ENGINEERING REPORT FOR INACTIVE CCR LANDFILL

FORMER PLANT ARKWRIGHT – AP3 LANDFILL AND MONOFILL

MACON-BIBB COUNTY, GEORGIA

FOR

Georgia Power

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1. BACKGROUND AND OBJECTIVE

AP3 Landfill and Monofill is no longer operational. A Closure Certificate was issued by the Georgia Environmental Protection Division (EPD) for AP3 Landfill and Monofill on August 19, 2010, under Solid Waste Handling Permit 011-025D(LI). Currently, the CCR waste areas within the permit boundary are stable and vegetation is well established on the final cover systems. Georgia Power will continue to perform groundwater monitoring and maintenance of the CCR unit throughout the post-closure care period. This report has been included to provide supporting documentation for the CCR unit solid waste handling permit application.

2. LOCATION RESTRICTION DEMONSTRATION

In accordance with the requirements of Georgia Solid Waste Management Rule 391-3-4-.10(9), an Inactive CCR Landfill permit application must include the location restriction demonstration requirements in 40 CFR 257.64 for unstable areas. No unstable areas were identified during the previous site suitability investigation for AP3 Landfill and Monofill. Local geologic/geomorphologic features and human-made surface features within the permit boundary and surrounding area were studied. Additional information for the onsite conditions can be found in the Limited Hydrogeological Assessment Report included in this permit application. No unstable areas were identified in preparation of this CCR unit solid waste handling permit application. A certification from a Georgia-Registered Professional Engineer regarding the location restriction demonstration is included in Appendix A.

3. GEOTECHNICAL EVALUATIONS OF AP3 LANDFILL

3.1 Site Investigations of AP3 Landfill

As part of the geotechnical scope of work, 34 cone penetration test (CPT) probes were performed to characterize the subsurface geometry and develop strength parameters for the AP3 Landfill at the former Plant Arkwright facility.

Jacobs personnel were onsite to oversee CPT operations between October 24 and October 31, 2017. CPT field work was subcontracted to Fugro USA Land, Inc. (Fugro). Fugro provided a 25-ton truck-mounted CPT rig capable of advancing a piezocone to a maximum depth of 70 feet below the existing ground surface. During testing, actual probe depth ranged from 17.5 feet to 67.1 feet. A Report for Piezocone Penetration Testing and Related Services provided by Fugro, including CPT logs generated by Fugro's in-house CPT software, dated November 20, 2017, is provided in Appendix B.

It should be noted that seismic piezocone testing (SCPT) was planned as part of the site investigation; however, after attempting data collection on the first four holes with poor to very poor data recovery, SCPT testing was abandoned and all future holes were completed as standard CPT probes.

Raw CPT data recorded in the field includes penetration depth, piezocone tip resistance, piezocone sleeve friction and pore water pressure. These raw parameters are used with Robertson and Campanella's (1986) Simplified Soil Behavior Type (SBT) charts to classify in-situ soil ranging from sensitive fine grained to coarse grained in 12 soil type categories. These categories are listed on the CPT logs presented in Appendix B.

Using specific cone calibration data, the raw data can be processed to derive more useful CPT parameters capable of correlating to specific engineering properties. Jacobs utilized computer software program CLiq v.2.2.0.35 developed by GeoLogismiki (2006) to process Fugro's raw CPT data. This requires a cone calibration factor (provided by Fugro) and an estimated water table depth (obtained from potentiometric surface map in drawing ES1375S5 by Georgia Power dated November 17, 2005).

The processed data included equivalent SPT N-values and equivalent shear strength of the soil strata encountered. These values are presented in the CPT logs created by Jacobs, which more broadly define specific strata breaks of the materials encountered during the subsurface investigation, as presented in Appendix C.

3.2 Material Properties of AP3 Landfill

Based on the results of the site investigation, subsurface profiles were created at 15 cross-sections throughout AP3 Landfill as shown in Appendix D. These cross sections were labeled A-A to O-O. The materials encountered could generally be grouped into one of four categories: geosynthetic clay liner (GCL) and overlying soil backfill, in-situ sluiced CCR, foundation soil, or embankment/levee fill.

Using the raw and processed CPT data, these material groups were assigned strength properties for both drained and undrained conditions. It should be noted that the overlying soil backfill likely has higher strength properties than the GCL it was placed over, but strength parameters were conservatively assigned to this soil mass as if it would fail on the weak plane through the GCL. A residual friction angle was chosen for this material of 15 degrees versus a peak friction angle which would be on the order of 18 to 20 degrees. This results in a more conservative analysis. Design material properties for the four material categories are listed below in Table 1.

TABLE 1. DESIGN MATERIAL STRENGTH PROPERTIES FOR AP3 LANDFILL

Soil Material	Elev.		Unit Weight	Drained Strength		Undrained Strength	
	From	To		c'	Φ'	c	Φ
	(ft)	(ft)	(pcf)	(psf)	(deg.)	(psf)	(deg.)
In-Situ Soil and GCL	~ 360	~ 355	110	100	15	100	15
In-Situ Sluiced CCR	~ 355	~ 330	90	0	22	0	22
Foundation Soil	~ 330	Below	108	300	24	500	20
Embankment/Levee Fill	Vary	Vary	120	100	28	700	10

Parameters selected for the in-situ sluiced CCR were based on results of the processed CPT data. The normalized cone resistance, Qt, and pore pressure ratio, Bq, were input into Equation 4-20 from Engineering Correlations for Geotechnical Parameters for Ponded Fly Ash by Electric Research Power Institute (EPRI): $\emptyset' = 29.5° \, x \, B_q{}^{0.121} \, [0.256 + 0.336 \, B_q + \log Q_t \,]$

A friction angle was calculated at every CPT interval at which data was recorded and then plotted versus elevation to determine if a trend existed for friction angle of the CCR with increasing depth below the ground surface. A conservative average value of 22 degrees was selected for the entire in-situ CCR layer after no trend of variation with depth was evident. The plot of calculated friction angle versus elevation is presented in the geotechnical calculation package included as Appendix D.

Parameters for the foundation soil and embankment/levee fill were based on CPT results as well as historical boring log information from the monitoring wells that surround AP3 Landfill.

It should be noted that the effect of penetration rate on the interpreted friction angle was investigated for one of the CPTs as suggested in Section 4.6.3 of the previously noted EPRI report. The typical cone penetration rate for CPT testing is 2.0 cm/sec. Per the above reference, this penetration rate may result in estimates of the drained friction angle which are less than those measured in a laboratory triaxial compression test. It was proposed that a penetration rate of 0.08 cm/s or less should result in a penetration rate consistent with drained conditions. A thirty-fifth CPT probe, identified as CPT-09 “Slow” or CPT-09SL was attempted to be pushed at a slower rate, though due to limitations in the equipment a rate of between 0.1 and 0.2 cm/sec was the lowest that could be achieved. Due to the increased time consumption required to perform a “slow” test and limitations of equipment to be unable to push at a rate of 0.08 cm/sec or less, attempts to achieve a true drained condition in CCR were abandoned. No conclusions could reasonably be drawn from a single comparison of CPT-09 and CPT09SL, though the processed data did vary slightly between the two push rates.

As noted in Appendix B, 38 total CPT pushes were attempted. Three locations (CPT-17, CPT-18 and CPT-26) were terminated at depths ranging between 4.9 and 26.2 feet below the ground surface, prior to encountering planned refusal depth below the CCR fill. These terminations were due to obstructions or CPT equipment malfunction. Due to the limited data these CPTs would have provided, they are not included in this report. Alternate locations, generally within a 5-foot distance from the staked location, were selected and the CPT was re-pushed. Logs CPT-17A, CPT-18A and CPT-26A are included in Appendix B as well as Jacobs stratigraphic CPT logs in Appendix C.

3.3 Stability Analysis of AP3 Landfill

3.3.1 Static Stability of AP3 Landfill

Global stability of the existing unit was evaluated under short-term and long-term loading conditions using software SLOPE/W Version 2012 developed by GEO-SLOPE International Ltd. For the short-term condition, undrained total stress parameters were used and a minimum required factor of safety of 1.5 was chosen in accordance with Georgia EPD factor of safety criteria for solid waste facilities. Likewise, for the long-term condition, a minimum required factor of safety of 1.5 was chosen; however, drained effective stress parameters were used to classify the subsurface materials. Results of the short-term and long-term global stability analyses are presented in Table 2 below. Additional details of the static stability analysis results are presented in the geotechnical calculation package in Appendix D.

TABLE 2. SHORT TERM AND LONG TERM GLOBAL STABILITY RESULTS FOR AP3 LANDFILL

Section	Load Condition	Calculated Factor of Safety (FOS)		Note
		Criteria	Calculated FOS	
A-A	Short-Term	1.50	4.48	OK
	Long-Term		4.48	OK
B-B	Short-Term	1.50	8.21	OK
	Long-Term		8.21	OK
C-C	Short-Term	1.50	9.26	OK
	Long-Term		9.26	OK
D-D	Short-Term	1.50	6.53	OK
	Long-Term		6.53	OK
E-E	Short-Term	1.50	7.82	OK
	Long-Term		7.79	OK
F-F	Short-Term	1.50	8.32	OK
	Long-Term		8.32	OK
G-G	Short-Term	1.50	12.01	OK
	Long-Term		12.01	OK
H-H	Short-Term	1.50	3.51	OK
	Long-Term		3.51	OK
I-I	Short-Term	1.50	2.51	OK
	Long-Term		2.51	OK
J-J	Short-Term	1.50	2.06	OK
	Long-Term		1.93	OK
K-K	Short-Term	1.50	12.20	OK
	Long-Term		12.20	OK
L-L	Short-Term	1.50	4.61	OK
	Long-Term		4.61	OK
M-M	Short-Term	1.50	9.99	OK
	Long-Term		9.99	OK
N-N	Short-Term	1.50	7.78	OK
	Long-Term		7.78	OK
O-O	Short-Term	1.50	10.30	OK
	Long-Term		10.30	OK

As mentioned above in Section 3.2, a residual friction angle was chosen for the in-situ soil and GCL and conservative friction angle values were chosen for both short-term and long-term conditions for the in-situ sluiced CCR based on the processed CPT results. Thus, when the failure surface passes through only the in-situ soil and GCL and the in-situ CCR, the calculated factor of safety was identical for both short-term and long-term conditions.

3.3.2 Seismic Stability of AP3 Landfill

AP3 Landfill is located in Macon-Bibb County, Georgia, which is an area of moderate seismic activity in relation to the Fall Line geomorphic break. The 2011 AASHTO Guide Specifications for LRFD Seismic Bridge Design (2nd Ed.) and 2014 Interim Revisions (Seismic Details) requires a site profile determination extending to 100 feet for seismic site classification. Each CPT probe was advanced to refusal, achieved at a depth of less than 100 feet. We have assumed that soils consistent with the foundation soil encountered at the refusal depths continue beyond the refusal depth at all probe locations. Based on our understanding of the local geology, we recommend the use of Site Class E for AP3 Landfill (a classification for soft clay soil) in accordance with 2011 AASHTO Seismic Design Table 3.4.2.1-1. Site specific design parameters are presented in Appendix D and summarized in Table 3.

TABLE 3. SEISMIC DESIGN PARAMETERS FOR AP3 LANDFILL

Description	Value
Site Classification (AASHTO LRFD Seismic Bridge Design 2011)	E
Site Latitude	32.92765° N
Site Longitude	83.70681° W
PGA Peak Ground Acceleration Coefficient	0.052g
S_s Spectral Acceleration for a Short Period	0.122g
S_1 Spectral Acceleration for a 1-Second Period	0.050g
F_a Site Coefficient for a Short Period	2.5
F_v Site Coefficient for a 1-Second Period	3.5
A_s Adjusted Ground Acceleration	0.131g
S_{DS} Design Spectral Response Acceleration for a Short Period	0.306g
S_{D1} Design Spectral Response Acceleration for a 1-Second Period	0.174g
kh Applied Horizontal Pseudo-Static Seismic Acceleration for Stability	0.065g

Seismic stability was performed using a pseudo-static method with an applied additional horizontal acceleration. For the seismic stability analysis, an applied horizontal acceleration (kh) of 0.065g was used, which is equal to half of the adjusted ground acceleration (As) of 0.131g in accordance with AASHTO LRFD. During a seismic event, it is assumed that excess pore water pressure is unable to dissipate, and the soil mass will act in an undrained total stress condition. A minimum required factor of safety of 1.1 was chosen for the seismic stability analyses based on Rule 391-3-8-.09 Standards for the Design and Evaluation of Dams. Results of the seismic stability analyses are summarized in Table 4 and presented in Appendix D.

TABLE 4. SEISMIC GLOBAL STABILITY RESULTS FOR AP3 LANDFILL

Section	Load Condition	Calculated Factor of Safety (FOS)		Note
		Criteria	Calculated FOS	
A-A	Short-Term	1.10	2.20	OK
B-B	Short-Term	1.10	3.62	OK
C-C	Short-Term	1.10	3.63	OK
D-D	Short-Term	1.10	2.95	OK
E-E	Short-Term	1.10	3.39	OK
F-F	Short-Term	1.10	2.92	OK
G-G	Short-Term	1.10	3.87	OK
H-H	Short-Term	1.10	2.49	OK
I-I	Short-Term	1.10	1.97	OK
J-J	Short-Term	1.10	1.67	OK
K-K	Short-Term	1.10	3.67	OK
L-L	Short-Term	1.10	2.89	OK
M-M	Short-Term	1.10	3.27	OK
N-N	Short-Term	1.10	3.02	OK
O-O	Short-Term	1.10	3.28	OK

4. GEOTECHNICAL EVALUATIONS OF MONOFILL

4.1 Material Properties of Monofill

Soil properties beneath the existing Monofill were developed using the information provided in the boring logs of former monitoring wells GWC-3 and GWC-4 (abandoned prior to July 2008). Undrained shear strength parameters of sandy clay were estimated using the pocket penetrometer readings provided in the boring log of GWC-3. Drained shear strength parameters were assumed by examining Atterberg limits testing results from nearby borings. No lab testing data was available for former monitoring wells GWC-3 and GWC-4. The Monofill's soil cover was assumed to be composed of compacted silty sand.

Properties of in-situ CCR were developed based upon consolidated undrained (CU) triaxial testing of remolded CCR samples collected from AP1 Landfill (located on the east side of Arkwright Road), AP3 Landfill, and from published literature on the strength properties of CCR at other sites. Further, the selection of strength parameters took into consideration the fact that the CCR at the Monofill was dry hauled, spread for final grading and compacted, which would yield a higher relative density than sluiced CCR. The triaxial testing results indicated a friction angle between 28 and 36 degrees for remolded CCR at 90 to 95% compaction and +2% to +4% above optimum moisture content. The test results are within the range found in published literature, so an effective friction angle of 28 degrees was conservatively selected for analysis. As CCR acts as a non-cohesive material in nature, the selected effective friction angle was used for both short-term and long-term loading conditions. Table 5 below provides the soil and CCR strength parameters used for analysis.

TABLE 5. DESIGN MATERIAL STRENGTH PROPERTIES FOR MONOFILL

Soil Material	Unit Weight	Drained Strength		Undrained Strength	
		c'	Φ'	c	Φ
	(pcf)	(psf)	(deg.)	(psf)	(deg.)
In-Situ CCR	90	0	28	0	28
Compacted Silty Sand	120	0	34	0	34
Sandy Clay (CL)	115	100	28	1,500	0

4.2 Stability Analysis of Monofill

4.2.1 Static Stability of Monofill

The global stability of the existing Monofill was evaluated under short-term and long-term loading conditions using software SLOPE/W Version 2012 developed by GEO-SLOPE International Ltd. For the short-term condition, undrained total stress parameters were used and for the long-term condition drained effective stress parameters were used. For both loading conditions a minimum required factor of safety of 1.5 was used in accordance with Georgia EPD factor of safety criteria for solid waste facilities. The analysis was performed at the critical slope geometry with a depth to groundwater based upon nearby monitoring well data. A summary of the global stability results is provided in Table 6 below. Additional details of the static stability analysis results are presented in the geotechnical calculation package in Appendix E.

TABLE 6. SHORT-TERM AND LONG-TERM GLOBAL STABILITY RESULTS FOR MONOFILL

Slope Location	Load Condition	Calculated Factor of Safety (FOS)		Note
		Criteria	Calculated FOS	
Western Monofill edge, near NW corner	Short-Term	1.5	1.59	OK
	Long-Term	1.5	1.59	OK

4.2.2 Seismic Stability of Monofill

The site is in Macon-Bibb County, Georgia, which is an area of moderate seismic activity in relation to the Fall Line geomorphic break. The 2011 AASHTO Guide Specifications for LRFD Seismic Bridge Design (2nd Ed.) and 2014 Interim Revisions (Seismic Details) requires a site profile determination extending to 100 feet for seismic site classification. All the borings examined were either terminated or reached refusal at depths less than 100 feet. Based on our understanding of the local geology and the presence of CCR fill, we recommend the use of Site Class E for the Monofill (a classification for soft clay soil) in accordance with 2011 AASHTO Seismic Design Table 3.4.2.1-1. Site specific design parameters are presented in Appendix E and summarized in Table 7.

TABLE 7. SEISMIC DESIGN PARAMETERS FOR MONOFILL

Description	Value
Site Classification (AASHTO LRFD Seismic Bridge Design 2011)	E
Site Latitude	32.92765° N
Site Longitude	83.70681° W
PGA Peak Ground Acceleration Coefficient	0.052g
S_s Spectral Acceleration for a Short Period	0.122g
S_1 Spectral Acceleration for a 1-Second Period	0.050g
F_a Site Coefficient for a Short Period	2.5
F_v Site Coefficient for a 1-Second Period	3.5
A_s Adjusted Ground Acceleration	0.131g
S_{DS} Design Spectral Response Acceleration for a Short Period	0.306g
S_{D1} Design Spectral Response Acceleration for a 1-Second Period	0.174g
kh Applied Horizontal Pseudo-Static Seismic Acceleration for Stability	0.065g

The seismic stability analysis was performed using a pseudo-static method with an applied additional horizontal acceleration. For the seismic stability analysis, an applied horizontal acceleration (kh) of 0.065g was used, which is equal to half of the adjusted ground acceleration (As) of 0.131g in accordance with AASHTO LRFD. During a seismic event, it is assumed that excess pore water pressure is unable to dissipate from cohesive materials and these soil masses will act in an undrained total stress condition. A minimum required factor of safety of 1.1 was chosen for the seismic stability analyses based on Rule 391-3-8-.09 Standards for the Design and Evaluation of Dams. Results of the seismic stability analyses are summarized in Table 8 and presented in Appendix E.

TABLE 8. SEISMIC GLOBAL STABILITY RESULTS FOR MONOFILL

Slope Location	Load Condition	Calculated Factor of Safety (FOS)		Note
		Criteria	Calculated FOS	
Western Monofill edge, near NW corner	Short-Term	1.10	1.29	OK

5. FINAL COVER SYSTEMS

5.1 Alternative Cover System Demonstration

The final cover systems of AP3 Landfill and Monofill consist of a Geosynthetic Clay Liner (GCL) overlain by a geocomposite and at least 18 inches of soil. The design of these systems was approved by EPD in the CCR unit's modified closure plan. EPD conducted an inspection of the final cover systems on April 21, 2010 before issuance of the Closure Certificate.

The construction of the existing final cover systems as documented in the 2010 closure report submitted to EPD has been evaluated to determine equivalency of the final cover systems in accordance with Rule 391-3-4-.10. The results of the alternative final cover system demonstration can be found in Appendix F and indicate that the existing final cover systems are equivalent to that required by Georgia Rule 391-3-4-.10.

5.2 Final Cover Thickness

When AP3 Landfill and Monofill were closed, Georgia Power provided EPD a Closure Completion Report which reported, among other items, that a minimum of 18-inches of soil cover had been placed over the GCL liner. Field testing was conducted by Jacobs to confirm the existing final soil cover thicknesses for AP3 Landfill and Monofill. The final cover thickness of AP3 Landfill was confirmed using the 34 CPT borings and varied from 2 to 12 feet, as documented in Appendix C. Final cover thickness for the Monofill was confirmed by completing ten hand auger borings. These ten borings indicated the existing soil cover thickness for the Monofill ranged from 17-inches to 25-inches. The soil cover thickness over the Monofill is considered confirmed since the single observance of 17 inches thick, in hand auger S2, is within the range of accuracy for the evaluation technique. Results of this testing can be found in Appendix G. Finally, no areas of significant erosion or final cover deficiencies were noted on AP3 Landfill or Monofill during the inspections conducted in preparation of this CCR unit permit application.

6. STORMWATER MANAGEMENT SYSTEM

The stormwater management systems of AP3 Landfill and Monofill were previously approved by EPD under Solid Waste Handling Permit 011-025D(LI). The area within the CCR unit permit boundary has been inspected during recent site visits and no signs of significant erosion have been observed. The existing systems have been evaluated as part of this CCR unit solid waste handling permit application; however, no additional stormwater management systems have been designed for this CCR unit. The existing onsite ditches will continue to be utilized for stormwater collection and conveyance.

6.1 General Description of System

The stormwater management system in place includes the following:

AP3 Landfill

a) A vegetated ditch along the west side perimeter of the AP3 Landfill, which collects run-on from the adjacent properties to the west, as well as run-off from the surface of the closed AP3 Landfill.

b) A vegetated ditch along the east side of the AP3 Landfill that collects run-off from the surface of the closed AP3 Landfill. This ditch is located to the west of the unnamed tributary to Beaverdam Creek and the site access road, intercepting run-off from the closed AP3 Landfill prior to discharge into the unnamed tributary.

c) The ditches end in the low area in the southeast corner of the AP3 Landfill, where two 36-inch corrugated metal culverts provide an outfall to the unnamed tributary. Adequate headwater to pass the run-off is provided above the culverts.

Monofill

a) A vegetated run-off ditch is located along the eastern and western perimeter of the Monofill that carries run-off to the south and west.

b) The perimeter access road slopes away from the run-off ditch along the western perimeter of the Monofill and discharges to the unnamed tributary separately from the run-off ditch flows.

c) The two run-off ditches combine at the western corner of the Monofill and discharge into a larger drainage ditch controlling run-off from adjacent undeveloped property. This ditch discharges through a 36-inch corrugated metal culvert into the unnamed tributary.

6.2 Evaluation Criteria

The evaluated drainage system consists of the perimeter ditch around the AP3 Landfill, the existing 36-inch culvert draining this ditch beneath the berm, and the existing ditches surrounding the closed Monofill, as described in Section 6.1. An assessment of this existing drainage system has been performed based on the 100-year, 24-hour design storm event with any exceptions noted below. All hydrology calculations have been completed using the Natural Resources Conservation Service (NRCS) model, commonly known as the SCS method. The Hydraflow Hydrographs software was used to perform the calculations. Drainage area maps and output for hydrology and hydraulic calculations are included in Appendix H.

6.2.1 Hydrology

a) Site visits were conducted to supplement the owner-provided survey in determining drainage divides and land uses.

b) Curve Numbers were determined based on land use, soil type, and known characteristics of the site. The onsite areas were modeled using a curve number of 80. This was chosen to represent a 'lawn' with good cover of grass and a D type soil. The soil type was chosen to represent a shallow soil over an impermeable layer, representing the existing geosynthetic clay liner (GCL). This was used for all onsite areas (neglecting the small perimeter areas outside the limits of the GCL) and includes the drainage channel and access road. The offsite areas were modeled using curve numbers representative of the soil type and land use.

c) Rainfall rates were obtained from the NOAA Atlas 14 Point Precipitation Frequency Estimate for Macon, Georgia (MACON (09-5438)).

6.2.2 AP3 Landfill Ditches

a) The review of the ditch capacity and velocity was completed based on the SCS hydrology model, site visits, and cross sections developed from the aerial survey (based on a 3-foot point grid) completed for the owner.

b) The ditches, which from site investigations appear to be stable and not experiencing significant erosion, were modeled for the 100-year and 25-year storm events. The results, included in Appendix H, show at least minimal freeboard above the predicted flow depth and velocities not exceeding 4 feet per second in all locations for the 25-year event. The following location does not provide adequate conveyance to contain the 100-year stormflow within the ditch:

- Section AP3-1 (western edge of AP3 Landfill)

No modifications to Ditch Section AP3-1 are proposed because the 100-year, 24-hour event exceeds State design criteria and because visual observations indicate the ditch is currently stable and not experiencing significant erosion.

A figure referencing the locations of each ditch is presented in Appendix H.

6.2.3 AP3 Landfill Outfall Culvert

The existing culverts pass the 10-year, 24-hour design storm event while containing the headwater within the perimeter berm. This headwater will inundate an area extending beyond the limit of CCR for short periods during larger rainfall events.

6.2.4 Monofill Ditches

a) The review of the ditch capacity and velocity was completed based on the SCS hydrology model, site visits, and cross sections developed from the aerial survey (based on a 3-foot point grid) completed for the owner.

b) The ditches, which appear from site investigations to be stable and not experiencing significant erosion, were modeled for the 100-year and 25-year events. The results, included in Appendix H, show at least minimal freeboard above the predicted flow depth for both the 100-year and 25-year events. Monofill Ditch Sections 2 and 3 (western and southern edges of the Monofill) have calculated velocities in excess of 4 feet per second during the 25 and 100-year events. While velocities in excess of 4 feet per second are not preferred for grass lined ditches, site observations of these specific ditch segments indicate the ditches are currently stable and not experiencing significant erosion.

A figure referencing the locations of each ditch is presented in Appendix H.

7. CONCLUSIONS OF ENGINEERING EVALUATIONS FOR CCR UNIT

Global stability of the existing AP3 Landfill meets the referenced minimum factor of safety criteria for short-term, long-term, and seismic loading conditions. Calculated factors of safety were typically highest in the north of the site, where general topography is relatively flat. The south end of the site near the levee presents lower calculated factors of safety because of the increased slope and topography. The global stability analysis of the Monofill indicates that the existing slopes meet the referenced minimum factor of safety criteria under both static and seismic conditions.

The existing final cover systems for AP3 Landfill and Monofill meet the current requirements of the Georgia Solid Waste Management Rules 391-3-4 based on information, surveys, data, and reports provided by Georgia Power, subcontractors to Georgia Power, or reports prepared by Jacobs as presented in the CCR unit permit application dated November 2018. The results of the alternative final cover system demonstration indicate that the existing final cover systems are equivalent to final cover systems specified in the applicable rules. Additionally, no significant erosion or deterioration of the final cover systems has been observed during recent inspections of the CCR unit.

The existing drainage systems for the AP3 Landfill and Monofill are functioning well with no apparent detrimental impacts from site run-off or run-on. The existing unnamed tributary to Beaverdam Creek does not appear to be impacted by siltation generated onsite. Therefore, with the exception noted below, it is recommended that the site be left as permitted and constructed under the previous closure permit.

The existing twin 36-inch corrugated metal pipe culverts draining the run-off ditches offsite and into the unnamed tributary of Beaverdam Creek are not adequate for either the 100-year or 25-year storm event. It is recommended that the existing pipes be replaced with three 36-inch reinforced concrete pipes to provide additional capacity and control overtopping of the berm.ru The downstream riprap outlet protection should be improved to provide additional protection from possible increases in velocity.

8. REFERENCES

AASHTO LRFD Bridge Design Specifications 2014 with Interim Revisions from 2016.

Electric Power Research Institute – Engineering Correlations for Geotechncial Parameters for Ponded Fly Ash – 2014 Technical Report

Fugro USA Land Inc. Report for Piezocone Penetration Testing and Related Services – November 2017

IDOT Liquefaction Spreadsheet – Illinois DOT Design Guide – AGMU Memo 10.1 Liquefaction Analysis

Robertson. P.K., Campanella, R.G., Gillespie, D., and Greig, J., 1986. Use of Piezometer Cone data. In-Situ'86 Use of In-situ testing in Geotechnical Engineering, GSP 6, ASCE, Reston, VA, Specialty Publication, pp 1263-1280.

U.S. Department of Transportation Federal Highway Administration (2011), LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations, Publication No. FHWA-NHI-11-032, FHWA GEC 03, August 2011.

USGS Seismic Design Tools, downloaded from https://earthquake.usgs.gov/designmaps/beta/us/ on February 21, 2018.

Southern Company Generation, Plant Arkwright Ash Ponds 2 and 3 and Ash Monofill Site Acceptability Report - Revision 1 – November 2005

Southern Company Services Inc., Plant Arkwright Private Industrial Landfill – Geologic Sections (rev. 1), Drawing No. GPC-PA-13 – March 1992

Appendix A. PE Certification for Location Restriction Demonstration

LOCATION RESTRICTION DEMONSTRATION

UNSTABLE AREAS

FORMER PLANT ARKWRIGHT – AP3 LANDFILL AND MONOFILL

GEORGIA POWER COMPANY

Georgia's Solid Waste Management Rule 391-3-4-.10(9) requires that Inactive CCR Landfill solid waste handling permit applications meet requirements of (9)(c)3.(i) – (iv), including the location restriction demonstration requirements in 40 C.F.R. 257.64 for unstable areas.

Per § 257.64 of Subpart D - Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, the owner or operator must demonstrate that the facility is not located within an unstable area or a demonstration must be made that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. As defined in § 257.53, an unstable area means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.

The AP3 Landfill and Monofill CCR unit is located in Bibb County approximately six miles northwest of Macon, Georgia. A review of the site geology, hydrogeology, and information available of onsite surface and subsurface conditions confirmed that the CCR unit is not located within an unstable area having subsurface soil conditions, onsite geologic or geomorphologic features, and/or on-site human-made features or events (both surface and subsurface) that may result in significant differential settling of the foundation of the CCR unit.

I hereby certify, to the best of my knowledge and based on the information presented in the CCR Unit Solid Waste Handling Permit Application dated November 2018, that for Georgia Power's former Plant Arkwright – AP3 Landfill and Monofill, the unstable areas location restriction demonstration meets the requirements of 391-3-4-.10(9)(c)3.(i).

11-14-18

Michael T. Feeney, P.E.
Licensed State of Georgia, PE No. 14390

11/14/18

Bret McClellan, P.G.
Licensed State of Georgia, PG No. 1540

Appendix B. **Piezocone Penetration Testing**

FUGRO USA LAND, INC.
6105 Rookin Street
Houston, Texas 77074
T +1 713 346-4000
F +1 713 346-4200

November 20, 2017
Report Number 04.19170066

Jacobs
600 William Northern Boulevard
Tullahoma, TN 37388

Attn.: Mr. Russ Parker

REPORT FOR
PIEZOCONE PENETRATION TESTING AND RELATED SERVICES
CONFIDENTIAL SITE
MACON, GEORGIA
JACOBS PROJECT # 35DK9201.5000

Dear Mr. Parker:

Introduction

Fugro is pleased to present data report for Piezocone Penetration Testing and Related Services performed at the above-referenced site. This report contains the scope of services performed and the test results.

Scope of Services

We performed thirty-eight (38) Piezocone Penetration Tests (PCPT) to depths ranging from 17-ft to 70-ft below ground surface each. All PCPT sounding locations were grouted after the completion of the soundings.

Please Note: At client request, the CPT-09SL was not performed in accordance with ASTM D5778-12, pushed at a speed of 0.1 to 0.2cm/second approximately.

PCPT Testing

The PCPT soundings were conducted in general accordance with ASTM D5778-12, *Electronic Friction Cone and Piezocone Penetration Testing of Soils* using a 25-ton truck mounted CPT unit. The in-situ soil data was obtained by hydraulically advancing a cylindrical steel rod, with an instrumented probe at the base, vertically into the subsurface materials at a constant rate of 2 centimeters per second. The instrumented probe consists of a cone-shaped tip element, with an apex angle of 60 degrees with a base area of 15 square centimeters (cm^2), a cylindrical-shaped side friction with a surface area of 200 cm^2. Measurements of penetration resistance at the cone tip (q_c), frictional resistance along the friction sleeve (f_s), and pore water pressure (u_2), were recorded with depth during penetration. PCPT sounding measurements collected for this project are presented on the logs attached at the end of this report.

PCPT methods test the soil *in situ* and soil samples are not obtained. There are several methods to identify the soil type using the PCPT data collected. For your reference, we have presented soil stratigraphy using the attached *Campanella and Robertson's Simplified Soil Behavior Chart (12-zone, 1986)*.

Please note that because of the empirical nature of the soil behavior chart, the soil identification should be verified locally from soil borings and laboratory testing. Some soils, such as cemented or calcareous soils, or glacial tills are outside the limits of the soil behavior chart

Closing
Fugro appreciates the opportunity to be of service to you. If you have any questions, please feel free to contact me at 713-369-5427.

Best Regards,

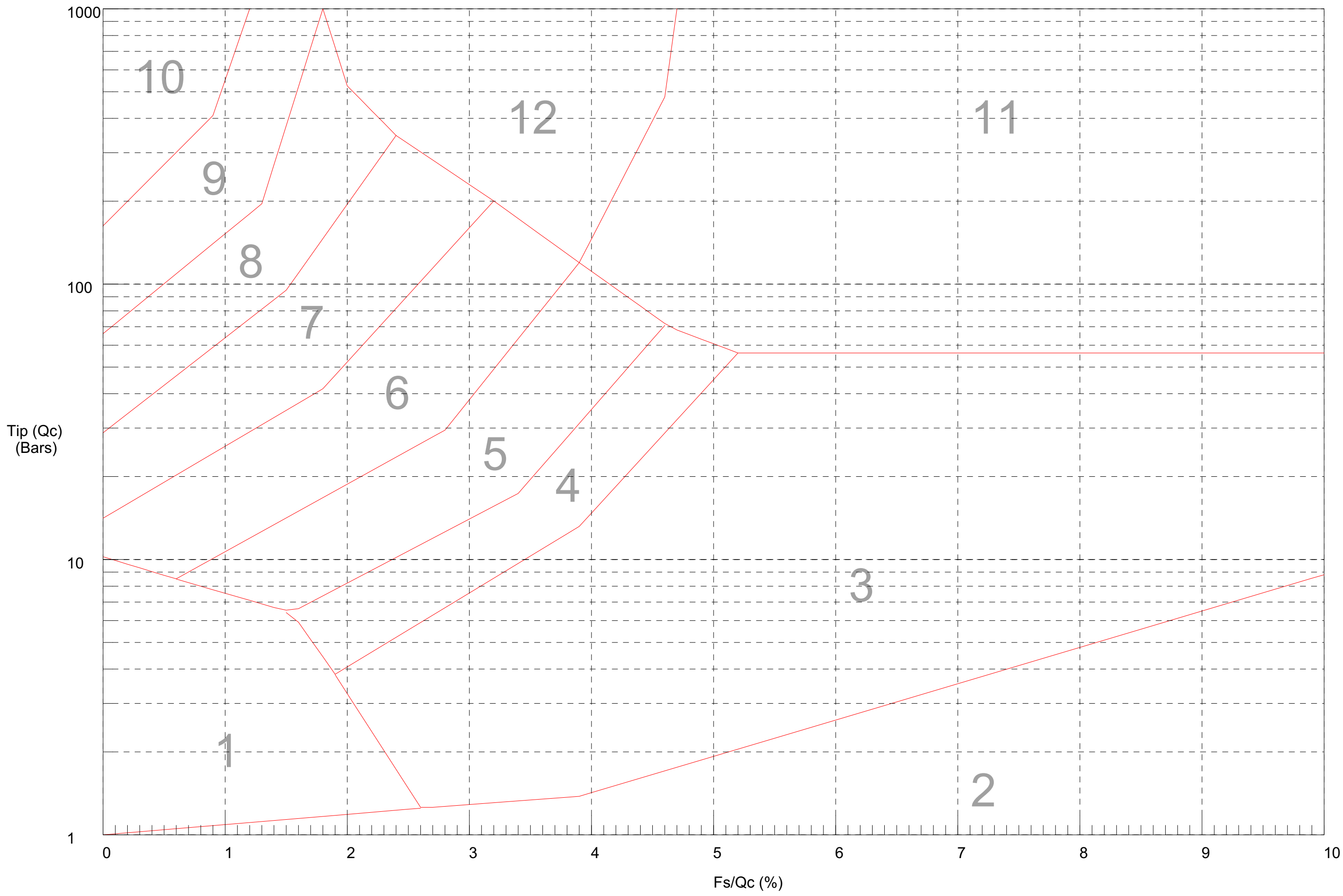
Jose Aramburu, P.E.
Exploration Division Manager

JA/am

Attachments: *Campanella and Robertson's Simplified Soil Behavior Chart* (1 page)
PCPT Sounding Logs (41 pages)
Thirty-seven (37) Electronic Data Files

12 Zone Soil Behavior Chart

Classification Data:
Robertson and Campanella UBC-1986



1 sensitive fine grained
2 organic material
3 clay

4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt

7 silty sand to sandy silt
8 sand to silty sand
9 sand

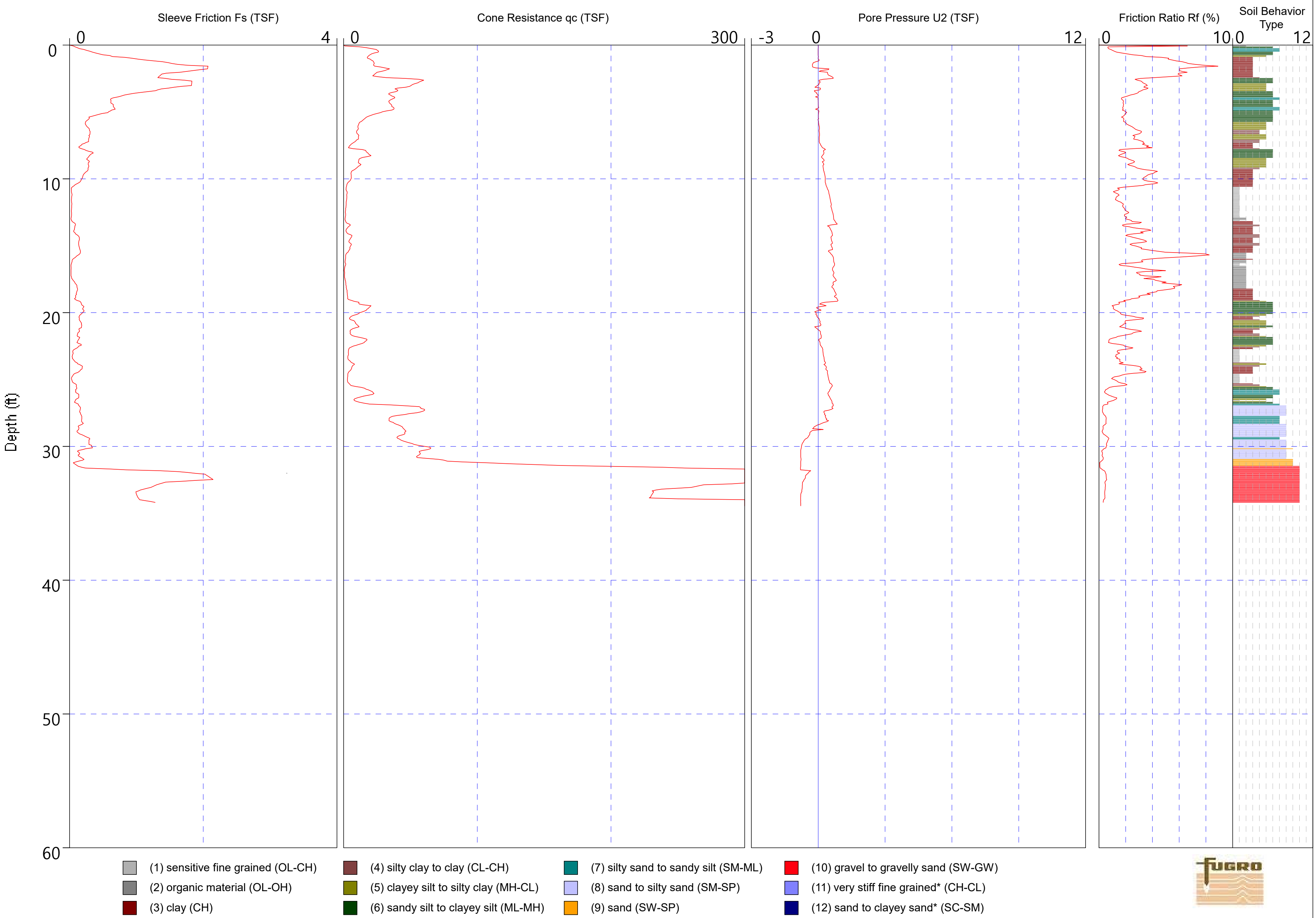
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

* Overconsolidated or cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-01
Date: 30-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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Elevation: 0.00

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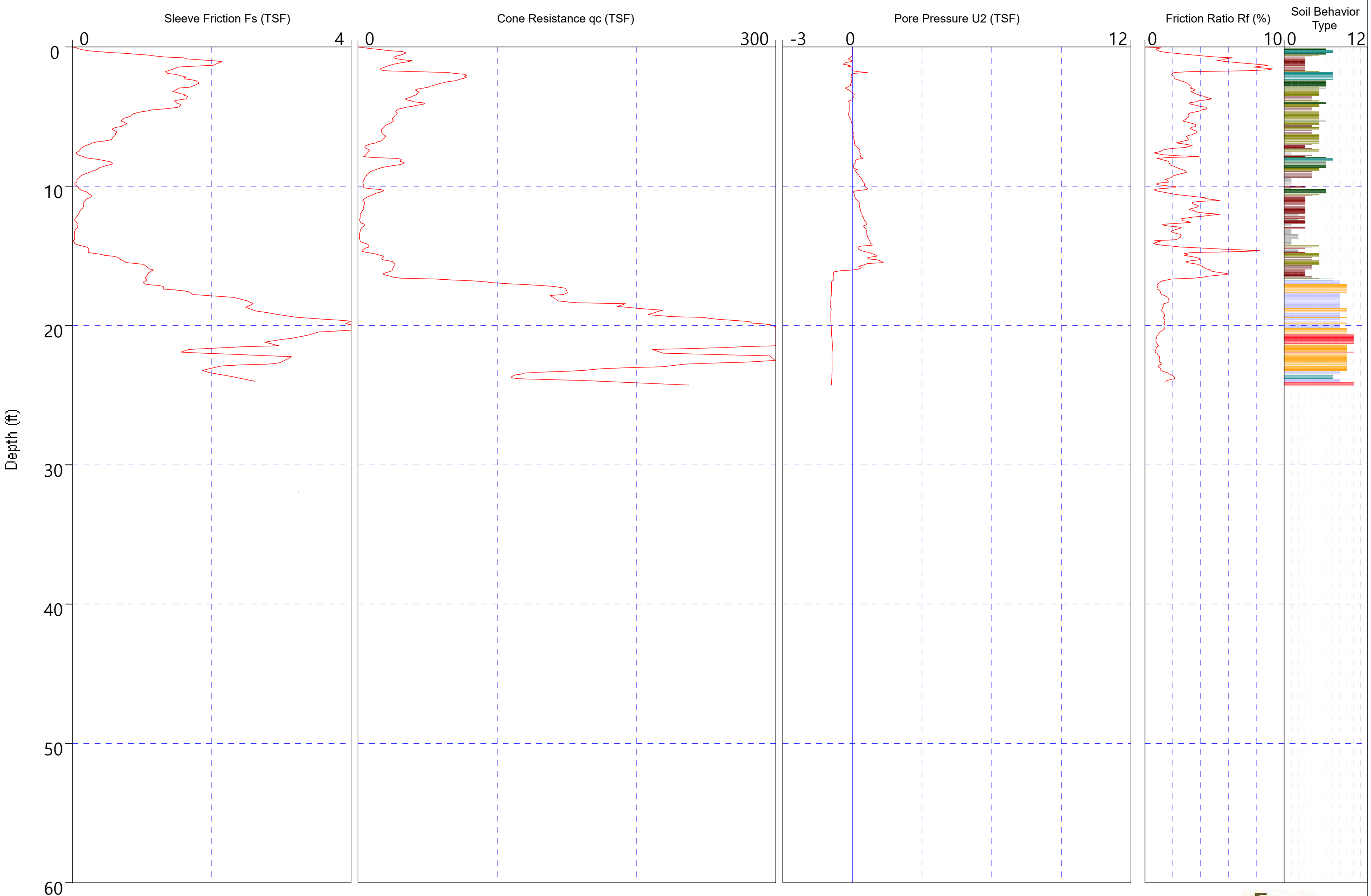
Cone Number: CP15-CF75PB7SN2-P1E1 2874



🟫 (1) sensitive fine grained (OL-CH)
🟫 (2) organic material (OL-OH)
🟥 (3) clay (CH)
🟫 (4) silty clay to clay (CL-CH)
🟩 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)
🟦 (7) silty sand to sandy silt (SM-ML)
🟪 (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)
🟥 (10) gravel to gravelly sand (SW-GW)
🟦 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-03
Date: 30-Oct-2017
Elevation: 0.00

Coordinates:
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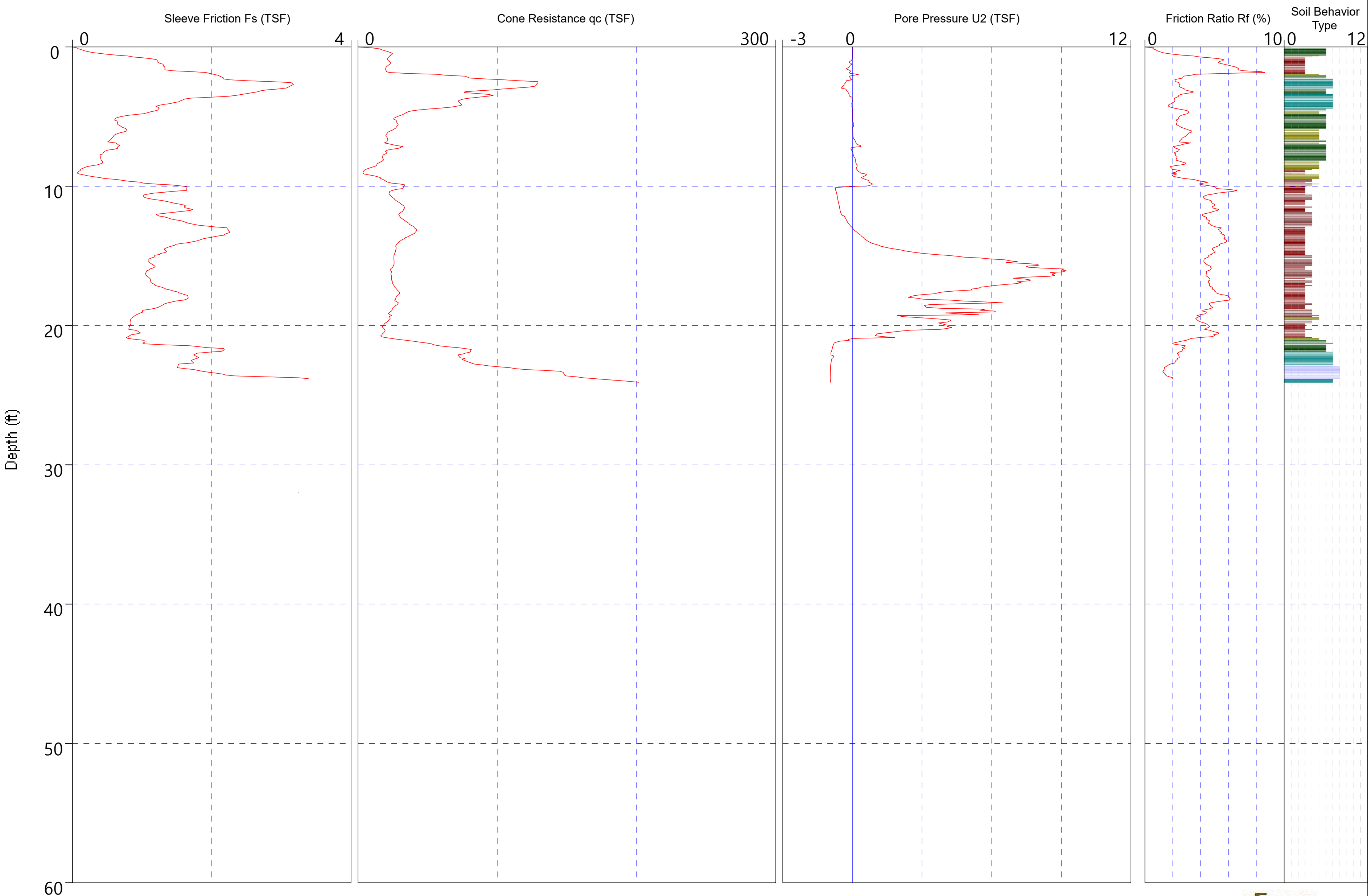

- ⬜ (1) sensitive fine grained (OL-CH)
- ⬜ (2) organic material (OL-OH)
- 🟥 (3) clay (CH)
- 🟫 (4) silty clay to clay (CL-CH)
- 🟨 (5) clayey silt to silty clay (MH-CL)
- 🟩 (6) sandy silt to clayey silt (ML-MH)
- 🟦 (7) silty sand to sandy silt (SM-ML)
- 🟪 (8) sand to silty sand (SM-SP)
- 🟧 (9) sand (SW-SP)
- 🟥 (10) gravel to gravelly sand (SW-GW)
- 🟦 (11) very stiff fine grained* (CH-CL)
- 🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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Date: 30-Oct-2017
Elevation: 0.00

Coordinates:
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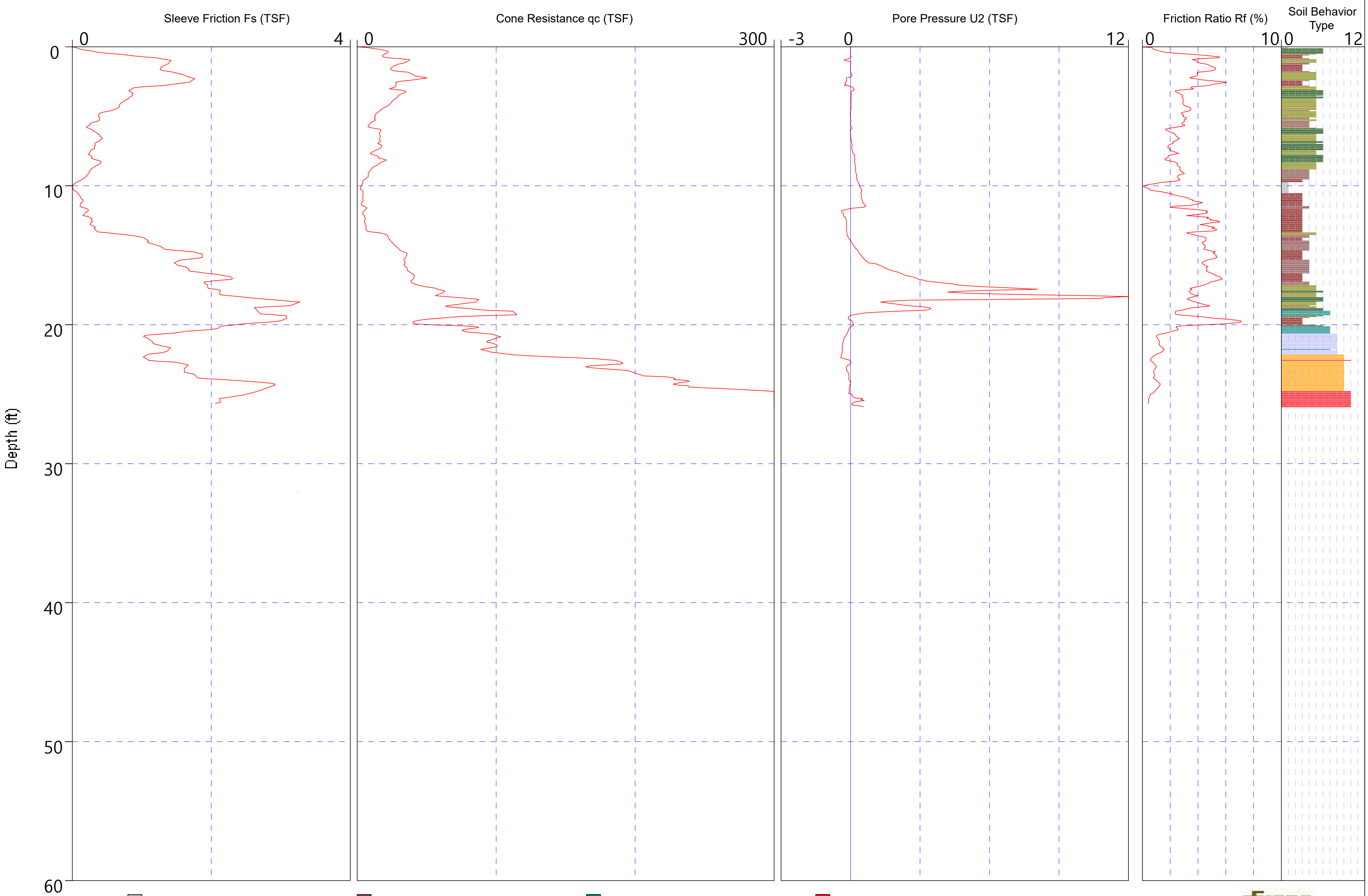

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■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

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Date: 25-Oct-2017
Elevation: 0.00

Coordinates:
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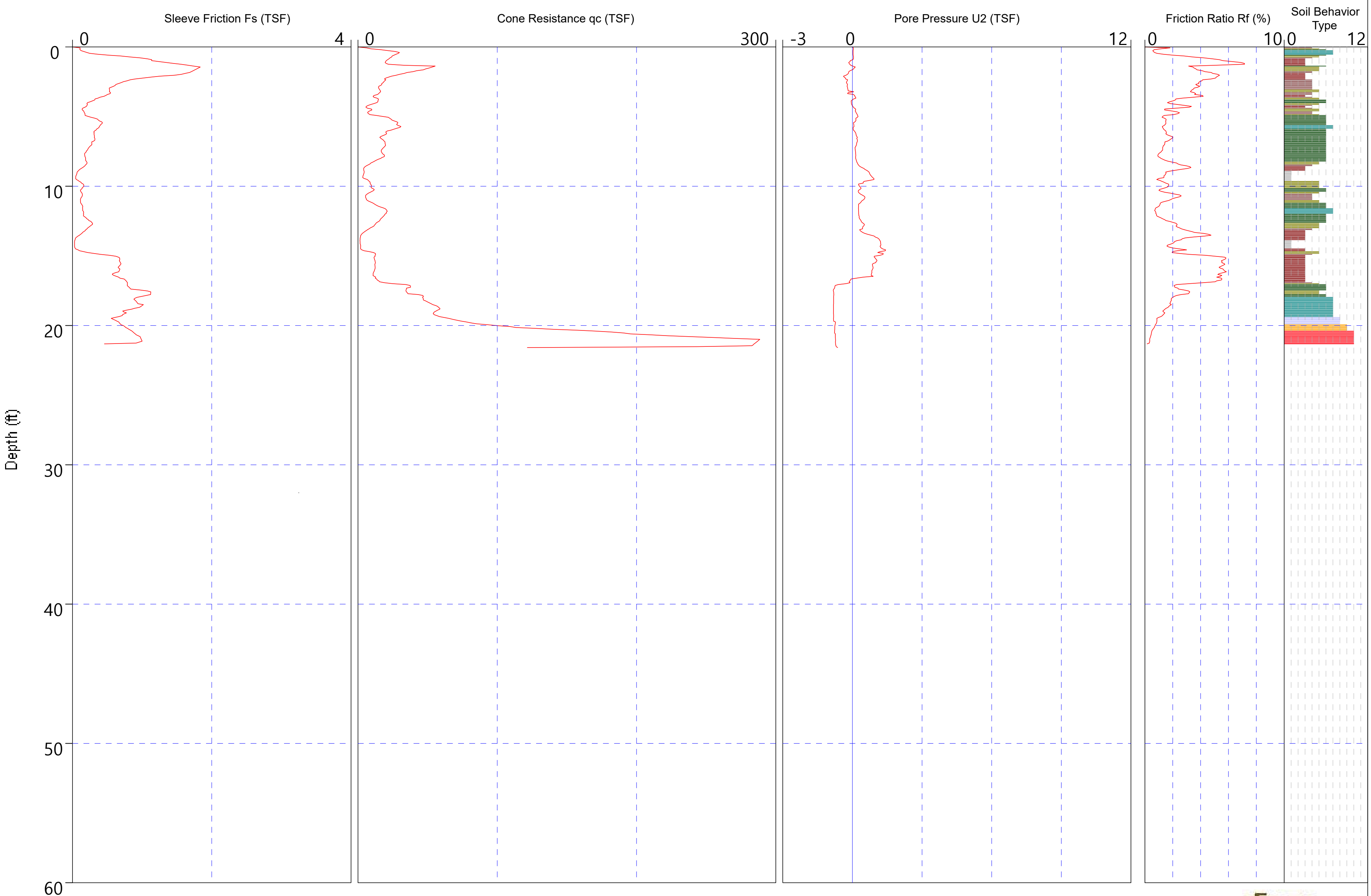

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■ (2) organic material (OL-OH)
■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 1

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

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Date: 25-Oct-2017
Elevation: 0.00

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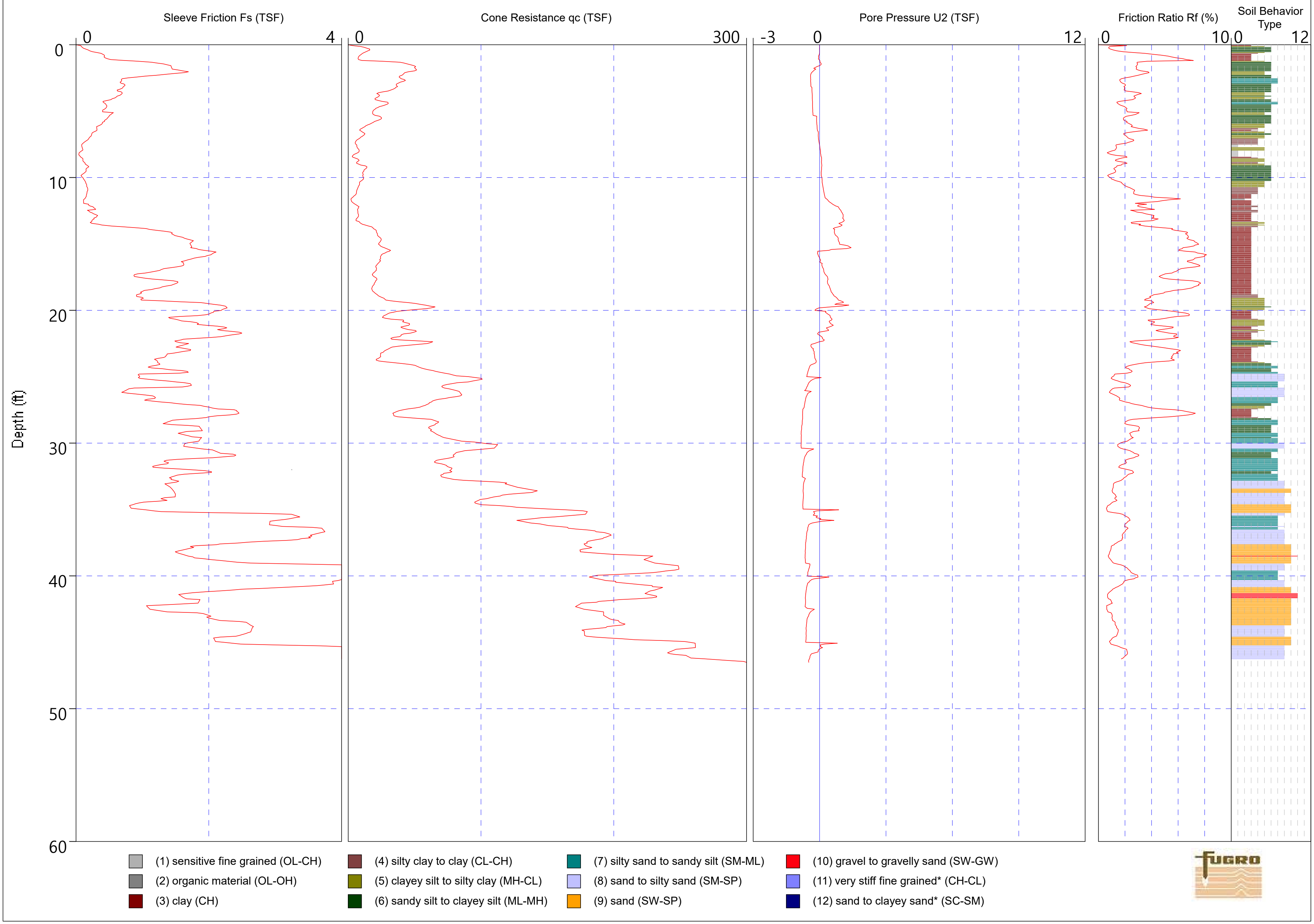

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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Elevation: 0.00

Coordinates:
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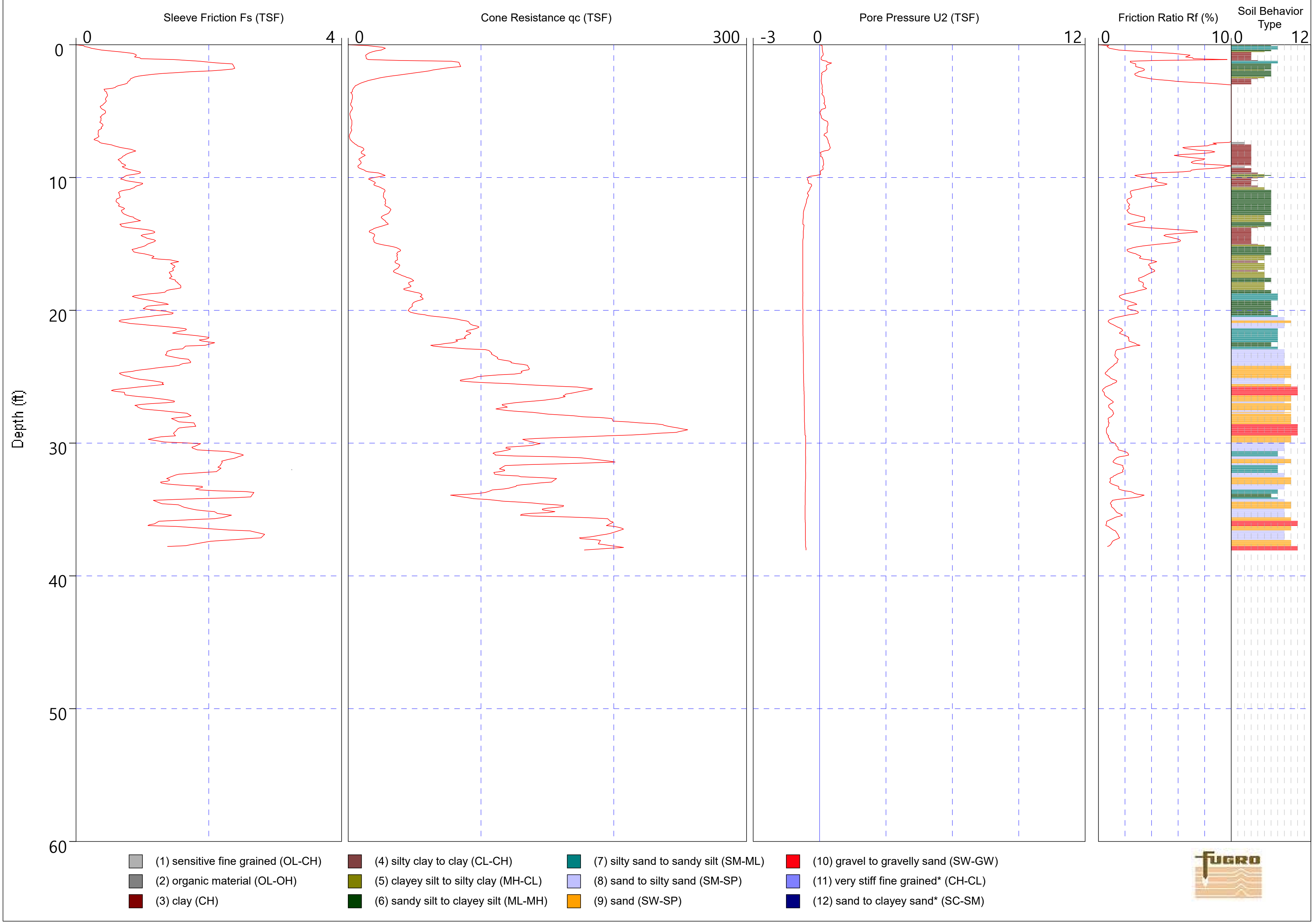

Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 1

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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Elevation: 0.00

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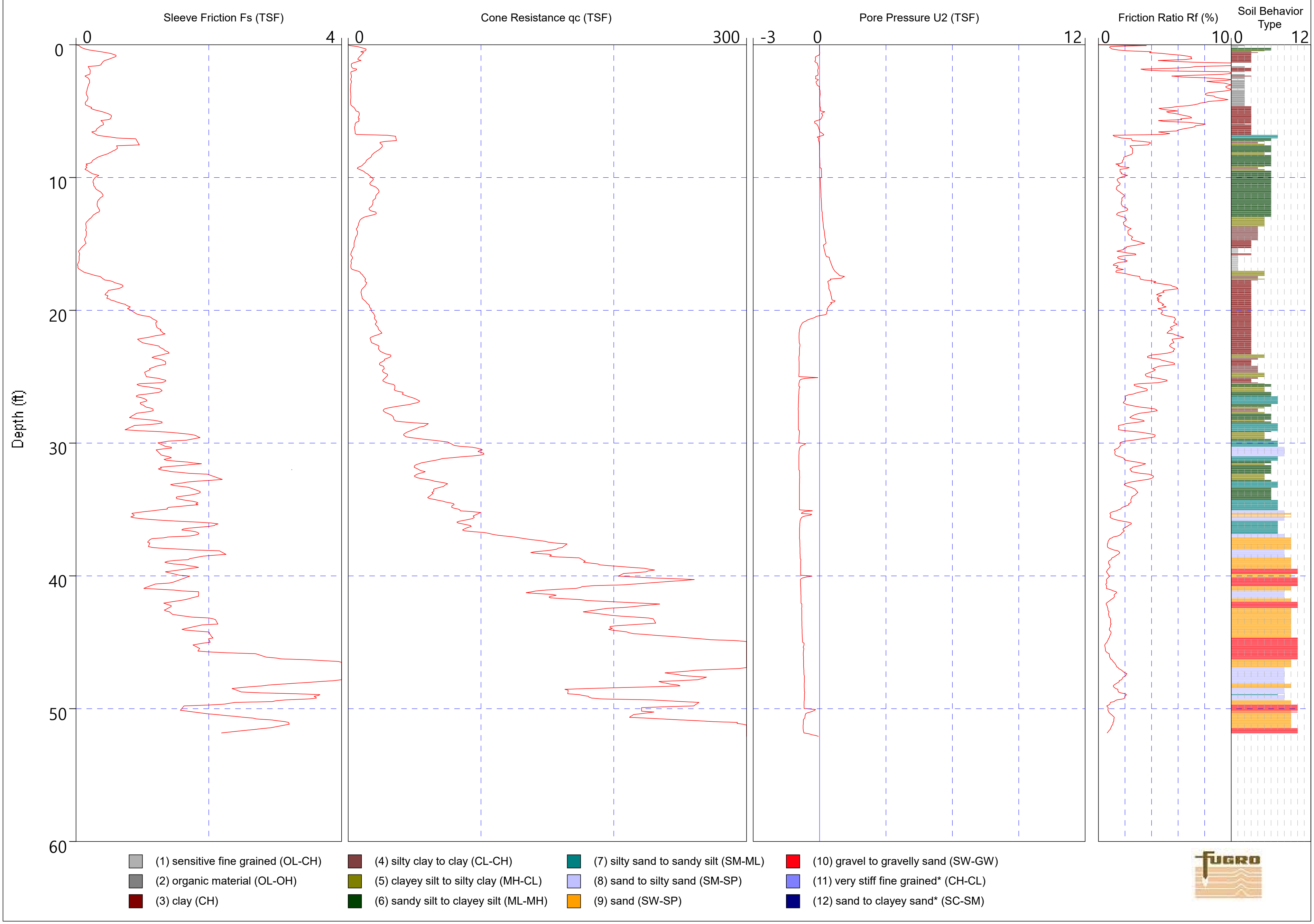

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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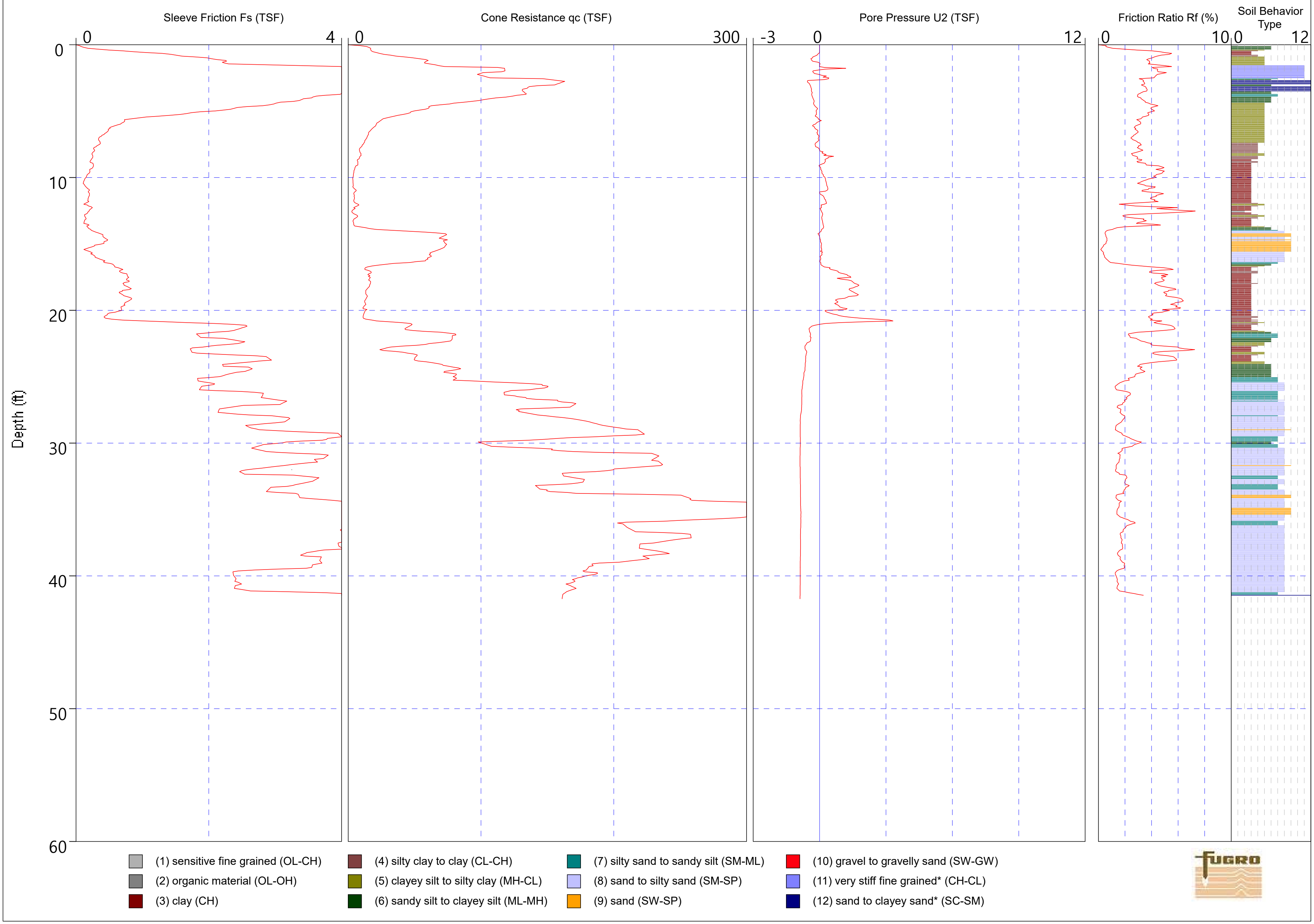
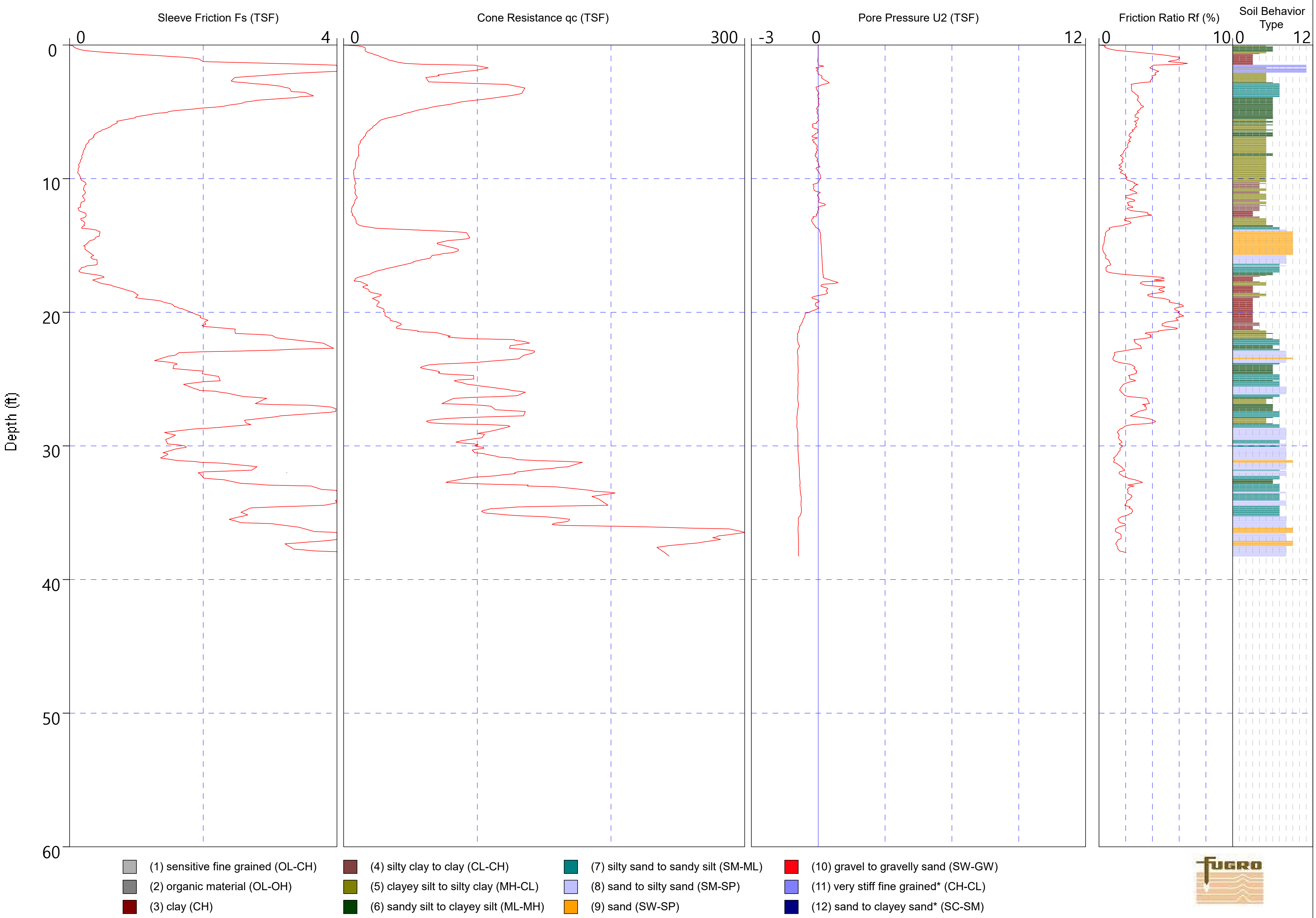


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-09SL
Date: 31-Oct-2017
Elevation: 0.00

Note: NOT IN COMPLIANCE WITH ASTM D5778-12
Cone Number: CP15-CF75PB7SN2-P1E1 2874



Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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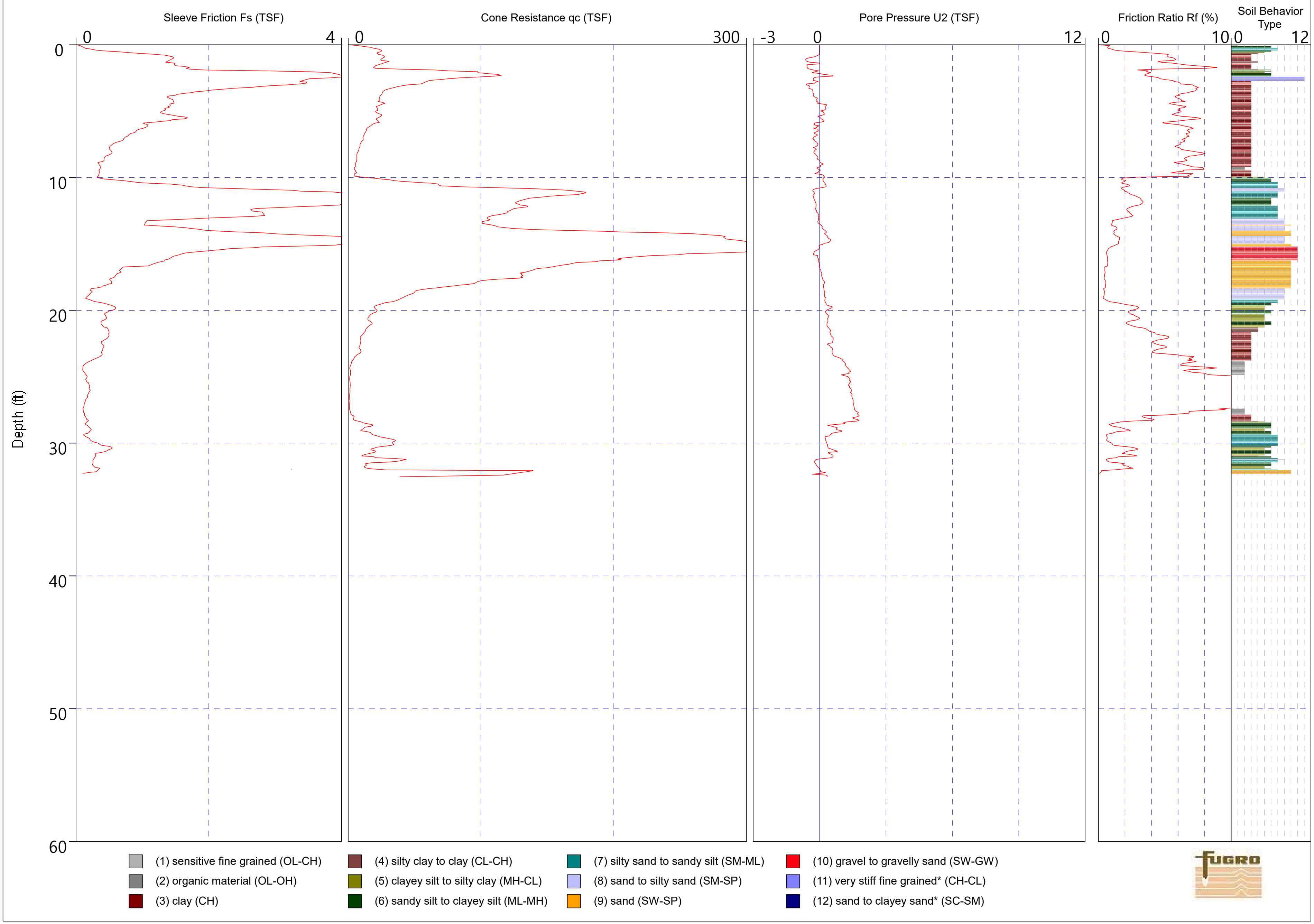

Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 1

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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Date: 30-Oct-2017
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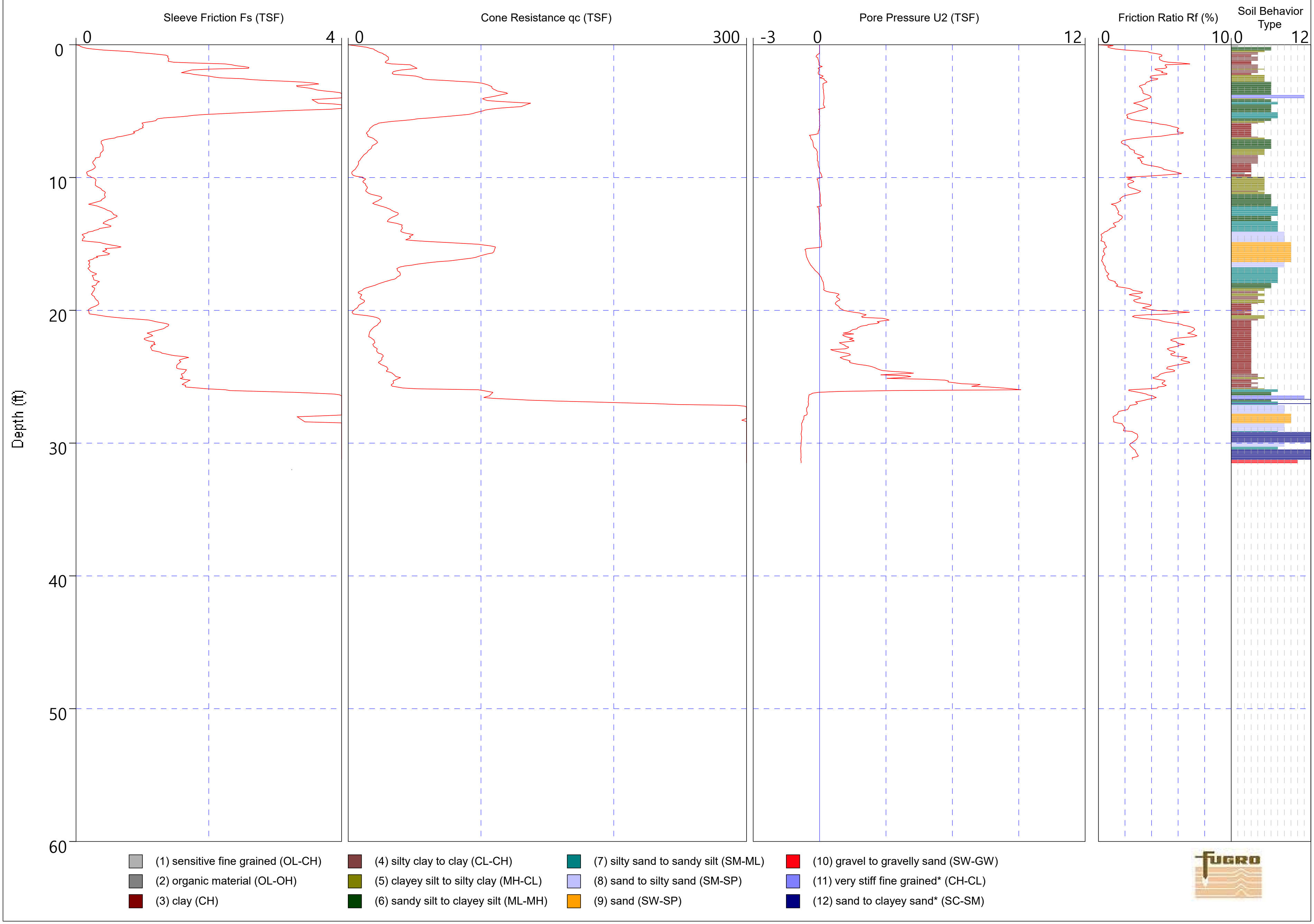

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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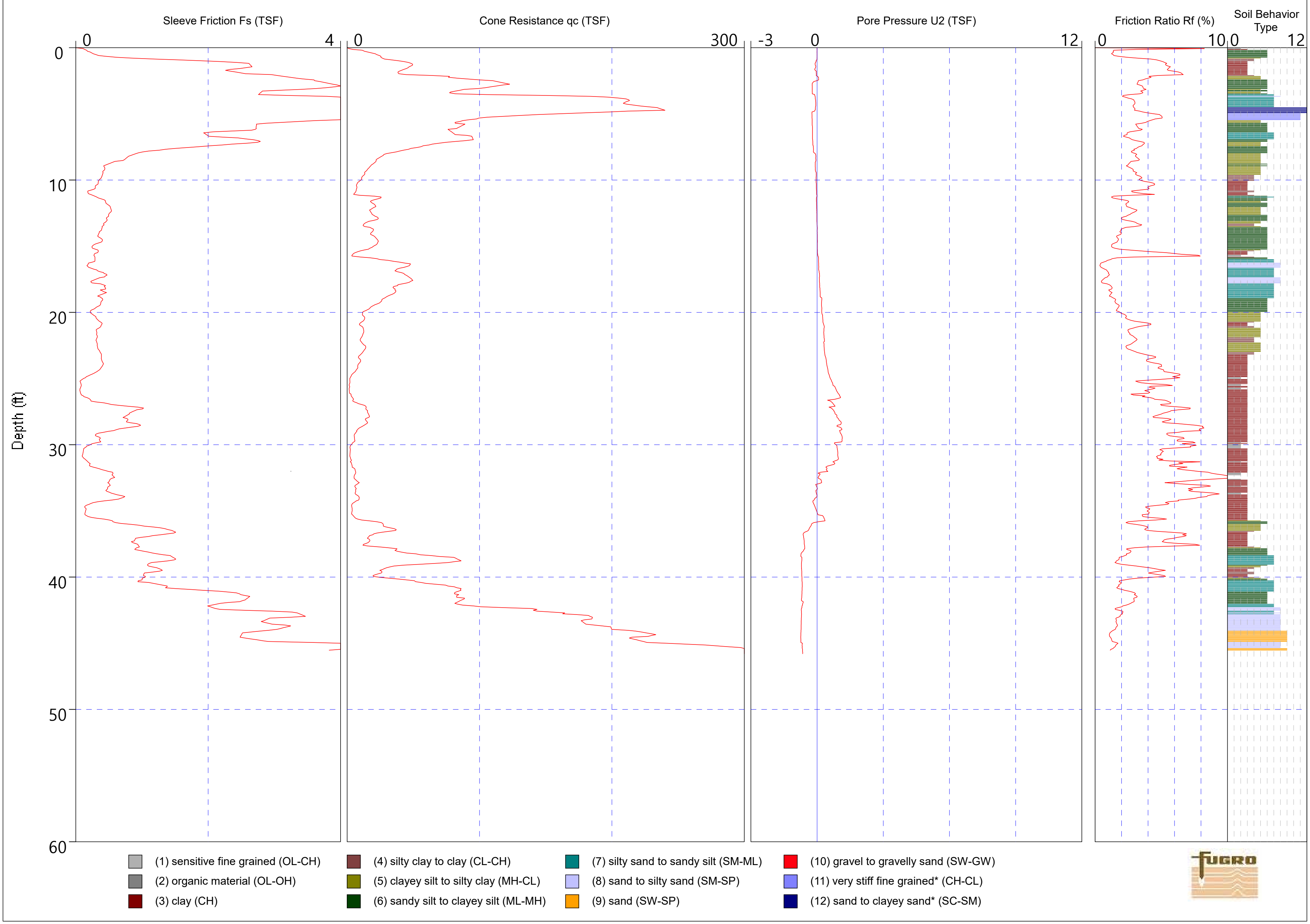

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Page 1 of 1

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

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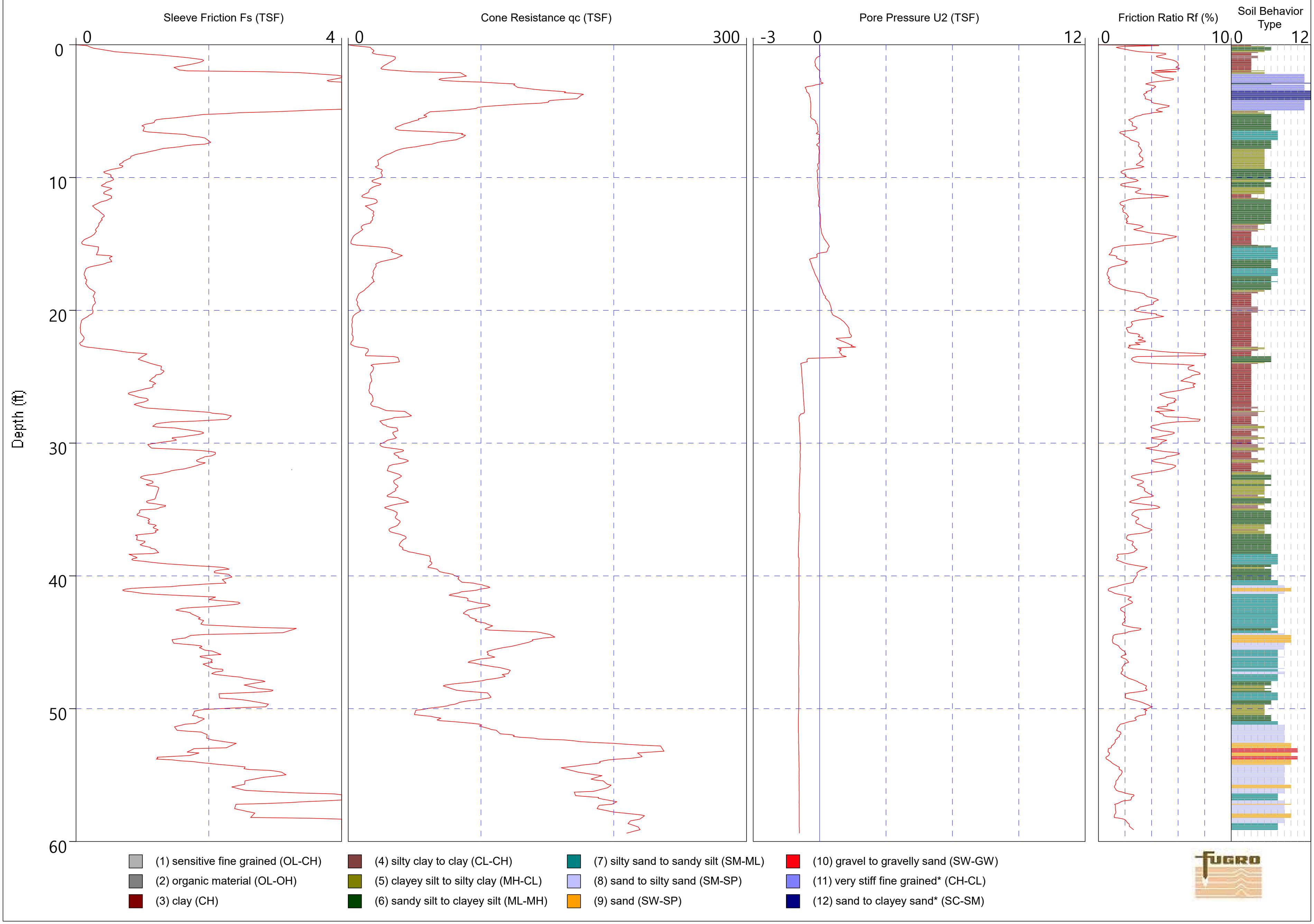

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Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

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Date: 25-Oct-2017
Elevation: 0.00

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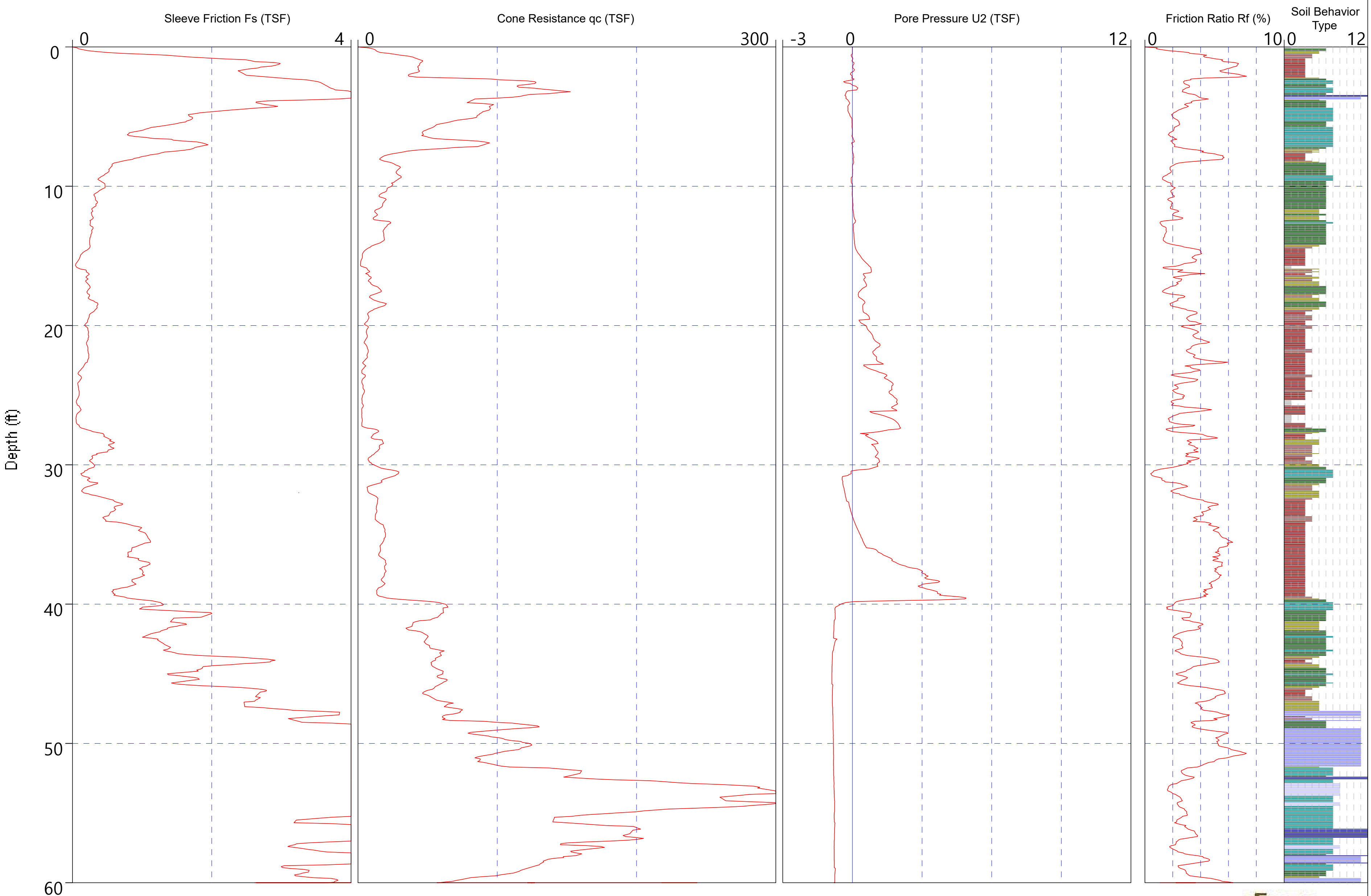

■ (1) sensitive fine grained (OL-CH)
■ (2) organic material (OL-OH)
■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-14
Date: 25-Oct-2017
Elevation: 0.00

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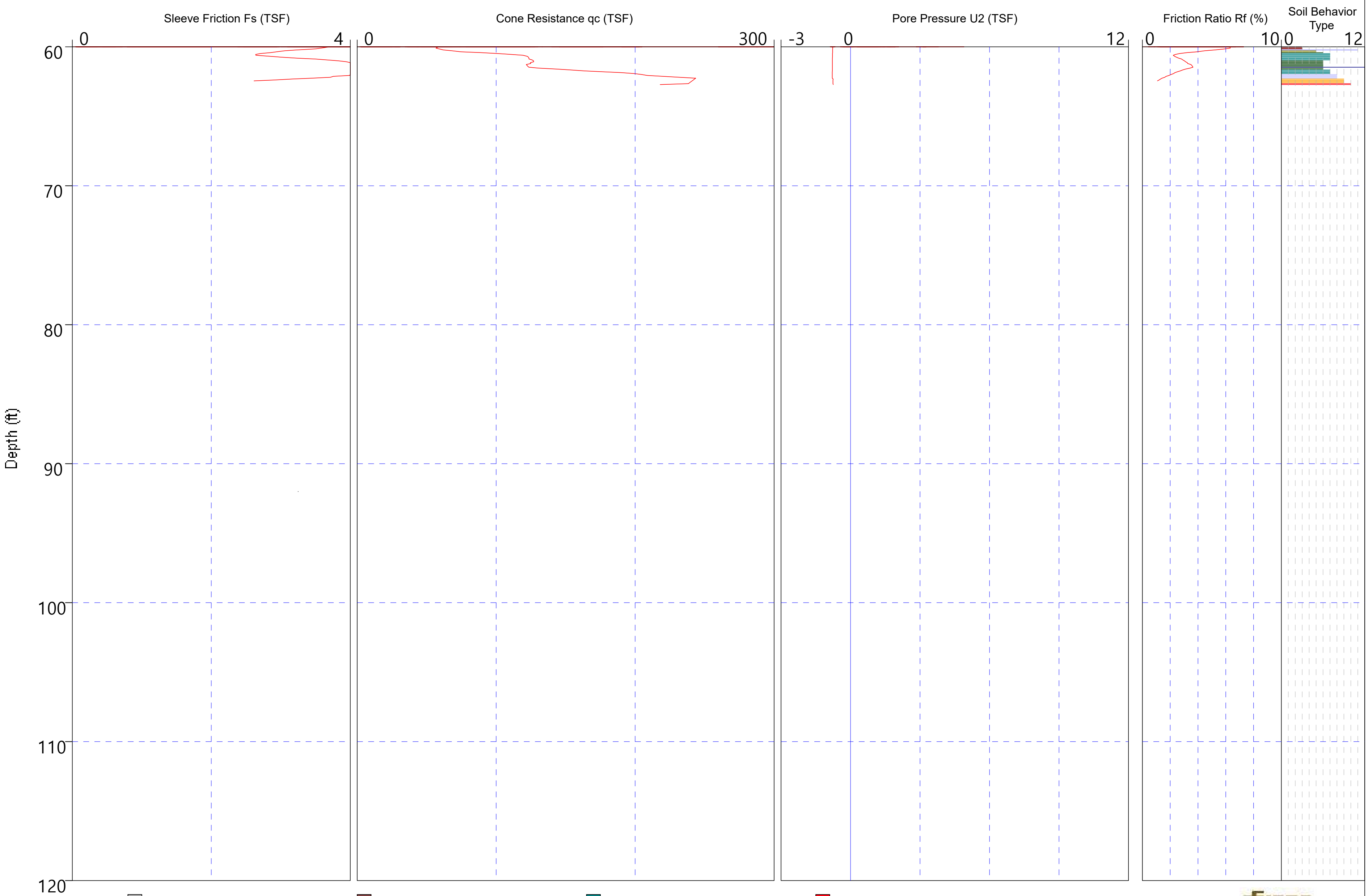


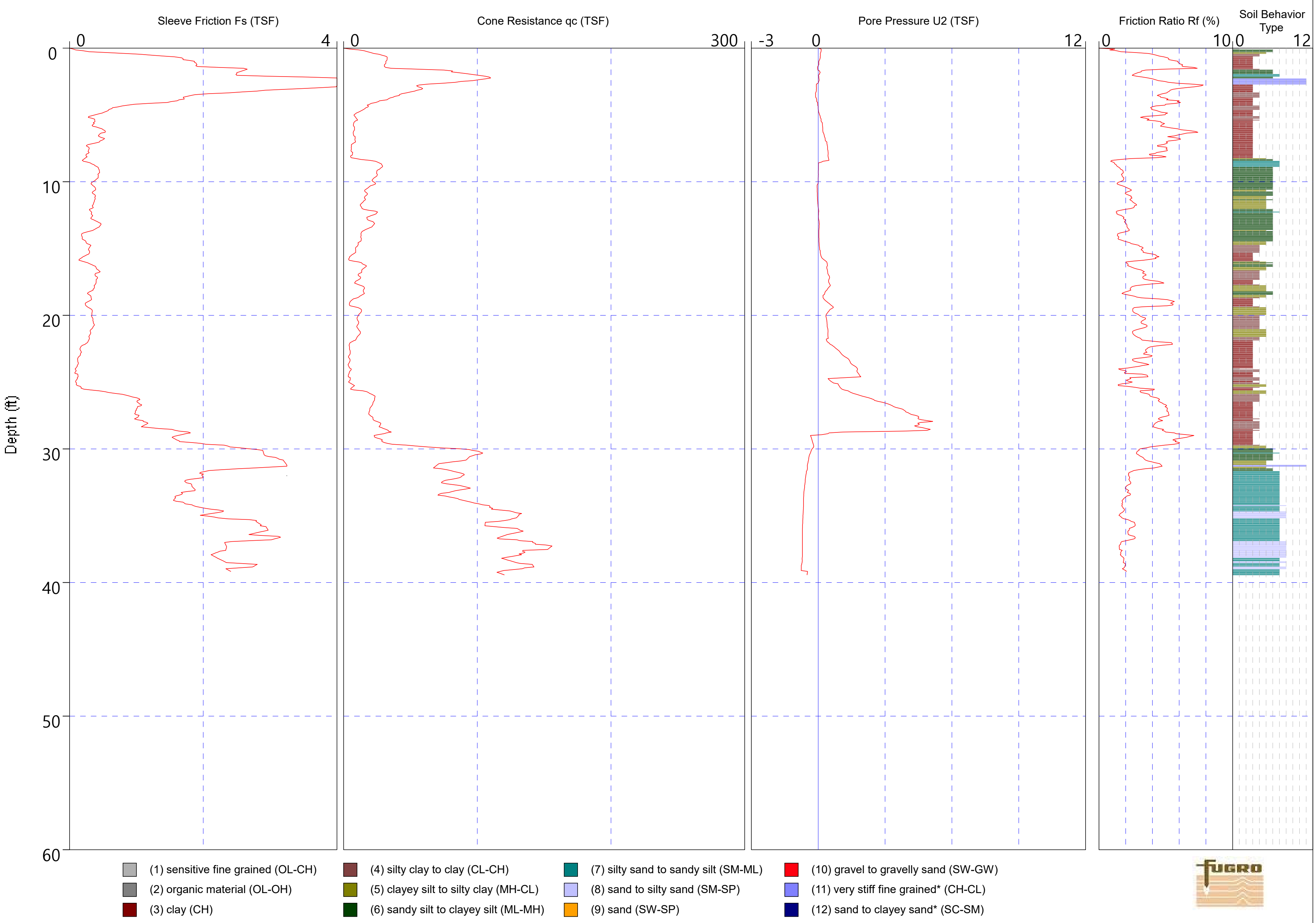
- ■ (1) sensitive fine grained (OL-CH)
- ■ (2) organic material (OL-OH)
- ■ (3) clay (CH)
- ■ (4) silty clay to clay (CL-CH)
- ■ (5) clayey silt to silty clay (MH-CL)
- ■ (6) sandy silt to clayey silt (ML-MH)
- ■ (7) silty sand to sandy silt (SM-ML)
- ■ (8) sand to silty sand (SM-SP)
- ■ (9) sand (SW-SP)
- ■ (10) gravel to gravelly sand (SW-GW)
- ■ (11) very stiff fine grained* (CH-CL)
- ■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

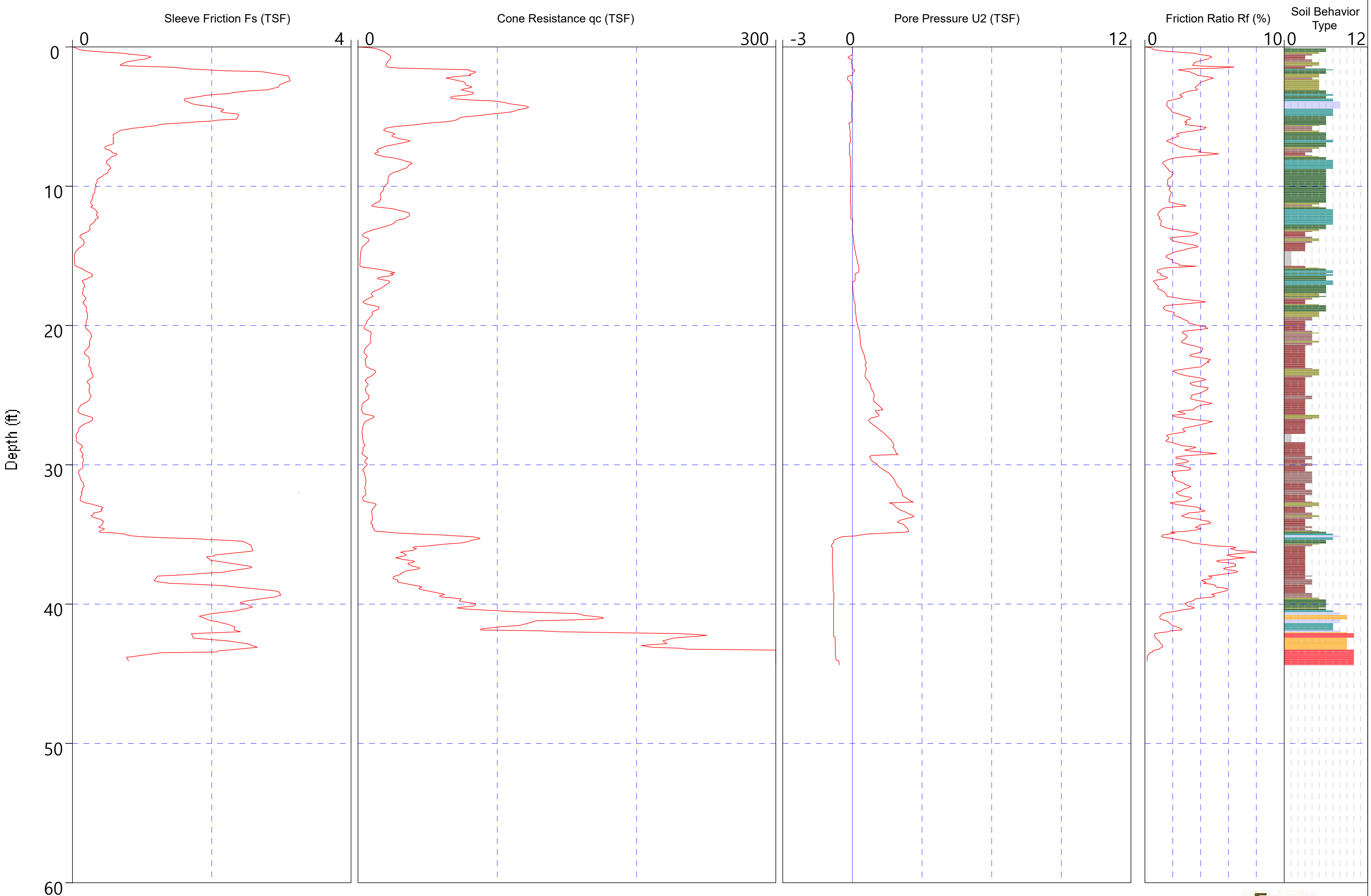
CPT Number: CPT-15
Date: 27-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



Robertson et al. 1986 *Overconsolidated or Cemented

Job Number:	04.19170066	**CPT Number:**	CPT-16	**Coordinates:**	
Operator:	Cesar Guzman	**Date:**	25-Oct-2017	**Cone Number:**	CP15-CF75PB7SN2-P1E1 1473
Location:	Macon, GA	**Elevation:**	0.00		



- 🟥 (1) sensitive fine grained (OL-CH)
- 🟥 (2) organic material (OL-OH)
- 🟥 (3) clay (CH)
- 🟥 (4) silty clay to clay (CL-CH)
- 🟩 (5) clayey silt to silty clay (MH-CL)
- 🟩 (6) sandy silt to clayey silt (ML-MH)
- 🟩 (7) silty sand to sandy silt (SM-ML)
- 🟦 (8) sand to silty sand (SM-SP)
- 🟧 (9) sand (SW-SP)
- 🟥 (10) gravel to gravelly sand (SW-GW)
- 🟦 (11) very stiff fine grained* (CH-CL)
- 🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

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Date: 27-Oct-2017
Elevation: 0.00

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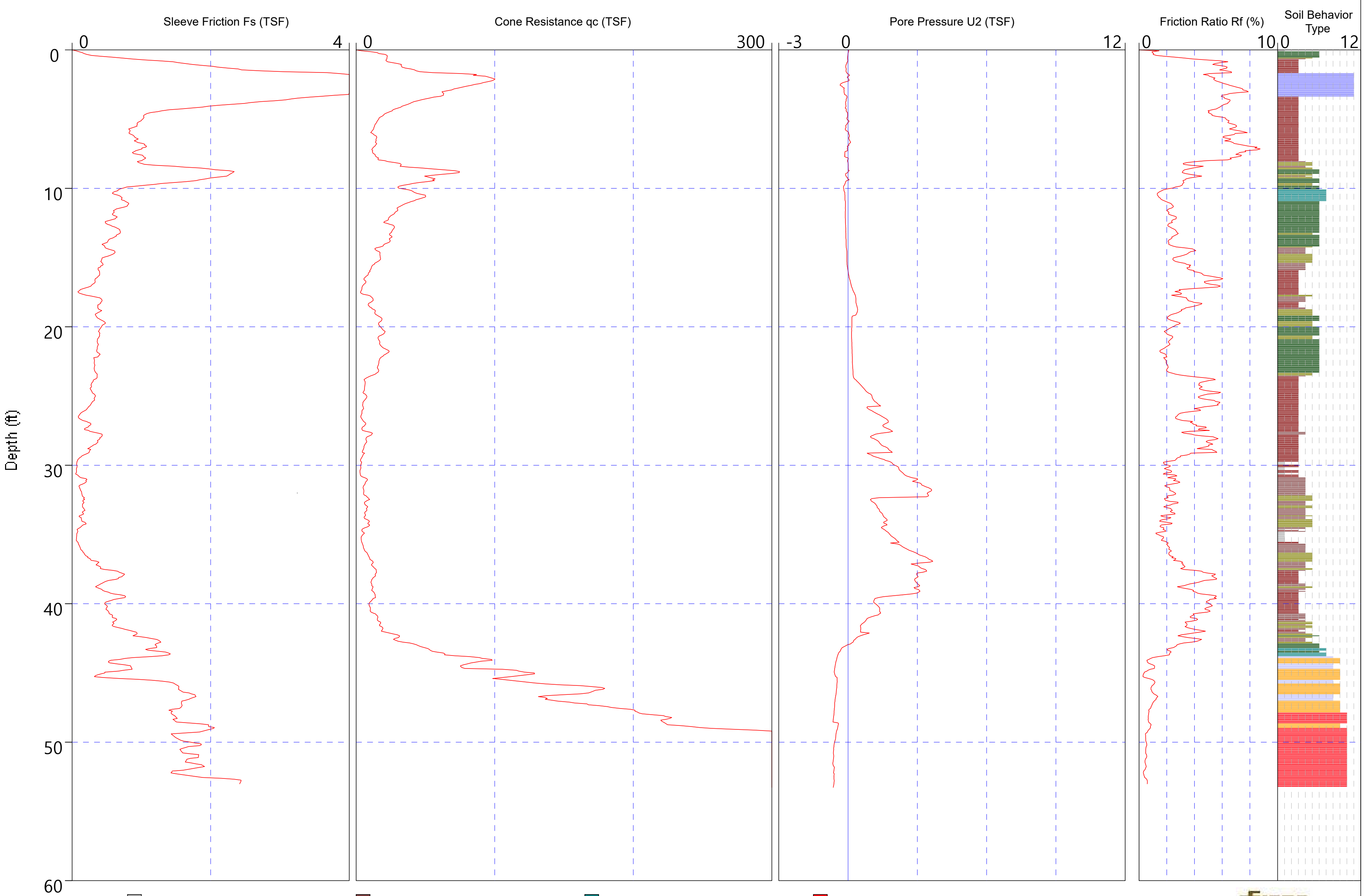

- ■ (1) sensitive fine grained (OL-CH)
- ■ (2) organic material (OL-OH)
- ■ (3) clay (CH)
- ■ (4) silty clay to clay (CL-CH)
- ■ (5) clayey silt to silty clay (MH-CL)
- ■ (6) sandy silt to clayey silt (ML-MH)
- ■ (7) silty sand to sandy silt (SM-ML)
- ■ (8) sand to silty sand (SM-SP)
- ■ (9) sand (SW-SP)
- ■ (10) gravel to gravelly sand (SW-GW)
- ■ (11) very stiff fine grained* (CH-CL)
- ■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 1

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-18A
Date: 25-Oct-2017
Elevation: 0.00

Coordinates:
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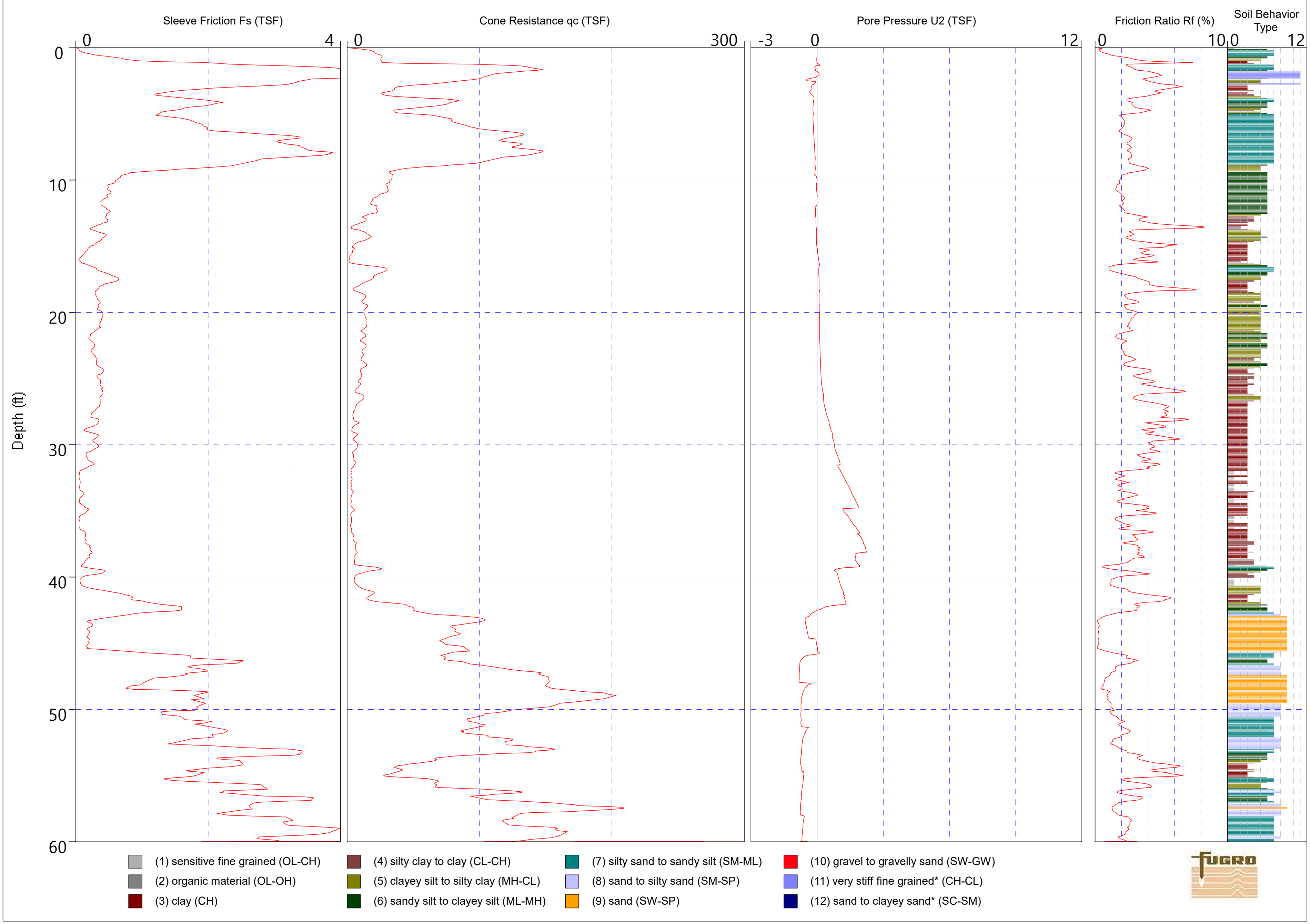
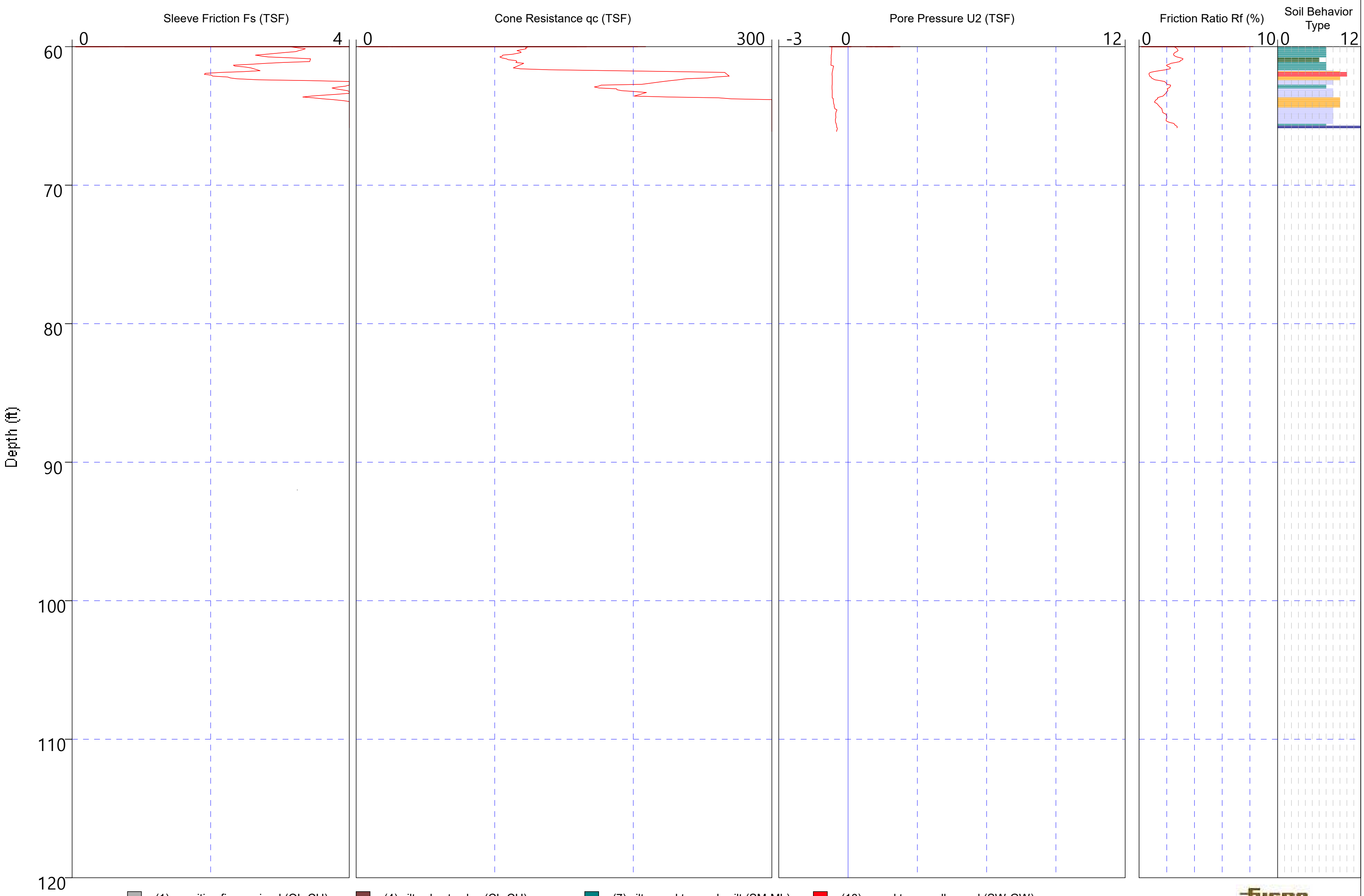


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-18A
Date: 25-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



▨ (1) sensitive fine grained (OL-CH)	▨ (4) silty clay to clay (CL-CH)	▨ (7) silty sand to sandy silt (SM-ML)	🟥 (10) gravel to gravelly sand (SW-GW)
▨ (2) organic material (OL-OH)	▨ (5) clayey silt to silty clay (MH-CL)	▨ (8) sand to silty sand (SM-SP)	▨ (11) very stiff fine grained* (CH-CL)
▨ (3) clay (CH)	🟩 (6) sandy silt to clayey silt (ML-MH)	🟧 (9) sand (SW-SP)	▨ (12) sand to clayey sand* (SC-SM)

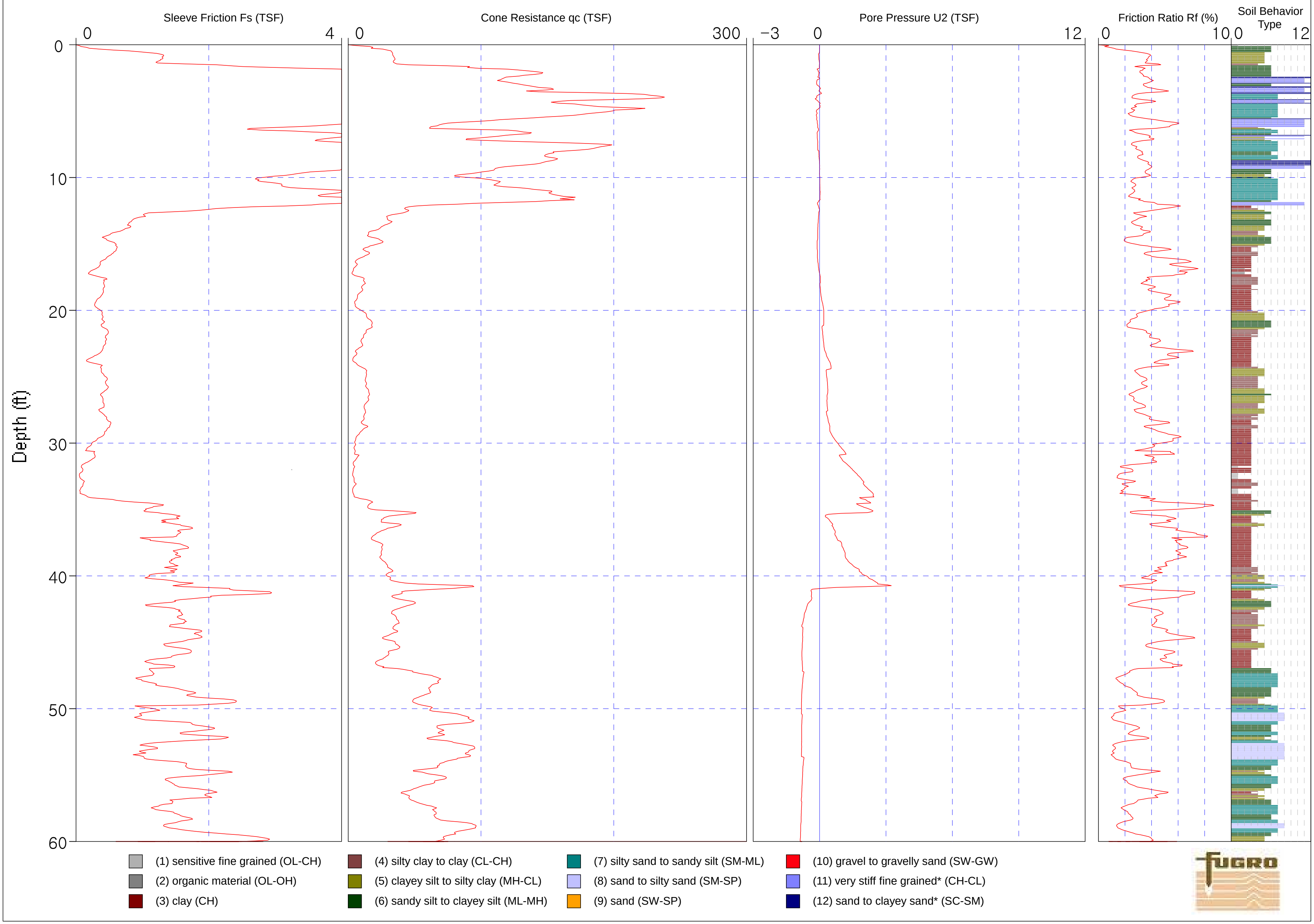
Robertson et al. 1986 *Overconsolidated or Cemented

Page 2 of 2

Job Number: 041917-0066
Operator: Cesar Guzman
Location: Macon,Ga

CPT Number: 19
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

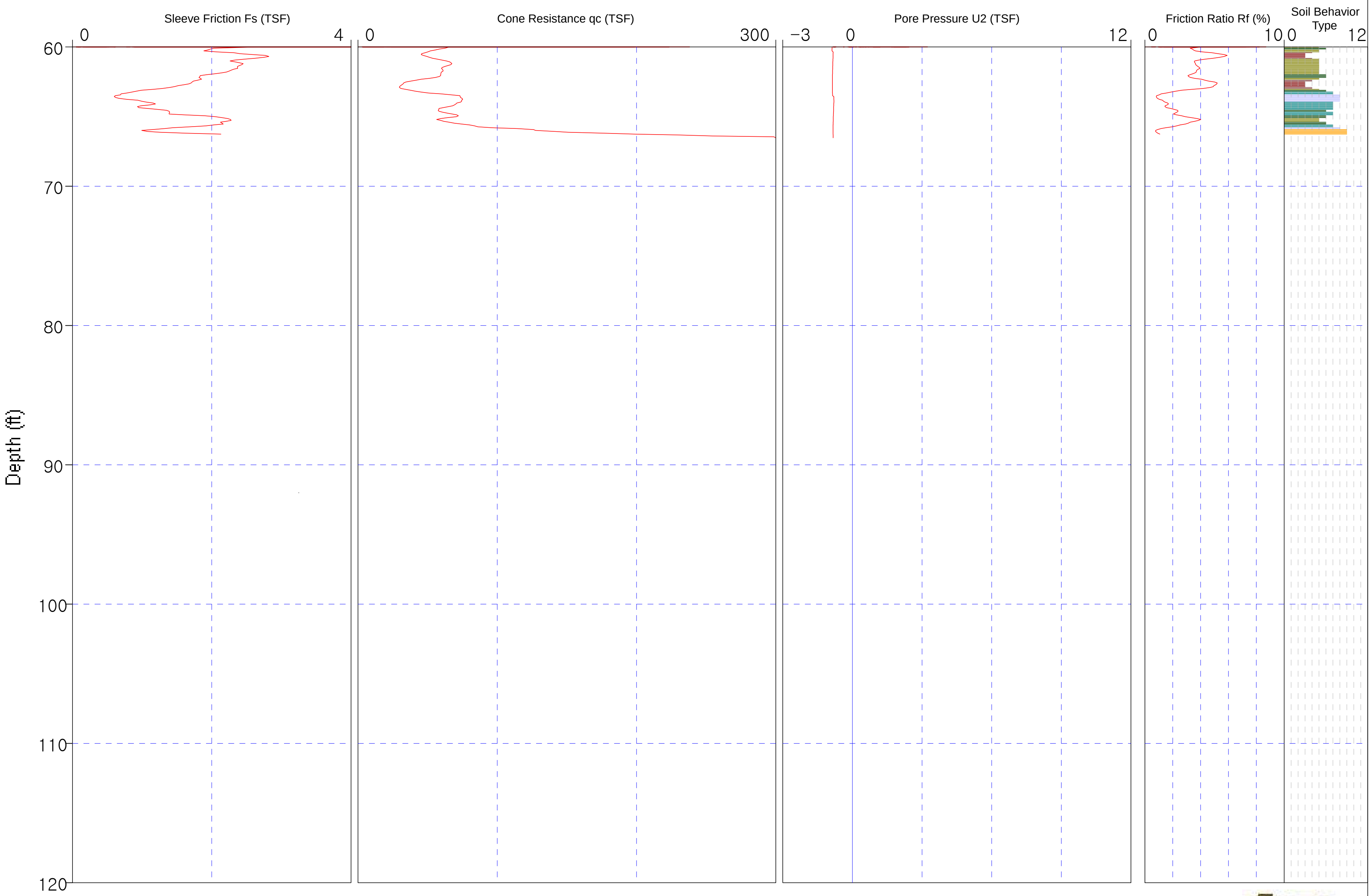


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 041917-0066
Operator: Cesar Guzman
Location: Macon,Ga

CPT Number: 19
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



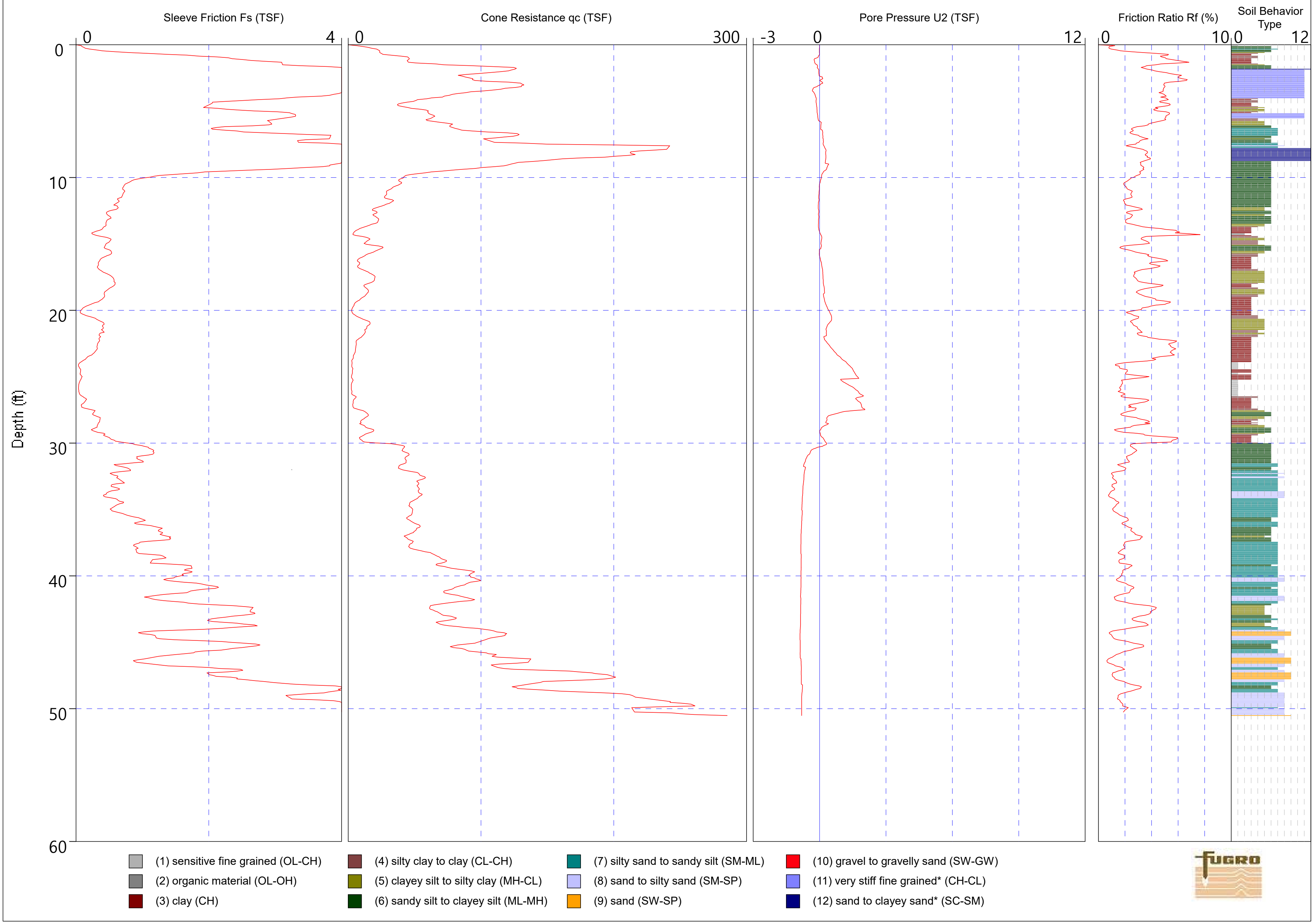
■ (1) sensitive fine grained (OL-CH)
■ (2) organic material (OL-OH)
■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-20
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

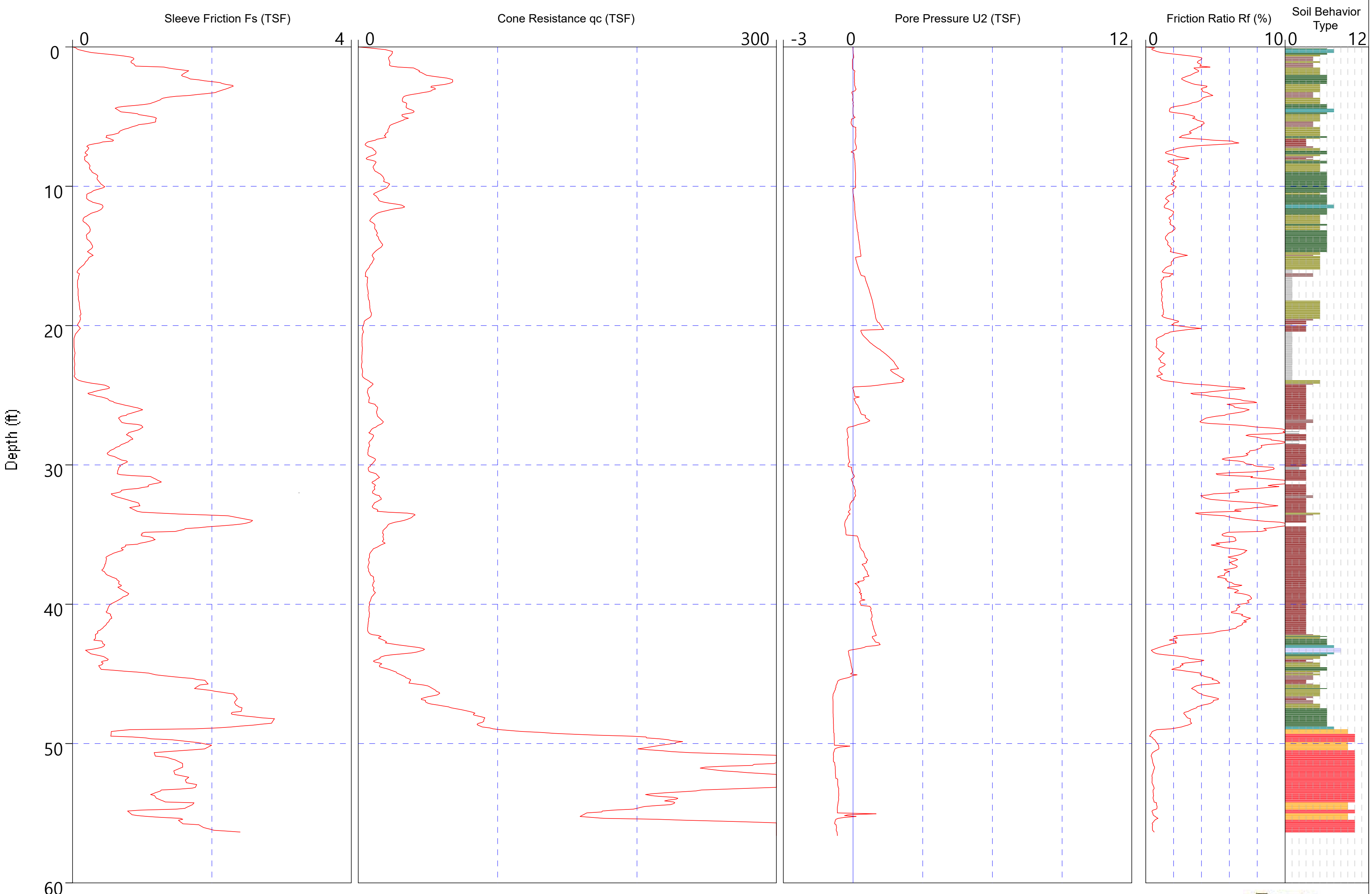


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-21
Date: 24-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 1473



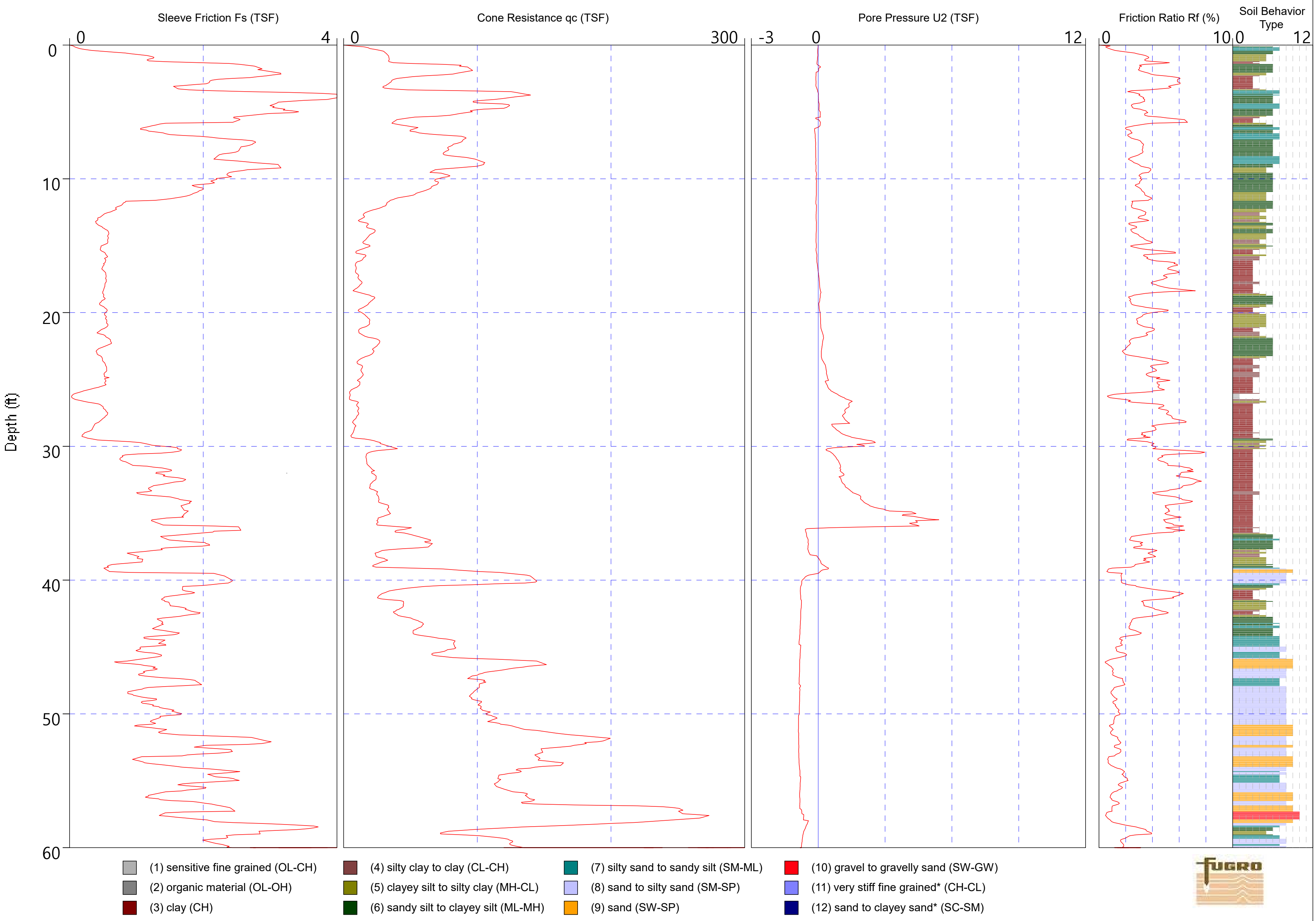
🟫 (1) sensitive fine grained (OL-CH)
🟫 (2) organic material (OL-OH)
🟥 (3) clay (CH)
🟫 (4) silty clay to clay (CL-CH)
🟩 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)
🟩 (7) silty sand to sandy silt (SM-ML)
🟦 (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)
🟥 (10) gravel to gravelly sand (SW-GW)
🟦 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-22
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



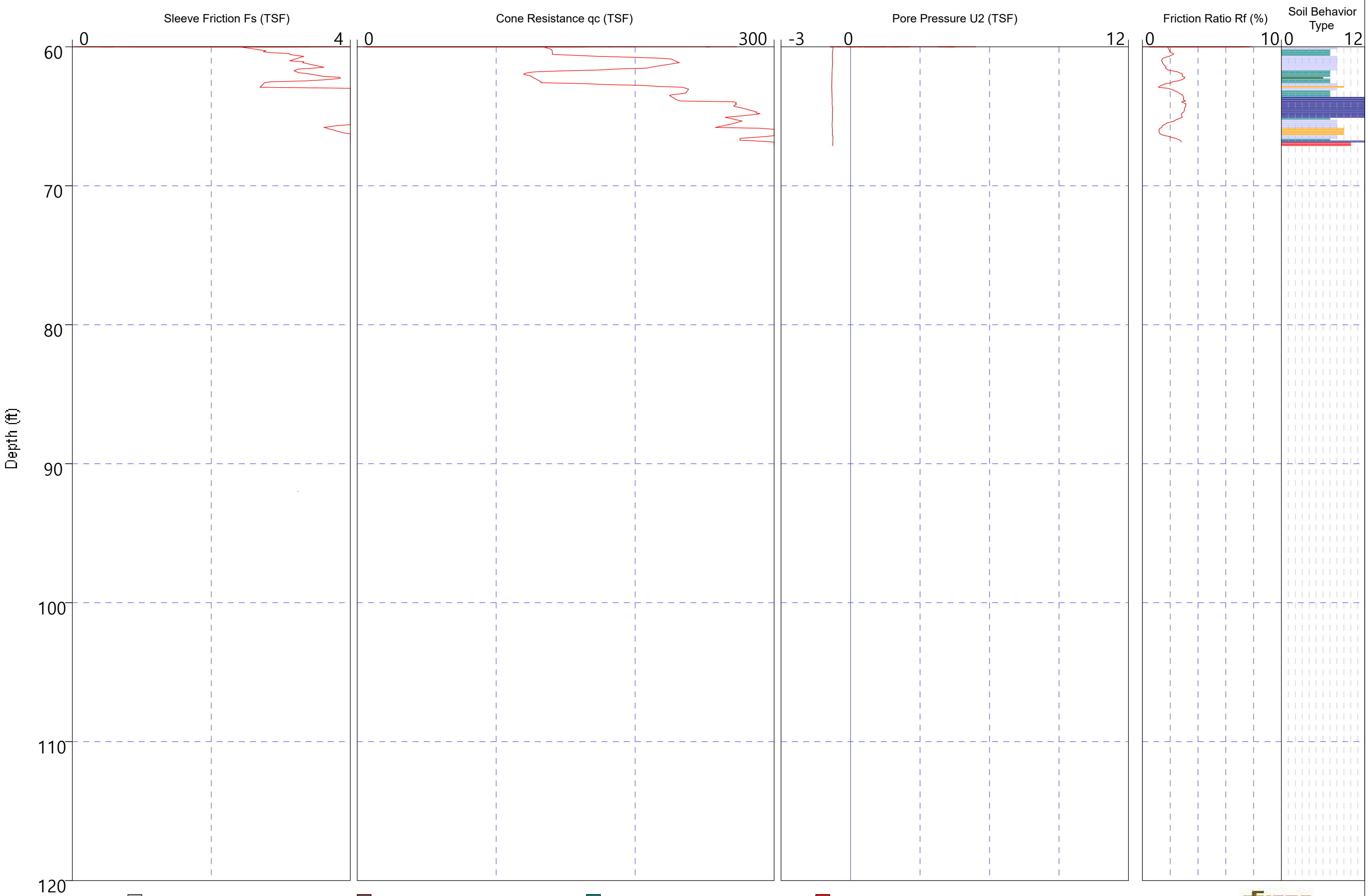
Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 2

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-22
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



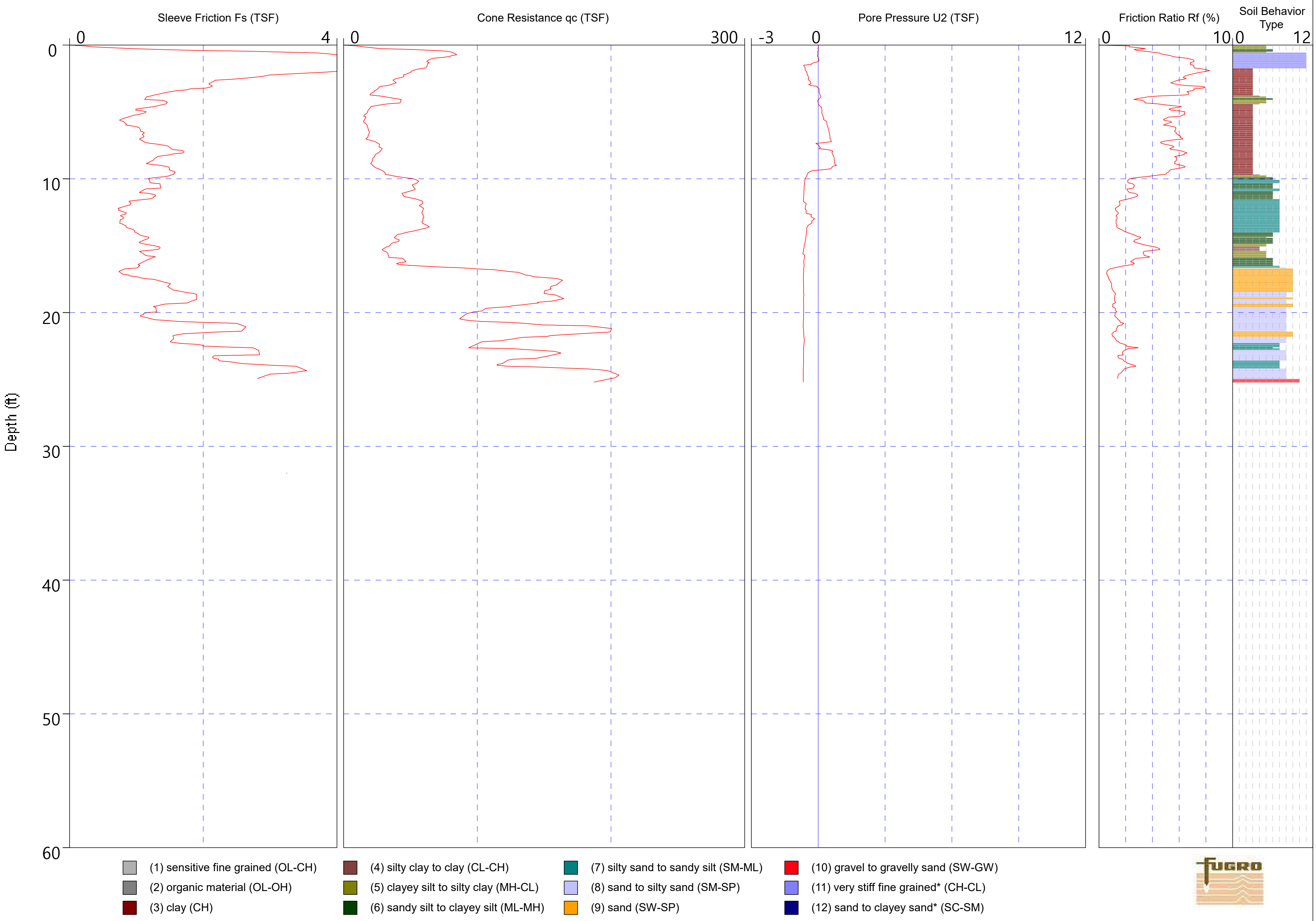
■ (1) sensitive fine grained (OL-CH)
■ (2) organic material (OL-OH)
■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-23
Date: 31-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

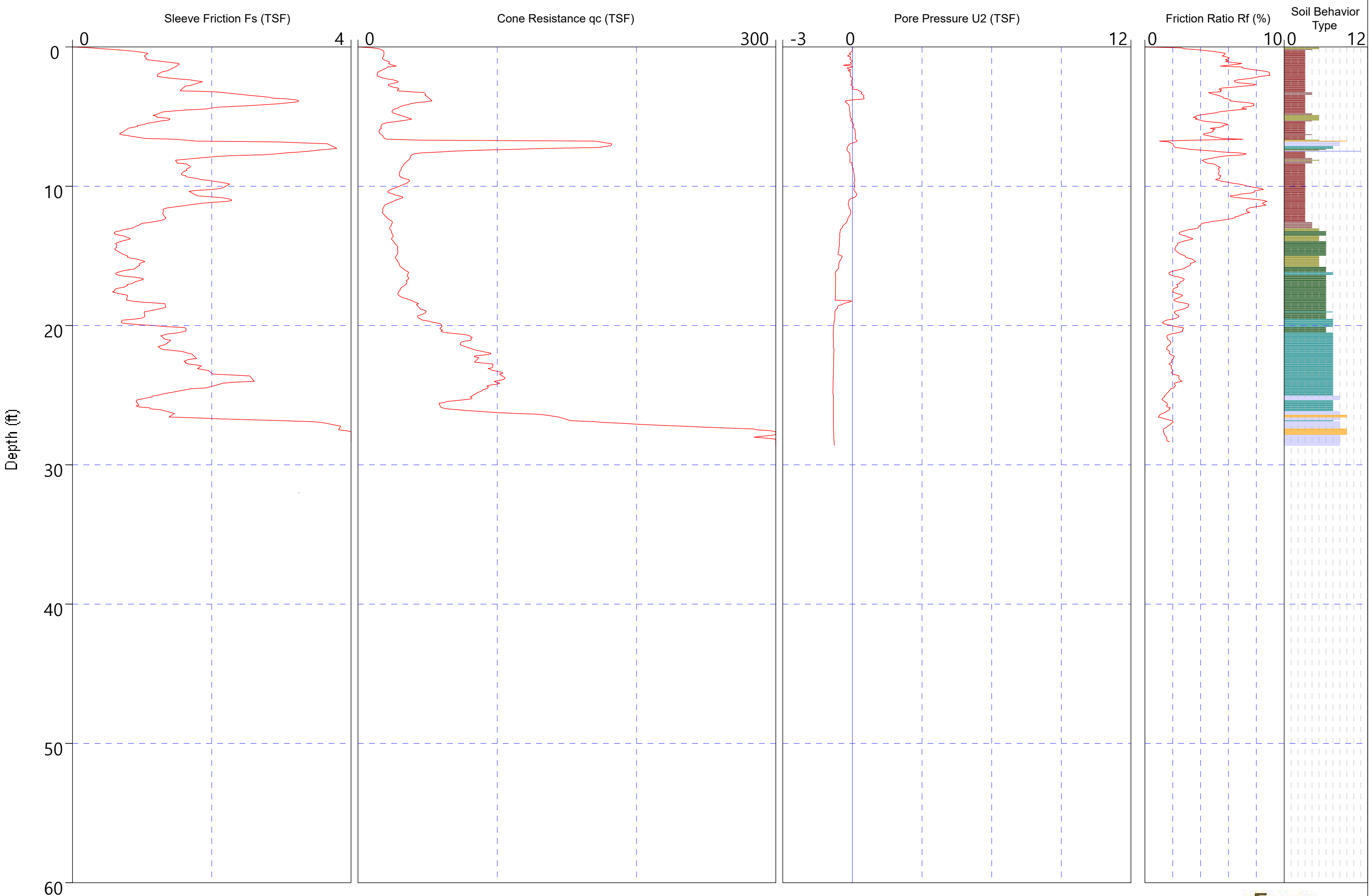


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-24
Date: 31-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



■ (1) sensitive fine grained (OL-CH)
■ (2) organic material (OL-OH)
■ (3) clay (CH)

■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)

■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)

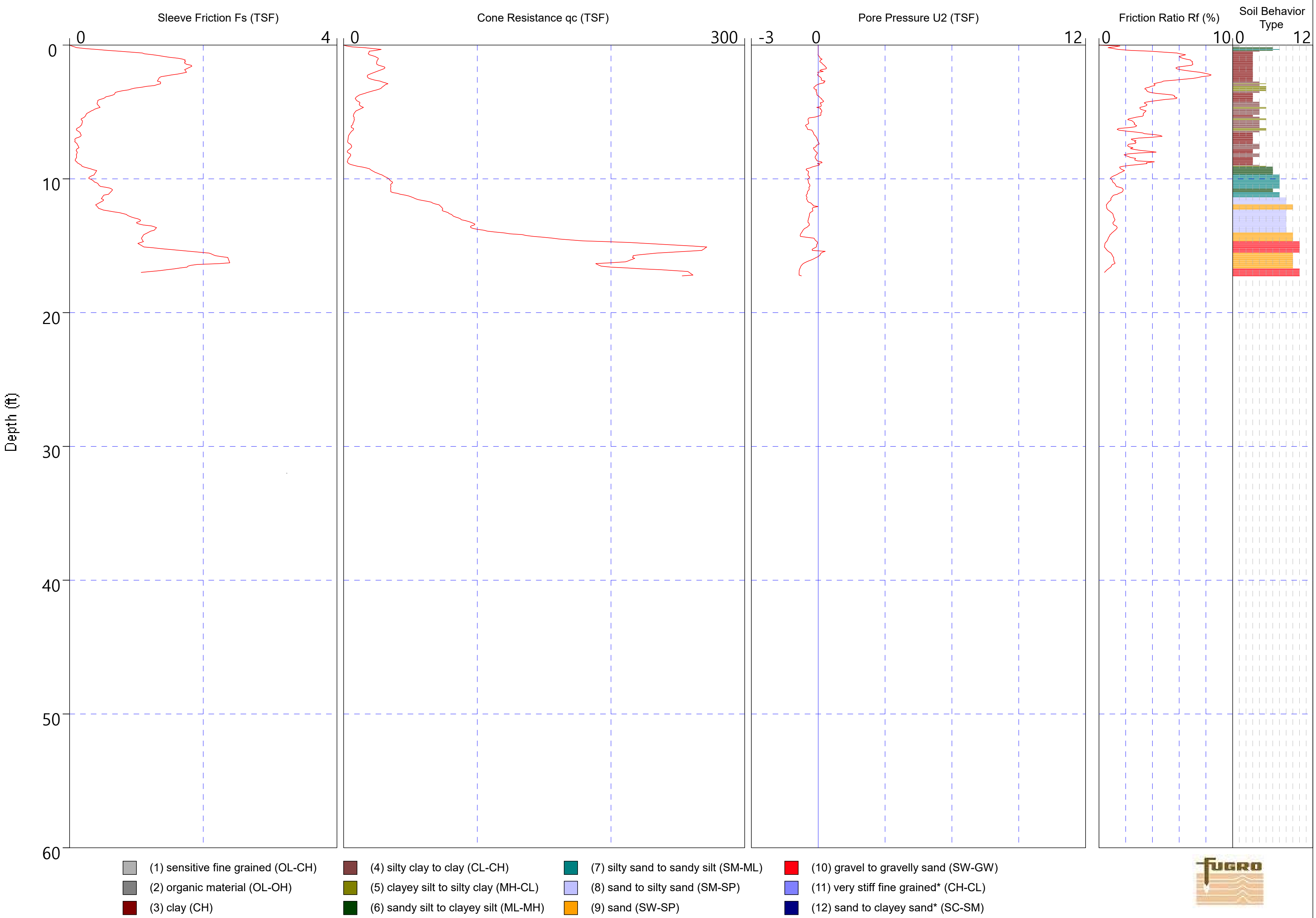
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-25
Date: 30-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

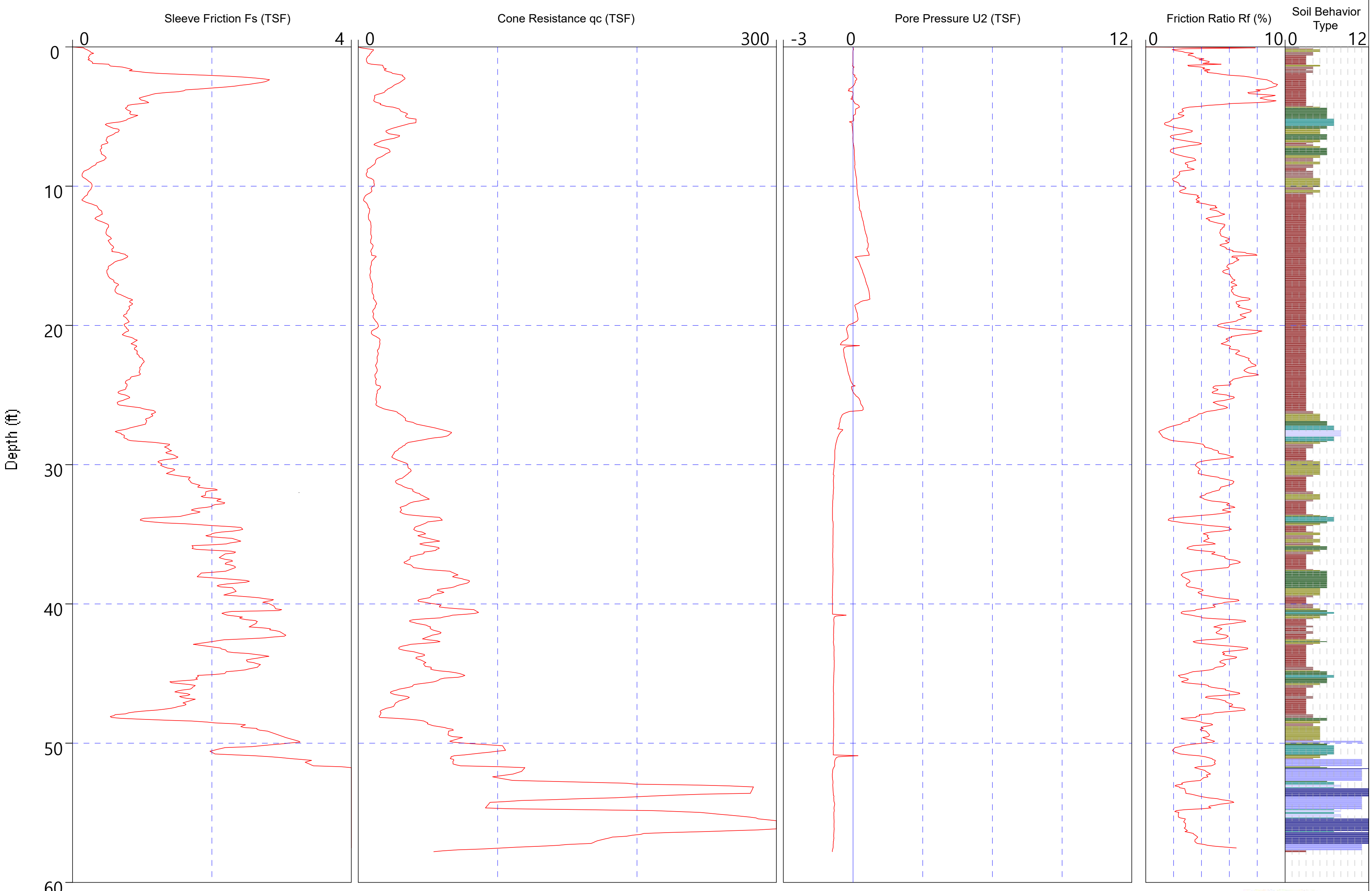


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-26
Date: 27-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



