City Water, Light & Power
CCR Impoundments – Lakeside and Dallman Ash Ponds
Springfield, Sangamon County, Illinois

Annual Consolidated Report

Year Ending December 31, 2025

January 2026

Submitted to:
Illinois Environmental Protection Agency
Bureau of Water
1021 North Grand Avenue East
Springfield, Illinois

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

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1. INTRODUCTION

Springfield City Water, Light and Power (CWLP) owns and operates two coal combustion residual (CCR) surface impoundments that are subject to the Illinois Environmental Protection Agency (IEPA) Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (35 Ill. Adm. Code 845). These impoundments are located north and east of the former Lakeside Power Generating Station and the Dallman Power Generating Station, within the eastern half of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1). The impoundments are identified as the Lakeside Ash Pond and the Dallman Ash Pond (see Figure 2).

The Lakeside Ash Pond was placed into service prior to 1958 and ceased receiving ash in 2009. It has been divided into four separate ponds—three lime sludge ponds and one settling pond—covering approximately 35.0 acres. The Lakeside Ash Pond formerly received lime sludge from the CWLP Drinking Water Purification Plant, scrubber wastewater treatment plant clarifier blowdown, and water from miscellaneous floor drains.

The Dallman Ash Pond was placed into service in 1976 and encompasses approximately 34.5 acres. The pond ceased receiving ash in 2021. Dallman Units 31, 32, and 33 were permanently shut down as of September 15, 2023.

Construction of the lime sludge processing area was completed in September 2023, at which time all CCR and non-CCR waste streams to the impoundments were discontinued. Although CWLP intended to initiate closure of the Lakeside and Dallman Ash Ponds upon completion of the lime sludge processing area, closure activities cannot commence until a closure construction permit is issued by the IEPA. CWLP submitted an Operating Permit Application to the IEPA on October 28, 2021, followed by a Construction Permit Application on February 1, 2022. CWLP has received IEPA comments on these applications and is currently in the process of addressing them.

The closure design and associated activities for the surface impoundments must comply with both 35 Ill. Adm. Code 845 and 40 CFR Part 257. Revisions to the closure plans may be required to align with pending determinations and approvals by the U.S. Environmental Protection Agency.

Pursuant to Section 845.550(a), the owner or operator of CCR surface impoundments is required to prepare an annual consolidated report. The following narrative provides the information required under this section.

2. ANNUAL CCR FUGITIVE DUST CONTROL REPORT

The Fugitive Dust Control Plan was developed by CWLP and last updated in January 2023. The Fugitive Dust Control Report for 2025 as defined in Section 845.500(c) is included as Attachment 1.

3. ANNUAL INSPECTION REPORT

The Annual Inspection Report was conducted and prepared by CWLP throughout 2025. The Annual Inspection Report as defined by Section 845.540(b) and accompanying certifications are included in Attachments 2 through 5.

3.1 Annual Hazard Potential Classification Certification

The Hazard Potential Classification was updated by Andrews Engineering, Inc. (Andrews) in January 2026. The Hazard Potential Classification as defined by Section 845.440 and accompanying certification are included as Attachment 2.

3.2 Annual Structural Stability Assessment Certification

The Structural Stability Assessment was updated by Andrews in January 2026. The Structural Stability Assessment Report as defined in Section 845.450 and accompanying certification are included as Attachment 3.

3.3 Annual Safety Factor Assessment Certification

The Safety Factor Assessment was updated by Andrews in January 2026. The Safety Factor Assessment Report as defined in Section 845.460 and accompanying certification are included as Attachment 4.

3.4 Inflow Design Flood Control System Plan Certification

The Inflow Design Flood Control System Plan was updated by Andrews and updated in January 2026. The Inflow Design Flood Control System Plan as defined in Section 845.510(c) and accompanying certification are included as Attachment 5.

4. ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

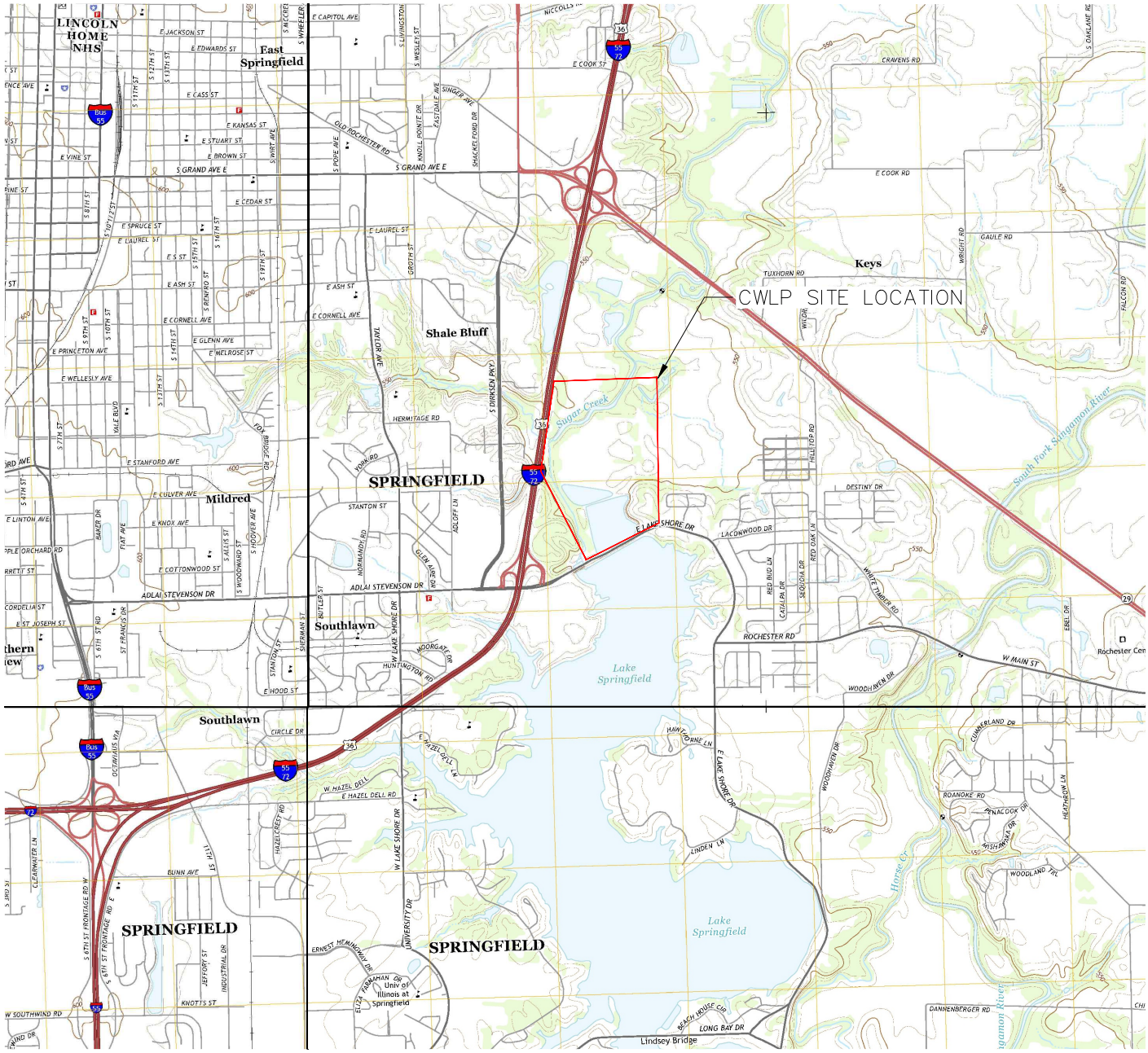
The Annual Groundwater Monitoring and Corrective Action Report was prepared by Andrews in January 2026. The Annual Groundwater Monitoring and Corrective Action Report is included as Attachment 6.

5. FACILITY RECORD

In addition to the submittal of the Annual Consolidated Report to the Illinois EPA, a copy of the Report will be placed in the facility's operating record.

FIGURES

J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2025\Annual Consolidation Report\Site Map.dwg Tab: Layout1



NOTE:
BACKGROUND IMAGE COURTESY OF
UNITED STATES GEOLOGICAL SURVEY.

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: MTH	DESIGNED BY: MTH	DRAWN BY: BCK

SITE LOCATION

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

DATE: DECEMBER 2025
PROJECT ID: 250289/0005
SHEET NUMBER:

FIG. 1

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NOTE

1. AERIAL IMAGE FROM APRIL 7, 2024, FROM GOOGLE EARTH.

LEGEND

- POND/LANDFILL BOUNDARY
- ACCESS ROADS
- IMPOUNDMENT BOUNDARY
- TEMPORARY ASSESSMENT WELL
- GROUNDWATER MONITORING WELL

N

0 250 500 1000

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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

DESIGNED BY: BJH | DRAWN BY: BCK | APPROVED BY: BJH

SITE FEATURES WITH CURRENT MONITOR WELL NETWORK

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

DATE: JANUARY 2026

PROJECT ID: 230339/0022

SHEET NUMBER:

FIG. 2

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Tab: FIGURE 2 NEW Last Saved: January 14, 2026, by Ben Korpus Plotted: Wednesday, January 14, 2026 11:28:08 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Site Plan Map.dwg

ATTACHMENTS

ATTACHMENT 1
CCR FUGITIVE DUST CONTROL REPORT

2025 Annual Fugitive Dust Control Report

For the

Dallman and Lakeside Coal Combustion Residuals Surface Impoundments and Landfill

City Water, Light and Power (CWLP)

Springfield, Illinois

Prepared by:

Environmental, Health & Safety, CWLP

January 2026

Introduction

Pursuant to the requirements of IAC Title 35 Part 845.500(c) and submitted in accordance with IAC Title 35 Part 845.550, CWLP must prepare an Annual CCR Fugitive Dust Control Report. This Report includes:

1. Description of actions taken to control CCR fugitive dust
2. Copies of the Quarterly Fugitive Dust Complaint Reports submitted under IAC Title 35 Part 845.500(b)(2)(B) during the reporting year

Description of Actions Taken to Control CCR Fugitive Dust

a) The paved roadway entrance to the facility shall be watered and/or swept as often as practicable to remove mud, dirt or similar debris. This is consistent with good engineering practice that consistently delivers satisfactory results and is a key component in the formal fugitive emission and control calculations as published by the EPA and is congruent with requirements found in the facility's Title V federal operating permit.

b) Fugitive dust emission reduction, roadway conditions, and employee safety concerns will limit vehicle speed to 10 mph on all roadways inside the facility. EPA emissions factors correlate vehicular speed with dispersed particulates. This engineering control is adequate as demonstrated by past experience and is consistent with the approach used to obtain federal air permits at the facility.

c) CCR storage piles maintain surface moisture sufficient to reduce wind-blown erosion and fugitive dust. Gypsum and ash have a moisture content of 10-20%. Industry-accepted methods for calculating fugitive particulate matter place great emphasis on the percent moisture of the material. With the moisture content so high given the nature of the product generation and transference, this is adequate to control fugitive emissions.

d) Material handlers operating inside the facility will exercise caution and care in CCR pile manipulation and loading procedures in order to minimize fugitive dust emissions. Good engineering practice to reduce the mechanical movement of CCR material with itself and with machinery demonstrates a commensurate reduction in fugitive dust.

e) During high wind events, material handlers will reduce or halt operations. Past experience has demonstrated that leaving piles undisturbed minimizes the possibility of entraining particulate material in the wind.

f) All haul trucks carrying wet CCR material from the Dallman generating station into the facility are not required to be covered due to the natural surface moisture content of the material. However, if the CCR material is handled dry in the future, then all haul trucks will be covered to reduce fugitive dust. Good practice and experience has shown that sheltering the CCR material from

airflow generated by the vehicular transference of material greatly reduces the entrainment of particulates in to the atmosphere.

g) In order to reduce roadway fugitive dust from the facility, a six foot concrete barrier wall has been constructed on the southeast side of the facility as a preventative measure. This barrier dissuades the movement of windborne material to disperse over and collect upon the roadway surface. In addition to the constructed wall mentioned above, the natural growth of vegetation within and surrounding the facility serves as a further control against roadway fugitive dust. Such an engineering practice is the industry standard for control as the above-ground fibrous vegetation creates a natural wind break while the root system anchors the CCR material in place.

Quarterly Fugitive Dust Complaint Reports

Quarterly Fugitive Dust Complaint Report

1st Quarter 2025

For the

Dallman and Lakeside Coal Combustion Residuals Surface Impoundments and Landfill

City Water, Light and Power (CWLP)

Springfield, Illinois

Prepared by:

Environmental, Health & Safety, CWLP

April 4, 2025

Introduction

Pursuant to the requirements of IAC Title 35 Part 845.500(b)(2)(A) and submitted in accordance with IAC Title 35 Part 845.500(b)(2)(B) , CWLP must prepare a Quarterly Coal Combustion Residuals (CCR) Fugitive Dust Citizen Complaint Report inclusive of the following information dating 14 days from the end of each quarter. Pursuant to the requirements of IAC Title 35 Part 845.500(c) the quarterly report will be included in the Annual CCR Fugitive Dust Report and placed in the Facility's operating record in accordance with IAC Title 35 Part 845.800(d)(14). This Report includes:

1. Date of citizen complaint
2. Date of the incident
3. Name and contact information of complainant if given
4. Summary of corrective measures taken

Description of Actions Taken to Control CCR Fugitive Dust

a) The paved roadway entrance to the facility shall be watered and/or swept as often as practicable to remove mud, dirt or similar debris. This is consistent with good engineering practice that consistently delivers satisfactory results and is a key component in the formal fugitive emission and control calculations as published by the EPA and is congruent with requirements found in the facility's Title V federal operating permit.

b) Fugitive dust emission reduction, roadway conditions, and employee safety concerns will limit vehicle speed to 10 mph on all roadways inside the facility. EPA emissions factors correlate vehicular speed with dispersed particulates. This engineering control is adequate as demonstrated by past experience and is consistent with the approach used to obtain federal air permits at the facility.

c) CCR storage piles maintain surface moisture sufficient to reduce wind-blown erosion and fugitive dust. Gypsum and ash have a moisture content of 10-20%. Industry-accepted methods for calculating fugitive particulate matter place great emphasis on the percent moisture of the material. With the moisture content so high given the nature of the product generation and transference, this is adequate to control fugitive emissions.

d) Material handlers operating inside the facility will exercise caution and care in CCR pile manipulation and loading procedures in order to minimize fugitive dust emissions. Good engineering practice to reduce the mechanical movement of CCR material with itself and with machinery demonstrates a commensurate reduction in fugitive dust.

e) During high wind events, material handlers will reduce or halt operations. Past experience has demonstrated that leaving piles undisturbed minimizes the possibility of entraining particulate material in the wind.

f) All haul trucks carrying wet CCR material from the Dallman generating station into the facility are not required to be covered due to the natural surface moisture content of the material. However, if the CCR material is handled dry in the future, then all haul trucks will be covered to reduce fugitive dust. Good practice and experience has shown that sheltering the CCR material from airflow generated by the vehicular transference of material greatly reduces the entrainment of particulates in to the atmosphere.

g) In order to reduce roadway fugitive dust from the facility, a six foot concrete barrier wall has been constructed on the southeast side of the facility as a preventative measure. This barrier dissuades the movement of windborne material to disperse over and collect upon the roadway surface.

h) In addition to the constructed wall mentioned above, the natural growth of vegetation within and surrounding the facility serves as a further control against roadway fugitive dust. Such an engineering practice is the industry standard for control as the above-ground fibrous vegetation creates a natural wind break while the root system anchors the CCR material in place.

All Citizen Complaints

There have been no citizen complaints registered in reference to fugitive dust from the Dallman and Lakeside CCR Surface Impoundments and Landfill. A copy of the Fugitive Dust Citizen Complaint Log is below;

Fugitive Dust Citizen Complaint Log								
Complaint Background Details				Received Dust Event Details				Summary of corrective measures taken
Date Received	Time Revived	Name Provided	Contact Information	Date Observed	Time Observed	Source and Location Description	Comments/Other	
No Complaints								

Summary of Corrective Measures Taken

There have been no additional corrective measures taken; however, CWLP continues to execute fugitive dust management practices in accordance with the Fugitive Dust Control Plan.

Quarterly Fugitive Dust Complaint Report

2nd Quarter 2025

For the

Dallman and Lakeside Coal Combustion Residuals Surface Impoundments and Landfill

City Water, Light and Power (CWLP)

Springfield, Illinois

Prepared by:

Environmental, Health & Safety, CWLP

July 2, 2025

Introduction

Pursuant to the requirements of IAC Title 35 Part 845.500(b)(2)(A) and submitted in accordance with IAC Title 35 Part 845.500(b)(2)(B) , CWLP must prepare a Quarterly Coal Combustion Residuals (CCR) Fugitive Dust Citizen Complaint Report inclusive of the following information dating 14 days from the end of each quarter. Pursuant to the requirements of IAC Title 35 Part 845.500(c) the quarterly report will be included in the Annual CCR Fugitive Dust Report and placed in the Facility's operating record in accordance with IAC Title 35 Part 845.800(d)(14). This Report includes:

1. Date of citizen complaint
2. Date of the incident
3. Name and contact information of complainant if given
4. Summary of corrective measures taken

Description of Actions Taken to Control CCR Fugitive Dust

a) The paved roadway entrance to the facility shall be watered and/or swept as often as practicable to remove mud, dirt or similar debris. This is consistent with good engineering practice that consistently delivers satisfactory results and is a key component in the formal fugitive emission and control calculations as published by the EPA and is congruent with requirements found in the facility's Title V federal operating permit.

b) Fugitive dust emission reduction, roadway conditions, and employee safety concerns will limit vehicle speed to 10 mph on all roadways inside the facility. EPA emissions factors correlate vehicular speed with dispersed particulates. This engineering control is adequate as demonstrated by past experience and is consistent with the approach used to obtain federal air permits at the facility.

c) CCR storage piles maintain surface moisture sufficient to reduce wind-blown erosion and fugitive dust. Gypsum and ash have a moisture content of 10-20%. Industry-accepted methods for calculating fugitive particulate matter place great emphasis on the percent moisture of the material. With the moisture content so high given the nature of the product generation and transference, this is adequate to control fugitive emissions.

d) Material handlers operating inside the facility will exercise caution and care in CCR pile manipulation and loading procedures in order to minimize fugitive dust emissions. Good engineering practice to reduce the mechanical movement of CCR material with itself and with machinery demonstrates a commensurate reduction in fugitive dust.

e) During high wind events, material handlers will reduce or halt operations. Past experience has demonstrated that leaving piles undisturbed minimizes the possibility of entraining particulate material in the wind.

f) All haul trucks carrying wet CCR material from the Dallman generating station into the facility are not required to be covered due to the natural surface moisture content of the material. However, if the CCR material is handled dry in the future, then all haul trucks will be covered to reduce fugitive dust. Good practice and experience has shown that sheltering the CCR material from airflow generated by the vehicular transference of material greatly reduces the entrainment of particulates in to the atmosphere.

g) In order to reduce roadway fugitive dust from the facility, a six foot concrete barrier wall has been constructed on the southeast side of the facility as a preventative measure. This barrier dissuades the movement of windborne material to disperse over and collect upon the roadway surface.

h) In addition to the constructed wall mentioned above, the natural growth of vegetation within and surrounding the facility serves as a further control against roadway fugitive dust. Such an engineering practice is the industry standard for control as the above-ground fibrous vegetation creates a natural wind break while the root system anchors the CCR material in place.

All Citizen Complaints

There have been no citizen complaints registered in reference to fugitive dust from the Dallman and Lakeside CCR Surface Impoundments and Landfill. A copy of the Fugitive Dust Citizen Complaint Log is below;

Fugitive Dust Citizen Complaint Log								
Complaint Background Details				Received Dust Event Details				Summary of corrective measures taken
Date Received	Time Revived	Name Provided	Contact Information	Date Observed	Time Observed	Source and Location Description	Comments/Other	
No Complaints								

Summary of Corrective Measures Taken

There have been no additional corrective measures taken; however, CWLP continues to execute fugitive dust management practices in accordance with the Fugitive Dust Control Plan.

Quarterly Fugitive Dust Complaint Report

3rd Quarter 2025

For the

Dallman and Lakeside Coal Combustion Residuals Surface Impoundments and Landfill

City Water, Light and Power (CWLP)

Springfield, Illinois

Prepared by:

Environmental, Health & Safety, CWLP

October 2, 2025

Introduction

Pursuant to the requirements of IAC Title 35 Part 845.500(b)(2)(A) and submitted in accordance with IAC Title 35 Part 845.500(b)(2)(B) , CWLP must prepare a Quarterly Coal Combustion Residuals (CCR) Fugitive Dust Citizen Complaint Report inclusive of the following information dating 14 days from the end of each quarter. Pursuant to the requirements of IAC Title 35 Part 845.500(c) the quarterly report will be included in the Annual CCR Fugitive Dust Report and placed in the Facility's operating record in accordance with IAC Title 35 Part 845.800(d)(14). This Report includes:

1. Date of citizen complaint
2. Date of the incident
3. Name and contact information of complainant if given
4. Summary of corrective measures taken

Description of Actions Taken to Control CCR Fugitive Dust

a) The paved roadway entrance to the facility shall be watered and/or swept as often as practicable to remove mud, dirt or similar debris. This is consistent with good engineering practice that consistently delivers satisfactory results and is a key component in the formal fugitive emission and control calculations as published by the EPA and is congruent with requirements found in the facility's Title V federal operating permit.

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f) All haul trucks carrying wet CCR material from the Dallman generating station into the facility are not required to be covered due to the natural surface moisture content of the material. However, if the CCR material is handled dry in the future, then all haul trucks will be covered to reduce fugitive dust. Good practice and experience has shown that sheltering the CCR material from airflow generated by the vehicular transference of material greatly reduces the entrainment of particulates in to the atmosphere.

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h) In addition to the constructed wall mentioned above, the natural growth of vegetation within and surrounding the facility serves as a further control against roadway fugitive dust. Such an engineering practice is the industry standard for control as the above-ground fibrous vegetation creates a natural wind break while the root system anchors the CCR material in place.

All Citizen Complaints

There have been no citizen complaints registered in reference to fugitive dust from the Dallman and Lakeside CCR Surface Impoundments and Landfill. A copy of the Fugitive Dust Citizen Complaint Log is below;

Fugitive Dust Citizen Complaint Log								
Complaint Background Details				Received Dust Event Details				Summary of corrective measures taken
Date Received	Time Revived	Name Provided	Contact Information	Date Observed	Time Observed	Source and Location Description	Comments/Other	
No Complaints								

Summary of Corrective Measures Taken

There have been no additional corrective measures taken; however, CWLP continues to execute fugitive dust management practices in accordance with the Fugitive Dust Control Plan.

Quarterly Fugitive Dust Complaint Report

4th Quarter 2025

For the

Dallman and Lakeside Coal Combustion Residuals Surface Impoundments and Landfill

City Water, Light and Power (CWLP)

Springfield, Illinois

Prepared by:

Environmental, Health & Safety, CWLP

January 2, 2026

Introduction

Pursuant to the requirements of IAC Title 35 Part 845.500(b)(2)(A) and submitted in accordance with IAC Title 35 Part 845.500(b)(2)(B) , CWLP must prepare a Quarterly Coal Combustion Residuals (CCR) Fugitive Dust Citizen Complaint Report inclusive of the following information dating 14 days from the end of each quarter. Pursuant to the requirements of IAC Title 35 Part 845.500(c) the quarterly report will be included in the Annual CCR Fugitive Dust Report and placed in the Facility's operating record in accordance with IAC Title 35 Part 845.800(d)(14). This Report includes:

1. Date of citizen complaint
2. Date of the incident
3. Name and contact information of complainant if given
4. Summary of corrective measures taken

Description of Actions Taken to Control CCR Fugitive Dust

a) The paved roadway entrance to the facility shall be watered and/or swept as often as practicable to remove mud, dirt or similar debris. This is consistent with good engineering practice that consistently delivers satisfactory results and is a key component in the formal fugitive emission and control calculations as published by the EPA and is congruent with requirements found in the facility's Title V federal operating permit.

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h) In addition to the constructed wall mentioned above, the natural growth of vegetation within and surrounding the facility serves as a further control against roadway fugitive dust. Such an engineering practice is the industry standard for control as the above-ground fibrous vegetation creates a natural wind break while the root system anchors the CCR material in place.

All Citizen Complaints

There have been no citizen complaints registered in reference to fugitive dust from the Dallman and Lakeside CCR Surface Impoundments and Landfill. A copy of the Fugitive Dust Citizen Complaint Log is below;

Fugitive Dust Citizen Complaint Log								
Complaint Background Details				Received Dust Event Details				Summary of corrective measures taken
Date Received	Time Revived	Name Provided	Contact Information	Date Observed	Time Observed	Source and Location Description	Comments/Other	
No Complaints								

Summary of Corrective Measures Taken

There have been no additional corrective measures taken; however, CWLP continues to execute fugitive dust management practices in accordance with the Fugitive Dust Control Plan.

ATTACHMENT 2

HAZARD POTENTIAL CLASSIFICATION ASSESSMENT AND ACCOMPANYING CERTIFICATION

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

Annual Hazard Potential Classification Assessment Report for Coal Combustion Residuals Surface Impoundments

January 2026

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

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4.4 Hazard Classification 3

5. STATEMENT 4

1. INTRODUCTION

City Water, Light and Power (CWLP) Lakeside Ash Pond and Dallman Ash Pond are coal combustion residuals (CCR) surface impoundments. An assessment of the hazard potential classification for the CCR surface impoundments was conducted as required by 35 IAC Part 845.440(a):

Andrews Engineering, Inc. (AEI) reviewed aerial maps and current hazard potential classification status information regarding the Lakeside Ash Pond and Dallman Ash Pond as part of this Annual Hazard Potential Classification Assessment. A summary of this information, as well as conclusions for the assessment is provided below.

2. CCR UNIT INFORMATION

Both the Lakeside Ash Pond and the Dallman Ash Pond are owned and operated by CWLP. The ponds are 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 original Lakeside Ash Pond has been divided into four separate ponds since it was expanded vertically in 1988, including three lime ponds and the settling pond. The vertical expansion consists of berms built on top and inside of the existing embankments. The current Lakeside Ash Pond is approximately 35 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 pursuant to the aforementioned NPDES permit.

3. CURRENT CLASSIFICATION

“Hazard potential classification" means the possible adverse incremental consequences that result from the release of water or stored contents due to failure of the diked CCR surface

impoundment or mis-operation of the diked CCR surface impoundment or its appurtenances. The hazardous potential classifications include Class 1 and Class 2, defined as follows:

A. Class 1 CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.

B. Class 2 CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

Based upon the hazard potential classification, both Lakeside and Dallman Ash Ponds are Class 2 CCR surface impoundments. In the event that either ash pond would fail, there is no probable loss of human life and would cause minimal economic loss or environmental damage.

4. CLASSIFICATION ANALYSIS

The following information was considered for the Annual Hazard Potential Classification Analysis of the CWLP surface impoundments performed by Karl Finke, PE, in January 2026.

4.1 Downstream Conditions

Both the Lakeside Ash Pond and Dallman Ash Pond are immediately adjacent to Sugar Creek. There are no homes, recreational facilities, businesses, roads, or other permanent structures immediately downstream of the impoundments. The floodplain area adjacent to the immediate downstream Sugar Creek is entirely comprised of agricultural fields and timber areas. The closest structures downstream along Sugar Creek from the ash ponds are a pedestrian bridge servicing the Lost Bridge Trail system at more than 4,000 feet downstream from Dallman Ash Pond, and a vehicle bridge for IL Route 29 at more than a mile downstream from Dallman Ash Pond.

4.2 Safety Factor Assessment

A Safety Factor Assessment was performed by Andrews for both the Dallman Ash Pond and Lakeside Ash Pond. This assessment included slope stability analyses for critical sections in the surface impoundments, including the constructed berms and underlying soils. Although there is a lack of construction records for the impoundments, conservative parameters derived from published literature, and current and previous geotechnical data from subsurface drilling and testing programs, and field surveys were used to assess factors of safety. The assessment concluded that all applicable factors of safety under 35 IAC 845.460 for both surface impoundments were exceeded by the results of these analyses.

4.3 Additional Information

The eastern portion of the original Lakeside Ash Pond is incised. The entire ash pond abuts the Lake Springfield dam to the south. The northern portion of the ash pond is separated by a

roadway from the Unit 1 landfill and the clarification pond. The only portions of the Lakeside Ash Pond with open downstream slopes are the west dike of the original ash pond and the vertical expansion berms, which were constructed on the east, west and north boundaries of the ash pond.

The entire Dallman Ash Pond is partially incised. Material from the center of the ash pond was excavated and utilized in the construction of the dikes. The Dallman Ash Pond abuts the CWLP landfills to the east and the clarification pond to the south. The only open downstream slopes of the Dallman Ash Pond are on the west and north dikes.

A stability analysis was performed by AEI in 2026 as part of the Annual Safety Factor Assessment. This analysis included a review of all of the subsurface studies performed up to present at the site. The geotechnical analysis relied upon the parameters primarily obtained during the 2023 through 2024 investigations while the site lithology relied upon all available data. Laboratory testing completed on all cohesive soil samples included analyses on: moisture content, in-place dry density, unconfined compressive strength, torvane, grain size analysis, Atterberg limits, and hydraulic conductivity.

The TSC analysis for Unit 2 included an evaluation of settlement and bearing capacity for the foundation, and mass stability for the various excavated and constructed slopes of the landfill. Both static and seismic conditions for short- and long-term scenarios were evaluated using the geologic data acquired from the aforementioned study. The safety factors resulting from these analyses exceeded all requirements for new solid waste landfills in Illinois under 35 Ill. Adm. Code 811.304.

The geologic characteristics at the site were determined via subsurface boring programs related to permitting and monitoring of the landfill units as well as the drilling conducted for the monitoring and geotechnical investigation that were implemented for the ash impoundments. The geologic characteristics were determined to be fairly consistent throughout the site. The structural characteristics of the soils also apply to the entire site, which includes the ash ponds.

4.4 Hazard Classification

Based on the information presented in this report, there is a low probability of a failure for either ash pond. In addition, there is a low probability of a failure to cause loss of life, and a failure would cause minimal economic loss or environmental damage. Therefore, both the Lakeside Ash Pond and Dallman Ash Pond qualify as "**Class 2 CCR Surface Impoundments**" under the qualifications described in 35 IAC 845.120.

5. STATEMENT

This Annual Hazard Potential Classification Assessment Report for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 35 IAC Part 845.440(a).

Karl W. Finke, P.E.

1/28/26
Date

Lic. Exp. 11/30/27

ATTACHMENT 3

STRUCTURAL STABILITY ASSESSMENT AND ACCOMPANYING CERTIFICATION

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

Annual Structural Stability Assessment for Coal Combustion Residuals Surface Impoundments

January 2026

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

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Appendix B: Annual Inspection Report for Coal Combustion Residuals Landfill

1. INTRODUCTION

City Water, Light and Power (CWLP) Lakeside Ash Pond and Dallman Ash Pond are coal combustion residuals (CCR) surface impoundments. An assessment of the structural stability for the CCR surface impoundments was conducted as required by 35 IAC 845.450(c).

The analysis presented herein for the Annual Structural Stability Assessment of the existing ash ponds at Springfield City Water, Light and Power (CWLP)—including the Lakeside and Dallman Ash Ponds, Springfield, Illinois—has been prepared in accordance with the requirements of 35 Ill. Adm. Code 845.450. Information reviewed for this report herein includes the following documents:

- Annual Inflow Design Flood Control System Assessment (January 2026)
- Annual Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments (January 2026)
- Periodic Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments (July 2025)
- Coal Ash Impoundment Site Assessment Final Report (May 2011)
- Historical Aerial Photographs (April 1995 – November 2025)
- Engineering Report: Proposed Embankment Modification; CWLP Ash Disposal Area (July 1987)
- Construction Grading Plan for the Dallman Ash Pond (August 1976)
- Annual Inspection Report for Coal Combustion Residuals Surface Impoundments (Appendix A)
- Annual Inspection Report for Coal Combustion Residuals Landfill (Appendix B)

2. CCR UNIT INFORMATION

Both the Lakeside Ash Pond and Dallman Ash Pond are owned and operated by CWLP and are managed 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. Following a vertical expansion in 1988, the original pond was divided into four separate ponds, including three lime ponds and a settling pond. The vertical expansion consisted of berms constructed on top of and within the existing embankments. The current Lakeside Ash Pond encompasses approximately 35.0 acres, ceased receiving ash in 2009, and ceased receiving lime sludge in October 2023.

The Dallman Ash Pond, a diked embankment impoundment placed into service around 1976, covers approximately 34.5 acres and ceased receiving ash in 2021. The pond is partially

incised, with material from the center excavated for use in dike construction. The Dallman Ash Pond abuts CWLP landfills to the east and the clarification pond to the south. Open downstream slopes exist only along the west and north dikes and between the landfills on the east.

Settled water from both the Lakeside and Dallman Ash Ponds flows into opposite sides of the Clarification Pond before discharge to Sugar Creek at Outfall 004 under the NPDES permit.

As of October 13, 2023, all CCR and non-CCR waste streams ceased flowing into the Lakeside and Dallman Ash Ponds.

3. SUBSURFACE CONDITIONS AT THE CCR IMPOUNDMENTS

The subsurface conditions in and surrounding the Lakeside and Dallman Ash Ponds have been characterized through multiple subsurface investigations, including the recently completed Periodic Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments (July 2025) and the Annual Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments (January 2026). The findings from these investigations were reviewed and incorporated into the structural stability analysis presented herein within the Annual Safety Factor Assessment.

4. DESIGN INFORMATION

Historically, Sugar Creek meandered across the site from west to east, with an overall flow direction to the north. During the construction of the Lakeside and Dallman Ash Ponds, the creek was abandoned and relocated to the west and north of the site. The former creek bed was subsequently filled and compacted during construction, preventing it from acting as a preferential groundwater or surface water pathway.

Prior to development, the upper soil layer at the site primarily consisted of brown, light brown, and brownish-gray silty clays and clayey silts of soft to stiff consistency. This included eolian (loess) deposits near the surface, isolated lenses of fine-grained silty to clayey sand at select locations, and alluvial silts and silty clays.

Construction plan drawings for the Dallman Ash Pond indicate that dikes were constructed over portions of the former creek bed. Notes on these drawings specify that the creek bed in these areas was over-excavated by at least 4.0 feet below the original channel banks and bottom. The excavations were subsequently filled with cohesive material and compacted to a minimum of 90 percent of the optimum density, as determined in accordance with AASHTO T-99 at optimum moisture.

5. SLOPE PROTECTION

5.1 Lakeside Ash Pond

Both the upstream and downstream slopes of the Lakeside Ash Pond are vegetated to protect against surface erosion. During the Annual Inspection, no significant signs of erosion were observed on any exterior slopes. An interior berm between the Lakeside Ash Pond and the West Settling Channel had localized erosion due to spring storms, which was repaired in spring 2025 using two-inch rock and #4 riprap. The repair remains sound and stable.

During weekly inspections from mid-April to mid-May, seeps were observed at the northeast corner of the Lakeside Ash Pond. These seeps are captured by the perimeter ditch, which drains to the Clarification Pond. No other visual indications of actual or potential structural weaknesses were identified during the Annual Inspection.

The Lakeside Ash Pond no longer receives process waters, with only limited surface water inflow. Due to the minimal surface water, wave action is negligible. The pond has been filled near capacity and is not susceptible to sudden drawdown.

5.2 Dallman Ash Pond

The downstream slope of the Dallman Ash Pond is vegetated to protect against surface erosion, and riprap has been placed along the lower portion of the slope. Any ruts or gullies observed on the downstream slopes are filled with soil and monitored during weekly inspections. During the Annual Inspection, no significant signs of erosion were observed on the downstream slopes, and weekly inspections prior to the Annual Inspection also did not reveal any notable erosion.

The Dallman Ash Pond no longer receives process waters and contains a reduced pool of shallow surface water, which does not adjoin the exterior embankments except along the Clarification Pond. With the limited surface water, wave action is minimal. The pond has been filled near capacity and is not susceptible to sudden drawdown.

6. DIKE COMPACTION

6.1 Documentation

6.1.1 Lakeside Ash Pond

No as-built construction documentation is available for the Lakeside Ash Pond. No construction plans are available for the original construction of the Lakeside Ash Pond. Construction plans for the upstream construction vertical expansion (Engineering Report: Proposed Embankment Modification; CWLP Ash Disposal Area, July 1987) do call for the expansion berms to be constructed by placing cohesive material in thin lifts of 6 to 8 inches and compacted. A

geotechnical investigation was performed on the dikes in October 2023 and found that in general the dikes were well compacted. In February 2024 a CPT investigation was conducted of the exterior of the dikes and within the ash ponds. In April/May 2024 an investigation within the ash ponds was conducted with a hollow stemmed auger for determination of the ash properties of pond liners.

6.1.2 Dallman Ash Pond

No as-built construction documentation is available for the Dallman Ash Pond. The construction plan drawings specify that dike materials should be compacted to "at least 90% of the minimum density at optimum moisture as determined by AASHTO T-99." A geotechnical investigation of the dikes conducted in October 2023 indicated that, overall, the dikes were well compacted. In February 2024, a cone penetration test (CPT) investigation was performed on the exterior of the dikes and within the ash ponds. Subsequently, in April and May 2024, a hollow-stem auger investigation was carried out within the ash ponds to characterize the properties of the pond liners.

6.2 Slope Stability Analyses

Slope stability analyses were conducted as part of both the initial and current Annual Safety Factor Assessments by Andrews Engineering, Inc. (AEI) for the Lakeside and Dallman Ash Ponds, utilizing the available geotechnical data for the site. The results indicate that both ponds meet or exceed the minimum factors of safety required by 35 IAC 845.460.

7. VEGETATED SLOPE HEIGHT

7.1 Lakeside Ash Pond

No as-built construction documentation is available for the Lakeside Ash Pond, and original construction plans are not available. Construction plans for the upstream vertical expansion (*Engineering Report: Proposed Embankment Modification; CWLP Ash Disposal Area, July 1987*) do not specify a thickness for the vegetated slope layer.

7.2 Dallman Ash Pond

No as-built construction documentation is available for the Dallman Ash Pond. The construction plan drawings specify that a 6-inch layer of seeded topsoil be placed on all upstream and downstream slopes.

8. SPILLWAYS/HYDRAULIC STRUCTURES

8.1 Lakeside Ash Pond

During the vertical expansion, an outlet structure was constructed through the northern berm of the Lakeside Ash Pond to drain into the adjacent Clarification Pond. The outlet consists of a 24-inch diameter reinforced concrete pipe (RCP) approximately 60 feet in length, bedded in compacted cohesive material with an anti-seep collar located roughly halfway through the berm. It has been reported that this outlet has been blocked by another pipe placed perpendicular to it, preventing drainage into the Clarification Pond.

Currently, the Lakeside Ash Pond operates under a temporary stormwater management plan due to the existing culvert being blinded in preparation for the planned closure and relocation of CCR material. Under this plan, stormwater from the Lakeside Ash Pond and Lime Pond 3 is pumped into the Clarification Pond until sufficient storage is available within the ponds to contain a 1,000-year storm event.

CWLP has rented a Pioneer PP66S12L71—a 75-horsepower, diesel-powered, variable-speed 6-inch automatic priming trash pump. Pump specifications and the pumping curve are provided in the Annual Inflow Design Flood Control System Assessment. An electronic water level indicator monitors the Lakeside Ash Pond and triggers an alarm if levels exceed 558 feet MSL. Upon alarm activation, staff are expected to start the pump within one hour.

8.2 Dallman Ash Pond

An outlet structure was constructed through the southern dike of the Dallman Ash Pond to convey flow to the adjacent clarification pond. The outlet consists of four 24-inch diameter corrugated metal pipes (CMP), each approximately 30 feet in length. The hydraulic performance of the outlet structures was evaluated using HY-8 and WinTR-20.

Limited information is available regarding the installation of the two older outlets; however, the outlet structure has been reported to be in structurally sound condition, with no observed evidence of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris accumulation. Two additional outlets were constructed in 2024 and were bedded in compacted cohesive material.

9. ADJACENT BODIES OF WATER

The Lakeside Ash Pond and the Dallman Ash Pond are located adjacent to the Clarification Pond, to the north and south, respectively. Sugar Creek borders both ash ponds to the west and also lies north of the Dallman Ash Pond. The initial Annual Safety Factor Assessments were performed by Andrews Engineering, Inc. (AEI) and evaluated the safety factors for both ponds under long-term, short-term, and seismic loading conditions.

10. OBSERVATIONS

As reported in the January 21, 2026, Annual Inspection Report, no significant signs of erosion were observed on any exterior slopes. Minor erosion was previously noted along an interior berm between the southwestern corner of the Lakeside Ash Pond and the West Settling Channel, where two-inch rock and No. 4 riprap were placed to stabilize the affected area following spring storm events. These repairs were completed in spring 2025 and remain sound and stable.

At the northeast corner of the Lakeside Ash Pond, seepage was observed and documented in the Weekly Inspection Reports dated April 16 through May 14. This condition is typical during periods of spring rainfall. The seepage is intercepted by a toe ditch and conveyed to the Clarification Pond. Since process flows to the Lakeside Ash Pond have ceased, seepage has been observed only following heavy spring rain events.

No other visual indications of actual or potential structural weaknesses, or conditions that could disrupt the operation or safety of the CCR units or associated appurtenant structures, were identified during any weekly inspections conducted over the past year. The 2026 Annual Inspection further states that "no structural issues were observed at any time during 2025, nor at the time of this inspection."

Additionally, a review of historical aerial photographs conducted as part of the Annual Inspection identified no indications of mass movement on any constructed berms associated with either surface impoundment.

11. STATEMENT

This Annual Structural Stability Assessment for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 35 IAC Part 845.450.

Karl W. Finke, P.E.

1/28/26
Date

LICENSED PROFESSIONAL ENGINEER
KARL W. FINKE
062.068571
STATE OF ILLINOIS

Lic. Exp. 11/30/27

APPENDIX A:
ANNUAL INSPECTION REPORT FOR COAL COMBUSTION RESIDUALS SURFACE IMPOUNDMENTS

Annual Inspection Report for Coal Combustion Residuals Surface Impoundments

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

January 2026

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Appendix A – Site Map
Appendix B – Annual Inspection Report

1. INTRODUCTION

City Water, Light and Power (CWLP) ash and lime ponds are coal combustion residuals (CCR) surface impoundments. An annual inspection was conducted as required by 40 CFR Part 257.83. This inspection included three items:

257.83(b)(1)(i) *A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., CCR unit design and construction information required by §§ 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under §§ 257.73(d) and 257.74(d), the results of inspections by a qualified person, and results of previous annual inspections);*

257.83(b)(1)(ii) *A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures; and*

257.83(b)(1)(iii) *A visual inspection of any hydraulic structures underlying the base of the CCR unit for structural integrity and continued safe and reliable operation.*

The following documents were reviewed:

- Weekly and monthly inspection results (October 2015 – December 2025)
- Historical Aerial Photographs and Contour Maps (April 1995 – November 2025)
- Construction grading plan for the Dallman Ash Pond (August 1976)
- (Lakeside) Ash Pond Embankment Modification Drawings (August 1987)

The visual inspections was performed on January 14, 2026. This report includes the results of the annual inspection (see Appendix B), as well as all information required under 40 CFR Part 257.84(b)(2).

2. BACKGROUND

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

The approximately 35.0 acre Lakeside Ash Pond (LAP) is primarily a diked embankment with some incising along the east perimeter and was placed into service prior to 1958. It was separated into four lime ponds, and a forty foot wide channel at the west border, that received sluiced Lakeside Ash. LAP ceased receiving ash in 2009. Until September 2023, two of lime ponds were active and two inactive. The channel at the west border, received Lakeside Ash until 2009 and from November 2022 until April 2023 it received sludge blowdown from the Generating Facilities Wastewater Treatment Plant. As of September 2023, LAP ceased receiving all flows and materials.

The second impoundment, the Dallman Ash Pond (DAP), which is a diked embankment, was

placed into service in approximately 1976 and is approximately 34.5 acres. Fly ash and bottom ash were sluiced to the Dallman Ash Pond with raw lake water. With the closure of the Dallman Generating Units 31, 32, and 33, the pond no longer receives ash.

Storm runoff collected by both the DAP and LAP flow into opposite sides of a Clarification Pond before being discharged to Sugar Creek at Outfall 004.

3. GEOMETRY OF THE STRUCTURES

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. The vertical expansion berms are approximately ten feet in height.

A site map drawing containing an aerial photograph and approximate boundaries for all of the CWLP CCR Units, including the ash and lime ponds, is provided in Appendix A.

This report documents the annual inspection required under 40 CFR 257.83(b)(4)(ii). There are no apparent structural movements or deformations, nor is there any apparent reduction of the structural integrity of the facility.

4. INSTRUMENTATION

In May of 2024, four piezometers were installed in both CCR Units. Monthly potentiometric readings are recorded for the groundwater at each piezometer.

In March 2025, CWLP advanced five additional borings in Lakeside Ash Pond and 7 additional borings in Dallman Ash Pond in order to set monitoring wells with screen intervals closer to the surface of the impoundments.

In July 2025, as part of the Dallman Ash Pond dewatering design and pilot testing, CWLP installed a 24-inch diameter well screened from the base of the impoundment to within 12 feet of the surface. Three additional piezometers were installed in Dallman Ash Pond to supplement the existing well network in measuring draw down levels during the pilot testing. All of the wells/piezometers installed in Lakeside Ash Pond and Dammlan Ash Pond are measured on a monthly basis for potentiometric surface mapping.

5. POND DEPTHS AND ELEVATIONS

On January 14, 2026, there was no visible surface water within the Lakeside Ash Pond and Lime Ponds. The ground elevation within the ponds varied from 552.00 to 578.00. The berms of the pond are at elevation 565.00

On January 14, 2026, the Dallman Ash Pond had a measured water surface elevation of 557.02. Water only covered about 50 square feet of surface area. The ground elevation within the ponds varied from 556.00 to 577.00.

6. STORAGE CAPACITIES

The Lakeside Ash Pond and Lime Ponds have a combined approximate storage capacity of 1,330,000 cubic yards. The Dallman Ash Pond has an approximate storage capacity of 1,500,000 cubic yards.

7. VOLUMES

The Lakeside Ash Pond and Lime Ponds have a combined approximate impounded water volume of 900 cubic yards, and an approximate impounded CCR volume of 1,144,900 cubic yards. The Dallman Ash Pond has an approximate impounded water volume of 1,400 cubic yards, and an approximate impounded CCR volume of 1,175,820 cubic yards.

8. STRUCTURAL CONDITION OF CCR UNITS

Visual inspections of the CCR units are performed on a weekly basis in accordance with 40 CFR 257.83(a)(1)(i) for the purpose of identifying appearances of actual or potential structural weaknesses and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR units or appurtenant structures.

In reports from the previous years, it was noted that signs of erosion had been periodically observed on the north and west outer berms of the Dallman Ash Pond in the forms of ruts and gullies that typically range from 6 – 24 inches deep. The erosion appeared to be caused by storm water flow collecting at points along the top of the berm before flowing down the outer slope in concentrated streams. Erosion of similar severity was discussed in the 2011 Site Assessment Final Report, which recommended that the erosion be repaired on an as-needed basis. In the fall of 2017, the tops of the berms of the Dallman Ash Ponds were regarded with a cross slope of approximately 1/4" per foot inward towards the ponds. This has allowed the rain water to be contained in the ponds and to not cause erosion on the slopes.

As previously reported, indications of seepage have been observed on outer berms of the Lakeside Ash Pond and lime ponds, between the top of the original pond berms and the vertical expansion berms. These range from staining or dampness to areas with noticeable drainage. Signs of seepage have been observed along the west berm, as well as isolated portions on the east and west portions of the north berm of the Lakeside Ash Pond. This seepage is discussed in the 2011 Site Assessment Final Report. During the fall of 2017, two 8" diameter perforated dual wall HDPE drain pipes were installed underneath the toe of the slope of the vertical extension. The water from these drain tiles outlets into the Clarification Pond. In July and August of 2019, lime removal was executed in the cannel on the west side of the Lakeside Ash Pond. Shortly after, the seepage was again visible at the vertical expansion joint. After a few weeks, the berm self-sealed. Only once during 2020 was seepage observed at the vertical expansion joint. In 2021, seepage was visible for a few weeks when the west lime pond was put into service. In the Summer of 2022 and again in the Winter of 2023, the north berm of the Lakeside Ash Pond was cleared of all brush and woody plants; multiple animal dens were filled and compacted. A couple of those were required to be refilled and recompacted. Two animal dens were also filled and compacted along this berm in January 2024. In 2024, similar minor events involving animal dens and seepage occurred. The dens were destroyed and filled and the seepage was directed to the Clarification Pond. The seepage only occurred after heavy spring rains.

No other visual indications of actual or potential structural weaknesses and other conditions that are disrupting or have the potential to disrupt the operation or safety of the CCR unit or appurtenant structures have been observed for the CCR units during any of the weekly inspections over the past year. Based on the review of historical aerial photographs, there were no observed indications of mass movement on any of the constructed berms for either unit.

9. OTHER CHANGES

In July of 2021, CWLP suspended the operation of Dallman Unit 33 and started the process of permanent plant retirement. CWLP no longer sluices fly ash and bottom ash to the Dallman Ash Pond.

In May of 2022, the discharge for the sump that collects surface water from the flood plain between the Lakeside Ash Pond and the Sugar Creek was diverted from the Dallman Ash Pond to report directly to the Clarification Pond.

In August of 2022, the leachate piping from Landfill #2 was diverted to from the Dallman Ash Pond to report directly to the Clarification Pond.

In November of 2022, the Generating Facilities Wastewater Treatment Plant clarifier blowdown was diverted from the Dallman Ash Pond to report directly to the southwest corner of the Lakeside Ash Pond.

In April of 2023, the Generating Facilities Wastewater Treatment Plant clarifier blowdown was diverted from the southwest corner of the Lakeside Ash Pond to the Water Purification Plant Sludge Tank, which flows to the new Lime Ponds.

In September of 2023, the lime sludge from the Water Purification Plant was rerouted to a new facility. At that time, the Lakeside Ash Pond ceased receiving all waste streams and materials.

In July of 2024, a dual run of 24-inch diameter pipe was installed, next to the existing run, to help drain the Dallman Ash Pond into the Clarification Pond. In October of 2024, a dual run of 24-inch diameter pipe was installed in the haul road in the middle of the Dallman Ash Pond. Both runs were installed to accommodate a 1,000 year storm.

In November and December of 2025, grading of the material within the Dallman Ash Pond began. This was done in anticipation of the required interim measures for the Ash Pond Closure.

10. STATEMENT

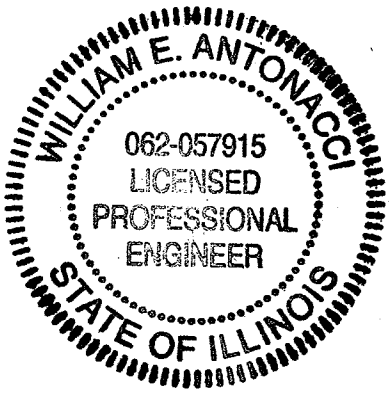
This annual inspection of the CWLP CCR surface impoundments was completed in accordance with the requirements under 40 CFR Part 257.83.

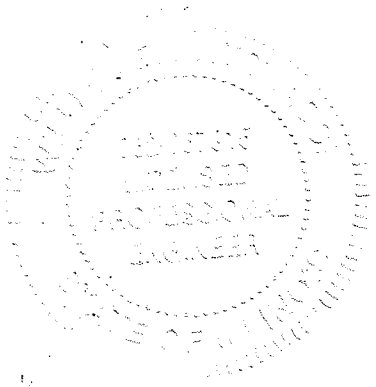
William E. Antonacci

William E. Antonacci, P.E.

1/21/2026

Date





APPENDIX A

Site Map

J:\S\Springfield CWLP\CWLP\dwg\PONDS.dwg Tab: FIG 2 Last Saved: January 13, 2016, by Mike Nguyen Plotted: Wednesday, January 13, 2016 9:25:34 AM

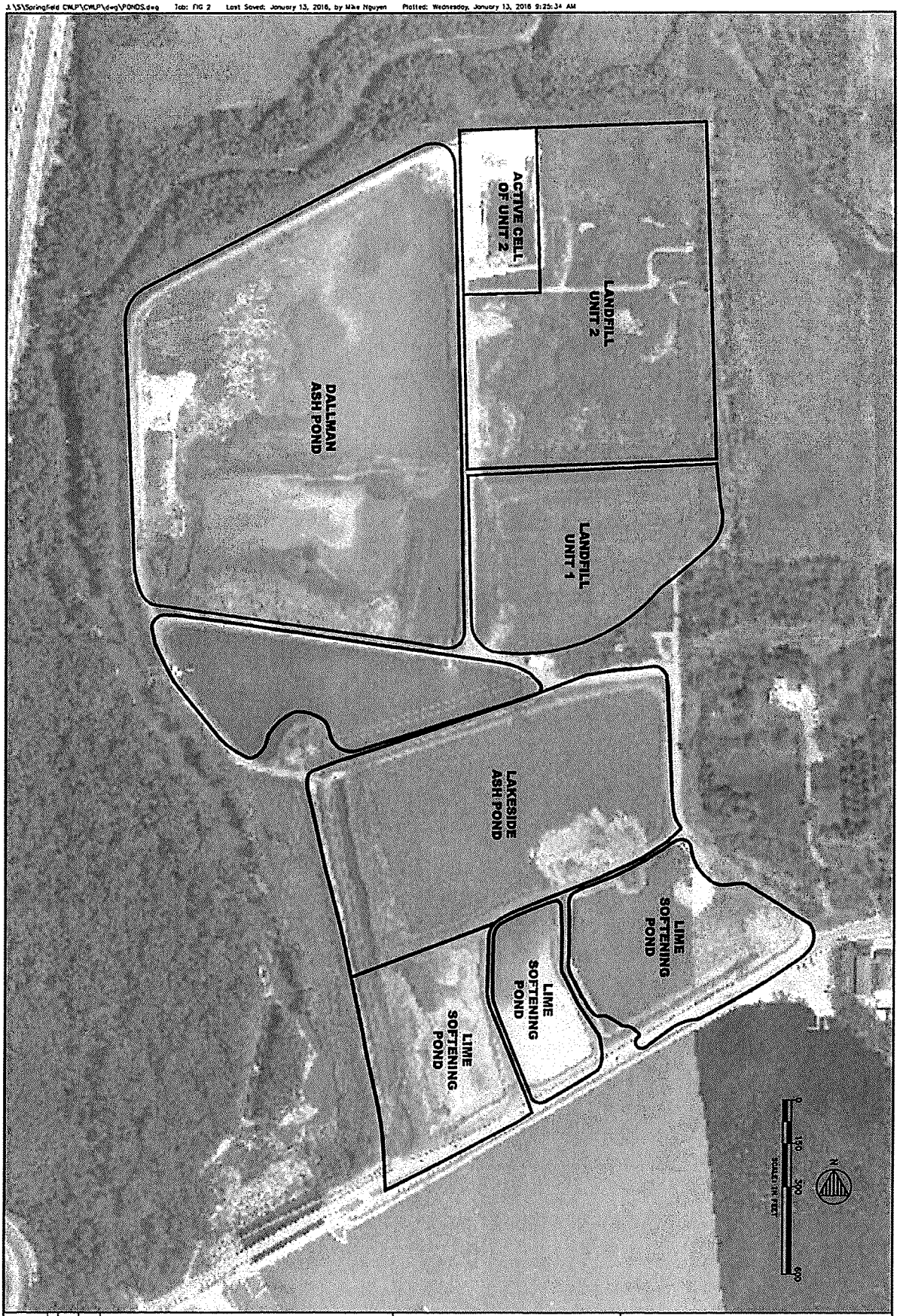


FIG. 1

CWLP COAL RESIDUAL COMBUSTION UNITS

PLANS PREPARED FOR

CITY, WATER, LIGHT & POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2016

PROJECT #: 150077/0011

SHEET NUMBER:

ANDREWS ENGINEERING, INC.
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 FAX (217) 787-9495
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WASHINGTON, MO
PROFESSIONAL DESIGN ENGINEERING AND LAND SURVEYING FIRM #184001341

APPROVED BY: PWV | DESIGNED BY: PWV | DRAWN BY: MPN

REVISIONS			
NO.	DATE	DESCRIPTION	BY

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APPENDIX B

Annual Inspection Report

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Date 1-14-26 Time 12:30 PM

Inspector(s) / Position: BILL ANTONACCI

Site Conditions:

Sky: CLOUDY Ground Moisture: DRY/DAMP IN SPOTS Temperature: 45° F Precipitation: NONE

Berms – Landfill Unit 2:

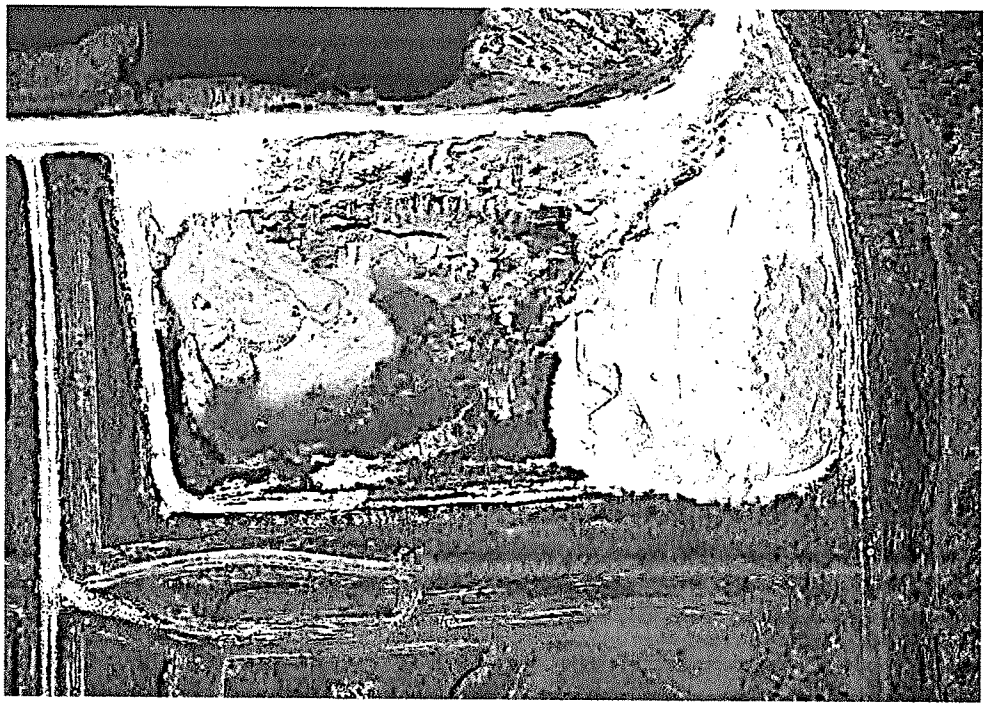
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Dallman Ash Pond

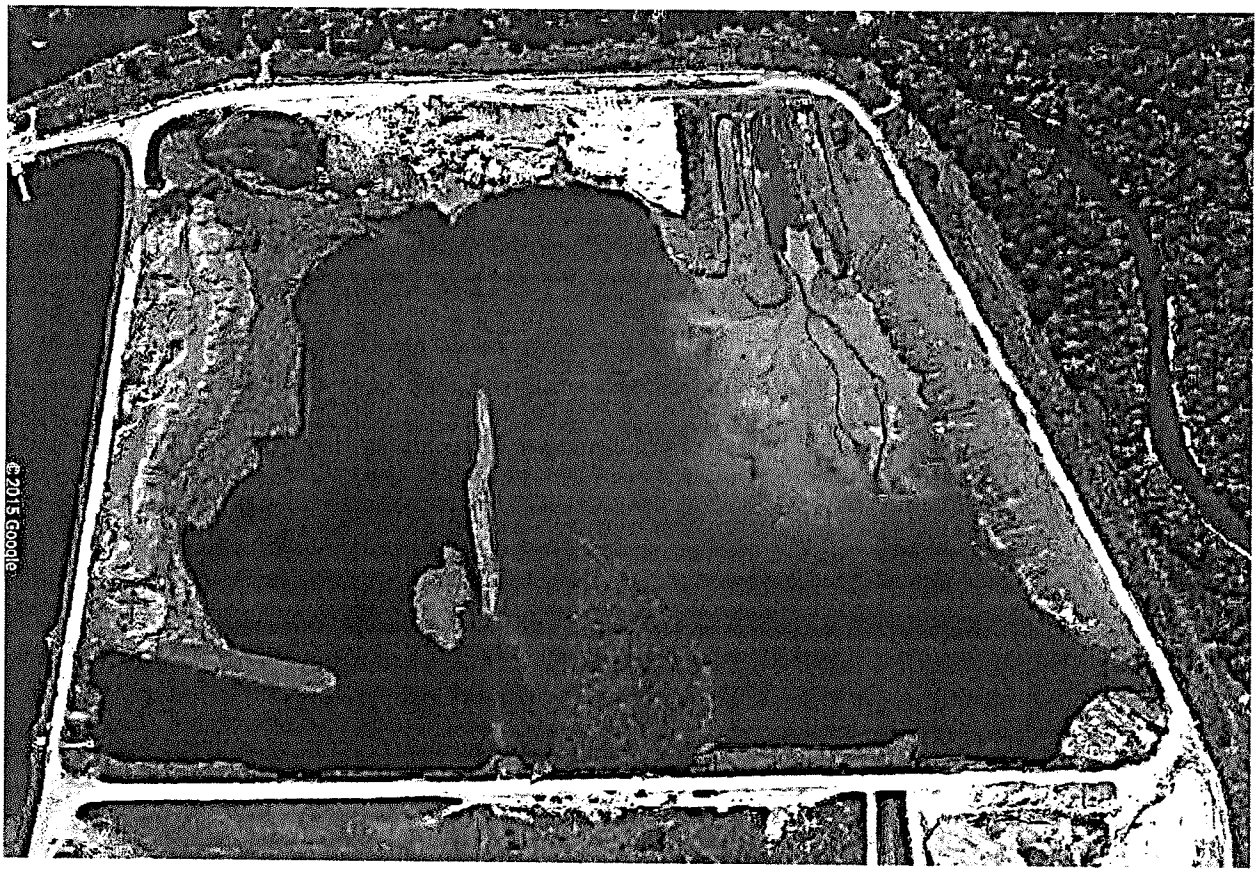
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Lakeside Ash Pond

Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Lime Softening Ponds

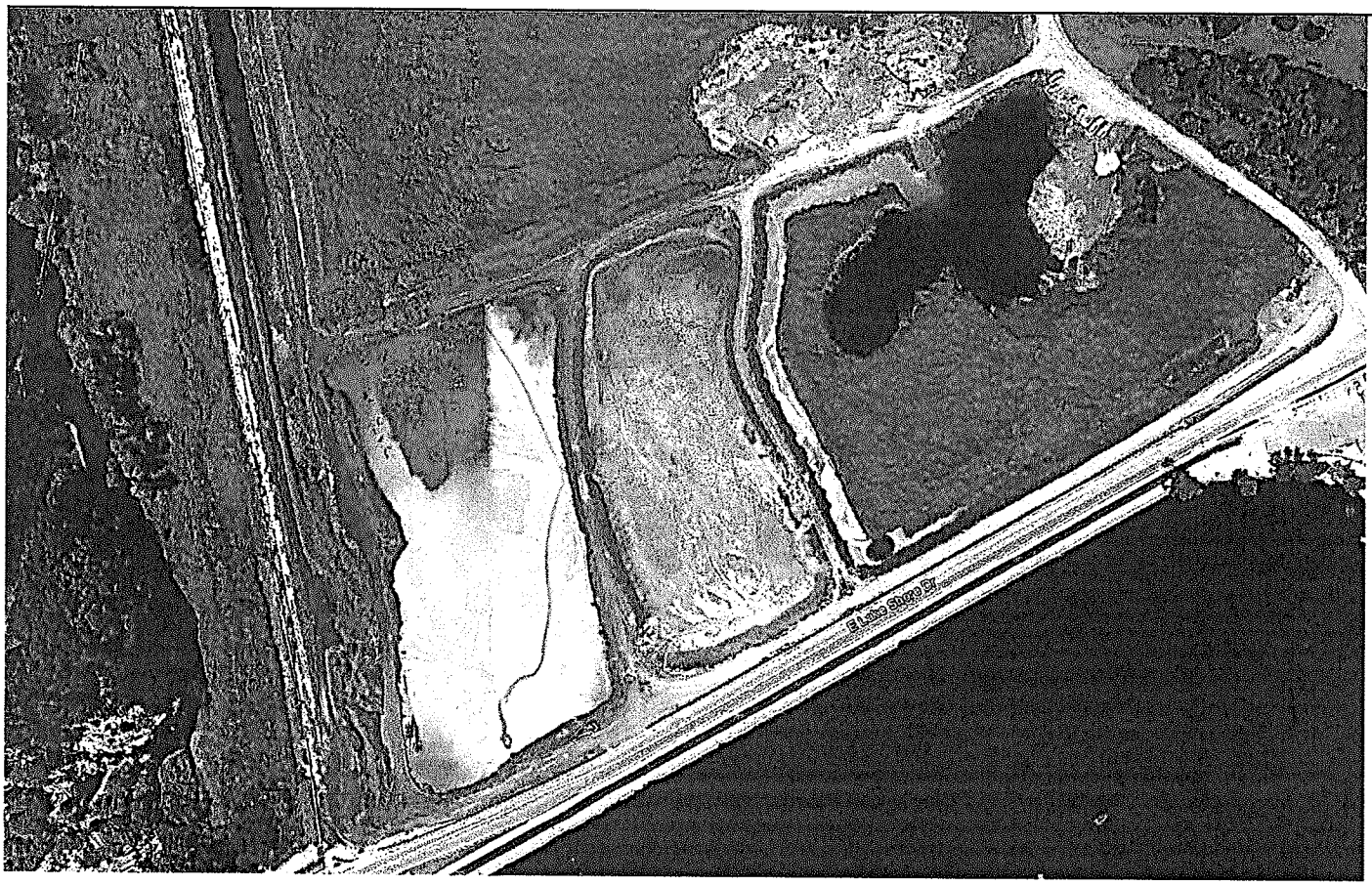
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Areas of Previous Repair(s):

Location: SW Corner of Lakeside Ash Pond, TOP OF BERM

Description of Repair: 2" Rock and RR #4 were used to fill in and stabilize rain runoff in the top of the berm. The repair was done in the Spring of 2025. The repair is still sound and stable.

Effectiveness of Repair:

- ☒ Problem completely remedied
- ☐ Problem partially remedied (explain below):
- ☐ Problem not remedied (explain below):

- ☐ Progression of trouble into new area (explain):

Areas of Previous Repair(s):

Location:

Description of Repair:

Effectiveness of Repair:

- ☐ Problem completely remedied
- ☐ Problem partially remedied (explain below):
- ☐ Problem not remedied (explain below):

- ☐ Progression of trouble into new area (explain):

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Additional Notes:

At the NE Corner of the Lakeside Ash Pond, seeps were observed as noted in the Weekly Inspection Reports of April 16 - May 14. This is typical as a result of Spring Rains. The seeps are collected by a ditch in the toe of the slope. The water then reports to the Clarification Pond. No structural issues were observed at any time during 2025 nor at the time of this inspection.

APPENDIX B:
ANNUAL INSPECTION REPORT FOR COAL COMBUSTION RESIDUALS LANDFILL

Annual Inspection Report
for
Coal Combustion Residuals Landfill

City Water, Light & Power
FGDS Disposal Facility- Unit 2
Springfield, Sangamon County, Illinois

January 2026

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4. APPROXIMATE VOLUME OF CONTAINED CCR....2
5. STRUCTURAL CONDITION OF CCR UNIT....2
6. OTHER CHANGES....3
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APPENDICES

Appendix A – Site Map
Appendix B – Annual Inspection Report

1. INTRODUCTION

City Water, Light and Power (CWLP) Flue Gas Desulfurization Sludge (FGDS) Development Landfill was issued Permit No. 1995-243-LFM on November 9, 1995. The active areas of Unit 2 have been developed and operated pursuant to the initial permit and subsequent permit modifications. Unit 2 is a non-hazardous special waste landfill that receives coal combustion residuals (CCR) .

An annual inspection was conducted as required by 40 CFR Part 257.84. This inspection included two items:

257.84(b)(1)(i) *A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and*

257.84(b)(1)(ii) *A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.*

Unit 1 Landfill, which was filled to capacity and closed in February 1993, is not included in this report. Since the landfill ceased receiving CCR prior to October 19, 2015, the above items are not applicable to the Unit 1 landfill as specified under 40 CFR Part 257.50(d).

The following documents were reviewed:

- Engineering Design Drawings (August 1976 – January 2017)
- Phase 1 – Cell 3 Construction Report for the (CWLP) FGDS Landfill (September 1993)
- Weekly and Monthly Inspection Reports (October 2015 – December 2025)
- Historical Aerial Photographs and Contour Maps (April 1995 – November 2025)
- CCR Landfill Location Restrictions – Unstable Areas (March 2024)

The visual inspections were performed on January 14, 2026. This report includes the results of the annual inspection (see Appendix B), as well as all information required under 40 CFR Part 257.84(b)(2).

2. BACKGROUND

The CWLP Flue Gas Desulfurization Sludge (FGDS) Disposal Facility – Unit 2, is an existing CCR landfill located in the City of Springfield, Sangamon County, Illinois. The landfill is used for the disposal of on-site generated flue gas desulfurization sludge, bottom ash, fly ash, lime sludge and other minor waste water treatment sludge.

The CCR landfill consists of 22.3 acres of disposal area divided into two units. The "in-place" net disposal capacity is estimated at 1,162,275 cubic yards, excluding daily, intermediate, and final cover, as well as protective soils. The maximum final elevation shall be approximately 608 feet above mean sea level.

CWLP has been permitted by the Illinois Environmental Protection Agency to landfill materials generated from power plant and water treatment activities into the CCR landfill since 1980. In February 1993, Unit 1 was filled to capacity and closed in accordance with 35 Illinois Administrative Code (Ill. Adm. Code) 807 regulations. The Unit 1 final cover system consists of a three-foot thick recompacted clay liner underlying a three-foot thick vegetative layer. Unit 2 was modified to meet the applicable requirements of 35 Ill. Adm. Code Parts 811 and 812 via Permit No. 1995-243-LFM.

In 2024, disposal to the landfill of Solids from the Generating Facilities Wastewater Treatment Plant began. Less than 1,000 cubic yards annually is expected.

3. GEOMETRY OF THE STRUCTURE

At the time of the inspection, one cell of Unit 2 has been constructed and is currently the only active portion of the CCR landfill. The active cell, which is approximately 3.5 acres, is rectangular and is located in the northwest portion of Unit 2. The constructed wall sections of Unit 2 bound the cell to the north and west. Constructed containment berms bound the cell to the east and south. A site map drawing containing an aerial photograph and approximate boundaries for all of the CWLP CCR Units, including Unit 2 and the active cell, can be found in Appendix A.

No changes to the geometry of the structure have been made since the initial construction of the active cell of the CCR landfill.

4. APPROXIMATE VOLUME OF CONTAINED CCR

The approximate volume of CCR contained in the unit at the time of the inspection is 94,700 cubic yards.

5. STRUCTURAL CONDITION OF CCR UNIT

The Report of Stability Analysis documents a detailed foundation and mass stability study, which was conducted prior to the approval of design and construction of the CCR landfill. The analysis considered site materials and design components and was compared to the minimum standards stated in 35 Ill. Adm. Code 811.304. These standards require that:

- The foundation of the landfill has sufficient strength to support the weight of the landfill and that loading will not cause a failure of the liner or leachate collection system;
- Settlement caused by the weight of the landfill will not cause a failure of the liner or leachate collection system;
- The landfill is designed to achieve the applicable safety factors against bearing capacity failure;
- The landfill is designed to achieve the applicable safety factors against slope failures;
- All applicable safety factors are met at both short and long term conditions; and

- The potential for earthquake or blast induced liquefaction is considered in regards to the stability and integrity of the landfill as well as to features outside of the landfill that could affect the landfill.

It was determined by the study that the minimum safety factors were exceeded for bearing capacity and slope stability for both short- and long-term conditions. Loading was not expected to cause failure of the liner or leachate collection system. Seismic risk was determined to be negligible for the site location.

Settlement was determined to be expected under the full weight of the landfill. However, it was determined that a properly constructed compacted clay liner would not fail under the expected settlement conditions, nor would settlement cause structural failure to the leachate collection piping. It was recommended that leachate collection points be located in the area of greatest expected settlement in order to mitigate the effects on the leachate collection process.

Visual inspections of the CCR landfill are performed on a weekly basis in accordance with 40 CFR 257.84(a)(1)(i) for the purpose of identifying appearances of actual or potential structural weaknesses and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit. No visual indications of any such items have been observed for the CCR landfill during any of the weekly inspections over the past year.

The CCR Landfill Location Restrictions – Unstable Areas report prepared in 2024 included a Breakthrough, Pillar and Floor Failure Analysis and found any underground coal mine pillars would support the site with a safety factor exceeding 1.5.

6. OTHER CHANGES

No changes to the exterior berms of the facility have been made that would affect the stability or operation since the initial construction of the active cell of the CCR landfill.

In September of 2024, the south interior waste berm and southern half of the east interior waste berm were raised to match the northern half of the east interior waste berm.

7. STATEMENT

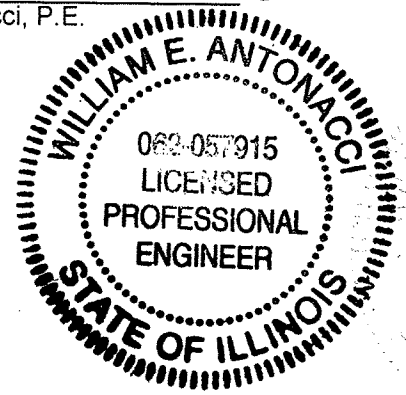
This annual inspection of the Unit 2 CCR landfill was completed in accordance with the requirements under 40 CFR Part 257.84.

William E. Antonacci

William E. Antonacci, P.E.

1/21/2026

Date



APPENDIX A

Site Map

J:\S\Springfield CWLP\CWLP\dwg\PONDS.dwg Tab: FIG 2 Last Saved: January 13, 2016, by Mike Nguyen Plotted: Wednesday, January 13, 2016 9:25:34 AM

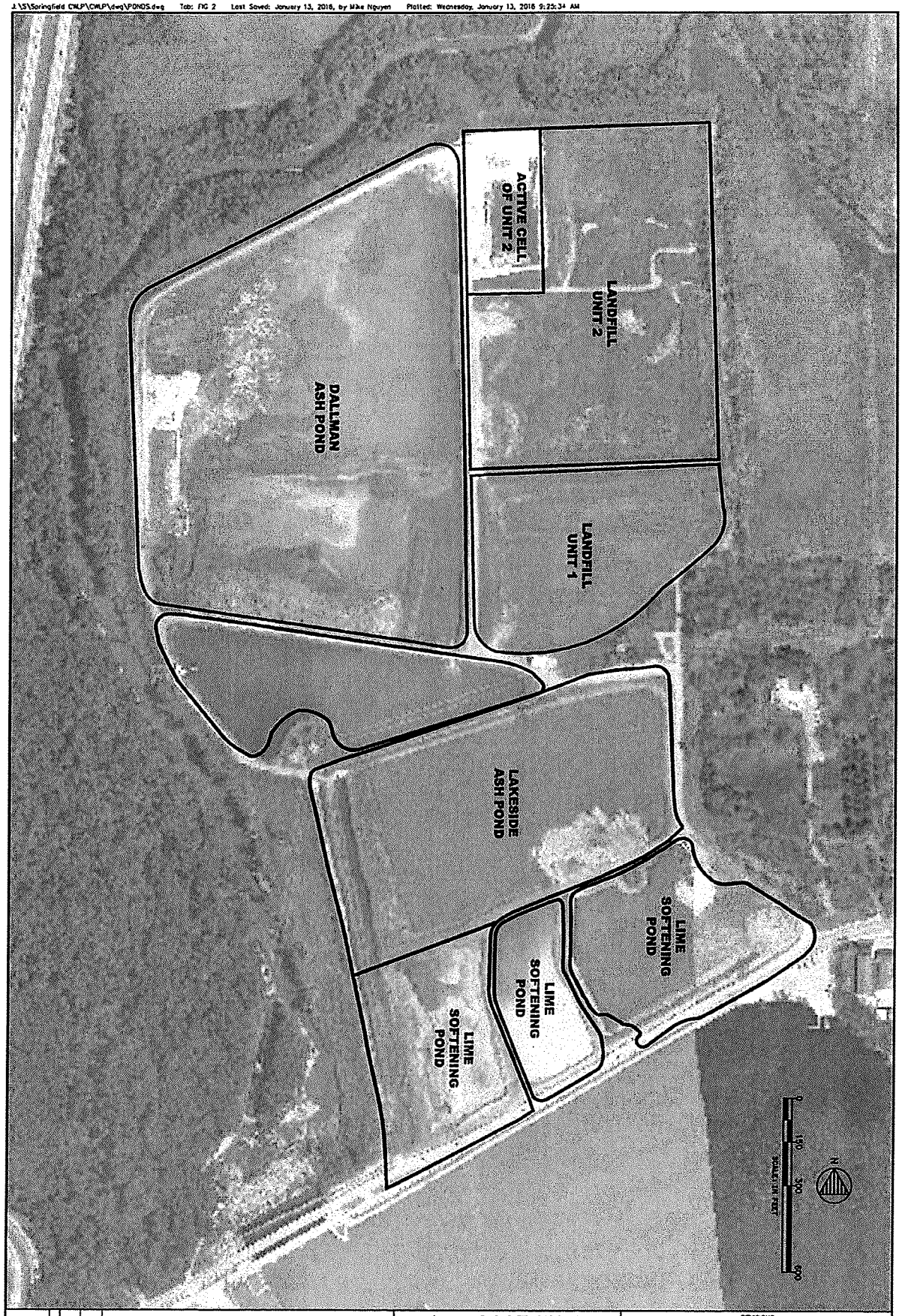


FIG. 1

CWLP COAL RESIDUAL COMBUSTION UNITS

PLANS PREPARED FOR

CITY, WATER, LIGHT & POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2016

PROJECT #: 15001/1001

SHEET NUMBER:

ANDREWS ENGINEERING, INC.
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 FAX (217) 787-9495
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WASHINGTON, MO
PROFESSIONAL DESIGN ENGINEERING AND LAND SURVEYING FIRM #184-001541

APPROVED BY: PMV | DESIGNED BY: PMV | DRAWN BY: MPH

NO.	DATE	REVISIONS DESCRIPTION	BY

© 2016 Andrews Engineering, Inc.

APPENDIX B

Annual Inspection Report

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Date 1-14-26 Time 12:30 PM

Inspector(s) / Position: BILL ANTONACCI

Site Conditions:

Sky: CLOUDY Ground Moisture: DRY/DAMP IN SPOTS Temperature: 45°F Precipitation: NONE

Berms – Landfill Unit 2:

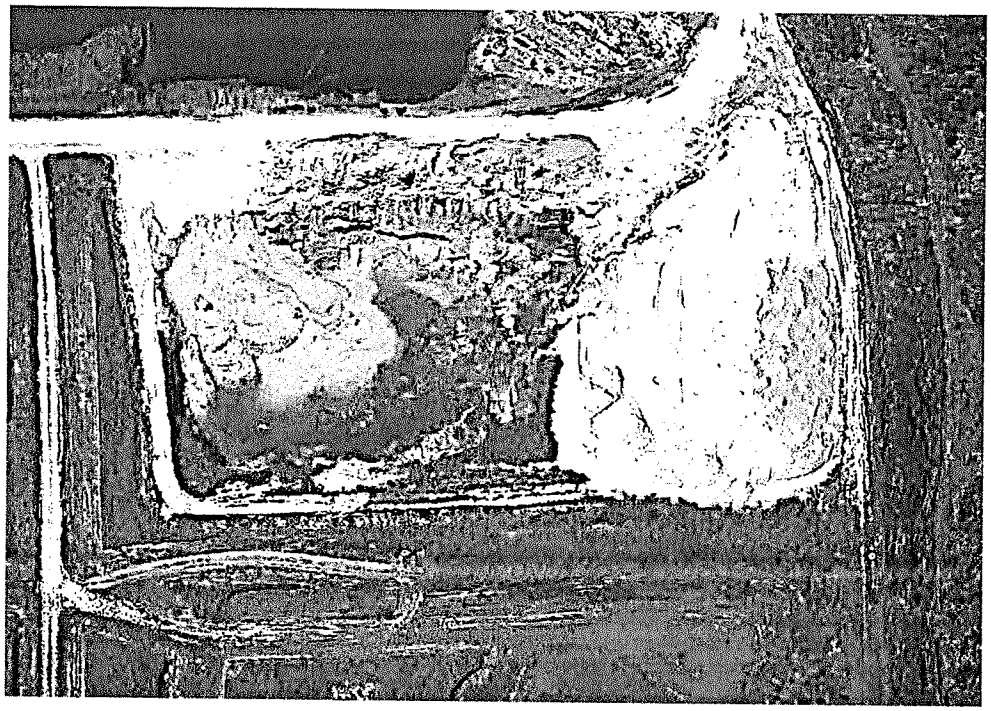
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Dallman Ash Pond

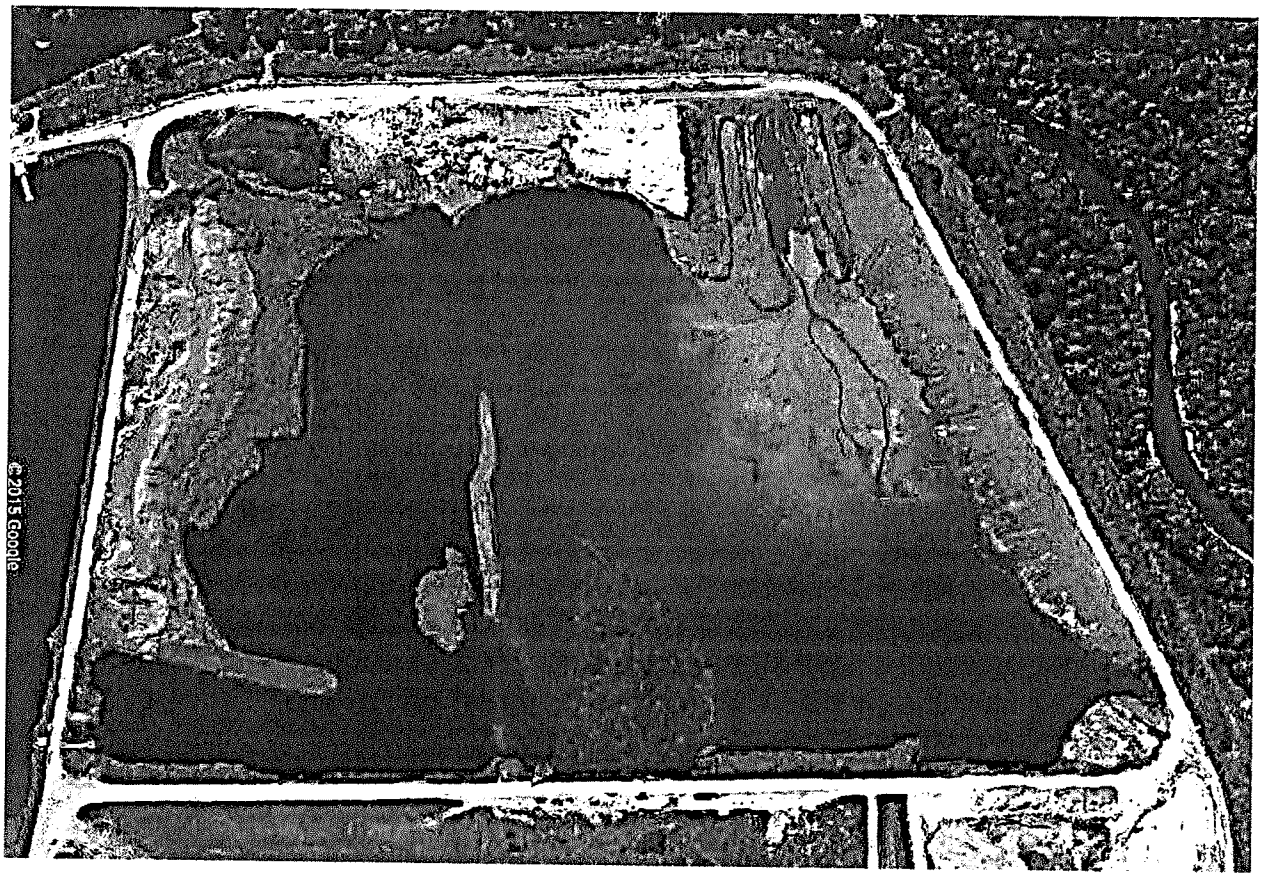
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Lakeside Ash Pond

Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Berms – Lime Softening Ponds

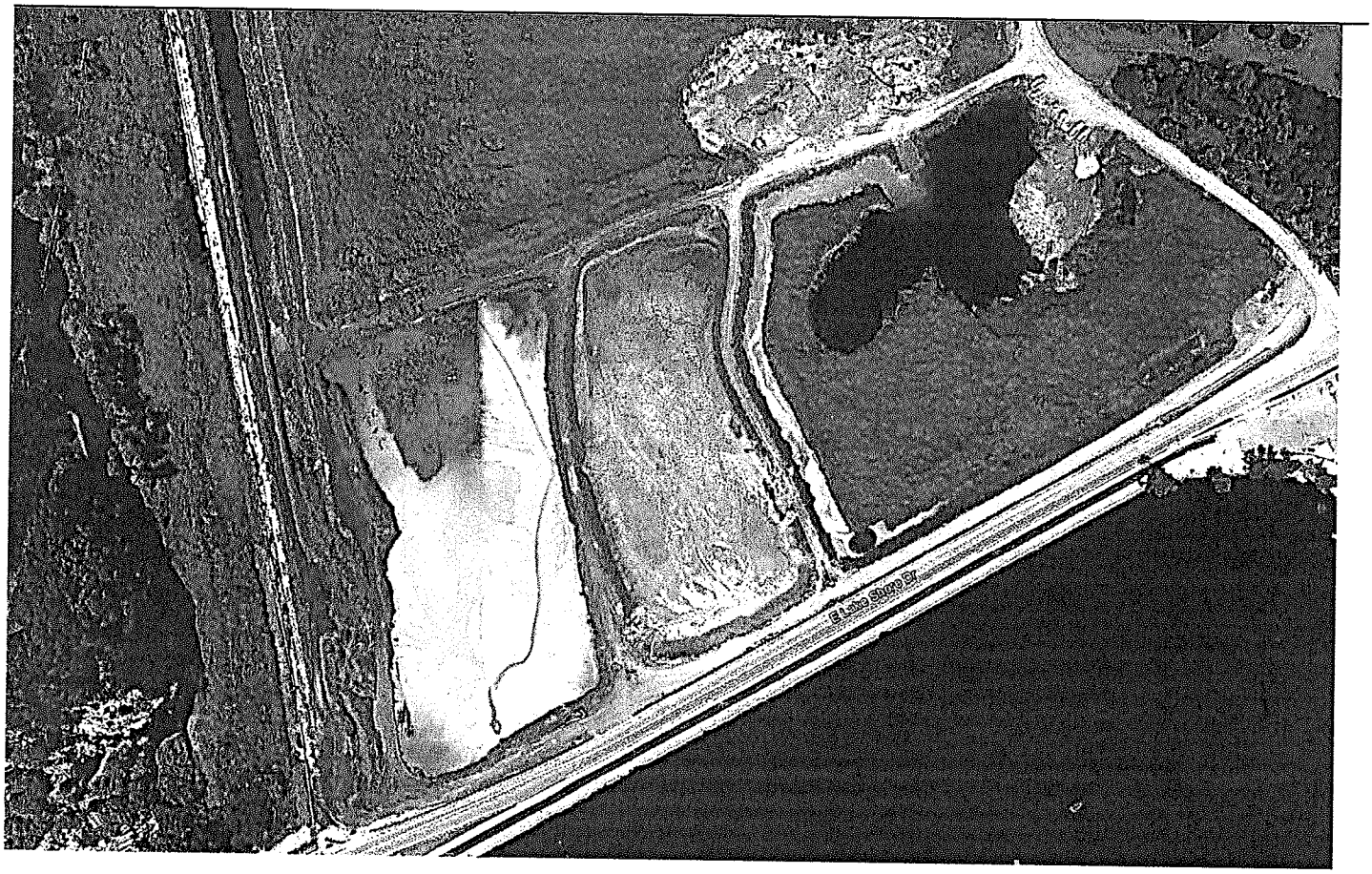
Conditions Limiting Visibility:

- ☐ Snow Cover
- ☒ Vegetation
- ☐ Other _____
- ☐ None

Observations:

- ☐ Erosion / Gullies
- ☐ Cracking / Sloughing
- ☐ Seeps / Damp Areas
- ☐ Signs of Creep
- ☐ Failed/eroded vegetation >100sq ft.
- ☐ Sudden drop in impoundment level
- ☐ Actual or potential structural weakness
- ☐ Improper operation of overtopping control
- ☐ Visible release
- ☒ No observed problems

Describe findings. Identify locations on attached map. Attach additional pages if necessary.



City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Areas of Previous Repair(s):

Location: SW Corner of Lakeside Ash Pond, TOP OF BERM

Description of Repair: 2" Rock and RR #4 were used to fill in and stabilize rain runoff in the top of the berm. The repair was done in the Spring of 2025. The repair is still sound and stable.

Effectiveness of Repair:

- ☒ Problem completely remedied
- ☐ Problem partially remedied (explain below):
- ☐ Problem not remedied (explain below):

- ☐ Progression of trouble into new area (explain):

Areas of Previous Repair(s):

Location:

Description of Repair:

Effectiveness of Repair:

- ☐ Problem completely remedied
- ☐ Problem partially remedied (explain below):
- ☐ Problem not remedied (explain below):

- ☐ Progression of trouble into new area (explain):

City Water, Light, and Power
Coal Combustion Residual Units

35 IAC 845 Annual Inspection Form

Additional Notes:

At the NE corner of the Lakeside Ash Pond, seeps were observed as noted in the Weekly Inspection Reports of April 16 - May 14. This is typical as a result of Spring Rains. The seeps are collected by a ditch in the toe of the slope. The water then reports to the Clarification Pond. No structural issues were observed at any time during 2025 nor at the time of this inspection.

ATTACHMENT 4

SAFETY FACTOR ASSESSMENT AND ACCOMPANYING CERTIFICATION

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

Annual Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments

January 2026

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

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Appendix I: Rapid Drawdown Analysis
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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 35 IAC 845.460 in October 2021.

Analysis is performed herein for the Annual Safety Factor Assessment of the existing ash ponds at Springfield CWLP, Lakeside and Dallman Ash Ponds, Springfield, Illinois, as required per 35 IAC 845.460. 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:

- Periodic Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments (July 2025)
- Geotechnical Investigation Report (June 2024)
- Coal Ash Impoundment Site Assessment Final Report (May 2011)
- Historical Aerial Photographs (April 1995 – November 2025)
- 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, which was placed into service prior to 1958, is primarily a diked embankment with some incising along the east perimeter. 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. It 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.

Figure 1 presents a site map showing 2023/2024/2025 geotechnical investigation boring locations and approximate boundaries of all CWLP CCR Units, including the ash and lime ponds. Figure 2 provides the locations of the cross sections used for slope stability analysis. Figures 3 through 5 show the cross-section profiles as surveyed and topographically mapped.

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 historical documents identified construction plans from upstream work completed in the 1980s, which 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 and the Periodic Safety Factor Assessment dated July 2025 provides the geotechnical data for the ash pond. The results of those geotechnical investigations are utilized within this safety factor assessment.

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 driven and blow counts recorded. The samples were visually classified, and pocket penetrometer readings were taken 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 to obtain samples, which were then analyzed in the laboratory for hydraulic conductivity, Atterberg limits, wet and dry densities, torvane strength, 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. As requested by the Illinois EPA, in April and May of 2024, an additional limited geotechnical investigation was conducted to obtain samples of the clay directly below the CCR in Lakeside Ash Pond and Dallman Ash Pond. 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 Appendix are copies of the boring logs the Dallman Ash Pond. 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 and CPT shear strength correlations.

In May 2025, six additional borings were advanced to obtain Shelby tube samples of the various soil types from the softest depths. These borings targeted the potentially weakest area of the embankment, where the former meandering Sugar Creek alignment coincided, for laboratory analysis. Laboratory analyses were completed for drained and undrained conditions, and one-dimensional consolidation of the cohesive soils. Included in Appendix C is additional laboratory analysis that supports the revised simplified geotechnical parameters provided in Table 1, including the rationale. Technical papers supporting the ash geotechnical parameters are included in Appendix D. Included in Appendix E are the water levels based upon vibrating wire measurements taken within the CCR and the embankment. The soil strengths provide 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)	
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)
CCR Wet Ash	100	15	0	25	0
CCR Moist Ash	95	30	0	30	0
Clay Fill	125	0	1,600	27	500
Scrubber Sludge	125	0	750	30	0
Bottom Ash	115	35	0	35	0
Silty Clay	121	0	1,100	27	180
Former Creek Bottom Clay	119	0	300	19	0
Soft Clay/Clayey Silt	120	0	400	20	0
Upper Cohesive Clayey Silt	125	0	690	26	0
Lower Cohesive Clayey Silt	125	0	1,200	28	0
Sand	125	34	0	34	0
Shale	Bedrock (Impenetrable)				

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 on the periphery of the Lakeside and Dallman Ash Ponds. The measurements have been recorded and compiled for the past two years. The vibrating wire water levels are included in Attachment E.

4.3 Seismic Ground Motion

CWLP is susceptible to potential seismic activity as provided by the USGS Earthquake Hazards Program. Included in Appendix F 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. The maximum acceleration of (aHmax = 0.10g) was selected for use in stability calculations.

5. SLOPE STABILITY ANALYSIS

The static and seismic slope stability model utilized for the following analysis was the Morgenstern and Price Circular Search Method within the Slope/W computer-based slope stability modeling software. Morgenstern and Price satisfies all conditions of equilibrium.

The annual safety factor assessment requires each CCR unit to document whether its calculated factors of safety meet the minimum required values. 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 the critical cross section identified as Section D–D′ in the Periodic Safety Factor Assessment 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 with the location shown on Figure 2 and the profile provided on Figure 3.

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. 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 1.538. The critical failure surfaces and stability reports are included in Appendix G-2. This analysis confirms that Lakeside meets the required factors of safety for both the long-term maximum storage pool and the maximum surcharge pool conditions, as the evaluation was conducted with the embankment fully loaded with ash and the pool at the top-of-embankment elevation.

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 1.600. 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. 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 1.457. 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. 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. 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 1.240. The critical failure surface and stability report are included in Appendix G-5. This analysis verifies that Lakeside exceeds the seismic factor of safety.

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 1.277. The critical failure surfaces and stability reports are included in Appendix G-6.

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 Periodic Safety Factor Assessment 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 northwest corner of the Dallman Ash Pond next to Sugar Creek with the location shown on Figure 2 and the profile provided on Figure 4.

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. 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 1.871. 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 and the maximum surcharge pool loading condition since the analysis was performed filled with ash approximately nine feet above the crest and the pool elevation at the crest of the embankment.

Additional long-term static slope stability was performed on the Dallman 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 1.905. The critical failure surfaces and stability reports are included in Appendix H-3.

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. 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 1.836. The critical failure surface and stability report are included in Appendix H-4.

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 2. 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 1.014. The critical failure surface and stability report are included in Appendix H-5. This analysis verifies that Dallman Ash Pond exceeds the seismic factor of safety with maximum surcharge pool loading condition.

Additional seismic slope stability was performed on the Dallman 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 1.014. The critical failure surfaces and stability reports are included in Appendix H-6.

5.2.4 Dallman Stockpile Global Stability Analysis

An analysis of stockpiling on the most critical cross section G-G' was evaluated. The stockpile analysis evaluates a ten-foot tall stockpile over a wide area near the access road that encompasses Dallman Ash Pond. The long-term, short-term and seismic conditions all pass. The critical failure surface and stability report are included in Appendix H-7.

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', with the location shown on Figure 2 and the profile provided on Figure 5, 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 does not approach the crest of the Clarification Pond and maintains in excess of two feet of freeboard in the analysis.

6. LIQUEFACTION

6.1 Liquefaction Screening

A liquefaction screening was conducted on the embankments of the ash ponds. A review of the borings and laboratory testing from the Lakeside and Dallman Geotechnical Investigation conducted in October 2023 were undertaken. The liquefaction screening process followed the guidelines provided by Bray et al. (2004a) in "Evaluating the Potential for Liquefaction or Cyclic Failure of Silts and Clays" by R. W. Boulanger and I. M. Idriss. Within the technical paper it states that "Bray et al. (2004a) concluded that soils with PI<=12 and water contents greater than 85% of the LL were susceptible to liquefaction." Additionally, Bray further concludes that "soils with 12<PI<20 and water contents greater than 80% of the LL were 'systematically more resistant to liquefaction but still susceptible to cyclic mobility."

Analysis of samples collected during the October 2023 geotechnical investigation were evaluated against the liquefaction screening guidelines. The liquefaction screening of the borings between the ash ponds and Sugar Creek were inconclusive, thus leading to another geotechnical investigation conducted with a CPT rig. The CPT investigation was conducted near geotechnical borings B-2, B-4, B-6 and B-7 surrounding the ash ponds with additional CPTs being pushed

within the ash ponds. The CPT logs are included in Appendix A for Lakeside Ash Pond and Appendix B for Dallman Ash Pond.

6.2 Liquefaction Analysis

A liquefaction analysis was conducted on the CPT soundings CPT-2L, CPT-4L, CPT-6L and CPT-7L for the perimeter of the ash ponds and on CPT-1CCR, CPT-2CCR, CPT-3CCR, CPT-4CCR, CPT-5CCR, CPT-6CCR, CPT-7CCR, CPT-10CCR, CPT-14CCR, and CPT-15CCR within the ash ponds for estimated liquefaction settlement. The liquefaction analysis was conducted using the CLiq software version 3.5.3.8, copyright by GeoLogismiki.

The liquefaction assessment calculation method employed within the CLiq software was Robertson 2009. The Robertson 2009 method for soil liquefaction is a deterministic model and provides liquefaction potential. The seismic parameters for the liquefaction analysis were obtained from the USGS Earthquake Hazards Program Unified Hazard Tool, Edition Dynamic: Conterminous U.S. 2014 as recommended by Dr. Robertson in his October 2021 short course. This tool provides the site-specific peak ground acceleration of 0.0955g with a mean moment magnitude (Mw) of 6.62. The parameters entered into the CLiq software for the maximum acceleration was 0.10g and an earthquake moment magnitude (Mw) of 6.62. As recommended by Robertson, removing transition zones and weighting strains with depth generally obtains results that are less conservative while still being conservative based upon case histories. A factor of safety of 1.2 was entered into the CLiq software as required by 35 IAC 845.460(a). The lateral displacement analysis utilized the level ground with free face as the in-situ alluvial soils are approximately level with Sugar Creek being the free face. The liquefaction analysis reports are provided in Attachment J. Provided below in Chart 1 is the calculated lateral displacement at each of the CPT soundings surrounding the Lakeside Ash Pond and Dallman Ash Pond. Chart 2 is the overall liquefaction potential index (LPI).

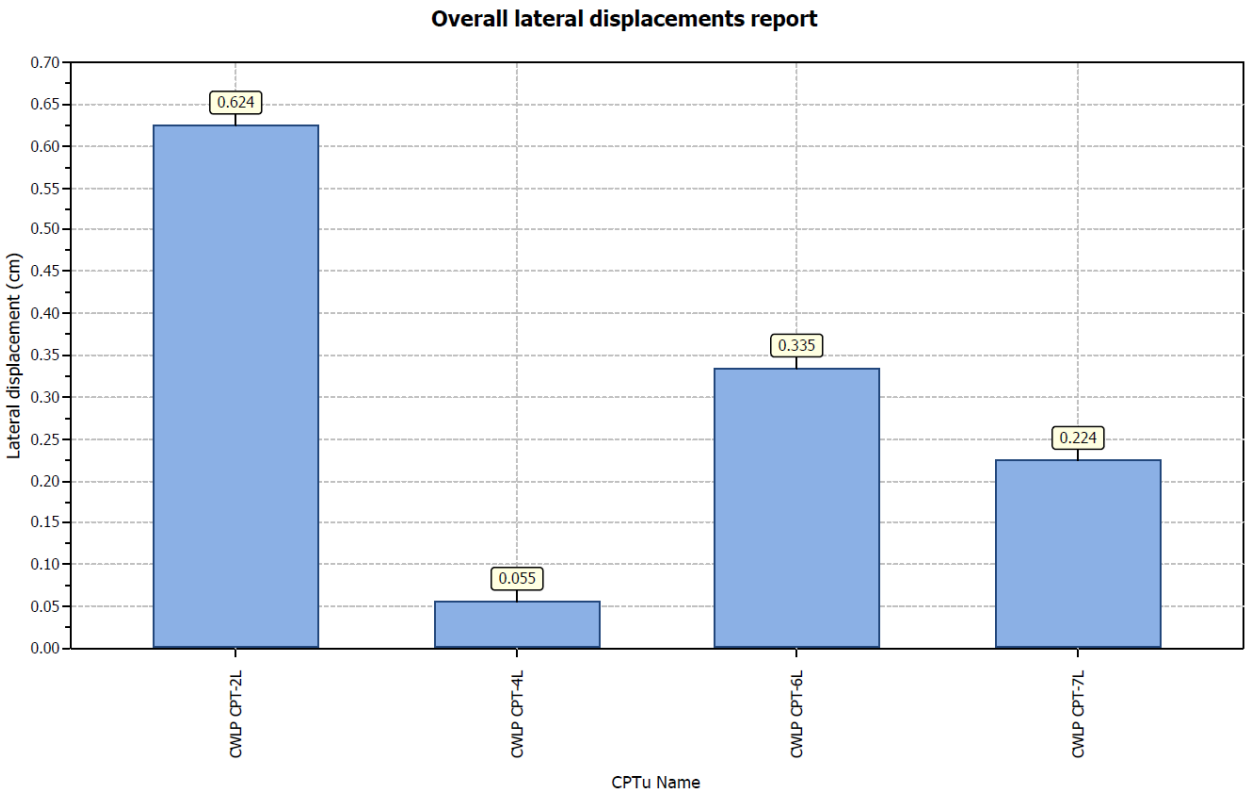


Chart 1 – Overall Lateral Displacements Report for Existing Conditions at the Toe Slope

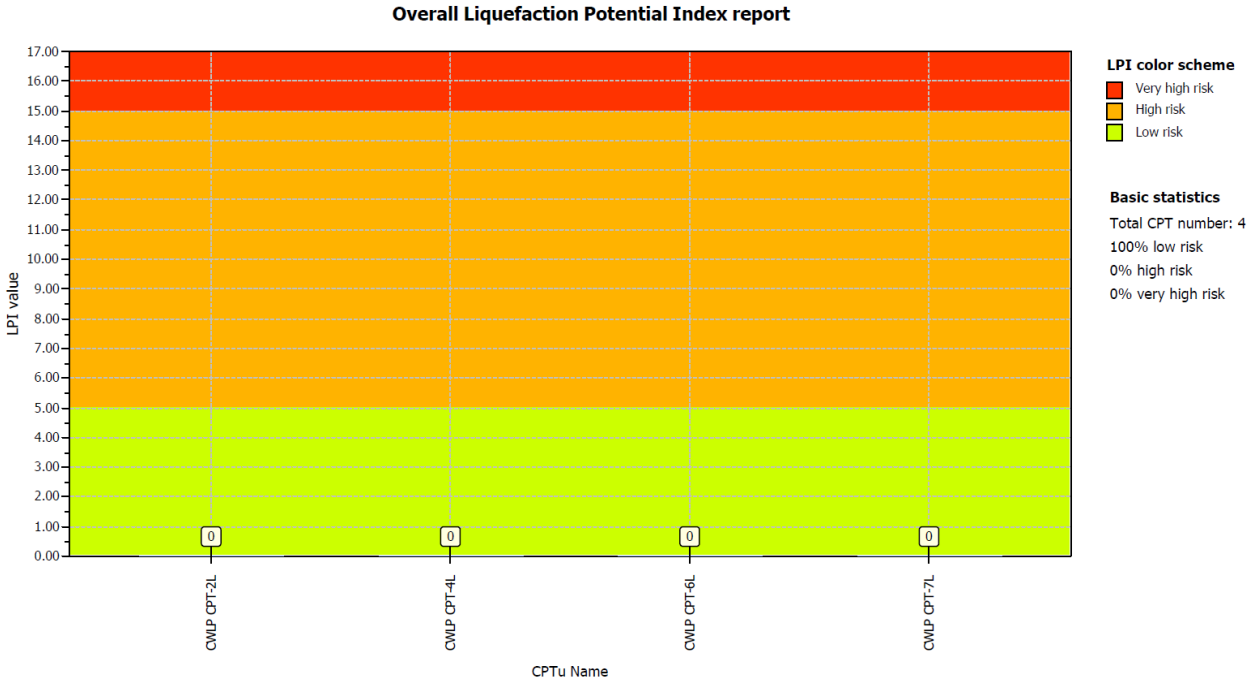


Chart 2 – Overall Liquefaction Potential Index Report at the Toe Slope

The lateral displacement calculated at CPT-2L is approximately 6 millimeters with the remaining CPTs surrounding the ash ponds 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.

Additional liquefaction analysis was performed on the exterior CPTs with a berm added to them as if the existing berm were constructed directly on these soils. This is conservative as the soils would consolidate over time with the additional load from the berm. This additional analysis is included in Appendix J using the same methodologies as discussed before with the exception of adding the embankments. Provided below in Figure 3 is the calculated lateral displacement at each of the CPT soundings surrounding the Lakeside Ash Pond and Dallman Ash Pond. The lateral displacement in Chart 3 is less than those of Chart 1 thus demonstrating that adding the embankment to these soils does not increase the liquefaction potential.

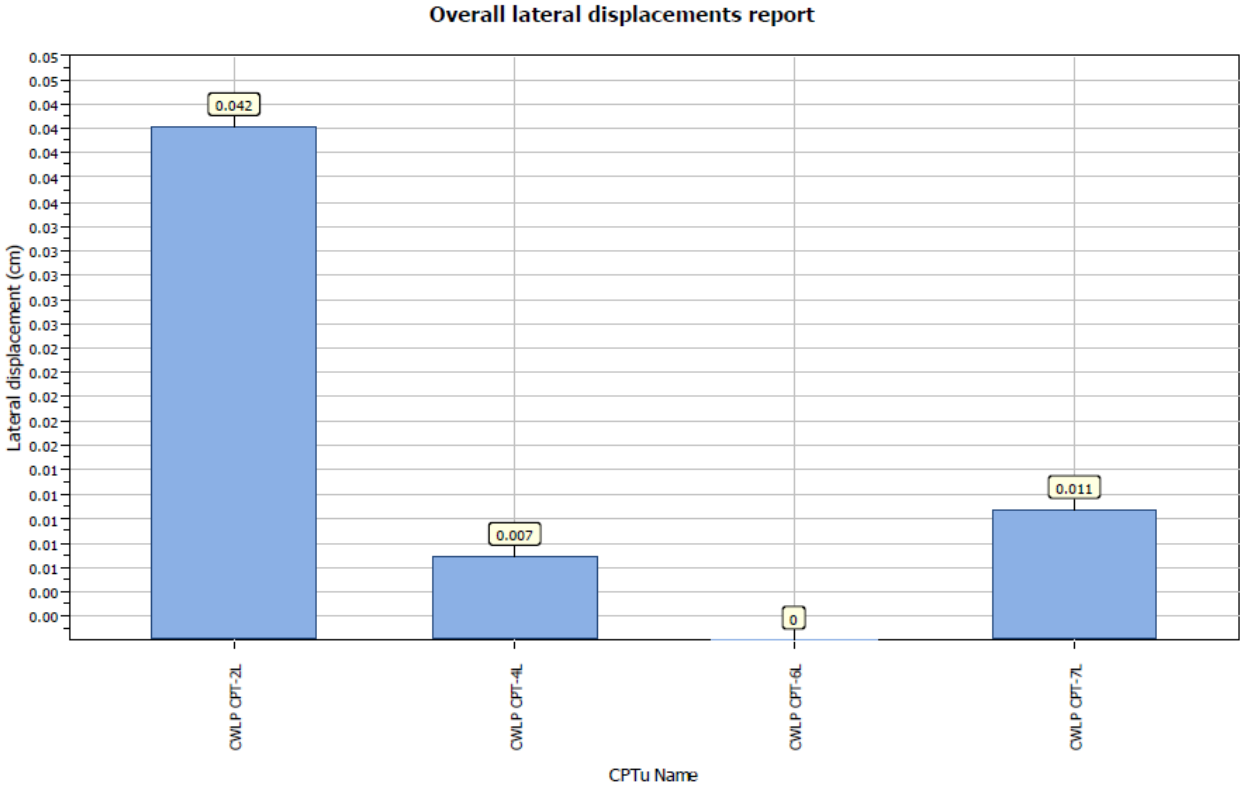


Chart 3 – Overall Lateral Displacements Report for Embankment Constructed Over Existing Soils

The liquefaction risk as interpreted by Iwasaki is very low if the LPI is zero, low if the LPI is equal to or below five but greater than zero, high if the LPI is equal to or below 15 but greater than 5, and very high if the LPI exceeds 15. Using the Iwasaki criterion for liquefaction potential index,

there is a very low risk of liquefaction within the soils investigated. Based upon this information, post-liquefaction slope stability analysis is deemed unnecessary.

7. SUMMARY

The geotechnical analysis indicate that Lakeside and Dallman Ash Ponds provide factors of safety equal to or greater than minimum values as required by 35 IAC 845.460(a). Table 3 and 4 below provides a summary of the slope stability results.

TABLE 3
Lakeside Ash Pond Slope Stability

Condition	Failure Geometry	Factor of Safety	Required Factor of Safety
Long Term Static Full Pool	Block	1.603	1.5
Long Term Static Full Pool	Circular	1.665	
Long Term Current Conditions	Block	1.669	
Long Term Current Conditions	Circular	1.728	
Short Term Maximum Surcharge	Block	1.483	1.4
Short Term Maximum Surcharge	Circular	1.792	
Seismic Full Pool	Block	1.264	1.0
Seismic Full Pool	Circular	1.566	
Seismic Current Conditions	Block	1.300	
Seismic Current Conditions	Circular	1.595	

TABLE 4
Dallman Ash Pond Slope Stability

Condition	Failure Geometry	Factor of Safety	Required Factor of Safety
Long Term Static Full Pool	Block	1.986	1.5
Long Term Static Full Pool	Circular	2.264	
Long Term Static Stockpile	Block	2.057	
Long Term Static Stockpile	Circular	1.932	
Short Term Maximum Surcharge	Block	1.726	1.4
Short Term Maximum Surcharge	Circular	1.993	
Short Term Stockpile	Block	1.422	
Short Term Stockpile	Circular	1.719	
Seismic Full Pool	Block	1.362	1.0
Seismic Full Pool	Circular	1.676	
Seismic Stockpile	Block	1.168	
Seismic Stockpile	Circular	1.487	

8. STATEMENT

This Annual Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 35 IAC 845.460(a).

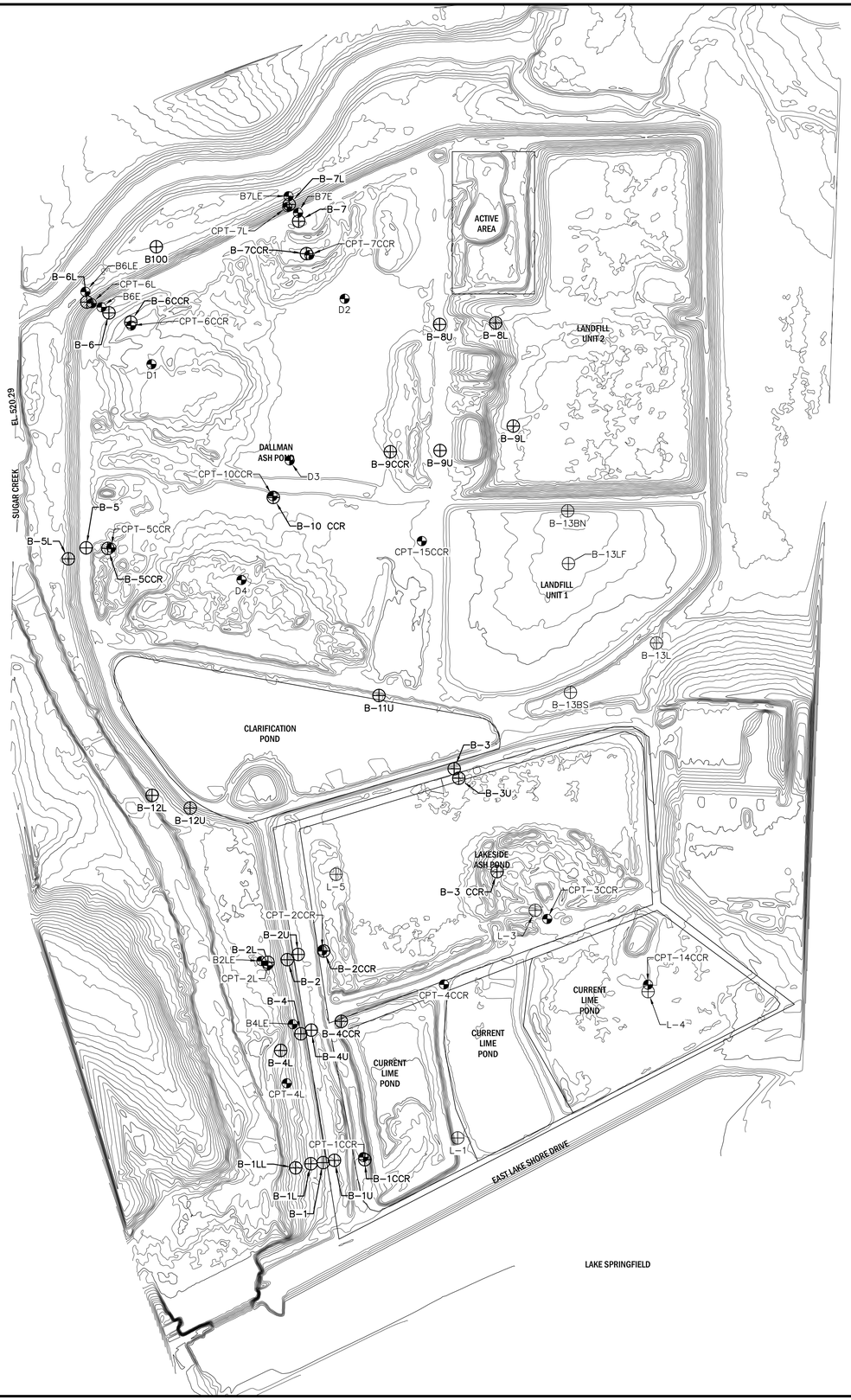
Signature: _____

Illinois P.E. No.: 062.068571

Date: 1/28/26

Lic. Exp. 11/30/27

FIGURES:



LEGEND

- ⊕ AS-BUILT BORING
- ◒ AS-BUILT CPT

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: JUNE 20, 2023).
2. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON USGS GAGE 05576250 FOR 12/20/2022.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

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

AS-BUILT BORING LOCATIONS

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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 1

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Tab: FIGURE 1 Last Saved: January 19, 2026, by Ben Karpus Plotted: Monday, January 19, 2026 3:00:39 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\As-Built Borings 2024 Site.dwg

LEGEND

- ⊕ AS-BUILT BORING
- ◕ AS-BUILT CPT

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: JUNE 20, 2023).

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0 200 400 800

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CROSS SECTION LOCATION MAP

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FIG. 2

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Tab: PROFILES Last Saved: January 19, 2026, by Ben Karpus Plotted: Monday, January 19, 2026 2:00:56 PM
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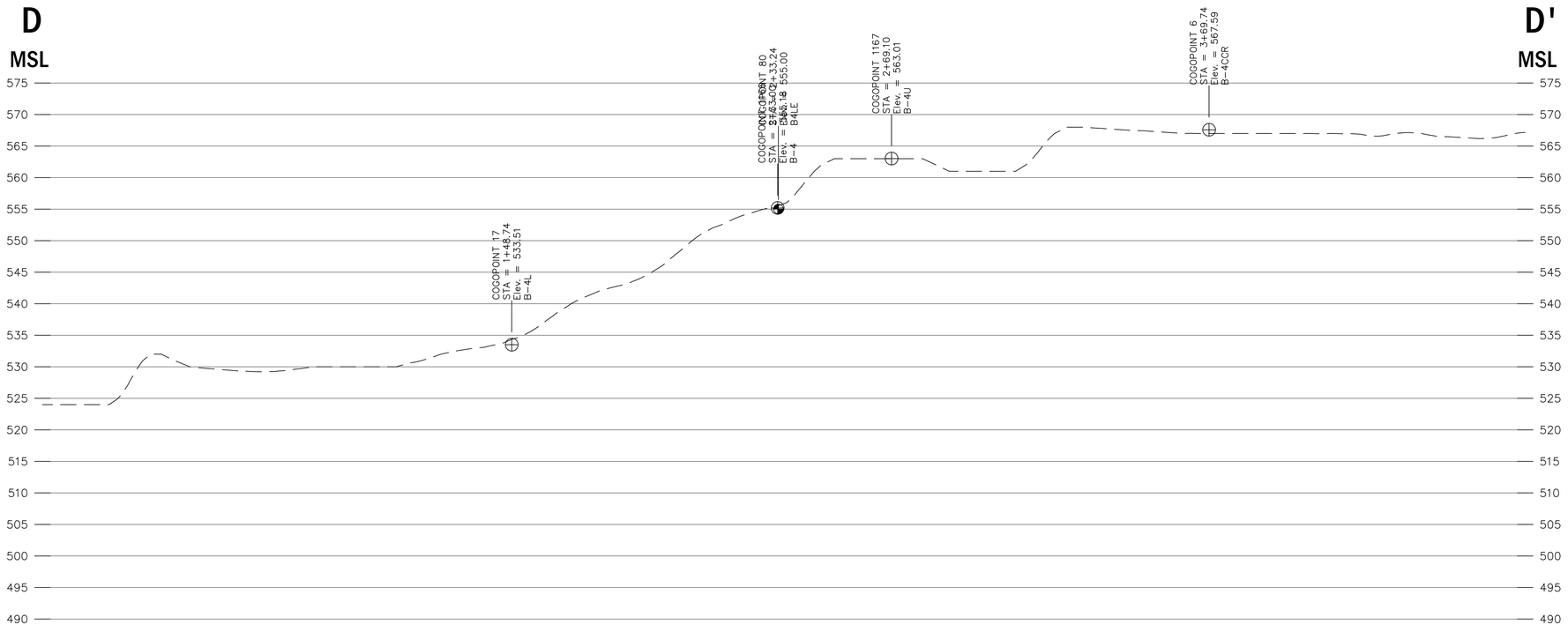
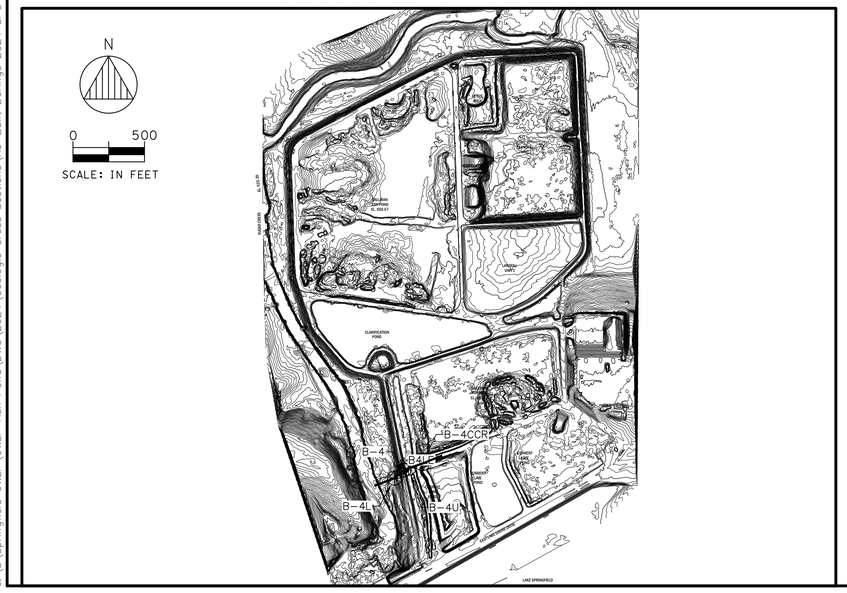


CROSS-SECTION LOCATION MAP



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VERT. 0 10 20 40
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CROSS SECTION D-D'

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FIG. 3

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Tab: D SLOPE ANALYSIS (2) Last Saved: January 19, 2026, by Ben Korpus Plotted: Monday, January 19, 2026 3:15:46 PM
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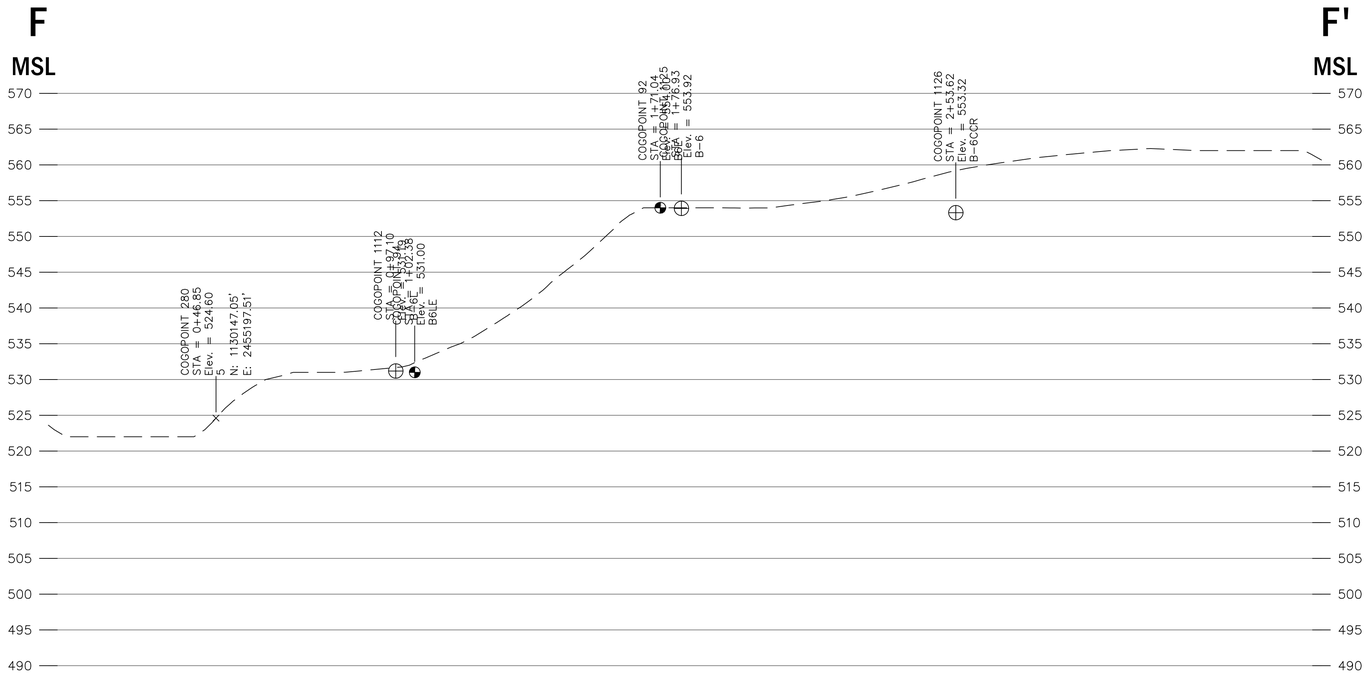

CROSS-SECTION LOCATION MAP

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VERT. 0 10 20 40
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CROSS SECTION F-F'

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JANUARY 2026

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FIG. 4

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Tab: F SLOPE ANALYSIS Last Saved: January 19, 2026 by Ben Karpus Plotted: Monday, January 19, 2026 3:16:30 PM
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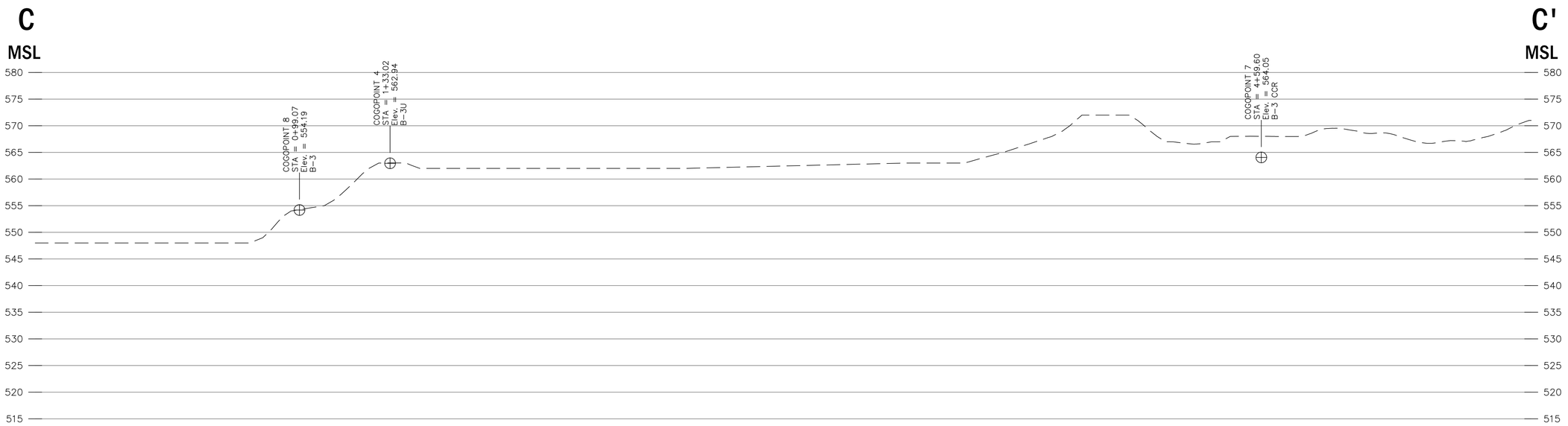

CROSS-SECTION LOCATION MAP

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

NO.	DATE	REVISION DESCRIPTION	BY

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

CROSS SECTION C-C'

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 5

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Tab: C SLOPE ANALYSIS Last Saved: January 19, 2026 by Ben Karpus Plotted: Monday, January 19, 2026 3:14:05 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\As-Built Borings 2024 SPC KWF.dwg

APPENDIX A:
Lakeside Boring Logs

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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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)
	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:

Andrews Engineering, Inc.
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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

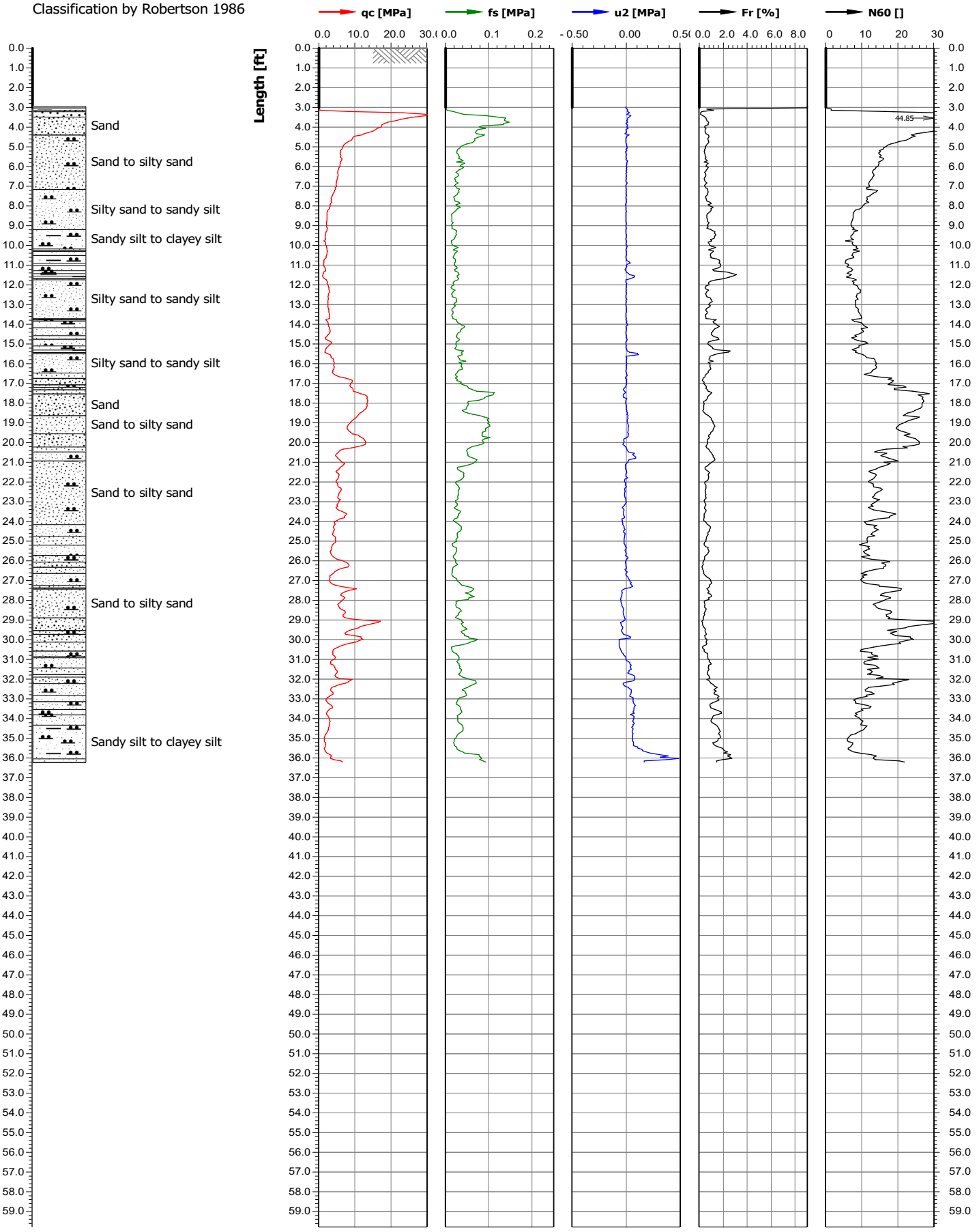
Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		3.6				Light grey (7/1 10YR) clayey SILT with yellowish brown (4/6 10YR) mottles and sand, moist	
							grades to yellowish brown (4/6 10YR) with grey (6/1 10YR) mottles	
25	7		2.25		1.4 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

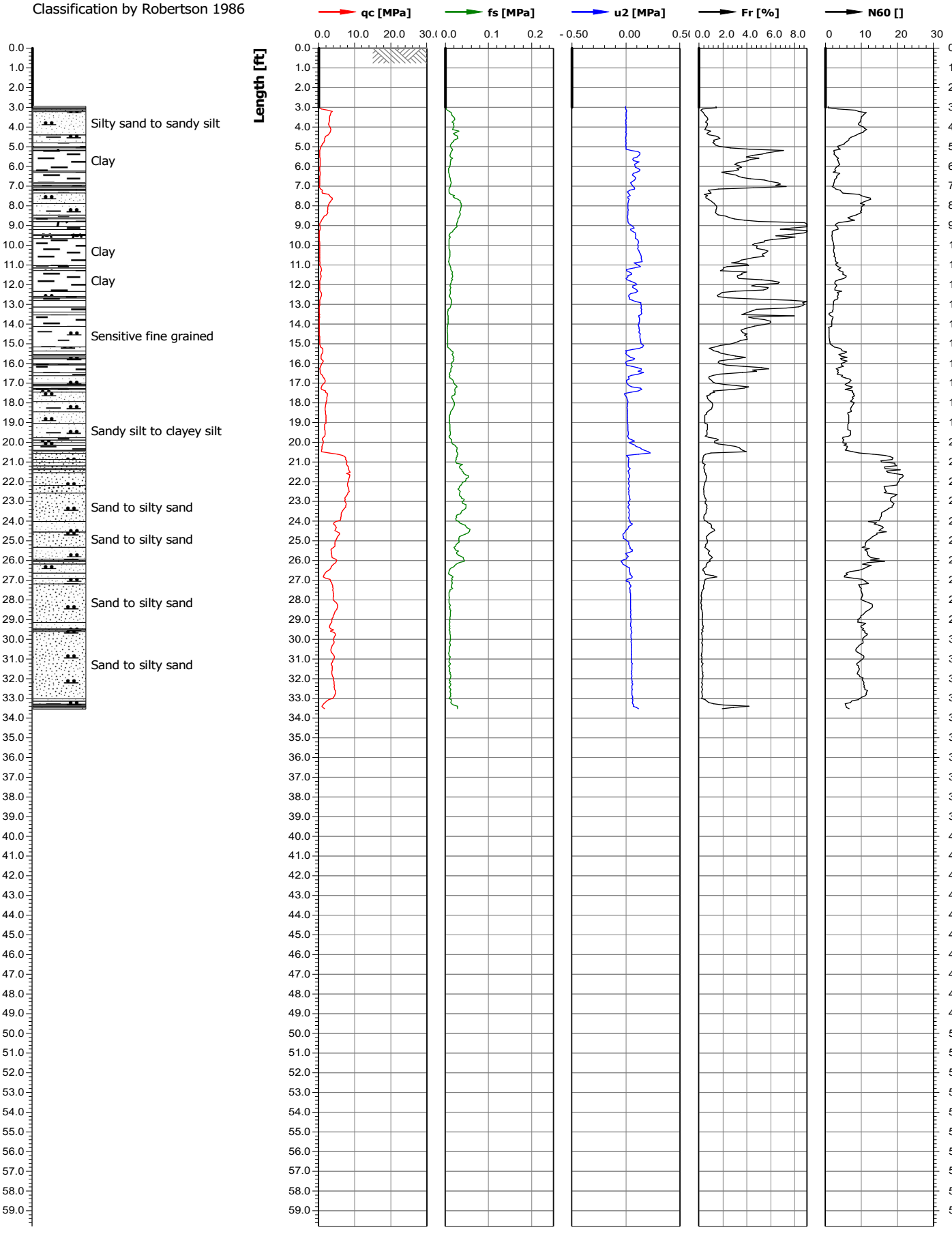
Classification by Robertson 1986



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

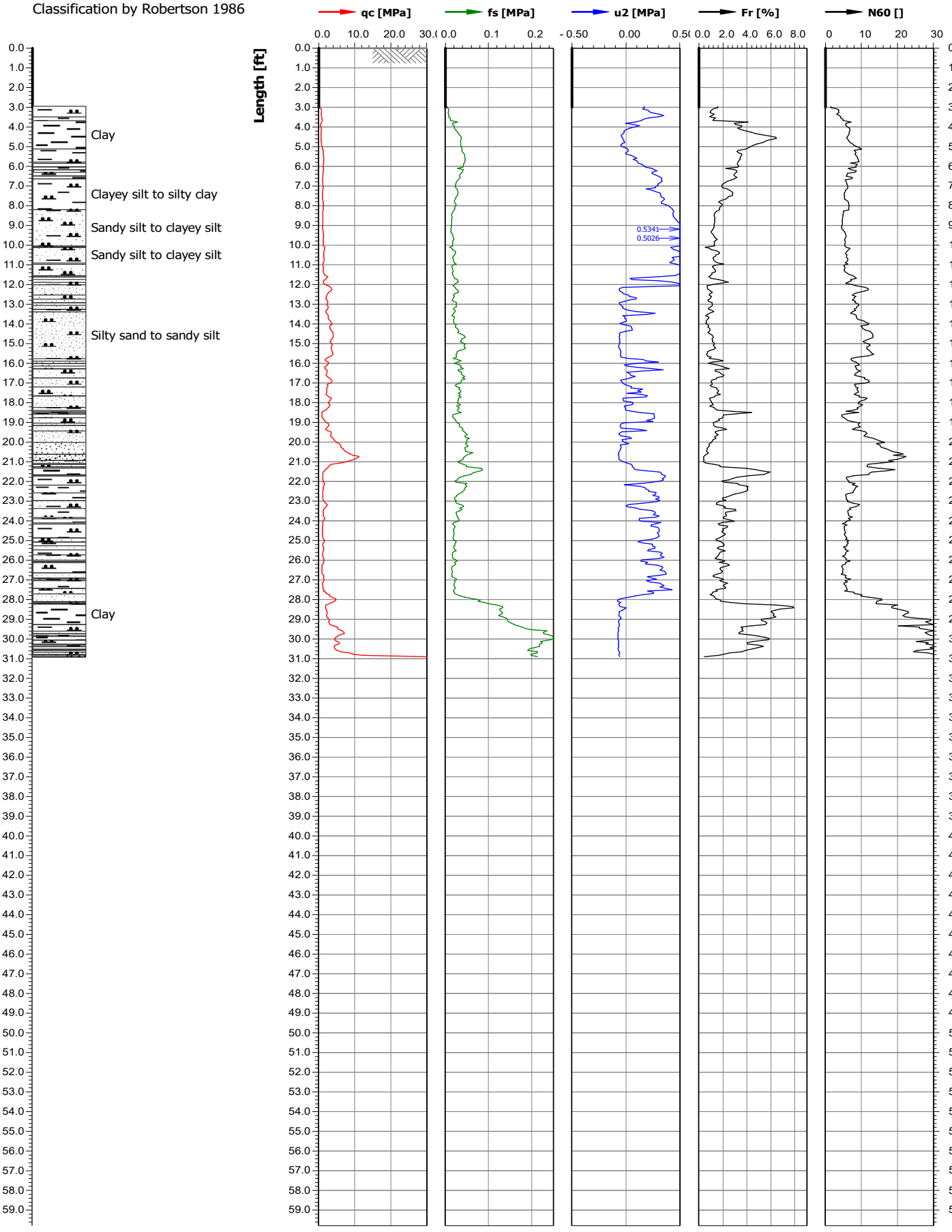
Classification by Robertson 1986



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

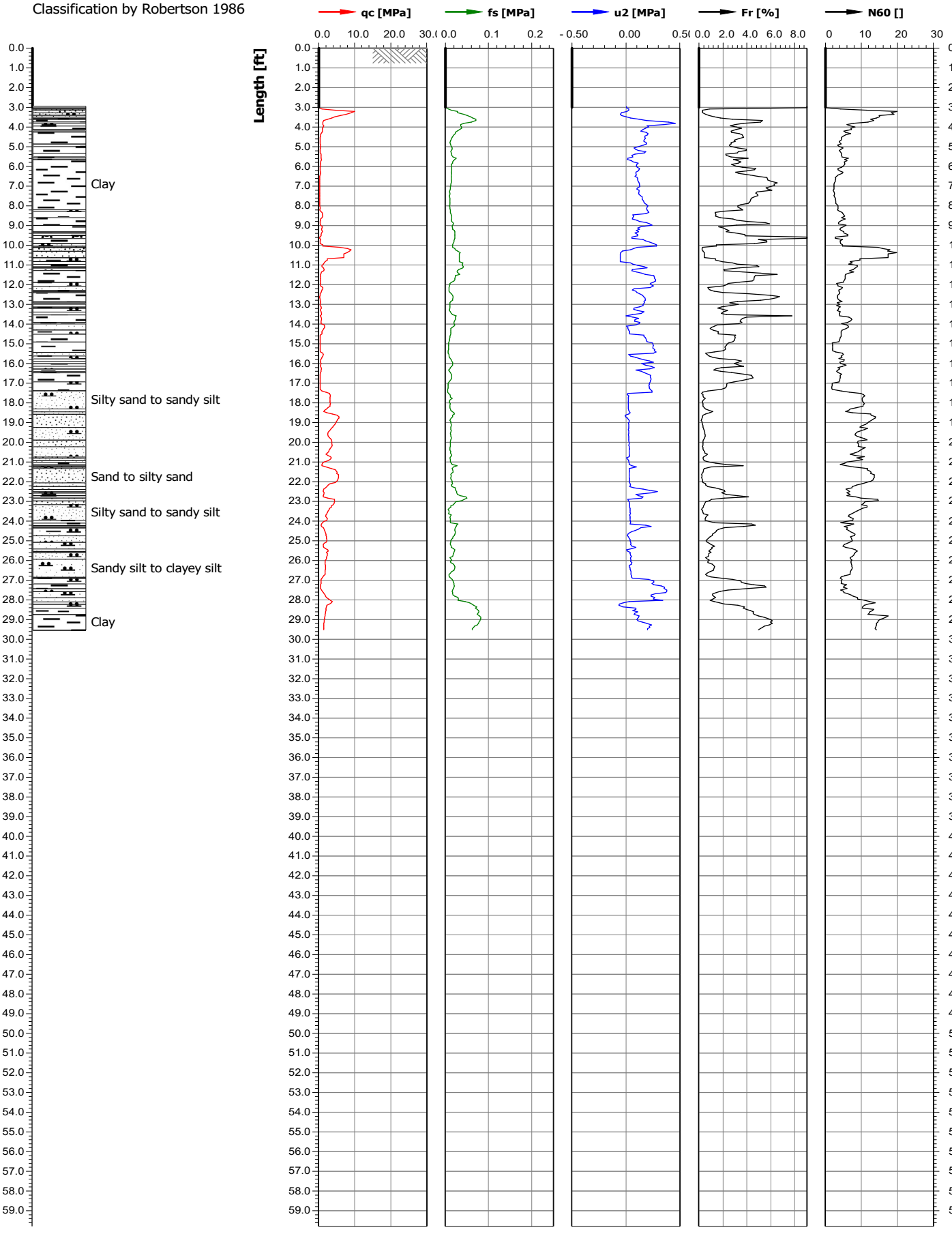
Classification by Robertson 1986



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

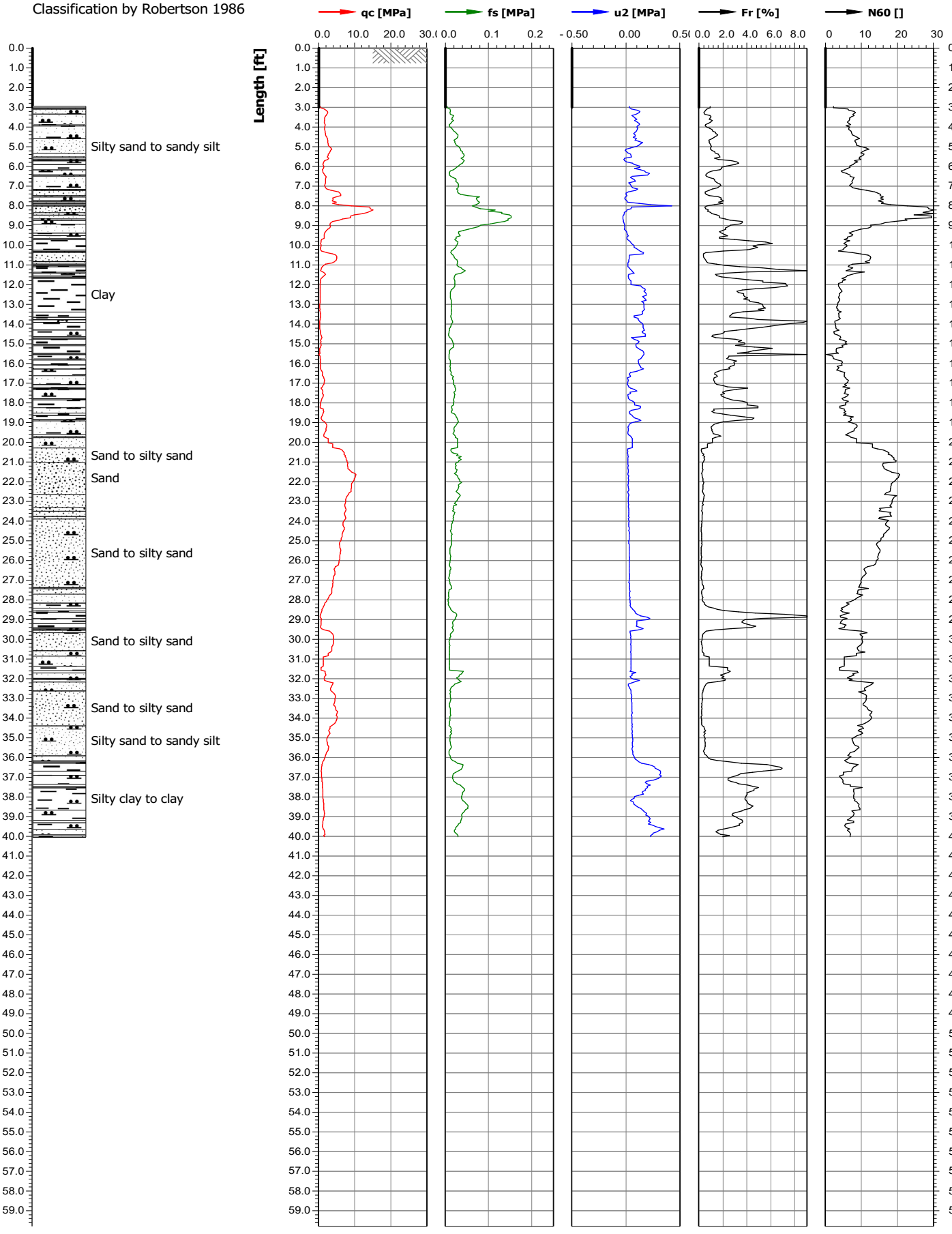
Classification by Robertson 1986



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

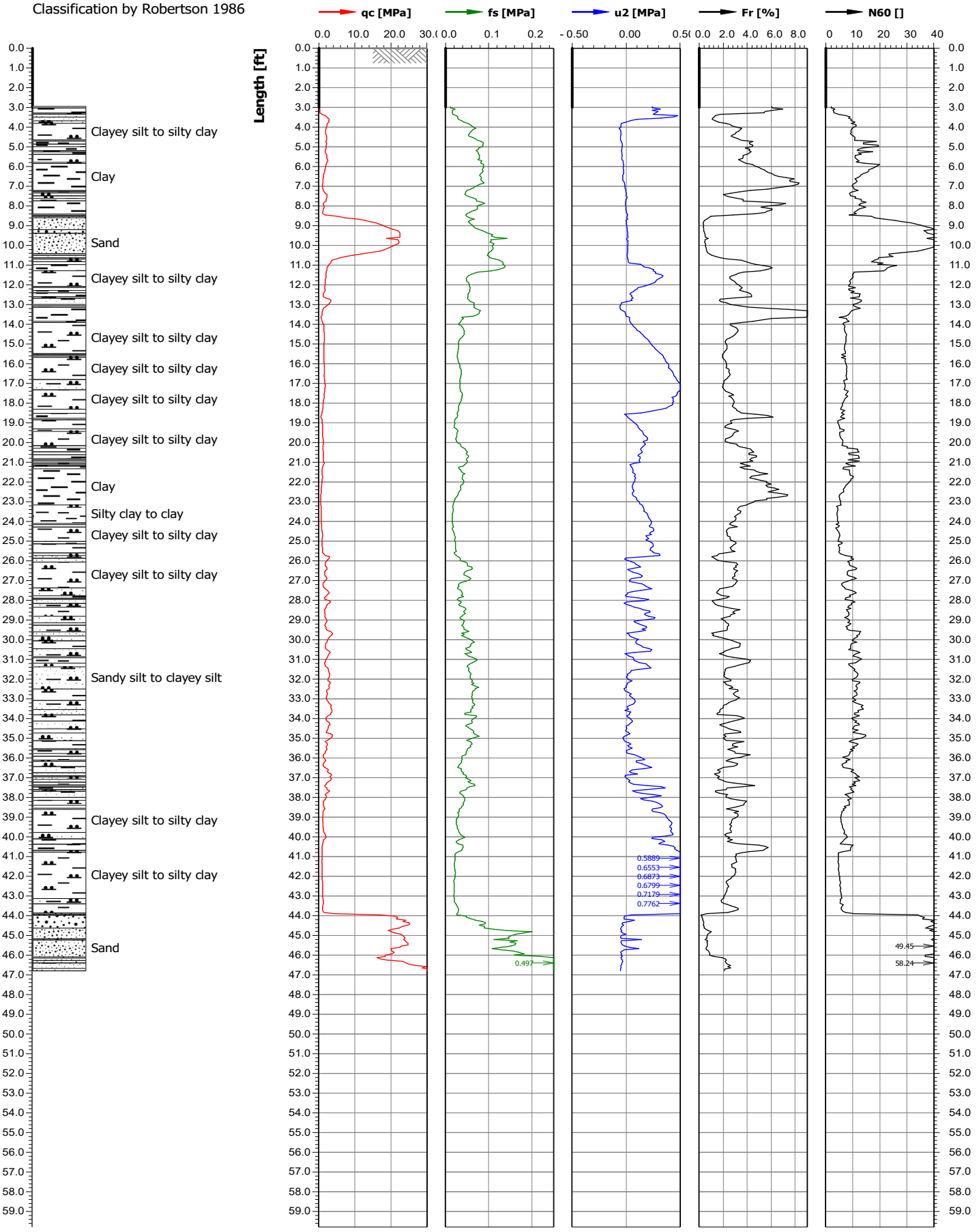
Classification by Robertson 1986



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

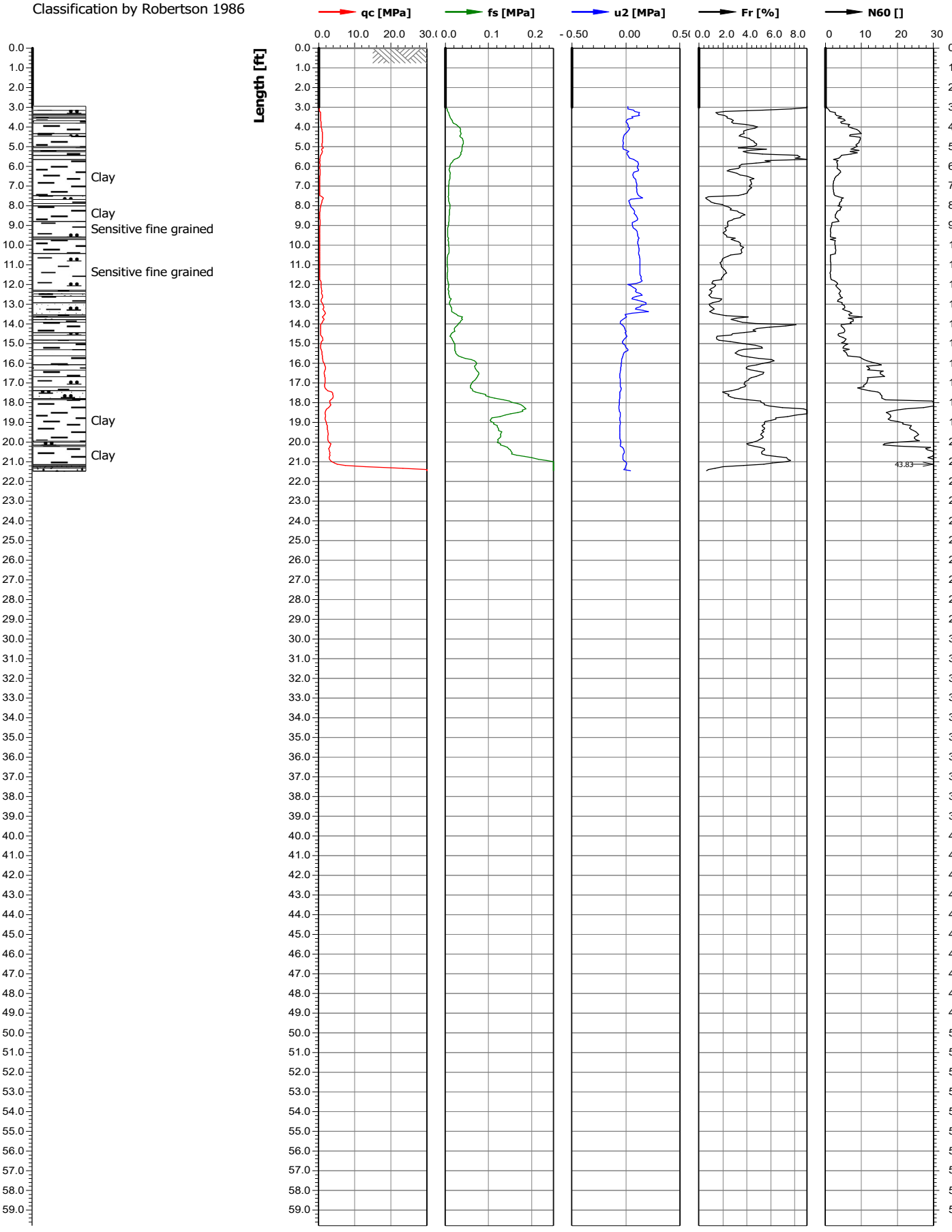
Classification by Robertson 1986



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



APPENDIX B:
Dallman Boring Logs

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:

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: 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:

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: 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:

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: 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:

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: 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:

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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:

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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.
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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:

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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:

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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:

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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.
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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:

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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:

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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:

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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:

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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:

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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.: 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:

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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:

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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

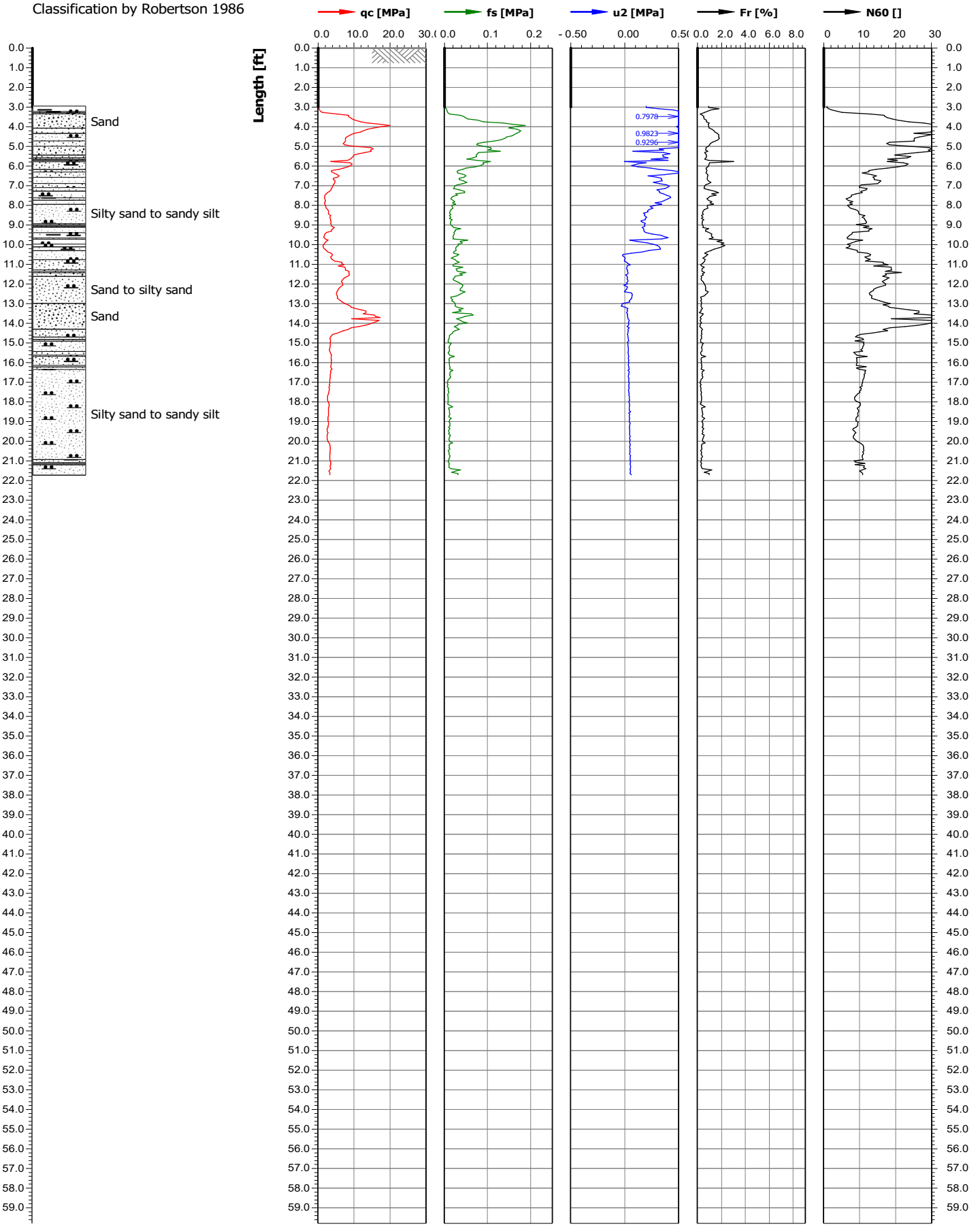
Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Light grey (7/1 10YR) silty CLAY, brown mottles, with brownish yellow (6/6 10YR), moist	
	8		Full					530.0
							grades to light bluish grey (8/1 10B) with brown (6/810YR) mottles	
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

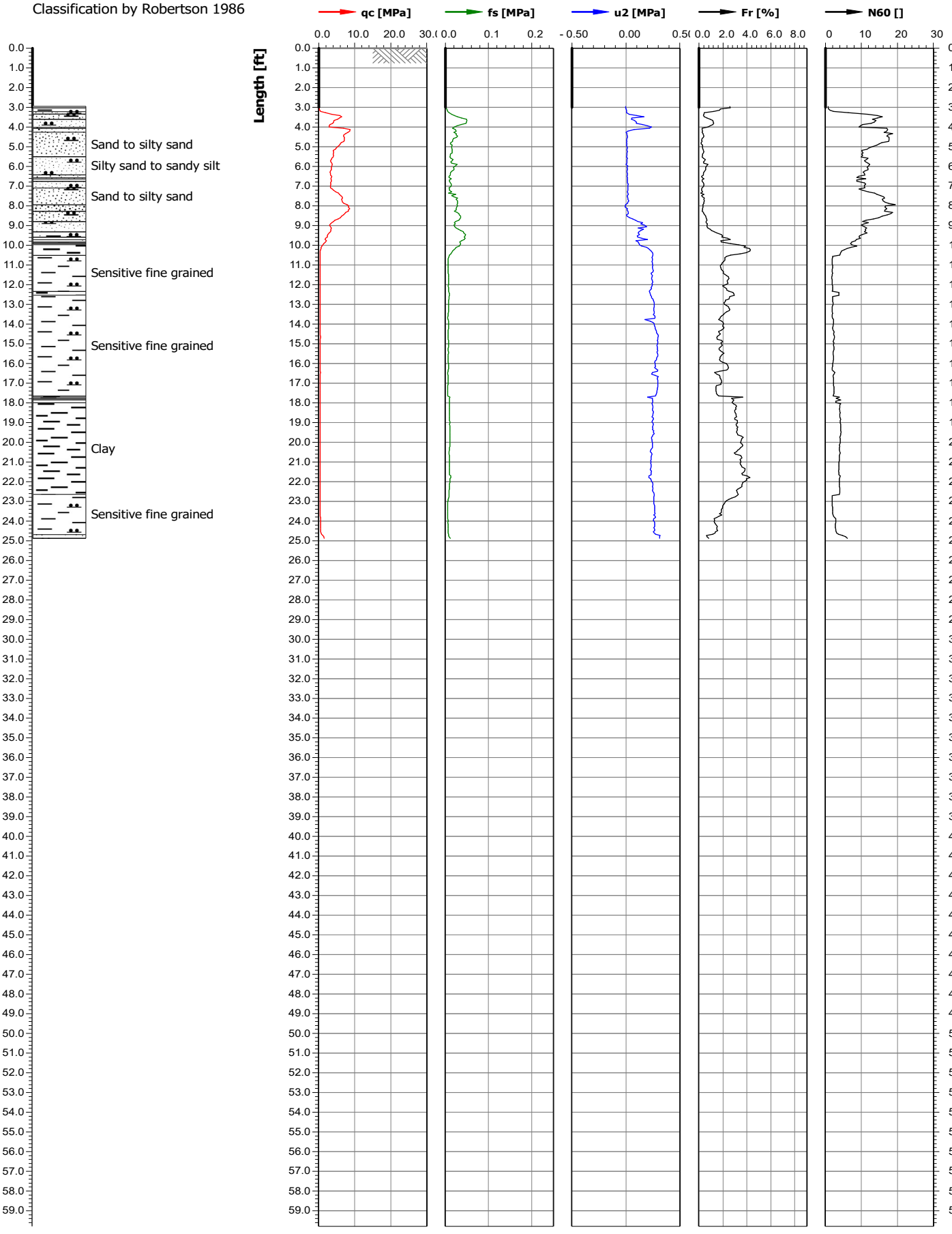
Classification by Robertson 1986



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

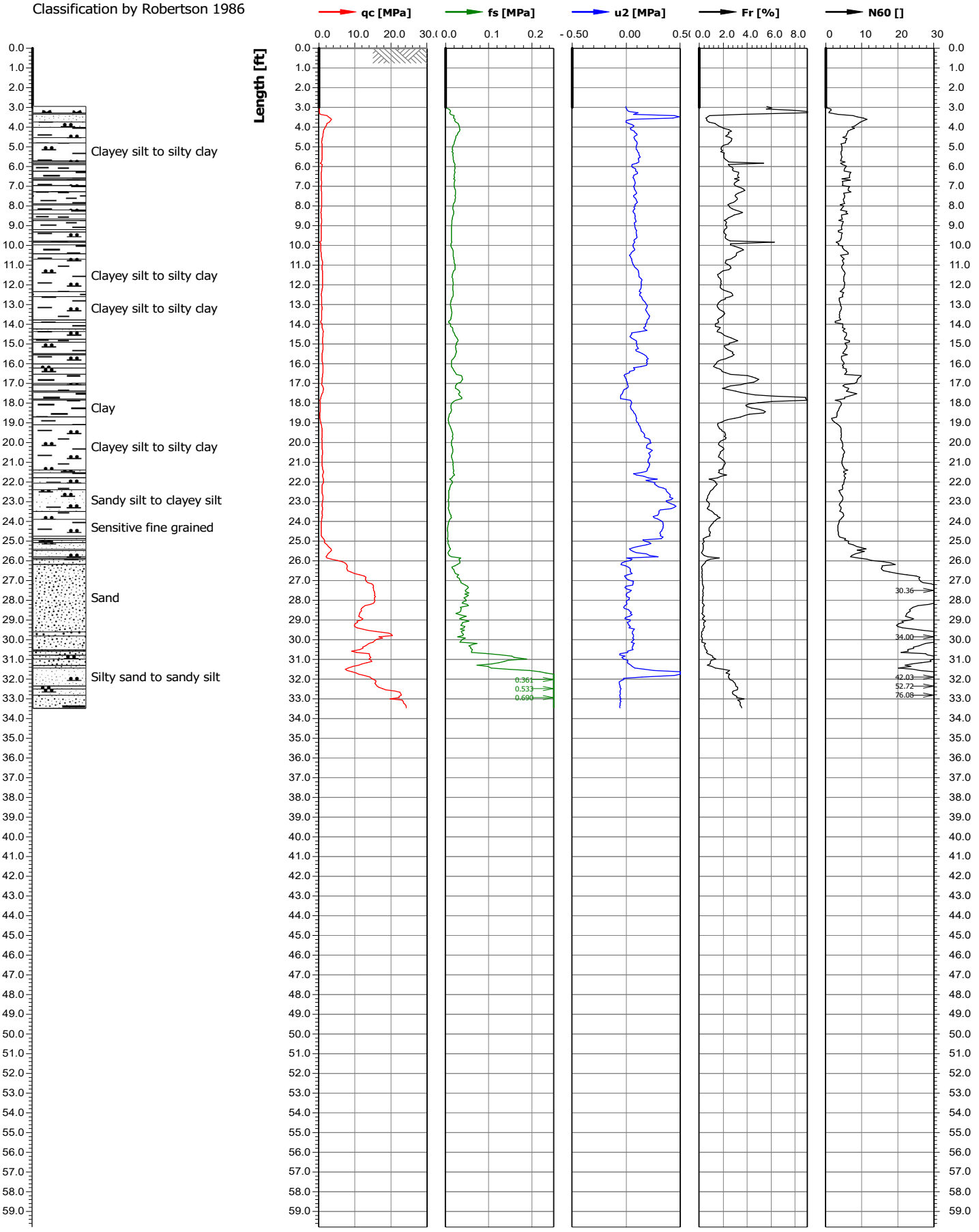
Classification by Robertson 1986



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

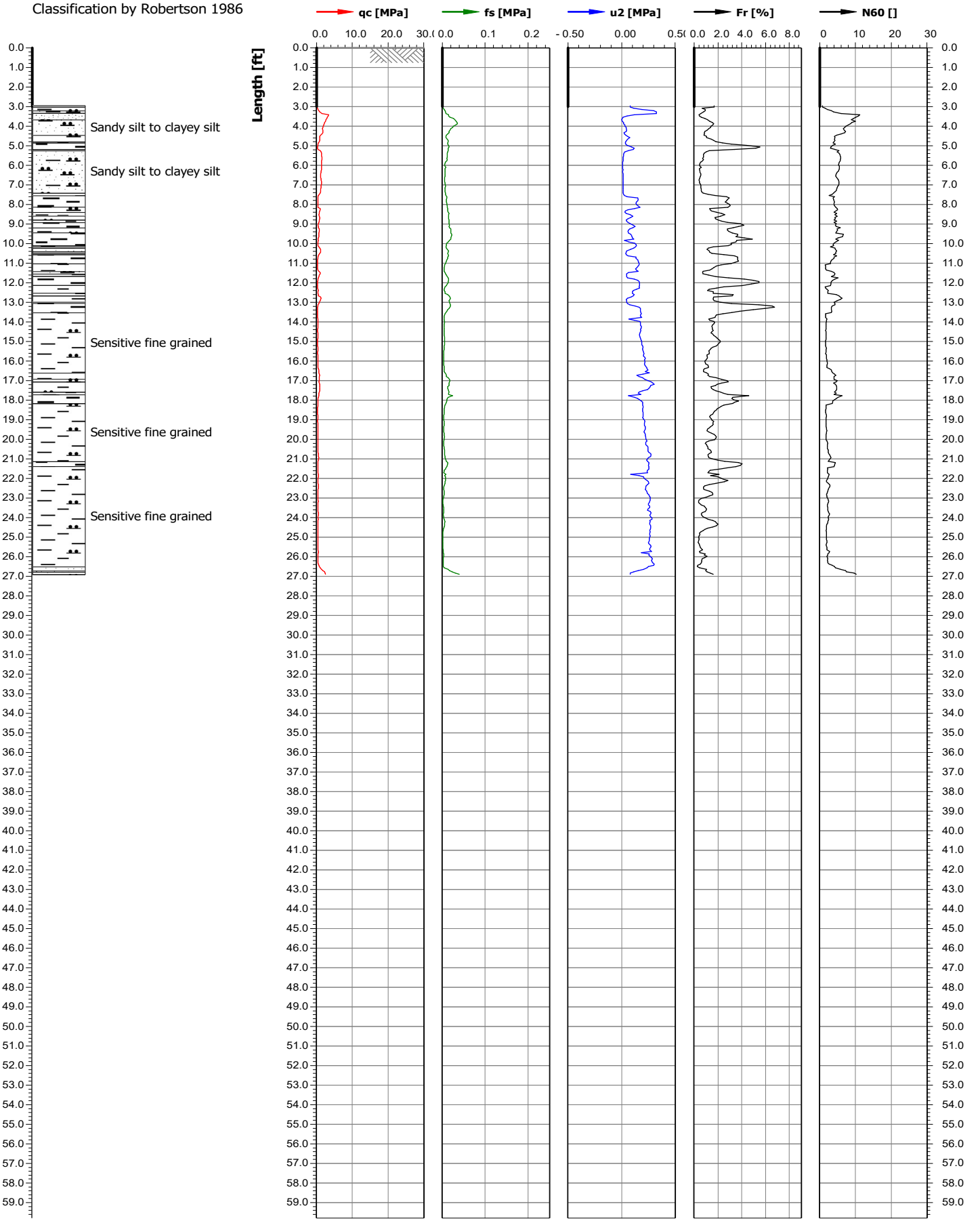
Classification by Robertson 1986



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

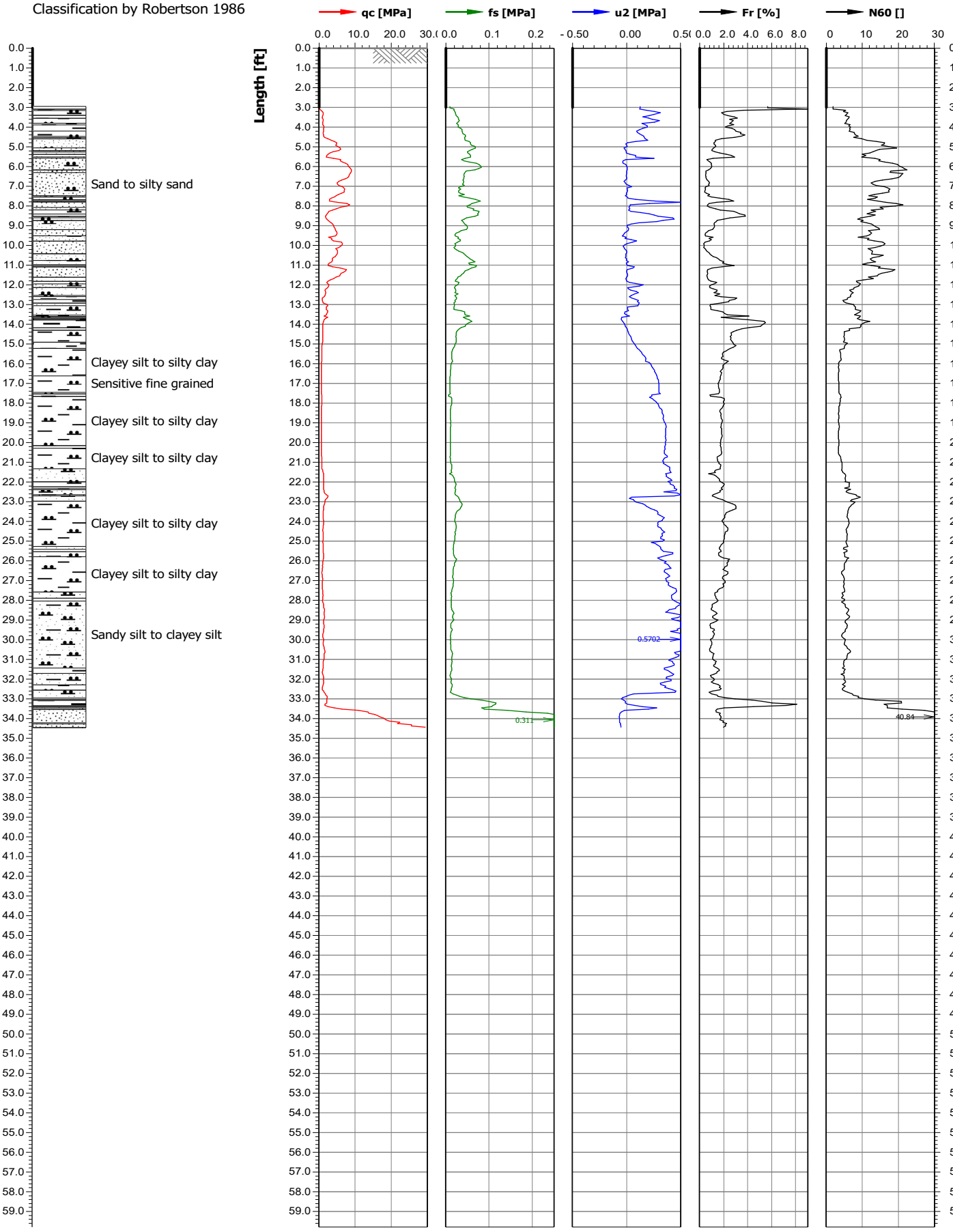
Classification by Robertson 1986



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

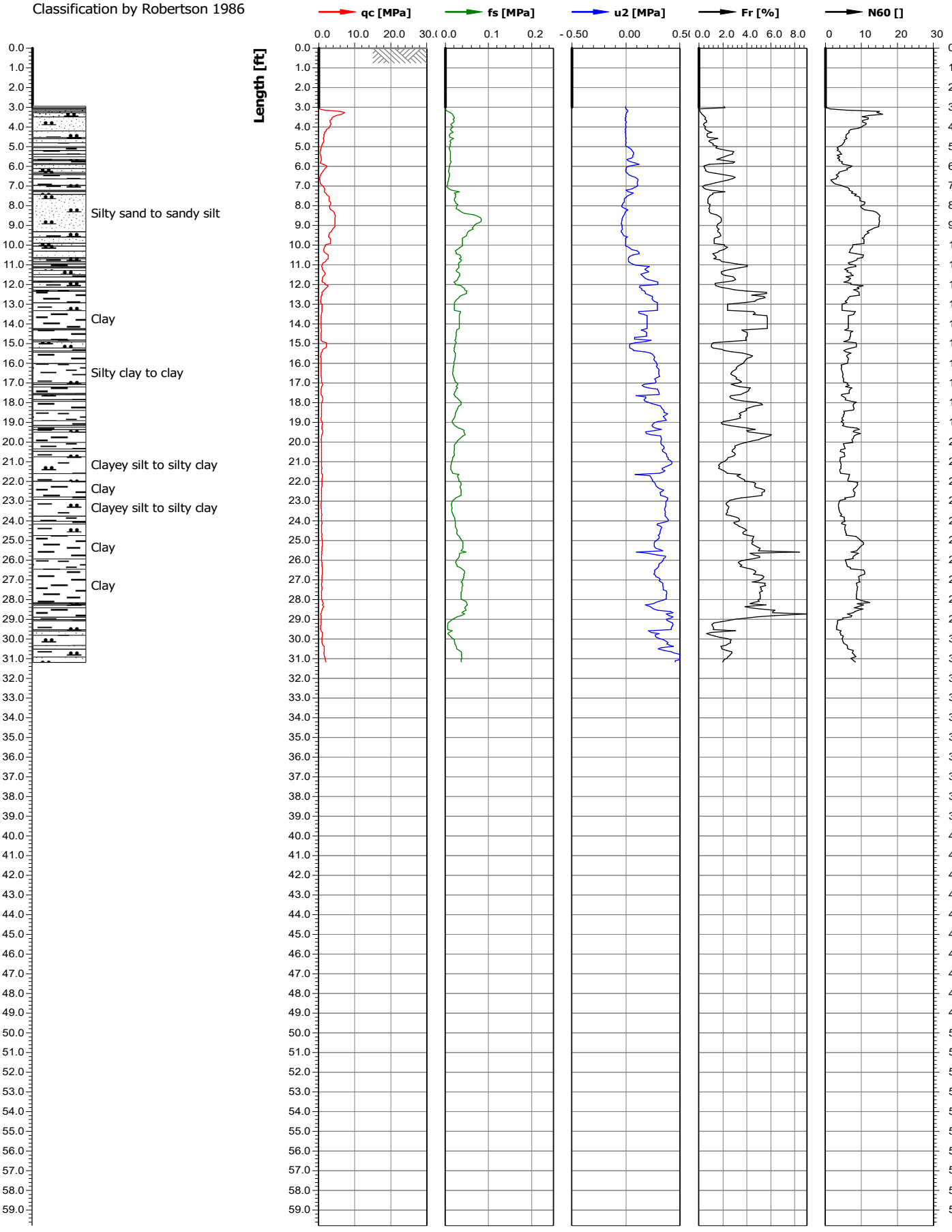
Classification by Robertson 1986



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

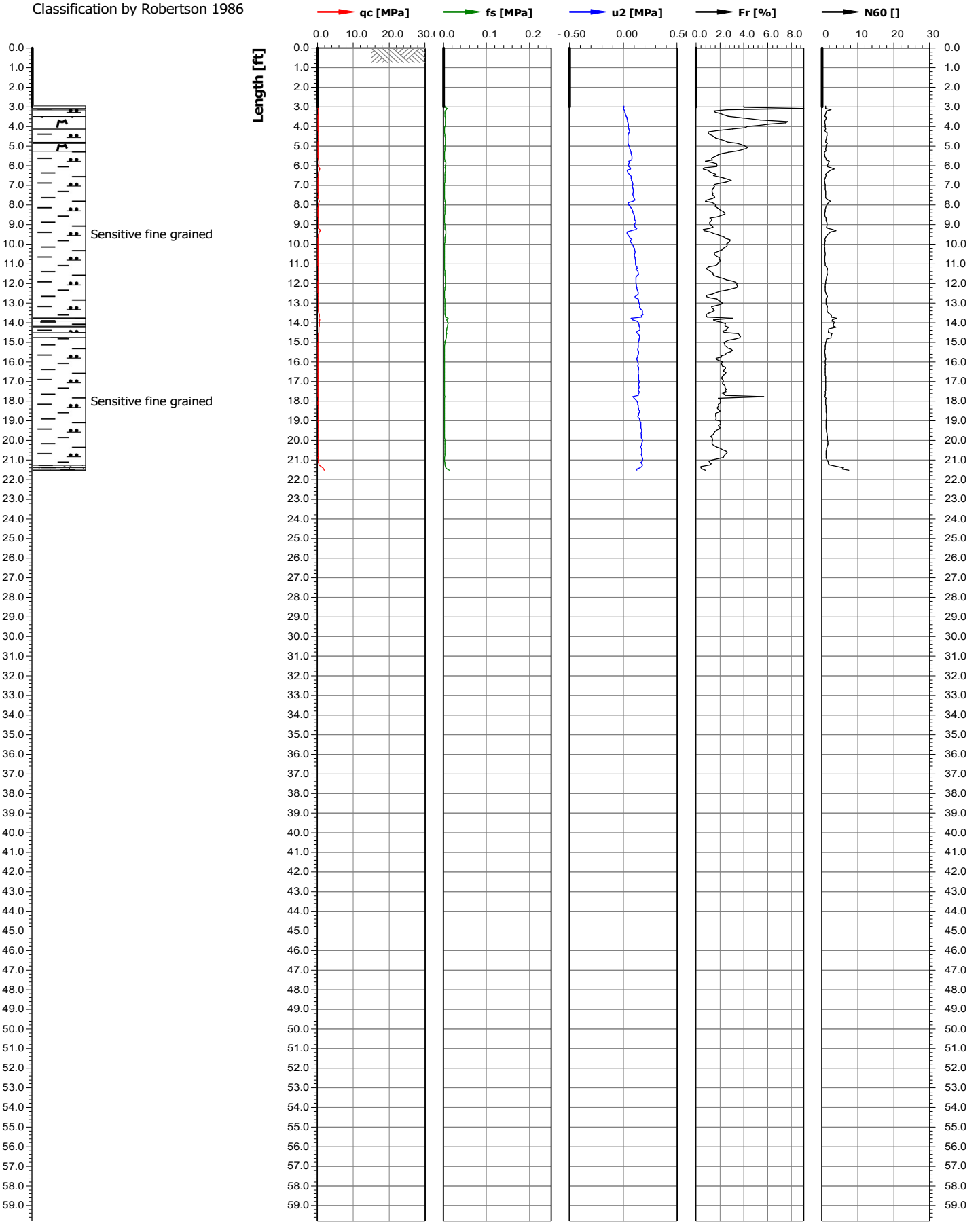
Classification by Robertson 1986



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



APPENDIX C:

Insitu Vane Shear Readings & Laboratory Analysis

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. Six additional borings were advanced onsite to collect undisturbed and bucket samples of these soils. 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. The unconsolidated-undrained triaxial compression test provided a total shear strength of 1,613 psf. 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. The composite of both ash pond's lower bound confidence 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. 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.

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 and 1,195 psf. The field vane shear results for the silty clays provided a lower bound confidence ranging from 1,111 psf to 1,336 psf. 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. The conservative effective strength used for modeling is 27 degrees with 180 psf.

Upper Cohesive Clayey Silt

The upper cohesive clayey silt unconsolidated-undrained triaxial compression test provided 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. The conservative total shear strength used for the upper cohesive clayey silt is 691 psf, the results from the unconsolidated-undrained triaxial compression test as it was 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.

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 conservative total shear strength used for the lower cohesive clayey silt is 1,200 psf. 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 the abandoned Sugar Creek sediment under the Dallman Ash Pond embankment was collected and analyzed. The unconsolidated-undrained triaxial compression test provided a total shear strength of 806 psf. 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 resulting in 1,440 psf and in 2024 a CPT sounding resulted in 300 psf. 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

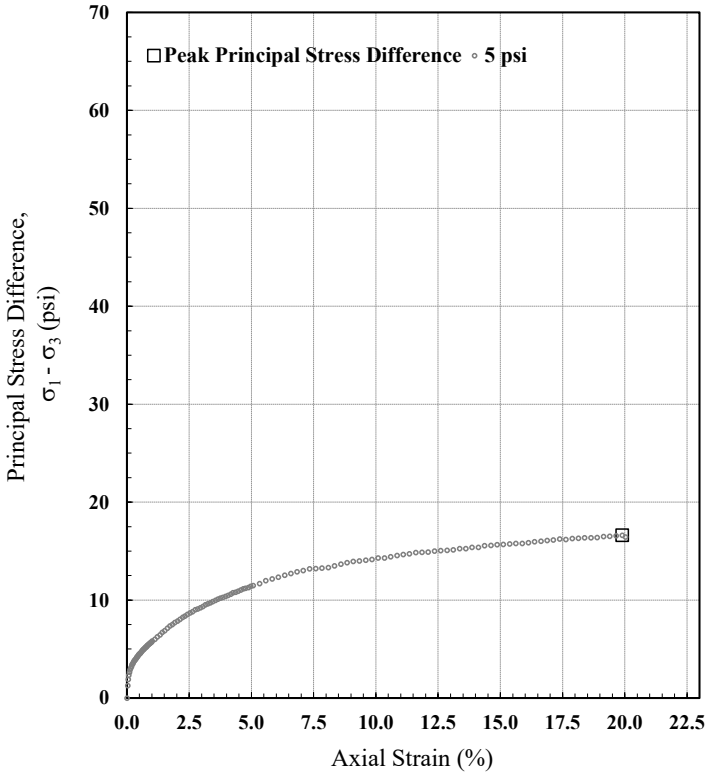
Poorly graded to well-graded sand typically has an effective friction angle of 37 degrees or greater. Using an effective friction angle of 34 degrees for sand is conservative.

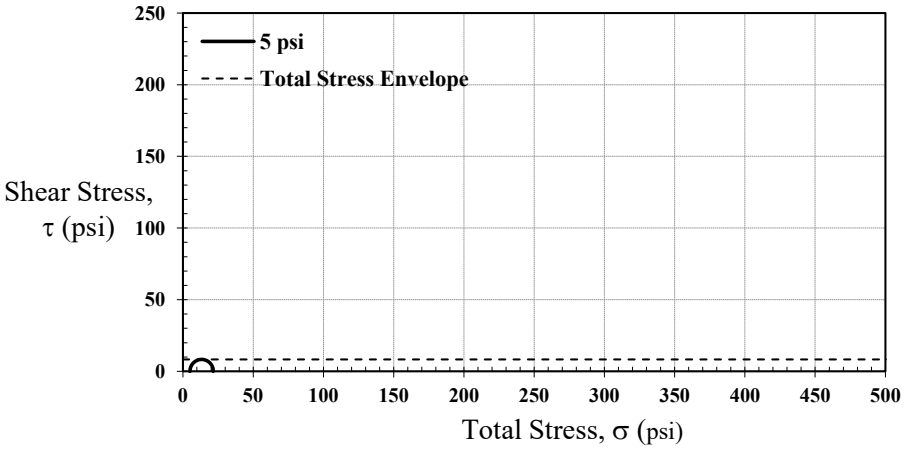
Field Vane Shear		Cohesive Soils	Shear Strength									Upper	Lower
Boring	Elevation (ft MSL)	Simplified Soil Description	Maximum (tsf)	Remolded (tsf)	Fill	Gray Silty Clay	Brown Silty Clay	Gray Clay	Gray Clayey Silt	Brown Clayey Silt	Gray Silt	Clayey Silt	Clayey Silt
B-1LL	528.3	Gray Silty Clay	1.7	0.72		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)			1.734	1.026	1.151429	1.3	0.8975	1.82	0.68	1.34	0.695
		Confidence Interval			0.269189	0.357901	0.595892		0.28021			0.522003	0.048999
		Standard Deviation			0.614221	0.57745	0.804393		0.285934			0.461303	0.035355
		Sample Count			20	10	7	1	4	1	1	3	2
		Lower Bound of Confidence (tsf)			1.464811	0.668099	0.555537	1.3	0.61729	1.82	0.68	0.817997	0.646001
		Lower Bound of Confidence (psf)			2929.621	1336.198	1111.074	2600	1234.579	3640	1360	1635.993	1292.002

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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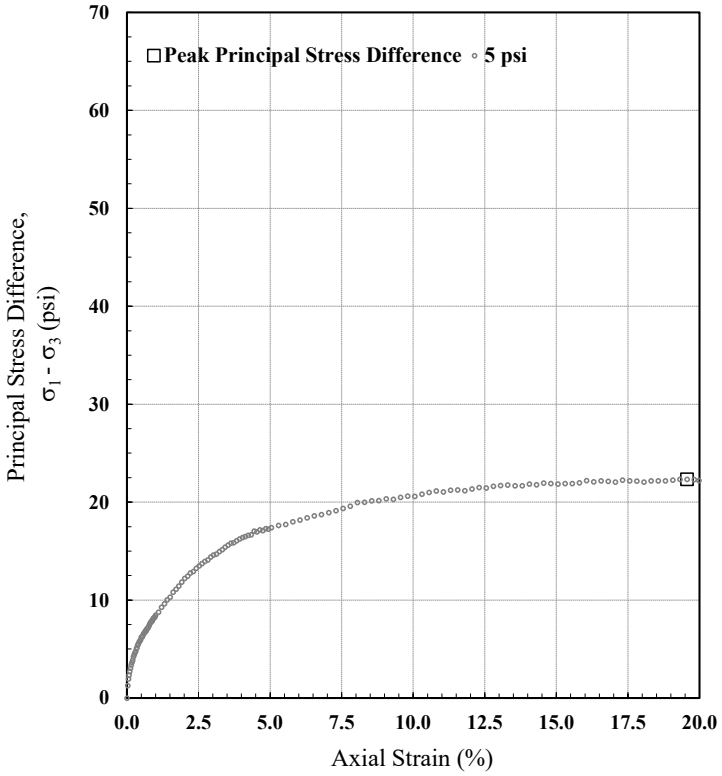
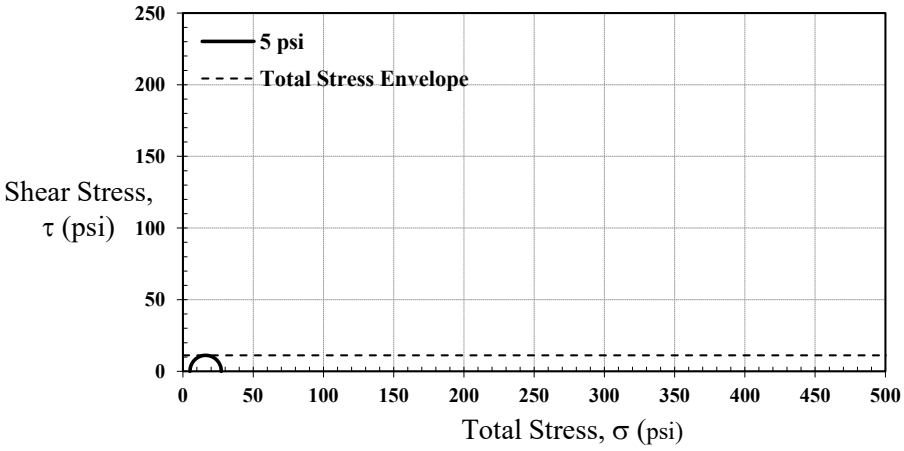
Unconsolidated-Undrained (Q) Triaxial Compression

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.

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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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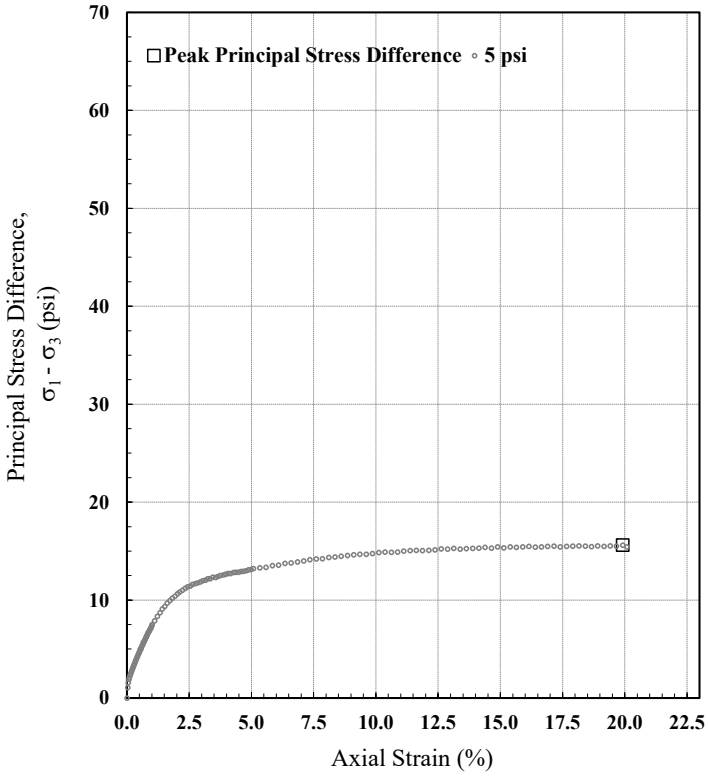
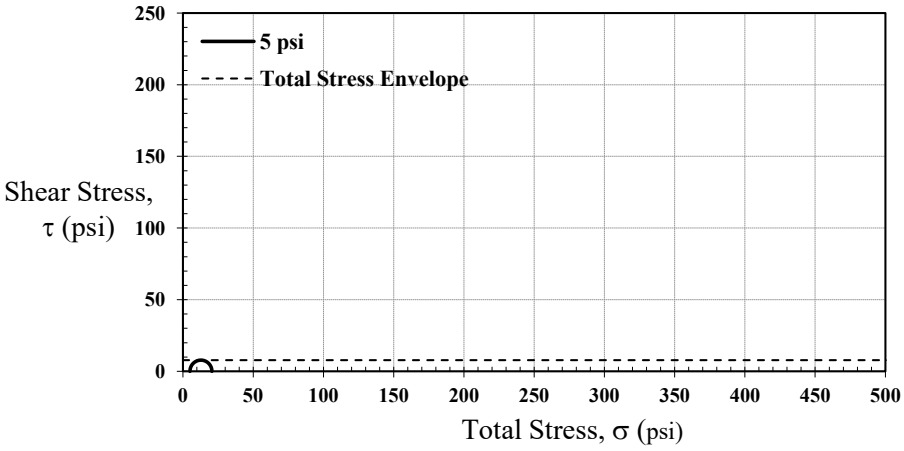
Unconsolidated-Undrained (Q) Triaxial Compression

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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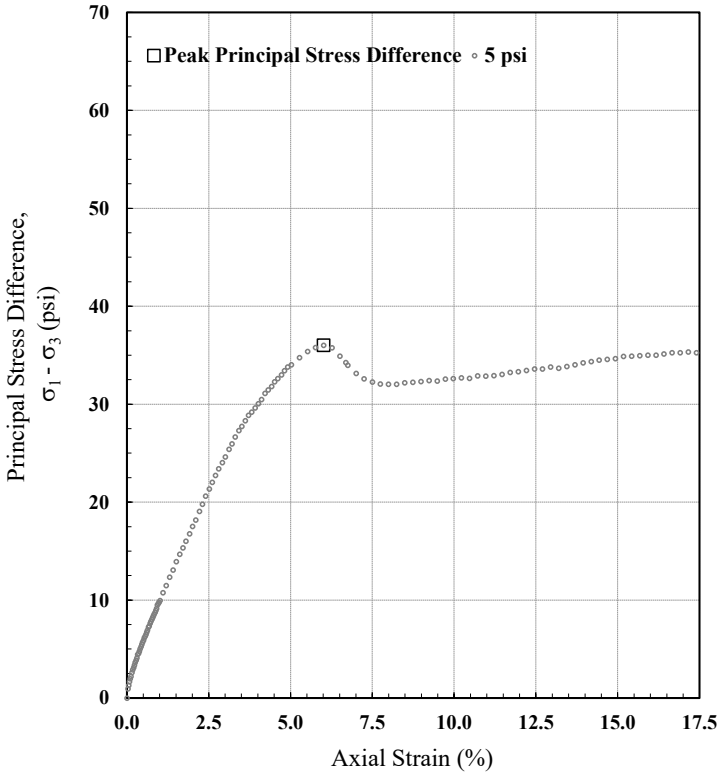
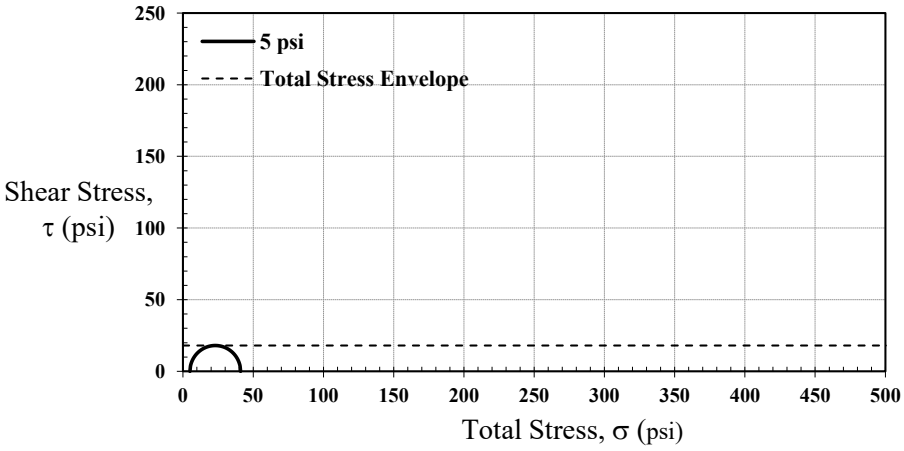
Unconsolidated-Undrained (Q) Triaxial Compression

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
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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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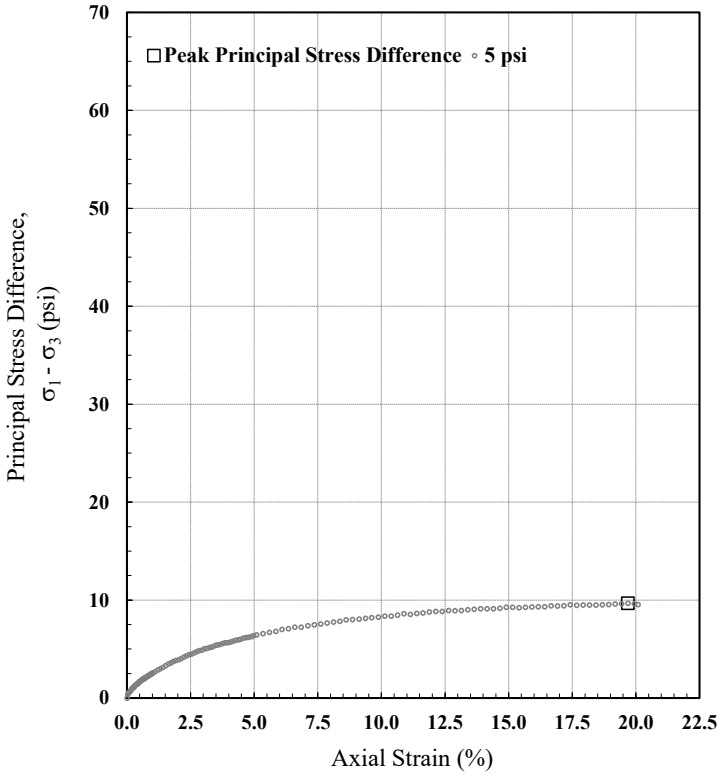
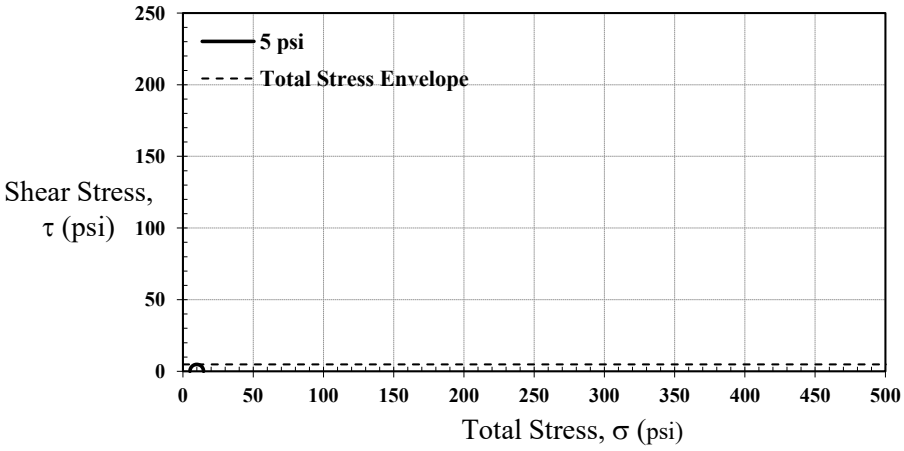
Unconsolidated-Undrained (Q) Triaxial Compression

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)

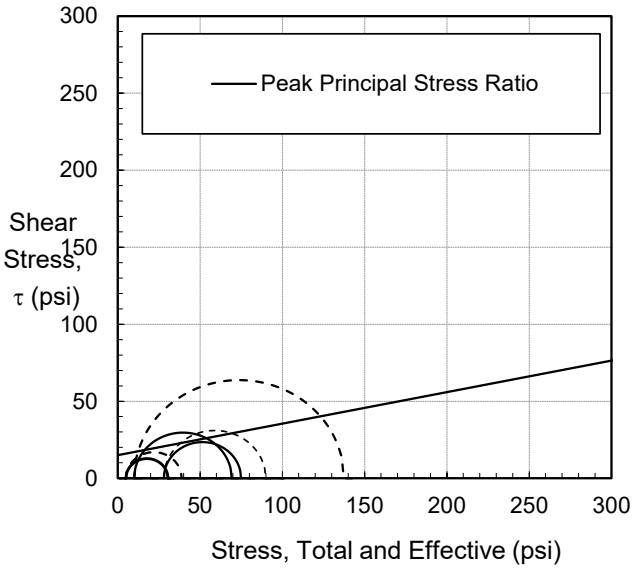
TRI Log #: 25-02906.5
Test Method: ASTM D4767

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

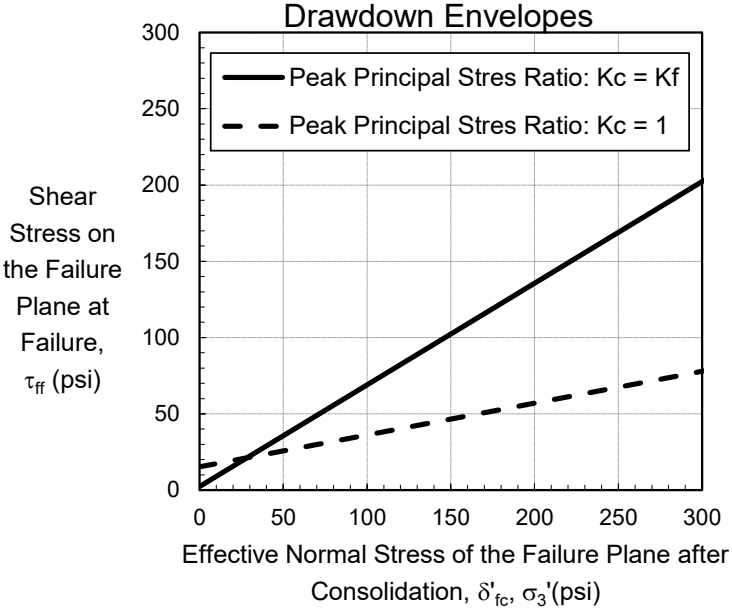
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	32.6	33.7
Effective Cohesion (psi)	c'	3.1	2.3

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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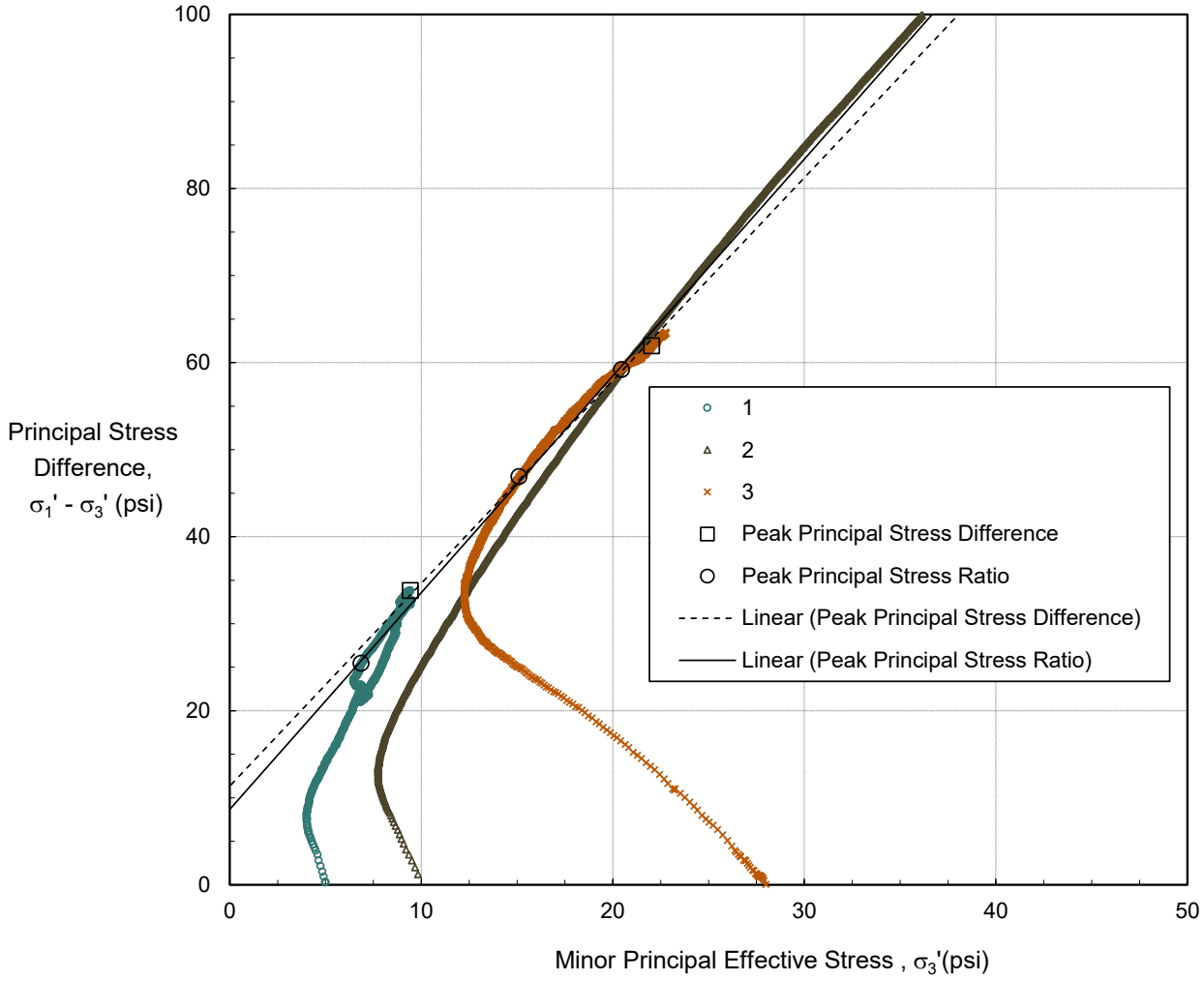
Consolidated-Undrained Triaxial Compression

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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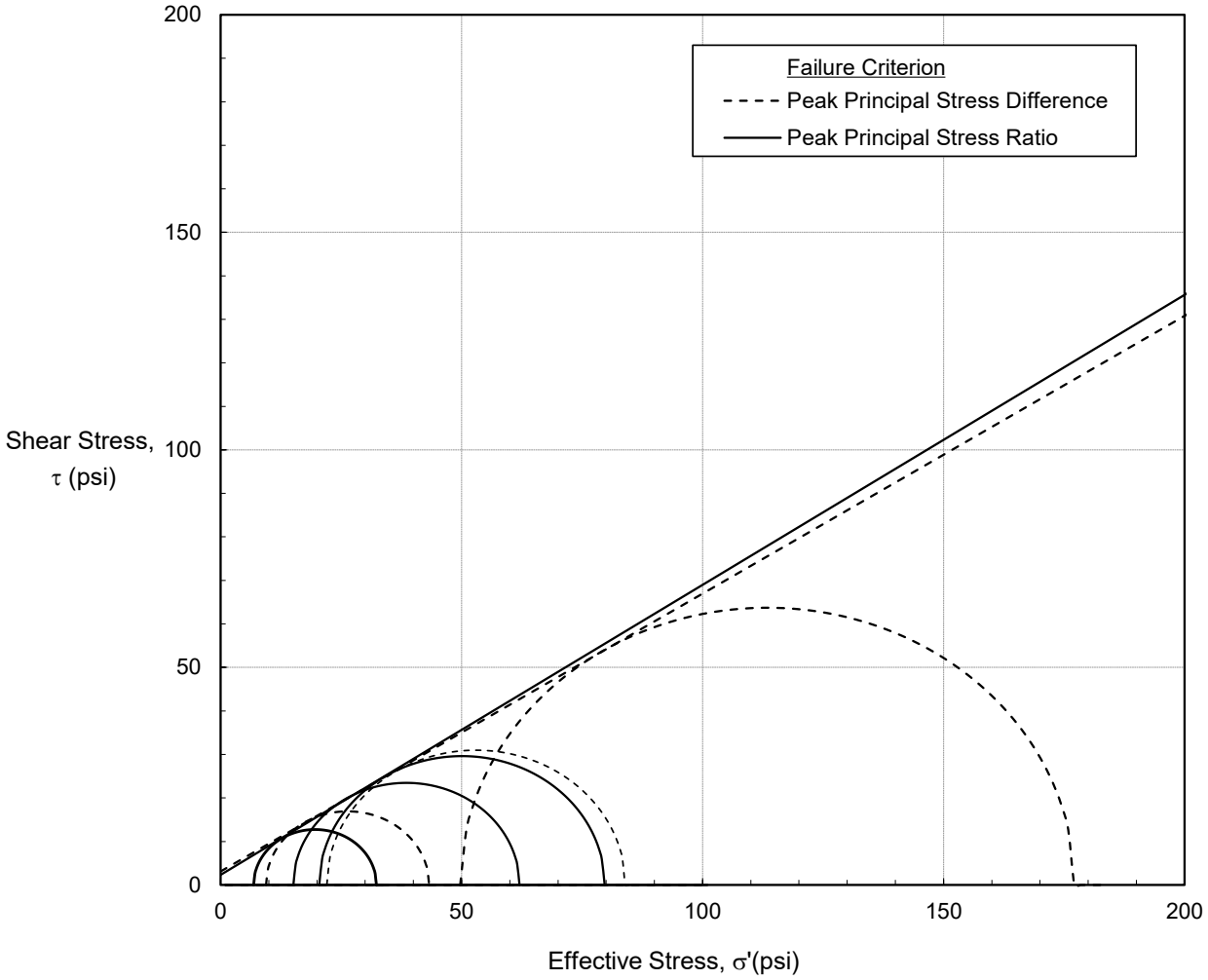
Consolidated-Undrained Triaxial Compression

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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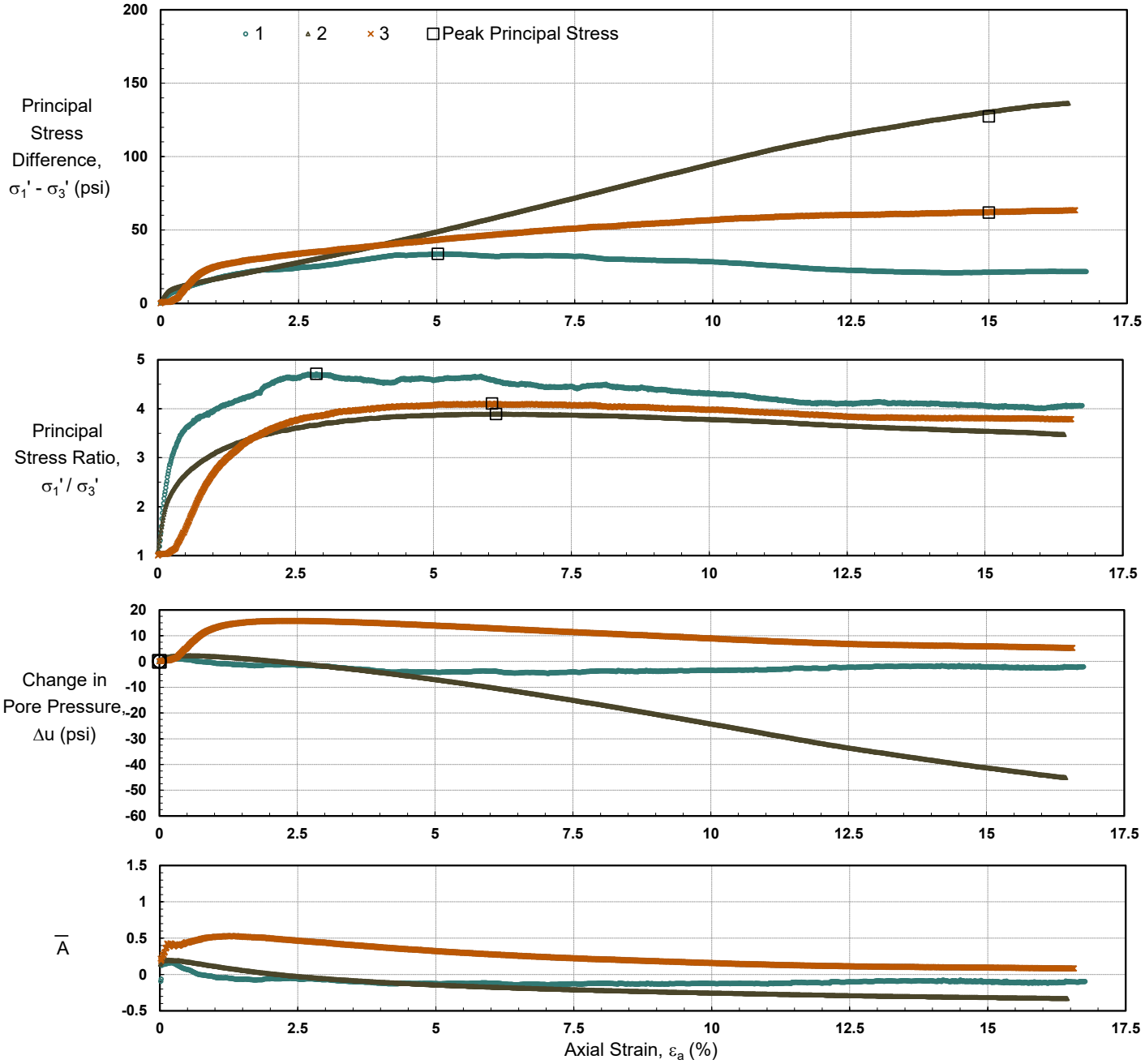
Consolidated-Undrained Triaxial Compression

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



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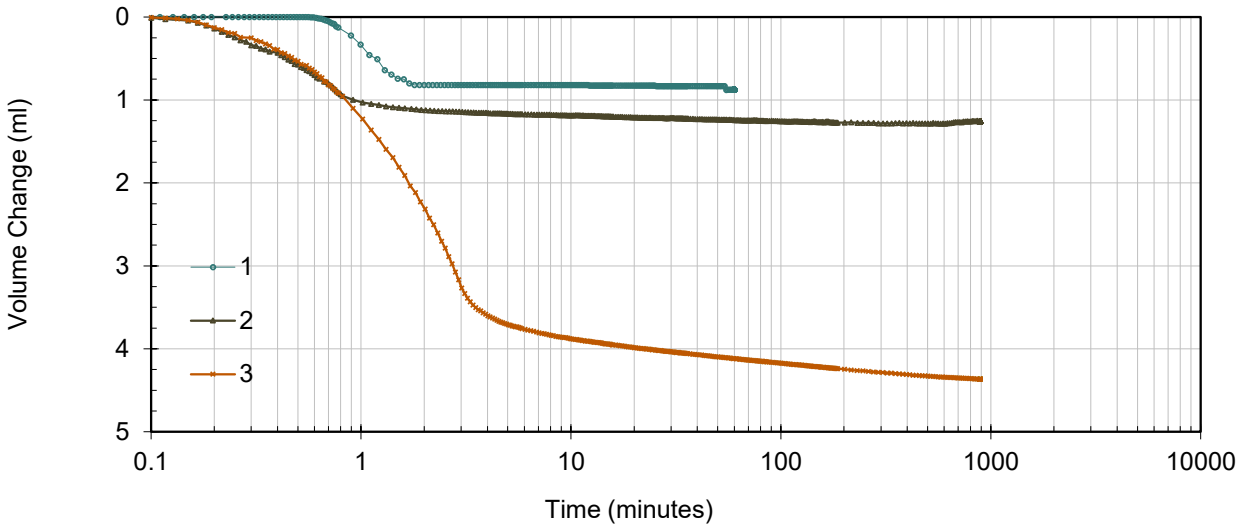
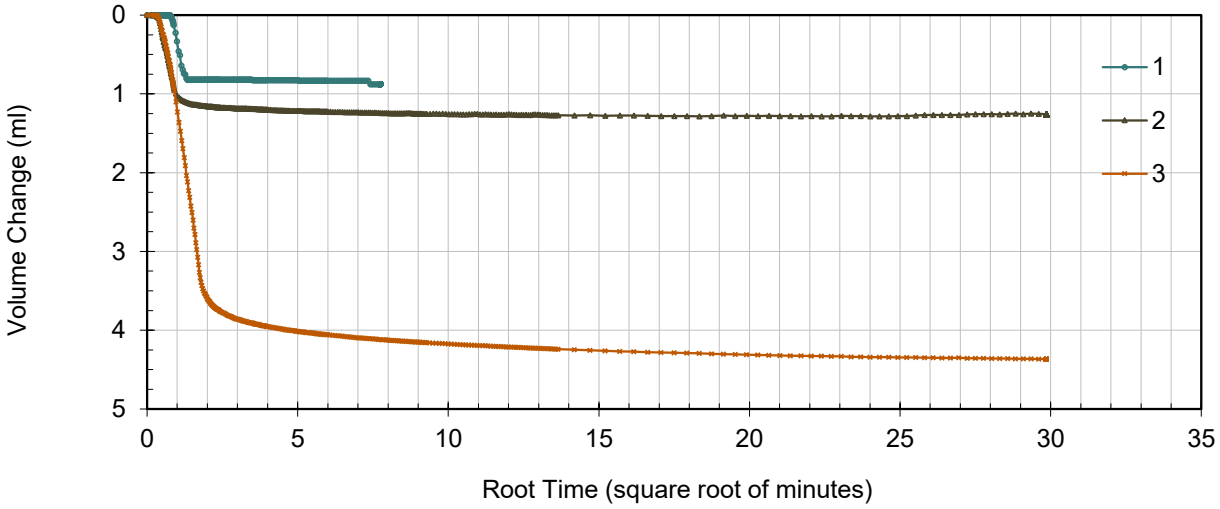
Consolidated-Undrained Triaxial Compression

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

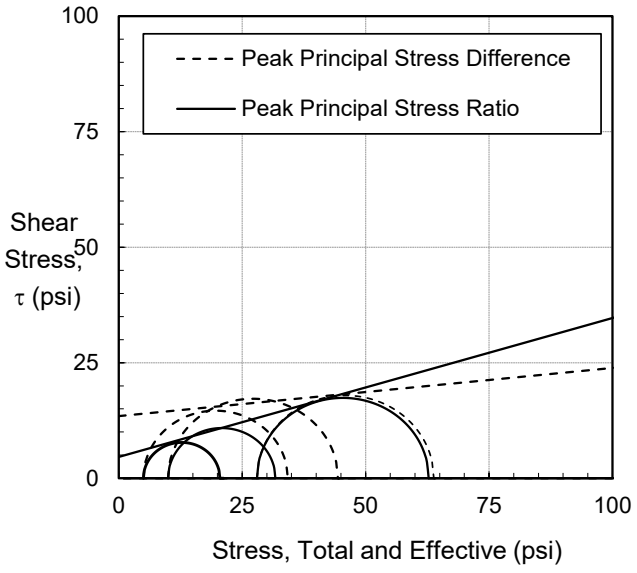
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

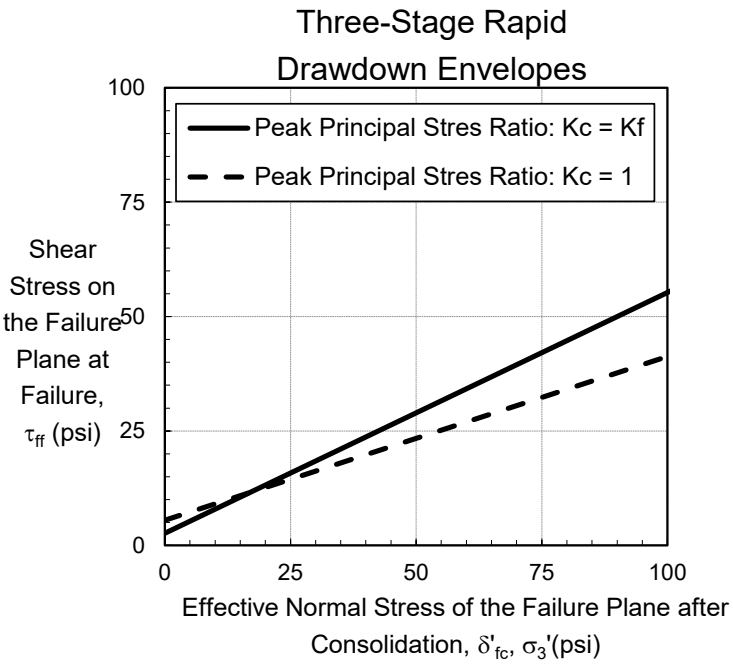
TRI Log #: 25-02906.8
Test Method: ASTM D4767

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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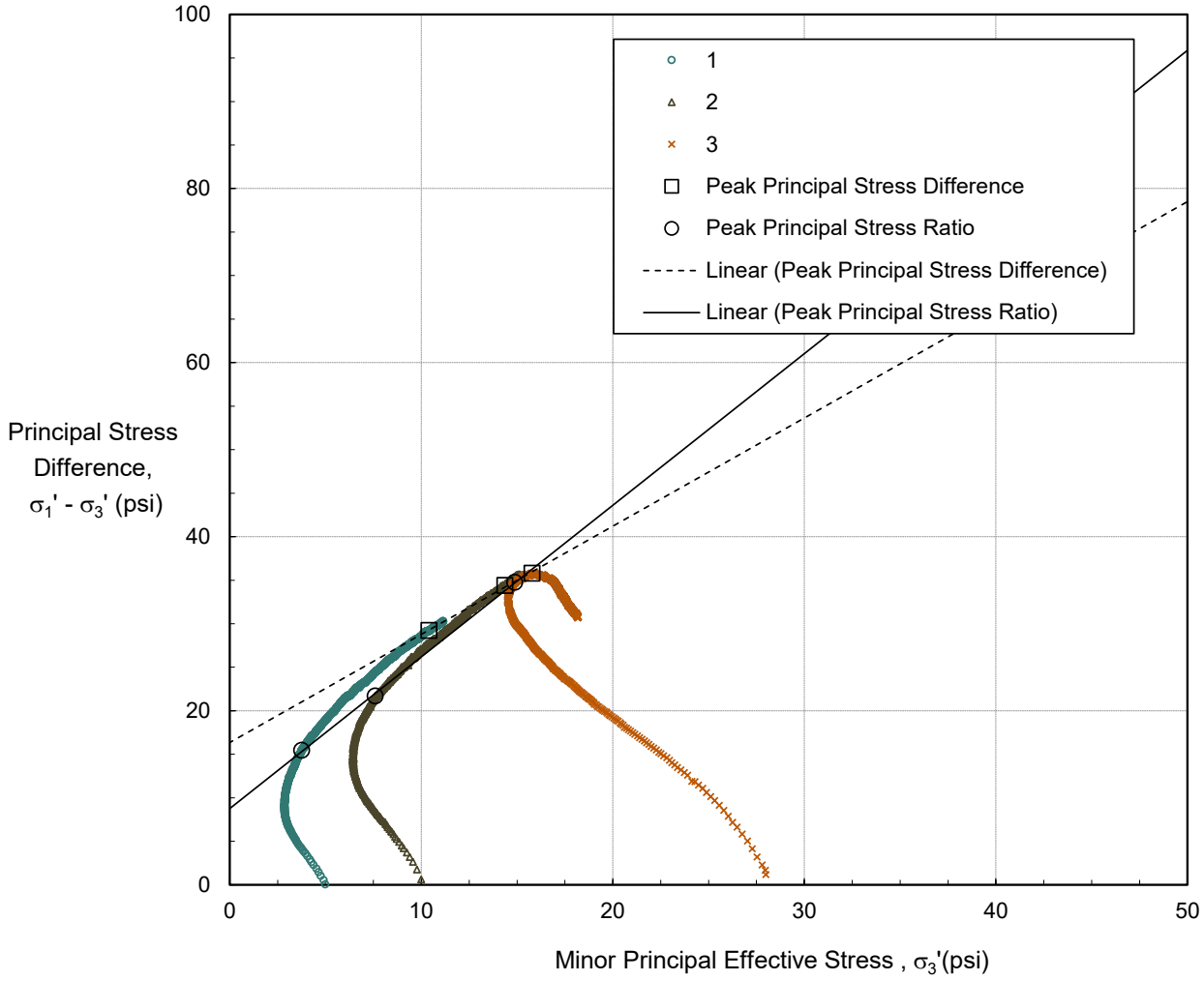
Consolidated-Undrained Triaxial Compression

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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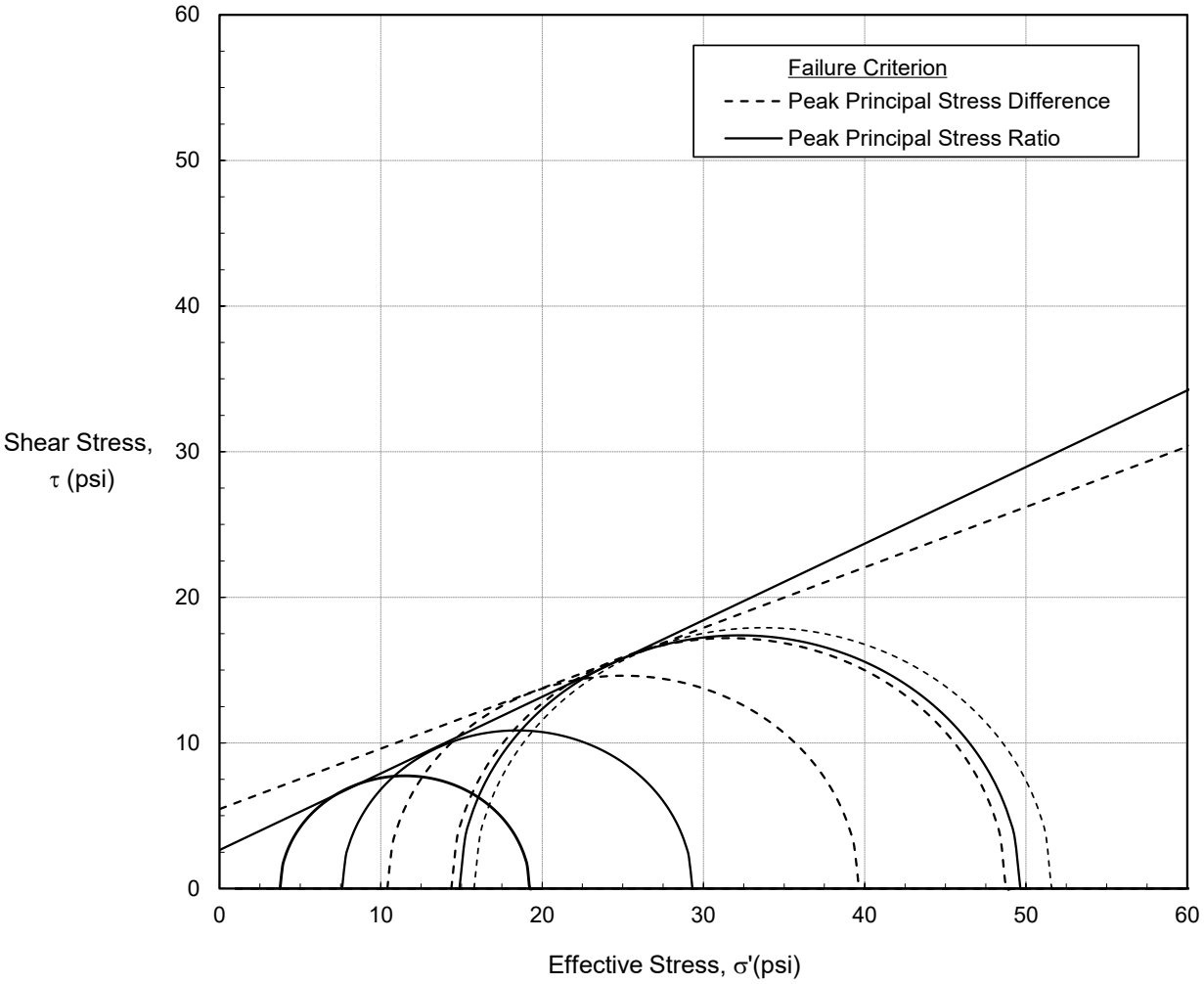
Consolidated-Undrained Triaxial Compression

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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Sample B-6-1 (7-8_ft)

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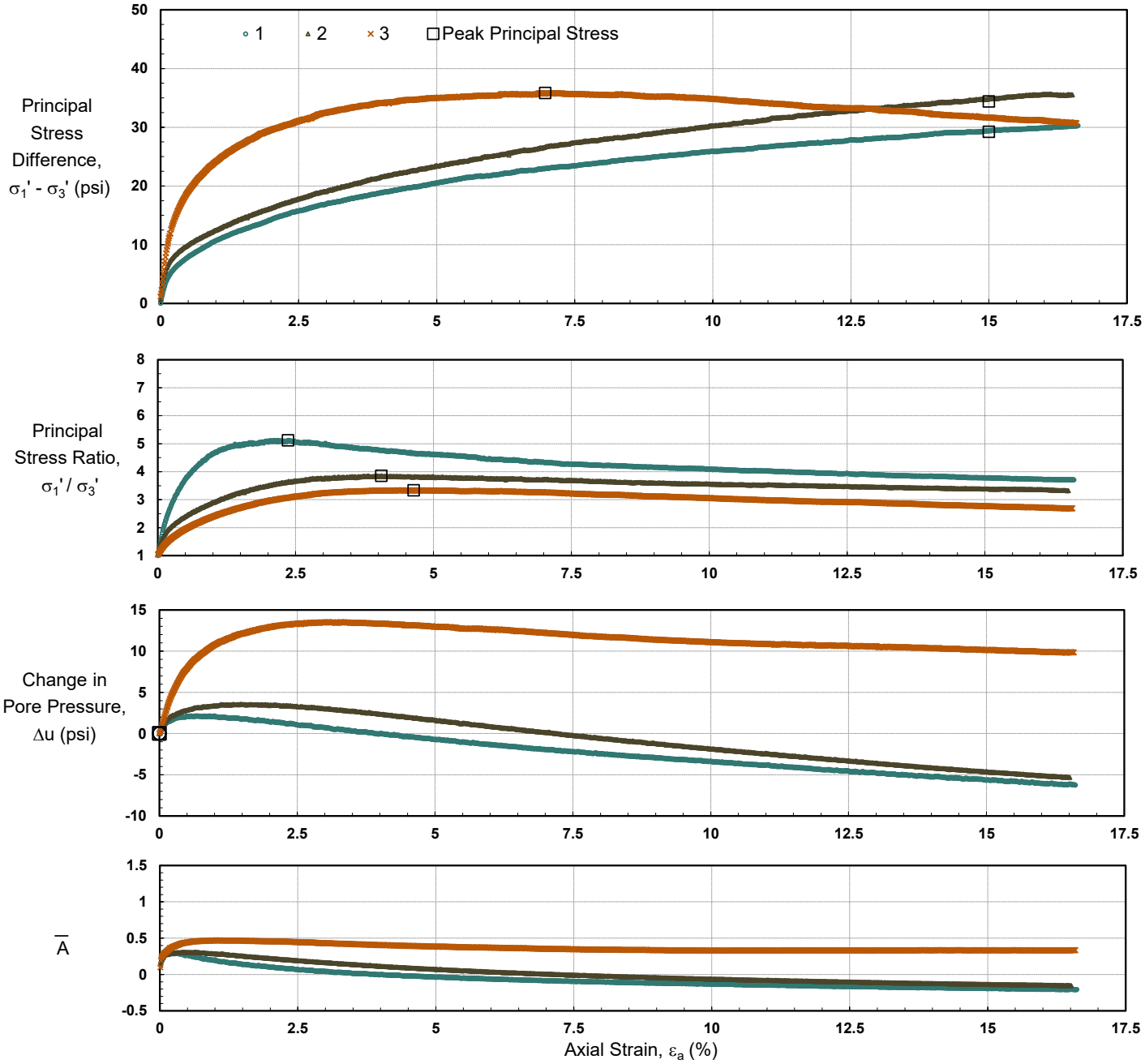

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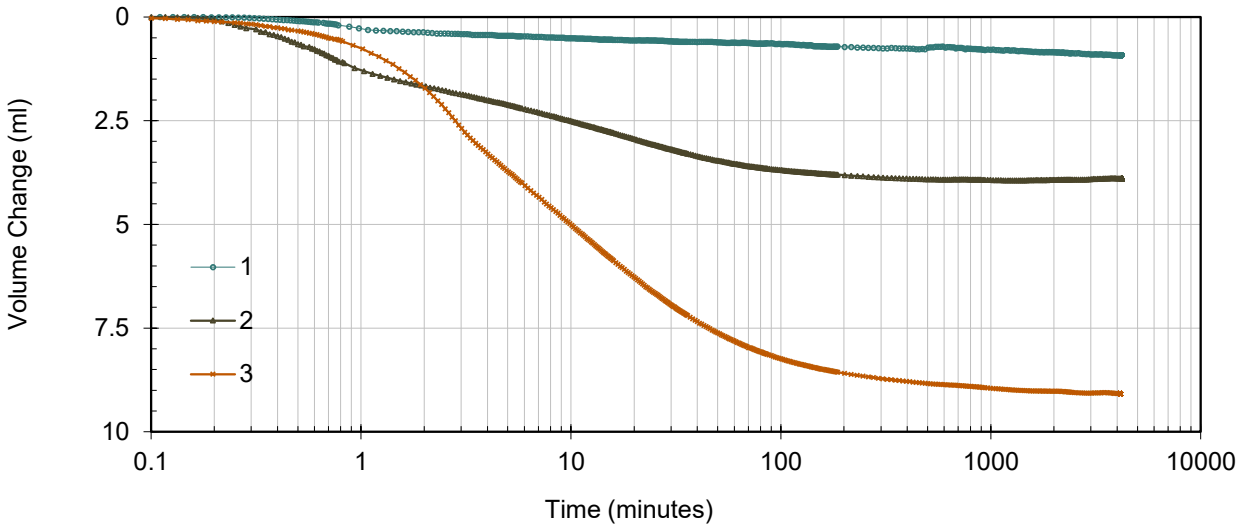
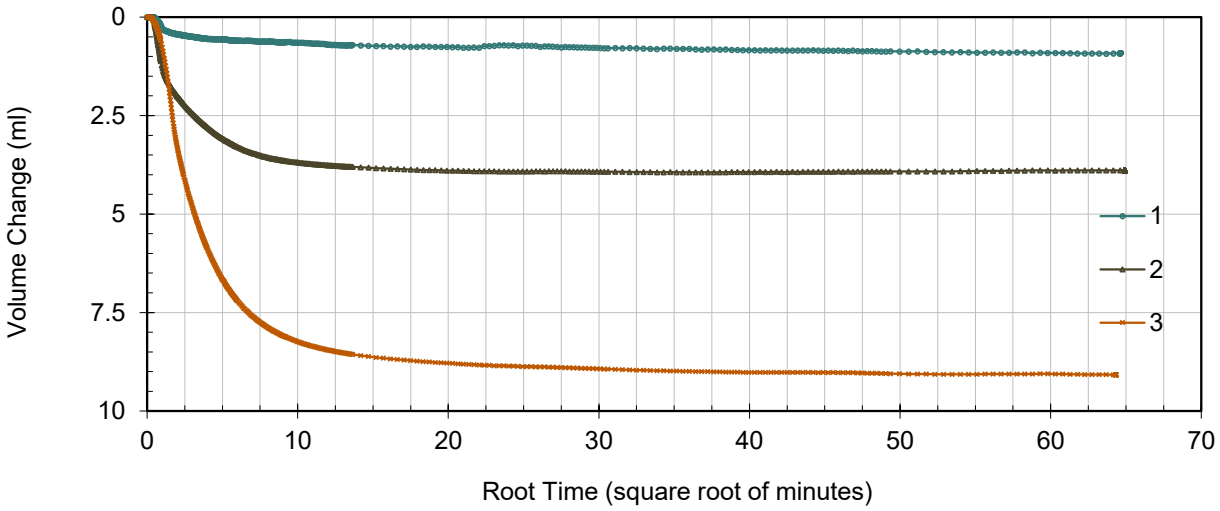
Sample B-6-1 (7-8_ft)

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)

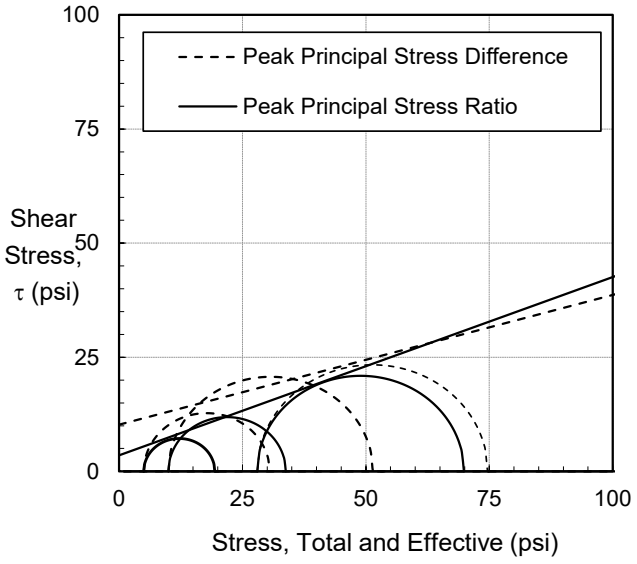
TRI Log #: 25-02906.9
Test Method: ASTM D4767

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

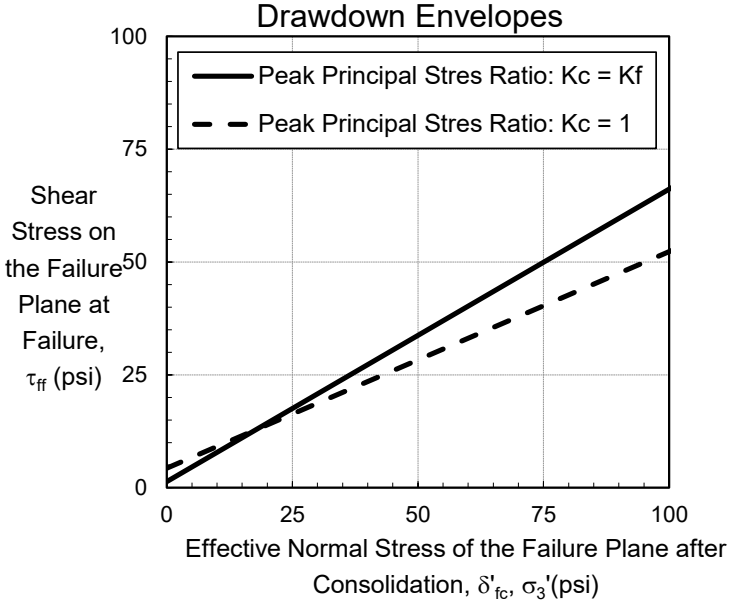
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	32.0	32.9
Effective Cohesion (psi)	c'	1.7	1.3

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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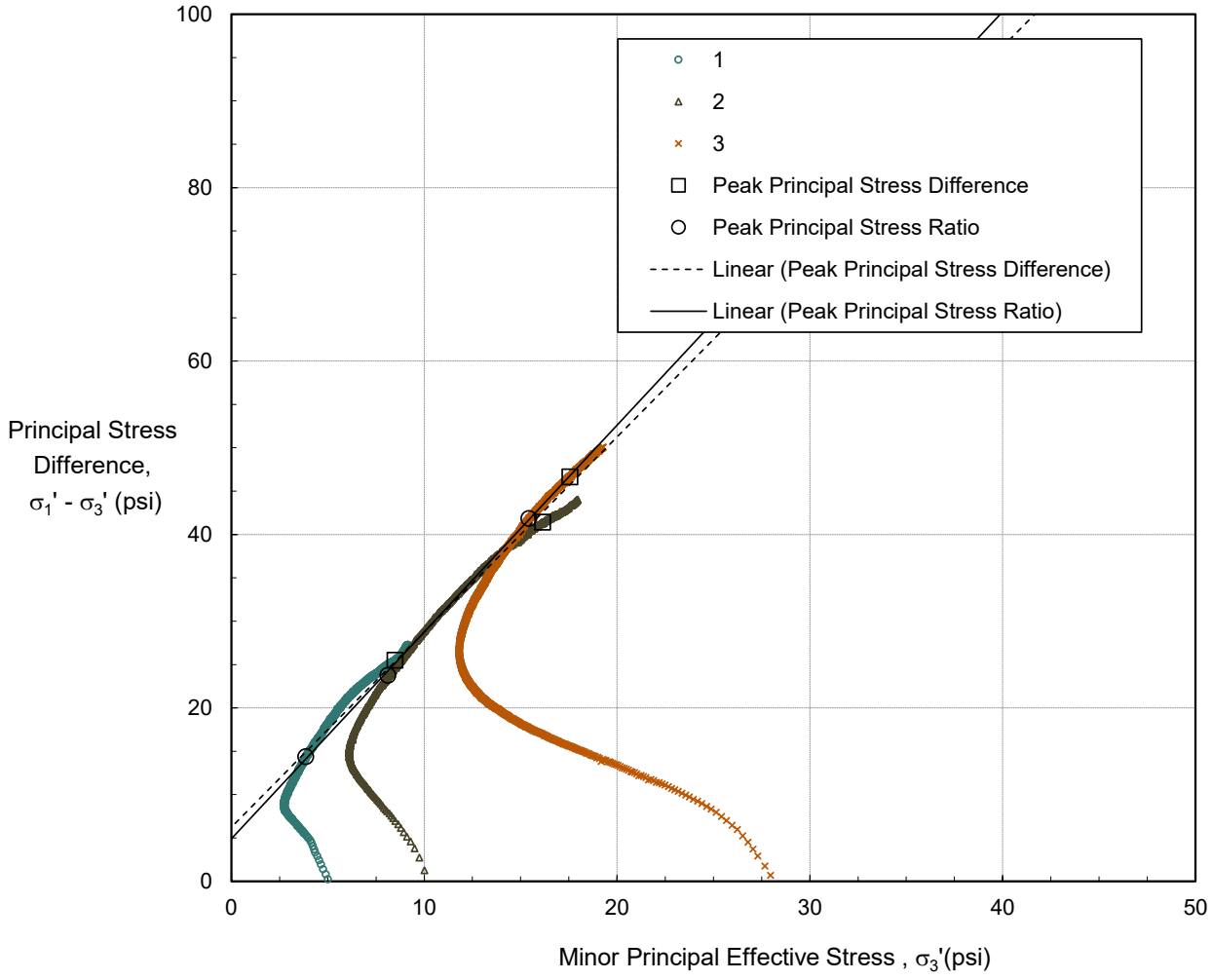
Consolidated-Undrained Triaxial Compression

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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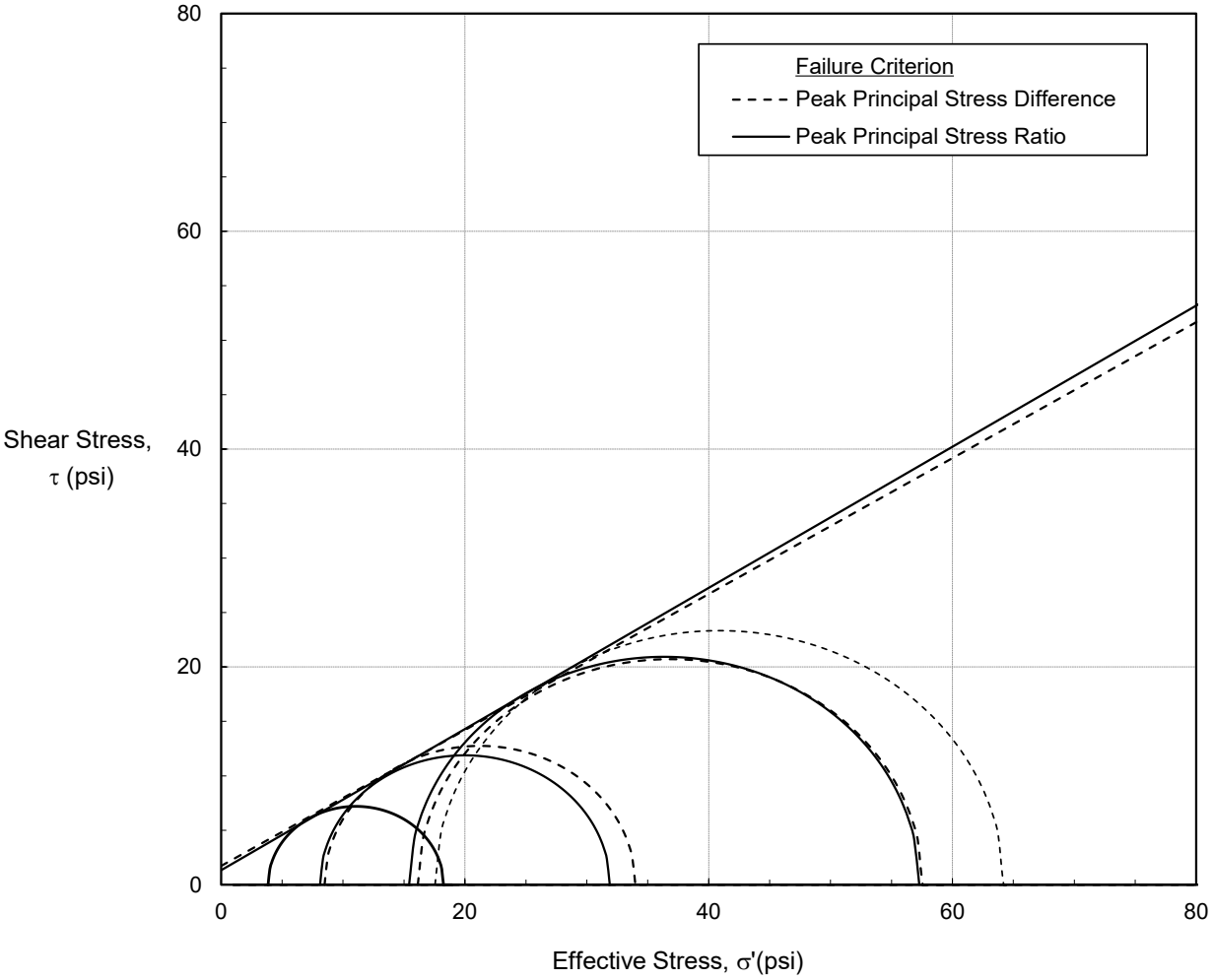
Consolidated-Undrained Triaxial Compression

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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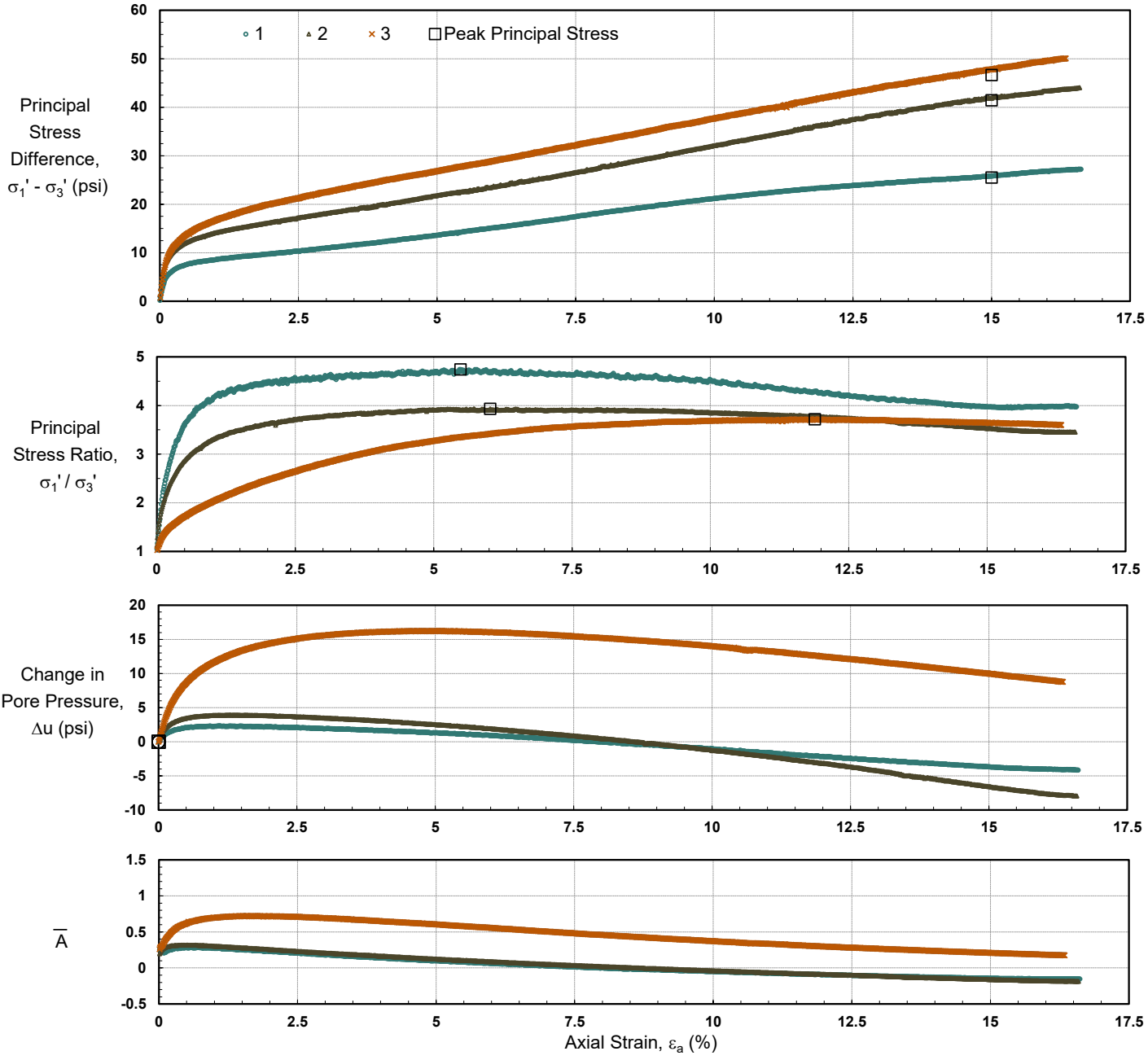
Sample: B-6/2 (8-9_ft)

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



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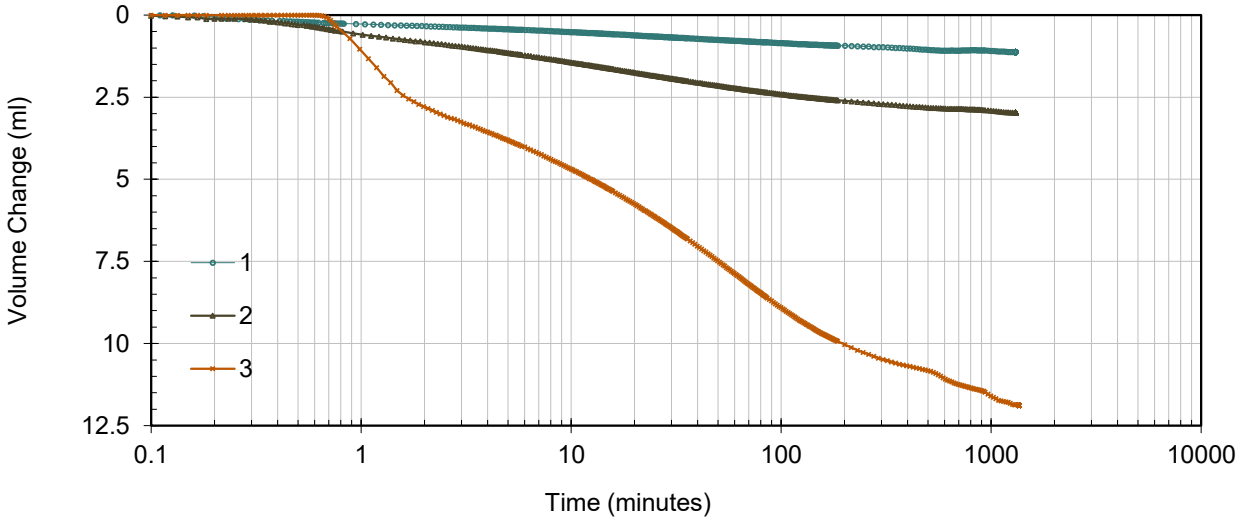
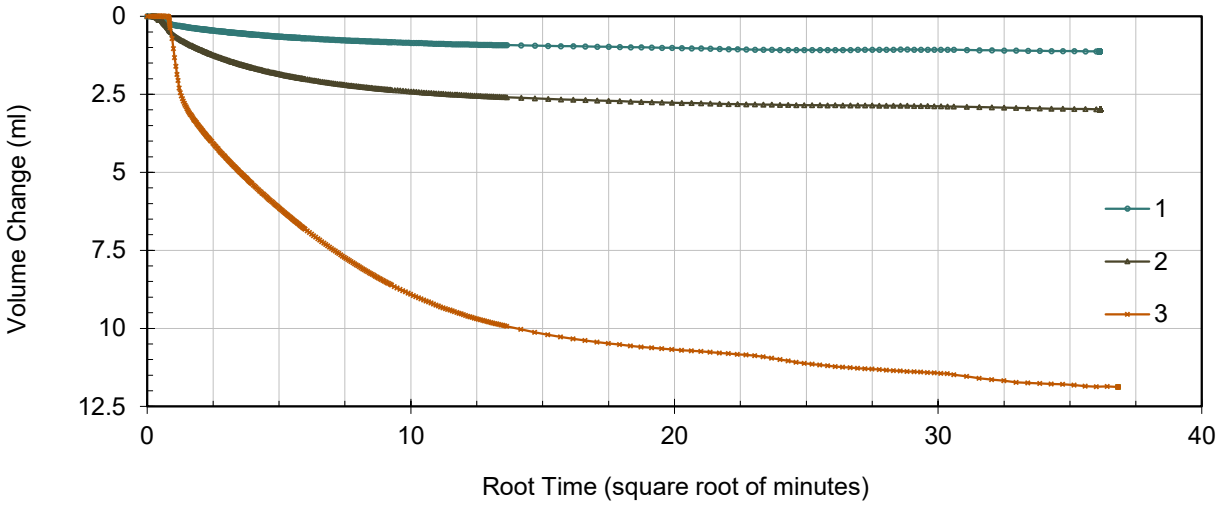
Consolidated-Undrained Triaxial Compression

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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9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

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

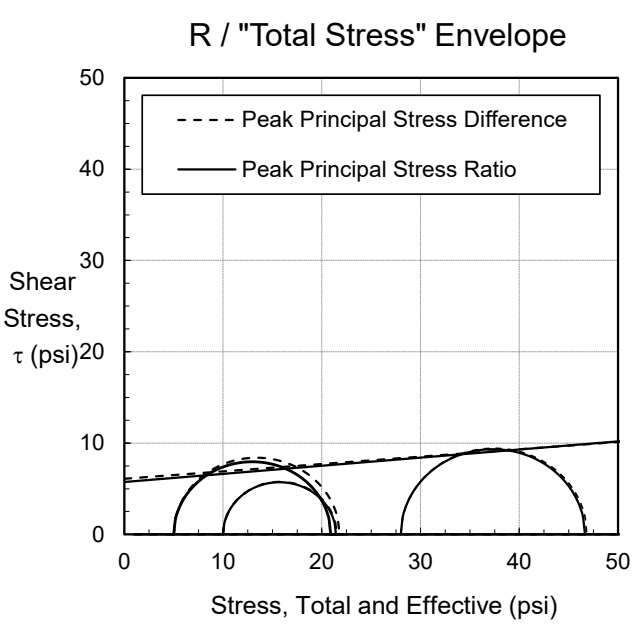
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

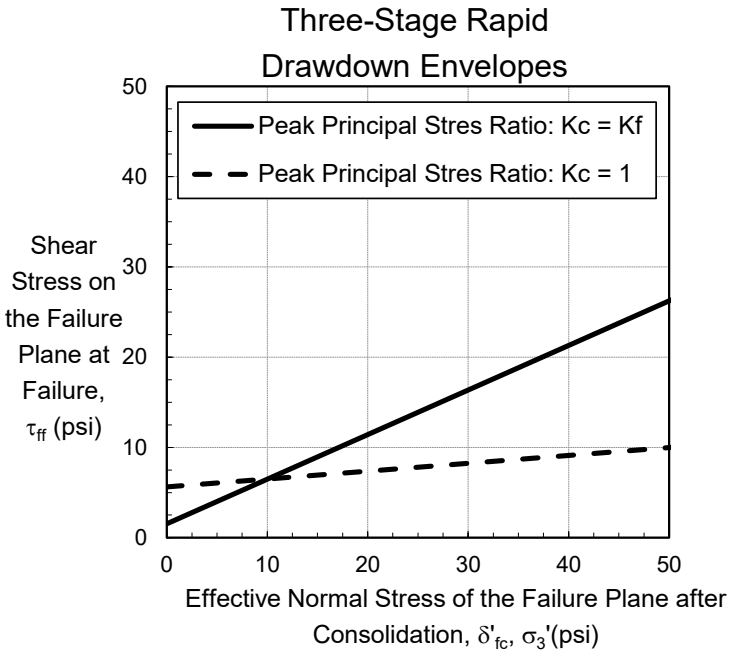
TRI Log #: 25-02906.11
Test Method: ASTM D4767

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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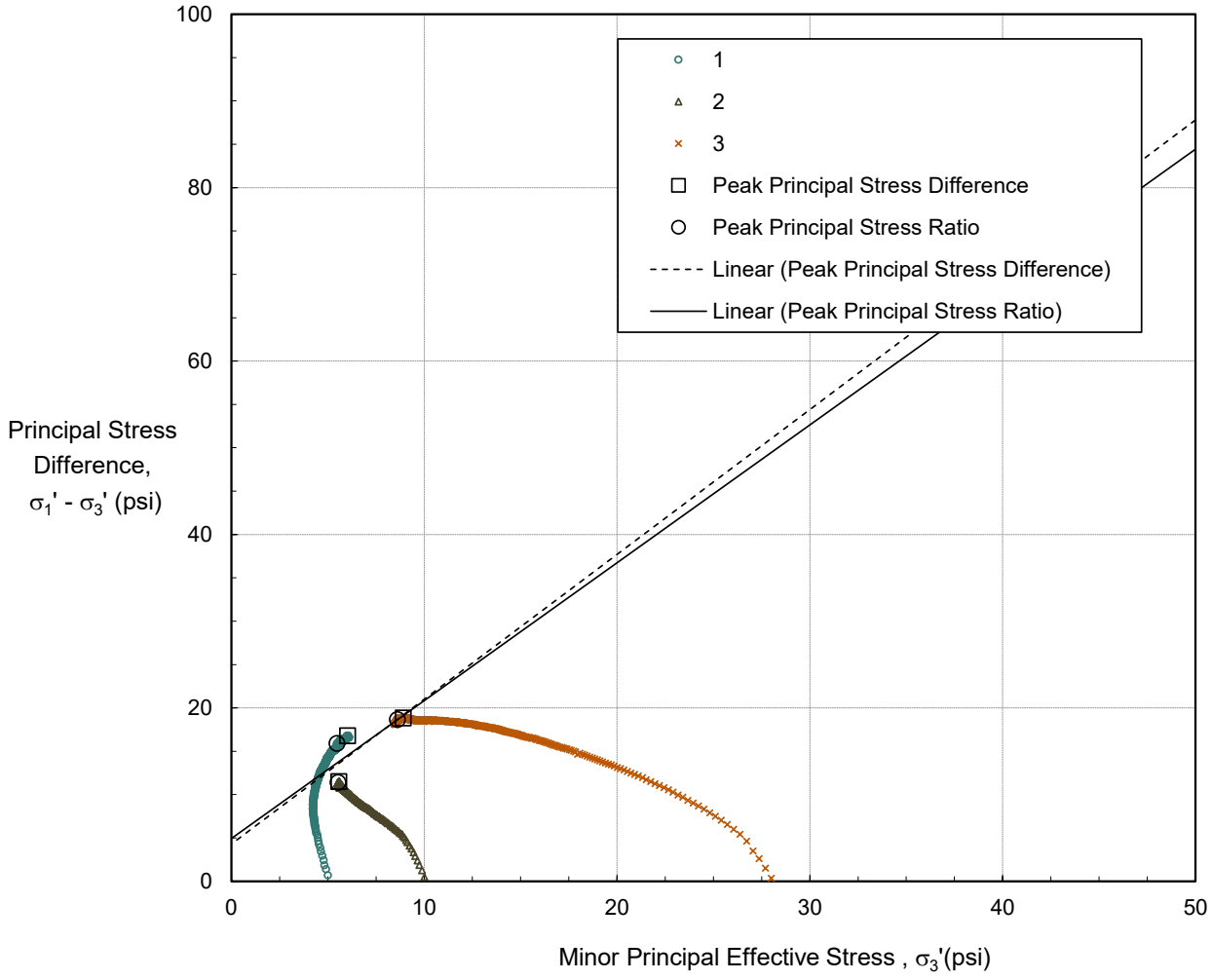
Consolidated-Undrained Triaxial Compression

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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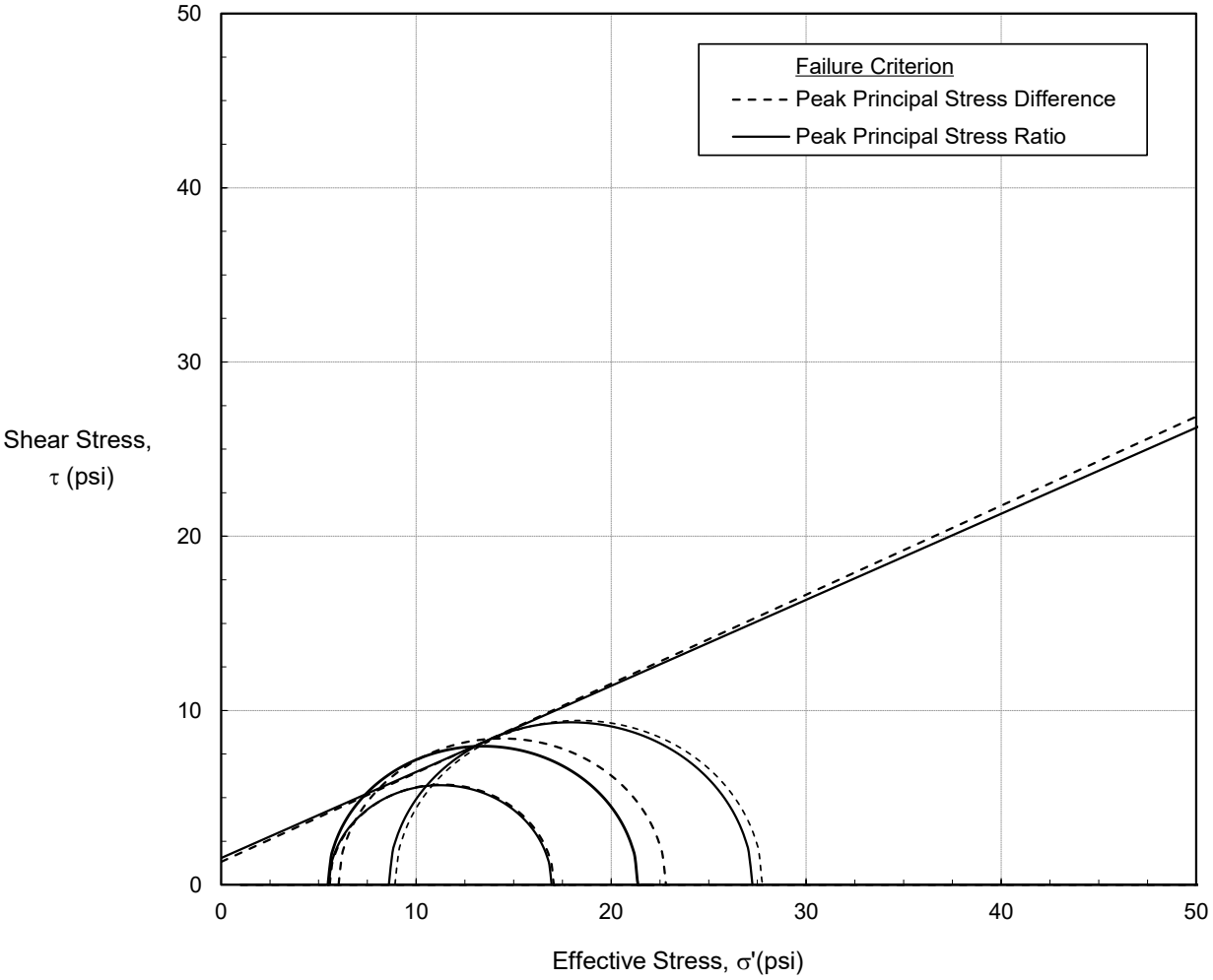
Consolidated-Undrained Triaxial Compression

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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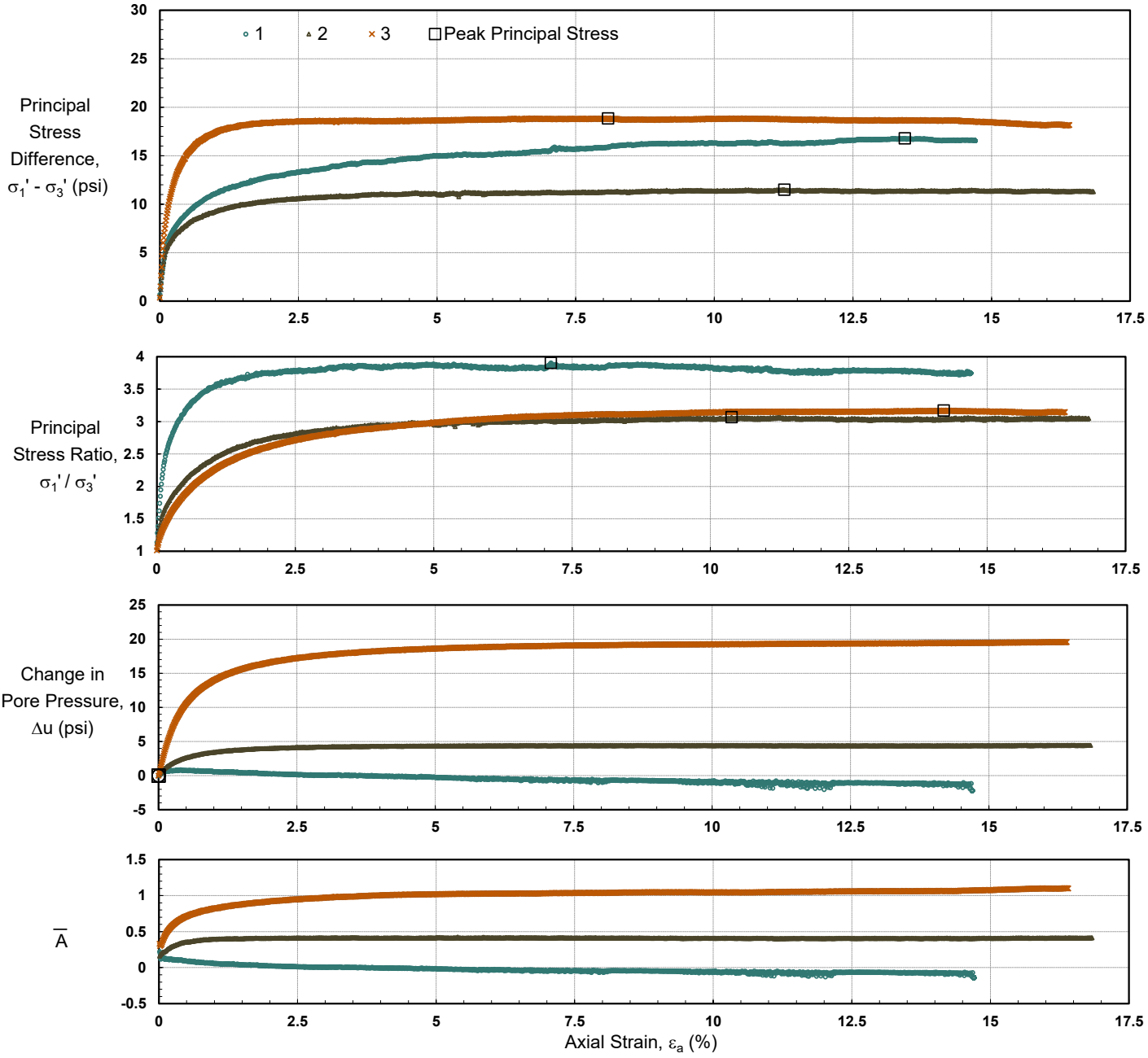

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Consolidated-Undrained Triaxial Compression

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Sample: B-7L-2 (13-15_ft)

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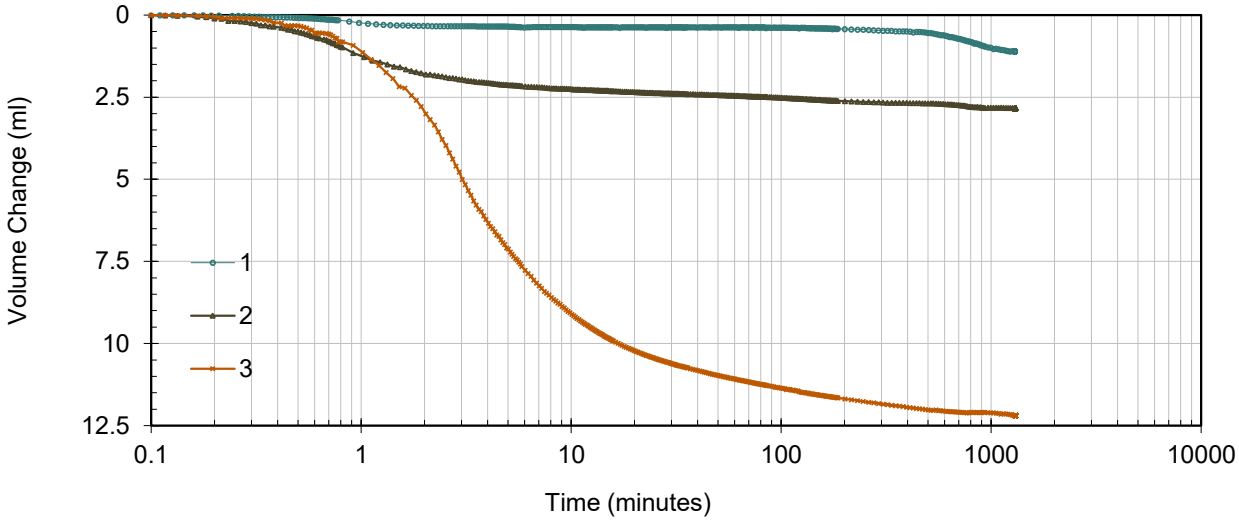
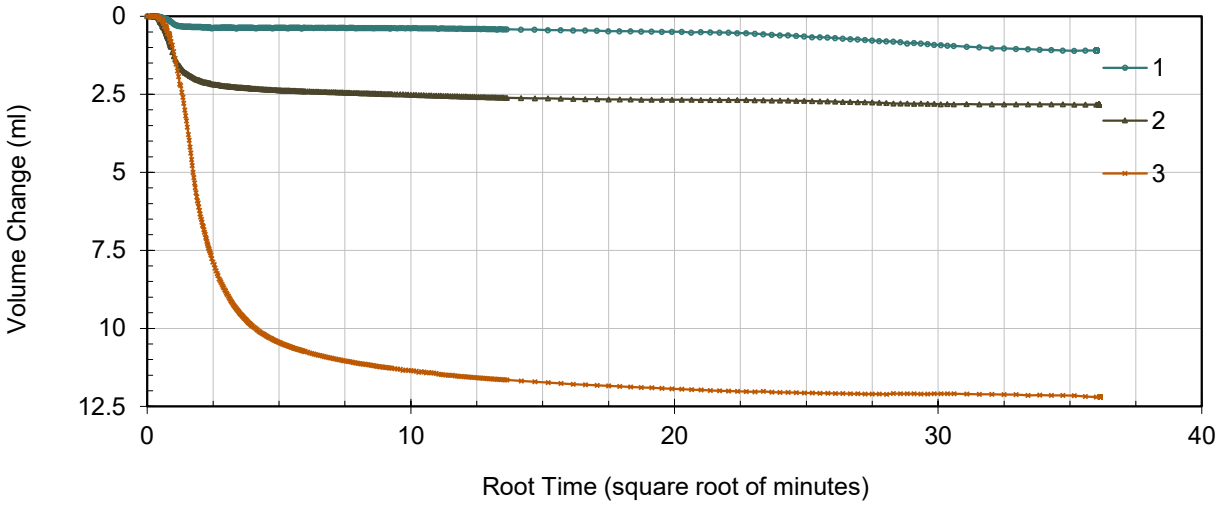
Consolidation





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9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

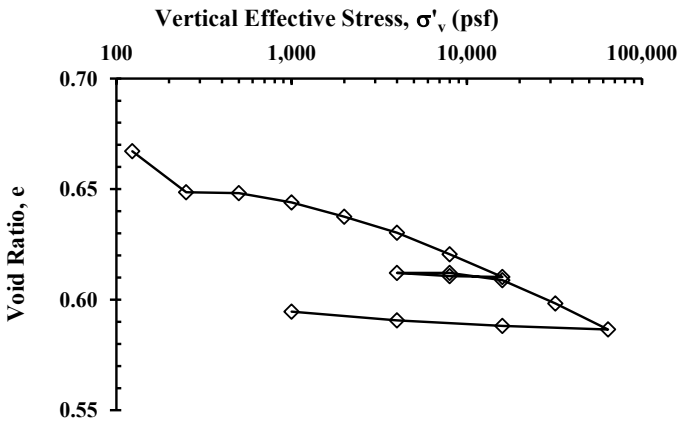
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

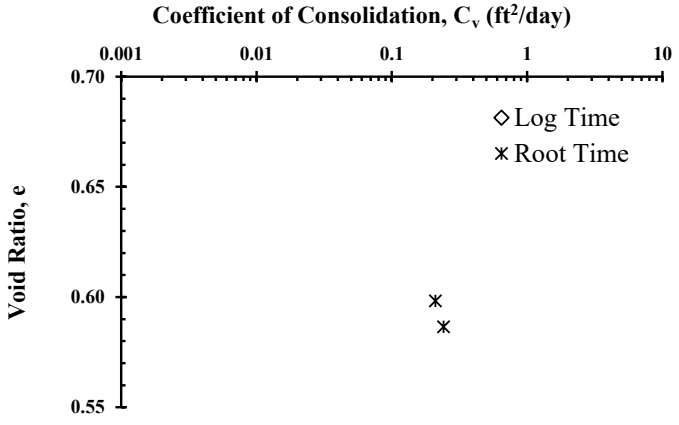
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

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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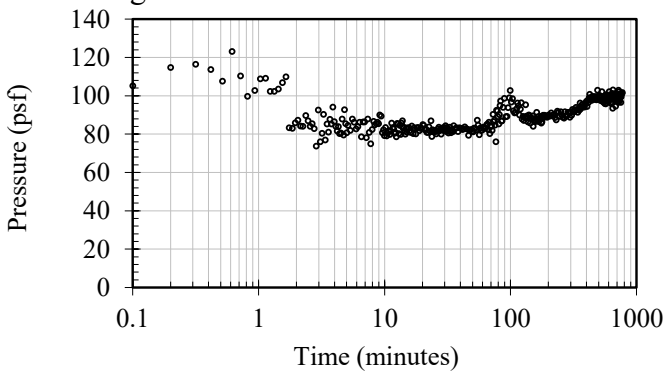
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

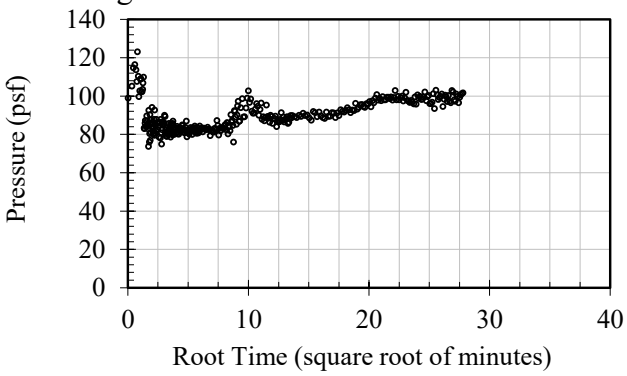
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

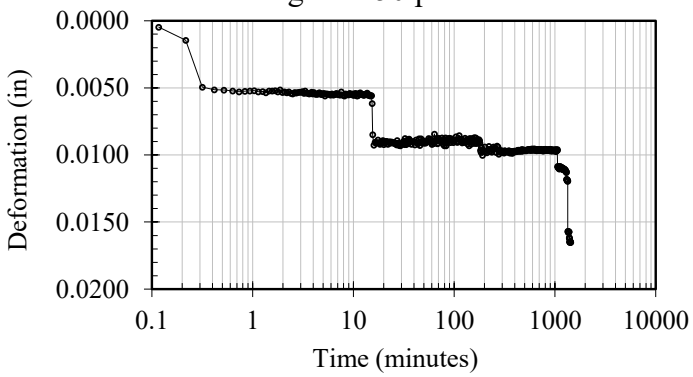
Stage 1: Swell Pressure Measurement



Stage 1: Swell Pressure Measurement



Stage 2: 250 psf



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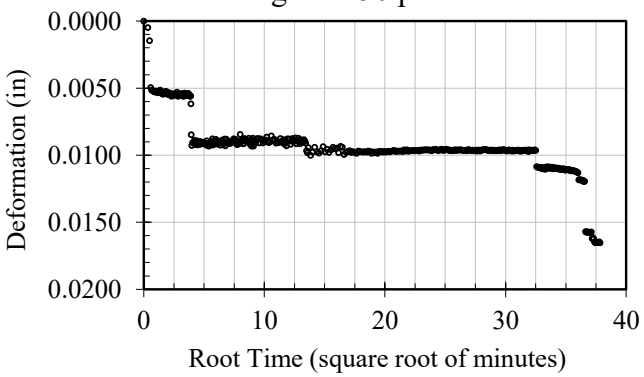
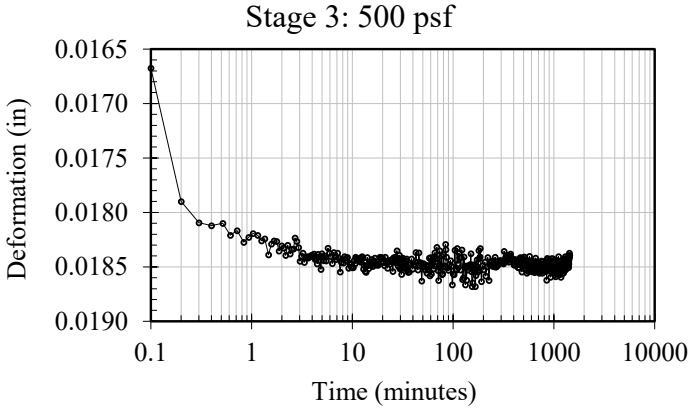
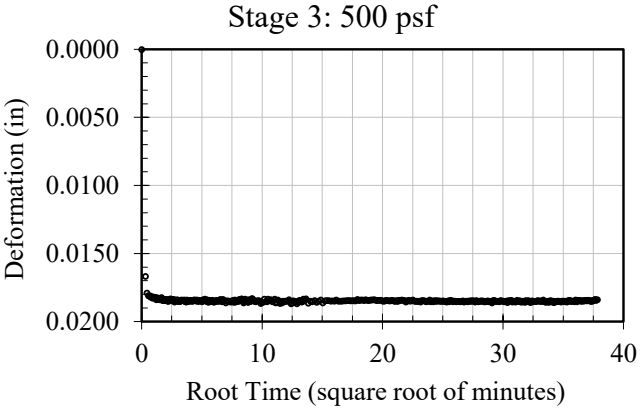


Stage 3: 500 psf



Stage 3: 500 psf



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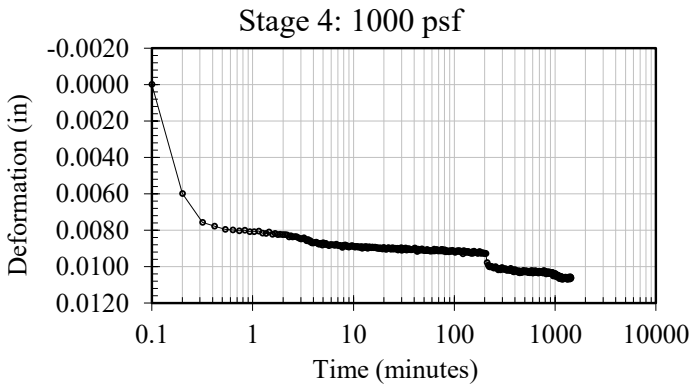
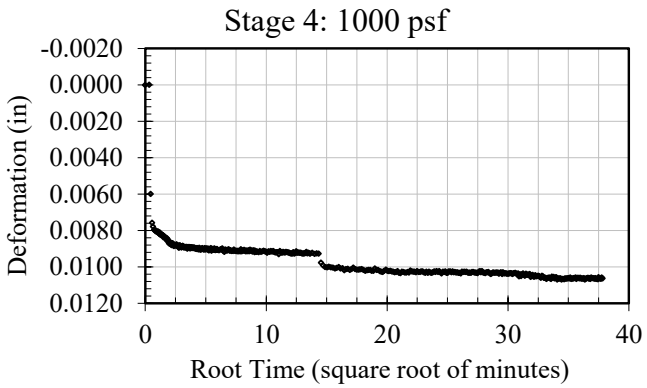
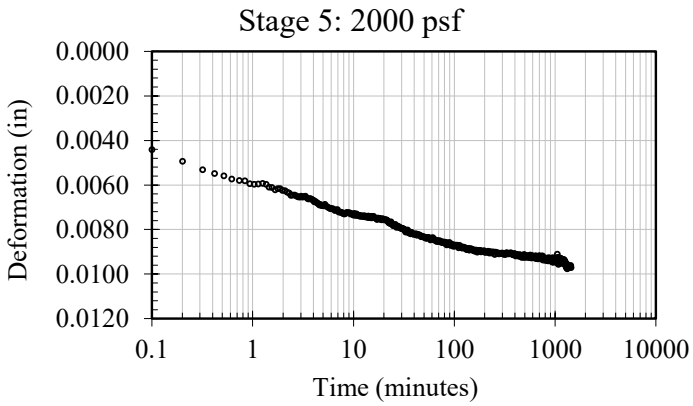
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

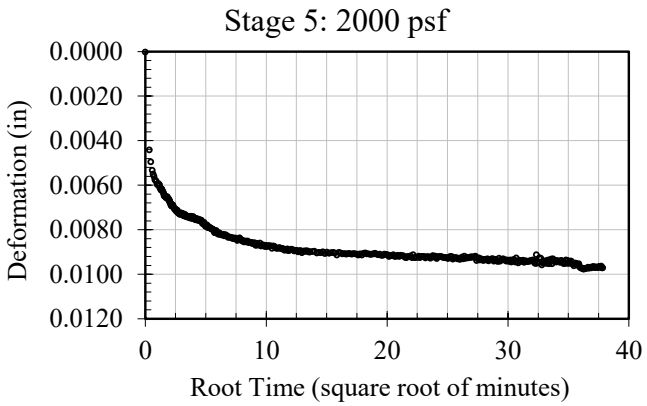
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

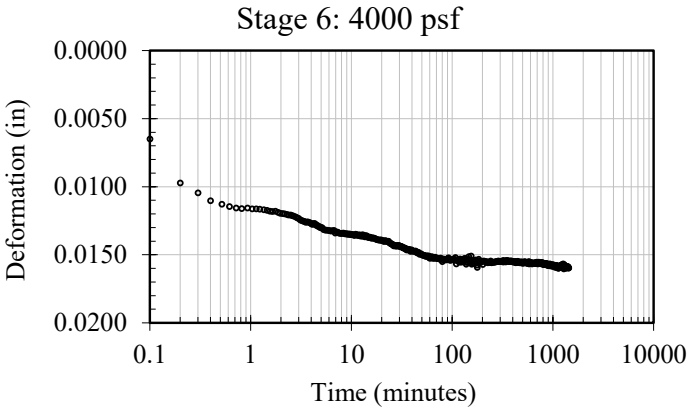
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

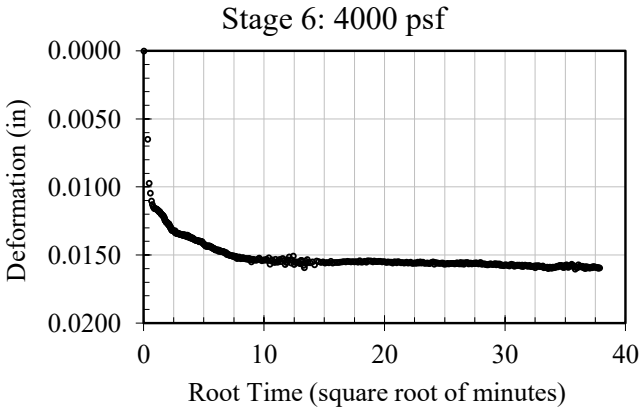












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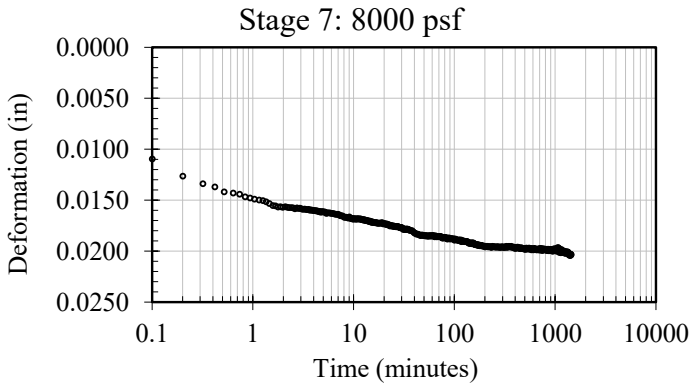
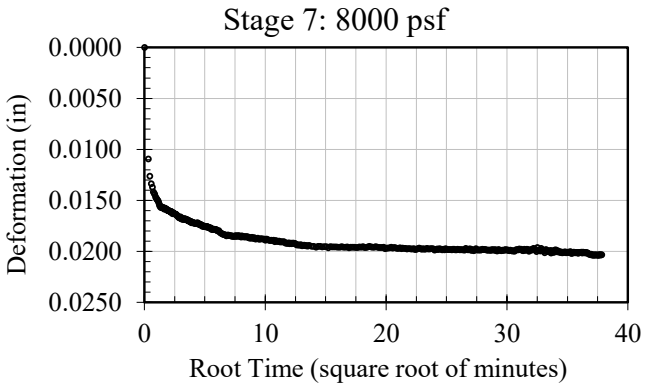
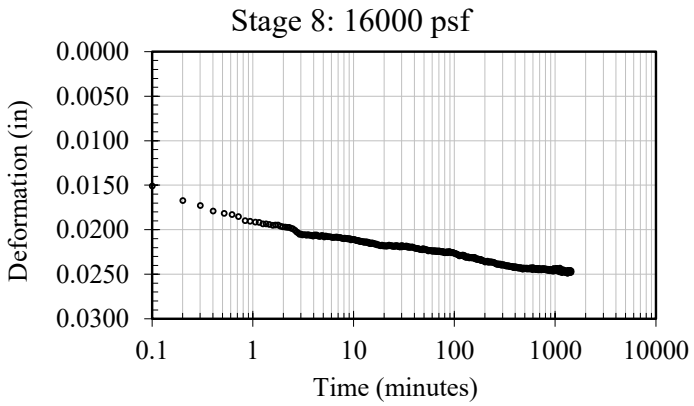
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

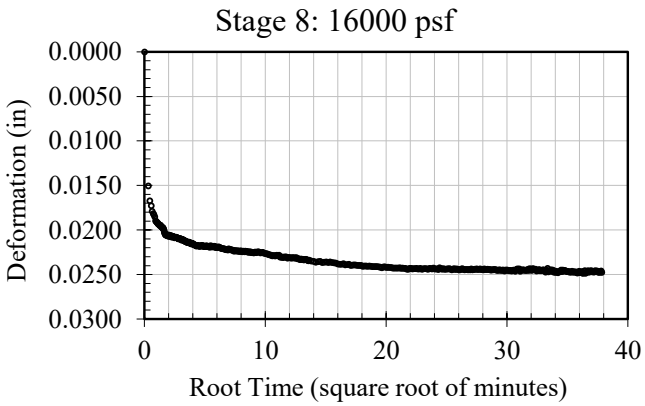
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

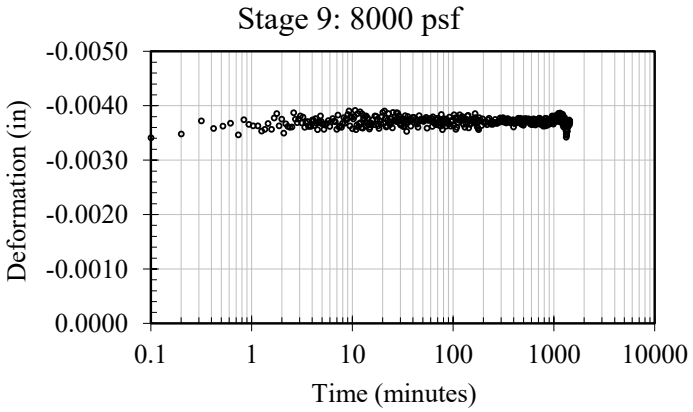
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

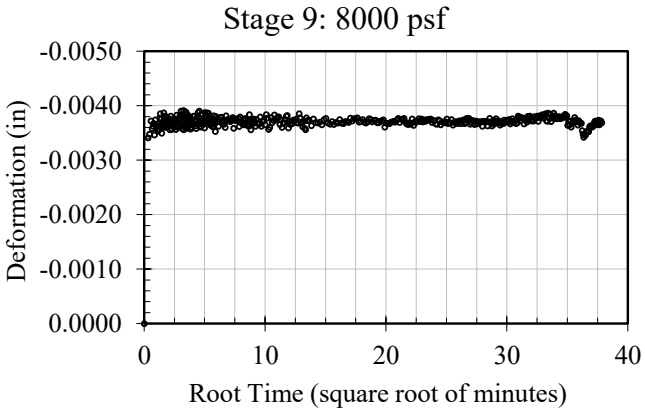












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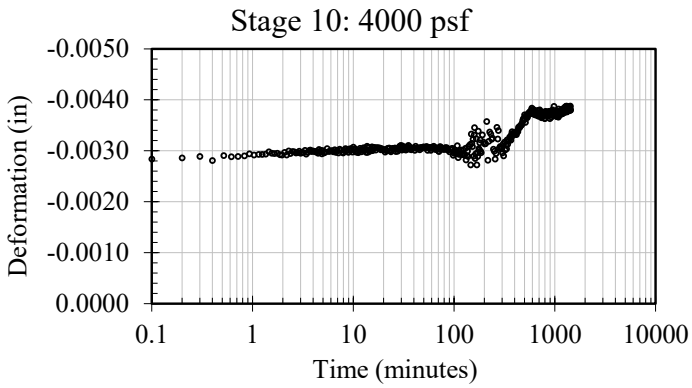
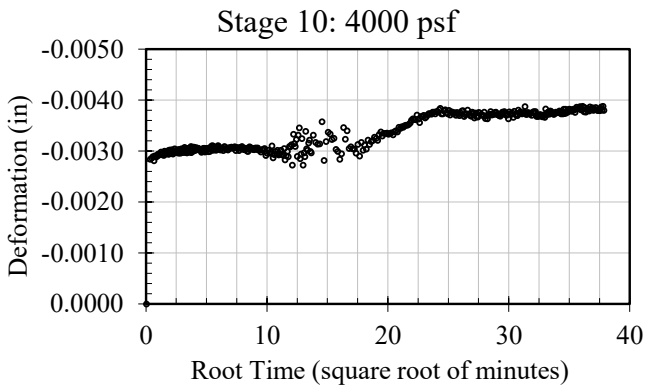
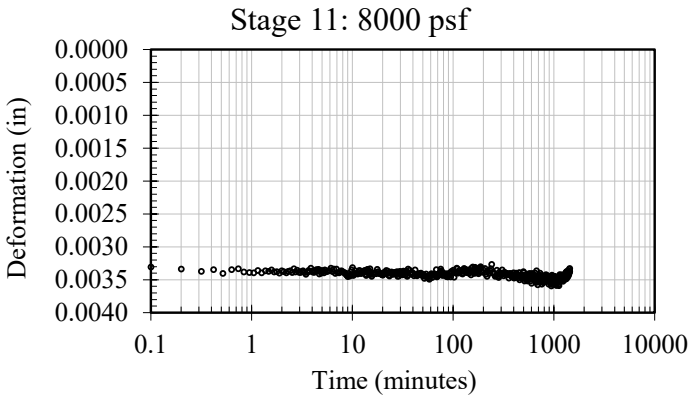
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

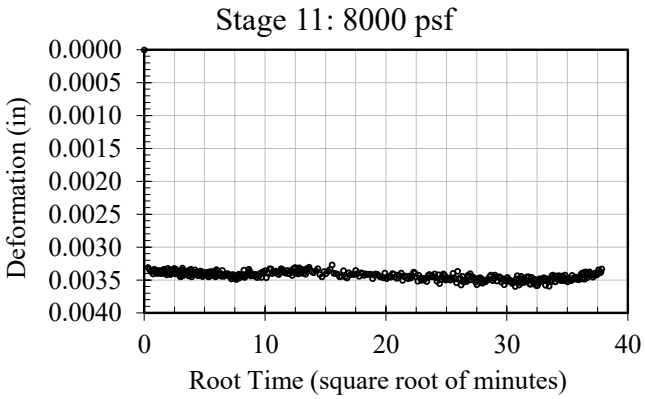
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

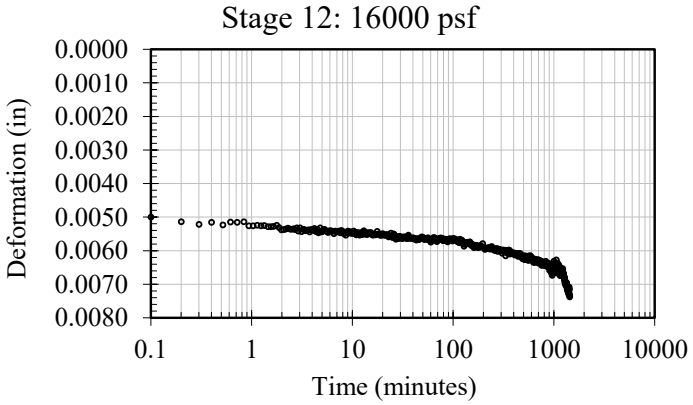
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

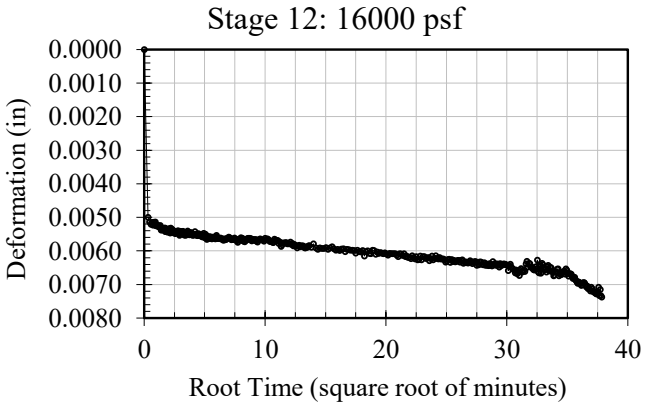












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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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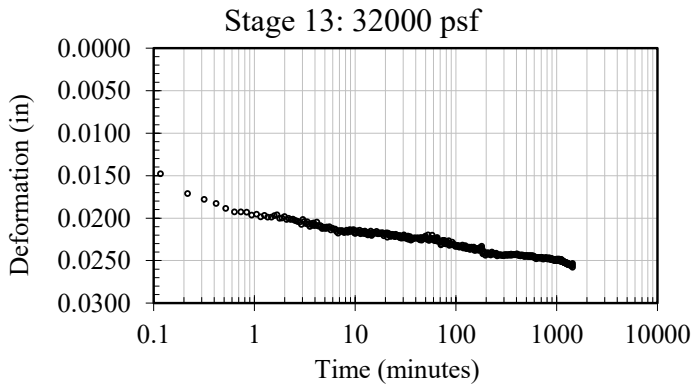

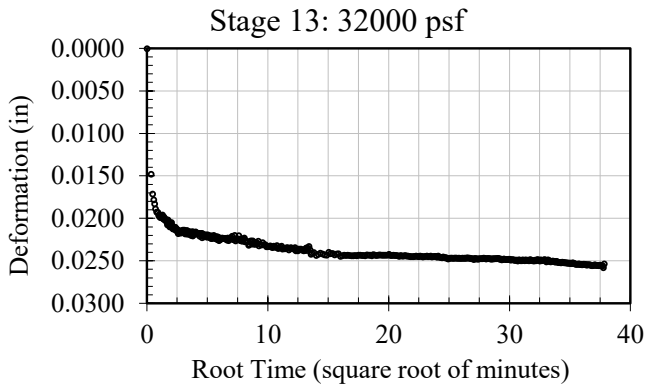

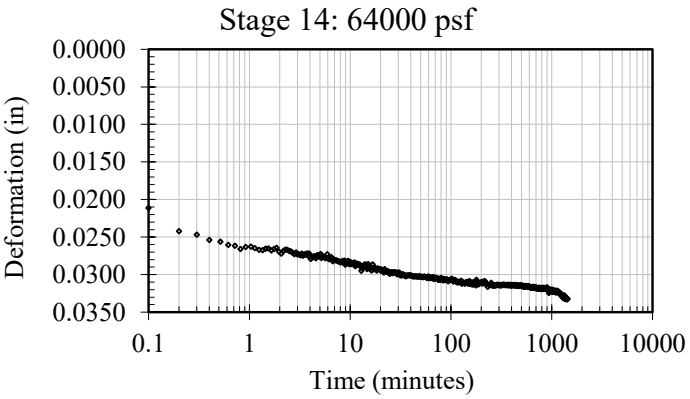

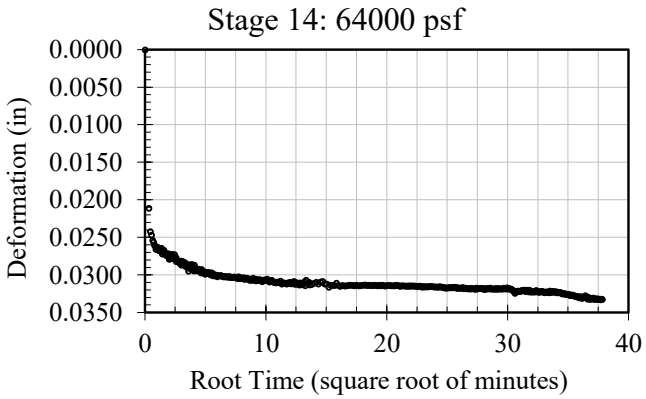

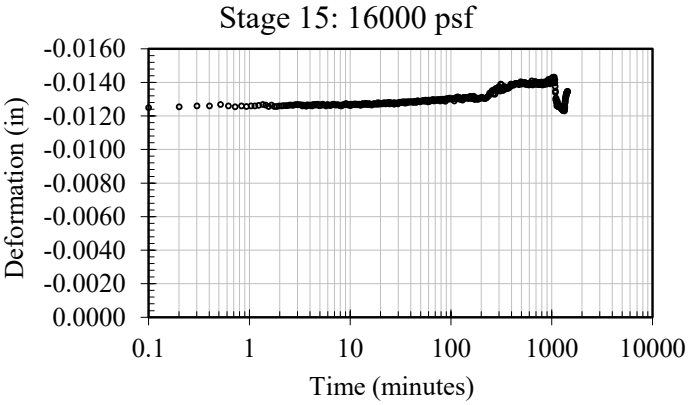

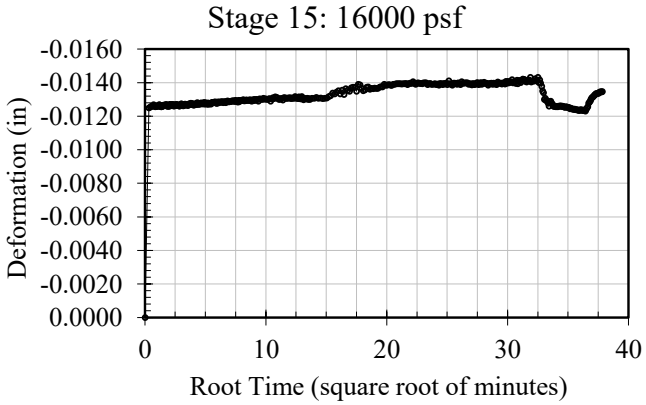

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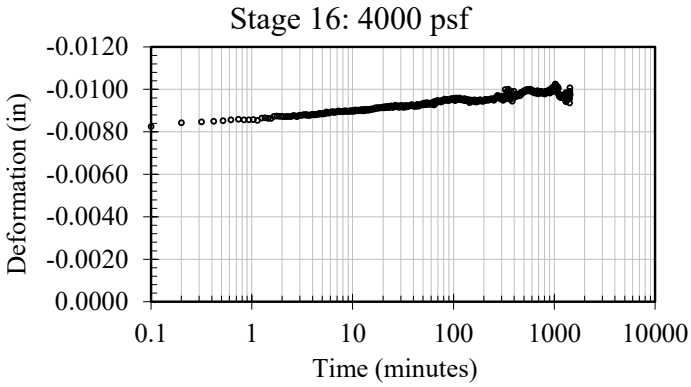
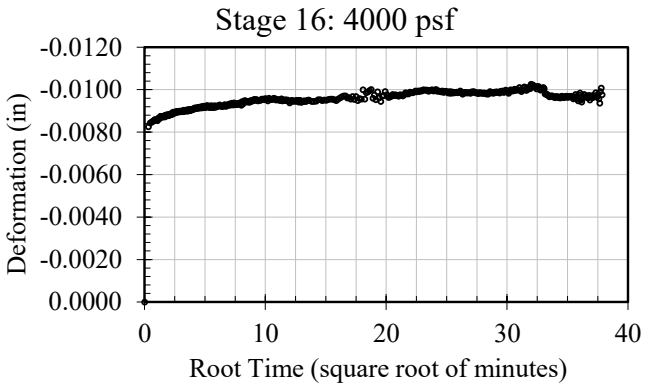
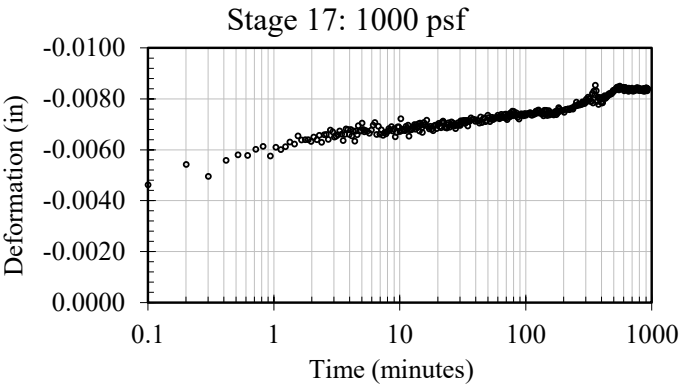
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

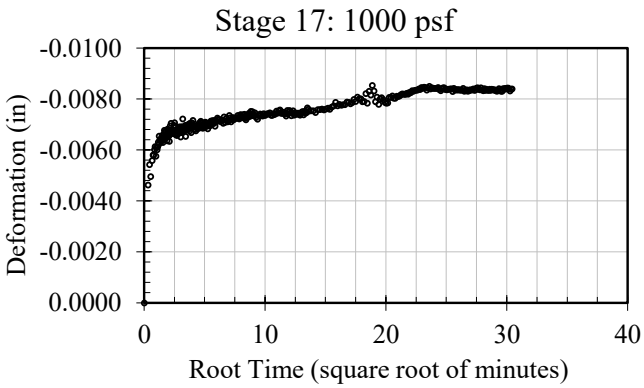
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date









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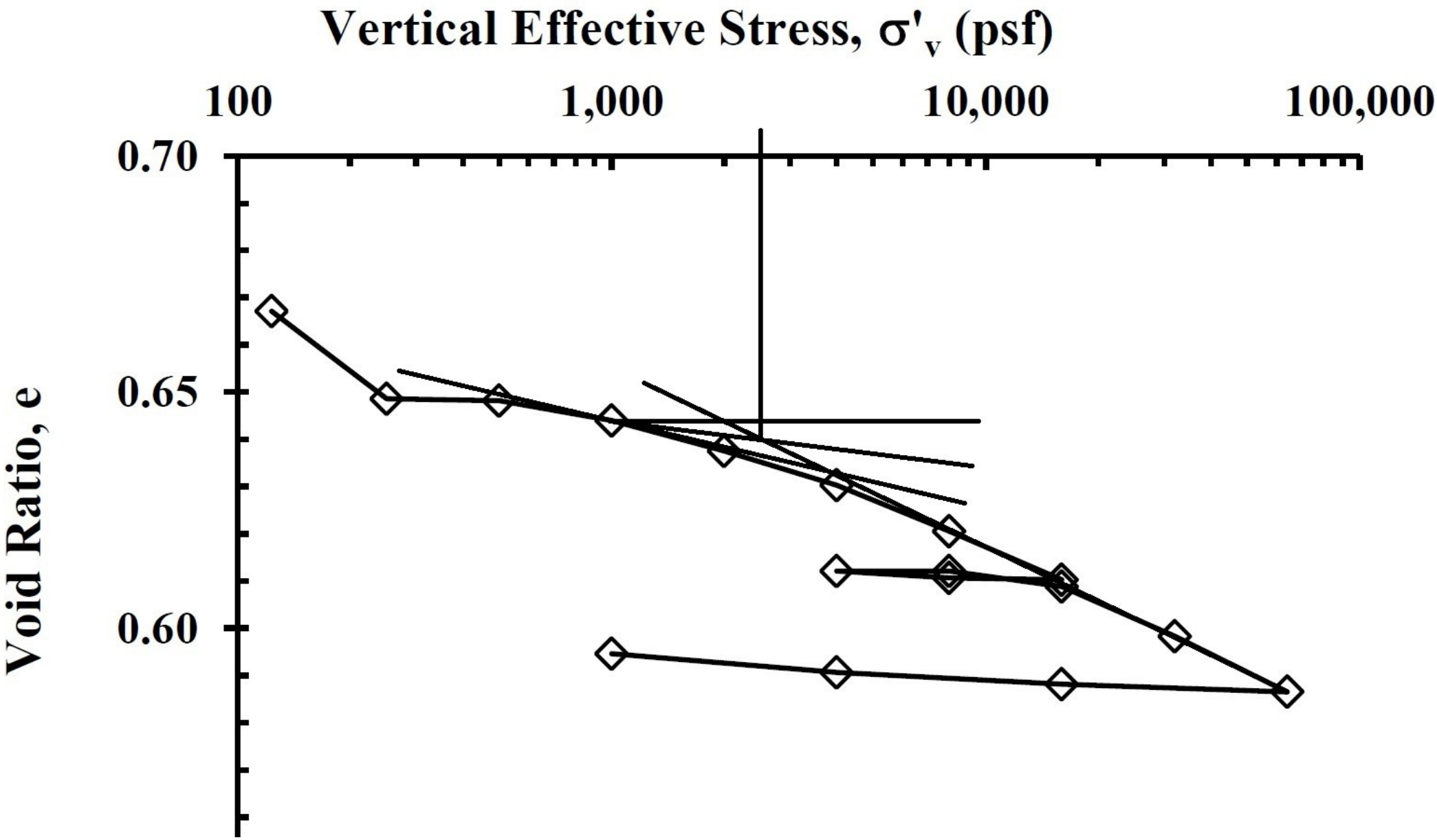

Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.70
0.65
0.60
Void Ratio, e

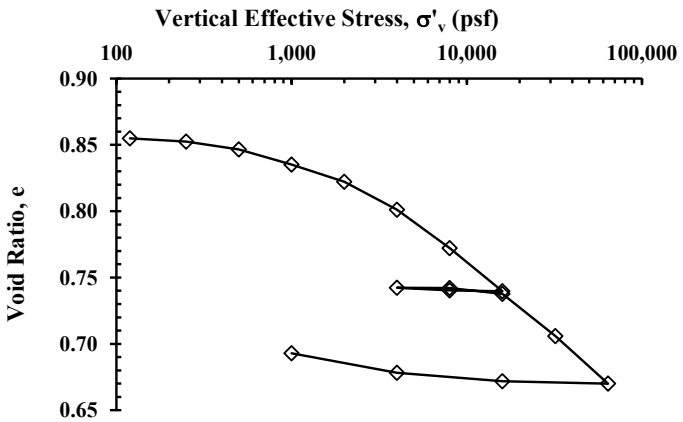
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

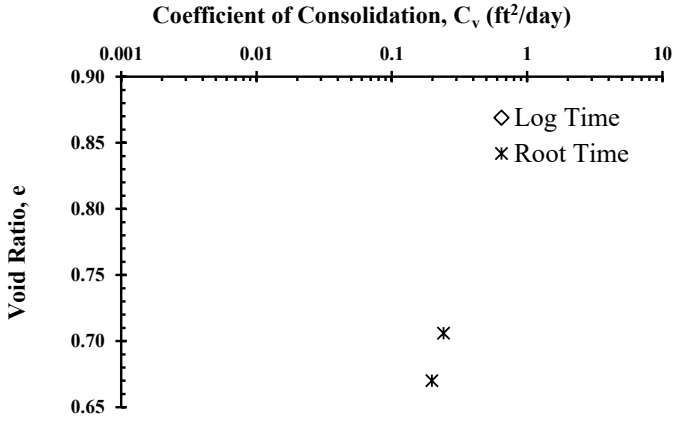
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

TRI Log No.: 25-02906.6
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

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
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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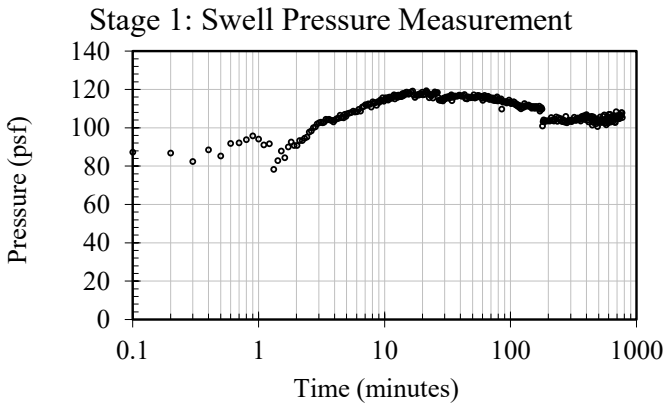

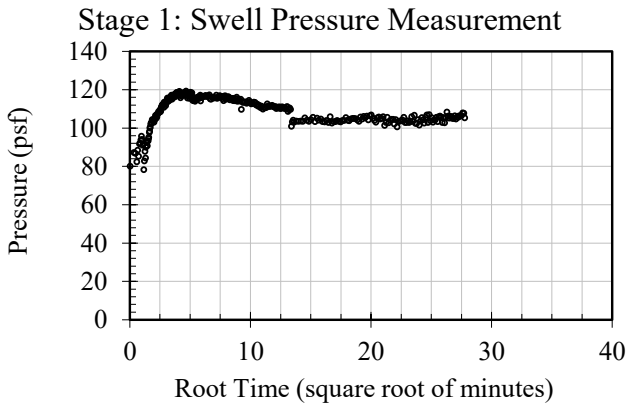

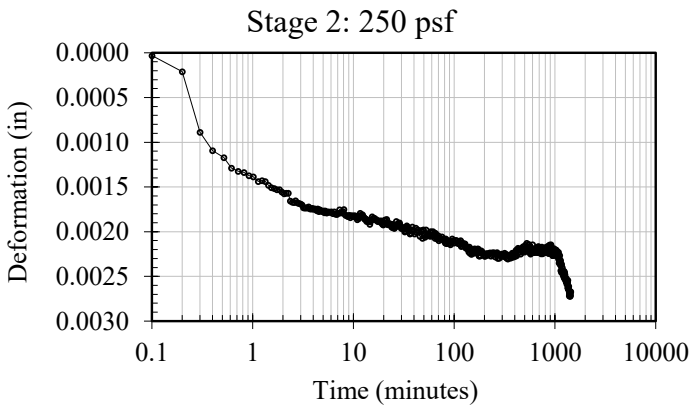

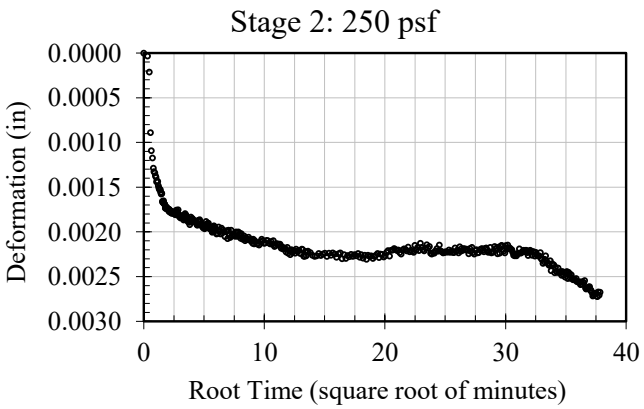

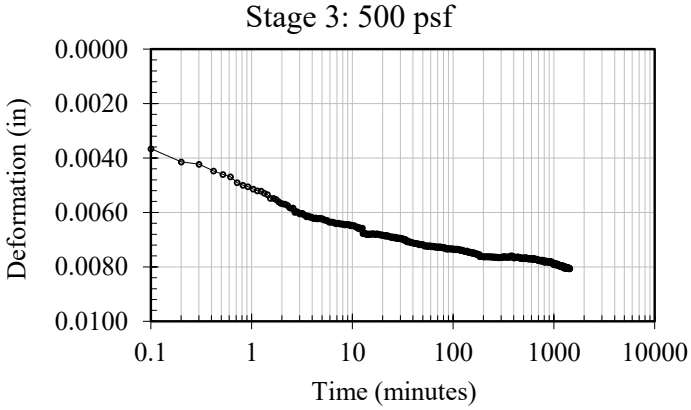

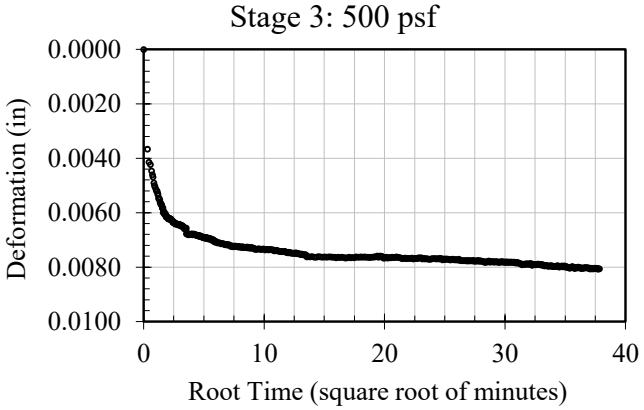

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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

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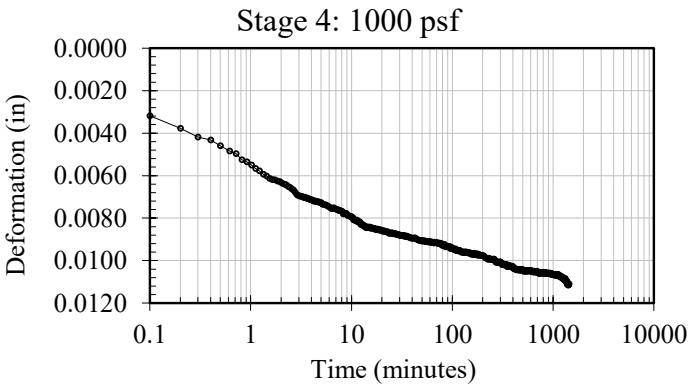

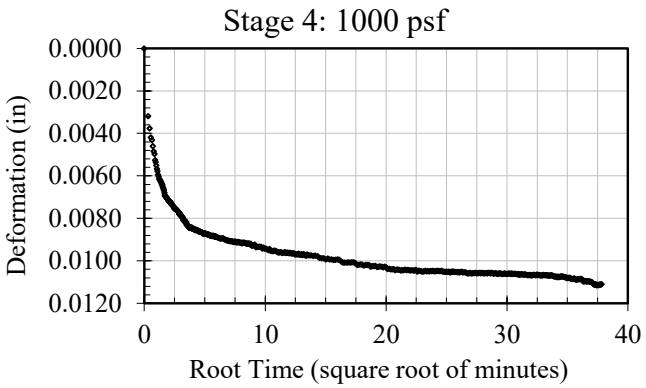

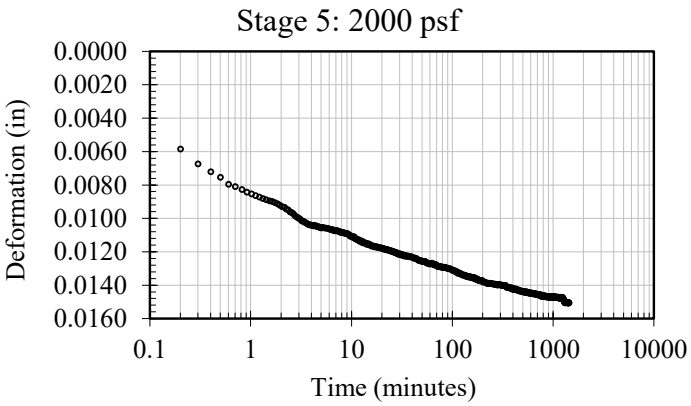

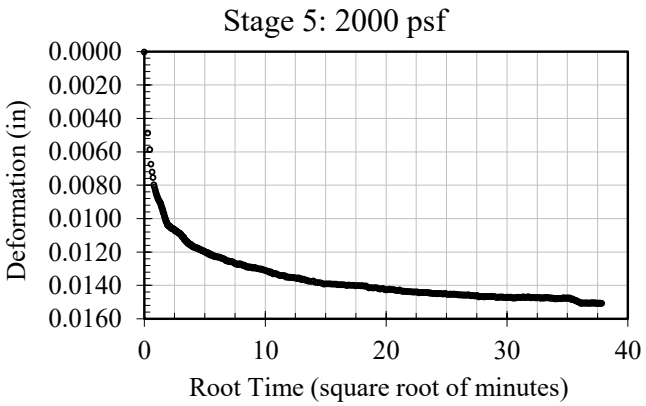

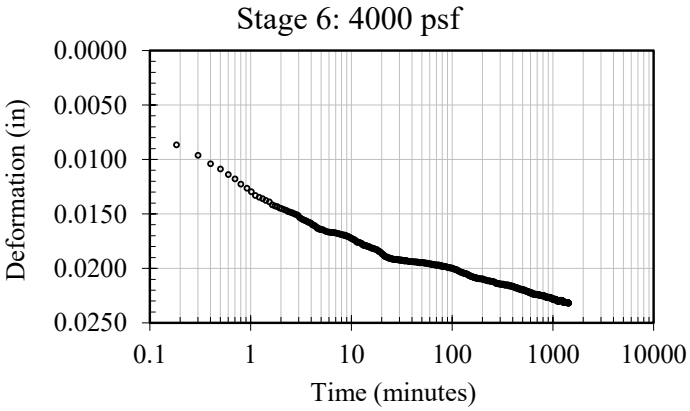

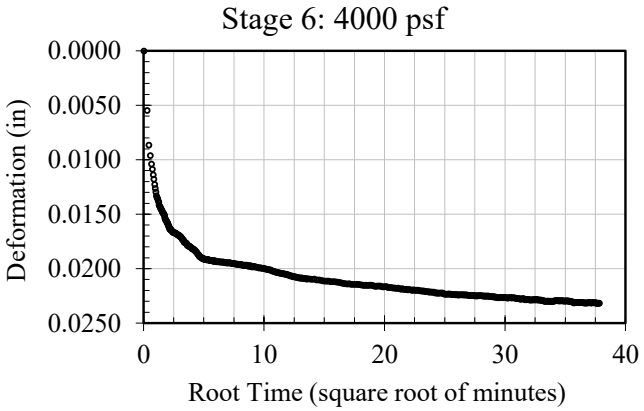

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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

TRI Log No.: 25-02906.6
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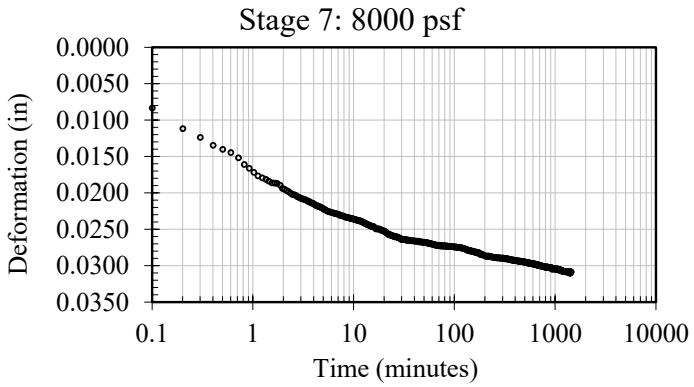

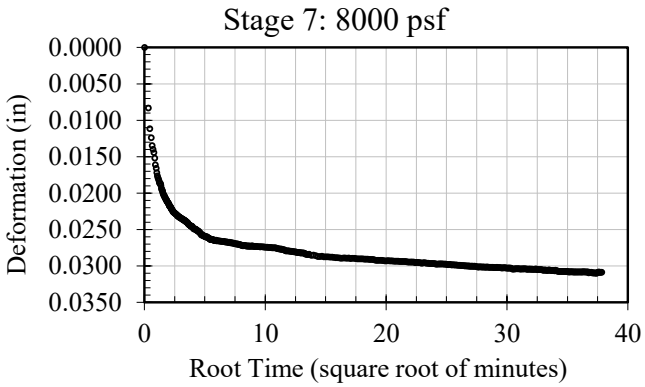

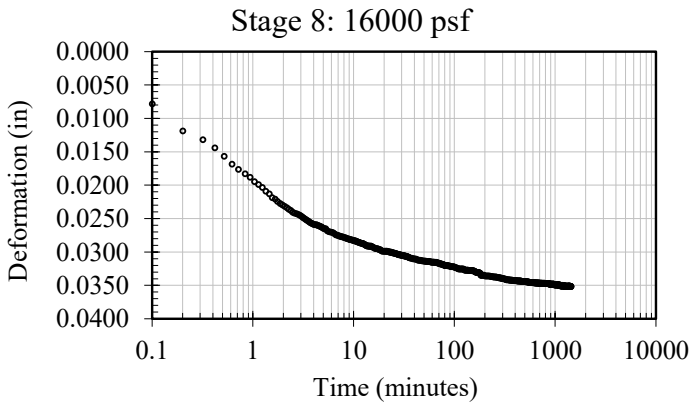

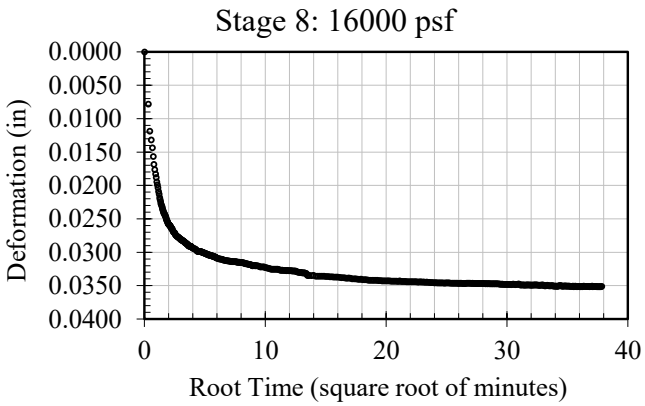

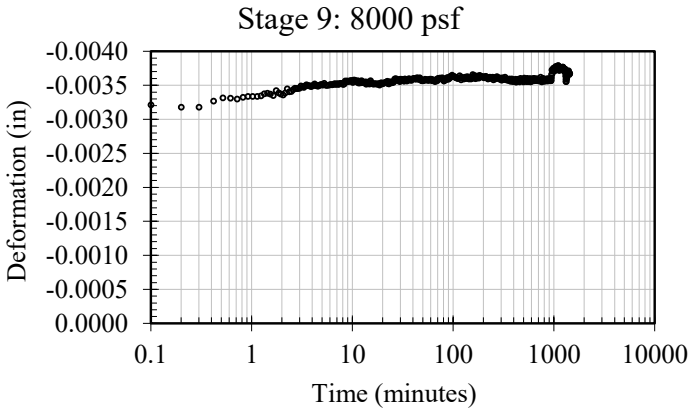

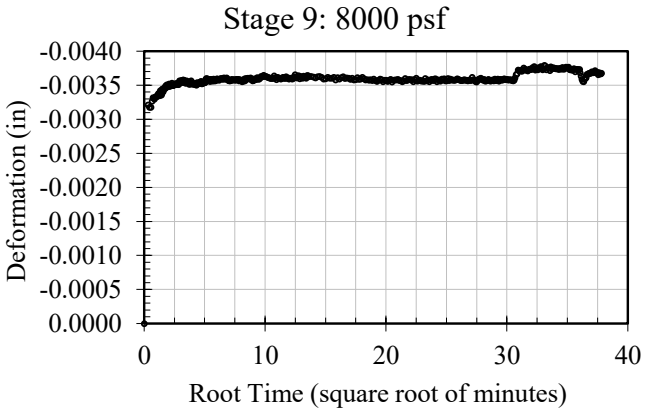

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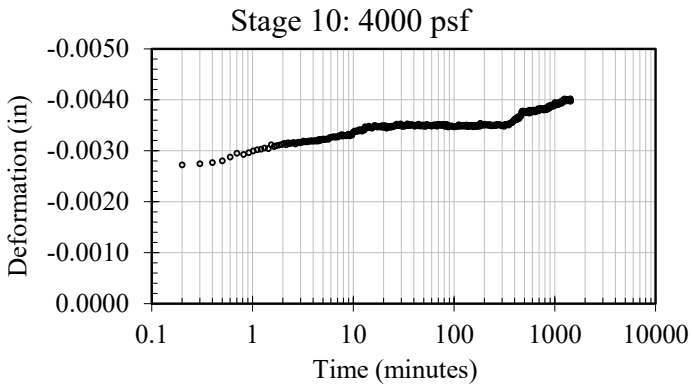
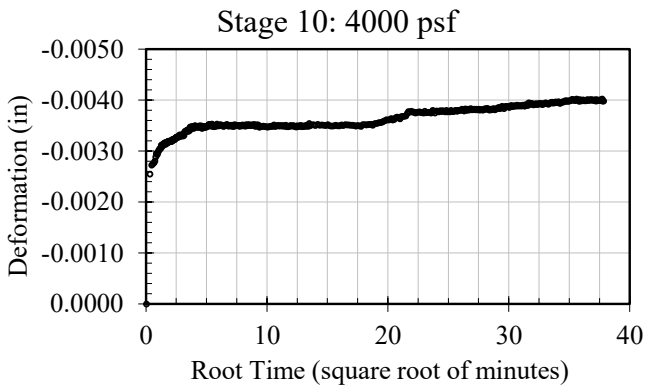
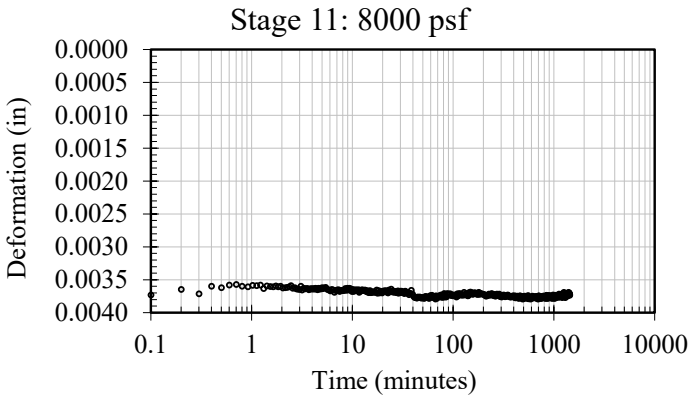
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

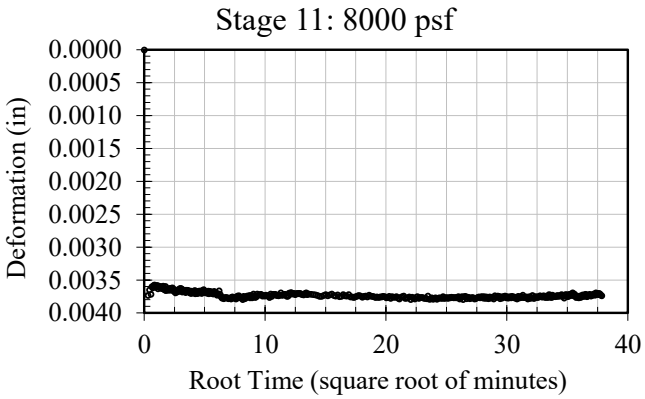
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

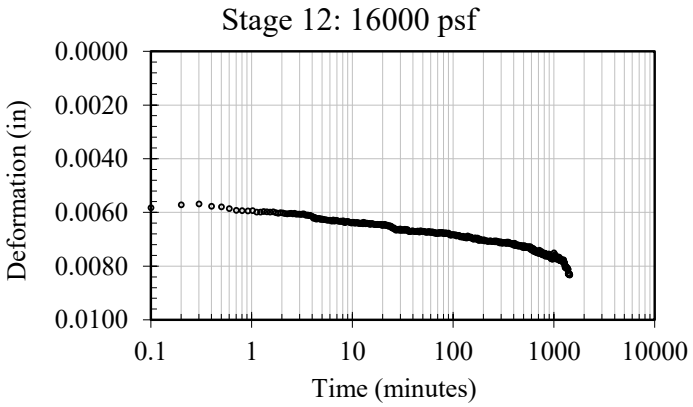
TRI Log No.: 25-02906.6
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

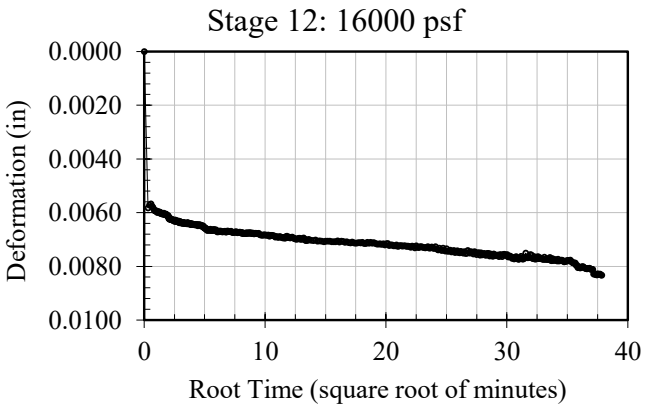












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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

TRI Log No.: 25-02906.6
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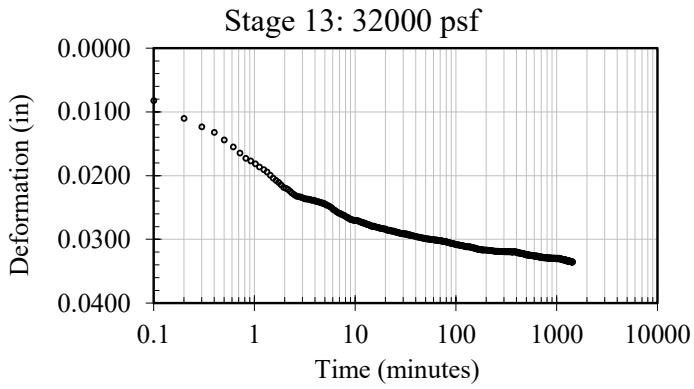

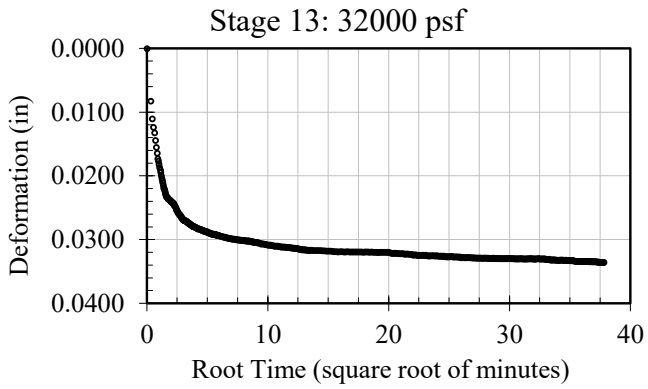

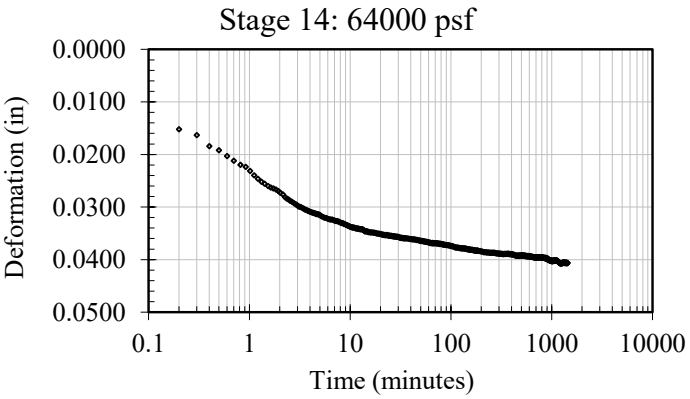

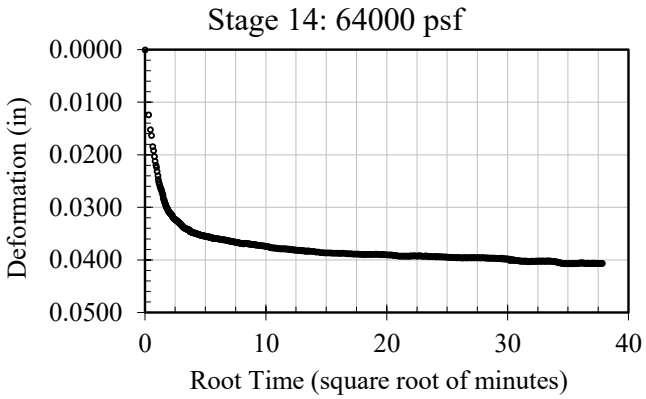

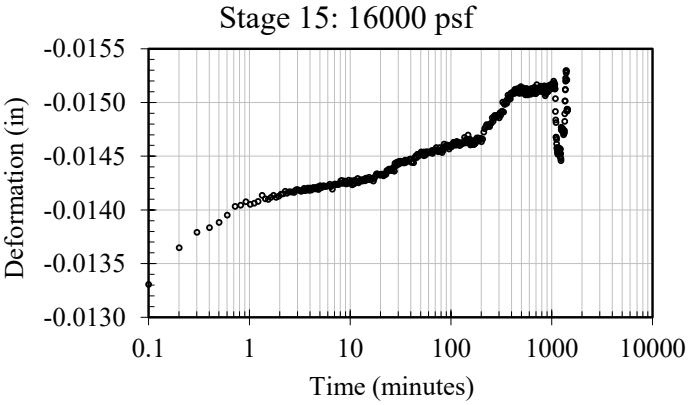

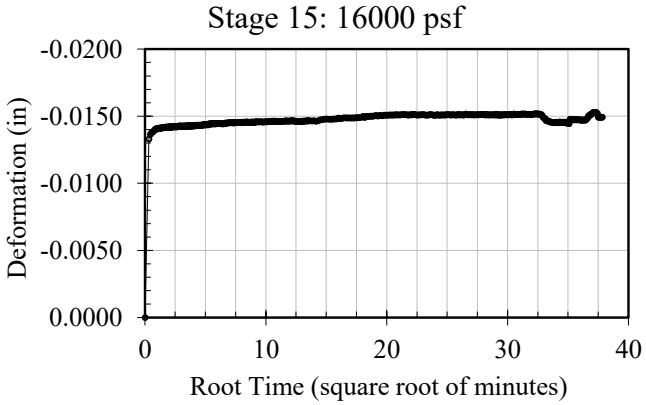

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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

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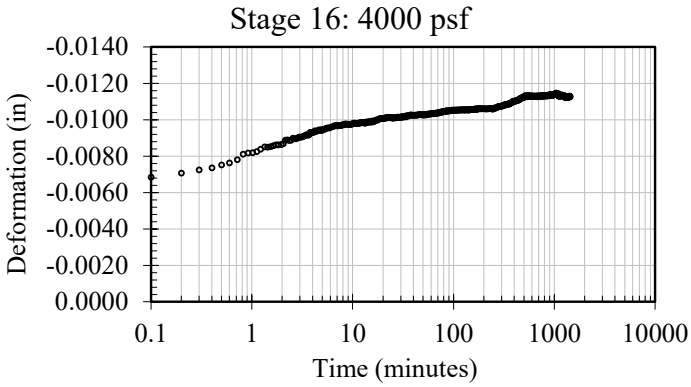

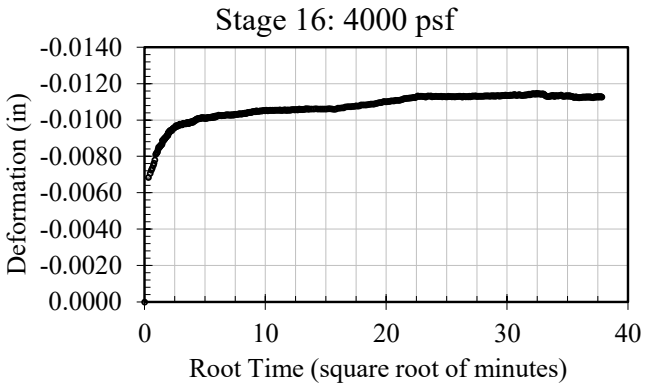

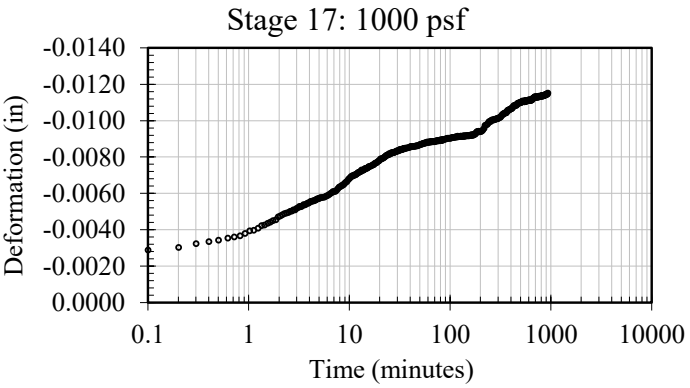

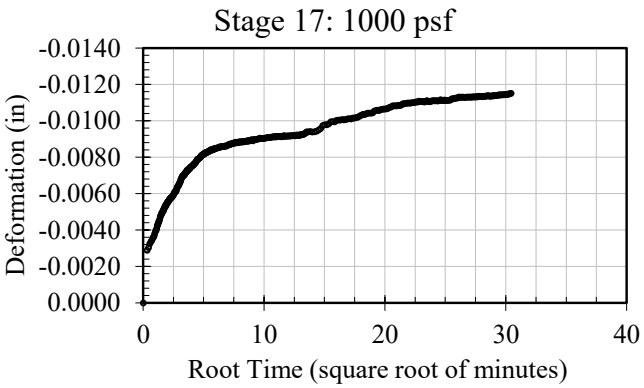

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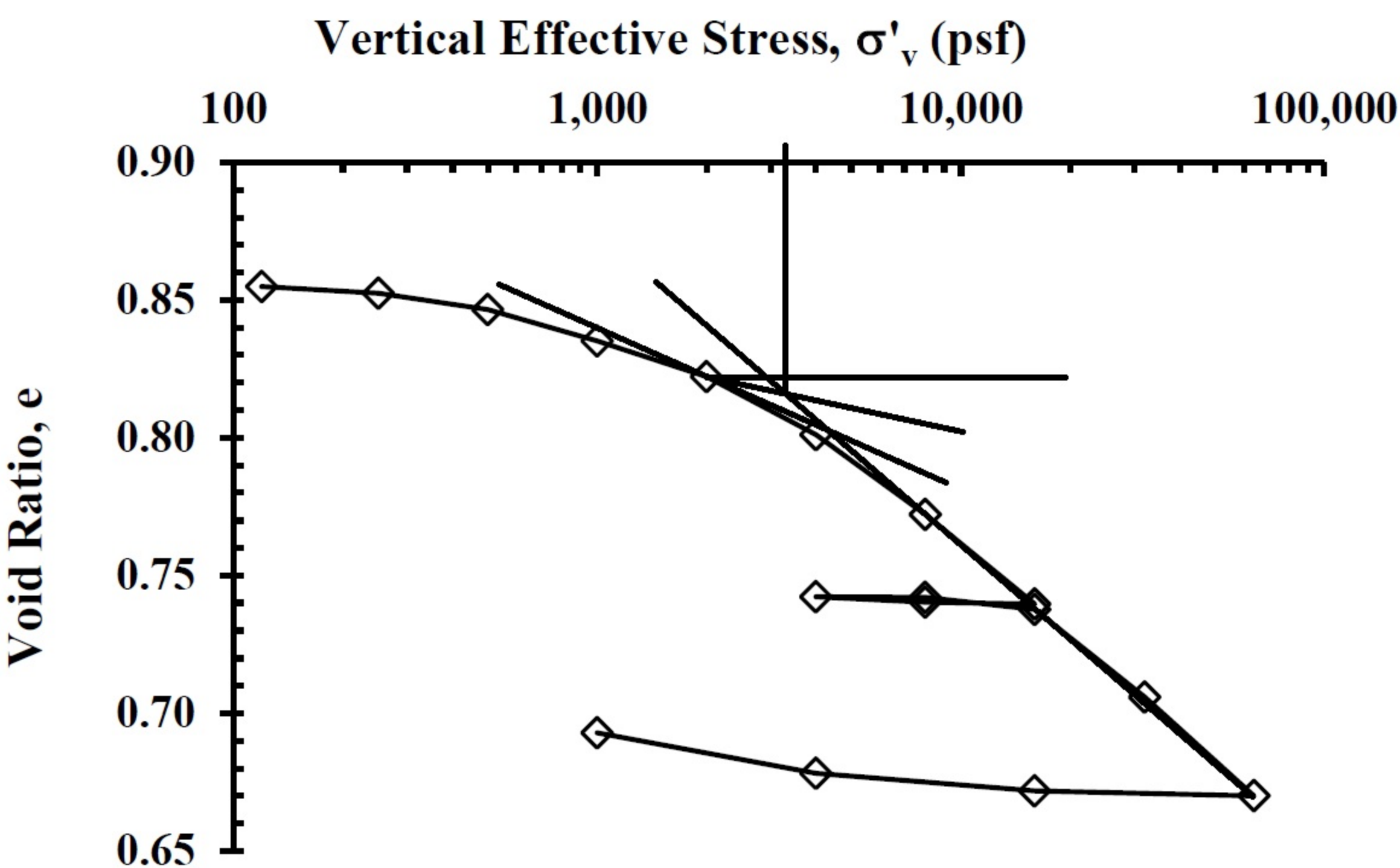

Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.90
0.85
0.80
0.75
0.70
0.65
Void Ratio, e

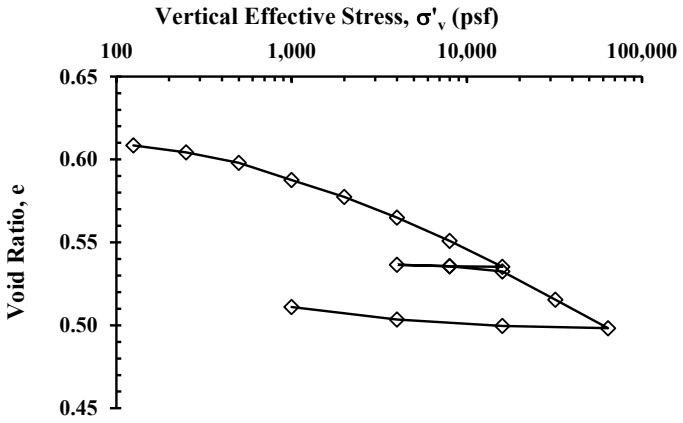
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

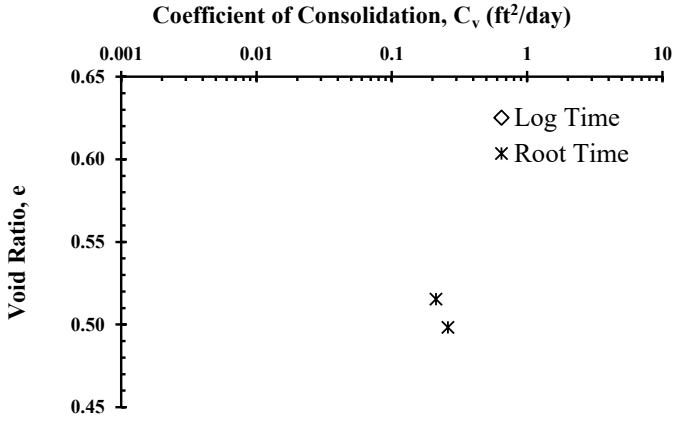
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

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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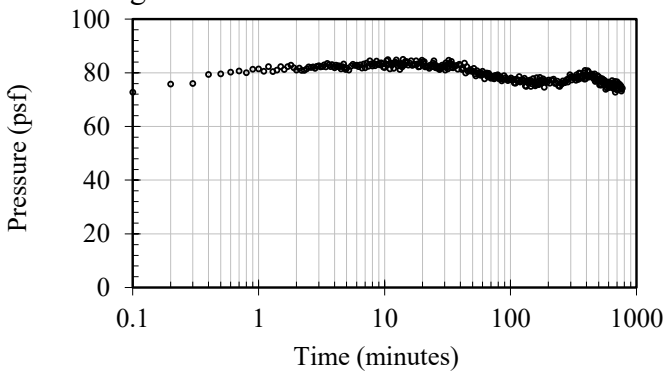
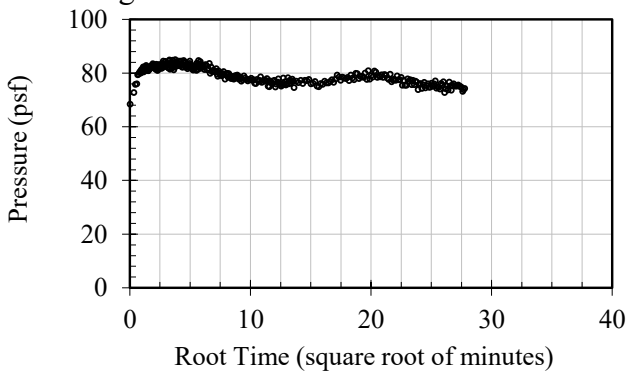
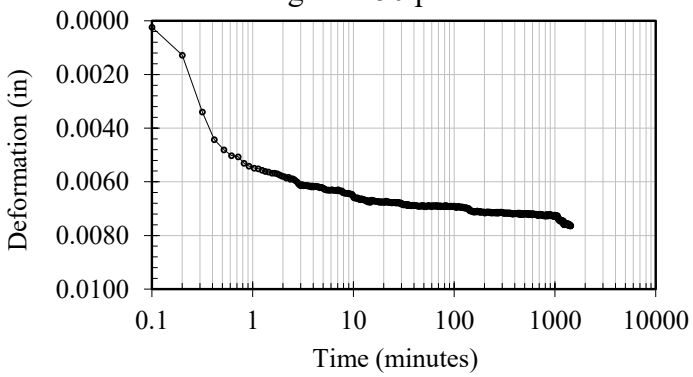
Stage 1: Swell Pressure Measurement



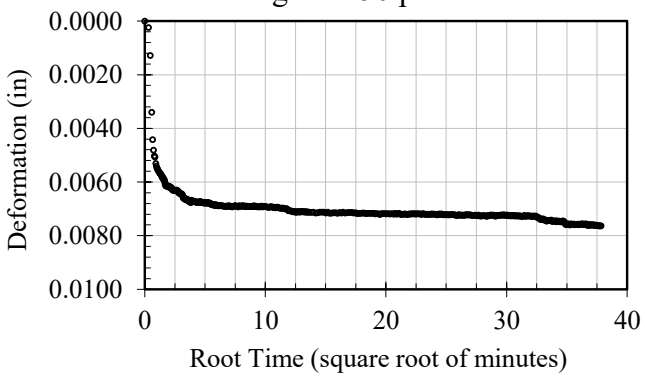
Stage 1: Swell Pressure Measurement



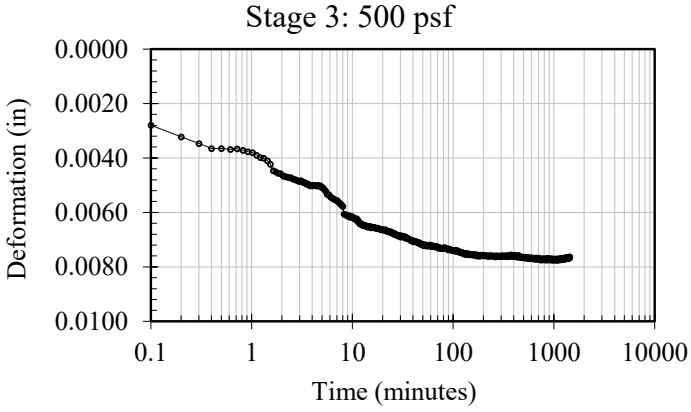
Stage 2: 250 psf



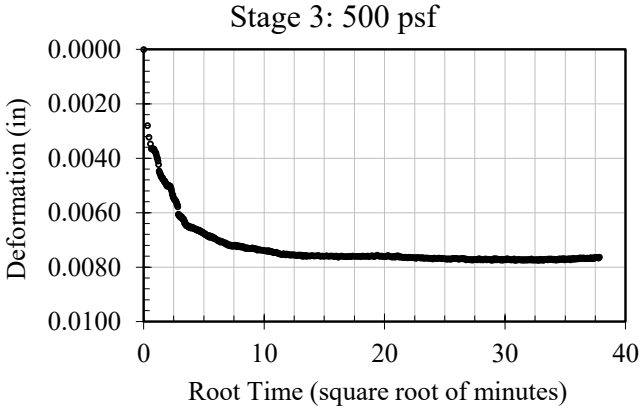
Stage 2: 250 psf



Stage 3: 500 psf



Stage 3: 500 psf



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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

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Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

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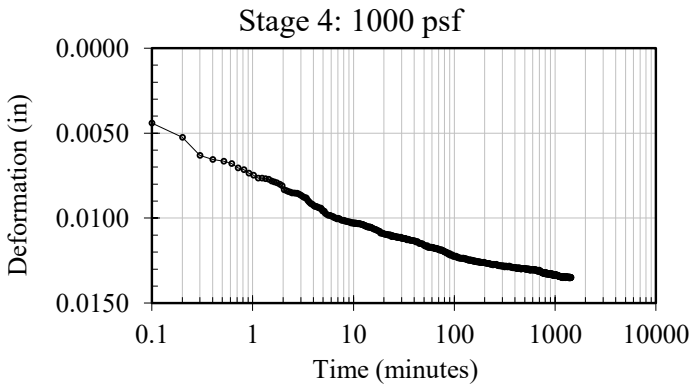

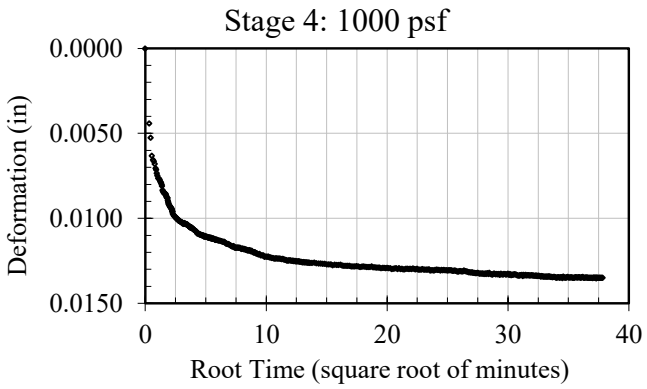

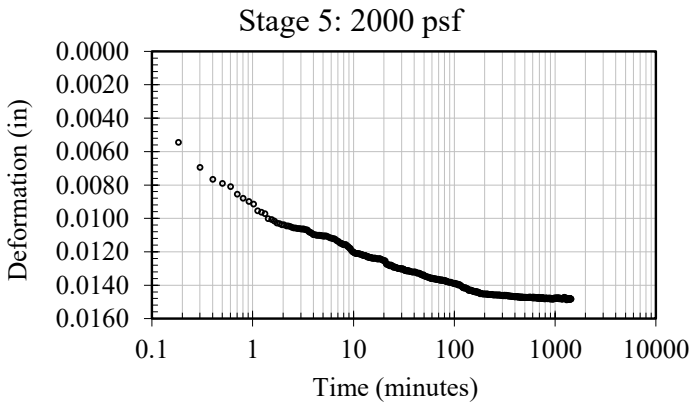

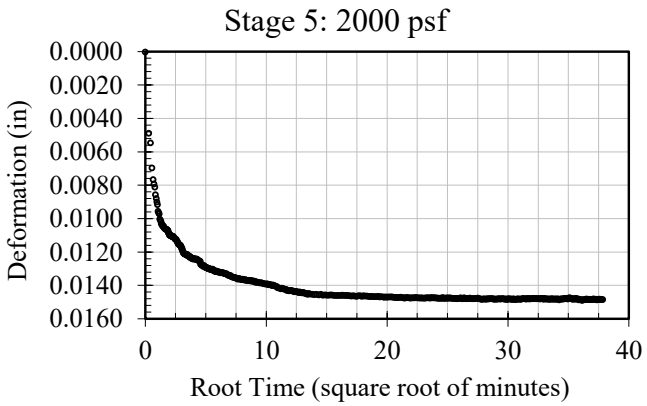

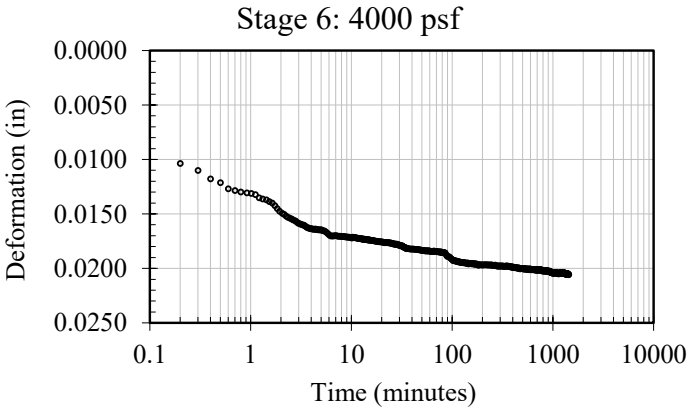

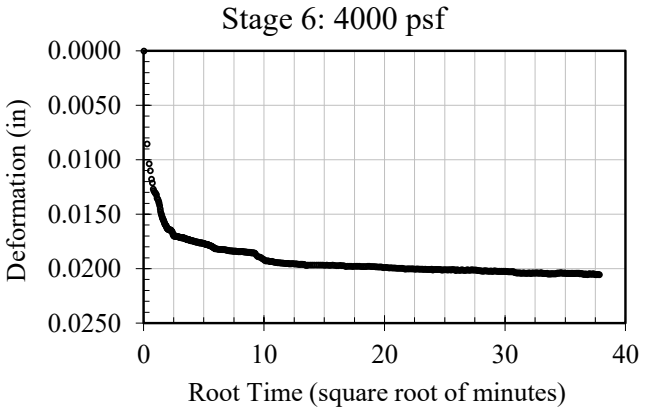

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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

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Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

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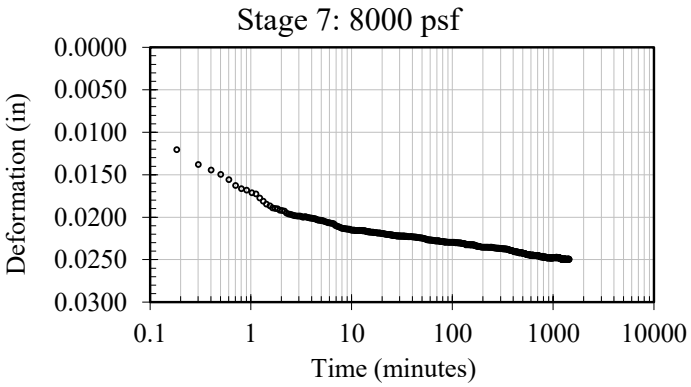

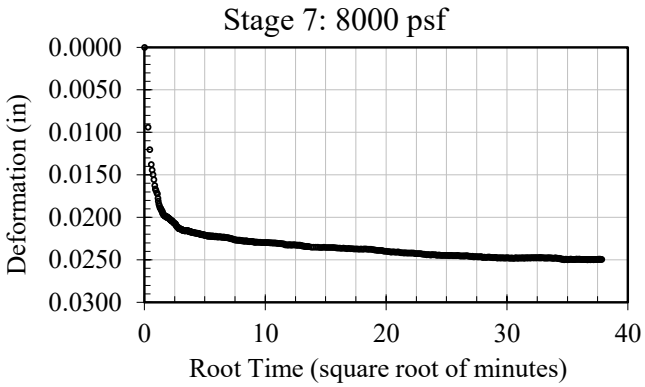

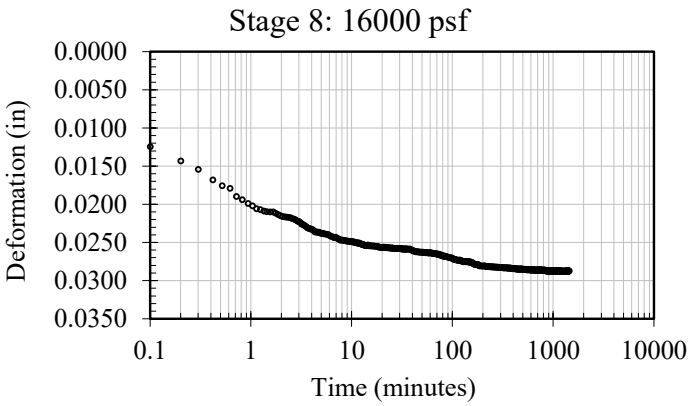

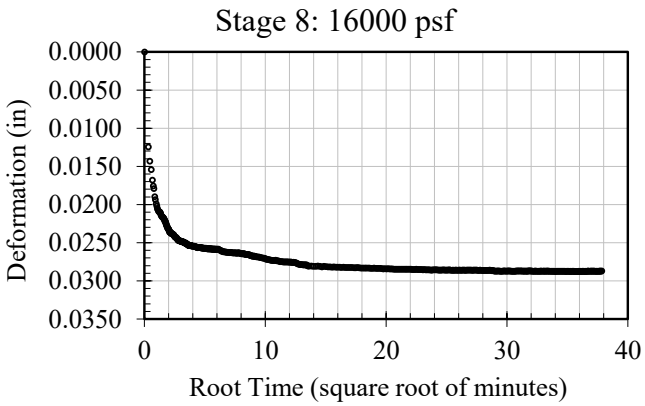

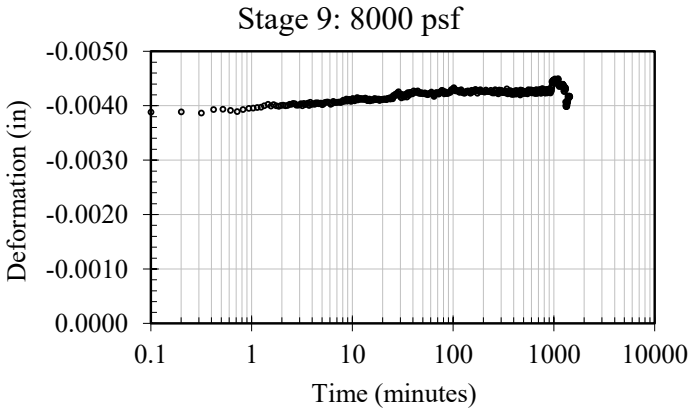

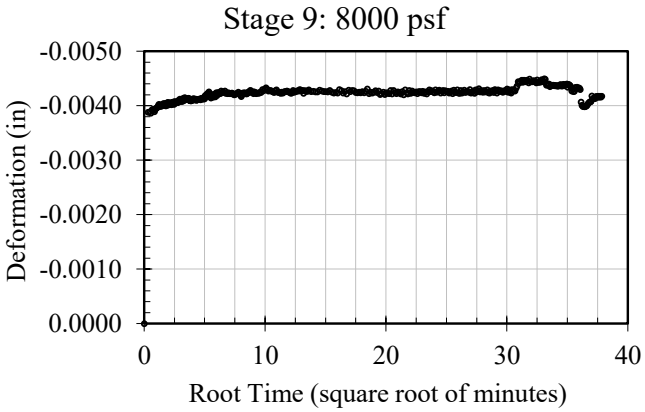

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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

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Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

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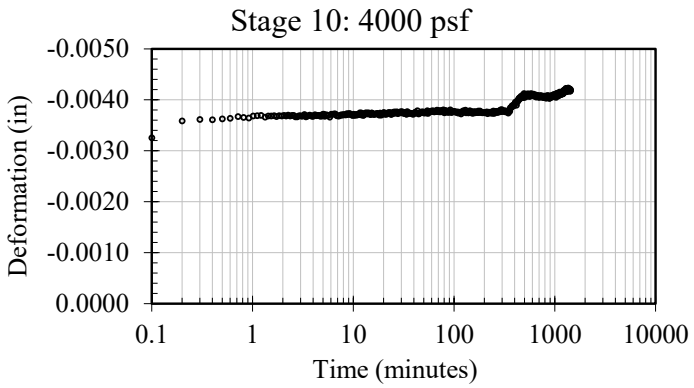

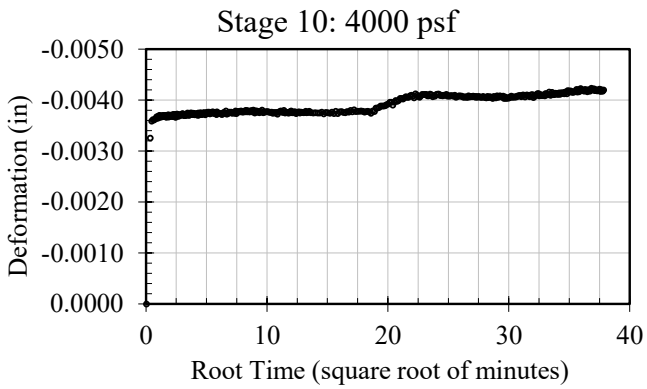

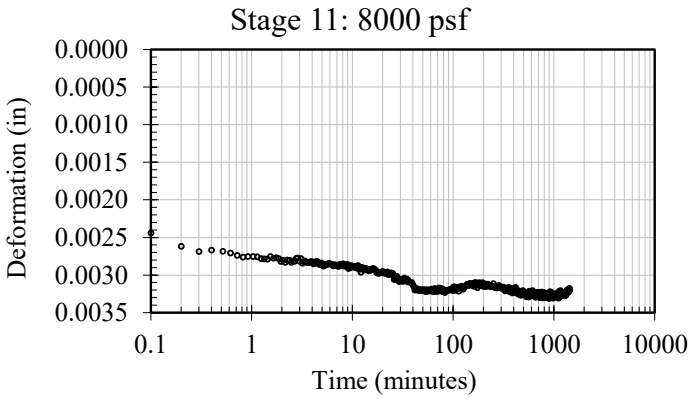

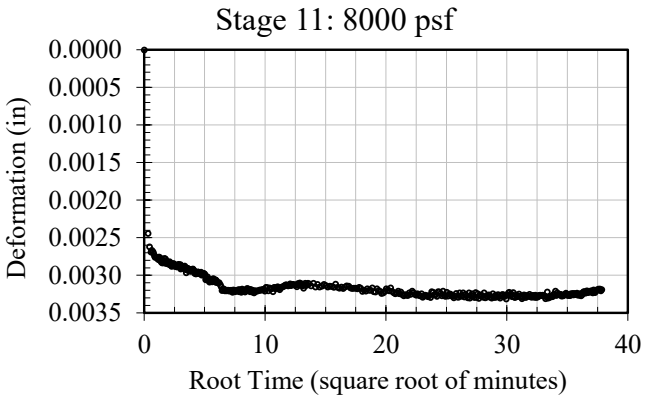

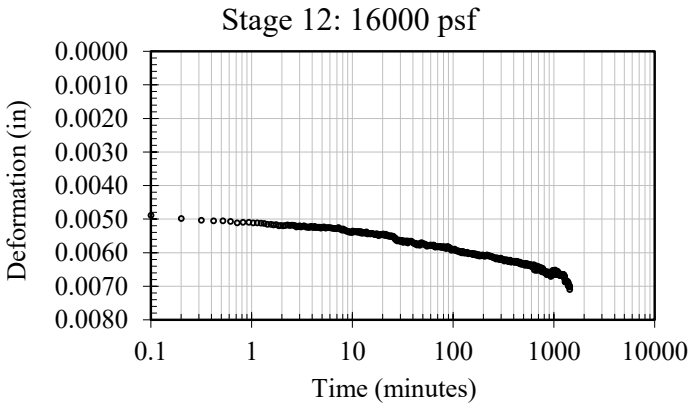

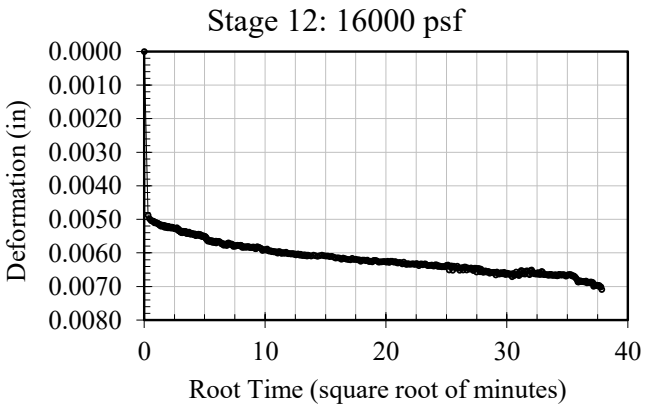

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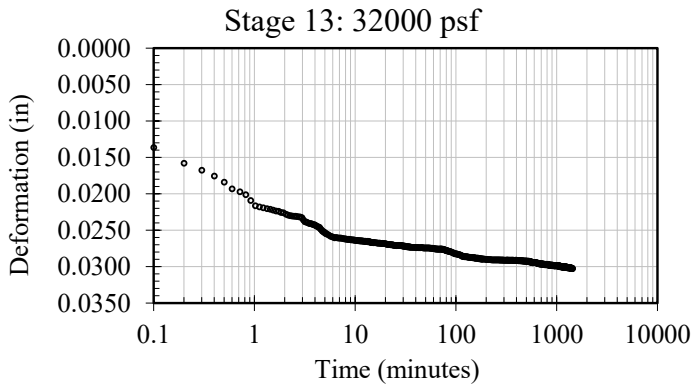
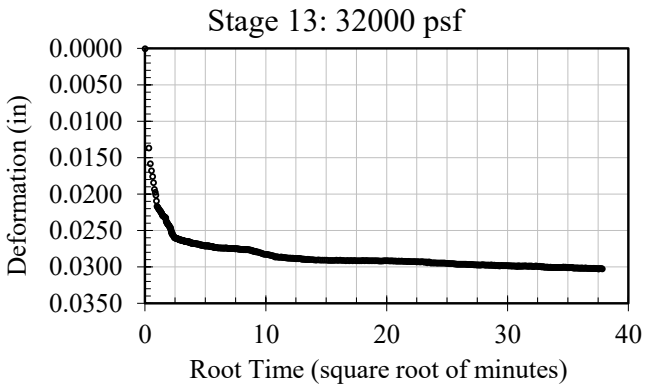
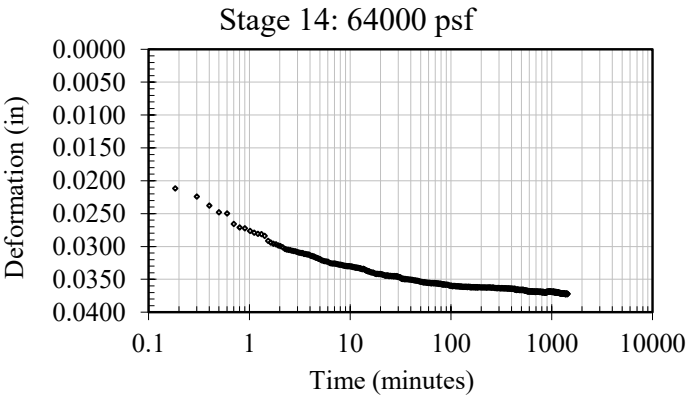
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

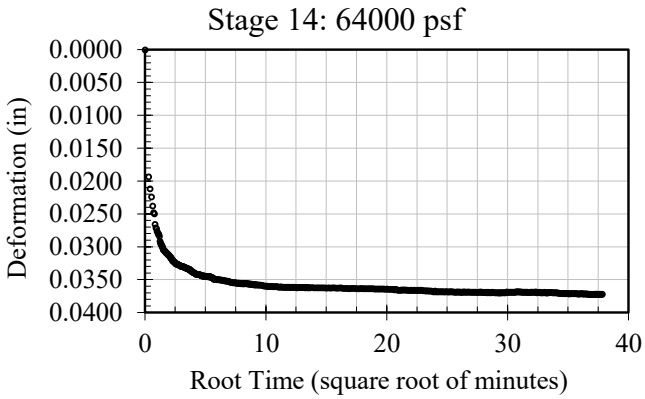
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

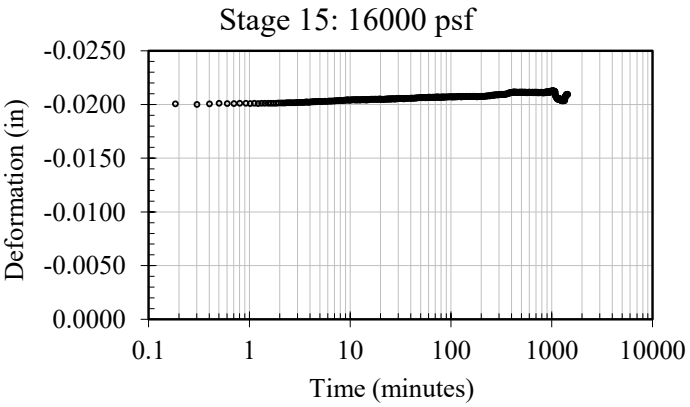
TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

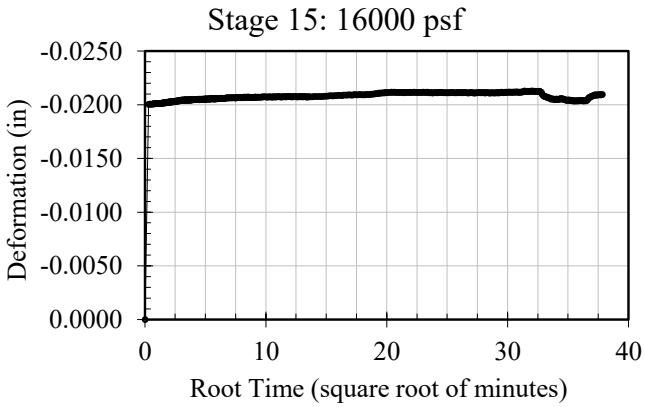












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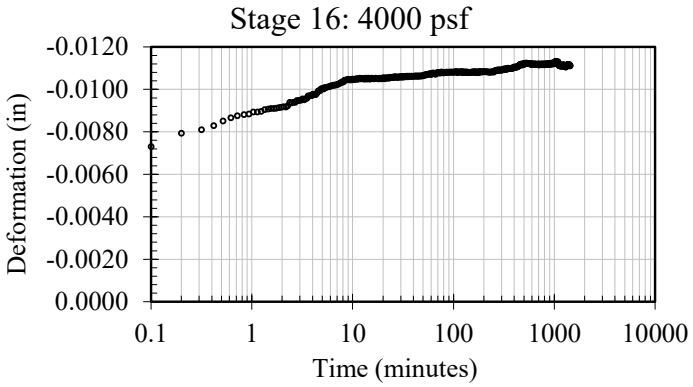
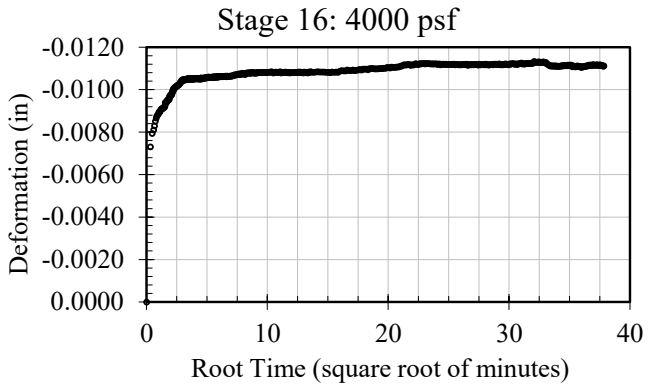
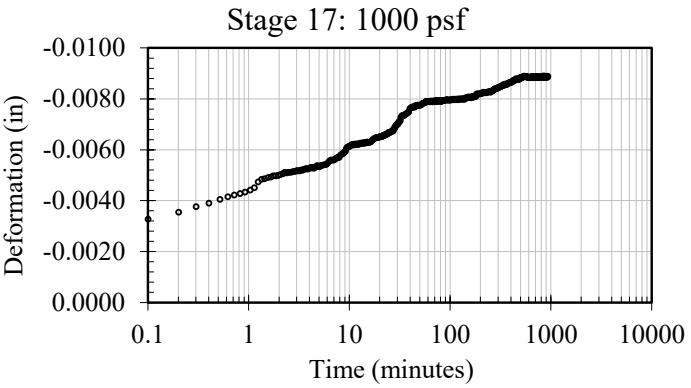
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

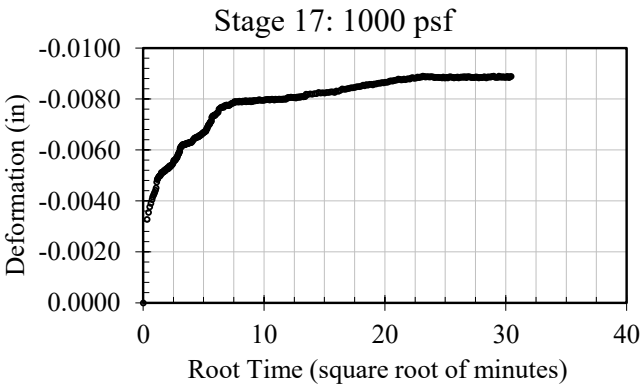
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date









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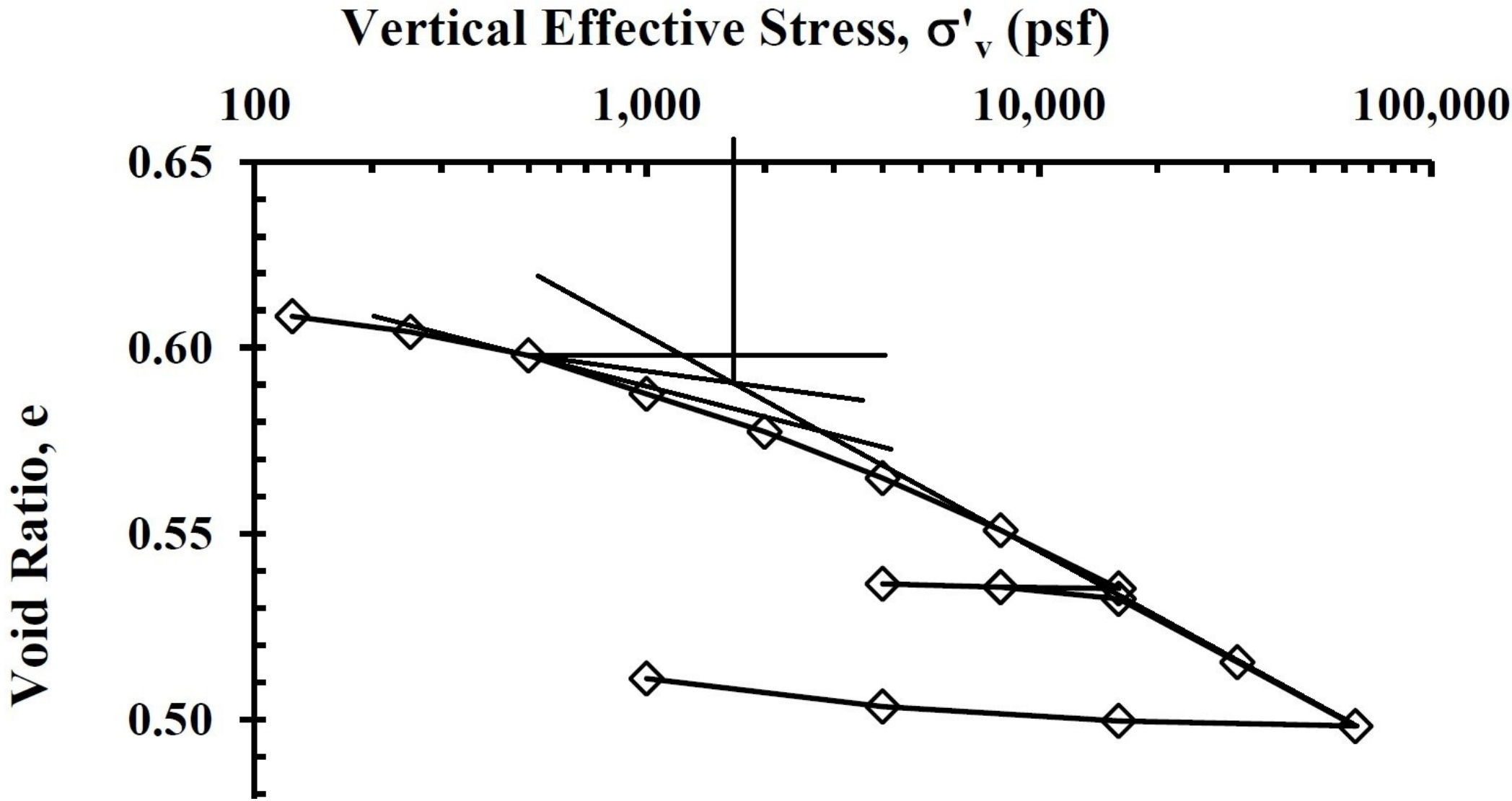

Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.65
0.60
0.55
0.50
Void Ratio, e

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

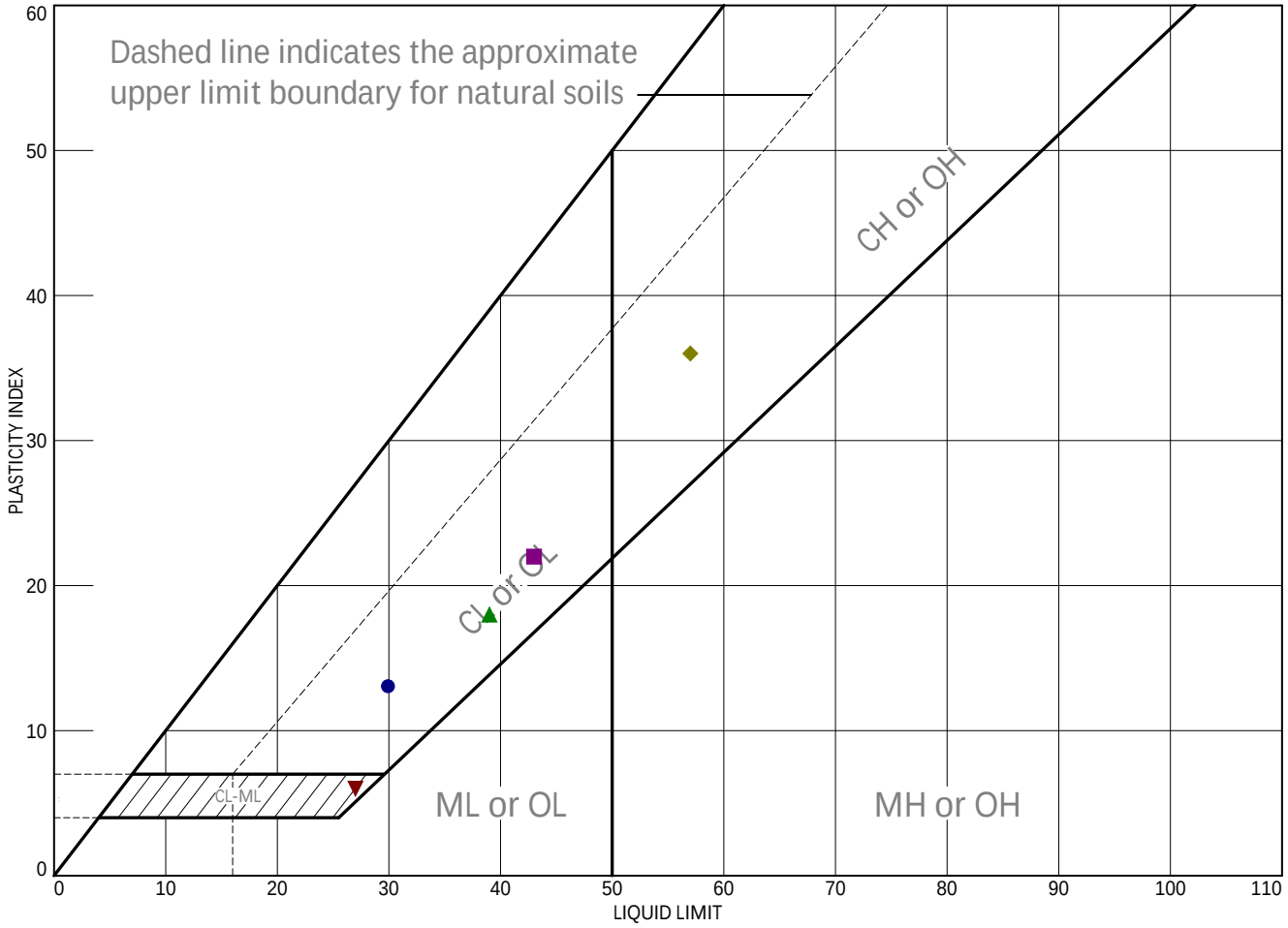
Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
13BN	2-3.5	18.6								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Silty
13BN	4.5-5	21.1								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:

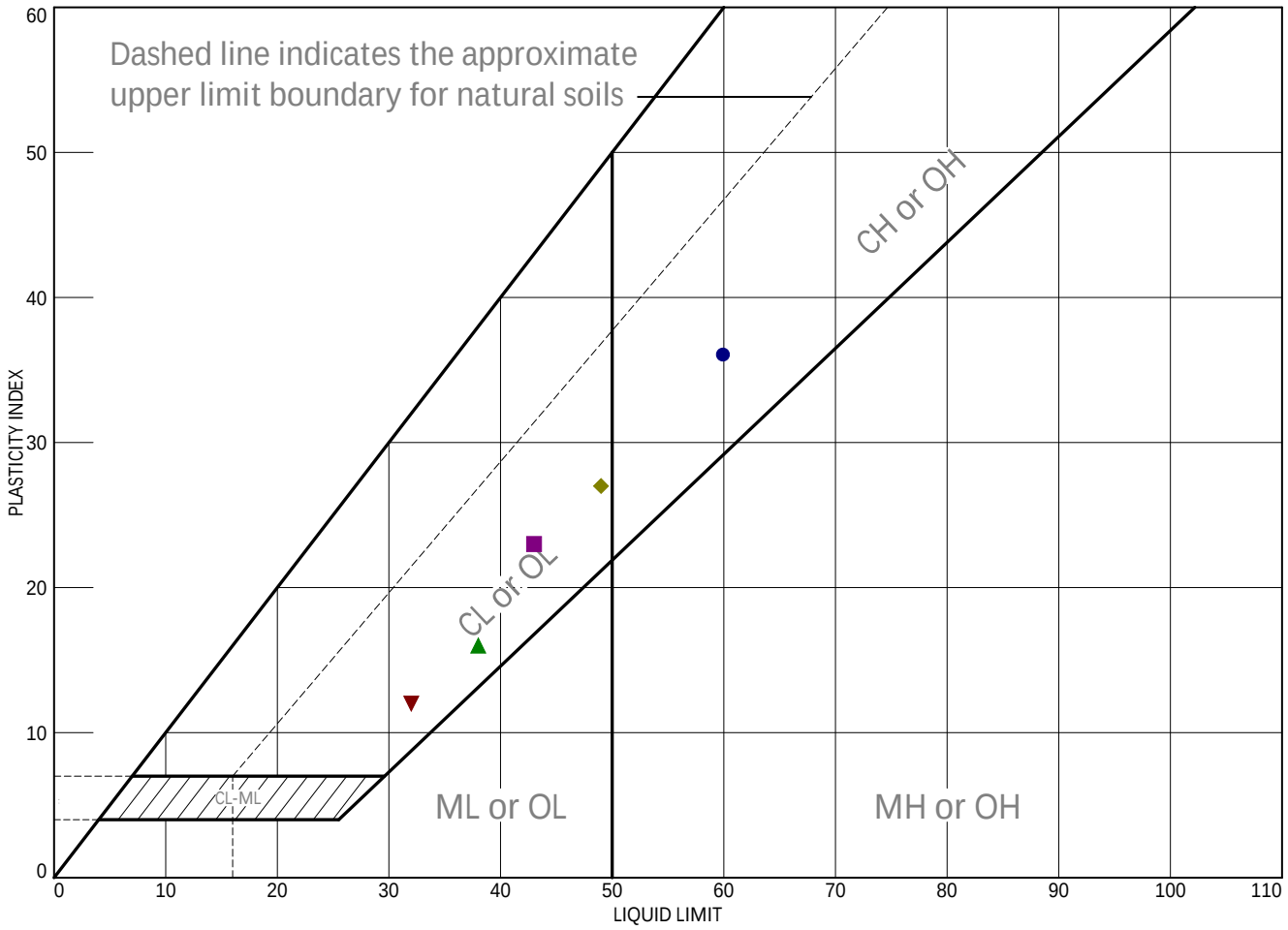
- ● Natural Moisture = 27.9%
- ■ Natural Moisture = 30.7%
- ▲ Natural Moisture = 24.7%
- ◆ Natural Moisture = 26.8%
- ▼ Natural Moisture = 25.5%

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:

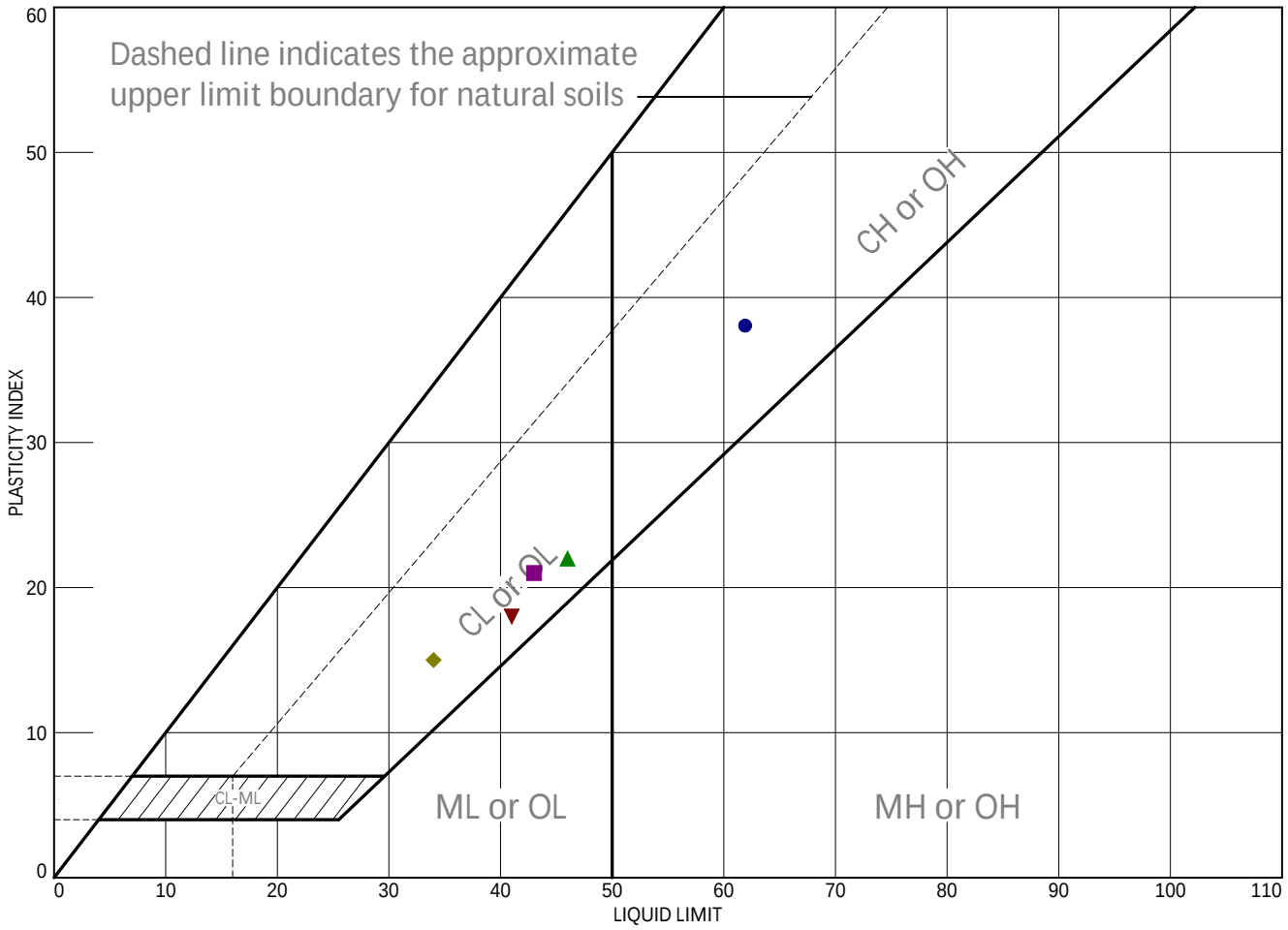
● Natural Moisture = 25.8%
■ Natural Moisture = 25.8%
▲ Natural Moisture = 21.3%
◆ Natural Moisture = 28.3%
▼ Natural Moisture = 27.4%

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:

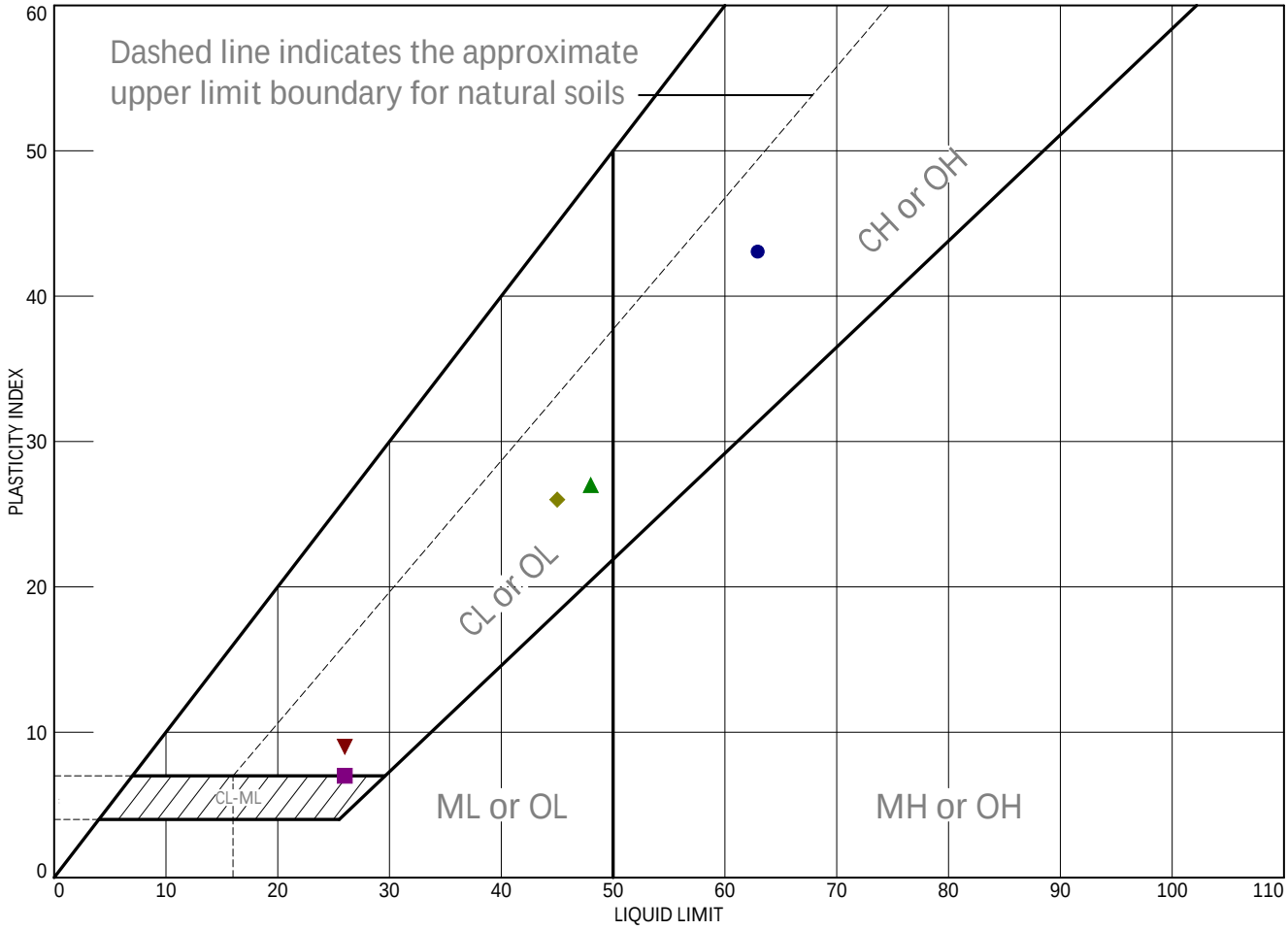
- ● Natural Moisture = 26.9%
- ■ Natural Moisture = 24.3%
- ▲ Natural Moisture = 28.8%
- ◆ Natural Moisture = 21.9%
- ▼ Natural Moisture = 26.6%

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:

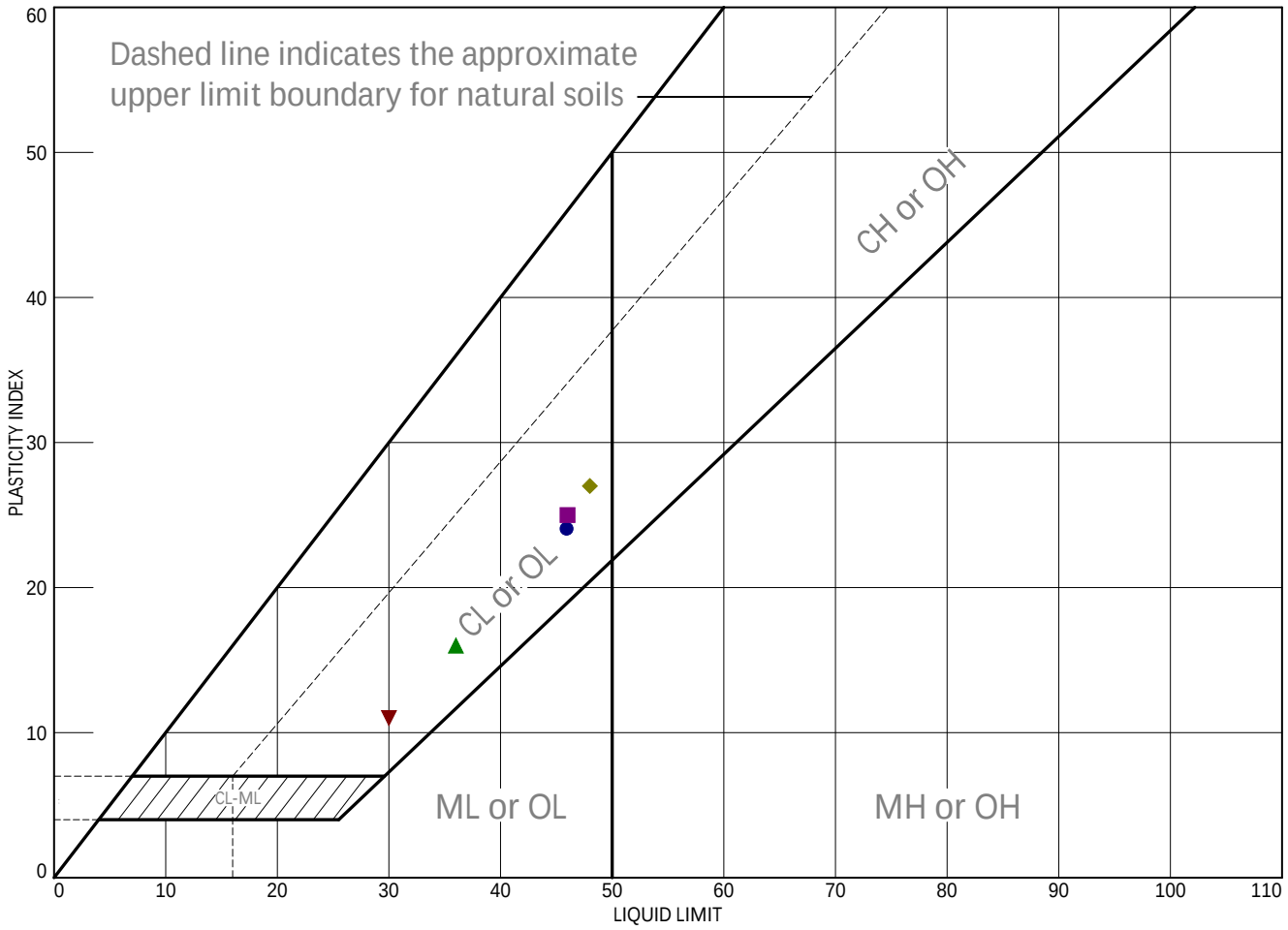
● Natural Moisture = 25.8%
■ Natural Moisture = 23.8%
▲ Natural Moisture = 24.0%
◆ Natural Moisture = 25.7%
▼ Natural Moisture = 28.0%

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:

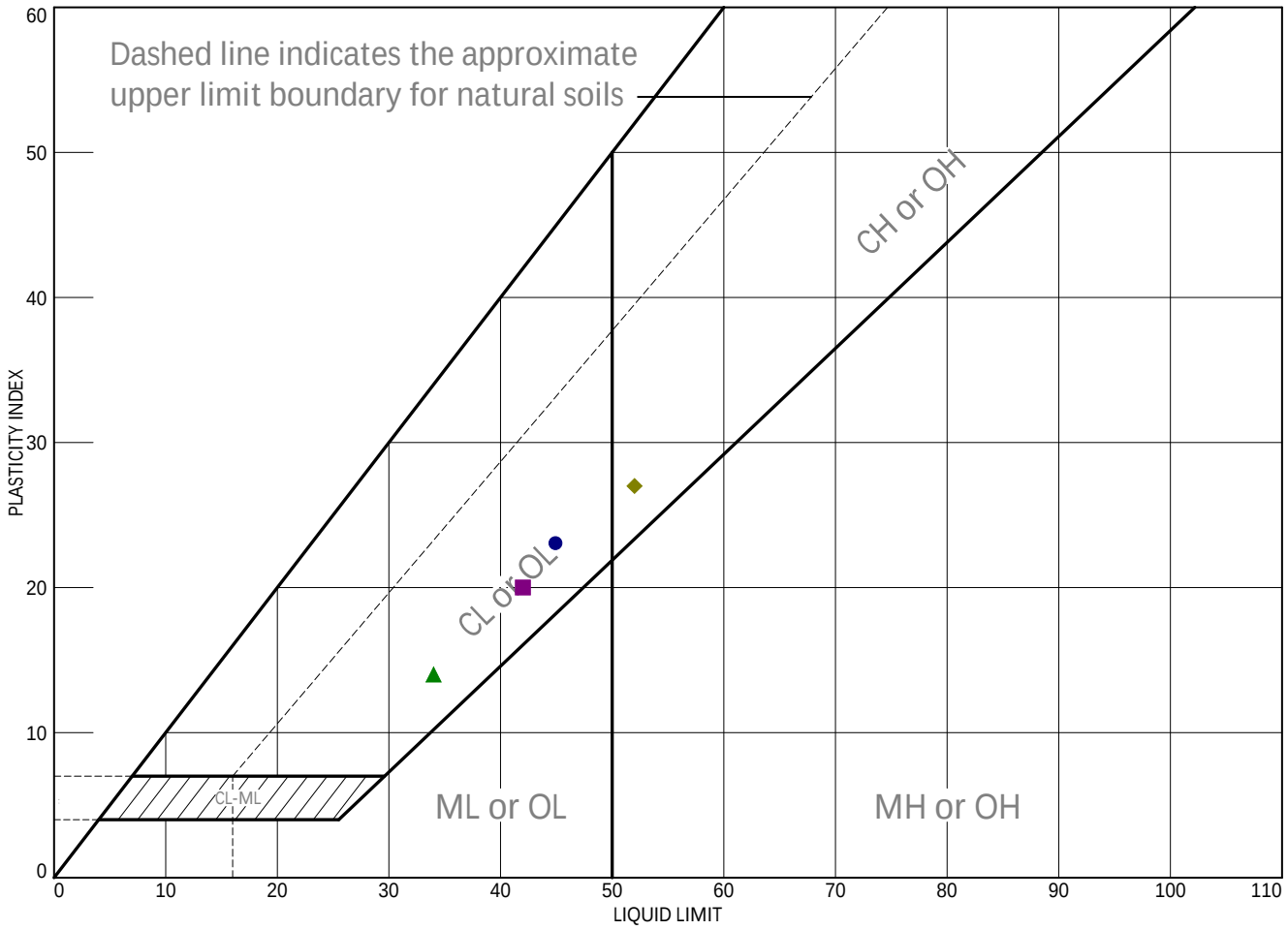
● Natural Moisture = 22.4%
■ Natural Moisture = 23.2%
▲ Natural Moisture = 21.8%
◆ Natural Moisture = 25.7%
▼ Natural Moisture = 23.2%

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:

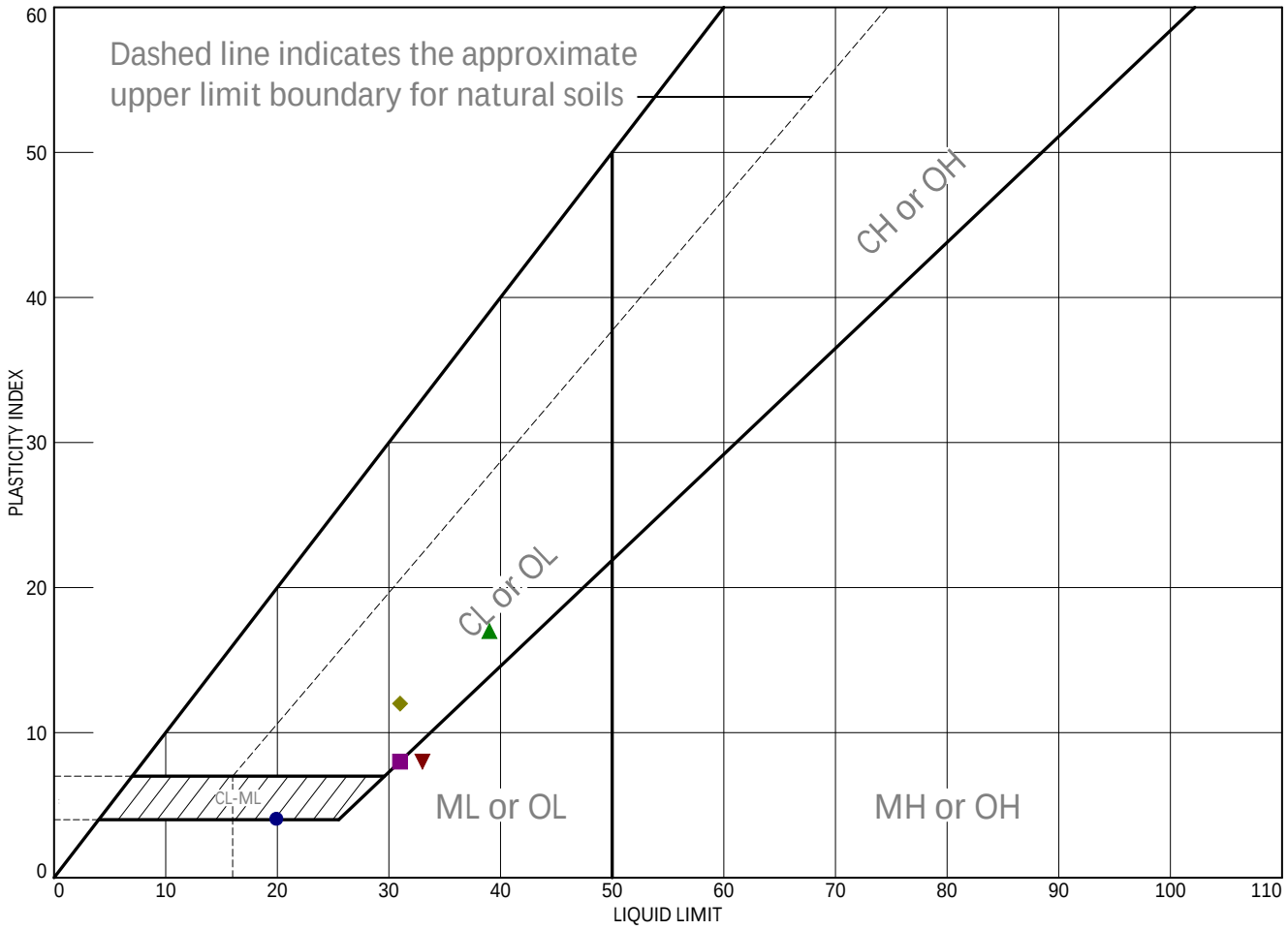
● Natural Moisture = 21.8%
■ Natural Moisture = 21.6%
▲ Natural Moisture = 18.4%
◆ Natural Moisture = 21.1%

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:

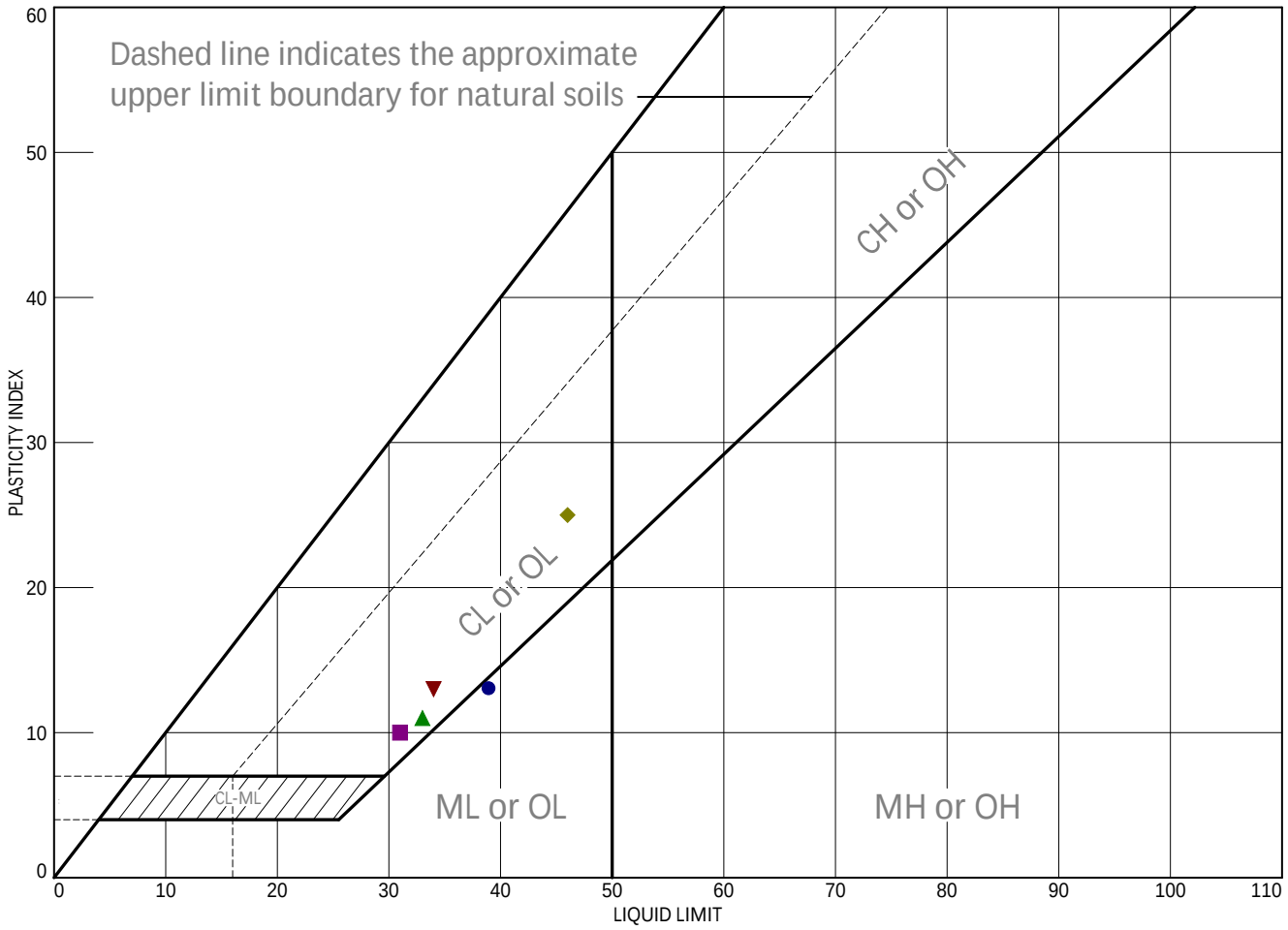
● Natural Moisture = 23.6%
■ Natural Moisture = 27.4%
▲ Natural Moisture = 28.3%
◆ Natural Moisture = 35.9%
▼ Natural Moisture = 29.2%

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.