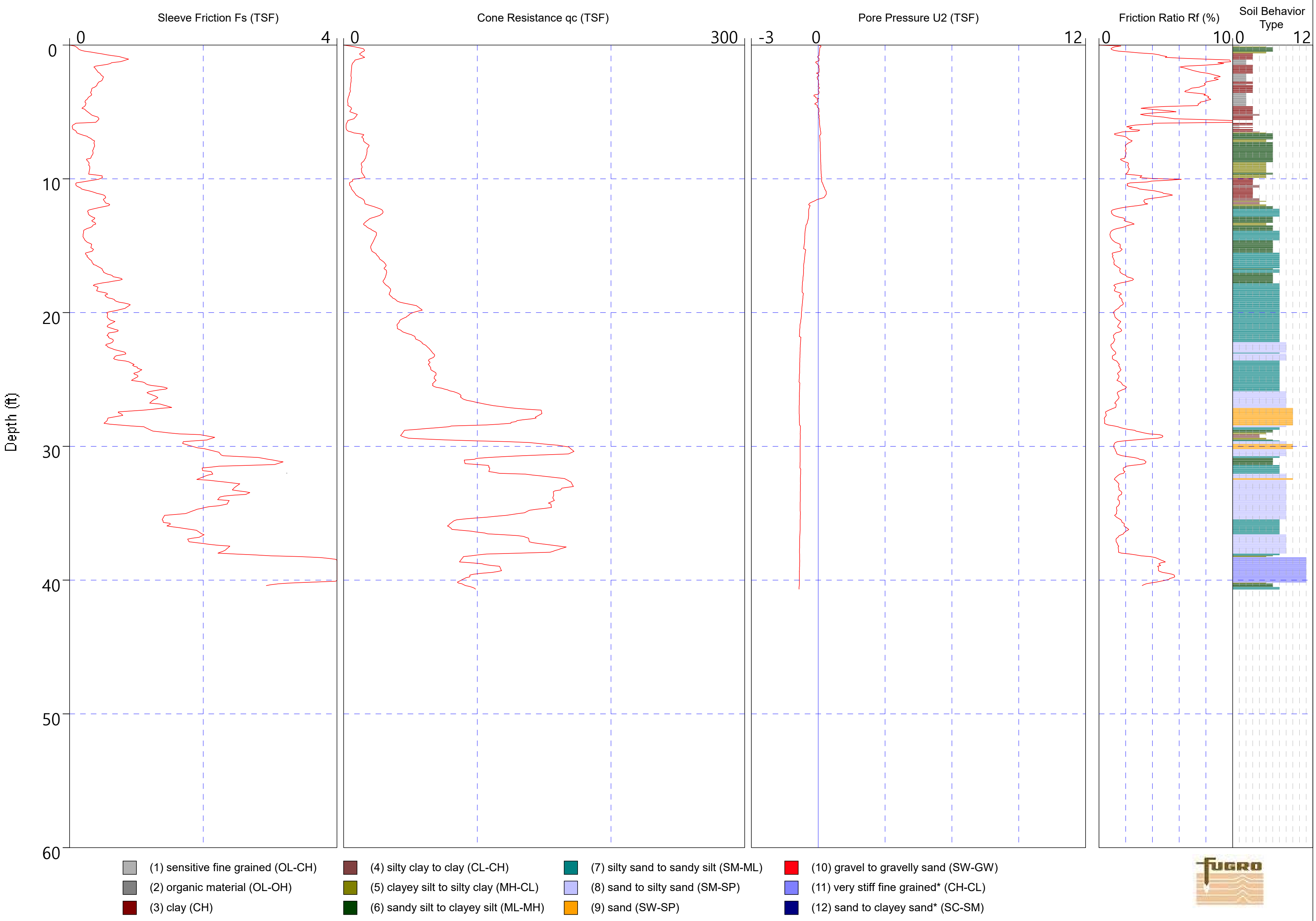
⬜ (1) sensitive fine grained (OL-CH)
⬛ (2) organic material (OL-OH)
🟥 (3) clay (CH)
🟫 (4) silty clay to clay (CL-CH)
🟨 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)
🟦 (7) silty sand to sandy silt (SM-ML)
🟪 (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)
🟥 (10) gravel to gravelly sand (SW-GW)
🟦 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-27
Date: 27-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



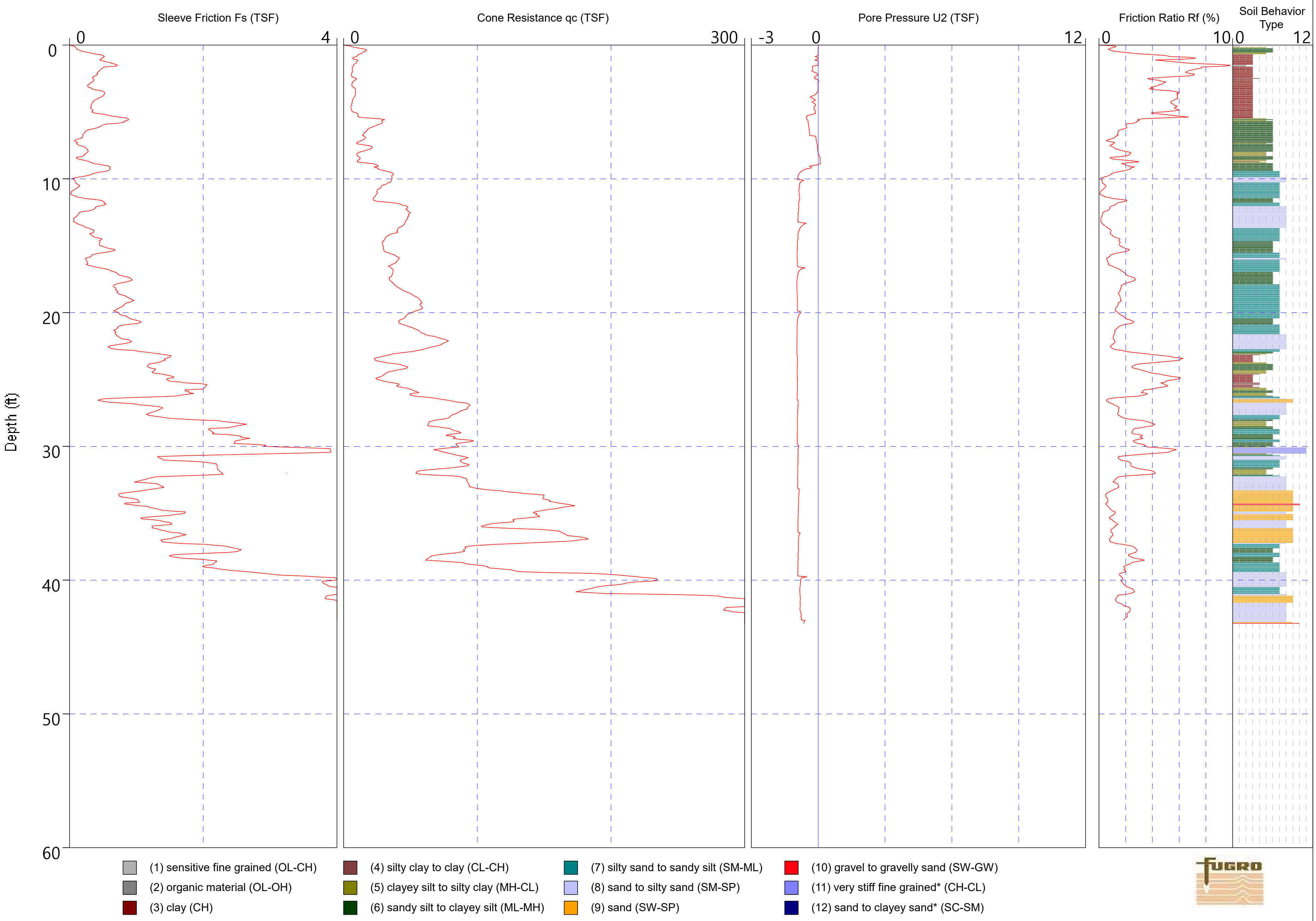
Robertson et al. 1986 *Overconsolidated or Cemented

Page 1 of 1

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-28
Date: 27-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

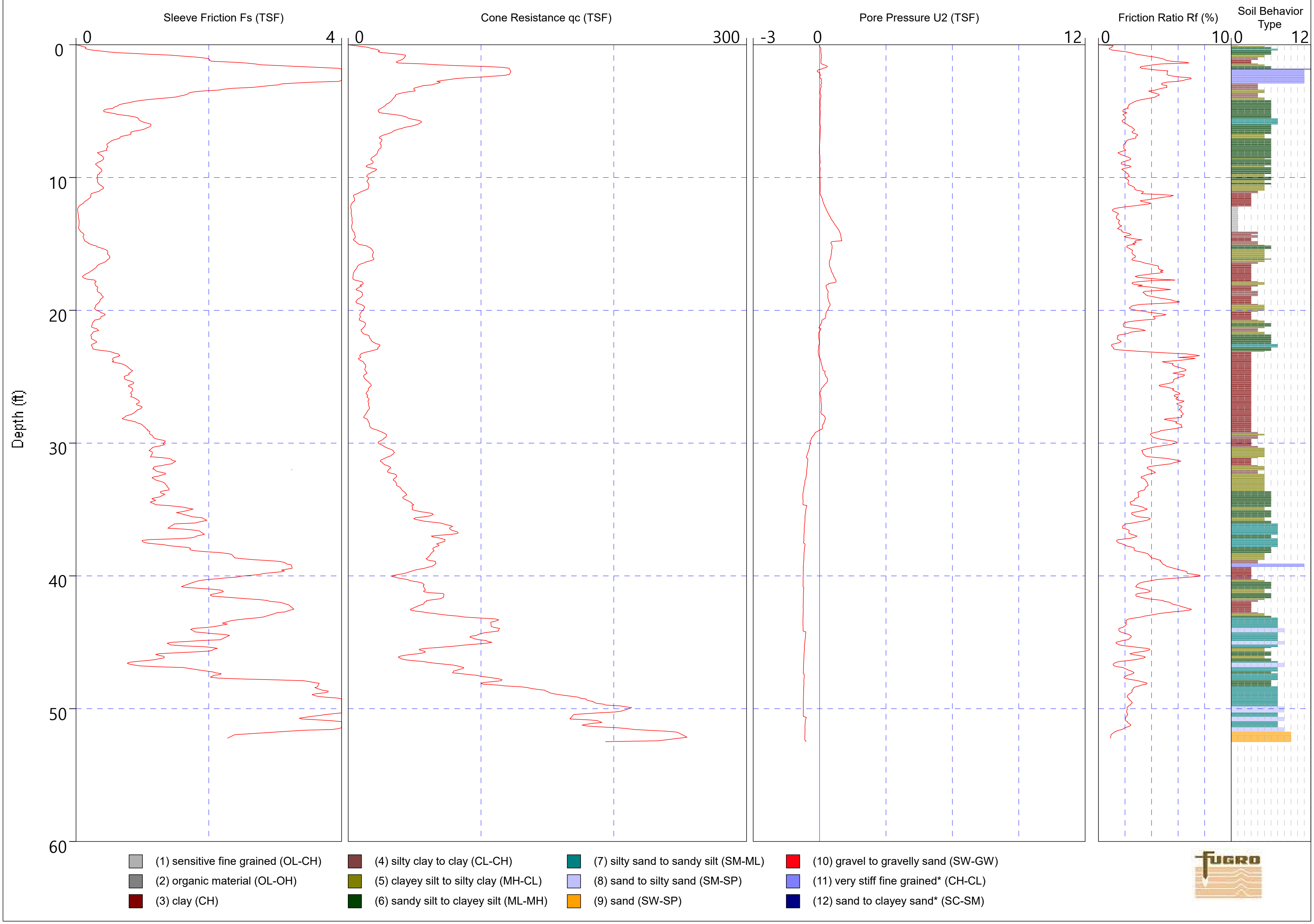


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-29
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874

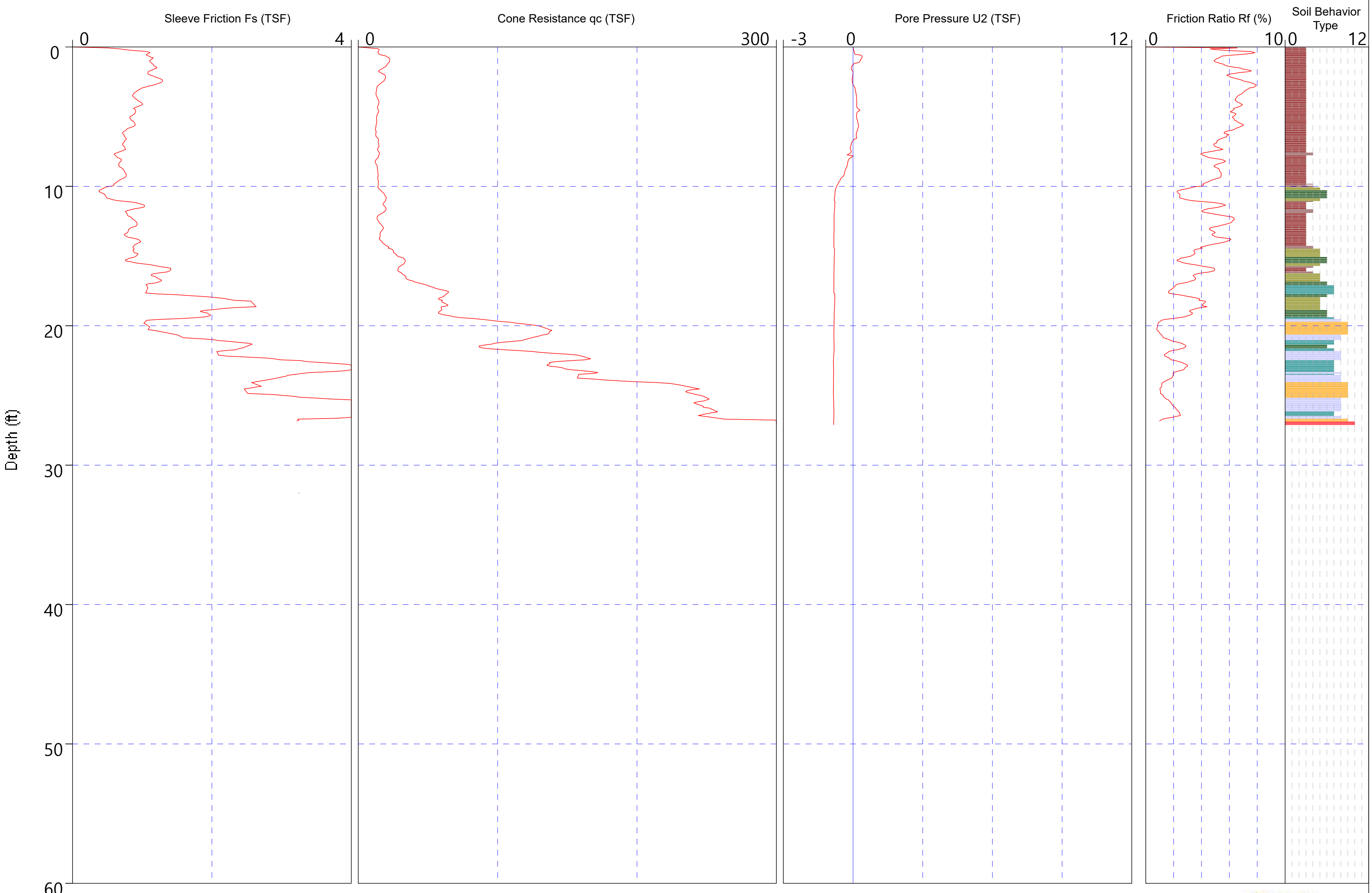


Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-30
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



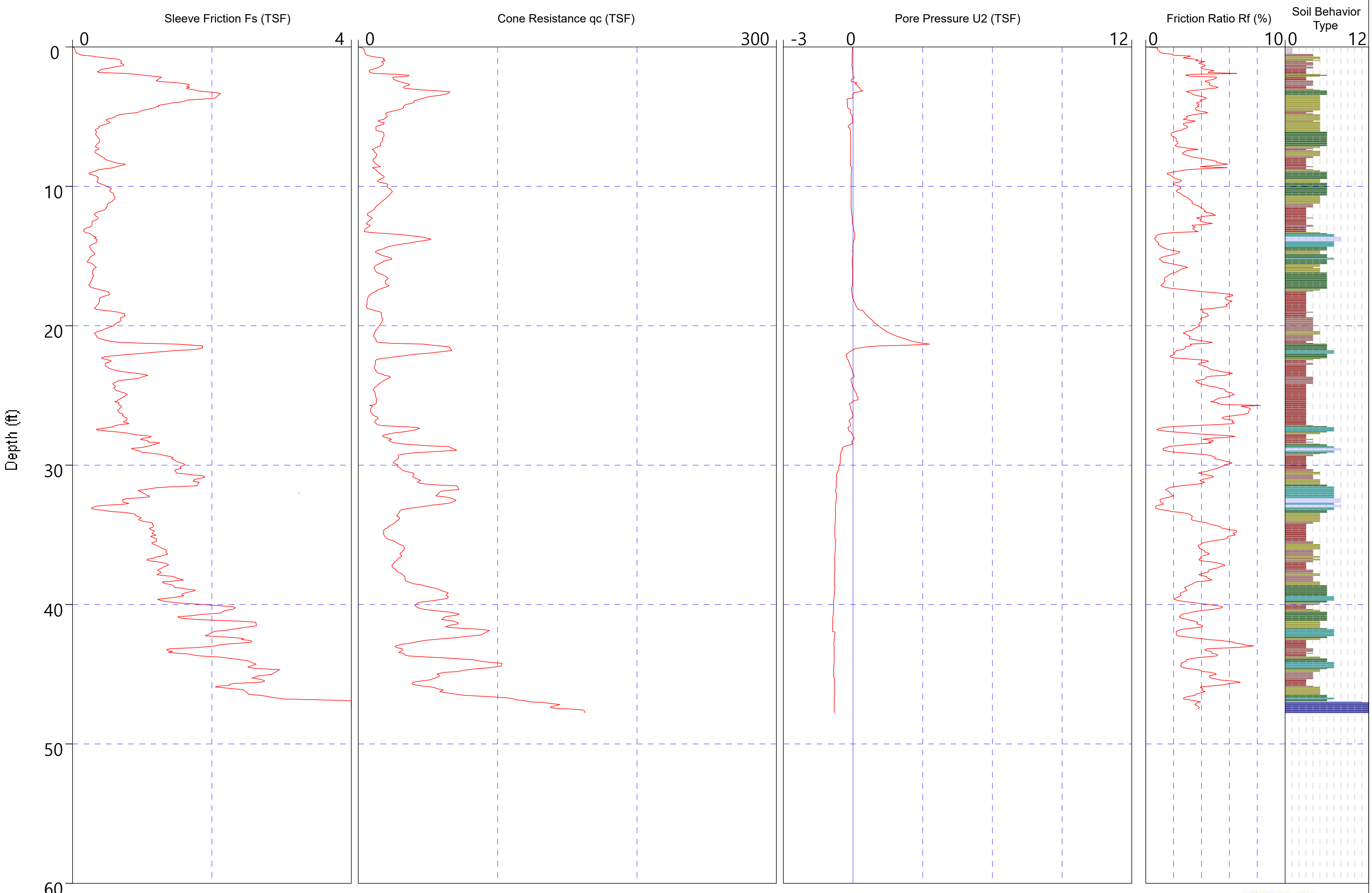
■ (1) sensitive fine grained (OL-CH)
■ (2) organic material (OL-OH)
■ (3) clay (CH)
■ (4) silty clay to clay (CL-CH)
■ (5) clayey silt to silty clay (MH-CL)
■ (6) sandy silt to clayey silt (ML-MH)
■ (7) silty sand to sandy silt (SM-ML)
■ (8) sand to silty sand (SM-SP)
■ (9) sand (SW-SP)
■ (10) gravel to gravelly sand (SW-GW)
■ (11) very stiff fine grained* (CH-CL)
■ (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-31
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



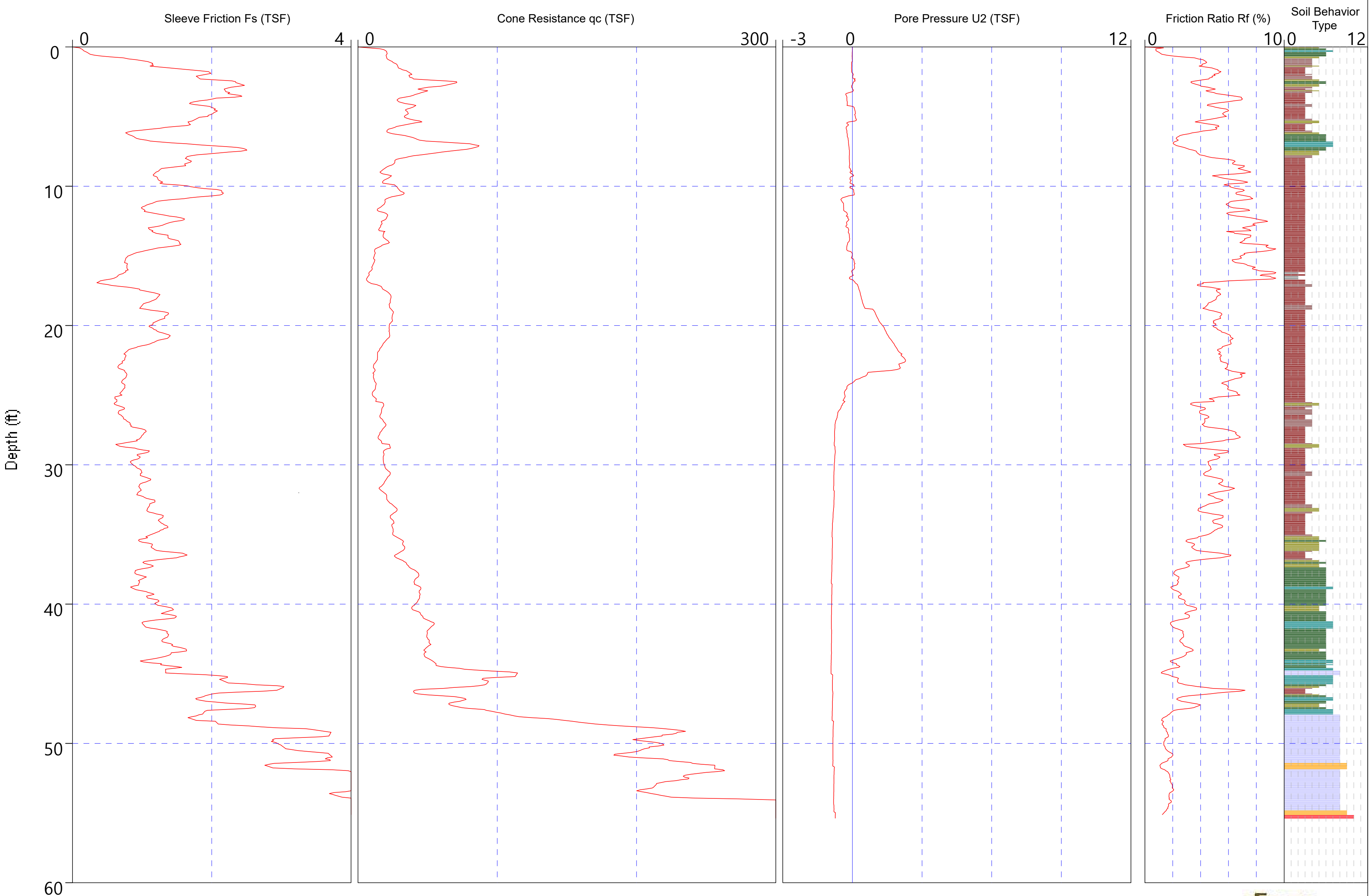
⬜ (1) sensitive fine grained (OL-CH)
⬛ (2) organic material (OL-OH)
🟥 (3) clay (CH)
🟫 (4) silty clay to clay (CL-CH)
🟨 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)
🟦 (7) silty sand to sandy silt (SM-ML)
🟪 (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)
🟥 (10) gravel to gravelly sand (SW-GW)
🟦 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-32
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



⬜ (1) sensitive fine grained (OL-CH)
⬛ (2) organic material (OL-OH)
🟥 (3) clay (CH)

🟫 (4) silty clay to clay (CL-CH)
🟨 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)

🟦 (7) silty sand to sandy silt (SM-ML)
⬜ (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)

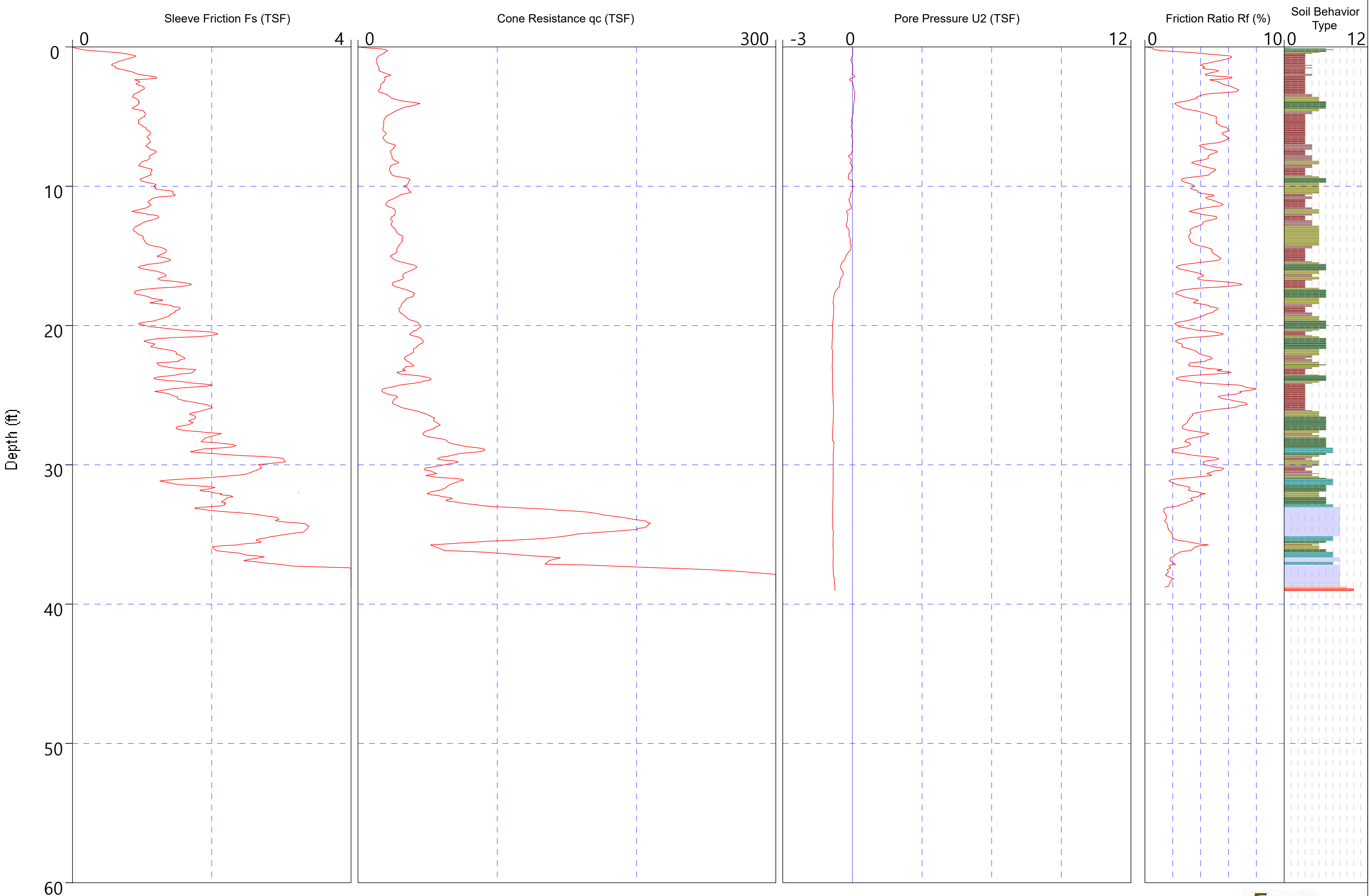
🟥 (10) gravel to gravelly sand (SW-GW)
🟪 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Cesar Guzman
Location: Macon, GA

CPT Number: CPT-33
Date: 26-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 2874



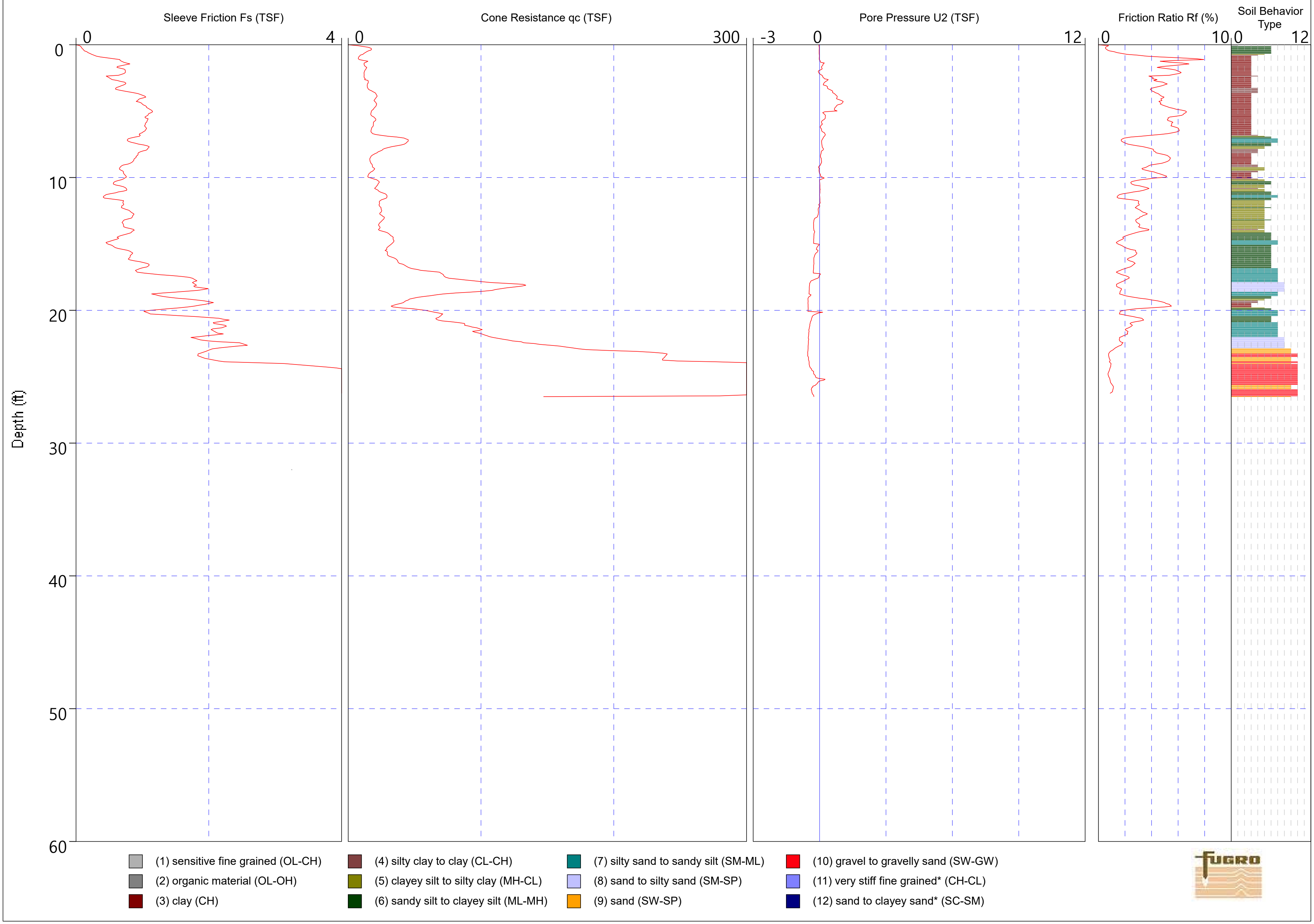
🟩 (1) sensitive fine grained (OL-CH)
🟩 (2) organic material (OL-OH)
🟥 (3) clay (CH)
🟥 (4) silty clay to clay (CL-CH)
🟩 (5) clayey silt to silty clay (MH-CL)
🟩 (6) sandy silt to clayey silt (ML-MH)
🟩 (7) silty sand to sandy silt (SM-ML)
🟦 (8) sand to silty sand (SM-SP)
🟧 (9) sand (SW-SP)
🟥 (10) gravel to gravelly sand (SW-GW)
🟦 (11) very stiff fine grained* (CH-CL)
🟦 (12) sand to clayey sand* (SC-SM)

Robertson et al. 1986 *Overconsolidated or Cemented

Job Number: 04.19170066
Operator: Albert Fonseca
Location: Macon, GA

CPT Number: CPT-34
Date: 24-Oct-2017
Elevation: 0.00

Coordinates:
Cone Number: CP15-CF75PB7SN2-P1E1 1473



Robertson et al. 1986 *Overconsolidated or Cemented

Appendix C. **Stratigraphic Logs of CPT Borings**

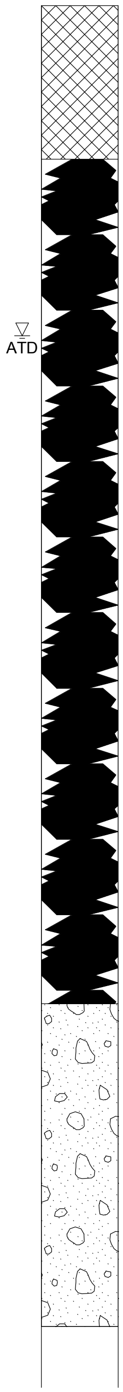
LOG OF CONE PENETRATION TEST PROBE

Page 1 of 1

AP3 CPT-01

PROJECT: Former Arkwright Plant - AP3
DATE: 10/30/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 8.6 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 359.65 ft
LATITUDE: 32.93118611
LONGITUDE: -83.70932222



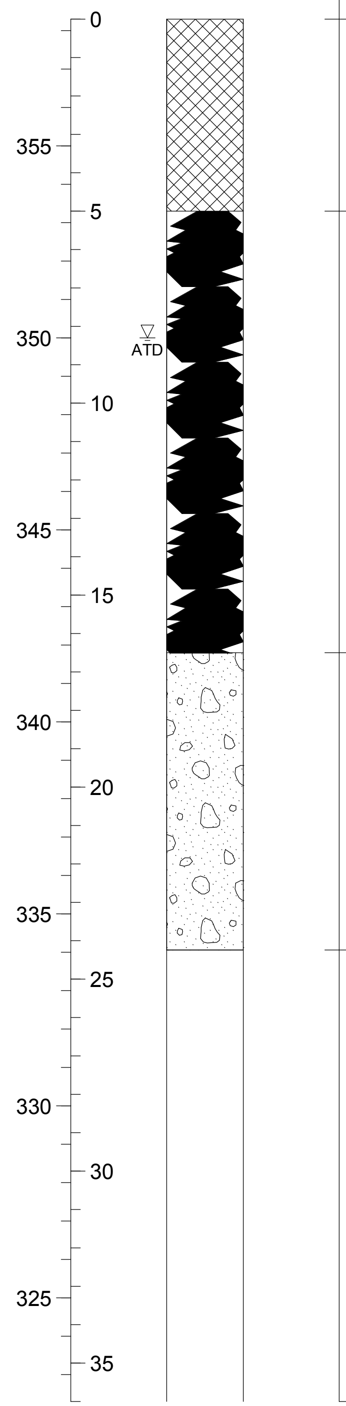
ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
0		SOIL FILL/GCL	3					
			6					QU=2.254 tsf
			8		19			QU=2.426 tsf
			11					QU=3.2 tsf
			9		34			QU=3.052 tsf
			17					
			14					QU=4.79 tsf
			11		28			
		Coal Ash, very soft to soft, slightly to medium plastic	9					
355 5			9		21			
			6					
			3					QU=1.442 tsf
			3		21			QU=1.16 tsf
			3					QU=1.198 tsf
			2		22			QU=0.88 tsf
			3					QU=1.048 tsf
			5					
	ATD		3		28			QU=1.296 tsf
			3					QU=0.964 tsf
350 10			2		26			QU=0.626 tsf
			2					QU=0.402 tsf
			0					QU=0.228 tsf
			0		20			QU=0.272 tsf
			0					QU=0.222 tsf
			0		19			QU=0.174 tsf
			0					QU=0.15 tsf
			0					QU=0.282 tsf
			0		20			QU=0.294 tsf
			2					QU=0.542 tsf
345 15			2		24			QU=0.528 tsf
			2					QU=0.482 tsf
			2					QU=0.19 tsf
			0		19			QU=0.148 tsf
			0					QU=0.078 tsf
			0		19			QU=0.08 tsf
			2					QU=0.168 tsf
			2					QU=0.25 tsf
			2		18			QU=0.318 tsf
			3					QU=1.214 tsf
340 20			5		23			
			2					QU=0.828 tsf
			3					QU=0.972 tsf
			2					QU=0.77 tsf
			3					QU=1.032 tsf
			4					
			1					QU=0.498 tsf
			1					QU=0.372 tsf
			1					QU=0.686 tsf
			1					QU=0.588 tsf
335 25			1					QU=0.338 tsf
			1					QU=0.432 tsf
			4		18			
		Sand, with gravel, medium dense to very dense	4					
			4		23			
			12					
			8					
			7					
			9					
			8					
330 30			10					
			11					
			10					
			18					
			48					
			63					
			50					
			39					
			38					
			53					
325 35		CPT Terminated at 34.4 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-02

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 358.30 ft
BORING LOCATION: AP3
LATITUDE: 32.9306
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 8.3 ft
LONGITUDE: -83.70903889
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



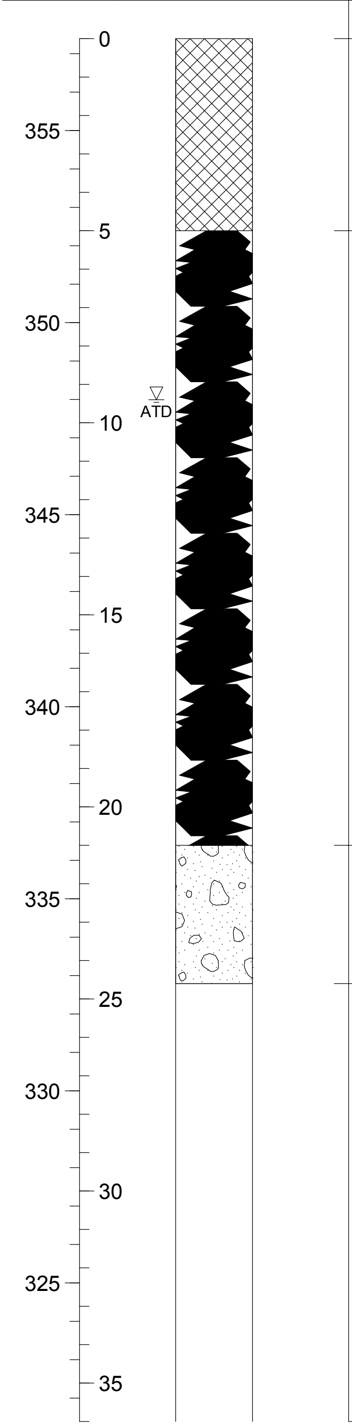
DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	9					QU=3.35 tsf
	9		22			QU=2.958 tsf
	12					QU=4.438 tsf
	21		33			
	17					
	14					QU=4.7 tsf
	12		26			QU=4.118 tsf
	12					QU=4.39 tsf
	9					QU=3.04 tsf
Coal Ash, very soft to soft, slightly to medium plastic	8					QU=2.754 tsf
	6					QU=2.122 tsf
	6		22			QU=2.016 tsf
	5					QU=1.7 tsf
	2		25			QU=0.728 tsf
	2					QU=0.736 tsf
	8					
	5		28			QU=1.672 tsf
	2					QU=0.67 tsf
	2		25			QU=0.432 tsf
	3					
	3					QU=0.832 tsf
	2		23			QU=0.476 tsf
	2					QU=0.364 tsf
	0		18			QU=0.164 tsf
	2					QU=0.364 tsf
	0					QU=0.18 tsf
	0		19			QU=0.136 tsf
	2					QU=0.706 tsf
	3		24			QU=0.85 tsf
	8					QU=2.248 tsf
	9					QU=2.866 tsf
	8		32			QU=2.4 tsf
Sand, with gravel, medium dense to very dense	20					
	35					
	38					
	42					
	53					
	59					
	74					
	81					
	87					
	78					
	53					
	65					
	57					
	36					
	30					
	38					
CPT Terminated at 24.2 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-03

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 357.39 ft
BORING LOCATION: AP3
LATITUDE: 32.92970833
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 9.4 ft
LONGITUDE: -83.70861667
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA

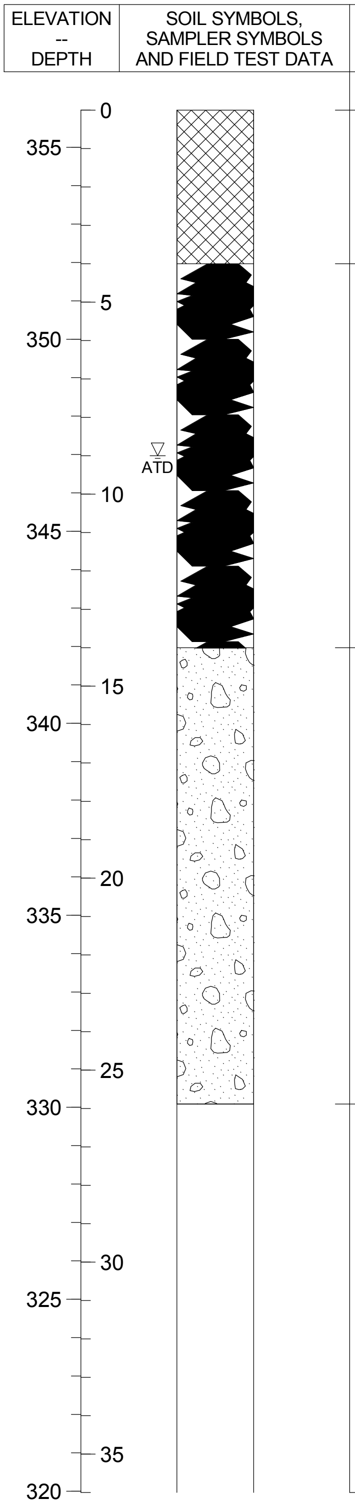


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	6		17			QU=2.484 tsf
	8					QU=2.462 tsf
	9					QU=2.974 tsf
	27		31			
	36					
	27					
	23					
	18					
	11		18			
Coal Ash, very soft to medium stiff, slightly to medium plastic	8					
	8					
	6		22			QU=2.332 tsf
	6					QU=2.314 tsf
	8		28			
	6					QU=2.096 tsf
	5					QU=1.798 tsf
	2		26			QU=0.82 tsf
	3					QU=1.166 tsf
	9		31			QU=2.776 tsf
	11					QU=3.014 tsf
	9					QU=2.702 tsf
	11					QU=3.39 tsf
	12					QU=3.558 tsf
	11					QU=3.442 tsf
	14					QU=4.188 tsf
	15					QU=4.576 tsf
	12		30			QU=3.728 tsf
	11					QU=3.082 tsf
	11		38			QU=2.964 tsf
	11					QU=2.87 tsf
	11					QU=2.78 tsf
	11		48			QU=2.65 tsf
	11					QU=2.708 tsf
	11		47			QU=2.972 tsf
	12					QU=3.202 tsf
	12					QU=3.064 tsf
	11		42			QU=2.846 tsf
	9					QU=2.536 tsf
	7		41			QU=2.292 tsf
	7					QU=2.06 tsf
	7		36			QU=2.192 tsf
Sand, with gravel, medium dense to very dense	14					
	22					
	20					
	22					
	31					
	40					
	48					
CPT Terminated at 24.6 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-04

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 355.97 ft
BORING LOCATION: AP3
LATITUDE: 32.92899444
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 9.0 ft
LONGITUDE: -83.70832222
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	8					QU=2.818 tsf
	9		19			QU=3.392 tsf
	9					QU=3.38 tsf
	14		23			QU=4.622 tsf
	9					QU=3.046 tsf
	9					
	8		26			QU=3.04 tsf
Coal Ash, very soft to soft, slightly to medium plastic	6					QU=2.41 tsf
	5		22			QU=1.618 tsf
	3					QU=1.346 tsf
	3					QU=1.182 tsf
	5		19			QU=1.826 tsf
	5					QU=1.78 tsf
	5		23			QU=1.774 tsf
	3					QU=1.352 tsf
	5					QU=1.952 tsf
	3		28			QU=1.204 tsf
	2					QU=0.856 tsf
	2		25			QU=0.454 tsf
	0					QU=0.35 tsf
	2					QU=0.448 tsf
	2		23			QU=0.414 tsf
	2					QU=0.618 tsf
	2		24			QU=0.57 tsf
	2					QU=0.648 tsf
	3					QU=1.11 tsf
	8					QU=2.512 tsf
Sand, with gravel, medium dense to very dense	9					QU=2.97 tsf
	12		29			QU=3.642 tsf
	12					QU=3.822 tsf
	12					QU=3.846 tsf
	14		36			QU=4.266 tsf
	15					QU=4.424 tsf
	18		45			QU=5.49 tsf
	21					QU=6.736 tsf
	27		46			
	26					QU=8.384 tsf
	32		42			
	18					QU=5.006 tsf
	24					
	25					
	24					
	24					
	29					
	39					
	40					
	45					
	51					
	63					
	84					
	80					
CPT Terminated at 25.9 feet depth						

LOG OF CONE PENETRATION TEST PROBE

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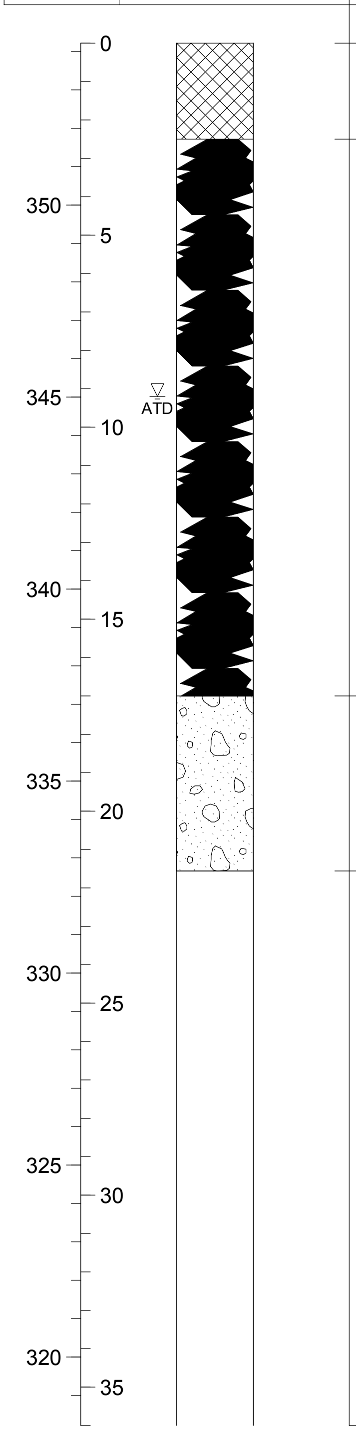
AP3 CPT-05

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 354.22 ft
BORING LOCATION: AP3
LATITUDE: 32.92831944
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 9.2 ft
LONGITUDE: -83.707825
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	6		24			QU=2.618 tsf
	11					QU=3.542 tsf
	12		28			QU=4.542 tsf
	6					QU=2.362 tsf
Coal Ash, very soft to soft, slightly to medium plastic	5					QU=1.8 tsf
	5					QU=1.66 tsf
	3		25			QU=1.484 tsf
	2					QU=0.962 tsf
	3		25			QU=1.1 tsf
	6					
	8					
	5		27			
	5					
	5		29			
	5					
	3					QU=1.27 tsf
	2		27			QU=0.514 tsf
	2					QU=0.432 tsf
	2		28			QU=0.94 tsf
	3					QU=1.098 tsf
	2					QU=0.646 tsf
	3		27			QU=1.252 tsf
	5					
	5		29			
	3					QU=1.338 tsf
	2					QU=0.562 tsf
	0		26			QU=0.182 tsf
	0					QU=0.192 tsf
	3		28			QU=0.91 tsf
	5					QU=1.336 tsf
	5		32			QU=1.358 tsf
	5					QU=1.252 tsf
	6		31			QU=1.756 tsf
Sand, with gravel, medium dense to very dense	11					
	12					
	14					
	17					
	15					
	20					
	31					
	50					
	53					

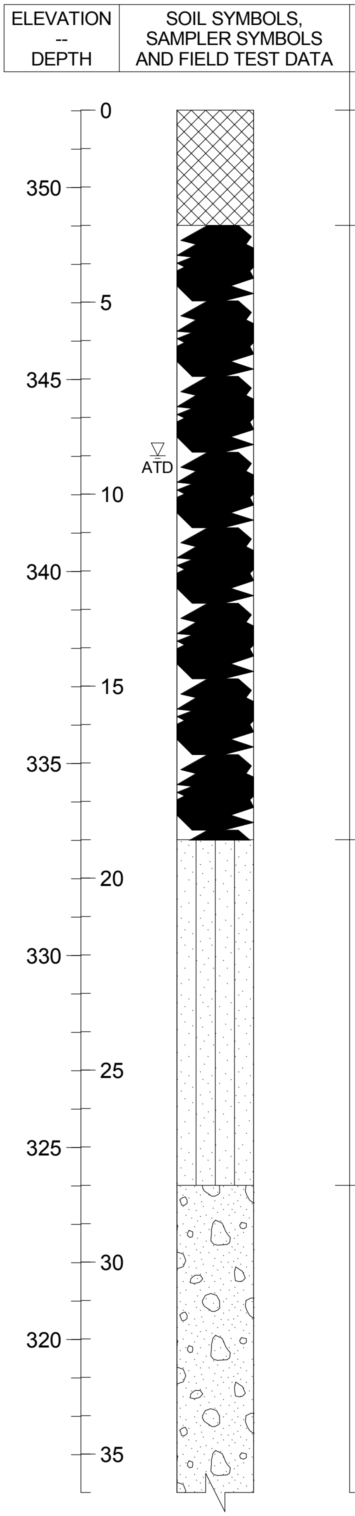
CPT Terminated at 21.6 feet depth

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-06

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 352.02 ft
BORING LOCATION: AP3
LATITUDE: 32.92751667
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 9.0 ft
LONGITUDE: -83.70763056
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

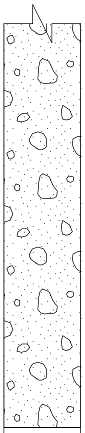


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	3					QU=1.086 tsf
	8		20			QU=2.798 tsf
	15					
	12		27			QU=4.554 tsf
	11					
Coal Ash, very soft to soft, slightly to medium plastic	9					
	6					QU=2.582 tsf
	6					
	6					
	6					QU=2.264 tsf
	6					
	3					QU=1.242 tsf
	3					QU=1.252 tsf
	2					QU=0.714 tsf
	2					QU=0.788 tsf
	2					QU=0.604 tsf
	2		20			QU=0.772 tsf
	3					QU=1.394 tsf
	3		24			
	3					QU=1.092 tsf
	2					QU=0.818 tsf
	2		23			QU=0.594 tsf
	2					QU=0.304 tsf
	3		24			QU=0.778 tsf
	3					QU=0.828 tsf
	3					QU=0.804 tsf
	6		32			QU=1.872 tsf
	9					QU=2.43 tsf
	11		34			QU=2.682 tsf
	11					QU=2.978 tsf
	11		36			QU=2.984 tsf
	11					QU=2.642 tsf
	9					QU=2.358 tsf
	8		23			QU=2.114 tsf
	9					QU=2.302 tsf
	8		27			QU=2.04 tsf
	8					QU=2.3 tsf
Silt, some sand, medium stiff to stiff	12					QU=3.812 tsf
	19		33			QU=6.524 tsf
	13					QU=3.568 tsf
	13		28			QU=4.164 tsf
	16					QU=4.804 tsf
	15		24			QU=4.974 tsf
	14					QU=5.044 tsf
	13					QU=4.442 tsf
	9					QU=2.818 tsf
	8					QU=2.764 tsf
	14					
	18					
	21					
	18					
	18					
	15					
	14					QU=5.898 tsf
	11					QU=3.916 tsf
Sand, with gravel, medium dense to very dense	15					
	16					
	15					
	18					
	22					
	19					
	16					
	15					
	16					
	17					
	22					
	23					
	18					
	19					
	29					
	26					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-06

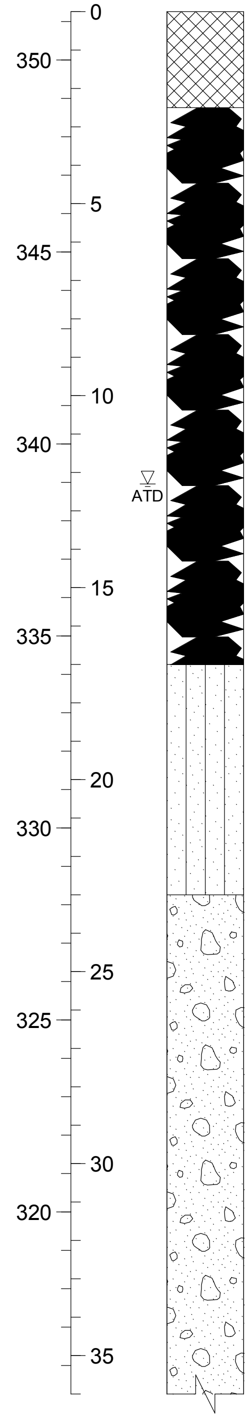
PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 352.02 ft
BORING LOCATION: AP3
LATITUDE: 32.92751667
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 9.0 ft
LONGITUDE: -83.70763056
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
315 40 310 45 305 50 300 55 295 60 290 65 285 70		CPT Terminated at 46.5 feet depth	29 34 33 28 28 34 40 40 33 36 32 29 24 26 28 29 26 29 37 38 36					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-07

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/24/17
ELEVATION: 351.26 ft
BORING LOCATION: AP3
LATITUDE: 32.92692222
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 12.3 ft
LONGITUDE: -83.70733333
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	5					QU=1.632 tsf
	17		28			
	23					
	12		33			
Coal Ash, very soft to soft, slightly to medium plastic	5					QU=1.542 tsf
	2					QU=0.49 tsf
	2		22			QU=0.32 tsf
	2					QU=0.288 tsf
	2		19			QU=0.288 tsf
	2					QU=0.162 tsf
	2					QU=0.28 tsf
	2		16			QU=0.268 tsf
	0					QU=0.142 tsf
	2		18			QU=0.314 tsf
	3					QU=1.074 tsf
	5					QU=1.208 tsf
	3		26			QU=1.006 tsf
	3					QU=0.988 tsf
	8		25			QU=2.446 tsf
	6					QU=2.034 tsf
	8					QU=2.67 tsf
	8					
	8					
	9					
	9					
	9					QU=3.058 tsf
	8					QU=2.542 tsf
	8					QU=2.03 tsf
	8					QU=2.164 tsf
	11					
	12					
	12					QU=4.038 tsf
	12					QU=4.142 tsf
Silt, some sand, medium stiff to stiff	12					QU=4.198 tsf
	15					QU=5.206 tsf
	15					QU=4.994 tsf
	15					
	15					
	15					
	17					
	21					
	26					
	26					
	26					
	22					
Sand, with gravel, medium dense to very dense	28					
	30					
	32					
	26					
	22					
	33					
	33					
	31					
	24					
	31					
	39					
	46					
	43					
	28					
	28					
	26					
	36					
	27					
	24					
	27					
	25					
	21					
	21					
	27					
	26					
	32					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-07

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/24/17

ELEVATION: 351.26 ft

BORING LOCATION: AP3

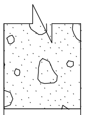
LATITUDE: 32.92692222

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 12.3 ft

LONGITUDE: -83.70733333

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
315		CPT Terminated at 38.2 feet depth	33 35 32 31 23					
40								
310								
45								
305								
50								
300								
55								
295								
60								
290								
65								
285								
70								
280								

LOG OF CONE PENETRATION TEST PROBE

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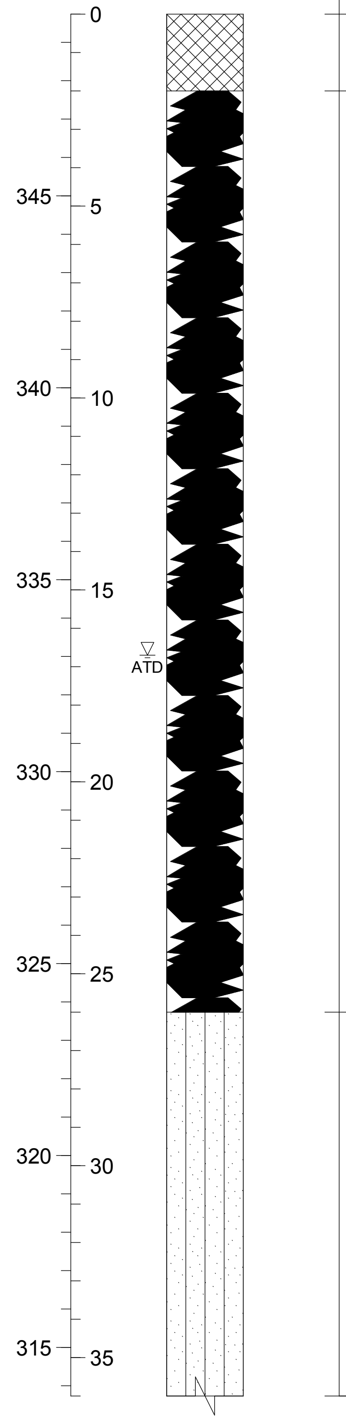
AP3 CPT-08

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/24/17
ELEVATION: 349.73 ft
BORING LOCATION: AP3
LATITUDE: 32.92636111
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 16.7 ft
LONGITUDE: -83.70709722
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	2					QU=1.082 tsf
	3					QU=1.074 tsf
	2		16			QU=0.69 tsf
	2					QU=0.422 tsf
Coal Ash, very soft to soft, slightly to medium plastic	0					QU=0.246 tsf
	0					QU=0.236 tsf
	0					QU=0.198 tsf
	0		11			QU=0.214 tsf
	0					QU=0.204 tsf
	2		13			QU=0.47 tsf
	3					QU=0.896 tsf
	2		24			QU=0.786 tsf
	2					QU=0.556 tsf
	5					
	9		22			QU=3.402 tsf
	8					QU=2.74 tsf
	6					QU=2.1 tsf
	3		16			QU=1.52 tsf
	2					QU=0.98 tsf
	5		23			QU=1.606 tsf
	5					
	6					
	6		24			
	6					
	5		26			QU=1.886 tsf
	5					
	3					QU=0.994 tsf
	2		25			QU=0.774 tsf
	2					QU=0.75 tsf
	2		22			QU=0.554 tsf
	2					QU=0.436 tsf
	0					QU=0.258 tsf
	0		17			QU=0.29 tsf
	0					QU=0.294 tsf
	3		22			QU=1.096 tsf
	5					QU=1.442 tsf
	5					QU=1.326 tsf
	5		27			QU=1.106 tsf
	5					QU=1.36 tsf
	6		27			QU=1.808 tsf
	8					QU=2.1 tsf
	8		26			QU=2.288 tsf
	9					QU=2.438 tsf
	9					QU=2.536 tsf
	6					QU=1.89 tsf
	9					QU=2.464 tsf
	10					QU=3.122 tsf
	10					QU=3.034 tsf
	8					QU=2.846 tsf
	10					QU=3.1 tsf
	9					QU=3.026 tsf
	11					QU=3.824 tsf
Silt, some sand, medium stiff to stiff	12					
	13					
	10					QU=4.038 tsf
	9					QU=3.288 tsf
	10					
	13					
	12					QU=4.918 tsf
	15					
	18					
	20					
	16					
	12					
	13					
	15					QU=6.558 tsf
	16					
	15					
	15					
	16					
	17					
	17					

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-08

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/24/17

ELEVATION: 349.73 ft

BORING LOCATION: AP3

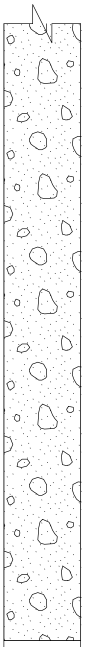
LATITUDE: 32.92636111

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 16.7 ft

LONGITUDE: -83.70709722

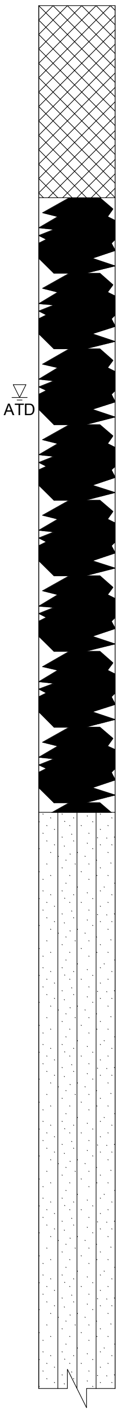
DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
310 — 40 305 — 45 300 — 50		Sand, with gravel, medium dense to very dense	18 20 22 25 26 27 31 32 34 28 23 26 30 27 32 30 30 36 44 44 47 48 39 38 32 25 30 31 28 31 38 37					
295 — 55 290 — 60 285 — 65 280 — 70		CPT Terminated at 52.1 feet depth						

LOG OF CONE PENETRATION TEST PROBE
AP3 CPT-09

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 361.22 ft
BORING LOCATION: AP3
LATITUDE: 32.93099167
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 10.2 ft
LONGITUDE: -83.70877778
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION --	DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	0		SOIL FILL/GCL	3					QU=1.69 tsf
				11		14			QU=3.468 tsf
360				18					QU=6.464 tsf
				33		35			
				35					
				48		37			
				42					
				39					
				29					
				20					QU=6.606 tsf
	5		Coal Ash, very soft to medium stiff, slightly to medium plastic	12					QU=4.496 tsf
				8		27			QU=2.692 tsf
355				6					QU=2.08 tsf
				5					QU=1.668 tsf
				3					QU=1.4 tsf
				3					QU=1.044 tsf
				3					QU=1.012 tsf
				2		26			QU=0.822 tsf
				2					QU=0.602 tsf
				2		21			QU=0.442 tsf
	10	∇ ATD		2					QU=0.396 tsf
				2					QU=0.488 tsf
350				2		23			QU=0.518 tsf
				2					QU=0.518 tsf
				2		21			QU=0.616 tsf
				2					QU=0.548 tsf
				2		17			QU=0.464 tsf
				3					QU=1.462 tsf
				15		23			
				17					
	15			15					
				14					
345				14					
				6					QU=1.902 tsf
				6		30			QU=1.794 tsf
				6					QU=1.816 tsf
				6		34			QU=1.704 tsf
				6					QU=1.506 tsf
				6					QU=1.446 tsf
				4		30			QU=1.368 tsf
	20			4					QU=1.328 tsf
				9		31			QU=2.672 tsf
340			Silt, some sand, medium stiff to hard	15					QU=5.016 tsf
				21					
				22					
				13					QU=4.488 tsf
				14					QU=4.882 tsf
				17					QU=5.946 tsf
				21					
				21					
	25			22					
				31					
335				28					
				34					
				33					
				30					
				37					
				39					
				44					
				31					
	30			26					
				39					
330				44					
				41					
				32					
				34					
				30					
				34					
				46					
				59					
	35			60					
				48					

LOG OF CONE PENETRATION TEST PROBE

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AP3 CPT-09

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/30/17

ELEVATION: 361.22 ft

BORING LOCATION: AP3

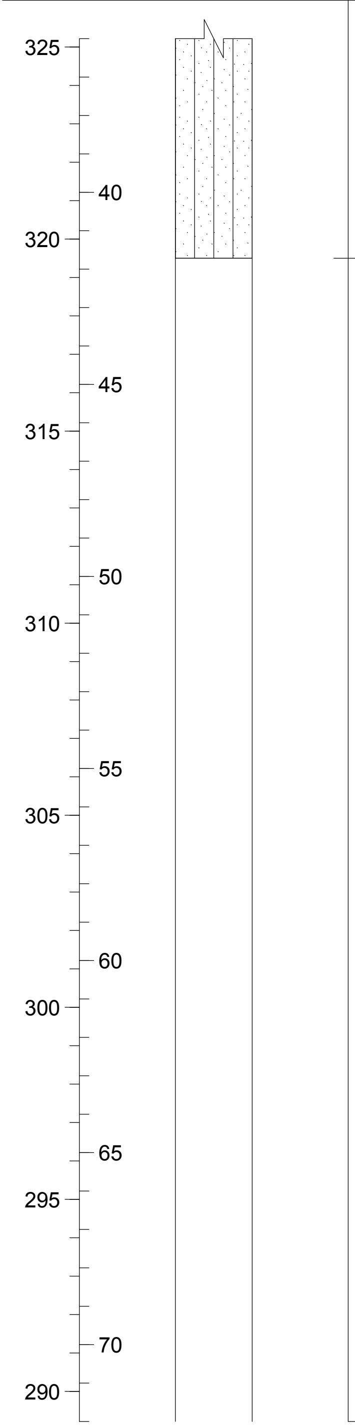
LATITUDE: 32.93099167

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 10.2 ft

LONGITUDE: -83.70877778

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	38					
	40					
	43					
	38					
	38					
	36					
	31					
	28					
	27					
	26					
	28					
CPT Terminated at 41.7 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-09SL

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/31/17

ELEVATION: 361.22 ft

BORING LOCATION: AP3

LATITUDE: 32.93099167

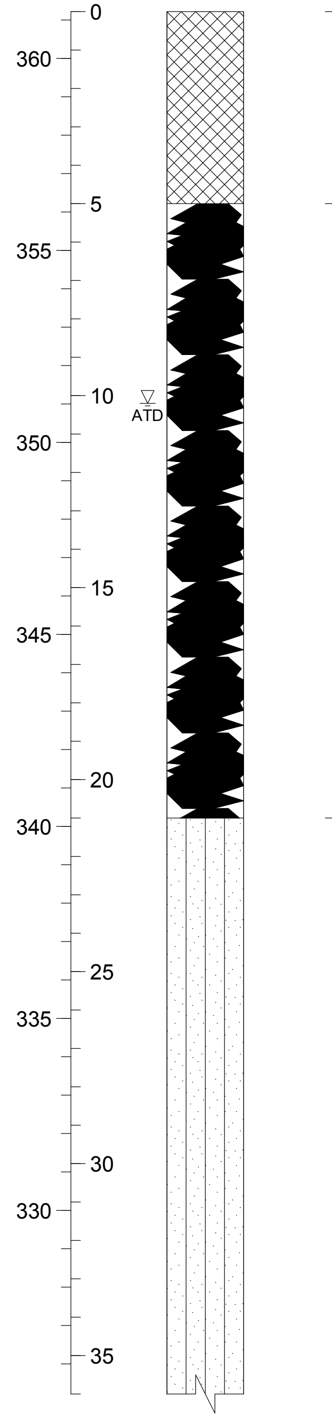
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 10.2 ft

LONGITUDE: -83.70877778

DRILL METHOD: CPT push ~ 0.2 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	8		15			QU=2.696 tsf
	14					QU=4.588 tsf
	33					QU=11.236 tsf
	23		28			QU=8.022 tsf
	24					
	38					
	38		32			
	27					
	18		25			
Coal Ash, very soft to medium stiff, slightly to medium plastic	12					
	8		22			QU=2.964 tsf
	6					QU=2.26 tsf
	5					QU=1.782 tsf
	3					QU=1.402 tsf
	3					QU=1.24 tsf
	3					QU=1.222 tsf
	3					QU=1.018 tsf
	2					QU=0.912 tsf
	2		22			QU=0.852 tsf
	3					QU=0.96 tsf
	3					QU=0.954 tsf
	3		21			QU=1.028 tsf
	3					QU=0.914 tsf
	2		23			QU=0.694 tsf
	2					QU=0.804 tsf
	3					QU=1.074 tsf
	9					
	21					
	17					
	18					
	17					
	14					
	8					
	5		19			QU=1.72 tsf
	5					QU=1.42 tsf
	6					QU=1.894 tsf
	9		27			QU=2.724 tsf
	11					QU=2.796 tsf
	12					QU=3.17 tsf
	12					QU=3.546 tsf
	14					QU=4.396 tsf
Silt, some sand, medium stiff to hard	16					QU=5.12 tsf
	25					QU=8.778 tsf
	37					
	36					
	30					
	23					
	17					
	23					
	22					
	27					
	28					
	22					QU=9.14 tsf
	30					
	28					
	20					
	25					
	21					
	20					
	20					
	21					
	30					
	29					
	21					
	20					
	34					
	39					
	37					
	23					
	26					
	29					

LOG OF CONE PENETRATION TEST PROBE

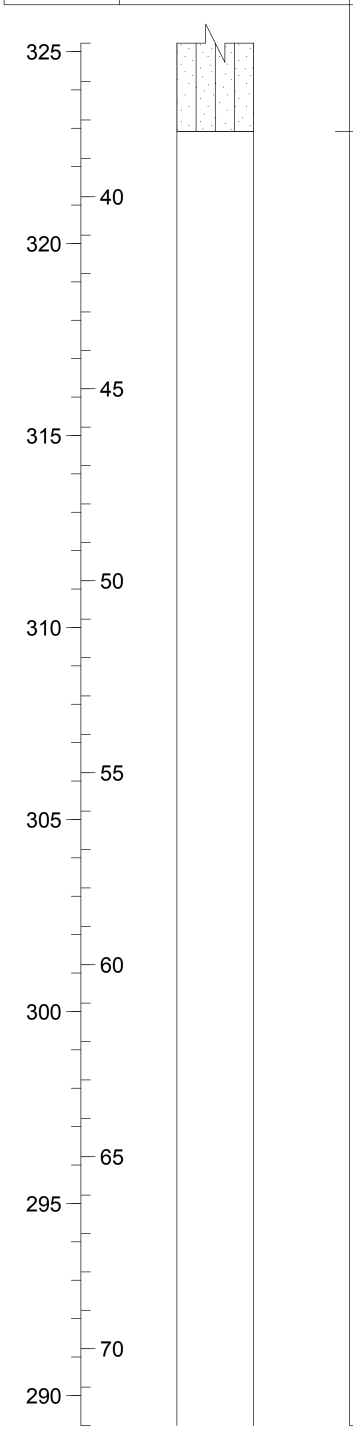
AP3 CPT-09SL

PROJECT: Former Arkwright Plant - AP3
DATE: 10/31/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 10.2 ft
DRILL METHOD: CPT push ~ 0.2 cm/s

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 361.22 ft
LATITUDE: 32.93099167
LONGITUDE: -83.70877778

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		CPT Terminated at 38.3 feet depth	45 48 43 40 39					

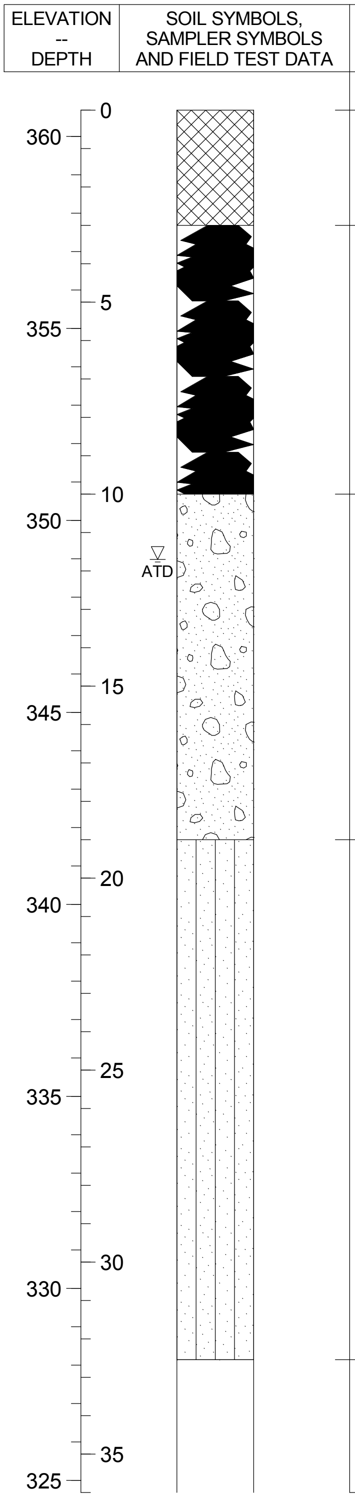


FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/22/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-10

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 360.68 ft
BORING LOCATION: AP3
LATITUDE: 32.93036667
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 11.7 ft
LONGITUDE: -83.70829167
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	8		17			QU=2.746 tsf
	9					QU=2.946 tsf
	12					QU=3.914 tsf
	33		34			QU=11.378 tsf
	21					
Coal Ash, very soft to medium stiff, slightly to medium plastic	12					QU=3.812 tsf
	9					QU=2.77 tsf
	9					QU=2.708 tsf
	8		30			QU=2.462 tsf
	8					QU=2.59 tsf
	8		29			QU=2.394 tsf
	6					QU=1.676 tsf
	5					QU=1.34 tsf
	3					QU=1.144 tsf
	3					QU=0.938 tsf
	3					QU=0.758 tsf
	2		18			QU=0.684 tsf
	2					QU=0.558 tsf
	2		21			QU=0.678 tsf
Sand, with gravel, medium dense to very dense	12					
	32					
	48		32			
	41					
	38					
	33					
	27					
	32		28			
	63					
	78		34			
	75					
	60					
	45					
	35					
	30					
	24					
	17					
	11		23			
Silt, some sand, soft to medium stiff	9					
	7		24			QU=2.338 tsf
	6					QU=2.074 tsf
	6					QU=1.786 tsf
	4		22			QU=1.658 tsf
	4					QU=1.258 tsf
	4		23			QU=1.034 tsf
	3					QU=0.966 tsf
	3		20			QU=0.872 tsf
	1					QU=0.388 tsf
	3		17			QU=0.18 tsf
	4					QU=0.178 tsf
	0					QU=0.14 tsf
	35					QU=0.16 tsf
	0					QU=0.136 tsf
	0					QU=0.128 tsf
	0					QU=0.116 tsf
	1					QU=0.242 tsf
	2					QU=0.688 tsf
	4					
	4					
	7					
	7					
	5					
	7					
	3					
	16					
CPT Terminated at 32.5 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

Page 1 of 1

AP3 CPT-11

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/30/17

ELEVATION: 360.80 ft

BORING LOCATION: AP3

LATITUDE: 32.92966667

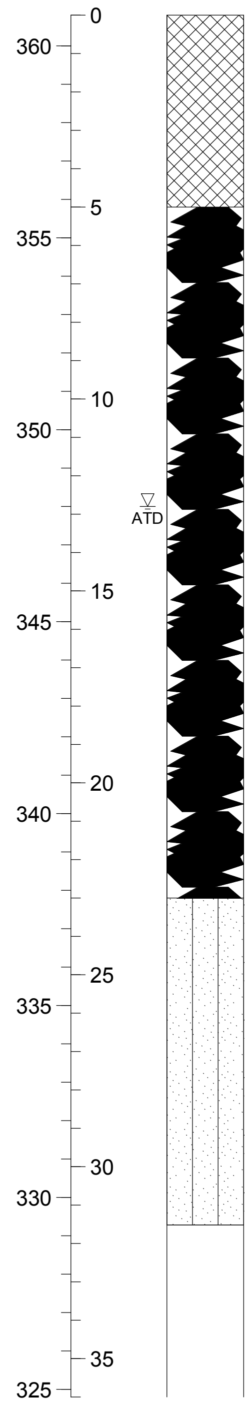
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 12.8 ft

LONGITUDE: -83.70786389

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA

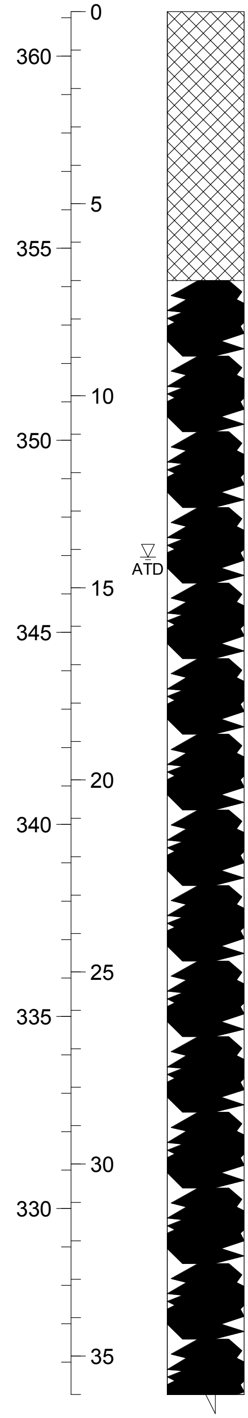


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	9		11			QU=3.01 tsf
	9					QU=3.296 tsf
	15					QU=5.134 tsf
	14		27			QU=4.704 tsf
	26					QU=9.058 tsf
	33					
	36		34			
	35					
	36		34			
Coal Ash, very soft to medium stiff, slightly to medium plastic	24					
	12					
	6		18			QU=1.9 tsf
	5					QU=1.626 tsf
	6					
	5					QU=1.938 tsf
	3					QU=1.404 tsf
	3					QU=0.944 tsf
	2					QU=0.674 tsf
	2		17			QU=0.492 tsf
	3					QU=1.334 tsf
	5					QU=1.53 tsf
	6		18			QU=2.032 tsf
	6					
	8		23			
	11					
	9					
	11					
	9					
	12		21			
	24					
	23		23			
	17					
	9					
	9					
	8					
	5					
	3		20			QU=1.01 tsf
	3					QU=1.188 tsf
	3		27			QU=0.782 tsf
	3					QU=0.804 tsf
	9					QU=2.592 tsf
	8		33			QU=2.196 tsf
	7					QU=1.78 tsf
	7		32			QU=2.094 tsf
	8					QU=2.218 tsf
Sand, with silt and some gravel, medium dense to very dense	9					QU=2.656 tsf
	9		31			QU=2.718 tsf
	10					QU=3.066 tsf
	11		34			QU=3.644 tsf
	11					QU=3.98 tsf
	13					QU=5 tsf
	27					
	36					
	66					
	64					
	59					
	70					
	72					
	72					
	68					
	66					
	74					
CPT Terminated at 31.5 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-12

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 361.16 ft
BORING LOCATION: AP3
LATITUDE: 32.92923333
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.2 ft
LONGITUDE: -83.70775833
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		SOIL FILL/GCL	3					QU=1.36 tsf
			8		10			QU=3.112 tsf
			17					QU=5.26 tsf
			14					QU=4.582 tsf
			26		29			QU=8.97 tsf
			36					
			27					
			53					
			65					
			66					
			38					
			27					
			24					
			27					
		Coal Ash, very soft to medium stiff, slightly to medium plastic	21					QU=7.704 tsf
			14					
			8					QU=2.842 tsf
			6					QU=2.19 tsf
			5					QU=1.65 tsf
			3					QU=1.312 tsf
			3					QU=0.886 tsf
			2					QU=0.752 tsf
			5					
			6					QU=2.156 tsf
			6					QU=2.07 tsf
			6					
			5					QU=1.61 tsf
			6		17			QU=2.022 tsf
			6					
			6		17			
			5					QU=1.51 tsf
			3					QU=1.046 tsf
			9		17			
			11					
			12		19			
			11					
			9					
			9		15			
			8					
			4		22			
			4					QU=1.364 tsf
			4					QU=1.208 tsf
			4		20			QU=1.35 tsf
			4					QU=1.27 tsf
			4		20			QU=1.206 tsf
			4					QU=1.484 tsf
			4		20			QU=1.082 tsf
			4					QU=1.052 tsf
			3		20			QU=0.82 tsf
			1					QU=0.378 tsf
			1					QU=0.218 tsf
			1					QU=0.18 tsf
			1					QU=0.316 tsf
			2					QU=0.696 tsf
			5					QU=1.602 tsf
			6					QU=1.8 tsf
			5					QU=1.606 tsf
			3					QU=1.066 tsf
			2					QU=0.66 tsf
			2					QU=0.542 tsf
			2					QU=0.258 tsf
			2					QU=0.242 tsf
			2					QU=0.332 tsf
			2					QU=0.538 tsf
			3					QU=0.65 tsf
			3					QU=0.804 tsf
			2					QU=0.712 tsf
			3					QU=0.806 tsf
			2					QU=0.77 tsf
			1					QU=0.402 tsf
			1					QU=0.464 tsf
			4					QU=1.86 tsf

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

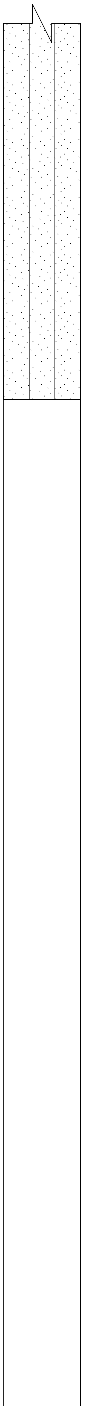
LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-12

PROJECT: Former Arkwright Plant - AP3
DATE: 10/30/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.2 ft
DRILL METHOD: CPT push ~ 2.0 cm/s

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 361.16 ft
LATITUDE: 32.92923333
LONGITUDE: -83.70775833

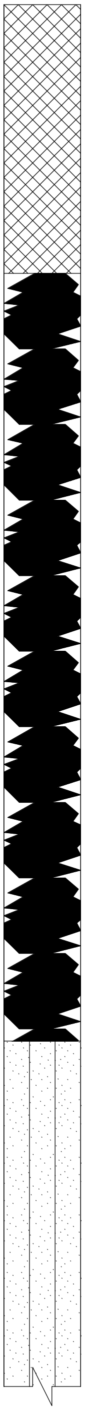
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
325		Sand, with silt and some gravel, medium dense to very dense	8					QU=3.506 tsf
			7					QU=2.438 tsf
			5					QU=1.788 tsf
			6					QU=2.87 tsf
			10					
			14					
			8					QU=3.96 tsf
40			5					QU=2.596 tsf
			9					
			14					
320			15					
			16					
			18					
			27					
			28					
			29					
			32					
45			32					
			41					
			36					
315		CPT Terminated at 45.8 feet depth						
50								
310								
55								
305								
60								
300								
65								
295								
70								
290								

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-13

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 360.27 ft
BORING LOCATION: AP3
LATITUDE: 32.92902778
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.3 ft
LONGITUDE: -83.70742222
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

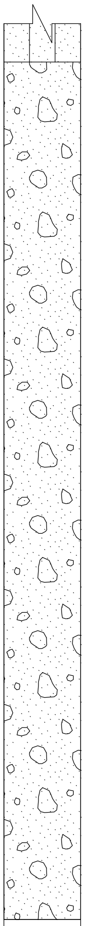


ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
360 — 0		SOIL FILL/GCL	3					QU=1.652 tsf
			8		19			QU=2.892 tsf
			11					QU=3.626 tsf
			9					QU=3.148 tsf
			27		19			
			30					
			44		29			
			54					
			50					
			33					
355 — 5			18					QU=6.57 tsf
			14					
			12					
			23					
		Coal Ash, very soft to medium stiff, slightly to medium plastic	23					
			15					
			9					QU=3.378 tsf
			8					QU=2.554 tsf
			8					QU=2.534 tsf
			8					
350 — 10			6					QU=2.316 tsf
			6					QU=2.084 tsf
			5					QU=1.426 tsf
			6					
			5		17			QU=1.756 tsf
			6					
			5					QU=1.952 tsf
			3		21			QU=1.192 tsf
	▽ ATD		3					QU=0.712 tsf
			2		18			QU=0.284 tsf
345 — 15			6					
			9		28			
			9					
			6					
			5					
			5					
			5					
			3		16			QU=0.996 tsf
			3					QU=0.738 tsf
			3		21			QU=0.862 tsf
340 — 20			3					QU=0.7 tsf
			1					QU=0.342 tsf
			1		20			QU=0.318 tsf
			1					QU=0.346 tsf
			1		20			QU=0.348 tsf
			3					QU=0.84 tsf
			7					QU=1.824 tsf
			10		27			
			6					QU=2.166 tsf
			6					QU=1.924 tsf
335 — 25			6					QU=1.928 tsf
			6					QU=1.786 tsf
			5					QU=1.848 tsf
			6					QU=2.032 tsf
		Sand, with silt and some gravel, medium dense to very dense	7					QU=2.348 tsf
			13					QU=4.752 tsf
			9					QU=3.354 tsf
			9					QU=3.408 tsf
			10					QU=3.896 tsf
			9					QU=3.49 tsf
330 — 30			7					QU=3.066 tsf
			10					QU=4.2 tsf
			10					QU=4.622 tsf
			9					QU=3.55 tsf
			8					QU=3.856 tsf
			8					
			9					QU=4.018 tsf
			8					QU=3.636 tsf
			9					
			8					QU=3.64 tsf
325 — 35			8					
			8					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-13

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/30/17
ELEVATION: 360.27 ft
BORING LOCATION: AP3
LATITUDE: 32.92902778
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.3 ft
LONGITUDE: -83.70742222
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			7					QU=3.92 tsf
			7					QU=3.852 tsf
		Sand, with gravel, medium dense to very dense	8					
			8					
			10					
			10					
			12					
			14					
320 40			15					
			17					
			13					
			16					
			17					
			15					
			15					
			18					
			21					
			20					
315 45			19					
			17					
			16					
			16					
			18					
			17					
			13					
			15					
			16					
			13					QU=8.218 tsf
310 50			9					QU=5.692 tsf
			11					
			14					
			15					
			20					
			27					
			26					
			24					
			22					
			23					
305 55			24					
			24					
			23					
			26					
			24					
			24					
			27					
			28					
			23					
		CPT Terminated at 59.3 feet depth						
300 60								
295 65								
290 70								

LOG OF CONE PENETRATION TEST PROBE

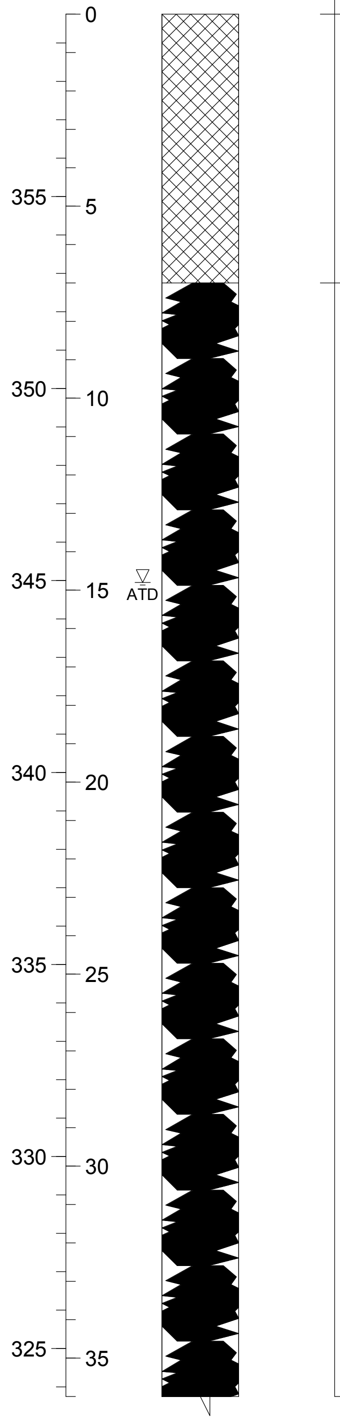
AP3 CPT-14

Page 1 of 2

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 359.75 ft
BORING LOCATION: AP3
LATITUDE: 32.92851944
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.8 ft
LONGITUDE: -83.70735833
DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA

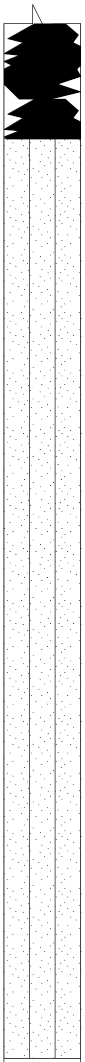


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					QU=1.506 tsf
	12					QU=4.254 tsf
	15		25			QU=4.926 tsf
	15					QU=4.67 tsf
	24		26			QU=8.754 tsf
	36					
	41		33			
	30					QU=10.386 tsf
	27					
	24					
	21					
	15		20			
	14					
	23					
Coal Ash, very soft to soft, slightly to medium plastic	20		25			
	8					QU=2.546 tsf
	6		23			QU=2.324 tsf
	8					
	8		20			
	8					
	6					
	5					
	5		19			
	5					QU=1.494 tsf
	3		22			QU=1.416 tsf
	6					
	5					
	5		24			
	3					QU=1.29 tsf
	2		21			QU=0.476 tsf
	2					QU=0.284 tsf
	2					QU=0.396 tsf
	3		20			QU=0.818 tsf
	3					QU=0.954 tsf
	5		26			QU=1.522 tsf
	3					QU=1.354 tsf
	5					QU=1.568 tsf
	5		26			QU=1.604 tsf
	3					QU=0.832 tsf
	2		23			QU=0.664 tsf
	3					QU=0.732 tsf
	3					QU=0.698 tsf
	1		23			QU=0.572 tsf
	3					QU=0.78 tsf
	3		24			QU=0.708 tsf
	1					QU=0.492 tsf
	1					QU=0.366 tsf
	1		20			QU=0.468 tsf
	1					QU=0.364 tsf
	1		22			QU=0.46 tsf
	1					QU=0.33 tsf
	1					QU=0.362 tsf
	1					QU=0.302 tsf
	1					QU=0.324 tsf
	2					QU=0.652 tsf
	4					QU=1.378 tsf
	5					QU=1.662 tsf
	5					QU=1.72 tsf
	3					QU=1.26 tsf
	2					QU=0.942 tsf
	4					
	5					
	3					QU=1.67 tsf
	2					QU=0.77 tsf
	3					QU=1.318 tsf
	4					QU=1.538 tsf
	4					QU=1.474 tsf
	3					QU=1.394 tsf
	5					QU=1.832 tsf
	6					QU=2.144 tsf
	6					QU=2.118 tsf
	5					QU=1.842 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-14

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 359.75 ft
BORING LOCATION: AP3
LATITUDE: 32.92851944
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 14.8 ft
LONGITUDE: -83.70735833
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			5					QU=1.736 tsf
			5					QU=1.984 tsf
			6					QU=2.168 tsf
			6					QU=2.15 tsf
			5					QU=1.952 tsf
			5					QU=1.85 tsf
		Sand, with silt and some gravel, medium dense to very dense	4					QU=1.536 tsf
320 -- 40			8					
			11					
			12					
			9					QU=5.052 tsf
			9					QU=4.262 tsf
			9					
			9					
			10					
			11					QU=6.438 tsf
			11					QU=5.936 tsf
315 -- 45			11					
			11					
			11					
			11					QU=5.5 tsf
			11					QU=6.004 tsf
			12					QU=7.188 tsf
			14					
			14					QU=7.794 tsf
			21					
			17					
310 -- 50			21					
			23					
			19					
			16					
			21					
			24					
			31					
			38					
			39					
			39					
305 -- 55			33					
			23					
			23					
			29					
			28					
			22					
			22					
			23					
			19					
			17					
300 -- 60			13					
			12					QU=7.896 tsf
			17					
			18					
			22					
			27					
			24					
		CPT Terminated at 63.0 feet depth						
295 -- 65								
290 -- 70								

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

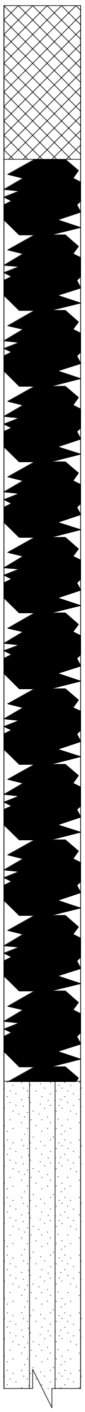
Page 1 of 2

AP3 CPT-15

PROJECT: Former Arkwright Plant - AP3
DATE: 10/27/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 15.1 ft
DRILL METHOD: CPT push ~ 2.0 cm/s

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 360.10 ft
LATITUDE: 32.92838333
LONGITUDE: -83.70701389

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
360 - 0		SOIL FILL/GCL	5					QU=1.874 tsf
			11					QU=3.524 tsf
			11		27			QU=3.452 tsf
			23					
			32		27			
			23					
			17		25			QU=5.66 tsf
			12					QU=3.874 tsf
		Coal Ash, very soft to soft, slightly to medium plastic	6					QU=2.24 tsf
			3		21			QU=1.308 tsf
355 - 5			3					QU=1.022 tsf
			3					QU=0.858 tsf
			3		25			QU=0.842 tsf
			3					QU=0.938 tsf
			2		27			QU=0.73 tsf
			2					QU=0.68 tsf
			3					QU=1.228 tsf
			8		27			
			8					
			6		19			
350 - 10			6					
			5		16			QU=1.858 tsf
			5					QU=1.76 tsf
			5					QU=1.468 tsf
			6		20			
			6					
			6					
			5		22			QU=1.612 tsf
			3					QU=1.45 tsf
			3		20			QU=1.162 tsf
345 - 15	▽ ATD		3					QU=0.918 tsf
			2					QU=0.53 tsf
			5		21			QU=1.656 tsf
			5					QU=1.418 tsf
			5		27			QU=1.272 tsf
			5					QU=1.352 tsf
			5					QU=1.658 tsf
			3		25			QU=0.988 tsf
			3					QU=0.74 tsf
			5		23			QU=1.408 tsf
340 - 20			3					QU=1.168 tsf
			4					QU=1.174 tsf
			4		24			QU=1.334 tsf
			3					QU=1.012 tsf
			1		21			QU=0.488 tsf
			1					QU=0.522 tsf
			1		22			QU=0.478 tsf
			1					QU=0.432 tsf
			1		25			QU=0.506 tsf
			1					QU=0.478 tsf
335 - 25			1					QU=0.718 tsf
			5					QU=1.75 tsf
			7					QU=2.574 tsf
			7					QU=2.342 tsf
			7					QU=2.14 tsf
			7					QU=2.482 tsf
		Sand, with silt and some gravel, medium dense to dense	8					QU=3.074 tsf
			10					QU=3.524 tsf
			8					QU=2.89 tsf
			14					QU=5.862 tsf
330 - 30			23					
			21					
			18					QU=7.856 tsf
			19					
			17					
			17					
			16					
			17					
			21					
			23					
325 - 35			23					
			23					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-15

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/27/17

ELEVATION: 360.10 ft

BORING LOCATION: AP3

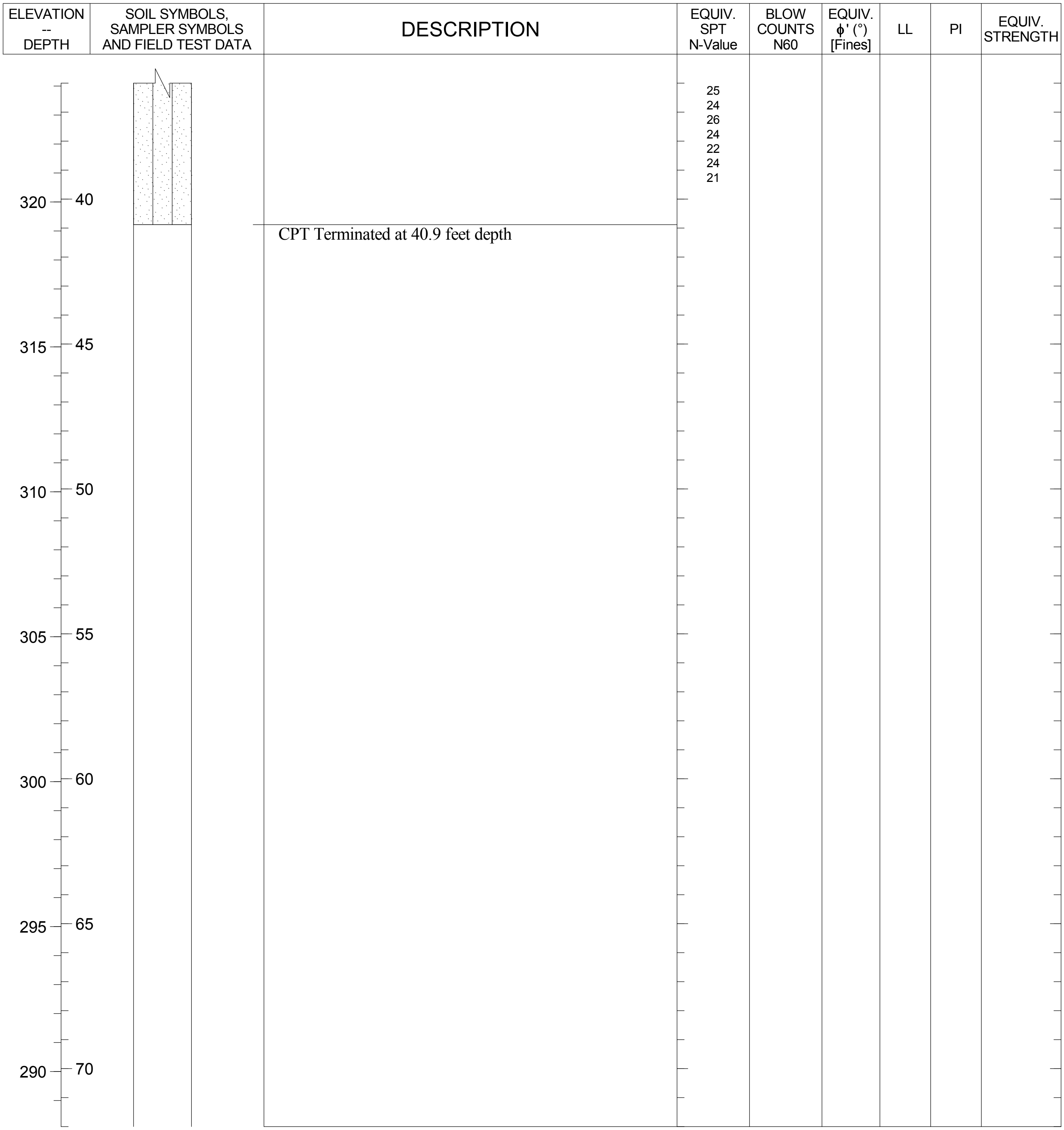
LATITUDE: 32.92838333

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 15.1 ft

LONGITUDE: -83.70701389

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-16

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/25/17

ELEVATION: 359.02 ft

BORING LOCATION: AP3

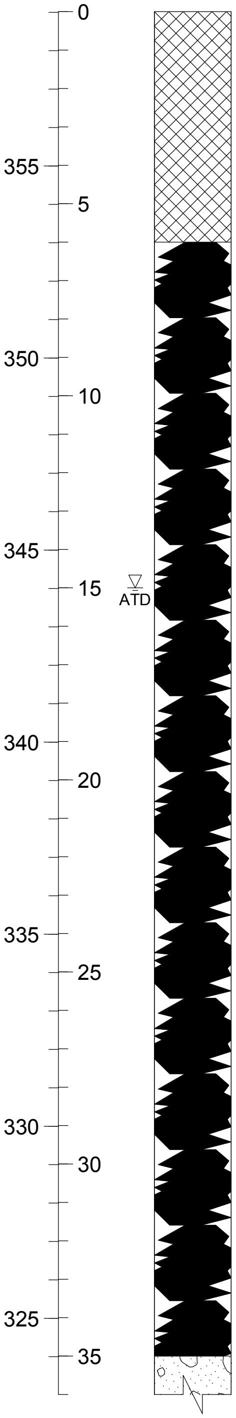
LATITUDE: 32.92783611

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 15.0 ft

LONGITUDE: -83.706975

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	8					QU=2.532 tsf
	6					QU=2.3 tsf
	21		27			
	23					QU=7.896 tsf
	24		24			QU=8.734 tsf
	24					
	21		19			
	30					
	29					
	21					
	9					QU=3.22 tsf
Coal Ash, very soft to soft, slightly to medium plastic	8					
	9					
	5					QU=1.97 tsf
	5					QU=1.758 tsf
	9					
	9					
	6					
	6					
	5					
	5					QU=1.794 tsf
	3					QU=1.416 tsf
	8					
	9		21			
	6					
	3					QU=0.878 tsf
	2		17			QU=0.672 tsf
	2					QU=0.498 tsf
	0		15			QU=0.234 tsf
	0					QU=0.178 tsf
	2		14			QU=0.494 tsf
	6					
	5		23			
	5					
	3					QU=1.14 tsf
	2					QU=0.596 tsf
	3		16			QU=1.418 tsf
	3					QU=1.068 tsf
	2		16			QU=0.708 tsf
	2					QU=0.65 tsf
	3					QU=1.018 tsf
	3		20			QU=0.942 tsf
	1					QU=0.552 tsf
	3		19			QU=0.646 tsf
	3					QU=0.616 tsf
	3		22			QU=1.22 tsf
	3					QU=0.844 tsf
	3		21			QU=0.71 tsf
	3					QU=0.672 tsf
	3					QU=0.78 tsf
	1					QU=0.346 tsf
	1					QU=0.47 tsf
	2					QU=0.928 tsf
	1					QU=0.406 tsf
	1					QU=0.338 tsf
	1					QU=0.402 tsf
	1					QU=0.466 tsf
	1					QU=0.45 tsf
	2					QU=0.646 tsf
	1					QU=0.506 tsf
	1					QU=0.54 tsf
	2					QU=0.62 tsf
	2					QU=0.576 tsf
	2					QU=0.498 tsf
	2					QU=1.002 tsf
	3					QU=1.162 tsf
	3					QU=1.136 tsf
	3					QU=1.104 tsf
	5					QU=2.098 tsf
Sand, with gravel and some silt, medium dense to very	16					
	14					QU=6.352 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-16

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/25/17

ELEVATION: 359.02 ft

BORING LOCATION: AP3

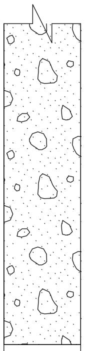
LATITUDE: 32.92783611

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 15.0 ft

LONGITUDE: -83.706975

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



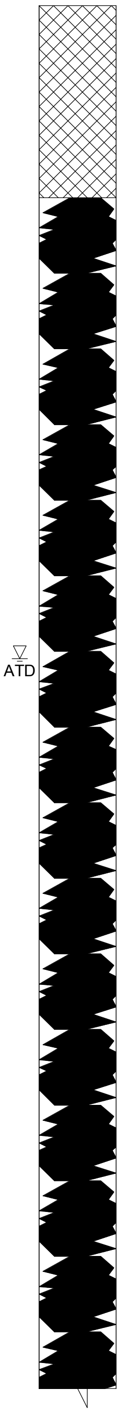
ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		dense	10					QU=3.988 tsf
			9					QU=3.67 tsf
			10					QU=4.406 tsf
			8					QU=3.604 tsf
			6					QU=3.022 tsf
320			10					QU=4.634 tsf
			14					QU=6.312 tsf
40			15					QU=8.15 tsf
			17					
			25					
			23					
			19					
			32					
			32					
			38					
315			50					
		CPT Terminated at 44.4 feet depth	53					
45								
310								
50								
305								
55								
300								
60								
295								
65								
290								
70								

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-17A

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/27/17
ELEVATION: 360.00 ft
BORING LOCATION: AP3
LATITUDE: 32.92771389
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 17.0 ft
LONGITUDE: -83.70657778
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



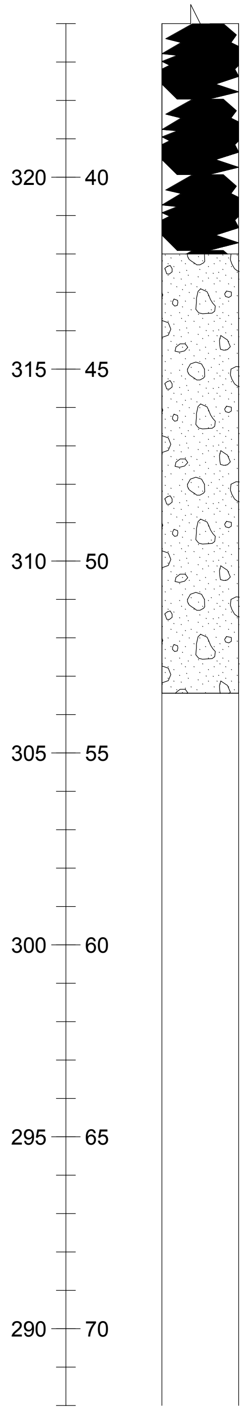
ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
360 — 0		SOIL FILL/GCL	3					
			8					QU=2.614 tsf
			12		19			QU=3.936 tsf
			24					
			33		28			
			27					
			21					
			15		31			QU=4.744 tsf
			11					QU=3.274 tsf
			6		25			QU=2.12 tsf
355 — 5		Coal Ash, very soft to medium stiff, slightly to medium plastic	5					QU=1.624 tsf
			5					QU=1.344 tsf
			5		22			QU=1.538 tsf
			6					QU=1.576 tsf
			5		22			QU=1.324 tsf
			6					QU=1.652 tsf
			9					QU=3.286 tsf
			20		23			
			18					QU=6.014 tsf
			12		26			QU=4.186 tsf
350 — 10			12					
			12					
			11					
			9					
			8					QU=2.518 tsf
			8					
			8					QU=2.784 tsf
			8					
			6					QU=1.88 tsf
			6					QU=1.868 tsf
345 — 15			5					QU=1.748 tsf
			5					QU=1.206 tsf
			3		15			QU=0.91 tsf
			3					QU=0.68 tsf
	▽ ATD		2		16			QU=0.446 tsf
			3					QU=0.91 tsf
			5					QU=1.154 tsf
			5		23			QU=1.332 tsf
			4					QU=1.82 tsf
			6		22			QU=1.876 tsf
340 — 20			6					
			6					QU=1.872 tsf
			6		19			QU=1.938 tsf
			5					
			5		17			
			4					QU=1.772 tsf
			4		16			QU=1.67 tsf
			3					QU=0.814 tsf
			3		18			QU=0.696 tsf
			2					QU=0.674 tsf
335 — 25			2					QU=0.712 tsf
			2					QU=0.548 tsf
			1					QU=0.442 tsf
			1					QU=0.538 tsf
			2					QU=0.576 tsf
			3					QU=1.09 tsf
			2					QU=0.796 tsf
			2					QU=0.608 tsf
			2					QU=0.532 tsf
			1					QU=0.384 tsf
330 — 30			1					QU=0.344 tsf
			1					QU=0.462 tsf
			2					QU=0.754 tsf
			2					QU=0.59 tsf
			2					QU=0.816 tsf
			2					QU=0.76 tsf
			2					QU=0.812 tsf
			2					QU=0.754 tsf
			2					QU=1.004 tsf
			1					QU=0.564 tsf
325 — 35			1					QU=0.43 tsf
			2					QU=0.53 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-17A

PROJECT: Former Arkwright Plant - AP3
DATE: 10/27/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 17.0 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 360.00 ft
LATITUDE: 32.92771389
LONGITUDE: -83.70657778



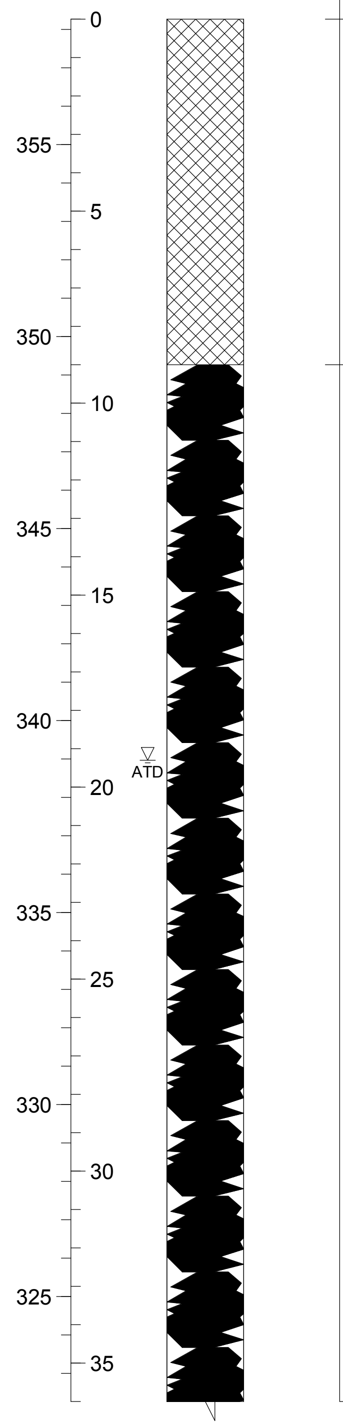
ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			2					QU=0.78 tsf
			3					QU=1.12 tsf
			4					QU=1.348 tsf
			5					QU=1.584 tsf
			4					QU=1.296 tsf
			4					QU=1.28 tsf
			4					QU=1.43 tsf
			4					QU=1.296 tsf
			3					QU=1.096 tsf
			3					QU=1.472 tsf
			4					QU=1.812 tsf
			4					QU=2.028 tsf
		Sand, with gravel and some silt, medium dense to very dense	6					QU=3.086 tsf
			7					QU=3.764 tsf
			9					
			12					
			12					
			14					
			14					
			20					
			23					
			20					
			22					
			25					
			27					
			29					
			35					
			36					
			37					
			37					
			39					
			40					
			46					
			45					
			46					
		CPT Terminated at 53.4 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-18A

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 358.27 ft
BORING LOCATION: AP3
LATITUDE: 32.92718611
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 19.3 ft
LONGITUDE: -83.70663611
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



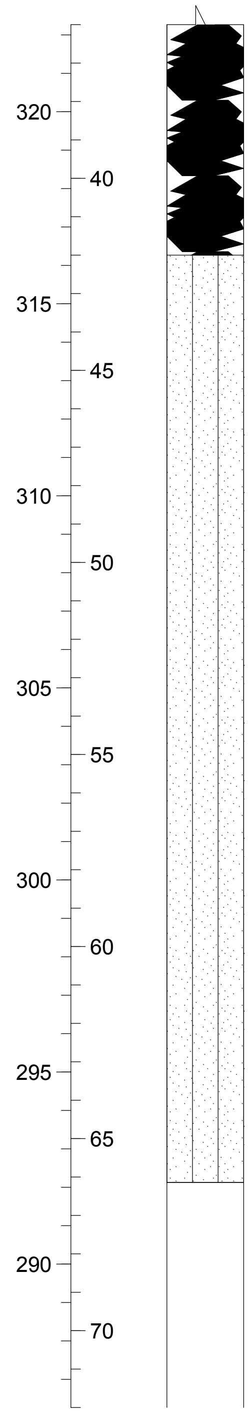
DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	6					
	24		17			
	42					
	33		30			
	20					QU=6.668 tsf
	11					QU=3.578 tsf
	15		23			
	21					
	12		28			QU=4.614 tsf
	20					
	24					
	32					
	36					
	36					
	41					
	36					
	27					
Coal Ash, very soft to soft, slightly to medium plastic	12					QU=4.302 tsf
	9					
	9					
	9					
	6		17			
	6					
	6					
	5					QU=1.586 tsf
	3					QU=1.072 tsf
	3					QU=0.842 tsf
	5					QU=1.85 tsf
	3					QU=0.946 tsf
	2					QU=0.484 tsf
	0		9			QU=0.27 tsf
	2					QU=0.57 tsf
	8					
	8		23			QU=2.34 tsf
	5					QU=1.474 tsf
	3		20			QU=0.662 tsf
	5					QU=1.416 tsf
	5					QU=1.41 tsf
	4		21			QU=1.534 tsf
	4					QU=1.49 tsf
	4		20			QU=1.59 tsf
	4					QU=1.396 tsf
	4					QU=1.442 tsf
	4		18			QU=1.302 tsf
	4					QU=1.416 tsf
	4		16			QU=1.28 tsf
	4					QU=1.404 tsf
	4		16			QU=1.298 tsf
	4					QU=1.178 tsf
	2					QU=1.028 tsf
	2					QU=0.828 tsf
	4					QU=1.188 tsf
	4					QU=1.094 tsf
	2					QU=0.66 tsf
	2					QU=0.5 tsf
	2					QU=0.724 tsf
	1					QU=0.466 tsf
	2					QU=0.698 tsf
	2					QU=0.682 tsf
	2					QU=0.782 tsf
	1					QU=0.504 tsf
	2					QU=0.614 tsf
	1					QU=0.438 tsf
	1					QU=0.352 tsf
	1					QU=0.364 tsf
	1					QU=0.37 tsf
	1					QU=0.41 tsf
	1					QU=0.326 tsf
	2					QU=0.444 tsf
	1					QU=0.358 tsf
	1					QU=0.36 tsf

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-18A

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/25/17
ELEVATION: 358.27 ft
BORING LOCATION: AP3
LATITUDE: 32.92718611
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 19.3 ft
LONGITUDE: -83.70663611
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



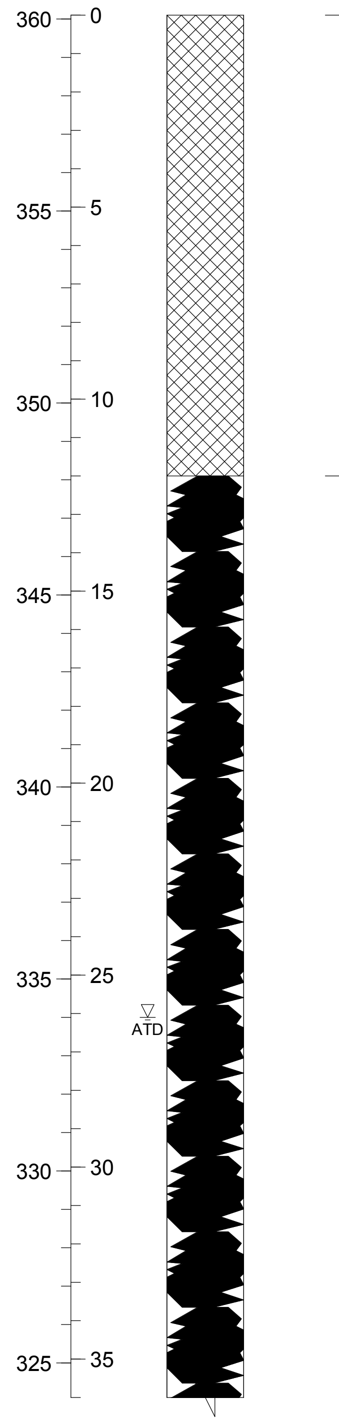
DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. φ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	1					QU=0.318 tsf
	2					QU=0.468 tsf
	2					QU=0.598 tsf
	2					QU=0.716 tsf
	2					QU=0.744 tsf
	2					QU=0.63 tsf
	4					
	3					QU=1.236 tsf
	1					QU=0.63 tsf
	2					QU=1.06 tsf
	4					QU=2.064 tsf
	5					QU=2.332 tsf
Sand, with silt and some gravel, medium dense to dense	9					
	11					
	13					
	11					
	11					
	9					
	11					
	13					
	14					
	17					
	20					
	20					
	19					
	25					
	25					
	21					
	16					
	14					
	15					
	15					
	17					
	19					
	20					
	12					QU=7.712 tsf
	8					QU=4.89 tsf
	7					QU=4 tsf
	9					
	12					QU=7.692 tsf
	17					
	17					
	23					
	21					
	18					
	19					
	22					
	20					
	17					
	15					
	16					
	22					
	28					
	25					
	25					
	31					
	44					
	45					
	43					
	39					
CPT Terminated at 66.1 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-19

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 360.10 ft
BORING LOCATION: AP3
LATITUDE: 32.92665278
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 26.1 ft
LONGITUDE: -83.70636389
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	11		15			QU=3.746 tsf
	11					QU=3.872 tsf
	30					
	42					
	38					
	47		26			
	63					
	57					
	59		26			
	50					
	33					
	26					QU=9.112 tsf
	39					
	39					
	56					
	47					
	47					
	38					QU=13.032 tsf
	29		20			
	32					
	38		24			
	47					
	45		23			
Coal Ash, very soft to soft, slightly to medium plastic	18					QU=5.798 tsf
	12					QU=4.016 tsf
	9					
	8					QU=2.764 tsf
	5					QU=1.712 tsf
	8					
	6					QU=1.662 tsf
	5					QU=1.588 tsf
	3					QU=0.774 tsf
	2					QU=0.566 tsf
	2		12			QU=0.46 tsf
	5					QU=1.324 tsf
	5		17			QU=1.19 tsf
	3					QU=0.942 tsf
	3					QU=0.646 tsf
	3		17			QU=0.714 tsf
	4					QU=1.4 tsf
	6		23			QU=1.844 tsf
	6					QU=1.882 tsf
	4					QU=1.4 tsf
	4		20			QU=1.134 tsf
	3					QU=1.032 tsf
	3		17			QU=0.634 tsf
	1					QU=0.44 tsf
	4		18			QU=1.062 tsf
	4					QU=1.522 tsf
	4					QU=1.458 tsf
	4					QU=1.546 tsf
	5					QU=1.738 tsf
	5					QU=1.648 tsf
	3					QU=1.372 tsf
	3					QU=1.392 tsf
	3					QU=1.234 tsf
	3					QU=1.408 tsf
	3					QU=0.976 tsf
	2					QU=0.61 tsf
	2					QU=0.55 tsf
	2					QU=0.638 tsf
	2					QU=0.604 tsf
	1					QU=0.474 tsf
	1					QU=0.4 tsf
	1					QU=0.482 tsf
	1					QU=0.516 tsf
	1					QU=0.418 tsf
	4					QU=1.358 tsf
	5					QU=1.736 tsf
	9					QU=4.302 tsf
	7					QU=2.888 tsf

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

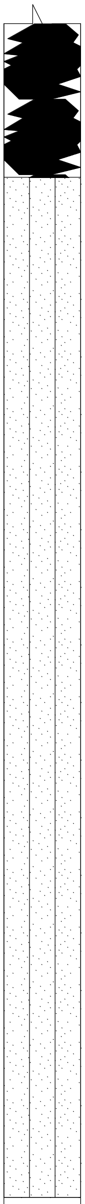
LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-19

PROJECT: Former Arkwright Plant - AP3
DATE: 10/26/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 26.1 ft
DRILL METHOD: CPT push ~ 2.0 cm/s

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 360.10 ft
LATITUDE: 32.92665278
LONGITUDE: -83.70636389

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			8					QU=3.832 tsf
			7					QU=2.522 tsf
			6					QU=2.114 tsf
			7					QU=2.824 tsf
			7					QU=2.776 tsf
			7					QU=2.814 tsf
			7					QU=3.284 tsf
			7					QU=3.458 tsf
320 -- 40		Sand, with silt and some gravel, medium dense to dense	8					QU=3.648 tsf
			14					
			10					QU=4.956 tsf
			8					QU=4.472 tsf
			8					
			7					QU=3.768 tsf
			8					QU=4.082 tsf
			7					QU=3.954 tsf
			8					QU=3.796 tsf
			7					QU=3.238 tsf
315 -- 45			8					QU=4.134 tsf
			7					QU=3.508 tsf
			5					QU=2.806 tsf
			5					QU=2.738 tsf
			8					
			10					
			11					
			10					
			10					QU=5.702 tsf
			10					
310 -- 50			10					
			12					
			12					
			11					
			11					
			12					
			12					
			11					
			10					
			10					QU=6.318 tsf
305 -- 55			10					
			9					
			8					QU=4.914 tsf
			8					QU=5.19 tsf
			9					
			9					
			10					
			12					
			11					
			11					QU=8.004 tsf
300 -- 60			9					QU=6.068 tsf
			9					QU=5.776 tsf
			10					QU=7.194 tsf
			9					QU=6.694 tsf
			8					QU=5.678 tsf
			5					QU=3.502 tsf
			7					
			8					
			8					
			9					
295 -- 65			9					QU=7.036 tsf
			12					
			19					
		CPT Terminated at 66.6 feet depth						
290 -- 70								

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-20

PROJECT: Former Arkwright Plant - AP3

DATE: 10/26/17

BORING LOCATION: AP3

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 24.0 ft

DRILL METHOD: CPT push ~ 2.0 cm/s

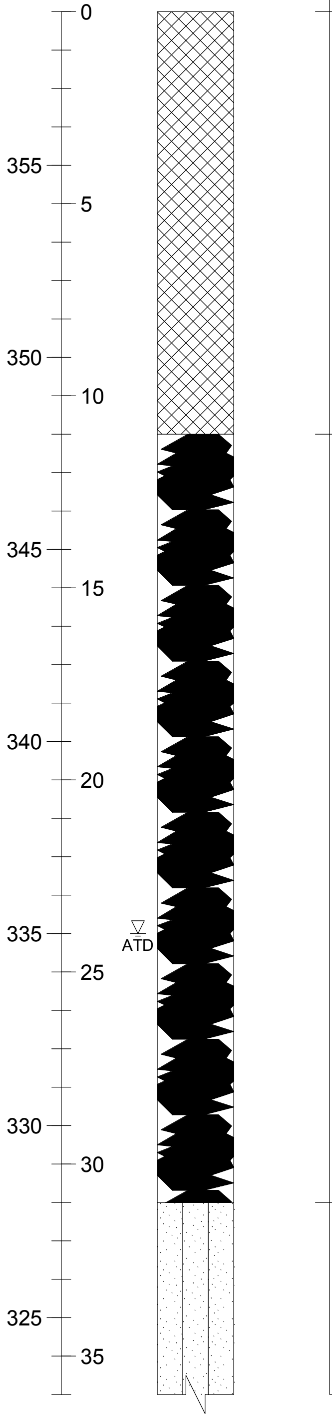
PROJECT NUMBER: DK9201IW.5000

ELEVATION: 359.00 ft

LATITUDE: 32.92685833

LONGITUDE: -83.70596944

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

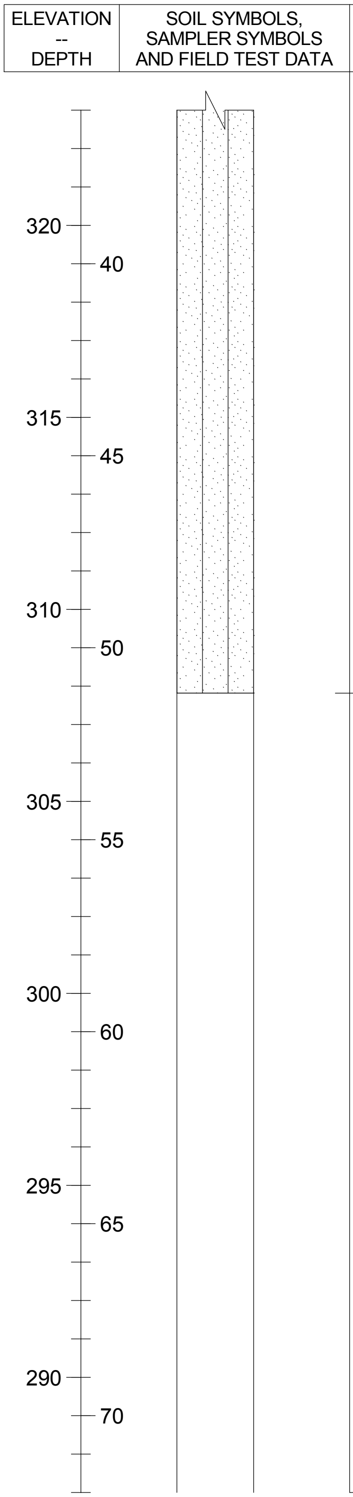


ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		SOIL FILL/GCL	3					
			11		14			QU=3.62 tsf
			17					QU=5.446 tsf
			36					
			33		32			
			39					
			41		30			
			27					
			17					QU=5.508 tsf
			15					QU=5.306 tsf
			21					
			23		28			QU=7.338 tsf
			24					
			36					
			35		33			
			69					
			66		36			
			45					
			32		33			
			17					
			12		25			
			11					
		Coal Ash, very soft to soft, slightly to medium plastic	9					
			9					
			8					QU=2.53 tsf
			6					QU=2.262 tsf
			6					
			5					QU=1.302 tsf
			2					QU=0.588 tsf
			5		19			QU=1.586 tsf
			6					
			6		20			QU=1.734 tsf
			3					QU=0.906 tsf
			3		21			QU=0.964 tsf
			6					QU=1.912 tsf
			6					QU=2.08 tsf
			5		24			QU=1.454 tsf
			5					QU=1.556 tsf
			3		18			QU=0.864 tsf
			1					QU=0.4 tsf
			1					QU=0.45 tsf
			4		21			QU=1.47 tsf
			4					QU=1.586 tsf
			4		21			QU=1.326 tsf
			3					QU=0.794 tsf
			3		18			QU=0.644 tsf
			3					QU=0.516 tsf
			1		17			QU=0.35 tsf
			1					QU=0.334 tsf
			1					QU=0.324 tsf
			1					QU=0.342 tsf
			1					QU=0.264 tsf
			1					QU=0.346 tsf
			1					QU=0.506 tsf
			1					QU=0.51 tsf
			3					QU=1.526 tsf
			3					QU=1.226 tsf
			3					QU=1.4 tsf
			4					QU=1.722 tsf
			3					QU=1.238 tsf
			10					
			11					
		Sand, with silt and some gravel, medium dense to dense	10					
			8					
			10					
			10					
			10					
			10					
			10					
			9					
			9					
			10					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-20

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 359.00 ft
BORING LOCATION: AP3
LATITUDE: 32.92685833
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 24.0 ft
LONGITUDE: -83.70596944
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



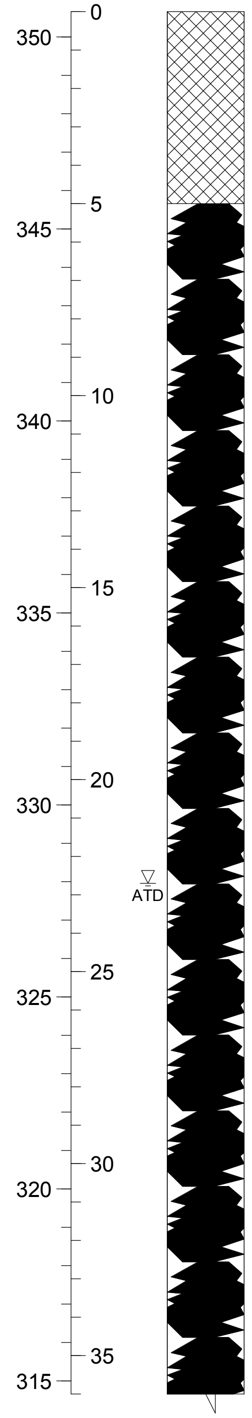
DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	10					
	10					
	9					
	9					
	11					
	13					
	13					
	16					
	16					
	16					
	14					
	14					
	13					QU=7.208 tsf
	13					QU=7.472 tsf
	14					
	15					
	17					
	16					
	15					
	16					
	17					
	17					
	24					
	26					
	22					
	27					
	31					
	35					
	32					
	37					
CPT Terminated at 51.2 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-21

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/24/17
ELEVATION: 350.66 ft
BORING LOCATION: AP3
LATITUDE: 32.925875
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 22.7 ft
LONGITUDE: -83.70625556
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH / SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	6		21			QU=2.5 tsf
	8					QU=2.612 tsf
	14					QU=4.862 tsf
	18		28			
	18					QU=6.512 tsf
	15		30			QU=5.188 tsf
	11					QU=3.56 tsf
	11					
	11					
Coal Ash, very soft to soft, slightly to medium plastic	11		20			QU=3.518 tsf
	8					QU=2.516 tsf
	6		28			QU=2.226 tsf
	3					QU=1.098 tsf
	3		25			QU=0.99 tsf
	3					QU=1.156 tsf
	3		23			QU=1.144 tsf
	3					QU=1.28 tsf
	5					QU=1.878 tsf
	6		27			
	5					QU=1.862 tsf
	3		23			QU=1.446 tsf
	6					
	6					
	3		25			QU=1.126 tsf
	3					QU=1.234 tsf
	3		26			QU=1.446 tsf
	5					
	5					
	3		27			QU=1.324 tsf
	3					QU=1.18 tsf
	3		23			QU=0.91 tsf
	2					QU=0.606 tsf
	2					QU=0.73 tsf
	2		24			QU=0.724 tsf
	2					QU=0.786 tsf
	2		26			QU=0.866 tsf
	3					QU=0.934 tsf
	3					QU=0.986 tsf
	2		25			QU=0.506 tsf
	2					QU=0.368 tsf
	0		17			QU=0.324 tsf
	0					QU=0.302 tsf
	1					QU=0.32 tsf
	1		20			QU=0.286 tsf
	1					QU=0.278 tsf
	1		23			QU=0.324 tsf
	1					QU=0.49 tsf
	3		28			QU=1.016 tsf
	3					QU=0.758 tsf
	3					QU=0.86 tsf
	5					QU=1.33 tsf
	5					QU=1.488 tsf
	5					QU=1.792 tsf
	5					QU=1.434 tsf
	4					QU=1.044 tsf
	4					QU=0.99 tsf
	4					QU=0.85 tsf
	3					QU=0.846 tsf
	3					QU=1.236 tsf
	3					QU=0.854 tsf
	4					QU=1.434 tsf
	4					QU=1.282 tsf
	4					QU=1.24 tsf
	4					QU=1.58 tsf
	4					QU=1.356 tsf
	5					QU=1.796 tsf
	10					QU=4.19 tsf
	8					QU=2.62 tsf
	6					QU=2.032 tsf
	5					QU=1.986 tsf
	5					QU=1.788 tsf

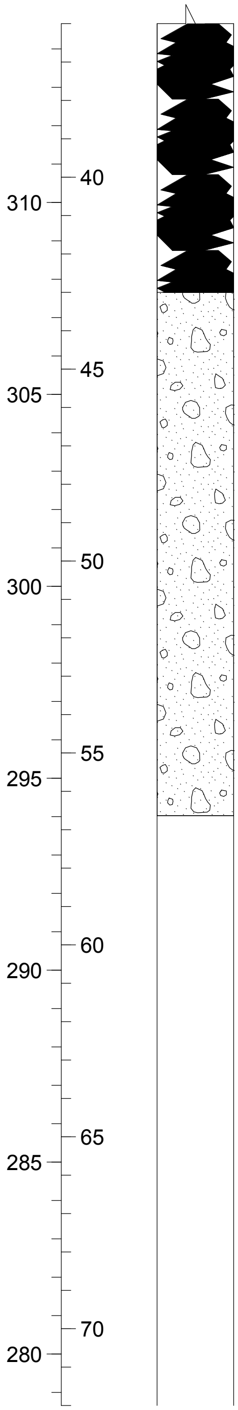
LOG OF CONE PENETRATION TEST PROBE

Page 2 of 2

AP3 CPT-21

PROJECT: Former Arkwright Plant - AP3
DATE: 10/24/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 22.7 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 350.66 ft
LATITUDE: 32.925875
LONGITUDE: -83.70625556

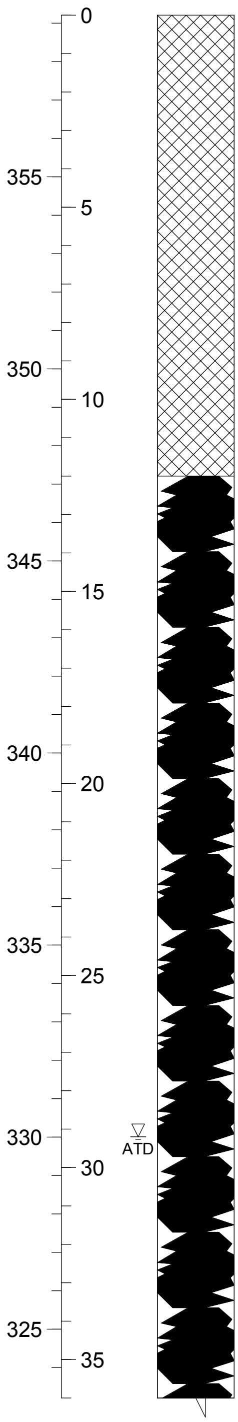


ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			3					QU=1.024 tsf
			3					QU=0.86 tsf
			3					QU=0.812 tsf
			3					QU=0.924 tsf
			4					QU=1.23 tsf
			4					QU=1.192 tsf
			4					QU=1.248 tsf
			3					QU=0.968 tsf
			3					QU=0.866 tsf
			3					QU=0.878 tsf
			3					QU=0.808 tsf
			3					QU=0.758 tsf
			3					QU=1.368 tsf
			4					
		Sand, with gravel and some silt, medium dense to very dense	7					
			4					
			3					QU=1.57 tsf
			5					QU=2.582 tsf
			7					QU=3.75 tsf
			9					QU=4.874 tsf
			11					QU=6.246 tsf
			10					QU=5.48 tsf
			11					QU=6.352 tsf
			14					
			15					
			15					
			17					
			27					
			27					
			30					
			34					
			31					
			35					
			39					
			31					
			25					
			26					
			21					
			20					
			34					
			40					
		CPT Terminated at 56.6 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-22

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 359.21 ft
BORING LOCATION: AP3
LATITUDE: 32.92623889
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 29.2 ft
LONGITUDE: -83.70583611
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					
	9					QU=3.638 tsf
	14					QU=4.726 tsf
	29		27			
	21					QU=7.31 tsf
	12					QU=3.902 tsf
	17					QU=5.79 tsf
	39		23			
	33					
	33		27			
	23					QU=8.158 tsf
	14		29			QU=4.384 tsf
	15					
	23					
	27					
	24					
	24					
	30					
	26					QU=8.8 tsf
	23					
	21					
	20					
	17					QU=5.4 tsf
	11					
Coal Ash, very soft to soft, slightly to medium plastic	8					QU=2.768 tsf
	5					QU=1.662 tsf
	5					QU=1.65 tsf
	6					QU=2.286 tsf
	6					QU=2.164 tsf
	6					QU=1.784 tsf
	5					QU=1.554 tsf
	5					QU=1.598 tsf
	5					QU=1.206 tsf
	3					QU=1.016 tsf
	5		17			QU=1.19 tsf
	5					QU=1.416 tsf
	5		20			QU=1.028 tsf
	6					QU=2.116 tsf
	6					QU=2.156 tsf
	4		21			QU=1.422 tsf
	6					QU=1.832 tsf
	6		22			QU=2.122 tsf
	4					QU=1.408 tsf
	5					QU=1.874 tsf
	8		24			
	7					
	5		23			QU=1.93 tsf
	4					QU=1.232 tsf
	5		22			QU=1.506 tsf
	4					QU=1.494 tsf
	4					QU=1.292 tsf
	2					QU=0.766 tsf
	1					QU=0.508 tsf
	2					QU=1.004 tsf
	3					QU=1.21 tsf
	3					QU=1.118 tsf
	3					QU=0.858 tsf
	2					QU=0.878 tsf
	2					QU=0.852 tsf
	8					QU=3.018 tsf
	9					QU=3.414 tsf
	5					QU=1.896 tsf
	5					QU=1.97 tsf
	7					QU=2.348 tsf
	7					QU=2.618 tsf
	7					QU=2.346 tsf
	6					QU=2.45 tsf
	7					QU=2.86 tsf
	9					QU=3.228 tsf
	9					QU=3.72 tsf
	9					QU=3.258 tsf
	7					QU=2.928 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-22

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 359.21 ft

BORING LOCATION: AP3

LATITUDE: 32.92623889

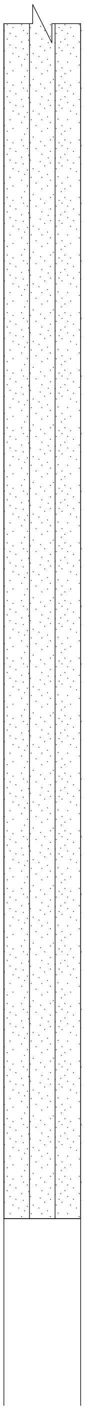
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 29.2 ft

LONGITUDE: -83.70583611

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH: 320 / 40, 315 / 45, 310 / 50, 305 / 55, 300 / 60, 295 / 65, 290 / 70



Sand, with silt and some gravel, medium dense to dense

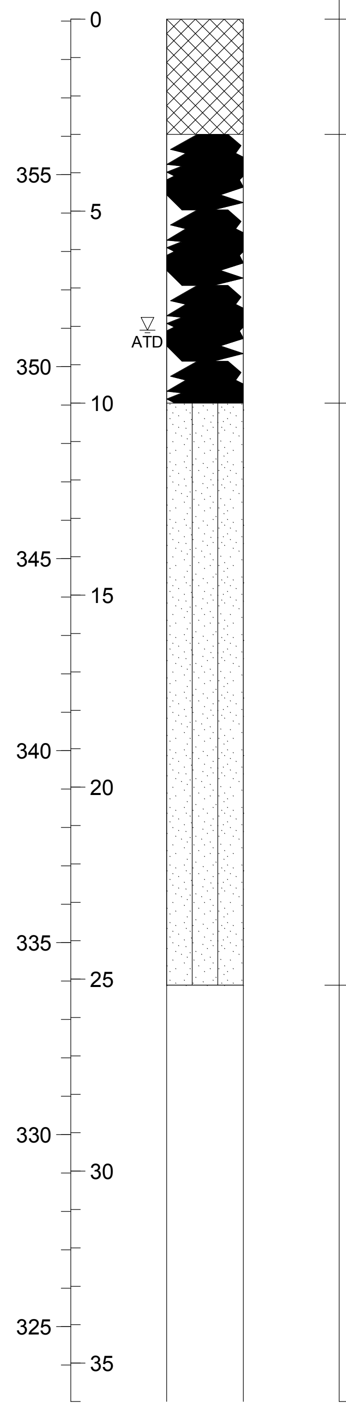
CPT Terminated at 67.1 feet depth

EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
11					QU=4.836 tsf
11					
14					
8					QU=4.208 tsf
6					QU=2.932 tsf
6					QU=2.95 tsf
12					
23					
20					
8					QU=4.428 tsf
7					QU=3.078 tsf
9					QU=4.932 tsf
9					QU=4.452 tsf
9					QU=5.07 tsf
10					
10					
11					
13					
12					
13					
18					
16					
14					
16					
13					
13					
14					
15					
15					
15					
18					
24					
24					
20					
18					
19					
18					
16					
15					
16					
16					
21					
28					
28					
24					
14					
15					
16					
18					
23					
27					
20					
17					
22					
29					
31					
35					
36					
33					
30					
34					
33					
26					

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-23

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/31/17
ELEVATION: 359.05 ft
BORING LOCATION: AP3
LATITUDE: 32.93128611
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 8.1 ft
LONGITUDE: -83.70841944
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		SOIL FILL/GCL	12					
			27		22			
			23					
			21					QU=6.408 tsf
			17					QU=5.04 tsf
			12					QU=4.176 tsf
		Coal Ash, medium stiff, slightly to medium plastic	9		25			QU=2.912 tsf
			9					QU=2.784 tsf
			12					QU=4.352 tsf
			8		27			QU=2.194 tsf
			6					QU=1.818 tsf
			6		30			QU=1.768 tsf
			6					QU=2.04 tsf
			6					QU=2.048 tsf
			8		33			QU=2.56 tsf
			11					QU=3.064 tsf
			9		33			QU=2.662 tsf
			8					QU=2.358 tsf
			9		35			QU=2.894 tsf
			12					QU=4.164 tsf
		Sand, with silt and some gravel, medium dense to dense	15					
			15					
			14					
			17					
			15					
			17					
			15					
			17					
			12					
			12					
			11					QU=3.446 tsf
			12					QU=3.882 tsf
			14					
			26					
			33					
			39					
			39					
			41					
			37					
			28					
			23					
			34					
			47					
			35					
			26					
			33					
			36					
			29					
			42					
			44					
			36					
		CPT Terminated at 25.2 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

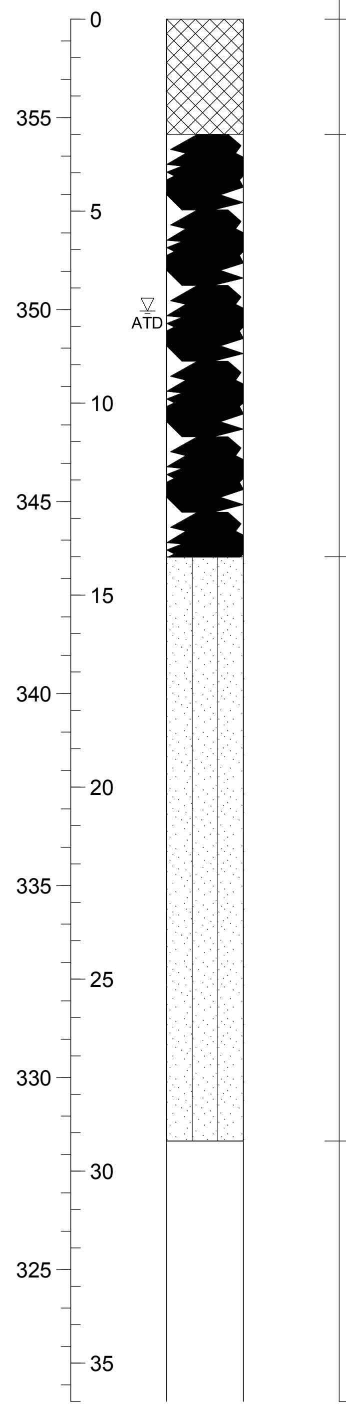
LOG OF CONE PENETRATION TEST PROBE

Page 1 of 1

AP3 CPT-24

PROJECT: Former Arkwright Plant - AP3
DATE: 10/31/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 7.6 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 357.57 ft
LATITUDE: 32.93059444
LONGITUDE: -83.70794722



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					QU=1.846 tsf
	6		17			QU=2.042 tsf
	8					QU=2.602 tsf
	6		16			QU=1.814 tsf
	8					QU=2.29 tsf
	9					QU=2.744 tsf
Coal Ash, medium stiff, slightly to medium plastic	14		34			QU=4.384 tsf
	18					QU=5.654 tsf
	12					QU=3.67 tsf
	9					QU=3.028 tsf
	11					QU=3.512 tsf
	6		25			QU=1.85 tsf
	6					QU=1.836 tsf
	32		30			
	41					
	15					QU=4.7 tsf
	12					QU=3.886 tsf
	11					QU=3.452 tsf
	11					QU=3.398 tsf
	14		23			QU=3.844 tsf
	11					QU=2.674 tsf
	12		25			QU=3.236 tsf
	9					QU=2.436 tsf
	8					QU=1.978 tsf
	8					QU=2.308 tsf
	8					QU=2.654 tsf
	8					QU=2.652 tsf
	8					QU=2.764 tsf
Sand, with silt and some gravel, medium dense to dense	9					
	9					
	9					QU=3.086 tsf
	11					QU=3.412 tsf
	11					
	11					
	9					
	9					
	12					
	15					
	13					
	15					
	17					
	21					
	19					
	22					
	23					
	24					
	25					
	27					
	24					
	21					
	17					
	14					
	22					
	33					
	51					
	60					
	64					
	75					
CPT Terminated at 29.2 feet depth						

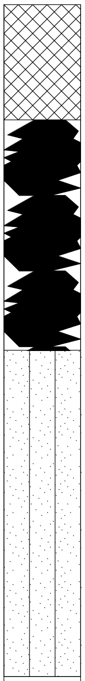
FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-25

PROJECT: Former Arkwright Plant - AP3
DATE: 10/30/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 6.7 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 354.70 ft
LATITUDE: 32.92996667
LONGITUDE: -83.70751111

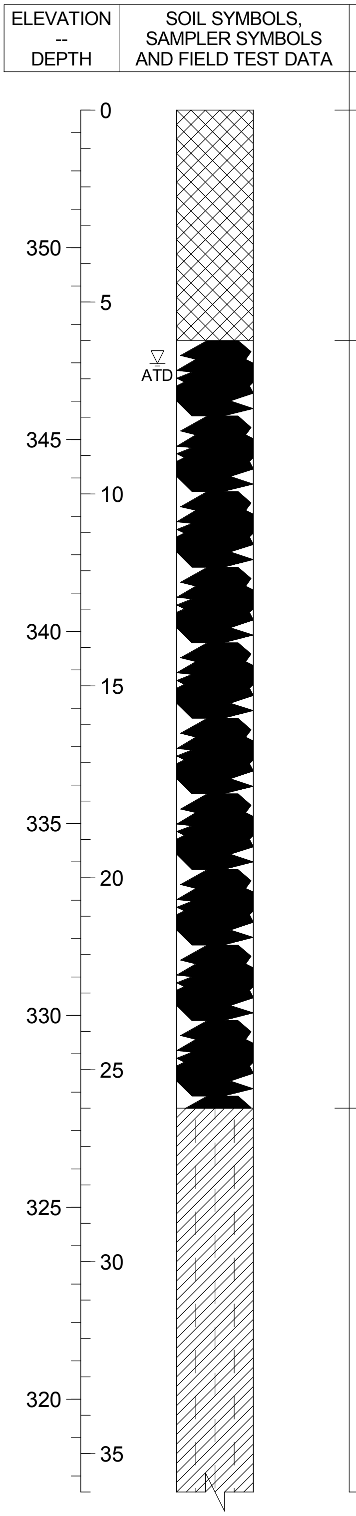


ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
0		SOIL FILL/GCL	5					QU=1.86 tsf
			8		27			QU=2.376 tsf
			9					QU=2.782 tsf
			9					QU=3.144 tsf
			8		29			QU=2.154 tsf
			9					QU=3.118 tsf
		Coal Ash, medium stiff, slightly to medium plastic	8		30			QU=2.928 tsf
			5					QU=1.398 tsf
			3		26			QU=1.192 tsf
350 -- 5			3					QU=1.314 tsf
			2		24			QU=0.854 tsf
			2					QU=0.822 tsf
			2					QU=0.708 tsf
	▽ ATD		2					QU=0.444 tsf
			2		14			QU=0.426 tsf
			2					QU=0.512 tsf
			2					QU=0.48 tsf
			2		17			QU=0.442 tsf
		Sand, with silt and some gravel, medium dense to dense	5					
345 -- 10			8					
			9					
			9					
			12					
			15					
			17					
			21					
			24					
			26					
			33					
340 -- 15			45					
			59		28			
			54					
			51					
			53					
			53					
		CPT Terminated at 17.5 feet depth						
335 -- 20								
330 -- 25								
325 -- 30								
320 -- 35								

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-26A

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/27/17
ELEVATION: 353.58 ft
BORING LOCATION: AP3
LATITUDE: 32.92932778
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 6.6 ft
LONGITUDE: -83.70705278
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	2					QU=0.924 tsf
	2		17			QU=0.75 tsf
	3					QU=1.306 tsf
	6					QU=2.422 tsf
	12		26			QU=3.584 tsf
	11					QU=2.888 tsf
	6		22			QU=1.95 tsf
	5					QU=1.286 tsf
	6		27			QU=2.302 tsf
	9					
	11		24			
	8					
Coal Ash, medium stiff, slightly to medium plastic	8					
	5					QU=1.96 tsf
	5		22			QU=1.99 tsf
	6					QU=2.11 tsf
	5		21			QU=1.38 tsf
	2					QU=0.856 tsf
	2					QU=0.73 tsf
	3		21			QU=1.242 tsf
	3					QU=1.048 tsf
	2		21			QU=0.55 tsf
	2					QU=0.648 tsf
	3					QU=0.88 tsf
	3		25			QU=0.83 tsf
	3					QU=1.004 tsf
	3		28			QU=1.006 tsf
	3					QU=1.026 tsf
	5					QU=1.11 tsf
	5		29			QU=1.046 tsf
	5					QU=1.222 tsf
	3		22			QU=0.998 tsf
	3					QU=0.96 tsf
	5					QU=1.03 tsf
	5		27			QU=1.114 tsf
	5					QU=1.168 tsf
	6		28			QU=1.342 tsf
	5					QU=1.302 tsf
	5					QU=1.196 tsf
	6					QU=1.438 tsf
	4					QU=1.36 tsf
	4					QU=1.354 tsf
	6					QU=1.716 tsf
	6					QU=1.598 tsf
	5					QU=1.534 tsf
	5					QU=1.462 tsf
	5					QU=1.468 tsf
	5					QU=1.376 tsf
	5					QU=1.54 tsf
	5					QU=1.542 tsf
	5					QU=1.436 tsf
	5					QU=1.594 tsf
Interbedded layers of clay (possibly ash) and silt, with sand lenses	8					QU=2.99 tsf
	9					QU=3.814 tsf
	12					
	14					
	10					
	9					QU=3.458 tsf
	8					QU=2.828 tsf
	9					QU=3.384 tsf
	10					QU=4.058 tsf
	10					QU=3.84 tsf
	8					QU=3.144 tsf
	10					QU=4.1 tsf
	11					QU=5.168 tsf
	10					QU=4.35 tsf
	9					QU=3.41 tsf
	11					
	11					QU=5.27 tsf
	11					QU=4.782 tsf
	11					QU=5.526 tsf
	11					QU=5.59 tsf

LOG OF CONE PENETRATION TEST PROBE

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AP3 CPT-26A

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/27/17

ELEVATION: 353.58 ft

BORING LOCATION: AP3

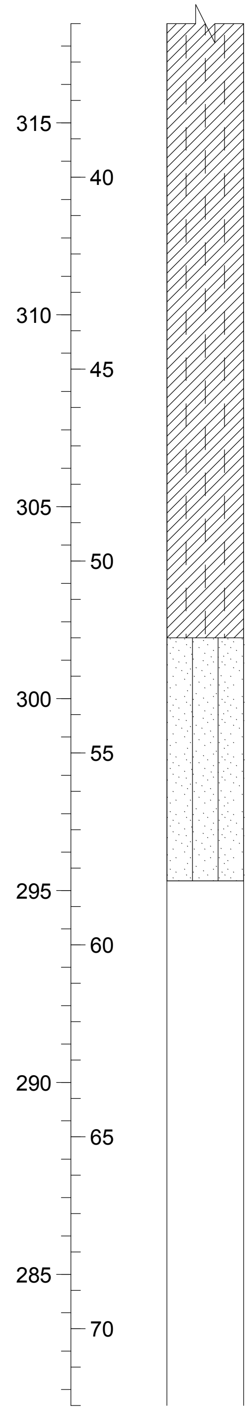
LATITUDE: 32.92932778

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 6.6 ft

LONGITUDE: -83.70705278

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

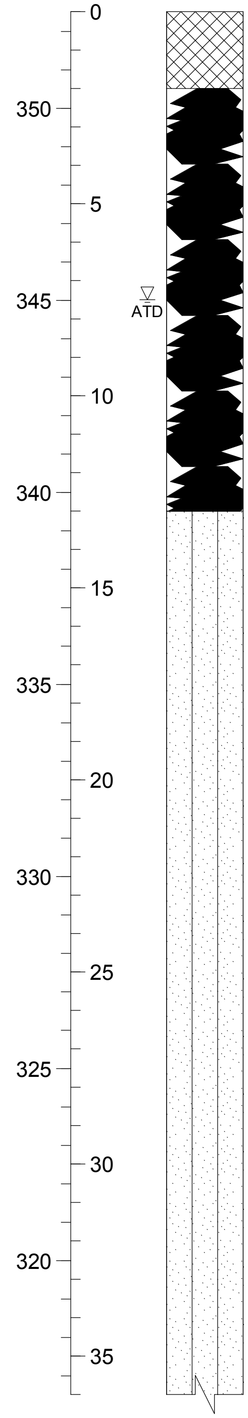


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	12					QU=5.638 tsf
	9					QU=4.112 tsf
	10					QU=4.17 tsf
	13					
	15					
	14					
	12					QU=6.328 tsf
	11					QU=5.262 tsf
	15					QU=7.422 tsf
	14					
	10					QU=4.824 tsf
	12					QU=5.834 tsf
	12					QU=5.978 tsf
	10					QU=5.342 tsf
	8					QU=3.574 tsf
	10					QU=4.896 tsf
	10					QU=5.23 tsf
	12					QU=6.408 tsf
	12					
	8					QU=5.002 tsf
	6					QU=2.952 tsf
	7					QU=3.586 tsf
	6					QU=2.886 tsf
	4					QU=1.88 tsf
	6					QU=3.468 tsf
	10					QU=6.168 tsf
	12					QU=7.286 tsf
	13					QU=7.79 tsf
	16					
	14					
	13					
	17					QU=10.958 tsf
Sand, with silt and some gravel, medium dense to dense	19					
	23					
	39					
	35					
	20					
	23					
	37					
	44					
	39					
	28					
	23					
	15					
CPT Terminated at 58.3 feet depth						

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-27

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/27/17
ELEVATION: 352.52 ft
BORING LOCATION: AP3
LATITUDE: 32.92868611
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 7.5 ft
LONGITUDE: -83.706575
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	5		23			QU=1.504 tsf
	3					QU=0.884 tsf
	2					QU=0.656 tsf
Coal Ash, medium stiff, slightly to medium plastic	2		19			QU=0.622 tsf
	2					QU=0.606 tsf
	2		17			QU=0.556 tsf
	2					QU=0.446 tsf
	2					QU=0.348 tsf
	2		18			QU=0.548 tsf
	3					QU=0.974 tsf
	2		17			QU=0.388 tsf
	0					QU=0.292 tsf
	3					QU=1.446 tsf
	5		24			QU=1.804 tsf
	5					
	5		26			QU=1.882 tsf
	5					QU=1.586 tsf
	5		25			QU=1.504 tsf
	5					QU=1.6 tsf
	2		23			QU=0.604 tsf
	2					QU=0.688 tsf
	3		26			QU=1.148 tsf
	5					QU=1.768 tsf
	8					
	6					
Sand, with silt and some gravel, medium dense to dense	5					QU=1.82 tsf
	5					
	6					
	6					
	6					
	6					
	8					
	9					
	9					
	9					
	9					
	11					
	14					
	15					
	14					
	12					
	12					
	13					
	14					
	16					
	17					
	16					
	16					
	17					
	17					
	19					
	20					
	22					
	28					
	27					
	21					
	14					
	13					QU=5.172 tsf
	27					
	34					
	28					
	23					
	23					
	29					
	33					
	31					
	30					
	29					
	26					
	20					
	16					

LOG OF CONE PENETRATION TEST PROBE

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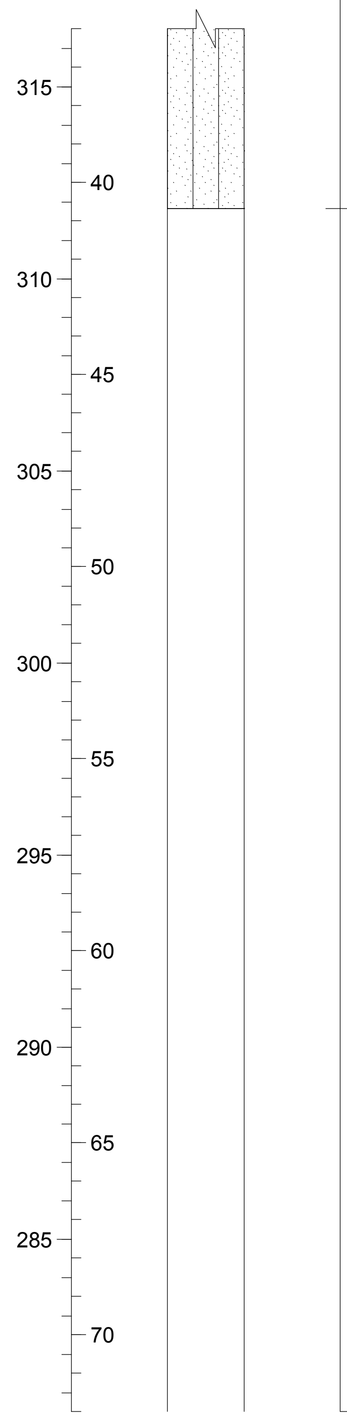
AP3 CPT-27