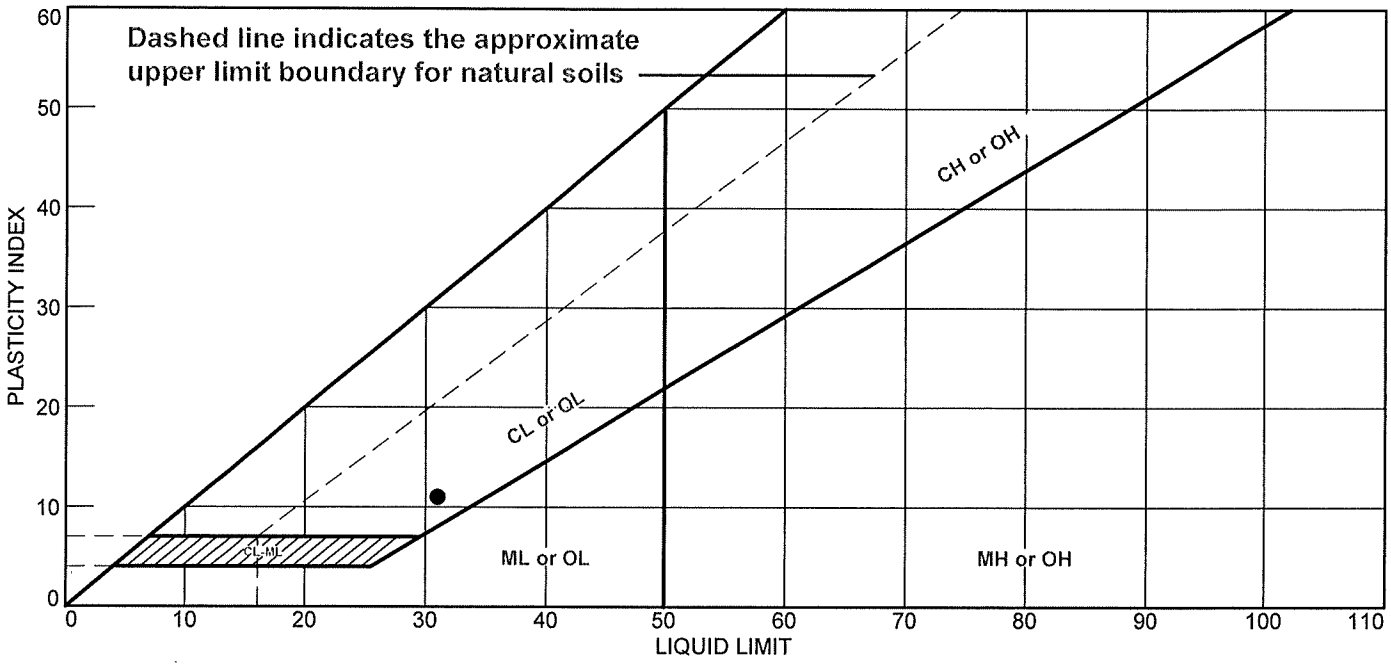
Remarks:
● Natural Moisture = 32.3%
■ Natural Moisture = 26.7%
▲ Natural Moisture = 28.1%
◆ Natural Moisture = 28.6%
▼ Natural Moisture = 28.3%

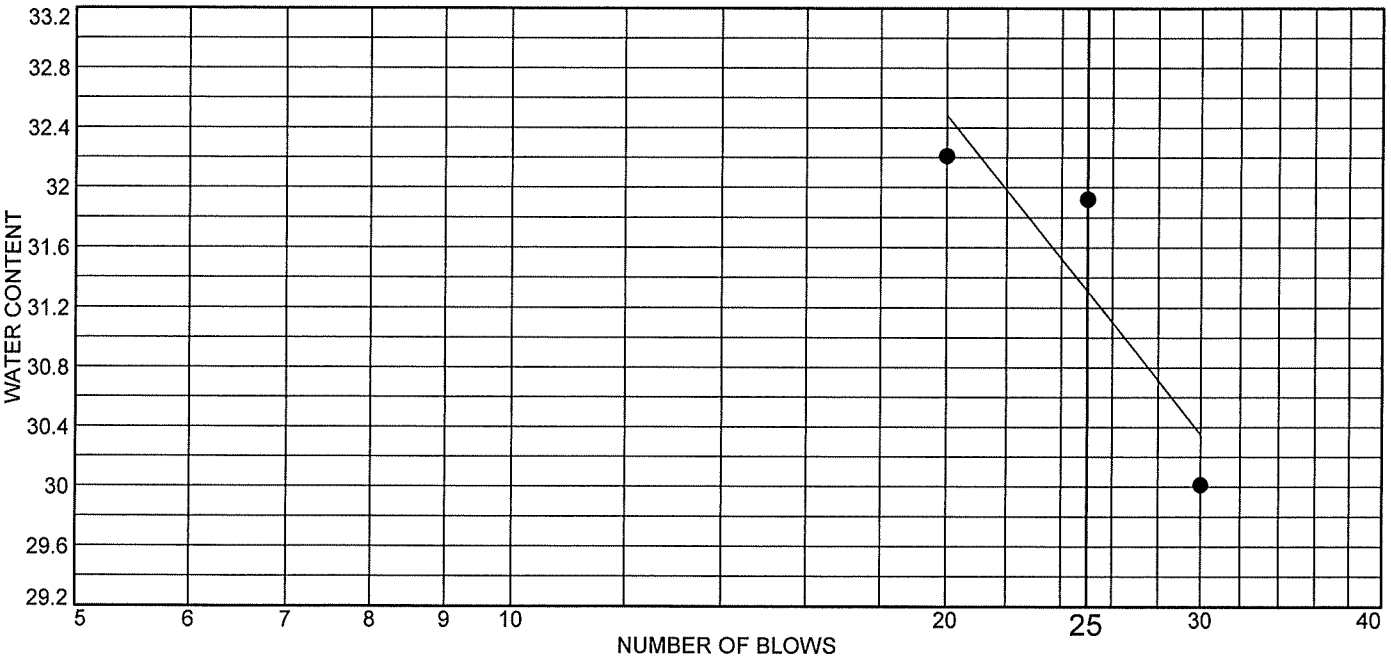
GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-8

Tested By: DAW Checked By: NAS

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Mottled Brown, low plasticity, trace sand	31	20	11			

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D1-38.5-40.5

Sample Number: 418834-1

Remarks:

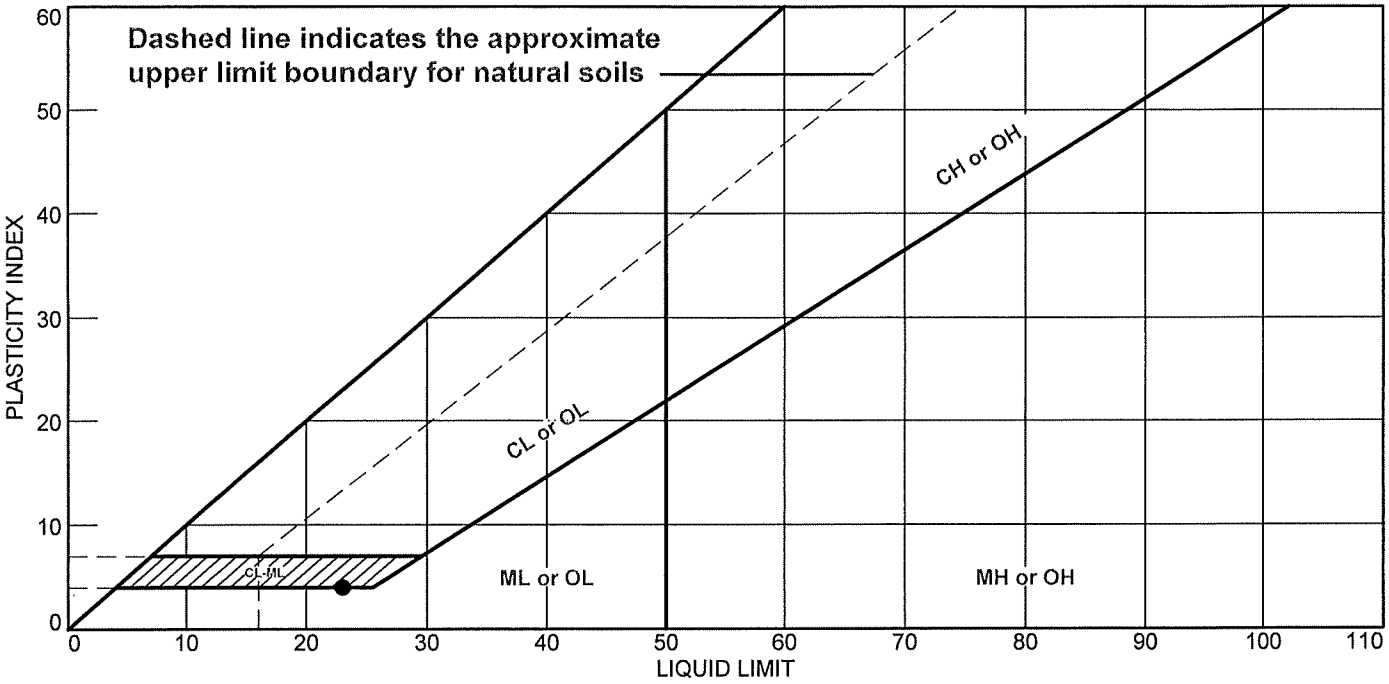
SLS ENGINEERS, LLC

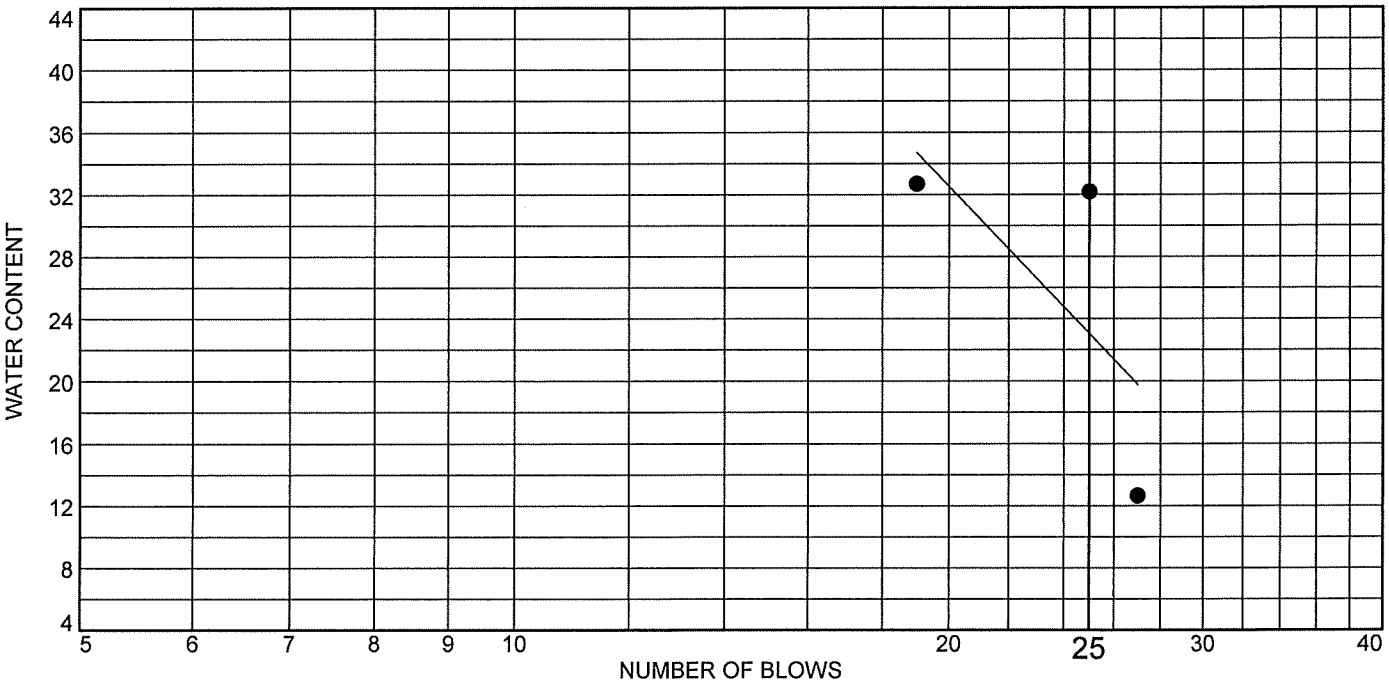
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Tested By: 5/20/24

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Brown-Mottled-Gray, low plasticity, trace sand	23	19	4			

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D3-29.5'-31.5'

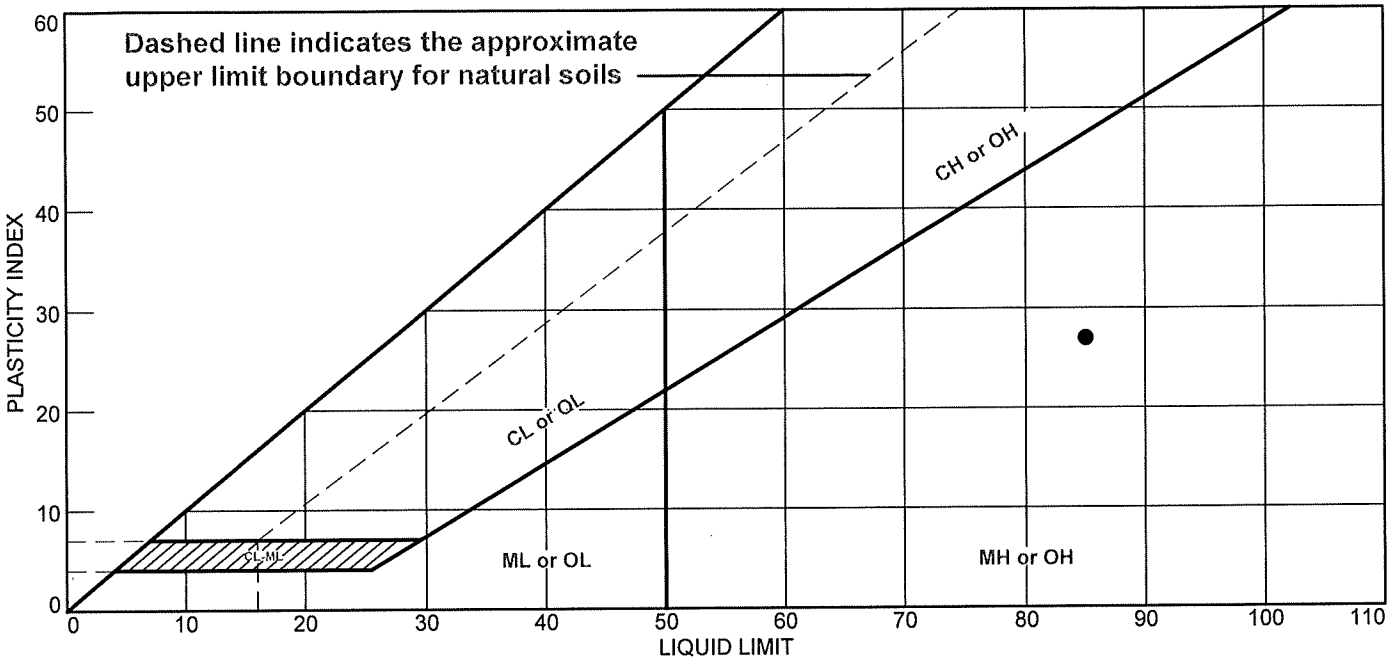
Sample Number: 418834-02

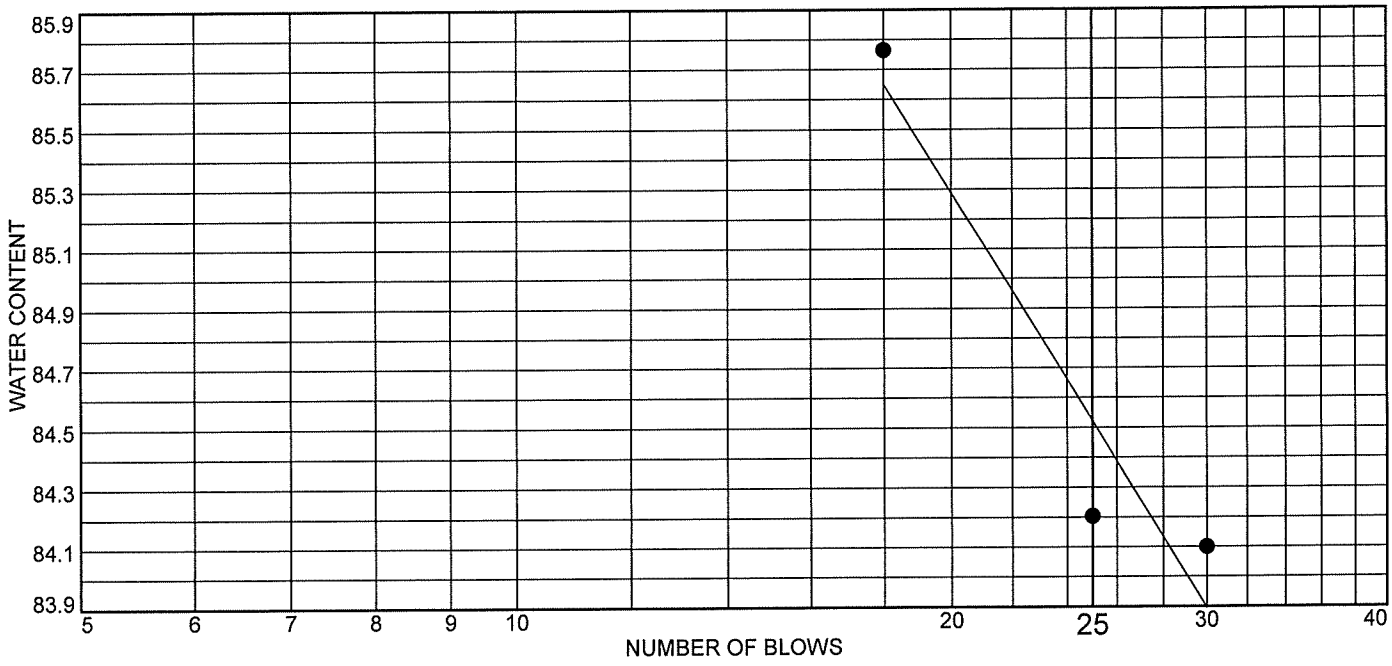
Remarks:

SIS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	ORGANIC SILTY CLAY Black, high plasticity, trace sand	85	58	27	99.7	87.5	MH

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L4-17.0' TO 19.0'

Sample Number: 418834-03

Remarks:

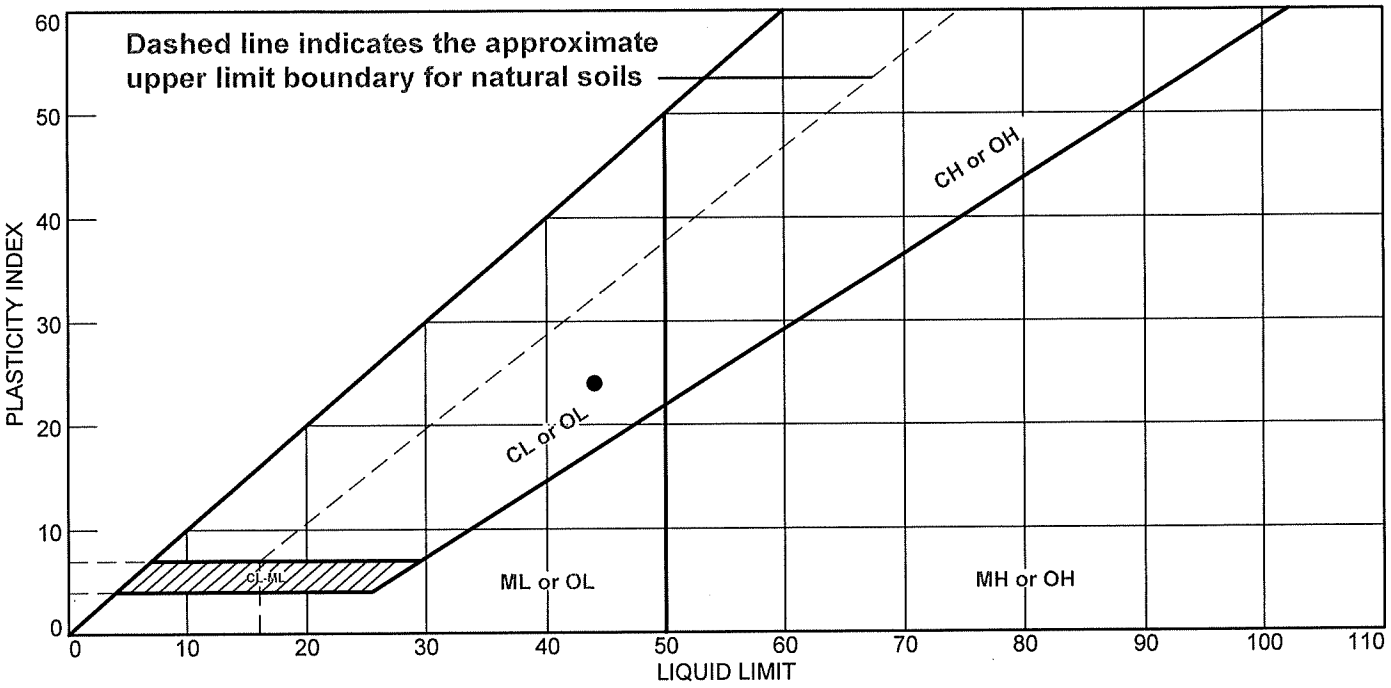
SLS ENGINEERS, LLC

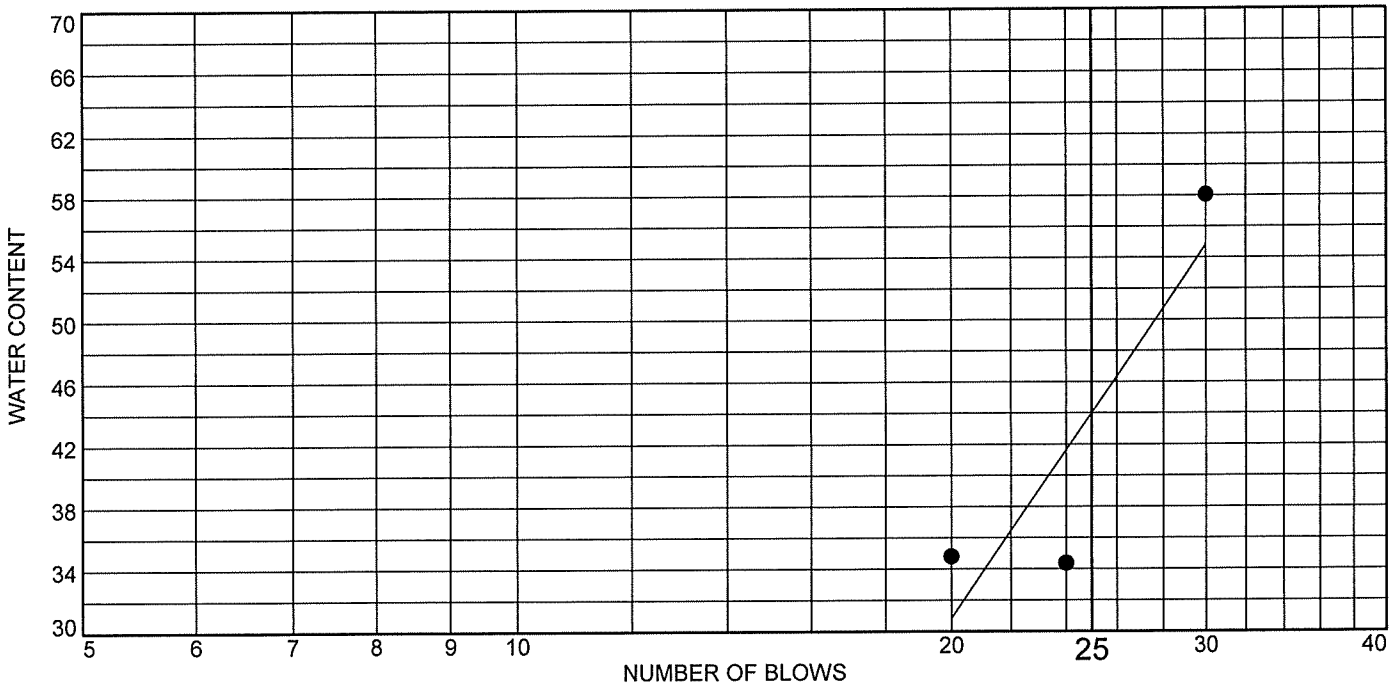
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

Tested By: 5/31/24

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Brown-Mottled-Gray, low plasticity, trace sand	44	20	24	99.3	84.4	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D4-34.5' TO 36.5'

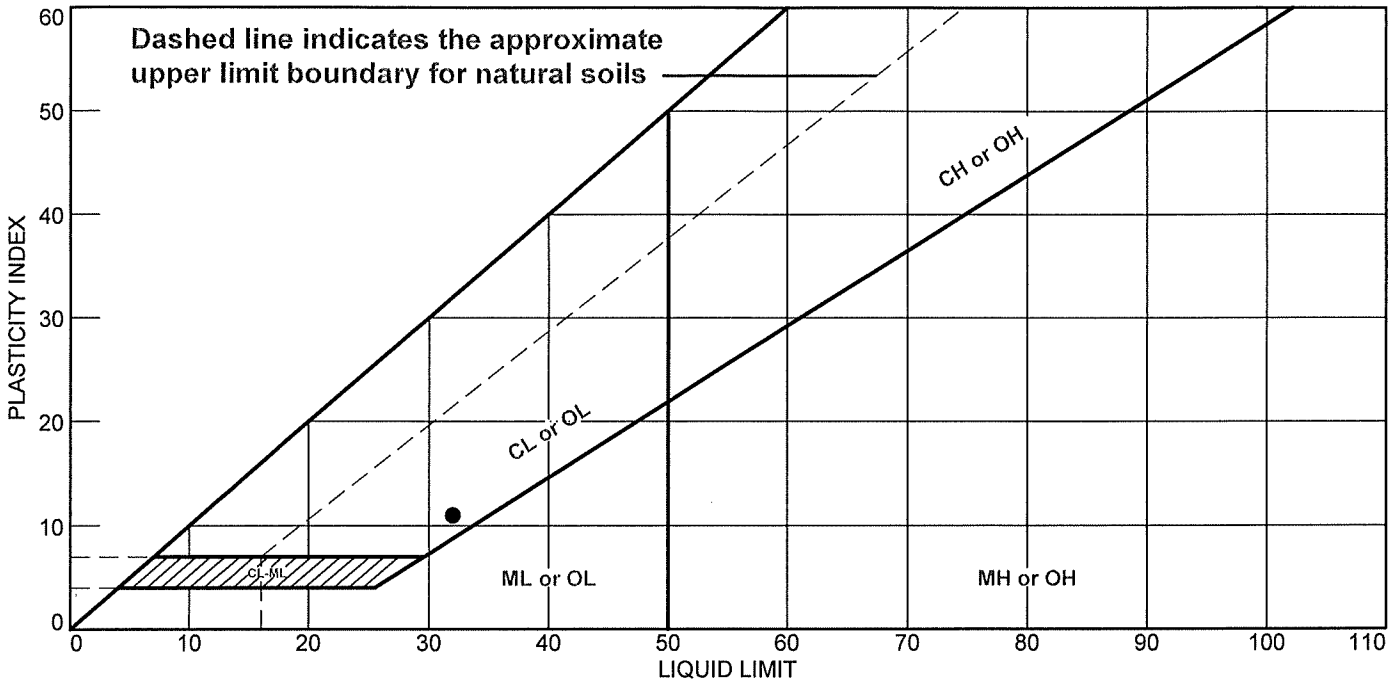
Sample Number: 418834-04

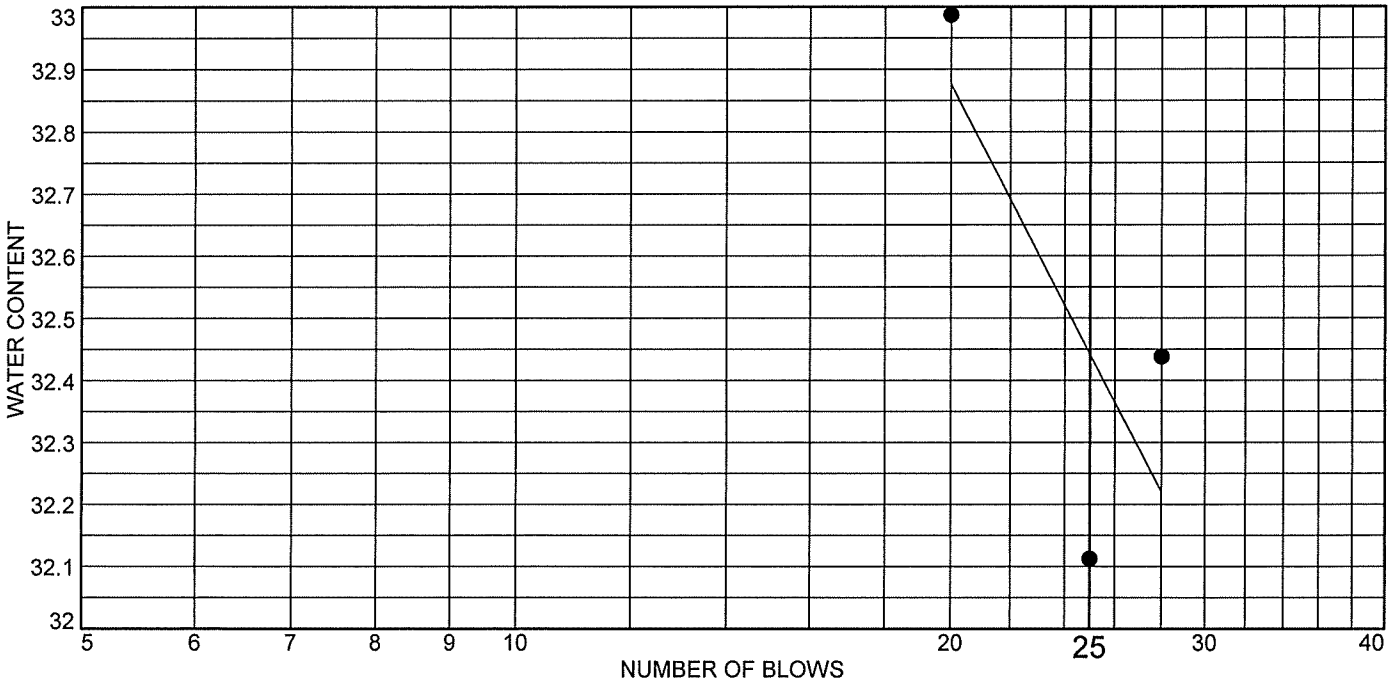
Remarks:

SLS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Gray-Mottled-Brown, low plasticity, trace sand	32	21	11	99.7	96.6	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: D2-35.5' TO 37.5'

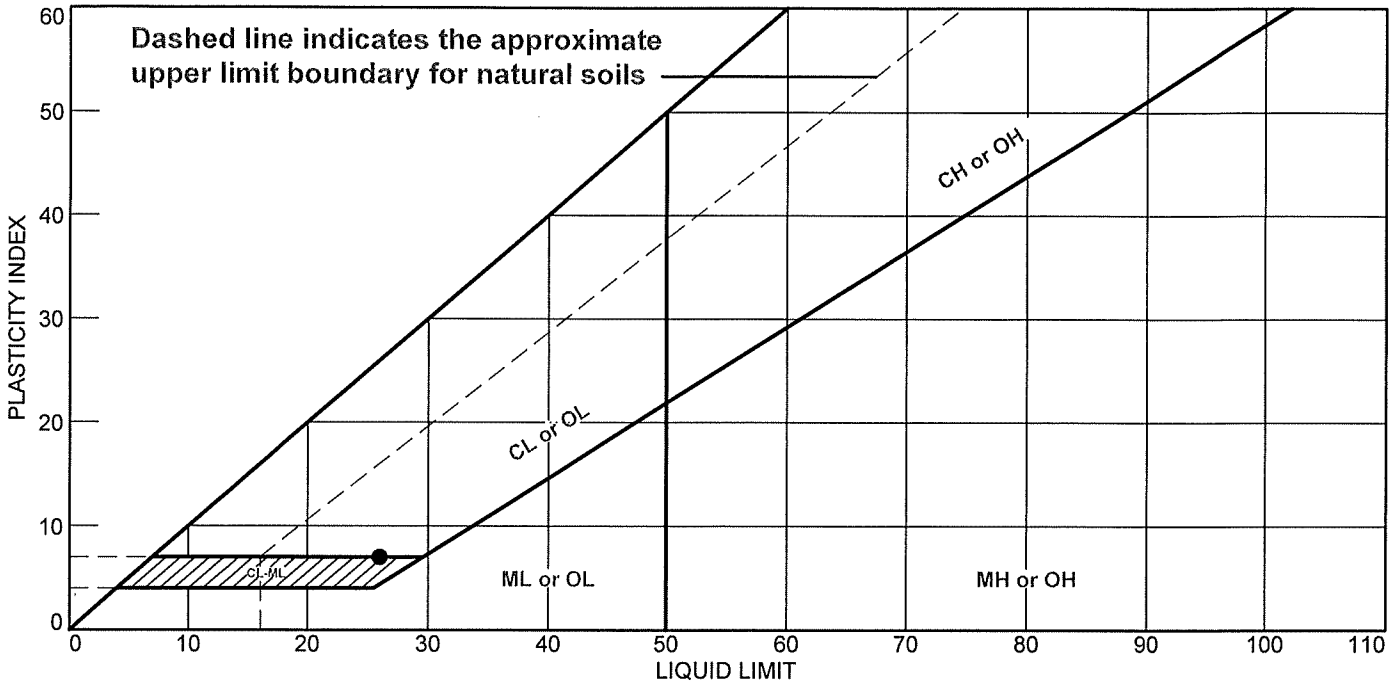
Sample Number: 418834-05

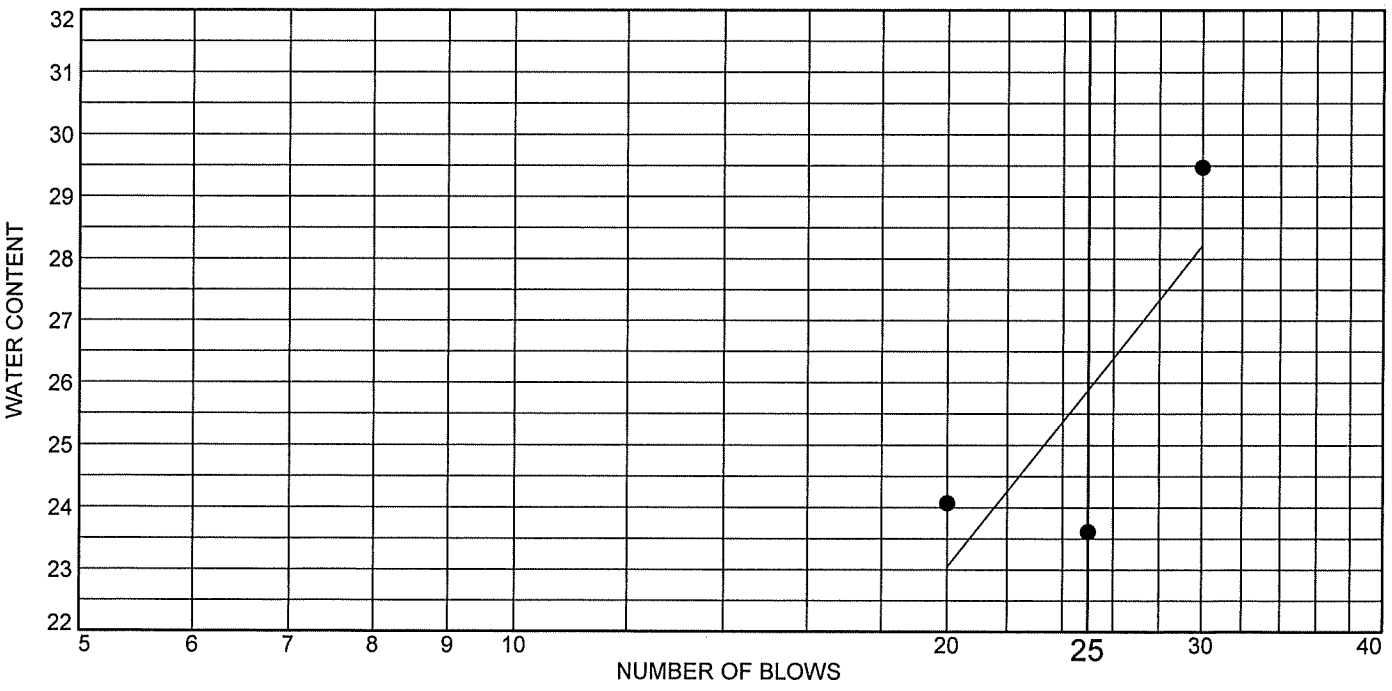
Remarks:

SIKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SANDY SILTY CLAY Brown, low plasticity	26	19	7	99.8	57.7	CL-ML

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L1-36.0' TO 38.0'

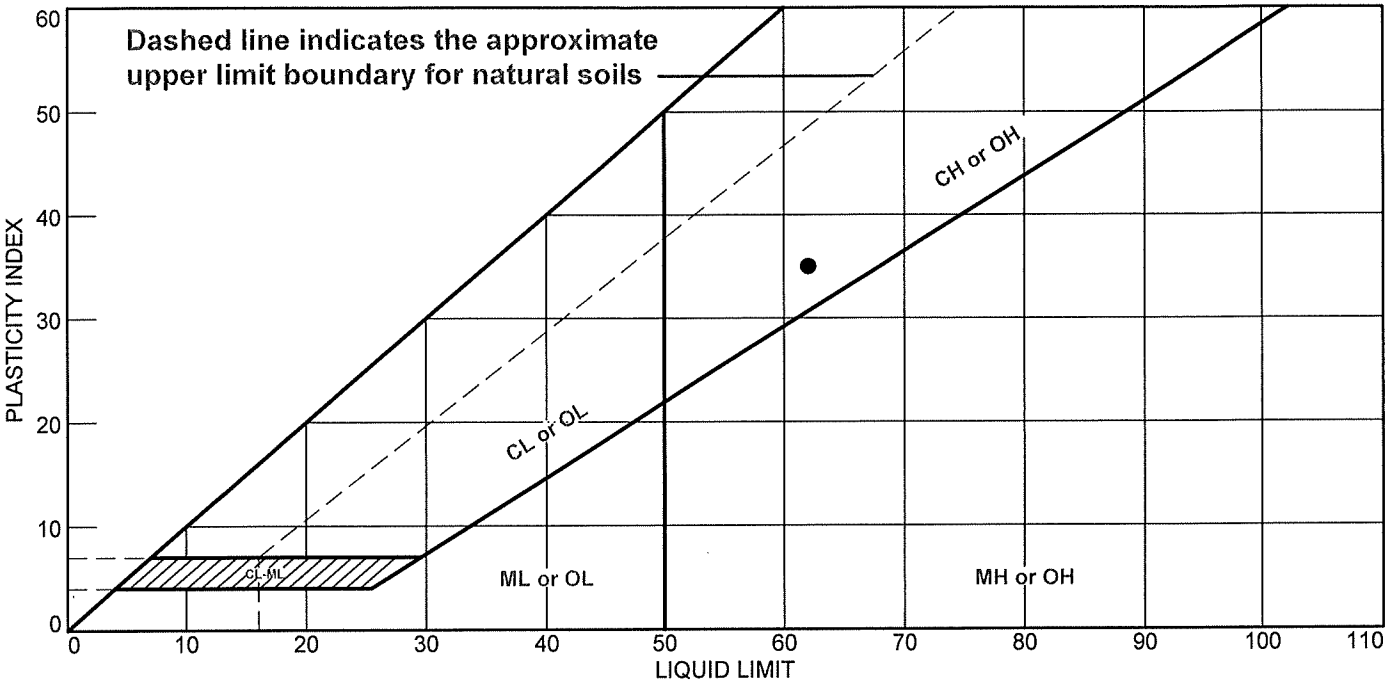
Sample Number: 418834-06

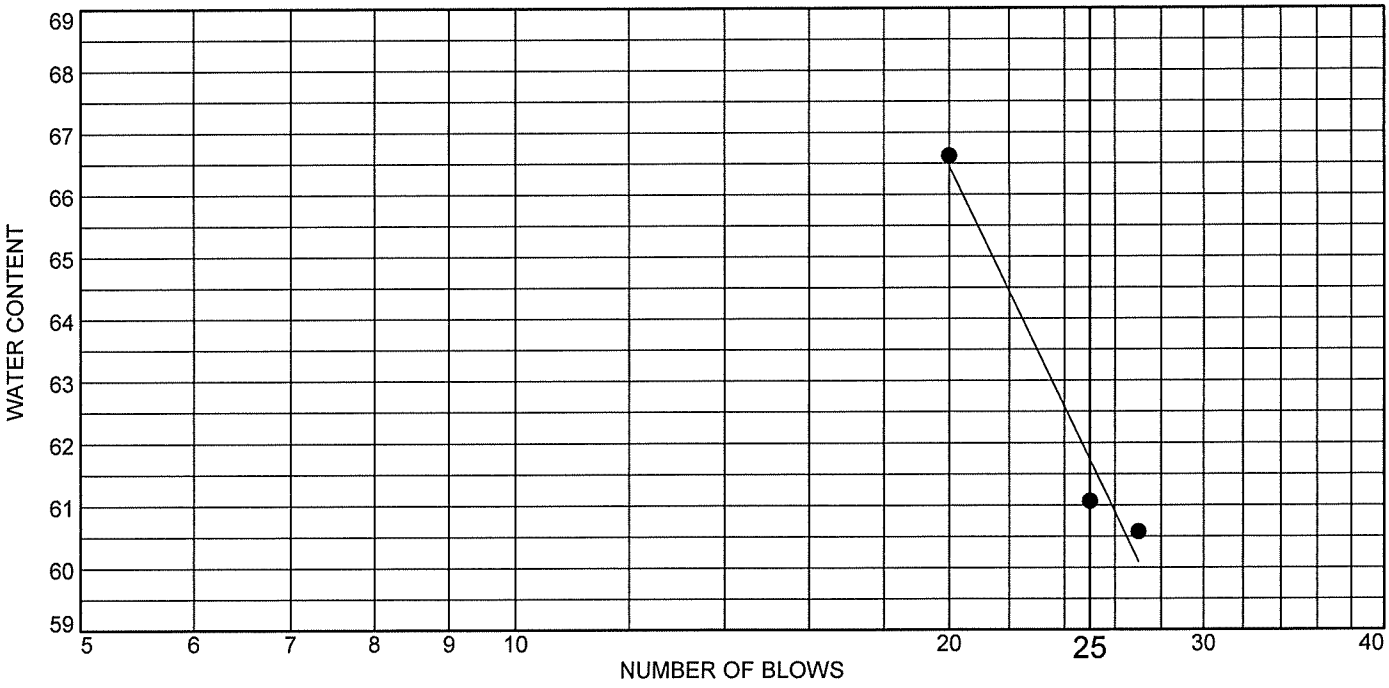
Remarks:

SIKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	LEAN CLAY Brown-Mottled-Gray, low plasticity, trace sand	62	27	35	99.8	98.6	CH

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L3-32.5' TO34.5'

Sample Number: 418834-07

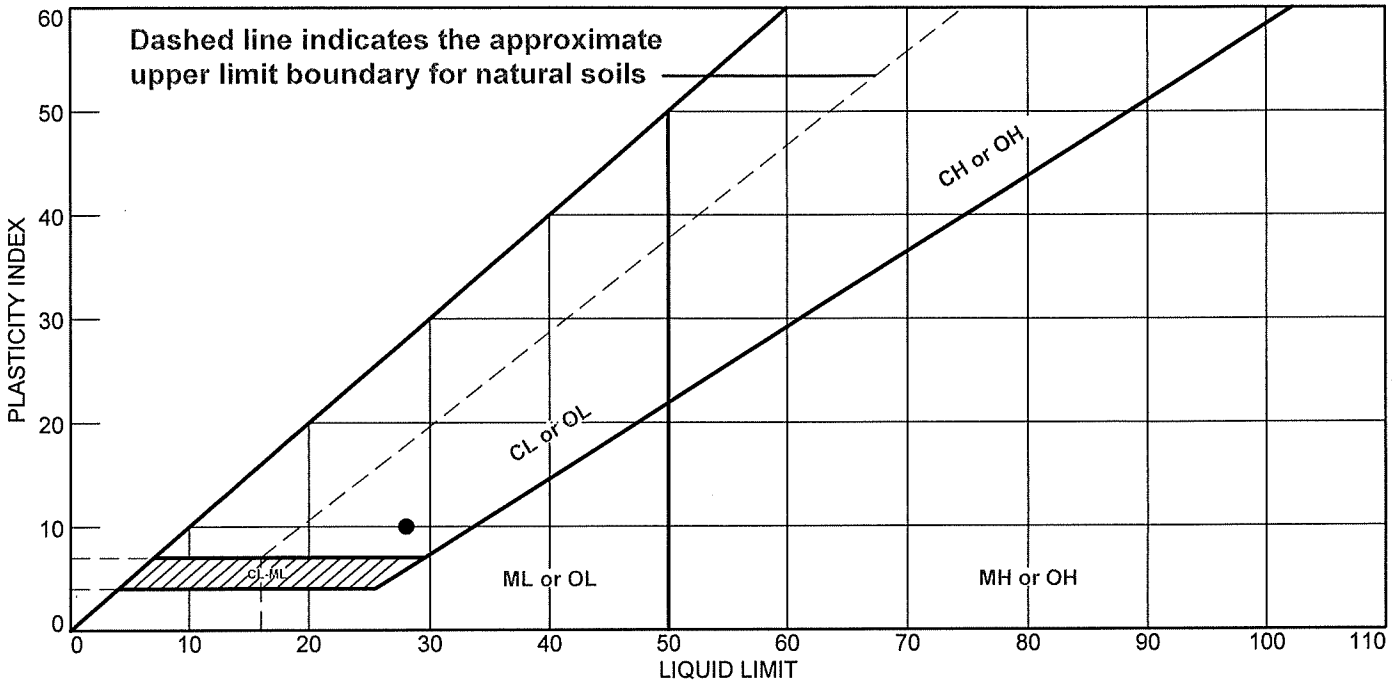
Remarks:

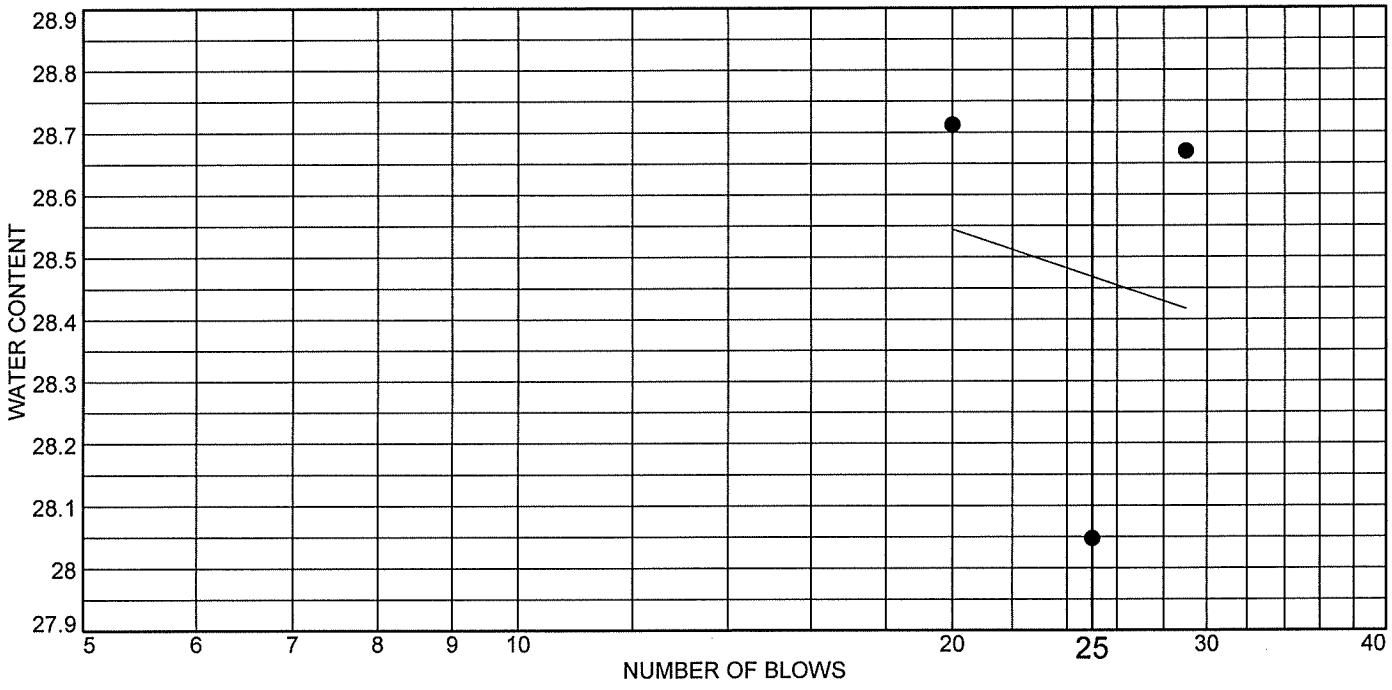
SLS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY Mottle Brown, low plasticity, trace sand	28	18	10	97.4	79.6	CL

Project No. 418834 **Client:** ANDREWS ENGINEERING INC.

Project: CONSTRUCTION & MATERIALS TESTING

SPRINGFIELD, ILLINOIS

Location: L5-37.5' TO 39.5'

Sample Number: 418834-08

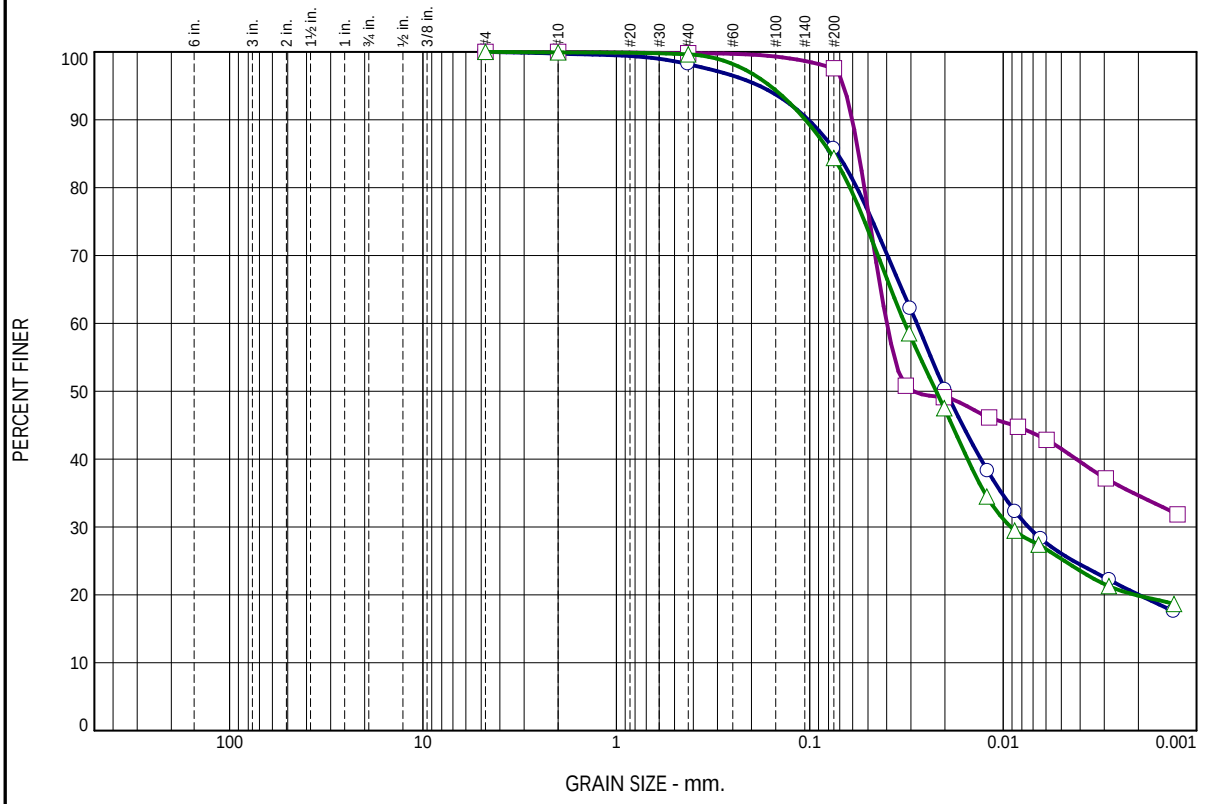
Remarks:

SIS ENGINEERS, LLC

2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Figure

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

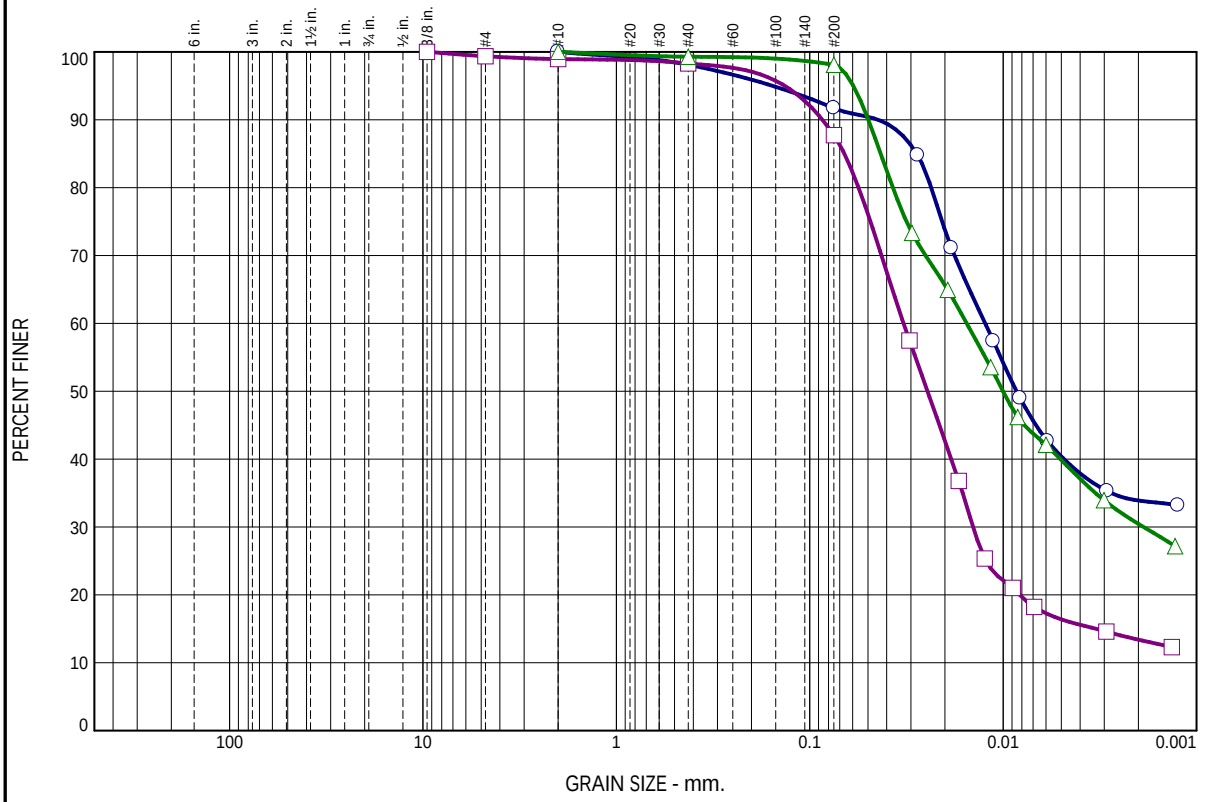
Client: Andrews Engineering

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
4510 Paris Gravel Road - Hannibal, MO

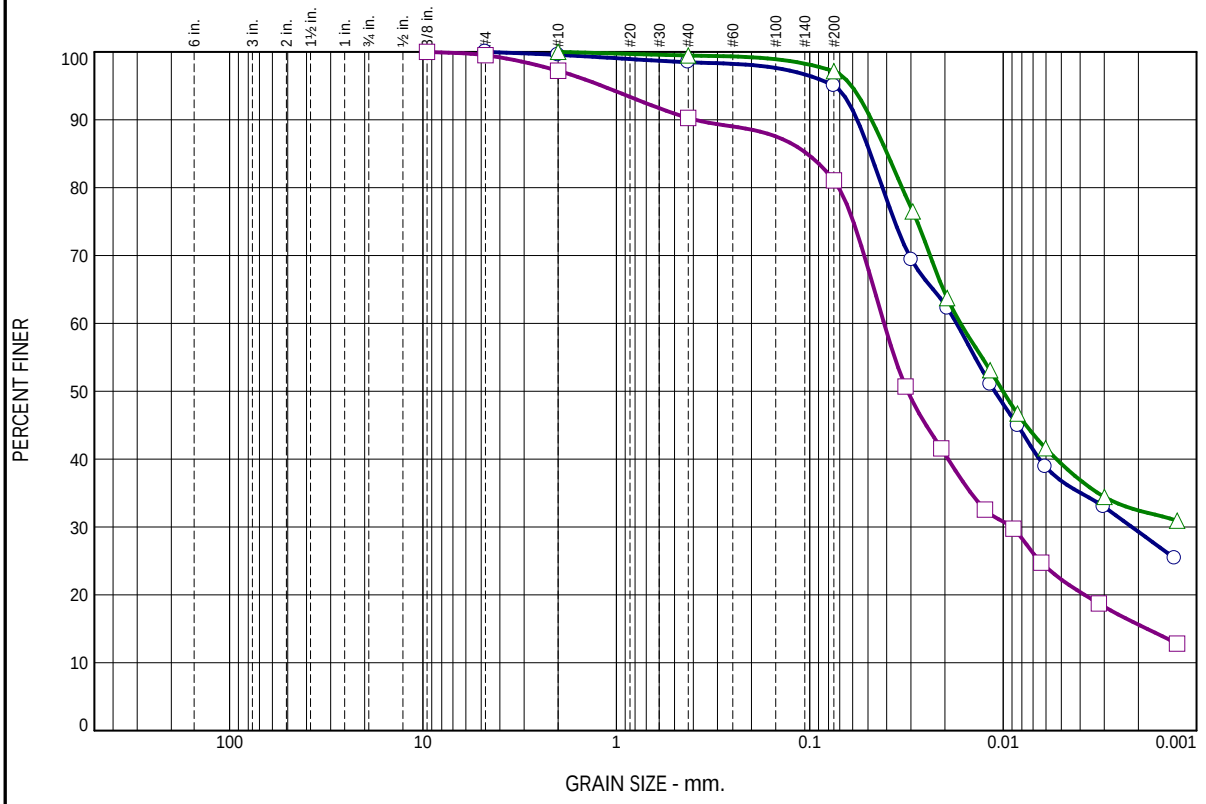
Client: Andrews Engineering

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
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

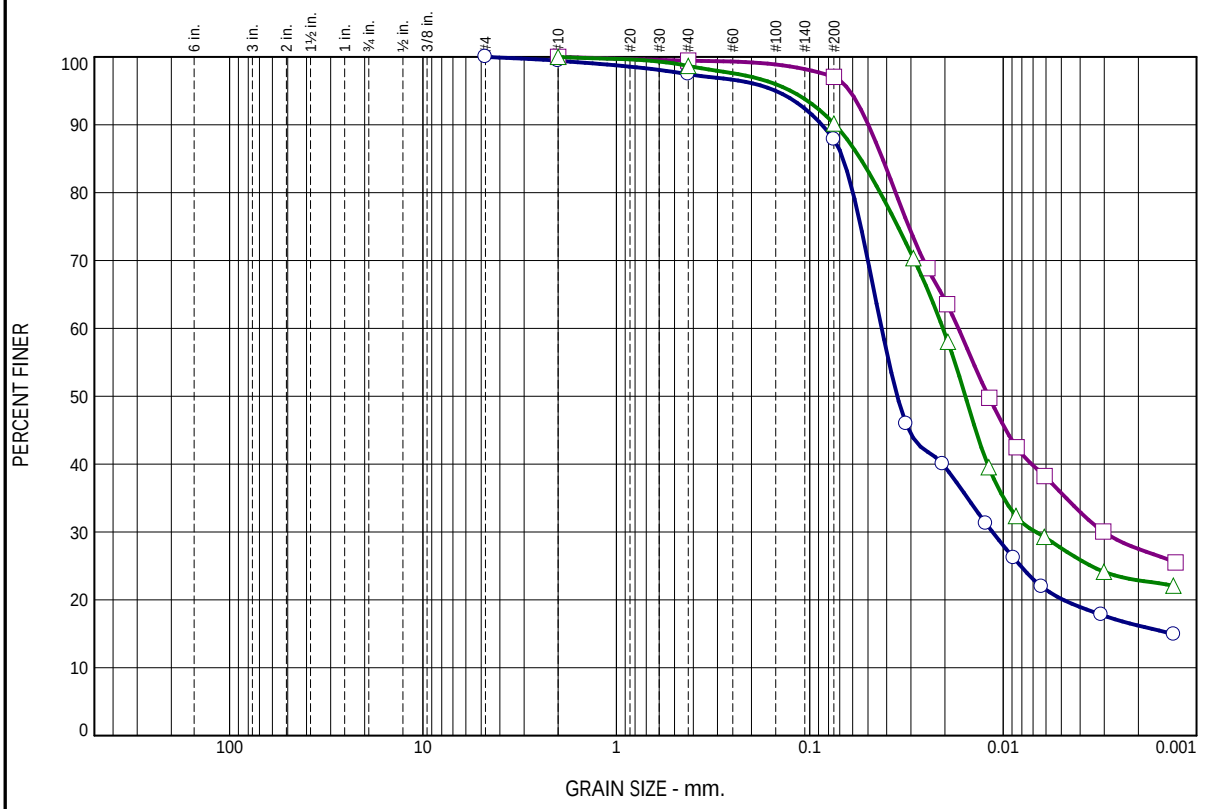
Client: Andrews Engineering

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
4510 Paris Gravel Road - Hannibal, MO

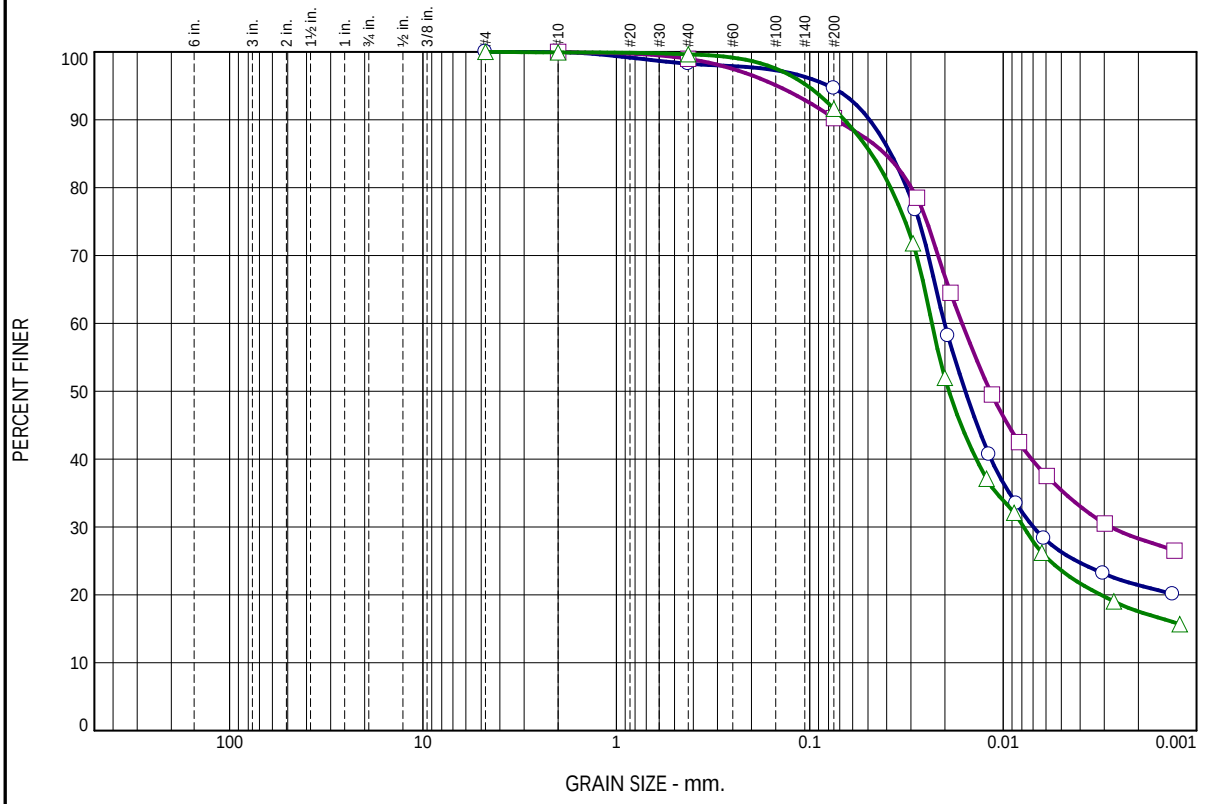
Client: Andrews Engineering

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

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

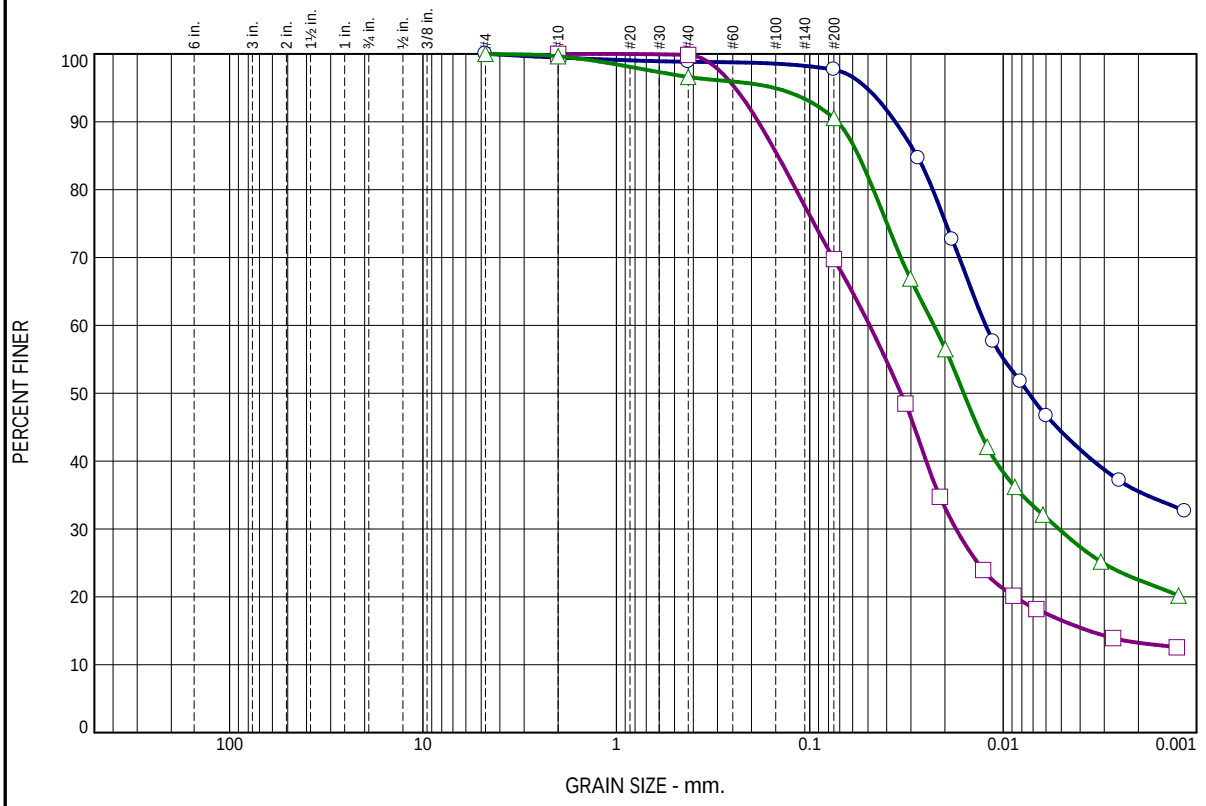
Client: Andrews Engineering

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

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

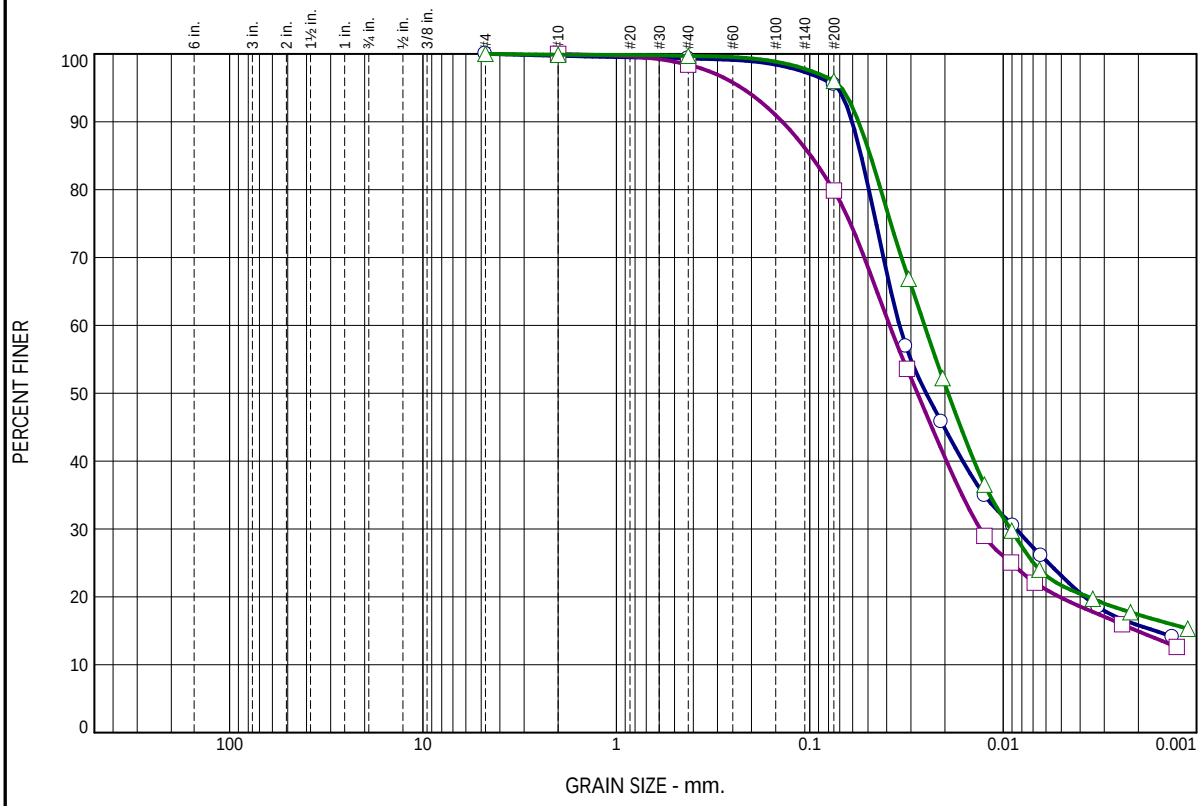
Client: Andrews Engineering

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

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

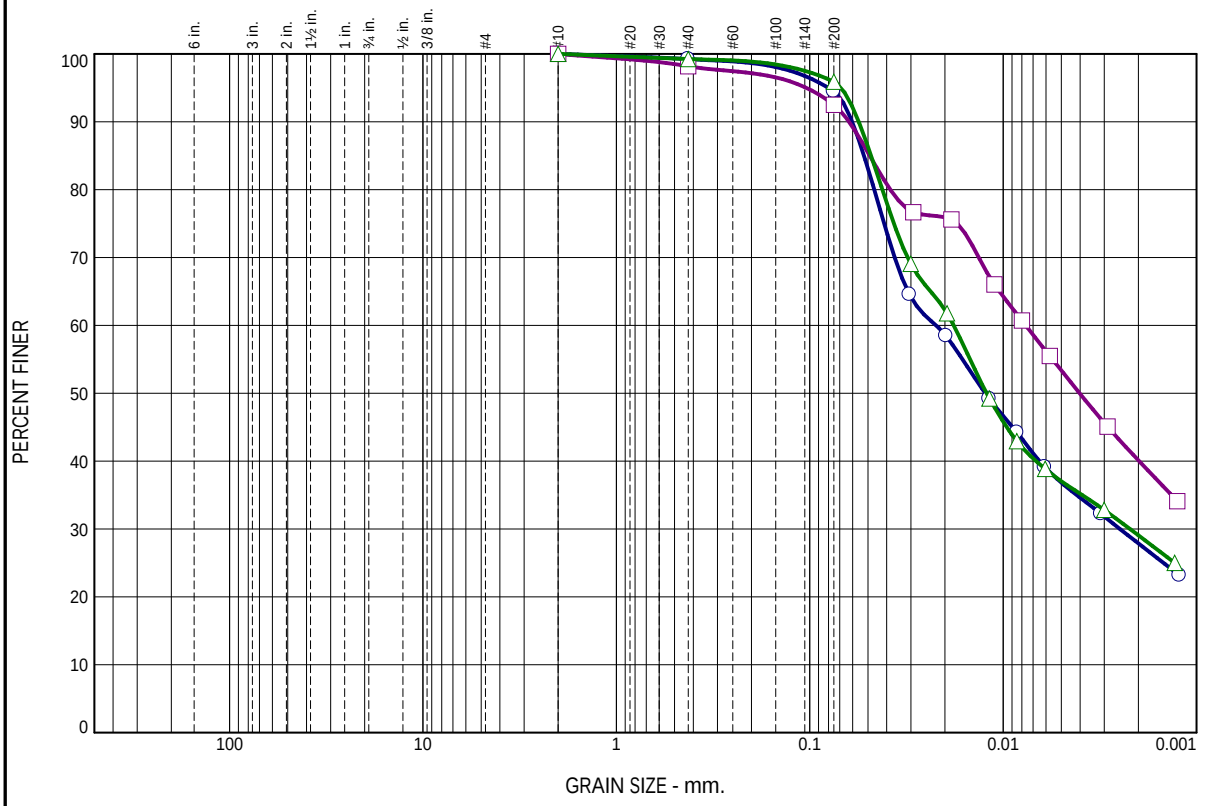
Client: Andrews Engineering

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:

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

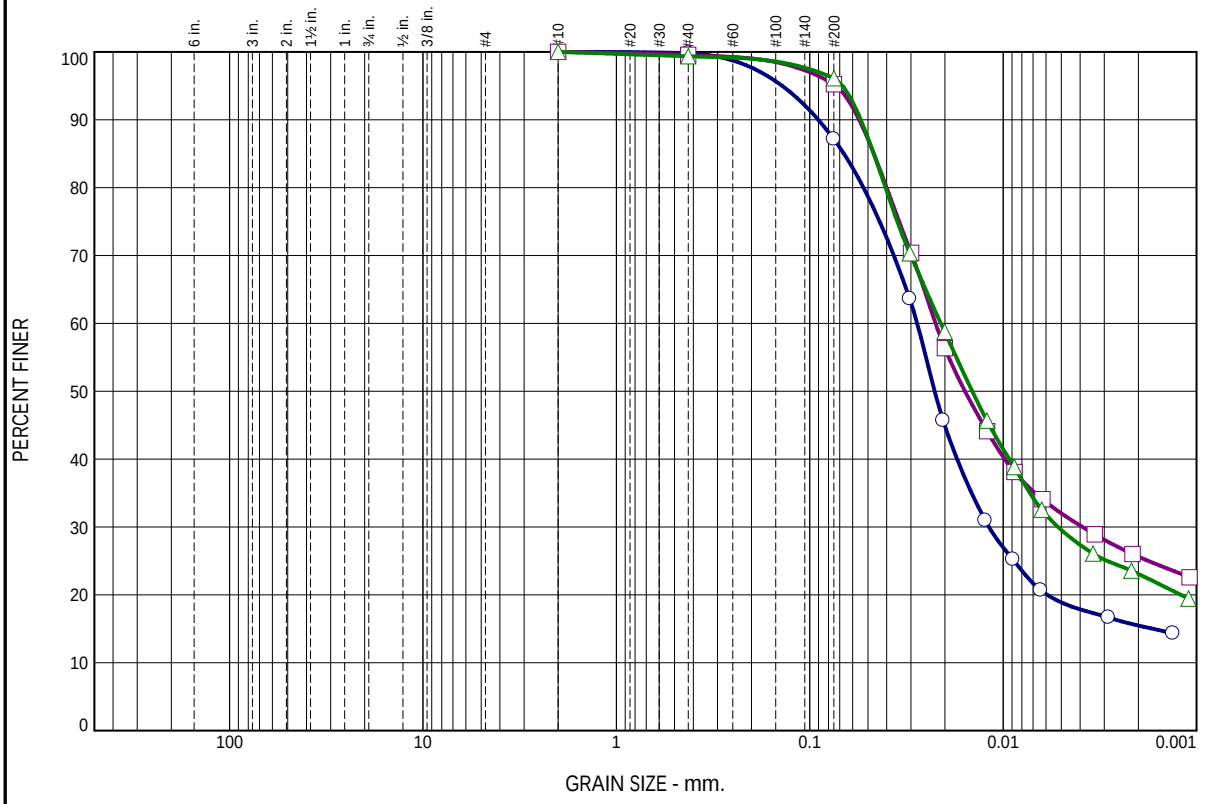
Client: Andrews Engineering

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

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

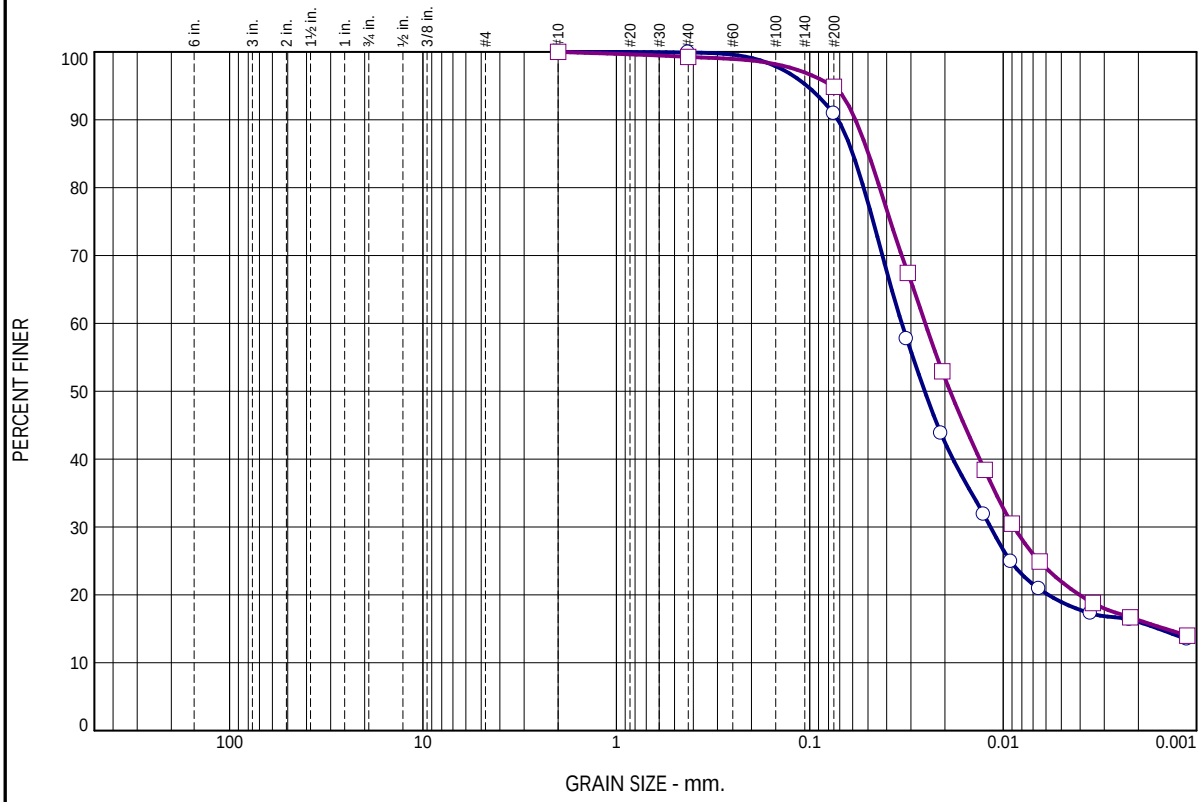
Client: Andrews Engineering

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

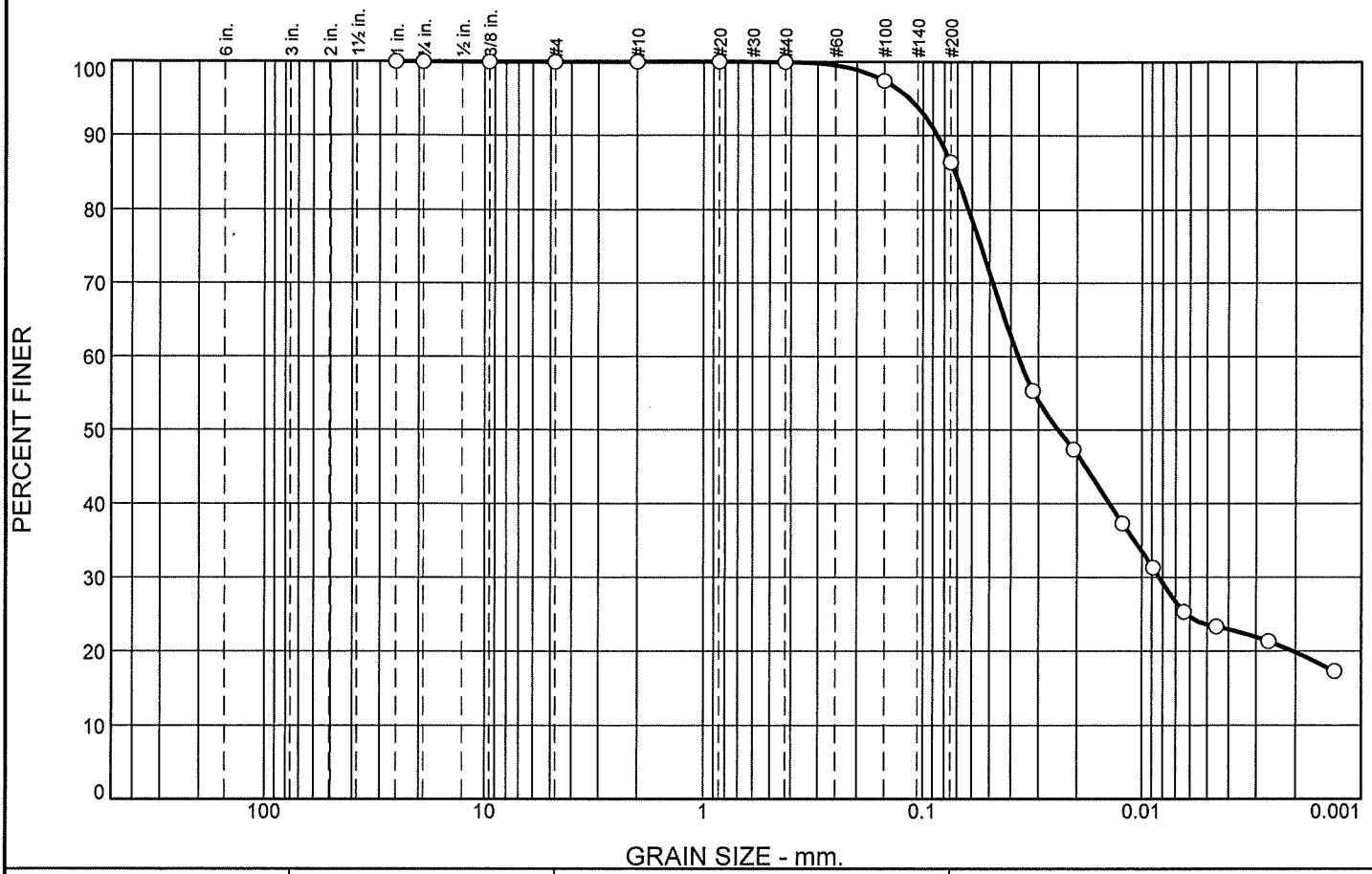
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-10

Tested By: MAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	13.5	62.8	23.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#100	97.4		
#200	86.4		

* (no specification provided)

Material Description

SILTY CLAY
Mottled Brown, low plasticity, trace sand

Atterberg Limits

PL= 20 LL= 31 PI= 11

Coefficients

D_{85}= 0.0717 D_{60}= 0.0371 D_{50}= 0.0244
D_{30}= 0.0083 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-6a(8)

Remarks

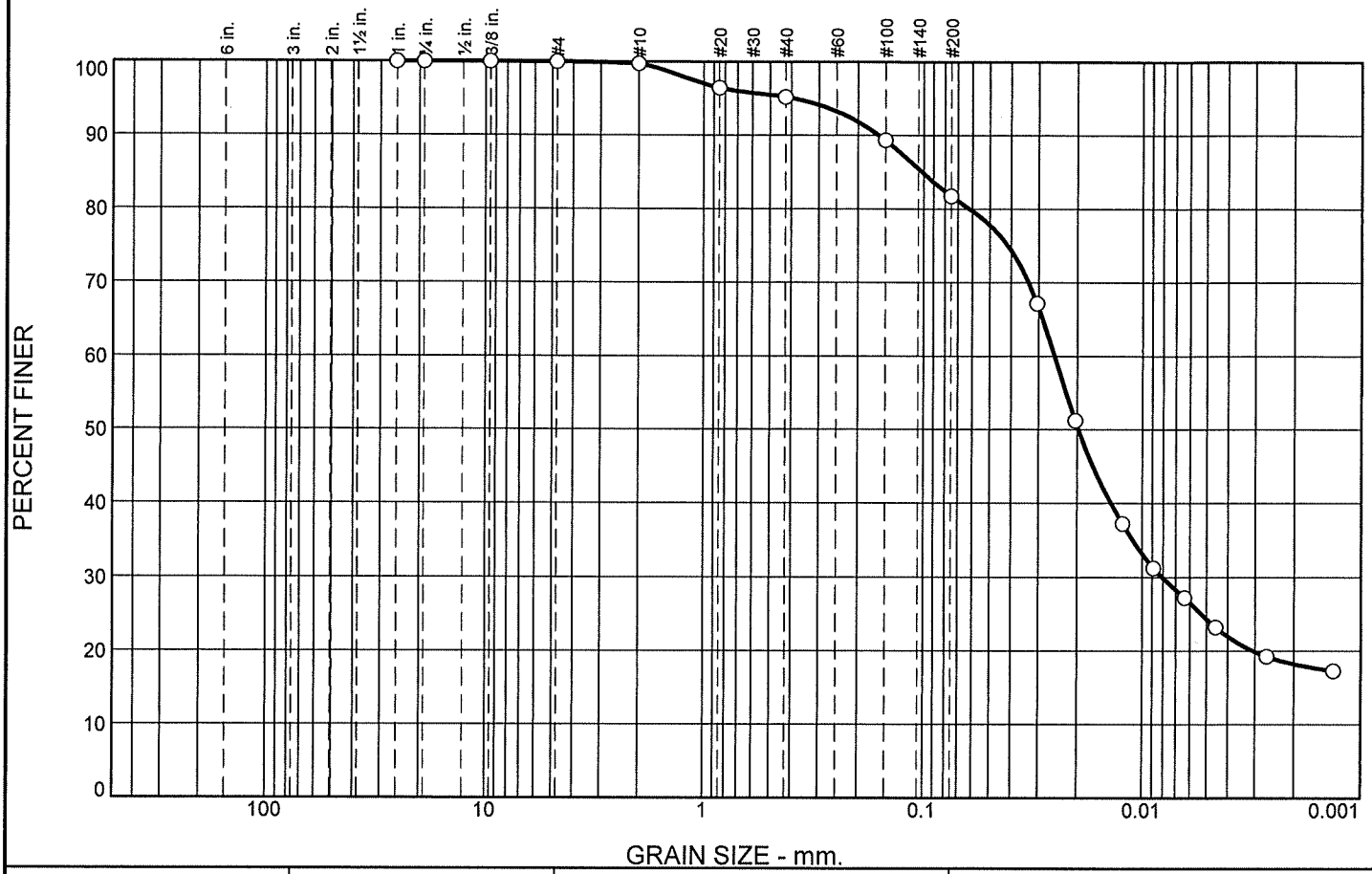
Location: D1-38.5'-40.5'
Sample Number: 418834-01

Date: 5/21/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.6	13.5	57.3	24.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.8		
#20	96.5		
#40	95.2		
#100	89.3		
#200	81.7		

* (no specification provided)

Material Description

SILTY CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 19 LL= 23 PI= 4

Coefficients

D_{85}= 0.1017 D_{60}= 0.0253 D_{50}= 0.0197
D_{30}= 0.0081 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML ODOT= A-4b(8)

Remarks

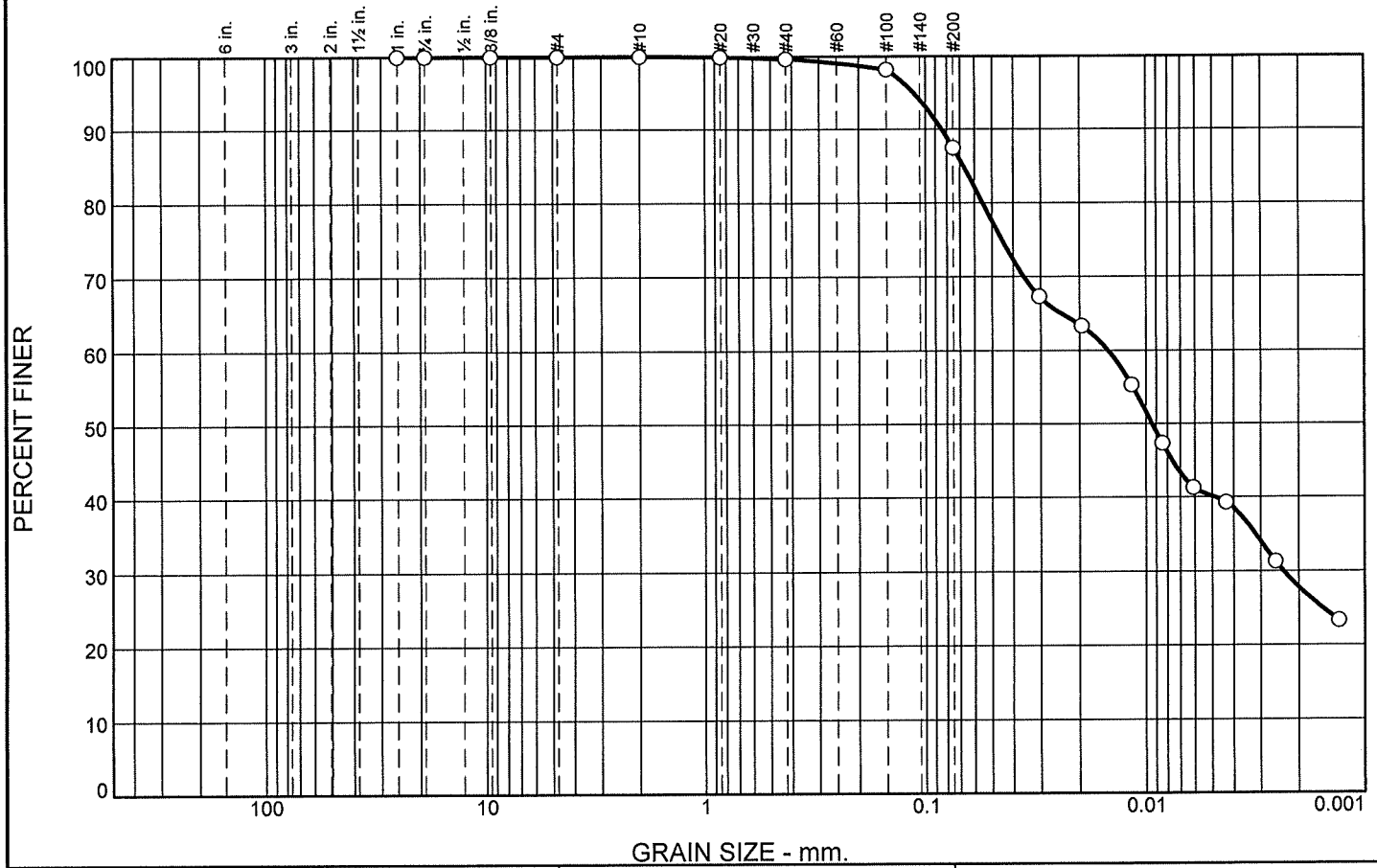
Location: D3-29.5'-31.5'
Sample Number: 418834-02

Date:

SIS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	12.2	47.4	40.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.7		
#100	98.2		
#200	87.5		

* (no specification provided)

Material Description

ORGANIC SILTY CLAY
Black, high plasticity, trace sand

Atterberg Limits

PL= 58 LL= 85 PI= 27

Coefficients

D_{85}= 0.0674 D_{60}= 0.0149 D_{50}= 0.0094
D_{30}= 0.0024 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH ODOT= A-7-5(19)

Remarks

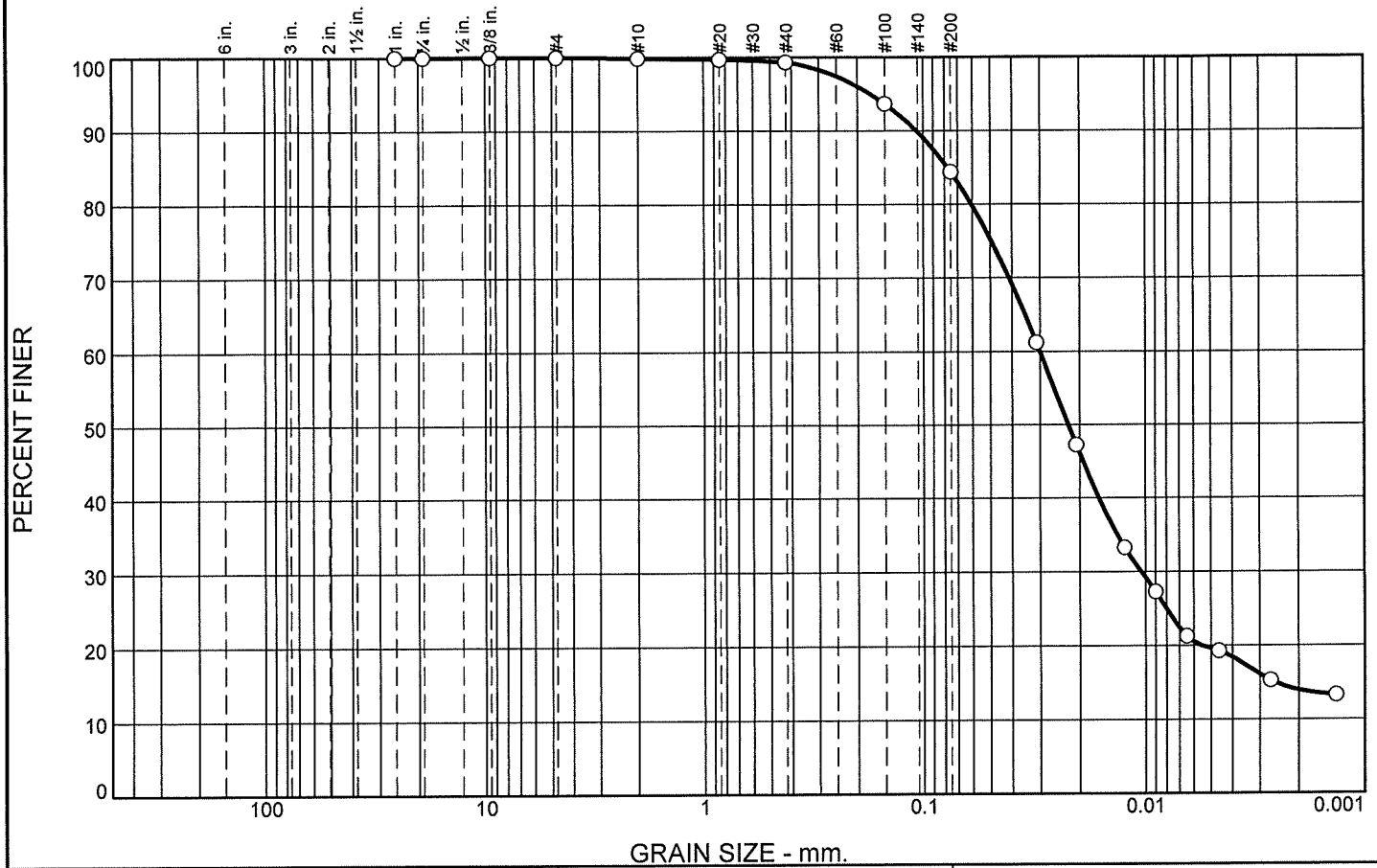
Location: L4-17.0' TO 19.0'
Sample Number: 418834-03

Date: 5/22/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.6	14.9	64.8	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	99.3		
#100	93.7		
#200	84.4		

* (no specification provided)

Material Description

SILTY CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 20 LL= 44 PI= 24

Coefficients

D_{85}= 0.0776 D_{60}= 0.0300 D_{50}= 0.0224
D_{30}= 0.0105 D_{15}= 0.0026 D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-7-6(14)

Remarks

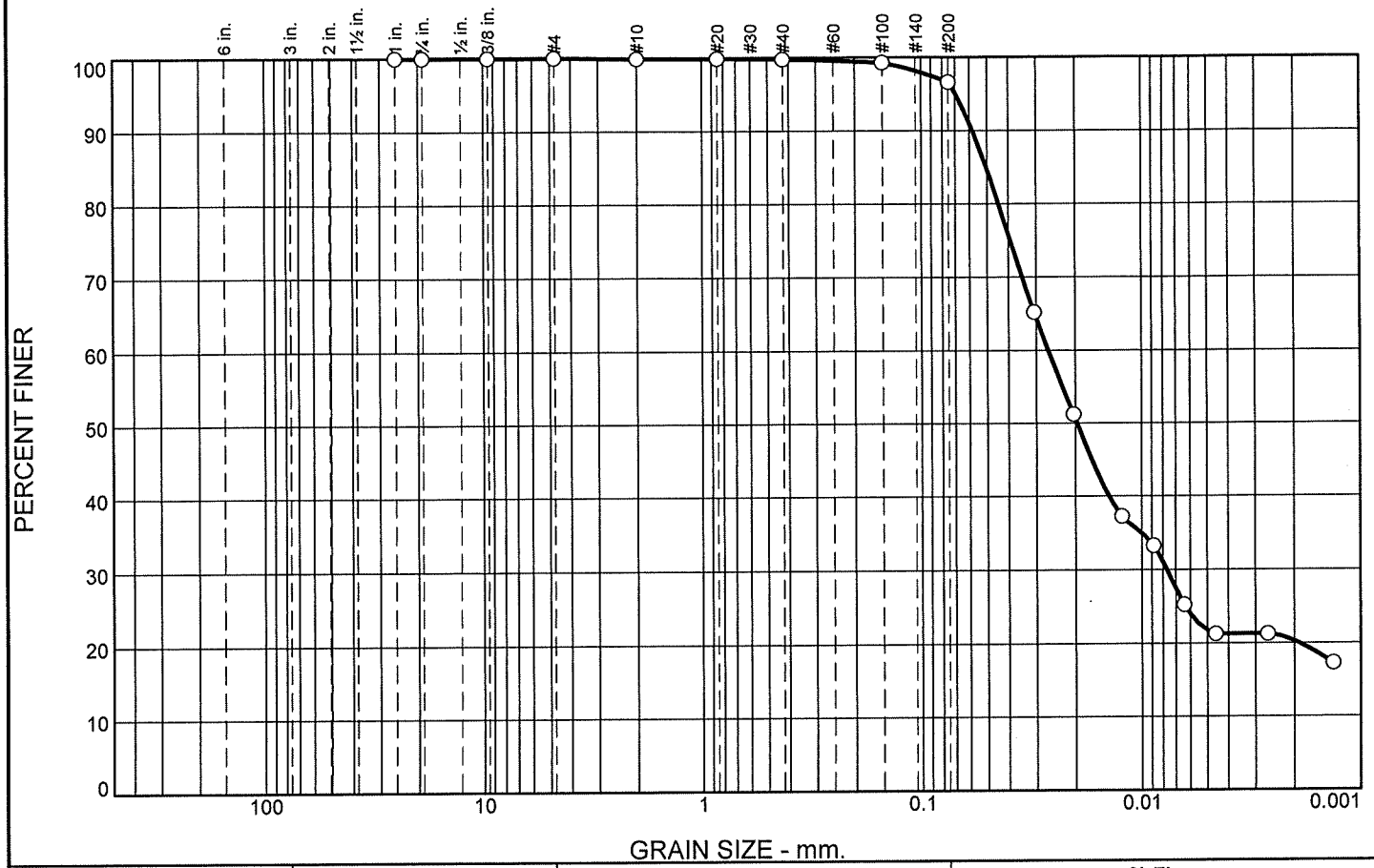
Location: D4-34.5' TO 36.5'
Sample Number: 418834-04

Date: 5/22/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.2	3.1	74.8	21.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.9		
#20	99.9		
#40	99.7		
#100	99.3		
#200	96.6		

* (no specification provided)

Material Description

SILTY CLAY
Gray-Mottled-Brown, low plasticity, trace sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.0505 D_{60}= 0.0265 D_{50}= 0.0196
D_{30}= 0.0077 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ODOT=

Remarks

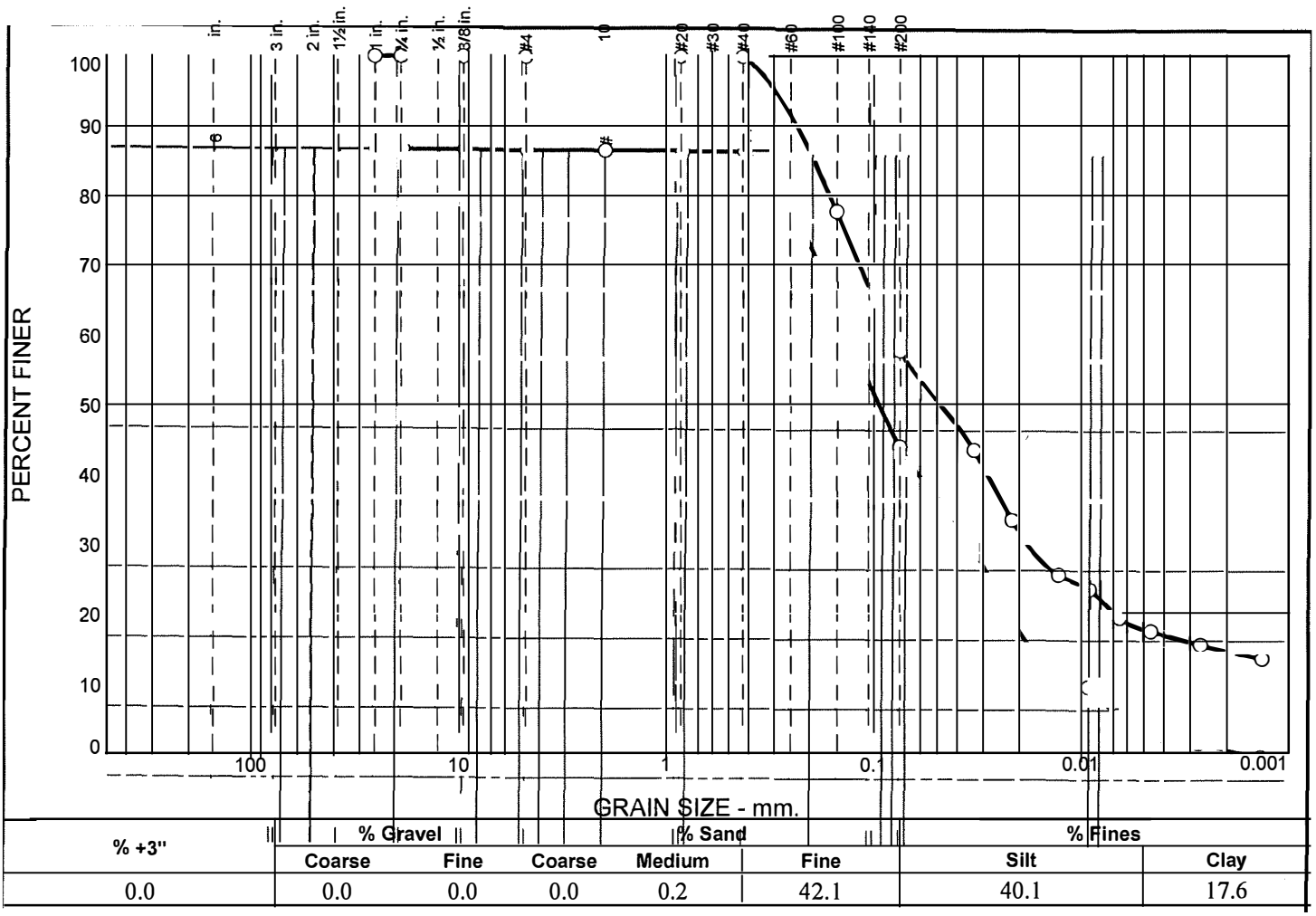
Location: D2-35.5' TO 37.5'
Sample Number: 418834-05

Date:

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	42.1	40.1	17.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.8		
#100	77.6		
#200	57.7		

* (no specification provided)

Material Description

SANDY SILTY CLAY
Brown, low plasticity

Atterberg Limits

PL= 19 LL= 26 PI= 7

Coefficients

D_{85}= 0.1931 D_{60}= 0.0826 D_{50}= 0.0487
D_{30}= 0.0183 D_{15}= 0.0024 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML ODOT=

Remarks

Location: L1-36.0' TO 38.0'
Sample Number: 418834-06

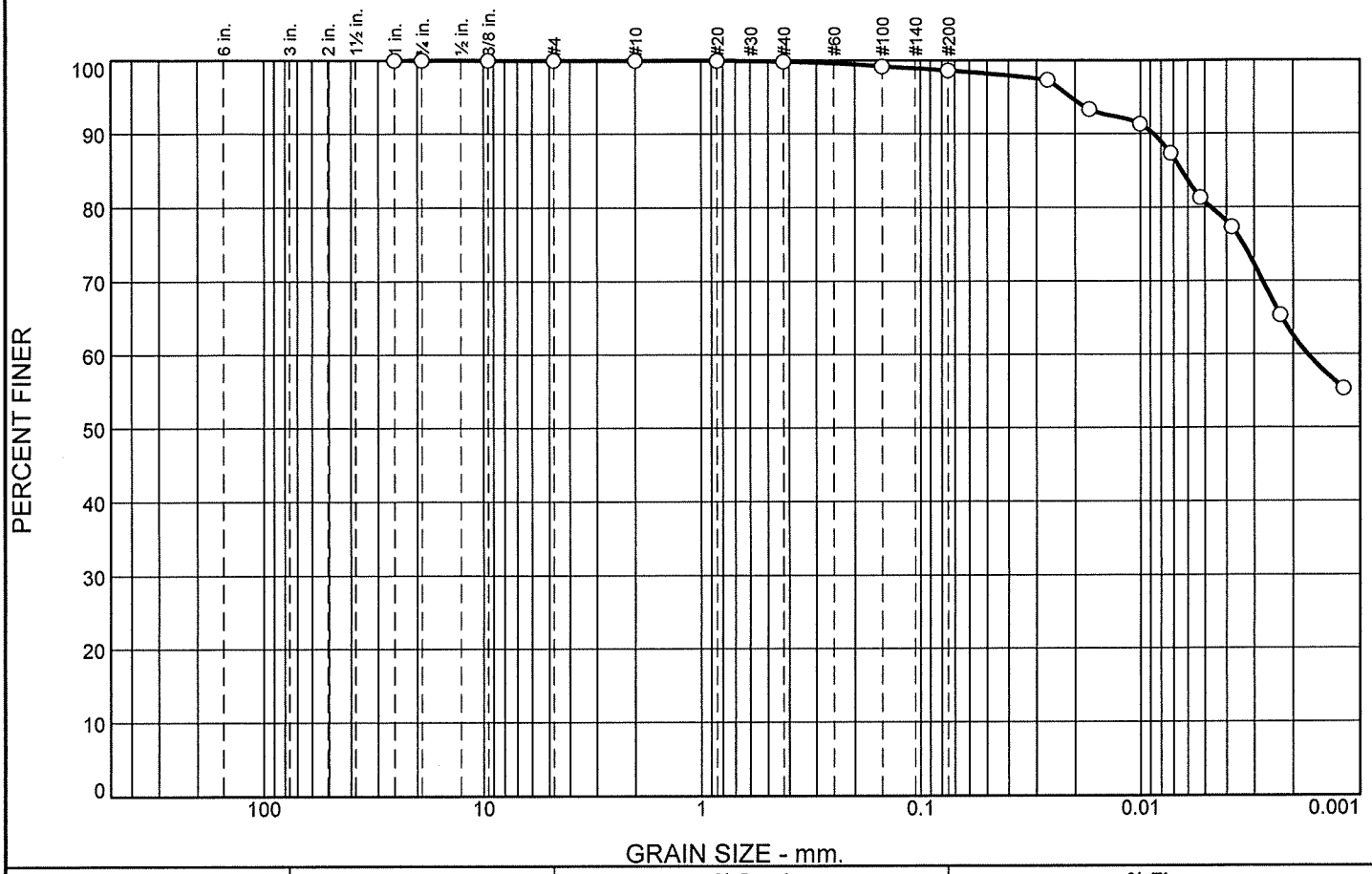
Date: 5/24/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS

Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	1.2	17.9	80.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.8		
#100	99.2		
#200	98.6		

* (no specification provided)

Material Description

LEAN CLAY
Brown-Mottled-Gray, low plasticity, trace sand

Atterberg Limits

PL= 27 LL= 62 PI= 35

Coefficients

D_{85}= 0.0064 D_{60}= 0.0017 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH ODOT= A-7-6(20)

Remarks

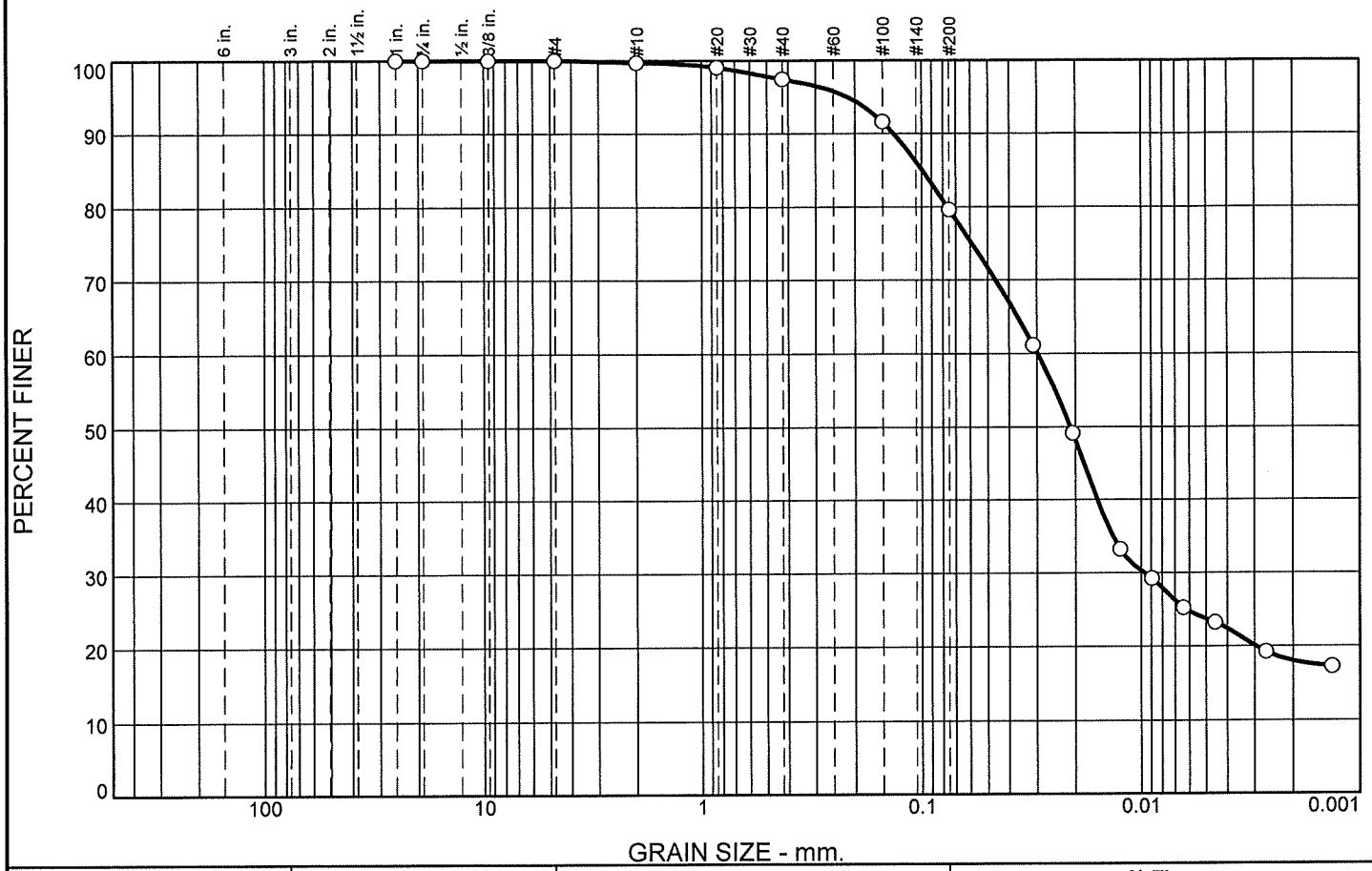
Location: L3-32.5' TO34.5'
Sample Number: 418834-07

Date: 5/25/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	2.3	17.8	55.9	23.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.7		
#20	99.0		
#40	97.4		
#100	91.6		
#200	79.6		

* (no specification provided)

Material Description

SILTY CLAY
Mottle Brown, low plasticity, trace sand

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{85}= 0.0993 D_{60}= 0.0297 D_{50}= 0.0210
D_{30}= 0.0097 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL ODOT= A-4b(8)

Remarks

Location: L5-37.5' TO 39.5'
Sample Number: 418834-08

Date: 6/1/24

SKS ENGINEERS, LLC
2900 N. MARTIN LUTHER KING JR. DRIVE, DECATUR, IL 62526

Client: ANDREWS ENGINEERING INC.
Project: CONSTRUCTION & MATERIALS TESTING
SPRINGFIELD, ILLINOIS
Project No: 418834 **Figure**

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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A Division of Klingner

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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), 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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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 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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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 **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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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 **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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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 **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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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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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 **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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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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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, 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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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, 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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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 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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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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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.**

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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
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													2.32E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.32 E-08 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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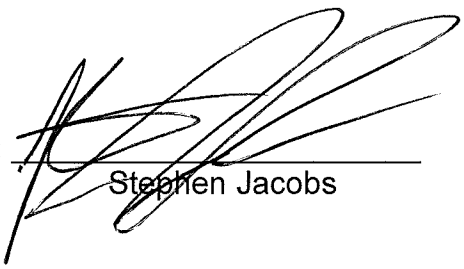
Report of Lab Test

PROJECT:	CWLP	**PROJECT NO:**	418834
		DATE OF TEST	June 03, 2024
CLIENT:	Andrews Engineering	**REPORT NUMBER:**	418834-01
ATTN:	Mr. Brad Hunsberger	**PAGE NO.**	1/1

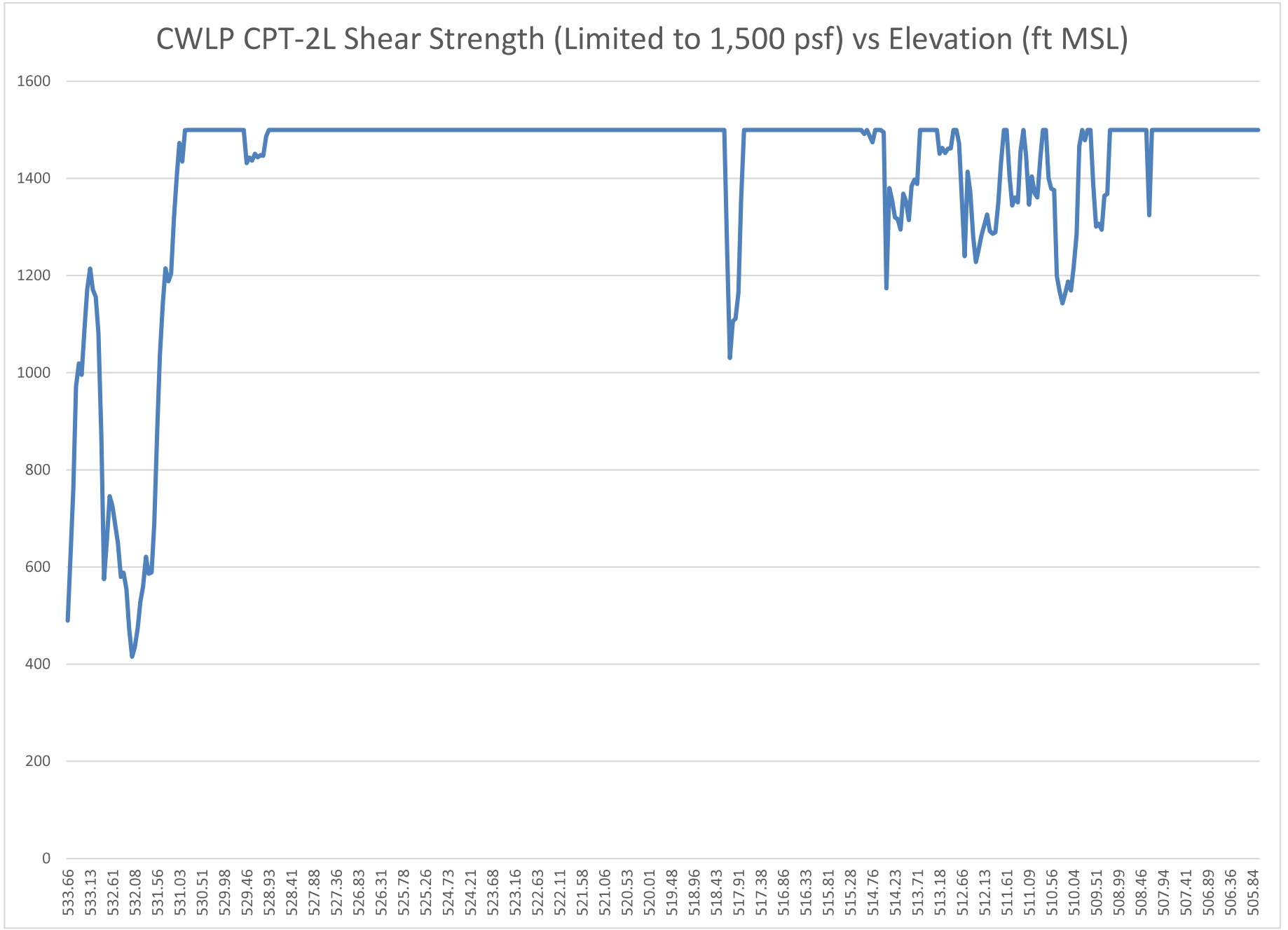
ITEM: **PERMEABILITY TEST RESULTS**

Sample	Moisture Content (%)		Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
	Before Test	After Test		
L4 (17'-19')	37.6	31.5	89.2	1.7 x 10-8
D3 (29.5'-31.5')	27.0	26.6	98.4	2.1 x 10-6
D1 (38.5'-40.5')	23.1	22.9	105.6	5.1 x 10-8
L5 (37.5'-39.5')	23.2	22.4	103.6	6.8 x 10-6
D2 (35.5'-37.5')	25.2	25.0	98.8	2.8 x 10-7
L3 (34.5'-36.5')	24.3	30.4	94.1	8.5 x 10-8
L1 (36'-38')	26.5	25.9	98.2	4.5 x 10-7
D4 (34.5'-36.5')	27.8	23.0	99.4	1.4 x 10-6

NOTES: Test ran according to ASTM D-5084

BY: 

Stephen Jacobs


CWLP CPT-2L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
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1400
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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
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515.81
515.28
514.76
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513.71
513.18
512.66
512.13
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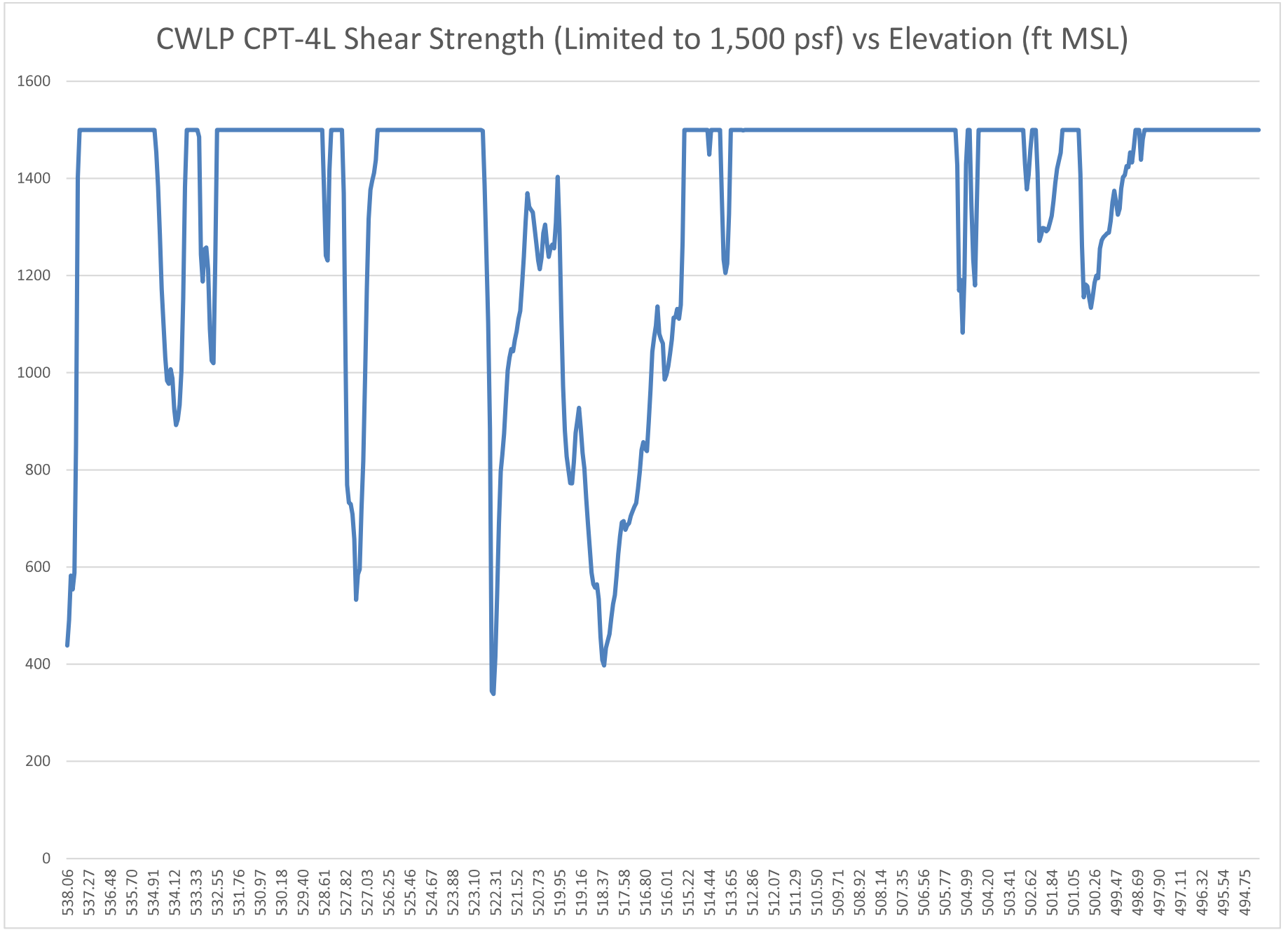
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530.97
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529.40
528.61
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512.86
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509.71
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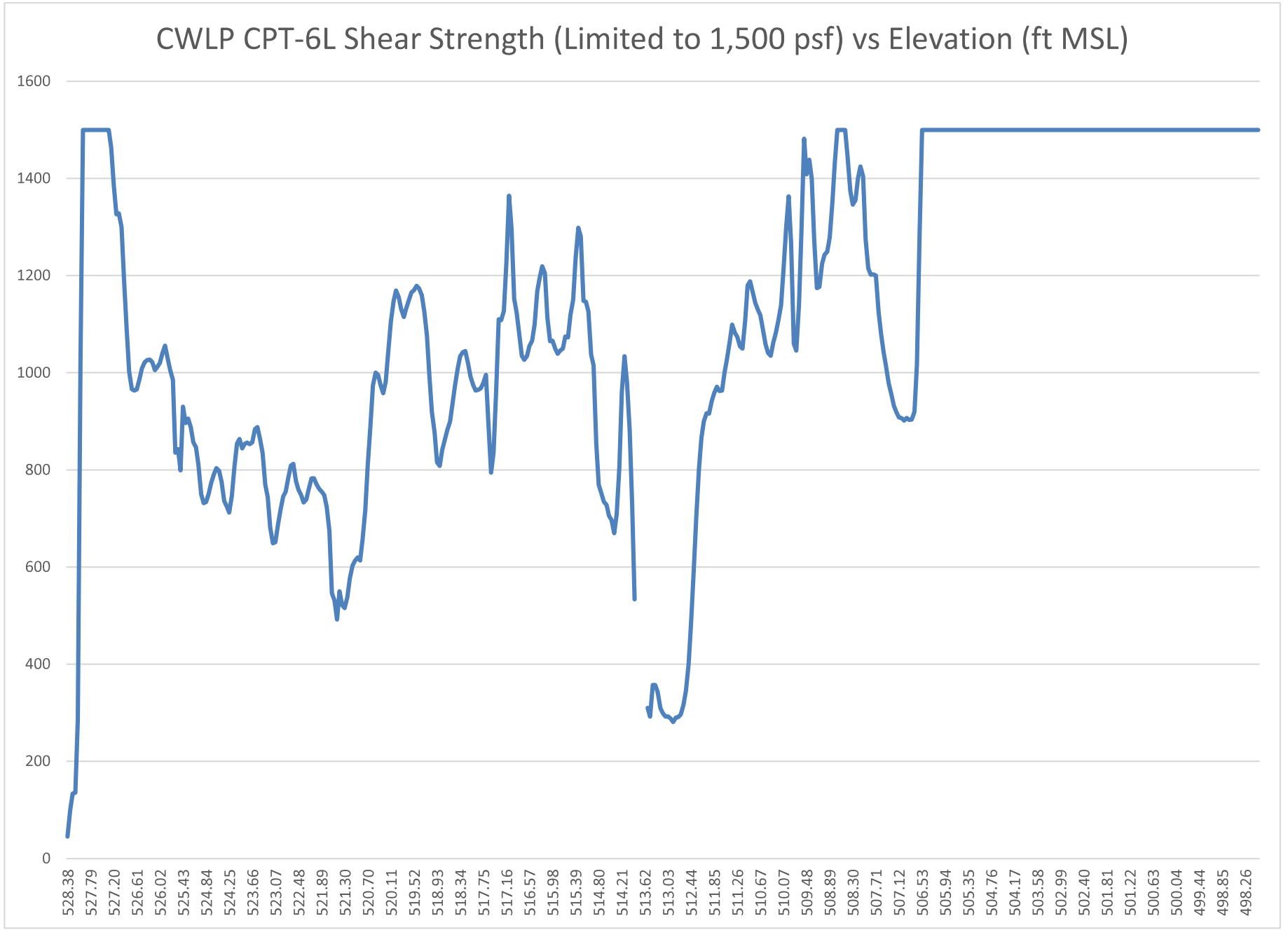
CWLP CPT-6L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
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800
600
400
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527.79
527.20
526.61
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523.66
523.07
522.48
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521.30
520.70
520.11
519.52
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507.12
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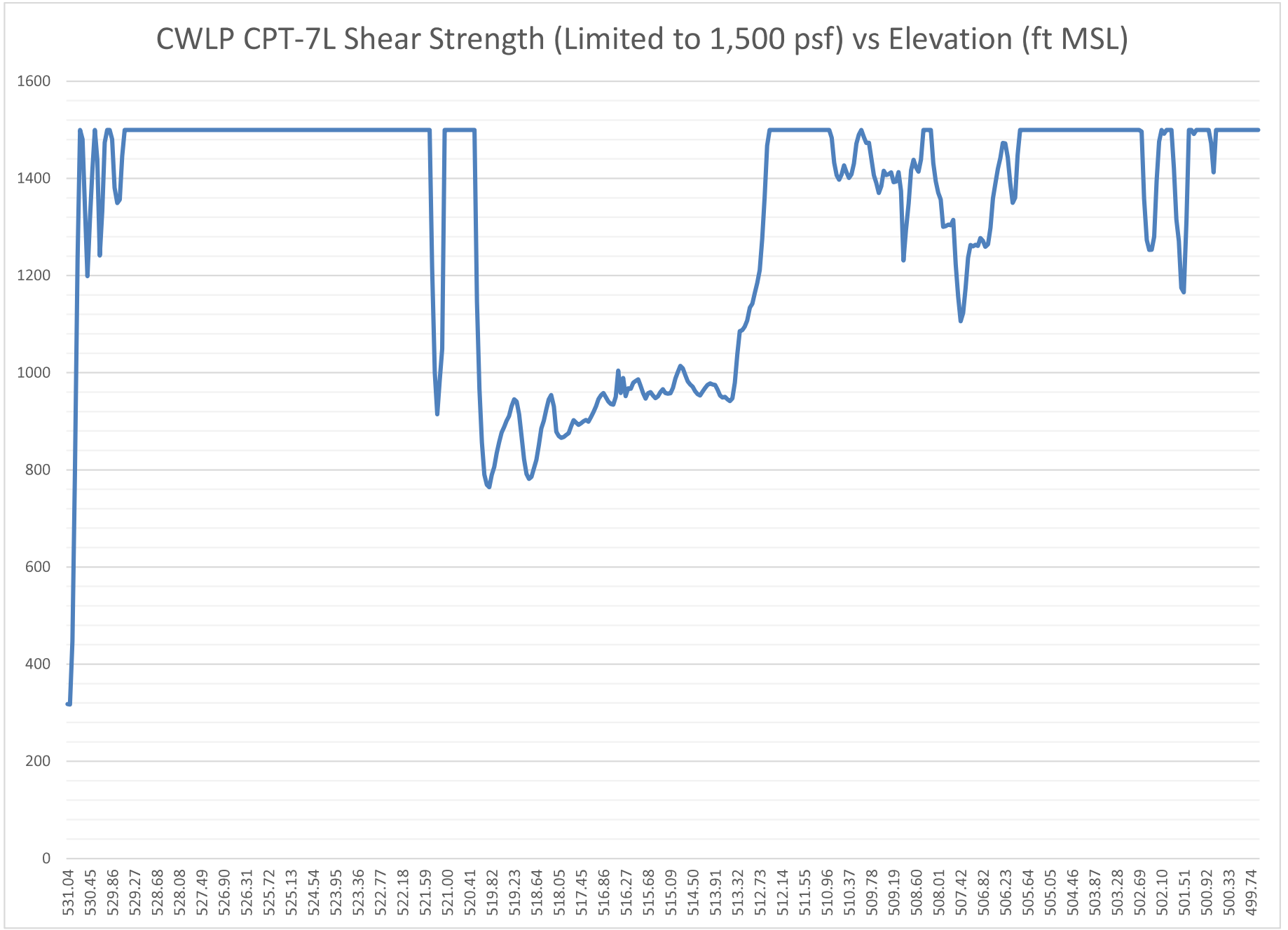
CWLP CPT-7L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
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800
600
400
200
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530.45
529.86
529.27
528.68
528.08
527.49
526.90
526.31
525.72
525.13
524.54
523.95
523.36
522.77
522.18
521.59
521.00
520.41
519.82
519.23
518.64
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503.28
502.69
502.10
501.51
500.92
500.33
499.74

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.

Acknowledgments

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.

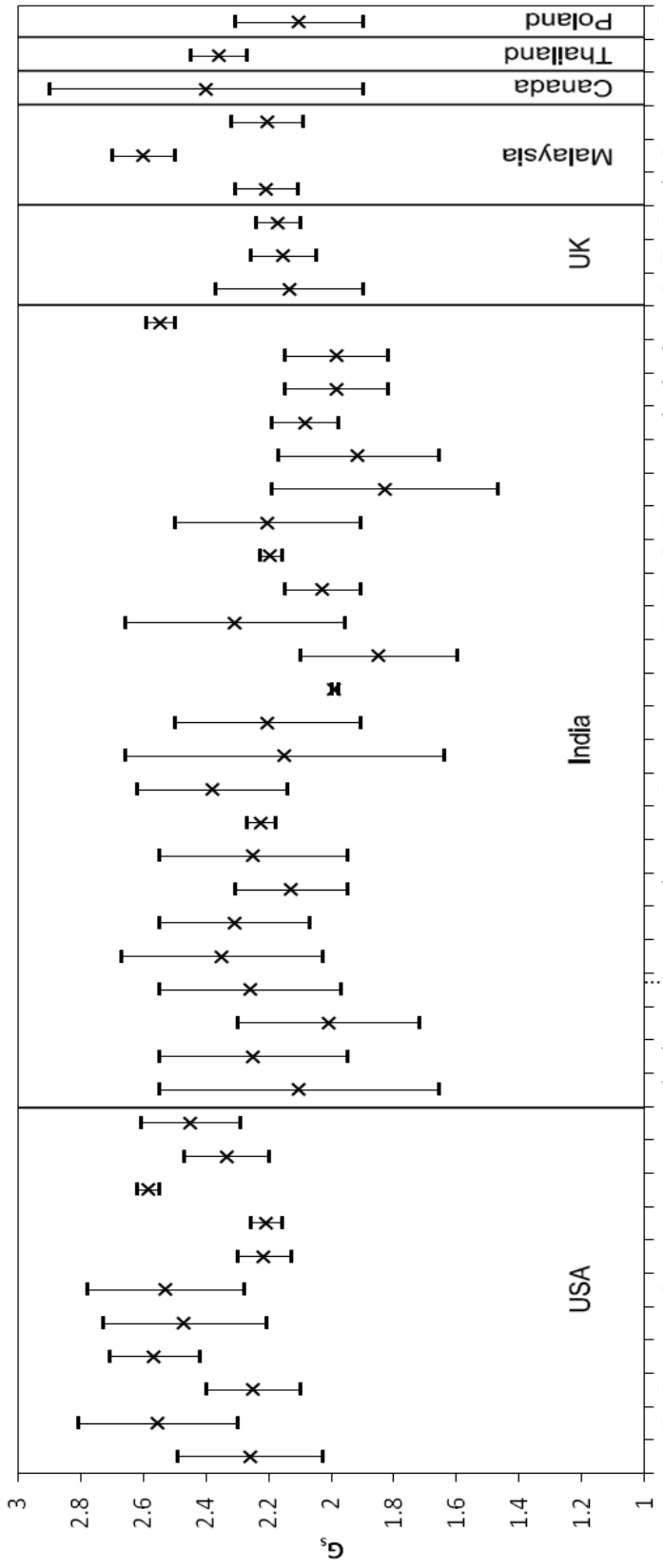

Figure 2: Variability plot for the specific gravities determined by studies performed in different countries.

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

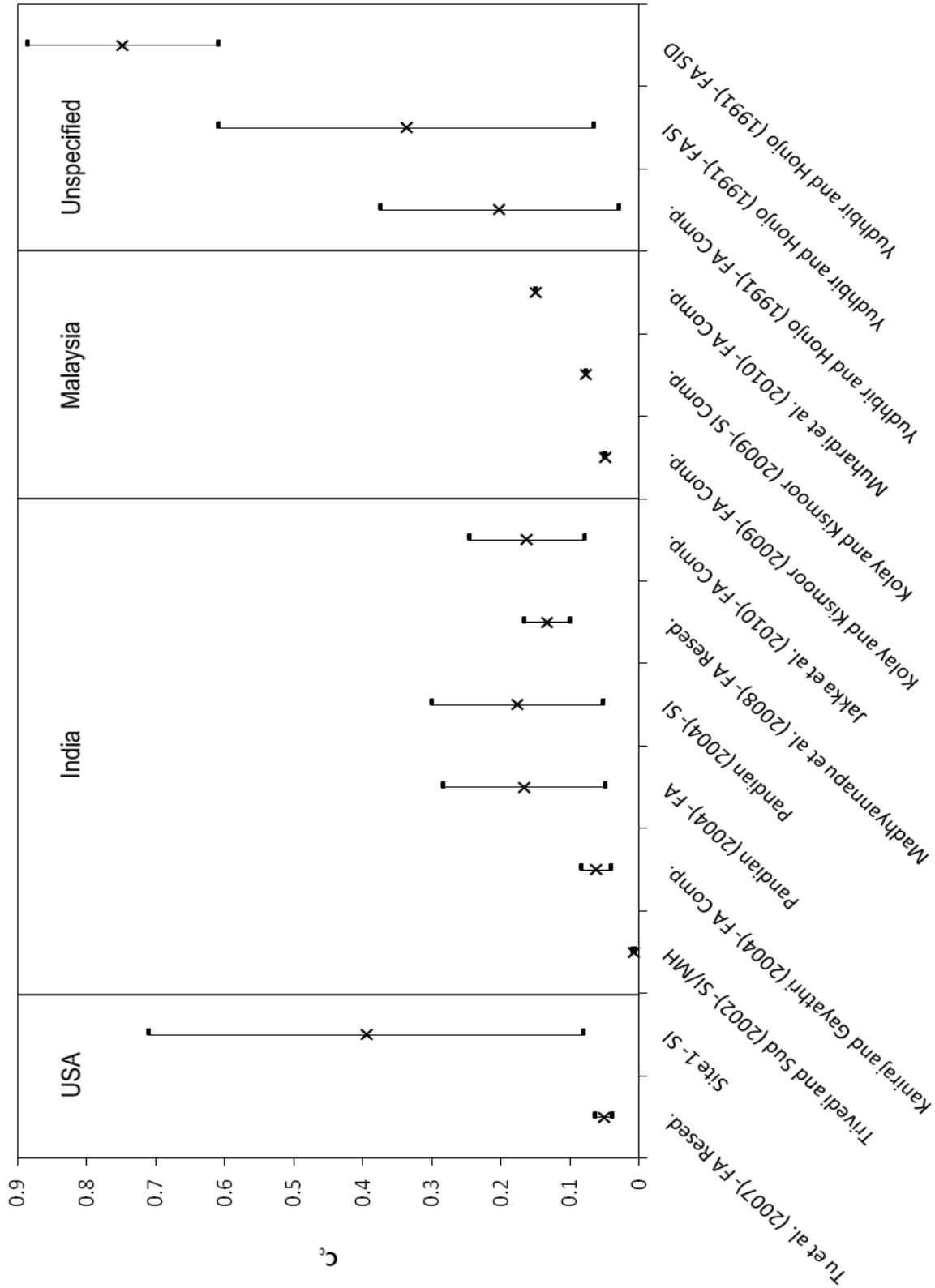

Figure 3: Variability plot for the compression indices of studies done on fly ashes and surface impounded ashes.

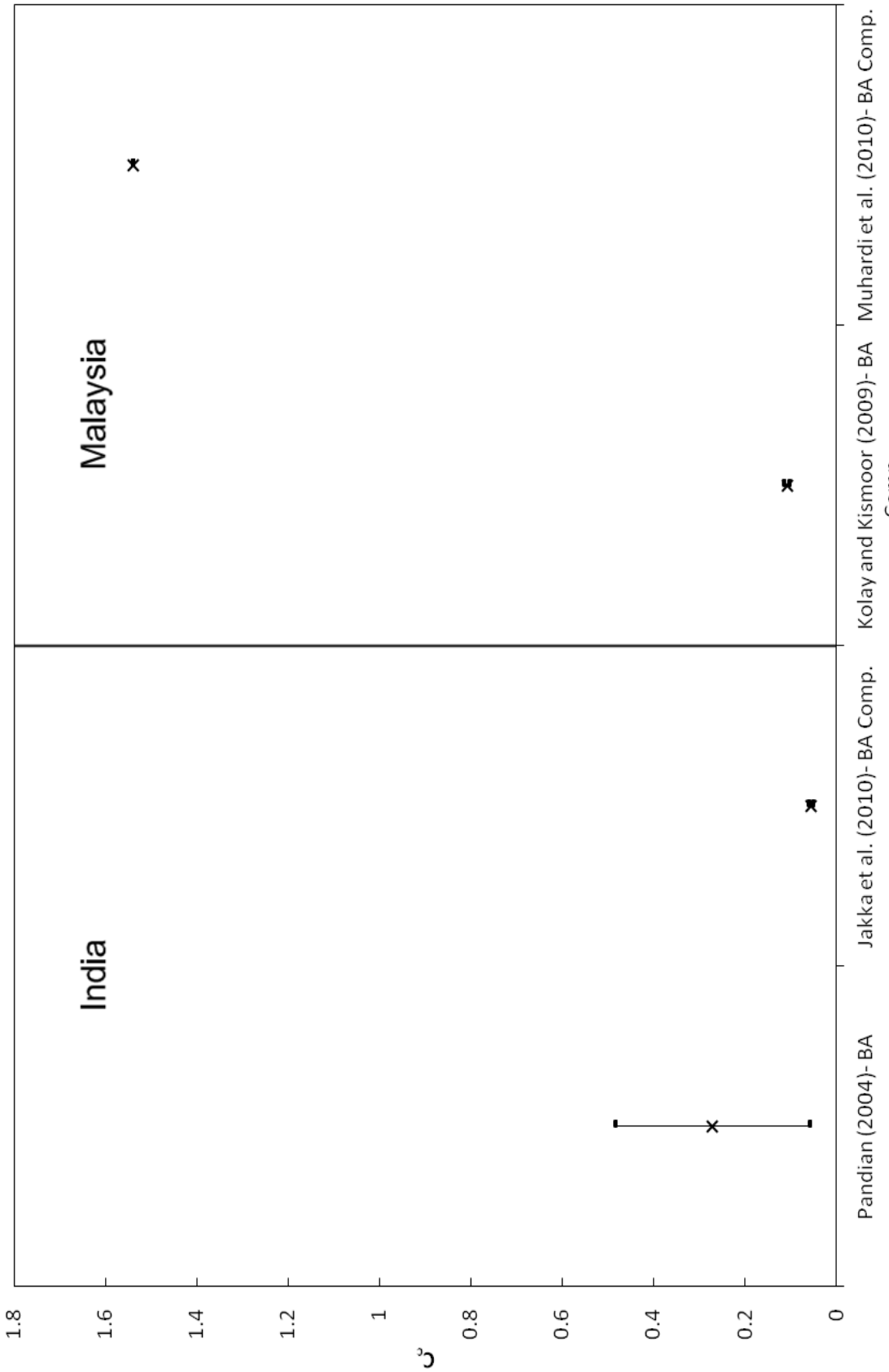

Figure 4: Variability plot of the compression indices for studies done on bottom ashes.

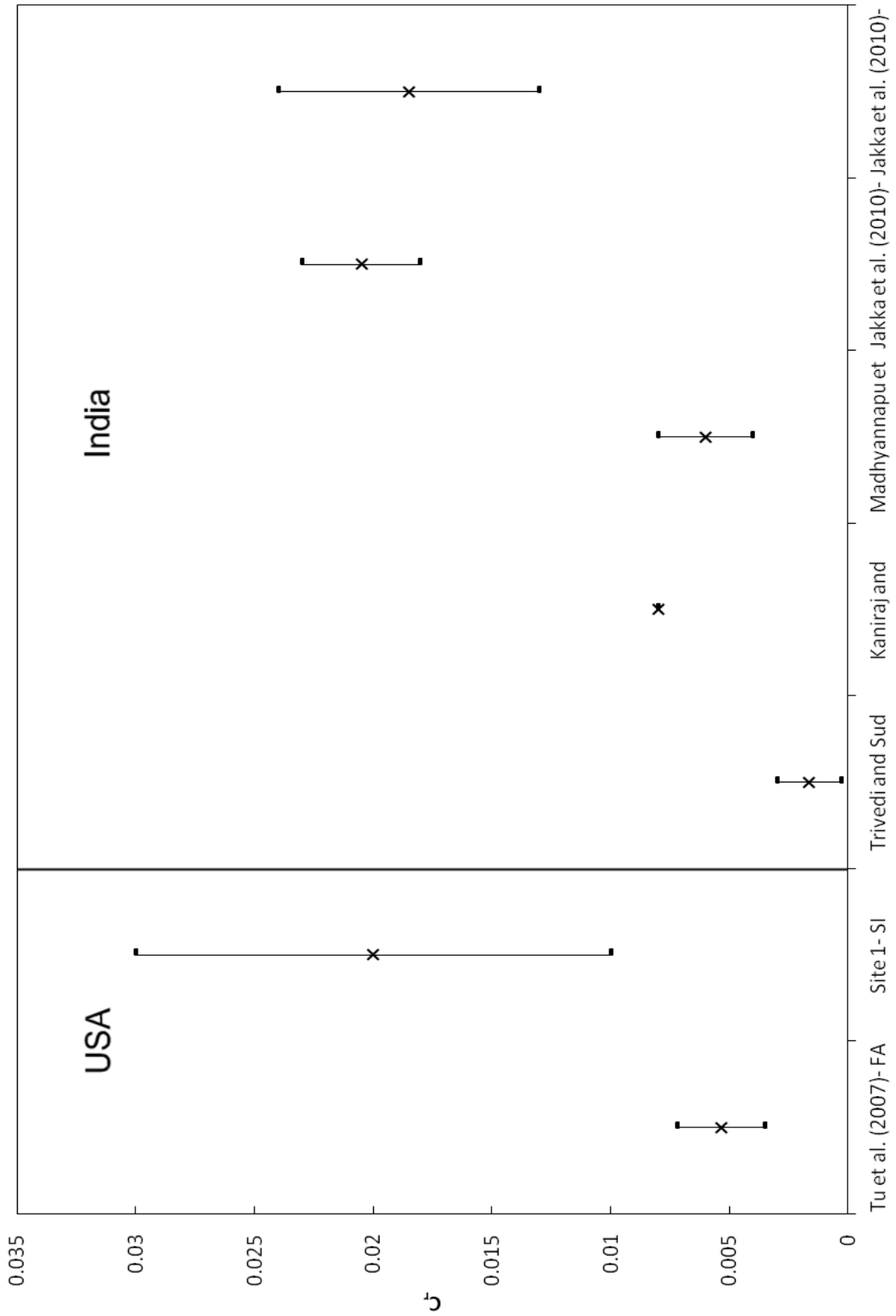

Figure 5: Variability plot of the recompression indices for studies done on fly ashes, bottom ashes, and surface impounded ashes

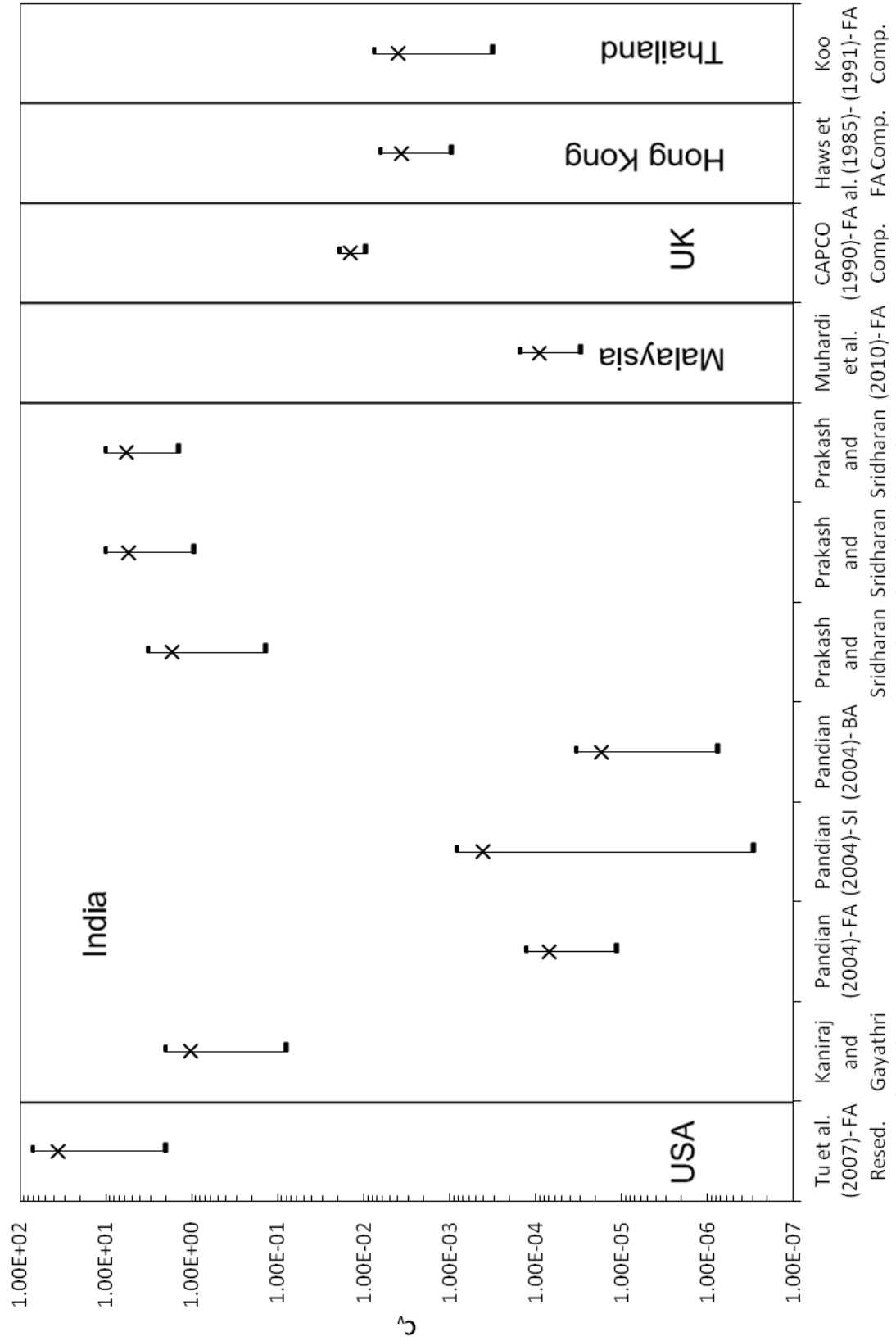

Figure 6: Variability plot for the coefficient of consolidation of studies done on fly ash, bottom ash, and surface impounded ash.

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.

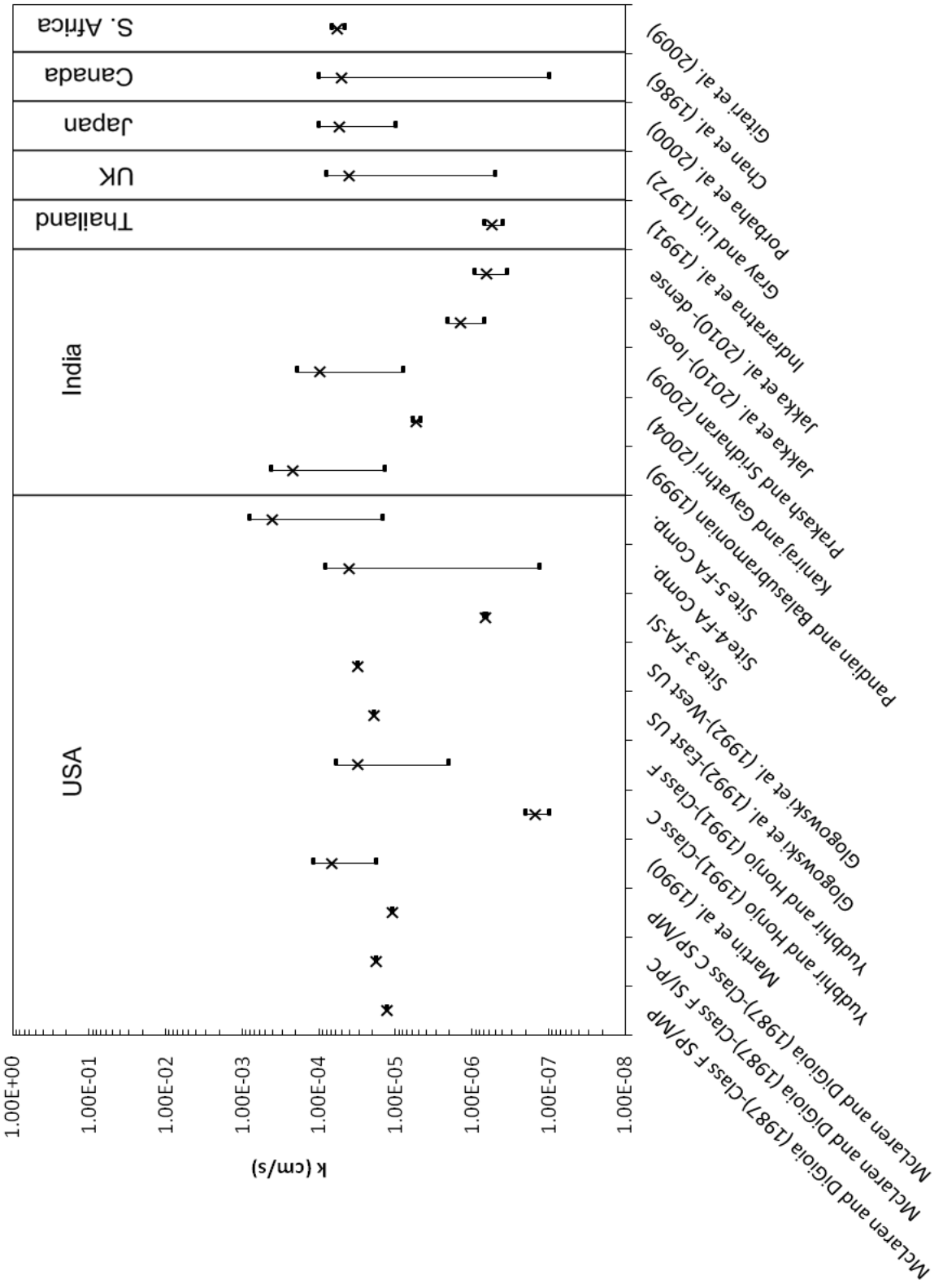

Figure 7: Variability plot of the hydraulic conductivity of fly ashes from different countries, as determined by different researchers.

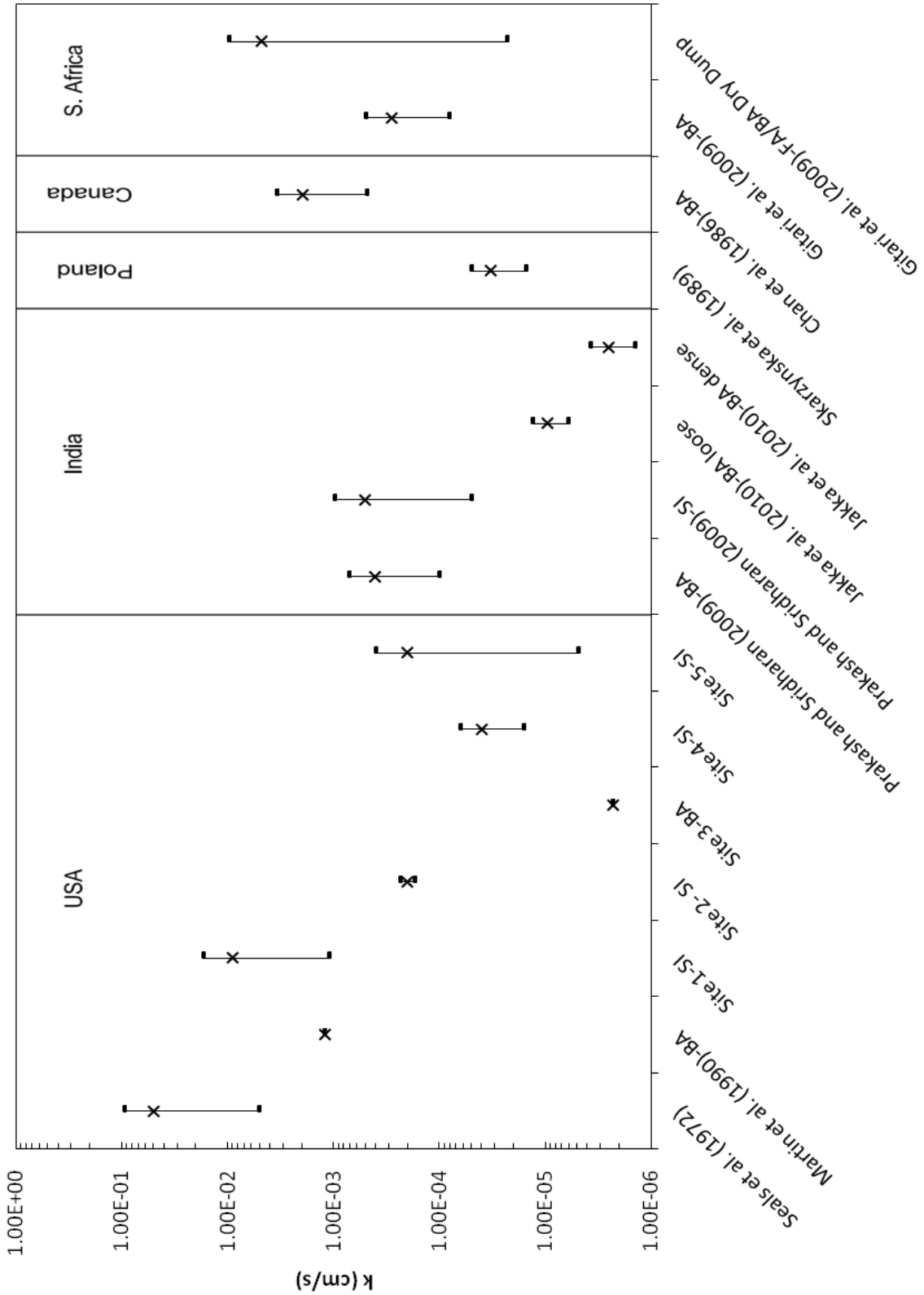

Figure 8: Variability plot of the hydraulic conductivity of surface impounded ashes and bottom ashes from different countries, as determined by different researchers.

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.

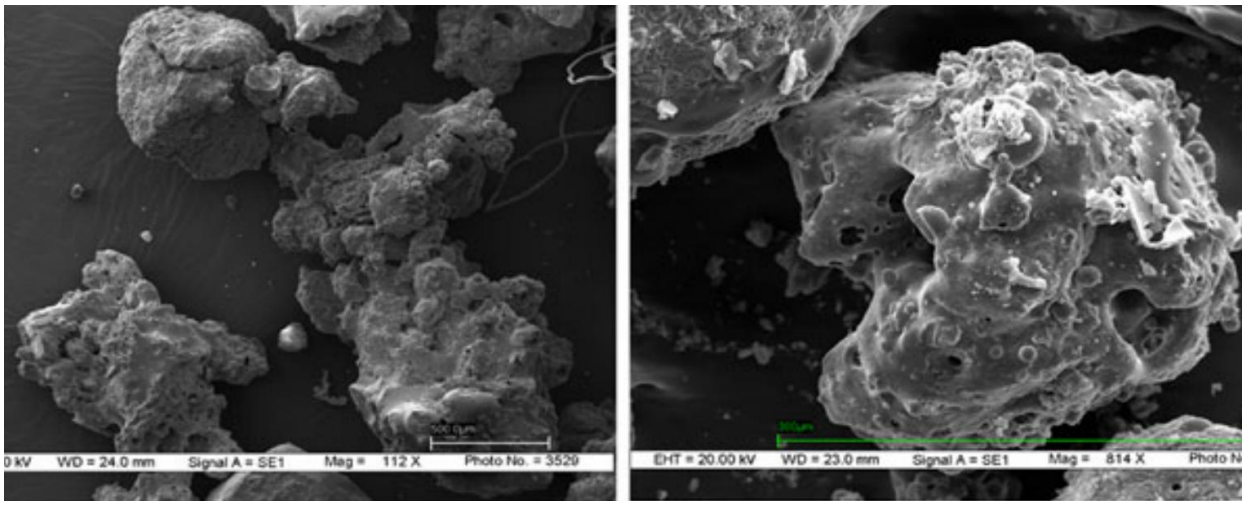

Figure 9: Micrographs of bottom ash particles magnified 112 and 373 times (Jakka et al. 2010)

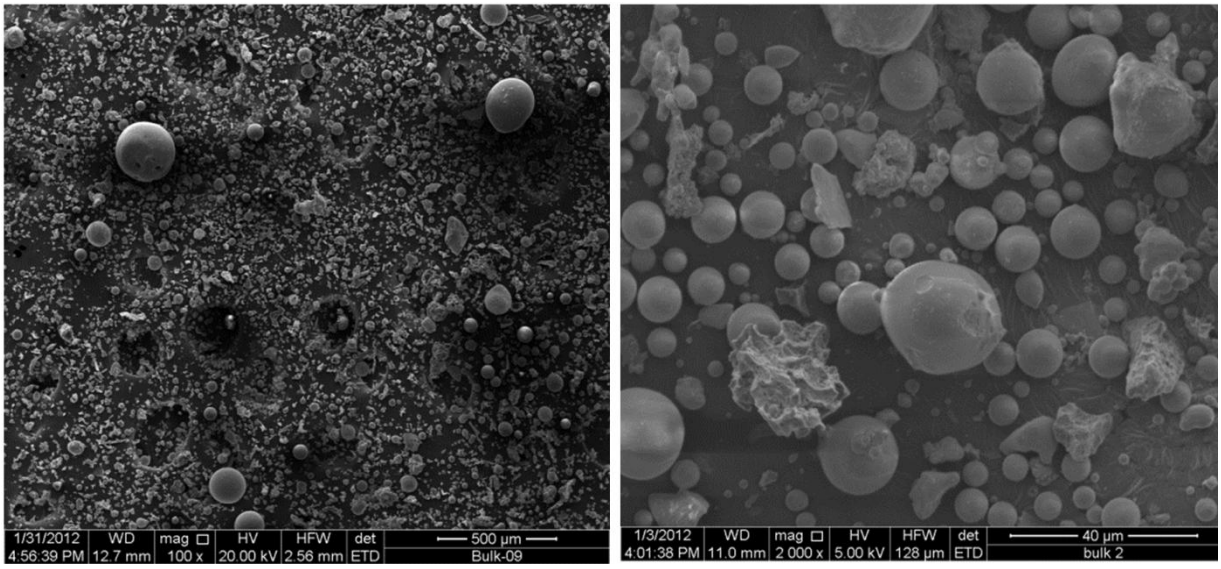

Figure 10: Micrographs of fly ash magnified 100 and 2,000 times (courtesy of Kevin Foster).

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

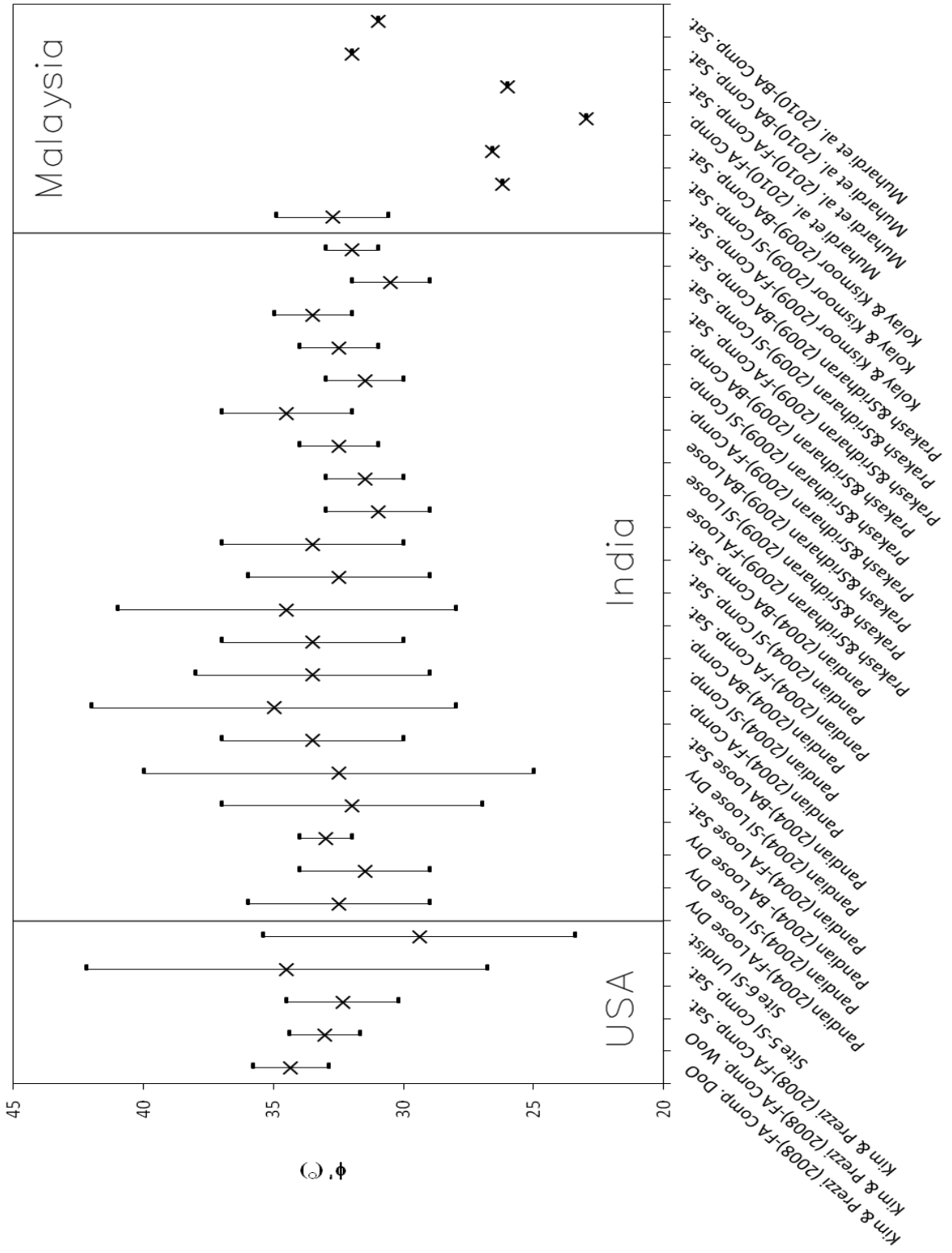

Figure 11: Variability plot of effective stress friction angle of various CCRs as determined by different researchers using the direct shear test.

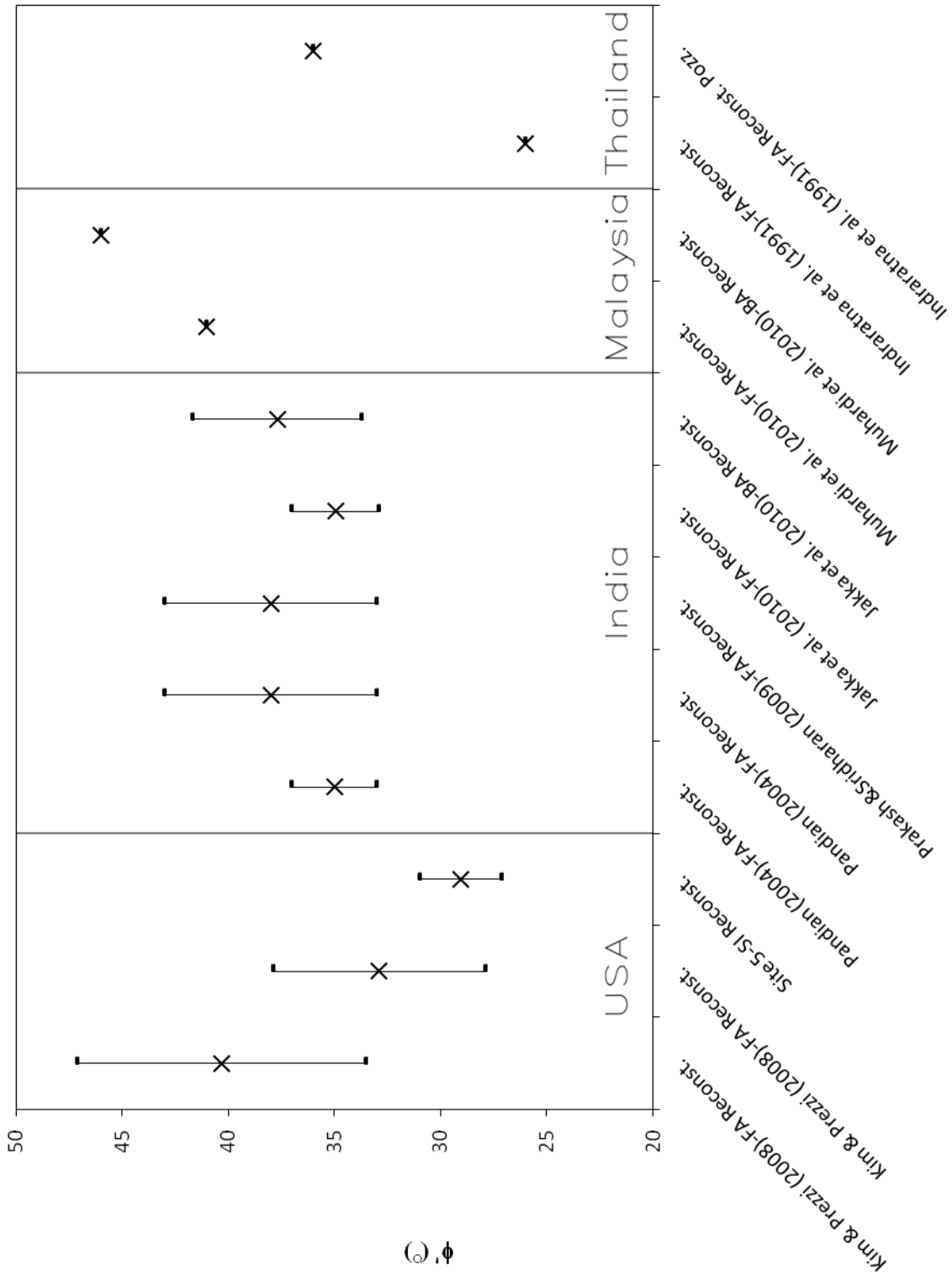

Figure 12: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated drained triaxial test.

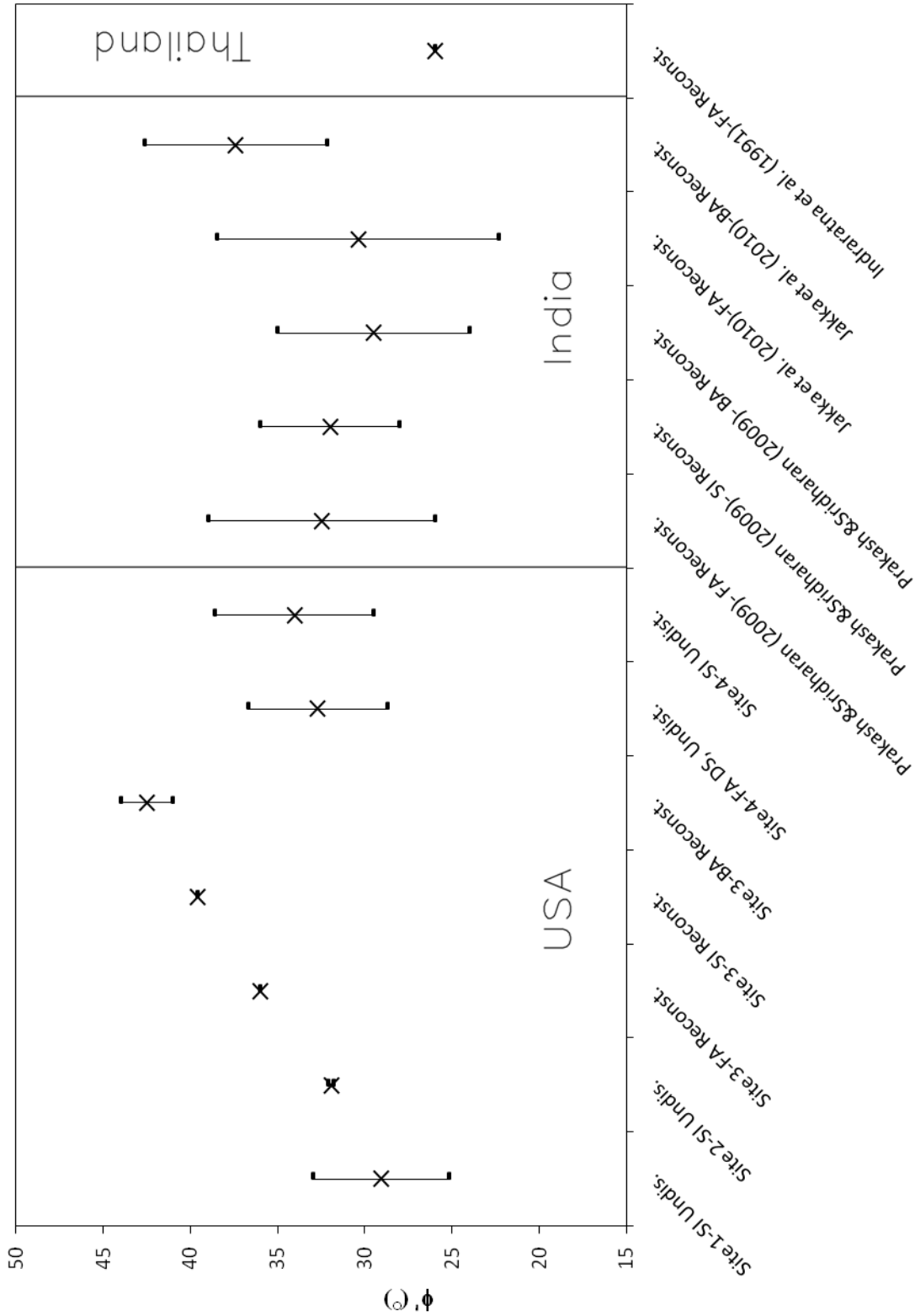

Figure 13: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated undrained triaxial test.

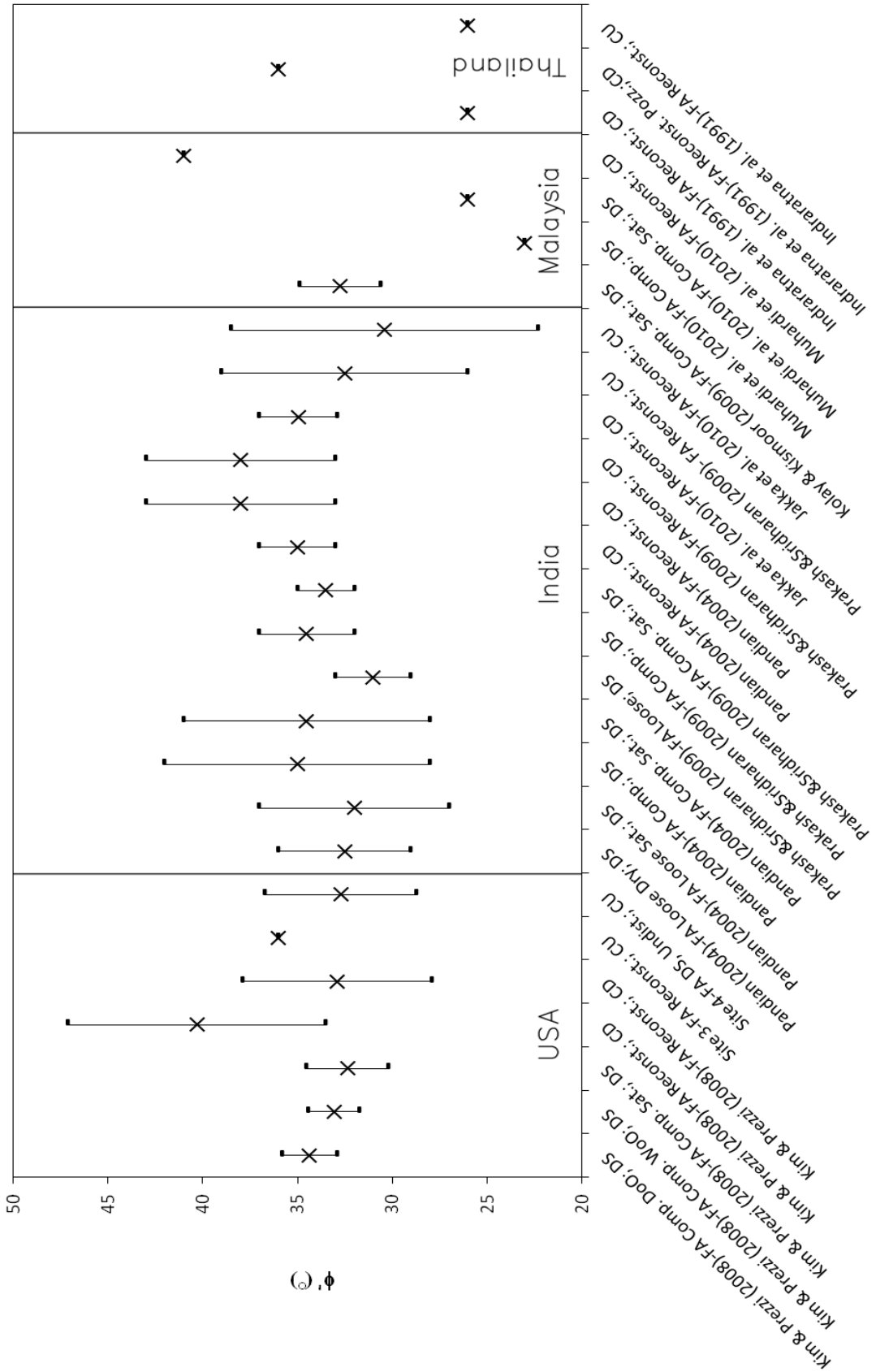

Figure 14: Variability plot of the effective stress friction angle of fly ashes for all shear strength tests performed by various researchers.

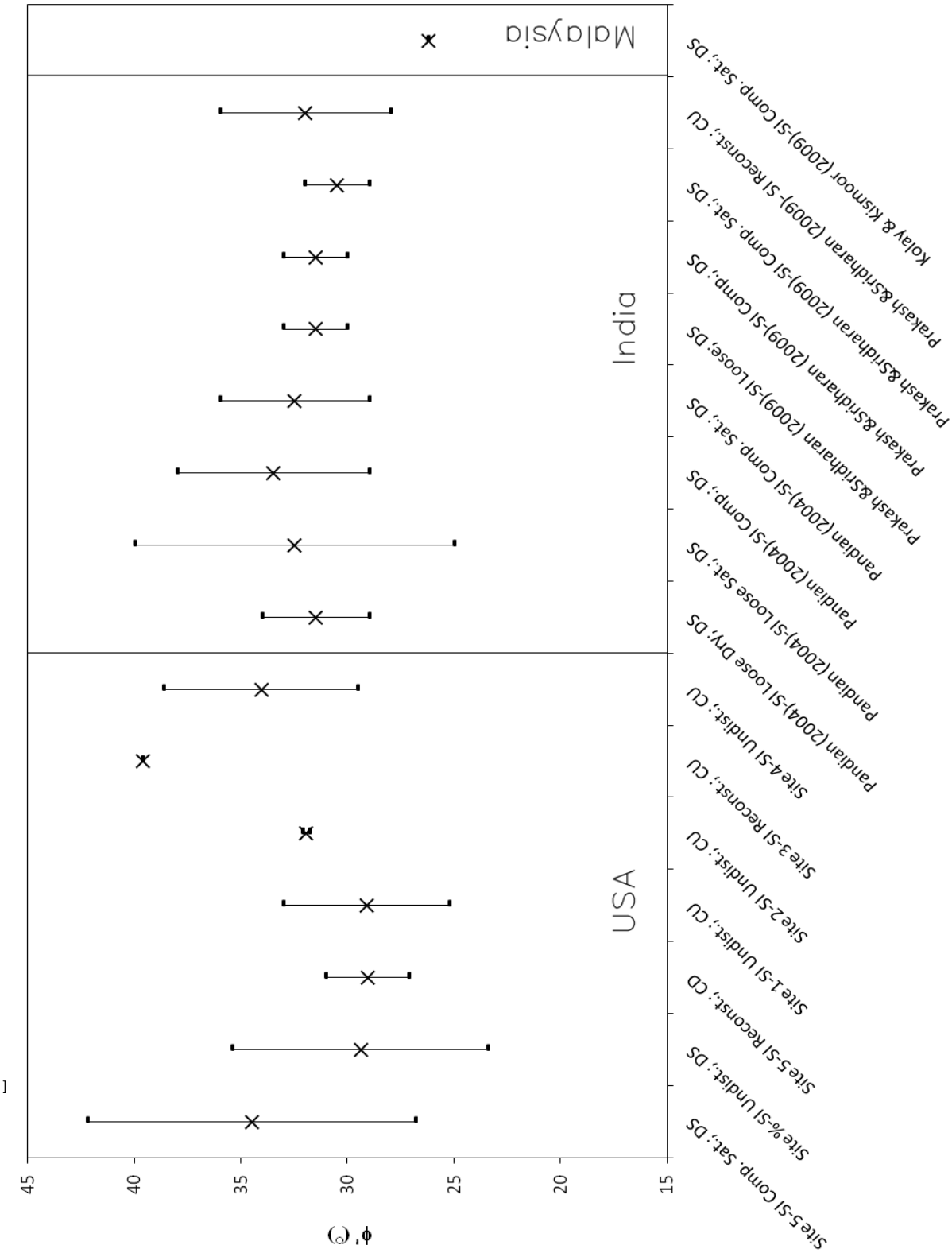

Figure 15: Variability plot of the effective stress friction angle of surface impounded ashes for all shear strength tests performed by various researchers.

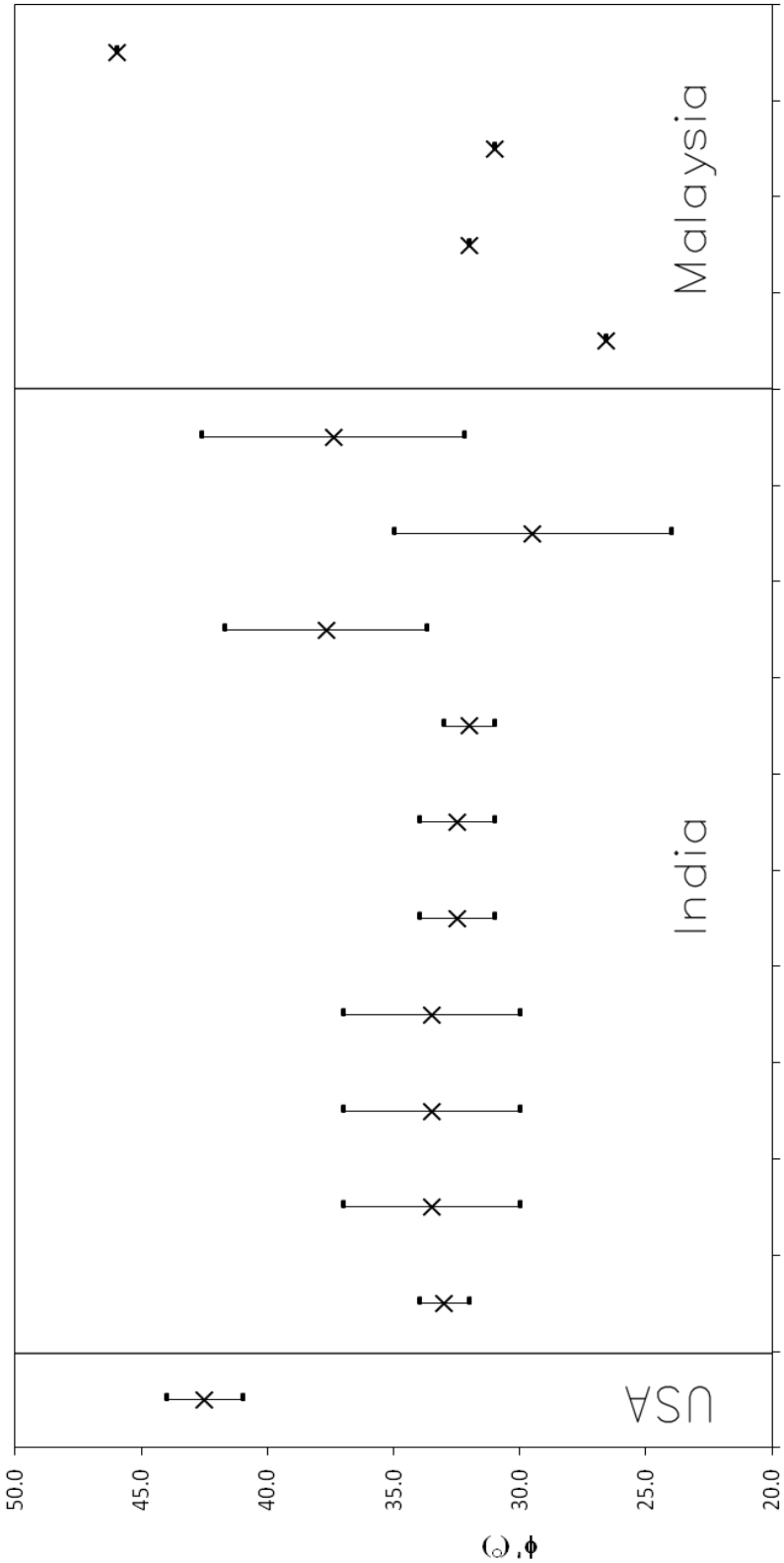

Figure 16: Variability plot of the effective stress friction angle of bottom ashes for all shear strength tests performed by various researchers.

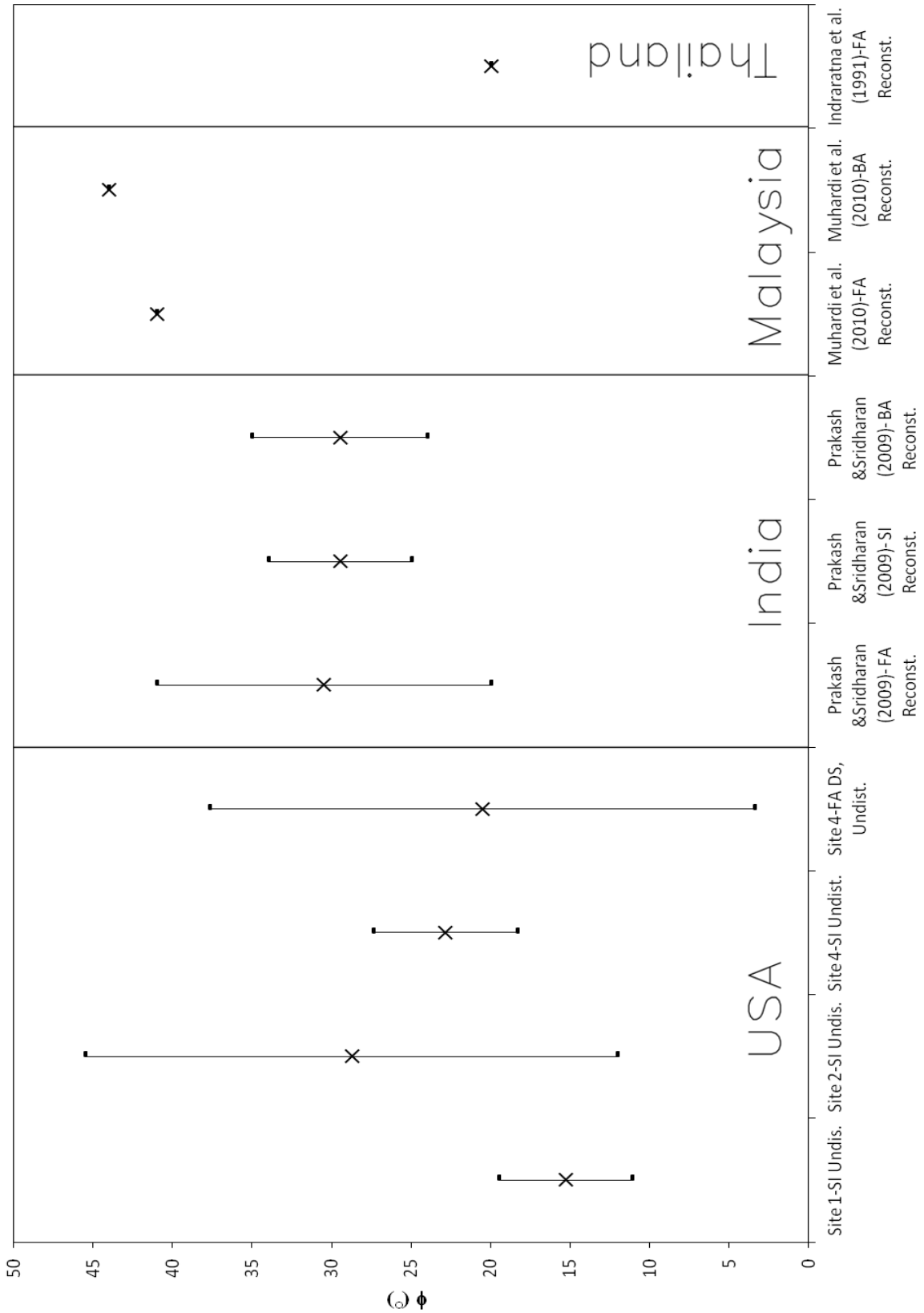

Figure 17: Variability plot of the total stress friction angle of all CCRs as determined by consolidated undrained triaxial tests performed by various researchers.

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.

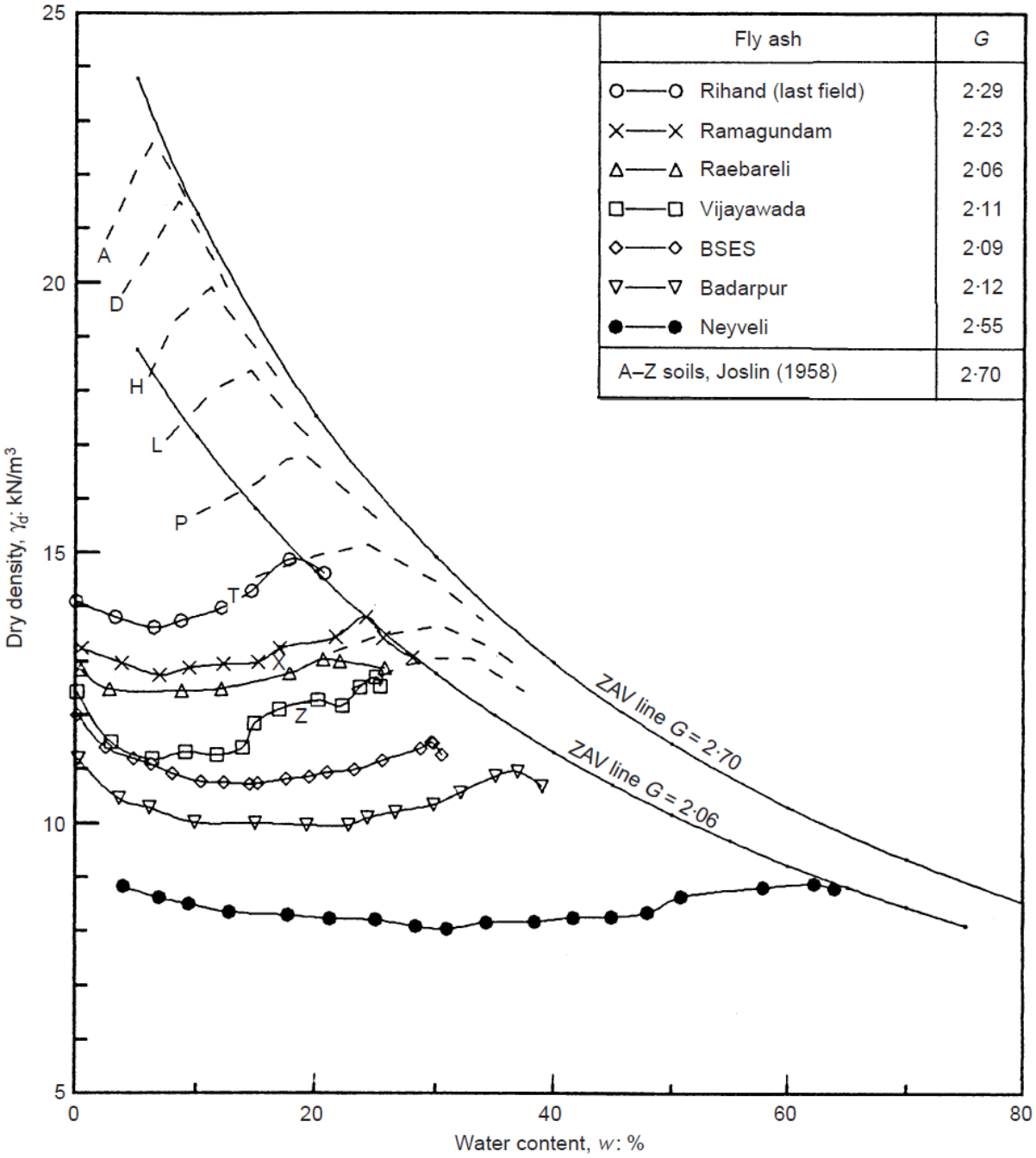

Figure 18(a): Compaction curves for different Indian fly ashes compared to those for several natural soils (Sridharan et al. 2001)

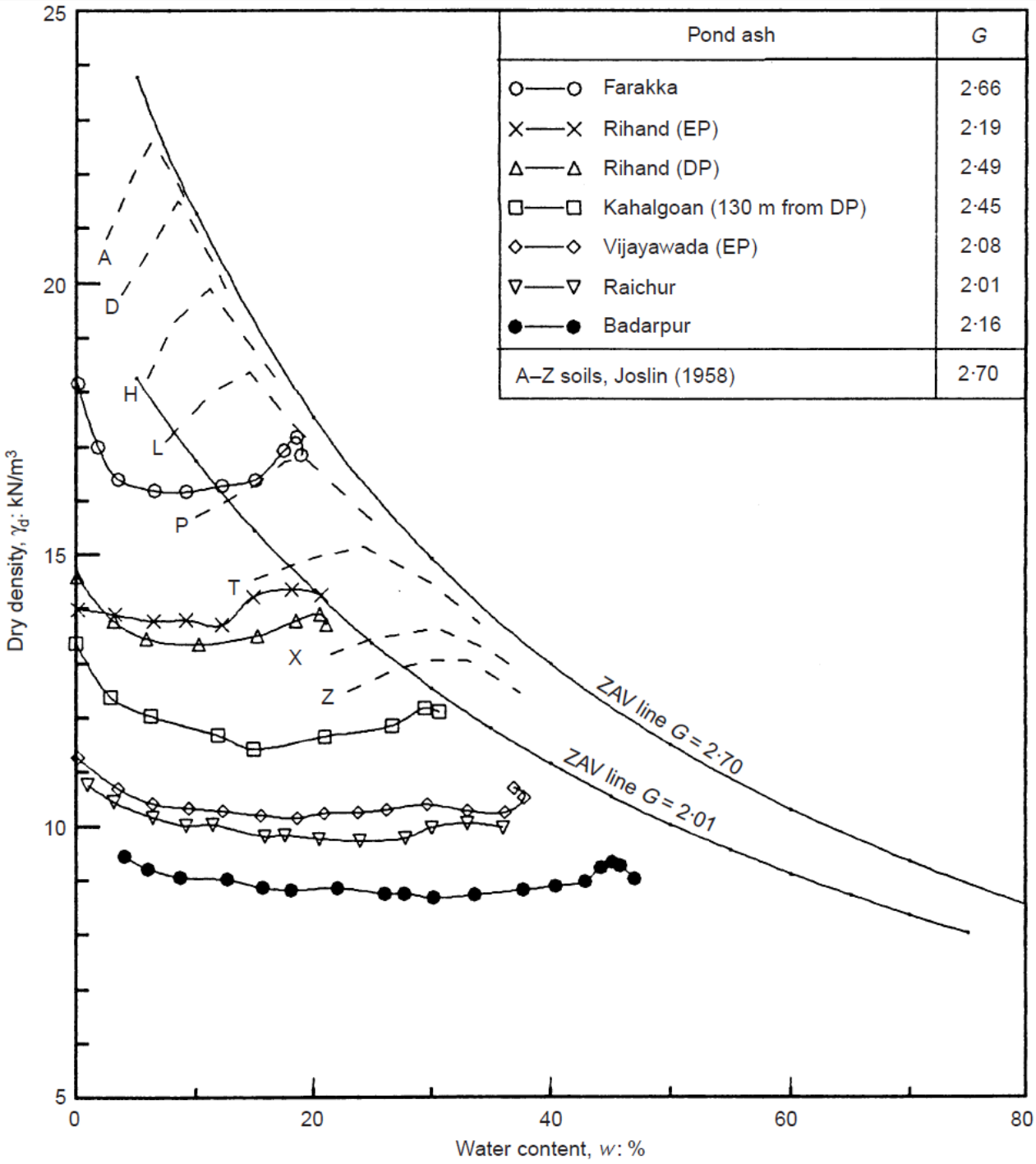

Figure 18(b): Compaction curves for different Indian surface impoundment ashes compared to those for several natural soils (Sridharan et al. 2001)

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.

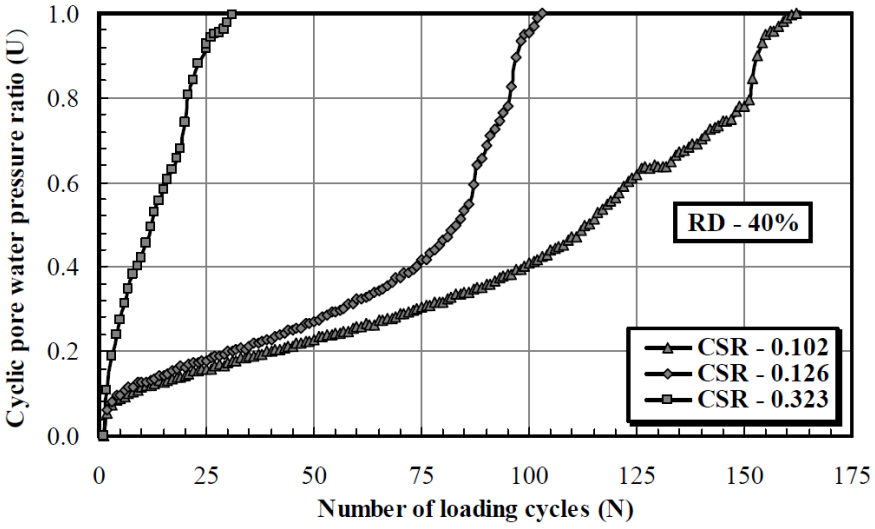

Figure 19: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at different cyclic stress ratios and 1 Hz loading frequency (Mohanty et al. 2010).

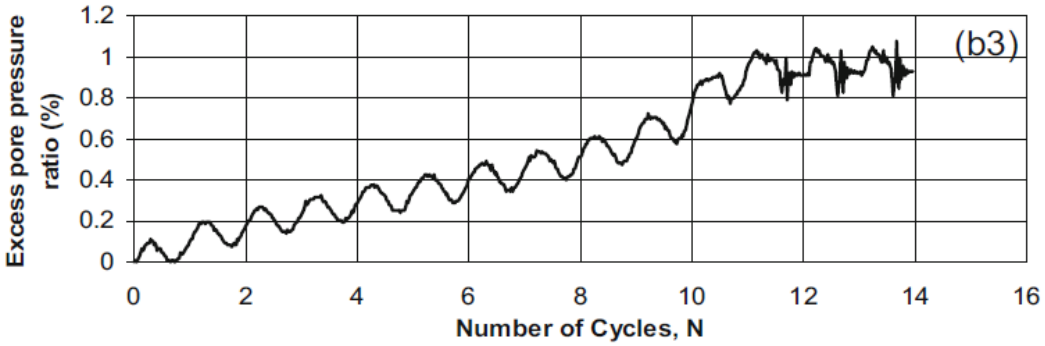

Figure 20: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at a cyclic stress ratio of 0.10 and confining pressure of 2214 psf and 0.1 Hz loading frequency (Jakka et al. 2010)

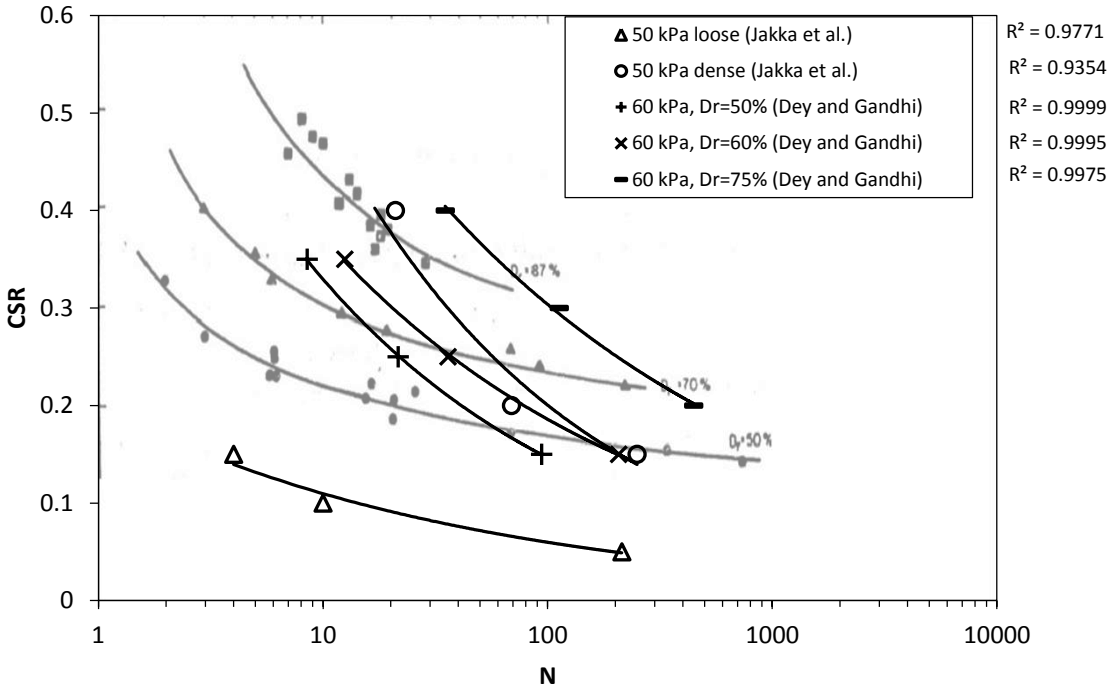

Figure 21: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at confining stresses close to 50 kPa. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Dey and Gandhi loaded specimens at 1 Hz. For comparison, curves for sands tested at the same confining pressure are superimposed (Mulilis et al 1976).

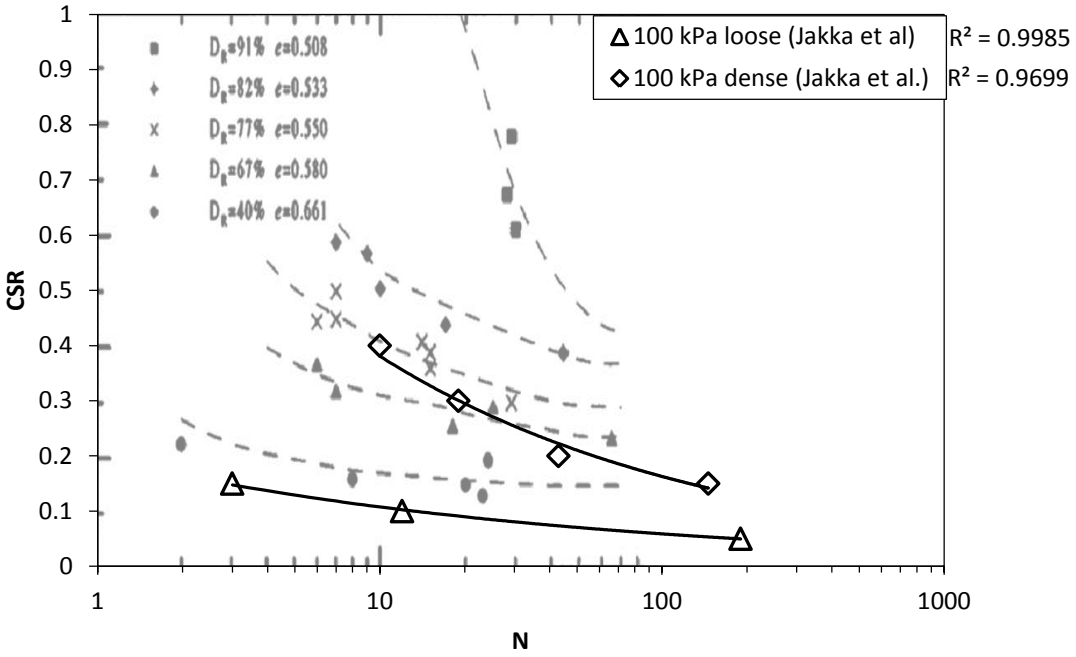

Figure 22: Plot of CSR versus number of loading cycles to liquefaction for surface impounded CCRs tested by Jakka et al (2010) at a confining pressure of 100 kPa. For comparison, curves for C778 sand at the same confining pressure are superimposed (Carraro et al 2003).

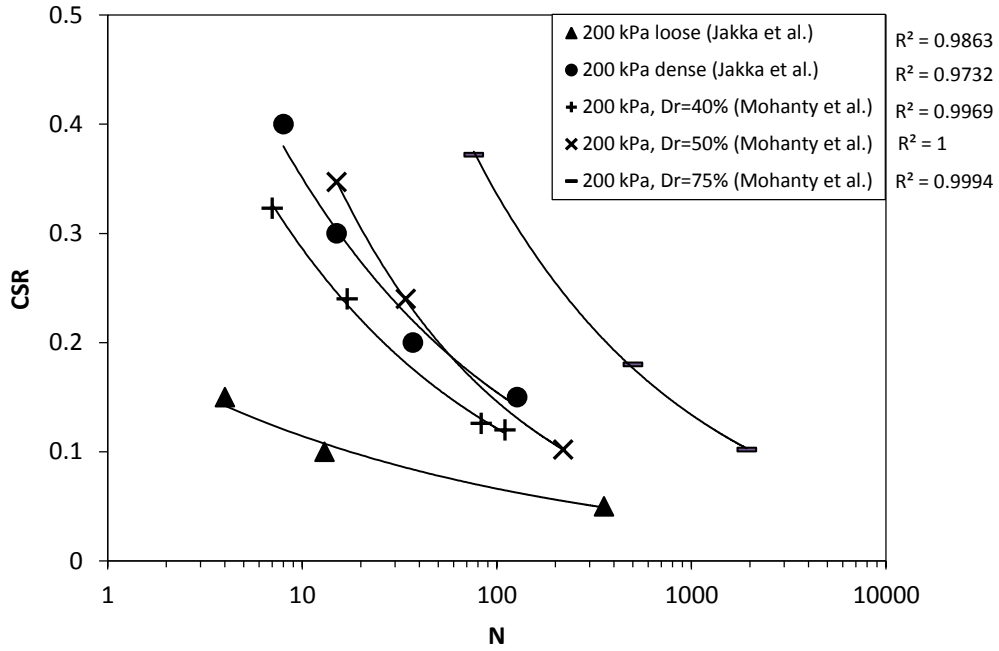

Figure 23: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at 200 kPa confining stress. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Mohanty et al. loaded specimens at 1 Hz.

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.

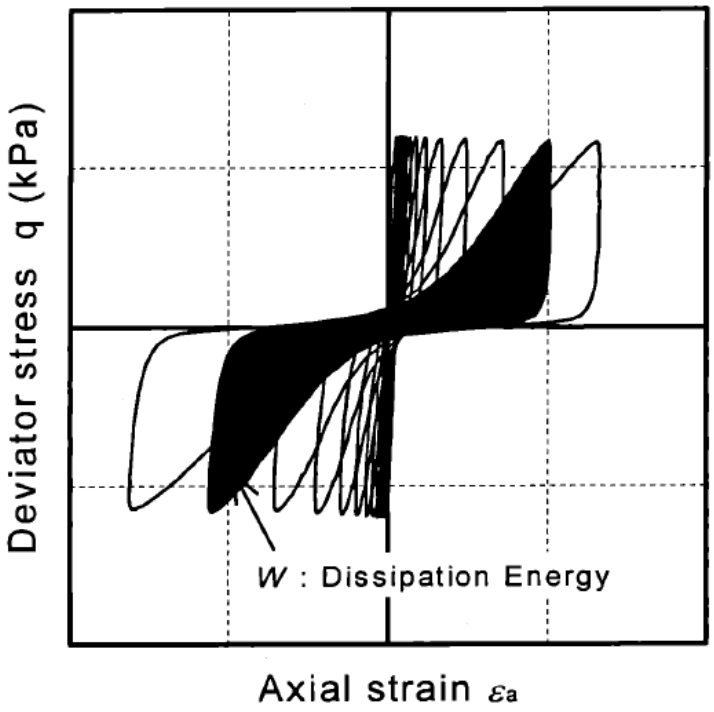

Figure 24: Example of how to determine the energy dissipated by a soil throughout a single loading cycle (Yoshimoto et al. 2006).

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.

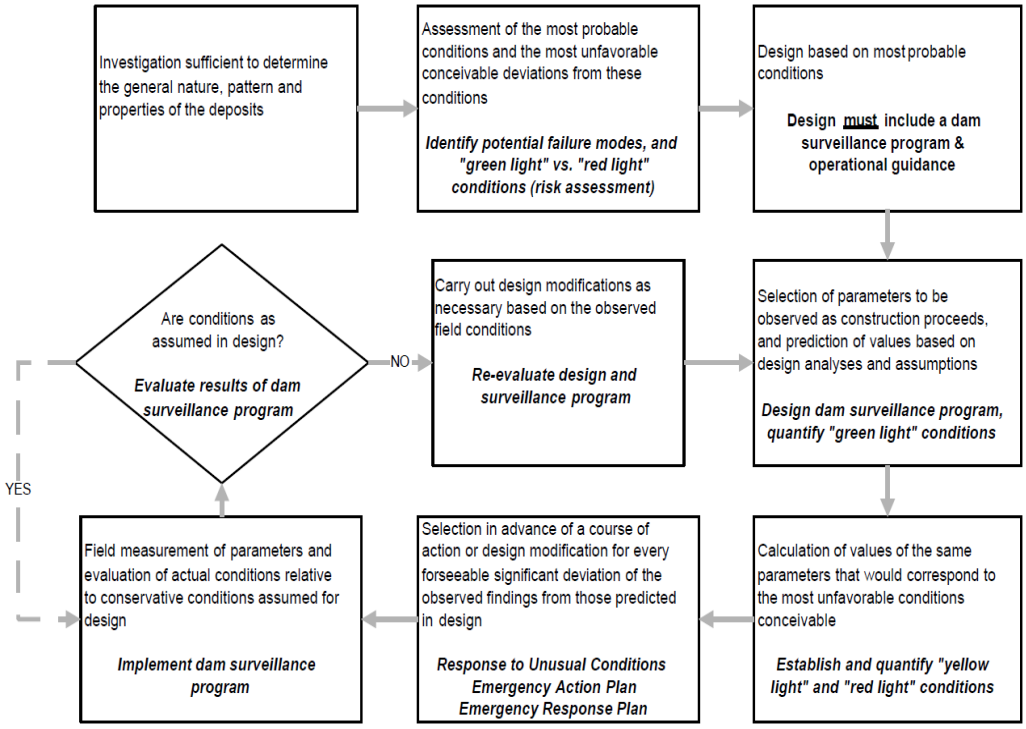

Figure 25: Flow chart illustrating risk management utilizing the observational method (after Martin and Davies 2000)

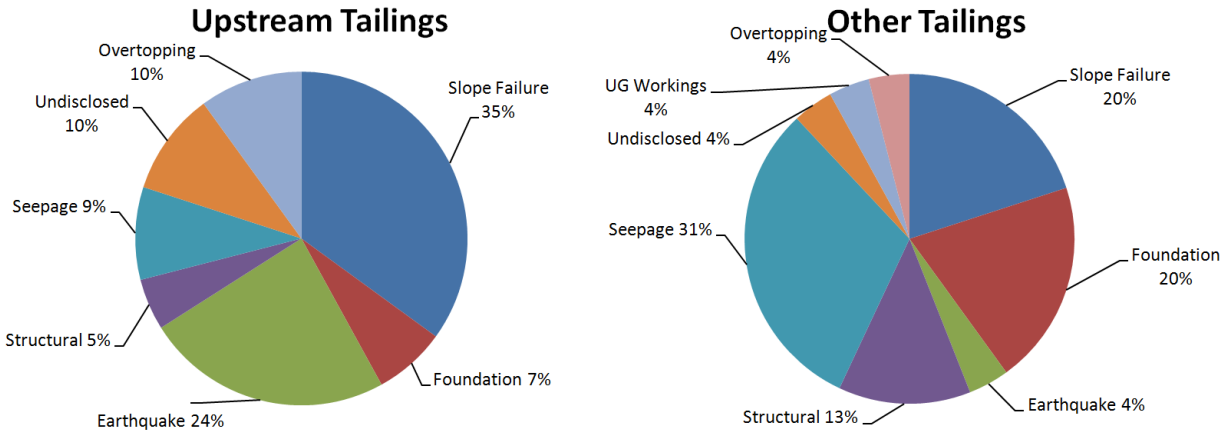

Figure 26: Comparison of failure modes of upstream mine tailings dams as compared to other types of mine tailings dams (modified from Martin and Davies 2000)

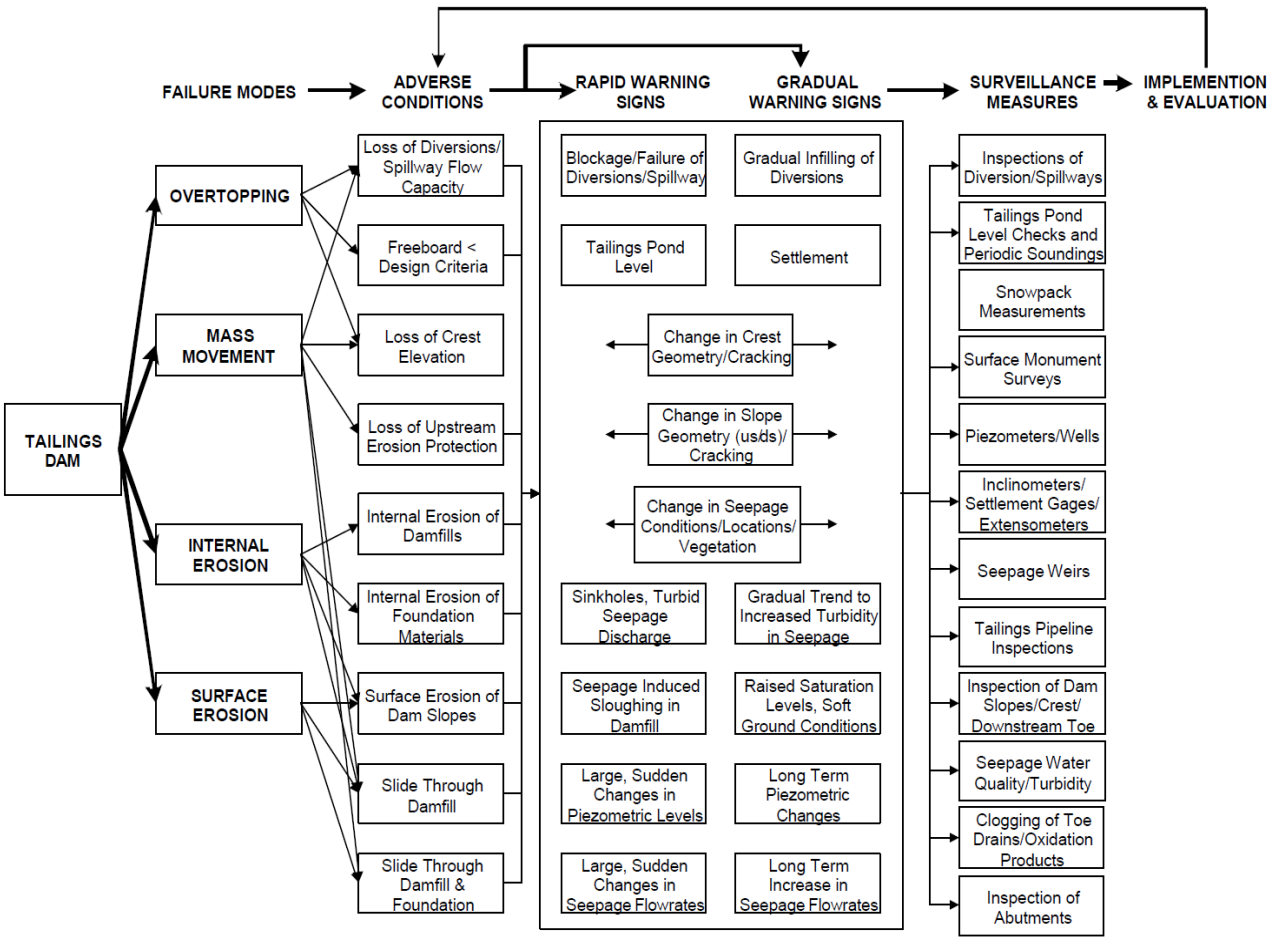

Figure 27: Sample surveillance plan schedule for a mine tailings impoundment (after Martin and Davies 2000)

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.

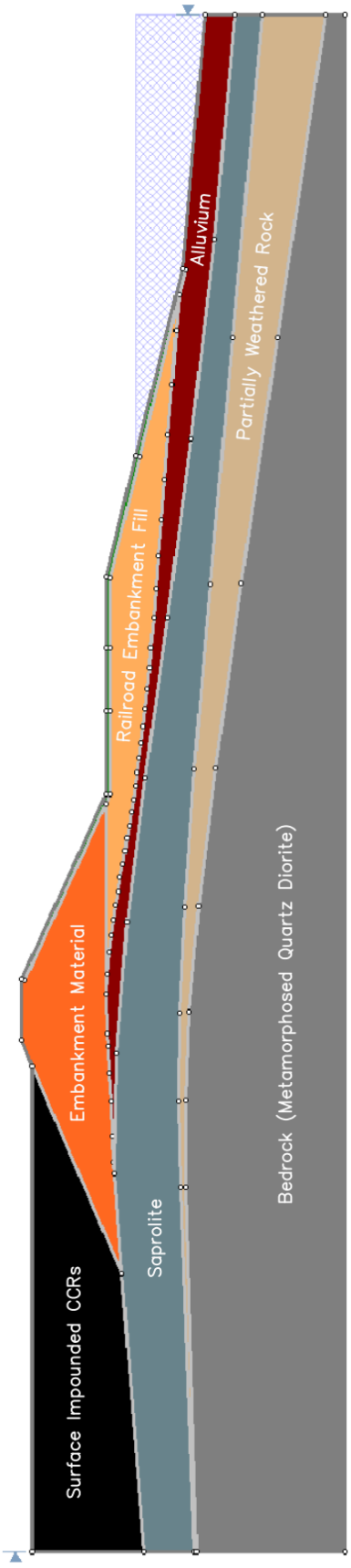

Figure 28: Subsurface profile of a slope stability example for an SI CCR embankment.

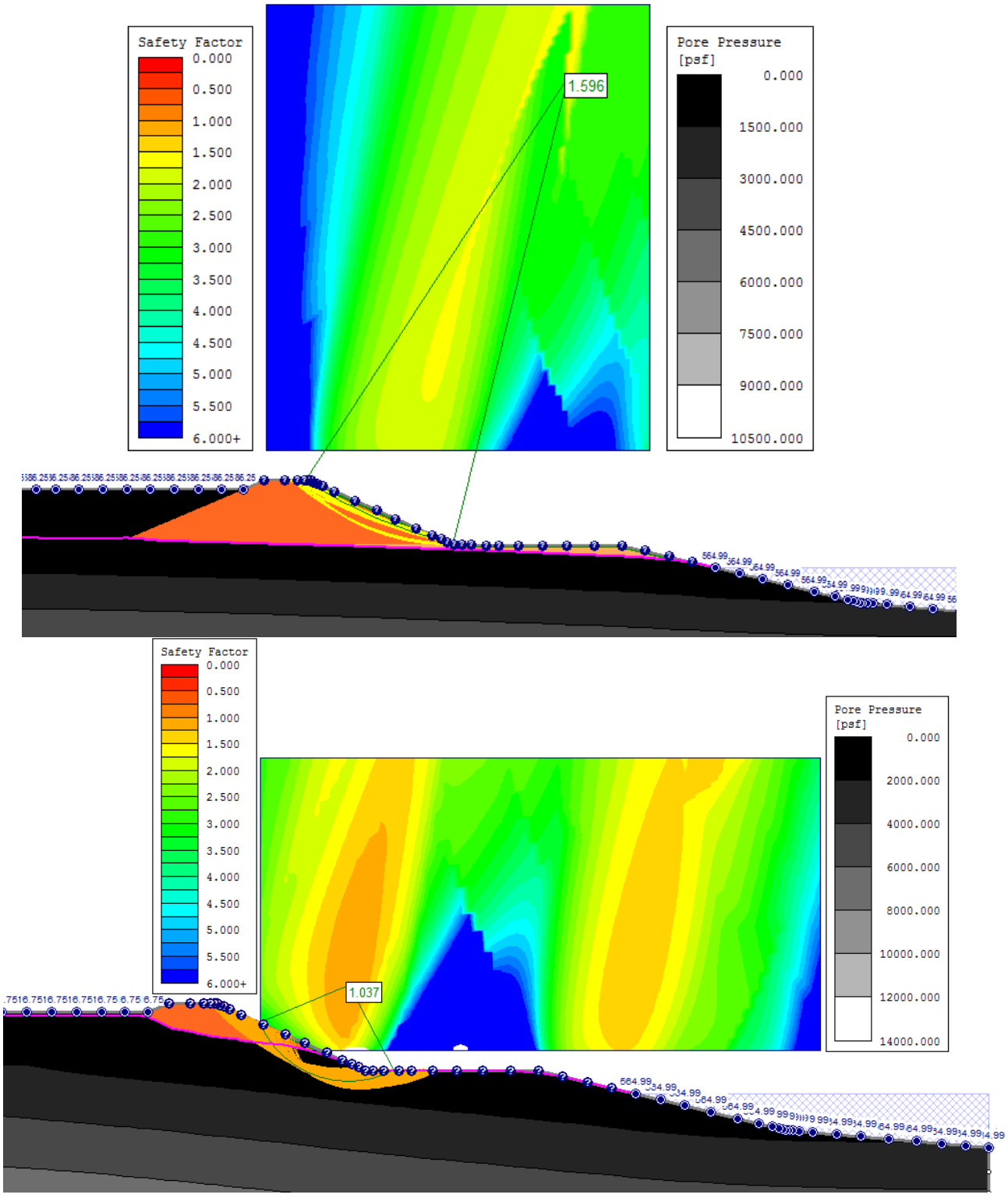

Figure 29: Analyses for the in-situ condition, first with the in-situ measured water table (above) and then with a hypothetical higher water table (below). Slip surfaces are shown for factors of safety below 1.7 for the above case and between 1.0 and 1.2 for the below case.

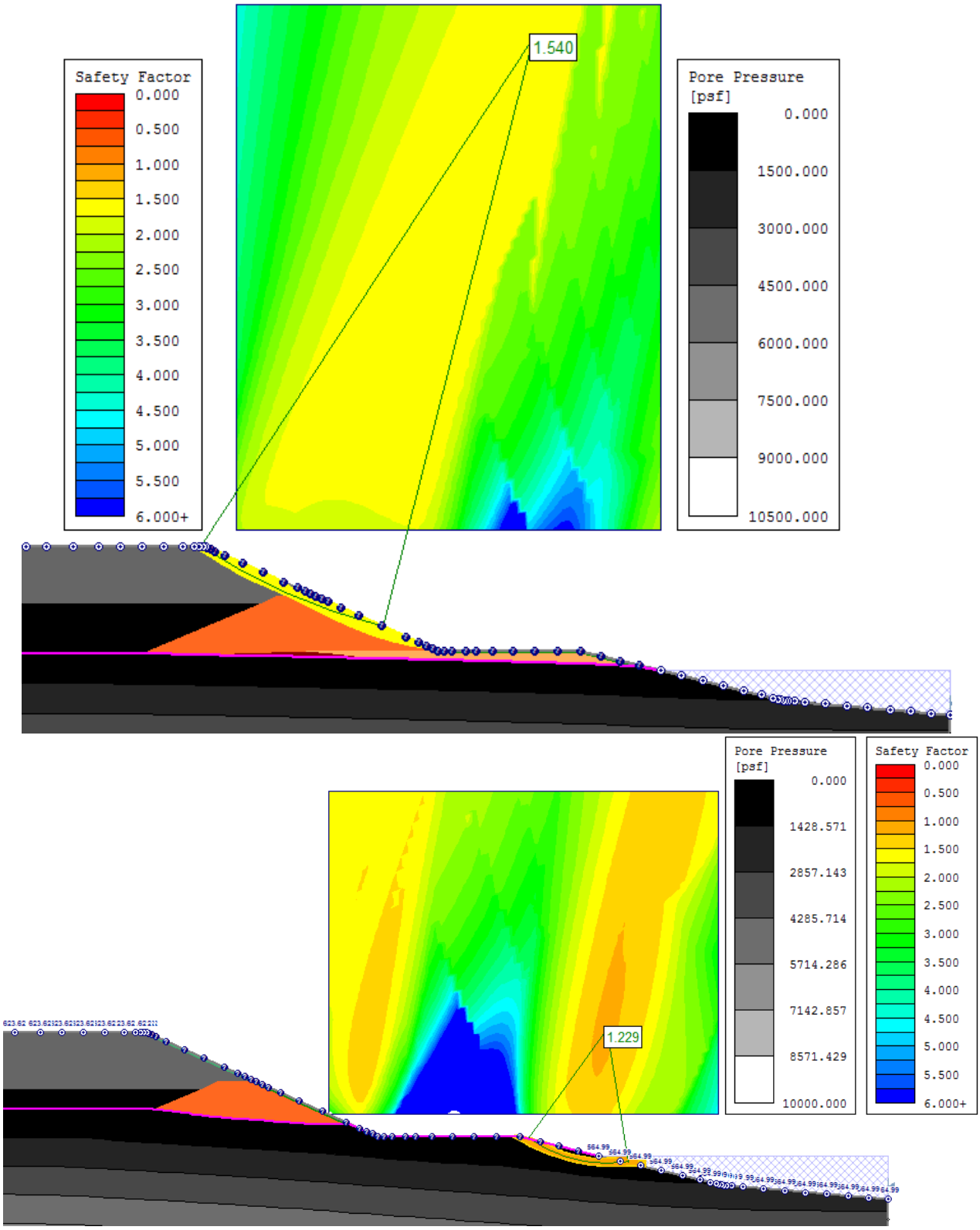

Figure 30: Analyses for an added upstream dry-disposed cell over the surface impoundment, for the in-situ water table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.6 are shown in the above case and between 1.2 and 1.3 for the below case.

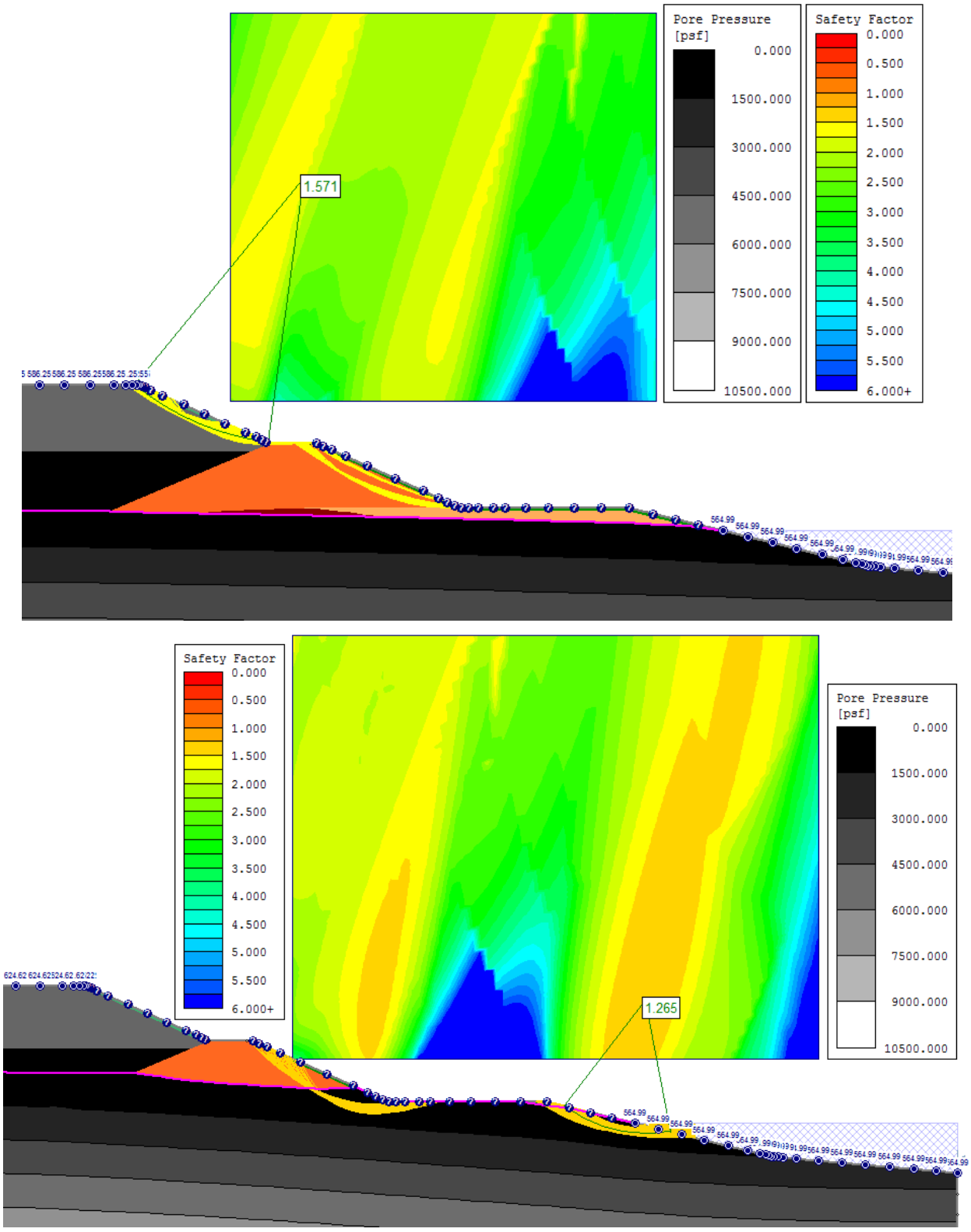

Figure 31: Analyses for an added upstream dry-disposed cell above the surface-impoundment for the in-situ groundwater table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.7 are shown for the above case and between 1.2 and 1.4 for 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.

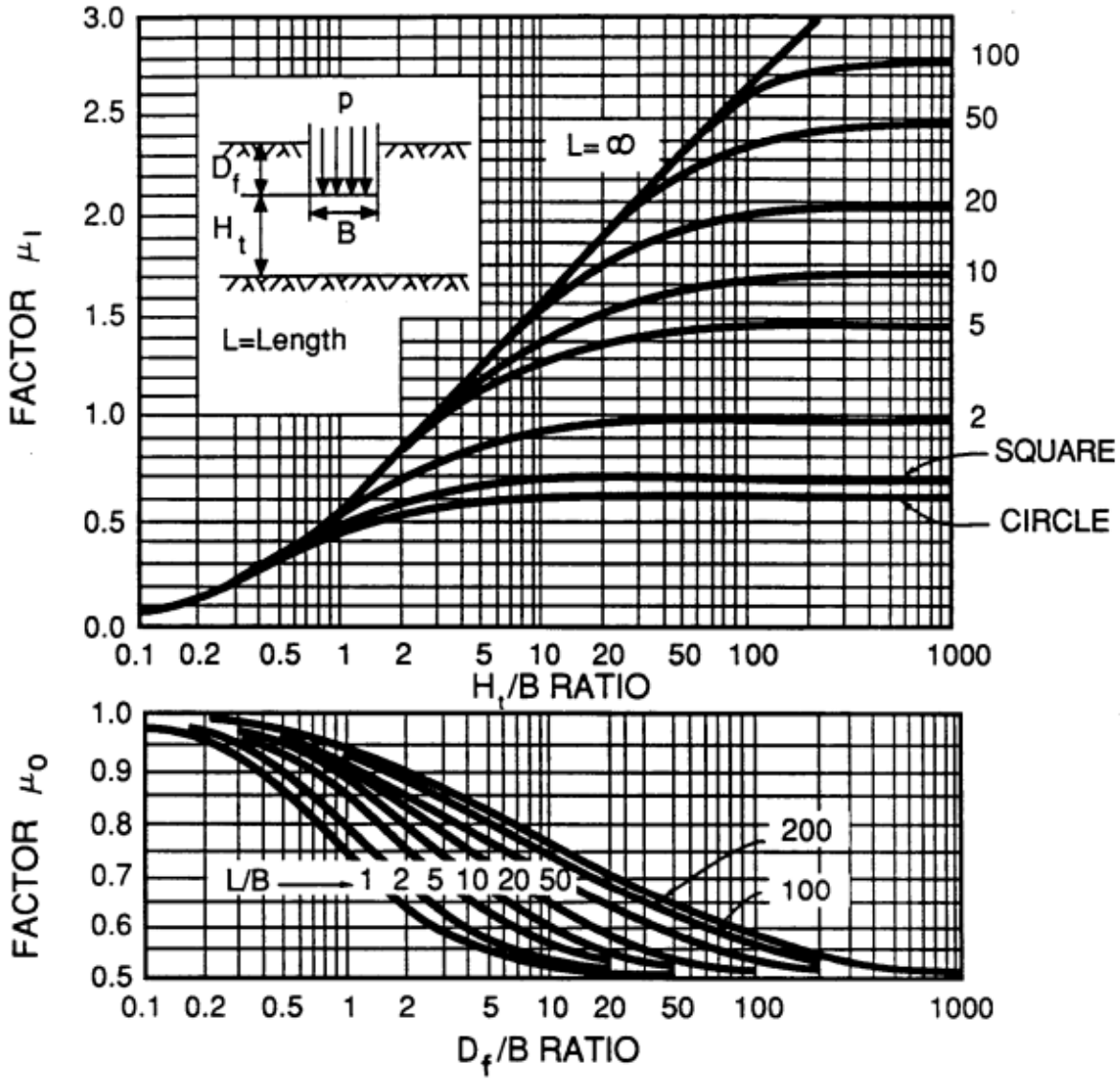

Figure 32: Plots published by D'Appolonia et al. (1970) to determine the values of the geometry factors to be used in footing settlement analyses.

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.

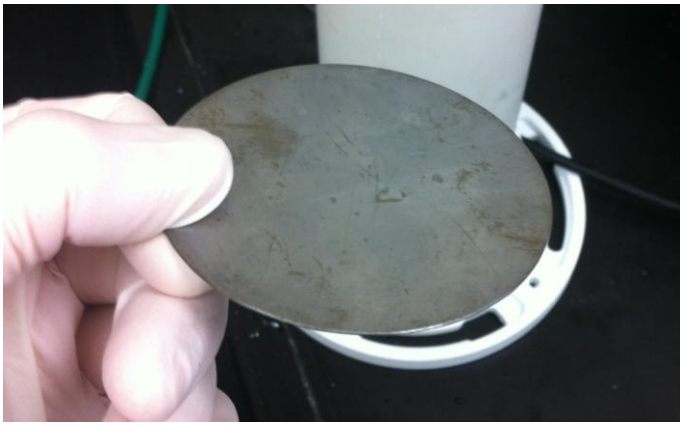

Figure 34: Thin metal disk approximately the same diameter of the bottom porous disk.

- 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.

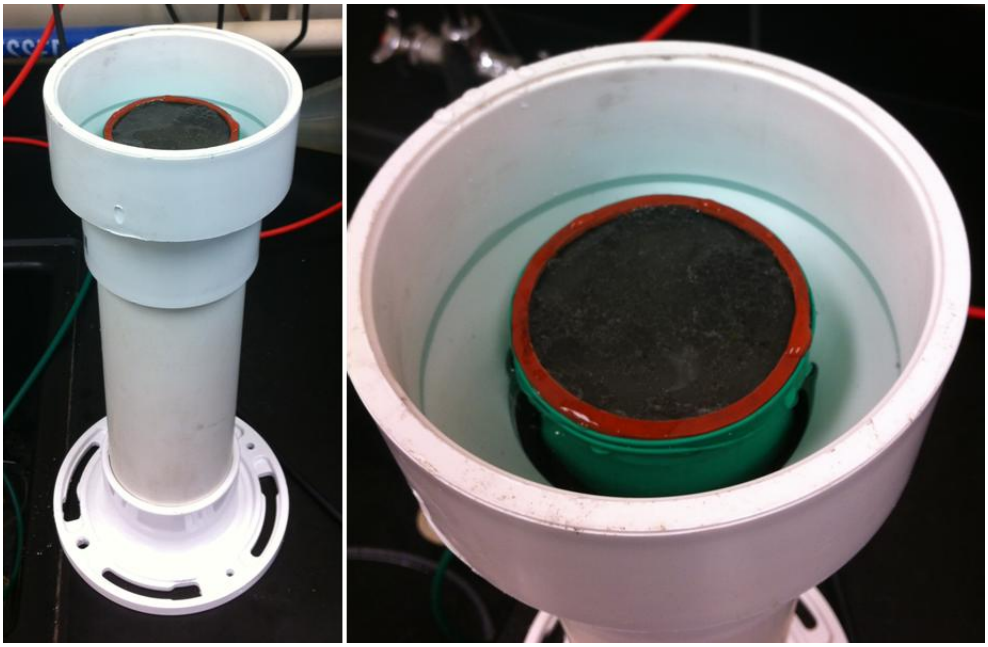

Figure 35: Water bath large enough to completely submerge the mixing tube and allow for easy placement of the porous disk and metal plate. The rubber membrane can also be seen rolled down around the mixing tube.

- 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.

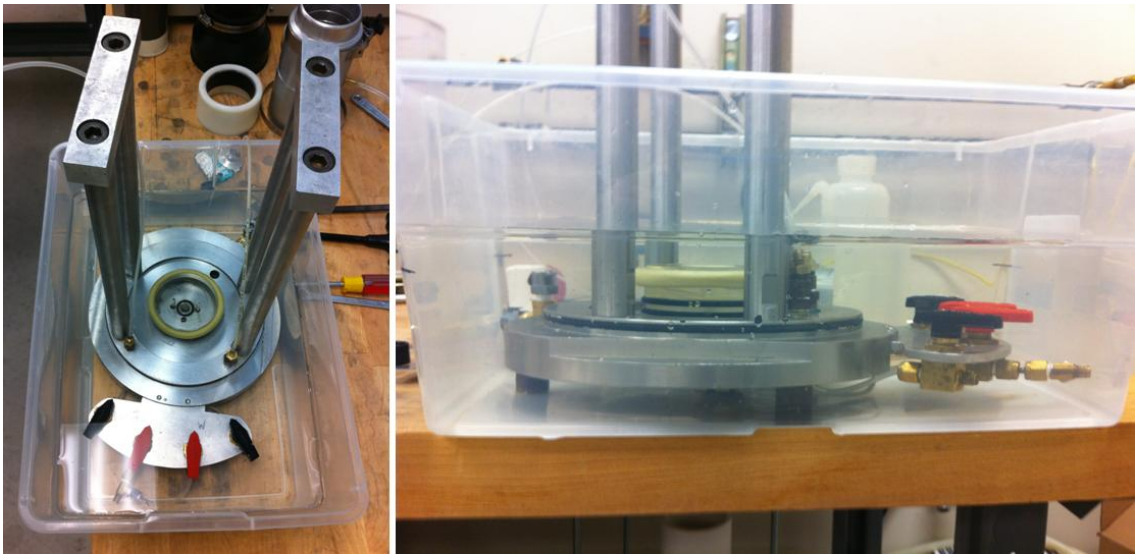

Figure 36: Water bath large enough to accommodate the bottom of the triaxial cell and submerge the bottom platen.

- 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.

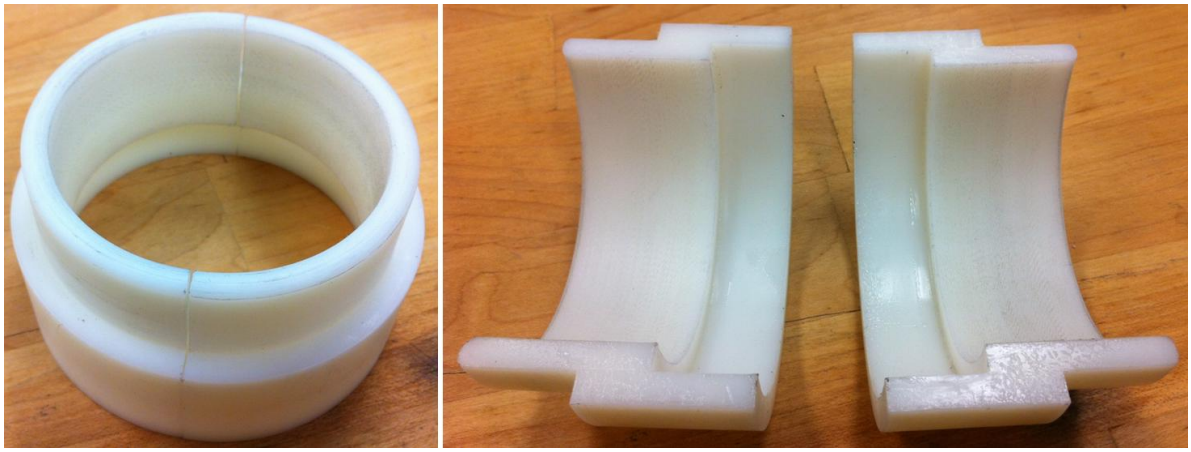

Figure 37: A custom-made split-collar to accommodate the additional volume of soil when the slurry is first placed in the specimen split-mold. This collar was machined out of nylon to fit the dimensions of the split-mold being used and the flexible collar used to accommodate the extra water volume when 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.

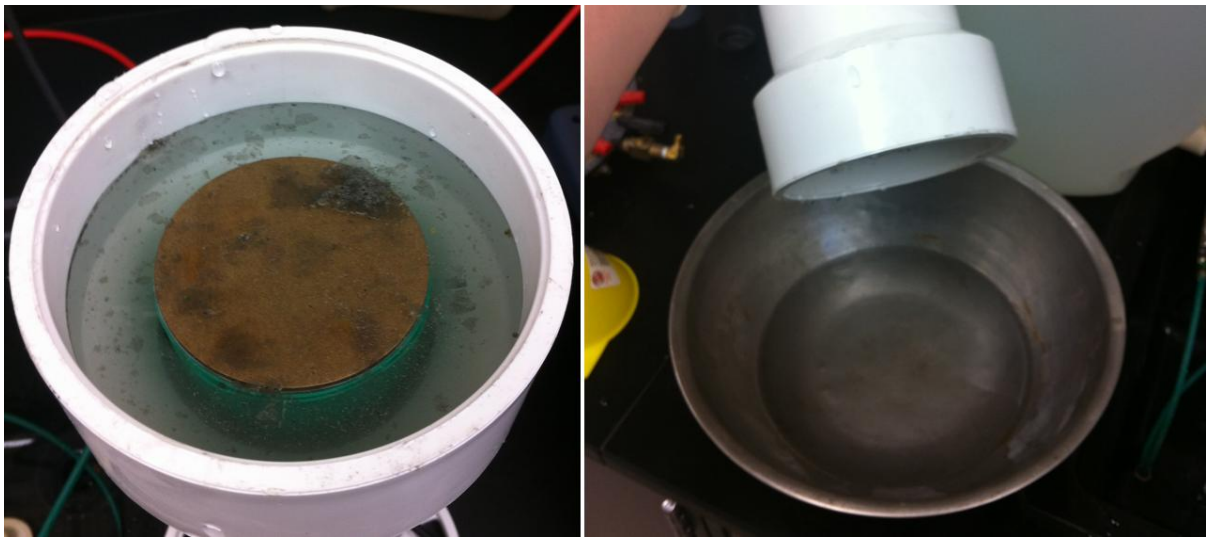

Figure 38: Placement of the porous disk and transferring of the fines lost in the water bath to a container to be oven-dried and weighed.

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.

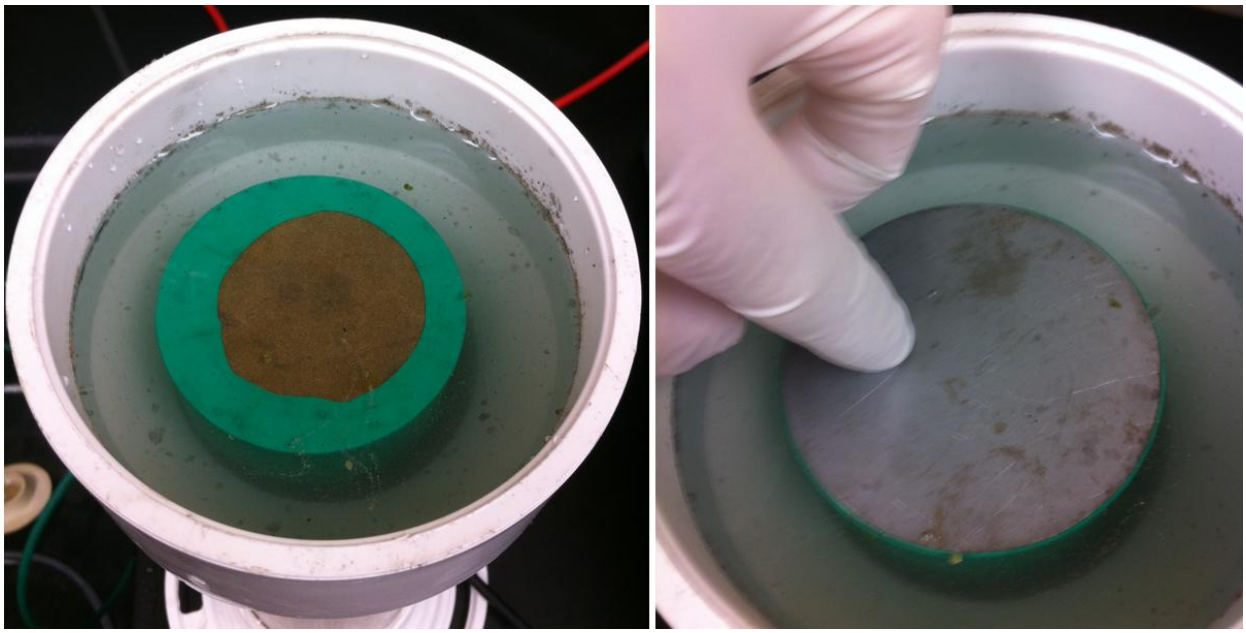

Figure 39: Securing of the porous disk with the thin rubber membrane and placement of the thin metal disk over the opening in the membrane.

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.

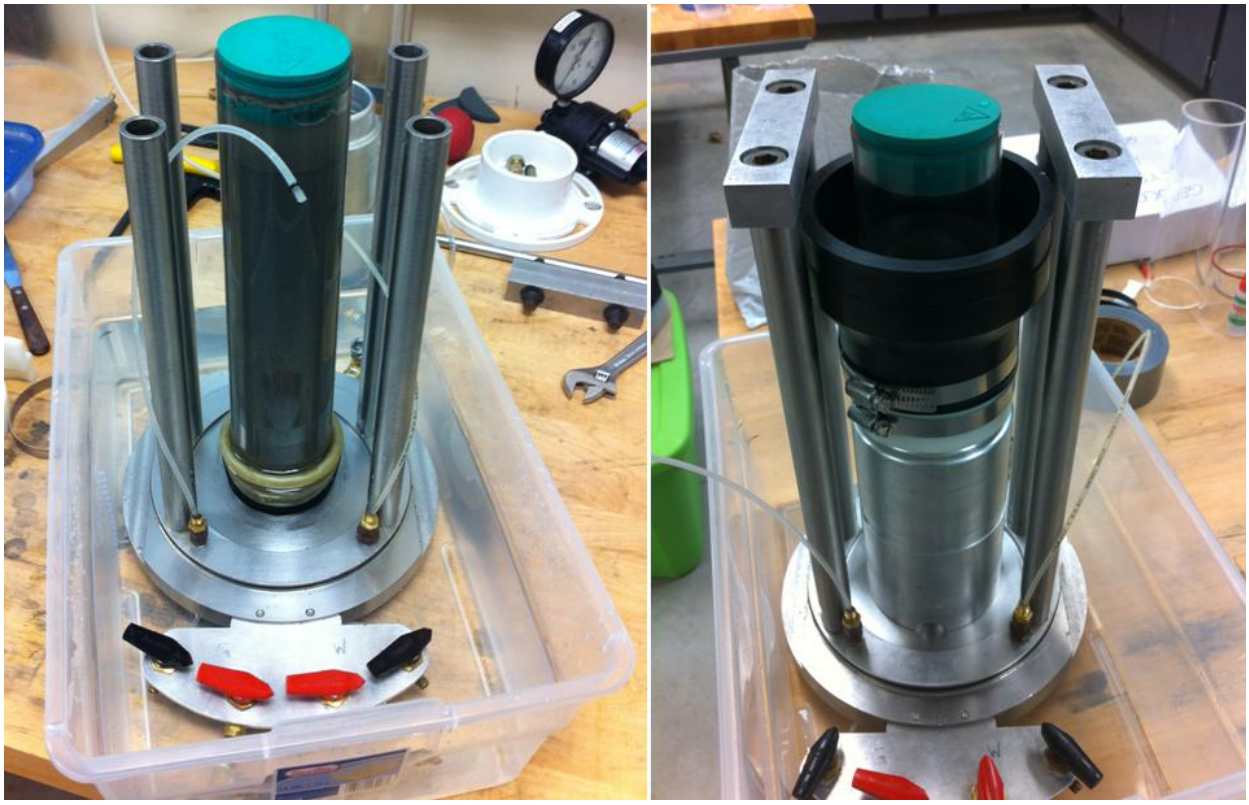

Figure 40: Rolling up the membrane around the mixing tube and placement of the specimen split-mold, the slurry extension collar, and the water extension collar after removal of the triaxial cell base from the water bath.

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.

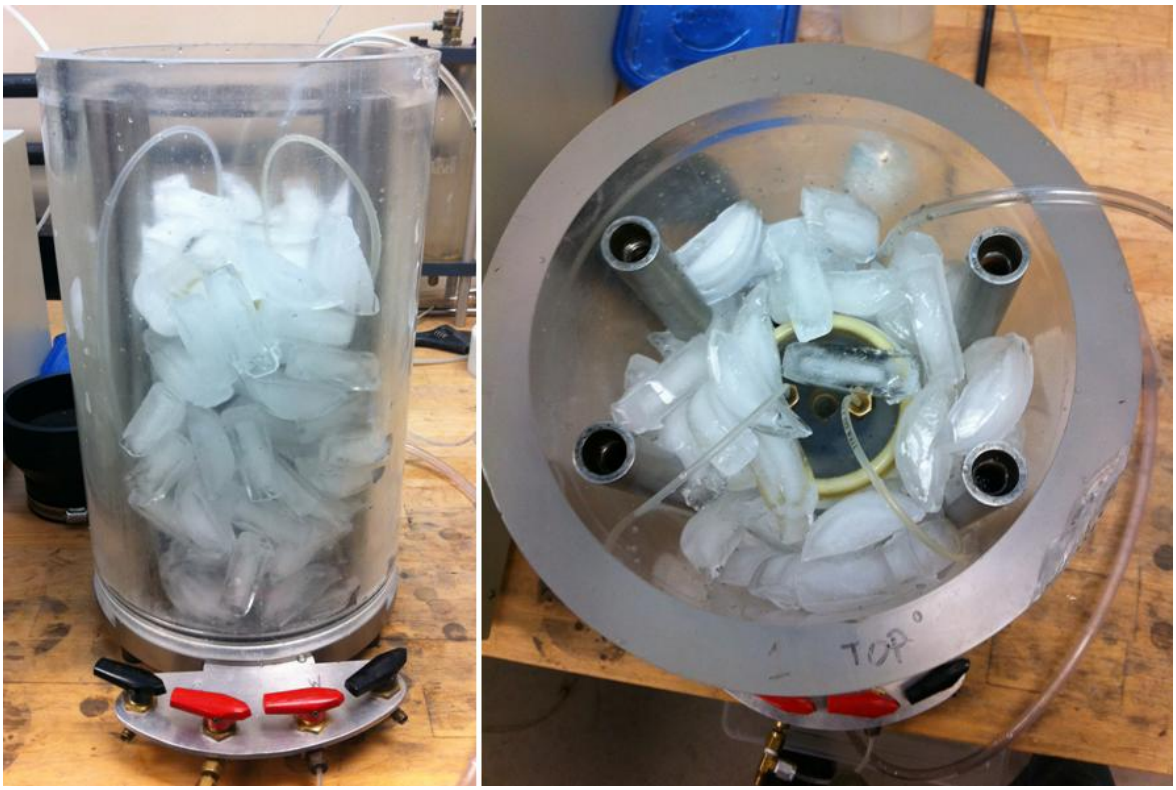

Figure 42: Ice bath placed around the compacted specimen for a period of four hours to set the gelatin.

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.

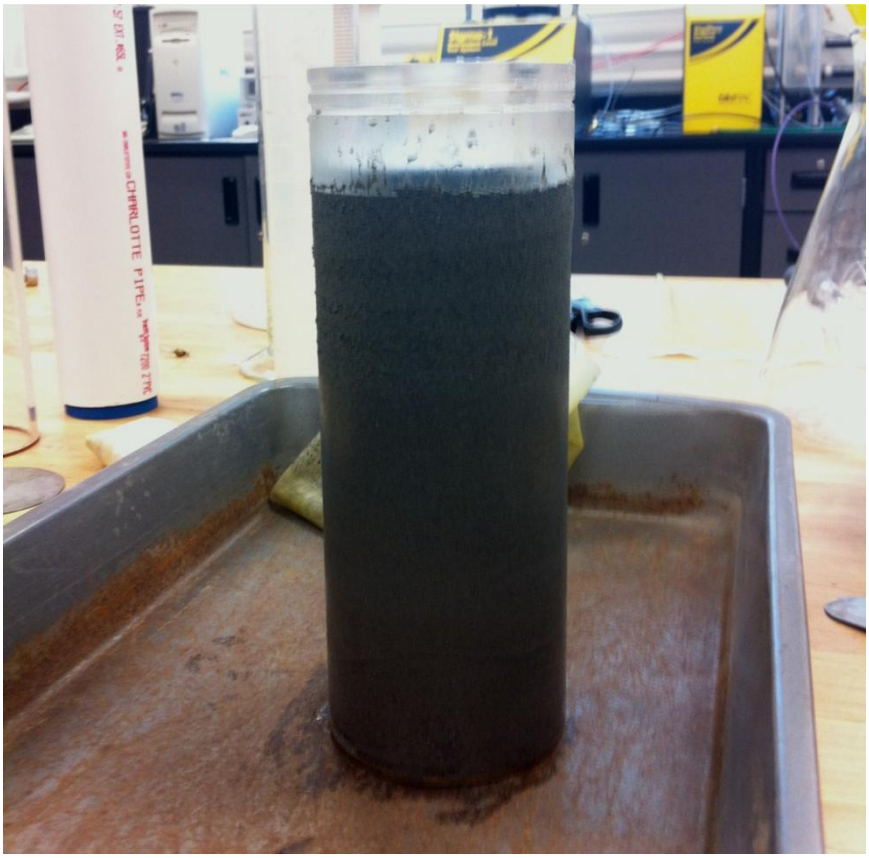

Figure 43: Specimen removed from the split mold and membrane following gelatin curing period.

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.

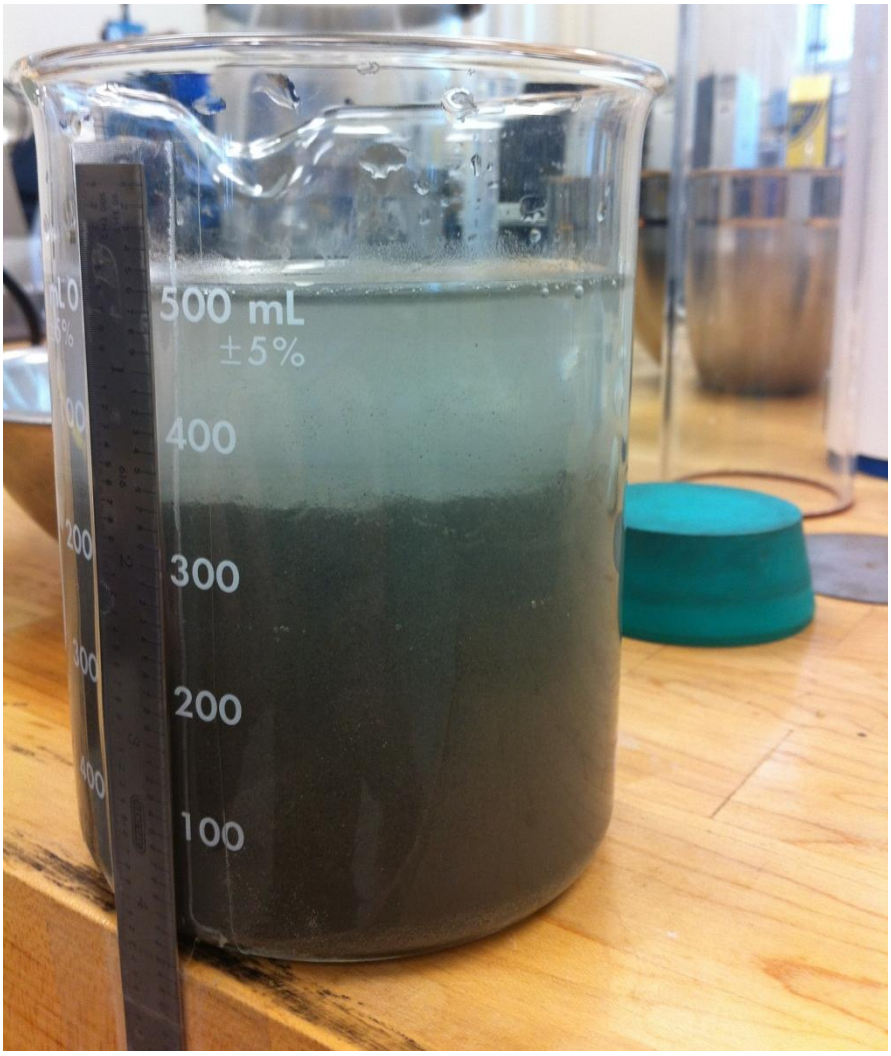

Figure 44: Each specimen slice volume was determined using water displacement. A 500 mL capacity beaker and a ruler incremented at 1/100" were used to do this. The vertical distance between a 100 mL addition of water to the beaker and the equation for the volume of a cylinder was used to calculate the 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.

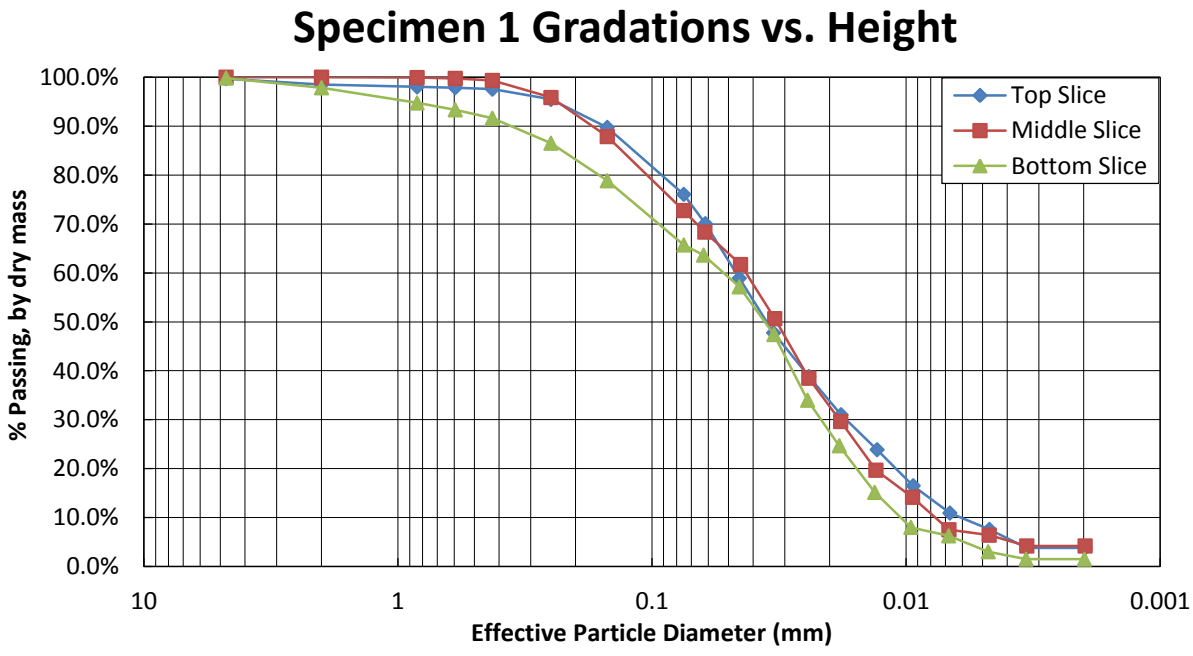

Figure 45: Plot comparing grain-size distributions across the height of specimen one.

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.

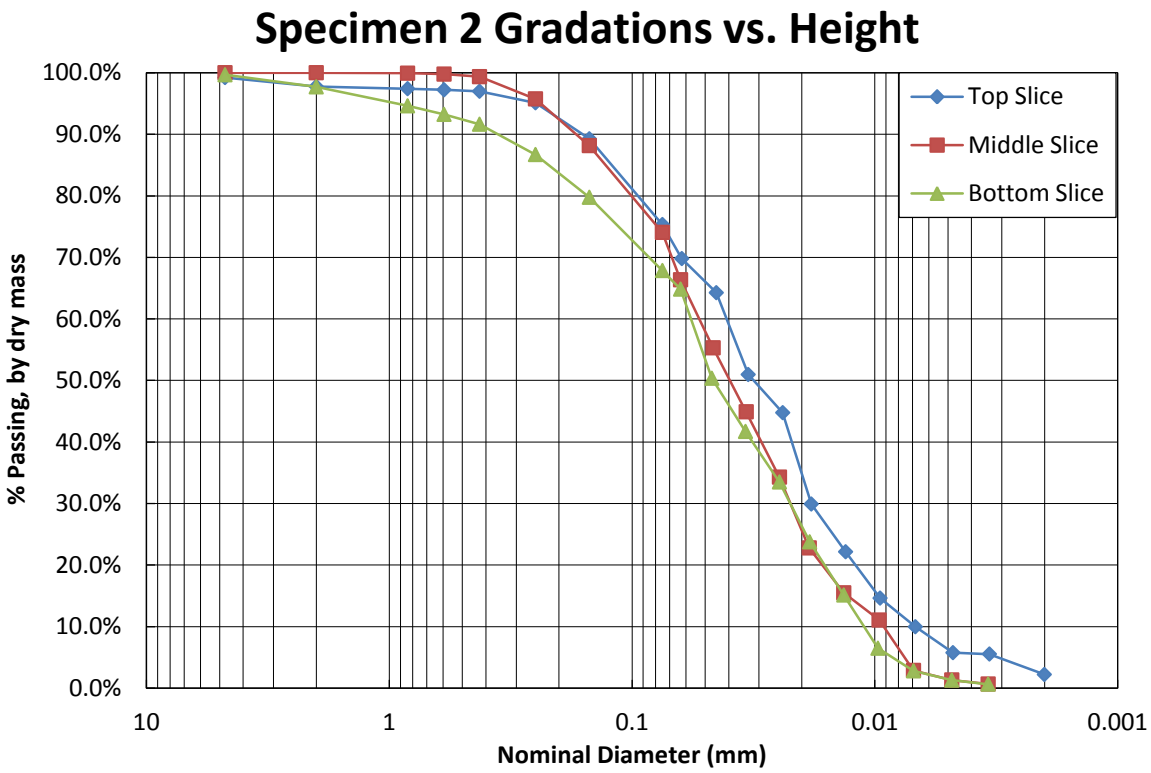

Figure 46: Plot comparing grain-size distribution across the height of specimen two.

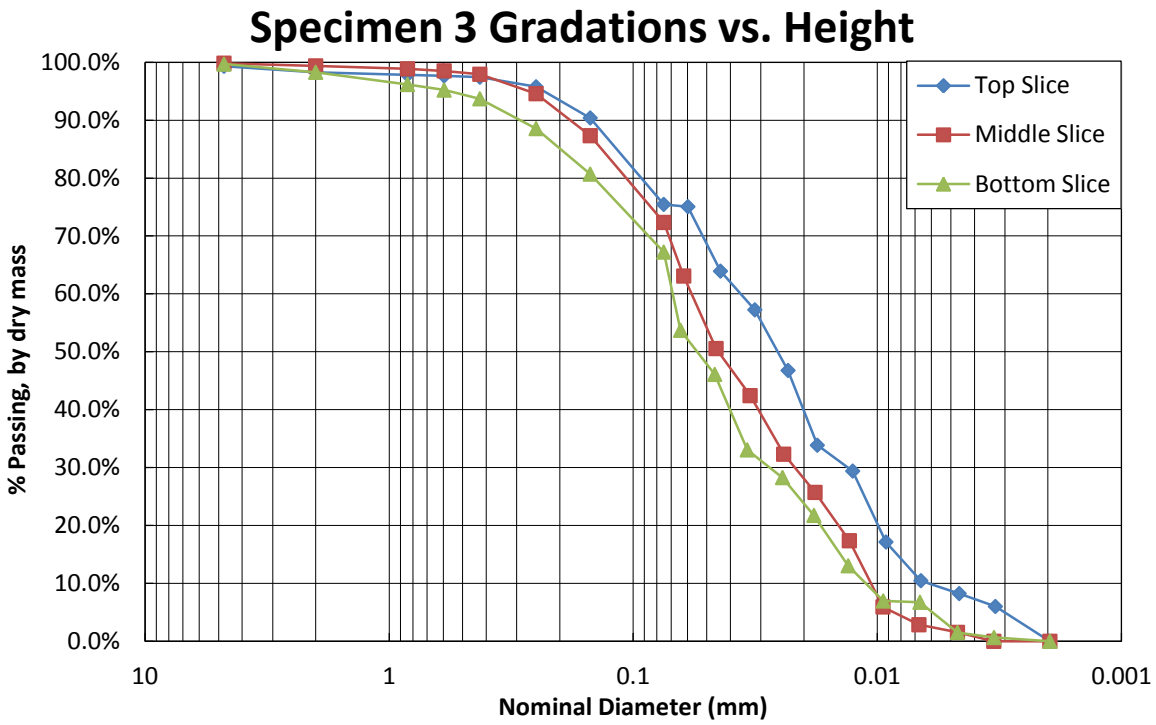

Figure 47: Plot comparing grain-size distribution across the height of specimen three.

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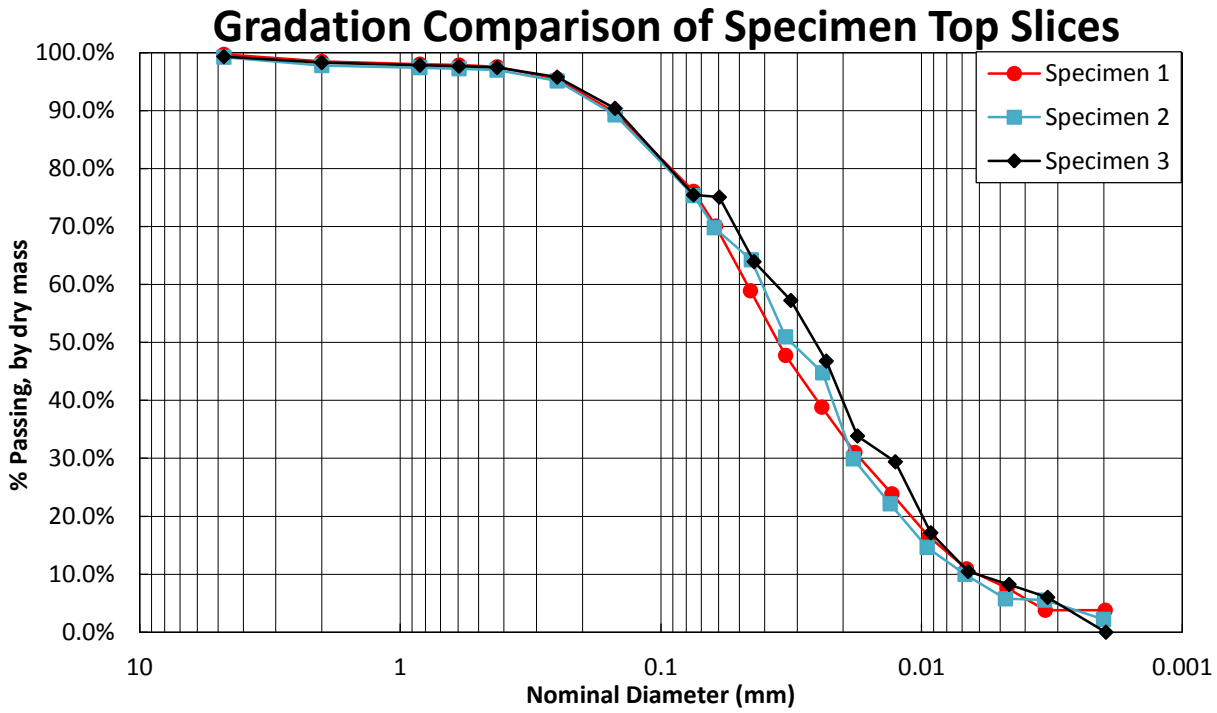


Figure 48: Plot comparing grain-size distributions of the top slices of all three specimens.

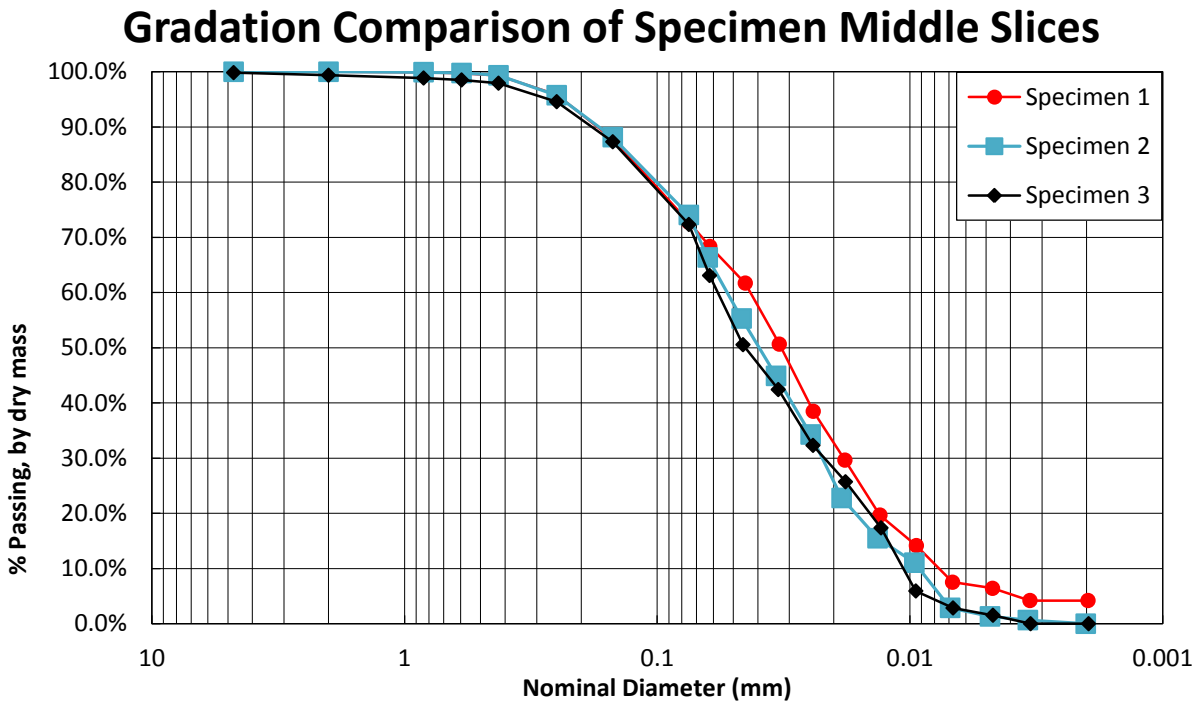


Figure 49: Plot comparing grain-size distribution of the middle slices of all three specimens.

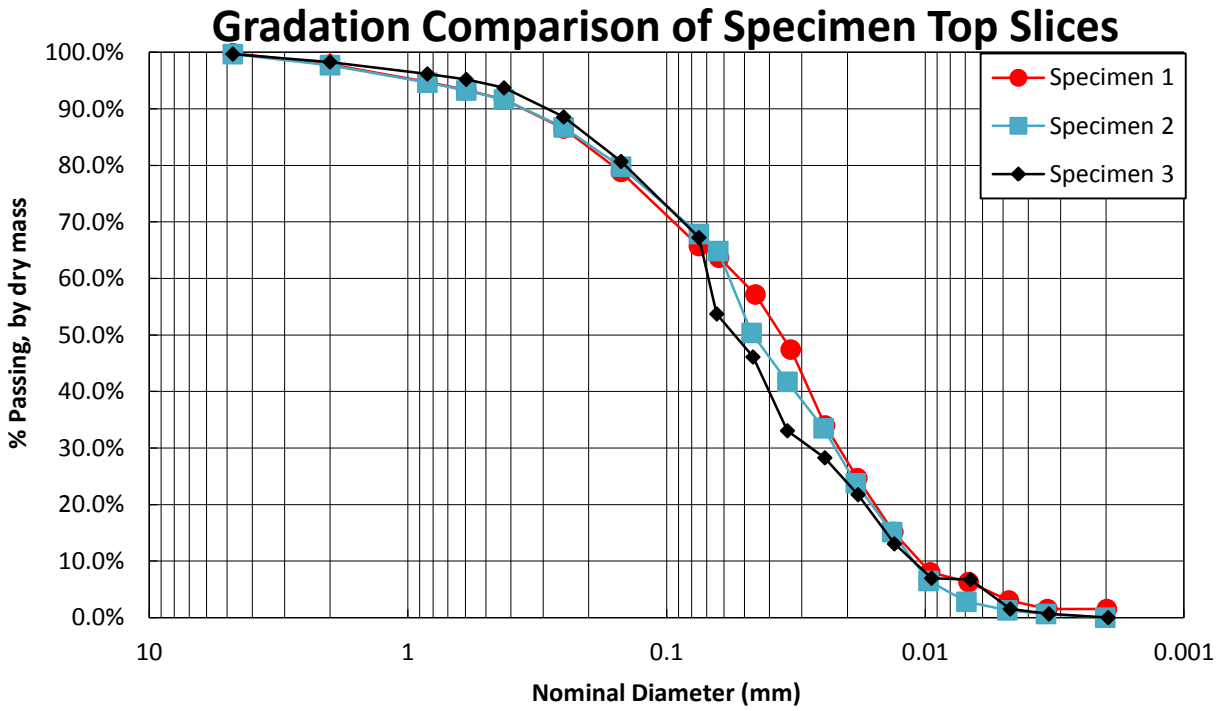


Figure 50: Plot comparing grain-size distribution for the bottom slices of all three specimens.

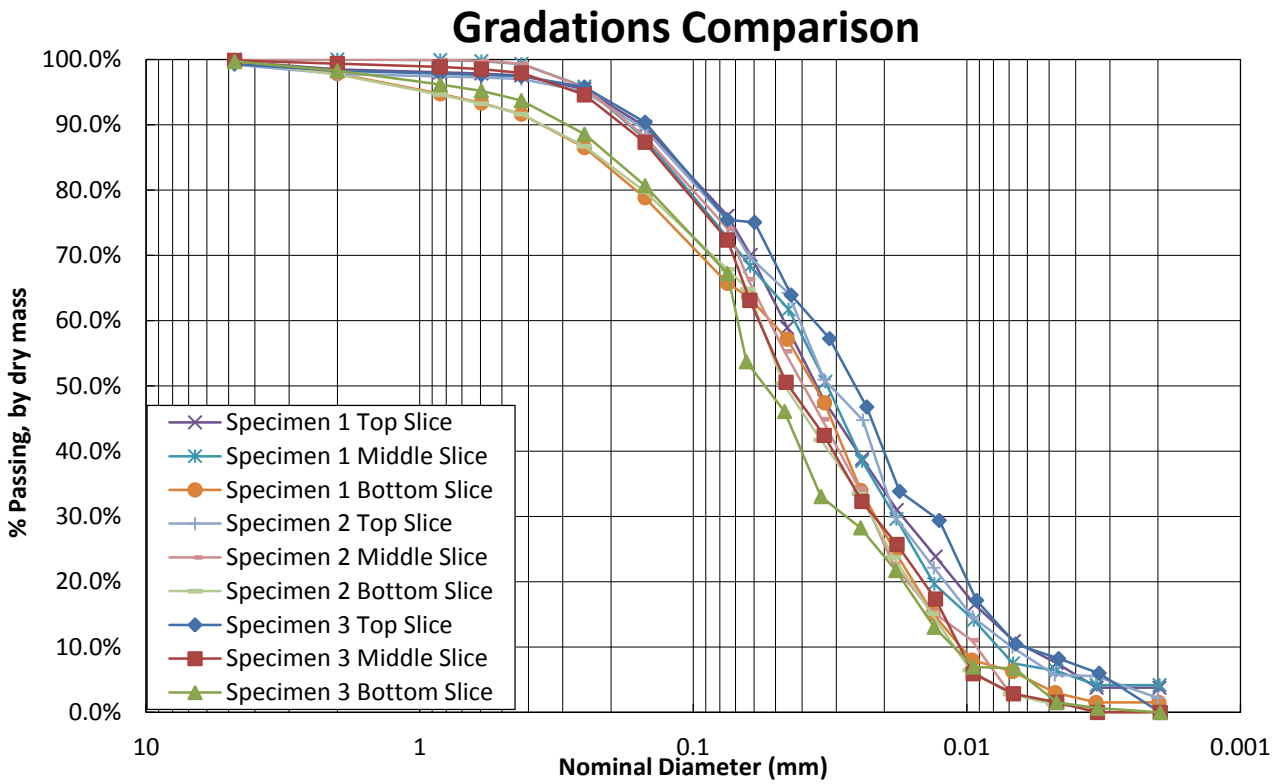


Figure 51: Comparison of all gradations for all three samples.

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.

References

ASTM. (2003). “Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading.” *D2435-03*, West Conshohocken, Pa.

ASTM. (2003). “Standard Test Method for Expansion Index of Soils.” *D4829-03*, West Conshohocken, Pa.

ASTM. (2003). “Standard Test Method for Shrinkage Factors of Soils by the Wax Method.” *D4943-03*, West Conshohocken, Pa.

ASTM. (1963). “Standard Test Method for Particle-Size Analysis of Soils.” *D422-63*, West Conshohocken, Pa.

Barton, N. and Choubey, V. (1977). “The Shear Strength of Rock Joints in Theory and Practice.” *Rock Mechanics*, 10(1-2), 1-54.

Carraro, J. A. H., Bandini, P., and Salgado, R. (2003). "Liquefaction Resistance of Clean and Nonplastic Silty Sands Based on Cone Penetration Resistance." *Journal of Geotechnical and Geoenvironmental Engineering*, 129(11), 965-976.

Bera, A. K., Ghosh, Ambarish, and Ghosh, Amalendu. (2007). “Compaction Characteristics of Pond Ash.” *J. Mater. Civil Eng.*, 19(4), 349-357.

D’Appolonia, D. J., D’Appolonia, E., and Brisette, R. F. (1970). “Settlement of Spread footings on Sand.” *Proceedings, Journal of Soil Mechanics and Foundation Division*, ASCE, Vol. 96, No. SM2, 754-761.

Das, S. K., Yudhbir (2005). “Geotechnical Characterization of Some Indian Fly Ashes.” *J. Mater. Civil Eng.*, 17(5), 544-552.

Dockter, B. A. and Jagiella, D. M. "Engineering and Environmental Specifications of State Agencies for Utilization and Disposal of Coal Combustion Products: Volume 2 – Environmental Regulations

Emery, J. J., Liam Finn, W. D., and Lee, K. W. (1973). "Uniformity of Saturated Sand Specimens." *Evaluation of Relative Density and Its Role in Geotechnical Projects Involving Cohesionless Soils, ASTM STP 523*, American Society for Testing and Materials, 182-194.

Energy Information Administration (2010). "Electricity Explained: Electricity in the United States," <http://www.eia.gov/energyexplained> (May 26, 2011).

Environmental Protection Agency (2011). "Coal Combustion Products," <http://www.epa.gov/wastes/conserve/rrr/imr/ccps/> (May 26, 2011).

Federal Register. (1993). 58(No. 151: Aug. 9), 42466-42482.

Federal Register. (2010). 75(No. 118: June 21), 35128-35264.

Gitari, M. W., Fatoba, O. O., Nyamihingura, A., Petrik L. F., Vadapalli, V. R. K., October, A., Dlamini, L., Gerike, G., and Mahlaba, J. S. (2009). "Chemical Weathering In A Dry Ash Dump: An Insight From Physiochemical and Mineralogical Analysis of Drilled Cores." *Proc. World of Coal Ash*, ACAA, Lexington, KY

Indraratna, B., Nutalaya, P., Koo, K. S., and Kuganenthira, N. (1991). "Engineering behavior of a low carbon, pozzolanic fly ash and its potential as a construction fill." *Can. Geotech. J.*, 28(4), 542-555.

Jakka, R. S., Ramana, G. V., and Datta, M. (2010a). "Shear Behaviour of Loose and Compacted Pond Ash." *Geotech. Geol. Eng.*, 28(6), 763-778.

Jakka, R. S., Datta, M., Ramana, G. V. (2010b). "Liquefaction behavior of loose and compacted pond ash." *Soil Dynamics and Earthquake Engineering*, 30(7), 580-590.

Joslin, J. G. (1958). "Ohio's Typical Moisture-Density Curves." *Proceedings, Symposium on Application of Soil Testing in Highway Design and Construction*, ASTM STP 239, 111-118.

Kaniraj, S. R. and Gayathri, V. (2004). “Permeability and Consolidation Characteristics of Compacted Fly Ash.” *J. Energy Eng.*, 130(1), 18-43.

Keurbis, R. and Vaid, Y. P. (1988). "Sand Sample Preparation —The Slurry Deposition Method." *Soils and Foundations*, 28(4), 107-118.

Kim, B. and Prezzi, M. (2008). “Evaluation of the mechanical properties of class-F fly ash.” *Waste Management*, 28(3), 649-659.

Kolay, P. K. and Kismoor, T. (2009). “Geotechnical Characterization of Coal Ashes from Sarawak for Bulk Utilization.” *J. of Solid Waste Technology and Management*, 35(2), 78-87.

Kulhawy, F.H. and Mayne, P. W. (1990). *Manual on Estimating Soil Properties for Foundation Design*. Final Report (EL-6800) submitted to Electric Power Research Institute (EPRI), Palo Alto, CA.

Ladd, R. S. (1978). "Preparing Test Specimens Using Undercompaction." *Geotechnical Testing Journal*, 1(1), 16-23.

Madhyannapu, R. S., Madhav, M. R., Puppala, A. J., and Ghosh, A. “Compressibility and Collapsibility Characteristics of Sedimented Fly Ash Beds.” *J. Mater. Civil Eng.*, 20(6), 401-409.

Martin, J. P., Collins, R. A., Browning, J. S., and Biehl, F. J. (1990). “Properties and Use of Fly Ashes for Embankments.” *Journal of Energy Engineering*, 116(2), 71-86.

Martin, T.E. and M. P. Davies (2000). “Development and Review of Surveillance Programs for Tailings Dams,” *Proceedings, Tailings Dams 2000*, Las Vegas, Association of State Dam Safety Officials (ASDSO), Lexington, KY, pp. 367-380.

McLaren, R. J. and DiGioia, A. M. (1987). “The typical engineering properties of fly ash.” *Geotechnical practice for waste disposal*, GSP 13, ASCE, 683-697.

Mohanty, B., Patra, N. R., and Chandra, S. (2010). “Cyclic Triaxial Behavior of Pond Ash.” *Proc. GeoFlorida, 2010*, Palm Beach, FL.

Muhardi, Marto, A., Kassim, K. A., Makhtar, A. M., Wei, L. F., and Lim, Y. S. (2010). "Engineering Charactertistics of *Tanjung Bin* Coal Ash." *Electronic J. of Geotechnical Eng.*, 15(K), 1117-1129.

Pandian, N. S. (2004). "Fly ash characterization with reference to geotechnical applications." *J. Indian Inst. Sci.* 84(6), 189-216.

Prakash, K. and Sridharan, A. (2009). "Beneficial Properties of Coal Ashes and Effective Solid Waste Management." *Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management*, 13(4), 239-248.

Prashanth, J. P., Sivapullaiah, P. V., and Sridharan, A. (1999). "Compaction behaviour of fly ashes." *Ground Improvement*, 3(2), 77-88.

Rad, N. S. and Tumay M. T. (1987). "Factors Affecting Sand Specimen Preparation by Raining." *Geotechnical Testing Journal*, 10(1), 31-37.

Raymond, S. (1962). "Pulverized fuel ash as embankment material." *ICE Proceedings*, 19(4), 515-536.

Schmertmann, J. H. (1970). "Static cone to compute static settlement over sand." *Journal of Soil Mechanics and Foundations Division*, 96(3), 1011-1043.

Schmertmann, J. H., Hartmann, J. P., and Brown, P. R. (1978). Improved strain influence factor diagrams." *Journal of the Geotechnical Engineering Division*, 104(GT8), 1131-1135.

Scott, G. A., Engemoen, W. O., Gillette, D. R., L. W. Anderson, Liu, P., Feidler, W. R., Nuss, L. K., Trojanowski, J., England, J., Dise, K. M., and Schultz, R. W. (2010). *Dam Safety Risk Analysis Best Practices Training Manual*, Version 2.1, U.S. Department of the Interior Bureau of Reclamation, Denver, CO.

Sherwood, P. T. (1995). "Power Station Wastes (pulverized fuel ash and furnace bottom ash)." *Alternative materials in road construction*, 1st ed., (5), 52-63.

Singh, H. P., Maheshwari, B. K., Saran, S., and Paul, D. K. (2008). "Evaluation of Liquefaction Potential of Pond Ash." *Proc. World Conference on Earthquake Engineering*, Beijing, China.

Sridharan, A., Pandian, N. S., and Srinivas, S. (2001). "Compaction behaviour of Indian coal ashes." *Ground Improvement*, 5(1), 13-22.

Sridharan, A., Pandian, N. S., and Rao, P. S. (1998). "Shear strength characteristics of some Indian fly ashes." *Ground Improvement*, 2(3), 141-146.

Tan, C.K. and Duncan, J. M. (1991). "Settlement of Footings on Sands-Accuracy and Reliability." *Proceedings, Geotechnical Engineering Congress,* ASCE, GSP 27, Vol. 2, 446-455.

Trivedi, A. and Singh, S. (2004a). "Geotechnical and Geoenvironmental Properties of Power Plant Ash." *J. Inst. Eng.*, 85(), 93-99.

Trivedi, A. and Singh, S. (2004b). "Cone Resistance of Compacted Ash Fill." *J. Test. Eval.*, 32(6), 1-9.

Trivedi, A. and Sud, V. K. (2002). "Grain characteristics and engineering properties of coal ash." *Granular Matter*, 4(3), 93-101.

Trivedi, A. and Sud, V. K. (2004). "Collapse Behavior of Coal Ash." *J. Geot. Geoenv. Eng.*, 130(4), 403-415.

Tu, W., Zand, B., Ajlouni, M. A., Butalia, T. S., and Wolfe, W. E. (2007). "The Consolidation Characteristics of Impounded Class F Fly Ash—A Case History." *Proc. World of Coal Ash,* ACAA, Covington, KY.

United States Army Corps of Engineers (2003). *Slope Stability Engineer Manual*, EM 1110-2-1902.

Vaid, Y. P. and Negussey, D. (1988). "Preparation of reconstituted sand specimens." *Advanced Triaxial Testing of Soil and Rock, ASTM STP 977,* American Society for Testing and Materials, 405-417.

Walton, W. H. and Butler, W. (2009). *Root Cause Analysis of TVA Kingston Dredge Pond Failure on December 22, 2008*. Engineering Report by AECOM.

Ward, C. R. and French, D. (2005). "Relation between Coal and Fly Ash Mineralogy, Based on Quantitative X-Ray Diffraction Methods." *Proc., World of Coal Ash*, ACAA, Lexington, KY.

Yoshimoto, N., Hyodo, M., Nakata, Y., Orense, R. P., and Murata, H. (2006). "Cyclic Shear Strength Characteristics of Granulated Coal Ash." *Proc., GeoShanghai 2006*, Shanghai, China.

Yudbhir and Honjo, Y. (1991). "Applications of Geotechnical Engineering to Environmental Control." *Proc., Ninth Asian Regional Conference on Soil Mechanics and Foundation Engineering*, Bangkok, Thailand.

APPENDIX E:
Vibrating Wire Water Levels

Boring	Dec 6 2023	Dec 14 2023	Jan 11 2024	May 15 2024	July 23 2024	Oct 28 2024	Feb 21 2025	March 27 2025	April 22 2025	June 26 2025	July 21 2025	August 22 2025	November 12, 2025
B-1CCR	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
B-2CCR	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
B-3CCR	552.600	552.284	552.672	552.520		547.960	548.942	549.220	551.123	549.901	549.991	548.707	546.943
B1-U	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
B-2U	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
B-3U	552.352	552.189	553.014	553.323		548.564	550.084	551.034	553.323	551.220	550.534	549.659	547.521
B-1L	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
B-2L	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
B-1LL	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
B-1	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
B-2	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
B-3	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
B-4	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
B-5CCR	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
B-6CCR	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
B-7CCR	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
B-5	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
B-6	526.291	526.243	527.439	528.732		525.000	527.127	527.810	529.704	527.827	528.488	525.596	524.533
B-7	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
B-5L	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
B-6L	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
B-7L	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
B-8L	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
B-9L	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
B-9U	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
B-9CCR	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
B-10CCR	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
B-12U	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
B-12L	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

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…

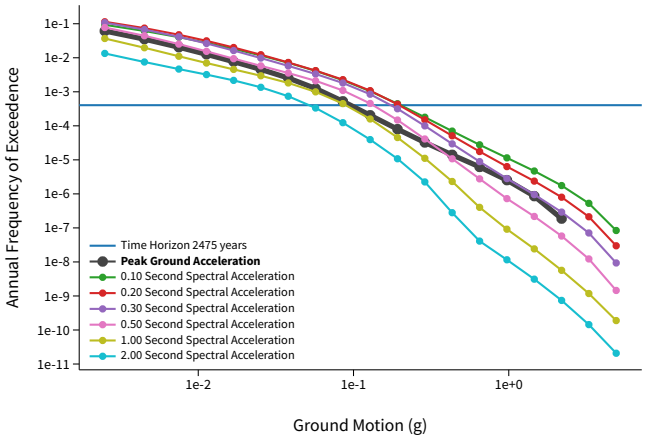
-89.596

Site Class

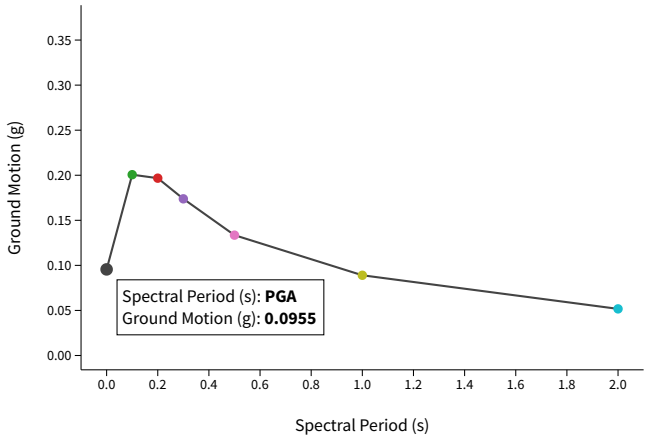
760 m/s (B/C boundary)

Hazard Curve

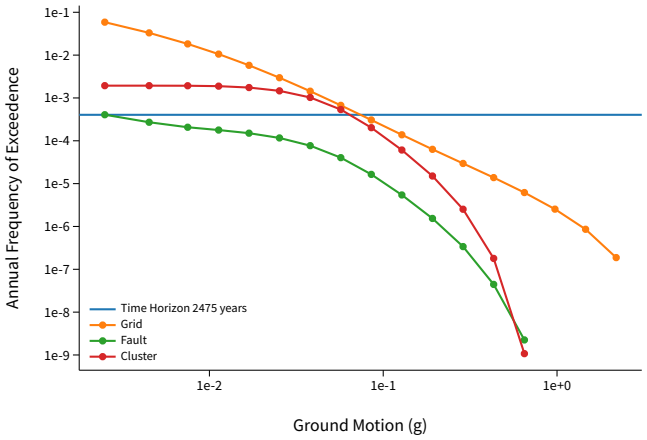
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration

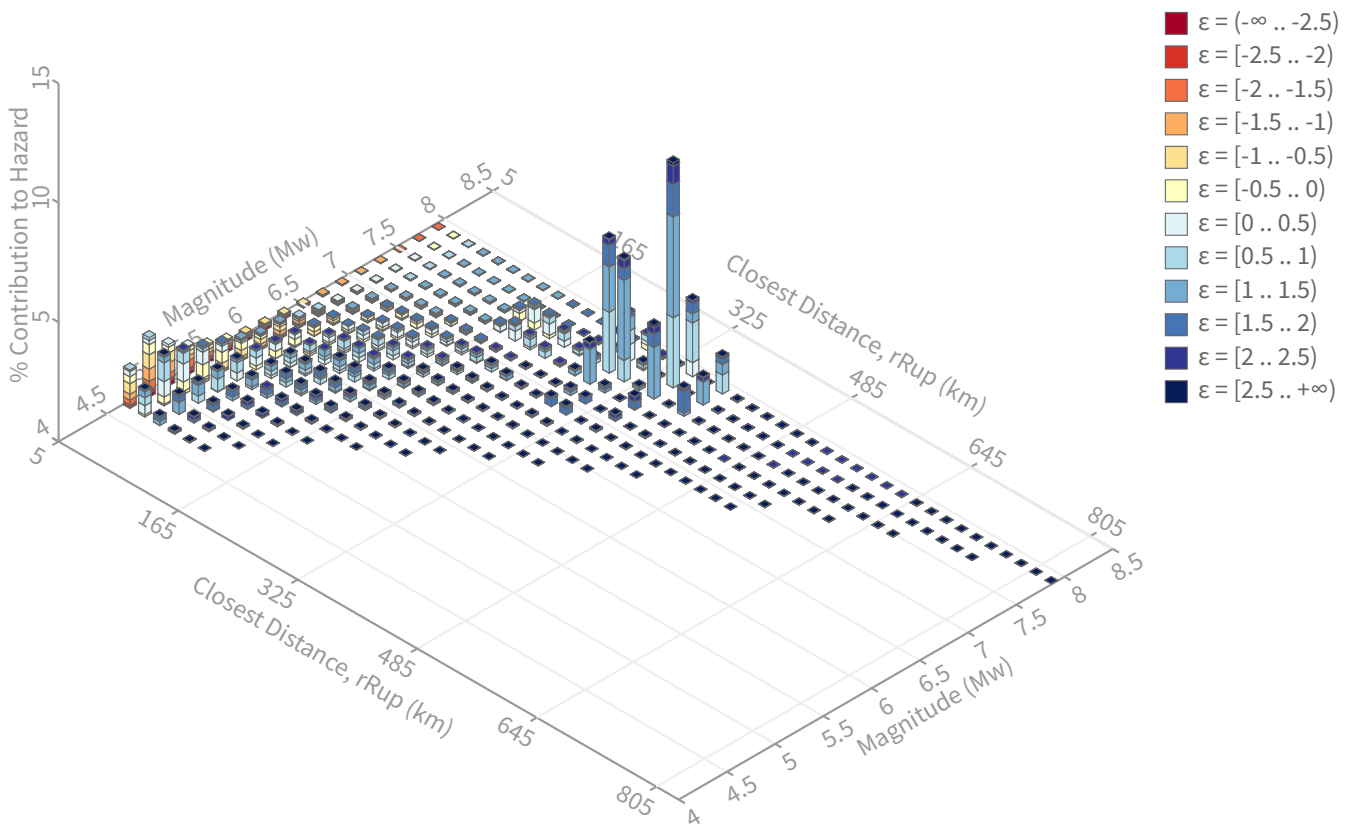


View Raw Data

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

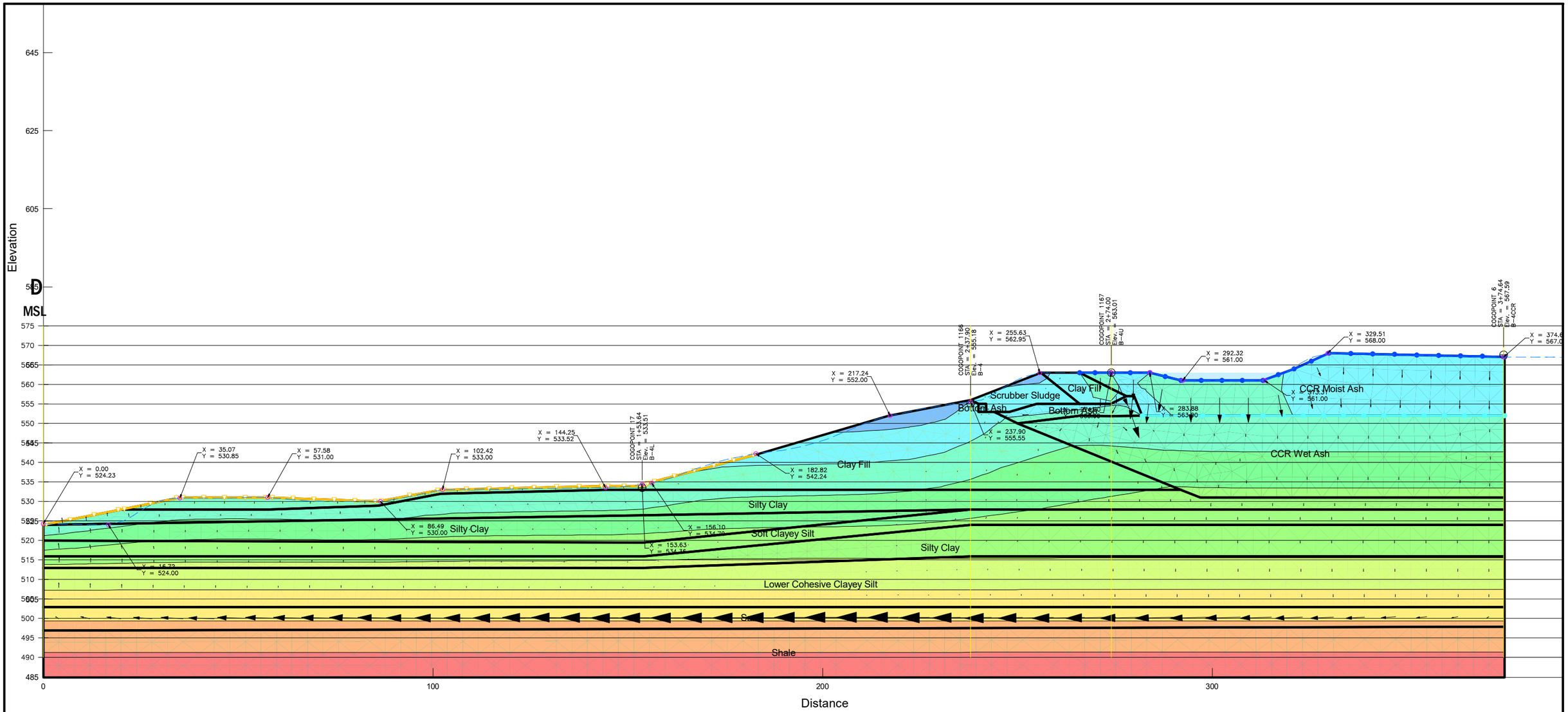
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

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 Full Pool



Steady-State Seepage	
CWLP Long Term D-D' Full Pool.gsz	
07/09/2025	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: 497
Date: 07/09/2025
Time: 07:57:05 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:57:12 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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 4
Rotation: 0 °

Shale

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 2
Rotation: 0 °

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Soft Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 8.76e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Lower Cohesive Clayey Silt

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
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 (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: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2990469e-08)
Data Point: (0.3864664, 2.2980478e-08)
Data Point: (0.71512174, 2.2962797e-08)
Data Point: (1.3232692, 2.2929405e-08)
Data Point: (2.4485922, 2.286599e-08)
Data Point: (4.5309023, 2.274406e-08)
Data Point: (8.384032, 2.2509288e-08)
Data Point: (15.513906, 2.2063258e-08)
Data Point: (28.707105, 2.1224272e-08)
Data Point: (53.119948, 1.970336e-08)
Data Point: (98.293744, 1.7098838e-08)
Data Point: (181.88384, 1.3057285e-08)
Data Point: (336.55989, 7.8920198e-09)
Data Point: (622.77416, 3.2195574e-09)
Data Point: (1,152.3883, 7.7716449e-10)
Data Point: (2,132.3921, 1.190773e-10)
Data Point: (3,945.8021, 1.4896782e-11)
Data Point: (7,301.3562, 1.8586082e-12)
Data Point: (13,510.511, 2.3472209e-13)
Data Point: (25,000, 1.5413775e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash (Silty Clay)
Saturated Kx: 2.3e-08 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)

Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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 °	

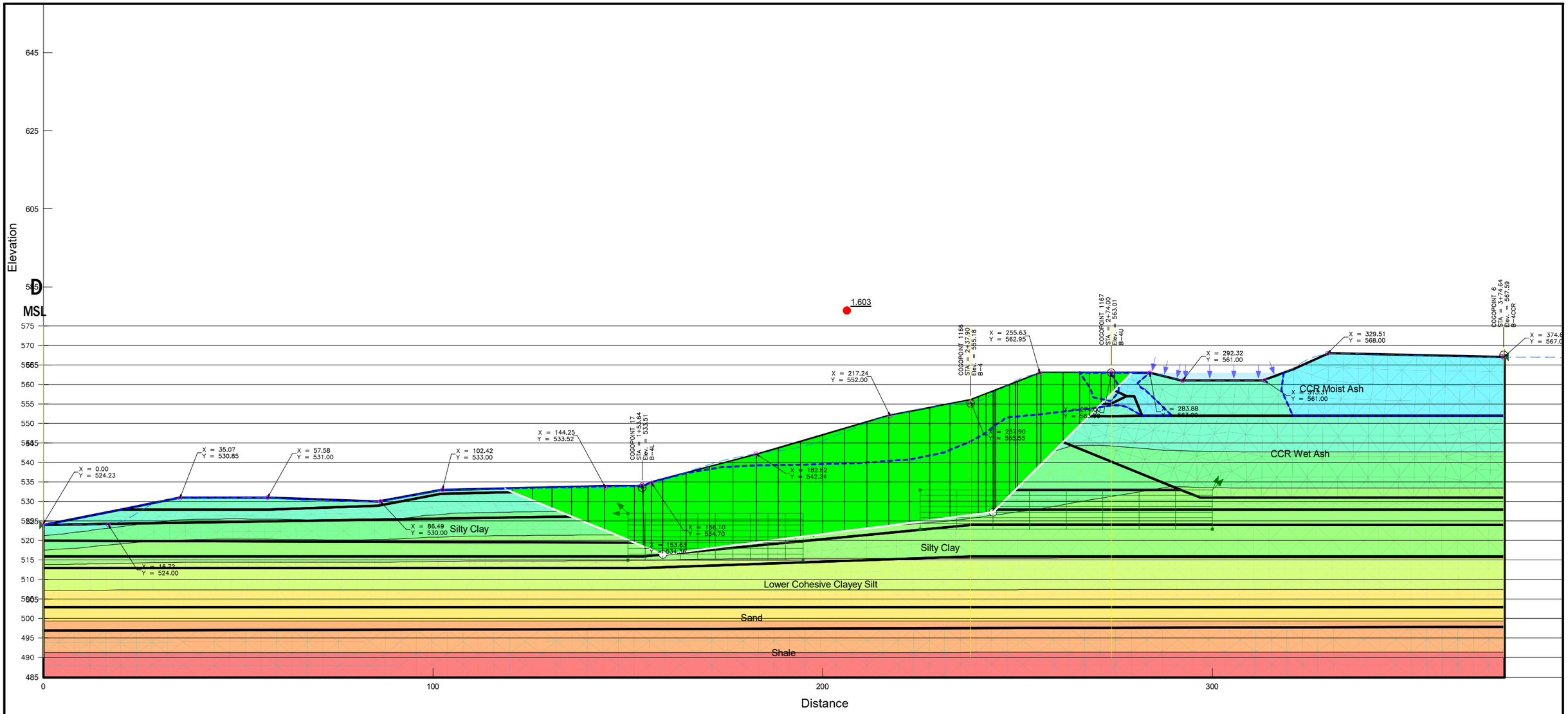
Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	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



Block Slope Stability	
CWLP Long Term D-D' Full Pool.gsz	
07/09/2025	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: 498
Date: 07/09/2025
Time: 07:58:59 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:59:20 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 49632 of 64152 converged

Current Slip Surface

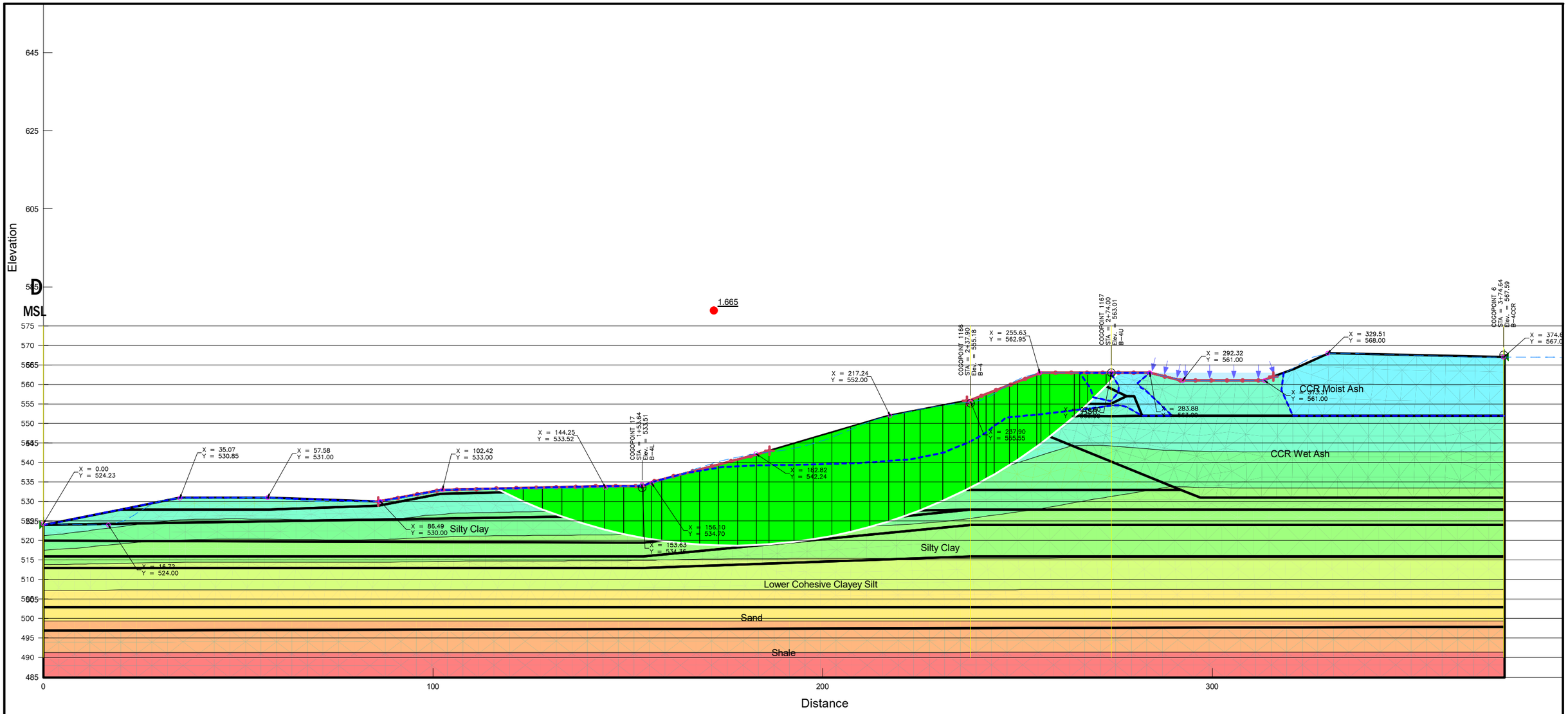
Slip Surface: 8,728
Factor of Safety: 1.603
Volume: 3,113.4032 ft³
Weight: 380,629.46 lbf
Resisting Moment: 6,422,077.2 lbf·ft
Activating Moment: 4,006,596.9 lbf·ft
Resisting Force: 101,788.11 lbf
Activating Force: 63,499.871 lbf
Slip Rank: 1 of 64,152 slip surfaces
Exit: (279.46429, 563) ft
Entry: (118.23242, 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	-6.2972084 psf	153.89445 psf	88.851003 psf	0 psf	3.6342012 psf	CCR Moist Ash
Column 2	274.48810 ft	558.02381 ft	58.38252 psf	260.07283 psf	102.76635 psf	270 psf	0 psf	Clay Fill
Column 3	272.73214 ft	556.26786 ft	8.617358 psf	432.06319 psf	215.75643 psf	270 psf	0 psf	Clay Fill
Column 4	269.94907 ft	553.48479 ft	31.21268 psf	770.80814 psf	517.87032 psf	0 psf	0 psf	Bottom Ash
Column 5	267.21693 ft	550.75265 ft	160.98759 psf	1,122.325 psf	448.27899 psf	0 psf	0 psf	CCR Wet Ash
Column 6	263.86017 ft	547.39588 ft	332.87497 psf	1,409.7982 psf	502.17754 psf	0 psf	0 psf	CCR Wet Ash
Column 7	258.86017 ft	542.39588 ft	514.83161 psf	1,733.1541 psf	620.7663 psf	270 psf	0 psf	Clay Fill
Column 8	255.50000 ft	539.03571 ft	607.31497 psf	2,050.4624 psf	735.32035 psf	270 psf	0 psf	Clay Fill
Column 9	252.50000 ft	536.03571 ft	690.86546 psf	2,244.8747 psf	791.80725 psf	270 psf	0 psf	Clay Fill
Column 10	249.73214 ft	533.26786 ft	772.58018 psf	2,423.4087 psf	841.13915 psf	270 psf	0 psf	Clay Fill
Column 11	248.73214 ft	532.26786 ft	799.81677 psf	2,516.1595 psf	874.5203 psf	180 psf	0 psf	Silty Clay
Column 12	246.23214 ft	529.76786 ft	871.64038 psf	2,652.2744 psf	907.27837 psf	180 psf	0 psf	Silty Clay
Column 13	244.23214 ft	527.76786 ft	937.22913 psf	2,945.5048 psf	730.95255 psf	0 psf	0 psf	Soft Clayey Silt
Column 14	243.87500 ft	527.41071 ft	953.12407 psf	2,964.627 psf	732.12719 psf	0 psf	0 psf	Soft Clayey Silt
Column 15	242.87500 ft	527.17436 ft	957.93933 psf	3,651.1568 psf	980.25101 psf	0 psf	0 psf	Soft Clayey Silt

Column 16	241.00000 ft	526.93574 ft	956.54744 psf	3,574.7624 psf	952.95232 psf	0 psf	0 psf	Soft Clayey Silt
Column 17	239.00000 ft	526.68121 ft	955.45736 psf	3,533.9417 psf	938.49154 psf	0 psf	0 psf	Soft Clayey Silt
Column 18	235.37500 ft	526.21987 ft	955.71827 psf	3,488.6676 psf	921.91818 psf	0 psf	0 psf	Soft Clayey Silt
Column 19	230.12500 ft	525.55173 ft	957.99592 psf	3,458.7434 psf	910.19763 psf	0 psf	0 psf	Soft Clayey Silt
Column 20	224.87500 ft	524.88359 ft	971.9033 psf	3,428.7486 psf	894.21855 psf	0 psf	0 psf	Soft Clayey Silt
Column 21	219.62500 ft	524.21544 ft	992.36492 psf	3,398.5256 psf	875.77088 psf	0 psf	0 psf	Soft Clayey Silt
Column 22	214.16667 ft	523.52079 ft	1,019.5916 psf	3,330.3943 psf	841.06341 psf	0 psf	0 psf	Soft Clayey Silt
Column 23	208.50000 ft	522.79962 ft	1,054.3804 psf	3,224.1498 psf	789.73148 psf	0 psf	0 psf	Soft Clayey Silt
Column 24	202.83333 ft	522.07845 ft	1,092.7235 psf	3,117.3546 psf	736.90544 psf	0 psf	0 psf	Soft Clayey Silt
Column 25	197.16667 ft	521.35728 ft	1,132.7775 psf	3,010.1192 psf	683.2965 psf	0 psf	0 psf	Soft Clayey Silt
Column 26	191.50000 ft	520.63611 ft	1,173.8635 psf	2,902.563 psf	629.19514 psf	0 psf	0 psf	Soft Clayey Silt
Column 27	185.83333 ft	519.91495 ft	1,215.0206 psf	2,794.8192 psf	574.99969 psf	0 psf	0 psf	Soft Clayey Silt
Column 28	180.00000 ft	519.17257 ft	1,256.0652 psf	2,696.7755 psf	524.37569 psf	0 psf	0 psf	Soft Clayey Silt
Column 29	174.00000 ft	518.40898 ft	1,296.4905 psf	2,608.4895 psf	477.52856 psf	0 psf	0 psf	Soft Clayey Silt
Column 30	168.00000 ft	517.64539 ft	1,335.2702 psf	2,520.2409 psf	431.29406 psf	0 psf	0 psf	Soft Clayey Silt
Column 31	162.00000 ft	516.88180 ft	1,373.3468 psf	2,432.0532 psf	385.33759 psf	0 psf	0 psf	Soft Clayey Silt
Column 32	157.50000 ft	517.12132 ft	1,349.0191 psf	2,600.3885 psf	455.46122 psf	0 psf	0 psf	Soft Clayey Silt
Column 33	155.00000 ft	518.15685 ft	1,272.3939 psf	2,309.0113 psf	377.29787 psf	0 psf	0 psf	Soft Clayey Silt

Column 34	152.86982 ft	519.03920 ft	1,206.8004 psf	2,101.6407 psf	325.69525 psf	0 psf	0 psf	Soft Clayey Silt
Column 35	147.86982 ft	521.11027 ft	1,037.4806 psf	1,910.7266 psf	444.94105 psf	180 psf	0 psf	Silty Clay
Column 36	141.89495 ft	523.58515 ft	830.19024 psf	1,522.1235 psf	352.5576 psf	180 psf	0 psf	Silty Clay
Column 37	137.68484 ft	525.32903 ft	685.0105 psf	1,245.3627 psf	285.51369 psf	180 psf	0 psf	Silty Clay
Column 38	133.06905 ft	527.24095 ft	524.29999 psf	949.91977 psf	216.86411 psf	180 psf	0 psf	Silty Clay
Column 39	128.04759 ft	529.32091 ft	347.15404 psf	638.39303 psf	148.39368 psf	180 psf	0 psf	Silty Clay
Column 40	123.02613 ft	531.40086 ft	168.08028 psf	337.46601 psf	86.306337 psf	180 psf	0 psf	Silty Clay
Column 41	119.37391 ft	532.91366 ft	38.983786 psf	148.98885 psf	56.05038 psf	270 psf	0 psf	Clay Fill



Circular Slope Stability	
CWLP Long Term D-D' Full Pool.gsz	
07/09/2025	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: 07/09/2025
Time: 07:58:59 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:59:10 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt
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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8846 of 9261 converged

Current Slip Surface

Slip Surface: 2,865
Factor of Safety: 1.665
Volume: 2,808.0497 ft³
Weight: 344,227.09 lbf
Resisting Moment: 15,304,571 lbf·ft
Activating Moment: 9,190,909.4 lbf·ft
Resisting Force: 105,402.28 lbf
Activating Force: 63,312.657 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

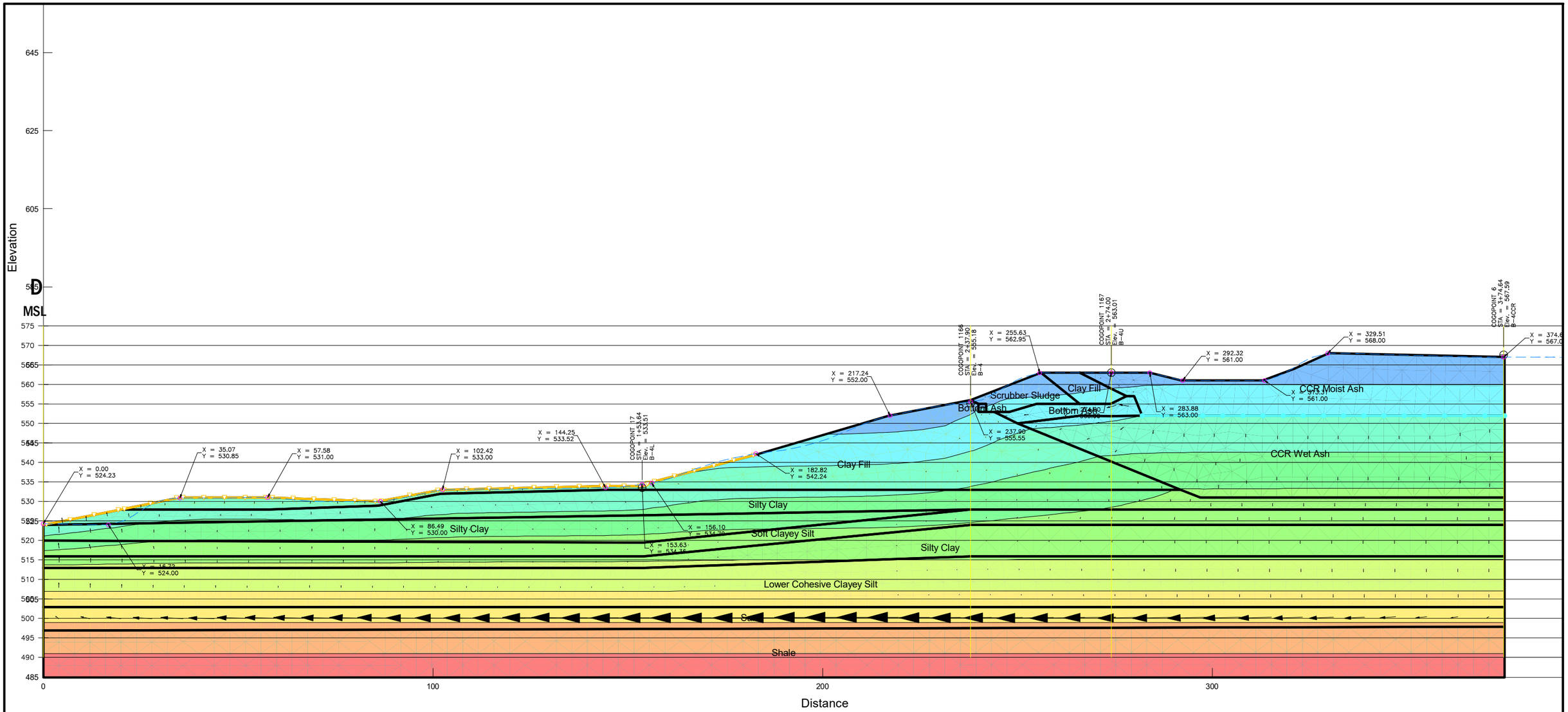
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.94076 ft	561.97090 ft	2.0857308 psf	71.195954 psf	39.900806 psf	0 psf	0 psf	CCR Moist Ash
Column 2	273.37626 ft	560.28277 ft	75.881608 psf	207.58447 psf	76.038685 psf	0 psf	0 psf	CCR Moist Ash
Column 3	270.42190 ft	557.31187 ft	24.530901 psf	373.90483 psf	178.01491 psf	270 psf	0 psf	Clay Fill
Column 4	267.04565 ft	554.03378 ft	-20.166462 psf	776.97656 psf	544.04484 psf	0 psf	0 psf	Bottom Ash
Column 5	265.30380 ft	552.44675 ft	62.162317 psf	940.00597 psf	614.67274 psf	0 psf	0 psf	Bottom Ash
Column 6	261.46425 ft	549.22898 ft	219.06011 psf	1,319.7172 psf	513.24485 psf	0 psf	0 psf	CCR Wet Ash
Column 7	257.16045 ft	545.75193 ft	367.53989 psf	1,552.5884 psf	603.81237 psf	270 psf	0 psf	Clay Fill
Column 8	255.50000 ft	544.50481 ft	392.11648 psf	1,684.0709 psf	658.28364 psf	270 psf	0 psf	Clay Fill
Column 9	252.50000 ft	542.40653 ft	433.01268 psf	1,831.8523 psf	712.74439 psf	270 psf	0 psf	Clay Fill
Column 10	249.00000 ft	540.02891 ft	482.86207 psf	1,996.0949 psf	771.03063 psf	270 psf	0 psf	Clay Fill
Column 11	246.00000 ft	538.16389 ft	524.72328 psf	2,104.5351 psf	804.95431 psf	270 psf	0 psf	Clay Fill
Column 12	243.00000 ft	536.37144 ft	550.92385 psf	2,199.1076 psf	839.79154 psf	270 psf	0 psf	Clay Fill
Column 13	241.00000 ft	535.24655 ft	571.37884 psf	2,234.1792 psf	847.23912 psf	270 psf	0 psf	Clay Fill
Column 14	239.00000 ft	534.16649 ft	594.52434 psf	2,299.0874 psf	868.51827 psf	270 psf	0 psf	Clay Fill
Column 15	237.37680 ft	533.31875 ft	615.64897 psf	2,349.0187 psf	883.19598 psf	270 psf	0 psf	Clay Fill
Column 16	233.81778 ft	531.60687 ft	660.2609 psf	2,502.0351 psf	938.43082 psf	180 psf	0 psf	Silty Clay
Column 17	227.94612 ft	528.99089 ft	751.89874 psf	2,711.1028 psf	998.2643 psf	180 psf	0 psf	Silty Clay
Column 18	222.99865 ft	527.02324 ft	836.00613 psf	2,869.526 psf	1,036.1301 psf	180 psf	0 psf	Silty Clay
Column 19	218.99350 ft	525.61199 ft	906.33721 psf	3,026.0258 psf	771.50356 psf	0 psf	0 psf	Soft Clayey Silt

Column 20	214.56638 ft	524.22537 ft	977.28463 psf	3,092.3383 psf	769.81659 psf	0 psf	0 psf	Soft Clayey Silt
Column 21	209.69914 ft	522.88453 ft	1,051.1628 psf	3,121.2314 psf	753.44337 psf	0 psf	0 psf	Soft Clayey Silt
Column 22	204.83191 ft	521.73986 ft	1,115.5596 psf	3,129.3861 psf	732.97293 psf	0 psf	0 psf	Soft Clayey Silt
Column 23	199.96467 ft	520.78621 ft	1,170.1267 psf	3,115.8297 psf	708.17799 psf	0 psf	0 psf	Soft Clayey Silt
Column 24	195.09743 ft	520.01941 ft	1,214.7066 psf	3,079.3673 psf	678.68098 psf	0 psf	0 psf	Soft Clayey Silt
Column 25	189.46012 ft	519.37715 ft	1,251.1738 psf	3,004.7213 psf	638.23908 psf	0 psf	0 psf	Soft Clayey Silt
Column 26	184.62822 ft	518.97675 ft	1,273.0527 psf	2,918.4743 psf	598.88449 psf	0 psf	0 psf	Soft Clayey Silt
Column 27	180.57483 ft	518.81372 ft	1,279.3182 psf	2,831.7876 psf	565.05268 psf	0 psf	0 psf	Soft Clayey Silt
Column 28	175.72448 ft	518.76679 ft	1,276.5171 psf	2,713.0584 psf	522.85829 psf	0 psf	0 psf	Soft Clayey Silt
Column 29	170.87413 ft	518.89706 ft	1,259.6651 psf	2,565.4913 psf	475.28188 psf	0 psf	0 psf	Soft Clayey Silt
Column 30	166.02378 ft	519.20507 ft	1,228.5574 psf	2,388.0705 psf	422.02824 psf	0 psf	0 psf	Soft Clayey Silt
Column 31	161.17343 ft	519.69204 ft	1,182.7154 psf	2,180.0839 psf	363.01247 psf	0 psf	0 psf	Soft Clayey Silt
Column 32	157.37413 ft	520.18424 ft	1,136.6433 psf	2,053.9661 psf	467.39931 psf	180 psf	0 psf	Silty Clay
Column 33	155.00000 ft	520.55481 ft	1,098.5469 psf	1,894.2756 psf	405.44402 psf	180 psf	0 psf	Silty Clay
Column 34	151.50000 ft	521.20785 ft	1,037.5631 psf	1,747.98 psf	361.97546 psf	180 psf	0 psf	Silty Clay
Column 35	146.50000 ft	522.28095 ft	940.50618 psf	1,616.2083 psf	344.28742 psf	180 psf	0 psf	Silty Clay
Column 36	141.26990 ft	523.62705 ft	826.20647 psf	1,433.5901 psf	309.47743 psf	180 psf	0 psf	Silty Clay
Column 37	135.80971 ft	525.27331 ft	687.52921 psf	1,197.5778 psf	259.88272 psf	180 psf	0 psf	Silty Clay
Column 38	130.60107 ft	527.08106 ft	534.17063 psf	938.86555 psf	206.20236 psf	180 psf	0 psf	Silty Clay
Column 39	125.64398 ft	529.03733 ft	366.71431 psf	662.29343 psf	150.60509 psf	180 psf	0 psf	Silty Clay
Column 40	120.68689 ft	531.22942 ft	178.06057 psf	358.30143 psf	91.837306 psf	180 psf	0 psf	Silty Clay

Column 41	117.25726 ft	532.86327 ft	39.127349 psf	165.14306 psf	64.208212 psf	270 psf	0 psf	Clay Fill

APPENDIX G-3:
Seepage Analysis Current Conditions



Steady-State Seepage	
CWLP Long Term D-D' Current Conditions.gsz	
07/09/2025	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: 501
Date: 07/09/2025
Time: 08:02:02 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 08:02:22 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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 4
Rotation: 0 °

Shale

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 2
Rotation: 0 °

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Soft Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 8.76e-09 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Lower Cohesive Clayey Silt

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
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 (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: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2990469e-08)
Data Point: (0.3864664, 2.2980478e-08)
Data Point: (0.71512174, 2.2962797e-08)
Data Point: (1.3232692, 2.2929405e-08)
Data Point: (2.4485922, 2.286599e-08)
Data Point: (4.5309023, 2.274406e-08)
Data Point: (8.384032, 2.2509288e-08)
Data Point: (15.513906, 2.2063258e-08)
Data Point: (28.707105, 2.1224272e-08)
Data Point: (53.119948, 1.970336e-08)
Data Point: (98.293744, 1.7098838e-08)
Data Point: (181.88384, 1.3057285e-08)
Data Point: (336.55989, 7.8920198e-09)
Data Point: (622.77416, 3.2195574e-09)
Data Point: (1,152.3883, 7.7716449e-10)
Data Point: (2,132.3921, 1.190773e-10)
Data Point: (3,945.8021, 1.4896782e-11)
Data Point: (7,301.3562, 1.8586082e-12)
Data Point: (13,510.511, 2.3472209e-13)
Data Point: (25,000, 1.5413775e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash (Silty Clay)
Saturated Kx: 2.3e-08 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)

Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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 °	

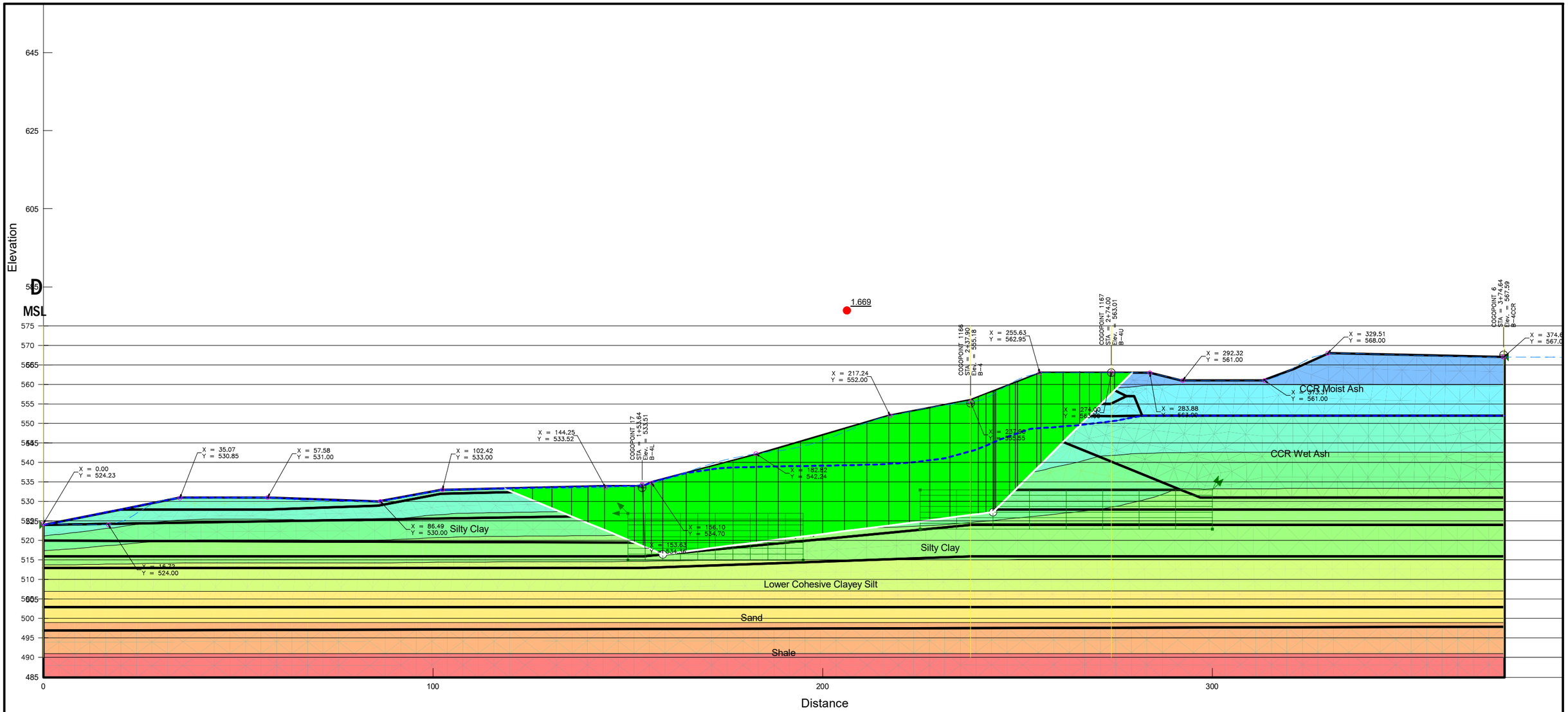
Regions

	Material	Points	Area
Region 1	Shale	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX G-4:
Long-Term Static Current Conditions



Block Slope Stability	
CWLP Long Term D-D' Current Conditions.gsz	
07/09/2025	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: 501
Date: 07/09/2025
Time: 08:02:02 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 08:02:32 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 49624 of 64152 converged

Current Slip Surface

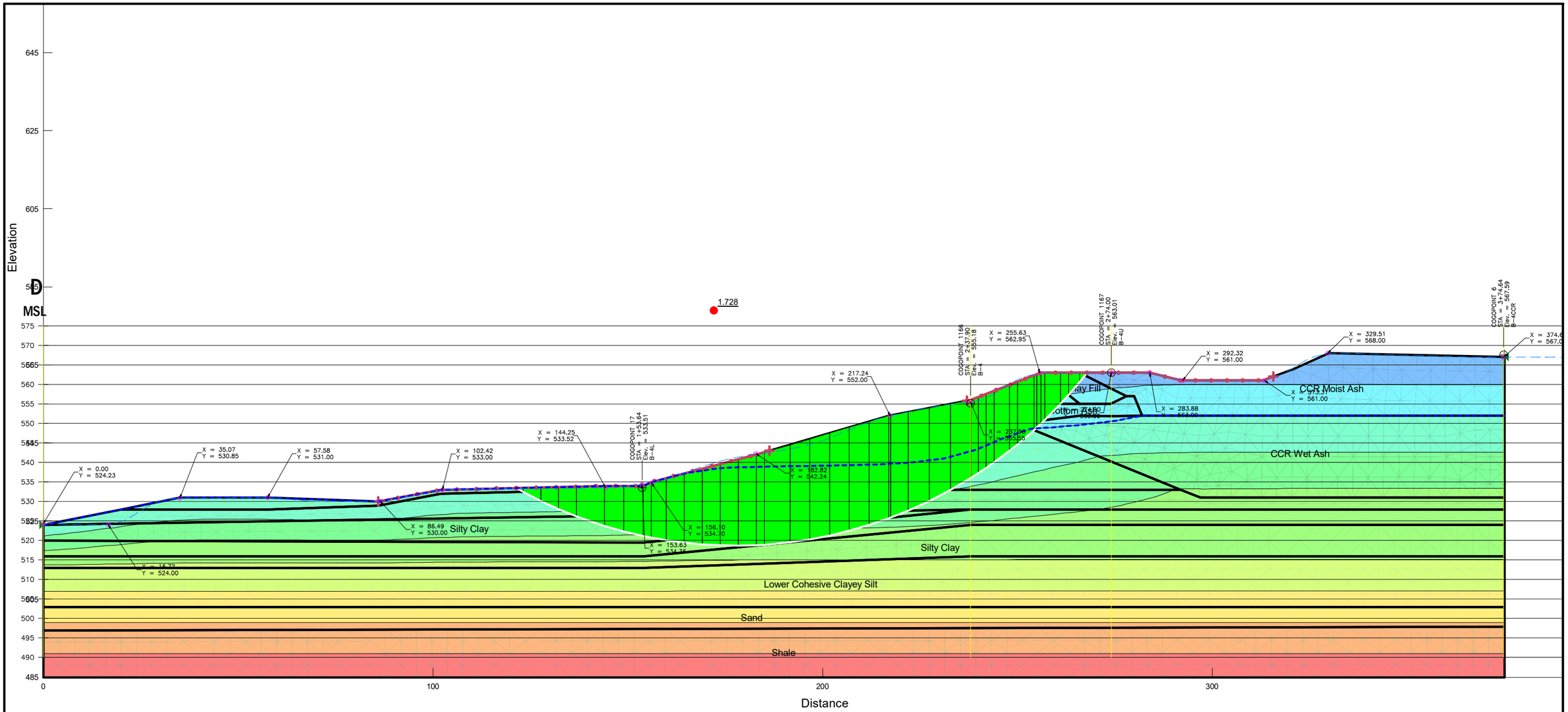
Slip Surface: 8,728
Factor of Safety: 1.669
Volume: 3,113.4032 ft³
Weight: 380,629.46 lbf
Resisting Moment: 6,711,038.4 lbf·ft
Activating Moment: 4,021,415.4 lbf·ft
Resisting Force: 105,374.49 lbf
Activating Force: 63,151.623 lbf
Slip Rank: 1 of 64,152 slip surfaces
Exit: (279.46429, 563) ft
Entry: (118.23242, 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	-595.69707 psf	61.475345 psf	35.492807 psf	0 psf	220.21939 psf	CCR Moist Ash
Column 2	274.48810 ft	558.02381 ft	-439.18913 psf	255.99034 psf	130.43359 psf	270 psf	0 psf	Clay Fill
Column 3	272.73214 ft	556.26786 ft	-350.8486 psf	441.38582 psf	224.89731 psf	270 psf	0 psf	Clay Fill
Column 4	269.94907 ft	553.48479 ft	-206.30433 psf	773.29658 psf	541.4681 psf	0 psf	0 psf	Bottom Ash
Column 5	267.21693 ft	550.75265 ft	-60.710784 psf	1,101.7693 psf	513.76345 psf	0 psf	0 psf	CCR Wet Ash
Column 6	263.86017 ft	547.39588 ft	121.63207 psf	1,382.4393 psf	587.92408 psf	0 psf	0 psf	CCR Wet Ash
Column 7	258.86017 ft	542.39588 ft	333.88221 psf	1,718.4405 psf	705.46767 psf	270 psf	0 psf	Clay Fill
Column 8	255.50000 ft	539.03571 ft	447.42349 psf	2,044.3157 psf	813.65722 psf	270 psf	0 psf	Clay Fill
Column 9	252.50000 ft	536.03571 ft	551.55674 psf	2,245.6052 psf	863.16082 psf	270 psf	0 psf	Clay Fill
Column 10	249.73214 ft	533.26786 ft	652.90338 psf	2,430.4583 psf	905.70948 psf	270 psf	0 psf	Clay Fill
Column 11	248.73214 ft	532.26786 ft	688.06279 psf	2,524.7267 psf	935.827 psf	180 psf	0 psf	Silty Clay
Column 12	246.23214 ft	529.76786 ft	779.48879 psf	2,666.5134 psf	961.48706 psf	180 psf	0 psf	Silty Clay
Column 13	244.23214 ft	527.76786 ft	860.15351 psf	2,965.3629 psf	766.23355 psf	0 psf	0 psf	Soft Clayey Silt
Column 14	243.87500 ft	527.41071 ft	877.57396 psf	2,984.9484 psf	767.02157 psf	0 psf	0 psf	Soft Clayey Silt
Column 15	242.87500 ft	527.17436 ft	884.47207 psf	3,659.6173 psf	1,010.0703 psf	0 psf	0 psf	Soft Clayey Silt

Column 16	241.00000 ft	526.93574 ft	886.35886 psf	3,582.8244 psf	981.43321 psf	0 psf	0 psf	Soft Clayey Silt
Column 17	239.00000 ft	526.68121 ft	888.69045 psf	3,541.5494 psf	965.56168 psf	0 psf	0 psf	Soft Clayey Silt
Column 18	235.37500 ft	526.21987 ft	895.71163 psf	3,495.4081 psf	946.21215 psf	0 psf	0 psf	Soft Clayey Silt
Column 19	230.12500 ft	525.55173 ft	907.94243 psf	3,464.1488 psf	930.38304 psf	0 psf	0 psf	Soft Clayey Silt
Column 20	224.87500 ft	524.88359 ft	929.83035 psf	3,432.8164 psf	911.01242 psf	0 psf	0 psf	Soft Clayey Silt
Column 21	219.62500 ft	524.21544 ft	956.64332 psf	3,401.2929 psf	889.77969 psf	0 psf	0 psf	Soft Clayey Silt
Column 22	214.16667 ft	523.52079 ft	988.93126 psf	3,331.9375 psf	852.78453 psf	0 psf	0 psf	Soft Clayey Silt
Column 23	208.50000 ft	522.79962 ft	1,027.0482 psf	3,224.5994 psf	799.84322 psf	0 psf	0 psf	Soft Clayey Silt
Column 24	202.83333 ft	522.07845 ft	1,067.5359 psf	3,116.8426 psf	745.88663 psf	0 psf	0 psf	Soft Clayey Silt
Column 25	197.16667 ft	521.35728 ft	1,109.1053 psf	3,008.7622 psf	691.4186 psf	0 psf	0 psf	Soft Clayey Silt
Column 26	191.50000 ft	520.63611 ft	1,151.2664 psf	2,900.4615 psf	636.65496 psf	0 psf	0 psf	Soft Clayey Silt
Column 27	185.83333 ft	519.91495 ft	1,193.2543 psf	2,792.0524 psf	581.91493 psf	0 psf	0 psf	Soft Clayey Silt
Column 28	180.00000 ft	519.17257 ft	1,235.1671 psf	2,693.3654 psf	530.74077 psf	0 psf	0 psf	Soft Clayey Silt
Column 29	174.00000 ft	518.40898 ft	1,276.4621 psf	2,604.4496 psf	483.34793 psf	0 psf	0 psf	Soft Clayey Silt
Column 30	168.00000 ft	517.64539 ft	1,315.9947 psf	2,515.6084 psf	436.62367 psf	0 psf	0 psf	Soft Clayey Silt
Column 31	162.00000 ft	516.88180 ft	1,354.5185 psf	2,426.8523 psf	390.29761 psf	0 psf	0 psf	Soft Clayey Silt
Column 32	157.50000 ft	517.12132 ft	1,330.5996 psf	2,577.5216 psf	453.84248 psf	0 psf	0 psf	Soft Clayey Silt
Column 33	155.00000 ft	518.15685 ft	1,254.6796 psf	2,289.7065 psf	376.71899 psf	0 psf	0 psf	Soft Clayey Silt

Column 34	152.86982 ft	519.03920 ft	1,189.6779 psf	2,084.7816 psf	325.7911 psf	0 psf	0 psf	Soft Clayey Silt
Column 35	147.86982 ft	521.11027 ft	1,022.6616 psf	1,890.4242 psf	442.14711 psf	180 psf	0 psf	Silty Clay
Column 36	141.89495 ft	523.58515 ft	818.40149 psf	1,507.3236 psf	351.02333 psf	180 psf	0 psf	Silty Clay
Column 37	137.68484 ft	525.32903 ft	675.32463 psf	1,233.9788 psf	284.64853 psf	180 psf	0 psf	Silty Clay
Column 38	133.06905 ft	527.24095 ft	516.93523 psf	941.64673 psf	216.40132 psf	180 psf	0 psf	Silty Clay
Column 39	128.04759 ft	529.32091 ft	342.34765 psf	632.75868 psf	147.97181 psf	180 psf	0 psf	Silty Clay
Column 40	123.02613 ft	531.40086 ft	165.85964 psf	333.7142 psf	85.526168 psf	180 psf	0 psf	Silty Clay
Column 41	119.37391 ft	532.91366 ft	38.524289 psf	145.02209 psf	54.263342 psf	270 psf	0 psf	Clay Fill



Circular Slope Stability	
CWLP Long Term D-D' Current Conditions.gsz	
07/09/2025	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: 501
Date: 07/09/2025
Time: 08:02:02 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 08:02:24 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt
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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8831 of 9261 converged

Current Slip Surface

Slip Surface: 3,265
Factor of Safety: 1.728
Volume: 2,539.222 ft³
Weight: 312,302.45 lbf
Resisting Moment: 12,708,109 lbf·ft
Activating Moment: 7,351,301.7 lbf·ft
Resisting Force: 99,615.223 lbf
Activating Force: 57,639.925 lbf

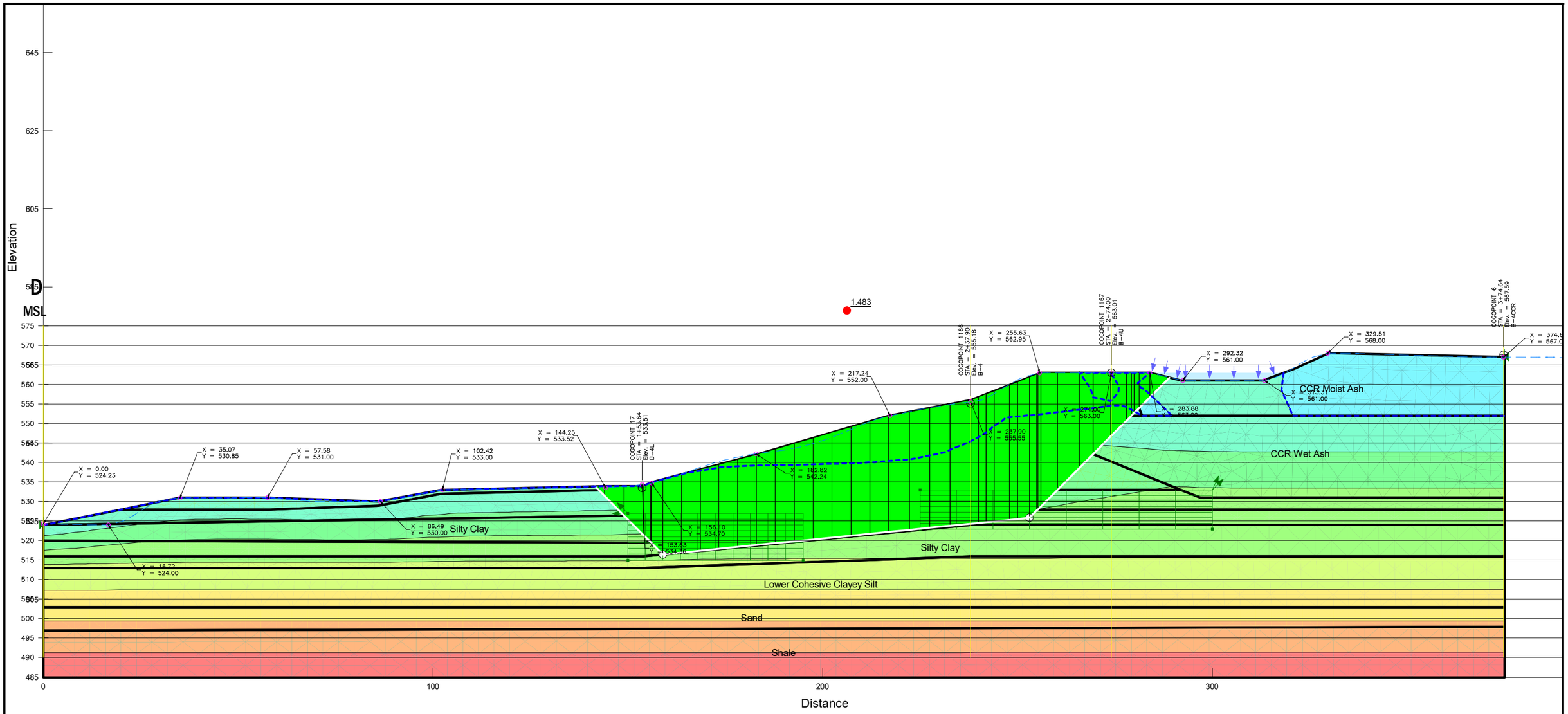
Slip Rank: 1 of 9,261 slip surfaces
Exit: (267.83897, 563) ft
Entry: (121.40289, 533.46197) ft
Radius: 114.19692 ft
Center: (177.54051, 632.90796) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	267.58097 ft	562.66926 ft	-766.16877 psf	-100.99434 psf	-58.30911 psf	0 psf	237.53472 psf	CCR Moist Ash
Column 2	266.66148 ft	561.51280 ft	-704.44937 psf	-12.660738 psf	-6.4509684 psf	270 psf	0 psf	Clay Fill
Column 3	264.56193 ft	558.99400 ft	-575.20723 psf	235.56611 psf	120.02693 psf	270 psf	0 psf	Clay Fill
Column 4	262.07930 ft	556.15046 ft	-421.62857 psf	379.60518 psf	0 psf	750 psf	0 psf	Scrubber Sludge
Column 5	259.00912 ft	552.93647 ft	-237.4531 psf	861.42672 psf	603.17748 psf	0 psf	0 psf	Bottom Ash
Column 6	256.49176 ft	550.40237 ft	-93.934336 psf	1,176.4535 psf	548.58926 psf	0 psf	0 psf	CCR Wet Ash
Column 7	255.50000 ft	549.46465 ft	-41.430701 psf	1,234.1049 psf	575.47257 psf	0 psf	0 psf	CCR Wet Ash
Column 8	254.61296 ft	548.64351 ft	4.477316 psf	1,269.5715 psf	589.9231 psf	0 psf	0 psf	CCR Wet Ash
Column 9	252.11296 ft	546.46666 ft	72.73499 psf	1,307.5247 psf	629.15676 psf	270 psf	0 psf	Clay Fill
Column 10	249.00000 ft	543.84151 ft	150.73346 psf	1,509.5881 psf	692.371 psf	270 psf	0 psf	Clay Fill
Column 11	246.00000 ft	541.54063 ft	220.48206 psf	1,666.1234 psf	736.59108 psf	270 psf	0 psf	Clay Fill
Column 12	243.00000 ft	539.34247 ft	276.40605 psf	1,805.645 psf	779.18615 psf	270 psf	0 psf	Clay Fill
Column 13	241.00000 ft	537.97439 ft	315.86526 psf	1,868.4568 psf	791.08488 psf	270 psf	0 psf	Clay Fill
Column 14	239.00000 ft	536.66733 ft	357.29418 psf	1,958.4461 psf	815.82765 psf	270 psf	0 psf	Clay Fill
Column 15	235.42588 ft	534.51436 ft	437.27324 psf	2,126.5653 psf	860.73729 psf	270 psf	0 psf	Clay Fill
Column 16	230.13466 ft	531.58955 ft	557.16535 psf	2,397.4613 psf	937.67763 psf	180 psf	0 psf	Silty Clay
Column 17	224.70044 ft	528.94655 ft	686.22861 psf	2,620.9486 psf	985.78907 psf	180 psf	0 psf	Silty Clay
Column 18	219.73264 ft	526.81888 ft	798.51486 psf	2,801.5469 psf	1,020.5958 psf	180 psf	0 psf	Silty Clay
Column 19	217.24098 ft	525.83442 ft	852.66049 psf	2,939.1635 psf	759.42501 psf	0 psf	0 psf	Soft Clayey Silt
Column 20	214.46390 ft	524.87826 ft	905.78182 psf	2,979.6126 psf	754.81269 psf	0 psf	0 psf	Soft Clayey Silt

Column 21	209.39170 ft	523.27465 ft	998.69363 psf	3,035.428 psf	741.31068 psf	0 psf	0 psf	Soft Clayey Silt
Column 22	204.31950 ft	521.92591 ft	1,077.9797 psf	3,065.5192 psf	723.40523 psf	0 psf	0 psf	Soft Clayey Silt
Column 23	199.24730 ft	520.82282 ft	1,143.3831 psf	3,068.8527 psf	700.81365 psf	0 psf	0 psf	Soft Clayey Silt
Column 24	194.17510 ft	519.95817 ft	1,194.9282 psf	3,043.9337 psf	672.98296 psf	0 psf	0 psf	Soft Clayey Silt
Column 25	188.36292 ft	519.27266 ft	1,234.8708 psf	2,975.9326 psf	633.69466 psf	0 psf	0 psf	Soft Clayey Silt
Column 26	184.04342 ft	518.90113 ft	1,255.7273 psf	2,904.9725 psf	600.27614 psf	0 psf	0 psf	Soft Clayey Silt
Column 27	180.68408 ft	518.77783 ft	1,260.6525 psf	2,836.6003 psf	573.59807 psf	0 psf	0 psf	Soft Clayey Silt
Column 28	176.05225 ft	518.74423 ft	1,258.1831 psf	2,726.6856 psf	534.4912 psf	0 psf	0 psf	Soft Clayey Silt
Column 29	171.42042 ft	518.89874 ft	1,241.1121 psf	2,586.2165 psf	489.57797 psf	0 psf	0 psf	Soft Clayey Silt
Column 30	166.78859 ft	519.24213 ft	1,209.5477 psf	2,413.9016 psf	438.34896 psf	0 psf	0 psf	Soft Clayey Silt
Column 31	162.15675 ft	519.77612 ft	1,162.2352 psf	2,208.8218 psf	380.92635 psf	0 psf	0 psf	Soft Clayey Silt
Column 32	157.92042 ft	520.42601 ft	1,103.9582 psf	2,051.2579 psf	482.67329 psf	180 psf	0 psf	Silty Clay
Column 33	155.00000 ft	520.96234 ft	1,051.5051 psf	1,851.6147 psf	407.67619 psf	180 psf	0 psf	Silty Clay
Column 34	151.50000 ft	521.74936 ft	980.55771 psf	1,686.7861 psf	359.84135 psf	180 psf	0 psf	Silty Clay
Column 35	146.50000 ft	523.04134 ft	866.91302 psf	1,524.797 psf	335.20863 psf	180 psf	0 psf	Silty Clay
Column 36	140.40593 ft	524.98432 ft	705.59898 psf	1,258.2858 psf	281.608 psf	180 psf	0 psf	Silty Clay
Column 37	134.53258 ft	527.14785 ft	526.26046 psf	949.67832 psf	215.74217 psf	180 psf	0 psf	Silty Clay
Column 38	129.97403 ft	529.11933 ft	361.54481 psf	671.80721 psf	158.08659 psf	180 psf	0 psf	Silty Clay
Column 39	125.41547 ft	531.33358 ft	175.46134 psf	365.29556 psf	96.725365 psf	180 psf	0 psf	Silty Clay
Column 40	122.26954 ft	532.98261 ft	38.41228 psf	172.63723 psf	68.391026 psf	270 psf	0 psf	Clay Fill

APPENDIX G-5:
Short-Term Maximum Surcharge



Block Slope Stability	
CWLP Short Term Alignment 4 rev2 Full Pool.gsz	
07/09/2025	1:300

Block Slope Stability

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Revision Number: 491
Date: 07/09/2025
Time: 07:48:17 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Alignment 4 rev2 Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:48:38 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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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: (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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.40000002
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 46059 of 64152 converged

Current Slip Surface

Slip Surface: 8,488
Factor of Safety: 1.483
Volume: 3,405.8616 ft³
Weight: 412,532.37 lbf
Resisting Moment: 5,817,504 lbf·ft
Activating Moment: 3,921,538 lbf·ft
Resisting Force: 81,383.094 lbf
Activating Force: 54,864.751 lbf
Slip Rank: 1 of 64,152 slip surfaces

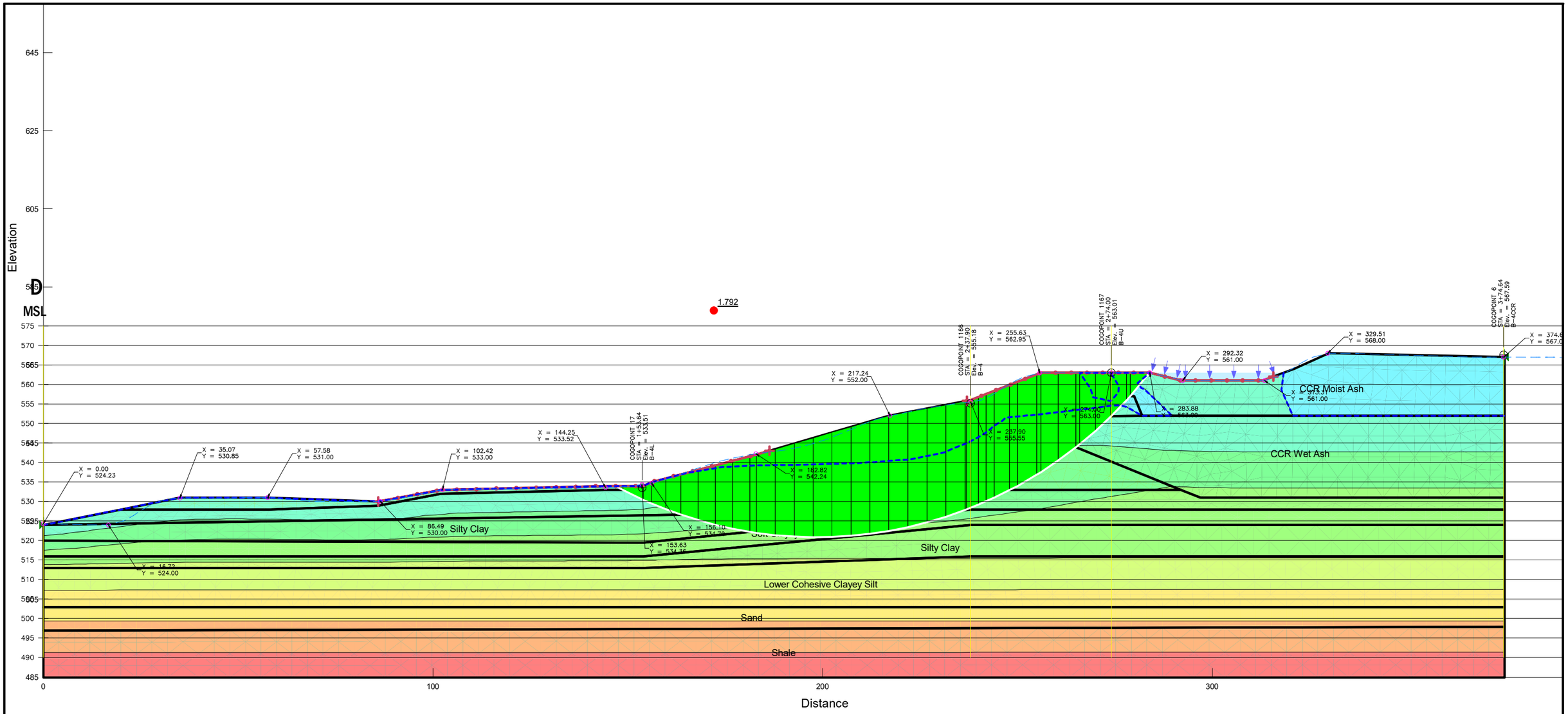
Exit: (289.01429, 561.74643) ft
Entry: (141.55814, 533.94186) ft
Radius: 67.569681 ft
Center: (211.35406, 568.69757) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	286.50714 ft	559.23929 ft	27.199115 psf	248.34604 psf	127.67924 psf	0 psf	0 psf	CCR Moist Ash
Column 2	282.60969 ft	555.34184 ft	-30.273207 psf	508.73964 psf	293.72097 psf	0 psf	17.394822 psf	CCR Moist Ash
Column 3	280.60969 ft	553.34184 ft	-9.569887 psf	643.17151 psf	450.35354 psf	0 psf	0 psf	Bottom Ash
Column 4	279.61664 ft	552.34878 ft	32.617872 psf	749.28399 psf	501.81502 psf	0 psf	0 psf	Bottom Ash
Column 5	278.61664 ft	551.34878 ft	92.696067 psf	1,011.3426 psf	246.15061 psf	0 psf	0 psf	CCR Wet Ash
Column 6	276.00000 ft	548.73214 ft	260.28121 psf	1,273.6733 psf	271.5376 psf	0 psf	0 psf	CCR Wet Ash
Column 7	271.70551 ft	544.43765 ft	500.10977 psf	1,697.6599 psf	320.8826 psf	0 psf	0 psf	CCR Wet Ash
Column 8	267.70551 ft	540.43765 ft	667.07139 psf	1,399.4303 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	263.13393 ft	535.86607 ft	796.34264 psf	1,995.9087 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	258.13393 ft	530.86607 ft	926.95129 psf	2,883.148 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 11	255.63393 ft	528.36607 ft	991.22562 psf	3,152.2497 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 12	255.13393 ft	527.86607 ft	1,007.0239 psf	3,580.056 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 13	254.06250 ft	526.79464 ft	1,053.2935 psf	3,651.6309 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 14	251.56250 ft	525.70181 ft	1,091.199 psf	4,235.0266 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 15	249.00000 ft	525.44707 ft	1,088.4203 psf	4,175.7621 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 16	246.00000 ft	525.14883 ft	1,085.6959 psf	4,088.6837 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 17	243.00000 ft	524.85060 ft	1,081.1962 psf	3,994.3705 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 18	241.00000 ft	524.65177 ft	1,078.5942 psf	3,905.4801 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 19	239.00000 ft	524.45295 ft	1,076.3104 psf	3,856.3802 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	235.37500 ft	524.09258 ft	1,074.0362 psf	3,796.7353 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 21	230.12500 ft	523.57067 ft	1,072.0702 psf	3,746.9364 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	224.87500 ft	523.04876 ft	1,080.2512 psf	3,698.1645 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	219.62500 ft	522.52685 ft	1,093.9672 psf	3,650.2274 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 24	214.57143 ft	522.02446 ft	1,111.4924 psf	3,573.634 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	209.71429 ft	521.54160 ft	1,133.6885 psf	3,468.1195 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	204.85714 ft	521.05874 ft	1,157.675 psf	3,362.7162 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	200.00000 ft	520.57589 ft	1,183.2164 psf	3,257.1909 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	195.14286 ft	520.09303 ft	1,210.1498 psf	3,151.3118 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	190.28571 ft	519.61017 ft	1,237.144 psf	3,044.8517 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	185.42857 ft	519.12731 ft	1,264.1456 psf	2,937.5917 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 31	180.60000 ft	518.64730 ft	1,289.8465 psf	2,840.3248 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 32	175.80000 ft	518.17012 ft	1,314.6044 psf	2,752.921 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 33	171.00000 ft	517.69294 ft	1,337.559 psf	2,664.2499 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 34	166.20000 ft	517.21577 ft	1,359.805 psf	2,574.1721 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 35	161.40000 ft	516.73859 ft	1,381.8132 psf	2,482.5687 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 36	157.50000 ft	518.00000 ft	1,288.9151 psf	2,623.3084 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 37	155.90811 ft	519.59189 ft	1,175.6829 psf	2,342.6274 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 38	154.90811 ft	520.59189 ft	1,095.2657 psf	2,644.4873 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 39	151.53994 ft	523.96006 ft	820.40886 psf	2,105.6707 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 40	146.53994 ft	528.96006 ft	403.99447 psf	1,415.1965 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 41	143.26744 ft	532.23256 ft	133.93406 psf	975.21703 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 42	142.04651 ft	533.45349 ft	37.060846 psf	1,146.6488 psf	0 psf	1,600 psf	0 psf	Clay Fill



Circular Slope Stability	
CWLP Short Term Alignment 4 rev2 Full Pool.gsz	
07/09/2025	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: 491
Date: 07/09/2025
Time: 07:48:17 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Alignment 4 rev2 Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:48:28 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 ft³
  - 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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash
Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)

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Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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
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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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8494 of 9261 converged

Current Slip Surface

Slip Surface: 5,554
Factor of Safety: 1.792
Volume: 2,739.6674 ft³
Weight: 333,869.67 lbf
Resisting Moment: 12,684,925 lbf·ft
Activating Moment: 7,080,231.2 lbf·ft
Resisting Force: 106,220.43 lbf
Activating Force: 59,291.906 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

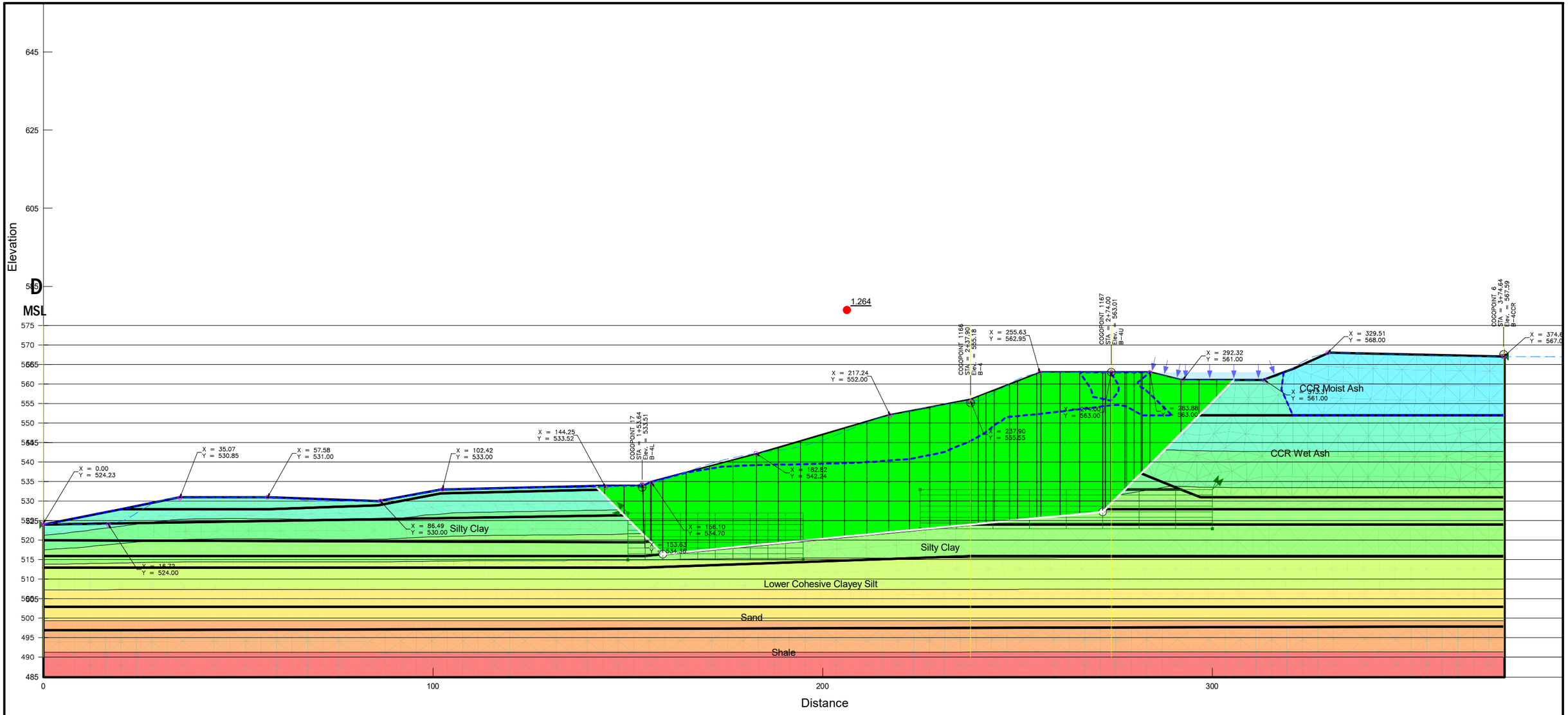
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material

Column 1	281.43924 ft	560.00000 ft	-0.55980902 psf	202.83377 psf	117.10613 psf	0 psf	0.32320245 psf	CCR Moist Ash
Column 2	278.47721 ft	556.47152 ft	-85.854144 psf	433.76133 psf	303.72295 psf	0 psf	0 psf	Bottom Ash
Column 3	276.00000 ft	553.87124 ft	36.946323 psf	686.47592 psf	454.80552 psf	0 psf	0 psf	Bottom Ash
Column 4	272.00000 ft	549.93263 ft	224.64546 psf	1,260.6189 psf	277.58824 psf	0 psf	0 psf	CCR Wet Ash
Column 5	268.00000 ft	546.37671 ft	394.27426 psf	1,628.4044 psf	330.68417 psf	0 psf	0 psf	CCR Wet Ash
Column 6	265.51475 ft	544.30211 ft	502.7782 psf	1,840.9295 psf	358.55657 psf	0 psf	0 psf	CCR Wet Ash
Column 7	262.77213 ft	542.23773 ft	564.19041 psf	1,662.3236 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 8	258.25738 ft	539.05313 ft	636.42144 psf	2,158.5504 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	255.50000 ft	537.23562 ft	677.48533 psf	2,420.4846 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	252.50000 ft	535.47453 ft	713.57086 psf	2,572.1484 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 11	249.00000 ft	533.49434 ft	755.28333 psf	2,735.4177 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 12	246.00000 ft	531.98019 ft	783.39485 psf	2,929.9032 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 13	243.00000 ft	530.54308 ft	808.19441 psf	2,995.0175 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 14	241.00000 ft	529.65955 ft	826.26677 psf	3,005.7144 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 15	239.00000 ft	528.82385 ft	845.80832 psf	3,049.724 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 16	237.43557 ft	528.19882 ft	862.58805 psf	3,079.8386 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 17	236.70219 ft	527.91571 ft	871.31153 psf	3,104.0563 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 18	234.09160 ft	526.99573 ft	903.40002 psf	3,259.5364 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 19	229.20828 ft	525.41251 ft	961.69676 psf	3,366.7291 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	224.32497 ft	524.08093 ft	1,016.7637 psf	3,451.387 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 21	219.44166 ft	522.99145 ft	1,065.5129 psf	3,512.9542 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	214.57143 ft	522.13832 ft	1,104.55 psf	3,519.5196 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	209.71429 ft	521.51470 ft	1,135.341 psf	3,469.0305 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 24	204.85714 ft	521.11375 ft	1,154.276 psf	3,390.3796 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	200.00000 ft	520.93296 ft	1,161.0492 psf	3,281.6416 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	195.14286 ft	520.97123 ft	1,155.4463 psf	3,140.9481 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	190.28571 ft	521.22879 ft	1,135.9691 psf	2,966.6252 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	185.42857 ft	521.70724 ft	1,102.2898 psf	2,757.3273 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	182.14783 ft	522.13201 ft	1,071.9134 psf	2,602.7161 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	179.08276 ft	522.66539 ft	1,033.9096 psf	2,557.1164 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 31	174.65698 ft	523.56862 ft	966.28794 psf	2,317.9495 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 32	170.23120 ft	524.66778 ft	879.60054 psf	2,047.9647 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 33	165.80542 ft	525.96917 ft	764.31124 psf	1,748.0669 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 34	161.69439 ft	527.35876 ft	634.86493 psf	1,444.7355 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 35	157.89813 ft	528.81580 ft	485.61029 psf	1,143.1099 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 36	155.00000 ft	530.02514 ft	350.99091 psf	871.61434 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 37	151.38515 ft	531.73245 ft	189.64122 psf	605.47151 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 38	147.82883 ft	533.50000 ft	39.731943 psf	544.36734 psf	0 psf	1,600 psf	0 psf	Clay Fill

APPENDIX G-6:
Seismic Full Pool



Block Slope Stability	
CWLP Seismic D-D' Full Pool.gsz	
07/09/2025	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: 496
Date: 07/09/2025
Time: 07:50:45 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:51:02 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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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: (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

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 46173 of 64152 converged

Current Slip Surface

Slip Surface: 8,521
Factor of Safety: 1.264
Volume: 4,024.0976 ft³
Weight: 479,225.73 lbf