PROJECT: Former Arkwright Plant - AP3
DATE: 10/27/17
BORING LOCATION: AP3
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 7.5 ft
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000
ELEVATION: 352.52 ft
LATITUDE: 32.92868611
LONGITUDE: -83.706575



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		CPT Terminated at 40.7 feet depth	17 23 26 27 20 22 25 21 19 17					QU=9.844 tsf

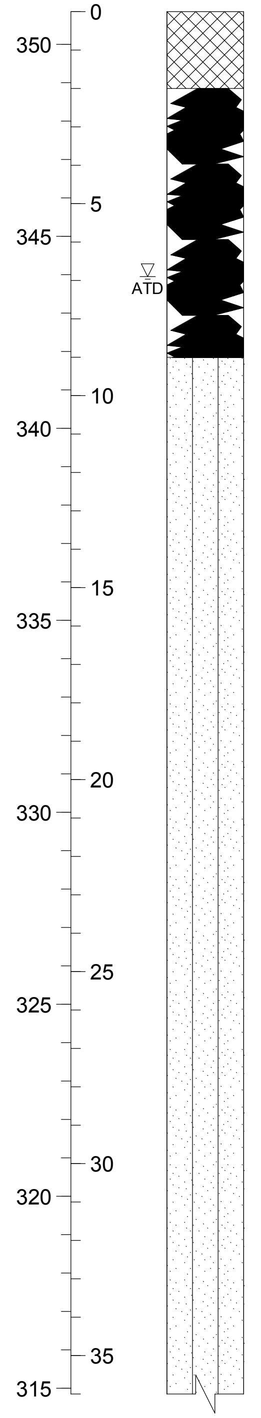
FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-28

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/27/17
ELEVATION: 350.85 ft
BORING LOCATION: AP3
LATITUDE: 32.92798333
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 6.9 ft
LONGITUDE: -83.706075
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	2					
	3		16			QU=1.194 tsf
	3					QU=1.026 tsf
	2					QU=0.752 tsf
Coal Ash, medium stiff, slightly to medium plastic	2					QU=0.742 tsf
	2		18			QU=0.814 tsf
	2					QU=0.886 tsf
	3					QU=0.946 tsf
	2					QU=0.722 tsf
	2					QU=0.65 tsf
	3					QU=1.266 tsf
	8					
	5					
	3					
	3					
	5					
	3					QU=1.218 tsf
	5		22			QU=1.79 tsf
Sand, with silt and some gravel, medium dense to dense	8					
	9					
	8					
	6					
	5					
	9					
	12					
	11					
	9					
	11					
	9					
	8					
	9					
	9					
	9					
	11					
	11					
	11					
	12					
	15					
	17					
	15					
	13					
	13					
	14					
	17					
	18					
	15					
	11					QU=3.394 tsf
	10					QU=3.712 tsf
	12					
	9					QU=3.104 tsf
	11					QU=3.982 tsf
	15					QU=5.486 tsf
	15					
	18					
	20					
	17					
	17					QU=7.21 tsf
	19					
	20					
	21					
	21					
	19					
	19					
	16					
	16					
	17					
	19					
	23					
	25					
	25					
	23					
	20					

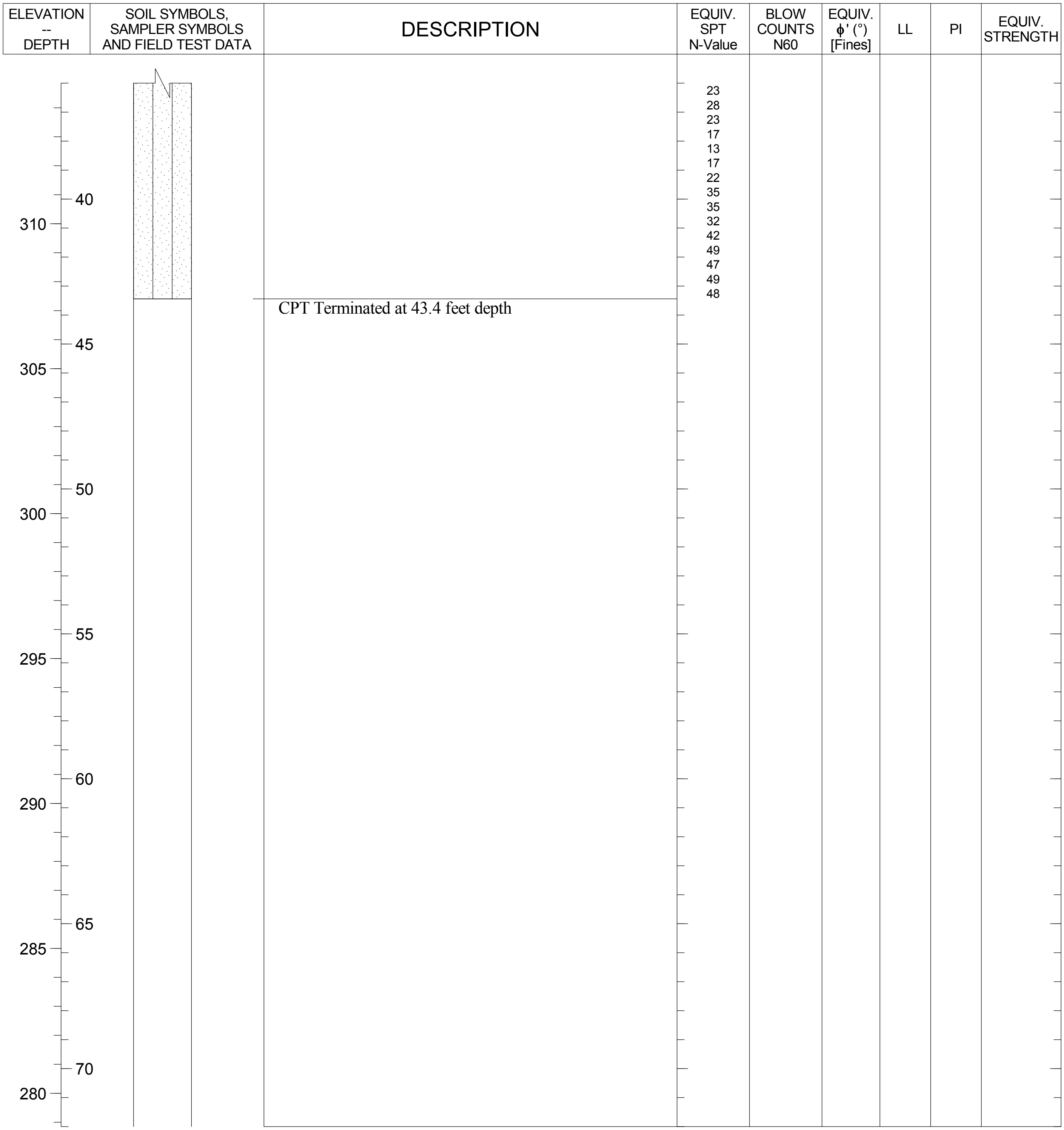
FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

Page 2 of 2

AP3 CPT-28

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/27/17
ELEVATION: 350.85 ft
BORING LOCATION: AP3
LATITUDE: 32.92798333
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 6.9 ft
LONGITUDE: -83.706075
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



CPT Terminated at 43.4 feet depth

LOG OF CONE PENETRATION TEST PROBE

Page 1 of 2

AP3 CPT-29

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 355.71 ft

BORING LOCATION: AP3

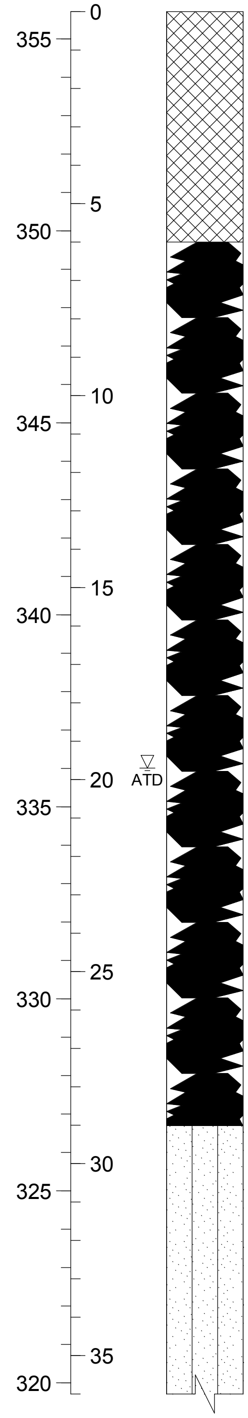
LATITUDE: 32.92698611

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 19.7 ft

LONGITUDE: -83.70565556

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
		SOIL FILL/GCL	3					
			11		27			QU=4.034 tsf
			14					QU=4.578 tsf
			35					QU=11.918 tsf
			39		30			
			24					
			18		28			QU=5.886 tsf
			12					QU=4.26 tsf
			9					QU=3.568 tsf
			8		25			
			9					
			14		25			
		Coal Ash, soft to medium stiff, slightly to medium plastic	12					
			9					
			8		23			
			6					
			6		21			
			5					QU=1.98 tsf
			5					QU=1.9 tsf
			5		21			QU=1.786 tsf
			5					QU=1.656 tsf
			5		21			QU=1.642 tsf
			2					QU=0.726 tsf
			2					QU=0.454 tsf
			0		17			QU=0.236 tsf
			0					QU=0.266 tsf
			0		20			QU=0.328 tsf
			0					QU=0.314 tsf
			2					QU=0.52 tsf
			2		25			QU=0.578 tsf
			5					QU=1.638 tsf
			6		30			QU=2.06 tsf
			6					QU=1.796 tsf
			3					QU=0.752 tsf
			2		23			QU=0.44 tsf
			3					QU=0.766 tsf
			3		23			QU=0.928 tsf
			3					QU=1.094 tsf
			3		24			QU=0.788 tsf
			5					QU=1.266 tsf
			3		21			QU=1.052 tsf
			3					QU=1.128 tsf
			3		16			QU=1.298 tsf
			4					QU=1.37 tsf
			4					
			6					
			4					QU=1.31 tsf
			4					QU=1.068 tsf
			5					QU=1.42 tsf
			5					QU=1.426 tsf
			5					QU=1.532 tsf
			5					QU=1.808 tsf
			5					QU=1.58 tsf
			5					QU=1.672 tsf
			6					QU=1.734 tsf
			5					QU=1.506 tsf
			5					QU=1.556 tsf
			6					QU=1.86 tsf
		Sand, with silt and some gravel, medium dense to dense	8					QU=2.882 tsf
			8					QU=2.826 tsf
			8					QU=3.016 tsf
			9					QU=3.728 tsf
			7					QU=2.932 tsf
			8					QU=3.308 tsf
			8					QU=3.62 tsf
			8					QU=3.898 tsf
			9					QU=4.186 tsf
			10					QU=4.72 tsf
			10					
			11					
			13					
			12					QU=6.08 tsf

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-29

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 355.71 ft

BORING LOCATION: AP3

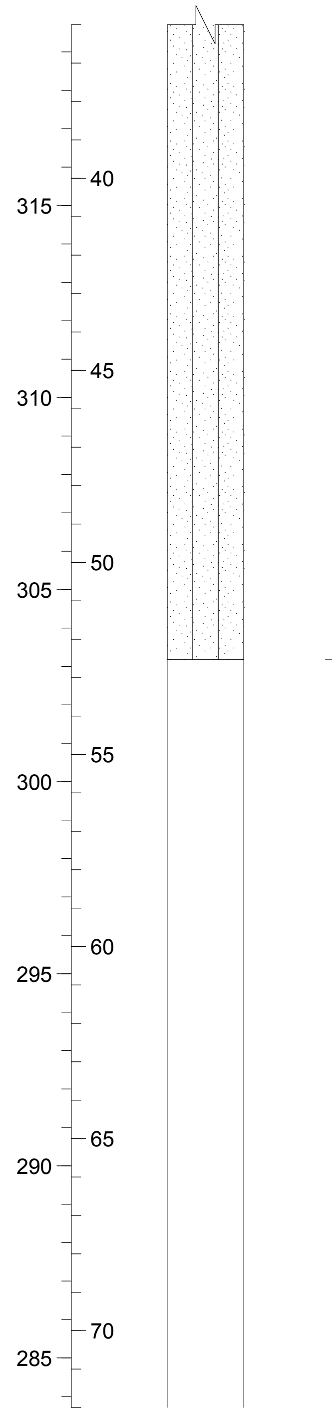
LATITUDE: 32.92698611

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 19.7 ft

LONGITUDE: -83.70565556

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	14					
	16					
	13					
	13					
	14					
	13					QU=6.826 tsf
	14					
	11					QU=4.976 tsf
	10					QU=4.72 tsf
	11					
	13					
	13					QU=7.27 tsf
	12					QU=5.906 tsf
	13					QU=6.528 tsf
	18					
	18					
	17					
	16					
	14					
	10					
	8					
	12					
	14					
	17					
	20					
	24					
	27					
	30					
	28					
	25					
	27					
	31					
	29					
CPT Terminated at 52.5 feet depth						

LOG OF CONE PENETRATION TEST PROBE

Page 1 of 1

AP3 CPT-30

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 348.62 ft

BORING LOCATION: AP3

LATITUDE: 32.92715556

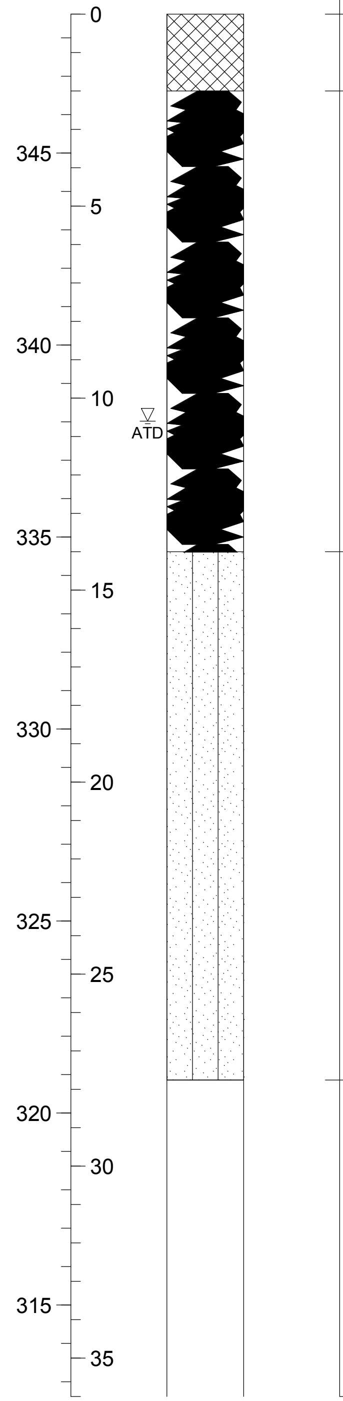
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 10.6 ft

LONGITUDE: -83.70522222

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					QU=1.502 tsf
	6		27			QU=2.264 tsf
	6					QU=2.316 tsf
	6					QU=1.826 tsf
Coal Ash, medium stiff, slightly to medium plastic	6					QU=2.112 tsf
	5					QU=1.63 tsf
	5		26			QU=1.438 tsf
	5					QU=1.566 tsf
	5					QU=1.582 tsf
	5		28			QU=1.558 tsf
	5					QU=1.47 tsf
	5		28			QU=1.402 tsf
	5					QU=1.422 tsf
	5		26			QU=1.608 tsf
	5					QU=1.6 tsf
	5		20			QU=1.644 tsf
	5					QU=1.414 tsf
	5					QU=1.534 tsf
	5					QU=1.572 tsf
	5					QU=1.594 tsf
	5					QU=1.774 tsf
	6					QU=2.172 tsf
	6					QU=2.076 tsf
	6					QU=2.106 tsf
	6					QU=1.566 tsf
	6					QU=1.834 tsf
	6					QU=1.83 tsf
	6					QU=1.752 tsf
Sand, with silt and some gravel, medium dense to dense	8					QU=2.206 tsf
	9					QU=2.864 tsf
	11					
	11					QU=3.358 tsf
	11					QU=3.454 tsf
	12					QU=4.29 tsf
	17					
	20					
	21					QU=6.672 tsf
	21					QU=6.742 tsf
	21					
	26					
	31					
	32					
	28					
	28					
	39					
	38					
	41					
	39					
	49					
	50					
	54					
	56					
	59					
	60					
	73					
CPT Terminated at 27.8 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

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AP3 CPT-31

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 356.63 ft

BORING LOCATION: AP3

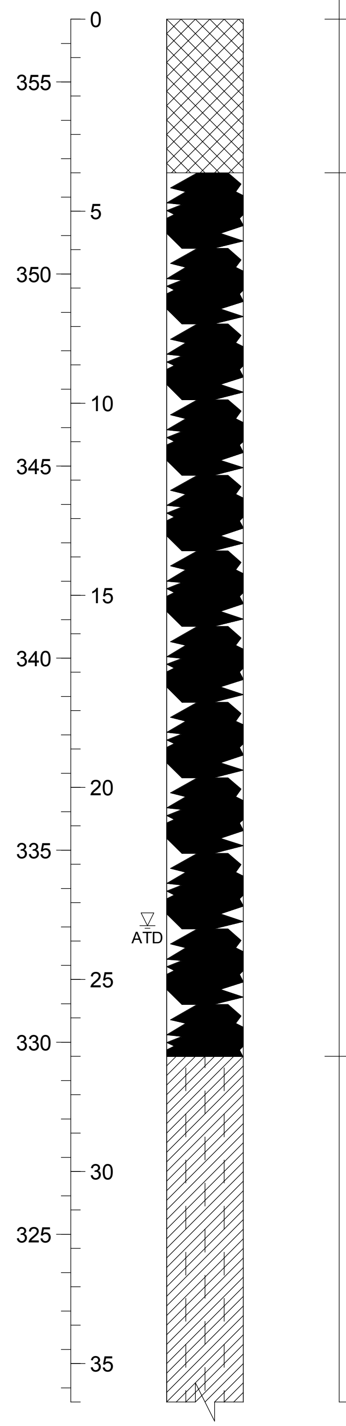
LATITUDE: 32.92661667

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 23.6 ft

LONGITUDE: -83.70538611

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

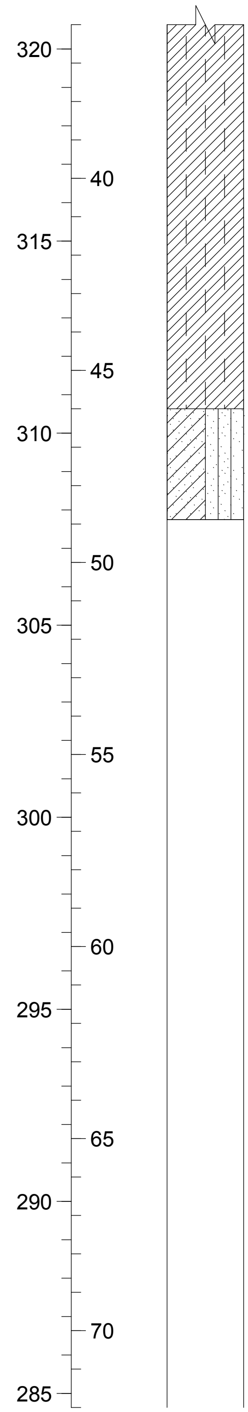


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	0					QU=0.466 tsf
	3					QU=1.478 tsf
	5					QU=1.882 tsf
	3					QU=1.36 tsf
	9		25			QU=3.216 tsf
	11					QU=3.782 tsf
	18		31			QU=6.336 tsf
	14					QU=5 tsf
Coal Ash, medium stiff, slightly to medium plastic	11					QU=3.77 tsf
	6					QU=2.456 tsf
	5					QU=1.94 tsf
	5					QU=1.568 tsf
	5					
	5					QU=1.89 tsf
	3					QU=1.428 tsf
	3					QU=1.41 tsf
	5					QU=1.302 tsf
	5					QU=1.472 tsf
	5					
	5					QU=1.956 tsf
	8					
	6					QU=2.32 tsf
	5					QU=1.668 tsf
	3					QU=1.078 tsf
	3					QU=0.914 tsf
	3					QU=0.77 tsf
	3		20			QU=1.232 tsf
	11					
	8		22			
	5					QU=1.642 tsf
	6					
	5					QU=1.394 tsf
	5					QU=1.71 tsf
	6					
	6					
	3					QU=1.034 tsf
	3		17			QU=0.714 tsf
	3					QU=0.898 tsf
	6					QU=1.856 tsf
	6		28			QU=1.856 tsf
	4					QU=1.488 tsf
	4		31			QU=1.29 tsf
	12					QU=3.53 tsf
	18		35			
	7					
	4					QU=1.338 tsf
	5		19			QU=1.49 tsf
	7					QU=2.296 tsf
	5					QU=1.578 tsf
	4					QU=1.3 tsf
	5					QU=1.44 tsf
	4					QU=1.168 tsf
	4					QU=1.066 tsf
	5					QU=1.43 tsf
Interbedded layers of clay (possibly ash) and silt, with sand lenses	7					
	7					QU=2.72 tsf
	7					QU=2.672 tsf
	14					
	10					QU=4.122 tsf
	8					QU=2.994 tsf
	9					QU=3.39 tsf
	11					QU=4.396 tsf
	13					QU=5.474 tsf
	14					
	12					
	11					
	7					
	7					QU=3.174 tsf
	7					QU=2.712 tsf
	6					QU=2.064 tsf
	6					QU=2.394 tsf
	8					QU=3.428 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-31

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 356.63 ft
BORING LOCATION: AP3
LATITUDE: 32.92661667
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 23.6 ft
LONGITUDE: -83.70538611
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			8					QU=3.49 tsf
			7					QU=3.178 tsf
			6					QU=2.784 tsf
			7					QU=3.346 tsf
			8					QU=3.84 tsf
			11					
			12					
			10					
			10					QU=5.128 tsf
			13					
			14					QU=7.42 tsf
			15					
			15					
			9					QU=4.324 tsf
			7					QU=3.326 tsf
			10					QU=5.522 tsf
			17					
			14					QU=8.292 tsf
			11					QU=6.068 tsf
			9					QU=4.946 tsf
		Sand, with clay and some gravel, medium dense to dense	12					QU=6.94 tsf
			18					
			24					
			27					
		CPT Terminated at 48.9 feet depth						

LOG OF CONE PENETRATION TEST PROBE

Page 1 of 2

AP3 CPT-32

PROJECT: Former Arkwright Plant - AP3

DATE: 10/26/17

BORING LOCATION: AP3

DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 27.2 ft

DRILL METHOD: CPT push ~ 2.0 cm/s

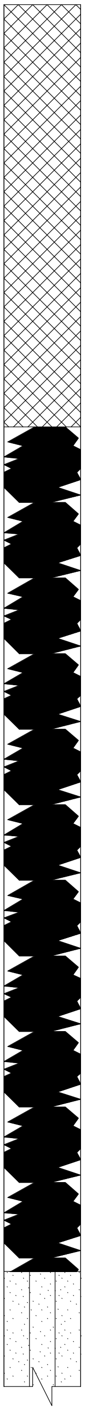
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

PROJECT NUMBER: DK9201IW.5000

ELEVATION: 357.21 ft

LATITUDE: 32.92627778

LONGITUDE: -83.705375

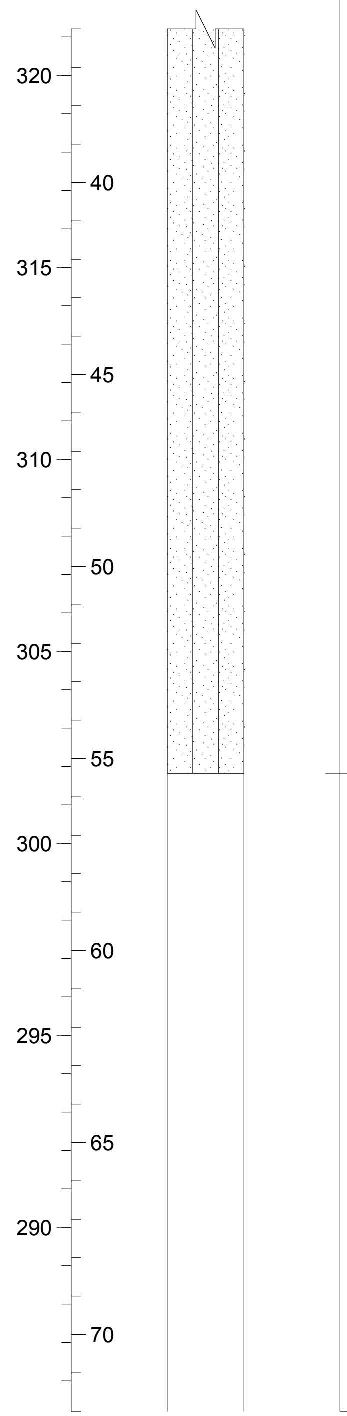


ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
0		SOIL FILL/GCL	3					
			6		16			QU=2.338 tsf
			8					QU=3.016 tsf
			11					QU=3.828 tsf
355			15		26			QU=5.152 tsf
			20					QU=6.738 tsf
			15		25			QU=4.954 tsf
			11					QU=3.42 tsf
			12					QU=4.14 tsf
			12		29			QU=3.868 tsf
5			14					QU=4.41 tsf
			9		31			QU=3.13 tsf
			9					QU=3.158 tsf
			15					
350			24					
			15					QU=5.148 tsf
			11					QU=2.974 tsf
			8					QU=2.1 tsf
			8					QU=2.334 tsf
			8		26			QU=2.318 tsf
10			12					QU=3.344 tsf
			11		27			QU=2.828 tsf
		Coal Ash, soft to medium stiff, slightly to medium plastic	8					QU=2.058 tsf
			6					QU=1.758 tsf
345			8					QU=2.256 tsf
			8					QU=1.84 tsf
			8					QU=1.9 tsf
			8					QU=2.17 tsf
			8					QU=2.004 tsf
			6					QU=1.344 tsf
15			5					QU=1.288 tsf
			5		21			QU=1.158 tsf
			5					QU=0.924 tsf
			3					QU=0.8 tsf
340			6		22			QU=1.842 tsf
			9					QU=2.5 tsf
			9		28			QU=2.576 tsf
			9					QU=2.588 tsf
			10					QU=2.76 tsf
			9		32			QU=2.648 tsf
20			9					QU=2.492 tsf
			8		32			QU=2.472 tsf
			7					QU=2.07 tsf
			5					QU=1.706 tsf
335			5		31			QU=1.554 tsf
			5					QU=1.342 tsf
			5		28			QU=1.288 tsf
			4					QU=1.26 tsf
			5		20			QU=1.406 tsf
			4					QU=1.228 tsf
25			4					QU=1.376 tsf
			5					QU=1.986 tsf
			5					QU=1.846 tsf
			5					QU=1.916 tsf
330	▽ ATD		6					QU=2.11 tsf
			6					QU=1.75 tsf
			6					QU=1.77 tsf
			5					QU=2.452 tsf
			5					QU=2.042 tsf
			5					QU=2.038 tsf
30			5					QU=2.232 tsf
			6					QU=2.478 tsf
			5					QU=2.1 tsf
			5					QU=1.812 tsf
325			6					QU=2.254 tsf
			6					QU=2.57 tsf
		Sand, with silt and some gravel, medium dense to dense	7					QU=3.02 tsf
			7					QU=2.66 tsf
			7					QU=2.782 tsf
			7					QU=2.786 tsf
35			7					QU=3.228 tsf
			7					QU=3.634 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-32

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 357.21 ft
BORING LOCATION: AP3
LATITUDE: 32.92627778
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 27.2 ft
LONGITUDE: -83.705375
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
	7					QU=3.388 tsf
	7					QU=3.254 tsf
	8					QU=4.004 tsf
	8					
	8					
	8					
	9					
	8					
	8					QU=4.408 tsf
	9					
	9					
	9					
	9					
	10					
	10					QU=5.4 tsf
	9					
	9					
	14					
	16					
	15					
	10					QU=4.942 tsf
	12					
	13					QU=7.61 tsf
	15					
	19					
	25					
	31					
	28					
	28					
	27					
	29					
	32					
	32					
	30					
	28					
	29					
	43					
	48					
	45					
CPT Terminated at 55.4 feet depth						

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-33

PROJECT: Former Arkwright Plant - AP3

PROJECT NUMBER: DK9201IW.5000

DATE: 10/26/17

ELEVATION: 349.28 ft

BORING LOCATION: AP3

LATITUDE: 32.92636111

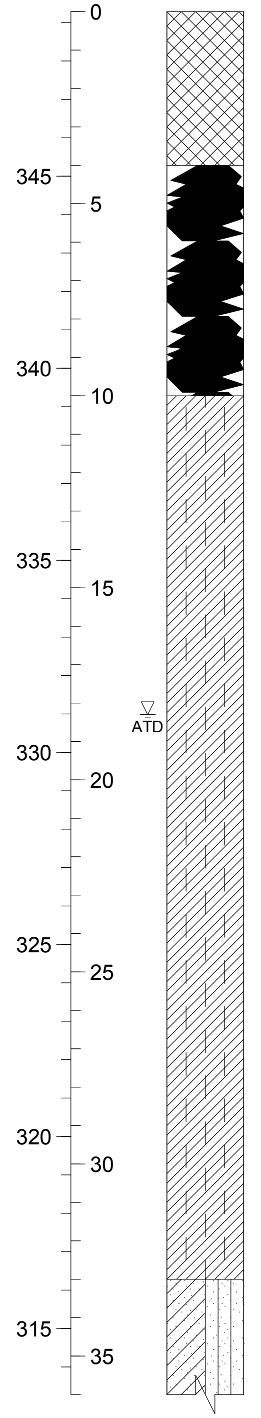
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 18.3 ft

LONGITUDE: -83.70478333

DRILL METHOD: CPT push ~ 2.0 cm/s

NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

ELEVATION -- DEPTH | SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA

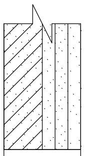


DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	5					QU=1.918 tsf
	5		20			QU=1.604 tsf
	5					QU=1.538 tsf
	5		22			QU=1.904 tsf
	6					QU=2.218 tsf
	6					QU=1.838 tsf
	6		25			QU=1.904 tsf
	8					QU=3.052 tsf
Coal Ash, medium stiff, slightly to medium plastic	11					
	8		25			QU=2.702 tsf
	6					QU=2.094 tsf
	6		21			QU=2.018 tsf
	6					QU=2.126 tsf
	8					QU=2.24 tsf
	9		18			QU=2.82 tsf
	8					QU=2.668 tsf
	9					QU=2.964 tsf
	8		20			QU=2.56 tsf
	9					QU=3.114 tsf
	11		21			QU=3.996 tsf
Interbedded layers of clay (possibly ash) and silt, with sand lenses	12					QU=4.008 tsf
	11					QU=3.128 tsf
	8					QU=2.338 tsf
	9					QU=2.904 tsf
	9					QU=2.744 tsf
	9					QU=2.72 tsf
	9					QU=3.074 tsf
	11					QU=3.528 tsf
	11					QU=3.29 tsf
	11					QU=2.988 tsf
	11					QU=2.988 tsf
	12					
	12					QU=3.836 tsf
	11					QU=3.234 tsf
	11					QU=3.242 tsf
	12					
	12					QU=3.708 tsf
	11					QU=3.356 tsf
	12					QU=3.646 tsf
	13					
	14					QU=4.742 tsf
	14					QU=4.584 tsf
	12					
	12					QU=4.478 tsf
	12					QU=3.882 tsf
	12					QU=4.124 tsf
	10					QU=3.502 tsf
	13					
	11					QU=3.746 tsf
	7					QU=2.14 tsf
	8					QU=2.96 tsf
	9					QU=3.194 tsf
	13					QU=5.018 tsf
	14					
	14					
	13					QU=5.308 tsf
	15					
	18					
	17					
	17					QU=7.158 tsf
	14					QU=5.78 tsf
	13					QU=6.158 tsf
	14					
	14					
	14					QU=6.526 tsf
	17					
Sand, with clay and some gravel, medium dense to dense	25					
	34					
	36					
	33					
	24					
	14					QU=6.914 tsf

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-33

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/26/17
ELEVATION: 349.28 ft
BORING LOCATION: AP3
LATITUDE: 32.92636111
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 18.3 ft
LONGITUDE: -83.70478333
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data

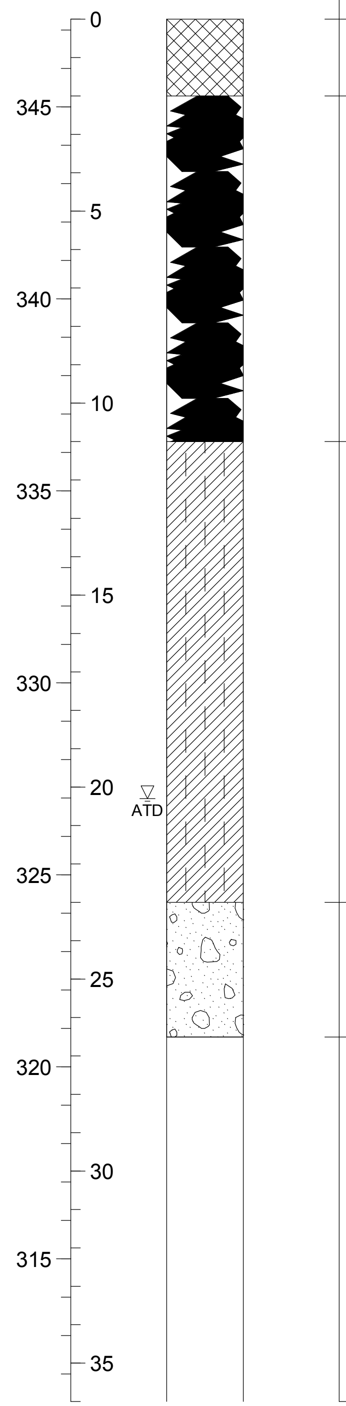
ELEVATION -- DEPTH	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
			16 24 30 47 59 61 52					
310 40		CPT Terminated at 39.3 feet depth						
305 45								
300 50								
295 55								
290 60								
285 65								
280 70								

FOR AP3 CPT WITH LAT-LONG ARKWRIGHT CPT.GPJ JACOBS CIVIL.GDT 3/19/18

LOG OF CONE PENETRATION TEST PROBE

AP3 CPT-34

PROJECT: Former Arkwright Plant - AP3
PROJECT NUMBER: DK9201IW.5000
DATE: 10/24/17
ELEVATION: 347.28 ft
BORING LOCATION: AP3
LATITUDE: 32.92587778
DEPTH TO WATER (FROM POTENTIOMETRIC SURFACE MAP): 20.3 ft
LONGITUDE: -83.70495
DRILL METHOD: CPT push ~ 2.0 cm/s
NOTES: CPTs & Misc. tests performed by Fugro; Equiv. values obtained from interpreted results of raw CPT data



DESCRIPTION	EQUIV. SPT N-Value	BLOW COUNTS N60	EQUIV. ϕ' (°) [Fines]	LL	PI	EQUIV. STRENGTH
SOIL FILL/GCL	3					
	3		21			QU=1.152 tsf
	3					QU=1.262 tsf
	5					QU=1.436 tsf
Coal Ash, soft to medium stiff, slightly to medium plastic	3		26			QU=1.334 tsf
	5					QU=1.58 tsf
	5		31			QU=1.692 tsf
	6					QU=2.31 tsf
	6					QU=2.272 tsf
	6		36			QU=2.176 tsf
	6					QU=1.956 tsf
	8		28			QU=2.198 tsf
	6					QU=1.992 tsf
	8					QU=2.616 tsf
	12		29			
	11					QU=3.474 tsf
	8		27			QU=2.218 tsf
	6					QU=1.856 tsf
	6					QU=2.098 tsf
	6		25			QU=1.77 tsf
	6					QU=2.39 tsf
	8		21			QU=2.362 tsf
Interbedded layers of clay (possibly ash) and silt, with sand lenses	8					
	8					
	8		21			QU=2.69 tsf
	8					QU=2.784 tsf
	8					QU=2.818 tsf
	8					QU=2.592 tsf
	9					
	9					
	9					
	9					
	12					
	14					
	20		24			
	27					
	33					
	23					
	15					QU=4.986 tsf
	13					QU=4.418 tsf
	19		28			
	23					
	26					
	27					
	29					
	38					
Sand, with gravel, medium dense to very dense	48					
	52					
	84					
	111					
	96					
	95					
	81					
CPT Terminated at 26.5 feet depth	25					

JACOBS

Project: Former Plant Arkwright - AP3 Landfill
Job No.: 35DK9203
Subject: CPT Soil Thickness Summary

By: RK 11/2/2018
Ckd: MLH 11/5/2018
Rvw: MTF 11/5/2018

Probe number	Soil thickness(feet) above ash
AP3 CPT 01	4
AP3 CPT 02	5
AP3 CPT 03	5
AP3 CPT 04	4
AP3 CPT 05	2.5
AP3 CPT 06	3
AP3 CPT 07	2.5
AP3 CPT 08	2
AP3 CPT 09	5
AP3 CPT 09SL	5
AP3 CPT 10	3
AP3 CPT 11	5
AP3 CPT 12	7
AP3 CPT 13	7
AP3 CPT 14	7
AP3 CPT 15	4
AP3 CPT 16	6
AP3 CPT 17A	5
AP3 CPT 18A	9
AP3 CPT 19	12
AP3 CPT 20	11
AP3 CPT 21	5
AP3 CPT 22	12
AP3 CPT 23	3
AP3 CPT 24	3
AP3 CPT 25	3
AP3 CPT 26A	6
AP3 CPT 27	2
AP3 CPT 28	2
AP3 CPT 29	6
AP3 CPT 30	2
AP3 CPT 31	4
AP3 CPT 32	11
AP3 CPT 33	4
AP3 CPT 34	2

Thickness Stats

Max. thickness = 12
Min. thickness = 2
Average = 5

Appendix D. **AP3 Landfill Global Stability & CPT Analyses**

Purpose:

- Analyze CPT results and perform global stability analyses of existing AP3 Landfill.

References:

- AASHTO LRFD Bridge Design Specifications, 2014
- Fugro USA Land Inc. Report for Piezocone Penetration Testing and Related Services - November 2017
- Georgia Power - Ash Pond 2 and 3 and Ash Monofill - Site Acceptability Report - November 2005
- Electric Power Research Institute - Engineering Correlations for Geotechnical Parameters for Ponded Fly Ash 2014 Technical Report

Assumptions:

Subsurface Conditions:

Refer to CPT Logs AP-01 through AP-34 and cross-section data on Figures AP3-1, -2 and -3.

Soil Profile and Soil Parameters

Soil	Elev.		PI	Unit Weight	Drained Strength		Undrained Strength	
	From	To			c'	Φ'	c	Φ'
	(ft)	(ft)	(%)	(pcf)	(psf)	(deg.)	(psf)	(deg.)
In-Situ GCL & Soil	~ 360	~ 355	-	110	100	15	100	15
In-Situ Sluiced CCR	~ 355	~ 330	-	90	0	22	0	22
Foundation Soil	~ 330	Below	-	108	300	24	500	20
Embankment/Levee Fill	Vary	Vary	-	120	100	28	700	10

Notes: - A residual shear strength (friction angle) was conservatively assumed for the in-situ geosynthetic clay liner (GCL).
- A nominal cohesion value was added to preclude any shallow sloughing failure surfaces from the results.
- Parameters for in-situ sluiced CCR based on EPRI report recommendation after processing CPT data

Seismic Parameters:

Seismic Site Classification:

The site was determined as Class E based on the amount of soft CCR fill encountered.

The seismic parameters:

Using USGS Seismic Design Maps Tool, the seismic parameters are determined for Site Class E at: 32.92765°N, 83.70681°W

PGA = 0.052 g A_s = 0.131 g
S_s = 0.122 g S_{Ds}= 0.306 g
S_1 = 0.050 g S_{D1}= 0.174 g

For external and global stability, use height adjusted horizontal peak acceleration

k_{av} = 0.065 g (0.5 x As)

Analysis:

Global Stability

Global stability of the existing AP3 Landfill was evaluated under short term and long term loading cases using software SLOPE/W Version 2012 developed by GEO-SLOPE International Ltd. The factor of safety (FOS) of the critical potential failure surface was obtained for each loading case. The minimum FOS criteria of slope stability as per project requirements is as follows:

Short Term, Undrained Condition, Total Stress Parameters - Minimum FOS = 1.5
Long Term, Drained Condition, Effective Stress Parameters - Minimum FOS = 1.5
Seismic, Undrained Condition, Total Stress Parameters - Minimum FOS = 1.1

The global stability at Sections A-A through O-O as presented on Figures AP3-1, -2 and -3 was analyzed.

Groundwater surface assumed for analyses based on map of potentiometric surface utilizing surrounding monitoring wells.

Section	Load Condition	FOS		Note
		Criteria	Calc. FOS	
A-A	Short Term, Undrained, Total Stress	1.50	4.48	OK
	Long Term, Drained, Effective Stress		4.48	OK
	Seismic, Undrained, Total Stress	1.10	2.20	OK
B-B	Short Term, Undrained, Total Stress	1.50	8.21	OK
	Long Term, Drained, Effective Stress		8.21	OK
	Seismic, Undrained, Total Stress	1.10	3.62	OK
C-C	Short Term, Undrained, Total Stress	1.50	9.26	OK
	Long Term, Drained, Effective Stress		9.26	OK
	Seismic, Undrained, Total Stress	1.10	3.63	OK
D-D	Short Term, Undrained, Total Stress	1.50	6.53	OK
	Long Term, Drained, Effective Stress		6.53	OK
	Seismic, Undrained, Total Stress	1.10	2.95	OK
E-E	Short Term, Undrained, Total Stress	1.50	7.82	OK
	Long Term, Drained, Effective Stress		7.79	OK
	Seismic, Undrained, Total Stress	1.10	3.39	OK
F-F	Short Term, Undrained, Total Stress	1.50	8.32	OK
	Long Term, Drained, Effective Stress		8.32	OK
	Seismic, Undrained, Total Stress	1.10	2.92	OK
G-G	Short Term, Undrained, Total Stress	1.50	12.01	OK
	Long Term, Drained, Effective Stress		12.01	OK
	Seismic, Undrained, Total Stress	1.10	3.87	OK
H-H	Short Term, Undrained, Total Stress	1.50	3.51	OK
	Long Term, Drained, Effective Stress		3.51	OK
	Seismic, Undrained, Total Stress	1.10	2.49	OK
I-I	Short Term, Undrained, Total Stress	1.50	2.51	OK
	Long Term, Drained, Effective Stress		2.51	OK
	Seismic, Undrained, Total Stress	1.10	1.97	OK
J-J	Short Term, Undrained, Total Stress	1.50	2.06	OK
	Long Term, Drained, Effective Stress		1.93	OK
	Seismic, Undrained, Total Stress	1.10	1.67	OK
K-K	Short Term, Undrained, Total Stress	1.50	12.20	OK
	Long Term, Drained, Effective Stress		12.20	OK
	Seismic, Undrained, Total Stress	1.10	3.67	OK
L-L	Short Term, Undrained, Total Stress	1.50	4.61	OK
	Long Term, Drained, Effective Stress		4.61	OK
	Seismic, Undrained, Total Stress	1.10	2.89	OK
M-M	Short Term, Undrained, Total Stress	1.50	9.99	OK
	Long Term, Drained, Effective Stress		9.99	OK
	Seismic, Undrained, Total Stress	1.10	3.27	OK
N-N	Short Term, Undrained, Total Stress	1.50	7.78	OK
	Long Term, Drained, Effective Stress		7.78	OK
	Seismic, Undrained, Total Stress	1.10	3.02	OK
O-O	Short Term, Undrained, Total Stress	1.50	10.30	OK
	Long Term, Drained, Effective Stress		10.30	OK
	Seismic, Undrained, Total Stress	1.10	3.28	OK

Notes: - Where failure surface passes through only GCL and in-situ CCR, FOS is the same for short term and long term conditions due to conservative selection of residual shear strengths (friction angles).

Liquefaction

Liquefaction of the CCR fill material was also analyzed to determine if a seismic event could induce settlement and lateral spread of material contained in AP3 Landfill. CPT data was processed utilizing program Cliq v.2.2.0.35 developed by GeoLogismiki (2006). A cyclic resistance ratio for an assumed magnitude 7.5 earthquake with seismic magnitude parameters as presented above was calculated and compared to the cyclic stress ratio. The ratio of thesze two numbers is equivalent to the factor of safety against liquefaction.

CPT	Liquefaction Results
AP3 CPT-01	Potentially liquefiable layers at 22 and 25 to 31 feet depth
AP3 CPT-02	No liquefaction
AP3 CPT-03	No liquefaction
AP3 CPT-04	No liquefaction
AP3 CPT-05	No liquefaction
AP3 CPT-06	No liquefaction
AP3 CPT-07	No liquefaction
AP3 CPT-08	No liquefaction
AP3 CPT-09	No liquefaction
AP3 CPT-09SL	Unlikely to liquefy
AP3 CPT-10	Potentially liquefiable layers at 18 to 19 and 29 to 32 feet depth
AP3 CPT-11	Unlikely to liquefy
AP3 CPT-12	Unlikely to liquefy
AP3 CPT-13	Unlikely to liquefy
AP3 CPT-14	Potentially liquefiable layers at 30 to 31 feet depth
AP3 CPT-15	No liquefaction
AP3 CPT-16	No liquefaction
AP3 CPT-17A	No liquefaction
AP3 CPT-18A	Unlikely to liquefy
AP3 CPT-19	No liquefaction
AP3 CPT-20	No liquefaction
AP3 CPT-21	Potentially liquefiable layers at 43 to 44 feet depth
AP3 CPT-22	No liquefaction
AP3 CPT-23	No liquefaction
AP3 CPT-24	No liquefaction
AP3 CPT-25	No liquefaction
AP3 CPT-26A	No liquefaction
AP3 CPT-27	Unlikely to liquefy
AP3 CPT-28	Potentially liquefiable layers at 10 to 11 feet depth
AP3 CPT-29	No liquefaction
AP3 CPT-30	No liquefaction
AP3 CPT-31	Unlikely to liquefy
AP3 CPT-32	No liquefaction
AP3 CPT-33	No liquefaction
AP3 CPT-34	No liquefaction

Because only localized CCR layers are identified as potentially liquefibale, setllement is not likely to be a concern. Excess pore water pressures will alleviate to non-liqufiable layers just outside of the potentially liquefiable zones in both the horizontal and vertical direction.

However, lateral squeezing/spreading of CCR material towards the levee at the south side of AP3 Landfill will still be checked. Logs of monitoring wells GWA-7 and GWA-8 are drilled nearest the south levee containing the AP3 Landfill. These locations were analyzed for liquefaction potential using the IDOT liquefaction spreadsheet and the results of SPT sampling and laboratory testing performed on samples for these two well logs.

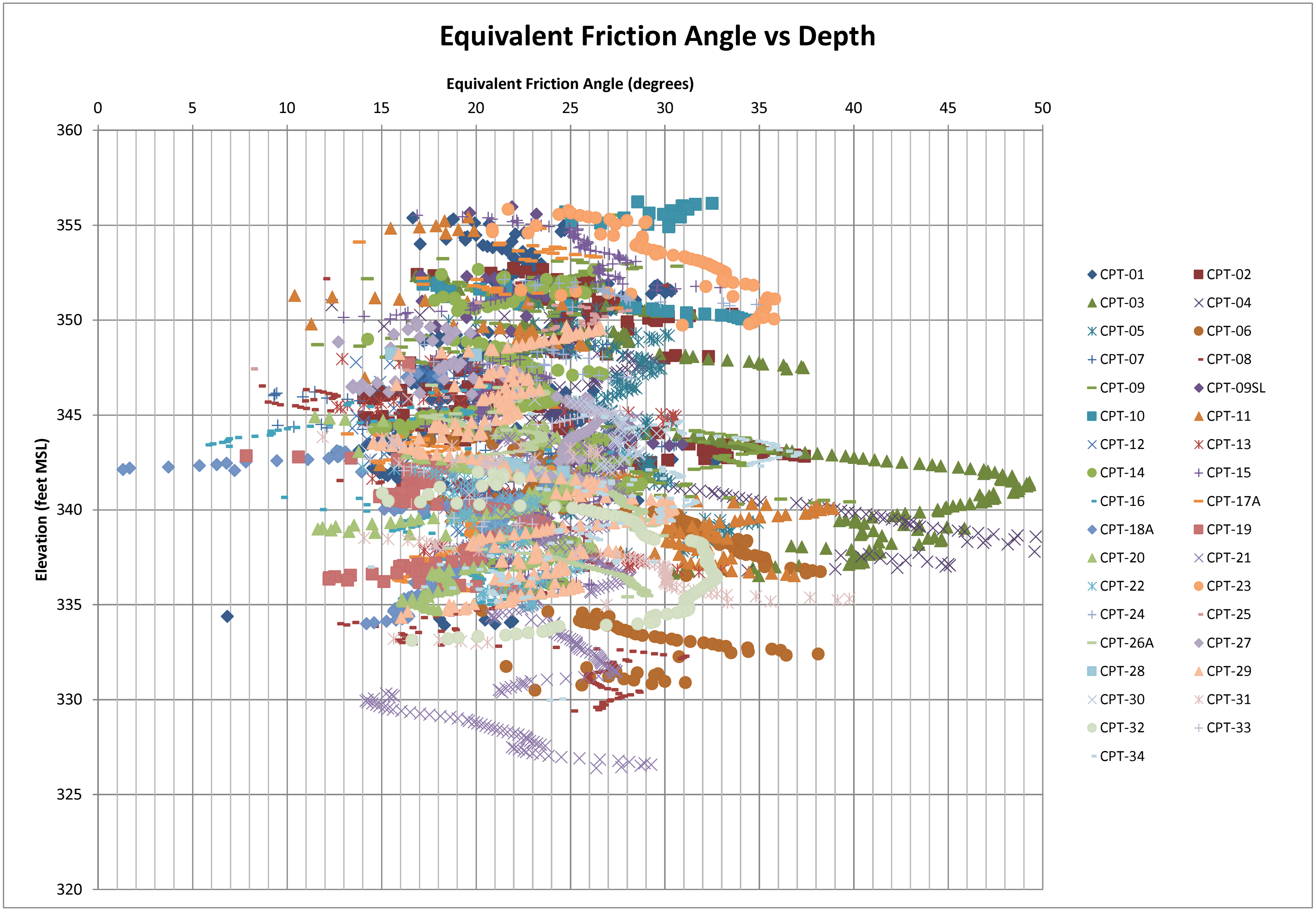
Boring/Well Log	Liquefaction Results
GWA-07	No liquefaction
GWA-08	No liquefaction

Even in the rare case of liquefaction of the CCR material in localized seams, the levee material containing the CCR is not anticipated to liquefy.

Conclusions:

Global stability of the existing AP3 Landfill meets all criteria for short term, long term and seismic loading conditions.

Liquefaction analyses indicate that CCR material may liquefy at very localized soft spots, but likely not cause any settlement or lateral spreading of CCR material. The levee containg AP3 Landfill at the south end of the site is not anticipated to be liquefiable.



Equivalent Friction Angle calculated using Equation 4-20 from report by Electric Power Research Institute - Engineering Correlations for Geotechnical Parameters for Ponded Fly Ash 2014 Technical Report based on processed CPT data

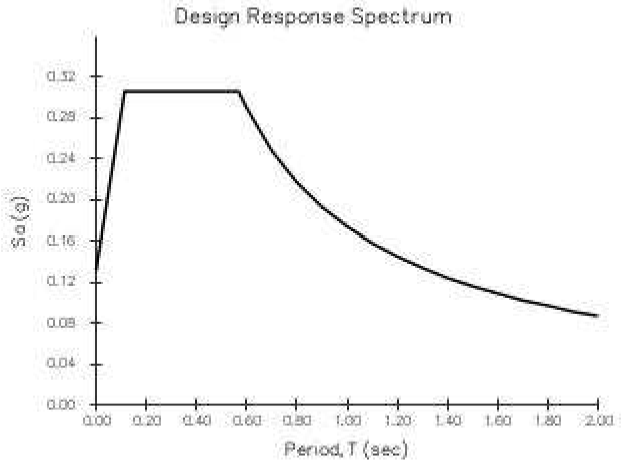
Design Maps Summary Report

User–Specified Input

Report Title	Former Arkwright Plant - AP3 Wed February 14, 2018 15:21:07 UTC
Building Code Reference Document	2009 AASHTO Guide Specifications for LRFD Seismic Bridge Design (which utilizes USGS hazard data available in 2002)
Site Coordinates	32.92765°N, 83.70681°W
Site Soil Classification	Site Class E – "Soft Clay Soil"

USGS–Provided Output

PGA =	0.052 g	**A_s =**	0.131 g
S_S =	0.122 g	**S_{DS} =**	0.306 g
S_1 =	0.050 g	**S_{D1} =**	0.174 g



Design Maps Detailed Report

2009 AASHTO Guide Specifications for LRFD Seismic Bridge Design (32.92765°N, 83.70681°W)

Site Class E – "Soft Clay Soil"

Article 3.4.1 — Design Spectra Based on General Procedure

Note: Maps in the 2009 AASHTO Specifications are provided by AASHTO for Site Class B. Adjustments for other Site Classes are made, as needed, in Article 3.4.2.3.

From Figure 3.4.1-2 [1]	PGA = 0.052 g
From Figure 3.4.1-3 [2]	S_S = 0.122 g
From Figure 3.4.1-4 [3]	S_1 = 0.050 g

Article 3.4.2.1 — Site Class Definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class E, based on the site soil properties in accordance with Article 3.4.2.

Table 3.4.2.1–1 Site Class Definitions

SITE CLASS	**SOIL PROFILE NAME**	**Soil shear wave velocity, $\bar{v}_s$, (ft/s)**	**Standard penetration resistance, $\bar{N}$**	**Soil undrained shear strength, $\bar{s}_u$, (psf)**
A	Hard rock	$\bar{v}_S > 5,000$	N/A	N/A
B	Rock	$2,500 < \bar{v}_S \leq 5,000$	N/A	N/A
C	Very dense soil and soft rock	$1,200 < \bar{v}_S \leq 2,500$	$\bar{N} > 50$	>2,000 psf
D	Stiff soil profile	$600 \leq \bar{v}_S < 1,200$	$15 \leq \bar{N} \leq 50$	1,000 to 2,000 psf
E	Stiff soil profile	$\bar{v}_S < 600$	$\bar{N} < 15$	<1,000 psf
E	—	Any profile with more than 10 ft of soil having the characteristics: 1. Plasticity index $PI > 20$, 2. Moisture content $w \geq 40\%$, and 3. Undrained shear strength $\bar{s}_u < 500$ psf		
F	—	Any profile containing soils having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays ($H > 10$ feet of peat and/or highly organic clay where H = thickness of soil) 3. Very high plasticity clays ($H > 25$ feet with plasticity index $PI > 75$) 4. Very thick soft/medium stiff clays ($H > 120$ feet)		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Article 3.4.2.3 — Site Coefficients

Table 3.4.2.3-1 (for F_{pga})—Values of F_{pga} as a Function of Site Class and Mapped Peak Ground Acceleration Coefficient

Site Class	Mapped Peak Ground Acceleration				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See AASHTO Article 3.4.3				
Note: Use straight–line interpolation for intermediate values of PGA					

For Site Class = E and PGA = 0.052 g, F_{PGA} = 2.500

Table 3.4.2.3-1 (for F_a)—Values of F_a as a Function of Site Class and Mapped Short-Period Spectral Acceleration Coefficient

Site Class	Spectral Response Acceleration Parameter at Short Periods				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See AASHTO Article 3.4.3				
Note: Use straight–line interpolation for intermediate values of S_S					

For Site Class = E and S_S = 0.122 g, F_a = 2.500

Table 3.4.2.3-2—Values of F_v as a Function of Site Class and Mapped 1-sec Period Spectral Acceleration Coefficient

Site Class	Mapped Spectral Response Acceleration Coefficient at 1-sec Periods				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See AASHTO Article 3.4.3				

Note: Use straight–line interpolation for intermediate values of S_1

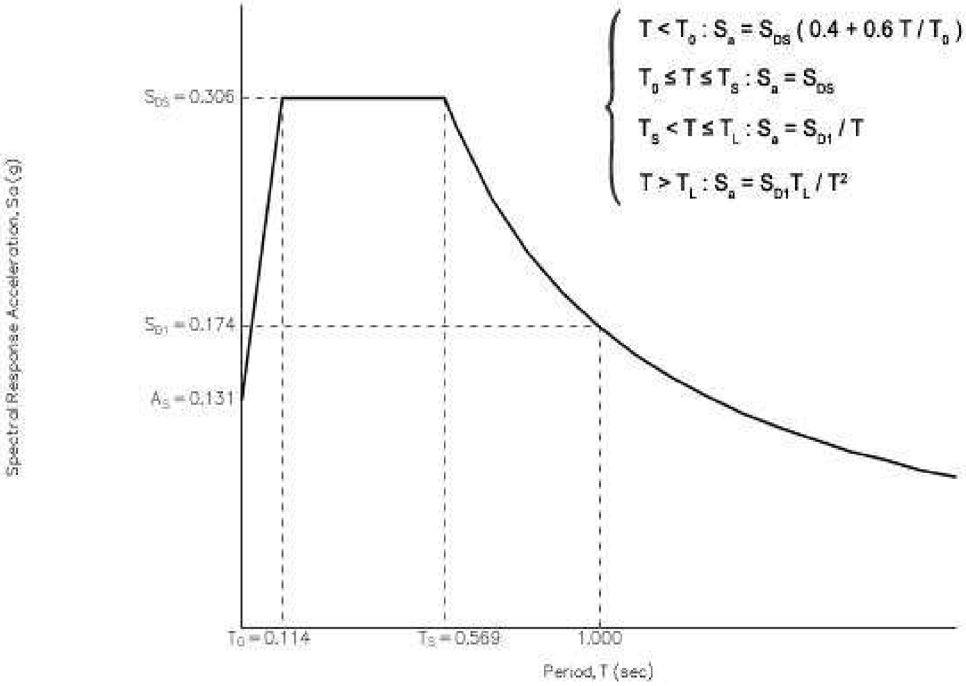
For Site Class = E and S_1 = 0.050 g, F_v = 3.500

Equation (3.4.1-1): $A_S = F_{PGA}\ PGA = 2.500 \times 0.052 = 0.131$ g

Equation (3.4.1-2): $S_{DS} = F_a\ S_S = 2.500 \times 0.122 = 0.306$ g

Equation (3.4.1-3): $S_{D1} = F_v\ S_1 = 3.500 \times 0.050 = 0.174$ g

Figure 3.4.1-1: Design Response Spectrum



Article 3.5 - Selection of Seismic Design Category (SDC)

Table 3.5-1—Partitions for Seismic Design Categories A, B, C, and D

VALUE OF S_{D1}	**SDC**
$S_{D1} < 0.15g$	A
$0.15g \le S_{D1} < 0.30g$	B
$0.30g \le S_{D1} < 0.50g$	C
$0.50g \le S_{D1}$	D

For S_{D1} = 0.174 g, Seismic Design Category = B

Seismic Design Category ≡ "the design category in accordance with Table 3.5-1" = B

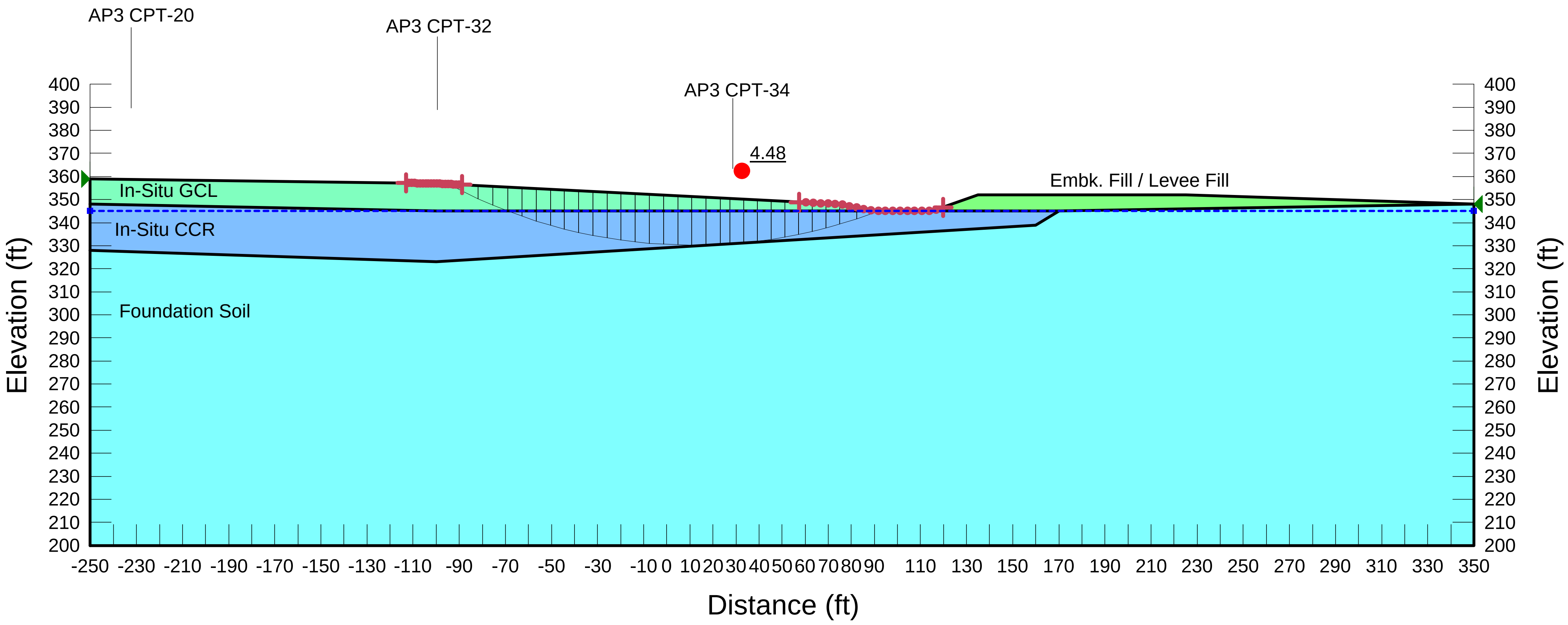
References

1. *Figure 3.4.1-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-2.pdf
2. *Figure 3.4.1-3*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-3.pdf
3. *Figure 3.4.1-4*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-4.pdf

Former Plant Arkwright
AP3 Landfill

Section A-A
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters

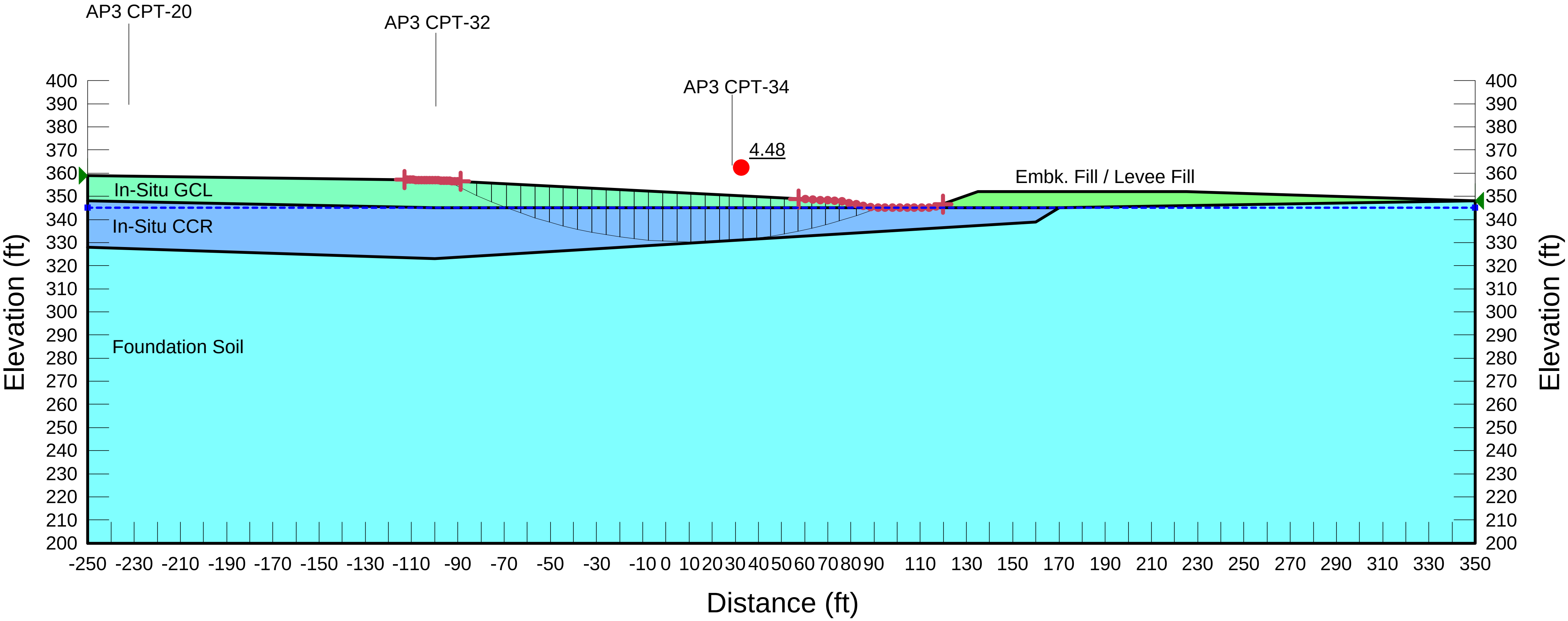


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 700 psf Phi': 10 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section A-A
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters

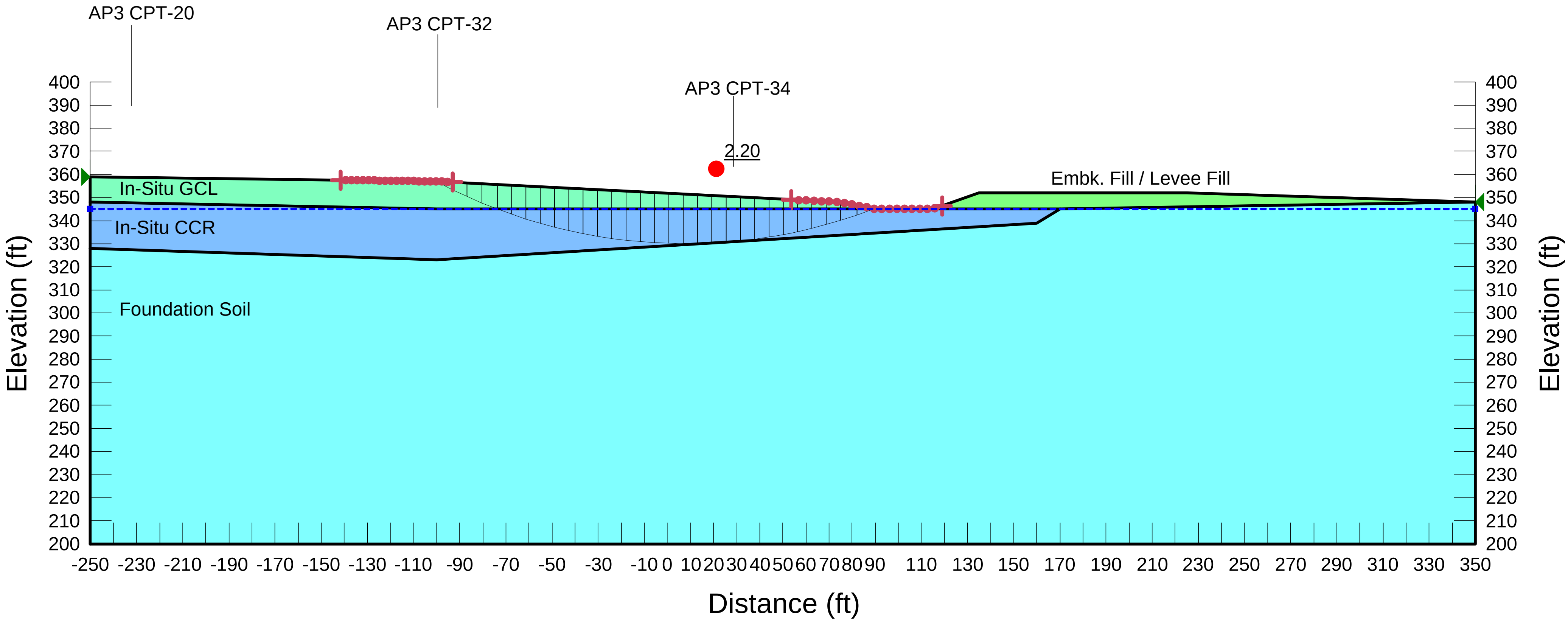


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section A-A
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g

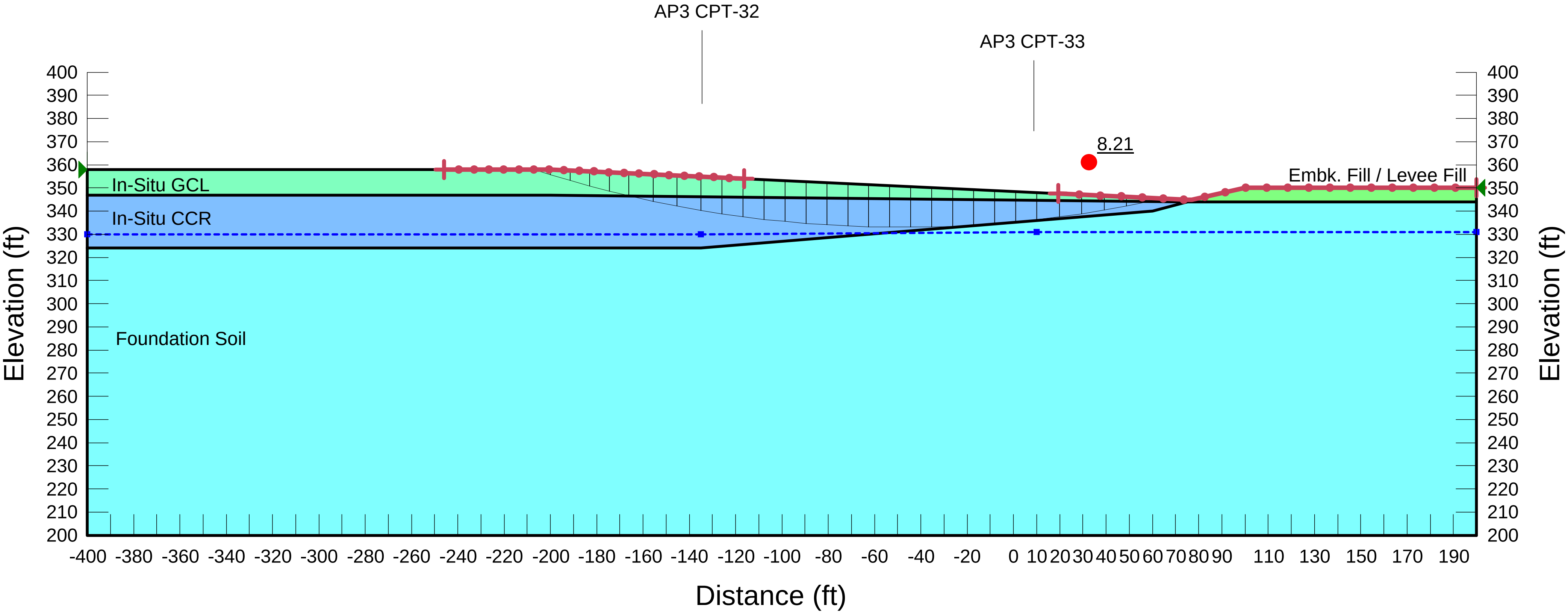


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 700 psf Phi': 10 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section B-B
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters

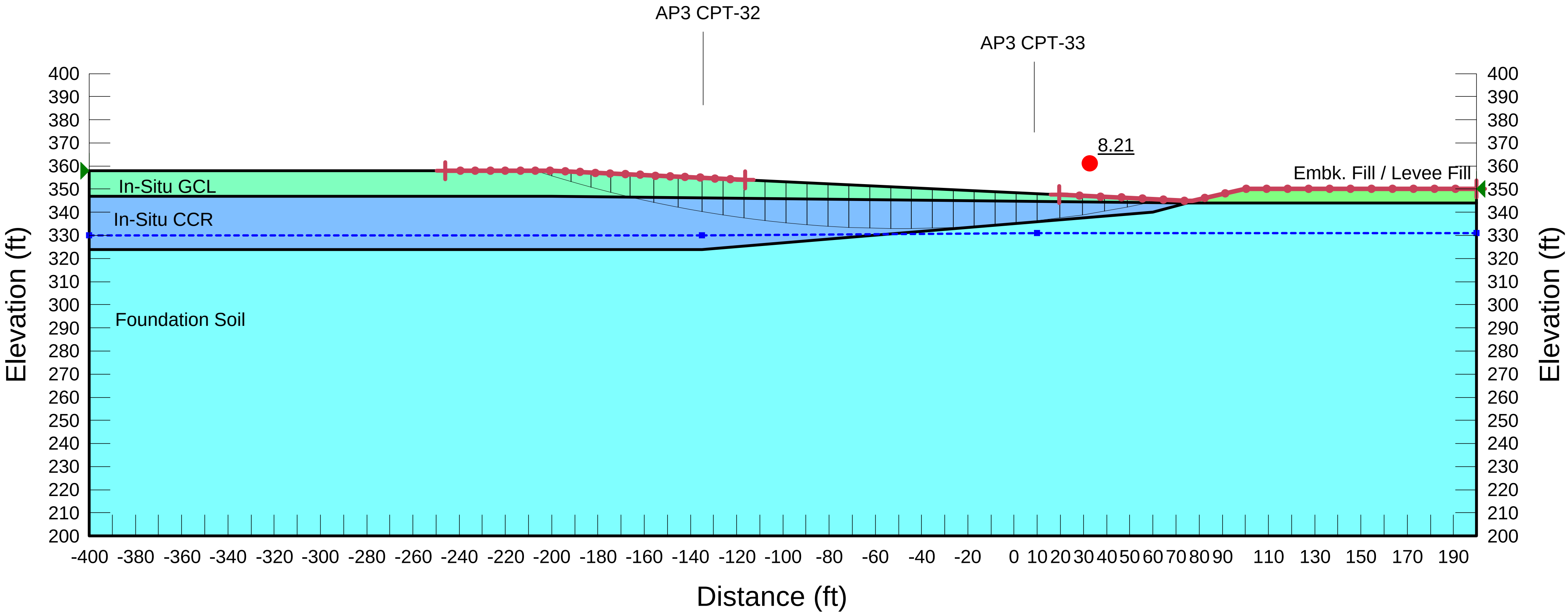


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 700 psf Phi': 10 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section B-B
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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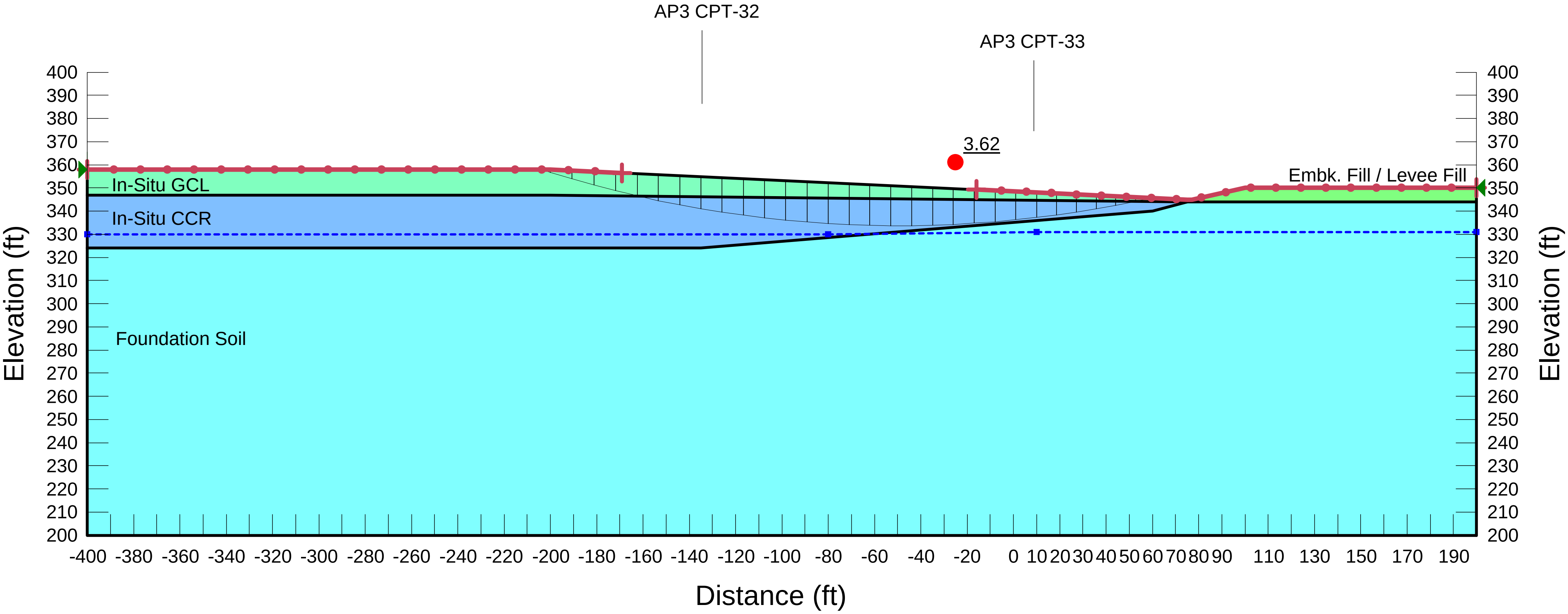
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section B-B
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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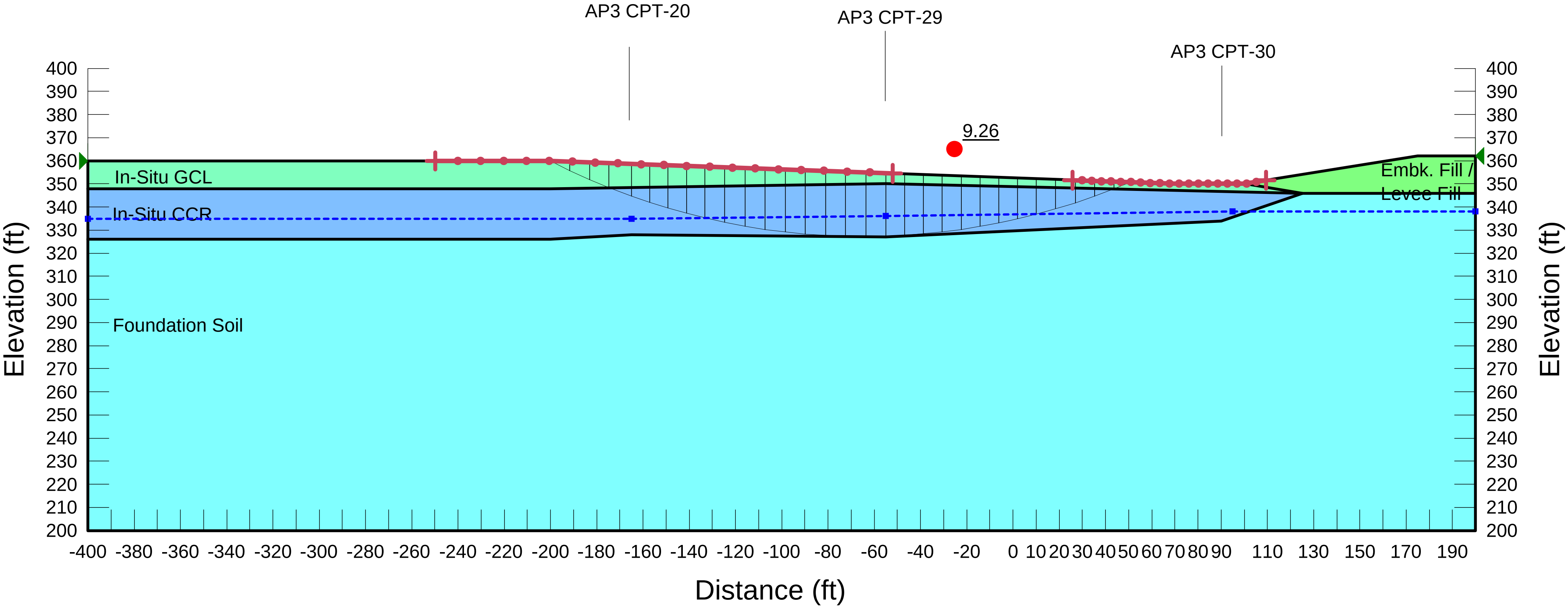
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section C-C
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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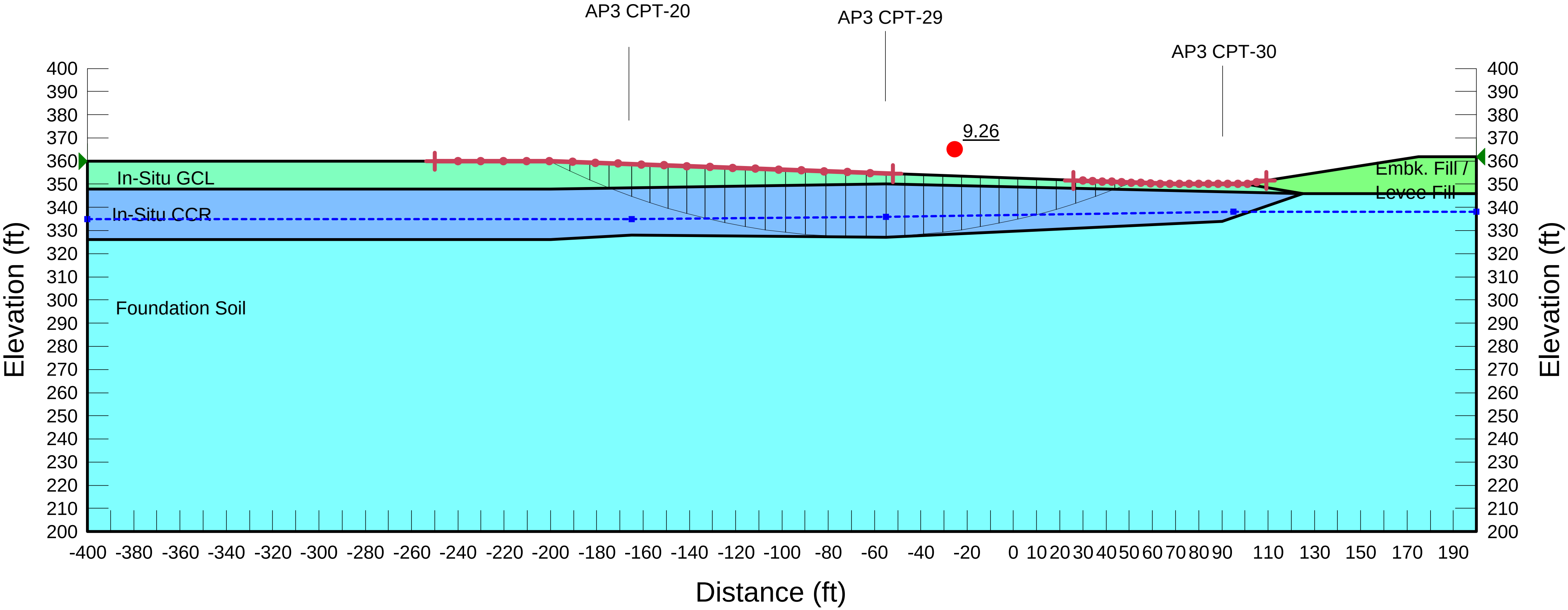
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section C-C
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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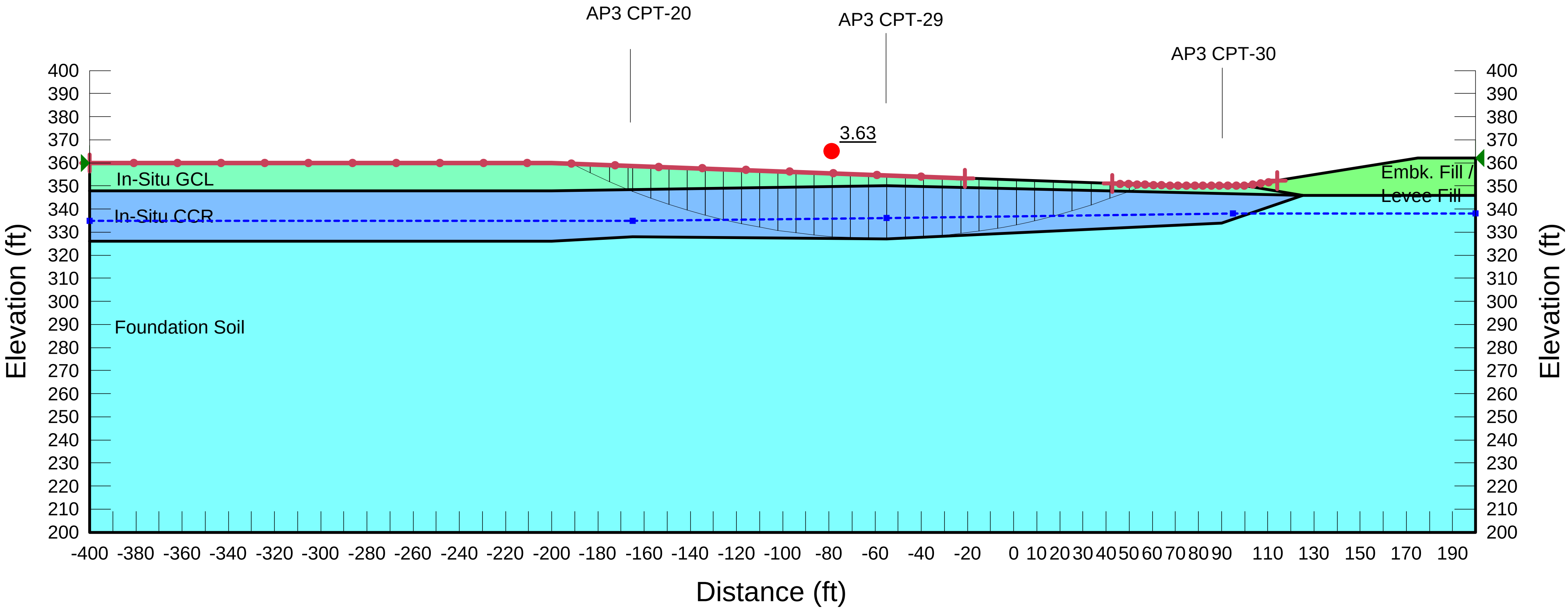
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section C-C
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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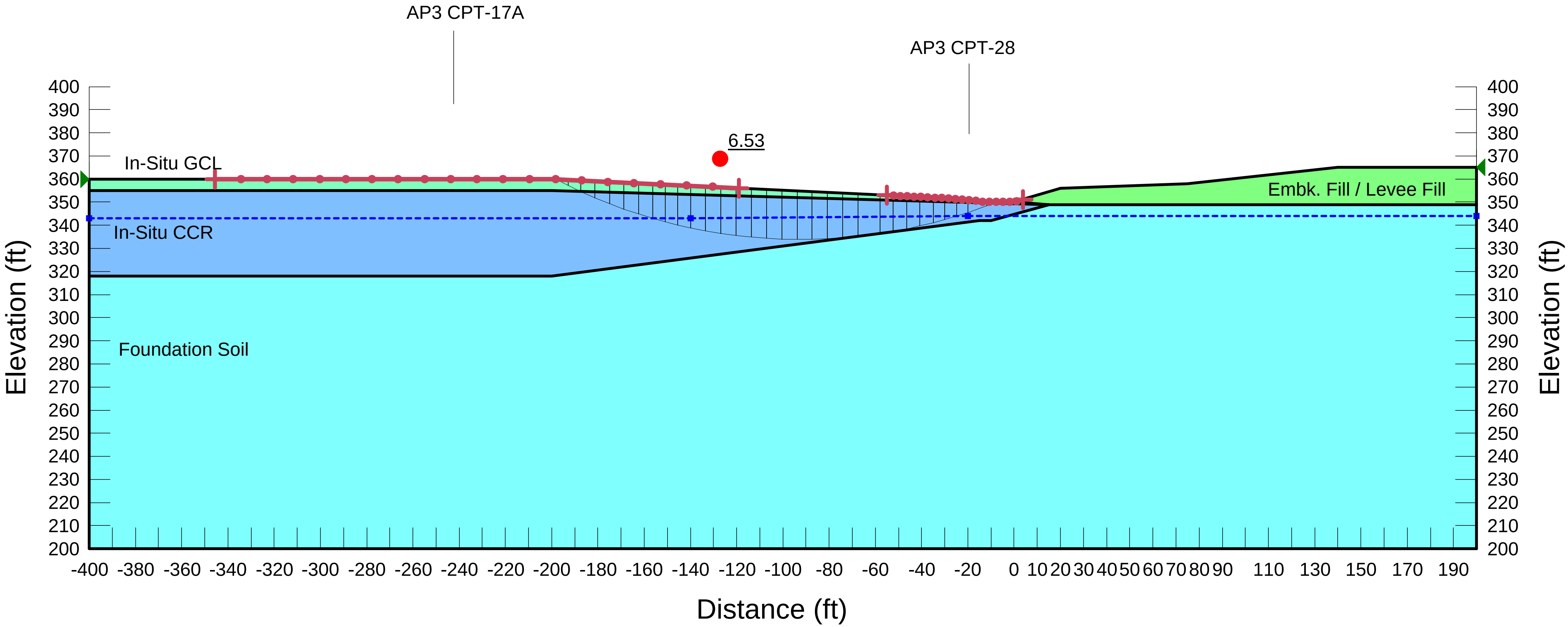
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section D-D
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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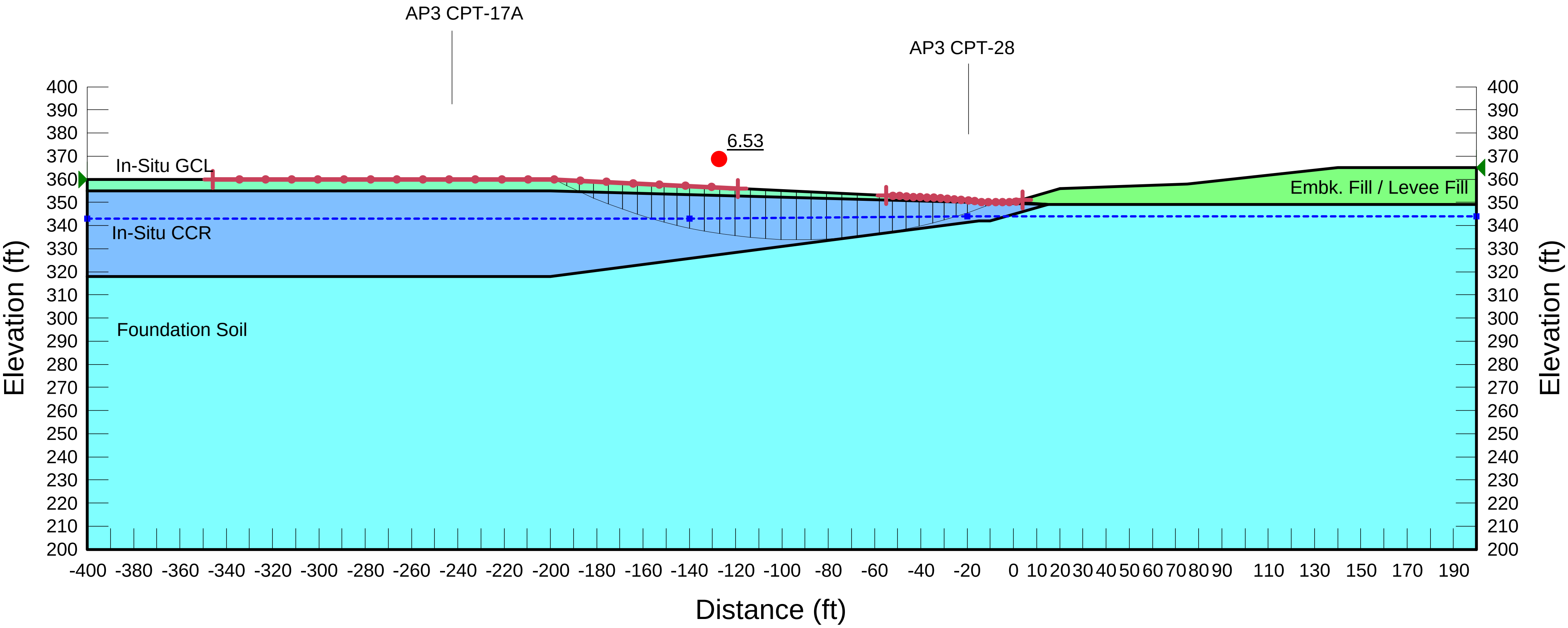
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section D-D
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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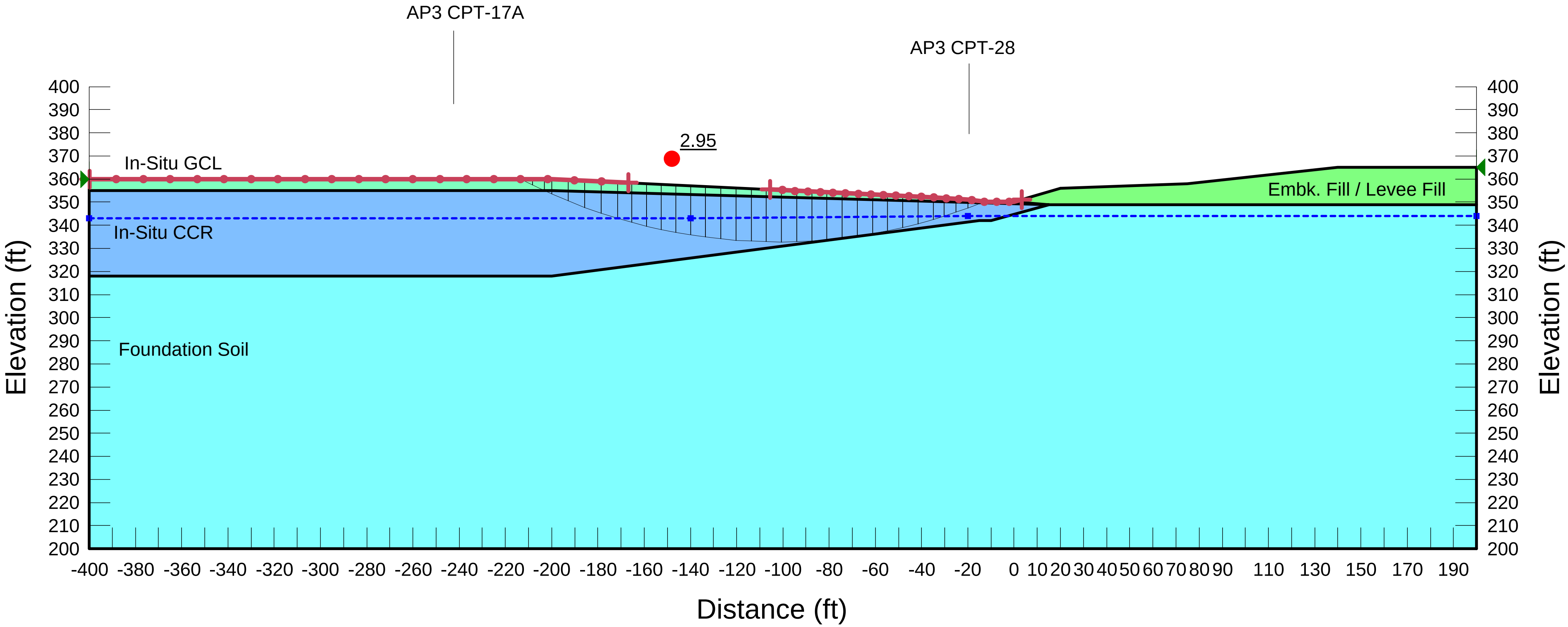
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section D-D
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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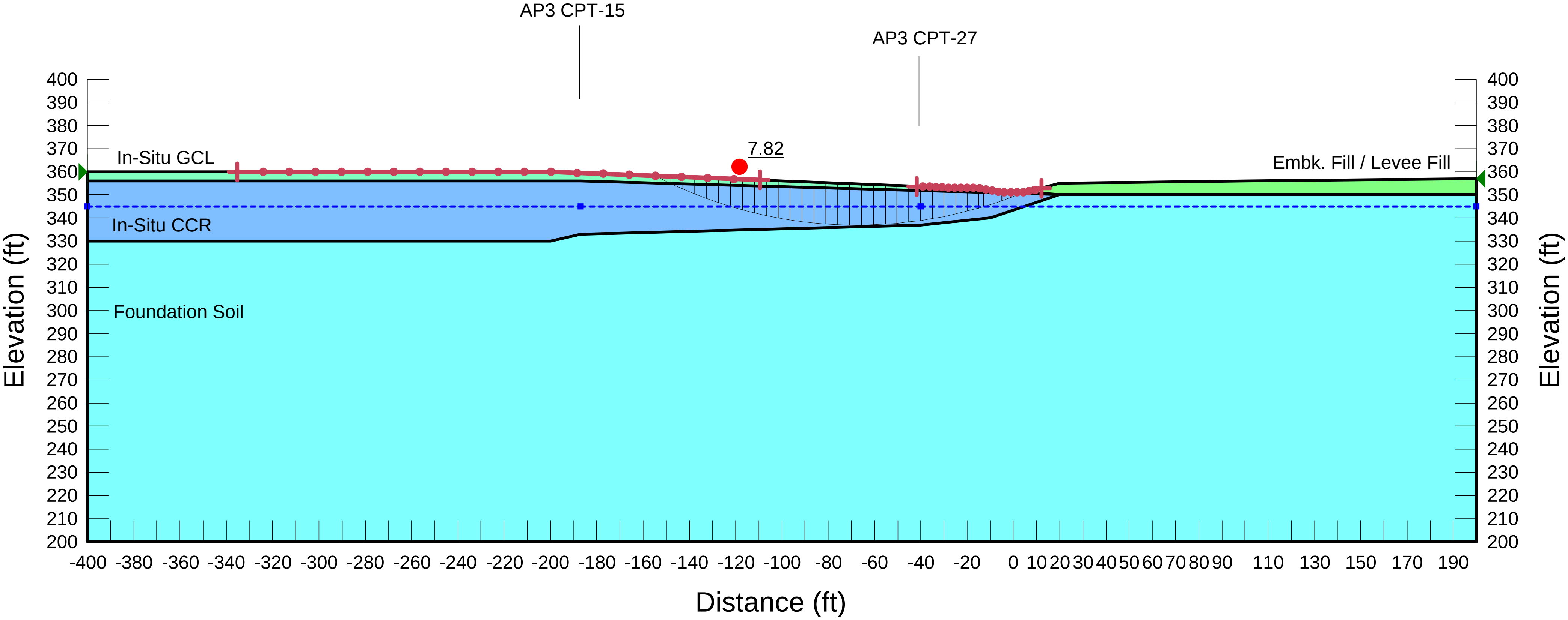
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section E-E
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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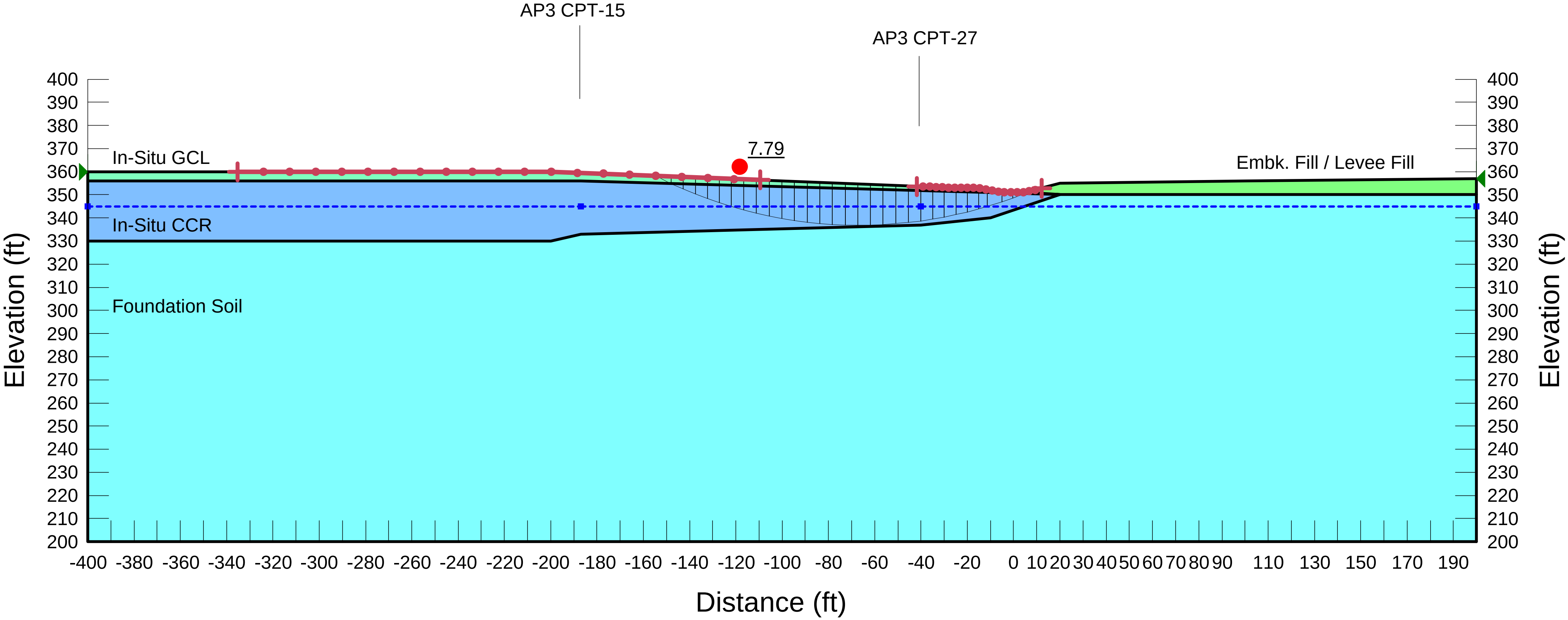
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section E-E
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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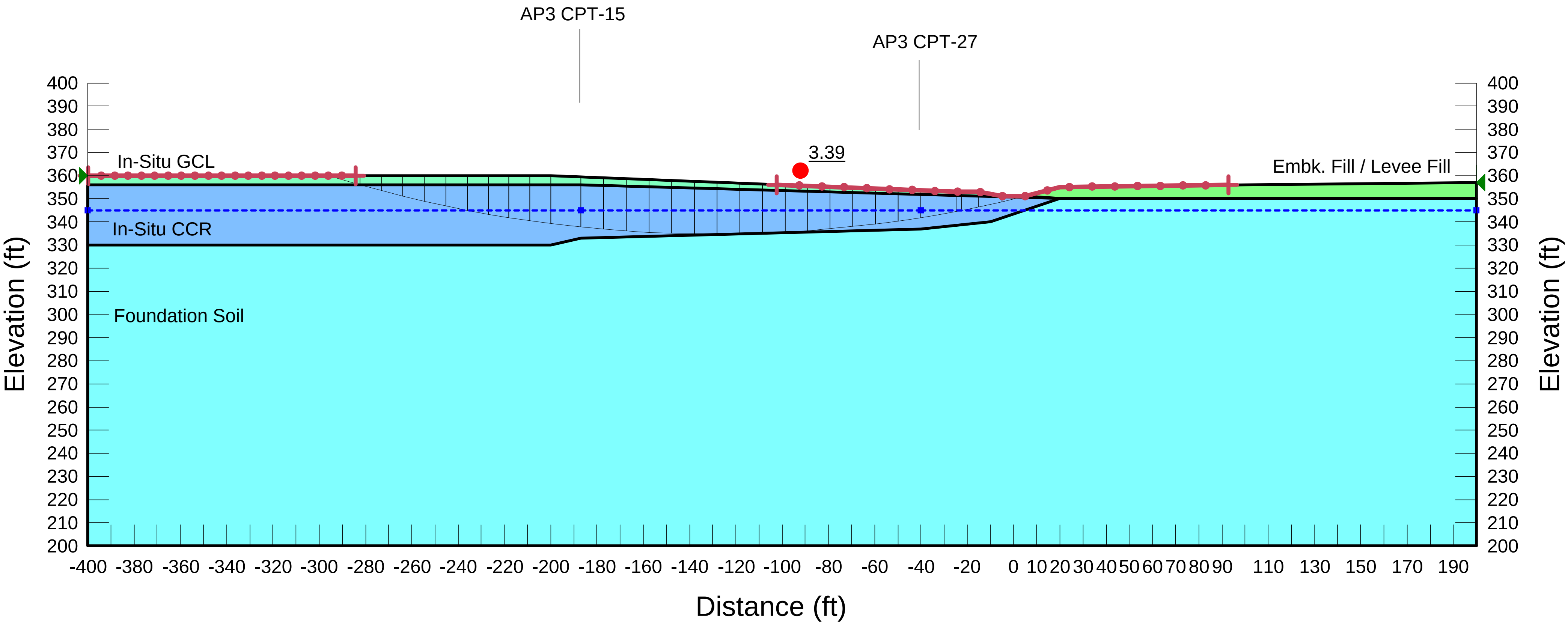
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section E-E
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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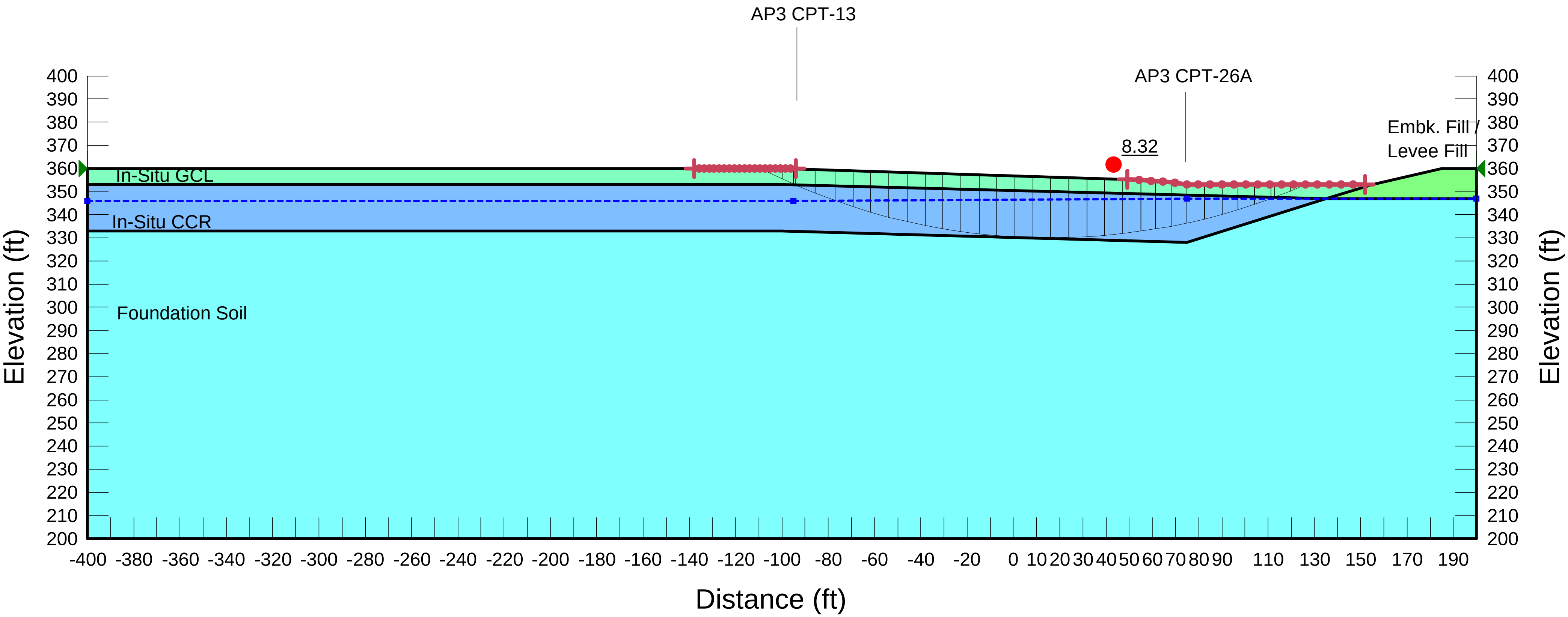
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section F-F
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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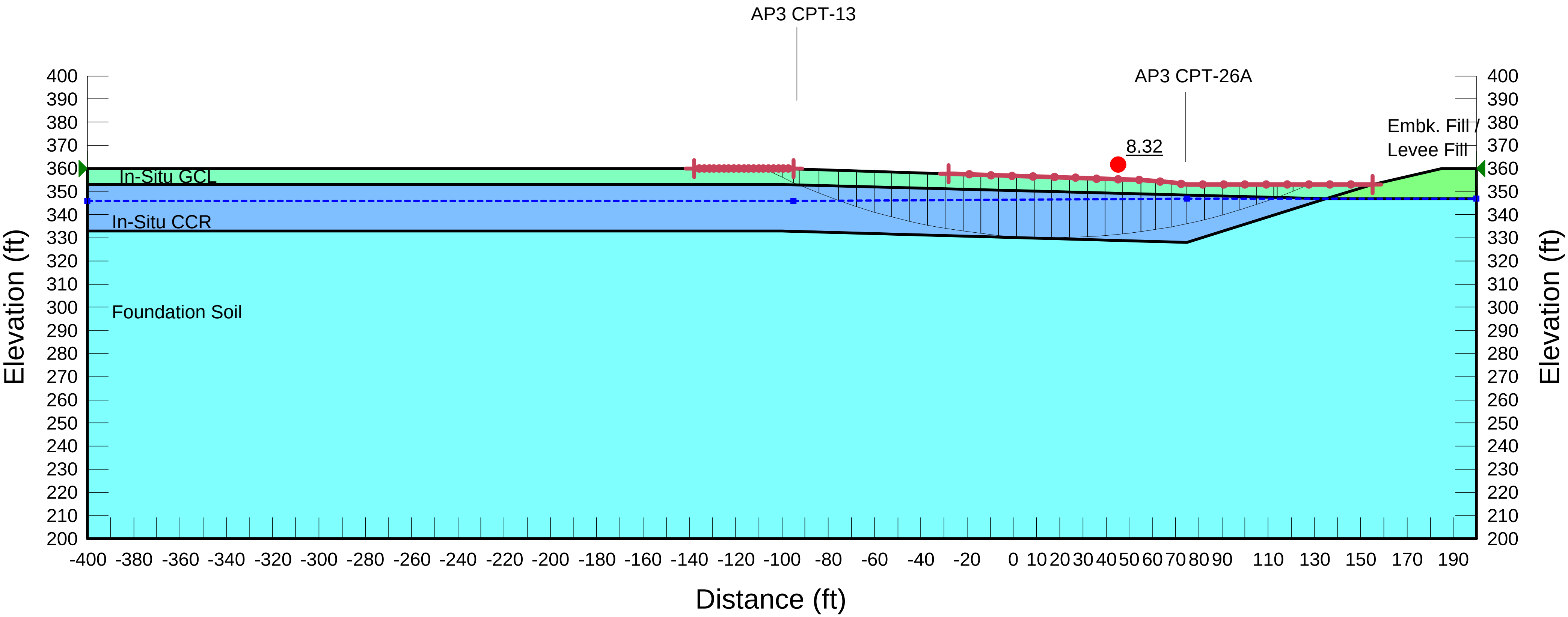
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section F-F
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters

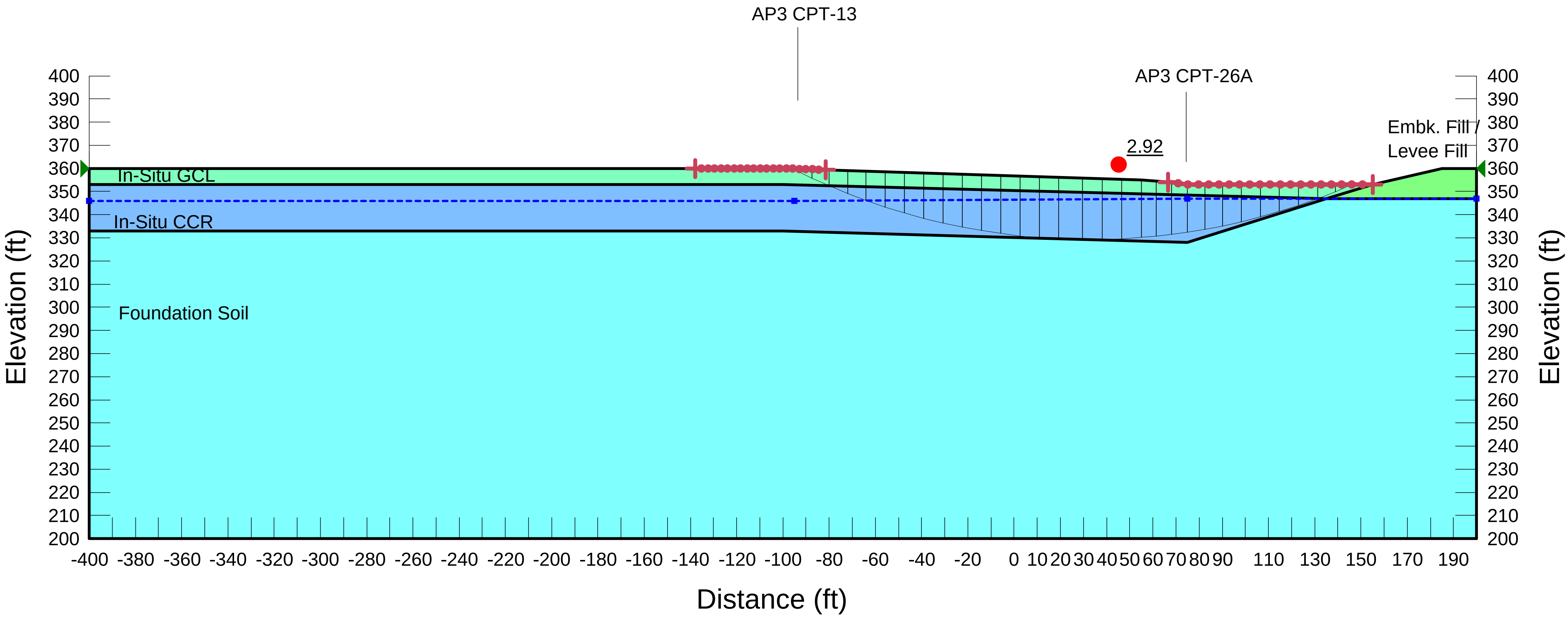


Name: Embk. Fill/Levee Fill	Unit Weight: 120 pcf	Cohesion': 100 psf	Phi': 28 °
Name: In-Situ GCL	Unit Weight: 110 pcf	Cohesion': 100 psf	Phi': 15 °
Name: Foundation Soil	Unit Weight: 108 pcf	Cohesion': 300 psf	Phi': 24 °
Name: In-Situ CCR	Unit Weight: 90 pcf	Cohesion': 0 psf	Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section F-F
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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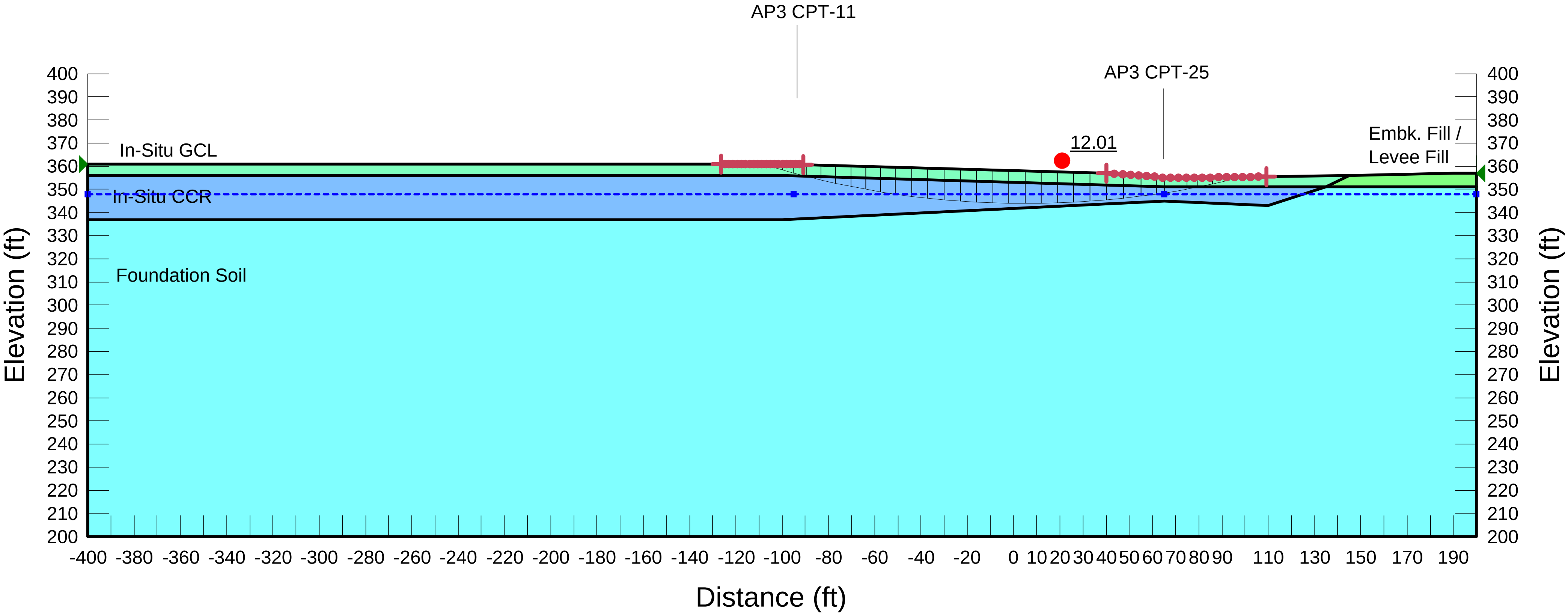
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section G-G
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
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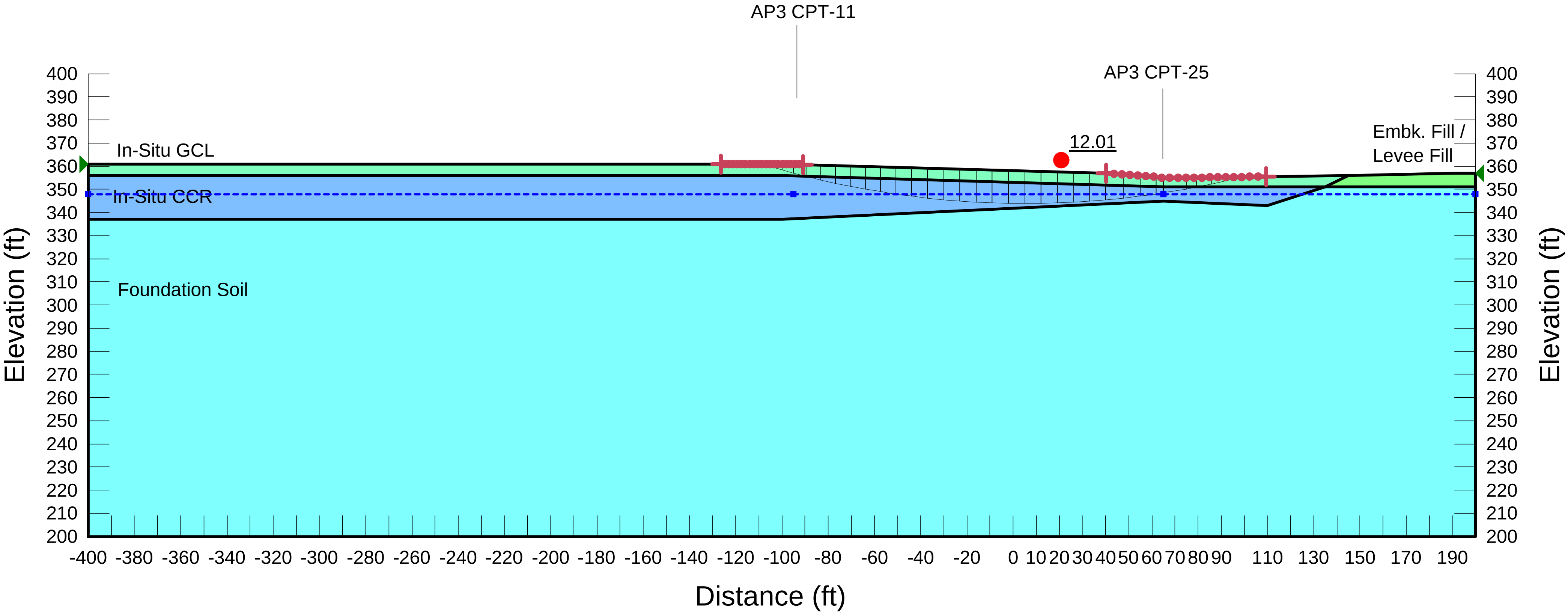
Former Plant Arkwright
AP3 Landfill

Section G-G
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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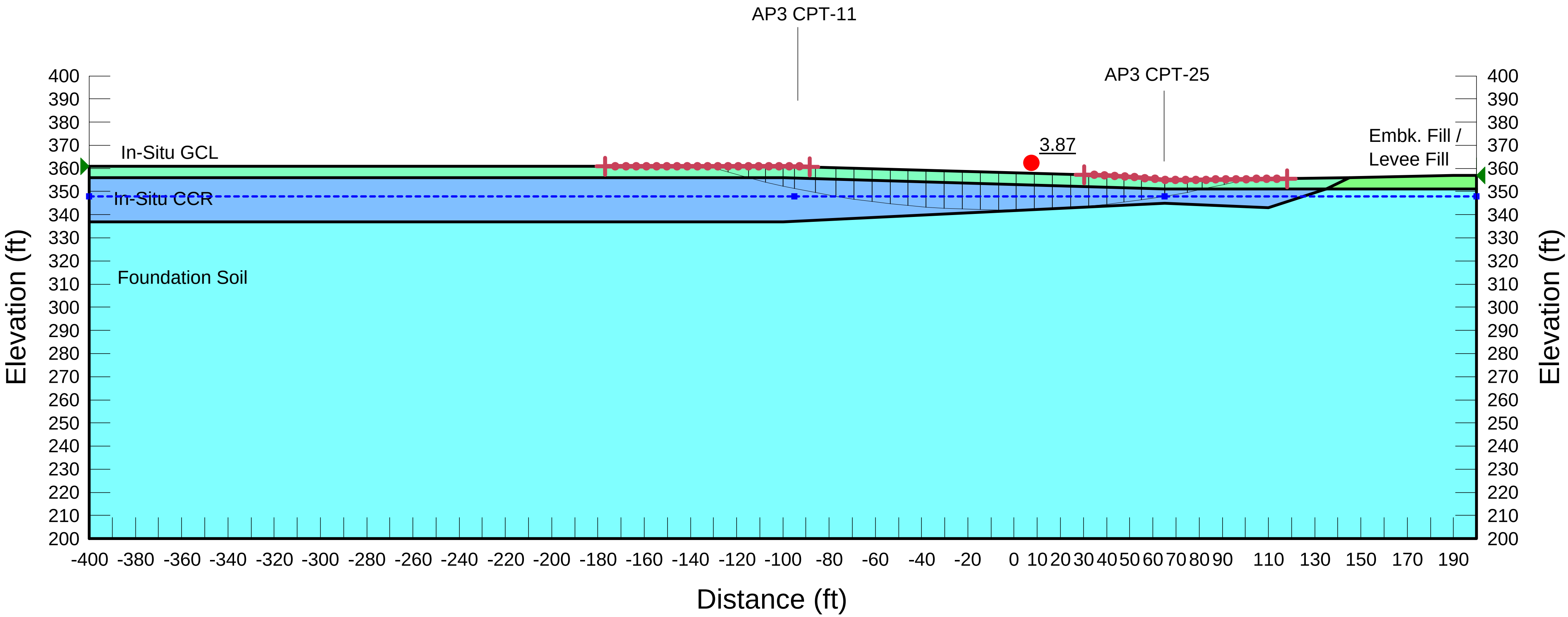
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section G-G
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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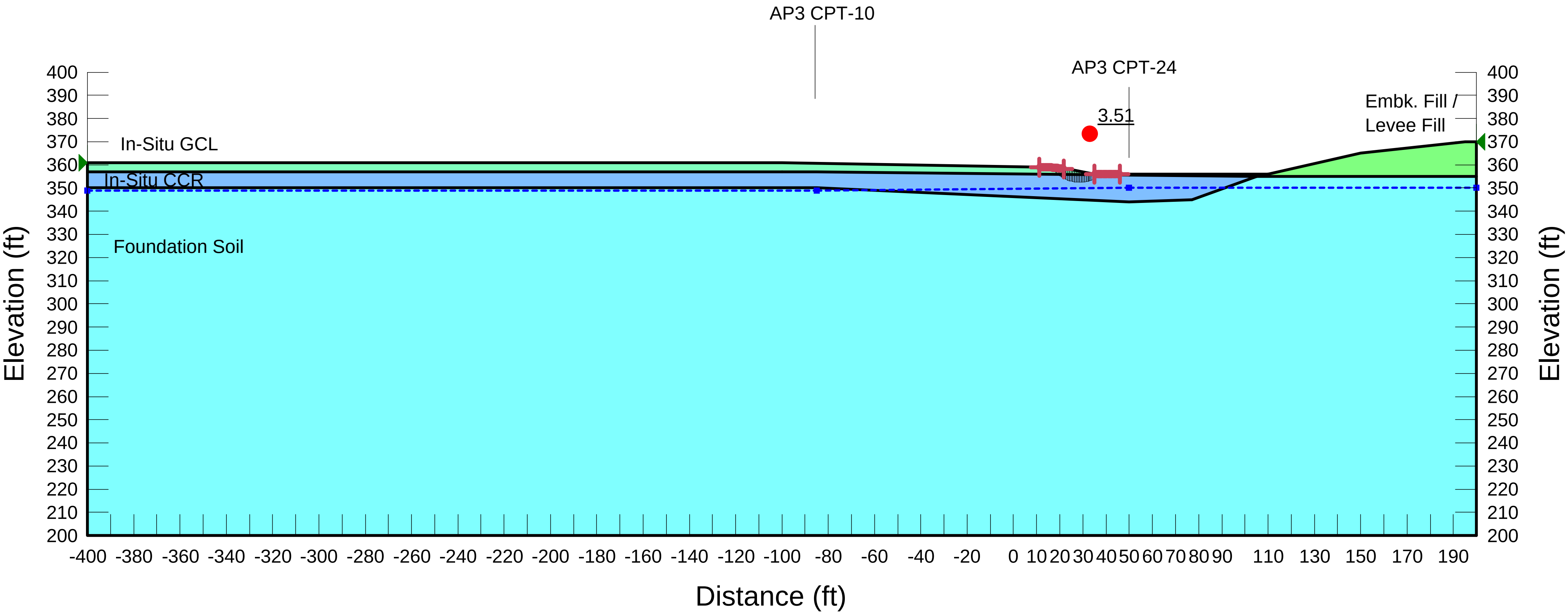
Former Plant Arkwright
AP3 Landfill

Section H-H
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
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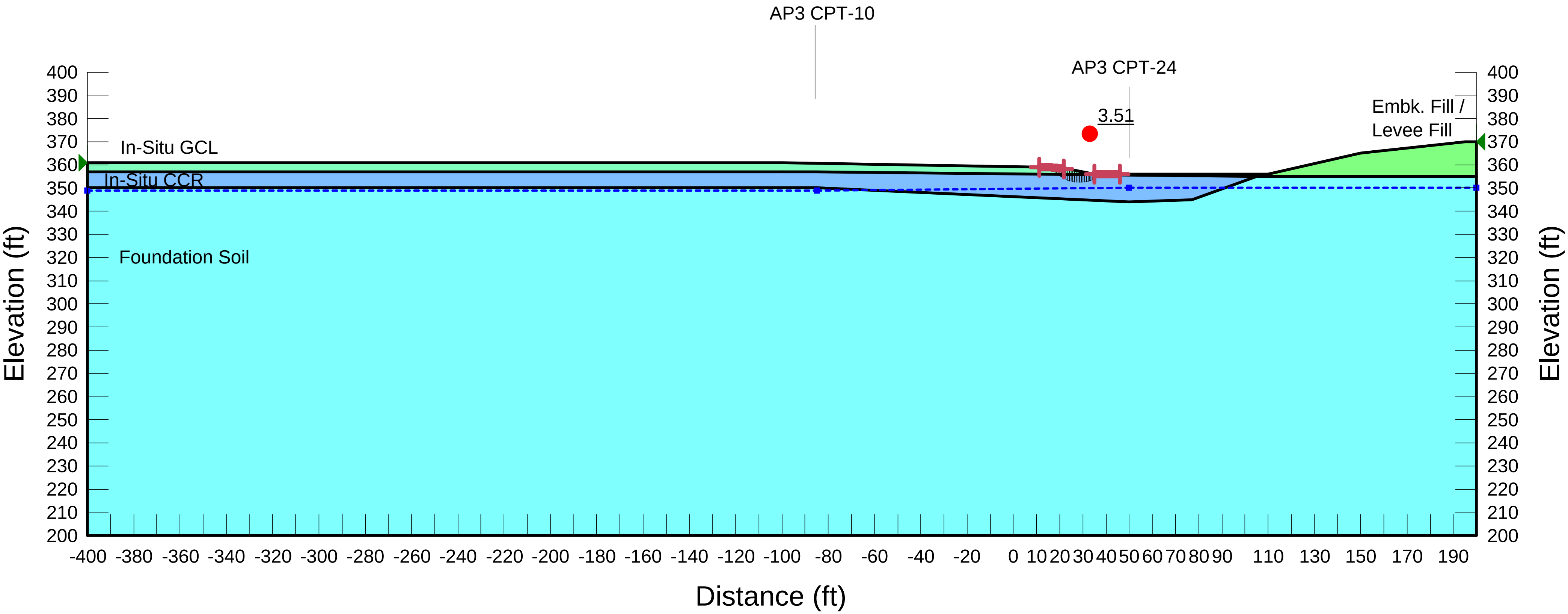
Former Plant Arkwright
AP3 Landfill

Section H-H
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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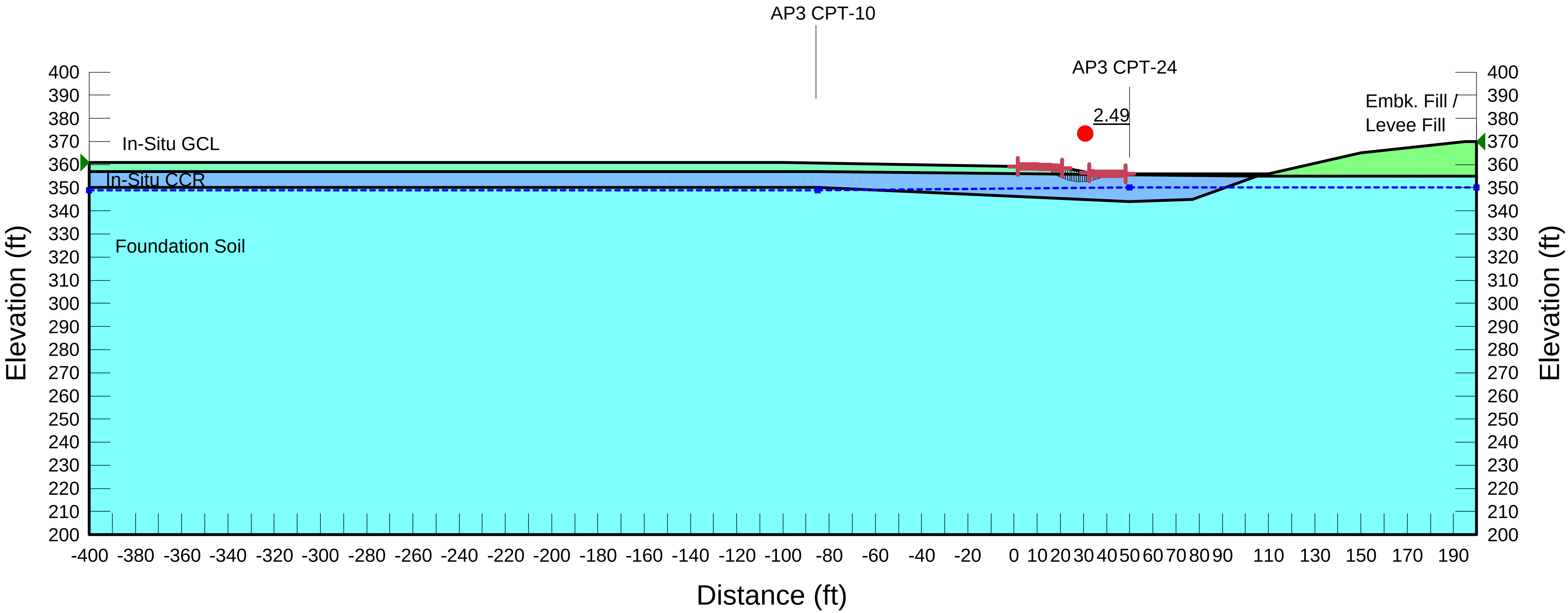
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section H-H
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
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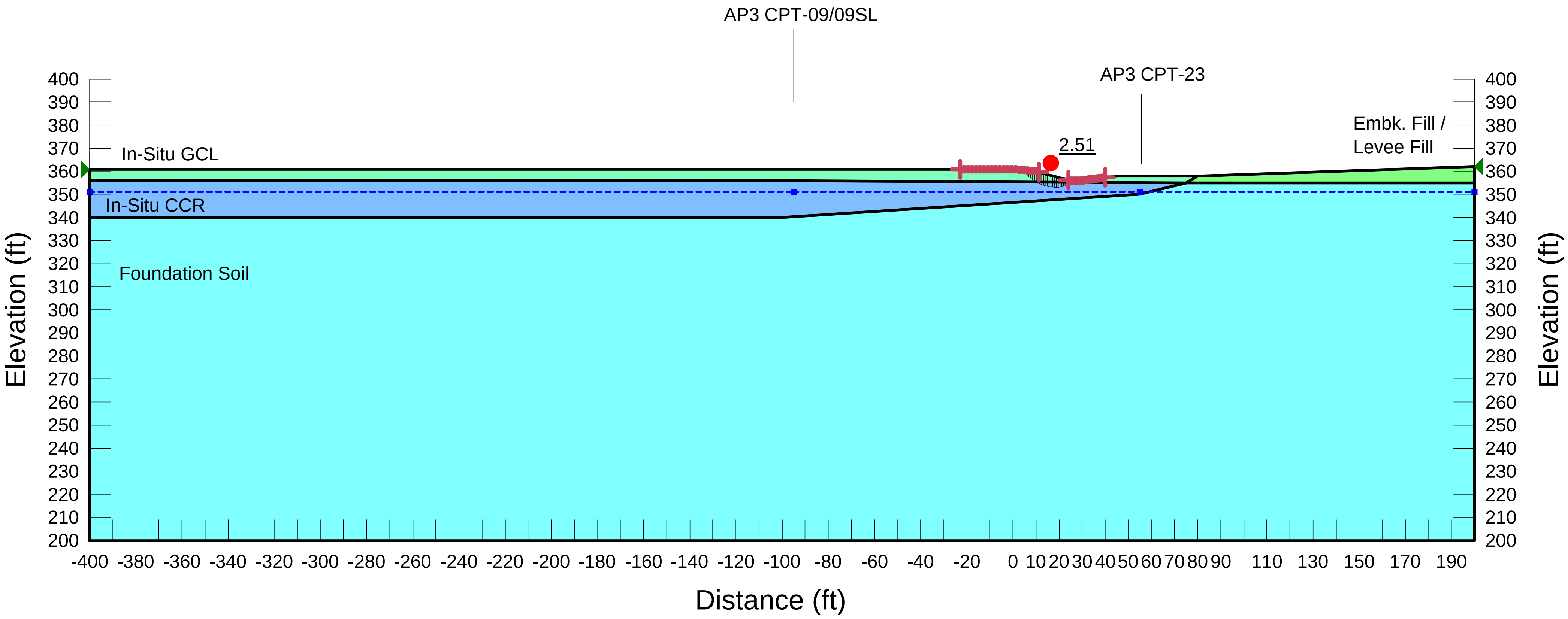
Former Plant Arkwright
AP3 Landfill

Section I-I
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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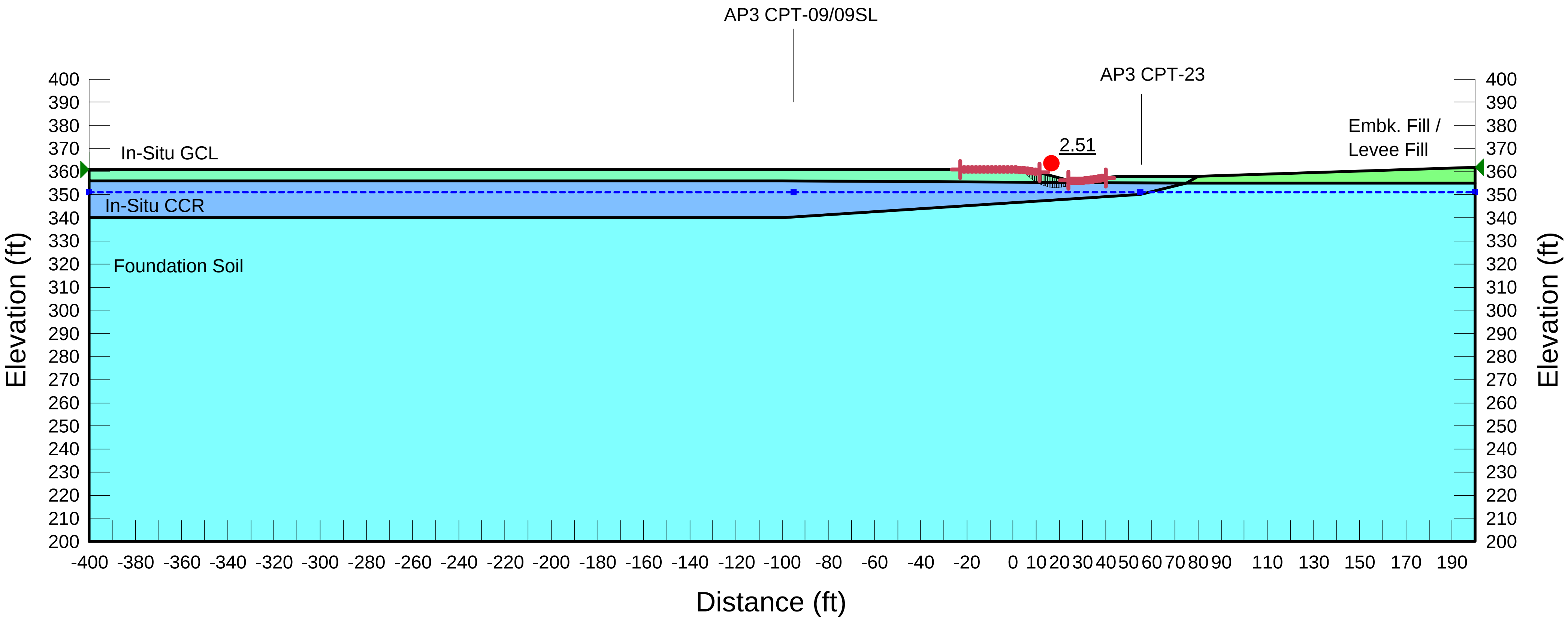
Former Plant Arkwright
AP3 Landfill

Section I-I
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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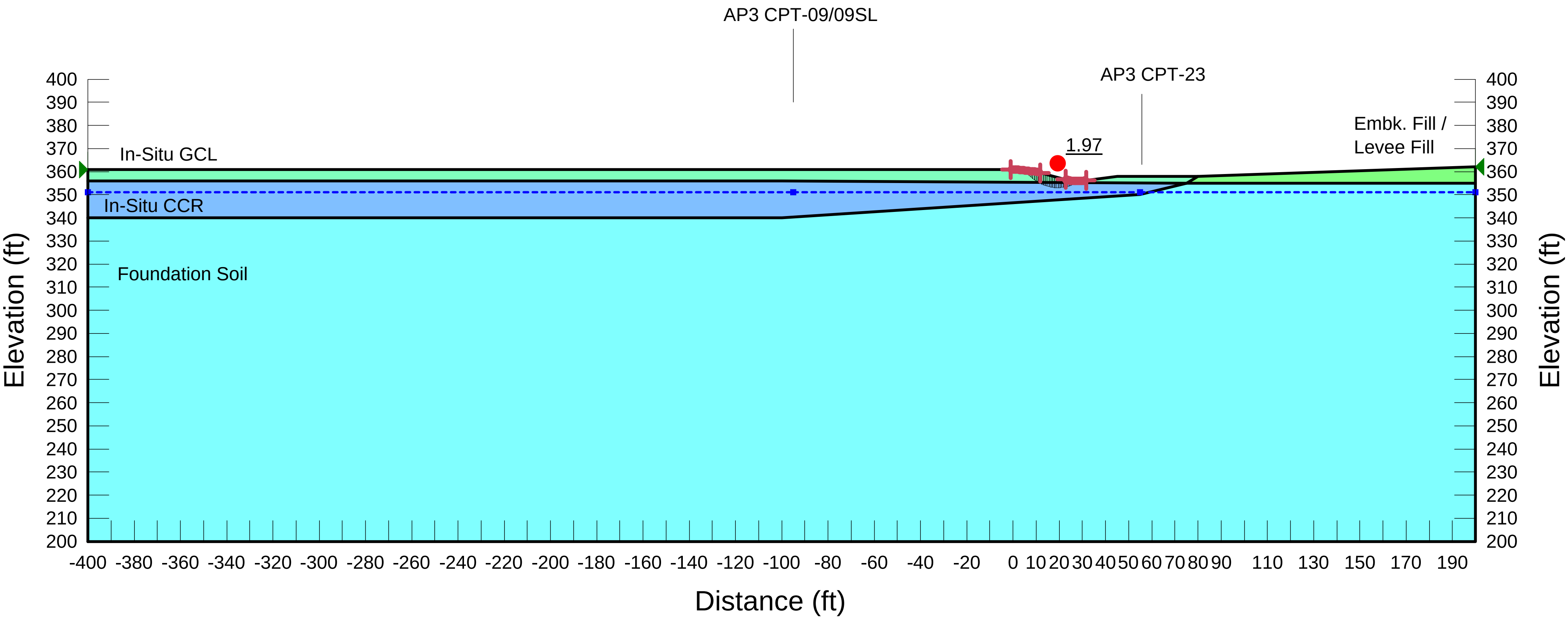
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section I-I
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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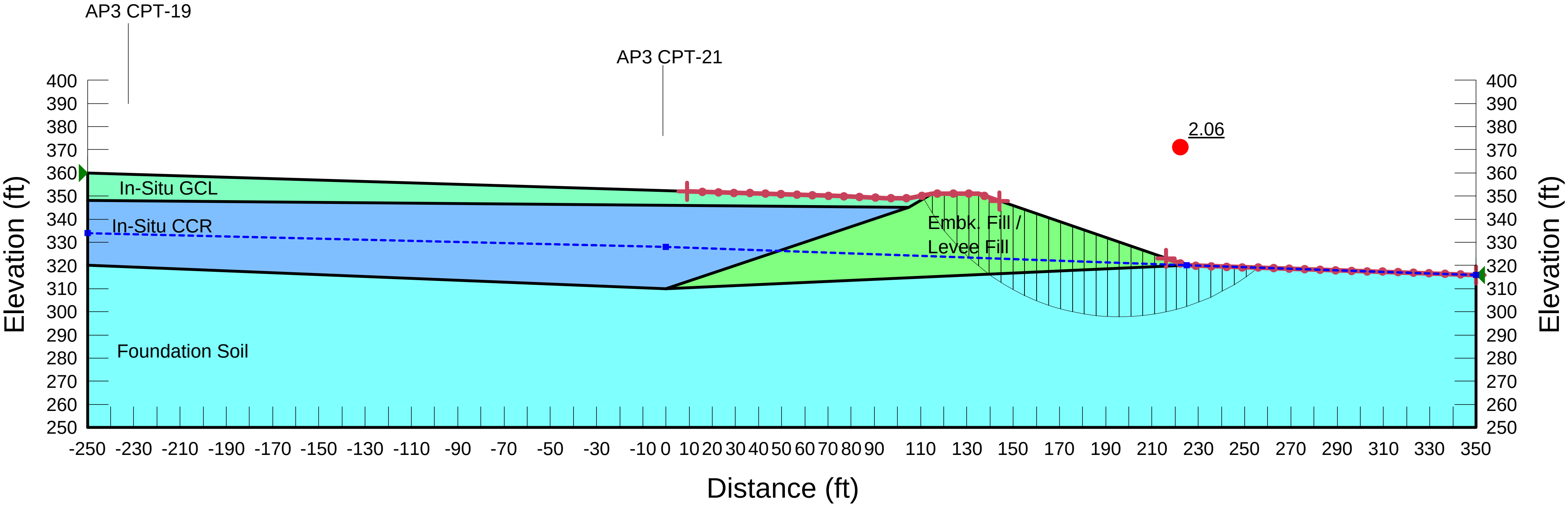
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section J-J
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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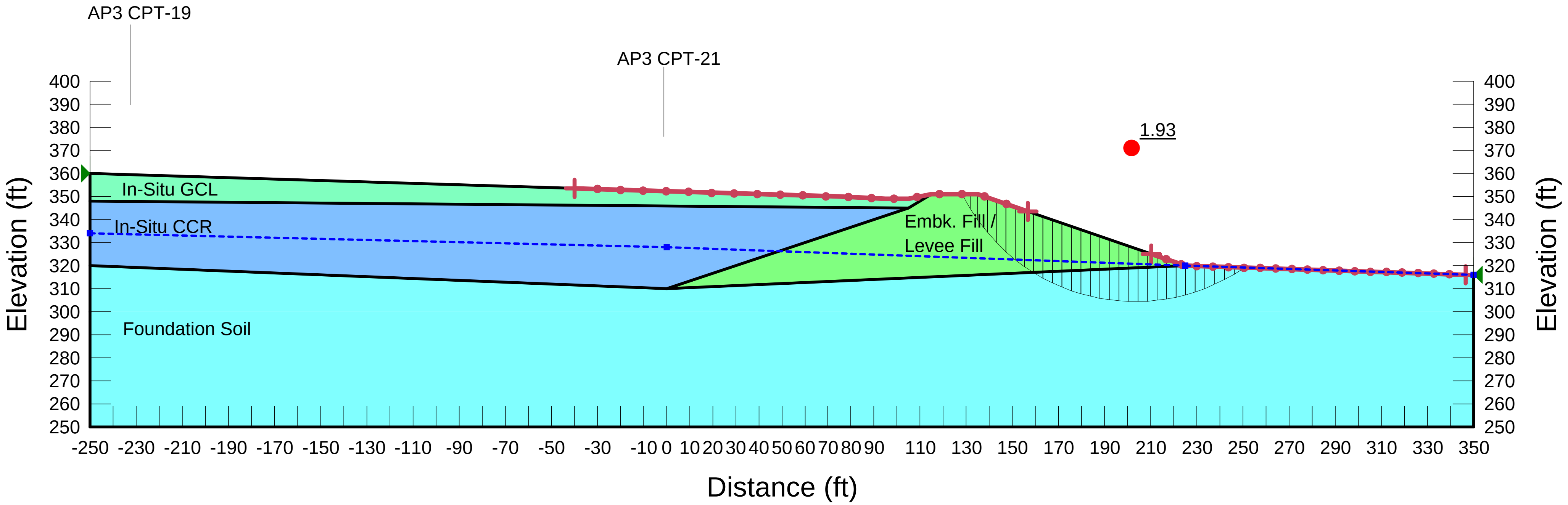
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section J-J
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
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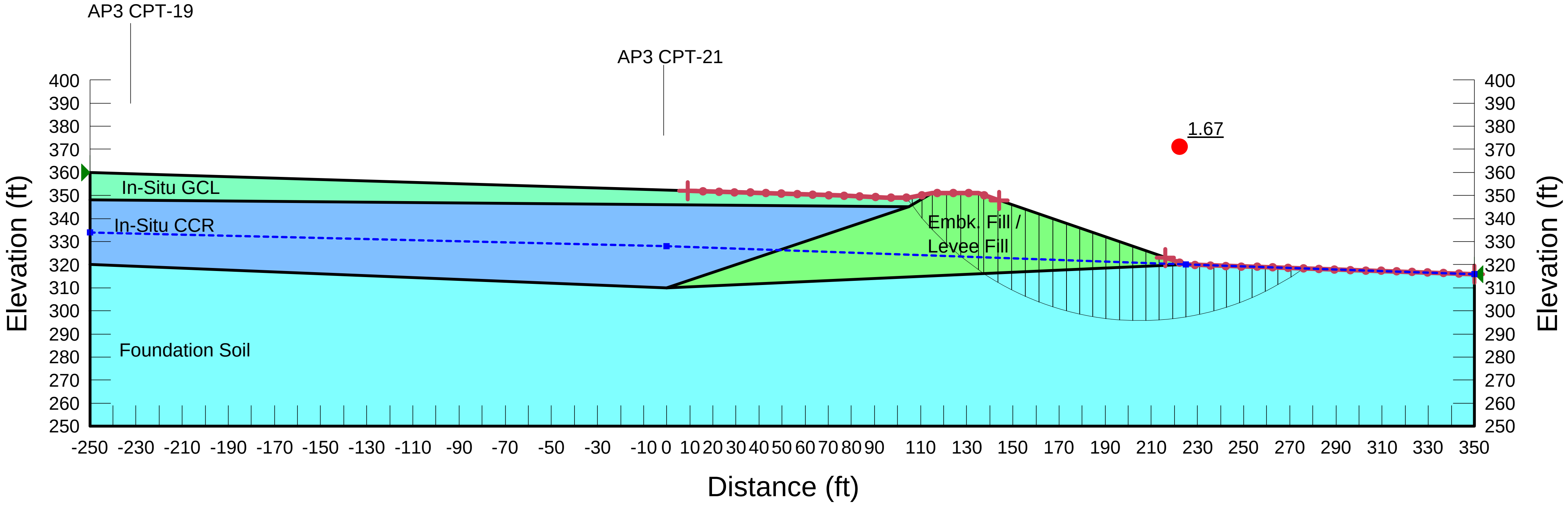
Former Plant Arkwright
AP3 Landfill

Section J-J
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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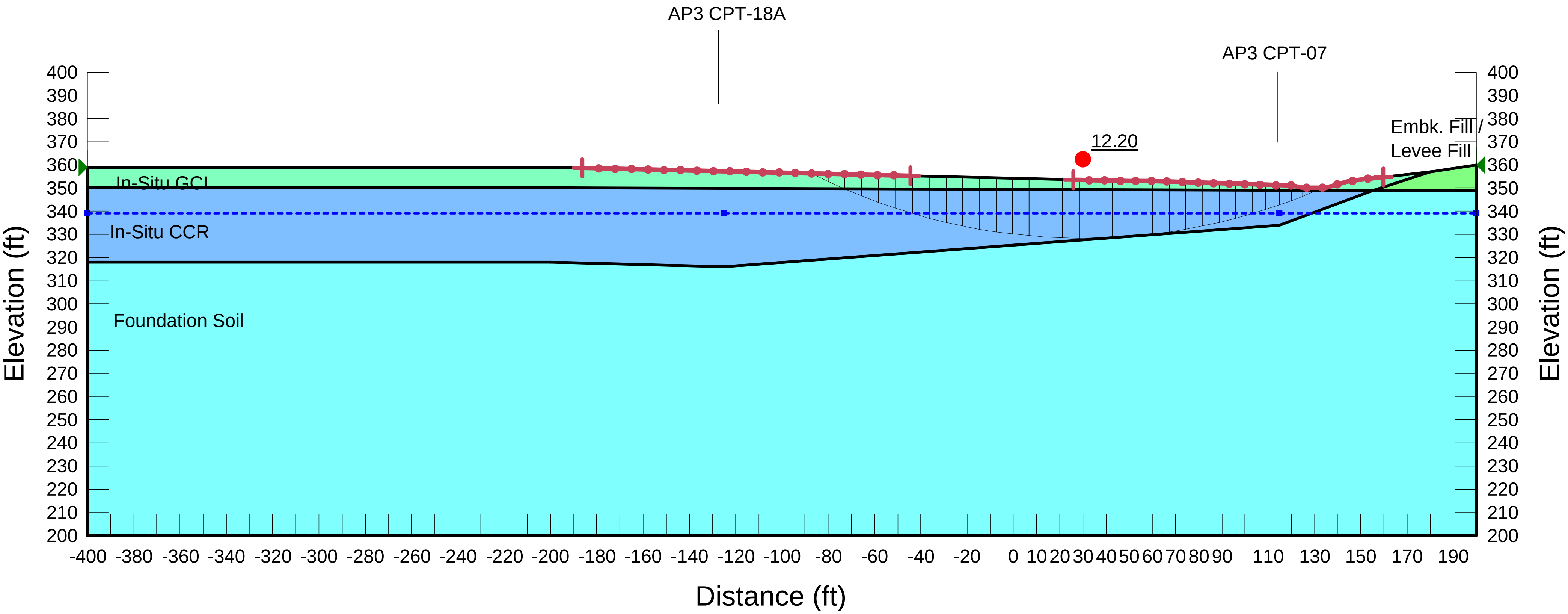
Former Plant Arkwright
AP3 Landfill

Section K-K
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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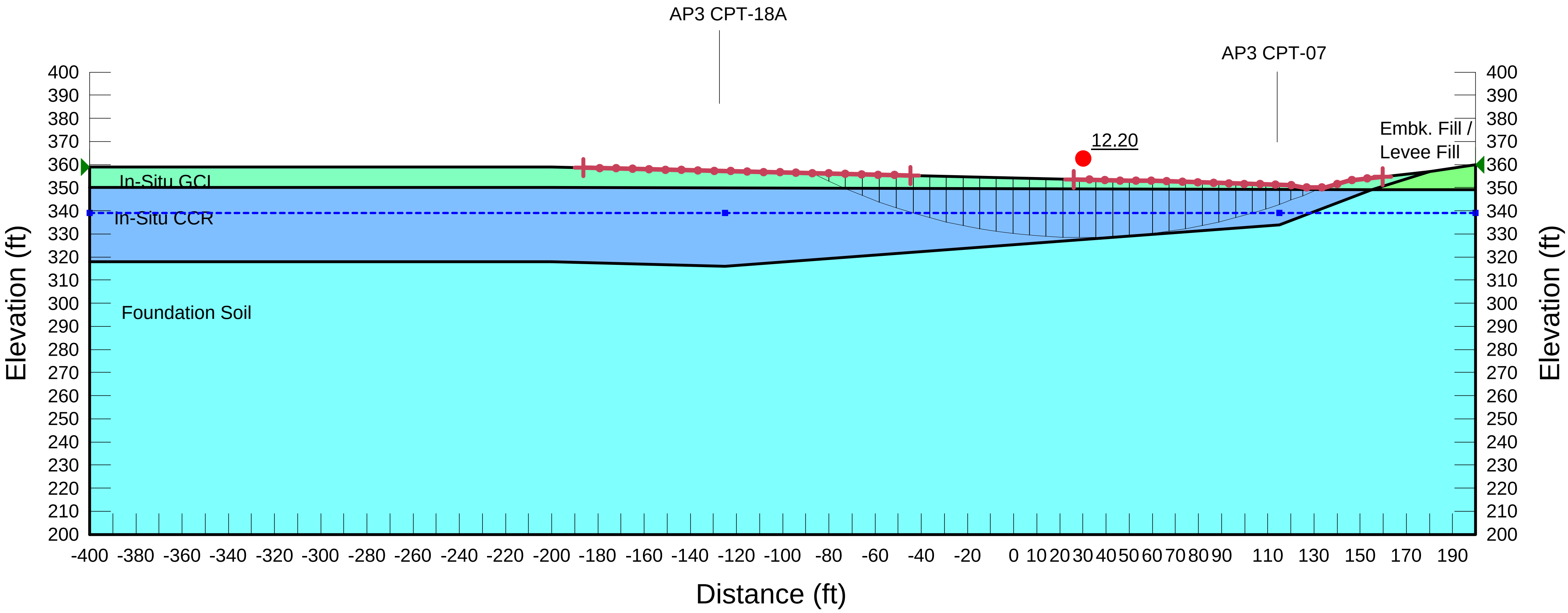
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section K-K
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section K-K
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
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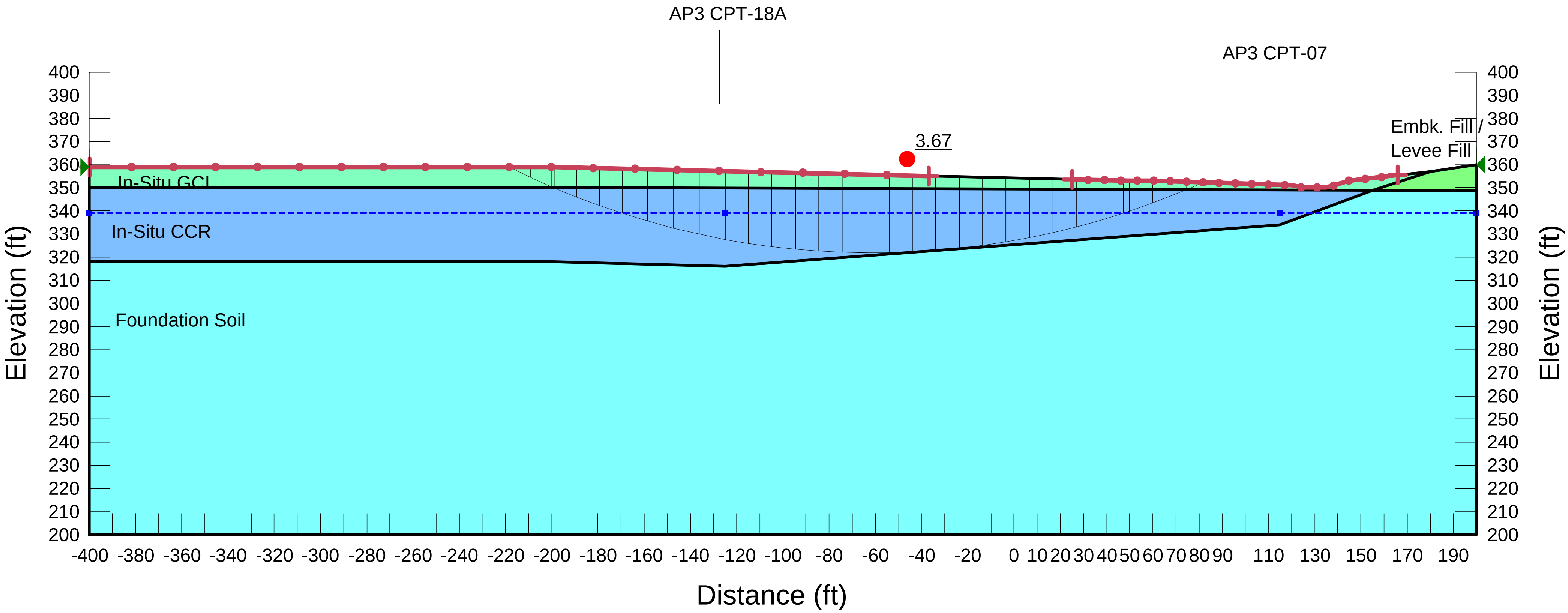