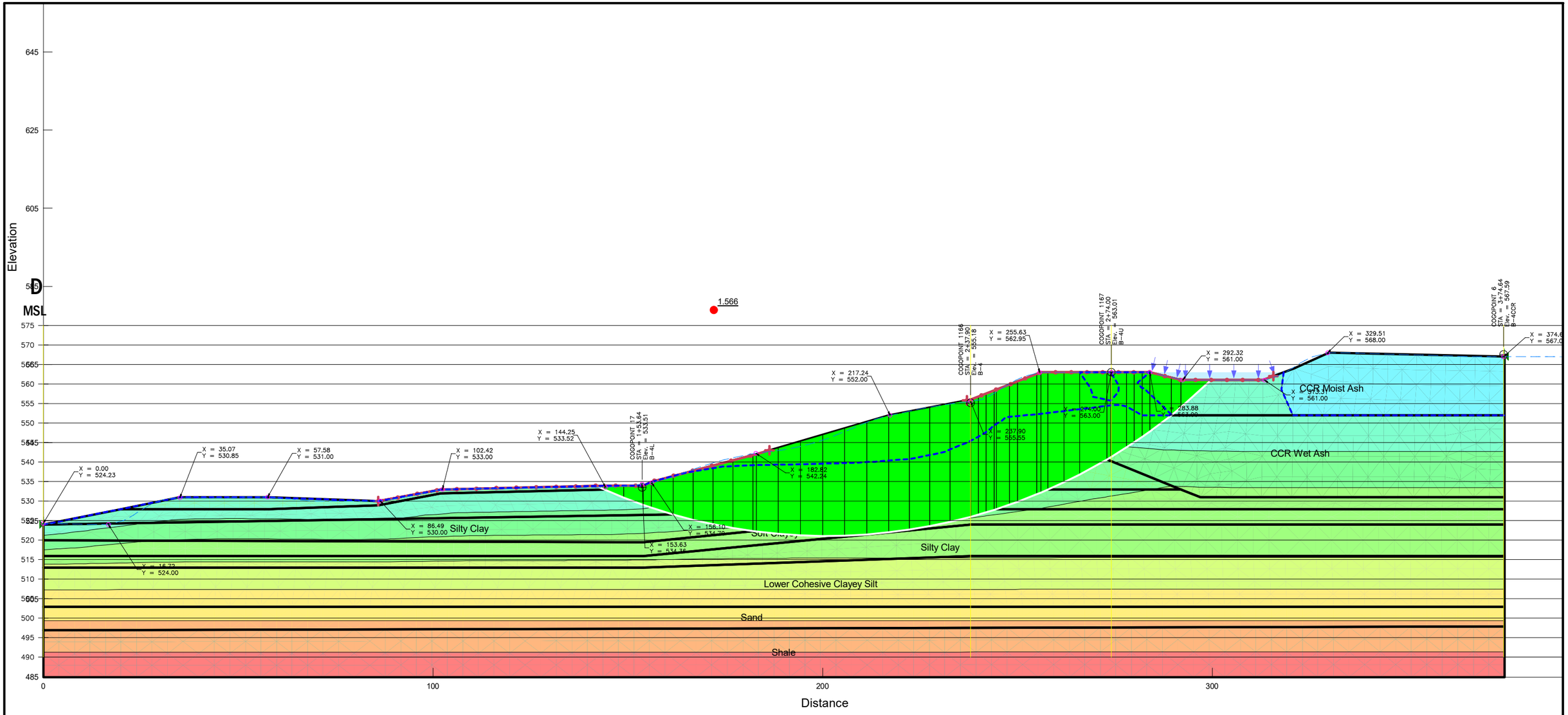
Resisting Moment: 5,687,443 lbf·ft
Activating Moment: 4,498,962.6 lbf·ft
Resisting Force: 80,770.512 lbf
Activating Force: 63,894.253 lbf
Slip Rank: 1 of 64,152 slip surfaces
Exit: (305.58929, 561) ft
Entry: (141.55814, 533.94186) ft
Radius: 72.159941 ft
Center: (220.22613, 567.76453) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	303.33929 ft	558.75000 ft	93.645282 psf	259.91095 psf	95.993531 psf	0 psf	0 psf	CCR Moist Ash
Column 2	298.83929 ft	554.25000 ft	31.215094 psf	527.43171 psf	286.49079 psf	0 psf	0 psf	CCR Moist Ash
Column 3	294.29464 ft	549.70536 ft	127.36686 psf	983.98122 psf	229.52913 psf	0 psf	0 psf	CCR Wet Ash
Column 4	288.00000 ft	543.41071 ft	485.91265 psf	1,535.6534 psf	281.27719 psf	0 psf	0 psf	CCR Wet Ash
Column 5	283.00000 ft	538.41071 ft	778.75014 psf	1,968.3354 psf	318.74842 psf	0 psf	0 psf	CCR Wet Ash
Column 6	281.87076 ft	537.28148 ft	844.68361 psf	2,063.3551 psf	326.54205 psf	0 psf	0 psf	CCR Wet Ash
Column 7	280.87076 ft	536.28148 ft	877.08736 psf	1,362.3376 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 8	279.00000 ft	534.41071 ft	931.20748 psf	1,634.1613 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	277.79464 ft	533.20536 ft	966.47452 psf	1,785.448 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	275.79464 ft	531.20536 ft	1,009.4457 psf	2,382.4428 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 11	273.29464 ft	528.70536 ft	1,063.7073 psf	2,704.0022 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 12	272.23214 ft	527.64286 ft	1,094.5312 psf	3,286.3126 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 13	268.93750 ft	527.00502 ft	1,111.6316 psf	4,021.8345 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 14	263.50000 ft	526.48545 ft	1,114.2096 psf	4,187.4548 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 15	258.50000 ft	526.00767 ft	1,113.3592 psf	4,306.2748 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 16	255.50000 ft	525.72101 ft	1,112.5044 psf	4,354.1577 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 17	252.50000 ft	525.43435 ft	1,110.0629 psf	4,290.3654 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 18	249.00000 ft	525.09991 ft	1,105.9132 psf	4,211.4116 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 19	246.00000 ft	524.81324 ft	1,102.9574 psf	4,124.2372 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	243.00000 ft	524.52658 ft	1,098.2514 psf	4,029.9293 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 21	241.00000 ft	524.33547 ft	1,095.4964 psf	3,941.2938 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	239.00000 ft	524.14436 ft	1,093.0472 psf	3,892.1027 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	235.37500 ft	523.79798 ft	1,090.422 psf	3,832.0565 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 24	230.12500 ft	523.29631 ft	1,087.8683 psf	3,781.4025 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	224.87500 ft	522.79465 ft	1,095.2562 psf	3,731.824 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	219.62500 ft	522.29299 ft	1,108.038 psf	3,683.1214 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	214.16667 ft	521.77142 ft	1,126.3248 psf	3,597.2476 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	208.50000 ft	521.22995 ft	1,150.9923 psf	3,473.9148 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	202.83333 ft	520.68847 ft	1,178.7848 psf	3,350.571 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	197.16667 ft	520.14700 ft	1,208.0621 psf	3,226.8209 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 31	191.50000 ft	519.60552 ft	1,238.224 psf	3,102.2768 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 32	185.83333 ft	519.06405 ft	1,268.3868 psf	2,976.5652 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 33	180.00000 ft	518.50664 ft	1,298.1255 psf	2,858.4516 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 34	174.00000 ft	517.93332 ft	1,326.9086 psf	2,747.5518 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 35	168.00000 ft	517.35999 ft	1,353.8777 psf	2,634.4111 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 36	162.00000 ft	516.78666 ft	1,379.7243 psf	2,518.7597 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 37	157.50000 ft	518.00000 ft	1,288.9151 psf	2,716.3071 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 38	155.90811 ft	519.59189 ft	1,175.6829 psf	2,430.3632 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 39	154.90811 ft	520.59189 ft	1,095.2657 psf	2,822.3932 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 40	151.53994 ft	523.96006 ft	820.40886 psf	2,268.8298 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 41	146.53994 ft	528.96006 ft	403.99447 psf	1,559.8496 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 42	143.26744 ft	532.23256 ft	133.93406 psf	1,109.5221 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 43	142.04651 ft	533.45349 ft	37.060846 psf	1,336.087 psf	0 psf	1,600 psf	0 psf	Clay Fill



Circular Slope Stability	
CWLP Seismic D-D' Full Pool.gsz	
07/09/2025	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: 496
Date: 07/09/2025
Time: 07:50:45 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Full Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:50:52 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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8486 of 9261 converged

Current Slip Surface

Slip Surface: 5,195
Factor of Safety: 1.566
Volume: 3,242.2765 ft³
Weight: 388,603.9 lbf
Resisting Moment: 17,743,107 lbf·ft
Activating Moment: 11,328,467 lbf·ft
Resisting Force: 116,431.35 lbf
Activating Force: 74,340.505 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (299.76292, 561) ft

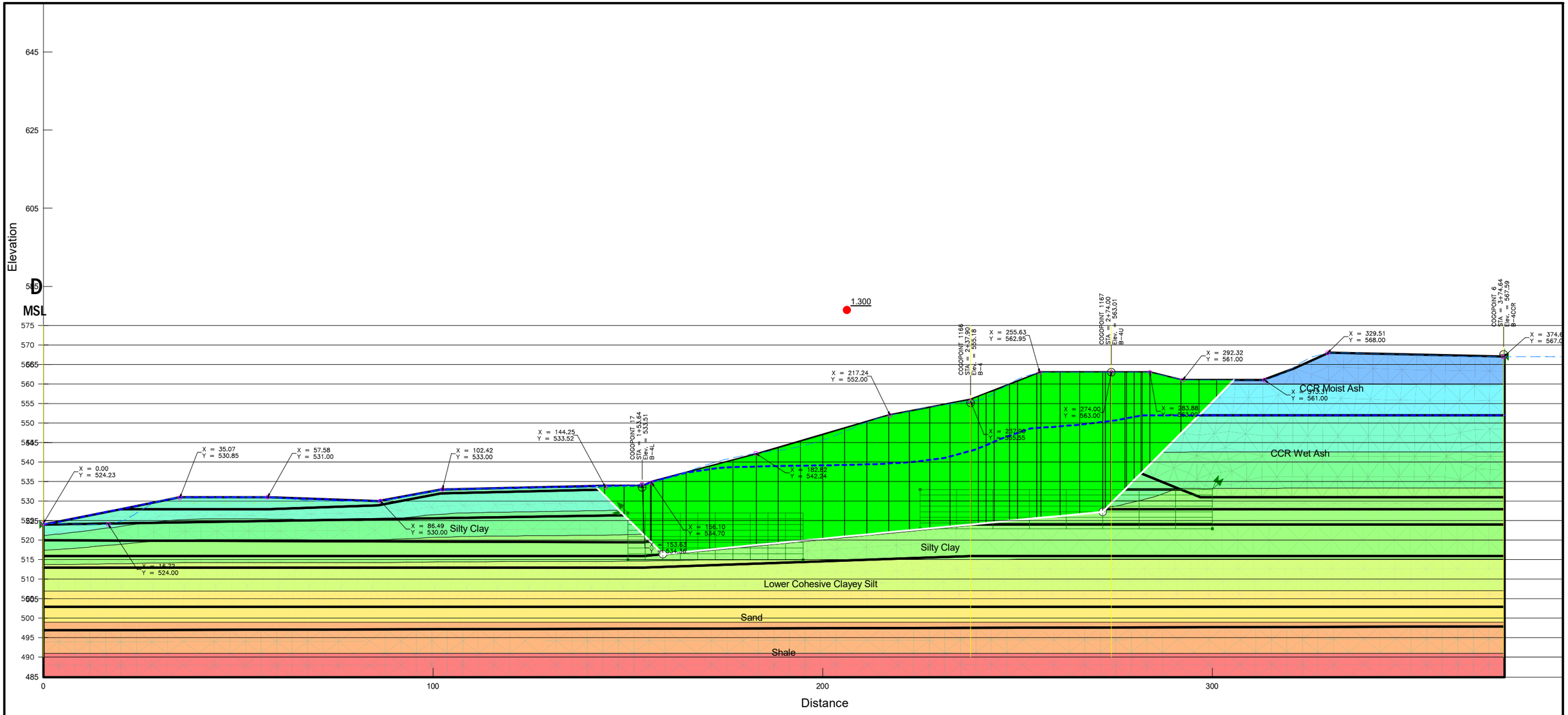
Entry: (141.7898, 533.94738) ft
Radius: 142.50608 ft
Center: (200.8861, 663.6224) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	295.88146 ft	557.52470 ft	76.646292 psf	356.88873 psf	161.79805 psf	0 psf	0 psf	CCR Moist Ash
Column 2	290.73871 ft	553.02470 ft	14.216103 psf	677.0052 psf	382.66146 psf	0 psf	0 psf	CCR Moist Ash
Column 3	286.73871 ft	549.93188 ft	120.40032 psf	1,064.8139 psf	253.05487 psf	0 psf	0 psf	CCR Wet Ash
Column 4	283.00000 ft	547.15870 ft	292.15986 psf	1,337.9544 psf	280.21981 psf	0 psf	0 psf	CCR Wet Ash
Column 5	281.00000 ft	545.77383 ft	383.69629 psf	1,507.9662 psf	301.2472 psf	0 psf	0 psf	CCR Wet Ash
Column 6	279.00000 ft	544.43862 ft	468.88478 psf	1,673.2038 psf	322.6963 psf	0 psf	0 psf	CCR Wet Ash
Column 7	276.00000 ft	542.54248 ft	583.54361 psf	1,880.3908 psf	347.48916 psf	0 psf	0 psf	CCR Wet Ash
Column 8	273.49038 ft	541.00001 ft	674.56921 psf	2,062.5839 psf	371.91742 psf	0 psf	0 psf	CCR Wet Ash
Column 9	269.49038 ft	538.78020 ft	738.5029 psf	2,071.8066 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	263.96444 ft	535.85718 ft	802.18697 psf	2,586.7361 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 11	259.89333 ft	533.92611 ft	841.59993 psf	2,906.6339 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 12	256.92889 ft	532.60267 ft	863.83623 psf	3,220.9435 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 13	255.50000 ft	531.99789 ft	872.11523 psf	3,293.9139 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 14	252.50000 ft	530.81880 ft	887.07991 psf	3,355.1673 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 15	249.00000 ft	529.48848 ft	904.63931 psf	3,418.316 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 16	246.32083 ft	528.56489 ft	919.24638 psf	3,440.2352 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 17	244.32083 ft	527.89733 ft	931.17261 psf	3,527.6887 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 18	243.00000 ft	527.48531 ft	942.51485 psf	3,521.826 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 19	241.00000 ft	526.88260 ft	959.38677 psf	3,489.8894 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	239.00000 ft	526.31167 ft	975.49985 psf	3,493.3522 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 21	235.37500 ft	525.37921 ft	1,002.4751 psf	3,518.0902 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	230.12500 ft	524.17393 ft	1,037.3332 psf	3,576.0399 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	224.87500 ft	523.17517 ft	1,072.7865 psf	3,614.4848 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 24	219.62500 ft	522.37855 ft	1,102.8901 psf	3,632.3166 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	214.16667 ft	521.76503 ft	1,126.7147 psf	3,591.0465 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	208.50000 ft	521.34815 ft	1,143.717 psf	3,486.2611 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	202.83333 ft	521.15780 ft	1,149.7263 psf	3,350.806 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	197.16667 ft	521.19306 ft	1,142.9928 psf	3,182.6651 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	191.50000 ft	521.45411 ft	1,122.7797 psf	2,980.0771 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	185.83333 ft	521.94220 ft	1,087.8767 psf	2,741.6764 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 31	182.58536 ft	522.29692 ft	1,062.0884 psf	2,594.0458 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 32	179.60053 ft	522.73893 ft	1,029.972 psf	2,567.9544 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 33	174.46014 ft	523.61236 ft	962.85555 psf	2,309.6419 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 34	169.31975 ft	524.68139 ft	875.43283 psf	2,019.9306 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 35	164.17937 ft	525.95060 ft	753.6294 psf	1,699.8534 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 36	158.80459 ft	527.50292 ft	595.42595 psf	1,333.7305 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 37	155.00000 ft	528.71008 ft	457.91644 psf	1,030.0169 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 38	151.50000 ft	529.97400 ft	334.45883 psf	812.28262 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 39	146.50000 ft	531.93026 ft	163.93634 psf	574.79056 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 40	142.89490 ft	533.45504 ft	38.212834 psf	528.83243 psf	0 psf	1,600 psf	0 psf	Clay Fill

APPENDIX G-7:
Seismic Current Conditions



Block Slope Stability	
CWLP Seismic D-D' Current Conditions.gsz	
07/09/2025	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: 499
Date: 07/09/2025
Time: 07:52:02 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:52:20 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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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: (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

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
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Data Point: (550.67599, 0.31418324)
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Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 46126 of 64152 converged

Current Slip Surface

Slip Surface: 8,521
Factor of Safety: 1.300
Volume: 4,024.0976 ft³
Weight: 479,225.73 lbf

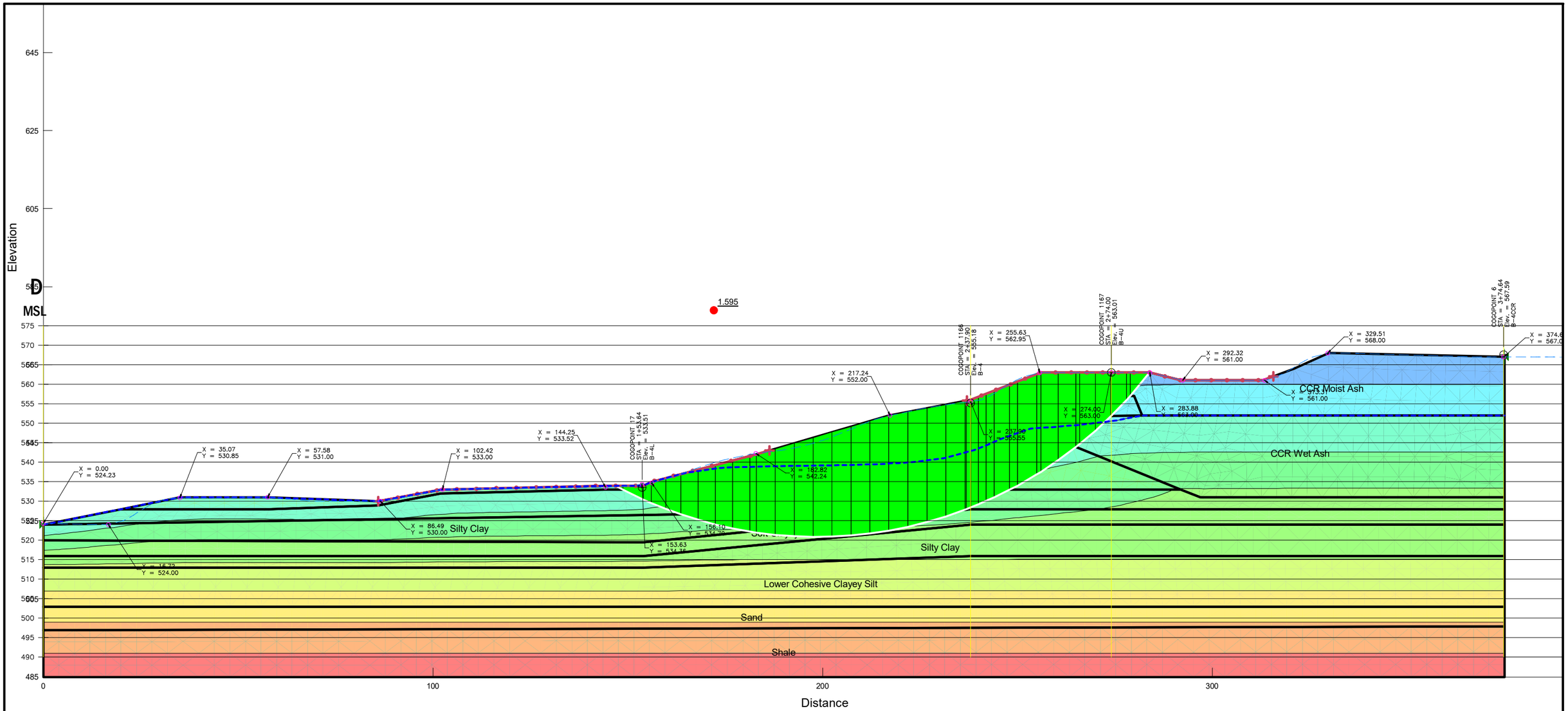
Resisting Moment: 5,738,891.4 lbf·ft
Activating Moment: 4,414,427.7 lbf·ft
Resisting Force: 81,327.909 lbf
Activating Force: 62,597.457 lbf
Slip Rank: 1 of 64,152 slip surfaces
Exit: (305.58929, 561) ft
Entry: (141.55814, 533.94186) ft
Radius: 72.159941 ft
Center: (220.22613, 567.76453) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	303.33929 ft	558.75000 ft	-421.60815 psf	50.678208 psf	29.259077 psf	0 psf	184.6717 psf	CCR Moist Ash
Column 2	298.83929 ft	554.25000 ft	-140.6128 psf	400.64873 psf	231.31465 psf	0 psf	76.986748 psf	CCR Moist Ash
Column 3	294.29464 ft	549.70536 ft	121.9243 psf	893.46237 psf	206.733 psf	0 psf	0 psf	CCR Wet Ash
Column 4	288.00000 ft	543.41071 ft	453.6996 psf	1,498.3144 psf	279.9037 psf	0 psf	0 psf	CCR Wet Ash
Column 5	283.00000 ft	538.41071 ft	717.34298 psf	1,980.8735 psf	338.56197 psf	0 psf	0 psf	CCR Wet Ash
Column 6	281.87076 ft	537.28148 ft	777.15978 psf	2,076.1066 psf	348.05175 psf	0 psf	0 psf	CCR Wet Ash
Column 7	280.87076 ft	536.28148 ft	806.378 psf	1,404.5257 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 8	279.00000 ft	534.41071 ft	855.96055 psf	1,677.2845 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	277.79464 ft	533.20536 ft	888.79151 psf	1,829.1673 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	275.79464 ft	531.20536 ft	931.67943 psf	2,423.2278 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 11	273.29464 ft	528.70536 ft	991.37659 psf	2,747.5754 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 12	272.23214 ft	527.64286 ft	1,024.7429 psf	3,325.5121 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 13	268.93750 ft	527.00502 ft	1,037.7199 psf	4,034.2224 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 14	263.50000 ft	526.48545 ft	1,035.4264 psf	4,199.2092 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 15	258.50000 ft	526.00767 ft	1,034.029 psf	4,317.332 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 16	255.50000 ft	525.72101 ft	1,033.6547 psf	4,364.7303 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 17	252.50000 ft	525.43435 ft	1,033.0138 psf	4,300.2538 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 18	249.00000 ft	525.09991 ft	1,032.2038 psf	4,220.4467 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 19	246.00000 ft	524.81324 ft	1,032.0651 psf	4,132.4578 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	243.00000 ft	524.52658 ft	1,031.86 psf	4,037.2875 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 21	241.00000 ft	524.33547 ft	1,032.0324 psf	3,948.0143 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	239.00000 ft	524.14436 ft	1,032.4521 psf	3,898.2307 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	235.37500 ft	523.79798 ft	1,035.4909 psf	3,837.1232 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 24	230.12500 ft	523.29631 ft	1,041.3621 psf	3,784.9398 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	224.87500 ft	522.79465 ft	1,055.5462 psf	3,733.7878 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	219.62500 ft	522.29299 ft	1,073.8165 psf	3,683.4861 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	214.16667 ft	521.77142 ft	1,096.5434 psf	3,595.8857 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	208.50000 ft	521.22995 ft	1,124.1649 psf	3,470.7278 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	202.83333 ft	520.68847 ft	1,153.8764 psf	3,345.6138 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	197.16667 ft	520.14700 ft	1,184.5248 psf	3,220.1791 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 31	191.50000 ft	519.60552 ft	1,215.6723 psf	3,094.0655 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 32	185.83333 ft	519.06405 ft	1,246.6083 psf	2,966.9272 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 33	180.00000 ft	518.50664 ft	1,277.1627 psf	2,847.5354 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 34	174.00000 ft	517.93332 ft	1,306.7808 psf	2,735.5379 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 35	168.00000 ft	517.35999 ft	1,334.5058 psf	2,621.5254 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 36	162.00000 ft	516.78666 ft	1,360.8531 psf	2,505.2464 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 37	157.50000 ft	518.00000 ft	1,270.9308 psf	2,681.005 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 38	155.90811 ft	519.59189 ft	1,158.6298 psf	2,398.673 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 39	154.90811 ft	520.59189 ft	1,079.4252 psf	2,772.7757 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 40	151.53994 ft	523.96006 ft	808.67367 psf	2,227.564 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 41	146.53994 ft	528.96006 ft	398.3467 psf	1,528.419 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 42	143.26744 ft	532.23256 ft	132.20032 psf	1,083.1253 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 43	142.04651 ft	533.45349 ft	36.626747 psf	1,300.3125 psf	0 psf	1,600 psf	0 psf	Clay Fill



Circular Slope Stability	
CWLP Seismic D-D' Current Conditions.gsz	
07/09/2025	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: 499
Date: 07/09/2025
Time: 07:52:02 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\
Last Solved Date: 07/09/2025
Last Solved Time: 07:52:10 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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill	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	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash	46,47,48,45	4 ft²
Region 7	Sand	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8484 of 9261 converged

Current Slip Surface

Slip Surface: 5,554
Factor of Safety: 1.595
Volume: 2,739.6674 ft³
Weight: 333,869.67 lbf
Resisting Moment: 12,857,664 lbf·ft
Activating Moment: 8,059,452.3 lbf·ft
Resisting Force: 107,297.49 lbf
Activating Force: 67,261.361 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

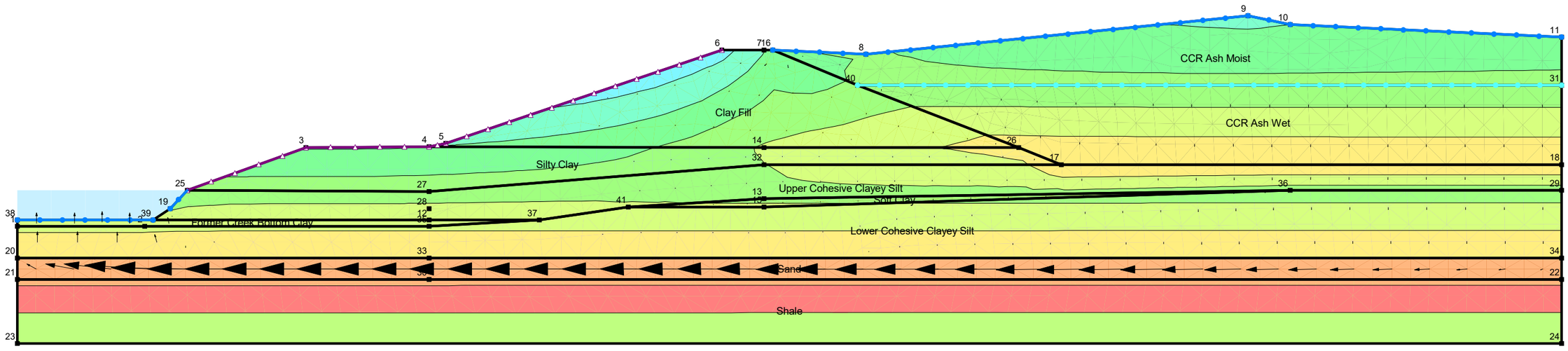
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	281.43924 ft	560.00000 ft	-526.86668 psf	89.07807 psf	51.429247 psf	0 psf	208.64281 psf	CCR Moist Ash
Column 2	278.47721 ft	556.47152 ft	-323.26727 psf	420.40771 psf	294.37265 psf	0 psf	0 psf	Bottom Ash
Column 3	276.00000 ft	553.87124 ft	-181.82627 psf	654.73484 psf	458.45027 psf	0 psf	0 psf	Bottom Ash
Column 4	272.00000 ft	549.93263 ft	20.913175 psf	1,216.6607 psf	320.39958 psf	0 psf	0 psf	CCR Wet Ash
Column 5	268.00000 ft	546.37671 ft	204.36792 psf	1,582.699 psf	369.32271 psf	0 psf	0 psf	CCR Wet Ash
Column 6	265.51475 ft	544.30211 ft	314.39095 psf	1,793.2361 psf	396.25536 psf	0 psf	0 psf	CCR Wet Ash
Column 7	262.77213 ft	542.23773 ft	382.88622 psf	1,584.5775 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 8	258.25738 ft	539.05313 ft	475.73474 psf	2,085.6953 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	255.50000 ft	537.23562 ft	528.47032 psf	2,350.1628 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	252.50000 ft	535.47453 ft	577.47709 psf	2,505.421 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 11	249.00000 ft	533.49434 ft	635.31684 psf	2,672.8664 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 12	246.00000 ft	531.98019 ft	676.96884 psf	2,877.8219 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 13	243.00000 ft	530.54308 ft	717.07912 psf	2,945.0601 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 14	241.00000 ft	529.65955 ft	744.08066 psf	2,957.6925 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 15	239.00000 ft	528.82385 ft	771.5756 psf	3,003.3689 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 16	237.43557 ft	528.19882 ft	794.07896 psf	3,034.9132 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 17	236.70219 ft	527.91571 ft	805.28897 psf	3,059.7101 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 18	234.09160 ft	526.99573 ft	844.01434 psf	3,218.7452 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 19	229.20828 ft	525.41251 ft	913.08007 psf	3,327.6252 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 20	224.32497 ft	524.08093 ft	976.31368 psf	3,415.5346 psf	0 psf	400 psf	0 psf	Soft Clayey Silt

Column 21	219.44166 ft	522.99145 ft	1,030.8999 psf	3,481.8109 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 22	214.57143 ft	522.13832 ft	1,074.3884 psf	3,494.6119 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 23	209.71429 ft	521.51470 ft	1,107.8198 psf	3,451.5433 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 24	204.85714 ft	521.11375 ft	1,128.7104 psf	3,380.8917 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 25	200.00000 ft	520.93296 ft	1,136.9075 psf	3,280.3617 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 26	195.14286 ft	520.97123 ft	1,132.1828 psf	3,147.6951 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 27	190.28571 ft	521.22879 ft	1,113.5281 psf	2,980.8337 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 28	185.42857 ft	521.70724 ft	1,080.6164 psf	2,778.08 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 29	182.14783 ft	522.13201 ft	1,050.8682 psf	2,627.2504 psf	0 psf	400 psf	0 psf	Soft Clayey Silt
Column 30	179.08276 ft	522.66539 ft	1,013.6101 psf	2,604.1865 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 31	174.65698 ft	523.56862 ft	947.56224 psf	2,367.711 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 32	170.23120 ft	524.66778 ft	863.30324 psf	2,098.909 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 33	165.80542 ft	525.96917 ft	750.95354 psf	1,798.8102 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 34	161.69439 ft	527.35876 ft	624.94992 psf	1,494.2639 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 35	157.89813 ft	528.81580 ft	478.39889 psf	1,190.8594 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 36	155.00000 ft	530.02514 ft	346.01287 psf	917.73943 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 37	151.38515 ft	531.73245 ft	187.09658 psf	649.54943 psf	0 psf	1,100 psf	0 psf	Silty Clay
Column 38	147.82883 ft	533.50000 ft	39.261779 psf	604.76379 psf	0 psf	1,600 psf	0 psf	Clay Fill

APPENDIX H:
Dallman Ash Pond Slope Stability

Appendix H-1:
Seepage Analysis Full Pool



Steady-State Seepage	
CWLP Long Term F-F'.gsz	
07/09/2025	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: 401
Date: 07/09/2025
Time: 08:17:01 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:17:08 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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Lean Clay Fill
K-Function: Lean Clay Fill
Ky'/Kx' Ratio: 2
Rotation: 0 °

Shale

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.25
Rotation: 0 °

Lower Cohesive Clayey Silt

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

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

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.38e-08 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Former Creek Bottom Clay

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Clayey Silt
K-Function: Clayey Silt
Ky'/Kx' Ratio: 1.5
Rotation: 0 °

Soft Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.12e-08 ft/sec
Ky'/Kx' Ratio: 1.25
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: 3.13e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.13e-10)
Data Point: (0.20885434, 3.13e-10)

Data Point: (0.38282598, 3.13e-10)
Data Point: (0.70171264, 3.13e-10)
Data Point: (1.2862257, 3.13e-10)
Data Point: (2.357627, 3.13e-10)
Data Point: (4.3214847, 3.13e-10)
Data Point: (7.9211981, 3.13e-10)
Data Point: (14.519403, 3.13e-10)
Data Point: (26.613786, 3.13e-10)
Data Point: (48.782557, 3.13e-10)
Data Point: (89.417486, 3.13e-10)
Data Point: (163.90053, 3.13e-10)
Data Point: (300.42651, 3.1299999e-10)
Data Point: (550.67599, 3.1300001e-10)
Data Point: (1,009.3785, 3.1300046e-10)
Data Point: (1,850.1713, 3.1300224e-10)
Data Point: (3,391.3282, 3.1297978e-10)
Data Point: (6,216.2392, 3.1272982e-10)
Data Point: (11,394.247, 3.1289947e-10)
Data Point: (20,885.434, 3.3121173e-10)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 3.13e-10 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)

Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 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		1.5 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		26.043 ft	3.3 °
Line 35	34	29		16 ft	90 °
Line 36	1	20		7.5 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		4.826 ft	34 °
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		26 ft	0 °
Line 47	13	41		32.062 ft	3.58 °

Line 48	41	37		21.213 ft	8.13 °
Line 49	15	41		32 ft	0 °

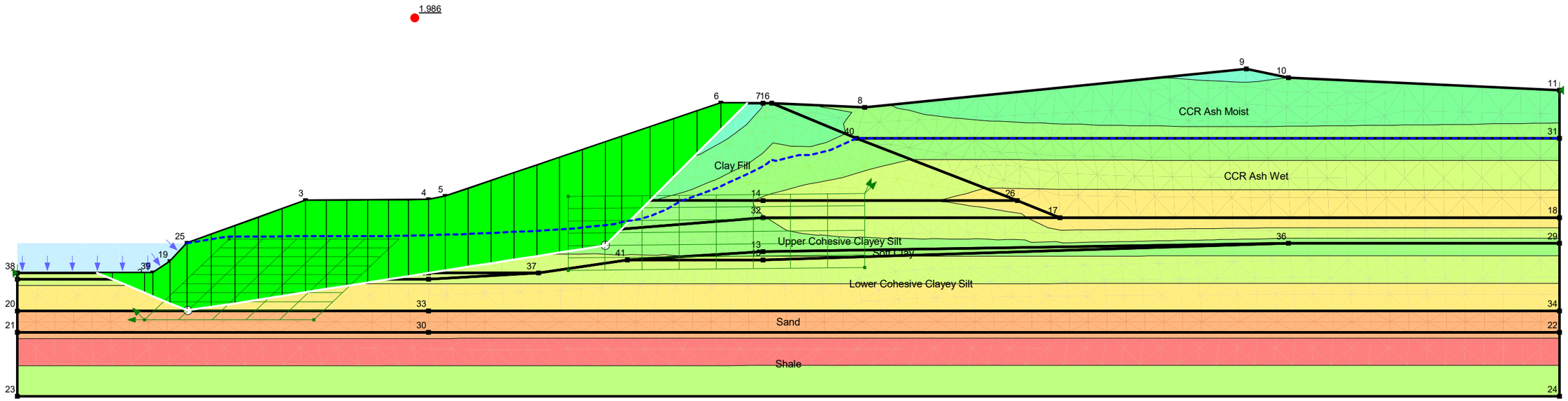
Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Mesh Properties

Global Element Size: 9 ft

Appendix H-2:
Long-Term Static Full Pool



Block Slope Stability	
CWLP Long Term F-F'.gsz	
07/09/2025	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: 405
Date: 07/09/2025
Time: 08:23:25 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:23:34 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist

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

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay

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, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (50, 522) ft
- Lower Left: (30, 503) ft
- Lower Right: (70, 503) ft
- X Increments: 5
- Y Increments: 9
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (130, 532) ft
- Lower Left: (130, 514.6) ft
- Lower Right: (200, 515.3) ft
- X Increments: 8
- Y Increments: 6
- 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 27140 of 34020 converged

Current Slip Surface

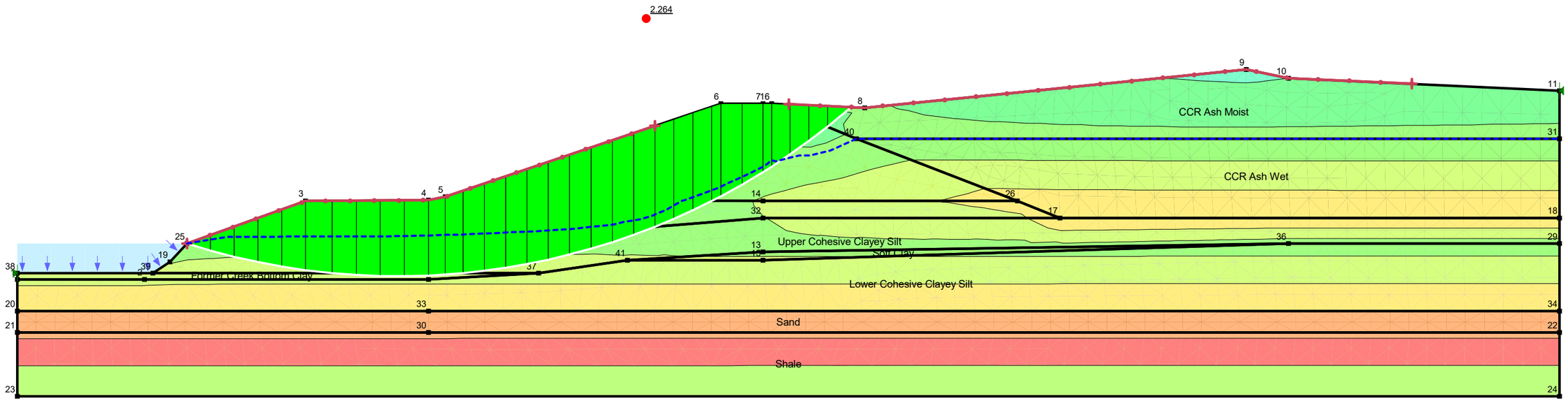
Slip Surface: 4,216
Factor of Safety: 1.986
Volume: 2,496.9699 ft³
Weight: 308,045.51 lbf
Resisting Moment: 7,597,385.3 lbf·ft
Activating Moment: 3,824,755.9 lbf·ft
Resisting Force: 119,824.77 lbf
Activating Force: 60,336.303 lbf
Slip Rank: 1 of 34,020 slip surfaces
Exit: (172.2625, 554) ft
Entry: (18.762546, 514) ft
Radius: 73.726024 ft
Center: (87.694931, 564) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	169.13125 ft	550.86875 ft	-725.81858 psf	115.34101 psf	58.769182 psf	500 psf	0 psf	Clay Fill
Column 2	163.22167 ft	544.95917 ft	-602.33031 psf	600.55633 psf	305.99873 psf	500 psf	0 psf	Clay Fill
Column 3	157.66501 ft	539.40251 ft	-429.95993 psf	940.74256 psf	479.33228 psf	500 psf	0 psf	Clay Fill
Column 4	152.10835 ft	533.84585 ft	-223.54292 psf	1,266.9116 psf	645.5237 psf	500 psf	0 psf	Clay Fill
Column 5	145.96444 ft	527.70194 ft	-37.438107 psf	1,706.054 psf	869.27794 psf	180 psf	0 psf	Silty Clay
Column 6	140.67443 ft	522.41193 ft	124.14418 psf	2,068.2439 psf	948.20078 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 7	136.05357 ft	520.06669 ft	222.10635 psf	2,805.5374 psf	1,260.0235 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 8	130.66071 ft	519.22507 ft	259.39683 psf	2,697.7948 psf	1,189.2861 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 9	125.26786 ft	518.38346 ft	300.54787 psf	2,588.596 psf	1,115.9556 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 10	119.87500 ft	517.54184 ft	341.9207 psf	2,477.973 psf	1,041.8223 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 11	114.48214 ft	516.70022 ft	384.48414 psf	2,365.9976 psf	966.44869 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Column 12	109.08929 ft	515.85861 ft	430.01997 psf	2,252.7684 psf	889.01381 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 13	103.69643 ft	515.01699 ft	477.93597 psf	2,138.4756 psf	809.8993 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	99.00000 ft	514.28406 ft	521.14425 psf	2,072.3637 psf	756.58025 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	94.64206 ft	513.60395 ft	562.87067 psf	2,098.0353 psf	528.59957 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 16	89.92618 ft	512.86798 ft	608.69531 psf	2,186.6458 psf	543.33193 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 17	85.12221 ft	512.11827 ft	655.42965 psf	2,291.7333 psf	870.03809 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 18	80.23015 ft	511.35481 ft	703.03975 psf	2,387.0658 psf	895.41255 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 19	75.33809 ft	510.59134 ft	750.66066 psf	2,481.6785 psf	920.39852 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 20	70.44603 ft	509.82788 ft	798.2869 psf	2,575.5617 psf	944.99377 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 21	65.22222 ft	509.01265 ft	849.10285 psf	2,559.6374 psf	909.50737 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 22	59.66667 ft	508.14564 ft	903.17098 psf	2,434.7189 psf	814.33845 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 23	54.11111 ft	507.27863 ft	957.35058 psf	2,310.5589 psf	719.51364 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 24	48.55556 ft	506.41162 ft	1,011.0429 psf	2,187.4633 psf	625.51384 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 25	42.88889 ft	505.59064 ft	1,062.1974 psf	2,065.7617 psf	533.60461 psf	0 psf	0 psf	Lower Cohesive

								Clayey Silt
Column 26	38.00000 ft	506.03159 ft	1,034.3534 psf	2,003.2752 psf	515.18486 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 27	34.00000 ft	507.68844 ft	927.76414 psf	1,468.7301 psf	287.63669 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 28	31.00000 ft	508.93108 ft	844.48103 psf	1,150.6045 psf	162.76873 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 29	26.19193 ft	510.92265 ft	710.47953 psf	854.54891 psf	76.603047 psf	0 psf	0 psf	Lower Cohesive Clayey Silt
Column 30	20.57321 ft	513.25000 ft	521.25026 psf	530.98026 psf	3.3503087 psf	0 psf	0 psf	Former Creek Bottom Clay



Circular Slope Stability	
CWLP Long Term F-F'.gsz	
07/09/2025	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: 401
Date: 07/09/2025
Time: 08:17:01 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:17:08 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist
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

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03559, 553.81656) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4536 of 4851 converged

Current Slip Surface

Slip Surface: 26
Factor of Safety: 2.264
Volume: 2,650.3286 ft³
Weight: 326,117.19 lbf
Resisting Moment: 24,240,177 lbf·ft
Activating Moment: 10,706,296 lbf·ft
Resisting Force: 138,142.61 lbf

Activating Force: 61,017.272 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (196.79888, 553.14551) ft
Entry: (40, 521) ft
Radius: 163.72971 ft
Center: (89.71277, 677.00019) ft

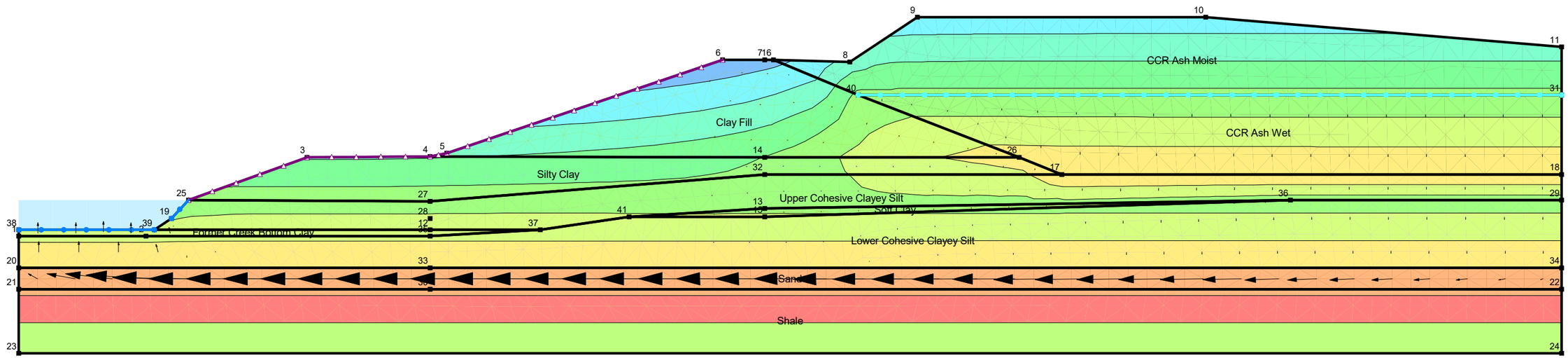
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	194.00124 ft	550.83301 ft	-128.3972 psf	189.41384 psf	109.35813 psf	0 psf	0 psf	CCR Ash Moist
Column 2	189.00300 ft	546.84180 ft	-230.0641 psf	459.5309 psf	234.14269 psf	500 psf	0 psf	Clay Fill
Column 3	184.60180 ft	543.59780 ft	-92.143153 psf	877.48934 psf	447.10315 psf	500 psf	0 psf	Clay Fill
Column 4	180.20060 ft	540.57293 ft	14.176445 psf	1,275.3449 psf	642.59745 psf	500 psf	0 psf	Clay Fill
Column 5	177.00000 ft	538.48318 ft	50.2639 psf	1,543.2393 psf	760.70897 psf	500 psf	0 psf	Clay Fill
Column 6	173.50000 ft	536.36360 ft	67.892281 psf	1,783.4011 psf	874.09542 psf	500 psf	0 psf	Clay Fill
Column 7	168.50000 ft	533.50156 ft	96.851333 psf	2,113.9849 psf	1,027.7809 psf	500 psf	0 psf	Clay Fill
Column 8	164.93847 ft	531.57982 ft	117.42092 psf	2,301.9439 psf	1,113.0701 psf	500 psf	0 psf	Clay Fill
Column 9	161.64415 ft	529.93858 ft	99.785596 psf	2,415.7079 psf	1,180.0214 psf	180 psf	0 psf	Silty Clay
Column 10	157.17858 ft	527.83659 ft	74.947994 psf	2,492.1542 psf	1,231.6281 psf	180 psf	0 psf	Silty Clay
Column 11	152.71300 ft	525.89580 ft	76.845029 psf	2,557.9529 psf	1,264.1876 psf	180 psf	0 psf	Silty Clay
Column 12	147.96196 ft	524.00611 ft	97.743356 psf	2,636.685 psf	1,238.3246 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 13	142.92544 ft	522.18178 ft	140.50864 psf	2,682.0598 psf	1,239.5973 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	137.88893 ft	520.54082 ft	201.87899 psf	2,710.5577 psf	1,223.5644 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	132.85241 ft	519.07750 ft	267.36416 psf	2,720.8286 psf	1,196.6345 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	127.81590 ft	517.78692 ft	333.04236 psf	2,711.8658 psf	1,160.2297 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Column 17	122.77938 ft	516.66490 ft	392.6734 psf	2,682.5862 psf	1,116.8651 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	117.74287 ft	515.70791 ft	442.7376 psf	2,631.9167 psf	1,067.734 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	112.70635 ft	514.91304 ft	486.04169 psf	2,558.6978 psf	1,010.9019 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	107.66984 ft	514.27790 ft	522.1167 psf	2,461.7283 psf	946.01177 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	103.07579 ft	513.83000 ft	548.93764 psf	2,339.079 psf	616.39509 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 22	99.00000 ft	513.54636 ft	566.54024 psf	2,256.2902 psf	581.82756 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 23	94.15924 ft	513.35554 ft	578.35229 psf	2,250.497 psf	575.76559 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 24	88.47773 ft	513.29978 ft	581.73012 psf	2,278.1627 psf	584.12857 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 25	82.79622 ft	513.44134 ft	572.83641 psf	2,276.6952 psf	586.68563 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 26	77.11471 ft	513.78074 ft	551.58332 psf	2,244.636 psf	582.9648 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 27	71.13698 ft	514.35828 ft	515.34306 psf	2,198.4911 psf	820.92615 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	65.20000 ft	515.14061 ft	466.68408 psf	1,963.2375 psf	729.91787 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	59.60000 ft	516.08864 ft	407.5883 psf	1,572.3005 psf	568.06809 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	54.00000 ft	517.23854 ft	333.65226 psf	1,151.5594 psf	398.91996 psf	0 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 31	48.40000 ft	518.59470 ft	238.63199 psf	704.71349 psf	227.32314 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	42.80000 ft	520.16247 ft	89.284364 psf	237.50458 psf	72.291828 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Appendix H-3:
Long-Term Static Full Pool with Stockpile



Steady-State Seepage	
CWLP Long Term F-F' Stockpile.gsz	
07/09/2025	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: 430
Date: 07/09/2025
Time: 08:57:57 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:58:04 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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Lean Clay Fill
K-Function: Lean Clay Fill
Ky'/Kx' Ratio: 2
Rotation: 0 °

Shale

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

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.25
Rotation: 0 °

Lower Cohesive Clayey Silt

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

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

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.38e-08 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Former Creek Bottom Clay

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Clayey Silt
K-Function: Clayey Silt
Ky'/Kx' Ratio: 1.5
Rotation: 0 °

Soft Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.12e-08 ft/sec
Ky'/Kx' Ratio: 1.25
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: 3.13e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.13e-10)
Data Point: (0.20885434, 3.13e-10)
Data Point: (0.38282598, 3.13e-10)
Data Point: (0.70171264, 3.13e-10)
Data Point: (1.2862257, 3.13e-10)
Data Point: (2.357627, 3.13e-10)
Data Point: (4.3214847, 3.13e-10)
Data Point: (7.9211981, 3.13e-10)

Data Point: (14.519403, 3.13e-10)
Data Point: (26.613786, 3.13e-10)
Data Point: (48.782557, 3.13e-10)
Data Point: (89.417486, 3.13e-10)
Data Point: (163.90053, 3.13e-10)
Data Point: (300.42651, 3.1299999e-10)
Data Point: (550.67599, 3.1300001e-10)
Data Point: (1,009.3785, 3.1300046e-10)
Data Point: (1,850.1713, 3.1300224e-10)
Data Point: (3,391.3282, 3.1297978e-10)
Data Point: (6,216.2392, 3.1272982e-10)
Data Point: (11,394.247, 3.1289947e-10)
Data Point: (20,885.434, 3.3121173e-10)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 3.13e-10 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)

Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 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		19.138 ft	33.3 °
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		1.5 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		26.043 ft	3.3 °
Line 35	34	29		16 ft	90 °
Line 36	1	20		7.5 ft	90 °
Line 37	11	10		84.291 ft	-4.76 °
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		4.826 ft	34 °
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		26 ft	0 °
Line 47	13	41		32.062 ft	3.58 °
Line 48	41	37		21.213 ft	8.13 °
Line 49	15	41		32 ft	0 °

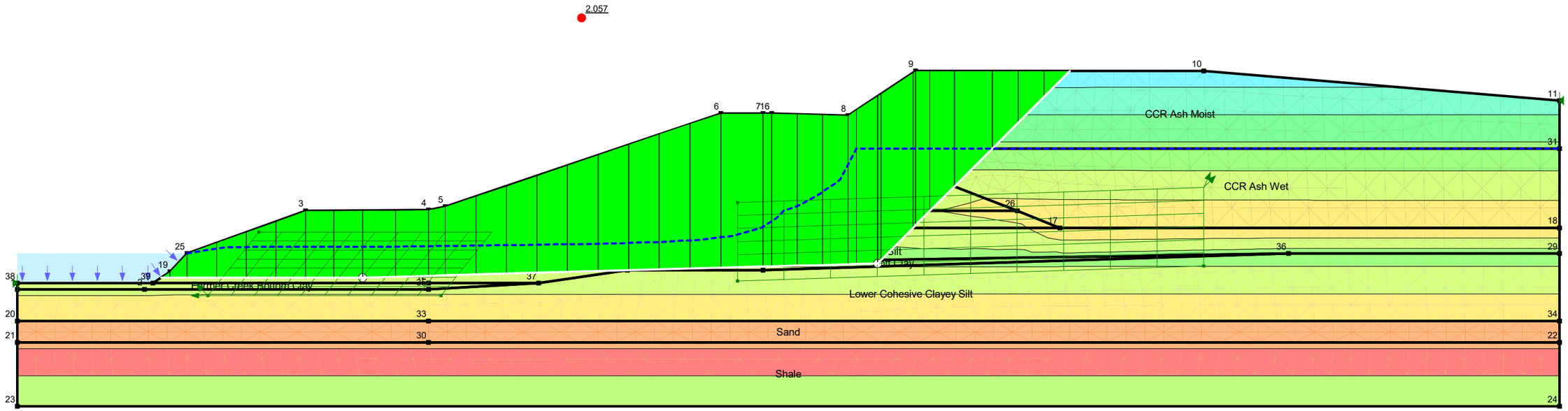
Regions

	Material	Points	Area

Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Mesh Properties

Global Element Size: 9 ft



Block Slope Stability	
CWLP Long Term F-F' Stockpile.gsz	
07/09/2025	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: 430
Date: 07/09/2025
Time: 08:57:57 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:58:28 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist

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

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay

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, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (57, 526) ft
- Lower Left: (45, 511) ft
- Lower Right: (100, 511) ft
- X Increments: 10
- Y Increments: 7
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (170, 533) ft
- Lower Left: (170, 514.5) ft
- Lower Right: (280, 518) ft
- X Increments: 10
- Y Increments: 6
- 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 55747 of 60984 converged

Current Slip Surface

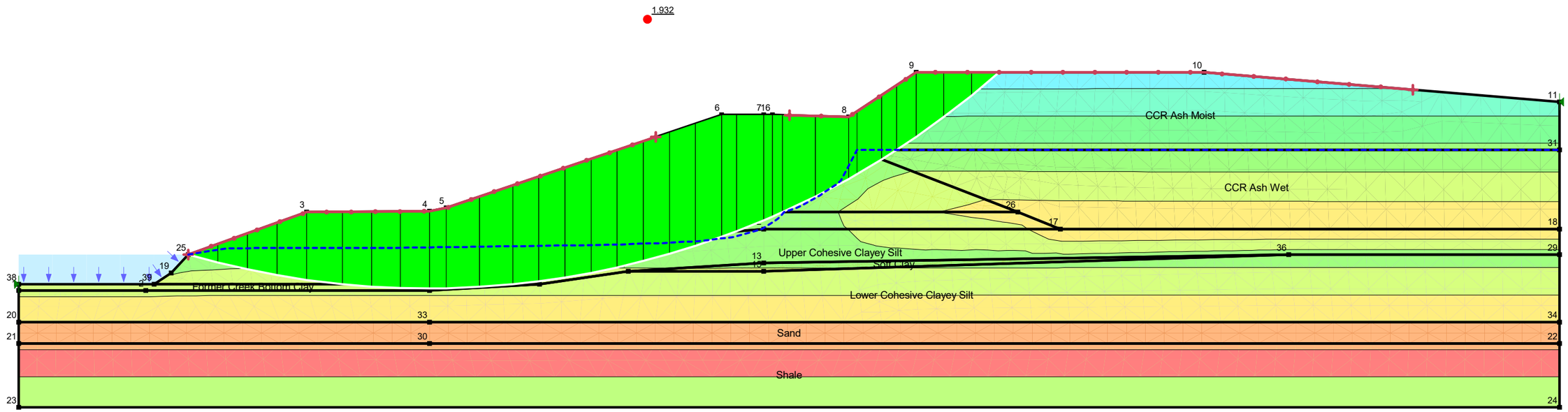
Slip Surface: 19,909
Factor of Safety: 2.057
Volume: 4,880.5472 ft³
Weight: 578,546.65 lbf
Resisting Moment: 15,066,597 lbf·ft
Activating Moment: 7,324,564.3 lbf·ft
Resisting Force: 212,484.66 lbf
Activating Force: 103,304.46 lbf
Slip Rank: 1 of 60,984 slip surfaces
Exit: (248.36667, 564) ft
Entry: (33.904762, 515.28571) ft
Radius: 97.389075 ft
Center: (132.83675, 576.17857) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	245.31667 ft	560.95000 ft	-953.11006 psf	222.467 psf	128.44138 psf	0 psf	0 psf	CCR Ash Moist
Column 2	239.21667 ft	554.85000 ft	-572.71054 psf	652.88148 psf	376.9413 psf	0 psf	0 psf	CCR Ash Moist
Column 3	233.11667 ft	548.75000 ft	-191.19047 psf	1,063.0083 psf	613.72813 psf	0 psf	0 psf	CCR Ash Moist
Column 4	225.59437 ft	541.22770 ft	267.12342 psf	1,655.5935 psf	647.45424 psf	0 psf	0 psf	CCR Ash Wet
Column 5	218.24437 ft	533.87770 ft	608.06014 psf	2,085.6232 psf	752.856 psf	500 psf	0 psf	Clay Fill
Column 6	213.68333 ft	529.31667 ft	592.149 psf	2,578.8131 psf	1,012.2559 psf	180 psf	0 psf	Silty Clay
Column 7	211.68333 ft	527.31667 ft	492.00237 psf	2,715.5683 psf	1,132.9634 psf	180 psf	0 psf	Silty Clay
Column 8	207.59098 ft	523.22432 ft	323.29952 psf	2,922.1295 psf	1,267.5341 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 9	203.40765 ft	519.04098 ft	231.12703 psf	3,177.5433 psf	1,072.4078 psf	0 psf	0 psf	Soft Clay
Column 10	200.50000 ft	518.56449 ft	257.75287 psf	4,230.2968 psf	1,445.8878 psf	0 psf	0 psf	Soft Clay
Column 11	197.00000 ft	518.46812 ft	263.10818 psf	4,077.41 psf	1,388.2923 psf	0 psf	0 psf	Soft Clay
Column 12	193.00000 ft	518.35797 ft	269.22041 psf	4,109.1606 psf	1,397.6239 psf	0 psf	0 psf	Soft Clay
Column 13	187.00000 ft	518.19275 ft	278.26916 psf	4,256.2576 psf	1,447.8694 psf	0 psf	0 psf	Soft Clay
Column 14	181.00000 ft	518.02754 ft	287.42036 psf	4,402.8284 psf	1,497.886 psf	0 psf	0 psf	Soft Clay

Column 15	177.00000 ft	517.91739 ft	293.56203 psf	4,484.4939 psf	1,525.3745 psf	0 psf	0 psf	Soft Clay
Column 16	171.00000 ft	517.75217 ft	302.63046 psf	4,534.7844 psf	1,540.378 psf	0 psf	0 psf	Soft Clay
Column 17	162.37478 ft	517.51467 ft	316.10107 psf	4,444.752 psf	1,502.7061 psf	0 psf	0 psf	Soft Clay
Column 18	155.12435 ft	517.31502 ft	327.87658 psf	4,180.1648 psf	1,402.1182 psf	0 psf	0 psf	Soft Clay
Column 19	147.87392 ft	517.11537 ft	339.89479 psf	3,910.5402 psf	1,299.6087 psf	0 psf	0 psf	Soft Clay
Column 20	140.64465 ft	516.91630 ft	354.69778 psf	3,697.5386 psf	1,630.4124 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	133.43653 ft	516.71782 ft	370.55186 psf	3,412.2374 psf	1,483.5292 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	126.22841 ft	516.51933 ft	384.57757 psf	3,121.6969 psf	1,334.9823 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	119.02029 ft	516.32085 ft	395.73309 psf	2,827.2028 psf	1,185.907 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	111.81218 ft	516.12236 ft	405.82571 psf	2,529.8952 psf	1,035.9779 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	104.60406 ft	515.92388 ft	416.31935 psf	2,230.973 psf	885.06574 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	99.00000 ft	515.76957 ft	424.86552 psf	2,034.2661 psf	784.9571 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	93.10714 ft	515.60730 ft	434.09985 psf	1,994.2833 psf	760.95234 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	85.32143 ft	515.39291 ft	446.69941 psf	2,006.5073 psf	760.76912 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	78.07143 ft	515.28571 ft	453.08538 psf	2,024.8424 psf	766.5971 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	71.35714 ft	515.28571 ft	452.85608 psf	2,004.7183 psf	756.89379 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Column 31	64.50000 ft	515.28571 ft	453.01 psf	1,830.5121 psf	671.85268 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	57.50000 ft	515.28571 ft	452.37676 psf	1,506.5467 psf	514.15302 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 33	50.50000 ft	515.28571 ft	449.56259 psf	1,187.9944 psf	360.15725 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 34	43.50000 ft	515.28571 ft	446.34336 psf	875.21772 psf	209.176 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 35	38.00000 ft	515.28571 ft	404.56074 psf	586.80081 psf	88.884422 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 36	34.95238 ft	515.28571 ft	368.97614 psf	403.10978 psf	16.648089 psf	0 psf	0 psf	Upper Cohesive Clayey Silt



Circular Slope Stability	
CWLP Long Term F-F' Stockpile.gsz	
07/09/2025	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: 430
Date: 07/09/2025
Time: 08:57:57 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:58:06 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist
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

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

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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03757, 553.88785) ft
Right-Zone Right Coordinate: (329.26186, 559.89485) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft

Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4537 of 4851 converged

Current Slip Surface

Slip Surface: 81
Factor of Safety: 1.932
Volume: 3,548.1155 ft³
Weight: 426,491.97 lbf
Resisting Moment: 38,364,261 lbf·ft
Activating Moment: 19,858,924 lbf·ft
Resisting Force: 177,324.01 lbf
Activating Force: 91,796.944 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (231.58286, 564) ft
Entry: (40, 521) ft
Radius: 204.21674 ft
Center: (96.575421, 717.22359) ft

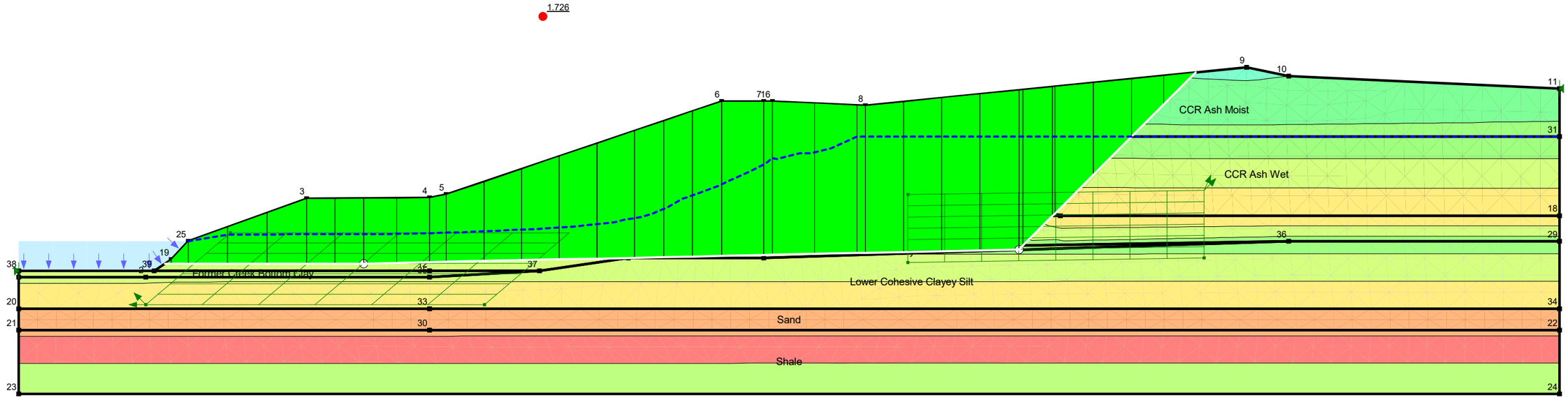
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	228.31905 ft	561.24333 ft	-975.24304 psf	206.06449 psf	118.97139 psf	0 psf	0 psf	CCR Ash Moist
Column 2	221.79143 ft	555.95253 ft	-647.37355 psf	601.57069 psf	347.317 psf	0 psf	0 psf	CCR Ash Moist
Column 3	215.26381 ft	551.08674 ft	-343.04747 psf	966.12219 psf	557.79091 psf	0 psf	0 psf	CCR Ash Moist
Column 4	209.70462 ft	547.22753 ft	-97.674714 psf	1,143.6794 psf	660.30362 psf	0 psf	0 psf	CCR Ash Moist
Column 5	205.62224 ft	544.57134 ft	67.055139 psf	1,181.1038 psf	519.48943 psf	0 psf	0 psf	CCR Ash Wet
Column 6	200.91762 ft	541.70818 ft	140.32535 psf	1,135.6725 psf	507.15472 psf	500 psf	0 psf	Clay Fill
Column 7	197.00000 ft	539.40891 ft	103.26614 psf	1,215.3481 psf	566.63407 psf	500 psf	0 psf	Clay Fill
Column 8	192.09805 ft	536.77855 ft	3.7878386 psf	1,509.2755 psf	767.0843 psf	500 psf	0 psf	Clay Fill
Column 9	184.29414 ft	532.85648 ft	-26.541704 psf	2,063.5632 psf	1,051.438 psf	500 psf	0 psf	Clay Fill
Column 10	179.19609 ft	530.47084 ft	-20.285666 psf	2,446.8339 psf	1,246.7241 psf	180 psf	0 psf	Silty Clay
Column 11	177.00000 ft	529.51323 ft	-38.335208 psf	2,574.7729 psf	1,311.9123 psf	180 psf	0 psf	Silty Clay
Column 12	172.76729 ft	527.78459 ft	-44.562917 psf	2,784.189 psf	1,418.6152 psf	180 psf	0 psf	Silty Clay
Column 13	167.76729 ft	525.82704 ft	-32.258382 psf	3,045.1867 psf	1,485.2368 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	162.91821 ft	524.11095 ft	15.202689 psf	3,157.1602 psf	1,532.4351 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	156.75462 ft	522.10173 ft	89.182571 psf	3,202.4056 psf	1,518.4203 psf	0 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 16	150.59103 ft	520.30590 ft	171.06272 psf	3,227.2521 psf	1,490.6032 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 17	144.42744 ft	518.71764 ft	253.45686 psf	3,229.9455 psf	1,451.7305 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	138.26385 ft	517.33202 ft	333.17476 psf	3,208.6138 psf	1,402.4453 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	132.10026 ft	516.14483 ft	404.13055 psf	3,161.3388 psf	1,344.7803 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	125.93667 ft	515.15258 ft	464.6753 psf	3,086.0781 psf	1,278.5436 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	119.77308 ft	514.35239 ft	512.80729 psf	2,980.808 psf	1,203.7244 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	112.76846 ft	513.68791 ft	553.13259 psf	2,786.3887 psf	768.97174 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 23	104.92282 ft	513.21530 ft	582.53241 psf	2,556.9377 psf	679.84225 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 24	99.00000 ft	513.03104 ft	593.96958 psf	2,388.464 psf	617.89396 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 25	93.57659 ft	513.05758 ft	592.25271 psf	2,354.1124 psf	606.65693 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 26	86.72978 ft	513.27313 ft	578.71915 psf	2,345.157 psf	608.23333 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 27	79.88297 ft	513.71919 ft	550.83369 psf	2,298.0246 psf	601.60608 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 28	72.22978 ft	514.50799 ft	501.40822 psf	2,227.7203 psf	841.97865 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Column 29	64.50000 ft	515.57270 ft	435.06562 psf	1,905.3534 psf	717.10724 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	57.50000 ft	516.81184 ft	356.9505 psf	1,393.53 psf	505.57359 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	50.50000 ft	518.30495 ft	261.56317 psf	850.12315 psf	287.05988 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	43.50000 ft	520.05783 ft	100.94838 psf	285.35111 psf	89.939218 psf	0 psf	0 psf	Upper Cohesive Clayey Silt

Appendix H-4:
Short-Term Maximum Surcharge



Block Slope Stability	
CWLP Short Term F-F'.gsz	
07/09/2025	1:300

Block Slope Stability

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File Information

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Title: Springfield CWLP
Created By: Karl Finke
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Date: 07/09/2025
Time: 08:14:01 AM
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File Name: CWLP Short Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:14:20 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist

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

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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (50, 523) ft
- Lower Left: (30, 506) ft
- Lower Right: (110, 506) ft
- X Increments: 6
- Y Increments: 7
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (210, 532) ft
- Lower Left: (210, 516) ft
- Lower Right: (280, 517) ft
- X Increments: 8
- Y Increments: 6
- 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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)
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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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 26426 of 31752 converged

Current Slip Surface

Slip Surface: 17,992
Factor of Safety: 1.726
Volume: 5,819.7383 ft³
Weight: 681,804.64 lbf
Resisting Moment: 8,500,646.9 lbf·ft
Activating Moment: 4,925,227.1 lbf·ft
Resisting Force: 129,068.95 lbf

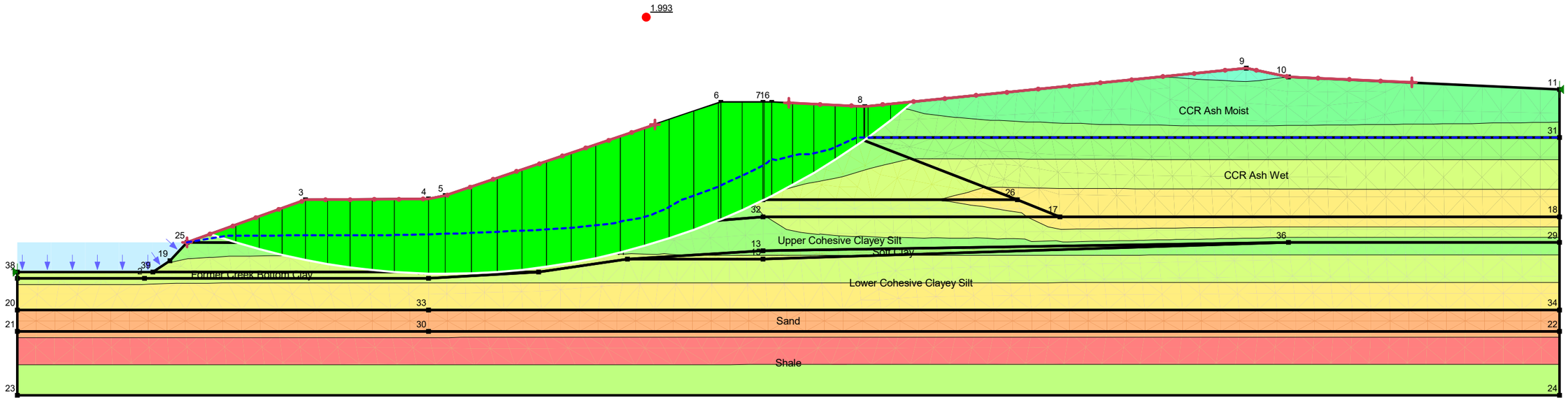
Activating Force: 74,790.848 lbf
Slip Rank: 1 of 31,752 slip surfaces
Exit: (278.00926, 560.80093) ft
Entry: (34.539683, 515.71429) ft
Radius: 104.03031 ft
Center: (150.01248, 572.07259) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.23403 ft	557.02569 ft	-404.48522 psf	240.15272 psf	138.65224 psf	0 psf	0 psf	CCR Ash Moist
Column 2	266.68356 ft	549.47523 ft	-128.90784 psf	713.76657 psf	412.09332 psf	0 psf	0 psf	CCR Ash Moist
Column 3	258.36131 ft	541.15298 ft	263.89653 psf	1,452.0996 psf	318.37805 psf	0 psf	0 psf	CCR Ash Wet
Column 4	249.26726 ft	532.05893 ft	794.19669 psf	2,164.5233 psf	367.1779 psf	0 psf	0 psf	CCR Ash Wet
Column 5	244.46429 ft	527.25595 ft	1,029.6865 psf	2,124.9411 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 6	240.70184 ft	523.49351 ft	488.16664 psf	2,797.3956 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 7	236.72268 ft	519.51434 ft	207.6597 psf	3,370.63 psf	0 psf	400 psf	0 psf	Soft Clay
Column 8	231.62500 ft	518.94227 ft	238.18086 psf	3,916.6884 psf	0 psf	400 psf	0 psf	Soft Clay
Column 9	222.50000 ft	518.74616 ft	250.12734 psf	3,952.5151 psf	0 psf	400 psf	0 psf	Soft Clay
Column 10	213.50000 ft	518.55273 ft	262.17177 psf	3,989.466 psf	0 psf	400 psf	0 psf	Soft Clay
Column 11	204.50000 ft	518.35930 ft	274.21212 psf	4,026.6294 psf	0 psf	400 psf	0 psf	Soft Clay
Column 12	199.00000 ft	518.24110 ft	281.53713 psf	4,063.1465 psf	0 psf	400 psf	0 psf	Soft Clay
Column 13	193.00000 ft	518.11215 ft	289.49049 psf	4,184.4185 psf	0 psf	400 psf	0 psf	Soft Clay
Column 14	183.00000 ft	517.89723 ft	302.5552 psf	4,390.8766 psf	0 psf	400 psf	0 psf	Soft Clay
Column 15	177.00000 ft	517.76828 ft	310.23613 psf	4,497.8163 psf	0 psf	400 psf	0 psf	Soft Clay
Column 16	171.00000 ft	517.63933 ft	316.94555 psf	4,520.4163 psf	0 psf	400 psf	0 psf	Soft Clay
Column 17	162.57334 ft	517.45823 ft	326.35773 psf	4,407.1161 psf	0 psf	400 psf	0 psf	Soft Clay
Column 18	155.72003 ft	517.31094 ft	334.33178 psf	4,143.0067 psf	0 psf	400 psf	0 psf	Soft Clay
Column 19	148.86671 ft	517.16365 ft	342.59534 psf	3,878.401 psf	0 psf	400 psf	0 psf	Soft Clay
Column 20	140.99605 ft	516.99449 ft	359.75308 psf	3,593.0995 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 21	132.10804 ft	516.80348 ft	381.65348 psf	3,244.4711 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	123.22003 ft	516.61246 ft	395.76387 psf	2,893.6297 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	114.33202 ft	516.42144 ft	400.29445 psf	2,540.5045 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	105.44401 ft	516.23042 ft	406.24393 psf	2,185.0738 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	99.00000 ft	516.09193 ft	412.15766 psf	1,960.5622 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	93.10714 ft	515.96528 ft	417.95572 psf	1,919.5603 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	85.32143 ft	515.79795 ft	426.59672 psf	1,928.8416 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	78.07143 ft	515.71429 ft	431.09413 psf	1,938.9478 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	71.35714 ft	515.71429 ft	430.78917 psf	1,926.0264 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	63.33333 ft	515.71429 ft	430.90195 psf	1,711.7466 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	54.00000 ft	515.71429 ft	428.76134 psf	1,295.8965 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	44.66667 ft	515.71429 ft	420.28601 psf	879.1824 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 33	38.00000 ft	515.71429 ft	372.49794 psf	533.48731 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Column 34	35.26984 ft	515.71429 ft	338.92345 psf	362.49343 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt



Circular Slope Stability	
CWLP Short Term F-F'.gsz	
07/09/2025	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: 397
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Time: 08:14:01 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:14:12 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist
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
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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03559, 553.81656) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)

Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4605 of 4851 converged

Current Slip Surface

Slip Surface: 279
Factor of Safety: 1.993
Volume: 3,032.1832 ft³
Weight: 370,988.96 lbf
Resisting Moment: 23,034,117 lbf·ft
Activating Moment: 11,562,512 lbf·ft
Resisting Force: 127,093.28 lbf
Activating Force: 63,773.011 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (211.51667, 554.15167) ft
Entry: (45.414673, 522.93381) ft
Radius: 170.38328 ft
Center: (101.13774, 683.94748) ft

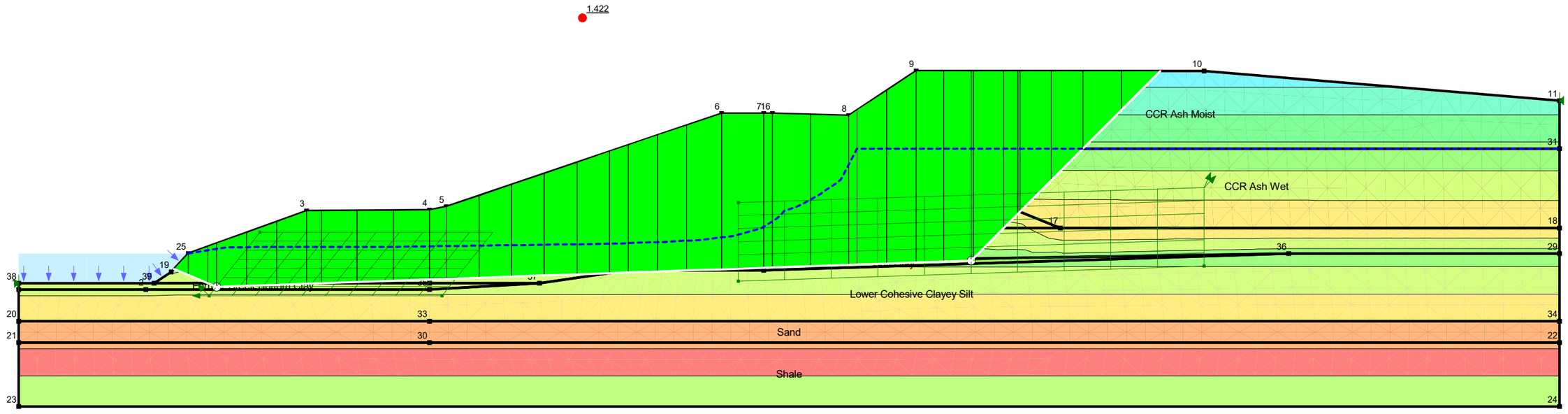
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	208.81935 ft	551.95121 ft	-91.318202 psf	147.47449 psf	85.144438 psf	0 psf	0 psf	CCR Ash Moist
Column 2	203.42470 ft	547.72538 ft	-24.075029 psf	432.83578 psf	249.89785 psf	0 psf	0 psf	CCR Ash Moist
Column 3	200.36369 ft	545.43946 ft	15.660544 psf	647.17734 psf	169.21442 psf	0 psf	0 psf	CCR Ash Wet
Column 4	199.88498 ft	545.09711 ft	36.23796 psf	676.64341 psf	171.59612 psf	0 psf	0 psf	CCR Ash Wet
Column 5	198.88498 ft	544.39544 ft	55.063242 psf	577.99225 psf	266.44564 psf	500 psf	0 psf	Clay Fill
Column 6	195.50000 ft	542.11233 ft	93.701476 psf	880.68449 psf	400.98788 psf	500 psf	0 psf	Clay Fill
Column 7	190.50000 ft	538.90878 ft	164.39423 psf	1,318.5133 psf	588.05302 psf	500 psf	0 psf	Clay Fill
Column 8	185.50000 ft	535.94346 ft	246.94115 psf	1,736.9814 psf	759.21345 psf	500 psf	0 psf	Clay Fill
Column 9	180.50000 ft	533.20229 ft	305.27341 psf	2,134.3098 psf	931.94057 psf	500 psf	0 psf	Clay Fill
Column 10	177.11061 ft	531.44306 ft	338.19244 psf	2,383.1446 psf	1,041.9552 psf	500 psf	0 psf	Clay Fill
Column 11	176.11061 ft	530.94580 ft	343.79599 psf	2,515.5492 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 12	173.50000 ft	529.71863 ft	289.3125 psf	2,668.9817 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 13	168.50000 ft	527.46943 ft	216.30199 psf	2,952.3519 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 14	165.71092 ft	526.27482 ft	192.53577 psf	3,092.6632 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 15	162.52708 ft	525.03813 ft	178.7585 psf	3,193.8889 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	156.73757 ft	522.92033 ft	178.91047 psf	3,230.4724 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 17	150.94806 ft	521.03575 ft	205.84572 psf	3,244.3402 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	145.15855 ft	519.37637 ft	255.77061 psf	3,235.5329 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	139.36904 ft	517.93541 ft	319.98598 psf	3,203.6875 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	133.57952 ft	516.70724 ft	384.95143 psf	3,148.1201 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 21	127.79001 ft	515.68718 ft	443.26243 psf	3,067.9092 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	122.00050 ft	514.87146 ft	490.67339 psf	2,961.9813 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	116.21099 ft	514.25714 ft	523.99022 psf	2,829.198 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	110.23718 ft	513.83530 ft	548.7077 psf	2,662.8253 psf	727.94905 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 25	104.07906 ft	513.61743 ft	562.19319 psf	2,454.2494 psf	651.4872 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 26	99.00000 ft	513.58935 ft	563.86088 psf	2,293.5196 psf	595.56926 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 27	92.97962 ft	513.80723 ft	550.15999 psf	2,232.4374 psf	579.25458 psf	0 psf	0 psf	Former Creek Bottom Clay
Column 28	86.33934 ft	514.22844 ft	523.86435 psf	2,202.4336 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	81.09953 ft	514.76719 ft	490.2597 psf	2,140.0071 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	75.85972 ft	515.47058 ft	446.18446 psf	2,052.7147 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	70.61991 ft	516.34070 ft	391.68947 psf	1,940.4858 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	65.25864 ft	517.40833 ft	324.9622 psf	1,682.4475 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 33	59.77591 ft	518.68504 ft	244.91219 psf	1,278.7829 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Column 34	54.29319 ft	520.15517 ft	151.65832 psf	851.38909 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 35	48.48325 ft	521.93651 ft	29.189761 psf	460.94714 psf	0 psf	1,200 psf	0 psf	Silty Clay

Appendix H-5:
Short-Term Maximum Surcharge with Stockpile



Block Slope Stability	
CWLP Short Term F-F' Stockpile.gsz	
07/09/2025	1:300

Block Slope Stability

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Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:55:48 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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist

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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (57, 526) ft
- Lower Left: (45, 511) ft
- Lower Right: (100, 511) ft
- X Increments: 10
- Y Increments: 7
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (170, 533) ft
- Lower Left: (170, 514.5) ft
- Lower Right: (280, 518) ft
- X Increments: 10
- Y Increments: 6
- 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: 0.22868775
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.22868775

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.232)
- Data Point: (0.20885434, 0.22868775)
- Data Point: (0.38282598, 0.22868775)
- Data Point: (0.70171264, 0.22868775)
- Data Point: (1.2862257, 0.22868775)
- Data Point: (2.357627, 0.22868775)
- Data Point: (4.3214847, 0.22868775)
- Data Point: (7.9211981, 0.22868775)
- Data Point: (14.519403, 0.22868775)
- Data Point: (26.613786, 0.22868775)
- Data Point: (48.782557, 0.22868775)
- Data Point: (89.417486, 0.22868775)
- Data Point: (163.90053, 0.22868775)
- Data Point: (300.42651, 0.22868775)
- Data Point: (550.67599, 0.22868775)
- Data Point: (1,009.3785, 0.22868775)
- Data Point: (1,850.1713, 0.22868775)
- Data Point: (3,391.3282, 0.22868775)
- Data Point: (6,216.2392, 0.22868775)
- Data Point: (11,394.247, 0.22868775)
- Data Point: (20,885.434, 0.22868775)

Estimation Properties
- Vol. WC Estimation Method: Grain Size Function
- Saturated Water Content: 0.232
- Sample Material: Clay
- 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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 55426 of 60984 converged

Current Slip Surface

Slip Surface: 7,903
Factor of Safety: 1.422
Volume: 5,952.4043 ft³
Weight: 693,944.32 lbf
Resisting Moment: 9,781,689.7 lbf·ft
Activating Moment: 6,877,750 lbf·ft
Resisting Force: 131,896.13 lbf
Activating Force: 92,749.736 lbf
Slip Rank: 1 of 60,984 slip surfaces
Exit: (269.66667, 564) ft

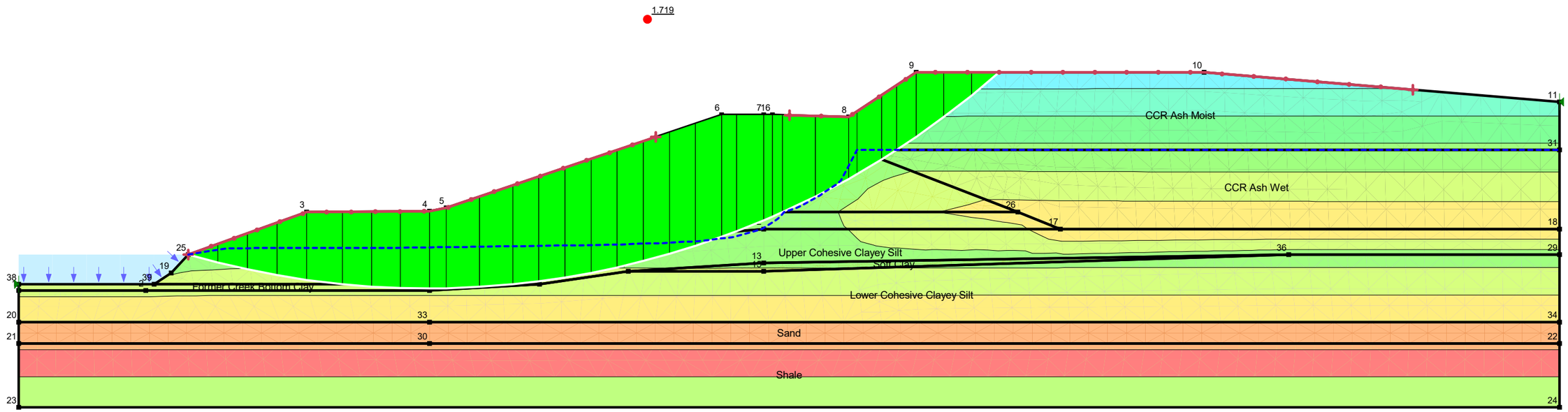
Entry: (36.591493, 517.33586) ft
Radius: 102.47746 ft
Center: (146.12208, 575.66604) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	265.09167 ft	559.42500 ft	-857.02654 psf	306.36893 psf	176.88218 psf	0 psf	0 psf	CCR Ash Moist
Column 2	255.94167 ft	550.27500 ft	-285.77748 psf	908.26193 psf	524.38527 psf	0 psf	0 psf	CCR Ash Moist
Column 3	247.64405 ft	541.97738 ft	217.22776 psf	1,725.4762 psf	404.13396 psf	0 psf	0 psf	CCR Ash Wet
Column 4	240.19881 ft	534.53214 ft	657.08855 psf	2,345.1302 psf	452.30939 psf	0 psf	0 psf	CCR Ash Wet
Column 5	236.23810 ft	530.57143 ft	853.67674 psf	2,238.2216 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 6	234.33333 ft	528.66667 ft	716.72181 psf	2,458.0123 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 7	229.06557 ft	523.39891 ft	372.04704 psf	3,362.6809 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 8	225.23224 ft	519.56557 ft	200.67996 psf	3,960.9006 psf	0 psf	400 psf	0 psf	Soft Clay
Column 9	221.75000 ft	519.22049 ft	219.84424 psf	4,688.3321 psf	0 psf	400 psf	0 psf	Soft Clay
Column 10	215.25000 ft	518.99479 ft	232.95244 psf	4,789.1313 psf	0 psf	400 psf	0 psf	Soft Clay
Column 11	208.50000 ft	518.76042 ft	246.49753 psf	4,677.0175 psf	0 psf	400 psf	0 psf	Soft Clay
Column 12	201.50000 ft	518.51736 ft	260.41201 psf	4,352.2333 psf	0 psf	400 psf	0 psf	Soft Clay
Column 13	197.00000 ft	518.36111 ft	269.18312 psf	4,146.5191 psf	0 psf	400 psf	0 psf	Soft Clay
Column 14	191.50000 ft	518.17014 ft	279.922 psf	4,198.0298 psf	0 psf	400 psf	0 psf	Soft Clay
Column 15	182.50000 ft	517.85764 ft	297.57549 psf	4,387.9887 psf	0 psf	400 psf	0 psf	Soft Clay
Column 16	177.00000 ft	517.66667 ft	308.5268 psf	4,488.9377 psf	0 psf	400 psf	0 psf	Soft Clay
Column 17	171.00000 ft	517.45833 ft	320.34953 psf	4,524.7249 psf	0 psf	400 psf	0 psf	Soft Clay
Column 18	161.90000 ft	517.14236 ft	338.79285 psf	4,406.0303 psf	0 psf	400 psf	0 psf	Soft Clay
Column 19	154.35000 ft	516.88021 ft	354.66586 psf	4,212.1251 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt
Column 20	147.45000 ft	516.64062 ft	369.4164 psf	3,961.3677 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt

Column 21	141.78440 ft	516.44390 ft	381.56072 psf	3,752.4079 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt
Column 22	135.71193 ft	516.23305 ft	396.91249 psf	3,476.7229 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	127.99817 ft	515.96521 ft	416.39987 psf	3,187.8731 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	120.28440 ft	515.69738 ft	433.04198 psf	2,896.5419 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	112.57064 ft	515.42954 ft	447.68348 psf	2,602.6517 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	104.85688 ft	515.16170 ft	462.79964 psf	2,306.171 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	99.00000 ft	514.95833 ft	474.6805 psf	2,113.8774 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	92.73333 ft	514.74074 ft	487.65203 psf	2,081.7109 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	84.20000 ft	514.44444 ft	505.67615 psf	2,102.4047 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	75.66667 ft	514.14815 ft	523.97141 psf	2,120.9729 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	69.70000 ft	513.94097 ft	536.7117 psf	2,122.283 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 32	64.45238 ft	513.75876 ft	548.4091 psf	1,987.2704 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 33	57.35714 ft	513.51240 ft	563.36918 psf	1,706.8065 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 34	50.26190 ft	513.26604 ft	577.34368 psf	1,425.4506 psf	0 psf	300 psf	0 psf	Former Creek

								Bottom Clay
Column 35	45.67962 ft	513.57143 ft	562.18335 psf	1,293.7558 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 36	42.32248 ft	514.96200 ft	470.35924 psf	1,080.7685 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 37	38.29575 ft	516.62993 ft	305.65291 psf	639.55575 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt



Circular Slope Stability	
CWLP Short Term F-F' Stockpile.gsz	
07/09/2025	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: 426
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Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:55:26 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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist
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
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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03757, 553.88785) ft
Right-Zone Right Coordinate: (329.26186, 559.89485) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)

Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4445 of 4851 converged

Current Slip Surface

Slip Surface: 81
Factor of Safety: 1.719
Volume: 3,548.1155 ft³
Weight: 426,491.97 lbf
Resisting Moment: 29,671,195 lbf·ft
Activating Moment: 17,267,303 lbf·ft
Resisting Force: 135,121.02 lbf
Activating Force: 78,616.26 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (231.58286, 564) ft
Entry: (40, 521) ft
Radius: 204.21674 ft
Center: (96.575421, 717.22359) ft

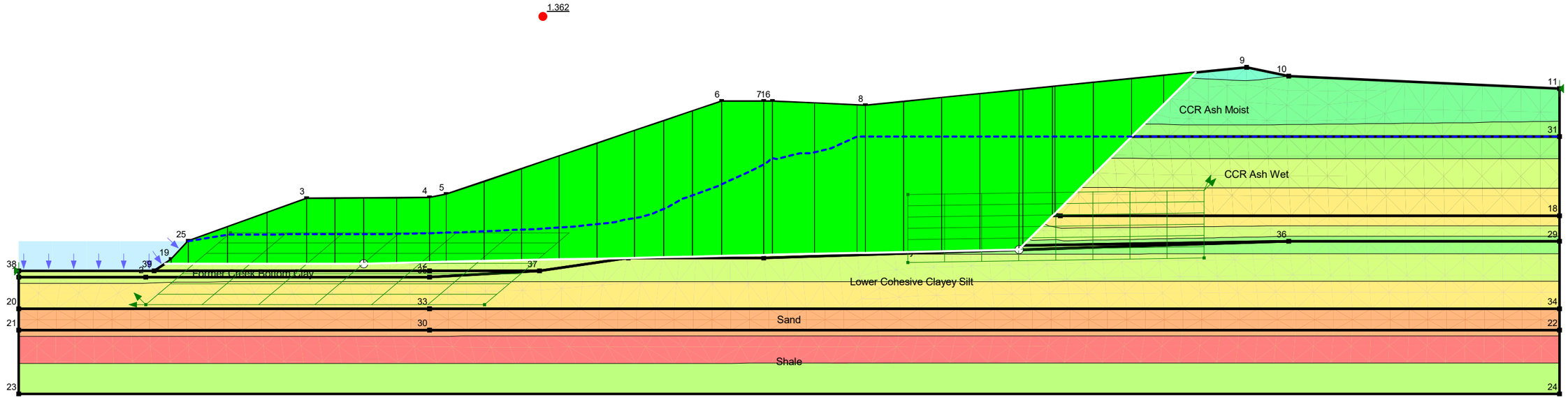
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material

Column 1	228.31905 ft	561.24333 ft	-975.24304 psf	202.63306 psf	116.99025 psf	0 psf	0 psf	CCR Ash Moist
Column 2	221.79143 ft	555.95253 ft	-647.37355 psf	597.92035 psf	345.20947 psf	0 psf	0 psf	CCR Ash Moist
Column 3	215.26381 ft	551.08674 ft	-343.04747 psf	969.63312 psf	559.81794 psf	0 psf	0 psf	CCR Ash Moist
Column 4	209.70462 ft	547.22753 ft	-97.674714 psf	1,156.6411 psf	667.78705 psf	0 psf	0 psf	CCR Ash Moist
Column 5	205.62224 ft	544.57134 ft	67.055139 psf	1,276.1053 psf	323.96402 psf	0 psf	0 psf	CCR Ash Wet
Column 6	200.91762 ft	541.70818 ft	140.32535 psf	974.05954 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 7	197.00000 ft	539.40891 ft	103.26614 psf	1,089.1994 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 8	192.09805 ft	536.77855 ft	3.7878386 psf	1,451.2962 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 9	184.29414 ft	532.85648 ft	-26.541704 psf	2,088.6095 psf	0 psf	1,600 psf	0 psf	Clay Fill
Column 10	179.19609 ft	530.47084 ft	-20.285666 psf	2,550.4653 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 11	177.00000 ft	529.51323 ft	-38.335208 psf	2,688.4849 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 12	172.76729 ft	527.78459 ft	-44.562917 psf	2,908.7498 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 13	167.76729 ft	525.82704 ft	-32.258382 psf	3,228.5275 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	162.91821 ft	524.11095 ft	15.202689 psf	3,324.3022 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	156.75462 ft	522.10173 ft	89.182571 psf	3,338.9981 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	150.59103 ft	520.30590 ft	171.06272 psf	3,332.0317 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 17	144.42744 ft	518.71764 ft	253.45686 psf	3,302.9745 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	138.26385 ft	517.33202 ft	333.17476 psf	3,251.1447 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	132.10026 ft	516.14483 ft	404.13055 psf	3,175.6741 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	125.93667 ft	515.15258 ft	464.6753 psf	3,075.5766 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 21	119.77308 ft	514.35239 ft	512.80729 psf	2,949.8197 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	112.76846 ft	513.68791 ft	553.13259 psf	2,756.4016 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 23	104.92282 ft	513.21530 ft	582.53241 psf	2,510.3099 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 24	99.00000 ft	513.03104 ft	593.96958 psf	2,334.1832 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 25	93.57659 ft	513.05758 ft	592.25271 psf	2,292.1366 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 26	86.72978 ft	513.27313 ft	578.71915 psf	2,275.4998 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 27	79.88297 ft	513.71919 ft	550.83369 psf	2,226.4283 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 28	72.22978 ft	514.50799 ft	501.40822 psf	2,170.9996 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	64.50000 ft	515.57270 ft	435.06562 psf	1,879.9014 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	57.50000 ft	516.81184 ft	356.9505 psf	1,413.5191 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	50.50000 ft	518.30495 ft	261.56317 psf	914.64234 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 32	43.50000 ft	520.05783 ft	100.94838 psf	386.22774 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Appendix H-6:
Seismic Full Pool



Block Slope Stability	
CWLP Seismic Term F-F'.gsz	
07/09/2025	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: 394
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Time: 08:11:59 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:12:16 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

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist

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

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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (50, 523) ft
- Lower Left: (30, 506) ft
- Lower Right: (110, 506) ft
- X Increments: 6
- Y Increments: 7
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (210, 532) ft
- Lower Left: (210, 516) ft
- Lower Right: (280, 517) ft
- X Increments: 8
- Y Increments: 6
- 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 26414 of 31752 converged

Current Slip Surface

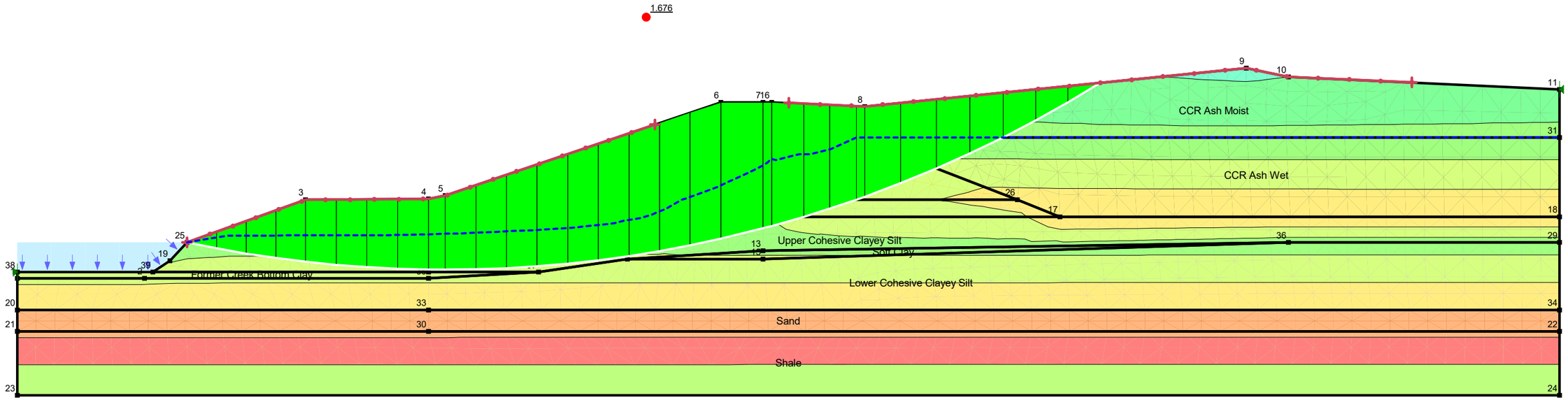
Slip Surface: 17,992
Factor of Safety: 1.362
Volume: 5,819.7383 ft³
Weight: 681,804.64 lbf
Resisting Moment: 8,419,348.1 lbf·ft
Activating Moment: 6,178,767.5 lbf·ft
Resisting Force: 128,483.27 lbf
Activating Force: 94,320.856 lbf
Slip Rank: 1 of 31,752 slip surfaces
Exit: (278.00926, 560.80093) ft
Entry: (34.539683, 515.71429) ft
Radius: 104.03031 ft
Center: (150.01248, 572.07259) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.23403 ft	557.02569 ft	-404.48522 psf	224.95316 psf	129.87677 psf	0 psf	0 psf	CCR Ash Moist
Column 2	266.68356 ft	549.47523 ft	-128.90784 psf	667.85763 psf	385.58778 psf	0 psf	0 psf	CCR Ash Moist
Column 3	258.36131 ft	541.15298 ft	263.89653 psf	1,398.9168 psf	304.12776 psf	0 psf	0 psf	CCR Ash Wet
Column 4	249.26726 ft	532.05893 ft	794.19669 psf	2,087.4634 psf	346.52977 psf	0 psf	0 psf	CCR Ash Wet
Column 5	244.46429 ft	527.25595 ft	1,029.6865 psf	1,925.1251 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 6	240.70184 ft	523.49351 ft	488.16664 psf	2,643.5141 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 7	236.72268 ft	519.51434 ft	207.6597 psf	3,233.0389 psf	0 psf	400 psf	0 psf	Soft Clay
Column 8	231.62500 ft	518.94227 ft	238.18086 psf	3,892.6702 psf	0 psf	400 psf	0 psf	Soft Clay
Column 9	222.50000 ft	518.74616 ft	250.12734 psf	3,928.7137 psf	0 psf	400 psf	0 psf	Soft Clay
Column 10	213.50000 ft	518.55273 ft	262.17177 psf	3,966.2573 psf	0 psf	400 psf	0 psf	Soft Clay
Column 11	204.50000 ft	518.35930 ft	274.21212 psf	4,004.4099 psf	0 psf	400 psf	0 psf	Soft Clay
Column 12	199.00000 ft	518.24110 ft	281.53713 psf	4,041.6324 psf	0 psf	400 psf	0 psf	Soft Clay
Column 13	193.00000 ft	518.11215 ft	289.49049 psf	4,163.3492 psf	0 psf	400 psf	0 psf	Soft Clay
Column 14	183.00000 ft	517.89723 ft	302.5552 psf	4,370.7864 psf	0 psf	400 psf	0 psf	Soft Clay
Column 15	177.00000 ft	517.76828 ft	310.23613 psf	4,478.6138 psf	0 psf	400 psf	0 psf	Soft Clay
Column 16	171.00000 ft	517.63933 ft	316.94555 psf	4,502.9161 psf	0 psf	400 psf	0 psf	Soft Clay

Column 17	162.57334 ft	517.45823 ft	326.35773 psf	4,393.342 psf	0 psf	400 psf	0 psf	Soft Clay
Column 18	155.72003 ft	517.31094 ft	334.33178 psf	4,133.7809 psf	0 psf	400 psf	0 psf	Soft Clay
Column 19	148.86671 ft	517.16365 ft	342.59534 psf	3,873.9083 psf	0 psf	400 psf	0 psf	Soft Clay
Column 20	140.99605 ft	516.99449 ft	359.75308 psf	3,607.7437 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	132.10804 ft	516.80348 ft	381.65348 psf	3,264.2101 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	123.22003 ft	516.61246 ft	395.76387 psf	2,917.5833 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	114.33202 ft	516.42144 ft	400.29445 psf	2,567.6015 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	105.44401 ft	516.23042 ft	406.24393 psf	2,214.0812 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	99.00000 ft	516.09193 ft	412.15766 psf	1,989.9821 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	93.10714 ft	515.96528 ft	417.95572 psf	1,947.9116 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	85.32143 ft	515.79795 ft	426.59672 psf	1,954.9397 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	78.07143 ft	515.71429 ft	431.09413 psf	1,965.6498 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	71.35714 ft	515.71429 ft	430.78917 psf	1,949.7245 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	63.33333 ft	515.71429 ft	430.90195 psf	1,731.7591 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	54.00000 ft	515.71429 ft	428.76134 psf	1,310.8699 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Column 32	44.66667 ft	515.71429 ft	420.28601 psf	887.83095 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 33	38.00000 ft	515.71429 ft	372.49794 psf	537.08046 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 34	35.26984 ft	515.71429 ft	338.92345 psf	363.31691 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt



Circular Slope Stability	
CWLP Seismic Term F-F'.gsz	
07/09/2025	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: 394
Date: 07/09/2025
Time: 08:11:59 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Term F-F'.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:12:08 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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist
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
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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03559, 553.81656) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %

Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4771 of 4851 converged

Current Slip Surface

Slip Surface: 113
Factor of Safety: 1.676
Volume: 4,008.954 ft³
Weight: 478,441.2 lbf
Resisting Moment: 44,468,538 lbf·ft
Activating Moment: 26,533,018 lbf·ft
Resisting Force: 146,821.26 lbf
Activating Force: 87,594.015 lbf
Slip Rank: 1 of 4,851 slip surfaces

Exit: (255.63226, 558.56323) ft
Entry: (40, 521) ft
Radius: 293.52258 ft
Center: (101.07529, 808.09809) ft

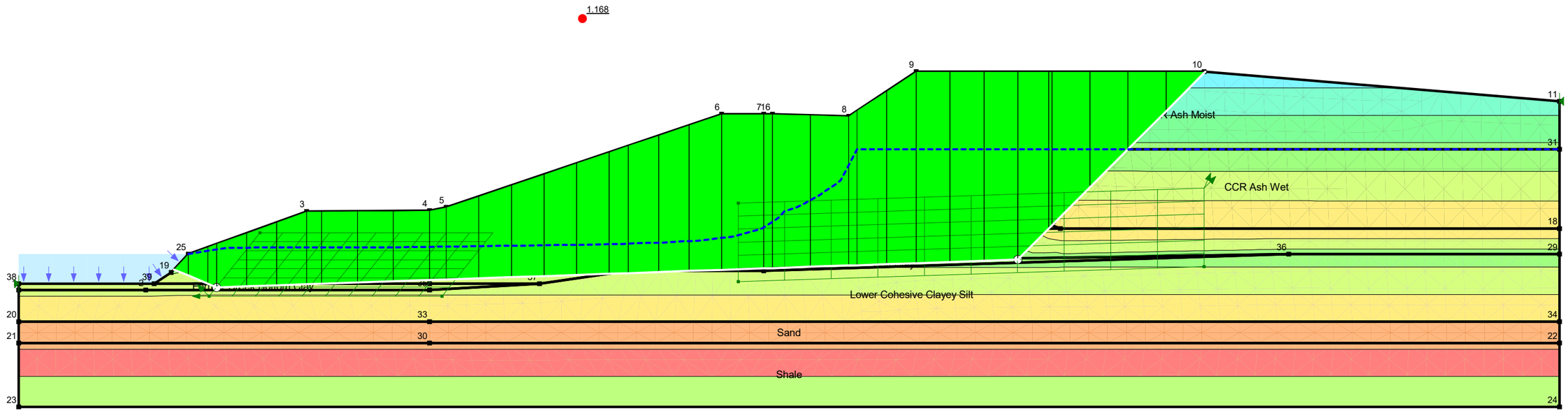
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	251.79608 ft	556.26727 ft	-326.97118 psf	149.82443 psf	86.501177 psf	0 psf	0 psf	CCR Ash Moist
Column 2	244.12372 ft	551.82997 ft	-177.6004 psf	439.95788 psf	254.0098 psf	0 psf	0 psf	CCR Ash Moist
Column 3	236.45137 ft	547.69431 ft	-53.414008 psf	710.09771 psf	409.9751 psf	0 psf	0 psf	CCR Ash Moist
Column 4	228.68468 ft	543.80224 ft	112.90638 psf	1,044.2766 psf	249.55991 psf	0 psf	0 psf	CCR Ash Wet
Column 5	220.82365 ft	540.14791 ft	332.56444 psf	1,313.0244 psf	262.71346 psf	0 psf	0 psf	CCR Ash Wet
Column 6	212.66985 ft	536.65508 ft	463.54147 psf	1,518.8206 psf	537.69158 psf	500 psf	0 psf	Clay Fill
Column 7	204.22328 ft	533.33338 ft	515.73811 psf	1,917.2869 psf	714.12478 psf	500 psf	0 psf	Clay Fill
Column 8	199.00000 ft	531.39404 ft	542.3277 psf	2,167.7729 psf	828.20572 psf	500 psf	0 psf	Clay Fill
Column 9	194.86381 ft	529.98253 ft	492.39229 psf	2,425.7155 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 10	188.64885 ft	527.96246 ft	400.47425 psf	2,779.3263 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 11	181.78504 ft	525.91740 ft	322.74007 psf	3,186.9381 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 12	177.00000 ft	524.56701 ft	282.51435 psf	3,420.0215 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 13	171.00000 ft	523.07259 ft	247.91714 psf	3,615.7576 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	162.38889 ft	521.07455 ft	236.77955 psf	3,739.6821 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	155.16667 ft	519.62603 ft	257.1315 psf	3,651.7785 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	147.94444 ft	518.36476 ft	295.63076 psf	3,543.4135 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Column 17	140.72222 ft	517.28829 ft	347.11697 psf	3,413.1072 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	133.50000 ft	516.39457 ft	400.59858 psf	3,259.3314 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	126.27778 ft	515.68195 ft	444.81234 psf	3,080.5896 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	119.05556 ft	515.14908 ft	474.50948 psf	2,875.5019 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	111.83333 ft	514.79499 ft	492.64793 psf	2,642.8898 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 22	104.61111 ft	514.61903 ft	501.65795 psf	2,381.8582 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	99.00000 ft	514.58966 ft	502.72194 psf	2,195.6259 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	93.37500 ft	514.69894 ft	495.41006 psf	2,138.7516 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	86.12500 ft	514.97897 ft	477.38699 psf	2,106.7982 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	78.87500 ft	515.43884 ft	448.3155 psf	2,047.1558 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	71.62500 ft	516.07941 ft	408.03271 psf	1,959.7023 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	64.50000 ft	516.88458 ft	357.69312 psf	1,697.9088 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	57.50000 ft	517.84962 ft	296.63674 psf	1,263.878 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	50.50000 ft	518.98735 ft	223.5304 psf	807.3179 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 31	43.50000 ft	520.29981 ft	85.697165 psf	330.39738 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt

Appendix H-7:
Seismic Full Pool with Stockpile



Block Slope Stability	
CWLP Seismic F-F' Stockpile.gsz	
07/09/2025	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: 428
Date: 07/09/2025
Time: 08:56:26 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:57:02 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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale

Slope Stability Material Model: Bedrock (Impenetrable)

Sand

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist

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

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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 514) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (57, 526) ft
- Lower Left: (45, 511) ft
- Lower Right: (100, 511) ft
- X Increments: 10
- Y Increments: 7
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (170, 533) ft
- Lower Left: (170, 514.5) ft
- Lower Right: (280, 518) ft
- X Increments: 10
- Y Increments: 6
- 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)
Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 55402 of 60984 converged

Current Slip Surface

Slip Surface: 7,906
Factor of Safety: 1.168
Volume: 6,429.0843 ft³
Weight: 743,177.39 lbf
Resisting Moment: 9,752,618.1 lbf·ft
Activating Moment: 8,348,169.6 lbf·ft

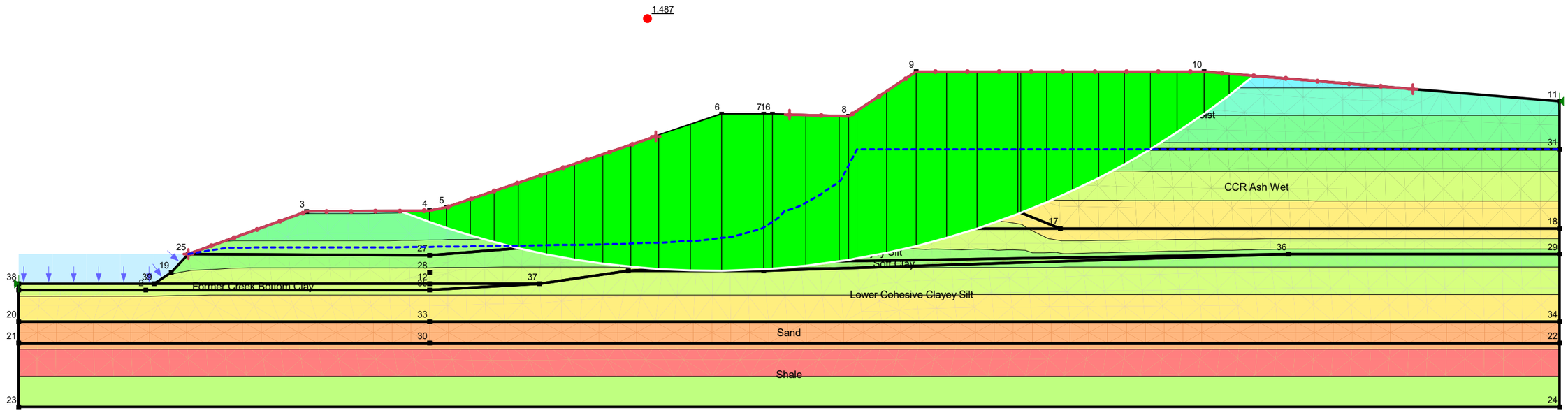
Resisting Force: 133,755.16 lbf
Activating Force: 114,525.42 lbf
Slip Rank: 1 of 60,984 slip surfaces
Exit: (280.29231, 563.97564) ft
Entry: (36.591493, 517.33586) ft
Radius: 105.71945 ft
Center: (151.74741, 575.63559) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	280.14615 ft	563.82949 ft	-1,131.8774 psf	10.064344 psf	5.8106518 psf	0 psf	0 psf	CCR Ash Moist
Column 2	275.50417 ft	559.18750 ft	-842.09579 psf	303.10798 psf	174.99947 psf	0 psf	0 psf	CCR Ash Moist
Column 3	266.51250 ft	550.19583 ft	-280.73828 psf	858.96266 psf	495.92232 psf	0 psf	0 psf	CCR Ash Moist
Column 4	257.53333 ft	541.21667 ft	260.18697 psf	1,727.1813 psf	393.07994 psf	0 psf	0 psf	CCR Ash Wet
Column 5	248.56667 ft	532.25000 ft	783.1354 psf	2,445.3916 psf	445.40019 psf	0 psf	0 psf	CCR Ash Wet
Column 6	243.70000 ft	527.38333 ft	999.86189 psf	2,320.7507 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 7	239.65833 ft	523.34167 ft	447.47385 psf	3,123.3108 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 8	232.00000 ft	519.54512 ft	201.39226 psf	4,521.4093 psf	0 psf	400 psf	0 psf	Soft Clay
Column 9	224.00000 ft	519.26869 ft	216.9148 psf	4,642.9775 psf	0 psf	400 psf	0 psf	Soft Clay
Column 10	216.00000 ft	518.99226 ft	233.00042 psf	4,765.3278 psf	0 psf	400 psf	0 psf	Soft Clay
Column 11	208.50000 ft	518.73311 ft	248.00766 psf	4,665.066 psf	0 psf	400 psf	0 psf	Soft Clay
Column 12	201.50000 ft	518.49124 ft	261.87684 psf	4,342.6263 psf	0 psf	400 psf	0 psf	Soft Clay
Column 13	197.00000 ft	518.33575 ft	270.62303 psf	4,138.6804 psf	0 psf	400 psf	0 psf	Soft Clay
Column 14	191.50000 ft	518.14570 ft	281.32983 psf	4,190.2598 psf	0 psf	400 psf	0 psf	Soft Clay
Column 15	182.50000 ft	517.83472 ft	298.92692 psf	4,379.6932 psf	0 psf	400 psf	0 psf	Soft Clay
Column 16	177.00000 ft	517.64468 ft	309.83914 psf	4,480.5836 psf	0 psf	400 psf	0 psf	Soft Clay
Column 17	171.00000 ft	517.43736 ft	321.61435 psf	4,517.146 psf	0 psf	400 psf	0 psf	Soft Clay
Column 18	162.17128 ft	517.13230 ft	339.4238 psf	4,411.1189 psf	0 psf	400 psf	0 psf	Soft Clay

Column 19	154.75692 ft	516.87610 ft	354.93613 psf	4,269.1298 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt
Column 20	147.58564 ft	516.62831 ft	370.18814 psf	4,010.502 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt
Column 21	141.71206 ft	516.42536 ft	382.71645 psf	3,794.8044 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt
Column 22	135.58171 ft	516.21353 ft	398.11094 psf	3,492.4045 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	127.89688 ft	515.94800 ft	417.44065 psf	3,206.644 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	120.21206 ft	515.68246 ft	433.9137 psf	2,917.8391 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	112.52724 ft	515.41692 ft	448.43565 psf	2,625.8142 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	104.84241 ft	515.15138 ft	463.42728 psf	2,330.4509 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	99.00000 ft	514.94951 ft	475.22234 psf	2,137.9971 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	92.75343 ft	514.73367 ft	488.08942 psf	2,103.5598 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	84.26028 ft	514.44020 ft	505.94124 psf	2,120.4499 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 30	75.76714 ft	514.14673 ft	524.06295 psf	2,134.9295 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 31	69.76028 ft	513.93918 ft	536.82597 psf	2,126.9957 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 32	64.45238 ft	513.75577 ft	548.59522 psf	1,992.5552 psf	0 psf	300 psf	0 psf	Former Creek

								Bottom Clay
Column 33	57.35714 ft	513.51060 ft	563.48196 psf	1,712.4774 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 34	50.26190 ft	513.26544 ft	577.38259 psf	1,430.8808 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 35	45.67962 ft	513.57143 ft	562.18335 psf	1,321.4004 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay
Column 36	42.32248 ft	514.96200 ft	470.35924 psf	1,131.8444 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 37	38.29575 ft	516.62993 ft	305.65291 psf	685.51824 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt



Circular Slope Stability	
CWLP Seismic F-F' Stockpile.gsz	
07/09/2025	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: 428
Date: 07/09/2025
Time: 08:56:26 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic F-F' Stockpile.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Alignment 6\
Last Solved Date: 07/09/2025
Last Solved Time: 08:56:36 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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale
Slope Stability Material Model: Bedrock (Impenetrable)

Sand
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
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt
Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist
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
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

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay

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: (40, 521) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (182.03757, 553.88785) ft
Right-Zone Right Coordinate: (329.26186, 559.89485) ft
Right-Zone Increment: 20
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 514) 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: 0.22868775
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.22868775
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.232)
Data Point: (0.20885434, 0.22868775)

Data Point: (0.38282598, 0.22868775)
Data Point: (0.70171264, 0.22868775)
Data Point: (1.2862257, 0.22868775)
Data Point: (2.357627, 0.22868775)
Data Point: (4.3214847, 0.22868775)
Data Point: (7.9211981, 0.22868775)
Data Point: (14.519403, 0.22868775)
Data Point: (26.613786, 0.22868775)
Data Point: (48.782557, 0.22868775)
Data Point: (89.417486, 0.22868775)
Data Point: (163.90053, 0.22868775)
Data Point: (300.42651, 0.22868775)
Data Point: (550.67599, 0.22868775)
Data Point: (1,009.3785, 0.22868775)
Data Point: (1,850.1713, 0.22868775)
Data Point: (3,391.3282, 0.22868775)
Data Point: (6,216.2392, 0.22868775)
Data Point: (11,394.247, 0.22868775)
Data Point: (20,885.434, 0.22868775)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.232
Sample Material: Clay
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	512.5 ft
Point 2	30 ft	512.5 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	564 ft
Point 10	280 ft	564 ft
Point 11	364 ft	557 ft
Point 12	97 ft	514 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	512.5 ft
Point 36	300 ft	521 ft
Point 37	123 ft	514 ft
Point 38	0 ft	514 ft
Point 39	32 ft	514 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist	11,10,9,8,16,40,31	2,758.3 ft²
Region 3	Shale	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet	26,17,18,31,40	2,652.9 ft²
Region 6	Sand	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay	1,2,35,37,12,39,38	165 ft²
Region 8	Lower Cohesive Clayey Silt	20,33,34,29,36,15,41,37,35,2,1	4,306.5 ft²
Region 9	Upper Cohesive Clayey Silt	39,19,25,27,32,17,18,29,36,13,41,37,12	2,285.9 ft²
Region 10	Soft Clay	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 4481 of 4851 converged

Current Slip Surface

Slip Surface: 2,248
Factor of Safety: 1.487
Volume: 5,147.6165 ft³
Weight: 581,278.7 lbf
Resisting Moment: 28,234,222 lbf·ft
Activating Moment: 18,997,098 lbf·ft
Resisting Force: 133,509.14 lbf
Activating Force: 89,781.705 lbf
Slip Rank: 1 of 4,851 slip surfaces
Exit: (291.75734, 563.02022) ft
Entry: (90.014058, 531.15182) ft
Radius: 200.71183 ft
Center: (163.92526, 717.75936) ft

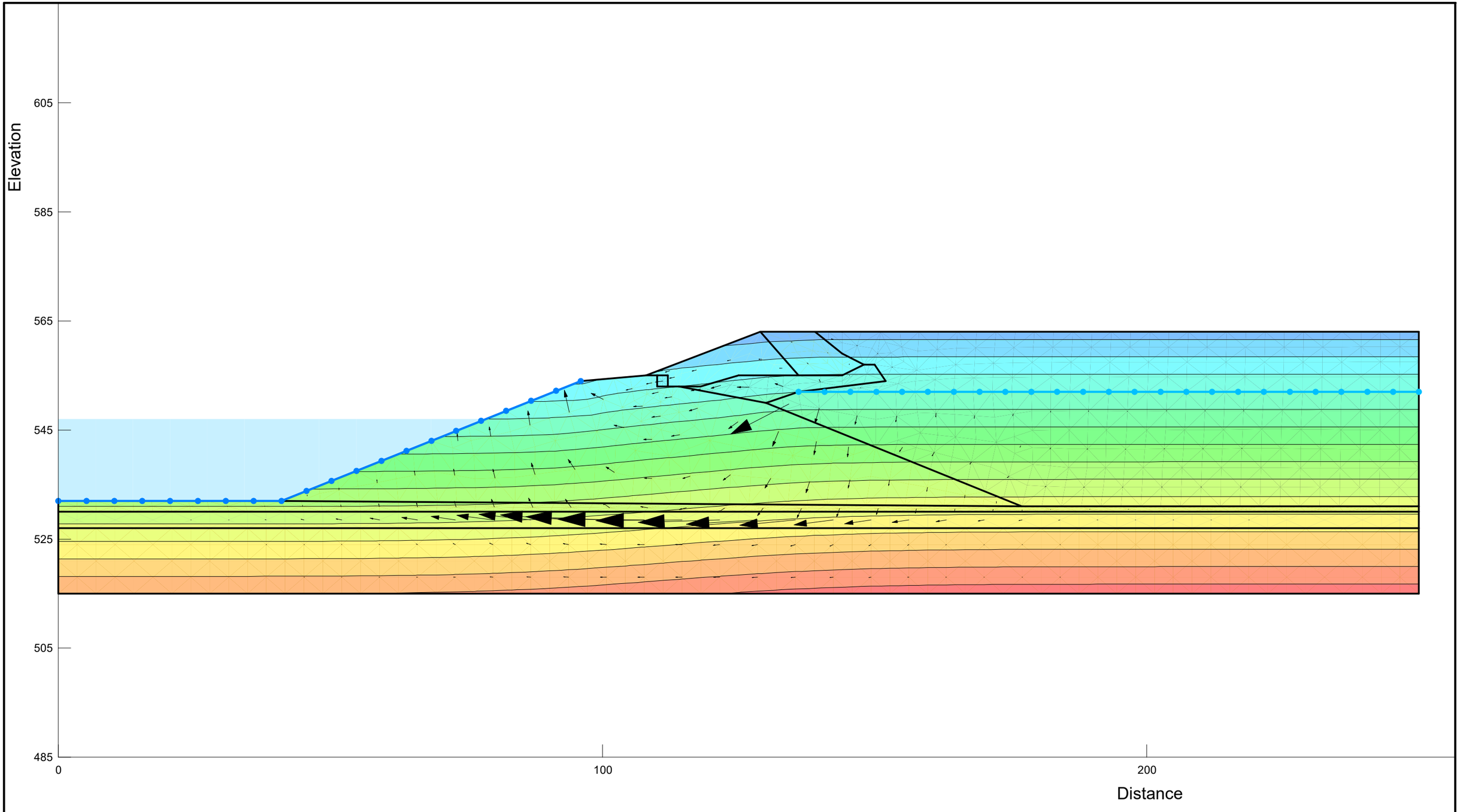
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	288.81800 ft	560.68313 ft	-935.42088 psf	186.51158 psf	107.68251 psf	0 psf	0 psf	CCR Ash Moist
Column 2	282.93933 ft	556.18101 ft	-654.36228 psf	553.84882 psf	319.76477 psf	0 psf	0 psf	CCR Ash Moist
Column 3	276.81832 ft	551.85099 ft	-384.04221 psf	899.44655 psf	519.29571 psf	0 psf	0 psf	CCR Ash Moist
Column 4	270.45497 ft	547.69300 ft	-124.44275 psf	1,223.5588 psf	706.422 psf	0 psf	0 psf	CCR Ash Moist
Column 5	264.21778 ft	543.93702 ft	102.1472 psf	1,684.6339 psf	424.02603 psf	0 psf	0 psf	CCR Ash Wet
Column 6	258.10675 ft	540.55012 ft	298.83577 psf	1,999.8767 psf	455.79254 psf	0 psf	0 psf	CCR Ash Wet
Column 7	251.99572 ft	537.43390 ft	481.09099 psf	2,292.0685 psf	485.24995 psf	0 psf	0 psf	CCR Ash Wet
Column 8	245.88469 ft	534.57452 ft	649.12699 psf	2,563.8588 psf	513.05084 psf	0 psf	0 psf	CCR Ash Wet
Column 9	239.77366 ft	531.96009 ft	808.91758 psf	2,817.7037 psf	538.25262 psf	0 psf	0 psf	CCR Ash Wet
Column 10	236.35907 ft	530.57380 ft	859.96987 psf	2,848.0139 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 11	231.17203 ft	528.71742 ft	688.64574 psf	3,143.2628 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 12	222.75805 ft	525.90036 ft	481.61238 psf	3,664.5998 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 13	215.58602 ft	523.84537 ft	368.91441 psf	4,014.3884 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 14	208.50000 ft	522.09269 ft	288.92611 psf	4,124.4307 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	201.50000 ft	520.62823 ft	238.02116 psf	3,992.833 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	197.00000 ft	519.79403 ft	219.64969 psf	3,898.9048 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 17	194.91406 ft	519.45725 ft	216.57991 psf	3,922.3947 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	189.87109 ft	518.77160 ft	245.00706 psf	4,110.9946 psf	0 psf	400 psf	0 psf	Soft Clay
Column 19	181.95703 ft	517.89863 ft	295.11994 psf	4,385.1656 psf	0 psf	400 psf	0 psf	Soft Clay

Column 20	177.00000 ft	517.47634 ft	319.88646 psf	4,529.1994 psf	0 psf	400 psf	0 psf	Soft Clay
Column 21	171.00000 ft	517.23466 ft	333.83764 psf	4,599.8282 psf	0 psf	400 psf	0 psf	Soft Clay
Column 22	162.30264 ft	517.08815 ft	342.12613 psf	4,519.2434 psf	0 psf	400 psf	0 psf	Soft Clay
Column 23	154.90791 ft	517.28435 ft	329.74891 psf	4,225.241 psf	0 psf	400 psf	0 psf	Soft Clay
Column 24	147.88873 ft	517.71695 ft	306.79164 psf	3,943.6149 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	141.24509 ft	518.36108 ft	274.06472 psf	3,602.7381 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	134.60146 ft	519.22957 ft	227.08411 psf	3,224.4698 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	127.95782 ft	520.32536 ft	162.73613 psf	2,809.1939 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	121.31419 ft	521.65230 ft	80.451073 psf	2,357.8704 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt
Column 29	115.16031 ft	523.08349 ft	-8.5266351 psf	2,019.0581 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 30	109.49619 ft	524.59089 ft	-102.6538 psf	1,590.2613 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 31	103.83206 ft	526.27767 ft	-210.99022 psf	1,139.5747 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 32	99.00000 ft	527.85022 ft	-314.31506 psf	775.24617 psf	0 psf	1,200 psf	0 psf	Silty Clay
Column 33	93.50703 ft	529.84289 ft	-444.99007 psf	480.20674 psf	0 psf	1,200 psf	0 psf	Silty Clay

Appendix I:
Rapid Drawdown Analysis

Appendix I-1:
Steady State Seepage Analysis



Intial Steady-State Condition	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/09/2025	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: 408
Date: 07/09/2025
Time: 04:06:07 PM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Rapid Drawdown\
Last Solved Date: 07/09/2025
Last Solved Time: 04:06:24 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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 4
Rotation: 0 °

Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

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

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
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 (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: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2977849e-08)
Data Point: (0.3864664, 2.2958239e-08)

Data Point: (0.71512174, 2.2928374e-08)
Data Point: (1.3232692, 2.2879881e-08)
Data Point: (2.4485922, 2.2800066e-08)
Data Point: (4.5309023, 2.2666108e-08)
Data Point: (8.384032, 2.2438922e-08)
Data Point: (15.513906, 2.2054082e-08)
Data Point: (28.707105, 2.1400875e-08)
Data Point: (53.119948, 2.0311541e-08)
Data Point: (98.293744, 1.8544223e-08)
Data Point: (181.88384, 1.5808266e-08)
Data Point: (336.55989, 1.1960834e-08)
Data Point: (622.77416, 7.3661998e-09)
Data Point: (1,152.3883, 3.268351e-09)
Data Point: (2,132.3921, 9.4065717e-10)
Data Point: (3,945.8021, 1.813189e-10)
Data Point: (7,301.3562, 2.7771852e-11)
Data Point: (13,510.511, 3.8199687e-12)
Data Point: (25,000, 2.9213842e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.3e-08 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)

Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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: 0.44
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	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay	23,7,25,2,1,28	359 ft²

Region 6	Clay Fill	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt	30,23,28,29	750 ft²
Region 8	Silty Clay	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash	25,7,33,26,15	2,067.5 ft²

Mesh Properties

Global Element Size: 7 ft

Appendix I-2:
Transient Seepage Analysis

Elevation

605
585
565
545
525
505
485

0
100
200

Distance

16-hr Rapid Rise Seepage Analysis	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/10/2025	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: 416
Date: 07/10/2025
Time: 07:25:19 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Rapid Drawdown\
Last Solved Date: 07/10/2025
Last Solved Time: 07:26:19 AM

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 4
Rotation: 0 °

Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

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

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
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 (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: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2977849e-08)
Data Point: (0.3864664, 2.2958239e-08)
Data Point: (0.71512174, 2.2928374e-08)
Data Point: (1.3232692, 2.2879881e-08)
Data Point: (2.4485922, 2.2800066e-08)
Data Point: (4.5309023, 2.2666108e-08)
Data Point: (8.384032, 2.2438922e-08)
Data Point: (15.513906, 2.2054082e-08)
Data Point: (28.707105, 2.1400875e-08)
Data Point: (53.119948, 2.0311541e-08)
Data Point: (98.293744, 1.8544223e-08)
Data Point: (181.88384, 1.5808266e-08)
Data Point: (336.55989, 1.1960834e-08)
Data Point: (622.77416, 7.3661998e-09)
Data Point: (1,152.3883, 3.268351e-09)
Data Point: (2,132.3921, 9.4065717e-10)
Data Point: (3,945.8021, 1.813189e-10)
Data Point: (7,301.3562, 2.7771852e-11)
Data Point: (13,510.511, 3.8199687e-12)
Data Point: (25,000, 2.9213842e-13)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.3e-08 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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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: 0.44
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 °	

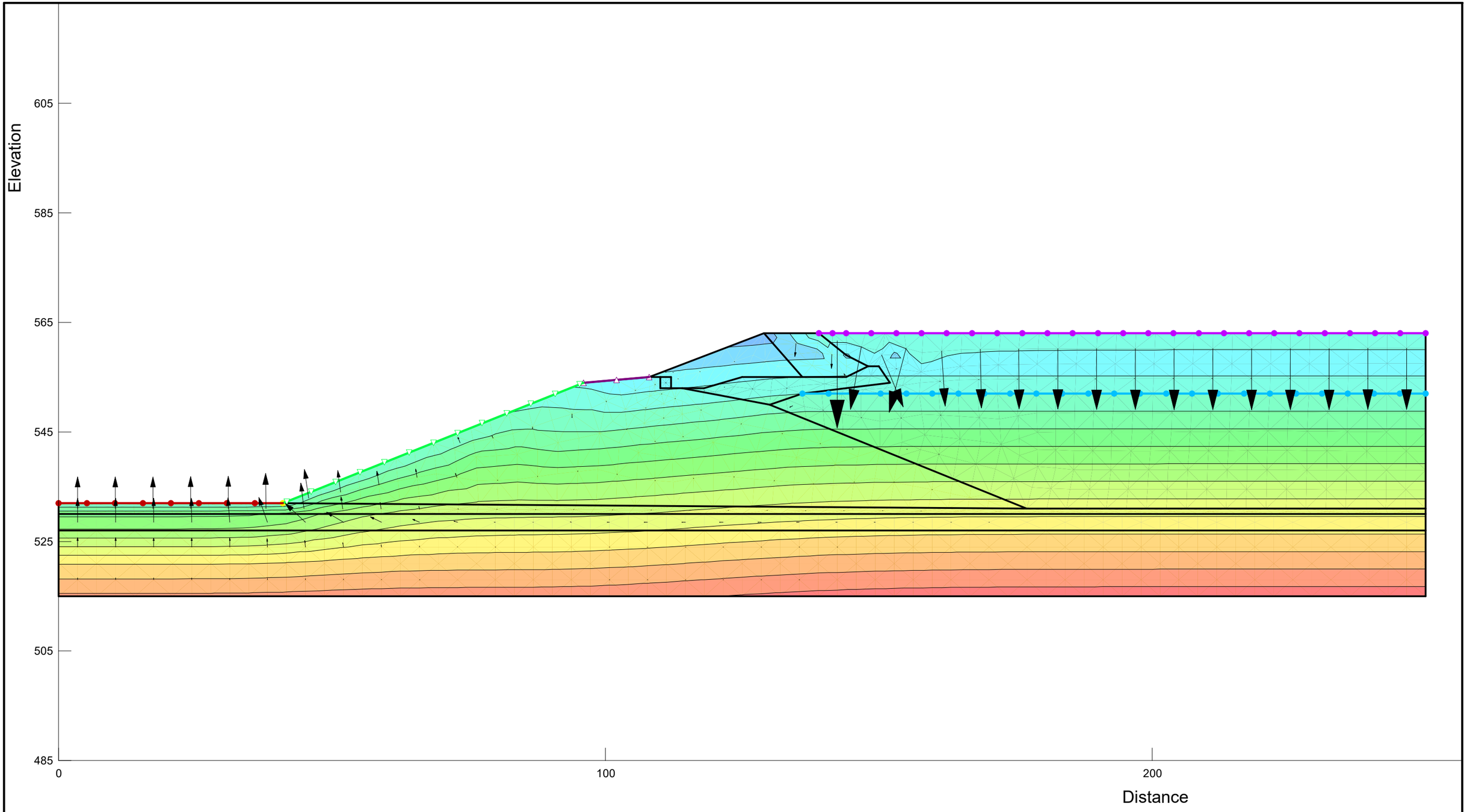
Regions

	Material	Points	Area
Region 1	Scrubber Sludge	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay	23,7,25,2,1,28	359 ft²
Region 6	Clay Fill	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt	30,23,28,29	750 ft²
Region 8	Silty Clay	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash	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



Instantaneous drawdown
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
07/10/2025 1:200

Elevation

605

585

565

545

525

505

485

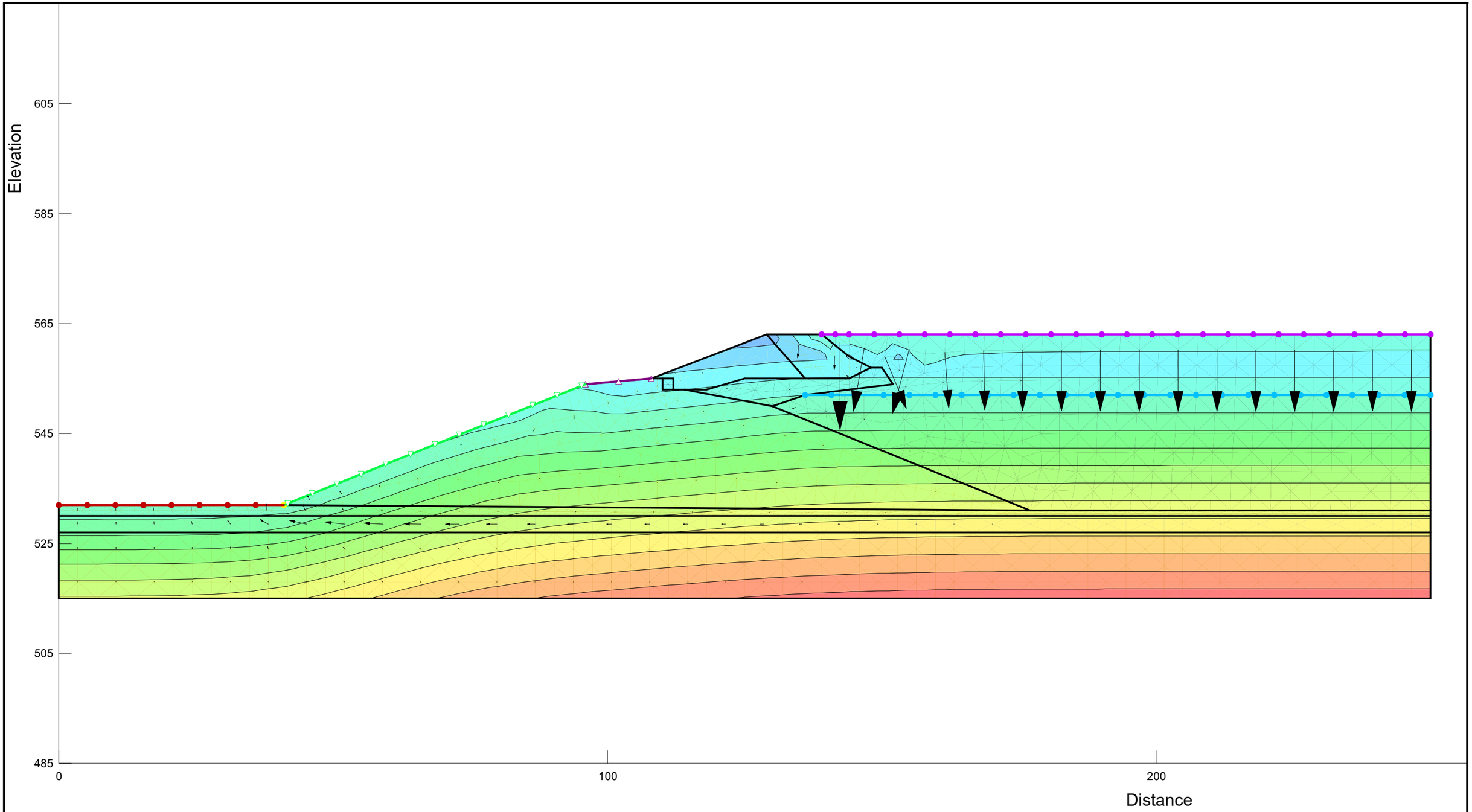
0

100

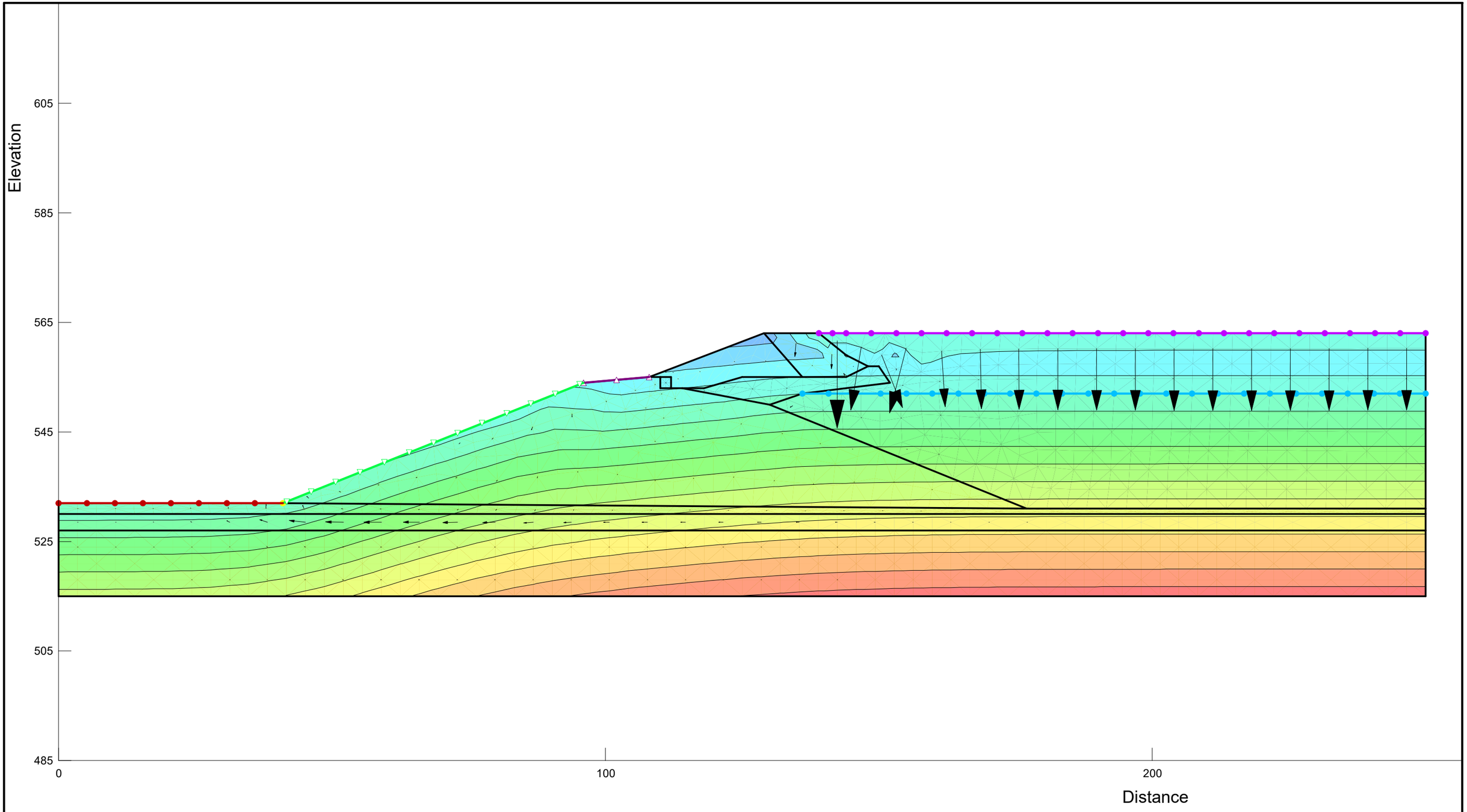
200

Distance

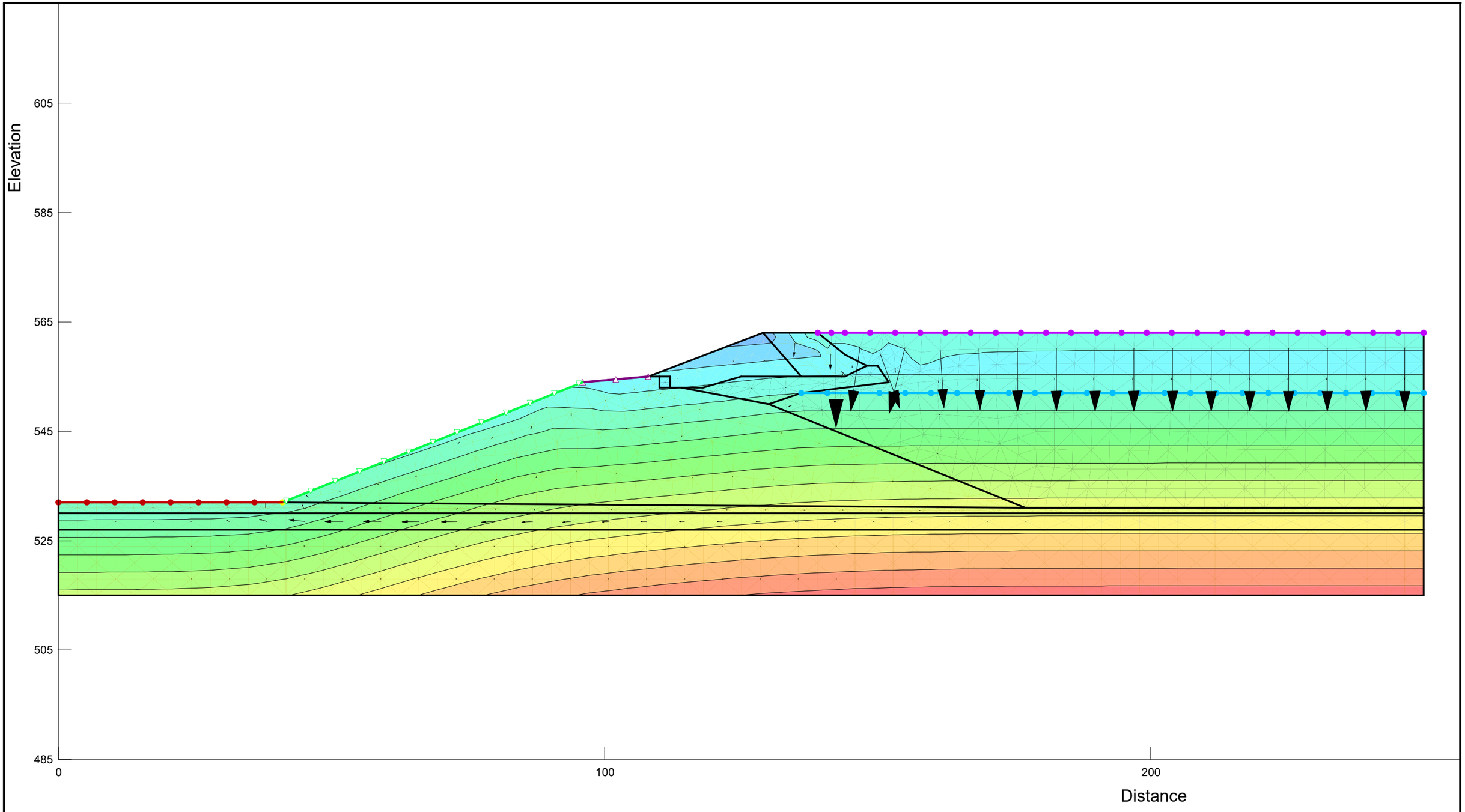
Instantaneous drawdown
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
07/10/2025 1:200



Instantaneous drawdown	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/10/2025	1:200



Instantaneous drawdown	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/10/2025	1:200



Instantaneous drawdown	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/10/2025	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: 416
Date: 07/10/2025
Time: 07:25:19 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Rapid Drawdown\
Last Solved Date: 07/10/2025
Last Solved Time: 07:26:19 AM

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

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 4
Rotation: 0 °

Silty Clay

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Fly Ash (Silty Clay)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silty Clay)
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge

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

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.3e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0
Compressibility: 0 /psf

Boundary Conditions

Drainage

Category: Hydraulic
Kind: Water Rate 0 ft³/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 (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: 2.3e-08 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.3e-08)
Data Point: (0.20885434, 2.2977849e-08)
Data Point: (0.3864664, 2.2958239e-08)
Data Point: (0.71512174, 2.2928374e-08)
Data Point: (1.3232692, 2.2879881e-08)
Data Point: (2.4485922, 2.2800066e-08)
Data Point: (4.5309023, 2.2666108e-08)
Data Point: (8.384032, 2.2438922e-08)
Data Point: (15.513906, 2.2054082e-08)
Data Point: (28.707105, 2.1400875e-08)
Data Point: (53.119948, 2.0311541e-08)
Data Point: (98.293744, 1.8544223e-08)
Data Point: (181.88384, 1.5808266e-08)
Data Point: (336.55989, 1.1960834e-08)
Data Point: (622.77416, 7.3661998e-09)
Data Point: (1,152.3883, 3.268351e-09)
Data Point: (2,132.3921, 9.4065717e-10)
Data Point: (3,945.8021, 1.813189e-10)
Data Point: (7,301.3562, 2.7771852e-11)
Data Point: (13,510.511, 3.8199687e-12)
Data Point: (25,000, 2.9213842e-13)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.3e-08 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)
Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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: 0.44
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 °	

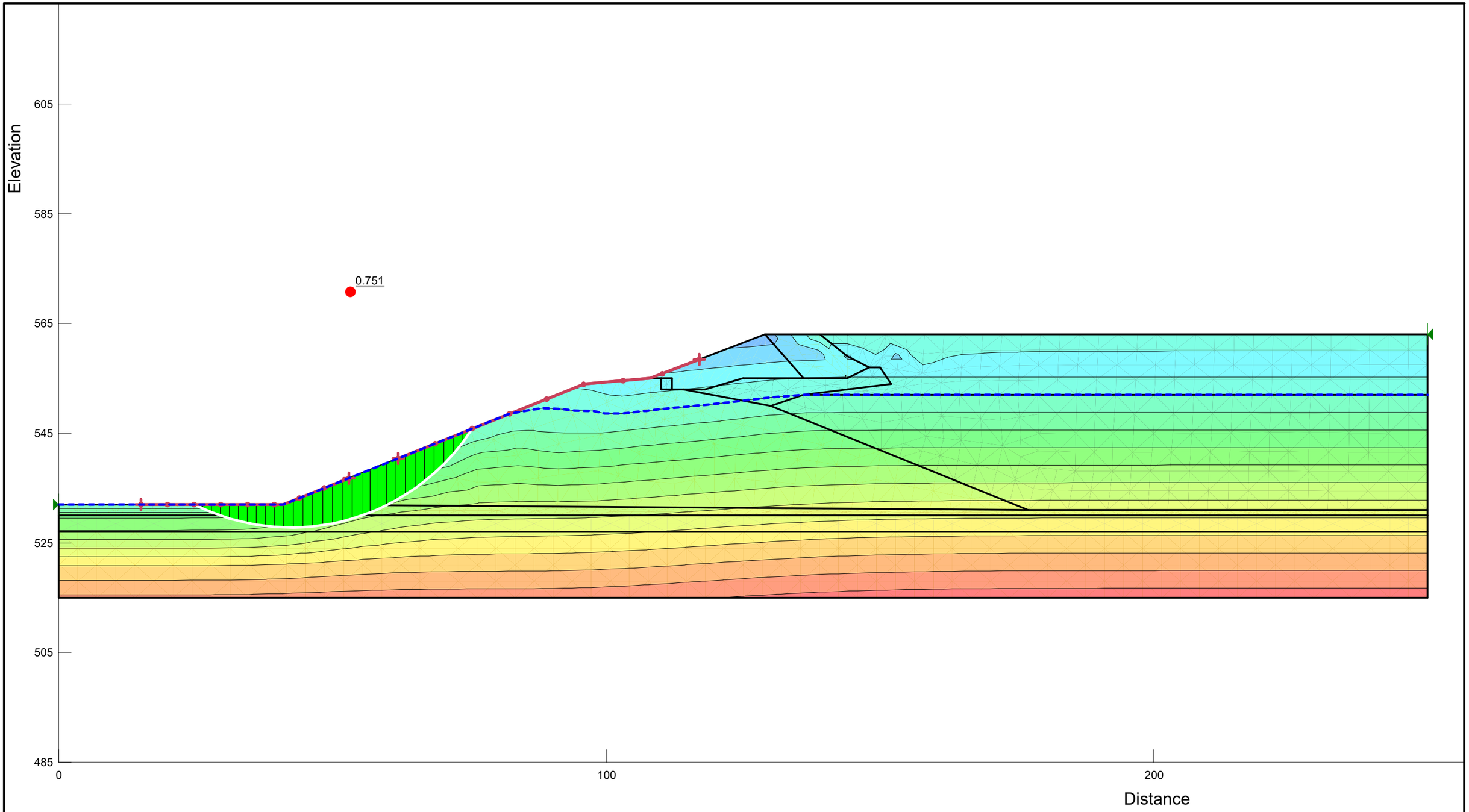
Regions

	Material	Points	Area
Region 1	Scrubber Sludge	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay	23,7,25,2,1,28	359 ft²
Region 6	Clay Fill	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt	30,23,28,29	750 ft²
Region 8	Silty Clay	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash	25,7,33,26,15	2,067.5 ft²

Mesh Properties

Global Element Size: 7 ft

Appendix I-4:
Drained Stability Analysis



Instantaneous DD Slope Stability	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
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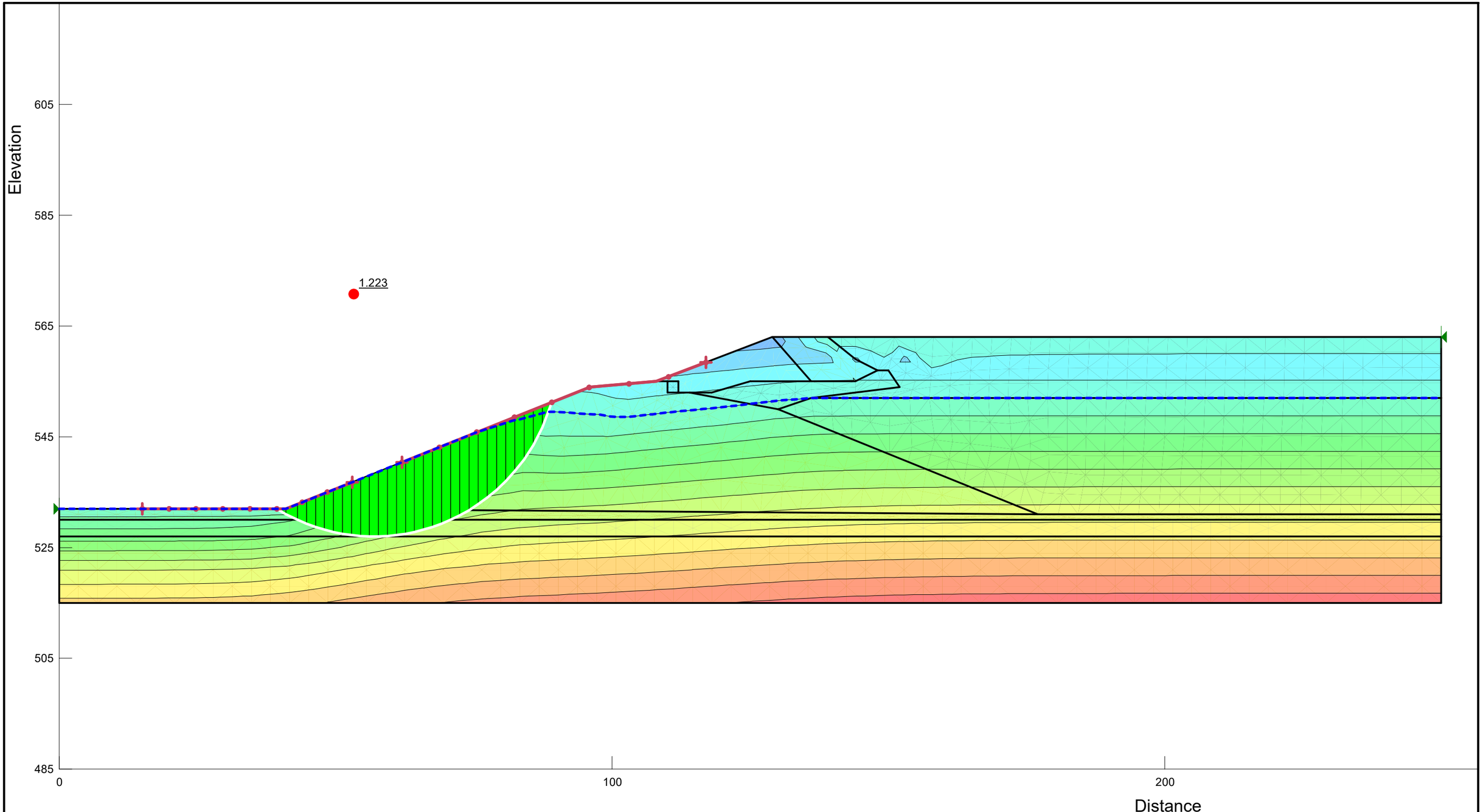

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CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
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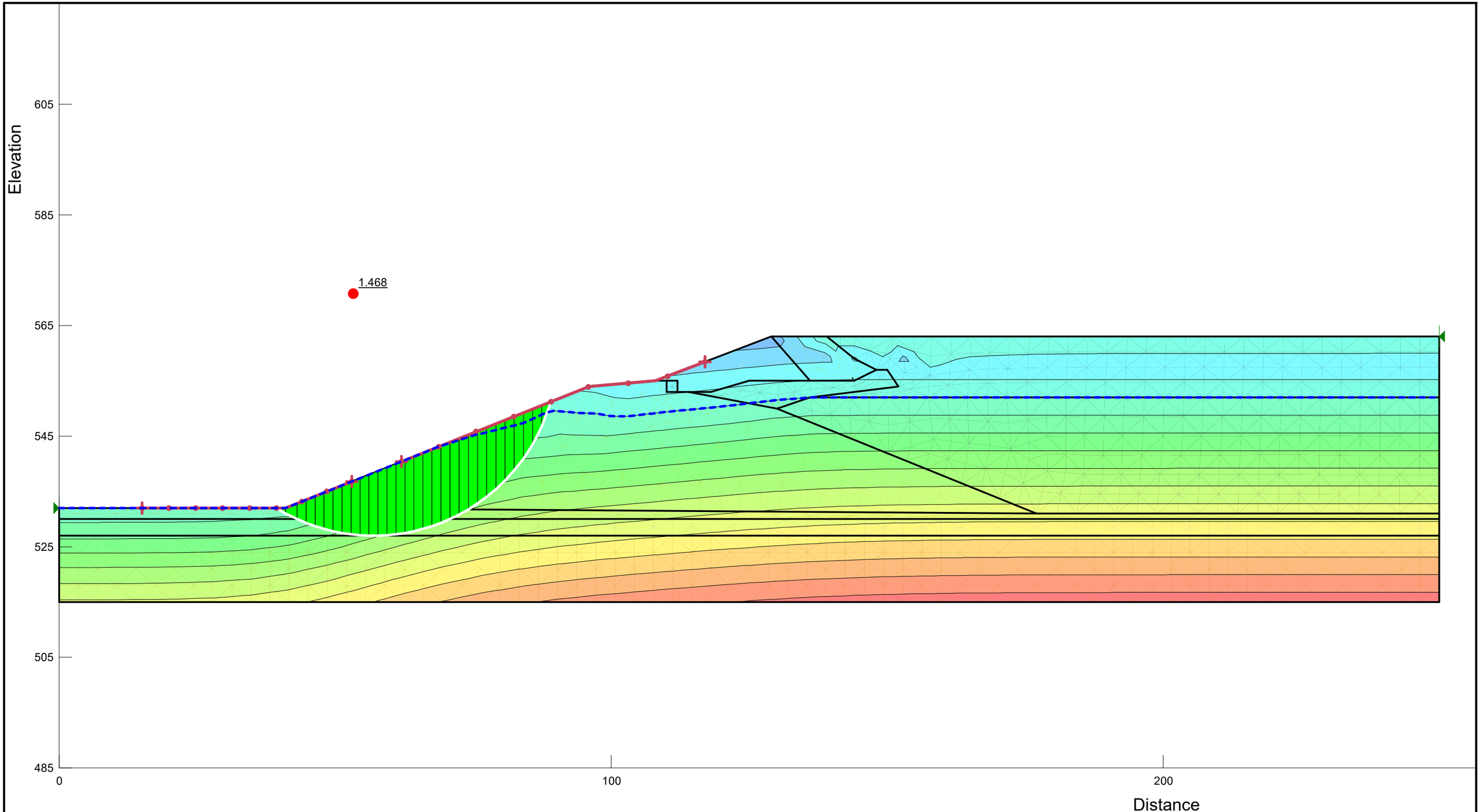

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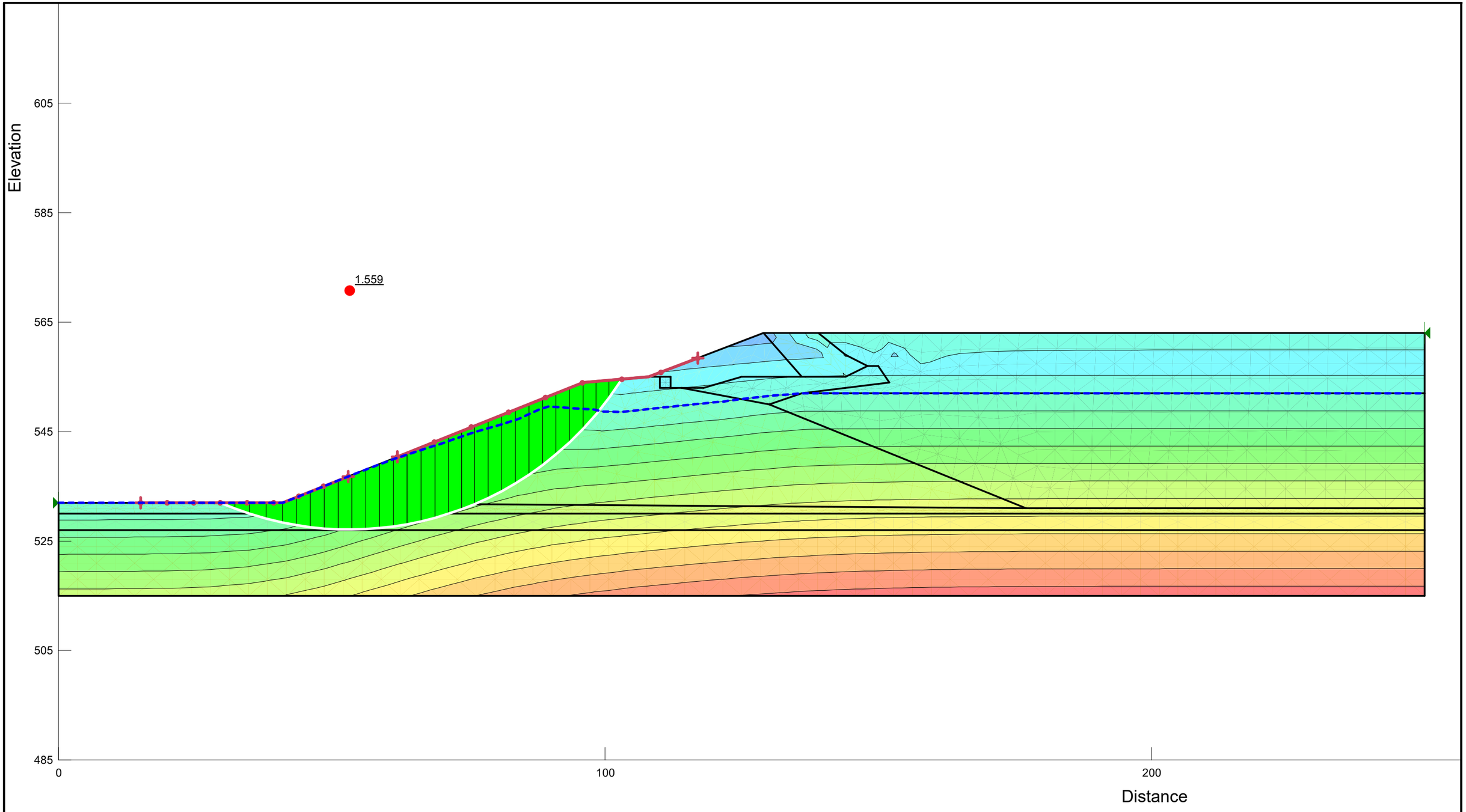

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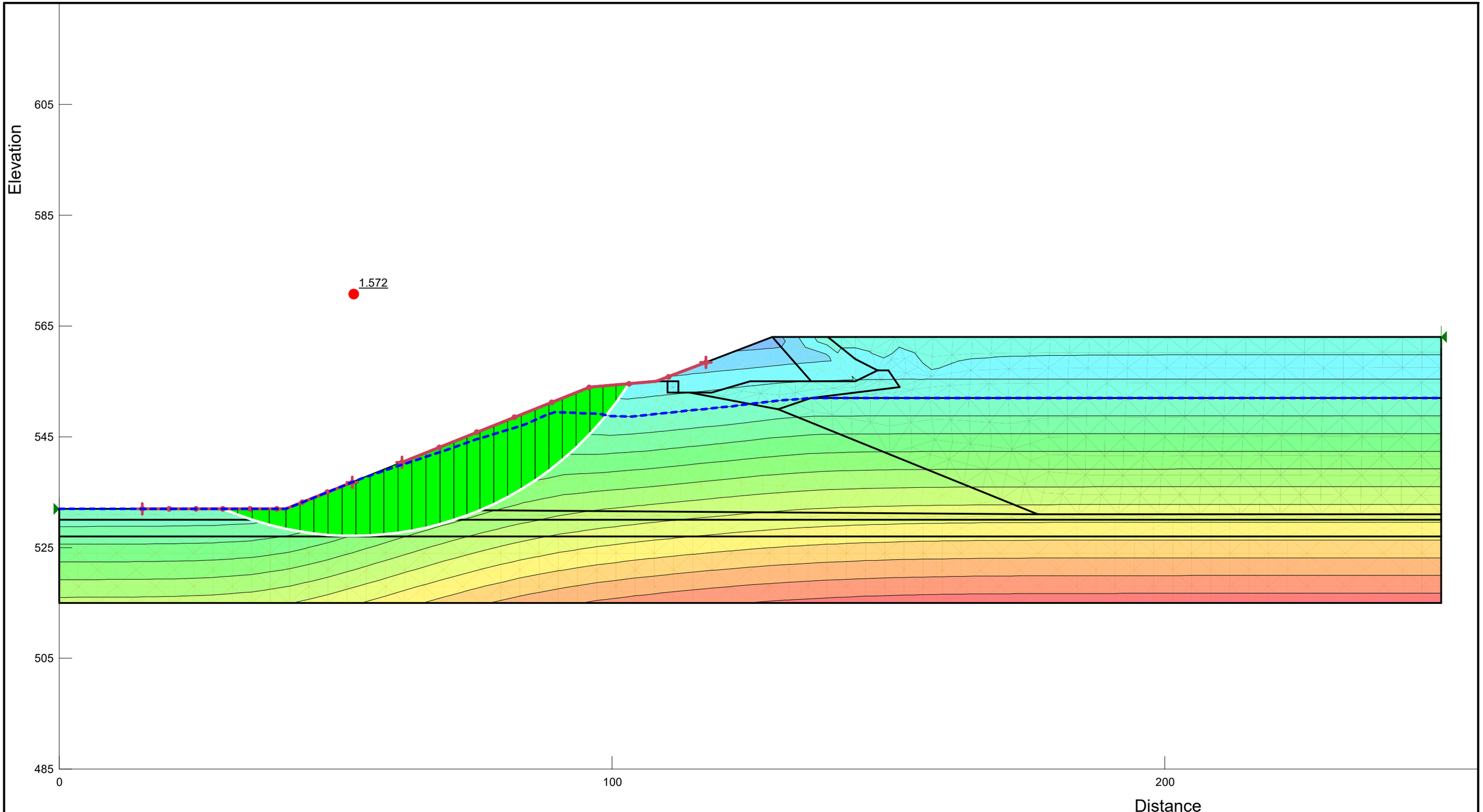

Instantaneous DD Slope Stability	
CWLP Rapid Drawdown Alignment 3 Max Pool.gsz	
07/10/2025	1:200

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: 416
Date: 07/10/2025
Time: 07:25:19 AM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown Alignment 3 Max Pool.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2025 Update\Rapid Drawdown\
Last Solved Date: 07/10/2025
Last Solved Time: 07:26:20 AM

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
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Silty Clay
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silty Clay)
Residual Water Content (% of Sat WC): 35 %

Upper Cohesive Clayey Silt
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Bottom Ash
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge
Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °

CCR Wet Ash

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 (Silty Clay)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.40000002
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.40000002
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999933)
Data Point: (0.38282598, 0.39999841)
Data Point: (0.70171264, 0.39999617)
Data Point: (1.2862257, 0.39999058)
Data Point: (2.357627, 0.39997643)
Data Point: (4.3214847, 0.39994028)
Data Point: (7.9211981, 0.39984728)
Data Point: (14.519403, 0.39960695)
Data Point: (26.613786, 0.39898469)
Data Point: (48.782557, 0.39737707)
Data Point: (89.417486, 0.39326799)
Data Point: (163.90053, 0.38308212)
Data Point: (300.42651, 0.35968724)

Data Point: (550.67599, 0.31418324)
Data Point: (1,009.3785, 0.24801666)
Data Point: (1,850.1713, 0.18119486)
Data Point: (3,391.3282, 0.13093286)
Data Point: (6,216.2392, 0.09780312)
Data Point: (11,394.247, 0.076025771)
Data Point: (20,885.434, 0.060887467)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
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

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	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash	20,21,22,19	4 ft²
Region 5	Silty Clay	23,7,25,2,1,28	359 ft²
Region 6	Clay Fill	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt	30,23,28,29	750 ft²
Region 8	Silty Clay	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash	25,7,33,26,15	2,067.5 ft²

Slip Results

Slip Surfaces Analysed: 316 of 405 converged

Current Slip Surface

Slip Surface: 168
Factor of Safety: 1.572
Volume: 678.84629 ft³
Weight: 84,538.297 lbf
Resisting Moment: 2,387,578.2 lbf·ft
Activating Moment: 1,518,384 lbf·ft
Resisting Force: 34,083.697 lbf
Activating Force: 21,676.838 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	-263.95854 psf	-173.85829 psf	-88.585224 psf	500 psf	0 psf	Clay Fill

Column 2	99.53755 ft	549.64836 ft	-46.117544 psf	132.36524 psf	67.443457 psf	500 psf	0 psf	Clay Fill
Column 3	97.17918 ft	546.83492 ft	123.47905 psf	442.05725 psf	162.3237 psf	500 psf	0 psf	Clay Fill
Column 4	94.75413 ft	544.28104 ft	260.60362 psf	694.68325 psf	221.17462 psf	500 psf	0 psf	Clay Fill
Column 5	92.26239 ft	541.94466 ft	390.57564 psf	886.05312 psf	252.45839 psf	500 psf	0 psf	Clay Fill
Column 6	89.77064 ft	539.85994 ft	488.25221 psf	1,044.2727 psf	283.30657 psf	500 psf	0 psf	Clay Fill
Column 7	87.27890 ft	537.99403 ft	563.17581 psf	1,176.069 psf	312.28466 psf	500 psf	0 psf	Clay Fill
Column 8	84.78716 ft	536.32225 ft	627.8198 psf	1,286.754 psf	335.74375 psf	500 psf	0 psf	Clay Fill
Column 9	82.29541 ft	534.82556 ft	675.91286 psf	1,377.54 psf	357.49691 psf	500 psf	0 psf	Clay Fill
Column 10	79.80367 ft	533.48900 ft	712.43997 psf	1,450.8095 psf	376.21806 psf	500 psf	0 psf	Clay Fill
Column 11	77.31193 ft	532.30063 ft	742.31283 psf	1,508.1602 psf	390.2187 psf	500 psf	0 psf	Clay Fill
Column 12	74.89487 ft	531.27844 ft	759.55704 psf	1,601.0906 psf	428.78275 psf	180 psf	0 psf	Silty Clay
Column 13	72.55248 ft	530.40736 ft	768.16077 psf	1,614.6905 psf	431.32842 psf	180 psf	0 psf	Silty Clay
Column 14	70.11540 ft	529.62032 ft	773.52299 psf	1,640.2518 psf	422.73186 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 15	67.58363 ft	528.92149 ft	771.47609 psf	1,624.4609 psf	416.02851 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 16	65.05185 ft	528.34176 ft	761.15359 psf	1,593.7457 psf	406.08228 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 17	62.52008 ft	527.87756 ft	743.72637 psf	1,547.7243 psf	392.13599 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 18	59.98831 ft	527.52616 ft	716.83812 psf	1,485.8593 psf	375.07671 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 19	57.45653 ft	527.28552 ft	683.09953 psf	1,407.6659 psf	353.39462 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 20	54.92476 ft	527.15430 ft	642.39203 psf	1,312.5891 psf	326.87693 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 21	52.39298 ft	527.13176 ft	594.34922 psf	1,200.1333 psf	295.46063 psf	0 psf	0 psf	Upper Cohesive

								Clayey Silt
Column 22	49.86121 ft	527.21778 ft	539.49144 psf	1,069.861 psf	258.67854 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 23	47.32944 ft	527.41284 ft	480.91455 psf	921.27464 psf	214.77797 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 24	44.79766 ft	527.71803 ft	418.00759 psf	754.0932 psf	163.9199 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 25	42.26589 ft	528.13508 ft	347.1023 psf	568.42044 psf	107.94407 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 26	39.47119 ft	528.73504 ft	278.44077 psf	423.70398 psf	70.849605 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 27	36.41357 ft	529.54912 ft	199.72351 psf	318.51404 psf	57.938012 psf	0 psf	0 psf	Upper Cohesive Clayey Silt
Column 28	33.56273 ft	530.46386 ft	118.10917 psf	248.44771 psf	66.410805 psf	180 psf	0 psf	Silty Clay
Column 29	30.91868 ft	531.46386 ft	39.435351 psf	124.64428 psf	43.41612 psf	180 psf	0 psf	Silty Clay

Appendix J:
Liquefaction Analysis

Appendix J-1:
Liquefaction Analysis at Toe of Slope

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Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

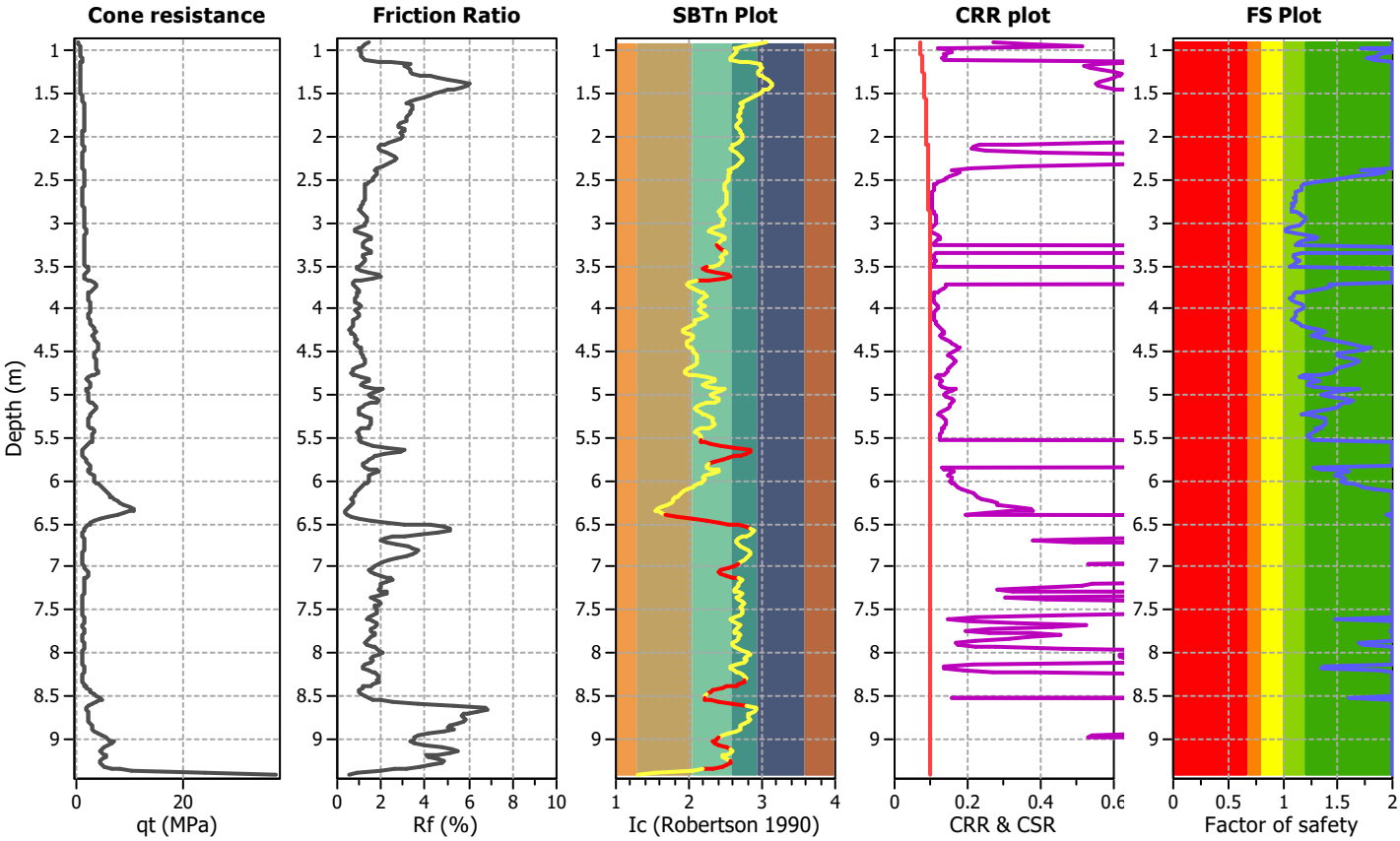
LIQUEFACTION ANALYSIS REPORT

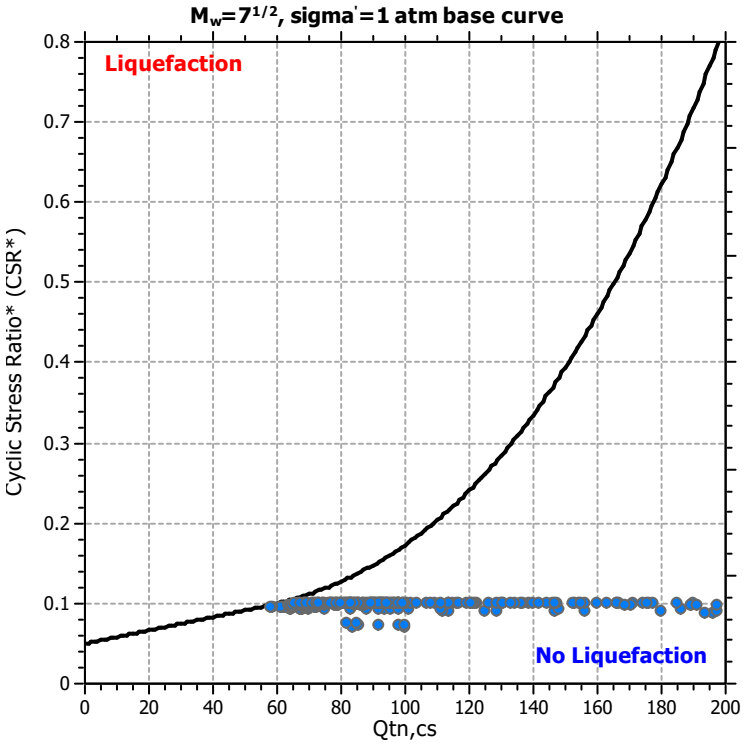
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

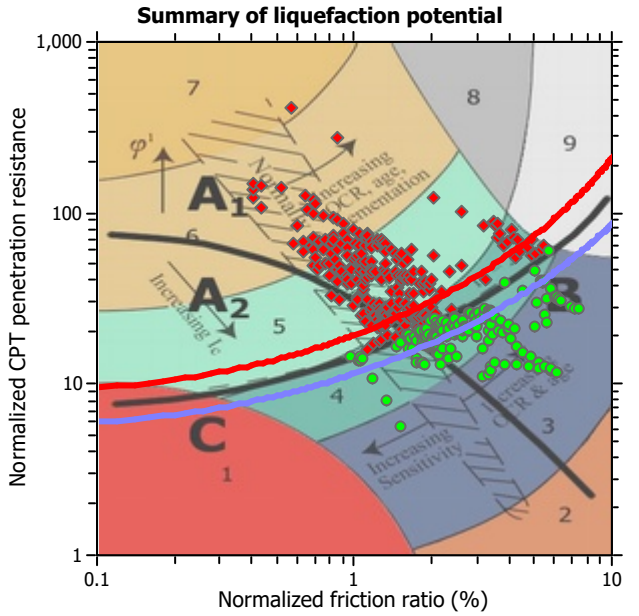
CPT file : CWLP CPT-2L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	0.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	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		

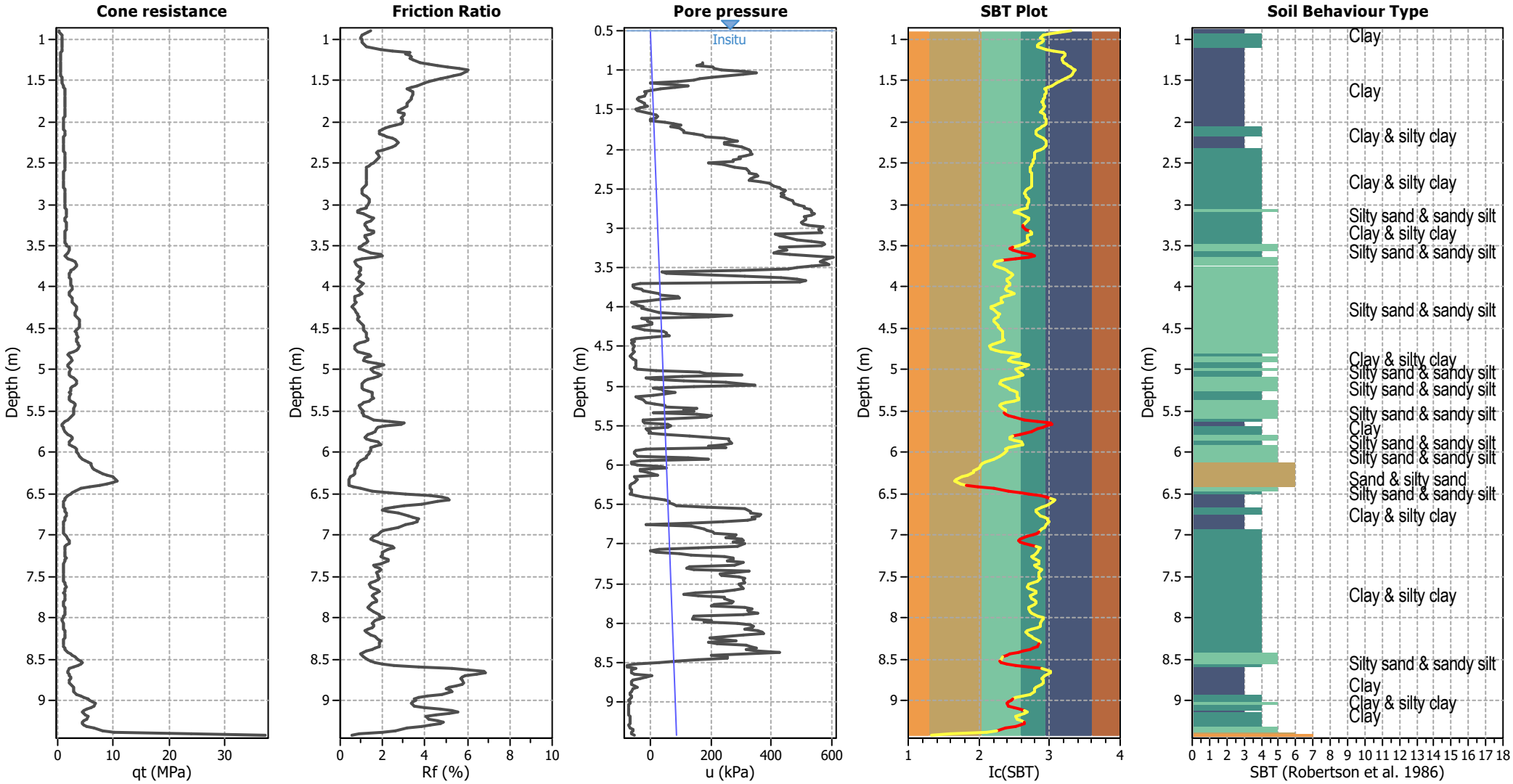






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



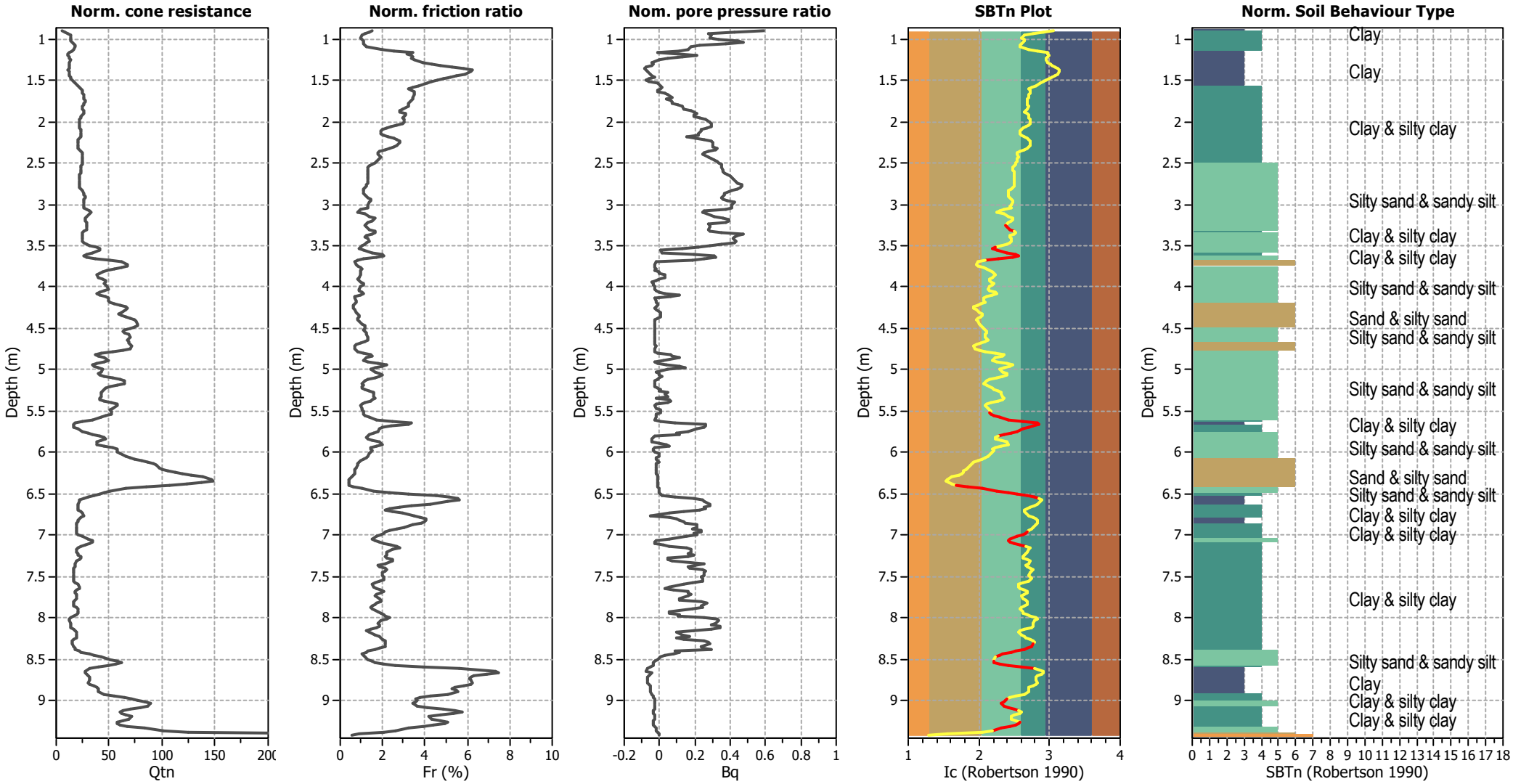
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	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)



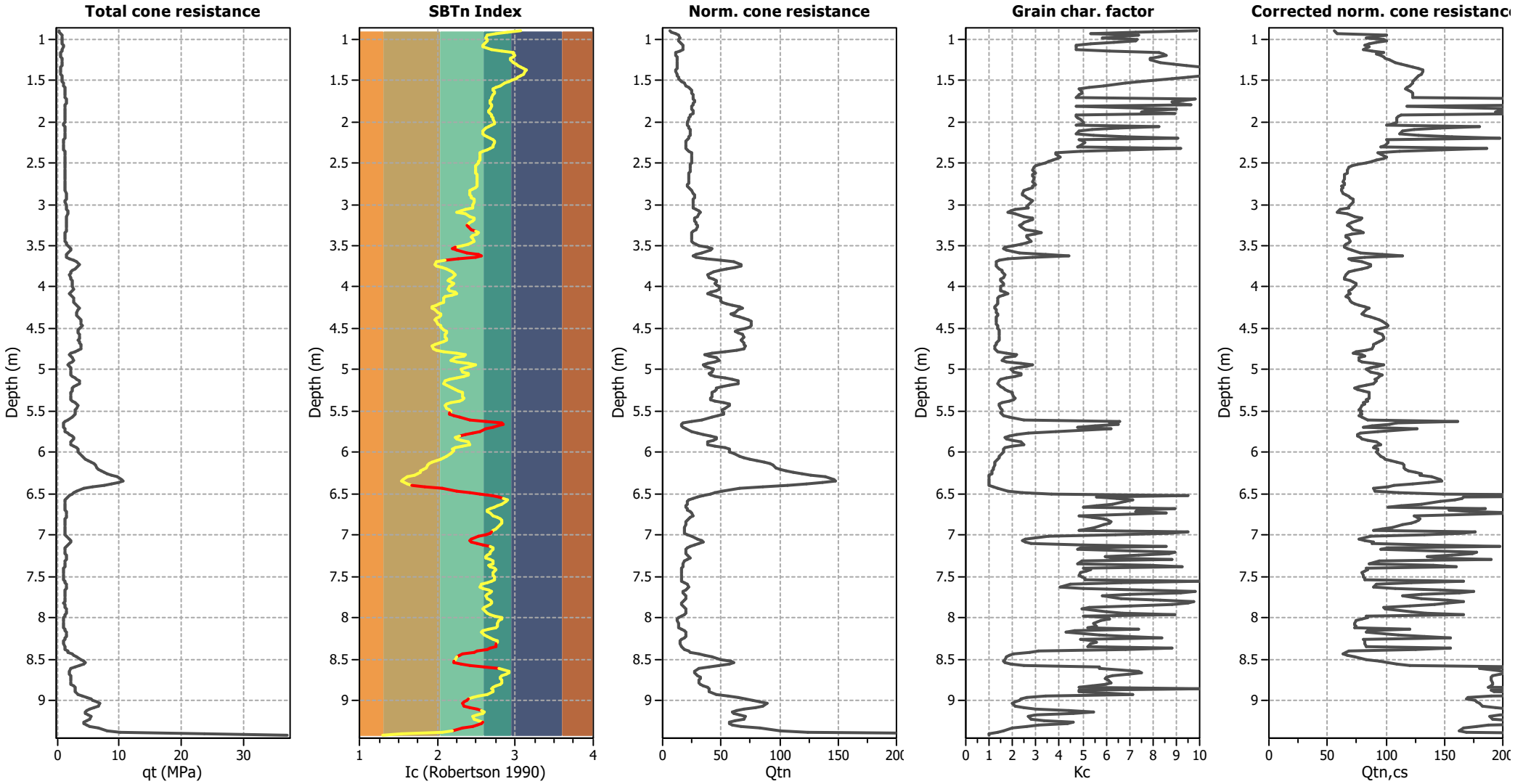
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	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

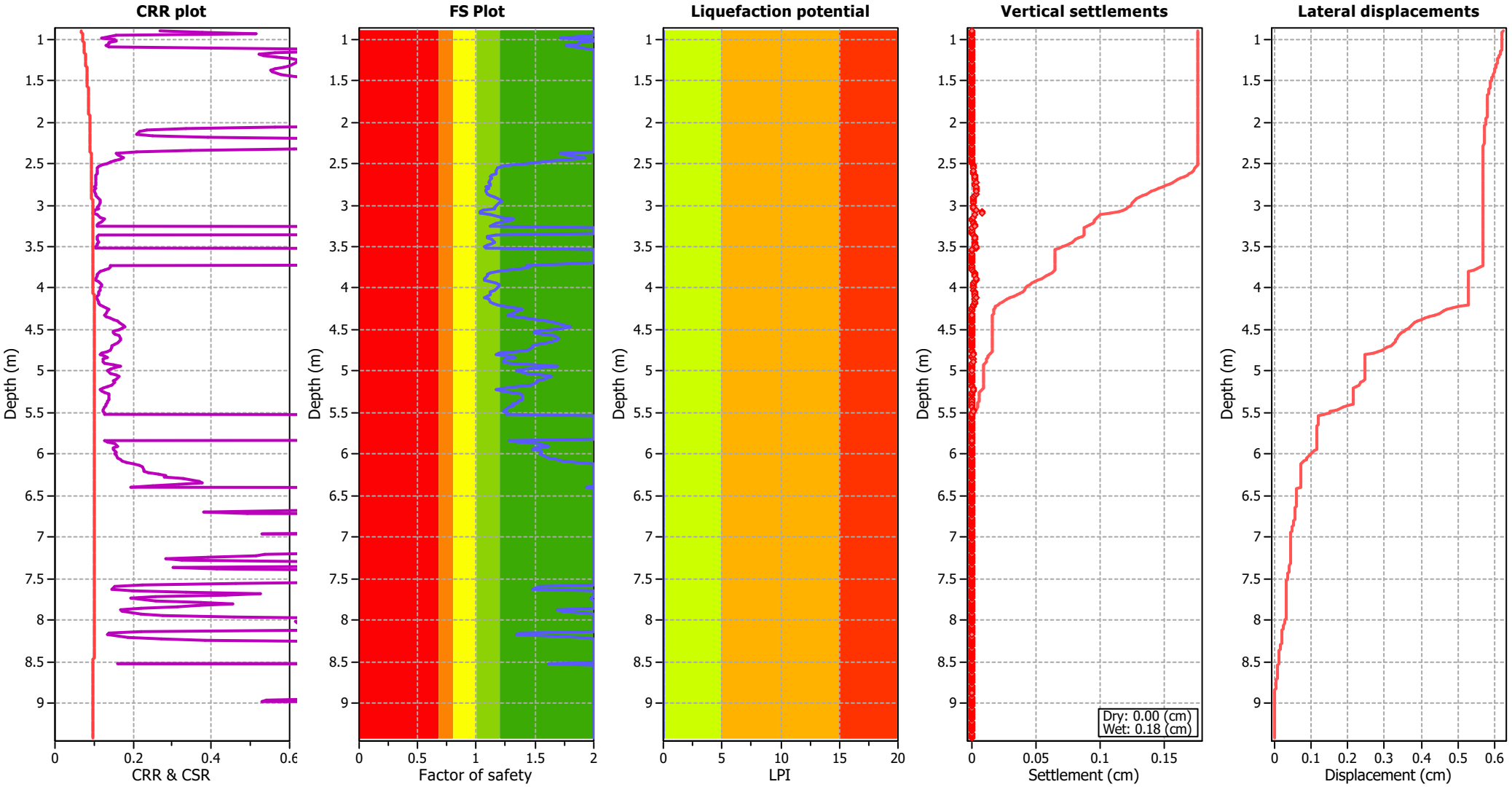
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
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_o 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:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

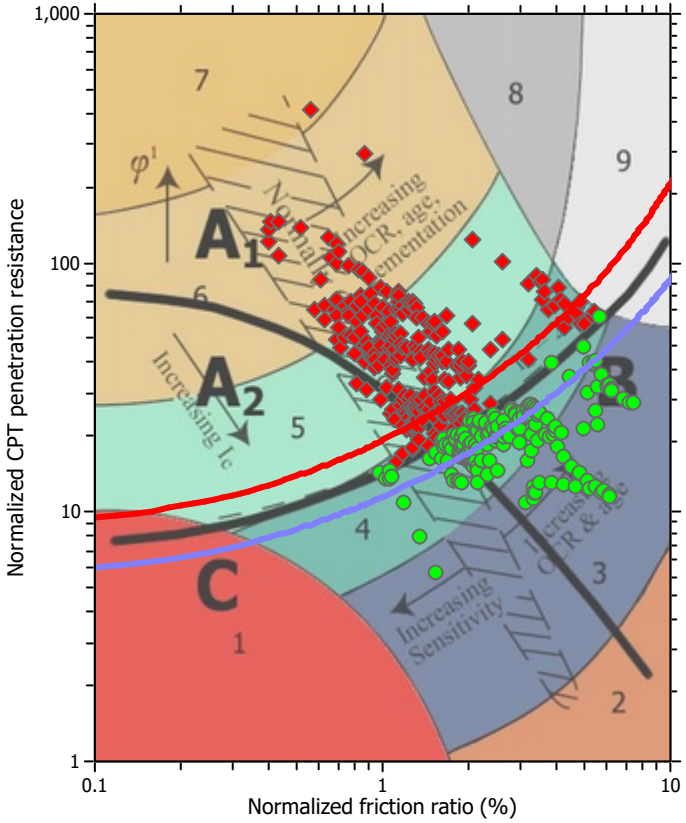
F.S. color scheme

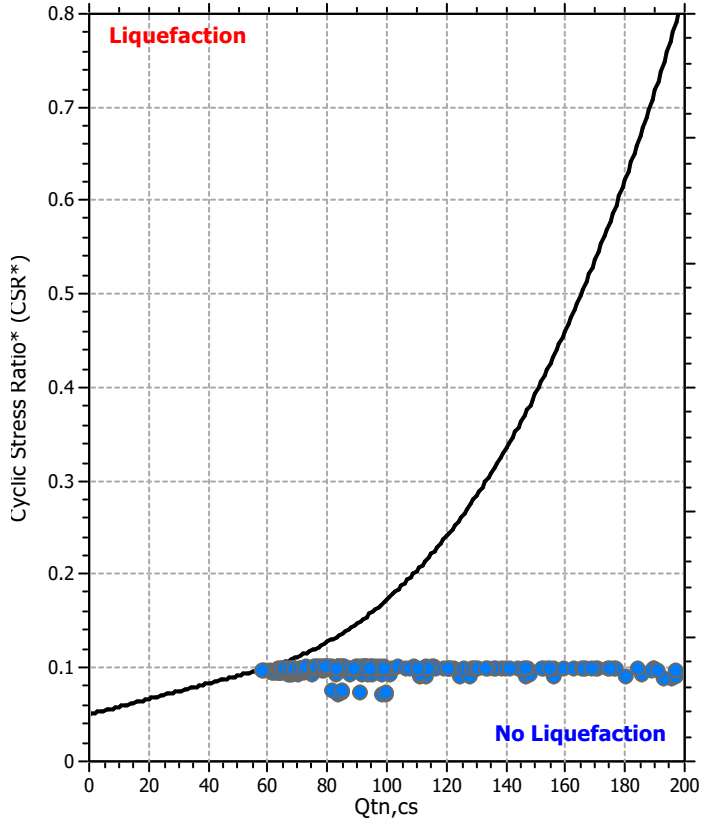
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

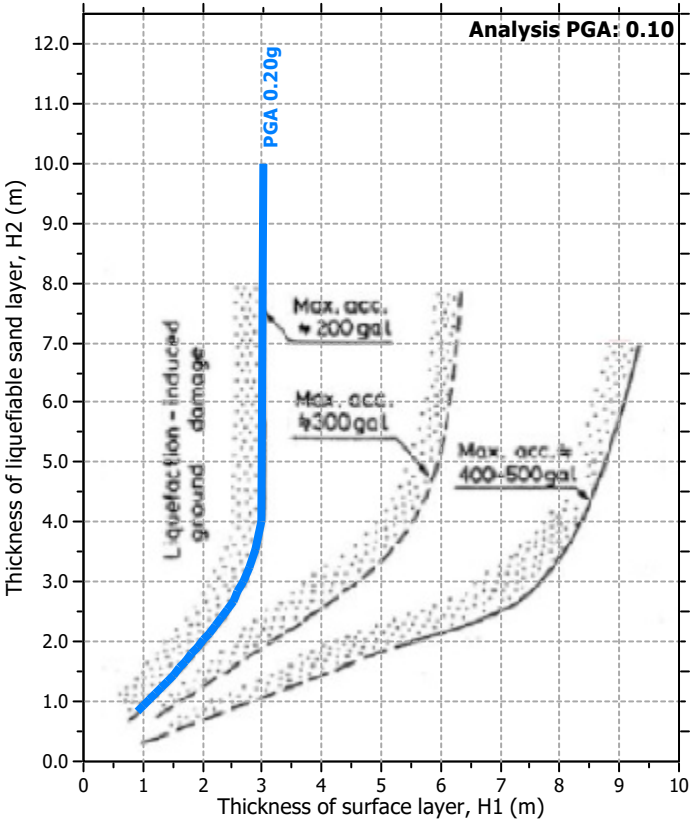
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



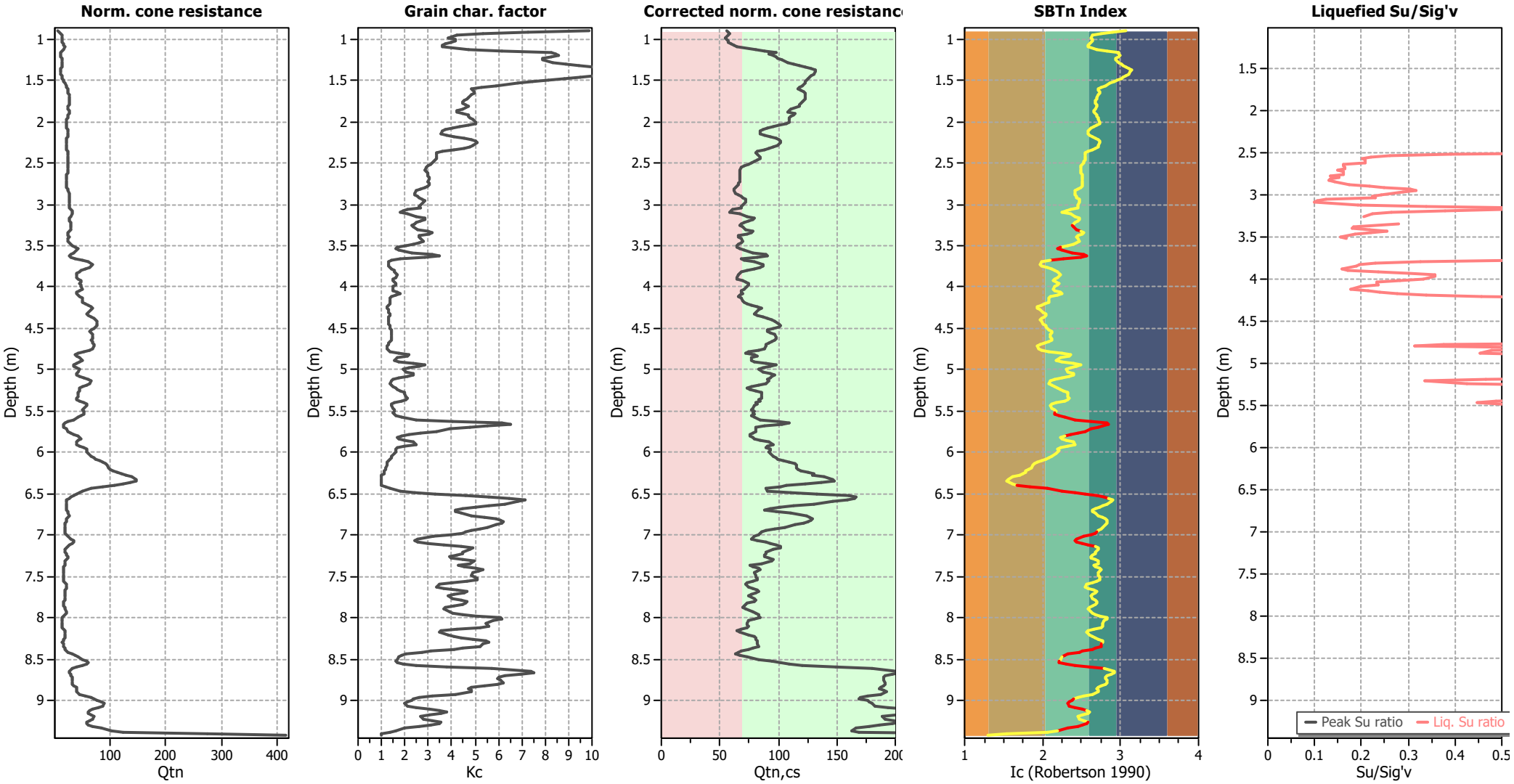




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

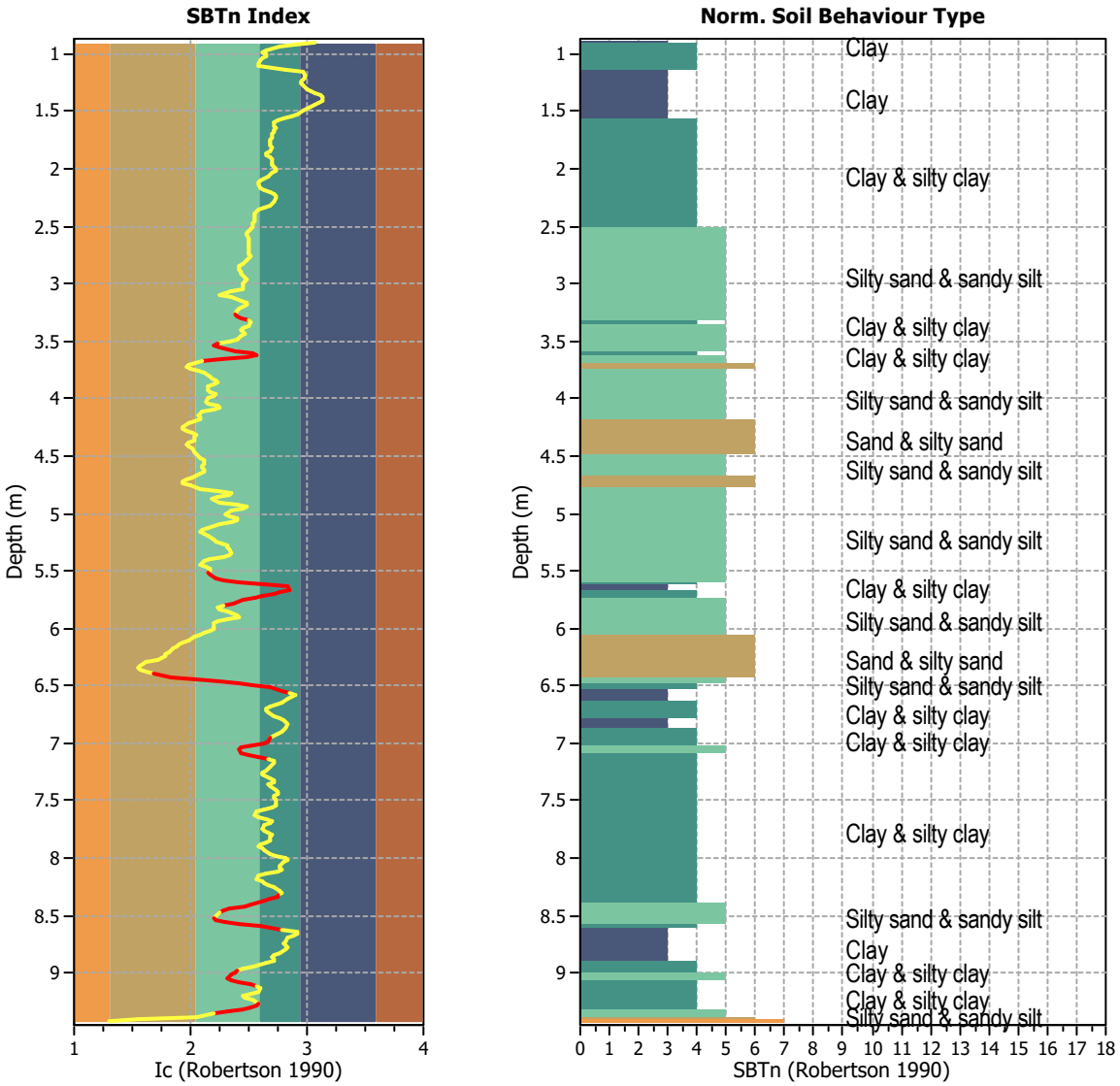
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	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	0.90	12.81	3.92	8.88	1.00	0.093	1.38	0.068	1.00	1.00	0.068	No
2	0.92	13.10	4.12	8.98	0.99	0.094	1.38	0.069	1.00	1.00	0.069	No
3	0.94	13.40	4.32	9.08	0.99	0.095	1.38	0.069	1.00	1.00	0.069	No
4	0.96	13.70	4.51	9.19	0.99	0.096	1.38	0.070	1.00	1.00	0.070	No
5	0.98	14.00	4.71	9.29	0.99	0.097	1.38	0.071	1.00	1.00	0.071	No
6	1.00	14.30	4.91	9.40	0.99	0.098	1.38	0.071	1.00	1.00	0.071	No
7	1.02	14.61	5.10	9.51	0.99	0.099	1.38	0.072	1.00	1.00	0.072	No
8	1.04	14.91	5.30	9.61	0.99	0.100	1.38	0.073	1.00	1.00	0.073	No
9	1.06	15.22	5.49	9.73	0.99	0.101	1.38	0.073	1.00	1.00	0.073	No
10	1.08	15.53	5.69	9.84	0.99	0.102	1.38	0.074	1.00	1.00	0.074	No
11	1.10	15.85	5.89	9.96	0.99	0.103	1.38	0.075	1.00	1.00	0.075	No
12	1.12	16.17	6.08	10.09	0.99	0.103	1.38	0.075	1.00	1.00	0.075	No
13	1.14	16.50	6.28	10.22	0.99	0.104	1.38	0.076	1.00	1.00	0.076	No
14	1.16	16.82	6.47	10.35	0.99	0.105	1.38	0.076	1.00	1.00	0.076	No
15	1.18	17.14	6.67	10.47	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
16	1.20	17.47	6.87	10.60	0.99	0.106	1.38	0.077	1.00	1.00	0.077	No
17	1.22	17.79	7.06	10.73	0.99	0.107	1.38	0.078	1.00	1.00	0.078	No
18	1.24	18.12	7.26	10.86	0.99	0.108	1.38	0.078	1.00	1.00	0.078	No
19	1.26	18.45	7.46	10.99	0.99	0.108	1.38	0.079	1.00	1.00	0.079	No
20	1.28	18.78	7.65	11.13	0.99	0.109	1.38	0.079	1.00	1.00	0.079	No
21	1.30	19.11	7.85	11.27	0.99	0.109	1.38	0.080	1.00	1.00	0.080	No
22	1.32	19.45	8.04	11.41	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
23	1.34	19.79	8.24	11.55	0.99	0.110	1.38	0.080	1.00	1.00	0.080	No
24	1.36	20.12	8.44	11.69	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
25	1.38	20.46	8.63	11.83	0.99	0.111	1.38	0.081	1.00	1.00	0.081	No
26	1.40	20.80	8.83	11.97	0.99	0.112	1.38	0.081	1.00	1.00	0.081	No
27	1.42	21.14	9.03	12.11	0.99	0.112	1.38	0.082	1.00	1.00	0.082	No
28	1.44	21.48	9.22	12.26	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No
29	1.46	21.82	9.42	12.40	0.99	0.113	1.38	0.082	1.00	1.00	0.082	No
30	1.48	22.16	9.61	12.54	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
31	1.50	22.50	9.81	12.69	0.99	0.114	1.38	0.083	1.00	1.00	0.083	No
32	1.52	22.84	10.01	12.83	0.99	0.115	1.38	0.083	1.00	1.00	0.083	No
33	1.54	23.18	10.20	12.98	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
34	1.56	23.52	10.40	13.13	0.99	0.115	1.38	0.084	1.00	1.00	0.084	No
35	1.58	23.87	10.59	13.27	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
36	1.60	24.21	10.79	13.42	0.99	0.116	1.38	0.084	1.00	1.00	0.084	No
37	1.62	24.56	10.99	13.57	0.99	0.116	1.38	0.085	1.00	1.00	0.085	No
38	1.64	24.91	11.18	13.73	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
39	1.66	25.26	11.38	13.88	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
40	1.68	25.61	11.58	14.03	0.99	0.117	1.38	0.085	1.00	1.00	0.085	No
41	1.70	25.96	11.77	14.19	0.99	0.118	1.38	0.085	1.00	1.00	0.085	No
42	1.72	26.31	11.97	14.34	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
43	1.74	26.66	12.16	14.49	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
44	1.76	27.01	12.36	14.65	0.99	0.118	1.38	0.086	1.00	1.00	0.086	No
45	1.78	27.36	12.56	14.80	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
46	1.80	27.70	12.75	14.95	0.99	0.119	1.38	0.086	1.00	1.00	0.086	No
47	1.82	28.05	12.95	15.10	0.99	0.119	1.38	0.087	1.00	1.00	0.087	No
48	1.84	28.39	13.15	15.25	0.99	0.120	1.38	0.087	1.00	1.00	0.087	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	1.86	28.74	13.34	15.40	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
50	1.88	29.08	13.54	15.55	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
51	1.90	29.43	13.73	15.70	0.99	0.120	1.38	0.087	1.00	1.00	0.087	No
52	1.92	29.78	13.93	15.85	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
53	1.94	30.12	14.13	15.99	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
54	1.96	30.46	14.32	16.14	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
55	1.98	30.80	14.52	16.29	0.99	0.121	1.38	0.088	1.00	1.00	0.088	No
56	2.00	31.15	14.72	16.43	0.99	0.122	1.38	0.088	1.00	1.00	0.088	No
57	2.02	31.49	14.91	16.57	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
58	2.04	31.82	15.11	16.72	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
59	2.06	32.16	15.30	16.86	0.99	0.122	1.38	0.089	1.00	1.00	0.089	No
60	2.08	32.49	15.50	17.00	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
61	2.10	32.83	15.70	17.13	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
62	2.12	33.16	15.89	17.27	0.99	0.123	1.38	0.089	1.00	1.00	0.089	No
63	2.14	33.50	16.09	17.41	0.99	0.123	1.38	0.090	1.00	1.00	0.090	No
64	2.16	33.83	16.28	17.55	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
65	2.18	34.17	16.48	17.69	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
66	2.20	34.50	16.68	17.83	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
67	2.22	34.84	16.87	17.97	0.99	0.124	1.38	0.090	1.00	1.00	0.090	No
68	2.24	35.18	17.07	18.11	0.98	0.124	1.38	0.090	1.00	1.00	0.090	No
69	2.26	35.52	17.27	18.25	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
70	2.28	35.85	17.46	18.39	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
71	2.30	36.19	17.66	18.53	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
72	2.32	36.52	17.85	18.67	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
73	2.34	36.85	18.05	18.80	0.98	0.125	1.38	0.091	1.00	1.00	0.091	No
74	2.36	37.19	18.25	18.94	0.98	0.126	1.38	0.091	1.00	1.00	0.091	No
75	2.38	37.52	18.44	19.08	0.98	0.126	1.38	0.091	1.00	1.00	0.091	No
76	2.40	37.85	18.64	19.21	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
77	2.42	38.19	18.84	19.35	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
78	2.44	38.52	19.03	19.49	0.98	0.126	1.38	0.092	1.00	1.00	0.092	No
79	2.46	38.85	19.23	19.63	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
80	2.48	39.19	19.42	19.76	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
81	2.50	39.52	19.62	19.90	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
82	2.52	39.85	19.82	20.03	0.98	0.127	1.38	0.092	1.00	1.00	0.092	No
83	2.54	40.17	20.01	20.16	0.98	0.127	1.38	0.093	1.00	1.00	0.093	No
84	2.56	40.50	20.21	20.29	0.98	0.127	1.38	0.093	1.00	1.00	0.093	No
85	2.58	40.82	20.40	20.42	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
86	2.60	41.14	20.60	20.54	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
87	2.62	41.47	20.80	20.67	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
88	2.64	41.79	20.99	20.80	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
89	2.66	42.11	21.19	20.92	0.98	0.128	1.38	0.093	1.00	1.00	0.093	No
90	2.68	42.44	21.39	21.05	0.98	0.129	1.38	0.093	1.00	1.00	0.093	No
91	2.70	42.76	21.58	21.18	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
92	2.72	43.08	21.78	21.30	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
93	2.74	43.40	21.97	21.43	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
94	2.76	43.72	22.17	21.55	0.98	0.129	1.38	0.094	1.00	1.00	0.094	No
95	2.78	44.04	22.37	21.68	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
96	2.80	44.36	22.56	21.80	0.98	0.130	1.38	0.094	1.00	1.00	0.094	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	2.82	44.68	22.76	21.92	0.98	0.130	1.38	0.094	1.00	1.00	0.094	No
98	2.84	45.00	22.96	22.05	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
99	2.86	45.33	23.15	22.18	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
100	2.88	45.65	23.35	22.31	0.98	0.130	1.38	0.095	1.00	1.00	0.095	No
101	2.90	45.98	23.54	22.44	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
102	2.92	46.31	23.74	22.57	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
103	2.94	46.64	23.94	22.70	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
104	2.96	46.97	24.13	22.84	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
105	2.98	47.30	24.33	22.97	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
106	3.00	47.63	24.53	23.10	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
107	3.02	47.95	24.72	23.23	0.98	0.131	1.38	0.095	1.00	1.00	0.095	No
108	3.04	48.28	24.92	23.36	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
109	3.06	48.60	25.11	23.49	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
110	3.08	48.93	25.31	23.62	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
111	3.10	49.25	25.51	23.75	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
112	3.12	49.58	25.70	23.88	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
113	3.14	49.91	25.90	24.02	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
114	3.16	50.25	26.09	24.15	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
115	3.18	50.58	26.29	24.29	0.98	0.132	1.38	0.096	1.00	1.00	0.096	No
116	3.20	50.92	26.49	24.43	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
117	3.22	51.25	26.68	24.56	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
118	3.24	51.57	26.88	24.69	0.98	0.133	1.38	0.096	1.00	1.00	0.096	No
119	3.26	51.90	27.08	24.83	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
120	3.28	52.23	27.27	24.96	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
121	3.30	52.56	27.47	25.10	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
122	3.32	52.90	27.66	25.23	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
123	3.34	53.23	27.86	25.37	0.98	0.133	1.38	0.097	1.00	1.00	2.000	Yes
124	3.36	53.56	28.06	25.50	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
125	3.38	53.88	28.25	25.63	0.98	0.133	1.38	0.097	1.00	1.00	0.097	No
126	3.40	54.21	28.45	25.76	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
127	3.42	54.53	28.65	25.89	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
128	3.44	54.86	28.84	26.02	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
129	3.46	55.19	29.04	26.15	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
130	3.48	55.51	29.23	26.28	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
131	3.50	55.84	29.43	26.41	0.98	0.134	1.38	0.097	1.00	1.00	0.097	No
132	3.52	56.17	29.63	26.55	0.98	0.134	1.38	0.098	1.00	1.00	0.098	No
133	3.54	56.51	29.82	26.69	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
134	3.56	56.85	30.02	26.83	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
135	3.58	57.18	30.21	26.97	0.98	0.134	1.38	0.098	1.00	1.00	2.000	Yes
136	3.60	57.52	30.41	27.11	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
137	3.62	57.86	30.61	27.26	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
138	3.64	58.20	30.80	27.40	0.98	0.135	1.38	0.098	1.00	1.00	2.000	Yes
139	3.66	58.53	31.00	27.53	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
140	3.68	58.87	31.20	27.67	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
141	3.70	59.21	31.39	27.82	0.97	0.135	1.38	0.098	1.00	1.00	2.000	Yes
142	3.72	59.55	31.59	27.96	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
143	3.74	59.90	31.78	28.11	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
144	3.76	60.24	31.98	28.26	0.97	0.135	1.38	0.098	1.00	1.00	0.098	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	3.78	60.59	32.18	28.41	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
146	3.80	60.93	32.37	28.56	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
147	3.82	61.26	32.57	28.70	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
148	3.84	61.60	32.77	28.83	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
149	3.86	61.93	32.96	28.97	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
150	3.88	62.26	33.16	29.10	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
151	3.90	62.59	33.35	29.24	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
152	3.92	62.93	33.55	29.38	0.97	0.135	1.38	0.098	1.00	1.00	0.098	No
153	3.94	63.27	33.75	29.52	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
154	3.96	63.61	33.94	29.67	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
155	3.98	63.95	34.14	29.81	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
156	4.00	64.29	34.34	29.95	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
157	4.02	64.63	34.53	30.10	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
158	4.04	64.96	34.73	30.24	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
159	4.06	65.30	34.92	30.38	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
160	4.08	65.63	35.12	30.51	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
161	4.10	65.97	35.32	30.65	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
162	4.12	66.30	35.51	30.79	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
163	4.14	66.63	35.71	30.92	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
164	4.16	66.97	35.90	31.06	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
165	4.18	67.30	36.10	31.20	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
166	4.20	67.64	36.30	31.34	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
167	4.22	67.97	36.49	31.48	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
168	4.24	68.31	36.69	31.62	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
169	4.26	68.65	36.89	31.77	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
170	4.28	68.99	37.08	31.91	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
171	4.30	69.33	37.28	32.06	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
172	4.32	69.68	37.47	32.20	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
173	4.34	70.02	37.67	32.35	0.97	0.136	1.38	0.099	1.00	1.00	0.099	No
174	4.36	70.37	37.87	32.50	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
175	4.38	70.71	38.06	32.65	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
176	4.40	71.06	38.26	32.80	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
177	4.42	71.42	38.46	32.96	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
178	4.44	71.77	38.65	33.12	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
179	4.46	72.13	38.85	33.28	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
180	4.48	72.48	39.04	33.44	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
181	4.50	72.84	39.24	33.60	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
182	4.52	73.19	39.44	33.75	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
183	4.54	73.54	39.63	33.91	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
184	4.56	73.90	39.83	34.07	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
185	4.58	74.25	40.02	34.23	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
186	4.60	74.61	40.22	34.39	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
187	4.62	74.97	40.42	34.55	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
188	4.64	75.32	40.61	34.71	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
189	4.66	75.68	40.81	34.87	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
190	4.68	76.03	41.01	35.02	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
191	4.70	76.37	41.20	35.17	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
192	4.72	76.72	41.40	35.32	0.97	0.137	1.38	0.099	1.00	1.00	0.099	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	4.74	77.06	41.59	35.47	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
194	4.76	77.41	41.79	35.62	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
195	4.78	77.75	41.99	35.76	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
196	4.80	78.09	42.18	35.90	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
197	4.82	78.43	42.38	36.05	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
198	4.84	78.77	42.58	36.20	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
199	4.86	79.11	42.77	36.34	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
200	4.88	79.46	42.97	36.49	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
201	4.90	79.80	43.16	36.64	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
202	4.92	80.15	43.36	36.79	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
203	4.94	80.50	43.56	36.94	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
204	4.96	80.84	43.75	37.09	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
205	4.98	81.19	43.95	37.24	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
206	5.00	81.54	44.15	37.39	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
207	5.02	81.88	44.34	37.54	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
208	5.04	82.23	44.54	37.70	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
209	5.06	82.58	44.73	37.85	0.97	0.137	1.38	0.099	1.00	1.00	0.099	No
210	5.08	82.94	44.93	38.01	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
211	5.10	83.29	45.13	38.16	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
212	5.12	83.64	45.32	38.32	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
213	5.14	84.00	45.52	38.48	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
214	5.16	84.35	45.71	38.64	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
215	5.18	84.70	45.91	38.79	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
216	5.20	85.04	46.11	38.94	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
217	5.22	85.38	46.30	39.08	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
218	5.24	85.73	46.50	39.23	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
219	5.26	86.07	46.70	39.38	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
220	5.28	86.42	46.89	39.53	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
221	5.30	86.77	47.09	39.68	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
222	5.32	87.11	47.28	39.83	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
223	5.34	87.46	47.48	39.98	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
224	5.36	87.80	47.68	40.13	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
225	5.38	88.15	47.87	40.28	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
226	5.40	88.50	48.07	40.43	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
227	5.42	88.85	48.27	40.58	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
228	5.44	89.19	48.46	40.73	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
229	5.46	89.54	48.66	40.88	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
230	5.48	89.88	48.85	41.03	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
231	5.50	90.23	49.05	41.18	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
232	5.52	90.58	49.25	41.33	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
233	5.54	90.92	49.44	41.48	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
234	5.56	91.27	49.64	41.63	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
235	5.58	91.61	49.83	41.78	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
236	5.60	91.96	50.03	41.92	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
237	5.62	92.30	50.23	42.07	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
238	5.64	92.63	50.42	42.21	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
239	5.66	92.97	50.62	42.35	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
240	5.68	93.29	50.82	42.48	0.96	0.137	1.38	0.100	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	5.70	93.62	51.01	42.61	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
242	5.72	93.95	51.21	42.74	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
243	5.74	94.28	51.40	42.88	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
244	5.76	94.62	51.60	43.02	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
245	5.78	94.96	51.80	43.16	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
246	5.80	95.30	51.99	43.31	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
247	5.82	95.64	52.19	43.46	0.96	0.137	1.38	0.100	1.00	1.00	2.000	Yes
248	5.84	95.99	52.39	43.61	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
249	5.86	96.34	52.58	43.76	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
250	5.88	96.69	52.78	43.91	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
251	5.90	97.04	52.97	44.07	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
252	5.92	97.39	53.17	44.22	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
253	5.94	97.75	53.37	44.38	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
254	5.96	98.11	53.56	44.54	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
255	5.98	98.46	53.76	44.70	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
256	6.00	98.82	53.96	44.87	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
257	6.02	99.18	54.15	45.03	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
258	6.04	99.54	54.35	45.19	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
259	6.06	99.90	54.54	45.36	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
260	6.08	100.26	54.74	45.52	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
261	6.10	100.62	54.94	45.69	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
262	6.12	100.99	55.13	45.85	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
263	6.14	101.35	55.33	46.02	0.96	0.137	1.38	0.100	1.00	1.00	0.100	No
264	6.16	101.71	55.52	46.19	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
265	6.18	102.08	55.72	46.36	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
266	6.20	102.44	55.92	46.52	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
267	6.22	102.80	56.11	46.69	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
268	6.24	103.17	56.31	46.86	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
269	6.26	103.54	56.51	47.03	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
270	6.28	103.91	56.70	47.20	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
271	6.30	104.27	56.90	47.37	0.96	0.137	1.38	0.099	1.00	1.00	0.099	No
272	6.32	104.64	57.09	47.54	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
273	6.34	105.00	57.29	47.71	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
274	6.36	105.36	57.49	47.88	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
275	6.38	105.72	57.68	48.04	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
276	6.40	106.08	57.88	48.20	0.95	0.137	1.38	0.099	1.00	1.00	0.099	No
277	6.42	106.43	58.08	48.36	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
278	6.44	106.79	58.27	48.52	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
279	6.46	107.14	58.47	48.68	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
280	6.48	107.51	58.66	48.84	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
281	6.50	107.87	58.86	49.01	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
282	6.52	108.24	59.06	49.18	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
283	6.54	108.60	59.25	49.35	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
284	6.56	108.96	59.45	49.51	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
285	6.58	109.32	59.64	49.68	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
286	6.60	109.67	59.84	49.83	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
287	6.62	110.02	60.04	49.99	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
288	6.64	110.37	60.23	50.13	0.95	0.136	1.38	0.099	1.00	1.00	0.099	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	6.66	110.70	60.43	50.28	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
290	6.68	111.04	60.63	50.42	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
291	6.70	111.38	60.82	50.56	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
292	6.72	111.72	61.02	50.70	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
293	6.74	112.07	61.21	50.85	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
294	6.76	112.42	61.41	51.01	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
295	6.78	112.77	61.61	51.16	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
296	6.80	113.12	61.80	51.32	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
297	6.82	113.47	62.00	51.47	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
298	6.84	113.82	62.20	51.62	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
299	6.86	114.16	62.39	51.77	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
300	6.88	114.51	62.59	51.92	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
301	6.90	114.85	62.78	52.06	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
302	6.92	115.18	62.98	52.20	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
303	6.94	115.52	63.18	52.34	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
304	6.96	115.85	63.37	52.48	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
305	6.98	116.18	63.57	52.61	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
306	7.00	116.51	63.77	52.75	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
307	7.02	116.85	63.96	52.89	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
308	7.04	117.19	64.16	53.03	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
309	7.06	117.54	64.35	53.19	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
310	7.08	117.89	64.55	53.34	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
311	7.10	118.24	64.75	53.49	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
312	7.12	118.59	64.94	53.64	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
313	7.14	118.93	65.14	53.79	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
314	7.16	119.27	65.33	53.94	0.95	0.136	1.38	0.099	1.00	1.00	2.000	Yes
315	7.18	119.61	65.53	54.08	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
316	7.20	119.95	65.73	54.22	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
317	7.22	120.28	65.92	54.36	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
318	7.24	120.62	66.12	54.50	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
319	7.26	120.96	66.32	54.64	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
320	7.28	121.30	66.51	54.79	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
321	7.30	121.64	66.71	54.93	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
322	7.32	121.98	66.90	55.08	0.95	0.136	1.38	0.099	1.00	1.00	0.099	No
323	7.34	122.31	67.10	55.21	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
324	7.36	122.64	67.30	55.34	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
325	7.38	122.97	67.49	55.48	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
326	7.40	123.30	67.69	55.61	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
327	7.42	123.63	67.89	55.74	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
328	7.44	123.96	68.08	55.88	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
329	7.46	124.29	68.28	56.01	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
330	7.48	124.61	68.47	56.14	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
331	7.50	124.94	68.67	56.27	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
332	7.52	125.27	68.87	56.41	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
333	7.54	125.60	69.06	56.54	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
334	7.56	125.93	69.26	56.67	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
335	7.58	126.26	69.45	56.80	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
336	7.60	126.59	69.65	56.94	0.94	0.136	1.38	0.099	1.00	1.00	0.099	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	7.62	126.92	69.85	57.07	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
338	7.64	127.26	70.04	57.21	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
339	7.66	127.59	70.24	57.35	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
340	7.68	127.92	70.44	57.49	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
341	7.70	128.25	70.63	57.62	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
342	7.72	128.58	70.83	57.76	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
343	7.74	128.91	71.02	57.89	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
344	7.76	129.25	71.22	58.03	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
345	7.78	129.58	71.42	58.16	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
346	7.80	129.91	71.61	58.30	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
347	7.82	130.23	71.81	58.43	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
348	7.84	130.56	72.01	58.55	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
349	7.86	130.88	72.20	58.68	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
350	7.88	131.21	72.40	58.81	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
351	7.90	131.54	72.59	58.95	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
352	7.92	131.88	72.79	59.09	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
353	7.94	132.21	72.99	59.23	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
354	7.96	132.55	73.18	59.36	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
355	7.98	132.88	73.38	59.50	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
356	8.00	133.21	73.58	59.63	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
357	8.02	133.53	73.77	59.76	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
358	8.04	133.85	73.97	59.89	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
359	8.06	134.17	74.16	60.01	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
360	8.08	134.50	74.36	60.14	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
361	8.10	134.82	74.56	60.26	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
362	8.12	135.14	74.75	60.39	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
363	8.14	135.46	74.95	60.52	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
364	8.16	135.79	75.14	60.64	0.94	0.136	1.38	0.099	1.00	1.00	0.099	No
365	8.18	136.12	75.34	60.78	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
366	8.20	136.45	75.54	60.91	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
367	8.22	136.78	75.73	61.05	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
368	8.24	137.12	75.93	61.19	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
369	8.26	137.45	76.13	61.32	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
370	8.28	137.78	76.32	61.46	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
371	8.30	138.11	76.52	61.59	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
372	8.32	138.44	76.71	61.72	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
373	8.34	138.77	76.91	61.86	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
374	8.36	139.10	77.11	61.99	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
375	8.38	139.43	77.30	62.13	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
376	8.40	139.76	77.50	62.27	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
377	8.42	140.10	77.70	62.40	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
378	8.44	140.44	77.89	62.54	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
379	8.46	140.78	78.09	62.69	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
380	8.48	141.13	78.28	62.85	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
381	8.50	141.49	78.48	63.01	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
382	8.52	141.85	78.68	63.18	0.93	0.136	1.38	0.099	1.00	1.00	0.099	No
383	8.54	142.22	78.87	63.35	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
384	8.56	142.60	79.07	63.53	0.93	0.136	1.38	0.099	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	8.58	142.97	79.26	63.70	0.93	0.136	1.38	0.099	1.00	1.00	2.000	Yes
386	8.60	143.34	79.46	63.88	0.93	0.136	1.38	0.098	1.00	1.00	2.000	Yes
387	8.62	143.72	79.66	64.06	0.93	0.135	1.38	0.098	1.00	1.00	2.000	Yes
388	8.64	144.10	79.85	64.24	0.93	0.135	1.38	0.098	1.00	1.00	2.000	Yes
389	8.66	144.47	80.05	64.42	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
390	8.68	144.85	80.25	64.60	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
391	8.70	145.23	80.44	64.78	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
392	8.72	145.60	80.64	64.97	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
393	8.74	145.98	80.83	65.15	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
394	8.76	146.36	81.03	65.33	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
395	8.78	146.74	81.23	65.51	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
396	8.80	147.12	81.42	65.69	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
397	8.82	147.50	81.62	65.88	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
398	8.84	147.88	81.82	66.06	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
399	8.86	148.26	82.01	66.25	0.93	0.135	1.38	0.098	1.00	1.00	0.098	No
400	8.88	148.64	82.21	66.43	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
401	8.90	149.03	82.40	66.62	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
402	8.92	149.41	82.60	66.81	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
403	8.94	149.80	82.80	67.00	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
404	8.96	150.19	82.99	67.20	0.92	0.134	1.38	0.098	1.00	1.00	0.098	No
405	8.98	150.58	83.19	67.40	0.92	0.134	1.38	0.097	1.00	1.00	0.097	No
406	9.00	150.98	83.39	67.60	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
407	9.02	151.38	83.58	67.80	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
408	9.04	151.78	83.78	68.00	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
409	9.06	152.18	83.97	68.20	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
410	9.08	152.58	84.17	68.41	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
411	9.10	152.98	84.37	68.61	0.92	0.134	1.38	0.097	1.00	1.00	2.000	Yes
412	9.12	153.37	84.56	68.81	0.92	0.133	1.38	0.097	1.00	1.00	2.000	Yes
413	9.14	153.77	84.76	69.01	0.92	0.133	1.38	0.097	1.00	1.00	2.000	Yes
414	9.16	154.17	84.95	69.22	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
415	9.18	154.57	85.15	69.42	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
416	9.20	154.96	85.35	69.62	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
417	9.22	155.36	85.54	69.82	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
418	9.24	155.76	85.74	70.02	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
419	9.26	156.15	85.94	70.22	0.92	0.133	1.38	0.097	1.00	1.00	0.097	No
420	9.28	156.55	86.13	70.41	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
421	9.30	156.94	86.33	70.61	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
422	9.32	157.33	86.52	70.81	0.92	0.133	1.38	0.096	1.00	1.00	2.000	Yes
423	9.34	157.73	86.72	71.01	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
424	9.36	158.13	86.92	71.21	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
425	9.38	158.53	87.11	71.42	0.92	0.132	1.38	0.096	1.00	1.00	2.000	Yes
426	9.40	158.93	87.31	71.63	0.92	0.132	1.38	0.096	1.00	1.00	0.096	No
427	9.42	159.35	87.51	71.84	0.92	0.132	1.38	0.096	1.00	1.00	0.096	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	0.90	0.30	3.06	1.54	1.00	5.65	9.86	55.69	0.270	No	Yes	2.00
2	0.92	0.41	2.91	1.35	0.96	7.87	7.30	57.42	0.375	No	Yes	2.00
3	0.94	0.56	2.76	1.18	0.91	10.79	5.36	57.79	0.515	No	Yes	2.00
4	0.96	0.70	2.65	1.06	0.86	13.57	7.38	100.16	0.156	No	No	2.00
5	0.98	0.74	2.61	0.98	0.85	14.31	5.85	83.66	0.121	No	No	1.71
6	1.00	0.70	2.65	1.04	0.86	13.48	7.30	98.42	0.152	No	No	2.00
7	1.02	0.71	2.65	1.08	0.86	13.76	7.27	100.03	0.156	No	No	2.00
8	1.04	0.75	2.62	1.06	0.85	14.47	6.33	91.60	0.136	No	No	1.87
9	1.06	0.82	2.60	1.12	0.84	15.98	5.35	85.56	0.138	No	No	1.88
10	1.08	0.89	2.58	1.18	0.84	17.25	4.74	81.84	0.131	No	No	1.77
11	1.10	0.92	2.58	1.26	0.84	17.94	4.75	85.18	0.137	No	No	1.84
12	1.12	0.88	2.70	1.97	0.88	17.02	4.74	80.70	0.812	No	Yes	2.00
13	1.14	0.75	2.82	2.53	0.93	14.43	6.15	88.75	0.688	No	Yes	2.00
14	1.16	0.61	2.97	3.40	0.99	11.79	8.28	97.64	0.563	No	Yes	2.00
15	1.18	0.57	2.98	3.18	0.99	10.92	8.45	92.20	0.521	No	Yes	2.00
16	1.20	0.58	2.99	3.38	0.99	11.17	8.57	95.75	0.533	No	Yes	2.00
17	1.22	0.62	2.97	3.43	0.99	11.90	8.26	98.35	0.568	No	Yes	2.00
18	1.24	0.66	2.95	3.39	0.98	12.62	7.89	99.57	0.602	No	Yes	2.00
19	1.26	0.68	2.94	3.52	0.98	13.04	7.87	102.61	0.622	No	Yes	2.00
20	1.28	0.67	2.97	3.90	0.99	12.93	8.35	107.92	0.617	No	Yes	2.00
21	1.30	0.67	3.01	4.32	1.00	12.76	8.87	113.19	0.608	No	Yes	2.00
22	1.32	0.66	3.04	4.75	1.00	12.55	9.43	118.31	0.599	No	Yes	2.00
23	1.34	0.64	3.07	5.24	1.00	12.25	10.07	123.33	0.584	No	Yes	2.00
24	1.36	0.62	3.11	5.81	1.00	11.83	10.85	128.28	0.564	No	Yes	2.00
25	1.38	0.61	3.14	6.21	1.00	11.55	11.39	131.51	0.551	No	Yes	2.00
26	1.40	0.61	3.13	6.17	1.00	11.65	11.28	131.49	0.556	No	Yes	2.00
27	1.42	0.63	3.11	5.86	1.00	12.07	10.76	129.93	0.576	No	Yes	2.00
28	1.44	0.66	3.07	5.50	1.00	12.64	10.12	127.92	0.603	No	Yes	2.00
29	1.46	0.70	3.04	5.20	1.00	13.38	9.49	126.89	0.638	No	Yes	2.00
30	1.48	0.74	3.00	4.89	1.00	14.19	8.84	125.42	0.677	No	Yes	2.00
31	1.50	0.79	2.96	4.58	0.98	15.23	8.15	124.10	0.727	No	Yes	2.00
32	1.52	0.86	2.92	4.31	0.97	16.58	7.45	123.47	0.791	No	Yes	2.00
33	1.54	0.94	2.87	4.08	0.95	18.05	6.81	122.98	0.861	No	Yes	2.00
34	1.56	1.05	2.81	3.70	0.93	20.33	5.92	120.39	0.970	No	Yes	2.00
35	1.58	1.15	2.75	3.40	0.90	22.28	5.27	117.45	1.063	No	Yes	2.00
36	1.60	1.24	2.71	3.24	0.89	23.93	4.86	116.29	1.141	No	Yes	2.00
37	1.62	1.25	2.72	3.34	0.89	24.23	4.91	118.84	1.156	No	Yes	2.00
38	1.64	1.26	2.73	3.46	0.90	24.40	4.99	121.73	1.164	No	Yes	2.00
39	1.66	1.28	2.72	3.51	0.90	24.79	4.97	123.31	1.183	No	Yes	2.00
40	1.68	1.32	2.71	3.47	0.89	25.48	4.84	123.26	1.216	No	Yes	2.00
41	1.70	1.34	2.70	3.44	0.89	26.00	4.74	123.23	1.240	No	Yes	2.00
42	1.72	1.36	2.69	3.39	0.88	26.42	9.82	259.38	3.600	No	No	2.00
43	1.74	1.38	2.69	3.34	0.88	26.73	9.31	248.90	3.600	No	No	2.00
44	1.76	1.39	2.68	3.26	0.88	26.92	8.79	236.70	3.600	No	No	2.00
45	1.78	1.37	2.68	3.21	0.88	26.51	8.87	235.23	3.600	No	No	2.00
46	1.80	1.33	2.69	3.23	0.88	25.64	9.61	246.48	3.600	No	No	2.00
47	1.82	1.29	2.70	3.25	0.89	24.91	4.72	117.72	1.188	No	Yes	2.00
48	1.84	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	1.86	1.32	2.65	2.83	0.87	25.55	7.68	196.25	0.705	No	No	2.00
50	1.88	1.33	2.65	2.81	0.87	25.65	7.54	193.51	0.679	No	No	2.00
51	1.90	1.32	2.68	3.09	0.88	25.53	8.96	228.71	3.600	No	No	2.00
52	1.92	1.25	2.70	3.11	0.89	24.08	4.72	113.61	1.148	No	Yes	2.00
53	1.94	1.21	2.70	3.02	0.89	23.35	4.74	110.70	1.114	No	Yes	2.00
54	1.96	1.18	2.71	2.97	0.89	22.74	4.79	108.94	1.085	No	Yes	2.00
55	1.98	1.15	2.72	3.01	0.89	22.17	4.92	109.02	1.058	No	Yes	2.00
56	2.00	1.13	2.73	3.03	0.90	21.62	5.03	108.86	1.031	No	Yes	2.00
57	2.02	1.11	2.73	2.95	0.90	21.31	5.00	106.57	1.017	No	Yes	2.00
58	2.04	1.12	2.70	2.69	0.89	21.40	4.72	101.12	1.021	No	Yes	2.00
59	2.06	1.14	2.67	2.42	0.87	21.88	8.24	180.26	0.562	No	No	2.00
60	2.08	1.17	2.63	2.18	0.86	22.52	6.52	146.78	0.337	No	No	2.00
61	2.10	1.20	2.60	2.01	0.85	23.07	5.41	124.79	0.235	No	No	2.00
62	2.12	1.22	2.58	1.93	0.84	23.49	4.84	113.69	0.217	No	No	2.00
63	2.14	1.24	2.58	1.92	0.84	23.77	4.70	111.72	0.210	No	No	2.00
64	2.16	1.23	2.60	2.08	0.85	23.56	5.45	128.47	0.249	No	No	2.00
65	2.18	1.19	2.64	2.29	0.86	22.81	6.86	156.41	0.392	No	No	2.00
66	2.20	1.14	2.68	2.55	0.88	21.77	9.06	197.25	0.714	No	No	2.00
67	2.22	1.09	2.71	2.70	0.89	20.82	4.84	100.72	0.993	No	Yes	2.00
68	2.24	1.06	2.73	2.79	0.90	20.33	5.02	102.04	0.970	No	Yes	2.00
69	2.26	1.05	2.73	2.80	0.90	20.05	5.08	101.96	0.956	No	Yes	2.00
70	2.28	1.05	2.72	2.67	0.90	20.09	4.94	99.17	0.958	No	Yes	2.00
71	2.30	1.05	2.71	2.53	0.89	20.07	4.79	96.21	0.957	No	Yes	2.00
72	2.32	1.06	2.68	2.33	0.88	20.29	9.17	186.04	0.611	No	No	2.00
73	2.34	1.12	2.64	2.11	0.86	21.36	6.94	148.28	0.345	No	No	2.00
74	2.36	1.19	2.58	1.86	0.84	22.84	4.88	111.44	0.209	No	No	2.00
75	2.38	1.27	2.55	1.76	0.83	24.24	3.86	93.67	0.156	No	No	1.71
76	2.40	1.29	2.55	1.81	0.83	24.79	3.86	95.58	0.161	No	No	1.76
77	2.42	1.30	2.56	1.88	0.83	25.00	4.04	101.07	0.176	No	No	1.92
78	2.44	1.31	2.55	1.86	0.83	25.03	3.93	98.35	0.168	No	No	1.83
79	2.46	1.30	2.54	1.78	0.83	24.89	3.70	92.12	0.153	No	No	1.66
80	2.48	1.29	2.54	1.72	0.83	24.72	3.55	87.84	0.143	No	No	1.55
81	2.50	1.27	2.53	1.63	0.82	24.30	3.41	82.90	0.133	No	No	1.44
82	2.52	1.25	2.52	1.52	0.82	23.97	3.14	75.21	0.120	No	No	1.29
83	2.54	1.24	2.50	1.38	0.81	23.66	2.97	70.29	0.112	No	No	1.21
84	2.56	1.23	2.49	1.31	0.81	23.51	2.90	68.20	0.110	No	No	1.18
85	2.58	1.22	2.49	1.28	0.81	23.31	2.88	67.24	0.108	No	No	1.17
86	2.60	1.21	2.49	1.29	0.81	23.00	2.93	67.50	0.109	No	No	1.17
87	2.62	1.19	2.50	1.30	0.81	22.75	2.97	67.54	0.109	No	No	1.17
88	2.64	1.18	2.50	1.30	0.81	22.51	2.87	64.51	0.105	No	No	1.13
89	2.66	1.17	2.50	1.29	0.81	22.30	2.89	64.36	0.105	No	No	1.12
90	2.68	1.17	2.51	1.29	0.82	22.22	2.91	64.76	0.105	No	No	1.13
91	2.70	1.17	2.51	1.29	0.82	22.19	2.91	64.63	0.105	No	No	1.12
92	2.72	1.17	2.50	1.27	0.81	22.15	2.87	63.54	0.104	No	No	1.11
93	2.74	1.15	2.51	1.27	0.82	21.90	2.94	64.38	0.105	No	No	1.12
94	2.76	1.14	2.51	1.25	0.82	21.61	2.98	64.38	0.105	No	No	1.11
95	2.78	1.14	2.50	1.22	0.81	21.62	2.87	61.93	0.102	No	No	1.08
96	2.80	1.17	2.48	1.17	0.81	22.27	2.86	63.73	0.104	No	No	1.10

:: 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	2.82	1.23	2.45	1.10	0.79	23.47	2.65	62.19	0.102	No	No	1.08
98	2.84	1.30	2.42	1.06	0.78	24.85	2.48	61.76	0.102	No	No	1.08
99	2.86	1.36	2.41	1.09	0.78	25.91	2.43	62.93	0.103	No	No	1.09
100	2.88	1.40	2.41	1.16	0.78	26.71	2.45	65.41	0.106	No	No	1.12
101	2.90	1.42	2.43	1.25	0.79	27.02	2.52	68.05	0.109	No	No	1.15
102	2.92	1.41	2.44	1.31	0.79	26.85	2.60	69.76	0.112	No	No	1.17
103	2.94	1.37	2.47	1.41	0.80	26.18	2.76	72.19	0.115	No	No	1.21
104	2.96	1.35	2.48	1.43	0.81	25.66	2.83	72.67	0.116	No	No	1.22
105	2.98	1.35	2.47	1.39	0.80	25.67	2.79	71.58	0.114	No	No	1.20
106	3.00	1.36	2.45	1.31	0.80	25.94	2.68	69.42	0.111	No	No	1.16
107	3.02	1.37	2.45	1.28	0.79	26.00	2.63	68.49	0.110	No	No	1.15
108	3.04	1.36	2.45	1.29	0.80	25.86	2.66	68.70	0.110	No	No	1.15
109	3.06	1.49	2.35	0.98	0.76	28.53	2.14	61.02	0.101	No	No	1.06
110	3.08	1.62	2.30	0.88	0.74	30.95	1.91	59.04	0.099	No	No	1.03
111	3.10	1.71	2.26	0.81	0.72	32.75	1.78	58.20	0.098	No	No	1.03
112	3.12	1.63	2.35	1.13	0.76	31.10	2.14	66.54	0.107	No	No	1.12
113	3.14	1.53	2.43	1.40	0.79	29.25	2.51	73.49	0.117	No	No	1.22
114	3.16	1.46	2.48	1.63	0.81	27.82	2.85	79.27	0.126	No	No	1.31
115	3.18	1.45	2.48	1.60	0.81	27.61	2.83	78.23	0.125	No	No	1.29
116	3.20	1.46	2.46	1.47	0.80	27.72	2.70	74.83	0.119	No	No	1.24
117	3.22	1.48	2.42	1.31	0.79	28.18	2.50	70.40	0.112	No	No	1.17
118	3.24	1.50	2.40	1.24	0.78	28.51	2.40	68.38	0.110	No	No	1.14
119	3.26	1.53	2.39	1.19	0.77	29.22	2.31	67.38	0.108	No	No	1.12
120	3.28	1.54	2.40	1.25	0.78	29.34	2.35	69.05	4.000	Yes	No	2.00
121	3.30	1.48	2.43	1.35	0.79	28.17	2.54	71.62	4.000	Yes	No	2.00
122	3.32	1.38	2.50	1.61	0.81	26.14	2.98	77.86	4.000	Yes	No	2.00
123	3.34	1.30	2.52	1.62	0.82	24.64	3.26	80.32	4.000	Yes	No	2.00
124	3.36	1.28	2.51	1.48	0.82	24.29	2.93	71.07	0.113	No	No	1.17
125	3.38	1.32	2.45	1.21	0.79	24.99	2.64	65.91	0.107	No	No	1.10
126	3.40	1.33	2.44	1.20	0.79	25.26	2.60	65.72	0.106	No	No	1.10
127	3.42	1.33	2.46	1.28	0.80	25.20	2.70	68.03	0.109	No	No	1.12
128	3.44	1.33	2.47	1.34	0.80	25.21	2.77	69.94	0.112	No	No	1.15
129	3.46	1.39	2.44	1.27	0.79	26.31	2.59	68.20	0.110	No	No	1.13
130	3.48	1.49	2.39	1.17	0.77	28.40	2.33	66.25	0.107	No	No	1.10
131	3.50	1.66	2.33	1.04	0.75	31.63	2.02	64.02	0.104	No	No	1.07
132	3.52	1.99	2.23	0.93	0.71	38.24	1.70	64.85	0.105	No	No	1.08
133	3.54	2.17	2.20	0.91	0.70	41.65	1.60	66.74	4.000	Yes	No	2.00
134	3.56	2.13	2.25	1.10	0.72	40.85	1.74	71.08	4.000	Yes	No	2.00
135	3.58	1.78	2.39	1.49	0.77	33.98	2.31	78.38	4.000	Yes	No	2.00
136	3.60	1.48	2.53	2.01	0.83	28.14	3.43	96.55	4.000	Yes	No	2.00
137	3.62	1.37	2.57	2.08	0.84	25.88	4.42	114.31	4.000	Yes	No	2.00
138	3.64	1.50	2.48	1.71	0.81	28.50	2.87	81.91	4.000	Yes	No	2.00
139	3.66	1.96	2.27	1.08	0.73	37.52	1.83	68.54	4.000	Yes	No	2.00
140	3.68	2.60	2.10	0.80	0.66	50.13	1.41	70.83	4.000	Yes	No	2.00
141	3.70	3.17	1.99	0.69	0.62	61.34	1.30	79.61	4.000	Yes	No	2.00
142	3.72	3.48	1.97	0.74	0.61	67.42	1.28	86.51	0.140	No	No	1.43
143	3.74	3.45	2.00	0.82	0.62	66.98	1.30	87.32	0.142	No	No	1.45
144	3.76	3.20	2.06	0.95	0.65	61.93	1.37	84.67	0.136	No	No	1.39

:: 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	3.78	2.82	2.12	1.00	0.67	54.54	1.45	79.05	0.126	No	No	1.28
146	3.80	2.49	2.16	0.98	0.69	47.93	1.52	73.04	0.116	No	No	1.18
147	3.82	2.27	2.18	0.94	0.70	43.58	1.58	68.69	0.110	No	No	1.12
148	3.84	2.12	2.21	0.94	0.71	40.66	1.64	66.80	0.108	No	No	1.10
149	3.86	2.03	2.23	0.97	0.72	38.94	1.71	66.41	0.107	No	No	1.09
150	3.88	2.08	2.20	0.87	0.70	39.85	1.61	64.19	0.105	No	No	1.06
151	3.90	2.25	2.15	0.80	0.68	43.22	1.51	65.15	0.106	No	No	1.07
152	3.92	2.41	2.14	0.86	0.68	46.26	1.49	69.01	0.111	No	No	1.12
153	3.94	2.42	2.17	0.98	0.69	46.43	1.55	71.99	0.115	No	No	1.16
154	3.96	2.35	2.21	1.10	0.71	45.13	1.64	74.09	0.118	No	No	1.20
155	3.98	2.41	2.20	1.07	0.70	46.22	1.60	74.09	0.118	No	No	1.20
156	4.00	2.51	2.16	0.97	0.69	48.30	1.52	73.25	0.117	No	No	1.18
157	4.02	2.54	2.13	0.88	0.68	48.77	1.46	71.32	0.114	No	No	1.15
158	4.04	2.36	2.16	0.89	0.69	45.35	1.52	68.88	0.110	No	No	1.12
159	4.06	2.13	2.23	1.02	0.71	40.69	1.69	68.88	0.110	No	No	1.12
160	4.08	2.04	2.26	1.07	0.72	38.94	1.77	69.06	0.111	No	No	1.12
161	4.10	2.18	2.20	0.93	0.70	41.68	1.61	67.03	0.108	No	No	1.09
162	4.12	2.40	2.10	0.72	0.67	46.09	1.42	65.51	0.106	No	No	1.07
163	4.14	2.56	2.07	0.70	0.65	49.13	1.38	67.81	0.109	No	No	1.10
164	4.16	2.59	2.08	0.73	0.66	49.86	1.39	69.21	0.111	No	No	1.12
165	4.18	2.65	2.08	0.78	0.66	50.89	1.40	71.05	0.113	No	No	1.15
166	4.20	2.85	2.03	0.70	0.64	54.95	1.34	73.39	0.117	No	No	1.18
167	4.22	3.09	1.98	0.63	0.62	59.69	1.29	77.02	0.122	No	No	1.24
168	4.24	3.38	1.93	0.58	0.60	65.39	1.25	82.00	0.131	No	No	1.33
169	4.26	3.50	1.93	0.63	0.60	67.72	1.26	85.11	0.137	No	No	1.39
170	4.28	3.37	1.96	0.69	0.61	65.09	1.28	83.32	0.134	No	No	1.35
171	4.30	3.19	2.01	0.76	0.63	61.57	1.31	80.94	0.129	No	No	1.30
172	4.32	3.03	2.05	0.82	0.65	58.51	1.35	78.98	0.126	No	No	1.27
173	4.34	3.17	2.04	0.86	0.64	61.11	1.35	82.20	0.132	No	No	1.33
174	4.36	3.39	2.03	0.89	0.64	65.46	1.33	87.04	0.141	No	No	1.42
175	4.38	3.62	1.99	0.83	0.62	70.15	1.30	90.86	0.150	No	No	1.51
176	4.40	3.81	1.97	0.83	0.62	73.87	1.28	94.66	0.159	No	No	1.60
177	4.42	3.88	1.98	0.91	0.62	75.26	1.29	97.24	0.166	No	No	1.67
178	4.44	3.93	2.01	1.04	0.63	76.08	1.32	100.31	0.174	No	No	1.75
179	4.46	3.94	2.04	1.13	0.64	76.28	1.34	102.17	0.179	No	No	1.81
180	4.48	3.82	2.05	1.13	0.65	74.06	1.35	100.01	0.173	No	No	1.74
181	4.50	3.63	2.06	1.13	0.65	70.19	1.37	96.20	0.163	No	No	1.64
182	4.52	3.35	2.09	1.11	0.66	64.74	1.40	90.61	0.149	No	No	1.50
183	4.54	3.25	2.11	1.17	0.67	62.73	1.44	90.07	0.148	No	No	1.49
184	4.56	3.34	2.11	1.23	0.67	64.46	1.44	92.86	0.154	No	No	1.56
185	4.58	3.54	2.10	1.25	0.67	68.41	1.42	96.95	0.165	No	No	1.66
186	4.60	3.59	2.10	1.27	0.67	69.41	1.42	98.32	0.168	No	No	1.70
187	4.62	3.53	2.11	1.30	0.67	68.15	1.44	97.83	0.167	No	No	1.68
188	4.64	3.46	2.12	1.31	0.68	66.76	1.45	96.86	0.165	No	No	1.66
189	4.66	3.52	2.08	1.17	0.66	67.98	1.40	94.84	0.159	No	No	1.61
190	4.68	3.63	2.02	0.94	0.64	69.10	1.33	91.63	0.152	No	No	1.53
191	4.70	3.74	1.97	0.78	0.62	69.65	1.28	89.40	0.146	No	No	1.48
192	4.72	3.87	1.93	0.69	0.61	70.93	1.26	89.34	0.146	No	No	1.47

:: 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	4.74	3.80	1.94	0.69	0.61	69.56	1.26	87.92	0.143	No	No	1.44
194	4.76	3.42	2.00	0.76	0.63	63.60	1.30	82.96	0.133	No	No	1.34
195	4.78	2.80	2.08	0.84	0.66	53.46	1.40	74.71	0.119	No	No	1.20
196	4.80	2.21	2.24	1.12	0.72	42.08	1.72	72.47	0.115	No	No	1.16
197	4.82	1.93	2.36	1.46	0.77	36.64	2.16	78.96	0.126	No	No	1.27
198	4.84	2.08	2.34	1.53	0.76	39.55	2.09	82.58	0.132	No	No	1.33
199	4.86	2.40	2.23	1.21	0.72	45.76	1.70	77.57	0.123	No	No	1.24
200	4.88	2.56	2.18	1.10	0.70	48.93	1.57	76.94	0.122	No	No	1.23
201	4.90	2.37	2.26	1.32	0.73	45.21	1.77	80.02	0.128	No	No	1.28
202	4.92	2.03	2.39	1.80	0.78	38.47	2.34	89.91	0.148	No	No	1.48
203	4.94	1.82	2.48	2.17	0.81	34.35	2.86	98.18	0.168	No	No	1.69
204	4.96	1.88	2.44	1.95	0.80	35.56	2.61	92.78	0.154	No	No	1.55
205	4.98	2.13	2.36	1.66	0.77	40.37	2.16	87.08	0.141	No	No	1.42
206	5.00	2.29	2.30	1.47	0.74	43.61	1.91	83.43	0.134	No	No	1.35
207	5.02	2.24	2.33	1.63	0.76	42.55	2.05	87.33	0.142	No	No	1.43
208	5.04	2.10	2.39	1.88	0.78	39.86	2.34	93.31	0.156	No	No	1.56
209	5.06	2.14	2.40	1.98	0.78	40.53	2.38	96.54	0.164	No	No	1.65
210	5.08	2.36	2.34	1.82	0.76	44.92	2.11	94.65	0.159	No	No	1.60
211	5.10	2.77	2.25	1.61	0.73	53.09	1.77	93.79	0.157	No	No	1.58
212	5.12	3.19	2.16	1.31	0.69	60.02	1.52	91.11	0.150	No	No	1.51
213	5.14	3.50	2.10	1.16	0.67	64.42	1.42	91.38	0.151	No	No	1.52
214	5.16	3.52	2.08	1.05	0.66	64.21	1.39	88.94	0.145	No	No	1.46
215	5.18	3.14	2.12	1.06	0.68	57.67	1.44	83.22	0.134	No	No	1.34
216	5.20	2.75	2.16	1.06	0.69	50.89	1.52	77.32	0.123	No	No	1.24
217	5.22	2.47	2.19	1.05	0.70	46.00	1.59	73.31	0.117	No	No	1.17
218	5.24	2.42	2.22	1.17	0.72	45.55	1.67	76.17	0.121	No	No	1.22
219	5.26	2.33	2.27	1.35	0.73	44.23	1.82	80.41	0.128	No	No	1.29
220	5.28	2.24	2.32	1.55	0.75	42.41	2.01	85.12	0.137	No	No	1.38
221	5.30	2.25	2.32	1.57	0.75	42.62	2.01	85.84	0.139	No	No	1.40
222	5.32	2.22	2.33	1.57	0.76	42.11	2.03	85.49	0.138	No	No	1.39
223	5.34	2.14	2.35	1.61	0.76	40.56	2.11	85.67	0.138	No	No	1.39
224	5.36	2.15	2.33	1.53	0.76	40.77	2.05	83.56	0.134	No	No	1.35
225	5.38	2.40	2.28	1.45	0.74	45.11	1.86	83.86	0.135	No	No	1.35
226	5.40	2.89	2.17	1.15	0.70	52.50	1.54	81.04	0.129	No	No	1.30
227	5.42	3.20	2.11	1.04	0.68	56.92	1.44	81.91	0.131	No	No	1.32
228	5.44	3.23	2.09	0.95	0.67	56.98	1.41	80.07	0.128	No	No	1.28
229	5.46	3.00	2.13	1.00	0.68	53.26	1.46	77.84	0.124	No	No	1.24
230	5.48	2.82	2.16	1.05	0.69	50.45	1.52	76.82	0.122	No	No	1.23
231	5.50	2.88	2.17	1.11	0.70	51.52	1.54	79.19	0.126	No	No	1.27
232	5.52	2.94	2.15	1.06	0.69	52.13	1.51	78.47	0.125	No	No	1.26
233	5.54	2.91	2.16	1.11	0.69	51.70	1.53	79.20	4.000	Yes	No	2.00
234	5.56	2.63	2.21	1.16	0.71	47.18	1.64	77.16	4.000	Yes	No	2.00
235	5.58	2.30	2.29	1.36	0.74	42.04	1.89	79.37	4.000	Yes	No	2.00
236	5.60	1.79	2.42	1.70	0.79	33.61	2.51	84.24	4.000	Yes	No	2.00
237	5.62	1.34	2.63	2.47	0.87	24.63	6.57	161.88	4.000	Yes	No	2.00
238	5.64	0.99	2.83	3.34	0.95	17.65	6.18	109.04	4.000	Yes	Yes	2.00
239	5.66	0.90	2.85	3.19	0.96	15.91	6.49	103.28	4.000	Yes	Yes	2.00
240	5.68	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	5.70	0.95	2.71	2.00	0.90	16.89	4.80	81.16	4.000	Yes	Yes	2.00
242	5.72	1.13	2.62	1.84	0.87	20.37	6.21	126.55	4.000	Yes	No	2.00
243	5.74	1.32	2.55	1.75	0.84	24.25	3.85	93.30	4.000	Yes	No	2.00
244	5.76	1.59	2.45	1.57	0.81	29.48	2.66	78.46	4.000	Yes	No	2.00
245	5.78	1.91	2.36	1.40	0.77	34.72	2.19	76.10	4.000	Yes	No	2.00
246	5.80	2.32	2.28	1.27	0.74	41.21	1.85	76.09	4.000	Yes	No	2.00
247	5.82	2.62	2.23	1.22	0.72	45.84	1.70	77.72	4.000	Yes	No	2.00
248	5.84	2.63	2.24	1.29	0.73	46.19	1.73	79.84	0.127	No	No	1.28
249	5.86	2.41	2.31	1.51	0.75	42.96	1.96	84.23	0.136	No	No	1.36
250	5.88	2.12	2.40	1.87	0.79	38.59	2.39	92.19	0.153	No	No	1.53
251	5.90	2.12	2.42	1.97	0.79	38.69	2.46	95.30	0.160	No	No	1.61
252	5.92	2.54	2.32	1.69	0.76	45.14	2.01	90.82	0.150	No	No	1.50
253	5.94	3.07	2.23	1.47	0.72	53.17	1.69	89.87	0.147	No	No	1.48
254	5.96	3.35	2.20	1.45	0.71	57.58	1.61	92.78	0.154	No	No	1.55
255	5.98	3.32	2.21	1.49	0.71	57.04	1.63	93.22	0.155	No	No	1.56
256	6.00	3.36	2.20	1.45	0.71	57.38	1.61	92.37	0.153	No	No	1.54
257	6.02	3.60	2.17	1.39	0.70	60.79	1.54	93.55	0.156	No	No	1.57
258	6.04	3.94	2.12	1.30	0.68	65.73	1.45	95.61	0.161	No	No	1.62
259	6.06	4.25	2.09	1.24	0.67	70.10	1.40	98.26	0.168	No	No	1.69
260	6.08	4.56	2.04	1.11	0.65	74.04	1.35	99.59	0.172	No	No	1.73
261	6.10	5.03	1.98	0.99	0.63	80.25	1.29	103.75	0.184	No	No	1.85
262	6.12	5.54	1.93	0.90	0.61	86.93	1.26	109.19	0.201	No	No	2.00
263	6.14	5.94	1.90	0.85	0.59	92.16	1.23	113.71	0.217	No	No	2.00
264	6.16	6.13	1.88	0.82	0.59	94.32	1.22	115.18	0.222	No	No	2.00
265	6.18	6.35	1.85	0.76	0.58	96.83	1.20	116.14	0.226	No	No	2.00
266	6.20	6.65	1.81	0.70	0.56	100.20	1.17	117.00	0.229	No	No	2.00
267	6.22	7.07	1.78	0.66	0.55	105.42	1.13	119.29	0.238	No	No	2.00
268	6.24	7.53	1.78	0.70	0.55	112.04	1.12	126.01	0.266	No	No	2.00
269	6.26	8.08	1.75	0.70	0.54	119.22	1.09	129.86	0.284	No	No	2.00
270	6.28	8.74	1.71	0.65	0.53	127.31	1.01	128.89	0.279	No	No	2.00
271	6.30	9.78	1.62	0.52	0.49	138.70	1.00	138.70	0.328	No	No	2.00
272	6.32	10.50	1.56	0.43	0.47	146.20	1.00	146.20	0.371	No	No	2.00
273	6.34	10.66	1.54	0.41	0.46	147.40	1.00	147.40	0.378	No	No	2.00
274	6.36	9.85	1.57	0.40	0.47	136.90	1.00	136.90	0.319	No	No	2.00
275	6.38	8.75	1.61	0.40	0.49	122.63	1.00	122.63	0.252	No	No	2.00
276	6.40	7.49	1.68	0.43	0.51	106.66	1.00	106.66	0.193	No	No	1.94
277	6.42	5.77	1.84	0.60	0.57	85.42	1.19	101.53	4.000	Yes	No	2.00
278	6.44	4.22	2.06	1.01	0.66	65.83	1.36	89.58	4.000	Yes	No	2.00
279	6.46	3.13	2.26	1.54	0.73	51.01	1.77	90.43	4.000	Yes	No	2.00
280	6.48	2.67	2.41	2.36	0.79	45.14	2.45	110.70	4.000	Yes	No	2.00
281	6.50	2.35	2.54	3.23	0.84	40.84	3.64	148.62	4.000	Yes	No	2.00
282	6.52	1.96	2.69	4.53	0.90	34.98	9.48	331.62	4.000	Yes	No	2.00
283	6.54	1.65	2.78	5.17	0.93	29.68	5.61	166.45	4.000	Yes	Yes	2.00
284	6.56	1.41	2.85	5.52	0.96	25.48	6.47	164.79	4.000	Yes	Yes	2.00
285	6.58	1.24	2.89	5.63	0.98	22.38	7.12	159.45	4.000	Yes	Yes	2.00
286	6.60	1.20	2.87	5.04	0.97	21.49	6.85	147.14	1.025	No	Yes	2.00
287	6.62	1.18	2.83	4.21	0.95	20.82	6.29	130.97	0.993	No	Yes	2.00
288	6.64	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	6.66	1.19	2.73	2.78	0.92	20.19	5.04	101.74	0.963	No	Yes	2.00
290	6.68	1.23	2.68	2.36	0.90	20.67	8.94	184.80	0.600	No	No	2.00
291	6.70	1.27	2.65	2.15	0.88	21.17	7.30	154.56	0.381	No	No	2.00
292	6.72	1.41	2.65	2.48	0.88	23.65	7.24	171.32	0.493	No	No	2.00
293	6.74	1.48	2.67	2.93	0.89	24.97	8.57	214.02	3.600	No	No	2.00
294	6.76	1.50	2.71	3.50	0.91	25.53	4.86	124.03	1.218	No	Yes	2.00
295	6.78	1.37	2.76	3.77	0.93	23.37	5.42	126.64	1.115	No	Yes	2.00
296	6.80	1.28	2.81	4.03	0.94	21.87	5.92	129.48	1.043	No	Yes	2.00
297	6.82	1.23	2.82	4.02	0.95	20.96	6.09	127.59	1.000	No	Yes	2.00
298	6.84	1.20	2.83	3.98	0.95	20.30	6.19	125.71	0.968	No	Yes	2.00
299	6.86	1.17	2.82	3.83	0.95	19.77	6.16	121.85	0.943	No	Yes	2.00
300	6.88	1.15	2.80	3.45	0.94	19.30	5.90	113.99	0.921	No	Yes	2.00
301	6.90	1.15	2.78	3.03	0.93	18.94	5.55	105.15	0.904	No	Yes	2.00
302	6.92	1.14	2.74	2.64	0.92	18.66	5.19	96.79	0.890	No	Yes	2.00
303	6.94	1.15	2.71	2.32	0.91	18.55	4.84	89.82	0.885	No	Yes	2.00
304	6.96	1.15	2.69	2.11	0.90	18.54	9.50	176.19	0.530	No	No	2.00
305	6.98	1.19	2.67	2.05	0.89	18.97	8.66	164.37	4.000	Yes	No	2.00
306	7.00	1.30	2.63	1.92	0.88	20.76	6.38	132.51	4.000	Yes	No	2.00
307	7.02	1.57	2.53	1.71	0.84	24.71	3.53	87.34	4.000	Yes	No	2.00
308	7.04	1.94	2.43	1.51	0.80	30.30	2.54	77.07	4.000	Yes	No	2.00
309	7.06	2.19	2.41	1.63	0.79	34.13	2.42	82.59	4.000	Yes	No	2.00
310	7.08	2.22	2.44	1.85	0.80	34.70	2.58	89.39	4.000	Yes	No	2.00
311	7.10	1.99	2.50	2.07	0.83	31.37	2.82	88.53	4.000	Yes	No	2.00
312	7.12	1.70	2.59	2.37	0.86	27.07	5.00	135.25	4.000	Yes	No	2.00
313	7.14	1.45	2.67	2.66	0.90	23.12	8.54	197.47	4.000	Yes	No	2.00
314	7.16	1.30	2.72	2.78	0.91	20.72	4.93	102.24	4.000	Yes	Yes	2.00
315	7.18	1.25	2.71	2.50	0.91	19.82	4.80	95.12	0.945	No	Yes	2.00
316	7.20	1.26	2.68	2.22	0.90	19.77	8.96	177.22	0.538	No	No	2.00
317	7.22	1.28	2.67	2.22	0.90	20.09	8.68	174.28	0.515	No	No	2.00
318	7.24	1.36	2.65	2.16	0.89	21.16	7.40	156.48	0.393	No	No	2.00
319	7.26	1.47	2.62	2.10	0.87	22.76	5.98	136.00	0.283	No	No	2.00
320	7.28	1.49	2.62	2.20	0.88	23.12	6.25	144.54	0.325	No	No	2.00
321	7.30	1.38	2.68	2.47	0.90	21.52	8.82	189.73	0.644	No	No	2.00
322	7.32	1.23	2.72	2.49	0.92	19.04	4.95	94.17	0.908	No	Yes	2.00
323	7.34	1.16	2.71	2.16	0.91	17.81	4.80	85.55	0.850	No	Yes	2.00
324	7.36	1.17	2.66	1.75	0.89	17.77	7.90	140.31	0.303	No	No	2.00
325	7.38	1.14	2.68	1.87	0.90	17.31	9.23	159.88	0.414	No	No	2.00
326	7.40	1.09	2.73	2.11	0.92	16.59	5.02	83.31	0.791	No	Yes	2.00
327	7.42	1.05	2.76	2.21	0.93	15.84	5.34	84.60	0.756	No	Yes	2.00
328	7.44	1.06	2.74	2.10	0.92	15.96	5.17	82.44	0.761	No	Yes	2.00
329	7.46	1.08	2.72	1.96	0.91	16.22	4.91	79.67	0.774	No	Yes	2.00
330	7.48	1.10	2.71	1.97	0.91	16.48	4.86	80.17	0.786	No	Yes	2.00
331	7.50	1.09	2.73	2.02	0.92	16.29	4.98	81.08	0.777	No	Yes	2.00
332	7.52	1.07	2.74	2.09	0.92	16.08	5.12	82.27	0.767	No	Yes	2.00
333	7.54	1.07	2.73	2.05	0.92	16.03	5.08	81.42	0.764	No	Yes	2.00
334	7.56	1.12	2.70	1.87	0.91	16.69	10.00	166.90	0.461	No	No	2.00
335	7.58	1.24	2.63	1.63	0.88	18.25	6.67	121.76	0.223	No	No	2.00
336	7.60	1.40	2.57	1.51	0.86	20.66	4.44	91.78	0.152	No	No	1.54

:: 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	7.62	1.51	2.55	1.58	0.85	22.19	4.03	89.33	0.146	No	No	1.48
338	7.64	1.46	2.59	1.75	0.86	21.56	5.02	108.34	0.198	No	No	2.00
339	7.66	1.32	2.65	1.95	0.89	19.49	7.54	146.86	0.337	No	No	2.00
340	7.68	1.21	2.69	2.04	0.91	17.90	9.80	175.39	0.524	No	No	2.00
341	7.70	1.20	2.68	1.93	0.90	17.67	9.22	162.99	0.434	No	No	2.00
342	7.72	1.27	2.64	1.73	0.89	18.56	7.02	130.35	0.257	No	No	2.00
343	7.74	1.33	2.61	1.65	0.87	19.40	5.87	113.77	0.195	No	No	1.97
344	7.76	1.34	2.63	1.82	0.88	19.59	6.67	130.59	0.258	No	No	2.00
345	7.78	1.26	2.67	1.91	0.90	18.38	8.33	153.16	0.373	No	No	2.00
346	7.80	1.18	2.69	1.89	0.91	17.04	9.75	166.09	0.456	No	No	2.00
347	7.82	1.12	2.69	1.70	0.90	16.07	9.47	152.21	0.367	No	No	2.00
348	7.84	1.13	2.68	1.62	0.90	16.13	8.80	141.93	0.311	No	No	2.00
349	7.86	1.20	2.64	1.53	0.89	17.09	7.07	120.79	0.219	No	No	2.00
350	7.88	1.30	2.60	1.43	0.87	18.57	5.28	98.01	0.168	No	No	1.69
351	7.90	1.39	2.59	1.54	0.86	19.89	5.00	99.43	0.171	No	No	1.73
352	7.92	1.41	2.62	1.77	0.88	20.19	6.00	121.24	0.221	No	No	2.00
353	7.94	1.40	2.63	1.88	0.88	20.08	6.68	134.15	0.274	No	No	2.00
354	7.96	1.30	2.68	2.04	0.90	18.61	8.95	166.51	0.458	No	No	2.00
355	7.98	1.16	2.73	2.12	0.92	16.49	5.05	83.31	0.787	No	Yes	2.00
356	8.00	0.99	2.82	2.35	0.95	13.96	6.07	84.79	0.666	No	Yes	2.00
357	8.02	0.92	2.83	2.17	0.96	12.91	6.18	79.79	0.616	No	Yes	2.00
358	8.04	0.93	2.79	1.89	0.94	12.97	5.75	74.57	0.618	No	Yes	2.00
359	8.06	0.96	2.77	1.77	0.93	13.31	5.46	72.70	0.635	No	Yes	2.00
360	8.08	0.96	2.77	1.82	0.94	13.35	5.52	73.75	0.637	No	Yes	2.00
361	8.10	0.97	2.78	1.86	0.94	13.38	5.57	74.55	0.638	No	Yes	2.00
362	8.12	1.01	2.75	1.75	0.93	14.00	5.20	72.84	0.668	No	Yes	2.00
363	8.14	1.18	2.65	1.46	0.89	16.26	7.42	120.55	0.219	No	No	2.00
364	8.16	1.31	2.58	1.27	0.86	18.11	4.67	84.57	0.136	No	No	1.38
365	8.18	1.41	2.56	1.34	0.86	19.43	4.27	82.97	0.133	No	No	1.35
366	8.20	1.39	2.61	1.62	0.87	19.36	5.74	111.06	0.187	No	No	1.89
367	8.22	1.38	2.64	1.82	0.89	19.28	6.92	133.32	0.270	No	No	2.00
368	8.24	1.33	2.67	1.94	0.90	18.53	8.37	155.10	0.384	No	No	2.00
369	8.26	1.20	2.72	2.02	0.92	16.64	4.89	81.33	0.794	No	Yes	2.00
370	8.28	1.10	2.77	2.16	0.94	15.10	5.46	82.53	0.720	No	Yes	2.00
371	8.30	1.07	2.78	2.16	0.94	14.63	5.60	81.97	0.698	No	Yes	2.00
372	8.32	1.11	2.76	2.09	0.93	15.23	5.34	81.43	0.727	No	Yes	2.00
373	8.34	1.15	2.75	2.13	0.93	15.83	5.23	82.84	4.000	Yes	Yes	2.00
374	8.36	1.29	2.68	1.86	0.90	17.63	8.82	155.58	4.000	Yes	No	2.00
375	8.38	1.35	2.64	1.68	0.89	18.37	6.83	125.58	4.000	Yes	No	2.00
376	8.40	1.62	2.52	1.32	0.84	21.93	3.13	68.59	4.000	Yes	No	2.00
377	8.42	1.77	2.47	1.22	0.82	23.91	2.76	65.97	4.000	Yes	No	2.00
378	8.44	2.34	2.33	1.04	0.77	31.40	2.04	63.91	4.000	Yes	No	2.00
379	8.46	2.66	2.29	1.08	0.75	35.72	1.89	67.46	4.000	Yes	No	2.00
380	8.48	3.19	2.24	1.15	0.74	42.72	1.73	73.89	4.000	Yes	No	2.00
381	8.50	3.73	2.22	1.32	0.73	50.09	1.67	83.64	4.000	Yes	No	2.00
382	8.52	4.32	2.21	1.51	0.72	57.95	1.63	94.66	0.159	No	No	1.61
383	8.54	4.56	2.22	1.67	0.73	61.29	1.66	101.48	4.000	Yes	No	2.00
384	8.56	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	8.58	3.56	2.42	2.61	0.80	48.88	2.47	120.87	4.000	Yes	No	2.00
386	8.60	2.79	2.61	3.89	0.88	39.15	5.68	222.54	4.000	Yes	No	2.00
387	8.62	2.22	2.79	5.64	0.94	31.60	5.69	179.83	4.000	Yes	Yes	2.00
388	8.64	1.90	2.91	7.31	0.99	27.17	7.40	201.05	4.000	Yes	Yes	2.00
389	8.66	1.89	2.92	7.45	0.99	27.07	7.51	203.27	1.291	No	Yes	2.00
390	8.68	1.99	2.88	6.94	0.98	28.38	6.98	197.95	1.354	No	Yes	2.00
391	8.70	2.15	2.84	6.34	0.96	30.36	6.30	191.41	1.448	No	Yes	2.00
392	8.72	2.25	2.81	6.13	0.95	31.77	5.99	190.44	1.515	No	Yes	2.00
393	8.74	2.28	2.81	6.10	0.95	32.06	5.94	190.47	1.529	No	Yes	2.00
394	8.76	2.23	2.82	6.16	0.96	31.32	6.07	190.03	1.494	No	Yes	2.00
395	8.78	2.20	2.83	6.26	0.96	30.79	6.20	190.88	1.469	No	Yes	2.00
396	8.80	2.29	2.81	6.17	0.95	32.01	5.99	191.67	1.527	No	Yes	2.00
397	8.82	2.55	2.76	5.79	0.93	35.40	5.38	190.46	1.689	No	Yes	2.00
398	8.84	2.78	2.71	5.42	0.92	38.51	4.87	187.33	1.837	No	Yes	2.00
399	8.86	2.88	2.70	5.31	0.91	39.67	10.12	401.58	3.600	No	No	2.00
400	8.88	2.86	2.71	5.46	0.92	39.37	4.81	189.56	1.878	No	Yes	2.00
401	8.90	2.90	2.71	5.56	0.92	39.85	4.84	192.77	1.901	No	Yes	2.00
402	8.92	3.32	2.64	5.06	0.89	45.35	7.15	324.40	3.600	No	No	2.00
403	8.94	4.11	2.53	4.26	0.85	55.47	3.42	189.61	0.714	No	No	2.00
404	8.96	4.83	2.45	3.78	0.82	64.59	2.64	170.37	0.540	No	No	2.00
405	8.98	5.36	2.40	3.57	0.80	71.24	2.37	169.06	0.529	No	No	2.00
406	9.00	5.79	2.38	3.64	0.79	76.71	2.29	176.01	4.000	Yes	No	2.00
407	9.02	6.36	2.35	3.53	0.78	83.84	2.13	178.23	4.000	Yes	No	2.00
408	9.04	6.82	2.32	3.45	0.77	89.43	2.01	180.12	4.000	Yes	No	2.00
409	9.06	6.58	2.35	3.61	0.78	86.28	2.12	183.02	4.000	Yes	No	2.00
410	9.08	5.98	2.42	4.10	0.80	78.93	2.45	193.71	4.000	Yes	No	2.00
411	9.10	5.22	2.51	4.88	0.84	69.45	2.97	206.28	4.000	Yes	No	2.00
412	9.12	4.77	2.57	5.43	0.86	63.65	4.41	280.82	4.000	Yes	No	2.00
413	9.14	4.51	2.60	5.73	0.88	60.11	5.49	329.81	4.000	Yes	No	2.00
414	9.16	4.61	2.58	5.35	0.87	61.13	4.60	281.26	4.000	No	No	2.00
415	9.18	5.05	2.51	4.70	0.84	66.38	2.97	197.44	0.796	No	No	2.00
416	9.20	5.45	2.45	4.18	0.82	71.09	2.66	189.42	0.712	No	No	2.00
417	9.22	5.30	2.47	4.30	0.83	69.00	2.77	191.29	0.731	No	No	2.00
418	9.24	4.79	2.53	4.71	0.85	62.60	3.35	209.71	4.000	No	No	2.00
419	9.26	4.39	2.58	5.07	0.87	57.40	4.61	264.73	4.000	No	No	2.00
420	9.28	4.37	2.57	4.91	0.86	56.93	4.37	248.97	4.000	Yes	No	2.00
421	9.30	4.66	2.52	4.40	0.84	60.21	3.11	187.33	4.000	Yes	No	2.00
422	9.32	5.24	2.45	3.93	0.82	67.30	2.64	177.54	4.000	Yes	No	2.00
423	9.34	6.58	2.32	3.20	0.77	83.31	2.00	166.55	4.000	Yes	No	2.00
424	9.36	8.09	2.20	2.63	0.72	100.98	1.61	162.72	4.000	Yes	No	2.00
425	9.38	10.13	2.06	2.04	0.67	124.39	1.36	169.53	4.000	Yes	No	2.00
426	9.40	23.81	1.55	0.86	0.48	275.25	1.00	275.25	4.000	No	No	2.00
427	9.42	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
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	1.71	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	1.87	0.00	0.00	0.02	0.00
1.06	1.88	0.00	0.00	0.02	0.00	1.08	1.77	0.00	0.00	0.02	0.00
1.10	1.84	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	1.71	0.00	0.00	0.02	0.00	2.40	1.76	0.00	0.00	0.02	0.00
2.42	1.92	0.00	0.00	0.02	0.00	2.44	1.83	0.00	0.00	0.02	0.00
2.46	1.66	0.00	0.00	0.02	0.00	2.48	1.55	0.00	0.00	0.02	0.00
2.50	1.44	0.00	0.00	0.02	0.00	2.52	1.29	0.00	0.00	0.02	0.00
2.54	1.21	0.00	0.00	0.02	0.00	2.56	1.18	0.00	0.00	0.02	0.00
2.58	1.17	0.00	0.00	0.02	0.00	2.60	1.17	0.00	0.00	0.02	0.00
2.62	1.17	0.00	0.00	0.02	0.00	2.64	1.13	0.00	0.00	0.02	0.00
2.66	1.12	0.00	0.00	0.02	0.00	2.68	1.13	0.00	0.00	0.02	0.00
2.70	1.12	0.00	0.00	0.02	0.00	2.72	1.11	0.00	0.00	0.02	0.00
2.74	1.12	0.00	0.00	0.02	0.00	2.76	1.11	0.00	0.00	0.02	0.00
2.78	1.08	0.00	0.00	0.02	0.00	2.80	1.10	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
2.82	1.08	0.00	0.00	0.02	0.00	2.84	1.08	0.00	0.00	0.02	0.00
2.86	1.09	0.00	0.00	0.02	0.00	2.88	1.12	0.00	0.00	0.02	0.00
2.90	1.15	0.00	0.00	0.02	0.00	2.92	1.17	0.00	0.00	0.02	0.00
2.94	1.21	0.00	0.00	0.02	0.00	2.96	1.22	0.00	0.00	0.02	0.00
2.98	1.20	0.00	0.00	0.02	0.00	3.00	1.16	0.00	0.00	0.02	0.00
3.02	1.15	0.00	0.00	0.02	0.00	3.04	1.15	0.00	0.00	0.02	0.00
3.06	1.06	0.00	0.00	0.02	0.00	3.08	1.03	0.00	0.00	0.02	0.00
3.10	1.03	0.00	0.00	0.02	0.00	3.12	1.12	0.00	0.00	0.02	0.00
3.14	1.22	0.00	0.00	0.02	0.00	3.16	1.31	0.00	0.00	0.02	0.00
3.18	1.29	0.00	0.00	0.02	0.00	3.20	1.24	0.00	0.00	0.02	0.00
3.22	1.17	0.00	0.00	0.02	0.00	3.24	1.14	0.00	0.00	0.02	0.00
3.26	1.12	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	1.17	0.00	0.00	0.02	0.00
3.38	1.10	0.00	0.00	0.02	0.00	3.40	1.10	0.00	0.00	0.02	0.00
3.42	1.12	0.00	0.00	0.02	0.00	3.44	1.15	0.00	0.00	0.02	0.00
3.46	1.13	0.00	0.00	0.02	0.00	3.48	1.10	0.00	0.00	0.02	0.00
3.50	1.07	0.00	0.00	0.02	0.00	3.52	1.08	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	1.43	0.00	0.00	0.02	0.00
3.74	1.45	0.00	0.00	0.02	0.00	3.76	1.39	0.00	0.00	0.02	0.00
3.78	1.28	0.00	0.00	0.02	0.00	3.80	1.18	0.00	0.00	0.02	0.00
3.82	1.12	0.00	0.00	0.02	0.00	3.84	1.10	0.00	0.00	0.02	0.00
3.86	1.09	0.00	0.00	0.02	0.00	3.88	1.06	0.00	0.00	0.02	0.00
3.90	1.07	0.00	0.00	0.02	0.00	3.92	1.12	0.00	0.00	0.02	0.00
3.94	1.16	0.00	0.00	0.02	0.00	3.96	1.20	0.00	0.00	0.02	0.00
3.98	1.20	0.00	0.00	0.02	0.00	4.00	1.18	0.00	0.00	0.02	0.00
4.02	1.15	0.00	0.00	0.02	0.00	4.04	1.12	0.00	0.00	0.02	0.00
4.06	1.12	0.00	0.00	0.02	0.00	4.08	1.12	0.00	0.00	0.02	0.00
4.10	1.09	0.00	0.00	0.02	0.00	4.12	1.07	0.00	0.00	0.02	0.00
4.14	1.10	0.00	0.00	0.02	0.00	4.16	1.12	0.00	0.00	0.02	0.00
4.18	1.15	0.00	0.00	0.02	0.00	4.20	1.18	0.00	0.00	0.02	0.00
4.22	1.24	0.00	0.00	0.02	0.00	4.24	1.33	0.00	0.00	0.02	0.00
4.26	1.39	0.00	0.00	0.02	0.00	4.28	1.35	0.00	0.00	0.02	0.00
4.30	1.30	0.00	0.00	0.02	0.00	4.32	1.27	0.00	0.00	0.02	0.00
4.34	1.33	0.00	0.00	0.02	0.00	4.36	1.42	0.00	0.00	0.02	0.00
4.38	1.51	0.00	0.00	0.02	0.00	4.40	1.60	0.00	0.00	0.02	0.00
4.42	1.67	0.00	0.00	0.02	0.00	4.44	1.75	0.00	0.00	0.02	0.00
4.46	1.81	0.00	0.00	0.02	0.00	4.48	1.74	0.00	0.00	0.02	0.00
4.50	1.64	0.00	0.00	0.02	0.00	4.52	1.50	0.00	0.00	0.02	0.00
4.54	1.49	0.00	0.00	0.02	0.00	4.56	1.56	0.00	0.00	0.02	0.00
4.58	1.66	0.00	0.00	0.02	0.00	4.60	1.70	0.00	0.00	0.02	0.00
4.62	1.68	0.00	0.00	0.02	0.00	4.64	1.66	0.00	0.00	0.02	0.00
4.66	1.61	0.00	0.00	0.02	0.00	4.68	1.53	0.00	0.00	0.02	0.00
4.70	1.48	0.00	0.00	0.02	0.00	4.72	1.47	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
4.74	1.44	0.00	0.00	0.02	0.00	4.76	1.34	0.00	0.00	0.02	0.00
4.78	1.20	0.00	0.00	0.02	0.00	4.80	1.16	0.00	0.00	0.02	0.00
4.82	1.27	0.00	0.00	0.02	0.00	4.84	1.33	0.00	0.00	0.02	0.00
4.86	1.24	0.00	0.00	0.02	0.00	4.88	1.23	0.00	0.00	0.02	0.00
4.90	1.28	0.00	0.00	0.02	0.00	4.92	1.48	0.00	0.00	0.02	0.00
4.94	1.69	0.00	0.00	0.02	0.00	4.96	1.55	0.00	0.00	0.02	0.00
4.98	1.42	0.00	0.00	0.02	0.00	5.00	1.35	0.00	0.00	0.02	0.00
5.02	1.43	0.00	0.00	0.02	0.00	5.04	1.56	0.00	0.00	0.02	0.00
5.06	1.65	0.00	0.00	0.02	0.00	5.08	1.60	0.00	0.00	0.02	0.00
5.10	1.58	0.00	0.00	0.02	0.00	5.12	1.51	0.00	0.00	0.02	0.00
5.14	1.52	0.00	0.00	0.02	0.00	5.16	1.46	0.00	0.00	0.02	0.00
5.18	1.34	0.00	0.00	0.02	0.00	5.20	1.24	0.00	0.00	0.02	0.00
5.22	1.17	0.00	0.00	0.02	0.00	5.24	1.22	0.00	0.00	0.02	0.00
5.26	1.29	0.00	0.00	0.02	0.00	5.28	1.38	0.00	0.00	0.02	0.00
5.30	1.40	0.00	0.00	0.02	0.00	5.32	1.39	0.00	0.00	0.02	0.00
5.34	1.39	0.00	0.00	0.02	0.00	5.36	1.35	0.00	0.00	0.02	0.00
5.38	1.35	0.00	0.00	0.02	0.00	5.40	1.30	0.00	0.00	0.02	0.00
5.42	1.32	0.00	0.00	0.02	0.00	5.44	1.28	0.00	0.00	0.02	0.00
5.46	1.24	0.00	0.00	0.02	0.00	5.48	1.23	0.00	0.00	0.02	0.00
5.50	1.27	0.00	0.00	0.02	0.00	5.52	1.26	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	1.28	0.00	0.00	0.02	0.00
5.86	1.36	0.00	0.00	0.02	0.00	5.88	1.53	0.00	0.00	0.02	0.00
5.90	1.61	0.00	0.00	0.02	0.00	5.92	1.50	0.00	0.00	0.02	0.00
5.94	1.48	0.00	0.00	0.02	0.00	5.96	1.55	0.00	0.00	0.02	0.00
5.98	1.56	0.00	0.00	0.02	0.00	6.00	1.54	0.00	0.00	0.02	0.00
6.02	1.57	0.00	0.00	0.02	0.00	6.04	1.62	0.00	0.00	0.02	0.00
6.06	1.69	0.00	0.00	0.02	0.00	6.08	1.73	0.00	0.00	0.02	0.00
6.10	1.85	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	1.94	0.00	0.00	0.02	0.00
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

:: 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
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	1.54	0.00	0.00	0.02	0.00
7.62	1.48	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	1.97	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	1.69	0.00	0.00	0.02	0.00
7.90	1.73	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	1.38	0.00	0.00	0.02	0.00
8.18	1.35	0.00	0.00	0.02	0.00	8.20	1.89	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	1.61	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

:: 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
8.58	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						

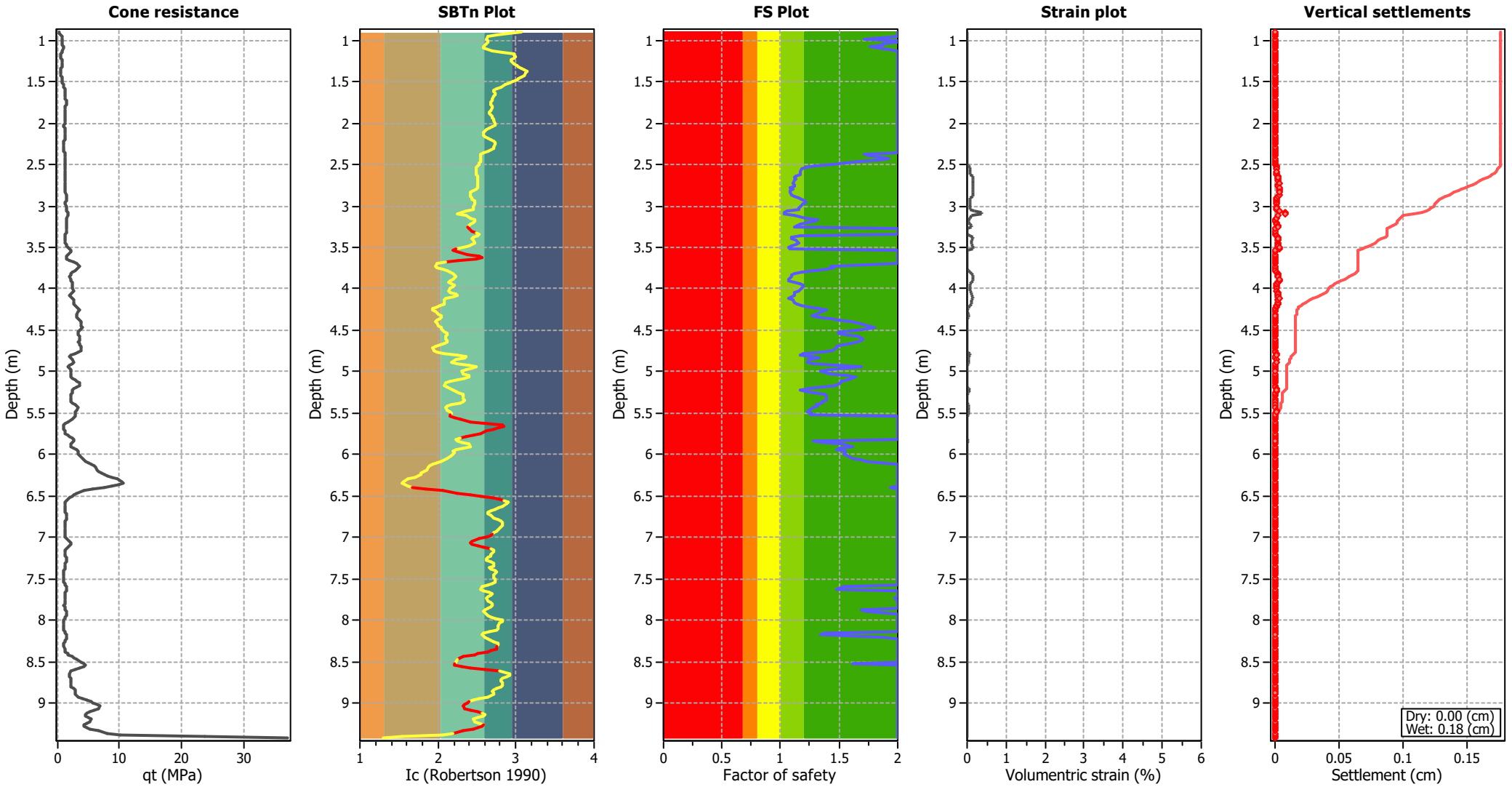
Overall liquefaction potential: 0.00

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)
0.90	55.69	2.00	0.00	0.95	0.00	0.92	57.42	2.00	0.00	0.95	0.00
0.94	57.79	2.00	0.00	0.95	0.00	0.96	100.16	2.00	0.00	0.95	0.00
0.98	83.66	1.71	0.00	0.95	0.00	1.00	98.42	2.00	0.00	0.94	0.00
1.02	100.03	2.00	0.00	0.94	0.00	1.04	91.60	1.87	0.00	0.94	0.00
1.06	85.56	1.88	0.00	0.94	0.00	1.08	81.84	1.77	0.00	0.94	0.00
1.10	85.18	1.84	0.00	0.94	0.00	1.12	80.70	2.00	0.00	0.94	0.00
1.14	88.75	2.00	0.00	0.94	0.00	1.16	97.64	2.00	0.00	0.94	0.00
1.18	92.20	2.00	0.00	0.93	0.00	1.20	95.75	2.00	0.00	0.93	0.00
1.22	98.35	2.00	0.00	0.93	0.00	1.24	99.57	2.00	0.00	0.93	0.00
1.26	102.61	2.00	0.00	0.93	0.00	1.28	107.92	2.00	0.00	0.93	0.00
1.30	113.19	2.00	0.00	0.93	0.00	1.32	118.31	2.00	0.00	0.93	0.00
1.34	123.33	2.00	0.00	0.93	0.00	1.36	128.28	2.00	0.00	0.92	0.00
1.38	131.51	2.00	0.00	0.92	0.00	1.40	131.49	2.00	0.00	0.92	0.00
1.42	129.93	2.00	0.00	0.92	0.00	1.44	127.92	2.00	0.00	0.92	0.00
1.46	126.89	2.00	0.00	0.92	0.00	1.48	125.42	2.00	0.00	0.92	0.00
1.50	124.10	2.00	0.00	0.92	0.00	1.52	123.47	2.00	0.00	0.92	0.00
1.54	122.98	2.00	0.00	0.91	0.00	1.56	120.39	2.00	0.00	0.91	0.00
1.58	117.45	2.00	0.00	0.91	0.00	1.60	116.29	2.00	0.00	0.91	0.00
1.62	118.84	2.00	0.00	0.91	0.00	1.64	121.73	2.00	0.00	0.91	0.00
1.66	123.31	2.00	0.00	0.91	0.00	1.68	123.26	2.00	0.00	0.91	0.00
1.70	123.23	2.00	0.00	0.91	0.00	1.72	259.38	2.00	0.00	0.90	0.00
1.74	248.90	2.00	0.00	0.90	0.00	1.76	236.70	2.00	0.00	0.90	0.00
1.78	235.23	2.00	0.00	0.90	0.00	1.80	246.48	2.00	0.00	0.90	0.00
1.82	117.72	2.00	0.00	0.90	0.00	1.84	219.95	2.00	0.00	0.90	0.00
1.86	196.25	2.00	0.00	0.90	0.00	1.88	193.51	2.00	0.00	0.90	0.00
1.90	228.71	2.00	0.00	0.89	0.00	1.92	113.61	2.00	0.00	0.89	0.00
1.94	110.70	2.00	0.00	0.89	0.00	1.96	108.94	2.00	0.00	0.89	0.00
1.98	109.02	2.00	0.00	0.89	0.00	2.00	108.86	2.00	0.00	0.89	0.00
2.02	106.57	2.00	0.00	0.89	0.00	2.04	101.12	2.00	0.00	0.89	0.00
2.06	180.26	2.00	0.00	0.89	0.00	2.08	146.78	2.00	0.00	0.88	0.00
2.10	124.79	2.00	0.00	0.88	0.00	2.12	113.69	2.00	0.00	0.88	0.00
2.14	111.72	2.00	0.00	0.88	0.00	2.16	128.47	2.00	0.00	0.88	0.00
2.18	156.41	2.00	0.00	0.88	0.00	2.20	197.25	2.00	0.00	0.88	0.00
2.22	100.72	2.00	0.00	0.88	0.00	2.24	102.04	2.00	0.00	0.88	0.00
2.26	101.96	2.00	0.00	0.87	0.00	2.28	99.17	2.00	0.00	0.87	0.00
2.30	96.21	2.00	0.00	0.87	0.00	2.32	186.04	2.00	0.00	0.87	0.00
2.34	148.28	2.00	0.00	0.87	0.00	2.36	111.44	2.00	0.00	0.87	0.00
2.38	93.67	1.71	0.00	0.87	0.00	2.40	95.58	1.76	0.00	0.87	0.00
2.42	101.07	1.92	0.00	0.87	0.00	2.44	98.35	1.83	0.00	0.86	0.00
2.46	92.12	1.66	0.00	0.86	0.00	2.48	87.84	1.55	0.00	0.86	0.00
2.50	82.90	1.44	0.00	0.86	0.00	2.52	75.21	1.29	0.03	0.86	0.00
2.54	70.29	1.21	0.06	0.86	0.00	2.56	68.20	1.18	0.07	0.86	0.00
2.58	67.24	1.17	0.08	0.86	0.00	2.60	67.50	1.17	0.08	0.86	0.00
2.62	67.54	1.17	0.08	0.85	0.00	2.64	64.51	1.13	0.13	0.85	0.00
2.66	64.36	1.12	0.13	0.85	0.00	2.68	64.76	1.13	0.13	0.85	0.00
2.70	64.63	1.12	0.13	0.85	0.00	2.72	63.54	1.11	0.14	0.85	0.00
2.74	64.38	1.12	0.14	0.85	0.00	2.76	64.38	1.11	0.14	0.85	0.00
2.78	61.93	1.08	0.16	0.85	0.00	2.80	63.73	1.10	0.15	0.84	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)
2.82	62.19	1.08	0.16	0.84	0.00	2.84	61.76	1.08	0.17	0.84	0.00
2.86	62.93	1.09	0.16	0.84	0.00	2.88	65.41	1.12	0.13	0.84	0.00
2.90	68.05	1.15	0.08	0.84	0.00	2.92	69.76	1.17	0.07	0.84	0.00
2.94	72.19	1.21	0.06	0.84	0.00	2.96	72.67	1.22	0.06	0.84	0.00
2.98	71.58	1.20	0.07	0.83	0.00	3.00	69.42	1.16	0.08	0.83	0.00
3.02	68.49	1.15	0.08	0.83	0.00	3.04	68.70	1.15	0.08	0.83	0.00
3.06	61.02	1.06	0.18	0.83	0.00	3.08	59.04	1.03	0.37	0.83	0.01
3.10	58.20	1.03	0.39	0.83	0.01	3.12	66.54	1.12	0.13	0.83	0.00
3.14	73.49	1.22	0.06	0.83	0.00	3.16	79.27	1.31	0.02	0.82	0.00
3.18	78.23	1.29	0.03	0.82	0.00	3.20	74.83	1.24	0.05	0.82	0.00
3.22	70.40	1.17	0.07	0.82	0.00	3.24	68.38	1.14	0.12	0.82	0.00
3.26	67.38	1.12	0.13	0.82	0.00	3.28	69.05	2.00	0.00	0.82	0.00
3.30	71.62	2.00	0.00	0.82	0.00	3.32	77.86	2.00	0.00	0.82	0.00
3.34	80.32	2.00	0.00	0.81	0.00	3.36	71.07	1.17	0.07	0.81	0.00
3.38	65.91	1.10	0.14	0.81	0.00	3.40	65.72	1.10	0.14	0.81	0.00
3.42	68.03	1.12	0.12	0.81	0.00	3.44	69.94	1.15	0.11	0.81	0.00
3.46	68.20	1.13	0.12	0.81	0.00	3.48	66.25	1.10	0.14	0.81	0.00
3.50	64.02	1.07	0.16	0.81	0.00	3.52	64.85	1.08	0.15	0.80	0.00
3.54	66.74	2.00	0.00	0.80	0.00	3.56	71.08	2.00	0.00	0.80	0.00
3.58	78.38	2.00	0.00	0.80	0.00	3.60	96.55	2.00	0.00	0.80	0.00
3.62	114.31	2.00	0.00	0.80	0.00	3.64	81.91	2.00	0.00	0.80	0.00
3.66	68.54	2.00	0.00	0.80	0.00	3.68	70.83	2.00	0.00	0.80	0.00
3.70	79.61	2.00	0.00	0.79	0.00	3.72	86.51	1.43	0.00	0.79	0.00
3.74	87.32	1.45	0.00	0.79	0.00	3.76	84.67	1.39	0.00	0.79	0.00
3.78	79.05	1.28	0.03	0.79	0.00	3.80	73.04	1.18	0.06	0.79	0.00
3.82	68.69	1.12	0.12	0.79	0.00	3.84	66.80	1.10	0.14	0.79	0.00
3.86	66.41	1.09	0.14	0.79	0.00	3.88	64.19	1.06	0.16	0.78	0.00
3.90	65.15	1.07	0.15	0.78	0.00	3.92	69.01	1.12	0.12	0.78	0.00
3.94	71.99	1.16	0.07	0.78	0.00	3.96	74.09	1.20	0.06	0.78	0.00
3.98	74.09	1.20	0.06	0.78	0.00	4.00	73.25	1.18	0.06	0.78	0.00
4.02	71.32	1.15	0.07	0.78	0.00	4.04	68.88	1.12	0.12	0.78	0.00
4.06	68.88	1.12	0.12	0.77	0.00	4.08	69.06	1.12	0.12	0.77	0.00
4.10	67.03	1.09	0.13	0.77	0.00	4.12	65.51	1.07	0.15	0.77	0.00
4.14	67.81	1.10	0.13	0.77	0.00	4.16	69.21	1.12	0.12	0.77	0.00
4.18	71.05	1.15	0.10	0.77	0.00	4.20	73.39	1.18	0.06	0.77	0.00
4.22	77.02	1.24	0.05	0.77	0.00	4.24	82.00	1.33	0.02	0.76	0.00
4.26	85.11	1.39	0.00	0.76	0.00	4.28	83.32	1.35	0.02	0.76	0.00
4.30	80.94	1.30	0.02	0.76	0.00	4.32	78.98	1.27	0.03	0.76	0.00
4.34	82.20	1.33	0.02	0.76	0.00	4.36	87.04	1.42	0.00	0.76	0.00
4.38	90.86	1.51	0.00	0.76	0.00	4.40	94.66	1.60	0.00	0.76	0.00
4.42	97.24	1.67	0.00	0.75	0.00	4.44	100.31	1.75	0.00	0.75	0.00
4.46	102.17	1.81	0.00	0.75	0.00	4.48	100.01	1.74	0.00	0.75	0.00
4.50	96.20	1.64	0.00	0.75	0.00	4.52	90.61	1.50	0.00	0.75	0.00
4.54	90.07	1.49	0.00	0.75	0.00	4.56	92.86	1.56	0.00	0.75	0.00
4.58	96.95	1.66	0.00	0.75	0.00	4.60	98.32	1.70	0.00	0.74	0.00
4.62	97.83	1.68	0.00	0.74	0.00	4.64	96.86	1.66	0.00	0.74	0.00
4.66	94.84	1.61	0.00	0.74	0.00	4.68	91.63	1.53	0.00	0.74	0.00
4.70	89.40	1.48	0.00	0.74	0.00	4.72	89.34	1.47	0.00	0.74	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)
4.74	87.92	1.44	0.00	0.74	0.00	4.76	82.96	1.34	0.02	0.74	0.00
4.78	74.71	1.20	0.06	0.73	0.00	4.80	72.47	1.16	0.07	0.73	0.00
4.82	78.96	1.27	0.03	0.73	0.00	4.84	82.58	1.33	0.02	0.73	0.00
4.86	77.57	1.24	0.04	0.73	0.00	4.88	76.94	1.23	0.05	0.73	0.00
4.90	80.02	1.28	0.02	0.73	0.00	4.92	89.91	1.48	0.00	0.73	0.00
4.94	98.18	1.69	0.00	0.73	0.00	4.96	92.78	1.55	0.00	0.72	0.00
4.98	87.08	1.42	0.00	0.72	0.00	5.00	83.43	1.35	0.02	0.72	0.00
5.02	87.33	1.43	0.00	0.72	0.00	5.04	93.31	1.56	0.00	0.72	0.00
5.06	96.54	1.65	0.00	0.72	0.00	5.08	94.65	1.60	0.00	0.72	0.00
5.10	93.79	1.58	0.00	0.72	0.00	5.12	91.11	1.51	0.00	0.72	0.00
5.14	91.38	1.52	0.00	0.71	0.00	5.16	88.94	1.46	0.00	0.71	0.00
5.18	83.22	1.34	0.02	0.71	0.00	5.20	77.32	1.24	0.04	0.71	0.00
5.22	73.31	1.17	0.06	0.71	0.00	5.24	76.17	1.22	0.05	0.71	0.00
5.26	80.41	1.29	0.02	0.71	0.00	5.28	85.12	1.38	0.00	0.71	0.00
5.30	85.84	1.40	0.00	0.71	0.00	5.32	85.49	1.39	0.00	0.70	0.00
5.34	85.67	1.39	0.00	0.70	0.00	5.36	83.56	1.35	0.02	0.70	0.00
5.38	83.86	1.35	0.00	0.70	0.00	5.40	81.04	1.30	0.02	0.70	0.00
5.42	81.91	1.32	0.02	0.70	0.00	5.44	80.07	1.28	0.02	0.70	0.00
5.46	77.84	1.24	0.04	0.70	0.00	5.48	76.82	1.23	0.04	0.70	0.00
5.50	79.19	1.27	0.03	0.69	0.00	5.52	78.47	1.26	0.03	0.69	0.00
5.54	79.20	2.00	0.00	0.69	0.00	5.56	77.16	2.00	0.00	0.69	0.00
5.58	79.37	2.00	0.00	0.69	0.00	5.60	84.24	2.00	0.00	0.69	0.00
5.62	161.88	2.00	0.00	0.69	0.00	5.64	109.04	2.00	0.00	0.69	0.00
5.66	103.28	2.00	0.00	0.69	0.00	5.68	88.03	2.00	0.00	0.68	0.00
5.70	81.16	2.00	0.00	0.68	0.00	5.72	126.55	2.00	0.00	0.68	0.00
5.74	93.30	2.00	0.00	0.68	0.00	5.76	78.46	2.00	0.00	0.68	0.00
5.78	76.10	2.00	0.00	0.68	0.00	5.80	76.09	2.00	0.00	0.68	0.00
5.82	77.72	2.00	0.00	0.68	0.00	5.84	79.84	1.28	0.02	0.68	0.00
5.86	84.23	1.36	0.00	0.67	0.00	5.88	92.19	1.53	0.00	0.67	0.00
5.90	95.30	1.61	0.00	0.67	0.00	5.92	90.82	1.50	0.00	0.67	0.00
5.94	89.87	1.48	0.00	0.67	0.00	5.96	92.78	1.55	0.00	0.67	0.00
5.98	93.22	1.56	0.00	0.67	0.00	6.00	92.37	1.54	0.00	0.67	0.00
6.02	93.55	1.57	0.00	0.67	0.00	6.04	95.61	1.62	0.00	0.66	0.00
6.06	98.26	1.69	0.00	0.66	0.00	6.08	99.59	1.73	0.00	0.66	0.00
6.10	103.75	1.85	0.00	0.66	0.00	6.12	109.19	2.00	0.00	0.66	0.00
6.14	113.71	2.00	0.00	0.66	0.00	6.16	115.18	2.00	0.00	0.66	0.00
6.18	116.14	2.00	0.00	0.66	0.00	6.20	117.00	2.00	0.00	0.66	0.00
6.22	119.29	2.00	0.00	0.65	0.00	6.24	126.01	2.00	0.00	0.65	0.00
6.26	129.86	2.00	0.00	0.65	0.00	6.28	128.89	2.00	0.00	0.65	0.00
6.30	138.70	2.00	0.00	0.65	0.00	6.32	146.20	2.00	0.00	0.65	0.00
6.34	147.40	2.00	0.00	0.65	0.00	6.36	136.90	2.00	0.00	0.65	0.00
6.38	122.63	2.00	0.00	0.65	0.00	6.40	106.66	1.94	0.00	0.64	0.00
6.42	101.53	2.00	0.00	0.64	0.00	6.44	89.58	2.00	0.00	0.64	0.00
6.46	90.43	2.00	0.00	0.64	0.00	6.48	110.70	2.00	0.00	0.64	0.00
6.50	148.62	2.00	0.00	0.64	0.00	6.52	331.62	2.00	0.00	0.64	0.00
6.54	166.45	2.00	0.00	0.64	0.00	6.56	164.79	2.00	0.00	0.64	0.00
6.58	159.45	2.00	0.00	0.63	0.00	6.60	147.14	2.00	0.00	0.63	0.00
6.62	130.97	2.00	0.00	0.63	0.00	6.64	113.23	2.00	0.00	0.63	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)
6.66	101.74	2.00	0.00	0.63	0.00	6.68	184.80	2.00	0.00	0.63	0.00
6.70	154.56	2.00	0.00	0.63	0.00	6.72	171.32	2.00	0.00	0.63	0.00
6.74	214.02	2.00	0.00	0.63	0.00	6.76	124.03	2.00	0.00	0.62	0.00
6.78	126.64	2.00	0.00	0.62	0.00	6.80	129.48	2.00	0.00	0.62	0.00
6.82	127.59	2.00	0.00	0.62	0.00	6.84	125.71	2.00	0.00	0.62	0.00
6.86	121.85	2.00	0.00	0.62	0.00	6.88	113.99	2.00	0.00	0.62	0.00
6.90	105.15	2.00	0.00	0.62	0.00	6.92	96.79	2.00	0.00	0.62	0.00
6.94	89.82	2.00	0.00	0.61	0.00	6.96	176.19	2.00	0.00	0.61	0.00
6.98	164.37	2.00	0.00	0.61	0.00	7.00	132.51	2.00	0.00	0.61	0.00
7.02	87.34	2.00	0.00	0.61	0.00	7.04	77.07	2.00	0.00	0.61	0.00
7.06	82.59	2.00	0.00	0.61	0.00	7.08	89.39	2.00	0.00	0.61	0.00
7.10	88.53	2.00	0.00	0.61	0.00	7.12	135.25	2.00	0.00	0.60	0.00
7.14	197.47	2.00	0.00	0.60	0.00	7.16	102.24	2.00	0.00	0.60	0.00
7.18	95.12	2.00	0.00	0.60	0.00	7.20	177.22	2.00	0.00	0.60	0.00
7.22	174.28	2.00	0.00	0.60	0.00	7.24	156.48	2.00	0.00	0.60	0.00
7.26	136.00	2.00	0.00	0.60	0.00	7.28	144.54	2.00	0.00	0.60	0.00
7.30	189.73	2.00	0.00	0.59	0.00	7.32	94.17	2.00	0.00	0.59	0.00
7.34	85.55	2.00	0.00	0.59	0.00	7.36	140.31	2.00	0.00	0.59	0.00
7.38	159.88	2.00	0.00	0.59	0.00	7.40	83.31	2.00	0.00	0.59	0.00
7.42	84.60	2.00	0.00	0.59	0.00	7.44	82.44	2.00	0.00	0.59	0.00
7.46	79.67	2.00	0.00	0.59	0.00	7.48	80.17	2.00	0.00	0.58	0.00
7.50	81.08	2.00	0.00	0.58	0.00	7.52	82.27	2.00	0.00	0.58	0.00
7.54	81.42	2.00	0.00	0.58	0.00	7.56	166.90	2.00	0.00	0.58	0.00
7.58	121.76	2.00	0.00	0.58	0.00	7.60	91.78	1.54	0.00	0.58	0.00
7.62	89.33	1.48	0.00	0.58	0.00	7.64	108.34	2.00	0.00	0.58	0.00
7.66	146.86	2.00	0.00	0.57	0.00	7.68	175.39	2.00	0.00	0.57	0.00
7.70	162.99	2.00	0.00	0.57	0.00	7.72	130.35	2.00	0.00	0.57	0.00
7.74	113.77	1.97	0.00	0.57	0.00	7.76	130.59	2.00	0.00	0.57	0.00
7.78	153.16	2.00	0.00	0.57	0.00	7.80	166.09	2.00	0.00	0.57	0.00
7.82	152.21	2.00	0.00	0.57	0.00	7.84	141.93	2.00	0.00	0.56	0.00
7.86	120.79	2.00	0.00	0.56	0.00	7.88	98.01	1.69	0.00	0.56	0.00
7.90	99.43	1.73	0.00	0.56	0.00	7.92	121.24	2.00	0.00	0.56	0.00
7.94	134.15	2.00	0.00	0.56	0.00	7.96	166.51	2.00	0.00	0.56	0.00
7.98	83.31	2.00	0.00	0.56	0.00	8.00	84.79	2.00	0.00	0.56	0.00
8.02	79.79	2.00	0.00	0.55	0.00	8.04	74.57	2.00	0.00	0.55	0.00
8.06	72.70	2.00	0.00	0.55	0.00	8.08	73.75	2.00	0.00	0.55	0.00
8.10	74.55	2.00	0.00	0.55	0.00	8.12	72.84	2.00	0.00	0.55	0.00
8.14	120.55	2.00	0.00	0.55	0.00	8.16	84.57	1.38	0.00	0.55	0.00
8.18	82.97	1.35	0.01	0.55	0.00	8.20	111.06	1.89	0.00	0.54	0.00
8.22	133.32	2.00	0.00	0.54	0.00	8.24	155.10	2.00	0.00	0.54	0.00
8.26	81.33	2.00	0.00	0.54	0.00	8.28	82.53	2.00	0.00	0.54	0.00
8.30	81.97	2.00	0.00	0.54	0.00	8.32	81.43	2.00	0.00	0.54	0.00
8.34	82.84	2.00	0.00	0.54	0.00	8.36	155.58	2.00	0.00	0.54	0.00
8.38	125.58	2.00	0.00	0.53	0.00	8.40	68.59	2.00	0.00	0.53	0.00
8.42	65.97	2.00	0.00	0.53	0.00	8.44	63.91	2.00	0.00	0.53	0.00
8.46	67.46	2.00	0.00	0.53	0.00	8.48	73.89	2.00	0.00	0.53	0.00
8.50	83.64	2.00	0.00	0.53	0.00	8.52	94.66	1.61	0.00	0.53	0.00
8.54	101.48	2.00	0.00	0.53	0.00	8.56	109.04	2.00	0.00	0.52	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)
8.58	120.87	2.00	0.00	0.52	0.00	8.60	222.54	2.00	0.00	0.52	0.00
8.62	179.83	2.00	0.00	0.52	0.00	8.64	201.05	2.00	0.00	0.52	0.00
8.66	203.27	2.00	0.00	0.52	0.00	8.68	197.95	2.00	0.00	0.52	0.00
8.70	191.41	2.00	0.00	0.52	0.00	8.72	190.44	2.00	0.00	0.52	0.00
8.74	190.47	2.00	0.00	0.51	0.00	8.76	190.03	2.00	0.00	0.51	0.00
8.78	190.88	2.00	0.00	0.51	0.00	8.80	191.67	2.00	0.00	0.51	0.00
8.82	190.46	2.00	0.00	0.51	0.00	8.84	187.33	2.00	0.00	0.51	0.00
8.86	401.58	2.00	0.00	0.51	0.00	8.88	189.56	2.00	0.00	0.51	0.00
8.90	192.77	2.00	0.00	0.51	0.00	8.92	324.40	2.00	0.00	0.50	0.00
8.94	189.61	2.00	0.00	0.50	0.00	8.96	170.37	2.00	0.00	0.50	0.00
8.98	169.06	2.00	0.00	0.50	0.00	9.00	176.01	2.00	0.00	0.50	0.00
9.02	178.23	2.00	0.00	0.50	0.00	9.04	180.12	2.00	0.00	0.50	0.00
9.06	183.02	2.00	0.00	0.50	0.00	9.08	193.71	2.00	0.00	0.50	0.00
9.10	206.28	2.00	0.00	0.49	0.00	9.12	280.82	2.00	0.00	0.49	0.00
9.14	329.81	2.00	0.00	0.49	0.00	9.16	281.26	2.00	0.00	0.49	0.00
9.18	197.44	2.00	0.00	0.49	0.00	9.20	189.42	2.00	0.00	0.49	0.00
9.22	191.29	2.00	0.00	0.49	0.00	9.24	209.71	2.00	0.00	0.49	0.00
9.26	264.73	2.00	0.00	0.49	0.00	9.28	248.97	2.00	0.00	0.48	0.00
9.30	187.33	2.00	0.00	0.48	0.00	9.32	177.54	2.00	0.00	0.48	0.00
9.34	166.55	2.00	0.00	0.48	0.00	9.36	162.72	2.00	0.00	0.48	0.00
9.38	169.53	2.00	0.00	0.48	0.00	9.40	275.25	2.00	0.00	0.48	0.00
9.42	415.53	2.00	0.00	0.48	0.00						

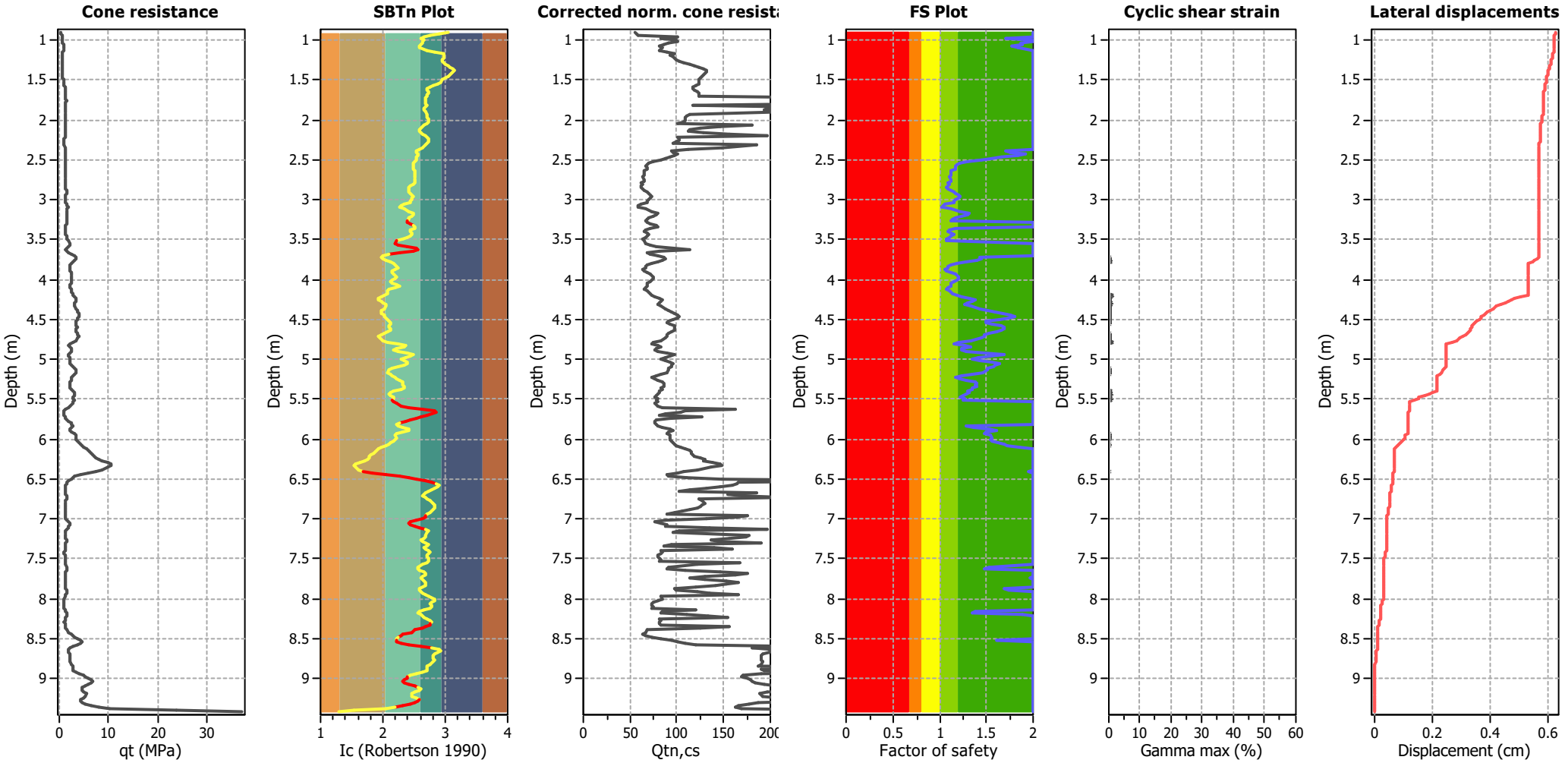
Total estimated settlement: 0.18

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

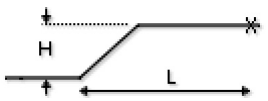
Geometric parameters: Level ground (or gently sloping) with free face (L: 50.00 m - H: 4.60 m)



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)
0.90	0.30	5.65	1.47	55.69	2.00	0.00	0.12	0.00
0.92	0.41	7.87	1.30	57.42	2.00	0.00	0.10	0.00
0.94	0.56	10.79	1.15	57.79	2.00	0.00	0.09	0.00
0.96	0.70	13.57	1.04	100.16	2.00	1.09	0.00	0.00
0.98	0.74	14.31	0.96	83.66	1.71	2.82	0.00	0.00
1.00	0.70	13.48	1.02	98.42	2.00	0.86	0.00	0.00
1.02	0.71	13.76	1.05	100.03	2.00	1.53	0.00	0.00
1.04	0.75	14.47	1.04	91.60	1.87	3.21	0.00	0.00
1.06	0.82	15.98	1.10	85.56	1.88	6.47	0.00	0.00
1.08	0.89	17.25	1.16	81.84	1.77	8.99	0.00	0.00
1.10	0.92	17.94	1.24	85.18	1.84	10.30	0.00	0.00
1.12	0.88	17.02	1.94	80.70	2.00	8.55	0.07	0.00
1.14	0.75	14.43	2.47	88.75	2.00	3.10	0.07	0.00
1.16	0.61	11.79	3.30	97.64	2.00	0.00	0.08	0.00
1.18	0.57	10.92	3.08	92.20	2.00	0.00	0.09	0.00
1.20	0.58	11.17	3.28	95.75	2.00	0.00	0.09	0.00
1.22	0.62	11.90	3.33	98.35	2.00	0.00	0.08	0.00
1.24	0.66	12.62	3.30	99.57	2.00	0.00	0.08	0.00
1.26	0.68	13.04	3.43	102.61	2.00	0.00	0.08	0.00
1.28	0.67	12.93	3.79	107.92	2.00	0.00	0.08	0.00
1.30	0.67	12.76	4.19	113.19	2.00	0.00	0.08	0.00
1.32	0.66	12.55	4.61	118.31	2.00	0.00	0.08	0.00
1.34	0.64	12.25	5.08	123.33	2.00	0.00	0.08	0.00
1.36	0.62	11.83	5.62	128.28	2.00	0.00	0.08	0.00
1.38	0.61	11.55	6.00	131.51	2.00	0.00	0.08	0.00
1.40	0.61	11.65	5.96	131.49	2.00	0.00	0.08	0.00
1.42	0.63	12.07	5.67	129.93	2.00	0.00	0.08	0.00
1.44	0.66	12.64	5.32	127.92	2.00	0.00	0.08	0.00
1.46	0.70	13.38	5.04	126.89	2.00	0.60	0.08	0.00
1.48	0.74	14.19	4.75	125.42	2.00	2.55	0.08	0.00
1.50	0.79	15.23	4.45	124.10	2.00	4.89	0.07	0.00
1.52	0.86	16.58	4.20	123.47	2.00	7.68	0.07	0.00
1.54	0.94	18.05	3.98	122.98	2.00	10.50	0.06	0.00
1.56	1.05	20.33	3.62	120.39	2.00	14.42	0.06	0.00
1.58	1.15	22.28	3.33	117.45	2.00	17.44	0.05	0.00
1.60	1.24	23.93	3.18	116.29	2.00	19.80	0.05	0.00
1.62	1.25	24.23	3.27	118.84	2.00	20.21	0.05	0.00
1.64	1.26	24.40	3.39	121.73	2.00	20.44	0.05	0.00
1.66	1.28	24.79	3.44	123.31	2.00	20.97	0.05	0.00
1.68	1.32	25.48	3.40	123.26	2.00	21.88	0.05	0.00
1.70	1.34	26.00	3.37	123.23	2.00	22.54	0.05	0.00
1.72	1.36	26.42	3.33	259.38	2.00	23.07	0.00	0.00
1.74	1.38	26.73	3.27	248.90	2.00	23.45	0.00	0.00
1.76	1.39	26.92	3.19	236.70	2.00	23.68	0.00	0.00
1.78	1.37	26.51	3.15	235.23	2.00	23.18	0.00	0.00
1.80	1.33	25.64	3.17	246.48	2.00	22.07	0.00	0.00
1.82	1.29	24.91	3.18	117.72	2.00	21.13	0.05	0.00
1.84	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)
1.86	1.32	25.55	2.77	196.25	2.00	21.97	0.00	0.00
1.88	1.33	25.65	2.75	193.51	2.00	22.09	0.00	0.00
1.90	1.32	25.53	3.02	228.71	2.00	21.94	0.00	0.00
1.92	1.25	24.08	3.04	113.61	2.00	20.00	0.05	0.00
1.94	1.21	23.35	2.95	110.70	2.00	18.99	0.05	0.00
1.96	1.18	22.74	2.90	108.94	2.00	18.12	0.05	0.00
1.98	1.15	22.17	2.93	109.02	2.00	17.28	0.05	0.00
2.00	1.13	21.62	2.95	108.86	2.00	16.45	0.06	0.00
2.02	1.11	21.31	2.86	106.57	2.00	15.98	0.06	0.00
2.04	1.12	21.40	2.61	101.12	2.00	16.11	0.06	0.00
2.06	1.14	21.88	2.35	180.26	2.00	16.84	0.00	0.00
2.08	1.17	22.52	2.12	146.78	2.00	17.79	0.00	0.00
2.10	1.20	23.07	1.96	124.79	2.00	18.59	0.00	0.00
2.12	1.22	23.49	1.87	113.69	2.00	19.19	0.00	0.00
2.14	1.24	23.77	1.87	111.72	2.00	19.57	0.00	0.00
2.16	1.23	23.56	2.02	128.47	2.00	19.29	0.00	0.00
2.18	1.19	22.81	2.22	156.41	2.00	18.22	0.00	0.00
2.20	1.14	21.77	2.47	197.25	2.00	16.67	0.00	0.00
2.22	1.09	20.82	2.62	100.72	2.00	15.20	0.06	0.00
2.24	1.06	20.33	2.70	102.04	2.00	14.41	0.06	0.00
2.26	1.05	20.05	2.71	101.96	2.00	13.96	0.06	0.00
2.28	1.05	20.09	2.58	99.17	2.00	14.03	0.06	0.00
2.30	1.05	20.07	2.45	96.21	2.00	13.99	0.06	0.00
2.32	1.06	20.29	2.25	186.04	2.00	14.36	0.00	0.00
2.34	1.12	21.36	2.04	148.28	2.00	16.05	0.00	0.00
2.36	1.19	22.84	1.80	111.44	2.00	18.25	0.00	0.00
2.38	1.27	24.24	1.70	93.67	1.71	20.22	0.00	0.00
2.40	1.29	24.79	1.76	95.58	1.76	20.96	0.00	0.00
2.42	1.30	25.00	1.83	101.07	1.92	21.24	0.00	0.00
2.44	1.31	25.03	1.80	98.35	1.83	21.28	0.00	0.00
2.46	1.30	24.89	1.72	92.12	1.66	21.10	0.00	0.00
2.48	1.29	24.72	1.66	87.84	1.55	20.88	0.00	0.00
2.50	1.27	24.30	1.58	82.90	1.44	20.30	0.00	0.00
2.52	1.25	23.97	1.47	75.21	1.29	19.86	0.00	0.00
2.54	1.24	23.66	1.34	70.29	1.21	19.42	0.00	0.00
2.56	1.23	23.51	1.27	68.20	1.18	19.21	0.00	0.00
2.58	1.22	23.31	1.24	67.24	1.17	18.93	0.00	0.00
2.60	1.21	23.00	1.25	67.50	1.17	18.50	0.00	0.00
2.62	1.19	22.75	1.25	67.54	1.17	18.13	0.00	0.00
2.64	1.18	22.51	1.26	64.51	1.13	17.79	0.00	0.00
2.66	1.17	22.30	1.24	64.36	1.12	17.47	0.00	0.00
2.68	1.17	22.22	1.24	64.76	1.13	17.36	0.00	0.00
2.70	1.17	22.19	1.24	64.63	1.12	17.30	0.00	0.00
2.72	1.17	22.15	1.22	63.54	1.11	17.26	0.00	0.00
2.74	1.15	21.90	1.22	64.38	1.12	16.87	0.00	0.00
2.76	1.14	21.61	1.20	64.38	1.11	16.43	0.00	0.00
2.78	1.14	21.62	1.17	61.93	1.08	16.44	0.00	0.00
2.80	1.17	22.27	1.13	63.73	1.10	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)
2.82	1.23	23.47	1.06	62.19	1.08	19.17	0.00	0.00
2.84	1.30	24.85	1.03	61.76	1.08	21.05	0.00	0.00
2.86	1.36	25.91	1.05	62.93	1.09	22.42	0.00	0.00
2.88	1.40	26.71	1.12	65.41	1.12	23.43	0.00	0.00
2.90	1.42	27.02	1.21	68.05	1.15	23.81	0.00	0.00
2.92	1.41	26.85	1.27	69.76	1.17	23.59	0.00	0.00
2.94	1.37	26.18	1.36	72.19	1.21	22.77	0.00	0.00
2.96	1.35	25.66	1.38	72.67	1.22	22.11	0.00	0.00
2.98	1.35	25.67	1.35	71.58	1.20	22.12	0.00	0.00
3.00	1.36	25.94	1.27	69.42	1.16	22.46	0.00	0.00
3.02	1.37	26.00	1.24	68.49	1.15	22.54	0.00	0.00
3.04	1.36	25.86	1.24	68.70	1.15	22.36	0.00	0.00
3.06	1.49	28.53	0.95	61.02	1.06	25.61	0.00	0.00
3.08	1.62	30.95	0.85	59.04	1.03	28.29	0.00	0.00
3.10	1.71	32.75	0.79	58.20	1.03	30.15	0.00	0.00
3.12	1.63	31.10	1.10	66.54	1.12	28.45	0.00	0.00
3.14	1.53	29.25	1.36	73.49	1.22	26.43	0.00	0.00
3.16	1.46	27.82	1.57	79.27	1.31	24.77	0.00	0.00
3.18	1.45	27.61	1.54	78.23	1.29	24.52	0.00	0.00
3.20	1.46	27.72	1.42	74.83	1.24	24.65	0.00	0.00
3.22	1.48	28.18	1.27	70.40	1.17	25.20	0.00	0.00
3.24	1.50	28.51	1.19	68.38	1.14	25.58	0.00	0.00
3.26	1.53	29.22	1.15	67.38	1.12	26.39	0.00	0.00
3.28	1.54	29.34	1.20	69.05	2.00	26.53	0.00	0.00
3.30	1.48	28.17	1.31	71.62	2.00	25.19	0.00	0.00
3.32	1.38	26.14	1.55	77.86	2.00	22.72	0.00	0.00
3.34	1.30	24.64	1.55	80.32	2.00	20.77	0.00	0.00
3.36	1.28	24.29	1.42	71.07	1.17	20.29	0.00	0.00
3.38	1.32	24.99	1.16	65.91	1.10	21.23	0.00	0.00
3.40	1.33	25.26	1.15	65.72	1.10	21.59	0.00	0.00
3.42	1.33	25.20	1.22	68.03	1.12	21.50	0.00	0.00
3.44	1.33	25.21	1.29	69.94	1.15	21.52	0.00	0.00
3.46	1.39	26.31	1.22	68.20	1.13	22.93	0.00	0.00
3.48	1.49	28.40	1.12	66.25	1.10	25.45	0.00	0.00
3.50	1.66	31.63	1.00	64.02	1.07	29.01	0.00	0.00
3.52	1.99	38.24	0.90	64.85	1.08	35.27	0.00	0.00
3.54	2.17	41.65	0.89	66.74	2.00	38.09	0.00	0.00
3.56	2.13	40.85	1.07	71.08	2.00	37.45	0.00	0.00
3.58	1.78	33.98	1.44	78.38	2.00	31.37	0.00	0.00
3.60	1.48	28.14	1.93	96.55	2.00	25.14	0.00	0.00
3.62	1.37	25.88	1.99	114.31	2.00	22.38	0.00	0.00
3.64	1.50	28.50	1.64	81.91	2.00	25.56	0.00	0.00
3.66	1.96	37.52	1.05	68.54	2.00	34.64	0.00	0.00
3.68	2.60	50.13	0.78	70.83	2.00	44.21	0.00	0.00
3.70	3.17	61.34	0.68	79.61	2.00	50.87	0.00	0.00
3.72	3.48	67.42	0.72	86.51	1.43	53.99	0.43	0.01
3.74	3.45	66.98	0.80	87.32	1.45	53.77	0.40	0.01
3.76	3.20	61.93	0.93	84.67	1.39	51.19	0.51	0.01

:: 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)
3.78	2.82	54.54	0.98	79.05	1.28	46.99	0.86	0.02
3.80	2.49	47.93	0.95	73.04	1.18	42.73	0.00	0.00
3.82	2.27	43.58	0.91	68.69	1.12	39.59	0.00	0.00
3.84	2.12	40.66	0.92	66.80	1.10	37.30	0.00	0.00
3.86	2.03	38.94	0.94	66.41	1.09	35.87	0.00	0.00
3.88	2.08	39.85	0.84	64.19	1.06	36.63	0.00	0.00
3.90	2.25	43.22	0.78	65.15	1.07	39.31	0.00	0.00
3.92	2.41	46.26	0.84	69.01	1.12	41.56	0.00	0.00
3.94	2.42	46.43	0.96	71.99	1.16	41.68	0.00	0.00
3.96	2.35	45.13	1.07	74.09	1.20	40.74	0.00	0.00
3.98	2.41	46.22	1.04	74.09	1.20	41.53	0.00	0.00
4.00	2.51	48.30	0.95	73.25	1.18	42.98	0.00	0.00
4.02	2.54	48.77	0.85	71.32	1.15	43.30	0.00	0.00
4.04	2.36	45.35	0.86	68.88	1.12	40.90	0.00	0.00
4.06	2.13	40.69	0.99	68.88	1.12	37.32	0.00	0.00
4.08	2.04	38.94	1.03	69.06	1.12	35.87	0.00	0.00
4.10	2.18	41.68	0.90	67.03	1.09	38.11	0.00	0.00
4.12	2.40	46.09	0.70	65.51	1.07	41.43	0.00	0.00
4.14	2.56	49.13	0.68	67.81	1.10	43.54	0.00	0.00
4.16	2.59	49.86	0.71	69.21	1.12	44.03	0.00	0.00
4.18	2.65	50.89	0.76	71.05	1.15	44.70	0.00	0.00
4.20	2.85	54.95	0.68	73.39	1.18	47.24	1.47	0.03
4.22	3.09	59.69	0.62	77.02	1.24	49.97	1.09	0.02
4.24	3.38	65.39	0.57	82.00	1.33	52.98	0.70	0.01
4.26	3.50	67.72	0.62	85.11	1.39	54.13	0.52	0.01
4.28	3.37	65.09	0.67	83.32	1.35	52.83	0.62	0.01
4.30	3.19	61.57	0.74	80.94	1.30	50.99	0.77	0.01
4.32	3.03	58.51	0.80	78.98	1.27	49.31	0.92	0.02
4.34	3.17	61.11	0.84	82.20	1.33	50.75	0.69	0.01
4.36	3.39	65.46	0.87	87.04	1.42	53.02	0.44	0.01
4.38	3.62	70.15	0.82	90.86	1.51	55.30	0.58	0.01
4.40	3.81	73.87	0.82	94.66	1.60	57.00	0.45	0.01
4.42	3.88	75.26	0.89	97.24	1.67	57.62	0.37	0.01
4.44	3.93	76.08	1.02	100.31	1.75	57.98	0.30	0.01
4.46	3.94	76.28	1.11	102.17	1.81	58.06	0.26	0.00
4.48	3.82	74.06	1.11	100.01	1.74	57.09	0.31	0.01
4.50	3.63	70.19	1.11	96.20	1.64	55.32	0.40	0.01
4.52	3.35	64.74	1.09	90.61	1.50	52.65	0.31	0.01
4.54	3.25	62.73	1.14	90.07	1.49	51.61	0.33	0.01
4.56	3.34	64.46	1.20	92.86	1.56	52.50	0.25	0.00
4.58	3.54	68.41	1.22	96.95	1.66	54.47	0.17	0.00
4.60	3.59	69.41	1.24	98.32	1.70	54.95	0.14	0.00
4.62	3.53	68.15	1.27	97.83	1.68	54.35	0.15	0.00
4.64	3.46	66.76	1.28	96.86	1.66	53.66	0.17	0.00
4.66	3.52	67.98	1.14	94.84	1.61	54.26	0.20	0.00
4.68	3.63	69.10	0.92	91.63	1.53	54.80	0.28	0.01
4.70	3.74	69.65	0.76	89.40	1.48	55.06	0.64	0.01
4.72	3.87	70.93	0.68	89.34	1.47	55.66	0.64	0.01

:: 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)
4.74	3.80	69.56	0.67	87.92	1.44	55.02	0.71	0.01
4.76	3.42	63.60	0.74	82.96	1.34	52.06	0.65	0.01
4.78	2.80	53.46	0.82	74.71	1.20	46.33	1.35	0.02
4.80	2.21	42.08	1.08	72.47	1.16	38.43	0.00	0.00
4.82	1.93	36.64	1.40	78.96	1.27	33.86	0.00	0.00
4.84	2.08	39.55	1.47	82.58	1.33	36.38	0.00	0.00
4.86	2.40	45.76	1.17	77.57	1.24	41.20	0.00	0.00
4.88	2.56	48.93	1.07	76.94	1.23	43.41	0.00	0.00
4.90	2.37	45.21	1.27	80.02	1.28	40.80	0.00	0.00
4.92	2.03	38.47	1.73	89.91	1.48	35.47	0.00	0.00
4.94	1.82	34.35	2.07	98.18	1.69	31.73	0.00	0.00
4.96	1.88	35.56	1.87	92.78	1.55	32.87	0.00	0.00
4.98	2.13	40.37	1.60	87.08	1.42	37.06	0.00	0.00
5.00	2.29	43.61	1.42	83.43	1.35	39.61	0.00	0.00
5.02	2.24	42.55	1.57	87.33	1.43	38.79	0.00	0.00
5.04	2.10	39.86	1.81	93.31	1.56	36.64	0.00	0.00
5.06	2.14	40.53	1.90	96.54	1.65	37.19	0.00	0.00
5.08	2.36	44.92	1.76	94.65	1.60	40.59	0.00	0.00
5.10	2.77	53.09	1.56	93.79	1.58	46.10	0.23	0.00
5.12	3.19	60.02	1.28	91.11	1.51	50.15	0.30	0.01
5.14	3.50	64.42	1.13	91.38	1.52	52.49	0.29	0.01
5.16	3.52	64.21	1.03	88.94	1.46	52.38	0.37	0.01
5.18	3.14	57.67	1.04	83.22	1.34	48.83	0.64	0.01
5.20	2.75	50.89	1.02	77.32	1.24	44.70	0.00	0.00
5.22	2.47	46.00	1.01	73.31	1.17	41.37	0.00	0.00
5.24	2.42	45.55	1.13	76.17	1.22	41.04	0.00	0.00
5.26	2.33	44.23	1.30	80.41	1.29	40.07	0.00	0.00
5.28	2.24	42.41	1.49	85.12	1.38	38.69	0.00	0.00
5.30	2.25	42.62	1.51	85.84	1.40	38.85	0.00	0.00
5.32	2.22	42.11	1.51	85.49	1.39	38.46	0.00	0.00
5.34	2.14	40.56	1.55	85.67	1.39	37.21	0.00	0.00
5.36	2.15	40.77	1.47	83.56	1.35	37.39	0.00	0.00
5.38	2.40	45.11	1.40	83.86	1.35	40.72	0.00	0.00
5.40	2.89	52.50	1.12	81.04	1.30	45.73	0.78	0.01
5.42	3.20	56.92	1.01	81.91	1.32	48.40	0.73	0.01
5.44	3.23	56.98	0.92	80.07	1.28	48.43	0.86	0.02
5.46	3.00	53.26	0.97	77.84	1.24	46.20	1.04	0.02
5.48	2.82	50.45	1.02	76.82	1.23	44.41	0.00	0.00
5.50	2.88	51.52	1.08	79.19	1.27	45.11	0.93	0.02
5.52	2.94	52.13	1.03	78.47	1.26	45.50	0.99	0.02
5.54	2.91	51.70	1.07	79.20	2.00	45.23	0.00	0.00
5.56	2.63	47.18	1.12	77.16	2.00	42.21	0.00	0.00
5.58	2.30	42.04	1.31	79.37	2.00	38.40	0.00	0.00
5.60	1.79	33.61	1.61	84.24	2.00	31.01	0.00	0.00
5.62	1.34	24.63	2.30	161.88	2.00	20.75	0.00	0.00
5.64	0.99	17.65	3.03	109.04	2.00	9.75	0.07	0.00
5.66	0.90	15.91	2.86	103.28	2.00	6.32	0.07	0.00
5.68	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)
5.70	0.95	16.89	1.80	81.16	2.00	8.30	0.07	0.00
5.72	1.13	20.37	1.68	126.55	2.00	14.49	0.00	0.00
5.74	1.32	24.25	1.63	93.30	2.00	20.24	0.00	0.00
5.76	1.59	29.48	1.48	78.46	2.00	26.68	0.00	0.00
5.78	1.91	34.72	1.33	76.10	2.00	32.08	0.00	0.00
5.80	2.32	41.21	1.22	76.09	2.00	37.74	0.00	0.00
5.82	2.62	45.84	1.17	77.72	2.00	41.25	0.00	0.00
5.84	2.63	46.19	1.24	79.84	1.28	41.50	0.00	0.00
5.86	2.41	42.96	1.45	84.23	1.36	39.12	0.00	0.00
5.88	2.12	38.59	1.79	92.19	1.53	35.58	0.00	0.00
5.90	2.12	38.69	1.88	95.30	1.61	35.66	0.00	0.00
5.92	2.54	45.14	1.63	90.82	1.50	40.74	0.00	0.00
5.94	3.07	53.17	1.42	89.87	1.48	46.15	0.35	0.01
5.96	3.35	57.58	1.41	92.78	1.55	48.78	0.26	0.00
5.98	3.32	57.04	1.44	93.22	1.56	48.47	0.25	0.00
6.00	3.36	57.38	1.40	92.37	1.54	48.66	0.27	0.00
6.02	3.60	60.79	1.35	93.55	1.57	50.57	0.24	0.00
6.04	3.94	65.73	1.26	95.61	1.62	53.15	0.19	0.00
6.06	4.25	70.10	1.21	98.26	1.69	55.27	0.35	0.01
6.08	4.56	74.04	1.09	99.59	1.73	57.08	0.32	0.01
6.10	5.03	80.25	0.97	103.75	1.85	59.74	0.24	0.00
6.12	5.54	86.93	0.88	109.19	2.00	62.38	0.00	0.00
6.14	5.94	92.16	0.84	113.71	2.00	64.30	0.00	0.00
6.16	6.13	94.32	0.81	115.18	2.00	65.07	0.00	0.00
6.18	6.35	96.83	0.75	116.14	2.00	65.94	0.00	0.00
6.20	6.65	100.20	0.69	117.00	2.00	67.07	0.00	0.00
6.22	7.07	105.42	0.65	119.29	2.00	68.74	0.00	0.00
6.24	7.53	112.04	0.69	126.01	2.00	70.75	0.00	0.00
6.26	8.08	119.22	0.69	129.86	2.00	72.80	0.00	0.00
6.28	8.74	127.31	0.64	128.89	2.00	74.97	0.00	0.00
6.30	9.78	138.70	0.51	138.70	2.00	77.80	0.00	0.00
6.32	10.50	146.20	0.43	146.20	2.00	79.54	0.00	0.00
6.34	10.66	147.40	0.40	147.40	2.00	79.81	0.00	0.00
6.36	9.85	136.90	0.40	136.90	2.00	77.37	0.00	0.00
6.38	8.75	122.63	0.40	122.63	2.00	73.73	0.00	0.00
6.40	7.49	106.66	0.43	106.66	1.94	69.13	0.47	0.01
6.42	5.77	85.42	0.59	101.53	2.00	61.80	0.00	0.00
6.44	4.22	65.83	0.98	89.58	2.00	53.20	0.00	0.00
6.46	3.13	51.01	1.49	90.43	2.00	44.78	0.00	0.00
6.48	2.67	45.14	2.26	110.70	2.00	40.75	0.00	0.00
6.50	2.35	40.84	3.09	148.62	2.00	37.44	0.00	0.00
6.52	1.96	34.98	4.28	331.62	2.00	32.33	0.00	0.00
6.54	1.65	29.68	4.83	166.45	2.00	26.91	0.04	0.00
6.56	1.41	25.48	5.09	164.79	2.00	21.87	0.05	0.00
6.58	1.24	22.38	5.13	159.45	2.00	17.59	0.05	0.00
6.60	1.20	21.49	4.58	147.14	2.00	16.25	0.06	0.00
6.62	1.18	20.82	3.82	130.97	2.00	15.21	0.06	0.00
6.64	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)
6.66	1.19	20.19	2.52	101.74	2.00	14.19	0.06	0.00
6.68	1.23	20.67	2.14	184.80	2.00	14.97	0.00	0.00
6.70	1.27	21.17	1.96	154.56	2.00	15.76	0.00	0.00
6.72	1.41	23.65	2.28	171.32	2.00	19.41	0.00	0.00
6.74	1.48	24.97	2.71	214.02	2.00	21.20	0.00	0.00
6.76	1.50	25.53	3.24	124.03	2.00	21.93	0.05	0.00
6.78	1.37	23.37	3.45	126.64	2.00	19.02	0.05	0.00
6.80	1.28	21.87	3.68	129.48	2.00	16.83	0.06	0.00
6.82	1.23	20.96	3.65	127.59	2.00	15.43	0.06	0.00
6.84	1.20	20.30	3.61	125.71	2.00	14.37	0.06	0.00
6.86	1.17	19.77	3.46	121.85	2.00	13.49	0.06	0.00
6.88	1.15	19.30	3.11	113.99	2.00	12.71	0.06	0.00
6.90	1.15	18.94	2.73	105.15	2.00	12.09	0.06	0.00
6.92	1.14	18.66	2.37	96.79	2.00	11.59	0.06	0.00
6.94	1.15	18.55	2.08	89.82	2.00	11.39	0.06	0.00
6.96	1.15	18.54	1.89	176.19	2.00	11.38	0.00	0.00
6.98	1.19	18.97	1.85	164.37	2.00	12.14	0.00	0.00
7.00	1.30	20.76	1.75	132.51	2.00	15.11	0.00	0.00
7.02	1.57	24.71	1.58	87.34	2.00	20.86	0.00	0.00
7.04	1.94	30.30	1.42	77.07	2.00	27.59	0.00	0.00
7.06	2.19	34.13	1.54	82.59	2.00	31.51	0.00	0.00
7.08	2.22	34.70	1.75	89.39	2.00	32.07	0.00	0.00
7.10	1.99	31.37	1.95	88.53	2.00	28.73	0.00	0.00
7.12	1.70	27.07	2.21	135.25	2.00	23.86	0.00	0.00
7.14	1.45	23.12	2.44	197.47	2.00	18.67	0.00	0.00
7.16	1.30	20.72	2.52	102.24	2.00	15.05	0.06	0.00
7.18	1.25	19.82	2.26	95.12	2.00	13.58	0.06	0.00
7.20	1.26	19.77	2.01	177.22	2.00	13.50	0.00	0.00
7.22	1.28	20.09	2.02	174.28	2.00	14.02	0.00	0.00
7.24	1.36	21.16	1.97	156.48	2.00	15.74	0.00	0.00
7.26	1.47	22.76	1.92	136.00	2.00	18.14	0.00	0.00
7.28	1.49	23.12	2.02	144.54	2.00	18.66	0.00	0.00
7.30	1.38	21.52	2.25	189.73	2.00	16.30	0.00	0.00
7.32	1.23	19.04	2.25	94.17	2.00	12.25	0.06	0.00
7.34	1.16	17.81	1.93	85.55	2.00	10.06	0.06	0.00
7.36	1.17	17.77	1.57	140.31	2.00	9.97	0.00	0.00
7.38	1.14	17.31	1.67	159.88	2.00	9.12	0.00	0.00
7.40	1.09	16.59	1.87	83.31	2.00	7.71	0.07	0.00
7.42	1.05	15.84	1.95	84.60	2.00	6.19	0.07	0.00
7.44	1.06	15.96	1.86	82.44	2.00	6.43	0.07	0.00
7.46	1.08	16.22	1.73	79.67	2.00	6.96	0.07	0.00
7.48	1.10	16.48	1.75	80.17	2.00	7.49	0.07	0.00
7.50	1.09	16.29	1.79	81.08	2.00	7.10	0.07	0.00
7.52	1.07	16.08	1.85	82.27	2.00	6.68	0.07	0.00
7.54	1.07	16.03	1.81	81.42	2.00	6.57	0.07	0.00
7.56	1.12	16.69	1.66	166.90	2.00	7.90	0.00	0.00
7.58	1.24	18.25	1.47	121.76	2.00	10.86	0.00	0.00
7.60	1.40	20.66	1.38	91.78	1.54	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)
7.62	1.51	22.19	1.45	89.33	1.48	17.30	0.00	0.00
7.64	1.46	21.56	1.59	108.34	2.00	16.36	0.00	0.00
7.66	1.32	19.49	1.76	146.86	2.00	13.02	0.00	0.00
7.68	1.21	17.90	1.83	175.39	2.00	10.21	0.00	0.00
7.70	1.20	17.67	1.72	162.99	2.00	9.80	0.00	0.00
7.72	1.27	18.56	1.56	130.35	2.00	11.41	0.00	0.00
7.74	1.33	19.40	1.49	113.77	1.97	12.87	0.00	0.00
7.76	1.34	19.59	1.64	130.59	2.00	13.20	0.00	0.00
7.78	1.26	18.38	1.71	153.16	2.00	11.09	0.00	0.00
7.80	1.18	17.04	1.68	166.09	2.00	8.58	0.00	0.00
7.82	1.12	16.07	1.50	152.21	2.00	6.65	0.00	0.00
7.84	1.13	16.13	1.44	141.93	2.00	6.78	0.00	0.00
7.86	1.20	17.09	1.36	120.79	2.00	8.68	0.00	0.00
7.88	1.30	18.57	1.29	98.01	1.69	11.43	0.00	0.00
7.90	1.39	19.89	1.40	99.43	1.73	13.69	0.00	0.00
7.92	1.41	20.19	1.61	121.24	2.00	14.20	0.00	0.00
7.94	1.40	20.08	1.71	134.15	2.00	14.01	0.00	0.00
7.96	1.30	18.61	1.83	166.51	2.00	11.51	0.00	0.00
7.98	1.16	16.49	1.87	83.31	2.00	7.52	0.07	0.00
8.00	0.99	13.96	2.03	84.79	2.00	2.02	0.08	0.00
8.02	0.92	12.91	1.85	79.79	2.00	0.00	0.08	0.00
8.04	0.93	12.97	1.62	74.57	2.00	0.00	0.08	0.00
8.06	0.96	13.31	1.53	72.70	2.00	0.44	0.08	0.00
8.08	0.96	13.35	1.57	73.75	2.00	0.54	0.08	0.00
8.10	0.97	13.38	1.60	74.55	2.00	0.61	0.08	0.00
8.12	1.01	14.00	1.51	72.84	2.00	2.11	0.08	0.00
8.14	1.18	16.26	1.29	120.55	2.00	7.04	0.00	0.00
8.16	1.31	18.11	1.14	84.57	1.38	10.60	0.00	0.00
8.18	1.41	19.43	1.21	82.97	1.35	12.92	0.00	0.00
8.20	1.39	19.36	1.46	111.06	1.89	12.81	0.00	0.00
8.22	1.38	19.28	1.64	133.32	2.00	12.66	0.00	0.00
8.24	1.33	18.53	1.74	155.10	2.00	11.35	0.00	0.00
8.26	1.20	16.64	1.79	81.33	2.00	7.80	0.07	0.00
8.28	1.10	15.10	1.88	82.53	2.00	4.61	0.07	0.00
8.30	1.07	14.63	1.88	81.97	2.00	3.57	0.07	0.00
8.32	1.11	15.23	1.83	81.43	2.00	4.90	0.07	0.00
8.34	1.15	15.83	1.87	82.84	2.00	6.16	0.07	0.00
8.36	1.29	17.63	1.66	155.58	2.00	9.72	0.00	0.00
8.38	1.35	18.37	1.50	125.58	2.00	11.08	0.00	0.00
8.40	1.62	21.93	1.21	68.59	2.00	16.92	0.00	0.00
8.42	1.77	23.91	1.13	65.97	2.00	19.78	0.00	0.00
8.44	2.34	31.40	0.97	63.91	2.00	28.77	0.00	0.00
8.46	2.66	35.72	1.02	67.46	2.00	33.02	0.00	0.00
8.48	3.19	42.72	1.10	73.89	2.00	38.93	0.00	0.00
8.50	3.73	50.09	1.27	83.64	2.00	44.18	0.00	0.00
8.52	4.32	57.95	1.46	94.66	1.61	48.99	0.20	0.00
8.54	4.56	61.29	1.62	101.48	2.00	50.84	0.00	0.00
8.56	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)
8.58	3.56	48.88	2.50	120.87	2.00	43.37	0.00	0.00
8.60	2.79	39.15	3.69	222.54	2.00	36.05	0.00	0.00
8.62	2.22	31.60	5.27	179.83	2.00	28.98	0.04	0.00
8.64	1.90	27.17	6.75	201.05	2.00	23.99	0.05	0.00
8.66	1.89	27.07	6.88	203.27	2.00	23.87	0.05	0.00
8.68	1.99	28.38	6.44	197.95	2.00	25.43	0.04	0.00
8.70	2.15	30.36	5.91	191.41	2.00	27.66	0.04	0.00
8.72	2.25	31.77	5.73	190.44	2.00	29.15	0.04	0.00
8.74	2.28	32.06	5.71	190.47	2.00	29.45	0.04	0.00
8.76	2.23	31.32	5.75	190.03	2.00	28.69	0.04	0.00
8.78	2.20	30.79	5.84	190.88	2.00	28.12	0.04	0.00
8.80	2.29	32.01	5.77	191.67	2.00	29.40	0.04	0.00
8.82	2.55	35.40	5.46	190.46	2.00	32.73	0.03	0.00
8.84	2.78	38.51	5.14	187.33	2.00	35.50	0.03	0.00
8.86	2.88	39.67	5.03	401.58	2.00	36.48	0.00	0.00
8.88	2.86	39.37	5.18	189.56	2.00	36.23	0.03	0.00
8.90	2.90	39.85	5.27	192.77	2.00	36.63	0.03	0.00
8.92	3.32	45.35	4.83	324.40	2.00	40.90	0.00	0.00
8.94	4.11	55.47	4.11	189.61	2.00	47.55	0.00	0.00
8.96	4.83	64.59	3.67	170.37	2.00	52.57	0.00	0.00
8.98	5.36	71.24	3.47	169.06	2.00	55.81	0.00	0.00
9.00	5.79	76.71	3.55	176.01	2.00	58.25	0.00	0.00
9.02	6.36	83.84	3.45	178.23	2.00	61.18	0.00	0.00
9.04	6.82	89.43	3.37	180.12	2.00	63.31	0.00	0.00
9.06	6.58	86.28	3.53	183.02	2.00	62.13	0.00	0.00
9.08	5.98	78.93	3.99	193.71	2.00	59.19	0.00	0.00
9.10	5.22	69.45	4.74	206.28	2.00	54.97	0.00	0.00
9.12	4.77	63.65	5.26	280.82	2.00	52.09	0.00	0.00
9.14	4.51	60.11	5.53	329.81	2.00	50.20	0.00	0.00
9.16	4.61	61.13	5.17	281.26	2.00	50.76	0.00	0.00
9.18	5.05	66.38	4.55	197.44	2.00	53.47	0.00	0.00
9.20	5.45	71.09	4.06	189.42	2.00	55.74	0.00	0.00
9.22	5.30	69.00	4.17	191.29	2.00	54.75	0.00	0.00
9.24	4.79	62.60	4.56	209.71	2.00	51.54	0.00	0.00
9.26	4.39	57.40	4.89	264.73	2.00	48.68	0.00	0.00
9.28	4.37	56.93	4.73	248.97	2.00	48.41	0.00	0.00
9.30	4.66	60.21	4.25	187.33	2.00	50.25	0.00	0.00
9.32	5.24	67.30	3.81	177.54	2.00	53.93	0.00	0.00
9.34	6.58	83.31	3.13	166.55	2.00	60.97	0.00	0.00
9.36	8.09	100.98	2.57	162.72	2.00	67.32	0.00	0.00
9.38	10.13	124.39	2.01	169.53	2.00	74.20	0.00	0.00
9.40	23.81	275.25	0.86	275.25	2.00	100.00	0.00	0.00
9.42	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: 0.62

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.30	5.65	9.86	55.69	3.06	0.50	2.30
0.92	0.41	7.87	7.30	57.42	2.91	0.09	0.65
0.94	0.56	10.79	5.36	57.79	2.76	0.09	0.65
0.96	0.70	13.57	4.19	56.92	2.65	0.75	0.75
0.98	0.74	14.31	3.86	55.20	2.61	0.72	0.72
1.00	0.70	13.48	4.18	56.32	2.65	0.75	0.75
1.02	0.71	13.76	4.17	57.38	2.65	0.75	0.75
1.04	0.75	14.47	3.97	57.45	2.62	0.73	0.73
1.06	0.82	15.98	3.74	59.74	2.60	0.72	0.72
1.08	0.89	17.25	3.58	61.78	2.58	0.68	0.71
1.10	0.92	17.94	3.58	64.28	2.58	0.72	0.72
1.12	0.88	17.02	4.74	80.70	2.70	0.62	0.71
1.14	0.75	14.43	6.15	88.75	2.82	0.73	0.73
1.16	0.61	11.79	8.28	97.64	2.97	0.74	0.74
1.18	0.57	10.92	8.45	92.20	2.98	0.73	0.73
1.20	0.58	11.17	8.57	95.75	2.99	0.74	0.74
1.22	0.62	11.90	8.26	98.35	2.97	0.74	0.74
1.24	0.66	12.62	7.89	99.57	2.95	0.75	0.75
1.26	0.68	13.04	7.87	102.61	2.94	0.75	0.75
1.28	0.67	12.93	8.35	107.92	2.97	0.76	0.76
1.30	0.67	12.76	8.87	113.19	3.01	2.49	4.10
1.32	0.66	12.55	9.43	118.31	3.04	2.63	3.98
1.34	0.64	12.25	10.07	123.33	3.07	2.82	3.84
1.36	0.62	11.83	10.85	128.28	3.11	2.99	3.66
1.38	0.61	11.55	11.39	131.51	3.14	3.11	3.53
1.40	0.61	11.65	11.28	131.49	3.13	3.11	3.52
1.42	0.63	12.07	10.76	129.93	3.11	2.91	3.61
1.44	0.66	12.64	10.12	127.92	3.07	2.87	3.73
1.46	0.70	13.38	9.49	126.89	3.04	2.85	3.90
1.48	0.74	14.19	8.84	125.42	3.00	2.81	4.09
1.50	0.79	15.23	8.15	124.10	2.96	0.79	0.79
1.52	0.86	16.58	7.45	123.47	2.92	0.79	0.79
1.54	0.94	18.05	6.81	122.98	2.87	0.79	0.79
1.56	1.05	20.33	5.92	120.39	2.81	0.78	0.78
1.58	1.15	22.28	5.27	117.45	2.75	0.78	0.78
1.60	1.24	23.93	4.86	116.29	2.71	0.78	0.78
1.62	1.25	24.23	4.91	118.84	2.72	0.78	0.78
1.64	1.26	24.40	4.99	121.73	2.73	0.79	0.79
1.66	1.28	24.79	4.97	123.31	2.72	0.79	0.79
1.68	1.32	25.48	4.84	123.26	2.71	0.79	0.79
1.70	1.34	26.00	4.74	123.23	2.70	0.79	0.79
1.72	1.36	26.42	4.65	122.74	2.69	0.94	0.94
1.74	1.38	26.73	4.56	121.83	2.69	0.93	0.93
1.76	1.39	26.92	4.47	120.20	2.68	0.92	0.92
1.78	1.37	26.51	4.48	118.76	2.68	0.92	0.92
1.80	1.33	25.64	4.61	118.20	2.69	0.93	0.93
1.82	1.29	24.91	4.72	117.72	2.70	0.78	0.78
1.84	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.32	25.55	4.25	108.70	2.65	0.88	0.88
1.88	1.33	25.65	4.23	108.42	2.65	0.88	0.88
1.90	1.32	25.53	4.50	114.77	2.68	0.92	0.92
1.92	1.25	24.08	4.72	113.61	2.70	0.77	0.77
1.94	1.21	23.35	4.74	110.70	2.70	0.77	0.77
1.96	1.18	22.74	4.79	108.94	2.71	0.76	0.76
1.98	1.15	22.17	4.92	109.02	2.72	0.76	0.76
2.00	1.13	21.62	5.03	108.86	2.73	0.76	0.76
2.02	1.11	21.31	5.00	106.57	2.73	0.76	0.76
2.04	1.12	21.40	4.72	101.12	2.70	0.75	0.75
2.06	1.14	21.88	4.36	95.43	2.67	0.86	0.86
2.08	1.17	22.52	4.01	90.32	2.63	0.82	0.82
2.10	1.20	23.07	3.75	86.56	2.60	0.79	0.79
2.12	1.22	23.49	3.61	84.73	2.58	0.77	0.77
2.14	1.24	23.77	3.57	84.84	2.58	0.77	0.77
2.16	1.23	23.56	3.76	88.67	2.60	0.80	0.80
2.18	1.19	22.81	4.08	93.17	2.64	0.84	0.84
2.20	1.14	21.77	4.51	98.25	2.68	0.88	0.88
2.22	1.09	20.82	4.84	100.72	2.71	0.75	0.75
2.24	1.06	20.33	5.02	102.04	2.73	0.75	0.75
2.26	1.05	20.05	5.08	101.96	2.73	0.75	0.75
2.28	1.05	20.09	4.94	99.17	2.72	0.75	0.75
2.30	1.05	20.07	4.79	96.21	2.71	0.74	0.74
2.32	1.06	20.29	4.53	91.98	2.68	0.87	0.87
2.34	1.12	21.36	4.10	87.62	2.64	0.82	0.82
2.36	1.19	22.84	3.62	82.61	2.58	0.77	0.77
2.38	1.27	24.24	3.33	80.74	2.55	0.74	0.74
2.40	1.29	24.79	3.33	82.51	2.55	0.74	0.74
2.42	1.30	25.00	3.38	84.60	2.56	0.75	0.75
2.44	1.31	25.03	3.35	83.86	2.55	0.74	0.74
2.46	1.30	24.89	3.28	81.66	2.54	0.73	0.73
2.48	1.29	24.72	3.23	79.96	2.54	0.72	0.72
2.50	1.27	24.30	3.19	77.48	2.53	0.71	0.71
2.52	1.25	23.97	3.10	74.25	2.52	0.39	0.70
2.54	1.24	23.66	2.97	70.29	2.50	0.26	0.68
2.56	1.23	23.51	2.90	68.20	2.49	0.22	0.68
2.58	1.22	23.31	2.88	67.24	2.49	0.20	0.68
2.60	1.21	23.00	2.93	67.50	2.49	0.21	0.68
2.62	1.19	22.75	2.97	67.54	2.50	0.21	0.68
2.64	1.18	22.51	3.00	67.57	2.50	0.16	0.67
2.66	1.17	22.30	3.01	67.09	2.50	0.16	0.67
2.68	1.17	22.22	3.02	67.09	2.51	0.17	0.67
2.70	1.17	22.19	3.02	66.97	2.51	0.16	0.67
2.72	1.17	22.15	3.00	66.51	2.50	0.15	0.67
2.74	1.15	21.90	3.03	66.31	2.51	0.16	0.67
2.76	1.14	21.61	3.04	65.73	2.51	0.16	0.67
2.78	1.14	21.62	3.00	64.87	2.50	0.13	0.66
2.80	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	1.23	23.47	2.65	62.19	2.45	0.13	0.66
2.84	1.30	24.85	2.48	61.76	2.42	0.13	0.66
2.86	1.36	25.91	2.43	62.93	2.41	0.14	0.66
2.88	1.40	26.71	2.45	65.41	2.41	0.17	0.67
2.90	1.42	27.02	2.52	68.05	2.43	0.22	0.68
2.92	1.41	26.85	2.60	69.76	2.44	0.25	0.68
2.94	1.37	26.18	2.76	72.19	2.47	0.31	0.69
2.96	1.35	25.66	2.83	72.67	2.48	0.32	0.69
2.98	1.35	25.67	2.79	71.58	2.47	0.29	0.69
3.00	1.36	25.94	2.68	69.42	2.45	0.24	0.68
3.02	1.37	26.00	2.63	68.49	2.45	0.23	0.68
3.04	1.36	25.86	2.66	68.70	2.45	0.23	0.68
3.06	1.49	28.53	2.14	61.02	2.35	0.12	0.66
3.08	1.62	30.95	1.91	59.04	2.30	0.10	0.65
3.10	1.71	32.75	1.78	58.20	2.26	0.10	0.65
3.12	1.63	31.10	2.14	66.54	2.35	0.19	0.67
3.14	1.53	29.25	2.51	73.49	2.43	0.34	0.69
3.16	1.46	27.82	2.85	79.27	2.48	0.55	0.71
3.18	1.45	27.61	2.83	78.23	2.48	0.50	0.70
3.20	1.46	27.72	2.70	74.83	2.46	0.38	0.70
3.22	1.48	28.18	2.50	70.40	2.42	0.26	0.68
3.24	1.50	28.51	2.40	68.38	2.40	0.22	0.68
3.26	1.53	29.22	2.31	67.38	2.39	0.21	0.68
3.28	1.54	29.34	2.35	69.05	2.40	0.24	0.68
3.30	1.48	28.17	2.54	71.62	2.43	0.29	0.69
3.32	1.38	26.14	2.98	77.86	2.50	0.49	0.70
3.34	1.30	24.64	3.14	77.33	2.52	0.60	0.71
3.36	1.28	24.29	3.02	73.42	2.51	0.28	0.69
3.38	1.32	24.99	2.64	65.91	2.45	0.18	0.67
3.40	1.33	25.26	2.60	65.72	2.44	0.18	0.67
3.42	1.33	25.20	2.70	68.03	2.46	0.22	0.68
3.44	1.33	25.21	2.77	69.94	2.47	0.25	0.68
3.46	1.39	26.31	2.59	68.20	2.44	0.22	0.68
3.48	1.49	28.40	2.33	66.25	2.39	0.19	0.67
3.50	1.66	31.63	2.02	64.02	2.33	0.16	0.67
3.52	1.99	38.24	1.70	64.85	2.23	0.17	0.67
3.54	2.17	41.65	1.60	66.74	2.20	0.19	0.67
3.56	2.13	40.85	1.74	71.08	2.25	0.28	0.69
3.58	1.78	33.98	2.31	78.38	2.39	0.51	0.70
3.60	1.48	28.14	3.20	89.90	2.53	0.74	0.74
3.62	1.37	25.88	3.49	90.37	2.57	0.77	0.77
3.64	1.50	28.50	2.87	81.91	2.48	0.68	0.71
3.66	1.96	37.52	1.83	68.54	2.27	0.23	0.68
3.68	2.60	50.13	1.41	70.83	2.10	0.27	0.69
3.70	3.17	61.34	1.30	79.61	1.99	0.57	0.71
3.72	3.48	67.42	1.28	86.51	1.97	0.72	0.72
3.74	3.45	66.98	1.30	87.32	2.00	0.72	0.72
3.76	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	2.82	54.54	1.45	79.05	2.12	0.54	0.70
3.80	2.49	47.93	1.52	73.04	2.16	0.33	0.69
3.82	2.27	43.58	1.58	68.69	2.18	0.23	0.68
3.84	2.12	40.66	1.64	66.80	2.21	0.20	0.68
3.86	2.03	38.94	1.71	66.41	2.23	0.19	0.67
3.88	2.08	39.85	1.61	64.19	2.20	0.16	0.67
3.90	2.25	43.22	1.51	65.15	2.15	0.17	0.67
3.92	2.41	46.26	1.49	69.01	2.14	0.23	0.68
3.94	2.42	46.43	1.55	71.99	2.17	0.30	0.69
3.96	2.35	45.13	1.64	74.09	2.21	0.36	0.69
3.98	2.41	46.22	1.60	74.09	2.20	0.36	0.69
4.00	2.51	48.30	1.52	73.25	2.16	0.33	0.69
4.02	2.54	48.77	1.46	71.32	2.13	0.28	0.69
4.04	2.36	45.35	1.52	68.88	2.16	0.23	0.68
4.06	2.13	40.69	1.69	68.88	2.23	0.23	0.68
4.08	2.04	38.94	1.77	69.06	2.26	0.24	0.68
4.10	2.18	41.68	1.61	67.03	2.20	0.20	0.68
4.12	2.40	46.09	1.42	65.51	2.10	0.18	0.67
4.14	2.56	49.13	1.38	67.81	2.07	0.21	0.68
4.16	2.59	49.86	1.39	69.21	2.08	0.24	0.68
4.18	2.65	50.89	1.40	71.05	2.08	0.28	0.69
4.20	2.85	54.95	1.34	73.39	2.03	0.34	0.69
4.22	3.09	59.69	1.29	77.02	1.98	0.46	0.70
4.24	3.38	65.39	1.25	82.00	1.93	0.69	0.71
4.26	3.50	67.72	1.26	85.11	1.93	0.72	0.72
4.28	3.37	65.09	1.28	83.32	1.96	0.71	0.71
4.30	3.19	61.57	1.31	80.94	2.01	0.63	0.71
4.32	3.03	58.51	1.35	78.98	2.05	0.54	0.70
4.34	3.17	61.11	1.35	82.20	2.04	0.70	0.71
4.36	3.39	65.46	1.33	87.04	2.03	0.72	0.72
4.38	3.62	70.15	1.30	90.86	1.99	0.73	0.73
4.40	3.81	73.87	1.28	94.66	1.97	0.74	0.74
4.42	3.88	75.26	1.29	97.24	1.98	0.74	0.74
4.44	3.93	76.08	1.32	100.31	2.01	0.75	0.75
4.46	3.94	76.28	1.34	102.17	2.04	0.75	0.75
4.48	3.82	74.06	1.35	100.01	2.05	0.75	0.75
4.50	3.63	70.19	1.37	96.20	2.06	0.74	0.74
4.52	3.35	64.74	1.40	90.61	2.09	0.73	0.73
4.54	3.25	62.73	1.44	90.07	2.11	0.73	0.73
4.56	3.34	64.46	1.44	92.86	2.11	0.73	0.73
4.58	3.54	68.41	1.42	96.95	2.10	0.74	0.74
4.60	3.59	69.41	1.42	98.32	2.10	0.74	0.74
4.62	3.53	68.15	1.44	97.83	2.11	0.74	0.74
4.64	3.46	66.76	1.45	96.86	2.12	0.74	0.74
4.66	3.52	67.98	1.40	94.84	2.08	0.74	0.74
4.68	3.63	69.10	1.33	91.63	2.02	0.73	0.73
4.70	3.74	69.65	1.28	89.40	1.97	0.73	0.73
4.72	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	3.80	69.56	1.26	87.92	1.94	0.72	0.72
4.76	3.42	63.60	1.30	82.96	2.00	0.71	0.71
4.78	2.80	53.46	1.40	74.71	2.08	0.38	0.69
4.80	2.21	42.08	1.72	72.47	2.24	0.31	0.69
4.82	1.93	36.64	2.16	78.96	2.36	0.54	0.70
4.84	2.08	39.55	2.09	82.58	2.34	0.71	0.71
4.86	2.40	45.76	1.70	77.57	2.23	0.48	0.70
4.88	2.56	48.93	1.57	76.94	2.18	0.45	0.70
4.90	2.37	45.21	1.77	80.02	2.26	0.58	0.71
4.92	2.03	38.47	2.34	89.91	2.39	0.73	0.73
4.94	1.82	34.35	2.86	98.18	2.48	0.74	0.74
4.96	1.88	35.56	2.61	92.78	2.44	0.73	0.73
4.98	2.13	40.37	2.16	87.08	2.36	0.72	0.72
5.00	2.29	43.61	1.91	83.43	2.30	0.71	0.71
5.02	2.24	42.55	2.05	87.33	2.33	0.72	0.72
5.04	2.10	39.86	2.34	93.31	2.39	0.74	0.74
5.06	2.14	40.53	2.38	96.54	2.40	0.74	0.74
5.08	2.36	44.92	2.11	94.65	2.34	0.74	0.74
5.10	2.77	53.09	1.77	93.79	2.25	0.74	0.74
5.12	3.19	60.02	1.52	91.11	2.16	0.73	0.73
5.14	3.50	64.42	1.42	91.38	2.10	0.73	0.73
5.16	3.52	64.21	1.39	88.94	2.08	0.73	0.73
5.18	3.14	57.67	1.44	83.22	2.12	0.71	0.71
5.20	2.75	50.89	1.52	77.32	2.16	0.47	0.70
5.22	2.47	46.00	1.59	73.31	2.19	0.33	0.69
5.24	2.42	45.55	1.67	76.17	2.22	0.42	0.70
5.26	2.33	44.23	1.82	80.41	2.27	0.60	0.71
5.28	2.24	42.41	2.01	85.12	2.32	0.72	0.72
5.30	2.25	42.62	2.01	85.84	2.32	0.72	0.72
5.32	2.22	42.11	2.03	85.49	2.33	0.72	0.72
5.34	2.14	40.56	2.11	85.67	2.35	0.72	0.72
5.36	2.15	40.77	2.05	83.56	2.33	0.71	0.71
5.38	2.40	45.11	1.86	83.86	2.28	0.72	0.72
5.40	2.89	52.50	1.54	81.04	2.17	0.64	0.71
5.42	3.20	56.92	1.44	81.91	2.11	0.68	0.71
5.44	3.23	56.98	1.41	80.07	2.09	0.59	0.71
5.46	3.00	53.26	1.46	77.84	2.13	0.49	0.70
5.48	2.82	50.45	1.52	76.82	2.16	0.45	0.70
5.50	2.88	51.52	1.54	79.19	2.17	0.55	0.71
5.52	2.94	52.13	1.51	78.47	2.15	0.51	0.70
5.54	2.91	51.70	1.53	79.20	2.16	0.55	0.71
5.56	2.63	47.18	1.64	77.16	2.21	0.46	0.70
5.58	2.30	42.04	1.89	79.37	2.29	0.55	0.71
5.60	1.79	33.61	2.51	84.24	2.42	0.72	0.72
5.62	1.34	24.63	4.02	99.07	2.63	0.84	0.84
5.64	0.99	17.65	6.18	109.04	2.83	0.76	0.76
5.66	0.90	15.91	6.49	103.28	2.85	0.75	0.75
5.68	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.95	16.89	4.80	81.16	2.71	0.64	0.71
5.72	1.13	20.37	3.94	80.32	2.62	0.79	0.79
5.74	1.32	24.25	3.33	80.66	2.55	0.74	0.74
5.76	1.59	29.48	2.66	78.46	2.45	0.51	0.70
5.78	1.91	34.72	2.19	76.10	2.36	0.42	0.70
5.80	2.32	41.21	1.85	76.09	2.28	0.42	0.70
5.82	2.62	45.84	1.70	77.72	2.23	0.48	0.70
5.84	2.63	46.19	1.73	79.84	2.24	0.58	0.71
5.86	2.41	42.96	1.96	84.23	2.31	0.72	0.72
5.88	2.12	38.59	2.39	92.19	2.40	0.73	0.73
5.90	2.12	38.69	2.46	95.30	2.42	0.74	0.74
5.92	2.54	45.14	2.01	90.82	2.32	0.73	0.73
5.94	3.07	53.17	1.69	89.87	2.23	0.73	0.73
5.96	3.35	57.58	1.61	92.78	2.20	0.73	0.73
5.98	3.32	57.04	1.63	93.22	2.21	0.74	0.74
6.00	3.36	57.38	1.61	92.37	2.20	0.73	0.73
6.02	3.60	60.79	1.54	93.55	2.17	0.74	0.74
6.04	3.94	65.73	1.45	95.61	2.12	0.74	0.74
6.06	4.25	70.10	1.40	98.26	2.09	0.74	0.74
6.08	4.56	74.04	1.35	99.59	2.04	0.75	0.75
6.10	5.03	80.25	1.29	103.75	1.98	0.76	0.76
6.12	5.54	86.93	1.26	109.19	1.93	0.76	0.76
6.14	5.94	92.16	1.23	113.71	1.90	0.77	0.77
6.16	6.13	94.32	1.22	115.18	1.88	0.77	0.77
6.18	6.35	96.83	1.20	116.14	1.85	0.78	0.78
6.20	6.65	100.20	1.17	117.00	1.81	0.78	0.78
6.22	7.07	105.42	1.13	119.29	1.78	0.78	0.78
6.24	7.53	112.04	1.12	126.01	1.78	0.79	0.79
6.26	8.08	119.22	1.09	129.86	1.75	0.80	0.80
6.28	8.74	127.31	1.01	128.89	1.71	0.80	0.80
6.30	9.78	138.70	1.00	138.70	1.62	0.81	0.81
6.32	10.50	146.20	1.00	146.20	1.56	0.82	0.82
6.34	10.66	147.40	1.00	147.40	1.54	0.82	0.82
6.36	9.85	136.90	1.00	136.90	1.57	0.81	0.81
6.38	8.75	122.63	1.00	122.63	1.61	0.79	0.79
6.40	7.49	106.66	1.00	106.66	1.68	0.76	0.76
6.42	5.77	85.42	1.19	101.53	1.84	0.75	0.75
6.44	4.22	65.83	1.36	89.58	2.06	0.73	0.73
6.46	3.13	51.01	1.77	90.43	2.26	0.73	0.73
6.48	2.67	45.14	2.45	110.70	2.41	0.77	0.77
6.50	2.35	40.84	3.26	133.20	2.54	0.83	0.83
6.52	1.96	34.98	4.59	160.46	2.69	1.00	1.00
6.54	1.65	29.68	5.61	166.45	2.78	0.85	0.85
6.56	1.41	25.48	6.47	164.79	2.85	0.85	0.85
6.58	1.24	22.38	7.12	159.45	2.89	0.84	0.84
6.60	1.20	21.49	6.85	147.14	2.87	0.82	0.82
6.62	1.18	20.82	6.29	130.97	2.83	0.80	0.80
6.64	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.19	20.19	5.04	101.74	2.73	0.75	0.75
6.68	1.23	20.67	4.49	92.86	2.68	0.87	0.87
6.70	1.27	21.17	4.18	88.44	2.65	0.83	0.83
6.72	1.41	23.65	4.17	98.51	2.65	0.85	0.85
6.74	1.48	24.97	4.42	110.48	2.67	0.90	0.90
6.76	1.50	25.53	4.86	124.03	2.71	0.79	0.79
6.78	1.37	23.37	5.42	126.64	2.76	0.79	0.79
6.80	1.28	21.87	5.92	129.48	2.81	0.80	0.80
6.82	1.23	20.96	6.09	127.59	2.82	0.79	0.79
6.84	1.20	20.30	6.19	125.71	2.83	0.79	0.79
6.86	1.17	19.77	6.16	121.85	2.82	0.79	0.79
6.88	1.15	19.30	5.90	113.99	2.80	0.77	0.77
6.90	1.15	18.94	5.55	105.15	2.78	0.76	0.76
6.92	1.14	18.66	5.19	96.79	2.74	0.74	0.74
6.94	1.15	18.55	4.84	89.82	2.71	0.73	0.73
6.96	1.15	18.54	4.59	85.14	2.69	0.86	0.86
6.98	1.19	18.97	4.44	84.27	2.67	0.85	0.85
7.00	1.30	20.76	3.98	82.64	2.63	0.80	0.80
7.02	1.57	24.71	3.23	79.77	2.53	0.72	0.72
7.04	1.94	30.30	2.54	77.07	2.43	0.46	0.70
7.06	2.19	34.13	2.42	82.59	2.41	0.71	0.71
7.08	2.22	34.70	2.58	89.39	2.44	0.73	0.73
7.10	1.99	31.37	2.99	93.65	2.50	0.73	0.73
7.12	1.70	27.07	3.65	98.74	2.59	0.81	0.81
7.14	1.45	23.12	4.42	102.17	2.67	0.88	0.88
7.16	1.30	20.72	4.93	102.24	2.72	0.75	0.75
7.18	1.25	19.82	4.80	95.12	2.71	0.74	0.74
7.20	1.26	19.77	4.50	88.90	2.68	0.86	0.86
7.22	1.28	20.09	4.44	89.27	2.67	0.86	0.86
7.24	1.36	21.16	4.20	88.79	2.65	0.84	0.84
7.26	1.47	22.76	3.89	88.49	2.62	0.81	0.81
7.28	1.49	23.12	3.95	91.36	2.62	0.82	0.82
7.30	1.38	21.52	4.47	96.19	2.68	0.88	0.88
7.32	1.23	19.04	4.95	94.17	2.72	0.74	0.74
7.34	1.16	17.81	4.80	85.55	2.71	0.72	0.72
7.36	1.17	17.77	4.30	76.33	2.66	0.81	0.81
7.38	1.14	17.31	4.54	78.68	2.68	0.84	0.84
7.40	1.09	16.59	5.02	83.31	2.73	0.71	0.71
7.42	1.05	15.84	5.34	84.60	2.76	0.72	0.72
7.44	1.06	15.96	5.17	82.44	2.74	0.71	0.71
7.46	1.08	16.22	4.91	79.67	2.72	0.57	0.71
7.48	1.10	16.48	4.86	80.17	2.71	0.59	0.71
7.50	1.09	16.29	4.98	81.08	2.73	0.64	0.71
7.52	1.07	16.08	5.12	82.27	2.74	0.71	0.71
7.54	1.07	16.03	5.08	81.42	2.73	0.66	0.71
7.56	1.12	16.69	4.68	78.04	2.70	0.85	0.85
7.58	1.24	18.25	4.04	73.82	2.63	0.79	0.79
7.60	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.51	22.19	3.38	74.98	2.55	0.73	0.73
7.64	1.46	21.56	3.66	78.82	2.59	0.76	0.76
7.66	1.32	19.49	4.22	82.34	2.65	0.82	0.82
7.68	1.21	17.90	4.64	83.09	2.69	0.86	0.86
7.70	1.20	17.67	4.54	80.28	2.68	0.84	0.84
7.72	1.27	18.56	4.12	76.45	2.64	0.80	0.80
7.74	1.33	19.40	3.86	74.92	2.61	0.77	0.77
7.76	1.34	19.59	4.04	79.21	2.63	0.80	0.80
7.78	1.26	18.38	4.38	80.51	2.67	0.83	0.83
7.80	1.18	17.04	4.63	78.94	2.69	0.85	0.85
7.82	1.12	16.07	4.59	73.69	2.69	0.83	0.83
7.84	1.13	16.13	4.47	72.04	2.68	0.82	0.82
7.86	1.20	17.09	4.13	70.56	2.64	0.78	0.78
7.88	1.30	18.57	3.72	69.08	2.60	0.74	0.74
7.90	1.39	19.89	3.65	72.56	2.59	0.75	0.75
7.92	1.41	20.19	3.89	78.65	2.62	0.78	0.78
7.94	1.40	20.08	4.05	81.26	2.63	0.80	0.80
7.96	1.30	18.61	4.49	83.63	2.68	0.85	0.85
7.98	1.16	16.49	5.05	83.31	2.73	0.71	0.71
8.00	0.99	13.96	6.07	84.79	2.82	0.72	0.72
8.02	0.92	12.91	6.18	79.79	2.83	0.57	0.71
8.04	0.93	12.97	5.75	74.57	2.79	0.37	0.69
8.06	0.96	13.31	5.46	72.70	2.77	0.32	0.69
8.08	0.96	13.35	5.52	73.75	2.77	0.35	0.69
8.10	0.97	13.38	5.57	74.55	2.78	0.37	0.69
8.12	1.01	14.00	5.20	72.84	2.75	0.32	0.69
8.14	1.18	16.26	4.20	68.28	2.65	0.78	0.78
8.16	1.31	18.11	3.56	64.50	2.58	0.72	0.72
8.18	1.41	19.43	3.45	67.04	2.56	0.71	0.71
8.20	1.39	19.36	3.83	74.19	2.61	0.77	0.77
8.22	1.38	19.28	4.10	78.98	2.64	0.80	0.80
8.24	1.33	18.53	4.39	81.28	2.67	0.83	0.83
8.26	1.20	16.64	4.89	81.33	2.72	0.65	0.71
8.28	1.10	15.10	5.46	82.53	2.77	0.71	0.71
8.30	1.07	14.63	5.60	81.97	2.78	0.69	0.71
8.32	1.11	15.23	5.34	81.43	2.76	0.66	0.71
8.34	1.15	15.83	5.23	82.84	2.75	0.71	0.71
8.36	1.29	17.63	4.47	78.84	2.68	0.83	0.83
8.38	1.35	18.37	4.08	74.96	2.64	0.79	0.79
8.40	1.62	21.93	3.09	67.84	2.52	0.23	0.68
8.42	1.77	23.91	2.76	65.97	2.47	0.18	0.67
8.44	2.34	31.40	2.04	63.91	2.33	0.15	0.67
8.46	2.66	35.72	1.89	67.46	2.29	0.21	0.68
8.48	3.19	42.72	1.73	73.89	2.24	0.35	0.69
8.50	3.73	50.09	1.67	83.64	2.22	0.72	0.72
8.52	4.32	57.95	1.63	94.66	2.21	0.74	0.74
8.54	4.56	61.29	1.66	101.48	2.22	0.75	0.75
8.56	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	3.56	48.88	2.47	120.87	2.42	0.78	0.78
8.60	2.79	39.15	3.82	149.54	2.61	0.91	0.91
8.62	2.22	31.60	5.69	179.83	2.79	0.86	0.86
8.64	1.90	27.17	7.40	201.05	2.91	0.89	0.89
8.66	1.89	27.07	7.51	203.27	2.92	0.89	0.89
8.68	1.99	28.38	6.98	197.95	2.88	0.88	0.88
8.70	2.15	30.36	6.30	191.41	2.84	0.88	0.88
8.72	2.25	31.77	5.99	190.44	2.81	0.88	0.88
8.74	2.28	32.06	5.94	190.47	2.81	0.88	0.88
8.76	2.23	31.32	6.07	190.03	2.82	0.88	0.88
8.78	2.20	30.79	6.20	190.88	2.83	0.88	0.88
8.80	2.29	32.01	5.99	191.67	2.81	0.88	0.88
8.82	2.55	35.40	5.38	190.46	2.76	0.88	0.88
8.84	2.78	38.51	4.87	187.33	2.71	0.87	0.87
8.86	2.88	39.67	4.70	186.33	2.70	1.05	1.05
8.88	2.86	39.37	4.81	189.56	2.71	0.88	0.88
8.90	2.90	39.85	4.84	192.77	2.71	0.88	0.88
8.92	3.32	45.35	4.15	188.06	2.64	1.00	1.00
8.94	4.11	55.47	3.19	177.00	2.53	0.88	0.88
8.96	4.83	64.59	2.64	170.37	2.45	0.85	0.85
8.98	5.36	71.24	2.37	169.06	2.40	0.85	0.85
9.00	5.79	76.71	2.29	176.01	2.38	0.86	0.86
9.02	6.36	83.84	2.13	178.23	2.35	0.86	0.86
9.04	6.82	89.43	2.01	180.12	2.32	0.86	0.86
9.06	6.58	86.28	2.12	183.02	2.35	0.87	0.87
9.08	5.98	78.93	2.45	193.71	2.42	0.88	0.88
9.10	5.22	69.45	3.04	211.03	2.51	0.89	0.89
9.12	4.77	63.65	3.49	222.16	2.57	0.96	0.96
9.14	4.51	60.11	3.77	226.72	2.60	1.00	1.00
9.16	4.61	61.13	3.54	216.57	2.58	0.96	0.96
9.18	5.05	66.38	3.04	201.80	2.51	0.88	0.88
9.20	5.45	71.09	2.66	189.42	2.45	0.88	0.88
9.22	5.30	69.00	2.77	191.29	2.47	0.88	0.88
9.24	4.79	62.60	3.17	198.34	2.53	0.90	0.90
9.26	4.39	57.40	3.55	203.53	2.58	0.95	0.95
9.28	4.37	56.93	3.48	198.10	2.57	0.93	0.93
9.30	4.66	60.21	3.09	185.93	2.52	0.87	0.87
9.32	5.24	67.30	2.64	177.54	2.45	0.86	0.86
9.34	6.58	83.31	2.00	166.55	2.32	0.85	0.85
9.36	8.09	100.98	1.61	162.72	2.20	0.84	0.84
9.38	10.13	124.39	1.36	169.53	2.06	0.85	0.85
9.40	23.81	275.25	1.00	275.25	1.55	0.96	0.96
9.42	37.13	415.53	1.00	415.53	1.29	1.06	1.06

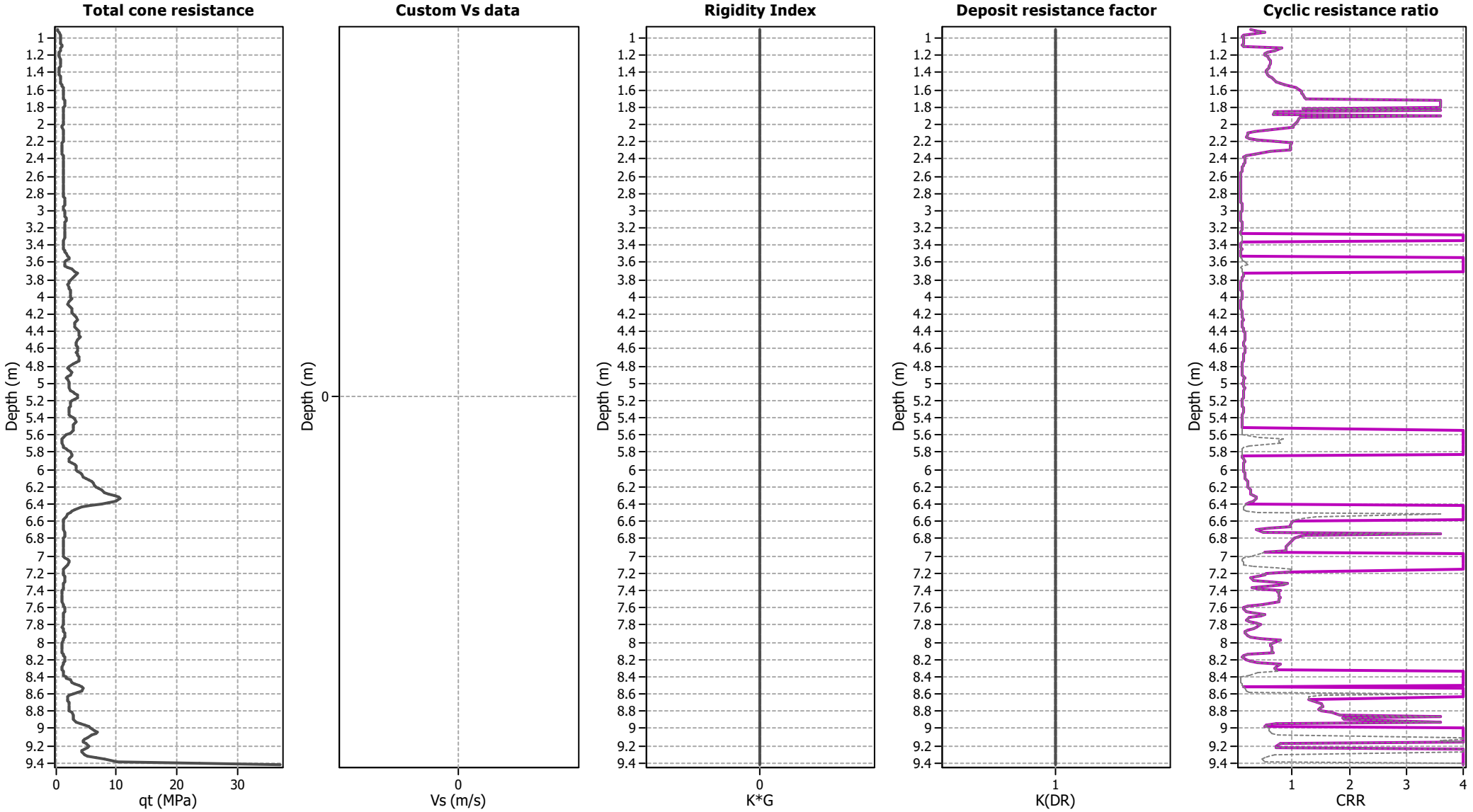
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