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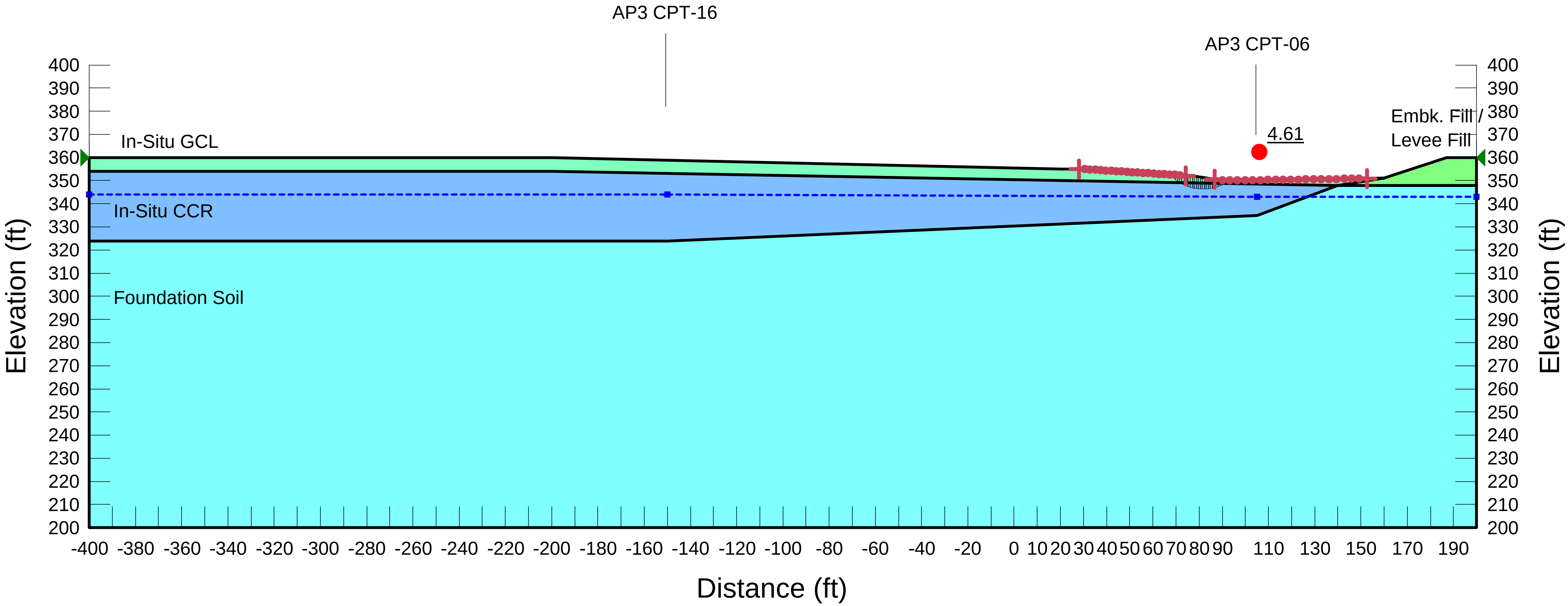
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section L-L
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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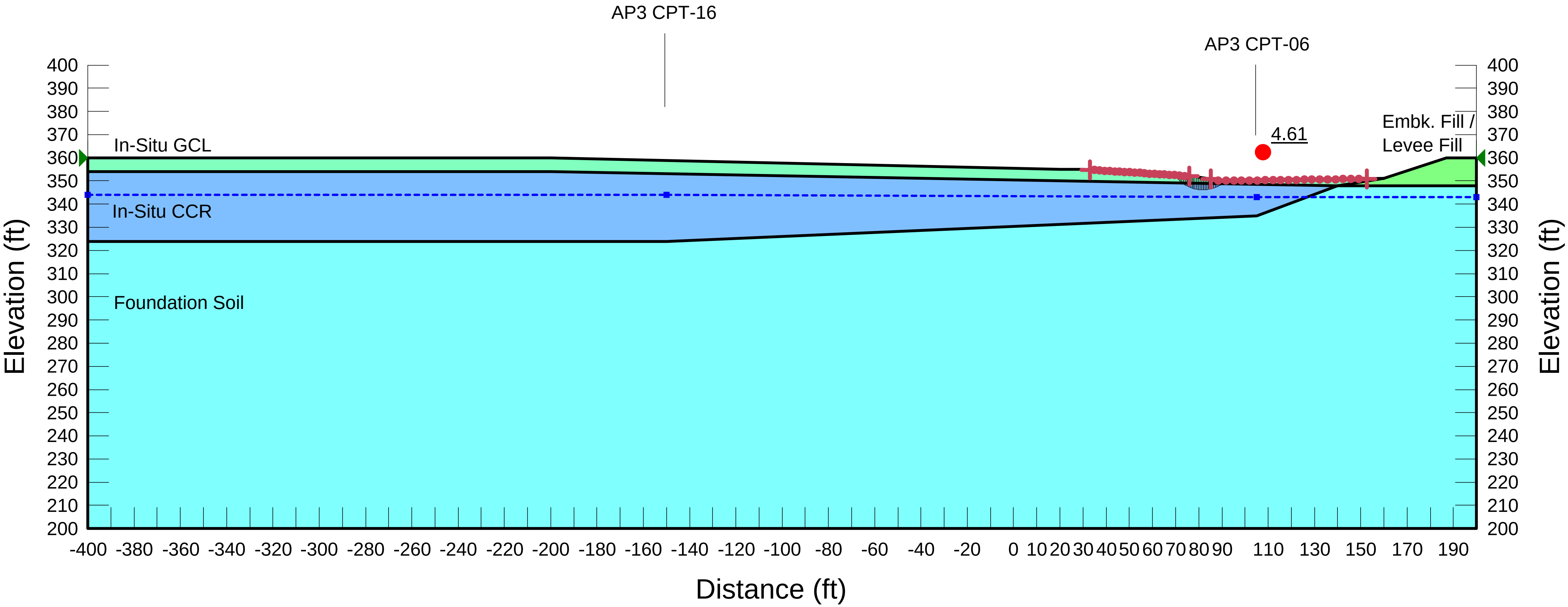
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section L-L
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters

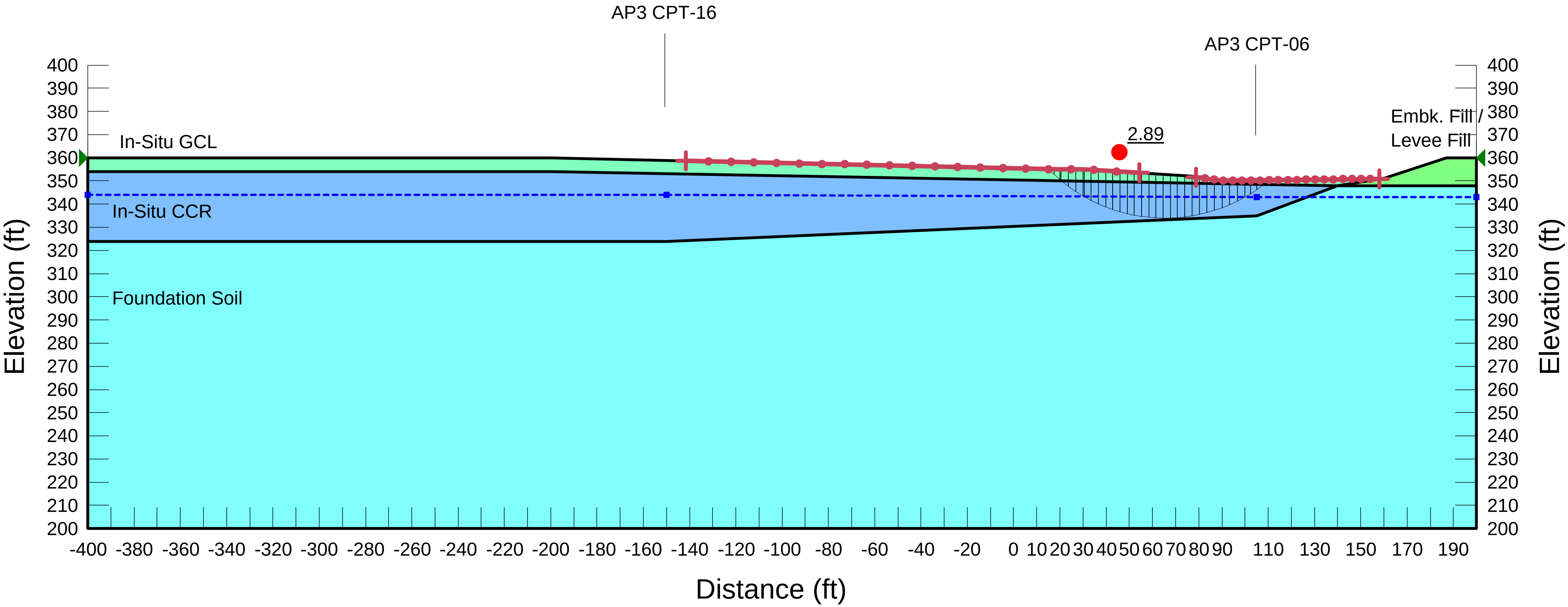


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section L-L
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g

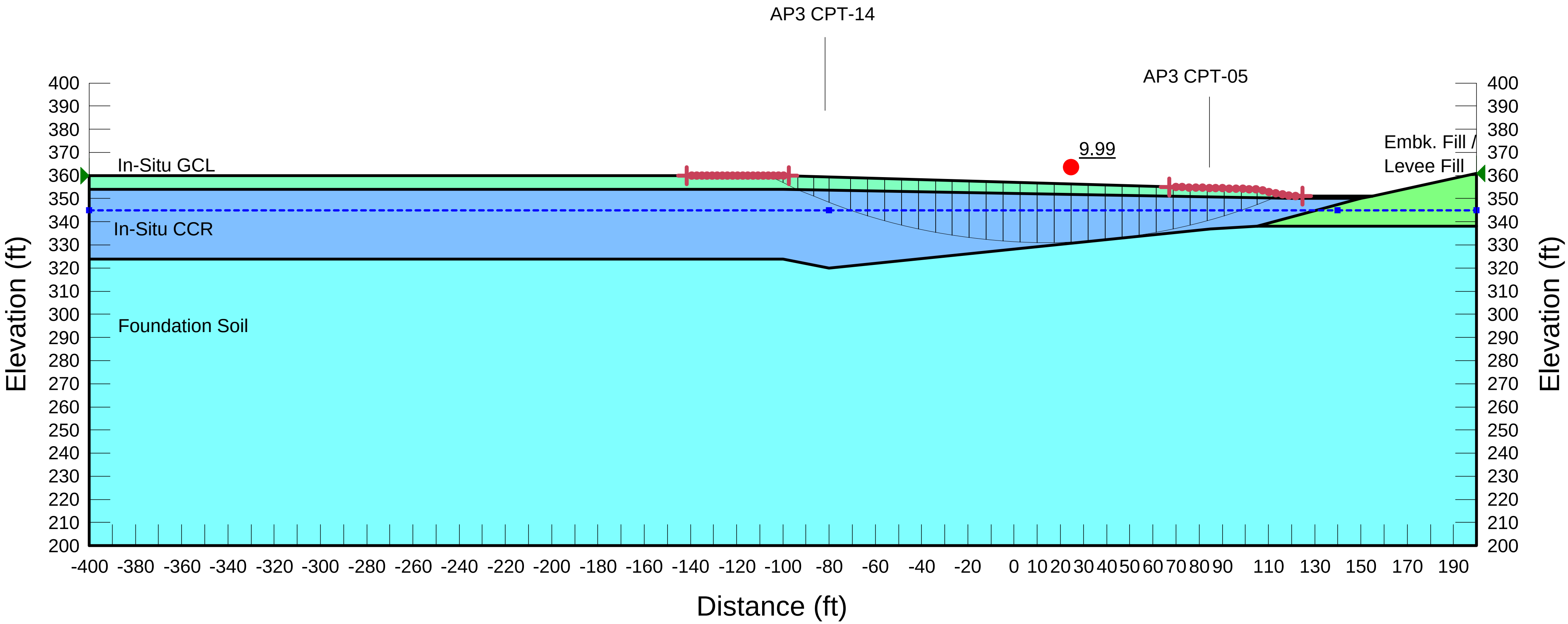


Name: Embk. Fill/Levee Fill   Unit Weight: 120 pcf   Cohesion': 700 psf   Phi': 10 °
Name: In-Situ GCL   Unit Weight: 110 pcf   Cohesion': 100 psf   Phi': 15 °
Name: Foundation Soil   Unit Weight: 108 pcf   Cohesion': 500 psf   Phi': 20 °
Name: In-Situ CCR   Unit Weight: 90 pcf   Cohesion': 0 psf   Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section M-M
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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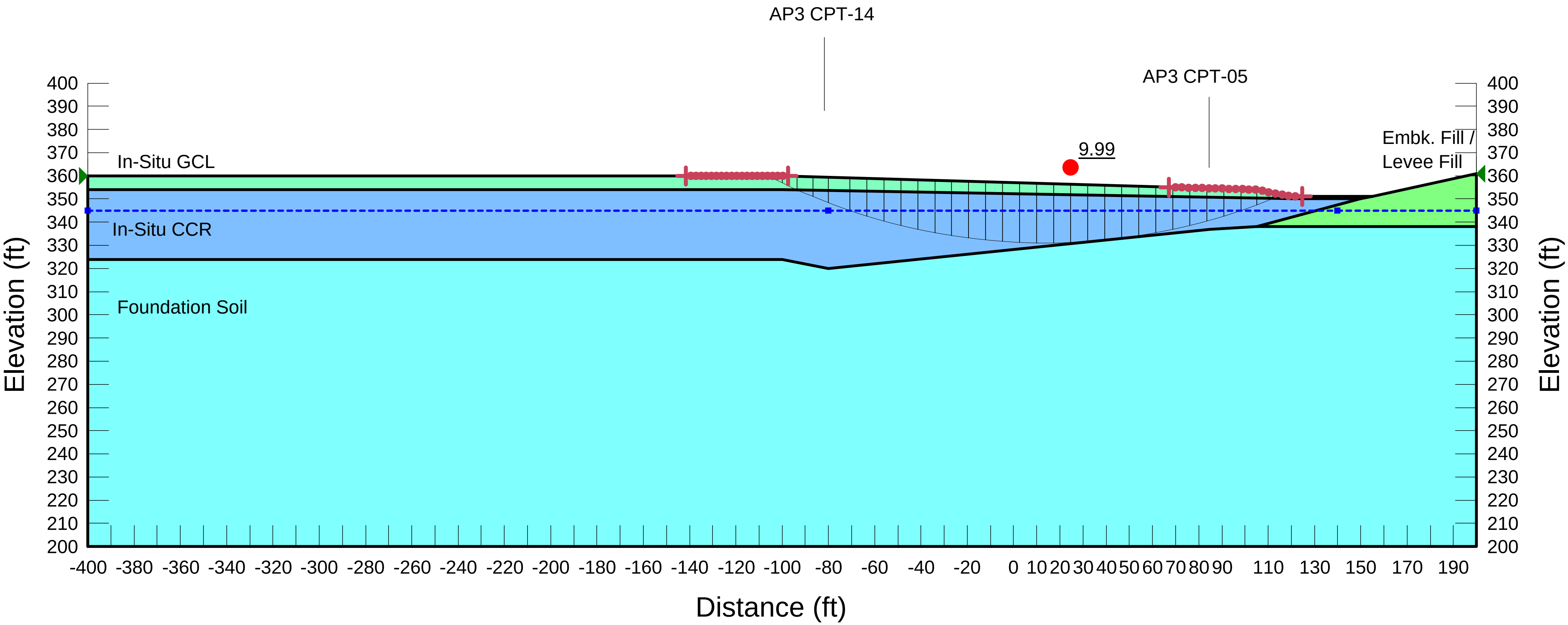
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section M-M
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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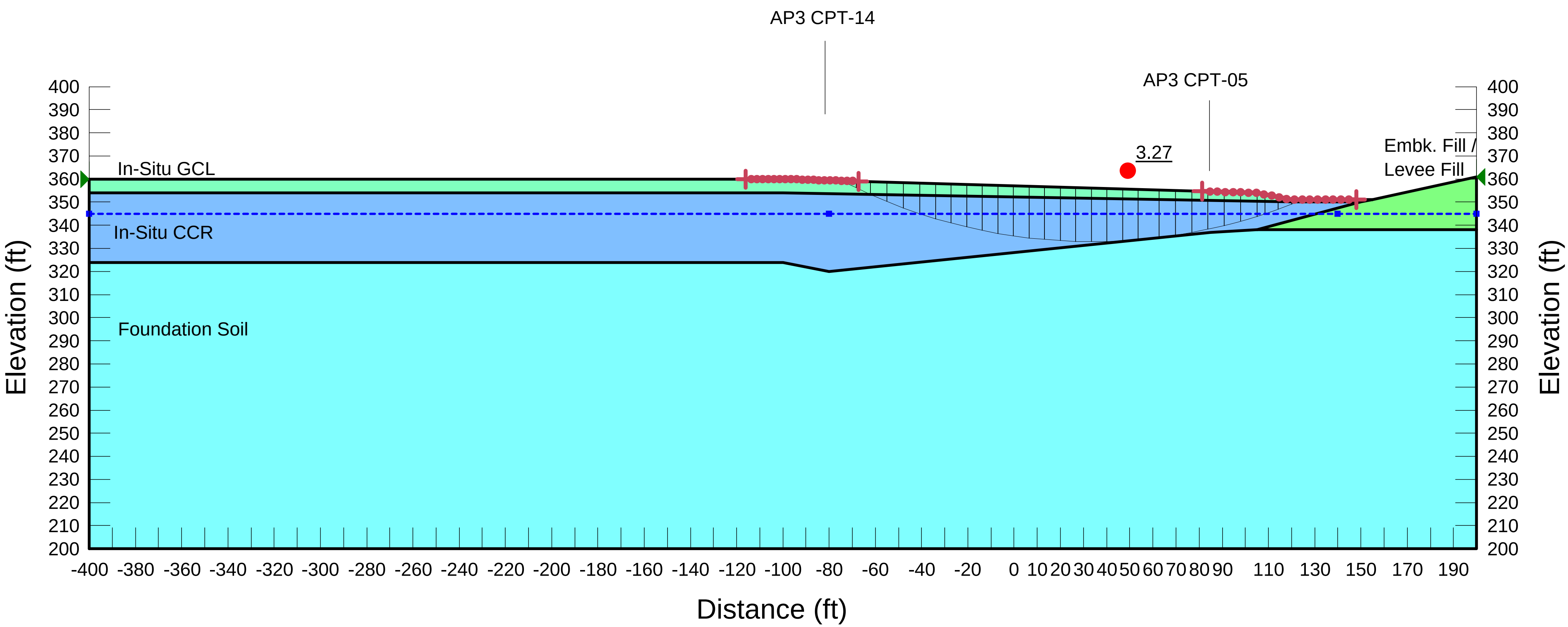
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section M-M
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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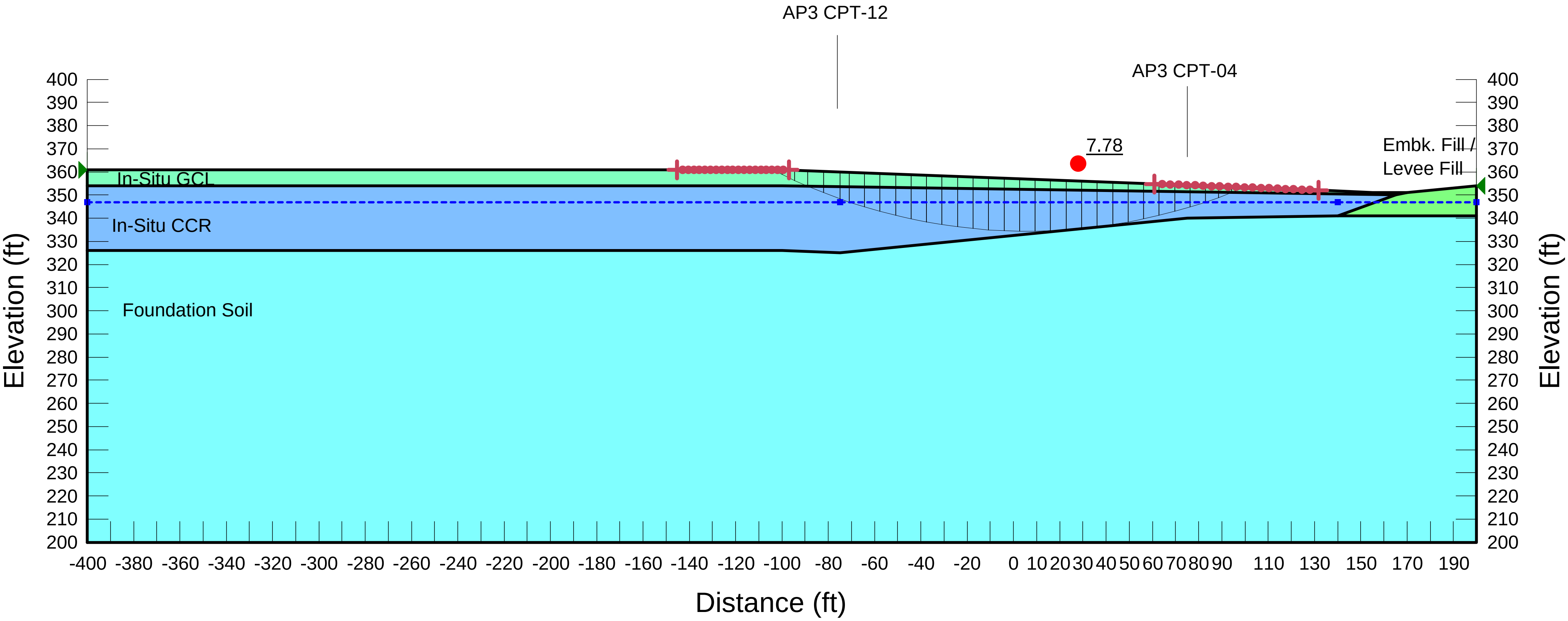
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section N-N
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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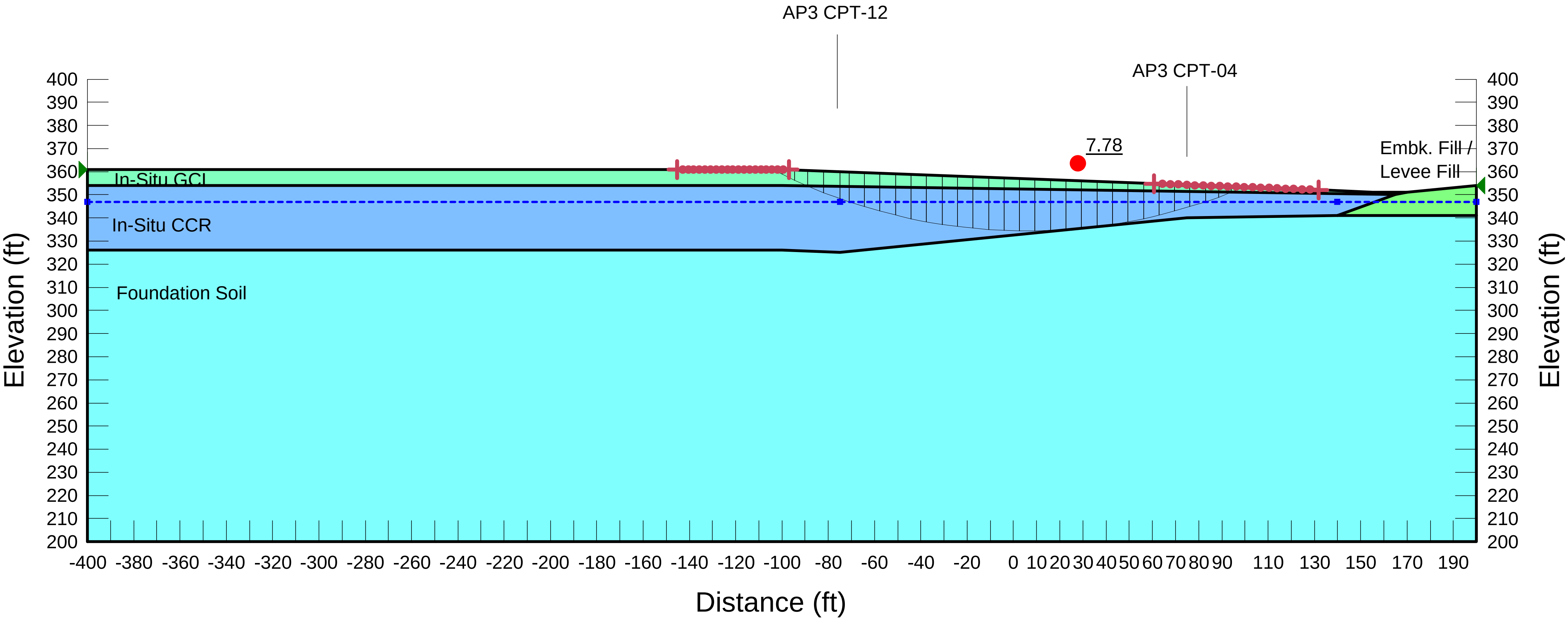
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section N-N
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters



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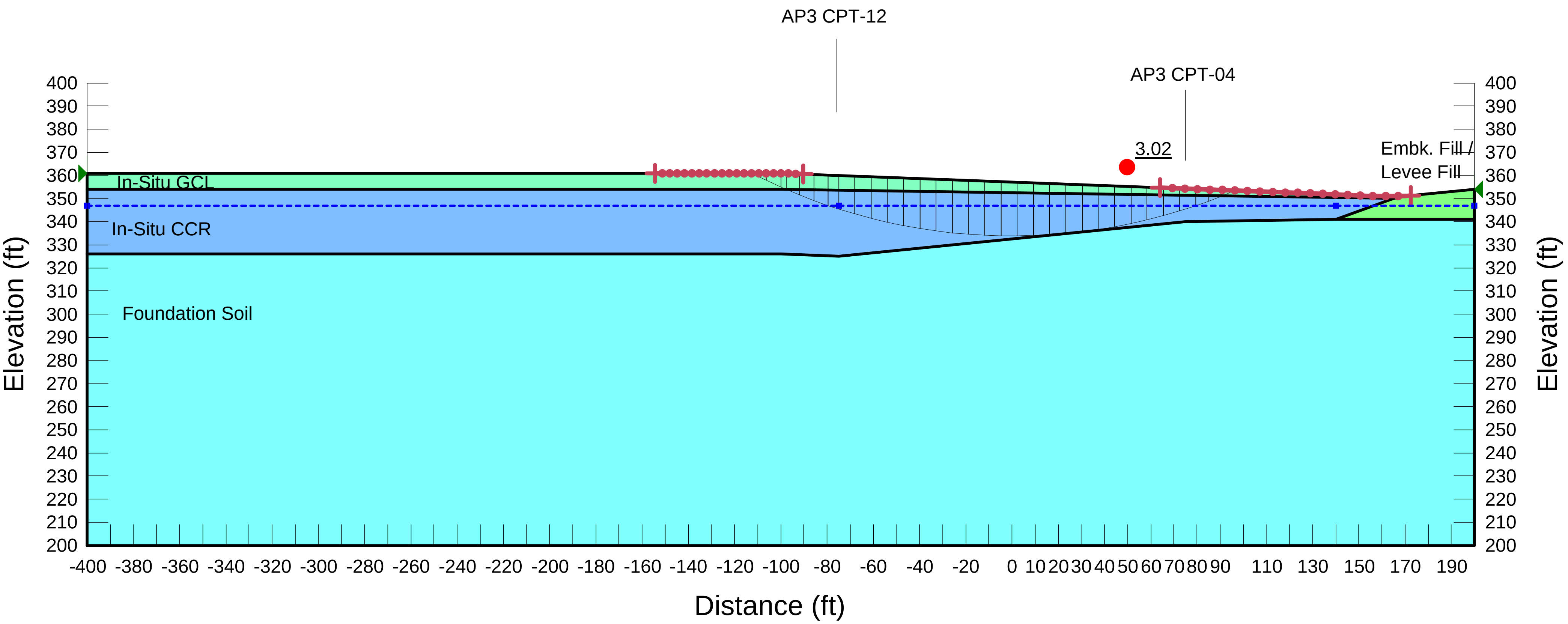
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section N-N
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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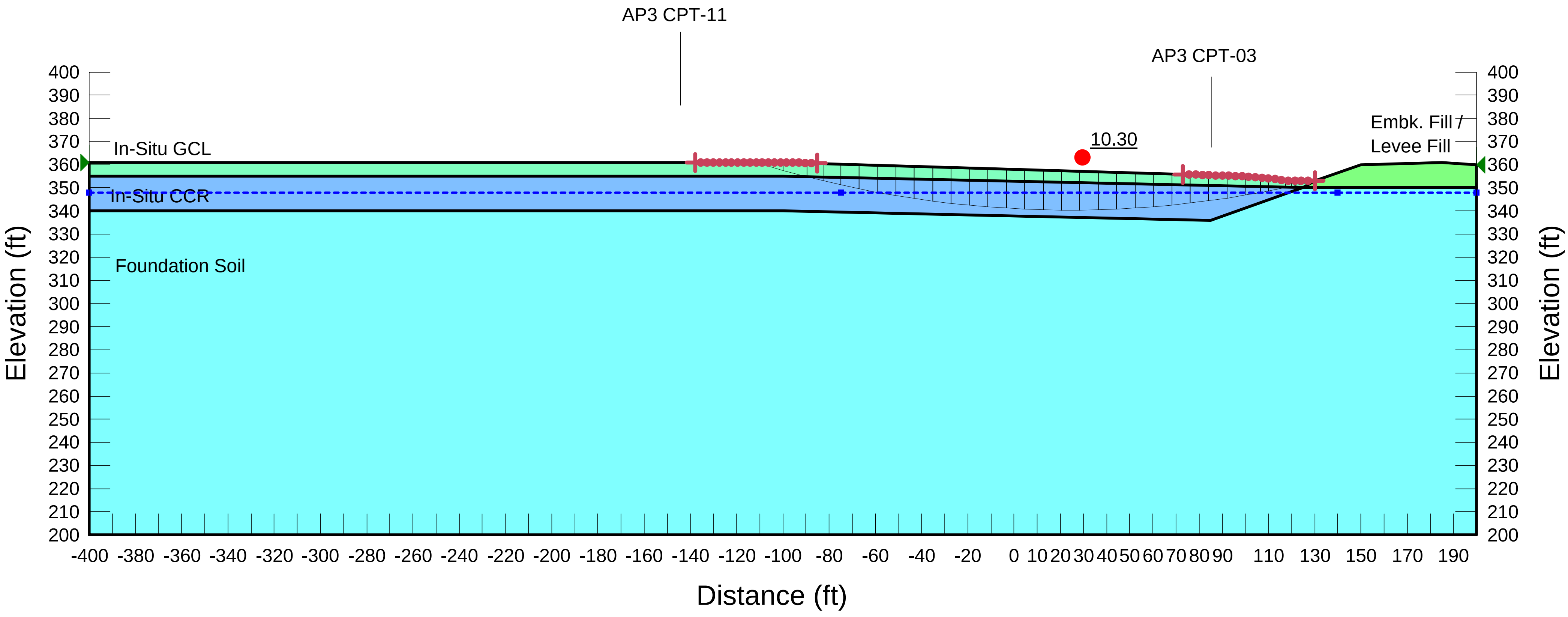
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section O-O
Global Stability - Spencer's Method

Short Term Analysis
Total Stress Parameters



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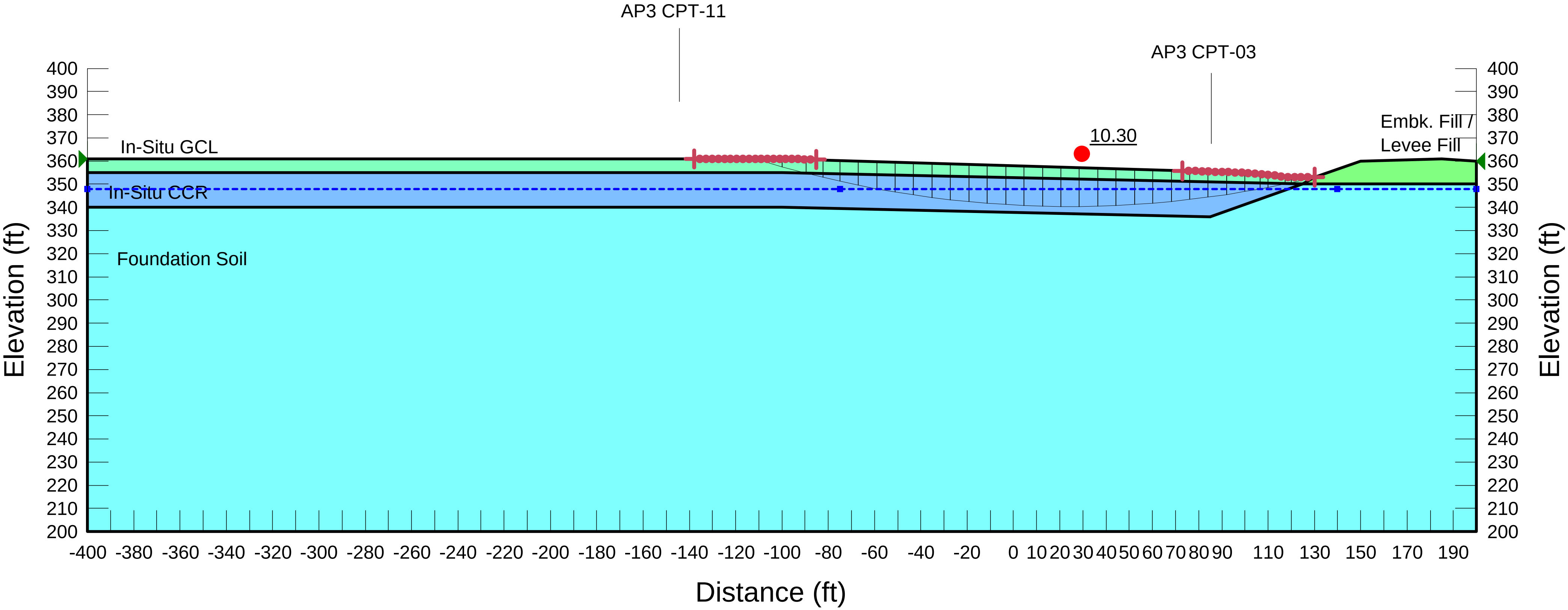
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section O-O
Global Stability - Spencer's Method

Long Term Analysis
Effective Stress Parameters

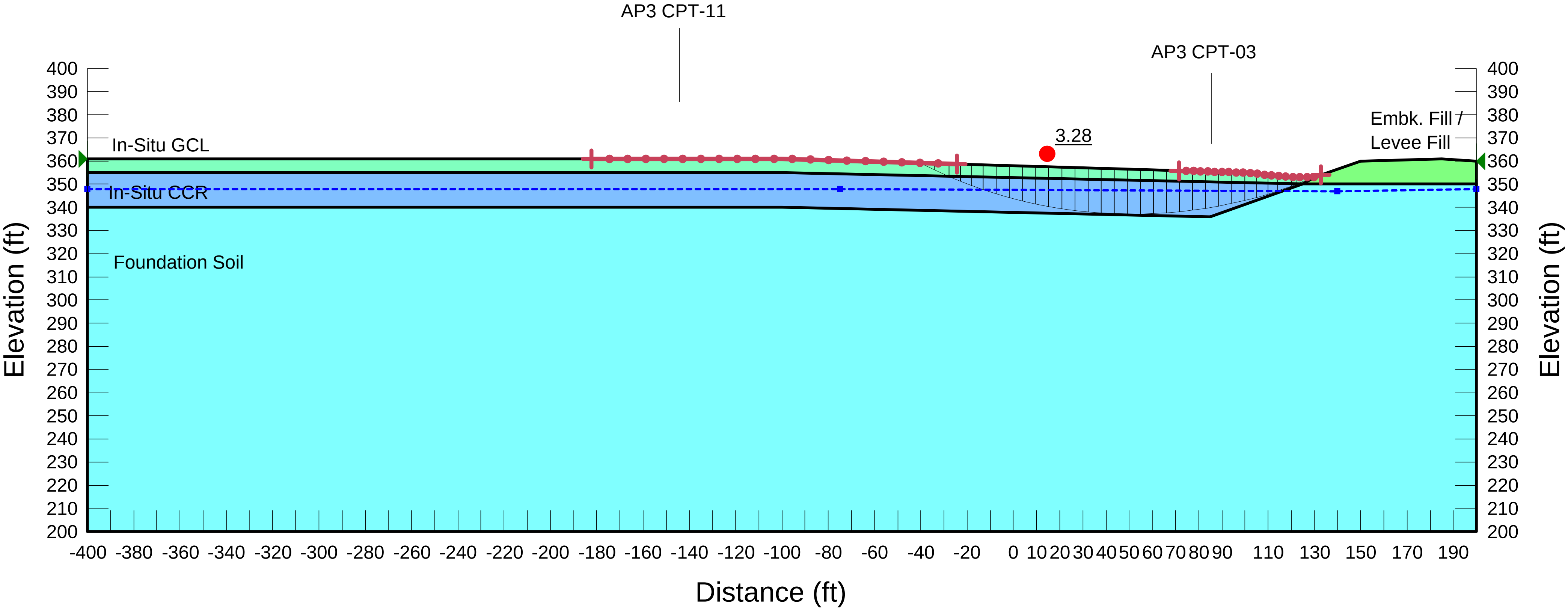


Name: Embk. Fill/Levee Fill Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 300 psf Phi': 24 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Former Plant Arkwright
AP3 Landfill

Section O-O
Global Stability - Spencer's Method

Seismic Analysis
Total Stress Parameters
kh = 0.5 x As = 0.5 x 0.131g = 0.065g



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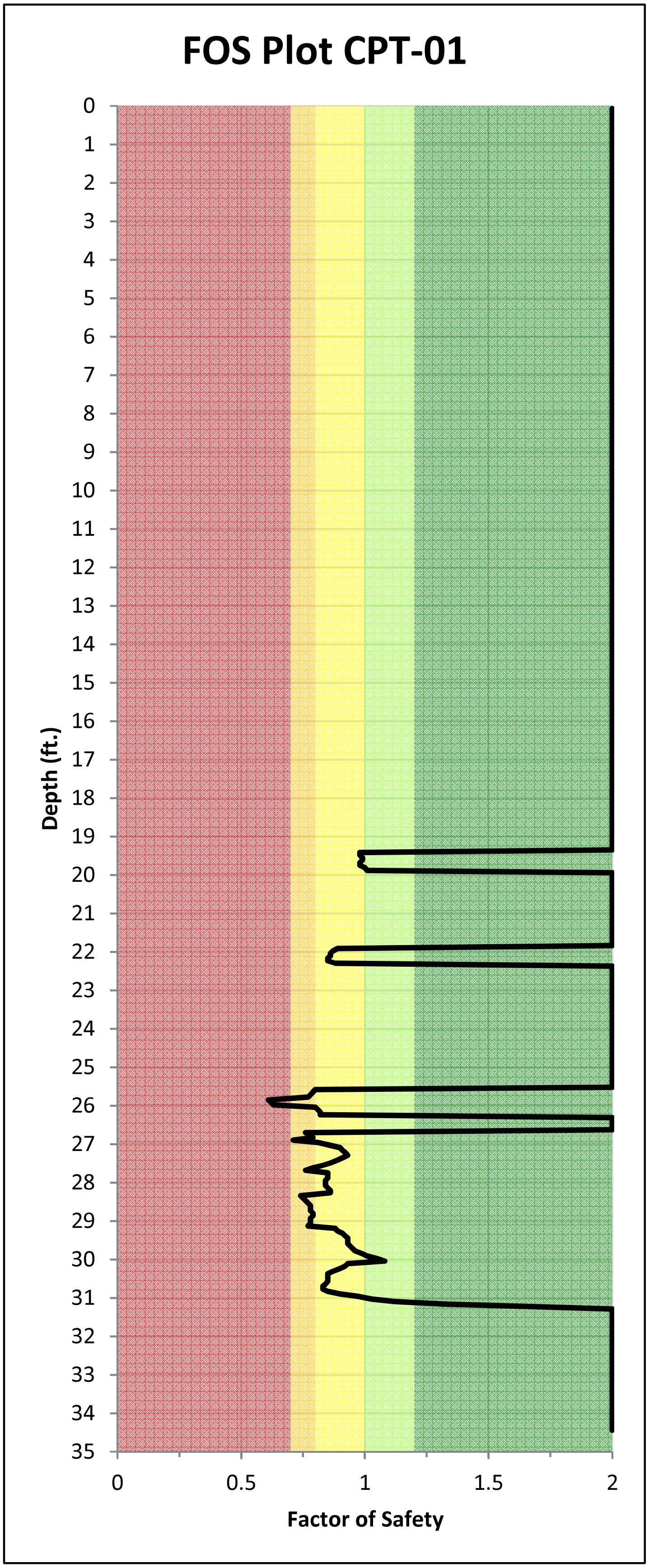
Name: In-Situ GCL Unit Weight: 110 pcf Cohesion': 100 psf Phi': 15 °
Name: Foundation Soil Unit Weight: 108 pcf Cohesion': 500 psf Phi': 20 °
Name: In-Situ CCR Unit Weight: 90 pcf Cohesion': 0 psf Phi': 22 °

Liquefaction Factor of Safety Plot CPT-01



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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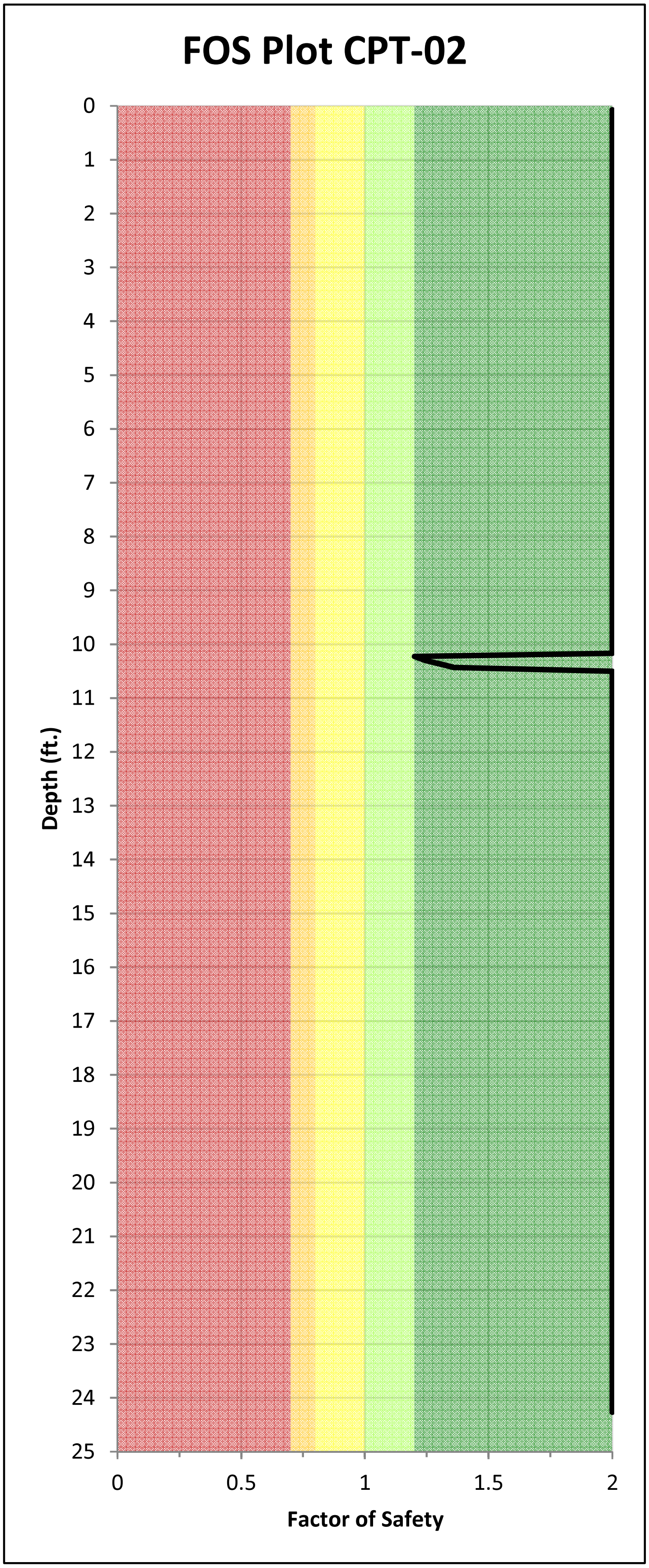
Liquefaction Factor of Safety Plot CPT-02



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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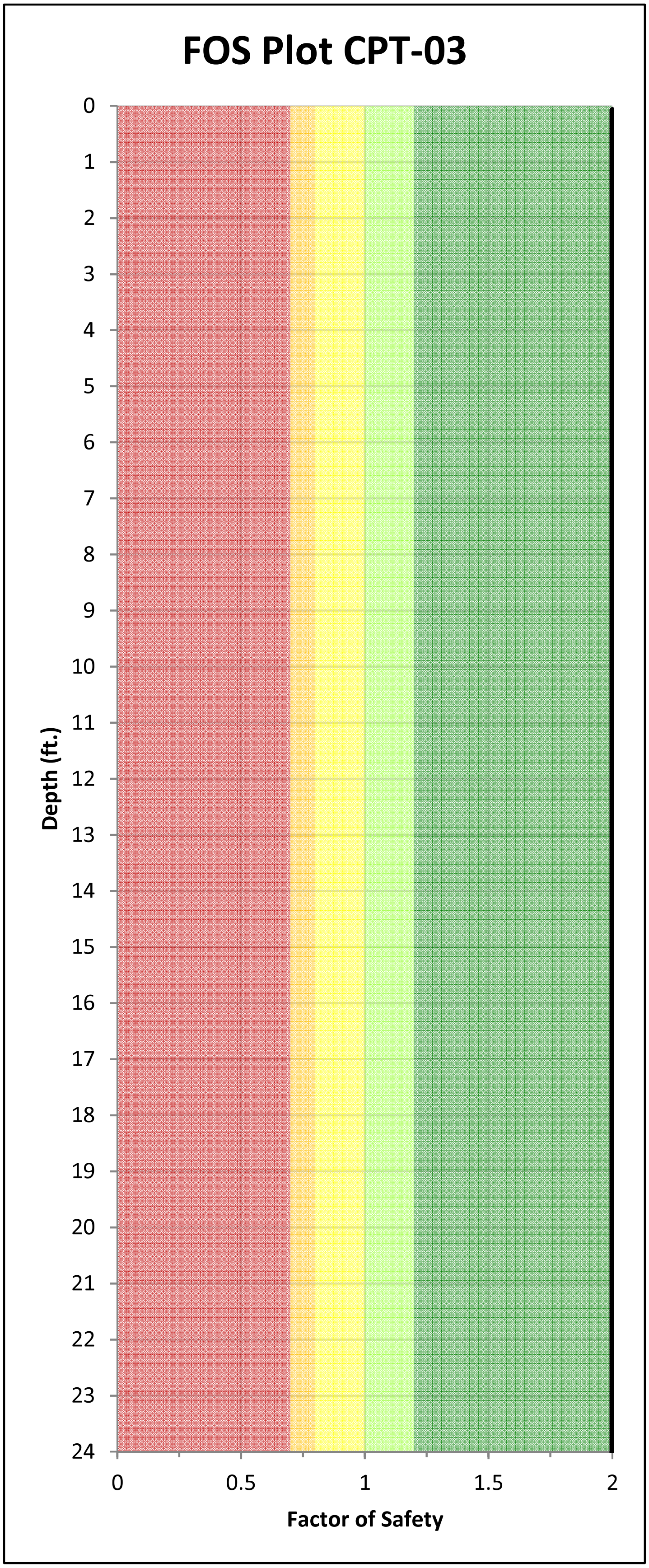
Liquefaction Factor of Safety Plot CPT-03



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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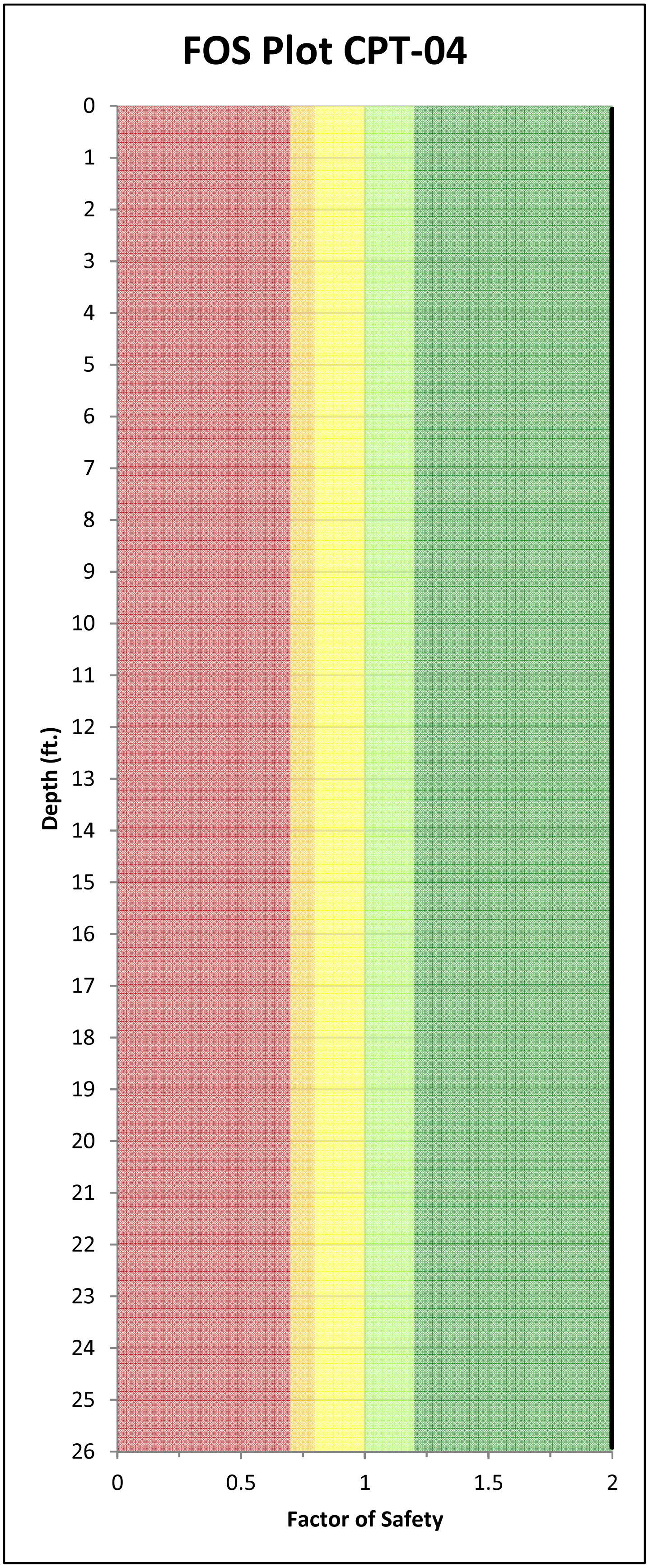
Liquefaction Factor of Safety Plot CPT-04



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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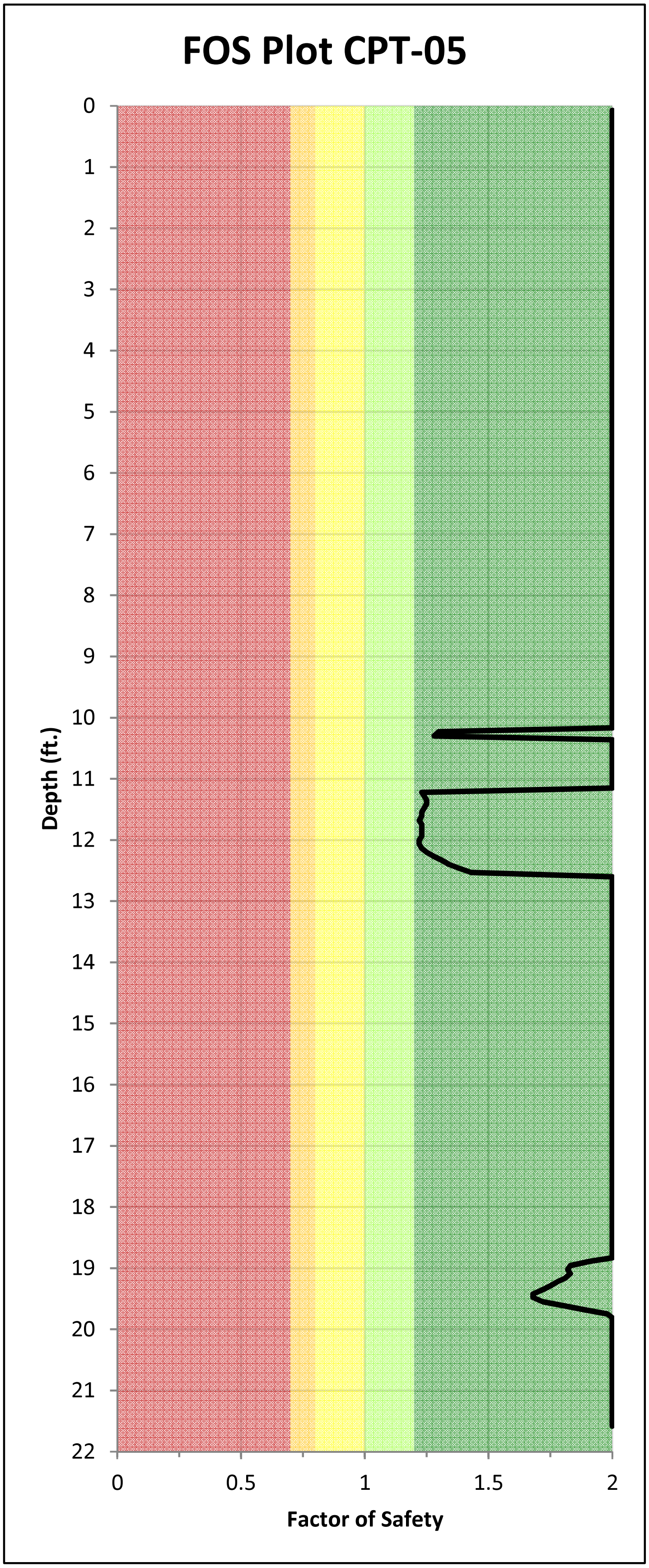
Liquefaction Factor of Safety Plot CPT-05



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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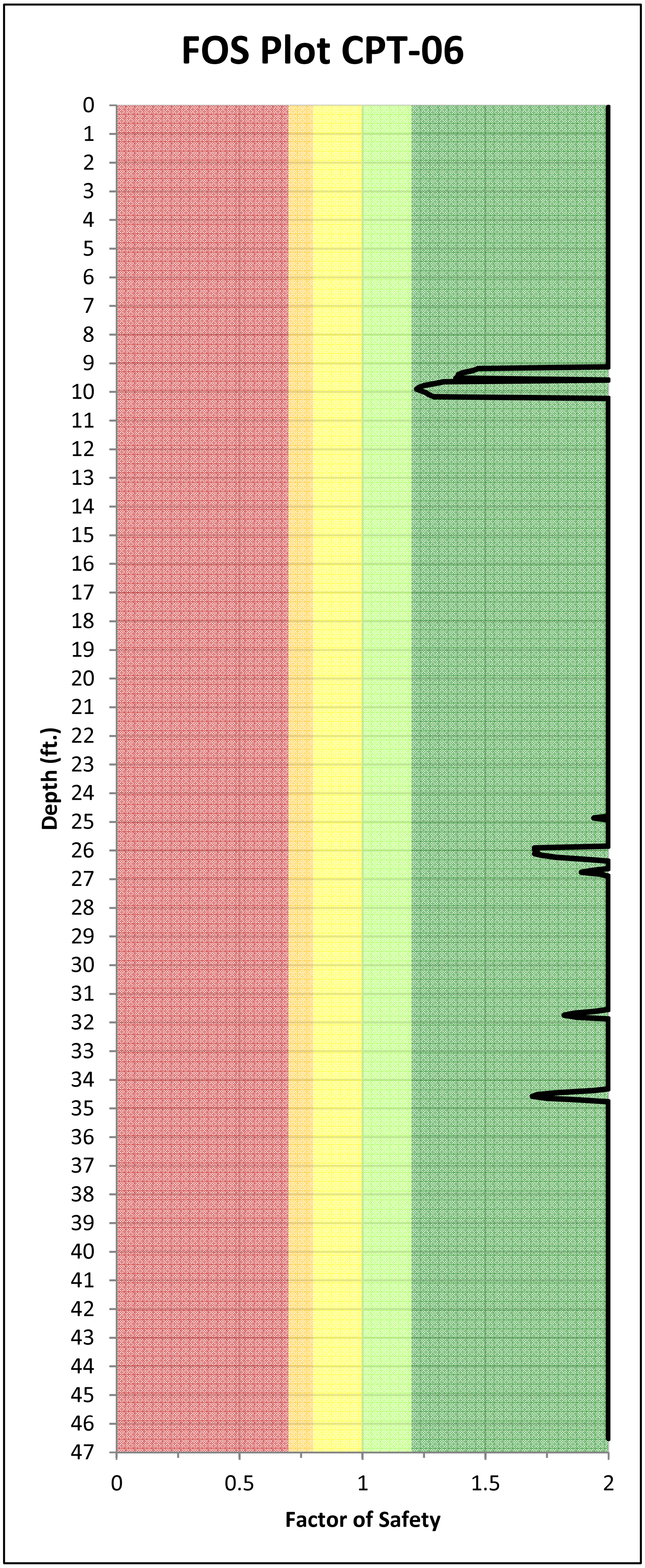
Liquefaction Factor of Safety Plot CPT-06



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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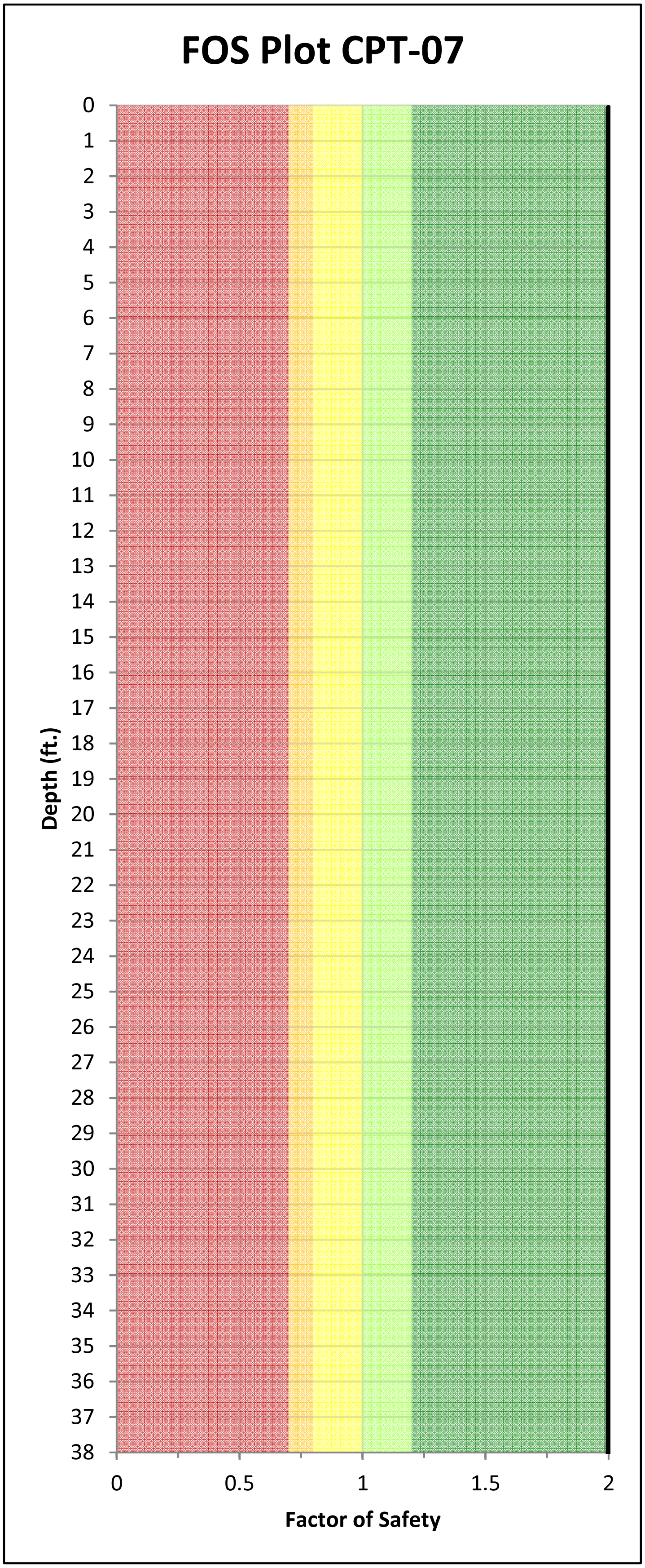
Liquefaction Factor of Safety Plot CPT-07



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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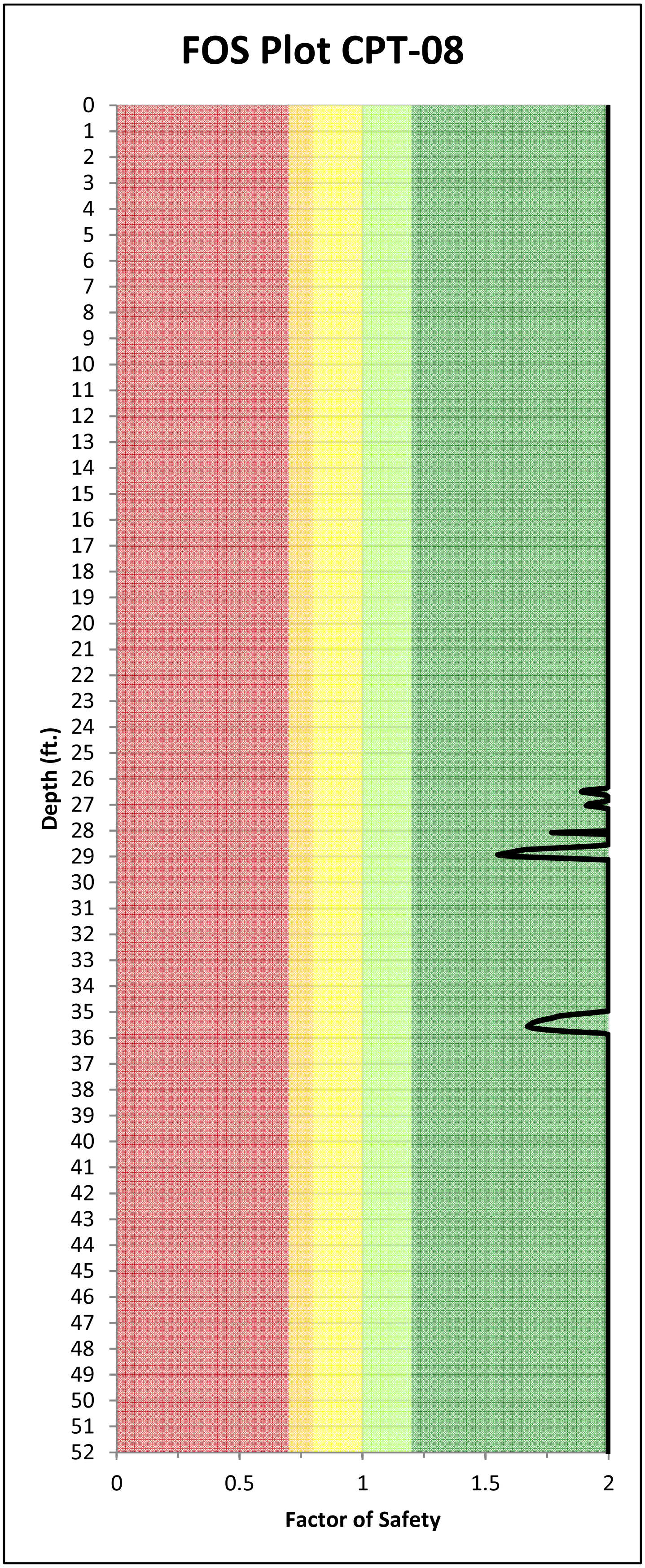
Liquefaction Factor of Safety Plot CPT-08



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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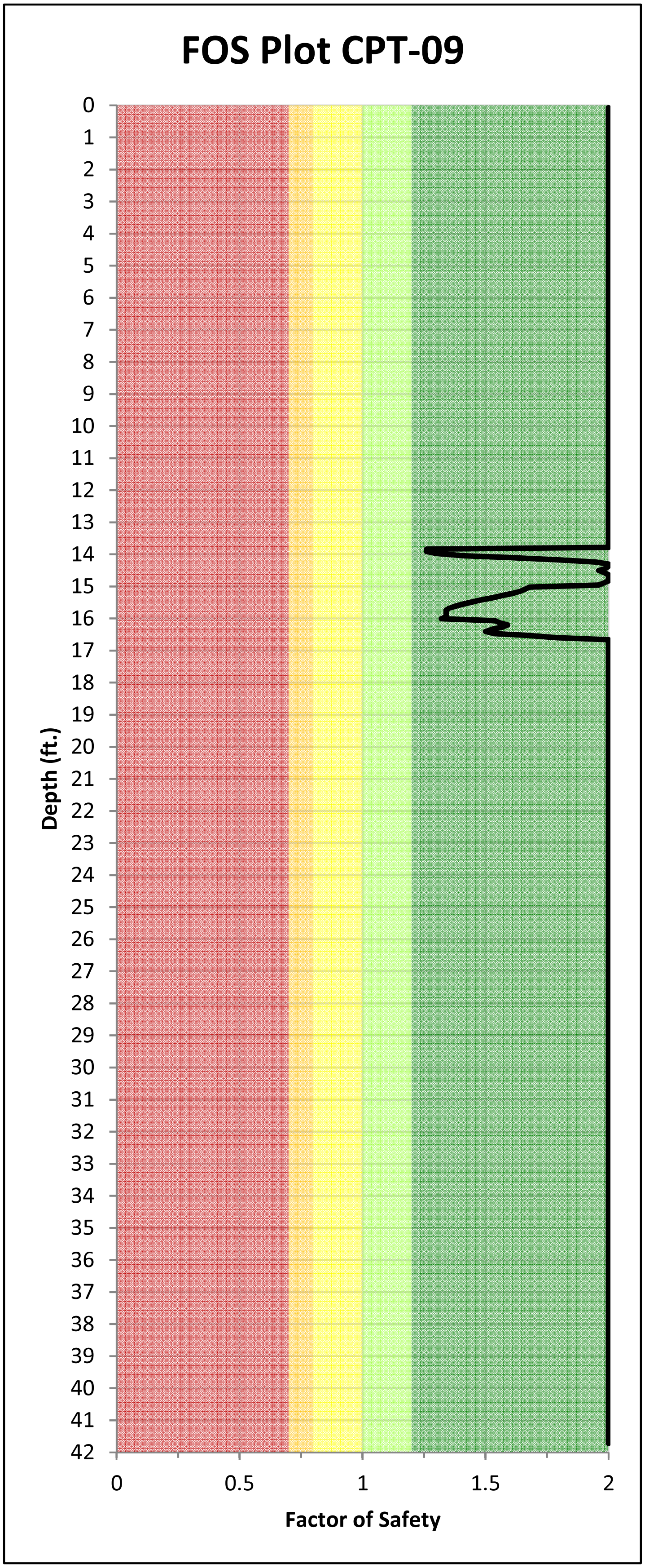
Liquefaction Factor of Safety Plot CPT-09



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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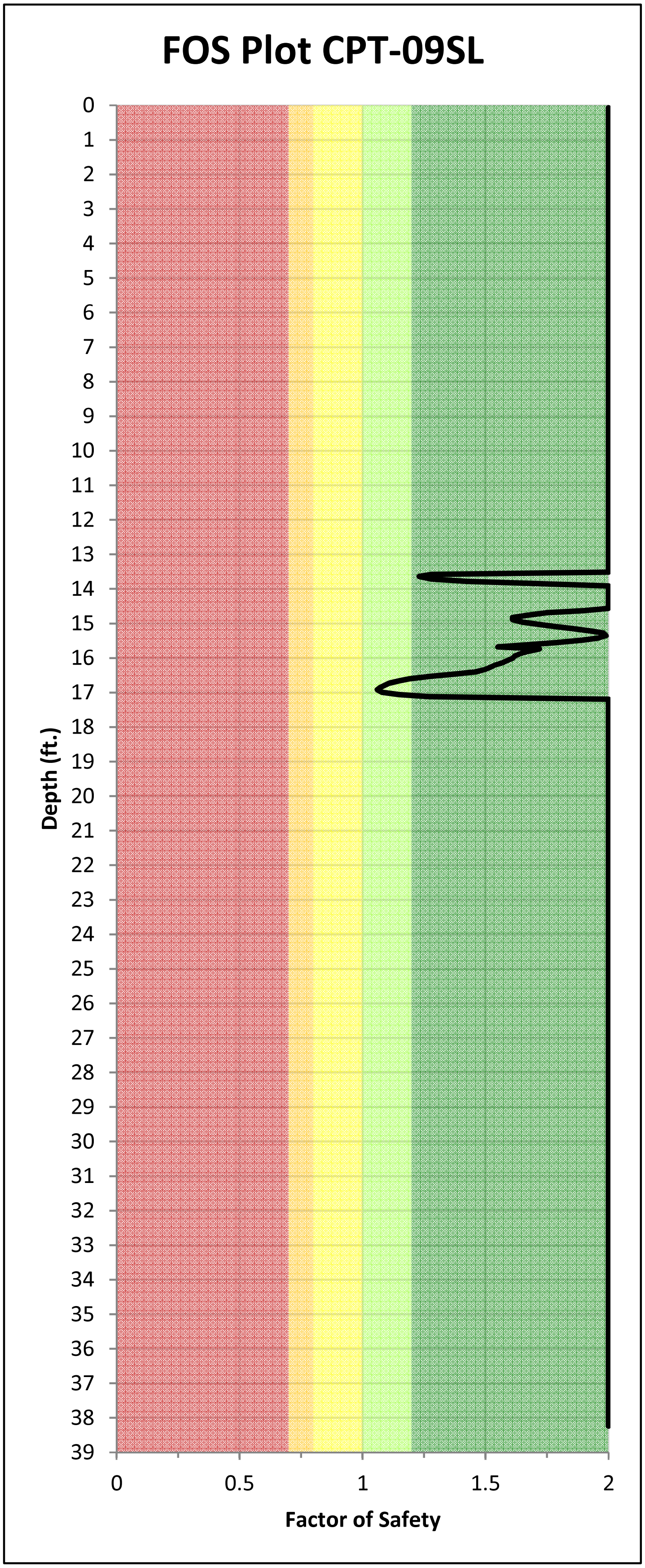
Liquefaction Factor of Safety Plot CPT-09SL



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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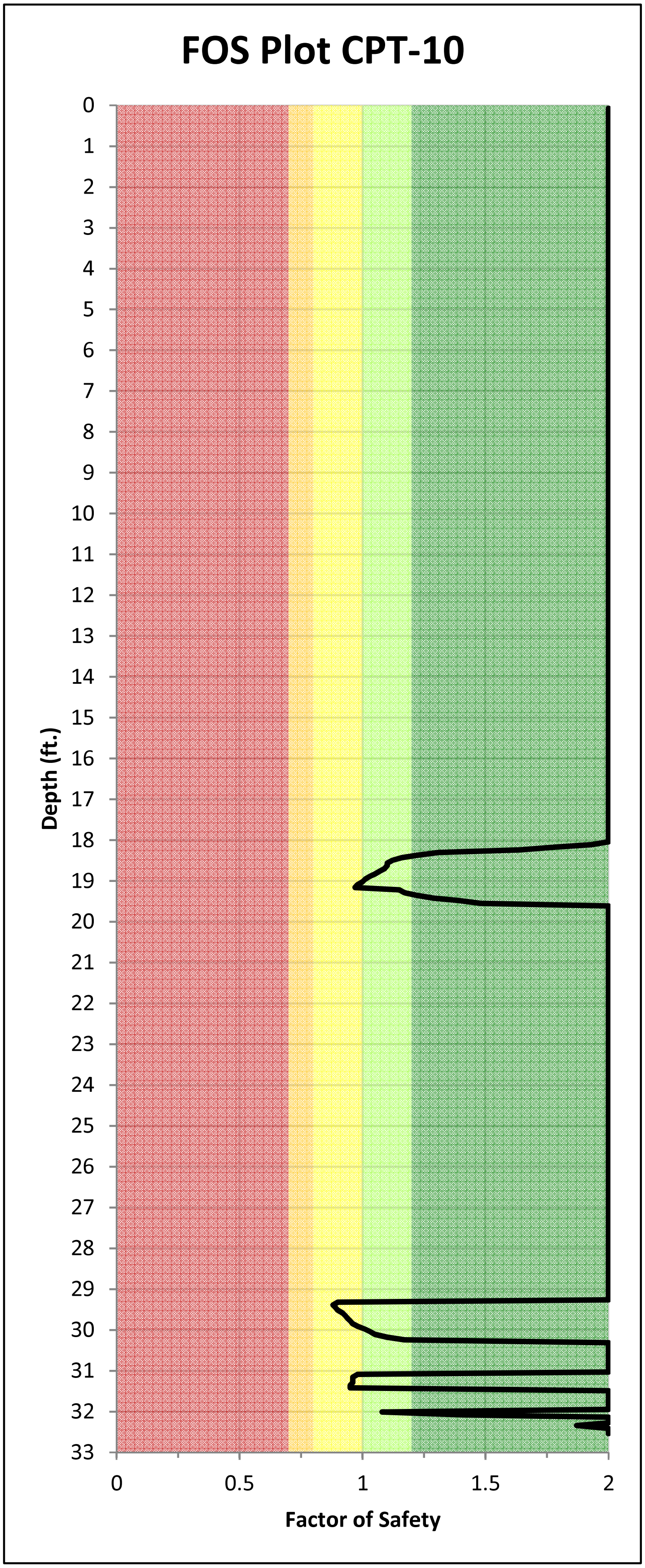
Liquefaction Factor of Safety Plot CPT-10



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

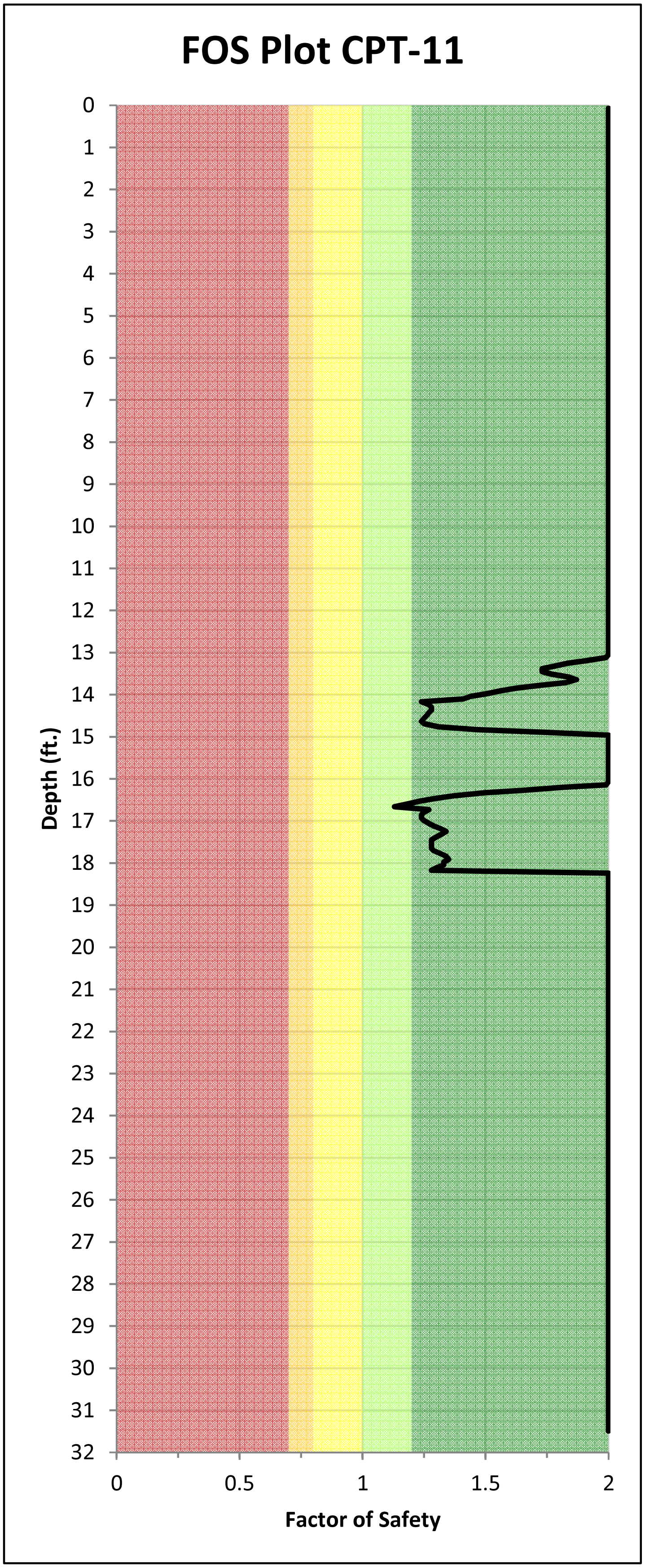
FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-11