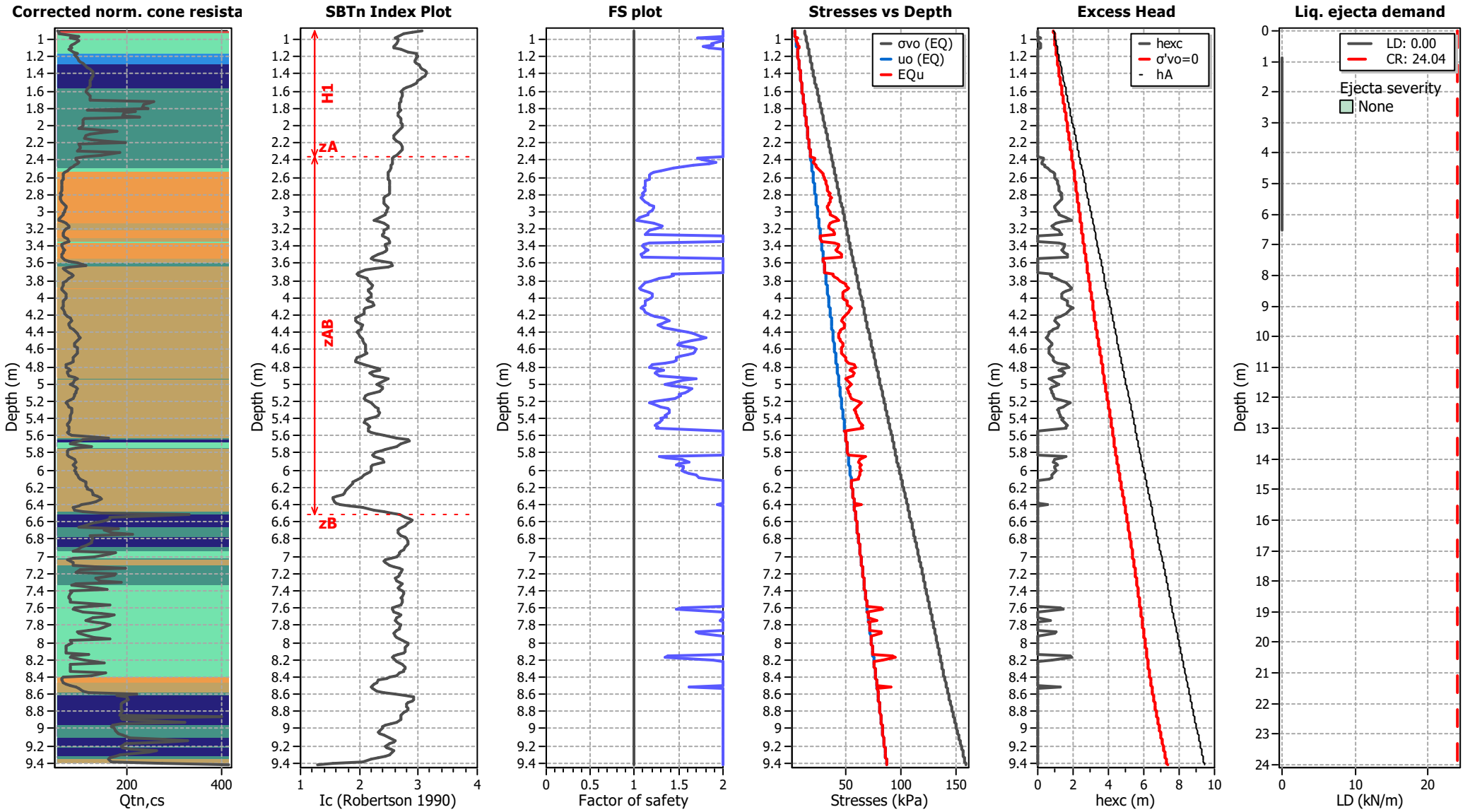
Abbreviations

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

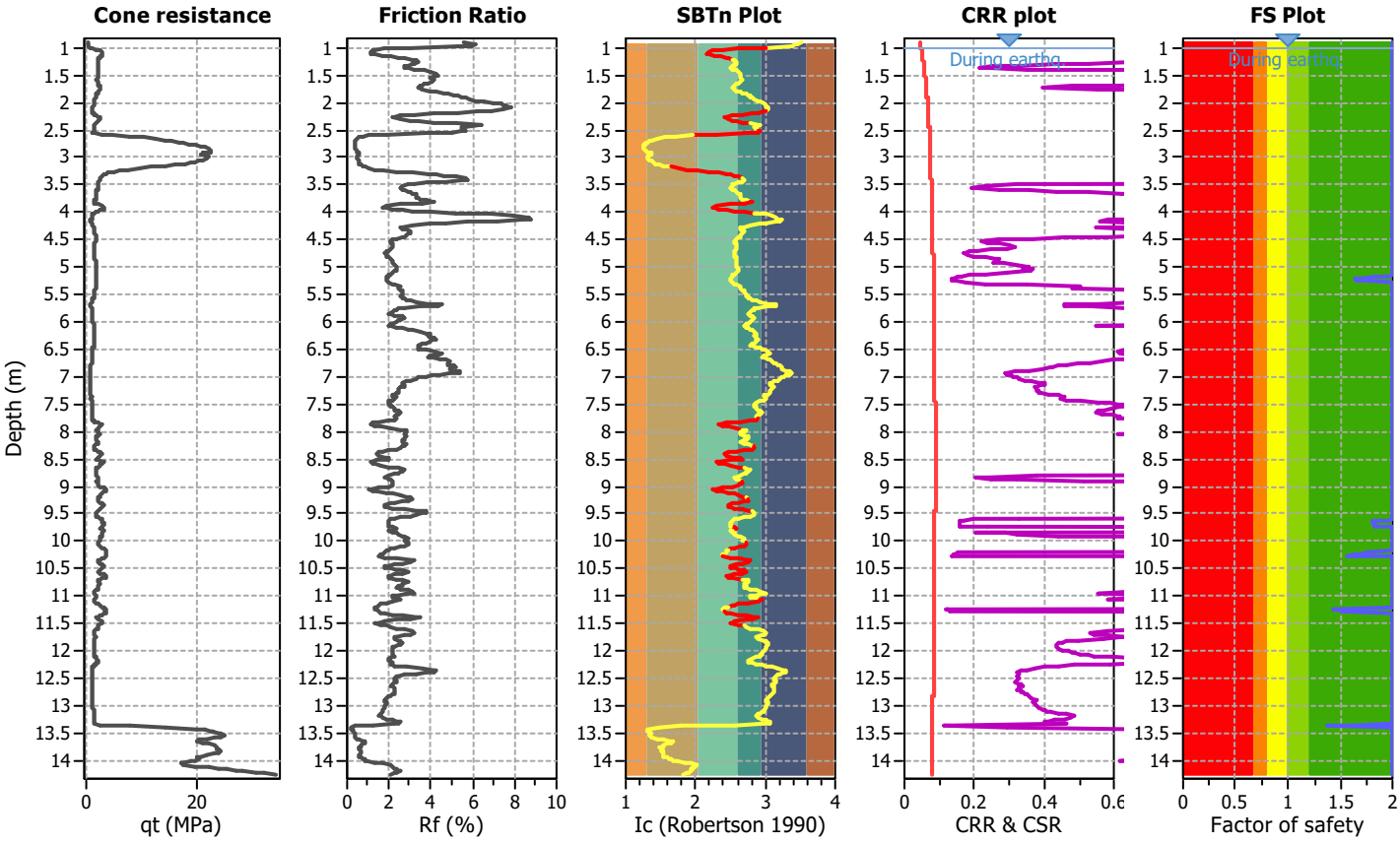
LIQUEFACTION ANALYSIS REPORT

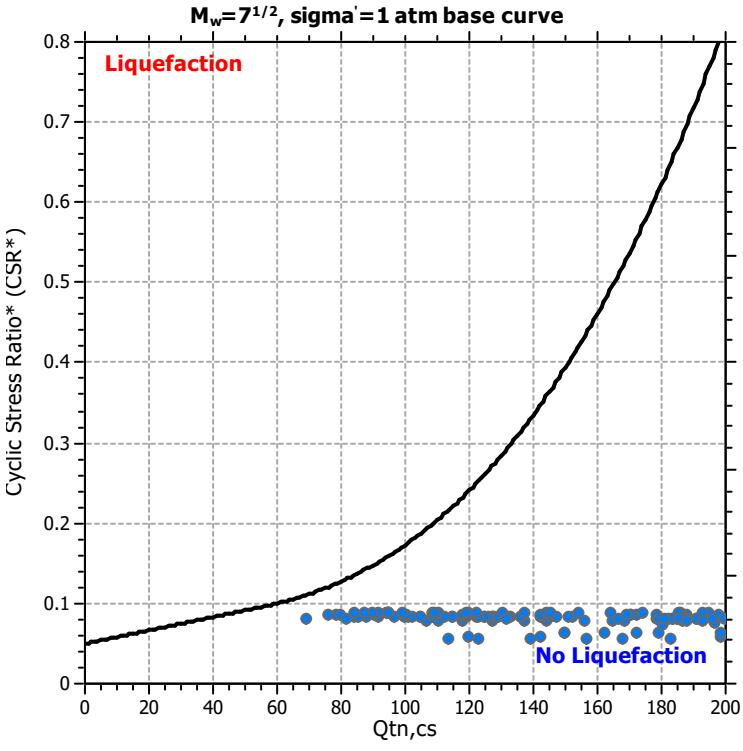
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

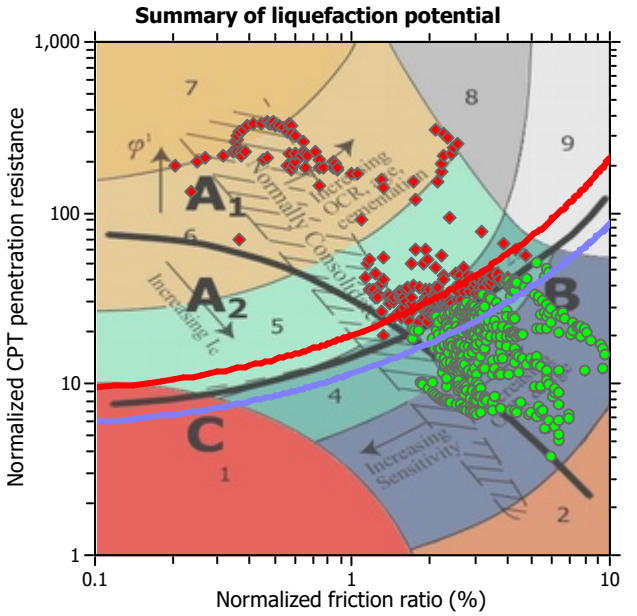
CPT file : CWLP CPT-4L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	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		

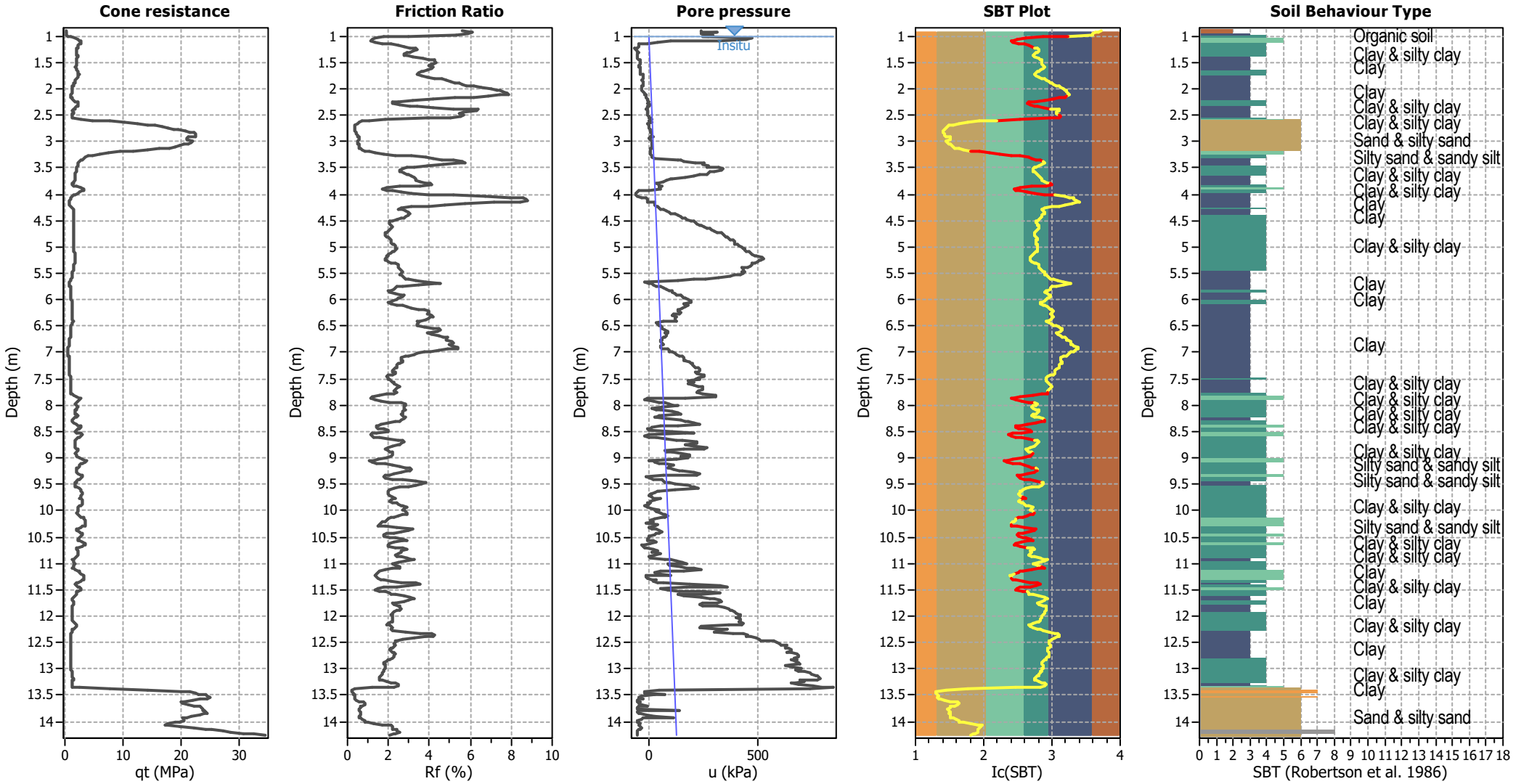






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



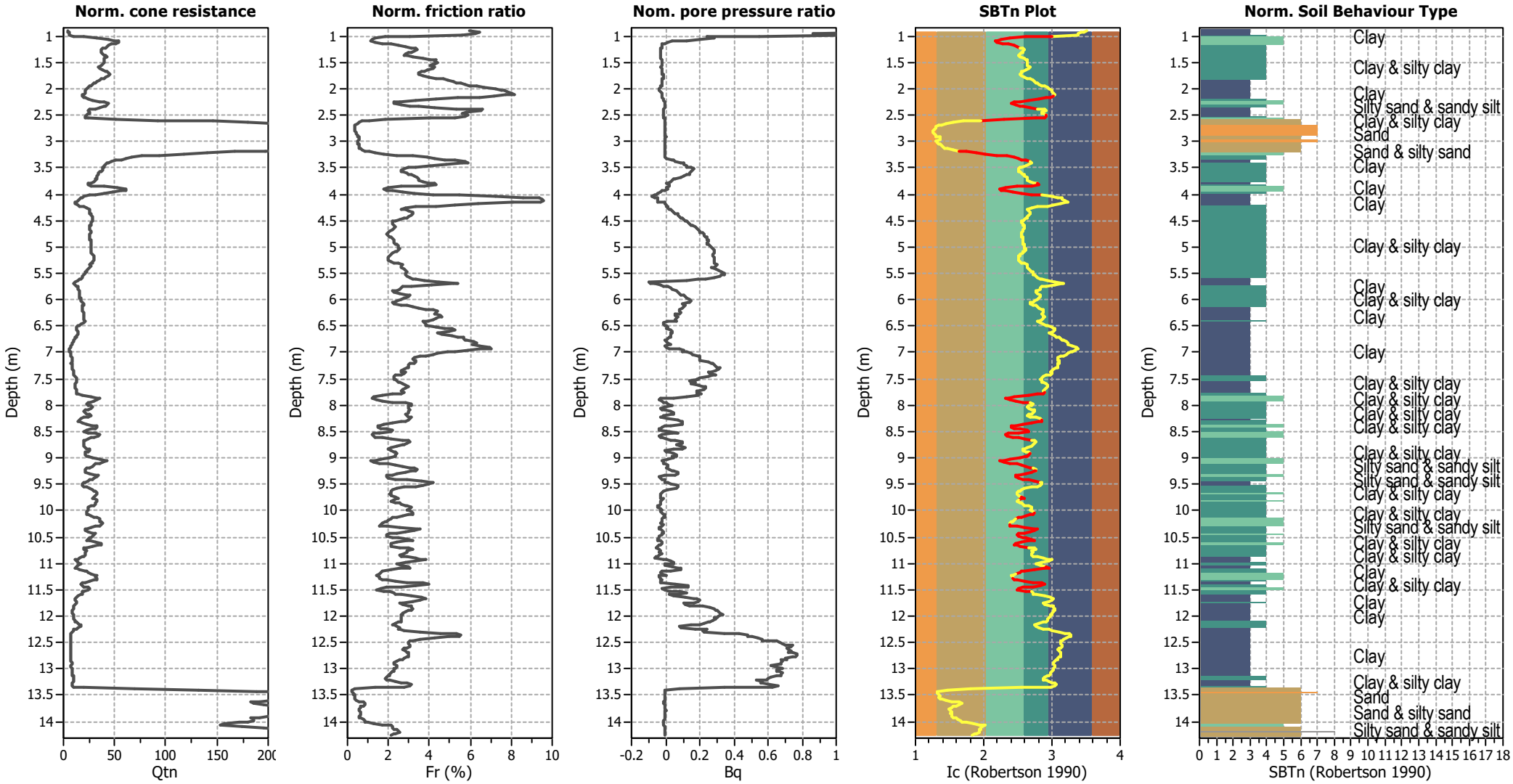
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	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)



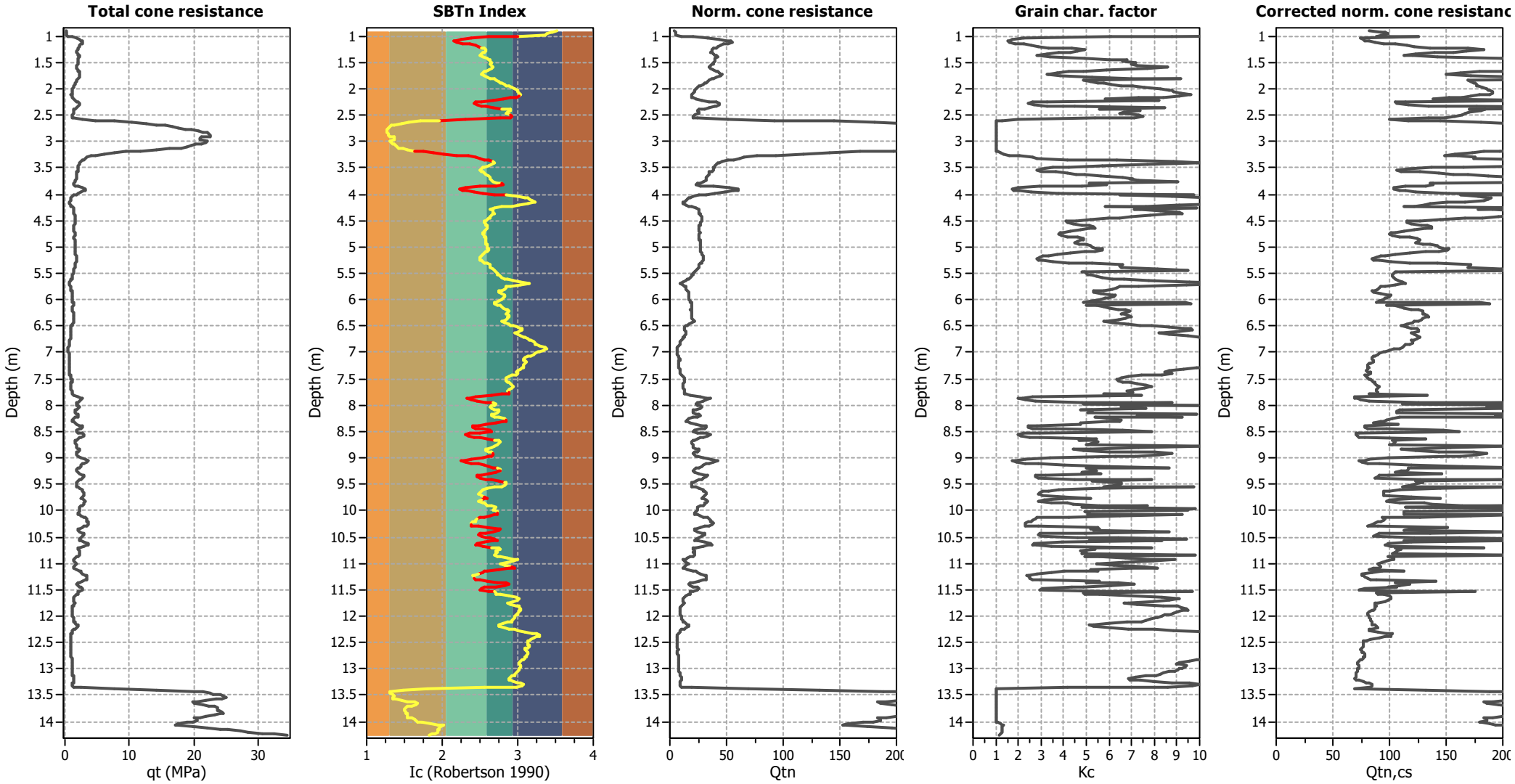
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	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

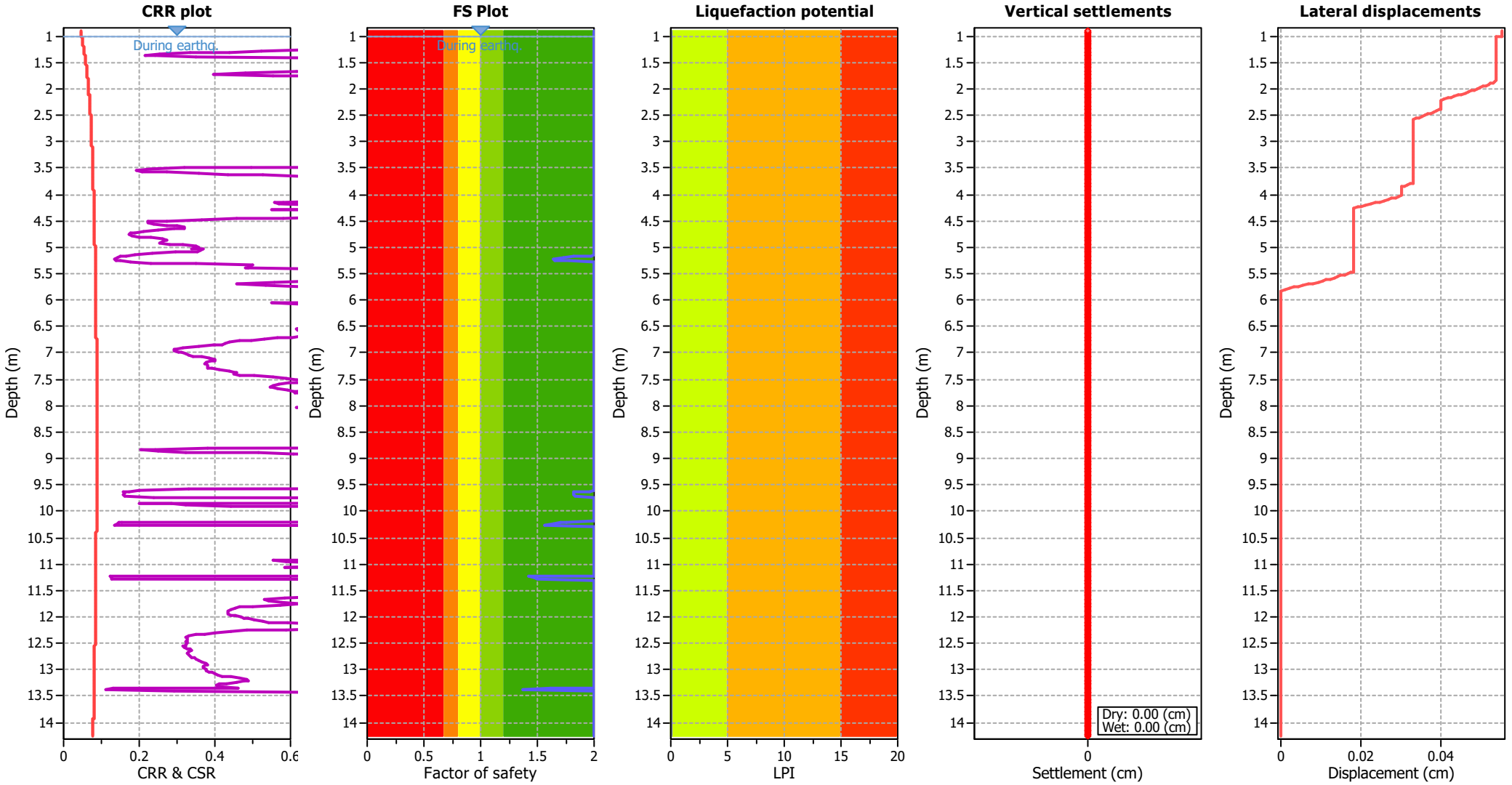
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

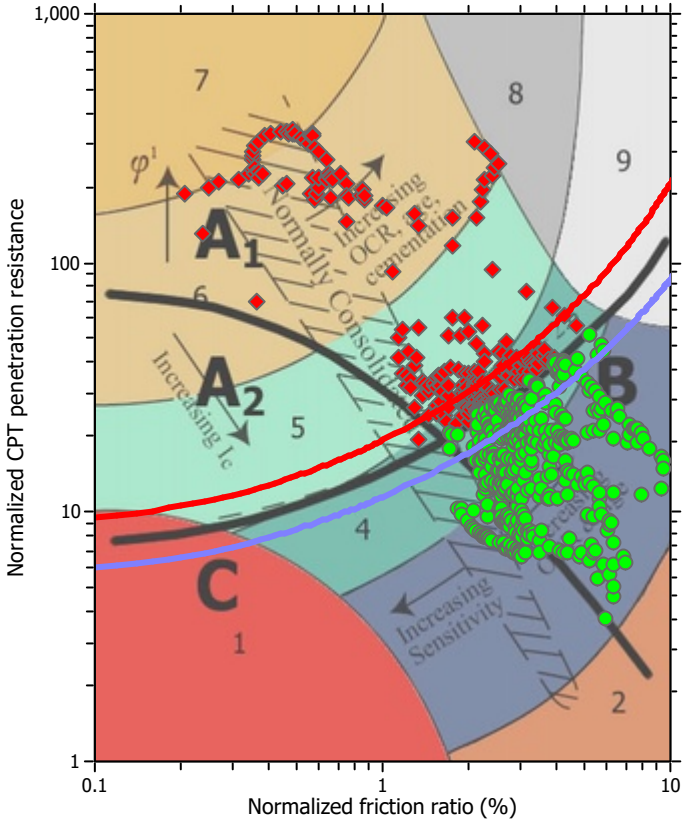
F.S. color scheme

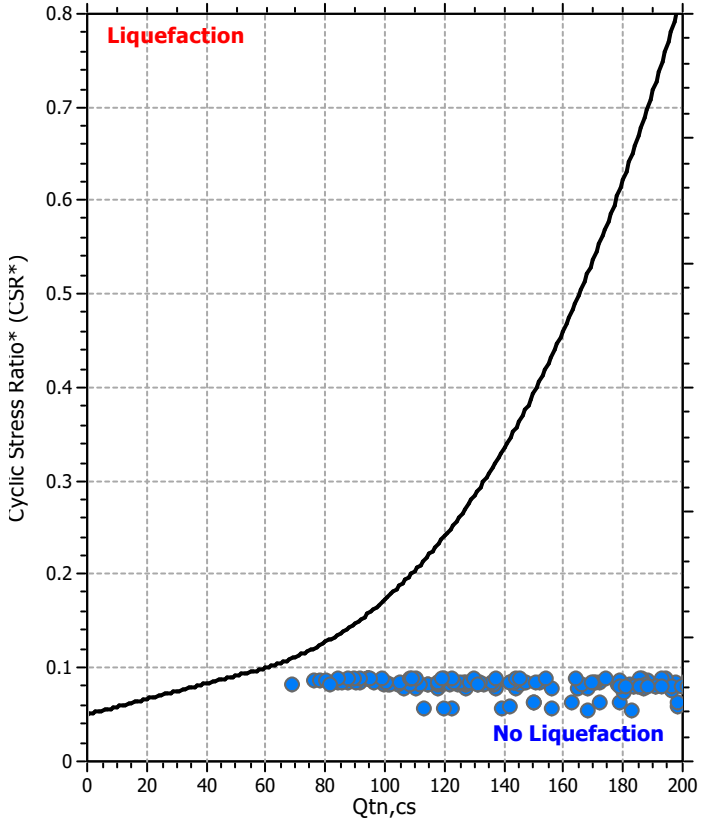
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

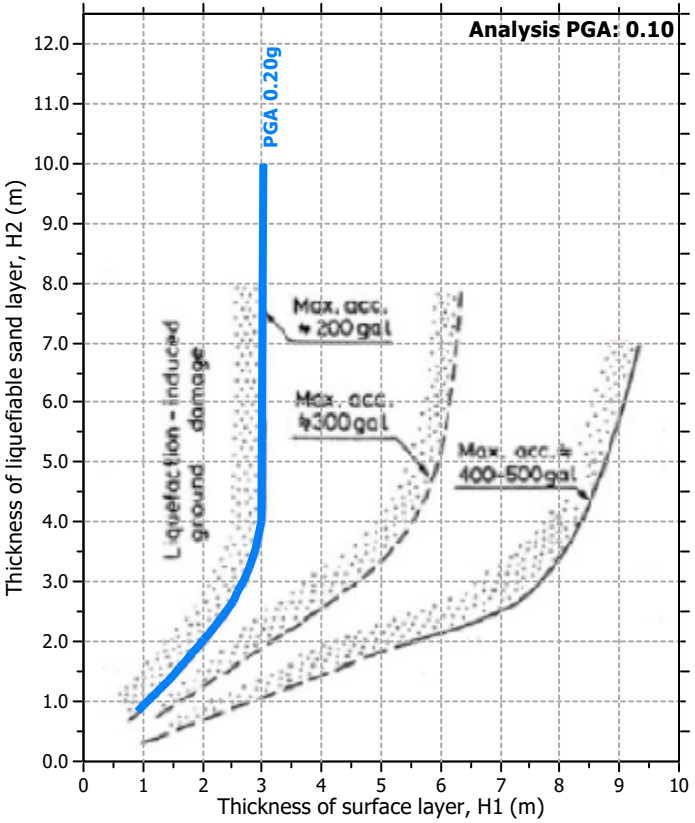
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



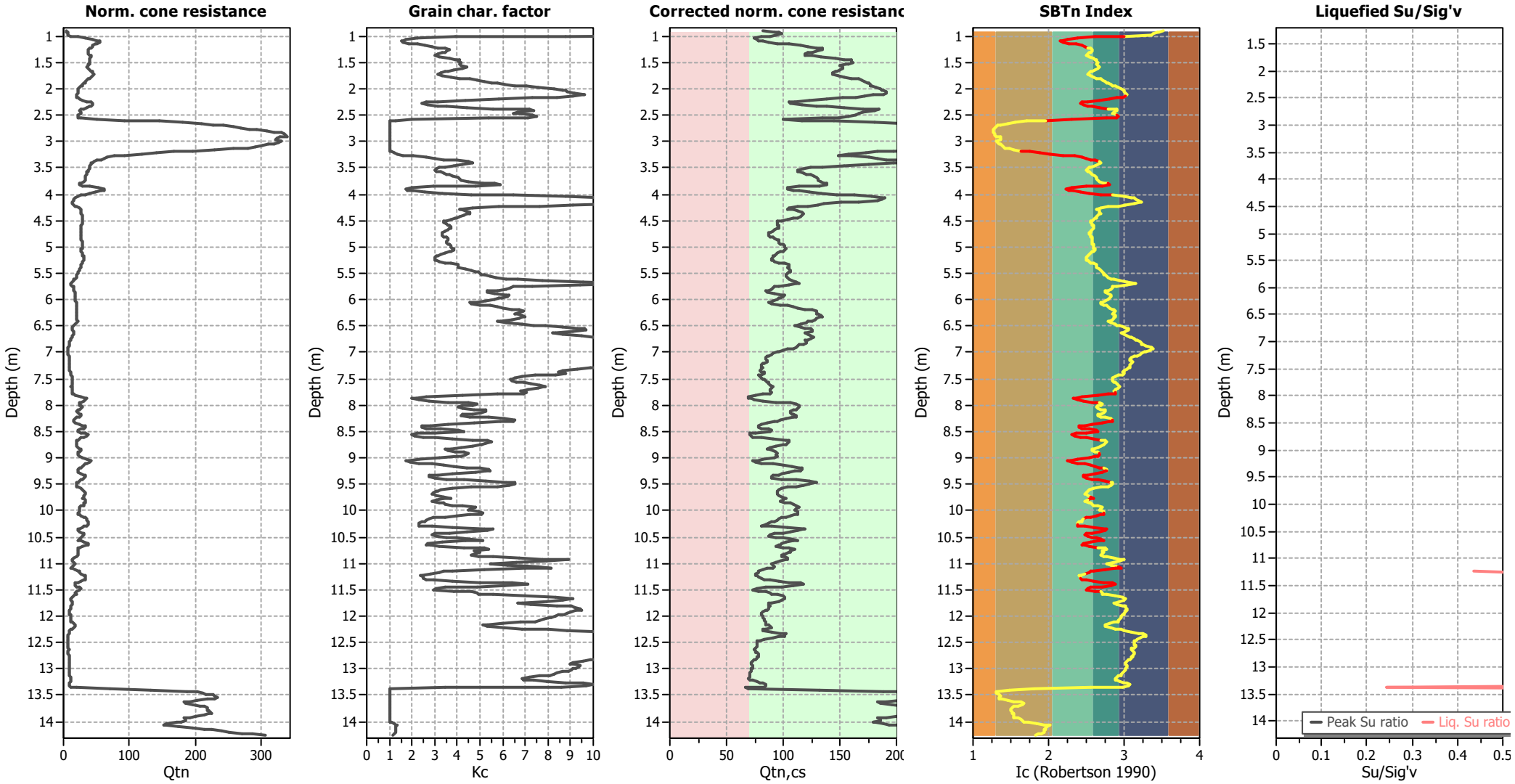




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

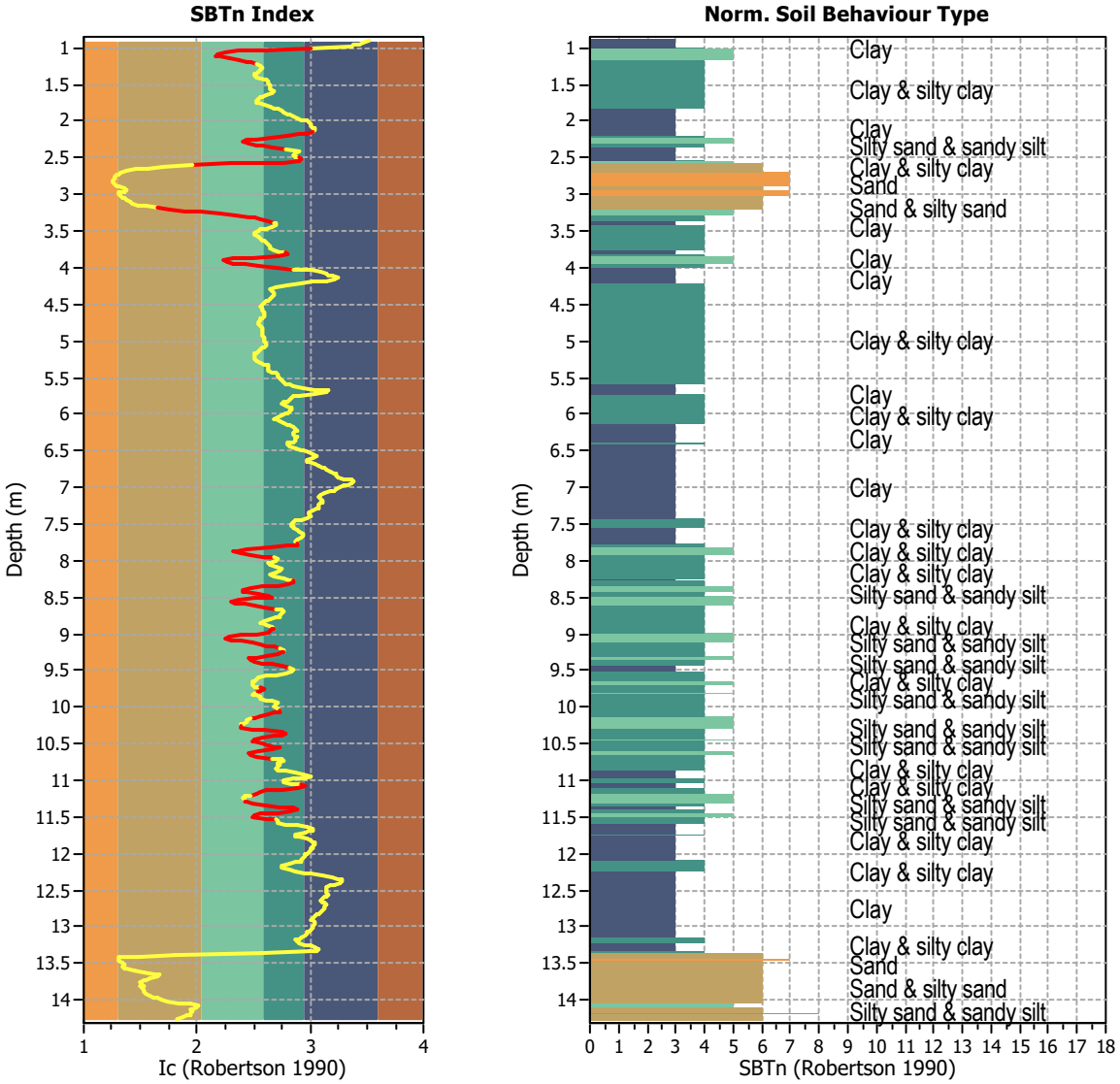
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	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:	178
I_c change ratio value:	0.0100	Exclusion percentage:	26.61%
Minimum number of points in layer:	4	Number of layers detected:	29

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	6	Start depth: 2.52 (m)	3	Clay
		End depth: 2.62 (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	6	Start depth: 7.78 (m)	3	Clay
		End depth: 7.88 (m)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 7.88 (m)	5	Silty sand & sandy silt
		End depth: 7.98 (m)	4	Clay & silty clay
Transition layer 11	6	Start depth: 8.30 (m)	4	Clay & silty clay
		End depth: 8.40 (m)	5	Silty sand & sandy silt
Transition layer 12	5	Start depth: 8.42 (m)	5	Silty sand & sandy silt
		End depth: 8.50 (m)	4	Clay & silty clay
Transition layer 13	4	Start depth: 8.50 (m)	4	Clay & silty clay
		End depth: 8.56 (m)	5	Silty sand & sandy silt
Transition layer 14	7	Start depth: 8.56 (m)	5	Silty sand & sandy silt
		End depth: 8.68 (m)	4	Clay & silty clay
Transition layer 15	7	Start depth: 8.94 (m)	4	Clay & silty clay
		End depth: 9.06 (m)	5	Silty sand & sandy silt
Transition layer 16	9	Start depth: 9.06 (m)	5	Silty sand & sandy silt
		End depth: 9.22 (m)	4	Clay & silty clay
Transition layer 17	5	Start depth: 9.26 (m)	4	Clay & silty clay
		End depth: 9.34 (m)	5	Silty sand & sandy silt
Transition layer 18	7	Start depth: 9.36 (m)	5	Silty sand & sandy silt
		End depth: 9.48 (m)	3	Clay
Transition layer 19	4	Start depth: 9.76 (m)	4	Clay & silty clay
		End depth: 9.82 (m)	5	Silty sand & sandy silt
Transition layer 20	7	Start depth: 10.06 (m)	4	Clay & silty clay
		End depth: 10.18 (m)	5	Silty sand & sandy silt
Transition layer 21	5	Start depth: 10.28 (m)	5	Silty sand & sandy silt
		End depth: 10.36 (m)	4	Clay & silty clay
Transition layer 22	6	Start depth: 10.36 (m)	4	Clay & silty clay
		End depth: 10.46 (m)	5	Silty sand & sandy silt
Transition layer 23	6	Start depth: 10.46 (m)	5	Silty sand & sandy silt
		End depth: 10.56 (m)	4	Clay & silty clay

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 24	4	Start depth: 10.56 (m)	4	Clay & silty clay
		End depth: 10.62 (m)	5	Silty sand & sandy silt
Transition layer 25	5	Start depth: 10.64 (m)	5	Silty sand & sandy silt
		End depth: 10.72 (m)	4	Clay & silty clay
Transition layer 26	8	Start depth: 11.08 (m)	3	Clay
		End depth: 11.22 (m)	5	Silty sand & sandy silt
Transition layer 27	6	Start depth: 11.30 (m)	5	Silty sand & sandy silt
		End depth: 11.40 (m)	3	Clay
Transition layer 28	5	Start depth: 11.40 (m)	3	Clay
		End depth: 11.48 (m)	5	Silty sand & sandy silt
Transition layer 29	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	6.18	18.43
88	2.64	10.81	66.80	13.60	3.75	18.58
89	2.66	12.80	56.10	-0.90	2.21	18.64
90	2.68	14.06	52.50	1.60	1.22	18.61
91	2.70	15.80	54.90	2.00	0.75	18.66
92	2.72	16.69	58.60	3.80	0.49	18.75
93	2.74	17.64	62.70	5.30	0.33	18.84
94	2.76	18.66	65.80	7.70	0.19	18.93
95	2.78	19.63	69.80	9.50	0.08	19.03
96	2.80	20.54	76.70	11.40	0.01	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	0.01	19.27
98	2.84	22.26	91.20	13.40	0.04	19.37
99	2.86	22.57	97.20	13.70	0.21	19.47
100	2.88	22.51	109.10	15.20	0.32	19.53
101	2.90	22.57	106.30	12.80	0.47	19.59
102	2.92	22.47	114.40	20.60	1.10	19.68
103	2.94	18.78	142.40	6.40	1.16	19.67
104	2.96	21.88	105.10	8.20	1.13	19.64
105	2.98	22.12	105.80	17.00	0.47	19.52
106	3.00	22.27	103.20	14.10	0.53	19.55
107	3.02	22.01	112.30	17.30	0.66	19.56
108	3.04	21.11	109.80	15.60	0.87	19.57
109	3.06	20.46	108.10	14.50	1.08	19.54
110	3.08	19.72	110.10	14.30	1.32	19.53
111	3.10	18.94	110.00	14.00	1.60	19.51
112	3.12	18.03	107.60	13.50	1.89	19.48
113	3.14	16.99	105.60	13.10	2.50	19.41
114	3.16	13.86	100.10	13.00	3.48	19.32
115	3.18	11.70	98.20	12.00	5.09	19.21
116	3.20	9.45	96.50	10.90	7.18	19.13
117	3.22	7.45	100.90	10.70	10.02	19.06
118	3.24	5.87	102.80	12.70	13.61	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	20.15	18.05
152	3.92	3.25	58.50	2.20	21.10	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	33.46	17.07
184	4.56	1.41	30.40	226.20	33.86	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	35.22	17.03
188	4.64	1.33	29.90	268.30	35.28	17.02
189	4.66	1.33	29.50	280.00	34.97	17.00
190	4.68	1.37	28.90	291.70	34.34	16.99
191	4.70	1.39	28.30	303.60	33.62	16.97
192	4.72	1.41	27.80	316.80	33.09	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	32.88	16.93
194	4.76	1.40	26.70	344.50	32.78	16.91
195	4.78	1.40	26.60	347.20	32.99	16.92
196	4.80	1.39	27.50	358.80	33.48	16.94
197	4.82	1.36	28.60	361.00	34.12	16.98
198	4.84	1.36	29.20	367.90	34.54	17.02
199	4.86	1.39	30.60	375.30	34.56	17.07
200	4.88	1.44	32.50	392.30	34.33	17.13
201	4.90	1.47	33.30	395.50	34.12	17.18
202	4.92	1.48	33.40	397.70	33.96	17.18
203	4.94	1.48	32.90	393.30	34.32	17.21
204	4.96	1.47	35.70	408.10	34.75	17.24
205	4.98	1.47	36.20	418.70	35.07	17.27
206	5.00	1.48	35.90	428.60	35.14	17.28
207	5.02	1.46	36.00	435.50	35.39	17.28
208	5.04	1.44	36.50	440.30	35.74	17.27
209	5.06	1.43	35.70	442.60	35.73	17.26
210	5.08	1.45	34.80	452.50	35.32	17.23
211	5.10	1.46	34.10	460.70	34.63	17.22
212	5.12	1.50	33.50	468.60	33.62	17.21
213	5.14	1.59	33.20	475.10	32.59	17.22
214	5.16	1.63	33.30	487.00	31.81	17.23
215	5.18	1.66	33.90	498.50	31.34	17.24
216	5.20	1.69	33.50	523.60	31.01	17.25
217	5.22	1.70	33.30	526.20	30.70	17.24
218	5.24	1.70	32.90	516.10	30.82	17.23
219	5.26	1.66	33.10	509.60	31.29	17.23
220	5.28	1.63	33.80	500.70	32.20	17.24
221	5.30	1.58	34.60	491.00	33.50	17.28
222	5.32	1.53	37.40	473.50	35.13	17.32
223	5.34	1.45	38.80	474.10	36.87	17.36
224	5.36	1.40	39.60	469.00	36.78	17.36
225	5.38	1.55	37.50	457.50	36.80	17.35
226	5.40	1.46	38.20	426.40	36.87	17.32
227	5.42	1.35	36.70	436.20	38.59	17.28
228	5.44	1.29	36.10	435.10	39.88	17.23
229	5.46	1.24	35.60	440.00	40.89	17.19
230	5.48	1.19	33.70	431.30	41.52	17.13
231	5.50	1.16	32.50	434.90	41.91	17.08
232	5.52	1.15	31.50	424.90	42.13	17.03
233	5.54	1.12	30.10	397.10	42.80	16.99
234	5.56	1.08	30.60	375.90	43.96	16.96
235	5.58	1.03	30.40	323.70	45.44	16.94
236	5.60	1.00	29.60	263.50	47.33	16.89
237	5.62	0.91	28.30	207.40	49.52	16.82
238	5.64	0.85	27.20	135.80	54.40	16.73
239	5.66	0.69	27.20	-14.40	61.45	16.67
240	5.68	0.59	28.10	0.40	70.16	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	69.22	16.57
242	5.72	0.69	24.10	26.40	60.95	16.53
243	5.74	0.84	21.90	39.00	52.49	16.47
244	5.76	0.89	20.60	57.40	48.74	16.45
245	5.78	0.89	21.20	68.40	48.14	16.45
246	5.80	0.88	21.40	81.10	47.29	16.46
247	5.82	0.94	20.50	98.80	45.54	16.44
248	5.84	0.99	19.60	108.40	43.58	16.43
249	5.86	1.01	19.80	111.20	43.54	16.50
250	5.88	1.01	23.80	123.60	45.12	16.63
251	5.90	0.99	27.20	130.70	47.37	16.77
252	5.92	0.96	28.90	146.90	48.00	16.81
253	5.94	1.00	27.00	154.60	47.63	16.80
254	5.96	1.00	26.20	161.80	46.59	16.76
255	5.98	1.00	25.80	166.70	46.03	16.74
256	6.00	1.03	25.50	186.30	44.99	16.73
257	6.02	1.07	24.90	196.80	43.20	16.71
258	6.04	1.13	23.20	197.90	41.14	16.73
259	6.06	1.23	25.10	198.90	39.74	16.75
260	6.08	1.25	25.40	160.30	39.98	16.85
261	6.10	1.22	28.90	167.70	41.92	16.97
262	6.12	1.19	34.70	180.40	43.96	17.08
263	6.14	1.18	34.90	169.00	45.52	17.17
264	6.16	1.18	36.80	155.30	46.81	17.23
265	6.18	1.16	41.40	141.20	48.60	17.33
266	6.20	1.15	45.70	133.90	50.06	17.42
267	6.22	1.16	46.90	138.90	50.67	17.50
268	6.24	1.20	50.80	150.00	49.94	17.53
269	6.26	1.25	48.10	140.20	49.16	17.56
270	6.28	1.26	48.40	119.60	49.54	17.57
271	6.30	1.20	52.80	111.40	50.58	17.61
272	6.32	1.21	53.40	130.80	51.17	17.61
273	6.34	1.22	49.40	129.30	50.37	17.58
274	6.36	1.23	47.80	122.70	50.02	17.56
275	6.38	1.22	50.60	123.30	48.61	17.58
276	6.40	1.38	50.30	129.80	46.35	17.60
277	6.42	1.49	47.60	67.90	45.51	17.55
278	6.44	1.26	43.70	34.90	47.40	17.44
279	6.46	1.08	41.50	43.00	50.54	17.23
280	6.48	0.99	29.90	51.00	52.83	17.05
281	6.50	0.92	30.70	58.60	54.82	16.95
282	6.52	0.87	35.30	65.20	58.03	17.00
283	6.54	0.87	36.00	62.40	60.47	17.07
284	6.56	0.86	37.90	60.60	61.85	17.17
285	6.58	0.88	44.30	79.30	62.06	17.20
286	6.60	0.88	39.30	86.60	59.75	17.23
287	6.62	1.00	39.20	78.70	56.80	17.19
288	6.64	1.00	37.90	87.30	56.22	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	58.04	17.19
290	6.68	0.91	41.20	80.20	61.28	17.21
291	6.70	0.86	42.40	78.90	63.30	17.22
292	6.72	0.83	40.30	70.30	65.85	17.19
293	6.74	0.78	40.50	64.80	67.38	17.10
294	6.76	0.74	35.00	61.40	69.25	17.01
295	6.78	0.70	33.80	55.30	71.16	16.94
296	6.80	0.67	35.40	59.60	73.92	16.92
297	6.82	0.64	35.20	64.00	75.36	16.91
298	6.84	0.65	33.60	72.00	75.20	16.86
299	6.86	0.65	30.90	69.80	76.40	16.77
300	6.88	0.56	29.40	55.80	80.37	16.69
301	6.90	0.51	29.40	58.90	85.98	16.60
302	6.92	0.48	27.10	66.40	88.23	16.52
303	6.94	0.48	24.50	90.40	86.63	16.39
304	6.96	0.49	21.50	97.80	84.41	16.31
305	6.98	0.49	21.50	97.80	80.87	16.23
306	7.00	0.52	19.40	110.90	78.47	16.20
307	7.02	0.53	19.30	121.60	75.51	16.13
308	7.04	0.53	17.60	127.30	73.78	16.10
309	7.06	0.55	17.60	145.60	70.98	16.05
310	7.08	0.58	16.60	155.90	67.96	16.05
311	7.10	0.61	16.70	160.00	65.15	16.06
312	7.12	0.64	17.20	165.30	63.69	16.09
313	7.14	0.64	17.30	166.70	64.04	16.11
314	7.16	0.61	17.80	165.70	65.28	16.10
315	7.18	0.59	16.90	187.20	66.18	16.06
316	7.20	0.59	16.00	195.70	65.79	16.00
317	7.22	0.59	15.30	202.40	64.53	15.96
318	7.24	0.61	15.10	206.20	63.96	15.95
319	7.26	0.60	15.50	210.60	63.77	15.96
320	7.28	0.60	15.60	215.80	63.79	15.97
321	7.30	0.61	15.40	230.00	62.76	15.97
322	7.32	0.64	15.30	234.30	60.58	15.98
323	7.34	0.68	15.40	235.60	58.05	16.03
324	7.36	0.73	16.30	229.10	57.24	16.08
325	7.38	0.71	17.10	216.00	58.26	16.16
326	7.40	0.69	18.80	219.80	58.54	16.14
327	7.42	0.70	15.30	250.60	56.68	16.12
328	7.44	0.77	15.80	254.20	53.03	16.12
329	7.46	0.86	17.60	255.40	50.57	16.23
330	7.48	0.92	18.80	231.00	49.21	16.34
331	7.50	0.95	19.80	218.60	48.41	16.41
332	7.52	0.98	20.60	233.30	48.16	16.46
333	7.54	0.99	21.00	185.50	48.54	16.52
334	7.56	0.97	22.50	191.30	49.49	16.52
335	7.58	0.93	21.50	211.60	50.84	16.51
336	7.60	0.89	20.70	184.00	52.28	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	53.80	16.50
338	7.64	0.86	23.20	232.80	54.89	16.54
339	7.66	0.85	23.10	247.00	54.66	16.55
340	7.68	0.88	22.40	250.40	53.43	16.55
341	7.70	0.92	22.60	252.30	51.57	16.56
342	7.72	0.98	22.60	229.20	50.60	16.58
343	7.74	0.97	23.10	228.10	50.13	16.61
344	7.76	0.98	23.60	224.00	51.22	16.64
345	7.78	0.94	25.00	248.20	50.68	16.59
346	7.80	0.96	20.00	249.00	45.59	16.58
347	7.82	1.34	20.30	307.90	37.84	16.67
348	7.84	1.78	25.30	311.50	28.24	16.97
349	7.86	2.95	29.50	170.10	24.65	17.23
350	7.88	2.80	33.10	-0.20	23.38	17.37
351	7.90	2.57	33.90	-15.80	25.80	17.39
352	7.92	2.29	33.70	20.30	29.37	17.45
353	7.94	2.04	42.70	48.00	34.47	17.56
354	7.96	1.73	49.50	79.80	39.21	17.67
355	7.98	1.71	50.90	93.90	41.41	17.72
356	8.00	1.80	50.90	117.10	40.22	17.82
357	8.02	2.08	60.40	135.30	38.03	17.94
358	8.04	2.29	62.20	67.90	36.83	18.02
359	8.06	2.21	60.00	15.90	38.02	17.93
360	8.08	1.70	50.00	35.10	40.50	17.75
361	8.10	1.58	44.20	57.60	43.02	17.57
362	8.12	1.57	42.90	108.60	43.05	17.50
363	8.14	1.59	43.00	134.90	42.27	17.56
364	8.16	1.75	48.90	149.80	40.17	17.70
365	8.18	2.08	55.10	137.40	37.93	17.85
366	8.20	2.25	58.40	49.80	37.66	17.91
367	8.22	1.93	55.50	37.00	39.63	17.81
368	8.24	1.60	46.00	30.30	43.67	17.57
369	8.26	1.28	35.30	84.40	47.14	17.27
370	8.28	1.15	30.90	147.20	49.10	17.05
371	8.30	1.15	29.50	169.50	48.93	16.99
372	8.32	1.22	30.80	185.40	46.20	16.98
373	8.34	1.37	28.50	207.80	40.76	17.02
374	8.36	1.74	28.00	238.90	34.40	17.16
375	8.38	2.32	35.60	136.50	29.60	17.35
376	8.40	2.66	37.80	56.50	26.93	17.52
377	8.42	2.82	38.50	15.60	26.70	17.57
378	8.44	2.53	39.30	9.30	28.27	17.53
379	8.46	2.18	36.80	-4.70	32.51	17.51
380	8.48	1.83	41.90	4.00	36.89	17.36
381	8.50	1.48	31.10	108.90	38.32	17.23
382	8.52	1.73	27.30	211.30	31.06	17.16
383	8.54	2.88	30.10	169.50	25.18	17.31
384	8.56	3.23	36.00	5.30	22.86	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	24.19	17.42
386	8.60	2.42	30.10	0.70	27.14	17.33
387	8.62	2.16	32.20	38.10	31.08	17.38
388	8.64	2.01	42.20	82.20	35.38	17.51
389	8.66	1.84	46.40	130.70	40.46	17.60
390	8.68	1.50	46.70	156.40	43.38	17.57
391	8.70	1.56	42.50	219.60	44.32	17.52
392	8.72	1.64	42.60	222.60	43.04	17.53
393	8.74	1.67	46.00	177.40	42.08	17.53
394	8.76	1.70	41.40	171.60	42.02	17.48
395	8.78	1.59	37.80	208.30	40.42	17.36
396	8.80	1.69	33.60	268.50	37.71	17.30
397	8.82	1.98	33.80	259.50	35.01	17.37
398	8.84	2.14	40.40	164.20	33.83	17.50
399	8.86	2.18	43.80	73.50	34.59	17.58
400	8.88	2.01	41.60	84.30	36.21	17.56
401	8.90	1.84	41.10	112.10	38.47	17.47
402	8.92	1.65	37.70	149.80	39.21	17.45
403	8.94	1.85	40.40	189.70	38.65	17.48
404	8.96	1.96	42.90	187.20	37.56	17.54
405	8.98	1.94	42.60	149.00	36.53	17.62
406	9.00	2.18	47.20	180.10	32.04	17.79
407	9.02	3.21	54.40	126.80	25.98	17.83
408	9.04	3.72	37.70	6.10	22.07	17.86
409	9.06	3.74	43.20	26.30	20.51	17.71
410	9.08	3.42	37.10	32.80	22.62	17.74
411	9.10	2.93	44.00	46.60	25.79	17.76
412	9.12	2.68	50.60	77.10	30.01	17.88
413	9.14	2.51	56.60	114.10	33.16	17.98
414	9.16	2.42	61.50	99.50	35.98	18.06
415	9.18	2.27	65.90	90.80	39.10	18.05
416	9.20	1.91	60.20	94.70	41.89	17.99
417	9.22	1.84	57.60	116.30	43.84	17.91
418	9.24	1.83	57.60	143.20	44.10	17.87
419	9.26	1.79	54.60	155.00	43.28	17.79
420	9.28	1.81	46.60	207.40	40.97	17.74
421	9.30	2.06	48.50	238.40	35.68	17.82
422	9.32	2.84	57.50	225.50	31.57	17.99
423	9.34	3.12	60.00	70.70	29.00	17.99
424	9.36	2.81	44.50	-11.00	29.30	17.92
425	9.38	2.61	49.60	11.40	30.92	17.84
426	9.40	2.51	53.40	25.90	33.92	17.95
427	9.42	2.37	62.60	65.30	38.32	18.07
428	9.44	1.98	71.80	73.10	43.16	18.14
429	9.46	1.85	72.30	73.60	47.40	18.12
430	9.48	1.75	67.00	99.40	49.01	18.04
431	9.50	1.64	61.90	124.60	49.04	17.93
432	9.52	1.65	56.10	188.40	47.94	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	45.49	17.76
434	9.56	1.81	49.50	211.70	40.06	17.80
435	9.58	2.48	54.40	230.70	35.58	17.87
436	9.60	2.66	54.00	124.10	32.69	17.94
437	9.62	2.62	53.20	47.90	31.86	17.96
438	9.64	2.76	54.90	43.80	31.32	17.99
439	9.66	2.90	57.30	32.00	30.65	18.05
440	9.68	2.97	59.30	11.40	30.21	18.07
441	9.70	2.96	57.10	13.60	30.38	18.07
442	9.72	2.86	57.30	2.70	31.27	18.04
443	9.74	2.66	57.20	13.80	33.26	18.04
444	9.76	2.46	60.00	20.40	35.04	18.05
445	9.78	2.49	62.00	57.10	33.33	18.09
446	9.80	3.16	60.00	29.80	31.44	18.15
447	9.82	3.11	65.00	10.80	30.25	18.15
448	9.84	2.84	59.90	9.90	32.06	18.19
449	9.86	2.77	68.40	-1.70	33.48	18.25
450	9.88	2.92	76.50	3.20	33.84	18.29
451	9.90	2.90	68.00	-18.40	35.60	18.27
452	9.92	2.30	68.30	-15.10	38.14	18.15
453	9.94	2.10	62.80	-6.00	40.81	18.09
454	9.96	2.26	62.50	19.10	40.15	18.05
455	9.98	2.33	61.60	47.10	39.24	18.06
456	10.00	2.28	62.40	29.90	39.84	18.04
457	10.02	2.11	60.30	38.40	41.62	18.01
458	10.04	1.99	61.30	55.60	42.59	18.00
459	10.06	2.09	61.30	70.90	42.16	18.02
460	10.08	2.22	62.80	79.30	39.64	18.05
461	10.10	2.48	62.00	87.10	36.72	18.10
462	10.12	2.77	63.50	74.70	33.55	18.17
463	10.14	3.12	67.30	63.70	30.69	18.24
464	10.16	3.44	65.90	30.20	29.21	18.24
465	10.18	3.26	61.70	10.40	28.34	18.23
466	10.20	3.38	63.50	9.20	27.83	18.19
467	10.22	3.50	59.40	22.40	26.80	18.19
468	10.24	3.61	58.50	-11.80	25.91	18.17
469	10.26	3.65	59.40	44.30	25.75	18.06
470	10.28	3.18	44.40	31.70	25.87	17.94
471	10.30	3.18	44.40	31.70	30.10	17.98
472	10.32	2.48	72.00	6.30	35.49	18.12
473	10.34	2.22	71.60	14.40	42.90	18.18
474	10.36	1.92	65.90	35.20	44.71	18.09
475	10.38	2.02	60.80	46.90	43.40	18.02
476	10.40	2.28	59.70	61.00	39.09	18.04
477	10.42	2.68	61.80	51.90	34.64	18.08
478	10.44	3.04	59.50	34.30	31.03	18.06
479	10.46	3.13	50.20	26.80	30.10	17.95
480	10.48	2.66	46.80	1.50	31.18	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	34.21	17.90
482	10.52	2.47	57.20	5.80	36.63	17.99
483	10.54	2.38	62.60	-2.90	39.77	18.06
484	10.56	2.12	65.80	-2.70	42.59	18.07
485	10.58	2.03	63.80	21.70	38.75	18.14
486	10.60	3.19	66.10	37.00	33.00	18.25
487	10.62	3.69	71.50	11.40	28.94	18.39
488	10.64	3.71	78.30	-13.50	28.45	18.38
489	10.66	3.36	63.90	-32.50	29.82	18.27
490	10.68	2.87	56.10	-24.80	32.15	18.02
491	10.70	2.35	48.50	-16.60	38.33	17.90
492	10.72	1.73	57.50	-7.10	42.79	17.88
493	10.74	2.09	59.70	21.40	43.76	17.97
494	10.76	2.37	61.40	41.60	40.78	17.99
495	10.78	2.25	56.80	15.50	41.16	17.98
496	10.80	2.00	58.20	28.10	41.80	17.91
497	10.82	2.13	52.80	56.00	41.01	17.86
498	10.84	2.29	49.90	27.00	40.13	17.80
499	10.86	2.04	50.00	3.80	41.66	17.74
500	10.88	1.79	47.70	6.70	44.68	17.69
501	10.90	1.79	47.70	6.70	49.97	17.61
502	10.92	1.29	47.00	76.40	54.20	17.49
503	10.94	1.21	38.90	105.90	58.91	17.35
504	10.96	1.24	37.40	130.40	55.01	17.28
505	10.98	1.49	37.00	156.20	49.38	17.33
506	11.00	1.76	38.90	173.00	44.52	17.37
507	11.02	1.84	36.80	92.20	44.22	17.37
508	11.04	1.55	37.40	94.10	47.80	17.28
509	11.06	1.24	34.10	147.00	53.42	17.17
510	11.08	1.17	31.50	177.60	56.02	17.05
511	11.10	1.21	30.20	207.20	51.01	17.02
512	11.12	1.58	28.50	240.30	42.75	17.17
513	11.14	2.22	36.70	162.20	35.50	17.33
514	11.16	2.58	36.20	57.00	33.25	17.46
515	11.18	2.31	37.10	29.10	32.13	17.53
516	11.20	2.62	41.00	48.60	29.65	17.60
517	11.22	3.36	40.10	104.50	27.08	17.74
518	11.24	3.42	46.80	-7.70	26.35	17.83
519	11.26	3.13	48.80	-12.30	27.19	17.87
520	11.28	3.22	45.80	-1.80	27.46	17.92
521	11.30	3.48	52.20	14.30	28.15	18.00
522	11.32	3.16	59.60	34.20	30.54	18.02
523	11.34	2.57	52.30	21.70	35.55	18.00
524	11.36	2.18	57.50	44.20	41.77	17.98
525	11.38	1.94	66.40	69.30	48.59	18.02
526	11.40	1.64	68.00	192.00	51.61	17.99
527	11.42	1.71	56.20	330.40	47.14	17.91
528	11.44	2.30	49.80	362.90	41.31	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	33.77	17.73
530	11.48	3.01	37.80	58.90	31.34	17.59
531	11.50	2.59	33.10	88.60	30.65	17.43
532	11.52	2.12	33.30	144.70	35.91	17.36
533	11.54	1.74	37.10	252.60	40.01	17.40
534	11.56	1.96	40.20	327.00	41.35	17.49
535	11.58	2.06	42.40	241.50	41.54	17.56
536	11.60	1.86	44.20	134.80	44.65	17.57
537	11.62	1.58	44.60	165.80	51.01	17.52
538	11.64	1.26	43.30	243.50	56.62	17.45
539	11.66	1.25	41.90	284.50	59.86	17.39
540	11.68	1.25	40.80	305.10	59.49	17.37
541	11.70	1.26	41.10	327.70	58.04	17.33
542	11.72	1.31	37.60	336.50	55.01	17.31
543	11.74	1.45	36.20	317.90	50.46	17.25
544	11.76	1.59	32.20	246.90	49.74	17.17
545	11.78	1.31	31.40	238.30	52.23	17.10
546	11.80	1.16	32.50	248.20	56.84	17.01
547	11.82	1.13	28.30	313.30	59.43	16.98
548	11.84	1.09	30.10	349.00	60.06	16.93
549	11.86	1.07	29.70	367.50	61.09	16.93
550	11.88	1.06	28.90	374.60	61.12	16.89
551	11.90	1.05	27.10	379.70	60.28	16.82
552	11.92	1.06	25.10	393.10	59.49	16.76
553	11.94	1.06	24.70	399.80	58.70	16.73
554	11.96	1.06	24.60	418.10	58.31	16.73
555	11.98	1.08	25.20	424.90	57.32	16.75
556	12.00	1.14	25.30	419.30	56.56	16.80
557	12.02	1.16	27.30	410.50	55.98	16.83
558	12.04	1.16	26.90	403.20	55.55	16.87
559	12.06	1.20	27.40	420.60	54.62	16.91
560	12.08	1.26	29.00	421.70	53.66	16.97
561	12.10	1.30	30.50	414.10	53.06	17.03
562	12.12	1.32	31.50	423.20	50.34	17.11
563	12.14	1.59	32.80	434.60	46.57	17.21
564	12.16	1.80	35.10	432.00	43.35	17.33
565	12.18	1.91	39.30	370.90	42.69	17.48
566	12.20	1.94	44.60	245.50	43.51	17.50
567	12.22	1.77	38.20	238.40	47.01	17.38
568	12.24	1.30	31.30	330.30	50.47	17.10
569	12.26	1.20	24.40	359.70	55.44	16.86
570	12.28	1.10	25.00	320.40	58.69	16.79
571	12.30	1.02	28.60	305.40	65.60	16.97
572	12.32	0.95	39.40	390.00	72.03	17.12
573	12.34	0.89	40.70	437.90	77.16	17.23
574	12.36	0.85	40.60	454.90	79.32	17.20
575	12.38	0.83	38.00	451.40	79.82	17.16
576	12.40	0.84	37.30	471.70	77.59	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	74.54	16.89
578	12.44	0.84	24.40	512.40	70.95	16.67
579	12.46	0.83	21.30	513.50	69.24	16.54
580	12.48	0.83	21.80	574.10	68.18	16.49
581	12.50	0.84	21.30	588.90	68.06	16.49
582	12.52	0.83	21.50	599.10	68.10	16.48
583	12.54	0.82	21.30	611.30	68.59	16.48
584	12.56	0.81	21.50	632.50	69.28	16.47
585	12.58	0.79	21.00	626.20	68.80	16.46
586	12.60	0.83	20.80	629.70	67.33	16.45
587	12.62	0.87	20.20	640.50	65.72	16.44
588	12.64	0.86	20.30	655.30	65.07	16.44
589	12.66	0.86	20.30	655.30	66.45	16.45
590	12.68	0.81	21.00	636.20	67.35	16.47
591	12.70	0.83	21.70	654.00	68.03	16.50
592	12.72	0.85	22.10	681.90	67.61	16.53
593	12.74	0.84	22.50	692.10	67.08	16.55
594	12.76	0.87	22.40	689.10	66.86	16.55
595	12.78	0.86	22.30	687.30	65.78	16.55
596	12.80	0.90	22.10	666.10	64.75	16.54
597	12.82	0.91	21.40	684.40	63.65	16.51
598	12.84	0.90	20.40	657.60	62.81	16.47
599	12.86	0.91	19.40	672.50	61.47	16.43
600	12.88	0.96	19.10	688.80	59.83	16.42
601	12.90	0.98	19.30	696.70	59.32	16.42
602	12.92	0.95	19.50	679.90	59.95	16.43
603	12.94	0.94	19.50	627.00	60.92	16.44
604	12.96	0.94	20.20	664.70	60.75	16.45
605	12.98	0.96	20.00	700.80	60.19	16.46
606	13.00	0.96	19.50	696.00	59.81	16.44
607	13.02	0.96	19.40	676.50	59.60	16.43
608	13.04	0.97	19.40	686.30	58.92	16.44
609	13.06	1.01	19.60	717.90	57.96	16.45
610	13.08	1.01	19.50	741.80	57.06	16.45
611	13.10	1.02	19.00	747.60	56.38	16.45
612	13.12	1.05	19.50	765.80	55.53	16.47
613	13.14	1.08	19.90	772.20	53.77	16.51
614	13.16	1.18	20.60	779.00	51.87	16.55
615	13.18	1.22	20.20	786.40	50.51	16.57
616	13.20	1.22	20.60	776.20	50.83	16.61
617	13.22	1.21	22.60	698.00	52.62	16.69
618	13.24	1.16	24.90	713.40	55.24	16.76
619	13.26	1.11	26.00	676.30	58.52	16.82
620	13.28	1.05	27.50	656.30	61.49	16.87
621	13.30	1.03	29.30	687.00	63.24	16.92
622	13.32	1.04	30.30	755.80	62.05	16.95
623	13.34	1.13	29.00	792.40	57.61	16.98
624	13.36	1.33	29.20	848.60	33.48	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	2.50	18.03
627	13.42	20.98	47.40	-15.60	0.50	18.40
628	13.44	21.90	48.60	-17.50	0.58	18.72
629	13.46	21.51	61.60	-17.10	0.57	18.89
630	13.48	24.15	69.60	76.90	0.87	19.11
631	13.50	23.41	85.00	29.30	0.89	19.28
632	13.52	25.02	92.10	-30.90	1.03	19.39
633	13.54	25.30	91.80	-41.40	0.83	19.37
634	13.56	24.83	78.30	-22.00	0.99	19.35
635	13.58	23.12	90.20	-41.00	1.28	19.32
636	13.60	22.23	90.40	-47.50	2.20	19.45
637	13.62	20.44	113.40	-51.20	3.34	19.60
638	13.64	19.23	140.20	-38.80	4.96	19.91
639	13.66	20.15	200.00	-46.00	5.58	20.07
640	13.68	21.11	180.70	-31.90	5.17	20.14
641	13.70	22.79	162.40	-4.00	4.21	20.06
642	13.72	23.30	153.90	-45.30	3.49	19.99
643	13.74	23.74	144.80	-50.30	3.19	19.95
644	13.76	23.94	147.00	-49.70	2.75	19.84
645	13.78	23.51	112.30	141.90	2.93	19.90
646	13.80	23.99	165.70	-42.90	2.92	19.91
647	13.82	24.31	149.60	-47.40	3.25	20.04
648	13.84	24.75	162.40	-42.70	3.11	20.04
649	13.86	24.72	160.70	-33.80	3.30	20.03
650	13.88	22.89	150.50	-10.30	3.28	19.94
651	13.90	22.50	129.30	31.70	3.37	19.76
652	13.92	20.06	107.60	118.30	3.53	19.68
653	13.94	20.15	128.30	-20.40	4.22	19.75
654	13.96	20.30	157.50	-33.30	4.78	19.92
655	13.98	20.97	168.90	-52.80	5.36	20.05
656	14.00	20.25	182.60	-40.50	5.73	20.04
657	14.02	18.43	159.10	-48.60	6.80	20.13
658	14.04	18.43	218.30	-36.70	9.08	20.33
659	14.06	16.16	302.30	-46.50	11.53	20.62
660	14.08	17.11	364.20	-42.00	13.26	20.87
661	14.10	18.95	428.60	-34.60	12.61	21.11
662	14.12	23.30	497.40	-29.90	11.90	21.30
663	14.14	24.26	536.60	-38.10	11.45	21.45
664	14.16	24.99	584.70	-40.30	11.75	21.58
665	14.18	26.94	697.90	-47.50	11.47	21.58
666	14.20	29.89	708.80	-48.70	11.52	21.58
667	14.22	28.71	748.30	-48.10	10.40	21.58
668	14.24	33.74	706.50	-52.50	9.69	21.58
669	14.26	34.99	725.90	-52.50	8.74	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	0.90	13.65	0.00	13.65	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	13.96	0.00	13.96	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	14.27	0.00	14.27	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	14.59	0.00	14.59	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	14.90	0.00	14.90	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	15.22	0.00	15.22	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	15.55	0.20	15.35	0.99	0.065	1.38	0.048	1.00	1.00	2.000	Yes
8	1.04	15.88	0.39	15.49	0.99	0.066	1.38	0.048	1.00	1.00	2.000	Yes
9	1.06	16.23	0.59	15.64	0.99	0.067	1.38	0.049	1.00	1.00	2.000	Yes
10	1.08	16.57	0.78	15.79	0.99	0.068	1.38	0.049	1.00	1.00	2.000	Yes
11	1.10	16.92	0.98	15.94	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
12	1.12	17.27	1.18	16.09	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
13	1.14	17.62	1.37	16.25	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
14	1.16	17.98	1.57	16.41	0.99	0.071	1.38	0.051	1.00	1.00	2.000	Yes
15	1.18	18.34	1.77	16.57	0.99	0.071	1.38	0.052	1.00	1.00	2.000	Yes
16	1.20	18.70	1.96	16.74	0.99	0.072	1.38	0.052	1.00	1.00	2.000	Yes
17	1.22	19.06	2.16	16.90	0.99	0.073	1.38	0.053	1.00	1.00	2.000	Yes
18	1.24	19.42	2.35	17.07	0.99	0.073	1.38	0.053	1.00	1.00	2.000	Yes
19	1.26	19.78	2.55	17.23	0.99	0.074	1.38	0.054	1.00	1.00	0.054	No
20	1.28	20.14	2.75	17.39	0.99	0.075	1.38	0.054	1.00	1.00	0.054	No
21	1.30	20.50	2.94	17.56	0.99	0.075	1.38	0.055	1.00	1.00	0.055	No
22	1.32	20.86	3.14	17.72	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
23	1.34	21.21	3.34	17.88	0.99	0.076	1.38	0.056	1.00	1.00	0.056	No
24	1.36	21.57	3.53	18.04	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
25	1.38	21.93	3.73	18.20	0.99	0.078	1.38	0.056	1.00	1.00	0.056	No
26	1.40	22.29	3.92	18.37	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
27	1.42	22.66	4.12	18.54	0.99	0.079	1.38	0.057	1.00	1.00	0.057	No
28	1.44	23.02	4.32	18.71	0.99	0.079	1.38	0.058	1.00	1.00	0.058	No
29	1.46	23.39	4.51	18.88	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
30	1.48	23.76	4.71	19.05	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
31	1.50	24.13	4.91	19.22	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
32	1.52	24.49	5.10	19.39	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
33	1.54	24.86	5.30	19.56	0.99	0.082	1.38	0.059	1.00	1.00	0.059	No
34	1.56	25.22	5.49	19.73	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
35	1.58	25.59	5.69	19.90	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
36	1.60	25.95	5.89	20.06	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
37	1.62	26.31	6.08	20.23	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
38	1.64	26.68	6.28	20.40	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
39	1.66	27.04	6.47	20.57	0.99	0.085	1.38	0.061	1.00	1.00	0.061	No
40	1.68	27.41	6.67	20.74	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
41	1.70	27.78	6.87	20.91	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
42	1.72	28.14	7.06	21.08	0.99	0.086	1.38	0.062	1.00	1.00	0.062	No
43	1.74	28.51	7.26	21.25	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
44	1.76	28.88	7.46	21.42	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
45	1.78	29.25	7.65	21.59	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
46	1.80	29.61	7.85	21.76	0.99	0.087	1.38	0.064	1.00	1.00	0.064	No
47	1.82	29.98	8.04	21.94	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
48	1.84	30.35	8.24	22.11	0.99	0.088	1.38	0.064	1.00	1.00	0.064	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	1.86	30.71	8.44	22.28	0.99	0.089	1.38	0.064	1.00	1.00	0.064	No
50	1.88	31.08	8.63	22.45	0.99	0.089	1.38	0.065	1.00	1.00	0.065	No
51	1.90	31.45	8.83	22.62	0.99	0.089	1.38	0.065	1.00	1.00	0.065	No
52	1.92	31.81	9.03	22.79	0.99	0.090	1.38	0.065	1.00	1.00	0.065	No
53	1.94	32.17	9.22	22.95	0.99	0.090	1.38	0.065	1.00	1.00	0.065	No
54	1.96	32.54	9.42	23.12	0.99	0.090	1.38	0.066	1.00	1.00	0.066	No
55	1.98	32.90	9.61	23.29	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
56	2.00	33.26	9.81	23.45	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
57	2.02	33.62	10.01	23.62	0.99	0.091	1.38	0.066	1.00	1.00	0.066	No
58	2.04	33.99	10.20	23.78	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
59	2.06	34.35	10.40	23.95	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
60	2.08	34.71	10.59	24.12	0.99	0.092	1.38	0.067	1.00	1.00	0.067	No
61	2.10	35.07	10.79	24.28	0.99	0.093	1.38	0.067	1.00	1.00	0.067	No
62	2.12	35.43	10.99	24.44	0.99	0.093	1.38	0.067	1.00	1.00	0.067	No
63	2.14	35.79	11.18	24.61	0.99	0.093	1.38	0.068	1.00	1.00	0.068	No
64	2.16	36.14	11.38	24.76	0.99	0.093	1.38	0.068	1.00	1.00	2.000	Yes
65	2.18	36.50	11.58	24.92	0.99	0.094	1.38	0.068	1.00	1.00	2.000	Yes
66	2.20	36.85	11.77	25.08	0.99	0.094	1.38	0.068	1.00	1.00	2.000	Yes
67	2.22	37.20	11.97	25.23	0.99	0.094	1.38	0.069	1.00	1.00	2.000	Yes
68	2.24	37.55	12.16	25.39	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
69	2.26	37.91	12.36	25.55	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
70	2.28	38.26	12.56	25.71	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
71	2.30	38.62	12.75	25.87	0.98	0.096	1.38	0.069	1.00	1.00	2.000	Yes
72	2.32	38.98	12.95	26.03	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
73	2.34	39.35	13.15	26.20	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
74	2.36	39.71	13.34	26.37	0.98	0.096	1.38	0.070	1.00	1.00	2.000	Yes
75	2.38	40.07	13.54	26.54	0.98	0.097	1.38	0.070	1.00	1.00	2.000	Yes
76	2.40	40.44	13.73	26.70	0.98	0.097	1.38	0.070	1.00	1.00	2.000	Yes
77	2.42	40.80	13.93	26.87	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
78	2.44	41.16	14.13	27.04	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
79	2.46	41.52	14.32	27.20	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
80	2.48	41.88	14.52	27.37	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
81	2.50	42.24	14.72	27.53	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
82	2.52	42.60	14.91	27.69	0.98	0.098	1.38	0.071	1.00	1.00	2.000	Yes
83	2.54	42.95	15.11	27.84	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
84	2.56	43.30	15.30	28.00	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
85	2.58	43.66	15.50	28.16	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
86	2.60	44.02	15.70	28.32	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
87	2.62	44.39	15.89	28.50	0.98	0.099	1.38	0.072	1.00	1.00	2.000	Yes
88	2.64	44.76	16.09	28.67	0.98	0.100	1.38	0.072	1.00	1.00	0.072	No
89	2.66	45.13	16.28	28.85	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
90	2.68	45.51	16.48	29.02	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
91	2.70	45.88	16.68	29.20	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
92	2.72	46.25	16.87	29.38	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
93	2.74	46.63	17.07	29.56	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
94	2.76	47.01	17.27	29.74	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
95	2.78	47.39	17.46	29.93	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
96	2.80	47.77	17.66	30.11	0.98	0.101	1.38	0.074	1.00	1.00	0.074	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	2.82	48.16	17.85	30.30	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
98	2.84	48.55	18.05	30.49	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
99	2.86	48.93	18.25	30.69	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
100	2.88	49.33	18.44	30.88	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
101	2.90	49.72	18.64	31.08	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
102	2.92	50.11	18.84	31.28	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
103	2.94	50.50	19.03	31.47	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
104	2.96	50.90	19.23	31.67	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
105	2.98	51.29	19.42	31.86	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
106	3.00	51.68	19.62	32.06	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
107	3.02	52.07	19.82	32.25	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
108	3.04	52.46	20.01	32.45	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
109	3.06	52.85	20.21	32.64	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
110	3.08	53.24	20.40	32.84	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
111	3.10	53.63	20.60	33.03	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
112	3.12	54.02	20.80	33.22	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
113	3.14	54.41	20.99	33.42	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
114	3.16	54.80	21.19	33.61	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
115	3.18	55.18	21.39	33.79	0.98	0.104	1.38	0.075	1.00	1.00	0.075	No
116	3.20	55.56	21.58	33.98	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
117	3.22	55.94	21.78	34.17	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
118	3.24	56.33	21.97	34.35	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
119	3.26	56.71	22.17	34.54	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
120	3.28	57.09	22.37	34.72	0.98	0.104	1.38	0.076	1.00	1.00	2.000	Yes
121	3.30	57.47	22.56	34.91	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
122	3.32	57.85	22.76	35.09	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
123	3.34	58.23	22.96	35.27	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
124	3.36	58.61	23.15	35.46	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
125	3.38	58.99	23.35	35.64	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
126	3.40	59.37	23.54	35.82	0.98	0.105	1.38	0.076	1.00	1.00	2.000	Yes
127	3.42	59.74	23.74	36.00	0.98	0.105	1.38	0.077	1.00	1.00	0.077	No
128	3.44	60.12	23.94	36.18	0.98	0.105	1.38	0.077	1.00	1.00	0.077	No
129	3.46	60.48	24.13	36.35	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
130	3.48	60.84	24.33	36.52	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
131	3.50	61.20	24.53	36.68	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
132	3.52	61.56	24.72	36.84	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
133	3.54	61.91	24.92	37.00	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
134	3.56	62.27	25.11	37.16	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
135	3.58	62.62	25.31	37.31	0.98	0.106	1.38	0.077	1.00	1.00	0.077	No
136	3.60	62.98	25.51	37.47	0.98	0.107	1.38	0.077	1.00	1.00	0.077	No
137	3.62	63.33	25.70	37.63	0.98	0.107	1.38	0.078	1.00	1.00	0.078	No
138	3.64	63.69	25.90	37.79	0.98	0.107	1.38	0.078	1.00	1.00	0.078	No
139	3.66	64.04	26.09	37.95	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
140	3.68	64.40	26.29	38.11	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
141	3.70	64.76	26.49	38.27	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
142	3.72	65.11	26.68	38.43	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
143	3.74	65.47	26.88	38.59	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
144	3.76	65.82	27.08	38.75	0.97	0.108	1.38	0.078	1.00	1.00	0.078	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	3.78	66.18	27.27	38.91	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
146	3.80	66.53	27.47	39.06	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
147	3.82	66.88	27.66	39.22	0.97	0.108	1.38	0.078	1.00	1.00	2.000	Yes
148	3.84	67.24	27.86	39.38	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
149	3.86	67.59	28.06	39.54	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
150	3.88	67.95	28.25	39.70	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
151	3.90	68.31	28.45	39.86	0.97	0.108	1.38	0.079	1.00	1.00	2.000	Yes
152	3.92	68.68	28.65	40.03	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
153	3.94	69.04	28.84	40.20	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
154	3.96	69.40	29.04	40.37	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
155	3.98	69.76	29.23	40.53	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
156	4.00	70.13	29.43	40.70	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
157	4.02	70.48	29.63	40.86	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
158	4.04	70.84	29.82	41.02	0.97	0.109	1.38	0.079	1.00	1.00	2.000	Yes
159	4.06	71.20	30.02	41.19	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
160	4.08	71.56	30.21	41.35	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
161	4.10	71.92	30.41	41.51	0.97	0.109	1.38	0.080	1.00	1.00	0.080	No
162	4.12	72.28	30.61	41.67	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
163	4.14	72.63	30.80	41.83	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
164	4.16	72.97	31.00	41.98	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
165	4.18	73.32	31.20	42.12	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
166	4.20	73.66	31.39	42.27	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
167	4.22	74.00	31.59	42.41	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
168	4.24	74.34	31.78	42.55	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
169	4.26	74.68	31.98	42.70	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
170	4.28	75.02	32.18	42.85	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
171	4.30	75.37	32.37	43.00	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
172	4.32	75.72	32.57	43.15	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
173	4.34	76.06	32.77	43.30	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
174	4.36	76.41	32.96	43.45	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
175	4.38	76.76	33.16	43.60	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
176	4.40	77.11	33.35	43.76	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
177	4.42	77.46	33.55	43.91	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
178	4.44	77.81	33.75	44.06	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
179	4.46	78.15	33.94	44.21	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
180	4.48	78.50	34.14	44.36	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
181	4.50	78.84	34.34	44.51	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
182	4.52	79.18	34.53	44.65	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
183	4.54	79.53	34.73	44.80	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
184	4.56	79.87	34.92	44.94	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
185	4.58	80.21	35.12	45.09	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
186	4.60	80.55	35.32	45.23	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
187	4.62	80.89	35.51	45.38	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
188	4.64	81.23	35.71	45.52	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
189	4.66	81.57	35.90	45.67	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
190	4.68	81.91	36.10	45.81	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
191	4.70	82.25	36.30	45.95	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
192	4.72	82.59	36.49	46.10	0.97	0.113	1.38	0.082	1.00	1.00	0.082	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	4.74	82.93	36.69	46.24	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
194	4.76	83.26	36.89	46.38	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
195	4.78	83.60	37.08	46.52	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
196	4.80	83.94	37.28	46.66	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
197	4.82	84.28	37.47	46.81	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
198	4.84	84.62	37.67	46.95	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
199	4.86	84.96	37.87	47.10	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
200	4.88	85.31	38.06	47.24	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
201	4.90	85.65	38.26	47.39	0.97	0.114	1.38	0.082	1.00	1.00	0.082	No
202	4.92	85.99	38.46	47.54	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
203	4.94	86.34	38.65	47.69	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
204	4.96	86.68	38.85	47.83	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
205	4.98	87.03	39.04	47.98	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
206	5.00	87.37	39.24	48.13	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
207	5.02	87.72	39.44	48.28	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
208	5.04	88.06	39.63	48.43	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
209	5.06	88.41	39.83	48.58	0.97	0.114	1.38	0.083	1.00	1.00	0.083	No
210	5.08	88.75	40.02	48.73	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
211	5.10	89.10	40.22	48.88	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
212	5.12	89.44	40.42	49.03	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
213	5.14	89.79	40.61	49.17	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
214	5.16	90.13	40.81	49.32	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
215	5.18	90.48	41.01	49.47	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
216	5.20	90.82	41.20	49.62	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
217	5.22	91.17	41.40	49.77	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
218	5.24	91.51	41.59	49.92	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
219	5.26	91.86	41.79	50.07	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
220	5.28	92.20	41.99	50.21	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
221	5.30	92.55	42.18	50.36	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
222	5.32	92.89	42.38	50.51	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
223	5.34	93.24	42.58	50.66	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
224	5.36	93.59	42.77	50.82	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
225	5.38	93.93	42.97	50.97	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
226	5.40	94.28	43.16	51.12	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
227	5.42	94.63	43.36	51.27	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
228	5.44	94.97	43.56	51.41	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
229	5.46	95.31	43.75	51.56	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
230	5.48	95.66	43.95	51.71	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
231	5.50	96.00	44.15	51.85	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
232	5.52	96.34	44.34	52.00	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
233	5.54	96.68	44.54	52.14	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
234	5.56	97.02	44.73	52.28	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
235	5.58	97.36	44.93	52.43	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
236	5.60	97.69	45.13	52.57	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
237	5.62	98.03	45.32	52.71	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
238	5.64	98.37	45.52	52.85	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
239	5.66	98.70	45.71	52.98	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
240	5.68	99.03	45.91	53.12	0.96	0.116	1.38	0.085	1.00	1.00	0.085	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	5.70	99.36	46.11	53.26	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
242	5.72	99.69	46.30	53.39	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
243	5.74	100.02	46.50	53.52	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
244	5.76	100.35	46.70	53.66	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
245	5.78	100.68	46.89	53.79	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
246	5.80	101.01	47.09	53.92	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
247	5.82	101.34	47.28	54.06	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
248	5.84	101.67	47.48	54.19	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
249	5.86	102.00	47.68	54.32	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
250	5.88	102.33	47.87	54.46	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
251	5.90	102.67	48.07	54.60	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
252	5.92	103.00	48.27	54.74	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
253	5.94	103.34	48.46	54.88	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
254	5.96	103.67	48.66	55.02	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
255	5.98	104.01	48.85	55.15	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
256	6.00	104.34	49.05	55.29	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
257	6.02	104.68	49.25	55.43	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
258	6.04	105.01	49.44	55.57	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
259	6.06	105.35	49.64	55.71	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
260	6.08	105.68	49.83	55.85	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
261	6.10	106.02	50.03	55.99	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
262	6.12	106.36	50.23	56.14	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
263	6.14	106.71	50.42	56.28	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
264	6.16	107.05	50.62	56.43	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
265	6.18	107.40	50.82	56.58	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
266	6.20	107.75	51.01	56.74	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
267	6.22	108.10	51.21	56.89	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
268	6.24	108.45	51.40	57.04	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
269	6.26	108.80	51.60	57.20	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
270	6.28	109.15	51.80	57.35	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
271	6.30	109.50	51.99	57.51	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
272	6.32	109.86	52.19	57.67	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
273	6.34	110.21	52.39	57.82	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
274	6.36	110.56	52.58	57.98	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
275	6.38	110.91	52.78	58.13	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
276	6.40	111.26	52.97	58.29	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
277	6.42	111.61	53.17	58.44	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
278	6.44	111.96	53.37	58.59	0.95	0.118	1.38	0.086	1.00	1.00	0.086	No
279	6.46	112.31	53.56	58.74	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
280	6.48	112.65	53.76	58.89	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
281	6.50	112.99	53.96	59.03	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
282	6.52	113.33	54.15	59.17	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
283	6.54	113.67	54.35	59.32	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
284	6.56	114.01	54.54	59.47	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
285	6.58	114.35	54.74	59.61	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
286	6.60	114.70	54.94	59.76	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
287	6.62	115.04	55.13	59.91	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
288	6.64	115.39	55.33	60.06	0.95	0.119	1.38	0.086	1.00	1.00	0.086	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	6.66	115.73	55.52	60.21	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
290	6.68	116.07	55.72	60.35	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
291	6.70	116.42	55.92	60.50	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
292	6.72	116.76	56.11	60.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
293	6.74	117.11	56.31	60.80	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
294	6.76	117.45	56.51	60.94	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
295	6.78	117.78	56.70	61.08	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
296	6.80	118.12	56.90	61.22	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
297	6.82	118.46	57.09	61.37	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
298	6.84	118.80	57.29	61.51	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
299	6.86	119.13	57.49	61.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
300	6.88	119.47	57.68	61.78	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
301	6.90	119.80	57.88	61.92	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
302	6.92	120.13	58.08	62.05	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
303	6.94	120.46	58.27	62.19	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
304	6.96	120.78	58.47	62.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
305	6.98	121.11	58.66	62.44	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
306	7.00	121.43	58.86	62.57	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
307	7.02	121.75	59.06	62.70	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
308	7.04	122.08	59.25	62.82	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
309	7.06	122.40	59.45	62.95	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
310	7.08	122.72	59.64	63.07	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
311	7.10	123.04	59.84	63.20	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
312	7.12	123.36	60.04	63.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
313	7.14	123.68	60.23	63.45	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
314	7.16	124.01	60.43	63.58	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
315	7.18	124.33	60.63	63.70	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
316	7.20	124.65	60.82	63.83	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
317	7.22	124.97	61.02	63.95	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
318	7.24	125.29	61.21	64.07	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
319	7.26	125.60	61.41	64.19	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
320	7.28	125.92	61.61	64.32	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
321	7.30	126.24	61.80	64.44	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
322	7.32	126.56	62.00	64.56	0.95	0.120	1.38	0.088	1.00	1.00	0.088	No
323	7.34	126.88	62.20	64.69	0.94	0.120	1.38	0.088	1.00	1.00	0.088	No
324	7.36	127.21	62.39	64.81	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
325	7.38	127.53	62.59	64.94	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
326	7.40	127.85	62.78	65.07	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
327	7.42	128.17	62.98	65.19	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
328	7.44	128.50	63.18	65.32	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
329	7.46	128.82	63.37	65.45	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
330	7.48	129.15	63.57	65.58	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
331	7.50	129.48	63.77	65.71	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
332	7.52	129.81	63.96	65.84	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
333	7.54	130.14	64.16	65.98	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
334	7.56	130.47	64.35	66.11	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
335	7.58	130.80	64.55	66.25	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
336	7.60	131.13	64.75	66.38	0.94	0.121	1.38	0.088	1.00	1.00	0.088	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	7.62	131.46	64.94	66.51	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
338	7.64	131.79	65.14	66.65	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
339	7.66	132.12	65.33	66.78	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
340	7.68	132.45	65.53	66.92	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
341	7.70	132.78	65.73	67.05	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
342	7.72	133.11	65.92	67.19	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
343	7.74	133.44	66.12	67.32	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
344	7.76	133.78	66.32	67.46	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
345	7.78	134.11	66.51	67.60	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
346	7.80	134.44	66.71	67.73	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
347	7.82	134.77	66.90	67.87	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
348	7.84	135.11	67.10	68.01	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
349	7.86	135.46	67.30	68.16	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
350	7.88	135.80	67.49	68.31	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
351	7.90	136.15	67.69	68.46	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
352	7.92	136.50	67.89	68.62	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
353	7.94	136.85	68.08	68.77	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
354	7.96	137.21	68.28	68.93	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
355	7.98	137.56	68.47	69.09	0.94	0.121	1.38	0.088	1.00	1.00	2.000	Yes
356	8.00	137.92	68.67	69.25	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
357	8.02	138.28	68.87	69.41	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
358	8.04	138.64	69.06	69.57	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
359	8.06	138.99	69.26	69.74	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
360	8.08	139.35	69.45	69.89	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
361	8.10	139.70	69.65	70.05	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
362	8.12	140.05	69.85	70.20	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
363	8.14	140.40	70.04	70.36	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
364	8.16	140.76	70.24	70.52	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
365	8.18	141.11	70.44	70.68	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
366	8.20	141.47	70.63	70.84	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
367	8.22	141.83	70.83	71.00	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
368	8.24	142.18	71.02	71.15	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
369	8.26	142.52	71.22	71.30	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
370	8.28	142.86	71.42	71.45	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
371	8.30	143.20	71.61	71.59	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
372	8.32	143.54	71.81	71.74	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
373	8.34	143.88	72.01	71.88	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
374	8.36	144.23	72.20	72.03	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
375	8.38	144.57	72.40	72.18	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
376	8.40	144.93	72.59	72.33	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
377	8.42	145.28	72.79	72.49	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
378	8.44	145.63	72.99	72.64	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
379	8.46	145.98	73.18	72.79	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
380	8.48	146.32	73.38	72.95	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
381	8.50	146.67	73.58	73.09	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
382	8.52	147.01	73.77	73.24	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
383	8.54	147.36	73.97	73.39	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
384	8.56	147.71	74.16	73.54	0.93	0.121	1.38	0.088	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	8.58	148.06	74.36	73.70	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
386	8.60	148.40	74.56	73.85	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
387	8.62	148.75	74.75	74.00	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
388	8.64	149.10	74.95	74.15	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
389	8.66	149.45	75.14	74.31	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
390	8.68	149.80	75.34	74.46	0.93	0.121	1.38	0.088	1.00	1.00	2.000	Yes
391	8.70	150.15	75.54	74.62	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
392	8.72	150.50	75.73	74.77	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
393	8.74	150.85	75.93	74.93	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
394	8.76	151.20	76.13	75.08	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
395	8.78	151.55	76.32	75.23	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
396	8.80	151.90	76.52	75.38	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
397	8.82	152.25	76.71	75.53	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
398	8.84	152.60	76.91	75.68	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
399	8.86	152.95	77.11	75.84	0.93	0.121	1.38	0.088	1.00	1.00	0.088	No
400	8.88	153.30	77.30	76.00	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
401	8.90	153.65	77.50	76.15	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
402	8.92	154.00	77.70	76.30	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
403	8.94	154.35	77.89	76.45	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
404	8.96	154.70	78.09	76.61	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
405	8.98	155.05	78.28	76.77	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
406	9.00	155.41	78.48	76.93	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
407	9.02	155.76	78.68	77.09	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
408	9.04	156.12	78.87	77.25	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
409	9.06	156.47	79.07	77.40	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
410	9.08	156.83	79.26	77.56	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
411	9.10	157.18	79.46	77.72	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
412	9.12	157.54	79.66	77.88	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
413	9.14	157.90	79.85	78.05	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
414	9.16	158.26	80.05	78.21	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
415	9.18	158.62	80.25	78.38	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
416	9.20	158.98	80.44	78.54	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
417	9.22	159.34	80.64	78.70	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
418	9.24	159.70	80.83	78.86	0.92	0.121	1.38	0.088	1.00	1.00	0.088	No
419	9.26	160.05	81.03	79.02	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
420	9.28	160.41	81.23	79.18	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
421	9.30	160.76	81.42	79.34	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
422	9.32	161.12	81.62	79.51	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
423	9.34	161.48	81.82	79.67	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
424	9.36	161.84	82.01	79.83	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
425	9.38	162.20	82.21	79.99	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
426	9.40	162.56	82.40	80.15	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
427	9.42	162.92	82.60	80.32	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
428	9.44	163.28	82.80	80.49	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
429	9.46	163.65	82.99	80.65	0.92	0.121	1.38	0.088	1.00	1.00	2.000	Yes
430	9.48	164.01	83.19	80.82	0.91	0.121	1.38	0.088	1.00	1.00	2.000	Yes
431	9.50	164.36	83.39	80.98	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
432	9.52	164.72	83.58	81.14	0.91	0.121	1.38	0.088	1.00	1.00	0.088	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	9.54	165.08	83.78	81.30	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
434	9.56	165.43	83.97	81.46	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
435	9.58	165.79	84.17	81.62	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
436	9.60	166.15	84.37	81.78	0.91	0.121	1.38	0.088	1.00	1.00	0.088	No
437	9.62	166.51	84.56	81.95	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
438	9.64	166.87	84.76	82.11	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
439	9.66	167.23	84.95	82.27	0.91	0.120	1.38	0.088	1.00	1.00	0.088	No
440	9.68	167.59	85.15	82.44	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
441	9.70	167.95	85.35	82.60	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
442	9.72	168.31	85.54	82.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
443	9.74	168.67	85.74	82.93	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
444	9.76	169.03	85.94	83.10	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
445	9.78	169.40	86.13	83.26	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
446	9.80	169.76	86.33	83.43	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
447	9.82	170.12	86.52	83.60	0.91	0.120	1.38	0.087	1.00	1.00	2.000	Yes
448	9.84	170.49	86.72	83.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
449	9.86	170.85	86.92	83.93	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
450	9.88	171.22	87.11	84.10	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
451	9.90	171.58	87.31	84.27	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
452	9.92	171.95	87.51	84.44	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
453	9.94	172.31	87.70	84.61	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
454	9.96	172.67	87.90	84.77	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
455	9.98	173.03	88.09	84.94	0.91	0.120	1.38	0.087	1.00	1.00	0.087	No
456	10.00	173.39	88.29	85.10	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
457	10.02	173.75	88.49	85.26	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
458	10.04	174.11	88.68	85.43	0.90	0.120	1.38	0.087	1.00	1.00	0.087	No
459	10.06	174.47	88.88	85.59	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
460	10.08	174.83	89.07	85.76	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
461	10.10	175.19	89.27	85.92	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
462	10.12	175.56	89.47	86.09	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
463	10.14	175.92	89.66	86.26	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
464	10.16	176.29	89.86	86.43	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
465	10.18	176.65	90.06	86.60	0.90	0.120	1.38	0.087	1.00	1.00	2.000	Yes
466	10.20	177.01	90.25	86.76	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
467	10.22	177.38	90.45	86.93	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
468	10.24	177.74	90.64	87.10	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
469	10.26	178.10	90.84	87.26	0.90	0.119	1.38	0.087	1.00	1.00	0.087	No
470	10.28	178.46	91.04	87.43	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
471	10.30	178.82	91.23	87.59	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
472	10.32	179.18	91.43	87.75	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
473	10.34	179.55	91.63	87.92	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
474	10.36	179.91	91.82	88.09	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
475	10.38	180.27	92.02	88.25	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
476	10.40	180.63	92.21	88.42	0.90	0.119	1.38	0.087	1.00	1.00	2.000	Yes
477	10.42	180.99	92.41	88.58	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
478	10.44	181.35	92.61	88.75	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
479	10.46	181.71	92.80	88.91	0.90	0.119	1.38	0.086	1.00	1.00	2.000	Yes
480	10.48	182.07	93.00	89.07	0.89	0.119	1.38	0.086	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	10.50	182.43	93.20	89.23	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
482	10.52	182.79	93.39	89.40	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
483	10.54	183.15	93.59	89.56	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
484	10.56	183.51	93.78	89.73	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
485	10.58	183.87	93.98	89.89	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
486	10.60	184.24	94.18	90.06	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
487	10.62	184.61	94.37	90.23	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
488	10.64	184.97	94.57	90.40	0.89	0.119	1.38	0.086	1.00	1.00	2.000	Yes
489	10.66	185.34	94.76	90.57	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
490	10.68	185.70	94.96	90.74	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
491	10.70	186.06	95.16	90.90	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
492	10.72	186.41	95.35	91.06	0.89	0.118	1.38	0.086	1.00	1.00	2.000	Yes
493	10.74	186.77	95.55	91.22	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
494	10.76	187.13	95.75	91.39	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
495	10.78	187.49	95.94	91.55	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
496	10.80	187.85	96.14	91.71	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
497	10.82	188.21	96.33	91.87	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
498	10.84	188.56	96.53	92.03	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
499	10.86	188.92	96.73	92.19	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
500	10.88	189.27	96.92	92.35	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
501	10.90	189.63	97.12	92.51	0.89	0.118	1.38	0.086	1.00	1.00	0.086	No
502	10.92	189.98	97.32	92.66	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
503	10.94	190.32	97.51	92.81	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
504	10.96	190.67	97.71	92.96	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
505	10.98	191.01	97.90	93.11	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
506	11.00	191.36	98.10	93.26	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
507	11.02	191.71	98.30	93.41	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
508	11.04	192.06	98.49	93.56	0.88	0.118	1.38	0.086	1.00	1.00	0.086	No
509	11.06	192.40	98.69	93.71	0.88	0.118	1.38	0.085	1.00	1.00	0.085	No
510	11.08	192.74	98.88	93.85	0.88	0.118	1.38	0.085	1.00	1.00	2.000	Yes
511	11.10	193.08	99.08	94.00	0.88	0.118	1.38	0.085	1.00	1.00	2.000	Yes
512	11.12	193.42	99.28	94.15	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
513	11.14	193.77	99.47	94.30	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
514	11.16	194.12	99.67	94.45	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
515	11.18	194.47	99.87	94.60	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
516	11.20	194.82	100.06	94.76	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
517	11.22	195.18	100.26	94.92	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
518	11.24	195.53	100.45	95.08	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
519	11.26	195.89	100.65	95.24	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
520	11.28	196.25	100.85	95.40	0.88	0.117	1.38	0.085	1.00	1.00	0.085	No
521	11.30	196.61	101.04	95.57	0.88	0.117	1.38	0.085	1.00	1.00	2.000	Yes
522	11.32	196.97	101.24	95.73	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
523	11.34	197.33	101.44	95.89	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
524	11.36	197.69	101.63	96.06	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
525	11.38	198.05	101.83	96.22	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
526	11.40	198.41	102.02	96.39	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
527	11.42	198.77	102.22	96.55	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
528	11.44	199.12	102.42	96.71	0.87	0.117	1.38	0.085	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	11.46	199.48	102.61	96.87	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
530	11.48	199.83	102.81	97.02	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
531	11.50	200.18	103.01	97.17	0.87	0.117	1.38	0.085	1.00	1.00	2.000	Yes
532	11.52	200.53	103.20	97.33	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
533	11.54	200.87	103.40	97.48	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
534	11.56	201.22	103.59	97.63	0.87	0.116	1.38	0.085	1.00	1.00	2.000	Yes
535	11.58	201.58	103.79	97.79	0.87	0.116	1.38	0.085	1.00	1.00	0.085	No
536	11.60	201.93	103.99	97.94	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
537	11.62	202.28	104.18	98.10	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
538	11.64	202.63	104.38	98.25	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
539	11.66	202.97	104.57	98.40	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
540	11.68	203.32	104.77	98.55	0.87	0.116	1.38	0.084	1.00	1.00	0.084	No
541	11.70	203.67	104.97	98.70	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
542	11.72	204.01	105.16	98.85	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
543	11.74	204.36	105.36	99.00	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
544	11.76	204.70	105.56	99.15	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
545	11.78	205.04	105.75	99.29	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
546	11.80	205.39	105.95	99.44	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
547	11.82	205.72	106.14	99.58	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
548	11.84	206.06	106.34	99.72	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
549	11.86	206.40	106.54	99.87	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
550	11.88	206.74	106.73	100.01	0.86	0.116	1.38	0.084	1.00	1.00	0.084	No
551	11.90	207.08	106.93	100.15	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
552	11.92	207.41	107.13	100.29	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
553	11.94	207.75	107.32	100.42	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
554	11.96	208.08	107.52	100.56	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
555	11.98	208.42	107.71	100.70	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
556	12.00	208.75	107.91	100.84	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
557	12.02	209.09	108.11	100.98	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
558	12.04	209.43	108.30	101.12	0.86	0.115	1.38	0.084	1.00	1.00	0.084	No
559	12.06	209.76	108.50	101.27	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
560	12.08	210.10	108.69	101.41	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
561	12.10	210.44	108.89	101.55	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
562	12.12	210.79	109.09	101.70	0.85	0.115	1.38	0.084	1.00	1.00	0.084	No
563	12.14	211.13	109.28	101.85	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
564	12.16	211.48	109.48	102.00	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
565	12.18	211.83	109.68	102.15	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
566	12.20	212.18	109.87	102.30	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
567	12.22	212.52	110.07	102.46	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
568	12.24	212.87	110.26	102.60	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
569	12.26	213.20	110.46	102.74	0.85	0.115	1.38	0.083	1.00	1.00	0.083	No
570	12.28	213.54	110.66	102.88	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
571	12.30	213.88	110.85	103.03	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
572	12.32	214.22	111.05	103.17	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
573	12.34	214.57	111.25	103.32	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
574	12.36	214.91	111.44	103.47	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
575	12.38	215.25	111.64	103.61	0.85	0.114	1.38	0.083	1.00	1.00	0.083	No
576	12.40	215.59	111.83	103.76	0.84	0.114	1.38	0.083	1.00	1.00	0.083	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	12.42	215.93	112.03	103.90	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
578	12.44	216.27	112.23	104.04	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
579	12.46	216.60	112.42	104.17	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
580	12.48	216.93	112.62	104.31	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
581	12.50	217.26	112.82	104.44	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
582	12.52	217.59	113.01	104.57	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
583	12.54	217.91	113.21	104.71	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
584	12.56	218.24	113.40	104.84	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
585	12.58	218.57	113.60	104.97	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
586	12.60	218.90	113.80	105.11	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
587	12.62	219.23	113.99	105.24	0.84	0.114	1.38	0.083	1.00	1.00	0.083	No
588	12.64	219.56	114.19	105.37	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
589	12.66	219.89	114.38	105.50	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
590	12.68	220.22	114.58	105.64	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
591	12.70	220.55	114.78	105.77	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
592	12.72	220.88	114.97	105.91	0.84	0.113	1.38	0.082	1.00	1.00	0.082	No
593	12.74	221.21	115.17	106.04	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
594	12.76	221.54	115.37	106.18	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
595	12.78	221.87	115.56	106.31	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
596	12.80	222.20	115.76	106.44	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
597	12.82	222.53	115.95	106.58	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
598	12.84	222.86	116.15	106.71	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
599	12.86	223.19	116.35	106.84	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
600	12.88	223.52	116.54	106.98	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
601	12.90	223.85	116.74	107.11	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
602	12.92	224.18	116.94	107.24	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
603	12.94	224.50	117.13	107.37	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
604	12.96	224.83	117.33	107.51	0.83	0.113	1.38	0.082	1.00	1.00	0.082	No
605	12.98	225.16	117.52	107.64	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
606	13.00	225.49	117.72	107.77	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
607	13.02	225.82	117.92	107.90	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
608	13.04	226.15	118.11	108.04	0.83	0.112	1.38	0.082	1.00	1.00	0.082	No
609	13.06	226.48	118.31	108.17	0.82	0.112	1.38	0.082	1.00	1.00	0.082	No
610	13.08	226.81	118.50	108.30	0.82	0.112	1.38	0.082	1.00	1.00	0.082	No
611	13.10	227.14	118.70	108.44	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
612	13.12	227.47	118.90	108.57	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
613	13.14	227.80	119.09	108.70	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
614	13.16	228.13	119.29	108.84	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
615	13.18	228.46	119.49	108.97	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
616	13.20	228.79	119.68	109.11	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
617	13.22	229.12	119.88	109.25	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
618	13.24	229.46	120.07	109.38	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
619	13.26	229.80	120.27	109.52	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
620	13.28	230.13	120.47	109.67	0.82	0.112	1.38	0.081	1.00	1.00	0.081	No
621	13.30	230.47	120.66	109.81	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
622	13.32	230.81	120.86	109.95	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
623	13.34	231.15	121.06	110.09	0.82	0.111	1.38	0.081	1.00	1.00	0.081	No
624	13.36	231.49	121.25	110.24	0.82	0.111	1.38	0.081	1.00	1.00	0.081	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	13.38	231.84	121.45	110.40	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
626	13.40	232.20	121.64	110.56	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
627	13.42	232.57	121.84	110.73	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
628	13.44	232.95	122.04	110.91	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
629	13.46	233.32	122.23	111.09	0.81	0.111	1.38	0.081	1.00	1.00	0.081	No
630	13.48	233.71	122.43	111.28	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
631	13.50	234.09	122.63	111.47	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
632	13.52	234.48	122.82	111.66	0.81	0.111	1.38	0.080	1.00	1.00	0.080	No
633	13.54	234.87	123.02	111.85	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
634	13.56	235.25	123.21	112.04	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
635	13.58	235.64	123.41	112.23	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
636	13.60	236.03	123.61	112.42	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
637	13.62	236.42	123.80	112.62	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
638	13.64	236.82	124.00	112.82	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
639	13.66	237.22	124.19	113.03	0.81	0.110	1.38	0.080	1.00	1.00	0.080	No
640	13.68	237.62	124.39	113.23	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
641	13.70	238.03	124.59	113.44	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
642	13.72	238.43	124.78	113.64	0.80	0.110	1.38	0.080	1.00	1.00	0.080	No
643	13.74	238.82	124.98	113.85	0.80	0.109	1.38	0.080	1.00	1.00	0.080	No
644	13.76	239.22	125.18	114.05	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
645	13.78	239.62	125.37	114.25	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
646	13.80	240.02	125.57	114.45	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
647	13.82	240.42	125.76	114.65	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
648	13.84	240.82	125.96	114.86	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
649	13.86	241.22	126.16	115.06	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
650	13.88	241.62	126.35	115.27	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
651	13.90	242.01	126.55	115.46	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
652	13.92	242.41	126.75	115.66	0.80	0.109	1.38	0.079	1.00	1.00	0.079	No
653	13.94	242.80	126.94	115.86	0.80	0.108	1.38	0.079	1.00	1.00	0.079	No
654	13.96	243.20	127.14	116.06	0.80	0.108	1.38	0.079	1.00	1.00	0.079	No
655	13.98	243.60	127.33	116.27	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
656	14.00	244.00	127.53	116.47	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
657	14.02	244.41	127.73	116.68	0.79	0.108	1.38	0.079	1.00	1.00	0.079	No
658	14.04	244.81	127.92	116.89	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
659	14.06	245.22	128.12	117.11	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
660	14.08	245.64	128.31	117.33	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
661	14.10	246.06	128.51	117.55	0.79	0.108	1.38	0.078	1.00	1.00	0.078	No
662	14.12	246.49	128.71	117.78	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
663	14.14	246.92	128.90	118.02	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
664	14.16	247.35	129.10	118.25	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
665	14.18	247.78	129.30	118.49	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
666	14.20	248.21	129.49	118.72	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
667	14.22	248.65	129.69	118.96	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
668	14.24	249.08	129.88	119.19	0.79	0.107	1.38	0.078	1.00	1.00	0.078	No
669	14.26	249.51	130.08	119.43	0.79	0.107	1.38	0.078	1.00	1.00	0.078	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	0.90	0.20	3.52	5.98	1.00	3.73	22.06	82.29	4.000	No	Yes	2.00
2	0.92	0.25	3.47	6.42	1.00	4.57	20.15	92.03	4.000	No	Yes	2.00
3	0.94	0.27	3.43	6.43	1.00	5.00	19.10	95.55	4.000	No	Yes	2.00
4	0.96	0.30	3.39	6.21	1.00	5.59	17.61	98.38	4.000	No	Yes	2.00
5	0.98	0.29	3.37	5.63	1.00	5.40	17.21	92.99	4.000	No	Yes	2.00
6	1.00	0.52	3.00	3.08	1.00	10.04	8.81	88.51	4.000	No	Yes	2.00
7	1.02	1.05	2.62	1.83	0.86	20.47	6.12	125.21	4.000	Yes	No	2.00
8	1.04	1.69	2.38	1.37	0.76	33.12	2.25	74.64	4.000	Yes	No	2.00
9	1.06	2.23	2.25	1.22	0.71	43.77	1.75	76.46	4.000	Yes	No	2.00
10	1.08	2.56	2.18	1.14	0.69	50.17	1.57	78.80	4.000	Yes	No	2.00
11	1.10	2.75	2.16	1.17	0.68	53.97	1.53	82.54	4.000	Yes	No	2.00
12	1.12	2.78	2.19	1.33	0.69	54.56	1.59	87.02	4.000	Yes	No	2.00
13	1.14	2.62	2.28	1.69	0.73	51.27	1.85	94.69	4.000	Yes	No	2.00
14	1.16	2.42	2.37	2.11	0.76	47.34	2.21	104.73	4.000	Yes	No	2.00
15	1.18	2.27	2.44	2.51	0.79	44.41	2.59	114.91	4.000	Yes	No	2.00
16	1.20	2.18	2.48	2.80	0.80	42.75	2.86	122.35	4.000	Yes	No	2.00
17	1.22	2.10	2.53	3.11	0.82	41.13	3.32	136.53	4.000	Yes	No	2.00
18	1.24	1.98	2.57	3.36	0.84	38.75	4.36	168.99	4.000	Yes	No	2.00
19	1.26	1.90	2.59	3.42	0.84	37.21	4.92	183.12	0.651	No	No	2.00
20	1.28	1.88	2.57	3.24	0.84	36.64	4.60	168.42	0.524	No	No	2.00
21	1.30	1.86	2.57	3.11	0.84	36.33	4.31	156.60	0.437	No	No	2.00
22	1.32	1.88	2.55	2.94	0.83	36.74	3.80	139.61	0.333	No	No	2.00
23	1.34	1.94	2.52	2.81	0.82	37.94	3.24	123.06	0.253	No	No	2.00
24	1.36	2.05	2.50	2.79	0.81	40.12	2.83	113.44	0.216	No	No	2.00
25	1.38	2.13	2.50	2.93	0.81	41.53	2.89	120.17	0.241	No	No	2.00
26	1.40	2.15	2.53	3.21	0.82	41.92	3.40	142.58	0.350	No	No	2.00
27	1.42	2.05	2.59	3.71	0.84	40.01	4.96	198.55	0.808	No	No	2.00
28	1.44	2.03	2.62	4.05	0.86	39.63	6.00	237.85	3.600	No	No	2.00
29	1.46	2.02	2.64	4.30	0.86	39.39	6.81	268.11	3.600	No	No	2.00
30	1.48	2.04	2.63	4.29	0.86	39.86	6.63	264.31	3.600	No	No	2.00
31	1.50	2.00	2.64	4.37	0.87	39.01	7.18	279.99	3.600	No	No	2.00
32	1.52	1.97	2.64	4.25	0.87	38.50	6.98	268.57	3.600	No	No	2.00
33	1.54	1.93	2.64	4.16	0.87	37.64	7.01	263.73	3.600	No	No	2.00
34	1.56	1.86	2.65	4.06	0.87	36.17	7.22	261.15	3.600	No	No	2.00
35	1.58	1.77	2.67	4.23	0.88	34.40	8.62	296.42	3.600	No	No	2.00
36	1.60	1.77	2.67	4.22	0.88	34.44	8.58	295.38	3.600	No	No	2.00
37	1.62	1.85	2.65	4.16	0.87	35.93	7.67	275.61	3.600	No	No	2.00
38	1.64	1.99	2.61	3.93	0.86	38.77	5.91	228.93	3.600	No	No	2.00
39	1.66	2.10	2.58	3.76	0.84	40.98	4.85	198.61	0.809	No	No	2.00
40	1.68	2.18	2.56	3.64	0.84	42.56	4.22	179.41	0.617	No	No	2.00
41	1.70	2.23	2.54	3.51	0.83	43.47	3.75	162.80	0.481	No	No	2.00
42	1.72	2.33	2.52	3.45	0.82	45.42	3.31	150.19	0.395	No	No	2.00
43	1.74	2.35	2.52	3.46	0.82	45.82	3.28	150.23	0.395	No	No	2.00
44	1.76	2.29	2.55	3.66	0.83	44.64	3.86	172.20	0.555	No	No	2.00
45	1.78	2.14	2.60	3.98	0.85	41.57	5.26	218.83	4.000	No	No	2.00
46	1.80	2.01	2.64	4.32	0.87	39.08	6.99	273.14	3.600	No	No	2.00
47	1.82	1.90	2.68	4.69	0.88	36.89	9.17	338.25	3.600	No	No	2.00
48	1.84	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	1.86	1.70	2.75	5.16	0.91	33.02	5.21	172.15	1.575	No	Yes	2.00
50	1.88	1.64	2.77	5.35	0.92	31.67	5.49	173.99	1.511	No	Yes	2.00
51	1.90	1.57	2.79	5.55	0.93	30.42	5.78	175.74	1.451	No	Yes	2.00
52	1.92	1.50	2.82	5.75	0.94	29.04	6.09	176.97	1.385	No	Yes	2.00
53	1.94	1.40	2.85	5.99	0.95	27.04	6.55	177.11	1.290	No	Yes	2.00
54	1.96	1.31	2.89	6.30	0.96	25.30	7.05	178.41	1.207	No	Yes	2.00
55	1.98	1.24	2.93	6.70	0.98	23.92	7.59	181.49	1.141	No	Yes	2.00
56	2.00	1.17	2.97	7.22	0.99	22.46	8.25	185.35	1.072	No	Yes	2.00
57	2.02	1.13	2.99	7.55	1.00	21.59	8.68	187.36	1.030	No	Yes	2.00
58	2.04	1.12	3.00	7.66	1.00	21.43	8.79	188.42	1.022	No	Yes	2.00
59	2.06	1.13	3.00	7.80	1.00	21.59	8.85	191.04	1.030	No	Yes	2.00
60	2.08	1.09	3.02	8.02	1.00	20.84	9.19	191.42	0.994	No	Yes	2.00
61	2.10	1.03	3.05	8.14	1.00	19.59	9.61	188.22	0.935	No	Yes	2.00
62	2.12	0.99	3.04	7.75	1.00	18.85	9.56	180.11	0.899	No	Yes	2.00
63	2.14	1.00	3.02	7.13	1.00	18.98	9.07	172.23	0.905	No	Yes	2.00
64	2.16	1.03	2.98	6.42	1.00	19.55	8.39	164.00	4.000	Yes	Yes	2.00
65	2.18	1.09	2.91	5.42	0.97	20.89	7.28	152.16	4.000	Yes	Yes	2.00
66	2.20	1.24	2.80	4.30	0.93	23.65	5.83	137.92	4.000	Yes	Yes	2.00
67	2.22	1.47	2.67	3.31	0.88	28.20	8.22	231.71	4.000	Yes	No	2.00
68	2.24	1.81	2.52	2.57	0.82	34.96	3.27	114.33	4.000	Yes	No	2.00
69	2.26	2.08	2.44	2.27	0.79	40.40	2.60	104.91	4.000	Yes	No	2.00
70	2.28	2.25	2.41	2.25	0.78	43.61	2.45	106.65	4.000	Yes	No	2.00
71	2.30	2.22	2.46	2.60	0.80	43.12	2.71	116.75	4.000	Yes	No	2.00
72	2.32	2.12	2.52	3.08	0.82	41.12	3.27	134.32	4.000	Yes	No	2.00
73	2.34	2.04	2.57	3.47	0.84	39.40	4.51	177.53	4.000	Yes	No	2.00
74	2.36	1.81	2.67	4.27	0.88	35.03	8.49	297.39	4.000	Yes	No	2.00
75	2.38	1.59	2.78	5.32	0.92	30.54	5.60	171.11	4.000	Yes	Yes	2.00
76	2.40	1.34	2.90	6.58	0.97	25.65	7.18	184.23	4.000	Yes	Yes	2.00
77	2.42	1.28	2.91	6.55	0.97	24.54	7.36	180.75	1.171	No	Yes	2.00
78	2.44	1.34	2.86	5.83	0.95	25.71	6.65	170.98	1.226	No	Yes	2.00
79	2.46	1.35	2.85	5.61	0.95	25.80	6.48	167.23	1.230	No	Yes	2.00
80	2.48	1.30	2.87	5.70	0.96	24.82	6.71	166.65	1.184	No	Yes	2.00
81	2.50	1.18	2.91	5.92	0.97	22.42	7.33	164.43	1.069	No	Yes	2.00
82	2.52	1.11	2.92	5.72	0.98	21.08	7.48	157.65	4.000	Yes	Yes	2.00
83	2.54	1.10	2.90	5.22	0.97	20.83	7.14	148.63	4.000	Yes	Yes	2.00
84	2.56	1.30	2.76	4.02	0.92	24.79	5.41	134.20	4.000	Yes	Yes	2.00
85	2.58	2.64	2.31	1.87	0.74	51.20	1.96	100.16	4.000	Yes	No	2.00
86	2.60	4.69	1.96	1.09	0.61	91.71	1.28	117.25	4.000	Yes	No	2.00
87	2.62	7.72	1.70	0.74	0.51	145.44	1.00	145.44	4.000	Yes	No	2.00
88	2.64	10.30	1.56	0.58	0.46	180.63	1.00	180.63	0.628	No	No	2.00
89	2.66	12.56	1.45	0.47	0.42	208.69	1.00	208.69	4.000	No	No	2.00
90	2.68	14.22	1.37	0.38	0.39	226.99	1.00	226.99	4.000	No	No	2.00
91	2.70	15.52	1.33	0.36	0.37	242.36	1.00	242.36	4.000	No	No	2.00
92	2.72	16.71	1.31	0.35	0.36	257.41	1.00	257.41	4.000	No	No	2.00
93	2.74	17.67	1.29	0.35	0.36	269.64	1.00	269.64	4.000	No	No	2.00
94	2.76	18.65	1.28	0.36	0.35	282.10	1.00	282.10	4.000	No	No	2.00
95	2.78	19.61	1.27	0.36	0.35	294.71	1.00	294.71	4.000	No	No	2.00
96	2.80	20.67	1.26	0.37	0.34	309.06	1.00	309.06	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	2.82	21.55	1.26	0.39	0.34	321.53	1.00	321.53	4.000	No	No	2.00
98	2.84	22.23	1.26	0.41	0.35	331.49	1.00	331.49	4.000	No	No	2.00
99	2.86	22.45	1.28	0.44	0.35	336.68	1.00	336.68	4.000	No	No	2.00
100	2.88	22.55	1.29	0.46	0.36	339.20	1.00	339.20	4.000	No	No	2.00
101	2.90	22.52	1.31	0.49	0.36	340.36	1.00	340.36	4.000	No	No	2.00
102	2.92	21.28	1.36	0.57	0.38	329.18	1.00	329.18	4.000	No	No	2.00
103	2.94	21.05	1.37	0.57	0.39	325.67	1.00	325.67	4.000	No	No	2.00
104	2.96	20.93	1.37	0.56	0.39	322.69	1.00	322.69	4.000	No	No	2.00
105	2.98	22.09	1.31	0.47	0.36	331.00	1.00	331.00	4.000	No	No	2.00
106	3.00	22.14	1.31	0.48	0.36	331.75	1.00	331.75	4.000	No	No	2.00
107	3.02	21.80	1.32	0.50	0.37	327.73	1.00	327.73	4.000	No	No	2.00
108	3.04	21.20	1.34	0.52	0.38	320.69	1.00	320.69	4.000	No	No	2.00
109	3.06	20.43	1.36	0.54	0.38	310.94	1.00	310.94	4.000	No	No	2.00
110	3.08	19.71	1.38	0.56	0.39	301.85	1.00	301.85	4.000	No	No	2.00
111	3.10	18.90	1.41	0.58	0.40	291.65	1.00	291.65	4.000	No	No	2.00
112	3.12	17.99	1.43	0.60	0.41	279.75	1.00	279.75	4.000	No	No	2.00
113	3.14	16.29	1.48	0.64	0.43	257.74	1.00	257.74	4.000	No	No	2.00
114	3.16	14.18	1.54	0.72	0.45	230.25	1.00	230.25	4.000	No	No	2.00
115	3.18	11.67	1.64	0.85	0.49	196.83	1.00	196.83	0.789	No	No	2.00
116	3.20	9.54	1.75	1.04	0.54	167.90	1.09	183.40	4.000	Yes	No	2.00
117	3.22	7.59	1.88	1.33	0.59	140.61	1.23	172.45	4.000	Yes	No	2.00
118	3.24	6.06	2.02	1.76	0.64	118.21	1.33	157.06	4.000	Yes	No	2.00
119	3.26	4.78	2.19	2.40	0.70	93.26	1.60	149.01	4.000	Yes	No	2.00
120	3.28	3.95	2.34	3.16	0.76	76.92	2.08	159.79	4.000	Yes	No	2.00
121	3.30	3.40	2.45	3.89	0.80	65.97	2.65	175.07	4.000	Yes	No	2.00
122	3.32	3.16	2.50	4.28	0.82	61.19	2.85	174.25	4.000	Yes	No	2.00
123	3.34	2.90	2.56	4.72	0.84	56.09	4.15	232.84	4.000	Yes	No	2.00
124	3.36	2.63	2.62	5.27	0.87	50.74	6.31	320.40	4.000	Yes	No	2.00
125	3.38	2.42	2.68	5.76	0.89	46.66	8.82	411.52	4.000	Yes	No	2.00
126	3.40	2.29	2.70	5.87	0.90	44.10	10.15	447.50	4.000	Yes	No	2.00
127	3.42	2.21	2.70	5.59	0.89	42.47	9.88	419.84	3.600	No	No	2.00
128	3.44	2.15	2.66	4.81	0.88	41.33	7.72	319.24	3.600	No	No	2.00
129	3.46	2.10	2.61	4.02	0.86	40.24	5.73	230.71	3.600	No	No	2.00
130	3.48	2.05	2.56	3.34	0.84	39.22	4.21	165.00	0.498	No	No	2.00
131	3.50	2.02	2.54	3.00	0.83	38.59	3.56	137.25	0.320	No	No	2.00
132	3.52	2.00	2.51	2.76	0.83	38.27	3.08	117.95	0.233	No	No	2.00
133	3.54	1.98	2.50	2.61	0.82	37.92	2.81	106.72	0.193	No	No	2.00
134	3.56	1.93	2.51	2.61	0.82	36.85	3.00	110.61	0.206	No	No	2.00
135	3.58	1.84	2.54	2.73	0.84	35.11	3.63	127.32	0.272	No	No	2.00
136	3.60	1.80	2.56	2.87	0.84	34.36	4.19	144.10	0.358	No	No	2.00
137	3.62	1.80	2.57	3.00	0.85	34.26	4.56	156.16	0.434	No	No	2.00
138	3.64	1.79	2.59	3.11	0.85	34.12	4.94	168.61	0.526	No	No	2.00
139	3.66	1.75	2.61	3.25	0.86	33.29	5.62	187.11	0.620	No	No	2.00
140	3.68	1.69	2.63	3.41	0.87	32.14	6.62	212.86	3.600	No	No	2.00
141	3.70	1.68	2.64	3.48	0.88	31.79	7.02	223.28	3.600	No	No	2.00
142	3.72	1.68	2.64	3.47	0.87	31.94	6.92	220.92	3.600	No	No	2.00
143	3.74	1.66	2.65	3.50	0.88	31.45	7.28	229.08	3.600	No	No	2.00
144	3.76	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	3.78	1.42	2.74	3.99	0.91	26.64	5.12	136.39	1.271	No	Yes	2.00
146	3.80	1.31	2.78	4.24	0.93	24.48	5.64	138.02	1.168	No	Yes	2.00
147	3.82	1.26	2.80	4.34	0.94	23.56	5.88	138.52	4.000	Yes	Yes	2.00
148	3.84	1.45	2.71	3.73	0.90	27.25	4.82	131.46	4.000	Yes	Yes	2.00
149	3.86	2.05	2.49	2.61	0.82	39.06	2.92	114.06	4.000	Yes	No	2.00
150	3.88	2.74	2.31	1.97	0.75	52.78	1.98	104.25	4.000	Yes	No	2.00
151	3.90	3.21	2.23	1.76	0.72	60.81	1.70	103.68	4.000	Yes	No	2.00
152	3.92	3.19	2.26	1.93	0.73	60.71	1.79	108.51	4.000	Yes	No	2.00
153	3.94	2.92	2.33	2.22	0.76	56.35	2.03	114.25	4.000	Yes	No	2.00
154	3.96	2.53	2.43	2.70	0.80	48.52	2.54	123.31	4.000	Yes	No	2.00
155	3.98	2.10	2.55	3.24	0.84	40.11	3.79	152.10	4.000	Yes	No	2.00
156	4.00	1.68	2.69	4.15	0.90	31.76	9.76	309.82	4.000	Yes	No	2.00
157	4.02	1.35	2.85	5.44	0.95	25.23	6.45	162.84	4.000	Yes	Yes	2.00
158	4.04	1.10	3.00	7.23	1.00	20.35	8.77	178.48	4.000	Yes	Yes	2.00
159	4.06	0.98	3.09	8.57	1.00	17.96	10.41	186.96	0.857	No	Yes	2.00
160	4.08	0.92	3.14	9.33	1.00	16.66	11.39	189.85	0.795	No	Yes	2.00
161	4.10	0.88	3.16	9.47	1.00	15.86	11.81	187.37	0.757	No	Yes	2.00
162	4.12	0.82	3.19	9.61	1.00	14.73	12.41	182.86	0.703	No	Yes	2.00
163	4.14	0.69	3.24	9.43	1.00	12.22	13.66	166.83	0.583	No	Yes	2.00
164	4.16	0.67	3.21	8.06	1.00	11.73	12.89	151.18	0.559	No	Yes	2.00
165	4.18	0.68	3.14	6.41	1.00	11.91	11.36	135.27	0.568	No	Yes	2.00
166	4.20	0.80	3.02	5.22	1.00	14.32	9.09	130.26	0.683	No	Yes	2.00
167	4.22	0.89	2.93	4.33	0.99	16.06	7.62	122.38	0.766	No	Yes	2.00
168	4.24	1.05	2.80	3.36	0.94	19.30	5.81	112.19	0.921	No	Yes	2.00
169	4.26	1.22	2.70	2.82	0.90	22.64	9.90	224.15	3.600	No	No	2.00
170	4.28	1.35	2.64	2.65	0.88	25.18	7.09	178.56	0.549	No	No	2.00
171	4.30	1.39	2.65	2.82	0.88	25.92	7.38	191.41	0.659	No	No	2.00
172	4.32	1.39	2.67	3.01	0.89	25.95	8.26	214.40	3.600	No	No	2.00
173	4.34	1.38	2.68	3.16	0.89	25.75	9.13	235.26	3.600	No	No	2.00
174	4.36	1.39	2.68	3.21	0.89	25.98	9.24	239.98	3.600	No	No	2.00
175	4.38	1.42	2.67	3.18	0.89	26.58	8.67	230.31	3.600	No	No	2.00
176	4.40	1.47	2.66	3.11	0.88	27.43	7.79	213.69	3.600	No	No	2.00
177	4.42	1.50	2.64	3.01	0.88	28.06	7.00	196.39	0.706	No	No	2.00
178	4.44	1.51	2.63	2.89	0.87	28.23	6.46	182.48	0.581	No	No	2.00
179	4.46	1.50	2.61	2.74	0.87	28.04	5.94	166.66	0.459	No	No	2.00
180	4.48	1.49	2.59	2.53	0.86	27.88	5.22	145.50	0.366	No	No	2.00
181	4.50	1.49	2.57	2.34	0.85	27.85	4.58	127.44	0.272	No	No	2.00
182	4.52	1.49	2.56	2.20	0.85	27.83	4.13	114.97	0.221	No	No	2.00
183	4.54	1.48	2.56	2.19	0.85	27.52	4.18	115.10	0.222	No	No	2.00
184	4.56	1.45	2.57	2.21	0.85	27.04	4.42	119.63	0.239	No	No	2.00
185	4.58	1.42	2.58	2.26	0.86	26.50	4.82	127.82	0.274	No	No	2.00
186	4.60	1.40	2.59	2.29	0.86	26.05	5.12	133.35	0.301	No	No	2.00
187	4.62	1.39	2.60	2.31	0.86	25.75	5.31	136.84	0.318	No	No	2.00
188	4.64	1.38	2.60	2.29	0.86	25.56	5.35	136.88	0.319	No	No	2.00
189	4.66	1.39	2.59	2.25	0.86	25.64	5.14	131.79	0.293	No	No	2.00
190	4.68	1.41	2.58	2.17	0.86	25.92	4.72	122.41	0.251	No	No	2.00
191	4.70	1.44	2.56	2.08	0.85	26.27	4.28	112.39	0.212	No	No	2.00
192	4.72	1.46	2.55	2.01	0.85	26.39	3.98	104.93	0.187	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	4.74	1.46	2.55	1.97	0.84	26.33	3.86	101.53	0.177	No	No	2.00
194	4.76	1.46	2.55	1.94	0.84	26.22	3.80	99.73	0.172	No	No	2.00
195	4.78	1.45	2.55	1.96	0.85	26.13	3.92	102.30	0.180	No	No	2.00
196	4.80	1.44	2.56	2.03	0.85	25.94	4.20	108.84	0.200	No	No	2.00
197	4.82	1.43	2.57	2.11	0.85	25.72	4.58	117.89	0.232	No	No	2.00
198	4.84	1.43	2.58	2.19	0.86	25.75	4.85	124.86	0.261	No	No	2.00
199	4.86	1.46	2.58	2.24	0.86	26.19	4.86	127.28	0.272	No	No	2.00
200	4.88	1.50	2.58	2.27	0.86	26.85	4.71	126.56	0.269	No	No	2.00
201	4.90	1.53	2.57	2.29	0.85	27.33	4.58	125.30	0.263	No	No	2.00
202	4.92	1.55	2.57	2.27	0.85	27.49	4.48	123.27	0.254	No	No	2.00
203	4.94	1.54	2.58	2.33	0.86	27.44	4.71	129.13	0.280	No	No	2.00
204	4.96	1.54	2.59	2.40	0.86	27.36	4.99	136.50	0.317	No	No	2.00
205	4.98	1.54	2.59	2.47	0.86	27.40	5.20	142.60	0.350	No	No	2.00
206	5.00	1.54	2.60	2.47	0.86	27.33	5.26	143.74	0.356	No	No	2.00
207	5.02	1.54	2.60	2.50	0.87	27.13	5.43	147.36	0.340	No	No	2.00
208	5.04	1.52	2.61	2.52	0.87	26.78	5.69	152.32	0.368	No	No	2.00
209	5.06	1.51	2.61	2.50	0.87	26.63	5.68	151.28	0.362	No	No	2.00
210	5.08	1.52	2.60	2.43	0.87	26.67	5.38	143.50	0.355	No	No	2.00
211	5.10	1.55	2.59	2.34	0.86	26.97	4.91	132.46	0.296	No	No	2.00
212	5.12	1.60	2.56	2.23	0.85	27.62	4.28	118.20	0.234	No	No	2.00
213	5.14	1.66	2.54	2.13	0.84	28.43	3.70	105.28	0.189	No	No	2.00
214	5.16	1.71	2.52	2.07	0.84	29.20	3.31	96.61	0.164	No	No	1.97
215	5.18	1.75	2.51	2.03	0.83	29.66	3.09	91.70	0.152	No	No	1.82
216	5.20	1.77	2.51	2.00	0.83	29.96	2.94	88.23	0.144	No	No	1.73
217	5.22	1.79	2.50	1.96	0.83	30.12	2.81	84.68	0.136	No	No	1.64
218	5.24	1.78	2.50	1.96	0.83	29.91	2.86	85.60	0.138	No	No	1.66
219	5.26	1.75	2.51	2.00	0.83	29.48	3.07	90.40	0.149	No	No	1.78
220	5.28	1.71	2.53	2.09	0.84	28.77	3.50	100.71	0.175	No	No	2.00
221	5.30	1.66	2.56	2.25	0.85	28.05	4.21	117.96	0.233	No	No	2.00
222	5.32	1.60	2.60	2.45	0.86	27.14	5.25	142.51	0.349	No	No	2.00
223	5.34	1.54	2.63	2.67	0.88	26.21	6.58	172.41	0.501	No	No	2.00
224	5.36	1.55	2.63	2.66	0.88	26.26	6.51	170.83	0.489	No	No	2.00
225	5.38	1.54	2.63	2.65	0.88	26.15	6.52	170.62	0.488	No	No	2.00
226	5.40	1.53	2.63	2.61	0.88	25.78	6.58	169.56	0.480	No	No	2.00
227	5.42	1.44	2.66	2.75	0.89	24.32	8.15	198.18	0.724	No	No	2.00
228	5.44	1.37	2.69	2.84	0.90	23.15	9.52	220.36	3.600	No	No	2.00
229	5.46	1.31	2.71	2.89	0.91	22.19	4.79	106.34	1.058	No	Yes	2.00
230	5.48	1.27	2.72	2.89	0.91	21.44	4.92	105.46	1.023	No	Yes	2.00
231	5.50	1.24	2.73	2.85	0.92	20.80	5.00	103.96	0.992	No	Yes	2.00
232	5.52	1.21	2.73	2.81	0.92	20.32	5.04	102.43	0.969	No	Yes	2.00
233	5.54	1.18	2.74	2.83	0.92	19.74	5.18	102.24	0.942	No	Yes	2.00
234	5.56	1.14	2.76	2.92	0.93	19.00	5.42	102.97	0.906	No	Yes	2.00
235	5.58	1.09	2.79	3.04	0.94	18.19	5.73	104.29	0.868	No	Yes	2.00
236	5.60	1.02	2.82	3.17	0.95	17.09	6.14	105.02	0.815	No	Yes	2.00
237	5.62	0.95	2.86	3.31	0.97	15.88	6.64	105.36	0.757	No	Yes	2.00
238	5.64	0.83	2.94	3.74	1.00	13.89	7.78	108.03	0.663	No	Yes	2.00
239	5.66	0.72	3.04	4.45	1.00	11.68	9.54	111.44	0.557	No	Yes	2.00
240	5.68	0.61	3.16	5.41	1.00	9.59	11.91	114.24	0.457	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	5.70	0.61	3.15	5.18	1.00	9.61	11.65	111.97	0.458	No	Yes	2.00
242	5.72	0.70	3.04	4.09	1.00	11.19	9.41	105.32	0.534	No	Yes	2.00
243	5.74	0.81	2.91	3.11	0.98	13.19	7.32	96.59	0.629	No	Yes	2.00
244	5.76	0.88	2.85	2.72	0.96	14.22	6.46	91.84	0.678	No	Yes	2.00
245	5.78	0.90	2.84	2.65	0.96	14.38	6.32	90.96	0.686	No	Yes	2.00
246	5.80	0.92	2.82	2.58	0.95	14.69	6.14	90.10	0.701	No	Yes	2.00
247	5.82	0.95	2.79	2.40	0.94	15.21	5.76	87.55	0.726	No	Yes	2.00
248	5.84	1.00	2.76	2.22	0.93	15.87	5.34	84.75	0.757	No	Yes	2.00
249	5.86	1.02	2.76	2.29	0.93	16.22	5.33	86.52	0.774	No	Yes	2.00
250	5.88	1.02	2.78	2.56	0.94	16.27	5.66	92.15	0.776	No	Yes	2.00
251	5.90	1.01	2.82	2.94	0.95	16.11	6.15	99.10	0.768	No	Yes	2.00
252	5.92	1.01	2.83	3.06	0.96	16.10	6.29	101.27	0.768	No	Yes	2.00
253	5.94	1.01	2.83	3.00	0.95	16.15	6.21	100.30	0.770	No	Yes	2.00
254	5.96	1.03	2.81	2.84	0.95	16.31	5.98	97.58	0.778	No	Yes	2.00
255	5.98	1.04	2.80	2.76	0.94	16.41	5.86	96.15	0.783	No	Yes	2.00
256	6.00	1.07	2.78	2.64	0.94	16.74	5.64	94.36	0.799	No	Yes	2.00
257	6.02	1.11	2.75	2.44	0.93	17.32	5.26	91.11	0.826	No	Yes	2.00
258	6.04	1.18	2.71	2.28	0.91	18.30	4.84	88.65	0.873	No	Yes	2.00
259	6.06	1.23	2.69	2.18	0.90	19.11	9.36	178.90	0.551	No	No	2.00
260	6.08	1.26	2.69	2.29	0.90	19.55	9.63	188.38	0.632	No	No	2.00
261	6.10	1.25	2.73	2.60	0.92	19.39	5.00	96.91	0.925	No	Yes	2.00
262	6.12	1.22	2.76	2.94	0.93	19.11	5.42	103.56	0.911	No	Yes	2.00
263	6.14	1.21	2.79	3.22	0.94	18.92	5.75	108.81	0.903	No	Yes	2.00
264	6.16	1.20	2.81	3.46	0.95	18.76	6.03	113.15	0.895	No	Yes	2.00
265	6.18	1.19	2.84	3.83	0.96	18.63	6.43	119.76	0.889	No	Yes	2.00
266	6.20	1.18	2.87	4.17	0.97	18.58	6.76	125.56	0.886	No	Yes	2.00
267	6.22	1.20	2.88	4.39	0.97	18.85	6.90	130.03	0.899	No	Yes	2.00
268	6.24	1.23	2.87	4.33	0.97	19.33	6.73	130.05	0.922	No	Yes	2.00
269	6.26	1.26	2.85	4.25	0.97	19.78	6.55	129.61	0.944	No	Yes	2.00
270	6.28	1.26	2.86	4.33	0.97	19.69	6.64	130.71	0.939	No	Yes	2.00
271	6.30	1.25	2.88	4.54	0.97	19.47	6.88	133.87	0.929	No	Yes	2.00
272	6.32	1.23	2.89	4.62	0.98	19.22	7.01	134.77	0.917	No	Yes	2.00
273	6.34	1.24	2.87	4.43	0.97	19.29	6.83	131.71	0.920	No	Yes	2.00
274	6.36	1.25	2.87	4.34	0.97	19.27	6.75	130.03	0.919	No	Yes	2.00
275	6.38	1.30	2.84	4.17	0.96	20.01	6.43	128.63	0.954	No	Yes	2.00
276	6.40	1.38	2.81	3.89	0.95	21.19	5.93	125.63	1.011	No	Yes	2.00
277	6.42	1.39	2.79	3.70	0.94	21.18	5.75	121.74	1.010	No	Yes	2.00
278	6.44	1.29	2.82	3.77	0.96	19.54	6.16	120.38	0.932	No	Yes	2.00
279	6.46	1.12	2.88	3.82	0.98	16.89	6.87	115.97	0.806	No	Yes	2.00
280	6.48	1.01	2.91	3.80	0.99	15.11	7.40	111.85	0.721	No	Yes	2.00
281	6.50	0.94	2.94	3.87	1.00	13.99	7.88	110.21	0.667	No	Yes	2.00
282	6.52	0.90	2.99	4.33	1.00	13.25	8.67	114.92	0.632	No	Yes	2.00
283	6.54	0.88	3.03	4.77	1.00	12.87	9.29	119.55	0.614	No	Yes	2.00
284	6.56	0.88	3.05	5.14	1.00	12.89	9.65	124.38	0.615	No	Yes	2.00
285	6.58	0.89	3.05	5.24	1.00	12.97	9.70	125.88	0.619	No	Yes	2.00
286	6.60	0.94	3.02	4.98	1.00	13.75	9.11	125.22	0.656	No	Yes	2.00
287	6.62	0.98	2.97	4.49	1.00	14.41	8.36	120.51	0.687	No	Yes	2.00
288	6.64	0.99	2.97	4.40	1.00	14.54	8.22	119.52	0.694	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	6.66	0.96	2.99	4.64	1.00	13.99	8.67	121.36	0.667	No	Yes	2.00
290	6.68	0.91	3.04	5.11	1.00	13.15	9.50	124.96	0.627	No	Yes	2.00
291	6.70	0.88	3.07	5.40	1.00	12.63	10.03	126.71	0.603	No	Yes	2.00
292	6.72	0.84	3.11	5.70	1.00	11.88	10.72	127.27	0.567	No	Yes	2.00
293	6.74	0.80	3.13	5.69	1.00	11.15	11.13	124.16	0.532	No	Yes	2.00
294	6.76	0.75	3.15	5.74	1.00	10.42	11.66	121.44	0.497	No	Yes	2.00
295	6.78	0.71	3.18	5.82	1.00	9.78	12.20	119.27	0.466	No	Yes	2.00
296	6.80	0.68	3.21	6.16	1.00	9.22	13.00	119.90	0.440	No	Yes	2.00
297	6.82	0.67	3.23	6.34	1.00	8.93	13.43	119.98	0.426	No	Yes	2.00
298	6.84	0.66	3.23	6.15	1.00	8.78	13.38	117.50	0.419	No	Yes	2.00
299	6.86	0.63	3.24	6.09	1.00	8.33	13.74	114.54	0.398	No	Yes	2.00
300	6.88	0.58	3.29	6.42	1.00	7.53	14.97	112.76	0.359	No	Yes	2.00
301	6.90	0.53	3.36	6.98	1.00	6.63	16.78	111.18	0.316	No	Yes	2.00
302	6.92	0.50	3.38	7.03	1.00	6.19	17.53	108.46	0.295	No	Yes	2.00
303	6.94	0.50	3.37	6.43	1.00	6.09	16.99	103.52	0.291	No	Yes	2.00
304	6.96	0.50	3.34	5.88	1.00	6.14	16.26	99.77	0.293	No	Yes	2.00
305	6.98	0.52	3.30	5.24	1.00	6.35	15.12	96.09	0.303	No	Yes	2.00
306	7.00	0.53	3.27	4.89	1.00	6.56	14.37	94.31	0.313	No	Yes	2.00
307	7.02	0.55	3.23	4.42	1.00	6.77	13.48	91.27	0.323	No	Yes	2.00
308	7.04	0.56	3.21	4.18	1.00	6.92	12.96	89.73	0.330	No	Yes	2.00
309	7.06	0.58	3.17	3.81	1.00	7.19	12.15	87.37	0.343	No	Yes	2.00
310	7.08	0.60	3.13	3.53	1.00	7.62	11.30	86.13	0.364	No	Yes	2.00
311	7.10	0.63	3.10	3.29	1.00	8.09	10.52	85.18	0.386	No	Yes	2.00
312	7.12	0.66	3.08	3.20	1.00	8.41	10.13	85.22	0.401	No	Yes	2.00
313	7.14	0.66	3.08	3.27	1.00	8.41	10.23	85.98	0.401	No	Yes	2.00
314	7.16	0.64	3.10	3.35	1.00	8.15	10.56	86.01	0.389	No	Yes	2.00
315	7.18	0.63	3.11	3.36	1.00	7.89	10.81	85.27	0.376	No	Yes	2.00
316	7.20	0.62	3.10	3.23	1.00	7.80	10.70	83.40	0.372	No	Yes	2.00
317	7.22	0.63	3.09	3.06	1.00	7.90	10.36	81.80	0.377	No	Yes	2.00
318	7.24	0.64	3.08	3.00	1.00	7.96	10.21	81.25	0.380	No	Yes	2.00
319	7.26	0.64	3.08	2.99	1.00	8.01	10.15	81.36	0.382	No	Yes	2.00
320	7.28	0.64	3.08	3.00	1.00	8.02	10.16	81.51	0.383	No	Yes	2.00
321	7.30	0.65	3.06	2.92	1.00	8.20	9.89	81.05	0.391	No	Yes	2.00
322	7.32	0.68	3.03	2.76	1.00	8.61	9.32	80.27	0.411	No	Yes	2.00
323	7.34	0.72	2.99	2.62	1.00	9.23	8.68	80.04	0.440	No	Yes	2.00
324	7.36	0.75	2.98	2.63	1.00	9.55	8.47	80.90	0.455	No	Yes	2.00
325	7.38	0.75	3.00	2.80	1.00	9.56	8.73	83.40	0.456	No	Yes	2.00
326	7.40	0.74	3.00	2.79	1.00	9.41	8.80	82.79	0.449	No	Yes	2.00
327	7.42	0.76	2.97	2.62	1.00	9.75	8.33	81.23	0.465	No	Yes	2.00
328	7.44	0.82	2.92	2.34	0.99	10.58	7.45	78.84	0.505	No	Yes	2.00
329	7.46	0.89	2.88	2.27	0.98	11.58	6.87	79.60	0.552	No	Yes	2.00
330	7.48	0.95	2.85	2.28	0.97	12.35	6.56	81.06	0.589	No	Yes	2.00
331	7.50	0.99	2.84	2.30	0.97	12.87	6.38	82.16	0.614	No	Yes	2.00
332	7.52	1.01	2.84	2.33	0.96	13.14	6.33	83.14	0.627	No	Yes	2.00
333	7.54	1.02	2.84	2.41	0.97	13.22	6.41	84.80	0.631	No	Yes	2.00
334	7.56	1.00	2.86	2.50	0.97	12.96	6.63	85.87	0.618	No	Yes	2.00
335	7.58	0.96	2.88	2.59	0.98	12.47	6.94	86.54	0.595	No	Yes	2.00
336	7.60	0.93	2.90	2.67	0.99	11.95	7.27	86.93	0.570	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	7.62	0.90	2.93	2.83	1.00	11.62	7.63	88.69	0.554	No	Yes	2.00
338	7.64	0.90	2.95	2.97	1.00	11.46	7.89	90.48	0.547	No	Yes	2.00
339	7.66	0.90	2.94	2.96	1.00	11.57	7.84	90.68	0.552	No	Yes	2.00
340	7.68	0.93	2.92	2.85	1.00	11.88	7.54	89.62	0.567	No	Yes	2.00
341	7.70	0.97	2.89	2.69	0.99	12.41	7.11	88.15	0.592	No	Yes	2.00
342	7.72	1.00	2.88	2.63	0.98	12.76	6.88	87.82	0.609	No	Yes	2.00
343	7.74	1.02	2.87	2.62	0.98	12.99	6.77	87.96	0.620	No	Yes	2.00
344	7.76	1.00	2.89	2.75	0.98	12.79	7.02	89.86	0.610	No	Yes	2.00
345	7.78	1.00	2.88	2.64	0.98	12.73	6.90	87.82	4.000	Yes	Yes	2.00
346	7.80	1.12	2.79	2.20	0.95	14.30	5.76	82.41	4.000	Yes	Yes	2.00
347	7.82	1.41	2.65	1.72	0.89	17.99	7.43	133.68	4.000	Yes	No	2.00
348	7.84	2.07	2.44	1.30	0.81	26.38	2.62	69.10	4.000	Yes	No	2.00
349	7.86	2.54	2.36	1.22	0.78	32.32	2.16	69.71	4.000	Yes	No	2.00
350	7.88	2.78	2.32	1.22	0.77	35.35	2.01	71.20	4.000	Yes	No	2.00
351	7.90	2.55	2.38	1.39	0.79	32.55	2.30	74.76	4.000	Yes	No	2.00
352	7.92	2.30	2.47	1.70	0.83	29.50	2.78	82.06	4.000	Yes	No	2.00
353	7.94	2.03	2.58	2.22	0.87	26.15	4.80	125.57	4.000	Yes	No	2.00
354	7.96	1.84	2.68	2.80	0.90	23.80	8.79	209.14	4.000	Yes	No	2.00
355	7.98	1.76	2.72	3.10	0.92	22.84	4.90	111.82	4.000	Yes	Yes	2.00
356	8.00	1.88	2.70	3.10	0.91	24.38	9.91	241.49	3.600	No	No	2.00
357	8.02	2.08	2.65	2.99	0.90	26.82	7.61	204.08	3.600	No	No	2.00
358	8.04	2.21	2.63	2.94	0.89	28.47	6.55	186.33	0.614	No	No	2.00
359	8.06	2.07	2.65	2.97	0.90	26.69	7.60	202.86	3.600	No	No	2.00
360	8.08	1.84	2.70	3.03	0.91	23.54	4.72	111.03	1.123	No	Yes	2.00
361	8.10	1.63	2.75	3.07	0.93	20.74	5.23	108.40	0.990	No	Yes	2.00
362	8.12	1.60	2.75	2.98	0.93	20.24	5.23	105.86	0.965	No	Yes	2.00
363	8.14	1.66	2.73	2.96	0.93	21.01	5.07	106.50	1.002	No	Yes	2.00
364	8.16	1.83	2.69	2.90	0.91	23.19	9.85	228.46	3.600	No	No	2.00
365	8.18	2.04	2.65	2.84	0.90	25.93	7.51	194.83	0.691	No	No	2.00
366	8.20	2.10	2.65	2.88	0.89	26.59	7.27	193.32	0.677	No	No	2.00
367	8.22	1.93	2.68	2.98	0.91	24.40	9.24	225.46	3.600	No	No	2.00
368	8.24	1.61	2.76	3.10	0.94	20.22	5.36	108.35	0.965	No	Yes	2.00
369	8.26	1.36	2.82	3.07	0.96	16.83	6.10	102.70	0.803	No	Yes	2.00
370	8.28	1.22	2.85	2.97	0.97	14.91	6.54	97.47	0.711	No	Yes	2.00
371	8.30	1.20	2.85	2.87	0.97	14.66	6.50	95.30	4.000	Yes	Yes	2.00
372	8.32	1.28	2.80	2.60	0.95	15.60	5.90	91.97	4.000	Yes	Yes	2.00
373	8.34	1.48	2.71	2.17	0.92	18.09	4.77	86.23	4.000	Yes	Yes	2.00
374	8.36	1.85	2.58	1.80	0.87	22.59	4.76	107.47	4.000	Yes	No	2.00
375	8.38	2.27	2.48	1.59	0.83	27.76	2.82	78.18	4.000	Yes	No	2.00
376	8.40	2.61	2.41	1.51	0.81	31.96	2.44	78.02	4.000	Yes	No	2.00
377	8.42	2.67	2.41	1.52	0.80	32.67	2.41	78.75	4.000	Yes	No	2.00
378	8.44	2.51	2.44	1.62	0.82	30.63	2.62	80.35	4.000	Yes	No	2.00
379	8.46	2.18	2.54	1.94	0.85	26.60	3.66	97.42	4.000	Yes	No	2.00
380	8.48	1.83	2.63	2.17	0.89	22.31	6.59	147.11	4.000	Yes	No	2.00
381	8.50	1.70	2.66	2.16	0.90	20.52	7.88	161.75	4.000	Yes	No	2.00
382	8.52	2.06	2.51	1.54	0.84	24.79	2.97	73.52	4.000	Yes	No	2.00
383	8.54	2.63	2.37	1.25	0.79	31.67	2.22	70.32	4.000	Yes	No	2.00
384	8.56	2.99	2.31	1.17	0.77	35.85	1.96	70.26	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	8.58	2.83	2.34	1.25	0.78	33.87	2.10	71.28	4.000	Yes	No	2.00
386	8.60	2.47	2.42	1.38	0.81	29.60	2.47	73.10	4.000	Yes	No	2.00
387	8.62	2.20	2.51	1.70	0.84	26.43	2.98	78.62	4.000	Yes	No	2.00
388	8.64	2.02	2.60	2.16	0.88	24.24	5.43	131.55	4.000	Yes	No	2.00
389	8.66	1.81	2.70	2.72	0.92	21.71	4.71	102.20	4.000	Yes	Yes	2.00
390	8.68	1.66	2.75	2.99	0.94	19.94	5.30	105.63	4.000	Yes	Yes	2.00
391	8.70	1.60	2.77	3.02	0.94	19.15	5.50	105.26	0.914	No	Yes	2.00
392	8.72	1.66	2.75	2.89	0.93	19.80	5.23	103.54	0.944	No	Yes	2.00
393	8.74	1.70	2.73	2.79	0.93	20.27	5.03	102.00	0.967	No	Yes	2.00
394	8.76	1.68	2.73	2.72	0.93	19.96	5.02	100.20	0.952	No	Yes	2.00
395	8.78	1.69	2.70	2.44	0.92	20.00	10.15	202.88	3.600	No	No	2.00
396	8.80	1.79	2.65	2.14	0.90	21.09	7.32	154.28	0.379	No	No	2.00
397	8.82	1.97	2.59	1.97	0.88	23.23	5.16	119.97	0.241	No	No	2.00
398	8.84	2.13	2.57	1.99	0.87	25.09	4.40	110.41	0.205	No	No	2.00
399	8.86	2.13	2.58	2.12	0.87	25.11	4.88	122.61	0.251	No	No	2.00
400	8.88	2.03	2.62	2.25	0.88	23.86	6.04	144.17	0.323	No	No	2.00
401	8.90	1.86	2.66	2.36	0.90	21.73	8.03	174.43	0.516	No	No	2.00
402	8.92	1.81	2.68	2.40	0.91	21.13	8.79	185.65	0.608	No	No	2.00
403	8.94	1.85	2.67	2.37	0.90	21.62	8.21	177.47	4.000	Yes	No	2.00
404	8.96	1.95	2.64	2.34	0.90	22.73	7.18	163.19	4.000	Yes	No	2.00
405	8.98	2.06	2.62	2.33	0.89	24.01	6.30	151.24	4.000	Yes	No	2.00
406	9.00	2.47	2.53	2.08	0.85	28.89	3.42	98.87	4.000	Yes	No	2.00
407	9.02	3.06	2.39	1.60	0.80	35.61	2.32	82.58	4.000	Yes	No	2.00
408	9.04	3.57	2.29	1.32	0.76	41.37	1.88	77.76	4.000	Yes	No	2.00
409	9.06	3.63	2.24	1.13	0.74	41.91	1.74	72.73	4.000	Yes	No	2.00
410	9.08	3.37	2.30	1.29	0.77	38.93	1.94	75.33	4.000	Yes	No	2.00
411	9.10	3.02	2.38	1.53	0.80	34.94	2.30	80.20	4.000	Yes	No	2.00
412	9.12	2.72	2.48	1.96	0.84	31.56	2.88	90.75	4.000	Yes	No	2.00
413	9.14	2.55	2.55	2.35	0.86	29.61	4.01	118.87	4.000	Yes	No	2.00
414	9.16	2.42	2.61	2.72	0.88	28.02	5.87	164.46	4.000	Yes	No	2.00
415	9.18	2.21	2.67	3.04	0.91	25.61	8.67	221.93	4.000	Yes	No	2.00
416	9.20	2.02	2.73	3.28	0.93	23.31	4.99	116.40	4.000	Yes	Yes	2.00
417	9.22	1.88	2.76	3.39	0.94	21.56	5.39	116.32	4.000	Yes	Yes	2.00
418	9.24	1.85	2.77	3.36	0.94	21.07	5.45	114.84	1.005	No	Yes	2.00
419	9.26	1.84	2.75	3.15	0.94	20.92	5.28	110.42	4.000	Yes	Yes	2.00
420	9.28	1.92	2.71	2.84	0.92	21.80	4.81	104.79	4.000	Yes	Yes	2.00
421	9.30	2.28	2.61	2.41	0.88	25.89	5.64	146.13	4.000	Yes	No	2.00
422	9.32	2.71	2.52	2.17	0.85	30.86	3.19	98.57	4.000	Yes	No	2.00
423	9.34	2.94	2.46	1.94	0.83	33.47	2.73	91.28	4.000	Yes	No	2.00
424	9.36	2.85	2.47	1.91	0.83	32.37	2.77	89.68	4.000	Yes	No	2.00
425	9.38	2.65	2.51	1.98	0.84	29.92	2.90	86.88	4.000	Yes	No	2.00
426	9.40	2.50	2.57	2.36	0.87	28.34	4.46	126.38	4.000	Yes	No	2.00
427	9.42	2.30	2.66	2.93	0.90	25.99	7.88	204.87	4.000	Yes	No	2.00
428	9.44	2.08	2.75	3.60	0.94	23.47	5.25	123.26	4.000	Yes	Yes	2.00
429	9.46	1.87	2.82	4.12	0.97	21.03	6.16	129.53	4.000	Yes	Yes	2.00
430	9.48	1.76	2.85	4.19	0.98	19.68	6.52	128.32	4.000	Yes	Yes	2.00
431	9.50	1.70	2.85	4.01	0.98	18.91	6.53	123.42	0.902	No	Yes	2.00
432	9.52	1.69	2.83	3.70	0.97	18.70	6.28	117.44	0.892	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	9.54	1.75	2.79	3.30	0.95	19.32	5.74	110.99	0.922	No	Yes	2.00
434	9.56	2.03	2.69	2.77	0.92	22.50	9.72	218.81	3.600	No	No	2.00
435	9.58	2.35	2.60	2.41	0.88	26.08	5.57	145.36	0.329	No	No	2.00
436	9.60	2.61	2.54	2.20	0.86	29.02	3.75	108.94	0.200	No	No	2.00
437	9.62	2.69	2.53	2.14	0.85	29.89	3.33	99.63	0.172	No	No	1.96
438	9.64	2.77	2.51	2.12	0.85	30.71	3.08	94.68	0.159	No	No	1.82
439	9.66	2.88	2.50	2.11	0.84	31.94	2.97	94.95	0.160	No	No	1.82
440	9.68	2.95	2.49	2.08	0.84	32.61	2.91	94.75	0.159	No	No	1.82
441	9.70	2.93	2.49	2.10	0.84	32.39	2.93	94.94	0.160	No	No	1.82
442	9.72	2.83	2.51	2.15	0.85	31.18	3.06	95.30	0.160	No	No	1.84
443	9.74	2.66	2.56	2.33	0.86	29.28	4.07	119.16	0.237	No	No	2.00
444	9.76	2.54	2.59	2.52	0.88	27.89	5.18	144.57	4.000	Yes	No	2.00
445	9.78	2.71	2.56	2.39	0.87	29.71	4.11	122.11	4.000	Yes	No	2.00
446	9.80	2.93	2.52	2.26	0.85	32.10	3.13	100.61	4.000	Yes	No	2.00
447	9.82	3.04	2.49	2.15	0.84	33.30	2.91	96.97	4.000	Yes	No	2.00
448	9.84	2.91	2.53	2.35	0.86	31.81	3.43	109.27	0.201	No	No	2.00
449	9.86	2.84	2.56	2.55	0.87	31.07	4.20	130.40	0.286	No	No	2.00
450	9.88	2.86	2.57	2.64	0.87	31.21	4.41	137.69	0.323	No	No	2.00
451	9.90	2.70	2.61	2.80	0.88	29.41	5.59	164.30	0.443	No	No	2.00
452	9.92	2.43	2.66	2.94	0.90	26.29	7.71	202.74	3.600	No	No	2.00
453	9.94	2.22	2.71	3.15	0.92	23.90	4.78	114.17	1.140	No	Yes	2.00
454	9.96	2.24	2.69	3.02	0.92	23.98	9.82	235.53	3.600	No	No	2.00
455	9.98	2.30	2.68	2.93	0.91	24.61	8.82	217.01	3.600	No	No	2.00
456	10.00	2.25	2.69	2.96	0.92	24.02	9.47	227.45	3.600	No	No	2.00
457	10.02	2.14	2.72	3.13	0.93	22.73	4.94	112.26	1.084	No	Yes	2.00
458	10.04	2.08	2.74	3.21	0.94	22.01	5.14	113.05	1.050	No	Yes	2.00
459	10.06	2.11	2.73	3.19	0.93	22.41	5.05	113.13	4.000	Yes	Yes	2.00
460	10.08	2.28	2.68	2.95	0.92	24.19	9.25	223.78	4.000	Yes	No	2.00
461	10.10	2.50	2.63	2.69	0.89	26.64	6.45	171.90	4.000	Yes	No	2.00
462	10.12	2.80	2.56	2.45	0.87	29.88	4.24	126.54	4.000	Yes	No	2.00
463	10.14	3.12	2.50	2.23	0.85	33.29	2.81	93.44	4.000	Yes	No	2.00
464	10.16	3.28	2.47	2.09	0.83	34.98	2.76	96.47	4.000	Yes	No	2.00
465	10.18	3.36	2.45	2.00	0.82	35.80	2.63	94.28	4.000	Yes	No	2.00
466	10.20	3.38	2.43	1.92	0.82	35.92	2.56	92.07	0.153	No	No	1.76
467	10.22	3.50	2.41	1.82	0.81	37.08	2.42	89.89	0.148	No	No	1.70
468	10.24	3.59	2.39	1.73	0.80	38.01	2.31	87.79	0.143	No	No	1.65
469	10.26	3.48	2.38	1.64	0.80	36.79	2.29	84.26	0.136	No	No	1.56
470	10.28	3.35	2.39	1.56	0.80	35.19	2.31	81.14	4.000	Yes	No	2.00
471	10.30	2.95	2.49	1.93	0.84	30.96	2.89	89.48	4.000	Yes	No	2.00
472	10.32	2.63	2.60	2.56	0.88	27.48	5.50	151.17	4.000	Yes	No	2.00
473	10.34	2.21	2.75	3.44	0.94	22.91	5.20	119.14	4.000	Yes	Yes	2.00
474	10.36	2.06	2.78	3.52	0.95	21.20	5.58	118.23	4.000	Yes	Yes	2.00
475	10.38	2.08	2.75	3.27	0.94	21.39	5.30	113.42	4.000	Yes	Yes	2.00
476	10.40	2.34	2.67	2.82	0.91	24.08	8.66	208.64	4.000	Yes	No	2.00
477	10.42	2.67	2.59	2.42	0.88	27.69	4.92	136.14	4.000	Yes	No	2.00
478	10.44	2.96	2.51	2.06	0.85	30.64	2.95	90.42	4.000	Yes	No	2.00
479	10.46	2.94	2.49	1.89	0.84	30.44	2.89	87.96	4.000	Yes	No	2.00
480	10.48	2.79	2.51	1.91	0.85	28.67	3.02	86.48	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	10.50	2.56	2.58	2.19	0.88	26.28	4.64	121.86	4.000	Yes	No	2.00
482	10.52	2.47	2.63	2.51	0.89	25.28	6.38	161.24	4.000	Yes	No	2.00
483	10.54	2.32	2.69	2.89	0.92	23.65	9.39	222.11	4.000	Yes	No	2.00
484	10.56	2.18	2.74	3.21	0.94	22.05	5.14	113.25	4.000	Yes	Yes	2.00
485	10.58	2.45	2.67	2.88	0.91	24.95	8.31	207.42	4.000	Yes	No	2.00
486	10.60	2.98	2.55	2.40	0.87	30.51	3.92	119.68	4.000	Yes	No	2.00
487	10.62	3.53	2.46	2.15	0.83	36.40	2.72	98.97	4.000	Yes	No	2.00
488	10.64	3.59	2.45	2.09	0.83	36.88	2.65	97.71	4.000	Yes	No	2.00
489	10.66	3.31	2.48	2.12	0.84	33.87	2.85	96.46	4.000	Yes	No	2.00
490	10.68	2.86	2.53	2.10	0.86	28.98	3.47	100.69	4.000	Yes	No	2.00
491	10.70	2.31	2.66	2.54	0.91	23.16	7.90	182.91	4.000	Yes	No	2.00
492	10.72	2.06	2.74	2.95	0.94	20.40	5.18	105.60	4.000	Yes	Yes	2.00
493	10.74	2.07	2.76	3.17	0.95	20.48	5.38	110.14	0.977	No	Yes	2.00
494	10.76	2.24	2.71	2.89	0.93	22.32	4.77	106.49	1.065	No	Yes	2.00
495	10.78	2.21	2.71	2.90	0.93	21.96	4.85	106.46	1.048	No	Yes	2.00
496	10.80	2.13	2.72	2.88	0.93	21.07	4.97	104.78	1.005	No	Yes	2.00
497	10.82	2.15	2.71	2.74	0.93	21.16	4.82	101.93	1.009	No	Yes	2.00
498	10.84	2.16	2.69	2.58	0.92	21.24	9.80	208.08	3.600	No	No	2.00
499	10.86	2.04	2.72	2.66	0.93	19.96	4.95	98.75	0.952	No	Yes	2.00
500	10.88	1.87	2.78	2.88	0.95	18.13	5.57	101.04	0.865	No	Yes	2.00
501	10.90	1.63	2.87	3.30	0.99	15.51	6.74	104.48	0.740	No	Yes	2.00
502	10.92	1.44	2.93	3.56	1.00	13.50	7.73	104.30	0.644	No	Yes	2.00
503	10.94	1.27	3.01	3.82	1.00	11.58	8.89	103.01	0.553	No	Yes	2.00
504	10.96	1.33	2.95	3.30	1.00	12.31	7.92	97.50	0.587	No	Yes	2.00
505	10.98	1.52	2.86	2.84	0.98	14.26	6.60	94.13	0.680	No	Yes	2.00
506	11.00	1.72	2.77	2.46	0.95	16.29	5.54	90.20	0.777	No	Yes	2.00
507	11.02	1.73	2.77	2.44	0.95	16.44	5.47	90.03	0.784	No	Yes	2.00
508	11.04	1.56	2.83	2.64	0.97	14.58	6.25	91.10	0.695	No	Yes	2.00
509	11.06	1.34	2.92	2.98	1.00	12.28	7.54	92.58	0.586	No	Yes	2.00
510	11.08	1.24	2.96	3.05	1.00	11.14	8.17	91.00	4.000	Yes	Yes	2.00
511	11.10	1.36	2.88	2.58	1.00	12.37	6.98	86.29	4.000	Yes	Yes	2.00
512	11.12	1.70	2.74	2.11	0.94	15.97	5.17	82.52	4.000	Yes	Yes	2.00
513	11.14	2.15	2.60	1.73	0.89	20.58	5.51	113.43	4.000	Yes	No	2.00
514	11.16	2.38	2.56	1.68	0.87	22.96	4.06	93.30	4.000	Yes	No	2.00
515	11.18	2.51	2.53	1.64	0.86	24.25	3.47	84.09	4.000	Yes	No	2.00
516	11.20	2.77	2.48	1.53	0.84	26.91	2.82	75.97	4.000	Yes	No	2.00
517	11.22	3.14	2.42	1.45	0.82	30.67	2.46	75.51	4.000	Yes	No	2.00
518	11.24	3.31	2.40	1.45	0.81	32.35	2.37	76.53	0.122	No	No	1.43
519	11.26	3.26	2.42	1.54	0.82	31.80	2.48	78.74	0.125	No	No	1.47
520	11.28	3.28	2.43	1.59	0.82	31.95	2.51	80.25	0.128	No	No	1.50
521	11.30	3.29	2.44	1.70	0.83	32.03	2.61	83.49	4.000	Yes	No	2.00
522	11.32	3.07	2.50	1.90	0.85	29.77	2.96	87.99	4.000	Yes	No	2.00
523	11.34	2.64	2.60	2.31	0.89	25.31	5.55	140.41	4.000	Yes	No	2.00
524	11.36	2.24	2.72	2.88	0.94	21.14	4.97	105.02	4.000	Yes	Yes	2.00
525	11.38	1.94	2.84	3.68	0.98	18.05	6.42	115.93	4.000	Yes	Yes	2.00
526	11.40	1.80	2.89	3.97	1.00	16.58	7.11	117.99	4.000	Yes	Yes	2.00
527	11.42	1.93	2.82	3.34	0.97	17.95	6.10	109.58	4.000	Yes	Yes	2.00
528	11.44	2.15	2.72	2.62	0.93	20.15	4.88	98.27	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
529	11.46	2.57	2.57	1.90	0.88	24.35	4.37	106.37	4.000	Yes	No	2.00
530	11.48	2.65	2.51	1.61	0.86	25.13	3.09	77.67	4.000	Yes	No	2.00
531	11.50	2.59	2.50	1.45	0.85	24.43	2.97	72.65	4.000	Yes	No	2.00
532	11.52	2.18	2.61	1.74	0.89	20.23	5.82	117.71	4.000	Yes	No	2.00
533	11.54	1.98	2.69	2.07	0.92	18.20	9.66	175.80	4.000	Yes	No	2.00
534	11.56	1.97	2.72	2.26	0.93	18.03	4.88	88.05	4.000	Yes	Yes	2.00
535	11.58	2.00	2.72	2.35	0.93	18.35	4.92	90.33	0.875	No	Yes	2.00
536	11.60	1.87	2.78	2.63	0.96	16.96	5.56	94.39	0.809	No	Yes	2.00
537	11.62	1.60	2.88	3.15	1.00	14.25	6.97	99.38	0.680	No	Yes	2.00
538	11.64	1.40	2.97	3.60	1.00	12.23	8.32	101.71	0.583	No	Yes	2.00
539	11.66	1.30	3.02	3.83	1.00	11.14	9.13	101.79	0.532	No	Yes	2.00
540	11.68	1.30	3.01	3.75	1.00	11.15	9.04	100.81	0.532	No	Yes	2.00
541	11.70	1.33	2.99	3.55	1.00	11.37	8.67	98.65	0.543	No	Yes	2.00
542	11.72	1.40	2.95	3.21	1.00	12.06	7.92	95.58	0.575	No	Yes	2.00
543	11.74	1.50	2.88	2.72	0.99	13.13	6.85	89.94	0.626	No	Yes	2.00
544	11.76	1.50	2.86	2.57	0.99	13.06	6.68	87.27	0.623	No	Yes	2.00
545	11.78	1.40	2.90	2.68	1.00	12.02	7.26	87.25	0.573	No	Yes	2.00
546	11.80	1.25	2.98	2.95	1.00	10.49	8.37	87.82	0.500	No	Yes	2.00
547	11.82	1.18	3.01	3.11	1.00	9.78	9.02	88.22	0.466	No	Yes	2.00
548	11.84	1.15	3.02	3.10	1.00	9.50	9.18	87.26	0.453	No	Yes	2.00
549	11.86	1.13	3.04	3.19	1.00	9.29	9.45	87.79	0.443	No	Yes	2.00
550	11.88	1.12	3.04	3.12	1.00	9.15	9.46	86.53	0.436	No	Yes	2.00
551	11.90	1.12	3.03	2.96	1.00	9.12	9.24	84.31	0.435	No	Yes	2.00
552	11.92	1.12	3.01	2.81	1.00	9.10	9.04	82.25	0.434	No	Yes	2.00
553	11.94	1.13	3.00	2.70	1.00	9.15	8.84	80.88	0.436	No	Yes	2.00
554	11.96	1.14	3.00	2.67	1.00	9.24	8.74	80.75	0.441	No	Yes	2.00
555	11.98	1.16	2.98	2.62	1.00	9.49	8.49	80.62	0.453	No	Yes	2.00
556	12.00	1.20	2.97	2.62	1.00	9.81	8.30	81.44	0.468	No	Yes	2.00
557	12.02	1.22	2.96	2.62	1.00	10.03	8.16	81.88	0.479	No	Yes	2.00
558	12.04	1.25	2.96	2.63	1.00	10.24	8.06	82.52	0.489	No	Yes	2.00
559	12.06	1.28	2.94	2.59	1.00	10.57	7.83	82.78	0.504	No	Yes	2.00
560	12.08	1.33	2.93	2.59	1.00	11.02	7.60	83.72	0.526	No	Yes	2.00
561	12.10	1.37	2.92	2.62	1.00	11.39	7.46	84.97	0.544	No	Yes	2.00
562	12.12	1.48	2.87	2.50	0.99	12.45	6.82	84.92	0.594	No	Yes	2.00
563	12.14	1.65	2.81	2.31	0.97	14.09	5.98	84.20	0.672	No	Yes	2.00
564	12.16	1.84	2.75	2.20	0.95	15.95	5.29	84.40	0.761	No	Yes	2.00
565	12.18	1.94	2.74	2.29	0.94	16.97	5.16	87.49	0.809	No	Yes	2.00
566	12.20	1.92	2.76	2.38	0.95	16.73	5.33	89.07	0.798	No	Yes	2.00
567	12.22	1.72	2.82	2.53	0.97	14.68	6.07	89.19	0.700	No	Yes	2.00
568	12.24	1.48	2.88	2.48	1.00	12.32	6.85	84.37	0.587	No	Yes	2.00
569	12.26	1.26	2.95	2.58	1.00	10.16	8.03	81.59	0.485	No	Yes	2.00
570	12.28	1.16	3.00	2.74	1.00	9.24	8.84	81.62	0.441	No	Yes	2.00
571	12.30	1.08	3.10	3.57	1.00	8.42	10.65	89.62	0.402	No	Yes	2.00
572	12.32	1.02	3.19	4.51	1.00	7.79	12.45	97.00	0.372	No	Yes	2.00
573	12.34	0.97	3.25	5.32	1.00	7.31	13.97	102.20	0.349	No	Yes	2.00
574	12.36	0.94	3.28	5.52	1.00	6.96	14.64	101.92	0.332	No	Yes	2.00
575	12.38	0.92	3.28	5.48	1.00	6.81	14.79	100.67	0.325	No	Yes	2.00
576	12.40	0.92	3.26	4.95	1.00	6.83	14.11	96.30	0.326	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	12.42	0.93	3.22	4.28	1.00	6.86	13.19	90.44	0.327	No	Yes	2.00
578	12.44	0.93	3.17	3.54	1.00	6.84	12.14	83.08	0.326	No	Yes	2.00
579	12.46	0.92	3.15	3.18	1.00	6.79	11.65	79.10	0.324	No	Yes	2.00
580	12.48	0.93	3.14	3.02	1.00	6.82	11.36	77.44	0.325	No	Yes	2.00
581	12.50	0.93	3.14	3.01	1.00	6.84	11.33	77.48	0.326	No	Yes	2.00
582	12.52	0.93	3.14	3.00	1.00	6.81	11.34	77.21	0.325	No	Yes	2.00
583	12.54	0.92	3.14	3.04	1.00	6.74	11.47	77.35	0.322	No	Yes	2.00
584	12.56	0.91	3.15	3.07	1.00	6.62	11.67	77.18	0.316	No	Yes	2.00
585	12.58	0.92	3.15	3.02	1.00	6.66	11.53	76.83	0.318	No	Yes	2.00
586	12.60	0.94	3.13	2.88	1.00	6.83	11.12	75.93	0.326	No	Yes	2.00
587	12.62	0.96	3.10	2.75	1.00	7.05	10.68	75.27	0.336	No	Yes	2.00
588	12.64	0.97	3.09	2.70	1.00	7.13	10.51	74.87	0.340	No	Yes	2.00
589	12.66	0.95	3.11	2.81	1.00	6.94	10.88	75.47	0.331	No	Yes	2.00
590	12.68	0.94	3.13	2.90	1.00	6.85	11.13	76.26	0.327	No	Yes	2.00
591	12.70	0.94	3.13	2.99	1.00	6.82	11.32	77.18	0.325	No	Yes	2.00
592	12.72	0.96	3.13	3.00	1.00	6.94	11.20	77.76	0.331	No	Yes	2.00
593	12.74	0.97	3.12	2.99	1.00	7.05	11.05	77.95	0.336	No	Yes	2.00
594	12.76	0.97	3.12	2.97	1.00	7.09	10.99	77.96	0.338	No	Yes	2.00
595	12.78	0.99	3.10	2.89	1.00	7.25	10.70	77.54	0.346	No	Yes	2.00
596	12.80	1.01	3.09	2.79	1.00	7.38	10.42	76.84	0.352	No	Yes	2.00
597	12.82	1.02	3.07	2.67	1.00	7.48	10.12	75.70	0.357	No	Yes	2.00
598	12.84	1.02	3.06	2.55	1.00	7.50	9.90	74.22	0.358	No	Yes	2.00
599	12.86	1.04	3.04	2.41	1.00	7.62	9.55	72.80	0.364	No	Yes	2.00
600	12.88	1.07	3.02	2.29	1.00	7.87	9.13	71.84	0.375	No	Yes	2.00
601	12.90	1.08	3.01	2.26	1.00	7.97	9.00	71.72	0.380	No	Yes	2.00
602	12.92	1.07	3.02	2.30	1.00	7.87	9.16	72.04	0.375	No	Yes	2.00
603	12.94	1.05	3.04	2.38	1.00	7.73	9.41	72.67	0.369	No	Yes	2.00
604	12.96	1.06	3.03	2.38	1.00	7.78	9.36	72.83	0.371	No	Yes	2.00
605	12.98	1.07	3.03	2.35	1.00	7.88	9.22	72.66	0.376	No	Yes	2.00
606	13.00	1.08	3.02	2.30	1.00	7.91	9.12	72.15	0.377	No	Yes	2.00
607	13.02	1.08	3.02	2.27	1.00	7.92	9.07	71.78	0.378	No	Yes	2.00
608	13.04	1.10	3.01	2.24	1.00	8.05	8.89	71.62	0.384	No	Yes	2.00
609	13.06	1.12	2.99	2.19	1.00	8.25	8.65	71.37	0.393	No	Yes	2.00
610	13.08	1.14	2.98	2.13	1.00	8.41	8.43	70.89	0.401	No	Yes	2.00
611	13.10	1.15	2.97	2.09	1.00	8.55	8.26	70.60	0.408	No	Yes	2.00
612	13.12	1.18	2.96	2.05	1.00	8.76	8.05	70.48	0.418	No	Yes	2.00
613	13.14	1.23	2.93	1.99	1.00	9.26	7.62	70.57	0.441	No	Yes	2.00
614	13.16	1.29	2.90	1.90	1.00	9.77	7.18	70.12	0.466	No	Yes	2.00
615	13.18	1.34	2.88	1.85	1.00	10.18	6.86	69.83	0.486	No	Yes	2.00
616	13.20	1.34	2.88	1.90	1.00	10.21	6.93	70.79	0.487	No	Yes	2.00
617	13.22	1.32	2.91	2.08	1.00	9.99	7.35	73.46	0.477	No	Yes	2.00
618	13.24	1.28	2.95	2.33	1.00	9.61	7.98	76.66	0.458	No	Yes	2.00
619	13.26	1.22	3.00	2.63	1.00	9.07	8.79	79.72	0.432	No	Yes	2.00
620	13.28	1.18	3.04	2.92	1.00	8.62	9.55	82.33	0.411	No	Yes	2.00
621	13.30	1.16	3.07	3.14	1.00	8.43	10.01	84.45	0.402	No	Yes	2.00
622	13.32	1.19	3.05	3.08	1.00	8.73	9.70	84.67	0.416	No	Yes	2.00
623	13.34	1.30	2.99	2.76	1.00	9.71	8.57	83.18	0.463	No	Yes	2.00
624	13.36	2.35	2.56	1.32	0.88	19.43	4.20	81.59	0.131	No	No	1.61

:: 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	13.38	7.63	1.81	0.36	0.59	69.39	1.00	69.39	0.111	No	No	1.37
626	13.40	14.13	1.48	0.24	0.47	131.71	1.00	131.71	0.292	No	No	2.00
627	13.42	19.99	1.31	0.21	0.40	188.11	1.00	188.11	0.699	No	No	2.00
628	13.44	21.46	1.32	0.25	0.41	201.95	1.00	201.95	4.000	No	No	2.00
629	13.46	22.52	1.32	0.27	0.41	211.90	1.00	211.90	4.000	No	No	2.00
630	13.48	23.03	1.34	0.32	0.42	216.36	1.00	216.36	4.000	No	No	2.00
631	13.50	24.20	1.35	0.34	0.42	227.24	1.00	227.24	4.000	No	No	2.00
632	13.52	24.57	1.36	0.37	0.42	230.55	1.00	230.55	4.000	No	No	2.00
633	13.54	25.04	1.34	0.35	0.42	234.97	1.00	234.97	4.000	No	No	2.00
634	13.56	24.41	1.35	0.36	0.42	228.69	1.00	228.69	4.000	No	No	2.00
635	13.58	23.39	1.38	0.37	0.43	218.62	1.00	218.62	4.000	No	No	2.00
636	13.60	21.92	1.45	0.45	0.46	204.04	1.00	204.04	4.000	No	No	2.00
637	13.62	20.63	1.53	0.56	0.49	191.07	1.00	191.07	0.729	No	No	2.00
638	13.64	19.93	1.64	0.77	0.53	183.63	1.00	183.63	0.656	No	No	2.00
639	13.66	20.16	1.67	0.87	0.54	185.28	1.00	185.28	0.672	No	No	2.00
640	13.68	21.35	1.65	0.86	0.53	196.32	1.00	196.32	0.784	No	No	2.00
641	13.70	22.40	1.59	0.75	0.51	206.40	1.00	206.40	4.000	No	No	2.00
642	13.72	23.27	1.54	0.67	0.49	214.78	1.00	214.78	4.000	No	No	2.00
643	13.74	23.65	1.52	0.63	0.49	218.32	1.00	218.32	4.000	No	No	2.00
644	13.76	23.73	1.49	0.57	0.48	219.18	1.00	219.18	4.000	No	No	2.00
645	13.78	23.82	1.51	0.60	0.48	219.64	1.00	219.64	4.000	No	No	2.00
646	13.80	23.94	1.51	0.60	0.48	220.62	1.00	220.62	4.000	No	No	2.00
647	13.82	24.34	1.53	0.66	0.49	223.93	1.00	223.93	4.000	No	No	2.00
648	13.84	24.59	1.52	0.65	0.49	226.10	1.00	226.10	4.000	No	No	2.00
649	13.86	24.12	1.53	0.66	0.49	221.38	1.00	221.38	4.000	No	No	2.00
650	13.88	23.37	1.53	0.63	0.49	214.30	1.00	214.30	4.000	No	No	2.00
651	13.90	21.83	1.54	0.60	0.49	199.74	1.00	199.74	0.821	No	No	2.00
652	13.92	20.91	1.55	0.59	0.50	191.01	1.00	191.01	0.728	No	No	2.00
653	13.94	20.17	1.59	0.66	0.51	183.60	1.00	183.60	0.656	No	No	2.00
654	13.96	20.46	1.63	0.75	0.53	185.80	1.00	185.80	0.676	No	No	2.00
655	13.98	20.50	1.66	0.84	0.54	185.60	1.00	185.60	0.675	No	No	2.00
656	14.00	19.87	1.68	0.87	0.55	179.51	1.00	179.51	0.618	No	No	2.00
657	14.02	19.03	1.74	0.99	0.57	171.08	1.06	181.20	0.633	No	No	2.00
658	14.04	17.66	1.84	1.30	0.61	157.56	1.20	188.36	0.702	No	No	2.00
659	14.06	17.23	1.95	1.74	0.65	152.57	1.27	193.33	0.752	No	No	2.00
660	14.08	17.40	2.01	2.13	0.67	153.38	1.32	201.98	4.000	No	No	2.00
661	14.10	19.78	1.99	2.20	0.67	174.65	1.30	226.53	4.000	No	No	2.00
662	14.12	22.16	1.96	2.22	0.66	195.98	1.28	250.31	4.000	No	No	2.00
663	14.14	24.17	1.94	2.26	0.65	213.91	1.27	270.61	4.000	No	No	2.00
664	14.16	25.39	1.95	2.41	0.65	224.31	1.27	285.57	4.000	No	No	2.00
665	14.18	27.27	1.94	2.46	0.65	240.91	1.27	304.91	4.000	No	No	2.00
666	14.20	28.51	1.95	2.54	0.65	251.62	1.27	318.77	4.000	No	No	2.00
667	14.22	30.77	1.90	2.36	0.63	272.18	1.24	336.69	4.000	No	No	2.00
668	14.24	32.47	1.87	2.26	0.62	287.50	1.22	349.68	4.000	No	No	2.00
669	14.26	34.57	1.83	2.10	0.61	306.59	1.18	362.40	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
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	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
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	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
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	1.97	0.00	0.00	0.02	0.00
5.18	1.82	0.00	0.00	0.02	0.00	5.20	1.73	0.00	0.00	0.02	0.00
5.22	1.64	0.00	0.00	0.02	0.00	5.24	1.66	0.00	0.00	0.02	0.00
5.26	1.78	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
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

:: 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
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	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

:: 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
8.58	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	1.96	0.00	0.00	0.02	0.00	9.64	1.82	0.00	0.00	0.02	0.00
9.66	1.82	0.00	0.00	0.02	0.00	9.68	1.82	0.00	0.00	0.02	0.00
9.70	1.82	0.00	0.00	0.02	0.00	9.72	1.84	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	1.76	0.00	0.00	0.02	0.00
10.22	1.70	0.00	0.00	0.02	0.00	10.24	1.65	0.00	0.00	0.02	0.00
10.26	1.56	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

:: 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
10.50	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	1.43	0.00	0.00	0.02	0.00
11.26	1.47	0.00	0.00	0.02	0.00	11.28	1.50	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
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

:: 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
12.42	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	1.61	0.00	0.00	0.02	0.00
13.38	1.37	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
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						

:: 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

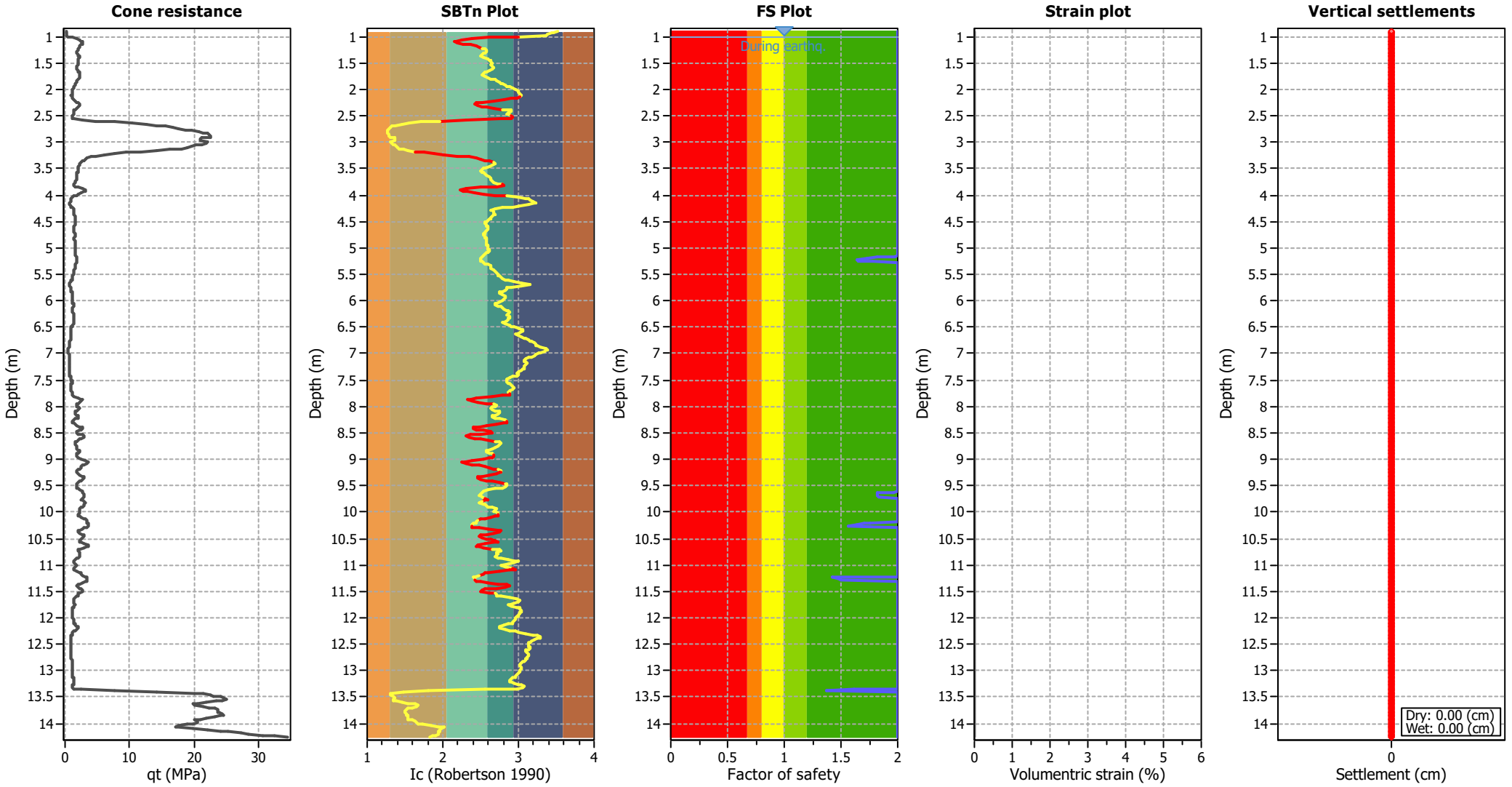
Overall liquefaction potential: 0.00

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)
1.00	88.51	2.00	0.00	0.94	0.00	1.02	125.21	2.00	0.00	0.94	0.00
1.04	74.64	2.00	0.00	0.94	0.00	1.06	76.46	2.00	0.00	0.94	0.00
1.08	78.80	2.00	0.00	0.94	0.00	1.10	82.54	2.00	0.00	0.94	0.00
1.12	87.02	2.00	0.00	0.94	0.00	1.14	94.69	2.00	0.00	0.94	0.00
1.16	104.73	2.00	0.00	0.94	0.00	1.18	114.91	2.00	0.00	0.93	0.00
1.20	122.35	2.00	0.00	0.93	0.00	1.22	136.53	2.00	0.00	0.93	0.00
1.24	168.99	2.00	0.00	0.93	0.00	1.26	183.12	2.00	0.00	0.93	0.00
1.28	168.42	2.00	0.00	0.93	0.00	1.30	156.60	2.00	0.00	0.93	0.00
1.32	139.61	2.00	0.00	0.93	0.00	1.34	123.06	2.00	0.00	0.93	0.00
1.36	113.44	2.00	0.00	0.92	0.00	1.38	120.17	2.00	0.00	0.92	0.00
1.40	142.58	2.00	0.00	0.92	0.00	1.42	198.55	2.00	0.00	0.92	0.00
1.44	237.85	2.00	0.00	0.92	0.00	1.46	268.11	2.00	0.00	0.92	0.00
1.48	264.31	2.00	0.00	0.92	0.00	1.50	279.99	2.00	0.00	0.92	0.00
1.52	268.57	2.00	0.00	0.92	0.00	1.54	263.73	2.00	0.00	0.91	0.00
1.56	261.15	2.00	0.00	0.91	0.00	1.58	296.42	2.00	0.00	0.91	0.00
1.60	295.38	2.00	0.00	0.91	0.00	1.62	275.61	2.00	0.00	0.91	0.00
1.64	228.93	2.00	0.00	0.91	0.00	1.66	198.61	2.00	0.00	0.91	0.00
1.68	179.41	2.00	0.00	0.91	0.00	1.70	162.80	2.00	0.00	0.91	0.00
1.72	150.19	2.00	0.00	0.90	0.00	1.74	150.23	2.00	0.00	0.90	0.00
1.76	172.20	2.00	0.00	0.90	0.00	1.78	218.83	2.00	0.00	0.90	0.00
1.80	273.14	2.00	0.00	0.90	0.00	1.82	338.25	2.00	0.00	0.90	0.00
1.84	169.77	2.00	0.00	0.90	0.00	1.86	172.15	2.00	0.00	0.90	0.00
1.88	173.99	2.00	0.00	0.90	0.00	1.90	175.74	2.00	0.00	0.89	0.00
1.92	176.97	2.00	0.00	0.89	0.00	1.94	177.11	2.00	0.00	0.89	0.00
1.96	178.41	2.00	0.00	0.89	0.00	1.98	181.49	2.00	0.00	0.89	0.00
2.00	185.35	2.00	0.00	0.89	0.00	2.02	187.36	2.00	0.00	0.89	0.00
2.04	188.42	2.00	0.00	0.89	0.00	2.06	191.04	2.00	0.00	0.89	0.00
2.08	191.42	2.00	0.00	0.88	0.00	2.10	188.22	2.00	0.00	0.88	0.00
2.12	180.11	2.00	0.00	0.88	0.00	2.14	172.23	2.00	0.00	0.88	0.00
2.16	164.00	2.00	0.00	0.88	0.00	2.18	152.16	2.00	0.00	0.88	0.00
2.20	137.92	2.00	0.00	0.88	0.00	2.22	231.71	2.00	0.00	0.88	0.00
2.24	114.33	2.00	0.00	0.88	0.00	2.26	104.91	2.00	0.00	0.87	0.00
2.28	106.65	2.00	0.00	0.87	0.00	2.30	116.75	2.00	0.00	0.87	0.00
2.32	134.32	2.00	0.00	0.87	0.00	2.34	177.53	2.00	0.00	0.87	0.00
2.36	297.39	2.00	0.00	0.87	0.00	2.38	171.11	2.00	0.00	0.87	0.00
2.40	184.23	2.00	0.00	0.87	0.00	2.42	180.75	2.00	0.00	0.87	0.00
2.44	170.98	2.00	0.00	0.86	0.00	2.46	167.23	2.00	0.00	0.86	0.00
2.48	166.65	2.00	0.00	0.86	0.00	2.50	164.43	2.00	0.00	0.86	0.00
2.52	157.65	2.00	0.00	0.86	0.00	2.54	148.63	2.00	0.00	0.86	0.00
2.56	134.20	2.00	0.00	0.86	0.00	2.58	100.16	2.00	0.00	0.86	0.00
2.60	117.25	2.00	0.00	0.86	0.00	2.62	145.44	2.00	0.00	0.85	0.00
2.64	180.63	2.00	0.00	0.85	0.00	2.66	208.69	2.00	0.00	0.85	0.00
2.68	226.99	2.00	0.00	0.85	0.00	2.70	242.36	2.00	0.00	0.85	0.00
2.72	257.41	2.00	0.00	0.85	0.00	2.74	269.64	2.00	0.00	0.85	0.00
2.76	282.10	2.00	0.00	0.85	0.00	2.78	294.71	2.00	0.00	0.85	0.00
2.80	309.06	2.00	0.00	0.84	0.00	2.82	321.53	2.00	0.00	0.84	0.00
2.84	331.49	2.00	0.00	0.84	0.00	2.86	336.68	2.00	0.00	0.84	0.00
2.88	339.20	2.00	0.00	0.84	0.00	2.90	340.36	2.00	0.00	0.84	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)
2.92	329.18	2.00	0.00	0.84	0.00	2.94	325.67	2.00	0.00	0.84	0.00
2.96	322.69	2.00	0.00	0.84	0.00	2.98	331.00	2.00	0.00	0.83	0.00
3.00	331.75	2.00	0.00	0.83	0.00	3.02	327.73	2.00	0.00	0.83	0.00
3.04	320.69	2.00	0.00	0.83	0.00	3.06	310.94	2.00	0.00	0.83	0.00
3.08	301.85	2.00	0.00	0.83	0.00	3.10	291.65	2.00	0.00	0.83	0.00
3.12	279.75	2.00	0.00	0.83	0.00	3.14	257.74	2.00	0.00	0.83	0.00
3.16	230.25	2.00	0.00	0.82	0.00	3.18	196.83	2.00	0.00	0.82	0.00
3.20	183.40	2.00	0.00	0.82	0.00	3.22	172.45	2.00	0.00	0.82	0.00
3.24	157.06	2.00	0.00	0.82	0.00	3.26	149.01	2.00	0.00	0.82	0.00
3.28	159.79	2.00	0.00	0.82	0.00	3.30	175.07	2.00	0.00	0.82	0.00
3.32	174.25	2.00	0.00	0.82	0.00	3.34	232.84	2.00	0.00	0.81	0.00
3.36	320.40	2.00	0.00	0.81	0.00	3.38	411.52	2.00	0.00	0.81	0.00
3.40	447.50	2.00	0.00	0.81	0.00	3.42	419.84	2.00	0.00	0.81	0.00
3.44	319.24	2.00	0.00	0.81	0.00	3.46	230.71	2.00	0.00	0.81	0.00
3.48	165.00	2.00	0.00	0.81	0.00	3.50	137.25	2.00	0.00	0.81	0.00
3.52	117.95	2.00	0.00	0.80	0.00	3.54	106.72	2.00	0.00	0.80	0.00
3.56	110.61	2.00	0.00	0.80	0.00	3.58	127.32	2.00	0.00	0.80	0.00
3.60	144.10	2.00	0.00	0.80	0.00	3.62	156.16	2.00	0.00	0.80	0.00
3.64	168.61	2.00	0.00	0.80	0.00	3.66	187.11	2.00	0.00	0.80	0.00
3.68	212.86	2.00	0.00	0.80	0.00	3.70	223.28	2.00	0.00	0.79	0.00
3.72	220.92	2.00	0.00	0.79	0.00	3.74	229.08	2.00	0.00	0.79	0.00
3.76	267.93	2.00	0.00	0.79	0.00	3.78	136.39	2.00	0.00	0.79	0.00
3.80	138.02	2.00	0.00	0.79	0.00	3.82	138.52	2.00	0.00	0.79	0.00
3.84	131.46	2.00	0.00	0.79	0.00	3.86	114.06	2.00	0.00	0.79	0.00
3.88	104.25	2.00	0.00	0.78	0.00	3.90	103.68	2.00	0.00	0.78	0.00
3.92	108.51	2.00	0.00	0.78	0.00	3.94	114.25	2.00	0.00	0.78	0.00
3.96	123.31	2.00	0.00	0.78	0.00	3.98	152.10	2.00	0.00	0.78	0.00
4.00	309.82	2.00	0.00	0.78	0.00	4.02	162.84	2.00	0.00	0.78	0.00
4.04	178.48	2.00	0.00	0.78	0.00	4.06	186.96	2.00	0.00	0.77	0.00
4.08	189.85	2.00	0.00	0.77	0.00	4.10	187.37	2.00	0.00	0.77	0.00
4.12	182.86	2.00	0.00	0.77	0.00	4.14	166.83	2.00	0.00	0.77	0.00
4.16	151.18	2.00	0.00	0.77	0.00	4.18	135.27	2.00	0.00	0.77	0.00
4.20	130.26	2.00	0.00	0.77	0.00	4.22	122.38	2.00	0.00	0.77	0.00
4.24	112.19	2.00	0.00	0.76	0.00	4.26	224.15	2.00	0.00	0.76	0.00
4.28	178.56	2.00	0.00	0.76	0.00	4.30	191.41	2.00	0.00	0.76	0.00
4.32	214.40	2.00	0.00	0.76	0.00	4.34	235.26	2.00	0.00	0.76	0.00
4.36	239.98	2.00	0.00	0.76	0.00	4.38	230.31	2.00	0.00	0.76	0.00
4.40	213.69	2.00	0.00	0.76	0.00	4.42	196.39	2.00	0.00	0.75	0.00
4.44	182.48	2.00	0.00	0.75	0.00	4.46	166.66	2.00	0.00	0.75	0.00
4.48	145.50	2.00	0.00	0.75	0.00	4.50	127.44	2.00	0.00	0.75	0.00
4.52	114.97	2.00	0.00	0.75	0.00	4.54	115.10	2.00	0.00	0.75	0.00
4.56	119.63	2.00	0.00	0.75	0.00	4.58	127.82	2.00	0.00	0.75	0.00
4.60	133.35	2.00	0.00	0.74	0.00	4.62	136.84	2.00	0.00	0.74	0.00
4.64	136.88	2.00	0.00	0.74	0.00	4.66	131.79	2.00	0.00	0.74	0.00
4.68	122.41	2.00	0.00	0.74	0.00	4.70	112.39	2.00	0.00	0.74	0.00
4.72	104.93	2.00	0.00	0.74	0.00	4.74	101.53	2.00	0.00	0.74	0.00
4.76	99.73	2.00	0.00	0.74	0.00	4.78	102.30	2.00	0.00	0.73	0.00
4.80	108.84	2.00	0.00	0.73	0.00	4.82	117.89	2.00	0.00	0.73	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)
4.84	124.86	2.00	0.00	0.73	0.00	4.86	127.28	2.00	0.00	0.73	0.00
4.88	126.56	2.00	0.00	0.73	0.00	4.90	125.30	2.00	0.00	0.73	0.00
4.92	123.27	2.00	0.00	0.73	0.00	4.94	129.13	2.00	0.00	0.73	0.00
4.96	136.50	2.00	0.00	0.72	0.00	4.98	142.60	2.00	0.00	0.72	0.00
5.00	143.74	2.00	0.00	0.72	0.00	5.02	147.36	2.00	0.00	0.72	0.00
5.04	152.32	2.00	0.00	0.72	0.00	5.06	151.28	2.00	0.00	0.72	0.00
5.08	143.50	2.00	0.00	0.72	0.00	5.10	132.46	2.00	0.00	0.72	0.00
5.12	118.20	2.00	0.00	0.72	0.00	5.14	105.28	2.00	0.00	0.71	0.00
5.16	96.61	1.97	0.00	0.71	0.00	5.18	91.70	1.82	0.00	0.71	0.00
5.20	88.23	1.73	0.00	0.71	0.00	5.22	84.68	1.64	0.00	0.71	0.00
5.24	85.60	1.66	0.00	0.71	0.00	5.26	90.40	1.78	0.00	0.71	0.00
5.28	100.71	2.00	0.00	0.71	0.00	5.30	117.96	2.00	0.00	0.71	0.00
5.32	142.51	2.00	0.00	0.70	0.00	5.34	172.41	2.00	0.00	0.70	0.00
5.36	170.83	2.00	0.00	0.70	0.00	5.38	170.62	2.00	0.00	0.70	0.00
5.40	169.56	2.00	0.00	0.70	0.00	5.42	198.18	2.00	0.00	0.70	0.00
5.44	220.36	2.00	0.00	0.70	0.00	5.46	106.34	2.00	0.00	0.70	0.00
5.48	105.46	2.00	0.00	0.70	0.00	5.50	103.96	2.00	0.00	0.69	0.00
5.52	102.43	2.00	0.00	0.69	0.00	5.54	102.24	2.00	0.00	0.69	0.00
5.56	102.97	2.00	0.00	0.69	0.00	5.58	104.29	2.00	0.00	0.69	0.00
5.60	105.02	2.00	0.00	0.69	0.00	5.62	105.36	2.00	0.00	0.69	0.00
5.64	108.03	2.00	0.00	0.69	0.00	5.66	111.44	2.00	0.00	0.69	0.00
5.68	114.24	2.00	0.00	0.68	0.00	5.70	111.97	2.00	0.00	0.68	0.00
5.72	105.32	2.00	0.00	0.68	0.00	5.74	96.59	2.00	0.00	0.68	0.00
5.76	91.84	2.00	0.00	0.68	0.00	5.78	90.96	2.00	0.00	0.68	0.00
5.80	90.10	2.00	0.00	0.68	0.00	5.82	87.55	2.00	0.00	0.68	0.00
5.84	84.75	2.00	0.00	0.68	0.00	5.86	86.52	2.00	0.00	0.67	0.00
5.88	92.15	2.00	0.00	0.67	0.00	5.90	99.10	2.00	0.00	0.67	0.00
5.92	101.27	2.00	0.00	0.67	0.00	5.94	100.30	2.00	0.00	0.67	0.00
5.96	97.58	2.00	0.00	0.67	0.00	5.98	96.15	2.00	0.00	0.67	0.00
6.00	94.36	2.00	0.00	0.67	0.00	6.02	91.11	2.00	0.00	0.67	0.00
6.04	88.65	2.00	0.00	0.66	0.00	6.06	178.90	2.00	0.00	0.66	0.00
6.08	188.38	2.00	0.00	0.66	0.00	6.10	96.91	2.00	0.00	0.66	0.00
6.12	103.56	2.00	0.00	0.66	0.00	6.14	108.81	2.00	0.00	0.66	0.00
6.16	113.15	2.00	0.00	0.66	0.00	6.18	119.76	2.00	0.00	0.66	0.00
6.20	125.56	2.00	0.00	0.66	0.00	6.22	130.03	2.00	0.00	0.65	0.00
6.24	130.05	2.00	0.00	0.65	0.00	6.26	129.61	2.00	0.00	0.65	0.00
6.28	130.71	2.00	0.00	0.65	0.00	6.30	133.87	2.00	0.00	0.65	0.00
6.32	134.77	2.00	0.00	0.65	0.00	6.34	131.71	2.00	0.00	0.65	0.00
6.36	130.03	2.00	0.00	0.65	0.00	6.38	128.63	2.00	0.00	0.65	0.00
6.40	125.63	2.00	0.00	0.64	0.00	6.42	121.74	2.00	0.00	0.64	0.00
6.44	120.38	2.00	0.00	0.64	0.00	6.46	115.97	2.00	0.00	0.64	0.00
6.48	111.85	2.00	0.00	0.64	0.00	6.50	110.21	2.00	0.00	0.64	0.00
6.52	114.92	2.00	0.00	0.64	0.00	6.54	119.55	2.00	0.00	0.64	0.00
6.56	124.38	2.00	0.00	0.64	0.00	6.58	125.88	2.00	0.00	0.63	0.00
6.60	125.22	2.00	0.00	0.63	0.00	6.62	120.51	2.00	0.00	0.63	0.00
6.64	119.52	2.00	0.00	0.63	0.00	6.66	121.36	2.00	0.00	0.63	0.00
6.68	124.96	2.00	0.00	0.63	0.00	6.70	126.71	2.00	0.00	0.63	0.00
6.72	127.27	2.00	0.00	0.63	0.00	6.74	124.16	2.00	0.00	0.63	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)
6.76	121.44	2.00	0.00	0.62	0.00	6.78	119.27	2.00	0.00	0.62	0.00
6.80	119.90	2.00	0.00	0.62	0.00	6.82	119.98	2.00	0.00	0.62	0.00
6.84	117.50	2.00	0.00	0.62	0.00	6.86	114.54	2.00	0.00	0.62	0.00
6.88	112.76	2.00	0.00	0.62	0.00	6.90	111.18	2.00	0.00	0.62	0.00
6.92	108.46	2.00	0.00	0.62	0.00	6.94	103.52	2.00	0.00	0.61	0.00
6.96	99.77	2.00	0.00	0.61	0.00	6.98	96.09	2.00	0.00	0.61	0.00
7.00	94.31	2.00	0.00	0.61	0.00	7.02	91.27	2.00	0.00	0.61	0.00
7.04	89.73	2.00	0.00	0.61	0.00	7.06	87.37	2.00	0.00	0.61	0.00
7.08	86.13	2.00	0.00	0.61	0.00	7.10	85.18	2.00	0.00	0.61	0.00
7.12	85.22	2.00	0.00	0.60	0.00	7.14	85.98	2.00	0.00	0.60	0.00
7.16	86.01	2.00	0.00	0.60	0.00	7.18	85.27	2.00	0.00	0.60	0.00
7.20	83.40	2.00	0.00	0.60	0.00	7.22	81.80	2.00	0.00	0.60	0.00
7.24	81.25	2.00	0.00	0.60	0.00	7.26	81.36	2.00	0.00	0.60	0.00
7.28	81.51	2.00	0.00	0.60	0.00	7.30	81.05	2.00	0.00	0.59	0.00
7.32	80.27	2.00	0.00	0.59	0.00	7.34	80.04	2.00	0.00	0.59	0.00
7.36	80.90	2.00	0.00	0.59	0.00	7.38	83.40	2.00	0.00	0.59	0.00
7.40	82.79	2.00	0.00	0.59	0.00	7.42	81.23	2.00	0.00	0.59	0.00
7.44	78.84	2.00	0.00	0.59	0.00	7.46	79.60	2.00	0.00	0.59	0.00
7.48	81.06	2.00	0.00	0.58	0.00	7.50	82.16	2.00	0.00	0.58	0.00
7.52	83.14	2.00	0.00	0.58	0.00	7.54	84.80	2.00	0.00	0.58	0.00
7.56	85.87	2.00	0.00	0.58	0.00	7.58	86.54	2.00	0.00	0.58	0.00
7.60	86.93	2.00	0.00	0.58	0.00	7.62	88.69	2.00	0.00	0.58	0.00
7.64	90.48	2.00	0.00	0.58	0.00	7.66	90.68	2.00	0.00	0.57	0.00
7.68	89.62	2.00	0.00	0.57	0.00	7.70	88.15	2.00	0.00	0.57	0.00
7.72	87.82	2.00	0.00	0.57	0.00	7.74	87.96	2.00	0.00	0.57	0.00
7.76	89.86	2.00	0.00	0.57	0.00	7.78	87.82	2.00	0.00	0.57	0.00
7.80	82.41	2.00	0.00	0.57	0.00	7.82	133.68	2.00	0.00	0.57	0.00
7.84	69.10	2.00	0.00	0.56	0.00	7.86	69.71	2.00	0.00	0.56	0.00
7.88	71.20	2.00	0.00	0.56	0.00	7.90	74.76	2.00	0.00	0.56	0.00
7.92	82.06	2.00	0.00	0.56	0.00	7.94	125.57	2.00	0.00	0.56	0.00
7.96	209.14	2.00	0.00	0.56	0.00	7.98	111.82	2.00	0.00	0.56	0.00
8.00	241.49	2.00	0.00	0.56	0.00	8.02	204.08	2.00	0.00	0.55	0.00
8.04	186.33	2.00	0.00	0.55	0.00	8.06	202.86	2.00	0.00	0.55	0.00
8.08	111.03	2.00	0.00	0.55	0.00	8.10	108.40	2.00	0.00	0.55	0.00
8.12	105.86	2.00	0.00	0.55	0.00	8.14	106.50	2.00	0.00	0.55	0.00
8.16	228.46	2.00	0.00	0.55	0.00	8.18	194.83	2.00	0.00	0.55	0.00
8.20	193.32	2.00	0.00	0.54	0.00	8.22	225.46	2.00	0.00	0.54	0.00
8.24	108.35	2.00	0.00	0.54	0.00	8.26	102.70	2.00	0.00	0.54	0.00
8.28	97.47	2.00	0.00	0.54	0.00	8.30	95.30	2.00	0.00	0.54	0.00
8.32	91.97	2.00	0.00	0.54	0.00	8.34	86.23	2.00	0.00	0.54	0.00
8.36	107.47	2.00	0.00	0.54	0.00	8.38	78.18	2.00	0.00	0.53	0.00
8.40	78.02	2.00	0.00	0.53	0.00	8.42	78.75	2.00	0.00	0.53	0.00
8.44	80.35	2.00	0.00	0.53	0.00	8.46	97.42	2.00	0.00	0.53	0.00
8.48	147.11	2.00	0.00	0.53	0.00	8.50	161.75	2.00	0.00	0.53	0.00
8.52	73.52	2.00	0.00	0.53	0.00	8.54	70.32	2.00	0.00	0.53	0.00
8.56	70.26	2.00	0.00	0.52	0.00	8.58	71.28	2.00	0.00	0.52	0.00
8.60	73.10	2.00	0.00	0.52	0.00	8.62	78.62	2.00	0.00	0.52	0.00
8.64	131.55	2.00	0.00	0.52	0.00	8.66	102.20	2.00	0.00	0.52	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)
8.68	105.63	2.00	0.00	0.52	0.00	8.70	105.26	2.00	0.00	0.52	0.00
8.72	103.54	2.00	0.00	0.52	0.00	8.74	102.00	2.00	0.00	0.51	0.00
8.76	100.20	2.00	0.00	0.51	0.00	8.78	202.88	2.00	0.00	0.51	0.00
8.80	154.28	2.00	0.00	0.51	0.00	8.82	119.97	2.00	0.00	0.51	0.00
8.84	110.41	2.00	0.00	0.51	0.00	8.86	122.61	2.00	0.00	0.51	0.00
8.88	144.17	2.00	0.00	0.51	0.00	8.90	174.43	2.00	0.00	0.51	0.00
8.92	185.65	2.00	0.00	0.50	0.00	8.94	177.47	2.00	0.00	0.50	0.00
8.96	163.19	2.00	0.00	0.50	0.00	8.98	151.24	2.00	0.00	0.50	0.00
9.00	98.87	2.00	0.00	0.50	0.00	9.02	82.58	2.00	0.00	0.50	0.00
9.04	77.76	2.00	0.00	0.50	0.00	9.06	72.73	2.00	0.00	0.50	0.00
9.08	75.33	2.00	0.00	0.50	0.00	9.10	80.20	2.00	0.00	0.49	0.00
9.12	90.75	2.00	0.00	0.49	0.00	9.14	118.87	2.00	0.00	0.49	0.00
9.16	164.46	2.00	0.00	0.49	0.00	9.18	221.93	2.00	0.00	0.49	0.00
9.20	116.40	2.00	0.00	0.49	0.00	9.22	116.32	2.00	0.00	0.49	0.00
9.24	114.84	2.00	0.00	0.49	0.00	9.26	110.42	2.00	0.00	0.49	0.00
9.28	104.79	2.00	0.00	0.48	0.00	9.30	146.13	2.00	0.00	0.48	0.00
9.32	98.57	2.00	0.00	0.48	0.00	9.34	91.28	2.00	0.00	0.48	0.00
9.36	89.68	2.00	0.00	0.48	0.00	9.38	86.88	2.00	0.00	0.48	0.00
9.40	126.38	2.00	0.00	0.48	0.00	9.42	204.87	2.00	0.00	0.48	0.00
9.44	123.26	2.00	0.00	0.48	0.00	9.46	129.53	2.00	0.00	0.47	0.00
9.48	128.32	2.00	0.00	0.47	0.00	9.50	123.42	2.00	0.00	0.47	0.00
9.52	117.44	2.00	0.00	0.47	0.00	9.54	110.99	2.00	0.00	0.47	0.00
9.56	218.81	2.00	0.00	0.47	0.00	9.58	145.36	2.00	0.00	0.47	0.00
9.60	108.94	2.00	0.00	0.47	0.00	9.62	99.63	1.96	0.00	0.47	0.00
9.64	94.68	1.82	0.00	0.46	0.00	9.66	94.95	1.82	0.00	0.46	0.00
9.68	94.75	1.82	0.00	0.46	0.00	9.70	94.94	1.82	0.00	0.46	0.00
9.72	95.30	1.84	0.00	0.46	0.00	9.74	119.16	2.00	0.00	0.46	0.00
9.76	144.57	2.00	0.00	0.46	0.00	9.78	122.11	2.00	0.00	0.46	0.00
9.80	100.61	2.00	0.00	0.46	0.00	9.82	96.97	2.00	0.00	0.45	0.00
9.84	109.27	2.00	0.00	0.45	0.00	9.86	130.40	2.00	0.00	0.45	0.00
9.88	137.69	2.00	0.00	0.45	0.00	9.90	164.30	2.00	0.00	0.45	0.00
9.92	202.74	2.00	0.00	0.45	0.00	9.94	114.17	2.00	0.00	0.45	0.00
9.96	235.53	2.00	0.00	0.45	0.00	9.98	217.01	2.00	0.00	0.45	0.00
10.00	227.45	2.00	0.00	0.44	0.00	10.02	112.26	2.00	0.00	0.44	0.00
10.04	113.05	2.00	0.00	0.44	0.00	10.06	113.13	2.00	0.00	0.44	0.00
10.08	223.78	2.00	0.00	0.44	0.00	10.10	171.90	2.00	0.00	0.44	0.00
10.12	126.54	2.00	0.00	0.44	0.00	10.14	93.44	2.00	0.00	0.44	0.00
10.16	96.47	2.00	0.00	0.44	0.00	10.18	94.28	2.00	0.00	0.43	0.00
10.20	92.07	1.76	0.00	0.43	0.00	10.22	89.89	1.70	0.00	0.43	0.00
10.24	87.79	1.65	0.00	0.43	0.00	10.26	84.26	1.56	0.00	0.43	0.00
10.28	81.14	2.00	0.00	0.43	0.00	10.30	89.48	2.00	0.00	0.43	0.00
10.32	151.17	2.00	0.00	0.43	0.00	10.34	119.14	2.00	0.00	0.43	0.00
10.36	118.23	2.00	0.00	0.42	0.00	10.38	113.42	2.00	0.00	0.42	0.00
10.40	208.64	2.00	0.00	0.42	0.00	10.42	136.14	2.00	0.00	0.42	0.00
10.44	90.42	2.00	0.00	0.42	0.00	10.46	87.96	2.00	0.00	0.42	0.00
10.48	86.48	2.00	0.00	0.42	0.00	10.50	121.86	2.00	0.00	0.42	0.00
10.52	161.24	2.00	0.00	0.42	0.00	10.54	222.11	2.00	0.00	0.41	0.00
10.56	113.25	2.00	0.00	0.41	0.00	10.58	207.42	2.00	0.00	0.41	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)
10.60	119.68	2.00	0.00	0.41	0.00	10.62	98.97	2.00	0.00	0.41	0.00
10.64	97.71	2.00	0.00	0.41	0.00	10.66	96.46	2.00	0.00	0.41	0.00
10.68	100.69	2.00	0.00	0.41	0.00	10.70	182.91	2.00	0.00	0.41	0.00
10.72	105.60	2.00	0.00	0.40	0.00	10.74	110.14	2.00	0.00	0.40	0.00
10.76	106.49	2.00	0.00	0.40	0.00	10.78	106.46	2.00	0.00	0.40	0.00
10.80	104.78	2.00	0.00	0.40	0.00	10.82	101.93	2.00	0.00	0.40	0.00
10.84	208.08	2.00	0.00	0.40	0.00	10.86	98.75	2.00	0.00	0.40	0.00
10.88	101.04	2.00	0.00	0.40	0.00	10.90	104.48	2.00	0.00	0.39	0.00
10.92	104.30	2.00	0.00	0.39	0.00	10.94	103.01	2.00	0.00	0.39	0.00
10.96	97.50	2.00	0.00	0.39	0.00	10.98	94.13	2.00	0.00	0.39	0.00
11.00	90.20	2.00	0.00	0.39	0.00	11.02	90.03	2.00	0.00	0.39	0.00
11.04	91.10	2.00	0.00	0.39	0.00	11.06	92.58	2.00	0.00	0.39	0.00
11.08	91.00	2.00	0.00	0.38	0.00	11.10	86.29	2.00	0.00	0.38	0.00
11.12	82.52	2.00	0.00	0.38	0.00	11.14	113.43	2.00	0.00	0.38	0.00
11.16	93.30	2.00	0.00	0.38	0.00	11.18	84.09	2.00	0.00	0.38	0.00
11.20	75.97	2.00	0.00	0.38	0.00	11.22	75.51	2.00	0.00	0.38	0.00
11.24	76.53	1.43	0.00	0.38	0.00	11.26	78.74	1.47	0.00	0.37	0.00
11.28	80.25	1.50	0.00	0.37	0.00	11.30	83.49	2.00	0.00	0.37	0.00
11.32	87.99	2.00	0.00	0.37	0.00	11.34	140.41	2.00	0.00	0.37	0.00
11.36	105.02	2.00	0.00	0.37	0.00	11.38	115.93	2.00	0.00	0.37	0.00
11.40	117.99	2.00	0.00	0.37	0.00	11.42	109.58	2.00	0.00	0.37	0.00
11.44	98.27	2.00	0.00	0.36	0.00	11.46	106.37	2.00	0.00	0.36	0.00
11.48	77.67	2.00	0.00	0.36	0.00	11.50	72.65	2.00	0.00	0.36	0.00
11.52	117.71	2.00	0.00	0.36	0.00	11.54	175.80	2.00	0.00	0.36	0.00
11.56	88.05	2.00	0.00	0.36	0.00	11.58	90.33	2.00	0.00	0.36	0.00
11.60	94.39	2.00	0.00	0.36	0.00	11.62	99.38	2.00	0.00	0.35	0.00
11.64	101.71	2.00	0.00	0.35	0.00	11.66	101.79	2.00	0.00	0.35	0.00
11.68	100.81	2.00	0.00	0.35	0.00	11.70	98.65	2.00	0.00	0.35	0.00
11.72	95.58	2.00	0.00	0.35	0.00	11.74	89.94	2.00	0.00	0.35	0.00
11.76	87.27	2.00	0.00	0.35	0.00	11.78	87.25	2.00	0.00	0.35	0.00
11.80	87.82	2.00	0.00	0.34	0.00	11.82	88.22	2.00	0.00	0.34	0.00
11.84	87.26	2.00	0.00	0.34	0.00	11.86	87.79	2.00	0.00	0.34	0.00
11.88	86.53	2.00	0.00	0.34	0.00	11.90	84.31	2.00	0.00	0.34	0.00
11.92	82.25	2.00	0.00	0.34	0.00	11.94	80.88	2.00	0.00	0.34	0.00
11.96	80.75	2.00	0.00	0.34	0.00	11.98	80.62	2.00	0.00	0.33	0.00
12.00	81.44	2.00	0.00	0.33	0.00	12.02	81.88	2.00	0.00	0.33	0.00
12.04	82.52	2.00	0.00	0.33	0.00	12.06	82.78	2.00	0.00	0.33	0.00
12.08	83.72	2.00	0.00	0.33	0.00	12.10	84.97	2.00	0.00	0.33	0.00
12.12	84.92	2.00	0.00	0.33	0.00	12.14	84.20	2.00	0.00	0.33	0.00
12.16	84.40	2.00	0.00	0.32	0.00	12.18	87.49	2.00	0.00	0.32	0.00
12.20	89.07	2.00	0.00	0.32	0.00	12.22	89.19	2.00	0.00	0.32	0.00
12.24	84.37	2.00	0.00	0.32	0.00	12.26	81.59	2.00	0.00	0.32	0.00
12.28	81.62	2.00	0.00	0.32	0.00	12.30	89.62	2.00	0.00	0.32	0.00
12.32	97.00	2.00	0.00	0.32	0.00	12.34	102.20	2.00	0.00	0.31	0.00
12.36	101.92	2.00	0.00	0.31	0.00	12.38	100.67	2.00	0.00	0.31	0.00
12.40	96.30	2.00	0.00	0.31	0.00	12.42	90.44	2.00	0.00	0.31	0.00
12.44	83.08	2.00	0.00	0.31	0.00	12.46	79.10	2.00	0.00	0.31	0.00
12.48	77.44	2.00	0.00	0.31	0.00	12.50	77.48	2.00	0.00	0.31	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)
12.52	77.21	2.00	0.00	0.30	0.00	12.54	77.35	2.00	0.00	0.30	0.00
12.56	77.18	2.00	0.00	0.30	0.00	12.58	76.83	2.00	0.00	0.30	0.00
12.60	75.93	2.00	0.00	0.30	0.00	12.62	75.27	2.00	0.00	0.30	0.00
12.64	74.87	2.00	0.00	0.30	0.00	12.66	75.47	2.00	0.00	0.30	0.00
12.68	76.26	2.00	0.00	0.30	0.00	12.70	77.18	2.00	0.00	0.29	0.00
12.72	77.76	2.00	0.00	0.29	0.00	12.74	77.95	2.00	0.00	0.29	0.00
12.76	77.96	2.00	0.00	0.29	0.00	12.78	77.54	2.00	0.00	0.29	0.00
12.80	76.84	2.00	0.00	0.29	0.00	12.82	75.70	2.00	0.00	0.29	0.00
12.84	74.22	2.00	0.00	0.29	0.00	12.86	72.80	2.00	0.00	0.29	0.00
12.88	71.84	2.00	0.00	0.28	0.00	12.90	71.72	2.00	0.00	0.28	0.00
12.92	72.04	2.00	0.00	0.28	0.00	12.94	72.67	2.00	0.00	0.28	0.00
12.96	72.83	2.00	0.00	0.28	0.00	12.98	72.66	2.00	0.00	0.28	0.00
13.00	72.15	2.00	0.00	0.28	0.00	13.02	71.78	2.00	0.00	0.28	0.00
13.04	71.62	2.00	0.00	0.28	0.00	13.06	71.37	2.00	0.00	0.27	0.00
13.08	70.89	2.00	0.00	0.27	0.00	13.10	70.60	2.00	0.00	0.27	0.00
13.12	70.48	2.00	0.00	0.27	0.00	13.14	70.57	2.00	0.00	0.27	0.00
13.16	70.12	2.00	0.00	0.27	0.00	13.18	69.83	2.00	0.00	0.27	0.00
13.20	70.79	2.00	0.00	0.27	0.00	13.22	73.46	2.00	0.00	0.27	0.00
13.24	76.66	2.00	0.00	0.26	0.00	13.26	79.72	2.00	0.00	0.26	0.00
13.28	82.33	2.00	0.00	0.26	0.00	13.30	84.45	2.00	0.00	0.26	0.00
13.32	84.67	2.00	0.00	0.26	0.00	13.34	83.18	2.00	0.00	0.26	0.00
13.36	81.59	1.61	0.00	0.26	0.00	13.38	69.39	1.37	0.00	0.26	0.00
13.40	131.71	2.00	0.00	0.26	0.00	13.42	188.11	2.00	0.00	0.25	0.00
13.44	201.95	2.00	0.00	0.25	0.00	13.46	211.90	2.00	0.00	0.25	0.00
13.48	216.36	2.00	0.00	0.25	0.00	13.50	227.24	2.00	0.00	0.25	0.00
13.52	230.55	2.00	0.00	0.25	0.00	13.54	234.97	2.00	0.00	0.25	0.00
13.56	228.69	2.00	0.00	0.25	0.00	13.58	218.62	2.00	0.00	0.25	0.00
13.60	204.04	2.00	0.00	0.24	0.00	13.62	191.07	2.00	0.00	0.24	0.00
13.64	183.63	2.00	0.00	0.24	0.00	13.66	185.28	2.00	0.00	0.24	0.00
13.68	196.32	2.00	0.00	0.24	0.00	13.70	206.40	2.00	0.00	0.24	0.00
13.72	214.78	2.00	0.00	0.24	0.00	13.74	218.32	2.00	0.00	0.24	0.00
13.76	219.18	2.00	0.00	0.24	0.00	13.78	219.64	2.00	0.00	0.23	0.00
13.80	220.62	2.00	0.00	0.23	0.00	13.82	223.93	2.00	0.00	0.23	0.00
13.84	226.10	2.00	0.00	0.23	0.00	13.86	221.38	2.00	0.00	0.23	0.00
13.88	214.30	2.00	0.00	0.23	0.00	13.90	199.74	2.00	0.00	0.23	0.00
13.92	191.01	2.00	0.00	0.23	0.00	13.94	183.60	2.00	0.00	0.23	0.00
13.96	185.80	2.00	0.00	0.22	0.00	13.98	185.60	2.00	0.00	0.22	0.00
14.00	179.51	2.00	0.00	0.22	0.00	14.02	181.20	2.00	0.00	0.22	0.00
14.04	188.36	2.00	0.00	0.22	0.00	14.06	193.33	2.00	0.00	0.22	0.00
14.08	201.98	2.00	0.00	0.22	0.00	14.10	226.53	2.00	0.00	0.22	0.00
14.12	250.31	2.00	0.00	0.22	0.00	14.14	270.61	2.00	0.00	0.21	0.00
14.16	285.57	2.00	0.00	0.21	0.00	14.18	304.91	2.00	0.00	0.21	0.00
14.20	318.77	2.00	0.00	0.21	0.00	14.22	336.69	2.00	0.00	0.21	0.00
14.24	349.68	2.00	0.00	0.21	0.00	14.26	362.40	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)

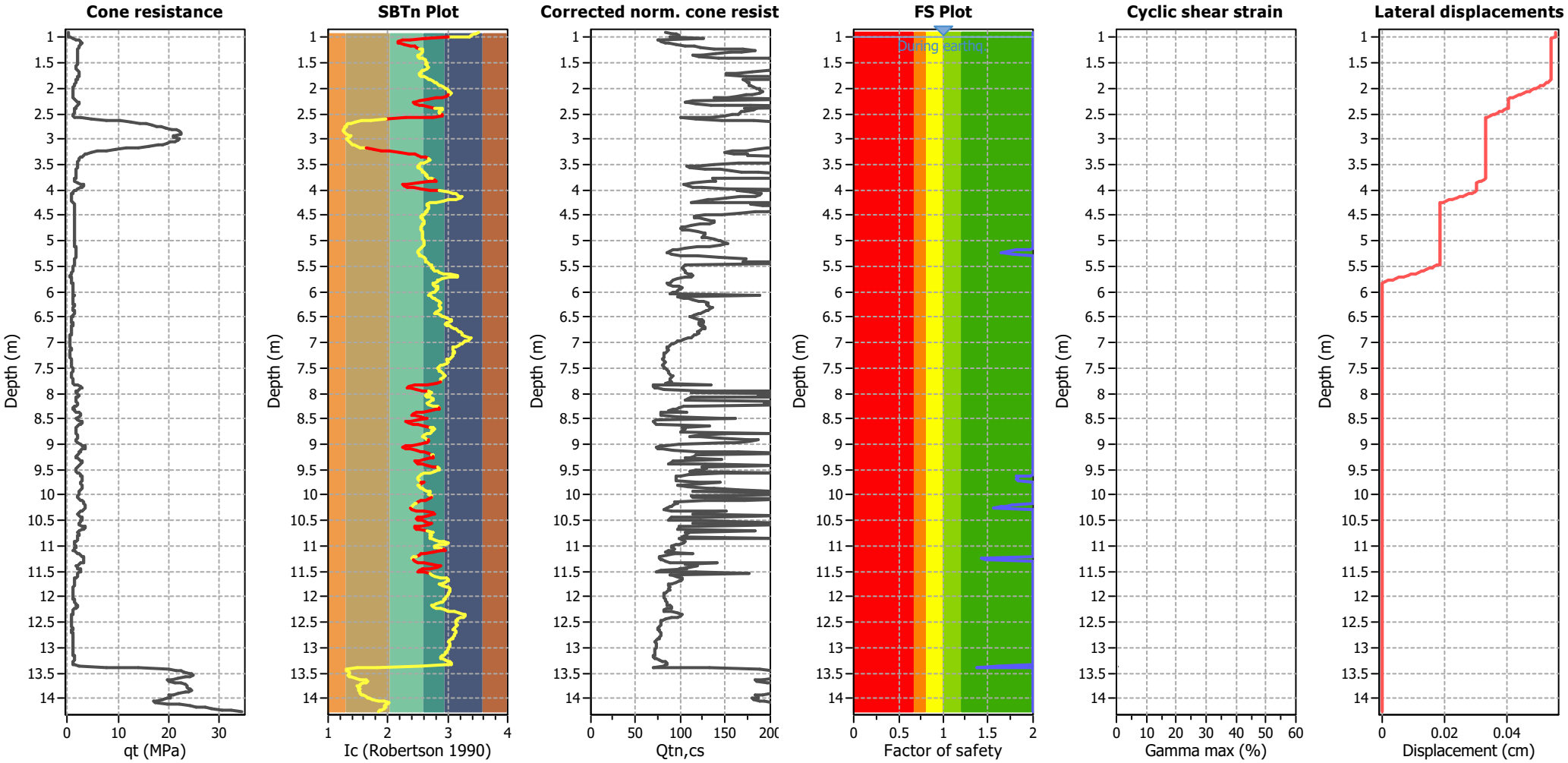
Total estimated settlement: 0.00

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

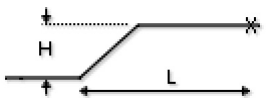
Geometric parameters: Level ground (or gently sloping) with free face (L: 41.40 m - H: 2.90 m)



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)
1.00	0.52	10.04	2.99	88.51	2.00	0.00	0.09	0.00
1.02	1.05	20.47	1.81	125.21	2.00	14.64	0.00	0.00
1.04	1.69	33.12	1.36	74.64	2.00	30.53	0.00	0.00
1.06	2.23	43.77	1.21	76.46	2.00	39.73	0.00	0.00
1.08	2.56	50.17	1.13	78.80	2.00	44.23	0.00	0.00
1.10	2.75	53.97	1.16	82.54	2.00	46.65	0.00	0.00
1.12	2.78	54.56	1.32	87.02	2.00	47.00	0.00	0.00
1.14	2.62	51.27	1.67	94.69	2.00	44.95	0.00	0.00
1.16	2.42	47.34	2.09	104.73	2.00	42.32	0.00	0.00
1.18	2.27	44.41	2.49	114.91	2.00	40.21	0.00	0.00
1.20	2.18	42.75	2.78	122.35	2.00	38.95	0.00	0.00
1.22	2.10	41.13	3.08	136.53	2.00	37.68	0.00	0.00
1.24	1.98	38.75	3.32	168.99	2.00	35.71	0.00	0.00
1.26	1.90	37.21	3.38	183.12	2.00	34.37	0.00	0.00
1.28	1.88	36.64	3.21	168.42	2.00	33.86	0.00	0.00
1.30	1.86	36.33	3.07	156.60	2.00	33.58	0.00	0.00
1.32	1.88	36.74	2.91	139.61	2.00	33.95	0.00	0.00
1.34	1.94	37.94	2.78	123.06	2.00	35.01	0.00	0.00
1.36	2.05	40.12	2.76	113.44	2.00	36.86	0.00	0.00
1.38	2.13	41.53	2.90	120.17	2.00	38.00	0.00	0.00
1.40	2.15	41.92	3.18	142.58	2.00	38.30	0.00	0.00
1.42	2.05	40.01	3.67	198.55	2.00	36.76	0.00	0.00
1.44	2.03	39.63	4.01	237.85	2.00	36.45	0.00	0.00
1.46	2.02	39.39	4.25	268.11	2.00	36.25	0.00	0.00
1.48	2.04	39.86	4.24	264.31	2.00	36.64	0.00	0.00
1.50	2.00	39.01	4.32	279.99	2.00	35.93	0.00	0.00
1.52	1.97	38.50	4.20	268.57	2.00	35.49	0.00	0.00
1.54	1.93	37.64	4.11	263.73	2.00	34.75	0.00	0.00
1.56	1.86	36.17	4.00	261.15	2.00	33.44	0.00	0.00
1.58	1.77	34.40	4.17	296.42	2.00	31.77	0.00	0.00
1.60	1.77	34.44	4.16	295.38	2.00	31.82	0.00	0.00
1.62	1.85	35.93	4.10	275.61	2.00	33.22	0.00	0.00
1.64	1.99	38.77	3.87	228.93	2.00	35.72	0.00	0.00
1.66	2.10	40.98	3.71	198.61	2.00	37.56	0.00	0.00
1.68	2.18	42.56	3.59	179.41	2.00	38.80	0.00	0.00
1.70	2.23	43.47	3.46	162.80	2.00	39.50	0.00	0.00
1.72	2.33	45.42	3.40	150.19	2.00	40.95	0.00	0.00
1.74	2.35	45.82	3.42	150.23	2.00	41.24	0.00	0.00
1.76	2.29	44.64	3.61	172.20	2.00	40.38	0.00	0.00
1.78	2.14	41.57	3.92	218.83	2.00	38.02	0.00	0.00
1.80	2.01	39.08	4.26	273.14	2.00	35.99	0.00	0.00
1.82	1.90	36.89	4.62	338.25	2.00	34.08	0.00	0.00
1.84	1.80	34.97	4.84	169.77	2.00	32.32	0.03	0.00
1.86	1.70	33.02	5.07	172.15	2.00	30.43	0.04	0.00
1.88	1.64	31.67	5.25	173.99	2.00	29.05	0.04	0.00
1.90	1.57	30.42	5.44	175.74	2.00	27.72	0.04	0.00
1.92	1.50	29.04	5.63	176.97	2.00	26.19	0.04	0.00
1.94	1.40	27.04	5.85	177.11	2.00	23.83	0.05	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)
1.96	1.31	25.30	6.14	178.41	2.00	21.63	0.05	0.00
1.98	1.24	23.92	6.52	181.49	2.00	19.78	0.05	0.00
2.00	1.17	22.46	7.01	185.35	2.00	17.71	0.05	0.00
2.02	1.13	21.59	7.32	187.36	2.00	16.40	0.06	0.00
2.04	1.12	21.43	7.43	188.42	2.00	16.16	0.06	0.00
2.06	1.13	21.59	7.56	191.04	2.00	16.40	0.06	0.00
2.08	1.09	20.84	7.77	191.42	2.00	15.24	0.06	0.00
2.10	1.03	19.59	7.86	188.22	2.00	13.20	0.06	0.00
2.12	0.99	18.85	7.47	180.11	2.00	11.92	0.06	0.00
2.14	1.00	18.98	6.88	172.23	2.00	12.15	0.06	0.00
2.16	1.03	19.55	6.19	164.00	2.00	13.13	0.06	0.00
2.18	1.09	20.89	5.24	152.16	2.00	15.31	0.06	0.00
2.20	1.24	23.65	4.18	137.92	2.00	19.41	0.05	0.00
2.22	1.47	28.20	3.22	231.71	2.00	25.22	0.00	0.00
2.24	1.81	34.96	2.51	114.33	2.00	32.31	0.00	0.00
2.26	2.08	40.40	2.22	104.91	2.00	37.09	0.00	0.00
2.28	2.25	43.61	2.22	106.65	2.00	39.61	0.00	0.00
2.30	2.22	43.12	2.56	116.75	2.00	39.23	0.00	0.00
2.32	2.12	41.12	3.03	134.32	2.00	37.67	0.00	0.00
2.34	2.04	39.40	3.41	177.53	2.00	36.25	0.00	0.00
2.36	1.81	35.03	4.18	297.39	2.00	32.38	0.00	0.00
2.38	1.59	30.54	5.18	171.11	2.00	27.86	0.04	0.00
2.40	1.34	25.65	6.38	184.23	2.00	22.09	0.05	0.00
2.42	1.28	24.54	6.34	180.75	2.00	20.64	0.05	0.00
2.44	1.34	25.71	5.65	170.98	2.00	22.16	0.05	0.00
2.46	1.35	25.80	5.44	167.23	2.00	22.28	0.05	0.00
2.48	1.30	24.82	5.52	166.65	2.00	21.01	0.05	0.00
2.50	1.18	22.42	5.71	164.43	2.00	17.65	0.05	0.00
2.52	1.11	21.08	5.50	157.65	2.00	15.61	0.06	0.00
2.54	1.10	20.83	5.01	148.63	2.00	15.22	0.06	0.00
2.56	1.30	24.79	3.89	134.20	2.00	20.96	0.05	0.00
2.58	2.64	51.20	1.84	100.16	2.00	44.91	0.00	0.00
2.60	4.69	91.71	1.08	117.25	2.00	64.14	0.00	0.00
2.62	7.72	145.44	0.74	145.44	2.00	79.36	0.00	0.00
2.64	10.30	180.63	0.58	180.63	2.00	86.52	0.00	0.00
2.66	12.56	208.69	0.47	208.69	2.00	91.28	0.00	0.00
2.68	14.22	226.99	0.38	226.99	2.00	94.06	0.00	0.00
2.70	15.52	242.36	0.36	242.36	2.00	96.22	0.00	0.00
2.72	16.71	257.41	0.35	257.41	2.00	98.21	0.00	0.00
2.74	17.67	269.64	0.35	269.64	2.00	99.74	0.00	0.00
2.76	18.65	282.10	0.35	282.10	2.00	100.00	0.00	0.00
2.78	19.61	294.71	0.36	294.71	2.00	100.00	0.00	0.00
2.80	20.67	309.06	0.37	309.06	2.00	100.00	0.00	0.00
2.82	21.55	321.53	0.39	321.53	2.00	100.00	0.00	0.00
2.84	22.23	331.49	0.41	331.49	2.00	100.00	0.00	0.00
2.86	22.45	336.68	0.44	336.68	2.00	100.00	0.00	0.00
2.88	22.55	339.20	0.46	339.20	2.00	100.00	0.00	0.00
2.90	22.52	340.36	0.49	340.36	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)
2.92	21.28	329.18	0.57	329.18	2.00	100.00	0.00	0.00
2.94	21.05	325.67	0.57	325.67	2.00	100.00	0.00	0.00
2.96	20.93	322.69	0.56	322.69	2.00	100.00	0.00	0.00
2.98	22.09	331.00	0.47	331.00	2.00	100.00	0.00	0.00
3.00	22.14	331.75	0.48	331.75	2.00	100.00	0.00	0.00
3.02	21.80	327.73	0.50	327.73	2.00	100.00	0.00	0.00
3.04	21.20	320.69	0.52	320.69	2.00	100.00	0.00	0.00
3.06	20.43	310.94	0.54	310.94	2.00	100.00	0.00	0.00
3.08	19.71	301.85	0.56	301.85	2.00	100.00	0.00	0.00
3.10	18.90	291.65	0.58	291.65	2.00	100.00	0.00	0.00
3.12	17.99	279.75	0.60	279.75	2.00	100.00	0.00	0.00
3.14	16.29	257.74	0.64	257.74	2.00	98.25	0.00	0.00
3.16	14.18	230.25	0.71	230.25	2.00	94.53	0.00	0.00
3.18	11.67	196.83	0.84	196.83	2.00	89.35	0.00	0.00
3.20	9.54	167.90	1.03	183.40	2.00	84.10	0.00	0.00
3.22	7.59	140.61	1.32	172.45	2.00	78.25	0.00	0.00
3.24	6.06	118.21	1.74	157.06	2.00	72.52	0.00	0.00
3.26	4.78	93.26	2.37	149.01	2.00	64.70	0.00	0.00
3.28	3.95	76.92	3.11	159.79	2.00	58.34	0.00	0.00
3.30	3.40	65.97	3.82	175.07	2.00	53.27	0.00	0.00
3.32	3.16	61.19	4.20	174.25	2.00	50.79	0.00	0.00
3.34	2.90	56.09	4.63	232.84	2.00	47.91	0.00	0.00
3.36	2.63	50.74	5.16	320.40	2.00	44.61	0.00	0.00
3.38	2.42	46.66	5.62	411.52	2.00	41.84	0.00	0.00
3.40	2.29	44.10	5.72	447.50	2.00	39.98	0.00	0.00
3.42	2.21	42.47	5.44	419.84	2.00	38.74	0.00	0.00
3.44	2.15	41.33	4.67	319.24	2.00	37.84	0.00	0.00
3.46	2.10	40.24	3.90	230.71	2.00	36.95	0.00	0.00
3.48	2.05	39.22	3.24	165.00	2.00	36.11	0.00	0.00
3.50	2.02	38.59	2.91	137.25	2.00	35.57	0.00	0.00
3.52	2.00	38.27	2.68	117.95	2.00	35.30	0.00	0.00
3.54	1.98	37.92	2.52	106.72	2.00	34.99	0.00	0.00
3.56	1.93	36.85	2.52	110.61	2.00	34.05	0.00	0.00
3.58	1.84	35.11	2.63	127.32	2.00	32.45	0.00	0.00
3.60	1.80	34.36	2.77	144.10	2.00	31.74	0.00	0.00
3.62	1.80	34.26	2.89	156.16	2.00	31.64	0.00	0.00
3.64	1.79	34.12	3.00	168.61	2.00	31.51	0.00	0.00
3.66	1.75	33.29	3.13	187.11	2.00	30.69	0.00	0.00
3.68	1.69	32.14	3.28	212.86	2.00	29.54	0.00	0.00
3.70	1.68	31.79	3.34	223.28	2.00	29.17	0.00	0.00
3.72	1.68	31.94	3.33	220.92	2.00	29.33	0.00	0.00
3.74	1.66	31.45	3.37	229.08	2.00	28.81	0.00	0.00
3.76	1.56	29.54	3.53	267.93	2.00	26.75	0.00	0.00
3.78	1.42	26.64	3.81	136.39	2.00	23.35	0.05	0.00
3.80	1.31	24.48	4.02	138.02	2.00	20.55	0.05	0.00
3.82	1.26	23.56	4.11	138.52	2.00	19.29	0.05	0.00
3.84	1.45	27.25	3.56	131.46	2.00	24.09	0.05	0.00
3.86	2.05	39.06	2.52	114.06	2.00	35.97	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)
3.88	2.74	52.78	1.93	104.25	2.00	45.91	0.00	0.00
3.90	3.21	60.81	1.72	103.68	2.00	50.58	0.00	0.00
3.92	3.19	60.71	1.89	108.51	2.00	50.53	0.00	0.00
3.94	2.92	56.35	2.17	114.25	2.00	48.07	0.00	0.00
3.96	2.53	48.52	2.62	123.31	2.00	43.13	0.00	0.00
3.98	2.10	40.11	3.13	152.10	2.00	36.85	0.00	0.00
4.00	1.68	31.76	3.98	309.82	2.00	29.14	0.00	0.00
4.02	1.35	25.23	5.16	162.84	2.00	21.54	0.05	0.00
4.04	1.10	20.35	6.77	178.48	2.00	14.44	0.06	0.00
4.06	0.98	17.96	7.95	186.96	2.00	10.33	0.06	0.00
4.08	0.92	16.66	8.60	189.85	2.00	7.86	0.07	0.00
4.10	0.88	15.86	8.69	187.37	2.00	6.22	0.07	0.00
4.12	0.82	14.73	8.76	182.86	2.00	3.78	0.07	0.00
4.14	0.69	12.22	8.44	166.83	2.00	0.00	0.08	0.00
4.16	0.67	11.73	7.18	151.18	2.00	0.00	0.08	0.00
4.18	0.68	11.91	5.71	135.27	2.00	0.00	0.08	0.00
4.20	0.80	14.32	4.74	130.26	2.00	2.86	0.07	0.00
4.22	0.89	16.06	3.96	122.38	2.00	6.65	0.07	0.00
4.24	1.05	19.30	3.12	112.19	2.00	12.70	0.06	0.00
4.26	1.22	22.64	2.65	224.15	2.00	17.97	0.00	0.00
4.28	1.35	25.18	2.50	178.56	2.00	21.48	0.00	0.00
4.30	1.39	25.92	2.66	191.41	2.00	22.44	0.00	0.00
4.32	1.39	25.95	2.84	214.40	2.00	22.47	0.00	0.00
4.34	1.38	25.75	2.98	235.26	2.00	22.23	0.00	0.00
4.36	1.39	25.98	3.03	239.98	2.00	22.51	0.00	0.00
4.38	1.42	26.58	3.01	230.31	2.00	23.27	0.00	0.00
4.40	1.47	27.43	2.95	213.69	2.00	24.31	0.00	0.00
4.42	1.50	28.06	2.85	196.39	2.00	25.06	0.00	0.00
4.44	1.51	28.23	2.75	182.48	2.00	25.25	0.00	0.00
4.46	1.50	28.04	2.60	166.66	2.00	25.03	0.00	0.00
4.48	1.49	27.88	2.39	145.50	2.00	24.84	0.00	0.00
4.50	1.49	27.85	2.22	127.44	2.00	24.80	0.00	0.00
4.52	1.49	27.83	2.09	114.97	2.00	24.78	0.00	0.00
4.54	1.48	27.52	2.07	115.10	2.00	24.41	0.00	0.00
4.56	1.45	27.04	2.09	119.63	2.00	23.84	0.00	0.00
4.58	1.42	26.50	2.13	127.82	2.00	23.17	0.00	0.00
4.60	1.40	26.05	2.16	133.35	2.00	22.61	0.00	0.00
4.62	1.39	25.75	2.17	136.84	2.00	22.22	0.00	0.00
4.64	1.38	25.56	2.16	136.88	2.00	21.98	0.00	0.00
4.66	1.39	25.64	2.12	131.79	2.00	22.08	0.00	0.00
4.68	1.41	25.92	2.04	122.41	2.00	22.43	0.00	0.00
4.70	1.44	26.27	1.97	112.39	2.00	22.87	0.00	0.00
4.72	1.46	26.39	1.90	104.93	2.00	23.03	0.00	0.00
4.74	1.46	26.33	1.86	101.53	2.00	22.95	0.00	0.00
4.76	1.46	26.22	1.83	99.73	2.00	22.82	0.00	0.00
4.78	1.45	26.13	1.85	102.30	2.00	22.70	0.00	0.00
4.80	1.44	25.94	1.91	108.84	2.00	22.46	0.00	0.00
4.82	1.43	25.72	1.99	117.89	2.00	22.18	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)
4.84	1.43	25.75	2.06	124.86	2.00	22.21	0.00	0.00
4.86	1.46	26.19	2.11	127.28	2.00	22.78	0.00	0.00
4.88	1.50	26.85	2.14	126.56	2.00	23.60	0.00	0.00
4.90	1.53	27.33	2.16	125.30	2.00	24.19	0.00	0.00
4.92	1.55	27.49	2.15	123.27	2.00	24.38	0.00	0.00
4.94	1.54	27.44	2.20	129.13	2.00	24.31	0.00	0.00
4.96	1.54	27.36	2.27	136.50	2.00	24.22	0.00	0.00
4.98	1.54	27.40	2.33	142.60	2.00	24.27	0.00	0.00
5.00	1.54	27.33	2.33	143.74	2.00	24.19	0.00	0.00
5.02	1.54	27.13	2.35	147.36	2.00	23.94	0.00	0.00
5.04	1.52	26.78	2.38	152.32	2.00	23.52	0.00	0.00
5.06	1.51	26.63	2.36	151.28	2.00	23.33	0.00	0.00
5.08	1.52	26.67	2.29	143.50	2.00	23.38	0.00	0.00
5.10	1.55	26.97	2.20	132.46	2.00	23.74	0.00	0.00
5.12	1.60	27.62	2.10	118.20	2.00	24.53	0.00	0.00
5.14	1.66	28.43	2.01	105.28	2.00	25.49	0.00	0.00
5.16	1.71	29.20	1.96	96.61	1.97	26.36	0.00	0.00
5.18	1.75	29.66	1.92	91.70	1.82	26.89	0.00	0.00
5.20	1.77	29.96	1.90	88.23	1.73	27.22	0.00	0.00
5.22	1.79	30.12	1.86	84.68	1.64	27.39	0.00	0.00
5.24	1.78	29.91	1.86	85.60	1.66	27.16	0.00	0.00
5.26	1.75	29.48	1.90	90.40	1.78	26.68	0.00	0.00
5.28	1.71	28.77	1.98	100.71	2.00	25.88	0.00	0.00
5.30	1.66	28.05	2.12	117.96	2.00	25.04	0.00	0.00
5.32	1.60	27.14	2.31	142.51	2.00	23.96	0.00	0.00
5.34	1.54	26.21	2.51	172.41	2.00	22.80	0.00	0.00
5.36	1.55	26.26	2.50	170.83	2.00	22.86	0.00	0.00
5.38	1.54	26.15	2.49	170.62	2.00	22.73	0.00	0.00
5.40	1.53	25.78	2.45	169.56	2.00	22.25	0.00	0.00
5.42	1.44	24.32	2.57	198.18	2.00	20.33	0.00	0.00
5.44	1.37	23.15	2.64	220.36	2.00	18.71	0.00	0.00
5.46	1.31	22.19	2.68	106.34	2.00	17.31	0.05	0.00
5.48	1.27	21.44	2.67	105.46	2.00	16.17	0.06	0.00
5.50	1.24	20.80	2.63	103.96	2.00	15.18	0.06	0.00
5.52	1.21	20.32	2.59	102.43	2.00	14.40	0.06	0.00
5.54	1.18	19.74	2.60	102.24	2.00	13.45	0.06	0.00
5.56	1.14	19.00	2.67	102.97	2.00	12.18	0.06	0.00
5.58	1.09	18.19	2.77	104.29	2.00	10.75	0.06	0.00
5.60	1.02	17.09	2.87	105.02	2.00	8.69	0.07	0.00
5.62	0.95	15.88	2.97	105.36	2.00	6.26	0.07	0.00
5.64	0.83	13.89	3.30	108.03	2.00	1.85	0.08	0.00
5.66	0.72	11.68	3.83	111.44	2.00	0.00	0.08	0.00
5.68	0.61	9.59	4.53	114.24	2.00	0.00	0.09	0.00
5.70	0.61	9.61	4.34	111.97	2.00	0.00	0.09	0.00
5.72	0.70	11.19	3.51	105.32	2.00	0.00	0.09	0.00
5.74	0.81	13.19	2.73	96.59	2.00	0.14	0.08	0.00
5.76	0.88	14.22	2.41	91.84	2.00	2.62	0.08	0.00
5.78	0.90	14.38	2.35	90.96	2.00	3.00	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)
5.80	0.92	14.69	2.29	90.10	2.00	3.68	0.07	0.00
5.82	0.95	15.21	2.15	87.55	2.00	4.84	0.07	0.00
5.84	1.00	15.87	1.99	84.75	2.00	6.25	0.07	0.00
5.86	1.02	16.22	2.06	86.52	2.00	6.97	0.07	0.00
5.88	1.02	16.27	2.31	92.15	2.00	7.06	0.07	0.00
5.90	1.01	16.11	2.64	99.10	2.00	6.73	0.07	0.00
5.92	1.01	16.10	2.75	101.27	2.00	6.71	0.07	0.00
5.94	1.01	16.15	2.70	100.30	2.00	6.83	0.07	0.00
5.96	1.03	16.31	2.56	97.58	2.00	7.15	0.07	0.00
5.98	1.04	16.41	2.48	96.15	2.00	7.35	0.07	0.00
6.00	1.07	16.74	2.38	94.36	2.00	8.01	0.07	0.00
6.02	1.11	17.32	2.21	91.11	2.00	9.13	0.07	0.00
6.04	1.18	18.30	2.07	88.65	2.00	10.95	0.06	0.00
6.06	1.23	19.11	1.99	178.90	2.00	12.37	0.00	0.00
6.08	1.26	19.55	2.10	188.38	2.00	13.13	0.00	0.00
6.10	1.25	19.39	2.38	96.91	2.00	12.85	0.06	0.00
6.12	1.22	19.11	2.68	103.56	2.00	12.37	0.06	0.00
6.14	1.21	18.92	2.93	108.81	2.00	12.05	0.06	0.00
6.16	1.20	18.76	3.15	113.15	2.00	11.77	0.06	0.00
6.18	1.19	18.63	3.48	119.76	2.00	11.54	0.06	0.00
6.20	1.18	18.58	3.79	125.56	2.00	11.45	0.06	0.00
6.22	1.20	18.85	4.00	130.03	2.00	11.93	0.06	0.00
6.24	1.23	19.33	3.95	130.05	2.00	12.75	0.06	0.00
6.26	1.26	19.78	3.89	129.61	2.00	13.52	0.06	0.00
6.28	1.26	19.69	3.95	130.71	2.00	13.36	0.06	0.00
6.30	1.25	19.47	4.14	133.87	2.00	12.99	0.06	0.00
6.32	1.23	19.22	4.21	134.77	2.00	12.56	0.06	0.00
6.34	1.24	19.29	4.04	131.71	2.00	12.68	0.06	0.00
6.36	1.25	19.27	3.95	130.03	2.00	12.65	0.06	0.00
6.38	1.30	20.01	3.82	128.63	2.00	13.89	0.06	0.00
6.40	1.38	21.19	3.58	125.63	2.00	15.78	0.06	0.00
6.42	1.39	21.18	3.40	121.74	2.00	15.77	0.06	0.00
6.44	1.29	19.54	3.44	120.38	2.00	13.11	0.06	0.00
6.46	1.12	16.89	3.43	115.97	2.00	8.30	0.07	0.00
6.48	1.01	15.11	3.38	111.85	2.00	4.63	0.07	0.00
6.50	0.94	13.99	3.40	110.21	2.00	2.09	0.08	0.00
6.52	0.90	13.25	3.79	114.92	2.00	0.30	0.08	0.00
6.54	0.88	12.87	4.15	119.55	2.00	0.00	0.08	0.00
6.56	0.88	12.89	4.47	124.38	2.00	0.00	0.08	0.00
6.58	0.89	12.97	4.56	125.88	2.00	0.00	0.08	0.00
6.60	0.94	13.75	4.37	125.22	2.00	1.52	0.08	0.00
6.62	0.98	14.41	3.97	120.51	2.00	3.06	0.07	0.00
6.64	0.99	14.54	3.89	119.52	2.00	3.36	0.07	0.00
6.66	0.96	13.99	4.08	121.36	2.00	2.09	0.08	0.00
6.68	0.91	13.15	4.46	124.96	2.00	0.05	0.08	0.00
6.70	0.88	12.63	4.69	126.71	2.00	0.00	0.08	0.00
6.72	0.84	11.88	4.91	127.27	2.00	0.00	0.08	0.00
6.74	0.80	11.15	4.86	124.16	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)
6.76	0.75	10.42	4.84	121.44	2.00	0.00	0.09	0.00
6.78	0.71	9.78	4.86	119.27	2.00	0.00	0.09	0.00
6.80	0.68	9.22	5.10	119.90	2.00	0.00	0.09	0.00
6.82	0.67	8.93	5.21	119.98	2.00	0.00	0.10	0.00
6.84	0.66	8.78	5.04	117.50	2.00	0.00	0.10	0.00
6.86	0.63	8.33	4.95	114.54	2.00	0.00	0.10	0.00
6.88	0.58	7.53	5.11	112.76	2.00	0.00	0.10	0.00
6.90	0.53	6.63	5.40	111.18	2.00	0.00	0.11	0.00
6.92	0.50	6.19	5.36	108.46	2.00	0.00	0.11	0.00
6.94	0.50	6.09	4.88	103.52	2.00	0.00	0.11	0.00
6.96	0.50	6.14	4.47	99.77	2.00	0.00	0.11	0.00
6.98	0.52	6.35	4.02	96.09	2.00	0.00	0.11	0.00
7.00	0.53	6.56	3.77	94.31	2.00	0.00	0.11	0.00
7.02	0.55	6.77	3.43	91.27	2.00	0.00	0.11	0.00
7.04	0.56	6.92	3.26	89.73	2.00	0.00	0.11	0.00
7.06	0.58	7.19	3.00	87.37	2.00	0.00	0.11	0.00
7.08	0.60	7.62	2.81	86.13	2.00	0.00	0.10	0.00
7.10	0.63	8.09	2.65	85.18	2.00	0.00	0.10	0.00
7.12	0.66	8.41	2.60	85.22	2.00	0.00	0.10	0.00
7.14	0.66	8.41	2.65	85.98	2.00	0.00	0.10	0.00
7.16	0.64	8.15	2.70	86.01	2.00	0.00	0.10	0.00
7.18	0.63	7.89	2.70	85.27	2.00	0.00	0.10	0.00
7.20	0.62	7.80	2.58	83.40	2.00	0.00	0.10	0.00
7.22	0.63	7.90	2.46	81.80	2.00	0.00	0.10	0.00
7.24	0.64	7.96	2.41	81.25	2.00	0.00	0.10	0.00
7.26	0.64	8.01	2.41	81.36	2.00	0.00	0.10	0.00
7.28	0.64	8.02	2.41	81.51	2.00	0.00	0.10	0.00
7.30	0.65	8.20	2.36	81.05	2.00	0.00	0.10	0.00
7.32	0.68	8.61	2.25	80.27	2.00	0.00	0.10	0.00
7.34	0.72	9.23	2.16	80.04	2.00	0.00	0.09	0.00
7.36	0.75	9.55	2.18	80.90	2.00	0.00	0.09	0.00
7.38	0.75	9.56	2.33	83.40	2.00	0.00	0.09	0.00
7.40	0.74	9.41	2.31	82.79	2.00	0.00	0.09	0.00
7.42	0.76	9.75	2.18	81.23	2.00	0.00	0.09	0.00
7.44	0.82	10.58	1.97	78.84	2.00	0.00	0.09	0.00
7.46	0.89	11.58	1.95	79.60	2.00	0.00	0.08	0.00
7.48	0.95	12.35	1.97	81.06	2.00	0.00	0.08	0.00
7.50	0.99	12.87	2.00	82.16	2.00	0.00	0.08	0.00
7.52	1.01	13.14	2.03	83.14	2.00	0.01	0.08	0.00
7.54	1.02	13.22	2.10	84.80	2.00	0.22	0.08	0.00
7.56	1.00	12.96	2.17	85.87	2.00	0.00	0.08	0.00
7.58	0.96	12.47	2.24	86.54	2.00	0.00	0.08	0.00
7.60	0.93	11.95	2.29	86.93	2.00	0.00	0.08	0.00
7.62	0.90	11.62	2.42	88.69	2.00	0.00	0.08	0.00
7.64	0.90	11.46	2.53	90.48	2.00	0.00	0.08	0.00
7.66	0.90	11.57	2.53	90.68	2.00	0.00	0.08	0.00
7.68	0.93	11.88	2.44	89.62	2.00	0.00	0.08	0.00
7.70	0.97	12.41	2.32	88.15	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)
7.72	1.00	12.76	2.28	87.82	2.00	0.00	0.08	0.00
7.74	1.02	12.99	2.27	87.96	2.00	0.00	0.08	0.00
7.76	1.00	12.79	2.38	89.86	2.00	0.00	0.08	0.00
7.78	1.00	12.73	2.28	87.82	2.00	0.00	0.08	0.00
7.80	1.12	14.30	1.94	82.41	2.00	2.79	0.07	0.00
7.82	1.41	17.99	1.55	133.68	2.00	10.39	0.00	0.00
7.84	2.07	26.38	1.21	69.10	2.00	23.02	0.00	0.00
7.86	2.54	32.32	1.15	69.71	2.00	29.72	0.00	0.00
7.88	2.78	35.35	1.16	71.20	2.00	32.68	0.00	0.00
7.90	2.55	32.55	1.31	74.76	2.00	29.96	0.00	0.00
7.92	2.30	29.50	1.60	82.06	2.00	26.71	0.00	0.00
7.94	2.03	26.15	2.07	125.57	2.00	22.73	0.00	0.00
7.96	1.84	23.80	2.59	209.14	2.00	19.62	0.00	0.00
7.98	1.76	22.84	2.86	111.82	2.00	18.25	0.05	0.00
8.00	1.88	24.38	2.87	241.49	2.00	20.41	0.00	0.00
8.02	2.08	26.82	2.79	204.08	2.00	23.57	0.00	0.00
8.04	2.21	28.47	2.76	186.33	2.00	25.53	0.00	0.00
8.06	2.07	26.69	2.77	202.86	2.00	23.40	0.00	0.00
8.08	1.84	23.54	2.80	111.03	2.00	19.26	0.05	0.00
8.10	1.63	20.74	2.80	108.40	2.00	15.09	0.06	0.00
8.12	1.60	20.24	2.72	105.86	2.00	14.27	0.06	0.00
8.14	1.66	21.01	2.71	106.50	2.00	15.50	0.06	0.00
8.16	1.83	23.19	2.68	228.46	2.00	18.76	0.00	0.00
8.18	2.04	25.93	2.65	194.83	2.00	22.45	0.00	0.00
8.20	2.10	26.59	2.68	193.32	2.00	23.28	0.00	0.00
8.22	1.93	24.40	2.76	225.46	2.00	20.45	0.00	0.00
8.24	1.61	20.22	2.83	108.35	2.00	14.24	0.06	0.00
8.26	1.36	16.83	2.75	102.70	2.00	8.18	0.07	0.00
8.28	1.22	14.91	2.62	97.47	2.00	4.18	0.07	0.00
8.30	1.20	14.66	2.53	95.30	2.00	3.63	0.07	0.00
8.32	1.28	15.60	2.31	91.97	2.00	5.67	0.07	0.00
8.34	1.48	18.09	1.96	86.23	2.00	10.56	0.06	0.00
8.36	1.85	22.59	1.66	107.47	2.00	17.90	0.00	0.00
8.38	2.27	27.76	1.49	78.18	2.00	24.70	0.00	0.00
8.40	2.61	31.96	1.43	78.02	2.00	29.35	0.00	0.00
8.42	2.67	32.67	1.44	78.75	2.00	30.07	0.00	0.00
8.44	2.51	30.63	1.52	80.35	2.00	27.94	0.00	0.00
8.46	2.18	26.60	1.81	97.42	2.00	23.30	0.00	0.00
8.48	1.83	22.31	1.99	147.11	2.00	17.49	0.00	0.00
8.50	1.70	20.52	1.97	161.75	2.00	14.72	0.00	0.00
8.52	2.06	24.79	1.43	73.52	2.00	20.97	0.00	0.00
8.54	2.63	31.67	1.18	70.32	2.00	29.04	0.00	0.00
8.56	2.99	35.85	1.12	70.26	2.00	33.14	0.00	0.00
8.58	2.83	33.87	1.18	71.28	2.00	31.26	0.00	0.00
8.60	2.47	29.60	1.30	73.10	2.00	26.82	0.00	0.00
8.62	2.20	26.43	1.58	78.62	2.00	23.07	0.00	0.00
8.64	2.02	24.24	2.00	131.55	2.00	20.23	0.00	0.00
8.66	1.81	21.71	2.50	102.20	2.00	16.59	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)
8.68	1.66	19.94	2.72	105.63	2.00	13.77	0.06	0.00
8.70	1.60	19.15	2.74	105.26	2.00	12.45	0.06	0.00
8.72	1.66	19.80	2.63	103.54	2.00	13.55	0.06	0.00
8.74	1.70	20.27	2.54	102.00	2.00	14.32	0.06	0.00
8.76	1.68	19.96	2.48	100.20	2.00	13.81	0.06	0.00
8.78	1.69	20.00	2.22	202.88	2.00	13.87	0.00	0.00
8.80	1.79	21.09	1.96	154.28	2.00	15.63	0.00	0.00
8.82	1.97	23.23	1.82	119.97	2.00	18.82	0.00	0.00
8.84	2.13	25.09	1.85	110.41	2.00	21.36	0.00	0.00
8.86	2.13	25.11	1.97	122.61	2.00	21.39	0.00	0.00
8.88	2.03	23.86	2.08	144.17	2.00	19.70	0.00	0.00
8.90	1.86	21.73	2.16	174.43	2.00	16.61	0.00	0.00
8.92	1.81	21.13	2.20	185.65	2.00	15.69	0.00	0.00
8.94	1.85	21.62	2.18	177.47	2.00	16.45	0.00	0.00
8.96	1.95	22.73	2.15	163.19	2.00	18.10	0.00	0.00
8.98	2.06	24.01	2.15	151.24	2.00	19.91	0.00	0.00
9.00	2.47	28.89	1.95	98.87	2.00	26.01	0.00	0.00
9.02	3.06	35.61	1.52	82.58	2.00	32.92	0.00	0.00
9.04	3.57	41.37	1.26	77.76	2.00	37.87	0.00	0.00
9.06	3.63	41.91	1.08	72.73	2.00	38.29	0.00	0.00
9.08	3.37	38.93	1.23	75.33	2.00	35.86	0.00	0.00
9.10	3.02	34.94	1.45	80.20	2.00	32.29	0.00	0.00
9.12	2.72	31.56	1.85	90.75	2.00	28.93	0.00	0.00
9.14	2.55	29.61	2.20	118.87	2.00	26.83	0.00	0.00
9.16	2.42	28.02	2.54	164.46	2.00	25.01	0.00	0.00
9.18	2.21	25.61	2.82	221.93	2.00	22.04	0.00	0.00
9.20	2.02	23.31	3.03	116.40	2.00	18.94	0.05	0.00
9.22	1.88	21.56	3.11	116.32	2.00	16.36	0.06	0.00
9.24	1.85	21.07	3.07	114.84	2.00	15.60	0.06	0.00
9.26	1.84	20.92	2.88	110.42	2.00	15.37	0.06	0.00
9.28	1.92	21.80	2.60	104.79	2.00	16.72	0.06	0.00
9.30	2.28	25.89	2.24	146.13	2.00	22.40	0.00	0.00
9.32	2.71	30.86	2.04	98.57	2.00	28.19	0.00	0.00
9.34	2.94	33.47	1.84	91.28	2.00	30.88	0.00	0.00
9.36	2.85	32.37	1.80	89.68	2.00	29.77	0.00	0.00
9.38	2.65	29.92	1.86	86.88	2.00	27.17	0.00	0.00
9.40	2.50	28.34	2.20	126.38	2.00	25.38	0.00	0.00
9.42	2.30	25.99	2.72	204.87	2.00	22.52	0.00	0.00
9.44	2.08	23.47	3.31	123.26	2.00	19.16	0.05	0.00
9.46	1.87	21.03	3.76	129.53	2.00	15.54	0.06	0.00
9.48	1.76	19.68	3.80	128.32	2.00	13.35	0.06	0.00
9.50	1.70	18.91	3.62	123.42	2.00	12.03	0.06	0.00
9.52	1.69	18.70	3.34	117.44	2.00	11.67	0.06	0.00
9.54	1.75	19.32	2.99	110.99	2.00	12.74	0.06	0.00
9.56	2.03	22.50	2.55	218.81	2.00	17.77	0.00	0.00
9.58	2.35	26.08	2.24	145.36	2.00	22.64	0.00	0.00
9.60	2.61	29.02	2.06	108.94	2.00	26.17	0.00	0.00
9.62	2.69	29.89	2.01	99.63	1.96	27.14	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)
9.64	2.77	30.71	1.99	94.68	1.82	28.03	0.00	0.00
9.66	2.88	31.94	1.98	94.95	1.82	29.32	0.00	0.00
9.68	2.95	32.61	1.97	94.75	1.82	30.01	0.00	0.00
9.70	2.93	32.39	1.98	94.94	1.82	29.79	0.00	0.00
9.72	2.83	31.18	2.02	95.30	1.84	28.53	0.00	0.00
9.74	2.66	29.28	2.18	119.16	2.00	26.46	0.00	0.00
9.76	2.54	27.89	2.35	144.57	2.00	24.85	0.00	0.00
9.78	2.71	29.71	2.24	122.11	2.00	26.95	0.00	0.00
9.80	2.93	32.10	2.13	100.61	2.00	29.49	0.00	0.00
9.82	3.04	33.30	2.03	96.97	2.00	30.70	0.00	0.00
9.84	2.91	31.81	2.21	109.27	2.00	29.20	0.00	0.00
9.86	2.84	31.07	2.40	130.40	2.00	28.42	0.00	0.00
9.88	2.86	31.21	2.48	137.69	2.00	28.57	0.00	0.00
9.90	2.70	29.41	2.62	164.30	2.00	26.61	0.00	0.00
9.92	2.43	26.29	2.73	202.74	2.00	22.91	0.00	0.00
9.94	2.22	23.90	2.90	114.17	2.00	19.76	0.05	0.00
9.96	2.24	23.98	2.79	235.53	2.00	19.87	0.00	0.00
9.98	2.30	24.61	2.71	217.01	2.00	20.73	0.00	0.00
10.00	2.25	24.02	2.73	227.45	2.00	19.92	0.00	0.00
10.02	2.14	22.73	2.87	112.26	2.00	18.10	0.05	0.00
10.04	2.08	22.01	2.94	113.05	2.00	17.04	0.06	0.00
10.06	2.11	22.41	2.92	113.13	2.00	17.63	0.05	0.00
10.08	2.28	24.19	2.72	223.78	2.00	20.16	0.00	0.00
10.10	2.50	26.64	2.51	171.90	2.00	23.34	0.00	0.00
10.12	2.80	29.88	2.29	126.54	2.00	27.13	0.00	0.00
10.14	3.12	33.29	2.10	93.44	2.00	30.70	0.00	0.00
10.16	3.28	34.98	1.98	96.47	2.00	32.33	0.00	0.00
10.18	3.36	35.80	1.89	94.28	2.00	33.10	0.00	0.00
10.20	3.38	35.92	1.82	92.07	1.76	33.20	0.00	0.00
10.22	3.50	37.08	1.73	89.89	1.70	34.25	0.00	0.00
10.24	3.59	38.01	1.65	87.79	1.65	35.07	0.00	0.00
10.26	3.48	36.79	1.55	84.26	1.56	33.99	0.00	0.00
10.28	3.35	35.19	1.48	81.14	2.00	32.53	0.00	0.00
10.30	2.95	30.96	1.81	89.48	2.00	28.30	0.00	0.00
10.32	2.63	27.48	2.38	151.17	2.00	24.37	0.00	0.00
10.34	2.21	22.91	3.16	119.14	2.00	18.36	0.05	0.00
10.36	2.06	21.20	3.21	118.23	2.00	15.79	0.06	0.00
10.38	2.08	21.39	2.98	113.42	2.00	16.09	0.06	0.00
10.40	2.34	24.08	2.60	208.64	2.00	20.01	0.00	0.00
10.42	2.67	27.69	2.26	136.14	2.00	24.62	0.00	0.00
10.44	2.96	30.64	1.93	90.42	2.00	27.96	0.00	0.00
10.46	2.94	30.44	1.77	87.96	2.00	27.74	0.00	0.00
10.48	2.79	28.67	1.79	86.48	2.00	25.76	0.00	0.00
10.50	2.56	26.28	2.03	121.86	2.00	22.89	0.00	0.00
10.52	2.47	25.28	2.32	161.24	2.00	21.61	0.00	0.00
10.54	2.32	23.65	2.66	222.11	2.00	19.41	0.00	0.00
10.56	2.18	22.05	2.94	113.25	2.00	17.10	0.06	0.00
10.58	2.45	24.95	2.66	207.42	2.00	21.18	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)
10.60	2.98	30.51	2.26	119.68	2.00	27.82	0.00	0.00
10.62	3.53	36.40	2.04	98.97	2.00	33.65	0.00	0.00
10.64	3.59	36.88	1.99	97.71	2.00	34.08	0.00	0.00
10.66	3.31	33.87	2.00	96.46	2.00	31.27	0.00	0.00
10.68	2.86	28.98	1.97	100.69	2.00	26.12	0.00	0.00
10.70	2.31	23.16	2.34	182.91	2.00	18.73	0.00	0.00
10.72	2.06	20.40	2.69	105.60	2.00	14.53	0.06	0.00
10.74	2.07	20.48	2.88	110.14	2.00	14.66	0.06	0.00
10.76	2.24	22.32	2.64	106.49	2.00	17.50	0.05	0.00
10.78	2.21	21.96	2.66	106.46	2.00	16.97	0.06	0.00
10.80	2.13	21.07	2.62	104.78	2.00	15.59	0.06	0.00
10.82	2.15	21.16	2.50	101.93	2.00	15.74	0.06	0.00
10.84	2.16	21.24	2.36	208.08	2.00	15.86	0.00	0.00
10.86	2.04	19.96	2.41	98.75	2.00	13.81	0.06	0.00
10.88	1.87	18.13	2.59	101.04	2.00	10.65	0.06	0.00
10.90	1.63	15.51	2.92	104.48	2.00	5.49	0.07	0.00
10.92	1.44	13.50	3.09	104.30	2.00	0.90	0.08	0.00
10.94	1.27	11.58	3.25	103.01	2.00	0.00	0.08	0.00
10.96	1.33	12.31	2.83	97.50	2.00	0.00	0.08	0.00
10.98	1.52	14.26	2.48	94.13	2.00	2.70	0.07	0.00
11.00	1.72	16.29	2.19	90.20	2.00	7.11	0.07	0.00
11.02	1.73	16.44	2.17	90.03	2.00	7.42	0.07	0.00
11.04	1.56	14.58	2.32	91.10	2.00	3.45	0.07	0.00
11.06	1.34	12.28	2.56	92.58	2.00	0.00	0.08	0.00
11.08	1.24	11.14	2.58	91.00	2.00	0.00	0.09	0.00
11.10	1.36	12.37	2.22	86.29	2.00	0.00	0.08	0.00
11.12	1.70	15.97	1.87	82.52	2.00	6.45	0.07	0.00
11.14	2.15	20.58	1.57	113.43	2.00	14.82	0.00	0.00
11.16	2.38	22.96	1.54	93.30	2.00	18.44	0.00	0.00
11.18	2.51	24.25	1.52	84.09	2.00	20.24	0.00	0.00
11.20	2.77	26.91	1.42	75.97	2.00	23.67	0.00	0.00
11.22	3.14	30.67	1.36	75.51	2.00	27.99	0.00	0.00
11.24	3.31	32.35	1.37	76.53	1.43	29.75	0.00	0.00
11.26	3.26	31.80	1.45	78.74	1.47	29.18	0.00	0.00
11.28	3.28	31.95	1.49	80.25	1.50	29.34	0.00	0.00
11.30	3.29	32.03	1.60	83.49	2.00	29.42	0.00	0.00
11.32	3.07	29.77	1.78	87.99	2.00	27.00	0.00	0.00
11.34	2.64	25.31	2.14	140.41	2.00	21.65	0.00	0.00
11.36	2.24	21.14	2.63	105.02	2.00	15.70	0.06	0.00
11.38	1.94	18.05	3.30	115.93	2.00	10.48	0.06	0.00
11.40	1.80	16.58	3.54	117.99	2.00	7.69	0.07	0.00
11.42	1.93	17.95	3.00	109.58	2.00	10.32	0.06	0.00
11.44	2.15	20.15	2.38	98.27	2.00	14.12	0.06	0.00
11.46	2.57	24.35	1.76	106.37	2.00	20.38	0.00	0.00
11.48	2.65	25.13	1.49	77.67	2.00	21.41	0.00	0.00
11.50	2.59	24.43	1.34	72.65	2.00	20.48	0.00	0.00
11.52	2.18	20.23	1.58	117.71	2.00	14.26	0.00	0.00
11.54	1.98	18.20	1.86	175.80	2.00	10.76	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)
11.56	1.97	18.03	2.03	88.05	2.00	10.46	0.06	0.00
11.58	2.00	18.35	2.11	90.33	2.00	11.03	0.06	0.00
11.60	1.87	16.96	2.34	94.39	2.00	8.44	0.07	0.00
11.62	1.60	14.25	2.75	99.38	2.00	2.69	0.07	0.00
11.64	1.40	12.23	3.08	101.71	2.00	0.00	0.08	0.00
11.66	1.30	11.14	3.23	101.79	2.00	0.00	0.09	0.00
11.68	1.30	11.15	3.17	100.81	2.00	0.00	0.09	0.00
11.70	1.33	11.37	3.00	98.65	2.00	0.00	0.09	0.00
11.72	1.40	12.06	2.74	95.58	2.00	0.00	0.08	0.00
11.74	1.50	13.13	2.35	89.94	2.00	0.00	0.08	0.00
11.76	1.50	13.06	2.22	87.27	2.00	0.00	0.08	0.00
11.78	1.40	12.02	2.29	87.25	2.00	0.00	0.08	0.00
11.80	1.25	10.49	2.46	87.82	2.00	0.00	0.09	0.00
11.82	1.18	9.78	2.57	88.22	2.00	0.00	0.09	0.00
11.84	1.15	9.50	2.55	87.26	2.00	0.00	0.09	0.00
11.86	1.13	9.29	2.61	87.79	2.00	0.00	0.09	0.00
11.88	1.12	9.15	2.55	86.53	2.00	0.00	0.10	0.00
11.90	1.12	9.12	2.41	84.31	2.00	0.00	0.10	0.00
11.92	1.12	9.10	2.29	82.25	2.00	0.00	0.10	0.00
11.94	1.13	9.15	2.20	80.88	2.00	0.00	0.10	0.00
11.96	1.14	9.24	2.18	80.75	2.00	0.00	0.09	0.00
11.98	1.16	9.49	2.15	80.62	2.00	0.00	0.09	0.00
12.00	1.20	9.81	2.16	81.44	2.00	0.00	0.09	0.00
12.02	1.22	10.03	2.17	81.88	2.00	0.00	0.09	0.00
12.04	1.25	10.24	2.18	82.52	2.00	0.00	0.09	0.00
12.06	1.28	10.57	2.17	82.78	2.00	0.00	0.09	0.00
12.08	1.33	11.02	2.18	83.72	2.00	0.00	0.09	0.00
12.10	1.37	11.39	2.22	84.97	2.00	0.00	0.09	0.00
12.12	1.48	12.45	2.14	84.92	2.00	0.00	0.08	0.00
12.14	1.65	14.09	2.01	84.20	2.00	2.31	0.08	0.00
12.16	1.84	15.95	1.94	84.40	2.00	6.40	0.07	0.00
12.18	1.94	16.97	2.04	87.49	2.00	8.45	0.07	0.00
12.20	1.92	16.73	2.12	89.07	2.00	7.98	0.07	0.00
12.22	1.72	14.68	2.22	89.19	2.00	3.68	0.07	0.00
12.24	1.48	12.32	2.12	84.37	2.00	0.00	0.08	0.00
12.26	1.26	10.16	2.14	81.59	2.00	0.00	0.09	0.00
12.28	1.16	9.24	2.23	81.62	2.00	0.00	0.09	0.00
12.30	1.08	8.42	2.87	89.62	2.00	0.00	0.10	0.00
12.32	1.02	7.79	3.56	97.00	2.00	0.00	0.10	0.00
12.34	0.97	7.31	4.15	102.20	2.00	0.00	0.11	0.00
12.36	0.94	6.96	4.25	101.92	2.00	0.00	0.11	0.00
12.38	0.92	6.81	4.20	100.67	2.00	0.00	0.11	0.00
12.40	0.92	6.83	3.80	96.30	2.00	0.00	0.11	0.00
12.42	0.93	6.86	3.29	90.44	2.00	0.00	0.11	0.00
12.44	0.93	6.84	2.71	83.08	2.00	0.00	0.11	0.00
12.46	0.92	6.79	2.44	79.10	2.00	0.00	0.11	0.00
12.48	0.93	6.82	2.31	77.44	2.00	0.00	0.11	0.00
12.50	0.93	6.84	2.31	77.48	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)
12.52	0.93	6.81	2.30	77.21	2.00	0.00	0.11	0.00
12.54	0.92	6.74	2.32	77.35	2.00	0.00	0.11	0.00
12.56	0.91	6.62	2.33	77.18	2.00	0.00	0.11	0.00
12.58	0.92	6.66	2.30	76.83	2.00	0.00	0.11	0.00
12.60	0.94	6.83	2.21	75.93	2.00	0.00	0.11	0.00
12.62	0.96	7.05	2.13	75.27	2.00	0.00	0.11	0.00
12.64	0.97	7.13	2.09	74.87	2.00	0.00	0.11	0.00
12.66	0.95	6.94	2.16	75.47	2.00	0.00	0.11	0.00
12.68	0.94	6.85	2.22	76.26	2.00	0.00	0.11	0.00
12.70	0.94	6.82	2.29	77.18	2.00	0.00	0.11	0.00
12.72	0.96	6.94	2.31	77.76	2.00	0.00	0.11	0.00
12.74	0.97	7.05	2.30	77.95	2.00	0.00	0.11	0.00
12.76	0.97	7.09	2.30	77.96	2.00	0.00	0.11	0.00
12.78	0.99	7.25	2.24	77.54	2.00	0.00	0.11	0.00
12.80	1.01	7.38	2.18	76.84	2.00	0.00	0.10	0.00
12.82	1.02	7.48	2.09	75.70	2.00	0.00	0.10	0.00
12.84	1.02	7.50	1.99	74.22	2.00	0.00	0.10	0.00
12.86	1.04	7.62	1.89	72.80	2.00	0.00	0.10	0.00
12.88	1.07	7.87	1.81	71.84	2.00	0.00	0.10	0.00
12.90	1.08	7.97	1.79	71.72	2.00	0.00	0.10	0.00
12.92	1.07	7.87	1.82	72.04	2.00	0.00	0.10	0.00
12.94	1.05	7.73	1.87	72.67	2.00	0.00	0.10	0.00
12.96	1.06	7.78	1.88	72.83	2.00	0.00	0.10	0.00
12.98	1.07	7.88	1.85	72.66	2.00	0.00	0.10	0.00
13.00	1.08	7.91	1.82	72.15	2.00	0.00	0.10	0.00
13.02	1.08	7.92	1.80	71.78	2.00	0.00	0.10	0.00
13.04	1.10	8.05	1.78	71.62	2.00	0.00	0.10	0.00
13.06	1.12	8.25	1.74	71.37	2.00	0.00	0.10	0.00
13.08	1.14	8.41	1.70	70.89	2.00	0.00	0.10	0.00
13.10	1.15	8.55	1.68	70.60	2.00	0.00	0.10	0.00
13.12	1.18	8.76	1.65	70.48	2.00	0.00	0.10	0.00
13.14	1.23	9.26	1.62	70.57	2.00	0.00	0.09	0.00
13.16	1.29	9.77	1.57	70.12	2.00	0.00	0.09	0.00
13.18	1.34	10.18	1.53	69.83	2.00	0.00	0.09	0.00
13.20	1.34	10.21	1.57	70.79	2.00	0.00	0.09	0.00
13.22	1.32	9.99	1.72	73.46	2.00	0.00	0.09	0.00
13.24	1.28	9.61	1.91	76.66	2.00	0.00	0.09	0.00
13.26	1.22	9.07	2.14	79.72	2.00	0.00	0.10	0.00
13.28	1.18	8.62	2.35	82.33	2.00	0.00	0.10	0.00
13.30	1.16	8.43	2.51	84.45	2.00	0.00	0.10	0.00
13.32	1.19	8.73	2.48	84.67	2.00	0.00	0.10	0.00
13.34	1.30	9.71	2.27	83.18	2.00	0.00	0.09	0.00
13.36	2.35	19.43	1.19	81.59	1.61	12.93	0.00	0.00
13.38	7.63	69.39	0.35	69.39	1.37	54.94	0.55	0.00
13.40	14.13	131.71	0.23	131.71	2.00	76.09	0.00	0.00
13.42	19.99	188.11	0.20	188.11	2.00	87.86	0.00	0.00
13.44	21.46	201.95	0.24	201.95	2.00	90.20	0.00	0.00
13.46	22.52	211.90	0.27	211.90	2.00	91.79	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)
13.48	23.03	216.36	0.31	216.36	2.00	92.47	0.00	0.00
13.50	24.20	227.24	0.34	227.24	2.00	94.09	0.00	0.00
13.52	24.57	230.55	0.36	230.55	2.00	94.57	0.00	0.00
13.54	25.04	234.97	0.35	234.97	2.00	95.20	0.00	0.00
13.56	24.41	228.69	0.36	228.69	2.00	94.30	0.00	0.00
13.58	23.39	218.62	0.37	218.62	2.00	92.82	0.00	0.00
13.60	21.92	204.04	0.45	204.04	2.00	90.54	0.00	0.00
13.62	20.63	191.07	0.56	191.07	2.00	88.37	0.00	0.00
13.64	19.93	183.63	0.76	183.63	2.00	87.06	0.00	0.00
13.66	20.16	185.28	0.86	185.28	2.00	87.36	0.00	0.00
13.68	21.35	196.32	0.85	196.32	2.00	89.26	0.00	0.00
13.70	22.40	206.40	0.74	206.40	2.00	90.92	0.00	0.00
13.72	23.27	214.78	0.66	214.78	2.00	92.23	0.00	0.00
13.74	23.65	218.32	0.63	218.32	2.00	92.77	0.00	0.00
13.76	23.73	219.18	0.57	219.18	2.00	92.90	0.00	0.00
13.78	23.82	219.64	0.59	219.64	2.00	92.97	0.00	0.00
13.80	23.94	220.62	0.60	220.62	2.00	93.12	0.00	0.00
13.82	24.34	223.93	0.65	223.93	2.00	93.61	0.00	0.00
13.84	24.59	226.10	0.64	226.10	2.00	93.93	0.00	0.00
13.86	24.12	221.38	0.65	221.38	2.00	93.23	0.00	0.00
13.88	23.37	214.30	0.63	214.30	2.00	92.16	0.00	0.00
13.90	21.83	199.74	0.59	199.74	2.00	89.84	0.00	0.00
13.92	20.91	191.01	0.58	191.01	2.00	88.36	0.00	0.00
13.94	20.17	183.60	0.65	183.60	2.00	87.05	0.00	0.00
13.96	20.46	185.80	0.74	185.80	2.00	87.45	0.00	0.00
13.98	20.50	185.60	0.83	185.60	2.00	87.41	0.00	0.00
14.00	19.87	179.51	0.86	179.51	2.00	86.31	0.00	0.00
14.02	19.03	171.08	0.98	181.20	2.00	84.72	0.00	0.00
14.04	17.66	157.56	1.28	188.36	2.00	82.01	0.00	0.00
14.06	17.23	152.57	1.71	193.33	2.00	80.94	0.00	0.00
14.08	17.40	153.38	2.10	201.98	2.00	81.12	0.00	0.00
14.10	19.78	174.65	2.17	226.53	2.00	85.41	0.00	0.00
14.12	22.16	195.98	2.20	250.31	2.00	89.21	0.00	0.00
14.14	24.17	213.91	2.23	270.61	2.00	92.10	0.00	0.00
14.16	25.39	224.31	2.39	285.57	2.00	93.66	0.00	0.00
14.18	27.27	240.91	2.43	304.91	2.00	96.02	0.00	0.00
14.20	28.51	251.62	2.52	318.77	2.00	97.46	0.00	0.00
14.22	30.77	272.18	2.34	336.69	2.00	100.00	0.00	0.00
14.24	32.47	287.50	2.24	349.68	2.00	100.00	0.00	0.00
14.26	34.57	306.59	2.08	362.40	2.00	100.00	0.00	0.00

Total estimated displacement: 0.06

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.20	3.73	22.06	82.29	3.52	0.83	13.84
0.92	0.25	4.57	20.15	92.03	3.47	0.81	16.58
0.94	0.27	5.00	19.10	95.55	3.43	1.54	17.76
0.96	0.30	5.59	17.61	98.38	3.39	1.07	19.40
0.98	0.29	5.40	17.21	92.99	3.37	1.01	18.37
1.00	0.52	10.04	8.81	88.51	3.00	1.02	33.43
1.02	1.05	20.47	3.92	80.26	2.62	0.79	0.79
1.04	1.69	33.12	2.25	74.64	2.38	0.37	0.69
1.06	2.23	43.77	1.75	76.46	2.25	0.43	0.70
1.08	2.56	50.17	1.57	78.80	2.18	0.53	0.70
1.10	2.75	53.97	1.53	82.54	2.16	0.71	0.71
1.12	2.78	54.56	1.59	87.02	2.19	0.72	0.72
1.14	2.62	51.27	1.85	94.69	2.28	0.74	0.74
1.16	2.42	47.34	2.21	104.73	2.37	0.76	0.76
1.18	2.27	44.41	2.59	114.91	2.44	0.77	0.77
1.20	2.18	42.75	2.86	122.35	2.48	0.79	0.79
1.22	2.10	41.13	3.16	129.91	2.53	0.81	0.81
1.24	1.98	38.75	3.48	134.70	2.57	0.85	0.85
1.26	1.90	37.21	3.63	135.00	2.59	0.87	0.87
1.28	1.88	36.64	3.54	129.76	2.57	0.85	0.85
1.30	1.86	36.33	3.46	125.77	2.57	0.84	0.84
1.32	1.88	36.74	3.31	121.66	2.55	0.81	0.81
1.34	1.94	37.94	3.13	118.86	2.52	0.79	0.79
1.36	2.05	40.12	2.99	119.87	2.50	0.77	0.77
1.38	2.13	41.53	3.01	125.06	2.50	0.78	0.78
1.40	2.15	41.92	3.19	133.52	2.53	0.82	0.82
1.42	2.05	40.01	3.64	145.59	2.59	0.89	0.89
1.44	2.03	39.63	3.89	154.32	2.62	0.92	0.92
1.46	2.02	39.39	4.07	160.46	2.64	0.95	0.95
1.48	2.04	39.86	4.04	160.87	2.63	0.95	0.95
1.50	2.00	39.01	4.15	161.96	2.64	0.96	0.96
1.52	1.97	38.50	4.11	158.21	2.64	0.95	0.95
1.54	1.93	37.64	4.12	154.94	2.64	0.95	0.95
1.56	1.86	36.17	4.16	150.50	2.65	0.95	0.95
1.58	1.77	34.40	4.43	152.48	2.67	0.98	0.98
1.60	1.77	34.44	4.43	152.41	2.67	0.97	0.97
1.62	1.85	35.93	4.25	152.78	2.65	0.96	0.96
1.64	1.99	38.77	3.87	150.10	2.61	0.92	0.92
1.66	2.10	40.98	3.61	147.89	2.58	0.89	0.89
1.68	2.18	42.56	3.43	146.18	2.56	0.86	0.86
1.70	2.23	43.47	3.29	143.21	2.54	0.84	0.84
1.72	2.33	45.42	3.15	143.25	2.52	0.83	0.83
1.74	2.35	45.82	3.14	144.10	2.52	0.83	0.83
1.76	2.29	44.64	3.33	148.61	2.55	0.86	0.86
1.78	2.14	41.57	3.72	154.48	2.60	0.91	0.91
1.80	2.01	39.08	4.11	160.71	2.64	0.96	0.96
1.82	1.90	36.89	4.53	167.21	2.68	1.01	1.01
1.84	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	1.70	33.02	5.21	172.15	2.75	0.86	0.86
1.88	1.64	31.67	5.49	173.99	2.77	0.86	0.86
1.90	1.57	30.42	5.78	175.74	2.79	0.86	0.86
1.92	1.50	29.04	6.09	176.97	2.82	0.86	0.86
1.94	1.40	27.04	6.55	177.11	2.85	0.86	0.86
1.96	1.31	25.30	7.05	178.41	2.89	0.86	0.86
1.98	1.24	23.92	7.59	181.49	2.93	0.87	0.87
2.00	1.17	22.46	8.25	185.35	2.97	0.87	0.87
2.02	1.13	21.59	8.68	187.36	2.99	0.87	0.87
2.04	1.12	21.43	8.79	188.42	3.00	3.45	45.66
2.06	1.13	21.59	8.85	191.04	3.00	3.55	45.66
2.08	1.09	20.84	9.19	191.42	3.02	3.68	43.78
2.10	1.03	19.59	9.61	188.22	3.05	3.30	40.88
2.12	0.99	18.85	9.56	180.11	3.04	3.00	39.07
2.14	1.00	18.98	9.07	172.23	3.02	2.78	39.08
2.16	1.03	19.55	8.39	164.00	2.98	0.85	0.85
2.18	1.09	20.89	7.28	152.16	2.91	0.83	0.83
2.20	1.24	23.65	5.83	137.92	2.80	0.81	0.81
2.22	1.47	28.20	4.36	122.89	2.67	0.92	0.92
2.24	1.81	34.96	3.14	109.85	2.52	0.77	0.77
2.26	2.08	40.40	2.60	104.91	2.44	0.76	0.76
2.28	2.25	43.61	2.45	106.65	2.41	0.76	0.76
2.30	2.22	43.12	2.71	116.75	2.46	0.78	0.78
2.32	2.12	41.12	3.14	129.15	2.52	0.80	0.80
2.34	2.04	39.40	3.52	138.54	2.57	0.86	0.86
2.36	1.81	35.03	4.41	154.47	2.67	0.98	0.98
2.38	1.59	30.54	5.60	171.11	2.78	0.85	0.85
2.40	1.34	25.65	7.18	184.23	2.90	0.87	0.87
2.42	1.28	24.54	7.36	180.75	2.91	0.87	0.87
2.44	1.34	25.71	6.65	170.98	2.86	0.85	0.85
2.46	1.35	25.80	6.48	167.23	2.85	0.85	0.85
2.48	1.30	24.82	6.71	166.65	2.87	0.85	0.85
2.50	1.18	22.42	7.33	164.43	2.91	0.85	0.85
2.52	1.11	21.08	7.48	157.65	2.92	0.84	0.84
2.54	1.10	20.83	7.14	148.63	2.90	0.83	0.83
2.56	1.30	24.79	5.41	134.20	2.76	0.80	0.80
2.58	2.64	51.20	1.96	100.16	2.31	0.75	0.75
2.60	4.69	91.71	1.28	117.25	1.96	0.78	0.78
2.62	7.72	145.44	1.00	145.44	1.70	0.82	0.82
2.64	10.30	180.63	1.00	180.63	1.56	0.87	0.87
2.66	12.56	208.69	1.00	208.69	1.45	0.90	0.90
2.68	14.22	226.99	1.00	226.99	1.37	0.91	0.91
2.70	15.52	242.36	1.00	242.36	1.33	0.93	0.93
2.72	16.71	257.41	1.00	257.41	1.31	0.94	0.94
2.74	17.67	269.64	1.00	269.64	1.29	0.95	0.95
2.76	18.65	282.10	1.00	282.10	1.28	0.96	0.96
2.78	19.61	294.71	1.00	294.71	1.27	0.97	0.97
2.80	20.67	309.06	1.00	309.06	1.26	0.98	0.98

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	21.55	321.53	1.00	321.53	1.26	0.99	0.99
2.84	22.23	331.49	1.00	331.49	1.26	1.00	1.00
2.86	22.45	336.68	1.00	336.68	1.28	1.01	1.01
2.88	22.55	339.20	1.00	339.20	1.29	1.01	1.01
2.90	22.52	340.36	1.00	340.36	1.31	1.01	1.01
2.92	21.28	329.18	1.00	329.18	1.36	1.00	1.00
2.94	21.05	325.67	1.00	325.67	1.37	1.00	1.00
2.96	20.93	322.69	1.00	322.69	1.37	1.00	1.00
2.98	22.09	331.00	1.00	331.00	1.31	1.00	1.00
3.00	22.14	331.75	1.00	331.75	1.31	1.00	1.00
3.02	21.80	327.73	1.00	327.73	1.32	1.00	1.00
3.04	21.20	320.69	1.00	320.69	1.34	0.99	0.99
3.06	20.43	310.94	1.00	310.94	1.36	0.99	0.99
3.08	19.71	301.85	1.00	301.85	1.38	0.98	0.98
3.10	18.90	291.65	1.00	291.65	1.41	0.97	0.97
3.12	17.99	279.75	1.00	279.75	1.43	0.96	0.96
3.14	16.29	257.74	1.00	257.74	1.48	0.94	0.94
3.16	14.18	230.25	1.00	230.25	1.54	0.92	0.92
3.18	11.67	196.83	1.00	196.83	1.64	0.88	0.88
3.20	9.54	167.90	1.09	183.40	1.75	0.87	0.87
3.22	7.59	140.61	1.23	172.45	1.88	0.86	0.86
3.24	6.06	118.21	1.33	157.06	2.02	0.84	0.84
3.26	4.78	93.26	1.60	149.01	2.19	0.83	0.83
3.28	3.95	76.92	2.08	159.79	2.34	0.84	0.84
3.30	3.40	65.97	2.65	175.07	2.45	0.86	0.86
3.32	3.16	61.19	2.99	183.25	2.50	0.86	0.86
3.34	2.90	56.09	3.42	191.60	2.56	0.92	0.92
3.36	2.63	50.74	3.97	201.23	2.62	0.99	0.99
3.38	2.42	46.66	4.47	208.59	2.68	1.05	1.05
3.40	2.29	44.10	4.70	207.31	2.70	1.08	1.08
3.42	2.21	42.47	4.66	197.79	2.70	1.06	1.06
3.44	2.15	41.33	4.26	176.17	2.66	0.99	0.99
3.46	2.10	40.24	3.83	154.16	2.61	0.92	0.92
3.48	2.05	39.22	3.43	134.62	2.56	0.85	0.85
3.50	2.02	38.59	3.24	124.85	2.54	0.81	0.81
3.52	2.00	38.27	3.08	117.80	2.51	0.78	0.78
3.54	1.98	37.92	2.98	113.10	2.50	0.76	0.76
3.56	1.93	36.85	3.05	112.39	2.51	0.77	0.77
3.58	1.84	35.11	3.26	114.37	2.54	0.79	0.79
3.60	1.80	34.36	3.43	117.79	2.56	0.82	0.82
3.62	1.80	34.26	3.53	120.97	2.57	0.84	0.84
3.64	1.79	34.12	3.63	123.98	2.59	0.85	0.85
3.66	1.75	33.29	3.80	126.63	2.61	0.87	0.87
3.68	1.69	32.14	4.03	129.66	2.63	0.90	0.90
3.70	1.68	31.79	4.12	130.95	2.64	0.91	0.91
3.72	1.68	31.94	4.10	130.86	2.64	0.91	0.91
3.74	1.66	31.45	4.17	131.25	2.65	0.92	0.92
3.76	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	1.42	26.64	5.12	136.39	2.74	0.81	0.81
3.80	1.31	24.48	5.64	138.02	2.78	0.81	0.81
3.82	1.26	23.56	5.88	138.52	2.80	0.81	0.81
3.84	1.45	27.25	4.82	131.46	2.71	0.80	0.80
3.86	2.05	39.06	2.92	114.06	2.49	0.77	0.77
3.88	2.74	52.78	1.98	104.25	2.31	0.76	0.76
3.90	3.21	60.81	1.70	103.68	2.23	0.75	0.75
3.92	3.19	60.71	1.79	108.51	2.26	0.76	0.76
3.94	2.92	56.35	2.03	114.25	2.33	0.77	0.77
3.96	2.53	48.52	2.54	123.31	2.43	0.79	0.79
3.98	2.10	40.11	3.31	132.72	2.55	0.83	0.83
4.00	1.68	31.76	4.64	147.19	2.69	0.99	0.99
4.02	1.35	25.23	6.45	162.84	2.85	0.84	0.84
4.04	1.10	20.35	8.77	178.48	3.00	0.86	0.86
4.06	0.98	17.96	10.41	186.96	3.09	1.95	22.09
4.08	0.92	16.66	11.39	189.85	3.14	1.89	20.42
4.10	0.88	15.86	11.81	187.37	3.16	1.87	19.36
4.12	0.82	14.73	12.41	182.86	3.19	1.74	17.91
4.14	0.69	12.22	13.66	166.83	3.24	1.56	14.80
4.16	0.67	11.73	12.89	151.18	3.21	0.89	14.15
4.18	0.68	11.91	11.36	135.27	3.14	0.98	14.32
4.20	0.80	14.32	9.09	130.26	3.02	0.89	17.17
4.22	0.89	16.06	7.62	122.38	2.93	0.79	0.79
4.24	1.05	19.30	5.81	112.19	2.80	0.77	0.77
4.26	1.22	22.64	4.66	105.50	2.70	0.91	0.91
4.28	1.35	25.18	4.13	104.09	2.64	0.86	0.86
4.30	1.39	25.92	4.19	108.72	2.65	0.88	0.88
4.32	1.39	25.95	4.37	113.31	2.67	0.90	0.90
4.34	1.38	25.75	4.53	116.59	2.68	0.92	0.92
4.36	1.39	25.98	4.54	118.08	2.68	0.93	0.93
4.38	1.42	26.58	4.44	118.06	2.67	0.92	0.92
4.40	1.47	27.43	4.28	117.28	2.66	0.90	0.90
4.42	1.50	28.06	4.11	115.46	2.64	0.88	0.88
4.44	1.51	28.23	4.00	112.89	2.63	0.87	0.87
4.46	1.50	28.04	3.88	108.82	2.61	0.85	0.85
4.48	1.49	27.88	3.70	103.29	2.59	0.82	0.82
4.50	1.49	27.85	3.54	98.47	2.57	0.79	0.79
4.52	1.49	27.83	3.41	94.90	2.56	0.77	0.77
4.54	1.48	27.52	3.43	94.25	2.56	0.77	0.77
4.56	1.45	27.04	3.49	94.48	2.57	0.78	0.78
4.58	1.42	26.50	3.60	95.47	2.58	0.80	0.80
4.60	1.40	26.05	3.68	95.86	2.59	0.80	0.80
4.62	1.39	25.75	3.73	96.01	2.60	0.81	0.81
4.64	1.38	25.56	3.74	95.58	2.60	0.81	0.81
4.66	1.39	25.64	3.68	94.48	2.59	0.80	0.80
4.68	1.41	25.92	3.58	92.68	2.58	0.79	0.79
4.70	1.44	26.27	3.45	90.69	2.56	0.77	0.77
4.72	1.46	26.39	3.36	88.79	2.55	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	1.46	26.33	3.33	87.64	2.55	0.75	0.75
4.76	1.46	26.22	3.31	86.85	2.55	0.75	0.75
4.78	1.45	26.13	3.35	87.43	2.55	0.75	0.75
4.80	1.44	25.94	3.43	88.94	2.56	0.76	0.76
4.82	1.43	25.72	3.54	91.00	2.57	0.78	0.78
4.84	1.43	25.75	3.61	92.93	2.58	0.79	0.79
4.86	1.46	26.19	3.61	94.60	2.58	0.79	0.79
4.88	1.50	26.85	3.57	95.94	2.58	0.79	0.79
4.90	1.53	27.33	3.54	96.71	2.57	0.79	0.79
4.92	1.55	27.49	3.51	96.51	2.57	0.79	0.79
4.94	1.54	27.44	3.57	97.99	2.58	0.80	0.80
4.96	1.54	27.36	3.65	99.75	2.59	0.81	0.81
4.98	1.54	27.40	3.70	101.41	2.59	0.82	0.82
5.00	1.54	27.33	3.71	101.54	2.60	0.82	0.82
5.02	1.54	27.13	3.76	101.95	2.60	0.82	0.82
5.04	1.52	26.78	3.82	102.32	2.61	0.83	0.83
5.06	1.51	26.63	3.82	101.69	2.61	0.83	0.83
5.08	1.52	26.67	3.75	99.90	2.60	0.82	0.82
5.10	1.55	26.97	3.63	97.78	2.59	0.80	0.80
5.12	1.60	27.62	3.45	95.37	2.56	0.78	0.78
5.14	1.66	28.43	3.28	93.30	2.54	0.76	0.76
5.16	1.71	29.20	3.15	92.11	2.52	0.74	0.74
5.18	1.75	29.66	3.08	91.39	2.51	0.73	0.73
5.20	1.77	29.96	3.03	90.77	2.51	0.72	0.72
5.22	1.79	30.12	2.98	89.80	2.50	0.72	0.72
5.24	1.78	29.91	3.00	89.74	2.50	0.72	0.72
5.26	1.75	29.48	3.07	90.57	2.51	0.73	0.73
5.28	1.71	28.77	3.22	92.57	2.53	0.75	0.75
5.30	1.66	28.05	3.43	96.25	2.56	0.78	0.78
5.32	1.60	27.14	3.71	100.78	2.60	0.82	0.82
5.34	1.54	26.21	4.02	105.47	2.63	0.86	0.86
5.36	1.55	26.26	4.01	105.25	2.63	0.85	0.85
5.38	1.54	26.15	4.01	104.92	2.63	0.85	0.85
5.40	1.53	25.78	4.02	103.73	2.63	0.85	0.85
5.42	1.44	24.32	4.35	105.67	2.66	0.88	0.88
5.44	1.37	23.15	4.59	106.36	2.69	0.91	0.91
5.46	1.31	22.19	4.79	106.34	2.71	0.76	0.76
5.48	1.27	21.44	4.92	105.46	2.72	0.76	0.76
5.50	1.24	20.80	5.00	103.96	2.73	0.76	0.76
5.52	1.21	20.32	5.04	102.43	2.73	0.75	0.75
5.54	1.18	19.74	5.18	102.24	2.74	0.75	0.75
5.56	1.14	19.00	5.42	102.97	2.76	0.75	0.75
5.58	1.09	18.19	5.73	104.29	2.79	0.76	0.76
5.60	1.02	17.09	6.14	105.02	2.82	0.76	0.76
5.62	0.95	15.88	6.64	105.36	2.86	0.76	0.76
5.64	0.83	13.89	7.78	108.03	2.94	0.76	0.76
5.66	0.72	11.68	9.54	111.44	3.04	0.51	11.68
5.68	0.61	9.59	11.91	114.24	3.16	0.53	9.59

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.61	9.61	11.65	111.97	3.15	0.51	9.61
5.72	0.70	11.19	9.41	105.32	3.04	0.45	11.19
5.74	0.81	13.19	7.32	96.59	2.91	0.74	0.74
5.76	0.88	14.22	6.46	91.84	2.85	0.73	0.73
5.78	0.90	14.38	6.32	90.96	2.84	0.73	0.73
5.80	0.92	14.69	6.14	90.10	2.82	0.73	0.73
5.82	0.95	15.21	5.76	87.55	2.79	0.72	0.72
5.84	1.00	15.87	5.34	84.75	2.76	0.72	0.72
5.86	1.02	16.22	5.33	86.52	2.76	0.72	0.72
5.88	1.02	16.27	5.66	92.15	2.78	0.73	0.73
5.90	1.01	16.11	6.15	99.10	2.82	0.75	0.75
5.92	1.01	16.10	6.29	101.27	2.83	0.75	0.75
5.94	1.01	16.15	6.21	100.30	2.83	0.75	0.75
5.96	1.03	16.31	5.98	97.58	2.81	0.74	0.74
5.98	1.04	16.41	5.86	96.15	2.80	0.74	0.74
6.00	1.07	16.74	5.64	94.36	2.78	0.74	0.74
6.02	1.11	17.32	5.26	91.11	2.75	0.73	0.73
6.04	1.18	18.30	4.84	88.65	2.71	0.73	0.73
6.06	1.23	19.11	4.57	87.26	2.69	0.86	0.86
6.08	1.26	19.55	4.61	90.22	2.69	0.87	0.87
6.10	1.25	19.39	5.00	96.91	2.73	0.74	0.74
6.12	1.22	19.11	5.42	103.56	2.76	0.75	0.75
6.14	1.21	18.92	5.75	108.81	2.79	0.76	0.76
6.16	1.20	18.76	6.03	113.15	2.81	0.77	0.77
6.18	1.19	18.63	6.43	119.76	2.84	0.78	0.78
6.20	1.18	18.58	6.76	125.56	2.87	0.79	0.79
6.22	1.20	18.85	6.90	130.03	2.88	0.80	0.80
6.24	1.23	19.33	6.73	130.05	2.87	0.80	0.80
6.26	1.26	19.78	6.55	129.61	2.85	0.80	0.80
6.28	1.26	19.69	6.64	130.71	2.86	0.80	0.80
6.30	1.25	19.47	6.88	133.87	2.88	0.80	0.80
6.32	1.23	19.22	7.01	134.77	2.89	0.81	0.81
6.34	1.24	19.29	6.83	131.71	2.87	0.80	0.80
6.36	1.25	19.27	6.75	130.03	2.87	0.80	0.80
6.38	1.30	20.01	6.43	128.63	2.84	0.80	0.80
6.40	1.38	21.19	5.93	125.63	2.81	0.79	0.79
6.42	1.39	21.18	5.75	121.74	2.79	0.79	0.79
6.44	1.29	19.54	6.16	120.38	2.82	0.78	0.78
6.46	1.12	16.89	6.87	115.97	2.88	0.78	0.78
6.48	1.01	15.11	7.40	111.85	2.91	0.77	0.77
6.50	0.94	13.99	7.88	110.21	2.94	0.77	0.77
6.52	0.90	13.25	8.67	114.92	2.99	0.77	0.77
6.54	0.88	12.87	9.29	119.55	3.03	0.61	12.87
6.56	0.88	12.89	9.65	124.38	3.05	0.64	12.89
6.58	0.89	12.97	9.70	125.88	3.05	0.74	12.97
6.60	0.94	13.75	9.11	125.22	3.02	0.66	13.75
6.62	0.98	14.41	8.36	120.51	2.97	0.78	0.78
6.64	0.99	14.54	8.22	119.52	2.97	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	0.96	13.99	8.67	121.36	2.99	0.78	0.78
6.68	0.91	13.15	9.50	124.96	3.04	0.68	13.15
6.70	0.88	12.63	10.03	126.71	3.07	0.70	12.63
6.72	0.84	11.88	10.72	127.27	3.11	0.66	11.88
6.74	0.80	11.15	11.13	124.16	3.13	0.67	11.15
6.76	0.75	10.42	11.66	121.44	3.15	0.57	10.42
6.78	0.71	9.78	12.20	119.27	3.18	0.55	9.78
6.80	0.68	9.22	13.00	119.90	3.21	0.58	9.22
6.82	0.67	8.93	13.43	119.98	3.23	0.57	8.93
6.84	0.66	8.78	13.38	117.50	3.23	0.55	8.78
6.86	0.63	8.33	13.74	114.54	3.24	0.50	8.33
6.88	0.58	7.53	14.97	112.76	3.29	0.48	7.53
6.90	0.53	6.63	16.78	111.18	3.36	0.47	6.63
6.92	0.50	6.19	17.53	108.46	3.38	0.44	6.19
6.94	0.50	6.09	16.99	103.52	3.37	0.39	6.09
6.96	0.50	6.14	16.26	99.77	3.34	0.35	6.14
6.98	0.52	6.35	15.12	96.09	3.30	0.34	6.35
7.00	0.53	6.56	14.37	94.31	3.27	0.31	6.56
7.02	0.55	6.77	13.48	91.27	3.23	0.31	6.77
7.04	0.56	6.92	12.96	89.73	3.21	0.28	6.92
7.06	0.58	7.19	12.15	87.37	3.17	0.28	7.19
7.08	0.60	7.62	11.30	86.13	3.13	0.26	7.62
7.10	0.63	8.09	10.52	85.18	3.10	0.26	8.09
7.12	0.66	8.41	10.13	85.22	3.08	0.27	8.41
7.14	0.66	8.41	10.23	85.98	3.08	0.27	8.41
7.16	0.64	8.15	10.56	86.01	3.10	0.28	8.15
7.18	0.63	7.89	10.81	85.27	3.11	0.27	7.89
7.20	0.62	7.80	10.70	83.40	3.10	0.25	7.80
7.22	0.63	7.90	10.36	81.80	3.09	0.24	7.90
7.24	0.64	7.96	10.21	81.25	3.08	0.24	7.96
7.26	0.64	8.01	10.15	81.36	3.08	0.24	8.01
7.28	0.64	8.02	10.16	81.51	3.08	0.24	8.02
7.30	0.65	8.20	9.89	81.05	3.06	0.24	8.20
7.32	0.68	8.61	9.32	80.27	3.03	0.24	8.61
7.34	0.72	9.23	8.68	80.04	2.99	0.59	0.71
7.36	0.75	9.55	8.47	80.90	2.98	0.63	0.71
7.38	0.75	9.56	8.73	83.40	3.00	0.71	0.71
7.40	0.74	9.41	8.80	82.79	3.00	0.29	9.41
7.42	0.76	9.75	8.33	81.23	2.97	0.65	0.71
7.44	0.82	10.58	7.45	78.84	2.92	0.53	0.70
7.46	0.89	11.58	6.87	79.60	2.88	0.56	0.71
7.48	0.95	12.35	6.56	81.06	2.85	0.64	0.71
7.50	0.99	12.87	6.38	82.16	2.84	0.70	0.71
7.52	1.01	13.14	6.33	83.14	2.84	0.71	0.71
7.54	1.02	13.22	6.41	84.80	2.84	0.72	0.72
7.56	1.00	12.96	6.63	85.87	2.86	0.72	0.72
7.58	0.96	12.47	6.94	86.54	2.88	0.72	0.72
7.60	0.93	11.95	7.27	86.93	2.90	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	0.90	11.62	7.63	88.69	2.93	0.73	0.73
7.64	0.90	11.46	7.89	90.48	2.95	0.73	0.73
7.66	0.90	11.57	7.84	90.68	2.94	0.73	0.73
7.68	0.93	11.88	7.54	89.62	2.92	0.73	0.73
7.70	0.97	12.41	7.11	88.15	2.89	0.72	0.72
7.72	1.00	12.76	6.88	87.82	2.88	0.72	0.72
7.74	1.02	12.99	6.77	87.96	2.87	0.72	0.72
7.76	1.00	12.79	7.02	89.86	2.89	0.73	0.73
7.78	1.00	12.73	6.90	87.82	2.88	0.72	0.72
7.80	1.12	14.30	5.76	82.41	2.79	0.71	0.71
7.82	1.41	17.99	4.20	75.64	2.65	0.80	0.80
7.84	2.07	26.38	2.62	69.10	2.44	0.24	0.68
7.86	2.54	32.32	2.16	69.71	2.36	0.25	0.68
7.88	2.78	35.35	2.01	71.20	2.32	0.28	0.69
7.90	2.55	32.55	2.30	74.76	2.38	0.38	0.69
7.92	2.30	29.50	2.78	82.06	2.47	0.69	0.71
7.94	2.03	26.15	3.60	94.06	2.58	0.79	0.79
7.96	1.84	23.80	4.46	106.25	2.68	0.90	0.90
7.98	1.76	22.84	4.90	111.82	2.72	0.77	0.77
8.00	1.88	24.38	4.66	113.61	2.70	0.93	0.93
8.02	2.08	26.82	4.24	113.72	2.65	0.89	0.89
8.04	2.21	28.47	4.02	114.36	2.63	0.87	0.87
8.06	2.07	26.69	4.24	113.11	2.65	0.89	0.89
8.08	1.84	23.54	4.72	111.03	2.70	0.77	0.77
8.10	1.63	20.74	5.23	108.40	2.75	0.76	0.76
8.12	1.60	20.24	5.23	105.86	2.75	0.76	0.76
8.14	1.66	21.01	5.07	106.50	2.73	0.76	0.76
8.16	1.83	23.19	4.65	107.86	2.69	0.92	0.92
8.18	2.04	25.93	4.22	109.43	2.65	0.88	0.88
8.20	2.10	26.59	4.17	110.91	2.65	0.88	0.88
8.22	1.93	24.40	4.55	110.92	2.68	0.91	0.91
8.24	1.61	20.22	5.36	108.35	2.76	0.76	0.76
8.26	1.36	16.83	6.10	102.70	2.82	0.75	0.75
8.28	1.22	14.91	6.54	97.47	2.85	0.74	0.74
8.30	1.20	14.66	6.50	95.30	2.85	0.74	0.74
8.32	1.28	15.60	5.90	91.97	2.80	0.73	0.73
8.34	1.48	18.09	4.77	86.23	2.71	0.72	0.72
8.36	1.85	22.59	3.59	80.98	2.58	0.76	0.76
8.38	2.27	27.76	2.82	78.18	2.48	0.50	0.70
8.40	2.61	31.96	2.44	78.02	2.41	0.50	0.70
8.42	2.67	32.67	2.41	78.75	2.41	0.53	0.70
8.44	2.51	30.63	2.62	80.35	2.44	0.60	0.71
8.46	2.18	26.60	3.27	86.96	2.54	0.74	0.74
8.48	1.83	22.31	4.03	89.87	2.63	0.82	0.82
8.50	1.70	20.52	4.29	88.10	2.66	0.84	0.84
8.52	2.06	24.79	3.04	75.30	2.51	0.34	0.69
8.54	2.63	31.67	2.22	70.32	2.37	0.26	0.68
8.56	2.99	35.85	1.96	70.26	2.31	0.26	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	2.83	33.87	2.10	71.28	2.34	0.28	0.69
8.60	2.47	29.60	2.47	73.10	2.42	0.33	0.69
8.62	2.20	26.43	3.04	80.35	2.51	0.52	0.70
8.64	2.02	24.24	3.76	91.08	2.60	0.80	0.80
8.66	1.81	21.71	4.71	102.20	2.70	0.75	0.75
8.68	1.66	19.94	5.30	105.63	2.75	0.76	0.76
8.70	1.60	19.15	5.50	105.26	2.77	0.76	0.76
8.72	1.66	19.80	5.23	103.54	2.75	0.75	0.75
8.74	1.70	20.27	5.03	102.00	2.73	0.75	0.75
8.76	1.68	19.96	5.02	100.20	2.73	0.75	0.75
8.78	1.69	20.00	4.70	94.00	2.70	0.89	0.89
8.80	1.79	21.09	4.18	88.16	2.65	0.83	0.83
8.82	1.97	23.23	3.69	85.75	2.59	0.78	0.78
8.84	2.13	25.09	3.49	87.48	2.57	0.77	0.77
8.86	2.13	25.11	3.62	90.85	2.58	0.79	0.79
8.88	2.03	23.86	3.90	93.13	2.62	0.82	0.82
8.90	1.86	21.73	4.32	93.91	2.66	0.86	0.86
8.92	1.81	21.13	4.46	94.32	2.68	0.87	0.87
8.94	1.85	21.62	4.36	94.18	2.67	0.86	0.86
8.96	1.95	22.73	4.15	94.38	2.64	0.84	0.84
8.98	2.06	24.01	3.96	95.13	2.62	0.83	0.83
9.00	2.47	28.89	3.19	92.22	2.53	0.75	0.75
9.02	3.06	35.61	2.32	82.58	2.39	0.71	0.71
9.04	3.57	41.37	1.88	77.76	2.29	0.48	0.70
9.06	3.63	41.91	1.74	72.73	2.24	0.32	0.69
9.08	3.37	38.93	1.94	75.33	2.30	0.40	0.70
9.10	3.02	34.94	2.30	80.20	2.38	0.59	0.71
9.12	2.72	31.56	2.88	90.75	2.48	0.73	0.73
9.14	2.55	29.61	3.38	99.97	2.55	0.78	0.78
9.16	2.42	28.02	3.86	108.25	2.61	0.85	0.85
9.18	2.21	25.61	4.44	113.76	2.67	0.91	0.91
9.20	2.02	23.31	4.99	116.40	2.73	0.78	0.78
9.22	1.88	21.56	5.39	116.32	2.76	0.78	0.78
9.24	1.85	21.07	5.45	114.84	2.77	0.77	0.77
9.26	1.84	20.92	5.28	110.42	2.75	0.77	0.77
9.28	1.92	21.80	4.81	104.79	2.71	0.76	0.76
9.30	2.28	25.89	3.81	98.65	2.61	0.82	0.82
9.32	2.71	30.86	3.12	96.17	2.52	0.75	0.75
9.34	2.94	33.47	2.73	91.28	2.46	0.73	0.73
9.36	2.85	32.37	2.77	89.68	2.47	0.73	0.73
9.38	2.65	29.92	3.01	90.21	2.51	0.72	0.72
9.40	2.50	28.34	3.50	99.29	2.57	0.79	0.79
9.42	2.30	25.99	4.29	111.58	2.66	0.89	0.89
9.44	2.08	23.47	5.25	123.26	2.75	0.79	0.79
9.46	1.87	21.03	6.16	129.53	2.82	0.80	0.80
9.48	1.76	19.68	6.52	128.32	2.85	0.80	0.80
9.50	1.70	18.91	6.53	123.42	2.85	0.79	0.79
9.52	1.69	18.70	6.28	117.44	2.83	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	1.75	19.32	5.74	110.99	2.79	0.77	0.77
9.56	2.03	22.50	4.63	104.18	2.69	0.91	0.91
9.58	2.35	26.08	3.79	98.92	2.60	0.82	0.82
9.60	2.61	29.02	3.30	95.69	2.54	0.76	0.76
9.62	2.69	29.89	3.16	94.54	2.53	0.75	0.75
9.64	2.77	30.71	3.08	94.52	2.51	0.74	0.74
9.66	2.88	31.94	2.97	94.95	2.50	0.74	0.74
9.68	2.95	32.61	2.91	94.75	2.49	0.74	0.74
9.70	2.93	32.39	2.93	94.94	2.49	0.74	0.74
9.72	2.83	31.18	3.07	95.69	2.51	0.74	0.74
9.74	2.66	29.28	3.39	99.32	2.56	0.78	0.78
9.76	2.54	27.89	3.70	103.08	2.59	0.82	0.82
9.78	2.71	29.71	3.40	101.15	2.56	0.79	0.79
9.80	2.93	32.10	3.10	99.37	2.52	0.75	0.75
9.82	3.04	33.30	2.91	96.97	2.49	0.74	0.74
9.84	2.91	31.81	3.20	101.68	2.53	0.76	0.76
9.86	2.84	31.07	3.43	106.55	2.56	0.80	0.80
9.88	2.86	31.21	3.49	108.94	2.57	0.81	0.81
9.90	2.70	29.41	3.80	111.64	2.61	0.85	0.85
9.92	2.43	26.29	4.26	112.01	2.66	0.89	0.89
9.94	2.22	23.90	4.78	114.17	2.71	0.77	0.77
9.96	2.24	23.98	4.65	111.42	2.69	0.92	0.92
9.98	2.30	24.61	4.47	110.02	2.68	0.90	0.90
10.00	2.25	24.02	4.59	110.14	2.69	0.91	0.91
10.02	2.14	22.73	4.94	112.26	2.72	0.77	0.77
10.04	2.08	22.01	5.14	113.05	2.74	0.77	0.77
10.06	2.11	22.41	5.05	113.13	2.73	0.77	0.77
10.08	2.28	24.19	4.55	110.02	2.68	0.91	0.91
10.10	2.50	26.64	4.00	106.47	2.63	0.85	0.85
10.12	2.80	29.88	3.44	102.79	2.56	0.79	0.79
10.14	3.12	33.29	2.98	99.21	2.50	0.74	0.74
10.16	3.28	34.98	2.76	96.47	2.47	0.74	0.74
10.18	3.36	35.80	2.63	94.28	2.45	0.74	0.74
10.20	3.38	35.92	2.56	92.07	2.43	0.73	0.73
10.22	3.50	37.08	2.42	89.89	2.41	0.73	0.73
10.24	3.59	38.01	2.31	87.79	2.39	0.72	0.72
10.26	3.48	36.79	2.29	84.26	2.38	0.72	0.72
10.28	3.35	35.19	2.31	81.14	2.39	0.64	0.71
10.30	2.95	30.96	2.89	89.48	2.49	0.73	0.73
10.32	2.63	27.48	3.78	103.75	2.60	0.83	0.83
10.34	2.21	22.91	5.20	119.14	2.75	0.78	0.78
10.36	2.06	21.20	5.58	118.23	2.78	0.78	0.78
10.38	2.08	21.39	5.30	113.42	2.75	0.77	0.77
10.40	2.34	24.08	4.44	106.96	2.67	0.90	0.90
10.42	2.67	27.69	3.63	100.44	2.59	0.81	0.81
10.44	2.96	30.64	3.03	92.90	2.51	0.73	0.73
10.46	2.94	30.44	2.89	87.96	2.49	0.72	0.72
10.48	2.79	28.67	3.06	87.58	2.51	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	2.56	26.28	3.55	93.36	2.58	0.79	0.79
10.52	2.47	25.28	3.98	100.60	2.63	0.84	0.84
10.54	2.32	23.65	4.57	108.13	2.69	0.91	0.91
10.56	2.18	22.05	5.14	113.25	2.74	0.77	0.77
10.58	2.45	24.95	4.38	109.20	2.67	0.89	0.89
10.60	2.98	30.51	3.35	102.17	2.55	0.78	0.78
10.62	3.53	36.40	2.72	98.97	2.46	0.75	0.75
10.64	3.59	36.88	2.65	97.71	2.45	0.74	0.74
10.66	3.31	33.87	2.85	96.46	2.48	0.74	0.74
10.68	2.86	28.98	3.21	93.00	2.53	0.75	0.75
10.70	2.31	23.16	4.30	99.52	2.66	0.87	0.87
10.72	2.06	20.40	5.18	105.60	2.74	0.76	0.76
10.74	2.07	20.48	5.38	110.14	2.76	0.77	0.77
10.76	2.24	22.32	4.77	106.49	2.71	0.76	0.76
10.78	2.21	21.96	4.85	106.46	2.71	0.76	0.76
10.80	2.13	21.07	4.97	104.78	2.72	0.76	0.76
10.82	2.15	21.16	4.82	101.93	2.71	0.75	0.75
10.84	2.16	21.24	4.64	98.59	2.69	0.90	0.90
10.86	2.04	19.96	4.95	98.75	2.72	0.75	0.75
10.88	1.87	18.13	5.57	101.04	2.78	0.75	0.75
10.90	1.63	15.51	6.74	104.48	2.87	0.76	0.76
10.92	1.44	13.50	7.73	104.30	2.93	0.76	0.76
10.94	1.27	11.58	8.89	103.01	3.01	0.42	11.58
10.96	1.33	12.31	7.92	97.50	2.95	0.74	0.74
10.98	1.52	14.26	6.60	94.13	2.86	0.74	0.74
11.00	1.72	16.29	5.54	90.20	2.77	0.73	0.73
11.02	1.73	16.44	5.47	90.03	2.77	0.73	0.73
11.04	1.56	14.58	6.25	91.10	2.83	0.73	0.73
11.06	1.34	12.28	7.54	92.58	2.92	0.73	0.73
11.08	1.24	11.14	8.17	91.00	2.96	0.73	0.73
11.10	1.36	12.37	6.98	86.29	2.88	0.72	0.72
11.12	1.70	15.97	5.17	82.52	2.74	0.71	0.71
11.14	2.15	20.58	3.78	77.74	2.60	0.77	0.77
11.16	2.38	22.96	3.39	77.85	2.56	0.74	0.74
11.18	2.51	24.25	3.21	77.77	2.53	0.72	0.72
11.20	2.77	26.91	2.82	75.97	2.48	0.42	0.70
11.22	3.14	30.67	2.46	75.51	2.42	0.40	0.70
11.24	3.31	32.35	2.37	76.53	2.40	0.44	0.70
11.26	3.26	31.80	2.48	78.74	2.42	0.53	0.70
11.28	3.28	31.95	2.51	80.25	2.43	0.60	0.71
11.30	3.29	32.03	2.61	83.49	2.44	0.71	0.71
11.32	3.07	29.77	2.96	87.99	2.50	0.72	0.72
11.34	2.64	25.31	3.79	95.84	2.60	0.81	0.81
11.36	2.24	21.14	4.97	105.02	2.72	0.76	0.76
11.38	1.94	18.05	6.42	115.93	2.84	0.78	0.78
11.40	1.80	16.58	7.11	117.99	2.89	0.78	0.78
11.42	1.93	17.95	6.10	109.58	2.82	0.77	0.77
11.44	2.15	20.15	4.88	98.27	2.72	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.46	2.57	24.35	3.48	84.70	2.57	0.76	0.76
11.48	2.65	25.13	3.08	77.42	2.51	0.48	0.70
11.50	2.59	24.43	2.97	72.65	2.50	0.32	0.69
11.52	2.18	20.23	3.85	77.92	2.61	0.78	0.78
11.54	1.98	18.20	4.62	84.05	2.69	0.86	0.86
11.56	1.97	18.03	4.88	88.05	2.72	0.72	0.72
11.58	2.00	18.35	4.92	90.33	2.72	0.73	0.73
11.60	1.87	16.96	5.56	94.39	2.78	0.74	0.74
11.62	1.60	14.25	6.97	99.38	2.88	0.75	0.75
11.64	1.40	12.23	8.32	101.71	2.97	0.75	0.75
11.66	1.30	11.14	9.13	101.79	3.02	0.43	11.14
11.68	1.30	11.15	9.04	100.81	3.01	0.41	11.15
11.70	1.33	11.37	8.67	98.65	2.99	0.75	0.75
11.72	1.40	12.06	7.92	95.58	2.95	0.74	0.74
11.74	1.50	13.13	6.85	89.94	2.88	0.73	0.73
11.76	1.50	13.06	6.68	87.27	2.86	0.72	0.72
11.78	1.40	12.02	7.26	87.25	2.90	0.72	0.72
11.80	1.25	10.49	8.37	87.82	2.98	0.72	0.72
11.82	1.18	9.78	9.02	88.22	3.01	0.28	9.78
11.84	1.15	9.50	9.18	87.26	3.02	0.30	9.50
11.86	1.13	9.29	9.45	87.79	3.04	0.30	9.29
11.88	1.12	9.15	9.46	86.53	3.04	0.29	9.15
11.90	1.12	9.12	9.24	84.31	3.03	0.27	9.12
11.92	1.12	9.10	9.04	82.25	3.01	0.25	9.10
11.94	1.13	9.15	8.84	80.88	3.00	0.25	9.15
11.96	1.14	9.24	8.74	80.75	3.00	0.62	0.71
11.98	1.16	9.49	8.49	80.62	2.98	0.62	0.71
12.00	1.20	9.81	8.30	81.44	2.97	0.66	0.71
12.02	1.22	10.03	8.16	81.88	2.96	0.68	0.71
12.04	1.25	10.24	8.06	82.52	2.96	0.71	0.71
12.06	1.28	10.57	7.83	82.78	2.94	0.71	0.71
12.08	1.33	11.02	7.60	83.72	2.93	0.72	0.72
12.10	1.37	11.39	7.46	84.97	2.92	0.72	0.72
12.12	1.48	12.45	6.82	84.92	2.87	0.72	0.72
12.14	1.65	14.09	5.98	84.20	2.81	0.72	0.72
12.16	1.84	15.95	5.29	84.40	2.75	0.72	0.72
12.18	1.94	16.97	5.16	87.49	2.74	0.72	0.72
12.20	1.92	16.73	5.33	89.07	2.76	0.73	0.73
12.22	1.72	14.68	6.07	89.19	2.82	0.73	0.73
12.24	1.48	12.32	6.85	84.37	2.88	0.72	0.72
12.26	1.26	10.16	8.03	81.59	2.95	0.67	0.71
12.28	1.16	9.24	8.84	81.62	3.00	0.24	9.24
12.30	1.08	8.42	10.65	89.62	3.10	0.28	8.42
12.32	1.02	7.79	12.45	97.00	3.19	0.38	7.79
12.34	0.97	7.31	13.97	102.20	3.25	0.39	7.31
12.36	0.94	6.96	14.64	101.92	3.28	0.39	6.96
12.38	0.92	6.81	14.79	100.67	3.28	0.37	6.81
12.40	0.92	6.83	14.11	96.30	3.26	0.36	6.83

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.42	0.93	6.86	13.19	90.44	3.22	0.29	6.86
12.44	0.93	6.84	12.14	83.08	3.17	0.23	6.84
12.46	0.92	6.79	11.65	79.10	3.15	0.20	6.79
12.48	0.93	6.82	11.36	77.44	3.14	0.21	6.82
12.50	0.93	6.84	11.33	77.48	3.14	0.20	6.84
12.52	0.93	6.81	11.34	77.21	3.14	0.21	6.81
12.54	0.92	6.74	11.47	77.35	3.14	0.20	6.74
12.56	0.91	6.62	11.67	77.18	3.15	0.21	6.62
12.58	0.92	6.66	11.53	76.83	3.15	0.20	6.66
12.60	0.94	6.83	11.12	75.93	3.13	0.20	6.83
12.62	0.96	7.05	10.68	75.27	3.10	0.19	7.05
12.64	0.97	7.13	10.51	74.87	3.09	0.19	7.13
12.66	0.95	6.94	10.88	75.47	3.11	0.19	6.94
12.68	0.94	6.85	11.13	76.26	3.13	0.20	6.85
12.70	0.94	6.82	11.32	77.18	3.13	0.21	6.82
12.72	0.96	6.94	11.20	77.76	3.13	0.21	6.94
12.74	0.97	7.05	11.05	77.95	3.12	0.21	7.05
12.76	0.97	7.09	10.99	77.96	3.12	0.21	7.09
12.78	0.99	7.25	10.70	77.54	3.10	0.21	7.25
12.80	1.01	7.38	10.42	76.84	3.09	0.21	7.38
12.82	1.02	7.48	10.12	75.70	3.07	0.20	7.48
12.84	1.02	7.50	9.90	74.22	3.06	0.19	7.50
12.86	1.04	7.62	9.55	72.80	3.04	0.18	7.62
12.88	1.07	7.87	9.13	71.84	3.02	0.18	7.87
12.90	1.08	7.97	9.00	71.72	3.01	0.18	7.97
12.92	1.07	7.87	9.16	72.04	3.02	0.18	7.87
12.94	1.05	7.73	9.41	72.67	3.04	0.18	7.73
12.96	1.06	7.78	9.36	72.83	3.03	0.19	7.78
12.98	1.07	7.88	9.22	72.66	3.03	0.19	7.88
13.00	1.08	7.91	9.12	72.15	3.02	0.18	7.91
13.02	1.08	7.92	9.07	71.78	3.02	0.18	7.92
13.04	1.10	8.05	8.89	71.62	3.01	0.18	8.05
13.06	1.12	8.25	8.65	71.37	2.99	0.29	0.69
13.08	1.14	8.41	8.43	70.89	2.98	0.27	0.69
13.10	1.15	8.55	8.26	70.60	2.97	0.27	0.68
13.12	1.18	8.76	8.05	70.48	2.96	0.27	0.68
13.14	1.23	9.26	7.62	70.57	2.93	0.27	0.68
13.16	1.29	9.77	7.18	70.12	2.90	0.26	0.68
13.18	1.34	10.18	6.86	69.83	2.88	0.25	0.68
13.20	1.34	10.21	6.93	70.79	2.88	0.27	0.69
13.22	1.32	9.99	7.35	73.46	2.91	0.34	0.69
13.24	1.28	9.61	7.98	76.66	2.95	0.44	0.70
13.26	1.22	9.07	8.79	79.72	3.00	0.24	9.07
13.28	1.18	8.62	9.55	82.33	3.04	0.25	8.62
13.30	1.16	8.43	10.01	84.45	3.07	0.27	8.43
13.32	1.19	8.73	9.70	84.67	3.05	0.28	8.73
13.34	1.30	9.71	8.57	83.18	2.99	0.71	0.71
13.36	2.35	19.43	3.43	66.65	2.56	0.67	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.38	7.63	69.39	1.00	69.39	1.81	0.24	0.68
13.40	14.13	131.71	1.00	131.71	1.48	0.80	0.80
13.42	19.99	188.11	1.00	188.11	1.31	0.87	0.87
13.44	21.46	201.95	1.00	201.95	1.32	0.89	0.89
13.46	22.52	211.90	1.00	211.90	1.32	0.90	0.90
13.48	23.03	216.36	1.00	216.36	1.34	0.90	0.90
13.50	24.20	227.24	1.00	227.24	1.35	0.91	0.91
13.52	24.57	230.55	1.00	230.55	1.36	0.92	0.92
13.54	25.04	234.97	1.00	234.97	1.34	0.92	0.92
13.56	24.41	228.69	1.00	228.69	1.35	0.92	0.92
13.58	23.39	218.62	1.00	218.62	1.38	0.91	0.91
13.60	21.92	204.04	1.00	204.04	1.45	0.89	0.89
13.62	20.63	191.07	1.00	191.07	1.53	0.88	0.88
13.64	19.93	183.63	1.00	183.63	1.64	0.87	0.87
13.66	20.16	185.28	1.00	185.28	1.67	0.87	0.87
13.68	21.35	196.32	1.00	196.32	1.65	0.88	0.88
13.70	22.40	206.40	1.00	206.40	1.59	0.89	0.89
13.72	23.27	214.78	1.00	214.78	1.54	0.90	0.90
13.74	23.65	218.32	1.00	218.32	1.52	0.91	0.91
13.76	23.73	219.18	1.00	219.18	1.49	0.91	0.91
13.78	23.82	219.64	1.00	219.64	1.51	0.91	0.91
13.80	23.94	220.62	1.00	220.62	1.51	0.91	0.91
13.82	24.34	223.93	1.00	223.93	1.53	0.91	0.91
13.84	24.59	226.10	1.00	226.10	1.52	0.91	0.91
13.86	24.12	221.38	1.00	221.38	1.53	0.91	0.91
13.88	23.37	214.30	1.00	214.30	1.53	0.90	0.90
13.90	21.83	199.74	1.00	199.74	1.54	0.89	0.89
13.92	20.91	191.01	1.00	191.01	1.55	0.88	0.88
13.94	20.17	183.60	1.00	183.60	1.59	0.87	0.87
13.96	20.46	185.80	1.00	185.80	1.63	0.87	0.87
13.98	20.50	185.60	1.00	185.60	1.66	0.87	0.87
14.00	19.87	179.51	1.00	179.51	1.68	0.86	0.86
14.02	19.03	171.08	1.06	181.20	1.74	0.87	0.87
14.04	17.66	157.56	1.20	188.36	1.84	0.87	0.87
14.06	17.23	152.57	1.27	193.33	1.95	0.88	0.88
14.08	17.40	153.38	1.32	201.98	2.01	0.89	0.89
14.10	19.78	174.65	1.30	226.53	1.99	0.91	0.91
14.12	22.16	195.98	1.28	250.31	1.96	0.94	0.94
14.14	24.17	213.91	1.27	270.61	1.94	0.95	0.95
14.16	25.39	224.31	1.27	285.57	1.95	0.97	0.97
14.18	27.27	240.91	1.27	304.91	1.94	0.98	0.98
14.20	28.51	251.62	1.27	318.77	1.95	0.99	0.99
14.22	30.77	272.18	1.24	336.69	1.90	1.01	1.01
14.24	32.47	287.50	1.22	349.68	1.87	1.01	1.01
14.26	34.57	306.59	1.18	362.40	1.83	1.02	1.02

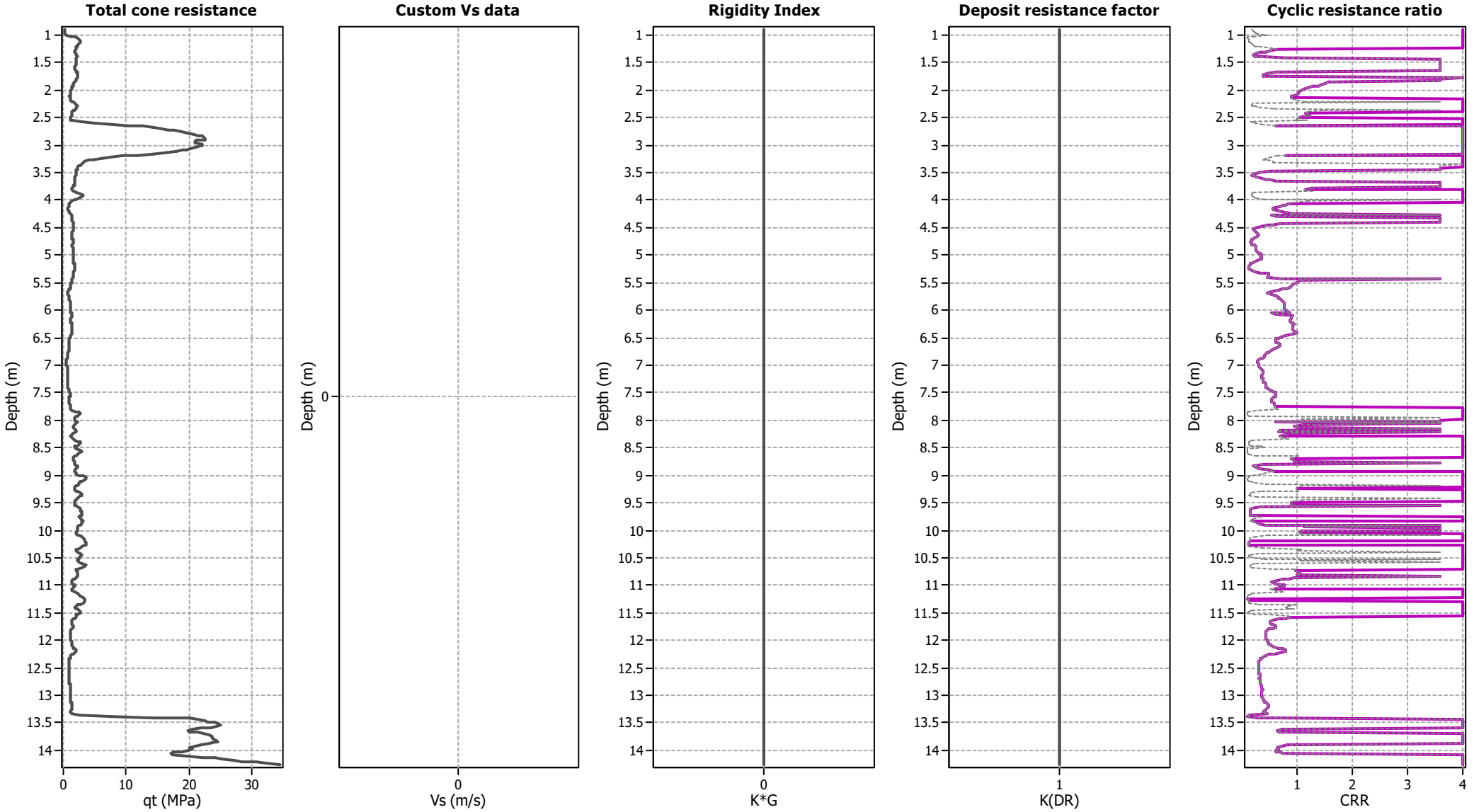
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

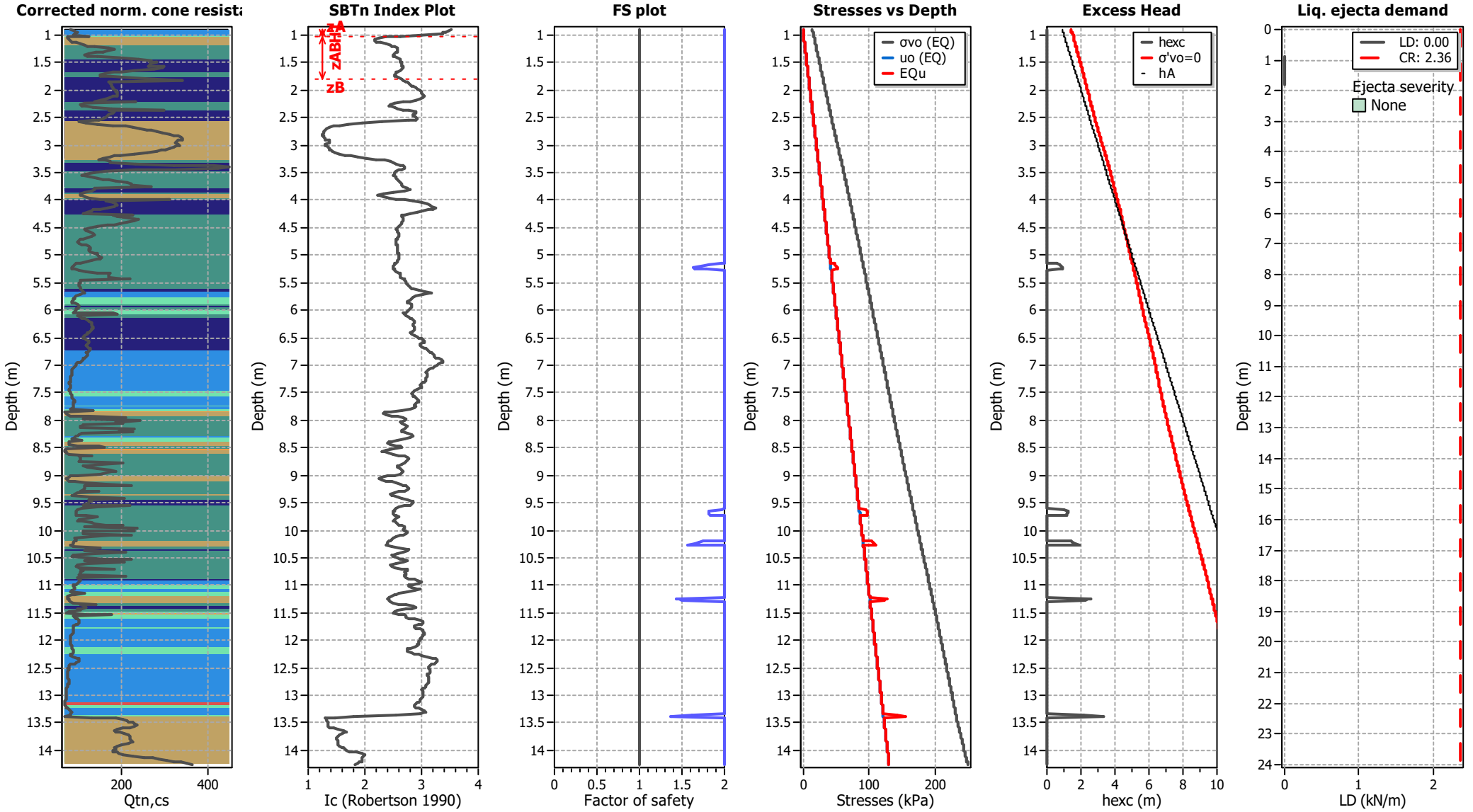
Abbreviations

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

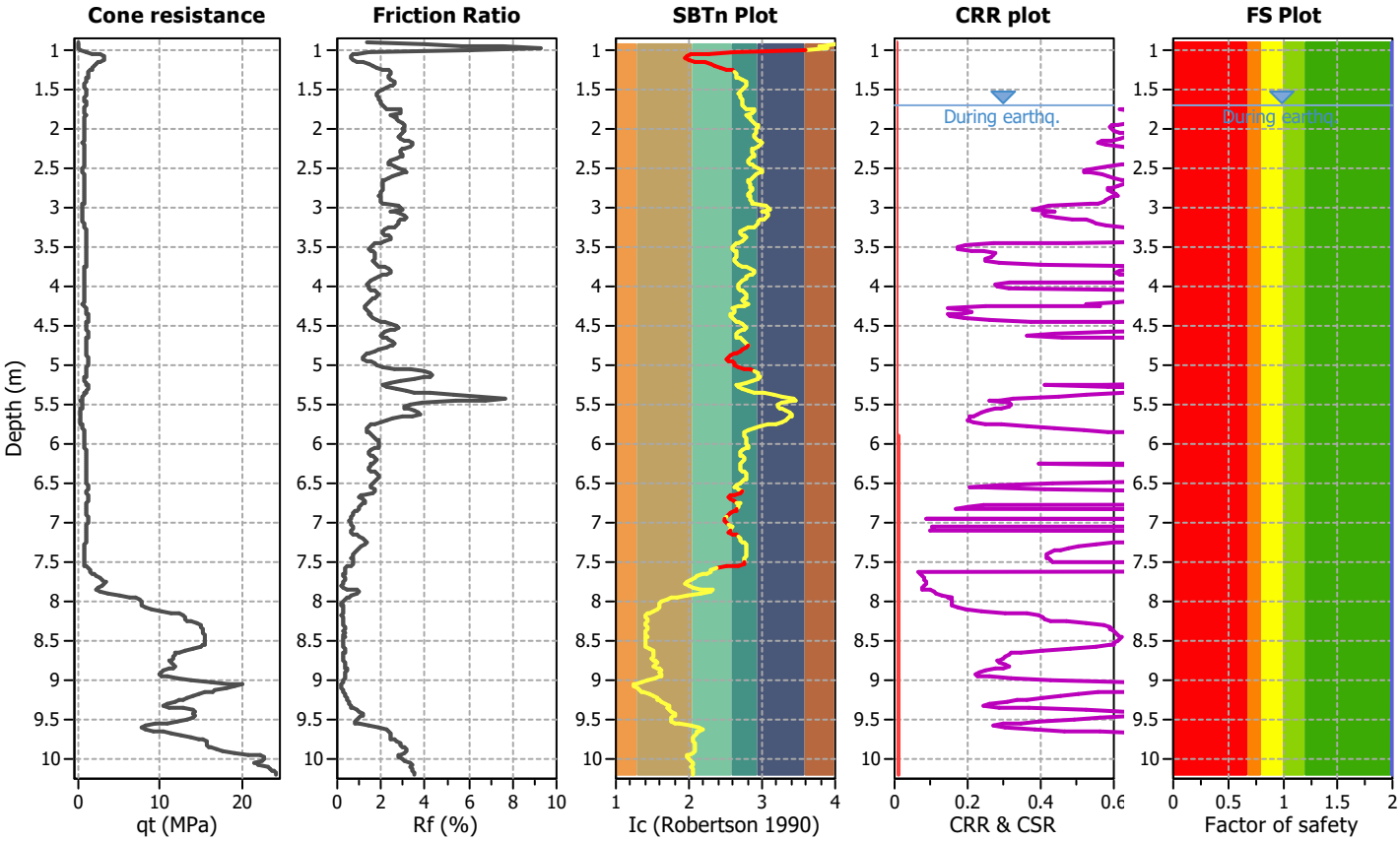
LIQUEFACTION ANALYSIS REPORT

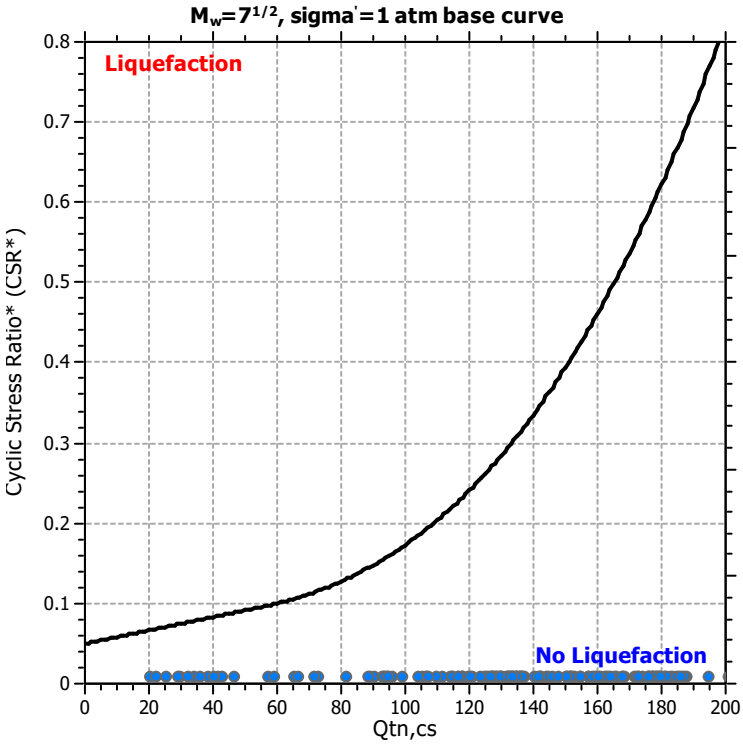
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

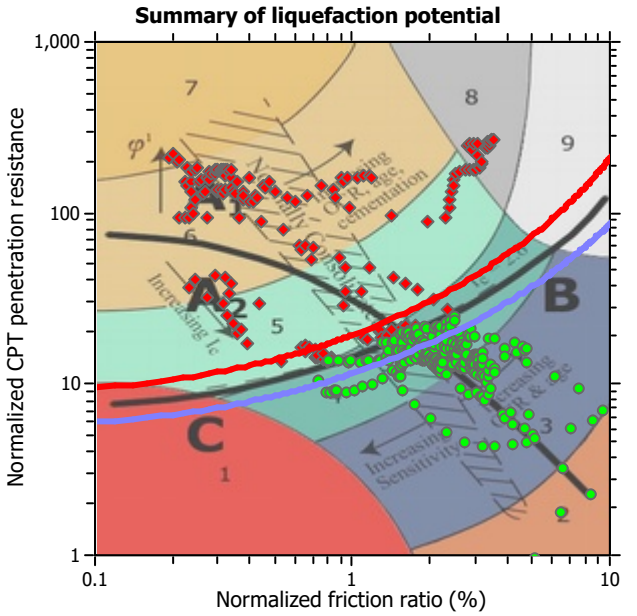
CPT file : CWLP CPT-6L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.70 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.70 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	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:	0.01	Unit weight calculation:	Based on SBT	K_σ applied:	No		

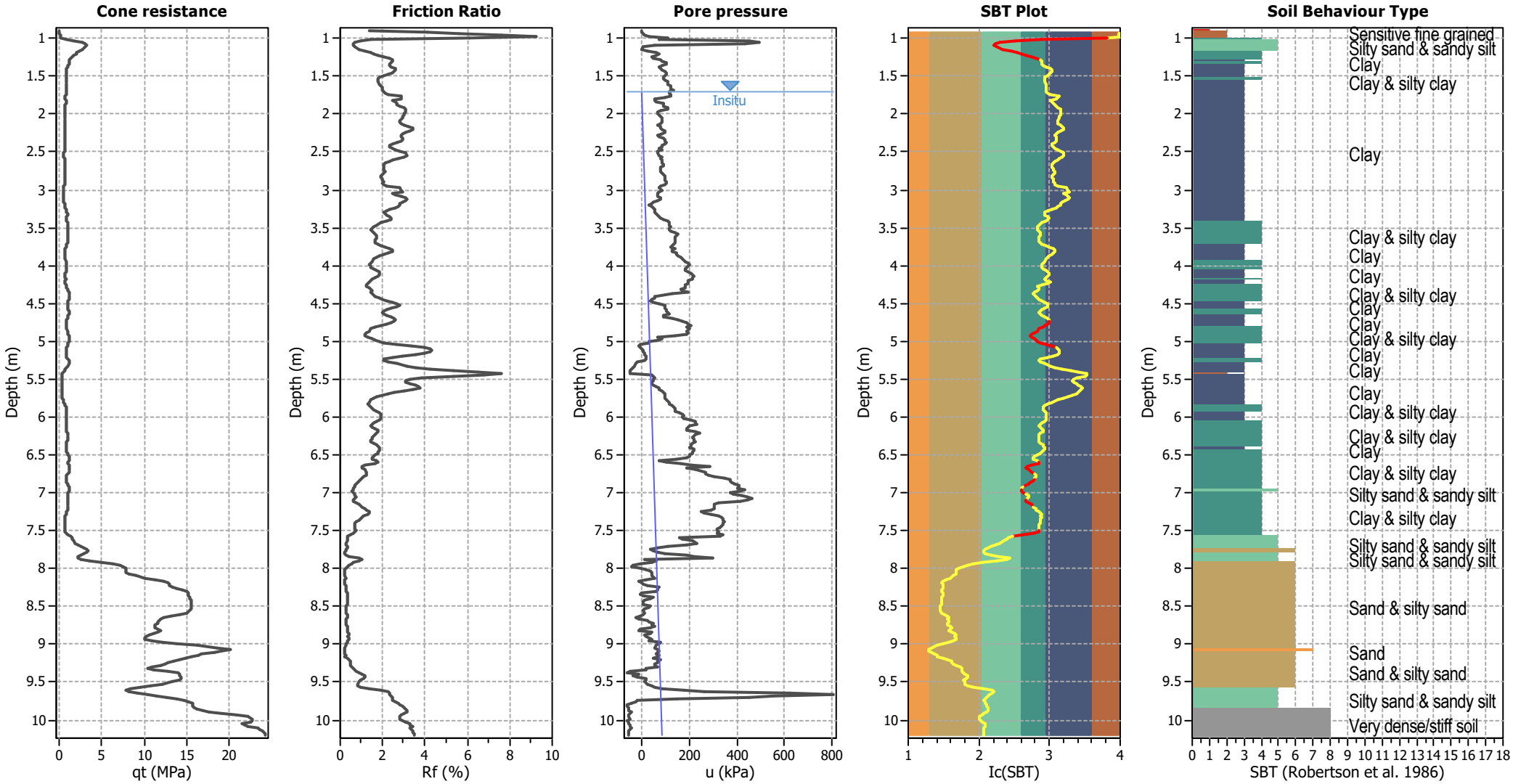






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



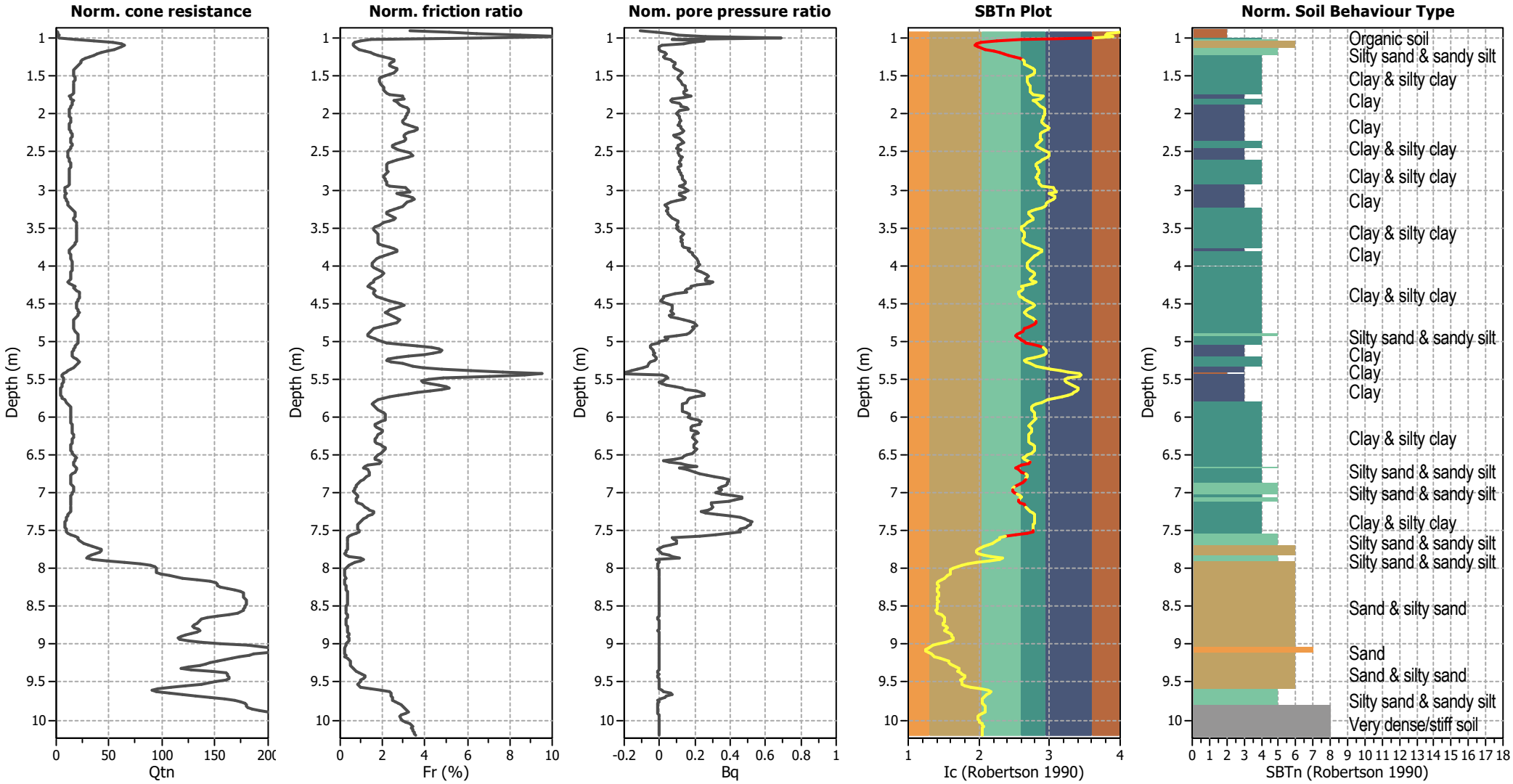
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
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:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	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)



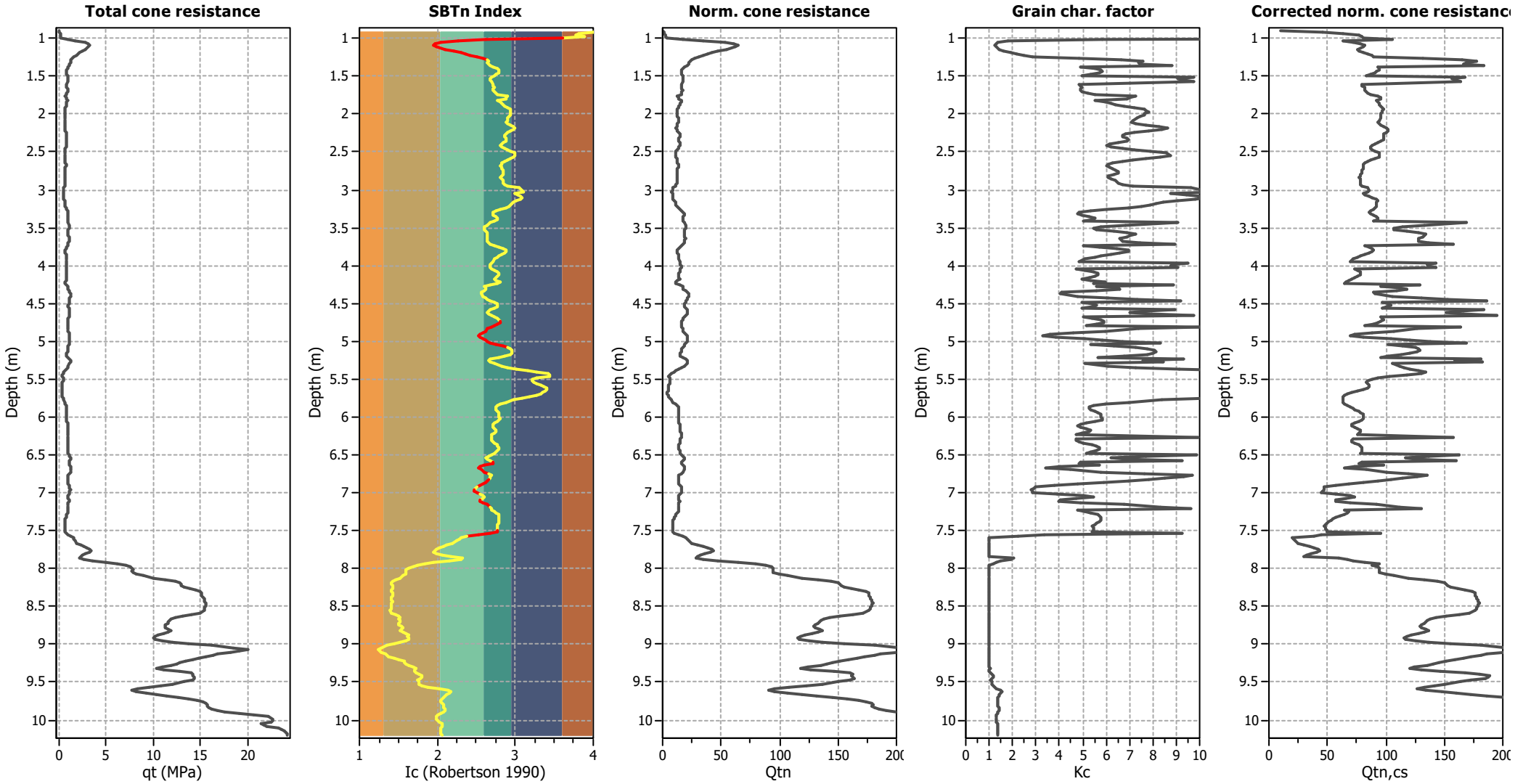
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
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:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	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

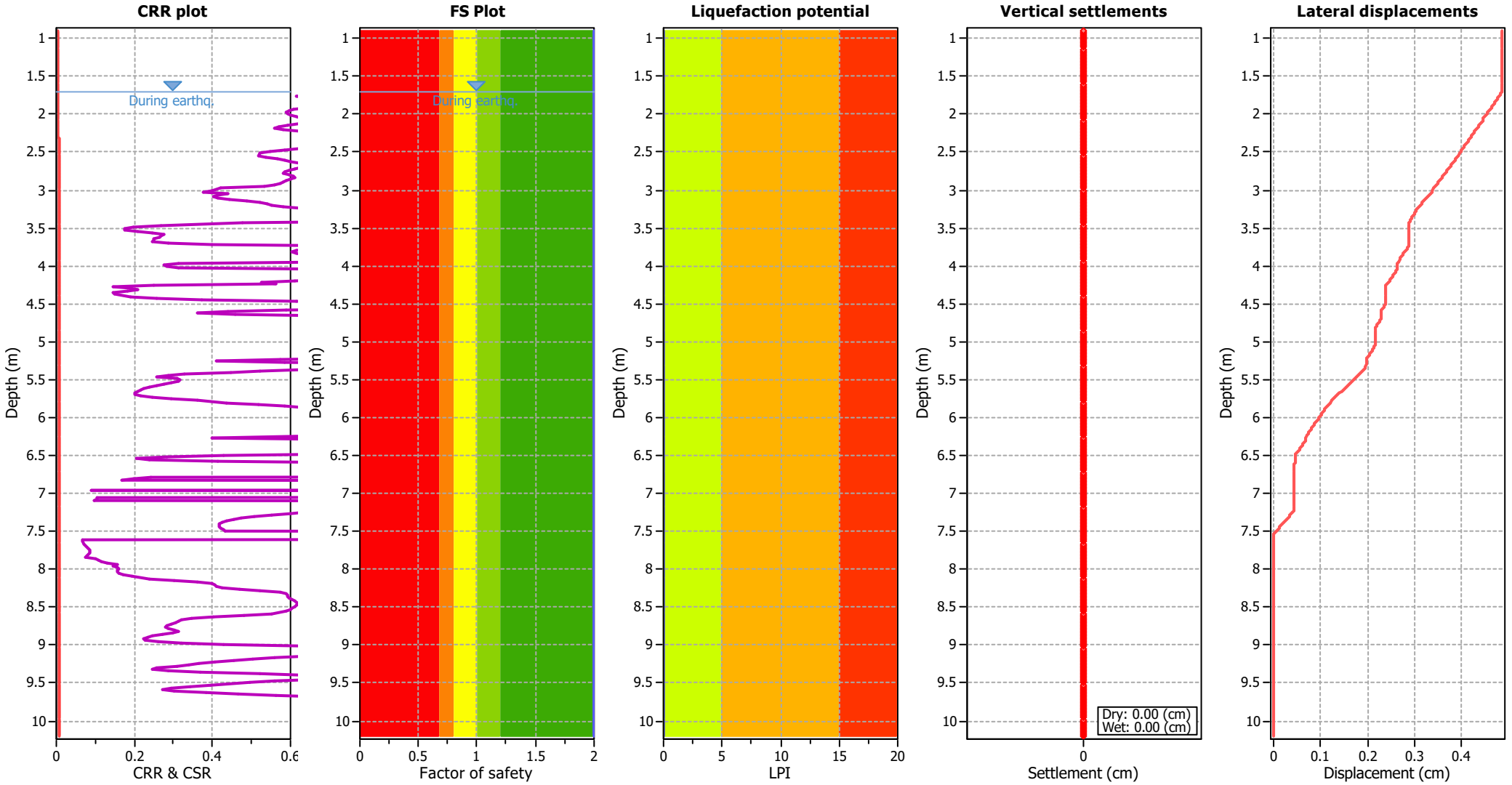
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
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:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
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:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

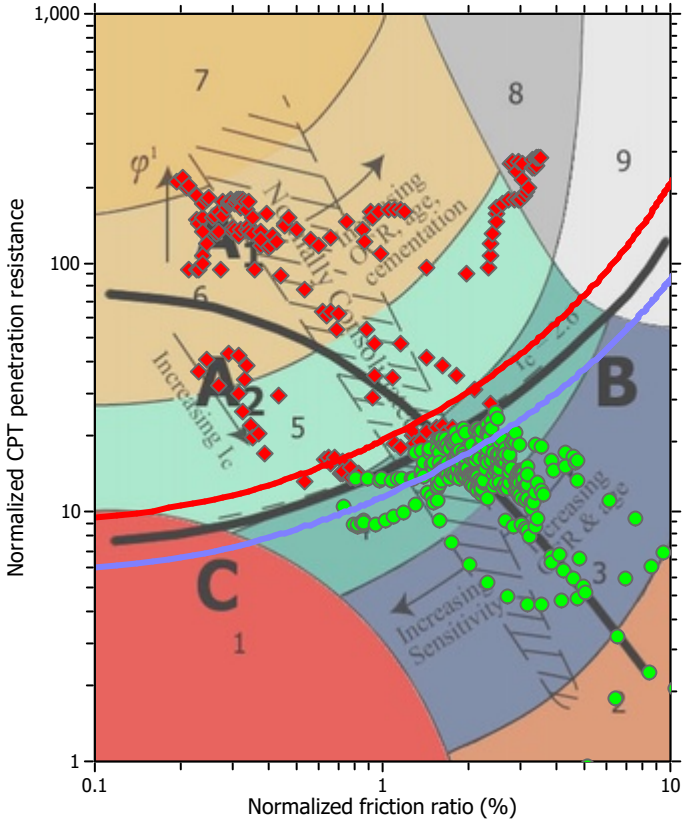
F.S. color scheme

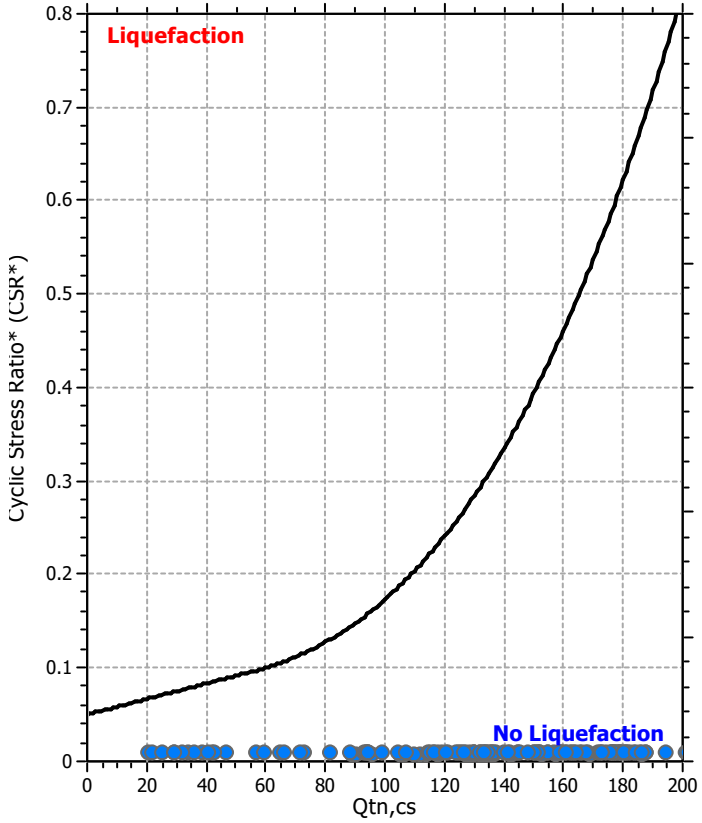
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

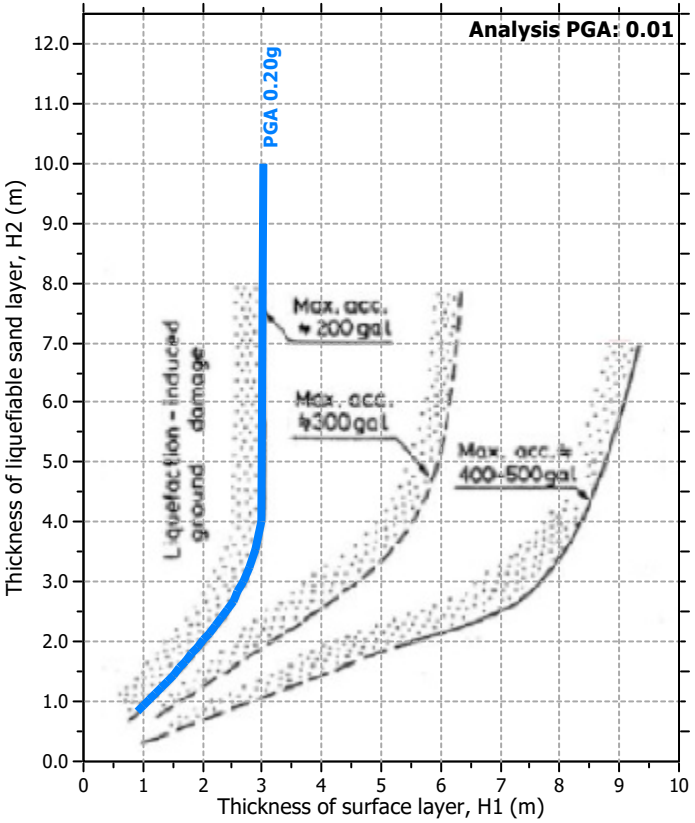
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



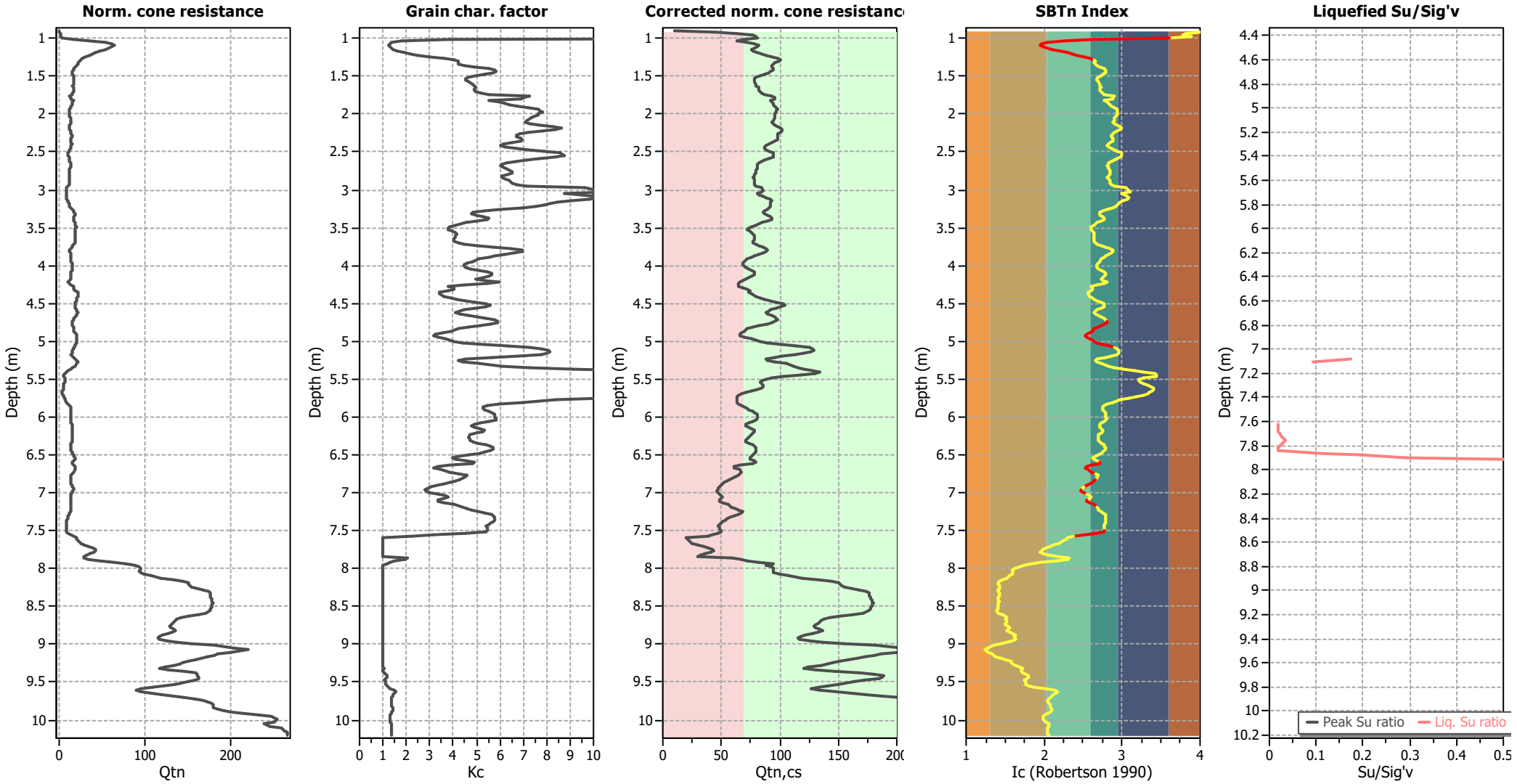




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
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:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

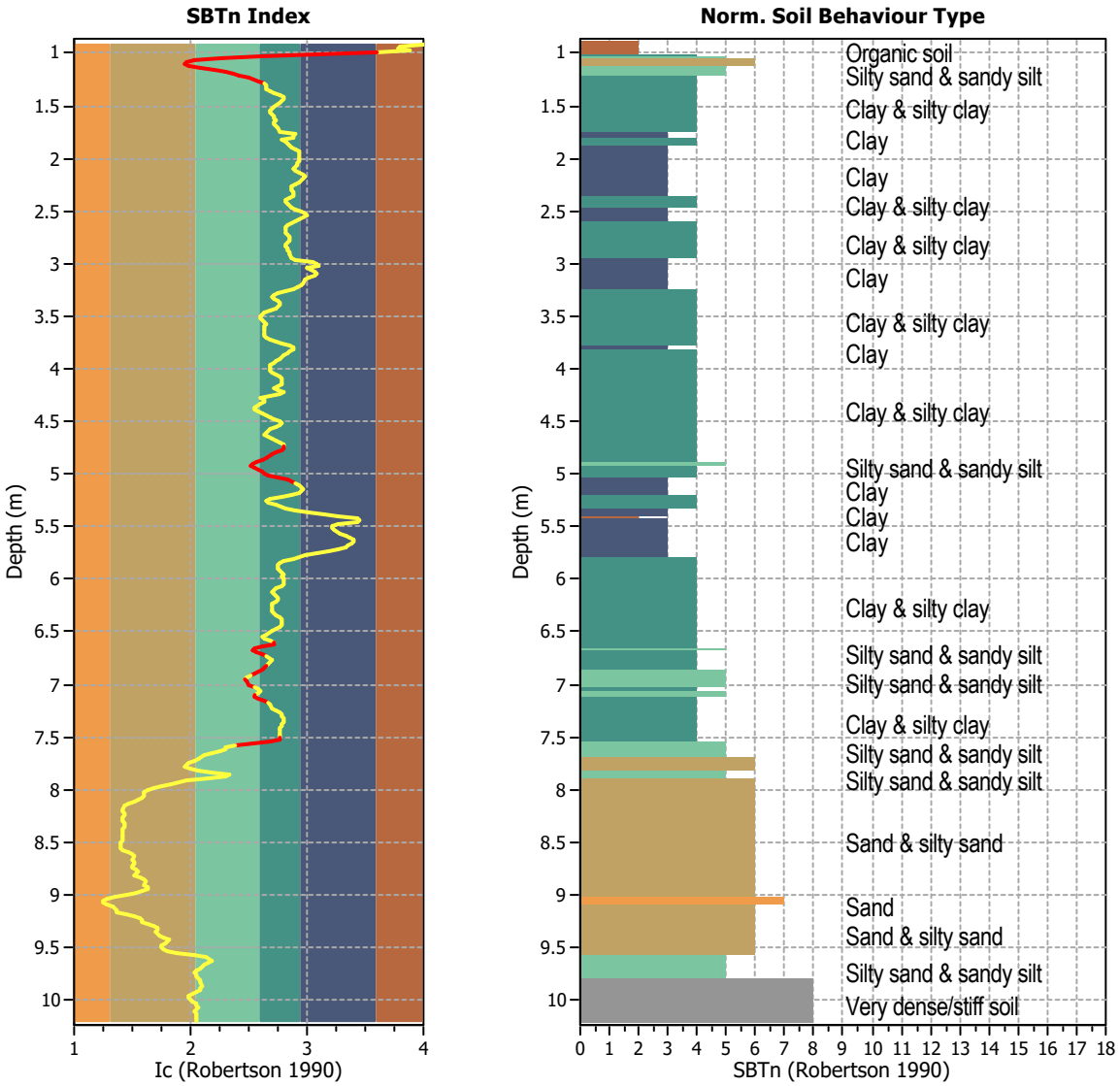
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.70 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.01	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	N/A	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	0.90	12.36	0.00	12.36	1.00	0.006	1.38	0.005	1.00	1.00	2.000	No
2	0.92	12.64	0.00	12.64	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
3	0.94	12.92	0.00	12.92	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
4	0.96	13.21	0.00	13.21	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
5	0.98	13.51	0.00	13.51	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
6	1.00	13.81	0.00	13.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
7	1.02	14.13	0.00	14.13	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
8	1.04	14.46	0.00	14.46	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
9	1.06	14.79	0.00	14.79	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
10	1.08	15.13	0.00	15.13	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
11	1.10	15.47	0.00	15.47	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
12	1.12	15.81	0.00	15.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
13	1.14	16.15	0.00	16.15	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
14	1.16	16.49	0.00	16.49	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
15	1.18	16.84	0.00	16.84	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
16	1.20	17.18	0.00	17.18	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
17	1.22	17.53	0.00	17.53	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
18	1.24	17.87	0.00	17.87	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
19	1.26	18.21	0.00	18.21	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
20	1.28	18.55	0.00	18.55	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
21	1.30	18.89	0.00	18.89	0.99	0.006	1.38	0.005	1.00	1.00	2.000	Yes
22	1.32	19.23	0.00	19.23	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
23	1.34	19.57	0.00	19.57	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
24	1.36	19.90	0.00	19.90	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
25	1.38	20.23	0.00	20.23	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
26	1.40	20.56	0.00	20.56	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
27	1.42	20.89	0.00	20.89	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
28	1.44	21.22	0.00	21.22	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
29	1.46	21.55	0.00	21.55	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
30	1.48	21.88	0.00	21.88	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
31	1.50	22.20	0.00	22.20	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
32	1.52	22.52	0.00	22.52	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
33	1.54	22.85	0.00	22.85	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
34	1.56	23.17	0.00	23.17	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
35	1.58	23.49	0.00	23.49	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
36	1.60	23.81	0.00	23.81	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
37	1.62	24.14	0.00	24.14	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
38	1.64	24.46	0.00	24.46	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
39	1.66	24.79	0.00	24.79	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
40	1.68	25.11	0.00	25.11	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
41	1.70	25.43	0.00	25.43	0.99	0.006	1.38	0.005	1.00	1.00	2.000	No
42	1.72	25.76	0.20	25.56	0.99	0.006	1.38	0.005	1.00	1.00	0.005	No
43	1.74	26.09	0.39	25.69	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
44	1.76	26.41	0.59	25.82	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
45	1.78	26.74	0.78	25.95	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
46	1.80	27.06	0.98	26.08	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
47	1.82	27.39	1.18	26.22	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
48	1.84	27.72	1.37	26.35	0.99	0.007	1.38	0.005	1.00	1.00	0.005	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	1.86	28.05	1.57	26.48	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
50	1.88	28.38	1.77	26.61	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
51	1.90	28.71	1.96	26.74	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
52	1.92	29.03	2.16	26.88	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
53	1.94	29.36	2.35	27.01	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
54	1.96	29.69	2.55	27.14	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
55	1.98	30.01	2.75	27.26	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
56	2.00	30.34	2.94	27.39	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
57	2.02	30.66	3.14	27.52	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
58	2.04	30.99	3.34	27.65	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
59	2.06	31.32	3.53	27.78	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
60	2.08	31.64	3.73	27.91	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
61	2.10	31.97	3.92	28.04	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
62	2.12	32.29	4.12	28.17	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
63	2.14	32.62	4.32	28.30	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
64	2.16	32.94	4.51	28.43	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
65	2.18	33.27	4.71	28.56	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
66	2.20	33.60	4.91	28.69	0.99	0.007	1.38	0.005	1.00	1.00	0.005	No
67	2.22	33.93	5.10	28.83	0.99	0.008	1.38	0.005	1.00	1.00	0.005	No
68	2.24	34.26	5.30	28.96	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
69	2.26	34.59	5.49	29.09	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
70	2.28	34.92	5.69	29.23	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
71	2.30	35.24	5.89	29.36	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
72	2.32	35.57	6.08	29.49	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
73	2.34	35.90	6.28	29.62	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
74	2.36	36.23	6.47	29.76	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
75	2.38	36.56	6.67	29.89	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
76	2.40	36.88	6.87	30.02	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
77	2.42	37.21	7.06	30.14	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
78	2.44	37.53	7.26	30.27	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
79	2.46	37.85	7.46	30.40	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
80	2.48	38.18	7.65	30.52	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
81	2.50	38.50	7.85	30.65	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
82	2.52	38.82	8.04	30.78	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
83	2.54	39.14	8.24	30.90	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
84	2.56	39.47	8.44	31.03	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
85	2.58	39.79	8.63	31.16	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
86	2.60	40.11	8.83	31.28	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
87	2.62	40.43	9.03	31.40	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
88	2.64	40.75	9.22	31.53	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
89	2.66	41.07	9.42	31.65	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
90	2.68	41.39	9.61	31.77	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
91	2.70	41.71	9.81	31.90	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
92	2.72	42.02	10.01	32.02	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
93	2.74	42.34	10.20	32.14	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
94	2.76	42.66	10.40	32.26	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
95	2.78	42.98	10.59	32.38	0.98	0.008	1.38	0.006	1.00	1.00	0.006	No
96	2.80	43.29	10.79	32.50	0.98	0.008	1.38	0.006	1.00	1.00	0.006	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	2.82	43.61	10.99	32.62	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
98	2.84	43.93	11.18	32.74	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
99	2.86	44.24	11.38	32.86	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
100	2.88	44.56	11.58	32.98	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
101	2.90	44.87	11.77	33.10	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
102	2.92	45.19	11.97	33.22	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
103	2.94	45.51	12.16	33.34	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
104	2.96	45.82	12.36	33.46	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
105	2.98	46.14	12.56	33.58	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
106	3.00	46.45	12.75	33.70	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
107	3.02	46.76	12.95	33.81	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
108	3.04	47.08	13.15	33.93	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
109	3.06	47.39	13.34	34.05	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
110	3.08	47.70	13.54	34.16	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
111	3.10	48.02	13.73	34.29	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
112	3.12	48.34	13.93	34.41	0.98	0.009	1.38	0.006	1.00	1.00	0.006	No
113	3.14	48.66	14.13	34.53	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
114	3.16	48.98	14.32	34.66	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
115	3.18	49.30	14.52	34.78	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
116	3.20	49.63	14.72	34.91	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
117	3.22	49.95	14.91	35.04	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
118	3.24	50.27	15.11	35.17	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
119	3.26	50.60	15.30	35.30	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
120	3.28	50.93	15.50	35.43	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
121	3.30	51.25	15.70	35.56	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
122	3.32	51.58	15.89	35.69	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
123	3.34	51.91	16.09	35.82	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
124	3.36	52.24	16.28	35.96	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
125	3.38	52.57	16.48	36.09	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
126	3.40	52.90	16.68	36.23	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
127	3.42	53.23	16.87	36.36	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
128	3.44	53.56	17.07	36.49	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
129	3.46	53.89	17.27	36.62	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
130	3.48	54.21	17.46	36.75	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
131	3.50	54.53	17.66	36.88	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
132	3.52	54.86	17.85	37.00	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
133	3.54	55.18	18.05	37.13	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
134	3.56	55.50	18.25	37.26	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
135	3.58	55.83	18.44	37.38	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
136	3.60	56.15	18.64	37.51	0.98	0.009	1.38	0.007	1.00	1.00	0.007	No
137	3.62	56.48	18.84	37.64	0.98	0.010	1.38	0.007	1.00	1.00	0.007	No
138	3.64	56.80	19.03	37.77	0.98	0.010	1.38	0.007	1.00	1.00	0.007	No
139	3.66	57.13	19.23	37.90	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
140	3.68	57.46	19.42	38.03	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
141	3.70	57.78	19.62	38.16	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
142	3.72	58.10	19.82	38.29	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
143	3.74	58.43	20.01	38.42	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
144	3.76	58.75	20.21	38.54	0.97	0.010	1.38	0.007	1.00	1.00	0.007	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	3.78	59.08	20.40	38.67	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
146	3.80	59.40	20.60	38.80	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
147	3.82	59.72	20.80	38.92	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
148	3.84	60.04	20.99	39.05	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
149	3.86	60.36	21.19	39.17	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
150	3.88	60.68	21.39	39.29	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
151	3.90	61.00	21.58	39.41	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
152	3.92	61.31	21.78	39.53	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
153	3.94	61.63	21.97	39.65	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
154	3.96	61.94	22.17	39.77	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
155	3.98	62.26	22.37	39.89	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
156	4.00	62.57	22.56	40.01	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
157	4.02	62.89	22.76	40.13	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
158	4.04	63.21	22.96	40.25	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
159	4.06	63.52	23.15	40.37	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
160	4.08	63.84	23.35	40.50	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
161	4.10	64.16	23.54	40.62	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
162	4.12	64.48	23.74	40.74	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
163	4.14	64.80	23.94	40.86	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
164	4.16	65.12	24.13	40.98	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
165	4.18	65.43	24.33	41.10	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
166	4.20	65.74	24.53	41.22	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
167	4.22	66.05	24.72	41.33	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
168	4.24	66.35	24.92	41.44	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
169	4.26	66.66	25.11	41.55	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
170	4.28	66.98	25.31	41.67	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
171	4.30	67.30	25.51	41.79	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
172	4.32	67.62	25.70	41.92	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
173	4.34	67.94	25.90	42.04	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
174	4.36	68.27	26.09	42.17	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
175	4.38	68.60	26.29	42.31	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
176	4.40	68.93	26.49	42.44	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
177	4.42	69.26	26.68	42.57	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
178	4.44	69.59	26.88	42.71	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
179	4.46	69.92	27.08	42.85	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
180	4.48	70.26	27.27	42.99	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
181	4.50	70.59	27.47	43.13	0.97	0.010	1.38	0.007	1.00	1.00	0.007	No
182	4.52	70.93	27.66	43.27	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
183	4.54	71.27	27.86	43.41	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
184	4.56	71.60	28.06	43.54	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
185	4.58	71.93	28.25	43.68	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
186	4.60	72.27	28.45	43.82	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
187	4.62	72.60	28.65	43.96	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
188	4.64	72.94	28.84	44.09	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
189	4.66	73.27	29.04	44.23	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
190	4.68	73.60	29.23	44.37	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
191	4.70	73.94	29.43	44.51	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
192	4.72	74.27	29.63	44.64	0.97	0.010	1.38	0.008	1.00	1.00	0.008	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	4.74	74.60	29.82	44.78	0.97	0.010	1.38	0.008	1.00	1.00	0.008	No
194	4.76	74.93	30.02	44.91	0.97	0.010	1.38	0.008	1.00	1.00	2.000	Yes
195	4.78	75.26	30.21	45.04	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
196	4.80	75.58	30.41	45.17	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
197	4.82	75.90	30.61	45.29	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
198	4.84	76.22	30.80	45.42	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
199	4.86	76.54	31.00	45.54	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
200	4.88	76.86	31.20	45.66	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
201	4.90	77.18	31.39	45.79	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
202	4.92	77.50	31.59	45.91	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
203	4.94	77.83	31.78	46.04	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
204	4.96	78.15	31.98	46.17	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
205	4.98	78.48	32.18	46.30	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
206	5.00	78.81	32.37	46.44	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
207	5.02	79.14	32.57	46.57	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
208	5.04	79.48	32.77	46.71	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
209	5.06	79.82	32.96	46.86	0.97	0.011	1.38	0.008	1.00	1.00	2.000	Yes
210	5.08	80.16	33.16	47.01	0.96	0.011	1.38	0.008	1.00	1.00	2.000	Yes
211	5.10	80.51	33.35	47.15	0.96	0.011	1.38	0.008	1.00	1.00	2.000	Yes
212	5.12	80.85	33.55	47.30	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
213	5.14	81.19	33.75	47.44	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
214	5.16	81.53	33.94	47.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
215	5.18	81.87	34.14	47.73	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
216	5.20	82.20	34.34	47.86	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
217	5.22	82.53	34.53	48.00	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
218	5.24	82.86	34.73	48.13	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
219	5.26	83.20	34.92	48.27	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
220	5.28	83.53	35.12	48.41	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
221	5.30	83.87	35.32	48.56	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
222	5.32	84.21	35.51	48.70	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
223	5.34	84.55	35.71	48.84	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
224	5.36	84.89	35.90	48.98	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
225	5.38	85.23	36.10	49.12	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
226	5.40	85.56	36.30	49.27	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
227	5.42	85.90	36.49	49.40	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
228	5.44	86.23	36.69	49.54	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
229	5.46	86.55	36.89	49.66	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
230	5.48	86.86	37.08	49.78	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
231	5.50	87.18	37.28	49.90	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
232	5.52	87.49	37.47	50.01	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
233	5.54	87.80	37.67	50.13	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
234	5.56	88.11	37.87	50.24	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
235	5.58	88.42	38.06	50.36	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
236	5.60	88.73	38.26	50.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
237	5.62	89.04	38.46	50.58	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
238	5.64	89.34	38.65	50.69	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
239	5.66	89.65	38.85	50.80	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
240	5.68	89.94	39.04	50.90	0.96	0.011	1.38	0.008	1.00	1.00	0.008	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	5.70	90.24	39.24	51.00	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
242	5.72	90.53	39.44	51.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
243	5.74	90.83	39.63	51.19	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
244	5.76	91.12	39.83	51.29	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
245	5.78	91.42	40.02	51.40	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
246	5.80	91.72	40.22	51.50	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
247	5.82	92.03	40.42	51.61	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
248	5.84	92.34	40.61	51.73	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
249	5.86	92.66	40.81	51.85	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
250	5.88	92.97	41.01	51.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
251	5.90	93.29	41.20	52.09	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
252	5.92	93.61	41.40	52.21	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
253	5.94	93.93	41.59	52.34	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
254	5.96	94.26	41.79	52.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
255	5.98	94.58	41.99	52.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
256	6.00	94.90	42.18	52.72	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
257	6.02	95.22	42.38	52.85	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
258	6.04	95.55	42.58	52.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
259	6.06	95.87	42.77	53.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
260	6.08	96.19	42.97	53.22	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
261	6.10	96.51	43.16	53.34	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
262	6.12	96.83	43.36	53.47	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
263	6.14	97.15	43.56	53.59	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
264	6.16	97.47	43.75	53.72	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
265	6.18	97.79	43.95	53.84	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
266	6.20	98.12	44.15	53.97	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
267	6.22	98.44	44.34	54.10	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
268	6.24	98.76	44.54	54.23	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
269	6.26	99.09	44.73	54.35	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
270	6.28	99.41	44.93	54.48	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
271	6.30	99.73	45.13	54.60	0.96	0.011	1.38	0.008	1.00	1.00	0.008	No
272	6.32	100.05	45.32	54.73	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
273	6.34	100.37	45.52	54.85	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
274	6.36	100.69	45.71	54.98	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
275	6.38	101.01	45.91	55.10	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
276	6.40	101.34	46.11	55.23	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
277	6.42	101.66	46.30	55.36	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
278	6.44	101.99	46.50	55.49	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
279	6.46	102.31	46.70	55.62	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
280	6.48	102.64	46.89	55.75	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
281	6.50	102.96	47.09	55.88	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
282	6.52	103.29	47.28	56.01	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
283	6.54	103.62	47.48	56.14	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
284	6.56	103.95	47.68	56.27	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
285	6.58	104.28	47.87	56.40	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
286	6.60	104.60	48.07	56.53	0.95	0.011	1.38	0.008	1.00	1.00	0.008	No
287	6.62	104.93	48.27	56.66	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
288	6.64	105.25	48.46	56.79	0.95	0.011	1.38	0.008	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	6.66	105.57	48.66	56.91	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
290	6.68	105.89	48.85	57.04	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
291	6.70	106.22	49.05	57.17	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
292	6.72	106.54	49.25	57.29	0.95	0.011	1.38	0.008	1.00	1.00	2.000	Yes
293	6.74	106.86	49.44	57.42	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
294	6.76	107.17	49.64	57.54	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
295	6.78	107.49	49.83	57.65	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
296	6.80	107.80	50.03	57.77	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
297	6.82	108.11	50.23	57.88	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
298	6.84	108.42	50.42	57.99	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
299	6.86	108.72	50.62	58.10	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
300	6.88	109.03	50.82	58.21	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
301	6.90	109.33	51.01	58.32	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
302	6.92	109.64	51.21	58.43	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
303	6.94	109.95	51.40	58.54	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
304	6.96	110.25	51.60	58.65	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
305	6.98	110.56	51.80	58.76	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
306	7.00	110.86	51.99	58.87	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
307	7.02	111.17	52.19	58.98	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
308	7.04	111.47	52.39	59.08	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
309	7.06	111.77	52.58	59.19	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
310	7.08	112.08	52.78	59.30	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
311	7.10	112.38	52.97	59.41	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
312	7.12	112.69	53.17	59.51	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
313	7.14	112.99	53.37	59.62	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
314	7.16	113.30	53.56	59.74	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
315	7.18	113.61	53.76	59.85	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
316	7.20	113.93	53.96	59.97	0.95	0.012	1.38	0.008	1.00	1.00	2.000	Yes
317	7.22	114.24	54.15	60.09	0.95	0.012	1.38	0.008	1.00	1.00	0.008	No
318	7.24	114.56	54.35	60.21	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
319	7.26	114.88	54.54	60.34	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
320	7.28	115.19	54.74	60.45	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
321	7.30	115.50	54.94	60.56	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
322	7.32	115.80	55.13	60.67	0.95	0.012	1.38	0.009	1.00	1.00	0.009	No
323	7.34	116.10	55.33	60.78	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
324	7.36	116.40	55.52	60.88	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
325	7.38	116.70	55.72	60.98	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
326	7.40	116.99	55.92	61.07	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
327	7.42	117.28	56.11	61.17	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
328	7.44	117.57	56.31	61.26	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
329	7.46	117.86	56.51	61.36	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
330	7.48	118.16	56.70	61.46	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
331	7.50	118.45	56.90	61.55	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
332	7.52	118.75	57.09	61.65	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
333	7.54	119.04	57.29	61.75	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
334	7.56	119.34	57.49	61.85	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
335	7.58	119.63	57.68	61.95	0.94	0.012	1.38	0.009	1.00	1.00	2.000	Yes
336	7.60	119.93	57.88	62.05	0.94	0.012	1.38	0.009	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	7.62	120.23	58.08	62.16	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
338	7.64	120.54	58.27	62.27	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
339	7.66	120.84	58.47	62.38	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
340	7.68	121.15	58.66	62.49	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
341	7.70	121.47	58.86	62.61	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
342	7.72	121.79	59.06	62.73	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
343	7.74	122.11	59.25	62.86	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
344	7.76	122.43	59.45	62.98	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
345	7.78	122.75	59.64	63.10	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
346	7.80	123.06	59.84	63.22	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
347	7.82	123.37	60.04	63.33	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
348	7.84	123.69	60.23	63.45	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
349	7.86	124.02	60.43	63.59	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
350	7.88	124.36	60.63	63.74	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
351	7.90	124.71	60.82	63.89	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
352	7.92	125.06	61.02	64.04	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
353	7.94	125.42	61.21	64.20	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
354	7.96	125.77	61.41	64.36	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
355	7.98	126.12	61.61	64.52	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
356	8.00	126.47	61.80	64.66	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
357	8.02	126.81	62.00	64.81	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
358	8.04	127.15	62.20	64.95	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
359	8.06	127.49	62.39	65.10	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
360	8.08	127.83	62.59	65.25	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
361	8.10	128.18	62.78	65.40	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
362	8.12	128.53	62.98	65.55	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
363	8.14	128.89	63.18	65.71	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
364	8.16	129.24	63.37	65.87	0.94	0.012	1.38	0.009	1.00	1.00	0.009	No
365	8.18	129.60	63.57	66.03	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
366	8.20	129.96	63.77	66.19	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
367	8.22	130.32	63.96	66.35	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
368	8.24	130.68	64.16	66.52	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
369	8.26	131.04	64.35	66.69	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
370	8.28	131.40	64.55	66.85	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
371	8.30	131.77	64.75	67.03	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
372	8.32	132.14	64.94	67.20	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
373	8.34	132.51	65.14	67.38	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
374	8.36	132.89	65.33	67.55	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
375	8.38	133.25	65.53	67.72	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
376	8.40	133.62	65.73	67.90	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
377	8.42	133.99	65.92	68.07	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
378	8.44	134.37	66.12	68.25	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
379	8.46	134.74	66.32	68.42	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
380	8.48	135.11	66.51	68.59	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
381	8.50	135.47	66.71	68.77	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
382	8.52	135.84	66.90	68.94	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
383	8.54	136.21	67.10	69.11	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
384	8.56	136.58	67.30	69.28	0.93	0.012	1.38	0.009	1.00	1.00	0.009	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	8.58	136.95	67.49	69.45	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
386	8.60	137.31	67.69	69.63	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
387	8.62	137.68	67.89	69.80	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
388	8.64	138.05	68.08	69.96	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
389	8.66	138.41	68.28	70.13	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
390	8.68	138.77	68.47	70.29	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
391	8.70	139.13	68.67	70.46	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
392	8.72	139.49	68.87	70.62	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
393	8.74	139.84	69.06	70.78	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
394	8.76	140.20	69.26	70.94	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
395	8.78	140.56	69.45	71.11	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
396	8.80	140.93	69.65	71.28	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
397	8.82	141.29	69.85	71.44	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
398	8.84	141.65	70.04	71.61	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
399	8.86	142.02	70.24	71.78	0.93	0.012	1.38	0.009	1.00	1.00	0.009	No
400	8.88	142.39	70.44	71.95	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
401	8.90	142.75	70.63	72.11	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
402	8.92	143.11	70.83	72.28	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
403	8.94	143.47	71.02	72.45	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
404	8.96	143.83	71.22	72.61	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
405	8.98	144.20	71.42	72.78	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
406	9.00	144.56	71.61	72.95	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
407	9.02	144.93	71.81	73.12	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
408	9.04	145.29	72.01	73.29	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
409	9.06	145.66	72.20	73.46	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
410	9.08	146.03	72.40	73.63	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
411	9.10	146.39	72.59	73.80	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
412	9.12	146.76	72.79	73.97	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
413	9.14	147.12	72.99	74.14	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
414	9.16	147.49	73.18	74.30	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
415	9.18	147.86	73.38	74.48	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
416	9.20	148.23	73.58	74.65	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
417	9.22	148.60	73.77	74.83	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
418	9.24	148.98	73.97	75.01	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
419	9.26	149.35	74.16	75.18	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
420	9.28	149.72	74.36	75.36	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
421	9.30	150.09	74.56	75.54	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
422	9.32	150.47	74.75	75.71	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
423	9.34	150.84	74.95	75.89	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
424	9.36	151.23	75.14	76.08	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
425	9.38	151.62	75.34	76.28	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
426	9.40	152.01	75.54	76.48	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
427	9.42	152.41	75.73	76.68	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
428	9.44	152.81	75.93	76.88	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
429	9.46	153.21	76.13	77.08	0.92	0.012	1.38	0.009	1.00	1.00	0.009	No
430	9.48	153.60	76.32	77.28	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
431	9.50	153.99	76.52	77.47	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
432	9.52	154.37	76.71	77.66	0.91	0.012	1.38	0.009	1.00	1.00	0.009	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	9.54	154.76	76.91	77.84	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
434	9.56	155.14	77.11	78.03	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
435	9.58	155.52	77.30	78.22	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
436	9.60	155.91	77.50	78.41	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
437	9.62	156.31	77.70	78.61	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
438	9.64	156.71	77.89	78.82	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
439	9.66	157.11	78.09	79.03	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
440	9.68	157.52	78.28	79.24	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
441	9.70	157.93	78.48	79.45	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
442	9.72	158.35	78.68	79.67	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
443	9.74	158.76	78.87	79.89	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
444	9.76	159.18	79.07	80.11	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
445	9.78	159.60	79.26	80.33	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
446	9.80	160.02	79.46	80.56	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
447	9.82	160.44	79.66	80.79	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
448	9.84	160.87	79.85	81.01	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
449	9.86	161.29	80.05	81.24	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
450	9.88	161.72	80.25	81.47	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
451	9.90	162.14	80.44	81.70	0.91	0.012	1.38	0.009	1.00	1.00	0.009	No
452	9.92	162.57	80.64	81.93	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
453	9.94	163.00	80.83	82.17	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
454	9.96	163.43	81.03	82.40	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
455	9.98	163.86	81.23	82.64	0.91	0.012	1.38	0.008	1.00	1.00	0.008	No
456	10.00	164.30	81.42	82.87	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
457	10.02	164.73	81.62	83.11	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
458	10.04	165.16	81.82	83.34	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
459	10.06	165.59	82.01	83.58	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
460	10.08	166.02	82.21	83.81	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
461	10.10	166.45	82.40	84.05	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
462	10.12	166.89	82.60	84.29	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
463	10.14	167.32	82.80	84.52	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
464	10.16	167.75	82.99	84.76	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
465	10.18	168.18	83.19	84.99	0.90	0.012	1.38	0.008	1.00	1.00	0.008	No
466	10.20	168.61	83.39	85.23	0.90	0.012	1.38	0.008	1.00	1.00	0.008	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	0.90	0.02	4.06	3.27	1.00	0.18	54.25	9.82	4.000	No	Yes	2.00
2	0.92	0.06	3.99	5.17	1.00	0.94	48.66	45.85	4.000	No	Yes	2.00
3	0.94	0.10	3.81	6.46	1.00	1.77	35.64	63.18	4.000	No	Yes	2.00
4	0.96	0.13	3.79	8.47	1.00	2.25	34.35	77.39	4.000	No	Yes	2.00
5	0.98	0.11	3.89	10.51	1.00	1.95	40.95	79.72	4.000	No	Yes	2.00
6	1.00	0.17	3.61	6.64	1.00	3.14	25.54	80.17	4.000	No	Yes	2.00
7	1.02	0.92	2.61	1.46	0.85	17.97	5.85	105.04	4.000	Yes	No	2.00
8	1.04	1.79	2.26	0.93	0.72	35.09	1.79	62.98	4.000	Yes	No	2.00
9	1.06	2.75	2.04	0.70	0.63	53.93	1.34	72.36	4.000	Yes	No	2.00
10	1.08	3.11	1.97	0.64	0.61	61.10	1.28	78.50	4.000	Yes	No	2.00
11	1.10	3.27	1.95	0.62	0.60	64.33	1.27	81.51	4.000	Yes	No	2.00
12	1.12	3.16	1.99	0.70	0.61	62.10	1.30	80.53	4.000	Yes	No	2.00
13	1.14	2.77	2.09	0.88	0.65	54.31	1.41	76.34	4.000	Yes	No	2.00
14	1.16	2.42	2.21	1.16	0.70	47.44	1.63	77.20	4.000	Yes	No	2.00
15	1.18	2.14	2.30	1.43	0.74	41.85	1.94	81.22	4.000	Yes	No	2.00
16	1.20	1.99	2.36	1.60	0.76	38.86	2.17	84.47	4.000	Yes	No	2.00
17	1.22	1.80	2.42	1.80	0.78	35.27	2.50	88.21	4.000	Yes	No	2.00
18	1.24	1.60	2.50	2.08	0.81	31.22	2.87	89.53	4.000	Yes	No	2.00
19	1.26	1.41	2.58	2.36	0.84	27.38	4.82	131.86	4.000	Yes	No	2.00
20	1.28	1.27	2.63	2.50	0.86	24.80	6.65	164.85	4.000	Yes	No	2.00
21	1.30	1.20	2.65	2.51	0.87	23.39	7.57	177.10	4.000	Yes	No	2.00
22	1.32	1.18	2.65	2.41	0.87	22.91	7.39	169.24	4.000	No	No	2.00
23	1.34	1.15	2.65	2.34	0.87	22.34	7.45	166.37	4.000	No	No	2.00
24	1.36	1.07	2.68	2.36	0.88	20.82	8.81	183.48	4.000	No	No	2.00
25	1.38	0.98	2.72	2.46	0.90	19.01	4.92	93.51	4.000	No	Yes	2.00
26	1.40	0.89	2.77	2.64	0.92	17.21	5.52	94.91	4.000	No	Yes	2.00
27	1.42	0.85	2.79	2.67	0.92	16.32	5.78	94.35	4.000	No	Yes	2.00
28	1.44	0.83	2.80	2.60	0.93	15.89	5.81	92.33	4.000	No	Yes	2.00
29	1.46	0.82	2.79	2.51	0.92	15.84	5.71	90.50	4.000	No	Yes	2.00
30	1.48	0.85	2.76	2.31	0.91	16.25	5.36	87.10	4.000	No	Yes	2.00
31	1.50	0.87	2.72	2.11	0.90	16.78	4.97	83.46	4.000	No	Yes	2.00
32	1.52	0.89	2.69	1.92	0.89	17.16	9.78	167.82	4.000	No	No	2.00
33	1.54	0.90	2.68	1.84	0.88	17.26	9.09	156.91	4.000	No	No	2.00
34	1.56	0.89	2.69	1.86	0.88	17.18	9.33	160.32	4.000	No	No	2.00
35	1.58	0.87	2.69	1.85	0.89	16.78	9.76	163.76	4.000	No	No	2.00
36	1.60	0.86	2.71	1.94	0.89	16.46	4.82	79.36	4.000	No	Yes	2.00
37	1.62	0.85	2.72	1.97	0.90	16.26	4.91	79.85	4.000	No	Yes	2.00
38	1.64	0.86	2.73	2.05	0.90	16.42	4.98	81.84	4.000	No	Yes	2.00
39	1.66	0.87	2.72	2.04	0.90	16.70	4.90	81.82	4.000	No	Yes	2.00
40	1.68	0.88	2.72	2.05	0.90	16.79	4.90	82.26	4.000	No	Yes	2.00
41	1.70	0.87	2.73	2.10	0.90	16.66	4.99	83.15	4.000	No	Yes	2.00
42	1.72	0.85	2.75	2.20	0.91	16.20	5.23	84.77	0.773	No	Yes	2.00
43	1.74	0.82	2.77	2.32	0.92	15.75	5.50	86.69	0.751	No	Yes	2.00
44	1.76	0.68	2.90	2.97	0.97	12.88	7.26	93.59	0.615	No	Yes	2.00
45	1.78	0.71	2.89	2.97	0.96	13.58	7.00	95.04	0.648	No	Yes	2.00
46	1.80	0.74	2.88	2.99	0.96	13.98	6.88	96.14	0.667	No	Yes	2.00
47	1.82	0.87	2.78	2.56	0.92	16.65	5.56	92.53	0.794	No	Yes	2.00
48	1.84	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	1.86	0.79	2.83	2.76	0.94	15.10	6.23	94.15	0.720	No	Yes	2.00
50	1.88	0.77	2.84	2.81	0.95	14.71	6.41	94.27	0.702	No	Yes	2.00
51	1.90	0.74	2.87	2.95	0.96	14.12	6.78	95.75	0.673	No	Yes	2.00
52	1.92	0.71	2.90	3.12	0.97	13.45	7.23	97.26	0.642	No	Yes	2.00
53	1.94	0.68	2.93	3.24	0.98	12.75	7.65	97.54	0.608	No	Yes	2.00
54	1.96	0.66	2.93	3.20	0.98	12.49	7.72	96.45	0.596	No	Yes	2.00
55	1.98	0.66	2.94	3.22	0.98	12.34	7.81	96.36	0.589	No	Yes	2.00
56	2.00	0.66	2.93	3.14	0.98	12.45	7.66	95.37	0.594	No	Yes	2.00
57	2.02	0.67	2.93	3.17	0.98	12.58	7.65	96.22	0.600	No	Yes	2.00
58	2.04	0.68	2.92	3.11	0.97	12.87	7.45	95.82	0.614	No	Yes	2.00
59	2.06	0.70	2.91	3.10	0.97	13.12	7.34	96.22	0.626	No	Yes	2.00
60	2.08	0.70	2.89	2.97	0.97	13.27	7.12	94.50	0.633	No	Yes	2.00
61	2.10	0.70	2.89	2.92	0.97	13.23	7.07	93.59	0.631	No	Yes	2.00
62	2.12	0.69	2.91	3.00	0.97	12.93	7.29	94.25	0.617	No	Yes	2.00
63	2.14	0.66	2.93	3.19	0.98	12.44	7.73	96.12	0.593	No	Yes	2.00
64	2.16	0.64	2.97	3.42	0.99	11.93	8.24	98.38	0.569	No	Yes	2.00
65	2.18	0.63	2.99	3.63	1.00	11.69	8.61	100.66	0.558	No	Yes	2.00
66	2.20	0.65	2.97	3.62	1.00	12.17	8.37	101.78	0.580	No	Yes	2.00
67	2.22	0.69	2.94	3.46	0.98	13.01	7.81	101.65	0.621	No	Yes	2.00
68	2.24	0.74	2.90	3.24	0.97	13.93	7.19	100.14	0.664	No	Yes	2.00
69	2.26	0.77	2.87	3.07	0.96	14.42	6.82	98.38	0.688	No	Yes	2.00
70	2.28	0.78	2.86	3.02	0.96	14.63	6.69	97.87	0.698	No	Yes	2.00
71	2.30	0.78	2.87	3.04	0.96	14.61	6.73	98.29	0.697	No	Yes	2.00
72	2.32	0.76	2.88	3.11	0.96	14.28	6.91	98.70	0.681	No	Yes	2.00
73	2.34	0.75	2.88	3.09	0.96	14.04	6.98	98.01	0.670	No	Yes	2.00
74	2.36	0.75	2.88	2.99	0.96	14.00	6.87	96.26	0.668	No	Yes	2.00
75	2.38	0.76	2.85	2.79	0.95	14.36	6.51	93.49	0.685	No	Yes	2.00
76	2.40	0.78	2.82	2.58	0.94	14.70	6.14	90.22	0.701	No	Yes	2.00
77	2.42	0.77	2.82	2.47	0.94	14.54	6.04	87.89	0.694	No	Yes	2.00
78	2.44	0.75	2.83	2.46	0.94	13.98	6.21	86.77	0.667	No	Yes	2.00
79	2.46	0.70	2.86	2.58	0.96	13.05	6.69	87.37	0.623	No	Yes	2.00
80	2.48	0.66	2.90	2.74	0.97	12.28	7.22	88.65	0.586	No	Yes	2.00
81	2.50	0.62	2.95	3.01	0.99	11.52	7.92	91.25	0.550	No	Yes	2.00
82	2.52	0.59	2.99	3.29	1.00	10.93	8.59	93.88	0.521	No	Yes	2.00
83	2.54	0.59	3.00	3.39	1.00	10.84	8.77	95.02	0.517	No	Yes	2.00
84	2.56	0.61	2.97	3.23	1.00	11.24	8.35	93.82	0.536	No	Yes	2.00
85	2.58	0.64	2.93	2.95	0.98	11.86	7.68	91.06	0.566	No	Yes	2.00
86	2.60	0.66	2.89	2.66	0.97	12.26	7.12	87.35	0.585	No	Yes	2.00
87	2.62	0.68	2.87	2.47	0.96	12.59	6.73	84.68	0.600	No	Yes	2.00
88	2.64	0.70	2.83	2.26	0.94	13.04	6.27	81.73	0.622	No	Yes	2.00
89	2.66	0.72	2.82	2.20	0.94	13.36	6.07	81.03	0.637	No	Yes	2.00
90	2.68	0.72	2.81	2.18	0.94	13.39	6.03	80.69	0.639	No	Yes	2.00
91	2.70	0.71	2.82	2.21	0.94	13.12	6.17	80.95	0.626	No	Yes	2.00
92	2.72	0.69	2.83	2.20	0.94	12.83	6.26	80.31	0.612	No	Yes	2.00
93	2.74	0.68	2.84	2.21	0.95	12.49	6.41	80.02	0.596	No	Yes	2.00
94	2.76	0.66	2.85	2.24	0.95	12.23	6.54	80.06	0.584	No	Yes	2.00
95	2.78	0.66	2.85	2.22	0.95	12.20	6.53	79.64	0.582	No	Yes	2.00
96	2.80	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	2.82	0.69	2.82	2.07	0.94	12.72	6.11	77.72	0.607	No	Yes	2.00
98	2.84	0.69	2.82	2.06	0.94	12.80	6.06	77.60	0.610	No	Yes	2.00
99	2.86	0.68	2.83	2.10	0.94	12.54	6.22	78.02	0.598	No	Yes	2.00
100	2.88	0.67	2.84	2.15	0.95	12.33	6.38	78.64	0.588	No	Yes	2.00
101	2.90	0.66	2.85	2.17	0.95	12.16	6.47	78.73	0.580	No	Yes	2.00
102	2.92	0.65	2.85	2.16	0.95	12.00	6.53	78.40	0.573	No	Yes	2.00
103	2.94	0.64	2.87	2.21	0.96	11.68	6.74	78.72	0.557	No	Yes	2.00
104	2.96	0.61	2.90	2.35	0.97	11.18	7.17	80.12	0.533	No	Yes	2.00
105	2.98	0.49	3.05	3.08	1.00	8.85	9.61	85.05	0.422	No	Yes	2.00
106	3.00	0.47	3.08	3.22	1.00	8.36	10.20	85.23	0.399	No	Yes	2.00
107	3.02	0.45	3.10	3.27	1.00	7.92	10.65	84.36	0.378	No	Yes	2.00
108	3.04	0.51	3.00	2.68	1.00	9.19	8.78	80.69	0.438	No	Yes	2.00
109	3.06	0.49	3.04	2.87	1.00	8.70	9.42	81.97	0.415	No	Yes	2.00
110	3.08	0.48	3.07	3.19	1.00	8.44	10.08	85.12	0.403	No	Yes	2.00
111	3.10	0.49	3.08	3.43	1.00	8.64	10.27	88.76	0.412	No	Yes	2.00
112	3.12	0.52	3.06	3.49	1.00	9.32	9.84	91.69	0.444	No	Yes	2.00
113	3.14	0.57	3.02	3.34	1.00	10.21	9.06	92.57	0.487	No	Yes	2.00
114	3.16	0.60	2.98	3.17	1.00	10.95	8.42	92.23	0.522	No	Yes	2.00
115	3.18	0.62	2.96	3.08	0.99	11.31	8.11	91.75	0.540	No	Yes	2.00
116	3.20	0.64	2.95	3.03	0.99	11.59	7.92	91.75	0.553	No	Yes	2.00
117	3.22	0.67	2.92	2.93	0.98	12.15	7.53	91.44	0.580	No	Yes	2.00
118	3.24	0.71	2.88	2.77	0.96	13.12	6.93	90.87	0.626	No	Yes	2.00
119	3.26	0.80	2.81	2.51	0.94	14.80	6.02	89.04	0.706	No	Yes	2.00
120	3.28	0.88	2.76	2.32	0.92	16.42	5.33	87.48	0.783	No	Yes	2.00
121	3.30	0.96	2.71	2.18	0.90	17.88	4.81	86.10	0.853	No	Yes	2.00
122	3.32	0.98	2.71	2.21	0.90	18.26	4.78	87.23	0.871	No	Yes	2.00
123	3.34	0.97	2.72	2.32	0.90	18.07	4.94	89.28	0.862	No	Yes	2.00
124	3.36	0.93	2.75	2.47	0.92	17.31	5.29	91.57	0.826	No	Yes	2.00
125	3.38	0.90	2.77	2.57	0.92	16.80	5.54	92.99	0.801	No	Yes	2.00
126	3.40	0.91	2.77	2.55	0.92	16.92	5.48	92.70	0.807	No	Yes	2.00
127	3.42	0.95	2.73	2.33	0.91	17.70	5.03	89.11	0.844	No	Yes	2.00
128	3.44	1.00	2.68	2.06	0.89	18.67	9.05	169.05	0.476	No	No	2.00
129	3.46	1.04	2.64	1.82	0.87	19.43	6.83	132.70	0.268	No	No	2.00
130	3.48	1.05	2.61	1.68	0.86	19.74	5.79	114.28	0.197	No	No	2.00
131	3.50	1.05	2.60	1.59	0.86	19.56	5.46	106.76	0.174	No	No	2.00
132	3.52	1.02	2.61	1.56	0.86	19.07	5.60	106.79	0.174	No	No	2.00
133	3.54	1.00	2.62	1.63	0.87	18.65	6.33	118.02	0.210	No	No	2.00
134	3.56	0.99	2.64	1.70	0.87	18.50	6.89	127.53	0.246	No	No	2.00
135	3.58	1.00	2.65	1.77	0.88	18.59	7.25	134.72	0.277	No	No	2.00
136	3.60	1.02	2.64	1.79	0.87	18.98	7.01	132.97	0.269	No	No	2.00
137	3.62	1.03	2.64	1.80	0.87	19.21	6.87	131.91	0.264	No	No	2.00
138	3.64	1.04	2.63	1.78	0.87	19.44	6.61	128.40	0.249	No	No	2.00
139	3.66	1.03	2.63	1.77	0.87	19.25	6.67	128.48	0.250	No	No	2.00
140	3.68	1.02	2.63	1.75	0.87	19.09	6.69	127.77	0.247	No	No	2.00
141	3.70	0.99	2.65	1.78	0.88	18.43	7.44	137.16	0.288	No	No	2.00
142	3.72	0.95	2.68	1.88	0.89	17.58	8.96	157.51	0.399	No	No	2.00
143	3.74	0.88	2.73	2.06	0.91	16.22	5.05	81.92	0.774	No	Yes	2.00
144	3.76	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	3.78	0.75	2.84	2.55	0.95	13.68	6.43	87.98	0.652	No	Yes	2.00
146	3.80	0.71	2.88	2.70	0.97	12.87	6.93	89.15	0.614	No	Yes	2.00
147	3.82	0.70	2.88	2.67	0.97	12.65	6.98	88.30	0.603	No	Yes	2.00
148	3.84	0.71	2.86	2.47	0.96	12.91	6.61	85.31	0.616	No	Yes	2.00
149	3.86	0.73	2.83	2.26	0.95	13.25	6.20	82.13	0.632	No	Yes	2.00
150	3.88	0.74	2.79	2.03	0.93	13.48	5.78	77.92	0.643	No	Yes	2.00
151	3.90	0.75	2.77	1.88	0.93	13.62	5.52	75.18	0.650	No	Yes	2.00
152	3.92	0.77	2.74	1.70	0.91	14.06	5.11	71.90	0.671	No	Yes	2.00
153	3.94	0.80	2.71	1.60	0.90	14.54	4.82	70.14	0.694	No	Yes	2.00
154	3.96	0.82	2.69	1.52	0.89	14.97	9.53	142.63	0.315	No	No	2.00
155	3.98	0.84	2.68	1.49	0.89	15.32	8.80	134.87	0.277	No	No	2.00
156	4.00	0.85	2.68	1.53	0.89	15.56	8.75	136.20	0.283	No	No	2.00
157	4.02	0.86	2.68	1.59	0.89	15.68	9.08	142.44	0.314	No	No	2.00
158	4.04	0.84	2.70	1.70	0.90	15.39	4.75	73.12	0.734	No	Yes	2.00
159	4.06	0.82	2.74	1.84	0.91	14.87	5.09	75.65	0.709	No	Yes	2.00
160	4.08	0.79	2.77	1.99	0.92	14.30	5.47	78.17	0.682	No	Yes	2.00
161	4.10	0.77	2.79	2.04	0.93	13.90	5.67	78.83	0.663	No	Yes	2.00
162	4.12	0.76	2.79	2.01	0.93	13.75	5.67	78.04	0.656	No	Yes	2.00
163	4.14	0.76	2.78	1.92	0.93	13.69	5.56	76.05	0.653	No	Yes	2.00
164	4.16	0.77	2.75	1.79	0.92	13.96	5.28	73.76	0.666	No	Yes	2.00
165	4.18	0.79	2.72	1.66	0.91	14.34	4.97	71.27	0.684	No	Yes	2.00
166	4.20	0.72	2.76	1.58	0.92	12.83	5.31	68.17	0.612	No	Yes	2.00
167	4.22	0.63	2.81	1.56	0.94	11.04	5.95	65.70	0.526	No	Yes	2.00
168	4.24	0.66	2.77	1.45	0.93	11.79	5.47	64.43	0.562	No	Yes	2.00
169	4.26	0.80	2.68	1.37	0.89	14.47	8.90	128.77	0.251	No	No	2.00
170	4.28	0.94	2.61	1.31	0.86	17.15	5.61	96.13	0.146	No	No	2.00
171	4.30	0.93	2.63	1.46	0.87	17.12	6.54	112.01	0.190	No	No	2.00
172	4.32	0.98	2.63	1.57	0.87	17.94	6.57	117.88	0.209	No	No	2.00
173	4.34	1.06	2.61	1.63	0.86	19.65	5.59	109.81	0.183	No	No	2.00
174	4.36	1.17	2.56	1.55	0.85	21.69	4.11	89.14	0.146	No	No	2.00
175	4.38	1.20	2.56	1.60	0.84	22.28	4.07	90.64	0.149	No	No	2.00
176	4.40	1.18	2.58	1.74	0.85	21.96	4.81	105.58	0.189	No	No	2.00
177	4.42	1.15	2.62	1.94	0.87	21.30	6.11	130.23	0.257	No	No	2.00
178	4.44	1.13	2.65	2.11	0.88	20.91	7.32	153.12	0.372	No	No	2.00
179	4.46	1.10	2.68	2.34	0.89	20.26	9.21	186.57	0.616	No	No	2.00
180	4.48	1.06	2.72	2.62	0.91	19.60	4.97	97.50	0.935	No	Yes	2.00
181	4.50	1.03	2.76	2.90	0.92	18.93	5.42	102.50	0.903	No	Yes	2.00
182	4.52	1.01	2.78	3.00	0.93	18.56	5.60	103.92	0.885	No	Yes	2.00
183	4.54	1.02	2.76	2.84	0.92	18.72	5.40	101.02	0.893	No	Yes	2.00
184	4.56	1.06	2.73	2.61	0.91	19.43	4.99	97.06	0.927	No	Yes	2.00
185	4.58	1.11	2.68	2.34	0.89	20.57	8.93	183.65	0.590	No	No	2.00
186	4.60	1.15	2.66	2.23	0.88	21.20	7.73	163.82	0.440	No	No	2.00
187	4.62	1.16	2.64	2.14	0.88	21.49	7.03	150.97	0.360	No	No	2.00
188	4.64	1.13	2.66	2.23	0.89	20.90	7.97	166.44	0.458	No	No	2.00
189	4.66	1.09	2.69	2.38	0.90	20.01	9.74	194.88	0.691	No	No	2.00
190	4.68	1.03	2.73	2.57	0.91	18.91	5.06	95.62	0.902	No	Yes	2.00
191	4.70	0.98	2.76	2.70	0.93	17.94	5.42	97.20	0.856	No	Yes	2.00
192	4.72	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	4.74	0.90	2.80	2.77	0.94	16.29	5.90	96.10	0.777	No	Yes	2.00
194	4.76	0.88	2.80	2.66	0.94	15.91	5.87	93.41	4.000	Yes	Yes	2.00
195	4.78	0.88	2.78	2.42	0.93	15.86	5.60	88.82	4.000	Yes	Yes	2.00
196	4.80	0.89	2.74	2.10	0.92	16.07	5.14	82.60	4.000	Yes	Yes	2.00
197	4.82	0.91	2.70	1.82	0.90	16.44	9.97	163.93	4.000	Yes	No	2.00
198	4.84	0.94	2.65	1.58	0.88	17.11	7.38	126.36	4.000	Yes	No	2.00
199	4.86	0.98	2.62	1.46	0.87	17.85	5.97	106.58	4.000	Yes	No	2.00
200	4.88	1.06	2.57	1.36	0.85	19.09	4.59	87.65	4.000	Yes	No	2.00
201	4.90	1.13	2.54	1.27	0.84	20.19	3.61	72.89	4.000	Yes	No	2.00
202	4.92	1.18	2.52	1.28	0.84	21.00	3.31	69.51	4.000	Yes	No	2.00
203	4.94	1.17	2.55	1.41	0.84	20.93	3.88	81.14	4.000	Yes	No	2.00
204	4.96	1.14	2.59	1.64	0.86	20.56	5.07	104.26	4.000	Yes	No	2.00
205	4.98	1.14	2.61	1.80	0.87	20.61	5.85	120.54	4.000	Yes	No	2.00
206	5.00	1.13	2.63	1.96	0.88	20.59	6.71	138.20	4.000	Yes	No	2.00
207	5.02	1.11	2.67	2.20	0.89	20.28	8.35	169.31	4.000	Yes	No	2.00
208	5.04	1.05	2.76	2.87	0.92	19.10	5.35	102.19	4.000	Yes	Yes	2.00
209	5.06	0.99	2.84	3.62	0.96	18.03	6.36	114.75	4.000	Yes	Yes	2.00
210	5.08	0.95	2.90	4.32	0.98	17.20	7.27	125.09	4.000	Yes	Yes	2.00
211	5.10	0.92	2.94	4.62	0.99	16.53	7.76	128.21	4.000	Yes	Yes	2.00
212	5.12	0.89	2.96	4.76	1.00	15.96	8.07	128.75	0.761	No	Yes	2.00
213	5.14	0.87	2.96	4.72	1.00	15.57	8.16	127.00	0.743	No	Yes	2.00
214	5.16	0.84	2.95	4.37	1.00	15.02	8.01	120.39	0.716	No	Yes	2.00
215	5.18	0.81	2.94	3.94	0.99	14.46	7.78	112.45	0.690	No	Yes	2.00
216	5.20	0.85	2.87	3.23	0.97	15.09	6.79	102.40	0.720	No	Yes	2.00
217	5.22	0.94	2.79	2.71	0.94	16.85	5.68	95.75	0.804	No	Yes	2.00
218	5.24	1.09	2.69	2.23	0.90	19.45	9.33	181.51	0.573	No	No	2.00
219	5.26	1.19	2.65	2.18	0.88	21.09	7.56	159.43	0.411	No	No	2.00
220	5.28	1.22	2.67	2.42	0.89	21.58	8.47	182.87	0.584	No	No	2.00
221	5.30	1.15	2.74	2.91	0.92	20.64	5.09	105.02	0.984	No	Yes	2.00
222	5.32	1.02	2.82	3.42	0.95	18.43	6.07	111.85	0.879	No	Yes	2.00
223	5.34	0.89	2.90	3.92	0.98	15.94	7.25	115.59	0.760	No	Yes	2.00
224	5.36	0.75	3.02	4.76	1.00	13.17	9.15	120.43	0.628	No	Yes	2.00
225	5.38	0.64	3.15	6.16	1.00	10.96	11.71	128.32	0.523	No	Yes	2.00
226	5.40	0.56	3.27	7.66	1.00	9.37	14.32	134.18	0.447	No	Yes	2.00
227	5.42	0.43	3.43	9.50	1.00	6.84	19.02	130.07	0.326	No	Yes	2.00
228	5.44	0.39	3.45	8.67	1.00	6.04	19.56	118.13	0.288	No	Yes	2.00
229	5.46	0.36	3.43	7.08	1.00	5.39	19.07	102.76	0.257	No	Yes	2.00
230	5.48	0.42	3.27	4.85	1.00	6.52	14.38	93.71	0.311	No	Yes	2.00
231	5.50	0.43	3.22	4.17	1.00	6.67	13.26	88.47	0.318	No	Yes	2.00
232	5.52	0.42	3.21	3.87	1.00	6.53	13.01	84.94	0.311	No	Yes	2.00
233	5.54	0.40	3.24	3.92	1.00	6.17	13.56	83.72	0.295	No	Yes	2.00
234	5.56	0.38	3.28	4.26	1.00	5.75	14.69	84.47	0.274	No	Yes	2.00
235	5.58	0.36	3.33	4.68	1.00	5.37	15.96	85.71	0.256	No	Yes	2.00
236	5.60	0.34	3.37	5.03	1.00	5.02	17.14	86.12	0.240	No	Yes	2.00
237	5.62	0.33	3.40	5.14	1.00	4.72	17.97	84.85	0.225	No	Yes	2.00
238	5.64	0.32	3.40	4.78	1.00	4.50	17.97	80.77	0.214	No	Yes	2.00
239	5.66	0.31	3.38	4.24	1.00	4.35	17.45	75.91	0.208	No	Yes	2.00
240	5.68	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	5.70	0.31	3.33	3.22	1.00	4.25	15.87	67.43	0.203	No	Yes	2.00
242	5.72	0.32	3.26	2.74	1.00	4.54	14.28	64.90	0.217	No	Yes	2.00
243	5.74	0.35	3.18	2.32	1.00	5.16	12.31	63.48	0.246	No	Yes	2.00
244	5.76	0.41	3.08	2.03	1.00	6.16	10.31	63.54	0.294	No	Yes	2.00
245	5.78	0.48	2.98	1.76	1.00	7.56	8.40	63.51	0.360	No	Yes	2.00
246	5.80	0.57	2.88	1.59	0.97	9.14	6.98	63.77	0.436	No	Yes	2.00
247	5.82	0.67	2.81	1.52	0.95	10.88	5.95	64.75	0.519	No	Yes	2.00
248	5.84	0.76	2.77	1.55	0.93	12.24	5.47	67.00	0.584	No	Yes	2.00
249	5.86	0.81	2.75	1.61	0.92	13.19	5.25	69.21	0.629	No	Yes	2.00
250	5.88	0.84	2.75	1.71	0.92	13.63	5.26	71.69	0.650	No	Yes	2.00
251	5.90	0.85	2.76	1.79	0.93	13.86	5.32	73.70	0.661	No	Yes	2.00
252	5.92	0.85	2.77	1.93	0.93	13.92	5.51	76.64	0.664	No	Yes	2.00
253	5.94	0.86	2.78	2.04	0.94	13.95	5.65	78.81	0.665	No	Yes	2.00
254	5.96	0.86	2.79	2.14	0.94	13.96	5.78	80.71	0.666	No	Yes	2.00
255	5.98	0.86	2.79	2.13	0.94	14.02	5.75	80.57	0.669	No	Yes	2.00
256	6.00	0.86	2.80	2.15	0.94	13.97	5.79	80.93	0.666	No	Yes	2.00
257	6.02	0.85	2.80	2.15	0.94	13.81	5.85	80.81	0.659	No	Yes	2.00
258	6.04	0.85	2.80	2.11	0.94	13.73	5.82	79.91	0.655	No	Yes	2.00
259	6.06	0.86	2.78	1.95	0.93	13.83	5.56	76.85	0.660	No	Yes	2.00
260	6.08	0.89	2.74	1.76	0.92	14.24	5.16	73.41	0.679	No	Yes	2.00
261	6.10	0.92	2.72	1.65	0.91	14.61	4.88	71.27	0.697	No	Yes	2.00
262	6.12	0.94	2.71	1.62	0.91	14.85	4.77	70.82	0.708	No	Yes	2.00
263	6.14	0.94	2.72	1.70	0.91	14.90	4.88	72.67	0.711	No	Yes	2.00
264	6.16	0.93	2.74	1.83	0.92	14.67	5.13	75.32	0.700	No	Yes	2.00
265	6.18	0.92	2.76	1.96	0.93	14.64	5.33	78.06	0.698	No	Yes	2.00
266	6.20	0.94	2.75	1.98	0.93	14.87	5.29	78.72	0.709	No	Yes	2.00
267	6.22	0.99	2.73	1.89	0.92	15.57	4.98	77.47	0.742	No	Yes	2.00
268	6.24	1.01	2.70	1.79	0.91	15.91	4.75	75.57	0.759	No	Yes	2.00
269	6.26	1.01	2.70	1.71	0.90	15.78	9.96	157.20	0.397	No	No	2.00
270	6.28	0.98	2.70	1.67	0.91	15.31	4.73	72.38	0.730	No	Yes	2.00
271	6.30	0.96	2.70	1.62	0.91	14.96	4.74	70.99	0.714	No	Yes	2.00
272	6.32	0.95	2.71	1.65	0.91	14.72	4.85	71.37	0.702	No	Yes	2.00
273	6.34	0.94	2.73	1.74	0.92	14.49	5.06	73.29	0.691	No	Yes	2.00
274	6.36	0.92	2.76	1.91	0.93	14.19	5.38	76.41	0.677	No	Yes	2.00
275	6.38	0.90	2.78	2.02	0.94	14.00	5.60	78.38	0.668	No	Yes	2.00
276	6.40	0.90	2.79	2.10	0.94	13.93	5.74	79.92	0.665	No	Yes	2.00
277	6.42	0.91	2.79	2.09	0.94	14.04	5.69	79.94	0.670	No	Yes	2.00
278	6.44	0.93	2.78	2.07	0.94	14.33	5.58	79.93	0.684	No	Yes	2.00
279	6.46	0.96	2.76	2.00	0.93	14.74	5.36	79.00	0.703	No	Yes	2.00
280	6.48	0.99	2.74	1.95	0.92	15.22	5.15	78.43	0.726	No	Yes	2.00
281	6.50	1.08	2.69	1.81	0.90	16.47	9.86	162.33	0.430	No	No	2.00
282	6.52	1.16	2.65	1.72	0.89	17.74	7.67	136.16	0.283	No	No	2.00
283	6.54	1.24	2.62	1.62	0.88	18.74	6.22	116.62	0.205	No	No	2.00
284	6.56	1.21	2.64	1.67	0.88	18.27	6.88	125.79	0.239	No	No	2.00
285	6.58	1.13	2.69	1.86	0.90	17.20	9.28	159.70	0.413	No	No	2.00
286	6.60	1.06	2.72	1.95	0.91	16.12	4.92	79.26	0.769	No	Yes	2.00
287	6.62	1.05	2.71	1.85	0.91	15.90	4.83	76.85	4.000	Yes	Yes	2.00
288	6.64	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	6.66	1.23	2.55	1.15	0.85	18.14	4.03	73.17	4.000	Yes	No	2.00
290	6.68	1.29	2.53	1.11	0.84	18.96	3.43	65.10	4.000	Yes	No	2.00
291	6.70	1.27	2.57	1.29	0.86	18.70	4.46	83.31	4.000	Yes	No	2.00
292	6.72	1.18	2.61	1.37	0.87	17.39	5.78	100.58	4.000	Yes	No	2.00
293	6.74	1.06	2.65	1.40	0.89	15.63	7.66	119.75	4.000	Yes	No	2.00
294	6.76	0.95	2.69	1.37	0.90	13.94	9.68	134.93	4.000	Yes	No	2.00
295	6.78	0.93	2.69	1.26	0.90	13.55	9.33	126.43	0.241	No	No	2.00
296	6.80	0.93	2.67	1.17	0.90	13.47	8.52	114.77	0.199	No	No	2.00
297	6.82	0.93	2.66	1.08	0.89	13.35	7.82	104.40	0.167	No	No	2.00
298	6.84	0.93	2.64	0.98	0.88	13.32	6.98	92.89	4.000	Yes	No	2.00
299	6.86	0.95	2.61	0.89	0.87	13.56	5.93	80.37	4.000	Yes	No	2.00
300	6.88	1.01	2.58	0.83	0.86	14.27	4.76	67.88	4.000	Yes	No	2.00
301	6.90	1.07	2.55	0.77	0.85	15.09	3.79	57.13	4.000	Yes	No	2.00
302	6.92	1.13	2.51	0.72	0.83	16.01	2.98	47.76	4.000	Yes	No	2.00
303	6.94	1.17	2.49	0.69	0.83	16.53	2.89	47.80	4.000	Yes	No	2.00
304	6.96	1.19	2.47	0.65	0.82	16.70	2.80	46.81	0.089	No	No	2.00
305	6.98	1.16	2.48	0.63	0.82	16.28	2.83	46.05	4.000	Yes	No	2.00
306	7.00	1.11	2.50	0.66	0.83	15.57	2.86	44.52	4.000	Yes	No	2.00
307	7.02	1.04	2.55	0.73	0.85	14.53	3.90	56.64	4.000	Yes	No	2.00
308	7.04	0.98	2.59	0.80	0.87	13.71	5.05	69.18	4.000	Yes	No	2.00
309	7.06	0.96	2.60	0.82	0.87	13.44	5.44	73.16	0.105	No	No	2.00
310	7.08	0.99	2.58	0.77	0.86	13.79	4.74	65.35	0.106	No	No	2.00
311	7.10	1.03	2.55	0.72	0.85	14.25	4.02	57.33	0.098	No	No	2.00
312	7.12	1.04	2.55	0.73	0.85	14.38	3.98	57.22	4.000	Yes	No	2.00
313	7.14	1.02	2.59	0.83	0.86	14.09	4.93	69.51	4.000	Yes	No	2.00
314	7.16	0.98	2.64	1.00	0.88	13.59	6.78	92.15	4.000	Yes	No	2.00
315	7.18	0.96	2.67	1.14	0.90	13.42	8.35	112.07	4.000	Yes	No	2.00
316	7.20	0.97	2.69	1.29	0.91	13.53	9.61	130.06	4.000	Yes	No	2.00
317	7.22	0.98	2.70	1.40	0.91	13.68	4.75	65.03	0.652	No	Yes	2.00
318	7.24	0.95	2.74	1.55	0.92	13.37	5.10	68.16	0.638	No	Yes	2.00
319	7.26	0.90	2.76	1.56	0.93	12.58	5.36	67.49	0.600	No	Yes	2.00
320	7.28	0.83	2.78	1.50	0.94	11.53	5.65	65.21	0.550	No	Yes	2.00
321	7.30	0.78	2.79	1.31	0.94	10.59	5.70	60.31	0.505	No	Yes	2.00
322	7.32	0.73	2.79	1.20	0.94	9.92	5.78	57.32	0.473	No	Yes	2.00
323	7.34	0.71	2.79	1.11	0.94	9.52	5.78	55.03	0.454	No	Yes	2.00
324	7.36	0.69	2.80	1.04	0.95	9.16	5.80	53.12	0.437	No	Yes	2.00
325	7.38	0.68	2.79	0.95	0.94	8.90	5.74	51.04	0.425	No	Yes	2.00
326	7.40	0.67	2.78	0.87	0.94	8.78	5.60	49.18	0.419	No	Yes	2.00
327	7.42	0.67	2.77	0.83	0.94	8.75	5.51	48.22	0.417	No	Yes	2.00
328	7.44	0.67	2.76	0.80	0.93	8.77	5.43	47.60	0.418	No	Yes	2.00
329	7.46	0.68	2.77	0.83	0.94	8.86	5.46	48.42	0.423	No	Yes	2.00
330	7.48	0.69	2.77	0.85	0.93	9.00	5.45	49.00	0.429	No	Yes	2.00
331	7.50	0.69	2.77	0.87	0.94	9.03	5.47	49.45	0.431	No	Yes	2.00
332	7.52	0.70	2.76	0.87	0.93	9.12	5.42	49.41	4.000	Yes	Yes	2.00
333	7.54	0.79	2.69	0.74	0.90	10.37	9.28	96.22	4.000	Yes	No	2.00
334	7.56	1.01	2.53	0.53	0.84	13.39	3.36	44.95	4.000	Yes	No	2.00
335	7.58	1.30	2.38	0.39	0.79	17.20	2.26	38.79	4.000	Yes	No	2.00
336	7.60	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	7.62	1.58	2.29	0.37	0.75	20.76	1.00	20.76	0.067	No	No	2.00
338	7.64	1.70	2.25	0.35	0.74	22.39	1.00	22.39	0.069	No	No	2.00
339	7.66	1.94	2.19	0.32	0.72	25.37	1.00	25.37	0.071	No	No	2.00
340	7.68	2.29	2.12	0.32	0.69	29.86	1.00	29.86	0.075	No	No	2.00
341	7.70	2.63	2.07	0.33	0.67	34.23	1.00	34.23	0.079	No	No	2.00
342	7.72	2.99	2.03	0.34	0.65	38.67	1.00	38.67	0.082	No	No	2.00
343	7.74	3.28	1.98	0.32	0.64	42.19	1.00	42.19	0.085	No	No	2.00
344	7.76	3.35	1.96	0.29	0.63	42.98	1.00	42.98	0.086	No	No	2.00
345	7.78	3.19	1.96	0.25	0.63	40.69	1.00	40.69	0.084	No	No	2.00
346	7.80	2.85	2.00	0.23	0.64	36.48	1.00	36.48	0.080	No	No	2.00
347	7.82	2.52	2.07	0.27	0.67	32.39	1.00	32.39	0.077	No	No	2.00
348	7.84	2.27	2.18	0.43	0.71	29.50	1.00	29.50	0.075	No	No	2.00
349	7.86	2.18	2.33	0.93	0.77	29.06	2.05	59.62	0.100	No	No	2.00
350	7.88	2.59	2.30	1.08	0.76	34.65	1.93	66.75	0.108	No	No	2.00
351	7.90	3.60	2.15	0.94	0.70	47.36	1.51	71.67	0.114	No	No	2.00
352	7.92	5.00	1.96	0.66	0.63	64.18	1.28	81.93	0.131	No	No	2.00
353	7.94	6.26	1.84	0.53	0.58	78.89	1.19	93.84	0.157	No	No	2.00
354	7.96	7.12	1.75	0.44	0.55	88.58	1.00	88.58	0.145	No	No	2.00
355	7.98	7.59	1.69	0.36	0.53	93.43	1.00	93.43	0.156	No	No	2.00
356	8.00	7.79	1.63	0.27	0.50	94.83	1.00	94.83	0.159	No	No	2.00
357	8.02	7.81	1.60	0.23	0.49	94.43	1.00	94.43	0.158	No	No	2.00
358	8.04	7.79	1.59	0.21	0.49	93.98	1.00	93.98	0.157	No	No	2.00
359	8.06	7.85	1.60	0.23	0.49	94.82	1.00	94.82	0.159	No	No	2.00
360	8.08	8.23	1.59	0.24	0.49	99.15	1.00	99.15	0.171	No	No	2.00
361	8.10	8.97	1.56	0.24	0.48	107.40	1.00	107.40	0.195	No	No	2.00
362	8.12	10.06	1.52	0.25	0.46	119.80	1.00	119.80	0.240	No	No	2.00
363	8.14	11.30	1.47	0.24	0.44	133.53	1.00	133.53	0.301	No	No	2.00
364	8.16	12.32	1.43	0.23	0.43	144.66	1.00	144.66	0.362	No	No	2.00
365	8.18	12.87	1.41	0.22	0.42	150.52	1.00	150.52	0.397	No	No	2.00
366	8.20	13.00	1.42	0.24	0.42	152.02	1.00	152.02	0.407	No	No	2.00
367	8.22	13.03	1.43	0.25	0.43	152.64	1.00	152.64	0.411	No	No	2.00
368	8.24	13.23	1.43	0.26	0.43	154.80	1.00	154.80	0.425	No	No	2.00
369	8.26	13.81	1.42	0.27	0.42	161.27	1.00	161.27	0.470	No	No	2.00
370	8.28	14.43	1.42	0.29	0.42	168.24	1.00	168.24	0.523	No	No	2.00
371	8.30	14.98	1.42	0.31	0.42	174.51	1.00	174.51	0.574	No	No	2.00
372	8.32	15.10	1.43	0.33	0.43	176.20	1.00	176.20	0.589	No	No	2.00
373	8.34	15.15	1.44	0.34	0.43	176.64	1.00	176.64	0.593	No	No	2.00
374	8.36	15.17	1.43	0.33	0.43	176.52	1.00	176.52	0.592	No	No	2.00
375	8.38	15.28	1.41	0.31	0.42	177.25	1.00	177.25	0.598	No	No	2.00
376	8.40	15.36	1.42	0.32	0.42	178.01	1.00	178.01	0.605	No	No	2.00
377	8.42	15.47	1.41	0.31	0.42	178.95	1.00	178.95	0.613	No	No	2.00
378	8.44	15.48	1.42	0.33	0.43	179.20	1.00	179.20	0.615	No	No	2.00
379	8.46	15.58	1.41	0.31	0.42	179.88	1.00	179.88	0.621	No	No	2.00
380	8.48	15.53	1.41	0.31	0.42	179.09	1.00	179.09	0.614	No	No	2.00
381	8.50	15.52	1.40	0.30	0.42	178.56	1.00	178.56	0.609	No	No	2.00
382	8.52	15.46	1.40	0.30	0.42	177.72	1.00	177.72	0.602	No	No	2.00
383	8.54	15.45	1.40	0.29	0.42	177.38	1.00	177.38	0.599	No	No	2.00
384	8.56	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	8.58	14.97	1.41	0.29	0.42	171.64	1.00	171.64	0.550	No	No	2.00
386	8.60	14.11	1.47	0.34	0.44	162.84	1.00	162.84	0.482	No	No	2.00
387	8.62	13.10	1.50	0.35	0.46	151.63	1.00	151.63	0.404	No	No	2.00
388	8.64	12.29	1.52	0.34	0.46	142.29	1.00	142.29	0.348	No	No	2.00
389	8.66	11.90	1.50	0.30	0.46	137.35	1.00	137.35	0.321	No	No	2.00
390	8.68	11.77	1.51	0.31	0.46	135.87	1.00	135.87	0.313	No	No	2.00
391	8.70	11.65	1.51	0.30	0.46	134.28	1.00	134.28	0.305	No	No	2.00
392	8.72	11.52	1.50	0.27	0.46	132.43	1.00	132.43	0.296	No	No	2.00
393	8.74	11.34	1.50	0.26	0.46	130.14	1.00	130.14	0.285	No	No	2.00
394	8.76	11.20	1.54	0.31	0.47	129.06	1.00	129.06	0.280	No	No	2.00
395	8.78	11.30	1.56	0.35	0.48	130.51	1.00	130.51	0.287	No	No	2.00
396	8.80	11.64	1.54	0.34	0.47	133.93	1.00	133.93	0.303	No	No	2.00
397	8.82	11.86	1.52	0.32	0.46	136.09	1.00	136.09	0.314	No	No	2.00
398	8.84	11.53	1.56	0.38	0.48	132.82	1.00	132.82	0.298	No	No	2.00
399	8.86	11.05	1.60	0.42	0.50	127.72	1.00	127.72	0.274	No	No	2.00
400	8.88	10.50	1.62	0.43	0.50	121.49	1.00	121.49	0.247	No	No	2.00
401	8.90	10.24	1.61	0.37	0.50	118.05	1.00	118.05	0.233	No	No	2.00
402	8.92	9.98	1.63	0.40	0.51	115.26	1.00	115.26	0.222	No	No	2.00
403	8.94	10.15	1.63	0.41	0.51	117.05	1.00	117.05	0.229	No	No	2.00
404	8.96	10.89	1.59	0.38	0.49	124.93	1.00	124.93	0.261	No	No	2.00
405	8.98	12.03	1.53	0.34	0.47	137.00	1.00	137.00	0.319	No	No	2.00
406	9.00	13.76	1.44	0.28	0.44	155.07	1.00	155.07	0.427	No	No	2.00
407	9.02	16.23	1.36	0.24	0.40	180.99	1.00	180.99	0.631	No	No	2.00
408	9.04	18.50	1.28	0.21	0.37	204.49	1.00	204.49	4.000	No	No	2.00
409	9.06	20.03	1.24	0.20	0.36	220.34	1.00	220.34	4.000	No	No	2.00
410	9.08	19.12	1.25	0.19	0.36	210.30	1.00	210.30	4.000	No	No	2.00
411	9.10	18.25	1.29	0.21	0.38	201.28	1.00	201.28	4.000	No	No	2.00
412	9.12	16.79	1.33	0.23	0.39	185.92	1.00	185.92	0.678	No	No	2.00
413	9.14	16.40	1.36	0.25	0.40	181.97	1.00	181.97	0.640	No	No	2.00
414	9.16	15.55	1.37	0.24	0.41	172.48	1.00	172.48	0.557	No	No	2.00
415	9.18	14.84	1.45	0.32	0.44	165.91	1.00	165.91	0.505	No	No	2.00
416	9.20	14.13	1.51	0.40	0.46	158.91	1.00	158.91	0.453	No	No	2.00
417	9.22	13.42	1.57	0.47	0.48	151.67	1.00	151.67	0.404	No	No	2.00
418	9.24	12.84	1.58	0.45	0.49	145.03	1.00	145.03	0.364	No	No	2.00
419	9.26	12.43	1.59	0.46	0.49	140.45	1.00	140.45	0.338	No	No	2.00
420	9.28	11.92	1.63	0.51	0.51	134.96	1.00	134.96	0.309	No	No	2.00
421	9.30	10.91	1.68	0.56	0.53	123.97	1.00	123.97	0.257	No	No	2.00
422	9.32	10.34	1.72	0.60	0.54	117.76	1.03	120.91	0.244	No	No	2.00
423	9.34	11.17	1.72	0.66	0.54	127.20	1.02	130.21	0.285	No	No	2.00
424	9.36	12.83	1.71	0.76	0.54	145.97	1.00	145.97	0.369	No	No	2.00
425	9.38	14.02	1.73	0.91	0.55	159.84	1.05	168.11	0.522	No	No	2.00
426	9.40	14.18	1.77	1.05	0.56	162.16	1.11	180.29	0.625	No	No	2.00
427	9.42	14.13	1.81	1.19	0.58	161.99	1.16	188.25	0.700	No	No	2.00
428	9.44	14.28	1.80	1.16	0.57	163.32	1.15	187.81	0.696	No	No	2.00
429	9.46	14.36	1.78	1.10	0.57	163.70	1.13	184.77	0.667	No	No	2.00
430	9.48	14.14	1.75	0.96	0.55	160.34	1.08	172.85	0.560	No	No	2.00
431	9.50	13.30	1.75	0.93	0.56	150.68	1.09	164.58	0.495	No	No	2.00
432	9.52	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	9.54	10.83	1.80	0.86	0.57	122.60	1.16	141.61	0.344	No	No	2.00
434	9.56	9.53	1.88	0.98	0.60	108.38	1.22	132.42	0.296	No	No	2.00
435	9.58	8.30	2.03	1.42	0.66	95.42	1.33	126.99	0.270	No	No	2.00
436	9.60	7.78	2.14	1.95	0.70	90.08	1.48	133.62	0.302	No	No	2.00
437	9.62	8.19	2.18	2.32	0.72	95.19	1.56	148.33	0.383	No	No	2.00
438	9.64	9.25	2.15	2.37	0.71	107.22	1.50	160.83	0.467	No	No	2.00
439	9.66	10.34	2.12	2.39	0.70	119.52	1.45	173.22	0.563	No	No	2.00
440	9.68	11.45	2.10	2.42	0.69	132.03	1.41	186.56	0.684	No	No	2.00
441	9.70	12.68	2.08	2.47	0.68	145.80	1.39	202.02	4.000	No	No	2.00
442	9.72	13.80	2.05	2.47	0.67	158.26	1.36	215.00	4.000	No	No	2.00
443	9.74	14.67	2.04	2.50	0.67	167.84	1.35	225.81	4.000	No	No	2.00
444	9.76	15.22	2.05	2.62	0.67	173.97	1.35	235.31	4.000	No	No	2.00
445	9.78	15.64	2.06	2.73	0.67	178.66	1.36	243.32	4.000	No	No	2.00
446	9.80	15.75	2.07	2.87	0.68	179.75	1.38	248.18	4.000	No	No	2.00
447	9.82	15.74	2.08	2.96	0.68	179.47	1.39	250.25	4.000	No	No	2.00
448	9.84	15.88	2.09	3.02	0.69	180.83	1.40	253.49	4.000	No	No	2.00
449	9.86	16.25	2.09	3.10	0.69	184.79	1.41	260.20	4.000	No	No	2.00
450	9.88	16.88	2.09	3.16	0.69	191.60	1.40	269.15	4.000	No	No	2.00
451	9.90	17.63	2.08	3.19	0.68	199.78	1.40	278.80	4.000	No	No	2.00
452	9.92	19.12	2.05	3.05	0.67	215.70	1.35	291.92	4.000	No	No	2.00
453	9.94	20.71	2.01	2.90	0.66	232.78	1.32	306.70	4.000	No	No	2.00
454	9.96	22.15	1.98	2.80	0.65	248.06	1.29	321.10	4.000	No	No	2.00
455	9.98	22.73	1.98	2.85	0.65	254.05	1.29	328.91	4.000	No	No	2.00
456	10.00	22.64	2.00	2.97	0.65	252.94	1.31	330.73	4.000	No	No	2.00
457	10.02	22.48	2.02	3.08	0.66	250.93	1.32	331.49	4.000	No	No	2.00
458	10.04	21.43	2.05	3.31	0.67	239.37	1.36	325.42	4.000	No	No	2.00
459	10.06	21.75	2.05	3.35	0.67	242.55	1.36	329.84	4.000	No	No	2.00
460	10.08	22.11	2.06	3.42	0.68	246.16	1.37	336.17	4.000	No	No	2.00
461	10.10	23.35	2.04	3.34	0.67	259.28	1.34	348.23	4.000	No	No	2.00
462	10.12	23.58	2.04	3.40	0.67	261.42	1.35	352.46	4.000	No	No	2.00
463	10.14	23.82	2.04	3.43	0.67	263.59	1.35	355.62	4.000	No	No	2.00
464	10.16	24.06	2.05	3.46	0.67	265.84	1.35	359.10	4.000	No	No	2.00
465	10.18	24.17	2.05	3.50	0.67	266.62	1.36	361.33	4.000	No	No	2.00
466	10.20	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
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	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
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	2.00	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	2.00	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	2.00	0.00	0.00	0.02	0.00
3.58	2.00	0.00	0.00	0.02	0.00	3.60	2.00	0.00	0.00	0.02	0.00
3.62	2.00	0.00	0.00	0.02	0.00	3.64	2.00	0.00	0.00	0.02	0.00
3.66	2.00	0.00	0.00	0.02	0.00	3.68	2.00	0.00	0.00	0.02	0.00
3.70	2.00	0.00	0.00	0.02	0.00	3.72	2.00	0.00	0.00	0.02	0.00
3.74	2.00	0.00	0.00	0.02	0.00	3.76	2.00	0.00	0.00	0.02	0.00
3.78	2.00	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	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
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
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

:: 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
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	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

:: 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
8.58	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	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

:: 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

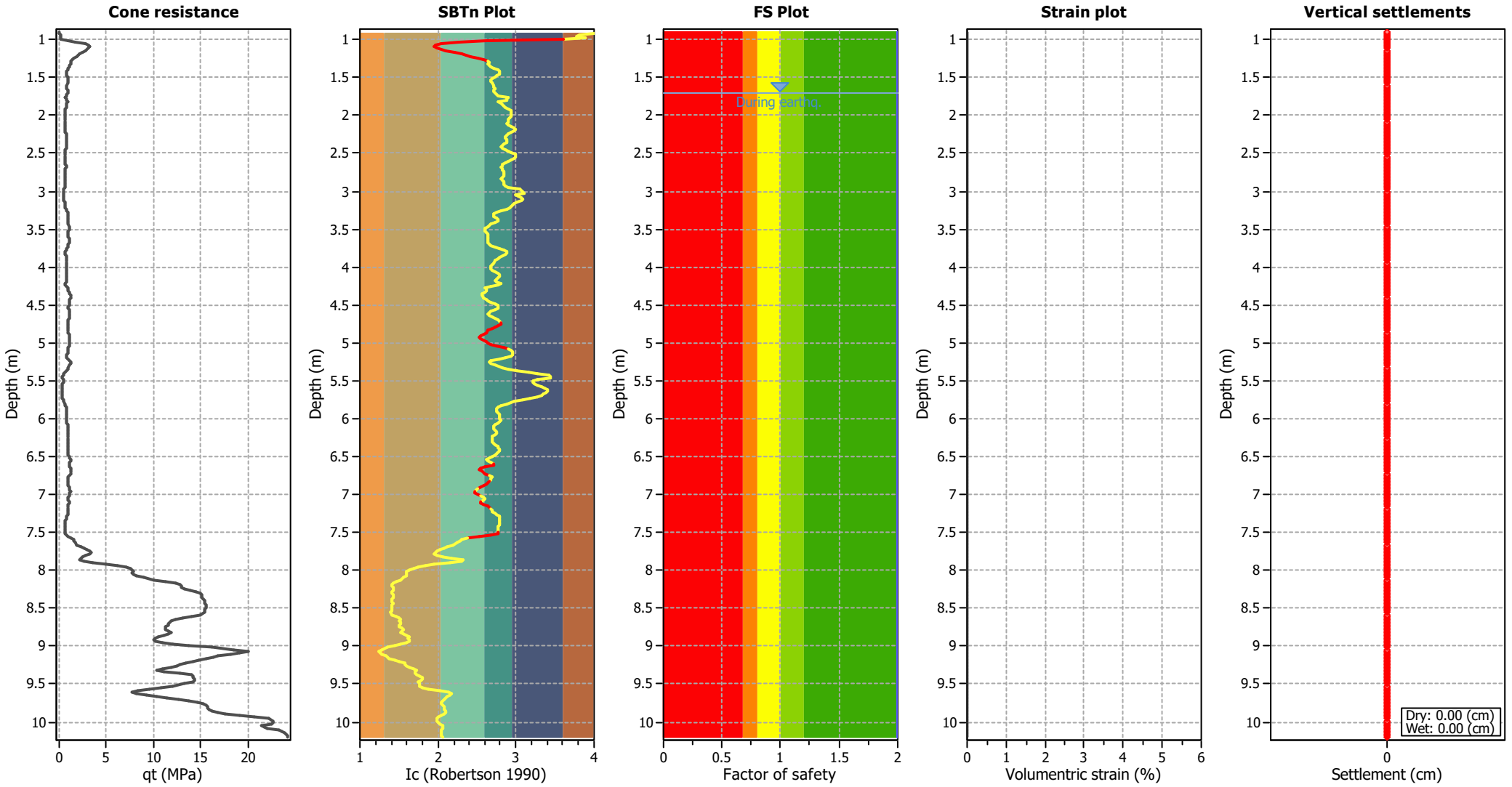
Overall liquefaction potential: 0.00

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)
1.70	83.15	2.00	0.00	0.91	0.00	1.72	84.77	2.00	0.00	0.90	0.00
1.74	86.69	2.00	0.00	0.90	0.00	1.76	93.59	2.00	0.00	0.90	0.00
1.78	95.04	2.00	0.00	0.90	0.00	1.80	96.14	2.00	0.00	0.90	0.00
1.82	92.53	2.00	0.00	0.90	0.00	1.84	93.67	2.00	0.00	0.90	0.00
1.86	94.15	2.00	0.00	0.90	0.00	1.88	94.27	2.00	0.00	0.90	0.00
1.90	95.75	2.00	0.00	0.89	0.00	1.92	97.26	2.00	0.00	0.89	0.00
1.94	97.54	2.00	0.00	0.89	0.00	1.96	96.45	2.00	0.00	0.89	0.00
1.98	96.36	2.00	0.00	0.89	0.00	2.00	95.37	2.00	0.00	0.89	0.00
2.02	96.22	2.00	0.00	0.89	0.00	2.04	95.82	2.00	0.00	0.89	0.00
2.06	96.22	2.00	0.00	0.89	0.00	2.08	94.50	2.00	0.00	0.88	0.00
2.10	93.59	2.00	0.00	0.88	0.00	2.12	94.25	2.00	0.00	0.88	0.00
2.14	96.12	2.00	0.00	0.88	0.00	2.16	98.38	2.00	0.00	0.88	0.00
2.18	100.66	2.00	0.00	0.88	0.00	2.20	101.78	2.00	0.00	0.88	0.00
2.22	101.65	2.00	0.00	0.88	0.00	2.24	100.14	2.00	0.00	0.88	0.00
2.26	98.38	2.00	0.00	0.87	0.00	2.28	97.87	2.00	0.00	0.87	0.00
2.30	98.29	2.00	0.00	0.87	0.00	2.32	98.70	2.00	0.00	0.87	0.00
2.34	98.01	2.00	0.00	0.87	0.00	2.36	96.26	2.00	0.00	0.87	0.00
2.38	93.49	2.00	0.00	0.87	0.00	2.40	90.22	2.00	0.00	0.87	0.00
2.42	87.89	2.00	0.00	0.87	0.00	2.44	86.77	2.00	0.00	0.86	0.00
2.46	87.37	2.00	0.00	0.86	0.00	2.48	88.65	2.00	0.00	0.86	0.00
2.50	91.25	2.00	0.00	0.86	0.00	2.52	93.88	2.00	0.00	0.86	0.00
2.54	95.02	2.00	0.00	0.86	0.00	2.56	93.82	2.00	0.00	0.86	0.00
2.58	91.06	2.00	0.00	0.86	0.00	2.60	87.35	2.00	0.00	0.86	0.00
2.62	84.68	2.00	0.00	0.85	0.00	2.64	81.73	2.00	0.00	0.85	0.00
2.66	81.03	2.00	0.00	0.85	0.00	2.68	80.69	2.00	0.00	0.85	0.00
2.70	80.95	2.00	0.00	0.85	0.00	2.72	80.31	2.00	0.00	0.85	0.00
2.74	80.02	2.00	0.00	0.85	0.00	2.76	80.06	2.00	0.00	0.85	0.00
2.78	79.64	2.00	0.00	0.85	0.00	2.80	78.78	2.00	0.00	0.84	0.00
2.82	77.72	2.00	0.00	0.84	0.00	2.84	77.60	2.00	0.00	0.84	0.00
2.86	78.02	2.00	0.00	0.84	0.00	2.88	78.64	2.00	0.00	0.84	0.00
2.90	78.73	2.00	0.00	0.84	0.00	2.92	78.40	2.00	0.00	0.84	0.00
2.94	78.72	2.00	0.00	0.84	0.00	2.96	80.12	2.00	0.00	0.84	0.00
2.98	85.05	2.00	0.00	0.83	0.00	3.00	85.23	2.00	0.00	0.83	0.00
3.02	84.36	2.00	0.00	0.83	0.00	3.04	80.69	2.00	0.00	0.83	0.00
3.06	81.97	2.00	0.00	0.83	0.00	3.08	85.12	2.00	0.00	0.83	0.00
3.10	88.76	2.00	0.00	0.83	0.00	3.12	91.69	2.00	0.00	0.83	0.00
3.14	92.57	2.00	0.00	0.83	0.00	3.16	92.23	2.00	0.00	0.82	0.00
3.18	91.75	2.00	0.00	0.82	0.00	3.20	91.75	2.00	0.00	0.82	0.00
3.22	91.44	2.00	0.00	0.82	0.00	3.24	90.87	2.00	0.00	0.82	0.00
3.26	89.04	2.00	0.00	0.82	0.00	3.28	87.48	2.00	0.00	0.82	0.00
3.30	86.10	2.00	0.00	0.82	0.00	3.32	87.23	2.00	0.00	0.82	0.00
3.34	89.28	2.00	0.00	0.81	0.00	3.36	91.57	2.00	0.00	0.81	0.00
3.38	92.99	2.00	0.00	0.81	0.00	3.40	92.70	2.00	0.00	0.81	0.00
3.42	89.11	2.00	0.00	0.81	0.00	3.44	169.05	2.00	0.00	0.81	0.00
3.46	132.70	2.00	0.00	0.81	0.00	3.48	114.28	2.00	0.00	0.81	0.00
3.50	106.76	2.00	0.00	0.81	0.00	3.52	106.79	2.00	0.00	0.80	0.00
3.54	118.02	2.00	0.00	0.80	0.00	3.56	127.53	2.00	0.00	0.80	0.00
3.58	134.72	2.00	0.00	0.80	0.00	3.60	132.97	2.00	0.00	0.80	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)
3.62	131.91	2.00	0.00	0.80	0.00	3.64	128.40	2.00	0.00	0.80	0.00
3.66	128.48	2.00	0.00	0.80	0.00	3.68	127.77	2.00	0.00	0.80	0.00
3.70	137.16	2.00	0.00	0.79	0.00	3.72	157.51	2.00	0.00	0.79	0.00
3.74	81.92	2.00	0.00	0.79	0.00	3.76	85.37	2.00	0.00	0.79	0.00
3.78	87.98	2.00	0.00	0.79	0.00	3.80	89.15	2.00	0.00	0.79	0.00
3.82	88.30	2.00	0.00	0.79	0.00	3.84	85.31	2.00	0.00	0.79	0.00
3.86	82.13	2.00	0.00	0.79	0.00	3.88	77.92	2.00	0.00	0.78	0.00
3.90	75.18	2.00	0.00	0.78	0.00	3.92	71.90	2.00	0.00	0.78	0.00
3.94	70.14	2.00	0.00	0.78	0.00	3.96	142.63	2.00	0.00	0.78	0.00
3.98	134.87	2.00	0.00	0.78	0.00	4.00	136.20	2.00	0.00	0.78	0.00
4.02	142.44	2.00	0.00	0.78	0.00	4.04	73.12	2.00	0.00	0.78	0.00
4.06	75.65	2.00	0.00	0.77	0.00	4.08	78.17	2.00	0.00	0.77	0.00
4.10	78.83	2.00	0.00	0.77	0.00	4.12	78.04	2.00	0.00	0.77	0.00
4.14	76.05	2.00	0.00	0.77	0.00	4.16	73.76	2.00	0.00	0.77	0.00
4.18	71.27	2.00	0.00	0.77	0.00	4.20	68.17	2.00	0.00	0.77	0.00
4.22	65.70	2.00	0.00	0.77	0.00	4.24	64.43	2.00	0.00	0.76	0.00
4.26	128.77	2.00	0.00	0.76	0.00	4.28	96.13	2.00	0.00	0.76	0.00
4.30	112.01	2.00	0.00	0.76	0.00	4.32	117.88	2.00	0.00	0.76	0.00
4.34	109.81	2.00	0.00	0.76	0.00	4.36	89.14	2.00	0.00	0.76	0.00
4.38	90.64	2.00	0.00	0.76	0.00	4.40	105.58	2.00	0.00	0.76	0.00
4.42	130.23	2.00	0.00	0.75	0.00	4.44	153.12	2.00	0.00	0.75	0.00
4.46	186.57	2.00	0.00	0.75	0.00	4.48	97.50	2.00	0.00	0.75	0.00
4.50	102.50	2.00	0.00	0.75	0.00	4.52	103.92	2.00	0.00	0.75	0.00
4.54	101.02	2.00	0.00	0.75	0.00	4.56	97.06	2.00	0.00	0.75	0.00
4.58	183.65	2.00	0.00	0.75	0.00	4.60	163.82	2.00	0.00	0.74	0.00
4.62	150.97	2.00	0.00	0.74	0.00	4.64	166.44	2.00	0.00	0.74	0.00
4.66	194.88	2.00	0.00	0.74	0.00	4.68	95.62	2.00	0.00	0.74	0.00
4.70	97.20	2.00	0.00	0.74	0.00	4.72	97.65	2.00	0.00	0.74	0.00
4.74	96.10	2.00	0.00	0.74	0.00	4.76	93.41	2.00	0.00	0.74	0.00
4.78	88.82	2.00	0.00	0.73	0.00	4.80	82.60	2.00	0.00	0.73	0.00
4.82	163.93	2.00	0.00	0.73	0.00	4.84	126.36	2.00	0.00	0.73	0.00
4.86	106.58	2.00	0.00	0.73	0.00	4.88	87.65	2.00	0.00	0.73	0.00
4.90	72.89	2.00	0.00	0.73	0.00	4.92	69.51	2.00	0.00	0.73	0.00
4.94	81.14	2.00	0.00	0.73	0.00	4.96	104.26	2.00	0.00	0.72	0.00
4.98	120.54	2.00	0.00	0.72	0.00	5.00	138.20	2.00	0.00	0.72	0.00
5.02	169.31	2.00	0.00	0.72	0.00	5.04	102.19	2.00	0.00	0.72	0.00
5.06	114.75	2.00	0.00	0.72	0.00	5.08	125.09	2.00	0.00	0.72	0.00
5.10	128.21	2.00	0.00	0.72	0.00	5.12	128.75	2.00	0.00	0.72	0.00
5.14	127.00	2.00	0.00	0.71	0.00	5.16	120.39	2.00	0.00	0.71	0.00
5.18	112.45	2.00	0.00	0.71	0.00	5.20	102.40	2.00	0.00	0.71	0.00
5.22	95.75	2.00	0.00	0.71	0.00	5.24	181.51	2.00	0.00	0.71	0.00
5.26	159.43	2.00	0.00	0.71	0.00	5.28	182.87	2.00	0.00	0.71	0.00
5.30	105.02	2.00	0.00	0.71	0.00	5.32	111.85	2.00	0.00	0.70	0.00
5.34	115.59	2.00	0.00	0.70	0.00	5.36	120.43	2.00	0.00	0.70	0.00
5.38	128.32	2.00	0.00	0.70	0.00	5.40	134.18	2.00	0.00	0.70	0.00
5.42	130.07	2.00	0.00	0.70	0.00	5.44	118.13	2.00	0.00	0.70	0.00
5.46	102.76	2.00	0.00	0.70	0.00	5.48	93.71	2.00	0.00	0.70	0.00
5.50	88.47	2.00	0.00	0.69	0.00	5.52	84.94	2.00	0.00	0.69	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)
5.54	83.72	2.00	0.00	0.69	0.00	5.56	84.47	2.00	0.00	0.69	0.00
5.58	85.71	2.00	0.00	0.69	0.00	5.60	86.12	2.00	0.00	0.69	0.00
5.62	84.85	2.00	0.00	0.69	0.00	5.64	80.77	2.00	0.00	0.69	0.00
5.66	75.91	2.00	0.00	0.69	0.00	5.68	70.66	2.00	0.00	0.68	0.00
5.70	67.43	2.00	0.00	0.68	0.00	5.72	64.90	2.00	0.00	0.68	0.00
5.74	63.48	2.00	0.00	0.68	0.00	5.76	63.54	2.00	0.00	0.68	0.00
5.78	63.51	2.00	0.00	0.68	0.00	5.80	63.77	2.00	0.00	0.68	0.00
5.82	64.75	2.00	0.00	0.68	0.00	5.84	67.00	2.00	0.00	0.68	0.00
5.86	69.21	2.00	0.00	0.67	0.00	5.88	71.69	2.00	0.00	0.67	0.00
5.90	73.70	2.00	0.00	0.67	0.00	5.92	76.64	2.00	0.00	0.67	0.00
5.94	78.81	2.00	0.00	0.67	0.00	5.96	80.71	2.00	0.00	0.67	0.00
5.98	80.57	2.00	0.00	0.67	0.00	6.00	80.93	2.00	0.00	0.67	0.00
6.02	80.81	2.00	0.00	0.67	0.00	6.04	79.91	2.00	0.00	0.66	0.00
6.06	76.85	2.00	0.00	0.66	0.00	6.08	73.41	2.00	0.00	0.66	0.00
6.10	71.27	2.00	0.00	0.66	0.00	6.12	70.82	2.00	0.00	0.66	0.00
6.14	72.67	2.00	0.00	0.66	0.00	6.16	75.32	2.00	0.00	0.66	0.00
6.18	78.06	2.00	0.00	0.66	0.00	6.20	78.72	2.00	0.00	0.66	0.00
6.22	77.47	2.00	0.00	0.65	0.00	6.24	75.57	2.00	0.00	0.65	0.00
6.26	157.20	2.00	0.00	0.65	0.00	6.28	72.38	2.00	0.00	0.65	0.00
6.30	70.99	2.00	0.00	0.65	0.00	6.32	71.37	2.00	0.00	0.65	0.00
6.34	73.29	2.00	0.00	0.65	0.00	6.36	76.41	2.00	0.00	0.65	0.00
6.38	78.38	2.00	0.00	0.65	0.00	6.40	79.92	2.00	0.00	0.64	0.00
6.42	79.94	2.00	0.00	0.64	0.00	6.44	79.93	2.00	0.00	0.64	0.00
6.46	79.00	2.00	0.00	0.64	0.00	6.48	78.43	2.00	0.00	0.64	0.00
6.50	162.33	2.00	0.00	0.64	0.00	6.52	136.16	2.00	0.00	0.64	0.00
6.54	116.62	2.00	0.00	0.64	0.00	6.56	125.79	2.00	0.00	0.64	0.00
6.58	159.70	2.00	0.00	0.63	0.00	6.60	79.26	2.00	0.00	0.63	0.00
6.62	76.85	2.00	0.00	0.63	0.00	6.64	97.56	2.00	0.00	0.63	0.00
6.66	73.17	2.00	0.00	0.63	0.00	6.68	65.10	2.00	0.00	0.63	0.00
6.70	83.31	2.00	0.00	0.63	0.00	6.72	100.58	2.00	0.00	0.63	0.00
6.74	119.75	2.00	0.00	0.63	0.00	6.76	134.93	2.00	0.00	0.62	0.00
6.78	126.43	2.00	0.00	0.62	0.00	6.80	114.77	2.00	0.00	0.62	0.00
6.82	104.40	2.00	0.00	0.62	0.00	6.84	92.89	2.00	0.00	0.62	0.00
6.86	80.37	2.00	0.00	0.62	0.00	6.88	67.88	2.00	0.00	0.62	0.00
6.90	57.13	2.00	0.00	0.62	0.00	6.92	47.76	2.00	0.00	0.62	0.00
6.94	47.80	2.00	0.00	0.61	0.00	6.96	46.81	2.00	0.00	0.61	0.00
6.98	46.05	2.00	0.00	0.61	0.00	7.00	44.52	2.00	0.00	0.61	0.00
7.02	56.64	2.00	0.00	0.61	0.00	7.04	69.18	2.00	0.00	0.61	0.00
7.06	73.16	2.00	0.00	0.61	0.00	7.08	65.35	2.00	0.00	0.61	0.00
7.10	57.33	2.00	0.00	0.61	0.00	7.12	57.22	2.00	0.00	0.60	0.00
7.14	69.51	2.00	0.00	0.60	0.00	7.16	92.15	2.00	0.00	0.60	0.00
7.18	112.07	2.00	0.00	0.60	0.00	7.20	130.06	2.00	0.00	0.60	0.00
7.22	65.03	2.00	0.00	0.60	0.00	7.24	68.16	2.00	0.00	0.60	0.00
7.26	67.49	2.00	0.00	0.60	0.00	7.28	65.21	2.00	0.00	0.60	0.00
7.30	60.31	2.00	0.00	0.59	0.00	7.32	57.32	2.00	0.00	0.59	0.00
7.34	55.03	2.00	0.00	0.59	0.00	7.36	53.12	2.00	0.00	0.59	0.00
7.38	51.04	2.00	0.00	0.59	0.00	7.40	49.18	2.00	0.00	0.59	0.00
7.42	48.22	2.00	0.00	0.59	0.00	7.44	47.60	2.00	0.00	0.59	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)
7.46	48.42	2.00	0.00	0.59	0.00	7.48	49.00	2.00	0.00	0.58	0.00
7.50	49.45	2.00	0.00	0.58	0.00	7.52	49.41	2.00	0.00	0.58	0.00
7.54	96.22	2.00	0.00	0.58	0.00	7.56	44.95	2.00	0.00	0.58	0.00
7.58	38.79	2.00	0.00	0.58	0.00	7.60	19.91	2.00	0.00	0.58	0.00
7.62	20.76	2.00	0.00	0.58	0.00	7.64	22.39	2.00	0.00	0.58	0.00
7.66	25.37	2.00	0.00	0.57	0.00	7.68	29.86	2.00	0.00	0.57	0.00
7.70	34.23	2.00	0.00	0.57	0.00	7.72	38.67	2.00	0.00	0.57	0.00
7.74	42.19	2.00	0.00	0.57	0.00	7.76	42.98	2.00	0.00	0.57	0.00
7.78	40.69	2.00	0.00	0.57	0.00	7.80	36.48	2.00	0.00	0.57	0.00
7.82	32.39	2.00	0.00	0.57	0.00	7.84	29.50	2.00	0.00	0.56	0.00
7.86	59.62	2.00	0.00	0.56	0.00	7.88	66.75	2.00	0.00	0.56	0.00
7.90	71.67	2.00	0.00	0.56	0.00	7.92	81.93	2.00	0.00	0.56	0.00
7.94	93.84	2.00	0.00	0.56	0.00	7.96	88.58	2.00	0.00	0.56	0.00
7.98	93.43	2.00	0.00	0.56	0.00	8.00	94.83	2.00	0.00	0.56	0.00
8.02	94.43	2.00	0.00	0.55	0.00	8.04	93.98	2.00	0.00	0.55	0.00
8.06	94.82	2.00	0.00	0.55	0.00	8.08	99.15	2.00	0.00	0.55	0.00
8.10	107.40	2.00	0.00	0.55	0.00	8.12	119.80	2.00	0.00	0.55	0.00
8.14	133.53	2.00	0.00	0.55	0.00	8.16	144.66	2.00	0.00	0.55	0.00
8.18	150.52	2.00	0.00	0.55	0.00	8.20	152.02	2.00	0.00	0.54	0.00
8.22	152.64	2.00	0.00	0.54	0.00	8.24	154.80	2.00	0.00	0.54	0.00
8.26	161.27	2.00	0.00	0.54	0.00	8.28	168.24	2.00	0.00	0.54	0.00
8.30	174.51	2.00	0.00	0.54	0.00	8.32	176.20	2.00	0.00	0.54	0.00
8.34	176.64	2.00	0.00	0.54	0.00	8.36	176.52	2.00	0.00	0.54	0.00
8.38	177.25	2.00	0.00	0.53	0.00	8.40	178.01	2.00	0.00	0.53	0.00
8.42	178.95	2.00	0.00	0.53	0.00	8.44	179.20	2.00	0.00	0.53	0.00
8.46	179.88	2.00	0.00	0.53	0.00	8.48	179.09	2.00	0.00	0.53	0.00
8.50	178.56	2.00	0.00	0.53	0.00	8.52	177.72	2.00	0.00	0.53	0.00
8.54	177.38	2.00	0.00	0.53	0.00	8.56	176.05	2.00	0.00	0.52	0.00
8.58	171.64	2.00	0.00	0.52	0.00	8.60	162.84	2.00	0.00	0.52	0.00
8.62	151.63	2.00	0.00	0.52	0.00	8.64	142.29	2.00	0.00	0.52	0.00
8.66	137.35	2.00	0.00	0.52	0.00	8.68	135.87	2.00	0.00	0.52	0.00
8.70	134.28	2.00	0.00	0.52	0.00	8.72	132.43	2.00	0.00	0.52	0.00
8.74	130.14	2.00	0.00	0.51	0.00	8.76	129.06	2.00	0.00	0.51	0.00
8.78	130.51	2.00	0.00	0.51	0.00	8.80	133.93	2.00	0.00	0.51	0.00
8.82	136.09	2.00	0.00	0.51	0.00	8.84	132.82	2.00	0.00	0.51	0.00
8.86	127.72	2.00	0.00	0.51	0.00	8.88	121.49	2.00	0.00	0.51	0.00
8.90	118.05	2.00	0.00	0.51	0.00	8.92	115.26	2.00	0.00	0.50	0.00
8.94	117.05	2.00	0.00	0.50	0.00	8.96	124.93	2.00	0.00	0.50	0.00
8.98	137.00	2.00	0.00	0.50	0.00	9.00	155.07	2.00	0.00	0.50	0.00
9.02	180.99	2.00	0.00	0.50	0.00	9.04	204.49	2.00	0.00	0.50	0.00
9.06	220.34	2.00	0.00	0.50	0.00	9.08	210.30	2.00	0.00	0.50	0.00
9.10	201.28	2.00	0.00	0.49	0.00	9.12	185.92	2.00	0.00	0.49	0.00
9.14	181.97	2.00	0.00	0.49	0.00	9.16	172.48	2.00	0.00	0.49	0.00
9.18	165.91	2.00	0.00	0.49	0.00	9.20	158.91	2.00	0.00	0.49	0.00
9.22	151.67	2.00	0.00	0.49	0.00	9.24	145.03	2.00	0.00	0.49	0.00
9.26	140.45	2.00	0.00	0.49	0.00	9.28	134.96	2.00	0.00	0.48	0.00
9.30	123.97	2.00	0.00	0.48	0.00	9.32	120.91	2.00	0.00	0.48	0.00
9.34	130.21	2.00	0.00	0.48	0.00	9.36	145.97	2.00	0.00	0.48	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)
9.38	168.11	2.00	0.00	0.48	0.00	9.40	180.29	2.00	0.00	0.48	0.00
9.42	188.25	2.00	0.00	0.48	0.00	9.44	187.81	2.00	0.00	0.48	0.00
9.46	184.77	2.00	0.00	0.47	0.00	9.48	172.85	2.00	0.00	0.47	0.00
9.50	164.58	2.00	0.00	0.47	0.00	9.52	150.37	2.00	0.00	0.47	0.00
9.54	141.61	2.00	0.00	0.47	0.00	9.56	132.42	2.00	0.00	0.47	0.00
9.58	126.99	2.00	0.00	0.47	0.00	9.60	133.62	2.00	0.00	0.47	0.00
9.62	148.33	2.00	0.00	0.47	0.00	9.64	160.83	2.00	0.00	0.46	0.00
9.66	173.22	2.00	0.00	0.46	0.00	9.68	186.56	2.00	0.00	0.46	0.00
9.70	202.02	2.00	0.00	0.46	0.00	9.72	215.00	2.00	0.00	0.46	0.00
9.74	225.81	2.00	0.00	0.46	0.00	9.76	235.31	2.00	0.00	0.46	0.00
9.78	243.32	2.00	0.00	0.46	0.00	9.80	248.18	2.00	0.00	0.46	0.00
9.82	250.25	2.00	0.00	0.45	0.00	9.84	253.49	2.00	0.00	0.45	0.00
9.86	260.20	2.00	0.00	0.45	0.00	9.88	269.15	2.00	0.00	0.45	0.00
9.90	278.80	2.00	0.00	0.45	0.00	9.92	291.92	2.00	0.00	0.45	0.00
9.94	306.70	2.00	0.00	0.45	0.00	9.96	321.10	2.00	0.00	0.45	0.00
9.98	328.91	2.00	0.00	0.45	0.00	10.00	330.73	2.00	0.00	0.44	0.00
10.02	331.49	2.00	0.00	0.44	0.00	10.04	325.42	2.00	0.00	0.44	0.00
10.06	329.84	2.00	0.00	0.44	0.00	10.08	336.17	2.00	0.00	0.44	0.00
10.10	348.23	2.00	0.00	0.44	0.00	10.12	352.46	2.00	0.00	0.44	0.00
10.14	355.62	2.00	0.00	0.44	0.00	10.16	359.10	2.00	0.00	0.44	0.00
10.18	361.33	2.00	0.00	0.43	0.00	10.20	362.23	2.00	0.00	0.43	0.00

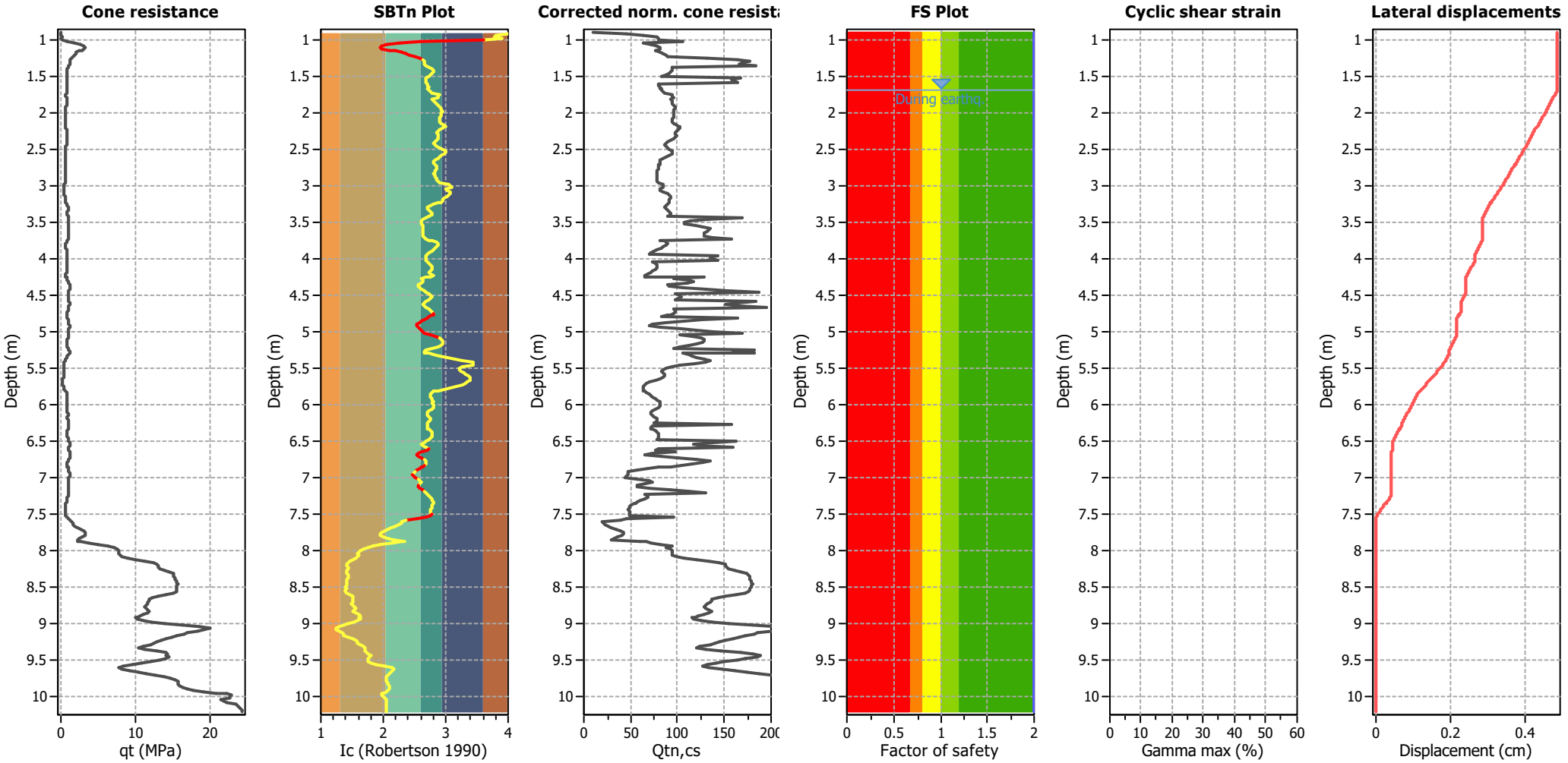
Total estimated settlement: 0.00

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

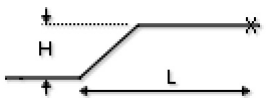
Geometric parameters: Level ground (or gently sloping) with free face (L: 16.75 m - H: 2.80 m)



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)
1.70	0.87	16.66	2.04	83.15	2.00	7.85	0.07	0.00
1.72	0.85	16.20	2.13	84.77	2.00	6.92	0.07	0.00
1.74	0.82	15.75	2.25	86.69	2.00	6.00	0.07	0.00
1.76	0.68	12.88	2.85	93.59	2.00	0.00	0.08	0.00
1.78	0.71	13.58	2.86	95.04	2.00	1.11	0.08	0.00
1.80	0.74	13.98	2.88	96.14	2.00	2.06	0.08	0.00
1.82	0.87	16.65	2.48	92.53	2.00	7.83	0.07	0.00
1.84	0.82	15.71	2.59	93.67	2.00	5.91	0.07	0.00
1.86	0.79	15.10	2.66	94.15	2.00	4.61	0.07	0.00
1.88	0.77	14.71	2.70	94.27	2.00	3.73	0.07	0.00
1.90	0.74	14.12	2.84	95.75	2.00	2.38	0.08	0.00
1.92	0.71	13.45	2.99	97.26	2.00	0.79	0.08	0.00
1.94	0.68	12.75	3.09	97.54	2.00	0.00	0.08	0.00
1.96	0.66	12.49	3.06	96.45	2.00	0.00	0.08	0.00
1.98	0.66	12.34	3.07	96.36	2.00	0.00	0.08	0.00
2.00	0.66	12.45	3.00	95.37	2.00	0.00	0.08	0.00
2.02	0.67	12.58	3.03	96.22	2.00	0.00	0.08	0.00
2.04	0.68	12.87	2.97	95.82	2.00	0.00	0.08	0.00
2.06	0.70	13.12	2.96	96.22	2.00	0.00	0.08	0.00
2.08	0.70	13.27	2.84	94.50	2.00	0.35	0.08	0.00
2.10	0.70	13.23	2.79	93.59	2.00	0.24	0.08	0.00
2.12	0.69	12.93	2.86	94.25	2.00	0.00	0.08	0.00
2.14	0.66	12.44	3.03	96.12	2.00	0.00	0.08	0.00
2.16	0.64	11.93	3.25	98.38	2.00	0.00	0.08	0.00
2.18	0.63	11.69	3.44	100.66	2.00	0.00	0.08	0.00
2.20	0.65	12.17	3.43	101.78	2.00	0.00	0.08	0.00
2.22	0.69	13.01	3.29	101.65	2.00	0.00	0.08	0.00
2.24	0.74	13.93	3.09	100.14	2.00	1.93	0.08	0.00
2.26	0.77	14.42	2.93	98.38	2.00	3.08	0.07	0.00
2.28	0.78	14.63	2.88	97.87	2.00	3.55	0.07	0.00
2.30	0.78	14.61	2.91	98.29	2.00	3.51	0.07	0.00
2.32	0.76	14.28	2.96	98.70	2.00	2.75	0.07	0.00
2.34	0.75	14.04	2.95	98.01	2.00	2.19	0.08	0.00
2.36	0.75	14.00	2.85	96.26	2.00	2.11	0.08	0.00
2.38	0.76	14.36	2.66	93.49	2.00	2.95	0.07	0.00
2.40	0.78	14.70	2.46	90.22	2.00	3.72	0.07	0.00
2.42	0.77	14.54	2.35	87.89	2.00	3.35	0.07	0.00
2.44	0.75	13.98	2.33	86.77	2.00	2.07	0.08	0.00
2.46	0.70	13.05	2.44	87.37	2.00	0.00	0.08	0.00
2.48	0.66	12.28	2.58	88.65	2.00	0.00	0.08	0.00
2.50	0.62	11.52	2.82	91.25	2.00	0.00	0.08	0.00
2.52	0.59	10.93	3.08	93.88	2.00	0.00	0.09	0.00
2.54	0.59	10.84	3.17	95.02	2.00	0.00	0.09	0.00
2.56	0.61	11.24	3.02	93.82	2.00	0.00	0.09	0.00
2.58	0.64	11.86	2.76	91.06	2.00	0.00	0.08	0.00
2.60	0.66	12.26	2.50	87.35	2.00	0.00	0.08	0.00
2.62	0.68	12.59	2.32	84.68	2.00	0.00	0.08	0.00
2.64	0.70	13.04	2.13	81.73	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)
2.66	0.72	13.36	2.07	81.03	2.00	0.55	0.08	0.00
2.68	0.72	13.39	2.05	80.69	2.00	0.64	0.08	0.00
2.70	0.71	13.12	2.08	80.95	2.00	0.00	0.08	0.00
2.72	0.69	12.83	2.07	80.31	2.00	0.00	0.08	0.00
2.74	0.68	12.49	2.07	80.02	2.00	0.00	0.08	0.00
2.76	0.66	12.23	2.09	80.06	2.00	0.00	0.08	0.00
2.78	0.66	12.20	2.07	79.64	2.00	0.00	0.08	0.00
2.80	0.68	12.48	2.01	78.78	2.00	0.00	0.08	0.00
2.82	0.69	12.72	1.94	77.72	2.00	0.00	0.08	0.00
2.84	0.69	12.80	1.93	77.60	2.00	0.00	0.08	0.00
2.86	0.68	12.54	1.96	78.02	2.00	0.00	0.08	0.00
2.88	0.67	12.33	2.01	78.64	2.00	0.00	0.08	0.00
2.90	0.66	12.16	2.02	78.73	2.00	0.00	0.08	0.00
2.92	0.65	12.00	2.02	78.40	2.00	0.00	0.08	0.00
2.94	0.64	11.68	2.06	78.72	2.00	0.00	0.08	0.00
2.96	0.61	11.18	2.17	80.12	2.00	0.00	0.09	0.00
2.98	0.49	8.85	2.79	85.05	2.00	0.00	0.10	0.00
3.00	0.47	8.36	2.90	85.23	2.00	0.00	0.10	0.00
3.02	0.45	7.92	2.93	84.36	2.00	0.00	0.10	0.00
3.04	0.51	9.19	2.43	80.69	2.00	0.00	0.09	0.00
3.06	0.49	8.70	2.59	81.97	2.00	0.00	0.10	0.00
3.08	0.48	8.44	2.87	85.12	2.00	0.00	0.10	0.00
3.10	0.49	8.64	3.10	88.76	2.00	0.00	0.10	0.00
3.12	0.52	9.32	3.17	91.69	2.00	0.00	0.09	0.00
3.14	0.57	10.21	3.06	92.57	2.00	0.00	0.09	0.00
3.16	0.60	10.95	2.91	92.23	2.00	0.00	0.09	0.00
3.18	0.62	11.31	2.83	91.75	2.00	0.00	0.09	0.00
3.20	0.64	11.59	2.80	91.75	2.00	0.00	0.08	0.00
3.22	0.67	12.15	2.71	91.44	2.00	0.00	0.08	0.00
3.24	0.71	13.12	2.58	90.87	2.00	0.00	0.08	0.00
3.26	0.80	14.80	2.35	89.04	2.00	3.95	0.07	0.00
3.28	0.88	16.42	2.19	87.48	2.00	7.36	0.07	0.00
3.30	0.96	17.88	2.06	86.10	2.00	10.18	0.06	0.00
3.32	0.98	18.26	2.10	87.23	2.00	10.88	0.06	0.00
3.34	0.97	18.07	2.19	89.28	2.00	10.52	0.06	0.00
3.36	0.93	17.31	2.33	91.57	2.00	9.12	0.07	0.00
3.38	0.90	16.80	2.42	92.99	2.00	8.12	0.07	0.00
3.40	0.91	16.92	2.40	92.70	2.00	8.36	0.07	0.00
3.42	0.95	17.70	2.20	89.11	2.00	9.85	0.07	0.00
3.44	1.00	18.67	1.95	169.05	2.00	11.61	0.00	0.00
3.46	1.04	19.43	1.73	132.70	2.00	12.93	0.00	0.00
3.48	1.05	19.74	1.59	114.28	2.00	13.45	0.00	0.00
3.50	1.05	19.56	1.51	106.76	2.00	13.15	0.00	0.00
3.52	1.02	19.07	1.47	106.79	2.00	12.31	0.00	0.00
3.54	1.00	18.65	1.54	118.02	2.00	11.57	0.00	0.00
3.56	0.99	18.50	1.61	127.53	2.00	11.31	0.00	0.00
3.58	1.00	18.59	1.67	134.72	2.00	11.47	0.00	0.00
3.60	1.02	18.98	1.69	132.97	2.00	12.15	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)
3.62	1.03	19.21	1.70	131.91	2.00	12.56	0.00	0.00
3.64	1.04	19.44	1.69	128.40	2.00	12.94	0.00	0.00
3.66	1.03	19.25	1.67	128.48	2.00	12.62	0.00	0.00
3.68	1.02	19.09	1.65	127.77	2.00	12.34	0.00	0.00
3.70	0.99	18.43	1.68	137.16	2.00	11.19	0.00	0.00
3.72	0.95	17.58	1.76	157.51	2.00	9.62	0.00	0.00
3.74	0.88	16.22	1.93	81.92	2.00	6.96	0.07	0.00
3.76	0.81	14.92	2.14	85.37	2.00	4.21	0.07	0.00
3.78	0.75	13.68	2.35	87.98	2.00	1.33	0.08	0.00
3.80	0.71	12.87	2.47	89.15	2.00	0.00	0.08	0.00
3.82	0.70	12.65	2.45	88.30	2.00	0.00	0.08	0.00
3.84	0.71	12.91	2.26	85.31	2.00	0.00	0.08	0.00
3.86	0.73	13.25	2.08	82.13	2.00	0.28	0.08	0.00
3.88	0.74	13.48	1.86	77.92	2.00	0.86	0.08	0.00
3.90	0.75	13.62	1.73	75.18	2.00	1.20	0.08	0.00
3.92	0.77	14.06	1.56	71.90	2.00	2.26	0.08	0.00
3.94	0.80	14.54	1.47	70.14	2.00	3.36	0.07	0.00
3.96	0.82	14.97	1.41	142.63	2.00	4.31	0.00	0.00
3.98	0.84	15.32	1.38	134.87	2.00	5.08	0.00	0.00
4.00	0.85	15.56	1.41	136.20	2.00	5.59	0.00	0.00
4.02	0.86	15.68	1.47	142.44	2.00	5.85	0.00	0.00
4.04	0.84	15.39	1.57	73.12	2.00	5.23	0.07	0.00
4.06	0.82	14.87	1.69	75.65	2.00	4.10	0.07	0.00
4.08	0.79	14.30	1.83	78.17	2.00	2.81	0.07	0.00
4.10	0.77	13.90	1.87	78.83	2.00	1.87	0.08	0.00
4.12	0.76	13.75	1.84	78.04	2.00	1.52	0.08	0.00
4.14	0.76	13.69	1.75	76.05	2.00	1.36	0.08	0.00
4.16	0.77	13.96	1.64	73.76	2.00	2.01	0.08	0.00
4.18	0.79	14.34	1.52	71.27	2.00	2.90	0.07	0.00
4.20	0.72	12.83	1.43	68.17	2.00	0.00	0.08	0.00
4.22	0.63	11.04	1.39	65.70	2.00	0.00	0.09	0.00
4.24	0.66	11.79	1.31	64.43	2.00	0.00	0.08	0.00
4.26	0.80	14.47	1.25	128.77	2.00	3.19	0.00	0.00
4.28	0.94	17.15	1.22	96.13	2.00	8.80	0.00	0.00
4.30	0.93	17.12	1.35	112.01	2.00	8.75	0.00	0.00
4.32	0.98	17.94	1.46	117.88	2.00	10.29	0.00	0.00
4.34	1.06	19.65	1.52	109.81	2.00	13.30	0.00	0.00
4.36	1.17	21.69	1.46	89.14	2.00	16.55	0.00	0.00
4.38	1.20	22.28	1.51	90.64	2.00	17.44	0.00	0.00
4.40	1.18	21.96	1.64	105.58	2.00	16.97	0.00	0.00
4.42	1.15	21.30	1.82	130.23	2.00	15.96	0.00	0.00
4.44	1.13	20.91	1.98	153.12	2.00	15.34	0.00	0.00
4.46	1.10	20.26	2.19	186.57	2.00	14.30	0.00	0.00
4.48	1.06	19.60	2.45	97.50	2.00	13.22	0.06	0.00
4.50	1.03	18.93	2.70	102.50	2.00	12.06	0.06	0.00
4.52	1.01	18.56	2.79	103.92	2.00	11.40	0.06	0.00
4.54	1.02	18.72	2.64	101.02	2.00	11.69	0.06	0.00
4.56	1.06	19.43	2.43	97.06	2.00	12.93	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)
4.58	1.11	20.57	2.19	183.65	2.00	14.80	0.00	0.00
4.60	1.15	21.20	2.09	163.82	2.00	15.80	0.00	0.00
4.62	1.16	21.49	2.01	150.97	2.00	16.24	0.00	0.00
4.64	1.13	20.90	2.08	166.44	2.00	15.32	0.00	0.00
4.66	1.09	20.01	2.22	194.88	2.00	13.89	0.00	0.00
4.68	1.03	18.91	2.38	95.62	2.00	12.02	0.06	0.00
4.70	0.98	17.94	2.50	97.20	2.00	10.28	0.06	0.00
4.72	0.93	16.98	2.57	97.65	2.00	8.48	0.07	0.00
4.74	0.90	16.29	2.54	96.10	2.00	7.11	0.07	0.00
4.76	0.88	15.91	2.43	93.41	2.00	6.32	0.07	0.00
4.78	0.88	15.86	2.21	88.82	2.00	6.23	0.07	0.00
4.80	0.89	16.07	1.93	82.60	2.00	6.65	0.07	0.00
4.82	0.91	16.44	1.67	163.93	2.00	7.41	0.00	0.00
4.84	0.94	17.11	1.45	126.36	2.00	8.73	0.00	0.00
4.86	0.98	17.85	1.35	106.58	2.00	10.13	0.00	0.00
4.88	1.06	19.09	1.27	87.65	2.00	12.33	0.00	0.00
4.90	1.13	20.19	1.19	72.89	2.00	14.20	0.00	0.00
4.92	1.18	21.00	1.20	69.51	2.00	15.48	0.00	0.00
4.94	1.17	20.93	1.32	81.14	2.00	15.38	0.00	0.00
4.96	1.14	20.56	1.52	104.26	2.00	14.79	0.00	0.00
4.98	1.14	20.61	1.67	120.54	2.00	14.88	0.00	0.00
5.00	1.13	20.59	1.82	138.20	2.00	14.84	0.00	0.00
5.02	1.11	20.28	2.04	169.31	2.00	14.33	0.00	0.00
5.04	1.05	19.10	2.65	102.19	2.00	12.36	0.06	0.00
5.06	0.99	18.03	3.33	114.75	2.00	10.46	0.06	0.00
5.08	0.95	17.20	3.96	125.09	2.00	8.90	0.07	0.00
5.10	0.92	16.53	4.22	128.21	2.00	7.59	0.07	0.00
5.12	0.89	15.96	4.33	128.75	2.00	6.43	0.07	0.00
5.14	0.87	15.57	4.28	127.00	2.00	5.61	0.07	0.00
5.16	0.84	15.02	3.95	120.39	2.00	4.43	0.07	0.00
5.18	0.81	14.46	3.54	112.45	2.00	3.18	0.07	0.00
5.20	0.85	15.09	2.92	102.40	2.00	4.58	0.07	0.00
5.22	0.94	16.85	2.47	95.75	2.00	8.23	0.07	0.00
5.24	1.09	19.45	2.06	181.51	2.00	12.96	0.00	0.00
5.26	1.19	21.09	2.03	159.43	2.00	15.63	0.00	0.00
5.28	1.22	21.58	2.25	182.87	2.00	16.39	0.00	0.00
5.30	1.15	20.64	2.70	105.02	2.00	14.91	0.06	0.00
5.32	1.02	18.43	3.14	111.85	2.00	11.19	0.06	0.00
5.34	0.89	15.94	3.55	115.59	2.00	6.39	0.07	0.00
5.36	0.75	13.17	4.22	120.43	2.00	0.08	0.08	0.00
5.38	0.64	10.96	5.34	128.32	2.00	0.00	0.09	0.00
5.40	0.56	9.37	6.49	134.18	2.00	0.00	0.09	0.00
5.42	0.43	6.84	7.62	130.07	2.00	0.00	0.11	0.00
5.44	0.39	6.04	6.77	118.13	2.00	0.00	0.11	0.00
5.46	0.36	5.39	5.38	102.76	2.00	0.00	0.12	0.00
5.48	0.42	6.52	3.84	93.71	2.00	0.00	0.11	0.00
5.50	0.43	6.67	3.32	88.47	2.00	0.00	0.11	0.00
5.52	0.42	6.53	3.06	84.94	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)
5.54	0.40	6.17	3.06	83.72	2.00	0.00	0.11	0.00
5.56	0.38	5.75	3.27	84.47	2.00	0.00	0.12	0.00
5.58	0.36	5.37	3.53	85.71	2.00	0.00	0.12	0.00
5.60	0.34	5.02	3.73	86.12	2.00	0.00	0.12	0.00
5.62	0.33	4.72	3.75	84.85	2.00	0.00	0.13	0.00
5.64	0.32	4.50	3.44	80.77	2.00	0.00	0.13	0.00
5.66	0.31	4.35	3.02	75.91	2.00	0.00	0.13	0.00
5.68	0.31	4.25	2.56	70.66	2.00	0.00	0.13	0.00
5.70	0.31	4.25	2.27	67.43	2.00	0.00	0.13	0.00
5.72	0.32	4.54	1.97	64.90	2.00	0.00	0.13	0.00
5.74	0.35	5.16	1.73	63.48	2.00	0.00	0.12	0.00
5.76	0.41	6.16	1.57	63.54	2.00	0.00	0.11	0.00
5.78	0.48	7.56	1.42	63.51	2.00	0.00	0.10	0.00
5.80	0.57	9.14	1.34	63.77	2.00	0.00	0.10	0.00
5.82	0.67	10.88	1.31	64.75	2.00	0.00	0.09	0.00
5.84	0.76	12.24	1.36	67.00	2.00	0.00	0.08	0.00
5.86	0.81	13.19	1.43	69.21	2.00	0.13	0.08	0.00
5.88	0.84	13.63	1.52	71.69	2.00	1.23	0.08	0.00
5.90	0.85	13.86	1.60	73.70	2.00	1.77	0.08	0.00
5.92	0.85	13.92	1.72	76.64	2.00	1.92	0.08	0.00
5.94	0.86	13.95	1.82	78.81	2.00	1.99	0.08	0.00
5.96	0.86	13.96	1.90	80.71	2.00	2.00	0.08	0.00
5.98	0.86	14.02	1.89	80.57	2.00	2.15	0.08	0.00
6.00	0.86	13.97	1.91	80.93	2.00	2.04	0.08	0.00
6.02	0.85	13.81	1.91	80.81	2.00	1.67	0.08	0.00
6.04	0.85	13.73	1.87	79.91	2.00	1.45	0.08	0.00
6.06	0.86	13.83	1.73	76.85	2.00	1.70	0.08	0.00
6.08	0.89	14.24	1.57	73.41	2.00	2.66	0.07	0.00
6.10	0.92	14.61	1.47	71.27	2.00	3.51	0.07	0.00
6.12	0.94	14.85	1.45	70.82	2.00	4.04	0.07	0.00
6.14	0.94	14.90	1.52	72.67	2.00	4.17	0.07	0.00
6.16	0.93	14.67	1.64	75.32	2.00	3.65	0.07	0.00
6.18	0.92	14.64	1.75	78.06	2.00	3.59	0.07	0.00
6.20	0.94	14.87	1.78	78.72	2.00	4.10	0.07	0.00
6.22	0.99	15.57	1.70	77.47	2.00	5.61	0.07	0.00
6.24	1.01	15.91	1.61	75.57	2.00	6.33	0.07	0.00
6.26	1.01	15.78	1.54	157.20	2.00	6.05	0.00	0.00
6.28	0.98	15.31	1.50	72.38	2.00	5.06	0.07	0.00
6.30	0.96	14.96	1.45	70.99	2.00	4.30	0.07	0.00
6.32	0.95	14.72	1.47	71.37	2.00	3.77	0.07	0.00
6.34	0.94	14.49	1.56	73.29	2.00	3.25	0.07	0.00
6.36	0.92	14.19	1.70	76.41	2.00	2.55	0.08	0.00
6.38	0.90	14.00	1.79	78.38	2.00	2.11	0.08	0.00
6.40	0.90	13.93	1.86	79.92	2.00	1.95	0.08	0.00
6.42	0.91	14.04	1.86	79.94	2.00	2.20	0.08	0.00
6.44	0.93	14.33	1.85	79.93	2.00	2.88	0.07	0.00
6.46	0.96	14.74	1.79	79.00	2.00	3.81	0.07	0.00
6.48	0.99	15.22	1.75	78.43	2.00	4.86	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)
6.50	1.08	16.47	1.64	162.33	2.00	7.46	0.00	0.00
6.52	1.16	17.74	1.56	136.16	2.00	9.93	0.00	0.00
6.54	1.24	18.74	1.49	116.62	2.00	11.72	0.00	0.00
6.56	1.21	18.27	1.53	125.79	2.00	10.90	0.00	0.00
6.58	1.13	17.20	1.69	159.70	2.00	8.90	0.00	0.00
6.60	1.06	16.12	1.75	79.26	2.00	6.75	0.07	0.00
6.62	1.05	15.90	1.66	76.85	2.00	6.31	0.07	0.00
6.64	1.15	17.06	1.20	97.56	2.00	8.63	0.00	0.00
6.66	1.23	18.14	1.05	73.17	2.00	10.65	0.00	0.00
6.68	1.29	18.96	1.02	65.10	2.00	12.11	0.00	0.00
6.70	1.27	18.70	1.18	83.31	2.00	11.66	0.00	0.00
6.72	1.18	17.39	1.25	100.58	2.00	9.26	0.00	0.00
6.74	1.06	15.63	1.26	119.75	2.00	5.74	0.00	0.00
6.76	0.95	13.94	1.21	134.93	2.00	1.97	0.00	0.00
6.78	0.93	13.55	1.12	126.43	2.00	1.02	0.00	0.00
6.80	0.93	13.47	1.03	114.77	2.00	0.83	0.00	0.00
6.82	0.93	13.35	0.95	104.40	2.00	0.53	0.00	0.00
6.84	0.93	13.32	0.87	92.89	2.00	0.45	0.00	0.00
6.86	0.95	13.56	0.79	80.37	2.00	1.06	0.00	0.00
6.88	1.01	14.27	0.74	67.88	2.00	2.75	0.00	0.00
6.90	1.07	15.09	0.69	57.13	2.00	4.58	0.00	0.00
6.92	1.13	16.01	0.65	47.76	2.00	6.53	0.00	0.00
6.94	1.17	16.53	0.62	47.80	2.00	7.58	0.00	0.00
6.96	1.19	16.70	0.59	46.81	2.00	7.93	0.00	0.00
6.98	1.16	16.28	0.57	46.05	2.00	7.09	0.00	0.00
7.00	1.11	15.57	0.59	44.52	2.00	5.62	0.00	0.00
7.02	1.04	14.53	0.65	56.64	2.00	3.34	0.00	0.00
7.04	0.98	13.71	0.71	69.18	2.00	1.41	0.00	0.00
7.06	0.96	13.44	0.72	73.16	2.00	0.75	0.00	0.00
7.08	0.99	13.79	0.68	65.35	2.00	1.60	0.00	0.00
7.10	1.03	14.25	0.64	57.33	2.00	2.70	0.00	0.00
7.12	1.04	14.38	0.65	57.22	2.00	2.98	0.00	0.00
7.14	1.02	14.09	0.74	69.51	2.00	2.31	0.00	0.00
7.16	0.98	13.59	0.88	92.15	2.00	1.13	0.00	0.00
7.18	0.96	13.42	1.01	112.07	2.00	0.72	0.00	0.00
7.20	0.97	13.53	1.14	130.06	2.00	0.98	0.00	0.00
7.22	0.98	13.68	1.24	65.03	2.00	1.34	0.08	0.00
7.24	0.95	13.37	1.37	68.16	2.00	0.60	0.08	0.00
7.26	0.90	12.58	1.36	67.49	2.00	0.00	0.08	0.00
7.28	0.83	11.53	1.30	65.21	2.00	0.00	0.08	0.00
7.30	0.78	10.59	1.12	60.31	2.00	0.00	0.09	0.00
7.32	0.73	9.92	1.01	57.32	2.00	0.00	0.09	0.00
7.34	0.71	9.52	0.93	55.03	2.00	0.00	0.09	0.00
7.36	0.69	9.16	0.86	53.12	2.00	0.00	0.10	0.00
7.38	0.68	8.90	0.79	51.04	2.00	0.00	0.10	0.00
7.40	0.67	8.78	0.72	49.18	2.00	0.00	0.10	0.00
7.42	0.67	8.75	0.68	48.22	2.00	0.00	0.10	0.00
7.44	0.67	8.77	0.66	47.60	2.00	0.00	0.10	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)
7.46	0.68	8.86	0.69	48.42	2.00	0.00	0.10	0.00
7.48	0.69	9.00	0.71	49.00	2.00	0.00	0.10	0.00
7.50	0.69	9.03	0.72	49.45	2.00	0.00	0.10	0.00
7.52	0.70	9.12	0.72	49.41	2.00	0.00	0.10	0.00
7.54	0.79	10.37	0.63	96.22	2.00	0.00	0.00	0.00
7.56	1.01	13.39	0.47	44.95	2.00	0.64	0.00	0.00
7.58	1.30	17.20	0.35	38.79	2.00	8.90	0.00	0.00
7.60	1.51	19.91	0.33	19.91	2.00	13.73	0.00	0.00
7.62	1.58	20.76	0.34	20.76	2.00	15.12	0.00	0.00
7.64	1.70	22.39	0.32	22.39	2.00	17.60	0.00	0.00
7.66	1.94	25.37	0.30	25.37	2.00	21.73	0.00	0.00
7.68	2.29	29.86	0.30	29.86	2.00	27.10	0.00	0.00
7.70	2.63	34.23	0.32	34.23	2.00	31.62	0.00	0.00
7.72	2.99	38.67	0.32	38.67	2.00	35.64	0.00	0.00
7.74	3.28	42.19	0.31	42.19	2.00	38.51	0.00	0.00
7.76	3.35	42.98	0.28	42.98	2.00	39.13	0.00	0.00
7.78	3.19	40.69	0.24	40.69	2.00	37.32	0.00	0.00
7.80	2.85	36.48	0.22	36.48	2.00	33.72	0.00	0.00
7.82	2.52	32.39	0.26	32.39	2.00	29.79	0.00	0.00
7.84	2.27	29.50	0.41	29.50	2.00	26.70	0.00	0.00
7.86	2.18	29.06	0.88	59.62	2.00	26.21	0.00	0.00
7.88	2.59	34.65	1.02	66.75	2.00	32.01	0.00	0.00
7.90	3.60	47.36	0.91	71.67	2.00	42.33	0.00	0.00
7.92	5.00	64.18	0.64	81.93	2.00	52.36	0.00	0.00
7.94	6.26	78.89	0.52	93.84	2.00	59.17	0.00	0.00
7.96	7.12	88.58	0.44	88.58	2.00	63.00	0.00	0.00
7.98	7.59	93.43	0.36	93.43	2.00	64.76	0.00	0.00
8.00	7.79	94.83	0.27	94.83	2.00	65.25	0.00	0.00
8.02	7.81	94.43	0.22	94.43	2.00	65.11	0.00	0.00
8.04	7.79	93.98	0.21	93.98	2.00	64.95	0.00	0.00
8.06	7.85	94.82	0.23	94.82	2.00	65.24	0.00	0.00
8.08	8.23	99.15	0.24	99.15	2.00	66.72	0.00	0.00
8.10	8.97	107.40	0.23	107.40	2.00	69.36	0.00	0.00
8.12	10.06	119.80	0.24	119.80	2.00	72.96	0.00	0.00
8.14	11.30	133.53	0.24	133.53	2.00	76.54	0.00	0.00
8.16	12.32	144.66	0.23	144.66	2.00	79.19	0.00	0.00
8.18	12.87	150.52	0.22	150.52	2.00	80.50	0.00	0.00
8.20	13.00	152.02	0.23	152.02	2.00	80.82	0.00	0.00
8.22	13.03	152.64	0.25	152.64	2.00	80.96	0.00	0.00
8.24	13.23	154.80	0.26	154.80	2.00	81.42	0.00	0.00
8.26	13.81	161.27	0.27	161.27	2.00	82.77	0.00	0.00
8.28	14.43	168.24	0.28	168.24	2.00	84.17	0.00	0.00
8.30	14.98	174.51	0.31	174.51	2.00	85.38	0.00	0.00
8.32	15.10	176.20	0.33	176.20	2.00	85.70	0.00	0.00
8.34	15.15	176.64	0.34	176.64	2.00	85.78	0.00	0.00
8.36	15.17	176.52	0.33	176.52	2.00	85.76	0.00	0.00
8.38	15.28	177.25	0.31	177.25	2.00	85.89	0.00	0.00
8.40	15.36	178.01	0.32	178.01	2.00	86.03	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)
8.42	15.47	178.95	0.31	178.95	2.00	86.21	0.00	0.00
8.44	15.48	179.20	0.32	179.20	2.00	86.25	0.00	0.00
8.46	15.58	179.88	0.31	179.88	2.00	86.38	0.00	0.00
8.48	15.53	179.09	0.31	179.09	2.00	86.23	0.00	0.00
8.50	15.52	178.56	0.30	178.56	2.00	86.14	0.00	0.00
8.52	15.46	177.72	0.30	177.72	2.00	85.98	0.00	0.00
8.54	15.45	177.38	0.29	177.38	2.00	85.92	0.00	0.00
8.56	15.37	176.05	0.28	176.05	2.00	85.67	0.00	0.00
8.58	14.97	171.64	0.29	171.64	2.00	84.83	0.00	0.00
8.60	14.11	162.84	0.34	162.84	2.00	83.09	0.00	0.00
8.62	13.10	151.63	0.35	151.63	2.00	80.74	0.00	0.00
8.64	12.29	142.29	0.34	142.29	2.00	78.64	0.00	0.00
8.66	11.90	137.35	0.30	137.35	2.00	77.48	0.00	0.00
8.68	11.77	135.87	0.30	135.87	2.00	77.12	0.00	0.00
8.70	11.65	134.28	0.30	134.28	2.00	76.73	0.00	0.00
8.72	11.52	132.43	0.27	132.43	2.00	76.27	0.00	0.00
8.74	11.34	130.14	0.26	130.14	2.00	75.70	0.00	0.00
8.76	11.20	129.06	0.31	129.06	2.00	75.42	0.00	0.00
8.78	11.30	130.51	0.35	130.51	2.00	75.79	0.00	0.00
8.80	11.64	133.93	0.34	133.93	2.00	76.64	0.00	0.00
8.82	11.86	136.09	0.32	136.09	2.00	77.17	0.00	0.00
8.84	11.53	132.82	0.37	132.82	2.00	76.37	0.00	0.00
8.86	11.05	127.72	0.41	127.72	2.00	75.08	0.00	0.00
8.88	10.50	121.49	0.42	121.49	2.00	73.43	0.00	0.00
8.90	10.24	118.05	0.37	118.05	2.00	72.48	0.00	0.00
8.92	9.98	115.26	0.39	115.26	2.00	71.69	0.00	0.00
8.94	10.15	117.05	0.40	117.05	2.00	72.20	0.00	0.00
8.96	10.89	124.93	0.37	124.93	2.00	74.35	0.00	0.00
8.98	12.03	137.00	0.33	137.00	2.00	77.39	0.00	0.00
9.00	13.76	155.07	0.28	155.07	2.00	81.48	0.00	0.00
9.02	16.23	180.99	0.24	180.99	2.00	86.58	0.00	0.00
9.04	18.50	204.49	0.21	204.49	2.00	90.61	0.00	0.00
9.06	20.03	220.34	0.20	220.34	2.00	93.08	0.00	0.00
9.08	19.12	210.30	0.19	210.30	2.00	91.54	0.00	0.00
9.10	18.25	201.28	0.21	201.28	2.00	90.09	0.00	0.00
9.12	16.79	185.92	0.23	185.92	2.00	87.47	0.00	0.00
9.14	16.40	181.97	0.25	181.97	2.00	86.76	0.00	0.00
9.16	15.55	172.48	0.23	172.48	2.00	84.99	0.00	0.00
9.18	14.84	165.91	0.32	165.91	2.00	83.71	0.00	0.00
9.20	14.13	158.91	0.39	158.91	2.00	82.29	0.00	0.00
9.22	13.42	151.67	0.47	151.67	2.00	80.75	0.00	0.00
9.24	12.84	145.03	0.45	145.03	2.00	79.27	0.00	0.00
9.26	12.43	140.45	0.45	140.45	2.00	78.21	0.00	0.00
9.28	11.92	134.96	0.50	134.96	2.00	76.90	0.00	0.00
9.30	10.91	123.97	0.55	123.97	2.00	74.09	0.00	0.00
9.32	10.34	117.76	0.59	120.91	2.00	72.39	0.00	0.00
9.34	11.17	127.20	0.65	130.21	2.00	74.94	0.00	0.00
9.36	12.83	145.97	0.75	145.97	2.00	79.48	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)
9.38	14.02	159.84	0.90	168.11	2.00	82.48	0.00	0.00
9.40	14.18	162.16	1.04	180.29	2.00	82.96	0.00	0.00
9.42	14.13	161.99	1.18	188.25	2.00	82.92	0.00	0.00
9.44	14.28	163.32	1.15	187.81	2.00	83.19	0.00	0.00
9.46	14.36	163.70	1.09	184.77	2.00	83.27	0.00	0.00
9.48	14.14	160.34	0.95	172.85	2.00	82.58	0.00	0.00
9.50	13.30	150.68	0.92	164.58	2.00	80.53	0.00	0.00
9.52	12.10	136.78	0.83	150.37	2.00	77.34	0.00	0.00
9.54	10.83	122.60	0.85	141.61	2.00	73.73	0.00	0.00
9.56	9.53	108.38	0.96	132.42	2.00	69.66	0.00	0.00
9.58	8.30	95.42	1.40	126.99	2.00	65.45	0.00	0.00
9.60	7.78	90.08	1.91	133.62	2.00	63.55	0.00	0.00
9.62	8.19	95.19	2.27	148.33	2.00	65.37	0.00	0.00
9.64	9.25	107.22	2.33	160.83	2.00	69.30	0.00	0.00
9.66	10.34	119.52	2.35	173.22	2.00	72.88	0.00	0.00
9.68	11.45	132.03	2.39	186.56	2.00	76.17	0.00	0.00
9.70	12.68	145.80	2.44	202.02	2.00	79.45	0.00	0.00
9.72	13.80	158.26	2.44	215.00	2.00	82.15	0.00	0.00
9.74	14.67	167.84	2.47	225.81	2.00	84.09	0.00	0.00
9.76	15.22	173.97	2.59	235.31	2.00	85.28	0.00	0.00
9.78	15.64	178.66	2.71	243.32	2.00	86.15	0.00	0.00
9.80	15.75	179.75	2.84	248.18	2.00	86.36	0.00	0.00
9.82	15.74	179.47	2.93	250.25	2.00	86.30	0.00	0.00
9.84	15.88	180.83	2.99	253.49	2.00	86.55	0.00	0.00
9.86	16.25	184.79	3.07	260.20	2.00	87.27	0.00	0.00
9.88	16.88	191.60	3.13	269.15	2.00	88.46	0.00	0.00
9.90	17.63	199.78	3.16	278.80	2.00	89.84	0.00	0.00
9.92	19.12	215.70	3.03	291.92	2.00	92.37	0.00	0.00
9.94	20.71	232.78	2.88	306.70	2.00	94.89	0.00	0.00
9.96	22.15	248.06	2.78	321.10	2.00	96.99	0.00	0.00
9.98	22.73	254.05	2.83	328.91	2.00	97.77	0.00	0.00
10.00	22.64	252.94	2.94	330.73	2.00	97.63	0.00	0.00
10.02	22.48	250.93	3.06	331.49	2.00	97.37	0.00	0.00
10.04	21.43	239.37	3.29	325.42	2.00	95.81	0.00	0.00
10.06	21.75	242.55	3.32	329.84	2.00	96.25	0.00	0.00
10.08	22.11	246.16	3.40	336.17	2.00	96.73	0.00	0.00
10.10	23.35	259.28	3.32	348.23	2.00	98.45	0.00	0.00
10.12	23.58	261.42	3.38	352.46	2.00	98.72	0.00	0.00
10.14	23.82	263.59	3.40	355.62	2.00	98.99	0.00	0.00
10.16	24.06	265.84	3.44	359.10	2.00	99.27	0.00	0.00
10.18	24.17	266.62	3.48	361.33	2.00	99.37	0.00	0.00
10.20	24.20	266.55	3.51	362.23	2.00	99.36	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)

Total estimated displacement: 0.49

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.02	0.18	54.25	9.82	4.06	0.02	0.05
0.92	0.06	0.94	48.66	45.85	3.99	0.02	0.27
0.94	0.10	1.77	35.64	63.18	3.81	0.53	0.50
0.96	0.13	2.25	34.35	77.39	3.79	0.78	0.62
0.98	0.11	1.95	40.95	79.72	3.89	0.88	0.52
1.00	0.17	3.14	25.54	80.17	3.61	0.64	0.82
1.02	0.92	17.97	3.86	69.31	2.61	0.76	0.76
1.04	1.79	35.09	1.79	62.98	2.26	0.14	0.66
1.06	2.75	53.93	1.34	72.36	2.04	0.31	0.69
1.08	3.11	61.10	1.28	78.50	1.97	0.52	0.70
1.10	3.27	64.33	1.27	81.51	1.95	0.66	0.71
1.12	3.16	62.10	1.30	80.53	1.99	0.61	0.71
1.14	2.77	54.31	1.41	76.34	2.09	0.43	0.70
1.16	2.42	47.44	1.63	77.20	2.21	0.46	0.70
1.18	2.14	41.85	1.94	81.22	2.30	0.65	0.71
1.20	1.99	38.86	2.17	84.47	2.36	0.72	0.72
1.22	1.80	35.27	2.50	88.21	2.42	0.72	0.72
1.24	1.60	31.22	3.00	93.73	2.50	0.73	0.73
1.26	1.41	27.38	3.60	98.59	2.58	0.80	0.80
1.28	1.27	24.80	4.04	100.17	2.63	0.85	0.85
1.30	1.20	23.39	4.23	98.99	2.65	0.86	0.86
1.32	1.18	22.91	4.19	96.11	2.65	0.85	0.85
1.34	1.15	22.34	4.21	93.99	2.65	0.85	0.85
1.36	1.07	20.82	4.47	93.03	2.68	0.87	0.87
1.38	0.98	19.01	4.92	93.51	2.72	0.74	0.74
1.40	0.89	17.21	5.52	94.91	2.77	0.74	0.74
1.42	0.85	16.32	5.78	94.35	2.79	0.74	0.74
1.44	0.83	15.89	5.81	92.33	2.80	0.73	0.73
1.46	0.82	15.84	5.71	90.50	2.79	0.73	0.73
1.48	0.85	16.25	5.36	87.10	2.76	0.72	0.72
1.50	0.87	16.78	4.97	83.46	2.72	0.71	0.71
1.52	0.89	17.16	4.64	79.61	2.69	0.85	0.85
1.54	0.90	17.26	4.52	77.99	2.68	0.84	0.84
1.56	0.89	17.18	4.56	78.37	2.69	0.84	0.84
1.58	0.87	16.78	4.64	77.78	2.69	0.84	0.84
1.60	0.86	16.46	4.82	79.36	2.71	0.55	0.71
1.62	0.85	16.26	4.91	79.85	2.72	0.58	0.71
1.64	0.86	16.42	4.98	81.84	2.73	0.68	0.71
1.66	0.87	16.70	4.90	81.82	2.72	0.68	0.71
1.68	0.88	16.79	4.90	82.26	2.72	0.71	0.71
1.70	0.87	16.66	4.99	83.15	2.73	0.71	0.71
1.72	0.85	16.20	5.23	84.77	2.75	0.72	0.72
1.74	0.82	15.75	5.50	86.69	2.77	0.72	0.72
1.76	0.68	12.88	7.26	93.59	2.90	0.74	0.74
1.78	0.71	13.58	7.00	95.04	2.89	0.74	0.74
1.80	0.74	13.98	6.88	96.14	2.88	0.74	0.74
1.82	0.87	16.65	5.56	92.53	2.78	0.73	0.73
1.84	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	0.79	15.10	6.23	94.15	2.83	0.74	0.74
1.88	0.77	14.71	6.41	94.27	2.84	0.74	0.74
1.90	0.74	14.12	6.78	95.75	2.87	0.74	0.74
1.92	0.71	13.45	7.23	97.26	2.90	0.74	0.74
1.94	0.68	12.75	7.65	97.54	2.93	0.74	0.74
1.96	0.66	12.49	7.72	96.45	2.93	0.74	0.74
1.98	0.66	12.34	7.81	96.36	2.94	0.74	0.74
2.00	0.66	12.45	7.66	95.37	2.93	0.74	0.74
2.02	0.67	12.58	7.65	96.22	2.93	0.74	0.74
2.04	0.68	12.87	7.45	95.82	2.92	0.74	0.74
2.06	0.70	13.12	7.34	96.22	2.91	0.74	0.74
2.08	0.70	13.27	7.12	94.50	2.89	0.74	0.74
2.10	0.70	13.23	7.07	93.59	2.89	0.74	0.74
2.12	0.69	12.93	7.29	94.25	2.91	0.74	0.74
2.14	0.66	12.44	7.73	96.12	2.93	0.74	0.74
2.16	0.64	11.93	8.24	98.38	2.97	0.75	0.75
2.18	0.63	11.69	8.61	100.66	2.99	0.75	0.75
2.20	0.65	12.17	8.37	101.78	2.97	0.75	0.75
2.22	0.69	13.01	7.81	101.65	2.94	0.75	0.75
2.24	0.74	13.93	7.19	100.14	2.90	0.75	0.75
2.26	0.77	14.42	6.82	98.38	2.87	0.75	0.75
2.28	0.78	14.63	6.69	97.87	2.86	0.74	0.74
2.30	0.78	14.61	6.73	98.29	2.87	0.74	0.74
2.32	0.76	14.28	6.91	98.70	2.88	0.75	0.75
2.34	0.75	14.04	6.98	98.01	2.88	0.74	0.74
2.36	0.75	14.00	6.87	96.26	2.88	0.74	0.74
2.38	0.76	14.36	6.51	93.49	2.85	0.74	0.74
2.40	0.78	14.70	6.14	90.22	2.82	0.73	0.73
2.42	0.77	14.54	6.04	87.89	2.82	0.72	0.72
2.44	0.75	13.98	6.21	86.77	2.83	0.72	0.72
2.46	0.70	13.05	6.69	87.37	2.86	0.72	0.72
2.48	0.66	12.28	7.22	88.65	2.90	0.73	0.73
2.50	0.62	11.52	7.92	91.25	2.95	0.73	0.73
2.52	0.59	10.93	8.59	93.88	2.99	0.74	0.74
2.54	0.59	10.84	8.77	95.02	3.00	0.74	0.74
2.56	0.61	11.24	8.35	93.82	2.97	0.74	0.74
2.58	0.64	11.86	7.68	91.06	2.93	0.73	0.73
2.60	0.66	12.26	7.12	87.35	2.89	0.72	0.72
2.62	0.68	12.59	6.73	84.68	2.87	0.72	0.72
2.64	0.70	13.04	6.27	81.73	2.83	0.67	0.71
2.66	0.72	13.36	6.07	81.03	2.82	0.64	0.71
2.68	0.72	13.39	6.03	80.69	2.81	0.62	0.71
2.70	0.71	13.12	6.17	80.95	2.82	0.63	0.71
2.72	0.69	12.83	6.26	80.31	2.83	0.60	0.71
2.74	0.68	12.49	6.41	80.02	2.84	0.58	0.71
2.76	0.66	12.23	6.54	80.06	2.85	0.59	0.71
2.78	0.66	12.20	6.53	79.64	2.85	0.57	0.71
2.80	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	0.69	12.72	6.11	77.72	2.82	0.48	0.70
2.84	0.69	12.80	6.06	77.60	2.82	0.48	0.70
2.86	0.68	12.54	6.22	78.02	2.83	0.50	0.70
2.88	0.67	12.33	6.38	78.64	2.84	0.52	0.70
2.90	0.66	12.16	6.47	78.73	2.85	0.53	0.70
2.92	0.65	12.00	6.53	78.40	2.85	0.51	0.70
2.94	0.64	11.68	6.74	78.72	2.87	0.53	0.70
2.96	0.61	11.18	7.17	80.12	2.90	0.59	0.71
2.98	0.49	8.85	9.61	85.05	3.05	0.41	0.95
3.00	0.47	8.36	10.20	85.23	3.08	0.43	0.90
3.02	0.45	7.92	10.65	84.36	3.10	0.38	0.85
3.04	0.51	9.19	8.78	80.69	3.00	0.62	0.71
3.06	0.49	8.70	9.42	81.97	3.04	0.37	0.92
3.08	0.48	8.44	10.08	85.12	3.07	0.39	0.89
3.10	0.49	8.64	10.27	88.76	3.08	0.44	0.91
3.12	0.52	9.32	9.84	91.69	3.06	0.49	0.98
3.14	0.57	10.21	9.06	92.57	3.02	0.51	1.07
3.16	0.60	10.95	8.42	92.23	2.98	0.73	0.73
3.18	0.62	11.31	8.11	91.75	2.96	0.73	0.73
3.20	0.64	11.59	7.92	91.75	2.95	0.73	0.73
3.22	0.67	12.15	7.53	91.44	2.92	0.73	0.73
3.24	0.71	13.12	6.93	90.87	2.88	0.73	0.73
3.26	0.80	14.80	6.02	89.04	2.81	0.73	0.73
3.28	0.88	16.42	5.33	87.48	2.76	0.72	0.72
3.30	0.96	17.88	4.81	86.10	2.71	0.72	0.72
3.32	0.98	18.26	4.78	87.23	2.71	0.72	0.72
3.34	0.97	18.07	4.94	89.28	2.72	0.73	0.73
3.36	0.93	17.31	5.29	91.57	2.75	0.73	0.73
3.38	0.90	16.80	5.54	92.99	2.77	0.73	0.73
3.40	0.91	16.92	5.48	92.70	2.77	0.73	0.73
3.42	0.95	17.70	5.03	89.11	2.73	0.73	0.73
3.44	1.00	18.67	4.51	84.25	2.68	0.85	0.85
3.46	1.04	19.43	4.08	79.25	2.64	0.80	0.80
3.48	1.05	19.74	3.84	75.90	2.61	0.77	0.77
3.50	1.05	19.56	3.76	73.64	2.60	0.76	0.76
3.52	1.02	19.07	3.80	72.46	2.61	0.76	0.76
3.54	1.00	18.65	3.97	74.02	2.62	0.78	0.78
3.56	0.99	18.50	4.09	75.71	2.64	0.79	0.79
3.58	1.00	18.59	4.17	77.45	2.65	0.81	0.81
3.60	1.02	18.98	4.12	78.12	2.64	0.80	0.80
3.62	1.03	19.21	4.09	78.51	2.64	0.80	0.80
3.64	1.04	19.44	4.03	78.34	2.63	0.80	0.80
3.66	1.03	19.25	4.04	77.87	2.63	0.80	0.80
3.68	1.02	19.09	4.05	77.29	2.63	0.80	0.80
3.70	0.99	18.43	4.21	77.53	2.65	0.81	0.81
3.72	0.95	17.58	4.50	79.03	2.68	0.84	0.84
3.74	0.88	16.22	5.05	81.92	2.73	0.69	0.71
3.76	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	0.75	13.68	6.43	87.98	2.84	0.72	0.72
3.80	0.71	12.87	6.93	89.15	2.88	0.73	0.73
3.82	0.70	12.65	6.98	88.30	2.88	0.73	0.73
3.84	0.71	12.91	6.61	85.31	2.86	0.72	0.72
3.86	0.73	13.25	6.20	82.13	2.83	0.70	0.71
3.88	0.74	13.48	5.78	77.92	2.79	0.49	0.70
3.90	0.75	13.62	5.52	75.18	2.77	0.39	0.70
3.92	0.77	14.06	5.11	71.90	2.74	0.30	0.69
3.94	0.80	14.54	4.82	70.14	2.71	0.26	0.68
3.96	0.82	14.97	4.60	68.78	2.69	0.82	0.82
3.98	0.84	15.32	4.47	68.44	2.68	0.81	0.81
4.00	0.85	15.56	4.46	69.37	2.68	0.81	0.81
4.02	0.86	15.68	4.52	70.84	2.68	0.82	0.82
4.04	0.84	15.39	4.75	73.12	2.70	0.33	0.69
4.06	0.82	14.87	5.09	75.65	2.74	0.41	0.70
4.08	0.79	14.30	5.47	78.17	2.77	0.50	0.70
4.10	0.77	13.90	5.67	78.83	2.79	0.53	0.70
4.12	0.76	13.75	5.67	78.04	2.79	0.50	0.70
4.14	0.76	13.69	5.56	76.05	2.78	0.42	0.70
4.16	0.77	13.96	5.28	73.76	2.75	0.35	0.69
4.18	0.79	14.34	4.97	71.27	2.72	0.28	0.69
4.20	0.72	12.83	5.31	68.17	2.76	0.22	0.68
4.22	0.63	11.04	5.95	65.70	2.81	0.18	0.67
4.24	0.66	11.79	5.47	64.43	2.77	0.16	0.67
4.26	0.80	14.47	4.48	64.89	2.68	0.80	0.80
4.28	0.94	17.15	3.80	65.17	2.61	0.74	0.74
4.30	0.93	17.12	4.02	68.76	2.63	0.77	0.77
4.32	0.98	17.94	4.02	72.16	2.63	0.78	0.78
4.34	1.06	19.65	3.80	74.61	2.61	0.77	0.77
4.36	1.17	21.69	3.40	73.83	2.56	0.73	0.73
4.38	1.20	22.28	3.39	75.57	2.56	0.73	0.73
4.40	1.18	21.96	3.60	79.03	2.58	0.76	0.76
4.42	1.15	21.30	3.92	83.51	2.62	0.80	0.80
4.44	1.13	20.91	4.18	87.43	2.65	0.83	0.83
4.46	1.10	20.26	4.54	91.97	2.68	0.87	0.87
4.48	1.06	19.60	4.97	97.50	2.72	0.74	0.74
4.50	1.03	18.93	5.42	102.50	2.76	0.75	0.75
4.52	1.01	18.56	5.60	103.92	2.78	0.76	0.76
4.54	1.02	18.72	5.40	101.02	2.76	0.75	0.75
4.56	1.06	19.43	4.99	97.06	2.73	0.74	0.74
4.58	1.11	20.57	4.49	92.34	2.68	0.87	0.87
4.60	1.15	21.20	4.26	90.37	2.66	0.84	0.84
4.62	1.16	21.49	4.12	88.53	2.64	0.83	0.83
4.64	1.13	20.90	4.31	90.05	2.66	0.85	0.85
4.66	1.09	20.01	4.63	92.68	2.69	0.88	0.88
4.68	1.03	18.91	5.06	95.62	2.73	0.74	0.74
4.70	0.98	17.94	5.42	97.20	2.76	0.74	0.74
4.72	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.90	16.29	5.90	96.10	2.80	0.74	0.74
4.76	0.88	15.91	5.87	93.41	2.80	0.74	0.74
4.78	0.88	15.86	5.60	88.82	2.78	0.73	0.73
4.80	0.89	16.07	5.14	82.60	2.74	0.71	0.71
4.82	0.91	16.44	4.67	76.81	2.70	0.85	0.85
4.84	0.94	17.11	4.19	71.77	2.65	0.79	0.79
4.86	0.98	17.85	3.89	69.39	2.62	0.76	0.76
4.88	1.06	19.09	3.54	67.57	2.57	0.72	0.72
4.90	1.13	20.19	3.25	65.68	2.54	0.32	0.69
4.92	1.18	21.00	3.16	66.25	2.52	0.24	0.68
4.94	1.17	20.93	3.33	69.80	2.55	0.64	0.71
4.96	1.14	20.56	3.67	75.39	2.59	0.76	0.76
4.98	1.14	20.61	3.86	79.53	2.61	0.78	0.78
5.00	1.13	20.59	4.05	83.46	2.63	0.81	0.81
5.02	1.11	20.28	4.38	88.88	2.67	0.85	0.85
5.04	1.05	19.10	5.35	102.19	2.76	0.75	0.75
5.06	0.99	18.03	6.36	114.75	2.84	0.77	0.77
5.08	0.95	17.20	7.27	125.09	2.90	0.79	0.79
5.10	0.92	16.53	7.76	128.21	2.94	0.80	0.80
5.12	0.89	15.96	8.07	128.75	2.96	0.80	0.80
5.14	0.87	15.57	8.16	127.00	2.96	0.79	0.79
5.16	0.84	15.02	8.01	120.39	2.95	0.78	0.78
5.18	0.81	14.46	7.78	112.45	2.94	0.77	0.77
5.20	0.85	15.09	6.79	102.40	2.87	0.75	0.75
5.22	0.94	16.85	5.68	95.75	2.79	0.74	0.74
5.24	1.09	19.45	4.56	88.73	2.69	0.87	0.87
5.26	1.19	21.09	4.23	89.20	2.65	0.84	0.84
5.28	1.22	21.58	4.41	95.09	2.67	0.87	0.87
5.30	1.15	20.64	5.09	105.02	2.74	0.76	0.76
5.32	1.02	18.43	6.07	111.85	2.82	0.77	0.77
5.34	0.89	15.94	7.25	115.59	2.90	0.78	0.78
5.36	0.75	13.17	9.15	120.43	3.02	0.63	0.97
5.38	0.64	10.96	11.71	128.32	3.15	0.69	0.81
5.40	0.56	9.37	14.32	134.18	3.27	0.76	0.69
5.42	0.43	6.84	19.02	130.07	3.43	0.76	0.50
5.44	0.39	6.04	19.56	118.13	3.45	0.48	0.44
5.46	0.36	5.39	19.07	102.76	3.43	0.37	0.39
5.48	0.42	6.52	14.38	93.71	3.27	0.32	0.47
5.50	0.43	6.67	13.26	88.47	3.22	0.28	0.48
5.52	0.42	6.53	13.01	84.94	3.21	0.25	0.47
5.54	0.40	6.17	13.56	83.72	3.24	0.24	0.45
5.56	0.38	5.75	14.69	84.47	3.28	0.24	0.41
5.58	0.36	5.37	15.96	85.71	3.33	0.26	0.39
5.60	0.34	5.02	17.14	86.12	3.37	0.26	0.36
5.62	0.33	4.72	17.97	84.85	3.40	0.25	0.34
5.64	0.32	4.50	17.97	80.77	3.40	0.23	0.32
5.66	0.31	4.35	17.45	75.91	3.38	0.17	0.31
5.68	0.31	4.25	16.61	70.66	3.35	0.15	0.30

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.31	4.25	15.87	67.43	3.33	0.14	0.30
5.72	0.32	4.54	14.28	64.90	3.26	0.12	0.32
5.74	0.35	5.16	12.31	63.48	3.18	0.12	0.37
5.76	0.41	6.16	10.31	63.54	3.08	0.12	0.44
5.78	0.48	7.56	8.40	63.51	2.98	0.15	0.67
5.80	0.57	9.14	6.98	63.77	2.88	0.15	0.67
5.82	0.67	10.88	5.95	64.75	2.81	0.17	0.67
5.84	0.76	12.24	5.47	67.00	2.77	0.20	0.68
5.86	0.81	13.19	5.25	69.21	2.75	0.24	0.68
5.88	0.84	13.63	5.26	71.69	2.75	0.29	0.69
5.90	0.85	13.86	5.32	73.70	2.76	0.35	0.69
5.92	0.85	13.92	5.51	76.64	2.77	0.44	0.70
5.94	0.86	13.95	5.65	78.81	2.78	0.53	0.70
5.96	0.86	13.96	5.78	80.71	2.79	0.62	0.71
5.98	0.86	14.02	5.75	80.57	2.79	0.61	0.71
6.00	0.86	13.97	5.79	80.93	2.80	0.63	0.71
6.02	0.85	13.81	5.85	80.81	2.80	0.62	0.71
6.04	0.85	13.73	5.82	79.91	2.80	0.58	0.71
6.06	0.86	13.83	5.56	76.85	2.78	0.45	0.70
6.08	0.89	14.24	5.16	73.41	2.74	0.34	0.69
6.10	0.92	14.61	4.88	71.27	2.72	0.28	0.69
6.12	0.94	14.85	4.77	70.82	2.71	0.27	0.69
6.14	0.94	14.90	4.88	72.67	2.72	0.32	0.69
6.16	0.93	14.67	5.13	75.32	2.74	0.40	0.70
6.18	0.92	14.64	5.33	78.06	2.76	0.50	0.70
6.20	0.94	14.87	5.29	78.72	2.75	0.52	0.70
6.22	0.99	15.57	4.98	77.47	2.73	0.47	0.70
6.24	1.01	15.91	4.75	75.57	2.70	0.40	0.70
6.26	1.01	15.78	4.67	73.68	2.70	0.84	0.84
6.28	0.98	15.31	4.73	72.38	2.70	0.31	0.69
6.30	0.96	14.96	4.74	70.99	2.70	0.28	0.69
6.32	0.95	14.72	4.85	71.37	2.71	0.29	0.69
6.34	0.94	14.49	5.06	73.29	2.73	0.33	0.69
6.36	0.92	14.19	5.38	76.41	2.76	0.43	0.70
6.38	0.90	14.00	5.60	78.38	2.78	0.51	0.70
6.40	0.90	13.93	5.74	79.92	2.79	0.58	0.71
6.42	0.91	14.04	5.69	79.94	2.79	0.58	0.71
6.44	0.93	14.33	5.58	79.93	2.78	0.58	0.71
6.46	0.96	14.74	5.36	79.00	2.76	0.54	0.70
6.48	0.99	15.22	5.15	78.43	2.74	0.51	0.70
6.50	1.08	16.47	4.65	76.61	2.69	0.84	0.84
6.52	1.16	17.74	4.25	75.45	2.65	0.81	0.81
6.54	1.24	18.74	3.95	73.92	2.62	0.78	0.78
6.56	1.21	18.27	4.09	74.74	2.64	0.79	0.79
6.58	1.13	17.20	4.55	78.32	2.69	0.84	0.84
6.60	1.06	16.12	4.92	79.26	2.72	0.55	0.71
6.62	1.05	15.90	4.83	76.85	2.71	0.45	0.70
6.64	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.23	18.14	3.38	61.34	2.55	0.33	0.69
6.68	1.29	18.96	3.20	60.59	2.53	0.17	0.67
6.70	1.27	18.70	3.50	65.49	2.57	0.71	0.71
6.72	1.18	17.39	3.84	66.83	2.61	0.75	0.75
6.74	1.06	15.63	4.25	66.42	2.65	0.78	0.78
6.76	0.95	13.94	4.62	64.44	2.69	0.81	0.81
6.78	0.93	13.55	4.56	61.79	2.69	0.79	0.79
6.80	0.93	13.47	4.42	59.47	2.67	0.77	0.77
6.82	0.93	13.35	4.28	57.15	2.66	0.76	0.76
6.84	0.93	13.32	4.11	54.72	2.64	0.73	0.73
6.86	0.95	13.56	3.88	52.58	2.61	0.60	0.71
6.88	1.01	14.27	3.58	51.17	2.58	0.21	0.68
6.90	1.07	15.09	3.31	49.91	2.55	0.09	0.65
6.92	1.13	16.01	3.04	48.72	2.51	0.04	0.62
6.94	1.17	16.53	2.89	47.80	2.49	0.05	0.62
6.96	1.19	16.70	2.80	46.81	2.47	0.04	0.62
6.98	1.16	16.28	2.83	46.05	2.48	0.04	0.62
7.00	1.11	15.57	3.00	46.70	2.50	0.04	0.62
7.02	1.04	14.53	3.34	48.56	2.55	0.09	0.65
7.04	0.98	13.71	3.66	50.18	2.59	0.24	0.68
7.06	0.96	13.44	3.76	50.54	2.60	0.33	0.69
7.08	0.99	13.79	3.58	49.36	2.58	0.17	0.67
7.10	1.03	14.25	3.38	48.15	2.55	0.09	0.65
7.12	1.04	14.38	3.37	48.39	2.55	0.09	0.65
7.14	1.02	14.09	3.63	51.16	2.59	0.24	0.68
7.16	0.98	13.59	4.07	55.29	2.64	0.73	0.73
7.18	0.96	13.42	4.38	58.84	2.67	0.77	0.77
7.20	0.97	13.53	4.61	62.38	2.69	0.80	0.80
7.22	0.98	13.68	4.75	65.03	2.70	0.17	0.67
7.24	0.95	13.37	5.10	68.16	2.74	0.22	0.68
7.26	0.90	12.58	5.36	67.49	2.76	0.21	0.68
7.28	0.83	11.53	5.65	65.21	2.78	0.17	0.67
7.30	0.78	10.59	5.70	60.31	2.79	0.12	0.66
7.32	0.73	9.92	5.78	57.32	2.79	0.09	0.65
7.34	0.71	9.52	5.78	55.03	2.79	0.08	0.64
7.36	0.69	9.16	5.80	53.12	2.80	0.07	0.64
7.38	0.68	8.90	5.74	51.04	2.79	0.06	0.63
7.40	0.67	8.78	5.60	49.18	2.78	0.05	0.62
7.42	0.67	8.75	5.51	48.22	2.77	0.05	0.62
7.44	0.67	8.77	5.43	47.60	2.76	0.04	0.62
7.46	0.68	8.86	5.46	48.42	2.77	0.05	0.62
7.48	0.69	9.00	5.45	49.00	2.77	0.05	0.62
7.50	0.69	9.03	5.47	49.45	2.77	0.05	0.62
7.52	0.70	9.12	5.42	49.41	2.76	0.05	0.62
7.54	0.79	10.37	4.55	47.20	2.69	0.74	0.74
7.56	1.01	13.39	3.17	42.46	2.53	0.04	0.62
7.58	1.30	17.20	2.26	38.79	2.38	0.03	0.62
7.60	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.58	20.76	1.00	20.76	2.29	0.02	0.62
7.64	1.70	22.39	1.00	22.39	2.25	0.02	0.62
7.66	1.94	25.37	1.00	25.37	2.19	0.02	0.62
7.68	2.29	29.86	1.00	29.86	2.12	0.02	0.62
7.70	2.63	34.23	1.00	34.23	2.07	0.02	0.62
7.72	2.99	38.67	1.00	38.67	2.03	0.03	0.62
7.74	3.28	42.19	1.00	42.19	1.98	0.03	0.62
7.76	3.35	42.98	1.00	42.98	1.96	0.03	0.62
7.78	3.19	40.69	1.00	40.69	1.96	0.03	0.62
7.80	2.85	36.48	1.00	36.48	2.00	0.02	0.62
7.82	2.52	32.39	1.00	32.39	2.07	0.02	0.62
7.84	2.27	29.50	1.00	29.50	2.18	0.02	0.62
7.86	2.18	29.06	2.05	59.62	2.33	0.11	0.66
7.88	2.59	34.65	1.93	66.75	2.30	0.20	0.68
7.90	3.60	47.36	1.51	71.67	2.15	0.29	0.69
7.92	5.00	64.18	1.28	81.93	1.96	0.69	0.71
7.94	6.26	78.89	1.19	93.84	1.84	0.74	0.74
7.96	7.12	88.58	1.00	88.58	1.75	0.73	0.73
7.98	7.59	93.43	1.00	93.43	1.69	0.74	0.74
8.00	7.79	94.83	1.00	94.83	1.63	0.74	0.74
8.02	7.81	94.43	1.00	94.43	1.60	0.74	0.74
8.04	7.79	93.98	1.00	93.98	1.59	0.74	0.74
8.06	7.85	94.82	1.00	94.82	1.60	0.74	0.74
8.08	8.23	99.15	1.00	99.15	1.59	0.75	0.75
8.10	8.97	107.40	1.00	107.40	1.56	0.76	0.76
8.12	10.06	119.80	1.00	119.80	1.52	0.78	0.78
8.14	11.30	133.53	1.00	133.53	1.47	0.80	0.80
8.16	12.32	144.66	1.00	144.66	1.43	0.82	0.82
8.18	12.87	150.52	1.00	150.52	1.41	0.83	0.83
8.20	13.00	152.02	1.00	152.02	1.42	0.83	0.83
8.22	13.03	152.64	1.00	152.64	1.43	0.83	0.83
8.24	13.23	154.80	1.00	154.80	1.43	0.83	0.83
8.26	13.81	161.27	1.00	161.27	1.42	0.84	0.84
8.28	14.43	168.24	1.00	168.24	1.42	0.85	0.85
8.30	14.98	174.51	1.00	174.51	1.42	0.86	0.86
8.32	15.10	176.20	1.00	176.20	1.43	0.86	0.86
8.34	15.15	176.64	1.00	176.64	1.44	0.86	0.86
8.36	15.17	176.52	1.00	176.52	1.43	0.86	0.86
8.38	15.28	177.25	1.00	177.25	1.41	0.86	0.86
8.40	15.36	178.01	1.00	178.01	1.42	0.86	0.86
8.42	15.47	178.95	1.00	178.95	1.41	0.86	0.86
8.44	15.48	179.20	1.00	179.20	1.42	0.86	0.86
8.46	15.58	179.88	1.00	179.88	1.41	0.86	0.86
8.48	15.53	179.09	1.00	179.09	1.41	0.86	0.86
8.50	15.52	178.56	1.00	178.56	1.40	0.86	0.86
8.52	15.46	177.72	1.00	177.72	1.40	0.86	0.86
8.54	15.45	177.38	1.00	177.38	1.40	0.86	0.86
8.56	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	14.97	171.64	1.00	171.64	1.41	0.85	0.85
8.60	14.11	162.84	1.00	162.84	1.47	0.84	0.84
8.62	13.10	151.63	1.00	151.63	1.50	0.83	0.83
8.64	12.29	142.29	1.00	142.29	1.52	0.82	0.82
8.66	11.90	137.35	1.00	137.35	1.50	0.81	0.81
8.68	11.77	135.87	1.00	135.87	1.51	0.81	0.81
8.70	11.65	134.28	1.00	134.28	1.51	0.80	0.80
8.72	11.52	132.43	1.00	132.43	1.50	0.80	0.80
8.74	11.34	130.14	1.00	130.14	1.50	0.80	0.80
8.76	11.20	129.06	1.00	129.06	1.54	0.80	0.80
8.78	11.30	130.51	1.00	130.51	1.56	0.80	0.80
8.80	11.64	133.93	1.00	133.93	1.54	0.80	0.80
8.82	11.86	136.09	1.00	136.09	1.52	0.81	0.81
8.84	11.53	132.82	1.00	132.82	1.56	0.80	0.80
8.86	11.05	127.72	1.00	127.72	1.60	0.79	0.79
8.88	10.50	121.49	1.00	121.49	1.62	0.79	0.79
8.90	10.24	118.05	1.00	118.05	1.61	0.78	0.78
8.92	9.98	115.26	1.00	115.26	1.63	0.78	0.78
8.94	10.15	117.05	1.00	117.05	1.63	0.78	0.78
8.96	10.89	124.93	1.00	124.93	1.59	0.79	0.79
8.98	12.03	137.00	1.00	137.00	1.53	0.81	0.81
9.00	13.76	155.07	1.00	155.07	1.44	0.83	0.83
9.02	16.23	180.99	1.00	180.99	1.36	0.87	0.87
9.04	18.50	204.49	1.00	204.49	1.28	0.89	0.89
9.06	20.03	220.34	1.00	220.34	1.24	0.91	0.91
9.08	19.12	210.30	1.00	210.30	1.25	0.90	0.90
9.10	18.25	201.28	1.00	201.28	1.29	0.89	0.89
9.12	16.79	185.92	1.00	185.92	1.33	0.87	0.87
9.14	16.40	181.97	1.00	181.97	1.36	0.87	0.87
9.16	15.55	172.48	1.00	172.48	1.37	0.86	0.86
9.18	14.84	165.91	1.00	165.91	1.45	0.85	0.85
9.20	14.13	158.91	1.00	158.91	1.51	0.84	0.84
9.22	13.42	151.67	1.00	151.67	1.57	0.83	0.83
9.24	12.84	145.03	1.00	145.03	1.58	0.82	0.82
9.26	12.43	140.45	1.00	140.45	1.59	0.81	0.81
9.28	11.92	134.96	1.00	134.96	1.63	0.81	0.81
9.30	10.91	123.97	1.00	123.97	1.68	0.79	0.79
9.32	10.34	117.76	1.03	120.91	1.72	0.78	0.78
9.34	11.17	127.20	1.02	130.21	1.72	0.80	0.80
9.36	12.83	145.97	1.00	145.97	1.71	0.82	0.82
9.38	14.02	159.84	1.05	168.11	1.73	0.85	0.85
9.40	14.18	162.16	1.11	180.29	1.77	0.86	0.86
9.42	14.13	161.99	1.16	188.25	1.81	0.87	0.87
9.44	14.28	163.32	1.15	187.81	1.80	0.87	0.87
9.46	14.36	163.70	1.13	184.77	1.78	0.87	0.87
9.48	14.14	160.34	1.08	172.85	1.75	0.86	0.86
9.50	13.30	150.68	1.09	164.58	1.75	0.85	0.85
9.52	12.10	136.78	1.10	150.37	1.76	0.83	0.83

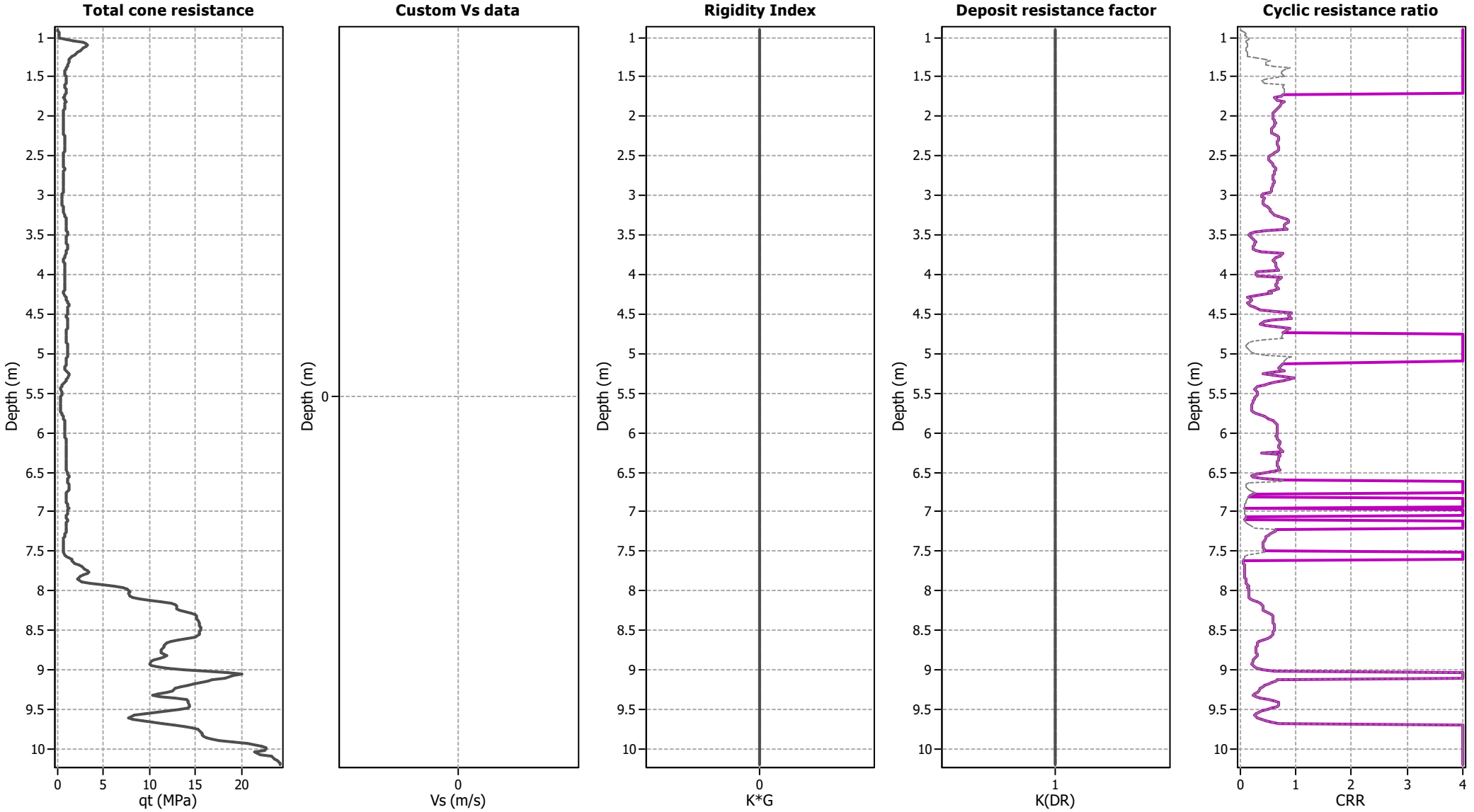
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	10.83	122.60	1.16	141.61	1.80	0.82	0.82
9.56	9.53	108.38	1.22	132.42	1.88	0.80	0.80
9.58	8.30	95.42	1.33	126.99	2.03	0.79	0.79
9.60	7.78	90.08	1.48	133.62	2.14	0.80	0.80
9.62	8.19	95.19	1.56	148.33	2.18	0.82	0.82
9.64	9.25	107.22	1.50	160.83	2.15	0.84	0.84
9.66	10.34	119.52	1.45	173.22	2.12	0.86	0.86
9.68	11.45	132.03	1.41	186.56	2.10	0.87	0.87
9.70	12.68	145.80	1.39	202.02	2.08	0.89	0.89
9.72	13.80	158.26	1.36	215.00	2.05	0.90	0.90
9.74	14.67	167.84	1.35	225.81	2.04	0.91	0.91
9.76	15.22	173.97	1.35	235.31	2.05	0.92	0.92
9.78	15.64	178.66	1.36	243.32	2.06	0.93	0.93
9.80	15.75	179.75	1.38	248.18	2.07	0.93	0.93
9.82	15.74	179.47	1.39	250.25	2.08	0.94	0.94
9.84	15.88	180.83	1.40	253.49	2.09	0.94	0.94
9.86	16.25	184.79	1.41	260.20	2.09	0.94	0.94
9.88	16.88	191.60	1.40	269.15	2.09	0.95	0.95
9.90	17.63	199.78	1.40	278.80	2.08	0.96	0.96
9.92	19.12	215.70	1.35	291.92	2.05	0.97	0.97
9.94	20.71	232.78	1.32	306.70	2.01	0.98	0.98
9.96	22.15	248.06	1.29	321.10	1.98	0.99	0.99
9.98	22.73	254.05	1.29	328.91	1.98	1.00	1.00
10.00	22.64	252.94	1.31	330.73	2.00	1.00	1.00
10.02	22.48	250.93	1.32	331.49	2.02	1.00	1.00
10.04	21.43	239.37	1.36	325.42	2.05	1.00	1.00
10.06	21.75	242.55	1.36	329.84	2.05	1.00	1.00
10.08	22.11	246.16	1.37	336.17	2.06	1.00	1.00
10.10	23.35	259.28	1.34	348.23	2.04	1.01	1.01
10.12	23.58	261.42	1.35	352.46	2.04	1.02	1.02
10.14	23.82	263.59	1.35	355.62	2.04	1.02	1.02
10.16	24.06	265.84	1.35	359.10	2.05	1.02	1.02
10.18	24.17	266.62	1.36	361.33	2.05	1.02	1.02
10.20	24.20	266.55	1.36	362.23	2.05	1.02	1.02

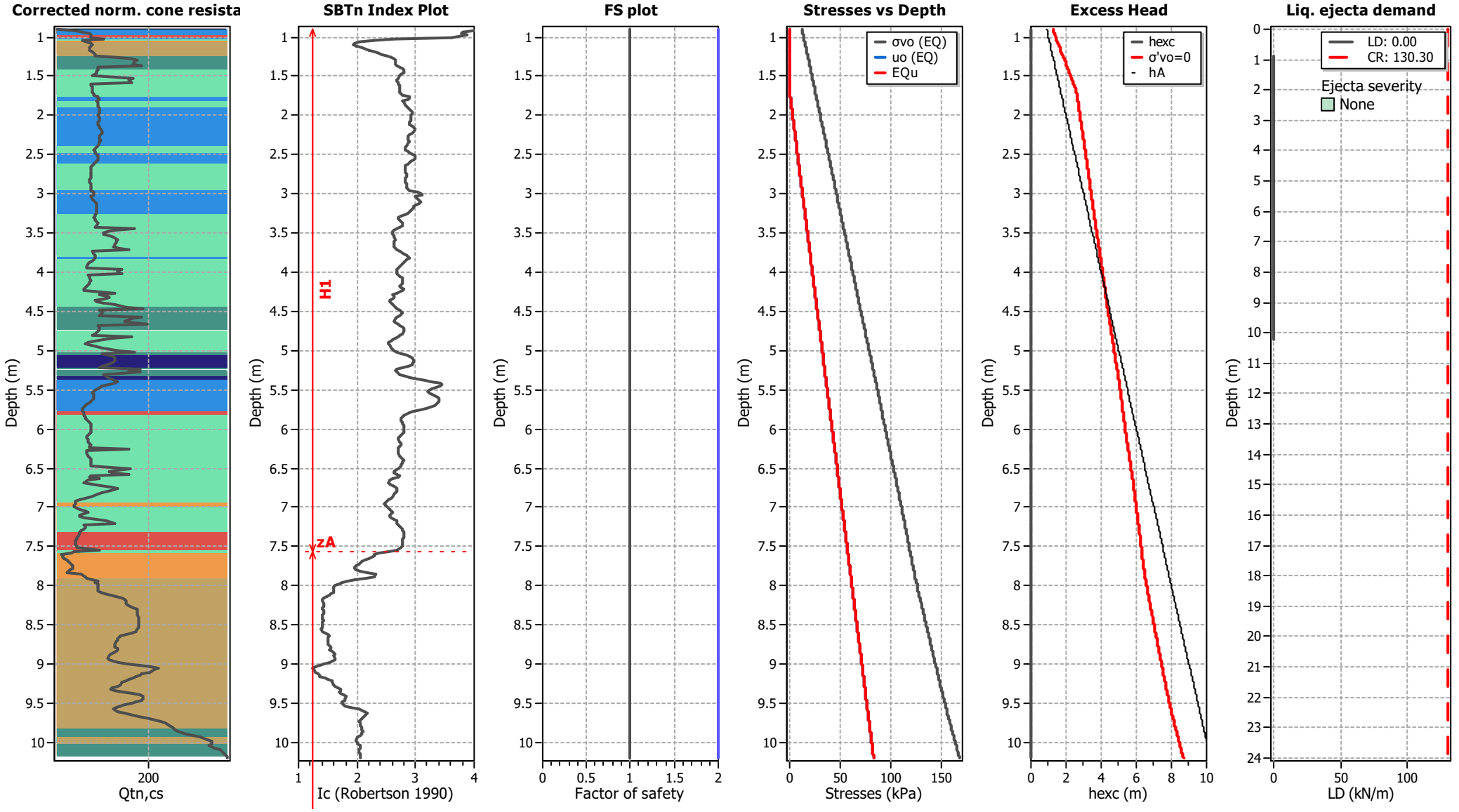
Abbreviations

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

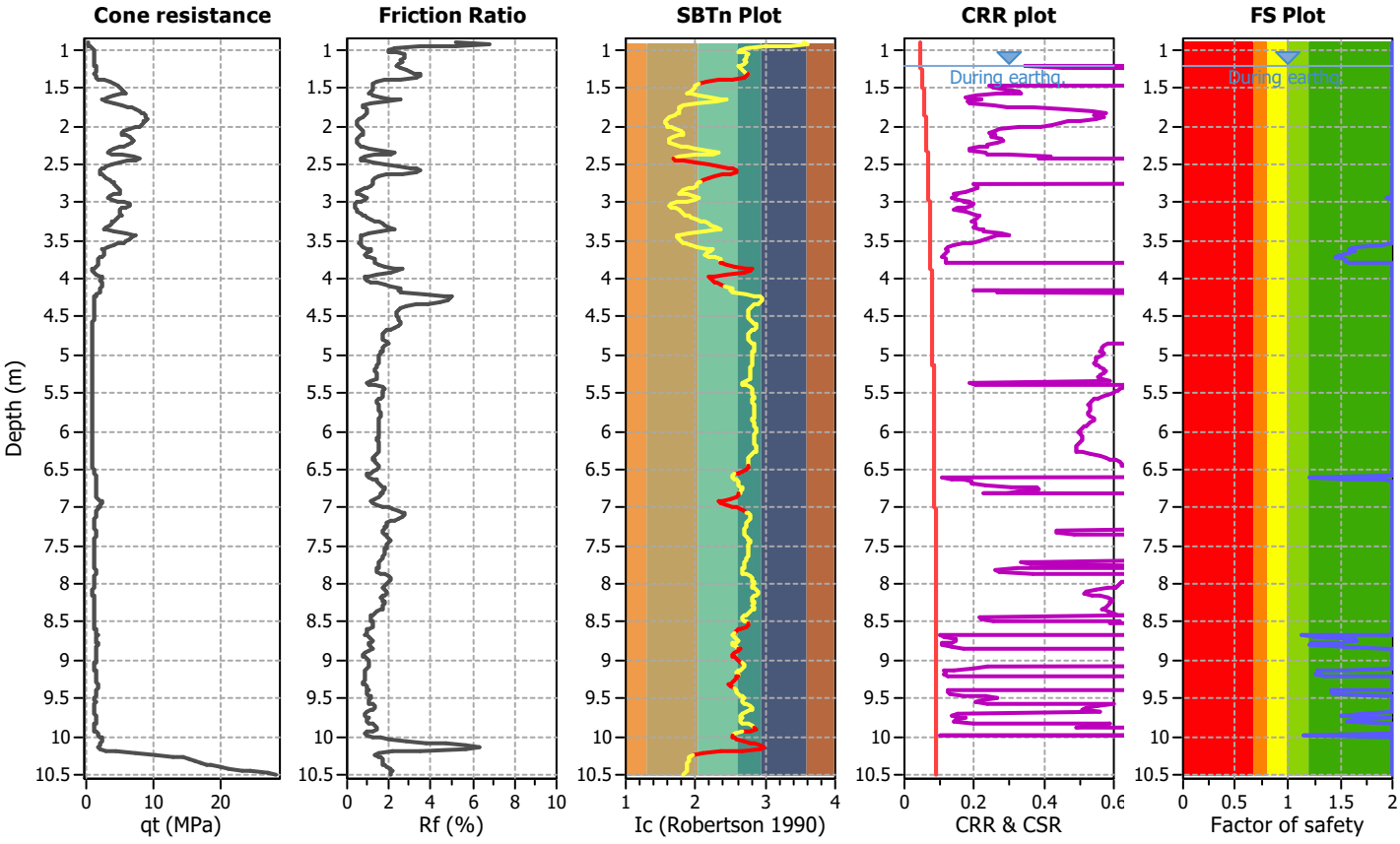
LIQUEFACTION ANALYSIS REPORT

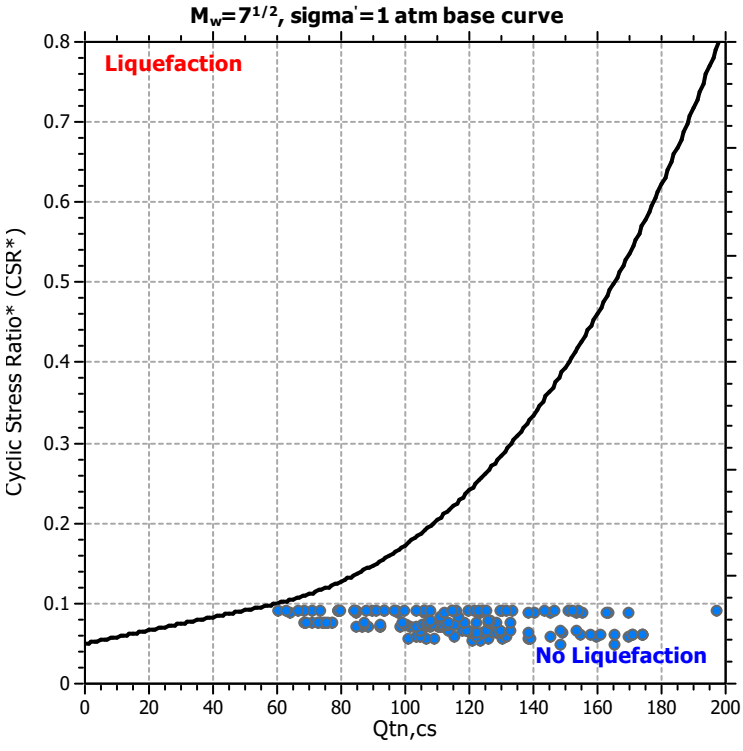
Project title : CWLP Free Face Liquefaction Analysis **Location : East Lake Shore Drive, Springfield, Illinois**

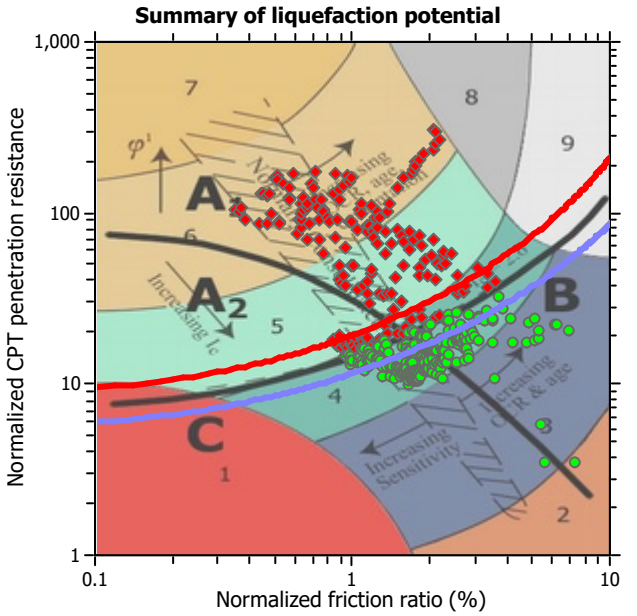
CPT file : CWLP CPT-7L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.20 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	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		

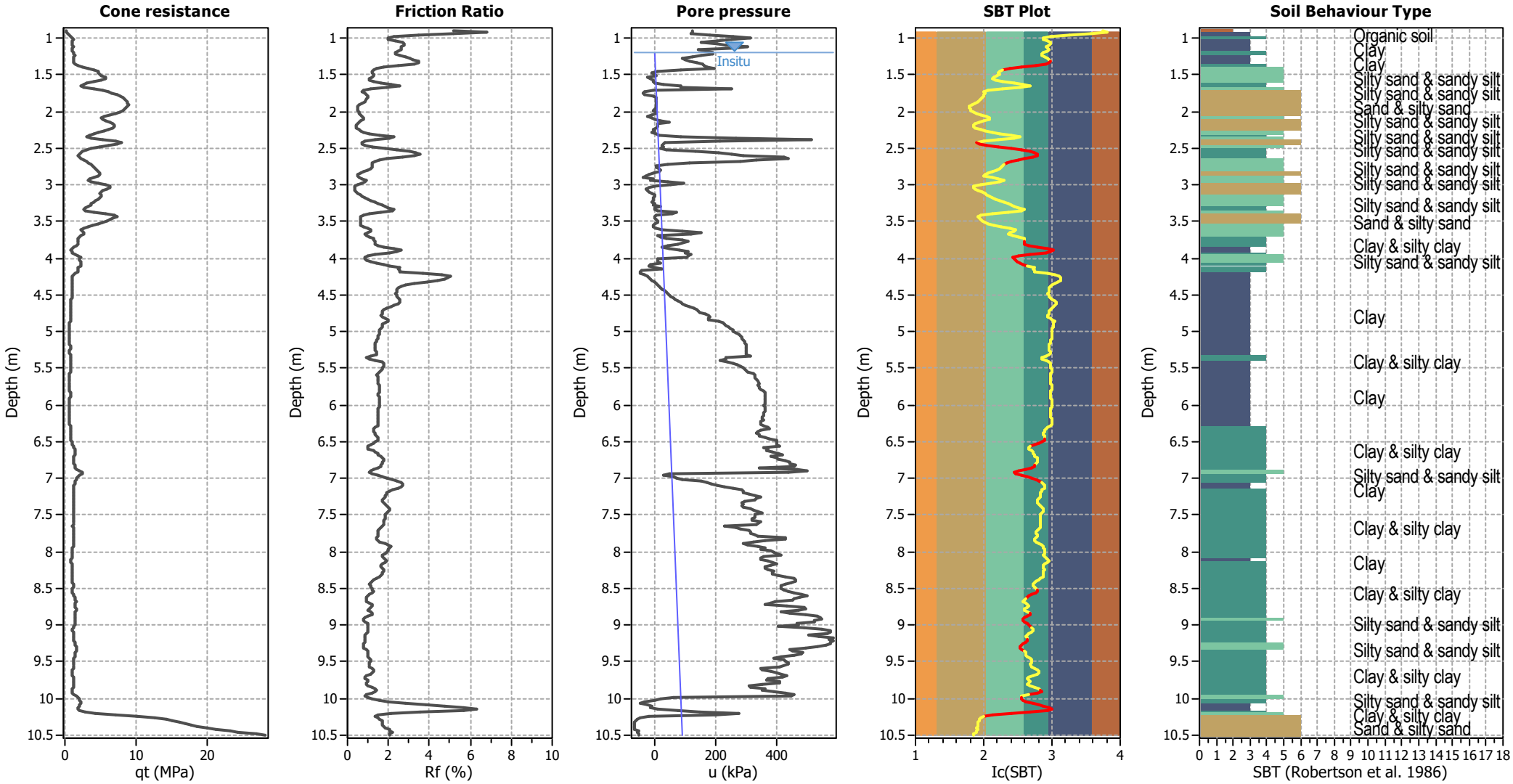






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



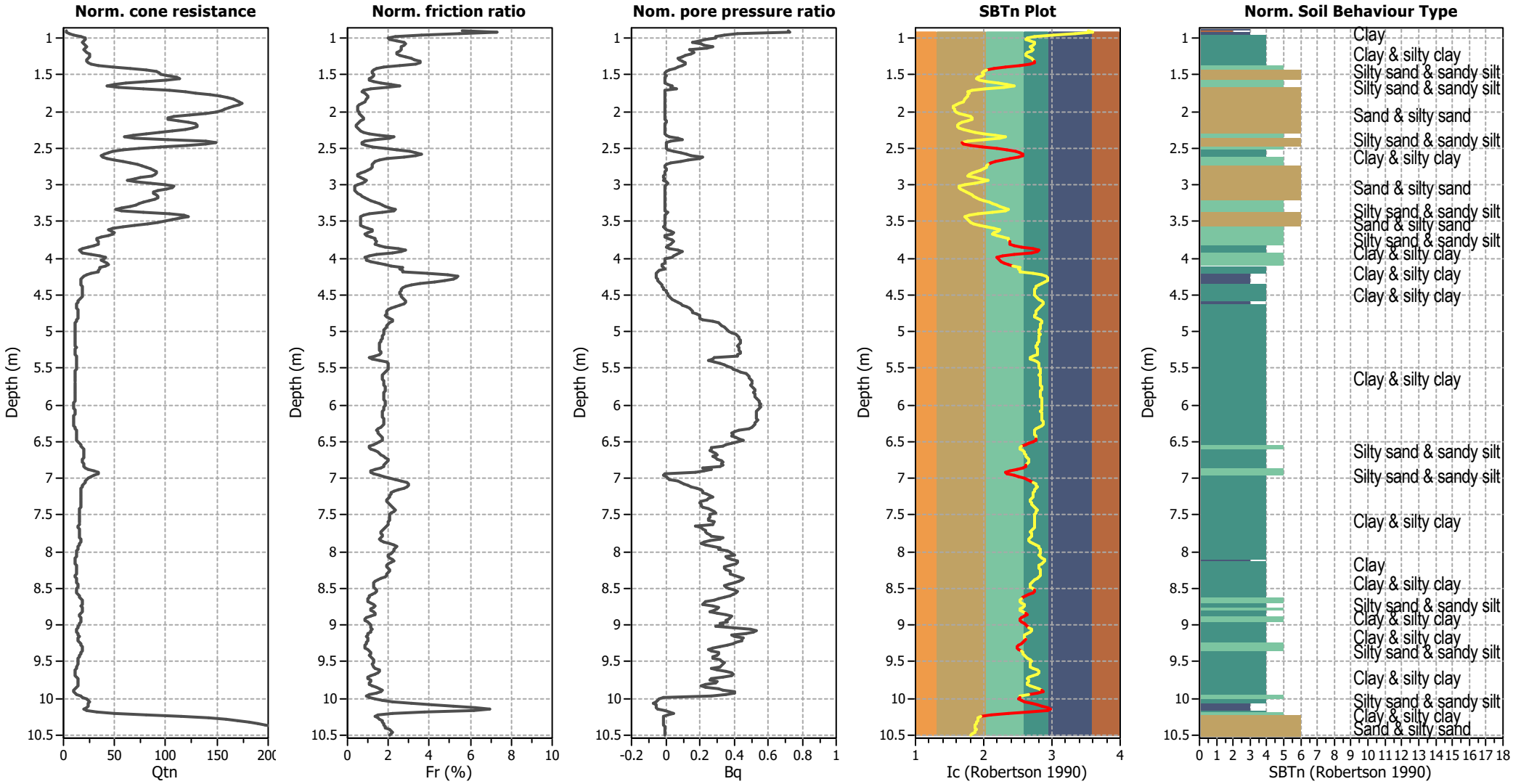
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	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)



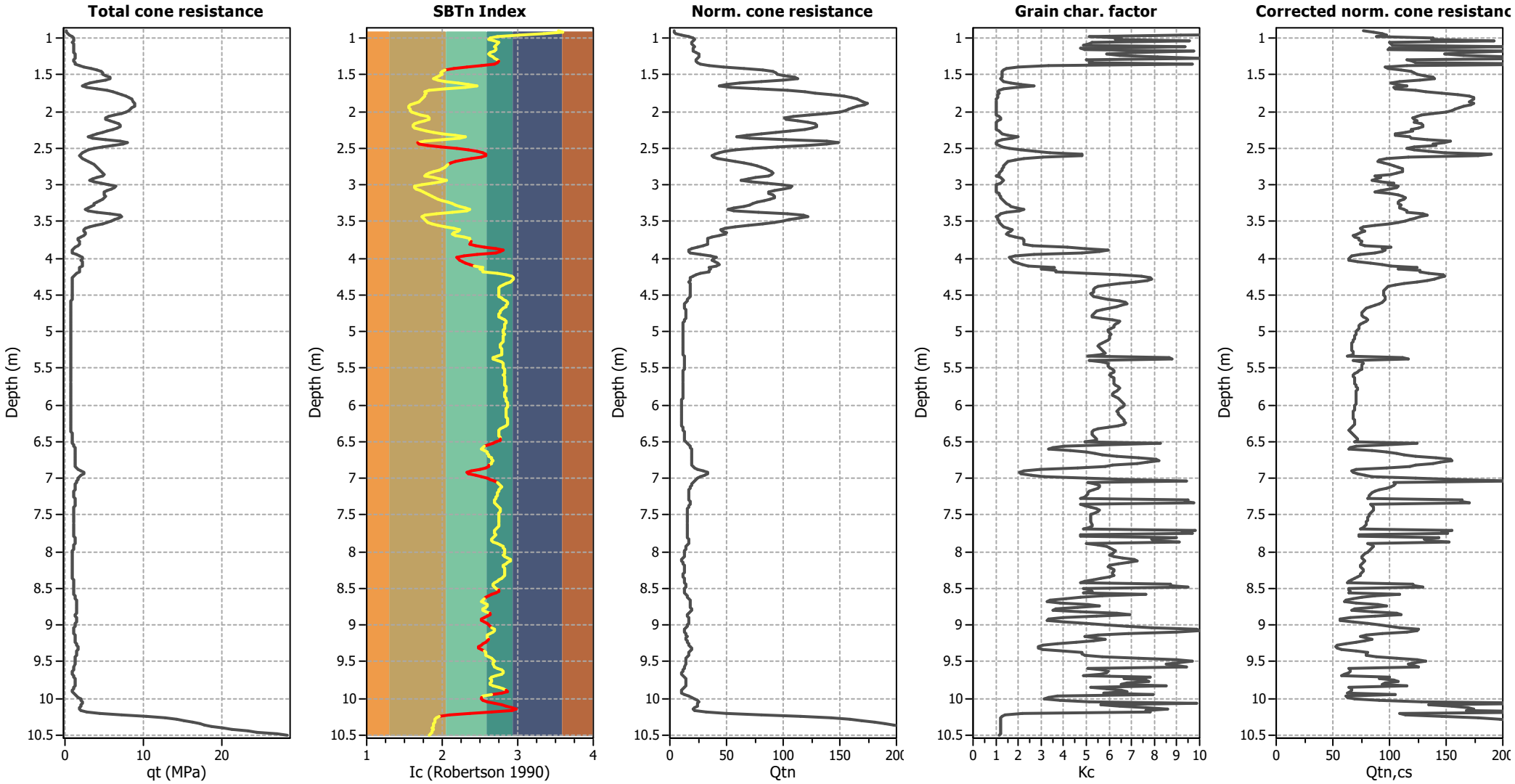
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	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

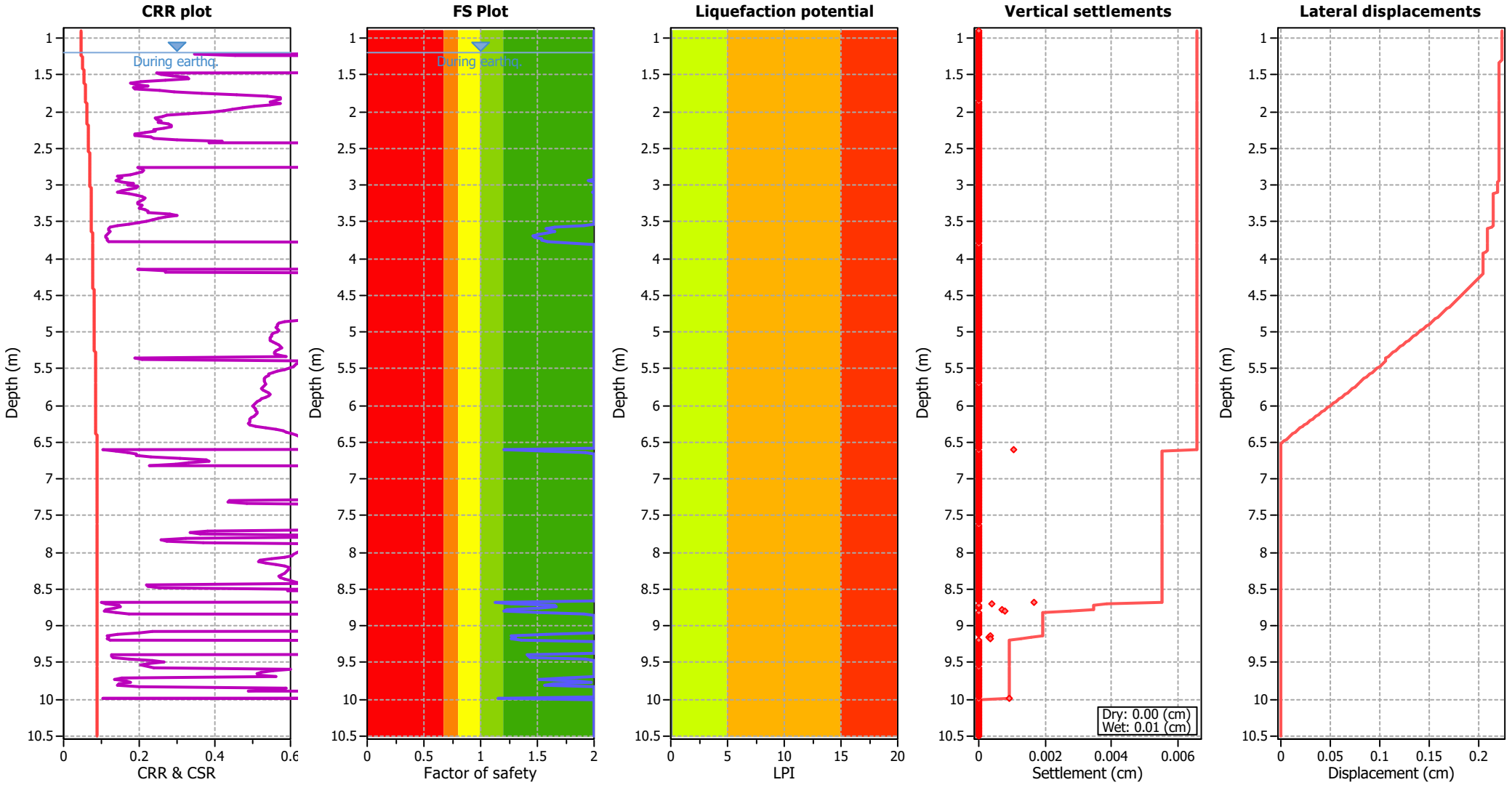
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

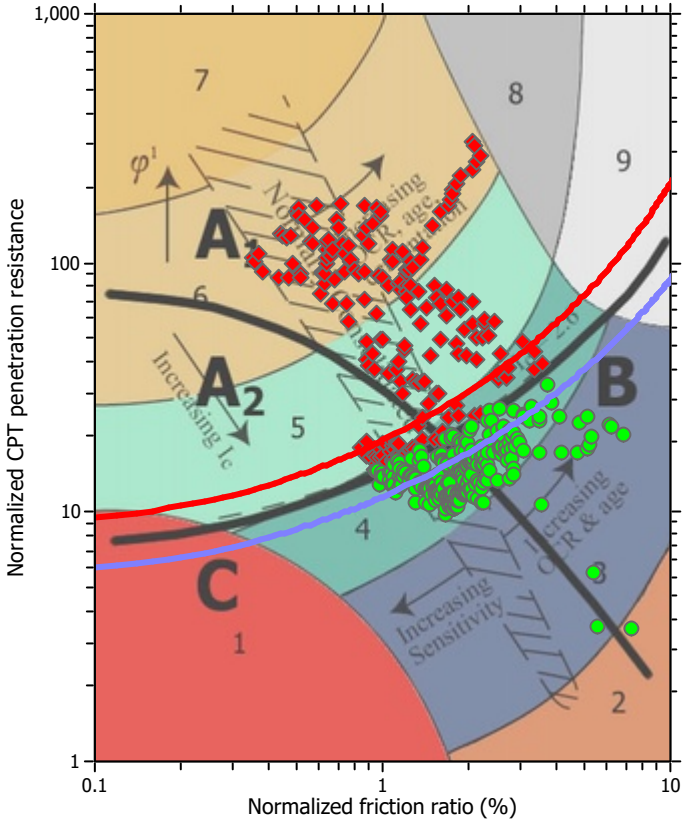
F.S. color scheme

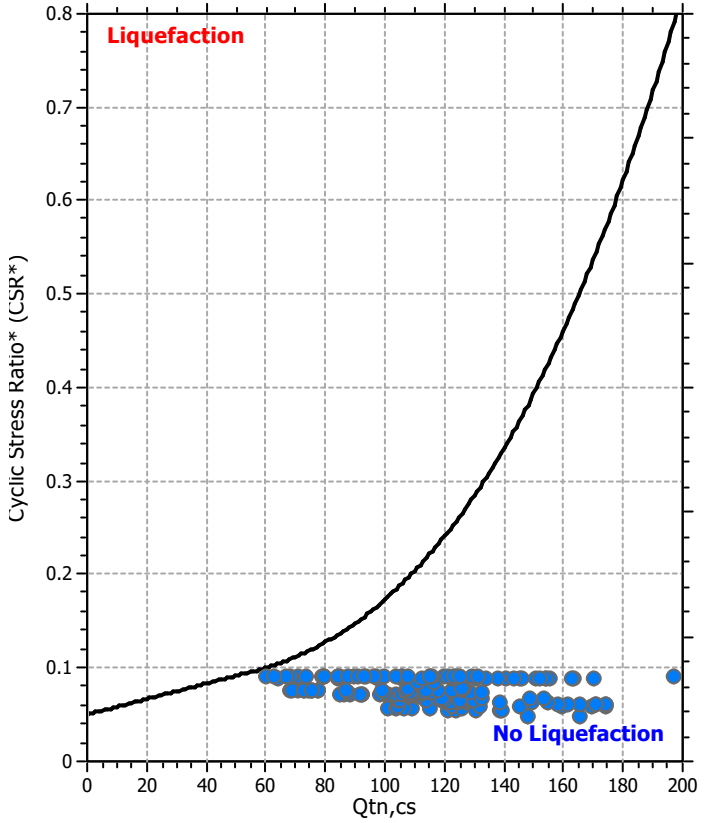
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

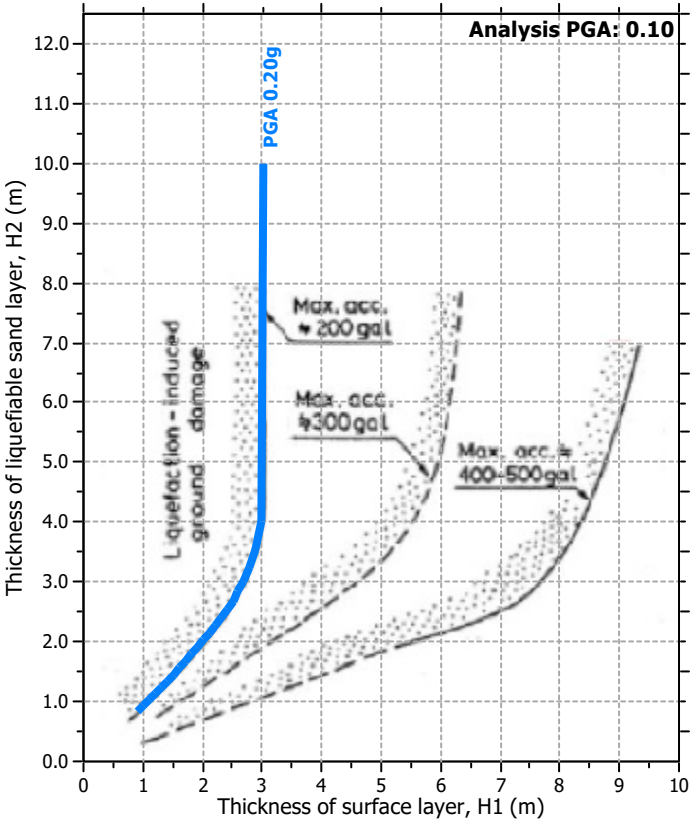
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



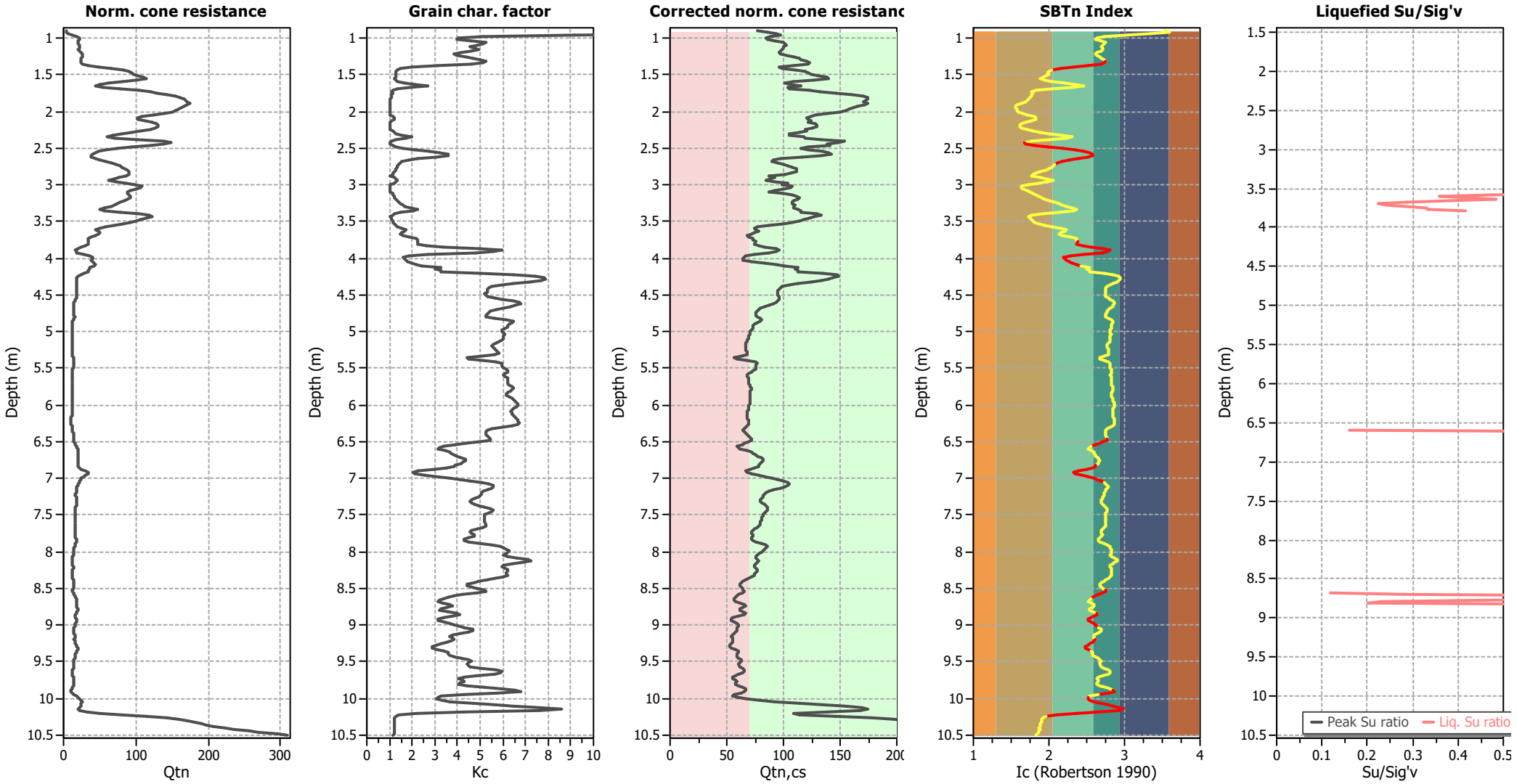




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
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:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

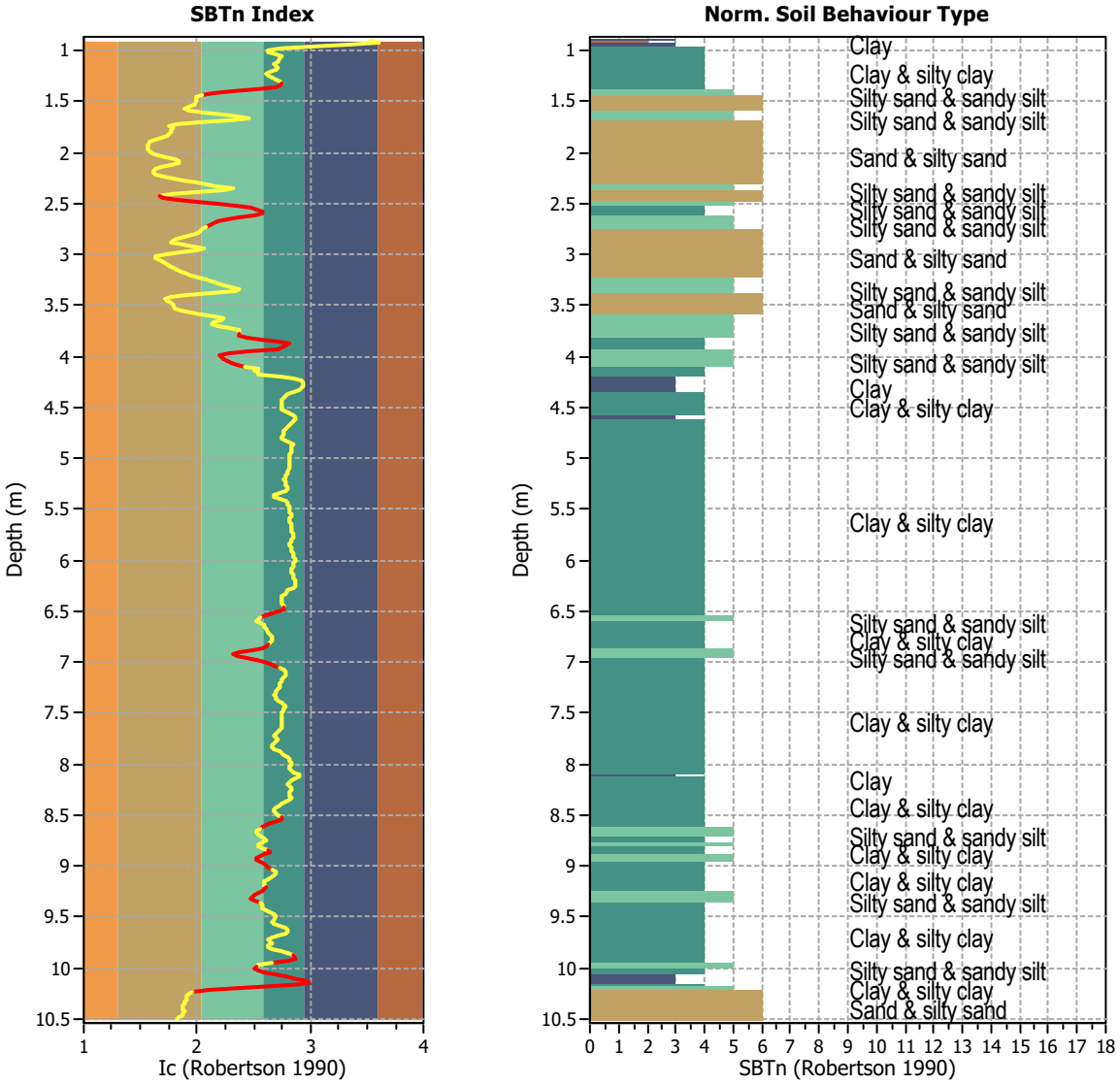
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.20 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	N/A	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	0.90	13.46	0.00	13.46	1.00	0.065	1.38	0.047	1.00	1.00	2.000	No
2	0.92	13.77	0.00	13.77	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
3	0.94	14.08	0.00	14.08	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
4	0.96	14.41	0.00	14.41	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
5	0.98	14.73	0.00	14.73	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
6	1.00	15.06	0.00	15.06	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
7	1.02	15.40	0.00	15.40	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
8	1.04	15.73	0.00	15.73	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
9	1.06	16.07	0.00	16.07	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
10	1.08	16.40	0.00	16.40	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
11	1.10	16.74	0.00	16.74	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
12	1.12	17.08	0.00	17.08	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
13	1.14	17.42	0.00	17.42	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
14	1.16	17.75	0.00	17.75	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
15	1.18	18.09	0.00	18.09	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
16	1.20	18.43	0.00	18.43	0.99	0.065	1.38	0.047	1.00	1.00	2.000	No
17	1.22	18.77	0.20	18.57	0.99	0.065	1.38	0.047	1.00	1.00	0.047	No
18	1.24	19.11	0.39	18.72	0.99	0.066	1.38	0.048	1.00	1.00	0.048	No
19	1.26	19.45	0.59	18.86	0.99	0.067	1.38	0.048	1.00	1.00	0.048	No
20	1.28	19.80	0.78	19.01	0.99	0.067	1.38	0.049	1.00	1.00	0.049	No
21	1.30	20.14	0.98	19.16	0.99	0.068	1.38	0.049	1.00	1.00	0.049	No
22	1.32	20.49	1.18	19.31	0.99	0.068	1.38	0.050	1.00	1.00	0.050	No
23	1.34	20.84	1.37	19.46	0.99	0.069	1.38	0.050	1.00	1.00	2.000	Yes
24	1.36	21.19	1.57	19.62	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
25	1.38	21.54	1.77	19.77	0.99	0.070	1.38	0.051	1.00	1.00	2.000	Yes
26	1.40	21.89	1.96	19.93	0.99	0.071	1.38	0.051	1.00	1.00	2.000	Yes
27	1.42	22.25	2.16	20.09	0.99	0.071	1.38	0.052	1.00	1.00	2.000	Yes
28	1.44	22.61	2.35	20.26	0.99	0.072	1.38	0.052	1.00	1.00	2.000	Yes
29	1.46	22.98	2.55	20.43	0.99	0.072	1.38	0.053	1.00	1.00	2.000	Yes
30	1.48	23.34	2.75	20.59	0.99	0.073	1.38	0.053	1.00	1.00	0.053	No
31	1.50	23.71	2.94	20.76	0.99	0.074	1.38	0.053	1.00	1.00	0.053	No
32	1.52	24.08	3.14	20.94	0.99	0.074	1.38	0.054	1.00	1.00	0.054	No
33	1.54	24.45	3.34	21.11	0.99	0.075	1.38	0.054	1.00	1.00	0.054	No
34	1.56	24.81	3.53	21.28	0.99	0.075	1.38	0.055	1.00	1.00	0.055	No
35	1.58	25.18	3.73	21.45	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
36	1.60	25.54	3.92	21.62	0.99	0.076	1.38	0.055	1.00	1.00	0.055	No
37	1.62	25.90	4.12	21.78	0.99	0.076	1.38	0.056	1.00	1.00	0.056	No
38	1.64	26.26	4.32	21.94	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
39	1.66	26.62	4.51	22.10	0.99	0.077	1.38	0.056	1.00	1.00	0.056	No
40	1.68	26.97	4.71	22.27	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
41	1.70	27.33	4.91	22.43	0.99	0.078	1.38	0.057	1.00	1.00	0.057	No
42	1.72	27.69	5.10	22.59	0.99	0.079	1.38	0.057	1.00	1.00	0.057	No
43	1.74	28.05	5.30	22.75	0.99	0.079	1.38	0.058	1.00	1.00	0.058	No
44	1.76	28.42	5.49	22.92	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
45	1.78	28.79	5.69	23.10	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
46	1.80	29.16	5.89	23.28	0.99	0.080	1.38	0.058	1.00	1.00	0.058	No
47	1.82	29.54	6.08	23.46	0.99	0.081	1.38	0.059	1.00	1.00	0.059	No
48	1.84	29.92	6.28	23.64	0.99	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
49	1.86	30.29	6.47	23.82	0.99	0.082	1.38	0.059	1.00	1.00	0.059	No
50	1.88	30.67	6.67	24.00	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
51	1.90	31.03	6.87	24.17	0.99	0.082	1.38	0.060	1.00	1.00	0.060	No
52	1.92	31.40	7.06	24.33	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
53	1.94	31.76	7.26	24.50	0.99	0.083	1.38	0.060	1.00	1.00	0.060	No
54	1.96	32.12	7.46	24.67	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
55	1.98	32.48	7.65	24.83	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
56	2.00	32.85	7.85	25.00	0.99	0.084	1.38	0.061	1.00	1.00	0.061	No
57	2.02	33.21	8.04	25.16	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
58	2.04	33.57	8.24	25.32	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
59	2.06	33.92	8.44	25.49	0.99	0.085	1.38	0.062	1.00	1.00	0.062	No
60	2.08	34.28	8.63	25.65	0.99	0.086	1.38	0.062	1.00	1.00	0.062	No
61	2.10	34.64	8.83	25.81	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
62	2.12	34.99	9.03	25.97	0.99	0.086	1.38	0.063	1.00	1.00	0.063	No
63	2.14	35.35	9.22	26.13	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
64	2.16	35.70	9.42	26.29	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
65	2.18	36.06	9.61	26.44	0.99	0.087	1.38	0.063	1.00	1.00	0.063	No
66	2.20	36.41	9.81	26.60	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
67	2.22	36.77	10.01	26.76	0.99	0.088	1.38	0.064	1.00	1.00	0.064	No
68	2.24	37.12	10.20	26.92	0.98	0.088	1.38	0.064	1.00	1.00	0.064	No
69	2.26	37.48	10.40	27.08	0.98	0.089	1.38	0.064	1.00	1.00	0.064	No
70	2.28	37.83	10.59	27.24	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
71	2.30	38.19	10.79	27.40	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
72	2.32	38.55	10.99	27.56	0.98	0.089	1.38	0.065	1.00	1.00	0.065	No
73	2.34	38.92	11.18	27.73	0.98	0.090	1.38	0.065	1.00	1.00	0.065	No
74	2.36	39.28	11.38	27.90	0.98	0.090	1.38	0.065	1.00	1.00	0.065	No
75	2.38	39.65	11.58	28.08	0.98	0.090	1.38	0.066	1.00	1.00	0.066	No
76	2.40	40.02	11.77	28.25	0.98	0.091	1.38	0.066	1.00	1.00	0.066	No
77	2.42	40.39	11.97	28.42	0.98	0.091	1.38	0.066	1.00	1.00	0.066	No
78	2.44	40.76	12.16	28.59	0.98	0.091	1.38	0.066	1.00	1.00	2.000	Yes
79	2.46	41.12	12.36	28.76	0.98	0.091	1.38	0.066	1.00	1.00	2.000	Yes
80	2.48	41.49	12.56	28.93	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
81	2.50	41.86	12.75	29.10	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
82	2.52	42.22	12.95	29.27	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
83	2.54	42.59	13.15	29.44	0.98	0.092	1.38	0.067	1.00	1.00	2.000	Yes
84	2.56	42.95	13.34	29.61	0.98	0.093	1.38	0.067	1.00	1.00	2.000	Yes
85	2.58	43.32	13.54	29.78	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
86	2.60	43.68	13.73	29.94	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
87	2.62	44.03	13.93	30.10	0.98	0.093	1.38	0.068	1.00	1.00	2.000	Yes
88	2.64	44.38	14.13	30.26	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
89	2.66	44.74	14.32	30.41	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
90	2.68	45.09	14.52	30.57	0.98	0.094	1.38	0.068	1.00	1.00	2.000	Yes
91	2.70	45.44	14.72	30.73	0.98	0.094	1.38	0.069	1.00	1.00	2.000	Yes
92	2.72	45.80	14.91	30.89	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
93	2.74	46.16	15.11	31.05	0.98	0.095	1.38	0.069	1.00	1.00	2.000	Yes
94	2.76	46.52	15.30	31.22	0.98	0.095	1.38	0.069	1.00	1.00	0.069	No
95	2.78	46.88	15.50	31.38	0.98	0.095	1.38	0.069	1.00	1.00	0.069	No
96	2.80	47.24	15.70	31.54	0.98	0.095	1.38	0.069	1.00	1.00	0.069	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	2.82	47.59	15.89	31.70	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
98	2.84	47.94	16.09	31.86	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
99	2.86	48.29	16.28	32.01	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
100	2.88	48.63	16.48	32.15	0.98	0.096	1.38	0.070	1.00	1.00	0.070	No
101	2.90	48.98	16.68	32.30	0.98	0.097	1.38	0.070	1.00	1.00	0.070	No
102	2.92	49.32	16.87	32.45	0.98	0.097	1.38	0.070	1.00	1.00	0.070	No
103	2.94	49.67	17.07	32.60	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
104	2.96	50.02	17.27	32.75	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
105	2.98	50.37	17.46	32.91	0.98	0.097	1.38	0.071	1.00	1.00	0.071	No
106	3.00	50.72	17.66	33.06	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
107	3.02	51.06	17.85	33.21	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
108	3.04	51.41	18.05	33.36	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
109	3.06	51.75	18.25	33.51	0.98	0.098	1.38	0.071	1.00	1.00	0.071	No
110	3.08	52.09	18.44	33.65	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
111	3.10	52.44	18.64	33.80	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
112	3.12	52.78	18.84	33.95	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
113	3.14	53.13	19.03	34.10	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
114	3.16	53.49	19.23	34.26	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
115	3.18	53.85	19.42	34.43	0.98	0.099	1.38	0.072	1.00	1.00	0.072	No
116	3.20	54.21	19.62	34.59	0.98	0.100	1.38	0.072	1.00	1.00	0.072	No
117	3.22	54.57	19.82	34.75	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
118	3.24	54.93	20.01	34.92	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
119	3.26	55.29	20.21	35.08	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
120	3.28	55.66	20.40	35.25	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
121	3.30	56.02	20.60	35.42	0.98	0.100	1.38	0.073	1.00	1.00	0.073	No
122	3.32	56.38	20.80	35.59	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
123	3.34	56.74	20.99	35.75	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
124	3.36	57.11	21.19	35.92	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
125	3.38	57.48	21.39	36.09	0.98	0.101	1.38	0.073	1.00	1.00	0.073	No
126	3.40	57.84	21.58	36.26	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
127	3.42	58.21	21.78	36.43	0.98	0.101	1.38	0.074	1.00	1.00	0.074	No
128	3.44	58.57	21.97	36.60	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
129	3.46	58.93	22.17	36.76	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
130	3.48	59.29	22.37	36.92	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
131	3.50	59.65	22.56	37.08	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
132	3.52	60.00	22.76	37.24	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
133	3.54	60.35	22.96	37.39	0.98	0.102	1.38	0.074	1.00	1.00	0.074	No
134	3.56	60.69	23.15	37.54	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
135	3.58	61.04	23.35	37.69	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
136	3.60	61.38	23.54	37.83	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
137	3.62	61.72	23.74	37.98	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
138	3.64	62.06	23.94	38.13	0.98	0.103	1.38	0.075	1.00	1.00	0.075	No
139	3.66	62.40	24.13	38.27	0.97	0.103	1.38	0.075	1.00	1.00	0.075	No
140	3.68	62.74	24.33	38.41	0.97	0.103	1.38	0.075	1.00	1.00	0.075	No
141	3.70	63.08	24.53	38.55	0.97	0.104	1.38	0.075	1.00	1.00	0.075	No
142	3.72	63.41	24.72	38.69	0.97	0.104	1.38	0.075	1.00	1.00	0.075	No
143	3.74	63.75	24.92	38.83	0.97	0.104	1.38	0.076	1.00	1.00	0.076	No
144	3.76	64.08	25.11	38.97	0.97	0.104	1.38	0.076	1.00	1.00	0.076	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	3.78	64.42	25.31	39.11	0.97	0.104	1.38	0.076	1.00	1.00	0.076	No
146	3.80	64.76	25.51	39.25	0.97	0.104	1.38	0.076	1.00	1.00	2.000	Yes
147	3.82	65.09	25.70	39.39	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
148	3.84	65.43	25.90	39.53	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
149	3.86	65.76	26.09	39.67	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
150	3.88	66.09	26.29	39.80	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
151	3.90	66.42	26.49	39.93	0.97	0.105	1.38	0.076	1.00	1.00	2.000	Yes
152	3.92	66.75	26.68	40.07	0.97	0.105	1.38	0.077	1.00	1.00	2.000	Yes
153	3.94	67.08	26.88	40.20	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
154	3.96	67.42	27.08	40.34	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
155	3.98	67.75	27.27	40.48	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
156	4.00	68.08	27.47	40.61	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
157	4.02	68.41	27.66	40.75	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
158	4.04	68.75	27.86	40.89	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
159	4.06	69.10	28.06	41.04	0.97	0.106	1.38	0.077	1.00	1.00	2.000	Yes
160	4.08	69.45	28.25	41.20	0.97	0.107	1.38	0.077	1.00	1.00	2.000	Yes
161	4.10	69.80	28.45	41.35	0.97	0.107	1.38	0.077	1.00	1.00	2.000	Yes
162	4.12	70.15	28.65	41.51	0.97	0.107	1.38	0.078	1.00	1.00	2.000	Yes
163	4.14	70.51	28.84	41.67	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
164	4.16	70.86	29.04	41.82	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
165	4.18	71.21	29.23	41.98	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
166	4.20	71.57	29.43	42.14	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
167	4.22	71.92	29.63	42.30	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
168	4.24	72.27	29.82	42.45	0.97	0.107	1.38	0.078	1.00	1.00	0.078	No
169	4.26	72.62	30.02	42.60	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
170	4.28	72.97	30.21	42.76	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
171	4.30	73.32	30.41	42.91	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
172	4.32	73.66	30.61	43.05	0.97	0.108	1.38	0.078	1.00	1.00	0.078	No
173	4.34	74.00	30.80	43.19	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
174	4.36	74.33	31.00	43.33	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
175	4.38	74.67	31.20	43.47	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
176	4.40	75.00	31.39	43.61	0.97	0.108	1.38	0.079	1.00	1.00	0.079	No
177	4.42	75.33	31.59	43.75	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
178	4.44	75.67	31.78	43.88	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
179	4.46	76.00	31.98	44.02	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
180	4.48	76.33	32.18	44.15	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
181	4.50	76.66	32.37	44.29	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
182	4.52	77.00	32.57	44.43	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
183	4.54	77.33	32.77	44.56	0.97	0.109	1.38	0.079	1.00	1.00	0.079	No
184	4.56	77.66	32.96	44.70	0.97	0.109	1.38	0.080	1.00	1.00	0.080	No
185	4.58	77.99	33.16	44.83	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
186	4.60	78.31	33.35	44.96	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
187	4.62	78.64	33.55	45.09	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
188	4.64	78.96	33.75	45.22	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
189	4.66	79.28	33.94	45.34	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
190	4.68	79.60	34.14	45.46	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
191	4.70	79.92	34.34	45.59	0.97	0.110	1.38	0.080	1.00	1.00	0.080	No
192	4.72	80.24	34.53	45.71	0.97	0.110	1.38	0.080	1.00	1.00	0.080	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	4.74	80.56	34.73	45.83	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
194	4.76	80.87	34.92	45.95	0.97	0.111	1.38	0.080	1.00	1.00	0.080	No
195	4.78	81.19	35.12	46.07	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
196	4.80	81.51	35.32	46.20	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
197	4.82	81.83	35.51	46.32	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
198	4.84	82.15	35.71	46.44	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
199	4.86	82.47	35.90	46.56	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
200	4.88	82.78	36.10	46.68	0.97	0.111	1.38	0.081	1.00	1.00	0.081	No
201	4.90	83.10	36.30	46.80	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
202	4.92	83.41	36.49	46.92	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
203	4.94	83.72	36.69	47.03	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
204	4.96	84.03	36.89	47.15	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
205	4.98	84.35	37.08	47.26	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
206	5.00	84.66	37.28	47.38	0.97	0.112	1.38	0.081	1.00	1.00	0.081	No
207	5.02	84.97	37.47	47.49	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
208	5.04	85.28	37.67	47.61	0.97	0.112	1.38	0.082	1.00	1.00	0.082	No
209	5.06	85.59	37.87	47.72	0.97	0.113	1.38	0.082	1.00	1.00	0.082	No
210	5.08	85.90	38.06	47.83	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
211	5.10	86.21	38.26	47.95	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
212	5.12	86.52	38.46	48.06	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
213	5.14	86.82	38.65	48.17	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
214	5.16	87.13	38.85	48.28	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
215	5.18	87.44	39.04	48.40	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
216	5.20	87.75	39.24	48.51	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
217	5.22	88.06	39.44	48.62	0.96	0.113	1.38	0.082	1.00	1.00	0.082	No
218	5.24	88.37	39.63	48.74	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
219	5.26	88.68	39.83	48.85	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
220	5.28	88.99	40.02	48.96	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
221	5.30	89.29	40.22	49.07	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
222	5.32	89.60	40.42	49.19	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
223	5.34	89.91	40.61	49.30	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
224	5.36	90.22	40.81	49.41	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
225	5.38	90.52	41.01	49.52	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
226	5.40	90.83	41.20	49.63	0.96	0.114	1.38	0.083	1.00	1.00	0.083	No
227	5.42	91.15	41.40	49.75	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
228	5.44	91.47	41.59	49.87	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
229	5.46	91.79	41.79	50.00	0.96	0.115	1.38	0.083	1.00	1.00	0.083	No
230	5.48	92.10	41.99	50.12	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
231	5.50	92.42	42.18	50.24	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
232	5.52	92.74	42.38	50.36	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
233	5.54	93.05	42.58	50.47	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
234	5.56	93.36	42.77	50.59	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
235	5.58	93.67	42.97	50.70	0.96	0.115	1.38	0.084	1.00	1.00	0.084	No
236	5.60	93.98	43.16	50.82	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
237	5.62	94.29	43.36	50.93	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
238	5.64	94.60	43.56	51.05	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
239	5.66	94.91	43.75	51.16	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
240	5.68	95.22	43.95	51.27	0.96	0.116	1.38	0.084	1.00	1.00	0.084	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	5.70	95.53	44.15	51.39	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
242	5.72	95.84	44.34	51.50	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
243	5.74	96.16	44.54	51.62	0.96	0.116	1.38	0.084	1.00	1.00	0.084	No
244	5.76	96.47	44.73	51.73	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
245	5.78	96.78	44.93	51.85	0.96	0.116	1.38	0.085	1.00	1.00	0.085	No
246	5.80	97.09	45.13	51.96	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
247	5.82	97.40	45.32	52.08	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
248	5.84	97.71	45.52	52.20	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
249	5.86	98.03	45.71	52.31	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
250	5.88	98.34	45.91	52.43	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
251	5.90	98.65	46.11	52.54	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
252	5.92	98.96	46.30	52.66	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
253	5.94	99.27	46.50	52.77	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
254	5.96	99.58	46.70	52.89	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
255	5.98	99.89	46.89	53.00	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
256	6.00	100.20	47.09	53.12	0.96	0.117	1.38	0.085	1.00	1.00	0.085	No
257	6.02	100.51	47.28	53.23	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
258	6.04	100.82	47.48	53.34	0.96	0.118	1.38	0.085	1.00	1.00	0.085	No
259	6.06	101.13	47.68	53.46	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
260	6.08	101.44	47.87	53.57	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
261	6.10	101.75	48.07	53.69	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
262	6.12	102.07	48.27	53.80	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
263	6.14	102.37	48.46	53.91	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
264	6.16	102.68	48.66	54.03	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
265	6.18	102.99	48.85	54.14	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
266	6.20	103.30	49.05	54.25	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
267	6.22	103.61	49.25	54.37	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
268	6.24	103.92	49.44	54.48	0.96	0.118	1.38	0.086	1.00	1.00	0.086	No
269	6.26	104.23	49.64	54.60	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
270	6.28	104.55	49.83	54.71	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
271	6.30	104.86	50.03	54.83	0.96	0.119	1.38	0.086	1.00	1.00	0.086	No
272	6.32	105.17	50.23	54.94	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
273	6.34	105.48	50.42	55.05	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
274	6.36	105.79	50.62	55.17	0.95	0.119	1.38	0.086	1.00	1.00	0.086	No
275	6.38	106.10	50.82	55.29	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
276	6.40	106.42	51.01	55.41	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
277	6.42	106.74	51.21	55.53	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
278	6.44	107.05	51.40	55.65	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
279	6.46	107.37	51.60	55.77	0.95	0.119	1.38	0.087	1.00	1.00	0.087	No
280	6.48	107.69	51.80	55.89	0.95	0.119	1.38	0.087	1.00	1.00	2.000	Yes
281	6.50	108.01	51.99	56.01	0.95	0.119	1.38	0.087	1.00	1.00	2.000	Yes
282	6.52	108.32	52.19	56.14	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
283	6.54	108.64	52.39	56.26	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
284	6.56	108.96	52.58	56.38	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
285	6.58	109.28	52.78	56.50	0.95	0.120	1.38	0.087	1.00	1.00	2.000	Yes
286	6.60	109.60	52.97	56.63	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
287	6.62	109.93	53.17	56.76	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
288	6.64	110.26	53.37	56.89	0.95	0.120	1.38	0.087	1.00	1.00	0.087	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	6.66	110.59	53.56	57.02	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
290	6.68	110.92	53.76	57.16	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
291	6.70	111.25	53.96	57.29	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
292	6.72	111.58	54.15	57.43	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
293	6.74	111.92	54.35	57.57	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
294	6.76	112.25	54.54	57.71	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
295	6.78	112.58	54.74	57.84	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
296	6.80	112.92	54.94	57.98	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
297	6.82	113.25	55.13	58.12	0.95	0.120	1.38	0.087	1.00	1.00	0.087	No
298	6.84	113.58	55.33	58.25	0.95	0.120	1.38	0.088	1.00	1.00	2.000	Yes
299	6.86	113.91	55.52	58.39	0.95	0.120	1.38	0.088	1.00	1.00	2.000	Yes
300	6.88	114.25	55.72	58.53	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
301	6.90	114.59	55.92	58.67	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
302	6.92	114.93	56.11	58.81	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
303	6.94	115.27	56.31	58.96	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
304	6.96	115.61	56.51	59.11	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
305	6.98	115.96	56.70	59.26	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
306	7.00	116.30	56.90	59.40	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
307	7.02	116.65	57.09	59.55	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
308	7.04	116.99	57.29	59.70	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
309	7.06	117.34	57.49	59.85	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
310	7.08	117.68	57.68	60.00	0.95	0.121	1.38	0.088	1.00	1.00	2.000	Yes
311	7.10	118.03	57.88	60.15	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
312	7.12	118.37	58.08	60.29	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
313	7.14	118.71	58.27	60.44	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
314	7.16	119.04	58.47	60.58	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
315	7.18	119.38	58.66	60.72	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
316	7.20	119.71	58.86	60.85	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
317	7.22	120.04	59.06	60.99	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
318	7.24	120.38	59.25	61.12	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
319	7.26	120.71	59.45	61.26	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
320	7.28	121.04	59.64	61.39	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
321	7.30	121.37	59.84	61.53	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
322	7.32	121.70	60.04	61.66	0.95	0.121	1.38	0.088	1.00	1.00	0.088	No
323	7.34	122.03	60.23	61.80	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
324	7.36	122.37	60.43	61.94	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
325	7.38	122.70	60.63	62.08	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
326	7.40	123.04	60.82	62.21	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
327	7.42	123.37	61.02	62.35	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
328	7.44	123.70	61.21	62.49	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
329	7.46	124.03	61.41	62.62	0.94	0.121	1.38	0.088	1.00	1.00	0.088	No
330	7.48	124.37	61.61	62.76	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
331	7.50	124.70	61.80	62.89	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
332	7.52	125.03	62.00	63.03	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
333	7.54	125.36	62.20	63.16	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
334	7.56	125.69	62.39	63.30	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
335	7.58	126.02	62.59	63.43	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
336	7.60	126.35	62.78	63.57	0.94	0.122	1.38	0.088	1.00	1.00	0.088	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	7.62	126.68	62.98	63.70	0.94	0.122	1.38	0.088	1.00	1.00	0.088	No
338	7.64	127.01	63.18	63.83	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
339	7.66	127.33	63.37	63.96	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
340	7.68	127.66	63.57	64.09	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
341	7.70	127.99	63.77	64.22	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
342	7.72	128.32	63.96	64.36	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
343	7.74	128.64	64.16	64.49	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
344	7.76	128.97	64.35	64.62	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
345	7.78	129.30	64.55	64.75	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
346	7.80	129.62	64.75	64.88	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
347	7.82	129.95	64.94	65.01	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
348	7.84	130.28	65.14	65.14	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
349	7.86	130.61	65.33	65.28	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
350	7.88	130.94	65.53	65.41	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
351	7.90	131.28	65.73	65.55	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
352	7.92	131.61	65.92	65.69	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
353	7.94	131.94	66.12	65.82	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
354	7.96	132.27	66.32	65.96	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
355	7.98	132.60	66.51	66.09	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
356	8.00	132.93	66.71	66.22	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
357	8.02	133.26	66.90	66.35	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
358	8.04	133.58	67.10	66.48	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
359	8.06	133.90	67.30	66.61	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
360	8.08	134.23	67.49	66.73	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
361	8.10	134.55	67.69	66.86	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
362	8.12	134.87	67.89	66.99	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
363	8.14	135.20	68.08	67.11	0.94	0.122	1.38	0.089	1.00	1.00	0.089	No
364	8.16	135.52	68.28	67.24	0.94	0.123	1.38	0.089	1.00	1.00	0.089	No
365	8.18	135.84	68.47	67.37	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
366	8.20	136.17	68.67	67.50	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
367	8.22	136.49	68.87	67.63	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
368	8.24	136.82	69.06	67.76	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
369	8.26	137.14	69.26	67.88	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
370	8.28	137.47	69.45	68.01	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
371	8.30	137.79	69.65	68.14	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
372	8.32	138.11	69.85	68.27	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
373	8.34	138.44	70.04	68.39	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
374	8.36	138.76	70.24	68.52	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
375	8.38	139.08	70.44	68.64	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
376	8.40	139.40	70.63	68.76	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
377	8.42	139.71	70.83	68.89	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
378	8.44	140.03	71.02	69.01	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
379	8.46	140.35	71.22	69.13	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
380	8.48	140.67	71.42	69.25	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
381	8.50	140.99	71.61	69.38	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
382	8.52	141.31	71.81	69.50	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
383	8.54	141.63	72.01	69.62	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
384	8.56	141.94	72.20	69.74	0.93	0.123	1.38	0.089	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	8.58	142.26	72.40	69.87	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
386	8.60	142.58	72.59	69.99	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
387	8.62	142.90	72.79	70.11	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
388	8.64	143.22	72.99	70.24	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
389	8.66	143.54	73.18	70.36	0.93	0.123	1.38	0.089	1.00	1.00	2.000	Yes
390	8.68	143.87	73.38	70.49	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
391	8.70	144.19	73.58	70.62	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
392	8.72	144.52	73.77	70.75	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
393	8.74	144.85	73.97	70.88	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
394	8.76	145.18	74.16	71.02	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
395	8.78	145.51	74.36	71.15	0.93	0.123	1.38	0.089	1.00	1.00	0.089	No
396	8.80	145.83	74.56	71.28	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
397	8.82	146.16	74.75	71.41	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
398	8.84	146.49	74.95	71.54	0.93	0.123	1.38	0.090	1.00	1.00	0.090	No
399	8.86	146.81	75.14	71.67	0.93	0.123	1.38	0.090	1.00	1.00	2.000	Yes
400	8.88	147.14	75.34	71.80	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
401	8.90	147.46	75.54	71.92	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
402	8.92	147.77	75.73	72.04	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
403	8.94	148.09	75.93	72.16	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
404	8.96	148.41	76.13	72.29	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
405	8.98	148.73	76.32	72.41	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
406	9.00	149.06	76.52	72.54	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
407	9.02	149.38	76.71	72.66	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
408	9.04	149.69	76.91	72.78	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
409	9.06	150.01	77.11	72.90	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
410	9.08	150.33	77.30	73.02	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
411	9.10	150.64	77.50	73.14	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
412	9.12	150.96	77.70	73.26	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
413	9.14	151.27	77.89	73.38	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
414	9.16	151.59	78.09	73.50	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
415	9.18	151.91	78.28	73.62	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
416	9.20	152.22	78.48	73.74	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
417	9.22	152.54	78.68	73.86	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
418	9.24	152.86	78.87	73.98	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
419	9.26	153.18	79.07	74.11	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
420	9.28	153.49	79.26	74.23	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
421	9.30	153.82	79.46	74.35	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
422	9.32	154.14	79.66	74.48	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
423	9.34	154.46	79.85	74.61	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
424	9.36	154.79	80.05	74.74	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
425	9.38	155.11	80.25	74.87	0.92	0.123	1.38	0.090	1.00	1.00	2.000	Yes
426	9.40	155.44	80.44	75.00	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
427	9.42	155.76	80.64	75.12	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
428	9.44	156.08	80.83	75.25	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
429	9.46	156.40	81.03	75.37	0.92	0.123	1.38	0.090	1.00	1.00	0.090	No
430	9.48	156.73	81.23	75.50	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
431	9.50	157.05	81.42	75.62	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
432	9.52	157.37	81.62	75.75	0.91	0.123	1.38	0.090	1.00	1.00	0.090	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	9.54	157.69	81.82	75.87	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
434	9.56	158.01	82.01	76.00	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
435	9.58	158.33	82.21	76.12	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
436	9.60	158.65	82.40	76.24	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
437	9.62	158.97	82.60	76.37	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
438	9.64	159.28	82.80	76.49	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
439	9.66	159.60	82.99	76.61	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
440	9.68	159.91	83.19	76.72	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
441	9.70	160.23	83.39	76.84	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
442	9.72	160.54	83.58	76.96	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
443	9.74	160.86	83.78	77.08	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
444	9.76	161.18	83.97	77.21	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
445	9.78	161.50	84.17	77.33	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
446	9.80	161.82	84.37	77.45	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
447	9.82	162.14	84.56	77.58	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
448	9.84	162.46	84.76	77.70	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
449	9.86	162.78	84.95	77.83	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
450	9.88	163.10	85.15	77.95	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
451	9.90	163.42	85.35	78.07	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
452	9.92	163.74	85.54	78.19	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
453	9.94	164.05	85.74	78.32	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
454	9.96	164.38	85.94	78.44	0.91	0.123	1.38	0.090	1.00	1.00	2.000	Yes
455	9.98	164.71	86.13	78.57	0.91	0.123	1.38	0.090	1.00	1.00	0.090	No
456	10.00	165.04	86.33	78.72	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
457	10.02	165.39	86.52	78.87	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
458	10.04	165.74	86.72	79.02	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
459	10.06	166.10	86.92	79.19	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
460	10.08	166.47	87.11	79.36	0.90	0.123	1.38	0.090	1.00	1.00	2.000	Yes
461	10.10	166.84	87.31	79.53	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
462	10.12	167.21	87.51	79.71	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
463	10.14	167.59	87.70	79.88	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
464	10.16	167.96	87.90	80.06	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
465	10.18	168.33	88.09	80.24	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
466	10.20	168.71	88.29	80.42	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
467	10.22	169.09	88.49	80.60	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
468	10.24	169.48	88.68	80.80	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
469	10.26	169.88	88.88	81.00	0.90	0.123	1.38	0.089	1.00	1.00	2.000	Yes
470	10.28	170.29	89.07	81.21	0.90	0.123	1.38	0.089	1.00	1.00	0.089	No
471	10.30	170.69	89.27	81.42	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
472	10.32	171.10	89.47	81.64	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
473	10.34	171.52	89.66	81.85	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
474	10.36	171.93	89.86	82.07	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
475	10.38	172.35	90.06	82.29	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
476	10.40	172.76	90.25	82.51	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
477	10.42	173.19	90.45	82.74	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
478	10.44	173.61	90.64	82.97	0.90	0.122	1.38	0.089	1.00	1.00	0.089	No
479	10.46	174.04	90.84	83.20	0.90	0.122	1.38	0.088	1.00	1.00	0.088	No
480	10.48	174.47	91.04	83.44	0.89	0.122	1.38	0.088	1.00	1.00	0.088	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	10.50	174.90	91.23	83.67	0.89	0.122	1.38	0.088	1.00	1.00	0.088	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	0.90	0.19	3.53	5.59	1.00	3.43	22.59	77.38	4.000	No	Yes	2.00
2	0.92	0.19	3.60	7.34	1.00	3.42	25.32	86.46	4.000	No	Yes	2.00
3	0.94	0.30	3.35	5.45	1.00	5.69	16.45	93.67	4.000	No	Yes	2.00
4	0.96	0.55	3.02	3.60	1.00	10.64	9.14	97.22	4.000	No	Yes	2.00
5	0.98	0.89	2.74	2.33	0.90	17.23	5.14	88.55	4.000	No	Yes	2.00
6	1.00	1.09	2.63	2.01	0.86	21.15	6.56	138.79	4.000	No	No	2.00
7	1.02	1.12	2.62	2.04	0.86	21.83	6.29	137.29	4.000	No	No	2.00
8	1.04	1.04	2.69	2.38	0.88	20.21	9.54	192.78	4.000	No	No	2.00
9	1.06	0.98	2.75	2.77	0.91	18.93	5.27	99.79	4.000	No	Yes	2.00
10	1.08	1.02	2.74	2.81	0.90	19.82	5.14	101.88	4.000	No	Yes	2.00
11	1.10	1.08	2.72	2.78	0.89	21.03	4.88	102.70	4.000	No	Yes	2.00
12	1.12	1.13	2.69	2.63	0.88	22.04	9.33	205.70	4.000	No	No	2.00
13	1.14	1.08	2.70	2.64	0.89	20.91	4.75	99.39	4.000	No	Yes	2.00
14	1.16	1.03	2.72	2.64	0.90	20.00	4.93	98.53	4.000	No	Yes	2.00
15	1.18	1.08	2.69	2.54	0.88	21.02	9.73	204.55	4.000	No	No	2.00
16	1.20	1.19	2.64	2.40	0.87	23.18	7.17	166.31	4.000	No	No	2.00
17	1.22	1.30	2.61	2.38	0.85	25.24	5.88	148.44	0.346	No	No	2.00
18	1.24	1.32	2.63	2.57	0.86	25.66	6.46	165.69	0.453	No	No	2.00
19	1.26	1.29	2.66	2.87	0.87	25.17	8.13	204.56	3.600	No	No	2.00
20	1.28	1.24	2.70	3.11	0.89	24.17	10.14	244.99	3.600	No	No	2.00
21	1.30	1.20	2.73	3.27	0.90	23.28	4.98	116.01	1.111	No	Yes	2.00
22	1.32	1.18	2.75	3.52	0.91	22.97	5.27	120.97	1.096	No	Yes	2.00
23	1.34	1.24	2.74	3.53	0.90	24.09	5.10	122.85	4.000	Yes	Yes	2.00
24	1.36	1.35	2.69	3.34	0.89	26.30	9.65	253.95	4.000	Yes	No	2.00
25	1.38	1.76	2.53	2.54	0.82	34.24	3.36	115.01	4.000	Yes	No	2.00
26	1.40	2.45	2.32	1.81	0.74	47.85	2.01	95.97	4.000	Yes	No	2.00
27	1.42	3.35	2.15	1.42	0.68	65.59	1.50	98.55	4.000	Yes	No	2.00
28	1.44	4.15	2.04	1.26	0.64	81.47	1.35	109.71	4.000	Yes	No	2.00
29	1.46	4.63	2.00	1.22	0.62	90.87	1.31	118.60	4.000	Yes	No	2.00
30	1.48	4.75	1.99	1.22	0.62	93.30	1.30	121.16	0.245	No	No	2.00
31	1.50	4.84	2.00	1.27	0.62	95.03	1.30	123.84	0.257	No	No	2.00
32	1.52	5.19	1.97	1.26	0.61	101.91	1.28	130.85	0.288	No	No	2.00
33	1.54	5.63	1.92	1.18	0.59	110.72	1.25	138.66	0.328	No	No	2.00
34	1.56	5.77	1.89	1.08	0.58	113.39	1.23	139.47	0.332	No	No	2.00
35	1.58	5.11	1.93	1.09	0.60	100.35	1.26	126.35	0.268	No	No	2.00
36	1.60	4.14	2.04	1.26	0.64	81.27	1.35	109.53	0.202	No	No	2.00
37	1.62	3.14	2.21	1.66	0.70	61.46	1.65	101.33	0.177	No	No	2.00
38	1.64	2.57	2.35	2.12	0.76	50.17	2.13	107.03	0.194	No	No	2.00
39	1.66	2.22	2.45	2.56	0.80	43.23	2.67	115.42	0.223	No	No	2.00
40	1.68	2.74	2.30	1.94	0.74	53.60	1.94	103.76	0.184	No	No	2.00
41	1.70	4.01	2.03	1.15	0.63	78.67	1.33	104.88	0.187	No	No	2.00
42	1.72	5.29	1.83	0.77	0.56	103.95	1.18	122.75	0.252	No	No	2.00
43	1.74	6.09	1.76	0.72	0.53	119.64	1.10	131.95	0.294	No	No	2.00
44	1.76	6.55	1.78	0.85	0.54	128.82	1.13	145.52	0.367	No	No	2.00
45	1.78	7.26	1.77	0.93	0.54	142.70	1.12	159.72	0.459	No	No	2.00
46	1.80	7.81	1.76	0.98	0.53	153.52	1.11	169.97	0.537	No	No	2.00
47	1.82	8.16	1.75	0.98	0.53	160.58	1.09	174.59	0.575	No	No	2.00
48	1.84	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	1.86	8.70	1.69	0.87	0.51	171.09	1.00	171.09	0.546	No	No	2.00
50	1.88	8.87	1.63	0.72	0.48	174.49	1.00	174.49	0.574	No	No	2.00
51	1.90	8.92	1.59	0.59	0.47	171.29	1.00	171.29	0.547	No	No	2.00
52	1.92	8.78	1.56	0.51	0.46	165.73	1.00	165.73	0.503	No	No	2.00
53	1.94	8.56	1.56	0.50	0.46	161.53	1.00	161.53	0.472	No	No	2.00
54	1.96	8.36	1.57	0.51	0.46	158.13	1.00	158.13	0.448	No	No	2.00
55	1.98	8.17	1.58	0.51	0.47	154.79	1.00	154.79	0.425	No	No	2.00
56	2.00	7.82	1.61	0.53	0.47	149.44	1.00	149.44	0.390	No	No	2.00
57	2.02	7.15	1.65	0.57	0.49	139.03	1.00	139.03	0.330	No	No	2.00
58	2.04	6.30	1.72	0.65	0.52	123.67	1.03	127.58	0.273	No	No	2.00
59	2.06	5.53	1.80	0.73	0.55	108.51	1.15	124.97	0.262	No	No	2.00
60	2.08	5.19	1.83	0.77	0.56	101.68	1.19	120.77	0.244	No	No	2.00
61	2.10	5.22	1.83	0.78	0.56	102.31	1.19	121.50	0.247	No	No	2.00
62	2.12	5.72	1.76	0.67	0.53	112.29	1.11	124.08	0.258	No	No	2.00
63	2.14	6.27	1.69	0.56	0.51	122.36	1.00	122.36	0.250	No	No	2.00
64	2.16	6.80	1.63	0.48	0.49	128.48	1.00	128.48	0.277	No	No	2.00
65	2.18	6.95	1.61	0.45	0.48	129.84	1.00	129.84	0.284	No	No	2.00
66	2.20	6.99	1.61	0.44	0.48	130.11	1.00	130.11	0.285	No	No	2.00
67	2.22	6.70	1.63	0.46	0.49	125.74	1.00	125.74	0.265	No	No	2.00
68	2.24	6.17	1.70	0.57	0.51	119.29	1.00	119.29	0.238	No	No	2.00
69	2.26	5.42	1.78	0.66	0.54	106.21	1.13	119.93	0.240	No	No	2.00
70	2.28	4.76	1.88	0.81	0.58	93.30	1.22	113.84	0.217	No	No	2.00
71	2.30	4.11	2.00	1.04	0.62	80.45	1.30	104.85	0.187	No	No	2.00
72	2.32	3.50	2.17	1.59	0.69	68.31	1.54	105.09	0.188	No	No	2.00
73	2.34	3.04	2.32	2.27	0.75	59.16	1.99	117.82	0.232	No	No	2.00
74	2.36	3.58	2.23	2.06	0.72	69.96	1.71	119.49	0.239	No	No	2.00
75	2.38	5.22	1.99	1.36	0.62	102.30	1.30	132.96	0.299	No	No	2.00
76	2.40	7.10	1.77	0.88	0.54	138.41	1.11	153.85	0.419	No	No	2.00
77	2.42	7.99	1.68	0.69	0.50	148.82	1.00	148.82	0.387	No	No	2.00
78	2.44	7.39	1.70	0.70	0.51	138.84	1.00	138.84	4.000	Yes	No	2.00
79	2.46	6.14	1.82	0.89	0.56	120.43	1.17	140.78	4.000	Yes	No	2.00
80	2.48	4.82	1.99	1.23	0.62	94.33	1.30	122.41	4.000	Yes	No	2.00
81	2.50	3.75	2.19	1.83	0.70	73.13	1.58	115.62	4.000	Yes	No	2.00
82	2.52	2.99	2.34	2.44	0.76	58.12	2.10	122.34	4.000	Yes	No	2.00
83	2.54	2.50	2.47	3.07	0.81	48.51	2.78	134.71	4.000	Yes	No	2.00
84	2.56	2.26	2.53	3.37	0.83	43.80	3.40	148.90	4.000	Yes	No	2.00
85	2.58	2.04	2.58	3.60	0.85	39.44	4.83	190.36	4.000	Yes	No	2.00
86	2.60	1.92	2.58	3.37	0.85	37.06	4.82	178.55	4.000	Yes	No	2.00
87	2.62	1.97	2.51	2.73	0.82	37.99	3.07	116.58	4.000	Yes	No	2.00
88	2.64	2.21	2.38	1.95	0.77	42.83	2.26	96.98	4.000	Yes	No	2.00
89	2.66	2.55	2.27	1.58	0.73	49.39	1.83	90.41	4.000	Yes	No	2.00
90	2.68	2.96	2.18	1.35	0.70	57.45	1.56	89.82	4.000	Yes	No	2.00
91	2.70	3.36	2.12	1.25	0.67	65.36	1.44	94.29	4.000	Yes	No	2.00
92	2.72	3.70	2.07	1.21	0.66	72.06	1.38	99.57	4.000	Yes	No	2.00
93	2.74	3.95	2.05	1.21	0.65	77.04	1.35	104.37	4.000	Yes	No	2.00
94	2.76	4.15	2.03	1.20	0.64	80.92	1.34	108.14	0.198	No	No	2.00
95	2.78	4.33	2.01	1.16	0.63	84.46	1.31	110.92	0.207	No	No	2.00
96	2.80	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	2.82	4.67	1.89	0.82	0.59	90.13	1.23	111.03	0.207	No	No	2.00
98	2.84	4.85	1.82	0.62	0.56	90.75	1.18	106.64	0.193	No	No	2.00
99	2.86	4.91	1.78	0.52	0.54	89.83	1.13	101.67	0.178	No	No	2.00
100	2.88	4.78	1.77	0.47	0.54	86.90	1.00	86.90	0.141	No	No	2.00
101	2.90	3.99	1.88	0.61	0.58	75.79	1.22	92.74	0.154	No	No	2.00
102	2.92	3.56	1.96	0.75	0.61	69.29	1.28	88.57	0.145	No	No	2.00
103	2.94	3.22	2.06	0.95	0.65	62.49	1.36	85.20	0.138	No	No	1.95
104	2.96	3.67	1.99	0.86	0.62	71.48	1.30	92.69	0.154	No	No	2.00
105	2.98	4.59	1.86	0.68	0.58	85.74	1.21	103.89	0.184	No	No	2.00
106	3.00	5.61	1.73	0.49	0.53	98.83	1.00	98.83	0.170	No	No	2.00
107	3.02	6.39	1.64	0.37	0.49	108.19	1.00	108.19	0.198	No	No	2.00
108	3.04	6.28	1.64	0.35	0.49	105.89	1.00	105.89	0.190	No	No	2.00
109	3.06	5.93	1.66	0.36	0.50	100.64	1.00	100.64	0.175	No	No	2.00
110	3.08	5.35	1.71	0.38	0.52	92.28	1.00	92.28	0.153	No	No	2.00
111	3.10	5.00	1.75	0.43	0.53	87.75	1.00	87.75	0.143	No	No	1.99
112	3.12	4.90	1.79	0.52	0.55	87.30	1.15	99.96	0.173	No	No	2.00
113	3.14	5.05	1.82	0.63	0.56	90.87	1.18	107.07	0.194	No	No	2.00
114	3.16	5.08	1.86	0.74	0.57	92.53	1.21	111.69	0.210	No	No	2.00
115	3.18	4.96	1.90	0.87	0.59	91.75	1.24	113.59	0.216	No	No	2.00
116	3.20	4.74	1.94	0.97	0.61	88.84	1.26	112.38	0.212	No	No	2.00
117	3.22	4.34	2.01	1.15	0.63	83.27	1.31	109.50	0.202	No	No	2.00
118	3.24	3.98	2.08	1.34	0.66	77.40	1.39	107.38	0.195	No	No	2.00
119	3.26	3.76	2.14	1.54	0.68	73.09	1.48	107.93	0.197	No	No	2.00
120	3.28	3.62	2.18	1.74	0.70	70.39	1.57	110.67	0.206	No	No	2.00
121	3.30	3.35	2.23	1.85	0.72	64.95	1.69	109.46	0.202	No	No	2.00
122	3.32	2.93	2.30	2.04	0.74	56.74	1.92	108.92	0.200	No	No	2.00
123	3.34	2.62	2.37	2.32	0.77	50.69	2.23	113.24	0.215	No	No	2.00
124	3.36	2.93	2.33	2.26	0.76	56.66	2.04	115.60	0.224	No	No	2.00
125	3.38	4.02	2.14	1.67	0.68	78.28	1.48	115.84	0.225	No	No	2.00
126	3.40	5.72	1.92	1.06	0.60	103.31	1.25	128.86	0.279	No	No	2.00
127	3.42	6.93	1.78	0.76	0.54	118.43	1.12	133.16	0.300	No	No	2.00
128	3.44	7.27	1.73	0.64	0.52	121.54	1.04	126.42	0.268	No	No	2.00
129	3.46	6.78	1.75	0.64	0.53	113.83	1.08	122.59	0.251	No	No	2.00
130	3.48	6.25	1.77	0.64	0.54	105.75	1.12	118.45	0.235	No	No	2.00
131	3.50	5.86	1.79	0.64	0.55	99.61	1.14	113.99	0.218	No	No	2.00
132	3.52	5.38	1.81	0.62	0.56	91.87	1.17	107.33	0.195	No	No	2.00
133	3.54	4.76	1.86	0.63	0.58	82.34	1.21	99.44	0.171	No	No	2.00
134	3.56	3.90	1.94	0.67	0.61	69.23	1.26	87.35	0.142	No	No	1.91
135	3.58	3.17	2.03	0.76	0.64	58.02	1.34	77.52	0.123	No	No	1.65
136	3.60	2.57	2.16	0.99	0.69	48.92	1.52	74.18	0.118	No	No	1.58
137	3.62	2.32	2.23	1.19	0.72	44.64	1.70	76.10	0.121	No	No	1.62
138	3.64	2.43	2.22	1.20	0.71	46.74	1.66	77.76	0.124	No	No	1.65
139	3.66	2.62	2.16	1.01	0.69	49.41	1.52	74.91	0.119	No	No	1.59
140	3.68	2.61	2.13	0.89	0.68	48.62	1.47	71.44	0.114	No	No	1.51
141	3.70	2.31	2.18	0.93	0.70	43.60	1.57	68.50	0.110	No	No	1.46
142	3.72	1.95	2.28	1.11	0.74	37.26	1.86	69.30	0.111	No	No	1.47
143	3.74	1.75	2.37	1.32	0.77	33.24	2.20	73.17	0.116	No	No	1.54
144	3.76	1.73	2.37	1.33	0.77	32.88	2.23	73.24	0.117	No	No	1.54

:: 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	3.78	1.77	2.38	1.41	0.77	33.70	2.25	75.91	0.121	No	No	1.59
146	3.80	1.76	2.37	1.37	0.77	33.41	2.23	74.67	4.000	Yes	No	2.00
147	3.82	1.59	2.44	1.56	0.80	30.04	2.61	78.43	4.000	Yes	No	2.00
148	3.84	1.29	2.56	1.84	0.84	24.23	4.18	101.24	4.000	Yes	No	2.00
149	3.86	1.03	2.72	2.46	0.91	19.00	4.91	93.31	4.000	Yes	Yes	2.00
150	3.88	0.88	2.81	2.81	0.94	16.14	5.99	96.67	4.000	Yes	Yes	2.00
151	3.90	0.91	2.78	2.59	0.93	16.74	5.57	93.32	4.000	Yes	Yes	2.00
152	3.92	0.99	2.71	2.21	0.90	18.16	4.79	87.01	4.000	Yes	Yes	2.00
153	3.94	1.45	2.46	1.44	0.81	27.33	2.70	73.79	4.000	Yes	No	2.00
154	3.96	1.91	2.28	1.04	0.74	35.89	1.85	66.52	4.000	Yes	No	2.00
155	3.98	2.22	2.20	0.89	0.71	40.66	1.61	65.30	4.000	Yes	No	2.00
156	4.00	2.12	2.22	0.90	0.72	39.03	1.65	64.57	4.000	Yes	No	2.00
157	4.02	2.02	2.24	0.93	0.72	37.29	1.72	64.27	4.000	Yes	No	2.00
158	4.04	2.15	2.26	1.14	0.73	39.95	1.80	71.77	4.000	Yes	No	2.00
159	4.06	2.25	2.31	1.48	0.75	42.39	1.96	82.92	4.000	Yes	No	2.00
160	4.08	2.28	2.36	1.83	0.77	43.60	2.16	94.06	4.000	Yes	No	2.00
161	4.10	2.14	2.42	2.11	0.79	40.86	2.46	100.65	4.000	Yes	No	2.00
162	4.12	1.84	2.54	2.68	0.84	34.87	3.58	124.71	4.000	Yes	No	2.00
163	4.14	1.90	2.51	2.54	0.83	36.14	2.99	107.93	0.197	No	No	2.00
164	4.16	1.82	2.54	2.69	0.84	34.45	3.68	126.70	0.269	No	No	2.00
165	4.18	1.81	2.54	2.68	0.84	34.40	3.68	126.42	0.268	No	No	2.00
166	4.20	1.44	2.73	3.89	0.91	27.08	4.98	134.76	1.292	No	Yes	2.00
167	4.22	1.22	2.85	4.88	0.96	22.76	6.46	147.10	1.086	No	Yes	2.00
168	4.24	1.09	2.92	5.37	0.98	20.05	7.44	149.09	0.956	No	Yes	2.00
169	4.26	1.01	2.94	5.31	0.99	18.44	7.80	143.90	0.880	No	Yes	2.00
170	4.28	0.97	2.95	5.17	0.99	17.71	7.89	139.82	0.845	No	Yes	2.00
171	4.30	0.95	2.93	4.78	0.99	17.31	7.67	132.73	0.826	No	Yes	2.00
172	4.32	0.95	2.90	4.23	0.98	17.25	7.17	123.75	0.823	No	Yes	2.00
173	4.34	0.95	2.85	3.56	0.96	17.33	6.48	112.38	0.827	No	Yes	2.00
174	4.36	0.97	2.81	3.11	0.94	17.65	5.93	104.72	0.842	No	Yes	2.00
175	4.38	0.98	2.77	2.81	0.93	17.90	5.54	99.25	0.854	No	Yes	2.00
176	4.40	0.99	2.76	2.67	0.92	18.08	5.35	96.80	0.863	No	Yes	2.00
177	4.42	0.99	2.75	2.63	0.92	18.09	5.30	95.89	0.863	No	Yes	2.00
178	4.44	0.98	2.75	2.60	0.92	17.94	5.30	95.11	0.856	No	Yes	2.00
179	4.46	0.98	2.75	2.58	0.92	17.90	5.29	94.72	0.854	No	Yes	2.00
180	4.48	0.99	2.75	2.56	0.92	18.07	5.22	94.35	0.862	No	Yes	2.00
181	4.50	1.00	2.75	2.60	0.92	18.22	5.23	95.37	0.869	No	Yes	2.00
182	4.52	0.99	2.76	2.63	0.92	17.95	5.33	95.68	0.856	No	Yes	2.00
183	4.54	0.94	2.78	2.70	0.93	17.10	5.61	95.94	0.816	No	Yes	2.00
184	4.56	0.89	2.81	2.76	0.94	16.00	5.97	95.52	0.763	No	Yes	2.00
185	4.58	0.83	2.85	2.86	0.96	14.78	6.45	95.34	0.705	No	Yes	2.00
186	4.60	0.78	2.87	2.86	0.96	13.91	6.75	93.85	0.663	No	Yes	2.00
187	4.62	0.76	2.87	2.77	0.97	13.43	6.80	91.35	0.641	No	Yes	2.00
188	4.64	0.75	2.85	2.55	0.96	13.29	6.57	87.24	0.634	No	Yes	2.00
189	4.66	0.75	2.84	2.34	0.95	13.18	6.33	83.43	0.629	No	Yes	2.00
190	4.68	0.75	2.82	2.16	0.95	13.24	6.05	80.10	0.632	No	Yes	2.00
191	4.70	0.77	2.79	2.01	0.94	13.59	5.72	77.74	0.648	No	Yes	2.00
192	4.72	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	4.74	0.80	2.76	1.90	0.92	14.19	5.38	76.28	0.677	No	Yes	2.00
194	4.76	0.80	2.76	1.88	0.92	14.21	5.34	75.87	0.678	No	Yes	2.00
195	4.78	0.81	2.75	1.85	0.92	14.36	5.25	75.33	0.685	No	Yes	2.00
196	4.80	0.82	2.75	1.89	0.92	14.50	5.26	76.34	0.692	No	Yes	2.00
197	4.82	0.80	2.78	2.06	0.93	14.11	5.62	79.32	0.673	No	Yes	2.00
198	4.84	0.75	2.82	2.20	0.95	13.14	6.15	80.82	0.627	No	Yes	2.00
199	4.86	0.70	2.85	2.22	0.96	12.28	6.50	79.88	0.586	No	Yes	2.00
200	4.88	0.69	2.84	2.06	0.96	11.95	6.40	76.52	0.570	No	Yes	2.00
201	4.90	0.69	2.83	1.97	0.95	11.89	6.29	74.70	0.567	No	Yes	2.00
202	4.92	0.68	2.83	1.92	0.95	11.83	6.23	73.66	0.564	No	Yes	2.00
203	4.94	0.68	2.83	1.91	0.95	11.77	6.24	73.44	0.561	No	Yes	2.00
204	4.96	0.69	2.82	1.85	0.95	11.89	6.10	72.53	0.567	No	Yes	2.00
205	4.98	0.69	2.81	1.79	0.94	11.97	5.97	71.45	0.571	No	Yes	2.00
206	5.00	0.68	2.81	1.76	0.94	11.82	5.97	70.62	0.564	No	Yes	2.00
207	5.02	0.67	2.82	1.76	0.95	11.63	6.05	70.39	0.555	No	Yes	2.00
208	5.04	0.67	2.82	1.76	0.95	11.50	6.11	70.27	0.548	No	Yes	2.00
209	5.06	0.67	2.82	1.73	0.95	11.50	6.05	69.61	0.548	No	Yes	2.00
210	5.08	0.67	2.81	1.70	0.95	11.48	6.02	69.09	0.548	No	Yes	2.00
211	5.10	0.66	2.81	1.69	0.95	11.42	6.02	68.75	0.545	No	Yes	2.00
212	5.12	0.67	2.81	1.66	0.94	11.47	5.96	68.33	0.547	No	Yes	2.00
213	5.14	0.67	2.80	1.62	0.94	11.60	5.84	67.69	0.553	No	Yes	2.00
214	5.16	0.68	2.79	1.57	0.94	11.78	5.68	66.84	0.562	No	Yes	2.00
215	5.18	0.69	2.78	1.55	0.93	11.93	5.58	66.57	0.569	No	Yes	2.00
216	5.20	0.70	2.77	1.55	0.93	12.04	5.53	66.64	0.574	No	Yes	2.00
217	5.22	0.70	2.77	1.56	0.93	12.06	5.55	66.88	0.575	No	Yes	2.00
218	5.24	0.70	2.78	1.57	0.93	11.93	5.61	66.95	0.569	No	Yes	2.00
219	5.26	0.69	2.79	1.59	0.94	11.79	5.70	67.18	0.562	No	Yes	2.00
220	5.28	0.69	2.79	1.61	0.94	11.71	5.77	67.51	0.558	No	Yes	2.00
221	5.30	0.69	2.80	1.62	0.94	11.67	5.80	67.74	0.557	No	Yes	2.00
222	5.32	0.70	2.79	1.59	0.94	11.89	5.67	67.45	0.567	No	Yes	2.00
223	5.34	0.74	2.73	1.32	0.92	12.36	5.03	62.20	0.590	No	Yes	2.00
224	5.36	0.77	2.67	1.08	0.89	12.80	8.68	111.13	0.187	No	No	2.00
225	5.38	0.80	2.68	1.17	0.89	13.32	8.78	116.93	0.206	No	No	2.00
226	5.40	0.79	2.74	1.54	0.92	13.30	5.10	67.84	0.634	No	Yes	2.00
227	5.42	0.78	2.79	1.93	0.94	13.26	5.71	75.73	0.633	No	Yes	2.00
228	5.44	0.76	2.81	2.00	0.94	12.92	5.93	76.67	0.616	No	Yes	2.00
229	5.46	0.76	2.81	1.98	0.94	12.85	5.93	76.22	0.613	No	Yes	2.00
230	5.48	0.75	2.81	1.98	0.95	12.71	5.99	76.12	0.606	No	Yes	2.00
231	5.50	0.75	2.82	1.98	0.95	12.53	6.05	75.80	0.598	No	Yes	2.00
232	5.52	0.73	2.82	1.97	0.95	12.23	6.15	75.21	0.583	No	Yes	2.00
233	5.54	0.71	2.83	1.91	0.95	11.88	6.19	73.54	0.567	No	Yes	2.00
234	5.56	0.70	2.83	1.83	0.95	11.58	6.19	71.72	0.552	No	Yes	2.00
235	5.58	0.69	2.82	1.74	0.95	11.41	6.12	69.77	0.544	No	Yes	2.00
236	5.60	0.69	2.82	1.68	0.95	11.33	6.05	68.50	0.540	No	Yes	2.00
237	5.62	0.69	2.82	1.69	0.95	11.21	6.11	68.45	0.535	No	Yes	2.00
238	5.64	0.68	2.83	1.72	0.95	11.12	6.19	68.89	0.531	No	Yes	2.00
239	5.66	0.68	2.83	1.74	0.95	11.09	6.24	69.23	0.529	No	Yes	2.00
240	5.68	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	5.70	0.69	2.83	1.74	0.95	11.18	6.22	69.47	0.533	No	Yes	2.00
242	5.72	0.69	2.84	1.78	0.96	11.11	6.31	70.10	0.530	No	Yes	2.00
243	5.74	0.68	2.84	1.82	0.96	11.03	6.42	70.75	0.526	No	Yes	2.00
244	5.76	0.68	2.85	1.86	0.96	10.98	6.49	71.31	0.524	No	Yes	2.00
245	5.78	0.69	2.85	1.85	0.96	11.05	6.44	71.20	0.527	No	Yes	2.00
246	5.80	0.70	2.84	1.81	0.96	11.20	6.32	70.83	0.534	No	Yes	2.00
247	5.82	0.71	2.83	1.78	0.95	11.34	6.21	70.45	0.541	No	Yes	2.00
248	5.84	0.71	2.82	1.76	0.95	11.44	6.14	70.19	0.546	No	Yes	2.00
249	5.86	0.71	2.83	1.77	0.95	11.36	6.18	70.17	0.542	No	Yes	2.00
250	5.88	0.70	2.83	1.78	0.96	11.18	6.27	70.12	0.534	No	Yes	2.00
251	5.90	0.69	2.84	1.80	0.96	10.99	6.39	70.24	0.524	No	Yes	2.00
252	5.92	0.69	2.85	1.81	0.96	10.87	6.46	70.19	0.518	No	Yes	2.00
253	5.94	0.68	2.85	1.81	0.96	10.75	6.52	70.14	0.513	No	Yes	2.00
254	5.96	0.68	2.86	1.82	0.96	10.63	6.59	70.08	0.507	No	Yes	2.00
255	5.98	0.67	2.86	1.82	0.97	10.53	6.65	70.01	0.502	No	Yes	2.00
256	6.00	0.67	2.86	1.81	0.97	10.50	6.65	69.78	0.501	No	Yes	2.00
257	6.02	0.67	2.86	1.80	0.97	10.52	6.61	69.54	0.502	No	Yes	2.00
258	6.04	0.68	2.85	1.76	0.96	10.61	6.50	68.98	0.506	No	Yes	2.00
259	6.06	0.69	2.85	1.74	0.96	10.67	6.44	68.67	0.509	No	Yes	2.00
260	6.08	0.69	2.84	1.71	0.96	10.73	6.36	68.27	0.512	No	Yes	2.00
261	6.10	0.69	2.84	1.72	0.96	10.71	6.39	68.35	0.511	No	Yes	2.00
262	6.12	0.69	2.84	1.72	0.96	10.67	6.40	68.25	0.509	No	Yes	2.00
263	6.14	0.69	2.85	1.72	0.96	10.55	6.46	68.19	0.503	No	Yes	2.00
264	6.16	0.68	2.85	1.73	0.96	10.43	6.53	68.14	0.498	No	Yes	2.00
265	6.18	0.68	2.86	1.75	0.97	10.35	6.61	68.46	0.494	No	Yes	2.00
266	6.20	0.67	2.86	1.77	0.97	10.32	6.65	68.67	0.492	No	Yes	2.00
267	6.22	0.68	2.86	1.78	0.97	10.32	6.67	68.84	0.492	No	Yes	2.00
268	6.24	0.67	2.86	1.78	0.97	10.27	6.70	68.86	0.490	No	Yes	2.00
269	6.26	0.68	2.86	1.78	0.97	10.34	6.67	68.99	0.493	No	Yes	2.00
270	6.28	0.70	2.84	1.72	0.96	10.63	6.43	68.34	0.507	No	Yes	2.00
271	6.30	0.74	2.81	1.60	0.95	11.21	5.95	66.71	0.534	No	Yes	2.00
272	6.32	0.78	2.77	1.49	0.93	11.75	5.54	65.15	0.561	No	Yes	2.00
273	6.34	0.80	2.75	1.44	0.93	12.15	5.31	64.53	0.580	No	Yes	2.00
274	6.36	0.82	2.75	1.46	0.93	12.37	5.26	65.11	0.590	No	Yes	2.00
275	6.38	0.84	2.75	1.50	0.93	12.67	5.24	66.43	0.605	No	Yes	2.00
276	6.40	0.85	2.75	1.55	0.93	12.88	5.24	67.49	0.614	No	Yes	2.00
277	6.42	0.86	2.76	1.63	0.93	13.03	5.32	69.37	0.622	No	Yes	2.00
278	6.44	0.87	2.76	1.68	0.93	13.07	5.40	70.58	0.623	No	Yes	2.00
279	6.46	0.87	2.77	1.73	0.93	13.13	5.45	71.53	0.626	No	Yes	2.00
280	6.48	0.87	2.76	1.72	0.93	13.16	5.43	71.40	4.000	Yes	Yes	2.00
281	6.50	0.93	2.72	1.56	0.92	13.97	4.93	68.90	4.000	Yes	Yes	2.00
282	6.52	1.01	2.67	1.39	0.89	15.08	8.25	124.45	4.000	Yes	No	2.00
283	6.54	1.10	2.62	1.28	0.87	16.39	6.01	98.45	4.000	Yes	No	2.00
284	6.56	1.18	2.56	1.07	0.85	17.40	4.06	70.64	4.000	Yes	No	2.00
285	6.58	1.25	2.54	1.08	0.84	18.48	3.54	65.42	4.000	Yes	No	2.00
286	6.60	1.31	2.53	1.12	0.84	19.36	3.32	64.35	0.105	No	No	1.20
287	6.62	1.32	2.57	1.37	0.86	19.65	4.32	84.77	0.137	No	No	1.57
288	6.64	1.32	2.59	1.51	0.86	19.62	5.00	98.01	0.168	No	No	1.92

:: 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	6.66	1.32	2.60	1.59	0.87	19.66	5.40	106.06	0.191	No	No	2.00
290	6.68	1.32	2.61	1.65	0.87	19.68	5.72	112.52	0.191	No	No	2.00
291	6.70	1.31	2.62	1.75	0.88	19.54	6.32	123.50	0.230	No	No	2.00
292	6.72	1.29	2.65	1.88	0.89	19.25	7.32	140.85	0.306	No	No	2.00
293	6.74	1.28	2.66	1.97	0.89	19.04	8.09	154.04	0.378	No	No	2.00
294	6.76	1.27	2.67	1.97	0.89	18.92	8.22	155.47	0.387	No	No	2.00
295	6.78	1.28	2.66	1.89	0.89	18.92	7.68	145.39	0.329	No	No	2.00
296	6.80	1.30	2.65	1.85	0.89	19.17	7.22	138.53	0.295	No	No	2.00
297	6.82	1.35	2.62	1.77	0.88	19.87	6.18	122.82	0.227	No	No	2.00
298	6.84	1.38	2.61	1.74	0.87	20.22	5.81	117.42	4.000	Yes	No	2.00
299	6.86	1.45	2.57	1.60	0.86	21.18	4.58	97.10	4.000	Yes	No	2.00
300	6.88	1.66	2.49	1.38	0.83	24.08	2.93	70.47	4.000	Yes	No	2.00
301	6.90	2.08	2.38	1.17	0.78	29.75	2.25	66.94	4.000	Yes	No	2.00
302	6.92	2.35	2.33	1.15	0.77	33.51	2.03	68.20	4.000	Yes	No	2.00
303	6.94	2.37	2.35	1.27	0.77	33.86	2.12	71.85	4.000	Yes	No	2.00
304	6.96	2.09	2.44	1.54	0.81	30.15	2.59	77.97	4.000	Yes	No	2.00
305	6.98	1.86	2.52	1.81	0.84	26.96	3.16	85.18	4.000	Yes	No	2.00
306	7.00	1.68	2.59	2.09	0.87	24.53	5.01	122.89	4.000	Yes	No	2.00
307	7.02	1.59	2.64	2.35	0.89	23.21	6.91	160.29	4.000	Yes	No	2.00
308	7.04	1.49	2.69	2.64	0.90	21.93	9.45	207.30	4.000	Yes	No	2.00
309	7.06	1.41	2.73	2.88	0.92	20.68	5.05	104.46	4.000	Yes	Yes	2.00
310	7.08	1.34	2.76	2.98	0.93	19.61	5.36	105.00	4.000	Yes	Yes	2.00
311	7.10	1.28	2.78	3.00	0.94	18.74	5.56	104.26	0.894	No	Yes	2.00
312	7.12	1.25	2.78	2.91	0.94	18.14	5.60	101.58	0.865	No	Yes	2.00
313	7.14	1.22	2.77	2.74	0.94	17.61	5.54	97.51	0.840	No	Yes	2.00
314	7.16	1.21	2.75	2.47	0.93	17.30	5.29	91.54	0.825	No	Yes	2.00
315	7.18	1.19	2.74	2.27	0.92	16.90	5.15	87.05	0.806	No	Yes	2.00
316	7.20	1.18	2.73	2.14	0.92	16.68	5.04	84.04	0.796	No	Yes	2.00
317	7.22	1.16	2.73	2.10	0.92	16.40	5.05	82.81	0.782	No	Yes	2.00
318	7.24	1.16	2.73	2.07	0.92	16.39	5.02	82.23	0.782	No	Yes	2.00
319	7.26	1.18	2.72	2.03	0.92	16.57	4.92	81.50	0.790	No	Yes	2.00
320	7.28	1.21	2.70	1.96	0.91	16.96	4.73	80.30	0.809	No	Yes	2.00
321	7.30	1.23	2.69	1.89	0.91	17.23	9.49	163.53	0.438	No	No	2.00
322	7.32	1.25	2.69	1.91	0.90	17.46	9.34	163.00	0.435	No	No	2.00
323	7.34	1.25	2.69	1.96	0.91	17.46	9.75	170.20	0.485	No	No	2.00
324	7.36	1.25	2.71	2.05	0.91	17.39	4.76	82.80	0.829	No	Yes	2.00
325	7.38	1.22	2.72	2.13	0.92	17.02	4.94	84.11	0.812	No	Yes	2.00
326	7.40	1.19	2.75	2.23	0.93	16.48	5.20	85.76	0.786	No	Yes	2.00
327	7.42	1.14	2.77	2.30	0.94	15.84	5.45	86.34	0.756	No	Yes	2.00
328	7.44	1.12	2.78	2.32	0.94	15.43	5.59	86.24	0.736	No	Yes	2.00
329	7.46	1.11	2.77	2.24	0.94	15.33	5.51	84.51	0.731	No	Yes	2.00
330	7.48	1.13	2.76	2.16	0.93	15.49	5.36	83.04	0.739	No	Yes	2.00
331	7.50	1.15	2.75	2.09	0.93	15.68	5.22	81.86	0.748	No	Yes	2.00
332	7.52	1.15	2.74	2.07	0.93	15.71	5.19	81.51	0.749	No	Yes	2.00
333	7.54	1.15	2.74	2.05	0.93	15.68	5.17	81.12	0.748	No	Yes	2.00
334	7.56	1.15	2.74	2.04	0.93	15.58	5.18	80.66	0.743	No	Yes	2.00
335	7.58	1.15	2.74	2.03	0.93	15.57	5.16	80.38	0.742	No	Yes	2.00
336	7.60	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	7.62	1.11	2.75	1.98	0.93	14.98	5.26	78.89	0.715	No	Yes	2.00
338	7.64	1.10	2.75	1.95	0.93	14.75	5.28	77.87	0.703	No	Yes	2.00
339	7.66	1.11	2.74	1.88	0.93	14.89	5.14	76.54	0.710	No	Yes	2.00
340	7.68	1.15	2.72	1.78	0.92	15.34	4.88	74.80	0.732	No	Yes	2.00
341	7.70	1.18	2.69	1.69	0.91	15.78	9.80	154.61	0.381	No	No	2.00
342	7.72	1.20	2.68	1.64	0.90	15.90	9.22	146.63	0.336	No	No	2.00
343	7.74	1.18	2.69	1.65	0.91	15.66	9.66	151.26	0.362	No	No	2.00
344	7.76	1.16	2.71	1.70	0.91	15.33	4.77	73.17	0.731	No	Yes	2.00
345	7.78	1.17	2.70	1.69	0.91	15.47	4.72	73.06	0.738	No	Yes	2.00
346	7.80	1.21	2.68	1.63	0.90	15.98	9.01	143.95	0.322	No	No	2.00
347	7.82	1.26	2.66	1.57	0.90	16.59	7.88	130.77	0.259	No	No	2.00
348	7.84	1.28	2.66	1.63	0.90	16.90	7.93	133.92	0.273	No	No	2.00
349	7.86	1.27	2.68	1.77	0.90	16.80	9.07	152.44	0.369	No	No	2.00
350	7.88	1.22	2.73	2.04	0.92	16.16	5.03	81.25	0.771	No	Yes	2.00
351	7.90	1.17	2.77	2.24	0.94	15.40	5.50	84.67	0.735	No	Yes	2.00
352	7.92	1.12	2.80	2.39	0.95	14.66	5.90	86.52	0.699	No	Yes	2.00
353	7.94	1.08	2.81	2.32	0.95	14.05	6.00	84.30	0.670	No	Yes	2.00
354	7.96	1.04	2.82	2.30	0.96	13.49	6.16	83.07	0.644	No	Yes	2.00
355	7.98	1.01	2.83	2.26	0.96	13.04	6.27	81.67	0.622	No	Yes	2.00
356	8.00	1.00	2.83	2.20	0.96	12.92	6.22	80.43	0.616	No	Yes	2.00
357	8.02	1.00	2.82	2.12	0.96	12.77	6.17	78.79	0.609	No	Yes	2.00
358	8.04	0.99	2.81	2.00	0.96	12.68	6.03	76.41	0.605	No	Yes	2.00
359	8.06	0.96	2.83	2.01	0.96	12.22	6.20	75.82	0.583	No	Yes	2.00
360	8.08	0.91	2.86	2.08	0.97	11.51	6.61	76.10	0.549	No	Yes	2.00
361	8.10	0.87	2.89	2.22	0.99	10.87	7.13	77.50	0.519	No	Yes	2.00
362	8.12	0.86	2.90	2.27	0.99	10.77	7.25	78.08	0.514	No	Yes	2.00
363	8.14	0.90	2.87	2.14	0.98	11.23	6.83	76.75	0.536	No	Yes	2.00
364	8.16	0.94	2.84	2.00	0.97	11.78	6.38	75.15	0.562	No	Yes	2.00
365	8.18	0.98	2.81	1.90	0.96	12.26	6.02	73.86	0.585	No	Yes	2.00
366	8.20	1.00	2.81	1.92	0.95	12.51	5.96	74.56	0.597	No	Yes	2.00
367	8.22	1.00	2.82	1.99	0.96	12.51	6.07	75.95	0.597	No	Yes	2.00
368	8.24	0.99	2.83	2.07	0.96	12.38	6.23	77.18	0.591	No	Yes	2.00
369	8.26	0.99	2.83	2.05	0.96	12.30	6.24	76.73	0.587	No	Yes	2.00
370	8.28	0.98	2.83	1.99	0.96	12.25	6.18	75.63	0.584	No	Yes	2.00
371	8.30	0.97	2.83	1.95	0.96	12.07	6.18	74.59	0.576	No	Yes	2.00
372	8.32	0.96	2.83	1.93	0.96	11.89	6.22	74.01	0.567	No	Yes	2.00
373	8.34	0.97	2.81	1.82	0.96	11.98	6.02	72.06	0.571	No	Yes	2.00
374	8.36	1.00	2.78	1.65	0.94	12.28	5.62	68.96	0.586	No	Yes	2.00
375	8.38	1.02	2.75	1.51	0.93	12.55	5.29	66.45	0.599	No	Yes	2.00
376	8.40	1.05	2.72	1.38	0.92	12.86	4.97	63.87	0.613	No	Yes	2.00
377	8.42	1.08	2.70	1.31	0.91	13.25	4.72	62.56	0.632	No	Yes	2.00
378	8.44	1.13	2.68	1.24	0.90	13.80	8.71	120.23	0.217	No	No	2.00
379	8.46	1.14	2.67	1.27	0.90	13.97	8.70	121.57	0.222	No	No	2.00
380	8.48	1.12	2.69	1.30	0.91	13.64	9.51	129.71	0.255	No	No	2.00
381	8.50	1.07	2.72	1.36	0.92	12.98	4.90	63.56	0.619	No	Yes	2.00
382	8.52	1.03	2.75	1.43	0.93	12.39	5.20	64.46	0.591	No	Yes	2.00
383	8.54	1.02	2.75	1.44	0.93	12.34	5.25	64.75	4.000	Yes	Yes	2.00
384	8.56	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	8.58	1.18	2.65	1.20	0.90	14.34	7.63	109.42	4.000	Yes	No	2.00
386	8.60	1.27	2.61	1.10	0.88	15.39	5.68	87.41	4.000	Yes	No	2.00
387	8.62	1.32	2.58	1.03	0.87	16.00	4.75	76.09	4.000	Yes	No	2.00
388	8.64	1.38	2.56	1.01	0.86	16.77	4.08	68.41	4.000	Yes	No	2.00
389	8.66	1.47	2.53	0.99	0.85	17.78	3.43	60.94	4.000	Yes	No	2.00
390	8.68	1.52	2.52	1.03	0.85	18.50	3.28	60.59	0.101	No	No	1.13
391	8.70	1.51	2.55	1.14	0.86	18.39	3.87	71.11	0.113	No	No	1.27
392	8.72	1.46	2.59	1.30	0.87	17.82	5.05	89.93	0.148	No	No	1.65
393	8.74	1.44	2.60	1.35	0.88	17.54	5.55	97.34	0.149	No	No	1.67
394	8.76	1.50	2.58	1.26	0.87	18.13	4.65	84.23	0.136	No	No	1.52
395	8.78	1.56	2.54	1.14	0.85	18.85	3.65	68.71	0.110	No	No	1.23
396	8.80	1.57	2.54	1.13	0.85	18.91	3.55	67.12	0.108	No	No	1.21
397	8.82	1.49	2.58	1.26	0.87	17.93	4.74	84.98	0.137	No	No	1.53
398	8.84	1.39	2.63	1.37	0.89	16.67	6.35	105.95	0.172	No	No	1.92
399	8.86	1.33	2.64	1.35	0.89	15.95	6.91	110.14	4.000	Yes	No	2.00
400	8.88	1.34	2.60	1.13	0.88	15.95	5.44	86.72	4.000	Yes	No	2.00
401	8.90	1.39	2.55	0.96	0.86	16.45	4.00	65.77	4.000	Yes	No	2.00
402	8.92	1.43	2.53	0.88	0.85	16.86	3.36	56.57	4.000	Yes	No	2.00
403	8.94	1.44	2.52	0.88	0.85	16.98	3.30	55.96	4.000	Yes	No	2.00
404	8.96	1.41	2.56	0.98	0.86	16.60	4.06	67.38	4.000	Yes	No	2.00
405	8.98	1.37	2.59	1.09	0.87	16.11	5.01	80.70	4.000	Yes	No	2.00
406	9.00	1.33	2.61	1.15	0.88	15.64	5.85	91.48	4.000	Yes	No	2.00
407	9.02	1.26	2.64	1.16	0.89	14.74	6.80	100.24	4.000	Yes	No	2.00
408	9.04	1.19	2.66	1.16	0.90	13.81	7.91	109.21	4.000	Yes	No	2.00
409	9.06	1.11	2.69	1.18	0.91	12.74	9.87	125.75	4.000	Yes	No	2.00
410	9.08	1.09	2.70	1.15	0.91	12.53	9.98	124.95	0.235	No	No	2.00
411	9.10	1.12	2.68	1.11	0.91	12.79	9.01	115.23	0.200	No	No	2.00
412	9.12	1.19	2.64	1.02	0.89	13.69	6.85	93.71	0.141	No	No	1.57
413	9.14	1.26	2.60	0.96	0.88	14.50	5.49	79.67	0.114	No	No	1.28
414	9.16	1.29	2.59	0.93	0.87	14.90	4.96	73.92	0.118	No	No	1.31
415	9.18	1.27	2.60	0.97	0.88	14.65	5.41	79.32	0.114	No	No	1.27
416	9.20	1.26	2.61	0.99	0.88	14.42	5.84	84.25	0.122	No	No	1.36
417	9.22	1.29	2.60	0.97	0.88	14.84	5.30	78.69	4.000	Yes	No	2.00
418	9.24	1.36	2.57	0.95	0.87	15.60	4.55	71.00	4.000	Yes	No	2.00
419	9.26	1.43	2.54	0.90	0.86	16.44	3.72	61.22	4.000	Yes	No	2.00
420	9.28	1.49	2.51	0.86	0.85	17.21	3.10	53.28	4.000	Yes	No	2.00
421	9.30	1.58	2.49	0.84	0.83	18.25	2.89	52.82	4.000	Yes	No	2.00
422	9.32	1.65	2.48	0.89	0.83	19.04	2.86	54.42	4.000	Yes	No	2.00
423	9.34	1.62	2.51	1.00	0.85	18.73	3.08	57.70	4.000	Yes	No	2.00
424	9.36	1.54	2.55	1.09	0.86	17.74	3.99	70.73	4.000	Yes	No	2.00
425	9.38	1.46	2.58	1.14	0.87	16.80	4.83	81.10	4.000	Yes	No	2.00
426	9.40	1.44	2.58	1.10	0.87	16.48	4.83	79.60	0.127	No	No	1.41
427	9.42	1.42	2.59	1.08	0.87	16.20	4.92	79.77	0.127	No	No	1.42
428	9.44	1.36	2.61	1.11	0.88	15.42	5.71	88.11	0.129	No	No	1.44
429	9.46	1.29	2.65	1.20	0.90	14.56	7.29	106.20	0.172	No	No	1.92
430	9.48	1.23	2.68	1.28	0.91	13.85	8.98	124.40	0.233	No	No	2.00
431	9.50	1.21	2.69	1.31	0.91	13.57	9.71	131.80	0.264	No	No	2.00
432	9.52	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	9.54	1.22	2.67	1.20	0.91	13.66	8.50	116.08	0.203	No	No	2.00
434	9.56	1.20	2.69	1.24	0.91	13.36	9.42	125.82	0.239	No	No	2.00
435	9.58	1.14	2.73	1.38	0.93	12.60	5.05	63.65	0.601	No	Yes	2.00
436	9.60	1.05	2.79	1.54	0.95	11.58	5.69	65.95	0.553	No	Yes	2.00
437	9.62	1.01	2.81	1.54	0.96	10.96	5.96	65.27	0.523	No	Yes	2.00
438	9.64	0.99	2.81	1.47	0.96	10.73	5.93	63.61	0.512	No	Yes	2.00
439	9.66	1.00	2.78	1.32	0.95	10.81	5.61	60.64	0.516	No	Yes	2.00
440	9.68	1.08	2.71	1.12	0.92	11.80	4.85	57.22	0.563	No	Yes	2.00
441	9.70	1.17	2.66	0.99	0.90	12.81	7.80	99.87	0.155	No	No	1.73
442	9.72	1.25	2.63	1.00	0.89	13.70	6.68	91.49	0.136	No	No	1.52
443	9.74	1.24	2.65	1.10	0.90	13.67	7.60	103.99	0.166	No	No	1.85
444	9.76	1.26	2.66	1.15	0.90	13.86	7.79	107.92	0.177	No	No	1.98
445	9.78	1.29	2.64	1.08	0.89	14.18	6.82	96.70	0.148	No	No	1.65
446	9.80	1.30	2.63	1.06	0.89	14.26	6.56	93.59	0.141	No	No	1.57
447	9.82	1.24	2.67	1.18	0.91	13.56	8.50	115.24	0.200	No	No	2.00
448	9.84	1.14	2.75	1.42	0.93	12.34	5.21	64.32	0.589	No	Yes	2.00
449	9.86	1.05	2.81	1.59	0.96	11.25	5.92	66.67	0.537	No	Yes	2.00
450	9.88	0.97	2.85	1.68	0.97	10.28	6.52	67.00	0.490	No	Yes	2.00
451	9.90	0.93	2.87	1.66	0.98	9.71	6.79	65.89	4.000	Yes	Yes	2.00
452	9.92	1.02	2.80	1.42	0.95	10.86	5.79	62.87	4.000	Yes	Yes	2.00
453	9.94	1.23	2.66	1.07	0.90	13.24	7.94	105.07	4.000	Yes	No	2.00
454	9.96	1.52	2.54	0.93	0.86	16.72	3.72	62.16	4.000	Yes	No	2.00
455	9.98	1.72	2.53	1.09	0.85	19.08	3.31	63.24	0.104	No	No	1.15
456	10.00	1.97	2.52	1.34	0.85	22.09	3.14	69.32	4.000	Yes	No	2.00
457	10.02	2.11	2.55	1.71	0.86	23.83	3.83	91.31	4.000	Yes	No	2.00
458	10.04	2.21	2.59	2.18	0.88	25.04	5.12	128.30	4.000	Yes	No	2.00
459	10.06	2.14	2.69	3.09	0.92	24.41	9.85	240.52	4.000	Yes	No	2.00
460	10.08	2.09	2.78	4.14	0.95	23.96	5.64	135.18	4.000	Yes	Yes	2.00
461	10.10	2.08	2.85	5.18	0.97	23.85	6.50	154.96	4.000	Yes	Yes	2.00
462	10.12	1.92	2.93	6.25	1.00	22.04	7.66	168.81	4.000	Yes	Yes	2.00
463	10.14	1.79	2.99	6.96	1.00	20.36	8.57	174.56	4.000	Yes	Yes	2.00
464	10.16	1.94	2.93	6.19	1.00	22.13	7.60	168.12	4.000	Yes	Yes	2.00
465	10.18	2.82	2.66	3.75	0.90	32.24	7.85	253.02	4.000	Yes	No	2.00
466	10.20	4.37	2.36	2.21	0.79	49.73	2.20	109.29	4.000	Yes	No	2.00
467	10.22	7.16	2.10	1.50	0.69	80.76	1.41	114.16	4.000	Yes	No	2.00
468	10.24	10.25	1.96	1.38	0.64	114.90	1.28	146.63	4.000	Yes	No	2.00
469	10.26	12.73	1.92	1.50	0.62	142.46	1.25	177.88	4.000	Yes	No	2.00
470	10.28	14.25	1.90	1.59	0.62	159.30	1.24	197.56	0.797	No	No	2.00
471	10.30	15.20	1.91	1.70	0.62	169.73	1.24	210.80	4.000	No	No	2.00
472	10.32	16.24	1.89	1.72	0.61	180.96	1.23	223.16	4.000	No	No	2.00
473	10.34	17.06	1.89	1.75	0.61	189.82	1.23	233.22	4.000	No	No	2.00
474	10.36	17.79	1.88	1.74	0.61	197.48	1.22	240.88	4.000	No	No	2.00
475	10.38	18.61	1.88	1.81	0.61	206.38	1.22	251.94	4.000	No	No	2.00
476	10.40	20.09	1.87	1.88	0.60	222.53	1.22	270.39	4.000	No	No	2.00
477	10.42	21.19	1.89	2.05	0.61	234.64	1.23	288.01	4.000	No	No	2.00
478	10.44	23.27	1.87	2.10	0.60	257.18	1.22	313.09	4.000	No	No	2.00
479	10.46	24.33	1.87	2.18	0.61	268.66	1.22	327.53	4.000	No	No	2.00
480	10.48	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	10.50	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
0.90	2.00	0.00	0.00	0.02	0.00	0.92	2.00	0.00	0.00	0.02	0.00
0.94	2.00	0.00	0.00	0.02	0.00	0.96	2.00	0.00	0.00	0.02	0.00
0.98	2.00	0.00	0.00	0.02	0.00	1.00	2.00	0.00	0.00	0.02	0.00
1.02	2.00	0.00	0.00	0.02	0.00	1.04	2.00	0.00	0.00	0.02	0.00
1.06	2.00	0.00	0.00	0.02	0.00	1.08	2.00	0.00	0.00	0.02	0.00
1.10	2.00	0.00	0.00	0.02	0.00	1.12	2.00	0.00	0.00	0.02	0.00
1.14	2.00	0.00	0.00	0.02	0.00	1.16	2.00	0.00	0.00	0.02	0.00
1.18	2.00	0.00	0.00	0.02	0.00	1.20	2.00	0.00	0.00	0.02	0.00
1.22	2.00	0.00	0.00	0.02	0.00	1.24	2.00	0.00	0.00	0.02	0.00
1.26	2.00	0.00	0.00	0.02	0.00	1.28	2.00	0.00	0.00	0.02	0.00
1.30	2.00	0.00	0.00	0.02	0.00	1.32	2.00	0.00	0.00	0.02	0.00
1.34	2.00	0.00	0.00	0.02	0.00	1.36	2.00	0.00	0.00	0.02	0.00
1.38	2.00	0.00	0.00	0.02	0.00	1.40	2.00	0.00	0.00	0.02	0.00
1.42	2.00	0.00	0.00	0.02	0.00	1.44	2.00	0.00	0.00	0.02	0.00
1.46	2.00	0.00	0.00	0.02	0.00	1.48	2.00	0.00	0.00	0.02	0.00
1.50	2.00	0.00	0.00	0.02	0.00	1.52	2.00	0.00	0.00	0.02	0.00
1.54	2.00	0.00	0.00	0.02	0.00	1.56	2.00	0.00	0.00	0.02	0.00
1.58	2.00	0.00	0.00	0.02	0.00	1.60	2.00	0.00	0.00	0.02	0.00
1.62	2.00	0.00	0.00	0.02	0.00	1.64	2.00	0.00	0.00	0.02	0.00
1.66	2.00	0.00	0.00	0.02	0.00	1.68	2.00	0.00	0.00	0.02	0.00
1.70	2.00	0.00	0.00	0.02	0.00	1.72	2.00	0.00	0.00	0.02	0.00
1.74	2.00	0.00	0.00	0.02	0.00	1.76	2.00	0.00	0.00	0.02	0.00
1.78	2.00	0.00	0.00	0.02	0.00	1.80	2.00	0.00	0.00	0.02	0.00
1.82	2.00	0.00	0.00	0.02	0.00	1.84	2.00	0.00	0.00	0.02	0.00
1.86	2.00	0.00	0.00	0.02	0.00	1.88	2.00	0.00	0.00	0.02	0.00
1.90	2.00	0.00	0.00	0.02	0.00	1.92	2.00	0.00	0.00	0.02	0.00
1.94	2.00	0.00	0.00	0.02	0.00	1.96	2.00	0.00	0.00	0.02	0.00
1.98	2.00	0.00	0.00	0.02	0.00	2.00	2.00	0.00	0.00	0.02	0.00
2.02	2.00	0.00	0.00	0.02	0.00	2.04	2.00	0.00	0.00	0.02	0.00
2.06	2.00	0.00	0.00	0.02	0.00	2.08	2.00	0.00	0.00	0.02	0.00
2.10	2.00	0.00	0.00	0.02	0.00	2.12	2.00	0.00	0.00	0.02	0.00
2.14	2.00	0.00	0.00	0.02	0.00	2.16	2.00	0.00	0.00	0.02	0.00
2.18	2.00	0.00	0.00	0.02	0.00	2.20	2.00	0.00	0.00	0.02	0.00
2.22	2.00	0.00	0.00	0.02	0.00	2.24	2.00	0.00	0.00	0.02	0.00
2.26	2.00	0.00	0.00	0.02	0.00	2.28	2.00	0.00	0.00	0.02	0.00
2.30	2.00	0.00	0.00	0.02	0.00	2.32	2.00	0.00	0.00	0.02	0.00
2.34	2.00	0.00	0.00	0.02	0.00	2.36	2.00	0.00	0.00	0.02	0.00
2.38	2.00	0.00	0.00	0.02	0.00	2.40	2.00	0.00	0.00	0.02	0.00
2.42	2.00	0.00	0.00	0.02	0.00	2.44	2.00	0.00	0.00	0.02	0.00
2.46	2.00	0.00	0.00	0.02	0.00	2.48	2.00	0.00	0.00	0.02	0.00
2.50	2.00	0.00	0.00	0.02	0.00	2.52	2.00	0.00	0.00	0.02	0.00
2.54	2.00	0.00	0.00	0.02	0.00	2.56	2.00	0.00	0.00	0.02	0.00
2.58	2.00	0.00	0.00	0.02	0.00	2.60	2.00	0.00	0.00	0.02	0.00
2.62	2.00	0.00	0.00	0.02	0.00	2.64	2.00	0.00	0.00	0.02	0.00
2.66	2.00	0.00	0.00	0.02	0.00	2.68	2.00	0.00	0.00	0.02	0.00
2.70	2.00	0.00	0.00	0.02	0.00	2.72	2.00	0.00	0.00	0.02	0.00
2.74	2.00	0.00	0.00	0.02	0.00	2.76	2.00	0.00	0.00	0.02	0.00
2.78	2.00	0.00	0.00	0.02	0.00	2.80	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
2.82	2.00	0.00	0.00	0.02	0.00	2.84	2.00	0.00	0.00	0.02	0.00
2.86	2.00	0.00	0.00	0.02	0.00	2.88	2.00	0.00	0.00	0.02	0.00
2.90	2.00	0.00	0.00	0.02	0.00	2.92	2.00	0.00	0.00	0.02	0.00
2.94	1.95	0.00	0.00	0.02	0.00	2.96	2.00	0.00	0.00	0.02	0.00
2.98	2.00	0.00	0.00	0.02	0.00	3.00	2.00	0.00	0.00	0.02	0.00
3.02	2.00	0.00	0.00	0.02	0.00	3.04	2.00	0.00	0.00	0.02	0.00
3.06	2.00	0.00	0.00	0.02	0.00	3.08	2.00	0.00	0.00	0.02	0.00
3.10	1.99	0.00	0.00	0.02	0.00	3.12	2.00	0.00	0.00	0.02	0.00
3.14	2.00	0.00	0.00	0.02	0.00	3.16	2.00	0.00	0.00	0.02	0.00
3.18	2.00	0.00	0.00	0.02	0.00	3.20	2.00	0.00	0.00	0.02	0.00
3.22	2.00	0.00	0.00	0.02	0.00	3.24	2.00	0.00	0.00	0.02	0.00
3.26	2.00	0.00	0.00	0.02	0.00	3.28	2.00	0.00	0.00	0.02	0.00
3.30	2.00	0.00	0.00	0.02	0.00	3.32	2.00	0.00	0.00	0.02	0.00
3.34	2.00	0.00	0.00	0.02	0.00	3.36	2.00	0.00	0.00	0.02	0.00
3.38	2.00	0.00	0.00	0.02	0.00	3.40	2.00	0.00	0.00	0.02	0.00
3.42	2.00	0.00	0.00	0.02	0.00	3.44	2.00	0.00	0.00	0.02	0.00
3.46	2.00	0.00	0.00	0.02	0.00	3.48	2.00	0.00	0.00	0.02	0.00
3.50	2.00	0.00	0.00	0.02	0.00	3.52	2.00	0.00	0.00	0.02	0.00
3.54	2.00	0.00	0.00	0.02	0.00	3.56	1.91	0.00	0.00	0.02	0.00
3.58	1.65	0.00	0.00	0.02	0.00	3.60	1.58	0.00	0.00	0.02	0.00
3.62	1.62	0.00	0.00	0.02	0.00	3.64	1.65	0.00	0.00	0.02	0.00
3.66	1.59	0.00	0.00	0.02	0.00	3.68	1.51	0.00	0.00	0.02	0.00
3.70	1.46	0.00	0.00	0.02	0.00	3.72	1.47	0.00	0.00	0.02	0.00
3.74	1.54	0.00	0.00	0.02	0.00	3.76	1.54	0.00	0.00	0.02	0.00
3.78	1.59	0.00	0.00	0.02	0.00	3.80	2.00	0.00	0.00	0.02	0.00
3.82	2.00	0.00	0.00	0.02	0.00	3.84	2.00	0.00	0.00	0.02	0.00
3.86	2.00	0.00	0.00	0.02	0.00	3.88	2.00	0.00	0.00	0.02	0.00
3.90	2.00	0.00	0.00	0.02	0.00	3.92	2.00	0.00	0.00	0.02	0.00
3.94	2.00	0.00	0.00	0.02	0.00	3.96	2.00	0.00	0.00	0.02	0.00
3.98	2.00	0.00	0.00	0.02	0.00	4.00	2.00	0.00	0.00	0.02	0.00
4.02	2.00	0.00	0.00	0.02	0.00	4.04	2.00	0.00	0.00	0.02	0.00
4.06	2.00	0.00	0.00	0.02	0.00	4.08	2.00	0.00	0.00	0.02	0.00
4.10	2.00	0.00	0.00	0.02	0.00	4.12	2.00	0.00	0.00	0.02	0.00
4.14	2.00	0.00	0.00	0.02	0.00	4.16	2.00	0.00	0.00	0.02	0.00
4.18	2.00	0.00	0.00	0.02	0.00	4.20	2.00	0.00	0.00	0.02	0.00
4.22	2.00	0.00	0.00	0.02	0.00	4.24	2.00	0.00	0.00	0.02	0.00
4.26	2.00	0.00	0.00	0.02	0.00	4.28	2.00	0.00	0.00	0.02	0.00
4.30	2.00	0.00	0.00	0.02	0.00	4.32	2.00	0.00	0.00	0.02	0.00
4.34	2.00	0.00	0.00	0.02	0.00	4.36	2.00	0.00	0.00	0.02	0.00
4.38	2.00	0.00	0.00	0.02	0.00	4.40	2.00	0.00	0.00	0.02	0.00
4.42	2.00	0.00	0.00	0.02	0.00	4.44	2.00	0.00	0.00	0.02	0.00
4.46	2.00	0.00	0.00	0.02	0.00	4.48	2.00	0.00	0.00	0.02	0.00
4.50	2.00	0.00	0.00	0.02	0.00	4.52	2.00	0.00	0.00	0.02	0.00
4.54	2.00	0.00	0.00	0.02	0.00	4.56	2.00	0.00	0.00	0.02	0.00
4.58	2.00	0.00	0.00	0.02	0.00	4.60	2.00	0.00	0.00	0.02	0.00
4.62	2.00	0.00	0.00	0.02	0.00	4.64	2.00	0.00	0.00	0.02	0.00
4.66	2.00	0.00	0.00	0.02	0.00	4.68	2.00	0.00	0.00	0.02	0.00
4.70	2.00	0.00	0.00	0.02	0.00	4.72	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
4.74	2.00	0.00	0.00	0.02	0.00	4.76	2.00	0.00	0.00	0.02	0.00
4.78	2.00	0.00	0.00	0.02	0.00	4.80	2.00	0.00	0.00	0.02	0.00
4.82	2.00	0.00	0.00	0.02	0.00	4.84	2.00	0.00	0.00	0.02	0.00
4.86	2.00	0.00	0.00	0.02	0.00	4.88	2.00	0.00	0.00	0.02	0.00
4.90	2.00	0.00	0.00	0.02	0.00	4.92	2.00	0.00	0.00	0.02	0.00
4.94	2.00	0.00	0.00	0.02	0.00	4.96	2.00	0.00	0.00	0.02	0.00
4.98	2.00	0.00	0.00	0.02	0.00	5.00	2.00	0.00	0.00	0.02	0.00
5.02	2.00	0.00	0.00	0.02	0.00	5.04	2.00	0.00	0.00	0.02	0.00
5.06	2.00	0.00	0.00	0.02	0.00	5.08	2.00	0.00	0.00	0.02	0.00
5.10	2.00	0.00	0.00	0.02	0.00	5.12	2.00	0.00	0.00	0.02	0.00
5.14	2.00	0.00	0.00	0.02	0.00	5.16	2.00	0.00	0.00	0.02	0.00
5.18	2.00	0.00	0.00	0.02	0.00	5.20	2.00	0.00	0.00	0.02	0.00
5.22	2.00	0.00	0.00	0.02	0.00	5.24	2.00	0.00	0.00	0.02	0.00
5.26	2.00	0.00	0.00	0.02	0.00	5.28	2.00	0.00	0.00	0.02	0.00
5.30	2.00	0.00	0.00	0.02	0.00	5.32	2.00	0.00	0.00	0.02	0.00
5.34	2.00	0.00	0.00	0.02	0.00	5.36	2.00	0.00	0.00	0.02	0.00
5.38	2.00	0.00	0.00	0.02	0.00	5.40	2.00	0.00	0.00	0.02	0.00
5.42	2.00	0.00	0.00	0.02	0.00	5.44	2.00	0.00	0.00	0.02	0.00
5.46	2.00	0.00	0.00	0.02	0.00	5.48	2.00	0.00	0.00	0.02	0.00
5.50	2.00	0.00	0.00	0.02	0.00	5.52	2.00	0.00	0.00	0.02	0.00
5.54	2.00	0.00	0.00	0.02	0.00	5.56	2.00	0.00	0.00	0.02	0.00
5.58	2.00	0.00	0.00	0.02	0.00	5.60	2.00	0.00	0.00	0.02	0.00
5.62	2.00	0.00	0.00	0.02	0.00	5.64	2.00	0.00	0.00	0.02	0.00
5.66	2.00	0.00	0.00	0.02	0.00	5.68	2.00	0.00	0.00	0.02	0.00
5.70	2.00	0.00	0.00	0.02	0.00	5.72	2.00	0.00	0.00	0.02	0.00
5.74	2.00	0.00	0.00	0.02	0.00	5.76	2.00	0.00	0.00	0.02	0.00
5.78	2.00	0.00	0.00	0.02	0.00	5.80	2.00	0.00	0.00	0.02	0.00
5.82	2.00	0.00	0.00	0.02	0.00	5.84	2.00	0.00	0.00	0.02	0.00
5.86	2.00	0.00	0.00	0.02	0.00	5.88	2.00	0.00	0.00	0.02	0.00
5.90	2.00	0.00	0.00	0.02	0.00	5.92	2.00	0.00	0.00	0.02	0.00
5.94	2.00	0.00	0.00	0.02	0.00	5.96	2.00	0.00	0.00	0.02	0.00
5.98	2.00	0.00	0.00	0.02	0.00	6.00	2.00	0.00	0.00	0.02	0.00
6.02	2.00	0.00	0.00	0.02	0.00	6.04	2.00	0.00	0.00	0.02	0.00
6.06	2.00	0.00	0.00	0.02	0.00	6.08	2.00	0.00	0.00	0.02	0.00
6.10	2.00	0.00	0.00	0.02	0.00	6.12	2.00	0.00	0.00	0.02	0.00
6.14	2.00	0.00	0.00	0.02	0.00	6.16	2.00	0.00	0.00	0.02	0.00
6.18	2.00	0.00	0.00	0.02	0.00	6.20	2.00	0.00	0.00	0.02	0.00
6.22	2.00	0.00	0.00	0.02	0.00	6.24	2.00	0.00	0.00	0.02	0.00
6.26	2.00	0.00	0.00	0.02	0.00	6.28	2.00	0.00	0.00	0.02	0.00
6.30	2.00	0.00	0.00	0.02	0.00	6.32	2.00	0.00	0.00	0.02	0.00
6.34	2.00	0.00	0.00	0.02	0.00	6.36	2.00	0.00	0.00	0.02	0.00
6.38	2.00	0.00	0.00	0.02	0.00	6.40	2.00	0.00	0.00	0.02	0.00
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	1.20	0.00	0.00	0.02	0.00
6.62	1.57	0.00	0.00	0.02	0.00	6.64	1.92	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
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	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

:: 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
8.58	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	1.13	0.00	0.00	0.02	0.00
8.70	1.27	0.00	0.00	0.02	0.00	8.72	1.65	0.00	0.00	0.02	0.00
8.74	1.67	0.00	0.00	0.02	0.00	8.76	1.52	0.00	0.00	0.02	0.00
8.78	1.23	0.00	0.00	0.02	0.00	8.80	1.21	0.00	0.00	0.02	0.00
8.82	1.53	0.00	0.00	0.02	0.00	8.84	1.92	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	1.57	0.00	0.00	0.02	0.00
9.14	1.28	0.00	0.00	0.02	0.00	9.16	1.31	0.00	0.00	0.02	0.00
9.18	1.27	0.00	0.00	0.02	0.00	9.20	1.36	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	1.41	0.00	0.00	0.02	0.00
9.42	1.42	0.00	0.00	0.02	0.00	9.44	1.44	0.00	0.00	0.02	0.00
9.46	1.92	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	1.73	0.00	0.00	0.02	0.00	9.72	1.52	0.00	0.00	0.02	0.00
9.74	1.85	0.00	0.00	0.02	0.00	9.76	1.98	0.00	0.00	0.02	0.00
9.78	1.65	0.00	0.00	0.02	0.00	9.80	1.57	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	1.15	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

:: 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
10.50	2.00	0.00	0.00	0.02	0.00						

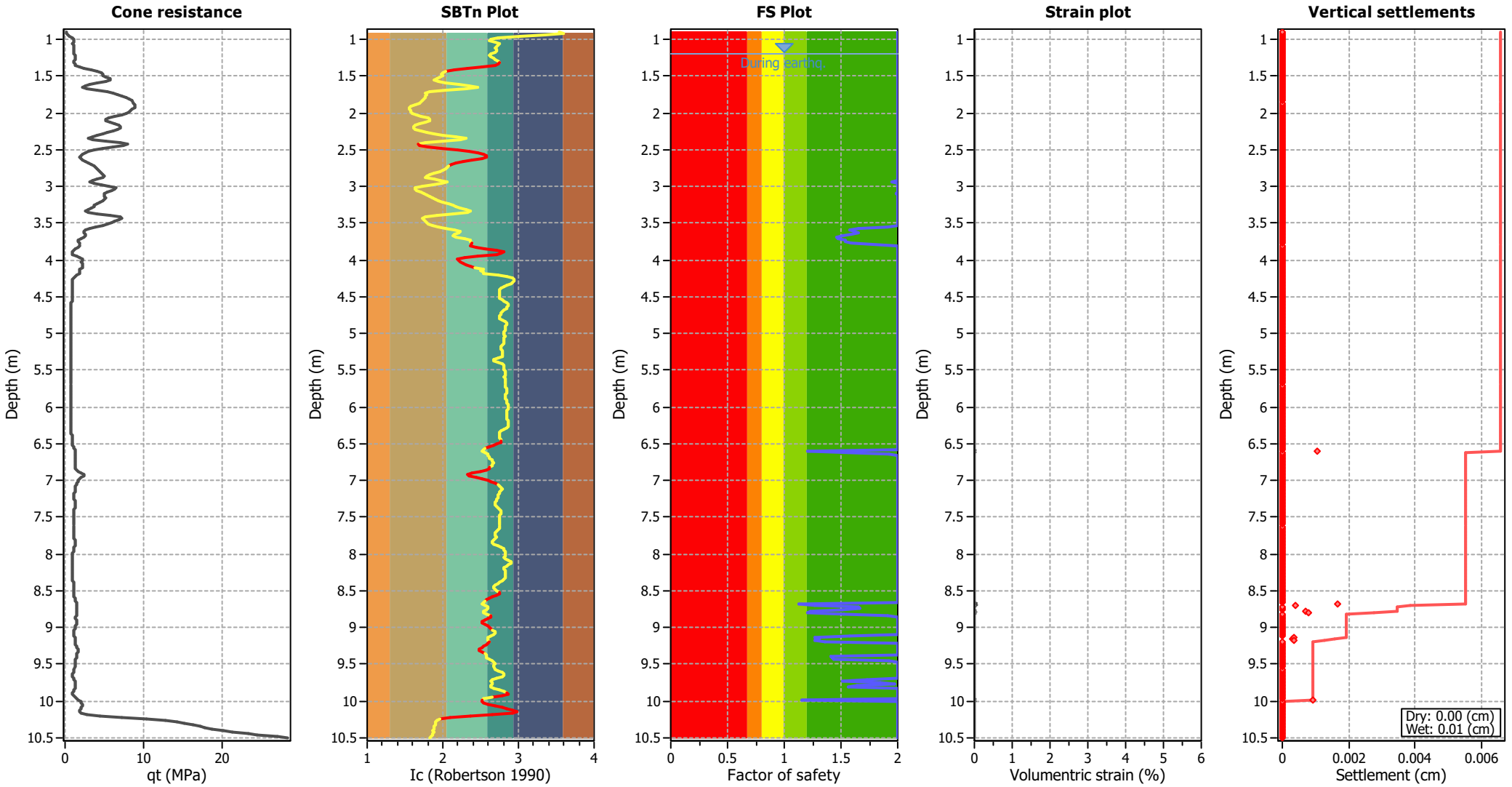
Overall liquefaction potential: 0.00

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)
1.20	166.31	2.00	0.00	0.93	0.00	1.22	148.44	2.00	0.00	0.93	0.00
1.24	165.69	2.00	0.00	0.93	0.00	1.26	204.56	2.00	0.00	0.93	0.00
1.28	244.99	2.00	0.00	0.93	0.00	1.30	116.01	2.00	0.00	0.93	0.00
1.32	120.97	2.00	0.00	0.93	0.00	1.34	122.85	2.00	0.00	0.93	0.00
1.36	253.95	2.00	0.00	0.92	0.00	1.38	115.01	2.00	0.00	0.92	0.00
1.40	95.97	2.00	0.00	0.92	0.00	1.42	98.55	2.00	0.00	0.92	0.00
1.44	109.71	2.00	0.00	0.92	0.00	1.46	118.60	2.00	0.00	0.92	0.00
1.48	121.16	2.00	0.00	0.92	0.00	1.50	123.84	2.00	0.00	0.92	0.00
1.52	130.85	2.00	0.00	0.92	0.00	1.54	138.66	2.00	0.00	0.91	0.00
1.56	139.47	2.00	0.00	0.91	0.00	1.58	126.35	2.00	0.00	0.91	0.00
1.60	109.53	2.00	0.00	0.91	0.00	1.62	101.33	2.00	0.00	0.91	0.00
1.64	107.03	2.00	0.00	0.91	0.00	1.66	115.42	2.00	0.00	0.91	0.00
1.68	103.76	2.00	0.00	0.91	0.00	1.70	104.88	2.00	0.00	0.91	0.00
1.72	122.75	2.00	0.00	0.90	0.00	1.74	131.95	2.00	0.00	0.90	0.00
1.76	145.52	2.00	0.00	0.90	0.00	1.78	159.72	2.00	0.00	0.90	0.00
1.80	169.97	2.00	0.00	0.90	0.00	1.82	174.59	2.00	0.00	0.90	0.00
1.84	174.36	2.00	0.00	0.90	0.00	1.86	171.09	2.00	0.00	0.90	0.00
1.88	174.49	2.00	0.00	0.90	0.00	1.90	171.29	2.00	0.00	0.89	0.00
1.92	165.73	2.00	0.00	0.89	0.00	1.94	161.53	2.00	0.00	0.89	0.00
1.96	158.13	2.00	0.00	0.89	0.00	1.98	154.79	2.00	0.00	0.89	0.00
2.00	149.44	2.00	0.00	0.89	0.00	2.02	139.03	2.00	0.00	0.89	0.00
2.04	127.58	2.00	0.00	0.89	0.00	2.06	124.97	2.00	0.00	0.89	0.00
2.08	120.77	2.00	0.00	0.88	0.00	2.10	121.50	2.00	0.00	0.88	0.00
2.12	124.08	2.00	0.00	0.88	0.00	2.14	122.36	2.00	0.00	0.88	0.00
2.16	128.48	2.00	0.00	0.88	0.00	2.18	129.84	2.00	0.00	0.88	0.00
2.20	130.11	2.00	0.00	0.88	0.00	2.22	125.74	2.00	0.00	0.88	0.00
2.24	119.29	2.00	0.00	0.88	0.00	2.26	119.93	2.00	0.00	0.87	0.00
2.28	113.84	2.00	0.00	0.87	0.00	2.30	104.85	2.00	0.00	0.87	0.00
2.32	105.09	2.00	0.00	0.87	0.00	2.34	117.82	2.00	0.00	0.87	0.00
2.36	119.49	2.00	0.00	0.87	0.00	2.38	132.96	2.00	0.00	0.87	0.00
2.40	153.85	2.00	0.00	0.87	0.00	2.42	148.82	2.00	0.00	0.87	0.00
2.44	138.84	2.00	0.00	0.86	0.00	2.46	140.78	2.00	0.00	0.86	0.00
2.48	122.41	2.00	0.00	0.86	0.00	2.50	115.62	2.00	0.00	0.86	0.00
2.52	122.34	2.00	0.00	0.86	0.00	2.54	134.71	2.00	0.00	0.86	0.00
2.56	148.90	2.00	0.00	0.86	0.00	2.58	190.36	2.00	0.00	0.86	0.00
2.60	178.55	2.00	0.00	0.86	0.00	2.62	116.58	2.00	0.00	0.85	0.00
2.64	96.98	2.00	0.00	0.85	0.00	2.66	90.41	2.00	0.00	0.85	0.00
2.68	89.82	2.00	0.00	0.85	0.00	2.70	94.29	2.00	0.00	0.85	0.00
2.72	99.57	2.00	0.00	0.85	0.00	2.74	104.37	2.00	0.00	0.85	0.00
2.76	108.14	2.00	0.00	0.85	0.00	2.78	110.92	2.00	0.00	0.85	0.00
2.80	111.73	2.00	0.00	0.84	0.00	2.82	111.03	2.00	0.00	0.84	0.00
2.84	106.64	2.00	0.00	0.84	0.00	2.86	101.67	2.00	0.00	0.84	0.00
2.88	86.90	2.00	0.00	0.84	0.00	2.90	92.74	2.00	0.00	0.84	0.00
2.92	88.57	2.00	0.00	0.84	0.00	2.94	85.20	1.95	0.00	0.84	0.00
2.96	92.69	2.00	0.00	0.84	0.00	2.98	103.89	2.00	0.00	0.83	0.00
3.00	98.83	2.00	0.00	0.83	0.00	3.02	108.19	2.00	0.00	0.83	0.00
3.04	105.89	2.00	0.00	0.83	0.00	3.06	100.64	2.00	0.00	0.83	0.00
3.08	92.28	2.00	0.00	0.83	0.00	3.10	87.75	1.99	0.00	0.83	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)
3.12	99.96	2.00	0.00	0.83	0.00	3.14	107.07	2.00	0.00	0.83	0.00
3.16	111.69	2.00	0.00	0.82	0.00	3.18	113.59	2.00	0.00	0.82	0.00
3.20	112.38	2.00	0.00	0.82	0.00	3.22	109.50	2.00	0.00	0.82	0.00
3.24	107.38	2.00	0.00	0.82	0.00	3.26	107.93	2.00	0.00	0.82	0.00
3.28	110.67	2.00	0.00	0.82	0.00	3.30	109.46	2.00	0.00	0.82	0.00
3.32	108.92	2.00	0.00	0.82	0.00	3.34	113.24	2.00	0.00	0.81	0.00
3.36	115.60	2.00	0.00	0.81	0.00	3.38	115.84	2.00	0.00	0.81	0.00
3.40	128.86	2.00	0.00	0.81	0.00	3.42	133.16	2.00	0.00	0.81	0.00
3.44	126.42	2.00	0.00	0.81	0.00	3.46	122.59	2.00	0.00	0.81	0.00
3.48	118.45	2.00	0.00	0.81	0.00	3.50	113.99	2.00	0.00	0.81	0.00
3.52	107.33	2.00	0.00	0.80	0.00	3.54	99.44	2.00	0.00	0.80	0.00
3.56	87.35	1.91	0.00	0.80	0.00	3.58	77.52	1.65	0.00	0.80	0.00
3.60	74.18	1.58	0.00	0.80	0.00	3.62	76.10	1.62	0.00	0.80	0.00
3.64	77.76	1.65	0.00	0.80	0.00	3.66	74.91	1.59	0.00	0.80	0.00
3.68	71.44	1.51	0.00	0.80	0.00	3.70	68.50	1.46	0.00	0.79	0.00
3.72	69.30	1.47	0.00	0.79	0.00	3.74	73.17	1.54	0.00	0.79	0.00
3.76	73.24	1.54	0.00	0.79	0.00	3.78	75.91	1.59	0.00	0.79	0.00
3.80	74.67	2.00	0.00	0.79	0.00	3.82	78.43	2.00	0.00	0.79	0.00
3.84	101.24	2.00	0.00	0.79	0.00	3.86	93.31	2.00	0.00	0.79	0.00
3.88	96.67	2.00	0.00	0.78	0.00	3.90	93.32	2.00	0.00	0.78	0.00
3.92	87.01	2.00	0.00	0.78	0.00	3.94	73.79	2.00	0.00	0.78	0.00
3.96	66.52	2.00	0.00	0.78	0.00	3.98	65.30	2.00	0.00	0.78	0.00
4.00	64.57	2.00	0.00	0.78	0.00	4.02	64.27	2.00	0.00	0.78	0.00
4.04	71.77	2.00	0.00	0.78	0.00	4.06	82.92	2.00	0.00	0.77	0.00
4.08	94.06	2.00	0.00	0.77	0.00	4.10	100.65	2.00	0.00	0.77	0.00
4.12	124.71	2.00	0.00	0.77	0.00	4.14	107.93	2.00	0.00	0.77	0.00
4.16	126.70	2.00	0.00	0.77	0.00	4.18	126.42	2.00	0.00	0.77	0.00
4.20	134.76	2.00	0.00	0.77	0.00	4.22	147.10	2.00	0.00	0.77	0.00
4.24	149.09	2.00	0.00	0.76	0.00	4.26	143.90	2.00	0.00	0.76	0.00
4.28	139.82	2.00	0.00	0.76	0.00	4.30	132.73	2.00	0.00	0.76	0.00
4.32	123.75	2.00	0.00	0.76	0.00	4.34	112.38	2.00	0.00	0.76	0.00
4.36	104.72	2.00	0.00	0.76	0.00	4.38	99.25	2.00	0.00	0.76	0.00
4.40	96.80	2.00	0.00	0.76	0.00	4.42	95.89	2.00	0.00	0.75	0.00
4.44	95.11	2.00	0.00	0.75	0.00	4.46	94.72	2.00	0.00	0.75	0.00
4.48	94.35	2.00	0.00	0.75	0.00	4.50	95.37	2.00	0.00	0.75	0.00
4.52	95.68	2.00	0.00	0.75	0.00	4.54	95.94	2.00	0.00	0.75	0.00
4.56	95.52	2.00	0.00	0.75	0.00	4.58	95.34	2.00	0.00	0.75	0.00
4.60	93.85	2.00	0.00	0.74	0.00	4.62	91.35	2.00	0.00	0.74	0.00
4.64	87.24	2.00	0.00	0.74	0.00	4.66	83.43	2.00	0.00	0.74	0.00
4.68	80.10	2.00	0.00	0.74	0.00	4.70	77.74	2.00	0.00	0.74	0.00
4.72	76.53	2.00	0.00	0.74	0.00	4.74	76.28	2.00	0.00	0.74	0.00
4.76	75.87	2.00	0.00	0.74	0.00	4.78	75.33	2.00	0.00	0.73	0.00
4.80	76.34	2.00	0.00	0.73	0.00	4.82	79.32	2.00	0.00	0.73	0.00
4.84	80.82	2.00	0.00	0.73	0.00	4.86	79.88	2.00	0.00	0.73	0.00
4.88	76.52	2.00	0.00	0.73	0.00	4.90	74.70	2.00	0.00	0.73	0.00
4.92	73.66	2.00	0.00	0.73	0.00	4.94	73.44	2.00	0.00	0.73	0.00
4.96	72.53	2.00	0.00	0.72	0.00	4.98	71.45	2.00	0.00	0.72	0.00
5.00	70.62	2.00	0.00	0.72	0.00	5.02	70.39	2.00	0.00	0.72	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)
5.04	70.27	2.00	0.00	0.72	0.00	5.06	69.61	2.00	0.00	0.72	0.00
5.08	69.09	2.00	0.00	0.72	0.00	5.10	68.75	2.00	0.00	0.72	0.00
5.12	68.33	2.00	0.00	0.72	0.00	5.14	67.69	2.00	0.00	0.71	0.00
5.16	66.84	2.00	0.00	0.71	0.00	5.18	66.57	2.00	0.00	0.71	0.00
5.20	66.64	2.00	0.00	0.71	0.00	5.22	66.88	2.00	0.00	0.71	0.00
5.24	66.95	2.00	0.00	0.71	0.00	5.26	67.18	2.00	0.00	0.71	0.00
5.28	67.51	2.00	0.00	0.71	0.00	5.30	67.74	2.00	0.00	0.71	0.00
5.32	67.45	2.00	0.00	0.70	0.00	5.34	62.20	2.00	0.00	0.70	0.00
5.36	111.13	2.00	0.00	0.70	0.00	5.38	116.93	2.00	0.00	0.70	0.00
5.40	67.84	2.00	0.00	0.70	0.00	5.42	75.73	2.00	0.00	0.70	0.00
5.44	76.67	2.00	0.00	0.70	0.00	5.46	76.22	2.00	0.00	0.70	0.00
5.48	76.12	2.00	0.00	0.70	0.00	5.50	75.80	2.00	0.00	0.69	0.00
5.52	75.21	2.00	0.00	0.69	0.00	5.54	73.54	2.00	0.00	0.69	0.00
5.56	71.72	2.00	0.00	0.69	0.00	5.58	69.77	2.00	0.00	0.69	0.00
5.60	68.50	2.00	0.00	0.69	0.00	5.62	68.45	2.00	0.00	0.69	0.00
5.64	68.89	2.00	0.00	0.69	0.00	5.66	69.23	2.00	0.00	0.69	0.00
5.68	69.40	2.00	0.00	0.68	0.00	5.70	69.47	2.00	0.00	0.68	0.00
5.72	70.10	2.00	0.00	0.68	0.00	5.74	70.75	2.00	0.00	0.68	0.00
5.76	71.31	2.00	0.00	0.68	0.00	5.78	71.20	2.00	0.00	0.68	0.00
5.80	70.83	2.00	0.00	0.68	0.00	5.82	70.45	2.00	0.00	0.68	0.00
5.84	70.19	2.00	0.00	0.68	0.00	5.86	70.17	2.00	0.00	0.67	0.00
5.88	70.12	2.00	0.00	0.67	0.00	5.90	70.24	2.00	0.00	0.67	0.00
5.92	70.19	2.00	0.00	0.67	0.00	5.94	70.14	2.00	0.00	0.67	0.00
5.96	70.08	2.00	0.00	0.67	0.00	5.98	70.01	2.00	0.00	0.67	0.00
6.00	69.78	2.00	0.00	0.67	0.00	6.02	69.54	2.00	0.00	0.67	0.00
6.04	68.98	2.00	0.00	0.66	0.00	6.06	68.67	2.00	0.00	0.66	0.00
6.08	68.27	2.00	0.00	0.66	0.00	6.10	68.35	2.00	0.00	0.66	0.00
6.12	68.25	2.00	0.00	0.66	0.00	6.14	68.19	2.00	0.00	0.66	0.00
6.16	68.14	2.00	0.00	0.66	0.00	6.18	68.46	2.00	0.00	0.66	0.00
6.20	68.67	2.00	0.00	0.66	0.00	6.22	68.84	2.00	0.00	0.65	0.00
6.24	68.86	2.00	0.00	0.65	0.00	6.26	68.99	2.00	0.00	0.65	0.00
6.28	68.34	2.00	0.00	0.65	0.00	6.30	66.71	2.00	0.00	0.65	0.00
6.32	65.15	2.00	0.00	0.65	0.00	6.34	64.53	2.00	0.00	0.65	0.00
6.36	65.11	2.00	0.00	0.65	0.00	6.38	66.43	2.00	0.00	0.65	0.00
6.40	67.49	2.00	0.00	0.64	0.00	6.42	69.37	2.00	0.00	0.64	0.00
6.44	70.58	2.00	0.00	0.64	0.00	6.46	71.53	2.00	0.00	0.64	0.00
6.48	71.40	2.00	0.00	0.64	0.00	6.50	68.90	2.00	0.00	0.64	0.00
6.52	124.45	2.00	0.00	0.64	0.00	6.54	98.45	2.00	0.00	0.64	0.00
6.56	70.64	2.00	0.00	0.64	0.00	6.58	65.42	2.00	0.00	0.63	0.00
6.60	64.35	1.20	0.05	0.63	0.00	6.62	84.77	1.57	0.00	0.63	0.00
6.64	98.01	1.92	0.00	0.63	0.00	6.66	106.06	2.00	0.00	0.63	0.00
6.68	112.52	2.00	0.00	0.63	0.00	6.70	123.50	2.00	0.00	0.63	0.00
6.72	140.85	2.00	0.00	0.63	0.00	6.74	154.04	2.00	0.00	0.63	0.00
6.76	155.47	2.00	0.00	0.62	0.00	6.78	145.39	2.00	0.00	0.62	0.00
6.80	138.53	2.00	0.00	0.62	0.00	6.82	122.82	2.00	0.00	0.62	0.00
6.84	117.42	2.00	0.00	0.62	0.00	6.86	97.10	2.00	0.00	0.62	0.00
6.88	70.47	2.00	0.00	0.62	0.00	6.90	66.94	2.00	0.00	0.62	0.00
6.92	68.20	2.00	0.00	0.62	0.00	6.94	71.85	2.00	0.00	0.61	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)
6.96	77.97	2.00	0.00	0.61	0.00	6.98	85.18	2.00	0.00	0.61	0.00
7.00	122.89	2.00	0.00	0.61	0.00	7.02	160.29	2.00	0.00	0.61	0.00
7.04	207.30	2.00	0.00	0.61	0.00	7.06	104.46	2.00	0.00	0.61	0.00
7.08	105.00	2.00	0.00	0.61	0.00	7.10	104.26	2.00	0.00	0.61	0.00
7.12	101.58	2.00	0.00	0.60	0.00	7.14	97.51	2.00	0.00	0.60	0.00
7.16	91.54	2.00	0.00	0.60	0.00	7.18	87.05	2.00	0.00	0.60	0.00
7.20	84.04	2.00	0.00	0.60	0.00	7.22	82.81	2.00	0.00	0.60	0.00
7.24	82.23	2.00	0.00	0.60	0.00	7.26	81.50	2.00	0.00	0.60	0.00
7.28	80.30	2.00	0.00	0.60	0.00	7.30	163.53	2.00	0.00	0.59	0.00
7.32	163.00	2.00	0.00	0.59	0.00	7.34	170.20	2.00	0.00	0.59	0.00
7.36	82.80	2.00	0.00	0.59	0.00	7.38	84.11	2.00	0.00	0.59	0.00
7.40	85.76	2.00	0.00	0.59	0.00	7.42	86.34	2.00	0.00	0.59	0.00
7.44	86.24	2.00	0.00	0.59	0.00	7.46	84.51	2.00	0.00	0.59	0.00
7.48	83.04	2.00	0.00	0.58	0.00	7.50	81.86	2.00	0.00	0.58	0.00
7.52	81.51	2.00	0.00	0.58	0.00	7.54	81.12	2.00	0.00	0.58	0.00
7.56	80.66	2.00	0.00	0.58	0.00	7.58	80.38	2.00	0.00	0.58	0.00
7.60	79.61	2.00	0.00	0.58	0.00	7.62	78.89	2.00	0.00	0.58	0.00
7.64	77.87	2.00	0.00	0.58	0.00	7.66	76.54	2.00	0.00	0.57	0.00
7.68	74.80	2.00	0.00	0.57	0.00	7.70	154.61	2.00	0.00	0.57	0.00
7.72	146.63	2.00	0.00	0.57	0.00	7.74	151.26	2.00	0.00	0.57	0.00
7.76	73.17	2.00	0.00	0.57	0.00	7.78	73.06	2.00	0.00	0.57	0.00
7.80	143.95	2.00	0.00	0.57	0.00	7.82	130.77	2.00	0.00	0.57	0.00
7.84	133.92	2.00	0.00	0.56	0.00	7.86	152.44	2.00	0.00	0.56	0.00
7.88	81.25	2.00	0.00	0.56	0.00	7.90	84.67	2.00	0.00	0.56	0.00
7.92	86.52	2.00	0.00	0.56	0.00	7.94	84.30	2.00	0.00	0.56	0.00
7.96	83.07	2.00	0.00	0.56	0.00	7.98	81.67	2.00	0.00	0.56	0.00
8.00	80.43	2.00	0.00	0.56	0.00	8.02	78.79	2.00	0.00	0.55	0.00
8.04	76.41	2.00	0.00	0.55	0.00	8.06	75.82	2.00	0.00	0.55	0.00
8.08	76.10	2.00	0.00	0.55	0.00	8.10	77.50	2.00	0.00	0.55	0.00
8.12	78.08	2.00	0.00	0.55	0.00	8.14	76.75	2.00	0.00	0.55	0.00
8.16	75.15	2.00	0.00	0.55	0.00	8.18	73.86	2.00	0.00	0.55	0.00
8.20	74.56	2.00	0.00	0.54	0.00	8.22	75.95	2.00	0.00	0.54	0.00
8.24	77.18	2.00	0.00	0.54	0.00	8.26	76.73	2.00	0.00	0.54	0.00
8.28	75.63	2.00	0.00	0.54	0.00	8.30	74.59	2.00	0.00	0.54	0.00
8.32	74.01	2.00	0.00	0.54	0.00	8.34	72.06	2.00	0.00	0.54	0.00
8.36	68.96	2.00	0.00	0.54	0.00	8.38	66.45	2.00	0.00	0.53	0.00
8.40	63.87	2.00	0.00	0.53	0.00	8.42	62.56	2.00	0.00	0.53	0.00
8.44	120.23	2.00	0.00	0.53	0.00	8.46	121.57	2.00	0.00	0.53	0.00
8.48	129.71	2.00	0.00	0.53	0.00	8.50	63.56	2.00	0.00	0.53	0.00
8.52	64.46	2.00	0.00	0.53	0.00	8.54	64.75	2.00	0.00	0.53	0.00
8.56	63.66	2.00	0.00	0.52	0.00	8.58	109.42	2.00	0.00	0.52	0.00
8.60	87.41	2.00	0.00	0.52	0.00	8.62	76.09	2.00	0.00	0.52	0.00
8.64	68.41	2.00	0.00	0.52	0.00	8.66	60.94	2.00	0.00	0.52	0.00
8.68	60.59	1.13	0.08	0.52	0.00	8.70	71.11	1.27	0.02	0.52	0.00
8.72	89.93	1.65	0.00	0.52	0.00	8.74	97.34	1.67	0.00	0.51	0.00
8.76	84.23	1.52	0.00	0.51	0.00	8.78	68.71	1.23	0.04	0.51	0.00
8.80	67.12	1.21	0.04	0.51	0.00	8.82	84.98	1.53	0.00	0.51	0.00
8.84	105.95	1.92	0.00	0.51	0.00	8.86	110.14	2.00	0.00	0.51	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)
8.88	86.72	2.00	0.00	0.51	0.00	8.90	65.77	2.00	0.00	0.51	0.00
8.92	56.57	2.00	0.00	0.50	0.00	8.94	55.96	2.00	0.00	0.50	0.00
8.96	67.38	2.00	0.00	0.50	0.00	8.98	80.70	2.00	0.00	0.50	0.00
9.00	91.48	2.00	0.00	0.50	0.00	9.02	100.24	2.00	0.00	0.50	0.00
9.04	109.21	2.00	0.00	0.50	0.00	9.06	125.75	2.00	0.00	0.50	0.00
9.08	124.95	2.00	0.00	0.50	0.00	9.10	115.23	2.00	0.00	0.49	0.00
9.12	93.71	1.57	0.00	0.49	0.00	9.14	79.67	1.28	0.02	0.49	0.00
9.16	73.92	1.31	0.02	0.49	0.00	9.18	79.32	1.27	0.02	0.49	0.00
9.20	84.25	1.36	0.00	0.49	0.00	9.22	78.69	2.00	0.00	0.49	0.00
9.24	71.00	2.00	0.00	0.49	0.00	9.26	61.22	2.00	0.00	0.49	0.00
9.28	53.28	2.00	0.00	0.48	0.00	9.30	52.82	2.00	0.00	0.48	0.00
9.32	54.42	2.00	0.00	0.48	0.00	9.34	57.70	2.00	0.00	0.48	0.00
9.36	70.73	2.00	0.00	0.48	0.00	9.38	81.10	2.00	0.00	0.48	0.00
9.40	79.60	1.41	0.00	0.48	0.00	9.42	79.77	1.42	0.00	0.48	0.00
9.44	88.11	1.44	0.00	0.48	0.00	9.46	106.20	1.92	0.00	0.47	0.00
9.48	124.40	2.00	0.00	0.47	0.00	9.50	131.80	2.00	0.00	0.47	0.00
9.52	123.25	2.00	0.00	0.47	0.00	9.54	116.08	2.00	0.00	0.47	0.00
9.56	125.82	2.00	0.00	0.47	0.00	9.58	63.65	2.00	0.00	0.47	0.00
9.60	65.95	2.00	0.00	0.47	0.00	9.62	65.27	2.00	0.00	0.47	0.00
9.64	63.61	2.00	0.00	0.46	0.00	9.66	60.64	2.00	0.00	0.46	0.00
9.68	57.22	2.00	0.00	0.46	0.00	9.70	99.87	1.73	0.00	0.46	0.00
9.72	91.49	1.52	0.00	0.46	0.00	9.74	103.99	1.85	0.00	0.46	0.00
9.76	107.92	1.98	0.00	0.46	0.00	9.78	96.70	1.65	0.00	0.46	0.00
9.80	93.59	1.57	0.00	0.46	0.00	9.82	115.24	2.00	0.00	0.45	0.00
9.84	64.32	2.00	0.00	0.45	0.00	9.86	66.67	2.00	0.00	0.45	0.00
9.88	67.00	2.00	0.00	0.45	0.00	9.90	65.89	2.00	0.00	0.45	0.00
9.92	62.87	2.00	0.00	0.45	0.00	9.94	105.07	2.00	0.00	0.45	0.00
9.96	62.16	2.00	0.00	0.45	0.00	9.98	63.24	1.15	0.05	0.45	0.00
10.00	69.32	2.00	0.00	0.44	0.00	10.02	91.31	2.00	0.00	0.44	0.00
10.04	128.30	2.00	0.00	0.44	0.00	10.06	240.52	2.00	0.00	0.44	0.00
10.08	135.18	2.00	0.00	0.44	0.00	10.10	154.96	2.00	0.00	0.44	0.00
10.12	168.81	2.00	0.00	0.44	0.00	10.14	174.56	2.00	0.00	0.44	0.00
10.16	168.12	2.00	0.00	0.44	0.00	10.18	253.02	2.00	0.00	0.43	0.00
10.20	109.29	2.00	0.00	0.43	0.00	10.22	114.16	2.00	0.00	0.43	0.00
10.24	146.63	2.00	0.00	0.43	0.00	10.26	177.88	2.00	0.00	0.43	0.00
10.28	197.56	2.00	0.00	0.43	0.00	10.30	210.80	2.00	0.00	0.43	0.00
10.32	223.16	2.00	0.00	0.43	0.00	10.34	233.22	2.00	0.00	0.43	0.00
10.36	240.88	2.00	0.00	0.42	0.00	10.38	251.94	2.00	0.00	0.42	0.00
10.40	270.39	2.00	0.00	0.42	0.00	10.42	288.01	2.00	0.00	0.42	0.00
10.44	313.09	2.00	0.00	0.42	0.00	10.46	327.53	2.00	0.00	0.42	0.00
10.48	352.18	2.00	0.00	0.42	0.00	10.50	362.66	2.00	0.00	0.42	0.00

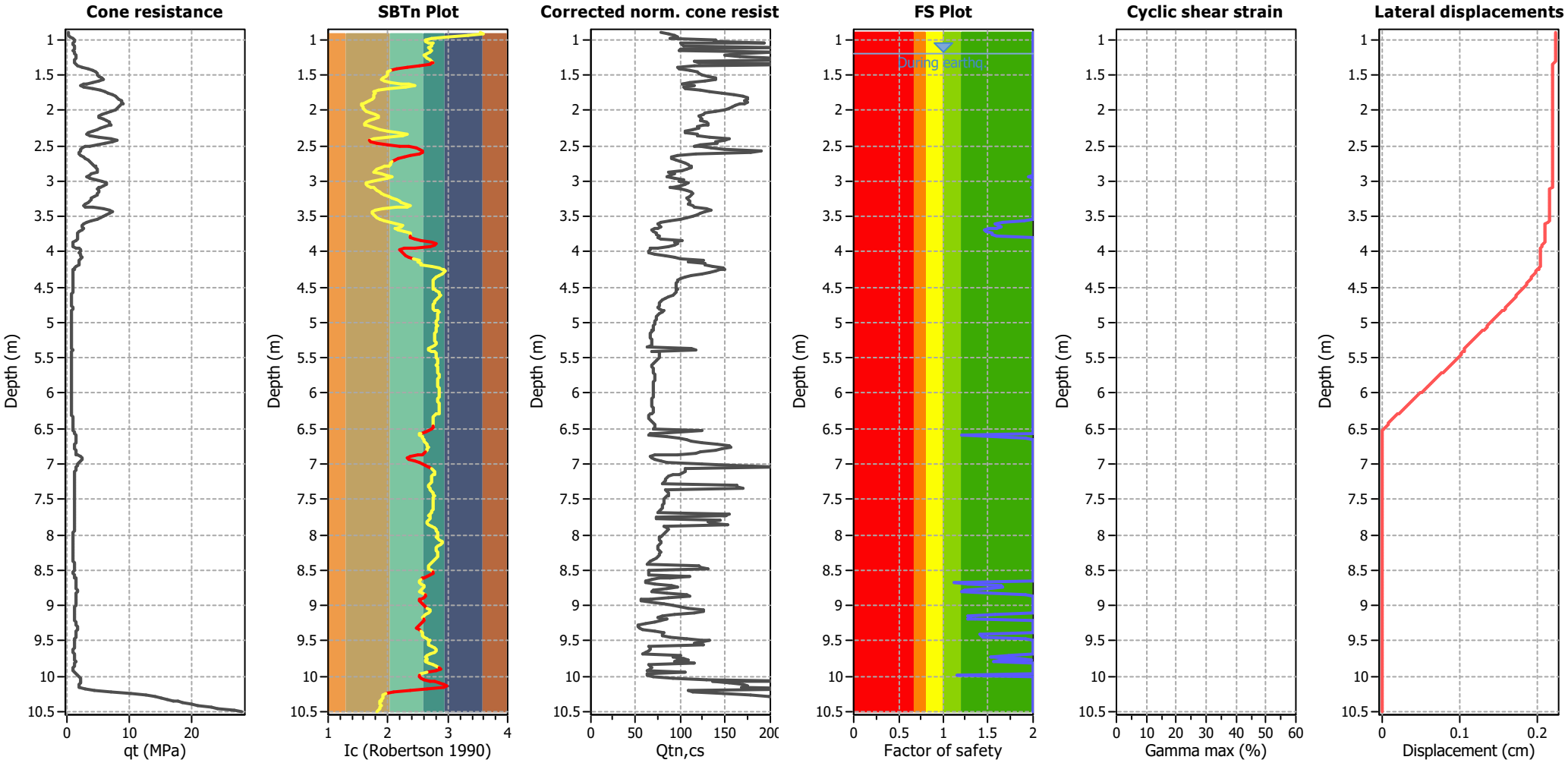
Total estimated settlement: 0.01

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

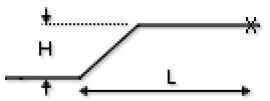
Geometric parameters: Level ground (or gently sloping) with free face (L: 27.70 m - H: 3.40 m)



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)
1.20	1.19	23.18	2.36	166.31	2.00	18.75	0.00	0.00
1.22	1.30	25.24	2.35	148.44	2.00	21.57	0.00	0.00
1.24	1.32	25.66	2.53	165.69	2.00	22.10	0.00	0.00
1.26	1.29	25.17	2.83	204.56	2.00	21.47	0.00	0.00
1.28	1.24	24.17	3.06	244.99	2.00	20.13	0.00	0.00
1.30	1.20	23.28	3.21	116.01	2.00	18.89	0.05	0.00
1.32	1.18	22.97	3.46	120.97	2.00	18.44	0.05	0.00
1.34	1.24	24.09	3.48	122.85	2.00	20.02	0.05	0.00
1.36	1.35	26.30	3.29	253.95	2.00	22.92	0.00	0.00
1.38	1.76	34.24	2.51	115.01	2.00	31.62	0.00	0.00
1.40	2.45	47.85	1.79	95.97	2.00	42.67	0.00	0.00
1.42	3.35	65.59	1.41	98.55	2.00	53.08	0.00	0.00
1.44	4.15	81.47	1.25	109.71	2.00	60.24	0.00	0.00
1.46	4.63	90.87	1.21	118.60	2.00	63.84	0.00	0.00
1.48	4.75	93.30	1.21	121.16	2.00	64.71	0.00	0.00
1.50	4.84	95.03	1.27	123.84	2.00	65.32	0.00	0.00
1.52	5.19	101.91	1.25	130.85	2.00	67.62	0.00	0.00
1.54	5.63	110.72	1.17	138.66	2.00	70.36	0.00	0.00
1.56	5.77	113.39	1.07	139.47	2.00	71.15	0.00	0.00
1.58	5.11	100.35	1.09	126.35	2.00	67.12	0.00	0.00
1.60	4.14	81.27	1.25	109.53	2.00	60.15	0.00	0.00
1.62	3.14	61.46	1.64	101.33	2.00	50.93	0.00	0.00
1.64	2.57	50.17	2.10	107.03	2.00	44.23	0.00	0.00
1.66	2.22	43.23	2.53	115.42	2.00	39.32	0.00	0.00
1.68	2.74	53.60	1.92	103.76	2.00	46.42	0.00	0.00
1.70	4.01	78.67	1.14	104.88	2.00	59.08	0.00	0.00
1.72	5.29	103.95	0.77	122.75	2.00	68.28	0.00	0.00
1.74	6.09	119.64	0.72	131.95	2.00	72.92	0.00	0.00
1.76	6.55	128.82	0.85	145.52	2.00	75.36	0.00	0.00
1.78	7.26	142.70	0.93	159.72	2.00	78.74	0.00	0.00
1.80	7.81	153.52	0.97	169.97	2.00	81.15	0.00	0.00
1.82	8.16	160.58	0.98	174.59	2.00	82.63	0.00	0.00
1.84	8.42	165.60	0.95	174.36	2.00	83.65	0.00	0.00
1.86	8.70	171.09	0.86	171.09	2.00	84.72	0.00	0.00
1.88	8.87	174.49	0.71	174.49	2.00	85.37	0.00	0.00
1.90	8.92	171.29	0.59	171.29	2.00	84.76	0.00	0.00
1.92	8.78	165.73	0.51	165.73	2.00	83.67	0.00	0.00
1.94	8.56	161.53	0.50	161.53	2.00	82.83	0.00	0.00
1.96	8.36	158.13	0.51	158.13	2.00	82.12	0.00	0.00
1.98	8.17	154.79	0.51	154.79	2.00	81.42	0.00	0.00
2.00	7.82	149.44	0.53	149.44	2.00	80.26	0.00	0.00
2.02	7.15	139.03	0.57	139.03	2.00	77.88	0.00	0.00
2.04	6.30	123.67	0.64	127.58	2.00	74.01	0.00	0.00
2.06	5.53	108.51	0.73	124.97	2.00	69.70	0.00	0.00
2.08	5.19	101.68	0.77	120.77	2.00	67.55	0.00	0.00
2.10	5.22	102.31	0.77	121.50	2.00	67.75	0.00	0.00
2.12	5.72	112.29	0.67	124.08	2.00	70.83	0.00	0.00
2.14	6.27	122.36	0.56	122.36	2.00	73.66	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)
2.16	6.80	128.48	0.48	128.48	2.00	75.27	0.00	0.00
2.18	6.95	129.84	0.45	129.84	2.00	75.62	0.00	0.00
2.20	6.99	130.11	0.44	130.11	2.00	75.69	0.00	0.00
2.22	6.70	125.74	0.46	125.74	2.00	74.56	0.00	0.00
2.24	6.17	119.29	0.57	119.29	2.00	72.82	0.00	0.00
2.26	5.42	106.21	0.66	119.93	2.00	68.99	0.00	0.00
2.28	4.76	93.30	0.80	113.84	2.00	64.71	0.00	0.00
2.30	4.11	80.45	1.03	104.85	2.00	59.82	0.00	0.00
2.32	3.50	68.31	1.57	105.09	2.00	54.42	0.00	0.00
2.34	3.04	59.16	2.25	117.82	2.00	49.67	0.00	0.00
2.36	3.58	69.96	2.04	119.49	2.00	55.21	0.00	0.00
2.38	5.22	102.30	1.35	132.96	2.00	67.75	0.00	0.00
2.40	7.10	138.41	0.88	153.85	2.00	77.73	0.00	0.00
2.42	7.99	148.82	0.69	148.82	2.00	80.12	0.00	0.00
2.44	7.39	138.84	0.70	138.84	2.00	77.83	0.00	0.00
2.46	6.14	120.43	0.88	140.78	2.00	73.14	0.00	0.00
2.48	4.82	94.33	1.22	122.41	2.00	65.07	0.00	0.00
2.50	3.75	73.13	1.81	115.62	2.00	56.67	0.00	0.00
2.52	2.99	58.12	2.41	122.34	2.00	49.09	0.00	0.00
2.54	2.50	48.51	3.02	134.71	2.00	43.12	0.00	0.00
2.56	2.26	43.80	3.30	148.90	2.00	39.75	0.00	0.00
2.58	2.04	39.44	3.53	190.36	2.00	36.29	0.00	0.00
2.60	1.92	37.06	3.29	178.55	2.00	34.24	0.00	0.00
2.62	1.97	37.99	2.67	116.58	2.00	35.05	0.00	0.00
2.64	2.21	42.83	1.91	96.98	2.00	39.01	0.00	0.00
2.66	2.55	49.39	1.55	90.41	2.00	43.72	0.00	0.00
2.68	2.96	57.45	1.33	89.82	2.00	48.71	0.00	0.00
2.70	3.36	65.36	1.24	94.29	2.00	52.96	0.00	0.00
2.72	3.70	72.06	1.19	99.57	2.00	56.18	0.00	0.00
2.74	3.95	77.04	1.19	104.37	2.00	58.39	0.00	0.00
2.76	4.15	80.92	1.19	108.14	2.00	60.01	0.00	0.00
2.78	4.33	84.46	1.14	110.92	2.00	61.43	0.00	0.00
2.80	4.50	87.82	0.99	111.73	2.00	62.71	0.00	0.00
2.82	4.67	90.13	0.81	111.03	2.00	63.57	0.00	0.00
2.84	4.85	90.75	0.62	106.64	2.00	63.80	0.00	0.00
2.86	4.91	89.83	0.52	101.67	2.00	63.46	0.00	0.00
2.88	4.78	86.90	0.47	86.90	2.00	62.37	0.00	0.00
2.90	3.99	75.79	0.60	92.74	2.00	57.85	0.00	0.00
2.92	3.56	69.29	0.74	88.57	2.00	54.89	0.00	0.00
2.94	3.22	62.49	0.93	85.20	1.95	51.48	0.06	0.00
2.96	3.67	71.48	0.85	92.69	2.00	55.92	0.00	0.00
2.98	4.59	85.74	0.68	103.89	2.00	61.92	0.00	0.00
3.00	5.61	98.83	0.48	98.83	2.00	66.61	0.00	0.00
3.02	6.39	108.19	0.37	108.19	2.00	69.60	0.00	0.00
3.04	6.28	105.89	0.35	105.89	2.00	68.89	0.00	0.00
3.06	5.93	100.64	0.36	100.64	2.00	67.21	0.00	0.00
3.08	5.35	92.28	0.38	92.28	2.00	64.35	0.00	0.00
3.10	5.00	87.75	0.43	87.75	1.99	62.69	0.17	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)
3.12	4.90	87.30	0.52	99.96	2.00	62.52	0.00	0.00
3.14	5.05	90.87	0.63	107.07	2.00	63.84	0.00	0.00
3.16	5.08	92.53	0.74	111.69	2.00	64.44	0.00	0.00
3.18	4.96	91.75	0.86	113.59	2.00	64.16	0.00	0.00
3.20	4.74	88.84	0.96	112.38	2.00	63.09	0.00	0.00
3.22	4.34	83.27	1.13	109.50	2.00	60.96	0.00	0.00
3.24	3.98	77.40	1.32	107.38	2.00	58.54	0.00	0.00
3.26	3.76	73.09	1.52	107.93	2.00	56.65	0.00	0.00
3.28	3.62	70.39	1.71	110.67	2.00	55.41	0.00	0.00
3.30	3.35	64.95	1.82	109.46	2.00	52.75	0.00	0.00
3.32	2.93	56.74	2.00	108.92	2.00	48.29	0.00	0.00
3.34	2.62	50.69	2.27	113.24	2.00	44.58	0.00	0.00
3.36	2.93	56.66	2.22	115.60	2.00	48.25	0.00	0.00
3.38	4.02	78.28	1.65	115.84	2.00	58.92	0.00	0.00
3.40	5.72	103.31	1.05	128.86	2.00	68.07	0.00	0.00
3.42	6.93	118.43	0.75	133.16	2.00	72.58	0.00	0.00
3.44	7.27	121.54	0.64	126.42	2.00	73.44	0.00	0.00
3.46	6.78	113.83	0.63	122.59	2.00	71.28	0.00	0.00
3.48	6.25	105.75	0.64	118.45	2.00	68.85	0.00	0.00
3.50	5.86	99.61	0.63	113.99	2.00	66.87	0.00	0.00
3.52	5.38	91.87	0.61	107.33	2.00	64.20	0.00	0.00
3.54	4.76	82.34	0.62	99.44	2.00	60.59	0.00	0.00
3.56	3.90	69.23	0.66	87.35	1.91	54.86	0.07	0.00
3.58	3.17	58.02	0.75	77.52	1.65	49.03	0.17	0.00
3.60	2.57	48.92	0.97	74.18	1.58	43.40	0.00	0.00
3.62	2.32	44.64	1.16	76.10	1.62	40.38	0.00	0.00
3.64	2.43	46.74	1.16	77.76	1.65	41.90	0.00	0.00
3.66	2.62	49.41	0.98	74.91	1.59	43.73	0.00	0.00
3.68	2.61	48.62	0.86	71.44	1.51	43.20	0.00	0.00
3.70	2.31	43.60	0.90	68.50	1.46	39.60	0.00	0.00
3.72	1.95	37.26	1.08	69.30	1.47	34.41	0.00	0.00
3.74	1.75	33.24	1.27	73.17	1.54	30.65	0.00	0.00
3.76	1.73	32.88	1.28	73.24	1.54	30.28	0.00	0.00
3.78	1.77	33.70	1.36	75.91	1.59	31.10	0.00	0.00
3.80	1.76	33.41	1.32	74.67	2.00	30.82	0.00	0.00
3.82	1.59	30.04	1.50	78.43	2.00	27.30	0.00	0.00
3.84	1.29	24.23	1.75	101.24	2.00	20.22	0.00	0.00
3.86	1.03	19.00	2.30	93.31	2.00	12.18	0.06	0.00
3.88	0.88	16.14	2.60	96.67	2.00	6.80	0.07	0.00
3.90	0.91	16.74	2.40	93.32	2.00	8.01	0.07	0.00
3.92	0.99	18.16	2.06	87.01	2.00	10.69	0.06	0.00
3.94	1.45	27.33	1.38	73.79	2.00	24.19	0.00	0.00
3.96	1.91	35.89	1.01	66.52	2.00	33.18	0.00	0.00
3.98	2.22	40.66	0.86	65.30	2.00	37.30	0.00	0.00
4.00	2.12	39.03	0.87	64.57	2.00	35.95	0.00	0.00
4.02	2.02	37.29	0.90	64.27	2.00	34.44	0.00	0.00
4.04	2.15	39.95	1.11	71.77	2.00	36.71	0.00	0.00
4.06	2.25	42.39	1.43	82.92	2.00	38.67	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)
4.08	2.28	43.60	1.78	94.06	2.00	39.60	0.00	0.00
4.10	2.14	40.86	2.04	100.65	2.00	37.46	0.00	0.00
4.12	1.84	34.87	2.58	124.71	2.00	32.23	0.00	0.00
4.14	1.90	36.14	2.45	107.93	2.00	33.41	0.00	0.00
4.16	1.82	34.45	2.58	126.70	2.00	31.83	0.00	0.00
4.18	1.81	34.40	2.58	126.42	2.00	31.78	0.00	0.00
4.20	1.44	27.08	3.70	134.76	2.00	23.89	0.05	0.00
4.22	1.22	22.76	4.59	147.10	2.00	18.14	0.05	0.00
4.24	1.09	20.05	5.01	149.09	2.00	13.96	0.06	0.00
4.26	1.01	18.44	4.93	143.90	2.00	11.20	0.06	0.00
4.28	0.97	17.71	4.79	139.82	2.00	9.87	0.06	0.00
4.30	0.95	17.31	4.42	132.73	2.00	9.11	0.07	0.00
4.32	0.95	17.25	3.90	123.75	2.00	9.00	0.07	0.00
4.34	0.95	17.33	3.28	112.38	2.00	9.15	0.07	0.00
4.36	0.97	17.65	2.87	104.72	2.00	9.75	0.07	0.00
4.38	0.98	17.90	2.59	99.25	2.00	10.22	0.06	0.00
4.40	0.99	18.08	2.47	96.80	2.00	10.55	0.06	0.00
4.42	0.99	18.09	2.43	95.89	2.00	10.57	0.06	0.00
4.44	0.98	17.94	2.40	95.11	2.00	10.28	0.06	0.00
4.46	0.98	17.90	2.38	94.72	2.00	10.22	0.06	0.00
4.48	0.99	18.07	2.36	94.35	2.00	10.53	0.06	0.00
4.50	1.00	18.22	2.40	95.37	2.00	10.81	0.06	0.00
4.52	0.99	17.95	2.42	95.68	2.00	10.31	0.06	0.00
4.54	0.94	17.10	2.48	95.94	2.00	8.71	0.07	0.00
4.56	0.89	16.00	2.52	95.52	2.00	6.51	0.07	0.00
4.58	0.83	14.78	2.59	95.34	2.00	3.90	0.07	0.00
4.60	0.78	13.91	2.58	93.85	2.00	1.89	0.08	0.00
4.62	0.76	13.43	2.48	91.35	2.00	0.74	0.08	0.00
4.64	0.75	13.29	2.28	87.24	2.00	0.38	0.08	0.00
4.66	0.75	13.18	2.09	83.43	2.00	0.11	0.08	0.00
4.68	0.75	13.24	1.93	80.10	2.00	0.28	0.08	0.00
4.70	0.77	13.59	1.80	77.74	2.00	1.12	0.08	0.00
4.72	0.79	14.04	1.73	76.53	2.00	2.19	0.08	0.00
4.74	0.80	14.19	1.71	76.28	2.00	2.55	0.08	0.00
4.76	0.80	14.21	1.69	75.87	2.00	2.60	0.08	0.00
4.78	0.81	14.36	1.66	75.33	2.00	2.95	0.07	0.00
4.80	0.82	14.50	1.70	76.34	2.00	3.27	0.07	0.00
4.82	0.80	14.11	1.85	79.32	2.00	2.36	0.08	0.00
4.84	0.75	13.14	1.96	80.82	2.00	0.02	0.08	0.00
4.86	0.70	12.28	1.96	79.88	2.00	0.00	0.08	0.00
4.88	0.69	11.95	1.82	76.52	2.00	0.00	0.08	0.00
4.90	0.69	11.89	1.73	74.70	2.00	0.00	0.08	0.00
4.92	0.68	11.83	1.68	73.66	2.00	0.00	0.08	0.00
4.94	0.68	11.77	1.68	73.44	2.00	0.00	0.08	0.00
4.96	0.69	11.89	1.63	72.53	2.00	0.00	0.08	0.00
4.98	0.69	11.97	1.57	71.45	2.00	0.00	0.08	0.00
5.00	0.68	11.82	1.54	70.62	2.00	0.00	0.08	0.00
5.02	0.67	11.63	1.54	70.39	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)
5.04	0.67	11.50	1.54	70.27	2.00	0.00	0.08	0.00
5.06	0.67	11.50	1.51	69.61	2.00	0.00	0.08	0.00
5.08	0.67	11.48	1.48	69.09	2.00	0.00	0.08	0.00
5.10	0.66	11.42	1.47	68.75	2.00	0.00	0.09	0.00
5.12	0.67	11.47	1.45	68.33	2.00	0.00	0.08	0.00
5.14	0.67	11.60	1.41	67.69	2.00	0.00	0.08	0.00
5.16	0.68	11.78	1.37	66.84	2.00	0.00	0.08	0.00
5.18	0.69	11.93	1.35	66.57	2.00	0.00	0.08	0.00
5.20	0.70	12.04	1.35	66.64	2.00	0.00	0.08	0.00
5.22	0.70	12.06	1.36	66.88	2.00	0.00	0.08	0.00
5.24	0.70	11.93	1.37	66.95	2.00	0.00	0.08	0.00
5.26	0.69	11.79	1.38	67.18	2.00	0.00	0.08	0.00
5.28	0.69	11.71	1.40	67.51	2.00	0.00	0.08	0.00
5.30	0.69	11.67	1.41	67.74	2.00	0.00	0.08	0.00
5.32	0.70	11.89	1.39	67.45	2.00	0.00	0.08	0.00
5.34	0.74	12.36	1.16	62.20	2.00	0.00	0.08	0.00
5.36	0.77	12.80	0.95	111.13	2.00	0.00	0.00	0.00
5.38	0.80	13.32	1.04	116.93	2.00	0.47	0.00	0.00
5.40	0.79	13.30	1.37	67.84	2.00	0.41	0.08	0.00
5.42	0.78	13.26	1.70	75.73	2.00	0.32	0.08	0.00
5.44	0.76	12.92	1.76	76.67	2.00	0.00	0.08	0.00
5.46	0.76	12.85	1.74	76.22	2.00	0.00	0.08	0.00
5.48	0.75	12.71	1.74	76.12	2.00	0.00	0.08	0.00
5.50	0.75	12.53	1.74	75.80	2.00	0.00	0.08	0.00
5.52	0.73	12.23	1.72	75.21	2.00	0.00	0.08	0.00
5.54	0.71	11.88	1.66	73.54	2.00	0.00	0.08	0.00
5.56	0.70	11.58	1.59	71.72	2.00	0.00	0.08	0.00
5.58	0.69	11.41	1.51	69.77	2.00	0.00	0.09	0.00
5.60	0.69	11.33	1.45	68.50	2.00	0.00	0.09	0.00
5.62	0.69	11.21	1.45	68.45	2.00	0.00	0.09	0.00
5.64	0.68	11.12	1.48	68.89	2.00	0.00	0.09	0.00
5.66	0.68	11.09	1.49	69.23	2.00	0.00	0.09	0.00
5.68	0.68	11.14	1.50	69.40	2.00	0.00	0.09	0.00
5.70	0.69	11.18	1.50	69.47	2.00	0.00	0.09	0.00
5.72	0.69	11.11	1.53	70.10	2.00	0.00	0.09	0.00
5.74	0.68	11.03	1.57	70.75	2.00	0.00	0.09	0.00
5.76	0.68	10.98	1.59	71.31	2.00	0.00	0.09	0.00
5.78	0.69	11.05	1.59	71.20	2.00	0.00	0.09	0.00
5.80	0.70	11.20	1.56	70.83	2.00	0.00	0.09	0.00
5.82	0.71	11.34	1.54	70.45	2.00	0.00	0.09	0.00
5.84	0.71	11.44	1.52	70.19	2.00	0.00	0.08	0.00
5.86	0.71	11.36	1.52	70.17	2.00	0.00	0.09	0.00
5.88	0.70	11.18	1.53	70.12	2.00	0.00	0.09	0.00
5.90	0.69	10.99	1.54	70.24	2.00	0.00	0.09	0.00
5.92	0.69	10.87	1.55	70.19	2.00	0.00	0.09	0.00
5.94	0.68	10.75	1.55	70.14	2.00	0.00	0.09	0.00
5.96	0.68	10.63	1.55	70.08	2.00	0.00	0.09	0.00
5.98	0.67	10.53	1.55	70.01	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)
6.00	0.67	10.50	1.54	69.78	2.00	0.00	0.09	0.00
6.02	0.67	10.52	1.53	69.54	2.00	0.00	0.09	0.00
6.04	0.68	10.61	1.50	68.98	2.00	0.00	0.09	0.00
6.06	0.69	10.67	1.48	68.67	2.00	0.00	0.09	0.00
6.08	0.69	10.73	1.46	68.27	2.00	0.00	0.09	0.00
6.10	0.69	10.71	1.47	68.35	2.00	0.00	0.09	0.00
6.12	0.69	10.67	1.46	68.25	2.00	0.00	0.09	0.00
6.14	0.69	10.55	1.46	68.19	2.00	0.00	0.09	0.00
6.16	0.68	10.43	1.47	68.14	2.00	0.00	0.09	0.00
6.18	0.68	10.35	1.49	68.46	2.00	0.00	0.09	0.00
6.20	0.67	10.32	1.50	68.67	2.00	0.00	0.09	0.00
6.22	0.68	10.32	1.50	68.84	2.00	0.00	0.09	0.00
6.24	0.67	10.27	1.51	68.86	2.00	0.00	0.09	0.00
6.26	0.68	10.34	1.51	68.99	2.00	0.00	0.09	0.00
6.28	0.70	10.63	1.47	68.34	2.00	0.00	0.09	0.00
6.30	0.74	11.21	1.37	66.71	2.00	0.00	0.09	0.00
6.32	0.78	11.75	1.29	65.15	2.00	0.00	0.08	0.00
6.34	0.80	12.15	1.25	64.53	2.00	0.00	0.08	0.00
6.36	0.82	12.37	1.27	65.11	2.00	0.00	0.08	0.00
6.38	0.84	12.67	1.31	66.43	2.00	0.00	0.08	0.00
6.40	0.85	12.88	1.35	67.49	2.00	0.00	0.08	0.00
6.42	0.86	13.03	1.43	69.37	2.00	0.00	0.08	0.00
6.44	0.87	13.07	1.48	70.58	2.00	0.00	0.08	0.00
6.46	0.87	13.13	1.51	71.53	2.00	0.00	0.08	0.00
6.48	0.87	13.16	1.51	71.40	2.00	0.05	0.08	0.00
6.50	0.93	13.97	1.38	68.90	2.00	2.04	0.08	0.00
6.52	1.01	15.08	1.24	124.45	2.00	4.57	0.00	0.00
6.54	1.10	16.39	1.15	98.45	2.00	7.30	0.00	0.00
6.56	1.18	17.40	0.97	70.64	2.00	9.29	0.00	0.00
6.58	1.25	18.48	0.99	65.42	2.00	11.27	0.00	0.00
6.60	1.31	19.36	1.03	64.35	1.20	12.81	0.00	0.00
6.62	1.32	19.65	1.26	84.77	1.57	13.29	0.00	0.00
6.64	1.32	19.62	1.38	98.01	1.92	13.24	0.00	0.00
6.66	1.32	19.66	1.46	106.06	2.00	13.31	0.00	0.00
6.68	1.32	19.68	1.52	112.52	2.00	13.35	0.00	0.00
6.70	1.31	19.54	1.60	123.50	2.00	13.11	0.00	0.00
6.72	1.29	19.25	1.72	140.85	2.00	12.62	0.00	0.00
6.74	1.28	19.04	1.80	154.04	2.00	12.26	0.00	0.00
6.76	1.27	18.92	1.80	155.47	2.00	12.05	0.00	0.00
6.78	1.28	18.92	1.72	145.39	2.00	12.05	0.00	0.00
6.80	1.30	19.17	1.69	138.53	2.00	12.49	0.00	0.00
6.82	1.35	19.87	1.62	122.82	2.00	13.67	0.00	0.00
6.84	1.38	20.22	1.60	117.42	2.00	14.25	0.00	0.00
6.86	1.45	21.18	1.48	97.10	2.00	15.78	0.00	0.00
6.88	1.66	24.08	1.29	70.47	2.00	20.01	0.00	0.00
6.90	2.08	29.75	1.10	66.94	2.00	26.99	0.00	0.00
6.92	2.35	33.51	1.09	68.20	2.00	30.92	0.00	0.00
6.94	2.37	33.86	1.20	71.85	2.00	31.26	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)
6.96	2.09	30.15	1.46	77.97	2.00	27.43	0.00	0.00
6.98	1.86	26.96	1.69	85.18	2.00	23.73	0.00	0.00
7.00	1.68	24.53	1.94	122.89	2.00	20.62	0.00	0.00
7.02	1.59	23.21	2.18	160.29	2.00	18.79	0.00	0.00
7.04	1.49	21.93	2.43	207.30	2.00	16.93	0.00	0.00
7.06	1.41	20.68	2.64	104.46	2.00	14.98	0.06	0.00
7.08	1.34	19.61	2.71	105.00	2.00	13.22	0.06	0.00
7.10	1.28	18.74	2.72	104.26	2.00	11.74	0.06	0.00
7.12	1.25	18.14	2.63	101.58	2.00	10.65	0.06	0.00
7.14	1.22	17.61	2.47	97.51	2.00	9.67	0.07	0.00
7.16	1.21	17.30	2.22	91.54	2.00	9.09	0.07	0.00
7.18	1.19	16.90	2.04	87.05	2.00	8.32	0.07	0.00
7.20	1.18	16.68	1.92	84.04	2.00	7.90	0.07	0.00
7.22	1.16	16.40	1.88	82.81	2.00	7.32	0.07	0.00
7.24	1.16	16.39	1.86	82.23	2.00	7.30	0.07	0.00
7.26	1.18	16.57	1.82	81.50	2.00	7.66	0.07	0.00
7.28	1.21	16.96	1.76	80.30	2.00	8.44	0.07	0.00
7.30	1.23	17.23	1.70	163.53	2.00	8.95	0.00	0.00
7.32	1.25	17.46	1.72	163.00	2.00	9.40	0.00	0.00
7.34	1.25	17.46	1.77	170.20	2.00	9.39	0.00	0.00
7.36	1.25	17.39	1.85	82.80	2.00	9.26	0.07	0.00
7.38	1.22	17.02	1.91	84.11	2.00	8.55	0.07	0.00
7.40	1.19	16.48	2.00	85.76	2.00	7.50	0.07	0.00
7.42	1.14	15.84	2.05	86.34	2.00	6.18	0.07	0.00
7.44	1.12	15.43	2.06	86.24	2.00	5.31	0.07	0.00
7.46	1.11	15.33	1.99	84.51	2.00	5.11	0.07	0.00
7.48	1.13	15.49	1.92	83.04	2.00	5.45	0.07	0.00
7.50	1.15	15.68	1.86	81.86	2.00	5.85	0.07	0.00
7.52	1.15	15.71	1.85	81.51	2.00	5.91	0.07	0.00
7.54	1.15	15.68	1.83	81.12	2.00	5.84	0.07	0.00
7.56	1.15	15.58	1.81	80.66	2.00	5.63	0.07	0.00
7.58	1.15	15.57	1.80	80.38	2.00	5.60	0.07	0.00
7.60	1.13	15.33	1.78	79.61	2.00	5.10	0.07	0.00
7.62	1.11	14.98	1.76	78.89	2.00	4.35	0.07	0.00
7.64	1.10	14.75	1.72	77.87	2.00	3.82	0.07	0.00
7.66	1.11	14.89	1.66	76.54	2.00	4.15	0.07	0.00
7.68	1.15	15.34	1.58	74.80	2.00	5.11	0.07	0.00
7.70	1.18	15.78	1.51	154.61	2.00	6.05	0.00	0.00
7.72	1.20	15.90	1.46	146.63	2.00	6.30	0.00	0.00
7.74	1.18	15.66	1.47	151.26	2.00	5.81	0.00	0.00
7.76	1.16	15.33	1.51	73.17	2.00	5.11	0.07	0.00
7.78	1.17	15.47	1.50	73.06	2.00	5.41	0.07	0.00
7.80	1.21	15.98	1.45	143.95	2.00	6.48	0.00	0.00
7.82	1.26	16.59	1.41	130.77	2.00	7.70	0.00	0.00
7.84	1.28	16.90	1.46	133.92	2.00	8.31	0.00	0.00
7.86	1.27	16.80	1.58	152.44	2.00	8.13	0.00	0.00
7.88	1.22	16.16	1.82	81.25	2.00	6.84	0.07	0.00
7.90	1.17	15.40	1.99	84.67	2.00	5.25	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)
7.92	1.12	14.66	2.11	86.52	2.00	3.63	0.07	0.00
7.94	1.08	14.05	2.03	84.30	2.00	2.22	0.08	0.00
7.96	1.04	13.49	2.00	83.07	2.00	0.89	0.08	0.00
7.98	1.01	13.04	1.96	81.67	2.00	0.00	0.08	0.00
8.00	1.00	12.92	1.91	80.43	2.00	0.00	0.08	0.00
8.02	1.00	12.77	1.84	78.79	2.00	0.00	0.08	0.00
8.04	0.99	12.68	1.73	76.41	2.00	0.00	0.08	0.00
8.06	0.96	12.22	1.73	75.82	2.00	0.00	0.08	0.00
8.08	0.91	11.51	1.77	76.10	2.00	0.00	0.08	0.00
8.10	0.87	10.87	1.88	77.50	2.00	0.00	0.09	0.00
8.12	0.86	10.77	1.91	78.08	2.00	0.00	0.09	0.00
8.14	0.90	11.23	1.82	76.75	2.00	0.00	0.09	0.00
8.16	0.94	11.78	1.71	75.15	2.00	0.00	0.08	0.00
8.18	0.98	12.26	1.63	73.86	2.00	0.00	0.08	0.00
8.20	1.00	12.51	1.65	74.56	2.00	0.00	0.08	0.00
8.22	1.00	12.51	1.72	75.95	2.00	0.00	0.08	0.00
8.24	0.99	12.38	1.78	77.18	2.00	0.00	0.08	0.00
8.26	0.99	12.30	1.76	76.73	2.00	0.00	0.08	0.00
8.28	0.98	12.25	1.71	75.63	2.00	0.00	0.08	0.00
8.30	0.97	12.07	1.67	74.59	2.00	0.00	0.08	0.00
8.32	0.96	11.89	1.66	74.01	2.00	0.00	0.08	0.00
8.34	0.97	11.98	1.56	72.06	2.00	0.00	0.08	0.00
8.36	1.00	12.28	1.42	68.96	2.00	0.00	0.08	0.00
8.38	1.02	12.55	1.31	66.45	2.00	0.00	0.08	0.00
8.40	1.05	12.86	1.20	63.87	2.00	0.00	0.08	0.00
8.42	1.08	13.25	1.14	62.56	2.00	0.28	0.08	0.00
8.44	1.13	13.80	1.09	120.23	2.00	1.63	0.00	0.00
8.46	1.14	13.97	1.11	121.57	2.00	2.04	0.00	0.00
8.48	1.12	13.64	1.14	129.71	2.00	1.25	0.00	0.00
8.50	1.07	12.98	1.18	63.56	2.00	0.00	0.08	0.00
8.52	1.03	12.39	1.23	64.46	2.00	0.00	0.08	0.00
8.54	1.02	12.34	1.24	64.75	2.00	0.00	0.08	0.00
8.56	1.08	13.08	1.18	63.66	2.00	0.00	0.08	0.00
8.58	1.18	14.34	1.06	109.42	2.00	2.90	0.00	0.00
8.60	1.27	15.39	0.97	87.41	2.00	5.23	0.00	0.00
8.62	1.32	16.00	0.92	76.09	2.00	6.52	0.00	0.00
8.64	1.38	16.77	0.90	68.41	2.00	8.06	0.00	0.00
8.66	1.47	17.78	0.89	60.94	2.00	10.00	0.00	0.00
8.68	1.52	18.50	0.93	60.59	1.13	11.31	0.00	0.00
8.70	1.51	18.39	1.03	71.11	1.27	11.11	0.00	0.00
8.72	1.46	17.82	1.17	89.93	1.65	10.06	0.00	0.00
8.74	1.44	17.54	1.22	97.34	1.67	9.54	0.00	0.00
8.76	1.50	18.13	1.14	84.23	1.52	10.64	0.00	0.00
8.78	1.56	18.85	1.04	68.71	1.23	11.92	0.00	0.00
8.80	1.57	18.91	1.02	67.12	1.21	12.02	0.00	0.00
8.82	1.49	17.93	1.13	84.98	1.53	10.27	0.00	0.00
8.84	1.39	16.67	1.22	105.95	1.92	7.88	0.00	0.00
8.86	1.33	15.95	1.20	110.14	2.00	6.40	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)
8.88	1.34	15.95	1.01	86.72	2.00	6.40	0.00	0.00
8.90	1.39	16.45	0.85	65.77	2.00	7.43	0.00	0.00
8.92	1.43	16.86	0.79	56.57	2.00	8.24	0.00	0.00
8.94	1.44	16.98	0.79	55.96	2.00	8.48	0.00	0.00
8.96	1.41	16.60	0.88	67.38	2.00	7.73	0.00	0.00
8.98	1.37	16.11	0.97	80.70	2.00	6.74	0.00	0.00
9.00	1.33	15.64	1.03	91.48	2.00	5.77	0.00	0.00
9.02	1.26	14.74	1.02	100.24	2.00	3.82	0.00	0.00
9.04	1.19	13.81	1.01	109.21	2.00	1.65	0.00	0.00
9.06	1.11	12.74	1.02	125.75	2.00	0.00	0.00	0.00
9.08	1.09	12.53	1.00	124.95	2.00	0.00	0.00	0.00
9.10	1.12	12.79	0.96	115.23	2.00	0.00	0.00	0.00
9.12	1.19	13.69	0.89	93.71	1.57	1.36	0.00	0.00
9.14	1.26	14.50	0.84	79.67	1.28	3.27	0.00	0.00
9.16	1.29	14.90	0.82	73.92	1.31	4.15	0.00	0.00
9.18	1.27	14.65	0.85	79.32	1.27	3.60	0.00	0.00
9.20	1.26	14.42	0.87	84.25	1.36	3.08	0.00	0.00
9.22	1.29	14.84	0.86	78.69	2.00	4.03	0.00	0.00
9.24	1.36	15.60	0.85	71.00	2.00	5.67	0.00	0.00
9.26	1.43	16.44	0.81	61.22	2.00	7.41	0.00	0.00
9.28	1.49	17.21	0.77	53.28	2.00	8.93	0.00	0.00
9.30	1.58	18.25	0.76	52.82	2.00	10.86	0.00	0.00
9.32	1.65	19.04	0.80	54.42	2.00	12.26	0.00	0.00
9.34	1.62	18.73	0.91	57.70	2.00	11.71	0.00	0.00
9.36	1.54	17.74	0.98	70.73	2.00	9.91	0.00	0.00
9.38	1.46	16.80	1.02	81.10	2.00	8.12	0.00	0.00
9.40	1.44	16.48	0.98	79.60	1.41	7.50	0.00	0.00
9.42	1.42	16.20	0.96	79.77	1.42	6.92	0.00	0.00
9.44	1.36	15.42	0.98	88.11	1.44	5.30	0.00	0.00
9.46	1.29	14.56	1.05	106.20	1.92	3.40	0.00	0.00
9.48	1.23	13.85	1.12	124.40	2.00	1.76	0.00	0.00
9.50	1.21	13.57	1.14	131.80	2.00	1.09	0.00	0.00
9.52	1.21	13.56	1.08	123.25	2.00	1.05	0.00	0.00
9.54	1.22	13.66	1.04	116.08	2.00	1.28	0.00	0.00
9.56	1.20	13.36	1.08	125.82	2.00	0.55	0.00	0.00
9.58	1.14	12.60	1.19	63.65	2.00	0.00	0.08	0.00
9.60	1.05	11.58	1.31	65.95	2.00	0.00	0.08	0.00
9.62	1.01	10.96	1.30	65.27	2.00	0.00	0.09	0.00
9.64	0.99	10.73	1.23	63.61	2.00	0.00	0.09	0.00
9.66	1.00	10.81	1.11	60.64	2.00	0.00	0.09	0.00
9.68	1.08	11.80	0.96	57.22	2.00	0.00	0.08	0.00
9.70	1.17	12.81	0.86	99.87	1.73	0.00	0.00	0.00
9.72	1.25	13.70	0.87	91.49	1.52	1.40	0.00	0.00
9.74	1.24	13.67	0.96	103.99	1.85	1.33	0.00	0.00
9.76	1.26	13.86	1.00	107.92	1.98	1.77	0.00	0.00
9.78	1.29	14.18	0.95	96.70	1.65	2.53	0.00	0.00
9.80	1.30	14.26	0.93	93.59	1.57	2.71	0.00	0.00
9.82	1.24	13.56	1.03	115.24	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)
9.84	1.14	12.34	1.22	64.32	2.00	0.00	0.08	0.00
9.86	1.05	11.25	1.34	66.67	2.00	0.00	0.09	0.00
9.88	0.97	10.28	1.40	67.00	2.00	0.00	0.09	0.00
9.90	0.93	9.71	1.37	65.89	2.00	0.00	0.09	0.00
9.92	1.02	10.86	1.20	62.87	2.00	0.00	0.09	0.00
9.94	1.23	13.24	0.93	105.07	2.00	0.27	0.00	0.00
9.96	1.52	16.72	0.83	62.16	2.00	7.97	0.00	0.00
9.98	1.72	19.08	0.99	63.24	1.15	12.33	0.00	0.00
10.00	1.97	22.09	1.23	69.32	2.00	17.16	0.00	0.00
10.02	2.11	23.83	1.57	91.31	2.00	19.67	0.00	0.00
10.04	2.21	25.04	2.01	128.30	2.00	21.30	0.00	0.00
10.06	2.14	24.41	2.85	240.52	2.00	20.46	0.00	0.00
10.08	2.09	23.96	3.81	135.18	2.00	19.84	0.05	0.00
10.10	2.08	23.85	4.76	154.96	2.00	19.69	0.05	0.00
10.12	1.92	22.04	5.71	168.81	2.00	17.09	0.06	0.00
10.14	1.79	20.36	6.31	174.56	2.00	14.47	0.06	0.00
10.16	1.94	22.13	5.65	168.12	2.00	17.22	0.05	0.00
10.18	2.82	32.24	3.53	253.02	2.00	29.64	0.00	0.00
10.20	4.37	49.73	2.12	109.29	2.00	43.94	0.00	0.00
10.22	7.16	80.76	1.47	114.16	2.00	59.95	0.00	0.00
10.24	10.25	114.90	1.36	146.63	2.00	71.58	0.00	0.00
10.26	12.73	142.46	1.48	177.88	2.00	78.68	0.00	0.00
10.28	14.25	159.30	1.57	197.56	2.00	82.37	0.00	0.00
10.30	15.20	169.73	1.68	210.80	2.00	84.46	0.00	0.00
10.32	16.24	180.96	1.70	223.16	2.00	86.58	0.00	0.00
10.34	17.06	189.82	1.74	233.22	2.00	88.15	0.00	0.00
10.36	17.79	197.48	1.73	240.88	2.00	89.46	0.00	0.00
10.38	18.61	206.38	1.80	251.94	2.00	90.91	0.00	0.00
10.40	20.09	222.53	1.86	270.39	2.00	93.40	0.00	0.00
10.42	21.19	234.64	2.04	288.01	2.00	95.15	0.00	0.00
10.44	23.27	257.18	2.09	313.09	2.00	98.18	0.00	0.00
10.46	24.33	268.66	2.17	327.53	2.00	99.62	0.00	0.00
10.48	26.91	295.98	2.09	352.18	2.00	100.00	0.00	0.00
10.50	28.21	309.43	2.04	362.66	2.00	100.00	0.00	0.00

Total estimated displacement: 0.22

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.90	0.19	3.43	22.59	77.38	3.53	0.72	0.92
0.92	0.19	3.42	25.32	86.46	3.60	0.70	0.90
0.94	0.30	5.69	16.45	93.67	3.35	1.33	1.46
0.96	0.55	10.64	9.14	97.22	3.02	1.31	2.67
0.98	0.89	17.23	5.14	88.55	2.74	0.73	0.73
1.00	1.09	21.15	4.02	85.03	2.63	0.81	0.81
1.02	1.12	21.83	3.96	86.45	2.62	0.81	0.81
1.04	1.04	20.21	4.60	92.92	2.69	0.88	0.88
1.06	0.98	18.93	5.27	99.79	2.75	0.75	0.75
1.08	1.02	19.82	5.14	101.88	2.74	0.75	0.75
1.10	1.08	21.03	4.88	102.70	2.72	0.75	0.75
1.12	1.13	22.04	4.56	100.53	2.69	0.89	0.89
1.14	1.08	20.91	4.75	99.39	2.70	0.75	0.75
1.16	1.03	20.00	4.93	98.53	2.72	0.75	0.75
1.18	1.08	21.02	4.63	97.33	2.69	0.89	0.89
1.20	1.19	23.18	4.15	96.23	2.64	0.85	0.85
1.22	1.30	25.24	3.87	97.59	2.61	0.82	0.82
1.24	1.32	25.66	4.00	102.57	2.63	0.85	0.85
1.26	1.29	25.17	4.34	109.26	2.66	0.89	0.89
1.28	1.24	24.17	4.70	113.57	2.70	0.93	0.93
1.30	1.20	23.28	4.98	116.01	2.73	0.78	0.78
1.32	1.18	22.97	5.27	120.97	2.75	0.78	0.78
1.34	1.24	24.09	5.10	122.85	2.74	0.79	0.79
1.36	1.35	26.30	4.62	121.46	2.69	0.94	0.94
1.38	1.76	34.24	3.17	108.58	2.53	0.77	0.77
1.40	2.45	47.85	2.01	95.97	2.32	0.74	0.74
1.42	3.35	65.59	1.50	98.55	2.15	0.75	0.75
1.44	4.15	81.47	1.35	109.71	2.04	0.77	0.77
1.46	4.63	90.87	1.31	118.60	2.00	0.78	0.78
1.48	4.75	93.30	1.30	121.16	1.99	0.78	0.78
1.50	4.84	95.03	1.30	123.84	2.00	0.79	0.79
1.52	5.19	101.91	1.28	130.85	1.97	0.80	0.80
1.54	5.63	110.72	1.25	138.66	1.92	0.81	0.81
1.56	5.77	113.39	1.23	139.47	1.89	0.81	0.81
1.58	5.11	100.35	1.26	126.35	1.93	0.79	0.79
1.60	4.14	81.27	1.35	109.53	2.04	0.77	0.77
1.62	3.14	61.46	1.65	101.33	2.21	0.75	0.75
1.64	2.57	50.17	2.13	107.03	2.35	0.76	0.76
1.66	2.22	43.23	2.67	115.42	2.45	0.78	0.78
1.68	2.74	53.60	1.94	103.76	2.30	0.76	0.76
1.70	4.01	78.67	1.33	104.88	2.03	0.76	0.76
1.72	5.29	103.95	1.18	122.75	1.83	0.79	0.79
1.74	6.09	119.64	1.10	131.95	1.76	0.80	0.80
1.76	6.55	128.82	1.13	145.52	1.78	0.82	0.82
1.78	7.26	142.70	1.12	159.72	1.77	0.84	0.84
1.80	7.81	153.52	1.11	169.97	1.76	0.85	0.85
1.82	8.16	160.58	1.09	174.59	1.75	0.86	0.86
1.84	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
1.86	8.70	171.09	1.00	171.09	1.69	0.85	0.85
1.88	8.87	174.49	1.00	174.49	1.63	0.86	0.86
1.90	8.92	171.29	1.00	171.29	1.59	0.85	0.85
1.92	8.78	165.73	1.00	165.73	1.56	0.85	0.85
1.94	8.56	161.53	1.00	161.53	1.56	0.84	0.84
1.96	8.36	158.13	1.00	158.13	1.57	0.84	0.84
1.98	8.17	154.79	1.00	154.79	1.58	0.83	0.83
2.00	7.82	149.44	1.00	149.44	1.61	0.83	0.83
2.02	7.15	139.03	1.00	139.03	1.65	0.81	0.81
2.04	6.30	123.67	1.03	127.58	1.72	0.79	0.79
2.06	5.53	108.51	1.15	124.97	1.80	0.79	0.79
2.08	5.19	101.68	1.19	120.77	1.83	0.78	0.78
2.10	5.22	102.31	1.19	121.50	1.83	0.79	0.79
2.12	5.72	112.29	1.11	124.08	1.76	0.79	0.79
2.14	6.27	122.36	1.00	122.36	1.69	0.79	0.79
2.16	6.80	128.48	1.00	128.48	1.63	0.80	0.80
2.18	6.95	129.84	1.00	129.84	1.61	0.80	0.80
2.20	6.99	130.11	1.00	130.11	1.61	0.80	0.80
2.22	6.70	125.74	1.00	125.74	1.63	0.79	0.79
2.24	6.17	119.29	1.00	119.29	1.70	0.78	0.78
2.26	5.42	106.21	1.13	119.93	1.78	0.78	0.78
2.28	4.76	93.30	1.22	113.84	1.88	0.77	0.77
2.30	4.11	80.45	1.30	104.85	2.00	0.76	0.76
2.32	3.50	68.31	1.54	105.09	2.17	0.76	0.76
2.34	3.04	59.16	1.99	117.82	2.32	0.78	0.78
2.36	3.58	69.96	1.71	119.49	2.23	0.78	0.78
2.38	5.22	102.30	1.30	132.96	1.99	0.80	0.80
2.40	7.10	138.41	1.11	153.85	1.77	0.83	0.83
2.42	7.99	148.82	1.00	148.82	1.68	0.83	0.83
2.44	7.39	138.84	1.00	138.84	1.70	0.81	0.81
2.46	6.14	120.43	1.17	140.78	1.82	0.81	0.81
2.48	4.82	94.33	1.30	122.41	1.99	0.79	0.79
2.50	3.75	73.13	1.58	115.62	2.19	0.78	0.78
2.52	2.99	58.12	2.10	122.34	2.34	0.79	0.79
2.54	2.50	48.51	2.78	134.71	2.47	0.81	0.81
2.56	2.26	43.80	3.18	139.48	2.53	0.83	0.83
2.58	2.04	39.44	3.60	142.12	2.58	0.88	0.88
2.60	1.92	37.06	3.60	133.46	2.58	0.86	0.86
2.62	1.97	37.99	3.07	116.75	2.51	0.78	0.78
2.64	2.21	42.83	2.26	96.98	2.38	0.74	0.74
2.66	2.55	49.39	1.83	90.41	2.27	0.73	0.73
2.68	2.96	57.45	1.56	89.82	2.18	0.73	0.73
2.70	3.36	65.36	1.44	94.29	2.12	0.74	0.74
2.72	3.70	72.06	1.38	99.57	2.07	0.75	0.75
2.74	3.95	77.04	1.35	104.37	2.05	0.76	0.76
2.76	4.15	80.92	1.34	108.14	2.03	0.76	0.76
2.78	4.33	84.46	1.31	110.92	2.01	0.77	0.77
2.80	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
2.82	4.67	90.13	1.23	111.03	1.89	0.77	0.77
2.84	4.85	90.75	1.18	106.64	1.82	0.76	0.76
2.86	4.91	89.83	1.13	101.67	1.78	0.75	0.75
2.88	4.78	86.90	1.00	86.90	1.77	0.72	0.72
2.90	3.99	75.79	1.22	92.74	1.88	0.73	0.73
2.92	3.56	69.29	1.28	88.57	1.96	0.73	0.73
2.94	3.22	62.49	1.36	85.20	2.06	0.72	0.72
2.96	3.67	71.48	1.30	92.69	1.99	0.73	0.73
2.98	4.59	85.74	1.21	103.89	1.86	0.76	0.76
3.00	5.61	98.83	1.00	98.83	1.73	0.75	0.75
3.02	6.39	108.19	1.00	108.19	1.64	0.76	0.76
3.04	6.28	105.89	1.00	105.89	1.64	0.76	0.76
3.06	5.93	100.64	1.00	100.64	1.66	0.75	0.75
3.08	5.35	92.28	1.00	92.28	1.71	0.73	0.73
3.10	5.00	87.75	1.00	87.75	1.75	0.72	0.72
3.12	4.90	87.30	1.15	99.96	1.79	0.75	0.75
3.14	5.05	90.87	1.18	107.07	1.82	0.76	0.76
3.16	5.08	92.53	1.21	111.69	1.86	0.77	0.77
3.18	4.96	91.75	1.24	113.59	1.90	0.77	0.77
3.20	4.74	88.84	1.26	112.38	1.94	0.77	0.77
3.22	4.34	83.27	1.31	109.50	2.01	0.77	0.77
3.24	3.98	77.40	1.39	107.38	2.08	0.76	0.76
3.26	3.76	73.09	1.48	107.93	2.14	0.76	0.76
3.28	3.62	70.39	1.57	110.67	2.18	0.77	0.77
3.30	3.35	64.95	1.69	109.46	2.23	0.77	0.77
3.32	2.93	56.74	1.92	108.92	2.30	0.76	0.76
3.34	2.62	50.69	2.23	113.24	2.37	0.77	0.77
3.36	2.93	56.66	2.04	115.60	2.33	0.78	0.78
3.38	4.02	78.28	1.48	115.84	2.14	0.78	0.78
3.40	5.72	103.31	1.25	128.86	1.92	0.80	0.80
3.42	6.93	118.43	1.12	133.16	1.78	0.80	0.80
3.44	7.27	121.54	1.04	126.42	1.73	0.79	0.79
3.46	6.78	113.83	1.08	122.59	1.75	0.79	0.79
3.48	6.25	105.75	1.12	118.45	1.77	0.78	0.78
3.50	5.86	99.61	1.14	113.99	1.79	0.77	0.77
3.52	5.38	91.87	1.17	107.33	1.81	0.76	0.76
3.54	4.76	82.34	1.21	99.44	1.86	0.75	0.75
3.56	3.90	69.23	1.26	87.35	1.94	0.72	0.72
3.58	3.17	58.02	1.34	77.52	2.03	0.48	0.70
3.60	2.57	48.92	1.52	74.18	2.16	0.36	0.69
3.62	2.32	44.64	1.70	76.10	2.23	0.42	0.70
3.64	2.43	46.74	1.66	77.76	2.22	0.48	0.70
3.66	2.62	49.41	1.52	74.91	2.16	0.38	0.70
3.68	2.61	48.62	1.47	71.44	2.13	0.29	0.69
3.70	2.31	43.60	1.57	68.50	2.18	0.23	0.68
3.72	1.95	37.26	1.86	69.30	2.28	0.24	0.68
3.74	1.75	33.24	2.20	73.17	2.37	0.33	0.69
3.76	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
3.78	1.77	33.70	2.25	75.91	2.38	0.42	0.70
3.80	1.76	33.41	2.23	74.67	2.37	0.37	0.69
3.82	1.59	30.04	2.61	78.43	2.44	0.51	0.70
3.84	1.29	24.23	3.42	82.97	2.56	0.75	0.75
3.86	1.03	19.00	4.91	93.31	2.72	0.74	0.74
3.88	0.88	16.14	5.99	96.67	2.81	0.74	0.74
3.90	0.91	16.74	5.57	93.32	2.78	0.74	0.74
3.92	0.99	18.16	4.79	87.01	2.71	0.72	0.72
3.94	1.45	27.33	2.70	73.79	2.46	0.35	0.69
3.96	1.91	35.89	1.85	66.52	2.28	0.19	0.67
3.98	2.22	40.66	1.61	65.30	2.20	0.17	0.67
4.00	2.12	39.03	1.65	64.57	2.22	0.16	0.67
4.02	2.02	37.29	1.72	64.27	2.24	0.16	0.67
4.04	2.15	39.95	1.80	71.77	2.26	0.29	0.69
4.06	2.25	42.39	1.96	82.92	2.31	0.71	0.71
4.08	2.28	43.60	2.16	94.06	2.36	0.74	0.74
4.10	2.14	40.86	2.46	100.65	2.42	0.75	0.75
4.12	1.84	34.87	3.24	113.04	2.54	0.79	0.79
4.14	1.90	36.14	3.04	110.04	2.51	0.76	0.76
4.16	1.82	34.45	3.27	112.78	2.54	0.79	0.79
4.18	1.81	34.40	3.27	112.58	2.54	0.79	0.79
4.20	1.44	27.08	4.98	134.76	2.73	0.81	0.81
4.22	1.22	22.76	6.46	147.10	2.85	0.82	0.82
4.24	1.09	20.05	7.44	149.09	2.92	0.83	0.83
4.26	1.01	18.44	7.80	143.90	2.94	0.82	0.82
4.28	0.97	17.71	7.89	139.82	2.95	0.81	0.81
4.30	0.95	17.31	7.67	132.73	2.93	0.80	0.80
4.32	0.95	17.25	7.17	123.75	2.90	0.79	0.79
4.34	0.95	17.33	6.48	112.38	2.85	0.77	0.77
4.36	0.97	17.65	5.93	104.72	2.81	0.76	0.76
4.38	0.98	17.90	5.54	99.25	2.77	0.75	0.75
4.40	0.99	18.08	5.35	96.80	2.76	0.74	0.74
4.42	0.99	18.09	5.30	95.89	2.75	0.74	0.74
4.44	0.98	17.94	5.30	95.11	2.75	0.74	0.74
4.46	0.98	17.90	5.29	94.72	2.75	0.74	0.74
4.48	0.99	18.07	5.22	94.35	2.75	0.74	0.74
4.50	1.00	18.22	5.23	95.37	2.75	0.74	0.74
4.52	0.99	17.95	5.33	95.68	2.76	0.74	0.74
4.54	0.94	17.10	5.61	95.94	2.78	0.74	0.74
4.56	0.89	16.00	5.97	95.52	2.81	0.74	0.74
4.58	0.83	14.78	6.45	95.34	2.85	0.74	0.74
4.60	0.78	13.91	6.75	93.85	2.87	0.74	0.74
4.62	0.76	13.43	6.80	91.35	2.87	0.73	0.73
4.64	0.75	13.29	6.57	87.24	2.85	0.72	0.72
4.66	0.75	13.18	6.33	83.43	2.84	0.71	0.71
4.68	0.75	13.24	6.05	80.10	2.82	0.59	0.71
4.70	0.77	13.59	5.72	77.74	2.79	0.48	0.70
4.72	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
4.74	0.80	14.19	5.38	76.28	2.76	0.43	0.70
4.76	0.80	14.21	5.34	75.87	2.76	0.41	0.70
4.78	0.81	14.36	5.25	75.33	2.75	0.40	0.70
4.80	0.82	14.50	5.26	76.34	2.75	0.43	0.70
4.82	0.80	14.11	5.62	79.32	2.78	0.55	0.71
4.84	0.75	13.14	6.15	80.82	2.82	0.63	0.71
4.86	0.70	12.28	6.50	79.88	2.85	0.58	0.71
4.88	0.69	11.95	6.40	76.52	2.84	0.44	0.70
4.90	0.69	11.89	6.29	74.70	2.83	0.38	0.69
4.92	0.68	11.83	6.23	73.66	2.83	0.34	0.69
4.94	0.68	11.77	6.24	73.44	2.83	0.34	0.69
4.96	0.69	11.89	6.10	72.53	2.82	0.31	0.69
4.98	0.69	11.97	5.97	71.45	2.81	0.29	0.69
5.00	0.68	11.82	5.97	70.62	2.81	0.27	0.68
5.02	0.67	11.63	6.05	70.39	2.82	0.26	0.68
5.04	0.67	11.50	6.11	70.27	2.82	0.26	0.68
5.06	0.67	11.50	6.05	69.61	2.82	0.25	0.68
5.08	0.67	11.48	6.02	69.09	2.81	0.24	0.68
5.10	0.66	11.42	6.02	68.75	2.81	0.23	0.68
5.12	0.67	11.47	5.96	68.33	2.81	0.22	0.68
5.14	0.67	11.60	5.84	67.69	2.80	0.21	0.68
5.16	0.68	11.78	5.68	66.84	2.79	0.20	0.68
5.18	0.69	11.93	5.58	66.57	2.78	0.19	0.67
5.20	0.70	12.04	5.53	66.64	2.77	0.19	0.67
5.22	0.70	12.06	5.55	66.88	2.77	0.20	0.68
5.24	0.70	11.93	5.61	66.95	2.78	0.20	0.68
5.26	0.69	11.79	5.70	67.18	2.79	0.20	0.68
5.28	0.69	11.71	5.77	67.51	2.79	0.21	0.68
5.30	0.69	11.67	5.80	67.74	2.80	0.21	0.68
5.32	0.70	11.89	5.67	67.45	2.79	0.21	0.68
5.34	0.74	12.36	5.03	62.20	2.73	0.13	0.66
5.36	0.77	12.80	4.44	56.91	2.67	0.77	0.77
5.38	0.80	13.32	4.46	59.45	2.68	0.78	0.78
5.40	0.79	13.30	5.10	67.84	2.74	0.21	0.68
5.42	0.78	13.26	5.71	75.73	2.79	0.41	0.70
5.44	0.76	12.92	5.93	76.67	2.81	0.44	0.70
5.46	0.76	12.85	5.93	76.22	2.81	0.43	0.70
5.48	0.75	12.71	5.99	76.12	2.81	0.42	0.70
5.50	0.75	12.53	6.05	75.80	2.82	0.41	0.70
5.52	0.73	12.23	6.15	75.21	2.82	0.39	0.70
5.54	0.71	11.88	6.19	73.54	2.83	0.34	0.69
5.56	0.70	11.58	6.19	71.72	2.83	0.29	0.69
5.58	0.69	11.41	6.12	69.77	2.82	0.25	0.68
5.60	0.69	11.33	6.05	68.50	2.82	0.23	0.68
5.62	0.69	11.21	6.11	68.45	2.82	0.22	0.68
5.64	0.68	11.12	6.19	68.89	2.83	0.23	0.68
5.66	0.68	11.09	6.24	69.23	2.83	0.24	0.68
5.68	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.70	0.69	11.18	6.22	69.47	2.83	0.24	0.68
5.72	0.69	11.11	6.31	70.10	2.84	0.26	0.68
5.74	0.68	11.03	6.42	70.75	2.84	0.27	0.69
5.76	0.68	10.98	6.49	71.31	2.85	0.28	0.69
5.78	0.69	11.05	6.44	71.20	2.85	0.28	0.69
5.80	0.70	11.20	6.32	70.83	2.84	0.27	0.69
5.82	0.71	11.34	6.21	70.45	2.83	0.26	0.68
5.84	0.71	11.44	6.14	70.19	2.82	0.26	0.68
5.86	0.71	11.36	6.18	70.17	2.83	0.26	0.68
5.88	0.70	11.18	6.27	70.12	2.83	0.26	0.68
5.90	0.69	10.99	6.39	70.24	2.84	0.26	0.68
5.92	0.69	10.87	6.46	70.19	2.85	0.26	0.68
5.94	0.68	10.75	6.52	70.14	2.85	0.26	0.68
5.96	0.68	10.63	6.59	70.08	2.86	0.26	0.68
5.98	0.67	10.53	6.65	70.01	2.86	0.25	0.68
6.00	0.67	10.50	6.65	69.78	2.86	0.25	0.68
6.02	0.67	10.52	6.61	69.54	2.86	0.25	0.68
6.04	0.68	10.61	6.50	68.98	2.85	0.23	0.68
6.06	0.69	10.67	6.44	68.67	2.85	0.23	0.68
6.08	0.69	10.73	6.36	68.27	2.84	0.22	0.68
6.10	0.69	10.71	6.39	68.35	2.84	0.22	0.68
6.12	0.69	10.67	6.40	68.25	2.84	0.22	0.68
6.14	0.69	10.55	6.46	68.19	2.85	0.22	0.68
6.16	0.68	10.43	6.53	68.14	2.85	0.22	0.68
6.18	0.68	10.35	6.61	68.46	2.86	0.22	0.68
6.20	0.67	10.32	6.65	68.67	2.86	0.23	0.68
6.22	0.68	10.32	6.67	68.84	2.86	0.23	0.68
6.24	0.67	10.27	6.70	68.86	2.86	0.23	0.68
6.26	0.68	10.34	6.67	68.99	2.86	0.23	0.68
6.28	0.70	10.63	6.43	68.34	2.84	0.22	0.68
6.30	0.74	11.21	5.95	66.71	2.81	0.19	0.67
6.32	0.78	11.75	5.54	65.15	2.77	0.17	0.67
6.34	0.80	12.15	5.31	64.53	2.75	0.16	0.67
6.36	0.82	12.37	5.26	65.11	2.75	0.17	0.67
6.38	0.84	12.67	5.24	66.43	2.75	0.19	0.67
6.40	0.85	12.88	5.24	67.49	2.75	0.21	0.68
6.42	0.86	13.03	5.32	69.37	2.76	0.24	0.68
6.44	0.87	13.07	5.40	70.58	2.76	0.27	0.68
6.46	0.87	13.13	5.45	71.53	2.77	0.29	0.69
6.48	0.87	13.16	5.43	71.40	2.76	0.29	0.69
6.50	0.93	13.97	4.93	68.90	2.72	0.23	0.68
6.52	1.01	15.08	4.36	65.83	2.67	0.79	0.79
6.54	1.10	16.39	3.90	63.84	2.62	0.75	0.75
6.56	1.18	17.40	3.39	58.98	2.56	0.27	0.68
6.58	1.25	18.48	3.23	59.69	2.54	0.18	0.67
6.60	1.31	19.36	3.16	61.18	2.53	0.16	0.67
6.62	1.32	19.65	3.46	68.04	2.57	0.72	0.72
6.64	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.66	1.32	19.66	3.75	73.70	2.60	0.76	0.76
6.68	1.32	19.68	3.83	75.33	2.61	0.77	0.77
6.70	1.31	19.54	3.97	77.51	2.62	0.79	0.79
6.72	1.29	19.25	4.18	80.47	2.65	0.81	0.81
6.74	1.28	19.04	4.33	82.53	2.66	0.83	0.83
6.76	1.27	18.92	4.36	82.45	2.67	0.83	0.83
6.78	1.28	18.92	4.25	80.50	2.66	0.82	0.82
6.80	1.30	19.17	4.16	79.80	2.65	0.81	0.81
6.82	1.35	19.87	3.94	78.20	2.62	0.79	0.79
6.84	1.38	20.22	3.85	77.83	2.61	0.78	0.78
6.86	1.45	21.18	3.54	74.95	2.57	0.74	0.74
6.88	1.66	24.08	2.93	70.47	2.49	0.26	0.68
6.90	2.08	29.75	2.25	66.94	2.38	0.20	0.68
6.92	2.35	33.51	2.03	68.20	2.33	0.22	0.68
6.94	2.37	33.86	2.12	71.85	2.35	0.30	0.69
6.96	2.09	30.15	2.59	77.97	2.44	0.49	0.70
6.98	1.86	26.96	3.10	83.69	2.52	0.72	0.72
7.00	1.68	24.53	3.65	89.57	2.59	0.79	0.79
7.02	1.59	23.21	4.09	95.04	2.64	0.84	0.84
7.04	1.49	21.93	4.58	100.51	2.69	0.89	0.89
7.06	1.41	20.68	5.05	104.46	2.73	0.76	0.76
7.08	1.34	19.61	5.36	105.00	2.76	0.76	0.76
7.10	1.28	18.74	5.56	104.26	2.78	0.76	0.76
7.12	1.25	18.14	5.60	101.58	2.78	0.75	0.75
7.14	1.22	17.61	5.54	97.51	2.77	0.74	0.74
7.16	1.21	17.30	5.29	91.54	2.75	0.73	0.73
7.18	1.19	16.90	5.15	87.05	2.74	0.72	0.72
7.20	1.18	16.68	5.04	84.04	2.73	0.72	0.72
7.22	1.16	16.40	5.05	82.81	2.73	0.71	0.71
7.24	1.16	16.39	5.02	82.23	2.73	0.70	0.71
7.26	1.18	16.57	4.92	81.50	2.72	0.66	0.71
7.28	1.21	16.96	4.73	80.30	2.70	0.60	0.71
7.30	1.23	17.23	4.59	79.06	2.69	0.84	0.84
7.32	1.25	17.46	4.56	79.66	2.69	0.84	0.84
7.34	1.25	17.46	4.63	80.90	2.69	0.85	0.85
7.36	1.25	17.39	4.76	82.80	2.71	0.71	0.71
7.38	1.22	17.02	4.94	84.11	2.72	0.72	0.72
7.40	1.19	16.48	5.20	85.76	2.75	0.72	0.72
7.42	1.14	15.84	5.45	86.34	2.77	0.72	0.72
7.44	1.12	15.43	5.59	86.24	2.78	0.72	0.72
7.46	1.11	15.33	5.51	84.51	2.77	0.72	0.72
7.48	1.13	15.49	5.36	83.04	2.76	0.71	0.71
7.50	1.15	15.68	5.22	81.86	2.75	0.68	0.71
7.52	1.15	15.71	5.19	81.51	2.74	0.66	0.71
7.54	1.15	15.68	5.17	81.12	2.74	0.64	0.71
7.56	1.15	15.58	5.18	80.66	2.74	0.62	0.71
7.58	1.15	15.57	5.16	80.38	2.74	0.60	0.71
7.60	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.62	1.11	14.98	5.26	78.89	2.75	0.53	0.70
7.64	1.10	14.75	5.28	77.87	2.75	0.49	0.70
7.66	1.11	14.89	5.14	76.54	2.74	0.44	0.70
7.68	1.15	15.34	4.88	74.80	2.72	0.38	0.70
7.70	1.18	15.78	4.64	73.24	2.69	0.83	0.83
7.72	1.20	15.90	4.54	72.21	2.68	0.82	0.82
7.74	1.18	15.66	4.62	72.34	2.69	0.83	0.83
7.76	1.16	15.33	4.77	73.17	2.71	0.33	0.69
7.78	1.17	15.47	4.72	73.06	2.70	0.33	0.69
7.80	1.21	15.98	4.50	71.99	2.68	0.82	0.82
7.82	1.26	16.59	4.29	71.22	2.66	0.80	0.80
7.84	1.28	16.90	4.30	72.69	2.66	0.80	0.80
7.86	1.27	16.80	4.52	75.87	2.68	0.83	0.83
7.88	1.22	16.16	5.03	81.25	2.73	0.65	0.71
7.90	1.17	15.40	5.50	84.67	2.77	0.72	0.72
7.92	1.12	14.66	5.90	86.52	2.80	0.72	0.72
7.94	1.08	14.05	6.00	84.30	2.81	0.72	0.72
7.96	1.04	13.49	6.16	83.07	2.82	0.71	0.71
7.98	1.01	13.04	6.27	81.67	2.83	0.67	0.71
8.00	1.00	12.92	6.22	80.43	2.83	0.61	0.71
8.02	1.00	12.77	6.17	78.79	2.82	0.53	0.70
8.04	0.99	12.68	6.03	76.41	2.81	0.43	0.70
8.06	0.96	12.22	6.20	75.82	2.83	0.41	0.70
8.08	0.91	11.51	6.61	76.10	2.86	0.42	0.70
8.10	0.87	10.87	7.13	77.50	2.89	0.47	0.70
8.12	0.86	10.77	7.25	78.08	2.90	0.50	0.70
8.14	0.90	11.23	6.83	76.75	2.87	0.45	0.70
8.16	0.94	11.78	6.38	75.15	2.84	0.39	0.70
8.18	0.98	12.26	6.02	73.86	2.81	0.35	0.69
8.20	1.00	12.51	5.96	74.56	2.81	0.37	0.69
8.22	1.00	12.51	6.07	75.95	2.82	0.42	0.70
8.24	0.99	12.38	6.23	77.18	2.83	0.46	0.70
8.26	0.99	12.30	6.24	76.73	2.83	0.44	0.70
8.28	0.98	12.25	6.18	75.63	2.83	0.41	0.70
8.30	0.97	12.07	6.18	74.59	2.83	0.37	0.69
8.32	0.96	11.89	6.22	74.01	2.83	0.35	0.69
8.34	0.97	11.98	6.02	72.06	2.81	0.30	0.69
8.36	1.00	12.28	5.62	68.96	2.78	0.23	0.68
8.38	1.02	12.55	5.29	66.45	2.75	0.19	0.67
8.40	1.05	12.86	4.97	63.87	2.72	0.15	0.67
8.42	1.08	13.25	4.72	62.56	2.70	0.14	0.66
8.44	1.13	13.80	4.45	61.42	2.68	0.78	0.78
8.46	1.14	13.97	4.45	62.15	2.67	0.79	0.79
8.48	1.12	13.64	4.59	62.65	2.69	0.80	0.80
8.50	1.07	12.98	4.90	63.56	2.72	0.15	0.67
8.52	1.03	12.39	5.20	64.46	2.75	0.16	0.67
8.54	1.02	12.34	5.25	64.75	2.75	0.17	0.67
8.56	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.58	1.18	14.34	4.24	60.85	2.65	0.77	0.77
8.60	1.27	15.39	3.82	58.77	2.61	0.72	0.72
8.62	1.32	16.00	3.58	57.36	2.58	0.42	0.70
8.64	1.38	16.77	3.40	56.93	2.56	0.22	0.68
8.66	1.47	17.78	3.19	56.79	2.53	0.12	0.66
8.68	1.52	18.50	3.14	58.16	2.52	0.12	0.66
8.70	1.51	18.39	3.33	61.27	2.55	0.28	0.69
8.72	1.46	17.82	3.66	65.23	2.59	0.73	0.73
8.74	1.44	17.54	3.79	66.42	2.60	0.74	0.74
8.76	1.50	18.13	3.55	64.45	2.58	0.72	0.72
8.78	1.56	18.85	3.26	61.52	2.54	0.23	0.68
8.80	1.57	18.91	3.23	61.13	2.54	0.20	0.68
8.82	1.49	17.93	3.58	64.19	2.58	0.72	0.72
8.84	1.39	16.67	3.97	66.27	2.63	0.76	0.76
8.86	1.33	15.95	4.10	65.30	2.64	0.77	0.77
8.88	1.34	15.95	3.76	59.95	2.60	0.72	0.72
8.90	1.39	16.45	3.37	55.45	2.55	0.18	0.67
8.92	1.43	16.86	3.17	53.45	2.53	0.09	0.65
8.94	1.44	16.98	3.15	53.50	2.52	0.08	0.64
8.96	1.41	16.60	3.39	56.26	2.56	0.21	0.68
8.98	1.37	16.11	3.65	58.82	2.59	0.62	0.71
9.00	1.33	15.64	3.86	60.36	2.61	0.73	0.73
9.02	1.26	14.74	4.07	60.04	2.64	0.75	0.75
9.04	1.19	13.81	4.30	59.35	2.66	0.76	0.76
9.06	1.11	12.74	4.65	59.30	2.69	0.79	0.79
9.08	1.09	12.53	4.67	58.52	2.70	0.79	0.79
9.10	1.12	12.79	4.50	57.63	2.68	0.77	0.77
9.12	1.19	13.69	4.08	55.87	2.64	0.74	0.74
9.14	1.26	14.50	3.77	54.72	2.60	0.57	0.71
9.16	1.29	14.90	3.64	54.21	2.59	0.35	0.69
9.18	1.27	14.65	3.75	54.99	2.60	0.55	0.71
9.20	1.26	14.42	3.86	55.61	2.61	0.72	0.72
9.22	1.29	14.84	3.73	55.29	2.60	0.52	0.70
9.24	1.36	15.60	3.53	55.05	2.57	0.28	0.69
9.26	1.43	16.44	3.29	54.05	2.54	0.12	0.66
9.28	1.49	17.21	3.08	53.06	2.51	0.07	0.64
9.30	1.58	18.25	2.89	52.82	2.49	0.06	0.63
9.32	1.65	19.04	2.86	54.42	2.48	0.07	0.64
9.34	1.62	18.73	3.08	57.64	2.51	0.09	0.65
9.36	1.54	17.74	3.37	59.74	2.55	0.27	0.69
9.38	1.46	16.80	3.60	60.53	2.58	0.64	0.71
9.40	1.44	16.48	3.60	59.41	2.58	0.56	0.71
9.42	1.42	16.20	3.63	58.79	2.59	0.57	0.71
9.44	1.36	15.42	3.83	59.01	2.61	0.72	0.72
9.46	1.29	14.56	4.18	60.80	2.65	0.76	0.76
9.48	1.23	13.85	4.50	62.33	2.68	0.79	0.79
9.50	1.21	13.57	4.63	62.81	2.69	0.80	0.80
9.52	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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.54	1.22	13.66	4.41	60.24	2.67	0.78	0.78
9.56	1.20	13.36	4.58	61.14	2.69	0.79	0.79
9.58	1.14	12.60	5.05	63.65	2.73	0.15	0.67
9.60	1.05	11.58	5.69	65.95	2.79	0.18	0.67
9.62	1.01	10.96	5.96	65.27	2.81	0.17	0.67
9.64	0.99	10.73	5.93	63.61	2.81	0.15	0.67
9.66	1.00	10.81	5.61	60.64	2.78	0.12	0.66
9.68	1.08	11.80	4.85	57.22	2.71	0.09	0.65
9.70	1.17	12.81	4.28	54.77	2.66	0.75	0.75
9.72	1.25	13.70	4.05	55.44	2.63	0.73	0.73
9.74	1.24	13.67	4.24	57.96	2.65	0.76	0.76
9.76	1.26	13.86	4.27	59.24	2.66	0.76	0.76
9.78	1.29	14.18	4.08	57.80	2.64	0.74	0.74
9.80	1.30	14.26	4.02	57.34	2.63	0.74	0.74
9.82	1.24	13.56	4.41	59.81	2.67	0.78	0.78
9.84	1.14	12.34	5.21	64.32	2.75	0.16	0.67
9.86	1.05	11.25	5.92	66.67	2.81	0.19	0.67
9.88	0.97	10.28	6.52	67.00	2.85	0.20	0.68
9.90	0.93	9.71	6.79	65.89	2.87	0.18	0.67
9.92	1.02	10.86	5.79	62.87	2.80	0.14	0.66
9.94	1.23	13.24	4.30	56.99	2.66	0.76	0.76
9.96	1.52	16.72	3.29	54.95	2.54	0.13	0.66
9.98	1.72	19.08	3.16	60.23	2.53	0.15	0.67
10.00	1.97	22.09	3.10	68.42	2.52	0.24	0.68
10.02	2.11	23.83	3.32	79.15	2.55	0.73	0.73
10.04	2.21	25.04	3.68	92.18	2.59	0.80	0.80
10.06	2.14	24.41	4.65	113.55	2.69	0.93	0.93
10.08	2.09	23.96	5.64	135.18	2.78	0.81	0.81
10.10	2.08	23.85	6.50	154.96	2.85	0.83	0.83
10.12	1.92	22.04	7.66	168.81	2.93	0.85	0.85
10.14	1.79	20.36	8.57	174.56	2.99	0.86	0.86
10.16	1.94	22.13	7.60	168.12	2.93	0.85	0.85
10.18	2.82	32.24	4.29	138.22	2.66	0.94	0.94
10.20	4.37	49.73	2.20	109.29	2.36	0.76	0.76
10.22	7.16	80.76	1.41	114.16	2.10	0.77	0.77
10.24	10.25	114.90	1.28	146.63	1.96	0.82	0.82
10.26	12.73	142.46	1.25	177.88	1.92	0.86	0.86
10.28	14.25	159.30	1.24	197.56	1.90	0.88	0.88
10.30	15.20	169.73	1.24	210.80	1.91	0.90	0.90
10.32	16.24	180.96	1.23	223.16	1.89	0.91	0.91
10.34	17.06	189.82	1.23	233.22	1.89	0.92	0.92
10.36	17.79	197.48	1.22	240.88	1.88	0.93	0.93
10.38	18.61	206.38	1.22	251.94	1.88	0.94	0.94
10.40	20.09	222.53	1.22	270.39	1.87	0.95	0.95
10.42	21.19	234.64	1.23	288.01	1.89	0.97	0.97
10.44	23.27	257.18	1.22	313.09	1.87	0.99	0.99
10.46	24.33	268.66	1.22	327.53	1.87	1.00	1.00
10.48	26.91	295.98	1.19	352.18	1.84	1.02	1.02

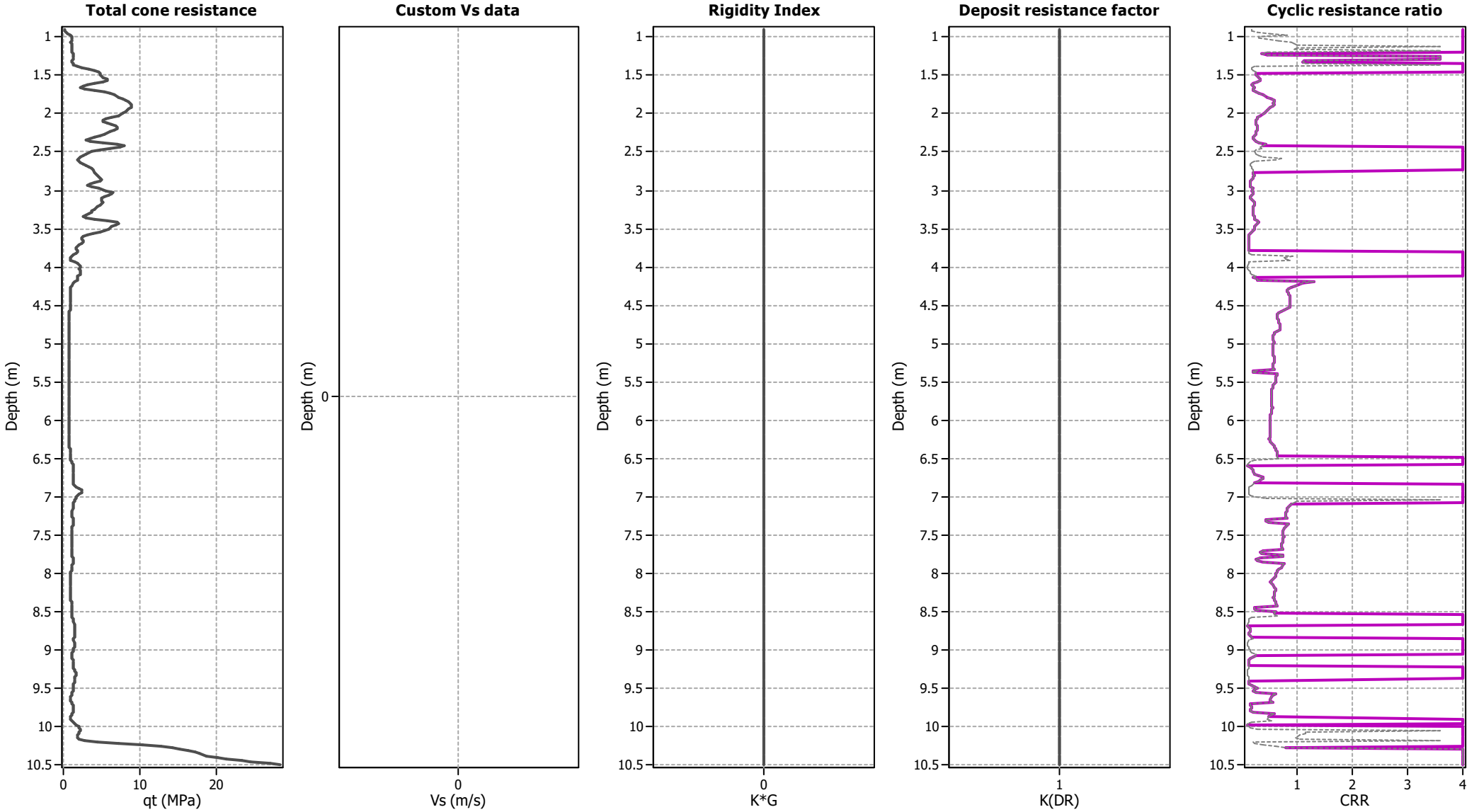
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.50	28.21	309.43	1.17	362.66	1.82	1.02	1.02

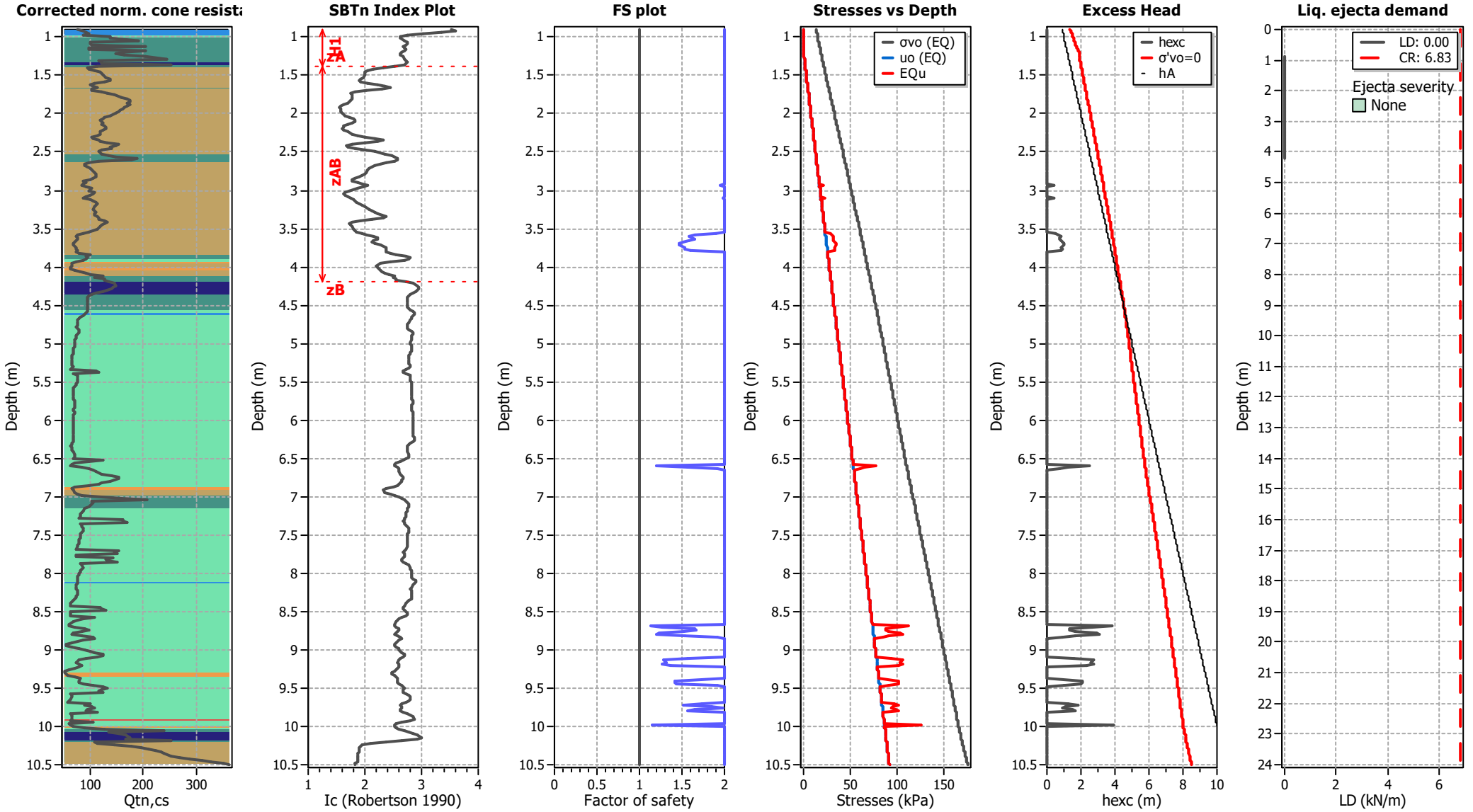
Abbreviations

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

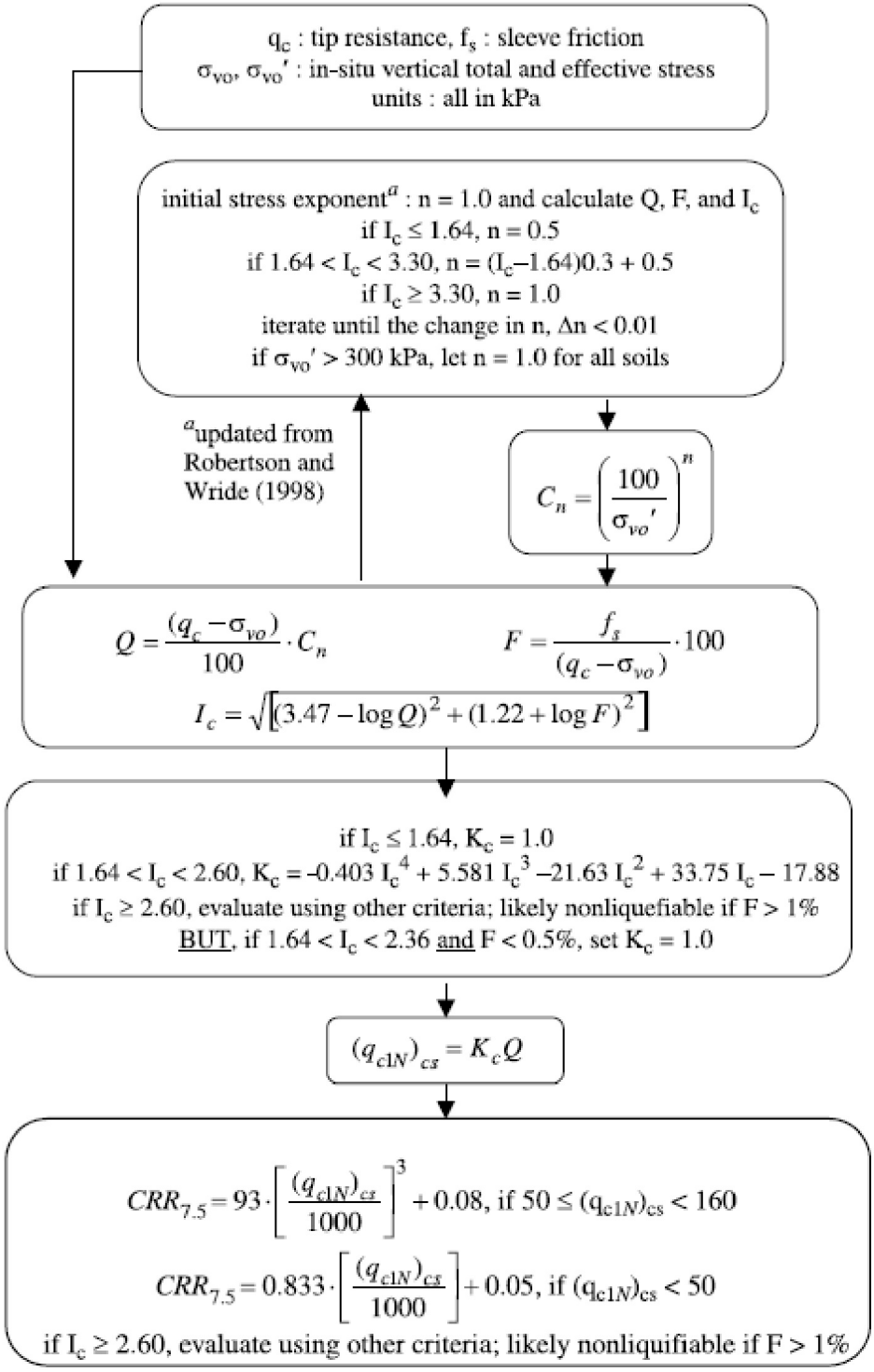


Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

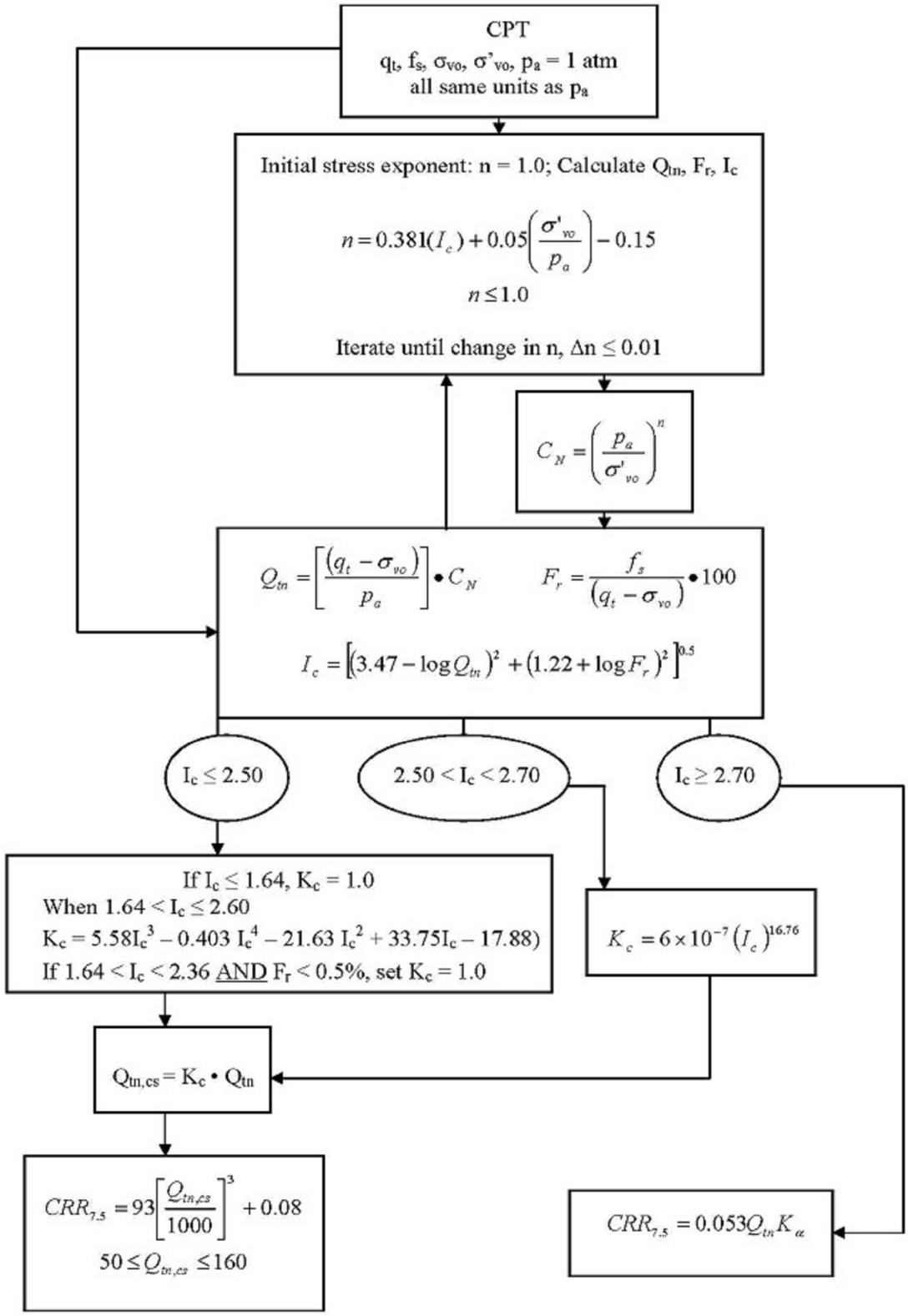
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

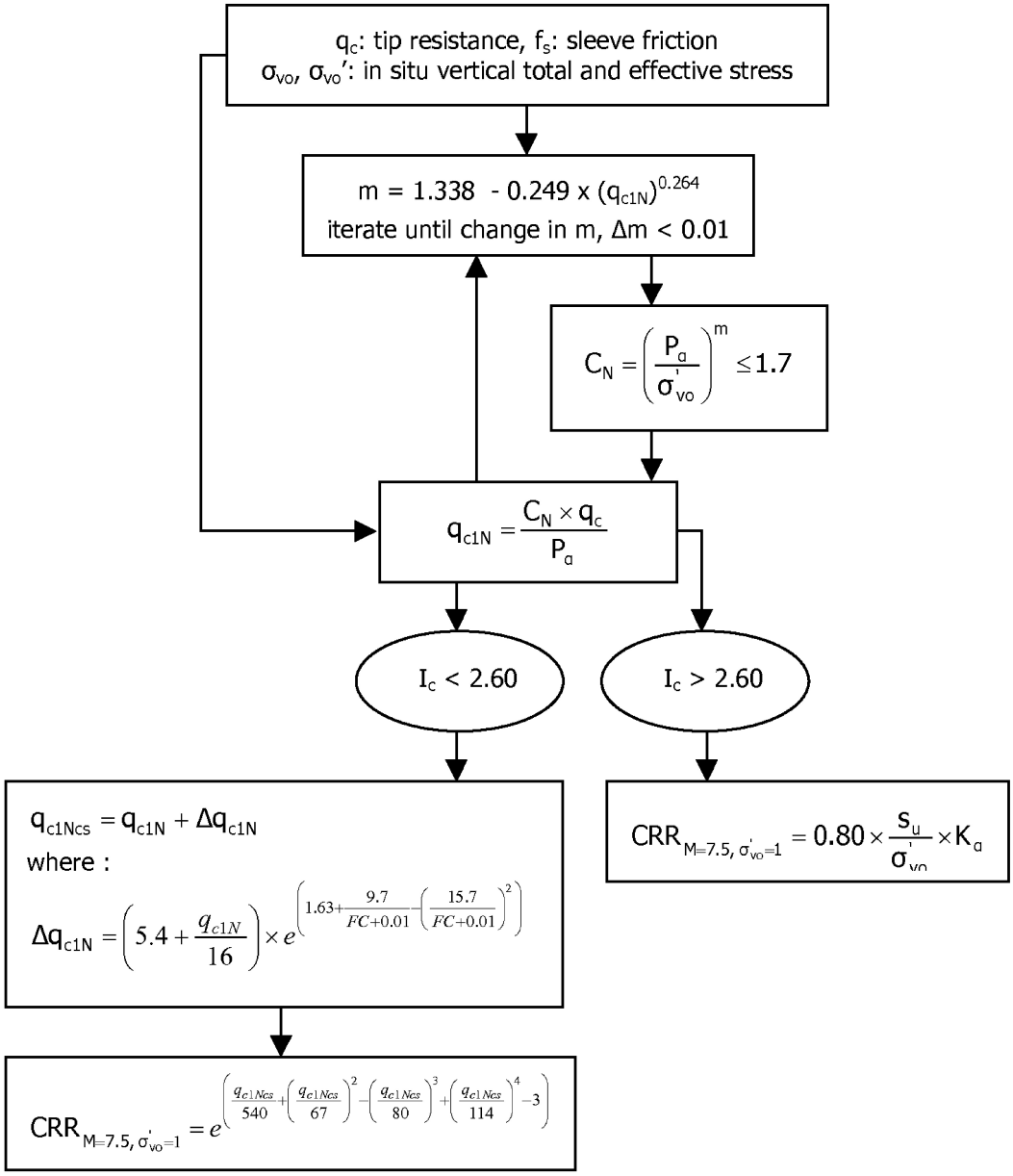
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

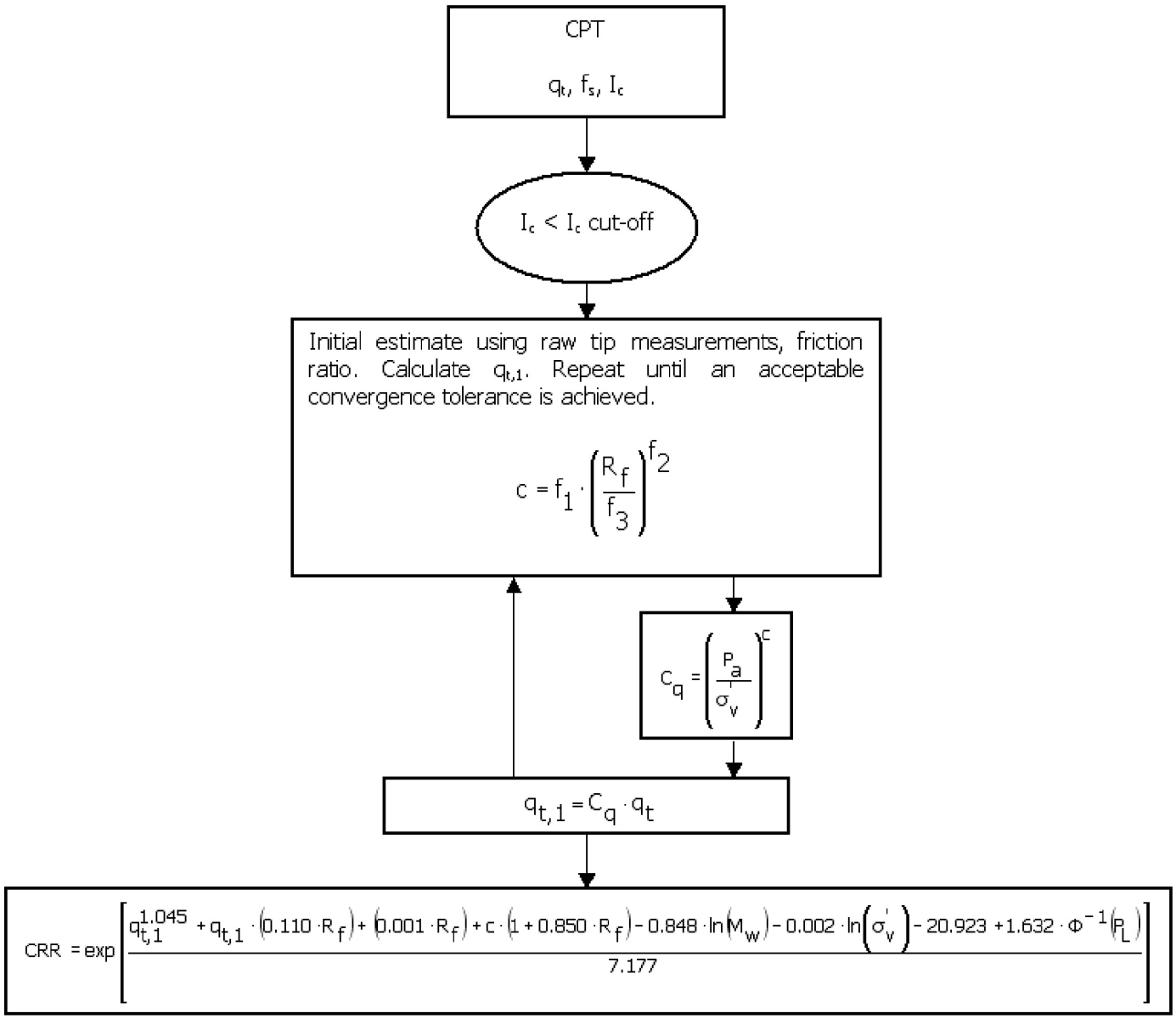


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \leq 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \leq 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \leq 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \leq 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \leq m \leq 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \leq FC \leq 100\%$$

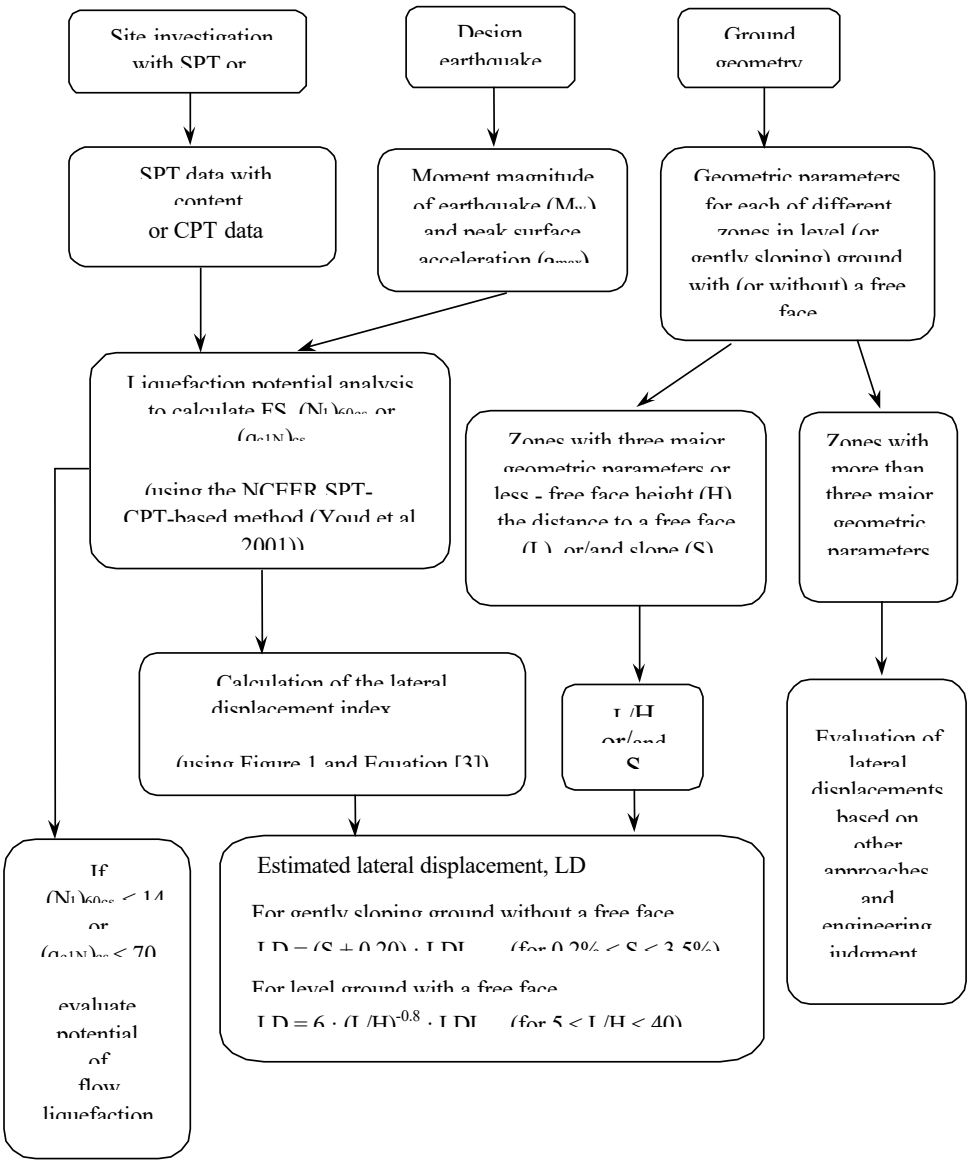
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \leq n \leq 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

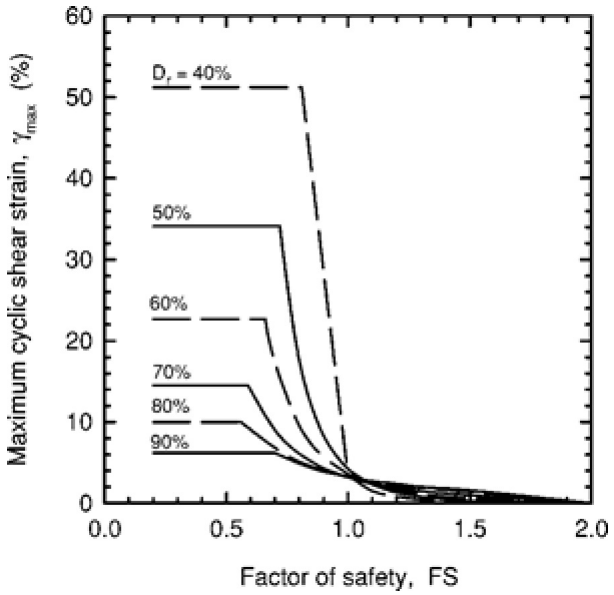
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

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



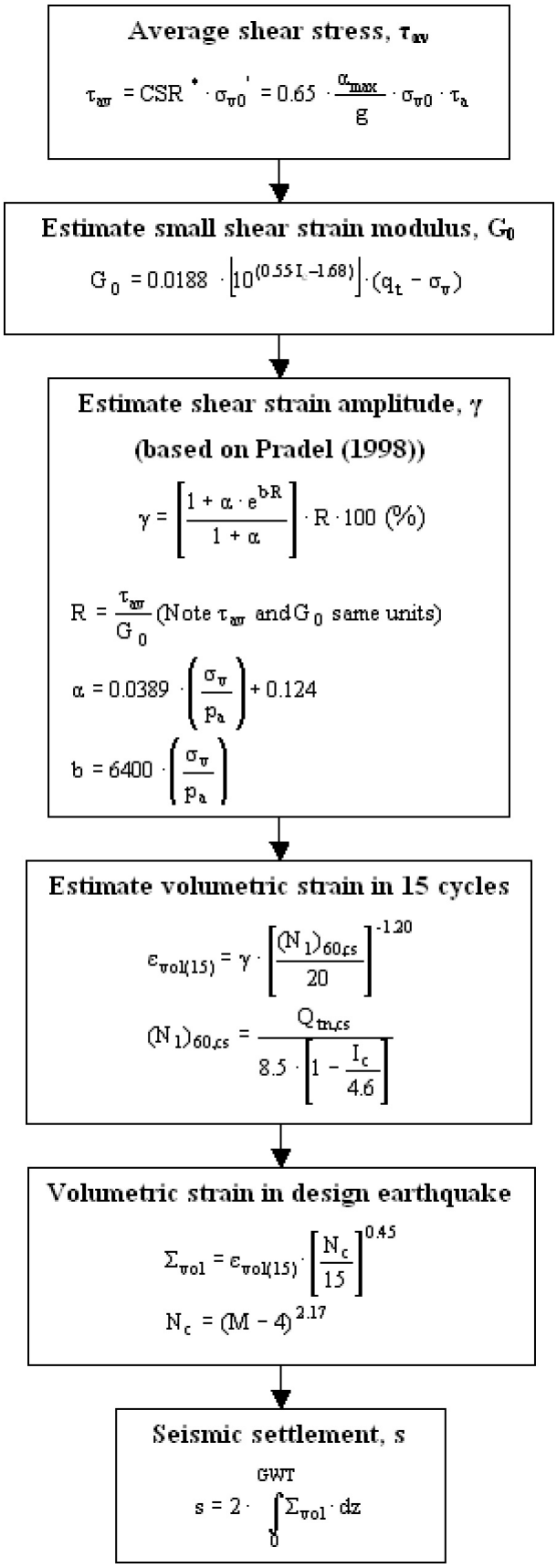
[1] **Figure 1**

$$\mathrm{LDI} = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

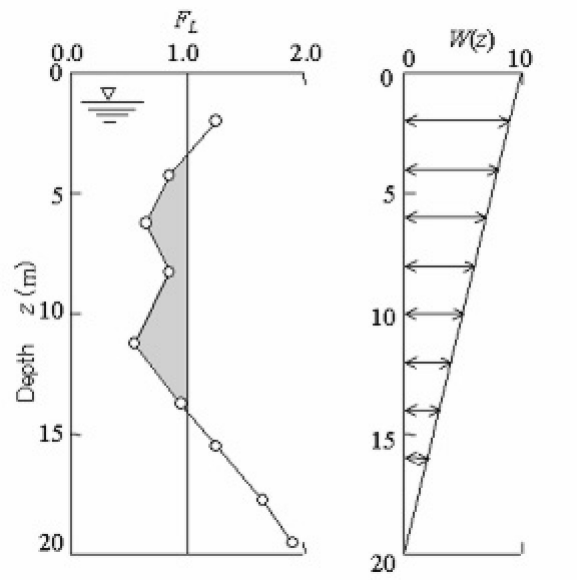
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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).

References

- Lunne, T., Robertson, P.K., and Powell, J.J.M 1997. Cone penetration testing in geotechnical practice, E & FN Spon Routledge, 352 p, ISBN 0-7514-0393-8.
- Boulanger, R.W. and Idriss, I. M., 2007. Evaluation of Cyclic Softening in Silts and Clays. ASCE Journal of Geotechnical and Geoenvironmental Engineering June, Vol. 133, No. 6 pp 641-652
- Boulanger, R.W. and Idriss, I. M., 2014. CPT AND SPT BASED LIQUEFACTION TRIGGERING PROCEDURES. DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA AT DAVIS
- Robertson, P.K. and Cabal, K.L., 2007, Guide to Cone Penetration Testing for Geotechnical Engineering. Available at no cost at http://www.geologismiki.gr/
- Robertson, P.K. 1990. Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27 (1), 151-8.
- Robertson, P.K. and Wride, C.E., 1998. Cyclic Liquefaction and its Evaluation based on the CPT Canadian Geotechnical Journal, 1998, Vol. 35, August.
- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 127, October, pp 817-833
- Zhang, G., Robertson. P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180
- Zhang, G., Robertson. P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 130, No. 8, 861-871
- Pradel, D., 1998, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 124, No. 4, 364-368
- Iwasaki, T., 1986, Soil liquefaction studies in Japan: state-of-the-art, Soil Dynamics and Earthquake Engineering, Vol. 5, No. 1, 2-70
- Papathanassiou G., 2008, LPI-based approach for calibrating the severity of liquefaction-induced failures and for assessing the probability of liquefaction surface evidence, Eng. Geol. 96:94–104
- P.K. Robertson, 2009, Interpretation of Cone Penetration Tests - a unified approach., Canadian Geotechnical Journal, Vol. 46, No. 11, pp 1337-1355
- 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
- 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
- R. E. S. Moss, R. B. Seed, R. E. Kayen, J. P. Stewart, A. Der Kiureghian, K. O. Cetin, CPT-Based Probabilistic and Deterministic Assessment of In Situ Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 132, No. 8, August 1, 2006
- I. M. Idriss and R. W. Boulanger, 2008. Soil liquefaction during earthquakes, Earthquake Engineering Research Institute MNO-12
- Jonathan D. Bray & Jorge Macedo, Department of Civil & Environmental Engineering, Univ. of California, Berkeley, CA, USA, Simplified procedure for estimating liquefaction-induced building settlement, *Proceedings of the 19th International Conference on Soil Mechanics and Geotechnical Engineering, Seoul 201*

Appendix J-2:
Liquefaction Analysis with Embankment

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Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

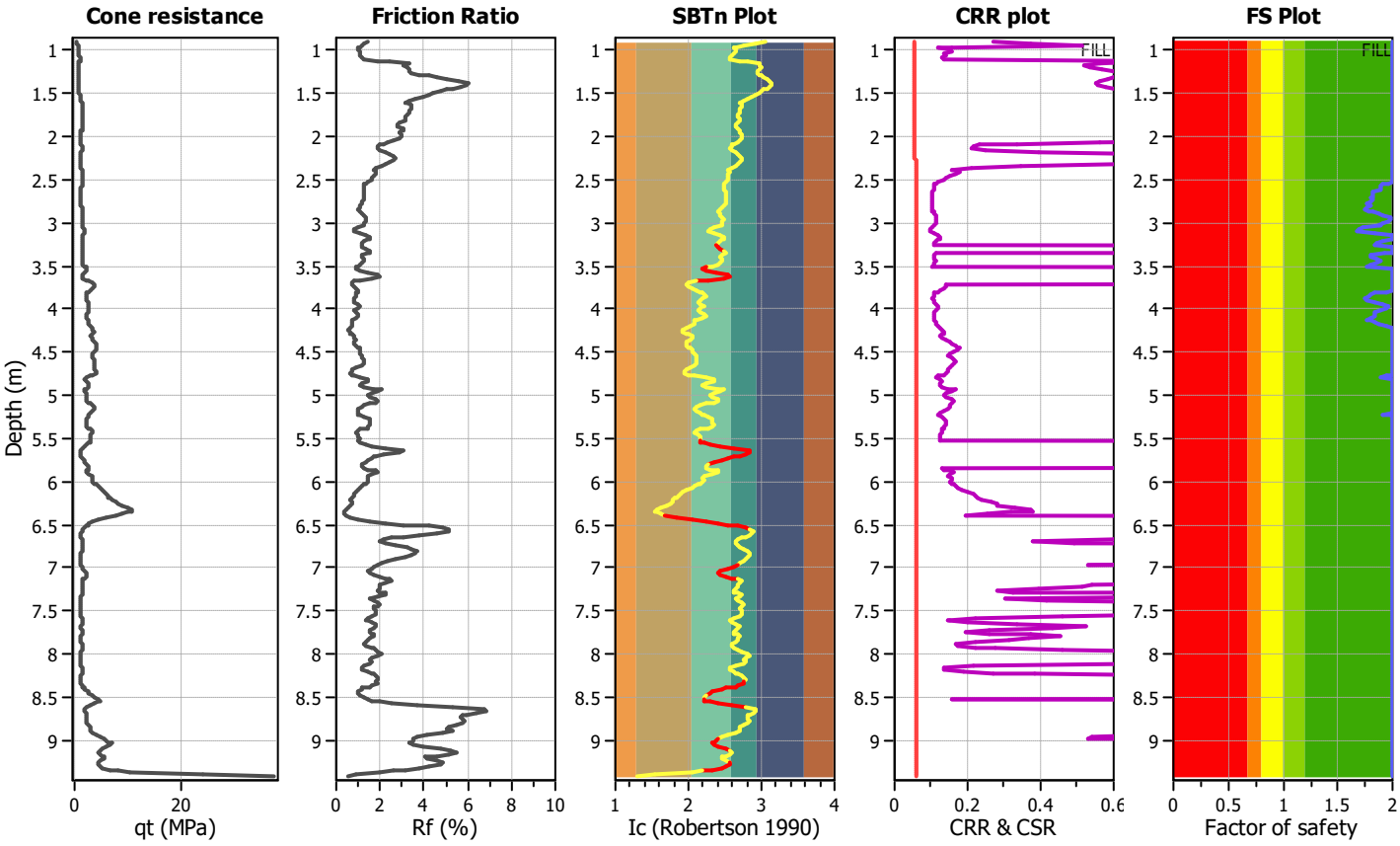
Project title : CWLP Liquefaction Analysis

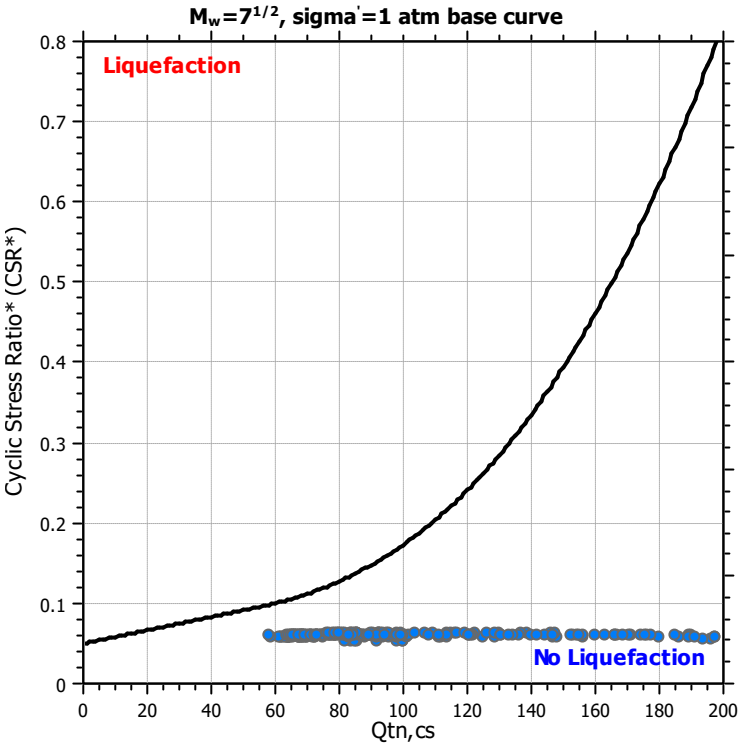
Location : East Lake Shore Drive, Springfield, Illinois

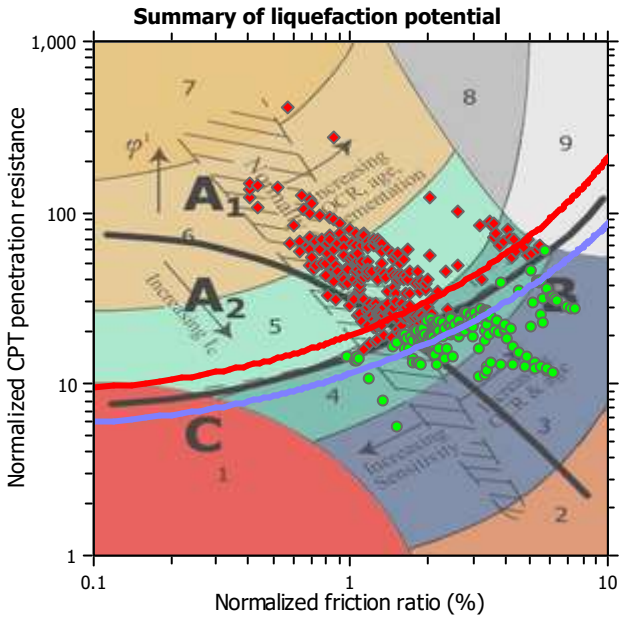
CPT file : CWLP CPT-2L

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		

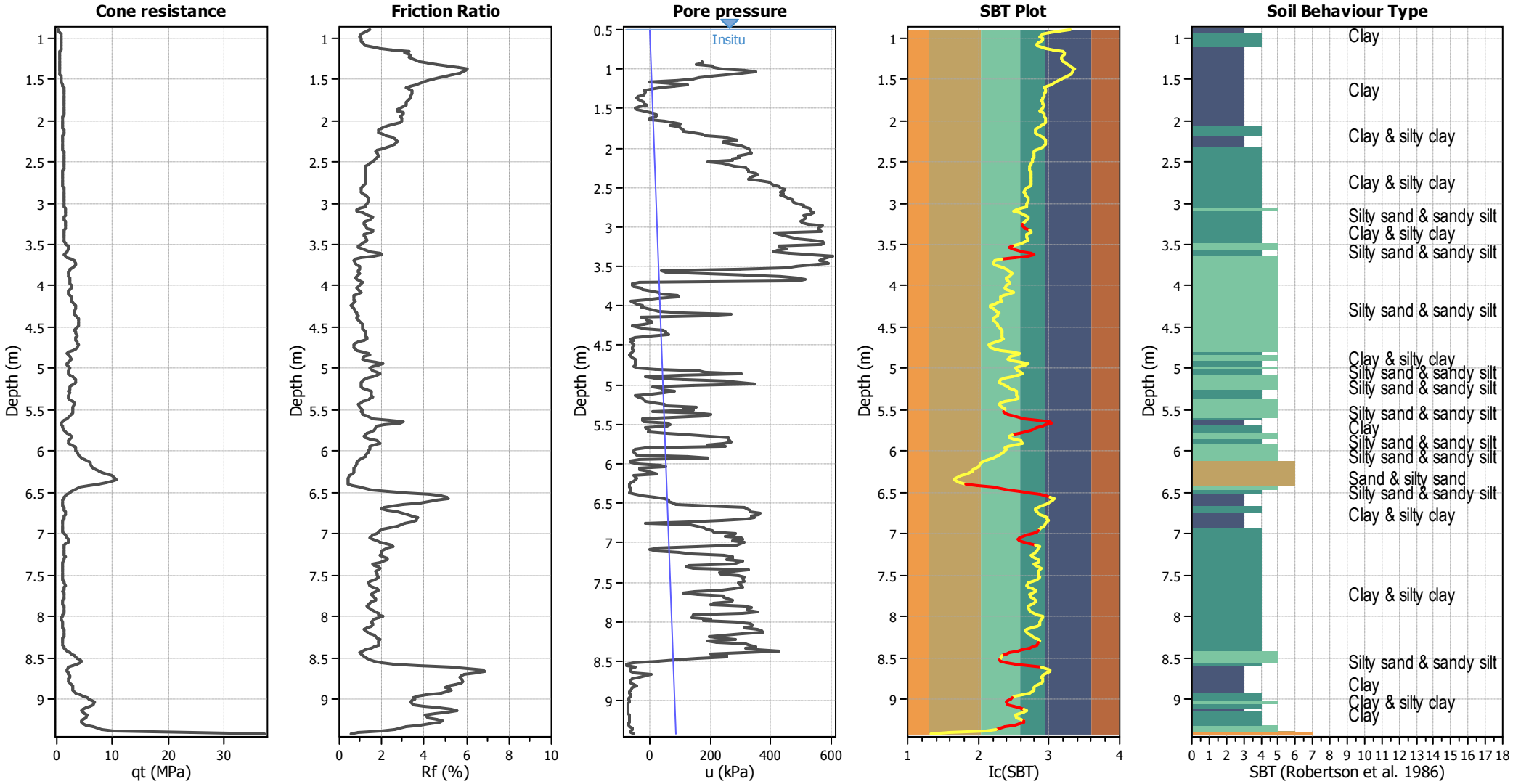






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



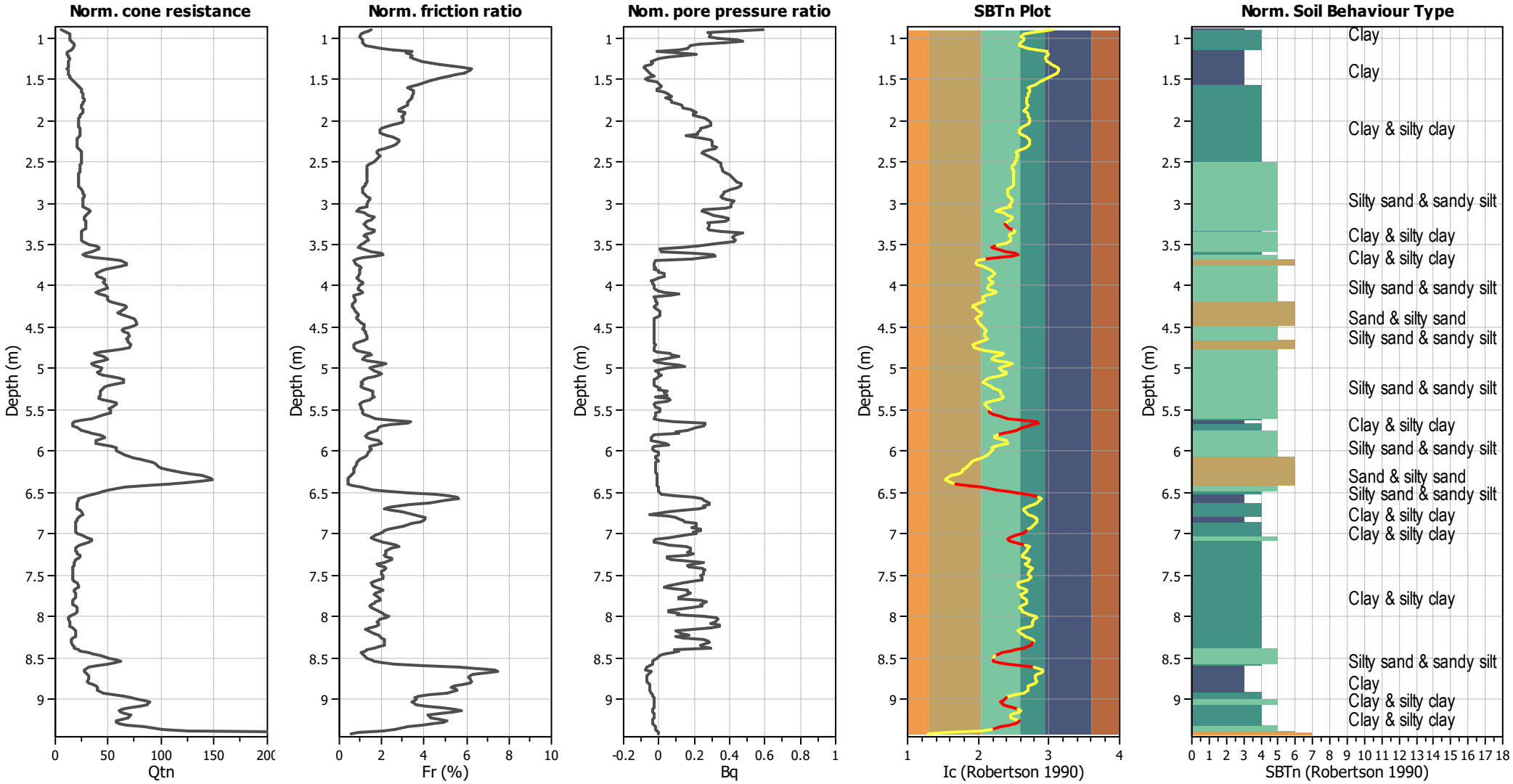
Input parameters and analysis data

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)



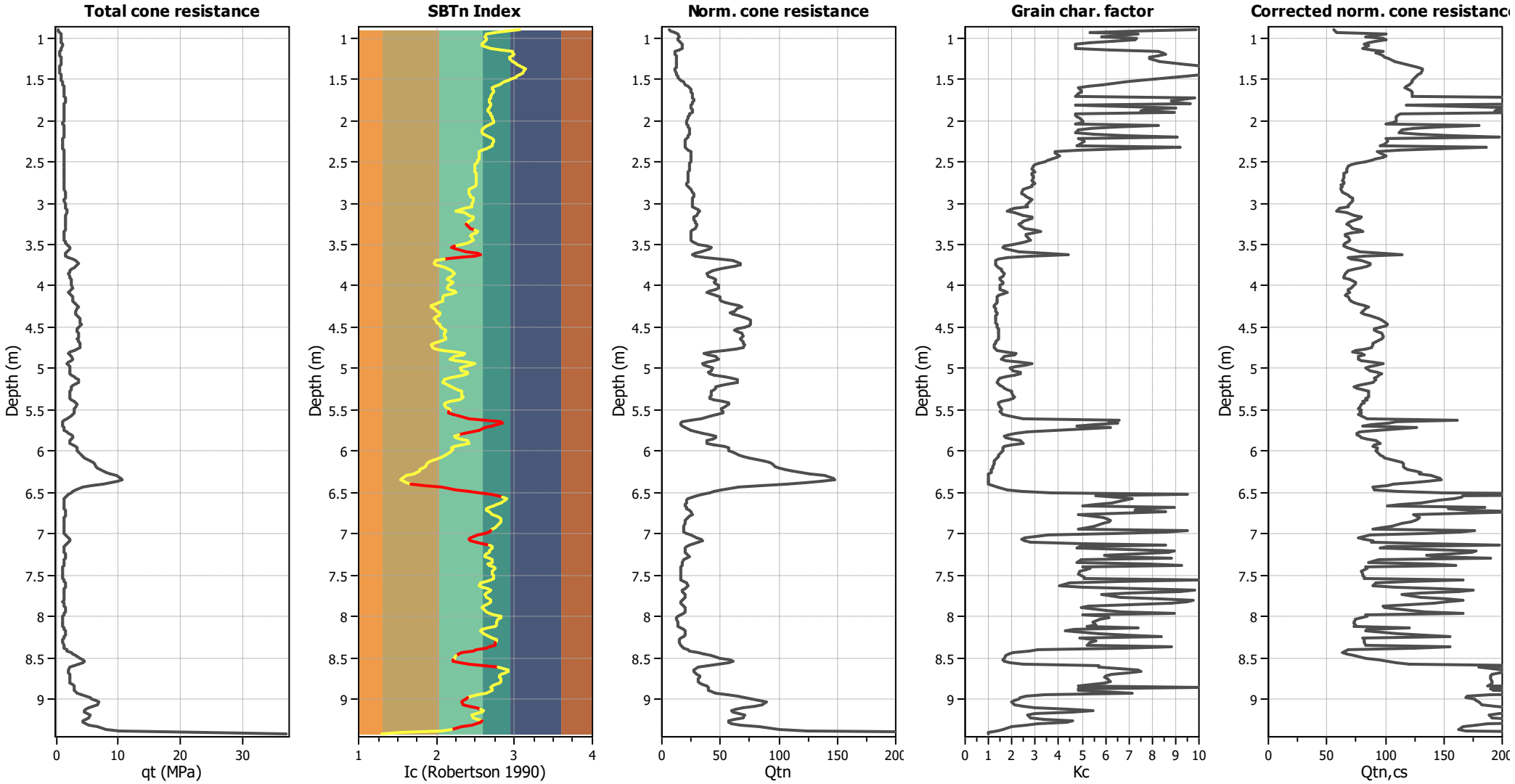
Input parameters and analysis data

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

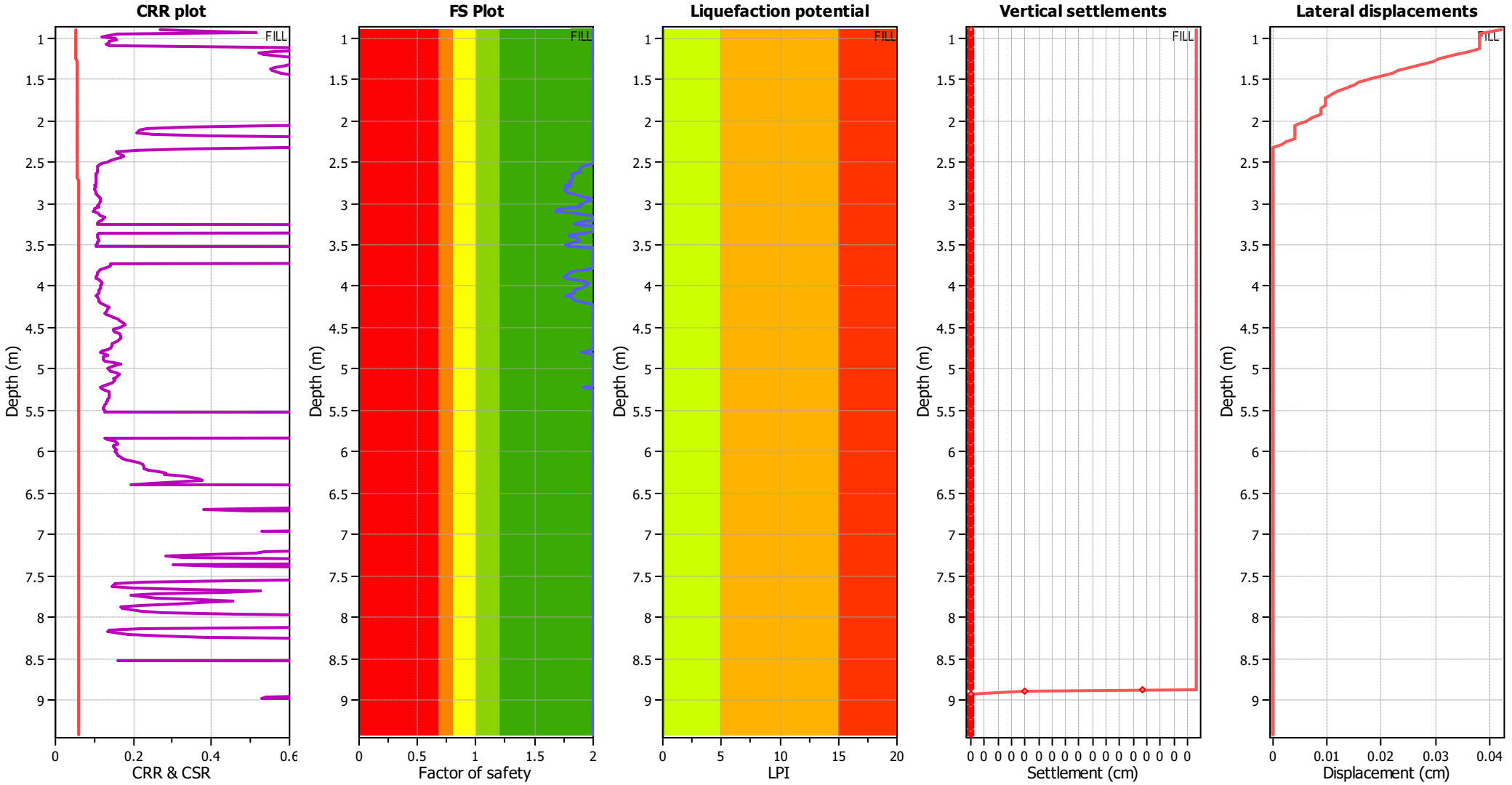
Liquefaction analysis overall plots (intermediate results)



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

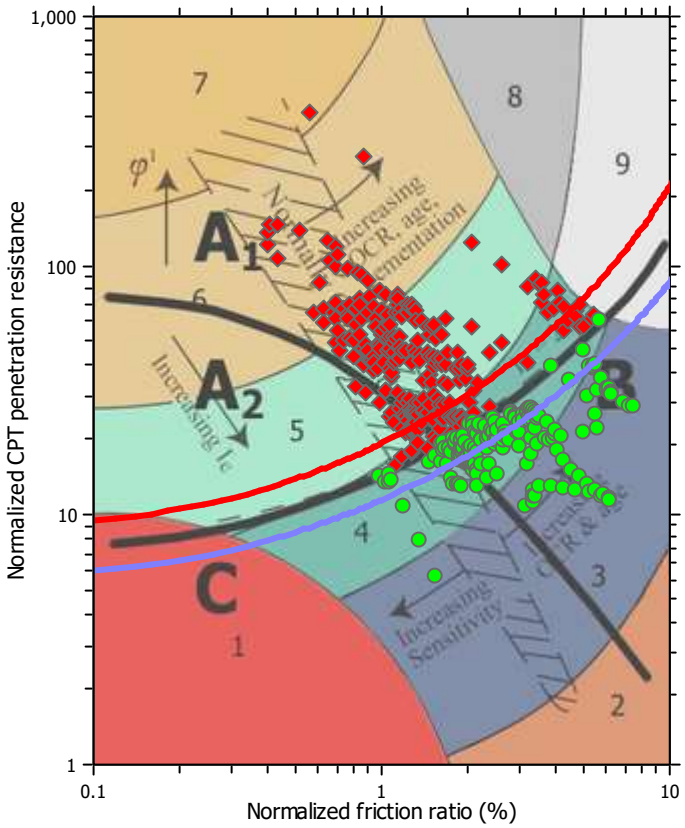
F.S. color scheme

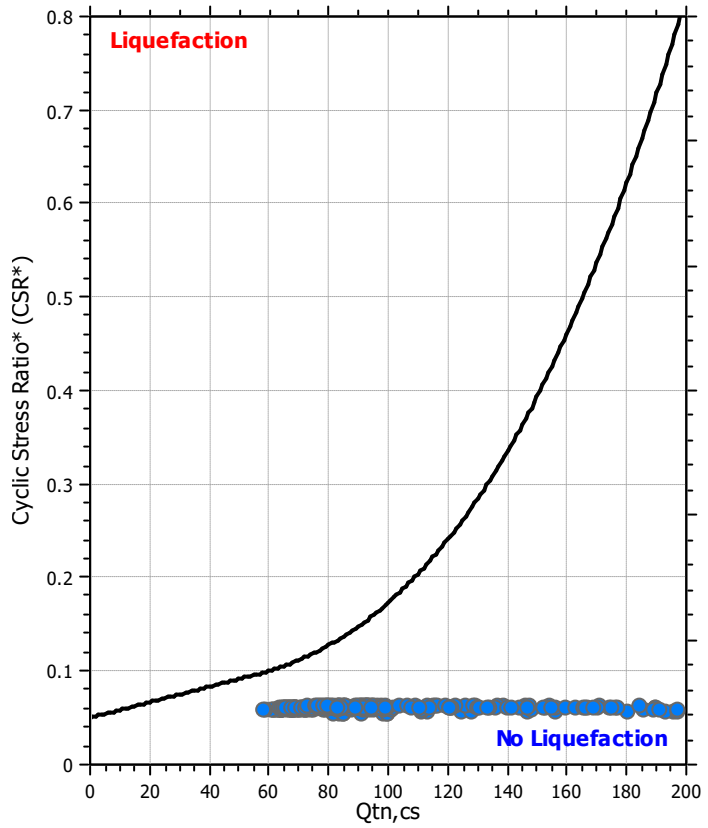
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

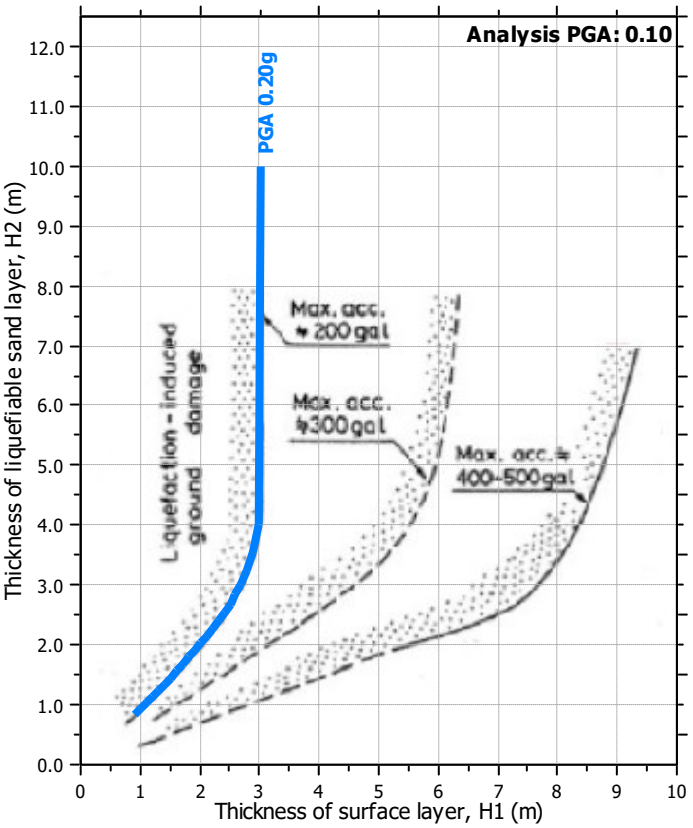
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



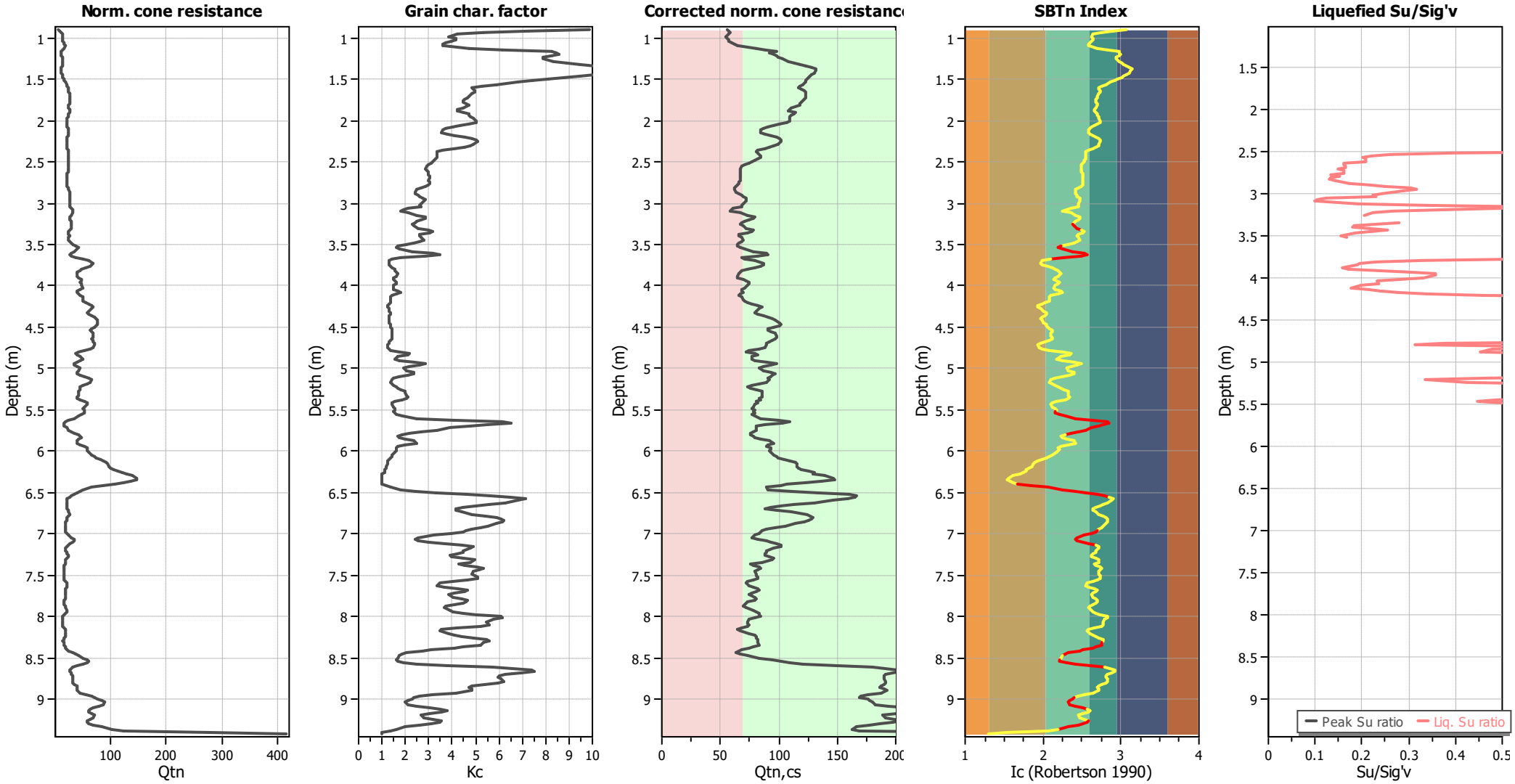




Input parameters and analysis data

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

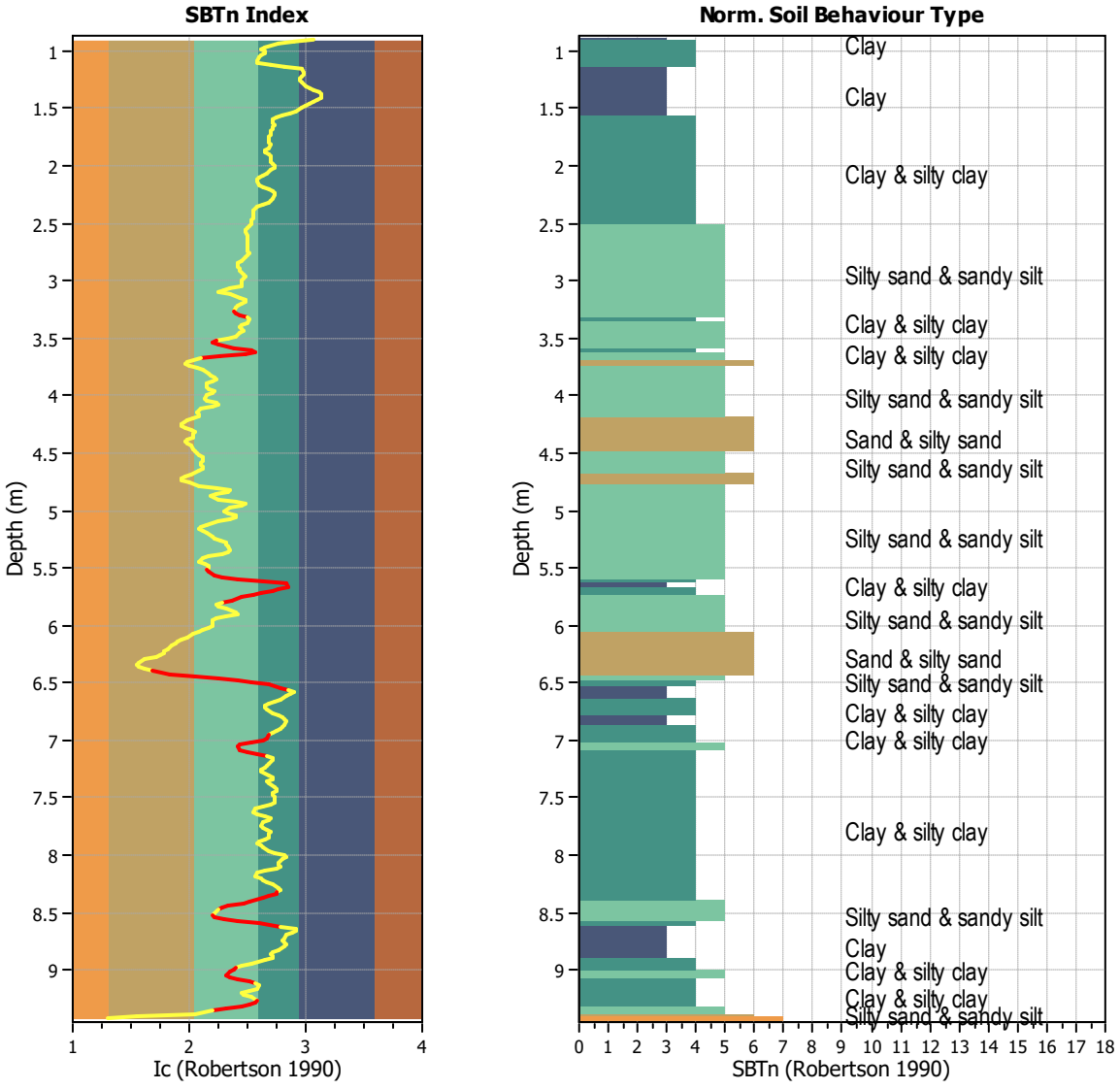
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	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						

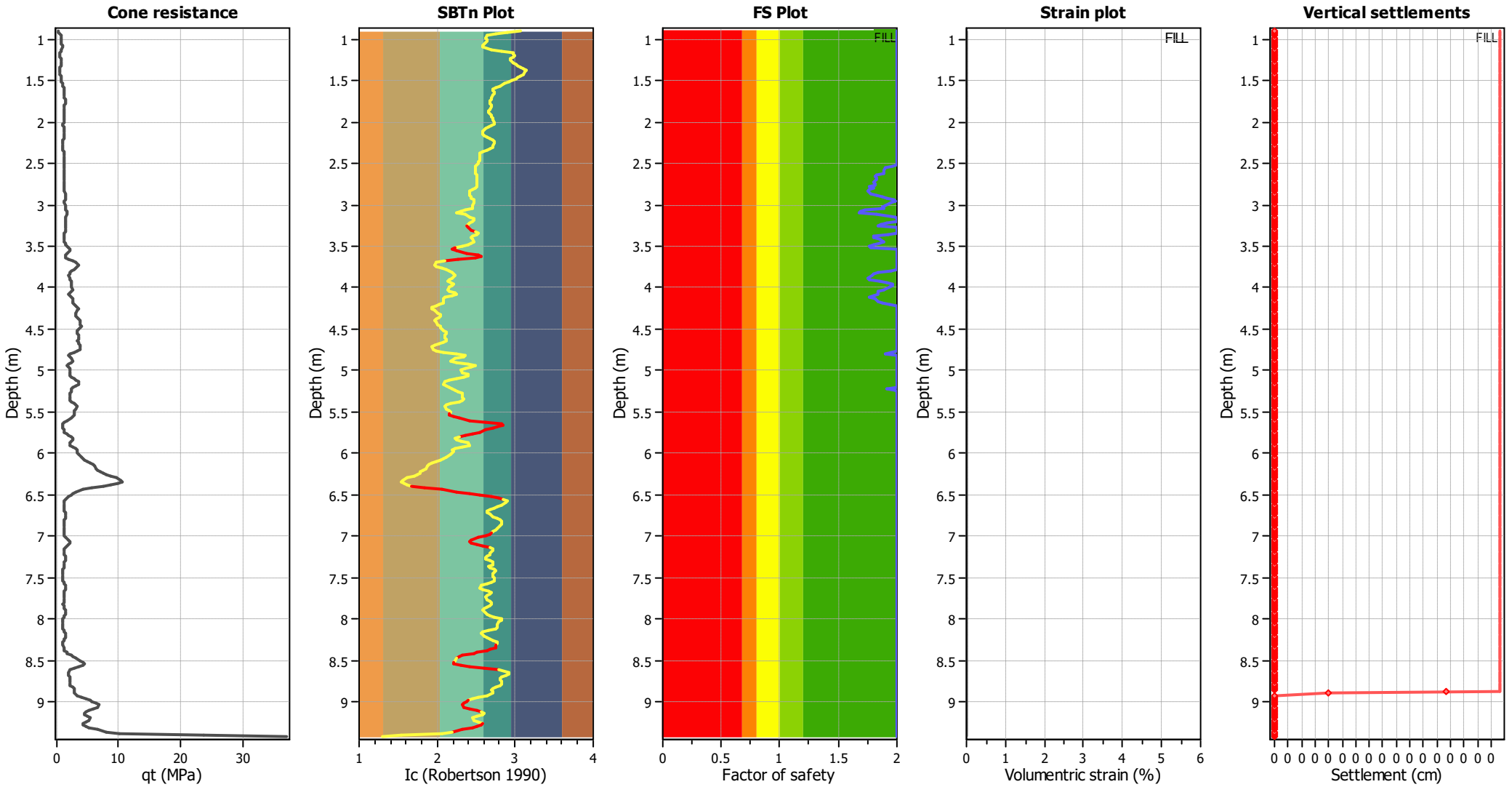
Overall liquefaction potential: 0.00

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						

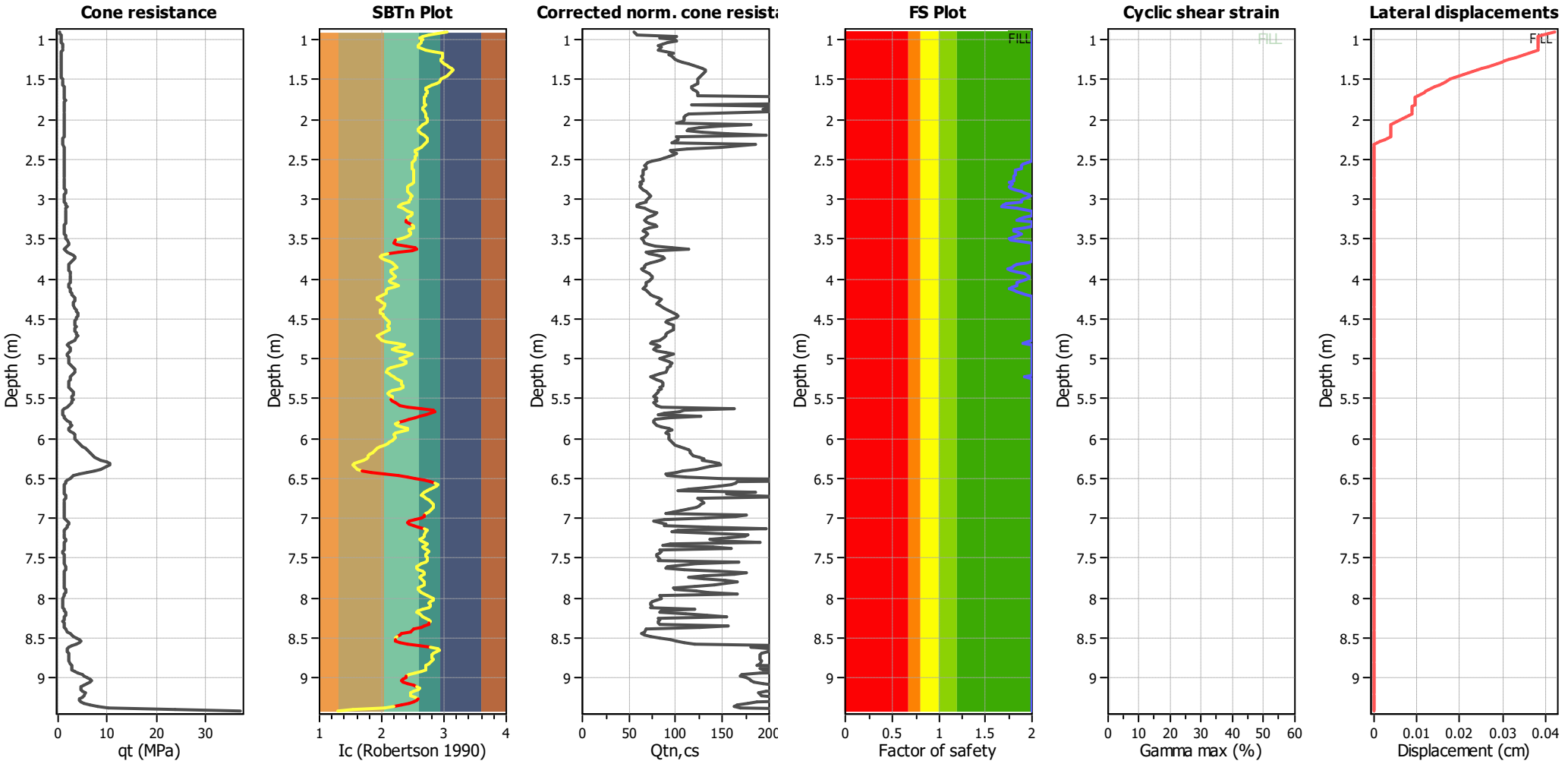
Total estimated settlement: 0.00

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

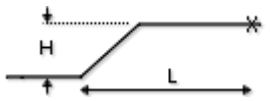
Geometric parameters: Level ground (or gently sloping) with free face (L: 72.00 m - H: 4.60 m)



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

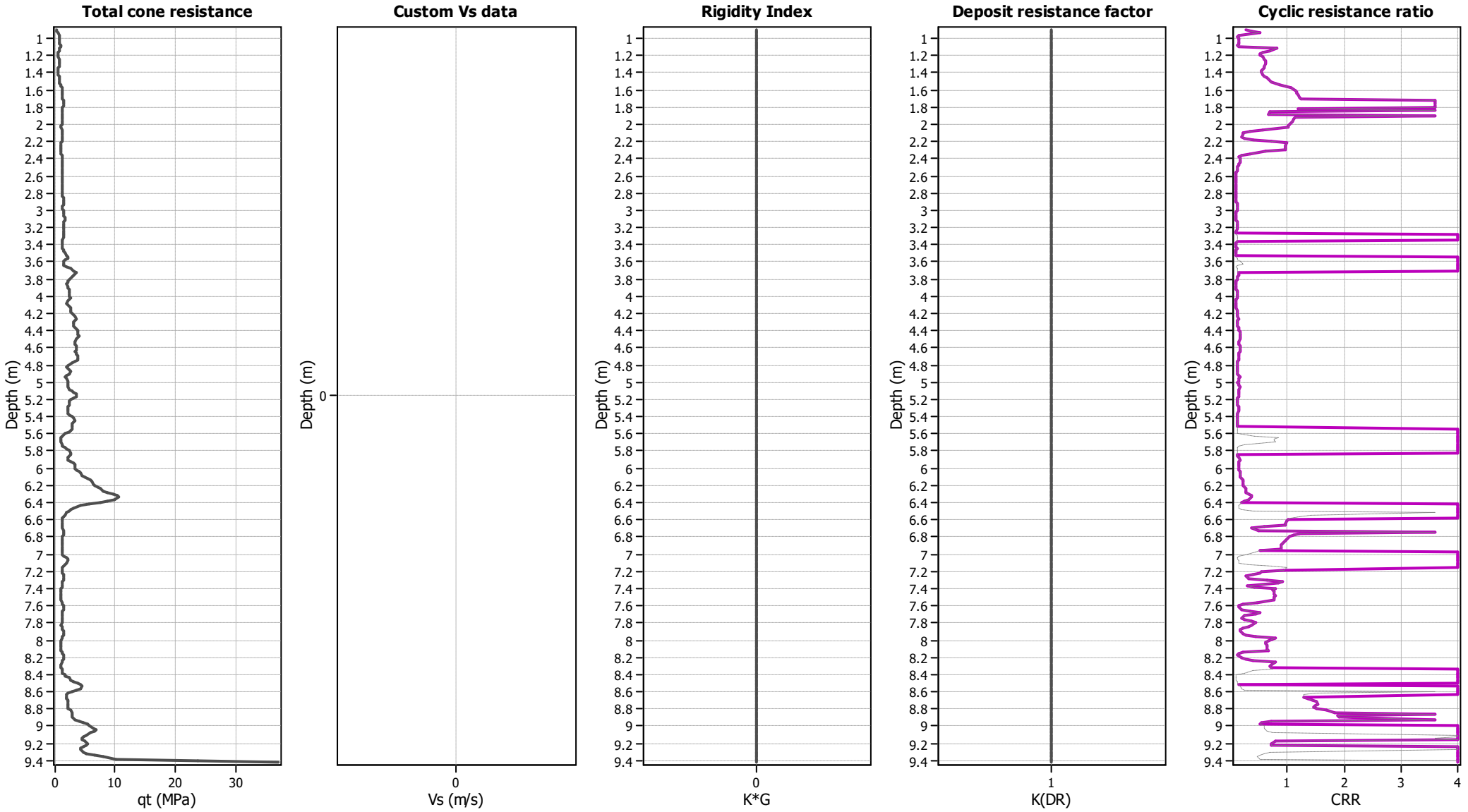
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

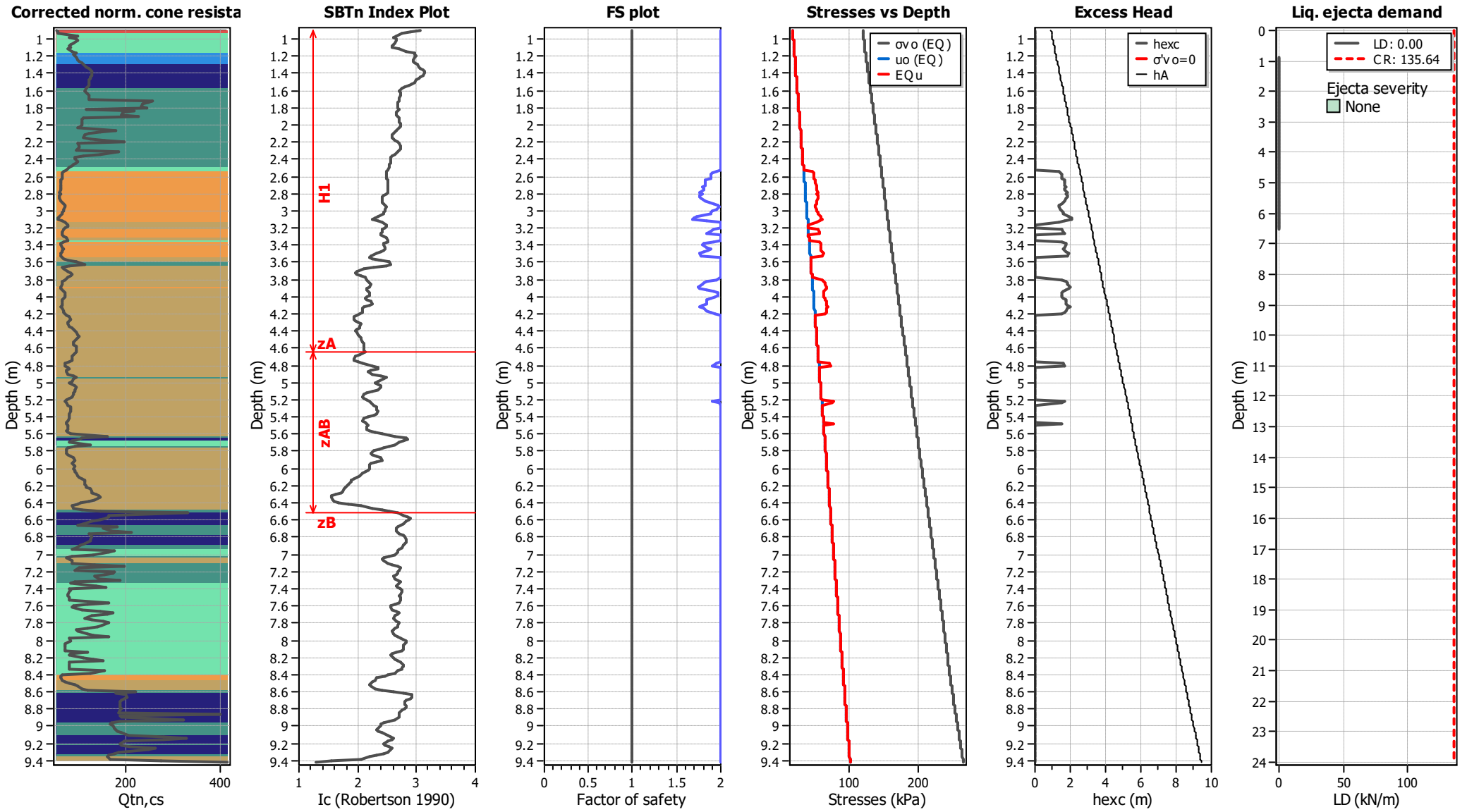
Abbreviations

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

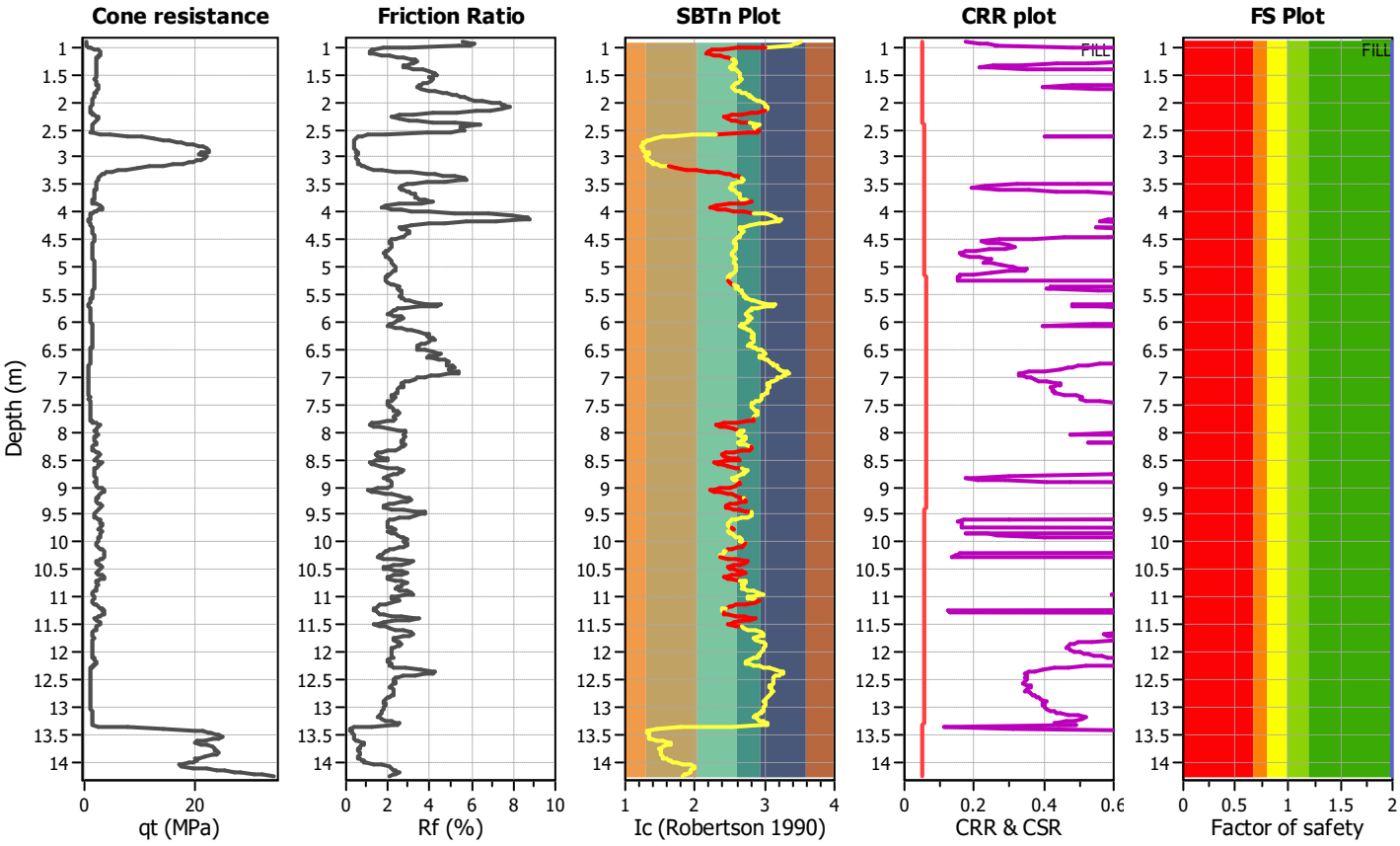
Project title : CWLP Liquefaction Analysis

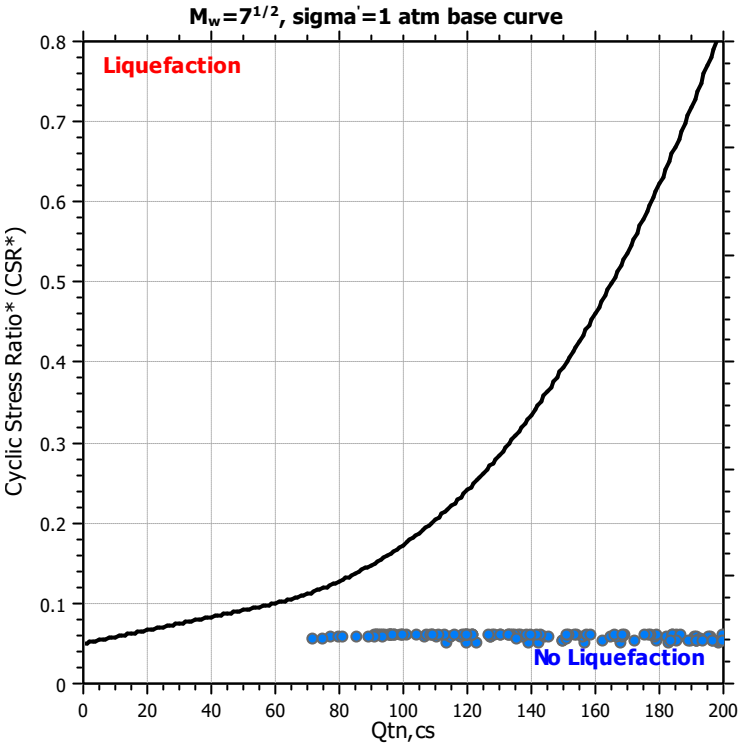
Location : East Lake Shore Drive, Springfield, Illinois

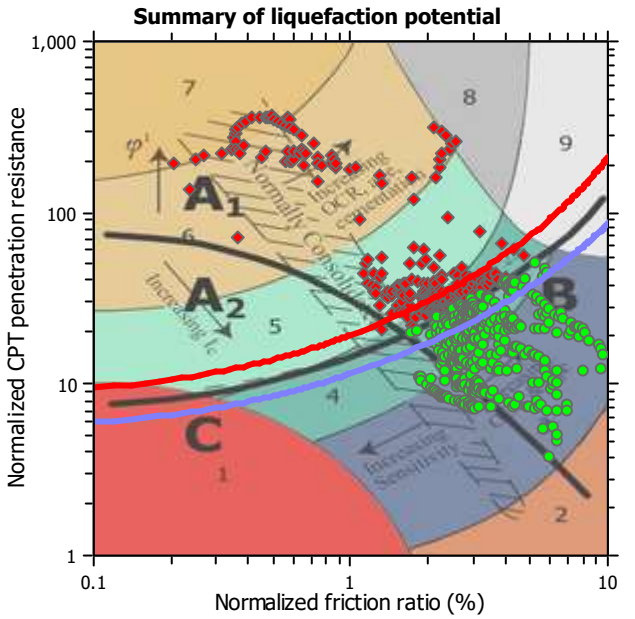
CPT file : CWLP CPT-4L

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		

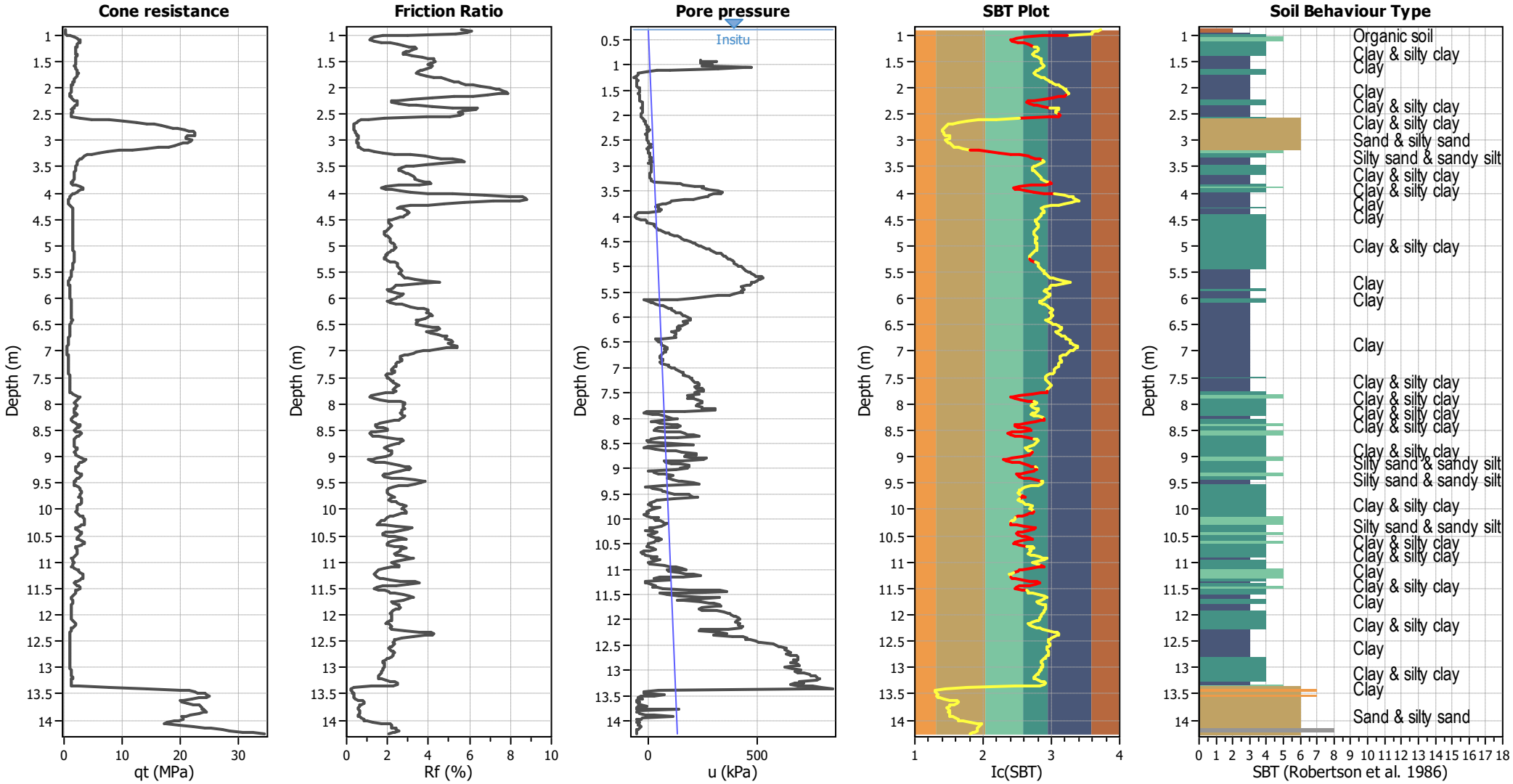






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



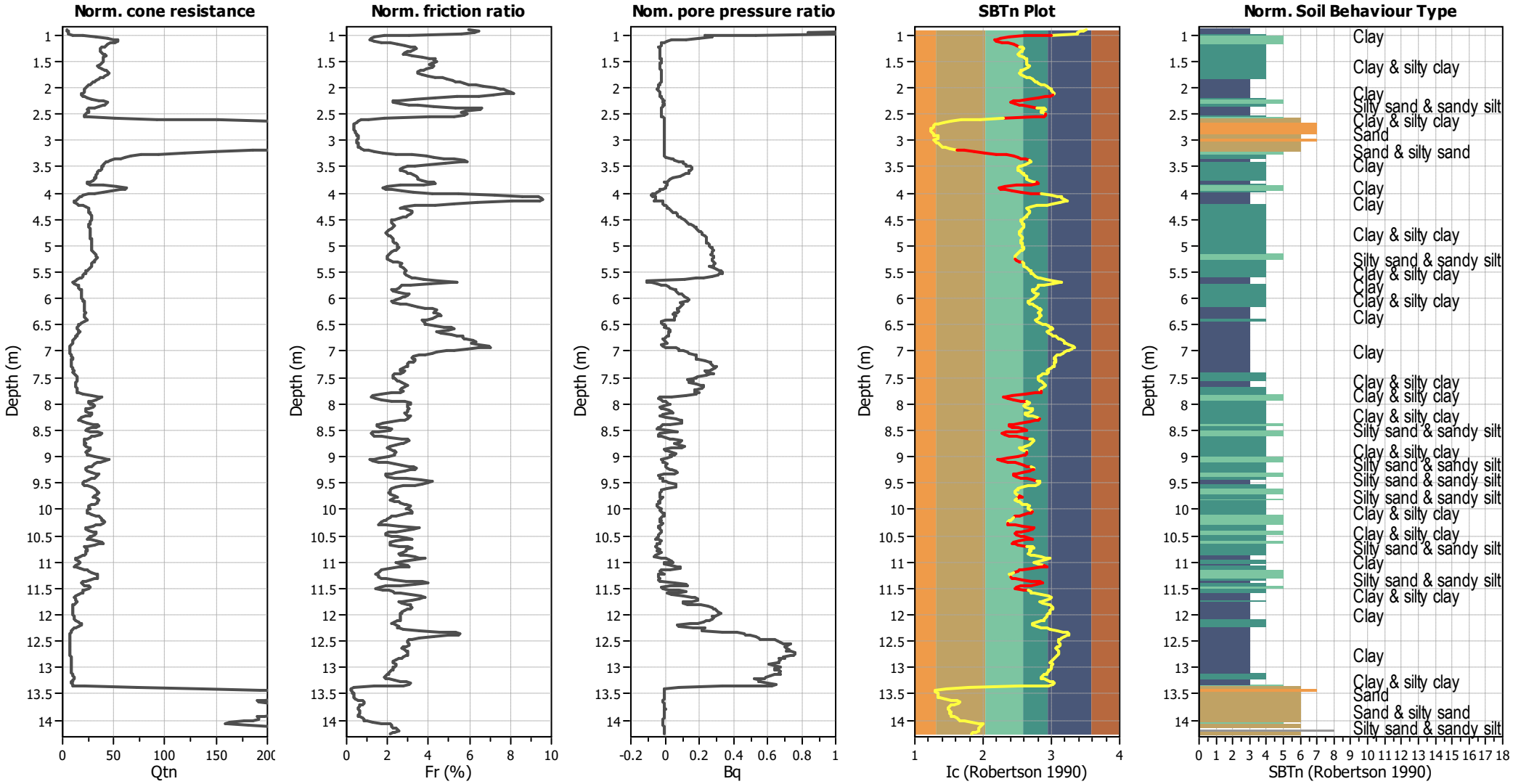
Input parameters and analysis data

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)



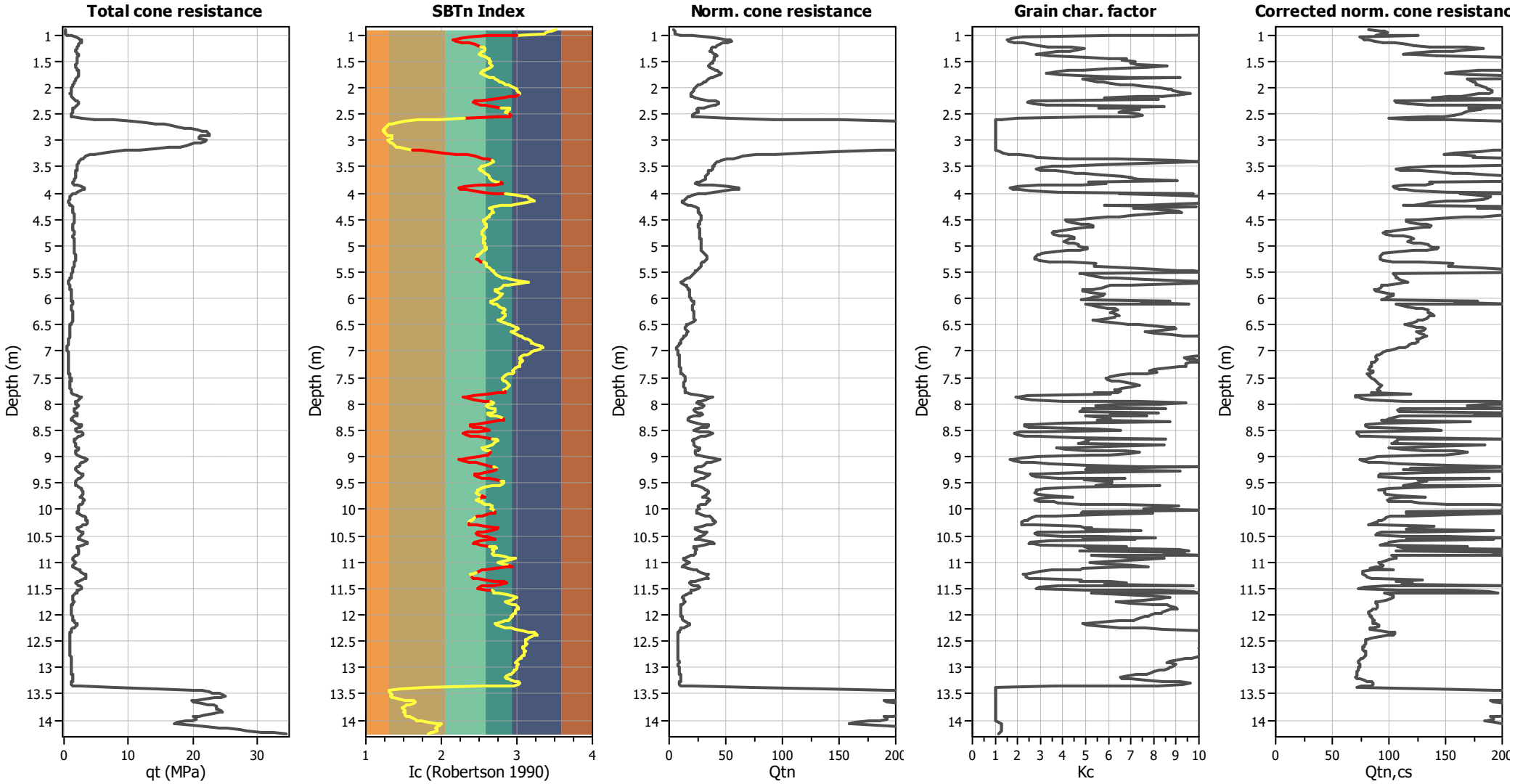
Input parameters and analysis data

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

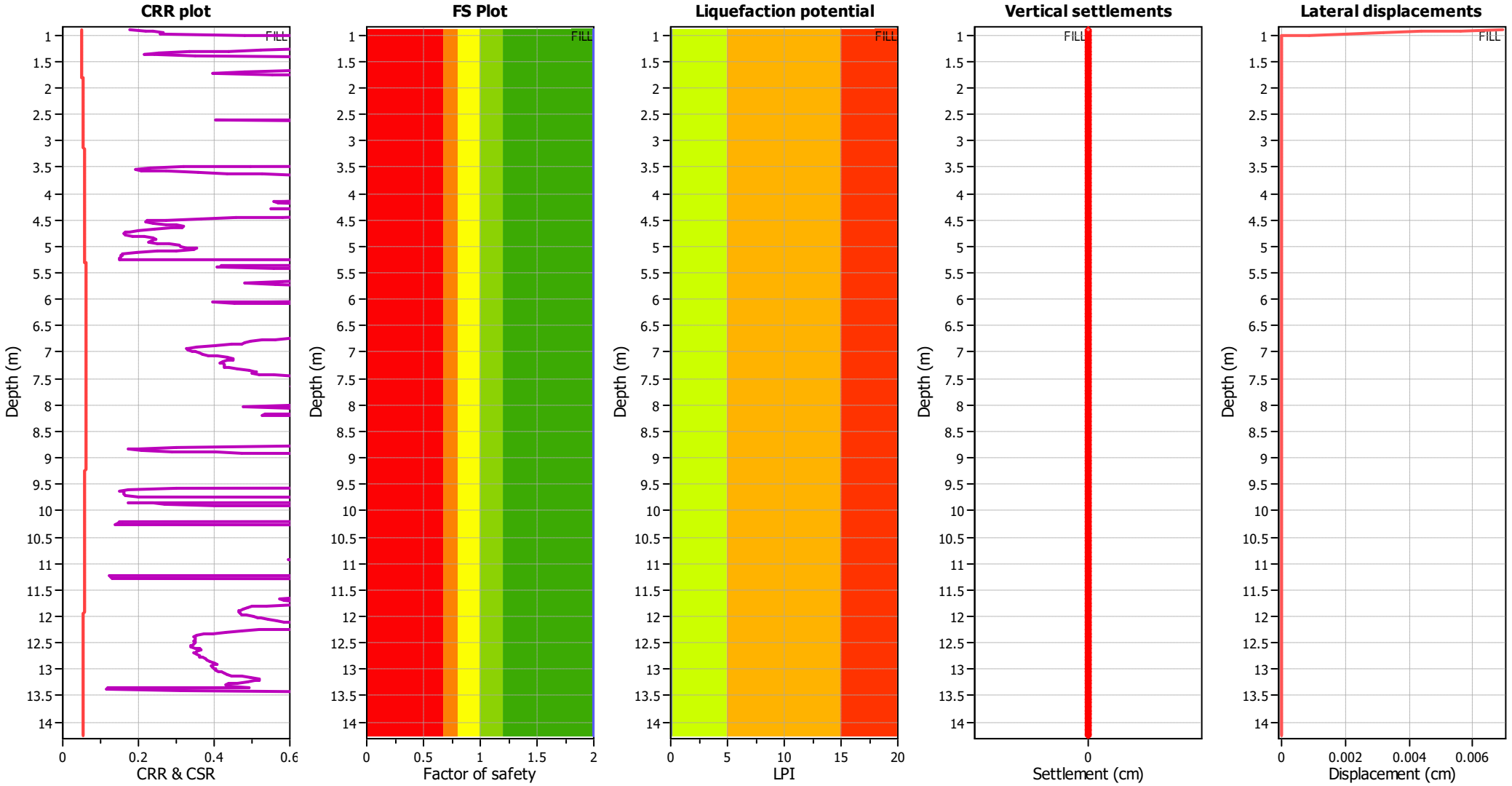
Liquefaction analysis overall plots (intermediate results)



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

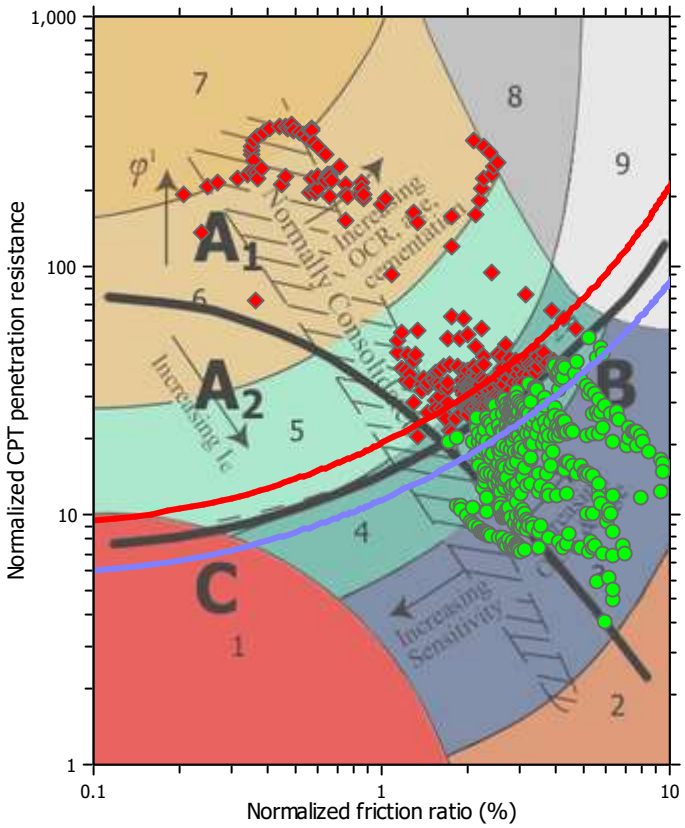
F.S. color scheme

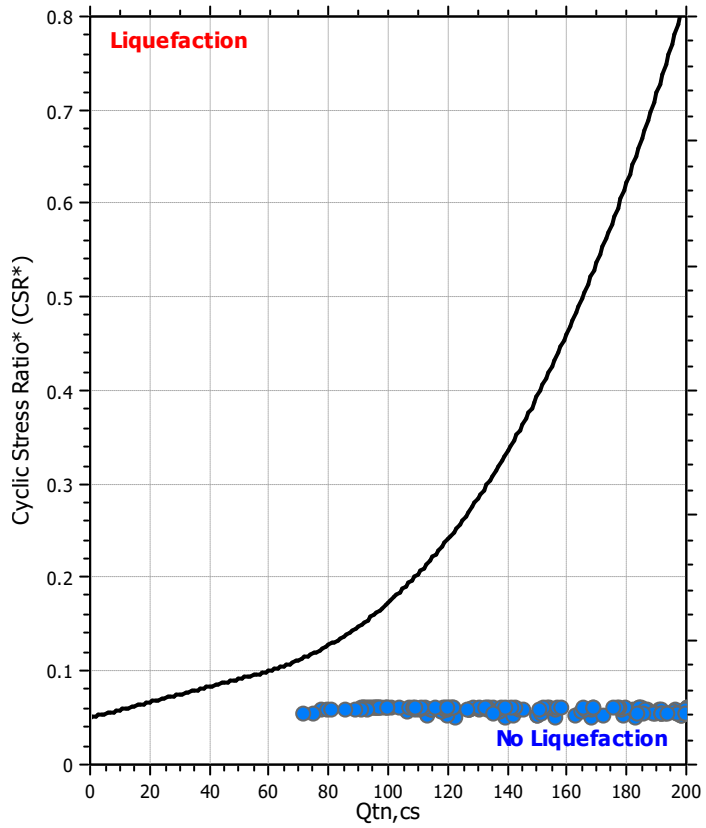
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

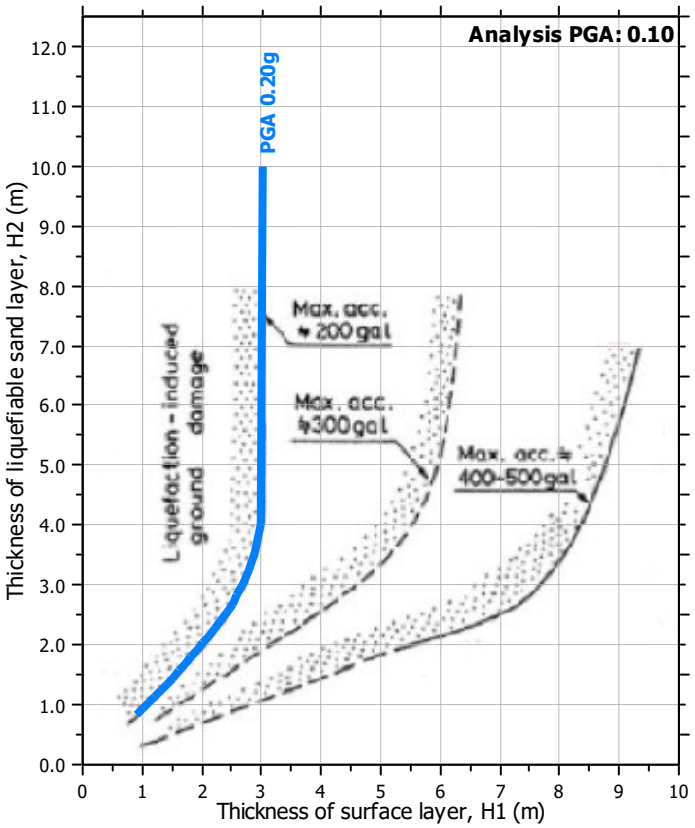
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



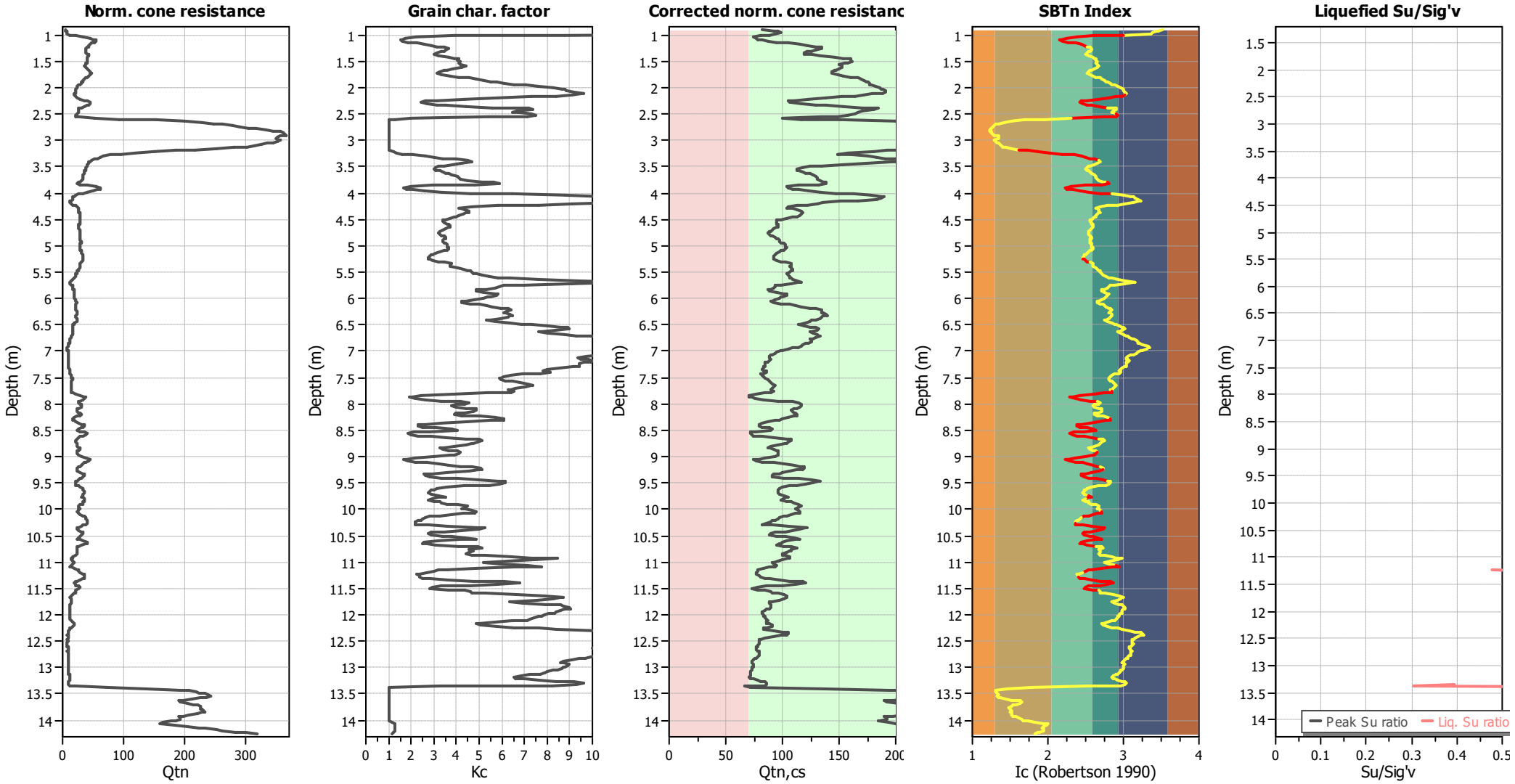




Input parameters and analysis data

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

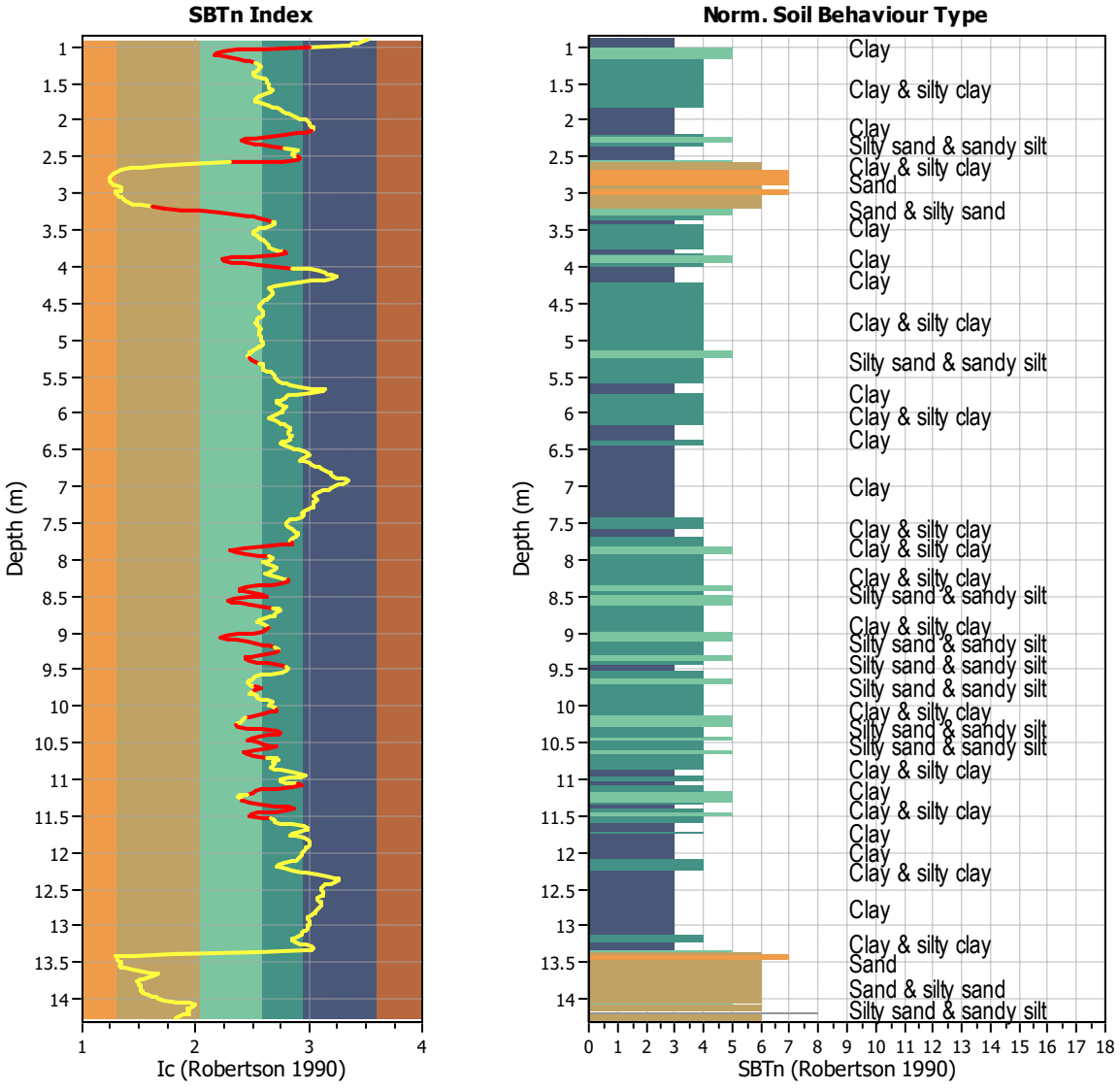
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	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

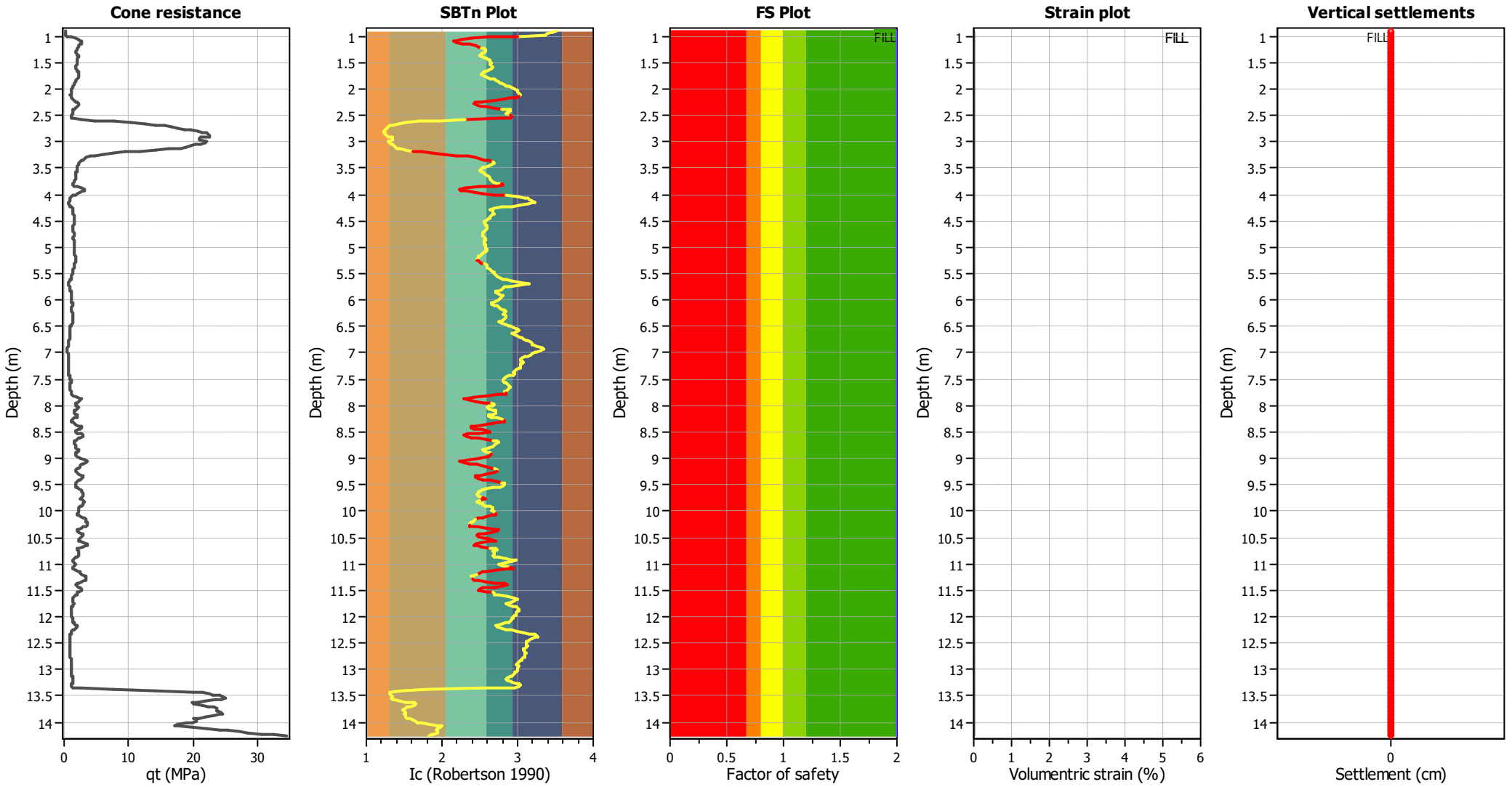
Overall liquefaction potential: 0.00

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)

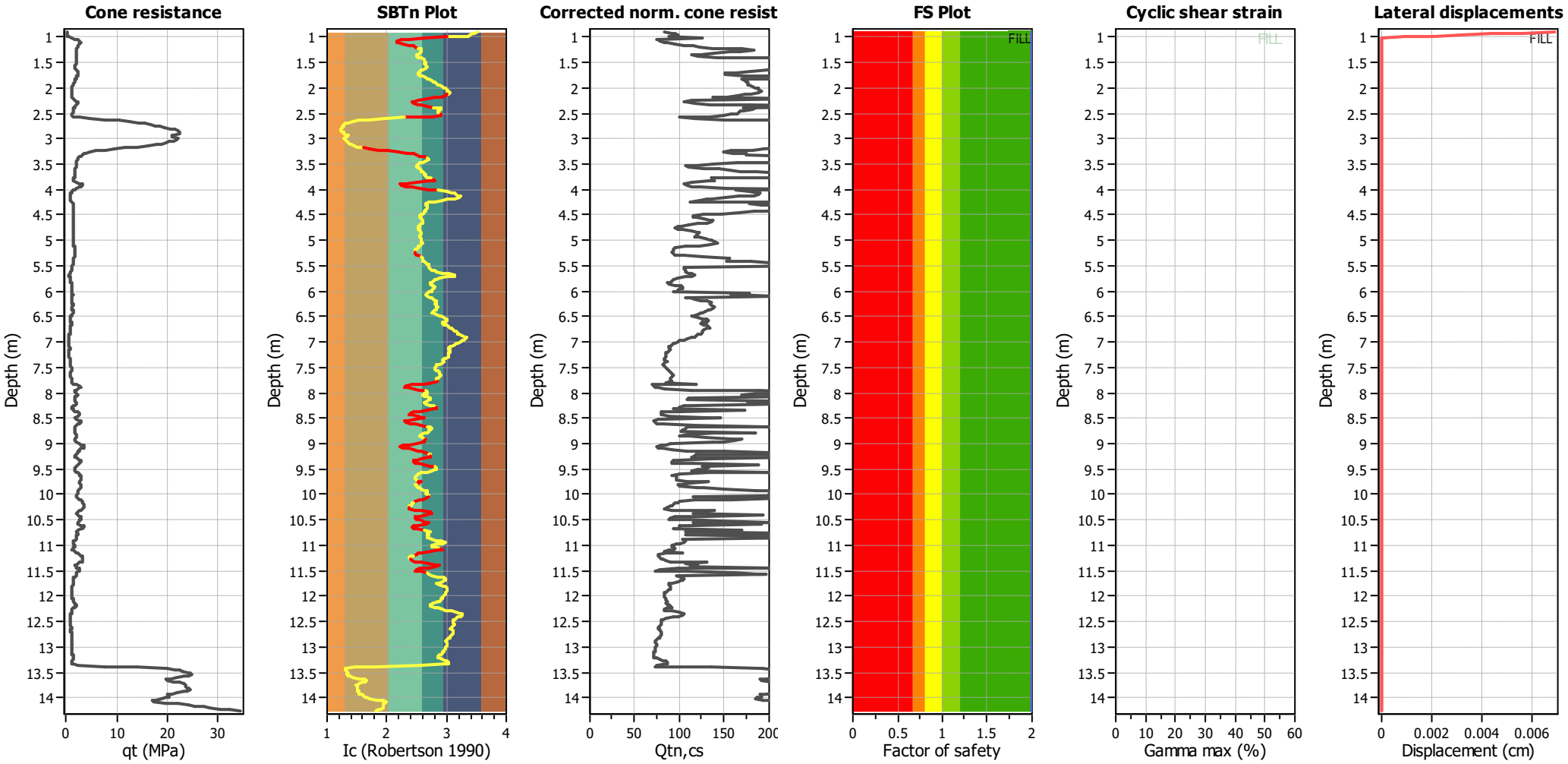
Total estimated settlement: 0.00

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

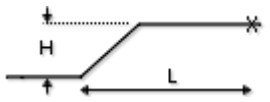
Geometric parameters: Level ground (or gently sloping) with free face (L: 67.00 m - H: 2.90 m)



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

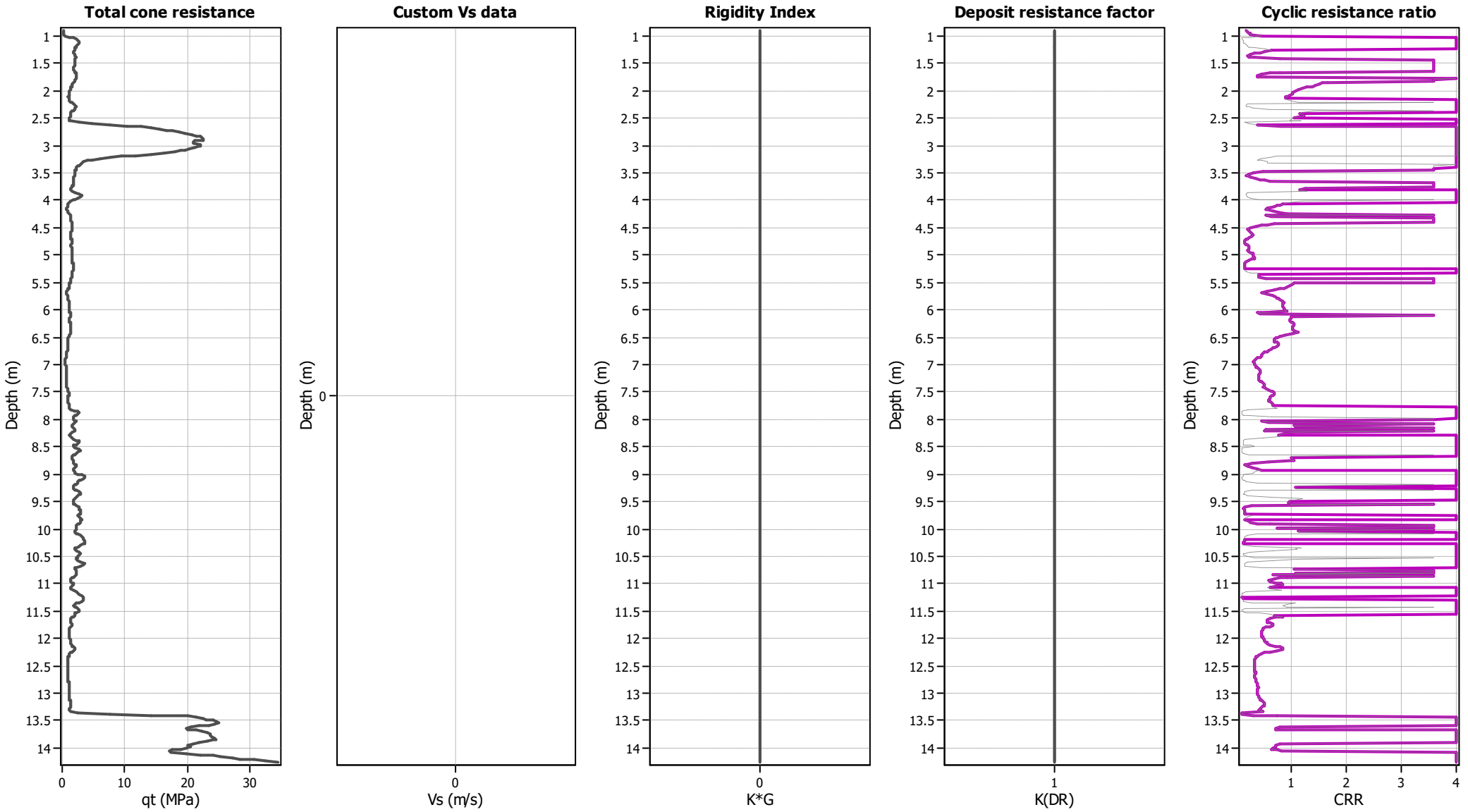
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

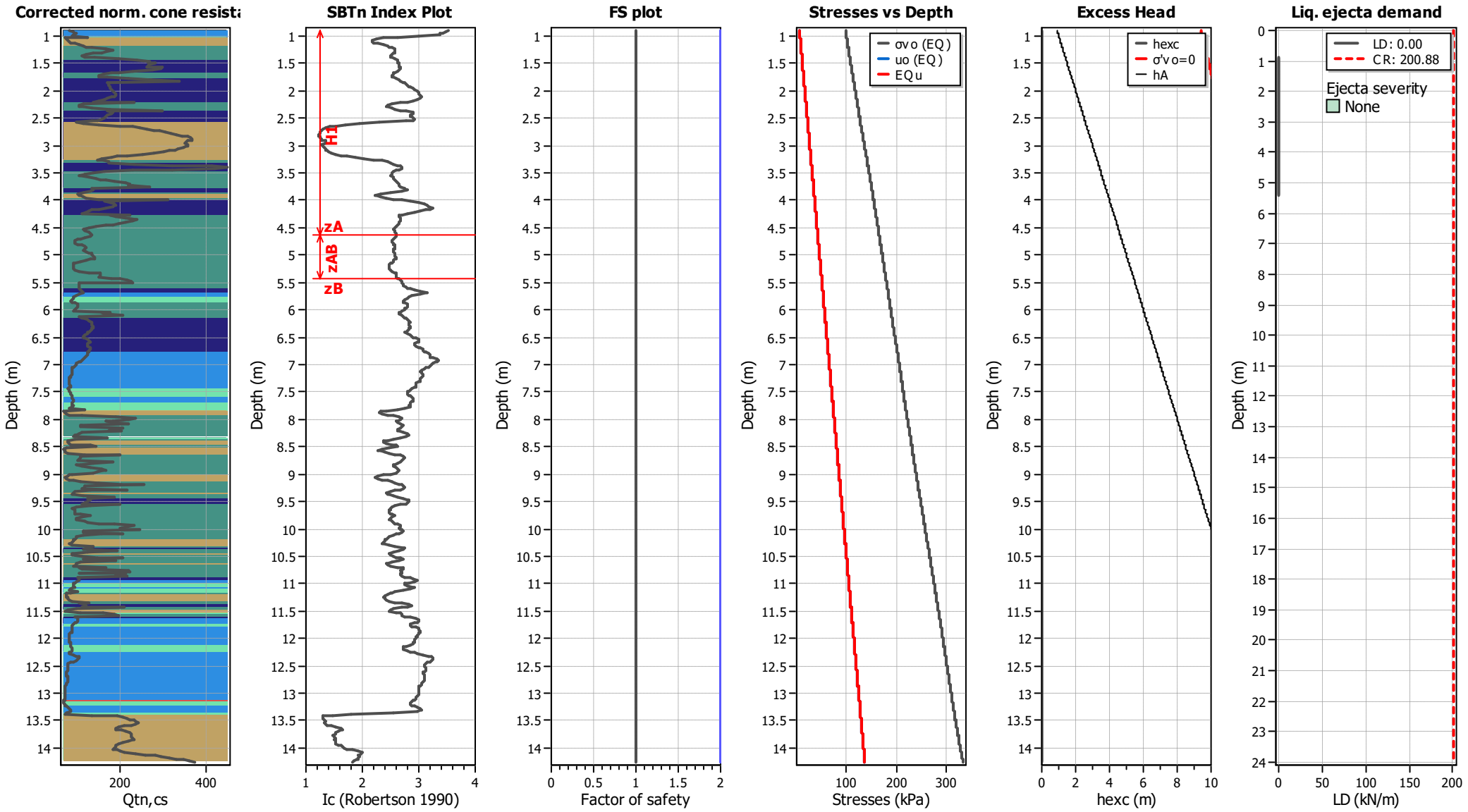
Abbreviations

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

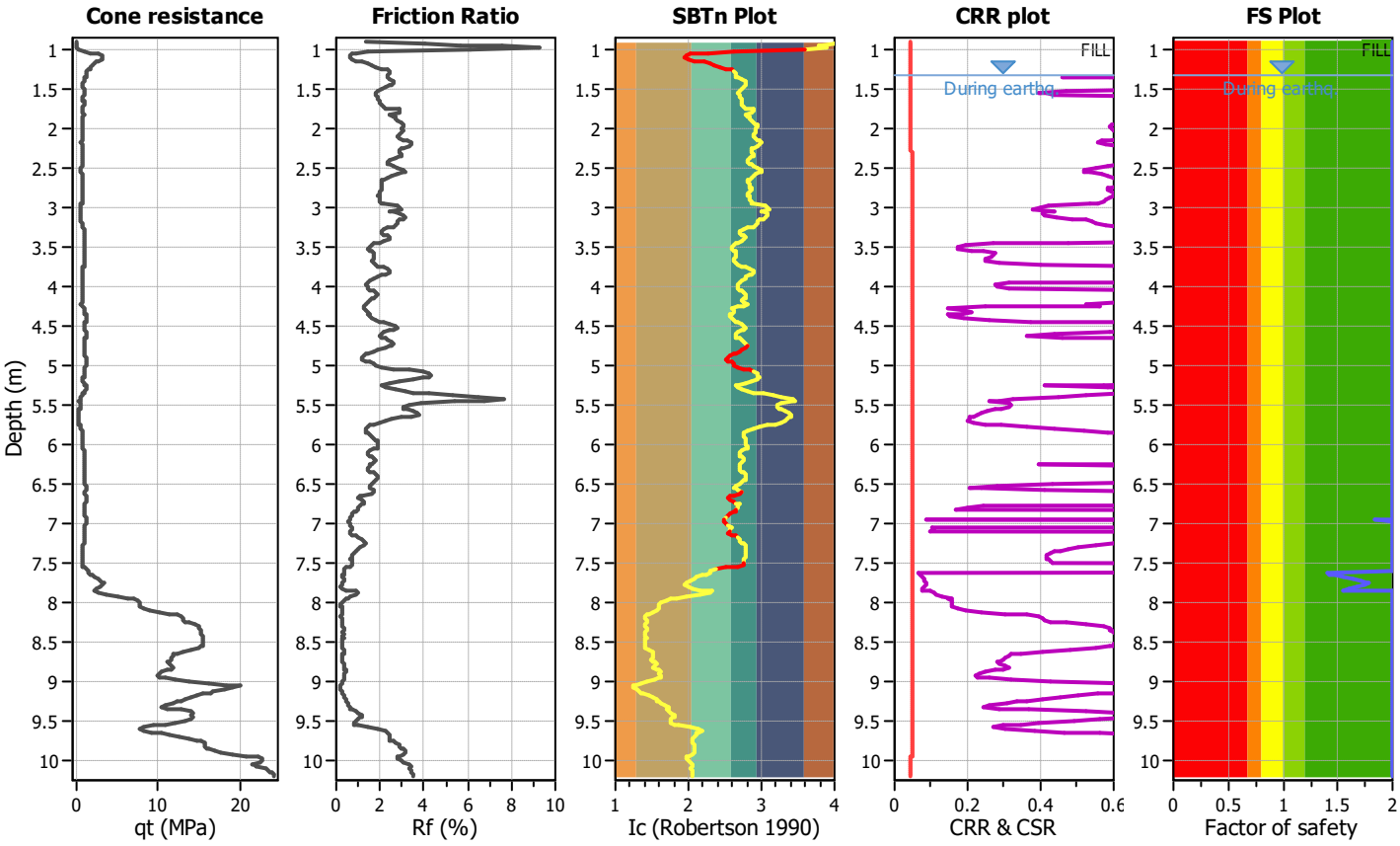
Project title : CWLP Liquefaction Analysis

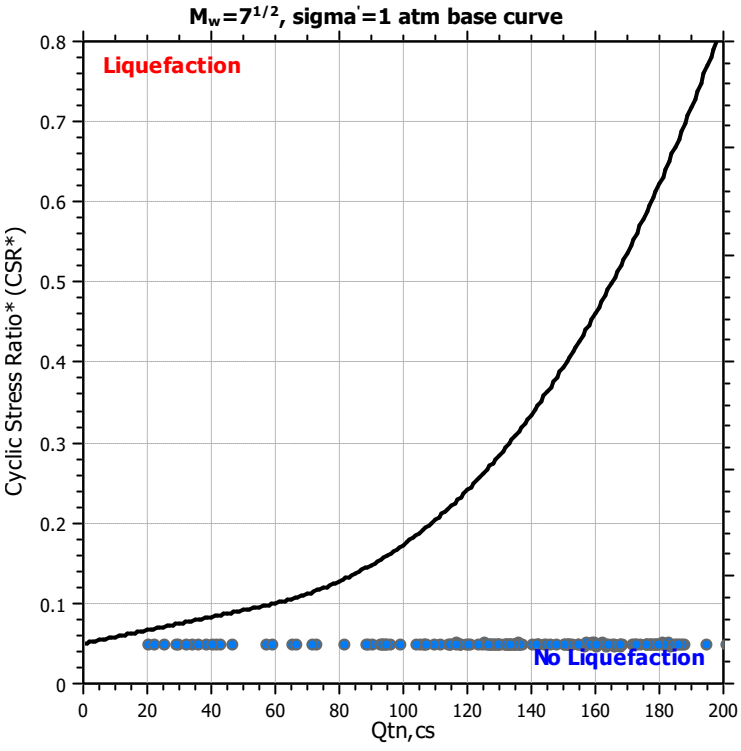
Location : East Lake Shore Drive, Springfield, Illinois

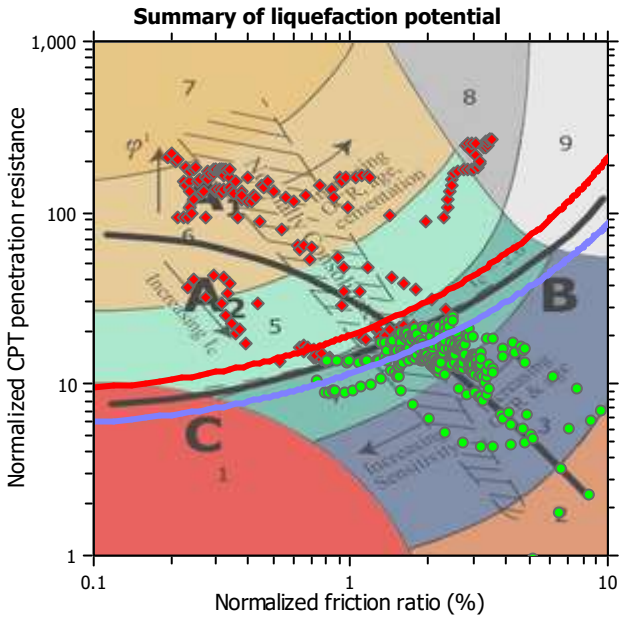
CPT file : CWLP CPT-6L

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		

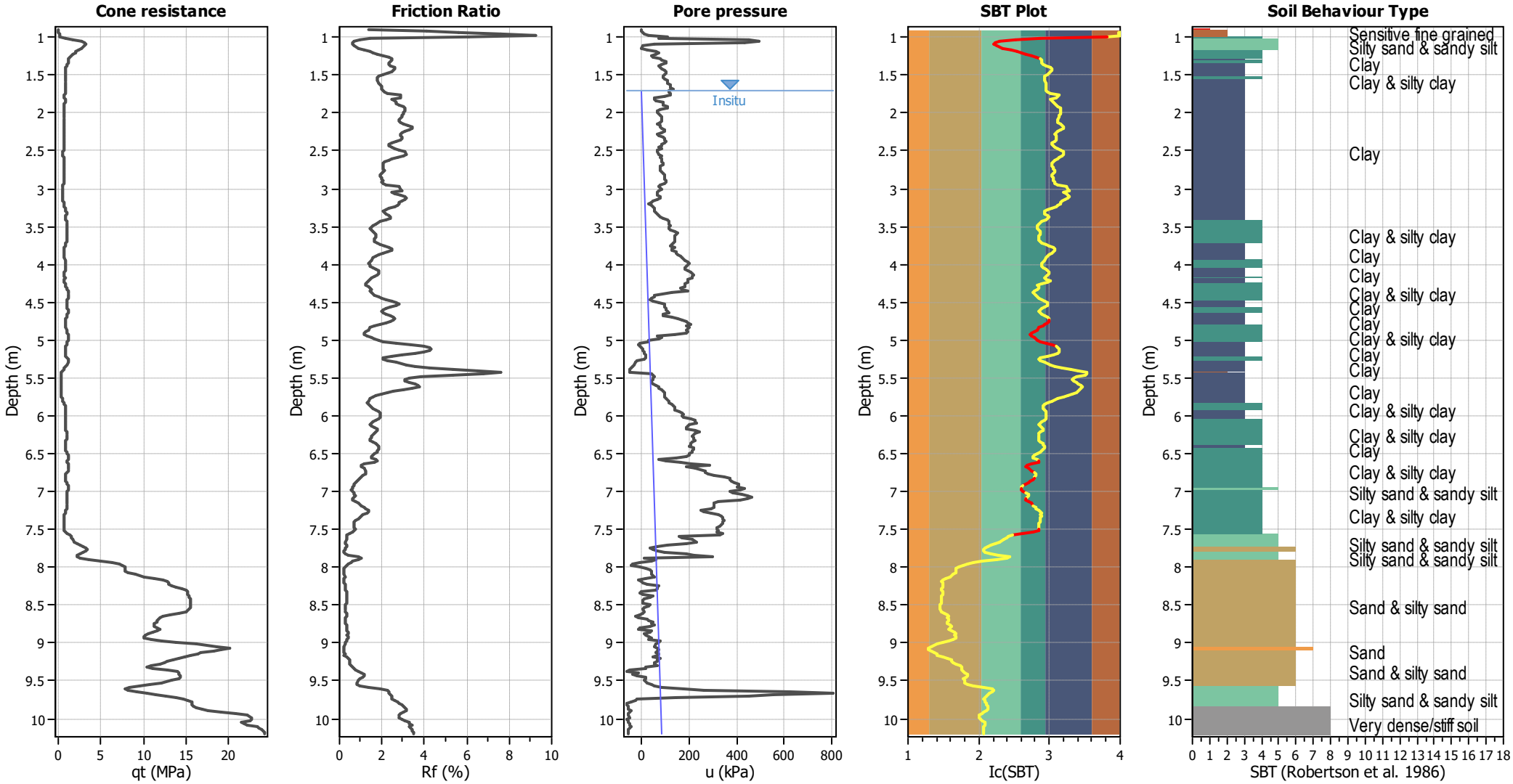






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



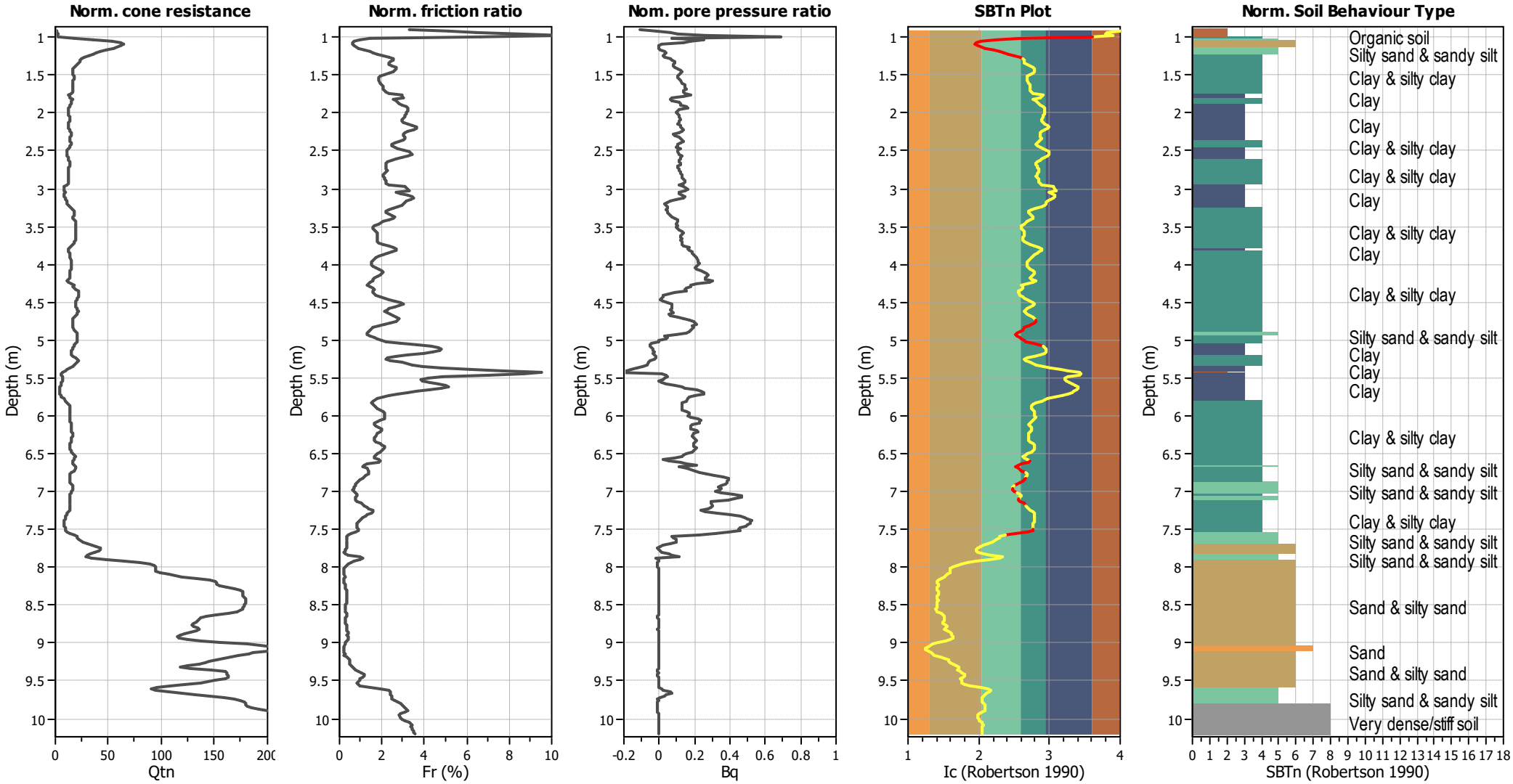
Input parameters and analysis data

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)



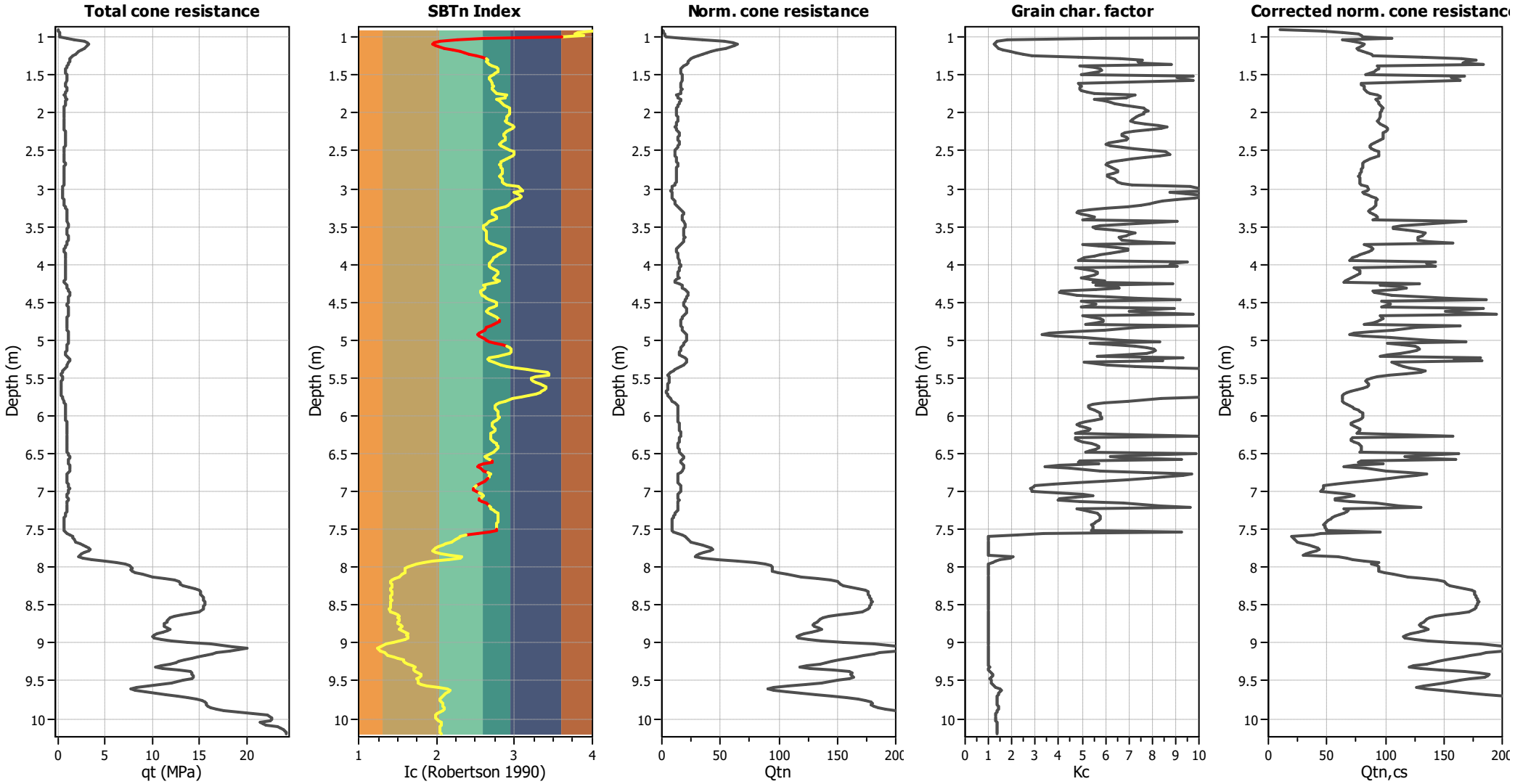
Input parameters and analysis data

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

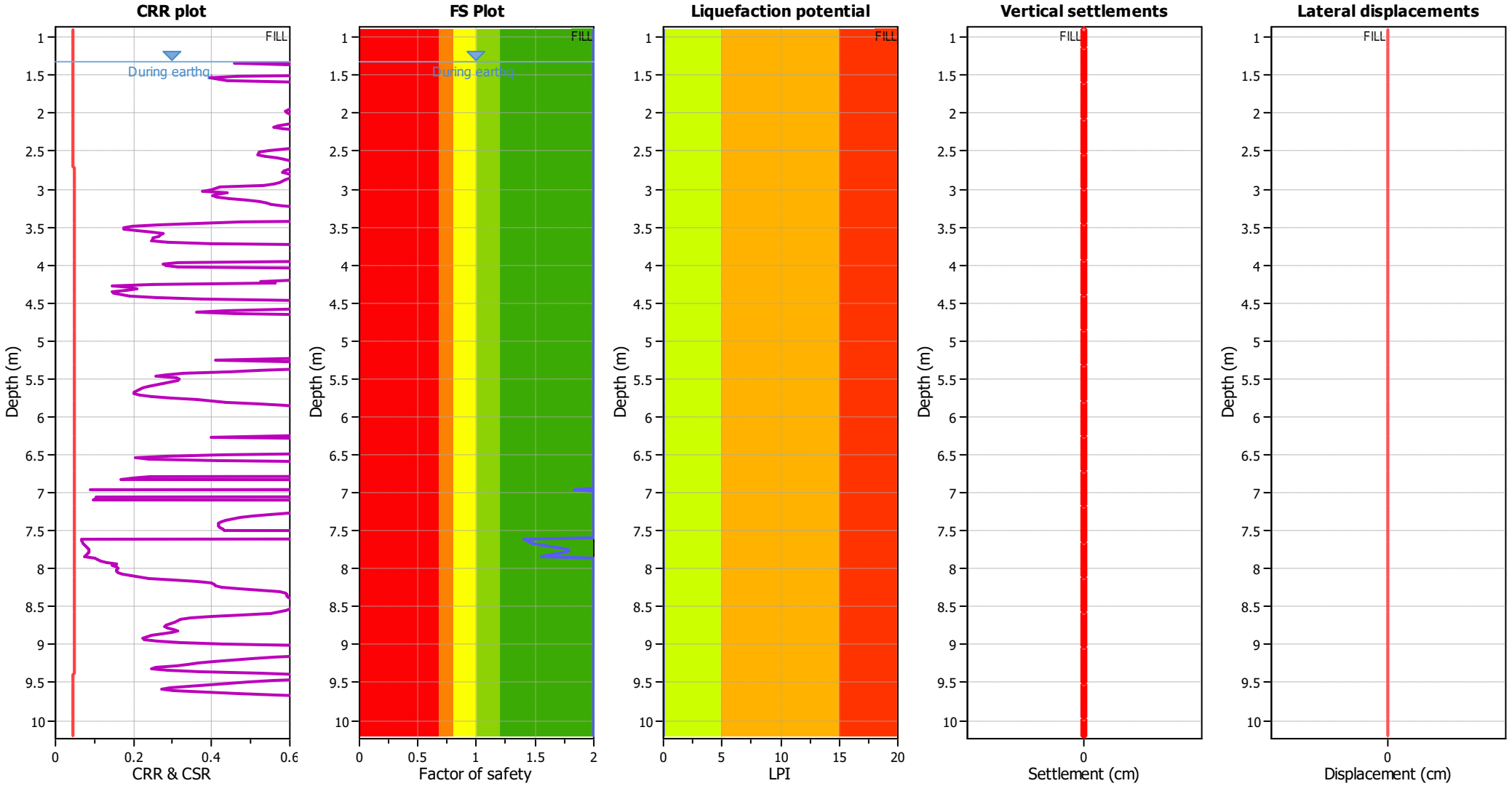
Liquefaction analysis overall plots (intermediate results)



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

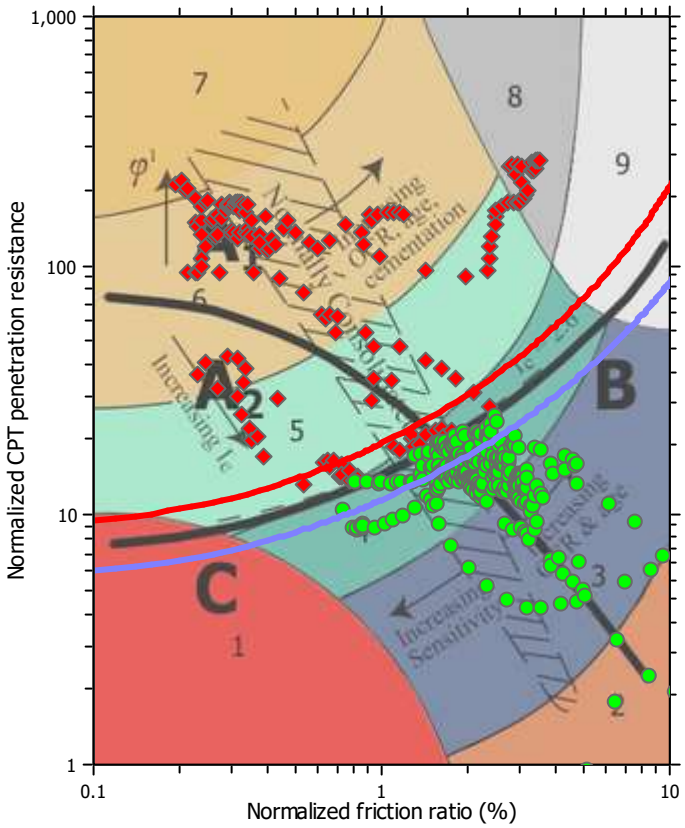
F.S. color scheme

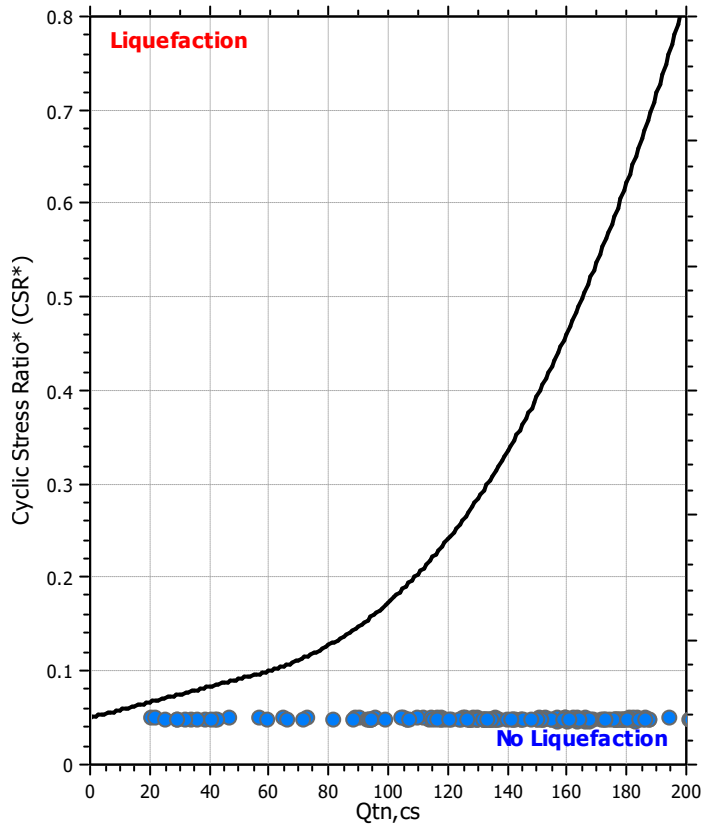
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

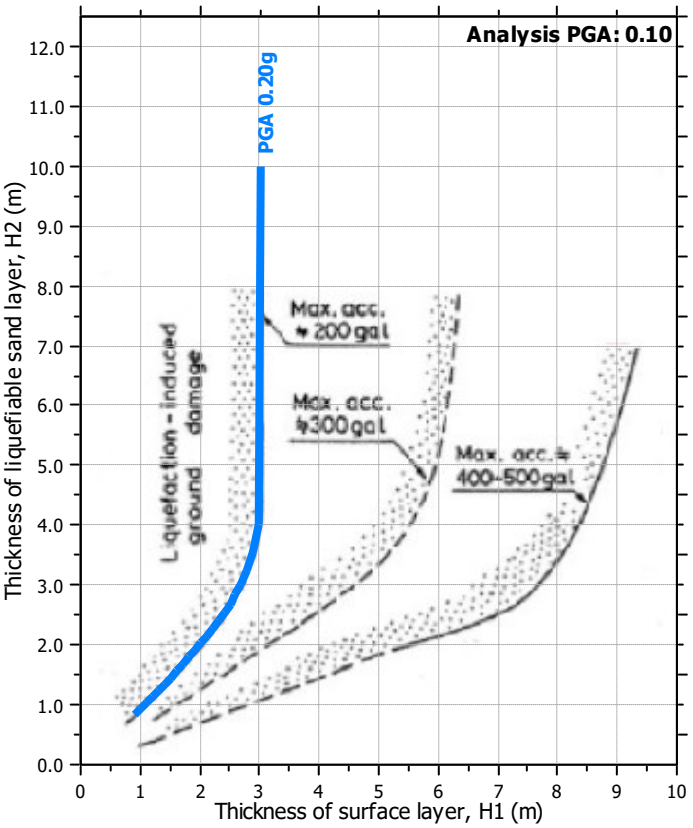
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



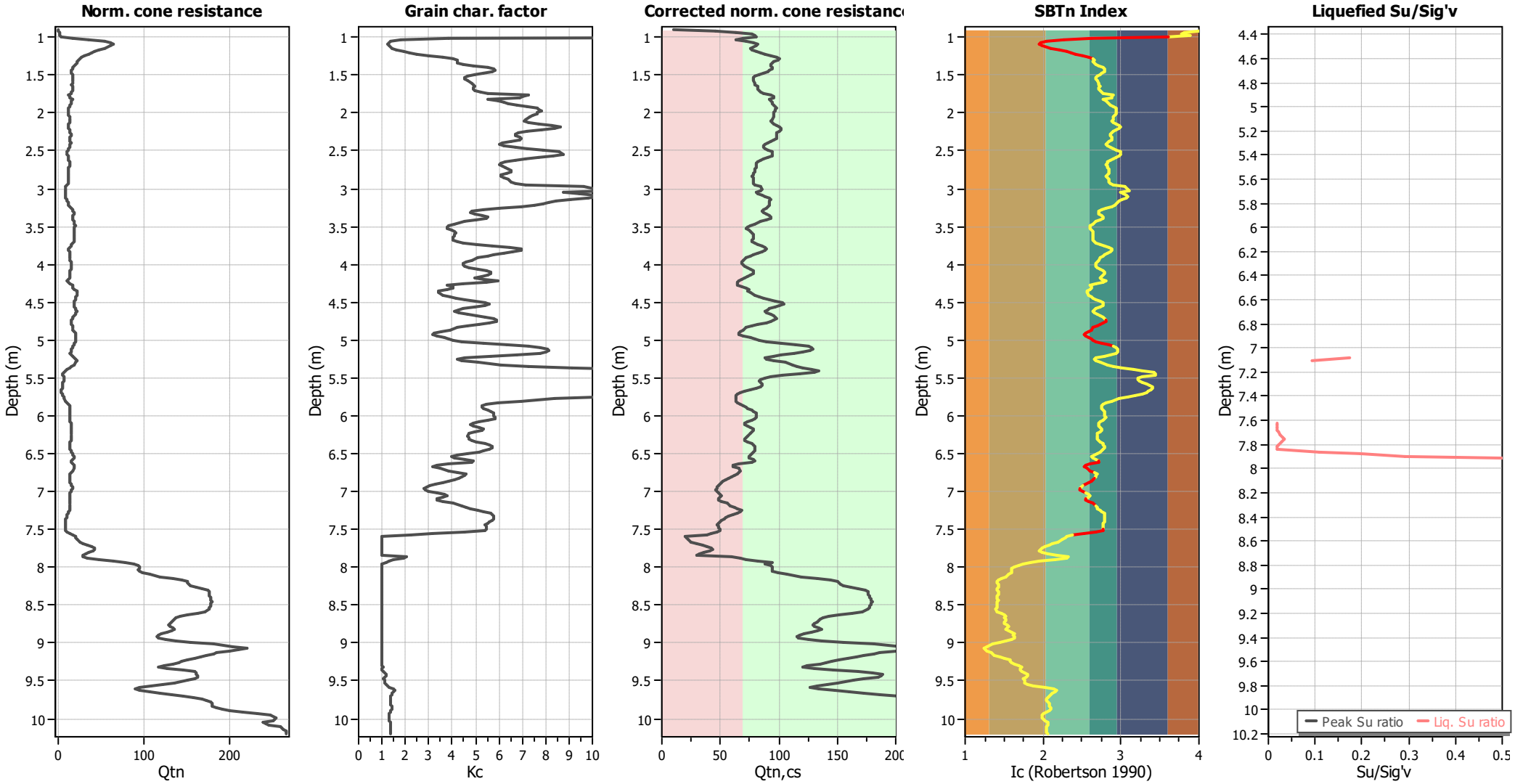




Input parameters and analysis data

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

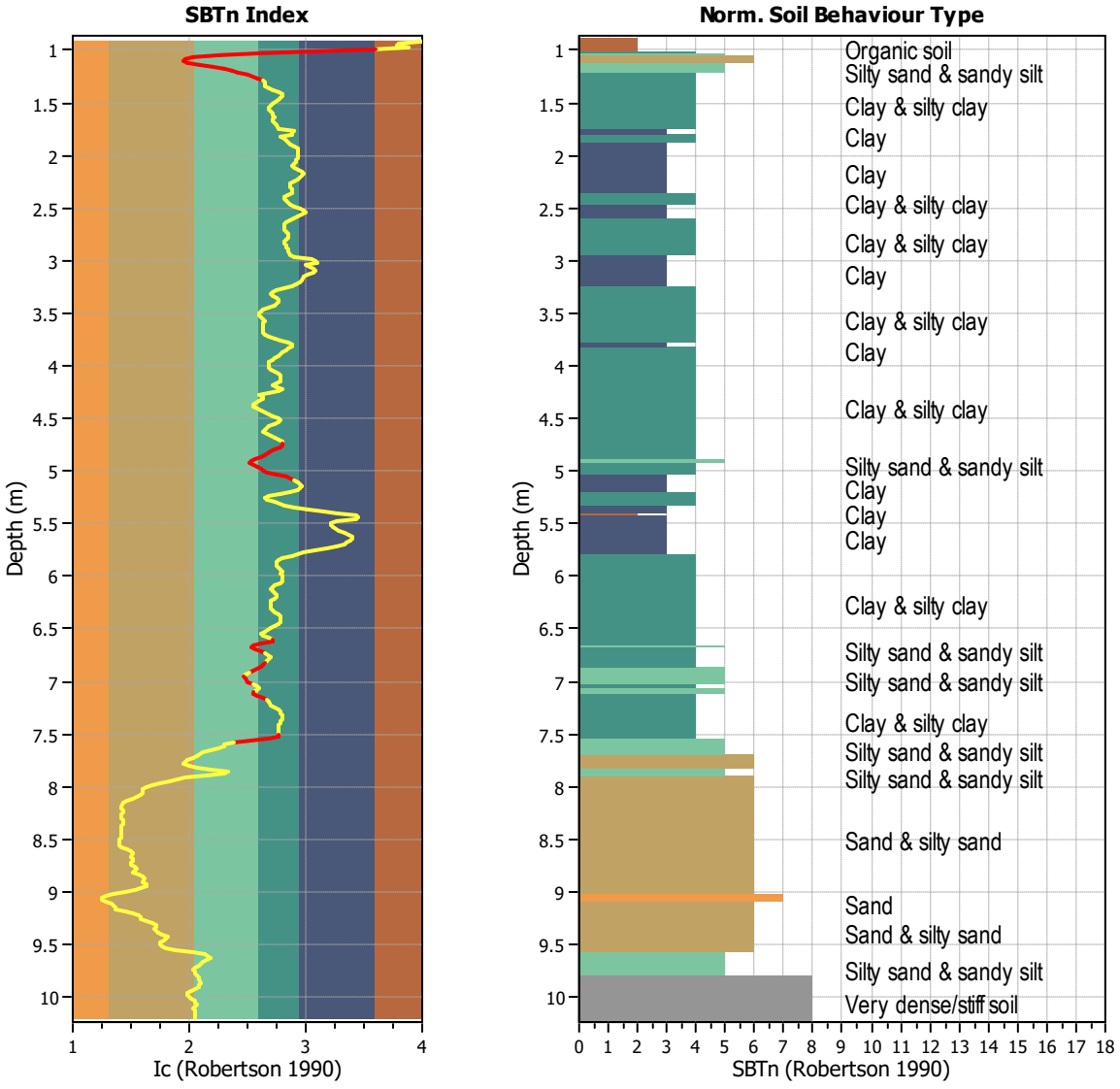
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	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

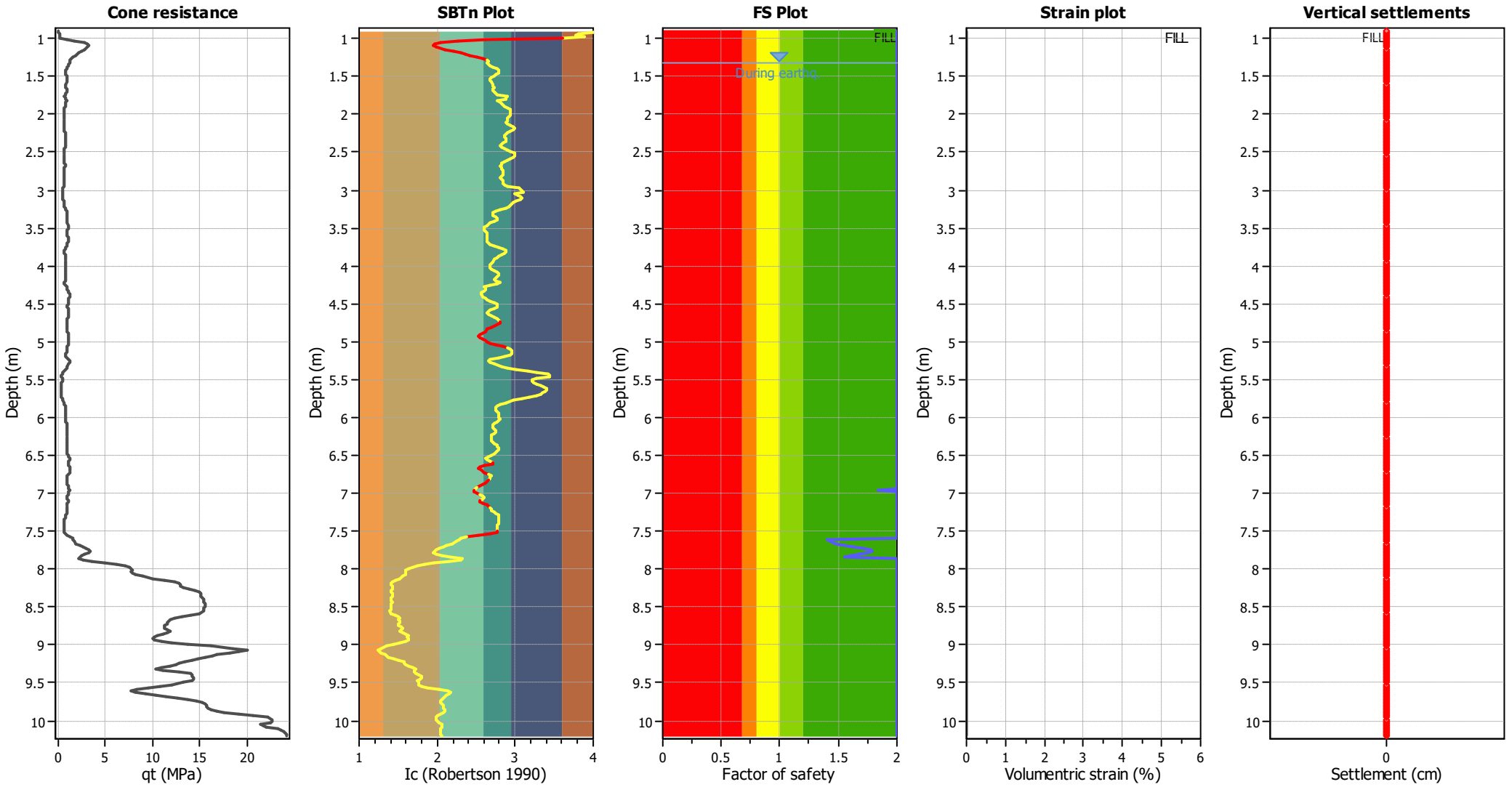
Overall liquefaction potential: 0.00

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

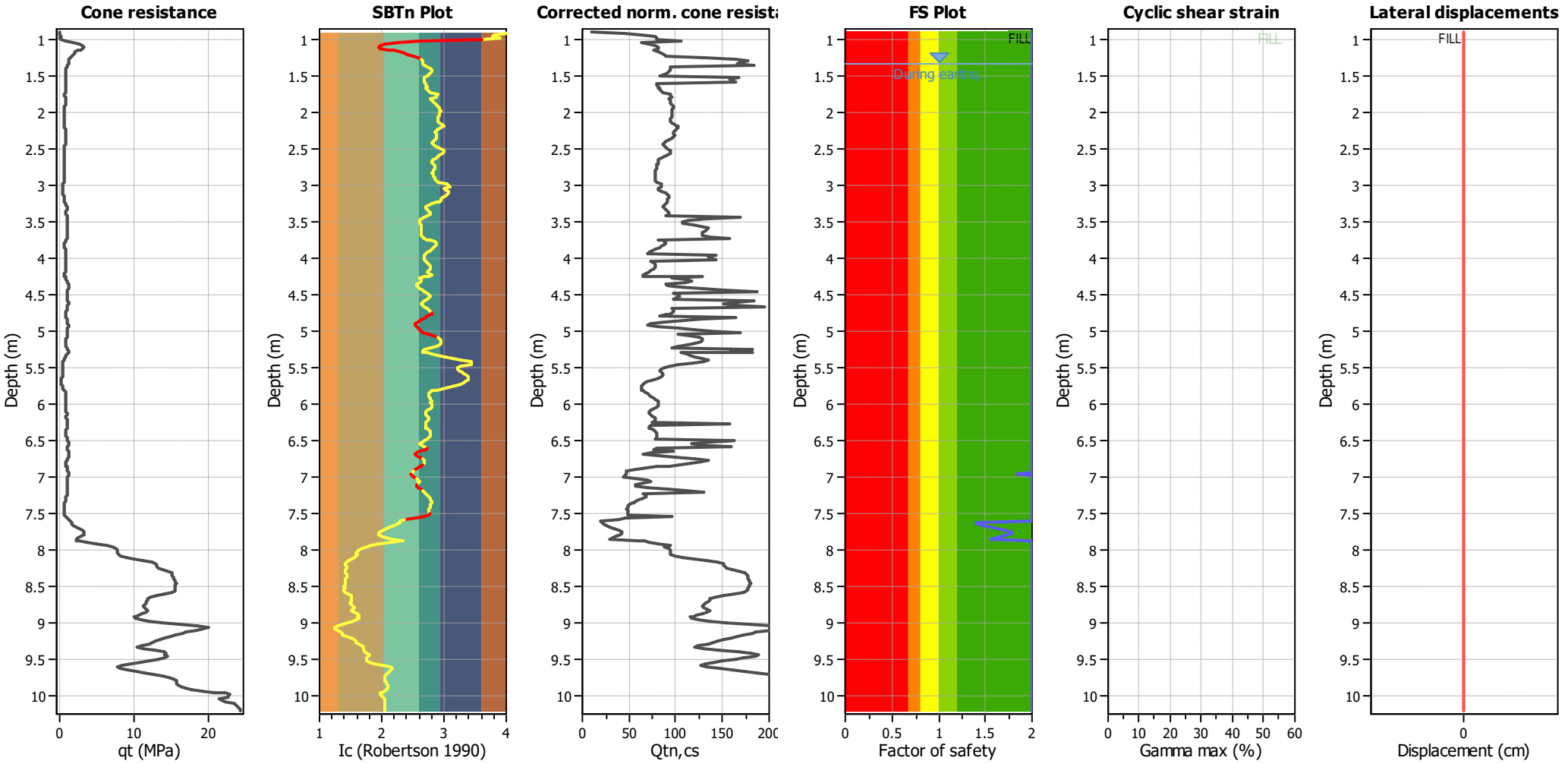
Total estimated settlement: 0.00

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

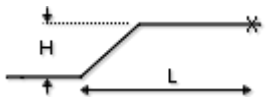
Geometric parameters: Level ground (or gently sloping) with free face (L: 41.50 m - H: 2.80 m)



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

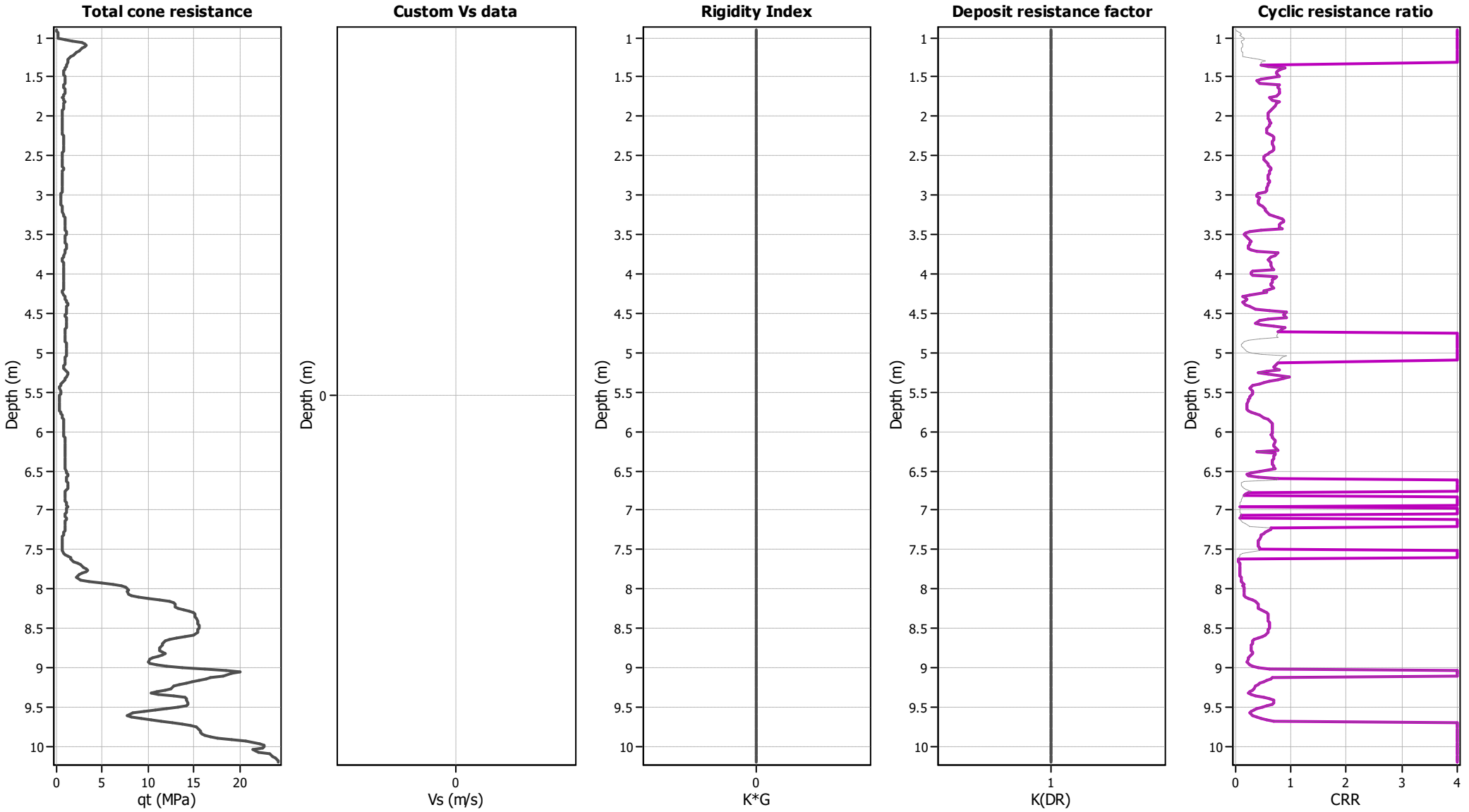
:: Strength loss calculation (Robertson (2009) :: (continued)

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

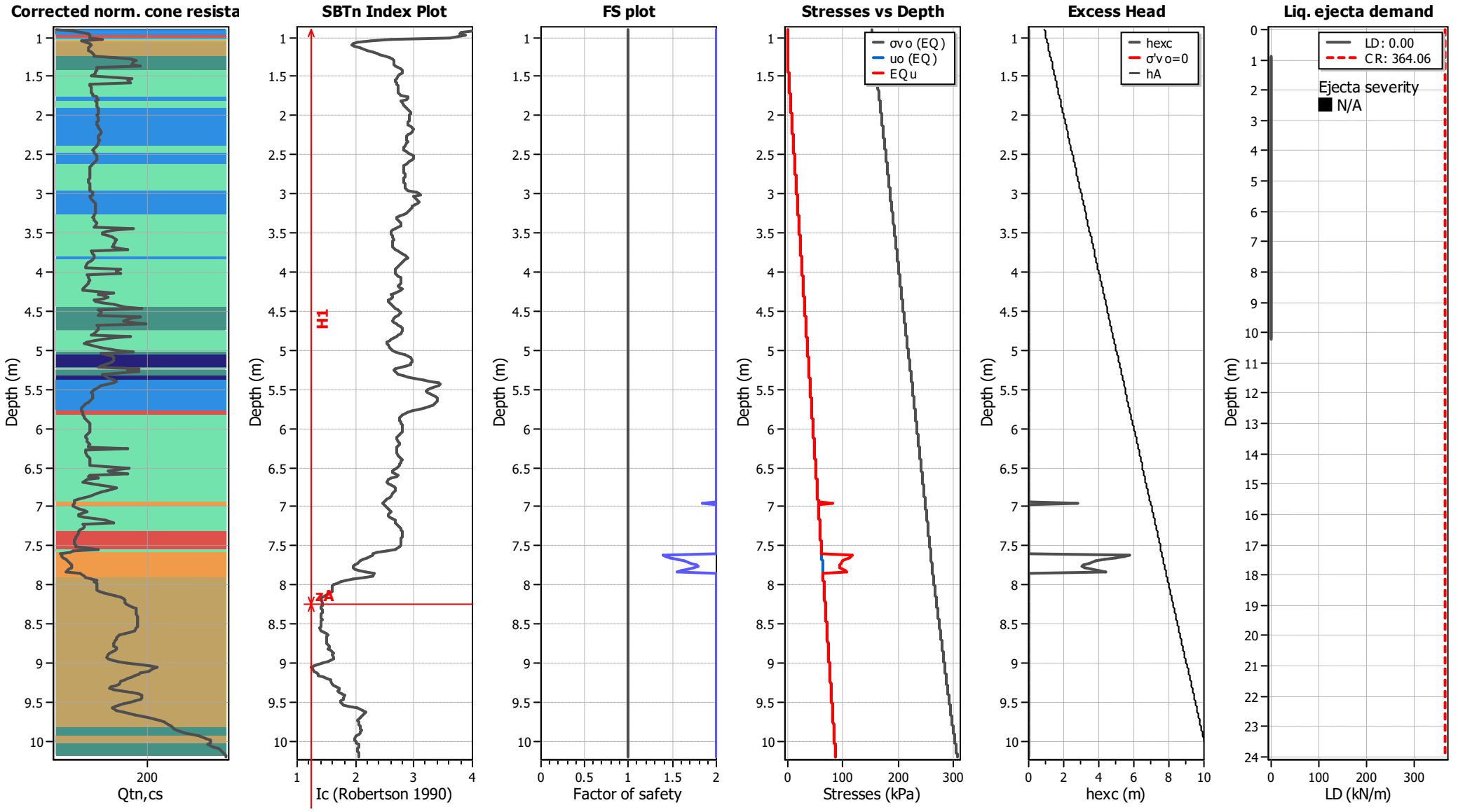
Abbreviations

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

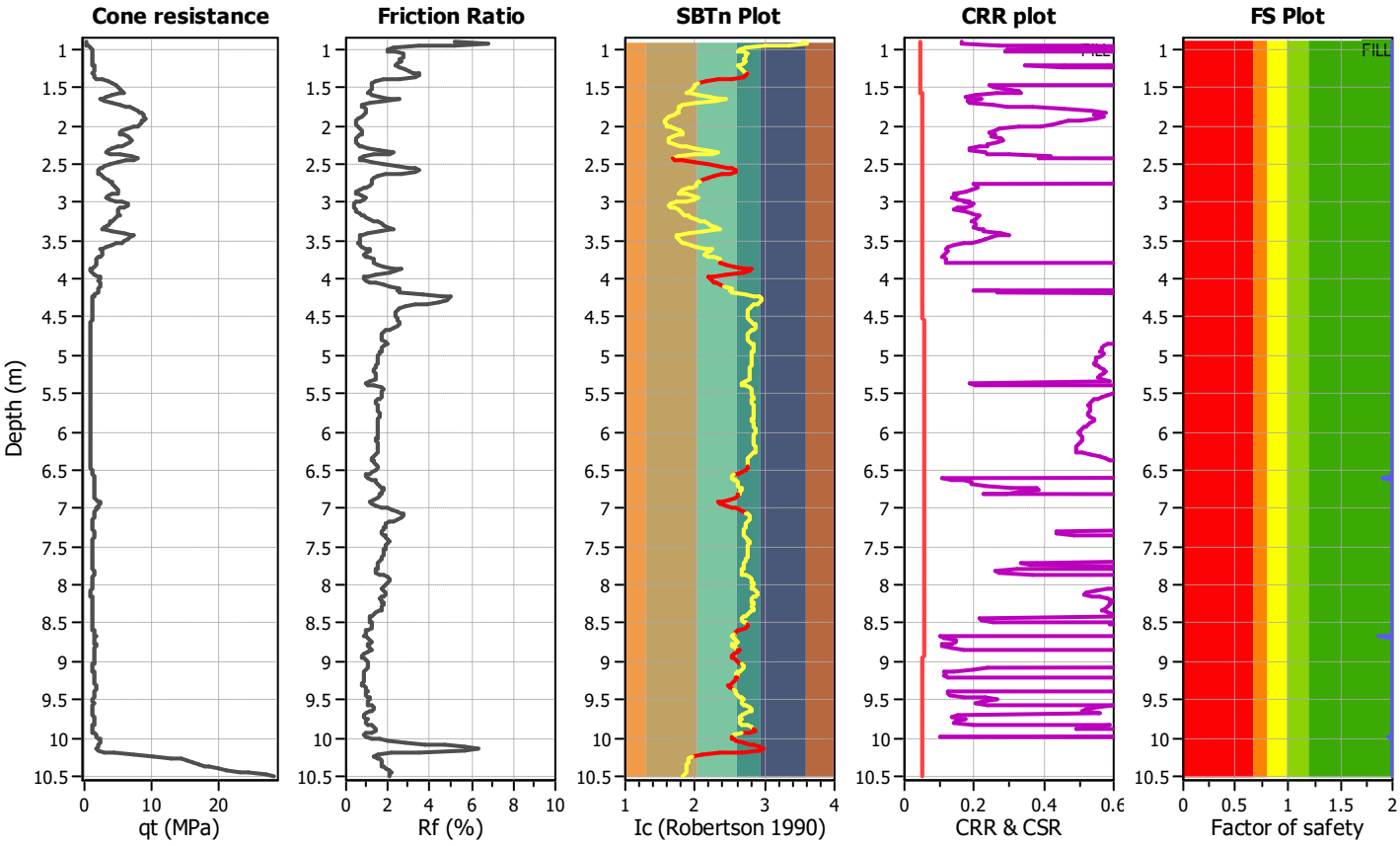
Project title : CWLP Liquefaction Analysis

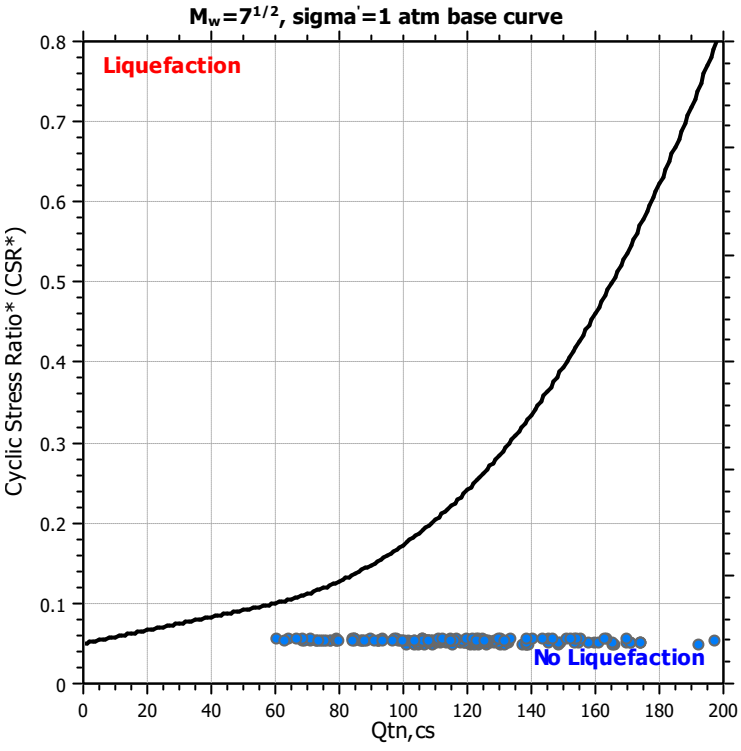
Location : East Lake Shore Drive, Springfield, Illinois

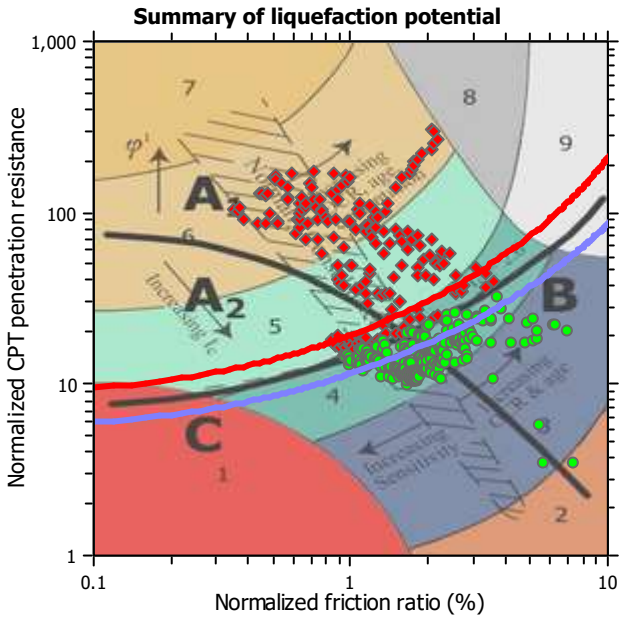
CPT file : CWLP CPT-7L

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		

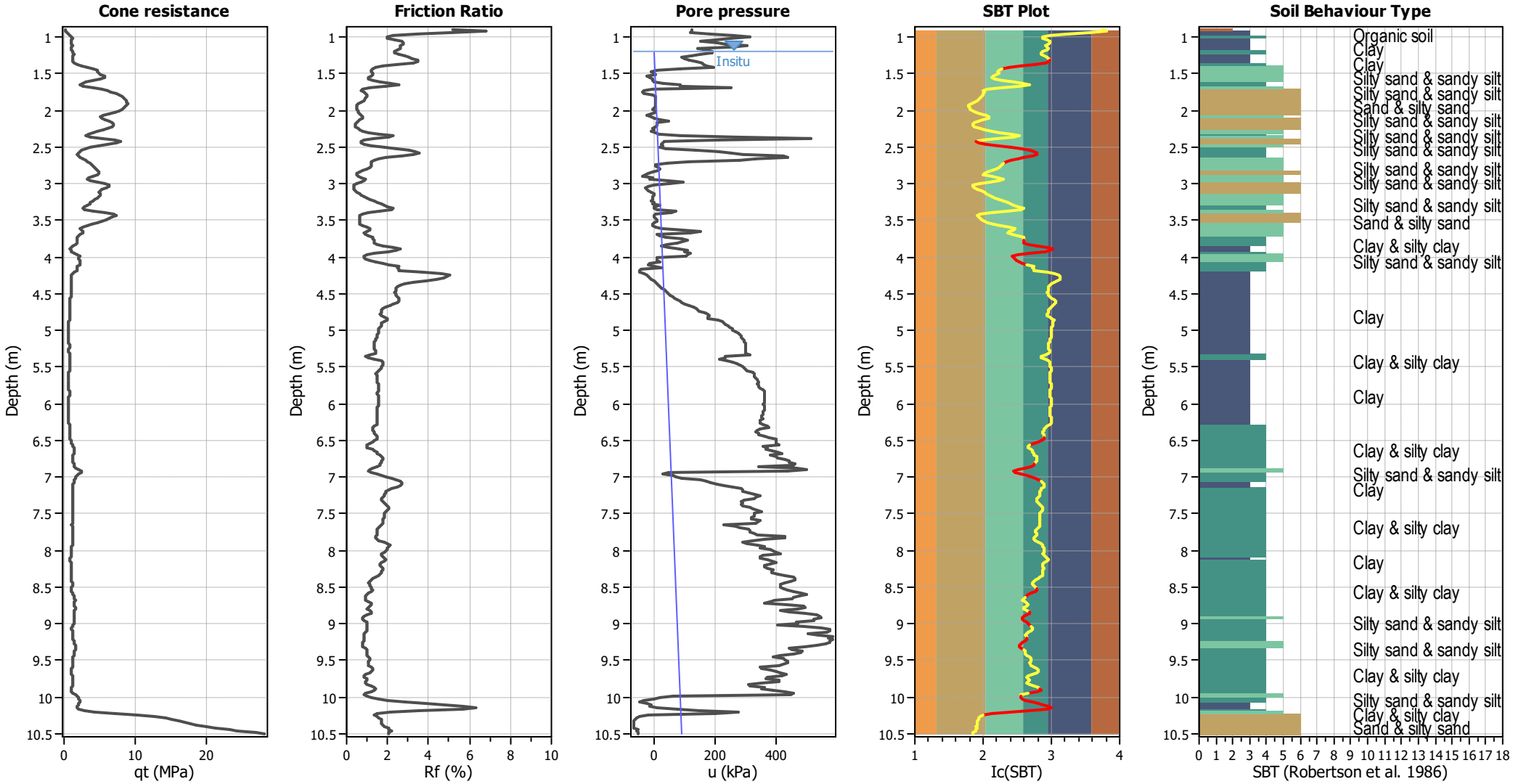






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



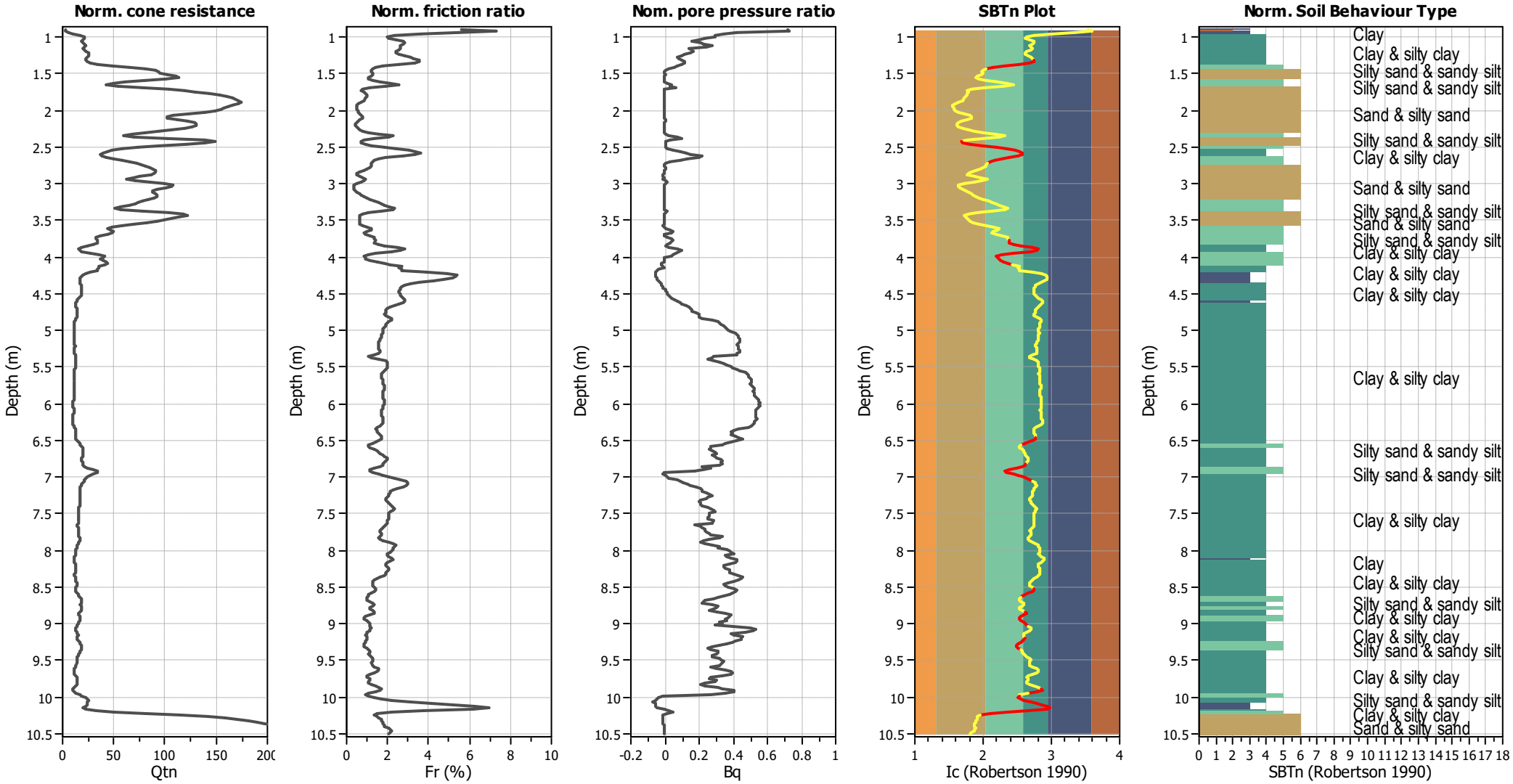
Input parameters and analysis data

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)



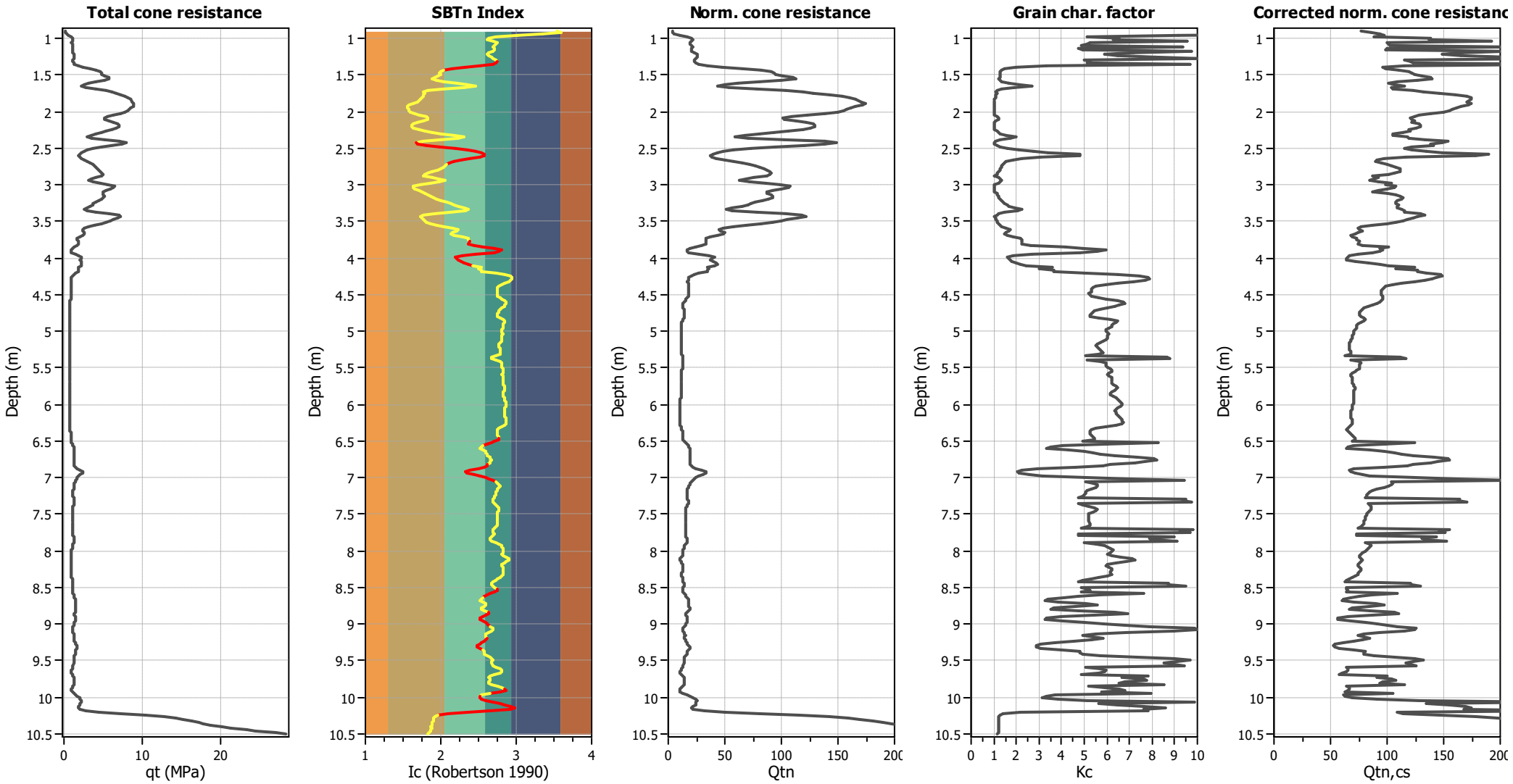
Input parameters and analysis data

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

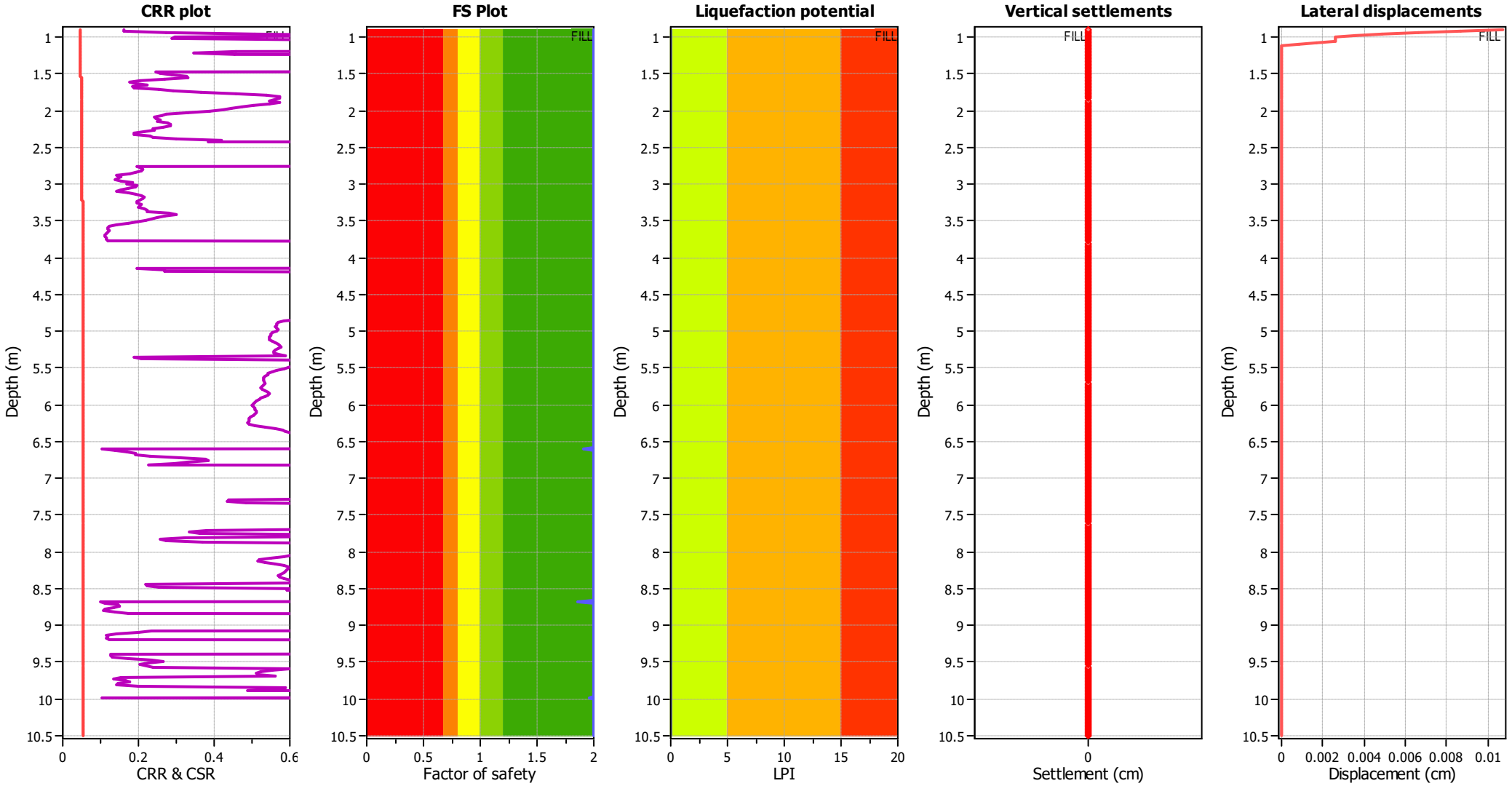
Liquefaction analysis overall plots (intermediate results)



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

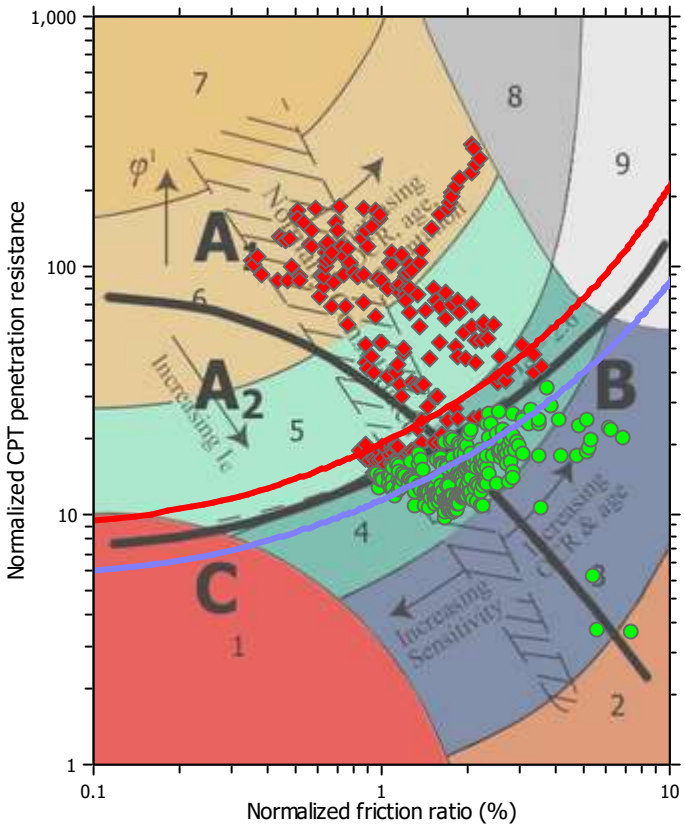
F.S. color scheme

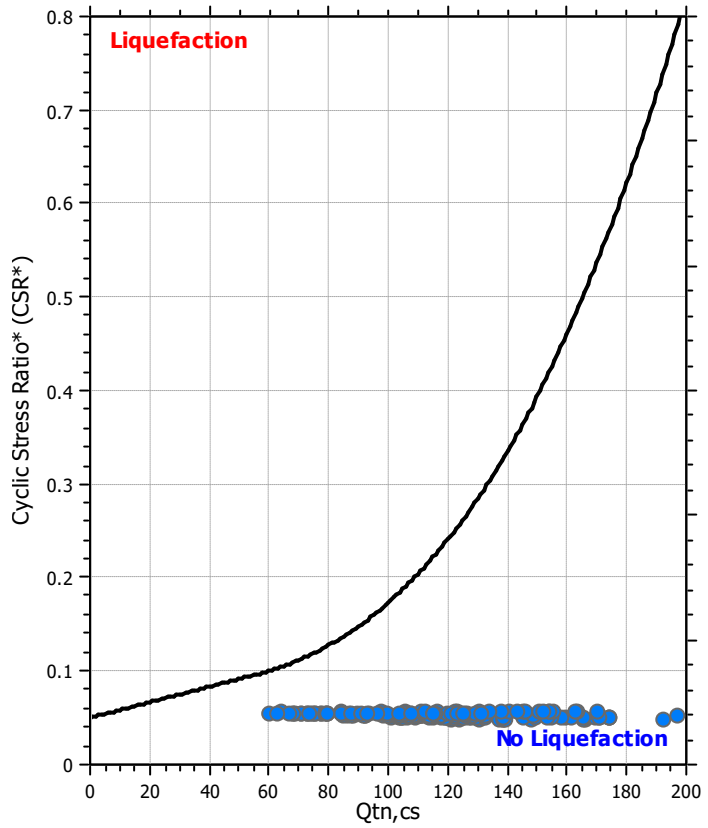
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

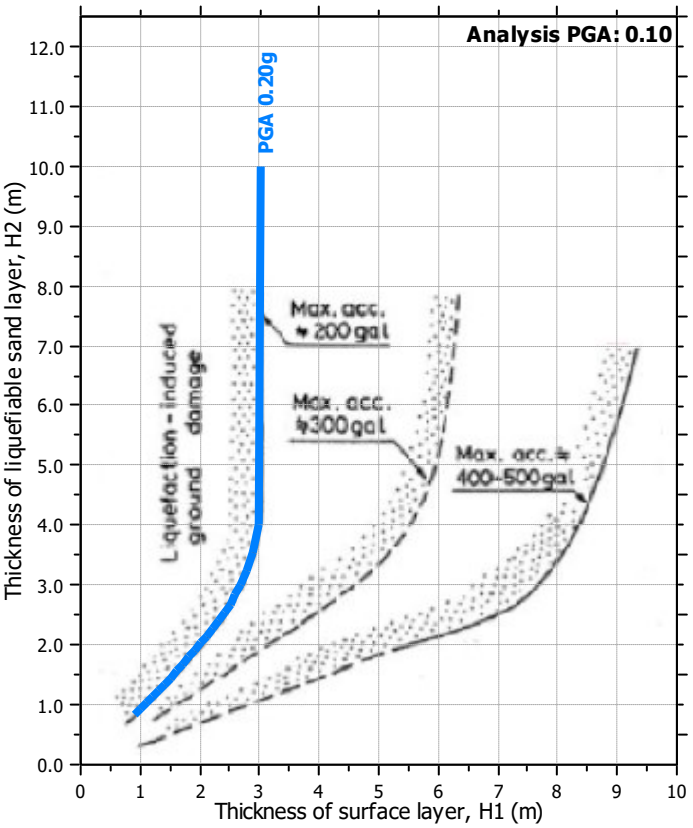
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



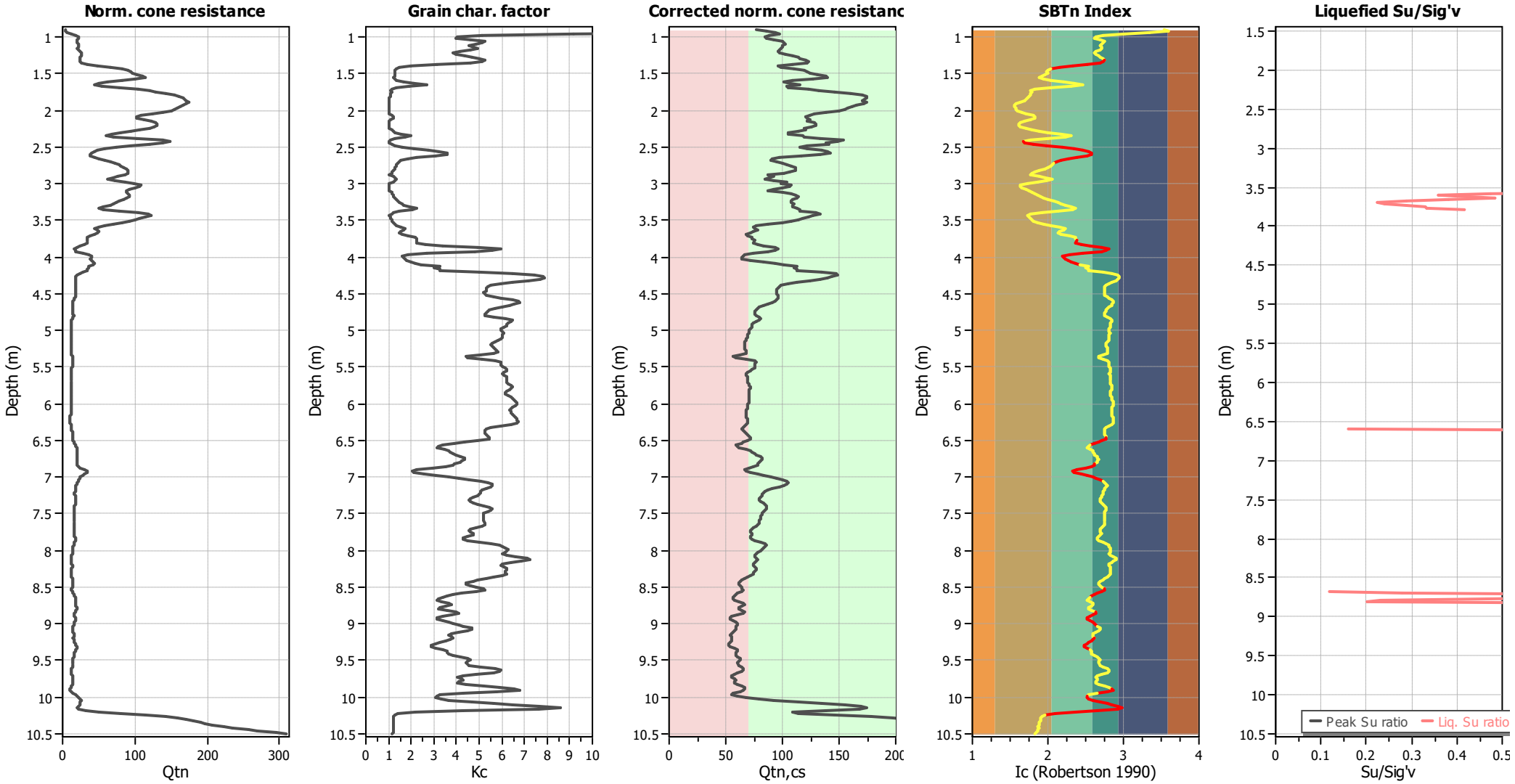




Input parameters and analysis data

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

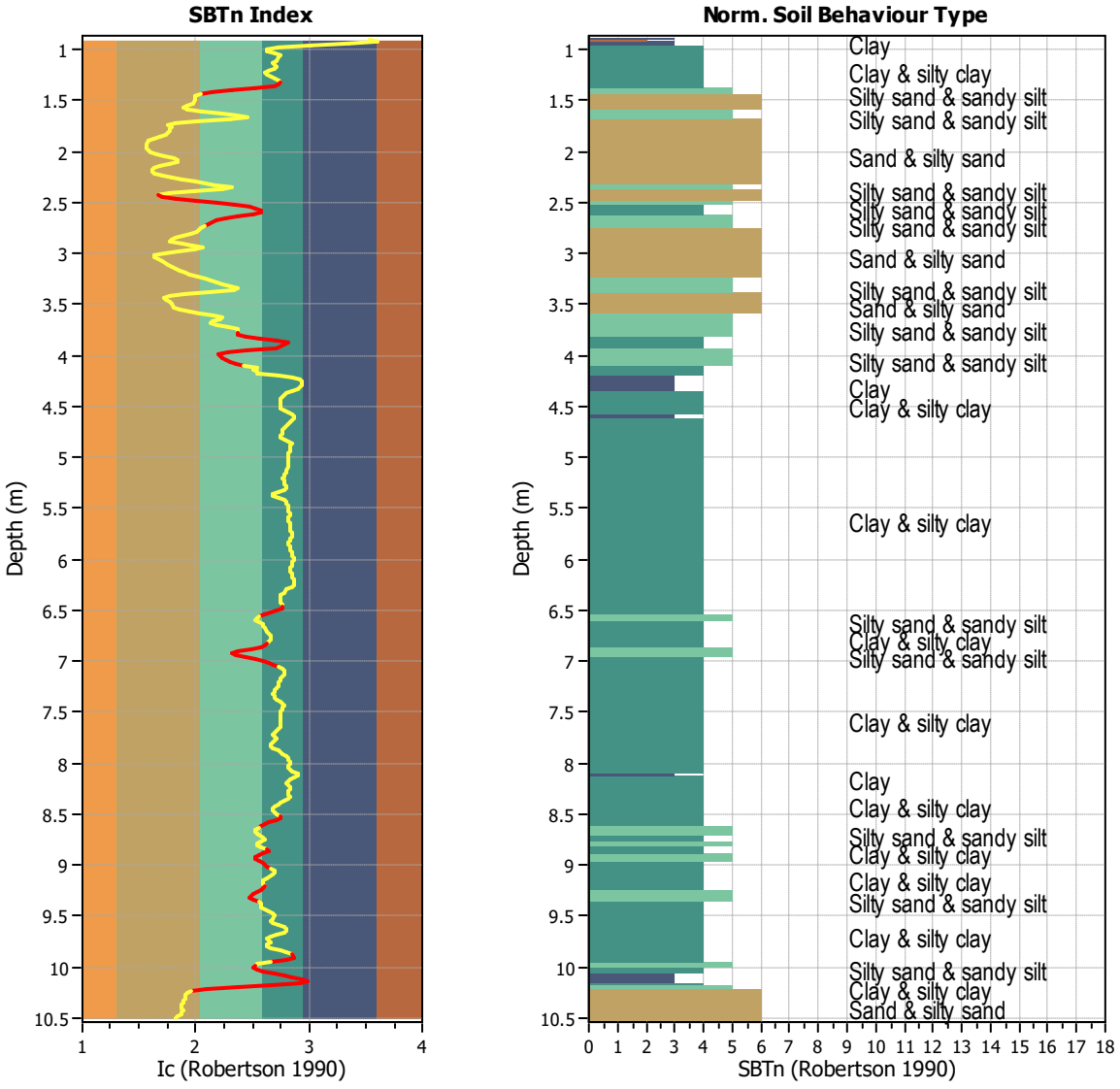
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	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						

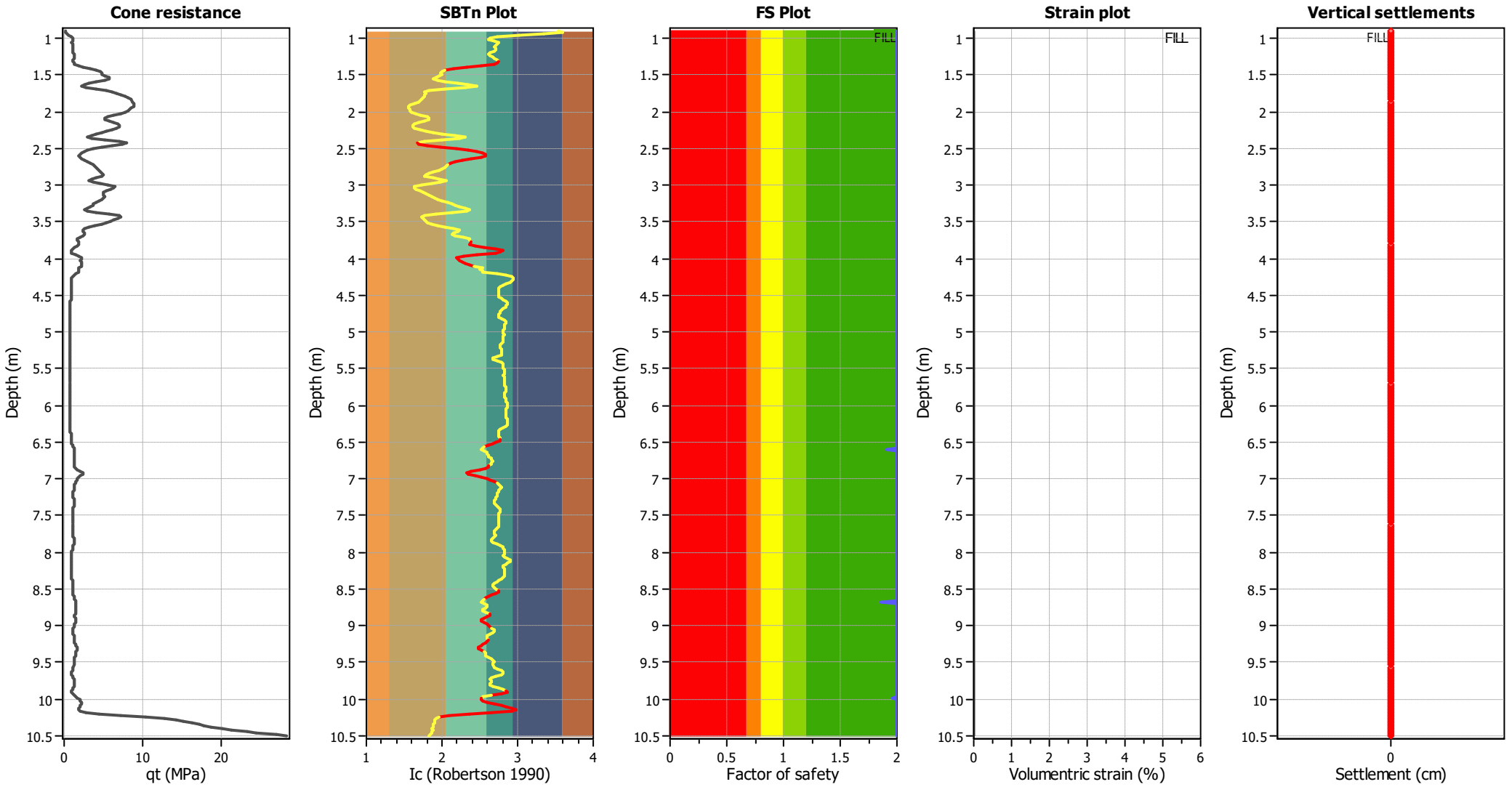
Overall liquefaction potential: 0.00

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						

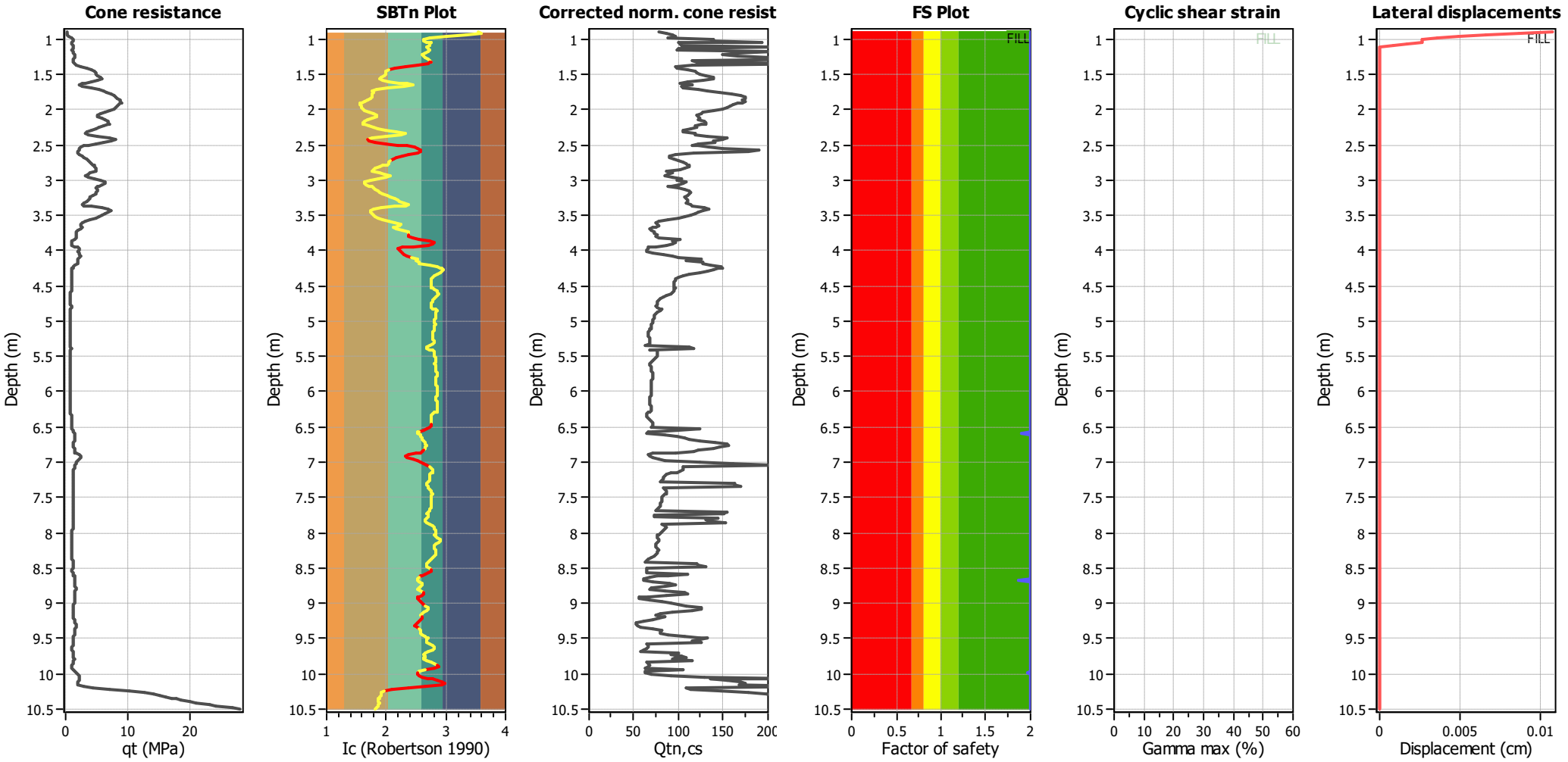
Total estimated settlement: 0.00

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

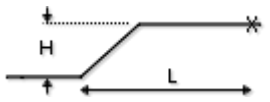
Geometric parameters: Level ground (or gently sloping) with free face (L: 47.00 m - H: 3.40 m)



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

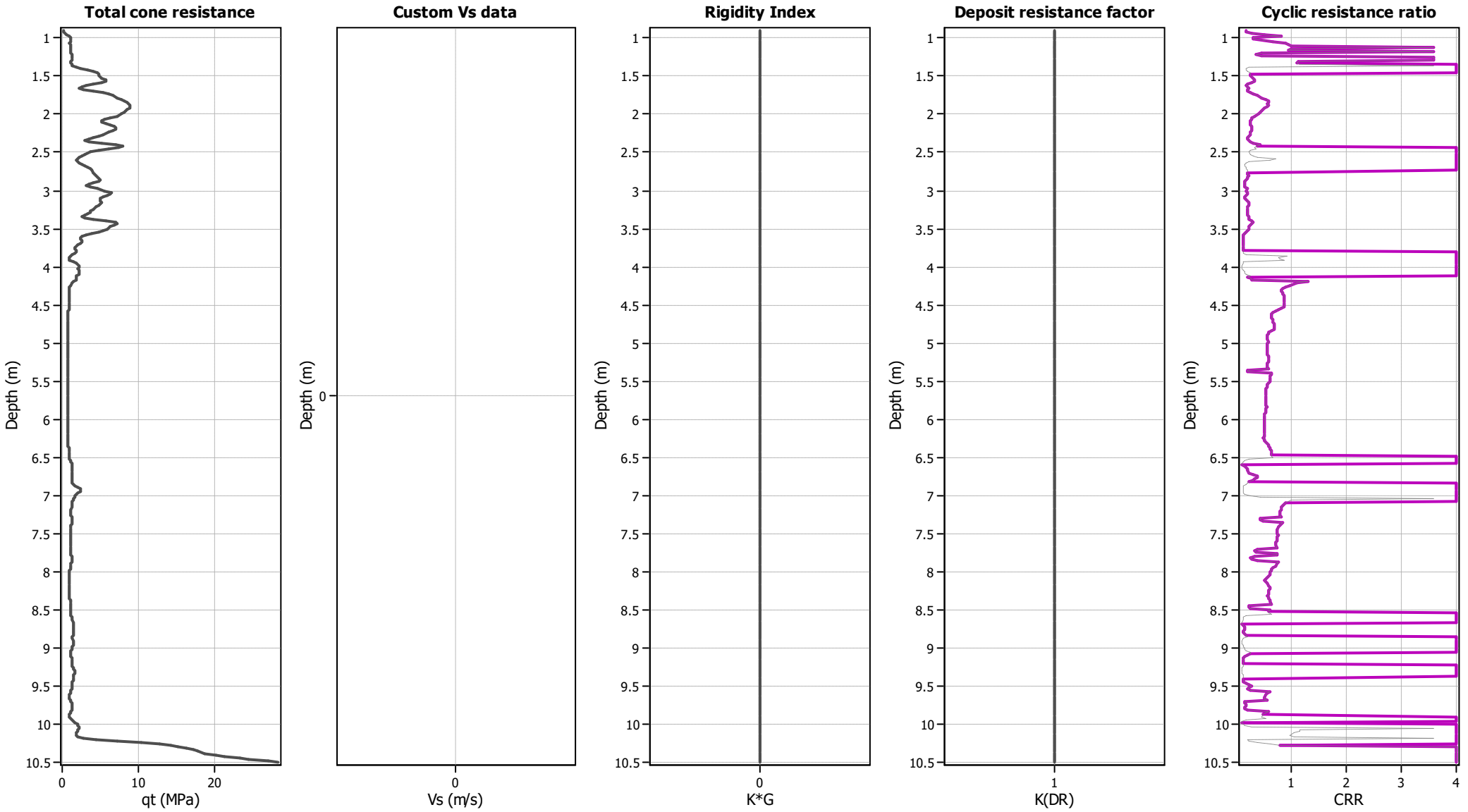
:: Strength loss calculation (Robertson (2009) :: (continued)

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

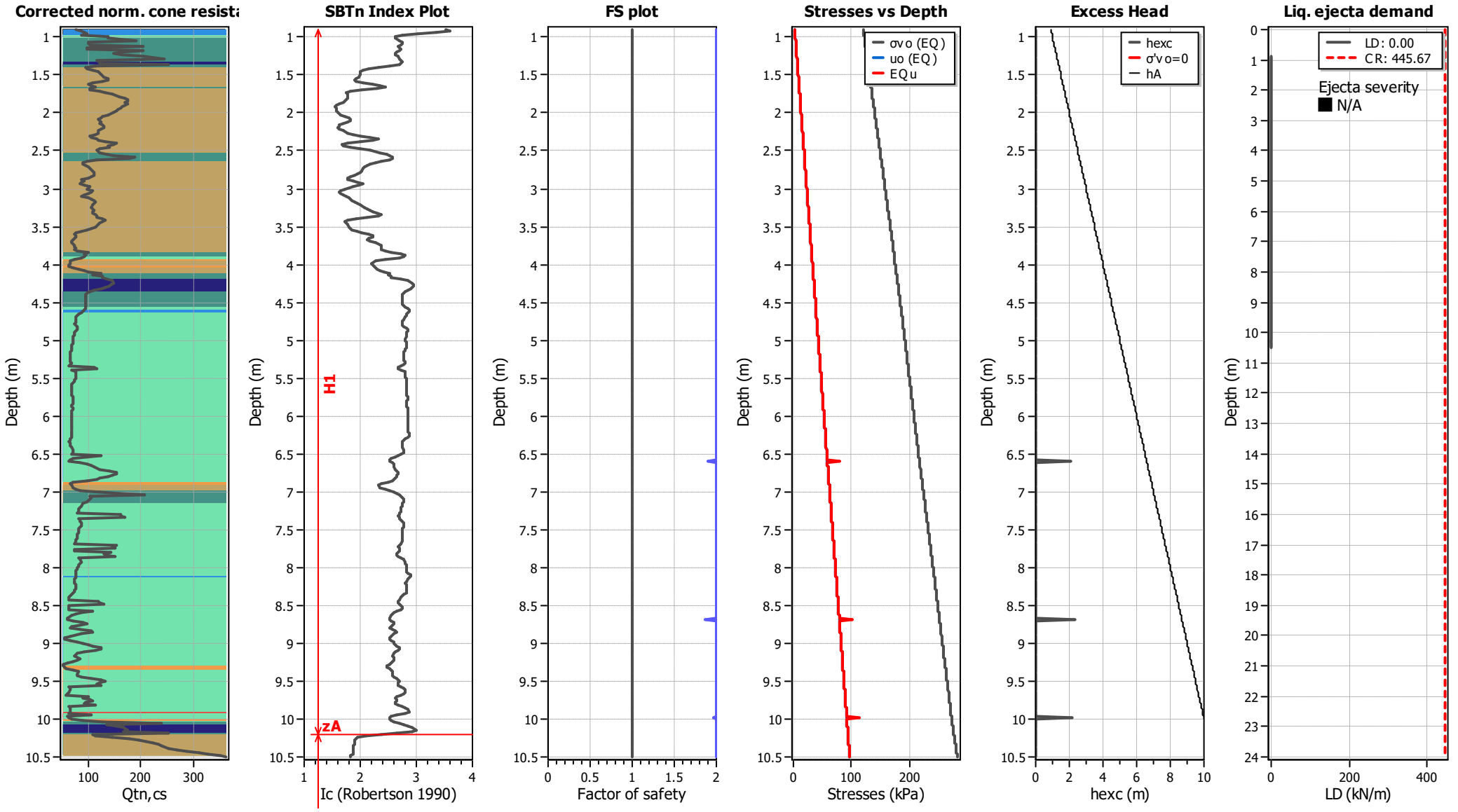
Abbreviations

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

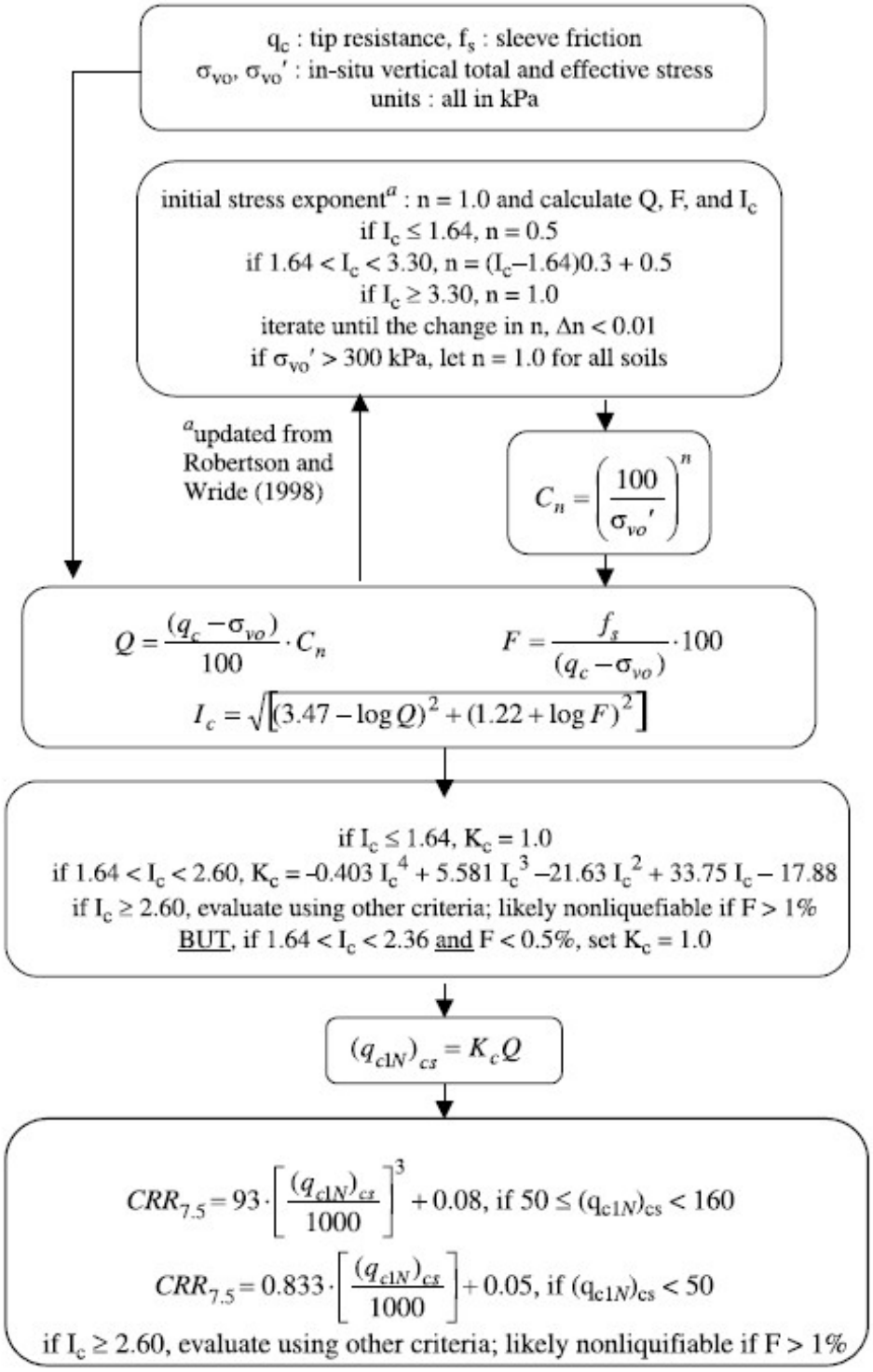


Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

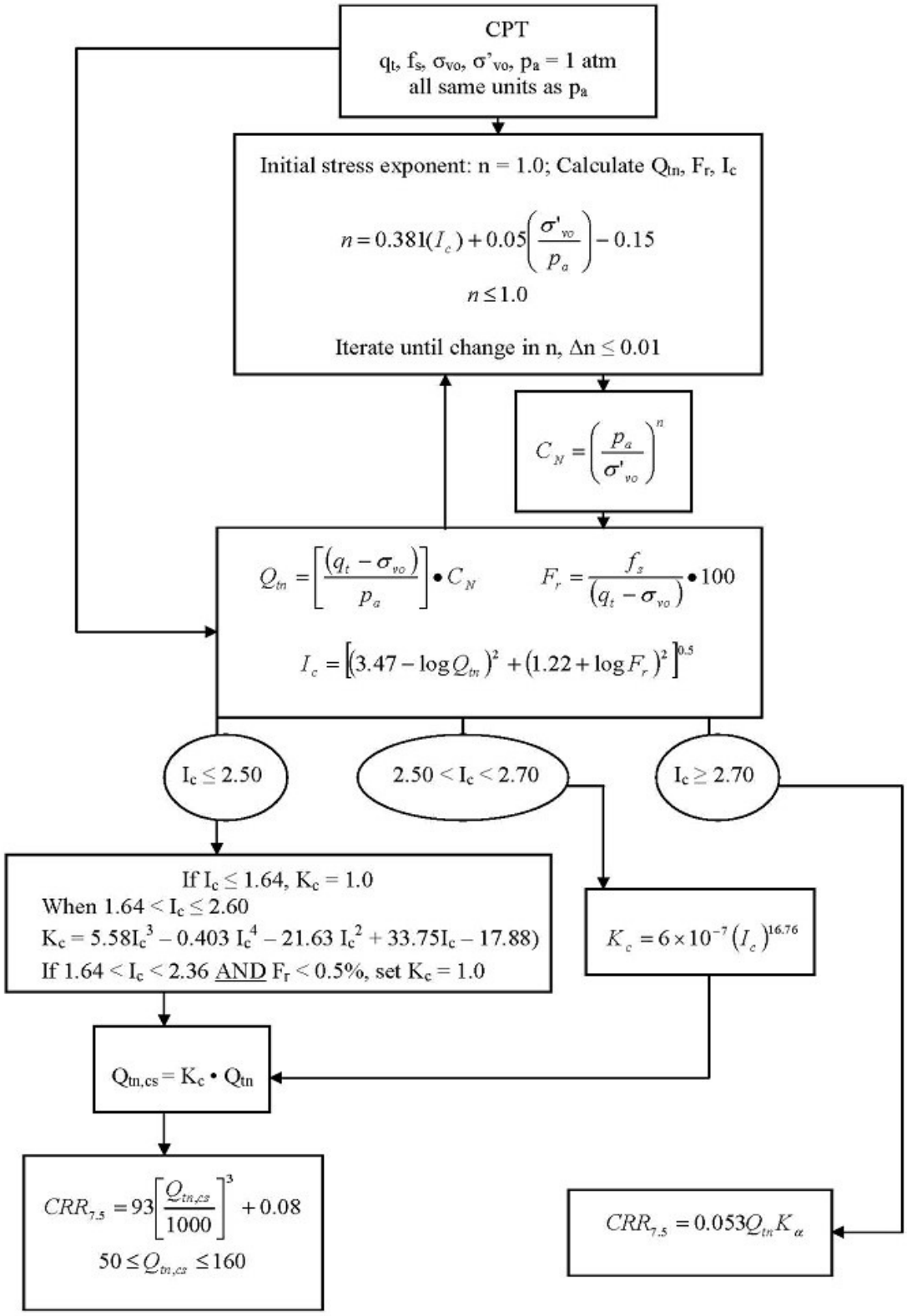
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

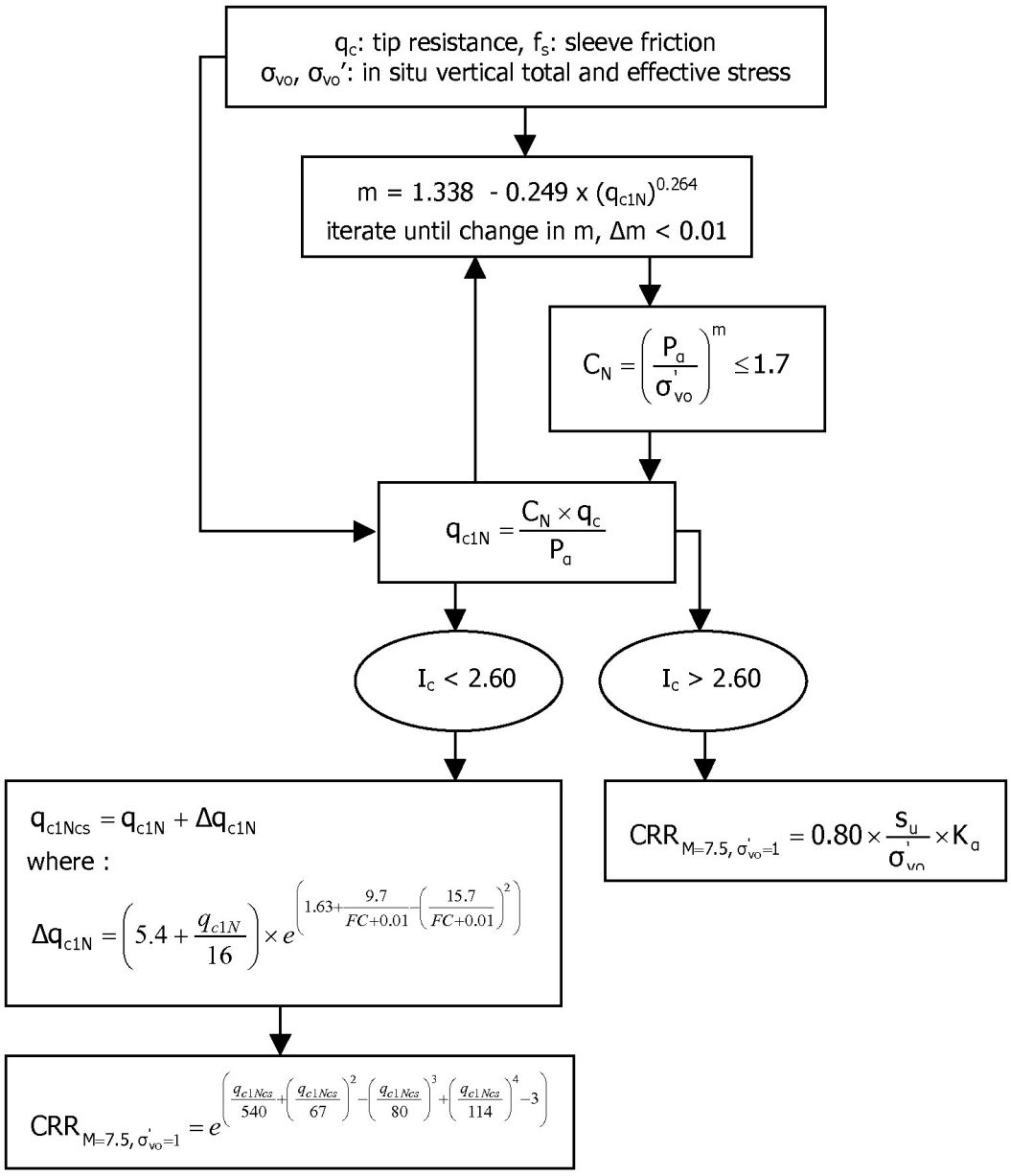
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

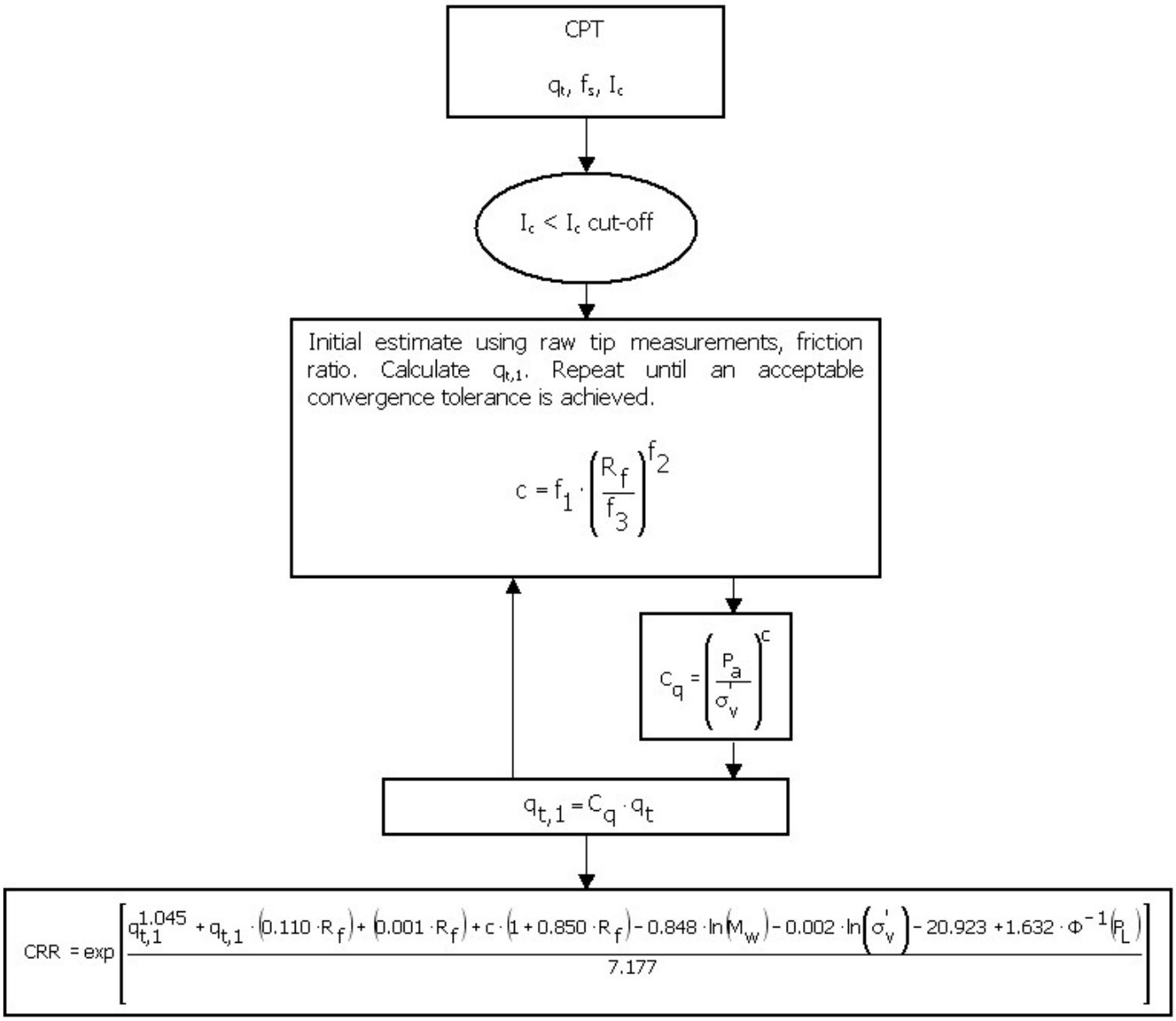


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

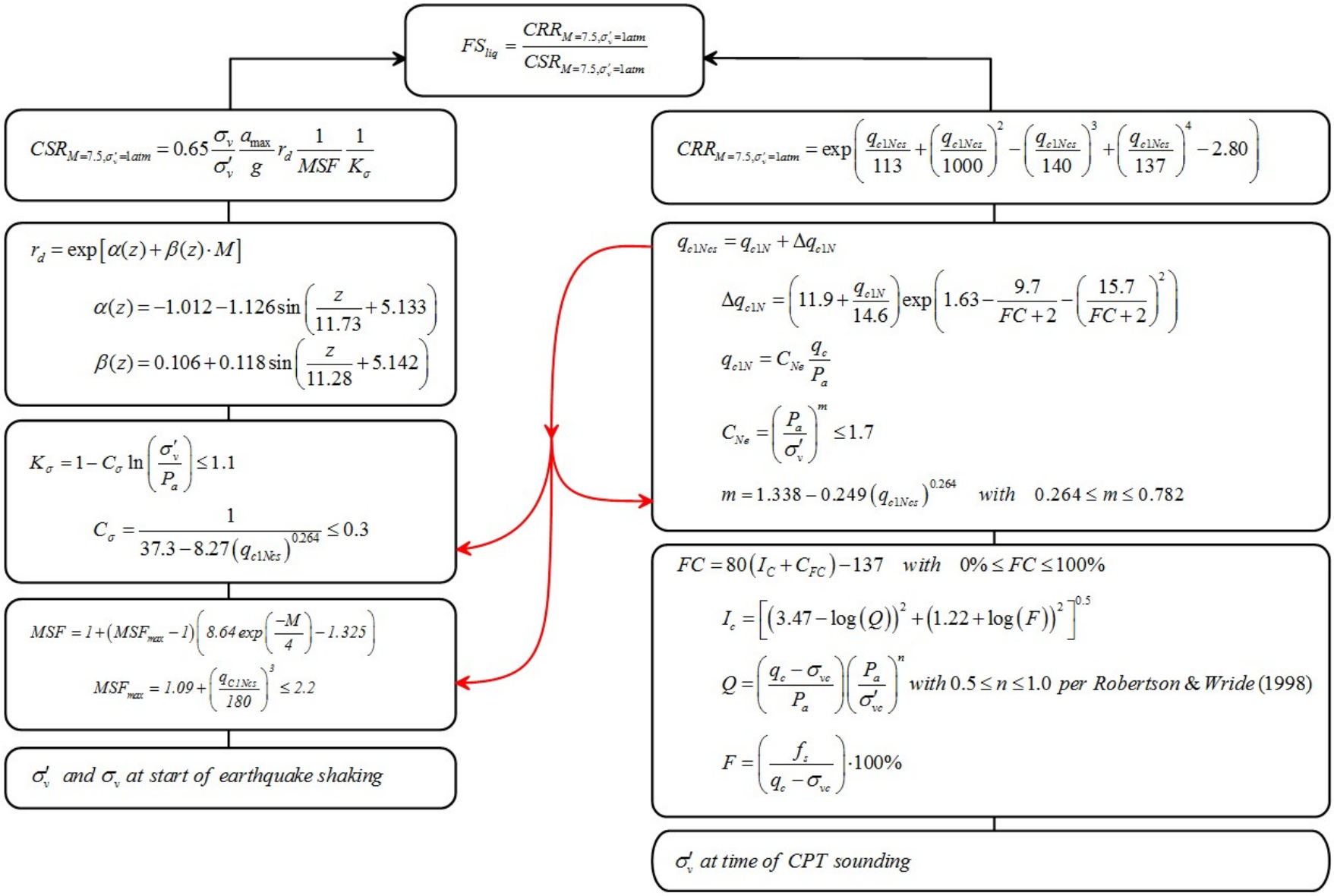
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



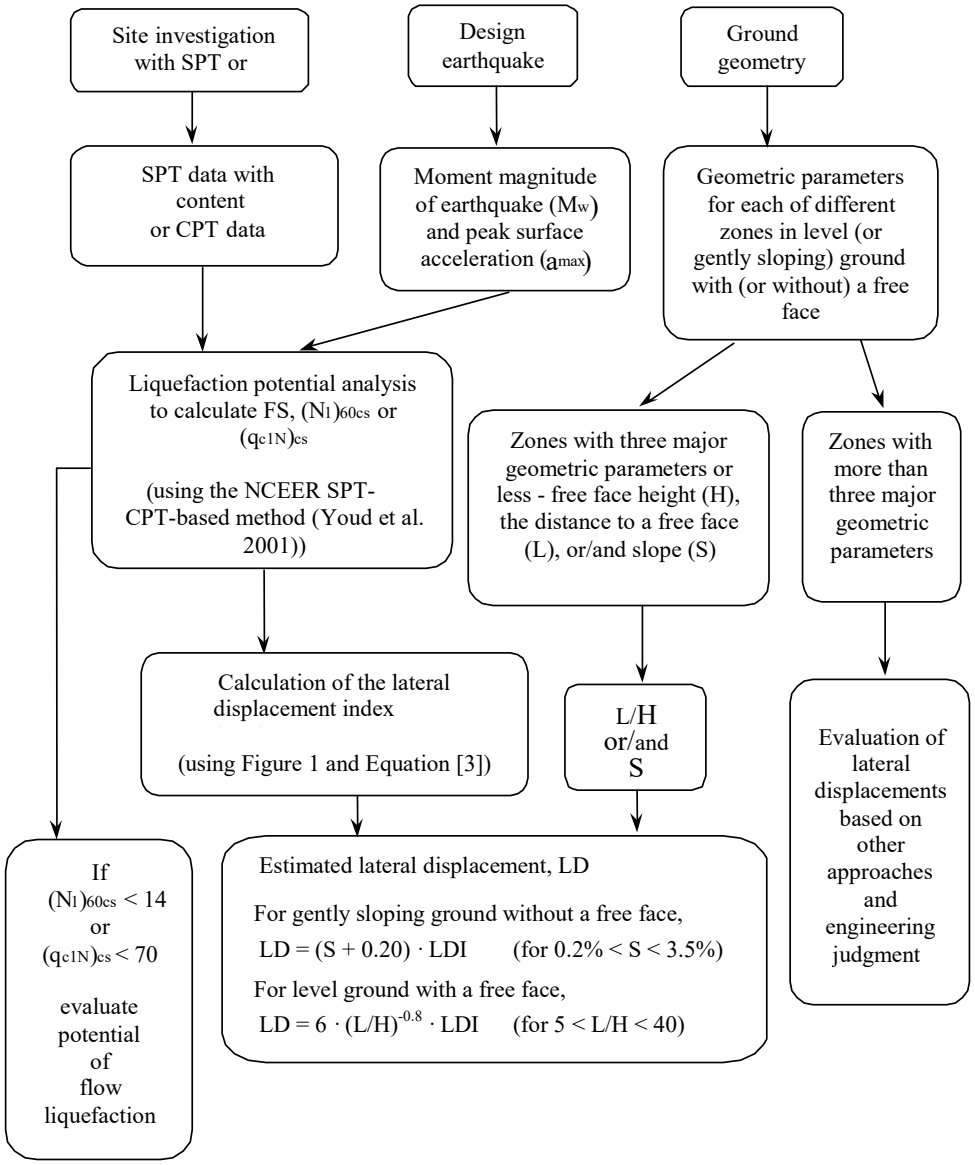
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



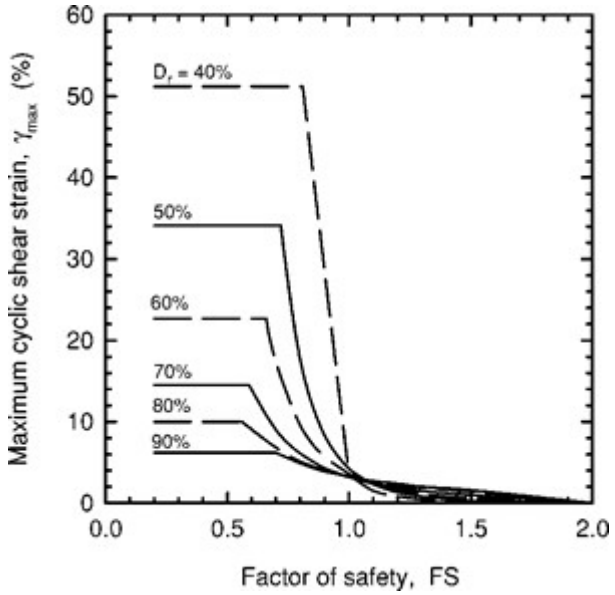
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



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



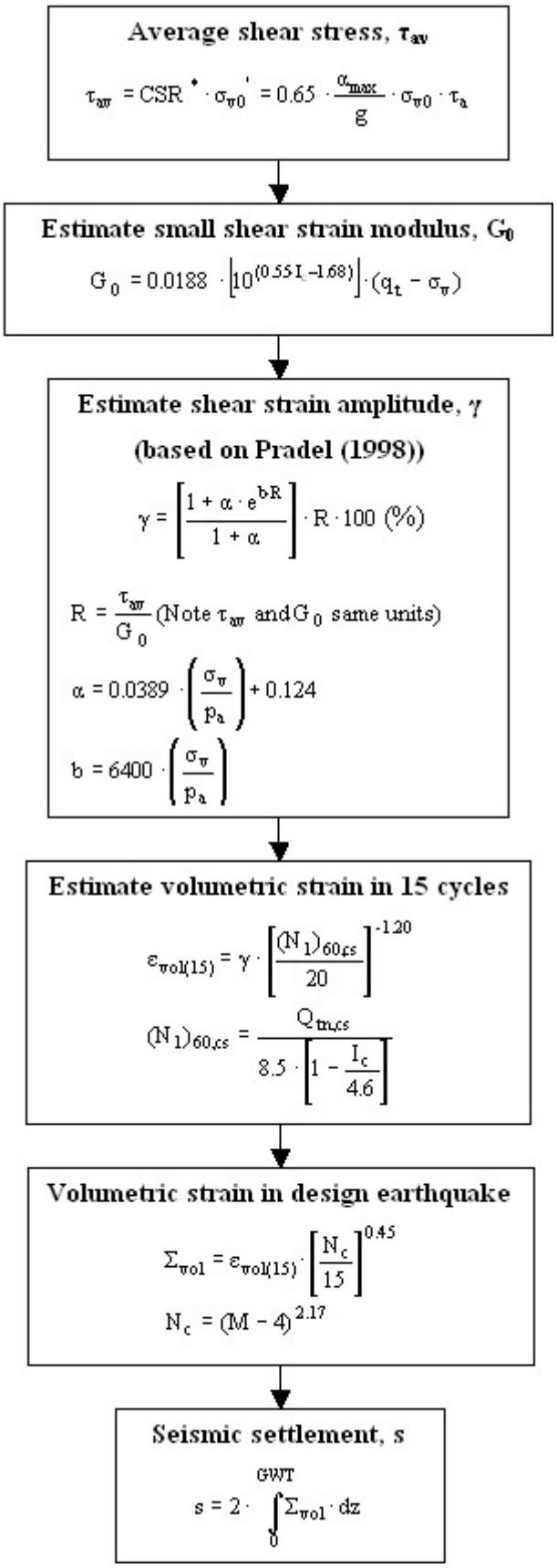
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[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.

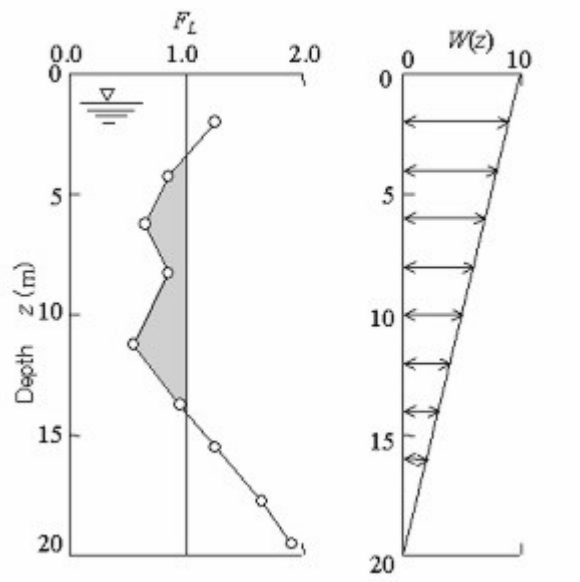
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

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).

References

- Lunne, T., Robertson, P.K., and Powell, J.J.M 1997. Cone penetration testing in geotechnical practice, E & FN Spon Routledge, 352 p, ISBN 0-7514-0393-8.
- Boulanger, R.W. and Idriss, I. M., 2007. Evaluation of Cyclic Softening in Silts and Clays. ASCE Journal of Geotechnical and Geoenvironmental Engineering June, Vol. 133, No. 6 pp 641-652
- Boulanger, R.W. and Idriss, I. M., 2014. CPT AND SPT BASED LIQUEFACTION TRIGGERING PROCEDURES. DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA AT DAVIS
- Robertson, P.K. and Cabal, K.L., 2007, Guide to Cone Penetration Testing for Geotechnical Engineering. Available at no cost at http://www.geologismiki.gr/
- Robertson, P.K. 1990. Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27 (1), 151-8.
- Robertson, P.K. and Wride, C.E., 1998. Cyclic Liquefaction and its Evaluation based on the CPT Canadian Geotechnical Journal, 1998, Vol. 35, August.
- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 127, October, pp 817-833
- Zhang, G., Robertson. P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180
- Zhang, G., Robertson. P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 130, No. 8, 861-871
- Pradel, D., 1998, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 124, No. 4, 364-368
- Iwasaki, T., 1986, Soil liquefaction studies in Japan: state-of-the-art, Soil Dynamics and Earthquake Engineering, Vol. 5, No. 1, 2-70
- Papathanassiou G., 2008, LPI-based approach for calibrating the severity of liquefaction-induced failures and for assessing the probability of liquefaction surface evidence, Eng. Geol. 96:94–104
- P.K. Robertson, 2009, Interpretation of Cone Penetration Tests - a unified approach., Canadian Geotechnical Journal, Vol. 46, No. 11, pp 1337-1355
- 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
- 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
- R. E. S. Moss, R. B. Seed, R. E. Kayen, J. P. Stewart, A. Der Kiureghian, K. O. Cetin, CPT-Based Probabilistic and Deterministic Assessment of In Situ Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 132, No. 8, August 1, 2006
- I. M. Idriss and R. W. Boulanger, 2008. Soil liquefaction during earthquakes, Earthquake Engineering Research Institute MNO-12
- Jonathan D. Bray & Jorge Macedo, Department of Civil & Environmental Engineering, Univ. of California, Berkeley, CA, USA, Simplified procedure for estimating liquefaction-induced building settlement, *Proceedings of the 19th International Conference on Soil Mechanics and Geotechnical Engineering, Seoul 201*

ATTACHMENT 5

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN AND ACCOMPANYING CERTIFICATION

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

Annual Inflow Design Flood Control System Assessment for Coal Combustion Residuals Surface Impoundments

January 2026

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

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

ILLINOIS | MISSOURI | INDIANA

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1. INTRODUCTION

City Water, Light and Power (CWLP) ash ponds are coal combustion residuals (CCR) surface impoundments, which include both the Lakeside and Dallman ash ponds. A plan for the inflow design flood control system assessment for the CCR surface impoundments was conducted as required by 35 IAC Part 845.510(c):

Andrews Engineering, Inc. (AEI) performed a review of information, which included the following documents:

- Lidar Topographic Map (May 2023)
- FEMA – DSS-WISE HCOM Human Consequence Report (2023)
- Coal Ash Impoundment Site Assessment Final Report (May 2011)
- Historical Aerial Photographs (April 1995 – November 2025)
- FEMA Flood Insurance Study, Sangamon County, Illinois (2007)
- Engineering Report: Proposed Embankment Modification; CWLP Ash Disposal Area (July 1987)
- Construction Grading Plan for the Dallman Ash Pond (August 1976)

2. CCR UNIT INFORMATION

The CWLP coal combustion residual (CCR) surface impoundments are located north and east of the former Lakeside and Dallman Power Generating Stations, within the eastern half of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figure 1). The impoundments consist of the Lakeside Ash Pond and the Dallman Ash Pond (see Figure 2). Both the Lakeside Ash Pond and the Dallman Ash Pond are owned and operated by CWLP and are regulated under National Pollutant Discharge Elimination System (NPDES) Permit No. IL0024767.

The former Lakeside and Dallman Power Generating Stations are located along the northwestern shoreline of Lake Springfield in Springfield, Illinois. The Lakeside Ash Pond is situated immediately north of Spaulding Dam at the northern end of Lake Springfield. The pond primarily consists of a diked embankment, with localized incising along its eastern perimeter, and was placed into service prior to 1958.

Following a vertical expansion in 1988, the original Lakeside Ash Pond was subdivided into four distinct units: three lime ponds and one settling pond. The Lakeside Ash Pond currently encompasses approximately 35.0 acres and ceased receiving ash in 2009. The three lime ponds were taken out of service in October 2023 upon completion of the new lime sludge–processing area.

The second impoundment, the Dallman Ash Pond, consists of a diked embankment and was placed into service in approximately 1976. The Dallman Ash Pond encompasses approximately 34.5 acres and ceased receiving ash in 2021.

As of October 13, 2023, all CCR and non-CCR waste streams were discontinued to both the Lakeside Ash Pond and the Dallman Ash Pond. Prior to inactivation, settled water from each impoundment was conveyed to opposite sides of the approximately 10.38-acre Clarification Pond and subsequently discharged to Sugar Creek through Outfall 004 in accordance with the referenced NPDES permit.

3. INFLOW

Both the Dallman Ash Pond and the Lakeside Ash Pond were constructed to prevent surficial stormwater runoff from entering the impoundments during precipitation events. As a result, the only water entering the impoundment areas is direct precipitation falling within the impoundment perimeter and limited runoff from immediately adjacent roadway surfaces. Surface water is conveyed around the impoundments by drainage ditches located along the southern and eastern boundaries, which ultimately discharge to the South Fork of Sugar Creek. The creek borders the western and much of the northern perimeter of the Dallman Ash Pond. Additional details are provided in Section 4.

4. FLOOD CONTROL DESIGN

4.1 Inflow from Adjacent Areas

The surface impoundments are classified as Hazard Potential Class 2, which requires the inflow evaluation to be based on a 1,000-year, 24-hour storm event. Based on National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3, the estimated 1,000-year, 24-hour rainfall for the site is 8.37 inches. Precipitation frequency data are provided in Appendix A.

Both the Dallman Ash Pond and the Lakeside Ash Pond are diked surface impoundments constructed above existing grades and partially incised. The CCR units were designed to prevent surficial stormwater runoff from entering the impoundments during precipitation events. Consequently, inflow to the impoundments is limited to direct precipitation falling within the pond and runoff from immediately adjacent roadways.

Surface water is routed around the impoundments via drainage ditches located along the southern and eastern boundaries, which ultimately discharge to the South Fork of Sugar Creek. Sugar Creek borders the western edge and much of the northern perimeter of the ash

impoundment area. The Lakeside Ash Pond is bounded to the south by Spaulding Dam. A site location map is provided in Figure 2.

The watershed for Lake Springfield is approximately 267.5 square miles. Storm events rarely cover an entire watershed the size of Lake Springfield. However, water levels are monitored at the Lick Creek and Sugar Creek tributaries to Lake Springfield, allowing CWLP to adjust the floodgates if needed.

The normal full pool elevation of Lake Springfield is 560 feet mean sea level (MSL), corresponding to the spillway crest elevation. If monitoring stations upstream of the lake indicate a significant rise in water level, up to five floodgates may be lowered by as much as 8 feet each to manage lake levels. The roadway adjacent to the Lakeside Ash Pond is approximately 570 feet MSL, providing roughly 10 feet of freeboard above the spillway elevation.

The highest lake level recorded since Lake Springfield was initially filled in 1935 occurred during a storm event on April 12, 1994, when the lake crested at approximately 564.5 feet MSL. Based on historical monitoring data, watershed evaluations, and more than 90 years of operational history, it is not anticipated that Lake Springfield or its receiving waters would inundate the impoundment area as a result of a 1,000-year, 24-hour storm event.

4.2 Capacity of the Surface Impoundments

The Dallman Ash Pond provides storage beginning at approximately 549.02 feet MSL and has a maximum dike crest elevation of 552.0 feet MSL, resulting in a total storage volume of approximately 315,810 cubic feet, as shown on Figure 3.

The Lakeside Ash Pond and Lime Pond 3 together provide approximately 124,686 cubic feet of storage at an elevation of 563 feet MSL, as illustrated on Figure 4. The maximum crest elevation of these impoundments is 565 feet MSL, which provides additional available storage capacity above the referenced elevation. The Lakeside Ash Pond historically contained the lime ponds that received lime sludge from the water treatment facility; however, sluicing activities ceased in October 2023, effectively eliminating ongoing liquid inputs to the pond system.

Lime Pond 1 has a storage volume of approximately 542,238 cubic feet between elevations 565.04 and 568.0 feet MSL, while Lime Pond 2 provides approximately 489,343 cubic feet of storage between elevations 564.52 and 568.0 feet MSL, as shown on Figure 5.

The Clarification Pond has a normal pool elevation of 546.09 feet MSL and a maximum dike crest elevation of 552.0 feet MSL, providing an additional approximately 2,095,365 cubic feet of stormwater storage, as presented on Figure 6.

The combined storage capacity of the Dallman Ash Pond, Lakeside Ash Pond, Lime Ponds 1, 2, and 3, and the Clarification Pond is approximately 3,567,442 cubic feet.

4.3 Hydrologic Modeling

Onsite surface water drainage and storage were evaluated in detail using NRCS hydrologic methodology, with particular emphasis on two key parameters: the composite runoff curve number and time of concentration (Tc). Hydrologic modeling of the study area was performed using the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Watershed Hydrology Model (WinTR-20). Discharge structures were evaluated using the Federal Highway Administration (FHWA) Culvert Hydraulic Analysis Program (HY-8).

4.3.1 Sub-Area Parameters

The Dallman Ash Pond tributary area includes the pond and the surrounding unpaved roadways, encompassing a total drainage area of approximately 37.79 acres. The areas of each ash pond are provided in Figure 2. The land surface is not vegetated. Based on 2025 topographic data, soil characteristics, and surface conditions, the composite runoff curve number was calculated to be 86.1, and the time of concentration (Tc) was determined to be 53.79 minutes. Detailed curve number and time-of-concentration calculations are provided in Appendix B. The Dallman Ash Pond discharges to the Clarification Pond through a quad-barreled 24-inch outlet pipe.

The Lakeside Ash Pond and Lime Pond 3 together comprise a tributary area of approximately 25.13 acres. The calculated composite runoff curve number for this area is 73.24, and the time of concentration is approximately 72 minutes. The Lakeside Ash Pond has been filled and is now heavily vegetated. Following the cessation of sluicing operations to the lime ponds in October 2023, no surface water is present within the defined tributary area.

The Lime Ponds 1 and 2 tributary area includes the ponds and approximately one-half of the unpaved roadway surrounding each pond, resulting in a combined drainage area of approximately 9.01 acres. This tributary area consists primarily of open water with a limited extent of unpaved roadway. The calculated runoff curve number is 89.80 for Lime Pond 1 and 91.00 for Lime Pond 2, with corresponding times of concentration of 12.10 minutes and 10.60 minutes, respectively. Lime Ponds 1 and 2 were historically well-defined impoundments and have since dried; culvert pipes now discharge toward the central channel flowing northward.

The lime stabilization decant structure is located east of the Lakeside Ash Pond and the Clarification Pond. Its tributary area consists of a concrete structure with an adjacent concrete storage pad to the south. A conservative runoff curve number of 100 was assumed, as the contributing surfaces are entirely concrete. The calculated time of concentration for this area is 8.19 minutes. For modeling purposes, it was assumed that one of the larger cells within the

structure is empty of lime sludge and drains freely to the Clarification Pond, while the remaining two cells are in operation and contribute only negligible seepage to the discharge piping.

The Clarification Pond tributary area includes the pond and approximately one-half of the surrounding unpaved roadway, encompassing a total of 10.38 acres. The area consists primarily of open water with a limited extent of unpaved roadway. The calculated composite runoff curve number for the tributary is 93.67, and the time of concentration is 5 minutes. The Clarification Pond is a well-defined impoundment with a rectangular weir outlet structure that discharges to Sugar Creek via permitted Outfall 004.

4.3.2 Discharge Structure Analyses

The culvert pipes connecting each pond to the channels and/or the Clarification Pond were evaluated using the HY-8 program. Detailed culvert analyses for each connection are provided in Appendix C. The following section presents stage-discharge-storage summaries for each sub-area.

The Dallman Ash Pond is equipped with four 24-inch culvert pipes that convey flow from the pond to the Clarification Pond. Table 1 provides the stage-discharge-storage relationship for the Dallman Ash Pond, including both the stage-discharge from the four culvert pipes and the corresponding stage-storage of the pond.

Table 1
Dallman Ash Pond Stage-Discharge-Storage

Elevation	Discharge	Storage Above 549.07 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
549.07	0	0
550	11.5	0.1
551	34.6	1.66
552	65.98	7.25

The Lakeside Ash Pond and Lime Pond 3 have a temporary stormwater management plan due to the existing culverts being blinded in preparation for the planned closure and relocation of CCR material. Under this plan, stormwater will be pumped from the Lakeside and Lime Pond 3 into the Clarification Pond until sufficient storage capacity within these ponds is available to contain a 1,000-year storm event.

CWLP has rented a Pioneer model PP66S12L71, a 75-horsepower diesel-powered variable-speed 6-inch automatic priming trash pump. Pump specifications and the pumping curve are provided in Attachment E. An electronic water level indicator will be installed in the Lakeside

Ash Pond to trigger an alarm if the water level exceeds 558 feet MSL. Upon receiving the alarm, a staff member is expected to start the pump within one hour.

The total anticipated head loss for pumping from the Lakeside and Lime Pond 3 to the Clarification Pond is approximately 50 feet. At this head, the 75-horsepower pump is capable of pumping over 3,000 gallons per minute. The structure rating for Lakeside and Lime Pond 3 assumes the pump will be activated at a water level of 559 feet MSL, pumping at an estimated rate of 35 gallons per second. Table 2 provides the stage-discharge-storage relationship for the Lakeside Ash Pond and Lime Pond 3, including both the stage-storage of the ponds and the stage-discharge through the pump.

Table 2
Lakeside Ash Pond and Lime Pond 3 Stage-Discharge-Storage

Elevation	Discharge	Storage Above 559 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
559	0	0.0005
559.01	34.95	0.000501
560	34.96	0.008035
561	34.97	0.0143
562	34.98	0.4605
563	34.99	2.8624

Lime Pond 1 is equipped with two 12-inch culvert pipes that convey flow from the pond to the Center Channel. Table 3 provides the stage-discharge-storage relationship for Lime Pond 1, including both the stage-discharge through the two culvert pipes and the corresponding stage-storage of the pond.

Table 3
Lime Pond 1 Stage-Discharge-Storage

Elevation	Discharge	Storage Above 564.93 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
564.93	0	0
565	0.02	0.285
566	4.05	4.405
567	8.75	8.608
568	11.85	12.897

Lime Pond 2 is equipped with a 24-inch culvert pipe that conveys flow from the pond to the Center Channel. Table 4 provides the stage-discharge-storage relationship for Lime Pond 2, including both the stage-discharge through the culvert and the corresponding stage-storage of the pond.

Table 4
Lime Pond 2 Stage-Discharge-Storage

Elevation	Discharge	Storage Above 564.52 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
564.52	0	0
566	7.3	4.722
567	14.7	7.968
568	20.18	11.29

The Center Channel is equipped with two 12-inch culvert pipes that convey flow from the Center Channel to the West Settling Channel. Table 5 presents the stage-discharge-storage relationship for the Center Channel, including both the stage-discharge through the two culvert pipes and the corresponding stage-storage of the channel.

Table 5
Center Channel Stage-Discharge-Storage

Elevation	Discharge	Storage Above 561.28 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
561.28	0	0
562	2.48	0.0011
563	7.08	0.06862
564	9.78	0.2457

The West Settling Channel is equipped with a 12-inch culvert pipe that conveys flow from the channel to the Clarification Pond. Table 6 presents the stage-discharge-storage relationship for the West Settling Channel, including both the stage-discharge through the culvert and the corresponding stage-storage of the channel.

Table 6
West Settling Channel Stage-Discharge-Storage

Elevation	Discharge	Storage Above 559.45 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
559.45	0	0
560	0.95	0.134
561	3.79	0.528
562	5.46	1.186

Elevation	Discharge	Storage Above 559.45 ft. MSL
562.5	6.12	1.602

The Lime Stabilization Decant is equipped with a 24-inch culvert pipe that conveys flow from the decant structure to the Clarification Pond. Table 7 presents the stage-discharge-storage relationship for the Lime Stabilization Decant, including both the stage-discharge through the culvert and the corresponding stage-storage of the structure. Storage calculations are based on one 120-foot-wide cell being out of service, allowing unobstructed flow for discharge.

Table 7
Lime Stabilization Decant Stage-Discharge-Storage

Elevation	Discharge	Storage Above 557.5 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
557.5	0	0
558.5	4.3	0.0008
559.5	12.75	0.001623
560.5	20.35	0.002466
561.5	52.5	0.003332

The Clarification Pond is equipped with a weir structure located upstream of the culvert pipe. Based on the combined weir and culvert discharge analysis, the weir serves as the controlling discharge structure for the pond. Table 8 presents the stage-discharge-storage relationship for the Clarification Pond, including both the stage-discharge through the weir and the corresponding stage-storage of the pond.

Table 8
Clarification Pond Stage-Discharge-Storage

Elevation	Discharge	Storage Above 546.09 ft. MSL
Feet MSL	Cubic Feet per Second	Arce-Feet
546.09	0	0
547	3.6528	7.0184
548	10.944	14.9050
549	20.408	22.9745
550	31.599	31.2278
551	44.264	39.6751
552	58.237	48.3378

4.3.3 Hydraulic Analysis

The WinTR-20 model is a watershed-scale hydrologic tool used to evaluate surface water runoff during storm events. It supports the hydrologic analysis of flood events and can assess both

existing watershed conditions and the potential impacts of proposed changes (alternates) within the watershed.

For this analysis, the Clarification Pond and Lime Ponds 1 and 2 were modeled as discrete pond structures with well-defined stage-discharge-storage rating curves. The Lakeside Ash Pond, Dallman Ash Pond, Lime Pond 3, and the settling channels were treated as drainage tributary areas, with runoff from these areas ultimately draining to the Clarification Pond.

All of the aforementioned data were used as inputs for the WinTR-20 model to perform a site-wide hydraulic analysis for the 1,000-year, 24-hour storm event. Model output is provided in Appendix F. Table 9 summarizes the maximum storage elevations for each sub-area.

Table 9
Sub-Area Maximum Storage

Sub-Area	Maximum Elevation in Feet MSL	Crest Elevation in Feet MSL
Dallman Ash Pond	551.98	552.0
Lakeside Ash Pond and Lime Pond 3	562.61	563.0
Lime Pond 1	565.47	568.0
Lime Pond 2	565.02	568.0
Center Channel	562.97	564.0
West Settling Channel	562.02	562.5
Lime Stabilization Decant	560.51	580.0
Clarification Pond	549.81	552.0

The maximum stormwater elevations within each sub-area during the 1,000-year, 24-hour storm event remain contained without overtopping.

Table 10 provides the maximum discharges from the sub-areas directly adjoining the Clarification Pond. In addition to the sub-areas listed, Landfill Unit 2 and its associated Evaporation Pond are pumped directly into the Clarification Pond. The WinTR-20 model does not account for pumped discharges from these areas. The maximum combined pumped discharge from Landfill Unit 2 and the Evaporation Pond is 1.421 cubic feet per second, which is statistically insignificant compared to the sum of maximum discharges from Table 9, totaling 123.27 cubic feet per second. Including the pumped discharge, the Clarification Pond is projected to remain below a maximum elevation of 549.85 feet MSL.

Table 10
Sub-Area Maximum Discharge Rates

Sub-Area	Maximum Discharge (cubic feet per second)
Dallman Ash Pond	65.3
Lakeside Ash Pond and Lime Pond 3	35.0
West Settling Channel	5.5
Lime Stabilization Decant	20.6

5. STATEMENT

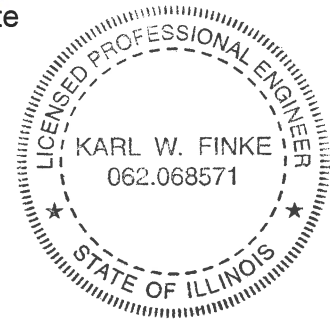
This Annual Inflow Design Flood Control Report for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 35 IAC Part 845.510(c).

Karl W. Finke

Karl W. Finke, P.E.

1/28/26

Date



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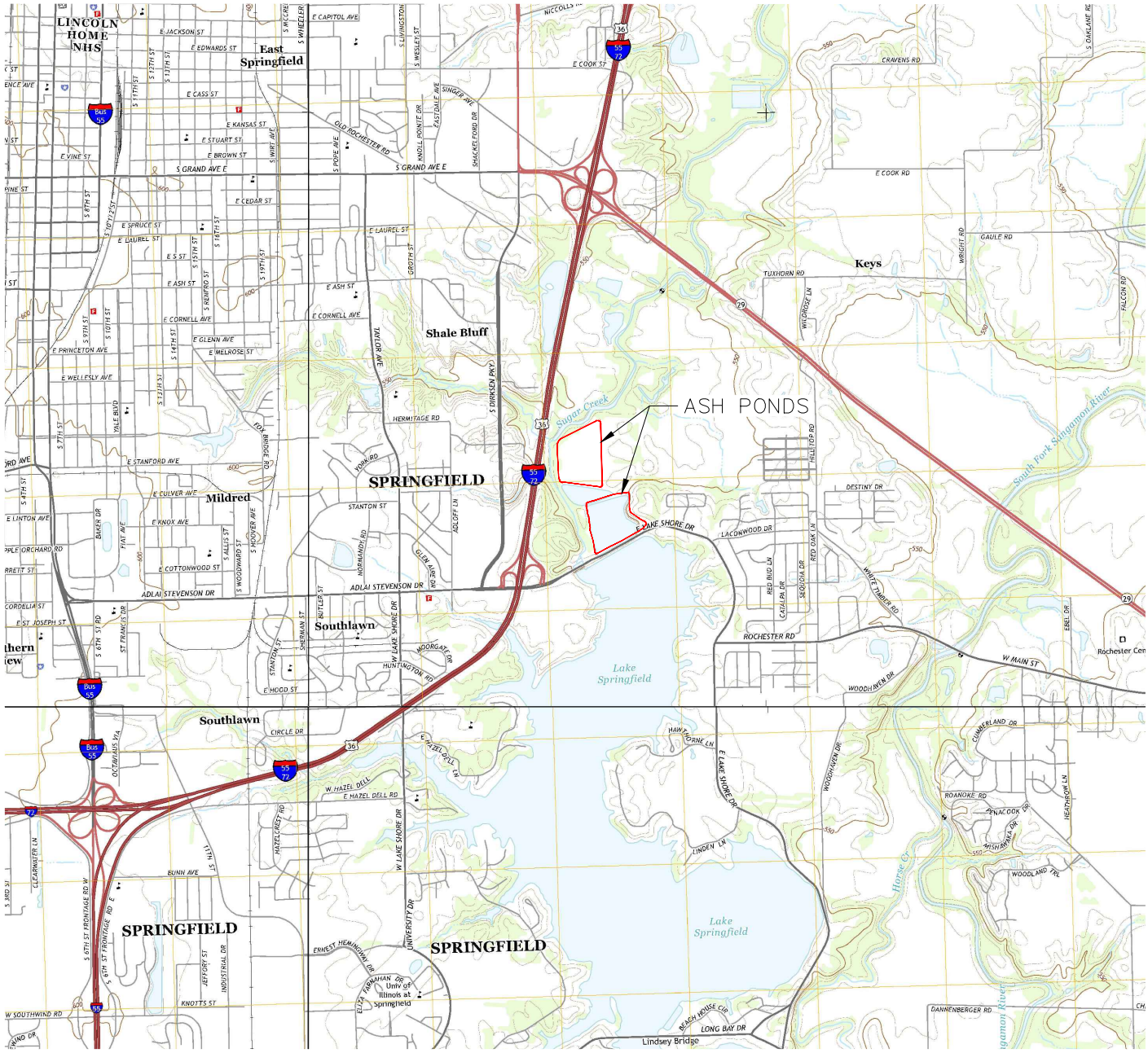
FIGURES:

FIGURE 1 – SITE LOCATION
FIGURE 2 - SITE MAP
FIGURE 3 - DALLMAN ASH POND
FIGURE 4 - LAKESIDE ASH POND AND LIME POND 3
FIGURE 5 - LIME PONDS 1 & 2
FIGURE 6 - CLARIFICATION POND

C:\Civil 3D Projects\Springfield CWLP\DWG\2025\Site Map.dwg Tab: Layout1



N

0 200 4000 8000

SCALE: IN FEET

NOTE:
BACKGROUND IMAGE COURTESY OF
UNITED STATES GEOLOGICAL SURVEY.

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APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: MPN

SITE LOCATION

PLANS PREPARED FOR

CITY, WATER, LIGHT & POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER: 1

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Tab: Layout1 Last Saved: January 12, 2026, by Mike Nguyen Plotted: Monday, January 12, 2026 3:46:37 PM
C:\Civil 3D Projects\Springfield CWLP\DWG\2024\Calculations\CWLP Acreage.dwg

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APPROVED BY: KWF	DESIGNED BY: KWF	DRAWN BY: MPN

SITE MAP

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER: 2

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STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
549.02	8,913.02	N/A	N/A	0
550.00	299.04	0.98	4514	4514
550.00	37,510.24	0.00	0	4514
550.00	124.34	0.00	0	4514
551.00	135,496.13	1.00	67810	72324
551.00	121.30	0.00	0	72324
551.00	179.54	0.00	0	72324
551.00	383.38	0.00	0	72324
551.00	850.82	0.00	0	72324
552.00	201,542.60	1.00	101197	173521
552.00	311.48	0.00	0	173521
552.00	654.63	0.00	0	173521

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
551.00	7,348.29	N/A	N/A	0
551.00	1,718.49	0.00	0	0
551.00	728.84	0.00	0	0
551.00	14,220.05	0.00	0	0
552.00	270,644.75	1.00	142432	142432
552.00	599.36	0.00	0	142432
552.00	350.54	0.00	0	142432

N

0 60 120 240

SCALE: IN FEET

NOTES

1. BACKGROUND IMAGE DERIVED FROM GOOGLE EARTH; NOVEMBER 9, 2025.
2. LIDAR DATA PROVIDED BY HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: MAY 2023).

NO.	DATE	REVISION DESCRIPTION	BY

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APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: MPN

DALLMAN ASH POND

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER: 3

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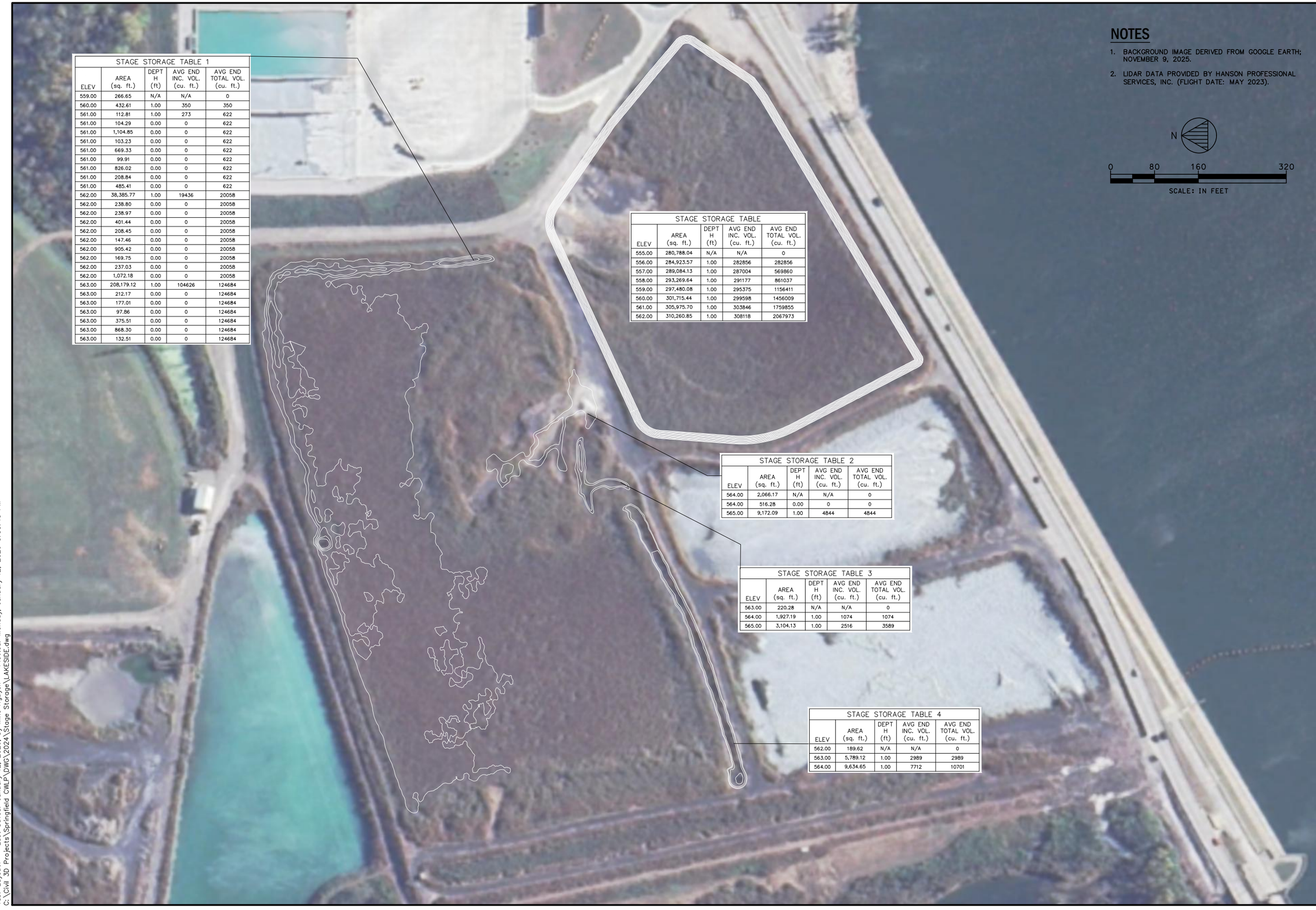

STAGE STORAGE TABLE 1				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
559.00	266.65	N/A	N/A	0
560.00	432.61	1.00	350	350
561.00	112.81	1.00	273	622
561.00	104.29	0.00	0	622
561.00	1,104.85	0.00	0	622
561.00	103.23	0.00	0	622
561.00	669.33	0.00	0	622
561.00	99.91	0.00	0	622
561.00	826.02	0.00	0	622
561.00	208.84	0.00	0	622
561.00	485.41	0.00	0	622
562.00	38,385.77	1.00	19436	20058
562.00	238.80	0.00	0	20058
562.00	238.97	0.00	0	20058
562.00	401.44	0.00	0	20058
562.00	208.45	0.00	0	20058
562.00	147.46	0.00	0	20058
562.00	905.42	0.00	0	20058
562.00	169.75	0.00	0	20058
562.00	237.03	0.00	0	20058
562.00	1,072.18	0.00	0	20058
563.00	208,179.12	1.00	104626	124684
563.00	212.17	0.00	0	124684
563.00	177.01	0.00	0	124684
563.00	97.86	0.00	0	124684
563.00	375.51	0.00	0	124684
563.00	868.30	0.00	0	124684
563.00	132.51	0.00	0	124684

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
555.00	280,788.04	N/A	N/A	0
556.00	284,923.57	1.00	282856	282856
557.00	289,084.13	1.00	287004	569860
558.00	293,269.64	1.00	291177	861037
559.00	297,480.08	1.00	295375	1156411
560.00	301,715.44	1.00	299598	1456009
561.00	305,975.70	1.00	303846	1759855
562.00	310,260.85	1.00	308118	2067973

STAGE STORAGE TABLE 2				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
564.00	2,066.17	N/A	N/A	0
564.00	516.28	0.00	0	0
565.00	9,172.09	1.00	4844	4844

STAGE STORAGE TABLE 3				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
563.00	220.28	N/A	N/A	0
564.00	1,927.19	1.00	1074	1074
565.00	3,104.13	1.00	2516	3589

STAGE STORAGE TABLE 4				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
562.00	189.62	N/A	N/A	0
563.00	5,789.12	1.00	2989	2989
564.00	9,634.65	1.00	7712	10701

NOTES

1. BACKGROUND IMAGE DERIVED FROM GOOGLE EARTH; NOVEMBER 9, 2025.
2. LIDAR DATA PROVIDED BY HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: MAY 2023).

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APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: MPN

LAKESIDE ASH POND AND LIME POND 3

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER: 4

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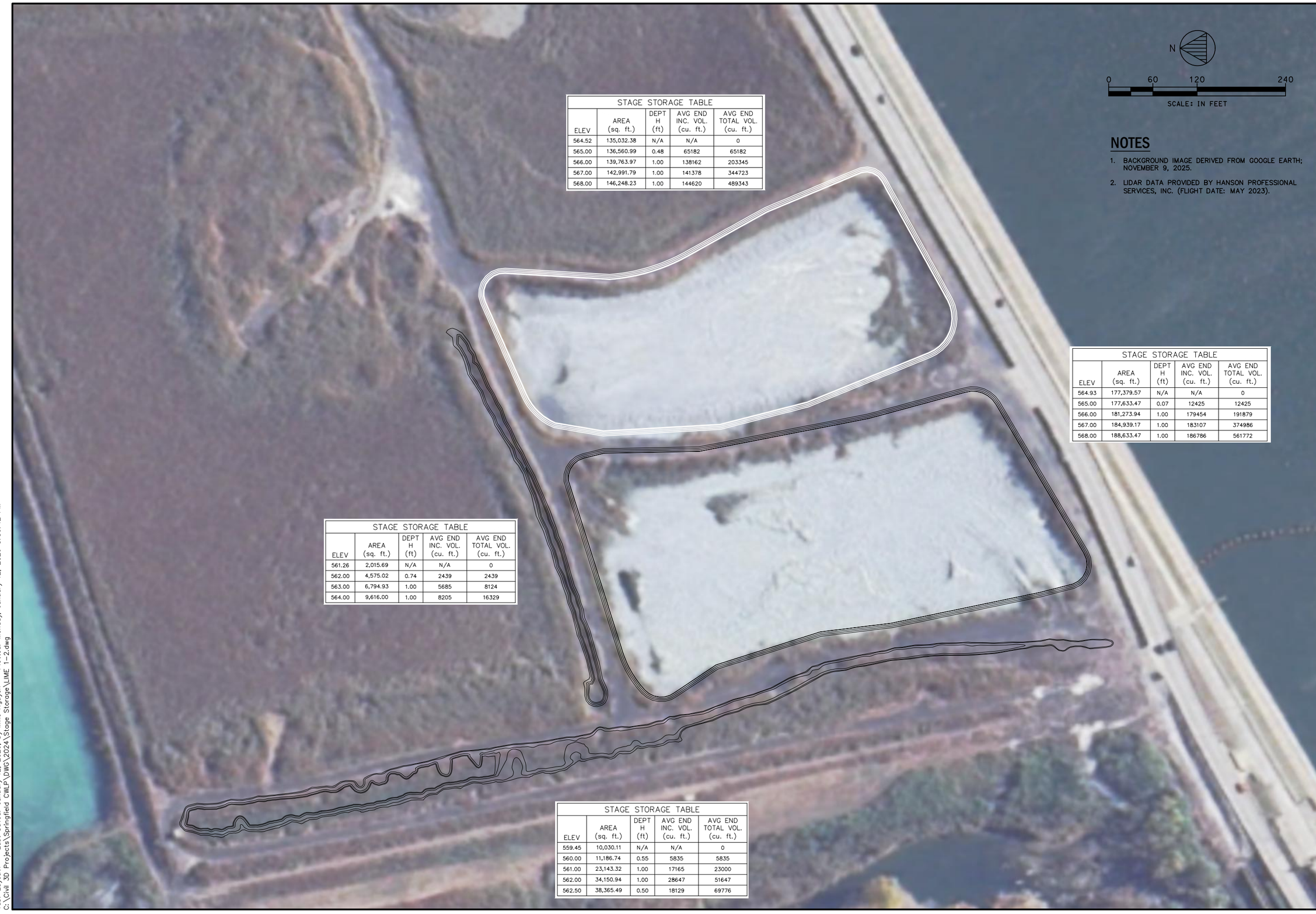
C:\Civil 3D Projects\Springfield CWLP\DWG\2024\Stage Storage\LAKESIDE.dwg



STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
564.52	135,032.38	N/A	N/A	0
565.00	136,560.99	0.48	65182	65182
566.00	139,763.97	1.00	138162	203345
567.00	142,991.79	1.00	141378	344723
568.00	146,248.23	1.00	144620	489343

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
564.93	177,379.57	N/A	N/A	0
565.00	177,633.47	0.07	12425	12425
566.00	181,273.94	1.00	179454	191879
567.00	184,939.17	1.00	183107	374986
568.00	188,633.47	1.00	186786	561772

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
561.26	2,015.69	N/A	N/A	0
562.00	4,575.02	0.74	2439	2439
563.00	6,794.93	1.00	5685	8124
564.00	9,616.00	1.00	8205	16329

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
559.45	10,030.11	N/A	N/A	0
560.00	11,186.74	0.55	5835	5835
561.00	23,143.32	1.00	17165	23000
562.00	34,150.94	1.00	28647	51647
562.50	38,365.49	0.50	18129	69776

NOTES

1. BACKGROUND IMAGE DERIVED FROM GOOGLE EARTH; NOVEMBER 9, 2025.
2. LIDAR DATA PROVIDED BY HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: MAY 2023).

NO.	DATE	REVISION DESCRIPTION	BY

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DESIGNED BY: KWF | DRAWN BY: MPN | APPROVED BY: KWF

LIME POND 1 & 2, WEST SETTLING CHANNEL, AND CENTER CHANNEL

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

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STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
546.09	317,964.12	N/A	N/A	0
547.00	324,080.79	0.91	292130	292130
548.00	330,828.77	1.00	327455	619585
549.00	337,604.36	1.00	334217	953802
550.00	344,407.54	1.00	341006	1294808
551.00	351,935.79	1.00	348172	1642979
552.00	382,298.50	1.00	367117	2010097

STAGE STORAGE TABLE				
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)
546.09	14,382.85	N/A	N/A	0
547.00	15,484.90	0.91	13590	13590
548.00	16,686.50	1.00	16086	29676
549.00	17,895.02	1.00	17291	46966
550.00	19,124.12	1.00	18510	65476
551.00	20,461.00	1.00	19793	85268

NOTES

1. BACKGROUND IMAGE DERIVED FROM GOOGLE EARTH; NOVEMBER 9, 2025.
2. LIDAR DATA PROVIDED BY HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: MAY 2023).

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SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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DESIGNED BY: KWF | DRAWN BY: MPN | APPROVED BY: KWF

CLARIFICATION POND

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER: 6

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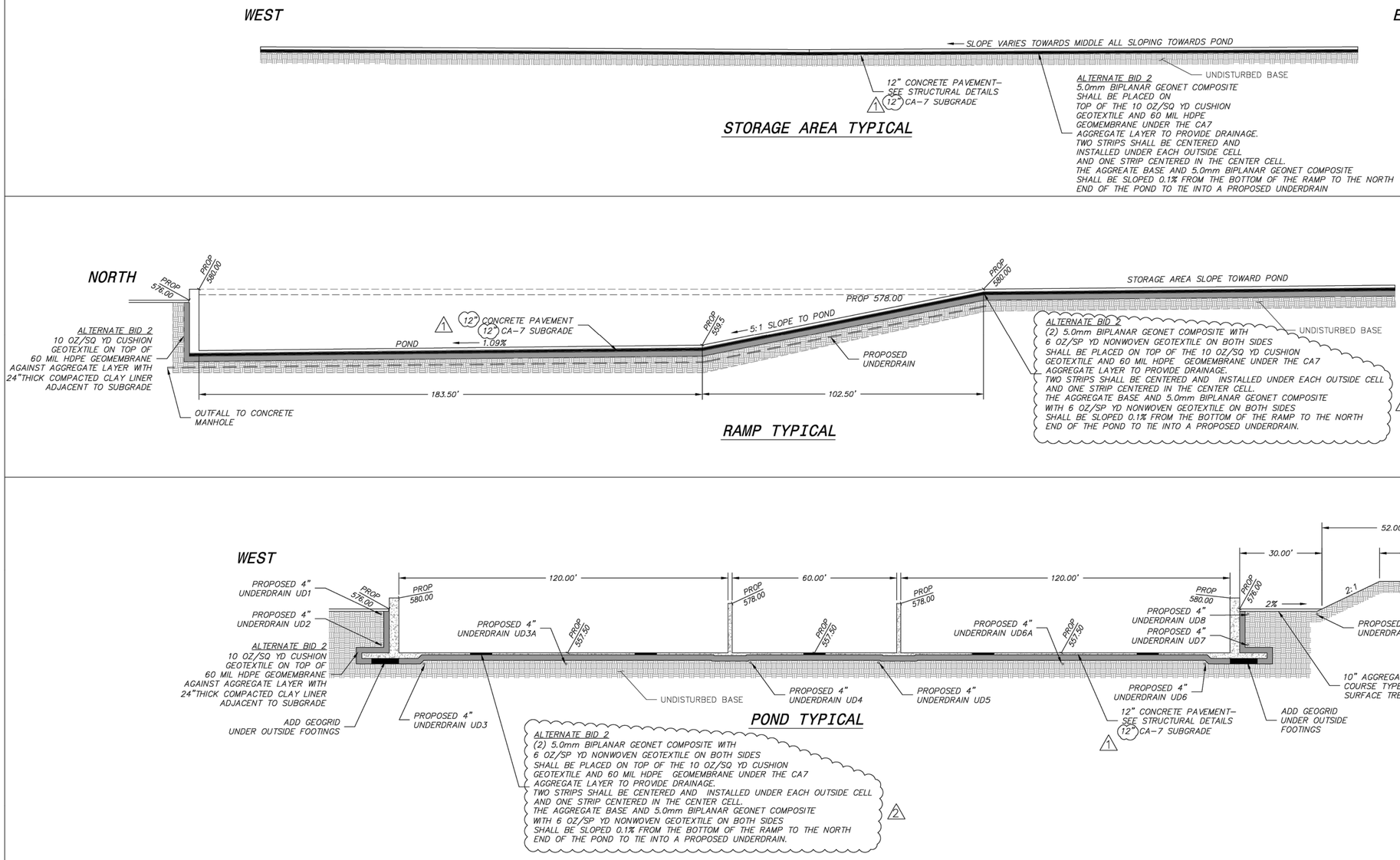

NOTE:
TYPICAL CROSS–SECTIONS FROM CAD FILE: TYPICAL – SECTIONS.DWG, SHEET G–08, ISSUE DATED: 05–25–2022, PROVIDED BY HANSON PROFESSIONAL SERVICES INC.

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APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: MPN

LIME STABILIZATION DECANT

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

DATE: JANUARY 2026

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 7

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C:\Civil 3D Projects\Springfield CWLP\DWG\2025\Lime Pond.dwg

APPENDIX A:
PRECIPITATION FREQUENCY DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Springfield, Illinois, USA*
Latitude: 39.765°, Longitude: -89.5946°
Elevation: 579 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.398** (0.365-0.438)	**0.474** (0.434-0.522)	**0.566** (0.518-0.621)	**0.637** (0.581-0.699)	**0.726** (0.660-0.794)	**0.796** (0.721-0.872)	**0.863** (0.778-0.944)	**0.933** (0.837-1.02)	**1.03** (0.913-1.12)	**1.10** (0.969-1.20)
10-min	**0.619** (0.567-0.681)	**0.741** (0.677-0.814)	**0.879** (0.805-0.966)	**0.983** (0.897-1.08)	**1.11** (1.01-1.22)	**1.21** (1.09-1.32)	**1.30** (1.17-1.42)	**1.39** (1.25-1.52)	**1.51** (1.34-1.65)	**1.60** (1.41-1.74)
15-min	**0.759** (0.695-0.834)	**0.906** (0.828-0.996)	**1.08** (0.988-1.19)	**1.21** (1.10-1.33)	**1.37** (1.25-1.50)	**1.49** (1.35-1.64)	**1.61** (1.46-1.76)	**1.73** (1.55-1.89)	**1.88** (1.68-2.06)	**1.99** (1.76-2.18)
30-min	**1.00** (0.919-1.10)	**1.21** (1.11-1.33)	**1.48** (1.35-1.62)	**1.68** (1.53-1.84)	**1.94** (1.76-2.12)	**2.14** (1.93-2.34)	**2.33** (2.10-2.55)	**2.53** (2.27-2.76)	**2.79** (2.48-3.05)	**2.99** (2.64-3.27)
60-min	**1.23** (1.12-1.35)	**1.49** (1.36-1.64)	**1.86** (1.70-2.04)	**2.14** (1.95-2.34)	**2.51** (2.28-2.75)	**2.81** (2.55-3.08)	**3.12** (2.81-3.41)	**3.43** (3.08-3.75)	**3.86** (3.43-4.22)	**4.20** (3.71-4.59)
2-hr	**1.45** (1.33-1.59)	**1.76** (1.61-1.94)	**2.21** (2.02-2.42)	**2.56** (2.33-2.80)	**3.03** (2.76-3.32)	**3.42** (3.10-3.73)	**3.81** (3.44-4.16)	**4.23** (3.79-4.61)	**4.81** (4.28-5.24)	**5.28** (4.66-5.76)
3-hr	**1.54** (1.41-1.69)	**1.87** (1.71-2.05)	**2.34** (2.14-2.58)	**2.72** (2.48-2.99)	**3.25** (2.95-3.56)	**3.68** (3.32-4.03)	**4.13** (3.70-4.51)	**4.61** (4.11-5.04)	**5.29** (4.66-5.79)	**5.85** (5.12-6.40)
6-hr	**1.81** (1.66-1.98)	**2.18** (2.00-2.40)	**2.74** (2.51-3.00)	**3.18** (2.91-3.49)	**3.80** (3.46-4.15)	**4.31** (3.90-4.69)	**4.84** (4.35-5.27)	**5.40** (4.83-5.88)	**6.21** (5.49-6.75)	**6.87** (6.03-7.48)
12-hr	**2.11** (1.94-2.29)	**2.54** (2.34-2.77)	**3.16** (2.92-3.45)	**3.66** (3.37-3.99)	**4.35** (3.99-4.73)	**4.92** (4.48-5.34)	**5.50** (4.98-5.96)	**6.12** (5.51-6.63)	**6.99** (6.24-7.58)	**7.71** (6.82-8.35)
24-hr	**2.42** (2.26-2.61)	**2.93** (2.73-3.16)	**3.67** (3.42-3.95)	**4.24** (3.94-4.56)	**5.00** (4.65-5.38)	**5.61** (5.20-6.03)	**6.22** (5.76-6.68)	**6.85** (6.33-7.36)	**7.70** (7.10-8.28)	**8.38** (7.71-8.98)
2-day	**2.84** (2.64-3.06)	**3.43** (3.20-3.70)	**4.26** (3.97-4.60)	**4.91** (4.57-5.28)	**5.77** (5.35-6.20)	**6.44** (5.97-6.92)	**7.12** (6.58-7.65)	**7.82** (7.21-8.40)	**8.76** (8.06-9.40)	**9.49** (8.72-10.2)
3-day	**3.01** (2.80-3.23)	**3.63** (3.39-3.90)	**4.51** (4.20-4.84)	**5.18** (4.83-5.56)	**6.08** (5.65-6.52)	**6.79** (6.30-7.28)	**7.50** (6.95-8.04)	**8.23** (7.61-8.82)	**9.20** (8.49-9.86)	**9.97** (9.18-10.7)
4-day	**3.17** (2.96-3.40)	**3.82** (3.58-4.10)	**4.75** (4.44-5.09)	**5.45** (5.09-5.84)	**6.40** (5.96-6.85)	**7.14** (6.64-7.63)	**7.88** (7.31-8.43)	**8.64** (8.00-9.24)	**9.65** (8.92-10.3)	**10.4** (9.64-11.2)
7-day	**3.75** (3.51-4.00)	**4.50** (4.22-4.81)	**5.51** (5.16-5.89)	**6.27** (5.86-6.70)	**7.26** (6.77-7.75)	**8.02** (7.47-8.56)	**8.77** (8.16-9.36)	**9.53** (8.85-10.2)	**10.5** (9.76-11.2)	**11.3** (10.5-12.1)
10-day	**4.24** (3.98-4.52)	**5.08** (4.77-5.43)	**6.19** (5.81-6.61)	**7.01** (6.56-7.48)	**8.08** (7.56-8.62)	**8.90** (8.31-9.50)	**9.71** (9.06-10.4)	**10.5** (9.80-11.2)	**11.6** (10.8-12.4)	**12.4** (11.5-13.3)
20-day	**5.72** (5.41-6.06)	**6.84** (6.46-7.26)	**8.24** (7.78-8.75)	**9.25** (8.73-9.81)	**10.6** (9.94-11.2)	**11.6** (10.9-12.2)	**12.5** (11.8-13.3)	**13.5** (12.6-14.3)	**14.7** (13.8-15.6)	**15.7** (14.7-16.7)
30-day	**7.12** (6.74-7.53)	**8.50** (8.05-8.99)	**10.1** (9.60-10.7)	**11.3** (10.7-12.0)	**12.8** (12.1-13.5)	**13.9** (13.1-14.7)	**15.0** (14.1-15.9)	**16.1** (15.1-17.0)	**17.4** (16.3-18.5)	**18.5** (17.3-19.6)
45-day	**8.96** (8.51-9.44)	**10.7** (10.1-11.2)	**12.6** (12.0-13.3)	**14.0** (13.3-14.7)	**15.7** (14.9-16.5)	**17.0** (16.1-17.9)	**18.2** (17.2-19.2)	**19.4** (18.3-20.5)	**21.0** (19.8-22.1)	**22.1** (20.8-23.3)
60-day	**10.6** (10.1-11.2)	**12.6** (12.0-13.3)	**14.8** (14.1-15.6)	**16.4** (15.5-17.2)	**18.4** (17.4-19.3)	**19.8** (18.7-20.8)	**21.2** (20.0-22.3)	**22.5** (21.3-23.7)	**24.3** (22.9-25.6)	**25.6** (24.1-26.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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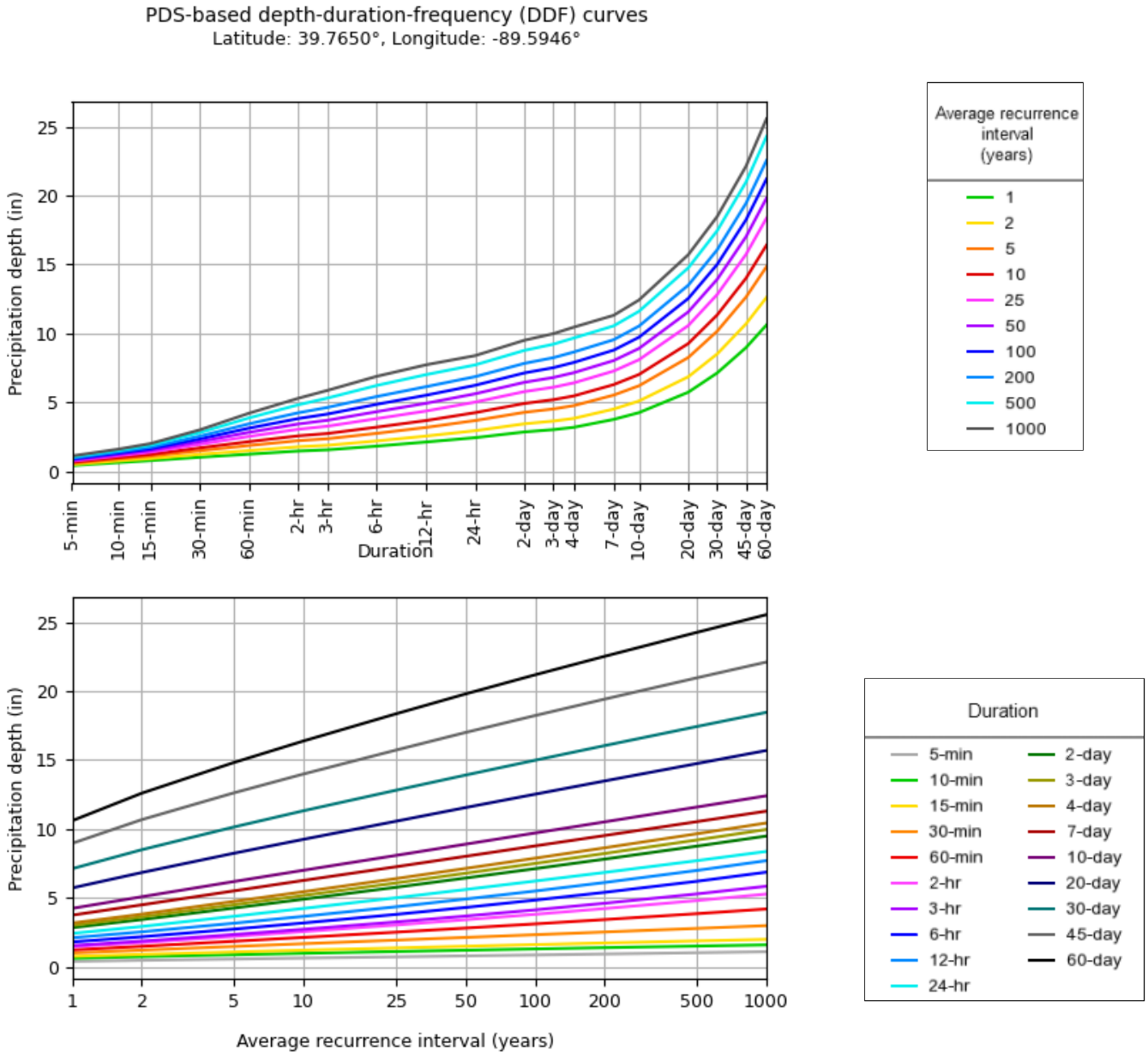
PF graphical



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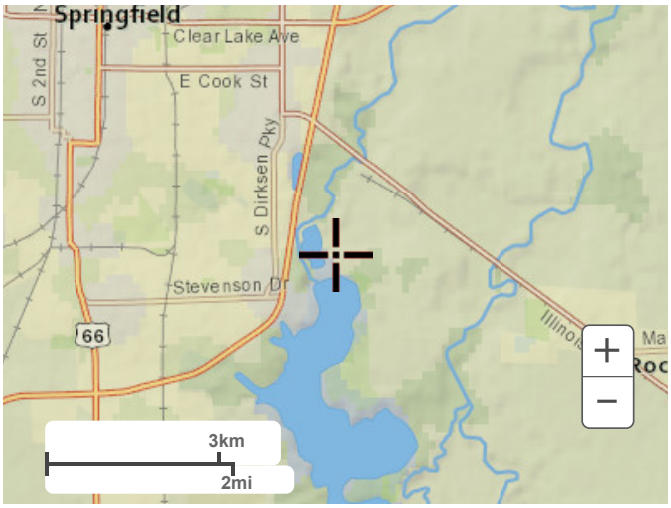
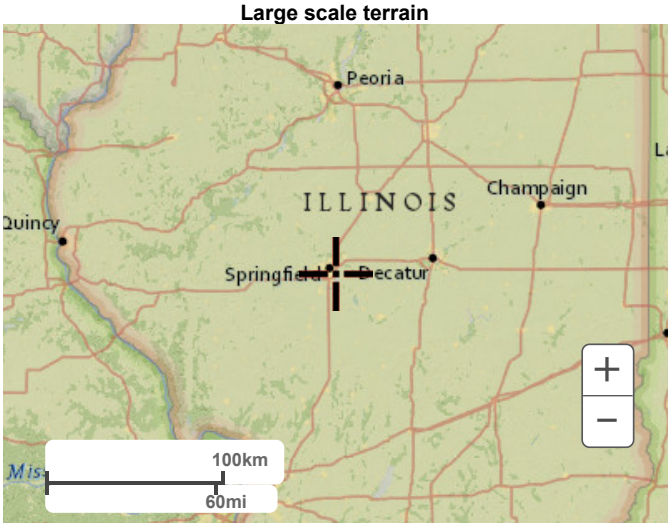
Maps & aerials

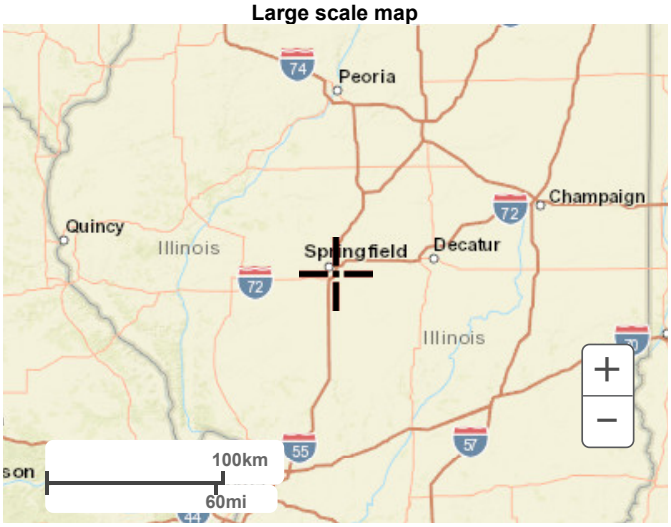
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B:
SUB-AREA CALCULATIONS

APPENDIX B-1:
DALLMAN ASH POND CURVE NUMBER AND TIME OF CONCENTRATION

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - Dalmann Ash Pond **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/2/2025

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA ___ MAJOR STORMWATER SYSTEM

___ UNRESTRICTED AREA ___ OTHER:

X UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Dalmann Ash Pond	dense brush	71	9.49	673.79
Dalmann Ash Pond	graded area	91	27.78	2527.98
Dalmann Ash Pond	water surface	100	0.52	52.00
		TOTALS:	37.79	3253.77

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{3253.77}{37.79} \rightarrow \textbf{Composite CN} = \textbf{86.10}$$

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - Dallman Ash Pond **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/2/2025

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

SHEET FLOW

1. Segment ID		Dallman					
2. Surface description		Fallow					
3. Manning's roughness coefficient, *n*		0.05					
4. Flow length, *L* (≤ 100 ft)		100	ft				
5. 2-year, 24-hr rainfall, P_2		2.93	in				
6. Land slope, *s*		0.010	ft/ft				
7. Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	5.61		+		=	5.61 min

SHALLOW CONCENTRATED FLOW

8. Segment ID		Dallman					
9. Surface description (drop-down list)		Unpaved					
10. Flow length, *L*		1475	ft				
11. Watercourse slope, *s*		0.001	ft/ft				
12. Average velocity, *V*		0.51	fps				
13. Travel time, T_t	$T_t = \frac{L}{60V}$	48.18		+		=	48.18 min

OPEN CHANNEL FLOW

14. Segment ID							
15. Cross-sectional flow area, *A*			ft^2				
16. Wetted Perimeter, P_w			ft				
17. Hydraulic radius, *R*			ft				
18. Flow Length, *L*			ft				
19. Channel slope, *S*			ft/ft				
20. Manning's roughness coefficient, *n*							
21. Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$		fps				
22. Travel time, T_t	$T_t = \frac{L}{60V}$			+		=	min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23. Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$					=	53.79 min

APPENDIX B-2:
LAKESIDE ASH AND LIME POND 3
CURVE NUMBER AND TIME OF CONCENTRATION

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - SF- Lime Pond 3 to Lakeside Ash Pond **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/4/2024

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA

___ UNRESTRICTED AREA

X UPSTREAM AREA

___ MAJOR STORMWATER SYSTEM

___ OTHER:

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION

X EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Lime Pond 3	dense brush	70	8.66	606.20
Lakeside Ash Pond	dense brush	70	13.79	965.30
Lakeside Ash Pond	graded area	91	3.66	333.06
		TOTALS:	26.11	1904.56

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{1904.56}{26.11} \rightarrow \textbf{Composite CN} = \textbf{72.94}$$

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - SF- Lime Pond 3 to Lakeside Pond **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/4/2024

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

SHEET FLOW

1. Segment ID		Lakeside					
2. Surface description		dense brush					
3. Manning's roughness coefficient, *n*		0.8					
4. Flow length, *L* (≤ 100 ft)		100	ft				
5. 2-year, 24-hr rainfall, P_2		3.34	in				
6. Land slope, *s*		0.008	ft/ft				
7. Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	52.80	+		=	52.80	min

SHALLOW CONCENTRATED FLOW

8. Segment ID		Lakeside					
9. Surface description (drop-down list)		Unpaved					
10. Flow length, *L*		1665	ft				
11. Watercourse slope, *s*		0.008	ft/ft				
12. Average velocity, *V*		1.44	fps				
13. Travel time, T_t	$T_t = \frac{L}{60V}$	19.23	+		=	19.23	min

OPEN CHANNEL FLOW

14. Segment ID							
15. Cross-sectional flow area, *A*			ft^2				
16. Wetted Perimeter, P_w			ft				
17. Hydraulic radius, *R*			ft				
18. Flow Length, *L*			ft				
19. Channel slope, *S*			ft/ft				
20. Manning's roughness coefficient, *n*							
21. Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$		fps				
22. Travel time, T_t	$T_t = \frac{L}{60V}$		+		=		min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23. Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$	=	72.03	min

APPENDIX B-3:
LIME POND 1 CURVE NUMBER AND TIME OF CONCENTRATION

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - Lime Pond 1 **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 12/8/2025

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA ___ MAJOR STORMWATER SYSTEM

___ UNRESTRICTED AREA ___ OTHER:

X UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Lime Pond 1	Graded Areas	91	6.26	569.66
Lime Pond 1	Native Plantings	70	0.38	26.60
TOTALS:			6.64	596.26

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{596.26}{6.64} \rightarrow \textbf{Composite CN} = \textbf{89.80}$$

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - Lime Pond 1 **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 12/8/2025

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION X EXISTING CONDITION

SHEET FLOW

1.	Segment ID		Lime Pond				
2.	Surface description		Fallow				
3.	Manning's roughness coefficient, *n*		0.05				
4.	Flow length, *L* (≤ 100 ft)		100	ft			
5.	2-year, 24-hr rainfall, P_2		3.34	in			
6.	Land slope, *s*		0.008	ft/ft			
7.	Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	5.75	+		=	5.75 min

SHALLOW CONCENTRATED FLOW

8.	Segment ID		Lime Pond				
9.	Surface description (drop-down list)		Unpaved				
10.	Flow length, *L*		550	ft			
11.	Watercourse slope, *s*		0.008	ft/ft			
12.	Average velocity, *V*		1.44	fps			
13.	Travel time, T_t	$T_t = \frac{L}{60V}$	6.35	+		=	6.35 min

OPEN CHANNEL FLOW

14.	Segment ID						
15.	Cross-sectional flow area, *A*			ft^2			
16.	Wetted Perimeter, P_w			ft			
17.	Hydraulic radius, *R*			ft			
18.	Flow Length, *L*			ft			
19.	Channel slope, *S*			ft/ft			
20.	Manning's roughness coefficient, *n*						
21.	Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$		fps			
22.	Travel time, T_t	$T_t = \frac{L}{60V}$		+		=	min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23.	Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$	=	12.10	min

APPENDIX B-4:
LIME POND 2 CURVE NUMBER AND TIME OF CONCENTRATION

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - Lime Pond 2 **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 12/8/2025

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA ___ MAJOR STORMWATER SYSTEM

___ UNRESTRICTED AREA ___ OTHER:

X UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Lime Pond 2	Graded Areas	91	4.00	364.00
TOTALS:			4.00	364.00

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{364.00}{4.00} \rightarrow \textbf{Composite CN} = \textbf{91.00}$$

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - Lime Pond 2 **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 12/8/2025

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

SHEET FLOW

1.	Segment ID		Lime Pond				
2.	Surface description		Fallow				
3.	Manning's roughness coefficient, *n*		0.05				
4.	Flow length, *L* (≤ 100 ft)		100	ft			
5.	2-year, 24-hr rainfall, P_2		3.34	in			
6.	Land slope, *s*		0.008	ft/ft			
7.	Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	5.75	+		=	5.75 min

SHALLOW CONCENTRATED FLOW

8.	Segment ID		Lime Pond				
9.	Surface description (drop-down list)		Unpaved				
10.	Flow length, *L*		420	ft			
11.	Watercourse slope, *s*		0.008	ft/ft			
12.	Average velocity, *V*		1.44	fps			
13.	Travel time, T_t	$T_t = \frac{L}{60V}$	4.85	+		=	4.85 min

OPEN CHANNEL FLOW

14.	Segment ID						
15.	Cross-sectional flow area, *A*			ft^2			
16.	Wetted Perimeter, P_w			ft			
17.	Hydraulic radius, *R*			ft			
18.	Flow Length, *L*			ft			
19.	Channel slope, *S*			ft/ft			
20.	Manning's roughness coefficient, *n*						
21.	Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$		fps			
22.	Travel time, T_t	$T_t = \frac{L}{60V}$		+		=	min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23.	Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$	=	10.60	min

APPENDIX B-5:
WEST SETTLING CHANNEL CURVE NUMBER

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - SF- Settling Channel **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/8/2024

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA ___ MAJOR STORMWATER SYSTEM

___ UNRESTRICTED AREA ___ OTHER:

X UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Settling Channel	water	100	0.88	88.00
Settling Channel	dense brush	70	1.12	78.40
Settling Channel	graded area	91	0.63	57.33
TOTALS:			2.63	223.73

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{223.73}{2.63} \rightarrow \textbf{Composite CN} = \textbf{85.07}$$

APPENDIX B-6:
CLARIFICATION POND CURVE NUMBER

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: CWLP - Clarification Pond **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 1/2/2025

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA ___ MAJOR STORMWATER SYSTEM

___ UNRESTRICTED AREA ___ OTHER:

X UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Clarification Pond	Water	100	7.70	770.00
Clarification Pond	Graded Areas	91	0.70	63.70
Clarification Pond	Native Plantings	70	1.98	138.60
		TOTALS:	10.38	972.30

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{972.30}{10.38} \rightarrow \textbf{Composite CN} = \textbf{93.67}$$

APPENDIX B-7:
DECANT CURVE NUMBER

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - Decant **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 7/6/2025

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

SHEET FLOW

1.	Segment ID		Sheet				
2.	Surface description		Storage Area				
3.	Manning's roughness coefficient, *n*		0.013				
4.	Flow length, *L* (≤ 100 ft)		385.8	ft			
5.	2-year, 24-hr rainfall, P_2		2.93	in			
6.	Land slope, *s*		0.010	ft/ft			
7.	Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	5.62	+		=	5.62 min

SHALLOW CONCENTRATED FLOW

8.	Segment ID		Pond Slope				
9.	Surface description (drop-down list)		Paved				
10.	Flow length, *L*		102.5	ft			
11.	Watercourse slope, *s*		0.200	ft/ft			
12.	Average velocity, *V*		9.09	fps			
13.	Travel time, T_t	$T_t = \frac{L}{60V}$	0.19	+		=	0.19 min

OPEN CHANNEL FLOW

14.	Segment ID		Pond				
15.	Cross-sectional flow area, *A*		4.26	ft^2			
16.	Wetted Perimeter, P_w		120.07	ft			
17.	Hydraulic radius, *R*		0.04	ft			
18.	Flow Length, *L*		183.5	ft			
19.	Channel slope, *S*		0.011	ft/ft			
20.	Manning's roughness coefficient, *n*		0.013				
21.	Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$	1.29	fps			
22.	Travel time, T_t	$T_t = \frac{L}{60V}$	2.37	+		=	2.37 min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23.	Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$	=	8.19	min

NRCS TIME OF CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

PROJECT: CWLP - Decant **PERMIT NUMBER:**

LOCATION: Springfield, Sangamon County **DATE:** 7/6/2025

CONDITION (SELECT FROM DROP-DOWN)

___ PROPOSED CONDITION **X** EXISTING CONDITION

SHEET FLOW

1.	Segment ID		Sheet				
2.	Surface description		Storage Area				
3.	Manning's roughness coefficient, *n*		0.013				
4.	Flow length, *L* (≤ 100 ft)		385.8	ft			
5.	2-year, 24-hr rainfall, P_2		2.93	in			
6.	Land slope, *s*		0.010	ft/ft			
7.	Travel time, T_t	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}(60)$	5.62	+		=	5.62 min

SHALLOW CONCENTRATED FLOW

8.	Segment ID		Pond Slope				
9.	Surface description (drop-down list)		Paved				
10.	Flow length, *L*		102.5	ft			
11.	Watercourse slope, *s*		0.200	ft/ft			
12.	Average velocity, *V*		9.09	fps			
13.	Travel time, T_t	$T_t = \frac{L}{60V}$	0.19	+		=	0.19 min

OPEN CHANNEL FLOW

14.	Segment ID		Pond				
15.	Cross-sectional flow area, *A*		4.26	ft^2			
16.	Wetted Perimeter, P_w		120.07	ft			
17.	Hydraulic radius, *R*		0.04	ft			
18.	Flow Length, *L*		183.5	ft			
19.	Channel slope, *S*		0.011	ft/ft			
20.	Manning's roughness coefficient, *n*		0.013				
21.	Average velocity, *V*	$V = \frac{1.486}{n}R^{\frac{2}{3}}S^{\frac{1}{2}}$	1.29	fps			
22.	Travel time, T_t	$T_t = \frac{L}{60V}$	2.37	+		=	2.37 min

TIME-OF-CONCENTRATION (T_c) OR TRAVEL TIME (T_t)

23.	Time-of-Concentration, *Tc,* or Travel Time, *Tt*	$T_c, T_t = \sum T_t$	=	8.19	min

APPENDIX C:
CULVERT ANALYSIS

APPENDIX C-1:
DALLMAN ASH POND CULVERT ANALYSIS

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

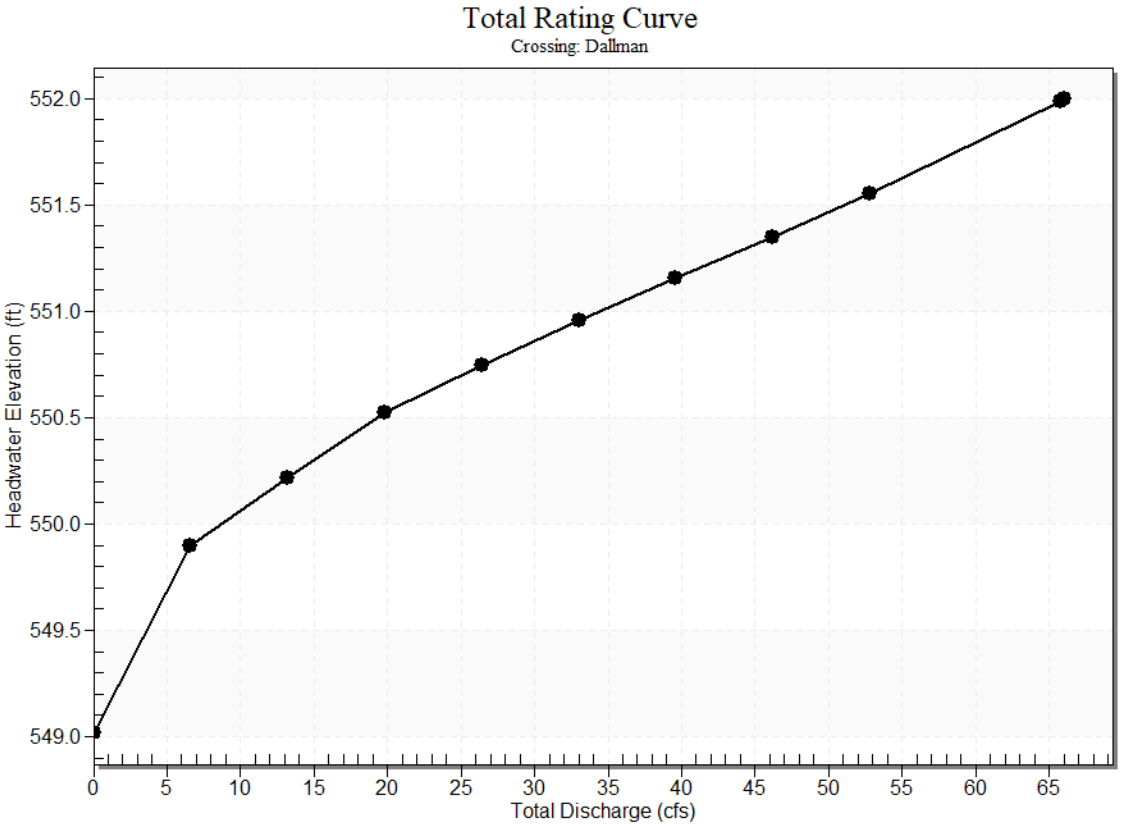
Design Flow: 65.80 cfs

Maximum Flow: 66.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: Dallman

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Culvert 2 Discharge (cfs)	Culvert 3 Discharge (cfs)	Culvert 4 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
549.02	0.00	0.00	0.00	0.00	0.00	0.00	0
549.90	6.60	2.93	1.73	1.66	0.28	0.00	5
550.22	13.20	5.14	3.40	3.30	1.35	0.00	5
550.52	19.80	6.08	5.38	5.30	3.04	0.00	6
550.75	26.40	7.84	6.99	6.99	4.58	0.00	4
550.95	33.00	9.61	8.55	8.70	6.13	0.00	3
551.15	39.60	11.43	10.06	10.42	7.69	0.00	4
551.35	46.20	13.28	11.52	12.15	9.25	0.00	7
551.56	52.80	15.11	12.90	13.89	10.85	0.00	13
551.99	65.80	17.64	17.27	16.78	13.96	0.00	26
552.00	66.00	17.68	17.32	16.83	14.02	0.00	8
552.00	65.91	17.70	17.33	16.84	14.04	0.00	Overtopping

Rating Curve Plot for Crossing: Dallman



Culvert Data: Culvert 1

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	549.02	0.00	0.000	0-NF	0.00	0.00	0.30	0.00	0.00	0.00
6.60 cfs	2.93 cfs	549.90	0.88	0.138	1-S2n	0.59	0.60	0.59	0.31	3.78	9.27
13.20 cfs	5.14 cfs	550.22	1.19	0.416	1-S2n	0.80	0.80	0.80	0.46	4.41	11.56
19.80 cfs	6.08 cfs	550.52	1.32	1.502	3-M1t	0.87	0.87	0.89	0.59	4.49	13.06
26.40	7.84	550.75	1.54	1.72	2-	1.01	1.00	1.0	0.69	5.02	14.21

cfs	cfs			6	M2c			0			
33.00 cfs	9.61 cfs	550.95	1.77	1.934	2-M2c	1.14	1.11	1.11	0.78	5.38	15.14
39.60 cfs	11.43 cfs	551.15	2.00	2.134	7-M2c	1.28	1.21	1.21	0.87	5.73	15.93
46.20 cfs	13.28 cfs	551.35	2.26	2.331	7-M2c	1.43	1.31	1.31	0.94	6.08	16.62
52.80 cfs	15.11 cfs	551.56	2.54	2.529	7-M2c	1.61	1.40	1.40	1.02	6.43	17.24
65.80 cfs	17.64 cfs	551.99	2.97	2.843	7-M2c	2.00	1.51	1.51	1.14	6.92	18.29
66.00 cfs	17.68 cfs	552.00	2.98	2.850	7-M2c	2.00	1.52	1.52	1.15	6.93	18.31

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

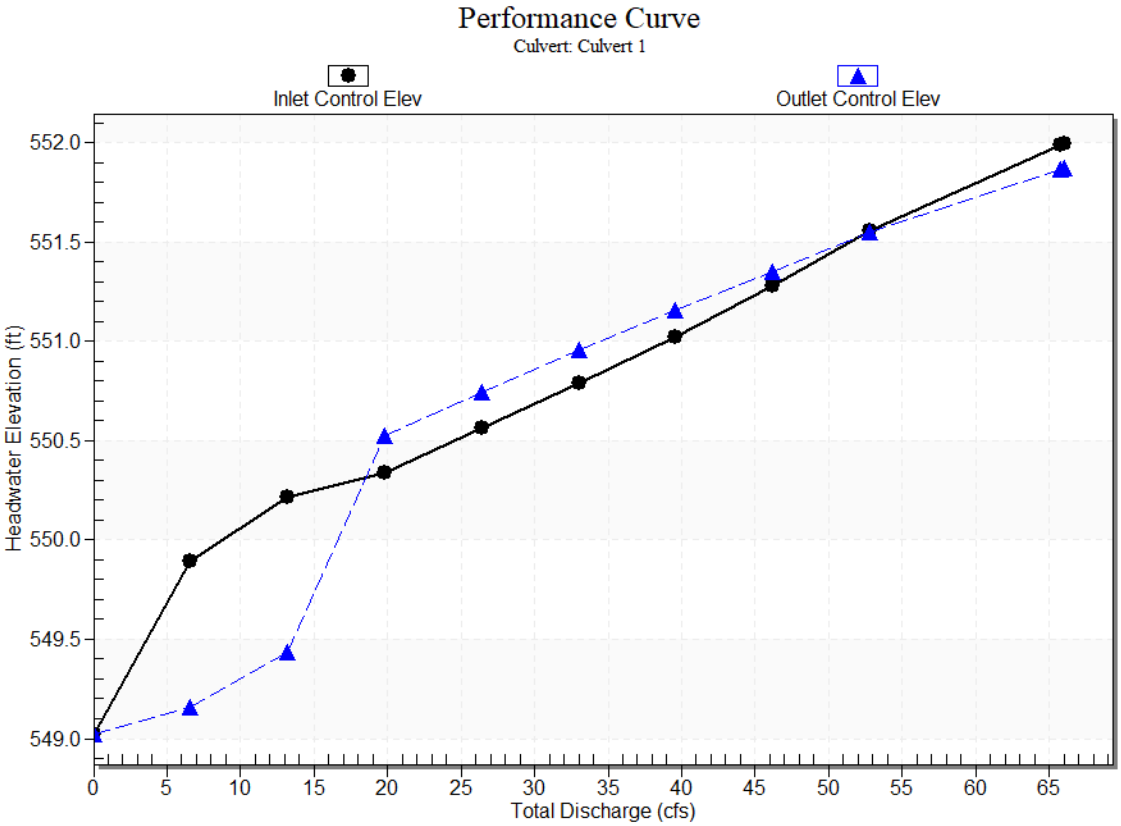
Inlet Elevation (invert): 549.02 ft,

Outlet Elevation (invert): 548.50 ft

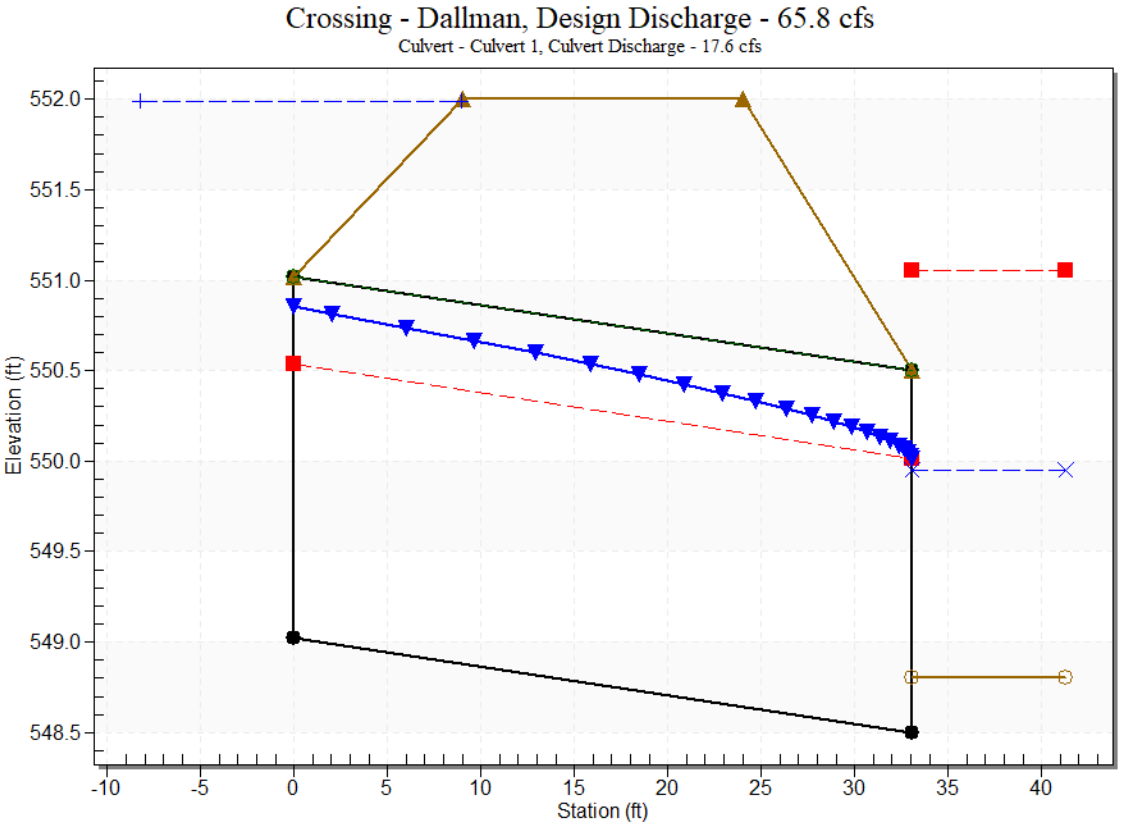
Culvert Length: 33.05 ft,

Culvert Slope: 0.0157

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 549.02 ft

Outlet Station: 33.05 ft

Outlet Elevation: 548.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Culvert Data: Culvert 2

Table 2 - Culvert Summary Table: Culvert 2

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	549.02	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
6.60 cfs	1.73 cfs	549.90	0.67	0.826	7-A2c	-1.00	0.45	0.45	0.31	3.21	9.27
13.20 cfs	3.40 cfs	550.22	0.96	1.146	7-A2c	-1.00	0.65	0.65	0.46	3.88	11.56
19.80 cfs	5.38 cfs	550.52	1.24	1.452	7-A2c	-1.00	0.82	0.82	0.59	4.45	13.06
26.40 cfs	6.99 cfs	550.75	1.45	1.676	7-A2c	-1.00	0.94	0.94	0.69	4.83	14.21
33.00 cfs	8.55 cfs	550.95	1.65	1.884	7-A2c	-1.00	1.04	1.04	0.78	5.17	15.14
39.60 cfs	10.06 cfs	551.15	1.84	2.083	7-A2c	-1.00	1.14	1.14	0.87	5.47	15.93
46.20 cfs	11.52 cfs	551.35	2.03	2.281	7-A2c	-1.00	1.22	1.22	0.94	5.75	16.62
52.80 cfs	12.90 cfs	551.56	2.22	2.487	7-A2c	-1.00	1.29	1.29	1.02	6.01	17.24
65.80 cfs	17.27 cfs	551.99	2.92	2.892	7-JA2c	-1.00	1.50	1.50	1.14	6.84	18.29
66.00 cfs	17.32 cfs	552.00	2.93	2.897	7-JA2t	-1.00	1.50	1.50	1.15	6.85	18.31

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

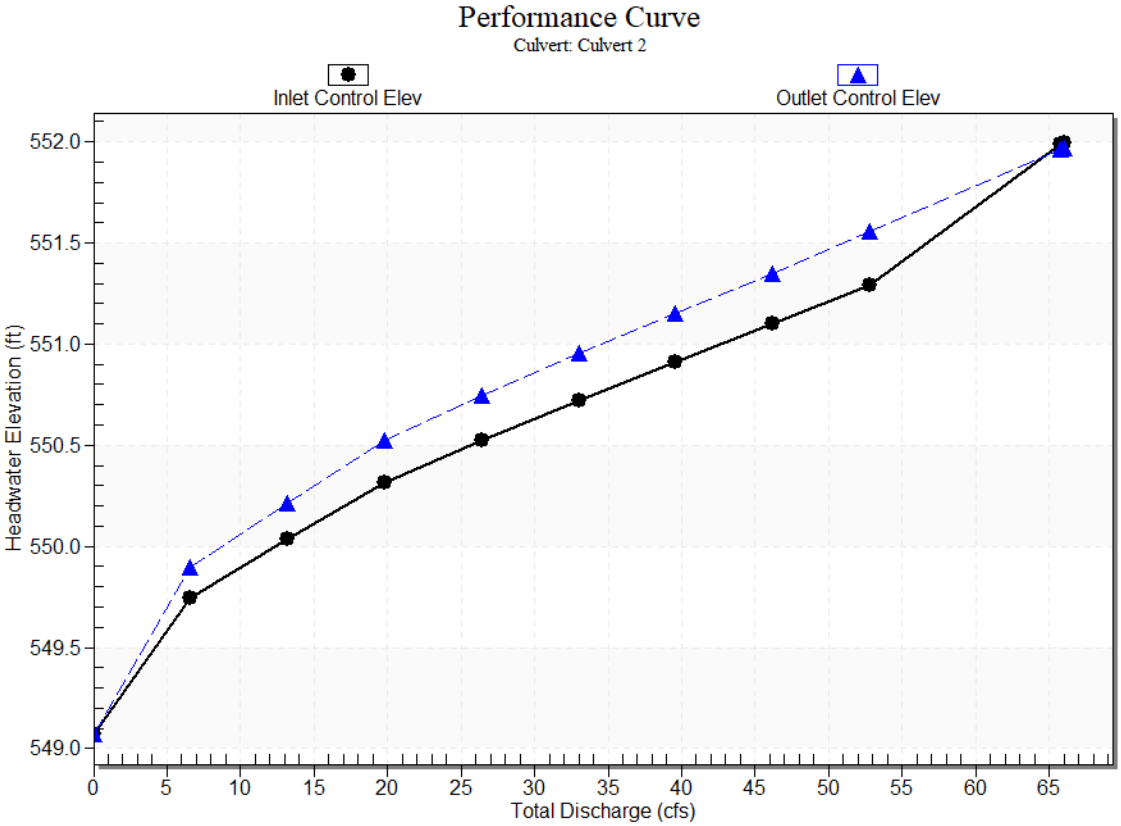
Inlet Elevation (invert): 549.07 ft,

Outlet Elevation (invert): 549.11 ft

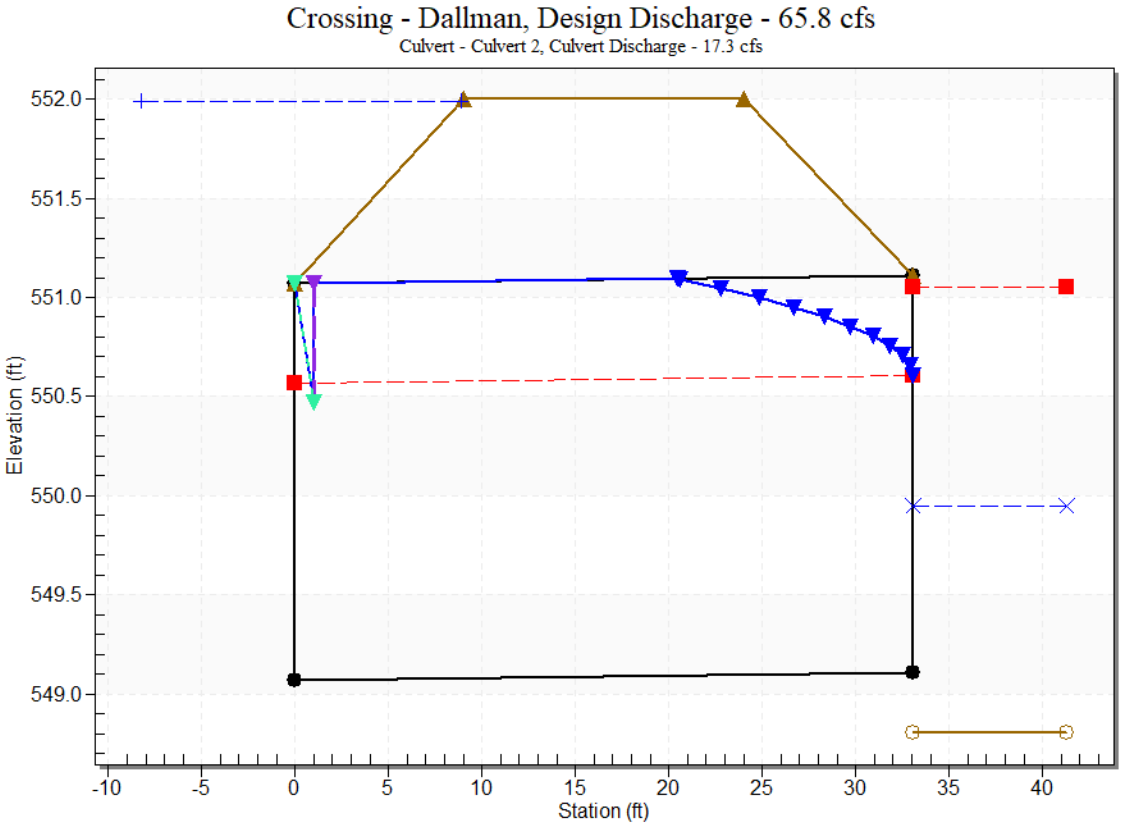
Culvert Length: 33.05 ft,

Culvert Slope: -0.0012

Culvert Performance Curve Plot: Culvert 2



Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 549.07 ft

Outlet Station: 33.05 ft

Outlet Elevation: 549.11 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Culvert Data: Culvert 3

Table 3 - Culvert Summary Table: Culvert 3

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	549.02	0.00	0.000	0-NF	0.00	0.00	0.03	0.00	0.00	0.00
6.60 cfs	1.66 cfs	549.90	0.65	0.726	2-M2c	0.47	0.45	0.45	0.31	3.18	9.27
13.20 cfs	3.30 cfs	550.22	0.94	1.046	2-M2c	0.67	0.64	0.64	0.46	3.85	11.56
19.80 cfs	5.30 cfs	550.52	1.22	1.352	2-M2c	0.87	0.81	0.81	0.59	4.43	13.06
26.40 cfs	6.99 cfs	550.75	1.44	1.575	2-M2c	1.02	0.94	0.94	0.69	4.83	14.21
33.00 cfs	8.70 cfs	550.95	1.66	1.785	2-M2c	1.17	1.05	1.05	0.78	5.20	15.14
39.60 cfs	10.42 cfs	551.15	1.88	1.984	2-M2c	1.32	1.16	1.16	0.87	5.54	15.93
46.20 cfs	12.15 cfs	551.35	2.10	2.181	7-M2c	1.48	1.25	1.25	0.94	5.87	16.62
52.80 cfs	13.89 cfs	551.56	2.35	2.386	7-M2c	1.70	1.34	1.34	1.02	6.20	17.24
65.80 cfs	16.78 cfs	551.99	2.82	2.770	7-M2c	2.00	1.48	1.48	1.14	6.75	18.29
66.00 cfs	16.83 cfs	552.00	2.83	2.778	7-M2c	2.00	1.48	1.48	1.15	6.76	18.31

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

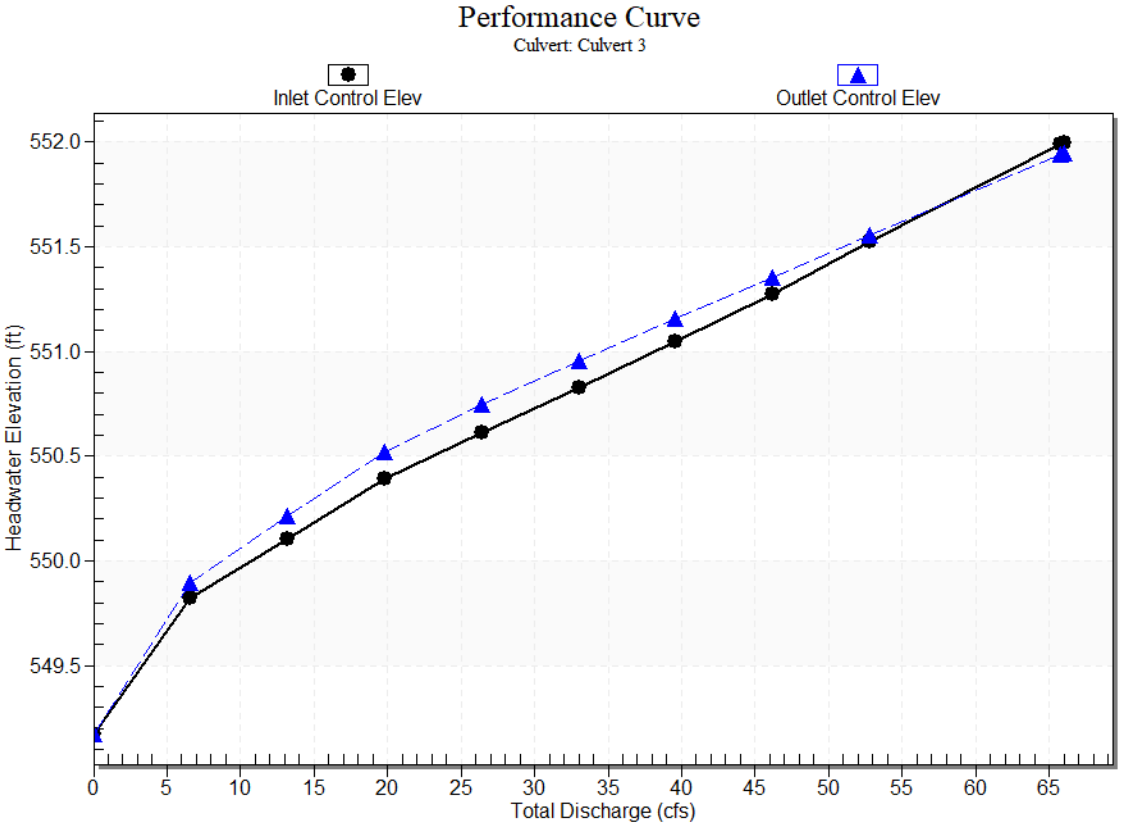
Inlet Elevation (invert): 549.17 ft,

Outlet Elevation (invert): 548.77 ft

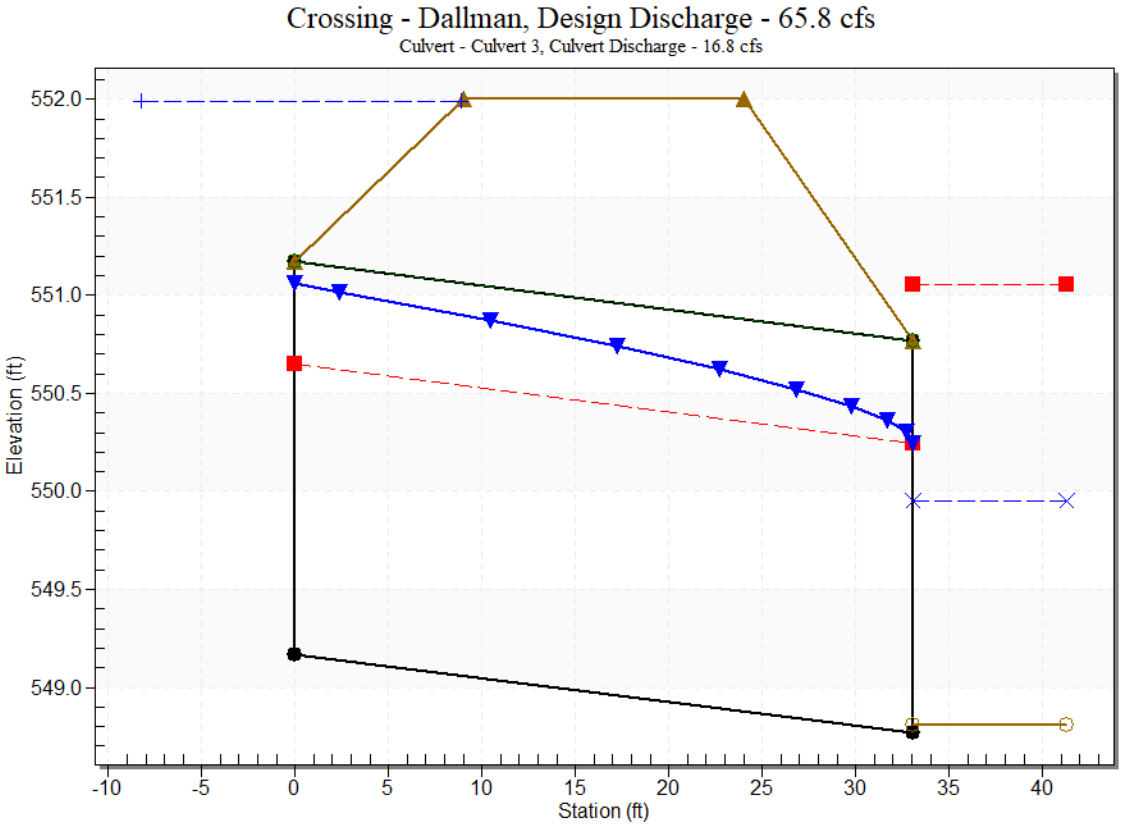
Culvert Length: 33.05 ft,

Culvert Slope: 0.0121

Culvert Performance Curve Plot: Culvert 3



Water Surface Profile Plot for Culvert: Culvert 3



Site Data - Culvert 3

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 549.17 ft

Outlet Station: 33.05 ft

Outlet Elevation: 548.77 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 3

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Culvert Data: Culvert 4

Table 4 - Culvert Summary Table: Culvert 4

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	549.02	0.00	0.000	0-NF	0.00	0.00	0.06	0.00	0.00	0.00
6.60 cfs	0.28 cfs	549.90	0.26	0.0*	1-JS1t	0.16	0.18	0.37	0.31	0.69	9.27
13.20 cfs	1.35 cfs	550.22	0.58	0.0*	1-S2n	0.35	0.40	0.35	0.46	3.67	11.56
19.80 cfs	3.04 cfs	550.52	0.88	0.0*	1-S2n	0.52	0.61	0.52	0.59	4.64	13.06
26.40 cfs	4.58 cfs	550.75	1.11	0.0*	1-S2n	0.65	0.75	0.65	0.69	5.22	14.21
33.00 cfs	6.13 cfs	550.95	1.31	0.170	1-S2n	0.75	0.88	0.75	0.78	5.65	15.14
39.60 cfs	7.69 cfs	551.15	1.51	0.392	1-S2n	0.85	0.99	0.85	0.87	6.01	15.93
46.20 cfs	9.25 cfs	551.35	1.71	0.629	1-S2n	0.95	1.09	0.95	0.94	6.30	16.62
52.80 cfs	10.85 cfs	551.56	1.92	0.890	1-S2n	1.04	1.18	1.04	1.02	6.56	17.24
65.80 cfs	13.96 cfs	551.99	2.35	1.456	5-S2n	1.22	1.35	1.22	1.14	6.96	18.29
66.00 cfs	14.02 cfs	552.00	2.36	1.467	5-S2n	1.22	1.35	1.22	1.15	6.96	18.31

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

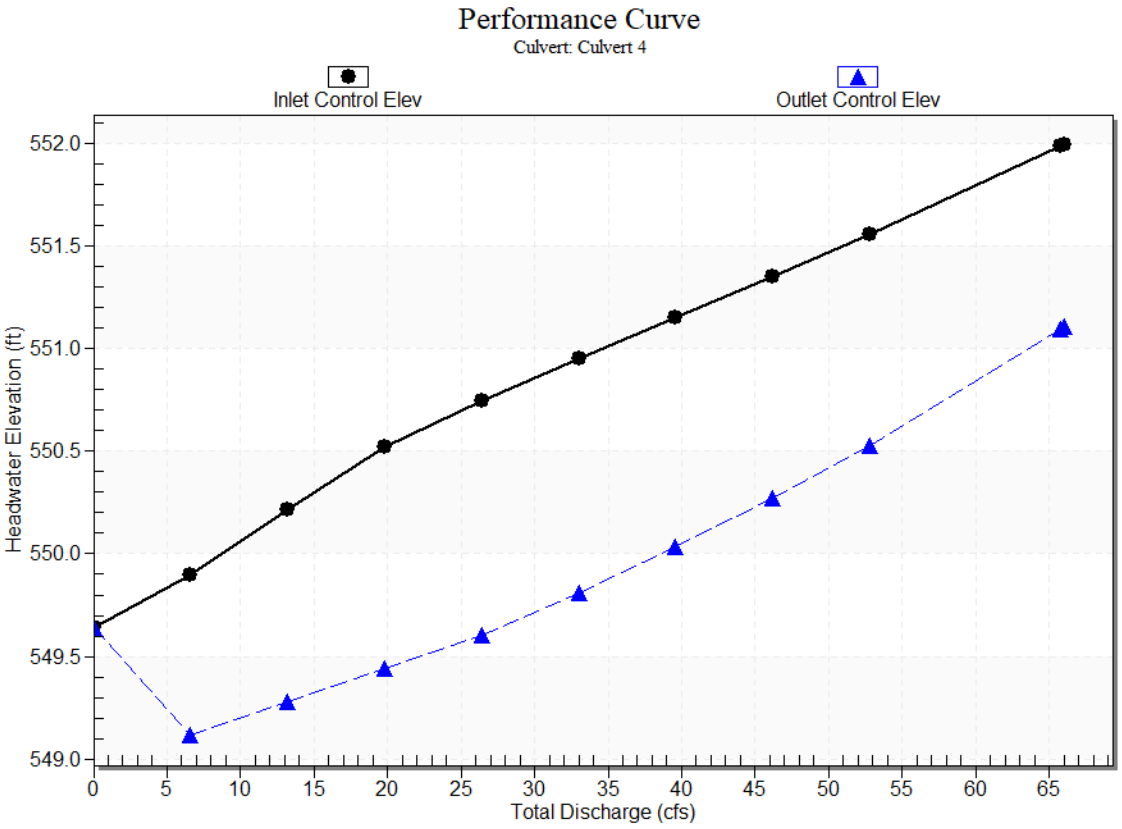
Inlet Elevation (invert): 549.64 ft,

Outlet Elevation (invert): 548.74 ft

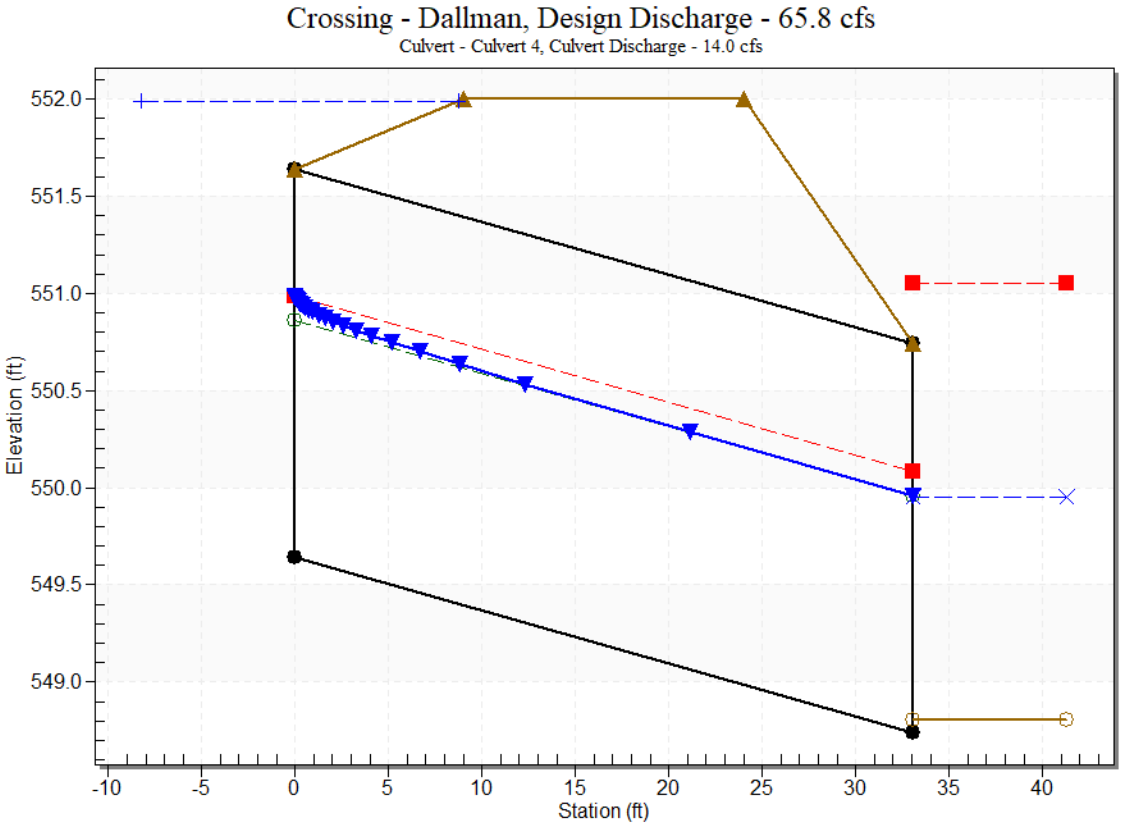
Culvert Length: 33.06 ft,

Culvert Slope: 0.0272

Culvert Performance Curve Plot: Culvert 4



Water Surface Profile Plot for Culvert: Culvert 4



Site Data - Culvert 4

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 549.64 ft

Outlet Station: 33.05 ft

Outlet Elevation: 548.74 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 4

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Tailwater Data for Crossing: Dallman

Table 2 - Downstream Channel Rating Curve (Crossing: Dallman)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	548.80	0.00	0.00	0.00	0.00
6.60	549.11	0.31	9.27	1.92	3.13
13.20	549.27	0.46	11.56	2.89	3.26
19.80	549.39	0.59	13.06	3.66	3.33
26.40	549.50	0.69	14.21	4.31	3.38
33.00	549.59	0.78	15.14	4.89	3.41
39.60	549.67	0.87	15.93	5.41	3.44
46.20	549.75	0.94	16.62	5.89	3.47
52.80	549.82	1.02	17.24	6.34	3.49
65.80	549.95	1.14	18.29	7.14	3.52
66.00	549.95	1.15	18.31	7.15	3.52

Tailwater Channel Data - Dallman

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 1.00 (_:1)

Channel Slope: 0.1000

Channel Manning's n: 0.0200

Channel Invert Elevation: 548.80 ft

Roadway Data for Crossing: Dallman

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 552.00 ft

Roadway Surface: Gravel

Roadway Top Width: 15.00 ft

APPENDIX C-2:
LIME POND 1 CULVERT ANALYSIS

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

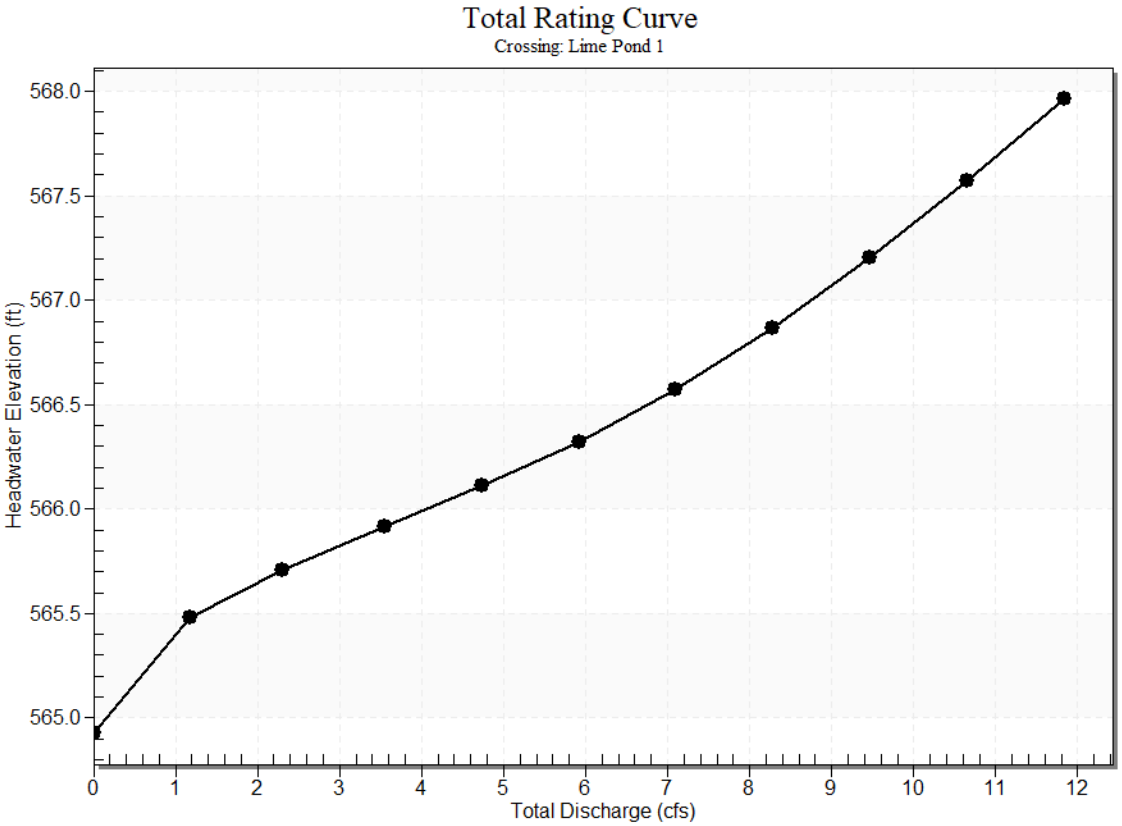
Design Flow: 2.30 cfs

Maximum Flow: 11.83 cfs

Table 1 - Summary of Culvert Flows at Crossing: Lime Pond 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert - Lime Pond 1 North Discharge (cfs)	Culvert - Lime Pond 1 South Discharge (cfs)	Roadway Discharge (cfs)	Iterations
564.93	0.00	0.00	0.00	0.00	0
565.48	1.18	0.26	0.92	0.00	7
565.71	2.30	0.72	1.58	0.00	4
565.92	3.55	1.28	2.27	0.00	4
566.11	4.73	1.88	2.85	0.00	4
566.32	5.92	2.52	3.39	0.00	5
566.57	7.10	3.15	3.93	0.00	6
566.87	8.28	3.80	4.49	0.00	5
567.20	9.46	4.44	5.03	0.00	5
567.57	10.65	5.07	5.56	0.00	28
567.96	11.83	5.69	6.08	0.00	49
568.00	11.86	5.74	6.12	0.00	Overtopping

Rating Curve Plot for Crossing: Lime Pond 1



Culvert Data: Culvert - Lime Pond 1 North

Table 1 - Culvert Summary Table: Culvert - Lime Pond 1 North

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	564.93	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
1.18 cfs	0.26 cfs	565.48	0.29	0.332	2-M2c	0.31	0.21	0.21	0.05	2.18	3.08
2.30 cfs	0.72 cfs	565.71	0.49	0.558	2-M2c	0.55	0.35	0.35	0.07	2.90	4.01
3.55 cfs	1.28 cfs	565.92	0.70	0.767	2-M2c	0.87	0.48	0.48	0.09	3.46	4.76
4.73	1.88	566.11	0.89	0.96	2-	1.00	0.58	0.5	0.11	3.94	5.33

cfs	cfs			2	M2c			8			
5.92 cfs	2.52 cfs	566.32	1.09	1.171	7-M2c	1.00	0.68	0.68	0.13	4.43	5.82
7.10 cfs	3.15 cfs	566.57	1.31	1.422	7-M2c	1.00	0.76	0.76	0.14	4.92	6.25
8.28 cfs	3.80 cfs	566.87	1.59	1.719	7-M2c	1.00	0.83	0.83	0.16	5.45	6.64
9.46 cfs	4.44 cfs	567.20	1.93	2.053	7-M2c	1.00	0.88	0.88	0.17	6.05	6.99
10.65 cfs	5.07 cfs	567.57	2.32	2.421	7-M2c	1.00	0.92	0.92	0.18	6.71	7.32
11.83 cfs	5.69 cfs	567.96	2.75	2.814	7-M2c	1.00	0.95	0.95	0.19	7.40	7.63

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

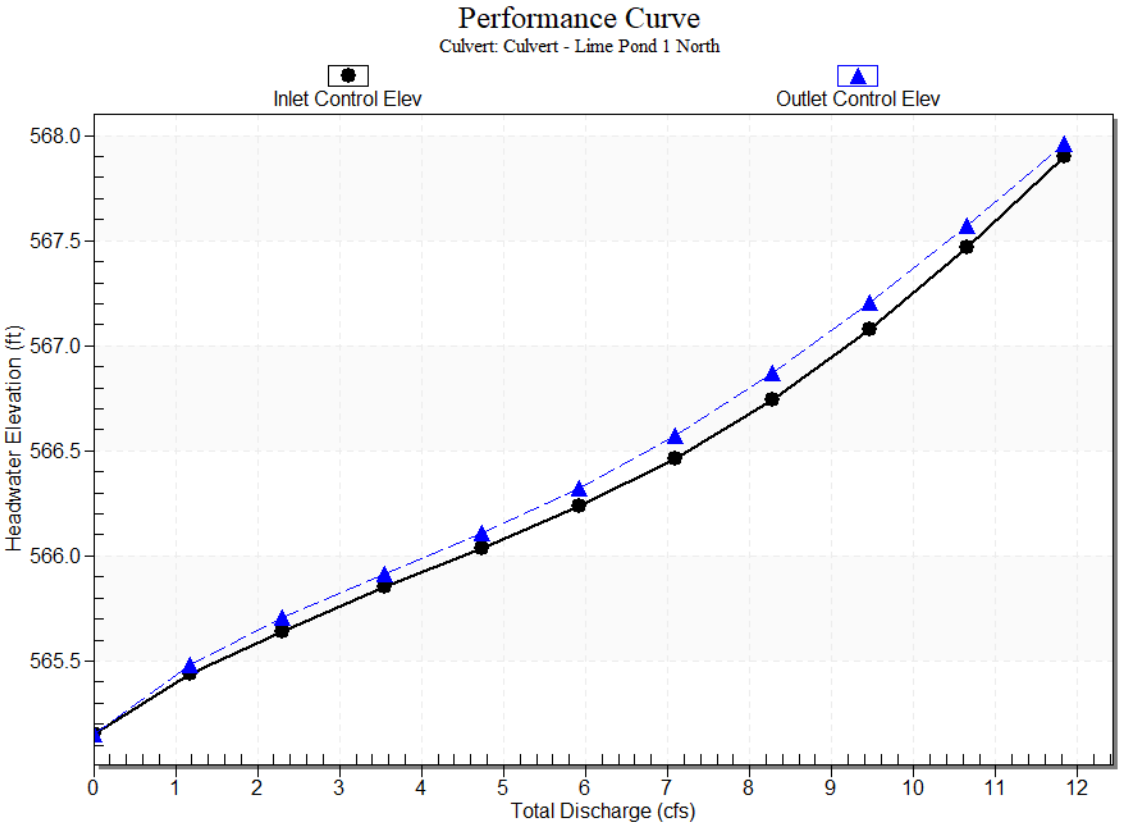
Inlet Elevation (invert): 565.15 ft,

Outlet Elevation (invert): 565.12 ft

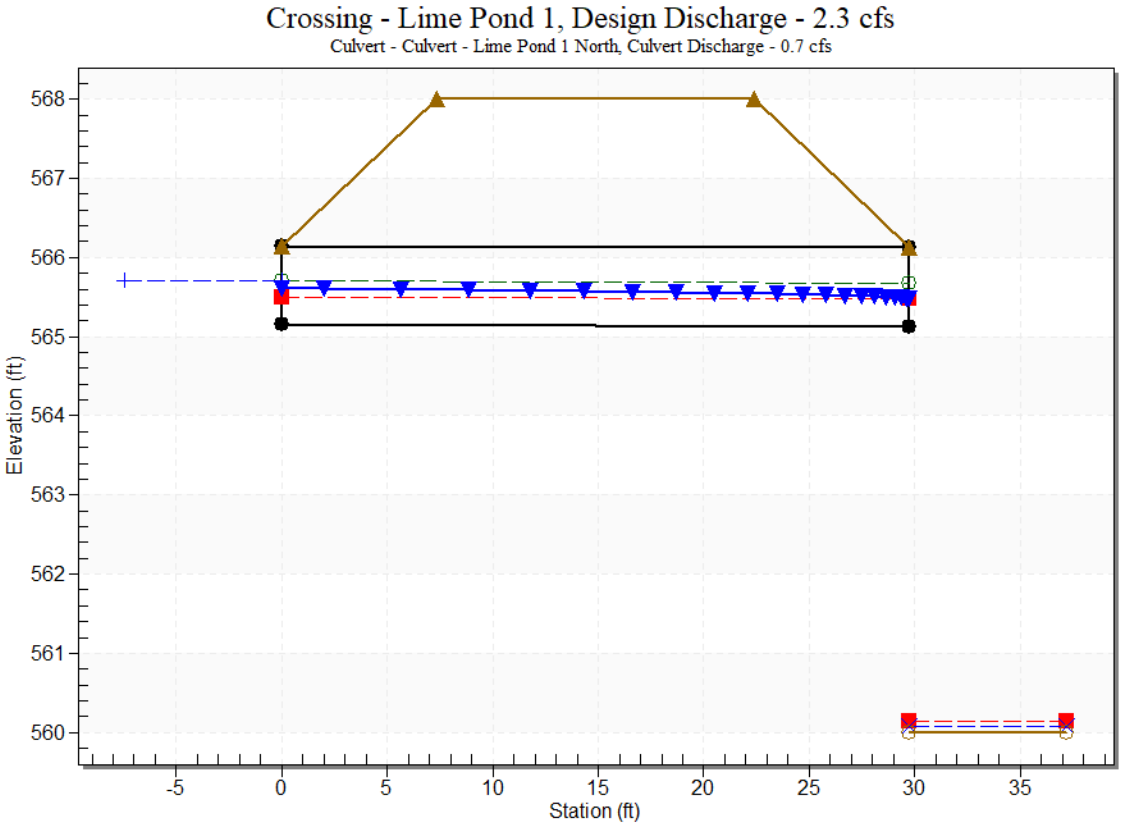
Culvert Length: 29.75 ft,

Culvert Slope: 0.0010

Culvert Performance Curve Plot: Culvert - Lime Pond 1 North



Water Surface Profile Plot for Culvert: Culvert - Lime Pond 1 North



Site Data - Culvert - Lime Pond 1 North

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 565.15 ft

Outlet Station: 29.75 ft

Outlet Elevation: 565.12 ft

Number of Barrels: 1

Culvert Data Summary - Culvert - Lime Pond 1 North

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Culvert Data: Culvert - Lime Pond 1 South

Table 2 - Culvert Summary Table: Culvert - Lime Pond 1 South

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	564.93	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
1.18 cfs	0.92 cfs	565.48	0.55	0.0*	1-S2n	0.24	0.40	0.24	0.05	6.38	3.08
2.30 cfs	1.58 cfs	565.71	0.78	0.0*	1-S2n	0.31	0.53	0.33	0.07	7.09	4.01
3.55 cfs	2.27 cfs	565.92	0.99	0.0*	1-S2n	0.38	0.64	0.40	0.09	7.71	4.76
4.73 cfs	2.85 cfs	566.11	1.18	0.124	5-S2n	0.43	0.72	0.46	0.11	8.11	5.33
5.92 cfs	3.39 cfs	566.32	1.39	0.487	5-S2n	0.48	0.79	0.51	0.13	8.43	5.82
7.10 cfs	3.93 cfs	566.57	1.64	0.743	5-S2n	0.52	0.84	0.56	0.14	8.71	6.25
8.28 cfs	4.49 cfs	566.87	1.94	1.032	5-S2n	0.56	0.89	0.61	0.16	8.98	6.64
9.46 cfs	5.03 cfs	567.20	2.27	1.347	5-S2n	0.61	0.92	0.66	0.17	9.22	6.99
10.65 cfs	5.56 cfs	567.57	2.64	1.682	5-S2n	0.65	0.94	0.70	0.18	9.45	7.32
11.83 cfs	6.08 cfs	567.96	3.03	2.029	5-S2n	0.69	0.94	0.75	0.19	9.67	7.63

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

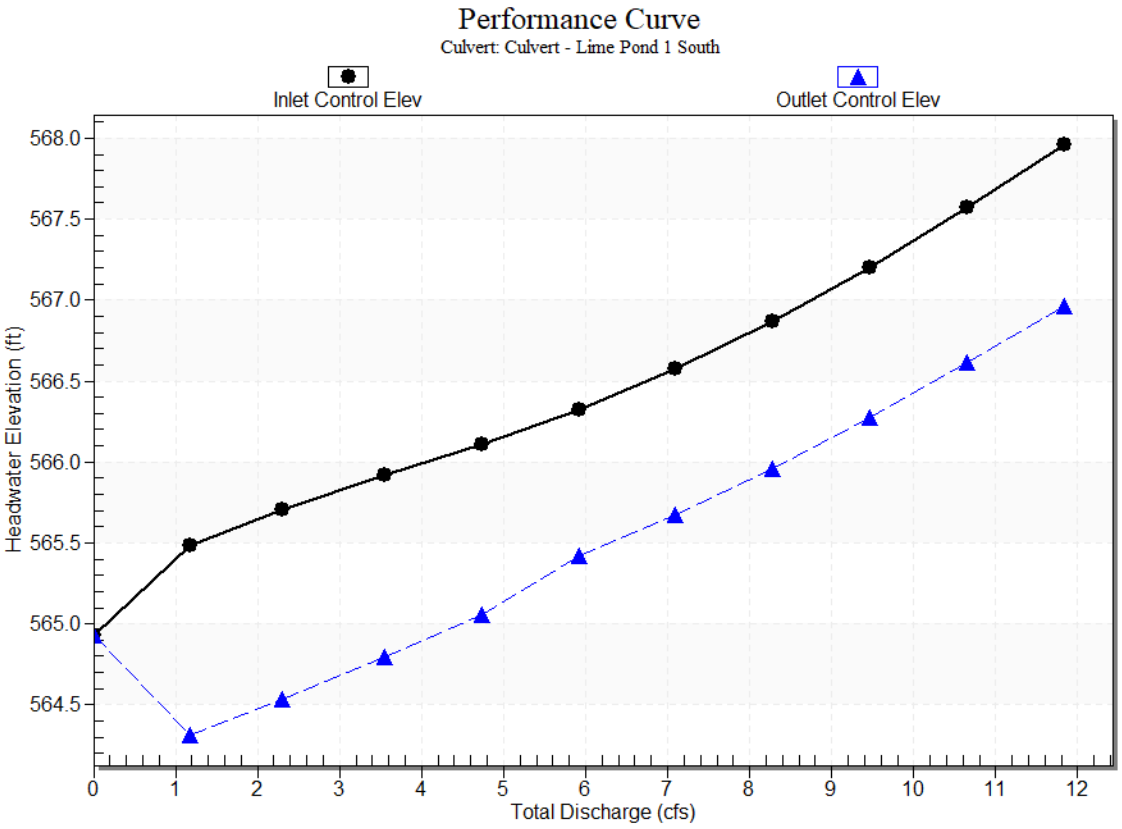
Inlet Elevation (invert): 564.93 ft,

Outlet Elevation (invert): 563.86 ft

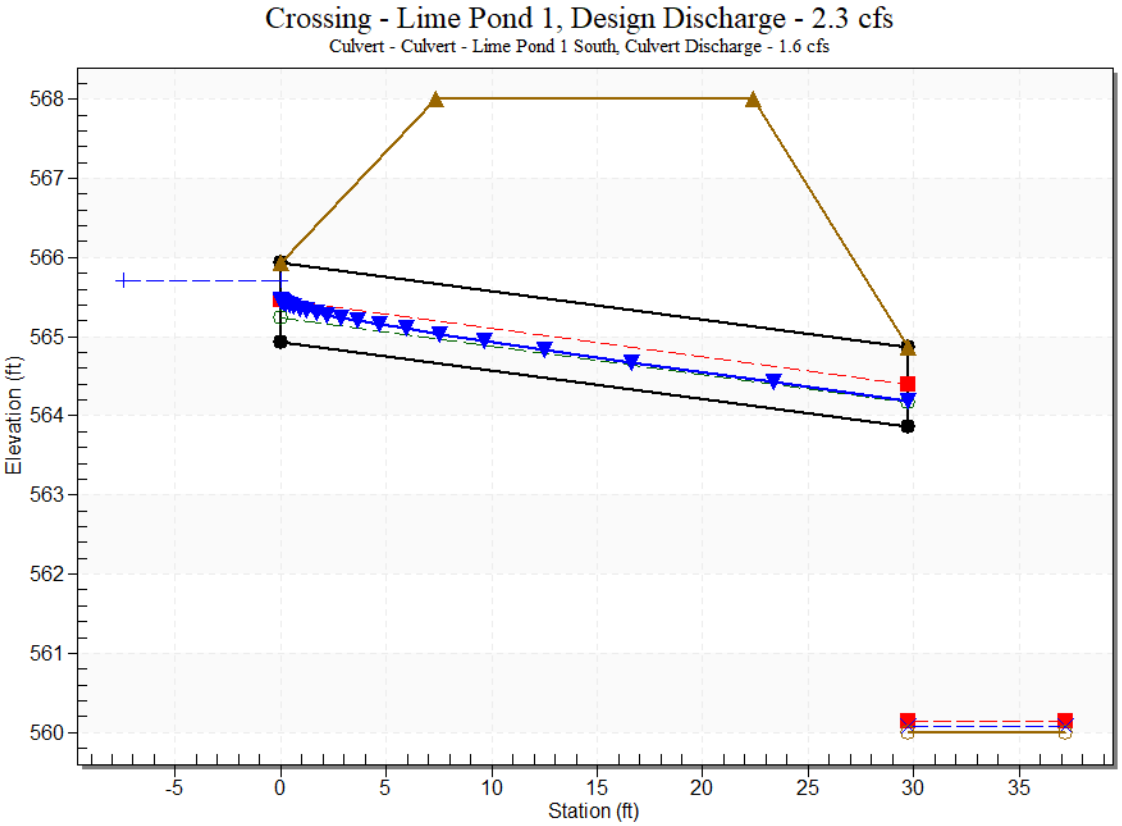
Culvert Length: 29.77 ft,

Culvert Slope: 0.0360

Culvert Performance Curve Plot: Culvert - Lime Pond 1 South



Water Surface Profile Plot for Culvert: Culvert - Lime Pond 1 South



Site Data - Culvert - Lime Pond 1 South

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 564.93 ft

Outlet Station: 29.75 ft

Outlet Elevation: 563.86 ft

Number of Barrels: 1

Culvert Data Summary - Culvert - Lime Pond 1 South

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: Lime Pond 1

Table 2 - Downstream Channel Rating Curve (Crossing: Lime Pond 1)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	560.00	0.00	0.00	0.00	0.00
1.18	560.05	0.05	3.08	0.30	2.47
2.30	560.07	0.07	4.01	0.45	2.64
3.55	560.09	0.09	4.76	0.58	2.75
4.73	560.11	0.11	5.33	0.69	2.82
5.92	560.13	0.13	5.82	0.79	2.88
7.10	560.14	0.14	6.25	0.89	2.92
8.28	560.16	0.16	6.64	0.97	2.96
9.46	560.17	0.17	6.99	1.06	3.00
10.65	560.18	0.18	7.32	1.13	3.03
11.83	560.19	0.19	7.63	1.21	3.05

Tailwater Channel Data - Lime Pond 1

Tailwater Channel Option: Rectangular Channel

Bottom Width: 8.00 ft

Channel Slope: 0.1000

Channel Manning's n: 0.0200

Channel Invert Elevation: 560.00 ft

Roadway Data for Crossing: Lime Pond 1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 568.00 ft

Roadway Surface: Gravel

Roadway Top Width: 15.00 ft

APPENDIX C-3:
LIME POND 2 CULVERT ANALYSIS

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

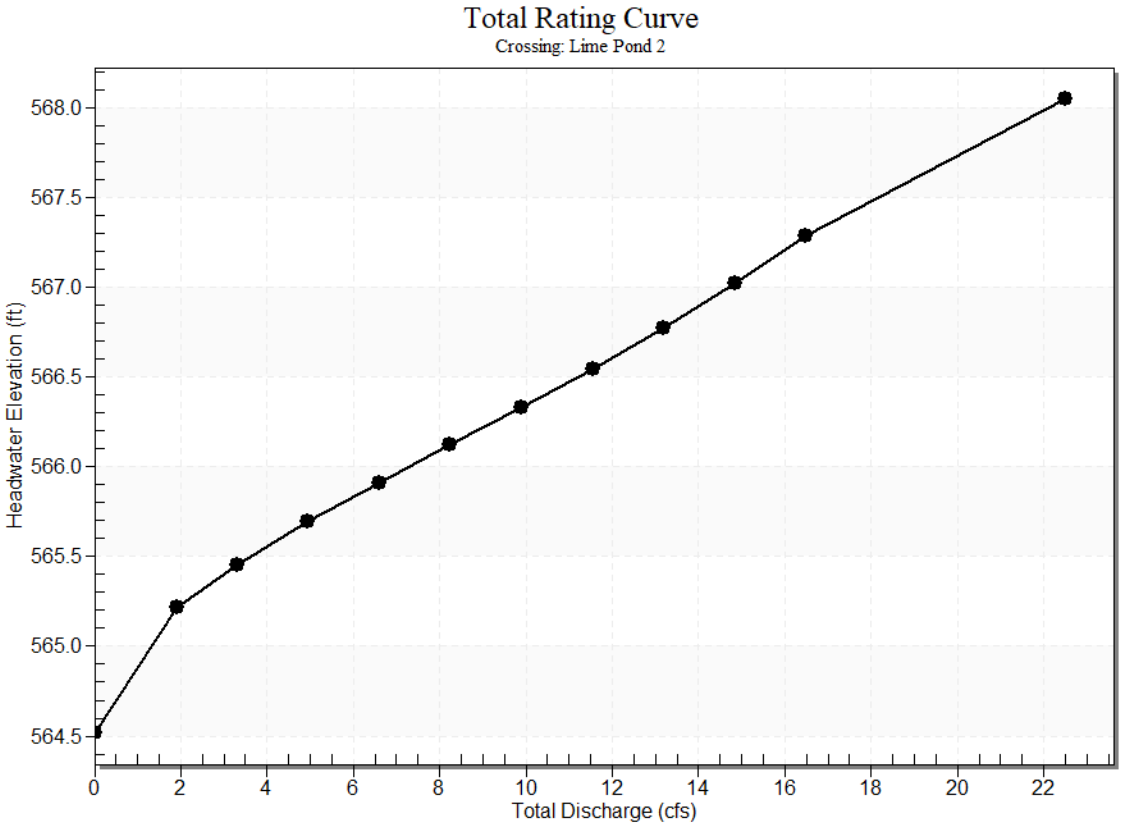
Design Flow: 1.90 cfs

Maximum Flow: 16.49 cfs

Table 1 - Summary of Culvert Flows at Crossing: Lime Pond 2

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
564.52	0.00	0.00	0.00	1
565.22	1.90	1.90	0.00	1
565.46	3.30	3.30	0.00	1
565.69	4.95	4.95	0.00	1
565.91	6.60	6.60	0.00	1
566.12	8.24	8.24	0.00	1
566.33	9.89	9.89	0.00	1
566.54	11.54	11.54	0.00	1
566.77	13.19	13.19	0.00	1
567.02	14.84	14.84	0.00	1
567.29	16.49	16.49	0.00	1
568.00	20.19	20.19	0.00	Overtopping

Rating Curve Plot for Crossing: Lime Pond 2



Culvert Data: Culvert 1

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	564.52	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
1.90 cfs	1.90 cfs	565.22	0.70	0.0*	1-S2n	0.36	0.48	0.36	0.09	4.96	4.45
3.30 cfs	3.30 cfs	565.46	0.94	0.076	1-S2n	0.47	0.63	0.48	0.12	5.71	5.52
4.95 cfs	4.95 cfs	565.69	1.17	0.276	1-S2n	0.58	0.78	0.59	0.15	6.35	6.46
6.60	6.60	565.91	1.39	0.47	1-	0.67	0.91	0.6	0.18	6.82	7.22

cfs	cfs			6	S2 n			9			
8.24 cfs	8.24 cfs	566.12	1.60	0.68 2	1- S2 n	0.76	1.02	0.7 8	0.21	7.21	7.86
9.89 cfs	9.89 cfs	566.33	1.81	0.89 8	1- S2 n	0.84	1.13	0.8 7	0.23	7.53	8.42
11.54 cfs	11.54 cfs	566.54	2.02	1.12 7	5- S2 n	0.91	1.22	0.9 5	0.26	7.82	8.93
13.19 cfs	13.19 cfs	566.77	2.25	1.37 0	5- S2 n	0.99	1.31	1.0 3	0.28	8.07	9.39
14.84 cfs	14.84 cfs	567.02	2.50	1.62 7	5- S2 n	1.06	1.39	1.1 1	0.30	8.31	9.81
16.49 cfs	16.49 cfs	567.29	2.77	1.89 9	5- S2 n	1.13	1.46	1.1 8	0.32	8.52	10.20

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

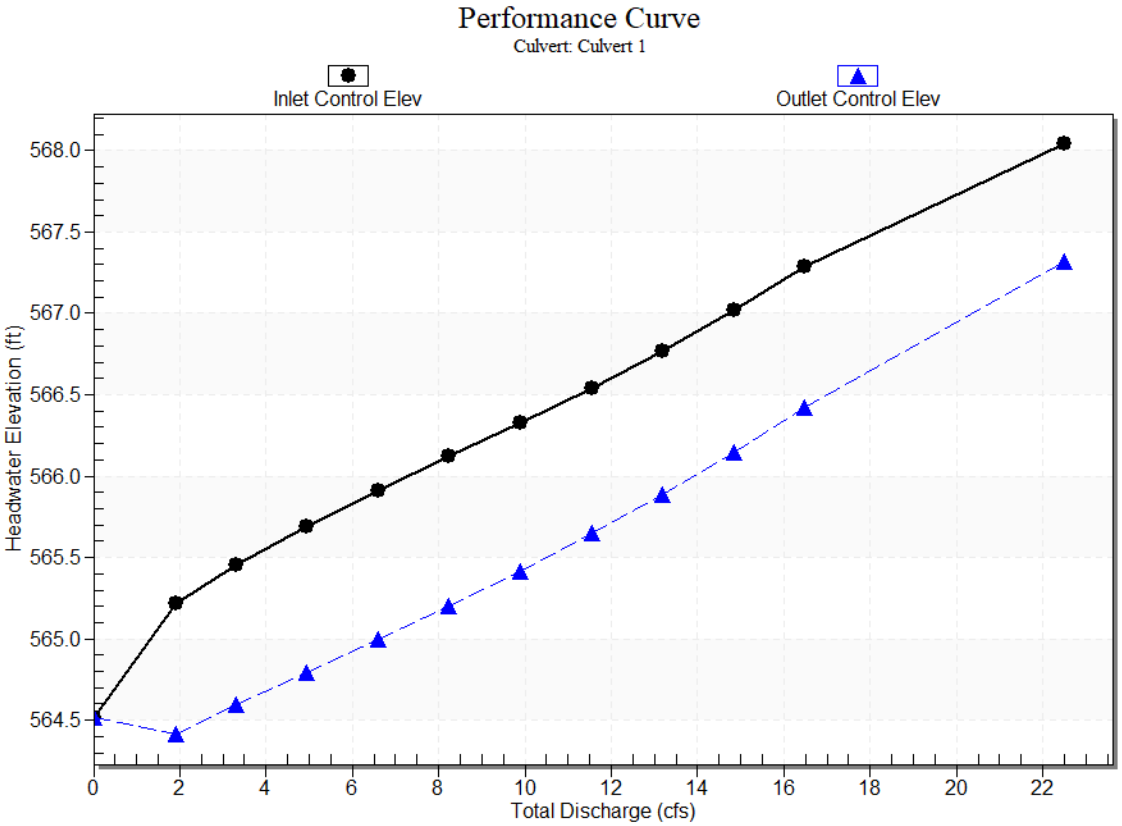
Inlet Elevation (invert): 564.52 ft,

Outlet Elevation (invert): 563.92 ft

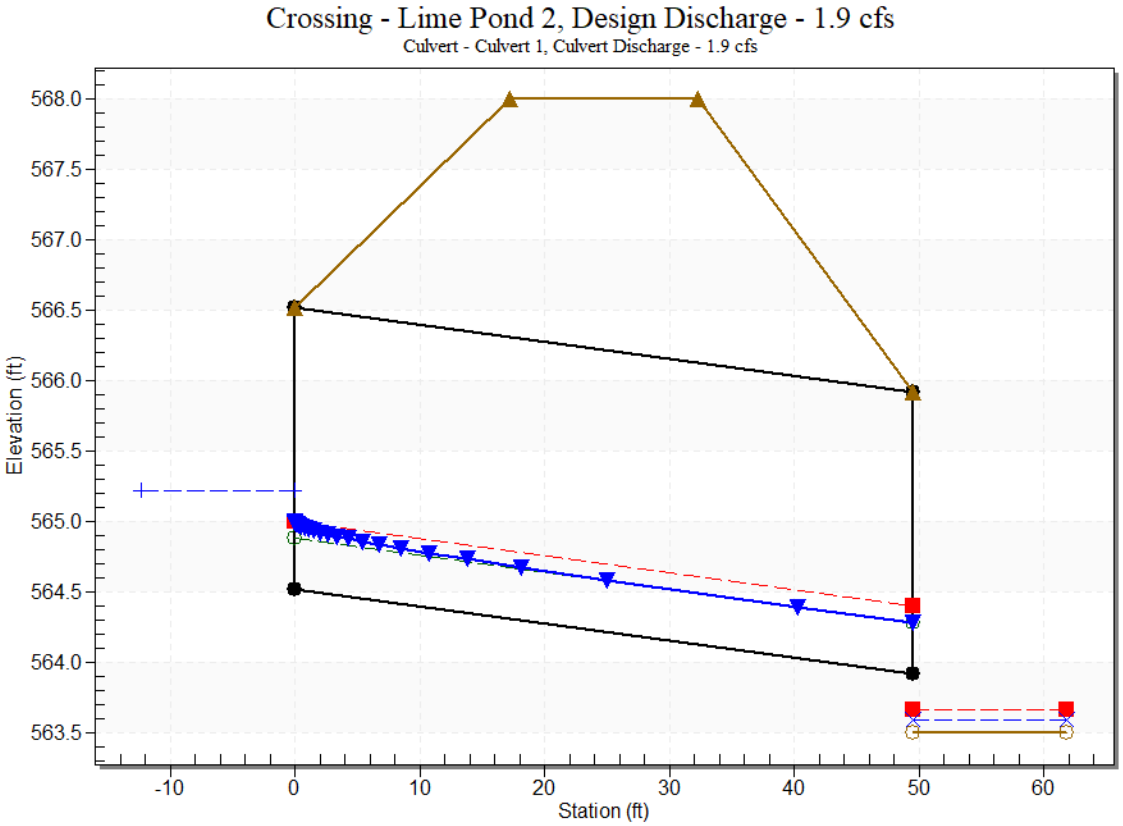
Culvert Length: 49.48 ft,

Culvert Slope: 0.0121

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 564.52 ft

Outlet Station: 49.48 ft

Outlet Elevation: 563.92 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Tailwater Data for Crossing: Lime Pond 2

Table 2 - Downstream Channel Rating Curve (Crossing: Lime Pond 2)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	563.50	0.00	0.00	0.00	0.00
1.90	563.59	0.09	4.45	0.53	2.68
3.30	563.62	0.12	5.52	0.74	2.82
4.95	563.65	0.15	6.46	0.96	2.91
6.60	563.68	0.18	7.22	1.14	2.97
8.24	563.71	0.21	7.86	1.31	3.02
9.89	563.73	0.23	8.42	1.47	3.06
11.54	563.76	0.26	8.93	1.61	3.10
13.19	563.78	0.28	9.39	1.75	3.12
14.84	563.80	0.30	9.81	1.89	3.14
16.49	563.82	0.32	10.20	2.02	3.16

Tailwater Channel Data - Lime Pond 2

Tailwater Channel Option: Rectangular Channel

Bottom Width: 5.00 ft

Channel Slope: 0.1000

Channel Manning's n: 0.0200

Channel Invert Elevation: 563.50 ft

Roadway Data for Crossing: Lime Pond 2

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 568.00 ft

Roadway Surface: Gravel

Roadway Top Width: 15.00 ft

APPENDIX C-4:
CENTER CHANNEL CULVERT ANALYSIS

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

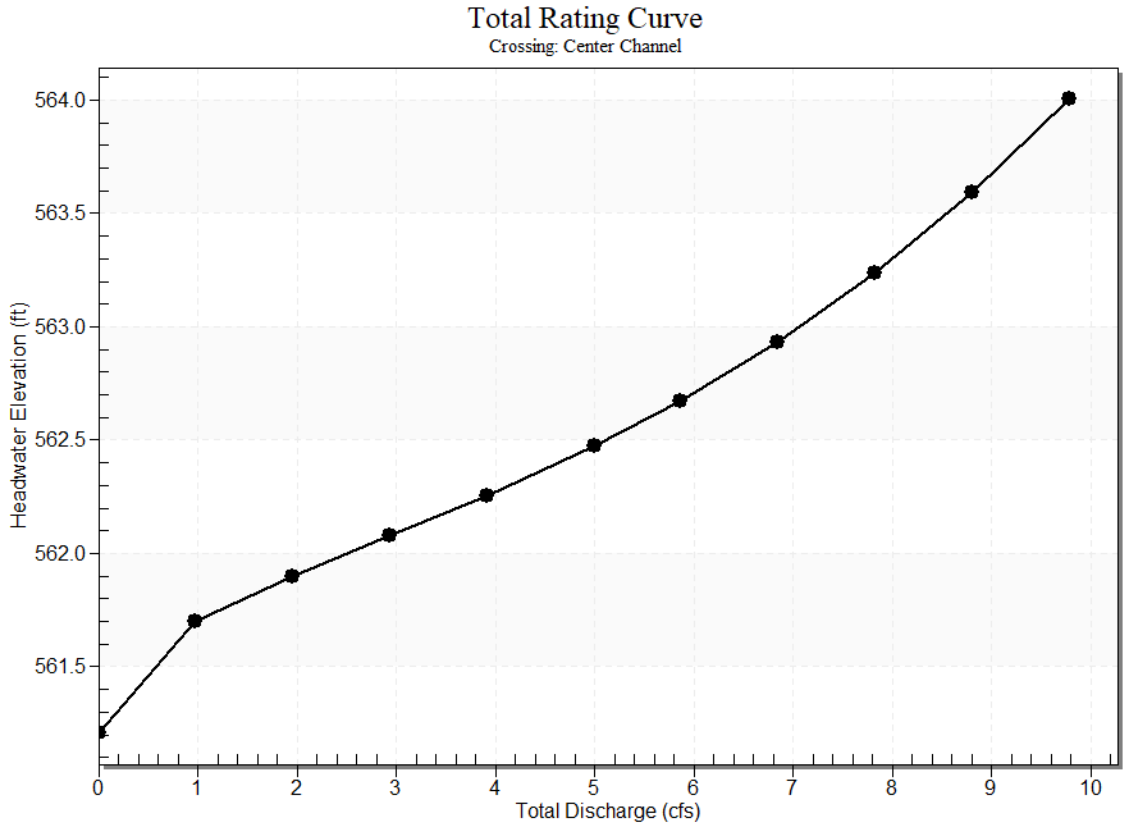
Design Flow: 5.00 cfs

Maximum Flow: 9.78 cfs

Table 1 - Summary of Culvert Flows at Crossing: Center Channel

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert - Center Channel North Discharge (cfs)	Culvert - Center Channel South Discharge (cfs)	Roadway Discharge (cfs)	Iterations
561.21	0.00	0.00	0.00	0.00	0
561.70	0.98	0.65	0.33	0.00	7
561.90	1.96	1.17	0.79	0.00	4
562.08	2.93	1.67	1.27	0.00	4
562.26	3.91	2.15	1.76	0.00	4
562.47	5.00	2.67	2.33	0.00	5
562.67	5.87	3.08	2.79	0.00	5
562.93	6.85	3.55	3.30	0.00	5
563.24	7.82	4.02	3.81	0.00	5
563.59	8.80	4.49	4.31	0.00	5
564.00	9.78	4.97	4.81	0.00	5
568.00	16.38	8.23	8.14	0.00	Overtopping

Rating Curve Plot for Crossing: Center Channel



Culvert Data: Culvert - Center Channel North

Table 1 - Culvert Summary Table: Culvert - Center Channel North

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	561.21	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
0.98 cfs	0.65 cfs	561.70	0.49	0.0*	1-S2n	0.22	0.33	0.22	0.04	4.96	2.84
1.96 cfs	1.17 cfs	561.90	0.69	0.0*	1-S2n	0.30	0.45	0.30	0.06	5.88	3.73
2.93 cfs	1.67 cfs	562.08	0.87	0.0*	1-S2n	0.36	0.55	0.37	0.08	6.31	4.37
3.91	2.15	562.26	1.05	0.10	5-	0.42	0.63	0.4	0.10	6.70	4.89

cfs	cfs			8	S2 n			3			
5.00 cfs	2.67 cfs	562.47	1.26	0.36 1	5-S2 n	0.47	0.70	0.4 8	0.11	7.07	5.37
5.87 cfs	3.08 cfs	562.67	1.46	0.70 8	5-S2 n	0.51	0.75	0.5 3	0.12	7.29	5.72
6.85 cfs	3.55 cfs	562.93	1.72	0.95 6	5-S2 n	0.56	0.80	0.5 8	0.14	7.53	6.07
7.82 cfs	4.02 cfs	563.24	2.03	1.23 4	5-S2 n	0.60	0.85	0.6 3	0.15	7.75	6.38
8.80 cfs	4.49 cfs	563.59	2.38	1.54 3	5-S2 n	0.65	0.89	0.6 8	0.16	7.95	6.68
9.78 cfs	4.97 cfs	564.00	2.79	1.88 3	5-S2 n	0.70	0.92	0.7 3	0.17	8.13	6.95

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

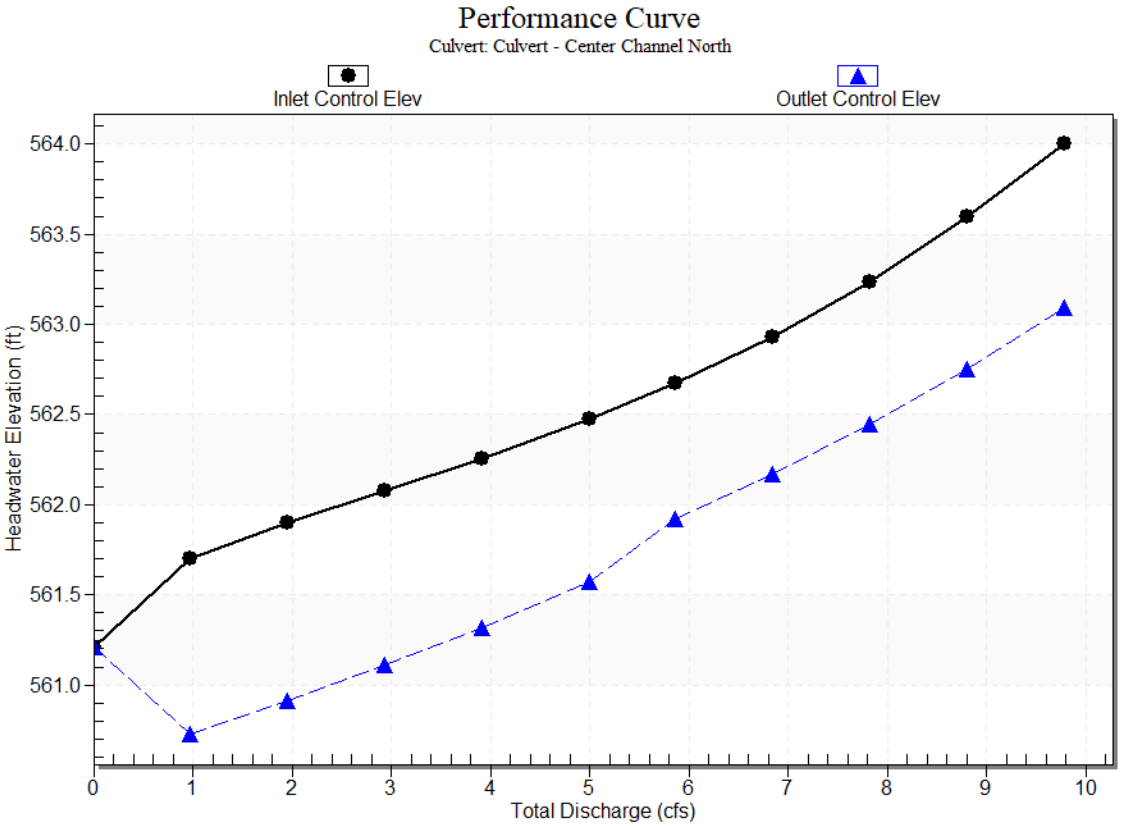
Inlet Elevation (invert): 561.21 ft,

Outlet Elevation (invert): 560.36 ft

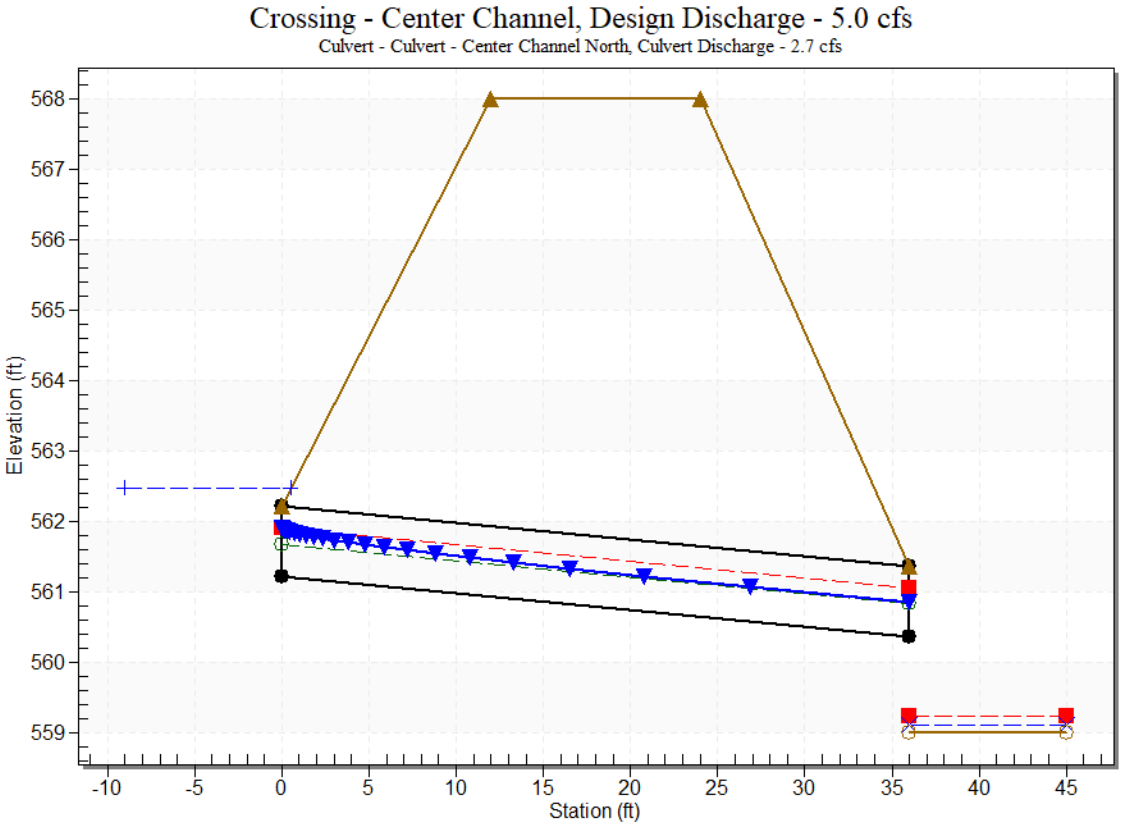
Culvert Length: 36.01 ft,

Culvert Slope: 0.0236

Culvert Performance Curve Plot: Culvert - Center Channel North



Water Surface Profile Plot for Culvert: Culvert - Center Channel North



Site Data - Culvert - Center Channel North

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 561.21 ft

Outlet Station: 36.00 ft

Outlet Elevation: 560.36 ft

Number of Barrels: 1

Culvert Data Summary - Culvert - Center Channel North

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Culvert Data: Culvert - Center Channel South

Table 2 - Culvert Summary Table: Culvert - Center Channel South

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	561.21	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
0.98 cfs	0.33 cfs	561.70	0.34	0.0*	1-S2n	0.14	0.24	0.14	0.04	4.81	2.84
1.96 cfs	0.79 cfs	561.90	0.54	0.0*	1-S2n	0.22	0.37	0.22	0.06	6.20	3.73
2.93 cfs	1.27 cfs	562.08	0.72	0.0*	1-S2n	0.28	0.48	0.28	0.08	6.89	4.37
3.91 cfs	1.76 cfs	562.26	0.90	0.0*	1-S2n	0.33	0.57	0.34	0.10	7.50	4.89
5.00 cfs	2.33 cfs	562.47	1.11	0.0*	5-S2n	0.38	0.65	0.40	0.11	8.01	5.37
5.87 cfs	2.79 cfs	562.67	1.31	0.0*	5-S2n	0.42	0.72	0.44	0.12	8.34	5.72
6.85 cfs	3.30 cfs	562.93	1.57	0.321	5-S2n	0.46	0.78	0.49	0.14	8.67	6.07
7.82 cfs	3.81 cfs	563.24	1.88	0.606	5-S2n	0.50	0.83	0.53	0.15	8.94	6.38
8.80 cfs	4.31 cfs	563.59	2.23	0.921	5-S2n	0.54	0.87	0.58	0.16	9.19	6.68
9.78 cfs	4.81 cfs	564.00	2.64	1.266	5-S2n	0.58	0.91	0.62	0.17	9.42	6.95

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

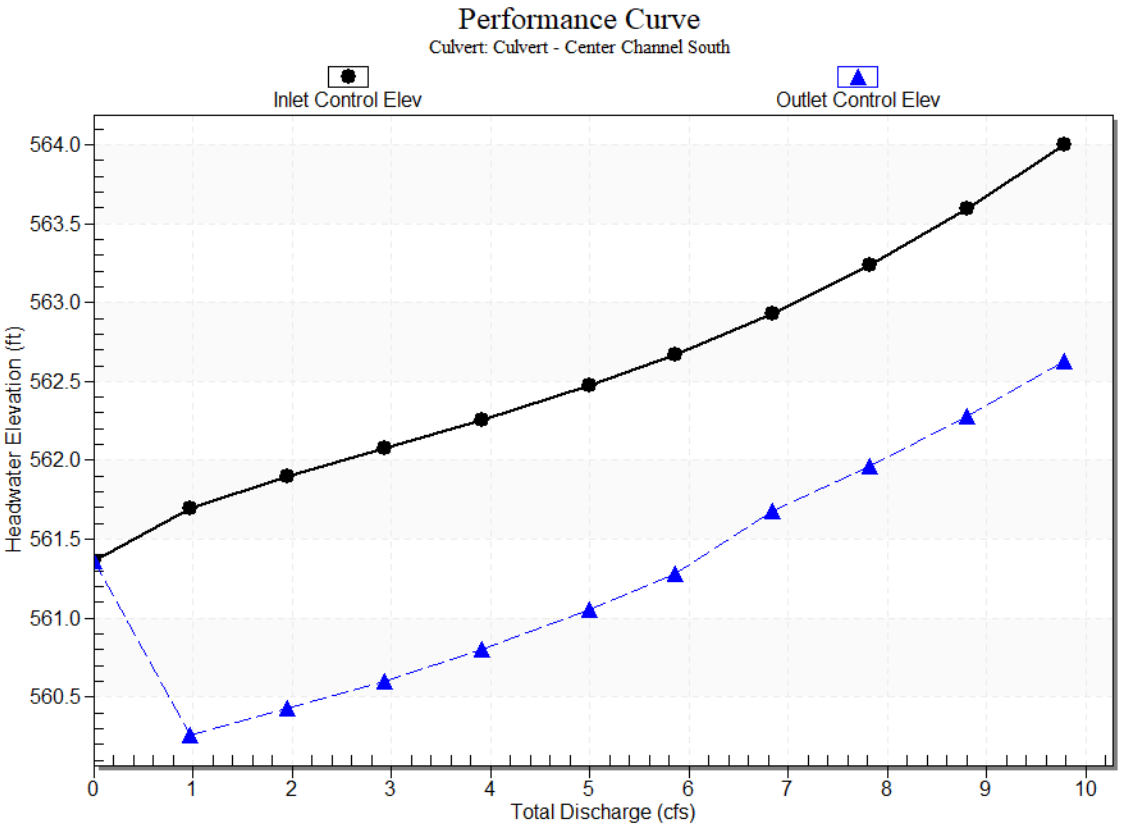
Inlet Elevation (invert): 561.36 ft,

Outlet Elevation (invert): 560.01 ft

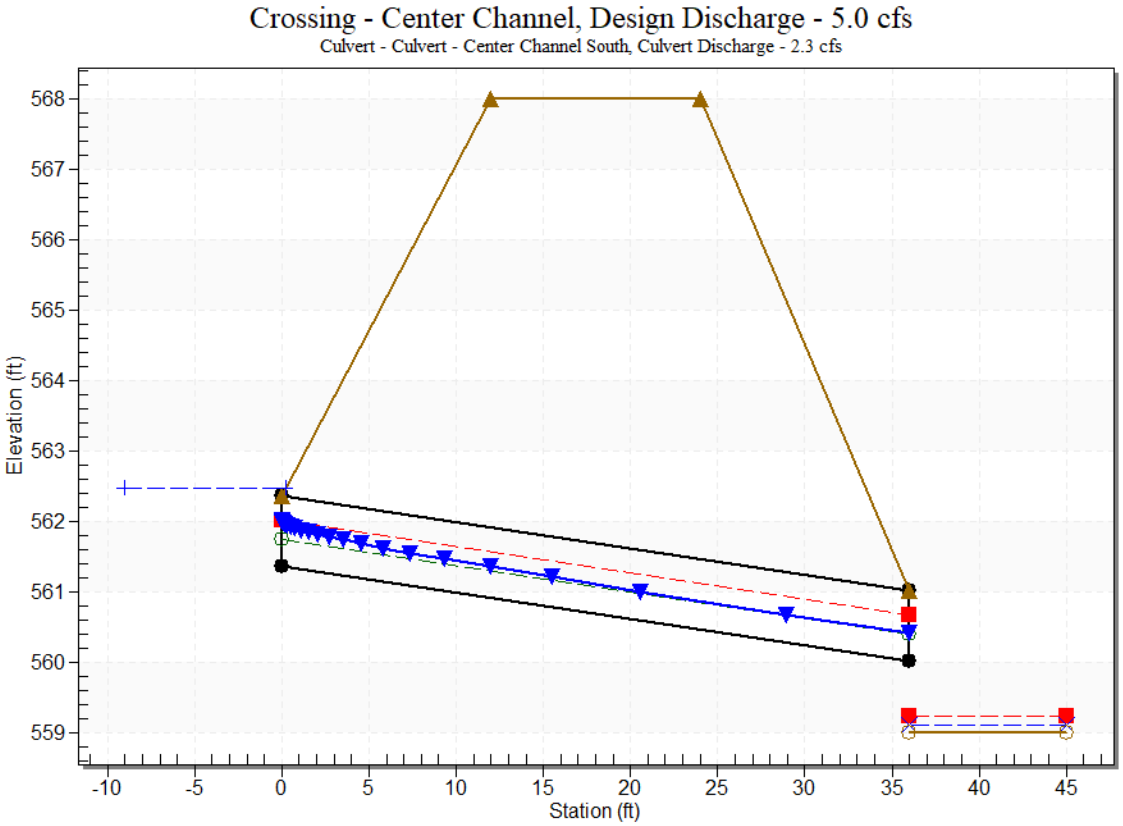
Culvert Length: 36.03 ft,

Culvert Slope: 0.0375

Culvert Performance Curve Plot: Culvert - Center Channel South



Water Surface Profile Plot for Culvert: Culvert - Center Channel South



Site Data - Culvert - Center Channel South

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 561.36 ft

Outlet Station: 36.00 ft

Outlet Elevation: 560.01 ft

Number of Barrels: 1

Culvert Data Summary - Culvert - Center Channel South

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting (Ke=0.9)

Inlet Depression: None

Tailwater Data for Crossing: Center Channel

Table 2 - Downstream Channel Rating Curve (Crossing: Center Channel)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	559.00	0.00	0.00	0.00	0.00
0.98	559.04	0.04	2.84	0.27	2.44
1.96	559.06	0.06	3.73	0.40	2.61
2.93	559.08	0.08	4.37	0.51	2.71
3.91	559.10	0.10	4.89	0.61	2.79
5.00	559.11	0.11	5.37	0.71	2.85
5.87	559.12	0.12	5.72	0.78	2.90
6.85	559.14	0.14	6.07	0.85	2.94
7.82	559.15	0.15	6.38	0.92	2.98
8.80	559.16	0.16	6.68	0.99	3.01
9.78	559.17	0.17	6.95	1.05	3.04

Tailwater Channel Data - Center Channel

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.1000

Channel Manning's n: 0.0200

Channel Invert Elevation: 559.00 ft

Roadway Data for Crossing: Center Channel

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 568.00 ft

Roadway Surface: Gravel

Roadway Top Width: 12.00 ft

APPENDIX C-5:
WEST SETTLING CHANNEL CULVERT ANALYSIS

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

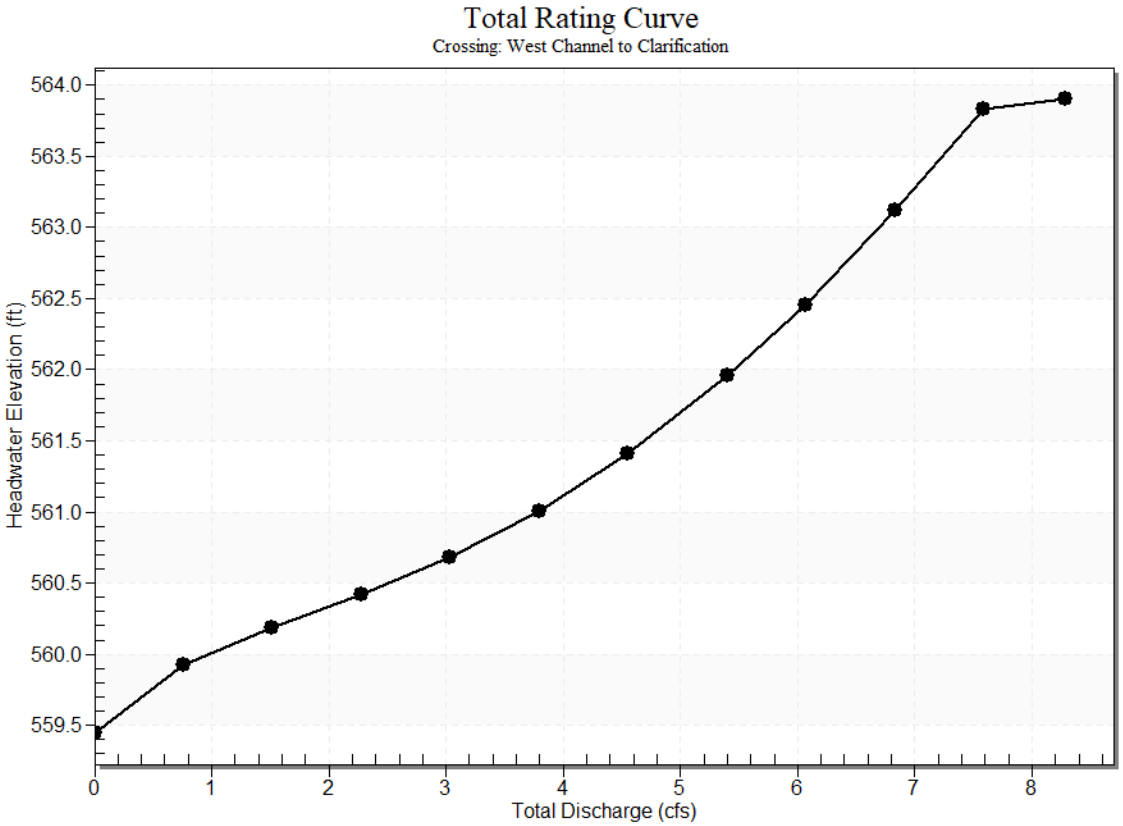
Design Flow: 5.40 cfs

Maximum Flow: 7.59 cfs

Table 1 - Summary of Culvert Flows at Crossing: West Channel to Clarification

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
559.45	0.00	0.00	0.00	1
559.92	0.76	0.76	0.00	1
560.19	1.52	1.52	0.00	1
560.42	2.28	2.28	0.00	1
560.68	3.04	3.04	0.00	1
561.00	3.79	3.79	0.00	1
561.41	4.55	4.55	0.00	1
561.95	5.40	5.40	0.00	1
562.46	6.07	6.07	0.00	1
563.12	6.83	6.83	0.00	1
563.83	7.59	7.56	0.00	68
563.86	7.59	7.59	0.00	Overtopping

Rating Curve Plot for Crossing: West Channel to Clarification



Culvert Data: Culvert 1

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	559.45	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
0.76 cfs	0.76 cfs	559.92	0.47	0.0*	1-S2n	0.18	0.36	0.18	0.07	7.97	1.29
1.52 cfs	1.52 cfs	560.19	0.74	0.0*	1-S2n	0.25	0.52	0.25	0.11	9.77	1.69
2.28 cfs	2.28 cfs	560.42	0.97	0.0*	1-S2n	0.31	0.65	0.31	0.14	10.96	1.98
3.04	3.04	560.68	1.23	0.0*	5-	0.36	0.75	0.3	0.17	11.4	2.21

cfs	cfs				S2 n			7		4	
3.79 cfs	3.79 cfs	561.00	1.55	0.0*	5-S2 n	0.41	0.83	0.41	0.19	12.62	2.41
4.55 cfs	4.55 cfs	561.41	1.96	0.0*	5-S2 n	0.45	0.89	0.45	0.21	13.36	2.58
5.40 cfs	5.40 cfs	561.95	2.50	0.0*	5-S2 n	0.50	0.94	0.50	0.24	13.61	2.76
6.07 cfs	6.07 cfs	562.46	3.01	0.0*	5-S2 n	0.53	0.94	0.53	0.26	14.24	2.88
6.83 cfs	6.83 cfs	563.12	3.67	0.0*	5-S2 n	0.57	1.00	0.61	0.27	13.67	3.01
7.59 cfs	7.56 cfs	563.83	4.38	0.0*	5-S2 n	0.61	1.00	0.63	0.29	14.54	3.14

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

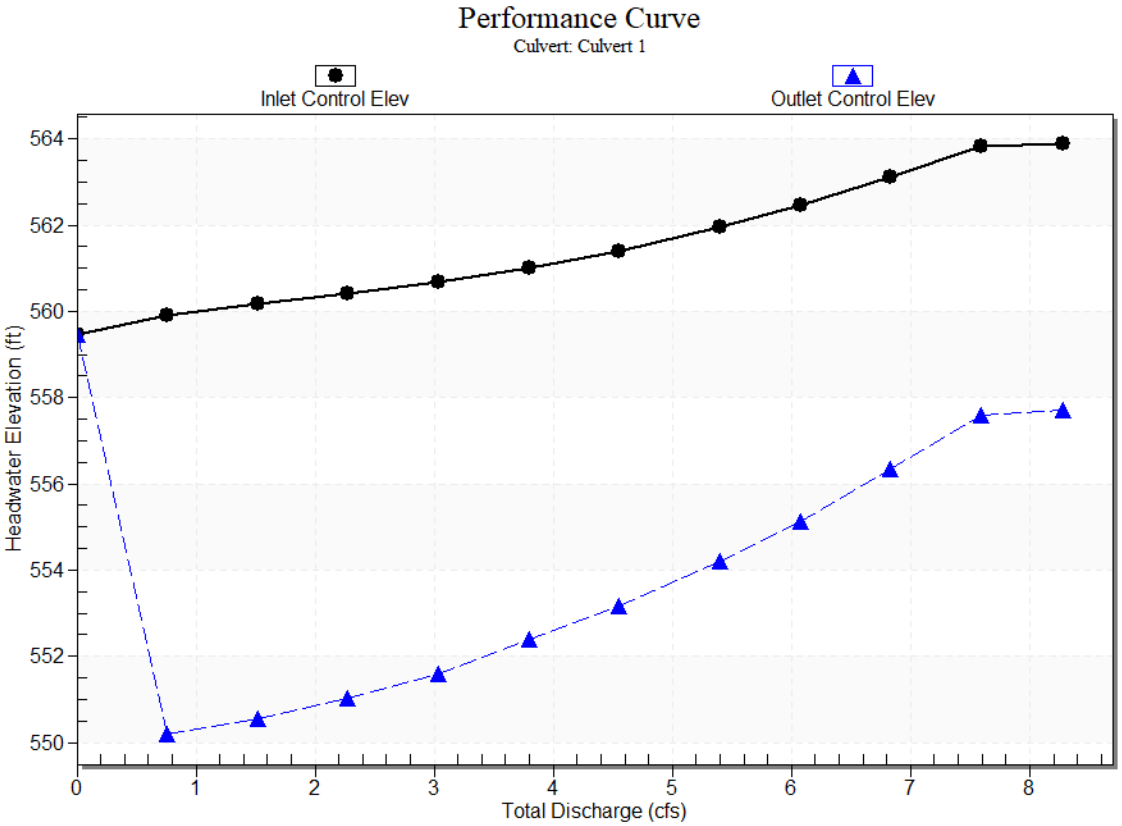
Inlet Elevation (invert): 559.45 ft,

Outlet Elevation (invert): 549.75 ft

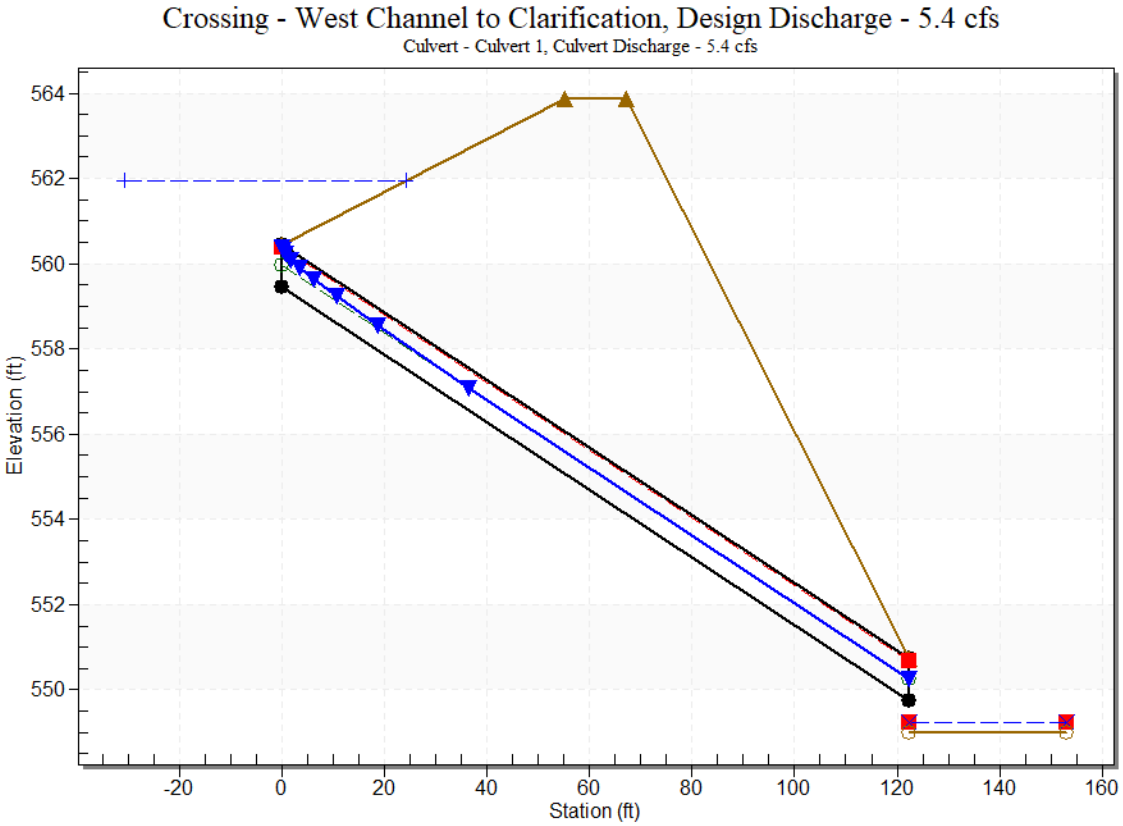
Culvert Length: 122.78 ft,

Culvert Slope: 0.0792

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 559.45 ft

Outlet Station: 122.40 ft

Outlet Elevation: 549.75 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: West Channel to Clarification

Table 2 - Downstream Channel Rating Curve (Crossing: West Channel to Clarification)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	549.00	0.00	0.00	0.00	0.00
0.76	549.07	0.07	1.29	0.05	0.84
1.52	549.11	0.11	1.69	0.07	0.90
2.28	549.14	0.14	1.98	0.09	0.93
3.04	549.17	0.17	2.21	0.11	0.96
3.79	549.19	0.19	2.41	0.12	0.98
4.55	549.21	0.21	2.58	0.13	0.99
5.40	549.24	0.24	2.76	0.15	1.01
6.07	549.26	0.26	2.88	0.16	1.02
6.83	549.27	0.27	3.01	0.17	1.03
7.59	549.29	0.29	3.14	0.18	1.04

Tailwater Channel Data - West Channel to Clarification

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 1.00 (_:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0200

Channel Invert Elevation: 549.00 ft

Roadway Data for Crossing: West Channel to Clarification

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 35.00 ft

Crest Elevation: 563.86 ft

Roadway Surface: Gravel

Roadway Top Width: 12.00 ft

APPENDIX C-6:
CLARIFICATION POND WEIR AND CULVERT ANALYSIS

Clarification Pond Outlet Structure Calculations

The Clarification Pond outlet structure is a 6-foot long rectangular weir, starting elevation at 546.09 ft. The discharge rate is calculated using $Q = CLH^{1.48}$.

Q = discharge rate, cfs

C = Weir Coefficient, for this case, C is 0.7

L = The length of the weir, 6 ft

H = the head water above the crest of the weir

Elevation (feet MSL)	Head (feet)	Discharge (cubic feet per second)
546.09	0	0
547	0.91	3.652839
548	1.91	10.94407
549	2.91	20.40849
550	3.91	31.59882
551	4.91	44.26392
552	5.91	58.23697

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

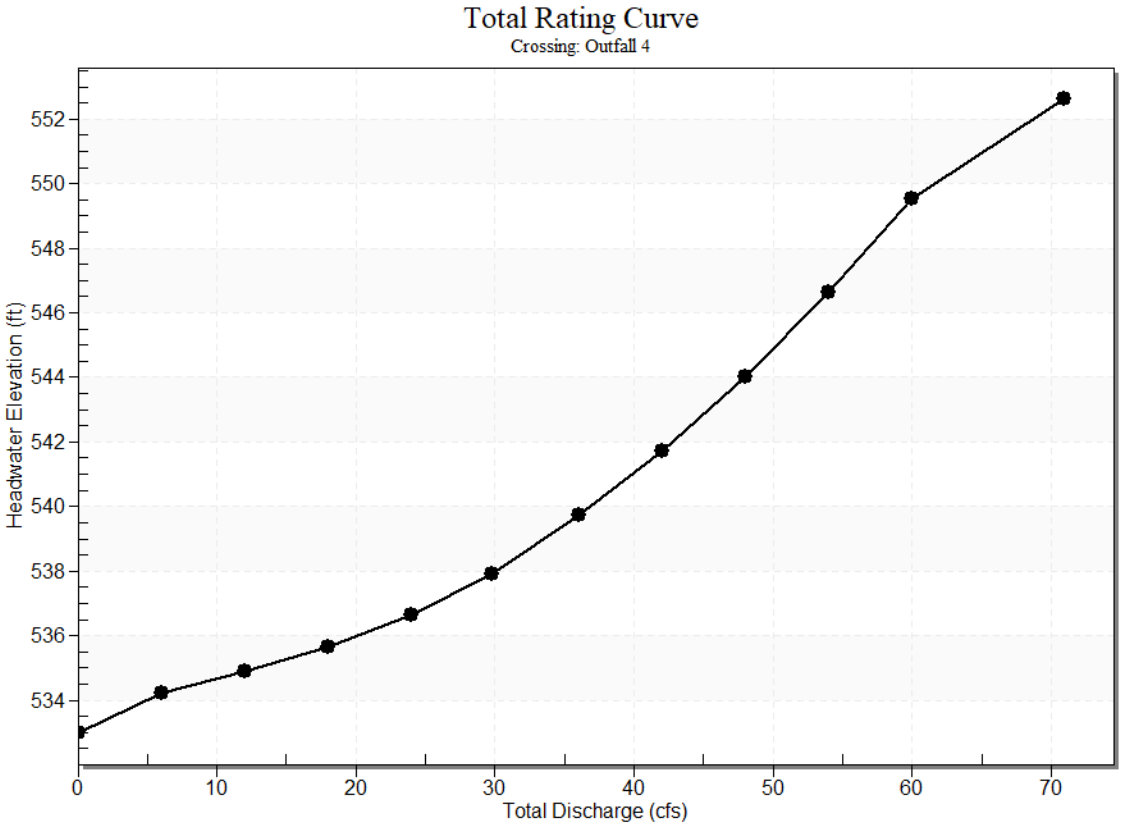
Design Flow: 29.80 cfs

Maximum Flow: 60.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: Outfall 4

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
533.00	0.00	0.00	0.00	1
534.24	6.00	6.00	0.00	1
534.91	12.00	12.00	0.00	1
535.64	18.00	18.00	0.00	1
536.63	24.00	24.00	0.00	1
537.92	29.80	29.80	0.00	1
539.72	36.00	36.00	0.00	1
541.71	42.00	42.00	0.00	1
544.01	48.00	48.00	0.00	1
546.62	54.00	54.00	0.00	1
549.54	60.00	60.00	0.00	1
552.50	65.50	65.50	0.00	Overtopping

Rating Curve Plot for Crossing: Outfall 4



Culvert Data: Culvert 1

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	533.00	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
6.00 cfs	6.00 cfs	534.24	1.24	0.210	1-S2n	0.74	0.87	0.74	0.11	5.69	5.37
12.00 cfs	12.00 cfs	534.91	1.91	1.048	1-S2n	1.10	1.24	1.10	0.17	6.81	7.06
18.00 cfs	18.00 cfs	535.64	2.64	2.336	5-S2n	1.45	1.53	1.45	0.22	7.39	8.27
24.00	24.00	536.63	3.63	3.47	7-	2.00	1.73	1.7	0.26	8.29	9.25

cfs	cfs			5	M2c			3			
29.80 cfs	29.80 cfs	537.92	4.90	4.916	7-M2c	2.00	1.86	1.86	0.30	9.79	10.05
36.00 cfs	36.00 cfs	539.72	6.59	6.716	7-M2c	2.00	1.81	1.81	0.33	12.06	10.81
42.00 cfs	42.00 cfs	541.71	8.61	8.712	6-FFc	2.00	2.00	2.00	0.37	13.37	11.47
48.00 cfs	48.00 cfs	544.01	10.93	11.014	6-FFc	2.00	2.00	2.00	0.40	15.28	12.07
54.00 cfs	54.00 cfs	546.62	13.57	13.624	6-FFc	2.00	2.00	2.00	0.43	17.19	12.63
60.00 cfs	60.00 cfs	549.54	16.52	16.540	6-FFc	2.00	2.00	2.00	0.46	19.10	13.14

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 533.00 ft,

Outlet Elevation (invert): 532.19 ft

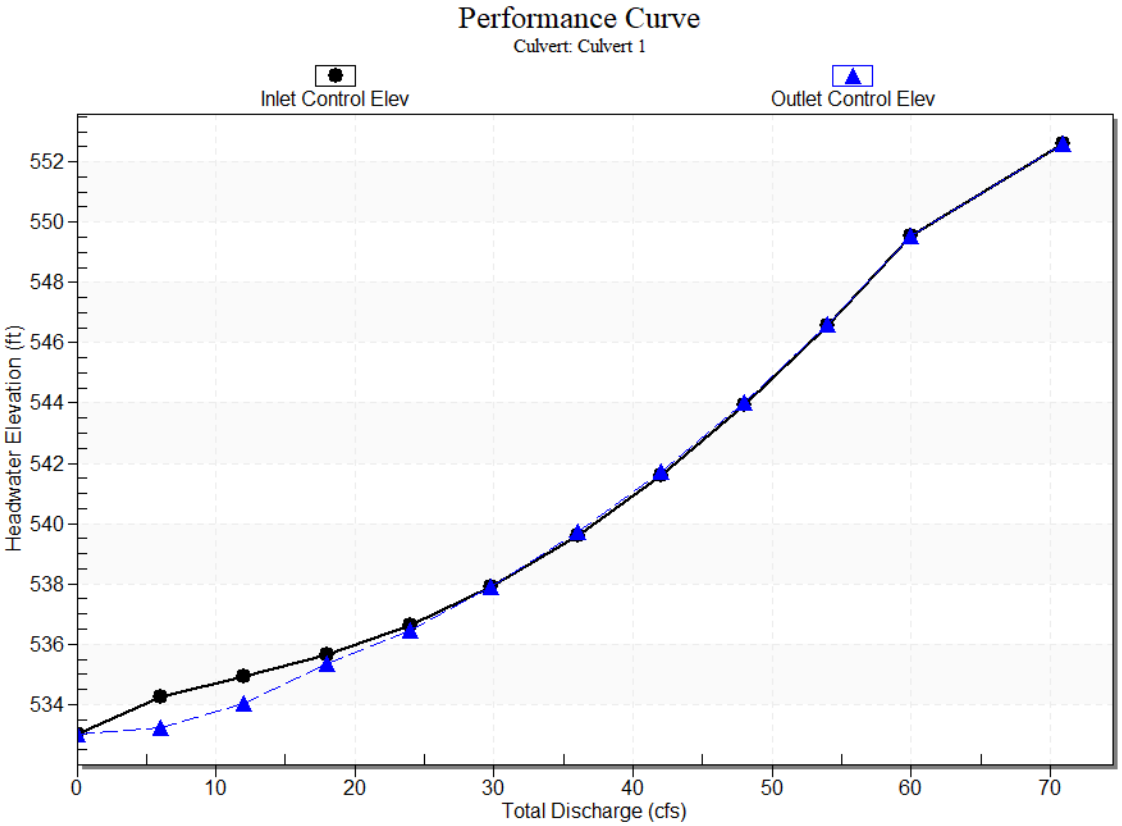
Culvert Length: 115.00 ft,

Culvert Slope: 0.0070

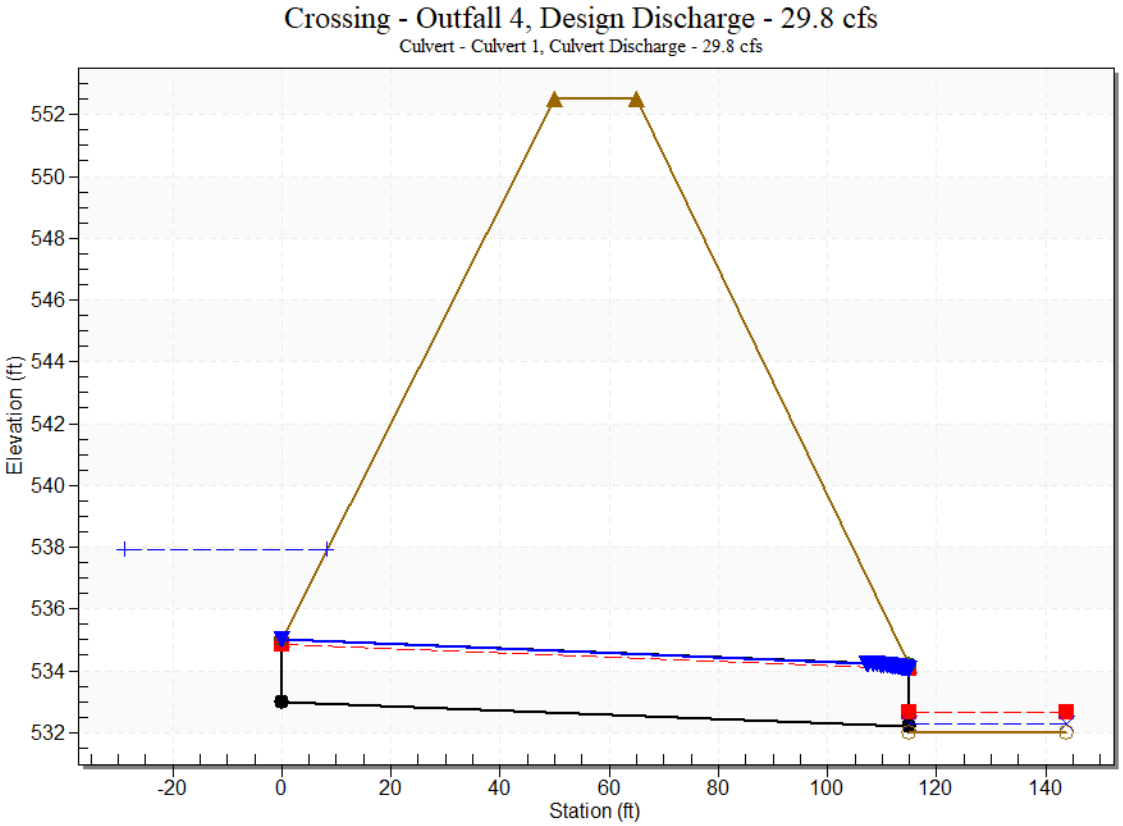
Inlet Throat Elevation: 533.00 ft,

Inlet Crest Elevation: 532.19 ft

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 533.00 ft

Outlet Station: 115.00 ft

Outlet Elevation: 532.19 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: Yes

Tailwater Data for Crossing: Outfall 4

Table 2 - Downstream Channel Rating Curve (Crossing: Outfall 4)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	532.00	0.00	0.00	0.00	0.00
6.00	532.11	0.11	5.37	0.70	2.83
12.00	532.17	0.17	7.06	1.06	3.02
18.00	532.22	0.22	8.27	1.36	3.12
24.00	532.26	0.26	9.25	1.62	3.20
29.80	532.30	0.30	10.05	1.85	3.25
36.00	532.33	0.33	10.81	2.08	3.30
42.00	532.37	0.37	11.47	2.28	3.34
48.00	532.40	0.40	12.07	2.48	3.37
54.00	532.43	0.43	12.63	2.67	3.40
60.00	532.46	0.46	13.14	2.85	3.43

Tailwater Channel Data - Outfall 4

Tailwater Channel Option: Rectangular Channel

Bottom Width: 10.00 ft

Channel Slope: 0.1000

Channel Manning's n: 0.0200

Channel Invert Elevation: 532.00 ft

Roadway Data for Crossing: Outfall 4

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

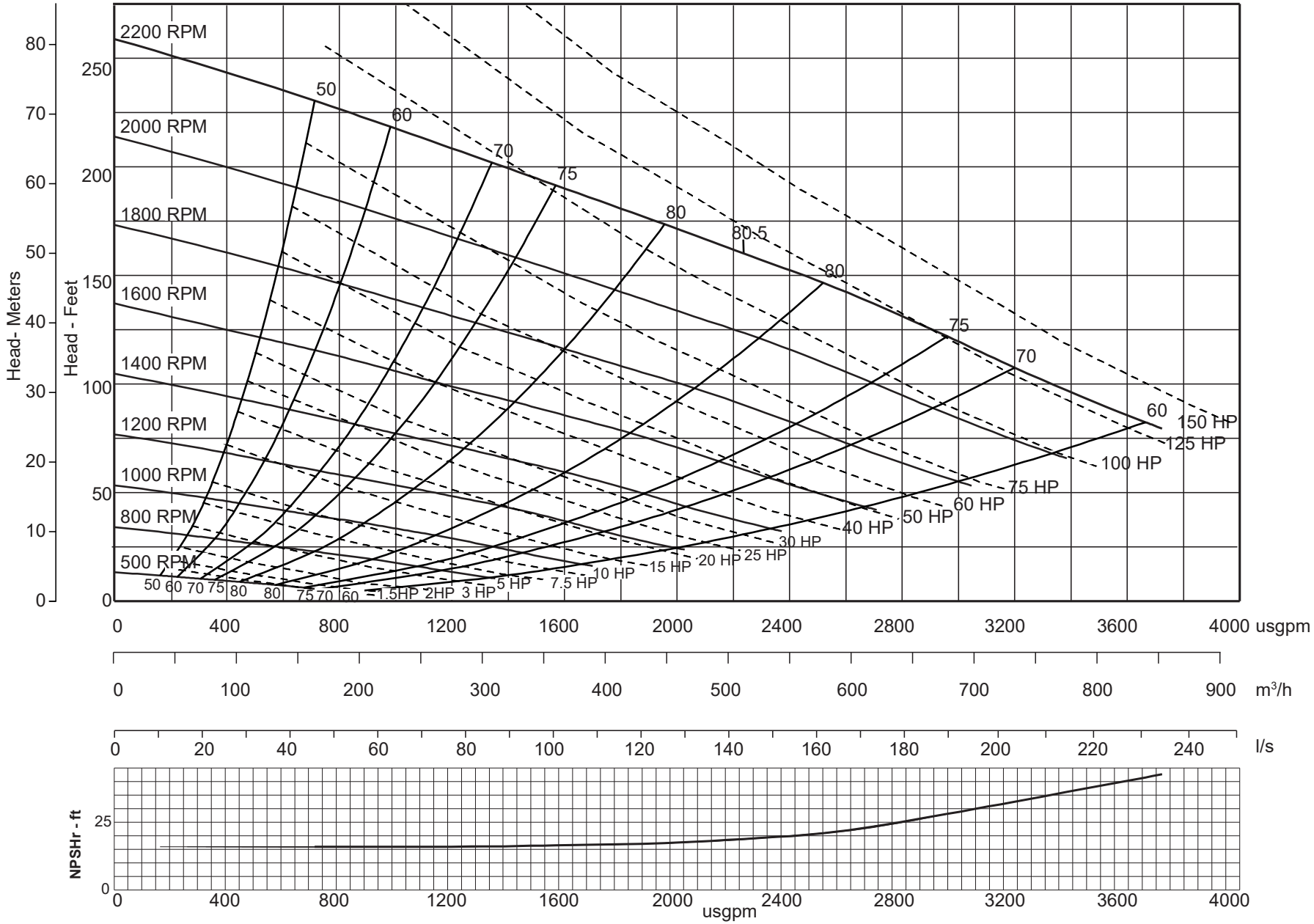
Crest Elevation: 552.50 ft

Roadway Surface: Gravel

Roadway Top Width: 15.00 ft

APPENDIX D:

LAKESIDE AND LIME POND 3 PUMP CURVE



Note: Losses from priming system not shown

PIONEER PUMP
PERFORMANCE THROUGH INNOVATION™

Model	PP66S12	
Size	6” x 6”	150 mm x 150 mm
Impeller Diameter	12.0”	305 mm
Solids Handling Size	3.0”	76 mm

DWG No. A5856HQ
Revision 003
Drawn By
Date 31 Mar 2014

APPENDIX E:
HYDRAULIC MODELING – WINTR-20

WinTR-20 Printed Page File Beginning of Input Data List
C:\Users\kfinke\Documents\CWLP-WinTR-20 2026 845 2.inp

WinTR-20: Version 3.30 0 0 0.1 0 Illinois,Sangamon
City Water Light and Power
Springfield, Illinois

SUB-AREA:
Dallman Reach 1 0.05905 86.1 0.8965 YY
Clarif Reach 2 0.01622 93.67 0.083 YY
Lime 1 Reach 4 0.00794 89.8 0.202 YY Y
Lime 2 Reach 3 0.00614 91. 0.177
Lake + L3 Reach 8 0.03927 73.24 1.26
Cntr Cnl Reach 5 0.0011875 98. 0.1
W Stl ChnlReach 7 0.003328 98. 0.1
Decant Reach 6 0.002892 100. 0.1365 YY Y

STREAM REACH:
Reach 1 Reach 2 D Pond YY Y
Reach 2 Outlet C Pond YY
Reach 7 Reach 2 W Stl Chnl
Reach 5 Reach 7 Cntr Cnl YY Y
Reach 4 Reach 7 Lime 1
Reach 3 Reach 5 Lime 2
Reach 8 Reach 2 Lake + L3
Reach 6 Reach 2 Decant YY

STORM ANALYSIS:
1000-yr 8.38 NOAA_A 2 2.95

STRUCTURE RATING:
C Pond 546.09
546.09 0. 0.
547. 3.6528 7.0184
548. 10.944 14.905
549. 20.408 22.9745
550. 31.599 31.2278
551. 44.264 39.6751
552. 58.237 48.3378
D Pond 549.07
549.07 0. 0.
550. 11.50 0.1
551. 34.6 1.66
552. 65.98 7.25
Lime 1 564.93
564.93 0. 0.
565. 0.02 0.285
566. 4.05 4.405
567. 8.75 8.608
568. 11.85 12.897
Lime 2 564.52
564.52 0. 0.
566. 7.3 4.722
567. 14.7 7.968
568. 20.18 11.29
W Stl Chnl559.45
559.45 0. 0.
560. 0.95 0.134
561. 3.79 0.528
562. 5.46 1.186
562.5 6.12 1.602
Cntr Cnl 561.28
561.28 0. 0.
562. 2.48 0.0011
563. 7.08 0.06862
564. 9.78 0.2457

Lake + L3 559.

559.	0.	0.0005
559.01	34.95	0.000501
560.	34.96	0.008035
561.	34.97	0.0143
562.	34.98	0.4605
563.	34.99	2.8624

Decant 557.5

557.5	0.	0.
558.5	4.3	0.0008
559.5	12.75	0.001623
560.5	20.35	0.002466
561.5	52.5	0.003332

RAINFALL DISTRIBUTION:

NOAA_A 0.1

0.0	0.000776	0.00141	0.00205	0.00270
0.00336	0.00403	0.00471	0.00539	0.00609
0.00679	0.00751	0.00823	0.00897	0.00971
0.01046	0.01122	0.01199	0.01277	0.01356
0.01435	0.01516	0.01598	0.01680	0.01764
0.01848	0.01933	0.02019	0.02106	0.02194
0.02283	0.02373	0.02464	0.02556	0.02648
0.02742	0.02836	0.02932	0.03028	0.03125
0.03223	0.03322	0.03422	0.03523	0.03625
0.03727	0.03831	0.03936	0.04041	0.04147
0.04255	0.04363	0.04472	0.04582	0.04693
0.04805	0.04918	0.05032	0.05146	0.05262
0.05378	0.05498	0.05622	0.05750	0.05881
0.06016	0.06154	0.06297	0.06442	0.06592
0.06745	0.06902	0.07063	0.07227	0.07395
0.07567	0.07742	0.07921	0.08104	0.08290
0.08480	0.08674	0.08871	0.09072	0.09277
0.09485	0.09697	0.09913	0.10132	0.10355
0.10582	0.10824	0.11081	0.11354	0.11643
0.11946	0.12265	0.12599	0.12949	0.13314
0.13695	0.14090	0.14502	0.14928	0.15370
0.15827	0.16348	0.16932	0.17580	0.18291
0.19065	0.19971	0.21009	0.22179	0.23481
0.24900	0.27176	0.29572	0.32954	0.37820
0.46660	0.62180	0.67046	0.70428	0.72824
0.75100	0.76519	0.77821	0.78991	0.80029
0.80935	0.81709	0.82420	0.83068	0.83652
0.84173	0.84630	0.85072	0.85498	0.85910
0.86305	0.86686	0.87051	0.87401	0.87735
0.88054	0.88357	0.88646	0.88919	0.89176
0.89418	0.89645	0.89868	0.90087	0.90303
0.90515	0.90723	0.90928	0.91129	0.91326
0.91520	0.91710	0.91896	0.92079	0.92258
0.92433	0.92605	0.92773	0.92937	0.93098
0.93255	0.93408	0.93558	0.93703	0.93846
0.93984	0.94119	0.94250	0.94378	0.94502
0.94622	0.94738	0.94854	0.94968	0.95082
0.95195	0.95307	0.95418	0.95528	0.95637
0.95745	0.95853	0.95959	0.96064	0.96169
0.96273	0.96375	0.96477	0.96578	0.96678
0.96777	0.96875	0.96972	0.97068	0.97164
0.97258	0.97352	0.97444	0.97536	0.97627
0.97717	0.97806	0.97894	0.97981	0.98067
0.98152	0.98236	0.98320	0.98402	0.98484
0.98565	0.98644	0.98723	0.98801	0.98878
0.98954	0.99029	0.99103	0.99177	0.99249
0.99321	0.99391	0.99461	0.99529	0.99597
0.99664	0.99730	0.99795	0.99859	0.999224
1.0				

GLOBAL OUTPUT:
0.1 YY N YY N

VERIFICATION:
DATA PREP Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
PROCESSINGY Y Y Y Y Y Y Y Y Y Y

WinTR-20 Printed Page File End of Input Data List

City Water Light and Power
Springfield, Illinois

Name of printed page file:
C:\Users\kfinke\Documents\CWLP-WinTR-20 2026 845 2.out

STORM 1000-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Lime 2	0.006		7.273	12.15	38.7	6305.69	

Line Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

9.100	0.5	0.5	0.6	0.6	0.7	0.7	0.7
9.800	0.8	0.8	0.9	0.9	1.0	1.0	1.1
10.500	1.1	1.2	1.4	1.6	1.8	1.9	2.2
11.200	2.6	3.0	3.4	3.8	4.9	6.4	8.0
11.900	11.3	18.4	32.7	34.2	19.0	11.8	8.6
12.600	6.7	5.0	4.3	3.8	3.3	2.9	2.6
13.300	2.3	2.1	1.9	1.7	1.5	1.4	1.4
14.000	1.3	1.3	1.2	1.2	1.1	1.1	1.0
14.700	1.0	0.9	0.9	0.8	0.8	0.7	0.7
15.400	0.7	0.7	0.7	0.7	0.7	0.7	0.6
16.100	0.6	0.6	0.6	0.6	0.6	0.6	0.6
16.800	0.5	0.5	0.5	0.5	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Reach 3	0.006	Upstream	7.273	12.15	38.7	6305.69	

Line Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

9.100	0.5	0.5	0.6	0.6	0.7	0.7	0.7
9.800	0.8	0.8	0.9	0.9	1.0	1.0	1.1
10.500	1.1	1.2	1.4	1.6	1.8	1.9	2.2
11.200	2.6	3.0	3.4	3.8	4.9	6.4	8.0
11.900	11.3	18.4	32.7	34.2	19.0	11.8	8.6
12.600	6.7	5.0	4.3	3.8	3.3	2.9	2.6
13.300	2.3	2.1	1.9	1.7	1.5	1.4	1.4
14.000	1.3	1.3	1.2	1.2	1.1	1.1	1.0
14.700	1.0	0.9	0.9	0.8	0.8	0.7	0.7
15.400	0.7	0.7	0.7	0.7	0.7	0.7	0.6
16.100	0.6	0.6	0.6	0.6	0.6	0.6	0.6

16.800	0.5	0.5	0.5	0.5	0.5	0.0

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Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Reach 3	0.006	Downstream	7.040	565.02	13.24	2.4	398.96

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
11.500	0.5	0.5	0.6	0.7	0.8	0.9	1.2
12.200	1.7	2.0	2.2	2.3	2.3	2.4	2.4
12.900	2.4	2.4	2.4	2.4	2.4	2.4	2.4
13.600	2.4	2.4	2.4	2.4	2.4	2.4	2.4
14.300	2.3	2.3	2.3	2.3	2.3	2.3	2.2
15.000	2.2	2.2	2.2	2.2	2.2	2.1	2.1
15.700	2.1	2.1	2.1	2.0	2.0	2.0	2.0
16.400	2.0	2.0	1.9	1.9	1.9	1.9	1.9
17.100	1.9	1.8	1.8	1.8	1.8	1.8	1.8
17.800	1.7	1.7	1.7	1.7	1.7	1.7	1.6
18.500	1.6	1.6	1.6	1.6	1.6	1.5	1.5
19.200	1.5	1.5	1.5	1.5	1.5	1.4	1.4
19.900	1.4	1.4	1.4	1.4	1.4	1.3	1.3
20.600	1.3	1.3	1.3	1.3	1.3	1.3	1.2
21.300	1.2	1.2	1.2	1.2	1.2	1.2	1.2
22.000	1.1	1.1	1.1	1.1	1.1	1.1	1.1
22.700	1.1	1.1	1.1	1.0	1.0	1.0	1.0
23.400	1.0	1.0	1.0	1.0	1.0	1.0	0.9
24.100	0.9	0.9	0.9	0.9	0.9	0.9	0.9
24.800	0.9	0.8	0.8	0.8	0.8	0.8	0.8
25.500	0.8	0.8	0.8	0.8	0.7	0.7	0.7
26.200	0.7	0.7	0.7	0.7	0.7	0.7	0.7
26.900	0.7	0.6	0.6	0.6	0.6	0.6	0.6
27.600	0.6	0.6	0.6	0.6	0.6	0.6	0.6
28.300	0.5	0.5	0.5	0.5	0.5	0.5	0.5
29.000	0.5	0.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Cntr Cnl	0.001		7.154		12.12	9.1	7695.71

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
11.000	0.5	0.6	0.6	0.7	0.8	0.9	1.3
11.700	1.5	2.0	2.9	5.0	8.9	4.7	2.5
12.400	1.7	1.5	1.0	0.9	0.8	0.7	0.6
13.100	0.5	0.0					

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Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 5	0.007	Upstream	7.058		12.12	10.5	1426.29

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
10.400	0.5	0.5	0.6	0.6	0.7	0.7	0.8
11.100	0.9	1.0	1.1	1.2	1.3	1.8	2.1
11.800	2.7	3.6	6.0	10.1	6.3	4.5	3.9
12.500	3.7	3.4	3.2	3.2	3.1	3.0	3.0
13.200	2.9	2.9	2.8	2.8	2.7	2.7	2.7
13.900	2.7	2.6	2.6	2.6	2.6	2.5	2.5
14.600	2.5	2.5	2.4	2.4	2.4	2.4	2.3
15.300	2.3	2.3	2.3	2.3	2.2	2.2	2.2
16.000	2.2	2.2	2.1	2.1	2.1	2.1	2.1
16.700	2.0	2.0	2.0	2.0	1.9	1.8	1.8
17.400	1.8	1.8	1.8	1.8	1.7	1.7	1.7
18.100	1.7	1.7	1.7	1.6	1.6	1.6	1.6
18.800	1.6	1.6	1.5	1.5	1.5	1.5	1.5
19.500	1.5	1.5	1.4	1.4	1.4	1.4	1.4
20.200	1.4	1.4	1.3	1.3	1.3	1.3	1.3
20.900	1.3	1.3	1.3	1.2	1.2	1.2	1.2
21.600	1.2	1.2	1.2	1.2	1.1	1.1	1.1
22.300	1.1	1.1	1.1	1.1	1.1	1.1	1.1
23.000	1.0	1.0	1.0	1.0	1.0	1.0	1.0
23.700	1.0	1.0	1.0	0.9	0.9	0.9	0.9
24.400	0.9	0.9	0.9	0.9	0.9	0.8	0.8
25.100	0.8	0.8	0.8	0.8	0.8	0.8	0.8
25.800	0.8	0.7	0.7	0.7	0.7	0.7	0.7
26.500	0.7	0.7	0.7	0.7	0.7	0.6	0.6
27.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
27.900	0.6	0.6	0.6	0.6	0.5	0.5	0.5
28.600	0.5	0.5	0.5	0.5	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 5	0.007	Downstream	7.058	562.97	12.19	6.9	945.98

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
10.400	0.5	0.5	0.6	0.6	0.7	0.7	0.8
11.100	0.9	1.0	1.1	1.2	1.3	1.8	2.1
11.800	2.5	2.8	3.6	5.5	6.9	6.2	5.3
12.500	4.6	4.2	3.8	3.5	3.4	3.2	3.1
13.200	3.1	3.0	2.9	2.9	2.8	2.8	2.7

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
13.900	2.7	2.7	2.7	2.6	2.6	2.6	2.6
14.600	2.5	2.5	2.5	2.4	2.4	2.4	2.3
15.300	2.3	2.3	2.3	2.3	2.2	2.2	2.2
16.000	2.2	2.2	2.1	2.1	2.1	2.1	2.1
16.700	2.0	2.0	2.0	2.0	1.9	1.8	1.8
17.400	1.8	1.8	1.8	1.8	1.7	1.7	1.7
18.100	1.7	1.7	1.7	1.6	1.6	1.6	1.6
18.800	1.6	1.6	1.5	1.5	1.5	1.5	1.5
19.500	1.5	1.5	1.4	1.4	1.4	1.4	1.4
20.200	1.4	1.4	1.3	1.3	1.3	1.3	1.3
20.900	1.3	1.3	1.3	1.2	1.2	1.2	1.2
21.600	1.2	1.2	1.2	1.2	1.2	1.1	1.1
22.300	1.1	1.1	1.1	1.1	1.1	1.1	1.1
23.000	1.0	1.0	1.0	1.0	1.0	1.0	1.0
23.700	1.0	1.0	1.0	0.9	0.9	0.9	0.9
24.400	0.9	0.9	0.9	0.9	0.9	0.8	0.8
25.100	0.8	0.8	0.8	0.8	0.8	0.8	0.8
25.800	0.8	0.7	0.7	0.7	0.7	0.7	0.7
26.500	0.7	0.7	0.7	0.7	0.7	0.6	0.6
27.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
27.900	0.6	0.6	0.6	0.6	0.5	0.5	0.5
28.600	0.5	0.5	0.5	0.5	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
W Stl Chnl	0.003		8.085		12.12	25.6	7695.71

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
9.400	0.5	0.5	0.5	0.6	0.6	0.6	0.7
10.100	0.7	0.7	0.7	0.8	0.8	0.9	1.0
10.800	1.1	1.2	1.3	1.6	1.8	2.0	2.3
11.500	2.5	3.7	4.2	5.6	8.1	14.1	24.9
12.200	13.0	7.0	4.8	4.2	2.9	2.4	2.2
12.900	1.9	1.7	1.5	1.3	1.2	1.1	1.0
13.600	0.9	0.8	0.8	0.7	0.7	0.7	0.7
14.300	0.6	0.6	0.6	0.6	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Lime 1	0.008		7.138		12.17	47.2	5938.72

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
8.600	0.5	0.5	0.5	0.5	0.6	0.6	0.6
9.300	0.7	0.7	0.8	0.8	0.9	0.9	1.0
10.000	1.1	1.1	1.2	1.2	1.3	1.4	1.5
10.700	1.7	1.9	2.1	2.4	2.7	3.1	3.6
11.400	4.1	4.6	5.8	7.8	9.7	13.5	21.4
12.100	38.1	44.7	27.1	16.9	11.9	9.3	6.8
12.800	5.7	5.0	4.4	3.8	3.4	3.0	2.7
13.500	2.5	2.2	2.0	1.9	1.8	1.7	1.7
14.200	1.6	1.5	1.5	1.4	1.3	1.3	1.2
14.900	1.2	1.1	1.0	1.0	0.9	0.9	0.9
15.600	0.9	0.9	0.9	0.8	0.8	0.8	0.8
16.300	0.8	0.8	0.8	0.7	0.7	0.7	0.7
17.000	0.7	0.7	0.6	0.6	0.6	0.6	0.6
17.700	0.6	0.6	0.5	0.5	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 4	0.008	Upstream	7.138		12.17	47.2	5938.72

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
8.600	0.5	0.5	0.5	0.5	0.6	0.6	0.6
9.300	0.7	0.7	0.8	0.8	0.9	0.9	1.0
10.000	1.1	1.1	1.2	1.2	1.3	1.4	1.5
10.700	1.7	1.9	2.1	2.4	2.7	3.1	3.6
11.400	4.1	4.6	5.8	7.8	9.7	13.5	21.4
12.100	38.1	44.7	27.1	16.9	11.9	9.3	6.8
12.800	5.7	5.0	4.4	3.8	3.4	3.0	2.7
13.500	2.5	2.2	2.0	1.9	1.8	1.7	1.7
14.200	1.6	1.5	1.5	1.4	1.3	1.3	1.2
14.900	1.2	1.1	1.0	1.0	0.9	0.9	0.9
15.600	0.9	0.9	0.9	0.8	0.8	0.8	0.8
16.300	0.8	0.8	0.8	0.7	0.7	0.7	0.7
17.000	0.7	0.7	0.6	0.6	0.6	0.6	0.6
17.700	0.6	0.6	0.5	0.5	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 4	0.008	Downstream	6.262	565.47	13.76	1.9	241.89

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.900	0.4	0.5	0.8	1.1	1.4	1.5	1.6
12.600	1.7	1.8	1.8	1.8	1.9	1.9	1.9
13.300	1.9	1.9	1.9	1.9	1.9	1.9	1.9
14.000	1.9	1.9	1.9	1.9	1.9	1.9	1.9
14.700	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15.400	1.9	1.8	1.8	1.8	1.8	1.8	1.8
16.100	1.8	1.8	1.8	1.8	1.8	1.8	1.7
16.800	1.7	1.7	1.7	1.7	1.7	1.7	1.7
17.500	1.7	1.7	1.7	1.7	1.6	1.6	1.6
18.200	1.6	1.6	1.6	1.6	1.6	1.6	1.6
18.900	1.6	1.5	1.5	1.5	1.5	1.5	1.5
19.600	1.5	1.5	1.5	1.5	1.5	1.5	1.4
20.300	1.4	1.4	1.4	1.4	1.4	1.4	1.4
21.000	1.4	1.4	1.4	1.4	1.3	1.3	1.3
21.700	1.3	1.3	1.3	1.3	1.3	1.3	1.3
22.400	1.3	1.3	1.3	1.2	1.2	1.2	1.2
23.100	1.2	1.2	1.2	1.2	1.2	1.2	1.2
23.800	1.2	1.2	1.2	1.1	1.1	1.1	1.1
24.500	1.1	1.1	1.1	1.1	1.1	1.1	1.1
25.200	1.0	1.0	1.0	1.0	1.0	1.0	1.0
25.900	1.0	1.0	1.0	1.0	1.0	1.0	0.9
26.600	0.9	0.9	0.9	0.9	0.9	0.9	0.9
27.300	0.9	0.9	0.9	0.9	0.9	0.8	0.8
28.000	0.8	0.8	0.8	0.8	0.8	0.8	0.8
28.700	0.8	0.8	0.8	0.8	0.8	0.8	0.8
29.400	0.7	0.7	0.7	0.7	0.7	0.7	0.7
30.100	0.7	0.7	0.7	0.7	0.7	0.7	0.7
30.800	0.7	0.7	0.7	0.7	0.6	0.6	0.6
31.500	0.6	0.6	0.6	0.6	0.6	0.6	0.6
32.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
32.900	0.6	0.6	0.6	0.5	0.5	0.5	0.5
33.600	0.5	0.5	0.5	0.5	0.5	0.5	0.5
34.300	0.5	0.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 7	0.019	Upstream	6.902		12.12	32.5	1745.76

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
8.600	0.5	0.5	0.5	0.5	0.6	0.7	0.7
9.300	0.8	0.8	0.8	0.9	0.9	1.0	1.0
10.000	1.1	1.1	1.2	1.2	1.3	1.3	1.4
10.700	1.6	1.8	2.0	2.1	2.4	2.8	3.1
11.400	3.6	4.0	5.7	6.5	8.4	11.2	18.3
12.100	31.2	21.1	14.6	11.6	10.5	8.8	8.0

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
12.800	7.5	7.1	6.8	6.5	6.3	6.1	5.9
13.500	5.8	5.6	5.5	5.4	5.4	5.3	5.3
14.200	5.2	5.2	5.1	5.0	5.0	4.9	4.9
14.900	4.8	4.7	4.6	4.6	4.6	4.5	4.5
15.600	4.5	4.4	4.4	4.4	4.3	4.3	4.3
16.300	4.2	4.2	4.2	4.1	4.1	4.0	4.0
17.000	4.0	3.8	3.8	3.8	3.7	3.7	3.7
17.700	3.7	3.6	3.6	3.6	3.5	3.5	3.5
18.400	3.4	3.4	3.4	3.4	3.3	3.3	3.3
19.100	3.3	3.2	3.2	3.2	3.2	3.1	3.1
19.800	3.1	3.1	3.0	3.0	3.0	3.0	2.9
20.500	2.9	2.9	2.9	2.9	2.8	2.8	2.8
21.200	2.8	2.7	2.7	2.7	2.7	2.7	2.6
21.900	2.6	2.6	2.6	2.6	2.5	2.5	2.5
22.600	2.5	2.5	2.4	2.4	2.4	2.4	2.4
23.300	2.3	2.3	2.3	2.3	2.3	2.2	2.2
24.000	2.2	2.1	2.1	2.0	2.0	2.0	2.0
24.700	2.0	1.9	1.9	1.9	1.9	1.9	1.8
25.400	1.8	1.8	1.8	1.8	1.8	1.7	1.7
26.100	1.7	1.7	1.7	1.6	1.6	1.6	1.6
26.800	1.6	1.6	1.6	1.5	1.5	1.5	1.5
27.500	1.5	1.5	1.4	1.4	1.4	1.4	1.4
28.200	1.4	1.4	1.3	1.3	1.3	1.3	1.3
28.900	1.3	1.3	1.3	1.2	1.2	1.2	1.2
29.600	1.2	1.2	1.2	1.2	1.2	1.1	1.1
30.300	1.1	1.1	1.1	1.1	1.1	1.1	1.1
31.000	1.0	1.0	1.0	1.0	1.0	1.0	1.0
31.700	1.0	1.0	1.0	0.9	0.9	0.9	0.9
32.400	0.9	0.9	0.9	0.9	0.9	0.9	0.9
33.100	0.8	0.8	0.8	0.8	0.8	0.8	0.8
33.800	0.8	0.8	0.8	0.8	0.8	0.8	0.7
34.500	0.7	0.7	0.7	0.7	0.7	0.7	0.7
35.200	0.7	0.7	0.7	0.7	0.7	0.7	0.7
35.900	0.6	0.6	0.6	0.6	0.6	0.6	0.6
36.600	0.6	0.6	0.6	0.6	0.6	0.6	0.6
37.300	0.6	0.6	0.6	0.6	0.5	0.5	0.5
38.000	0.5	0.5	0.5	0.5	0.5	0.5	0.5
38.700	0.0						

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 7	0.019	Downstream	6.878	562.02	13.73	5.5	294.85

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Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
9.600	0.5	0.5	0.5	0.6	0.6	0.6	0.6
10.300	0.7	0.7	0.7	0.8	0.8	0.9	0.9
11.000	1.0	1.1	1.1	1.3	1.4	1.5	1.7
11.700	2.0	2.3	2.7	3.4	4.1	4.6	4.8
12.400	5.0	5.1	5.2	5.3	5.3	5.4	5.4
13.100	5.4	5.5	5.5	5.5	5.5	5.5	5.5
13.800	5.5	5.5	5.5	5.5	5.5	5.5	5.5
14.500	5.5	5.5	5.4	5.4	5.4	5.4	5.4
15.200	5.4	5.4	5.3	5.3	5.3	5.3	5.3
15.900	5.3	5.2	5.2	5.2	5.2	5.2	5.1
16.600	5.1	5.1	5.1	5.0	5.0	5.0	5.0
17.300	5.0	4.9	4.9	4.9	4.9	4.8	4.8
18.000	4.8	4.8	4.7	4.7	4.7	4.7	4.6
18.700	4.6	4.6	4.5	4.5	4.5	4.5	4.4
19.400	4.4	4.4	4.4	4.3	4.3	4.3	4.3
20.100	4.2	4.2	4.2	4.2	4.1	4.1	4.1
20.800	4.1	4.0	4.0	4.0	4.0	3.9	3.9
21.500	3.9	3.9	3.8	3.8	3.8	3.7	3.6
22.200	3.6	3.5	3.5	3.4	3.4	3.3	3.3
22.900	3.2	3.2	3.1	3.1	3.0	3.0	2.9
23.600	2.9	2.9	2.8	2.8	2.8	2.7	2.7
24.300	2.7	2.6	2.6	2.6	2.5	2.5	2.5
25.000	2.4	2.4	2.4	2.3	2.3	2.3	2.2
25.700	2.2	2.2	2.2	2.1	2.1	2.1	2.1
26.400	2.0	2.0	2.0	2.0	2.0	1.9	1.9
27.100	1.9	1.9	1.8	1.8	1.8	1.8	1.8
27.800	1.7	1.7	1.7	1.7	1.7	1.7	1.6
28.500	1.6	1.6	1.6	1.6	1.6	1.5	1.5
29.200	1.5	1.5	1.5	1.5	1.4	1.4	1.4
29.900	1.4	1.4	1.4	1.4	1.3	1.3	1.3
30.600	1.3	1.3	1.3	1.3	1.3	1.2	1.2
31.300	1.2	1.2	1.2	1.2	1.2	1.2	1.1
32.000	1.1	1.1	1.1	1.1	1.1	1.1	1.1
32.700	1.1	1.0	1.0	1.0	1.0	1.0	1.0
33.400	1.0	1.0	1.0	1.0	1.0	0.9	0.9
34.100	0.9	0.9	0.9	0.9	0.9	0.9	0.9
34.800	0.9	0.9	0.8	0.8	0.8	0.8	0.8
35.500	0.8	0.8	0.8	0.8	0.8	0.8	0.8
36.200	0.8	0.7	0.7	0.7	0.7	0.7	0.7
36.900	0.7	0.7	0.7	0.7	0.7	0.7	0.7
37.600	0.7	0.7	0.6	0.6	0.6	0.6	0.6
38.300	0.6	0.6	0.6	0.6	0.6	0.6	0.6
39.000	0.6	0.6	0.6	0.6	0.6	0.5	0.5
39.700	0.5	0.5	0.5	0.5	0.5	0.5	0.5
40.400	0.5	0.5	0.0				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Clarif	0.016		7.617		12.11	126.9	7824.95

Line Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

5.700	0.5	0.5	0.5	0.5	0.6	0.6	0.6
6.400	0.6	0.7	0.7	0.7	0.8	0.8	0.8
7.100	0.9	0.9	0.9	1.0	1.0	1.0	1.1
7.800	1.1	1.1	1.2	1.2	1.2	1.3	1.3
8.500	1.3	1.4	1.4	1.5	1.5	1.5	1.6
9.200	1.8	1.9	2.0	2.1	2.3	2.4	2.5
9.900	2.6	2.8	2.9	3.0	3.2	3.3	3.5
10.600	3.9	4.4	5.0	5.5	6.0	7.0	8.1
11.300	9.3	10.4	11.4	17.7	19.7	27.1	39.3
12.000	70.6	125.4	54.6	31.6	22.0	19.9	13.4
12.700	11.5	10.3	9.2	8.0	6.9	6.3	5.7
13.400	5.2	4.6	4.1	3.9	3.7	3.6	3.5
14.100	3.3	3.2	3.1	2.9	2.8	2.7	2.5
14.800	2.4	2.3	2.1	2.0	1.9	1.9	1.9
15.500	1.9	1.8	1.8	1.8	1.7	1.7	1.7
16.200	1.6	1.6	1.6	1.5	1.5	1.5	1.4
16.900	1.4	1.4	1.3	1.3	1.3	1.2	1.2
17.600	1.2	1.1	1.1	1.1	1.1	1.0	1.0
18.300	1.0	1.0	1.0	1.0	1.0	1.0	1.0
19.000	0.9	0.9	0.9	0.9	0.9	0.9	0.9
19.700	0.9	0.9	0.9	0.9	0.9	0.8	0.8
20.400	0.8	0.8	0.8	0.8	0.8	0.8	0.8
21.100	0.8	0.8	0.8	0.8	0.7	0.7	0.7
21.800	0.7	0.7	0.7	0.7	0.7	0.7	0.7
22.500	0.7	0.7	0.6	0.6	0.6	0.6	0.6
23.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
23.900	0.6	0.7	0.0				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Dallman	0.059		6.711		12.60	157.5	2667.13

Line Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

6.500	0.5	0.5	0.6	0.6	0.7	0.7	0.8
7.200	0.9	0.9	1.0	1.1	1.1	1.2	1.3
7.900	1.4	1.5	1.6	1.7	1.8	1.9	2.0
8.600	2.1	2.2	2.3	2.4	2.5	2.6	2.7
9.300	2.8	3.0	3.2	3.4	3.6	3.9	4.2

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
10.000	4.5	4.8	5.1	5.5	5.9	6.2	6.6
10.700	7.1	7.6	8.2	9.0	10.0	11.1	12.5
11.400	14.2	16.2	18.7	21.8	26.1	32.2	41.5
12.100	56.9	80.1	108.6	135.8	153.0	157.4	151.0
12.800	137.4	119.3	100.9	85.8	73.2	62.6	53.5
13.500	46.2	40.0	34.8	30.4	26.7	23.7	21.2
14.200	19.1	17.4	16.1	14.9	13.9	13.0	12.2
14.900	11.5	10.8	10.3	9.7	9.2	8.8	8.4
15.600	8.0	7.7	7.4	7.2	7.0	6.8	6.6
16.300	6.5	6.3	6.2	6.1	6.0	5.8	5.7
17.000	5.6	5.5	5.4	5.3	5.1	5.0	4.9
17.700	4.8	4.7	4.6	4.5	4.3	4.2	4.1
18.400	4.0	3.9	3.8	3.8	3.7	3.6	3.6
19.100	3.6	3.5	3.5	3.4	3.4	3.4	3.3
19.800	3.3	3.3	3.3	3.2	3.2	3.2	3.1
20.500	3.1	3.1	3.1	3.0	3.0	3.0	2.9
21.200	2.9	2.9	2.9	2.8	2.8	2.8	2.7
21.900	2.7	2.7	2.7	2.6	2.6	2.6	2.5
22.600	2.5	2.5	2.5	2.4	2.4	2.4	2.3
23.300	2.3	2.3	2.3	2.2	2.2	2.2	2.1
24.000	2.1	2.1	2.0	1.9	1.7	1.4	1.2
24.700	0.9	0.7	0.0				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 1	0.059	Upstream	6.711		12.60	157.5	2667.13

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
6.500	0.5	0.5	0.6	0.6	0.7	0.7	0.8
7.200	0.9	0.9	1.0	1.1	1.1	1.2	1.3
7.900	1.4	1.5	1.6	1.7	1.8	1.9	2.0
8.600	2.1	2.2	2.3	2.4	2.5	2.6	2.7
9.300	2.8	3.0	3.2	3.4	3.6	3.9	4.2
10.000	4.5	4.8	5.1	5.5	5.9	6.2	6.6
10.700	7.1	7.6	8.2	9.0	10.0	11.1	12.5
11.400	14.2	16.2	18.7	21.8	26.1	32.2	41.5
12.100	56.9	80.1	108.6	135.8	153.0	157.4	151.0
12.800	137.4	119.3	100.9	85.8	73.2	62.6	53.5
13.500	46.2	40.0	34.8	30.4	26.7	23.7	21.2
14.200	19.1	17.4	16.1	14.9	13.9	13.0	12.2
14.900	11.5	10.8	10.3	9.7	9.2	8.8	8.4
15.600	8.0	7.7	7.4	7.2	7.0	6.8	6.6
16.300	6.5	6.3	6.2	6.1	6.0	5.8	5.7
17.000	5.6	5.5	5.4	5.3	5.1	5.0	4.9
17.700	4.8	4.7	4.6	4.5	4.3	4.2	4.1

City Water Light and Power
Springfield, Illinois

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
18.400	4.0	3.9	3.8	3.8	3.7	3.6	3.6
19.100	3.6	3.5	3.5	3.4	3.4	3.4	3.3
19.800	3.3	3.3	3.3	3.2	3.2	3.2	3.1
20.500	3.1	3.1	3.1	3.0	3.0	3.0	2.9
21.200	2.9	2.9	2.9	2.8	2.8	2.8	2.7
21.900	2.7	2.7	2.7	2.6	2.6	2.6	2.5
22.600	2.5	2.5	2.5	2.4	2.4	2.4	2.3
23.300	2.3	2.3	2.3	2.2	2.2	2.2	2.1
24.000	2.1	2.1	2.0	1.9	1.7	1.4	1.2
24.700	0.9	0.7	0.0				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 1	0.059	Downstream	6.710	551.98	13.28	65.3	1105.55

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
6.600	0.5	0.5	0.6	0.6	0.7	0.7	0.8
7.300	0.9	0.9	1.0	1.1	1.1	1.2	1.3
8.000	1.4	1.5	1.6	1.7	1.8	1.8	1.9
8.700	2.0	2.2	2.3	2.4	2.5	2.6	2.7
9.400	2.8	3.0	3.2	3.4	3.6	3.9	4.2
10.100	4.5	4.8	5.1	5.5	5.8	6.2	6.6
10.800	7.1	7.6	8.3	9.1	10.0	11.2	11.7
11.500	12.1	12.7	13.6	14.8	16.4	18.7	22.2
12.200	27.5	34.3	38.8	43.7	48.7	53.5	57.7
12.900	60.9	63.1	64.5	65.1	65.3	64.9	64.2
13.600	63.3	62.1	60.8	59.3	57.7	56.1	54.5
14.300	52.9	51.2	49.6	48.0	46.4	44.9	43.4
15.000	41.9	40.5	39.1	37.8	36.5	35.2	33.0
15.700	30.1	27.5	25.2	23.1	21.2	19.6	18.1
16.400	16.7	15.5	14.4	13.5	12.6	11.8	9.2
17.100	6.9	6.0	5.6	5.3	5.2	5.0	4.9
17.800	4.8	4.7	4.6	4.5	4.4	4.2	4.1
18.500	4.0	3.9	3.8	3.8	3.7	3.6	3.6
19.200	3.6	3.5	3.5	3.4	3.4	3.4	3.3
19.900	3.3	3.3	3.3	3.2	3.2	3.2	3.1
20.600	3.1	3.1	3.1	3.0	3.0	3.0	2.9
21.300	2.9	2.9	2.9	2.8	2.8	2.8	2.7
22.000	2.7	2.7	2.7	2.6	2.6	2.6	2.5
22.700	2.5	2.5	2.5	2.4	2.4	2.4	2.3
23.400	2.3	2.3	2.3	2.2	2.2	2.2	2.1
24.100	2.1	2.1	2.0	1.9	1.7	1.4	1.2
24.800	0.9	0.7	0.5	0.0			

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Lake + L3	0.039		5.174		12.82	66.5	1694.49

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.900	0.4	0.5	0.6	0.7	0.8	0.9	1.0
10.600	1.2	1.3	1.5	1.6	1.9	2.1	2.4
11.300	2.8	3.3	3.8	4.6	5.5	6.7	8.4
12.000	11.1	15.3	21.8	30.0	39.7	49.9	58.1
12.700	63.6	66.2	66.3	63.8	59.8	54.5	48.5
13.400	43.0	38.2	34.0	30.2	26.9	24.0	21.4
14.100	19.2	17.2	15.5	14.1	12.8	11.8	10.8
14.800	10.0	9.3	8.7	8.1	7.6	7.1	6.7
15.500	6.3	6.0	5.6	5.3	5.1	4.8	4.6
16.200	4.5	4.3	4.2	4.1	4.0	3.9	3.8
16.900	3.7	3.6	3.6	3.5	3.4	3.3	3.3
17.600	3.2	3.1	3.0	3.0	2.9	2.8	2.8
18.300	2.7	2.6	2.6	2.5	2.5	2.4	2.4
19.000	2.3	2.3	2.2	2.2	2.2	2.2	2.1
19.700	2.1	2.1	2.1	2.0	2.0	2.0	2.0
20.400	2.0	2.0	1.9	1.9	1.9	1.9	1.9
21.100	1.8	1.8	1.8	1.8	1.8	1.8	1.7
21.800	1.7	1.7	1.7	1.7	1.7	1.6	1.6
22.500	1.6	1.6	1.6	1.6	1.5	1.5	1.5
23.200	1.5	1.5	1.5	1.4	1.4	1.4	1.4
23.900	1.4	1.3	1.3	1.3	1.3	1.2	1.1
24.600	1.0	0.9	0.8	0.6	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Reach 8	0.039	Upstream	5.174		12.82	66.5	1694.49

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.900	0.4	0.5	0.6	0.7	0.8	0.9	1.0
10.600	1.2	1.3	1.5	1.6	1.9	2.1	2.4
11.300	2.8	3.3	3.8	4.6	5.5	6.7	8.4
12.000	11.1	15.3	21.8	30.0	39.7	49.9	58.1
12.700	63.6	66.2	66.3	63.8	59.8	54.5	48.5
13.400	43.0	38.2	34.0	30.2	26.9	24.0	21.4
14.100	19.2	17.2	15.5	14.1	12.8	11.8	10.8
14.800	10.0	9.3	8.7	8.1	7.6	7.1	6.7
15.500	6.3	6.0	5.6	5.3	5.1	4.8	4.6
16.200	4.5	4.3	4.2	4.1	4.0	3.9	3.8

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
16.900	3.7	3.6	3.6	3.5	3.4	3.3	3.3
17.600	3.2	3.1	3.0	3.0	2.9	2.8	2.8
18.300	2.7	2.6	2.6	2.5	2.5	2.4	2.4
19.000	2.3	2.3	2.2	2.2	2.2	2.2	2.1
19.700	2.1	2.1	2.1	2.0	2.0	2.0	2.0
20.400	2.0	2.0	1.9	1.9	1.9	1.9	1.9
21.100	1.8	1.8	1.8	1.8	1.8	1.8	1.7
21.800	1.7	1.7	1.7	1.7	1.7	1.6	1.6
22.500	1.6	1.6	1.6	1.6	1.5	1.5	1.5
23.200	1.5	1.5	1.5	1.4	1.4	1.4	1.4
23.900	1.4	1.3	1.3	1.3	1.3	1.2	1.1
24.600	1.0	0.9	0.8	0.6	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 8	0.039	Downstream	5.153	562.61	13.53	35.0	890.91

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
9.900	0.4	0.5	0.6	0.7	0.8	0.9	1.0
10.600	1.2	1.3	1.5	1.6	1.9	2.1	2.4
11.300	2.8	3.3	3.8	4.6	5.5	6.7	8.4
12.000	11.1	15.3	21.8	30.0	34.6	35.0	35.0
12.700	35.0	35.0	35.0	35.0	35.0	35.0	35.0
13.400	35.0	35.0	35.0	35.0	35.0	35.0	35.0
14.100	35.0	35.0	35.0	35.0	35.0	35.0	35.0
14.800	35.0	30.9	8.7	8.1	7.6	7.1	6.7
15.500	6.3	6.0	5.6	5.3	5.1	4.8	4.6
16.200	4.5	4.3	4.2	4.1	4.0	3.9	3.8
16.900	3.7	3.6	3.6	3.5	3.4	3.3	3.3
17.600	3.2	3.1	3.0	3.0	2.9	2.8	2.8
18.300	2.7	2.6	2.6	2.5	2.5	2.4	2.4
19.000	2.3	2.3	2.2	2.2	2.2	2.2	2.1
19.700	2.1	2.1	2.1	2.0	2.0	2.0	2.0
20.400	2.0	2.0	1.9	1.9	1.9	1.9	1.9
21.100	1.8	1.8	1.8	1.8	1.8	1.8	1.7
21.800	1.7	1.7	1.7	1.7	1.7	1.6	1.6
22.500	1.6	1.6	1.6	1.6	1.5	1.5	1.5
23.200	1.5	1.5	1.5	1.4	1.4	1.4	1.4
23.900	1.4	1.3	1.3	1.3	1.3	1.2	1.1
24.600	1.0	0.9	0.8	0.6	0.5	0.0	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Decant	0.003		8.373		12.13	20.6	7137.52

Line
Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

9.600	0.5	0.5	0.5	0.6	0.6	0.6	0.6
10.300	0.7	0.7	0.7	0.8	0.9	1.0	1.1
11.000	1.2	1.3	1.5	1.7	1.9	2.1	2.9
11.700	3.6	4.5	6.4	10.7	18.9	14.7	7.5
12.400	4.8	3.8	2.9	2.2	2.0	1.7	1.5
13.100	1.3	1.2	1.1	1.0	0.9	0.8	0.7
13.800	0.7	0.7	0.6	0.6	0.6	0.6	0.5
14.500	0.5	0.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Reach 6	0.003	Upstream	8.372		12.13	20.6	7137.52

Line
Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

9.600	0.5	0.5	0.5	0.6	0.6	0.6	0.6
10.300	0.7	0.7	0.7	0.8	0.9	1.0	1.1
11.000	1.2	1.3	1.5	1.7	1.9	2.1	2.9
11.700	3.6	4.5	6.4	10.7	18.9	14.7	7.5
12.400	4.8	3.8	2.9	2.2	2.0	1.7	1.5
13.100	1.3	1.2	1.1	1.0	0.9	0.8	0.7
13.800	0.7	0.7	0.6	0.6	0.6	0.6	0.5
14.500	0.5	0.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Reach 6	0.003	Downstream	8.372	560.51	12.14	20.6	7134.42

Line
Start Time (hr) — Flow Values @ time increment of 0.100 hr (cfs)

9.600	0.5	0.5	0.5	0.6	0.6	0.6	0.6
10.300	0.7	0.7	0.7	0.8	0.9	1.0	1.1
11.000	1.2	1.3	1.5	1.7	1.9	2.1	2.9
11.700	3.6	4.5	6.4	10.7	18.8	14.8	7.5

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
12.400	4.8	3.8	2.9	2.2	2.0	1.7	1.5
13.100	1.3	1.2	1.1	1.0	0.9	0.8	0.7
13.800	0.7	0.7	0.6	0.6	0.6	0.6	0.5
14.500	0.5	0.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 2	0.136	Upstream	6.427		12.12	189.8	1395.65

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
4.500	0.5	0.5	0.5	0.5	0.5	0.6	0.7
5.200	0.7	0.7	0.7	0.8	0.8	0.9	1.0
5.900	1.0	1.1	1.1	1.2	1.3	1.4	1.5
6.600	1.5	1.6	1.7	1.8	1.9	2.0	2.1
7.300	2.2	2.3	2.5	2.6	2.7	2.8	3.0
8.000	3.1	3.2	3.4	3.5	3.7	3.8	4.0
8.700	4.1	4.3	4.4	4.6	4.9	5.2	5.6
9.400	5.9	6.3	6.7	7.1	7.6	8.1	8.6
10.100	9.2	9.8	10.4	11.1	11.8	12.8	14.0
10.800	15.3	16.7	18.3	20.6	23.2	26.2	28.6
11.500	31.0	39.6	44.2	55.4	73.2	114.4	185.7
12.200	123.2	108.2	105.4	107.5	105.2	107.5	110.3
12.900	112.2	113.1	113.1	113.0	112.5	111.5	110.2
13.600	108.6	107.1	105.6	104.0	102.3	100.5	98.8
14.300	96.9	95.1	93.4	91.6	89.9	88.2	82.4
15.000	58.6	56.4	54.4	52.6	50.8	49.1	46.4
15.700	43.2	40.2	37.5	35.2	33.0	31.2	29.5
16.400	27.9	26.6	25.3	24.2	23.2	22.2	19.4
17.100	17.1	16.0	15.4	15.1	14.8	14.5	14.3
17.800	14.0	13.8	13.5	13.3	13.0	12.8	12.6
18.500	12.4	12.2	12.0	11.9	11.7	11.6	11.5
19.200	11.4	11.2	11.2	11.1	11.0	10.9	10.8
19.900	10.7	10.6	10.5	10.4	10.4	10.3	10.2
20.600	10.1	10.0	10.0	9.9	9.8	9.7	9.6
21.300	9.6	9.5	9.4	9.3	9.2	9.2	9.1
22.000	8.9	8.8	8.7	8.6	8.5	8.4	8.3
22.700	8.2	8.1	7.9	7.9	7.7	7.7	7.5
23.400	7.5	7.4	7.3	7.2	7.1	7.0	7.0
24.100	6.3	6.1	5.9	5.7	5.4	5.0	4.6
24.800	4.2	3.8	3.5	3.2	3.0	2.8	2.7
25.500	2.6	2.4	2.3	2.3	2.2	2.1	2.1
26.200	2.1	2.1	2.0	2.0	2.0	2.0	2.0
26.900	1.9	1.9	1.9	1.9	1.8	1.8	1.8
27.600	1.8	1.8	1.7	1.7	1.7	1.7	1.7
28.300	1.7	1.6	1.6	1.6	1.6	1.6	1.6

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
29.000	1.5	1.5	1.5	1.5	1.5	1.5	1.4
29.700	1.4	1.4	1.4	1.4	1.4	1.4	1.3
30.400	1.3	1.3	1.3	1.3	1.3	1.3	1.3
31.100	1.2	1.2	1.2	1.2	1.2	1.2	1.2
31.800	1.2	1.1	1.1	1.1	1.1	1.1	1.1
32.500	1.1	1.1	1.1	1.0	1.0	1.0	1.0
33.200	1.0	1.0	1.0	1.0	1.0	1.0	1.0
33.900	0.9	0.9	0.9	0.9	0.9	0.9	0.9
34.600	0.9	0.9	0.9	0.9	0.8	0.8	0.8
35.300	0.8	0.8	0.8	0.8	0.8	0.8	0.8
36.000	0.8	0.8	0.8	0.7	0.7	0.7	0.7
36.700	0.7	0.7	0.7	0.7	0.7	0.7	0.7
37.400	0.7	0.7	0.7	0.7	0.6	0.6	0.6
38.100	0.6	0.6	0.6	0.6	0.6	0.6	0.6
38.800	0.6	0.6	0.6	0.6	0.6	0.6	0.6
39.500	0.6	0.5	0.5	0.5	0.5	0.5	0.5
40.200	0.5	0.5	0.5	0.5	0.0		

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Reach 2	0.136	Downstream	6.399	549.81	16.30	29.4	216.45

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
9.500	0.5	0.5	0.5	0.6	0.6	0.6	0.7
10.200	0.7	0.8	0.8	0.8	0.9	0.9	1.0
10.900	1.1	1.1	1.2	1.3	1.4	1.5	1.6
11.600	1.8	2.0	2.2	2.4	2.8	3.4	4.5
12.300	5.3	6.1	6.8	7.6	8.3	9.1	9.9
13.000	10.7	11.6	12.6	13.5	14.5	15.4	16.3
13.700	17.2	18.1	18.9	19.7	20.5	21.4	22.2
14.400	23.1	23.9	24.6	25.4	26.1	26.7	27.2
15.100	27.5	27.8	28.1	28.4	28.6	28.8	29.0
15.800	29.2	29.3	29.4	29.4	29.4	29.4	29.4
16.500	29.4	29.4	29.3	29.3	29.2	29.1	29.0
17.200	28.8	28.7	28.5	28.4	28.2	28.1	27.9
17.900	27.8	27.6	27.4	27.3	27.1	27.0	26.8
18.600	26.6	26.5	26.3	26.2	26.0	25.8	25.7
19.300	25.5	25.4	25.2	25.0	24.9	24.7	24.6
20.000	24.4	24.3	24.1	24.0	23.8	23.7	23.5
20.700	23.4	23.2	23.1	22.9	22.8	22.6	22.5
21.400	22.3	22.2	22.0	21.9	21.8	21.6	21.5
22.100	21.3	21.2	21.1	20.9	20.8	20.6	20.5
22.800	20.4	20.2	20.1	20.0	19.9	19.8	19.7
23.500	19.5	19.4	19.3	19.2	19.1	18.9	18.8
24.200	18.7	18.6	18.5	18.3	18.2	18.1	17.9

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Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
24.900	17.8	17.7	17.5	17.4	17.3	17.1	17.0
25.600	16.8	16.7	16.6	16.4	16.3	16.2	16.0
26.300	15.9	15.7	15.6	15.5	15.4	15.2	15.1
27.000	15.0	14.8	14.7	14.6	14.5	14.3	14.2
27.700	14.1	14.0	13.9	13.8	13.6	13.5	13.4
28.400	13.3	13.2	13.1	13.0	12.9	12.7	12.6
29.100	12.5	12.4	12.3	12.2	12.1	12.0	11.9
29.800	11.8	11.7	11.6	11.5	11.4	11.3	11.2
30.500	11.1	11.0	10.9	10.9	10.8	10.7	10.6
31.200	10.6	10.5	10.4	10.4	10.3	10.2	10.1
31.900	10.1	10.0	9.9	9.9	9.8	9.7	9.7
32.600	9.6	9.5	9.5	9.4	9.4	9.3	9.2
33.300	9.2	9.1	9.0	9.0	8.9	8.9	8.8
34.000	8.7	8.7	8.6	8.6	8.5	8.4	8.4
34.700	8.3	8.3	8.2	8.2	8.1	8.1	8.0
35.400	7.9	7.9	7.8	7.8	7.7	7.7	7.6
36.100	7.6	7.5	7.5	7.4	7.4	7.3	7.3
36.800	7.2	7.2	7.1	7.1	7.0	7.0	6.9
37.500	6.9	6.8	6.8	6.7	6.7	6.6	6.6
38.200	6.5	6.5	6.5	6.4	6.4	6.3	6.3
38.900	6.2	6.2	6.2	6.1	6.1	6.0	6.0
39.600	5.9	5.9	5.9	5.8	5.8	5.7	5.7
40.300	5.7	5.6	5.6	5.5	5.5	5.5	5.4
41.000	5.4	5.4	5.3	5.3	5.2	5.2	5.2
41.700	5.1	5.1	5.1	5.0	5.0	5.0	4.9
42.400	4.9	4.9	4.8	4.8	4.8	4.7	4.7
43.100	4.7	4.6	4.6	4.6	4.5	4.5	4.5
43.800	4.4	4.4	4.4	4.3	4.3	4.3	4.2
44.500	4.2	4.2	4.2	4.1	4.1	4.1	4.0
45.200	4.0	4.0	4.0	3.9	3.9	3.9	3.8
45.900	3.8	3.8	3.8	3.7	3.7	3.7	3.7
46.600	3.6	3.6	3.6	3.6	3.6	3.6	3.5
47.300	3.5	3.5	3.5	3.5	3.5	3.5	3.5
48.000	3.4	3.4	3.4	3.4	3.4	3.4	3.4
48.700	3.3	3.3	3.3	3.3	3.3	3.3	3.3
49.400	3.2	3.2	3.2	3.2	3.2	3.2	3.2
50.100	3.2	3.1	3.1	3.1	3.1	3.1	3.1
50.800	3.1	3.1	3.0	3.0	3.0	3.0	3.0
51.500	3.0	3.0	3.0	2.9	2.9	2.9	2.9
52.200	2.9	2.9	2.9	2.9	2.8	2.8	2.8
52.900	2.8	2.8	2.8	2.8	2.8	2.8	2.7
53.600	2.7	2.7	2.7	2.7	2.7	2.7	2.7
54.300	2.7	2.6	2.6	2.6	2.6	2.6	2.6
55.000	2.6	2.6	2.6	2.5	2.5	2.5	2.5
55.700	2.5	2.5	2.5	2.5	2.5	2.4	2.4
56.400	2.4	2.4	2.4	2.4	2.4	2.4	2.4
57.100	2.4	2.3	2.3	2.3	2.3	2.3	2.3
57.800	2.3	2.3	2.3	2.3	2.2	2.2	2.2
58.500	2.2	2.2	2.2	2.2	2.2	2.2	2.2
59.200	2.2	2.1	2.1	2.1	2.1	2.1	2.1
59.900	2.1	2.1	2.1	2.1	2.1	2.0	2.0

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Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
60.600	2.0	2.0	2.0	2.0	2.0	2.0	2.0
61.300	2.0	2.0	1.9	1.9	1.9	1.9	1.9
62.000	1.9	1.9	1.9	1.9	1.9	1.9	1.9
62.700	1.9	1.8	1.8	1.8	1.8	1.8	1.8
63.400	1.8	1.8	1.8	1.8	1.8	1.8	1.8
64.100	1.7	1.7	1.7	1.7	1.7	1.7	1.7
64.800	1.7	1.7	1.7	1.7	1.7	1.7	1.6
65.500	1.6	1.6	1.6	1.6	1.6	1.6	1.6
66.200	1.6	1.6	1.6	1.6	1.6	1.6	1.6
66.900	1.5	1.5	1.5	1.5	1.5	1.5	1.5
67.600	1.5	1.5	1.5	1.5	1.5	1.5	1.5
68.300	1.5	1.4	1.4	1.4	1.4	1.4	1.4
69.000	1.4	1.4	1.4	1.4	1.4	1.4	1.4
69.700	1.4	1.4	1.4	1.4	1.3	1.3	1.3
70.400	1.3	1.3	1.3	1.3	1.3	1.3	1.3
71.100	1.3	1.3	1.3	1.3	1.3	1.3	1.3
71.800	1.3	1.2	1.2	1.2	1.2	1.2	1.2
72.500	1.2	1.2	1.2	1.2	1.2	1.2	1.2
73.200	1.2	1.2	1.2	1.2	1.2	1.2	1.1
73.900	1.1	1.1	1.1	1.1	1.1	1.1	1.1
74.600	1.1	1.1	1.1	1.1	1.1	1.1	1.1
75.300	1.1	1.1	1.1	1.1	1.1	1.1	1.0
76.000	1.0	1.0	1.0	1.0	1.0	1.0	1.0
76.700	1.0	1.0	1.0	1.0	1.0	1.0	1.0
77.400	1.0	1.0	1.0	1.0	1.0	1.0	1.0
78.100	1.0	1.0	0.9	0.9	0.9	0.9	0.9
78.800	0.9	0.9	0.9	0.9	0.9	0.9	0.9
79.500	0.9	0.9	0.9	0.9	0.9	0.9	0.9
80.200	0.9	0.9	0.9	0.9	0.9	0.9	0.9
80.900	0.8	0.8	0.8	0.8	0.8	0.8	0.8
81.600	0.8	0.8	0.8	0.8	0.8	0.8	0.8
82.300	0.8	0.8	0.8	0.8	0.8	0.8	0.8
83.000	0.8	0.8	0.8	0.8	0.8	0.8	0.8
83.700	0.8	0.7	0.7	0.7	0.7	0.7	0.7
84.400	0.7	0.7	0.7	0.7	0.7	0.7	0.7
85.100	0.7	0.7	0.7	0.7	0.7	0.7	0.7
85.800	0.7	0.7	0.7	0.7	0.7	0.7	0.7
86.500	0.7	0.7	0.7	0.7	0.7	0.7	0.6
87.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
87.900	0.6	0.6	0.6	0.6	0.6	0.6	0.6
88.600	0.6	0.6	0.6	0.6	0.6	0.6	0.6
89.300	0.6	0.6	0.6	0.6	0.6	0.6	0.6
90.000	0.6	0.6	0.6	0.6	0.6	0.6	0.6
90.700	0.6	0.6	0.6	0.5	0.5	0.5	0.5
91.400	0.5	0.5	0.5	0.5	0.5	0.5	0.5
92.100	0.5	0.5	0.5	0.5	0.5	0.5	0.5
92.800	0.5	0.5	0.5	0.5	0.0		

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Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.136		6.399		16.30	29.4	216.45

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
9.500	0.5	0.5	0.5	0.6	0.6	0.6	0.7
10.200	0.7	0.8	0.8	0.8	0.9	0.9	1.0
10.900	1.1	1.1	1.2	1.3	1.4	1.5	1.6
11.600	1.8	2.0	2.2	2.4	2.8	3.4	4.5
12.300	5.3	6.1	6.8	7.6	8.3	9.1	9.9
13.000	10.7	11.6	12.6	13.5	14.5	15.4	16.3
13.700	17.2	18.1	18.9	19.7	20.5	21.4	22.2
14.400	23.1	23.9	24.6	25.4	26.1	26.7	27.2
15.100	27.5	27.8	28.1	28.4	28.6	28.8	29.0
15.800	29.2	29.3	29.4	29.4	29.4	29.4	29.4
16.500	29.4	29.4	29.3	29.3	29.2	29.1	29.0
17.200	28.8	28.7	28.5	28.4	28.2	28.1	27.9
17.900	27.8	27.6	27.4	27.3	27.1	27.0	26.8
18.600	26.6	26.5	26.3	26.2	26.0	25.8	25.7
19.300	25.5	25.4	25.2	25.0	24.9	24.7	24.6
20.000	24.4	24.3	24.1	24.0	23.8	23.7	23.5
20.700	23.4	23.2	23.1	22.9	22.8	22.6	22.5
21.400	22.3	22.2	22.0	21.9	21.8	21.6	21.5
22.100	21.3	21.2	21.1	20.9	20.8	20.6	20.5
22.800	20.4	20.2	20.1	20.0	19.9	19.8	19.7
23.500	19.5	19.4	19.3	19.2	19.1	18.9	18.8
24.200	18.7	18.6	18.5	18.3	18.2	18.1	17.9
24.900	17.8	17.7	17.5	17.4	17.3	17.1	17.0
25.600	16.8	16.7	16.6	16.4	16.3	16.2	16.0
26.300	15.9	15.7	15.6	15.5	15.4	15.2	15.1
27.000	15.0	14.8	14.7	14.6	14.5	14.3	14.2
27.700	14.1	14.0	13.9	13.8	13.6	13.5	13.4
28.400	13.3	13.2	13.1	13.0	12.9	12.7	12.6
29.100	12.5	12.4	12.3	12.2	12.1	12.0	11.9
29.800	11.8	11.7	11.6	11.5	11.4	11.3	11.2
30.500	11.1	11.0	10.9	10.9	10.8	10.7	10.6
31.200	10.6	10.5	10.4	10.4	10.3	10.2	10.1
31.900	10.1	10.0	9.9	9.9	9.8	9.7	9.7
32.600	9.6	9.5	9.5	9.4	9.4	9.3	9.2
33.300	9.2	9.1	9.0	9.0	8.9	8.9	8.8
34.000	8.7	8.7	8.6	8.6	8.5	8.4	8.4
34.700	8.3	8.3	8.2	8.2	8.1	8.1	8.0
35.400	7.9	7.9	7.8	7.8	7.7	7.7	7.6
36.100	7.6	7.5	7.5	7.4	7.4	7.3	7.3
36.800	7.2	7.2	7.1	7.1	7.0	7.0	6.9
37.500	6.9	6.8	6.8	6.7	6.7	6.6	6.6
38.200	6.5	6.5	6.5	6.4	6.4	6.3	6.3
38.900	6.2	6.2	6.2	6.1	6.1	6.0	6.0
39.600	5.9	5.9	5.9	5.8	5.8	5.7	5.7

Line Start Time (hr)	Flow Values @ time increment of 0.100 hr (cfs)						
40.300	5.7	5.6	5.6	5.5	5.5	5.5	5.4
41.000	5.4	5.4	5.3	5.3	5.2	5.2	5.2
41.700	5.1	5.1	5.1	5.0	5.0	5.0	4.9
42.400	4.9	4.9	4.8	4.8	4.8	4.7	4.7
43.100	4.7	4.6	4.6	4.6	4.5	4.5	4.5
43.800	4.4	4.4	4.4	4.3	4.3	4.3	4.2
44.500	4.2	4.2	4.2	4.1	4.1	4.1	4.0
45.200	4.0	4.0	4.0	3.9	3.9	3.9	3.8
45.900	3.8	3.8	3.8	3.7	3.7	3.7	3.7
46.600	3.6	3.6	3.6	3.6	3.6	3.6	3.5
47.300	3.5	3.5	3.5	3.5	3.5	3.5	3.5
48.000	3.4	3.4	3.4	3.4	3.4	3.4	3.4
48.700	3.3	3.3	3.3	3.3	3.3	3.3	3.3
49.400	3.2	3.2	3.2	3.2	3.2	3.2	3.2
50.100	3.2	3.1	3.1	3.1	3.1	3.1	3.1
50.800	3.1	3.1	3.0	3.0	3.0	3.0	3.0
51.500	3.0	3.0	3.0	2.9	2.9	2.9	2.9
52.200	2.9	2.9	2.9	2.9	2.8	2.8	2.8
52.900	2.8	2.8	2.8	2.8	2.8	2.8	2.7
53.600	2.7	2.7	2.7	2.7	2.7	2.7	2.7
54.300	2.7	2.6	2.6	2.6	2.6	2.6	2.6
55.000	2.6	2.6	2.6	2.5	2.5	2.5	2.5
55.700	2.5	2.5	2.5	2.5	2.5	2.4	2.4
56.400	2.4	2.4	2.4	2.4	2.4	2.4	2.4
57.100	2.4	2.3	2.3	2.3	2.3	2.3	2.3
57.800	2.3	2.3	2.3	2.3	2.2	2.2	2.2
58.500	2.2	2.2	2.2	2.2	2.2	2.2	2.2
59.200	2.2	2.1	2.1	2.1	2.1	2.1	2.1
59.900	2.1	2.1	2.1	2.1	2.1	2.0	2.0
60.600	2.0	2.0	2.0	2.0	2.0	2.0	2.0
61.300	2.0	2.0	1.9	1.9	1.9	1.9	1.9
62.000	1.9	1.9	1.9	1.9	1.9	1.9	1.9
62.700	1.9	1.8	1.8	1.8	1.8	1.8	1.8
63.400	1.8	1.8	1.8	1.8	1.8	1.8	1.8
64.100	1.7	1.7	1.7	1.7	1.7	1.7	1.7
64.800	1.7	1.7	1.7	1.7	1.7	1.7	1.6
65.500	1.6	1.6	1.6	1.6	1.6	1.6	1.6
66.200	1.6	1.6	1.6	1.6	1.6	1.6	1.6
66.900	1.5	1.5	1.5	1.5	1.5	1.5	1.5
67.600	1.5	1.5	1.5	1.5	1.5	1.5	1.5
68.300	1.5	1.4	1.4	1.4	1.4	1.4	1.4
69.000	1.4	1.4	1.4	1.4	1.4	1.4	1.4
69.700	1.4	1.4	1.4	1.4	1.3	1.3	1.3
70.400	1.3	1.3	1.3	1.3	1.3	1.3	1.3
71.100	1.3	1.3	1.3	1.3	1.3	1.3	1.3
71.800	1.3	1.2	1.2	1.2	1.2	1.2	1.2
72.500	1.2	1.2	1.2	1.2	1.2	1.2	1.2
73.200	1.2	1.2	1.2	1.2	1.2	1.2	1.1
73.900	1.1	1.1	1.1	1.1	1.1	1.1	1.1
74.600	1.1	1.1	1.1	1.1	1.1	1.1	1.1
75.300	1.1	1.1	1.1	1.1	1.1	1.1	1.0

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Line Start Time (hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
	---------- Flow Values @ time increment of 0.100 hr ----------						
76.000	1.0	1.0	1.0	1.0	1.0	1.0	1.0
76.700	1.0	1.0	1.0	1.0	1.0	1.0	1.0
77.400	1.0	1.0	1.0	1.0	1.0	1.0	1.0
78.100	1.0	1.0	0.9	0.9	0.9	0.9	0.9
78.800	0.9	0.9	0.9	0.9	0.9	0.9	0.9
79.500	0.9	0.9	0.9	0.9	0.9	0.9	0.9
80.200	0.9	0.9	0.9	0.9	0.9	0.9	0.9
80.900	0.8	0.8	0.8	0.8	0.8	0.8	0.8
81.600	0.8	0.8	0.8	0.8	0.8	0.8	0.8
82.300	0.8	0.8	0.8	0.8	0.8	0.8	0.8
83.000	0.8	0.8	0.8	0.8	0.8	0.8	0.8
83.700	0.8	0.7	0.7	0.7	0.7	0.7	0.7
84.400	0.7	0.7	0.7	0.7	0.7	0.7	0.7
85.100	0.7	0.7	0.7	0.7	0.7	0.7	0.7
85.800	0.7	0.7	0.7	0.7	0.7	0.7	0.7
86.500	0.7	0.7	0.7	0.7	0.7	0.7	0.6
87.200	0.6	0.6	0.6	0.6	0.6	0.6	0.6
87.900	0.6	0.6	0.6	0.6	0.6	0.6	0.6
88.600	0.6	0.6	0.6	0.6	0.6	0.6	0.6
89.300	0.6	0.6	0.6	0.6	0.6	0.6	0.6
90.000	0.6	0.6	0.6	0.6	0.6	0.6	0.6
90.700	0.6	0.6	0.6	0.5	0.5	0.5	0.5
91.400	0.5	0.5	0.5	0.5	0.5	0.5	0.5
92.100	0.5	0.5	0.5	0.5	0.5	0.5	0.5
92.800	0.5	0.5	0.5	0.5	0.0		

City Water Light and Power
Springfield, Illinois

Area or Reach Identifier	Drainage Area (sq mi)	Peak Flow by Storm 1000-yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Dallman	0.059	157.5				
Clarif	0.016	126.9				
Lime 1	0.008	47.2				
Lime 2	0.006	38.7				
Lake + L3	0.039	66.5				
Cntr Cnl	0.001	9.1				
W Stl Chnl	0.003	25.6				
Decant	0.003	20.6				
Reach 1	0.059	157.5				
DOWNSTREAM		65.3				
Reach 2	0.136	189.8				
DOWNSTREAM		29.4				
Reach 7	0.019	32.5				
DOWNSTREAM		5.5				
Reach 5	0.007	10.5				
DOWNSTREAM		6.9				
Reach 4	0.008	47.2				
DOWNSTREAM		1.9				
Reach 3	0.006	38.7				
DOWNSTREAM		2.4				
Reach 8	0.039	66.5				
DOWNSTREAM		35.0				
Reach 6	0.003	20.6				
DOWNSTREAM		20.6				
OUTLET	0.136	29.4				

ATTACHMENT 6

ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

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

Annual Groundwater Monitoring and Corrective Action Report
35 Ill. Adm. Code Part 845
Year Ending December 31, 2025

January 2026

Prepared for:
City Water, Light & Power
3100 E. Lake Shore Drive
Springfield, Illinois

ANDREWS ENGINEERING

3300 Ginger Creek Drive, Springfield, IL 62711 | 217.787.2334

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1. INTRODUCTION

In accordance with 35 Ill. Adm. Code 845.550(a)(3) provided herein is the Annual Groundwater Monitoring and Corrective Action Report for year ending December 31, 2025. Pursuant to Section 845.610(e)(1), the Annual Groundwater Monitoring and Corrective Action Report must be included as part of the annual consolidated report required by Section 845.550.

City Water, Light and Power (CWLP) owns and operates two (2) existing coal combustion residual (CCR) surface impoundments. These impoundments, known as the Lakeside Ash Pond and the Dallman Ash Pond, are located north and east of the former Lakeside Power Generating Station and the Dallman Power Generating Station. The facilities are situated in the eastern half of Section 12, Township 15 North, Range 5 West, in Springfield, Illinois (see Figures 1 and 2).

The former Lakeside Power Generating Station and the Dallman Power Generating Station are located along the northwestern shoreline of Lake Springfield in Springfield, Illinois. The Lakeside Ash Pond is situated immediately north of Spaulding Dam at the northern end of Lake Springfield, while the Dallman Ash Pond lies immediately northwest of the Lakeside Ash Pond.

The Lakeside Ash Pond, placed into service prior to 1958, is primarily a diked embankment and consists of four separate ponds—three lime ponds and one settling pond—encompassing a total area of approximately 35.0 acres. The Lakeside Ash Pond ceased receiving ash in 2009.

The Dallman Ash Pond was placed into service in approximately 1976 and is also a diked embankment. It encompasses approximately 34.5 acres and ceased receiving ash in 2021.

All CCR and non-CCR waste streams ceased flowing into the Lakeside Ash Pond and Dallman Ash Pond as of October 13, 2023.

Status of the Groundwater Monitoring and Corrective Action Programs

Pursuant to Section 845.610(e)(4), the annual report must provide an overview of the groundwater monitoring program and corrective action plan. The summary must:

A) Specify whether groundwater monitoring data shows a statistically significant increase over background concentrations for one or more constituents listed in Section 845.600.

Pursuant to 35 Ill. Adm. Code 845.600, CWLP submitted a Groundwater Monitoring Program (GMP) for the CCR surface impoundments to the Illinois EPA and placed the program in the facility operating record on October 28, 2021. The background concentrations presented in the

2021 GMP were established using eight independent samples collected from each background and downgradient monitoring well. All samples were analyzed for the following monitoring parameters specified in Section 845.600:

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Calcium
- Chloride
- Chromium
- Cobalt
- Fluoride
- Lead
- Lithium
- Mercury
- Molybdenum
- pH
- Radium 226/228
- Selenium
- Sulfate
- Thallium
- Total Dissolved Solids

CWLP updated the GMP in September 2024 as part of correspondence with the United States EPA and in response to Illinois EPA comments on the Initial Operating and Construction Permit applications. The 2024 GMP update included revisions to background concentrations based on eight independent samples collected between the first quarter of 2016 and the fourth quarter of 2017. For antimony, cobalt, calcium, and lead, background sampling was conducted between the first quarter of 2020 and the fourth quarter of 2021 using lower practical quantitation limits (PQLs). The arsenic background concentration was calculated using eight independent samples collected between July 7, 2023, and August 12, 2024.

The present groundwater monitoring network includes two upgradient wells (wells AP-4 and AP-5), eight downgradient wells (RW-3, AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10 and AP-14) and ten compliance boundary wells (AP-7, AP-9, AP-11, AP-12, AP-13, T-1, T-2, T-4, T-5 and T-6). Monitoring wells T-1, T-2, T-4, T-5 and T-6 were installed in April and May of 2024. In addition to the above surface impoundment wells, Table 1 and Table 2 include groundwater analytical data from FGDS Landfill wells, AW-1 and G120. Wells AW-1 and G120 are not part of the groundwater monitoring program under 35 Ill. Adm. Code 845, but are permitted under 35 Ill. Adm. Code 811. Consistent with the surface impoundment groundwater monitoring wells, FGDS landfill wells AW-1 and G120 are screened across the basal sand/bedrock interface. During 2025, groundwater analytical results were compared to the groundwater protection/background values (see Table 1). Reports documenting exceedances of the calculated background were submitted to the Illinois EPA and placed into the facility record for 2025.

Pursuant to 35 Ill. Adm. Code 845.640(f), the statistical method selected to evaluate groundwater monitoring data for each constituent is the Prediction Interval Procedure specified in 35 Ill. Adm.

Code 845.640(f)(1)(C). Under this procedure, a prediction interval for each constituent is established based on the distribution of background data, and concentrations measured in each compliance well (i.e., well/constituent pair) are compared to the upper prediction limit to determine whether a statistically significant increase (SSI) over background has occurred.

Based on this evaluation, groundwater monitoring data collected in 2025 indicate statistically significant increases (SSIs) over background concentrations for multiple constituents listed in Section 845.600.

B) *Identify those constituents having a statistically significant increase over background concentrations and the names of the monitoring wells associated with the increase.*

The constituents and wells that exhibit an SSI over background concentrations in 2025 are:

Parameter	*AP-1R*	*AP-2A*	*AP-3*	*AP-4*	*AP-5*	*AP-6*	*AP-7*	*AP-8*	*AP-9*	*AP-10*	*AP-11*	*AP-12*	*AP-13*	*AP-14*	*RW-3*	*AW-1*	*G-120*
Arsenic, total			X	X		X	X	X							X	X	X
Barium, total										X							X
Boron, total	X	X	X			X	X			X	X			X	X	X	X
Calcium, total	X	X	X									X		X		X	X
Chloride, total	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
Cobalt, total		X	X	X													
pH	X	X	X	X	X				X	X	X	X	X			X	X
Sulfate, total	X	X	X		X					X	X	X	X	X		X	X
Total Dissolved Solids	X	X	X						X	X	X	X		X		X	X

Parameter	*T-1*	*T-2*	*T-4*	*T-5*	*T-6*
Boron, total	X				X
Calcium, total		X			
Chloride, total	X	X			X
Cobalt, total	X				
Fluoride, total					
Lithium	X	X	X		

pH	*X*	*X*	*X*		
Sulfate, total	*X*	*X*	*X*		
Total Dissolved Solids	*X*	*X*			

C) Specify whether there have been any exceedances of the groundwater protection standards for one or more constituents listed in Section 845.600.

Pursuant to Section 845.120, an "exceedance of the groundwater protection standard" is defined as follows for existing CCR surface impoundments and inactive CCR surface impoundments:

- An analytical result in a downgradient well with a concentration exceeding the numerical value for a constituent listed in Section 845.600(a); or
- Where the upgradient background concentration of a constituent exceeds the numerical value listed in Section 845.600(a), an analytical result in a downgradient well that is statistically significantly greater than the upgradient background concentration.

Based upon this evaluation, groundwater monitoring data for 2025 exhibits an SSI of the groundwater protection standards (GWPS) for multiple constituents listed in Section 845.600.

D) Identify those constituents with exceedances of the groundwater protection standards in Section 845.600 and the names of the monitoring wells associated with the exceedance.

The constituents that exhibit an SSI of a GWPS in 2025 are:

Parameter	*AP-1R*	*AP-2A*	*AP-3*	*AP-4*	*AP-5*	*AP-6*	*AP-7*	*AP-8*	*AP-9*	*AP-10*	*AP-11*	*AP-12*	*AP-13*	*AP-14*	*RW-3*	*AW-1*	*G-120*
Arsenic, total							*X*	*X*							*X*	*X*	
Boron, total	*X*	*X*	*X*							*X*				*X*		*X*	*X*
Calcium, total	*X*	*X*	*X*									*X*		*X*		*X*	*X*
pH	*X*	*X*	*X*								*X*	*X*	*X*				
Sulfate, total	*X*		*X*									*X*		*X*		*X*	*X*
Total Dissolved Solids	*X*													*X*			*X*

Parameter	*T-1*	*T-2*	*T-4*	*T-5*	*T-6*
Calcium, total		*X*			
Chloride, total	*X*	*X*			
pH	*X*				
Total Dissolved Solids		*X*			

E) *Provide the date when the assessment of corrective measures was initiated for the CCR surface impoundment.*

The assessment of corrective measures was initiated May 2021.

F) *Provide the date when the assessment of corrective measures was completed for the CCR surface impoundment.*

An assessment of alternatives, including an evaluation of corrective measures and a closure alternatives analysis, was completed and posted on the facility's CCR compliance website on October 25, 2021. A public meeting was held on December 2, 2021, to present the closure alternatives and corrective action analysis and to receive and respond to public comments. Based on the closure alternatives assessment, closure-in-place with a final cover system was determined to be the most appropriate option.

As provided in Section 845.660(e), the owner/operator may combine the corrective measures assessment and the closure alternatives analysis into a single assessment of alternatives. The groundwater monitoring program has identified constituent concentrations in downgradient wells that require the implementation of an assessment of corrective measures. Based on the results of groundwater sampling and analyses, the facility anticipates conducting closure activities concurrently with corrective action.

G) *Specify whether a remedy was selected under Section 845.670 during the current annual reporting period, and if so, the date of remedy selection; and*

Pursuant to Section 845.710, closure of the surface impoundments may be completed by either:

- Leaving the CCR in place and installing a final cover system, or;
- Removing the CCR and decontaminating of the surface impoundments.

Currently, CWLP has selected closure-in-place with a final cover system as the most appropriate remedy. CWLP submitted a construction permit application for closure by installation of a final cover system pursuant to Section 845.750 on February 1, 2022. CWLP received a review letter from the Illinois EPA dated October 10, 2023, and subsequently submitted responses to the Illinois EPA on September 9, 2024, and October 30, 2024.

H) *Specify whether remedial activities were initiated or are ongoing under Section 845.780 during the current annual reporting period.*

In April 2019, CWLP submitted a notification of intent to comply with the Alternative Closure Requirements of 40 CFR 257.103(a), as no alternative disposal capacity was then available. Since that time, CWLP has shut down Dallman Units 31, 32, and 33 and completed the relocation of the lime ponds. All CCR and non-CCR waste streams ceased flowing into the impoundments as of October 2023.

While CWLP intended to commence closure of the Lakeside Ash Pond and the Dallman Ash Pond following completion of the new lime pond processing area, closure of the CCR ash impoundments cannot begin until a closure construction permit is issued by the Illinois EPA. To that end, CWLP submitted an Operating Permit Application to the Illinois EPA on October 28, 2021, and a Construction Permit Application on February 1, 2022. CWLP provided responses to the Illinois EPA review letter on September 9, 2024, and October 30, 2024.

2. GROUNDWATER MONITORING PROGRAM

As required by Section 845.650(a), CWLP prepared and placed a Groundwater Monitoring Program (GMP) for the CCR surface impoundments into the facility record on October 28, 2021. The GMP was updated in September 2024 and submitted to the Illinois EPA as part of CWLP's response to the review letter on September 9, 2024.

The current groundwater monitoring network includes two upgradient wells (AP-4 and AP-5), eight downgradient wells (RW-3, AP-1R, AP-2A, AP-3, AP-6, AP-8, AP-10, and AP-14), and ten compliance boundary wells (AP-7, AP-9, AP-11, AP-12, AP-13, T-1, T-2, T-4, T-5, and T-6). Wells T-1, T-2, T-4, T-5, and T-6 were installed in April and May 2024. Well locations are shown in Figure 2.

A Groundwater Monitoring System Certification has been placed in the site record and uploaded to the facility Illinois CCR Compliance website: https://www.cwlp.com/IllinoisCCRCompliance.aspx.

The following sections of this report address the annual groundwater monitoring and corrective action requirements specified in Section 845.650(e)(2) and (3).

3. SECTION 845.610(e)(2): KEY ACTIONS, PROBLEMS ENCOUNTERED, AND KEY ACTIVITIES FOR 2025

3.1 Key Actions

The following summarizes key actions undertaken in 2025 specifically related to the Groundwater Monitoring Program:

3.1.1 Assessment Monitoring

In accordance with Section 845.660(a), CWLP has initiated an assessment of corrective measures in response to statistically significant increases (SSIs) over background concentrations or the groundwater quality standards for one or more constituents listed in Section 845.600(a). Pursuant to Section 845.660(b), CWLP will continue to monitor groundwater in accordance with the monitoring program specified in Section 845.650.

Assessment monitoring, which includes all Section 845.600(a) parameters as well as calcium and turbidity, continued throughout 2025 for all wells in the groundwater monitoring system. A summary of the 2025 groundwater analytical reports and field sampling notes is provided in Appendix C. The chemical analysis results are summarized in Table 1.

3.1.2 Assessment Monitoring Investigation

Pursuant to Section 845.650(d)(1), the nature and extent of affected groundwater must be determined to allow evaluation and selection of potential remedies, if necessary. Characterization of affected groundwater is regulated under Section 845.650(d)(1)(A–D).

Seven wells were installed in February 2021 to augment the monitoring network and evaluate exceedances of the groundwater protection standards (GWPSs), all in accordance with Section 845.650(d)(1). Wells AP-10 and AP-14 were installed along the west side of the impoundments, and compliance boundary wells AP-9, AP-11, AP-12, and AP-13 were installed west of the creek.

Five additional wells were installed north and west of the creek in April and May 2024. These wells, identified as T-1, T-2, T-4, T-5 and T-6, are shown in Figure 3.

GWPS exceedances were observed and confirmed during the 2025 quarterly groundwater sampling events in downgradient wells AP-1R, AP-2A, AP-3, AP-8, AP-10, AP-14, RW-3, T-1 and T-2, as well as in compliance boundary well AP-7 and AP-12 (see Table 2).

Pursuant to 35 Ill. Adm. Code 845.650(d), CWLP has submitted notifications of the GWPS exceedances to the Illinois EPA and posted each notification its Illinois CCR Compliance website (https://www.cwlp.com/IllinoisCCRCompliance.aspx).

An alternate source demonstration (ASD) pursuant to 35 Ill. Adm. Code 845.650(e) was submitted to the Illinois EPA on October 28, 2024, to address the exceedances observed at monitoring well AP-7. The Illinois EPA issued a letter of non-concurrence on November 14, 2024, citing three data gaps. CWLP provided supplemental information on December 9, 2024, to address the cited gaps. The Illinois EPA issued a subsequent non-concurrence letter on January 9, 2025, noting that Section 845.650(e)(6) does not allow resubmittal of an ASD. CWLP previously submitted an Assessment of Corrective Measures pursuant to 35 Ill. Adm. Code 845.660 as part of the Closure Construction Permit Application on February 1, 2022, which remains under review by the Illinois EPA.

The remaining exceedances, at wells AP-1R, AP-2A, AP-3, AP-10, AP-14, and RW-3, have been delineated pursuant to Section 845.650(d)(1).

Assessment monitoring data collected during the 2025 quarterly sampling events, including sample dates and Section 845.600 parameters, are presented in Table 1.

Assessment monitoring at the CWLP CCR surface impoundments will continue pursuant to Section 845.660(b).

3.2 Assessment of Corrective Measures

As provided in Section 845.660(e), the owner/operator may combine the assessment of corrective measures and the closure analysis into a single assessment of closure alternatives. The groundwater monitoring program has identified constituent concentrations in downgradient wells that require implementation of an assessment of corrective measures. The facility anticipates conducting closure activities concurrently with corrective action based on groundwater sampling and analysis results. The assessment of corrective measures has been completed pursuant to Section 845.660 and is incorporated into the assessment of alternatives in accordance with Section 845.660(e).

Pursuant to Section 845.700(b), the surface impoundments are required to either be retrofitted or closed as long-term corrective measures. A closure alternative analysis was completed and

posted on the facility website on October 25, 2021. A public meeting was held on December 2, 2021, to present the closure alternatives analysis and the assessment of corrective measures, and to receive and respond to public comments. Based on the evaluation of closure alternatives, closure-in-place with a final cover system was determined to be the most appropriate option. Following installation of the final cover system, it is estimated that approximately 13 years will be required to achieve groundwater protection standards.

The closure alternative analysis and corrective measures assessment were submitted to the Illinois Environmental Protection Agency (Illinois EPA) on February 1, 2022, as part of the closure construction permit application prepared pursuant to Section 845.700(c) and in accordance with the application schedule under Section 845.700(h). CWLP submitted responses to the Illinois EPA review letter on September 9, 2024, and October 30, 2024.

3.3 Problems Encountered

All activities which occurred in 2025 are discussed in Section 3.1 and 3.2 above. No problems were encountered.

3.4 Key Activities for Upcoming Year (2026)

Assessment monitoring shall continue at the CWLP CCR surface impoundments in accordance with Section 845.660(b).

Closure of the CCR ash impoundments may not commence until a closure construction permit is issued by the Illinois Environmental Protection Agency (Illinois EPA). CWLP submitted an Operating Permit Application to the Illinois EPA on October 28, 2021, followed by a Construction Permit Application on February 1, 2022. The Illinois EPA has provided comments on the applications, and a meeting was held on November 16, 2023, to discuss the comments in part. CWLP has initiated modifications to its National Pollutant Discharge Elimination System (NPDES) permit to allow dewatering of the surface impoundments in preparation for closure with a final cover system. All closure activities must be implemented and completed in accordance with approvals issued by the U.S. Environmental Protection Agency pursuant to 40 CFR Part 257. Coordination with the U.S. EPA regarding proposed closure activities is ongoing.

4. SECTION 845.610(e)(3)(A-F)

Additional requirements for the Annual Groundwater Monitoring and Corrective Action Report are detailed in Section 854.610(e)(3)(A-F). Each of the requirements is reproduced below along with the response.

(A) - A map, aerial image, or diagram showing the CCR surface impoundment, all background (or upgradient) and downgradient monitoring wells, including the well identification numbers, that are part of the groundwater monitoring program for the CCR surface impoundment, and a visual delineation of any exceedances of the groundwater protection standards.

Maps depicting the CCR surface impoundments, all background and downgradient monitoring wells, and the delineation of identified exceedances of the groundwater protection standards are provided in Appendix A.

(B) - Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken.

Five additional CCR surface impoundment monitoring wells (CCR T-1, T-2, T-4, T-5, and T-6) were installed north and west of the creek in April and May 2024 to enhance the groundwater monitoring network. No additional wells were installed or decommissioned in 2025.

(C) - A potentiometric surface map for each groundwater elevation sampling event required by Section 845.650(b)(2).

Pursuant to 35 Ill. Adm. Code 845.610(e)(3)(C), the Annual Groundwater Monitoring and Corrective Action Report must include, as part of the annual consolidated report required by Section 845.550, a potentiometric surface map for each groundwater elevation sampling event required under Section 845.650(b)(2). To satisfy this requirement for the 2025 reporting period, groundwater elevation data from CCR surface impoundment wells (35 Ill. Adm. Code 845) and all other piezometers and monitoring wells (i.e., FGDS Landfill wells permitted under 35 Ill. Adm. Code 811) were reviewed and analyzed to prepare comprehensive potentiometric surface maps.

To better characterize groundwater flow directions, groundwater elevation data from all basal sand monitoring wells were used to develop the potentiometric surface maps. Because some wells are monitored at different frequencies or for specific assessment monitoring purposes, groundwater elevation measurements were not available for all wells on all sampling dates. These missing data points are identified as “NM” (not measured) on the potentiometric surface maps.
To address these data gaps and ensure a complete dataset for evaluating groundwater flow directions and gradients across the site, groundwater elevations were estimated where measurements were unavailable. Estimates were generated using linear regression applied to the available time-series groundwater elevation data for each affected well, with sampling dates converted to numerical days since January 27, 2025, to facilitate model fitting. This approach

captures observed temporal trends—such as the general decline in groundwater elevations observed in many wells—and provides reasonable approximations where direct measurements were not obtained.

For wells with missing data during earlier sampling events (e.g., AP15D, AP16, P04D, and P06D Middle), groundwater elevations were extrapolated backward from subsequent measurements under the assumption of continuity in the observed linear trends. For wells with missing data during later sampling events (e.g., AW2, G110, G112, and others), elevations were extrapolated forward from prior measurements. The quality of each regression fit was evaluated using the coefficient of determination (R^2), which ranged from 0.026 to 0.988, with an average R^2 of approximately 0.753 across all affected wells. Lower R^2 values indicate increased variability potentially attributable to seasonal effects, localized hydrogeologic conditions, or measurement variability; however, linear regression represents a conservative and commonly accepted method for interpolation and extrapolation in the absence of additional site-specific data.

This estimation methodology ensures that the potentiometric surface maps are developed using the best available information and provide a representative depiction of site-wide groundwater conditions, consistent with annual reporting requirements. Potentiometric surface maps for each monthly groundwater elevation sampling event are included in Appendix B.

As shown on the potentiometric surface maps, groundwater generally flows radially outward from the CCR surface impoundment areas, with an overall northerly component of groundwater flow.

(D) - In addition to all the monitoring data obtained under this Subpart, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, and the dates the samples were collected.

Pursuant to Section 845.650(b)(1), groundwater samples are collected on a quarterly basis. The laboratory analytical reports for the parameters at Section 845.600(a), calcium, and turbidity for each of the quarterly groundwater sampling events are provided in Appendix C.

(E) - A narrative discussion of any statistically significant increases over background levels for the constituents listed in Section 845.600; and

Sampling and analysis were conducted at all required monitoring wells for the parameters identified in Section 845.600(a)(1), including calcium and turbidity. Due to it being frozen during the initial first quarter 2025 sampling activities, AP-14 was sampled a week after the other wells for the first quarter 2025. During the 2025 assessment monitoring period, statistically significant increases (SSIs) above the groundwater protection standards (GWPS) were confirmed for seven

parameters: arsenic, boron, calcium, cobalt, pH, sulfate, and total dissolved solids (TDS). Table 2 summarizes all confirmed SSIs. The following sections provide detailed evaluations for each constituent, including concentration ranges, temporal trends, relevant geochemical considerations, and an assessment of whether observed exceedances are attributable to the unlined CCR surface impoundments.

Arsenic (Total)

Confirmed SSIs for total arsenic (GWPS = 0.0239 mg/L) were identified in 2025 at monitoring wells AP-7, AP-8, and RW-3.

Arsenic exceedances were primarily observed at wells AP-8 and RW-3, which are located immediately north and northeast of the CCR surface impoundments. These wells are positioned along the predominant northerly groundwater flow path as indicated by the potentiometric surface maps. Arsenic concentrations decrease farther downgradient at well AP-6, where concentrations ranged from 0.0037 to 0.012 mg/L and remained below the GWPS. This spatial trend indicates attenuation of arsenic concentrations between the impoundments and the compliance boundary well (AP-7).

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-7	Arsenic, total	mg/L	0.0239	0.0248	0.0289	0.0289	0.0182
AP-8	Arsenic, total	mg/L	0.0239	0.0487	0.0446	0.0389	0.0372
RW-3	Arsenic, total	mg/L	0.0239	0.0961	0.0808	0.103	0.108

Eight-quarter linear regression analyses indicate downward concentration trends for total arsenic at monitoring wells AP-7, AP-8, and RW-3.

Alternate source demonstrations submitted on October 28 and December 9, 2024, concluded that arsenic detected at AP-7 is attributable to naturally occurring geochemical conditions north of Sugar Creek rather than to CCR leachate. This conclusion is supported by the local groundwater flow regime along the north bank of Sugar Creek, which consistently flows from north to south toward the creek. As a result, groundwater north of the creek is hydraulically isolated from groundwater originating beneath the CCR surface impoundments.

Arsenic mobility is governed by geochemical factors including redox conditions, pH, ionic strength, and competitive sorption processes. Elevated ionic strength and increased sulfate and calcium concentrations—conditions commonly associated with CCR leachate—can inhibit arsenic sorption and increase mobility. The observed declining arsenic concentrations at AP-8 and RW-

3 may reflect stabilization of redox conditions, reductions in competing anion concentrations, or increased sorption capacity within the aquifer matrix. The limited spatial extent of exceedances, combined with the downward concentration trends, indicates that an expanding arsenic plume is not present.

Based on groundwater flow patterns, flow directions, and trend analyses, arsenic exceedances at AP-8 and RW-3 are most likely associated with localized geochemical mobilization, while the exceedance at AP-7 is unrelated to CCR impacts. There is no evidence of a migrating arsenic plume extending downgradient from the CCR surface impoundments.

Boron, total

Confirmed statistically significant increases (SSIs) for total boron (GWPS = 2 mg/L) were identified during the 2025 assessment period at downgradient monitoring wells AP-1R, AP-2A, AP-3, AP-10, AP-14, AW-1, and G120.

Elevated boron concentrations closely correspond to the radial groundwater flow paths originating beneath the CCR surface impoundments, as shown on the potentiometric surface maps. These monitoring wells are located immediately downgradient of the CCR units and exhibit boron concentrations consistent with those typically associated with CCR leachate.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	Boron, total	mg/L	2	21.7	20.8	23	21.4
AP-2	Boron, total	mg/L	2	3.53	3.12	3.43	3.15
AP-3	Boron, total	mg/L	2	12.1	12.9	16.5	18
AP-10	Boron, total	mg/L	2	3.36	4.5	4.25	3.88
AP-14	Boron, total	mg/L	2	21.5	21.7	21.9	20.8
AW-1	Boron, total	mg/L	2	8.79	8.75	9.61	9.67
G120	Boron, total	mg/L	2	7.5	8.02	7.95	8.23

Monitoring wells located on the opposite bank of Sugar Creek (AP-7, AP-9, AP-11, AP-12, and AP-13) remain below the GWPS, confirming that boron has not migrated beneath or across Sugar Creek.

Trend analyses indicate decreasing boron concentrations at wells AP-1R, AP-2A, and AP-14, while increasing concentrations were observed at AP-3, AP-10, AW-1, and G120.

Boron is a highly conservative tracer that is strongly associated with CCR leachate and exhibits minimal attenuation through sorption or precipitation processes. As a result, boron migrates conservatively with groundwater and reliably delineates the extent of the CCR leachate footprint. The observed spatial distribution and temporal trends of boron concentrations strongly indicate a CCR-derived plume, limited to monitoring wells immediately downgradient of the CCR surface impoundments, with no evidence of migration beneath or across Sugar Creek.

Calcium, total

Statistically significant increases (SSIs) for calcium (GWPS = 181.6 mg/L) were confirmed during 2025 at monitoring wells AP-1R, AP-2A, AP-3, AP-12, AP-14, AW-1, G120, and temporary assessment well T-2.

Calcium concentrations at AP-1R, AP-2A, AP-3, AP-14, AW-1, and G120 closely follow the downgradient groundwater flow paths originating beneath the CCR surface impoundments. These wells are situated along the potentiometric gradient where groundwater discharging from the impoundments enters the basal sand/bedrock interface.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	Calcium, total	mg/L	181.6	245	228	259	251
AP-2	Calcium, total	mg/L	181.6	198	183	216	213
AP-3	Calcium, total	mg/L	181.6	168	171	205	192
AP-12	Calcium, total	mg/L	181.6	197	204	226	193
AP-14	Calcium, total	mg/L	181.6	268	276	277	317
AW-1	Calcium, total	mg/L	181.6	186	203	205	209
G120	Calcium, total	mg/L	181.6	249	256	272	287
T-2	Calcium, total	mg/L	181.6	210	231	231	209

Calcium concentrations mirror the downgradient flow paths beneath the CCR surface impoundments and are elevated in the same wells exhibiting elevated boron, sulfate, and TDS.

Monitoring well AP-12, located across Sugar Creek, continues to show elevated calcium attributed to off-site sources (e.g., deicing along Interstate 55), consistent with the September 12, 2022, Alternate Source Demonstration.

Trend analyses indicate slight decreases at AP-12 and increasing concentrations at all other wells with confirmed SSIs.

In CCR-impacted environments, calcium commonly originates from the dissolution of gypsum or anhydrite phases. Elevated calcium typically co-occurs with high sulfate and TDS, reflecting leachate with elevated ionic strength.

Overall, calcium patterns are consistent with a CCR-derived plume immediately adjacent to the surface impoundments, except for wells AP-12 and T-2, where off-site sources are the primary influence.

Cobalt, total

During 2025, confirmed statistically significant increases (SSIs) for total cobalt (GWPS = 0.006 mg/L) were observed at downgradient monitoring wells AP-2A and AP-3, as well as at upgradient well AP-4.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-2	Cobalt, total	mg/L	0.006	0.014	0.0095	0.0127	0.0078
AP-3	Cobalt, total	mg/L	0.006	0.0057	0.0081	0.0076	< 0.005
AP-4	Cobalt, total	mg/L	0.006	< 0.005	0.0083	0.0075	0.0067

During 2025, confirmed statistically significant increases (SSIs) for total cobalt (GWPS = 0.006 mg/L) were observed at downgradient monitoring wells AP-2A and AP-3, as well as at upgradient well AP-4. Trend analyses indicate increasing cobalt concentrations at AP-2A and AP-4 and decreasing concentrations at AP-3.

Cobalt mobility can increase under acidic, reducing, or high-ionic-strength conditions. However, observed cobalt concentrations remain near detection limits, exhibit limited spatial coherence, and are detected both downgradient and upgradient of the CCR surface impoundments.

The detection of cobalt above the GWPS in upgradient well AP-4 indicates that these exceedances are attributable to local natural variability rather than CCR leachate transport. Considering the extremely low concentrations, lack of spatial correlation with CCR indicator ions, upgradient exceedances, and questionable fourth-quarter pH data, the confirmed SSIs for cobalt are not attributable to the CCR surface impoundments.

pH (Field)

During 2025, pH values outside the groundwater protection standard range (6.5–9.0 standard units) were observed at monitoring wells AP-1, AP-2A, AP-3, AP-11, AP-12, AP-13, and

temporary assessment well T-1. The fourth-quarter 2025 pH data are considered suspect and potentially erroneous, likely due to calibration issues.

Data from the first through third quarters of 2025 indicate mildly acidic conditions across the site. However, no plume-like pattern or concentration gradient indicative of CCR leachate migration was exhibited. Lower pH values occur both near and distant from the CCR surface impoundments and on both sides of Sugar Creek.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	pH	s.u.	6.5-9	6.55	6.42	6.42	4.86
AP-2	pH	s.u.	6.5-9	6.44	6.45	6.3	4.55
AP-3	pH	s.u.	6.5-9	6.54	6.53	6.36	4.93
AP-11	pH	s.u.	6.5-9	6.4	6.53	6.34	4.79
AP-12	pH	s.u.	6.5-9	6.55	6.5	6.38	4.74
AP-13	pH	s.u.	6.5-9	6.69	6.68	6.43	5.22
T-1	pH	s.u.	6.5-9	6.59	6.58	6.46	4.54

Lower pH can increase the solubility of metals and oxyanions. However, the widespread pH decreases observed in 2025 are more consistent with regional aquifer conditions, seasonal recharge effects, or natural geochemical variability rather than a localized, point-source release from the CCR surface impoundments.

The acidic conditions may have contributed to modest increases in dissolved cobalt and could potentially facilitate mobilization of other trace constituents if present; however, pH alone is not sufficient to identify the source of such constituents.

Overall, pH variations observed in 2025 do not indicate impacts related to the CCR surface impoundments.

Sulfate, total

During 2025, confirmed statistically significant increases (SSIs) for sulfate (GWPS = 400 mg/L) were observed at monitoring wells AP-1R, AP-3, AP-12, AP-14, AW-1, and G120.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	Sulfate, total	mg/L	400	834	858	884	828
AP-3	Sulfate, total	mg/L	400	569	505	609	588
AP-12	Sulfate, total	mg/L	400	433	416	488	395
AP-14	Sulfate, total	mg/L	400	866	909	926	1040
AW-1	Sulfate, total	mg/L	400	374	388	408	403
G120	Sulfate, total	mg/L	400	548	562	569	578

Trend analyses indicate increasing sulfate concentrations at most wells (AP-1, AP-3, AP-14, AW-1, and G120), while AP-12 shows a decreasing trend.

Most wells (AP-1, AP-3, AP-14, AW-1 and G120) exhibit increasing sulfate concentrations; AP-12 shows a decreasing trend.

Sulfate closely tracks the CCR leachate signature, occurring in the same wells with elevated boron, calcium, and TDS. Its distribution follows the potentiometric flow paths and does not extend across Sugar Creek, confirming that the CCR-derived plume is contained.

Sulfate commonly originates from the dissolution of sulfate-containing minerals in CCR materials. Elevated sulfate can reduce sorption capacity for oxyanions and influence overall ionic strength. Sulfate mobility is also sensitive to redox conditions, and sulfurization/desulfurization processes are influenced by multiple hydrogeochemical factors.

The magnitude, spatial distribution, and geochemical associations of sulfate in 2025 are consistent with CCR leachate influence at wells immediately downgradient of the impoundments. No evidence was observed of sulfate exceedances beyond the monitored perimeter, including across Sugar Creek, supporting the conclusion that the CCR-derived plume remains contained.

Total Dissolved Solids

During the 2025 assessment period, confirmed statistically significant increases (SSIs) for total dissolved solids (TDS) (GWPS = 1,200 mg/L) were observed at monitoring wells AP-1R, AP-12, AP-3, AP-14, G120, and temporary assessment well T-2.

Well ID	Parameter	Units	Groundwater Protection Standard	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	TDS	mg/L	1200	1600	1740	1870	1590
AP-3	TDS	mg/L	1200	1150	1180	1400	1310
AP-12	TDS	mg/L	1200	1250	1190	1380	1150
AP-14	TDS	mg/L	1200	1650	1620	1940	1900
G120	TDS	mg/L	1200	1400	1340	1640	1500
T-2	TDS	mg/L	1200	1270	1550	1490	1370

Trend analyses indicate increasing TDS concentrations at wells AP-1, AP-3, AP-14, G120, and temporary well T-2, while AP-12 shows a decreasing trend.

TDS reflects the combined load of dissolved ions—including boron, calcium, sulfate, and chloride—and serves as an integrative indicator of CCR leachate impact. Elevated TDS unrelated to CCR sources is consistent with off-site influences previously documented.

The observed TDS trends corroborate the presence of a multi-ion plume associated with CCR leachate in wells immediately downgradient of the surface impoundments, while separate off-site influences are evident west of Sugar Creek.

(F) - Other information required to be included in the annual report as specified in 35 Ill. Adm. Code 845.Subpart F.

All applicable information has been provided in the narrative above.

5. CONCLUSION

The 2025 groundwater quality data support the presence of a leachate-influenced groundwater from the unlined CCR surface impoundments at CWLP Springfield. The areas of influence appear relatively stable, hydraulically contained, and confined within the monitoring network on the impoundment side of Sugar Creek. There is no clear evidence of migration across Sugar Creek or of an expanding contaminant front.

This annual groundwater monitoring and corrective action report has been provided in accordance with Section 845.550(a)(3). The next annual report for monitoring year 2025 will be provided by January 31, 2026.

6. STATEMENT

This Annual Groundwater Monitoring and Corrective Action Report for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 35 IAC Part 845.610(e).

Karl W. Finke, P.E.

1/28/26

Date

Lic. Exp. 11/30/27

TABLES

TABLE 1:
2025 GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix III										
AP-1	Boron, total	mg/L	--	--	**0.14973**	--	21.7	20.8	23	21.4
AP-2	Boron, total	mg/L	--	--	**0.14973**	--	3.53	3.12	3.43	3.15
AP-3	Boron, total	mg/L	--	--	**0.14973**	--	12.1	12.9	16.5	18
AP-4	Boron, total	mg/L	--	--	**0.14973**	--	0.0913	0.0772	0.094	0.0914
AP-5	Boron, total	mg/L	--	--	**0.14973**	--	0.0435	0.0521	0.0351	0.0386
AP-6	Boron, total	mg/L	--	--	**0.14973**	--	0.228	0.407	0.278	0.272
AP-7	Boron, total	mg/L	--	--	**0.14973**	--	0.244	0.393	0.39	0.475
AP-8	Boron, total	mg/L	--	--	**0.14973**	--	0.0784	0.963	0.084	0.0821
AP-9	Boron, total	mg/L	--	--	**0.14973**	--	0.0874	0.0887	0.099	0.0985
AP-10	Boron, total	mg/L	--	--	**0.14973**	--	3.36	4.5	4.25	3.88
AP-11	Boron, total	mg/L	--	--	**0.14973**	--	0.221	0.273	0.228	0.276
AP-12	Boron, total	mg/L	--	--	**0.14973**	--	0.0217	0.0205	0.0255	0.0249
AP-13	Boron, total	mg/L	--	--	**0.14973**	--	0.0369	0.0276	0.0566	0.0257
AP-14	Boron, total	mg/L	--	--	**0.14973**	--		21.7	21.9	20.8
AW-1	Boron, total	mg/L	--	--	**0.14973**	--	8.79	8.75	9.61	9.67
RW-3	Boron, total	mg/L	--	--	**0.14973**	--	0.126	0.153	0.16	0.16
R111	Boron, total	mg/L	--	--	**0.14973**	--	3.09	3.98		
G120	Boron, total	mg/L	--	--	**0.14973**	--	7.5	8.02	7.95	8.23
T-1	Boron, total	mg/L	--	--	**0.14973**	--	0.17	0.163	0.173	0.175
T-2	Boron, total	mg/L	--	--	**0.14973**	--	0.0466	0.0507	0.0504	0.0487
T-4	Boron, total	mg/L	--	--	**0.14973**	--	0.0454	0.0577	0.0504	0.0426
T-5	Boron, total	mg/L	--	--	**0.14973**	--	0.0608	0.0671	0.0917	0.106
T-6	Boron, total	mg/L	--	--	**0.14973**	--	0.187	0.2	0.0428	0.214
AP-1	Calcium, total	mg/L	--	--	**181.6**	--	245	228	259	251
AP-2	Calcium, total	mg/L	--	--	**181.6**	--	198	183	216	213
AP-3	Calcium, total	mg/L	--	--	**181.6**	--	168	171	205	192
AP-4	Calcium, total	mg/L	--	--	**181.6**	--	113	113	124	128
AP-5	Calcium, total	mg/L	--	--	**181.6**	--	97.3	97.6	108	109
AP-6	Calcium, total	mg/L	--	--	**181.6**	--	64.4	65.1	67.3	69.8
AP-7	Calcium, total	mg/L	--	--	**181.6**	--	57.6	58.4	60.9	55.9
AP-8	Calcium, total	mg/L	--	--	**181.6**	--	91.3	97.7	102	103
AP-9	Calcium, total	mg/L	--	--	**181.6**	--	98.4	99.4	112	111
AP-10	Calcium, total	mg/L	--	--	**181.6**	--	127	143	158	141
AP-11	Calcium, total	mg/L	--	--	**181.6**	--	135	160	153	133
AP-12	Calcium, total	mg/L	--	--	**181.6**	--	197	204	226	193
AP-13	Calcium, total	mg/L	--	--	**181.6**	--	101	114	109	115
AP-14	Calcium, total	mg/L	--	--	**181.6**	--		276	277	317
AW-1	Calcium, total	mg/L	--	--	**181.6**	--	186	203	205	209
RW-3	Calcium, total	mg/L	--	--	**181.6**	--	64.5	64.9	73.9	71.1
R111	Calcium, total	mg/L	--	--	**181.6**	--	148	166		
G120	Calcium, total	mg/L	--	--	**181.6**	--	249	256	272	287
T-1	Calcium, total	mg/L	--	--	**181.6**	--	157	165	172	164
T-2	Calcium, total	mg/L	--	--	**181.6**	--	210	231	231	209
T-4	Calcium, total	mg/L	--	--	**181.6**	--	89.2	72.8	61.9	65.8
T-5	Calcium, total	mg/L	--	--	**181.6**	--	70.1	72.4	73.3	99.4
T-6	Calcium, total	mg/L	--	--	**181.6**	--	82.2	92.2	86.7	97.7

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix III (cont.)										
AP-1	Chloride, total	mg/L	--	--	**12.3**	--	49.3	50.1	51.8	51.8
AP-2	Chloride, total	mg/L	--	--	**12.3**	--	35.8	36.2	36	37
AP-3	Chloride, total	mg/L	--	--	**12.3**	--	61.5	61.7	71.2	70.8
AP-4	Chloride, total	mg/L	--	--	**12.3**	--	12.4	12.1	12.4	12.8
AP-5	Chloride, total	mg/L	--	--	**12.3**	--	8.4	9.13	9.5	9.78
AP-6	Chloride, total	mg/L	--	--	**12.3**	--	33	32.6	37.5	38
AP-7	Chloride, total	mg/L	--	--	**12.3**	--	51.7	81.4	69.8	88.5
AP-8	Chloride, total	mg/L	--	--	**12.3**	--	22.5	22.6	23.3	24.2
AP-9	Chloride, total	mg/L	--	--	**12.3**	--	23.5	27	24.4	25.5
AP-10	Chloride, total	mg/L	--	--	**12.3**	--	24.4	24.6	25.4	25.9
AP-11	Chloride, total	mg/L	--	--	**12.3**	--	95.1	129	127	113
AP-12	Chloride, total	mg/L	--	--	**12.3**	--	114	113	119	115
AP-13	Chloride, total	mg/L	--	--	**12.3**	--	26.8	24.7	29.4	26.3
AP-14	Chloride, total	mg/L	--	--	**12.3**	--		105	105	120
AW-1	Chloride, total	mg/L	--	--	**12.3**	--	35.4	36.8	37.2	38.2
RW-3	Chloride, total	mg/L	--	--	**12.3**	--	25.4	25	26.4	27.1
R111	Chloride, total	mg/L	--	--	**12.3**	--	169	179		
G120	Chloride, total	mg/L	--	--	**12.3**	--	35.2	35.5	36.8	38.3
T-1	Chloride, total	mg/L	--	--	**12.3**	--	220	232	233	253
T-2	Chloride, total	mg/L	--	--	**12.3**	--	500	522	509	427
T-4	Chloride, total	mg/L	--	--	**12.3**	--	< 5	< 5	< 5	< 5
T-5	Chloride, total	mg/L	--	--	**12.3**	--	< 5	< 5	< 5	< 5
T-6	Chloride, total	mg/L	--	--	**12.3**	--	18.9	20.8	11.8	19.8
AP-1	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-2	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-3	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-4	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-5	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-6	Fluoride, total	mg/L	**4**	--	0.5	--	0.54	0.58	0.53	0.53
AP-7	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	0.55	< 0.5	0.53
AP-8	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-9	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-10	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-11	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-12	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-13	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
AP-14	Fluoride, total	mg/L	**4**	--	0.5	--		< 0.5	< 0.5	< 0.5
AW-1	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
RW-3	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
R111	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5		
G120	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
T-1	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
T-2	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
T-4	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
T-5	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5
T-6	Fluoride, total	mg/L	**4**	--	0.5	--	< 0.5	< 0.5	< 0.5	< 0.5

City Water, Light and Power
Power Plant Ash Impoundment
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Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix III (cont.)										
AP-1	pH	s.u.	--	--	6.7 - 7.87	--	6.55	6.42	6.42	4.86
AP-2	pH	s.u.	--	--	6.7 - 7.87	--	6.44	6.45	6.3	4.55
AP-3	pH	s.u.	--	--	6.7 - 7.87	--	6.54	6.53	6.36	4.93
AP-4	pH	s.u.	--	--	6.7 - 7.87	--	6.78	6.69	6.64	6.76
AP-5	pH	s.u.	--	--	6.7 - 7.87	--	6.83	6.67	6.64	6.83
AP-6	pH	s.u.	--	--	6.7 - 7.87	--	7.21	7	6.89	7.06
AP-7	pH	s.u.	--	--	6.7 - 7.87	--	7.38	7.14	7.12	7.06
AP-8	pH	s.u.	--	--	6.7 - 7.87	--	6.89	6.78	6.71	6.11
AP-9	pH	s.u.	--	--	6.7 - 7.87	--	7.02	6.79	6.57	6.57
AP-10	pH	s.u.	--	--	6.7 - 7.87	--	6.67	6.63	6.52	5.37
AP-11	pH	s.u.	--	--	6.7 - 7.87	--	6.4	6.53	6.34	4.79
AP-12	pH	s.u.	--	--	6.7 - 7.87	--	6.55	6.5	6.38	4.74
AP-13	pH	s.u.	--	--	6.7 - 7.87	--	6.69	6.68	6.43	5.22
AP-14	pH	s.u.	--	--	6.7 - 7.87	--		7.02	6.71	6.24
AW-1	pH	s.u.	--	--	6.7 - 7.87	--	6.64	6.96	6.58	6.62
RW-3	pH	s.u.	--	--	6.7 - 7.87	--	7.1	7.03	6.92	7.09
R111	pH	s.u.	--	--	6.7 - 7.87	--	6.86	6.71	6.9	6.92
G120	pH	s.u.	--	--	6.7 - 7.87	--	6.66	6.57	6.67	6.67
T-1	pH	s.u.	--	--	6.7 - 7.87	--	6.59	6.58	6.46	4.54
T-2	pH	s.u.	--	--	6.7 - 7.87	--	6.53	6.55	6.51	4.89
T-4	pH	s.u.	--	--	6.7 - 7.87	--	6.64	6.63	6.6	6.43
T-5	pH	s.u.	--	--	6.7 - 7.87	--	6.72	6.77	6.8	6.64
T-6	pH	s.u.	--	--	6.7 - 7.87	--	7.3	7	7.16	6.76
AP-1	Sulfate, total	mg/L	--	--	**55.5**	--	834	858	884	828
AP-2	Sulfate, total	mg/L	--	--	**55.5**	--	397	367	422	389
AP-3	Sulfate, total	mg/L	--	--	**55.5**	--	569	505	609	588
AP-4	Sulfate, total	mg/L	--	--	**55.5**	--	< 10	< 10	< 10	< 10
AP-5	Sulfate, total	mg/L	--	--	**55.5**	--	59.7	63.6	69.1	70.9
AP-6	Sulfate, total	mg/L	--	--	**55.5**	--	< 10	< 10	< 10	< 10
AP-7	Sulfate, total	mg/L	--	--	**55.5**	--	11.6	< 10	< 10	< 10
AP-8	Sulfate, total	mg/L	--	--	**55.5**	--	< 10	< 10	< 10	< 10
AP-9	Sulfate, total	mg/L	--	--	**55.5**	--	16.1	17.9	15.9	15.5
AP-10	Sulfate, total	mg/L	--	--	**55.5**	--	84.4	94.9	96.7	90.8
AP-11	Sulfate, total	mg/L	--	--	**55.5**	--	65.5	84.6	85.7	68.9
AP-12	Sulfate, total	mg/L	--	--	**55.5**	--	433	416	488	395
AP-13	Sulfate, total	mg/L	--	--	**55.5**	--	94.5	124	104	120
AP-14	Sulfate, total	mg/L	--	--	**55.5**	--		909	926	1040
AW-1	Sulfate, total	mg/L	--	--	**55.5**	--	374	388	408	403
RW-3	Sulfate, total	mg/L	--	--	**55.5**	--	< 10	< 10	< 10	< 10
R111	Sulfate, total	mg/L	--	--	**55.5**	--	24.7	28.5		
G120	Sulfate, total	mg/L	--	--	**55.5**	--	548	562	569	578
T-1	Sulfate, total	mg/L	--	--	**55.5**	--	163	148	151	169
T-2	Sulfate, total	mg/L	--	--	**55.5**	--	135	143	136	90
T-4	Sulfate, total	mg/L	--	--	**55.5**	--	121	101	76.7	77.9
T-5	Sulfate, total	mg/L	--	--	**55.5**	--	40.7	35.4	31.3	87.4
T-6	Sulfate, total	mg/L	--	--	**55.5**	--	< 10	< 10	15.5	< 10

City Water, Light and Power
Power Plant Ash Impoundment
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Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix III (cont.)										
AP-1	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1600	1740	1870	1590
AP-2	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1070	1100	1280	1190
AP-3	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1150	1180	1400	1310
AP-4	Total Dissolved Solids	mg/L	--	--	**609.21**	--	508	528	574	532
AP-5	Total Dissolved Solids	mg/L	--	--	**609.21**	--	474	514	568	498
AP-6	Total Dissolved Solids	mg/L	--	--	**609.21**	--	398	432	482	450
AP-7	Total Dissolved Solids	mg/L	--	--	**609.21**	--	430	652	514	522
AP-8	Total Dissolved Solids	mg/L	--	--	**609.21**	--	548	580	580	550
AP-9	Total Dissolved Solids	mg/L	--	--	**609.21**	--	880	681	638	614
AP-10	Total Dissolved Solids	mg/L	--	--	**609.21**	--	788	820	834	834
AP-11	Total Dissolved Solids	mg/L	--	--	**609.21**	--	740	784	756	694
AP-12	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1250	1190	1380	1150
AP-13	Total Dissolved Solids	mg/L	--	--	**609.21**	--	620	595	630	580
AP-14	Total Dissolved Solids	mg/L	--	--	**609.21**	--		1620	1940	1900
AW-1	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1110	1190	1250	1190
RW-3	Total Dissolved Solids	mg/L	--	--	**609.21**	--	372	385	440	454
R111	Total Dissolved Solids	mg/L	--	--	**609.21**	--	725	770	912	986
G120	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1400	1340	1640	1530
T-1	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1010	962	950	1020
T-2	Total Dissolved Solids	mg/L	--	--	**609.21**	--	1270	1550	1490	1370
T-4	Total Dissolved Solids	mg/L	--	--	**609.21**	--	472	478	370	372
T-5	Total Dissolved Solids	mg/L	--	--	**609.21**	--	374	428	392	496
T-6	Total Dissolved Solids	mg/L	--	--	**609.21**	--	530	570	412	558

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Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV										
AP-1	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-2	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	0.0021
AP-3	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	0.0015
AP-4	Antimony, total	mg/L	**0.006**	--	0.001	--	0.0014	< 0.001	< 0.001	< 0.001
AP-5	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-6	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-7	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-8	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-9	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-10	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	0.0011
AP-11	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-12	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-13	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-14	Antimony, total	mg/L	**0.006**	--	0.001	--		< 0.001	< 0.001	< 0.001
AW-1	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
RW-3	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	0.0039
R111	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001		
G120	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
T-1	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
T-2	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
T-4	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
T-5	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
T-6	Antimony, total	mg/L	**0.006**	--	0.001	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-1	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-2	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0022	0.0013	0.0014	0.0014
AP-3	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0137	0.0103	0.016	0.0135
AP-4	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.021	0.0223	0.0248	0.0219
AP-5	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-6	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.012	0.0037	0.0068	0.0112
AP-7	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0248	0.0289	0.0289	0.0182
AP-8	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0487	0.0446	0.0389	0.0372
AP-9	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0023	0.0014	0.0013	0.0016
AP-10	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	0.0015	0.0012	< 0.001
AP-11	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0015	< 0.001	< 0.001	< 0.001
AP-12	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-13	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	0.0032	0.002	0.0018
AP-14	Arsenic, total	mg/L	0.01	--	**0.0239**	--		0.0017	0.0011	0.0017
AW-1	Arsenic, total	mg/L	0.01	--	0.0239	**0.24962**	0.146	0.0016	0.0098	0.13
RW-3	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0961	0.0808	0.103	0.108
R111	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0156	0.0215		
G120	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0113	0.0114	0.0115	0.0128
T-1	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0023	< 0.001	0.0016	< 0.001
T-2	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0073	0.0056	0.0068	0.0073
T-4	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0049	0.0039	0.0038	0.003
T-5	Arsenic, total	mg/L	0.01	--	**0.0239**	--	< 0.001	< 0.001	0.0014	0.0022
T-6	Arsenic, total	mg/L	0.01	--	**0.0239**	--	0.0037	0.0195	0.0086	0.0145

City Water, Light and Power
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Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Barium, total	mg/L	**2**	--	0.51918	--	0.307	0.262	0.276	0.248
AP-2	Barium, total	mg/L	**2**	--	0.51918	--	0.071	0.0654	0.0736	0.0749
AP-3	Barium, total	mg/L	**2**	--	0.51918	--	0.12	0.106	0.121	0.117
AP-4	Barium, total	mg/L	**2**	--	0.51918	--	0.378	0.434	0.413	0.417
AP-5	Barium, total	mg/L	**2**	--	0.51918	--	0.0532	0.0571	0.0595	0.0604
AP-6	Barium, total	mg/L	**2**	--	0.51918	--	0.137	0.154	0.168	0.199
AP-7	Barium, total	mg/L	**2**	--	0.51918	--	0.105	0.137	0.143	0.152
AP-8	Barium, total	mg/L	**2**	--	0.51918	--	0.355	0.415	0.394	0.373
AP-9	Barium, total	mg/L	**2**	--	0.51918	--	0.431	0.322	0.492	0.437
AP-10	Barium, total	mg/L	**2**	--	0.51918	--	0.565	0.765	0.675	0.601
AP-11	Barium, total	mg/L	**2**	--	0.51918	--	0.134	0.14	0.152	0.12
AP-12	Barium, total	mg/L	**2**	--	0.51918	--	0.045	0.0575	0.0561	0.0525
AP-13	Barium, total	mg/L	**2**	--	0.51918	--	0.118	0.127	0.142	0.12
AP-14	Barium, total	mg/L	**2**	--	0.51918	--		0.0384	0.0463	0.0486
AW-1	Barium, total	mg/L	**2**	--	0.51918	--	0.486	0.079	0.105	0.218
RW-3	Barium, total	mg/L	**2**	--	0.51918	--	0.136	0.142	0.169	0.167
R111	Barium, total	mg/L	**2**	--	0.51918	--	0.586	0.696		
G120	Barium, total	mg/L	**2**	--	0.51918	--	0.708	0.842	0.769	1.35
T-1	Barium, total	mg/L	**2**	--	0.51918	--	0.0691	0.0586	0.0747	0.0621
T-2	Barium, total	mg/L	**2**	--	0.51918	--	0.217	0.226	0.232	0.193
T-4	Barium, total	mg/L	**2**	--	0.51918	--	0.05	0.0345	0.0456	0.0382
T-5	Barium, total	mg/L	**2**	--	0.51918	--	0.0535	0.0567	0.0658	0.0762
T-6	Barium, total	mg/L	**2**	--	0.51918	--	0.166	0.279	0.116	0.305
AP-1	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-2	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-3	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-4	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-5	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	0.0006	< 0.0005
AP-6	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-7	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-8	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-9	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-10	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-11	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-12	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-13	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
AP-14	Beryllium, total	mg/L	**0.004**	--	0.0025	--		< 0.0005	< 0.0005	< 0.0005
AW-1	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
RW-3	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
R111	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005		
G120	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	0.0009	< 0.0005	0.0006
T-1	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
T-2	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	0.0005	< 0.0005	< 0.0005
T-4	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
T-5	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005
T-6	Beryllium, total	mg/L	**0.004**	--	0.0025	--	< 0.0005	< 0.0005	< 0.0005	< 0.0005

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-2	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-3	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-4	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-5	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-6	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-7	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-8	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-9	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-10	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-11	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-12	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-13	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-14	Cadmium, total	mg/L	**0.005**	--	0.0025	--		< 0.002	< 0.002	< 0.002
AW-1	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
RW-3	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
R111	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002		
G120	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	0.002
T-1	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
T-2	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
T-4	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
T-5	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
T-6	Cadmium, total	mg/L	**0.005**	--	0.0025	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-1	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-2	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-3	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-4	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	0.0081	0.0051	< 0.005
AP-5	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-6	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-7	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-8	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-9	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-10	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-11	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-12	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-13	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-14	Chromium, total	mg/L	**0.1**	--	0.0653	--		< 0.005	< 0.005	< 0.005
AW-1	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
RW-3	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
R111	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005		
G120	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
T-1	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
T-2	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
T-4	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
T-5	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005
T-6	Chromium, total	mg/L	**0.1**	--	0.0653	--	< 0.005	< 0.005	< 0.005	< 0.005

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-2	Cobalt, total	mg/L	--	**0.006**	0.0052	--	0.014	0.0095	0.0127	0.0078
AP-3	Cobalt, total	mg/L	--	**0.006**	0.0052	--	0.0057	0.0081	0.0076	< 0.005
AP-4	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	0.0083	0.0075	0.0067
AP-5	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-6	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-7	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-8	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-9	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-10	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-11	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-12	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-13	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-14	Cobalt, total	mg/L	--	**0.006**	0.0052	--		< 0.005	< 0.005	< 0.005
AW-1	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
RW-3	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
R111	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005		
G120	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	0.0058	< 0.005	0.0051
T-1	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	0.0055	0.0063	< 0.005
T-2	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	0.0062	< 0.005
T-4	Cobalt, total	mg/L	--	**0.006**	0.0052	--	0.0052	< 0.005	< 0.005	< 0.005
T-5	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
T-6	Cobalt, total	mg/L	--	**0.006**	0.0052	--	< 0.005	< 0.005	< 0.005	< 0.005
AP-1	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-2	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-3	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-4	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-5	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-6	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	0.023	< 0.0075	< 0.0075
AP-7	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-8	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	0.132	< 0.0075	< 0.0075
AP-9	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-10	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	0.0621	< 0.0075	< 0.0075
AP-11	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-12	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-13	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
AP-14	Lead, total	mg/L	--	**0.015**	0.0075	--		< 0.0075	< 0.0075	< 0.0075
AW-1	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
RW-3	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
R111	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.001		
G120	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	0.0301	< 0.0075	< 0.0075
T-1	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
T-2	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
T-4	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
T-5	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075
T-6	Lead, total	mg/L	--	**0.015**	0.0075	--	< 0.0075	< 0.0075	< 0.0075	< 0.0075

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Lithium	mg/L	--	**0.04**	0.0124	--	0.0105	0.0102	0.0114	0.0086
AP-2	Lithium	mg/L	--	**0.04**	0.0124	--	0.006	0.0059	0.0087	0.0061
AP-3	Lithium	mg/L	--	**0.04**	0.0124	--	0.0052	0.0046	0.0078	0.0062
AP-4	Lithium	mg/L	--	**0.04**	0.0124	--	0.0087	0.0117	0.0127	0.009
AP-5	Lithium	mg/L	--	**0.04**	0.0124	--	0.0043	0.0044	0.0061	0.0041
AP-6	Lithium	mg/L	--	**0.04**	0.0124	--	0.0063	0.0073	0.0092	0.0075
AP-7	Lithium	mg/L	--	**0.04**	0.0124	--	0.0056	0.0106	0.0091	0.0103
AP-8	Lithium	mg/L	--	**0.04**	0.0124	--	0.008	0.0072	0.0066	0.0065
AP-9	Lithium	mg/L	--	**0.04**	0.0124	--	0.0064	0.0064	0.0057	0.0059
AP-10	Lithium	mg/L	--	**0.04**	0.0124	--	0.0082	0.0107	0.0092	0.0082
AP-11	Lithium	mg/L	--	**0.04**	0.0124	--	0.004	0.0034	0.0057	0.0049
AP-12	Lithium	mg/L	--	**0.04**	0.0124	--	0.0057	0.0056	0.006	0.0062
AP-13	Lithium	mg/L	--	**0.04**	0.0124	--	0.0088	0.0107	0.011	0.0114
AP-14	Lithium	mg/L	--	**0.04**	0.0124	--		0.0073	0.0068	0.008
AW-1	Lithium	mg/L	--	**0.04**	0.0124	--	0.0108	0.0101	0.0112	0.0105
RW-3	Lithium	mg/L	--	**0.04**	0.0124	--	0.0047	0.0051	0.008	0.0057
R111	Lithium	mg/L	--	**0.04**	0.0124	--	0.0055			
G120	Lithium	mg/L	--	**0.04**	0.0124	--	0.0076	0.0084	0.0073	0.0095
T-1	Lithium	mg/L	--	**0.04**	0.0124	--	0.0142	0.0142	0.0177	0.0176
T-2	Lithium	mg/L	--	**0.04**	0.0124	--	0.0314	0.032	0.0342	0.031
T-4	Lithium	mg/L	--	**0.04**	0.0124	--	0.0147	0.0158	0.013	0.0136
T-5	Lithium	mg/L	--	**0.04**	0.0124	--	0.0101	0.0089	0.0103	0.0155
T-6	Lithium	mg/L	--	**0.04**	0.0124	--	0.0098	0.0138	0.0066	0.0105
AP-1	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-2	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-3	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-4	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-5	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-6	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-7	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-8	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-9	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-10	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-11	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-12	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-13	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
AP-14	Mercury, total	mg/L	**0.002**	--	0.0005	--		< 0.0002	< 0.0002	< 0.0002
AW-1	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
RW-3	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
R111	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002		
G120	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
T-1	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
T-2	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
T-4	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
T-5	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002
T-6	Mercury, total	mg/L	**0.002**	--	0.0005	--	< 0.0002	< 0.0002	< 0.0002	< 0.0002

City Water, Light and Power
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2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-2	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-3	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-4	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-5	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-6	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-7	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-8	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-9	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-10	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-11	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-12	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-13	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-14	Molybdenum, total	mg/L	--	**0.1**	0.025	--		< 0.01	< 0.01	< 0.01
AW-1	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
RW-3	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
R111	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01			
G120	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
T-1	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
T-2	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
T-4	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
T-5	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
T-6	Molybdenum, total	mg/L	--	**0.1**	0.025	--	< 0.01	< 0.01	< 0.01	< 0.01
AP-1	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		0.914	< 2	< 2
AP-2	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.318	< 2	< 2
AP-3	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0	< 2	< 2
AP-4	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.871	< 2	< 2
AP-5	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.106	< 2	< 2
AP-6	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.279	< 2	< 2
AP-7	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.19	< 2	< 2
AP-8	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		2.013	< 2	< 2
AP-9	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.454	< 2	< 2
AP-10	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		2.26	< 2	< 2
AP-11	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.299	< 2	< 2
AP-12	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.578	< 2	< 2
AP-13	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.114	< 2	< 2
AP-14	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.427	< 2	< 2
AW-1	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		0.5191	< 2	< 2
RW-3	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.028	< 2	< 2
G120	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		2.83	< 2	5.9
T-1	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.769	< 2	< 2
T-2	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		0.767	< 2	< 2
T-4	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		0.475	< 2	< 2
T-5	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		< 0.466	< 2	< 2
T-6	Radium-226 + Radium-228	pCi/L	**5**	--	3.79	--		1.974	< 2	< 2

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Analytical Summary Data

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	Intrawell Value	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix IV (cont.)										
AP-1	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-2	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-3	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-4	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-5	Selenium, total	mg/L	**0.05**	--	0.025	--	0.0011	< 0.001	< 0.001	< 0.001
AP-6	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-7	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-8	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-9	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-10	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-11	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	0.0049	< 0.001	< 0.001
AP-12	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-13	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-14	Selenium, total	mg/L	**0.05**	--	0.025	--		< 0.001	< 0.001	< 0.001
AW-1	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
RW-3	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
R111	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.04		
G120	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
T-1	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
T-2	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
T-4	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
T-5	Selenium, total	mg/L	**0.05**	--	0.025	--	0.0012	< 0.001	< 0.001	< 0.001
T-6	Selenium, total	mg/L	**0.05**	--	0.025	--	< 0.001	< 0.001	< 0.001	< 0.001
AP-1	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-2	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-3	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-4	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-5	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-6	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-7	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-8	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-9	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-10	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-11	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-12	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	0.0027
AP-13	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
AP-14	Thallium, total	mg/L	**0.002**	--	**0.002**	--		< 0.002	< 0.002	< 0.002
AW-1	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
RW-3	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
R111	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002		
G120	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
T-1	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
T-2	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
T-4	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
T-5	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002
T-6	Thallium, total	mg/L	**0.002**	--	**0.002**	--	< 0.002	< 0.002	< 0.002	< 0.002

Notes:

1. A shaded value indicates an exceedance of the higher of the MCL and the Background. The comparison value that was used is in bold font.

2. The 40 CFR 257 list requires Radium-226 and Radium-228 combined. The established MCL is for the combined parameters. However, these parameters require two separate analysis and have been reported separately by the analytical laboratory. The sum of the values has been provided and compared to the MCL. Background values have been calculated for the individual parameters (Radium-226 = 1.41 pCi/L and Radium-228 =2.38 pCi/L).

TABLE 2:
2025 GROUNDWATER ANALYTICAL RESULTS EXCEEDANCE SUMMARY TABLE

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Exceedances

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	2025-Q1	2025-Q2	2025-Q3	2025-Q4
Appendix III									
AP-1	Boron, total	mg/L	--	--	**0.14973**	21.7	20.8	23	21.4
AP-2	Boron, total	mg/L	--	--	**0.14973**	3.53	3.12	3.43	3.15
AP-3	Boron, total	mg/L	--	--	**0.14973**	12.1	12.9	16.5	18
AP-6	Boron, total	mg/L	--	--	**0.14973**	0.228	0.407	0.278	0.272
AP-7	Boron, total	mg/L	--	--	**0.14973**	0.244	0.393	0.39	0.475
AP-8	Boron, total	mg/L	--	--	**0.14973**	0.0784	0.963	0.084	0.0821
AP-10	Boron, total	mg/L	--	--	**0.14973**	3.36	4.5	4.25	3.88
AP-11	Boron, total	mg/L	--	--	**0.14973**	0.221	0.273	0.228	0.276
AP-14	Boron, total	mg/L	--	--	**0.14973**		21.7	21.9	20.8
AW-1	Boron, total	mg/L	--	--	**0.14973**	8.79	8.75	9.61	9.67
RW-3	Boron, total	mg/L	--	--	**0.14973**	0.126	0.153	0.16	0.16
R111	Boron, total	mg/L	--	--	**0.14973**	3.09	3.98		
G120	Boron, total	mg/L	--	--	**0.14973**	7.5	8.02	7.95	8.23
T-1	Boron, total	mg/L	--	--	**0.14973**	0.17	0.163	0.173	0.175
T-6	Boron, total	mg/L	--	--	**0.14973**	0.187	0.2	0.0428	0.214
AP-1	Calcium, total	mg/L	--	--	**181.6**	245	228	259	251
AP-2	Calcium, total	mg/L	--	--	**181.6**	198	183	216	213
AP-3	Calcium, total	mg/L	--	--	**181.6**	168	171	205	192
AP-12	Calcium, total	mg/L	--	--	**181.6**	197	204	226	193
AP-14	Calcium, total	mg/L	--	--	**181.6**		276	277	317
AW-1	Calcium, total	mg/L	--	--	**181.6**	186	203	205	209
G120	Calcium, total	mg/L	--	--	**181.6**	249	256	272	287
T-2	Calcium, total	mg/L	--	--	**181.6**	210	231	231	209
AP-1	Chloride, total	mg/L	--	--	**12.3**	49.3	50.1	51.8	51.8
AP-2	Chloride, total	mg/L	--	--	**12.3**	35.8	36.2	36	37
AP-3	Chloride, total	mg/L	--	--	**12.3**	61.5	61.7	71.2	70.8
AP-4	Chloride, total	mg/L	--	--	**12.3**	12.4	12.1	12.4	12.8
AP-6	Chloride, total	mg/L	--	--	**12.3**	33	32.6	37.5	38
AP-7	Chloride, total	mg/L	--	--	**12.3**	51.7	81.4	69.8	88.5
AP-8	Chloride, total	mg/L	--	--	**12.3**	22.5	22.6	23.3	24.2
AP-9	Chloride, total	mg/L	--	--	**12.3**	23.5	27	24.4	25.5
AP-10	Chloride, total	mg/L	--	--	**12.3**	24.4	24.6	25.4	25.9
AP-11	Chloride, total	mg/L	--	--	**12.3**	95.1	129	127	113
AP-12	Chloride, total	mg/L	--	--	**12.3**	114	113	119	115
AP-13	Chloride, total	mg/L	--	--	**12.3**	26.8	24.7	29.4	26.3
AP-14	Chloride, total	mg/L	--	--	**12.3**		105	105	120
AW-1	Chloride, total	mg/L	--	--	**12.3**	35.4	36.8	37.2	38.2
RW-3	Chloride, total	mg/L	--	--	**12.3**	25.4	25	26.4	27.1
R111	Chloride, total	mg/L	--	--	**12.3**	169	179		
G120	Chloride, total	mg/L	--	--	**12.3**	35.2	35.5	36.8	38.3
T-1	Chloride, total	mg/L	--	--	**12.3**	220	232	233	253
T-2	Chloride, total	mg/L	--	--	**12.3**	500	522	509	427
T-6	Chloride, total	mg/L	--	--	**12.3**	18.9	20.8	11.8	19.8
AP-1	pH	s.u.	--	--	6.7 - 7.87	6.55	6.42	6.42	4.86
AP-2	pH	s.u.	--	--	6.7 - 7.87	6.44	6.45	6.3	4.55
AP-3	pH	s.u.	--	--	6.7 - 7.87	6.54	6.53	6.36	4.93
AP-4	pH	s.u.	--	--	6.7 - 7.87	6.78	6.69	6.64	6.76
AP-5	pH	s.u.	--	--	6.7 - 7.87	6.83	6.67	6.64	6.83
AP-8	pH	s.u.	--	--	6.7 - 7.87	6.89	6.78	6.71	6.11
AP-9	pH	s.u.	--	--	6.7 - 7.87	7.02	6.79	6.57	6.57
AP-10	pH	s.u.	--	--	6.7 - 7.87	6.67	6.63	6.52	5.37
AP-11	pH	s.u.	--	--	6.7 - 7.87	6.4	6.53	6.34	4.79
AP-12	pH	s.u.	--	--	6.7 - 7.87	6.55	6.5	6.38	4.74
AP-13	pH	s.u.	--	--	6.7 - 7.87	6.69	6.68	6.43	5.22
AP-14	pH	s.u.	--	--	6.7 - 7.87		7.02	6.71	6.24
AW-1	pH	s.u.	--	--	6.7 - 7.87	6.64	6.96	6.58	6.62
G120	pH	s.u.	--	--	6.7 - 7.87	6.66	6.57	6.67	6.67
T-1	pH	s.u.	--	--	6.7 - 7.87	6.59	6.58	6.46	4.54
T-2	pH	s.u.	--	--	6.7 - 7.87	6.53	6.55	6.51	4.89
T-4	pH	s.u.	--	--	6.7 - 7.87	6.64	6.63	6.6	6.43
T-5	pH	s.u.	--	--	6.7 - 7.87	6.72	6.77	6.8	6.64

City Water, Light and Power
Power Plant Ash Impoundment
2025 Groundwater Exceedances

Well ID	Parameter	Units	40 CFR 257.95(h)	40 CFR 141	Background	2025-Q1	2025-Q2	2025-Q3	2025-Q4
AP-1	Sulfate, total	mg/L	--	--	**55.5**	834	858	884	828
AP-2	Sulfate, total	mg/L	--	--	**55.5**	397	367	422	389
AP-3	Sulfate, total	mg/L	--	--	**55.5**	569	505	609	588
AP-5	Sulfate, total	mg/L	--	--	**55.5**	59.7	63.6	69.1	70.9
AP-10	Sulfate, total	mg/L	--	--	**55.5**	84.4	94.9	96.7	90.8
AP-11	Sulfate, total	mg/L	--	--	**55.5**	65.5	84.6	85.7	68.9
AP-12	Sulfate, total	mg/L	--	--	**55.5**	433	416	488	395
AP-13	Sulfate, total	mg/L	--	--	**55.5**	94.5	124	104	120
AP-14	Sulfate, total	mg/L	--	--	**55.5**		909	926	1040
AW-1	Sulfate, total	mg/L	--	--	**55.5**	374	388	408	403
G120	Sulfate, total	mg/L	--	--	**55.5**	548	562	569	578
T-1	Sulfate, total	mg/L	--	--	**55.5**	163	148	151	169
T-2	Sulfate, total	mg/L	--	--	**55.5**	135	143	136	90
T-4	Sulfate, total	mg/L	--	--	**55.5**	121	101	76.7	77.9
T-5	Sulfate, total	mg/L	--	--	**55.5**	40.7	35.4	31.3	87.4
AP-1	Total Dissolved Solids	mg/L	--	--	**609.21**	1600	1740	1870	1590
AP-2	Total Dissolved Solids	mg/L	--	--	**609.21**	1070	1100	1280	1190
AP-3	Total Dissolved Solids	mg/L	--	--	**609.21**	1150	1180	1400	1310
AP-7	Total Dissolved Solids	mg/L	--	--	**609.21**	430	652	514	522
AP-9	Total Dissolved Solids	mg/L	--	--	**609.21**	880	681	638	614
AP-10	Total Dissolved Solids	mg/L	--	--	**609.21**	788	820	834	834
AP-11	Total Dissolved Solids	mg/L	--	--	**609.21**	740	784	756	694
AP-12	Total Dissolved Solids	mg/L	--	--	**609.21**	1250	1190	1380	1150
AP-13	Total Dissolved Solids	mg/L	--	--	**609.21**	620	595	630	580
AP-14	Total Dissolved Solids	mg/L	--	--	**609.21**		1620	1940	1900
AW-1	Total Dissolved Solids	mg/L	--	--	**609.21**	1110	1190	1250	1190
R111	Total Dissolved Solids	mg/L	--	--	**609.21**	725	770	912	986
G120	Total Dissolved Solids	mg/L	--	--	**609.21**	1400	1340	1640	1530
T-1	Total Dissolved Solids	mg/L	--	--	**609.21**	1010	962	950	1020
T-2	Total Dissolved Solids	mg/L	--	--	**609.21**	1270	1550	1490	1370
Appendix IV									
AP-4	Arsenic, total	mg/L	0.01	--	**0.0239**	0.021	0.0223	0.0248	0.0219
AP-7	Arsenic, total	mg/L	0.01	--	**0.0239**	0.0248	0.0289	0.0289	0.0182
AP-8	Arsenic, total	mg/L	0.01	--	**0.0239**	0.0487	0.0446	0.0389	0.0372
RW-3	Arsenic, total	mg/L	0.01	--	**0.0239**	0.0961	0.0808	0.103	0.108
AP-2	Cobalt, total	mg/L	--	**0.006**	0.0052	0.014	0.0095	0.0127	0.0078
AP-3	Cobalt, total	mg/L	--	**0.006**	0.0052	0.0057	0.0081	0.0076	< 0.005
AP-4	Cobalt, total	mg/L	--	**0.006**	0.0052	< 0.005	0.0083	0.0075	0.0067
T-1	Cobalt, total	mg/L	--	**0.006**	0.0052	< 0.005	0.0055	0.0063	< 0.005
T-2	Cobalt, total	mg/L	--	**0.006**	0.0052	< 0.005	< 0.005	0.0062	< 0.005
AP-6	Lead, total	mg/L	--	**0.015**	0.0075	< 0.0075	0.023	< 0.0075	< 0.0075
AP-8	Lead, total	mg/L	--	**0.015**	0.0075	< 0.0075	0.132	< 0.0075	< 0.0075
AP-10	Lead, total	mg/L	--	**0.015**	0.0075	< 0.0075	0.0621	< 0.0075	< 0.0075
G120	Lead, total	mg/L	--	**0.015**	0.0075	< 0.0075	0.0301	< 0.0075	< 0.0075
G120	Radium-226 + Radium-228	pCi/L	**5**	--	3.79		2.83	< 2	5.9
AP-12	Thallium, total	mg/L	**0.002**	--	**0.002**	< 0.002	< 0.002	< 0.002	0.0027

Notes:

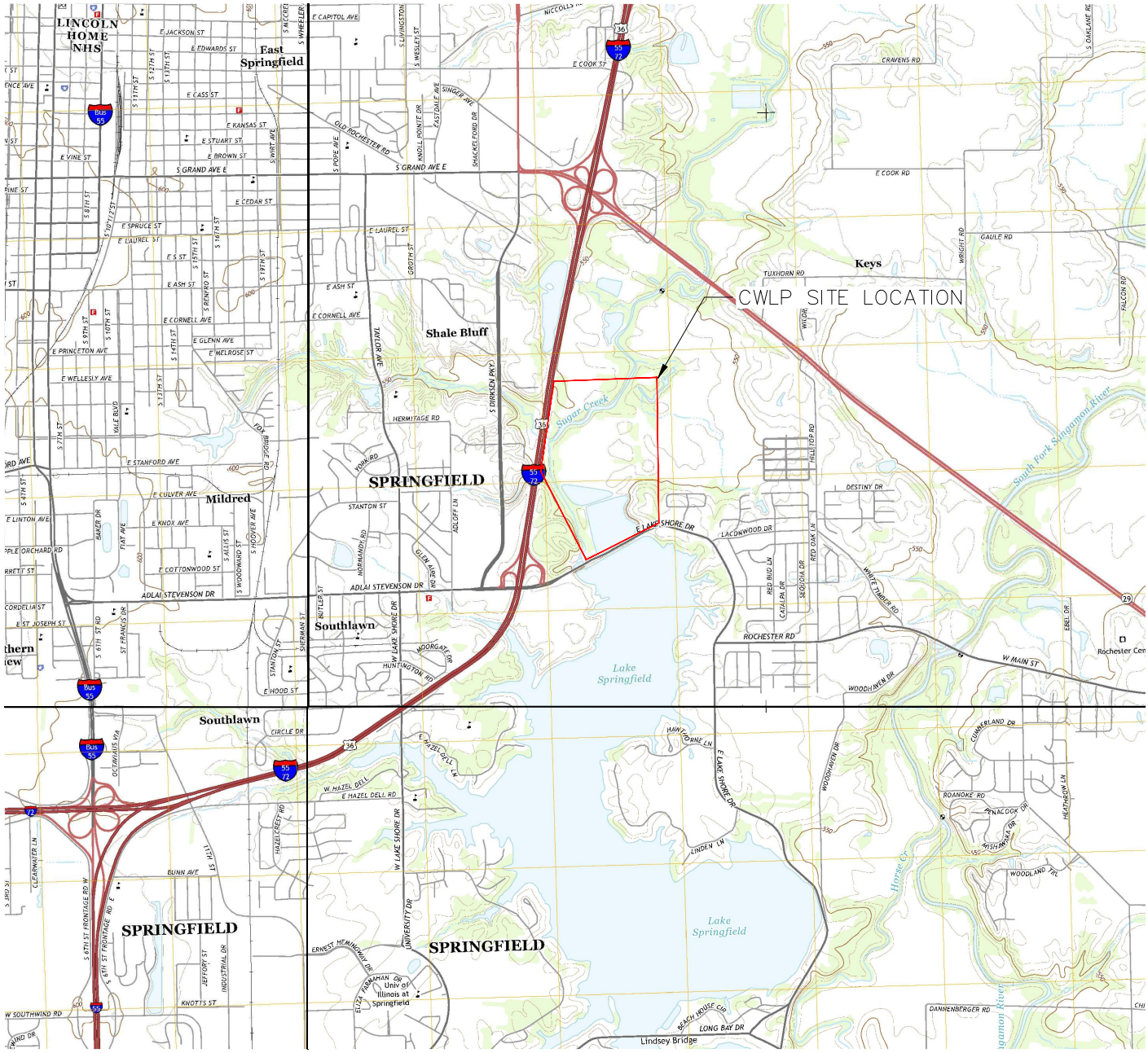
1. A shaded value indicates an exceedance of the higher of the MCL and the Background. The comparison value that was used is in bold font.

2. The 40 CFR 257 list requires Radium-226 and Radium-228 combined. The established MCL is for the combined parameters. However, these parameters require two separate analysis and have been reported separately by the analytical laboratory. The sum of the values has been provided and compared to the MCL. Background values have been calculated for the individual parameters (Radium-226 = 1.41 pCi/L and Radium-228 =2.38 pCi/L).

3. * An intrawell value of 0.2496 mg/L has been proposed for total arsenic at well AW-1 in pending application Log No. 2024-415.

FIGURES

J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2025\Annual Consolidation Report\Site Map.dwg Tab: Layout1



NOTE:
BACKGROUND IMAGE COURTESY OF
UNITED STATES GEOLOGICAL SURVEY.

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APPROVED BY: MTH	DESIGNED BY: MTH	DRAWN BY: BCK

SITE LOCATION

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

DATE: DECEMBER 2025
PROJECT ID: 250289/0005
SHEET NUMBER:

FIG. 1

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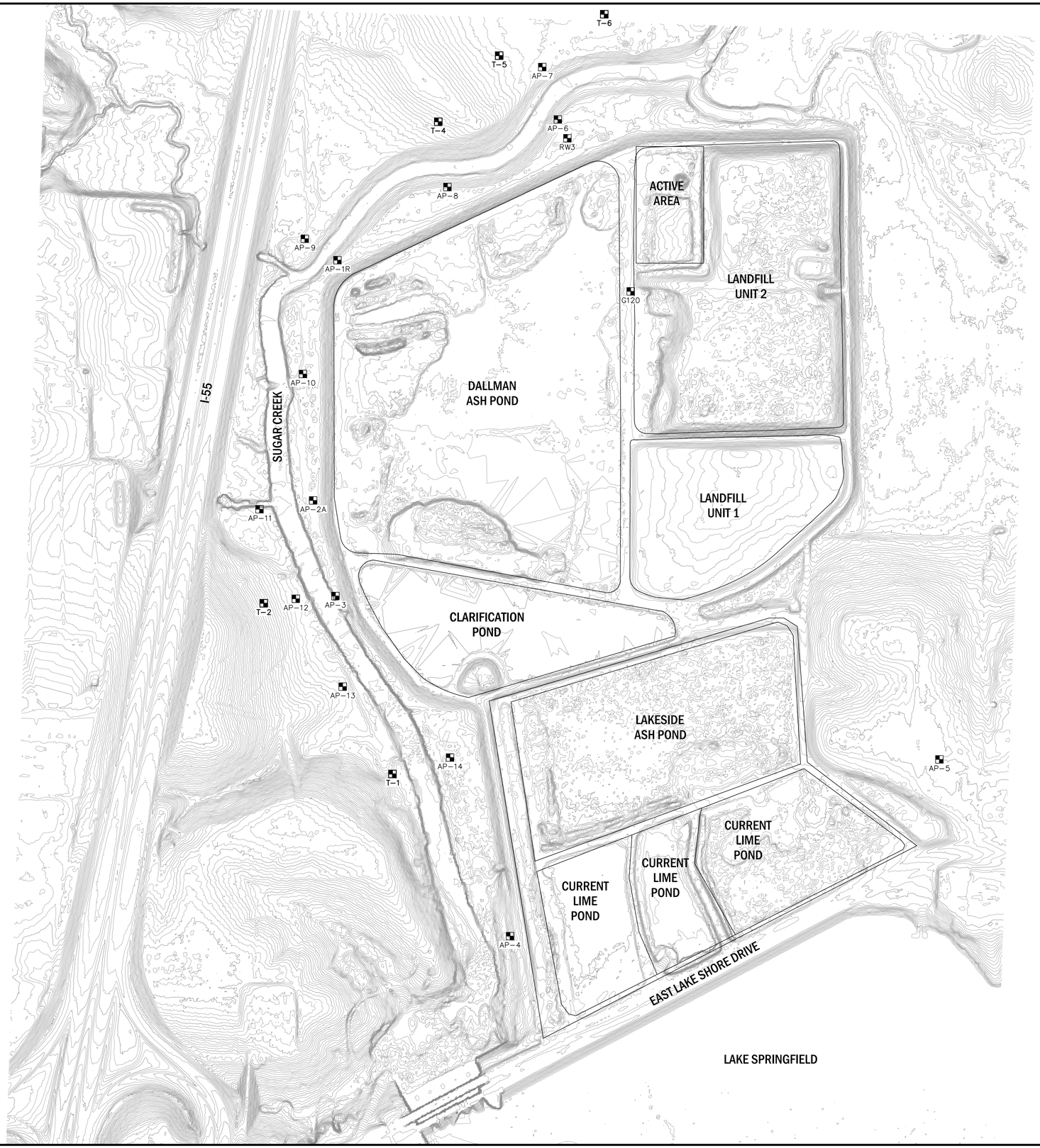

LEGEND

MONITORING WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: MAY 16, 2023).

N

0 200 400 800

SCALE: IN FEET

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SITE DETAILS MAP

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: DECEMBER 2025

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FIG. 2

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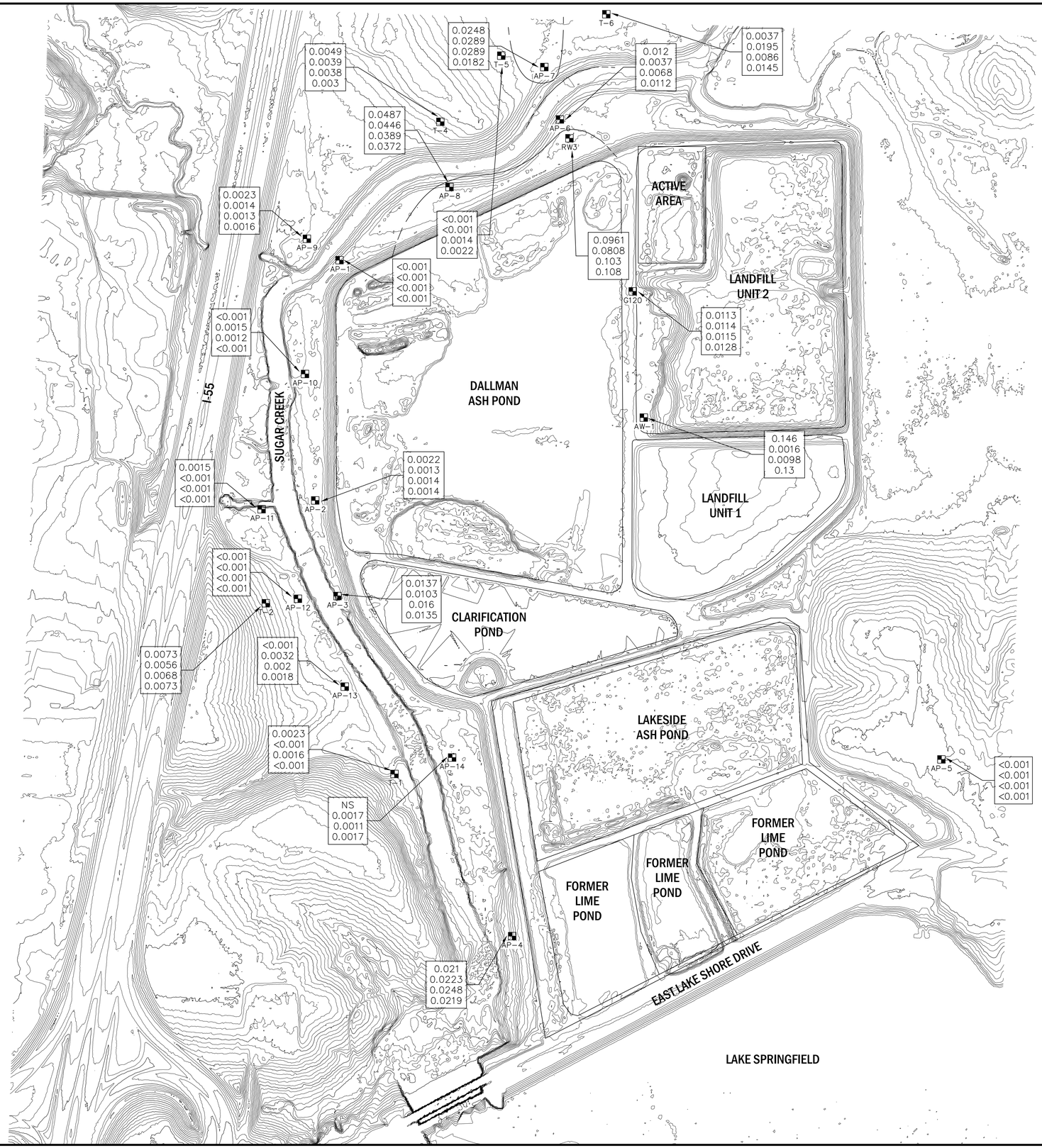
Tab: SITE DETAILS MAP Last Saved: December 4, 2025, by Ben Karpus Plotted: Tuesday, January 13, 2026 9:34:07 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2025\Annual Consolidation Report\Site Detail Map.dwg

APPENDIX A:
2025 GWPS EXCEEDANCE MAPS



LEGEND

- MONITORING WELL
- Q1 – 02/20/2025
  Q2 – 05/27/2025
  Q3 – 08/12/2025
  Q4 – 11/13/2025
  DATA CALLOUTS
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. ARSENIC, TOTAL: GWPS = 0.0239 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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APPROVED BY: BJH

ARSENIC GW EXCEEDANCE MAP 2025

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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

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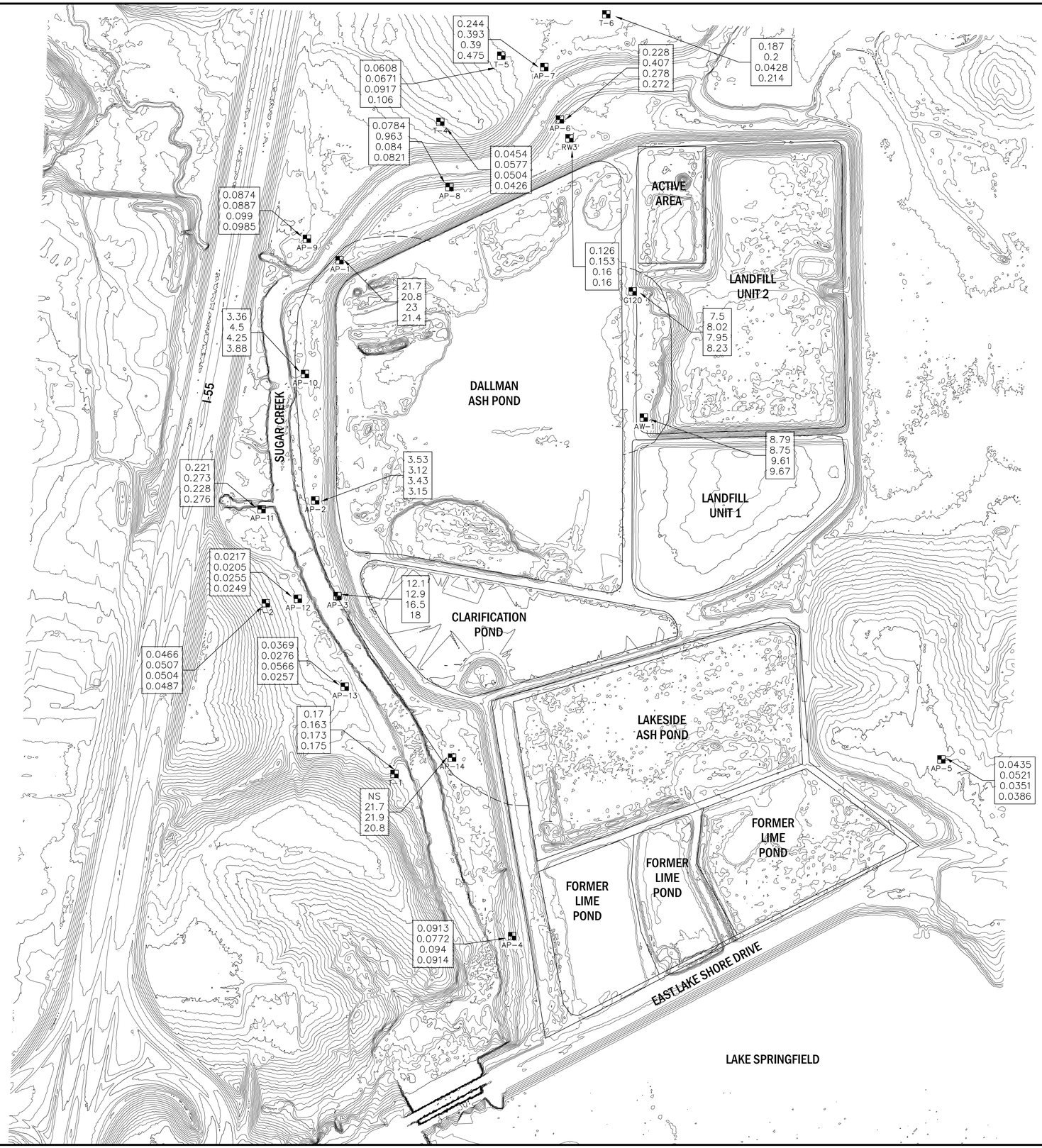
Tab: ARSENIC Last Saved: December 18, 2025, by Ben Karpus Plotted: Thursday, December 18, 2025 1:56:26 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2025\GW base map 845 ccr impoundment.dwg



LEGEND

- MONITORING WELL
- Q1 – 02/20/2025
  Q2 – 05/27/2025
  Q3 – 08/12/2025
  Q4 – 11/13/2025
  DATA CALLOUTS
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. BORON, TOTAL: GWPS = 2 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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BORON GW EXCEEDANCE MAP 2025

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Tab: BORON Last Saved: December 18, 2025, by Ben Karpus Plotted: Thursday, December 18, 2025 1:59:44 PM
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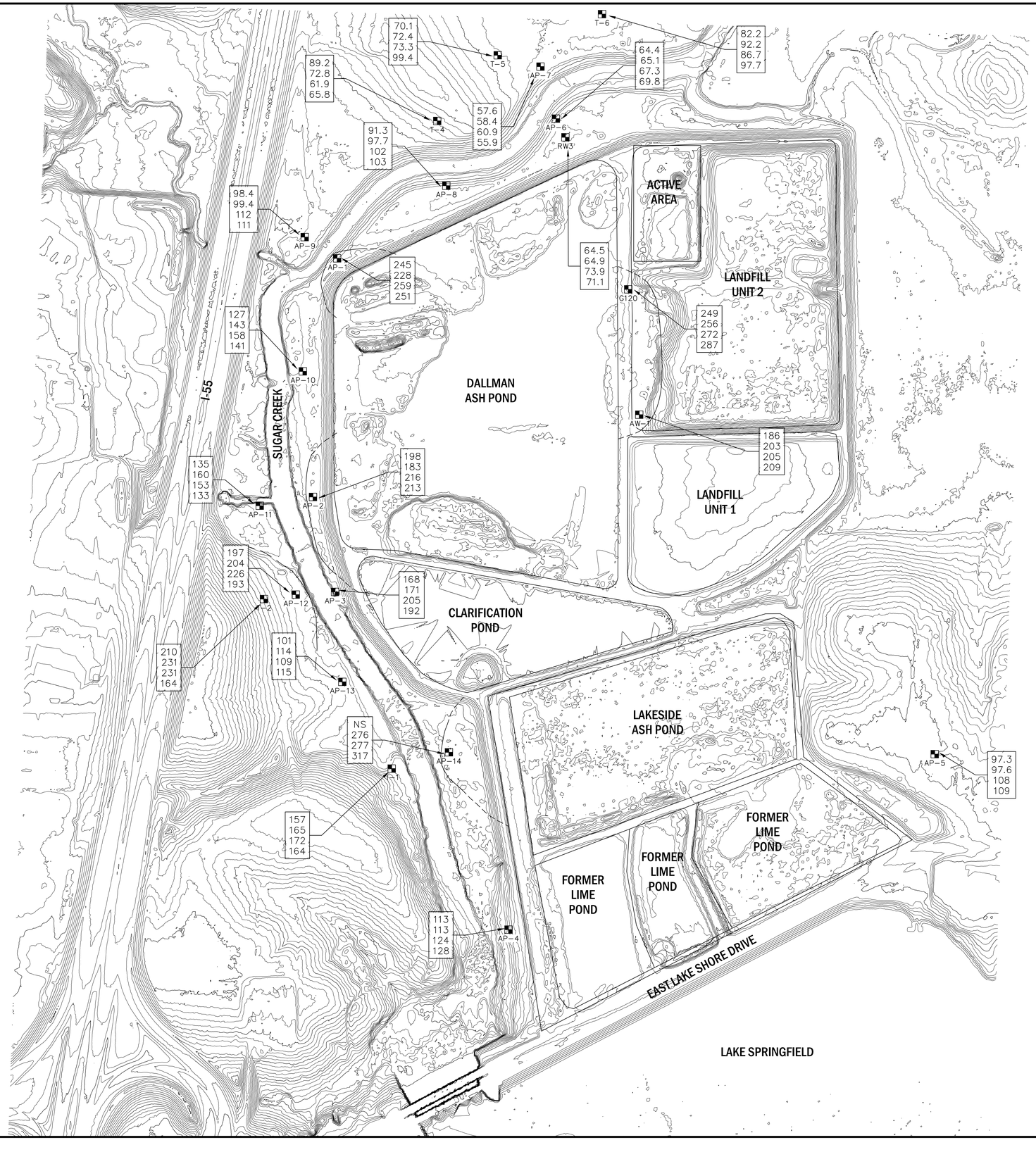

LEGEND

- MONITORING WELL
- DATA CALLOUTS
  - Q1 – 02/20/2025
  - Q2 – 05/27/2025
  - Q3 – 08/12/2025
  - Q4 – 11/13/2025
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. CALCIUM, TOTAL: GWPS = 181.6 mg/L.
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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CALCIUM GW EXCEEDANCE MAP 2025

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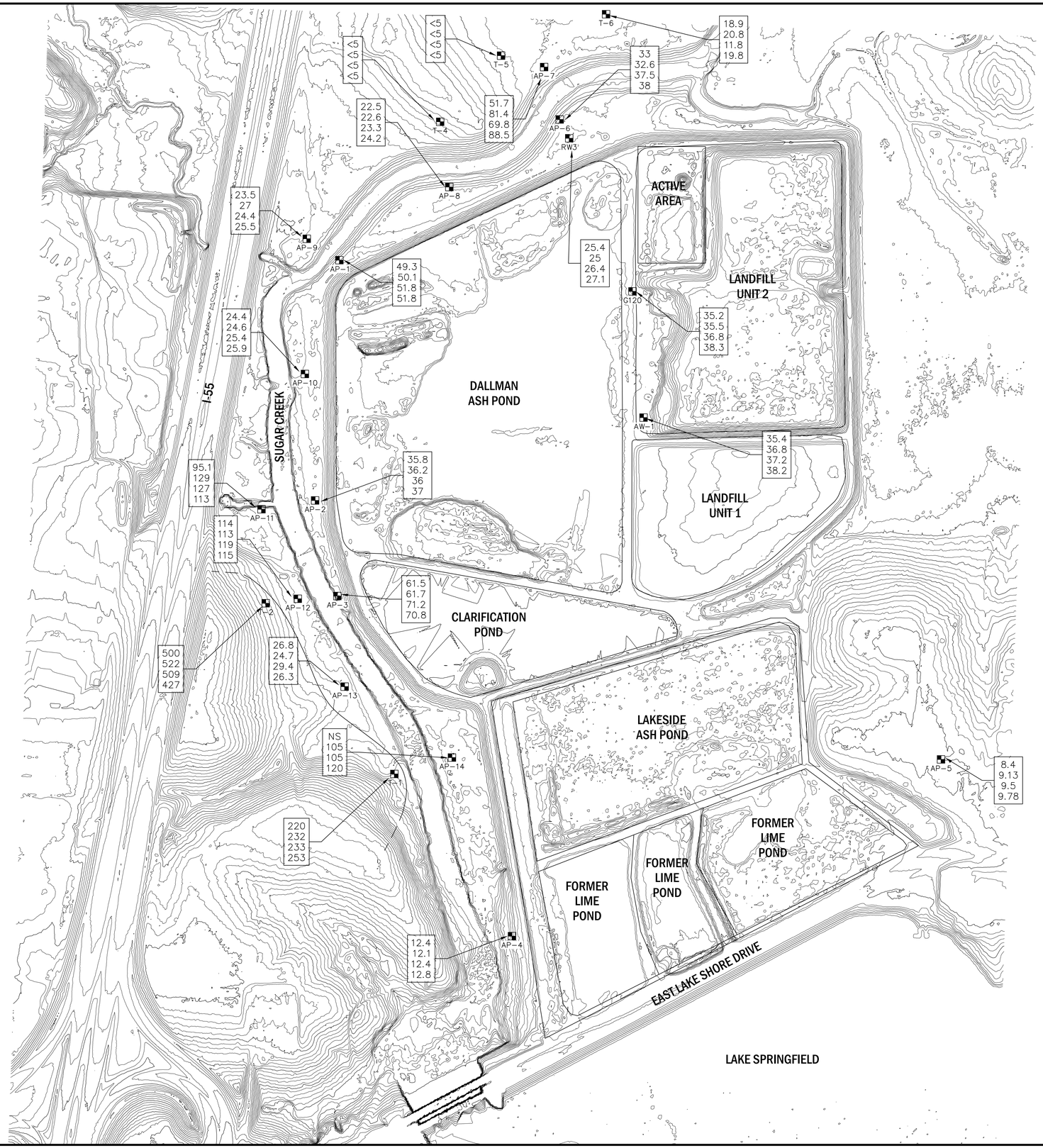

LEGEND

- MONITORING WELL
- Q1 – 02/20/2025
  Q2 – 05/27/2025
  Q3 – 08/12/2025
  Q4 – 11/13/2025
  DATA CALLOUTS
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. CHLORIDE, TOTAL: GWPS = 200 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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CHLORIDE GW EXCEEDANCE MAP 2025

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Tab: CHLORIDE Last Saved: December 18, 2025, by Ben Karpus Plotted: Thursday, December 18, 2025 2:01:33 PM
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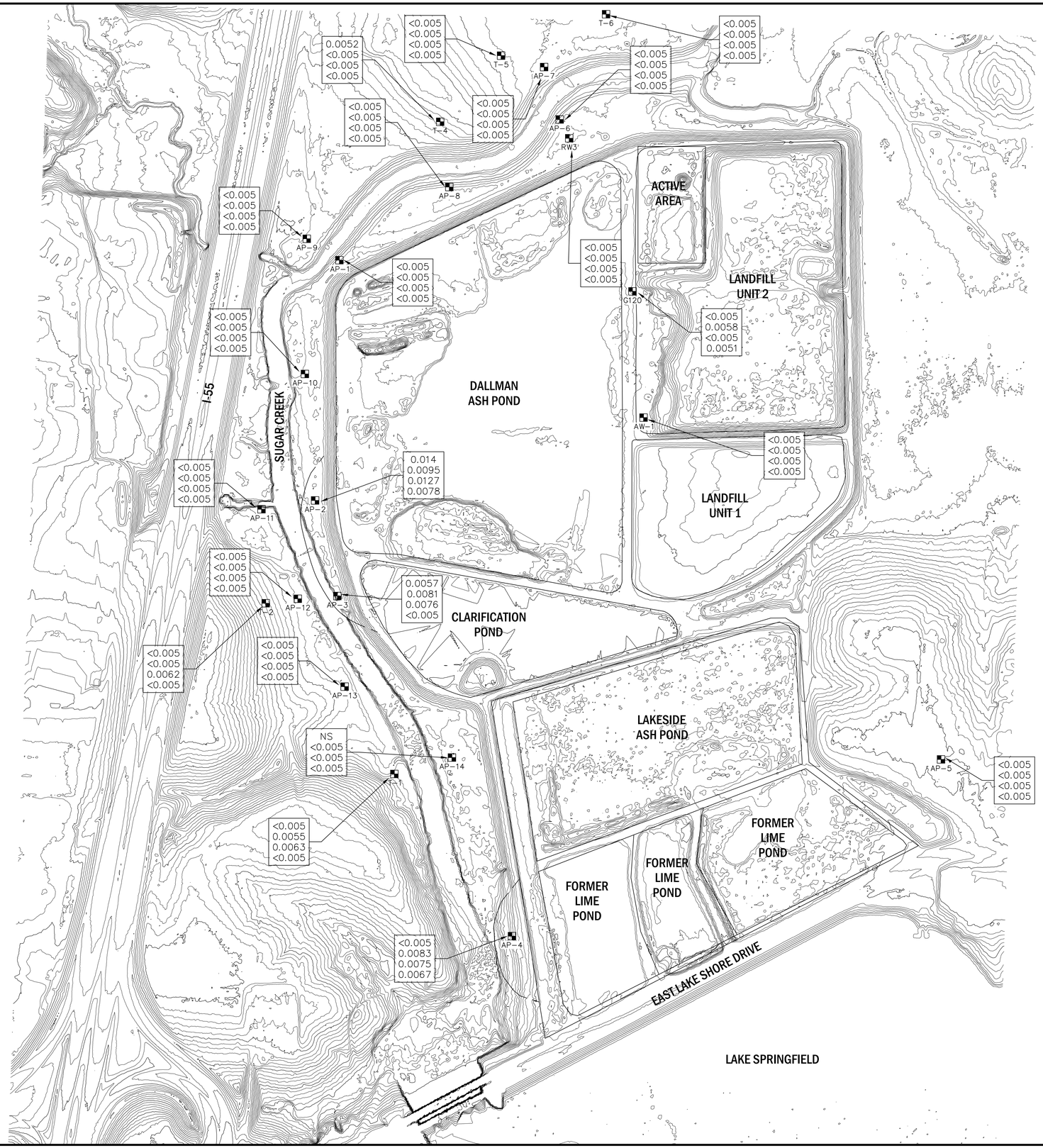

LEGEND

- MONITORING WELL
- Q1 – 02/20/2025
- Q2 – 05/27/2025
- Q3 – 08/12/2025
- Q4 – 11/13/2025
- DATA CALLOUTS
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. COBALT, TOTAL: GWPS = 0.006 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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COBALT GW EXCEEDANCE MAP 2025

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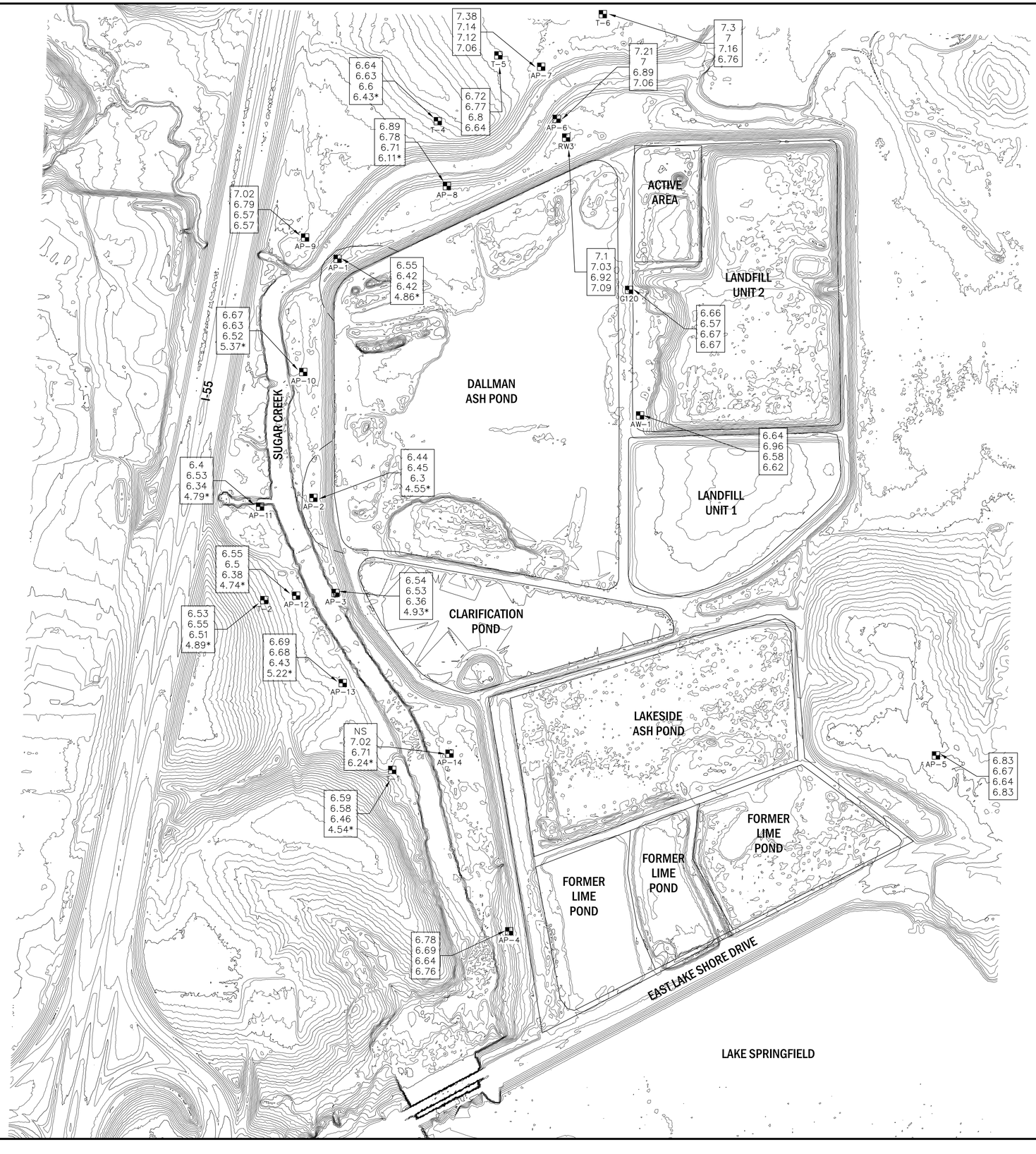

LEGEND

- MONITORING WELL
- DATA CALLOUTS
  - Q1 – 02/20/2025
  - Q2 – 05/27/2025
  - Q3 – 08/12/2025
  - Q4 – 11/13/2025
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. pH, TOTAL: GWPS = 6.5–9 UNITS
3. "*" VALUES ARE UNRELIABLE DUE TO ERROR DURING INSTRUMENT CALIBRATION.
4. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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pH GW EXCEEDANCE MAP 2025

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: DECEMBER 2025

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Tab: PH Last Saved: December 18, 2025, by Ben Karpus Plotted: Thursday, December 18, 2025 2:02:40 PM
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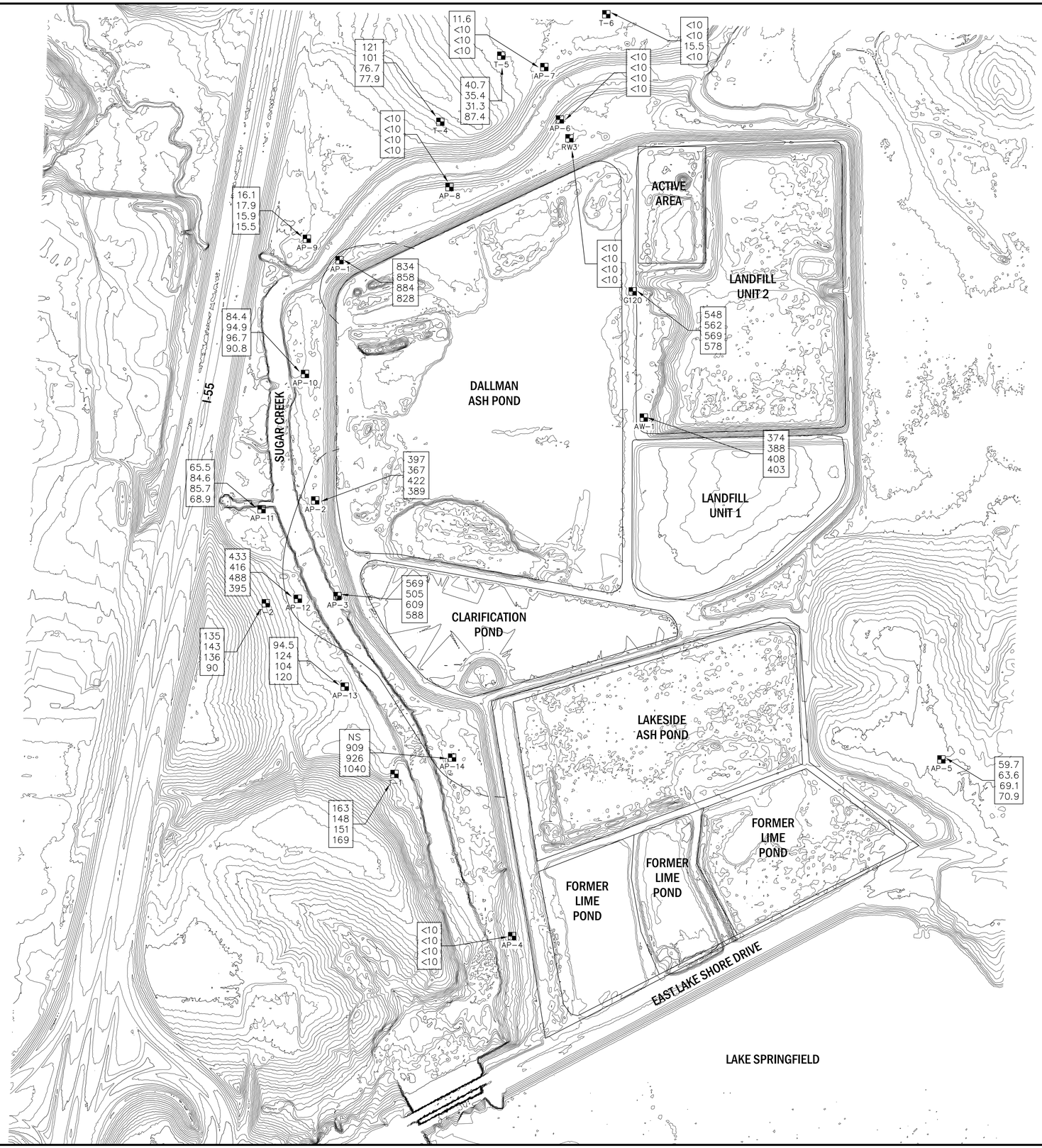

LEGEND

- MONITORING WELL
- Q1 – 02/20/2025
  Q2 – 05/27/2025
  Q3 – 08/12/2025
  Q4 – 11/13/2025
  DATA CALLOUTS
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. SULFATE, TOTAL: GWPS = 400 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

SCALE: IN FEET

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SULFATE GW EXCEEDANCE MAP 2025

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

DATE: DECEMBER 2025

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Tab: SULFATE Last Saved: December 18, 2025, by Ben Korpus Plotted: Thursday, December 18, 2025 2:04:04 PM
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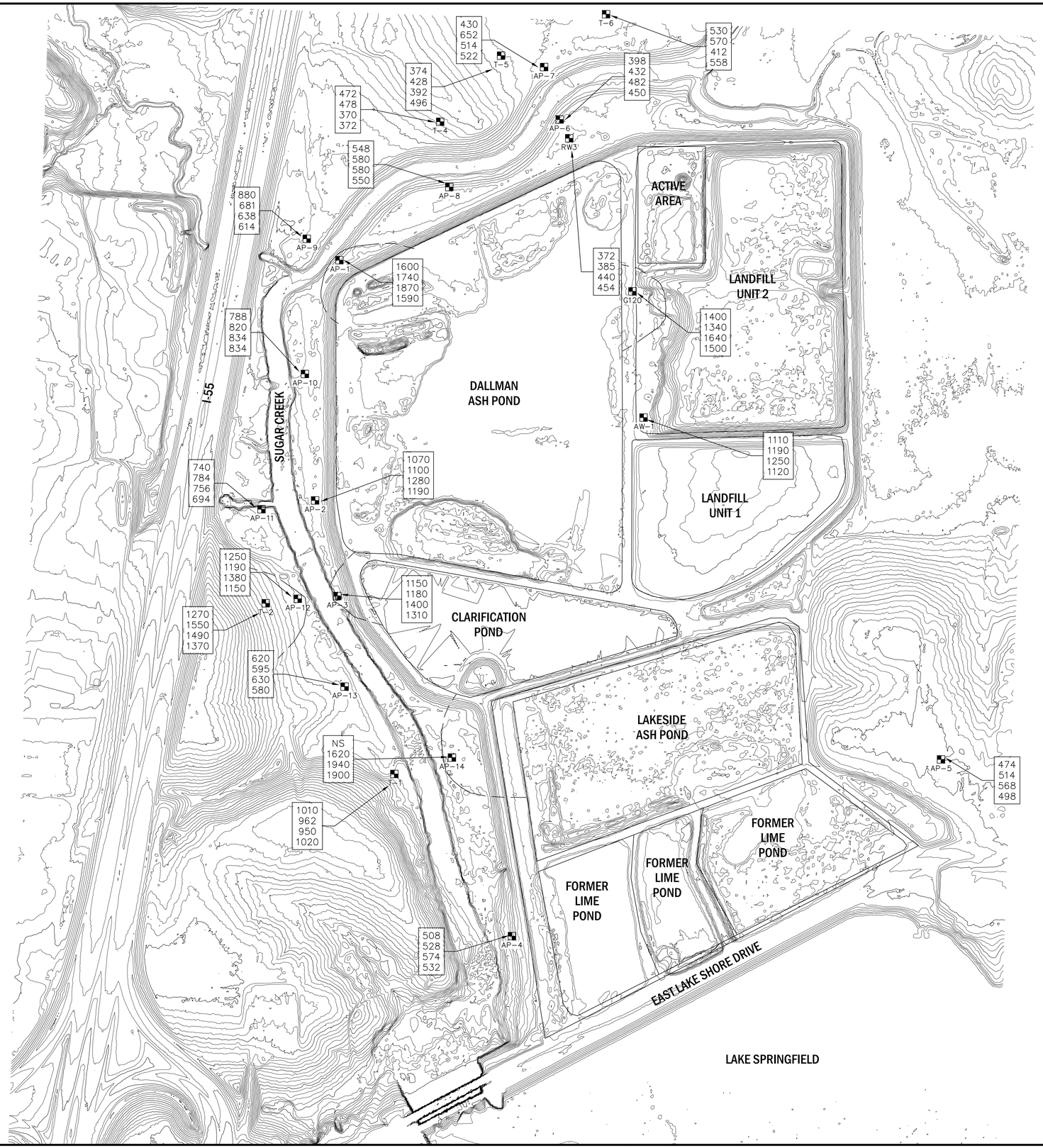

LEGEND

- MONITORING WELL
- DATA CALLOUTS
  - Q1 – 02/20/2025
  - Q2 – 05/27/2025
  - Q3 – 08/12/2025
  - Q4 – 11/13/2025
- GWPS ISOCONTOUR

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. TDS, TOTAL: GWPS = 1200 mg/L
3. NS = NOT SAMPLED

N

0 200 400 800

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TOTAL DISSOLVED SOLIDS GW EXCEEDANCE MAP 2025

PREPARED FOR
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SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER: 8

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Tab: TDS Last Saved: December 18, 2025, by Ben Korpus Plotted: Thursday, December 18, 2025 2:05:55 PM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2025\GW base map 845 ccr impoundment.dwg

APPENDIX B:
2025 POTENTIOMETRIC SURFACE MAPS

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 1/27/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
JANUARY 27, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 1

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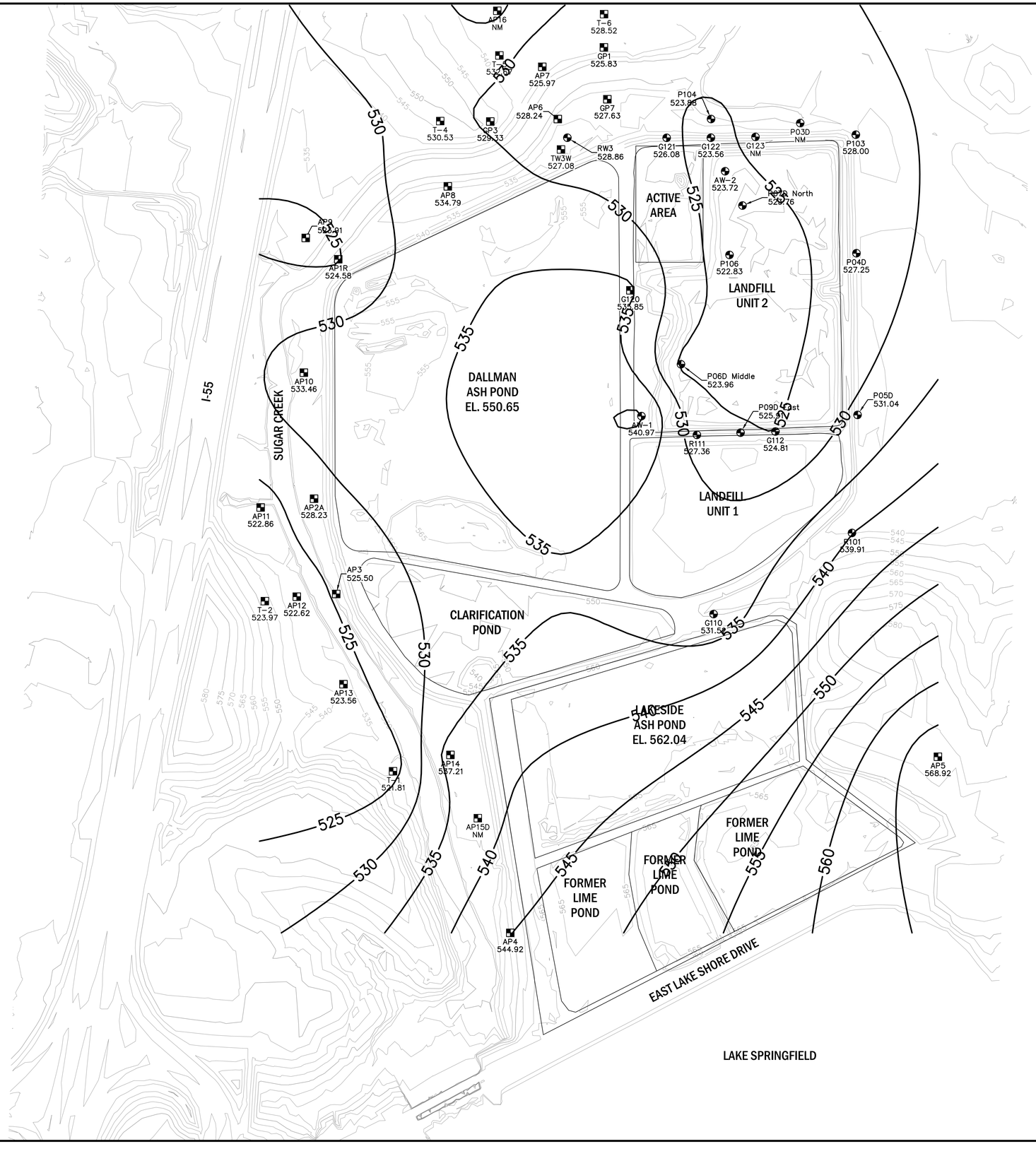
Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:56:47 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\1-27-25.dwg



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 2/25/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
FEBRUARY 25, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 2

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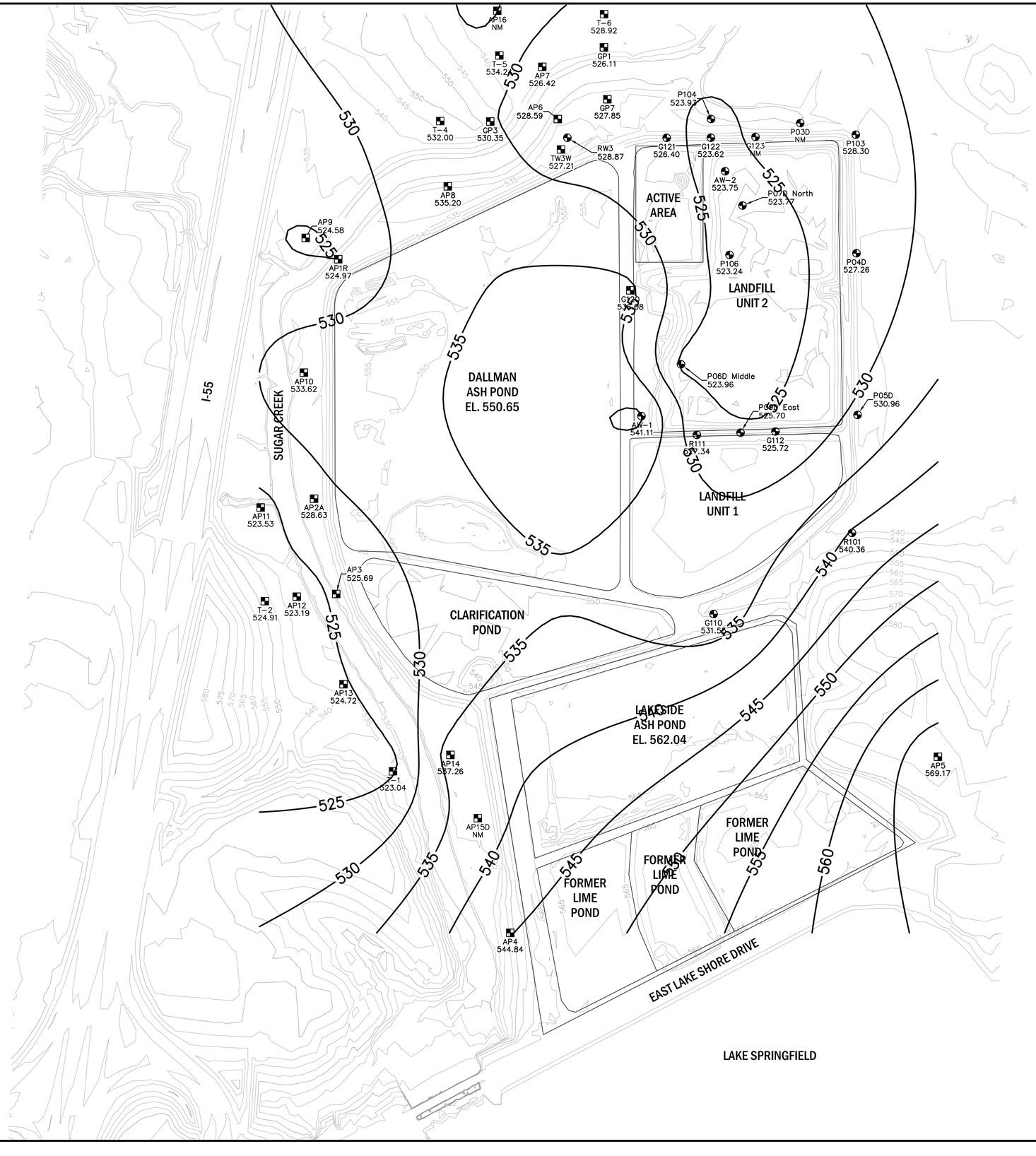

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 3/28/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
MARCH 28, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 3

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:53:17 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\3-28-25.dwg

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 4/20/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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

DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
APRIL 20, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 4

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:52:17 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\4-20-25.dwg

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 5/29/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
MAY 29, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 5

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:51:42 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\5-29-25.dwg

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 6/25/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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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: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
JUNE 25, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 6

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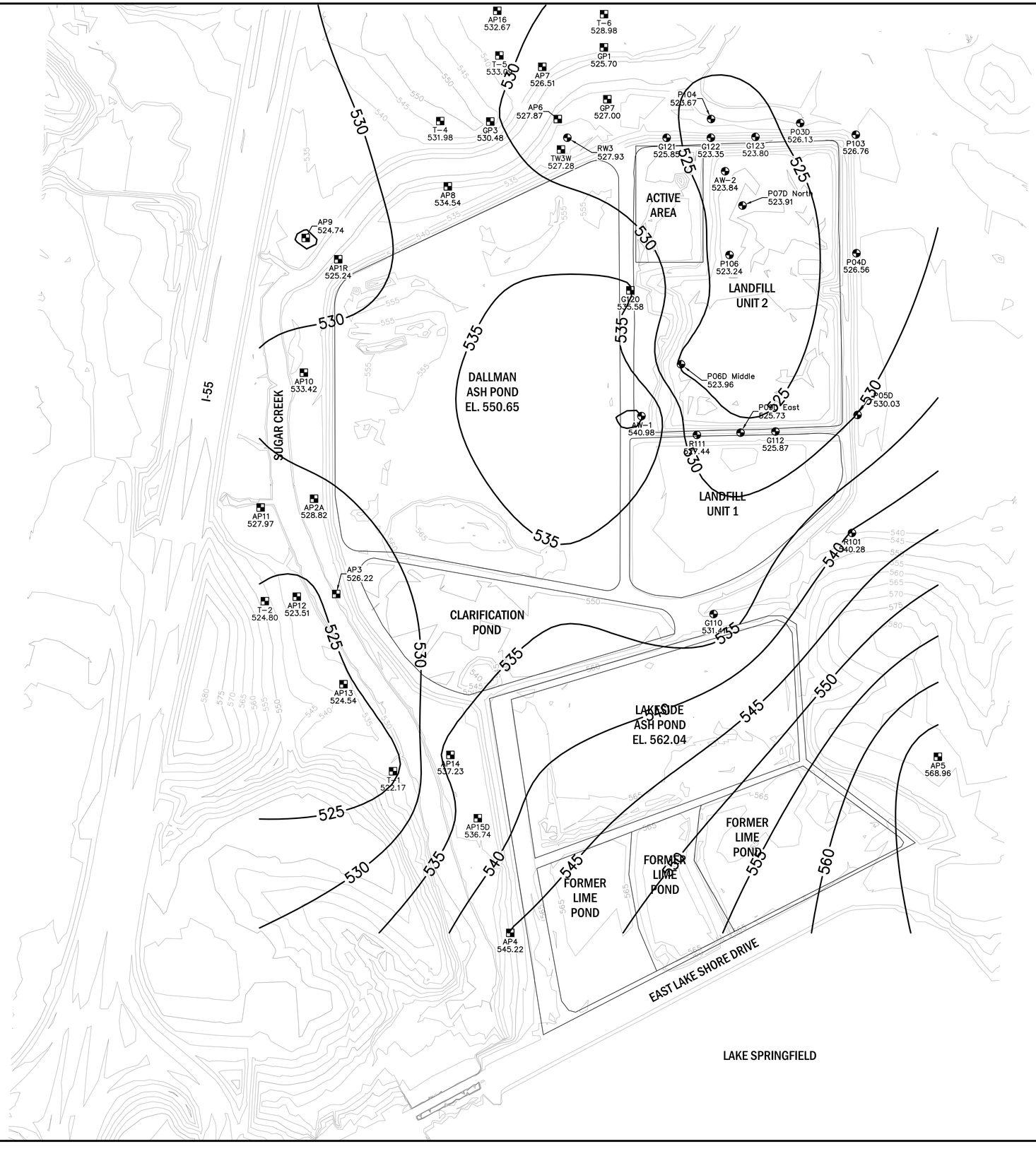
Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:50:41 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\6-25-25.dwg



LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 7/21/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
JULY 21, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 7

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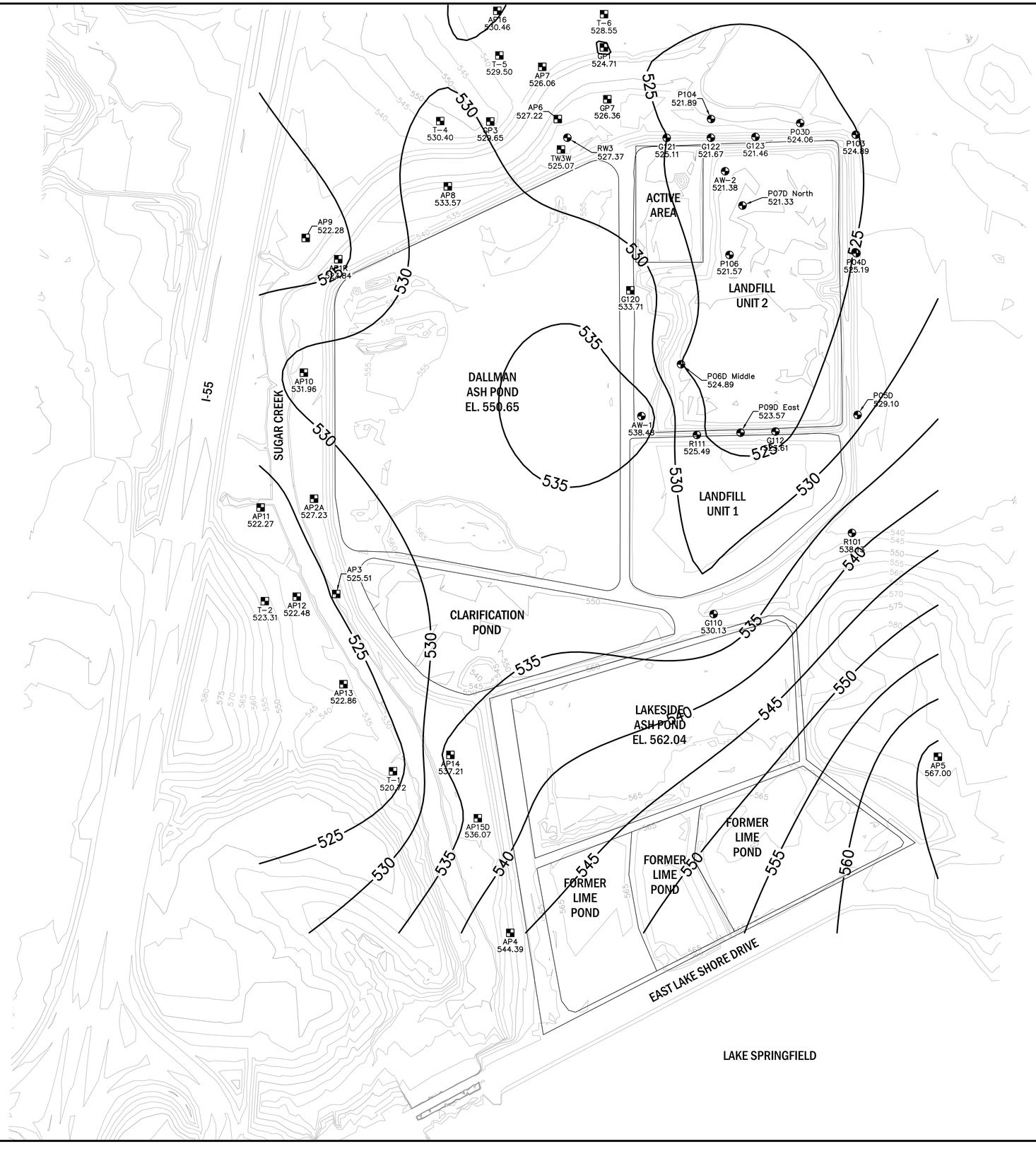
Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:50:00 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\7-21-25.dwg



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 8/21/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
AUGUST 21, 2025

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

DATE:
DECEMBER 2025

PROJECT ID:
250289/0005

SHEET NUMBER:

FIG. 8

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:49:21 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\8-21-25.dwg

LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 9/30/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

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SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO
APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: BCK

POTENTIOMETRIC SURFACE MAP
SEPTEMBER 30, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 9

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:48:28 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\9-30-25.dwg

LEGEND

- EXISTING GROUND CONTOURS
- GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 10/27/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
OCTOBER 27, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 10

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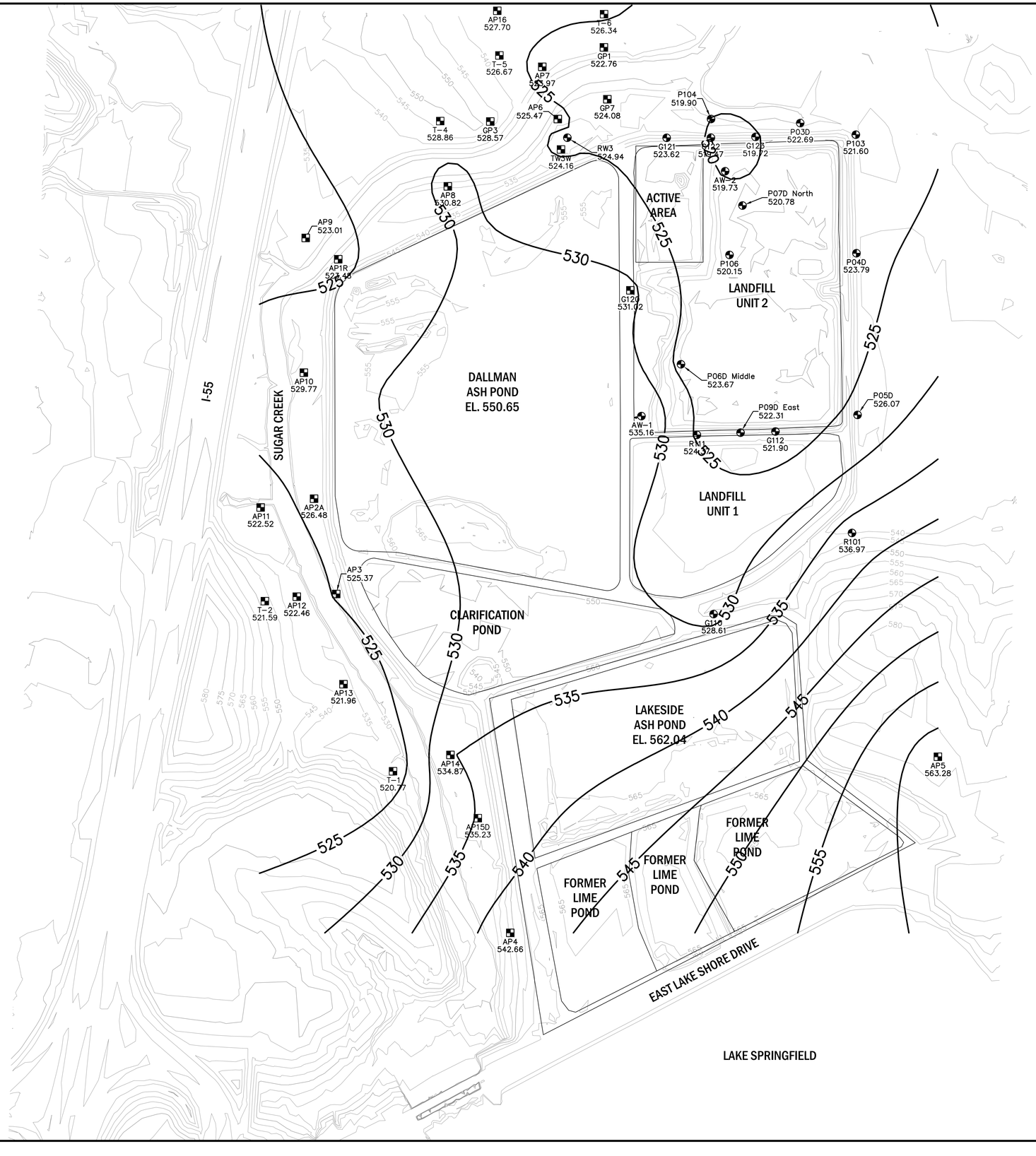
Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:47:38 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\10-27-25.dwg



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 11/15/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
NOVEMBER 15, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 11

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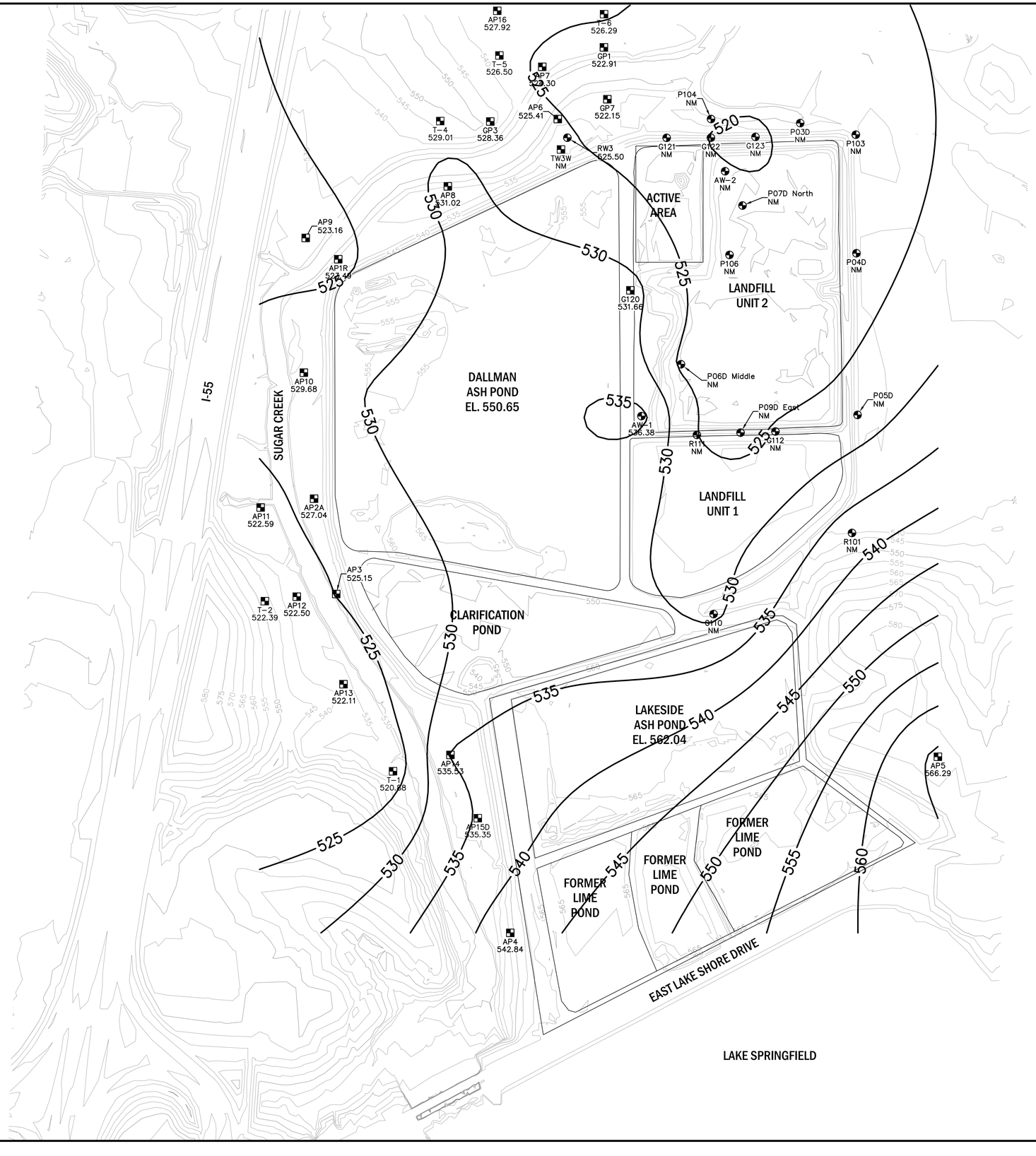
Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:45:57 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\11-15-25.dwg



LEGEND

- 550 — EXISTING GROUND CONTOURS
- —540— GROUNDWATER CONTOURS
- CCR SURFACE IMPOUNDMENT WELL
- FGDS LANDFILL WELL

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. POTENTIOMETRIC CONTOUR INTERVAL SHOWN IS 5 FEET.
3. TOPOGRAPHIC CONTOUR INTERVAL SHOWN IS 5 FEET.
4. SAMPLING DATE: 12/10/2025.
5. "NM" – NOT MEASURED. GROUNDWATER ELEVATION BASED ON LINEAR REGRESSION APPROXIMATION.
6. DEPICTED BOUNDARIES OF SITE FEATURES ARE APPROXIMATE.

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: MTH | DRAWN BY: BCK | APPROVED BY: MTH

POTENTIOMETRIC SURFACE MAP
DECEMBER 10, 2025

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

DATE: DECEMBER 2025

PROJECT ID: 250289/0005

SHEET NUMBER:

FIG. 12

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Tab: Layout1 Last Saved: January 12, 2026, by Ben Karpus Plotted: Monday, January 12, 2026 10:58:08 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\PMAPS\2025\Monthly Basal Sand\12-10-25.dwg

APPENDIX C:
2025 LABORATORY ANALYTICAL REPORTS AND FIELD SAMPLING NOTES

APPENDIX C-1:

First Quarter 2025

Laboratory Analytical Report and Field Notes

March 31, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: FGDS Landfill **WorkOrder:** 25020750

Dear Eric Staley:

TEKLAB, INC received 12 samples on 2/21/2025 12:22:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

Client: City Water, Light & Power
Work Order: 25020750
Client Project: FGDS Landfill
Report Date: 31-Mar-25

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	19
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25020750

Client Project: FGDS Landfill **Report Date:** 31-Mar-25

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Client: City Water, Light & Power
Work Order: 25020750
Client Project: FGDS Landfill
Report Date: 31-Mar-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Work Order: 25020750
Client Project: FGDS Landfill
Report Date: 31-Mar-25

Cooler Receipt Temp: 9.9 °C

An employee of Teklab, Inc. collected the sample(s).

Radium 226/228 analysis was performed by Alliance Technical Group. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power

Work Order: 25020750

Client Project: FGDS Landfill

Report Date: 31-Mar-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2025	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2025	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power **Work Order:** 25020750

Client Project: FGDS Landfill **Report Date:** 31-Mar-25

Lab ID: 25020750-003 **Client Sample ID:** R111

Matrix: GROUNDWATER **Collection Date:** 02/20/2025 11:41

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.25**	ft	1	02/20/2025 11:41	R360884
Depth to water	*	-5.00		**25.04**	ft	1	02/20/2025 11:41	R360884
Depth to water from measuring point	*	0		**25.04**	ft	1	02/20/2025 11:41	R360884
Elevation of groundwater surface	*	0		**528.96**	ft	1	02/20/2025 11:41	R360884
Measuring Point Elevation	*	0		**554.00**	ft	1	02/20/2025 11:41	R360884
Measuring Point Height Above Land Surface	*	0		**0**	ft	1	02/20/2025 11:41	R360884
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.8**	NTU	1	02/20/2025 11:41	R360884
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**46.8**	°F	1	02/20/2025 11:41	R360884
SW-846 9040B								
pH, Field	*	1.00		**6.86**		1	02/20/2025 11:41	R360884
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1090**	µmhos/cm @25C	1	02/20/2025 11:41	R360884
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	33		**725**	mg/L	1.67	02/21/2025 14:57	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 13:59	R360629
Chloride	NELAP	5.00		**169**	mg/L	10	02/21/2025 13:59	R360629
Sulfate	NELAP	10.0		**24.7**	mg/L	10	02/21/2025 13:59	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.586**	mg/L	1	02/24/2025 14:47	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 14:47	235068
Boron	NELAP	0.0200		**3.09**	mg/L	1	02/24/2025 14:47	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 14:47	235068
Calcium	NELAP	0.100		**148**	mg/L	1	02/24/2025 14:47	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:47	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:47	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 14:47	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 14:47	235068
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:52	235068
Arsenic	NELAP	0.0010		**0.0156**	mg/L	5	02/25/2025 10:43	235068
Lithium	*	0.0030		**0.0055**	mg/L	5	02/25/2025 10:43	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:52	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 11:52	235068
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:37	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020750

Client Project: FGDS Landfill **Report Date:** 31-Mar-25

Lab ID: 25020750-006 **Client Sample ID:** G120

Matrix: GROUNDWATER **Collection Date:** 02/21/2025 9:36

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**502.73**	ft	1	02/21/2025 9:36	R360884
Depth to water	*	-5.00		**15.89**	ft	1	02/21/2025 9:36	R360884
Depth to water from measuring point	*	0		**15.89**	ft	1	02/21/2025 9:36	R360884
Elevation of groundwater surface	*	0		**537.21**	ft	1	02/21/2025 9:36	R360884
Measuring Point Elevation	*	0		**553.10**	ft	1	02/21/2025 9:36	R360884
Measuring Point Height Above Land Surface	*	0		**0**	ft	1	02/21/2025 9:36	R360884
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**17**	NTU	1	02/21/2025 9:36	R360884
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.8**	°F	1	02/21/2025 9:36	R360884
SW-846 9040B								
pH, Field	*	1.00		**6.66**		1	02/21/2025 9:36	R360884
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1910**	µmhos/cm @25C	1	02/21/2025 9:36	R360884
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	50		**1400**	mg/L	2.5	02/24/2025 14:57	R360789
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 21:46	R360629
Chloride	NELAP	5.00		**35.2**	mg/L	10	02/21/2025 21:46	R360629
Sulfate	NELAP	10.0		**548**	mg/L	10	02/21/2025 21:46	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.708**	mg/L	1	02/24/2025 10:06	235106
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 10:06	235106
Boron	NELAP	0.0200		**7.50**	mg/L	1	02/24/2025 10:06	235106
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 10:06	235106
Calcium	NELAP	0.100		**249**	mg/L	1	02/24/2025 10:06	235106
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 10:06	235106
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 10:06	235106
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 10:06	235106
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 10:06	235106
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 14:17	235106
Arsenic	NELAP	0.0010		**0.0113**	mg/L	5	02/24/2025 14:17	235106
Lithium	*	0.0030		**0.0076**	mg/L	5	02/25/2025 10:54	235106
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2025 10:54	235106
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 14:17	235106
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/25/2025 10:07	235158
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/21/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/21/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020750

Client Project: FGDS Landfill **Report Date:** 31-Mar-25

Lab ID: 25020750-009 **Client Sample ID:** AW-1

Matrix: GROUNDWATER **Collection Date:** 02/20/2025 12:21

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.79**	ft	1	02/20/2025 12:21	R360884
Depth to water	*	-5.00		**10.70**	ft	1	02/20/2025 12:21	R360884
Depth to water from measuring point	*	0		**13.45**	ft	1	02/20/2025 12:21	R360884
Elevation of groundwater surface	*	0		**542.15**	ft	1	02/20/2025 12:21	R360884
Measuring Point Elevation	*	0		**555.60**	ft	1	02/20/2025 12:21	R360884
Measuring Point Height Above Land Surface	*	0		**2.75**	ft	1	02/20/2025 12:21	R360884
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.4**	NTU	1	02/20/2025 12:21	R360884
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**48.2**	°F	1	02/20/2025 12:21	R360884
SW-846 9040B								
pH, Field	*	1.00		**6.64**		1	02/20/2025 12:21	R360884
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1310**	µmhos/cm @25C	1	02/20/2025 12:21	R360884
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	50		**1110**	mg/L	2.5	02/21/2025 14:59	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 15:21	R360629
Chloride	NELAP	5.00		**35.4**	mg/L	10	02/21/2025 15:21	R360629
Sulfate	NELAP	10.0		**374**	mg/L	10	02/21/2025 15:21	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.486**	mg/L	1	02/24/2025 11:14	235055
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 11:14	235055
Boron	NELAP	0.0200		**8.79**	mg/L	1	02/24/2025 11:14	235055
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 11:14	235055
Calcium	NELAP	0.100		**186**	mg/L	1	02/24/2025 11:14	235055
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 11:14	235055
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 11:14	235055
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 11:14	235055
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 11:14	235055
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 10:24	235055
Arsenic	NELAP	0.0010		**0.146**	mg/L	5	02/25/2025 11:17	235055
Lithium	*	0.0030		**0.0108**	mg/L	5	02/24/2025 10:24	235055
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 10:24	235055
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/25/2025 11:17	235055
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020	S	**< 0.00020**	mg/L	1	02/21/2025 14:46	235075
Matrix spike did not recover within control limits due to matrix interference. Verified by bench spike.								
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/21/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/21/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020750

Client Project: FGDS Landfill **Report Date:** 31-Mar-25

Lab ID: 25020750-011 **Client Sample ID:** RW-3

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 12:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.49**	ft	1	02/18/2025 12:00	R360884
Depth to water	*	-5.00		**6.86**	ft	1	02/18/2025 12:00	R360884
Depth to water from measuring point	*	0		**9.56**	ft	1	02/18/2025 12:00	R360884
Elevation of groundwater surface	*	0		**529.94**	ft	1	02/18/2025 12:00	R360884
Measuring Point Elevation	*	0		**539.50**	ft	1	02/18/2025 12:00	R360884
Measuring Point Height Above Land Surface	*	0		**2.70**	ft	1	02/18/2025 12:00	R360884
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**21**	NTU	1	02/18/2025 12:00	R360884
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**53.5**	°F	1	02/18/2025 12:00	R360884
SW-846 9040B								
pH, Field	*	1.00		**7.10**		1	02/18/2025 12:00	R360884
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**623**	µmhos/cm @25C	1	02/18/2025 12:00	R360884
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	25		**372**	mg/L	1.25	02/19/2025 10:55	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 0:00	R360503
Chloride	NELAP	5.00		**25.4**	mg/L	10	02/19/2025 0:00	R360503
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/19/2025 0:00	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.136**	mg/L	1	02/20/2025 17:08	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:08	234945
Boron	NELAP	0.0200		**0.126**	mg/L	1	02/20/2025 17:08	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:08	234945
Calcium	NELAP	0.100		**64.5**	mg/L	1	02/24/2025 11:25	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:08	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:08	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:08	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:08	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:19	234945
Arsenic	NELAP	0.0010		**0.0961**	mg/L	5	02/20/2025 11:19	234945
Lithium	*	0.0030		**0.0047**	mg/L	5	02/24/2025 8:08	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:19	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:19	234945
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:09	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: FGDS Landfill

Work Order: 25020750
Report Date: 31-Mar-25

Carrier: Justin Colp
Received By: AMD

Completed by: Amber Dilallo
On: 18-Feb-25

Reviewed by: Ellie Hopkins
On: 21-Feb-25

Pages to follow: Chain of custody 5 Extra pages included 49

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 9.9
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

Samples were received on 2/18/25 at 1500 on ice [9.9, 11.5C - LTG#5]. pH strip #101358. - amberdilallo - 2/18/2025 3:33:57 PM

Samples were received on 2/19/25 at 15.50 on ice [temp10.1C - LTG#9]. pH#101358 -EK/ lhenson - 2/19/2025 4:09:47 PM

Samples were received on 2/20/25 at 15.55 on ice [temp5.7C, 5.9C - LTG#9]. pH#101358. Added nitric acid (102194) to G121 and AW-1. - lhenson - 2/20/2025 4:39:14 PM

Samples were received on 12/21/25 at 12.22 on ice [temp5.5C - LTG#9]. pH#101358/98858. Added nitric acid (102194) to G113 and G120. - EK/lhenson - 2/21/2025 1:04:17 PM

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020750

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 9.9 . 11.5°C #5
Preserved in: [ ] LAB [X] FIELD FOR LAB USE ONLY
LAB NOTES: 101358 DM 2/18/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring 4Q2023-3Q2025
RW-3 report data from Ash Pond sampling event.

PROJECT NAME/NUMBER
FGDS Landfill

SAMPLE COLLECTOR'S NAME
Justin Colp

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020750-001	R101		Groundwater	1	2								✓	✓	✓	✓	✓	✓
002	G110		Groundwater	1	2								✓	✓	✓	✓	✓	✓
003	R111		Groundwater	1	2								✓	✓	✓	✓	✓	✓
004	G112		Groundwater	1	2								✓	✓	✓	✓	✓	✓
005	G113		Groundwater	1	2								✓	✓	✓	✓	✓	✓
006	G120		Groundwater	1	2								✓	✓	✓	✓	✓	✓
007	G121		Groundwater	1	2								✓	✓	✓	✓	✓	✓
008	G122		Groundwater	1	2								✓	✓	✓	✓	✓	✓
009	AW-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓
010	AW-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
011	RW-3	2-18-25 / 1700	Groundwater	0	0								✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
J. Colp	2-18-25 1500	[illegible]	2/18/25 1500

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020750

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [x] ICE [ ] BLUE ICE [ ] NO ICE 10.1 °C #9
Preserved in: [ ] LAB [x] FIELD FOR LAB USE ONLY
LAB NOTES: pH V 101358 EIC 2119 2025

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [x] No
Are these samples known to be hazardous? [ ] Yes [x] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [x] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring 4Q2023-3Q2025
RW-3 report data from Ash Pond sampling event.

PROJECT NAME/NUMBER
FGDS Landfill

SAMPLE COLLECTOR'S NAME
Justin Gdp

RESULTS REQUESTED
[x] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED																
				UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity											
25020750-001	R101		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
002	G110	2-19-25 / 1325	Groundwater	1	2								✓	✓	✓	✓	✓	✓											
003	R111		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
004	G112		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
005	G113		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
006	G120		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
007	G121		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
008	G122		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
009	AW-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
010	AW-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓											
011	RW-3		Groundwater	0	0								✓	✓	✓	✓	✓	✓											

Relinquished By	Date/Time	Received By	Date/Time
	2-19 / 1550		2/19/25 15:50

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020750

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [x] ICE [ ] BLUE ICE [ ] NO ICE 5.7/5.9 °C #9
Preserved in: [x] LAB [ ] FIELD
FOR LAB USE ONLY
LAB NOTES: Added HNO3(102194) to G121 2 liter and AW-1 2 liter. PM V101358 EK 2/20/2025

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [x] No
Are these samples known to be hazardous? [ ] Yes [x] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [x] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring 4Q2023-3Q2025
RW-3 report data from Ash Pond sampling event.

PROJECT NAME/NUMBER
FGDS Landfill

SAMPLE COLLECTOR'S NAME
Justin Culp

RESULTS REQUESTED
[x] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020750-001	R101		Groundwater	1	2								✓	✓	✓	✓	✓	✓
002	G110		Groundwater	1	2								✓	✓	✓	✓	✓	✓
003	R111	2-20-25 / 1141	Groundwater	1	2								✓	✓	✓	✓	✓	✓
004	G112	2-20-25 / 1255	Groundwater	1	2								✓	✓	✓	✓	✓	✓
005	G113		Groundwater	1	2								✓	✓	✓	✓	✓	✓
006	G120		Groundwater	1	2								✓	✓	✓	✓	✓	✓
007	G121	2-20-25 / 1325	Groundwater	1	2								✓	✓	✓	✓	✓	✓
008	G122	2-20-25 / 1334	Groundwater	1	2								✓	✓	✓	✓	✓	✓
009	AW-1	2-20-25 / 1221	Groundwater	1	2								✓	✓	✓	✓	✓	✓
010	AW-2	2-20-25 / 1018	Groundwater	1	2								✓	✓	✓	✓	✓	✓
011	RW-3		Groundwater	0	0								✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
	2-20 / 1555		2/20/25 1555

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25020750

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring 4Q2023-3Q2025

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

PROJECT NAME/NUMBER: FGDS Landfill
SAMPLE COLLECTOR'S NAME: Justin Colp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020750 02	P07D	2-20-25 / 1112	Groundwater	1	2								✔	✔	✔	✔	✔	✔
			Groundwater															
			Groundwater															
			Groundwater															
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			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															

Relinquished By	Date/Time	Received By	Date/Time
	2-20 / 1555		2/20/25 1555

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020750

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 5,5 °C #9
Preserved in: ☒ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO3 (102194) to G113 and G120. PhV98858, 101358 EK 2/21/2025

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring 4Q2023-3Q2025
RW-3 report data from Ash Pond sampling event.

PROJECT NAME/NUMBER
FGDS Landfill

SAMPLE COLLECTOR'S NAME
Justin Colp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020750-001	R101	2-21-25 / 1020	Groundwater	1	2								✔	✔	✔	✔	✔	✔
002	G110		Groundwater	1	2								✔	✔	✔	✔	✔	✔
003	R111		Groundwater	1	2								✔	✔	✔	✔	✔	✔
004	G112		Groundwater	1	2								✔	✔	✔	✔	✔	✔
005	G113	2-21-25 / 0942	Groundwater	1	2								✔	✔	✔	✔	✔	✔
006	G120	2-21-25 / 0936	Groundwater	1	2								✔	✔	✔	✔	✔	✔
007	G121		Groundwater	1	2								✔	✔	✔	✔	✔	✔
008	G122		Groundwater	1	2								✔	✔	✔	✔	✔	✔
009	AW-1		Groundwater	1	2								✔	✔	✔	✔	✔	✔
010	AW-2		Groundwater	1	2								✔	✔	✔	✔	✔	✔
011	RW-3		Groundwater	0	0								✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
Tracy Carrell	2/21/25 1222	Emily Kosakoski	2/21/2025 1222

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Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	R101
Project Location:	Springfield, IL	**Sample ID:**	001
W.O. Number (s):	25020750	**Date (s):**	2/21/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☐ N ☐ S ☑ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/21/2025 9:52

Static Water Level: 6.89 feet below TOC

Total Depth: 35.27 feet below TOC

Water Column: 28.38 feet

Purging Activities

Purged By: TC Purge Date: 2/21/2025

Purge Method: Peristaltic Pump Well Diameter: 4"

Purge Volume Calculation (L): 28.38 ft. x 0.022 = 0.62 L x 3 Vol. = 1.86 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 8.00 L

Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:54	0.0	308	purge start time						
10:02	2.5	↓	7.01	681.10	9.04	7.11	68.90	5.04	
10:05	3.4		7.03	681.10	8.94	6.96	69.60	6.98	
10:08	4.3		7.04	680.60	9.10	6.78	70.30	5.30	
10:11	5.2		7.05	680.30	9.12	6.57	71.10	3.96	
10:14	6.2		7.06	681.50	9.11	6.44	71.80	3.31	
10:17	7.1		7.07	681.00	8.82	6.31	72.70	3.08	
10:20	8.0		7.07	679.80	9.47	6.27	73.10	3.06	

Sampling Activities

Sampled By: TC Sample Date/Time: 2/21/2025 10:20

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 7.07 pH 679.80 Spec. Cond. 9.47 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 10.02 feet below TOC Drawdown: 3.13 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Tracy Carroll **Date:** 2/21/2025

Field Data Sheet

Project Name: FGDS LF
Project Location: Springfield, IL
W.O. Number (s): 25020750
Monitoring Point: G110
Sample ID: 002
Date (s): 2/19/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: Payton Yoch — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 16 °F — Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 13:10
Static Water Level: 24.40 feet below TOC
Total Depth: 57.15 feet below TOC
Water Column: 32.75 feet

Purging Activities

Purged By: JC — Purge Date: 2/19/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 32.75 ft. x 0.022 = 0.72 L x 3 Vol. = 2.16 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:10	0.0	267	purge start time						
13:16	1.6	↓	6.81	695.30	11.06	1.69	-80.60	2.57	
13:19	2.4		6.81	694.80	11.20	1.54	-84.90	2.32	
13:22	3.2		6.80	694.80	11.05	1.41	-87.40	2.86	
13:25	4.0		6.80	693.10	11.20	1.33	-89.00	4.16	

Sampling Activities

Sampled By: JC — Sample Date/Time: 2/19/2025 13:25
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.80 pH — 693.10 Spec. Cond. — 11.20 Temp
Field Filtered: Yes — Filter Type: Inline Disposable
Water Level: 24.48 feet below TOC — Drawdown: 0.08 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp — **Date:** 2/19/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	R111
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25020750	**Date (s):**	2/20/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Payton Yoch — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F — Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 11:26

Static Water Level: 25.04 feet below TOC

Total Depth: 55.75 feet below TOC

Water Column: 30.71 feet

Purging Activities

Purged By: JC — Purge Date: 2/20/2025

Purge Method: Peristaltic Pump — Well Diameter: 2"

Purge Volume Calculation (L): 30.71 ft. x 0.022 = 0.68 L x 3 Vol. = 2.04 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 3.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:27	0.0	214	purge start time						
11:32	1.1	↓	6.94	851.90	8.56	1.64	-103.20	6.33	
11:35	1.7		6.92	806.60	8.51	1.39	-107.50	4.95	
11:38	2.4		6.89	895.30	8.40	1.29	-109.10	3.74	
11:41	3.0		6.86	1,087.10	8.21	1.23	-109.20	3.75	

Sampling Activities

Sampled By: JC — Sample Date/Time: 2/20/2025 11:41

Sample Method: Low Flow — Sample Equipment: Peristaltic Pump

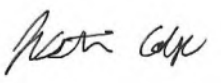
Sample Parameters: 6.86 pH — 1,087.10 Spec. Cond. — 8.21 Temp

Field Filtered: Yes — Filter Type: Inline Disposable

Water Level: 25.18 feet below TOC — Drawdown: 0.14 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By:  **Date:** 2/20/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	G112
Project Location:	Springfield, IL	**Sample ID:**	004
W.O. Number (s):	25020750	**Date (s):**	2/20/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 17 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 12:38

Static Water Level: 28.49 feet below TOC

Total Depth: 58.81 feet below TOC

Water Column: 30.32 feet

Purging Activities

Purged By: JC Purge Date: 2/20/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.32 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 3.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:40	0.0	200	purge start time						
12:46	1.2	↓	7.06	1,328.20	8.92	2.09	-120.20	4.12	
12:49	1.8		7.06	1,336.20	8.54	2.39	-124.20	3.97	
12:52	2.4		7.07	1,342.30	8.55	2.47	-124.60	4.26	
12:55	3.0		7.07	1,363.10	8.65	2.50	-123.60	3.81	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/20/2025 12:55

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 7.07 pH 1,363.10 Spec. Cond. 8.65 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 28.49 feet below TOC Drawdown: 0.00 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/20/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	G113
Project Location:	Springfield, IL	**Sample ID:**	005
W.O. Number (s):	25020750	**Date (s):**	2/21/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☐ N ☐ S ☑ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/21/2025 9:11

Static Water Level: 5.01 feet below TOC

Total Depth: 12.85 feet below TOC

Water Column: 7.84 feet

Purging Activities

Purged By: JC Purge Date: 2/21/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 7.84 ft. x 0.022 = 0.17 L x 3 Vol. = 0.51 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 2.50 L

Physical appearance of purge water: Cloudy Odor: None Color: lt brown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:27	0.0	167	purge start time						
9:30	0.5	↓	6.55	1,694.40	5.46	2.95	-105.30	84.13	
9:33	1.0		6.47	1,683.60	4.66	1.88	-96.90	82.59	
9:36	1.5		6.43	1,681.50	4.84	1.65	-98.10	59.92	
9:39	2.0		6.41	1,680.30	5.12	1.48	-100.40	59.73	
9:42	2.5		6.40	1,688.90	5.02	1.32	-102.50	68.40	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/21/2025 9:42

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.40 pH 1,688.90 Spec. Cond. 5.02 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 7.45 feet below TOC Drawdown: 2.44 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/21/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	G120
Project Location:	Springfield, IL	**Sample ID:**	006
W.O. Number (s):	25020750	**Date (s):**	2/21/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☐ N ☐ S ☑ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/21/2025 9:15

Static Water Level: 15.89 feet below TOC

Total Depth: 50.37 feet below TOC

Water Column: 34.48 feet

Purging Activities

Purged By: BG Purge Date: 2/21/2025

Purge Method: Submersible Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.48 ft. x 0.022 = 0.76 L x 3 Vol. = 2.28 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Slightly cloudy Odor: Moderate Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:15	0.0	286	purge start time						
9:24	2.6	↓	6.68	1,927.00	11.01	3.56	-117.50	72.51	
9:27	3.4		6.66	1,924.20	13.36	2.96	-123.80	21.63	
9:30	4.3		6.66	1,923.00	13.29	2.61	-127.10	12.70	
9:33	5.1		6.66	1,921.80	13.29	2.37	-128.90	13.74	
9:36	6.0		6.66	1,914.80	13.23	2.20	-130.40	16.78	

Sampling Activities

Sampled By: BG Sample Date/Time: 2/21/2025 9:36

Sample Method: Low Flow Sample Equipment: Submersible Pump

Sample Parameters: 6.66 pH 1,914.80 Spec. Cond. 13.23 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 16.34 feet below TOC Drawdown: 0.45 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Brett Gillihan **Date:** 2/21/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	G121
Project Location:	Springfield, IL	**Sample ID:**	007
W.O. Number (s):	25020750	**Date (s):**	2/20/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 17 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/21/2025 13:01

Static Water Level: 28.25 feet below TOC

Total Depth: 58.56 feet below TOC

Water Column: 30.31 feet

Purging Activities

Purged By: BG Purge Date: 2/20/2025

Purge Method: Submersible Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.31 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 10.00 L

Physical appearance of purge water: Cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:01	0.0	417	purge start time						
13:13	5.0	↓	6.95	1,563.90	12.00	3.36	-117.40	41.75	
13:16	6.3		6.95	1,579.30	12.12	2.80	-121.70	27.75	
13:19	7.5		6.95	1,565.20	12.25	2.47	-123.30	33.21	
13:22	8.8		6.95	1,564.30	12.48	2.19	-126.30	30.81	
13:25	10.0		6.95	1,565.50	12.64	1.97	-128.70	30.48	

Sampling Activities

Sampled By: BG Sample Date/Time: 2/20/2025 13:25

Sample Method: Low Flow Sample Equipment: Submersible Pump

Sample Parameters: 6.95 pH 1,565.50 Spec. Cond. 12.64 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 29.31 feet below TOC Drawdown: 1.06 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Brett Gillihan **Date:** 2/20/2025

Field Data Sheet

Project Name: FGDS LF
Project Location: Springfield, IL
W.O. Number (s): 25020750
Monitoring Point: G122
Sample ID: 008
Date (s): 2/20/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 18 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 13:21
Static Water Level: 29.72 feet below TOC
Total Depth: 49.29 feet below TOC
Water Column: 19.57 feet

Purging Activities

Purged By: JC Purge Date: 2/20/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 19.57 ft. x 0.022 = 0.43 L x 3 Vol. = 1.29 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:21	0.0	222	purge start time						
13:24	0.7	↓	6.95	1,403.30	11.69	3.44	-26.40	13.20	
13:27	1.3		6.84	1,426.70	10.26	2.18	-15.00	13.16	
13:30	2.0		6.80	1,417.30	10.09	1.92	-9.40	12.82	
13:33	2.7		6.78	1,421.70	10.05	1.78	-6.40	12.78	
13:36	3.3		6.76	1,419.90	10.15	1.56	-4.50	13.40	
13:39	4.0		6.75	1,424.40	10.11	1.48	-3.20	14.15	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/20/2025 13:39
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.75 pH 1,424.40 Spec. Cond. 10.11 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 29.76 feet below TOC Drawdown: 0.04 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/20/2025

Field Data Sheet

Project Name: FGDS LF
Project Location: Springfield, IL
W.O. Number (s): 25020750
Monitoring Point: AW-1
Sample ID: 009
Date (s): 2/20/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: Payton Yoch — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F — Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 12:06
Static Water Level: 13.45 feet below TOC
Total Depth: 54.81 feet below TOC
Water Column: 41.36 feet

Purging Activities

Purged By: JC — Purge Date: 2/20/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 41.36 ft. x 0.022 = 0.91 L x 3 Vol. = 2.73 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.00 L
Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:07	0.0	214	purge start time						
12:15	1.7	↓	6.66	1,309.30	8.60	5.87	-75.60	9.62	
12:18	2.4		6.65	1,312.30	8.97	6.03	-77.20	8.26	
12:21	3.0		6.64	1,313.90	9.02	6.19	-78.20	8.45	

Sampling Activities

Sampled By: JC — Sample Date/Time: 2/20/2025 12:21
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.64 pH — 1,313.90 Spec. Cond. — 9.02 Temp
Field Filtered: Yes — Filter Type: Inline Disposable
Water Level: 15.57 feet below TOC — Drawdown: 2.12 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp — **Date:** 2/20/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	AW-2
Project Location:	Springfield, IL	**Sample ID:**	010
W.O. Number (s):	25020750	**Date (s):**	2/20/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Payton Yoch — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 6 °F — Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 9:42

Static Water Level: 4.53 feet below TOC

Total Depth: 32.64 feet below TOC

Water Column: 28.11 feet

Purging Activities

Purged By: JC — Purge Date: 2/20/2025

Purge Method: Peristaltic Pump — Well Diameter: 2"

Purge Volume Calculation (L): 28.11 ft. x 0.022 = 0.62 L x 3 Vol. = 1.86 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:53	0.0	240	purge start time						
9:57	1.0	↓	7.08	771.10	5.54	2.16	47.20	37.34	
10:00	1.7		7.05	764.70	4.92	1.87	35.40	40.57	
10:03	2.4		7.05	763.70	5.38	1.63	18.90	30.93	
10:06	3.1		7.05	764.50	5.25	1.51	7.50	25.69	
10:09	3.8		7.05	765.40	5.92	1.38	4.20	26.14	
10:12	4.6		7.05	767.40	5.19	1.34	1.30	17.26	
10:15	5.3		7.05	766.70	5.52	1.29	0.40	13.58	
10:18	6.0		7.05	763.60	5.52	1.27	-0.10	17.95	

Sampling Activities

Sampled By: JC — Sample Date/Time: 2/20/2025 10:18

Sample Method: Low Flow — Sample Equipment: Peristaltic Pump

Sample Parameters: 7.05 pH — 763.60 Spec. Cond. — 5.52 Temp

Field Filtered: Yes — Filter Type: Inline Disposable

Water Level: 5.49 feet below TOC — Drawdown: 0.96 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp — **Date:** 2/20/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	RW-3
Project Location:	Springfield, IL	**Sample ID:**	011
W.O. Number (s):	25020750	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 8 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	No

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 11:44

Static Water Level: 9.56 feet below TOC

Total Depth: 44.01 feet below TOC

Water Column: 34.45 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.45 ft. x 0.022 = 0.76 L x 3 Vol. = 2.28 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: ltbrown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:45	0.0	333	purge start time						
11:48	1.0	↓	7.08	616.30	11.66	1.23	-125.20	41.78	
11:51	2.0		7.08	629.50	11.89	0.70	-143.50	48.63	
11:54	3.0		7.09	631.70	11.94	0.58	-151.00	29.58	
11:57	4.0		7.10	629.70	11.94	0.54	-154.20	25.24	
12:00	5.0		7.10	622.80	11.96	0.54	-154.20	20.73	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 12:00

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.10 pH 622.80 Spec. Cond. 11.96 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 15.15 feet below TOC Drawdown: 5.59 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name:	FGDS LF	**Monitoring Point:**	P07D
Project Location:	Springfield, IL	**Sample ID:**	012
W.O. Number (s):	25020750	**Date (s):**	2/20/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 7 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 10:31

Static Water Level: 4.49 feet below TOC

Total Depth: 32.54 feet below TOC

Water Column: 28.05 feet

Purging Activities

Purged By: JC Purge Date: 2/20/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 28.05 ft. x 0.022 = 0.62 L x 3 Vol. = 1.86 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: ltbrown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:34	0.0	184	purge start time						
11:00	4.8	↓	6.77	1,251.80	8.06	1.22	-106.10	63.75	
11:03	5.3		6.78	1,248.00	7.78	1.21	-109.50	55.28	
11:06	5.9		6.77	1,250.70	7.60	1.08	-111.70	46.90	
11:09	6.4		6.77	1,251.50	8.27	1.01	-113.80	40.37	
11:12	7.0		6.78	1,252.30	8.21	0.99	-115.20	40.04	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/20/2025 11:12

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.10 pH 622.80 Spec. Cond. 11.96 Temp

Field Filtered: No Filter Type:

Water Level: 4.55 feet below TOC Drawdown: 0.06 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/20/2025

Site Samping Event: FGDS Landfill
LIMS Workorder: 25020750
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/18/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/18/25 9:30
7.0 Buffer	wc240913b	7.00	2/18/25 9:26
10.0 Buffer	wc240625b	10.00	2/18/25 9:34
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/18/25 9:42

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.5	2/18/25 9:42
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-JC	LCS	2/18/25 9:44	17.5	7.02	1,410	0.51		
CCV-1-JC	CCV	2/18/25 13:20	18.5	7.06	1,423	0.57		

Comments:

Field Meter ID: Pine 50115 Technician(s): justn colp Date: 2/19/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/19/25 10:31
7.0 Buffer	wc240913b	7.00	2/19/25 10:28
10.0 Buffer	wc240625b	10.00	2/19/25 10:36
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/19/25 10:47

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.49	2/19/25 10:53
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-JC	LCS	2/19/25 10:55	9.1	7.01	1,411	0.47		
CCV-2-JC	CCV	2/19/25 14:29	11.1	7.03	1,417	0.56		

Comments:

Site Samping Event: FGDS Landfill
LIMS Workorder: 25020750
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/20/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/20/25 8:56
7.0 Buffer	wc240913b	7.00	2/20/25 8:51
10.0 Buffer	wc240625b	10.00	2/20/25 9:00
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/20/25 9:06

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.5	2/20/25 9:06
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-JC	LCS	2/20/25 9:08	9.3	6.99	1,415	0.5		
CCV-3-JC	CCV	2/20/25 13:42	10.4	7.02	1,426	0.54		

Comments:

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/21/25 8:41
7.0 Buffer	wc240913b	7.00	2/21/25 8:37
10.0 Buffer	wc240625b	10.00	2/21/25 8:45
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/21/25 8:53

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.6	2/21/25 8:53
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-4-JC	LCS	2/21/25 8:55	9.4	7.02	1,413	0.62		
CCV-4-JC	CCV	2/21/25 10:30	9.7	7.02	1,418	0.61		

Comments:

Site Samping Event: FGDS Landfill
LIMS Workorder: 25020750
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/19/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.01	2/19/25 11:14
7.0 Buffer	WC240913B	7.00	2/19/25 11:11
10.0 Buffer	WC240625B	10.00	2/19/25 11:19
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/19/25 11:05

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-TC	LCS	2/19/25 11:21	0.3	7.06	1,413			
CCV-1-TC	CCV	2/19/25 14:27	13.7	7.08	1,321			

Comments:

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/20/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.00	2/20/25 9:55
7.0 Buffer	WC240913B	7.00	2/20/25 9:49
10.0 Buffer	WC240625B	10.00	2/20/25 10:12
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/20/25 10:13

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-TC	LCS	2/20/25 10:25	0.6	7.09	1,417			
CCV-2-TC	CCV	2/20/25 14:35	0.8	7.09	1,423			

Comments:

Site Samping Event: FGDS Landfill
LIMS Workorder: 25020750
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.01	2/21/25 9:29
7.0 Buffer	WC240913B	7.00	2/21/25 9:21
10.0 Buffer	WC240625B	10.00	2/21/25 9:33
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/21/25 9:41

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-TC	LCS	2/21/25 9:44	0.2	7.05	1,415			
CCV-3-TC	CCV	2/21/25 10:46	0.2	7.06	1,404			

Comments:

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

March 31, 2025

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 25020750

Order No.: 25030052

Dear Shelly Hennessy:

Alliance Technical Group - Akron received 12 sample(s) on 2/27/2025 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **25030052**
Date: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750

WorkOrder Narrative:
25030052: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Alliance Technical Group Work Order Number assigned to this report.

Alliance Technical Group holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Alliance Technical Group and that of the customer. It cannot be reproduced in any form without the consent of Alliance Technical Group or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Alliance Technical Group is not responsible for use or interpretation of the data included herein.

All results for solid samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence QC Notes:
LCS/LCSD-82663 Radium-228_DW(904.0): LCS/LCSD exhibited a high RPD, individually each LCS/LCSD meets the required criteria.

Alliance Technical Group - Akro
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-448
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **25030052**
Date: **3/31/2025**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Workorder Sample Summary

WO#: **25030052**

31-Mar-25

CLIENT: TEKLAB Inc,
Project: 25020750

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
25030052-001	25020750-001		2/21/2025 10:20:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-002	25020750-002		2/19/2025 1:25:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-003	25020750-003		2/20/2025 11:41:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-004	25020750-004		2/20/2025 12:55:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-005	25020750-005		2/21/2025 9:42:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-006	25020750-006		2/21/2025 9:36:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-007	25020750-007		2/20/2025 1:25:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-008	25020750-008		2/20/2025 1:39:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-009	25020750-009		2/20/2025 12:21:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-010	25020750-010		2/20/2025 10:18:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-011	25020750-011		2/18/2025 12:00:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25030052-012	25020750-012		2/20/2025 11:12:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,

Project: 25020750

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25030052-001A	25020750-001	2/21/2025 10:20:00 AM	Non-Potable Water	Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25030052-002A	25020750-002	2/19/2025 1:25:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25030052-003A	25020750-003	2/20/2025 11:41:00 AM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25030052-004A	25020750-004	2/20/2025 12:55:00 PM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-005A	25020750-005	2/21/2025 9:42:00 AM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-006A	25020750-006	2/21/2025 9:36:00 AM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-007A	25020750-007	2/20/2025 1:25:00 PM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-008A	25020750-008	2/20/2025 1:39:00 PM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-009A	25020750-009	2/20/2025 12:21:00 PM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-010A	25020750-010	2/20/2025 10:18:00 AM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM
				Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM
25030052-011A	25020750-011	2/18/2025 12:00:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25030052-012A	25020750-012	2/20/2025 11:12:00 AM		Radium-226 (EPA 903.0)		3/8/2025 1:30:00 PM	3/23/2025 1:04:00 PM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,

Project: 25020750

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25030052-012A	25020750-012	2/20/2025 11:12:00 AM	Non-Potable Water	Radium-228 (EPA 904.0)		3/8/2025 1:30:00 PM	3/21/2025 2:04:00 PM

Original

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Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-001
Client Sample ID: 25020750-001

Collection Date: 2/21/2025 10:20:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.100	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.380	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 1:25:00 PM

Project: 25020750

Lab ID: 25030052-002

Matrix: NON-POTABLE WATER

Client Sample ID: 25020750-002

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.160	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.380	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/20/2025 11:41:00 AM

Project: 25020750

Lab ID: 25030052-003

Matrix: NON-POTABLE WATER

Client Sample ID: 25020750-003

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.210	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.530	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/20/2025 12:55:00 PM

Project: 25020750

Lab ID: 25030052-004

Matrix: NON-POTABLE WATER

Client Sample ID: 25020750-004

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.180	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.350	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-005
Client Sample ID: 25020750-005

Collection Date: 2/21/2025 9:42:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.160	1	3/23/2025 1:04:00 PM
Yield	0.990					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.460	1	3/21/2025 2:04:00 PM
Yield	0.920					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/21/2025 9:36:00 AM

Project: 25020750

Lab ID: 25030052-006

Matrix: NON-POTABLE WATER

Client Sample ID: 25020750-006

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	2.75	1.00		pCi/L	± 0.360	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.470	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-007
Client Sample ID: 25020750-007

Collection Date: 2/20/2025 1:25:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	1.97	1.00		pCi/L	± 0.300	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.460	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-008
Client Sample ID: 25020750-008

Collection Date: 2/20/2025 1:39:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.280	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-009
Client Sample ID: 25020750-009

Collection Date: 2/20/2025 12:21:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.200	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.500	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-010
Client Sample ID: 25020750-010

Collection Date: 2/20/2025 10:18:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.110	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.290	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,
Project: 25020750
Lab ID: 25030052-011
Client Sample ID: 25020750-011

Collection Date: 2/18/2025 12:00:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.110	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.440	1	3/26/2025 3:34:00 PM
Yield	0.780					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25030052**

Date Reported: **3/31/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/20/2025 11:12:00 AM

Project: 25020750

Lab ID: 25030052-012

Matrix: NON-POTABLE WATER

Client Sample ID: 25020750-012

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	1.17	1.00		pCi/L	± 0.240	1	3/23/2025 1:04:00 PM
Yield	1.00					1	3/23/2025 1:04:00 PM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	1.32	1.00		pCi/L	± 0.500	1	3/21/2025 2:04:00 PM
Yield	1.00					1	3/21/2025 2:04:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82663**

Sample ID: **MB-82663** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-82663** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	6.47	1.00	5.000	0	129	50	130				QLR
Yield	0.580			0	0						

Sample ID: **LCSD-82663** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	4.45	1.00	5.000	0	89.0	50	130	6.470	37.0	20	R
Yield	1.00			0	0			0.5800	53.2		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82663**

Sample ID: **25021873-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25021875-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			1.260	200	20	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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3310 Win St.
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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82663**

Sample ID: **MB-82663**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/4/2025**	RunNo: **205811**
Client ID: **BatchQC**	Batch ID: **82663**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/27/2025**	SeqNo: **5509528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-82663**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/4/2025**	RunNo: **205811**
Client ID: **BatchQC**	Batch ID: **82663**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/27/2025**	SeqNo: **5509529**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	3.65	1.00	5.000	0	73.0	70	130				QLR

Sample ID: **LCSD-82663**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/4/2025**	RunNo: **205811**
Client ID: **BatchQC**	Batch ID: **82663**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/27/2025**	SeqNo: **5509530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.97	1.00	5.000	0	99.4	70	130	3.650	30.6	20	R

Sample ID: **25021873-001ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/4/2025**	RunNo: **205811**
Client ID: **BatchQC**	Batch ID: **82663**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/27/2025**	SeqNo: **5509535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82663**

Sample ID: **25021873-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **25021875-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509537**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82683**

Sample ID: **MB-82683**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205677**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/25/2025**	SeqNo: **5506861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-82683**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205677**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/25/2025**	SeqNo: **5506862**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.54	1.00	5.000	0	70.8	50	130				
Yield	0.900			0	0						

Sample ID: **LCSD-82683**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205677**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/25/2025**	SeqNo: **5506863**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.35	1.00	5.000	0	67.0	50	130	3.540	5.52	20	
Yield	1.00			0	0			0.9000	10.5		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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Cuyahoga Falls, Ohio 44223
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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82683**

Sample ID: **25030002-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205677**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E904.0** **E903-904** Analysis Date: **3/25/2025** SeqNo: **5506868**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25030004-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205677**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E904.0** **E903-904** Analysis Date: **3/25/2025** SeqNo: **5506870**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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Cuyahoga Falls, Ohio 44223
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QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82683**

Sample ID: **MB-82683**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205680**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/26/2025**	SeqNo: **5506940**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-82683**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205680**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/26/2025**	SeqNo: **5506941**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.48	1.00	5.000	0	89.6	70	130				

Sample ID: **LCSD-82683**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205680**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/26/2025**	SeqNo: **5506942**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.61	1.00	5.000	0	92.2	70	130	4.480	2.86	20	

Sample ID: **25030002-001ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205680**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/26/2025**	SeqNo: **5506947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82683**

Sample ID: **25030002-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **25030004-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506949**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82776**

Sample ID: **MB-82776**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205482**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/21/2025**	SeqNo: **5502453**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-82776**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205482**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/21/2025**	SeqNo: **5502454**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.46	1.00	5.000	0	69.2	50	130				
Yield	1.00			0	0						

Sample ID: **LCSD-82776**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205482**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/21/2025**	SeqNo: **5502455**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	4.00	1.00	5.000	0	80.0	50	130	3.460	14.5	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82776**

Sample ID: **25030057-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/8/2025** RunNo: **205482**
Client ID: **BatchQC** Batch ID: **82776** TestNo: **E904.0** **E903-904** Analysis Date: **3/21/2025** SeqNo: **5502474**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Sample ID: **25030059-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/8/2025** RunNo: **205482**
Client ID: **BatchQC** Batch ID: **82776** TestNo: **E904.0** **E903-904** Analysis Date: **3/21/2025** SeqNo: **5502476**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82776**

Sample ID: **MB-82776**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502642**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-82776**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.72	1.00	5.000	0	94.4	70	130				

Sample ID: **LCSD-82776**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.29	1.00	5.000	0	106	70	130	4.720	11.4	20	

Sample ID: **25030057-001ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502658**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25030052**

31-Mar-25

Client: TEKLAB Inc,
Project: 25020750 **BatchID:** **82776**

Sample ID: **25030057-001ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502658**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	R
Yield	1.00							1.000	0	0	

Sample ID: **25030059-001ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **3/8/2025**	RunNo: **205492**
Client ID: **BatchQC**	Batch ID: **82776**	TestNo: **E903.0**	**E903-904**	Analysis Date: **3/23/2025**	SeqNo: **5502660**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

TEKLAB, INC. Chain of Custody

25030052

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: Client | QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Project# 25020750

Contact: Shelly Hennessy | Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT | Billing/PO: 38001 | Phone: (618) 344-1004 ext. 36

Report data from 25020749-001

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228												
	25020750-001	2/21/25 1020	HNO3	Groundwater	✔	pH	1	CPM	28								
	25020750-002	2/19/25 1325	HNO3	Groundwater	✔		1		23								
	25020750-003	2/20/25 1141	HNO3	Groundwater	✔		1		52								
	25020750-004	2/20/25 1255	HNO3	Groundwater	✔		1		46								
	25020750-005	2/21/25 0942	HNO3	Groundwater	✔		1		30								
	25020750-006	2/21/25 ~~935~~ 0936	HNO3	Groundwater	✔		1		33								
	25020750-007	2/20/25 1325	HNO3	Groundwater	✔		1		38								
	25020750-008	2/20/25 1339	HNO3	Groundwater	✔		1		22								
	25020750-009	2/20/25 1221	HNO3	Groundwater	✔		1		28								
	25020750-010	2/20/25 1018	HNO3	Groundwater	✔		1		30								
	25020750-011	2/18/25 1200	HNO3	Groundwater	✔												

18.8-0.6 = 18.8 cs intact 02/25 - Fedex Box/cooler

*Relinquished By	Date/Time	Received By	Date/Time
[signature]		[signature]	02/27/25 1130

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sample information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: Client | QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.
Samples collected from an IL site.

Project# 25020750

Contact: Shelly Hennessy | Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT | Billing/PO: 38001 | Phone: (618) 344-1004 ext.

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228												
	25020750-012	2/20/25 1112	HNO3	Groundwater	✔	pH 1	CPM 52										
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													
			Other	Aqueous													

18.8-0.9=18.8, CS intact 02/25 - Fedex Box/cooler

*Relinquished By	Date/Time	Received By	Date/Time
[illegible]		[signature]	02/27/25 1130

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sample information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 25030052 RcptNo: 1

Logged by:	Anthony W. Britton	2/27/2025 11:30:00 AM	Anthony Britton
Completed By:	Tegan A. Richards	3/1/2025 6:16:55 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	3/3/2025 11:03:50 AM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☑ No ☐ Not Present ☐
   No. Seal Date: 2/25/2025 Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
    Relinquish time & dare not included

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	18.8	Good	Yes		2/25/2025	

March 31, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Ash Pond Monitoring Wells **WorkOrder:** 25020749

Dear Eric Staley:

TEKLAB, INC received 20 samples on 2/21/2025 12:22:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25020749
Report Date: 31-Mar-25

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	26
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Abbr Definition

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Client: City Water, Light & Power
Work Order: 25020749

Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25020749
Report Date: 31-Mar-25

Cooler Receipt Temp: 9.9 °C

An employee of Teklab, Inc. collected the sample(s).

AP-14 was frozen, no sample collected.

Radium 226/228 analysis was performed by Alliance Technical Group. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25020749
Report Date: 31-Mar-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2025	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2025	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2025	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-001 **Client Sample ID:** RW-3

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 12:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.49**	ft	1	02/18/2025 12:00	R360883
Depth to water	*	-5.00		**6.86**	ft	1	02/18/2025 12:00	R360883
Depth to water from measuring point	*	0		**9.56**	ft	1	02/18/2025 12:00	R360883
Elevation of groundwater surface	*	0		**529.94**	ft	1	02/18/2025 12:00	R360883
Measuring Point Elevation	*	0		**539.50**	ft	1	02/18/2025 12:00	R360883
Measuring Point Height Above Land Surface	*	0		**2.70**	ft	1	02/18/2025 12:00	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**21**	NTU	1	02/18/2025 12:00	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**53.5**	°F	1	02/18/2025 12:00	R360883
SW-846 9040B								
pH, Field	*	1.00		**7.10**		1	02/18/2025 12:00	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**623**	µmhos/cm @25C	1	02/18/2025 12:00	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	25		**372**	mg/L	1.25	02/19/2025 10:55	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 9:38	R360503
Chloride	NELAP	5.00		**25.4**	mg/L	10	02/19/2025 9:38	R360503
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/19/2025 9:38	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.136**	mg/L	1	02/20/2025 17:08	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:08	234945
Boron	NELAP	0.0200		**0.126**	mg/L	1	02/20/2025 17:08	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:08	234945
Calcium	NELAP	0.100		**64.5**	mg/L	1	02/24/2025 11:25	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:08	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:08	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:08	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:08	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:19	234945
Arsenic	NELAP	0.0010		**0.0961**	mg/L	5	02/20/2025 11:19	234945
Lithium	*	0.0030		**0.0047**	mg/L	5	02/24/2025 8:08	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:19	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:19	234945
LCS recovered outside upper control limits for Sb. Sample results are below the reporting limit. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:09	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-002 **Client Sample ID:** AP-1

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 12:38

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**504.29**	ft	1	02/18/2025 12:38	R360883
Depth to water	*	-5.00		**8.52**	ft	1	02/18/2025 12:38	R360883
Depth to water from measuring point	*	0		**10.79**	ft	1	02/18/2025 12:38	R360883
Elevation of groundwater surface	*	0		**524.58**	ft	1	02/18/2025 12:38	R360883
Measuring Point Elevation	*	0		**535.37**	ft	1	02/18/2025 12:38	R360883
Measuring Point Height Above Land Surface	*	0		**2.27**	ft	1	02/18/2025 12:38	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**17**	NTU	1	02/18/2025 12:38	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.8**	°F	1	02/18/2025 12:38	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.55**		1	02/18/2025 12:38	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1670**	µmhos/cm @25C	1	02/18/2025 12:38	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	33		**1600**	mg/L	1.67	02/19/2025 10:56	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 9:49	R360503
Chloride	NELAP	5.00		**49.3**	mg/L	10	02/19/2025 9:49	R360503
Sulfate	NELAP	10.0		**834**	mg/L	10	02/19/2025 9:49	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.307**	mg/L	1	02/20/2025 17:09	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:09	234945
Boron	NELAP	0.200		**21.7**	mg/L	10	02/25/2025 11:16	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:09	234945
Calcium	NELAP	0.100		**245**	mg/L	1	02/24/2025 11:32	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:09	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:09	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:09	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:09	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:25	234945
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:25	234945
Lithium	*	0.0030		**0.0105**	mg/L	5	02/24/2025 8:14	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:25	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:25	234945
LCS recovered outside upper control limitsfor Sb. Sample results are below the reporting limit. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:12	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-003 **Client Sample ID:** AP-2

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 13:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.77**	ft	1	02/18/2025 13:15	R360883
Depth to water	*	-5.00		**5.37**	ft	1	02/18/2025 13:15	R360883
Depth to water from measuring point	*	0		**7.87**	ft	1	02/18/2025 13:15	R360883
Elevation of groundwater surface	*	0		**528.23**	ft	1	02/18/2025 13:15	R360883
Measuring Point Elevation	*	0		**536.10**	ft	1	02/18/2025 13:15	R360883
Measuring Point Height Above Land Surface	*	0		**2.50**	ft	1	02/18/2025 13:15	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**25**	NTU	1	02/18/2025 13:15	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**52.3**	°F	1	02/18/2025 13:15	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.44**		1	02/18/2025 13:15	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1250**	µmhos/cm @25C	1	02/18/2025 13:15	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**1070**	mg/L	1	02/19/2025 10:57	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 10:01	R360503
Chloride	NELAP	5.00		**35.8**	mg/L	10	02/19/2025 10:01	R360503
Sulfate	NELAP	10.0		**397**	mg/L	10	02/19/2025 10:01	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0710**	mg/L	1	02/20/2025 17:10	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:10	234945
Boron	NELAP	0.0200		**3.53**	mg/L	1	02/20/2025 17:10	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:10	234945
Calcium	NELAP	0.100		**198**	mg/L	1	02/24/2025 11:33	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:10	234945
Cobalt	NELAP	0.0050		**0.0140**	mg/L	1	02/24/2025 11:33	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:10	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:10	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:31	234945
Arsenic	NELAP	0.0010		**0.0022**	mg/L	5	02/20/2025 11:31	234945
Lithium	*	0.0030		**0.0060**	mg/L	5	02/24/2025 8:19	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:31	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:31	234945
LCS recovered outside upper control limitsfor Sb. Sample results are below the reporting limit. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:14	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-004
Client Sample ID: AP-3
Matrix: GROUNDWATER
Collection Date: 02/19/2025 11:54

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.45**	ft	1	02/19/2025 11:54	R360883
Depth to water	*	-5.00		**7.20**	ft	1	02/19/2025 11:54	R360883
Depth to water from measuring point	*	0		**9.75**	ft	1	02/19/2025 11:54	R360883
Elevation of groundwater surface	*	0		**525.50**	ft	1	02/19/2025 11:54	R360883
Measuring Point Elevation	*	0		**535.25**	ft	1	02/19/2025 11:54	R360883
Measuring Point Height Above Land Surface	*	0		**2.55**	ft	1	02/19/2025 11:54	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**61**	NTU	1	02/19/2025 11:54	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**52.1**	°F	1	02/19/2025 11:54	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.54**		1	02/19/2025 11:54	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1270**	µmhos/cm @25C	1	02/19/2025 11:54	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	25		**1150**	mg/L	1.25	02/20/2025 11:38	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 10:28	R360529
Chloride	NELAP	5.00		**61.5**	mg/L	10	02/20/2025 10:28	R360529
Sulfate	NELAP	10.0		**569**	mg/L	10	02/20/2025 10:28	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.120**	mg/L	1	02/20/2025 16:39	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:39	235016
Boron	NELAP	0.0200		**12.1**	mg/L	1	02/20/2025 16:39	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:39	235016
Calcium	NELAP	0.100		**168**	mg/L	1	02/24/2025 10:50	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:39	235016
Cobalt	NELAP	0.0050		**0.0057**	mg/L	1	02/20/2025 16:39	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:39	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:39	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 14:51	235016
Arsenic	NELAP	0.0010		**0.0137**	mg/L	5	02/20/2025 14:51	235016
Lithium	*	0.0030		**0.0052**	mg/L	5	02/20/2025 14:51	235016
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 14:51	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 14:51	235016
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 10:35	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 02/18/2025 10:38

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.19**	ft	1	02/18/2025 10:38	R360883
Depth to water	*	-5.00		**7.54**	ft	1	02/18/2025 10:38	R360883
Depth to water from measuring point	*	0		**10.68**	ft	1	02/18/2025 10:38	R360883
Elevation of groundwater surface	*	0		**544.92**	ft	1	02/18/2025 10:38	R360883
Measuring Point Elevation	*	0		**555.60**	ft	1	02/18/2025 10:38	R360883
Measuring Point Height Above Land Surface	*	0		**3.14**	ft	1	02/18/2025 10:38	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**18**	NTU	1	02/18/2025 10:38	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.8**	°F	1	02/18/2025 10:38	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.78**		1	02/18/2025 10:38	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**786**	µmhos/cm @25C	1	02/18/2025 10:38	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	33		**508**	mg/L	1.67	02/19/2025 10:57	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 10:13	R360503
Chloride	NELAP	5.00		**12.4**	mg/L	10	02/19/2025 10:13	R360503
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/19/2025 10:13	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.378**	mg/L	1	02/20/2025 17:10	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:10	234945
Boron	NELAP	0.0200		**0.0913**	mg/L	1	02/20/2025 17:10	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:10	234945
Calcium	NELAP	0.100		**113**	mg/L	1	02/24/2025 11:34	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:10	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:10	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:10	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:10	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**0.0014**	mg/L	5	02/21/2025 12:06	234945
Arsenic	NELAP	0.0010		**0.0210**	mg/L	5	02/20/2025 11:36	234945
Lithium	*	0.0030		**0.0087**	mg/L	5	02/24/2025 8:25	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:36	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:36	234945
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:16	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-006 **Client Sample ID:** AP-5

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 10:10

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	02/18/2025 10:10	R360883
Depth to water	*	-5.00		**12.68**	ft	1	02/18/2025 10:10	R360883
Depth to water from measuring point	*	0		**14.98**	ft	1	02/18/2025 10:10	R360883
Elevation of groundwater surface	*	0		**568.92**	ft	1	02/18/2025 10:10	R360883
Measuring Point Elevation	*	0		**583.90**	ft	1	02/18/2025 10:10	R360883
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	02/18/2025 10:10	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**2.7**	NTU	1	02/18/2025 10:10	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**53.4**	°F	1	02/18/2025 10:10	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.83**		1	02/18/2025 10:10	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**662**	µmhos/cm @25C	1	02/18/2025 10:10	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**474**	mg/L	1	02/19/2025 10:57	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/19/2025 11:23	R360503
Chloride	NELAP	5.00		**8.40**	mg/L	10	02/19/2025 11:23	R360503
Sulfate	NELAP	10.0		**59.7**	mg/L	10	02/19/2025 11:23	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0532**	mg/L	1	02/20/2025 17:11	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:11	234945
Boron	NELAP	0.0200		**0.0435**	mg/L	1	02/20/2025 17:11	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:11	234945
Calcium	NELAP	0.100		**97.3**	mg/L	1	02/24/2025 11:35	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:11	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:11	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:11	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:11	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:42	234945
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 11:42	234945
Lithium	*	0.0030		**0.0043**	mg/L	5	02/24/2025 9:56	234945
Selenium	NELAP	0.0010		**0.0011**	mg/L	5	02/20/2025 11:42	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 11:42	234945
LCS recovered outside upper control limitsfor Sb. Sample results are below the reporting limit. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:18	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-007 **Client Sample ID:** AP-6

Matrix: GROUNDWATER **Collection Date:** 02/18/2025 11:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.20**	ft	1	02/18/2025 11:32	R360883
Depth to water	*	-5.00		**6.14**	ft	1	02/18/2025 11:32	R360883
Depth to water from measuring point	*	0		**8.56**	ft	1	02/18/2025 11:32	R360883
Elevation of groundwater surface	*	0		**529.26**	ft	1	02/18/2025 11:32	R360883
Measuring Point Elevation	*	0		**537.82**	ft	1	02/18/2025 11:32	R360883
Measuring Point Height Above Land Surface	*	0		**2.42**	ft	1	02/18/2025 11:32	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**7.8**	NTU	1	02/18/2025 11:32	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**52.0**	°F	1	02/18/2025 11:32	R360883
SW-846 9040B								
pH, Field	*	1.00		**7.21**		1	02/18/2025 11:32	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**617**	µmhos/cm @25C	1	02/18/2025 11:32	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**398**	mg/L	1	02/19/2025 10:59	R360584
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.54**	mg/L	10	02/19/2025 11:34	R360503
Chloride	NELAP	5.00		**33.0**	mg/L	10	02/19/2025 11:34	R360503
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/19/2025 11:34	R360503
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.137**	mg/L	1	02/20/2025 17:12	234945
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 17:12	234945
Boron	NELAP	0.0200		**0.228**	mg/L	1	02/20/2025 17:12	234945
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 17:12	234945
Calcium	NELAP	0.100		**64.4**	mg/L	1	02/24/2025 11:35	234945
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:12	234945
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 17:12	234945
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 17:12	234945
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 17:12	234945
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 12:28	234945
Arsenic	NELAP	0.0010		**0.0120**	mg/L	5	02/20/2025 12:28	234945
Lithium	*	0.0030		**0.0063**	mg/L	5	02/24/2025 10:01	234945
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 12:28	234945
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 12:28	234945
LCS recovered outside upper control limitsfor Sb. Sample results are below the reporting limit. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/19/2025 11:25	234976
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-008
Client Sample ID: AP-7
Matrix: GROUNDWATER
Collection Date: 02/20/2025 11:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.50**	ft	1	02/20/2025 11:42	R360883
Depth to water	*	-5.00		**9.26**	ft	1	02/20/2025 11:42	R360883
Depth to water from measuring point	*	0		**11.92**	ft	1	02/20/2025 11:42	R360883
Elevation of groundwater surface	*	0		**527.10**	ft	1	02/20/2025 11:42	R360883
Measuring Point Elevation	*	0		**539.02**	ft	1	02/20/2025 11:42	R360883
Measuring Point Height Above Land Surface	*	0		**2.66**	ft	1	02/20/2025 11:42	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**50**	NTU	1	02/20/2025 11:42	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**53.5**	°F	1	02/20/2025 11:42	R360883
SW-846 9040B								
pH, Field	*	1.00		**7.38**		1	02/20/2025 11:42	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**795**	µmhos/cm @25C	1	02/20/2025 11:42	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**430**	mg/L	1	02/21/2025 14:52	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 11:39	R360629
Chloride	NELAP	5.00		**51.7**	mg/L	10	02/21/2025 11:39	R360629
Sulfate	NELAP	10.0		**11.6**	mg/L	10	02/21/2025 11:39	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.105**	mg/L	1	02/24/2025 13:34	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 13:34	235068
Boron	NELAP	0.0200		**0.244**	mg/L	1	02/24/2025 13:34	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 13:34	235068
Calcium	NELAP	0.100		**57.6**	mg/L	1	02/24/2025 13:34	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 13:34	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 13:34	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 13:34	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 13:34	235068
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:30	235068
Arsenic	NELAP	0.0010		**0.0248**	mg/L	5	02/25/2025 8:04	235068
Lithium	*	0.0030		**0.0056**	mg/L	5	02/25/2025 8:04	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:30	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 11:30	235068
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:12	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-009
Client Sample ID: AP-8
Matrix: GROUNDWATER
Collection Date: 02/19/2025 12:26

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**497.60**	ft	1	02/19/2025 12:26	R360883
Depth to water	*	-5.00		**2.61**	ft	1	02/19/2025 12:26	R360883
Depth to water from measuring point	*	0		**5.51**	ft	1	02/19/2025 12:26	R360883
Elevation of groundwater surface	*	0		**531.69**	ft	1	02/19/2025 12:26	R360883
Measuring Point Elevation	*	0		**537.20**	ft	1	02/19/2025 12:26	R360883
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	02/19/2025 12:26	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.2**	NTU	1	02/19/2025 12:26	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**49.2**	°F	1	02/19/2025 12:26	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.89**		1	02/19/2025 12:26	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**850**	µmhos/cm @25C	1	02/19/2025 12:26	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	25		**548**	mg/L	1.25	02/20/2025 11:39	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 10:39	R360529
Chloride	NELAP	5.00		**22.5**	mg/L	10	02/20/2025 10:39	R360529
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/20/2025 10:39	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.355**	mg/L	1	02/20/2025 16:40	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:40	235016
Boron	NELAP	0.0200		**0.0784**	mg/L	1	02/24/2025 10:52	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:40	235016
Calcium	NELAP	0.100		**91.3**	mg/L	1	02/24/2025 10:52	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:40	235016
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:40	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:40	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:40	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 14:57	235016
Arsenic	NELAP	0.0010		**0.0487**	mg/L	5	02/20/2025 14:57	235016
Lithium	*	0.0030		**0.0080**	mg/L	5	02/20/2025 14:57	235016
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 14:57	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 14:57	235016
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 10:52	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-010
Client Sample ID: AP-9
Matrix: GROUNDWATER
Collection Date: 02/20/2025 12:16

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.70**	ft	1	02/20/2025 12:16	R360883
Depth to water	*	-5.00		**10.19**	ft	1	02/20/2025 12:16	R360883
Depth to water from measuring point	*	0		**13.29**	ft	1	02/20/2025 12:16	R360883
Elevation of groundwater surface	*	0		**527.01**	ft	1	02/20/2025 12:16	R360883
Measuring Point Elevation	*	0		**540.30**	ft	1	02/20/2025 12:16	R360883
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	02/20/2025 12:16	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**54**	NTU	1	02/20/2025 12:16	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**52.2**	°F	1	02/20/2025 12:16	R360883
SW-846 9040B								
pH, Field	*	1.00		**7.02**		1	02/20/2025 12:16	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1080**	µmhos/cm @25C	1	02/20/2025 12:16	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	200		**880**	mg/L	10	02/21/2025 14:53	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 11:51	R360629
Chloride	NELAP	5.00		**23.5**	mg/L	10	02/21/2025 11:51	R360629
Sulfate	NELAP	10.0		**16.1**	mg/L	10	02/21/2025 11:51	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.431**	mg/L	1	02/24/2025 14:38	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 14:38	235068
Boron	NELAP	0.0200		**0.0874**	mg/L	1	02/24/2025 14:38	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 14:38	235068
Calcium	NELAP	0.100		**98.4**	mg/L	1	02/24/2025 14:38	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:38	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:38	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 14:38	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 14:38	235068
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:36	235068
Arsenic	NELAP	0.0010		**0.0023**	mg/L	5	02/25/2025 8:10	235068
Lithium	*	0.0030		**0.0064**	mg/L	5	02/25/2025 8:10	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:36	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 11:36	235068
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:14	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-011 **Client Sample ID:** AP-10

Matrix: GROUNDWATER **Collection Date:** 02/19/2025 12:53

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**499.43**	ft	1	02/19/2025 12:53	R360883
Depth to water	*	-5.00		**0.94**	ft	1	02/19/2025 12:53	R360883
Depth to water from measuring point	*	0		**4.04**	ft	1	02/19/2025 12:53	R360883
Elevation of groundwater surface	*	0		**533.46**	ft	1	02/19/2025 12:53	R360883
Measuring Point Elevation	*	0		**537.50**	ft	1	02/19/2025 12:53	R360883
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	02/19/2025 12:53	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**6.5**	NTU	1	02/19/2025 12:53	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**49.5**	°F	1	02/19/2025 12:53	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.67**		1	02/19/2025 12:53	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1090**	µmhos/cm @25C	1	02/19/2025 12:53	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	25		**788**	mg/L	1.25	02/20/2025 11:39	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 10:51	R360529
Chloride	NELAP	5.00		**24.4**	mg/L	10	02/20/2025 10:51	R360529
Sulfate	NELAP	10.0		**84.4**	mg/L	10	02/20/2025 10:51	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.565**	mg/L	1	02/20/2025 16:40	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:40	235016
Boron	NELAP	0.0200		**3.36**	mg/L	1	02/20/2025 16:40	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:40	235016
Calcium	NELAP	0.100		**127**	mg/L	1	02/24/2025 10:52	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:40	235016
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:40	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:40	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:40	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:03	235016
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:03	235016
Lithium	*	0.0030		**0.0082**	mg/L	5	02/20/2025 15:03	235016
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:03	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 15:03	235016
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 10:54	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-012
Client Sample ID: AP-11
Matrix: GROUNDWATER
Collection Date: 02/20/2025 11:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.15**	ft	1	02/20/2025 11:56	R360883
Depth to water	*	-5.00		**12.44**	ft	1	02/20/2025 11:56	R360883
Depth to water from measuring point	*	0		**15.24**	ft	1	02/20/2025 11:56	R360883
Elevation of groundwater surface	*	0		**522.86**	ft	1	02/20/2025 11:56	R360883
Measuring Point Elevation	*	0		**538.10**	ft	1	02/20/2025 11:56	R360883
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	02/20/2025 11:56	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**14**	NTU	1	02/20/2025 11:56	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**48.9**	°F	1	02/20/2025 11:56	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.40**		1	02/20/2025 11:56	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**706**	µmhos/cm @25C	1	02/20/2025 11:56	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**740**	mg/L	1	02/21/2025 14:54	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 12:37	R360629
Chloride	NELAP	5.00		**95.1**	mg/L	10	02/21/2025 12:37	R360629
Sulfate	NELAP	10.0		**65.5**	mg/L	10	02/21/2025 12:37	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.134**	mg/L	1	02/24/2025 14:39	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 14:39	235068
Boron	NELAP	0.0200		**0.221**	mg/L	1	02/24/2025 14:39	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 14:39	235068
Calcium	NELAP	0.100		**135**	mg/L	1	02/24/2025 14:39	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:39	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:39	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 14:39	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 14:39	235068
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:41	235068
Arsenic	NELAP	0.0010		**0.0015**	mg/L	5	02/25/2025 8:15	235068
Lithium	*	0.0030		**0.0040**	mg/L	5	02/25/2025 8:15	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:41	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 11:41	235068
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:21	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power
Work Order: 25020749
Client Project: Ash Pond Monitoring Wells
Report Date: 31-Mar-25
Lab ID: 25020749-013
Client Sample ID: AP-12
Matrix: GROUNDWATER
Collection Date: 02/20/2025 13:06

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**510.30**	ft	1	02/20/2025 13:06	R360883
Depth to water	*	-5.00		**15.18**	ft	1	02/20/2025 13:06	R360883
Depth to water from measuring point	*	0		**18.08**	ft	1	02/20/2025 13:06	R360883
Elevation of groundwater surface	*	0		**522.62**	ft	1	02/20/2025 13:06	R360883
Measuring Point Elevation	*	0		**540.70**	ft	1	02/20/2025 13:06	R360883
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	02/20/2025 13:06	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.6**	NTU	1	02/20/2025 13:06	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**51.3**	°F	1	02/20/2025 13:06	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.55**		1	02/20/2025 13:06	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1020**	µmhos/cm @25C	1	02/20/2025 13:06	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**1250**	mg/L	1	02/21/2025 14:54	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 12:49	R360629
Chloride	NELAP	5.00		**114**	mg/L	10	02/21/2025 12:49	R360629
Sulfate	NELAP	10.0		**433**	mg/L	10	02/21/2025 12:49	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0450**	mg/L	1	02/24/2025 14:41	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 14:41	235068
Boron	NELAP	0.0200		**0.0217**	mg/L	1	02/24/2025 14:41	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 14:41	235068
Calcium	NELAP	0.100		**197**	mg/L	1	02/24/2025 14:41	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:41	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:41	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 14:41	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 14:41	235068
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:47	235068
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2025 8:21	235068
Lithium	*	0.0030		**0.0057**	mg/L	5	02/25/2025 8:21	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 11:47	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 11:47	235068
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:28	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-014 **Client Sample ID:** AP-13

Matrix: GROUNDWATER **Collection Date:** 02/20/2025 13:41

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**511.00**	ft	1	02/20/2025 13:41	R360883
Depth to water	*	-5.00		**15.04**	ft	1	02/20/2025 13:41	R360883
Depth to water from measuring point	*	0		**18.44**	ft	1	02/20/2025 13:41	R360883
Elevation of groundwater surface	*	0		**523.56**	ft	1	02/20/2025 13:41	R360883
Measuring Point Elevation	*	0		**542.00**	ft	1	02/20/2025 13:41	R360883
Measuring Point Height Above Land Surface	*	0		**3.40**	ft	1	02/20/2025 13:41	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**6.7**	NTU	1	02/20/2025 13:41	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**50.7**	°F	1	02/20/2025 13:41	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.69**		1	02/20/2025 13:41	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**527**	µmhos/cm @25C	1	02/20/2025 13:41	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	200		**620**	mg/L	10	02/21/2025 14:55	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 13:01	R360629
Chloride	NELAP	5.00		**26.8**	mg/L	10	02/21/2025 13:01	R360629
Sulfate	NELAP	10.0		**94.5**	mg/L	10	02/21/2025 13:01	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.118**	mg/L	1	02/24/2025 14:42	235068
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 14:42	235068
Boron	NELAP	0.0200		**0.0369**	mg/L	1	02/24/2025 14:42	235068
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 14:42	235068
Calcium	NELAP	0.100	S	**101**	mg/L	1	02/24/2025 14:42	235068
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:42	235068
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 14:42	235068
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 14:42	235068
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 14:42	235068
Matrix spike control limits are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 13:26	235068
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2025 8:32	235068
Lithium	*	0.0030		**0.0088**	mg/L	5	02/25/2025 8:32	235068
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 13:26	235068
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 13:26	235068
CCV recovered outside the upper control limits for Se. Sample results are below the reporting limit. Data is reportable per the TNI standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:30	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/26/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-016 **Client Sample ID:** T-1

Matrix: GROUNDWATER **Collection Date:** 02/20/2025 14:13

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**512.70**	ft	1	02/20/2025 14:13	R360883
Depth to water	*	-5.00		**13.51**	ft	1	02/20/2025 14:13	R360883
Depth to water from measuring point	*	0		**13.84**	ft	1	02/20/2025 14:13	R360883
Elevation of groundwater surface	*	0		**521.81**	ft	1	02/20/2025 14:13	R360883
Measuring Point Elevation	*	0		**535.65**	ft	1	02/20/2025 14:13	R360883
Measuring Point Height Above Land Surface	*	0		**0.33**	ft	1	02/20/2025 14:13	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**12**	NTU	1	02/20/2025 14:13	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**50.6**	°F	1	02/20/2025 14:13	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.59**		1	02/20/2025 14:13	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**955**	µmhos/cm @25C	1	02/20/2025 14:13	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**1010**	mg/L	1	02/21/2025 14:56	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 13:36	R360629
Chloride	NELAP	5.00		**220**	mg/L	10	02/21/2025 13:36	R360629
Sulfate	NELAP	10.0		**163**	mg/L	10	02/21/2025 13:36	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0691**	mg/L	1	02/24/2025 10:02	235106
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 10:02	235106
Boron	NELAP	0.0200		**0.170**	mg/L	1	02/24/2025 10:02	235106
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 10:02	235106
Calcium	NELAP	0.100		**157**	mg/L	1	02/24/2025 10:02	235106
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 10:02	235106
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/25/2025 11:20	235106
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 10:02	235106
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 10:02	235106
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 13:09	235106
Arsenic	NELAP	0.0010		**0.0023**	mg/L	5	02/24/2025 13:09	235106
Lithium	*	0.0030		**0.0142**	mg/L	5	02/25/2025 8:27	235106
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2025 8:27	235106
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 13:09	235106
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:32	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-017 **Client Sample ID:** T-2

Matrix: GROUNDWATER **Collection Date:** 02/20/2025 12:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.18**	ft	1	02/20/2025 12:30	R360883
Depth to water	*	-5.00		**23.25**	ft	1	02/20/2025 12:30	R360883
Depth to water from measuring point	*	0		**25.65**	ft	1	02/20/2025 12:30	R360883
Elevation of groundwater surface	*	0		**523.97**	ft	1	02/20/2025 12:30	R360883
Measuring Point Elevation	*	0		**549.62**	ft	1	02/20/2025 12:30	R360883
Measuring Point Height Above Land Surface	*	0		**2.40**	ft	1	02/20/2025 12:30	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**11**	NTU	1	02/20/2025 12:30	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**50.0**	°F	1	02/20/2025 12:30	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.53**		1	02/20/2025 12:30	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1290**	µmhos/cm @25C	1	02/20/2025 12:30	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**1270**	mg/L	1	02/21/2025 14:57	R360717
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/21/2025 13:47	R360629
Chloride	NELAP	5.00		**500**	mg/L	10	02/21/2025 13:47	R360629
Sulfate	NELAP	10.0		**135**	mg/L	10	02/21/2025 13:47	R360629
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.217**	mg/L	1	02/24/2025 10:02	235106
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/24/2025 10:02	235106
Boron	NELAP	0.0200		**0.0466**	mg/L	1	02/24/2025 10:02	235106
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/24/2025 10:02	235106
Calcium	NELAP	0.100		**210**	mg/L	1	02/24/2025 10:02	235106
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 10:02	235106
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/24/2025 10:02	235106
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/24/2025 10:02	235106
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/24/2025 10:02	235106
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/24/2025 13:14	235106
Arsenic	NELAP	0.0010		**0.0073**	mg/L	5	02/24/2025 13:14	235106
Lithium	*	0.0030		**0.0314**	mg/L	5	02/25/2025 9:53	235106
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/25/2025 9:53	235106
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/24/2025 13:14	235106
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/21/2025 14:35	235075
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-018 **Client Sample ID:** T-4

Matrix: GROUNDWATER **Collection Date:** 02/19/2025 14:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**521.52**	ft	1	02/19/2025 14:00	R360883
Depth to water	*	-5.00		**16.03**	ft	1	02/19/2025 14:00	R360883
Depth to water from measuring point	*	0		**18.41**	ft	1	02/19/2025 14:00	R360883
Elevation of groundwater surface	*	0		**530.53**	ft	1	02/19/2025 14:00	R360883
Measuring Point Elevation	*	0		**548.94**	ft	1	02/19/2025 14:00	R360883
Measuring Point Height Above Land Surface	*	0		**2.38**	ft	1	02/19/2025 14:00	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**56**	NTU	1	02/19/2025 14:00	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**49.4**	°F	1	02/19/2025 14:00	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.64**		1	02/19/2025 14:00	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**520**	µmhos/cm @25C	1	02/19/2025 14:00	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**472**	mg/L	1	02/20/2025 11:40	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 11:02	R360529
Chloride	NELAP	5.00		**ND**	mg/L	10	02/20/2025 11:02	R360529
Sulfate	NELAP	10.0		**121**	mg/L	10	02/20/2025 11:02	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0500**	mg/L	1	02/20/2025 16:41	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:41	235016
Boron	NELAP	0.0200		**0.0454**	mg/L	1	02/24/2025 10:54	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:41	235016
Calcium	NELAP	0.100		**89.2**	mg/L	1	02/24/2025 10:54	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:41	235016
Cobalt	NELAP	0.0050		**0.0052**	mg/L	1	02/20/2025 16:41	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:41	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:41	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:09	235016
Arsenic	NELAP	0.0010		**0.0049**	mg/L	5	02/20/2025 15:09	235016
Lithium	*	0.0030		**0.0147**	mg/L	5	02/20/2025 15:09	235016
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:09	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 15:09	235016
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 10:56	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-019 **Client Sample ID:** T-5

Matrix: GROUNDWATER **Collection Date:** 02/19/2025 12:29

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**518.32**	ft	1	02/19/2025 12:29	R360883
Depth to water	*	-5.00		**5.48**	ft	1	02/19/2025 12:29	R360883
Depth to water from measuring point	*	0		**7.99**	ft	1	02/19/2025 12:29	R360883
Elevation of groundwater surface	*	0		**532.67**	ft	1	02/19/2025 12:29	R360883
Measuring Point Elevation	*	0		**540.66**	ft	1	02/19/2025 12:29	R360883
Measuring Point Height Above Land Surface	*	0		**2.51**	ft	1	02/19/2025 12:29	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.7**	NTU	1	02/19/2025 12:29	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**43.1**	°F	1	02/19/2025 12:29	R360883
SW-846 9040B								
pH, Field	*	1.00		**6.72**		1	02/19/2025 12:29	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**448**	µmhos/cm @25C	1	02/19/2025 12:29	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**374**	mg/L	1	02/20/2025 11:40	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 11:37	R360529
Chloride	NELAP	5.00		**ND**	mg/L	10	02/20/2025 11:37	R360529
Sulfate	NELAP	10.0		**40.7**	mg/L	10	02/20/2025 11:37	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0535**	mg/L	1	02/20/2025 16:42	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:42	235016
Boron	NELAP	0.0200		**0.0608**	mg/L	1	02/20/2025 16:42	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:42	235016
Calcium	NELAP	0.100		**70.1**	mg/L	1	02/24/2025 11:08	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:42	235016
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:42	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:42	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:42	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 15:16	235016
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	02/21/2025 16:26	235016
Lithium	*	0.0030		**0.0101**	mg/L	5	02/20/2025 15:16	235016
Selenium	NELAP	0.0010		**0.0012**	mg/L	5	02/21/2025 16:26	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 15:16	235016
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 10:59	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Client: City Water, Light & Power **Work Order:** 25020749

Client Project: Ash Pond Monitoring Wells **Report Date:** 31-Mar-25

Lab ID: 25020749-020 **Client Sample ID:** T-6

Matrix: GROUNDWATER **Collection Date:** 02/19/2025 13:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**494.70**	ft	1	02/19/2025 13:00	R360883
Depth to water	*	-5.00		**7.44**	ft	1	02/19/2025 13:00	R360883
Depth to water from measuring point	*	0		**9.80**	ft	1	02/19/2025 13:00	R360883
Elevation of groundwater surface	*	0		**528.52**	ft	1	02/19/2025 13:00	R360883
Measuring Point Elevation	*	0		**538.32**	ft	1	02/19/2025 13:00	R360883
Measuring Point Height Above Land Surface	*	0		**2.36**	ft	1	02/19/2025 13:00	R360883
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**29**	NTU	1	02/19/2025 13:00	R360883
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**45.9**	°F	1	02/19/2025 13:00	R360883
SW-846 9040B								
pH, Field	*	1.00		**7.30**		1	02/19/2025 13:00	R360883
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**661**	µmhos/cm @25C	1	02/19/2025 13:00	R360883
STANDARD METHODS 2540 C (TOTAL) 1997, 2011								
Total Dissolved Solids	NELAP	20		**530**	mg/L	1	02/20/2025 11:41	R360650
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	02/20/2025 11:49	R360529
Chloride	NELAP	5.00		**18.9**	mg/L	10	02/20/2025 11:49	R360529
Sulfate	NELAP	10.0		**ND**	mg/L	10	02/20/2025 11:49	R360529
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.166**	mg/L	1	02/20/2025 16:43	235016
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	02/20/2025 16:43	235016
Boron	NELAP	0.0200		**0.187**	mg/L	1	02/20/2025 16:43	235016
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	02/20/2025 16:43	235016
Calcium	NELAP	0.100		**82.2**	mg/L	1	02/24/2025 11:08	235016
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:43	235016
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	02/20/2025 16:43	235016
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	02/20/2025 16:43	235016
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	02/20/2025 16:43	235016
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 16:06	235016
Arsenic	NELAP	0.0010		**0.0037**	mg/L	5	02/20/2025 16:06	235016
Lithium	*	0.0030		**0.0098**	mg/L	5	02/20/2025 16:06	235016
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	02/20/2025 16:06	235016
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	02/20/2025 16:06	235016
CCV recovered outside the upper control limits. Sample results are below the reporting limit. Data is reportable per the TNI standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	02/20/2025 11:01	235028
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556
Radium-228	*	0		**See Attached**	pci/L	1	03/25/2025 0:00	R362556

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25020749
Report Date: 31-Mar-25

Carrier: Justin Colp

Received By: AMD

Completed by: Amber Dilallo
On: 18-Feb-25

Reviewed by: Ellie Hopkins
On: 21-Feb-25

Pages to follow: Chain of custody 6 Extra pages included 61

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 9.9
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

Samples were received on 2/18/25 at 1500 on ice [9.9, 11.5C - LTG#5]. pH strip #101358. - NR/amberdilallo - 2/18/2025 3:21:57 PM

Samples were received on 2/19/25 at 1550 on ice [6.9C - LTG#9]. pH strip #101358. - CF/amberdilallo - 2/19/2025 4:10:24 PM

Samples were received on 2/20/25 at 15:55 on ice [temp5.5C, 6.7 - LTG#9]. pH# 101358. Added nitric acid (102194) to AP-7 and AP-9. - EK/lhenson - 2/20/2025 4:21:47 PM

Sample AP-14 COC was received on 12/21/25 at 1222. No sample due to location being frozen. - lhenson - 2/21/2025 12:55:27 PM

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE #1 9.8 °C #2 11.5 °C AS
Preserved in: [ ] LAB [X] FIELD
FOR LAB USE ONLY
LAB NOTES: 10837 2/18

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Colp

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED												
				UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity								
25020749-001	RW-3	2-18-25 / 1200	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
002	AP-1	2-18-25 / 1238	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
003	AP-2	2-18-25 / 1315	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
004	AP-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓								
005	AP-4	2-18-25 / 1038	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
006	AP-5	2-18-25 / 1010	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
007	AP-6	2-18-25 / 1132	Groundwater	1	2								✓	✓	✓	✓	✓	✓								
008	AP-7		Groundwater	1	2								✓	✓	✓	✓	✓	✓								
009	AP-8		Groundwater	1	2								✓	✓	✓	✓	✓	✓								
010	AP-9		Groundwater	1	2								✓	✓	✓	✓	✓	✓								
011	AP-10		Groundwater	1	2								✓	✓	✓	✓	✓	✓								

Relinquished By	Date/Time	Received By	Date/Time
J. Colp	2-18-25 1500	[illegible]	2/18/25 1500

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 6.9 °C #9
Preserved in: [ ] LAB [X] FIELD
FOR LAB USE ONLY
LAB NOTES: PH✓101358
CF 2/19/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Glp

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020749-001	RW-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓
002	AP-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓
003	AP-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
004	AP-3	2-19-25 / 1154	Groundwater	1	2								✓	✓	✓	✓	✓	✓
005	AP-4		Groundwater	1	2								✓	✓	✓	✓	✓	✓
006	AP-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓
007	AP-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓
008	AP-7		Groundwater	1	2								✓	✓	✓	✓	✓	✓
009	AP-8	2-19-25 / 1226	Groundwater	1	2								✓	✓	✓	✓	✓	✓
010	AP-9		Groundwater	1	2								✓	✓	✓	✓	✓	✓
011	AP-10	2-19-25 / 1253	Groundwater	1	2								✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
	2-19 / 1550	Carli Fenton	2/19/25 15:50

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Culp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020749-012	AP-11		Groundwater	1	2								✔	✔	✔	✔	✔	✔
013	AP-12		Groundwater	1	2								✔	✔	✔	✔	✔	✔
014	AP-13		Groundwater	1	2								✔	✔	✔	✔	✔	✔
015	AP-14		Groundwater	1	2								✔	✔	✔	✔	✔	✔
016	T-1		Groundwater	1	2								✔	✔	✔	✔	✔	✔
017	T-2		Groundwater	1	2								✔	✔	✔	✔	✔	✔
018	T-4	2-14-25 / 1400	Groundwater	1	2								✔	✔	✔	✔	✔	✔
019	T-5	2-14-25 / 1229	Groundwater	1	2								✔	✔	✔	✔	✔	✔
020	T-6	2-14-25 / 1300	Groundwater	1	2								✔	✔	✔	✔	✔	✔
			Groundwater															
			Groundwater															

Relinquished By	Date/Time	Received By	Date/Time
[signature]	2-19 / 1550	[signature]	2/19/25 15:00

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

5.5

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 6.7 °C (9)
Preserved in: ☒ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO3 (102194) to AP-7 2 liter and PH/101358 AP-9 2 liter. Ex 2/20/2025

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Cdp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020749-001	RW-3		Groundwater	1	2								✔	✔	✔	✔	✔	✔
002	AP-1		Groundwater	1	2								✔	✔	✔	✔	✔	✔
003	AP-2		Groundwater	1	2								✔	✔	✔	✔	✔	✔
004	AP-3		Groundwater	1	2								✔	✔	✔	✔	✔	✔
005	AP-4		Groundwater	1	2								✔	✔	✔	✔	✔	✔
006	AP-5		Groundwater	1	2								✔	✔	✔	✔	✔	✔
007	AP-6		Groundwater	1	2								✔	✔	✔	✔	✔	✔
008	AP-7	7-20-25 / 1142	Groundwater	1	2								✔	✔	✔	✔	✔	✔
009	AP-8		Groundwater	1	2								✔	✔	✔	✔	✔	✔
010	AP-9	7-20-25 / 1216	Groundwater	1	2								✔	✔	✔	✔	✔	✔
011	AP-10		Groundwater	1	2								✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
	2-20 / 1555		2/20/25 1555

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Culp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020749-012	AP-11	2/20/25 1156	Groundwater	1	2								✔	✔	✔	✔	✔	✔
013	AP-12	2/20/25 1306	Groundwater	1	2								✔	✔	✔	✔	✔	✔
014	AP-13	2/20/25 1341	Groundwater	1	2								✔	✔	✔	✔	✔	✔
015	AP-14		Groundwater	1	2								✔	✔	✔	✔	✔	✔
016	T-1	2/20/25 1413	Groundwater	1	2								✔	✔	✔	✔	✔	✔
017	T-2	2/20/25 1230	Groundwater	1	2								✔	✔	✔	✔	✔	✔
018	T-4		Groundwater	1	2								✔	✔	✔	✔	✔	✔
019	T-5		Groundwater	1	2								✔	✔	✔	✔	✔	✔
020	T-6		Groundwater	1	2								✔	✔	✔	✔	✔	✔
			Groundwater															
			Groundwater															

Relinquished By	Date/Time	Received By	Date/Time
[signature]	2-20 / 1555	[signature]	2/20/25 1555

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25020749

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE NA °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Culp

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25020749-012	AP-11		Groundwater	1	2								✔	✔	✔	✔	✔	✔
013	AP-12		Groundwater	1	2								✔	✔	✔	✔	✔	✔
014	AP-13		Groundwater	1	2								✔	✔	✔	✔	✔	✔
015	AP-14 NO Sample	2-21-25 / Frozen	Groundwater	1	2								✔	✔	✔	✔	✔	✔
016	T-1 Frozen @ 2.24)		Groundwater	1	2								✔	✔	✔	✔	✔	✔
017	T-2		Groundwater	1	2								✔	✔	✔	✔	✔	✔
018	T-4		Groundwater	1	2								✔	✔	✔	✔	✔	✔
019	T-5		Groundwater	1	2								✔	✔	✔	✔	✔	✔
020	T-6		Groundwater	1	2								✔	✔	✔	✔	✔	✔
			Groundwater															
			Groundwater															

Relinquished By	Date/Time	Received By	Date/Time
Jeremy Caswell	2/21/25 1222	Emily Kassakoski	2/21/25 1222

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Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	RW-3
Project Location:	Springfield, IL	**Sample ID:**	001
W.O. Number (s):	25020749	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 8 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	No

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 11:44

Static Water Level: 9.56 feet below TOC

Total Depth: 44.01 feet below TOC

Water Column: 34.45 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.45 ft. x 0.022 = 0.76 L x 3 Vol. = 2.28 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: lt brown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:45	0.0	333	purge start time						
11:48	1.0	↓	7.08	616.30	11.66	1.23	-125.20	41.78	
11:51	2.0		7.08	629.50	11.89	0.70	-143.50	48.63	
11:54	3.0		7.09	631.70	11.94	0.58	-151.00	29.58	
11:57	4.0		7.10	629.70	11.94	0.54	-154.20	25.24	
12:00	5.0		7.10	622.80	11.96	0.54	-154.20	20.73	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 12:00

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.10 pH 622.80 Spec. Cond. 11.96 Temp

Field Filtered: No Filter Type:

Water Level: 15.15 feet below TOC Drawdown: 5.59 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: AP-1
Sample ID: 002
Date (s): 2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 10 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 12:18
Static Water Level: 10.79 feet below TOC
Total Depth: 31.08 feet below TOC
Water Column: 20.29 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025
Purge Method: Bladder Pump Well Diameter: 2"
Purge Volume Calculation (L): 20.29 ft. x 0.022 = 0.45 L x 3 Vol. = 1.35 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.50 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:18	0.0	325	purge start time						
12:23	1.6	↓	6.54	1,482.30	12.09	1.18	-66.20	25.12	
12:26	2.6		6.53	1,548.60	12.40	0.76	-78.00	22.97	
12:29	3.6		6.53	1,599.00	12.40	0.59	-84.80	28.22	
12:32	4.6		6.54	1,644.70	12.49	0.54	-88.60	24.22	
12:35	5.5		6.55	1,666.90	12.48	0.52	-91.20	21.71	
12:38	6.5		6.55	1,674.70	12.64	0.49	-93.10	16.80	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 12:38
Sample Method: Low Flow Sample Equipment: Bladder Pump
Sample Parameters: 6.55 pH 1,674.70 Spec. Cond. 12.64 Temp
Field Filtered: No Filter Type:
Water Level: 11.14 feet below TOC Drawdown: 0.35 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-2
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25020749	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 12:49

Static Water Level: 7.87 feet below TOC

Total Depth: 21.33 feet below TOC

Water Column: 13.46 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 13.46 ft. x 0.022 = 0.3 L x 3 Vol. = 0.9 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 8.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: lt brown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:50	0.0	320	purge start time						
12:57	2.2	↓	6.45	1,232.60	10.86	0.94	6.10	135.27	
13:00	3.2		6.45	1,236.30	10.82	0.78	9.00	86.86	
13:03	4.2		6.44	1,238.60	11.21	0.69	10.50	62.32	
13:06	5.1		6.44	1,238.00	11.62	0.63	11.50	43.73	
13:09	6.1		6.44	1,245.20	11.08	0.60	12.40	32.16	
13:12	7.0		6.44	1,248.50	11.15	0.57	13.10	29.84	
13:15	8.0		6.44	1,254.10	11.29	0.56	13.50	25.46	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 13:15

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.44 pH 1,254.10 Spec. Cond. 11.29 Temp

Field Filtered: No Filter Type:

Water Level: 7.94 feet below TOC Drawdown: 0.07 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: AP-3
Sample ID: 004
Date (s): 2/19/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: Payton Yoch — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 14 °F — Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 11:09
Static Water Level: 9.75 feet below TOC
Total Depth: 20.80 feet below TOC
Water Column: 11.05 feet

Purging Activities

Purged By: JC — Purge Date: 2/19/2025
Purge Method: Bladder Pump — Well Diameter: 2"
Purge Volume Calculation (L): 11.05 ft. x 0.022 = 0.24 L x 3 Vol. = 0.72 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 14.00 L
Physical appearance of purge water: Cloudy — Odor: None — Color: lt brown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:09	0.0	311	purge start time						
11:15	1.9	↓	6.48	1,265.80	11.69	1.24	-23.70	267.20	
11:18	2.8		6.49	1,263.40	11.69	1.17	-33.90	240.68	
11:21	3.7		6.51	1,262.30	11.63	1.16	-43.20	217.87	
11:24	4.7		6.52	1,261.30	11.49	1.11	-48.00	203.38	
11:27	5.6		6.53	1,261.40	11.53	1.02	-51.50	187.54	
11:30	6.5		6.53	1,261.50	11.52	0.96	-52.80	180.34	
11:33	7.5		6.54	1,261.10	11.38	0.92	-54.00	159.27	
11:36	8.4		6.54	1,263.20	11.22	0.88	-53.90	133.35	
11:39	9.3		6.54	1,261.50	11.22	0.85	-55.10	117.37	
11:42	10.3		6.54	1,263.30	11.12	0.81	-56.20	101.61	
11:45	11.2		6.54	1,264.30	11.35	0.78	-56.40	84.49	
11:48	12.1		6.54	1,264.70	11.42	0.75	-56.40	73.00	
11:51	13.1		6.54	1,265.30	11.25	0.73	-56.80	62.82	
11:54	14.0		6.54	1,266.60	11.18	0.70	-57.00	60.69	

Sampled By: JC — Sample Date/Time: 2/19/2025 11:54
Sample Method: Low Flow — Sample Equipment: Bladder Pump
Sample Parameters: 6.54 pH — 1,266.60 Spec. Cond. — 11.18 Temp
Field Filtered: No — Filter Type:
Water Level: 9.96 feet below TOC — Drawdown: 0.21 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp — **Date:** 2/19/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-4
Project Location:	Springfield, IL	**Sample ID:**	005
W.O. Number (s):	25020749	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 7 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	No

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 10:21

Static Water Level: 10.68 feet below TOC

Total Depth: 60.41 feet below TOC

Water Column: 49.73 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 49.73 ft. x 0.022 = 1.09 L x 3 Vol. = 3.27 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:22	0.0	250	purge start time						
10:26	1.0	↓	6.74	776.20	12.00	2.48	-105.00	12.85	
10:29	1.8		6.76	782.80	12.64	1.51	-118.20	16.19	
10:32	2.5		6.77	785.10	12.68	1.20	-123.00	18.55	
10:35	3.3		6.77	787.50	12.80	1.11	-124.60	18.39	
10:38	4.0		6.78	786.10	12.66	1.05	-124.80	18.11	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 10:38

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.78 pH 786.10 Spec. Cond. 12.66 Temp

Field Filtered: No Filter Type:

Water Level: 12.75 feet below TOC Drawdown: 2.07 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-5
Project Location:	Springfield, IL	**Sample ID:**	006
W.O. Number (s):	25020749	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 5 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 9:48

Static Water Level: 14.98 feet below TOC

Total Depth: 31.27 feet below TOC

Water Column: 16.29 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 16.29 ft. x 0.022 = 0.36 L x 3 Vol. = 1.08 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:49	0.0	286	purge start time						
9:55	1.7	↓	6.91	658.60	11.72	4.61	64.20	19.89	
9:58	2.6		6.87	656.90	11.63	3.84	71.90	12.78	
10:01	3.4		6.84	658.50	11.78	3.02	76.70	7.32	
10:04	4.3		6.83	660.70	11.77	2.58	80.10	4.36	
10:07	5.1		6.83	661.30	11.79	2.38	82.50	3.23	
10:10	6.0		6.83	662.20	11.89	2.21	84.40	2.68	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 10:10

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.83 pH 662.20 Spec. Cond. 11.89 Temp

Field Filtered: No Filter Type:

Water Level: 18.70 feet below TOC Drawdown: 3.72 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-6
Project Location:	Springfield, IL	**Sample ID:**	007
W.O. Number (s):	25020749	**Date (s):**	2/18/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 8 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	No			

Groundwater Level Measurements

Date/Time Measured: 2/18/2025 10:56

Static Water Level: 8.56 feet below TOC

Total Depth: 39.62 feet below TOC

Water Column: 31.06 feet

Purging Activities

Purged By: JC Purge Date: 2/18/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 31.06 ft. x 0.022 = 0.68 L x 3 Vol. = 2.04 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.50 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:56	0.0	208	purge start time						
11:02	1.3	↓	7.20	614.50	9.77	3.90	-73.00	36.81	
11:05	1.9		7.22	615.40	10.12	4.55	-70.70	31.77	
11:08	2.5		7.25	613.60	10.57	4.83	-68.90	25.13	
11:11	3.1		7.25	613.60	10.67	5.01	-67.80	19.54	
11:14	3.8		7.24	613.70	10.75	4.95	-68.90	18.49	
11:17	4.4		7.26	615.30	10.92	5.14	-67.70	14.87	
11:20	5.0		7.26	614.70	10.79	5.17	-68.30	11.14	
11:23	5.6		7.24	615.30	10.85	5.06	-69.90	10.77	
11:26	6.3		7.21	617.30	10.88	4.72	-72.10	9.47	
11:29	6.9		7.21	617.20	10.92	4.60	-73.00	7.96	
11:32	7.5		7.21	617.10	11.11	4.60	-73.40	7.85	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/18/2025 11:32

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.21 pH 617.10 Spec. Cond. 11.11 Temp

Field Filtered: No Filter Type:

Water Level: 16.97 feet below TOC Drawdown: 8.41 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/18/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-7
Project Location:	Springfield, IL	**Sample ID:**	008
W.O. Number (s):	25020749	**Date (s):**	2/20/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 9 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 11:15

Static Water Level: 11.92 feet below TOC

Total Depth: 42.52 feet below TOC

Water Column: 30.60 feet

Purging Activities

Purged By: BG Purge Date: 2/20/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.6 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:15	0.0	222	purge start time						
11:30	3.3	↓	7.26	872.00	9.78	2.36	-136.10	111.37	
11:33	4.0		7.27	871.80	9.54	2.24	-132.20	42.04	
11:36	4.7		7.29	866.10	8.93	2.21	-127.20	33.54	
11:39	5.3		7.28	856.30	11.88	2.19	-122.30	54.03	
11:42	6.0		7.38	794.90	11.96	2.95	-94.10	49.55	

Sampling Activities

Sampled By: BG Sample Date/Time: 2/20/2025 11:42

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.38 pH 794.90 Spec. Cond. 11.96 Temp

Field Filtered: No Filter Type:

Water Level: 12.31 feet below TOC Drawdown: 0.39 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Brett Gillihan **Date:** 2/20/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-8
Project Location:	Springfield, IL	**Sample ID:**	009
W.O. Number (s):	25020749	**Date (s):**	2/19/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 14 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 12:06

Static Water Level: 5.51 feet below TOC

Total Depth: 39.60 feet below TOC

Water Column: 34.09 feet

Purging Activities

Purged By: JC Purge Date: 2/19/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.09 ft. x 0.022 = 0.75 L x 3 Vol. = 2.25 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.50 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:08	0.0	250	purge start time						
12:14	1.5	↓	6.93	838.20	9.24	1.92	-76.40	18.65	
12:17	2.3		6.90	847.00	9.34	1.32	-92.70	12.70	
12:20	3.0		6.90	847.90	9.43	1.11	-101.10	12.19	
12:23	3.8		6.89	848.00	9.30	1.01	-106.00	10.08	
12:26	4.5		6.89	850.10	9.55	0.94	-109.30	8.25	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/19/2025 12:26

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.89 pH 850.10 Spec. Cond. 9.55 Temp

Field Filtered: No Filter Type:

Water Level: 5.77 feet below TOC Drawdown: 0.26 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/19/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-9
Project Location:	Springfield, IL	**Sample ID:**	010
W.O. Number (s):	25020749	**Date (s):**	2/20/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 11:57

Static Water Level: 13.29 feet below TOC

Total Depth: 39.60 feet below TOC

Water Column: 26.31 feet

Purging Activities

Purged By: BG Purge Date: 2/20/2025

Purge Method: Submersible Pump Well Diameter: 2"

Purge Volume Calculation (L): 26.31 ft. x 0.022 = 0.58 L x 3 Vol. = 1.74 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Cloudy Odor: None Color: lt brown

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:57	0.0	263	purge start time						
12:04	1.8	↓	6.98	1,096.40	10.34	3.25	-90.70	168.56	
12:07	2.6		6.98	1,098.40	12.29	2.69	-90.80	120.20	
12:10	3.4		7.01	1,091.40	12.02	2.39	-89.30	91.39	
12:13	4.2		7.02	1,092.20	11.18	2.21	-89.00	71.61	
12:16	5.0		7.02	1,081.10	11.21	2.08	-89.50	53.93	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 12:16

Sample Method: Low Flow Sample Equipment: Submersible Pump

Sample Parameters: 7.02 pH 1,081.10 Spec. Cond. 11.21 Temp

Field Filtered: No Filter Type:

Water Level: 13.91 feet below TOC Drawdown: 0.62 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Brett Gillihan **Date:** 2/20/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-10
Project Location:	Springfield, IL	**Sample ID:**	011
W.O. Number (s):	25020749	**Date (s):**	2/19/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 14 °F Wind Direction: ☐ N ☑ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 12:36

Static Water Level: 4.04 feet below TOC

Total Depth: 38.07 feet below TOC

Water Column: 34.03 feet

Purging Activities

Purged By: JC Purge Date: 2/19/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.03 ft. x 0.022 = 0.75 L x 3 Vol. = 2.25 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:37	0.0	250	purge start time						
12:41	1.0	↓	6.68	1,079.40	9.00	2.66	-72.40	68.13	
12:44	1.8		6.66	1,083.70	9.47	1.66	-79.70	21.50	
12:47	2.5		6.66	1,088.80	9.83	1.43	-83.50	11.10	
12:50	3.3		6.67	1,088.00	9.66	1.32	-85.50	7.80	
12:53	4.0		6.67	1,088.50	9.73	1.26	-86.70	6.46	

Sampling Activities

Sampled By: JC Sample Date/Time: 2/19/2025 12:53

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.67 pH 1,088.50 Spec. Cond. 9.73 Temp

Field Filtered: No Filter Type:

Water Level: 4.29 feet below TOC Drawdown: 0.25 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 50115

Form Completed By: Justin Colp **Date:** 2/19/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: AP-11
Sample ID: 012
Date (s): 2/20/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.
Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 7 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☑ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 11:26
Static Water Level: 15.24 feet below TOC
Total Depth: 22.95 feet below TOC
Water Column: 7.71 feet

Purging Activities

Purged By: TC Purge Date: 2/20/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 7.71 ft. x 0.022 = 0.17 L x 3 Vol. = 0.51 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.00 L
Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:38	0.0	167	purge start time						
11:41	0.5	↓	6.45	724.10	9.45	3.35	78.00	29.66	
11:44	1.0		6.42	707.90	8.95	2.93	75.80	28.00	
11:47	1.5		6.41	709.10	8.94	2.60	70.70	21.52	
11:50	2.0		6.40	707.90	9.17	2.26	54.60	19.19	
11:53	2.5		6.40	707.90	9.51	1.98	32.40	18.77	
11:56	3.0		6.40	706.50	9.41	1.74	16.20	13.71	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 11:56
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.40 pH 706.50 Spec. Cond. 9.41 Temp
Field Filtered: No Filter Type:
Water Level: 15.93 feet below TOC Drawdown: 0.69 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/20/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-12
Project Location:	Springfield, IL	**Sample ID:**	013
W.O. Number (s):	25020749	**Date (s):**	2/20/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☑ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 12:44

Static Water Level: 18.08 feet below TOC

Total Depth: 30.40 feet below TOC

Water Column: 12.32 feet

Purging Activities

Purged By: TC Purge Date: 2/20/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 12.32 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:45	0.0	190	purge start time						
12:57	2.3	↓	6.57	1,024.90	10.79	1.91	-52.60	15.33	
13:00	2.9		6.56	1,024.50	10.74	1.70	-53.80	12.53	
13:03	3.4		6.55	1,022.70	10.66	1.60	-54.60	10.49	
13:06	4.0		6.55	1,022.00	10.72	1.53	-55.20	8.58	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 13:06

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.55 pH 1,022.00 Spec. Cond. 10.72 Temp

Field Filtered: No Filter Type:

Water Level: 19.31 feet below TOC Drawdown: 1.23 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/20/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-13
Project Location:	Springfield, IL	**Sample ID:**	014
W.O. Number (s):	25020749	**Date (s):**	2/20/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☑ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 13:14

Static Water Level: 18.44 feet below TOC

Total Depth: 31.00 feet below TOC

Water Column: 12.56 feet

Purging Activities

Purged By: TC Purge Date: 2/20/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 12.56 ft. x 0.022 = 0.28 L x 3 Vol. = 0.84 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:15	0.0	192	purge start time						
13:29	2.7	↓	6.70	519.20	10.47	2.60	-90.70	38.40	
13:32	3.3		6.70	521.30	10.48	2.46	-91.60	19.92	
13:35	3.8		6.69	521.70	10.58	2.33	-93.50	11.64	
13:38	4.4		6.69	525.80	10.62	2.24	-93.80	23.94	
13:41	5.0		6.69	527.20	10.40	2.20	-94.70	6.69	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 13:41

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.69 pH 527.20 Spec. Cond. 10.40 Temp

Field Filtered: No Filter Type:

Water Level: 19.71 feet below TOC Drawdown: 1.27 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/20/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: AP-14
Sample ID: 015
Date (s):

Field Team Members

Name: _____ Affiliation: _____
Name: _____ Affiliation: _____

Weather Conditions

Temp: _____ °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☐ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad _____
Casing _____
Protective Casing _____
Reference Mark/Identification _____

Locks	Yes	No
Protective Casing		
Well		

Groundwater Level Measurements

Date/Time Measured: _____
Static Water Level: _____ feet below TOC
Total Depth: _____ feet below TOC
Water Column: _____ feet

Purging Activities

Purged By: _____ Purge Date: _____
Purge Method: _____ Well Diameter: _____
Purge Volume Calculation (L): _____
Actual Purge Volume (L): _____
Physical appearance of purge water: _____ Odor: _____ Color: _____

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other

Sampling Activities

Sampled By: _____ Sample Date/Time: _____
Sample Method: _____ Sample Equipment: _____
Sample Parameters: _____ pH _____ Spec. Cond. _____ Temp
Field Filtered: _____ Filter Type: _____
Water Level: _____ feet below TOC Drawdown: _____ feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Well/tubing frozen in place. Unable to sample

Form Completed By: _____ **Date:** _____

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-1
Project Location:	Springfield, IL	**Sample ID:**	016
W.O. Number (s):	25020749	**Date (s):**	2/20/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F Wind Direction: ☐ N ☐ S ☐ E ☐ EW ☐ SW ☑ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 13:50

Static Water Level: 13.84 feet below TOC

Total Depth: 22.95 feet below TOC

Water Column: 9.11 feet

Purging Activities

Purged By: TC Purge Date: 2/20/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 9.11 ft. x 0.022 = 0.2 L x 3 Vol. = 0.6 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:50	0.0	261	purge start time						
14:01	2.9	↓	6.58	932.50	10.07	3.87	-29.90	19.38	
14:04	3.7		6.58	942.60	10.06	3.84	-26.10	16.97	
14:07	4.4		6.59	948.40	10.12	3.86	-22.90	18.85	
14:10	5.2		6.59	951.80	10.16	3.76	-19.60	13.32	
14:13	6.0		6.59	954.80	10.33	3.89	-16.60	11.88	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 14:13

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.59 pH 954.80 Spec. Cond. 10.33 Temp

Field Filtered: No Filter Type:

Water Level: 14.61 feet below TOC Drawdown: 0.77 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/20/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: T-2
Sample ID: 017
Date (s): 2/20/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.
Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 11 °F Wind Direction: ☑ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/20/2025 12:10
Static Water Level: 25.65 feet below TOC
Total Depth: 34.44 feet below TOC
Water Column: 8.79 feet

Purging Activities

Purged By: TC Purge Date: 2/20/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 8.79 ft. x 0.022 = 0.19 L x 3 Vol. = 0.57 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:10	0.0	250	purge start time						
12:15	1.3	↓	6.53	1,306.30	9.67	1.31	-71.60	14.98	
12:18	2.0		6.52	1,299.60	9.79	1.05	-76.50	15.15	
12:21	2.8		6.52	1,297.10	9.93	0.93	-78.10	43.90	
12:24	3.5		6.52	1,297.50	9.95	0.87	-79.70	28.51	
12:27	4.3		6.53	1,297.50	9.86	0.84	-82.50	8.44	
12:30	5.0		6.53	1,294.10	9.98	0.82	-85.80	10.51	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/20/2025 12:30
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.53 pH 1,294.10 Spec. Cond. 9.98 Temp
Field Filtered: No Filter Type:
Water Level: 27.50 feet below TOC Drawdown: 1.85 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/20/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-4
Project Location:	Springfield, IL	**Sample ID:**	018
W.O. Number (s):	25020749	**Date (s):**	2/19/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☑ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 13:25

Static Water Level: 18.41 feet below TOC

Total Depth: 27.42 feet below TOC

Water Column: 9.01 feet

Purging Activities

Purged By: TC Purge Date: 2/19/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 9.01 ft. x 0.022 = 0.2 L x 3 Vol. = 0.6 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Cloudy Odor: None Color: Grey

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:25	0.0	143	purge start time						
13:48	3.3	↓	6.71	522.80	9.70	1.42	36.90	100.42	
13:51	3.7		6.68	520.60	9.64	1.33	38.80	62.94	
13:54	4.1		6.66	520.40	9.95	1.25	40.30	76.61	
13:57	4.6		6.65	522.30	9.55	1.21	41.80	47.50	
14:00	5.0		6.64	519.80	9.65	1.15	42.60	55.80	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/19/2025 14:00

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.64 pH 519.80 Spec. Cond. 9.65 Temp

Field Filtered: No Filter Type:

Water Level: 19.57 feet below TOC Drawdown: 1.16 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/19/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-5
Project Location:	Springfield, IL	**Sample ID:**	019
W.O. Number (s):	25020749	**Date (s):**	2/19/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☑ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 11:50

Static Water Level: 7.99 feet below TOC

Total Depth: 22.34 feet below TOC

Water Column: 14.35 feet

Purging Activities

Purged By: TC Purge Date: 2/19/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 14.35 ft. x 0.022 = 0.32 L x 3 Vol. = 0.96 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:56	0.0	152	purge start time						
12:17	3.2	↓	6.72	445.60	5.51	4.71	84.60	7.01	
12:20	3.6		6.72	445.40	5.59	4.67	86.90	5.23	
12:23	4.1		6.72	445.80	6.04	4.65	89.10	4.46	
12:26	4.5		6.72	446.60	6.15	4.66	91.10	4.27	
12:29	5.0		6.72	447.50	6.19	4.67	92.90	3.67	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/19/2025 12:29

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.72 pH 447.50 Spec. Cond. 6.19 Temp

Field Filtered: No Filter Type:

Water Level: 9.83 feet below TOC Drawdown: 1.84 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/19/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25020749
Monitoring Point: T-6
Sample ID: 020
Date (s): 2/19/2025

Field Team Members

Name: Tracy Carroll Affiliation: TekLab, Inc.
Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 15 °F Wind Direction: ☑ N ☐ S ☐ E ☐ EW ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 2/19/2025 12:40
Static Water Level: 9.80 feet below TOC
Total Depth: 43.62 feet below TOC
Water Column: 33.82 feet

Purging Activities

Purged By: TC Purge Date: 2/19/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 33.82 ft. x 0.022 = 0.74 L x 3 Vol. = 2.22 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.50 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:40	0.0	225	purge start time						
12:51	2.5	↓	7.29	661.20	7.51	6.82	111.90	68.41	
12:54	3.2		7.30	660.80	7.44	6.90	110.80	47.35	
12:57	3.8		7.30	661.10	7.66	7.00	109.60	36.79	
13:00	4.5		7.30	661.00	7.72	6.98	108.60	28.73	

Sampling Activities

Sampled By: DC Sample Date/Time: 2/19/2025 13:00
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 7.30 pH 661.00 Spec. Cond. 7.72 Temp
Field Filtered: No Filter Type:
Water Level: 10.50 feet below TOC Drawdown: 0.70 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210756

Form Completed By: Date: 2/19/2025

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25020749
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/18/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/18/25 9:30
7.0 Buffer	wc240913b	7.00	2/18/25 9:26
10.0 Buffer	wc240625b	10.00	2/18/25 9:34
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/18/25 9:42

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.5	2/18/25 9:42
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-JC	LCS	2/18/25 9:44	17.5	7.02	1,410	0.51		
CCV-1-JC	CCV	2/18/25 13:20	18.5	7.06	1,423	0.57		

Comments:

Field Meter ID: Pine 50115 Technician(s): justn colp Date: 2/19/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/19/25 10:31
7.0 Buffer	wc240913b	7.00	2/19/25 10:28
10.0 Buffer	wc240625b	10.00	2/19/25 10:36
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/19/25 10:47

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.49	2/19/25 10:53
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-JC	LCS	2/19/25 10:55	9.1	7.01	1,411	0.47		
CCV-2-JC	CCV	2/19/25 14:29	11.1	7.03	1,417	0.56		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25020749
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/20/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/20/25 8:56
7.0 Buffer	wc240913b	7.00	2/20/25 8:51
10.0 Buffer	wc240625b	10.00	2/20/25 9:00
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/20/25 9:06

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.5	2/20/25 9:06
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-JC	LCS	2/20/25 9:08	9.3	6.99	1,415	0.5		
CCV-3-JC	CCV	2/20/25 13:42	10.4	7.02	1,426	0.54		

Comments:

Field Meter ID: Pine 50115 Technician(s): justin colp Date: 2/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc230619c	4.00	2/21/25 8:41
7.0 Buffer	wc240913b	7.00	2/21/25 8:37
10.0 Buffer	wc240625b	10.00	2/21/25 8:45
LCS/CCV (7.0 Buffer)	wc240913c		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/21/25 8:53

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.6	2/21/25 8:53
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-4-JC	LCS	2/21/25 8:55	9.4	7.02	1,413	0.62		
CCV-4-JC	CCV	2/21/25 10:30	9.7	7.02	1,418	0.61		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25020749
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/19/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.01	2/19/25 11:14
7.0 Buffer	WC240913B	7.00	2/19/25 11:11
10.0 Buffer	WC240625B	10.00	2/19/25 11:19
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/19/25 11:05

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-TC	LCS	2/19/25 11:21	0.3	7.06	1,413			
CCV-1-TC	CCV	2/19/25 14:27	13.7	7.08	1,321			

Comments:

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/20/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.00	2/20/25 9:55
7.0 Buffer	WC240913B	7.00	2/20/25 9:49
10.0 Buffer	WC240625B	10.00	2/20/25 10:12
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/20/25 10:13

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-TC	LCS	2/20/25 10:25	0.6	7.09	1,417			
CCV-2-TC	CCV	2/20/25 14:35	0.8	7.09	1,423			

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25020749
Technician(s): DC, JC, TC, BG, PY

Field Calibration Log(s)
CWLP- 1Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210756 Technician(s): Tracy Carroll Date: 2/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC230619C	4.01	2/21/25 9:29
7.0 Buffer	WC240913B	7.00	2/21/25 9:21
10.0 Buffer	WC240625B	10.00	2/21/25 9:33
LCS/CCV (7.0 Buffer)	WC240913C		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	102040	1412	2/21/25 9:41

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1		
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-TC	LCS	2/21/25 9:44	0.2	7.05	1,415			
CCV-3-TC	CCV	2/21/25 10:46	0.2	7.06	1,404			

Comments:

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

March 28, 2025

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 25020749

Order No.: 25021959

Dear Shelly Hennessy:

Alliance Technical Group - Akron received 19 sample(s) on 2/27/2025 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **25021959**
Date: **3/28/2025**

CLIENT: TEKLAB Inc,
Project: 25020749

This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Alliance Technical Group Work Order Number assigned to this report.

Alliance Technical Group holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Alliance Technical Group and that of the customer. It cannot be reproduced in any form without the consent of Alliance Technical Group or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Alliance Technical Group is not responsible for use or interpretation of the data included herein.

All results for solid samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Alliance Technical Group - Akro
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-448
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **25021959**
Date: **3/28/2025**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Workorder Sample Summary

WO#: **25021959**

28-Mar-25

CLIENT: TEKLAB Inc,
Project: 25020749

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
25021959-001	25020749-001B		2/18/2025 12:00:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-002	25020749-002B		2/18/2025 12:38:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-003	25020749-003B		2/18/2025 1:15:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-004	25020749-004B		2/19/2025 11:54:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-005	25020749-005B		2/18/2025 10:38:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-006	25020749-006B		2/18/2025 10:10:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-007	25020749-007B		2/18/2025 11:32:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-008	25020749-008B		2/20/2025 11:42:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-009	25020749-009B		2/19/2025 12:26:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-010	25020749-010B		2/20/2025 12:16:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-011	25020749-011B		2/19/2025 12:53:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-012	25020749-012B		2/20/2025 11:56:00 AM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-013	25020749-013B		2/20/2025 1:06:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-014	25020749-014B		2/20/2025 1:41:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-015	25020749-016B		2/20/2025 2:13:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-016	25020749-017B		2/20/2025 12:30:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-017	25020749-018B		2/19/2025 2:00:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-018	25020749-019B		2/19/2025 12:29:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water
25021959-019	25020749-020B		2/19/2025 1:00:00 PM	2/27/2025 11:30:00 AM	Non-Potable Water

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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DATES REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25021959-001A	25020749-001B	2/18/2025 12:00:00 PM	Non-Potable Water	Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-002A	25020749-002B	2/18/2025 12:38:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-003A	25020749-003B	2/18/2025 1:15:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-004A	25020749-004B	2/19/2025 11:54:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-005A	25020749-005B	2/18/2025 10:38:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-006A	25020749-006B	2/18/2025 10:10:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-007A	25020749-007B	2/18/2025 11:32:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-008A	25020749-008B	2/20/2025 11:42:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-009A	25020749-009B	2/19/2025 12:26:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-010A	25020749-010B	2/20/2025 12:16:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-011A	25020749-011B	2/19/2025 12:53:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-012A	25020749-012B	2/20/2025 11:56:00 AM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM

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Cuyahoga Falls, Ohio 44223
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DATES REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25021959-012A	25020749-012B	2/20/2025 11:56:00 AM	Non-Potable Water	Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-013A	25020749-013B	2/20/2025 1:06:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-014A	25020749-014B	2/20/2025 1:41:00 PM		Radium-226 (EPA 903.0)		3/4/2025 11:20:02 AM	3/27/2025 10:25:00 AM
				Radium-228 (EPA 904.0)		3/4/2025 11:20:02 AM	3/26/2025 3:34:00 PM
25021959-015A	25020749-016B	2/20/2025 2:13:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25021959-016A	25020749-017B	2/20/2025 12:30:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25021959-017A	25020749-018B	2/19/2025 2:00:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25021959-018A	25020749-019B	2/19/2025 12:29:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM
25021959-019A	25020749-020B	2/19/2025 1:00:00 PM		Radium-226 (EPA 903.0)		3/5/2025 10:47:15 AM	3/26/2025 9:39:00 AM
				Radium-228 (EPA 904.0)		3/5/2025 10:47:15 AM	3/25/2025 2:10:00 PM

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/18/2025 12:00:00 PM

Project: 25020749

Lab ID: 25021959-001

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-001B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.110	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.440	1	3/26/2025 3:34:00 PM
Yield	0.780					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/18/2025 12:38:00 PM
Project: 25020749
Lab ID: 25021959-002
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-002B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.20		pCi/L	± 0.220	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.20		pCi/L	± 0.380	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/18/2025 1:15:00 PM

Project: 25020749

Lab ID: 25021959-003

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-003B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.100	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.380	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/19/2025 11:54:00 AM
Project: 25020749
Lab ID: 25021959-004
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-004B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.110	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.490	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/18/2025 10:38:00 AM

Project: 25020749

Lab ID: 25021959-005

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-005B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.150	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.410	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/18/2025 10:10:00 AM
Project: 25020749
Lab ID: 25021959-006
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-006B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.110	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.410	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/18/2025 11:32:00 AM
Project: 25020749
Lab ID: 25021959-007
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-007B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.110	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.680	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 11:42:00 AM
Project: 25020749
Lab ID: 25021959-008
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-008B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.130	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.380	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
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Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 12:26:00 PM

Project: 25020749

Lab ID: 25021959-009

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-009B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.220	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.570	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 12:16:00 PM
Project: 25020749
Lab ID: 25021959-010
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-010B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.30		pCi/L	± 0.220	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.30		pCi/L	± 0.580	1	3/26/2025 3:34:00 PM
Yield	0.910					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 12:53:00 PM

Project: 25020749

Lab ID: 25021959-011

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-011B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.170	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.570	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 11:56:00 AM
Project: 25020749
Lab ID: 25021959-012
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-012B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.50		pCi/L	± 0.140	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.50		pCi/L	± 0.540	1	3/26/2025 3:34:00 PM
Yield	0.780					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 1:06:00 PM
Project: 25020749
Lab ID: 25021959-013
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-013B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.40		pCi/L	± 0.130	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.40		pCi/L	± 0.470	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 1:41:00 PM
Project: 25020749
Lab ID: 25021959-014
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-014B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.50		pCi/L	± 0.160	1	3/27/2025 10:25:00 AM
Yield	1.00					1	3/27/2025 10:25:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.50		pCi/L	± 0.580	1	3/26/2025 3:34:00 PM
Yield	1.00					1	3/26/2025 3:34:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 2:13:00 PM
Project: 25020749
Lab ID: 25021959-015
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-016B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.110	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.420	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,
Collection Date: 2/20/2025 12:30:00 PM
Project: 25020749
Lab ID: 25021959-016
Matrix: NON-POTABLE WATER
Client Sample ID: 25020749-017B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.180	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.430	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 2:00:00 PM

Project: 25020749

Lab ID: 25021959-017

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-018B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	1.04	1.00		pCi/L	± 0.250	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	1.56	1.00		pCi/L	± 0.500	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 12:29:00 PM

Project: 25020749

Lab ID: 25021959-018

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-019B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.120	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.490	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25021959**

Date Reported: **3/28/2025**

CLIENT: TEKLAB Inc,

Collection Date: 2/19/2025 1:00:00 PM

Project: 25020749

Lab ID: 25021959-019

Matrix: NON-POTABLE WATER

Client Sample ID: 25020749-020B

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.140	1	3/26/2025 9:39:00 AM
Yield	1.00					1	3/26/2025 9:39:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.380	1	3/25/2025 2:10:00 PM
Yield	1.00					1	3/25/2025 2:10:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82663**

Sample ID: **MB-82663** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-82663** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509487**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	6.47	1.00	5.000	0	129	50	130				QLR
Yield	0.580			0	0						

Sample ID: **LCSD-82663** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509488**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	4.45	1.00	5.000	0	89.0	50	130	6.470	37.0	20	R
Yield	1.00			0	0			0.5800	53.2		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

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QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82663**

Sample ID: **25021873-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25021875-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205809**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E904.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5509495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			1.260	200	20	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82663**

Sample ID: **MB-82663** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-82663** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509529**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	3.65	1.00	5.000	0	73.0	70	130				QLR

Sample ID: **LCSD-82663** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.97	1.00	5.000	0	99.4	70	130	3.650	30.6	20	R

Sample ID: **25021873-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82663**

Sample ID: **25021873-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **25021875-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/4/2025** RunNo: **205811**
Client ID: **BatchQC** Batch ID: **82663** TestNo: **E903.0** **E903-904** Analysis Date: **3/27/2025** SeqNo: **5509537**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82683**

Sample ID: **MB-82683** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205677**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E904.0** **E903-904** Analysis Date: **3/25/2025** SeqNo: **5506861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-82683** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205677**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E904.0** **E903-904** Analysis Date: **3/25/2025** SeqNo: **5506862**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.54	1.00	5.000	0	70.8	50	130				
Yield	0.900			0	0						

Sample ID: **LCSD-82683** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205677**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E904.0** **E903-904** Analysis Date: **3/25/2025** SeqNo: **5506863**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.35	1.00	5.000	0	67.0	50	130	3.540	5.52	20	
Yield	1.00			0	0			0.9000	10.5		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82683**

Sample ID: **25030002-001ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205677**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/25/2025**	SeqNo: **5506868**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25030004-001ADUP**	SampType: **DUP**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **3/5/2025**	RunNo: **205677**
Client ID: **BatchQC**	Batch ID: **82683**	TestNo: **E904.0**	**E903-904**	Analysis Date: **3/25/2025**	SeqNo: **5506870**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82683**

Sample ID: **MB-82683** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506940**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-82683** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506941**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.48	1.00	5.000	0	89.6	70	130				

Sample ID: **LCSD-82683** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506942**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.61	1.00	5.000	0	92.2	70	130	4.480	2.86	20	

Sample ID: **25030002-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25021959**

28-Mar-25

Client: TEKLAB Inc,
Project: 25020749 **BatchID:** **82683**

Sample ID: **25030002-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **25030004-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **3/5/2025** RunNo: **205680**
Client ID: **BatchQC** Batch ID: **82683** TestNo: **E903.0** **E903-904** Analysis Date: **3/26/2025** SeqNo: **5506949**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

 25021959

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Teklab QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for combined Radium 226/228 per your routine method/s.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested.

Project# 25020749

Contact: Shelly Hennessy Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT Billing/PO: 37997 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Ra226/228											
	25020749-001B	2/18/25 12:00	HNO3	Groundwater	✔	pH	1	CPM	30							
	25020749-002B	2/18/25 12:38	HNO3	Groundwater	✔		1		32							
	25020749-003B	2/18/25 13:15	HNO3	Groundwater	✔		1		36							
	25020749-004B	2/19/25 11:54	HNO3	Groundwater	✔		1		28							
	25020749-005B	2/18/25 10:38	HNO3	Groundwater	✔		1		40							
	25020749-006B	2/18/25 10:10	HNO3	Groundwater	✔		1		33							
	25020749-007B	2/18/25 11:32	HNO3	Groundwater	✔		1		31							
	25020749-008B	2/20/25 11:42	HNO3	Groundwater	✔		1		26							
	25020749-009B	2/19/25 12:26	HNO3	Groundwater	✔		1		23							
	25020749-010B	2/20/25 12:16	HNO3	Groundwater	✔		1		16							
	25020749-011B	2/19/25 12:53	HNO3	Groundwater	✔		1		28							

18.8-0.0=18.8, CS intact 02/25-Feder Box/codes

*Relinquished By	Date/Time	Received By	Date/Time
[signature]		[signature]	02/27/25 1130

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

SubCocRevA
3/2/2016

 25021959

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Teklab QC Level: 2

Project# 25020749

Comments: **Please Issue reports and invoices via email only**
Please analyze for combined Radium 226/228 per your routine method/s.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested.

Contact: Shelly Hennessy Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT Billing/PO: 37997 Phone: (618) 344-1004 ext. 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Ra226/228											
	25020749-012B	02/20/25 11:56	HNO3	Groundwater	✔	pH	1	CPM	26							
	25020749-013B	02/20/25 13:06	HNO3	Groundwater	✔		1		42							
	25020749-014B	02/20/25 13:41	HNO3	Groundwater	✔		1		30							
	25020749-016B	02/20/25 14:13	HNO3	Groundwater	✔		1		31							
	25020749-017B	02/20/25 12:30	HNO3	Groundwater	✔		1		33							
	25020749-018B	02/19/25 14:00	HNO3	Groundwater	✔		1		50							
	25020749-019B	02/19/25 12:29	HNO3	Groundwater	✔		1		26							
	25020749-020B	02/19/25 13:00	HNO3	Groundwater	✔		1		26							
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												

18.8-0.0=18.8, c's intact 02/25 - Fedex Box/Cooler

*Relinquished By	Date/Time	Received By	Date/Time
			02/27/25 1130

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

Alliance Technical Group - Akron
3310 Win Street
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 25021959 RcptNo: 1

Logged by:	Spencer M. Hartwell	2/27/2025 11:30:00 AM	Spencer M. Hartwell
Completed By:	Spencer M. Hartwell	2/28/2025 3:02:15 PM	Spencer M. Hartwell
Reviewed By:	Jennifer Woolf	2/28/2025 3:11:56 PM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☑ No ☐ Not Present ☐
   No. Seal Date: 2/19/2025 Signed By:
5. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

Alliance Technical Group - Akron
3310 Win Street
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 25021959 RcptNo: 1

April 22, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Ash Pond Monitoring Wells **WorkOrder:** 25030754

Dear Eric Staley:

TEKLAB, INC received 1 sample on 3/18/2025 3:05:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25030754
Report Date: 22-Apr-25

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	8
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25030754

Client Project: Ash Pond Monitoring Wells **Report Date:** 22-Apr-25

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Client: City Water, Light & Power
Work Order: 25030754

Client Project: Ash Pond Monitoring Wells
Report Date: 22-Apr-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25030754
Report Date: 22-Apr-25

Cooler Receipt Temp: 10.7 °C

An employee of Teklab, Inc. collected the sample(s).

Radium 226/228 analysis was performed by Alliance Technical Group. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power
Work Order: 25030754
Client Project: Ash Pond Monitoring Wells
Report Date: 22-Apr-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2026	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2025	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2025	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2025	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power
Work Order: 25030754
Client Project: Ash Pond Monitoring Wells
Report Date: 22-Apr-25
Lab ID: 25030754-001
Client Sample ID: AP-14
Matrix: GROUNDWATER
Collection Date: 03/18/2025 12:17

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	04/18/2025 0:00	R363684
Radium-228	*	0		**See Attached**	pci/L	1	04/18/2025 0:00	R363684

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25030754
Report Date: 22-Apr-25

Carrier: Daniel Crump

Received By: JMD

Completed by: Laura E Henson
On: 18-Mar-25

Reviewed by: Elizabeth A. Hurley
On: 18-Mar-25

Pages to follow: Chain of custody 1 Extra pages included 12

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	10.7	
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐	
Chain of custody present?	Yes ☑	No ☐				
Chain of custody signed when relinquished and received?	Yes ☑	No ☐				
Chain of custody agrees with sample labels?	Yes ☑	No ☐				
Samples in proper container/bottle?	Yes ☑	No ☐				
Sample containers intact?	Yes ☑	No ☐				
Sufficient sample volume for indicated test?	Yes ☑	No ☐				
All samples received within holding time?	Yes ☑	No ☐				
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑			
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐				

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

pH strip #101358. - JD/lhenson - 3/18/2025 4:07:28 PM

Additional nitric acid (102194) was needed upon arrival at the laboratory. - JD/lhenson - 3/18/2025 4:07:30 PM

Print PDF

CHAIN OF CUSTODY

Pg __ of __ Workorder # 25030754

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 10.7 °C
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES: PH 101358
Added HNO3 (102194) 1/2 JD 3/18/25

Client Comments:
Resample AP14, original WO#25022048.

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

PROJECT NAME/NUMBER: Ash Pond Monitoring Wells
SAMPLE COLLECTOR'S NAME: Beth Gillihan

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25030754.001	AP-14	3-18-25 1217	Groundwater		2											✓	✓	
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															
			Groundwater															

Relinquished By	Date/Time	Received By	Date/Time
[signature]	3-18-1505	[signature]	3/18/25 15:05

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

April 22, 2025

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 25030754

Order No.: 25031751

Dear Shelly Hennessy:

Alliance Technical Group - Akron received 1 sample(s) on 3/21/2025 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Salwa Najjar

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0108, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **25031751**
Date: **4/22/2025**

CLIENT: TEKLAB Inc,
Project: 25030754

WorkOrder Narrative:
25031751: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Alliance Technical Group Work Order Number assigned to this report.

Alliance Technical Group holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Alliance Technical Group and that of the customer. It cannot be reproduced in any form without the consent of Alliance Technical Group or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Alliance Technical Group is not responsible for use or interpretation of the data included herein.

All results for solid samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Alliance Technical Group - Akro
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-448
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **25031751**
Date: **4/22/2025**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Workorder Sample Summary

WO#: **25031751**

22-Apr-25

CLIENT: TEKLAB Inc,
Project: 25030754

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
25031751-001	25030754-001		3/18/2025 12:17:00 PM	3/21/2025 12:45:00 PM	Non-Potable Water

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25031751**

22-Apr-25

Client: TEKLAB Inc,

Project: 25030754

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25031751-001A	25030754-001	3/18/2025 12:17:00 PM	Non-Potable Water	Radium-226 (EPA 903.0)		4/14/2025 4:00:36 PM	4/21/2025 10:58:00 AM
				Radium-228 (EPA 904.0)		4/14/2025 4:00:36 PM	4/18/2025 2:20:00 PM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25031751**

Date Reported: **4/22/2025**

CLIENT: TEKLAB Inc,
Project: 25030754
Lab ID: 25031751-001
Client Sample ID: 25030754-001

Collection Date: 3/18/2025 12:17:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **HDJ**
Radium-226	ND	1.00		pCi/L	± 0.0600	1	4/21/2025 10:58:00 AM
Yield	1.00					1	4/21/2025 10:58:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **HDJ**
Radium-228	ND	1.00		pCi/L	± 0.400	1	4/18/2025 2:20:00 PM
Yield	0.980					1	4/18/2025 2:20:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25031751**

22-Apr-25

Client: TEKLAB Inc,
Project: 25030754 **BatchID:** **83646**

Sample ID: **MB-83646** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207342**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E904.0** **E903-904** Analysis Date: **4/18/2025** SeqNo: **5548239**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-83646** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207342**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E904.0** **E903-904** Analysis Date: **4/18/2025** SeqNo: **5548240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.42	1.00	5.000	0	68.4	50	130				
Yield	1.00			0	0						

Sample ID: **LCSD-83646** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207342**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E904.0** **E903-904** Analysis Date: **4/18/2025** SeqNo: **5548241**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	2.87	1.00	5.000	0	57.4	50	130	3.420	17.5	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25031751**

22-Apr-25

Client: TEKLAB Inc,
Project: 25030754 **BatchID:** **83646**

Sample ID: **25031742-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207342**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E904.0** **E903-904** Analysis Date: **4/18/2025** SeqNo: **5548246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	0.800			0	0			0.9800	20.2		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance TECHNICAL GROUP

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25031751**

22-Apr-25

Client: TEKLAB Inc,
Project: 25030754 **BatchID:** **83646**

Sample ID: **MB-83646** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549116**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-83646** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549117**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	3.91	1.00	5.000	0	78.2	70	130				QLR

Sample ID: **LCSD-83646** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549118**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.90	1.00	5.000	0	98.0	70	130	3.910	22.5	20	R

Sample ID: **25031742-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549123**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25031751**

22-Apr-25

Client: TEKLAB Inc,
Project: 25030754 **BatchID:** **83646**

Sample ID: **25031742-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549123**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Sample ID: **25031743-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **4/14/2025** RunNo: **207393**
Client ID: **BatchQC** Batch ID: **83646** TestNo: **E903.0** **E903-904** Analysis Date: **4/21/2025** SeqNo: **5549125**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Pg ___ of ___

TEKLAB, INC. Chain of Custody

25031751

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc 18.2-0.0=
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: 18.2 Sampler: teklab employee QC Level: 2

Fedex, cooler CS intact 3/19/25

Project# 25030754

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested.

Contact: Shelly Hennessy Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT Billing/PO: 38180 Phone: (618) 344-1004 ex 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Ra226/228		CPM				PM					
	25030754-001	3/18/25 12.17	HNO3	Groundwater	✔		24, 34				1, 1					
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Aqueous												
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												
			HNO3	Groundwater												

*Relinquished By	Date/Time	Received By	Date/Time
			3/21/25, 1245

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

APPENDIX C-2:

Second Quarter 2025
Laboratory Analytical Report and Field Notes

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: TEK-IL-62234-A Work Order Number: 25031751 RcptNo: 1

Logged by:	Tegan A. Richards	3/21/2025 12:45:00 PM	Tegan Richards
Completed By:	Tegan A. Richards	3/22/2025 4:31:16 PM	Tegan Richards
Reviewed By:	Jennifer Woolf	3/24/2025 12:44:54 PM	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☐ No ☑ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☑ No ☐ Not Present ☐
   No. Seal Date: 3/13/2025 Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
    relinquish time & date not included

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	18.2	Good	Yes		3/19/2025	

June 27, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10438
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Ash Pond Monitoring Wells **WorkOrder:** 25051158

Dear Eric Staley:

TEKLAB, INC received 22 samples on 5/28/2025 1:50:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25051158
Report Date: 27-Jun-25

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Client: City Water, Light & Power **Work Order:** 25051158

Client Project: Ash Pond Monitoring Wells **Report Date:** 27-Jun-25

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25051158
Report Date: 27-Jun-25

Cooler Receipt Temp: 5.9 °C

An employee of Teklab, Inc. collected the sample(s).

Radium-226 & -228 analysis was performed by Eurofins St. Louis. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10438	NELAP	7/31/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2026	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2026	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2026	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2026	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-001
Client Sample ID: RW-3
Matrix: GROUNDWATER
Collection Date: 05/21/2025 10:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.49**	ft	1	05/21/2025 10:20	R365853
Depth to water	*	-5.00		**6.57**	ft	1	05/21/2025 10:20	R365853
Depth to water from measuring point	*	0		**9.27**	ft	1	05/21/2025 10:20	R365853
Elevation of groundwater surface	*	0		**530.23**	ft	1	05/21/2025 10:20	R365853
Measuring Point Elevation	*	0		**539.50**	ft	1	05/21/2025 10:20	R365853
Measuring Point Height Above Land Surface	*	0		**2.70**	ft	1	05/21/2025 10:20	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**5.0**	NTU	1	05/21/2025 10:20	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.6**	°F	1	05/21/2025 10:20	R365853
SW-846 9040B								
pH, Field	*	1.00		**7.03**		1	05/21/2025 10:20	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**650**	µmhos/cm @25C	1	05/21/2025 10:20	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	50		**385**	mg/L	2.5	05/27/2025 15:58	R365834
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 12:48	R365418
Chloride	NELAP	5.00		**25.0**	mg/L	10	05/22/2025 12:48	R365418
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/22/2025 12:48	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.142**	mg/L	1	05/29/2025 8:50	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:50	239494
Boron	NELAP	0.0200		**0.153**	mg/L	1	05/29/2025 8:50	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:50	239494
Calcium	NELAP	0.100	B	**64.9**	mg/L	1	05/29/2025 8:50	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:50	239494
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:50	239494
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 8:50	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:50	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:05	239494
Arsenic	NELAP	0.0010		**0.0808**	mg/L	5	05/27/2025 21:20	239494
Lithium	*	0.0030		**0.0051**	mg/L	5	05/27/2025 21:20	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:05	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:05	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:26	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-002
Client Sample ID: AP-1
Matrix: GROUNDWATER
Collection Date: 05/28/2025 9:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**504.29**	ft	1	05/28/2025 9:56	R365853
Depth to water	*	-5.00		**7.52**	ft	1	05/28/2025 9:56	R365853
Depth to water from measuring point	*	0		**9.79**	ft	1	05/28/2025 9:56	R365853
Elevation of groundwater surface	*	0		**525.58**	ft	1	05/28/2025 9:56	R365853
Measuring Point Elevation	*	0		**535.37**	ft	1	05/28/2025 9:56	R365853
Measuring Point Height Above Land Surface	*	0		**2.27**	ft	1	05/28/2025 9:56	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**9.7**	NTU	1	05/28/2025 9:56	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.2**	°F	1	05/28/2025 9:56	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.42**		1	05/28/2025 9:56	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2100**	µmhos/cm @25C	1	05/28/2025 9:56	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1740**	mg/L	1	06/04/2025 8:44	R366213
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/29/2025 8:47	R365636
Chloride	NELAP	5.00		**50.1**	mg/L	10	05/29/2025 8:47	R365636
Sulfate	NELAP	10.0		**858**	mg/L	10	05/29/2025 8:47	R365636
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.262**	mg/L	1	06/03/2025 12:47	239769
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/03/2025 12:47	239769
Boron	NELAP	0.200		**20.8**	mg/L	10	06/04/2025 12:30	239769
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/03/2025 12:47	239769
Calcium	NELAP	0.100		**228**	mg/L	1	06/03/2025 12:47	239769
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2025 12:47	239769
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2025 12:47	239769
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	06/03/2025 12:47	239769
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/03/2025 12:47	239769
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/30/2025 13:09	239769
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	06/03/2025 0:45	239769
Lithium	*	0.0030		**0.0102**	mg/L	5	05/30/2025 13:09	239769
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/30/2025 13:09	239769
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/30/2025 13:09	239769
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/30/2025 11:47	239778
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-003
Client Sample ID: AP-2
Matrix: GROUNDWATER
Collection Date: 05/21/2025 13:33

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.77**	ft	1	05/21/2025 13:33	R365853
Depth to water	*	-5.00		**5.29**	ft	1	05/21/2025 13:33	R365853
Depth to water from measuring point	*	0		**7.79**	ft	1	05/21/2025 13:33	R365853
Elevation of groundwater surface	*	0		**528.31**	ft	1	05/21/2025 13:33	R365853
Measuring Point Elevation	*	0		**536.10**	ft	1	05/21/2025 13:33	R365853
Measuring Point Height Above Land Surface	*	0		**2.50**	ft	1	05/21/2025 13:33	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**24**	NTU	1	05/21/2025 13:33	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.4**	°F	1	05/21/2025 13:33	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.45**		1	05/21/2025 13:33	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1180**	µmhos/cm @25C	1	05/21/2025 13:33	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1100**	mg/L	1	05/27/2025 15:58	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 13:01	R365418
Chloride	NELAP	5.00		**36.2**	mg/L	10	05/22/2025 13:01	R365418
Sulfate	NELAP	10.0		**367**	mg/L	10	05/22/2025 13:01	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0654**	mg/L	1	05/29/2025 8:50	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:50	239494
Boron	NELAP	0.0200		**3.12**	mg/L	1	05/29/2025 8:50	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:50	239494
Calcium	NELAP	0.100	B	**183**	mg/L	1	05/29/2025 8:50	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:50	239494
Cobalt	NELAP	0.0050		**0.0095**	mg/L	1	05/29/2025 8:50	239494
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 8:50	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:50	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:11	239494
Arsenic	NELAP	0.0010		**0.0013**	mg/L	5	05/27/2025 21:26	239494
Lithium	*	0.0030		**0.0059**	mg/L	5	05/27/2025 21:26	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:11	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:11	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:28	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-004
Client Sample ID: AP-3
Matrix: GROUNDWATER
Collection Date: 05/21/2025 12:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.45**	ft	1	05/21/2025 12:56	R365853
Depth to water	*	-5.00		**5.12**	ft	1	05/21/2025 12:56	R365853
Depth to water from measuring point	*	0		**7.67**	ft	1	05/21/2025 12:56	R365853
Elevation of groundwater surface	*	0		**527.58**	ft	1	05/21/2025 12:56	R365853
Measuring Point Elevation	*	0		**535.25**	ft	1	05/21/2025 12:56	R365853
Measuring Point Height Above Land Surface	*	0		**2.55**	ft	1	05/21/2025 12:56	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**9.2**	NTU	1	05/21/2025 12:56	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.8**	°F	1	05/21/2025 12:56	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.53**		1	05/21/2025 12:56	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1130**	µmhos/cm @25C	1	05/21/2025 12:56	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	100		**1180**	mg/L	5	05/27/2025 15:59	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 13:13	R365418
Chloride	NELAP	5.00		**61.7**	mg/L	10	05/22/2025 13:13	R365418
Sulfate	NELAP	10.0		**505**	mg/L	10	05/22/2025 13:13	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.106**	mg/L	1	05/29/2025 8:51	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:51	239494
Boron	NELAP	0.0200		**12.9**	mg/L	1	05/29/2025 8:51	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:51	239494
Calcium	NELAP	0.100	B	**171**	mg/L	1	05/29/2025 8:51	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:51	239494
Cobalt	NELAP	0.0050		**0.0081**	mg/L	1	05/30/2025 8:29	239494
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 8:51	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:51	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:17	239494
Arsenic	NELAP	0.0010		**0.0103**	mg/L	5	05/27/2025 21:31	239494
Lithium	*	0.0030		**0.0046**	mg/L	5	05/27/2025 21:31	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:17	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:17	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:35	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 05/28/2025 11:31

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.19**	ft	1	05/28/2025 11:31	R365853
Depth to water	*	-5.00		**7.24**	ft	1	05/28/2025 11:31	R365853
Depth to water from measuring point	*	0		**10.38**	ft	1	05/28/2025 11:31	R365853
Elevation of groundwater surface	*	0		**545.22**	ft	1	05/28/2025 11:31	R365853
Measuring Point Elevation	*	0		**555.60**	ft	1	05/28/2025 11:31	R365853
Measuring Point Height Above Land Surface	*	0		**3.14**	ft	1	05/28/2025 11:31	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**170**	NTU	1	05/28/2025 11:31	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.6**	°F	1	05/28/2025 11:31	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.69**		1	05/28/2025 11:31	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**979**	µmhos/cm @25C	1	05/28/2025 11:31	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**528**	mg/L	1	06/04/2025 8:44	R366213
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/29/2025 9:00	R365636
Chloride	NELAP	5.00		**12.1**	mg/L	10	05/29/2025 9:00	R365636
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/29/2025 9:00	R365636
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.434**	mg/L	1	06/03/2025 12:48	239769
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	06/03/2025 12:48	239769
Boron	NELAP	0.0200		**0.0772**	mg/L	1	06/03/2025 12:48	239769
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	06/03/2025 12:48	239769
Calcium	NELAP	0.100		**113**	mg/L	1	06/03/2025 12:48	239769
Chromium	NELAP	0.0050		**0.0081**	mg/L	1	06/03/2025 12:48	239769
Cobalt	NELAP	0.0050		**0.0083**	mg/L	1	06/03/2025 12:48	239769
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	06/04/2025 12:31	239769
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	06/03/2025 12:48	239769
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/30/2025 13:15	239769
Arsenic	NELAP	0.0010		**0.0223**	mg/L	5	06/03/2025 0:51	239769
Lithium	*	0.0030		**0.0117**	mg/L	5	05/30/2025 13:15	239769
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/30/2025 13:15	239769
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/30/2025 13:15	239769
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/30/2025 11:49	239778
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/24/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 05/21/2025 10:31

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	05/21/2025 10:31	R365853
Depth to water	*	-5.00		**12.11**	ft	1	05/21/2025 10:31	R365853
Depth to water from measuring point	*	0		**14.41**	ft	1	05/21/2025 10:31	R365853
Elevation of groundwater surface	*	0		**569.49**	ft	1	05/21/2025 10:31	R365853
Measuring Point Elevation	*	0		**583.90**	ft	1	05/21/2025 10:31	R365853
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	05/21/2025 10:31	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**2.3**	NTU	1	05/21/2025 10:31	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.3**	°F	1	05/21/2025 10:31	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.67**		1	05/21/2025 10:31	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**834**	µmhos/cm @25C	1	05/21/2025 10:31	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**514**	mg/L	1	05/27/2025 16:00	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 13:26	R365418
Chloride	NELAP	5.00		**9.13**	mg/L	10	05/22/2025 13:26	R365418
Sulfate	NELAP	10.0		**63.6**	mg/L	10	05/22/2025 13:26	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0571**	mg/L	1	05/29/2025 8:52	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:52	239494
Boron	NELAP	0.0200		**0.0521**	mg/L	1	05/29/2025 8:52	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:52	239494
Calcium	NELAP	0.100	B	**97.6**	mg/L	1	05/29/2025 8:52	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:52	239494
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:52	239494
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 8:52	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:52	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:23	239494
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 21:37	239494
Lithium	*	0.0030		**0.0044**	mg/L	5	05/27/2025 21:37	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:23	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:23	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:42	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-007
Client Sample ID: AP-6
Matrix: GROUNDWATER
Collection Date: 05/21/2025 14:16

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.20**	ft	1	05/21/2025 14:16	R365853
Depth to water	*	-5.00		**5.35**	ft	1	05/21/2025 14:16	R365853
Depth to water from measuring point	*	0		**7.77**	ft	1	05/21/2025 14:16	R365853
Elevation of groundwater surface	*	0		**530.05**	ft	1	05/21/2025 14:16	R365853
Measuring Point Elevation	*	0		**537.82**	ft	1	05/21/2025 14:16	R365853
Measuring Point Height Above Land Surface	*	0		**2.42**	ft	1	05/21/2025 14:16	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**4.0**	NTU	1	05/21/2025 14:16	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.7**	°F	1	05/21/2025 14:16	R365853
SW-846 9040B								
pH, Field	*	1.00		**7.00**		1	05/21/2025 14:16	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**684**	µmhos/cm @25C	1	05/21/2025 14:16	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**432**	mg/L	1	05/27/2025 16:00	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.58**	mg/L	10	05/22/2025 13:39	R365418
Chloride	NELAP	5.00		**32.6**	mg/L	10	05/22/2025 13:39	R365418
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/22/2025 13:39	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.154**	mg/L	1	05/29/2025 8:53	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:53	239494
Boron	NELAP	0.0200		**0.407**	mg/L	1	05/29/2025 8:53	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:53	239494
Calcium	NELAP	0.100	B	**65.1**	mg/L	1	05/29/2025 8:53	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:53	239494
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:53	239494
Lead	NELAP	0.0075		**0.0230**	mg/L	1	05/29/2025 8:53	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:53	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:29	239494
Arsenic	NELAP	0.0010		**0.0037**	mg/L	5	05/27/2025 21:42	239494
Lithium	*	0.0030		**0.0073**	mg/L	5	05/27/2025 21:42	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:29	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:29	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:44	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-008
Client Sample ID: AP-7
Matrix: GROUNDWATER
Collection Date: 05/27/2025 11:57

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.50**	ft	1	05/27/2025 11:57	R365853
Depth to water	*	-5.00		**7.98**	ft	1	05/27/2025 11:57	R365853
Depth to water from measuring point	*	0		**10.64**	ft	1	05/27/2025 11:57	R365853
Elevation of groundwater surface	*	0		**528.38**	ft	1	05/27/2025 11:57	R365853
Measuring Point Elevation	*	0		**539.02**	ft	1	05/27/2025 11:57	R365853
Measuring Point Height Above Land Surface	*	0		**2.66**	ft	1	05/27/2025 11:57	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**4.6**	NTU	1	05/27/2025 11:57	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.4**	°F	1	05/27/2025 11:57	R365853
SW-846 9040B								
pH, Field	*	1.00		**7.14**		1	05/27/2025 11:57	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**770**	µmhos/cm @25C	1	05/27/2025 11:57	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**652**	mg/L	1	06/03/2025 6:58	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.55**	mg/L	10	05/28/2025 10:27	R365685
Chloride	NELAP	5.00		**81.4**	mg/L	10	05/28/2025 10:27	R365685
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/28/2025 10:27	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.137**	mg/L	1	05/29/2025 14:54	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 14:54	239684
Boron	NELAP	0.0200		**0.393**	mg/L	1	05/29/2025 14:54	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 14:54	239684
Calcium	NELAP	0.100		**58.4**	mg/L	1	05/29/2025 14:54	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:54	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:54	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 14:54	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 14:54	239684
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 15:19	239684
Arsenic	NELAP	0.0010		**0.0289**	mg/L	5	05/28/2025 15:19	239684
Lithium	*	0.0030		**0.0106**	mg/L	5	05/28/2025 15:19	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 15:19	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 15:19	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:37	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-009
Client Sample ID: AP-8
Matrix: GROUNDWATER
Collection Date: 05/21/2025 11:12

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**497.60**	ft	1	05/21/2025 11:12	R365853
Depth to water	*	-5.00		**1.11**	ft	1	05/21/2025 11:12	R365853
Depth to water from measuring point	*	0		**4.01**	ft	1	05/21/2025 11:12	R365853
Elevation of groundwater surface	*	0		**533.19**	ft	1	05/21/2025 11:12	R365853
Measuring Point Elevation	*	0		**537.20**	ft	1	05/21/2025 11:12	R365853
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	05/21/2025 11:12	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**37**	NTU	1	05/21/2025 11:12	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.3**	°F	1	05/21/2025 11:12	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.78**		1	05/21/2025 11:12	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**876**	µmhos/cm @25C	1	05/21/2025 11:12	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	100		**580**	mg/L	5	05/27/2025 16:00	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 13:52	R365418
Chloride	NELAP	5.00		**22.6**	mg/L	10	05/22/2025 13:52	R365418
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/22/2025 13:52	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.415**	mg/L	1	05/29/2025 8:53	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:53	239494
Boron	NELAP	0.0200		**0.963**	mg/L	1	05/29/2025 8:53	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:53	239494
Calcium	NELAP	0.100	B	**97.7**	mg/L	1	05/29/2025 8:53	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:53	239494
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:53	239494
Lead	NELAP	0.0075		**0.132**	mg/L	1	05/29/2025 8:53	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:53	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:35	239494
Arsenic	NELAP	0.0010		**0.0446**	mg/L	5	05/27/2025 21:48	239494
Lithium	*	0.0030		**0.0072**	mg/L	5	05/27/2025 21:48	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:35	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:35	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:47	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-010
Client Sample ID: AP-9
Matrix: GROUNDWATER
Collection Date: 05/27/2025 10:24

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.70**	ft	1	05/27/2025 10:24	R365853
Depth to water	*	-5.00		**9.39**	ft	1	05/27/2025 10:24	R365853
Depth to water from measuring point	*	0		**12.49**	ft	1	05/27/2025 10:24	R365853
Elevation of groundwater surface	*	0		**527.81**	ft	1	05/27/2025 10:24	R365853
Measuring Point Elevation	*	0		**540.30**	ft	1	05/27/2025 10:24	R365853
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	05/27/2025 10:24	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**45**	NTU	1	05/27/2025 10:24	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.6**	°F	1	05/27/2025 10:24	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.79**		1	05/27/2025 10:24	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**963**	µmhos/cm @25C	1	05/27/2025 10:24	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	33		**681**	mg/L	1.67	06/03/2025 6:58	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/28/2025 10:38	R365685
Chloride	NELAP	5.00		**27.0**	mg/L	10	05/28/2025 10:38	R365685
Sulfate	NELAP	10.0		**17.9**	mg/L	10	05/28/2025 10:38	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.322**	mg/L	1	05/29/2025 14:28	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 14:28	239684
Boron	NELAP	0.0200		**0.0887**	mg/L	1	05/29/2025 14:28	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 14:28	239684
Calcium	NELAP	0.100	S	**99.4**	mg/L	1	05/29/2025 14:28	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:28	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:28	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 14:28	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 14:28	239684
Matrix spike control limits are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 15:25	239684
Arsenic	NELAP	0.0010		**0.0014**	mg/L	5	05/28/2025 15:25	239684
Lithium	*	0.0030		**0.0064**	mg/L	5	05/28/2025 15:25	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 15:25	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 15:25	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:39	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-011
Client Sample ID: AP-10
Matrix: GROUNDWATER
Collection Date: 05/21/2025 12:04

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**499.43**	ft	1	05/21/2025 12:04	R365853
Depth to water	*	-5.00		**0.82**	ft	1	05/21/2025 12:04	R365853
Depth to water from measuring point	*	0		**3.92**	ft	1	05/21/2025 12:04	R365853
Elevation of groundwater surface	*	0		**533.58**	ft	1	05/21/2025 12:04	R365853
Measuring Point Elevation	*	0		**537.50**	ft	1	05/21/2025 12:04	R365853
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	05/21/2025 12:04	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**140**	NTU	1	05/21/2025 12:04	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.2**	°F	1	05/21/2025 12:04	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.63**		1	05/21/2025 12:04	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1100**	µmhos/cm @25C	1	05/21/2025 12:04	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	100		**820**	mg/L	5	05/27/2025 16:00	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 14:42	R365418
Chloride	NELAP	5.00		**24.6**	mg/L	10	05/22/2025 14:42	R365418
Sulfate	NELAP	10.0		**94.9**	mg/L	10	05/22/2025 14:42	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.765**	mg/L	1	05/29/2025 8:54	239494
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 8:54	239494
Boron	NELAP	0.0200		**4.50**	mg/L	1	05/29/2025 8:54	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 8:54	239494
Calcium	NELAP	0.100	B	**143**	mg/L	1	05/29/2025 8:54	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:54	239494
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 8:54	239494
Lead	NELAP	0.0075		**0.0621**	mg/L	1	05/29/2025 8:54	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 8:54	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 20:48	239494
Arsenic	NELAP	0.0010		**0.0015**	mg/L	5	05/27/2025 22:33	239494
Lithium	*	0.0030		**0.0107**	mg/L	5	05/27/2025 22:33	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 20:48	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 20:48	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:49	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-012
Client Sample ID: AP-11
Matrix: GROUNDWATER
Collection Date: 05/22/2025 10:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.15**	ft	1	05/22/2025 10:55	R365853
Depth to water	*	-5.00		**9.23**	ft	1	05/22/2025 10:55	R365853
Depth to water from measuring point	*	0		**12.03**	ft	1	05/22/2025 10:55	R365853
Elevation of groundwater surface	*	0		**526.07**	ft	1	05/22/2025 10:55	R365853
Measuring Point Elevation	*	0		**538.10**	ft	1	05/22/2025 10:55	R365853
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	05/22/2025 10:55	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.9**	NTU	1	05/22/2025 10:55	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**55.5**	°F	1	05/22/2025 10:55	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.53**		1	05/22/2025 10:55	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1110**	µmhos/cm @25C	1	05/22/2025 10:55	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**784**	mg/L	1	05/27/2025 16:00	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 11:34	R365491
Chloride	NELAP	5.00		**129**	mg/L	10	05/23/2025 11:34	R365491
Sulfate	NELAP	10.0		**84.6**	mg/L	10	05/23/2025 11:34	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.140**	mg/L	1	05/29/2025 15:54	239543
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:54	239543
Boron	NELAP	0.0200		**0.273**	mg/L	1	05/29/2025 15:54	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:54	239543
Calcium	NELAP	0.100		**160**	mg/L	1	05/29/2025 15:54	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:54	239543
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:54	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:54	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:54	239543
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 11:30	239543
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 11:30	239543
Lithium	*	0.0030		**0.0034**	mg/L	5	05/27/2025 11:30	239543
Selenium	NELAP	0.0010		**0.0049**	mg/L	5	05/27/2025 11:30	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 13:35	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:29	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power **Work Order:** 25051158

Client Project: Ash Pond Monitoring Wells **Report Date:** 27-Jun-25

Lab ID: 25051158-013 **Client Sample ID:** AP-12

Matrix: GROUNDWATER **Collection Date:** 05/22/2025 11:38

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**510.30**	ft	1	05/22/2025 11:38	R365853
Depth to water	*	-5.00		**12.26**	ft	1	05/22/2025 11:38	R365853
Depth to water from measuring point	*	0		**15.16**	ft	1	05/22/2025 11:38	R365853
Elevation of groundwater surface	*	0		**525.54**	ft	1	05/22/2025 11:38	R365853
Measuring Point Elevation	*	0		**540.70**	ft	1	05/22/2025 11:38	R365853
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	05/22/2025 11:38	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**98**	NTU	1	05/22/2025 11:38	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.2**	°F	1	05/22/2025 11:38	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.50**		1	05/22/2025 11:38	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1330**	µmhos/cm @25C	1	05/22/2025 11:38	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	100		**1190**	mg/L	5	05/27/2025 16:01	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 12:12	R365491
Chloride	NELAP	5.00		**113**	mg/L	10	05/23/2025 12:12	R365491
Sulfate	NELAP	10.0		**416**	mg/L	10	05/23/2025 12:12	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0575**	mg/L	1	05/29/2025 15:55	239543
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:55	239543
Boron	NELAP	0.0200		**0.0205**	mg/L	1	05/29/2025 15:55	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:55	239543
Calcium	NELAP	0.100		**204**	mg/L	1	05/29/2025 15:55	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:55	239543
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:55	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:55	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:55	239543
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 11:36	239543
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 11:36	239543
Lithium	*	0.0030		**0.0056**	mg/L	5	05/27/2025 11:36	239543
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 11:36	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 13:41	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:31	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-014
Client Sample ID: AP-13
Matrix: GROUNDWATER
Collection Date: 05/22/2025 13:07

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**511.00**	ft	1	05/22/2025 13:07	R365853
Depth to water	*	-5.00		**11.33**	ft	1	05/22/2025 13:07	R365853
Depth to water from measuring point	*	0		**14.73**	ft	1	05/22/2025 13:07	R365853
Elevation of groundwater surface	*	0		**527.27**	ft	1	05/22/2025 13:07	R365853
Measuring Point Elevation	*	0		**542.00**	ft	1	05/22/2025 13:07	R365853
Measuring Point Height Above Land Surface	*	0		**3.40**	ft	1	05/22/2025 13:07	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**25**	NTU	1	05/22/2025 13:07	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.6**	°F	1	05/22/2025 13:07	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.68**		1	05/22/2025 13:07	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**755**	µmhos/cm @25C	1	05/22/2025 13:07	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	50		**595**	mg/L	2.5	05/27/2025 16:01	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 13:03	R365491
Chloride	NELAP	5.00		**24.7**	mg/L	10	05/23/2025 13:03	R365491
Sulfate	NELAP	10.0		**124**	mg/L	10	05/23/2025 13:03	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.127**	mg/L	1	05/29/2025 15:56	239543
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:56	239543
Boron	NELAP	0.0200		**0.0276**	mg/L	1	05/29/2025 15:56	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:56	239543
Calcium	NELAP	0.100		**114**	mg/L	1	05/29/2025 15:56	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:56	239543
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:56	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:56	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:56	239543
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:09	239543
Arsenic	NELAP	0.0010		**0.0032**	mg/L	5	05/27/2025 12:09	239543
Lithium	*	0.0030		**0.0107**	mg/L	5	05/27/2025 12:09	239543
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:09	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 13:47	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:38	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-015
Client Sample ID: AP-14
Matrix: GROUNDWATER
Collection Date: 05/27/2025 13:44

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**508.40**	ft	1	05/27/2025 13:44	R365853
Depth to water	*	-5.00		**-0.08**	ft	1	05/27/2025 13:44	R365853
Depth to water from measuring point	*	0		**2.72**	ft	1	05/27/2025 13:44	R365853
Elevation of groundwater surface	*	0		**536.88**	ft	1	05/27/2025 13:44	R365853
Measuring Point Elevation	*	0		**539.60**	ft	1	05/27/2025 13:44	R365853
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	05/27/2025 13:44	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.2**	NTU	1	05/27/2025 13:44	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.8**	°F	1	05/27/2025 13:44	R365853
SW-846 9040B								
pH, Field	*	1.00		**7.02**		1	05/27/2025 13:44	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2020**	µmhos/cm @25C	1	05/27/2025 13:44	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	33		**1620**	mg/L	1.67	06/03/2025 6:58	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/28/2025 11:25	R365685
Chloride	NELAP	5.00		**105**	mg/L	10	05/28/2025 11:25	R365685
Sulfate	NELAP	10.0		**909**	mg/L	10	05/28/2025 11:25	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0384**	mg/L	1	05/29/2025 14:55	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 14:55	239684
Boron	NELAP	0.200		**21.7**	mg/L	10	06/02/2025 22:21	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 14:55	239684
Calcium	NELAP	0.100		**276**	mg/L	1	05/29/2025 14:55	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:55	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:55	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 14:55	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 14:55	239684
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:08	239684
Arsenic	NELAP	0.0010		**0.0017**	mg/L	5	05/28/2025 16:08	239684
Lithium	*	0.0030		**0.0073**	mg/L	5	05/28/2025 16:08	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:08	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 16:08	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:46	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-016
Client Sample ID: T-1
Matrix: GROUNDWATER
Collection Date: 05/22/2025 13:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**512.70**	ft	1	05/22/2025 13:50	R365853
Depth to water	*	-5.00		**10.53**	ft	1	05/22/2025 13:50	R365853
Depth to water from measuring point	*	0		**10.86**	ft	1	05/22/2025 13:50	R365853
Elevation of groundwater surface	*	0		**524.79**	ft	1	05/22/2025 13:50	R365853
Measuring Point Elevation	*	0		**535.65**	ft	1	05/22/2025 13:50	R365853
Measuring Point Height Above Land Surface	*	0		**0.33**	ft	1	05/22/2025 13:50	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**24**	NTU	1	05/22/2025 13:50	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.1**	°F	1	05/22/2025 13:50	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.58**		1	05/22/2025 13:50	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1280**	µmhos/cm @25C	1	05/22/2025 13:50	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**962**	mg/L	1	05/27/2025 16:01	R365834
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 13:16	R365491
Chloride	NELAP	5.00		**232**	mg/L	10	05/23/2025 13:16	R365491
Sulfate	NELAP	10.0		**148**	mg/L	10	05/23/2025 13:16	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0586**	mg/L	1	05/29/2025 15:56	239543
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:56	239543
Boron	NELAP	0.0200		**0.163**	mg/L	1	05/29/2025 15:56	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:56	239543
Calcium	NELAP	0.100		**165**	mg/L	1	05/29/2025 15:56	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:56	239543
Cobalt	NELAP	0.0050		**0.0055**	mg/L	1	05/29/2025 15:56	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:56	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:56	239543
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:14	239543
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:14	239543
Lithium	*	0.0030		**0.0142**	mg/L	5	05/27/2025 12:14	239543
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:14	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 14:17	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:40	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-017
Client Sample ID: T-2
Matrix: GROUNDWATER
Collection Date: 05/22/2025 12:19

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.18**	ft	1	05/22/2025 12:19	R365853
Depth to water	*	-5.00		**21.43**	ft	1	05/22/2025 12:19	R365853
Depth to water from measuring point	*	0		**23.83**	ft	1	05/22/2025 12:19	R365853
Elevation of groundwater surface	*	0		**525.79**	ft	1	05/22/2025 12:19	R365853
Measuring Point Elevation	*	0		**549.62**	ft	1	05/22/2025 12:19	R365853
Measuring Point Height Above Land Surface	*	0		**2.40**	ft	1	05/22/2025 12:19	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**17**	NTU	1	05/22/2025 12:19	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.1**	°F	1	05/22/2025 12:19	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.55**		1	05/22/2025 12:19	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1740**	µmhos/cm @25C	1	05/22/2025 12:19	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	50		**1550**	mg/L	2.5	05/27/2025 16:01	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 13:28	R365491
Chloride	NELAP	5.00		**522**	mg/L	10	05/23/2025 13:28	R365491
Sulfate	NELAP	10.0		**143**	mg/L	10	05/23/2025 13:28	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.226**	mg/L	1	05/29/2025 16:02	239543
Beryllium	NELAP	0.0005		**0.0005**	mg/L	1	05/29/2025 16:02	239543
Boron	NELAP	0.0200		**0.0507**	mg/L	1	05/29/2025 16:02	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 16:02	239543
Calcium	NELAP	0.100		**231**	mg/L	1	05/29/2025 16:02	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 16:02	239543
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	06/03/2025 10:13	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 16:02	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 16:02	239543
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:20	239543
Arsenic	NELAP	0.0010		**0.0056**	mg/L	5	05/27/2025 12:20	239543
Lithium	*	0.0030		**0.0320**	mg/L	5	05/27/2025 12:20	239543
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:20	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 14:23	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:43	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-018
Client Sample ID: T-4
Matrix: GROUNDWATER
Collection Date: 05/27/2025 11:04

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**521.52**	ft	1	05/27/2025 11:04	R365853
Depth to water	*	-5.00		**13.26**	ft	1	05/27/2025 11:04	R365853
Depth to water from measuring point	*	0		**15.64**	ft	1	05/27/2025 11:04	R365853
Elevation of groundwater surface	*	0		**533.30**	ft	1	05/27/2025 11:04	R365853
Measuring Point Elevation	*	0		**548.94**	ft	1	05/27/2025 11:04	R365853
Measuring Point Height Above Land Surface	*	0		**2.38**	ft	1	05/27/2025 11:04	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**23**	NTU	1	05/27/2025 11:04	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.2**	°F	1	05/27/2025 11:04	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.63**		1	05/27/2025 11:04	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**641**	µmhos/cm @25C	1	05/27/2025 11:04	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	33		**478**	mg/L	1.67	06/03/2025 6:59	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/28/2025 11:37	R365685
Chloride	NELAP	5.00		**ND**	mg/L	10	05/28/2025 11:37	R365685
Sulfate	NELAP	10.0		**101**	mg/L	10	05/28/2025 11:37	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0345**	mg/L	1	05/29/2025 14:56	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 14:56	239684
Boron	NELAP	0.0200		**0.0577**	mg/L	1	05/29/2025 14:56	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 14:56	239684
Calcium	NELAP	0.100		**72.8**	mg/L	1	05/29/2025 14:56	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:56	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 14:56	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 14:56	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 14:56	239684
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:14	239684
Arsenic	NELAP	0.0010		**0.0039**	mg/L	5	05/28/2025 16:14	239684
Lithium	*	0.0030		**0.0158**	mg/L	5	05/28/2025 16:14	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:14	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 16:14	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:48	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-019
Client Sample ID: T-5
Matrix: GROUNDWATER
Collection Date: 05/27/2025 13:23

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**518.32**	ft	1	05/27/2025 13:23	R365853
Depth to water	*	-5.00		**6.06**	ft	1	05/27/2025 13:23	R365853
Depth to water from measuring point	*	0		**8.57**	ft	1	05/27/2025 13:23	R365853
Elevation of groundwater surface	*	0		**532.09**	ft	1	05/27/2025 13:23	R365853
Measuring Point Elevation	*	0		**540.66**	ft	1	05/27/2025 13:23	R365853
Measuring Point Height Above Land Surface	*	0		**2.51**	ft	1	05/27/2025 13:23	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**9.9**	NTU	1	05/27/2025 13:23	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.7**	°F	1	05/27/2025 13:23	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.77**		1	05/27/2025 13:23	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**536**	µmhos/cm @25C	1	05/27/2025 13:23	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**428**	mg/L	1	06/03/2025 6:59	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/28/2025 11:48	R365685
Chloride	NELAP	5.00		**ND**	mg/L	10	05/28/2025 11:48	R365685
Sulfate	NELAP	10.0		**35.4**	mg/L	10	05/28/2025 11:48	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0567**	mg/L	1	05/29/2025 15:17	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:17	239684
Boron	NELAP	0.0200		**0.0671**	mg/L	1	05/29/2025 15:17	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:17	239684
Calcium	NELAP	0.100		**72.4**	mg/L	1	05/29/2025 15:17	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:17	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:17	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:17	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:17	239684
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:20	239684
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:20	239684
Lithium	*	0.0030		**0.0089**	mg/L	5	05/28/2025 16:20	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:20	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 16:20	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:55	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-020
Client Sample ID: T-6
Matrix: GROUNDWATER
Collection Date: 05/27/2025 12:38

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**494.70**	ft	1	05/27/2025 12:38	R365853
Depth to water	*	-5.00		**6.47**	ft	1	05/27/2025 12:38	R365853
Depth to water from measuring point	*	0		**8.83**	ft	1	05/27/2025 12:38	R365853
Elevation of groundwater surface	*	0		**529.49**	ft	1	05/27/2025 12:38	R365853
Measuring Point Elevation	*	0		**538.32**	ft	1	05/27/2025 12:38	R365853
Measuring Point Height Above Land Surface	*	0		**2.36**	ft	1	05/27/2025 12:38	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.8**	NTU	1	05/27/2025 12:38	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.8**	°F	1	05/27/2025 12:38	R365853
SW-846 9040B								
pH, Field	*	1.00		**7.00**		1	05/27/2025 12:38	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**860**	µmhos/cm @25C	1	05/27/2025 12:38	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	50		**570**	mg/L	2.5	06/03/2025 6:59	R366064
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/28/2025 12:23	R365685
Chloride	NELAP	5.00		**20.8**	mg/L	10	05/28/2025 12:23	R365685
Sulfate	NELAP	10.0		**ND**	mg/L	10	05/28/2025 12:23	R365685
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.279**	mg/L	1	05/29/2025 15:18	239684
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 15:18	239684
Boron	NELAP	0.0200		**0.200**	mg/L	1	05/29/2025 15:18	239684
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 15:18	239684
Calcium	NELAP	0.100		**92.2**	mg/L	1	05/29/2025 15:18	239684
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:18	239684
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 15:18	239684
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 15:18	239684
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 15:18	239684
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:26	239684
Arsenic	NELAP	0.0010		**0.0195**	mg/L	5	05/28/2025 16:26	239684
Lithium	*	0.0030		**0.0138**	mg/L	5	05/28/2025 16:26	239684
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 16:26	239684
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 16:26	239684
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/29/2025 15:57	239734
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-021
Client Sample ID: AW-1
Matrix: GROUNDWATER
Collection Date: 05/22/2025 10:24

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.79**	ft	1	05/22/2025 10:24	R365853
Depth to water	*	-5.00		**11.02**	ft	1	05/22/2025 10:24	R365853
Depth to water from measuring point	*	0		**13.77**	ft	1	05/22/2025 10:24	R365853
Elevation of groundwater surface	*	0		**541.83**	ft	1	05/22/2025 10:24	R365853
Measuring Point Elevation	*	0		**555.60**	ft	1	05/22/2025 10:24	R365853
Measuring Point Height Above Land Surface	*	0		**2.75**	ft	1	05/22/2025 10:24	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.6**	NTU	1	05/22/2025 10:24	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.4**	°F	1	05/22/2025 10:24	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.96**		1	05/22/2025 10:24	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1480**	µmhos/cm @25C	1	05/22/2025 10:24	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1190**	mg/L	1	05/27/2025 16:01	R365834
Stability in final weights could not be achieved after multiple drying, cooling, and weighing cycles.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/23/2025 14:06	R365491
Chloride	NELAP	5.00		**36.8**	mg/L	10	05/23/2025 14:06	R365491
Sulfate	NELAP	10.0		**388**	mg/L	10	05/23/2025 14:06	R365491
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0790**	mg/L	1	05/29/2025 16:03	239543
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	05/29/2025 16:03	239543
Boron	NELAP	0.0200		**8.75**	mg/L	1	05/29/2025 16:03	239543
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 16:03	239543
Calcium	NELAP	0.100	S	**203**	mg/L	1	05/29/2025 16:03	239543
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 16:03	239543
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 16:03	239543
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	05/29/2025 16:03	239543
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 16:03	239543
Matrix spike control limits are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:41	239543
Arsenic	NELAP	0.0010		**0.0016**	mg/L	5	05/27/2025 12:41	239543
Lithium	*	0.0030		**0.0101**	mg/L	5	05/27/2025 12:41	239543
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/27/2025 12:41	239543
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/23/2025 14:48	239543
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/23/2025 14:45	239545
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Client: City Water, Light & Power
Work Order: 25051158
Client Project: Ash Pond Monitoring Wells
Report Date: 27-Jun-25
Lab ID: 25051158-022
Client Sample ID: G120
Matrix: GROUNDWATER
Collection Date: 05/21/2025 13:58

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**502.73**	ft	1	05/21/2025 13:58	R365853
Depth to water	*	-5.00		**16.18**	ft	1	05/21/2025 13:58	R365853
Depth to water from measuring point	*	0		**16.18**	ft	1	05/21/2025 13:58	R365853
Elevation of groundwater surface	*	0		**536.92**	ft	1	05/21/2025 13:58	R365853
Measuring Point Elevation	*	0		**553.10**	ft	1	05/21/2025 13:58	R365853
Measuring Point Height Above Land Surface	*	0		**0**	ft	1	05/21/2025 13:58	R365853
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**14**	NTU	1	05/21/2025 13:58	R365853
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.7**	°F	1	05/21/2025 13:58	R365853
SW-846 9040B								
pH, Field	*	1.00		**6.57**		1	05/21/2025 13:58	R365853
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1950**	µmhos/cm @25C	1	05/21/2025 13:58	R365853
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	200		**1340**	mg/L	10	05/27/2025 15:59	R365834
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 14:55	R365418
Chloride	NELAP	5.00		**35.5**	mg/L	10	05/22/2025 14:55	R365418
Sulfate	NELAP	10.0		**562**	mg/L	10	05/22/2025 14:55	R365418
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.842**	mg/L	1	05/29/2025 9:00	239494
Beryllium	NELAP	0.0005		**0.0009**	mg/L	1	05/29/2025 9:00	239494
Boron	NELAP	0.0200		**8.02**	mg/L	1	05/29/2025 9:00	239494
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	05/29/2025 9:00	239494
Calcium	NELAP	0.100	B	**256**	mg/L	1	05/29/2025 9:00	239494
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	05/29/2025 9:00	239494
Cobalt	NELAP	0.0050		**0.0058**	mg/L	1	05/29/2025 9:00	239494
Lead	NELAP	0.0075		**0.0301**	mg/L	1	05/29/2025 9:00	239494
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	05/29/2025 9:00	239494
Sample result for Ca exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:41	239494
Arsenic	NELAP	0.0010		**0.0114**	mg/L	5	05/27/2025 22:38	239494
Lithium	*	0.0030		**0.0084**	mg/L	5	05/27/2025 22:38	239494
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	05/28/2025 19:41	239494
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	05/28/2025 19:41	239494
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	05/22/2025 17:51	239492
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317
Radium-228	*	0		**See Attached**	pci/L	1	06/25/2025 0:00	R367317

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25051158
Report Date: 27-Jun-25

Carrier: Daniel Crump

Received By: JMD

Completed by: Laura E Henson
On: 21-May-25

Reviewed by: Elizabeth A. Hurley
On: 28-May-25

Pages to follow: Chain of custody 7 Extra pages included 53

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 5.9
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

pH strip #101358. - EK/lhenson - 5/21/2025 5:22:34 PM

Additional nitric acid (103505) was needed in AP5, AP-10 and G120 upon arrival at the laboratory. - EK/lhenson - 5/21/2025 5:22:40 PM

Cooler #2 = 5.3C, Cooler #3 = 8.3C (LTG#9). EK/LH 5/21/25

Samples were received on 5/22/25 at 15:45 on ice [temp4.5C, 7.1C - LTG#9]. pH# 101358. Additional nitric acid (103505) was needed in AW-1 upon arrival at the laboratory. -JD/ lhenson - 5/22/2025 4:29:35 PM

Samples were received on 5/27/25 at 1535 on ice [16.3C - LTG#5]. pH strip #101358. - JD/amberdilallo - 5/27/2025 4:03:59 PM

Samples were received on 5/28/25 at 13:50 on ice [5.5C - LTG#9]. pH# 101358. Addional nitric acid (103505) was needed in AP-4 upon arrival at the laboratory. - JD/lhenson - 5/28/2025 4:38:37 PM

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 5.9/5.3 °C 8.3 9
Preserved in: ☑ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES: Add HNO3 (103505) 1 liter bottles for 1 AP5, 2 AP-10, and 2 G120. AC 5/21/25

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

PROJECT NAME/NUMBER: Ash Pond Monitoring Wells
SAMPLE COLLECTOR'S NAME: Daniel Crump

RESULTS REQUESTED: ☑ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

and Type of Containers / INDICATE ANALYSIS REQUESTED

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25051158 001	RW-3	5-21-25 1020	Groundwater	1	~~2~~ 3								✔	✔	✔	✔	✔	✔
002	AP-1		Groundwater	1	2								✔	✔	✔	✔	✔	✔
003	AP-2	5-21-25 1333	Groundwater	1	2								✔	✔	✔	✔	✔	✔
004	AP-3	5-21-25 1256	Groundwater	1	2								✔	✔	✔	✔	✔	✔
005	AP-4		Groundwater	1	2								✔	✔	✔	✔	✔	✔
006	AP-5	5/21/25 1031	Groundwater	1	2								✔	✔	✔	✔	✔	✔
007	AP-6	5-21-25 1416	Groundwater	1	2								✔	✔	✔	✔	✔	✔
008	AP-7		Groundwater	1	2								✔	✔	✔	✔	✔	✔
009	AP-8	5-21-25 1112	Groundwater	1	2								✔	✔	✔	✔	✔	✔
010	AP-9		Groundwater	1	2								✔	✔	✔	✔	✔	✔
011	AP-10	5-21-25 1204	Groundwater	1	2								✔	✔	✔	✔	✔	✔

TE SAH 5/15/25

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5-21 / 1605	Emily Kussakoski	5/21/25 @ 1605

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [x] ICE [ ] BLUE ICE [ ] NO ICE 5.9/5.3 °C
Preserved in: [x] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [x] No
Are these samples known to be hazardous? [ ] Yes [x] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [x] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Daniel Crump

RESULTS REQUESTED
[x] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25051158 012	AP-11		Groundwater	1	3								✓	✓	✓	✓	✓	✓
013	AP-12		Groundwater	1	2								✓	✓	✓	✓	✓	✓
014	AP-13		Groundwater	1	2								✓	✓	✓	✓	✓	✓
015	AP-14		Groundwater	1	2								✓	✓	✓	✓	✓	✓
016	T-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓
017	T-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
018	T-4		Groundwater	1	2								✓	✓	✓	✓	✓	✓
019	T-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓
020	T-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓
* 021	AW-1		Groundwater	1	3								✓	✓	✓	✓	✓	✓
* 022	9120	5/21/25 1358	Groundwater	1	3								✓	✓	✓	✓	✓	✓

HNO3 pH <2 5/15/25

Relinquished By	Date/Time	Received By	Date/Time
D-180	5-21/1605	Emily Kessakoski	5/21/25 @ 1605

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

7.1

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 4.5 °C 9
Preserved in: [ ] LAB [X] FIELD FOR LAB USE ONLY
LAB NOTES: PH101358 ~~98858~~
Added HNO3 ~~1/2~~ ~~AW~~ TE JD 5/22/25 1/2 - AW-1 JD 5/22/25 (103505)

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25051158 001	RW-3		Groundwater	1	~~2~~ 3								✓	✓	✓	✓	✓	✓
002	AP-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓
003	AP-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
004	AP-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓
005	AP-4		Groundwater	1	2								✓	✓	✓	✓	✓	✓
006	AP-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓
007	AP-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓
008	AP-7		Groundwater	1	2								✓	✓	✓	✓	✓	✓
009	AP-8		Groundwater	1	2								✓	✓	✓	✓	✓	✓
010	AP-9		Groundwater	1	2								✓	✓	✓	✓	✓	✓
011	AP-10	~~BT 1204~~	Groundwater	1	2								✓	✓	✓	✓	✓	✓

TE SAH 5/15/25

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5-22/1545	[signature]	5/22/25 1548

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED												
				UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity								
					~~HN~~ 5/15/25																				
25051158-012	AP-11	5-22-25 1055	Groundwater	1	~~2~~3								✓	✓	✓	✓	✓	✓							
013	AP-12	5-22-25 1130	Groundwater	1	2								✓	✓	✓	✓	✓	✓							
014	AP-13	5-22-25 1307	Groundwater	1	2								✓	✓	✓	✓	✓	✓							
015	AP-14		Groundwater	1	2								✓	✓	✓	✓	✓	✓							
016	T-1	5-22-25 1350	Groundwater	1	2								✓	✓	✓	✓	✓	✓							
017	T-2	5-22-25 1219	Groundwater	1	2								✓	✓	✓	✓	✓	✓							
018	T-4		Groundwater	1	2								✓	✓	✓	✓	✓	✓							
019	T-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓							
020	T-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓							
** 021	AW-1	5/22/25 1024	Groundwater	1	3								✓	✓	✓	✓	✓	✓							
** 022	9120		Groundwater	1	3								✓	✓	✓	✓	✓	✓							

Relinquished By	Date/Time	Received By	Date/Time
DLS	5-22/1545	[signature]	5/22/25 15:45

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 16.3 °C 5
Preserved in: [ ] LAB [X] FIELD FOR LAB USE ONLY
LAB NOTES: PH 101358
JD 5/27/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Brett Gillihan

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED													
				UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity									
25051158 001	RW-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
002	AP-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
003	AP-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
004	AP-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
005	AP-4		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
006	AP-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
007	AP-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
008	AP-7	5-27-25 1157	Groundwater	1	2								✓	✓	✓	✓	✓	✓									
009	AP-8		Groundwater	1	2								✓	✓	✓	✓	✓	✓									
010	AP-9	5-27-25 1024	Groundwater	1	2								✓	✓	✓	✓	✓	✓									
011	AP-10		Groundwater	1	2								✓	✓	✓	✓	✓	✓									

Relinquished By	Date/Time	Received By	Date/Time
	5-27/1535		5/27/25 15:35

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Brett Gillihan

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
					5/15/25													
25051158 012	AP-11		Groundwater	1	3								✓	✓	✓	✓	✓	✓
013	AP-12		Groundwater	1	2								✓	✓	✓	✓	✓	✓
014	AP-13		Groundwater	1	2								✓	✓	✓	✓	✓	✓
015	AP-14	5-27-25 1344	Groundwater	1	2								✓	✓	✓	✓	✓	✓
016	T-1		Groundwater	1	2								✓	✓	✓	✓	✓	✓
017	T-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
018	T-4	5-27-25 1104	Groundwater	1	2								✓	✓	✓	✓	✓	✓
019	T-5	5-27-25 1325	Groundwater	1	2								✓	✓	✓	✓	✓	✓
020	T-6	5-27-25 1238	Groundwater	1	2								✓	✓	✓	✓	✓	✓
** 021	AW-1		Groundwater	1	3								✓	✓	✓	✓	✓	✓
** 022	9120		Groundwater	1	3								✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
	5-27-25 1535		5/27/25 15:35

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051158

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 5.5 °C 9
Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY
LAB NOTES: Added HNO3 (103505) 2/2 AP-4 Liters PH 101358 JD 2/28/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No
Are these samples known to be hazardous? [ ] Yes [✓] No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Justin Colp

RESULTS REQUESTED
[✓] Standard [ ] 1-2 Day (100% Surcharge)
[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25051158 001	RW-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓
002	AP-1	5-28-25 956	Groundwater	1	2								✓	✓	✓	✓	✓	✓
003	AP-2		Groundwater	1	2								✓	✓	✓	✓	✓	✓
004	AP-3		Groundwater	1	2								✓	✓	✓	✓	✓	✓
005	AP-4	5-28-25 1131	Groundwater	1	2								✓	✓	✓	✓	✓	✓
006	AP-5		Groundwater	1	2								✓	✓	✓	✓	✓	✓
007	AP-6		Groundwater	1	2								✓	✓	✓	✓	✓	✓
008	AP-7		Groundwater	1	2								✓	✓	✓	✓	✓	✓
009	AP-8		Groundwater	1	2								✓	✓	✓	✓	✓	✓
010	AP-9		Groundwater	1	2								✓	✓	✓	✓	✓	✓
011	AP-10		Groundwater	1	2								✓	✓	✓	✓	✓	✓

Courier

Relinquished By	Date/Time	Received By	Date/Time
	5-28 / 1350		5/28/25 1350

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Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	RW-3
Project Location:	Springfield, IL	**Sample ID:**	001
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 57 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 10:00

Static Water Level: 9.27 feet below TOC

Total Depth: 44.01 feet below TOC

Water Column: 34.74 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.74 ft. x 0.022 = 0.76 L x 3 Vol. = 2.28 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:00	0.0	300	purge start time						
10:08	2.4	↓	7.04	649.70	12.60	0.59	-99.00	8.49	
10:11	3.3		7.04	649.10	12.61	0.55	-103.90	6.68	
10:14	4.2		7.04	648.50	12.58	0.51	-108.10	4.91	
10:17	5.1		7.03	649.20	12.59	0.48	-111.30	5.05	
10:20	6.0		7.03	649.80	12.58	0.45	-114.40	5.04	

Sampling Activities

Sampled By: DC Sample Date/Time: 5/21/2025 10:20

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.03 pH 649.80 Spec. Cond. 12.58 Temp

Field Filtered: No Filter Type:

Water Level: 9.27 feet below TOC Drawdown: 0.00 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: AP-1
Sample ID: 002
Date (s): 5/28/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.
Name: Affiliation:

Weather Conditions

Temp: 59 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☐ None ☑ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/28/2025 9:19
Static Water Level: 9.79 feet below TOC
Total Depth: 31.08 feet below TOC
Water Column: 21.29 feet

Purging Activities

Purged By: JC Purge Date: 5/28/2025
Purge Method: Bladder Pump Well Diameter: 2"
Purge Volume Calculation (L): 21.29 ft. x 0.022 = 0.47 L x 3 Vol. = 1.41 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 8.00 L
Physical appearance of purge water: Clear Odor: Slight Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:20	0.0	222	purge start time						
9:26	1.3	↓	6.57	1,846.80	14.01	6.18	86.00	50.33	
9:29	2.0		6.44	1,922.20	14.03	5.37	88.70	39.69	
9:32	2.7		6.40	1,969.40	14.06	4.80	89.00	36.83	
9:35	3.3		6.39	2,000.20	14.01	4.39	88.60	33.74	
9:38	4.0		6.39	2,046.10	14.01	4.06	88.30	26.01	
9:41	4.7		6.39	2,068.70	14.01	3.81	87.80	23.84	
9:44	5.3		6.40	2,082.70	14.08	3.59	87.30	23.90	
9:47	6.0		6.41	2,091.30	14.05	3.41	86.80	16.86	
9:50	6.7		6.41	2,094.80	14.03	3.26	86.40	13.60	
9:53	7.3		6.42	2,096.20	14.02	3.13	85.90	9.55	
9:56	8.0		6.42	2,095.90	14.02	3.01	85.40	9.71	

Sampling Activities

Sampled By: JC Sample Date/Time: 5/28/2025 9:56
Sample Method: Low Flow Sample Equipment: Bladder Pump
Sample Parameters: 6.42 pH 2,095.90 Spec. Cond. 14.02 Temp
Field Filtered: No Filter Type:
Water Level: 10.20 feet below TOC Drawdown: 0.41 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By: Justin Colp **Date:** 5/28/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-2
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 61 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 13:07

Static Water Level: 7.79 feet below TOC

Total Depth: 21.33 feet below TOC

Water Column: 13.54 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 13.54 ft. x 0.022 = 0.3 L x 3 Vol. = 0.9 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:07	0.0	231	purge start time						
13:21	3.2	↓	6.45	1,177.50	13.41	0.38	8.80	70.62	
13:24	3.9		6.44	1,179.20	13.58	0.35	8.70	52.86	
13:27	4.6		6.44	1,184.60	13.87	0.32	8.80	40.66	
13:30	5.3		6.45	1,182.50	13.43	0.30	9.10	31.33	
13:33	6.0		6.45	1,180.90	13.58	0.29	9.20	24.47	

Sampling Activities

Sampled By: DC Sample Date/Time: 5/21/2025 13:33

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.45 pH 1,180.90 Spec. Cond. 13.58 Temp

Field Filtered: No Filter Type:

Water Level: 7.80 feet below TOC Drawdown: 0.01 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-3
Project Location:	Springfield, IL	**Sample ID:**	004
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 60 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 12:30

Static Water Level: 7.67 feet below TOC

Total Depth: 20.80 feet below TOC

Water Column: 13.13 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 13.13 ft. x 0.022 = 0.29 L x 3 Vol. = 0.87 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:30	0.0	231	purge start time						
12:44	3.2	↓	6.53	1,119.40	13.56	0.31	-53.20	26.92	
12:47	3.9		6.52	1,118.10	13.50	0.28	-55.50	18.11	
12:50	4.6		6.52	1,123.10	13.61	0.26	-57.30	13.70	
12:53	5.3		6.52	1,126.10	13.47	0.25	-58.50	10.62	
12:56	6.0		6.53	1,126.40	13.25	0.23	-59.30	9.17	

Sampling Activities

Sampled By: DC Sample Date/Time: 5/21/2025 12:56

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.53 pH 1,126.40 Spec. Cond. 13.25 Temp

Field Filtered: No Filter Type:

Water Level: 7.85 feet below TOC Drawdown: 0.18 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-4
Project Location:	Springfield, IL	**Sample ID:**	005
W.O. Number (s):	25051158	**Date (s):**	5/28/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Affiliation:

Weather Conditions

Temp: 62 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/28/2025 10:54

Static Water Level: 10.38 feet below TOC

Total Depth: 60.41 feet below TOC

Water Column: 50.03 feet

Purging Activities

Purged By: JC Purge Date: 5/28/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 50.03 ft. x 0.022 = 1.1 L x 3 Vol. = 3.3 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.00 L

Physical appearance of purge water: Cloudy Odor: None Color: greyish

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:55	0.0	194	purge start time						
11:04	1.8	↓	6.73	964.00	15.95	4.59	68.80	140.86	
11:07	2.3		6.71	968.70	15.99	4.08	68.80	195.05	
11:10	2.9		6.70	972.90	15.97	3.70	68.40	212.04	
11:13	3.5		6.69	975.00	15.91	3.41	67.70	229.67	
11:16	4.1		6.69	976.10	15.99	3.17	66.70	232.48	
11:19	4.7		6.69	976.70	16.07	2.98	65.40	217.94	
11:22	5.3		6.69	977.50	16.13	2.82	64.00	212.96	
11:25	5.8		6.68	977.90	16.26	2.69	62.30	196.53	
11:28	6.4		6.69	978.90	16.35	2.58	60.60	168.32	
11:31	7.0		6.69	978.70	16.43	2.48	58.70	170.33	

Sampling Activities

Sampled By: JC Sample Date/Time: 5/28/2025 11:31

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.69 pH 978.70 Spec. Cond. 16.43 Temp

Field Filtered: No Filter Type:

Water Level: 10.53 feet below TOC Drawdown: 0.15 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By: Justin Colp **Date:** 5/28/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-5
Project Location:	Springfield, IL	**Sample ID:**	006
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 57 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 9:43

Static Water Level: 14.41 feet below TOC

Total Depth: 31.27 feet below TOC

Water Column: 16.86 feet

Purging Activities

Purged By: JC Purge Date: 5/21/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 16.86 ft. x 0.022 = 0.37 L x 3 Vol. = 1.11 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 8.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:47	0.0	182	purge start time						
10:19	5.8	↓	6.65	835.40	12.91	3.23	41.90	1.79	
10:22	6.4		6.65	834.90	12.90	3.15	41.30	1.80	
10:25	6.9		6.66	834.60	12.93	3.08	40.80	2.00	
10:28	7.5		6.66	834.30	12.95	3.01	40.40	2.10	
10:31	8.0		6.67	834.20	12.95	2.95	40.00	2.33	

Sampling Activities

Sampled By: JC Sample Date/Time: 5/21/2025 10:31

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.67 pH 834.20 Spec. Cond. 12.95 Temp

Field Filtered: No Filter Type:

Water Level: 15.69 feet below TOC Drawdown: 1.28 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By: Justin Colp **Date:** 5/21/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-6
Project Location:	Springfield, IL	**Sample ID:**	007
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 62 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 13:52

Static Water Level: 7.77 feet below TOC

Total Depth: 39.62 feet below TOC

Water Column: 31.85 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 31.85 ft. x 0.022 = 0.7 L x 3 Vol. = 2.1 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:52	0.0	250	purge start time						
14:04	3.0	↓	7.08	648.70	12.84	1.40	62.10	8.84	
14:07	3.8		7.07	648.20	12.75	1.31	60.00	7.25	
14:10	4.5		7.01	648.70	12.78	1.26	61.60	5.84	
14:13	5.3		6.99	648.30	12.69	1.23	61.10	5.62	
14:16	6.0		7.00	648.50	12.62	1.25	60.20	4.05	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/21/2025 14:16

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.00 pH 648.50 Spec. Cond. 12.62 Temp

Field Filtered: No Filter Type:

Water Level: 7.79 feet below TOC Drawdown: 0.02 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-7
Project Location:	Springfield, IL	**Sample ID:**	008
W.O. Number (s):	25051158	**Date (s):**	5/27/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 64 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 11:27

Static Water Level: 10.64 feet below TOC

Total Depth: 42.52 feet below TOC

Water Column: 31.88 feet

Purging Activities

Purged By: JR Purge Date: 5/27/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 31.88 ft. x 0.022 = 0.7 L x 3 Vol. = 2.1 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:27	0.0	167	purge start time						
11:44	2.8	↓	7.13	730.50	12.22	0.65	-9.80	7.65	
11:47	3.3		7.12	736.70	12.30	0.60	-24.40	7.03	
11:50	3.8		7.11	746.90	12.37	0.57	-36.40	10.65	
11:53	4.3		7.13	759.20	12.49	0.54	-45.70	6.33	
11:56	4.8		7.14	769.70	12.47	0.51	-52.90	4.56	

Sampling Activities

Sampled By: JR Sample Date/Time: 5/27/2025 11:57

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.14 pH 769.70 Spec. Cond. 12.47 Temp

Field Filtered: No Filter Type:

Water Level: 10.69 feet below TOC Drawdown: 0.05 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/27/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: AP-8
Sample ID: 009
Date (s): 5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.
Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 10:45
Static Water Level: 4.01 feet below TOC
Total Depth: 39.60 feet below TOC
Water Column: 35.59 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 35.59 ft. x 0.022 = 0.78 L x 3 Vol. = 2.34 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.00 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:45	0.0	222	purge start time						
11:00	3.3	↓	6.78	878.60	13.40	1.19	-98.10	85.01	
11:03	4.0		6.78	876.10	13.37	1.08	-99.50	67.14	
11:06	4.7		6.78	876.00	13.43	1.03	-100.70	53.27	
11:09	5.3		6.78	875.20	13.54	1.02	-101.40	48.89	
11:12	6.0		6.78	876.20	13.52	0.96	-102.10	37.12	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/21/2025 11:12
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.78 pH 876.20 Spec. Cond. 13.52 Temp
Field Filtered: No Filter Type:
Water Level: 4.32 feet below TOC Drawdown: 0.31 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: AP-9
Sample ID: 010
Date (s): 5/27/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 61 °F Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☑ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 9:31
Static Water Level: 12.49 feet below TOC
Total Depth: 39.60 feet below TOC
Water Column: 27.11 feet

Purging Activities

Purged By: BG Purge Date: 5/27/2025
Purge Method: Submersible Pump Well Diameter: 2"
Purge Volume Calculation (L): 27.11 ft. x 0.022 = 0.6 L x 3 Vol. = 1.8 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:31	0.0	94	purge start time						
10:12	3.9	↓	6.77	982.90	13.57	2.08	265.00	47.03	
10:15	4.2		6.78	975.30	13.76	2.10	262.90	41.45	
10:18	4.4		6.78	973.40	13.70	1.96	258.40	41.67	
10:21	4.7		6.78	966.30	13.72	1.80	250.10	43.68	
10:24	5.0		6.79	963.40	13.68	1.71	239.20	45.24	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/27/2025 10:24
Sample Method: Low Flow Sample Equipment: Submersible Pump
Sample Parameters: 6.79 pH 963.40 Spec. Cond. 13.68 Temp
Field Filtered: No Filter Type:
Water Level: 12.62 feet below TOC Drawdown: 0.13 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/27/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-10
Project Location:	Springfield, IL	**Sample ID:**	011
W.O. Number (s):	25051158	**Date (s):**	5/21/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 11:35

Static Water Level: 3.92 feet below TOC

Total Depth: 38.07 feet below TOC

Water Column: 34.15 feet

Purging Activities

Purged By: DC Purge Date: 5/21/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 34.15 ft. x 0.022 = 0.75 L x 3 Vol. = 2.25 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:35	0.0	207	purge start time						
11:52	3.5	↓	6.62	1,101.10	13.82	0.91	-82.30	55.50	
11:55	4.1		6.62	1,099.50	13.83	0.86	-84.10	87.61	
11:58	4.8		6.62	1,102.00	14.05	0.84	-85.70	179.00	
12:01	5.4		6.63	1,103.20	14.02	0.83	-86.90	162.87	
12:04	6.0		6.63	1,102.80	13.99	0.81	-87.60	136.71	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/21/2025 12:04

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.63 pH 1,102.80 Spec. Cond. 13.99 Temp

Field Filtered: No Filter Type:

Water Level: 4.21 feet below TOC Drawdown: 0.29 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/21/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-11
Project Location:	Springfield, IL	**Sample ID:**	012
W.O. Number (s):	25051158	**Date (s):**	5/22/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 58 °F Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 10:30

Static Water Level: 12.03 feet below TOC

Total Depth: 22.95 feet below TOC

Water Column: 10.92 feet

Purging Activities

Purged By: DC Purge Date: 5/22/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 10.92 ft. x 0.022 = 0.24 L x 3 Vol. = 0.72 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:30	0.0	160	purge start time						
10:43	2.1	↓	6.55	1,117.80	13.61	1.51	167.70	22.69	
10:46	2.6		6.54	1,106.60	13.79	1.35	168.40	13.78	
10:49	3.0		6.54	1,110.80	13.51	1.16	167.80	9.56	
10:52	3.5		6.53	1,105.70	13.30	1.13	167.10	9.02	
10:55	4.0		6.53	1,107.80	13.03	1.09	166.10	8.90	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/22/2025 10:55

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.53 pH 1,107.80 Spec. Cond. 13.03 Temp

Field Filtered: No Filter Type:

Water Level: 12.05 feet below TOC Drawdown: 0.02 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/22/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-12
Project Location:	Springfield, IL	**Sample ID:**	013
W.O. Number (s):	25051158	**Date (s):**	5/22/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 11:12

Static Water Level: 15.16 feet below TOC

Total Depth: 30.40 feet below TOC

Water Column: 15.24 feet

Purging Activities

Purged By: DC Purge Date: 5/22/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 15.24 ft. x 0.022 = 0.34 L x 3 Vol. = 1.02 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Cloudy Odor: None Color: Lt Orange

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:12	0.0	154	purge start time						
11:25	2.0	↓	6.51	1,328.30	13.10	1.22	110.10	211.77	
11:28	2.5		6.51	1,325.30	12.91	1.11	102.10	174.11	
11:31	2.9		6.51	1,322.60	12.99	1.09	95.20	135.07	
11:34	3.4		6.50	1,323.50	13.32	1.07	88.80	95.93	
11:37	3.8		6.50	1,325.90	13.42	1.05	82.70	98.34	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/22/2025 11:38

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.50 pH 1,325.90 Spec. Cond. 13.42 Temp

Field Filtered: No Filter Type:

Water Level: 15.26 feet below TOC Drawdown: 0.10 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/22/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: AP-13
Sample ID: 014
Date (s): 5/22/2025

Field Team Members

Name: Danny Crump — Affiliation: TekLab, Inc.
Name: Brett Gillihan — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F — Wind Direction: ☐ N ☐ S ☐ E ☑ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 12:37
Static Water Level: 14.73 feet below TOC
Total Depth: 31.00 feet below TOC
Water Column: 16.27 feet

Purging Activities

Purged By: DC — Purge Date: 5/22/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 16.27 ft. x 0.022 = 0.36 L x 3 Vol. = 1.08 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Clear — Odor: None — Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:37	0.0	167	purge start time						
12:55	3.0	↓	6.70	758.80	12.97	1.02	-46.10	22.00	
12:58	3.5		6.69	756.60	12.69	0.99	-46.90	17.69	
13:01	4.0		6.69	755.70	12.62	0.97	-47.60	16.88	
13:04	4.5		6.68	755.30	12.56	0.94	-47.90	12.02	
13:07	5.0		6.68	754.60	12.56	0.93	-48.10	25.44	

Sampling Activities

Sampled By: BG — Sample Date/Time: 5/22/2025 13:07
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.68 pH — 754.60 Spec. Cond. — 12.56 Temp
Field Filtered: No — Filter Type:
Water Level: 14.96 feet below TOC — Drawdown: 0.23 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan — **Date:** 5/22/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-14
Project Location:	Springfield, IL	**Sample ID:**	015
W.O. Number (s):	25051158	**Date (s):**	5/27/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Affiliation:

Weather Conditions

Temp: 65 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 13:07

Static Water Level: 2.72 feet below TOC

Total Depth: 31.20 feet below TOC

Water Column: 28.48 feet

Purging Activities

Purged By: JC Purge Date: 5/27/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 28.48 ft. x 0.022 = 0.63 L x 3 Vol. = 1.89 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 9.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:06	0.0	237	purge start time						
13:14	1.9	↓	7.16	2,023.70	14.74	5.78	111.10	16.61	
13:17	2.6		7.11	2,023.20	14.71	5.30	110.80	7.27	
13:20	3.3		7.08	2,021.40	14.44	4.94	110.30	5.26	
13:23	4.0		7.06	2,022.40	14.39	4.63	109.60	2.83	
13:26	4.7		7.05	2,023.00	14.34	4.37	108.80	6.82	
13:29	5.4		7.04	2,023.20	14.33	4.15	107.90	5.66	
13:32	6.2		7.03	2,025.90	14.57	3.94	106.90	14.55	
13:35	6.9		7.03	2,026.70	14.56	3.76	105.80	9.22	
13:38	7.6		7.03	2,026.10	14.52	3.59	105.00	3.49	
13:41	8.3		7.03	2,023.50	14.40	3.45	104.30	2.62	
13:44	9.0		7.02	2,021.50	14.34	3.33	103.50	3.23	

Sampling Activities

Sampled By: JC Sample Date/Time: 5/27/2025 13:44

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 7.02 pH 2,021.50 Spec. Cond. 14.34 Temp

Field Filtered: No Filter Type:

Water Level: 3.09 feet below TOC Drawdown: 0.37 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By: Justin Colp **Date:** 5/27/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: T-1
Sample ID: 016
Date (s): 5/22/2025

Field Team Members

Name: Danny Crump — Affiliation: TekLab, Inc.
Name: Brett Gillihan — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 60 °F — Wind Direction: ☐ N ☐ S ☐ E ☑ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 13:23
Static Water Level: 10.86 feet below TOC
Total Depth: 22.95 feet below TOC
Water Column: 12.09 feet

Purging Activities

Purged By: DC — Purge Date: 5/22/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 12.09 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Clear — Odor: None — Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:23	0.0	185	purge start time						
13:38	2.8	↓	6.60	1,281.40	12.17	1.05	31.10	53.11	
13:41	3.3		6.59	1,285.80	12.23	0.99	33.80	40.42	
13:44	3.9		6.59	1,286.30	12.21	0.97	36.40	35.04	
13:47	4.4		6.58	1,285.40	12.26	0.96	39.00	31.18	
13:50	5.0		6.58	1,284.90	12.26	0.98	41.30	24.38	

Sampling Activities

Sampled By: BG — Sample Date/Time: 5/22/2025 13:50
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.58 pH — 1,284.90 Spec. Cond. — 12.26 Temp
Field Filtered: No — Filter Type:
Water Level: 11.25 feet below TOC — Drawdown: 0.39 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan — **Date:** 5/22/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-2
Project Location:	Springfield, IL	**Sample ID:**	017
W.O. Number (s):	25051158	**Date (s):**	5/22/2025

Field Team Members

Name: Danny Crump Affiliation: TekLab, Inc.

Name: Brett Gillihan Affiliation: TekLab, Inc.

Weather Conditions

Temp: 58 °F Wind Direction: ☐ N ☐ S ☐ E ☑ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 11:58

Static Water Level: 23.83 feet below TOC

Total Depth: 34.44 feet below TOC

Water Column: 10.61 feet

Purging Activities

Purged By: DC Purge Date: 5/22/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 10.61 ft. x 0.022 = 0.23 L x 3 Vol. = 0.69 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:58	0.0	238	purge start time						
12:07	2.1	↓	6.54	1,700.10	12.86	1.85	-31.10	14.04	
12:10	2.9		6.53	1,705.50	13.33	2.37	-37.90	18.37	
12:13	3.6		6.54	1,718.20	13.74	2.71	-43.30	18.19	
12:16	4.3		6.54	1,731.30	13.91	3.00	-47.10	17.42	
12:19	5.0		6.55	1,742.30	13.96	3.03	-49.80	17.28	

Sampling Activities

Sampled By: BG Sample Date/Time: 5/22/2025 12:19

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.55 pH 1,742.30 Spec. Cond. 13.96 Temp

Field Filtered: No Filter Type:

Water Level: 23.98 feet below TOC Drawdown: 0.15 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/22/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-4
Project Location:	Springfield, IL	**Sample ID:**	018
W.O. Number (s):	25051158	**Date (s):**	5/27/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 62 °F Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☑ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 10:44

Static Water Level: 15.64 feet below TOC

Total Depth: 27.42 feet below TOC

Water Column: 11.78 feet

Purging Activities

Purged By: BG Purge Date: 5/27/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 11.78 ft. x 0.022 = 0.26 L x 3 Vol. = 0.78 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:44	0.0	250	purge start time						
10:52	2.0	↓	6.68	650.50	13.27	1.64	190.40	21.71	
10:55	2.8		6.65	647.50	13.59	1.72	194.10	26.95	
10:58	3.5		6.63	645.50	13.45	1.70	196.90	23.73	
11:01	4.3		6.63	642.60	13.50	1.63	199.00	26.12	
11:04	5.0		6.63	641.30	13.46	1.58	200.60	22.74	

Sampling Activities

Sampled By: JR Sample Date/Time: 5/27/2025 11:04

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.63 pH 641.30 Spec. Cond. 13.46 Temp

Field Filtered: No Filter Type:

Water Level: 15.80 feet below TOC Drawdown: 0.16 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/27/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-5
Project Location:	Springfield, IL	**Sample ID:**	019
W.O. Number (s):	25051158	**Date (s):**	5/27/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 66 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 12:59

Static Water Level: 8.57 feet below TOC

Total Depth: 22.34 feet below TOC

Water Column: 13.77 feet

Purging Activities

Purged By: BG Purge Date: 5/27/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 13.77 ft. x 0.022 = 0.3 L x 3 Vol. = 0.9 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:59	0.0	167	purge start time						
13:11	2.0	↓	6.78	543.10	16.36	1.21	28.70	11.50	
13:14	2.5		6.77	540.30	16.12	1.17	32.60	10.59	
13:17	3.0		6.77	539.10	16.07	1.15	36.50	9.76	
13:20	3.5		6.77	537.20	16.00	1.13	40.10	10.74	
13:23	4.0		6.77	536.50	15.94	1.13	43.80	9.87	

Sampling Activities

Sampled By: JR Sample Date/Time: 5/27/2025 13:23

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.77 pH 536.50 Spec. Cond. 15.94 Temp

Field Filtered: No Filter Type:

Water Level: 9.14 feet below TOC Drawdown: 0.57 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/27/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: T-6
Sample ID: 020
Date (s): 5/27/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 65 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/27/2025 12:15
Static Water Level: 8.83 feet below TOC
Total Depth: 43.62 feet below TOC
Water Column: 34.79 feet

Purging Activities

Purged By: JR Purge Date: 5/27/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 34.79 ft. x 0.022 = 0.77 L x 3 Vol. = 2.31 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:15	0.0	217	purge start time						
12:26	2.4	↓	6.99	858.40	16.17	1.46	-87.50	4.90	
12:29	3.0		6.99	862.80	15.83	1.30	-95.50	6.02	
12:32	3.7		6.99	857.20	15.83	1.16	-101.10	8.20	
12:35	4.3		6.99	855.90	15.95	1.19	-104.50	6.31	
12:38	5.0		7.00	859.60	16.00	1.14	-107.10	8.81	

Sampling Activities

Sampled By: JR Sample Date/Time: 5/27/2025 12:38
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 7.00 pH 859.60 Spec. Cond. 16.00 Temp
Field Filtered: No Filter Type:
Water Level: 9.05 feet below TOC Drawdown: 0.22 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 44716

Form Completed By: Brett Gillihan **Date:** 5/27/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AW-1
Project Location:	Springfield, IL	**Sample ID:**	021
W.O. Number (s):	25051158	**Date (s):**	5/22/2025

Field Team Members

Name: Payton Yoch — Affiliation: TekLab, Inc.

Name: Justin Colp — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 57 °F — Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☑ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/22/2025 9:50

Static Water Level: 13.77 feet below TOC

Total Depth: 54.81 feet below TOC

Water Column: 41.04 feet

Purging Activities

Purged By: PY — Purge Date: 5/22/2025

Purge Method: Peristaltic Pump — Well Diameter: 2"

Purge Volume Calculation (L): 41.04 ft. x 0.022 = 0.9 L x 3 Vol. = 2.7 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear — Odor: None — Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:55	0.0	172	purge start time						
10:12	2.9	↓	6.89	1,482.50	13.66	7.29	70.00	4.06	
10:15	3.4		6.90	1,480.20	13.86	7.16	70.40	4.64	
10:18	4.0		6.92	1,478.90	14.31	7.08	70.70	4.12	
10:21	4.5		6.94	1,478.80	14.50	7.10	71.00	3.38	
10:24	5.0		6.96	1,477.40	14.65	7.19	71.50	3.55	

Sampling Activities

Sampled By: PY — Sample Date/Time: 5/22/2025 10:24

Sample Method: Low Flow — Sample Equipment: Peristaltic Pump

Sample Parameters: 6.96 pH — 1,477.40 Spec. Cond. — 14.65 Temp

Field Filtered: Yes — Filter Type: Inline Disposable

Water Level: 15.72 feet below TOC — Drawdown: 1.95 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By: Payton K — **Date:** 5/22/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25051158
Monitoring Point: G120
Sample ID: 022
Date (s): 5/21/2025

Field Team Members

Name: Payton Yoch — Affiliation: TekLab, Inc.
Name: Justin Colp — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 61 °F — Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☑ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 13:34
Static Water Level: 16.18 feet below TOC
Total Depth: 50.37 feet below TOC
Water Column: 34.19 feet

Purging Activities

Purged By: PY — Purge Date: 5/21/2025
Purge Method: Submersible Pump — Well Diameter: 2"
Purge Volume Calculation (L): 34.19 ft. x 0.022 = 0.75 L x 3 Vol. = 2.25 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 7.00 L
Physical appearance of purge water: Slightly cloudy — Odor: Slight — Color: None

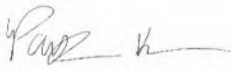
Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:25	0.0	212	purge start time						
13:43	3.8	↓	6.59	1,943.40	15.75	3.59	77.90	15.49	
13:46	4.5		6.58	1,946.40	15.82	3.31	73.60	15.45	
13:49	5.1		6.58	1,947.80	15.70	3.11	68.80	20.89	
13:52	5.7		6.57	1,946.60	15.86	2.95	63.60	18.90	
13:55	6.4		6.57	1,949.50	15.88	2.82	58.10	13.31	
13:58	7.0		6.57	1,948.40	15.95	2.71	52.50	13.58	

Sampling Activities

Sampled By: PY — Sample Date/Time: 5/21/2025 13:58
Sample Method: Low Flow — Sample Equipment: Submersible Pump
Sample Parameters: 6.57 pH — 1,948.40 Spec. Cond. — 15.95 Temp
Field Filtered: Yes — Filter Type: Inline Disposable
Water Level: 16.30 feet below TOC — Drawdown: 0.12 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By:  **Date:** 5/21/2025

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25051158
Technician(s): DC, JC, BG, PY

Field Calibration Log(s)
CWLP- 2Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 44716 Technician(s): Brett Gillihan Date: 5/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/21/25 9:19
7.0 Buffer	WC250407A	7.00	5/21/25 9:12
10.0 Buffer	WC240625A	10.00	5/21/25 9:25
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1412	5/21/25 9:31

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.23	5/21/25 9:37
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-BG	LCS	5/21/25 9:41	17	7.01	1,447	0.63		
CCV-1-BG	CCV	5/21/25 16:03	17.8	7.04	1,422	0.66		

Comments:

Field Meter ID: Pine 44716 Technician(s): Brett Gillihan Date: 5/22/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/22/25 9:40
7.0 Buffer	WC250407A	7.00	5/22/25 9:35
10.0 Buffer	WC240625A	10.00	5/22/25 9:50
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1418	5/22/25 9:53

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.17	5/22/25 9:56
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-BG	LCS	5/22/25 10:30	18.1	6.94	1,436	0.45		
CCV-2-BG	CCV	5/22/25 14:19	17.1	7.02	1,439	0.66		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25051158
Technician(s): DC, JC, BG, PY

Field Calibration Log(s)
CWLP- 2Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 44716 Technician(s): Brett Gillihan Date: 5/27/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/27/25 8:17
7.0 Buffer	WC25047A	7.00	5/27/25 8:10
10.0 Buffer	WC240625A	10.00	5/27/25 8:26
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1413	5/27/25 8:36

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.23	5/27/25 8:43
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-BG	LCS	5/27/25 8:48	16.9	7.05	1,443	0.42		
CCV-3-BG	CCV	5/27/25 14:12	18.6	7.03	1,464	0.54		

Comments:

Field Meter ID: Pine 44716 Technician(s): Brett Gillihan Date: 5/28/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/28/25 8:37
7.0 Buffer	WC25047A	7.00	5/28/25 8:28
10.0 Buffer	WC240625A	10.00	5/28/25 8:43
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1418	5/28/25 8:49

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.19	5/28/25 8:52
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-4-BG	LCS	5/28/25 8:55	17.1	6.99	1,446	0.35		
CCV-4-BG	CCV	5/28/25 12:08	18.4	7.02	1,425	0.48		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25051158
Technician(s): DC, JC, BG, PY

Field Calibration Log(s)
CWLP- 2Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210760 Technician(s): justin colp Date: 5/21/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc250102a	4.00	5/21/25 9:19
7.0 Buffer	wc250407a	7.00	5/21/25 9:14
10.0 Buffer	wc240625a	10.00	5/21/25 9:24
LCS/CCV (7.0 Buffer)	wc240918a		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1412	5/21/25 9:29

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.12	5/21/25 9:30
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-JC	LCS	5/21/25 9:34	18.9	6.98	1,410	1.08		
CCV-1-JC	CCV	5/21/25 14:37	20	6.96	1,434	1.05		

Comments:

Field Meter ID: Pine 210760 Technician(s): Payton Yoch Date: 5/22/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/22/25 9:14
7.0 Buffer	WC250407A	7.00	5/22/25 9:09
10.0 Buffer	WC240625A	10.00	5/22/25 9:20
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1412	5/22/25 9:23

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.07	5/22/25 9:31
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-PY	LCS	5/22/25 9:38	17.3	7.05	1,412	1.07		
CCV-2-PY	CCV	5/22/25 14:14	18.5	6.98	1,415	1.08		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25051158
Technician(s): DC, JC, BG, PY

Field Calibration Log(s)
CWLP- 2Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 210760 Technician(s): justin colp Date: 5/27/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/27/25 8:56
7.0 Buffer	WC250407A	7.00	5/27/25 8:50
10.0 Buffer	WC240625A	10.00	5/27/25 9:01
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1412	5/27/25 9:07

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.21	5/27/25 9:08
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-JC	LCS	5/27/25 9:11	19.2	6.96	1,407	1.24		
CCV-3-JC	CCV	5/27/25 14:15	21.9	7.02	1,404	1.31		

Comments:

Field Meter ID: Pine 210760 Technician(s): justin colp Date: 5/28/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	5/28/25 8:47
7.0 Buffer	WC250407A	7.00	5/28/25 8:43
10.0 Buffer	WC240625A	10.00	5/28/25 8:51
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	103743	1412	5/28/25 8:57

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.12	5/28/25 8:58
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-4-JC	LCS	5/28/25 9:03	20.5	6.97	1,409	1.16		
CCV-4-JC	CCV	5/28/25 12:20	20.8	6.93	1,400	1.57		

Comments:

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Elizabeth A Hurley
TekLab, Inc
5445 Horseshoe Lake Road
Collinsville, Illinois 62234

Generated 6/26/2025 3:10:42 PM

JOB DESCRIPTION

Radium-226 and Radium-228
25051158

JOB NUMBER

160-58259-1

Eurofins St. Louis
13715 Rider Trail North
Earth City MO 63045

See page two for job notes and contact information.

myEOL

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

Authorization

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Authorized for release by
Erika Smith, Project Manager
erika.smith@et.eurofinsus.com
(314)298-8566

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CASE NARRATIVE

Client: TekLab, Inc

Project: 25051158

Report Number: 160-58259-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition, all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method.

Eurofins Environment Testing attests to the validity of the laboratory data generated by Eurofins facilities reported herein. All analyses performed by Eurofins Environment Testing facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins Environment Testing's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report.

Calculations are performed before rounding to avoid round-off errors in calculated results.

Proper preservation was noted for the methods performed on these samples, unless otherwise detailed below.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

No additional analytical or quality issues were noted, other than those described below or in the Definitions/ Glossary page.

Receipt
The samples were received on 5/29/2025 9:26 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved. The temperatures of the 3 coolers at receipt time were 11.2°C, 18.4°C and 18.6°C.

Receipt Exceptions
The container label for the following samples did not match the information listed on the Chain-of-Custody (COC): 25052389-001 (160-58258-1), 25051158-001 (160-58259-1), 25051158-002 (160-58259-2), 25051158-003 (160-58259-3), 25051158-004 (160-58259-4), 25051158-005 (160-58259-5), 25051158-006 (160-58259-6), 25051158-007 (160-58259-7), 25051158-008 (160-58259-8), 25051158-009 (160-58259-9), 25051158-010 (160-58259-10), 25051158-011 (160-58259-11), 25051158-012 (160-58259-12), 25051158-013 (160-58259-13), 25051158-014 (160-58259-14), 25051158-015 (160-58259-15), 25051158-016 (160-58259-16), 25051158-017 (160-58259-17), 25051158-018 (160-58259-18), 25051158-019 (160-58259-19), 25051158-020 (160-58259-20), 25051158-021 (160-58259-21) and 25051158-022 (160-58259-22). The container labels list B at the end of the sample IDs, while the COC lists no B at the end of the sample IDs. The sample ID was logged in per the COC.

Method 903.0 - Radium-226 (GFPC)
Samples 25051158-001 (160-58259-1), 25051158-002 (160-58259-2), 25051158-003 (160-58259-3), 25051158-004 (160-58259-4), 25051158-005 (160-58259-5), 25051158-006 (160-58259-6), 25051158-007 (160-58259-7), 25051158-008 (160-58259-8), 25051158-009 (160-58259-9), 25051158-010 (160-58259-10), 25051158-011 (160-58259-11), 25051158-012 (160-58259-12), 25051158-013 (160-58259-13), 25051158-014 (160-58259-14), 25051158-015 (160-58259-15), 25051158-016 (160-58259-16), 25051158-017 (160-58259-17), 25051158-018 (160-58259-18), 25051158-019 (160-58259-19), 25051158-020 (160-58259-20), 25051158-021 (160-58259-21) and 25051158-022 (160-58259-22) were analyzed for Radium-226 (GFPC). The samples were prepared on 6/2/2025 and analyzed on 6/24/2025 and 6/25/2025.

Job ID: 160-58259-1 (Continued)

Method 904.0 - Radium-228 (GFPC)
Samples 25051158-001 (160-58259-1), 25051158-002 (160-58259-2), 25051158-003 (160-58259-3), 25051158-004 (160-58259-4), 25051158-005 (160-58259-5), 25051158-006 (160-58259-6), 25051158-007 (160-58259-7), 25051158-008 (160-58259-8), 25051158-009 (160-58259-9), 25051158-010 (160-58259-10), 25051158-011 (160-58259-11), 25051158-012 (160-58259-12), 25051158-013 (160-58259-13), 25051158-014 (160-58259-14), 25051158-015 (160-58259-15), 25051158-016 (160-58259-16), 25051158-017 (160-58259-17), 25051158-018 (160-58259-18), 25051158-019 (160-58259-19), 25051158-020 (160-58259-20), 25051158-021 (160-58259-21) and 25051158-022 (160-58259-22) were analyzed for Radium-228 (GFPC). The samples were prepared on 6/2/2025 and analyzed on 6/24/2025 and 6/25/2025.

The detection goal was not met for the following sample due to the reduced sample volume attributed to the presence of matrix interferences: 25051158-022 (160-58259-22). Analytical results are reported with the detection limit achieved.

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: client QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per methods specified for Vistra/Ramboll projects.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested. Vistra-EDD requested.

Project# 25051158

Contact: Shelly Hennessy Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT Billing/PO: 38673 Phone: 618-344-1004 ex 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226	Radium 228
	25051158-001	5/21/25 10:20	HNO3	Groundwater	✔	✔
	25051158-002	5/28/25 9:56	HNO3	Groundwater	✔	✔
	25051158-003	5/21/25 13:33	HNO3	Groundwater	✔	✔
	25051158-004	5/21/25 12:56	HNO3	Groundwater	✔	✔
	25051158-005	5/28/25 11:31	HNO3	Groundwater	✔	✔
	25051158-006	5/21/25 10:31	HNO3	Groundwater	✔	✔
	25051158-007	5/21/25 14:16	HNO3	Groundwater	✔	✔
	25051158-008	5/27/25 11:57	HNO3	Groundwater	✔	✔
	25051158-009	5/21/25 11:12	HNO3	Groundwater	✔	✔
	25051158-010	5/27/25 10:24	HNO3	Groundwater	✔	✔
	25051158-011	5/21/25 12:04	HNO3	Groundwater	✔	✔

160-58259 Chain of Custody

*Relinquished By	Date/Time	Received By	Date/Time
[signature]	5/29/25 0830	[signature]	5/29/25 0830
	5/29/25 0926	M. Pinette	5/29/25 0926

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

SubCocRevA
3/2/2016

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: client | QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Please analyze for Radium 226/228 per methods specified for Vistra/Ramboll projects.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested. Vistra-EDD requested.

Project# 25051158

Contact: Shelly Hennessy | Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT | Billing/PO: 38673 | Phone: 618-344-1004 ex 36

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Extd 5/29/25

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix		Radium 226	Radium 228										
	25051158-012	5/22/25 10:55	HNO3	Groundwater		✔	✔										
	25051158-013	5/22/25 11:38	HNO3	Groundwater		✔	✔										
	25051158-014	5/22/25 13:07	HNO3	Groundwater		✔	✔										
	25051158-015	5/27/25 13:44	HNO3	Groundwater		✔	✔										
	25051158-016	5/22/25 13:50	HNO3	Groundwater		✔	✔										
	25051158-017	5/22/25 12:19	HNO3	Groundwater		✔	✔										
	25051158-018	5/27/25 ~~1:04~~ 1104	HNO3	Groundwater		✔	✔										
	25051158-019	5/27/25 13:25	HNO3	Groundwater		✔	✔										
	25051158-020	5/27/25 12:38	HNO3	Groundwater		✔	✔										
	25051158-021	5/22/25 10:24	HNO3	Groundwater		✔	✔										
	25051158-022	5/21/25 13:58	HNO3	Groundwater		✔	✔										

*Relinquished By	Date/Time	Received By	Date/Time
	5/29/25 0930	M. Pinette	5/29/25 0930
	5/29/25 0926		5/29/25 0926

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SubCocRevA
3/2/2016

6/26/2025

Login Sample Receipt Checklist

Client: TekLab, Inc

Job Number: 160-58259-1
SDG Number: 25051158

Login Number: 58259
List Number: 1
Creator: Pinette, Meadow L

List Source: Eurofins St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	False	IDs on containers do not match the COC. Logged in per COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Qualifiers

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency
None = None

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-58259-1	25051158-001	Water	05/21/25 10:20	05/29/25 09:26
160-58259-2	25051158-002	Water	05/28/25 09:56	05/29/25 09:26
160-58259-3	25051158-003	Water	05/21/25 13:33	05/29/25 09:26
160-58259-4	25051158-004	Water	05/21/25 12:56	05/29/25 09:26
160-58259-5	25051158-005	Water	05/28/25 11:31	05/29/25 09:26
160-58259-6	25051158-006	Water	05/21/25 10:31	05/29/25 09:26
160-58259-7	25051158-007	Water	05/21/25 14:16	05/29/25 09:26
160-58259-8	25051158-008	Water	05/27/25 11:57	05/29/25 09:26
160-58259-9	25051158-009	Water	05/21/25 11:12	05/29/25 09:26
160-58259-10	25051158-010	Water	05/27/25 10:24	05/29/25 09:26
160-58259-11	25051158-011	Water	05/21/25 12:04	05/29/25 09:26
160-58259-12	25051158-012	Water	05/22/25 10:55	05/29/25 09:26
160-58259-13	25051158-013	Water	05/22/25 11:38	05/29/25 09:26
160-58259-14	25051158-014	Water	05/22/25 13:07	05/29/25 09:26
160-58259-15	25051158-015	Water	05/27/25 13:44	05/29/25 09:26
160-58259-16	25051158-016	Water	05/22/25 13:50	05/29/25 09:26
160-58259-17	25051158-017	Water	05/22/25 12:19	05/29/25 09:26
160-58259-18	25051158-018	Water	05/27/25 11:04	05/29/25 09:26
160-58259-19	25051158-019	Water	05/27/25 13:25	05/29/25 09:26
160-58259-20	25051158-020	Water	05/27/25 12:38	05/29/25 09:26
160-58259-21	25051158-021	Water	05/22/25 10:24	05/29/25 09:26
160-58259-22	25051158-022	Water	05/21/25 13:58	05/29/25 09:26

Client Sample ID: 25051158-001

Date Collected: 05/21/25 10:20
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-1

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.169	U	0.223	0.224	1.00	0.374	pCi/L	06/02/25 08:39	06/24/25 18:17	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.6*		*30 - 110*	*06/02/25 08:39*	*06/24/25 18:17*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.859**		0.476	0.483	1.00	0.670	pCi/L	06/02/25 08:45	06/24/25 12:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.6*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:28*	*1*
Y Carrier	*77.0*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:28*	*1*

Client Sample ID: 25051158-002

Date Collected: 05/28/25 09:56
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-2

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.312	U	0.225	0.226	1.00	0.315	pCi/L	06/02/25 08:39	06/24/25 18:17	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*06/02/25 08:39*	*06/24/25 18:17*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.602**		0.384	0.388	1.00	0.570	pCi/L	06/02/25 08:45	06/24/25 12:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:28*	*1*
Y Carrier	*83.0*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:28*	*1*

Client Sample ID: 25051158-003

Date Collected: 05/21/25 13:33
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-3

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.318	U	0.270	0.272	1.00	0.414	pCi/L	06/02/25 08:39	06/24/25 18:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*30 - 110*	*06/02/25 08:39*	*06/24/25 18:19*	*1*

Client Sample ID: 25051158-003
Date Collected: 05/21/25 13:33
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-3
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0327	U	0.330	0.330	1.00	0.626	pCi/L	06/02/25 08:45	06/24/25 12:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:22*	*1*
Y Carrier	*78.9*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:22*	*1*

Client Sample ID: 25051158-004
Date Collected: 05/21/25 12:56
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-4
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.000	U	0.164	0.164	1.00	0.340	pCi/L	06/02/25 08:39	06/24/25 18:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*30 - 110*	*06/02/25 08:39*	*06/24/25 18:19*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.181	U	0.277	0.277	1.00	0.581	pCi/L	06/02/25 08:45	06/24/25 12:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:22*	*1*
Y Carrier	*81.1*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:22*	*1*

Client Sample ID: 25051158-005
Date Collected: 05/28/25 11:31
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-5
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.731**		0.436	0.441	1.00	0.566	pCi/L	06/02/25 08:39	06/24/25 18:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*30 - 110*	*06/02/25 08:39*	*06/24/25 18:19*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.14**		0.645	0.653	1.00	0.913	pCi/L	06/02/25 08:45	06/24/25 12:22	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*30 - 110*	*06/02/25 08:45*	*06/24/25 12:22*	*1*

Client Sample ID: 25051158-005
Date Collected: 05/28/25 11:31
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-5
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	81.1		30 - 110	06/02/25 08:45	06/24/25 12:22	1

Client Sample ID: 25051158-006
Date Collected: 05/21/25 10:31
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-6
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.106	U	0.193	0.194	1.00	0.343	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	83.8		30 - 110	06/02/25 08:18	06/25/25 16:29	1

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0430	U	0.305	0.306	1.00	0.590	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	83.8		30 - 110	06/02/25 08:26	06/25/25 12:08	1
Y Carrier	78.5		30 - 110	06/02/25 08:26	06/25/25 12:08	1

Client Sample ID: 25051158-007
Date Collected: 05/21/25 14:16
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-7
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.112	U	0.192	0.192	1.00	0.428	pCi/L	06/02/25 08:18	06/25/25 16:28	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	87.8		30 - 110	06/02/25 08:18	06/25/25 16:28	1

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.279	U	0.362	0.363	1.00	0.602	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	87.8		30 - 110	06/02/25 08:26	06/25/25 12:08	1
Y Carrier	80.7		30 - 110	06/02/25 08:26	06/25/25 12:08	1

Client Sample ID: 25051158-008

Lab Sample ID: 160-58259-8
Date Collected: 05/27/25 11:57
Matrix: Water
Date Received: 05/29/25 09:26

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.304	U	0.244	0.245	1.00	0.357	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.886**		0.446	0.453	1.00	0.622	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*
Y Carrier	*78.5*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*

Client Sample ID: 25051158-009

Lab Sample ID: 160-58259-9
Date Collected: 05/21/25 11:12
Matrix: Water
Date Received: 05/29/25 09:26

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**1.23**		0.433	0.447	1.00	0.408	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.783**		0.486	0.491	1.00	0.705	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*
Y Carrier	*77.0*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*

Client Sample ID: 25051158-010

Lab Sample ID: 160-58259-10
Date Collected: 05/27/25 10:24
Matrix: Water
Date Received: 05/29/25 09:26

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.324	U	0.247	0.249	1.00	0.357	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Client Sample ID: 25051158-010
Date Collected: 05/27/25 10:24
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-10
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.130	U	0.274	0.274	1.00	0.483	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*
Y Carrier	*81.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*

Client Sample ID: 25051158-011
Date Collected: 05/21/25 12:04
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-11
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**1.12**		0.465	0.476	1.00	0.552	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.14**		0.573	0.582	1.00	0.807	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*
Y Carrier	*81.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:08*	*1*

Client Sample ID: 25051158-012
Date Collected: 05/22/25 10:55
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-12
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.259	U	0.245	0.246	1.00	0.381	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.04**		0.435	0.446	1.00	0.569	pCi/L	06/02/25 08:26	06/25/25 12:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:06*	*1*

Client Sample ID: 25051158-012
Date Collected: 05/22/25 10:55
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-12
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	*77.4*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:06*	*1*

Client Sample ID: 25051158-013
Date Collected: 05/22/25 11:38
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-13
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.130	U	0.216	0.216	1.00	0.375	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*92.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.448	U	0.345	0.347	1.00	0.527	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*92.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*79.6*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-014
Date Collected: 05/22/25 13:07
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-14
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.322	U	0.236	0.237	1.00	0.329	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*86.1*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.792**		0.446	0.452	1.00	0.647	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*86.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*79.6*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-015

Date Collected: 05/27/25 13:44
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-15

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.200	U	0.201	0.202	1.00	0.312	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.227	U	0.388	0.388	1.00	0.662	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*77.8*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-016

Date Collected: 05/22/25 13:50
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-16

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.198	U	0.230	0.231	1.00	0.371	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.571	U	0.482	0.485	1.00	0.754	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*77.8*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-017

Date Collected: 05/22/25 12:19
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-17

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.166	U	0.188	0.188	1.00	0.302	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Client Sample ID: 25051158-017
Date Collected: 05/22/25 12:19
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-17
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.601		0.367	0.371	1.00	0.530	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*78.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-018
Date Collected: 05/27/25 11:04
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-18
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.289		0.207	0.209	1.00	0.283	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.186	U	0.346	0.346	1.00	0.596	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*
Y Carrier	*76.6*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-019
Date Collected: 05/27/25 13:25
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-19
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.173	U	0.213	0.214	1.00	0.351	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.293	U	0.378	0.379	1.00	0.630	pCi/L	06/02/25 08:26	06/25/25 12:09	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-019
Date Collected: 05/27/25 13:25
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-19
Matrix: Water

Method: EPA 904.0 - Radium-228 (GFPC) (Continued)

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Y Carrier	*80.4*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:09*	*1*

Client Sample ID: 25051158-020
Date Collected: 05/27/25 12:38
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-20
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.114	U	0.356	0.356	1.00	0.650	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*82.1*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.86**		0.654	0.676	1.00	0.781	pCi/L	06/02/25 08:26	06/25/25 12:10	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*82.1*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*
Y Carrier	*78.5*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*

Client Sample ID: 25051158-021
Date Collected: 05/22/25 10:24
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-21
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0111	U	0.161	0.161	1.00	0.326	pCi/L	06/02/25 08:18	06/25/25 18:32	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*90.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 18:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.508**		0.335	0.338	1.00	0.489	pCi/L	06/02/25 08:26	06/25/25 12:10	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*90.3*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*
Y Carrier	*80.0*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*

Client Sample Results

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Client Sample ID: 25051158-022

Date Collected: 05/21/25 13:58
Date Received: 05/29/25 09:26

Lab Sample ID: 160-58259-22

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.38		0.558	0.572	1.00	0.573	pCi/L	06/02/25 08:18	06/25/25 18:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*30 - 110*	*06/02/25 08:18*	*06/25/25 18:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.45	G	0.739	0.751	1.00	1.02	pCi/L	06/02/25 08:26	06/25/25 12:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*
Y Carrier	*80.4*		*30 - 110*	*06/02/25 08:26*	*06/25/25 12:10*	*1*

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-720229/1-A
Matrix: Water
Analysis Batch: 724268

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 720229

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.06815	U	0.230	0.230	1.00	0.425	pCi/L	06/02/25 08:18	06/25/25 16:29	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.3*		*30 - 110*	*06/02/25 08:18*	*06/25/25 16:29*	*1*

Lab Sample ID: LCS 160-720229/2-A
Matrix: Water
Analysis Batch: 724268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 720229

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			9.58	9.380		1.27	1.00	0.336	pCi/L	98	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*88.6*		*30 - 110*

Lab Sample ID: MB 160-720233/1-A
Matrix: Water
Analysis Batch: 724135

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 720233

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.002253	U	0.189	0.189	1.00	0.378	pCi/L	06/02/25 08:39	06/24/25 17:24	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.6*		*30 - 110*	*06/02/25 08:39*	*06/24/25 17:24*	*1*

Lab Sample ID: LCS 160-720233/2-A
Matrix: Water
Analysis Batch: 724118

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 720233

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			9.58	8.745		1.20	1.00	0.338	pCi/L	91	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*87.8*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-720230/1-A
Matrix: Water
Analysis Batch: 724268

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 720230

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.2063	U	0.298	0.299	1.00	0.612	pCi/L	06/02/25 08:26	06/25/25 12:08	1

Method: 904.0 - Radium-228 (GFPC) (Continued)

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	87.3		30 - 110	06/02/25 08:26	06/25/25 12:08	1
Y Carrier	80.7		30 - 110	06/02/25 08:26	06/25/25 12:08	1

Lab Sample ID: LCS 160-720230/2-A
Matrix: Water
Analysis Batch: 724268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 720230

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			9.32	11.15		1.48	1.00	0.541	pCi/L	120	75 - 125		

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	88.6		30 - 110
Y Carrier	82.6		30 - 110

Lab Sample ID: MB 160-720234/1-A
Matrix: Water
Analysis Batch: 724136

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 720234

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2252	U	0.337	0.338	1.00	0.572	pCi/L	06/02/25 08:45	06/24/25 12:26	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	86.6		30 - 110	06/02/25 08:45	06/24/25 12:26	1
Y Carrier	79.6		30 - 110	06/02/25 08:45	06/24/25 12:26	1

Lab Sample ID: LCS 160-720234/2-A
Matrix: Water
Analysis Batch: 724136

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 720234

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			9.32	10.81		1.45	1.00	0.519	pCi/L	116	75 - 125		

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	87.8		30 - 110
Y Carrier	81.9		30 - 110

QC Association Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Rad

Prep Batch: 720229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-58259-6	25051158-006	Total/NA	Water	PrecSep-21	
160-58259-7	25051158-007	Total/NA	Water	PrecSep-21	
160-58259-8	25051158-008	Total/NA	Water	PrecSep-21	
160-58259-9	25051158-009	Total/NA	Water	PrecSep-21	
160-58259-10	25051158-010	Total/NA	Water	PrecSep-21	
160-58259-11	25051158-011	Total/NA	Water	PrecSep-21	
160-58259-12	25051158-012	Total/NA	Water	PrecSep-21	
160-58259-13	25051158-013	Total/NA	Water	PrecSep-21	
160-58259-14	25051158-014	Total/NA	Water	PrecSep-21	
160-58259-15	25051158-015	Total/NA	Water	PrecSep-21	
160-58259-16	25051158-016	Total/NA	Water	PrecSep-21	
160-58259-17	25051158-017	Total/NA	Water	PrecSep-21	
160-58259-18	25051158-018	Total/NA	Water	PrecSep-21	
160-58259-19	25051158-019	Total/NA	Water	PrecSep-21	
160-58259-20	25051158-020	Total/NA	Water	PrecSep-21	
160-58259-21	25051158-021	Total/NA	Water	PrecSep-21	
160-58259-22	25051158-022	Total/NA	Water	PrecSep-21	
MB 160-720229/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-720229/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 720230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-58259-6	25051158-006	Total/NA	Water	PrecSep_0	
160-58259-7	25051158-007	Total/NA	Water	PrecSep_0	
160-58259-8	25051158-008	Total/NA	Water	PrecSep_0	
160-58259-9	25051158-009	Total/NA	Water	PrecSep_0	
160-58259-10	25051158-010	Total/NA	Water	PrecSep_0	
160-58259-11	25051158-011	Total/NA	Water	PrecSep_0	
160-58259-12	25051158-012	Total/NA	Water	PrecSep_0	
160-58259-13	25051158-013	Total/NA	Water	PrecSep_0	
160-58259-14	25051158-014	Total/NA	Water	PrecSep_0	
160-58259-15	25051158-015	Total/NA	Water	PrecSep_0	
160-58259-16	25051158-016	Total/NA	Water	PrecSep_0	
160-58259-17	25051158-017	Total/NA	Water	PrecSep_0	
160-58259-18	25051158-018	Total/NA	Water	PrecSep_0	
160-58259-19	25051158-019	Total/NA	Water	PrecSep_0	
160-58259-20	25051158-020	Total/NA	Water	PrecSep_0	
160-58259-21	25051158-021	Total/NA	Water	PrecSep_0	
160-58259-22	25051158-022	Total/NA	Water	PrecSep_0	
MB 160-720230/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-720230/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Prep Batch: 720233

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-58259-1	25051158-001	Total/NA	Water	PrecSep-21	
160-58259-2	25051158-002	Total/NA	Water	PrecSep-21	
160-58259-3	25051158-003	Total/NA	Water	PrecSep-21	
160-58259-4	25051158-004	Total/NA	Water	PrecSep-21	
160-58259-5	25051158-005	Total/NA	Water	PrecSep-21	
MB 160-720233/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-720233/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

QC Association Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Rad

Prep Batch: 720234

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-58259-1	25051158-001	Total/NA	Water	PrecSep_0	
160-58259-2	25051158-002	Total/NA	Water	PrecSep_0	
160-58259-3	25051158-003	Total/NA	Water	PrecSep_0	
160-58259-4	25051158-004	Total/NA	Water	PrecSep_0	
160-58259-5	25051158-005	Total/NA	Water	PrecSep_0	
MB 160-720234/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-720234/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Tracer/Carrier Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water | **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba (30-110)
160-58259-1	25051158-001	74.6
160-58259-2	25051158-002	90.5
160-58259-3	25051158-003	86.8
160-58259-4	25051158-004	83.8
160-58259-5	25051158-005	102
160-58259-6	25051158-006	83.8
160-58259-7	25051158-007	87.8
160-58259-8	25051158-008	83.3
160-58259-9	25051158-009	91.3
160-58259-10	25051158-010	85.1
160-58259-11	25051158-011	92.3
160-58259-12	25051158-012	91.0
160-58259-13	25051158-013	92.3
160-58259-14	25051158-014	86.1
160-58259-15	25051158-015	88.3
160-58259-16	25051158-016	92.5
160-58259-17	25051158-017	91.3
160-58259-18	25051158-018	94.3
160-58259-19	25051158-019	83.8
160-58259-20	25051158-020	82.1
160-58259-21	25051158-021	90.3
160-58259-22	25051158-022	92.5
LCS 160-720229/2-A	Lab Control Sample	88.6
LCS 160-720233/2-A	Lab Control Sample	87.8
MB 160-720229/1-A	Method Blank	87.3
MB 160-720233/1-A	Method Blank	86.6

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water | **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba (30-110)	Y (30-110)
160-58259-1	25051158-001	74.6	77.0
160-58259-2	25051158-002	90.5	83.0
160-58259-3	25051158-003	86.8	78.9
160-58259-4	25051158-004	83.8	81.1
160-58259-5	25051158-005	102	81.1
160-58259-6	25051158-006	83.8	78.5
160-58259-7	25051158-007	87.8	80.7
160-58259-8	25051158-008	83.3	78.5
160-58259-9	25051158-009	91.3	77.0
160-58259-10	25051158-010	85.1	81.1
160-58259-11	25051158-011	92.3	81.1
160-58259-12	25051158-012	91.0	77.4
160-58259-13	25051158-013	92.3	79.6
160-58259-14	25051158-014	86.1	79.6

Tracer/Carrier Summary

Client: TekLab, Inc
Project/Site: Radium-226 and Radium-228

Job ID: 160-58259-1
SDG: 25051158

Method: 904.0 - Radium-228 (GFPC) (Continued)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba (30-110)	Y (30-110)
160-58259-15	25051158-015	88.3	77.8
160-58259-16	25051158-016	92.5	77.8
160-58259-17	25051158-017	91.3	78.1
160-58259-18	25051158-018	94.3	76.6
160-58259-19	25051158-019	83.8	80.4
160-58259-20	25051158-020	82.1	78.5
160-58259-21	25051158-021	90.3	80.0
160-58259-22	25051158-022	92.5	80.4
LCS 160-720230/2-A	Lab Control Sample	88.6	82.6
LCS 160-720234/2-A	Lab Control Sample	87.8	81.9
MB 160-720230/1-A	Method Blank	87.3	80.7
MB 160-720234/1-A	Method Blank	86.6	79.6

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

June 23, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10438
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Landfill Monitoring Wells **WorkOrder:** 25051157

Dear Eric Staley:

TEKLAB, INC received 12 samples on 5/27/2025 3:35:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Landfill Monitoring Wells

Work Order: 25051157
Report Date: 23-Jun-25

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	31
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25051157

Client Project: Landfill Monitoring Wells **Report Date:** 23-Jun-25

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

Client: City Water, Light & Power
Work Order: 25051157
Client Project: Landfill Monitoring Wells
Report Date: 23-Jun-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Landfill Monitoring Wells

Work Order: 25051157
Report Date: 23-Jun-25

Cooler Receipt Temp: 5.9 °C

An employee of Teklab, Inc. collected the sample(s).

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power

Work Order: 25051157

Client Project: Landfill Monitoring Wells

Report Date: 23-Jun-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10438	NELAP	7/31/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2026	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2025	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2025	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2026	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power **Work Order:** 25051157

Client Project: Landfill Monitoring Wells **Report Date:** 23-Jun-25

Lab ID: 25051157-003 **Client Sample ID:** R111

Matrix: GROUNDWATER **Collection Date:** 05/21/2025 12:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.25**	ft	1	05/21/2025 12:22	R365851
Depth to water	*	-5.00		**25.19**	ft	1	05/21/2025 12:22	R365851
Depth to water from measuring point	*	0		**25.19**	ft	1	05/21/2025 12:22	R365851
Elevation of groundwater surface	*	0		**528.81**	ft	1	05/21/2025 12:22	R365851
Measuring Point Elevation	*	0		**554.00**	ft	1	05/21/2025 12:22	R365851
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.9**	°F	1	05/21/2025 12:22	R365851
SW-846 9040B								
pH, Field	*	1.00		**6.71**		1	05/21/2025 12:22	R365851
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1500**	µmhos/cm @25C	1	05/21/2025 12:22	R365851
EPA 600 350.1 (DISSOLVED)								
Nitrogen, Ammonia (as N)	NELAP	0.10		**2.97**	mg/L	1	05/22/2025 20:38	R365449
EPA 600 350.1 (TOTAL)								
Nitrogen, Ammonia (as N)	NELAP	0.10		**2.87**	mg/L	1	05/22/2025 20:35	R365449
EPA 600 353.2 R2.0 (DISSOLVED)								
Nitrogen, Nitrate (as N)	NELAP	0.050		**< 0.050**	mg/L	1	05/22/2025 17:00	R365466
EPA 600 353.2 R2.0 (TOTAL)								
Nitrogen, Nitrate (as N)	NELAP	0.050		**< 0.050**	mg/L	1	05/22/2025 17:31	R365466
STANDARD METHODS 2540 C (DISSOLVED) 2020								
Total Dissolved Solids	NELAP	100	H	**770**	mg/L	5	05/29/2025 9:39	R365837
STANDARD METHODS 5210 B 2011, 2016								
Biochemical Oxygen Demand	NELAP	10		**< 10**	mg/L	1	05/21/2025 20:24	239455
STANDARD METHODS 5220 D (TOTAL) 1997, 2011								
Chemical Oxygen Demand	NELAP	50		**< 50**	mg/L	1	05/27/2025 10:13	R365563
SW-846 9012A (TOTAL)								
Cyanide	NELAP	0.005		**< 0.005**	mg/L	1	05/23/2025 15:27	239530
SW846 9056A DISSOLVED ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Chloride	NELAP	5.00		**184**	mg/L	10	05/22/2025 10:54	R365418
Sulfate	NELAP	10.0		**30.2**	mg/L	10	05/22/2025 10:54	R365418
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	05/22/2025 9:25	R365418
Chloride	NELAP	5.00		**179**	mg/L	10	05/22/2025 9:25	R365418
Sulfate	NELAP	10.0		**28.5**	mg/L	10	05/22/2025 9:25	R365418
SW-846 9060A								
Total Organic Carbon (TOC)	NELAP	2.0		**2.3**	mg/L	2	05/28/2025 15:58	R365637
SW-846 3005A, 6010B, METALS BY ICP (DISSOLVED)								
Boron	NELAP	20.0		**3720**	µg/L	1	05/29/2025 14:03	239534
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	05/29/2025 14:03	239534
Chromium	NELAP	4.0		**< 4.0**	µg/L	1	05/29/2025 14:03	239534
Magnesium	NELAP	0.050		**71.0**	mg/L	1	05/29/2025 14:03	239534
Zinc	NELAP	10.0		**< 10.0**	µg/L	1	05/29/2025 14:03	239534
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Aluminum	NELAP	25.0		**44.2**	µg/L	1	06/03/2025 16:24	239883

Client: City Water, Light & Power
Work Order: 25051157
Client Project: Landfill Monitoring Wells
Report Date: 23-Jun-25
Lab ID: 25051157-003
Client Sample ID: R111
Matrix: GROUNDWATER
Collection Date: 05/21/2025 12:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**696**	µg/L	1	05/29/2025 8:27	239494
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	05/29/2025 8:27	239494
Boron	NELAP	20.0		**3980**	µg/L	1	05/29/2025 8:27	239494
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	05/29/2025 8:27	239494
Calcium	NELAP	0.100	B	**166**	mg/L	1	05/29/2025 8:27	239494
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	05/29/2025 8:27	239494
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	05/29/2025 8:27	239494
Copper	NELAP	5.0		**< 5.0**	µg/L	1	05/29/2025 8:27	239494
Iron	NELAP	40.0	B	**12300**	µg/L	1	05/29/2025 8:27	239494
Magnesium	NELAP	0.050	B	**72.5**	mg/L	1	05/30/2025 8:26	239494
Manganese	NELAP	7.0		**112**	µg/L	1	05/29/2025 8:27	239494
Nickel	NELAP	5.0		**< 5.0**	µg/L	1	05/29/2025 8:27	239494
Potassium	NELAP	0.100		**1.94**	mg/L	1	05/29/2025 8:27	239494
Selenium	NELAP	40.0		**< 40.0**	µg/L	1	05/29/2025 8:27	239494
Silver	NELAP	7.0		**< 7.0**	µg/L	1	05/29/2025 8:27	239494
Sodium	NELAP	0.050	B	**36.9**	mg/L	1	05/29/2025 8:27	239494
Vanadium	NELAP	10.0		**< 10.0**	µg/L	1	05/29/2025 8:27	239494
Zinc	NELAP	10.0		**< 10.0**	µg/L	1	05/29/2025 8:27	239494
Sample results for Ca, Mg and Na exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Sample result for Fe exceeds 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (DISSOLVED)								
Arsenic	NELAP	1.0		**16.1**	µg/L	5	05/23/2025 10:47	239534
Lead	NELAP	1.0		**< 1.0**	µg/L	5	05/23/2025 10:47	239534
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	05/28/2025 18:04	239494
Arsenic	NELAP	1.0		**21.5**	µg/L	5	05/27/2025 20:24	239494
Lead	NELAP	1.0		**< 1.0**	µg/L	5	05/28/2025 18:04	239494
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	05/28/2025 18:04	239494
SW-846 7470A (DISSOLVED)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/22/2025 17:01	239492
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	05/22/2025 16:58	239492

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051157

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

5.3, 8.3

Client: City Water, Light & Power

Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building

City/State/Zip: Springfield IL 62712

Contact: Eric Staley Phone: (217) 757-8610

Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 5.9 °C 9

Preserved in: [ ] LAB [X] FIELD FOR LAB USE ONLY

LAB NOTES: HV 101358/98858

LH 5/21/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No

Are these samples known to be hazardous? [ ] Yes [✓] No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:

Quarter 2

*elevations, pH, conductivity, temperature

**As B Cd Cr Pb Mg Hg Zn

***Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn

PROJECT NAME/NUMBER

Landfill Monitoring Wells G1-G2

SAMPLE COLLECTOR'S NAME

Payton Tock

RESULTS REQUESTED

[ ] Standard [ ] 1-2 Day (100% Surcharge)

[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

	Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl SO4 TDS (D)	Metals (D)**	Cyanide	Nitrate (D)	Ammonia (D)	Metals (T)***	BOD Cl F SO4 (T)	NH3 COD TOC	Nitrate (T)
*	25051157-001	R101		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	002	G110	5/21/25 1123	Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	003	R111	5/21/25 1222	Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	004	G112		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	005	G113		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	006	G120	5/21/25 1358	Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*	007	G121		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*	008	G122		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*	009	AW-1		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*	010	AW-2		Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*	011	RW-3	5-21-25 1020	Groundwater	2	2	1	4						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
	5-21/1605		5/21/25 1605

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25051157

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
Quarter 2
*elevations, pH, conductivity, temperature
**As B Cd Cr Pb Mg Hg Zn
***Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn

PROJECT NAME/NUMBER
Landfill Monitoring Wells G1-G2

SAMPLE COLLECTOR'S NAME

RESULTS REQUESTED
☐ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl SO4 TDS (D)	Metals (D)**	Cyanide	Nitrate (D)	Ammonia (D)	Metals (T)***	BOD Cl F SO4 (T)	NH3 COD TOC	Nitrate (T)
25051157-012	Duplicate		Groundwater	2	2	1	4							✔	✔	✔	✔	✔	✔	✔	✔	✔
			Groundwater																			
			Groundwater																			
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Relinquished By	Date/Time	Received By	Date/Time
	5-21/1605		5/21/25 1605

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051157

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

7.1

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 4.5 °C 9
Preserved in: ☐ LAB ☒ FIELD FOR LAB USE ONLY
LAB NOTES: PH 101358 98858
JD 5/22/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
Quarter 2
*elevations, pH, conductivity, temperature
**As B Cd Cr Pb Mg Hg Zn
***Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn

PROJECT NAME/NUMBER
Landfill Monitoring Wells G1-G2

SAMPLE COLLECTOR'S NAME
Payton Tock

RESULTS REQUESTED
☐ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl SO4 TDS (D)	Metals (D)**	Cyanide	Nitrate (D)	Ammonia (D)	Metals (T)***	BOD Cl F SO4 (T)	NH3 COD TOC	Nitrate (T)
* 25051157 001	R101		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
002	G110		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
003	R111		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
004	G112		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
005	G113		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
006	G120		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
* 007	G121	5/22/25 1143	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
* 008	G122	5/22/25 1245	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
* 009	AW-1	5/22/25 1024	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
* 010	AW-2	5/22/25 1344	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
* 011	RW-3		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5-22/ 1545	[signature]	5/22/25 1545

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25051157

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
Quarter 2
*elevations, pH, conductivity, temperature
**As B Cd Cr Pb Mg Hg Zn
***Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn

PROJECT NAME/NUMBER
Landfill Monitoring Wells G1-G2

SAMPLE COLLECTOR'S NAME

RESULTS REQUESTED
☐ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl SO4 TDS (D)	Metals (D)**	Cyanide	Nitrate (D)	Ammonia (D)	Metals (T)***	BOD Cl F SO4 (T)	NH3 COD TOC	Nitrate (T)
25051157 012	Duplicate		Groundwater	2	2	1	4							✔	✔	✔	✔	✔	✔	✔	✔	✔
			Groundwater																			
			Groundwater																			
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			Groundwater																			

Relinquished By	Date/Time	Received By	Date/Time
	5-22/1545		5/22/25 1545

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

Print PDF

CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25051157

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 13.1/16.3°C 5
Preserved in: ☑ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES: Date and time collected for sample R101 from 25051159 workorder. PHV 101358 : 98858

Client Comments: Added NaOH (102642) to G113. EK 5/27/25
Quarter 2
*elevations, pH, conductivity, temperature
**As B Cd Cr Pb Mg Hg Zn
***Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

PROJECT NAME/NUMBER
Landfill Monitoring Wells G1-G2

SAMPLE COLLECTOR'S NAME
Justin Colp

RESULTS REQUESTED
☐ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl SO4 TDS (D)	Metals (D)**	Cyanide	Nitrate (D)	Ammonia (D)	Metals (T)***	BOD Cl F SO4 (T)	NH3 COD TOC	Nitrate (T)
* 25051157 001	R101	5-27-25 1046	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
002	G110		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
003	R111		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
004	G112	5-27-25 1241	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
005	G113	5-27-25 1140	Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
006	G120		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
007	G121		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
008	G122		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
009	AW-1		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
010	AW-2		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
011	RW-3		Groundwater	2	2	1	4						✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
[signature]	5-27/1535	Emily Kossakowski	5/27/25 1535

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

APPENDIX C-3:

Third Quarter 2025

Laboratory Analytical Report and Field Notes

Field Data Sheet

Project Name:	Landfill Monitoring Wells	**Monitoring Point:**	R111
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25051157	**Date (s):**	5/21/2025

Field Team Members

Name: Payton Yoch Affiliation: TekLab, Inc.

Name: Justin Colp Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F Wind Direction: ☐ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☑ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 5/21/2025 11:44

Static Water Level: 25.19 feet below TOC

Total Depth: 55.75 feet below TOC

Water Column: 30.56 feet

Purging Activities

Purged By: PY Purge Date: 5/21/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.56 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear Odor: Moderate Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:44	0.0	132	purge start time						
12:10	3.4	↓	6.70	1,476.10	14.76	2.46	71.30	3.92	
12:13	3.8		6.70	1,480.10	14.74	2.38	68.30	3.20	
12:16	4.2		6.71	1,488.60	14.71	2.31	65.40	2.38	
12:19	4.6		6.71	1,494.20	15.06	2.25	62.20	2.21	
12:22	5.0		6.71	1,501.00	14.93	2.20	59.10	1.99	

Sampling Activities

Sampled By: PY Sample Date/Time: 5/21/2025 12:22

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

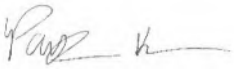
Sample Parameters: 6.71 pH 1,501.00 Spec. Cond. 14.93 Temp

Field Filtered: Yes Filter Type: Inline Disposable

Water Level: 25.31 feet below TOC Drawdown: 0.12 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 210760

Form Completed By:  **Date:** 5/21/2025

October 09, 2025

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Illinois	1004652024-2
Kansas	E-10438
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Ash Pond Monitoring Wells **WorkOrder:** 25080110

Dear Eric Staley:

TEKLAB, INC received 22 samples on 8/13/2025 2:36:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25080110
Report Date: 09-Oct-25

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	29
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25080110

Client Project: Ash Pond Monitoring Wells **Report Date:** 09-Oct-25

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25080110
Report Date: 09-Oct-25

Cooler Receipt Temp: 4.3 °C

An employee of Teklab, Inc. collected the sample(s).

Radium-226 & -228 analysis was performed by Alliance Technical Group. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power

Work Order: 25080110

Client Project: Ash Pond Monitoring Wells

Report Date: 09-Oct-25

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2026	Collinsville
Illinois	IEPA	1004652024-2	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10438	NELAP	7/31/2026	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2026	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2026	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2026	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2025	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2025	Collinsville
Kentucky	KWLCP	KY98006		12/31/2025	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2026	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-001
Client Sample ID: RW-3
Matrix: GROUNDWATER
Collection Date: 08/12/2025 13:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.49**	ft	1	08/12/2025 13:32	R369783
Depth to water	*	-5.00		**7.87**	ft	1	08/12/2025 13:32	R369783
Depth to water from measuring point	*	0		**10.57**	ft	1	08/12/2025 13:32	R369783
Elevation of groundwater surface	*	0		**528.93**	ft	1	08/12/2025 13:32	R369783
Measuring Point Elevation	*	0		**539.50**	ft	1	08/12/2025 13:32	R369783
Measuring Point Height Above Land Surface	*	0		**2.70**	ft	1	08/12/2025 13:32	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**13**	NTU	1	08/12/2025 13:32	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.3**	°F	1	08/12/2025 13:32	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.92**		1	08/12/2025 13:32	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**794**	µmhos/cm @25C	1	08/12/2025 13:32	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**440**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 12:51	R369781
Chloride	NELAP	5.00		**26.4**	mg/L	10	08/13/2025 12:51	R369781
Sulfate	NELAP	10.0		**ND**	mg/L	10	08/13/2025 12:51	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.169**	mg/L	1	08/14/2025 18:11	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:11	243344
Boron	NELAP	0.0200		**0.160**	mg/L	1	08/14/2025 18:11	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:11	243344
Calcium	NELAP	0.100		**73.9**	mg/L	1	08/14/2025 18:11	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:11	243344
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:11	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:11	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:11	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:36	243344
Arsenic	NELAP	0.0010		**0.103**	mg/L	5	08/15/2025 3:45	243344
Lithium	*	0.0030		**0.0080**	mg/L	5	08/16/2025 0:00	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:36	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 14:36	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 14:55	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-002
Client Sample ID: AP-1
Matrix: GROUNDWATER
Collection Date: 08/12/2025 11:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**504.29**	ft	1	08/12/2025 11:55	R369783
Depth to water	*	-5.00		**8.95**	ft	1	08/12/2025 11:55	R369783
Depth to water from measuring point	*	0		**11.22**	ft	1	08/12/2025 11:55	R369783
Elevation of groundwater surface	*	0		**524.15**	ft	1	08/12/2025 11:55	R369783
Measuring Point Elevation	*	0		**535.37**	ft	1	08/12/2025 11:55	R369783
Measuring Point Height Above Land Surface	*	0		**2.27**	ft	1	08/12/2025 11:55	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**11**	NTU	1	08/12/2025 11:55	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.5**	°F	1	08/12/2025 11:55	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.42**		1	08/12/2025 11:55	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2100**	µmhos/cm @25C	1	08/12/2025 11:55	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1870**	mg/L	1	08/14/2025 16:05	R369886
Stable weight could not be achieved after multiple drying, cooling, and weighing. Lowest final weight reported.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 13:26	R369781
Chloride	NELAP	5.00		**51.8**	mg/L	10	08/13/2025 13:26	R369781
Sulfate	NELAP	10.0		**884**	mg/L	10	08/13/2025 13:26	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.276**	mg/L	1	08/14/2025 18:12	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:12	243344
Boron	NELAP	0.200		**23.0**	mg/L	10	08/18/2025 13:19	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:12	243344
Calcium	NELAP	0.100		**259**	mg/L	1	08/14/2025 18:12	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:12	243344
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:12	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:12	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:12	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:42	243344
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 3:51	243344
Lithium	*	0.0030		**0.0114**	mg/L	5	08/16/2025 0:06	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:42	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 14:42	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 14:57	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-003
Client Sample ID: AP-2
Matrix: GROUNDWATER
Collection Date: 08/12/2025 12:26

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.77**	ft	1	08/12/2025 12:26	R369783
Depth to water	*	-5.00		**6.10**	ft	1	08/12/2025 12:26	R369783
Depth to water from measuring point	*	0		**8.60**	ft	1	08/12/2025 12:26	R369783
Elevation of groundwater surface	*	0		**527.50**	ft	1	08/12/2025 12:26	R369783
Measuring Point Elevation	*	0		**536.10**	ft	1	08/12/2025 12:26	R369783
Measuring Point Height Above Land Surface	*	0		**2.50**	ft	1	08/12/2025 12:26	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.4**	NTU	1	08/12/2025 12:26	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**62.0**	°F	1	08/12/2025 12:26	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.30**		1	08/12/2025 12:26	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1610**	µmhos/cm @25C	1	08/12/2025 12:26	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1280**	mg/L	1	08/14/2025 16:05	R369886
Stable weight could not be achieved after multiple drying, cooling, and weighing. Lowest final weight reported.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 13:37	R369781
Chloride	NELAP	5.00		**36.0**	mg/L	10	08/13/2025 13:37	R369781
Sulfate	NELAP	10.0		**422**	mg/L	10	08/13/2025 13:37	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0736**	mg/L	1	08/14/2025 18:12	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:12	243344
Boron	NELAP	0.0200		**3.43**	mg/L	1	08/14/2025 18:12	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:12	243344
Calcium	NELAP	0.100		**216**	mg/L	1	08/14/2025 18:12	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:12	243344
Cobalt	NELAP	0.0050		**0.0127**	mg/L	1	08/14/2025 18:12	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:12	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:12	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:49	243344
Arsenic	NELAP	0.0010		**0.0014**	mg/L	5	08/15/2025 3:57	243344
Lithium	*	0.0030		**0.0087**	mg/L	5	08/16/2025 0:12	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:49	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 14:49	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:00	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-004
Client Sample ID: AP-3
Matrix: GROUNDWATER
Collection Date: 08/12/2025 12:58

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.45**	ft	1	08/12/2025 12:58	R369783
Depth to water	*	-5.00		**6.18**	ft	1	08/12/2025 12:58	R369783
Depth to water from measuring point	*	0		**8.73**	ft	1	08/12/2025 12:58	R369783
Elevation of groundwater surface	*	0		**526.52**	ft	1	08/12/2025 12:58	R369783
Measuring Point Elevation	*	0		**535.25**	ft	1	08/12/2025 12:58	R369783
Measuring Point Height Above Land Surface	*	0		**2.55**	ft	1	08/12/2025 12:58	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**2.9**	NTU	1	08/12/2025 12:58	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.2**	°F	1	08/12/2025 12:58	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.36**		1	08/12/2025 12:58	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1620**	µmhos/cm @25C	1	08/12/2025 12:58	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1400**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 13:49	R369781
Chloride	NELAP	5.00		**71.2**	mg/L	10	08/13/2025 13:49	R369781
Sulfate	NELAP	10.0		**609**	mg/L	10	08/13/2025 13:49	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.121**	mg/L	1	08/14/2025 18:13	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:13	243344
Boron	NELAP	0.0200		**16.5**	mg/L	1	08/14/2025 18:13	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:13	243344
Calcium	NELAP	0.100		**205**	mg/L	1	08/14/2025 18:13	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:13	243344
Cobalt	NELAP	0.0050		**0.0076**	mg/L	1	08/20/2025 13:09	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:13	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:13	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:55	243344
Arsenic	NELAP	0.0010		**0.0160**	mg/L	5	08/15/2025 4:04	243344
Lithium	*	0.0030		**0.0078**	mg/L	5	08/16/2025 1:03	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 14:55	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 14:55	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:02	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-005
Client Sample ID: AP-4
Matrix: GROUNDWATER
Collection Date: 08/12/2025 10:40

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.19**	ft	1	08/12/2025 10:40	R369783
Depth to water	*	-5.00		**7.72**	ft	1	08/12/2025 10:40	R369783
Depth to water from measuring point	*	0		**10.86**	ft	1	08/12/2025 10:40	R369783
Elevation of groundwater surface	*	0		**544.74**	ft	1	08/12/2025 10:40	R369783
Measuring Point Elevation	*	0		**555.60**	ft	1	08/12/2025 10:40	R369783
Measuring Point Height Above Land Surface	*	0		**3.14**	ft	1	08/12/2025 10:40	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**120**	NTU	1	08/12/2025 10:40	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**67.5**	°F	1	08/12/2025 10:40	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.64**		1	08/12/2025 10:40	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1000**	µmhos/cm @25C	1	08/12/2025 10:40	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**574**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 14:36	R369781
Chloride	NELAP	5.00		**12.4**	mg/L	10	08/13/2025 14:36	R369781
Sulfate	NELAP	10.0		**ND**	mg/L	10	08/13/2025 14:36	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.413**	mg/L	1	08/14/2025 18:14	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:14	243344
Boron	NELAP	0.0200		**0.0940**	mg/L	1	08/14/2025 18:14	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:14	243344
Calcium	NELAP	0.100		**124**	mg/L	1	08/14/2025 18:14	243344
Chromium	NELAP	0.0050		**0.0051**	mg/L	1	08/14/2025 18:14	243344
Cobalt	NELAP	0.0050		**0.0075**	mg/L	1	08/18/2025 13:20	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:14	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:14	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:01	243344
Arsenic	NELAP	0.0010		**0.0248**	mg/L	5	08/15/2025 4:10	243344
Lithium	*	0.0030		**0.0127**	mg/L	5	08/16/2025 1:09	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:01	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 15:01	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:04	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 08/12/2025 9:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	08/12/2025 9:56	R369783
Depth to water	*	-5.00		**13.64**	ft	1	08/12/2025 9:56	R369783
Depth to water from measuring point	*	0		**15.94**	ft	1	08/12/2025 9:56	R369783
Elevation of groundwater surface	*	0		**567.96**	ft	1	08/12/2025 9:56	R369783
Measuring Point Elevation	*	0		**583.90**	ft	1	08/12/2025 9:56	R369783
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	08/12/2025 9:56	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**25**	NTU	1	08/12/2025 9:56	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.3**	°F	1	08/12/2025 9:56	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.64**		1	08/12/2025 9:56	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**868**	µmhos/cm @25C	1	08/12/2025 9:56	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**568**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 14:48	R369781
Chloride	NELAP	5.00		**9.50**	mg/L	10	08/13/2025 14:48	R369781
Sulfate	NELAP	10.0		**69.1**	mg/L	10	08/13/2025 14:48	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0595**	mg/L	1	08/14/2025 18:18	243344
Beryllium	NELAP	0.0005		**0.0006**	mg/L	1	08/14/2025 18:18	243344
Boron	NELAP	0.0200		**0.0351**	mg/L	1	08/14/2025 18:18	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:18	243344
Calcium	NELAP	0.100		**108**	mg/L	1	08/14/2025 18:18	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:18	243344
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:18	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:18	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:18	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:07	243344
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 4:16	243344
Lithium	*	0.0030		**0.0061**	mg/L	5	08/16/2025 1:15	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:07	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 15:07	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:07	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-007
Client Sample ID: AP-6
Matrix: GROUNDWATER
Collection Date: 08/12/2025 11:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.20**	ft	1	08/12/2025 11:20	R369783
Depth to water	*	-5.00		**5.71**	ft	1	08/12/2025 11:20	R369783
Depth to water from measuring point	*	0		**8.13**	ft	1	08/12/2025 11:20	R369783
Elevation of groundwater surface	*	0		**529.69**	ft	1	08/12/2025 11:20	R369783
Measuring Point Elevation	*	0		**537.82**	ft	1	08/12/2025 11:20	R369783
Measuring Point Height Above Land Surface	*	0		**2.42**	ft	1	08/12/2025 11:20	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**7.1**	NTU	1	08/12/2025 11:20	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.7**	°F	1	08/12/2025 11:20	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.89**		1	08/12/2025 11:20	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**819**	µmhos/cm @25C	1	08/12/2025 11:20	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**482**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.53**	mg/L	10	08/13/2025 14:59	R369781
Chloride	NELAP	5.00		**37.5**	mg/L	10	08/13/2025 14:59	R369781
Sulfate	NELAP	10.0		**ND**	mg/L	10	08/13/2025 14:59	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.168**	mg/L	1	08/14/2025 18:19	243344
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 18:19	243344
Boron	NELAP	0.0200		**0.278**	mg/L	1	08/14/2025 18:19	243344
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 18:19	243344
Calcium	NELAP	0.100		**67.3**	mg/L	1	08/14/2025 18:19	243344
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:19	243344
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 18:19	243344
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 18:19	243344
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 18:19	243344
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:39	243344
Arsenic	NELAP	0.0010		**0.0068**	mg/L	5	08/15/2025 5:07	243344
Lithium	*	0.0030		**0.0092**	mg/L	5	08/16/2025 1:22	243344
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 15:39	243344
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 15:39	243344
Sample result(s) for Li exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:09	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-008
Client Sample ID: AP-7
Matrix: GROUNDWATER
Collection Date: 08/13/2025 9:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.50**	ft	1	08/13/2025 10:07	R369783
Depth to water	*	-5.00		**9.05**	ft	1	08/13/2025 10:07	R369783
Depth to water from measuring point	*	0		**11.71**	ft	1	08/13/2025 10:07	R369783
Elevation of groundwater surface	*	0		**527.31**	ft	1	08/13/2025 10:07	R369783
Measuring Point Elevation	*	0		**539.02**	ft	1	08/13/2025 10:07	R369783
Measuring Point Height Above Land Surface	*	0		**2.66**	ft	1	08/13/2025 10:07	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**98**	NTU	1	08/13/2025 10:07	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.2**	°F	1	08/13/2025 10:07	R369783
SW-846 9040B								
pH, Field	*	1.00		**7.12**		1	08/13/2025 10:07	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**908**	µmhos/cm @25C	1	08/13/2025 10:07	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**514**	mg/L	1	08/15/2025 13:31	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 15:41	R369837
Chloride	NELAP	5.00		**69.8**	mg/L	10	08/14/2025 15:41	R369837
Sulfate	NELAP	10.0		**ND**	mg/L	10	08/14/2025 15:41	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.143**	mg/L	1	08/19/2025 15:18	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:18	243426
Boron	NELAP	0.0200		**0.390**	mg/L	1	08/19/2025 15:18	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:18	243426
Calcium	NELAP	0.100	S	**60.9**	mg/L	1	08/19/2025 15:18	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:18	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:18	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:18	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:18	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
Matrix spike control limits for Ca are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 16:02	243426
Arsenic	NELAP	0.0010		**0.0289**	mg/L	5	08/19/2025 17:37	243563
Lithium	*	0.0030		**0.0091**	mg/L	5	08/15/2025 12:27	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 12:27	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 12:27	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:12	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-009
Client Sample ID: AP-8
Matrix: GROUNDWATER
Collection Date: 08/13/2025 12:14

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**497.60**	ft	1	08/13/2025 12:14	R369783
Depth to water	*	-5.00		**3.06**	ft	1	08/13/2025 12:14	R369783
Depth to water from measuring point	*	0		**5.96**	ft	1	08/13/2025 12:14	R369783
Elevation of groundwater surface	*	0		**531.24**	ft	1	08/13/2025 12:14	R369783
Measuring Point Elevation	*	0		**537.20**	ft	1	08/13/2025 12:14	R369783
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	08/13/2025 12:14	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**21**	NTU	1	08/13/2025 12:14	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.7**	°F	1	08/13/2025 12:14	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.71**		1	08/13/2025 12:14	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1070**	µmhos/cm @25C	1	08/13/2025 12:14	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**580**	mg/L	1	08/15/2025 13:41	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 16:16	R369837
Chloride	NELAP	5.00		**23.3**	mg/L	10	08/14/2025 16:16	R369837
Sulfate	NELAP	10.0		**ND**	mg/L	10	08/14/2025 16:16	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.394**	mg/L	1	08/19/2025 15:23	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:23	243426
Boron	NELAP	0.0200		**0.0840**	mg/L	1	08/19/2025 15:23	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:23	243426
Calcium	NELAP	0.100		**102**	mg/L	1	08/19/2025 15:23	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:23	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:23	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:23	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:23	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 15:45	243426
Arsenic	NELAP	0.0010		**0.0389**	mg/L	5	08/19/2025 17:26	243563
Lithium	*	0.0030		**0.0066**	mg/L	5	08/15/2025 13:18	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:18	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:18	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:15	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-010
Client Sample ID: AP-9
Matrix: GROUNDWATER
Collection Date: 08/13/2025 10:31

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.70**	ft	1	08/13/2025 10:31	R369783
Depth to water	*	-5.00		**10.54**	ft	1	08/13/2025 10:31	R369783
Depth to water from measuring point	*	0		**13.64**	ft	1	08/13/2025 10:31	R369783
Elevation of groundwater surface	*	0		**526.66**	ft	1	08/13/2025 10:31	R369783
Measuring Point Elevation	*	0		**540.30**	ft	1	08/13/2025 10:31	R369783
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	08/13/2025 10:31	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**18**	NTU	1	08/13/2025 10:31	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.1**	°F	1	08/13/2025 10:31	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.57**		1	08/13/2025 10:31	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1150**	µmhos/cm @25C	1	08/13/2025 10:31	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**638**	mg/L	1	08/15/2025 13:41	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 19:00	R369837
Chloride	NELAP	5.00		**24.4**	mg/L	10	08/14/2025 19:00	R369837
Sulfate	NELAP	10.0		**15.9**	mg/L	10	08/14/2025 19:00	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.492**	mg/L	1	08/19/2025 15:24	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:24	243426
Boron	NELAP	0.0200		**0.0990**	mg/L	1	08/19/2025 15:24	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:24	243426
Calcium	NELAP	0.100		**112**	mg/L	1	08/19/2025 15:24	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:24	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:24	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:24	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:24	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 15:51	243426
Arsenic	NELAP	0.0010		**0.0013**	mg/L	5	08/19/2025 17:32	243563
Lithium	*	0.0030		**0.0057**	mg/L	5	08/15/2025 13:23	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:23	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:23	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:22	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-011
Client Sample ID: AP-10
Matrix: GROUNDWATER
Collection Date: 08/13/2025 11:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**499.43**	ft	1	08/13/2025 11:32	R369783
Depth to water	*	-5.00		**1.79**	ft	1	08/13/2025 11:32	R369783
Depth to water from measuring point	*	0		**4.89**	ft	1	08/13/2025 11:32	R369783
Elevation of groundwater surface	*	0		**532.61**	ft	1	08/13/2025 11:32	R369783
Measuring Point Elevation	*	0		**537.50**	ft	1	08/13/2025 11:32	R369783
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	08/13/2025 11:32	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**12**	NTU	1	08/13/2025 11:32	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.6**	°F	1	08/13/2025 11:32	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.52**		1	08/13/2025 11:32	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1390**	µmhos/cm @25C	1	08/13/2025 11:32	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**834**	mg/L	1	08/15/2025 13:41	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 16:28	R369837
Chloride	NELAP	5.00		**25.4**	mg/L	10	08/14/2025 16:28	R369837
Sulfate	NELAP	10.0		**96.7**	mg/L	10	08/14/2025 16:28	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.675**	mg/L	1	08/19/2025 15:26	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:26	243426
Boron	NELAP	0.0200		**4.25**	mg/L	1	08/19/2025 15:26	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:26	243426
Calcium	NELAP	0.100		**158**	mg/L	1	08/19/2025 15:26	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:26	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:26	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:26	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:26	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 15:56	243426
Arsenic	NELAP	0.0010		**0.0012**	mg/L	5	08/20/2025 8:27	243563
Lithium	*	0.0030		**0.0092**	mg/L	5	08/15/2025 13:29	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:29	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:29	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:24	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-012
Client Sample ID: AP-11
Matrix: GROUNDWATER
Collection Date: 08/12/2025 10:44

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.15**	ft	1	08/12/2025 10:44	R369783
Depth to water	*	-5.00		**12.89**	ft	1	08/12/2025 10:44	R369783
Depth to water from measuring point	*	0		**15.69**	ft	1	08/12/2025 10:44	R369783
Elevation of groundwater surface	*	0		**522.41**	ft	1	08/12/2025 10:44	R369783
Measuring Point Elevation	*	0		**538.10**	ft	1	08/12/2025 10:44	R369783
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	08/12/2025 10:44	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**13**	NTU	1	08/12/2025 10:44	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**77.7**	°F	1	08/12/2025 10:44	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.34**		1	08/12/2025 10:44	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1010**	µmhos/cm @25C	1	08/12/2025 10:44	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**756**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 15:11	R369781
Chloride	NELAP	5.00		**127**	mg/L	10	08/13/2025 15:11	R369781
Sulfate	NELAP	10.0		**85.7**	mg/L	10	08/13/2025 15:11	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.152**	mg/L	1	08/14/2025 17:25	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:25	243361
Boron	NELAP	0.0200		**0.228**	mg/L	1	08/14/2025 17:25	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:25	243361
Calcium	NELAP	0.100		**153**	mg/L	1	08/14/2025 17:25	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:25	243361
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:25	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:25	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:25	243361
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:37	243361
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 1:45	243361
Lithium	*	0.0030		**0.0057**	mg/L	5	08/18/2025 12:37	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:37	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 12:37	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:16	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-013
Client Sample ID: AP-12
Matrix: GROUNDWATER
Collection Date: 08/12/2025 11:27

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**510.30**	ft	1	08/12/2025 11:27	R369783
Depth to water	*	-5.00		**15.13**	ft	1	08/12/2025 11:27	R369783
Depth to water from measuring point	*	0		**18.03**	ft	1	08/12/2025 11:27	R369783
Elevation of groundwater surface	*	0		**522.67**	ft	1	08/12/2025 11:27	R369783
Measuring Point Elevation	*	0		**540.70**	ft	1	08/12/2025 11:27	R369783
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	08/12/2025 11:27	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**82**	NTU	1	08/12/2025 11:27	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**73.9**	°F	1	08/12/2025 11:27	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.38**		1	08/12/2025 11:27	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**951**	µmhos/cm @25C	1	08/12/2025 11:27	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1380**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 15:23	R369781
Chloride	NELAP	5.00		**119**	mg/L	10	08/13/2025 15:23	R369781
Sulfate	NELAP	10.0		**488**	mg/L	10	08/13/2025 15:23	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0561**	mg/L	1	08/14/2025 17:40	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:40	243361
Boron	NELAP	0.0200		**0.0255**	mg/L	1	08/14/2025 17:40	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:40	243361
Calcium	NELAP	0.100		**226**	mg/L	1	08/14/2025 17:40	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:40	243361
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/15/2025 18:15	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:40	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:40	243361
Sample result(s) for Ca exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:43	243361
Arsenic	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:43	243361
Lithium	*	0.0030		**0.0060**	mg/L	5	08/18/2025 12:43	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:43	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 12:43	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:18	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power **Work Order:** 25080110

Client Project: Ash Pond Monitoring Wells **Report Date:** 09-Oct-25

Lab ID: 25080110-014 **Client Sample ID:** AP-13

Matrix: GROUNDWATER **Collection Date:** 08/13/2025 9:53

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**511.00**	ft	1	08/13/2025 9:53	R369783
Depth to water	*	-5.00		**15.25**	ft	1	08/13/2025 9:53	R369783
Depth to water from measuring point	*	0		**18.65**	ft	1	08/13/2025 9:53	R369783
Elevation of groundwater surface	*	0		**523.35**	ft	1	08/13/2025 9:53	R369783
Measuring Point Elevation	*	0		**542.00**	ft	1	08/13/2025 9:53	R369783
Measuring Point Height Above Land Surface	*	0		**3.40**	ft	1	08/13/2025 9:53	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**37**	NTU	1	08/13/2025 9:53	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**74.3**	°F	1	08/13/2025 9:53	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.43**		1	08/13/2025 9:53	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**763**	µmhos/cm @25C	1	08/13/2025 9:53	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**630**	mg/L	1	08/15/2025 13:42	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 16:40	R369837
Chloride	NELAP	5.00		**29.4**	mg/L	10	08/14/2025 16:40	R369837
Sulfate	NELAP	10.0		**104**	mg/L	10	08/14/2025 16:40	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.142**	mg/L	1	08/19/2025 15:35	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:35	243426
Boron	NELAP	0.0200		**0.0566**	mg/L	1	08/19/2025 15:35	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:35	243426
Calcium	NELAP	0.100		**109**	mg/L	1	08/19/2025 15:35	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:35	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:35	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:35	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:35	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 16:52	243426
Arsenic	NELAP	0.0010		**0.0020**	mg/L	5	08/19/2025 18:29	243563
Lithium	*	0.0030		**0.0110**	mg/L	5	08/15/2025 13:34	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:34	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:34	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:26	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-015
Client Sample ID: AP-14
Matrix: GROUNDWATER
Collection Date: 08/13/2025 10:54

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**508.40**	ft	1	08/13/2025 10:54	R369783
Depth to water	*	-5.00		**0.42**	ft	1	08/13/2025 10:54	R369783
Depth to water from measuring point	*	0		**3.22**	ft	1	08/13/2025 10:54	R369783
Elevation of groundwater surface	*	0		**536.38**	ft	1	08/13/2025 10:54	R369783
Measuring Point Elevation	*	0		**539.60**	ft	1	08/13/2025 10:54	R369783
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	08/13/2025 10:54	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**12**	NTU	1	08/13/2025 10:54	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**84.7**	°F	1	08/13/2025 10:54	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.71**		1	08/13/2025 10:54	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1120**	µmhos/cm @25C	1	08/13/2025 10:54	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1940**	mg/L	1	08/15/2025 13:42	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 16:51	R369837
Chloride	NELAP	5.00		**105**	mg/L	10	08/14/2025 16:51	R369837
Sulfate	NELAP	10.0		**926**	mg/L	10	08/14/2025 16:51	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.0463**	mg/L	1	08/19/2025 15:37	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:37	243426
Boron	NELAP	0.200		**21.9**	mg/L	10	08/20/2025 12:39	243563
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:37	243426
Calcium	NELAP	0.100		**277**	mg/L	1	08/19/2025 15:37	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:37	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:37	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:37	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:37	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 16:58	243426
Arsenic	NELAP	0.0010		**0.0011**	mg/L	5	08/20/2025 8:32	243563
Lithium	*	0.0030		**0.0068**	mg/L	5	08/15/2025 13:40	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:40	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:40	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:29	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/18/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-016
Client Sample ID: T-1
Matrix: GROUNDWATER
Collection Date: 08/12/2025 13:16

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**512.70**	ft	1	08/12/2025 13:16	R369783
Depth to water	*	-5.00		**14.30**	ft	1	08/12/2025 13:16	R369783
Depth to water from measuring point	*	0		**14.63**	ft	1	08/12/2025 13:16	R369783
Elevation of groundwater surface	*	0		**521.02**	ft	1	08/12/2025 13:16	R369783
Measuring Point Elevation	*	0		**535.65**	ft	1	08/12/2025 13:16	R369783
Measuring Point Height Above Land Surface	*	0		**0.33**	ft	1	08/12/2025 13:16	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**36**	NTU	1	08/12/2025 13:16	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**75.6**	°F	1	08/12/2025 13:16	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.46**		1	08/12/2025 13:16	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1070**	µmhos/cm @25C	1	08/12/2025 13:16	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**950**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 15:34	R369781
Chloride	NELAP	5.00		**233**	mg/L	10	08/13/2025 15:34	R369781
Sulfate	NELAP	10.0		**151**	mg/L	10	08/13/2025 15:34	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.0747**	mg/L	1	08/14/2025 17:41	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:41	243361
Boron	NELAP	0.0200		**0.173**	mg/L	1	08/14/2025 17:41	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:41	243361
Calcium	NELAP	0.100		**172**	mg/L	1	08/14/2025 17:41	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:41	243361
Cobalt	NELAP	0.0050		**0.0063**	mg/L	1	08/14/2025 17:41	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:41	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:41	243361
Sample result(s) for Ca exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 1:07	243361
Arsenic	NELAP	0.0010		**0.0016**	mg/L	5	08/18/2025 12:49	243361
Lithium	*	0.0030		**0.0177**	mg/L	5	08/18/2025 12:49	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:49	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 12:49	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:26	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-017
Client Sample ID: T-2
Matrix: GROUNDWATER
Collection Date: 08/12/2025 12:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.18**	ft	1	08/12/2025 12:20	R369783
Depth to water	*	-5.00		**23.32**	ft	1	08/12/2025 12:20	R369783
Depth to water from measuring point	*	0		**25.72**	ft	1	08/12/2025 12:20	R369783
Elevation of groundwater surface	*	0		**523.90**	ft	1	08/12/2025 12:20	R369783
Measuring Point Elevation	*	0		**549.62**	ft	1	08/12/2025 12:20	R369783
Measuring Point Height Above Land Surface	*	0		**2.40**	ft	1	08/12/2025 12:20	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**4.4**	NTU	1	08/12/2025 12:20	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**72.7**	°F	1	08/12/2025 12:20	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.51**		1	08/12/2025 12:20	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**905**	µmhos/cm @25C	1	08/12/2025 12:20	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1490**	mg/L	1	08/14/2025 16:05	R369886
Stable weight could not be achieved after multiple drying, cooling, and weighing. Lowest final weight reported.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 15:46	R369781
Chloride	NELAP	5.00		**509**	mg/L	10	08/13/2025 15:46	R369781
Sulfate	NELAP	10.0		**136**	mg/L	10	08/13/2025 15:46	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.232**	mg/L	1	08/14/2025 17:42	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:42	243361
Boron	NELAP	0.0200		**0.0504**	mg/L	1	08/14/2025 17:42	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:42	243361
Calcium	NELAP	0.100		**231**	mg/L	1	08/14/2025 17:42	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:42	243361
Cobalt	NELAP	0.0050		**0.0062**	mg/L	1	08/14/2025 17:42	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:42	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:42	243361
Sample result(s) for Ca exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:56	243361
Arsenic	NELAP	0.0010		**0.0068**	mg/L	5	08/15/2025 1:39	243361
Lithium	*	0.0030		**0.0342**	mg/L	5	08/18/2025 12:56	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 12:56	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 12:56	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:28	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-018
Client Sample ID: T-4
Matrix: GROUNDWATER
Collection Date: 08/13/2025 11:54

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**521.52**	ft	1	08/13/2025 11:54	R369783
Depth to water	*	-5.00		**15.87**	ft	1	08/13/2025 11:54	R369783
Depth to water from measuring point	*	0		**18.25**	ft	1	08/13/2025 11:54	R369783
Elevation of groundwater surface	*	0		**530.69**	ft	1	08/13/2025 11:54	R369783
Measuring Point Elevation	*	0		**548.94**	ft	1	08/13/2025 11:54	R369783
Measuring Point Height Above Land Surface	*	0		**2.38**	ft	1	08/13/2025 11:54	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**32**	NTU	1	08/13/2025 11:54	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**63.4**	°F	1	08/13/2025 11:54	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.60**		1	08/13/2025 11:54	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**607**	µmhos/cm @25C	1	08/13/2025 11:54	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**370**	mg/L	1	08/15/2025 13:42	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 17:03	R369837
Chloride	NELAP	5.00		**ND**	mg/L	10	08/14/2025 17:03	R369837
Sulfate	NELAP	10.0		**76.7**	mg/L	10	08/14/2025 17:03	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.0456**	mg/L	1	08/19/2025 15:38	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:38	243426
Boron	NELAP	0.0200		**0.0504**	mg/L	1	08/19/2025 15:38	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:38	243426
Calcium	NELAP	0.100		**61.9**	mg/L	1	08/19/2025 15:38	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:38	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:38	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:38	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:38	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 17:03	243426
Arsenic	NELAP	0.0010		**0.0038**	mg/L	5	08/19/2025 18:40	243563
Lithium	*	0.0030		**0.0130**	mg/L	5	08/15/2025 13:45	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:45	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:45	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:31	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power **Work Order:** 25080110

Client Project: Ash Pond Monitoring Wells **Report Date:** 09-Oct-25

Lab ID: 25080110-019 **Client Sample ID:** T-5

Matrix: GROUNDWATER **Collection Date:** 08/13/2025 11:19

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**518.32**	ft	1	08/13/2025 11:19	R369783
Depth to water	*	-5.00		**7.81**	ft	1	08/13/2025 11:19	R369783
Depth to water from measuring point	*	0		**10.32**	ft	1	08/13/2025 11:19	R369783
Elevation of groundwater surface	*	0		**530.34**	ft	1	08/13/2025 11:19	R369783
Measuring Point Elevation	*	0		**540.66**	ft	1	08/13/2025 11:19	R369783
Measuring Point Height Above Land Surface	*	0		**2.51**	ft	1	08/13/2025 11:19	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**13**	NTU	1	08/13/2025 11:19	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**65.9**	°F	1	08/13/2025 11:19	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.80**		1	08/13/2025 11:19	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**616**	µmhos/cm @25C	1	08/13/2025 11:19	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**392**	mg/L	1	08/15/2025 13:52	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 17:15	R369837
Chloride	NELAP	5.00		**ND**	mg/L	10	08/14/2025 17:15	R369837
Sulfate	NELAP	10.0		**31.3**	mg/L	10	08/14/2025 17:15	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.0658**	mg/L	1	08/19/2025 15:40	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:40	243426
Boron	NELAP	0.0200		**0.0917**	mg/L	1	08/19/2025 15:40	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:40	243426
Calcium	NELAP	0.100		**73.3**	mg/L	1	08/19/2025 15:40	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:40	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:40	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:40	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:40	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 17:09	243426
Arsenic	NELAP	0.0010		**0.0014**	mg/L	5	08/19/2025 18:46	243563
Lithium	*	0.0030		**0.0103**	mg/L	5	08/15/2025 13:51	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:51	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:51	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:33	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power **Work Order:** 25080110

Client Project: Ash Pond Monitoring Wells **Report Date:** 09-Oct-25

Lab ID: 25080110-020 **Client Sample ID:** T-6

Matrix: GROUNDWATER **Collection Date:** 08/13/2025 10:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**494.70**	ft	1	08/13/2025 10:42	R369783
Depth to water	*	-5.00		**5.79**	ft	1	08/13/2025 10:42	R369783
Depth to water from measuring point	*	0		**8.15**	ft	1	08/13/2025 10:42	R369783
Elevation of groundwater surface	*	0		**530.17**	ft	1	08/13/2025 10:42	R369783
Measuring Point Elevation	*	0		**538.32**	ft	1	08/13/2025 10:42	R369783
Measuring Point Height Above Land Surface	*	0		**2.36**	ft	1	08/13/2025 10:42	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**37**	NTU	1	08/13/2025 10:42	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**73.0**	°F	1	08/13/2025 10:42	R369783
SW-846 9040B								
pH, Field	*	1.00		**7.16**		1	08/13/2025 10:42	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**760**	µmhos/cm @25C	1	08/13/2025 10:42	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**412**	mg/L	1	08/15/2025 13:52	R369952
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/14/2025 18:01	R369837
Chloride	NELAP	5.00		**11.8**	mg/L	10	08/14/2025 18:01	R369837
Sulfate	NELAP	10.0		**15.5**	mg/L	10	08/14/2025 18:01	R369837
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025	B	**0.116**	mg/L	1	08/19/2025 15:42	243426
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/19/2025 15:42	243426
Boron	NELAP	0.0200		**0.0428**	mg/L	1	08/19/2025 15:42	243426
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/19/2025 15:42	243426
Calcium	NELAP	0.100		**86.7**	mg/L	1	08/19/2025 15:42	243426
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:42	243426
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/19/2025 15:42	243426
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/19/2025 15:42	243426
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/19/2025 15:42	243426
Sample result(s) for Ba exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010	B	**< 0.0010**	mg/L	5	08/18/2025 17:14	243426
Arsenic	NELAP	0.0010		**0.0086**	mg/L	5	08/19/2025 18:52	243563
Lithium	*	0.0030		**0.0066**	mg/L	5	08/15/2025 13:56	243426
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/15/2025 13:56	243426
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/15/2025 13:56	243426
Contamination present in the MBLK for Sb. Sample results below the reporting limit are reportable per the TNI Standard.								
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 16:40	243437
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-021
Client Sample ID: AW-1
Matrix: GROUNDWATER
Collection Date: 08/12/2025 11:02

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.79**	ft	1	08/12/2025 11:02	R369783
Depth to water	*	-5.00		**12.26**	ft	1	08/12/2025 11:02	R369783
Depth to water from measuring point	*	0		**15.01**	ft	1	08/12/2025 11:02	R369783
Elevation of groundwater surface	*	0		**540.59**	ft	1	08/12/2025 11:02	R369783
Measuring Point Elevation	*	0		**555.60**	ft	1	08/12/2025 11:02	R369783
Measuring Point Height Above Land Surface	*	0		**2.75**	ft	1	08/12/2025 11:02	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**71**	NTU	1	08/12/2025 11:02	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**66.1**	°F	1	08/12/2025 11:02	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.58**		1	08/12/2025 11:02	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1600**	µmhos/cm @25C	1	08/12/2025 11:02	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1250**	mg/L	1	08/14/2025 16:05	R369886
Stable weight could not be achieved after multiple drying, cooling, and weighing. Lowest final weight reported.								
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 15:58	R369781
Chloride	NELAP	5.00		**37.2**	mg/L	10	08/13/2025 15:58	R369781
Sulfate	NELAP	10.0		**408**	mg/L	10	08/13/2025 15:58	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.105**	mg/L	1	08/14/2025 17:42	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:42	243361
Boron	NELAP	0.0200	S	**9.61**	mg/L	1	08/14/2025 17:42	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:42	243361
Calcium	NELAP	0.100	S	**205**	mg/L	1	08/14/2025 17:42	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:42	243361
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:42	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:42	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:42	243361
Sample result(s) for Ca exceed 10 times the CCB. Data is reportable per the TNI Standard.								
Matrix spike control limits for Ca & B are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 13:21	243361
Arsenic	NELAP	0.0010		**0.0098**	mg/L	5	08/15/2025 2:04	243361
Lithium	*	0.0030		**0.0112**	mg/L	5	08/18/2025 13:21	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 13:21	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 13:21	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:30	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/22/2025 0:00	R372539

Client: City Water, Light & Power
Work Order: 25080110
Client Project: Ash Pond Monitoring Wells
Report Date: 09-Oct-25
Lab ID: 25080110-022
Client Sample ID: G120
Matrix: GROUNDWATER
Collection Date: 08/12/2025 11:52

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**502.73**	ft	1	08/12/2025 11:52	R369783
Depth to water	*	-5.00		**18.10**	ft	1	08/12/2025 11:52	R369783
Depth to water from measuring point	*	0		**18.10**	ft	1	08/12/2025 11:52	R369783
Elevation of groundwater surface	*	0		**535.00**	ft	1	08/12/2025 11:52	R369783
Measuring Point Elevation	*	0		**553.10**	ft	1	08/12/2025 11:52	R369783
Measuring Point Height Above Land Surface	*	0		**0**	ft	1	08/12/2025 11:52	R369783
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.7**	NTU	1	08/12/2025 11:52	R369783
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**74.4**	°F	1	08/12/2025 11:52	R369783
SW-846 9040B								
pH, Field	*	1.00		**6.67**		1	08/12/2025 11:52	R369783
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2000**	µmhos/cm @25C	1	08/12/2025 11:52	R369783
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1640**	mg/L	1	08/14/2025 16:05	R369886
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	08/13/2025 16:09	R369781
Chloride	NELAP	5.00		**36.8**	mg/L	10	08/13/2025 16:09	R369781
Sulfate	NELAP	10.0		**569**	mg/L	10	08/13/2025 16:09	R369781
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	0.0025		**0.769**	mg/L	1	08/14/2025 17:45	243361
Beryllium	NELAP	0.0005		**< 0.0005**	mg/L	1	08/14/2025 17:45	243361
Boron	NELAP	0.0200		**7.95**	mg/L	1	08/14/2025 17:45	243361
Cadmium	NELAP	0.0020		**< 0.0020**	mg/L	1	08/14/2025 17:45	243361
Calcium	NELAP	0.100		**272**	mg/L	1	08/14/2025 17:45	243361
Chromium	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:45	243361
Cobalt	NELAP	0.0050		**< 0.0050**	mg/L	1	08/14/2025 17:45	243361
Lead	NELAP	0.0075		**< 0.0075**	mg/L	1	08/14/2025 17:45	243361
Molybdenum	NELAP	0.0100		**< 0.0100**	mg/L	1	08/14/2025 17:45	243361
Sample result(s) for Ca exceed 10 times the CCB. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 13:02	243361
Arsenic	NELAP	0.0010		**0.0115**	mg/L	5	08/15/2025 1:58	243361
Lithium	*	0.0030		**0.0073**	mg/L	5	08/18/2025 13:02	243361
Selenium	NELAP	0.0010		**< 0.0010**	mg/L	5	08/18/2025 13:02	243361
Thallium	NELAP	0.0020		**< 0.0020**	mg/L	5	08/18/2025 13:02	243361
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.00020		**< 0.00020**	mg/L	1	08/14/2025 15:33	243378
EPA 903.0/904.0, RADIUM 226/228								
Radium-226	*	0		**See Attached**	pci/L	1	09/23/2025 0:00	R372539
Radium-228	*	0		**See Attached**	pci/L	1	09/23/2025 0:00	R372539

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25080110
Report Date: 09-Oct-25

Carrier: Daniel Crump

Received By: LEH

Completed by: Laura E Henson
On: 13-Aug-25

Reviewed by: Ellie Hopkins
On: 14-Aug-25

Pages to follow: Chain of custody 4 Extra pages included 71

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 4.3
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.				
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑	
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑	
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐	
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑	

Any No responses must be detailed below or on the COC.

pH strip #104524. - lhenson - 8/13/2025 8:47:33 AM

Additional nitric acid (104844) was needed in RW-3 and G120 upon arrival at the laboratory. - lhenson - 8/13/2025 8:47:35 AM

Cooler #2 = 5.3C, Cooler #3 = 4.7, and Cooler #4 = 3.7C (LTG #5). - LH 8/13/25

Samples were received on 8/13/25 at 1436 on ice [12.7, 11.9 and 15.3C - LTG#5]. pH strip #104524. - amberdilallo - 8/14/2025 7:41:56 AM

Print PDF

CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25080110

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

5.3, 4.7, 3.7

Client: City Water, Light & Power

Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building

City/State/Zip: Springfield IL 62712

Contact: Eric Staley Phone: (217) 757-8610

Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 4.3 °C 5

Preserved in: [X] LAB [ ] FIELD FOR LAB USE ONLY

LAB NOTES: PM 104524

added HNO3 (104544) to RW3 and G120 LH 8/13/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No

Are these samples known to be hazardous? [ ] Yes [✓] No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:

*elevations, pH, conductivity, temperature

**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo

Quarterly monitoring

PROJECT NAME/NUMBER

Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME

Justin Colp

RESULTS REQUESTED

[✓] Standard [ ] 1-2 Day (100% Surcharge)

[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25080110-001	RW-3	8-12-25 / 1332	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-002	AP-1	1155	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-003	AP-2	1226	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-004	AP-3	1258	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-005	AP-4	1040	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-006	AP-5	956	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-007	AP-6	1120	Groundwater	1	4								✓	✓	✓	✓	✓	✓
-008	AP-7		Groundwater	1	4								✓	✓	✓	✓	✓	✓
-009	AP-8		Groundwater	1	4								✓	✓	✓	✓	✓	✓
-010	AP-9		Groundwater	1	4								✓	✓	✓	✓	✓	✓
-011	AP-10		Groundwater	1	4								✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
	8-12 / 1540		8/12/25 1540

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25080110

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Bret Gillihan/Patrick

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25080110-012	AP-11	8-12-25 1044	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-013	AP-12	8-12-25 1127	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-014	AP-13		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-015	AP-14		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-016	T-1	8-12-25 1316	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-017	T-2	8-12-25 1220	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-018	T-4		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-019	T-5		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-020	T-6		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-021	AW-1	8/12/25 1102	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-022	G120	8/12/25 1157	Groundwater	1	4								✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
	8-12/1540		8/12/25 1540

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CHAIN OF CUSTODY

Pg 1 of 2 Workorder # 25080110

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

12.7, 11.9

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Samples on: ☑ ICE ☐ BLUE ICE ☐ NO ICE 15.3 °C 5
Preserved in: ☐ LAB ☒ FIELD FOR LAB USE ONLY
LAB NOTES: 104524 [illegible] 8/14/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Allison Lampe

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25080110-001	RW-3		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-002	AP-1		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-003	AP-2		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-004	AP-3		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-005	AP-4		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-006	AP-5		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-007	AP-6		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-008	AP-7	8-13-25 956	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-009	AP-8	8-13-25 1214	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-010	AP-9	8-13-25 1031	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-011	AP-10	8-13-25 1132	Groundwater	1	4								✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
[illegible]	8-13-25 236	[illegible]	8/13/25 1436

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CHAIN OF CUSTODY

Pg 2 of 2 Workorder # 25080110

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☑ ~~ICE~~ ☐ BLUE ICE ☐ NO ICE 15.3 °C 5
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY
LAB NOTES:
**corrected collection times: T-4 11:54, T-5 11:19, T-6 10:42. SAH 8/18/25

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Bet Gillihan

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other ____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Field Turbidity
25080110-012	AP-11		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-013	AP-12		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-014	AP-13	8-13-25 953	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-015	AP-14	8-13-25 1054	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-016	T-1		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-017	T-2		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-018	T-4 **	8-13-25 1135	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-019	T-5 **	8-13-25 1100	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-020	T-6 **	8-13-25 1026	Groundwater	1	4								✔	✔	✔	✔	✔	✔
-021	AW-1		Groundwater	1	4								✔	✔	✔	✔	✔	✔
-022	G120		Groundwater	1	4								✔	✔	✔	✔	✔	✔

Relinquished By	Date/Time	Received By	Date/Time
Ellen Boyce	8-13-25 2336	[illegible]	8/13/25 1436

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Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	RW-3
Project Location:	Springfield, IL	**Sample ID:**	001
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 87 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 1:11 PM

Static Water Level: 10.57 feet below TOC

Total Depth: 44.01 feet below TOC

Water Column: 33.44 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 33.44 ft. x 0.022 = 0.74 L x 3 Vol. = 2.22 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:12	0.0	250	purge start time						
13:17	1.3	↓	7.07	798.90	15.60	2.83	50.20	19.30	
13:20	2.0		7.00	790.90	15.50	1.83	32.90	20.87	
13:23	2.8		6.97	790.00	15.29	1.42	19.30	8.51	
13:26	3.5		6.94	789.40	15.35	1.18	8.40	8.14	
13:29	4.3		6.93	792.30	15.36	1.04	-1.60	11.57	
13:32	5.0		6.92	794.40	15.17	0.94	-10.80	13.43	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 13:32

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.92 pH — 794.40 Spec. Cond. — 15.17 Temp

Field Filtered: Yes — Filter Type: Inline Disposable

Water Level: 17.62 feet below TOC — Drawdown: 7.05 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-1
Project Location:	Springfield, IL	**Sample ID:**	002
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 86 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	No

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 11:34 AM

Static Water Level: 11.22 feet below TOC

Total Depth: 31.08 feet below TOC

Water Column: 19.86 feet

Purging Activities

Purged By: JC Purge Date: 8/12/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 19.86 ft. x 0.022 = 0.44 L x 3 Vol. = 1.32 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:35	0.0	250	purge start time						
11:40	1.3	↓	6.46	1,809.80	16.79	2.44	103.50	16.48	
11:43	2.0		6.44	1,883.30	16.76	1.63	76.10	17.05	
11:46	2.8		6.43	1,970.00	16.58	1.29	48.10	19.77	
11:49	3.5		6.42	2,021.40	16.60	1.09	26.30	22.55	
11:52	4.3		6.43	2,076.80	16.55	0.97	11.20	7.96	
11:55	5.0		6.42	2,104.50	16.41	0.88	0.50	10.98	

Sampling Activities

Sampled By: JC Sample Date/Time: 8/12/2025 11:55

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.42 pH 2,104.50 Spec. Cond. 16.41 Temp

Field Filtered: No Filter Type:

Water Level: 11.55 feet below TOC Drawdown: 0.33 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-2
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 87 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 12:06 PM

Static Water Level: 8.60 feet below TOC

Total Depth: 21.33 feet below TOC

Water Column: 12.73 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 12.73 ft. x 0.022 = 0.28 L x 3 Vol. = 0.84 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:07	0.0	263	purge start time						
12:14	1.8	↓	6.39	1,602.30	17.04	1.92	78.10	17.42	
12:17	2.6		6.35	1,603.90	16.92	1.43	75.60	17.06	
12:20	3.4		6.33	1,603.30	16.56	1.18	73.70	19.29	
12:23	4.2		6.32	1,603.10	16.48	1.03	72.20	6.81	
12:26	5.0		6.30	1,606.10	16.68	0.93	70.80	8.43	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 12:26

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.30 pH — 1,606.10 Spec. Cond. — 16.68 Temp

Field Filtered: No — Filter Type:

Water Level: 8.80 feet below TOC — Drawdown: 0.20 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-3
Project Location:	Springfield, IL	**Sample ID:**	004
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 87 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 12:34 PM

Static Water Level: 8.73 feet below TOC

Total Depth: 20.80 feet below TOC

Water Column: 12.07 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 12.07 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.50 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:36	0.0	250	purge start time						
12:43	1.8	↓	6.42	1,622.60	17.60	2.04	96.00	5.57	
12:46	2.5		6.39	1,624.00	17.43	1.51	80.40	4.97	
12:49	3.3		6.38	1,625.40	17.53	1.22	64.50	4.11	
12:52	4.0		6.38	1,625.50	17.31	1.05	50.40	3.26	
12:55	4.8		6.37	1,625.40	17.24	0.94	38.90	3.14	
12:58	5.5		6.36	1,624.50	17.32	0.86	29.80	2.90	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 12:58

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.36 pH — 1,624.50 Spec. Cond. — 17.32 Temp

Field Filtered: No — Filter Type:

Water Level: 9.71 feet below TOC — Drawdown: 0.98 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-4
Project Location:	Springfield, IL	**Sample ID:**	005
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/12/25 10:12 AM

Static Water Level: 10.86 feet below TOC

Total Depth: 60.41 feet below TOC

Water Column: 49.55 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 49.55 ft. x 0.022 = 1.09 L x 3 Vol. = 3.27 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.50 L

Physical appearance of purge water: Cloudy — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:13	0.0	241	purge start time						
10:22	2.2	↓	6.66	992.60	19.67	2.38	136.80	133.52	
10:25	2.9		6.65	995.50	19.62	1.78	89.50	167.82	
10:28	3.6		6.65	997.50	19.65	1.41	49.20	164.04	
10:31	4.3		6.65	999.30	19.62	1.19	21.50	168.64	
10:34	5.1		6.65	999.40	19.55	1.06	2.80	119.36	
10:37	5.8		6.65	999.70	19.60	0.96	-10.60	119.27	
10:40	6.5		6.64	999.90	19.70	0.90	-20.80	115.89	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 10:40

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.64 pH — 999.90 Spec. Cond. — 19.70 Temp

Field Filtered: No — Filter Type:

Water Level: 12.10 feet below TOC — Drawdown: 1.24 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-5
Project Location:	Springfield, IL	**Sample ID:**	006
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 81 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/12/25 9:28 AM

Static Water Level: 15.94 feet below TOC

Total Depth: 31.27 feet below TOC

Water Column: 15.33 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 15.33 ft. x 0.022 = 0.34 L x 3 Vol. = 1.02 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 8.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:29	0.0	296	purge start time						
9:32	0.9	↓	6.61	854.60	15.72	4.28	192.80	7.48	
9:35	1.8		6.55	857.20	15.53	2.72	196.90	6.29	
9:38	2.7		6.55	861.90	15.34	2.12	199.20	6.06	
9:41	3.6		6.57	864.70	15.26	1.84	200.70	7.92	
9:44	4.4		6.59	865.30	15.30	1.67	201.20	10.44	
9:47	5.3		6.61	867.30	15.31	1.55	201.40	15.13	
9:50	6.2		6.62	867.50	15.22	1.47	202.40	33.56	
9:53	7.1		6.63	868.30	15.19	1.41	203.70	11.51	
9:56	8.0		6.64	867.70	15.16	1.37	204.60	24.57	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 9:56

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.64 pH — 867.70 Spec. Cond. — 15.16 Temp

Field Filtered: No — Filter Type:

Water Level: 18.27 feet below TOC — Drawdown: 2.33 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864
- Lid on protective cover won't close.

Form Completed By: Justin Colp — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-6
Project Location:	Springfield, IL	**Sample ID:**	007
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.

Name: Danny Crump — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 85 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 10:57 AM

Static Water Level: 8.13 feet below TOC

Total Depth: 39.62 feet below TOC

Water Column: 31.49 feet

Purging Activities

Purged By: JC — Purge Date: 8/12/2025

Purge Method: Bladder Pump — Well Diameter: 2"

Purge Volume Calculation (L): 31.49 ft. x 0.022 = 0.69 L x 3 Vol. = 2.07 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:58	0.0	227	purge start time						
11:05	1.6	↓	7.05	814.60	15.62	1.87	64.10	18.67	
11:08	2.3		6.99	817.10	15.59	1.44	62.10	22.34	
11:11	3.0		6.95	817.50	15.52	1.21	60.10	17.42	
11:14	3.6		6.92	818.40	15.47	1.07	58.00	16.04	
11:17	4.3		6.91	817.30	15.45	0.97	55.40	9.09	
11:20	5.0		6.89	818.90	15.39	0.90	52.50	7.08	

Sampling Activities

Sampled By: JC — Sample Date/Time: 8/12/2025 11:20

Sample Method: Low Flow — Sample Equipment: Bladder Pump

Sample Parameters: 6.89 pH — 818.90 Spec. Cond. — 15.39 Temp

Field Filtered: No — Filter Type:

Water Level: 17.81 feet below TOC — Drawdown: 9.68 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: [signature] **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-7
Project Location:	Springfield, IL	**Sample ID:**	008
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.

Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/13/25 9:56 AM

Static Water Level: 11.71 feet below TOC

Total Depth: 42.52 feet below TOC

Water Column: 30.81 feet

Purging Activities

Purged By: AL Purge Date: 8/13/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.81 ft. x 0.022 = 0.68 L x 3 Vol. = 2.04 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: Moderate Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:56	0.0	364	purge start time						
9:58	0.7	↓	7.10	897.80	15.70	0.44	-121.80	73.22	
10:01	1.8		7.11	900.40	15.65	0.42	-126.10	78.01	
10:04	2.9		7.12	903.20	15.82	0.40	-129.10	65.72	
10:07	4.0		7.12	908.30	15.68	0.39	-131.50	98.20	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/13/2025 10:07

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.12 pH 908.30 Spec. Cond. 15.68 Temp

Field Filtered: No Filter Type:

Water Level: 16.35 feet below TOC Drawdown: 4.64 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe Date: 8/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-8
Project Location:	Springfield, IL	**Sample ID:**	009
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/13/25 11:47 AM

Static Water Level: 5.96 feet below TOC

Total Depth: 39.60 feet below TOC

Water Column: 33.64 feet

Purging Activities

Purged By: JC Purge Date: 8/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 33.64 ft. x 0.022 = 0.74 L x 3 Vol. = 2.22 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 8.00 L

Physical appearance of purge water: Clear Odor: Moderate Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:48	0.0	308	purge start time						
11:56	2.5	↓	6.78	1,072.50	17.37	2.36	47.10	27.64	
11:59	3.4		6.75	1,072.40	17.48	1.91	28.10	35.01	
12:02	4.3		6.74	1,073.20	17.31	1.67	13.70	27.08	
12:05	5.2		6.73	1,071.90	17.39	1.50	2.00	17.07	
12:08	6.2		6.72	1,072.50	17.50	1.39	-6.80	28.74	
12:11	7.1		6.72	1,073.40	17.37	1.30	-13.60	24.21	
12:14	8.0		6.71	1,074.30	17.59	1.23	-19.10	21.21	

Sampling Activities

Sampled By: JC Sample Date/Time: 8/13/2025 12:14

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.71 pH 1,074.30 Spec. Cond. 17.59 Temp

Field Filtered: No Filter Type:

Water Level: 6.38 feet below TOC Drawdown: 0.42 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp **Date:** 8/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-9
Project Location:	Springfield, IL	**Sample ID:**	010
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 77 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/13/25 9:38 AM

Static Water Level: 13.64 feet below TOC

Total Depth: 39.60 feet below TOC

Water Column: 25.96 feet

Purging Activities

Purged By: JC Purge Date: 8/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 25.96 ft. x 0.022 = 0.57 L x 3 Vol. = 1.71 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 12.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:40	0.0	235	purge start time						
9:46	1.4	↓	6.58	1,143.50	18.23	3.47	154.00	61.09	
9:49	2.1		6.55	1,143.40	18.12	2.90	149.00	93.19	
9:52	2.8		6.55	1,148.00	17.86	2.54	138.20	43.74	
9:55	3.5		6.60	1,159.10	18.90	4.34	123.00	6.68	
9:58	4.2		6.59	1,161.00	17.02	3.46	106.30	14.03	
10:01	4.9		6.56	1,160.30	17.16	2.32	88.20	28.72	
10:04	5.6		6.58	1,159.50	17.76	3.20	74.30	3.11	
10:07	6.4		6.63	1,159.30	17.88	4.29	66.50	9.13	
10:10	7.1		6.82	1,153.60	18.14	6.08	62.30	8.03	
10:13	7.8		6.65	1,162.20	16.48	4.13	51.70	33.73	
10:16	8.5		6.60	1,155.00	16.09	2.53	39.50	22.64	
10:19	9.2		6.58	1,155.40	16.12	1.98	28.90	22.90	
10:22	9.9		6.58	1,152.40	16.11	1.71	20.00	22.52	
10:25	10.6		6.57	1,154.20	16.04	1.55	12.60	23.71	
10:28	11.3		6.57	1,155.10	16.11	1.44	6.70	23.15	
10:31	12.0		6.57	1,153.30	16.14	1.37	1.20	18.43	

Sampling Activities

Sampled By: JC Sample Date/Time: 8/13/2025 10:31

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.57 pH 1,153.30 Spec. Cond. 16.14 Temp

Field Filtered: No Filter Type:

Water Level: 18.81 feet below TOC Drawdown: 5.17 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp **Date:** 8/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-10
Project Location:	Springfield, IL	**Sample ID:**	011
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 79 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/13/25 11:06 AM

Static Water Level: 4.89 feet below TOC

Total Depth: 38.07 feet below TOC

Water Column: 33.18 feet

Purging Activities

Purged By: JC Purge Date: 8/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 33.18 ft. x 0.022 = 0.73 L x 3 Vol. = 2.19 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.00 L

Physical appearance of purge water: Clear Odor: Slight Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:07	0.0	280	purge start time						
11:14	2.0	↓	6.62	1,382.40	18.51	2.74	100.30	6.70	
11:17	2.8		6.57	1,386.30	18.03	2.21	85.50	6.47	
11:20	3.6		6.54	1,380.40	17.98	1.91	70.90	8.95	
11:23	4.5		6.53	1,383.90	17.90	1.71	57.20	9.13	
11:26	5.3		6.52	1,385.80	17.97	1.58	45.10	8.34	
11:29	6.2		6.52	1,382.70	17.74	1.48	34.80	8.63	
11:32	7.0		6.52	1,386.40	17.54	1.41	26.50	11.76	

Sampling Activities

Sampled By: JC Sample Date/Time: 8/13/2025 11:32

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.52 pH 1,386.40 Spec. Cond. 17.54 Temp

Field Filtered: No Filter Type:

Water Level: 5.09 feet below TOC Drawdown: 0.20 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46864

Form Completed By: Justin Colp **Date:** 8/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: AP-11
Sample ID: 012
Date (s): 8/12/2025

Field Team Members

Name: Brett Gillihan — Affiliation: TekLab, Inc.
Name: Jeremy Rodriguez — Affiliation: TekLab, Inc.

Weather Conditions

Temp: 84 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 10:24 AM
Static Water Level: 15.69 feet below TOC
Total Depth: 22.95 feet below TOC
Water Column: 7.26 feet

Purging Activities

Purged By: JR — Purge Date: 8/12/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 7.26 ft. x 0.022 = 0.16 L x 3 Vol. = 0.48 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Clear — Odor: Slight — Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:24	0.0	200	purge start time						
10:32	1.6	↓	6.22	1,056.40	23.96	2.24	94.90	10.24	
10:35	2.2		6.26	1,038.10	24.41	2.18	89.80	10.34	
10:38	2.8		6.31	1,026.00	24.76	2.17	84.40	10.81	
10:41	3.4		6.33	1,016.40	25.07	2.17	80.40	11.94	
10:44	4.0		6.34	1,009.40	25.37	2.18	77.80	12.85	

Sampling Activities

Sampled By: JR — Sample Date/Time: 8/12/2025 10:44
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.34 pH — 1,009.40 Spec. Cond. — 25.37 Temp
Field Filtered: No — Filter Type:
Water Level: 15.94 feet below TOC — Drawdown: 0.25 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan — **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-12
Project Location:	Springfield, IL	**Sample ID:**	013
W.O. Number (s):	25080110	**Date (s):**	8/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 86 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/12/25 11:03 AM

Static Water Level: 18.03 feet below TOC

Total Depth: 30.40 feet below TOC

Water Column: 12.37 feet

Purging Activities

Purged By: JR Purge Date: 8/12/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 12.37 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Lt Gray

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:03	0.0	167	purge start time						
11:15	2.0	↓	6.38	919.10	21.63	1.57	46.50	57.46	
11:18	2.5		6.37	935.60	22.73	1.59	43.00	66.31	
11:21	3.0		6.38	947.90	23.18	1.62	39.70	75.89	
11:24	3.5		6.38	950.20	23.04	1.64	37.30	78.00	
11:27	4.0		6.38	951.40	23.26	1.63	35.30	82.48	

Sampling Activities

Sampled By: JR Sample Date/Time: 8/12/2025 11:27

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.38 pH 951.40 Spec. Cond. 23.26 Temp

Field Filtered: No Filter Type:

Water Level: 19.01 feet below TOC Drawdown: 0.98 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan **Date:** 8/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-13
Project Location:	Springfield, IL	**Sample ID:**	014
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 77 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/13/25 9:30 AM

Static Water Level: 18.65 feet below TOC

Total Depth: 31.00 feet below TOC

Water Column: 12.35 feet

Purging Activities

Purged By: JR Purge Date: 8/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 12.35 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 6.00 L

Physical appearance of purge water: Slightly cloudy Odor: Slight Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:30	0.0	261	purge start time						
9:41	2.9	↓	6.39	806.30	22.60	2.47	71.70	23.29	
9:44	3.7		6.42	792.60	22.86	2.42	59.70	28.67	
9:47	4.4		6.43	781.40	23.25	2.32	49.60	30.32	
9:50	5.2		6.43	772.20	23.49	2.24	41.50	34.50	
9:53	6.0		6.43	762.80	23.52	2.15	34.80	37.20	

Sampling Activities

Sampled By: JR Sample Date/Time: 8/13/2025 9:53

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.43 pH 762.80 Spec. Cond. 23.52 Temp

Field Filtered: No Filter Type:

Water Level: 19.76 feet below TOC Drawdown: 1.11 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan **Date:** 8/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-14
Project Location:	Springfield, IL	**Sample ID:**	015
W.O. Number (s):	25080110	**Date (s):**	8/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 79 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing	X	
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/13/25 10:34 AM

Static Water Level: 3.22 feet below TOC

Total Depth: 31.20 feet below TOC

Water Column: 27.98 feet

Purging Activities

Purged By: JR Purge Date: 8/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 27.98 ft. x 0.022 = 0.62 L x 3 Vol. = 1.86 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:34	0.0	250	purge start time						
10:42	2.0	↓	6.79	1,095.20	29.34	3.69	71.40	11.59	
10:45	2.8		6.74	1,105.50	29.05	2.66	69.60	16.94	
10:48	3.5		6.72	1,097.90	28.88	1.99	68.00	18.64	
10:51	4.3		6.71	1,108.40	28.98	1.70	65.30	21.89	
10:54	5.0		6.71	1,115.40	29.26	1.59	61.50	11.84	

Sampling Activities

Sampled By: JR Sample Date/Time: 8/13/2025 10:54

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.71 pH 1,115.40 Spec. Cond. 29.26 Temp

Field Filtered: No Filter Type:

Water Level: 3.47 feet below TOC Drawdown: 0.25 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan **Date:** 8/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: T-1
Sample ID: 016
Date (s): 8/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 87 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/12/25 12:49 PM
Static Water Level: 14.63 feet below TOC
Total Depth: 22.95 feet below TOC
Water Column: 8.32 feet

Purging Activities

Purged By: JR Purge Date: 8/12/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 8.32 ft. x 0.022 = 0.18 L x 3 Vol. = 0.54 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.00 L
Physical appearance of purge water: Slightly cloudy Odor: Slight Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:49	0.0	222	purge start time						
13:04	3.3	↓	6.48	1,032.00	23.62	1.96	37.20	31.78	
13:07	4.0		6.47	1,044.50	23.81	1.95	36.30	33.26	
13:10	4.7		6.47	1,051.90	24.03	1.94	35.50	29.37	
13:13	5.3		6.46	1,061.40	24.06	1.93	35.00	32.12	
13:16	6.0		6.46	1,069.60	24.24	1.91	34.70	35.67	

Sampling Activities

Sampled By: JR Sample Date/Time: 8/12/2025 13:16
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.46 pH 1,069.60 Spec. Cond. 24.24 Temp
Field Filtered: No Filter Type:
Water Level: 15.23 feet below TOC Drawdown: 0.60 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan **Date:** 8/12/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: T-2
Sample ID: 017
Date (s): 8/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Jeremy Rodriguez Affiliation: TekLab, Inc.

Weather Conditions

Temp: 87 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 8/12/25 12:03 PM
Static Water Level: 25.72 feet below TOC
Total Depth: 34.44 feet below TOC
Water Column: 8.72 feet

Purging Activities

Purged By: JR Purge Date: 8/12/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 8.72 ft. x 0.022 = 0.19 L x 3 Vol. = 0.57 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Clear Odor: Strong Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:03	0.0	235	purge start time						
12:08	1.2	↓	6.62	807.50	20.46	2.29	-36.80	6.96	
12:11	1.9		6.54	849.50	21.69	2.25	-47.90	6.27	
12:14	2.6		6.52	868.30	22.19	2.15	-56.90	5.17	
12:17	3.3		6.51	883.40	22.48	2.03	-64.10	4.74	
12:20	4.0		6.51	905.10	22.61	1.95	-70.00	4.37	

Sampling Activities

Sampled By: JR Sample Date/Time: 8/12/2025 12:20
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.51 pH 905.10 Spec. Cond. 22.61 Temp
Field Filtered: No Filter Type:
Water Level: 26.12 feet below TOC Drawdown: 0.40 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 46868

Form Completed By: Brett Gillihan **Date:** 8/12/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: T-4
Sample ID: 018
Date (s): 8/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/13/25 11:35 AM
Static Water Level: 18.25 feet below TOC
Total Depth: 27.42 feet below TOC
Water Column: 9.17 feet

Purging Activities

Purged By: AL Purge Date: 8/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 9.17 ft. x 0.022 = 0.2 L x 3 Vol. = 0.6 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 9.00 L
Physical appearance of purge water: Slightly cloudy Odor: Slight Color: gray

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:35	0.0	474	purge start time						
11:45	4.7	↓	6.62	673.60	17.40	0.65	-2.30	66.72	
11:48	6.2		6.63	661.70	17.15	0.53	-6.10	38.28	
11:51	7.6		6.62	636.80	17.55	0.49	-7.70	33.95	
11:54	9.0		6.60	607.40	17.46	0.47	-7.60	31.69	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/13/2025 11:54
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.60 pH 607.40 Spec. Cond. 17.46 Temp
Field Filtered: No Filter Type:
Water Level: 20.10 feet below TOC Drawdown: 1.85 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe **Date:** 8/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: T-5
Sample ID: 019
Date (s): 8/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/13/25 11:00 AM
Static Water Level: 10.32 feet below TOC
Total Depth: 22.34 feet below TOC
Water Column: 12.02 feet

Purging Activities

Purged By: AL Purge Date: 8/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 12.02 ft. x 0.022 = 0.26 L x 3 Vol. = 0.78 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.00 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:00	0.0	158	purge start time						
11:10	1.6	↓	6.80	636.30	19.39	0.79	-7.80	27.89	
11:13	2.1		6.79	634.60	19.12	0.66	-9.80	20.48	
11:16	2.5		6.79	624.10	19.58	0.64	-10.10	15.44	
11:19	3.0		6.80	615.80	18.84	0.65	-8.80	13.45	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/13/2025 11:19
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.80 pH 615.80 Spec. Cond. 18.84 Temp
Field Filtered: No Filter Type:
Water Level: 15.08 feet below TOC Drawdown: 4.76 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe **Date:** 8/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: T-6
Sample ID: 020
Date (s): 8/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 82 °F
Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW
Precipitation: ☑ None ☐ Light ☐ Heavy
Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/13/25 10:26 AM
Static Water Level: 8.15 feet below TOC
Total Depth: 43.62 feet below TOC
Water Column: 35.47 feet

Purging Activities

Purged By: AL Purge Date: 8/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 35.47 ft. x 0.022 = 0.78 L x 3 Vol. = 2.34 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.00 L
Physical appearance of purge water: Slightly cloudy Odor: Strong Color: gray

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:26	0.0	375	purge start time						
10:33	2.6	↓	7.17	769.30	20.52	0.44	-147.00	70.17	
10:36	3.8		7.17	758.20	21.22	0.40	-149.20	61.90	
10:39	4.9		7.17	757.90	22.21	0.38	-150.90	50.89	
10:42	6.0		7.16	759.90	22.80	0.37	-152.20	37.05	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/13/2025 10:42
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 7.16 pH 759.90 Spec. Cond. 22.80 Temp
Field Filtered: No Filter Type:
Water Level: 11.61 feet below TOC Drawdown: 3.46 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe Date: 8/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: AW-1
Sample ID: 021
Date (s): 8/12/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 85 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 10:46 AM
Static Water Level: 15.01 feet below TOC
Total Depth: 54.81 feet below TOC
Water Column: 39.80 feet

Purging Activities

Purged By: AL Purge Date: 8/12/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 39.8 ft. x 0.022 = 0.88 L x 3 Vol. = 2.64 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.50 L
Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:46	0.0	281	purge start time						
10:53	2.0	↓	6.57	1,602.50	18.89	1.13	-70.70	52.46	
10:56	2.8		6.57	1,598.90	18.79	1.03	-70.90	48.78	
10:59	3.7		6.58	1,600.70	18.80	0.97	-70.90	53.77	
11:02	4.5		6.58	1,599.30	18.97	0.93	-70.90	70.99	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/12/2025 11:02
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.58 pH 1,599.30 Spec. Cond. 18.97 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 17.02 feet below TOC Drawdown: 2.01 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe **Date:** 8/12/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25080110
Monitoring Point: G120
Sample ID: 022
Date (s): 8/12/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Payton Yoch Affiliation: TekLab, Inc.

Weather Conditions

Temp: 85 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 8/12/25 11:28 AM
Static Water Level: 18.10 feet below TOC
Total Depth: 50.37 feet below TOC
Water Column: 32.27 feet

Purging Activities

Purged By: AL Purge Date: 8/12/2025
Purge Method: Submersible Pump Well Diameter: 2"
Purge Volume Calculation (L): 32.27 ft. x 0.022 = 0.71 L x 3 Vol. = 2.13 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.00 L
Physical appearance of purge water: Slightly cloudy Odor: Slight Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:28	0.0	125	purge start time						
11:43	1.9	↓	6.67	1,995.10	24.23	0.83	-123.60	3.47	
11:46	2.3		6.66	2,010.50	25.64	0.65	-129.30	2.92	
11:49	2.6		6.66	2,014.80	24.46	0.57	-131.50	3.05	
11:52	3.0		6.67	2,003.10	23.53	0.51	-132.40	3.67	

Sampling Activities

Sampled By: PY Sample Date/Time: 8/12/2025 11:52
Sample Method: Low Flow Sample Equipment: Submersible Pump
Sample Parameters: 6.67 pH 2,003.10 Spec. Cond. 23.53 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 18.21 feet below TOC Drawdown: 0.11 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45612

Form Completed By: Allison Lampe **Date:** 8/12/2025

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25080110
Technician(s): DC, JC, BG, AL, JR, PY

Field Calibration Log(s)
CWLP- 3Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 46868 Technician(s): B. Gillihan Date: 8/11/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	8/11/25 10:09
7.0 Buffer	WC240918A	7.00	8/11/25 9:59
10.0 Buffer	WC240625A	10.00	8/11/25 10:15
LCS/CCV (7.0 Buffer)	WC250407A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1411	8/11/25 10:26

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.31	8/11/25 10:28
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-BG	LCS	8/11/25 10:28	21.7	7.02	1,414	0.34		
CCV-1-BG	CCV	8/11/25 15:01	23.3	7.02	1,417	0.39		

Comments:

Field Meter ID: Pine 46868 Technician(s): B. Gillihan Date: 8/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	
7.0 Buffer	WC240918A	7.00	8/12/25 8:49
10.0 Buffer	WC240625A	10.00	8/12/25 8:55
LCS/CCV (7.0 Buffer)	WC250407A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1415	8/12/25 9:01

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.17	8/12/25 9:06
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-BG	LCS	8/12/25 9:08	22.6	7.02	1,418	0.2		
CCV-2-BG	CCV	8/12/25 14:07	24.3	7.03	1,422	0.29		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25080110
Technician(s): DC, JC, BG, AL, JR, PY

Field Calibration Log(s)
CWLP- 3Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 46868 B. Gillihan Date: 8/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250102A	4.00	8/13/25 9:04
7.0 Buffer	WC240918A	7.00	8/13/25 8:58
10.0 Buffer	WC240625A	10.00	8/13/25 9:13
LCS/CCV (7.0 Buffer)	WC250407A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1415	8/13/25 9:18

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.37	8/13/25 9:19
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. bb
LCS-3-BG	LCS	8/13/25 9:28	23.4	7.01	1,435	0.63		
CCV-3-BG	CCV	8/13/25 12:39	24.7	7.03	1,444	0.55		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25080110
Technician(s): DC, JC, BG, AL, JR, PY

Field Calibration Log(s)
CWLP- 3Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 46864 Technician(s): justin colp Date: 8/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc250102a	4.00	8/12/25 9:03
7.0 Buffer	wc250407a	7.00	8/12/25 9:00
10.0 Buffer	wc240625a	10.00	8/12/25 9:06
LCS/CCV (7.0 Buffer)	wc240918a		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1412	8/12/25 9:11

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.91	8/12/25 9:12
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-JC	LCS	8/12/25 9:12	23.8	7.01	1,397	1.87		
CCV-1-JC	CCV	8/12/25 13:41	26.4	7.04	1,382	2.03		

Comments:

Field Meter ID: Pine 46864 Technician(s): justin colp Date: 8/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	wc250102a	4.00	8/13/25 8:54
7.0 Buffer	wc250407a	7.00	8/13/25 8:49
10.0 Buffer	wc240625a	10.00	8/13/25 8:58
LCS/CCV (7.0 Buffer)	wc240918a		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1412	8/13/25 9:04

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	1.95	8/13/25 9:04
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-JC	LCS	8/13/25 9:06	23.6	7.03	1,410	1.92		
CCV-2-JC	CCV	8/13/25 13:00	24.2	6.97	1,388	2.03		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25080110
Technician(s): DC, JC, BG, AL, JR, PY

Field Calibration Log(s)
CWLP- 3Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 45612 Technician(s): A.Lampe Date: 8/11/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250429L	4.00	8/11/25 10:09
7.0 Buffer	WC250407A	7.00	8/11/25 10:11
10.0 Buffer	Wc240625A	10.00	8/11/25 10:15
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1412	8/11/25 10:19

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.13	8/11/25 10:19
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-AL	LCS	8/11/25 10:21	21.9	7.07	1,416	0.13		
CCV-1-AL	CCV	8/11/25 14:16	25.7	7.09	1,412	0.23		

Comments:

Field Meter ID: Pine 45612 Technician(s): A.Lampe Date: 8/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250429L	4.00	8/12/25 9:11
7.0 Buffer	WC250407A	7.00	8/12/25 9:15
10.0 Buffer	Wc240625A	10.00	8/12/25 9:20
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1412	8/12/25 9:25

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.24	8/12/25 9:25
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-AL	LCS	8/12/25 9:31	25.8	7.09	1,418	0.24		
CCV-2-AL	CCV	8/12/25 14:14	27.5	7.09	1,420	0.21		

Comments:

Site Samping Event: Ash Pond Monitoring Wells
LIMS Workorder: 25080110
Technician(s): DC, JC, BG, AL, JR, PY

Field Calibration Log(s)
CWLP- 3Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 45612 Technician(s): A.Lampe Date: 8/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC250429L	4.00	8/13/25 9:06
7.0 Buffer	WC250407A	7.00	8/13/25 9:10
10.0 Buffer	Wc240625A	10.00	8/13/25 9:13
LCS/CCV (7.0 Buffer)	WC240918A		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	105373	1412	8/13/25 9:16

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.12	8/13/25 9:17
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-3-AL	LCS	8/13/25 9:16	25.3	7.09	1,413	0.12		
CCV-3-AL	CCV	8/13/25 12:35	27.6	7.09	1,406	0.14		

Comments:

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

October 07, 2025

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 25080110

Dear Shelly Hennessy: Order No.: 25081497

Alliance Technical Group - Akron received 22 sample(s) on 8/19/2025 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0828, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **25081497**
Date: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110

WorkOrder Narrative:
25081497: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Alliance Technical Group Work Order Number assigned to this report.

Alliance Technical Group holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Alliance Technical Group and that of the customer. It cannot be reproduced in any form without the consent of Alliance Technical Group or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Alliance Technical Group is not responsible for use or interpretation of the data included herein.

All results for solid samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence QC Notes:
LCS/LCSD-87172 Radium-228_DW(904.0): LCS and LCSD exhibit high RPD. Individually both LCS and LCSD meet required criteria.

LCS/LCSD-87463 Radium-228_DW(904.0): LCS and LCSD have high RPD. Individually each LCS and LCSD meet criteria.

LCS/LCSD-87531 Radium-228_DW(904.0): LCS and LCSD exhibit high RPD. Individually each LCS and LCSD meet required criteria.

Alliance Technical Group - Akro
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-448
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **25081497**
Date: **10/7/2025**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Workorder Sample Summary

WO#: **25081497**

07-Oct-25

CLIENT: TEKLAB Inc,
Project: 25080110

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
25081497-001	25080110-001		8/12/2025 1:32:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-002	25080110-002		8/12/2025 11:55:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-003	25080110-003		8/12/2025 12:26:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-004	25080110-004		8/12/2025 12:58:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-005	25080110-005		8/12/2025 10:40:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-006	25080110-006		8/12/2025 9:56:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-007	25080110-007		8/12/2025 11:20:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-008	25080110-008		8/13/2025 9:56:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-009	25080110-009		8/13/2025 12:14:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-010	25080110-010		8/13/2025 10:31:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-011	25080110-011		8/13/2025 11:32:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-012	25080110-012		8/12/2025 10:44:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-013	25080110-013		8/12/2025 11:27:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-014	25080110-014		8/13/2025 9:53:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-015	25080110-015		8/13/2025 10:54:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-016	25080110-016		8/12/2025 1:16:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-017	25080110-017		8/12/2025 12:20:00 PM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-018	25080110-018		8/13/2025 11:35:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-019	25080110-019		8/13/2025 11:00:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-020	25080110-020		8/13/2025 10:26:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-021	25080110-021		8/12/2025 11:02:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water
25081497-022	25080110-022		8/12/2025 11:52:00 AM	8/19/2025 10:15:00 AM	Non-Potable Water

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25081497-001A	25080110-001	8/12/2025 1:32:00 PM	Non-Potable Water	Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-002A	25080110-002	8/12/2025 11:55:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-003A	25080110-003	8/12/2025 12:26:00 PM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-004A	25080110-004	8/12/2025 12:58:00 PM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-005A	25080110-005	8/12/2025 10:40:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-006A	25080110-006	8/12/2025 9:56:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-007A	25080110-007	8/12/2025 11:20:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
				Radium-228 (EPA 904.0)		9/23/2025 9:40:00 AM	10/1/2025 1:22:00 PM
25081497-008A	25080110-008	8/13/2025 9:56:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25081497-008A	25080110-008	8/13/2025 9:56:00 AM	Non-Potable Water	Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-009A	25080110-009	8/13/2025 12:14:00 PM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-010A	25080110-010	8/13/2025 10:31:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-011A	25080110-011	8/13/2025 11:32:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-012A	25080110-012	8/12/2025 10:44:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-013A	25080110-013	8/12/2025 11:27:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-014A	25080110-014	8/13/2025 9:53:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM
25081497-015A	25080110-015	8/13/2025 10:54:00 AM		Combined Radium (EPA903+904)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-226 (EPA 903.0)		9/11/2025 9:30:00 AM	9/18/2025 2:40:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 9:30:00 AM	9/18/2025 11:29:00 AM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25081497-016A	25080110-016	8/12/2025 1:16:00 PM	Non-Potable Water	Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-017A	25080110-017	8/12/2025 12:20:00 PM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-018A	25080110-018	8/13/2025 11:35:00 AM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-019A	25080110-019	8/13/2025 11:00:00 AM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-020A	25080110-020	8/13/2025 10:26:00 AM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-021A	25080110-021	8/12/2025 11:02:00 AM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM
25081497-022A	25080110-022	8/12/2025 11:52:00 AM		Combined Radium (EPA903+904)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-226 (EPA 903.0)		9/11/2025 12:50:00 PM	9/23/2025 10:01:00 AM
				Radium-228 (EPA 904.0)		9/24/2025 2:30:00 PM	10/3/2025 3:06:00 PM
				Radium-228 (EPA 904.0)		9/11/2025 12:50:00 PM	9/22/2025 3:59:00 PM

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Analytical Report

(consolidated)

WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Collection Date: 8/12/2025 1:32:00 PM
Project: 25080110
Lab ID: 25081497-001
Matrix: NON-POTABLE WATER
Client Sample ID: 25080110-001

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.520	1	9/18/2025 2:40:00 PM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.0800	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	1.31	1.00		pCi/L	± 0.440	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-002
Client Sample ID: 25080110-002

Collection Date: 8/12/2025 11:55:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.350	1	9/18/2025 2:40:00 PM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.110	1	9/18/2025 2:40:00 PM
Yield	0.960					1	9/18/2025 2:40:00 PM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	ND	1.00		pCi/L	± 0.240	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-003
Client Sample ID: 25080110-003

Collection Date: 8/12/2025 12:26:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.300	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0600	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.240	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-004
Client Sample ID: 25080110-004

Collection Date: 8/12/2025 12:58:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.360	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0600	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.300	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-005
Client Sample ID: 25080110-005

Collection Date: 8/12/2025 10:40:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.450	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.130	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.320	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-006
Client Sample ID: 25080110-006

Collection Date: 8/12/2025 9:56:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.340	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.270	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Collection Date: 8/12/2025 11:20:00 AM
Project: 25080110
Lab ID: 25081497-007
Matrix: NON-POTABLE WATER
Client Sample ID: 25080110-007

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.440	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.370	1	10/1/2025 1:22:00 PM
Yield	1.00					1	10/1/2025 1:22:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-008
Client Sample ID: 25080110-008

Collection Date: 8/13/2025 9:56:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.400	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.330	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-009
Client Sample ID: 25080110-009

Collection Date: 8/13/2025 12:14:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.460	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.160	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.300	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-010
Client Sample ID: 25080110-010

Collection Date: 8/13/2025 10:31:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.440	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.120	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.320	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-011
Client Sample ID: 25080110-011

Collection Date: 8/13/2025 11:32:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.490	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.150	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.340	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Collection Date: 8/12/2025 10:44:00 AM

Project: 25080110

Lab ID: 25081497-012
Matrix: NON-POTABLE WATER

Client Sample ID: 25080110-012

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.390	1	9/18/2025 2:40:00 PM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.0800	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	ND	1.00		pCi/L	± 0.310	1	9/18/2025 11:29:00 AM
Yield	0.920					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-013
Client Sample ID: 25080110-013

Collection Date: 8/12/2025 11:27:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.450	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0900	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.360	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Analytical Report

(consolidated)

WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-014
Client Sample ID: 25080110-014

Collection Date: 8/13/2025 9:53:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.430	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.350	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-015
Client Sample ID: 25080110-015

Collection Date: 8/13/2025 10:54:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.440	1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	9/18/2025 2:40:00 PM
Yield	1.00					1	9/18/2025 2:40:00 PM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.360	1	9/18/2025 11:29:00 AM
Yield	1.00					1	9/18/2025 11:29:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-016
Client Sample ID: 25080110-016

Collection Date: 8/12/2025 1:16:00 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.570	1	9/23/2025 10:01:00 AM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.0600	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	1.17	1.00		pCi/L	± 0.510	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Collection Date: 8/12/2025 12:20:00 PM
Project: 25080110
Lab ID: 25081497-017
Matrix: NON-POTABLE WATER
Client Sample ID: 25080110-017

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.550	1	9/23/2025 10:01:00 AM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.110	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	1.04	1.00		pCi/L	± 0.440	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Analytical Report

(consolidated)

WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-018
Client Sample ID: 25080110-018

Collection Date: 8/13/2025 11:35:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.450	1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.100	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.350	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-019
Client Sample ID: 25080110-019

Collection Date: 8/13/2025 11:00:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.520	1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	ND	1.00		pCi/L	± 0.440	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Collection Date: 8/13/2025 10:26:00 AM
Project: 25080110
Lab ID: 25081497-020
Matrix: NON-POTABLE WATER
Client Sample ID: 25080110-020

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.580	1	9/23/2025 10:01:00 AM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.0900	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	1.10	1.00		pCi/L	± 0.490	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-021
Client Sample ID: 25080110-021

Collection Date: 8/12/2025 11:02:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228 COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **SEE**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.620	1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **SEE**
Radium-226	ND	1.00		pCi/L	± 0.0600	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228 RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **SEE**
Radium-228	1.72	1.00		pCi/L	± 0.560	1	9/22/2025 3:59:00 PM
Yield	1.00					1	9/22/2025 3:59:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

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WO#: **25081497**

Date Reported: **10/7/2025**

CLIENT: TEKLAB Inc,
Project: 25080110
Lab ID: 25081497-022
Client Sample ID: 25080110-022

Collection Date: 8/12/2025 11:52:00 AM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
RAD226/228					**CALCULATION**	**E903-904**	Analyst: **SEE**
COMBINED RADIUM (EPA903+904)							
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.490	1	9/23/2025 10:01:00 AM
RAD226/228					**E903.0**	**E903-904**	Analyst: **SEE**
RADIUM-226 (EPA 903.0)							
Radium-226	ND	1.00		pCi/L	± 0.170	1	9/23/2025 10:01:00 AM
Yield	1.00					1	9/23/2025 10:01:00 AM
RAD226/228					**E904.0**	**E903-904**	Analyst: **SEE**
RADIUM-228 (EPA 904.0)							
Radium-228	ND	1.00		pCi/L	± 0.320	1	10/3/2025 3:06:00 PM
Yield	1.00					1	10/3/2025 3:06:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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QC SUMMARY REPORT

WO#: **25081497**
07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87172**

Sample ID: **MB-87172** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217073**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E904.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-87172** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217073**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E904.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787222**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	5.39	1.00	5.000	0	108	50	130				QLR
Yield	1.00			0	0						

Sample ID: **LCSD-87172** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217073**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E904.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787223**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.86	1.00	5.000	0	77.2	50	130	5.390	33.1	20	R
Yield	0.970			0	0			1.000	3.05		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87172**

Sample ID: **25081492-018ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217073**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E904.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787229**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	0.42	1.00		0	0			0	0	20	
Yield	0.330			0	0			1.000	101		

Sample ID: **25081492-019ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217073**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E904.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87172**

Sample ID: **MB-87172** SampType: **MBLK** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217076**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E903.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787301**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-87172** SampType: **LCS** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217076**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E903.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.52	1.00	5.000	0	90.4	70	130				

Sample ID: **LCSD-87172** SampType: **LCSD** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217076**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E903.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5787303**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.17	1.00	5.000	0	103	70	130	4.520	13.4	20	

Sample ID: **25081492-018ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217076**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E903.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5815588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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Cuyahoga Falls, Ohio 44223
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QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87172**

Sample ID: **25081492-018ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217076**
Client ID: **BatchQC** Batch ID: **87172** TestNo: **E903.0** **E903-904** Analysis Date: **9/18/2025** SeqNo: **5815588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	0.15	1.00						0	0	20	
Yield	0.340							1.000	98.5	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

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Cuyahoga Falls, Ohio 44223
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QC SUMMARY REPORT

WO#: **25081497**
07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87178**

Sample ID: **MB-87178**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217179**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E904.0**	**E903-904**	Analysis Date: **9/22/2025**	SeqNo: **5790136**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-87178**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217179**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E904.0**	**E903-904**	Analysis Date: **9/22/2025**	SeqNo: **5790137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.88	1.00	5.000	0	77.6	50	130				
Yield	1.00			0	0						

Sample ID: **LCSD-87178**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217179**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E904.0**	**E903-904**	Analysis Date: **9/22/2025**	SeqNo: **5790138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.60	1.00	5.000	0	72.0	50	130	3.880	7.49	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87178**

Sample ID: **25081580-001ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **9/11/2025** RunNo: **217196**
Client ID: **BatchQC** Batch ID: **87178** TestNo: **E903.0** **E903-904** Analysis Date: **9/23/2025** SeqNo: **5790550**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	
Yield	1.00							1.000	0	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**
07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87178**

Sample ID: **MB-87178**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217196**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E903.0**	**E903-904**	Analysis Date: **9/23/2025**	SeqNo: **5790531**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-87178**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217196**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E903.0**	**E903-904**	Analysis Date: **9/23/2025**	SeqNo: **5790532**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	4.87	1.00	5.000	0	97.4	70	130				

Sample ID: **LCSD-87178**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **9/11/2025**	RunNo: **217196**
Client ID: **BatchQC**	Batch ID: **87178**	TestNo: **E903.0**	**E903-904**	Analysis Date: **9/23/2025**	SeqNo: **5790533**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.15	1.00	5.000	0	103	70	130	4.870	5.59	20	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87463**

Sample ID: **MB-87463**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/23/2025**	RunNo: **217938**
Client ID: **BatchQC**	Batch ID: **87463**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/1/2025**	SeqNo: **5809972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-87463**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/23/2025**	RunNo: **217938**
Client ID: **BatchQC**	Batch ID: **87463**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/1/2025**	SeqNo: **5809973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.36	1.00	5.000	0	67.2	50	130				QLR
Yield	1.00			0	0						

Sample ID: **LCSD-87463**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/23/2025**	RunNo: **217938**
Client ID: **BatchQC**	Batch ID: **87463**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/1/2025**	SeqNo: **5809974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	5.26	1.00	5.000	0	105	50	130	3.360	44.1	20	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87463**

Sample ID: **25082041-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/23/2025** RunNo: **217938**
Client ID: **BatchQC** Batch ID: **87463** TestNo: **E904.0** **E903-904** Analysis Date: **10/1/2025** SeqNo: **5809984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25082041-002ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/23/2025** RunNo: **217938**
Client ID: **BatchQC** Batch ID: **87463** TestNo: **E904.0** **E903-904** Analysis Date: **10/1/2025** SeqNo: **5809986**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**
07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87531**

Sample ID: **MB-87531**	SampType: **MBLK**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/24/2025**	RunNo: **218111**
Client ID: **BatchQC**	Batch ID: **87531**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/3/2025**	SeqNo: **5815454**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	1.00			0	0						

Sample ID: **LCS-87531**	SampType: **LCS**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/24/2025**	RunNo: **218111**
Client ID: **BatchQC**	Batch ID: **87531**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/3/2025**	SeqNo: **5815455**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	5.84	1.00	5.000	0	117	50	130				QLR
Yield	1.00			0	0						

Sample ID: **LCSD-87531**	SampType: **LCSD**	TestCode: **Radium-228_**	Units: **pCi/L**	Prep Date: **9/24/2025**	RunNo: **218111**
Client ID: **BatchQC**	Batch ID: **87531**	TestNo: **E904.0**	**E903-904**	Analysis Date: **10/3/2025**	SeqNo: **5815456**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.77	1.00	5.000	0	75.4	50	130	5.840	43.1	20	R
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25081497**

07-Oct-25

Client: TEKLAB Inc,
Project: 25080110 **BatchID:** **87531**

Sample ID: **25082268-001ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **9/24/2025** RunNo: **218111**
Client ID: **BatchQC** Batch ID: **87531** TestNo: **E904.0** **E903-904** Analysis Date: **10/3/2025** SeqNo: **5815469**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	0.13	1.00		0	0			0	0	20	
Yield	1.00			0	0			1.000	0		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode				

Original

Pg 1 of 2 25881497

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Client QC Level: 2

Comments: **Please Issue reports and invoices via email only**
SHIP to ATG-Akron. Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.

Project# 25080110

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 39206 Phone: (618) 344-1004 ext. State of Sample Origin = IL

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228	Pb	Pb	Pb						Cl	Cl	Cl
	25080110-001	8/12/25 1332	HNO3	Groundwater	✓	1	1	1						18	28	12
	25080110-002	8/12/25 1155	HNO3	Groundwater	✓	1	1	1						34	34	24
	25080110-003	8/12/25 1226	HNO3	Groundwater	✓	1	1	1						28	20	30
	25080110-004	8/12/25 1258	HNO3	Groundwater	✓	1	1	1						30	24	36
	25080110-005	8/12/25 1040	HNO3	Groundwater	✓	1	1	1						30	22	30
	25080110-006	8/12/25 0956	HNO3	Groundwater	✓	1	1	1						30	32	32
	25080110-007	8/12/25 1120	HNO3	Groundwater	✓	1	1	1						36	34	18
	25080110-008	8/13/25 0956	HNO3	Groundwater	✓	1	1	1						18	32	24
	25080110-009	8/13/25 1214	HNO3	Groundwater	✓	1	1	1						22	44	38
	25080110-010	8/13/25 1031	HNO3	Groundwater	✓	5	5	1						22	32	20
	25080110-011	8/13/25 1132	HNO3	Groundwater	✓	4	4	4						40	48	22

*Relinquished By	Date/Time	Received By	Date/Time
Linda Overall		(UPS)	8/19/25 10:15AM

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

SubCocRevA 3/2/2016

24.9 - 0.1 = 24.8

25081497

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Client QC Level: 2

Comments: **Please Issue reports and invoices via email only**
SHIP to ATG-Akron. Please analyze for Radium 226/228 per your usual methods.
Any changes to analysis/methods must be approved by Teklab, Inc. Batch QC is required.

Project# 25080110

Contact: Shelly Hennessy Email: shennessy@TekLabInc.com
Requested Due Date: Standard TAT Billing/PO: 39206 Phone: (618) 344-1004 ext. State of Sample Origin = IL

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Radium 226/228	Pit	Pit	Pit						CPM	CPM	CPM
	25080110-012	8/12/25 1044	HNO3	Groundwater	✔	1	1	1						18	20	22
	25080110-013	8/12/25 1127	HNO3	Groundwater	✔	1	1	1						26	26	42
	25080110-014	8/13/25 0953	HNO3	Groundwater	✔	1	1	1						22	14	28
	25080110-015	8/13/25 1054	HNO3	Groundwater	✔	1	1	1						26	26	14
	25080110-016	8/12/25 1316	HNO3	Groundwater	✔	1	1	1						10	36	22
	25080110-017	8/12/25 1220	HNO3	Groundwater	✔	1	1	1						42	36	28
	25080110-018	8/13/25 1135	HNO3	Groundwater	✔	1	1	1						34	28	30
	25080110-019	8/13/25 1100	HNO3	Groundwater	✔	1	1	1						20	32	34
	25080110-020	8/13/25 1026	HNO3	Groundwater	✔	1	1	1						22	28	26
	25080110-021	8/12/25 1102	HNO3	Groundwater	✔	1	4	1						24	22	28
	25080110-022	8/12/25 1152	HNO3	Groundwater	✔	1	1	1						18	20	28

*Relinquished By	Date/Time	Received By	Date/Time
[signature]		[signature] (UPS)	8/19/25 10:15AM

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization, and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

SubCocRevA
3/2/2016

24.9 - 0.1 = 24.8

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: **TEK-IL-62234-A** Work Order Number: **25081497** RcptNo: **1**

Logged by:	**Spencer M. Hartwell**	**8/19/2025 10:15:00 AM**	Spencer M. Hartwell
Completed By:	**Spencer M. Hartwell**	**8/20/2025 11:04:05 AM**	Spencer M. Hartwell
Reviewed By:	**Jennifer Woolf**	**8/21/2025 8:31:45 PM**	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☑ No ☐ Not Present ☐ NA ☐
   No. Seal Date: 8/15/2025 Signed By:
5. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☐ No ☑
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
    combined also? : include per client email

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	24.8	Good	Yes	4443	8/15/2025	
2	24.8	Good	Yes	4444	8/15/2025	

APPENDIX C-4:

Fourth Quarter 2025

Laboratory Analytical Report and Field Notes

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: **TEK-IL-62234-A** Work Order Number: **25081497** RcptNo: **1**

3	24.8	Good	Yes	4497	8/15/2025	

January 13, 2026

Eric Staley
City Water, Light & Power
3100 Stevenson Drive
2nd Floor Maintenance Building
Springfield, IL 62712
TEL: (217) 757-8610
FAX: (217) 757-8615

Illinois	100226
Kansas	E-10374
Kansas	E-10438
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Ash Pond Monitoring Wells **WorkOrder:** 25110404

Dear Eric Staley:

TEKLAB, INC received 22 samples on 11/13/2025 4:30:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004
SHennessy@teklabinc.com

Report Contents

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25110404
Report Date: 13-Jan-26

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	34
Chain of Custody	Appended

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Abbr Definition

Abbr	Definition
*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
NC	Data is not acceptable for compliance purposes
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Definitions

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- C - RL shown is a Client Requested Quantitation Limit
- E - Value above quantitation range
- H - Holding times exceeded
- I - Associated internal standard was outside method criteria
- J - Analyte detected below quantitation limits
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- T - TIC(Tentatively identified compound)
- X - Value exceeds Maximum Contaminant Level

Case Narrative

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25110404
Report Date: 13-Jan-26

Cooler Receipt Temp: 17.5 °C

An employee of Teklab, Inc. collected the sample(s).

A15S and A15D are not required this quarter per Eric Staley. SAH 11/12/25

Radium-226 & -228 analysis was performed by Alliance Technical Group. See attached report for results.

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Collinsville

Address 120 United Drive
Collinsville, IL 62234-7433
Phone (618) 344-1004
Fax
Email jhriley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Collinsville Air

Address 120 United Drive
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Client: City Water, Light & Power

Client Project: Ash Pond Monitoring Wells

Work Order: 25110404

Report Date: 13-Jan-26

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2027	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2026	Collinsville
Kansas	KDHE	E-10438	NELAP	7/31/2026	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2026	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2026	Collinsville
Oklahoma	ODEQ	9978	NELAP	1/31/2026	Collinsville
Arkansas	ADEQ	88-0966		3/14/2026	Collinsville
Illinois	IDPH	17584		5/31/2026	Collinsville
Iowa	IDNR	430		6/1/2026	Collinsville
Kentucky	KWLCP	KY98050		12/31/2026	Collinsville
Kentucky	KWLCP	KY98006		12/31/2026	Collinsville
Kentucky	UST	0073		1/31/2026	Collinsville
Mississippi	MSDH			4/30/2026	Collinsville
Missouri	MDNR	930		1/31/2028	Collinsville
Missouri	MDNR	00930		10/31/2026	Collinsville

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-001 **Client Sample ID:** RW-3

Matrix: GROUNDWATER **Collection Date:** 11/12/2025 13:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.49**	ft	1	11/12/2025 13:56	R374970
Depth to water	*	-5.00		**10.78**	ft	1	11/12/2025 13:56	R374970
Depth to water from measuring point	*	0		**13.48**	ft	1	11/12/2025 13:56	R374970
Elevation of groundwater surface	*	0		**526.02**	ft	1	11/12/2025 13:56	R374970
Measuring Point Elevation	*	0		**539.50**	ft	1	11/12/2025 13:56	R374970
Measuring Point Height Above Land Surface	*	0		**2.70**	ft	1	11/12/2025 13:56	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**130**	NTU	1	11/12/2025 13:56	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.8**	°F	1	11/12/2025 13:56	R374970
SW-846 9040B								
pH, Field	*	1.00		**7.09**		1	11/12/2025 13:56	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**780**	µmhos/cm @25C	1	11/12/2025 13:56	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**454**	mg/L	1	11/17/2025 14:23	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/13/2025 16:25	R374691
Chloride	NELAP	5.00		**27.1**	mg/L	10	11/13/2025 16:25	R374691
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/13/2025 16:25	R374691
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**167**	µg/L	1	11/18/2025 10:15	247867
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/18/2025 10:15	247867
Boron	NELAP	20.0		**160**	µg/L	1	11/18/2025 10:15	247867
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/18/2025 10:15	247867
Calcium	NELAP	0.100	B	**71.1**	mg/L	1	11/18/2025 10:15	247867
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:15	247867
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:15	247867
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/18/2025 10:15	247867
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/18/2025 10:15	247867
Sample result(s) for Ca exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**3.9**	µg/L	5	11/14/2025 19:26	247867
Arsenic	NELAP	1.0		**108**	µg/L	5	11/13/2025 20:27	247867
Lithium	*	3.0		**5.7**	µg/L	5	11/14/2025 19:26	247867
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/13/2025 20:27	247867
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/14/2025 19:26	247867
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/14/2025 19:04	247892
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.38**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.080**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-001
Client Sample ID: RW-3
Matrix: GROUNDWATER
Collection Date: 11/12/2025 13:56

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-228 Uncertainty	*	0		**0.30**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-002
Client Sample ID: AP-1
Matrix: GROUNDWATER
Collection Date: 11/13/2025 14:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**504.29**	ft	1	11/13/2025 14:25	R374970
Depth to water	*	-5.00		**9.62**	ft	1	11/13/2025 14:25	R374970
Depth to water from measuring point	*	0		**11.89**	ft	1	11/13/2025 14:25	R374970
Elevation of groundwater surface	*	0		**523.48**	ft	1	11/13/2025 14:25	R374970
Measuring Point Elevation	*	0		**535.37**	ft	1	11/13/2025 14:25	R374970
Measuring Point Height Above Land Surface	*	0		**2.27**	ft	1	11/13/2025 14:25	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**15**	NTU	1	11/13/2025 14:25	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.6**	°F	1	11/13/2025 14:25	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.86**		1	11/13/2025 14:25	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2140**	µmhos/cm @25C	1	11/13/2025 14:25	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1590**	mg/L	1	11/18/2025 10:51	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 21:25	R374783
Chloride	NELAP	5.00		**51.8**	mg/L	10	11/16/2025 21:25	R374783
Sulfate	NELAP	10.0		**828**	mg/L	10	11/16/2025 21:25	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**248**	µg/L	1	11/17/2025 11:59	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 11:59	247986
Boron	NELAP	200		**21400**	µg/L	10	11/19/2025 16:50	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 11:59	247986
Calcium	NELAP	0.100		**251**	mg/L	1	11/17/2025 11:59	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 11:59	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 11:59	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 11:59	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 11:59	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:39	247986
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:39	247986
Lithium	*	3.0		**8.6**	µg/L	5	11/18/2025 13:43	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:39	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 13:43	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:06	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.44**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.10**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.34**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-003 **Client Sample ID:** AP-2

Matrix: GROUNDWATER **Collection Date:** 11/12/2025 13:54

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.77**	ft	1	11/12/2025 13:54	R374970
Depth to water	*	-5.00		**7.12**	ft	1	11/12/2025 13:54	R374970
Depth to water from measuring point	*	0		**9.62**	ft	1	11/12/2025 13:54	R374970
Elevation of groundwater surface	*	0		**526.48**	ft	1	11/12/2025 13:54	R374970
Measuring Point Elevation	*	0		**536.10**	ft	1	11/12/2025 13:54	R374970
Measuring Point Height Above Land Surface	*	0		**2.50**	ft	1	11/12/2025 13:54	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**20**	NTU	1	11/12/2025 13:54	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.6**	°F	1	11/12/2025 13:54	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.55**		1	11/12/2025 13:54	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1740**	µmhos/cm @25C	1	11/12/2025 13:54	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1190**	mg/L	1	11/17/2025 14:23	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/13/2025 16:38	R374691
Chloride	NELAP	5.00		**37.0**	mg/L	10	11/13/2025 16:38	R374691
Sulfate	NELAP	10.0		**389**	mg/L	10	11/13/2025 16:38	R374691
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**74.9**	µg/L	1	11/18/2025 10:17	247867
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/18/2025 10:17	247867
Boron	NELAP	20.0		**3150**	µg/L	1	11/18/2025 10:17	247867
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/18/2025 10:17	247867
Calcium	NELAP	0.100	B	**213**	mg/L	1	11/18/2025 10:17	247867
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:17	247867
Cobalt	NELAP	5.0		**7.8**	µg/L	1	11/18/2025 10:17	247867
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/18/2025 10:17	247867
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/18/2025 10:17	247867
Sample result(s) for Ca exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**2.1**	µg/L	5	11/14/2025 19:32	247867
Arsenic	NELAP	1.0		**1.4**	µg/L	5	11/13/2025 20:32	247867
Lithium	*	3.0		**6.1**	µg/L	5	11/14/2025 19:32	247867
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/13/2025 20:32	247867
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/14/2025 19:32	247867
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/14/2025 19:06	247892
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.38**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.080**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-003
Client Sample ID: AP-2
Matrix: GROUNDWATER
Collection Date: 11/12/2025 13:54

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-228 Uncertainty	*	0		**0.30**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-004 **Client Sample ID:** AP-3

Matrix: GROUNDWATER **Collection Date:** 11/12/2025 13:17

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**514.45**	ft	1	11/12/2025 13:17	R374970
Depth to water	*	-5.00		**7.33**	ft	1	11/12/2025 13:17	R374970
Depth to water from measuring point	*	0		**9.88**	ft	1	11/12/2025 13:17	R374970
Elevation of groundwater surface	*	0		**525.37**	ft	1	11/12/2025 13:17	R374970
Measuring Point Elevation	*	0		**535.25**	ft	1	11/12/2025 13:17	R374970
Measuring Point Height Above Land Surface	*	0		**2.55**	ft	1	11/12/2025 13:17	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**6.1**	NTU	1	11/12/2025 13:17	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**62.9**	°F	1	11/12/2025 13:17	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.93**		1	11/12/2025 13:17	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1740**	µmhos/cm @25C	1	11/12/2025 13:17	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1310**	mg/L	1	11/17/2025 14:23	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/13/2025 16:50	R374691
Chloride	NELAP	5.00		**70.8**	mg/L	10	11/13/2025 16:50	R374691
Sulfate	NELAP	10.0		**588**	mg/L	10	11/13/2025 16:50	R374691
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**117**	µg/L	1	11/18/2025 10:46	247867
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/18/2025 10:46	247867
Boron	NELAP	20.0		**18000**	µg/L	1	11/18/2025 10:46	247867
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/18/2025 10:46	247867
Calcium	NELAP	0.100	B	**192**	mg/L	1	11/18/2025 10:46	247867
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:46	247867
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:46	247867
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/18/2025 10:46	247867
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/18/2025 10:46	247867
Sample result(s) for Ca exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**1.5**	µg/L	5	11/14/2025 19:37	247867
Arsenic	NELAP	1.0		**13.5**	µg/L	5	11/13/2025 20:38	247867
Lithium	*	3.0		**6.2**	µg/L	5	11/14/2025 19:37	247867
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/13/2025 20:38	247867
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/14/2025 19:37	247867
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/14/2025 19:13	247892
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.40**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.070**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-004
Client Sample ID: AP-3
Matrix: GROUNDWATER
Collection Date: 11/12/2025 13:17

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-228 Uncertainty	*	0		**0.33**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-005 **Client Sample ID:** AP-4

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 13:43

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**495.19**	ft	1	11/13/2025 13:43	R374970
Depth to water	*	-5.00		**9.80**	ft	1	11/13/2025 13:43	R374970
Depth to water from measuring point	*	0		**12.94**	ft	1	11/13/2025 13:43	R374970
Elevation of groundwater surface	*	0		**542.66**	ft	1	11/13/2025 13:43	R374970
Measuring Point Elevation	*	0		**555.60**	ft	1	11/13/2025 13:43	R374970
Measuring Point Height Above Land Surface	*	0		**3.14**	ft	1	11/13/2025 13:43	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**62**	NTU	1	11/13/2025 13:43	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**64.0**	°F	1	11/13/2025 13:43	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.76**		1	11/13/2025 13:43	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**914**	µmhos/cm @25C	1	11/13/2025 13:43	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**532**	mg/L	1	11/18/2025 10:51	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 21:37	R374783
Chloride	NELAP	5.00		**12.8**	mg/L	10	11/16/2025 21:37	R374783
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/16/2025 21:37	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**417**	µg/L	1	11/17/2025 11:59	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 11:59	247986
Boron	NELAP	20.0		**91.4**	µg/L	1	11/17/2025 11:59	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 11:59	247986
Calcium	NELAP	0.100		**128**	mg/L	1	11/17/2025 11:59	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 11:59	247986
Cobalt	NELAP	5.0		**6.7**	µg/L	1	11/20/2025 15:22	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 11:59	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 11:59	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:44	247986
Arsenic	NELAP	1.0		**21.9**	µg/L	5	11/18/2025 3:44	247986
Lithium	*	3.0		**9.0**	µg/L	5	11/18/2025 13:49	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:44	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 13:49	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:08	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.47**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.13**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.34**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-006
Client Sample ID: AP-5
Matrix: GROUNDWATER
Collection Date: 11/13/2025 13:04

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**552.63**	ft	1	11/13/2025 13:04	R374970
Depth to water	*	-5.00		**18.32**	ft	1	11/13/2025 13:04	R374970
Depth to water from measuring point	*	0		**20.62**	ft	1	11/13/2025 13:04	R374970
Elevation of groundwater surface	*	0		**563.28**	ft	1	11/13/2025 13:04	R374970
Measuring Point Elevation	*	0		**583.90**	ft	1	11/13/2025 13:04	R374970
Measuring Point Height Above Land Surface	*	0		**2.30**	ft	1	11/13/2025 13:04	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**1.9**	NTU	1	11/13/2025 13:04	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.6**	°F	1	11/13/2025 13:04	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.83**		1	11/13/2025 13:04	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**788**	µmhos/cm @25C	1	11/13/2025 13:04	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**498**	mg/L	1	11/18/2025 10:51	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 21:50	R374783
Chloride	NELAP	5.00		**9.78**	mg/L	10	11/16/2025 21:50	R374783
Sulfate	NELAP	10.0		**70.9**	mg/L	10	11/16/2025 21:50	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**60.4**	µg/L	1	11/17/2025 12:00	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 12:00	247986
Boron	NELAP	20.0		**38.6**	µg/L	1	11/17/2025 12:00	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 12:00	247986
Calcium	NELAP	0.100		**109**	mg/L	1	11/17/2025 12:00	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 12:00	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 12:00	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 12:00	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 12:00	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:50	247986
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:50	247986
Lithium	*	3.0		**4.1**	µg/L	5	11/18/2025 13:54	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:50	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 13:54	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:11	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.37**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.040**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.33**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-007
Client Sample ID: AP-6
Matrix: GROUNDWATER
Collection Date: 11/13/2025 12:58

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**498.20**	ft	1	11/13/2025 12:58	R374970
Depth to water	*	-5.00		**8.91**	ft	1	11/13/2025 12:58	R374970
Depth to water from measuring point	*	0		**11.33**	ft	1	11/13/2025 12:58	R374970
Elevation of groundwater surface	*	0		**526.49**	ft	1	11/13/2025 12:58	R374970
Measuring Point Elevation	*	0		**537.82**	ft	1	11/13/2025 12:58	R374970
Measuring Point Height Above Land Surface	*	0		**2.42**	ft	1	11/13/2025 12:58	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**2.6**	NTU	1	11/13/2025 12:58	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**61.6**	°F	1	11/13/2025 12:58	R374970
SW-846 9040B								
pH, Field	*	1.00		**7.06**		1	11/13/2025 12:58	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**737**	µmhos/cm @25C	1	11/13/2025 12:58	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**450**	mg/L	1	11/18/2025 11:02	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.53**	mg/L	10	11/16/2025 22:28	R374783
Chloride	NELAP	5.00		**38.0**	mg/L	10	11/16/2025 22:28	R374783
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/16/2025 22:28	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**199**	µg/L	1	11/17/2025 15:58	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 15:58	247986
Boron	NELAP	20.0		**272**	µg/L	1	11/17/2025 15:58	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 15:58	247986
Calcium	NELAP	0.100		**69.8**	mg/L	1	11/17/2025 15:58	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 15:58	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 15:58	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 15:58	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 15:58	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:55	247986
Arsenic	NELAP	1.0		**11.2**	µg/L	5	11/18/2025 3:55	247986
Lithium	*	3.0		**7.5**	µg/L	5	11/18/2025 14:00	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 3:55	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 14:00	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:13	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.41**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.070**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.34**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-008 **Client Sample ID:** AP-7

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 12:19

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**496.50**	ft	1	11/13/2025 12:19	R374970
Depth to water	*	-5.00		**11.26**	ft	1	11/13/2025 12:19	R374970
Depth to water from measuring point	*	0		**13.92**	ft	1	11/13/2025 12:19	R374970
Elevation of groundwater surface	*	0		**525.10**	ft	1	11/13/2025 12:19	R374970
Measuring Point Elevation	*	0		**539.02**	ft	1	11/13/2025 12:19	R374970
Measuring Point Height Above Land Surface	*	0		**2.66**	ft	1	11/13/2025 12:19	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**59**	NTU	1	11/13/2025 12:19	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.4**	°F	1	11/13/2025 12:19	R374970
SW-846 9040B								
pH, Field	*	1.00		**7.06**		1	11/13/2025 12:19	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**903**	µmhos/cm @25C	1	11/13/2025 12:19	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**522**	mg/L	1	11/18/2025 11:03	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**0.53**	mg/L	10	11/16/2025 22:41	R374783
Chloride	NELAP	5.00		**88.5**	mg/L	10	11/16/2025 22:41	R374783
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/16/2025 22:41	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**152**	µg/L	1	11/17/2025 15:58	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 15:58	247986
Boron	NELAP	20.0		**475**	µg/L	1	11/17/2025 15:58	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 15:58	247986
Calcium	NELAP	0.100	S	**55.9**	mg/L	1	11/17/2025 15:58	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 15:58	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 15:58	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 15:58	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 15:58	247986
Matrix spike control limits for CA are not applicable due to high sample/spike ratio.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:25	247986
Arsenic	NELAP	1.0		**18.2**	µg/L	5	11/18/2025 5:25	247986
Lithium	*	3.0		**10.3**	µg/L	5	11/18/2025 13:04	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:25	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 13:04	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:15	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.41**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.070**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-008
Client Sample ID: AP-7
Matrix: GROUNDWATER
Collection Date: 11/13/2025 12:19

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-228 Uncertainty	*	0		**0.34**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-009
Client Sample ID: AP-8
Matrix: GROUNDWATER
Collection Date: 11/13/2025 13:53

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**497.60**	ft	1	11/13/2025 13:53	R374970
Depth to water	*	-5.00		**6.58**	ft	1	11/13/2025 13:53	R374970
Depth to water from measuring point	*	0		**9.48**	ft	1	11/13/2025 13:53	R374970
Elevation of groundwater surface	*	0		**527.72**	ft	1	11/13/2025 13:53	R374970
Measuring Point Elevation	*	0		**537.20**	ft	1	11/13/2025 13:53	R374970
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	11/13/2025 13:53	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**13**	NTU	1	11/13/2025 13:53	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**60.7**	°F	1	11/13/2025 13:53	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.11**		1	11/13/2025 13:53	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1160**	µmhos/cm @25C	1	11/13/2025 13:53	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**550**	mg/L	1	11/18/2025 11:03	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 22:53	R374783
Chloride	NELAP	5.00		**24.2**	mg/L	10	11/16/2025 22:53	R374783
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/16/2025 22:53	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**373**	µg/L	1	11/17/2025 16:01	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:01	247986
Boron	NELAP	20.0		**82.1**	µg/L	1	11/17/2025 16:01	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:01	247986
Calcium	NELAP	0.100		**103**	mg/L	1	11/17/2025 16:01	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:01	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:01	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:01	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:01	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:41	247986
Arsenic	NELAP	1.0		**37.2**	µg/L	5	11/18/2025 4:41	247986
Lithium	*	3.0		**6.5**	µg/L	5	11/18/2025 14:05	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:41	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 14:05	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:18	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.59**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**1.4**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.16**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.43**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-010
Client Sample ID: AP-9
Matrix: GROUNDWATER
Collection Date: 11/13/2025 9:38

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.70**	ft	1	11/13/2025 9:38	R374970
Depth to water	*	-5.00		**11.09**	ft	1	11/13/2025 9:38	R374970
Depth to water from measuring point	*	0		**14.19**	ft	1	11/13/2025 9:38	R374970
Elevation of groundwater surface	*	0		**526.11**	ft	1	11/13/2025 9:38	R374970
Measuring Point Elevation	*	0		**540.30**	ft	1	11/13/2025 9:38	R374970
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	11/13/2025 9:38	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.8**	NTU	1	11/13/2025 9:38	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.0**	°F	1	11/13/2025 9:38	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.57**		1	11/13/2025 9:38	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1070**	µmhos/cm @25C	1	11/13/2025 9:38	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**614**	mg/L	1	11/18/2025 11:03	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 23:06	R374783
Chloride	NELAP	5.00		**25.5**	mg/L	10	11/16/2025 23:06	R374783
Sulfate	NELAP	10.0		**15.5**	mg/L	10	11/16/2025 23:06	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**437**	µg/L	1	11/17/2025 16:01	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:01	247986
Boron	NELAP	20.0		**98.5**	µg/L	1	11/17/2025 16:01	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:01	247986
Calcium	NELAP	0.100		**111**	mg/L	1	11/17/2025 16:01	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:01	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:01	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:01	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:01	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:46	247986
Arsenic	NELAP	1.0		**1.6**	µg/L	5	11/18/2025 4:46	247986
Lithium	*	3.0		**5.9**	µg/L	5	11/18/2025 14:11	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:46	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 14:11	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:20	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Combined 226/228 Uncertainty	*	0		**0.42**	+/-	1	12/19/2025 11:15	R377436
Radium-226	*	1.0		**ND**	pci/L	1	12/19/2025 11:15	R377436
Radium-226 Uncertainty	*	0		**0.11**	+/-	1	12/19/2025 11:15	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 11:20	R377439
Radium-228 Uncertainty	*	0		**0.31**	+/-	1	01/02/2026 11:20	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-011 **Client Sample ID:** AP10

Matrix: GROUNDWATER **Collection Date:** 11/12/2025 14:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**499.43**	ft	1	11/12/2025 14:32	R374970
Depth to water	*	-5.00		**4.63**	ft	1	11/12/2025 14:32	R374970
Depth to water from measuring point	*	0		**7.73**	ft	1	11/12/2025 14:32	R374970
Elevation of groundwater surface	*	0		**529.77**	ft	1	11/12/2025 14:32	R374970
Measuring Point Elevation	*	0		**537.50**	ft	1	11/12/2025 14:32	R374970
Measuring Point Height Above Land Surface	*	0		**3.10**	ft	1	11/12/2025 14:32	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**4.7**	NTU	1	11/12/2025 14:32	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.8**	°F	1	11/12/2025 14:32	R374970
SW-846 9040B								
pH, Field	*	1.00		**5.37**		1	11/12/2025 14:32	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1470**	µmhos/cm @25C	1	11/12/2025 14:32	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**834**	mg/L	1	11/17/2025 14:38	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/13/2025 17:03	R374691
Chloride	NELAP	5.00		**25.9**	mg/L	10	11/13/2025 17:03	R374691
Sulfate	NELAP	10.0		**90.8**	mg/L	10	11/13/2025 17:03	R374691
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**601**	µg/L	1	11/18/2025 10:48	247867
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/18/2025 10:48	247867
Boron	NELAP	20.0		**3880**	µg/L	1	11/18/2025 10:48	247867
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/18/2025 10:48	247867
Calcium	NELAP	0.100	B	**141**	mg/L	1	11/18/2025 10:48	247867
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:48	247867
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/18/2025 10:48	247867
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/18/2025 10:48	247867
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/18/2025 10:48	247867
Sample result(s) for Ca exceed 10 times the method blank contamination. Data is reportable per the TNI Standard.								
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**1.1**	µg/L	5	11/14/2025 19:43	247867
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/13/2025 20:44	247867
Lithium	*	3.0		**8.2**	µg/L	5	11/14/2025 19:43	247867
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/13/2025 20:44	247867
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/14/2025 19:43	247867
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/14/2025 19:16	247892
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.55**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**1.0**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.14**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-011
Client Sample ID: AP10
Matrix: GROUNDWATER
Collection Date: 11/12/2025 14:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 903.0/904.0, RADIUM 226/228								
Radium-228 Uncertainty	*	0		**0.41**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-012
Client Sample ID: AP11
Matrix: GROUNDWATER
Collection Date: 11/13/2025 9:40

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.15**	ft	1	11/13/2025 9:40	R374970
Depth to water	*	-5.00		**12.78**	ft	1	11/13/2025 9:40	R374970
Depth to water from measuring point	*	0		**15.58**	ft	1	11/13/2025 9:40	R374970
Elevation of groundwater surface	*	0		**522.52**	ft	1	11/13/2025 9:40	R374970
Measuring Point Elevation	*	0		**538.10**	ft	1	11/13/2025 9:40	R374970
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	11/13/2025 9:40	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**8.4**	NTU	1	11/13/2025 9:40	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.9**	°F	1	11/13/2025 9:40	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.79**		1	11/13/2025 9:40	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1270**	µmhos/cm @25C	1	11/13/2025 9:40	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**694**	mg/L	1	11/18/2025 11:03	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/16/2025 23:18	R374783
Chloride	NELAP	5.00		**113**	mg/L	10	11/16/2025 23:18	R374783
Sulfate	NELAP	10.0		**68.9**	mg/L	10	11/16/2025 23:18	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**120**	µg/L	1	11/17/2025 16:02	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:02	247986
Boron	NELAP	20.0		**276**	µg/L	1	11/17/2025 16:02	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:02	247986
Calcium	NELAP	0.100		**133**	mg/L	1	11/17/2025 16:02	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:02	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:02	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:02	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:02	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:52	247986
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:52	247986
Lithium	*	3.0		**4.9**	µg/L	5	11/18/2025 14:16	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:52	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 14:16	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:22	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.34**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.050**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.29**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-013
Client Sample ID: AP12
Matrix: GROUNDWATER
Collection Date: 11/13/2025 11:04

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**510.30**	ft	1	11/13/2025 11:04	R374970
Depth to water	*	-5.00		**15.34**	ft	1	11/13/2025 11:04	R374970
Depth to water from measuring point	*	0		**18.24**	ft	1	11/13/2025 11:04	R374970
Elevation of groundwater surface	*	0		**522.46**	ft	1	11/13/2025 11:04	R374970
Measuring Point Elevation	*	0		**540.70**	ft	1	11/13/2025 11:04	R374970
Measuring Point Height Above Land Surface	*	0		**2.90**	ft	1	11/13/2025 11:04	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**15**	NTU	1	11/13/2025 11:04	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.2**	°F	1	11/13/2025 11:04	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.74**		1	11/13/2025 11:04	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1730**	µmhos/cm @25C	1	11/13/2025 11:04	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1150**	mg/L	1	11/18/2025 11:03	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 0:09	R374783
Chloride	NELAP	5.00		**115**	mg/L	10	11/17/2025 0:09	R374783
Sulfate	NELAP	10.0		**395**	mg/L	10	11/17/2025 0:09	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**52.5**	µg/L	1	11/17/2025 16:06	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:06	247986
Boron	NELAP	20.0		**24.9**	µg/L	1	11/17/2025 16:06	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:06	247986
Calcium	NELAP	0.100		**193**	mg/L	1	11/17/2025 16:06	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:06	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:06	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:06	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:06	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:57	247986
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:57	247986
Lithium	*	3.0		**6.2**	µg/L	5	11/18/2025 15:18	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 4:57	247986
Thallium	NELAP	2.0		**2.7**	µg/L	5	11/18/2025 15:18	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:25	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.38**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.050**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.33**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-014
Client Sample ID: AP13
Matrix: GROUNDWATER
Collection Date: 11/13/2025 11:40

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**511.00**	ft	1	11/13/2025 11:40	R374970
Depth to water	*	-5.00		**16.64**	ft	1	11/13/2025 11:40	R374970
Depth to water from measuring point	*	0		**20.04**	ft	1	11/13/2025 11:40	R374970
Elevation of groundwater surface	*	0		**521.96**	ft	1	11/13/2025 11:40	R374970
Measuring Point Elevation	*	0		**542.00**	ft	1	11/13/2025 11:40	R374970
Measuring Point Height Above Land Surface	*	0		**3.40**	ft	1	11/13/2025 11:40	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**11**	NTU	1	11/13/2025 11:40	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.9**	°F	1	11/13/2025 11:40	R374970
SW-846 9040B								
pH, Field	*	1.00		**5.22**		1	11/13/2025 11:40	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**982**	µmhos/cm @25C	1	11/13/2025 11:40	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**580**	mg/L	1	11/18/2025 12:42	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 0:22	R374783
Chloride	NELAP	5.00		**26.3**	mg/L	10	11/17/2025 0:22	R374783
Sulfate	NELAP	10.0		**120**	mg/L	10	11/17/2025 0:22	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**120**	µg/L	1	11/17/2025 16:07	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:07	247986
Boron	NELAP	20.0		**25.7**	µg/L	1	11/17/2025 16:07	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:07	247986
Calcium	NELAP	0.100		**115**	mg/L	1	11/17/2025 16:07	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:07	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:07	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:07	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:07	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:03	247986
Arsenic	NELAP	1.0		**1.8**	µg/L	5	11/18/2025 5:03	247986
Lithium	*	3.0		**11.4**	µg/L	5	11/18/2025 15:23	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:03	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 15:23	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:27	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.40**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.10**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.30**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-015 **Client Sample ID:** AP14

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 13:14

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**508.40**	ft	1	11/13/2025 13:14	R374970
Depth to water	*	-5.00		**1.93**	ft	1	11/13/2025 13:14	R374970
Depth to water from measuring point	*	0		**4.73**	ft	1	11/13/2025 13:14	R374970
Elevation of groundwater surface	*	0		**534.87**	ft	1	11/13/2025 13:14	R374970
Measuring Point Elevation	*	0		**539.60**	ft	1	11/13/2025 13:14	R374970
Measuring Point Height Above Land Surface	*	0		**2.80**	ft	1	11/13/2025 13:14	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**11**	NTU	1	11/13/2025 13:14	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.6**	°F	1	11/13/2025 13:14	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.24**		1	11/13/2025 13:14	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2430**	µmhos/cm @25C	1	11/13/2025 13:14	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1900**	mg/L	1	11/18/2025 12:42	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 0:35	R374783
Chloride	NELAP	5.00		**120**	mg/L	10	11/17/2025 0:35	R374783
Sulfate	NELAP	10.0		**1040**	mg/L	10	11/17/2025 0:35	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**48.6**	µg/L	1	11/17/2025 16:08	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:08	247986
Boron	NELAP	200		**20800**	µg/L	10	11/19/2025 16:51	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:08	247986
Calcium	NELAP	0.100		**317**	mg/L	1	11/17/2025 16:08	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:08	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:08	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:08	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:08	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:08	247986
Arsenic	NELAP	1.0		**1.7**	µg/L	5	11/18/2025 5:08	247986
Lithium	*	3.0		**8.0**	µg/L	5	11/18/2025 15:29	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:08	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 15:29	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:34	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.63**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.090**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**1.5**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.54**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-016
Client Sample ID: T-01
Matrix: GROUNDWATER
Collection Date: 11/13/2025 12:21

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**512.70**	ft	1	11/13/2025 12:21	R374970
Depth to water	*	-5.00		**14.55**	ft	1	11/13/2025 12:21	R374970
Depth to water from measuring point	*	0		**14.88**	ft	1	11/13/2025 12:21	R374970
Elevation of groundwater surface	*	0		**520.77**	ft	1	11/13/2025 12:21	R374970
Measuring Point Elevation	*	0		**535.65**	ft	1	11/13/2025 12:21	R374970
Measuring Point Height Above Land Surface	*	0		**0.33**	ft	1	11/13/2025 12:21	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**18**	NTU	1	11/13/2025 12:21	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.3**	°F	1	11/13/2025 12:21	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.54**		1	11/13/2025 12:21	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1810**	µmhos/cm @25C	1	11/13/2025 12:21	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1020**	mg/L	1	11/18/2025 12:42	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 0:47	R374783
Chloride	NELAP	5.00		**253**	mg/L	10	11/17/2025 0:47	R374783
Sulfate	NELAP	10.0		**169**	mg/L	10	11/17/2025 0:47	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**62.1**	µg/L	1	11/17/2025 16:09	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:09	247986
Boron	NELAP	20.0		**175**	µg/L	1	11/17/2025 16:09	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:09	247986
Calcium	NELAP	0.100		**164**	mg/L	1	11/17/2025 16:09	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:09	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:09	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:09	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:09	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:19	247986
Arsenic	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:19	247986
Lithium	*	3.0		**17.6**	µg/L	5	11/18/2025 15:34	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 5:19	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 15:34	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 14:41	247982
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.41**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.050**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.36**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-017 **Client Sample ID:** T-02

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 10:17

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**515.18**	ft	1	11/13/2025 10:17	R374970
Depth to water	*	-5.00		**25.63**	ft	1	11/13/2025 10:17	R374970
Depth to water from measuring point	*	0		**28.03**	ft	1	11/13/2025 10:17	R374970
Elevation of groundwater surface	*	0		**521.59**	ft	1	11/13/2025 10:17	R374970
Measuring Point Elevation	*	0		**549.62**	ft	1	11/13/2025 10:17	R374970
Measuring Point Height Above Land Surface	*	0		**2.40**	ft	1	11/13/2025 10:17	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**5.1**	NTU	1	11/13/2025 10:17	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**54.5**	°F	1	11/13/2025 10:17	R374970
SW-846 9040B								
pH, Field	*	1.00		**4.89**		1	11/13/2025 10:17	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**2310**	µmhos/cm @25C	1	11/13/2025 10:17	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1370**	mg/L	1	11/18/2025 12:42	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 1:00	R374783
Chloride	NELAP	5.00		**427**	mg/L	10	11/17/2025 1:00	R374783
Sulfate	NELAP	10.0		**90.0**	mg/L	10	11/17/2025 1:00	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**193**	µg/L	1	11/17/2025 16:09	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:09	247986
Boron	NELAP	20.0		**48.7**	µg/L	1	11/17/2025 16:09	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:09	247986
Calcium	NELAP	0.100		**209**	mg/L	1	11/17/2025 16:09	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:09	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:09	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:09	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:09	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 15:40	247986
Arsenic	NELAP	1.0		**7.3**	µg/L	5	11/18/2025 15:40	247986
Lithium	*	3.0		**31.0**	µg/L	5	11/18/2025 15:40	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 15:40	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 15:40	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 18:31	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.56**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.11**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.45**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-018 **Client Sample ID:** T-04

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 10:27

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**521.52**	ft	1	11/13/2025 10:27	R374970
Depth to water	*	-5.00		**17.70**	ft	1	11/13/2025 10:27	R374970
Depth to water from measuring point	*	0		**20.08**	ft	1	11/13/2025 10:27	R374970
Elevation of groundwater surface	*	0		**528.86**	ft	1	11/13/2025 10:27	R374970
Measuring Point Elevation	*	0		**548.94**	ft	1	11/13/2025 10:27	R374970
Measuring Point Height Above Land Surface	*	0		**2.38**	ft	1	11/13/2025 10:27	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**3.6**	NTU	1	11/13/2025 10:27	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**56.8**	°F	1	11/13/2025 10:27	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.43**		1	11/13/2025 10:27	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**545**	µmhos/cm @25C	1	11/13/2025 10:27	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**372**	mg/L	1	11/18/2025 13:01	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 1:13	R374783
Chloride	NELAP	5.00		**ND**	mg/L	10	11/17/2025 1:13	R374783
Sulfate	NELAP	10.0		**77.9**	mg/L	10	11/17/2025 1:13	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**38.2**	µg/L	1	11/17/2025 16:10	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:10	247986
Boron	NELAP	20.0		**42.6**	µg/L	1	11/17/2025 16:10	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:10	247986
Calcium	NELAP	0.100		**65.8**	mg/L	1	11/17/2025 16:10	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:10	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:10	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:10	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:10	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:31	247986
Arsenic	NELAP	1.0		**3.0**	µg/L	5	11/18/2025 16:31	247986
Lithium	*	3.0		**13.6**	µg/L	5	11/18/2025 16:31	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:31	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 16:31	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 18:33	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.48**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.070**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.41**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-019
Client Sample ID: T-05
Matrix: GROUNDWATER
Collection Date: 11/13/2025 11:01

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**518.32**	ft	1	11/13/2025 11:01	R374970
Depth to water	*	-5.00		**11.48**	ft	1	11/13/2025 11:01	R374970
Depth to water from measuring point	*	0		**13.99**	ft	1	11/13/2025 11:01	R374970
Elevation of groundwater surface	*	0		**526.67**	ft	1	11/13/2025 11:01	R374970
Measuring Point Elevation	*	0		**540.66**	ft	1	11/13/2025 11:01	R374970
Measuring Point Height Above Land Surface	*	0		**2.51**	ft	1	11/13/2025 11:01	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**6.0**	NTU	1	11/13/2025 11:01	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**62.2**	°F	1	11/13/2025 11:01	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.64**		1	11/13/2025 11:01	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**726**	µmhos/cm @25C	1	11/13/2025 11:01	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**496**	mg/L	1	11/18/2025 13:01	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 1:25	R374783
Chloride	NELAP	5.00		**ND**	mg/L	10	11/17/2025 1:25	R374783
Sulfate	NELAP	10.0		**87.4**	mg/L	10	11/17/2025 1:25	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**76.2**	µg/L	1	11/17/2025 16:11	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:11	247986
Boron	NELAP	20.0		**106**	µg/L	1	11/17/2025 16:11	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:11	247986
Calcium	NELAP	0.100		**99.4**	mg/L	1	11/17/2025 16:11	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:11	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:11	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:11	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:11	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:36	247986
Arsenic	NELAP	1.0		**2.2**	µg/L	5	11/18/2025 16:36	247986
Lithium	*	3.0		**15.5**	µg/L	5	11/18/2025 16:36	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:36	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 16:36	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 18:36	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.46**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.080**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.38**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-020 **Client Sample ID:** T-06

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 11:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**494.70**	ft	1	11/13/2025 11:32	R374970
Depth to water	*	-5.00		**9.62**	ft	1	11/13/2025 11:32	R374970
Depth to water from measuring point	*	0		**11.98**	ft	1	11/13/2025 11:32	R374970
Elevation of groundwater surface	*	0		**526.34**	ft	1	11/13/2025 11:32	R374970
Measuring Point Elevation	*	0		**538.32**	ft	1	11/13/2025 11:32	R374970
Measuring Point Height Above Land Surface	*	0		**2.36**	ft	1	11/13/2025 11:32	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**35**	NTU	1	11/13/2025 11:32	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**57.8**	°F	1	11/13/2025 11:32	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.76**		1	11/13/2025 11:32	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**940**	µmhos/cm @25C	1	11/13/2025 11:32	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**558**	mg/L	1	11/18/2025 13:01	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 1:38	R374783
Chloride	NELAP	5.00		**19.8**	mg/L	10	11/17/2025 1:38	R374783
Sulfate	NELAP	10.0		**ND**	mg/L	10	11/17/2025 1:38	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**305**	µg/L	1	11/17/2025 16:12	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:12	247986
Boron	NELAP	20.0		**214**	µg/L	1	11/17/2025 16:12	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:12	247986
Calcium	NELAP	0.100		**97.7**	mg/L	1	11/17/2025 16:12	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:12	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:12	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:12	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:12	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:42	247986
Arsenic	NELAP	1.0		**14.5**	µg/L	5	11/18/2025 16:42	247986
Lithium	*	3.0		**10.5**	µg/L	5	11/18/2025 16:42	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:42	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 16:42	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 18:38	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.51**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.13**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.38**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power
Work Order: 25110404
Client Project: Ash Pond Monitoring Wells
Report Date: 13-Jan-26
Lab ID: 25110404-021
Client Sample ID: AW-1
Matrix: GROUNDWATER
Collection Date: 11/13/2025 13:47

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**500.79**	ft	1	11/13/2025 13:47	R374970
Depth to water	*	-5.00		**16.51**	ft	1	11/13/2025 13:47	R374970
Depth to water from measuring point	*	0		**19.26**	ft	1	11/13/2025 13:47	R374970
Elevation of groundwater surface	*	0		**536.34**	ft	1	11/13/2025 13:47	R374970
Measuring Point Elevation	*	0		**555.60**	ft	1	11/13/2025 13:47	R374970
Measuring Point Height Above Land Surface	*	0		**2.75**	ft	1	11/13/2025 13:47	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**9.8**	NTU	1	11/13/2025 13:47	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**58.7**	°F	1	11/13/2025 13:47	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.62**		1	11/13/2025 13:47	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1360**	µmhos/cm @25C	1	11/13/2025 13:47	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	20		**1120**	mg/L	1	11/18/2025 13:01	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 1:51	R374783
Chloride	NELAP	5.00		**38.2**	mg/L	10	11/17/2025 1:51	R374783
Sulfate	NELAP	10.0		**403**	mg/L	10	11/17/2025 1:51	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**218**	µg/L	1	11/17/2025 16:12	247986
Beryllium	NELAP	0.5		**< 0.5**	µg/L	1	11/17/2025 16:12	247986
Boron	NELAP	20.0		**9670**	µg/L	1	11/17/2025 16:12	247986
Cadmium	NELAP	2.0		**< 2.0**	µg/L	1	11/17/2025 16:12	247986
Calcium	NELAP	0.100		**209**	mg/L	1	11/17/2025 16:12	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:12	247986
Cobalt	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:12	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:12	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:12	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:47	247986
Arsenic	NELAP	1.0		**130**	µg/L	5	11/18/2025 16:47	247986
Lithium	*	3.0		**10.5**	µg/L	5	11/18/2025 16:47	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:47	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 16:47	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/18/2025 18:40	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.45**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**ND**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.090**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**ND**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.36**	+/-	1	01/02/2026 13:47	R377439

Client: City Water, Light & Power **Work Order:** 25110404

Client Project: Ash Pond Monitoring Wells **Report Date:** 13-Jan-26

Lab ID: 25110404-022 **Client Sample ID:** G120

Matrix: GROUNDWATER **Collection Date:** 11/13/2025 10:22

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
FIELD ELEVATION MEASUREMENTS								
Bottom of well elevation	*	0		**502.73**	ft	1	11/13/2025 10:22	R374970
Depth to water	*	-5.00		**20.72**	ft	1	11/13/2025 10:22	R374970
Depth to water from measuring point	*	0		**20.72**	ft	1	11/13/2025 10:22	R374970
Elevation of groundwater surface	*	0		**532.38**	ft	1	11/13/2025 10:22	R374970
Measuring Point Elevation	*	0		**553.10**	ft	1	11/13/2025 10:22	R374970
Measuring Point Height Above Land Surface	*	0		**0**	ft	1	11/13/2025 10:22	R374970
STANDARD METHODS 2130 B FIELD								
Turbidity	*	1.0		**39**	NTU	1	11/13/2025 10:22	R374970
STANDARD METHODS 2550 B FIELD								
Temperature	*	0		**59.9**	°F	1	11/13/2025 10:22	R374970
SW-846 9040B								
pH, Field	*	1.00		**6.67**		1	11/13/2025 10:22	R374970
SW-846 9050A								
Spec. Conductance, Field	*	1.00		**1750**	µmhos/cm @25C	1	11/13/2025 10:22	R374970
STANDARD METHODS 2540 C (TOTAL) 2020								
Total Dissolved Solids	NELAP	25		**1500**	mg/L	1.25	11/18/2025 13:01	R374847
SW846 9056A TOTAL ANIONIC COMPOUNDS BY ION CHROMATOGRAPHY								
Fluoride	NELAP	0.50		**ND**	mg/L	10	11/17/2025 2:03	R374783
Chloride	NELAP	5.00		**38.3**	mg/L	10	11/17/2025 2:03	R374783
Sulfate	NELAP	10.0		**578**	mg/L	10	11/17/2025 2:03	R374783
SW-846 3005A, 6010B, METALS BY ICP (TOTAL)								
Barium	NELAP	2.5		**1350**	µg/L	1	11/17/2025 16:17	247986
Beryllium	NELAP	0.5		**0.6**	µg/L	1	11/17/2025 16:17	247986
Boron	NELAP	20.0		**8230**	µg/L	1	11/17/2025 16:17	247986
Cadmium	NELAP	2.0		**2.0**	µg/L	1	11/17/2025 16:17	247986
Calcium	NELAP	0.100		**287**	mg/L	1	11/17/2025 16:17	247986
Chromium	NELAP	5.0		**< 5.0**	µg/L	1	11/17/2025 16:17	247986
Cobalt	NELAP	5.0		**5.1**	µg/L	1	11/17/2025 16:17	247986
Lead	NELAP	7.5		**< 7.5**	µg/L	1	11/17/2025 16:17	247986
Molybdenum	NELAP	10.0		**< 10.0**	µg/L	1	11/17/2025 16:17	247986
SW-846 3005A, 6020A, METALS BY ICPMS (TOTAL)								
Antimony	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:53	247986
Arsenic	NELAP	1.0		**12.8**	µg/L	5	11/18/2025 16:53	247986
Lithium	*	3.0		**9.5**	µg/L	5	11/18/2025 16:53	247986
Selenium	NELAP	1.0		**< 1.0**	µg/L	5	11/18/2025 16:53	247986
Thallium	NELAP	2.0		**< 2.0**	µg/L	5	11/18/2025 16:53	247986
SW-846 7470A (TOTAL)								
Mercury	NELAP	0.20		**< 0.20**	µg/L	1	11/19/2025 11:36	247984
EPA 903.0/904.0, RADIUM 226/228								
Combined 226/228	*	2.0		**5.9**	pci/L	1	01/06/2026 8:26	R377436
Combined 226/228 Uncertainty	*	0		**0.88**	+/-	1	01/06/2026 8:26	R377436
Radium-226	*	1.0		**3.9**	pci/L	1	01/06/2026 8:26	R377436
Radium-226 Uncertainty	*	0		**0.26**	+/-	1	01/06/2026 8:26	R377436
Radium-228	*	1.0		**1.9**	pci/L	1	01/02/2026 13:47	R377439
Radium-228 Uncertainty	*	0		**0.62**	+/-	1	01/02/2026 13:47	R377439

Receiving Check List

http://www.teklabinc.com/

Client: City Water, Light & Power
Client Project: Ash Pond Monitoring Wells

Work Order: 25110404
Report Date: 13-Jan-26

Carrier: Justin Colp

Received By: KTM

Completed by: Emily Kossakoski
On: 12-Nov-25
Emily Kossakoski

Reviewed by: Shelly A Hennessy
On: 14-Nov-25
Shelly A. Hennessy

Pages to follow: Chain of custody 3 Extra pages included 62

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	17.5
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐
Chain of custody present?	Yes ☑	No ☐			
Chain of custody signed when relinquished and received?	Yes ☑	No ☐			
Chain of custody agrees with sample labels?	Yes ☑	No ☐			
Samples in proper container/bottle?	Yes ☑	No ☐			
Sample containers intact?	Yes ☑	No ☐			
Sufficient sample volume for indicated test?	Yes ☑	No ☐			
All samples received within holding time?	Yes ☑	No ☐			
Reported field parameters measured:	Field ☑	Lab ☐	NA ☐		
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐			
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.					
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑		
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑		
Water - pH acceptable upon receipt?	Yes ☐	No ☑	NA ☐		
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑		

Any No responses must be detailed below or on the COC.

Additonal cooler temperature 4.3C. EK 11/12/2025

pH strip #104524. - KTM/ekossakoski - 11/12/2025 4:54:38 PM

Additional nitric acid (107106) was needed for 1 of 3 RW3 1L and 2 of 3 AP10 1L upon arrival at the laboratory. - KTM/ekossakoski - 11/12/2025 4:58:51 PM

Samples were received on 11/13/25 at 16:30 on ice [temp9.1C, 9.9C, 4.1C, 4.7C, 0.7C - LTG#5]. pH# 104524. Additional nitric acid (107106) was needed for G120 upon arrival at the laboratory. - lhenson - 11/14/2025 7:35:27 AM

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CHAIN OF CUSTODY

Pg 1 of 3 Workorder # 25110404

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☒ ICE ☐ BLUE ICE ☐ NO ICE 17.5, 6.3 °C
Preserved in: ☐ LAB ☐ FIELD FOR LAB USE ONLY #9
LAB NOTES: PH 10+3.24. Added HNO3 (1:1) to RWS & AP13. KTM 11.12.25 1 of 3 2 of 3

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring-to be reported electronically
-001/-003 collection times corrected. SAH 11/24/25

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Brett Gillihan

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID		Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED														
					UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Combined Radium	Field Turbidity								
25110404-001	RW-3	13:56	11-12-25 ~~1222~~	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
002	AP-1			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
003	AP-2		11-12-25 1357	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
004	AP-3	13:54	11-12-25 ~~1317~~	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
005	AP-4			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
006	AP-5			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
007	AP-6			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
008	AP-7			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
009	AP-8			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
010	AP-9			Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
011	AP10		11-12-25 1432	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								

Relinquished By	Date/Time	Received By	Date/Time
J. Colp	11-12-25 1610	Kyle Wooley	11-12-25 16:10

*The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions

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CHAIN OF CUSTODY

Pg 1 of 3 Workorder # 25110404

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

9.1, 9.9, 4.1

Client: City Water, Light & Power

Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building

City/State/Zip: Springfield IL 62712

Contact: Eric Staley Phone: (217) 757-8610

Email: eric.staley@cwlp.com Fax:

Samples on: [X] ICE [ ] BLUE ICE [ ] NO ICE 4.7, 0.7 °C 5

Preserved in: [X] LAB [X] FIELD HNO3 FOR LAB USE ONLY

LAB NOTES: PW 104524

added HNO3 (57106) to G120 LH 11/14/25

Are these samples known to be involved in litigation? If yes, a surcharge will apply: [ ] Yes [✓] No

Are these samples known to be hazardous? [ ] Yes [✓] No

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: [✓] Yes [ ] No Permit on file

Client Comments:

*elevations, pH, conductivity, temperature

**Sb As Li Se Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo

Quarterly monitoring-to be reported electronically

PROJECT NAME/NUMBER

Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME

Bret Gillihan

RESULTS REQUESTED

[✓] Standard [ ] 1-2 Day (100% Surcharge)

[ ] Other _____ [ ] 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers: UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	INDICATE ANALYSIS REQUESTED: Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Combined Radium	Field Turbidity
25110404-001	RW-3		Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
002	AP-1	11-13-25 1425	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
003	AP-2		Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
004	AP-3		Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
005	AP-4	11-13-25 1343	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
006	AP-5	11-13-25 1304	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
007	AP-6	11-13-25 1258	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
008	AP-7	11-13-25 1219	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
009	AP-8	11-13-25 1353	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
010	AP-9	11-13-25 958	Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓
011	AP10		Groundwater	1	4								✓	✓	✓	✓	✓	✓	✓

Relinquished By	Date/Time	Received By	Date/Time
Allen Tarpe	11-13-25 1630		11/13/25 1630

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CHAIN OF CUSTODY

Pg 2 of 3 Workorder # 25110404

TEKLAB INC, 5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Client: City Water, Light & Power
Address: 3100 Stevenson Drive, 2nd Floor Maintenance Building
City/State/Zip: Springfield IL 62712
Contact: Eric Staley Phone: (217) 757-8610
Email: eric.staley@cwlp.com Fax:

Are these samples known to be involved in litigation? If yes, a surcharge will apply: ☐ Yes ☑ No
Are these samples known to be hazardous? ☐ Yes ☑ No
Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section: ☑ Yes ☐ No Permit on file

Samples on: ☐ ICE ☐ BLUE ICE ☐ NO ICE _____ °C
Preserved in: ☐ LAB ☐ FIELD
FOR LAB USE ONLY
LAB NOTES:

Client Comments:
*elevations, pH, conductivity, temperature
**Sb As Se Li Tl (ICPMS) Ba Be B Cd Ca Cr Co Pb Hg Mo
Quarterly monitoring-to be reported electronically

PROJECT NAME/NUMBER
Ash Pond Monitoring Wells

SAMPLE COLLECTOR'S NAME
Brett Gillihan

RESULTS REQUESTED
☑ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other _____ ☐ 3 Day (50% Surcharge)

BILLING INSTRUCTIONS

Lab Use Only	Sample ID	Date/Time Sampled	Matrix	# and Type of Containers									INDICATE ANALYSIS REQUESTED													
				UNP	HNO3	NaOH	H2SO4	HCL	MeOH	NaHSO4	TSP	Other	Field parameters*	Cl F SO4 TDS (T)	Metals (T)**	Radium-226	Radium-228	Combined Radium	Field Turbidity								
25110404-012	AP11	11-13-25 940	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
013	AP12	11-13-25 1104	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
014	AP13	11-13-25 1140	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
015	AP14	11-13-25 1314	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
016	T-01	11-13-25 1221	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
017	T-02	11-13-25 1017	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
018	T-04	11-13-25 1027	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
019	T-05	11-13-25 1101	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
020	T-06	11-13-25 1132	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
021	AW-1	11-13-25 1347	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								
022	G120	11-13-25 1022	Groundwater	1	4								✔	✔	✔	✔	✔	✔	✔								

Relinquished By	Date/Time	Received By	Date/Time
Allen Lampe	11-13-25 1630		11/13/25 1630

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Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: RW-3
Sample ID: 001
Date (s): 11/12/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: — Affiliation:

Weather Conditions

Temp: 60 °F — Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/12/25 1:25 PM
Static Water Level: 13.48 feet below TOC
Total Depth: 44.01 feet below TOC
Water Column: 30.53 feet

Purging Activities

Purged By: JC — Purge Date: 11/12/2025
Purge Method: Bladder Pump — Well Diameter: 2"
Purge Volume Calculation (L): 30.53 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 11.00 L
Physical appearance of purge water: Slightly cloudy — Odor: Slight — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:09	0.0	234	purge start time						
13:14	1.2	↓	7.10	773.80	14.96	1.12	-151.50	55.45	
13:17	1.9		7.08	776.00	14.95	0.84	-157.90	234.71	
13:20	2.6		7.08	777.30	14.98	0.69	-158.00	281.63	
13:23	3.3		7.08	777.10	15.10	0.61	-157.00	324.88	
13:26	4.0		7.08	777.70	15.26	0.60	-155.80	259.88	
13:29	4.7		7.08	778.50	15.30	0.57	-155.60	266.15	
13:32	5.4		7.08	778.30	15.19	0.54	-154.80	129.46	
13:35	6.1		7.08	778.60	15.19	0.53	-154.60	283.82	
13:38	6.8		7.08	778.80	15.06	0.50	-154.20	217.75	
13:41	7.5		7.08	778.20	15.04	0.48	-153.70	235.75	
13:44	8.2		7.08	778.90	15.02	0.47	-153.20	94.02	
13:47	8.9		7.09	779.20	14.97	0.46	-152.40	164.96	
13:50	9.6		7.09	779.20	14.92	0.45	-152.30	218.71	
13:53	10.3		7.09	779.50	14.90	0.45	-152.00	136.71	
13:56	11.0		7.09	780.10	14.87	0.44	-151.20	134.35	

Sampling Activities

Sampled By: JC — Sample Date/Time: 11/12/2025 13:56
Sample Method: Low Flow — Sample Equipment: Bladder Pump
Sample Parameters: 7.09 pH — 780.10 Spec. Cond. — 14.87 Temp
Field Filtered: Yes — Filter Type: Inline Disposable
Water Level: 19.89 feet below TOC — Drawdown: 6.41 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: [signature] — **Date:** 11/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-1
Project Location:	Springfield, IL	**Sample ID:**	002
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 64 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 2:07 PM

Static Water Level: 11.89 feet below TOC

Total Depth: 31.08 feet below TOC

Water Column: 19.19 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 19.19 ft. x 0.022 = 0.42 L x 3 Vol. = 1.26 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
14:07	0.0	222	purge start time						
14:13	1.3	↓	5.00	2,031.90	15.99	1.23	28.30	28.52	
14:16	2.0		4.94	2,086.10	16.08	1.08	11.30	30.88	
14:19	2.7		4.91	2,102.40	16.02	1.00	3.60	21.62	
14:22	3.3		4.88	2,129.40	16.01	0.97	-0.20	19.21	
14:25	4.0		4.86	2,144.80	15.87	0.94	-1.80	15.06	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 14:25

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 4.86 pH 2,144.80 Spec. Cond. 15.87 Temp

Field Filtered: No Filter Type:

Water Level: 12.41 feet below TOC Drawdown: 0.52 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-2
Project Location:	Springfield, IL	**Sample ID:**	003
W.O. Number (s):	25111404	**Date (s):**	11/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 60 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/12/25 1:34 PM

Static Water Level: 9.62 feet below TOC

Total Depth: 21.33 feet below TOC

Water Column: 11.71 feet

Purging Activities

Purged By: DC Purge Date: 11/12/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 11.71 ft. x 0.022 = 0.26 L x 3 Vol. = 0.78 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.50 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:34	0.0	225	purge start time						
13:42	1.8	↓	4.68	1,733.80	16.61	0.89	61.50	13.17	
13:45	2.5		4.63	1,736.10	16.61	0.79	62.70	11.55	
13:48	3.2		4.60	1,737.90	16.57	0.74	63.70	17.91	
13:51	3.8		4.58	1,739.40	16.54	0.69	64.70	16.91	
13:54	4.5		4.55	1,743.00	16.47	0.68	65.90	19.54	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/12/2025 13:54

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 4.55 pH 1,743.00 Spec. Cond. 16.47 Temp

Field Filtered: No Filter Type:

Water Level: 9.83 feet below TOC Drawdown: 0.21 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/12/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AP-3
Sample ID: 004
Date (s): 11/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 60 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/12/25 12:57 PM
Static Water Level: 9.88 feet below TOC
Total Depth: 20.80 feet below TOC
Water Column: 10.92 feet

Purging Activities

Purged By: DC Purge Date: 11/12/2025
Purge Method: Bladder Pump Well Diameter: 2"
Purge Volume Calculation (L): 10.92 ft. x 0.022 = 0.24 L x 3 Vol. = 0.72 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.50 L
Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:57	0.0	225	purge start time						
13:02	1.1	↓	5.12	1,730.20	17.22	1.36	30.80	12.88	
13:05	1.8		5.04	1,732.80	17.19	1.23	23.90	11.58	
13:08	2.5		4.99	1,734.00	17.18	1.12	20.10	9.14	
13:11	3.2		4.96	1,738.00	17.16	1.05	17.00	7.83	
13:14	3.8		4.94	1,739.20	17.20	0.99	14.20	7.23	
13:17	4.5		4.93	1,739.90	17.14	0.96	12.40	6.06	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/12//25 13:17
Sample Method: Low Flow Sample Equipment: Bladder Pump
Sample Parameters: 4.93 pH 1,739.90 Spec. Cond. 17.14 Temp
Field Filtered: No Filter Type:
Water Level: 10.03 feet below TOC Drawdown: 0.15 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan Date: 11/12//25

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-4
Project Location:	Springfield, IL	**Sample ID:**	005
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Affiliation:

Weather Conditions

Temp: 63 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 1:21 PM

Static Water Level: 12.94 feet below TOC

Total Depth: 60.41 feet below TOC

Water Column: 47.47 feet

Purging Activities

Purged By: JC Purge Date: 11/13/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 47.47 ft. x 0.022 = 1.04 L x 3 Vol. = 3.12 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 5.00 L

Physical appearance of purge water: Slightly cloudy Odor: Slight Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:23	0.0	250	purge start time						
13:28	1.3	↓	6.75	905.60	17.85	1.61	-106.10	52.63	
13:31	2.0		6.75	909.50	17.85	1.06	-115.10	75.35	
13:34	2.8		6.75	911.50	17.83	0.80	-119.60	71.05	
13:37	3.5		6.76	912.60	17.75	0.67	-122.10	64.61	
13:40	4.3		6.76	913.00	17.76	0.58	-123.70	60.51	
13:43	5.0		6.76	913.50	17.78	0.54	-124.70	61.69	

Sampling Activities

Sampled By: JC Sample Date/Time: 11/13/2025 13:43

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 6.76 pH 913.50 Spec. Cond. 17.78 Temp

Field Filtered: No Filter Type:

Water Level: 12.97 feet below TOC Drawdown: 0.03 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AP-5
Sample ID: 006
Date (s): 11/13/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: — Affiliation:

Weather Conditions

Temp: 61 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 12:43 PM
Static Water Level: 20.62 feet below TOC
Total Depth: 31.27 feet below TOC
Water Column: 10.65 feet

Purging Activities

Purged By: JC — Purge Date: 11/13/2025
Purge Method: Bladder Pump — Well Diameter: 2"
Purge Volume Calculation (L): 10.65 ft. x 0.022 = 0.23 L x 3 Vol. = 0.69 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 5.00 L
Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:45	0.0	263	purge start time						
12:52	1.8	↓	6.84	771.30	14.76	2.40	40.30	3.95	
12:55	2.6		6.83	770.90	14.81	1.93	44.10	3.33	
12:58	3.4		6.83	776.70	14.80	1.73	46.60	3.35	
13:01	4.2		6.83	782.70	14.79	1.66	48.90	2.89	
13:04	5.0		6.83	787.70	14.80	1.55	51.10	1.89	

Sampling Activities

Sampled By: JC — Sample Date/Time: 11/13/2025 13:04
Sample Method: Low Flow — Sample Equipment: Bladder Pump
Sample Parameters: 6.83 pH — 787.70 Spec. Cond. — 14.80 Temp
Field Filtered: No — Filter Type:
Water Level: 21.42 feet below TOC — Drawdown: 0.80 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp — **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AP-6
Sample ID: 007
Date (s): 11/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Drew Nieters Affiliation: TekLab, Inc.

Weather Conditions

Temp: 49 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 12:39 PM
Static Water Level: 11.33 feet below TOC
Total Depth: 39.62 feet below TOC
Water Column: 28.29 feet

Purging Activities

Purged By: AL Purge Date: 11/13/2025
Purge Method: Bladder Pump Well Diameter: 2"
Purge Volume Calculation (L): 28.29 ft. x 0.022 = 0.62 L x 3 Vol. = 1.86 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.00 L
Physical appearance of purge water: Clear Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:39	0.0	158	purge start time						
12:49	1.6	↓	7.12	724.40	15.40	4.40	-6.80	8.81	
12:52	2.1		7.09	730.70	15.95	3.78	-8.00	4.16	
12:55	2.5		7.07	734.80	16.26	3.33	-9.10	3.34	
12:58	3.0		7.06	737.00	16.42	3.01	-10.00	2.58	

Sampling Activities

Sampled By: DN Sample Date/Time: 11/13/2025 12:58
Sample Method: Low Flow Sample Equipment: Bladder Pump
Sample Parameters: 7.06 pH 737.00 Spec. Cond. 16.42 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 12.67 feet below TOC Drawdown: 1.34 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45280

Form Completed By: A Nieters **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-7
Project Location:	Springfield, IL	**Sample ID:**	008
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Affiliation:

Weather Conditions

Temp: 58 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 11:48 AM

Static Water Level: 13.92 feet below TOC

Total Depth: 42.52 feet below TOC

Water Column: 28.60 feet

Purging Activities

Purged By: JC Purge Date: 11/13/2025

Purge Method: Bladder Pump Well Diameter: 2"

Purge Volume Calculation (L): 28.6 ft. x 0.022 = 0.63 L x 3 Vol. = 1.89 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:50	0.0	241	purge start time						
11:55	1.2	↓	6.97	859.30	13.99	0.98	-129.30	22.99	
11:58	1.9		6.97	852.90	13.91	0.68	-122.90	51.63	
12:01	2.7		6.98	854.90	13.86	0.55	-120.00	79.92	
12:04	3.4		6.99	857.60	13.82	0.48	-119.70	86.97	
12:07	4.1		7.00	864.30	13.79	0.43	-119.20	74.99	
12:10	4.8		7.02	875.90	13.76	0.39	-118.10	60.19	
12:13	5.6		7.04	893.80	13.76	0.37	-112.00	54.55	
12:16	6.3		7.05	900.30	13.63	0.36	-108.20	53.70	
12:19	7.0		7.06	903.40	13.56	0.34	-105.90	59.02	

Sampling Activities

Sampled By: JC Sample Date/Time: 11/13/2025 12:19

Sample Method: Low Flow Sample Equipment: Bladder Pump

Sample Parameters: 7.06 pH 903.40 Spec. Cond. 13.56 Temp

Field Filtered: No Filter Type:

Water Level: 23.18 feet below TOC Drawdown: 9.26 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-8
Project Location:	Springfield, IL	**Sample ID:**	009
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 64 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 1:34 PM

Static Water Level: 9.48 feet below TOC

Total Depth: 39.60 feet below TOC

Water Column: 30.12 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.12 ft. x 0.022 = 0.66 L x 3 Vol. = 1.98 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:34	0.0	211	purge start time						
13:41	1.5	↓	6.22	1,172.60	16.22	1.40	12.50	8.46	
13:44	2.1		6.18	1,168.60	16.06	1.12	-6.30	9.36	
13:47	2.7		6.14	1,169.60	16.18	1.03	-13.80	11.59	
13:50	3.4		6.12	1,166.20	16.00	0.91	-17.00	15.11	
13:53	4.0		6.11	1,163.80	15.92	0.86	-18.90	13.07	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 13:53

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.11 pH 1,163.80 Spec. Cond. 15.92 Temp

Field Filtered: No Filter Type:

Water Level: 9.88 feet below TOC Drawdown: 0.40 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AP-9
Sample ID: 010
Date (s): 11/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.
Name: Affiliation:

Weather Conditions

Temp: 47 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 9:18 AM
Static Water Level: 14.19 feet below TOC
Total Depth: 39.60 feet below TOC
Water Column: 25.41 feet

Purging Activities

Purged By: JC Purge Date: 11/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 25.41 ft. x 0.022 = 0.56 L x 3 Vol. = 1.68 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.50 L
Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:22	0.0	281	purge start time						
9:26	1.1	↓	6.50	1,103.90	14.43	1.68	-78.40	2.94	
9:29	2.0		6.53	1,069.10	14.53	1.23	-87.80	2.98	
9:32	2.8		6.55	1,066.80	14.40	1.03	-92.00	3.36	
9:35	3.7		6.57	1,065.20	14.48	0.92	-94.50	3.71	
9:38	4.5		6.57	1,065.60	14.42	0.83	-95.30	3.82	

Sampling Activities

Sampled By: JC Sample Date/Time: 11/13/2025 9:38
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.57 pH 1,065.60 Spec. Cond. 14.42 Temp
Field Filtered: No Filter Type:
Water Level: 17.64 feet below TOC Drawdown: 3.45 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-10
Project Location:	Springfield, IL	**Sample ID:**	011
W.O. Number (s):	25111404	**Date (s):**	11/12/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 61 °F Wind Direction: ☐ N ☐ S ☑ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing	X	
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/12/25 2:07 PM

Static Water Level: 7.73 feet below TOC

Total Depth: 38.07 feet below TOC

Water Column: 30.34 feet

Purging Activities

Purged By: DC Purge Date: 11/12/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 30.34 ft. x 0.022 = 0.67 L x 3 Vol. = 2.01 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.50 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
14:07	0.0	180	purge start time						
14:19	2.2	↓	5.50	1,474.80	15.20	1.61	-17.30	6.94	
14:22	2.7		5.40	1,474.70	15.23	1.38	-44.30	4.68	
14:25	3.2		5.39	1,475.50	15.23	1.25	-54.80	5.74	
14:28	3.8		5.38	1,474.50	15.10	1.17	-60.90	4.55	
14:31	4.3		5.37	1,468.10	14.87	0.95	-65.70	4.74	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/12/2025 14:32

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 5.37 pH 1,468.10 Spec. Cond. 14.87 Temp

Field Filtered: No Filter Type:

Water Level: 7.74 feet below TOC Drawdown: 0.01 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/12/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-11
Project Location:	Springfield, IL	**Sample ID:**	012
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 47 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 9:20 AM

Static Water Level: 15.58 feet below TOC

Total Depth: 22.95 feet below TOC

Water Column: 7.37 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 7.37 ft. x 0.022 = 0.16 L x 3 Vol. = 0.48 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:20	0.0	200	purge start time						
9:28	1.6	↓	5.06	1,269.00	13.56	1.92	61.70	10.29	
9:31	2.2		4.95	1,265.30	13.53	1.63	57.50	9.15	
9:34	2.8		4.89	1,263.20	13.55	1.52	55.60	8.41	
9:37	3.4		4.83	1,264.60	13.66	1.32	54.70	8.29	
9:40	4.0		4.79	1,267.20	13.83	1.21	54.20	8.42	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 9:40

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 4.79 pH 1,267.20 Spec. Cond. 13.83 Temp

Field Filtered: No Filter Type:

Water Level: 15.62 feet below TOC Drawdown: 0.04 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-12
Project Location:	Springfield, IL	**Sample ID:**	013
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 54 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 10:44 AM

Static Water Level: 18.24 feet below TOC

Total Depth: 30.40 feet below TOC

Water Column: 12.16 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 12.16 ft. x 0.022 = 0.27 L x 3 Vol. = 0.81 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:44	0.0	200	purge start time						
10:52	1.6	↓	4.89	1,723.00	13.90	1.37	103.70	15.93	
10:55	2.2		4.82	1,725.80	13.95	1.17	89.50	16.32	
10:58	2.8		4.78	1,729.70	14.04	1.06	79.80	17.31	
11:01	3.4		4.75	1,732.10	14.04	0.99	73.00	17.89	
11:04	4.0		4.74	1,731.90	14.01	0.96	68.00	14.66	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 11:04

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 4.74 pH 1,731.90 Spec. Cond. 14.01 Temp

Field Filtered: No Filter Type:

Water Level: 18.59 feet below TOC Drawdown: 0.35 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AP-13
Sample ID: 014
Date (s): 11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.
Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 56 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good	Protective Casing		X
Casing	Good	Well		X
Protective Casing	Good			
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 11:21 AM
Static Water Level: 20.04 feet below TOC
Total Depth: 31.00 feet below TOC
Water Column: 10.96 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 10.96 ft. x 0.022 = 0.24 L x 3 Vol. = 0.72 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Clear Odor: Slight Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:21	0.0	211	purge start time						
11:28	1.5	↓	5.50	992.10	14.01	1.22	57.80	17.60	
11:31	2.1		5.37	985.70	13.97	1.01	48.90	17.12	
11:34	2.7		5.31	983.90	13.90	0.92	43.80	13.04	
11:37	3.4		5.26	981.80	13.88	0.88	41.20	11.54	
11:40	4.0		5.22	981.60	13.86	0.85	39.30	10.81	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 11:40
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 5.32 pH 1,778.80 Spec. Cond. 14.81 Temp
Field Filtered: No Filter Type:
Water Level: 20.23 feet below TOC Drawdown: 0.19 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	AP-14
Project Location:	Springfield, IL	**Sample ID:**	015
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 61 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing	X	
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 12:58 PM

Static Water Level: 4.73 feet below TOC

Total Depth: 31.20 feet below TOC

Water Column: 26.47 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 26.47 ft. x 0.022 = 0.58 L x 3 Vol. = 1.74 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
12:58	0.0	250	purge start time						
13:02	1.0	↓	6.54	2,343.50	15.76	1.48	100.60	7.88	
13:05	1.8		6.32	2,404.80	15.50	1.14	96.50	10.68	
13:08	2.5		6.26	2,426.70	15.55	1.01	91.00	10.78	
13:11	3.3		6.24	2,426.70	15.45	0.92	86.10	6.63	
13:14	4.0		6.24	2,428.40	15.32	0.87	81.70	10.77	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 13:14

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.24 pH 2,428.40 Spec. Cond. 15.32 Temp

Field Filtered: No Filter Type:

Water Level: 5.72 feet below TOC Drawdown: 0.99 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-1
Project Location:	Springfield, IL	**Sample ID:**	016
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 59 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 11:59 AM

Static Water Level: 14.88 feet below TOC

Total Depth: 22.95 feet below TOC

Water Column: 8.07 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 8.07 ft. x 0.022 = 0.18 L x 3 Vol. = 0.54 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Slightly cloudy Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:59	0.0	182	purge start time						
12:09	1.8	↓	4.55	1,799.20	15.01	1.33	90.40	22.53	
12:12	2.4		4.56	1,808.20	15.04	1.16	92.50	18.66	
12:15	2.9		4.56	1,806.40	14.67	1.09	94.50	19.13	
12:18	3.5		4.55	1,802.50	14.55	1.05	96.30	19.30	
12:21	4.0		4.54	1,805.40	14.61	1.01	98.00	18.23	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 12:21

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 4.54 pH 1,805.40 Spec. Cond. 14.61 Temp

Field Filtered: No Filter Type:

Water Level: 15.00 feet below TOC Drawdown: 0.12 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-2
Project Location:	Springfield, IL	**Sample ID:**	017
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Brett Gillihan Affiliation: TekLab, Inc.

Name: Danny Crump Affiliation: TekLab, Inc.

Weather Conditions

Temp: 50 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

			Yes	No
Well Pad	Good	**Locks**		
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 10:03 AM

Static Water Level: 28.03 feet below TOC

Total Depth: 34.44 feet below TOC

Water Column: 6.41 feet

Purging Activities

Purged By: DC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 6.41 ft. x 0.022 = 0.14 L x 3 Vol. = 0.42 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 4.00 L

Physical appearance of purge water: Clear Odor: None Color: Clear

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:03	0.0	286	purge start time						
10:06	0.9	↓	5.04	2,305.20	12.48	1.82	-2.60	10.05	
10:09	1.7		4.88	2,310.90	12.45	1.45	-14.60	6.50	
10:12	2.6		4.88	2,311.30	12.46	1.28	-22.50	5.82	
10:15	3.4		4.88	2,310.50	12.50	1.17	-28.30	5.41	
10:18	4.3		4.89	2,309.10	12.51	1.12	-32.80	5.12	

Sampling Activities

Sampled By: BG Sample Date/Time: 11/13/2025 10:17

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 4.89 pH 2,309.10 Spec. Cond. 12.51 Temp

Field Filtered: No Filter Type:

Water Level: 28.36 feet below TOC Drawdown: 0.33 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 223358

Form Completed By: Brett Gillihan **Date:** 11/13/2025

Field Data Sheet

Project Name:	Ash Pond Monitoring Wells	**Monitoring Point:**	T-4
Project Location:	Springfield, IL	**Sample ID:**	018
W.O. Number (s):	25111404	**Date (s):**	11/13/2025

Field Team Members

Name: Justin Colp Affiliation: TekLab, Inc.

Name: Affiliation:

Weather Conditions

Temp: 51 °F Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☐ Partly Cloudy ☑ Cloudy

Well Observations

		Locks	Yes	No
Well Pad	Good			
Casing	Good	Protective Casing		X
Protective Casing	Good	Well		X
Reference Mark/Identification	Yes			

Groundwater Level Measurements

Date/Time Measured: 11/13/25 9:54 AM

Static Water Level: 20.08 feet below TOC

Total Depth: 27.42 feet below TOC

Water Column: 7.34 feet

Purging Activities

Purged By: JC Purge Date: 11/13/2025

Purge Method: Peristaltic Pump Well Diameter: 2"

Purge Volume Calculation (L): 7.34 ft. x 0.022 = 0.16 L x 3 Vol. = 0.48 L **Based on Low-Flow (3/8" discharge)*

Actual Purge Volume (L): 7.00 L

Physical appearance of purge water: Clear Odor: None Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
9:56	0.0	226	purge start time						
10:03	1.6	↓	6.80	974.50	13.53	0.89	-52.80	76.61	
10:06	2.3		6.72	788.60	13.54	0.92	-40.60	77.88	
10:09	2.9		6.64	643.10	13.61	0.92	-16.00	55.17	
10:12	3.6		6.41	549.70	13.63	1.56	16.90	23.06	
10:15	4.3		6.35	534.90	13.70	1.53	25.70	12.29	
10:18	5.0		6.36	537.20	13.70	1.37	23.10	8.95	
10:21	5.6		6.39	544.00	13.71	1.17	16.10	5.85	
10:24	6.3		6.41	546.60	13.71	1.05	9.80	6.95	
10:27	7.0		6.43	544.70	13.79	0.95	4.80	3.56	

Sampling Activities

Sampled By: JC Sample Date/Time: 11/13/2025 10:27

Sample Method: Low Flow Sample Equipment: Peristaltic Pump

Sample Parameters: 6.43 pH 544.70 Spec. Cond. 13.79 Temp

Field Filtered: No Filter Type:

Water Level: 21.34 feet below TOC Drawdown: 1.26 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: T-5
Sample ID: 019
Date (s): 11/13/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: — Affiliation:

Weather Conditions

Temp: 54 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 10:43 AM

Static Water Level: 13.99 feet below TOC
Total Depth: 22.34 feet below TOC
Water Column: 8.35 feet

Purging Activities

Purged By: JC — Purge Date: 11/13/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 8.35 ft. x 0.022 = 0.18 L x 3 Vol. = 0.54 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 4.00 L
Physical appearance of purge water: Clear — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:45	0.0	250	purge start time						
10:52	1.7	↓	6.61	693.90	16.13	1.64	26.50	5.52	
10:55	2.5		6.62	693.50	16.43	1.44	40.20	5.55	
10:58	3.3		6.63	707.50	16.55	1.46	47.70	6.87	
11:01	4.0		6.64	726.40	16.76	1.36	48.10	6.04	

Sampling Activities

Sampled By: JC — Sample Date/Time: 11/13/2025 11:01
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.64 pH — 726.40 Spec. Cond. — 16.76 Temp
Field Filtered: No — Filter Type:
Water Level: 15.53 feet below TOC — Drawdown: 1.54 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp — **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: T-6
Sample ID: 020
Date (s): 11/13/2025

Field Team Members

Name: Justin Colp — Affiliation: TekLab, Inc.
Name: — Affiliation:

Weather Conditions

Temp: 56 °F — Wind Direction: ☑ N ☐ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy — Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing		X
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 11:17 AM

Static Water Level: 11.98 feet below TOC
Total Depth: 43.62 feet below TOC
Water Column: 31.64 feet

Purging Activities

Purged By: JC — Purge Date: 11/13/2025
Purge Method: Peristaltic Pump — Well Diameter: 2"
Purge Volume Calculation (L): 31.64 ft. x 0.022 = 0.7 L x 3 Vol. = 2.1 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 3.50 L
Physical appearance of purge water: Slightly cloudy — Odor: None — Color: none

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
11:19	0.0	269	purge start time						
11:23	1.1	↓	6.72	944.50	14.91	1.17	-133.30	15.17	
11:26	1.9		6.74	942.00	14.62	0.91	-136.30	26.27	
11:29	2.7		6.75	940.40	14.42	0.82	-136.60	31.41	
11:32	3.5		6.76	939.70	14.36	0.78	-136.70	35.26	

Sampling Activities

Sampled By: JC — Sample Date/Time: 11/13/2025 11:32
Sample Method: Low Flow — Sample Equipment: Peristaltic Pump
Sample Parameters: 6.76 pH — 939.70 Spec. Cond. — 14.36 Temp
Field Filtered: No — Filter Type:
Water Level: 12.03 feet below TOC — Drawdown: 0.05 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 217941

Form Completed By: Justin Colp — **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: AW-1
Sample ID: 021
Date (s): 11/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Drew Nieters Affiliation: TekLab, Inc.

Weather Conditions

Temp: 65 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☑ Clear ☐ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 1:29 PM
Static Water Level: 19.26 feet below TOC
Total Depth: 54.81 feet below TOC
Water Column: 35.55 feet

Purging Activities

Purged By: AL Purge Date: 11/13/2025
Purge Method: Peristaltic Pump Well Diameter: 2"
Purge Volume Calculation (L): 35.55 ft. x 0.022 = 0.78 L x 3 Vol. = 2.34 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.00 L
Physical appearance of purge water: Slightly cloudy Odor: None Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
13:29	0.0	333	purge start time						
13:38	3.0	↓	6.66	1,370.30	15.00	3.88	11.80	20.63	
13:41	4.0		6.64	1,369.10	14.91	3.46	12.00	17.55	
13:44	5.0		6.63	1,367.00	14.87	3.14	11.40	12.33	
13:47	6.0		6.62	1,363.50	14.83	2.89	10.60	9.76	

Sampling Activities

Sampled By: Dn Sample Date/Time: 11/13/2025 13:47
Sample Method: Low Flow Sample Equipment: Peristaltic Pump
Sample Parameters: 6.62 pH 1,363.50 Spec. Cond. 14.83 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 22.13 feet below TOC Drawdown: 2.87 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45280

Form Completed By: A Nieters **Date:** 11/13/2025

Field Data Sheet

Project Name: Ash Pond Monitoring Wells
Project Location: Springfield, IL
W.O. Number (s): 25111404
Monitoring Point: G120
Sample ID: 022
Date (s): 11/13/2025

Field Team Members

Name: Allison Lampe Affiliation: TekLab, Inc.
Name: Drew Nieters Affiliation: TekLab, Inc.

Weather Conditions

Temp: 49 °F Wind Direction: ☐ N ☑ S ☐ E ☐ SE ☐ SW ☐ NE ☐ NW

Precipitation: ☑ None ☐ Light ☐ Heavy Sky: ☐ Clear ☑ Partly Cloudy ☐ Cloudy

Well Observations

Well Pad	Good
Casing	Good
Protective Casing	Good
Reference Mark/Identification	Yes

Locks	Yes	No
Protective Casing	X	
Well		X

Groundwater Level Measurements

Date/Time Measured: 11/13/25 10:04 AM
Static Water Level: 20.72 feet below TOC
Total Depth: 50.37 feet below TOC
Water Column: 29.65 feet

Purging Activities

Purged By: Al Purge Date: 11/13/2025
Purge Method: Submersible Pump Well Diameter: 2"
Purge Volume Calculation (L): 29.65 ft. x 0.022 = 0.65 L x 3 Vol. = 1.95 L **Based on Low-Flow (3/8" discharge)*
Actual Purge Volume (L): 6.00 L
Physical appearance of purge water: Cloudy Odor: Moderate Color: None

Purge Time	Cumulative Purge Vol.(L)	Purge Rate (mL/m)	pH (S.U.)	Specific Conductivity (µS/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Other
10:04	0.0	333	purge start time						
10:13	3.0	↓	6.68	1,759.90	15.18	3.75	34.50	31.85	
10:16	4.0		6.67	1,753.40	15.21	3.29	30.90	42.73	
10:19	5.0		6.67	1,749.00	15.17	2.96	27.90	43.19	
10:22	6.0		6.67	1,748.40	15.51	2.70	25.10	38.98	

Sampling Activities

Sampled By: DN Sample Date/Time: 11/13/2025 10:22
Sample Method: Low Flow Sample Equipment: Submersible Pump
Sample Parameters: 6.67 pH 1,748.40 Spec. Cond. 15.51 Temp
Field Filtered: Yes Filter Type: Inline Disposable
Water Level: 20.81 feet below TOC Drawdown: 0.09 feet

Observations/Comments: (i.e., equipment malfunctions, contamination sources, sampling difficulties; duplicate sample)

- Field Meter: 45280

Form Completed By: A Nieters Date: 11/13/2025

Site Samping Event: Ash Pond Mon. Wells
LIMS Workorder: 25110404
Technician(s): DC, JC, BG, AL, DN

Field Calibration Log(s)
CWLP- 4Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 217941 Technician(s): justin colp Date: 11/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.00	11/12/25 11:40
7.0 Buffer	WC251017B	7.00	11/12/25 11:37
10.0 Buffer	WC251017C	10.00	11/12/25 11:44
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1412	11/12/25 11:50

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.85	11/12/25 11:52
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-JC	LCS	11/12/25 11:55	15.3	7.01	1,409	0.83		
CCV-1-JC	CCV	11/12/25 14:17	19.1	6.98	1,377	0.96		

Comments:

Field Meter ID: Pine 217941 Technician(s): justin colp Date: 11/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.00	11/13/25 8:37
7.0 Buffer	WC251017B	7.00	11/13/25 8:33
10.0 Buffer	WC251017C	10.00	11/13/25 8:40
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1412	11/13/25 8:46

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.93	11/13/25 8:47
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-JC	LCS	11/13/25 8:52	12	6.97	1,409	0.87		
CCV-2-JC	CCV	11/13/25 14:47	18.6	7.02	1,364	1.61		

Comments:

Site Samping Event: Ash Pond Mon. Wells
LIMS Workorder: 25110404
Technician(s): DC, JC, BG, AL, DN

Field Calibration Log(s)
CWLP- 4Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 45280 Technician(s): D. Nieters Date: 11/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.00	11/12/25 10:56
7.0 Buffer	WC251017B	7.00	11/12/25 10:50
10.0 Buffer	WC251017C	10.00	11/12/25 11:05
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1418	11/12/25 11:09

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.64	11/12/25 11:16
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-DN	LCS	11/12/25 11:17	18.9	7.05	1,418	0.64		
CCV-1-DN	CCV	11/12/25 14:00	18.9	6.96	1,358	0.73		

Comments:

Field Meter ID: Pine 45280 Technician(s): D. Nieters Date: 11/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.00	11/13/25 7:50
7.0 Buffer	WC251017B	7.00	11/13/25 7:46
10.0 Buffer	WC251017C	10.00	11/13/25 8:01
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1390	11/13/25 8:11

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.82	11/13/25 8:24
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-DN	LCS	11/13/25 8:29	10.8	7.02	1,412	1.01		
CCV-2-DN	CCV	11/13/25 14:15	19.6	6.98	1,356	0.89		

Comments:

Site Samping Event: Ash Pond Mon. Wells
LIMS Workorder: 25110404
Technician(s): DC, JC, BG, AL, DN

Field Calibration Log(s)
CWLP- 4Q 2025

Field Temp SOP 1156 - SM 2550 B
Field pH SOP 1152 - SW-846 9040B - SM 4500-H B
Field Cond. SOP 1155 - SW-846 9050A - SM 2510 B

Field Meter ID: Pine 223358 Technician(s): Brett Gillihan Date: 11/12/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.01	11/12/25 10:50
7.0 Buffer	WC251017B	6.98	11/12/25 10:47
10.0 Buffer	WC251017C	10.00	11/12/25 10:56
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1425	11/12/25 11:03

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.35	11/12/25 11:04
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-1-BG	LCS	11/12/25 11:08	13.3	7.01	1,443	0.39		
CCV-1-BG	CCV	11/12/25 14:34	13.8	7.03	1,448	0.46		

Comments:

Field Meter ID: Pine 223358 Technician(s): Brett Gillihan Date: 11/13/2025

pH Standards	LIMS ID	Calibration reading	Date/Time
4.0 Buffer	WC251017A	4.02	11/13/25 8:39
7.0 Buffer	WC251017B	7.00	11/13/25 8:35
10.0 Buffer	WC251017C	10.01	11/13/25 8:46
LCS/CCV (7.0 Buffer)	WC251017D		

Conductivity Standard	LIMS ID	Reading	Date/Time
1,412 µS Std.	107107	1427	11/13/25 8:50

Turbidity Standard	LIMS ID	Reading	Date/Time
0 NTU (DI Water)	1	0.48	11/13/25 8:53
124 NTU	95834		

ORP Standard	LIMS ID/Lot#	Reading	Date/Time

D.O. Saturation	LIMS ID/Lot#	Reading	Date/Time
100%	N/A		

Sample ID	Sample Type	Date/Time	Temp. °C	pH S.U.	Conductivity µS	Turbidity NTU	ORP mV	D.O. %
LCS-2-BG	LCS	11/13/25 8:58	14.3	7.03	1,439	0.52		
CCV-2-BG	CCV	11/13/25 14:46	16.3	7.02	1,451	0.53		

Comments:

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

January 08, 2026

Shelly Hennessy
TEKLAB Inc,
5445 Horseshoe lake Road
Collinsville, IL 62234
TEL:
FAX:

RE: 25110404

Dear Shelly Hennessy:

Order No.: 25111579

Alliance Technical Group - Akron received 22 sample(s) on 11/19/2025 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Jennifer Woolf

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 2943, Colorado, Connecticut PH-0828, Florida NELAC E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, ISO/IEC 17025:2017 119125 L22-544, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Maryland 339, Michigan 9988, Minnesota 1780279, Nevada OH009232020-1, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 2019-155, Oregon OH200001, Pennsylvania 68-01335, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-19-16, Utah OH009232020-12, Virginia VELAP 10381, West Virginia 9957C

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **25111579**
Date: **1/8/2026**

CLIENT: TEKLAB Inc,
Project: 25110404

WorkOrder Narrative:
25111579: This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Alliance Technical Group Work Order Number assigned to this report.

Alliance Technical Group holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Alliance Technical Group and that of the customer. It cannot be reproduced in any form without the consent of Alliance Technical Group or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Alliance Technical Group is not responsible for use or interpretation of the data included herein.

All results for solid samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence Sample Notes:
25111579-009A Radium-228_NPW(904.0): Parent sample and duplicate exhibit a high RPD, most likely caused by sample matrix.
25111579-010A Radium-226_NPW(903.0): Parent sample and dup exhibit high RPD, both results are below the PQL.

Analytical Sequence QC Notes:
LCS/LCSD-90886 Radium-228_DW(904.0): LCS and LCSD exhibited high RPD. Both are within passing recovery criteria.

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
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Qualifiers and Acronyms

WO#: **25111579**
Date: **1/8/2026**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected above the MDL.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*****	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B	The analyte was detected in the Method Blank at a concentration greater than the RL.
MB+	The analyte was detected in the Method Blank at a concentration greater than the MDL.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
W	Samples were received outside temperature limits (0° – 6° C). Not Clean Water Act compliant.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

Workorder Sample Summary

WO#: **25111579**

08-Jan-26

CLIENT: TEKLAB Inc,
Project: 25110404

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
25111579-001	25110404-001C		11/12/2025 12:22:01 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-002	25110404-002C		11/13/2025 2:25:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-003	25110404-003C		11/12/2025 1:57:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-004	25110404-004C		11/12/2025 1:17:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-005	25110404-005C		11/13/2025 1:43:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-006	25110404-006C		11/13/2025 1:04:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-007	25110404-007C		11/13/2025 12:58:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-008	25110404-008C		11/13/2025 12:19:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-009	25110404-009C		11/13/2025 1:53:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-010	25110404-010C		11/13/2025 9:38:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-011	25110404-011C		11/12/2025 2:32:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-012	25110404-012C		11/13/2025 9:40:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-013	25110404-013C		11/13/2025 11:04:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-014	25110404-014C		11/13/2025 11:40:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-015	25110404-015C		11/13/2025 1:14:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-016	25110404-016C		11/13/2025 12:21:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-017	25110404-017C		11/13/2025 10:17:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-018	25110404-018C		11/13/2025 10:27:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-019	25110404-019C		11/13/2025 11:01:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-020	25110404-020C		11/13/2025 11:32:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-021	25110404-021C		11/13/2025 1:47:00 PM	11/19/2025 11:20:00 AM	Non-Potable Water
25111579-022	25110404-022C		11/13/2025 10:22:00 AM	11/19/2025 11:20:00 AM	Non-Potable Water

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
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Website: http://www.settek.com

DATES REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25111579-001A	25110404-001C	11/12/2025 12:22:01 PM	Non-Potable Water	Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 9320)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-002A	25110404-002C	11/13/2025 2:25:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-003A	25110404-003C	11/12/2025 1:57:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-004A	25110404-004C	11/12/2025 1:17:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-005A	25110404-005C	11/13/2025 1:43:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-006A	25110404-006C	11/13/2025 1:04:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-007A	25110404-007C	11/13/2025 12:58:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-008A	25110404-008C	11/13/2025 12:19:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25111579-008A	25110404-008C	11/13/2025 12:19:00 PM	Non-Potable Water	Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-009A	25110404-009C	11/13/2025 1:53:00 PM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-010A	25110404-010C	11/13/2025 9:38:00 AM		Combined Radium (EPA903+904)		12/19/2025 11:10:00 AM	12/19/2025 11:15:12 AM
				Radium-226 (EPA 903.0)		12/19/2025 11:10:00 AM	12/19/2025 11:15:36 AM
				Radium-228 (EPA 904.0)		12/19/2025 11:10:00 AM	1/2/2026 11:20:00 AM
25111579-011A	25110404-011C	11/12/2025 2:32:00 PM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-012A	25110404-012C	11/13/2025 9:40:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-013A	25110404-013C	11/13/2025 11:04:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-014A	25110404-014C	11/13/2025 11:40:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-015A	25110404-015C	11/13/2025 1:14:00 PM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-016A	25110404-016C	11/13/2025 12:21:00 PM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

DATES REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
25111579-016A	25110404-016C	11/13/2025 12:21:00 PM	Non-Potable Water	Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-017A	25110404-017C	11/13/2025 10:17:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-018A	25110404-018C	11/13/2025 10:27:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-019A	25110404-019C	11/13/2025 11:01:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-020A	25110404-020C	11/13/2025 11:32:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-021A	25110404-021C	11/13/2025 1:47:00 PM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM
25111579-022A	25110404-022C	11/13/2025 10:22:00 AM		Combined Radium (EPA903+904)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-226 (EPA 903.0)		12/22/2025 8:14:08 AM	1/6/2026 8:26:00 AM
				Radium-228 (EPA 904.0)		12/22/2025 8:14:08 AM	1/2/2026 1:47:00 PM

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Project: 25110404
Lab ID: 25111579-001
Client Sample ID: 25110404-001C

Collection Date: 11/12/2025 12:22:01 PM
Matrix: NON-POTABLE WATER

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.380	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	12/19/2025 11:15:36 A
Yield	0.940					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 9320)					**SW9320**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.300	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 2:25:00 PM
Project: 25110404
Lab ID: 25111579-002
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-002C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.440	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.100	1	12/19/2025 11:15:36 A
Yield	0.780					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.340	1	1/2/2026 11:20:00 AM
Yield	0.830					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/12/2025 1:57:00 PM
Project: 25110404
Lab ID: 25111579-003
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-003C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.380	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	12/19/2025 11:15:36 A
Yield	0.870					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.300	1	1/2/2026 11:20:00 AM
Yield	0.930					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/12/2025 1:17:00 PM
Project: 25110404
Lab ID: 25111579-004
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-004C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.400	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	12/19/2025 11:15:36 A
Yield	0.950					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.330	1	1/2/2026 11:20:00 AM
Yield	0.960					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 1:43:00 PM
Project: 25110404
Lab ID: 25111579-005
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-005C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.470	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.130	1	12/19/2025 11:15:36 A
Yield	0.990					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.340	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 1:04:00 PM
Project: 25110404
Lab ID: 25111579-006
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-006C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.370	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0400	1	12/19/2025 11:15:36 A
Yield	0.930					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.330	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

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Cuyahoga Falls, Ohio 44223
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Analytical Report

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WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 12:58:00 PM
Project: 25110404
Lab ID: 25111579-007
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-007C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.410	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	12/19/2025 11:15:36 A
Yield	0.970					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.340	1	1/2/2026 11:20:00 AM
Yield	0.960					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
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Analytical Report

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WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 12:19:00 PM
Project: 25110404
Lab ID: 25111579-008
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-008C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.410	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	12/19/2025 11:15:36 A
Yield	0.940					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.340	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 1:53:00 PM
Project: 25110404
Lab ID: 25111579-009
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-009C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.590	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	1.37	1.00		pCi/L	± 0.160	1	12/19/2025 11:15:36 A
Yield	0.990					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00	QDR	pCi/L	± 0.430	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Cuyahoga Falls, Ohio 44223
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 9:38:00 AM
Project: 25110404
Lab ID: 25111579-010
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-010C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **KM**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.420	1	12/19/2025 11:15:12 A
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **KM**
Radium-226	ND	1.00	QDR	pCi/L	± 0.110	1	12/19/2025 11:15:36 A
Yield	0.960					1	12/19/2025 11:15:36 A
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **KM**
Radium-228	ND	1.00		pCi/L	± 0.310	1	1/2/2026 11:20:00 AM
Yield	1.00					1	1/2/2026 11:20:00 AM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/12/2025 2:32:00 PM
Project: 25110404
Lab ID: 25111579-011
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-011C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.550	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	1.01	1.00		pCi/L	± 0.140	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.410	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 9:40:00 AM
Project: 25110404
Lab ID: 25111579-012
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-012C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.340	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0500	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.290	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 11:04:00 AM
Project: 25110404
Lab ID: 25111579-013
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-013C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.380	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0500	1	1/6/2026 8:26:00 AM
Yield	0.980					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.330	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Cuyahoga Falls, Ohio 44223
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Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 11:40:00 AM
Project: 25110404
Lab ID: 25111579-014
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-014C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.400	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.100	1	1/6/2026 8:26:00 AM
Yield	0.930					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.300	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

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WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 1:14:00 PM
Project: 25110404
Lab ID: 25111579-015
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-015C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.630	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0900	1	1/6/2026 8:26:00 AM
Yield	0.990					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	1.46	1.00		pCi/L	± 0.540	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Cuyahoga Falls, Ohio 44223
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Analytical Report

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WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 12:21:00 PM
Project: 25110404
Lab ID: 25111579-016
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-016C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.410	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0500	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.360	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

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3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
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Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 10:17:00 AM
Project: 25110404
Lab ID: 25111579-017
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-017C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.560	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.110	1	1/6/2026 8:26:00 AM
Yield	0.950					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.450	1	1/2/2026 1:47:00 PM
Yield	0.990					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 10:27:00 AM
Project: 25110404
Lab ID: 25111579-018
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-018C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.480	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0700	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.410	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 11:01:00 AM
Project: 25110404
Lab ID: 25111579-019
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-019C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.460	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0800	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.380	1	1/2/2026 1:47:00 PM
Yield	0.990					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 11:32:00 AM
Project: 25110404
Lab ID: 25111579-020
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-020C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.510	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.130	1	1/6/2026 8:26:00 AM
Yield	0.890					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.380	1	1/2/2026 1:47:00 PM
Yield	0.990					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 1:47:00 PM
Project: 25110404
Lab ID: 25111579-021
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-021C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	ND	2.00		pCi/L	± 0.450	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	ND	1.00		pCi/L	± 0.0900	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	ND	1.00		pCi/L	± 0.360	1	1/2/2026 1:47:00 PM
Yield	1.00					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected	PL	Permit Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **25111579**

Date Reported: **1/8/2026**

CLIENT: TEKLAB Inc,
Collection Date: 11/13/2025 10:22:00 AM
Project: 25110404
Lab ID: 25111579-022
Matrix: NON-POTABLE WATER
Client Sample ID: 25110404-022C

Analyses	Result	RL	Qual	Units	Uncertainty	DF	Date Analyzed
COMBINED RADIUM (EPA903+904)					**CALCULATION**	**E903-904**	Analyst: **TAL**
Radium-226/Radium-228	5.88	2.00		pCi/L	± 0.880	1	1/6/2026 8:26:00 AM
RADIUM-226 (EPA 903.0)					**E903.0**	**E903-904**	Analyst: **TAL**
Radium-226	3.94	1.00		pCi/L	± 0.260	1	1/6/2026 8:26:00 AM
Yield	1.00					1	1/6/2026 8:26:00 AM
RADIUM-228 (EPA 904.0)					**E904.0**	**E903-904**	Analyst: **TAL**
Radium-228	1.94	1.00		pCi/L	± 0.620	1	1/2/2026 1:47:00 PM
Yield	0.970					1	1/2/2026 1:47:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded
ND	Not Detected
R	RPD outside accepted recovery limits
W	Sample container temperature is out of limit as specified at testcode
M	Manual Integration used to determine area response
PL	Permit Limit
RL	Reporting Detection Limit

Original

Alliance Technical Group - Akron
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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404 **BatchID:** **90856**

Sample ID: **25111579-009ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224241**
Client ID: **25110404-009C** Batch ID: **90856** TestNo: **E904.0** **E903-904** Analysis Date: **1/2/2026** SeqNo: **5977079**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	1.25	1.00		0	0			0.8400	39.2	30	R
Yield	1.00			0	0			1.000	0		

Sample ID: **25111579-010ADUP** SampType: **DUP** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224241**
Client ID: **25110404-010C** Batch ID: **90856** TestNo: **E904.0** **E903-904** Analysis Date: **1/2/2026** SeqNo: **5977081**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0			0	0	30	
Yield	0.930			0	0			1.000	7.25		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404 **BatchID:** **90856**

Sample ID: **MB-90856** SampType: **MBLK** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224241**
Client ID: **BatchQC** Batch ID: **90856** TestNo: **SW9320** **E903-904** Analysis Date: **1/2/2026** SeqNo: **5977054**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						
Yield	0.970			0	0						

Sample ID: **LCS-90856** SampType: **LCS** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224241**
Client ID: **BatchQC** Batch ID: **90856** TestNo: **SW9320** **E903-904** Analysis Date: **1/2/2026** SeqNo: **5977055**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.74	1.00	5.000	0	74.8	50	130				
Yield	0.920			0	0						

Sample ID: **LCSD-90856** SampType: **LCSD** TestCode: **Radium-228_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224241**
Client ID: **BatchQC** Batch ID: **90856** TestNo: **SW9320** **E903-904** Analysis Date: **1/2/2026** SeqNo: **5977056**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.41	1.00	5.000	0	68.2	50	130	3.740	9.23	20	
Yield	0.960			0	0			0.9200	4.26		

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404 **BatchID:** **90856**

Sample ID: **MB-90856**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/19/2025**	RunNo: **224246**
Client ID: **BatchQC**	Batch ID: **90856**	TestNo: **E903.0**	**E903-904**	Analysis Date: **12/19/2025**	SeqNo: **5977140**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	0.940										

Sample ID: **LCS-90856**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/19/2025**	RunNo: **224246**
Client ID: **BatchQC**	Batch ID: **90856**	TestNo: **E903.0**	**E903-904**	Analysis Date: **12/19/2025**	SeqNo: **5977141**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.99	1.00	5.000	0	120	70	130				

Sample ID: **LCSD-90856**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/19/2025**	RunNo: **224246**
Client ID: **BatchQC**	Batch ID: **90856**	TestNo: **E903.0**	**E903-904**	Analysis Date: **12/19/2025**	SeqNo: **5977142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.17	1.00	5.000	0	123	70	130	5.990	2.96	20	

Sample ID: **25111579-009ADUP**	SampType: **DUP**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/19/2025**	RunNo: **224246**
Client ID: **25110404-009C**	Batch ID: **90856**	TestNo: **E903.0**	**E903-904**	Analysis Date: **12/19/2025**	SeqNo: **5977164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404 **BatchID:** **90856**

Sample ID: **25111579-009ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224246**
Client ID: **25110404-009C** Batch ID: **90856** TestNo: **E903.0** **E903-904** Analysis Date: **12/19/2025** SeqNo: **5977164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	1.48	1.00						1.370	7.72	30	
Yield	0.900							0.9900	9.52	0	

Sample ID: **25111579-010ADUP** SampType: **DUP** TestCode: **Radium-226_** Units: **pCi/L** Prep Date: **12/19/2025** RunNo: **224246**
Client ID: **25110404-010C** Batch ID: **90856** TestNo: **E903.0** **E903-904** Analysis Date: **12/19/2025** SeqNo: **5977166**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	30	R
Yield	0.850							0.9600	12.2	0	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **25111579**

08-Jan-26

Client: TEKLAB Inc,
Project: 25110404 **BatchID:** **90886**

Sample ID: **MB-90886**	SampType: **MBLK**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/22/2025**	RunNo: **224319**
Client ID: **BatchQC**	Batch ID: **90886**	TestNo: **E903.0**	**E903-904**	Analysis Date: **1/6/2026**	SeqNo: **5979841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00									
Yield	1.00										

Sample ID: **LCS-90886**	SampType: **LCS**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/22/2025**	RunNo: **224319**
Client ID: **BatchQC**	Batch ID: **90886**	TestNo: **E903.0**	**E903-904**	Analysis Date: **1/6/2026**	SeqNo: **5979842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.13	1.00	5.000	0	103	70	130				

Sample ID: **LCSD-90886**	SampType: **LCSD**	TestCode: **Radium-226_**	Units: **pCi/L**	Prep Date: **12/22/2025**	RunNo: **224319**
Client ID: **BatchQC**	Batch ID: **90886**	TestNo: **E903.0**	**E903-904**	Analysis Date: **1/6/2026**	SeqNo: **5979843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	5.24	1.00	5.000	0	105	70	130	5.130	2.12	20	

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits	W	Sample container temperature is out of limit as specified at testcode		

Original

25111579

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: Sampler: Teklab Employee QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Analyze for Radium 226/228 per your normal method/s.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested.

Project# 25110404

Contact: Shelly Hennessy Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT Billing/PO: 39856 Phone: 618-344-1004 ex 36 State of Sample Origin = IL

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Ra226/228	Radium 226	Radium 228	pH			CPM					
	25110404-001C	11/12/25 12:22	HNO3	Groundwater	✔	✔	✔	3	2	2	21	30	22			
	25110404-002C	11/13/25 14:25	HNO3	Groundwater	✔	✔	✔	2	3	2	22	20	26			
	25110404-003C	11/12/25 13:57	HNO3	Groundwater	✔	✔	✔	3	3	3	22	32	22			
	25110404-004C	11/12/25 13:17	HNO3	Groundwater	✔	✔	✔	2	2	2	26	24	26			
	25110404-005C	11/13/25 13:43	HNO3	Groundwater	✔	✔	✔	3	3	3	24	26	28			
	25110404-006C	11/13/25 13:04	HNO3	Groundwater	✔	✔	✔	2	2	3	30	36	24			
	25110404-007C	11/13/25 12:58	HNO3	Groundwater	✔	✔	✔	2	2	3	32	30	30			
	25110404-008C	11/13/25 12:19	HNO3	Groundwater	✔	✔	✔	3	2	3	30	30	30			
	25110404-009C	11/13/25 13:53	HNO3	Groundwater	✔	✔	✔	3	3	3	22	24	28			
	25110404-010C	11/13/25 9:38	HNO3	Groundwater	✔	✔	✔	3	3	3	16	22	30			
	25110404-011C	11/12/25 14:32	HNO3	Groundwater	✔	✔	✔	2	3	1	26	18	26			

*Relinquished By	Date/Time	Received By	Date/Time
[signature]	11/19/25 1700	[signature] ~~11/20/25~~	
		Fedex 1120 11/19/25	
		18.8+0.2=19.0	

C.S. 11/17/25 intact

19.0°C = 18.8+0.2

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

SubCocRevA
3/2/2016

TEKLAB, INC. Chain of Custody

5445 Horseshoe Lake Road, Collinsville, IL 62234 Phone (618) 344-1004 Fax (618) 344-1005

Are the samples chilled? YES ☐ NO ☑ With: ☐ Ice ☐ Blue Ice Preserved in: ☐ Lab ☐ Field

Teklab Inc
5445 Horseshoe Lake Road
Collinsville, IL 62234

Cooler Temp: | Sampler: Teklab Employee | QC Level: 2

Comments: **Please Issue reports and invoices via email only**
Analyze for Radium 226/228 per your normal method/s.
Method changes require Teklab authorization. Samples collected from an IL site.
Batch QC is required for all analyses requested.

Project# 25110404

Contact: Shelly Hennessy | Email: shennessy@teklabinc.com
Requested Due Date: Standard TAT | Billing/PO: 39856
Phone: 618-344-1004 ex 36 State of Sample Origin = IL

PLEASE NOTE:

NELAP accreditation is required on the requested analytes and must be documented as such on the final report. If your laboratory does not currently hold a NELAP accreditation for the requested method and/or analytes, please contact Teklab immediately. If your laboratory loses accreditation or is suspended for any analyte/method during the life of the contract, you must contact Teklab immediately.

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	Ra226/228	Radium 226	Radium 228	PH			UPW					
	25110404-012C	11/13/25 9:40	HNO3	Groundwater	✔	✔	✔	3	3	3	22	30	28			
	25110404-013C	11/13/25 11:04	HNO3	Groundwater	✔	✔	✔	2	3	3	24	28	24			
	25110404-014C	11/13/25 11:40	HNO3	Groundwater	✔	✔	✔	2	3	3	26	34	26			
	25110404-015C	11/13/25 13:14	HNO3	Groundwater	✔	✔	✔	2	3	3	28	22	18			
	25110404-016C	11/13/25 12:21	HNO3	Groundwater	✔	✔	✔	2	2	3	36	26	38			
	25110404-017C	11/13/25 10:17	HNO3	Groundwater	✔	✔	✔	2	3	3	22	28	32			
	25110404-018C	11/13/25 10:27	HNO3	Groundwater	✔	✔	✔	1	1	1	22	30	46			
	25110404-019C	11/13/25 11:01	HNO3	Groundwater	✔	✔	✔	2	3	2	24	30	28			
	25110404-020C	11/13/25 11:32	HNO3	Groundwater	✔	✔	✔	3	3	3	28	32	34			
	25110404-021C	11/13/25 13:47	HNO3	Groundwater	✔	✔	✔	3	3	3	22	14	26			
	25110404-022C	11/13/25 10:22	HNO3	Groundwater	✔	✔	✔	2	2	3	26	20	34			

*Relinquished By	Date/Time	Received By	Date/Time
	11/17/25 1700	Paige Aguirre	~~11/20/25~~ PA 12:00
			11/19/25

CS intact
11/17/25
19.0 C =
18.8 +0.2

Teklab maintains a strict policy of client confidentiality and as such does not provide client/sampler information without proper authorization. and proprietary rights, Teklab, Inc. protects clients' confidential information as directed by local, state or federal laws. (Teklab QAM Section 9.1, TNI V1 M2 Section 4.1.5 c)

Alliance Technical Group - Akron
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Sample Log-In Check List

Client Name: **TEK-IL-62234-A** Work Order Number: **25111579** RcptNo: **1**

Logged by:	**Spencer M. Hartwell**	**11/19/2025 11:20:00 AM**	Spencer M. Hartwell
Completed By:	**Spencer M. Hartwell**	**11/20/2025 3:53:59 PM**	Spencer M. Hartwell
Reviewed By:	**Jennifer Woolf**	**11/25/2025 9:29:17 PM**	Jennifer Woolf

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☑ No ☐ Not Present ☐ NA ☐
   No. Seal Date: 11/17/2025 Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☑ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	19	Good	Yes		11/17/2025	