FOS Color Score Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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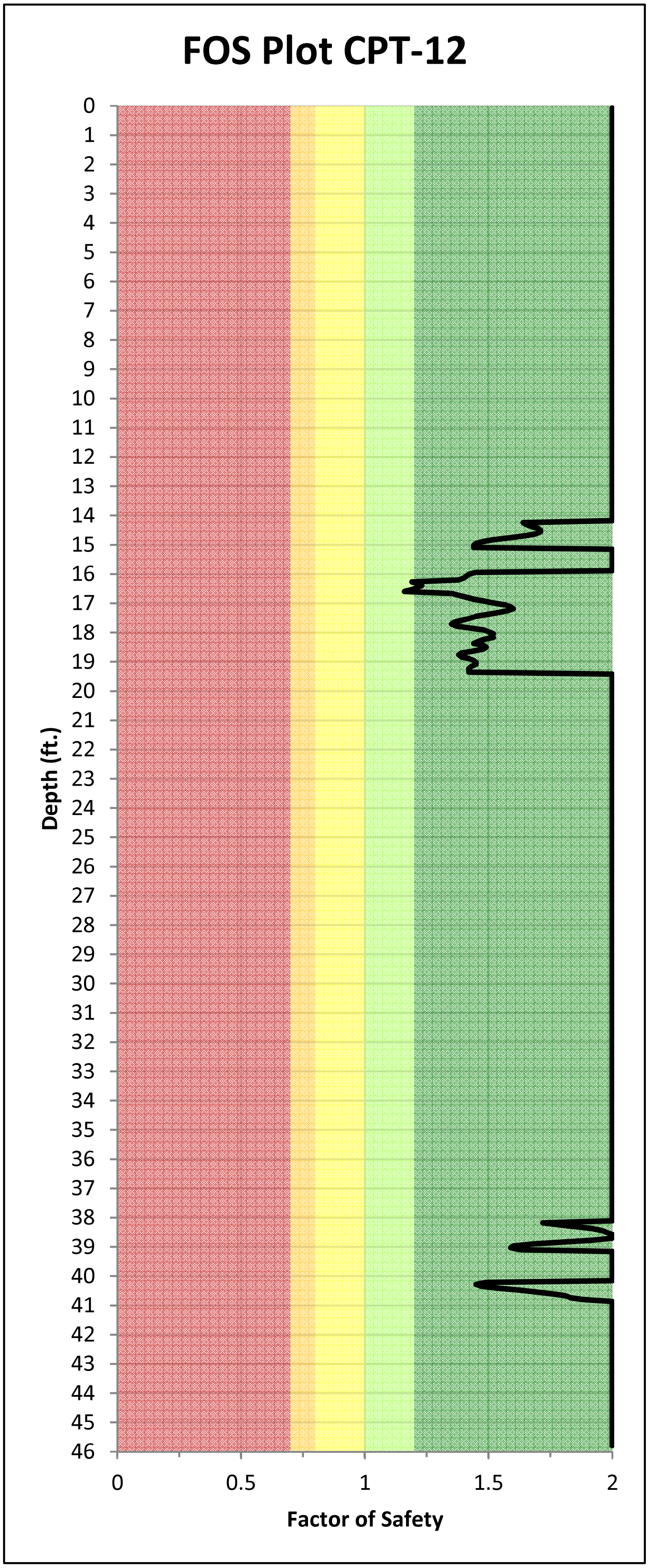
Liquefaction Factor of Safety Plot CPT-12



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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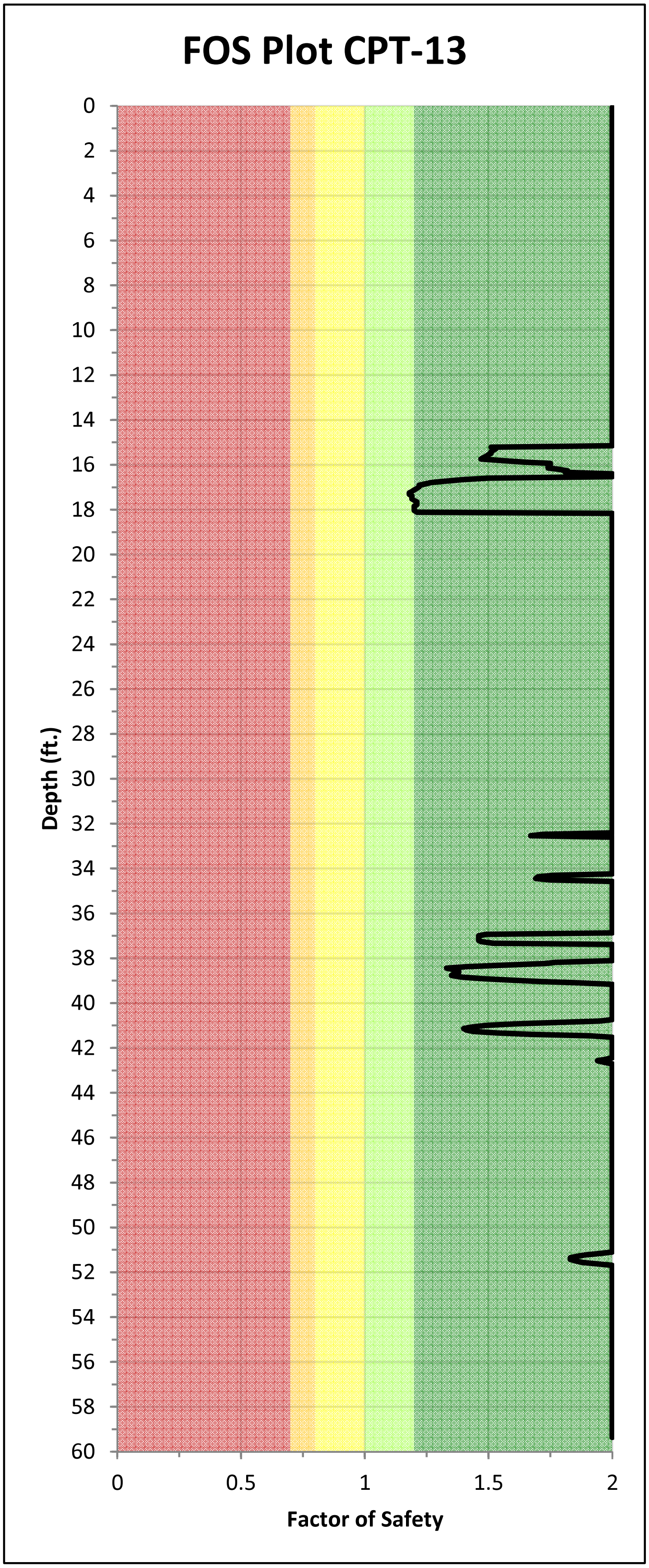
Liquefaction Factor of Safety Plot CPT-13



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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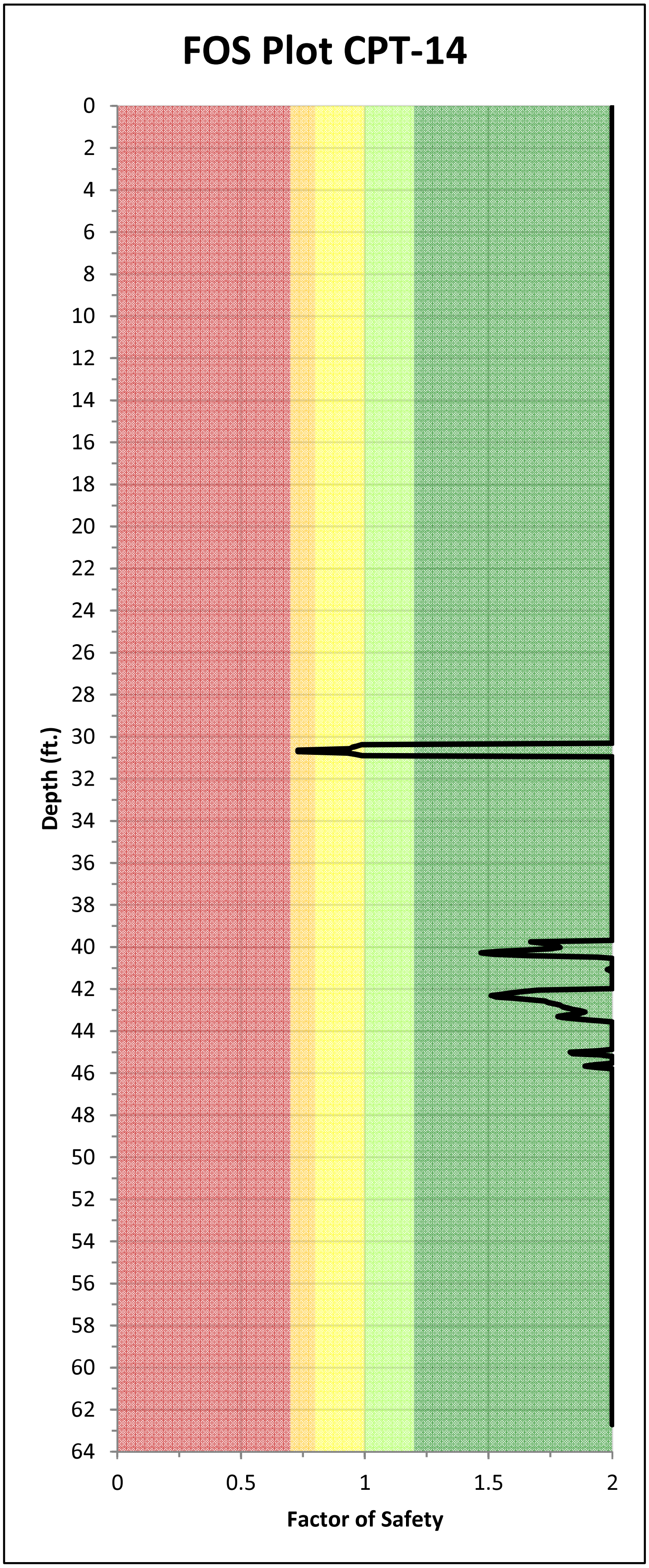
Liquefaction Factor of Safety Plot CPT-14



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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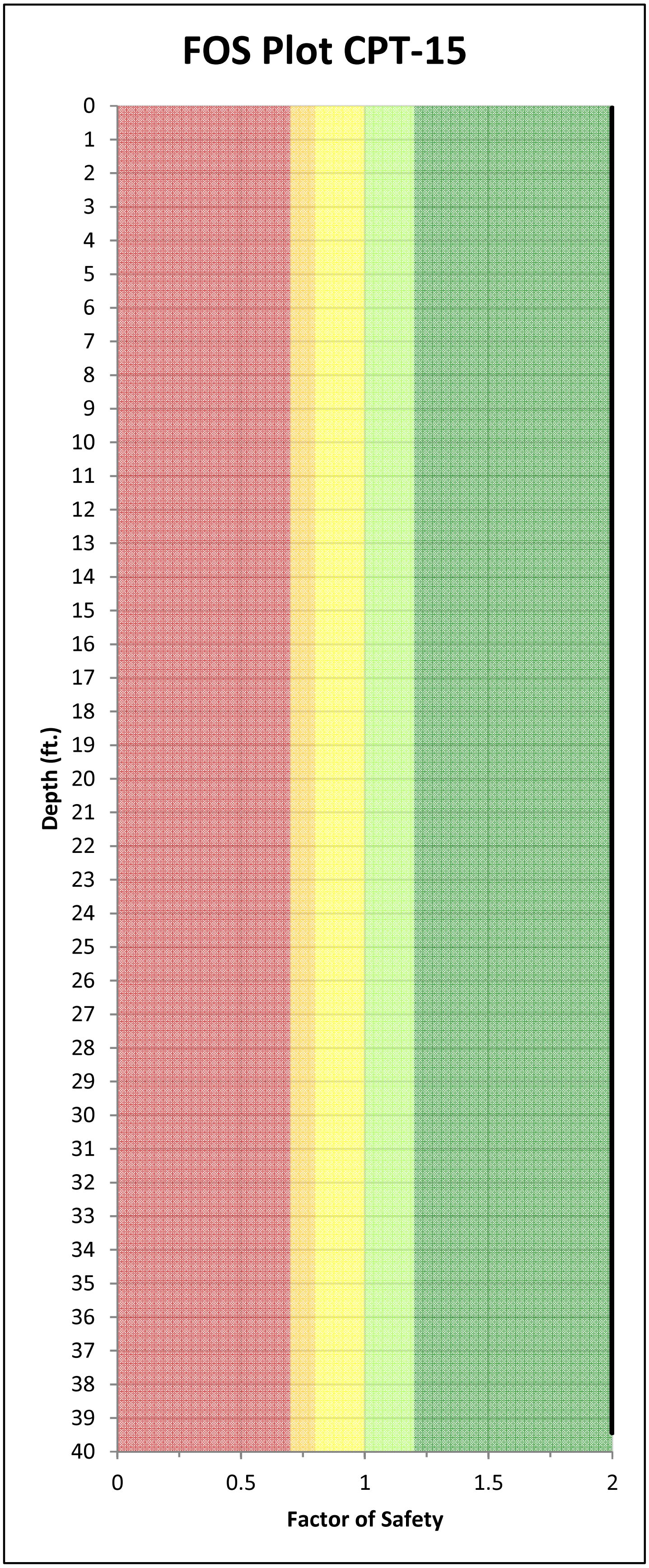
Liquefaction Factor of Safety Plot CPT-15



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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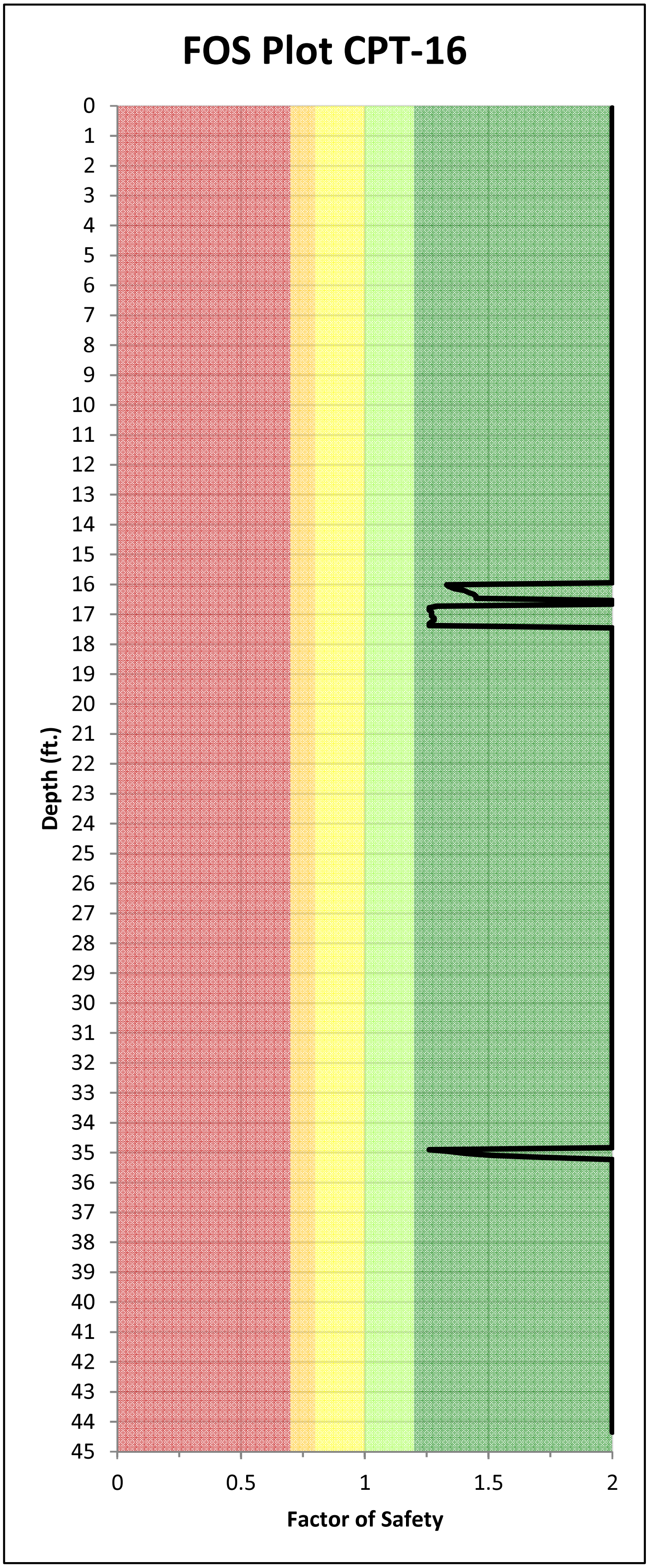
Liquefaction Factor of Safety Plot CPT-16



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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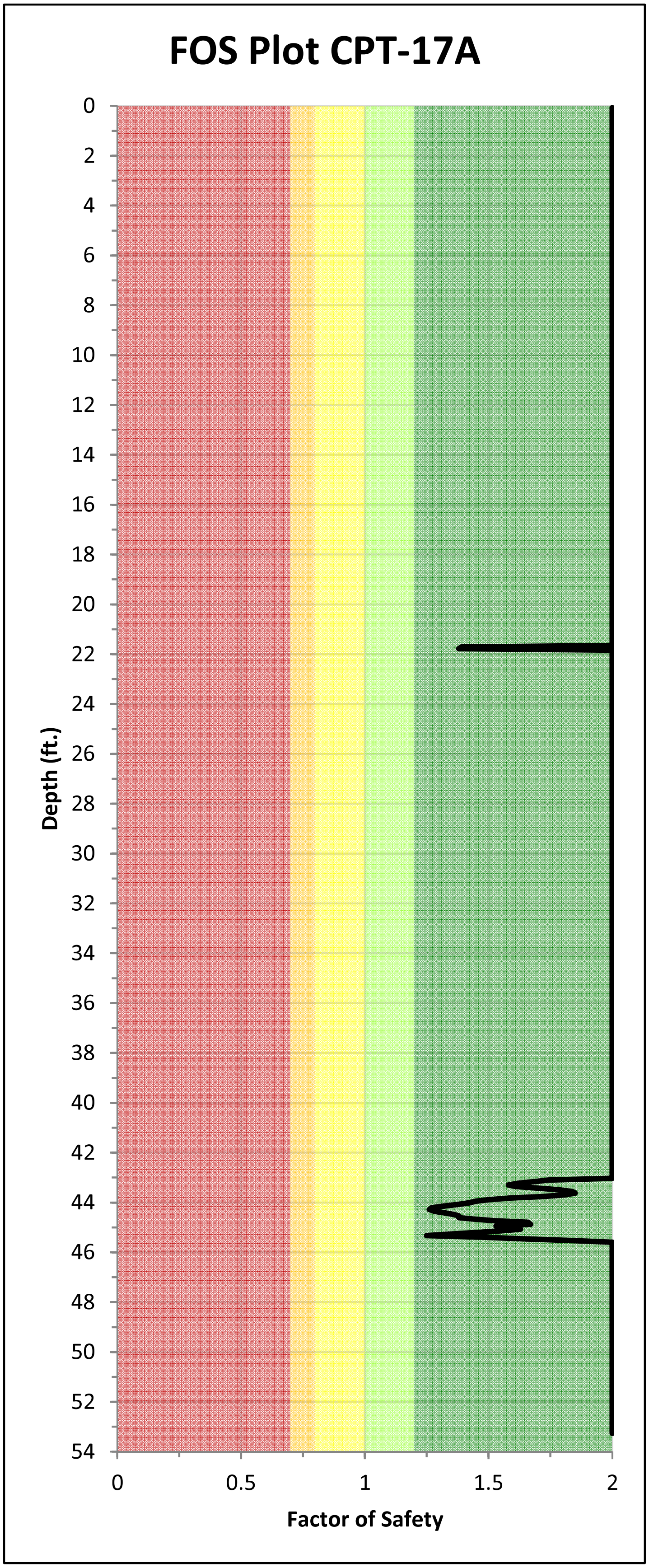
Liquefaction Factor of Safety Plot CPT-17A



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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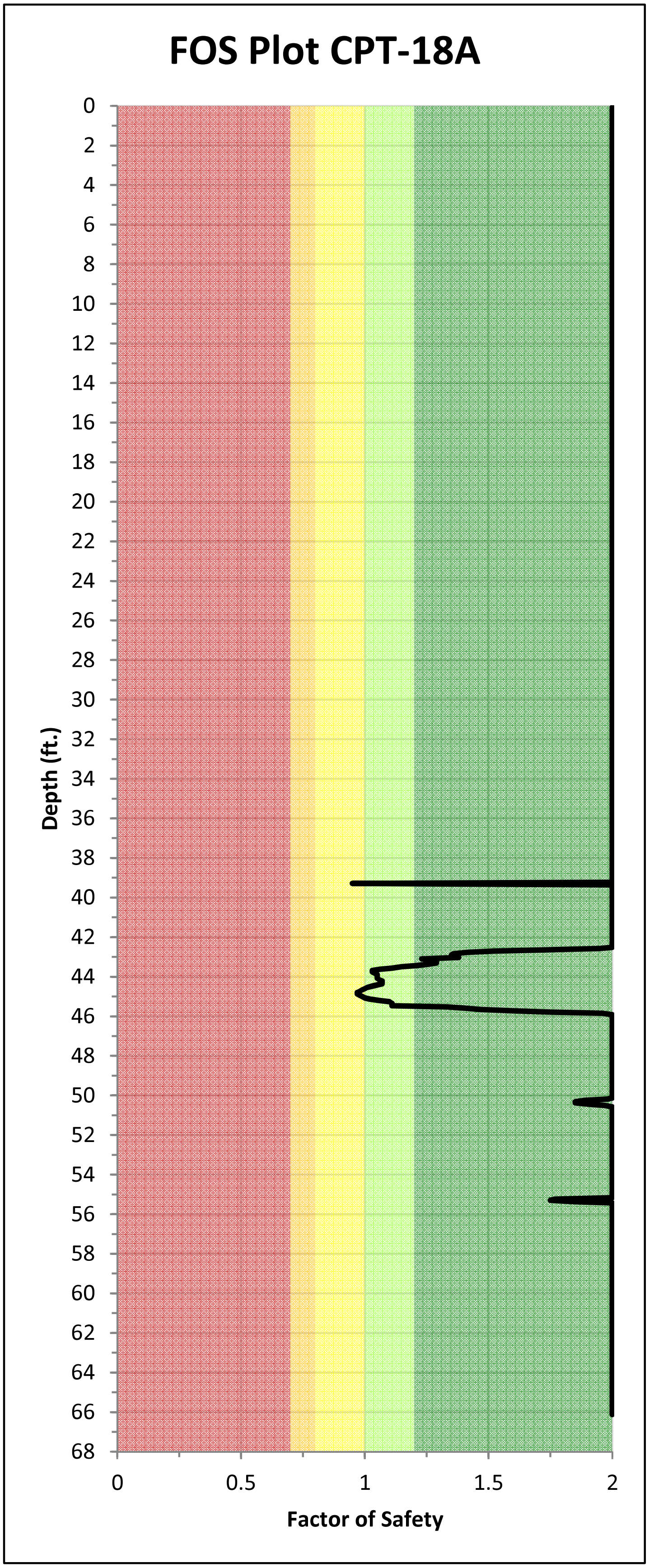
Liquefaction Factor of Safety Plot CPT-18A



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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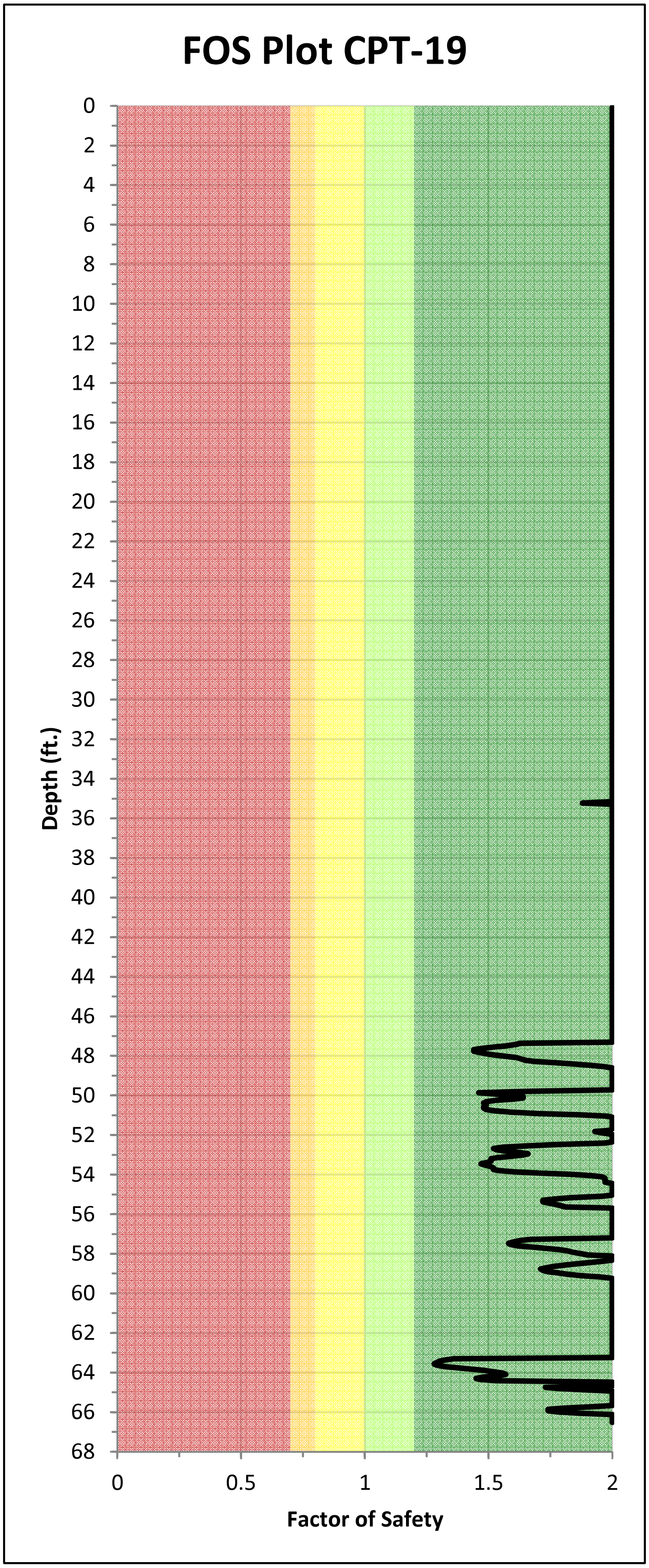
Liquefaction Factor of Safety Plot CPT-19



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

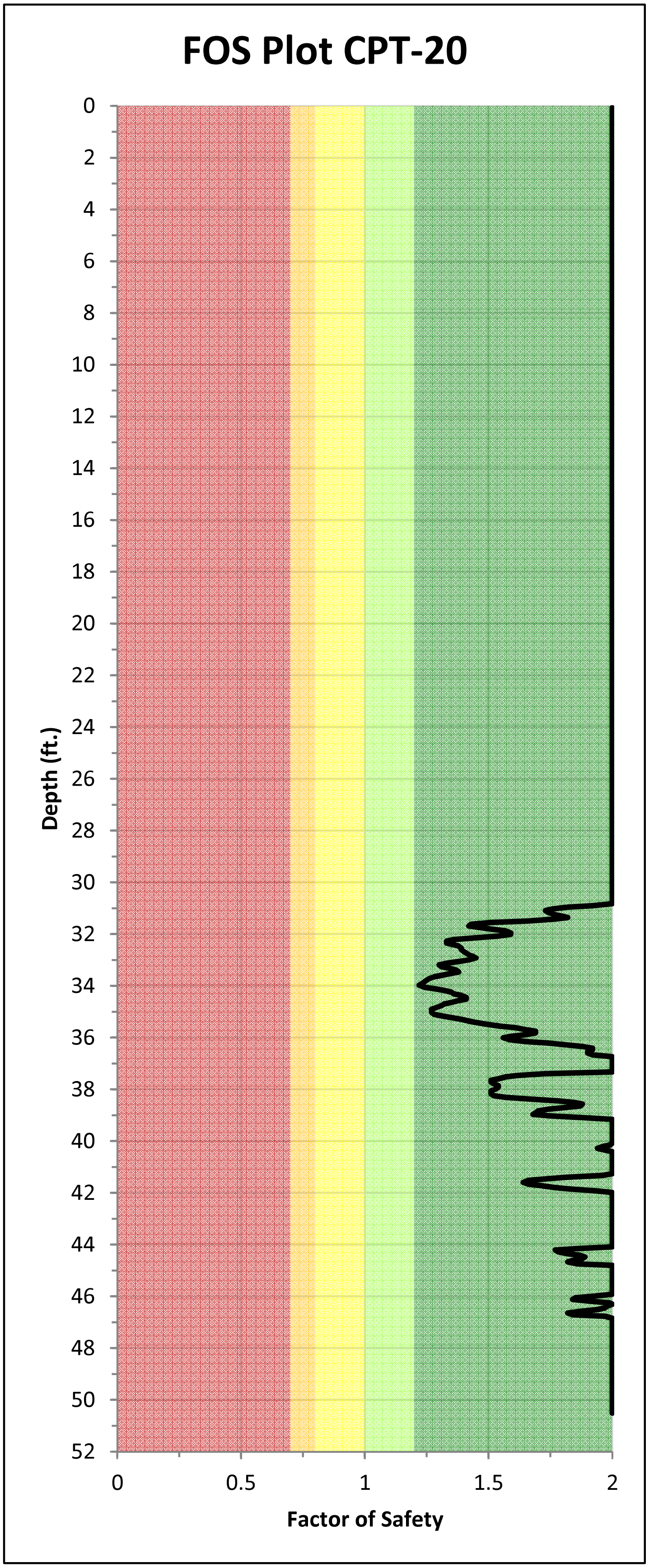
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-20



FOS Color Scheme

🟥	Almost Certain it will liquefy
🟧	Very Likely to Liquefy
🟨	Liquefaction and no. liq. are equally Likely
🟩	Unlikely to liquefy
🟩	Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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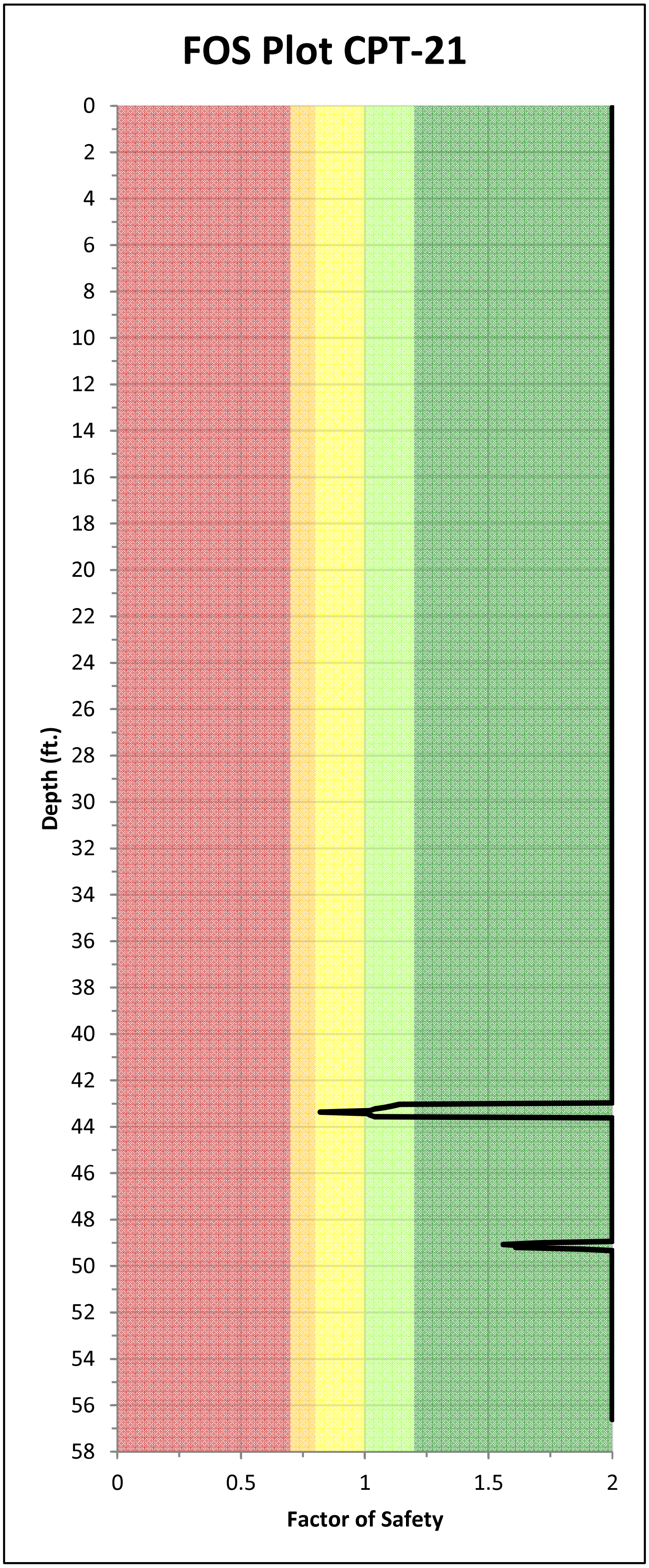
Liquefaction Factor of Safety Plot CPT-21



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

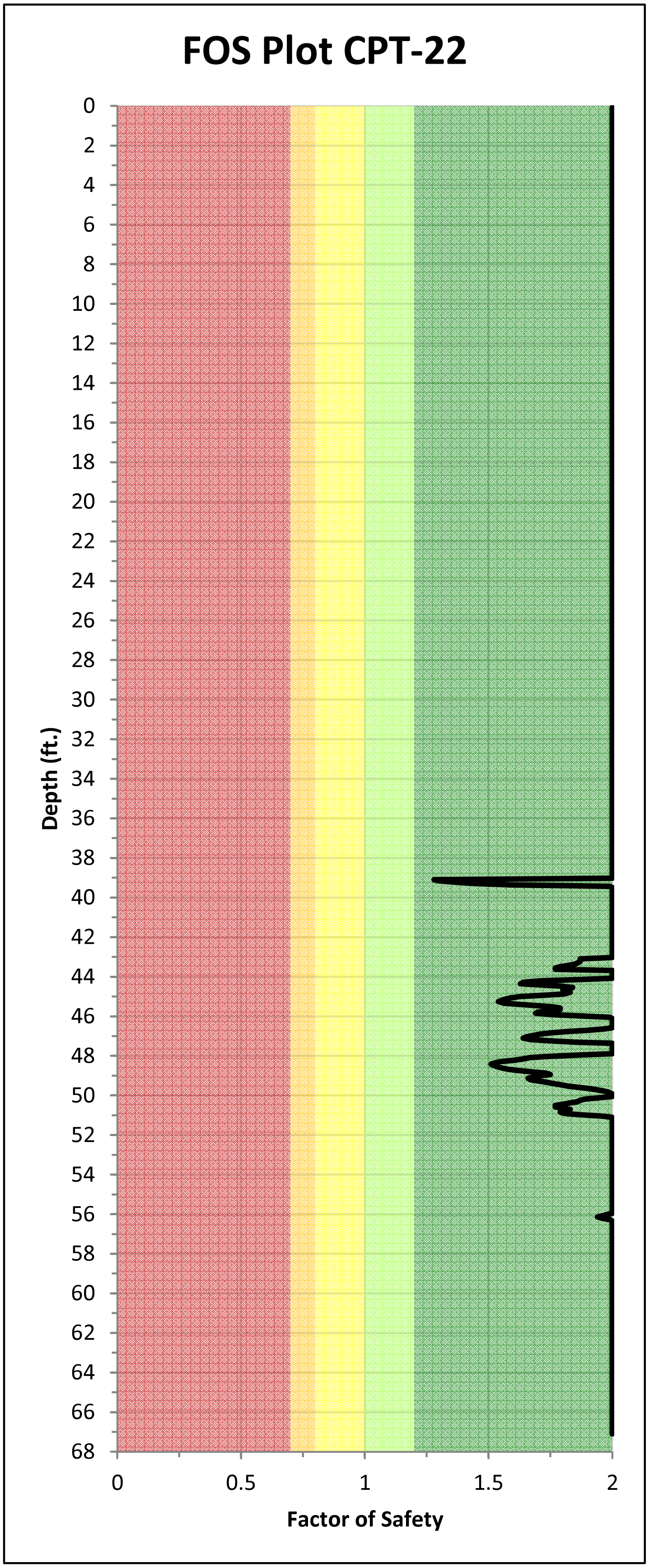
FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-22



FOS Color Scheme

🟥 Almost Certain it will liquefy
🟧 Very Likely to Liquefy
🟨 Liquefaction and no. liq. are equally Likely
🟩 Unlikely to liquefy
🟩 Almost certain it will not liquefy

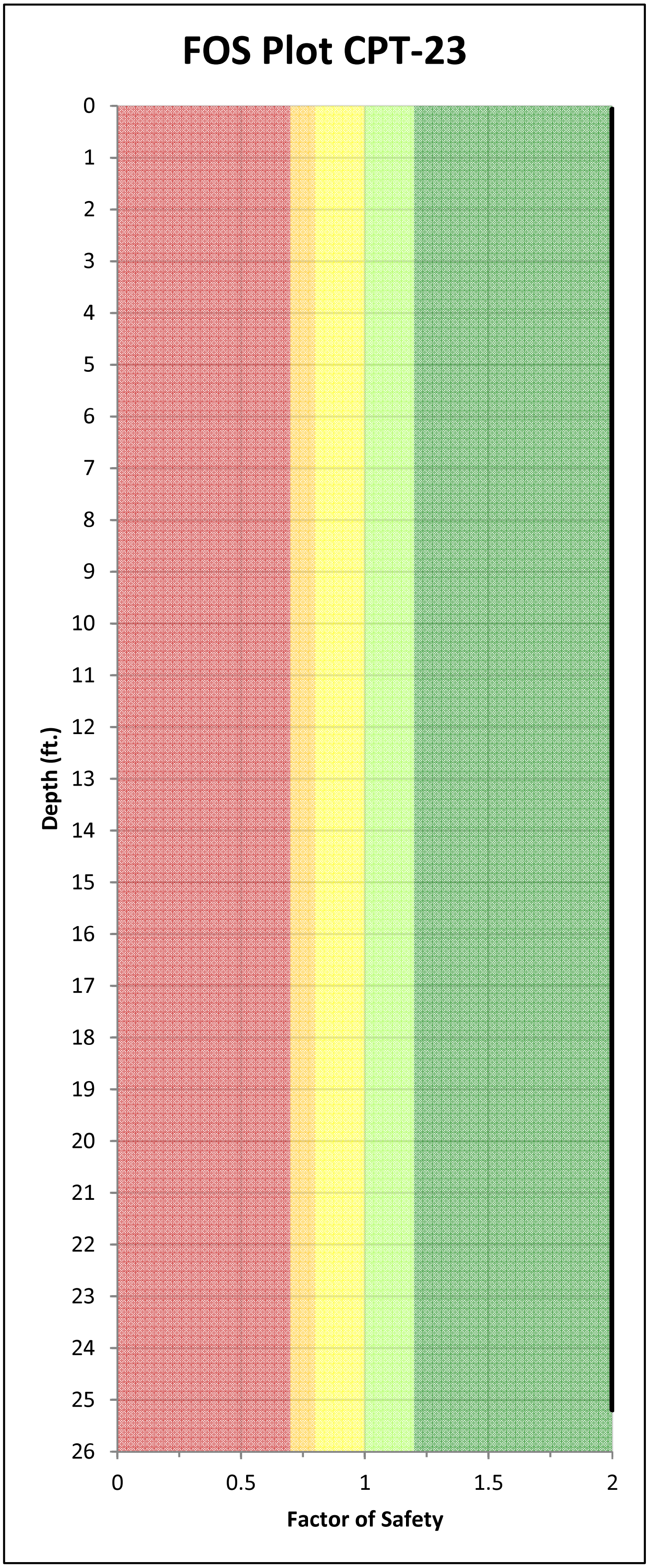
FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-23



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

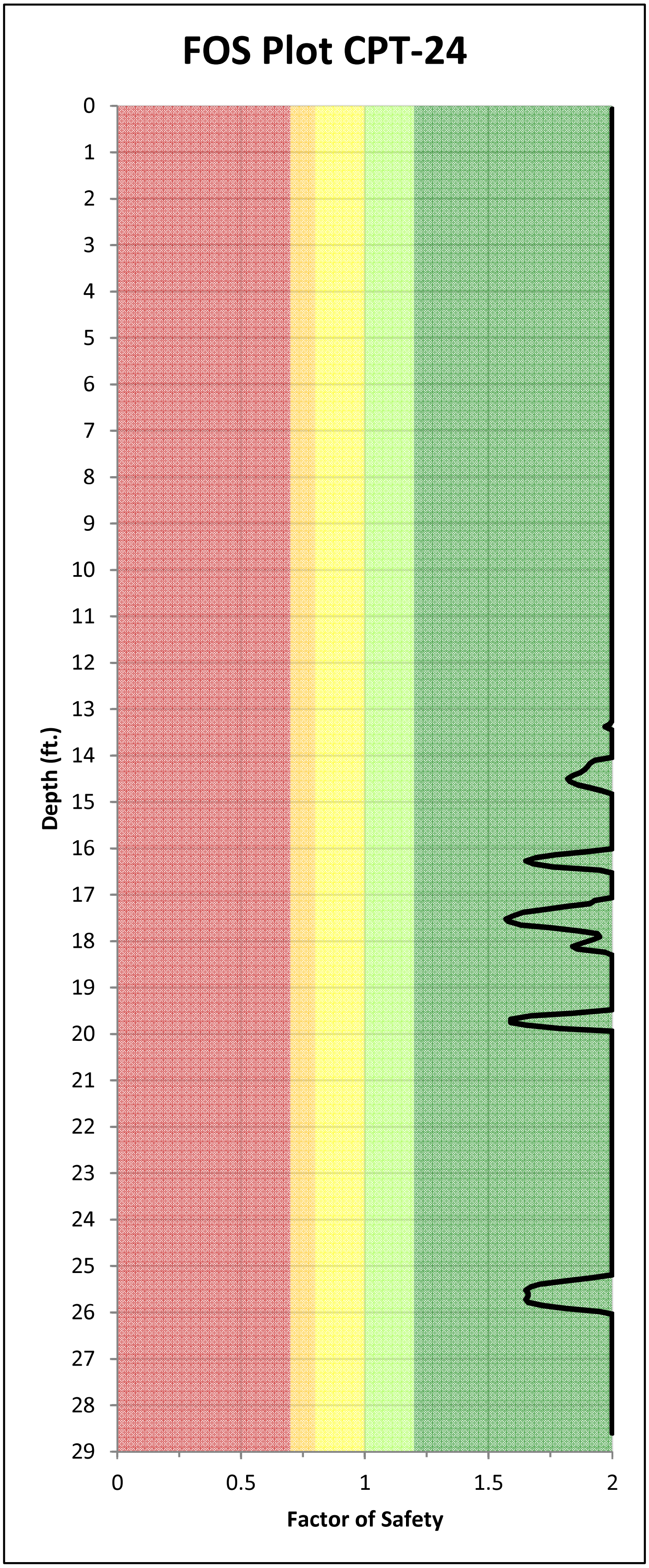
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-24



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

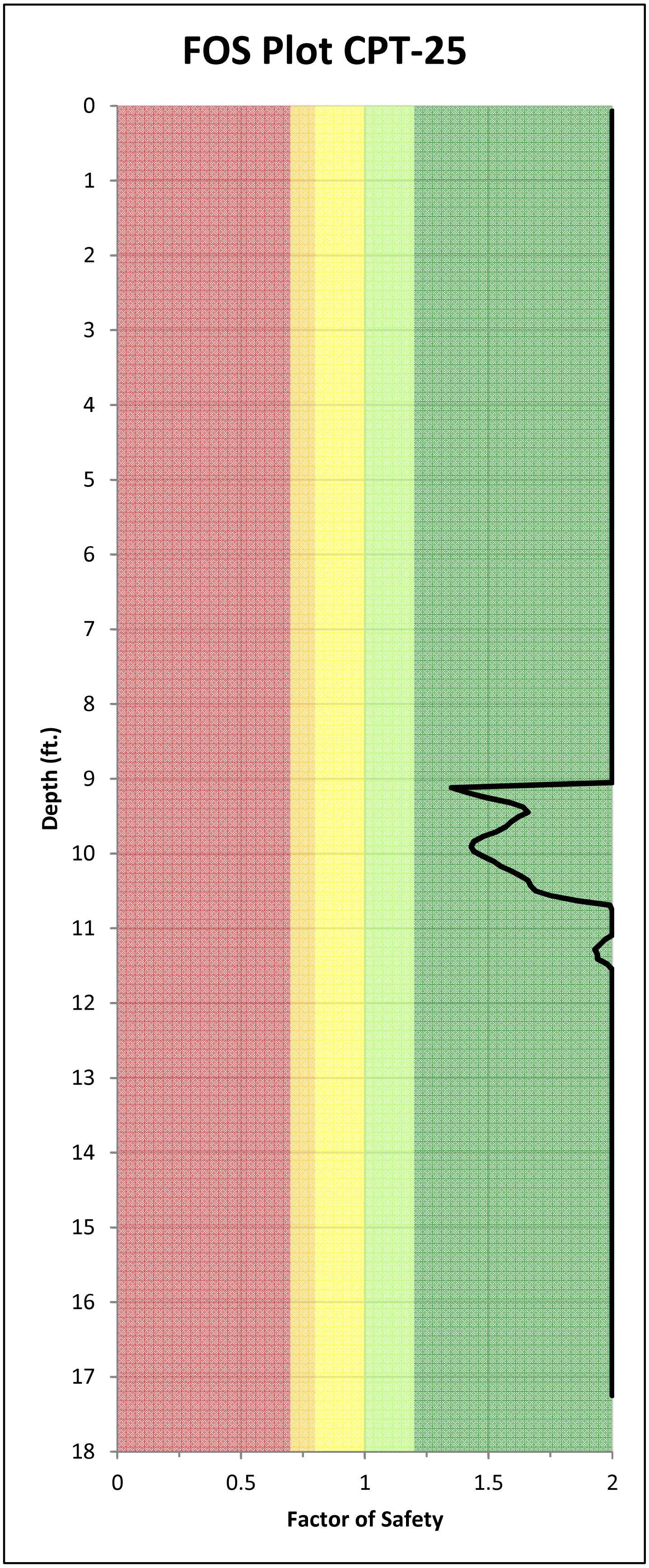
CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-25



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

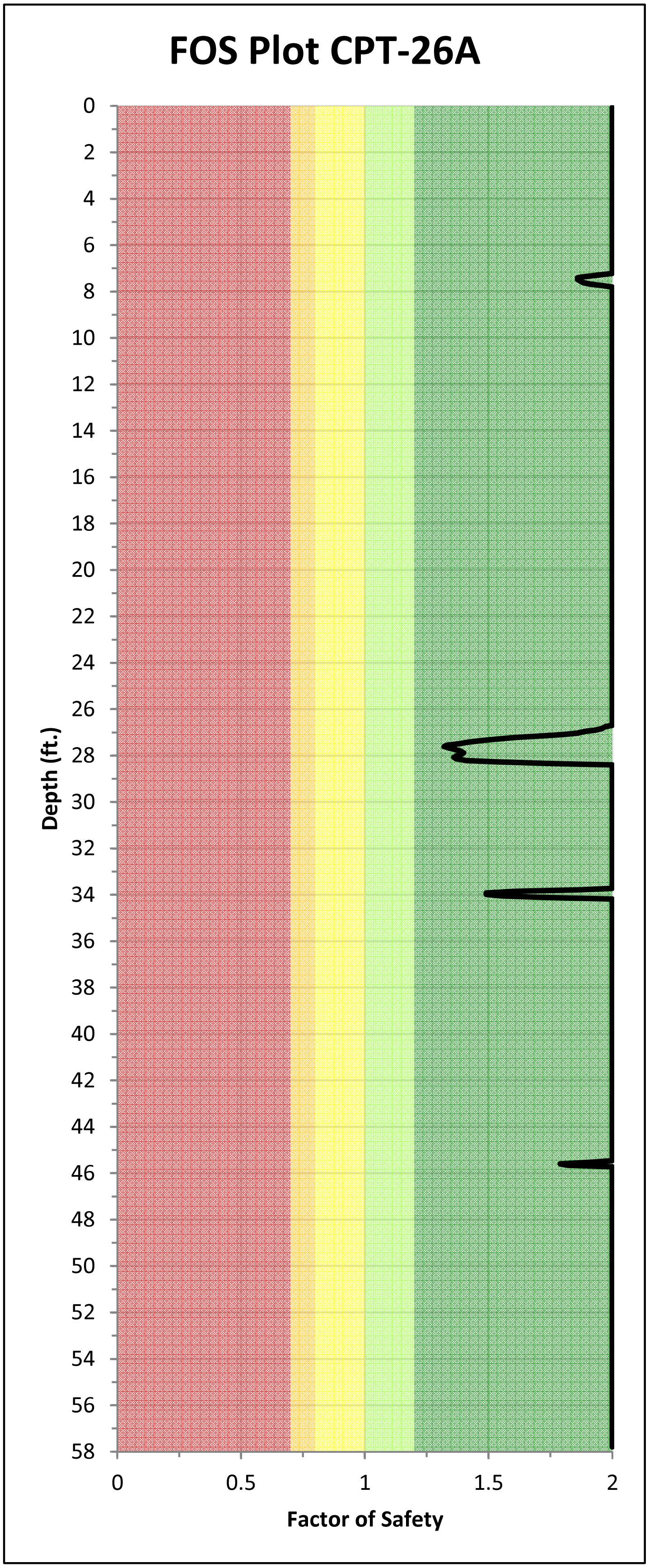
CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-26A



FOS Color Scheme

🟥 Almost Certain it will liquefy

🟧 Very Likely to Liquefy

🟨 Liquefaction and no. liq. are equally Likely

🟩 Unlikely to liquefy

🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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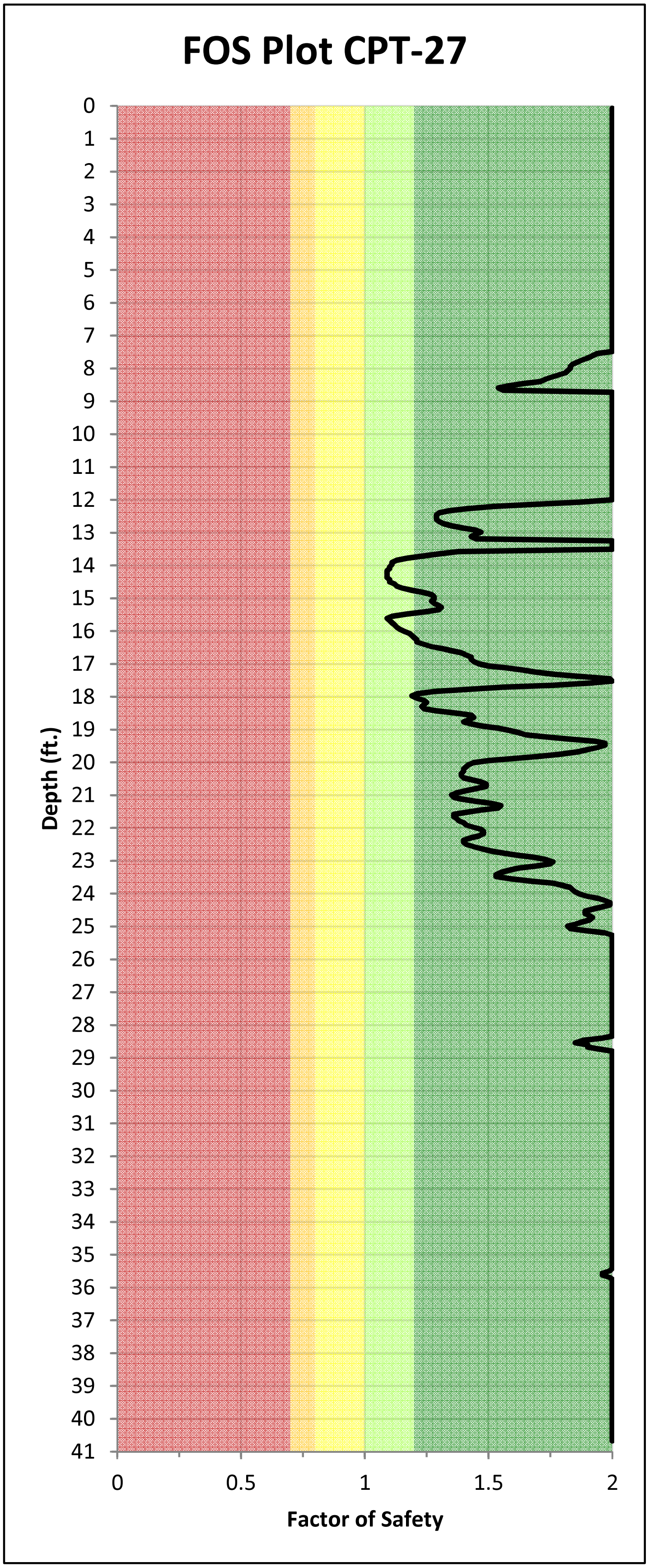
Liquefaction Factor of Safety Plot CPT-27



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

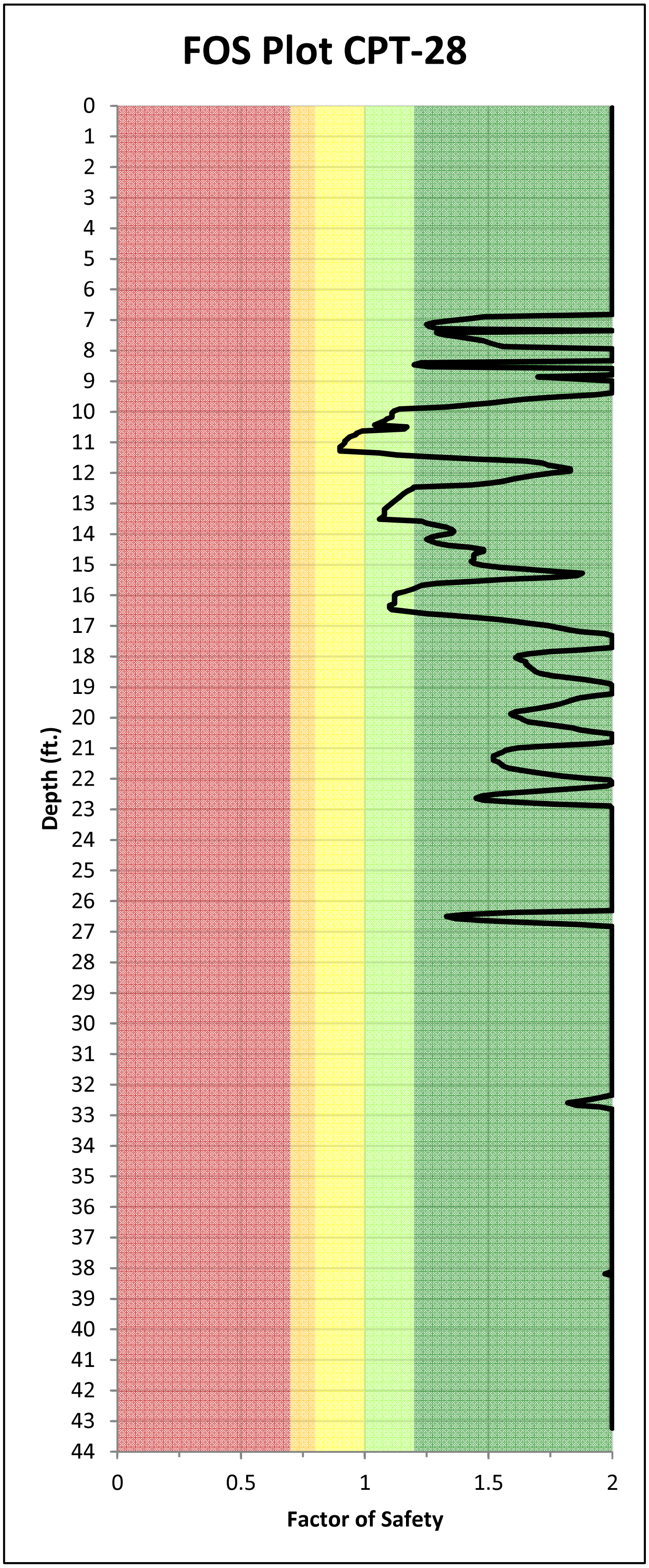
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-28



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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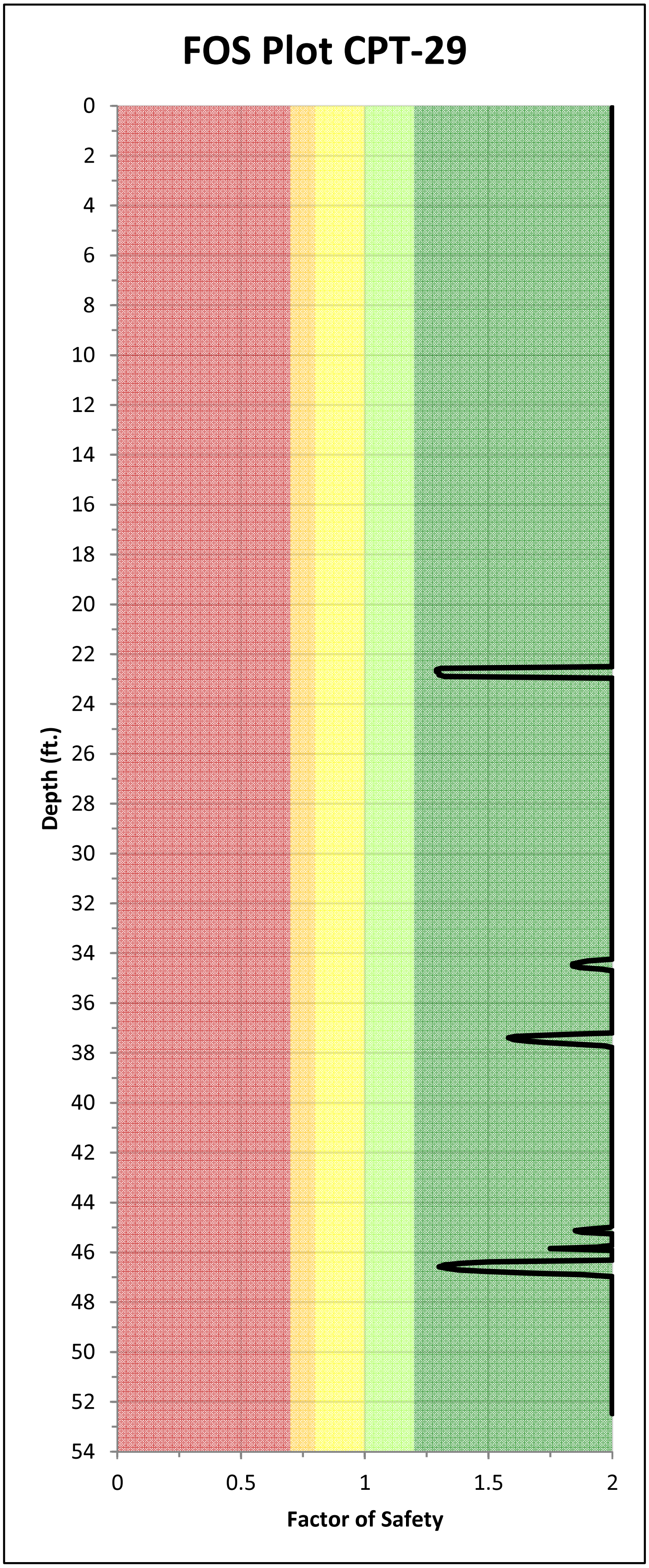
Liquefaction Factor of Safety Plot CPT-29



FOS Color Scheme

🟥	Almost Certain it will liquefy
🟧	Very Likely to Liquefy
🟨	Liquefaction and no. liq. are equally Likely
🟩	Unlikely to liquefy
🟩	Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

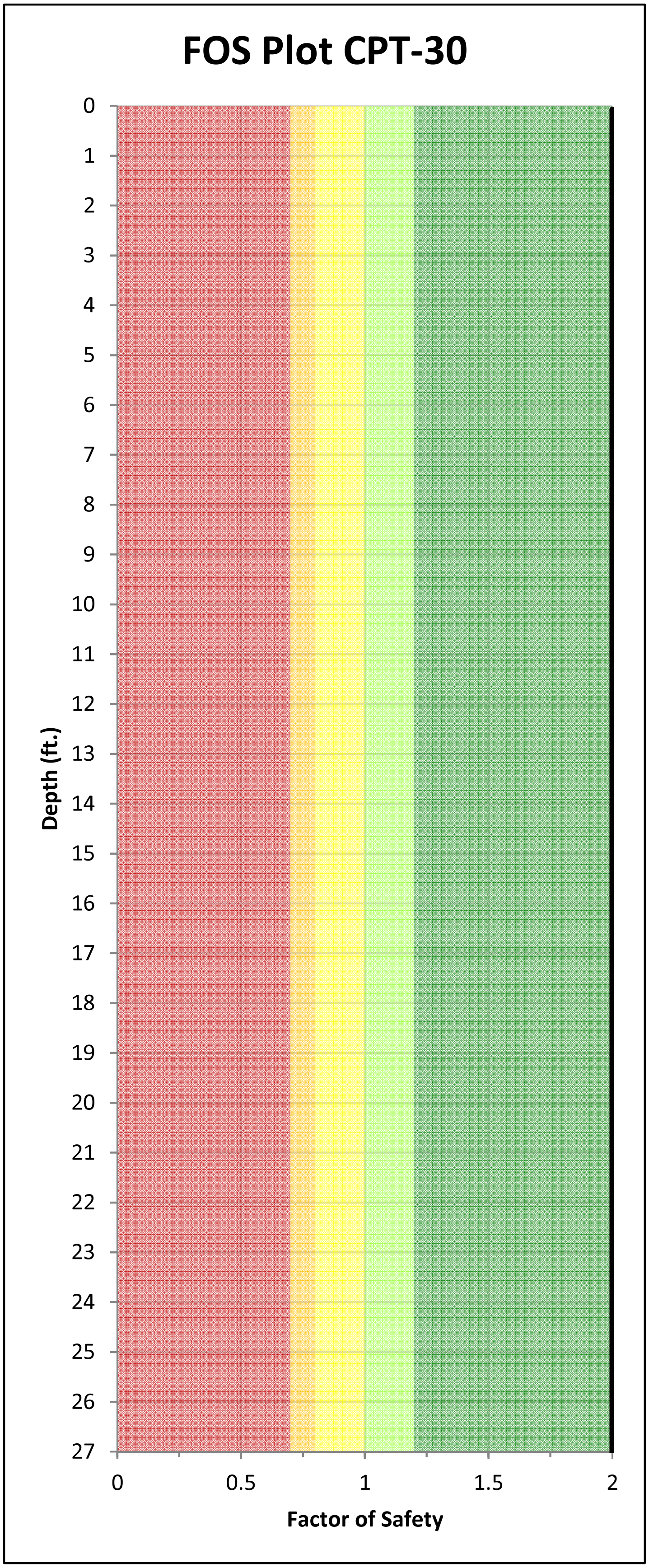
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

© 2006 GeoLogismiki

Liquefaction Factor of Safety Plot CPT-30



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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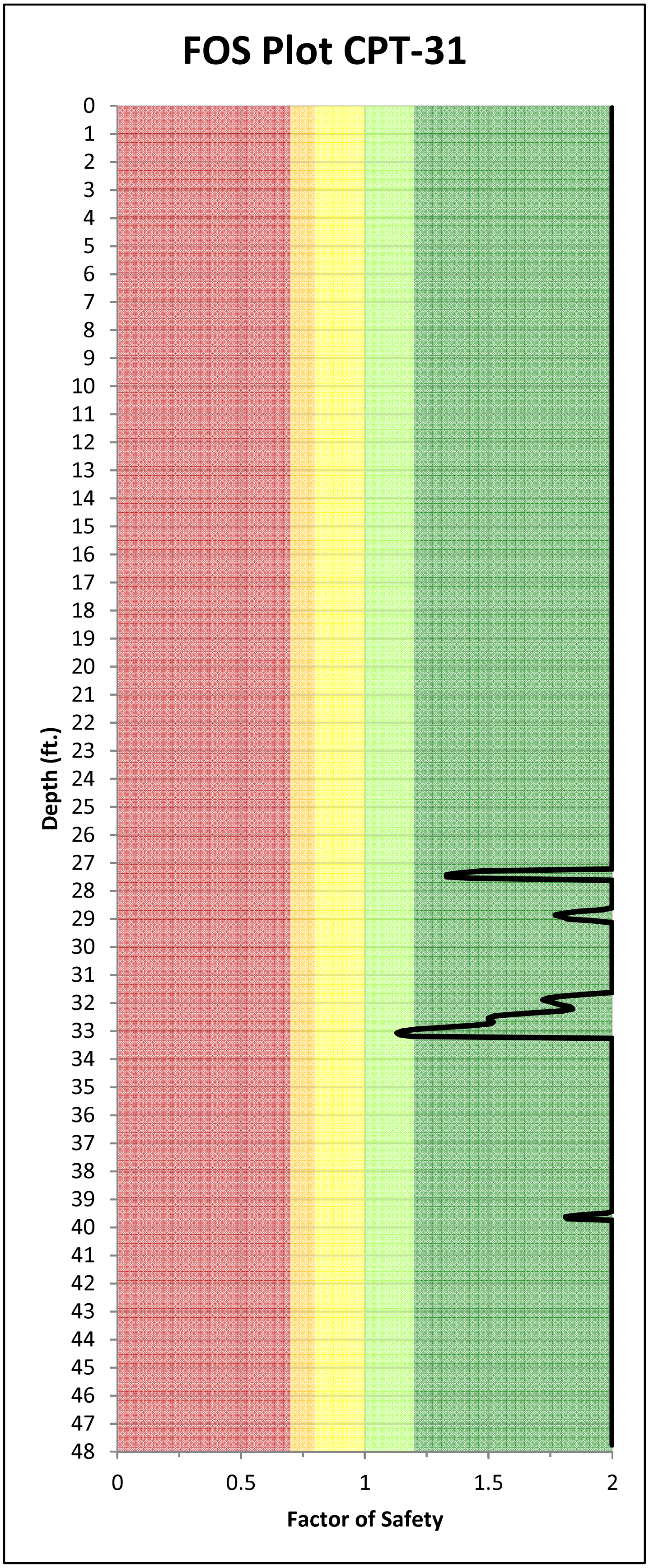
Liquefaction Factor of Safety Plot CPT-31



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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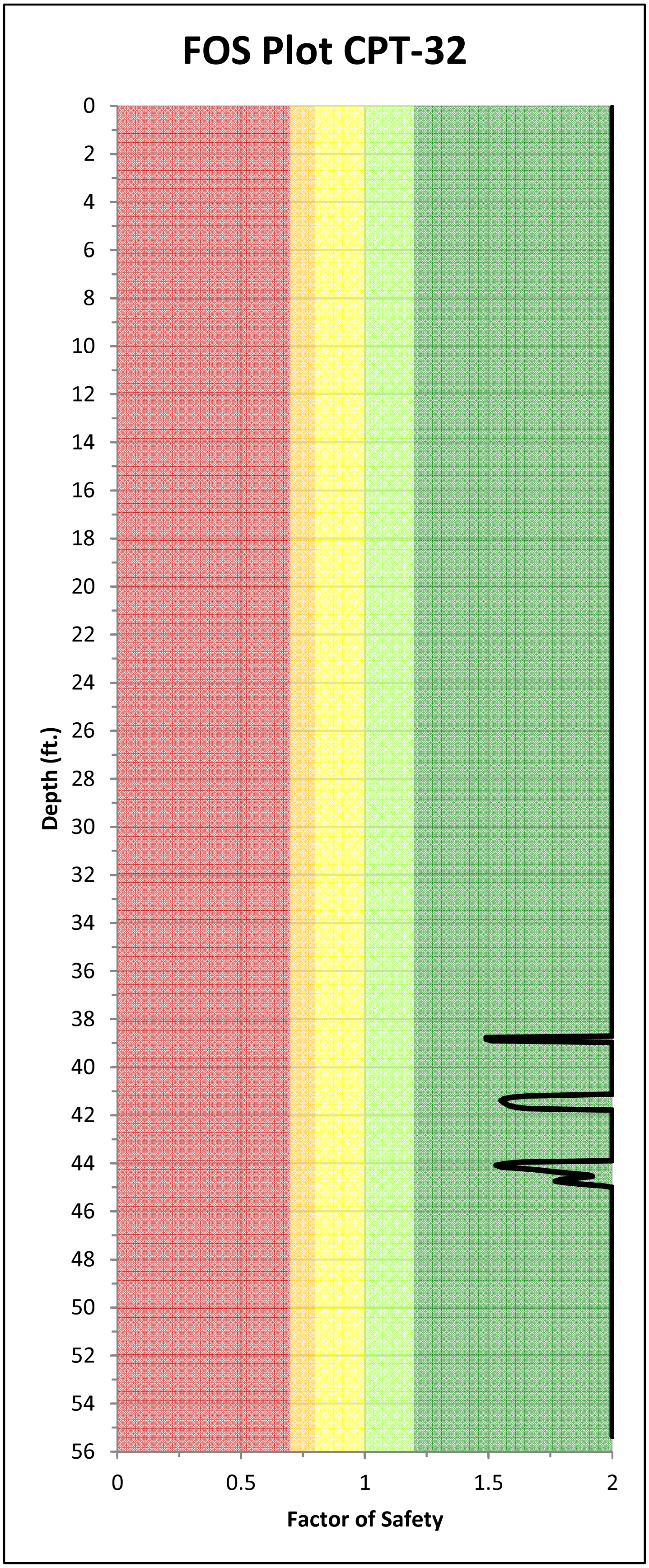
Liquefaction Factor of Safety Plot CPT-32



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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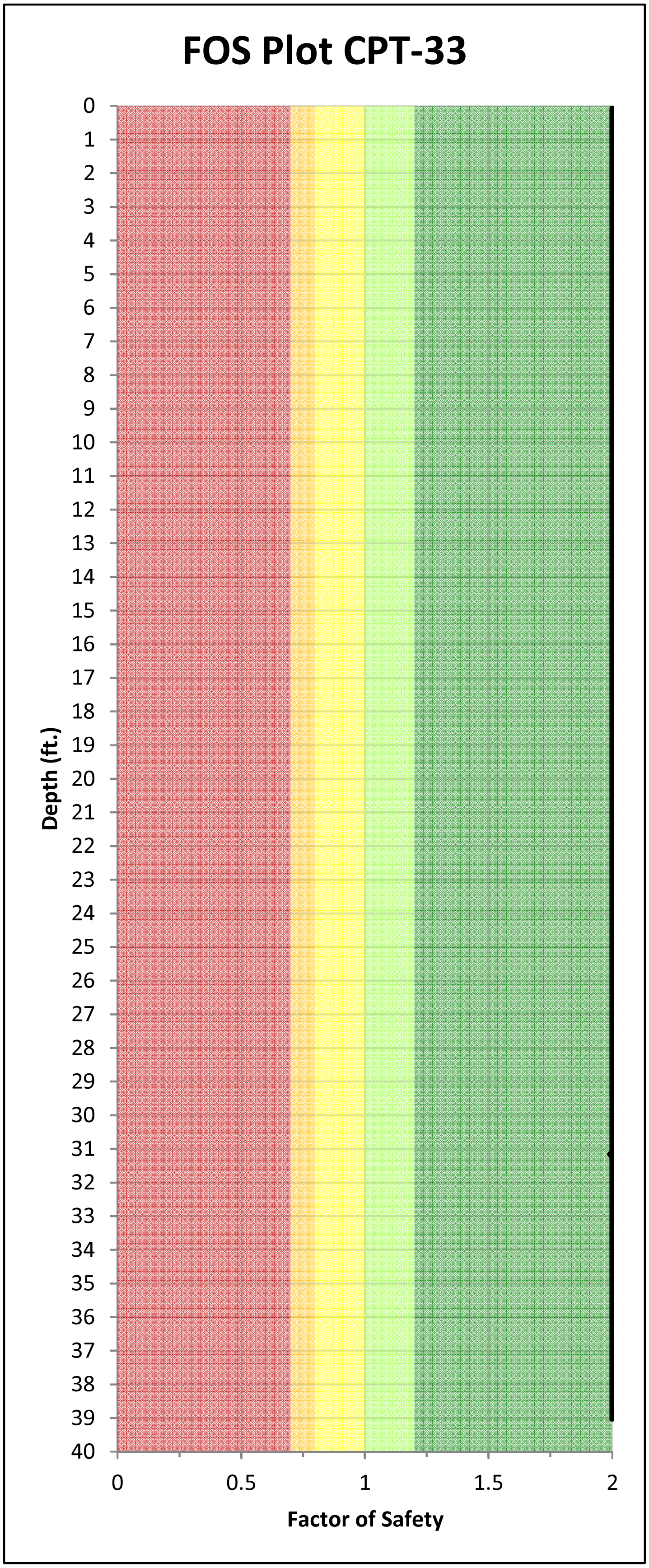
Liquefaction Factor of Safety Plot CPT-33



FOS Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety
CRR 7.5 = Cyclic Resistance Ratio
CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35
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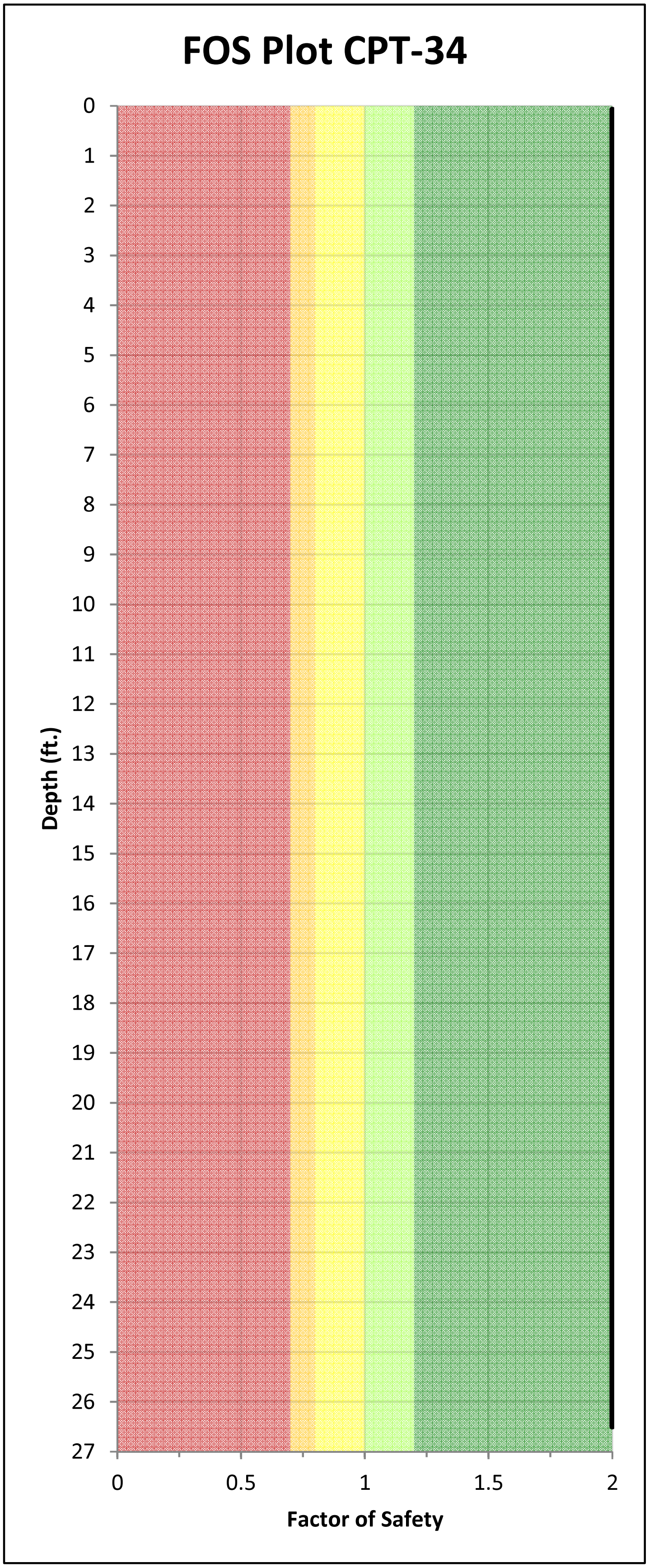
Liquefaction Factor of Safety Plot CPT-34



F0S Color Scheme

- 🟥 Almost Certain it will liquefy
- 🟧 Very Likely to Liquefy
- 🟨 Liquefaction and no. liq. are equally Likely
- 🟩 Unlikely to liquefy
- 🟩 Almost certain it will not liquefy

FOS = CRR 7.5 /CSR

FOS = Factor of Safety

CRR 7.5 = Cyclic Resistance Ratio

CSR = Cyclic Stress Ratio

Values interepreted based on generated CPT data output of cone friction, tip resistance and pore pressure versus depth

Ref: CLiq v.2.2.0.35

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LIQUEFACTION ANALYSIS

I.D.O.T. Bureau of Bridges and Structures FOUNDATIONS AND GEOTECHNICAL UNIT

Modified 1/27/2011

REFERENCE BORING NUMBER ====================================== GWA-7
ELEVATION OF BORING GROUND SURFACE ========================== 349.00 FT.
DEPTH TO GROUNDWATER - DURING DRILLING ====================== 21.00 FT. (Below Boring Ground Surface)
DEPTH TO GROUNDWATER - DURING EARTHQUAKE ================== 21.00 FT. (Below Finished Grade Cut or Fill Surface)
PEAK HORIZ. GROUND SURFACE ACCELERATION COEFFICIENT (As) ===== 0.131
EARTHQUAKE MOMENT MAGNITUDE =============================== 7.5
FINISHED GRADE FILL OR CUT FROM BORING SURFACE =============== 0.00 FT.
HAMMER EFFICIENCY== 80 %
BOREHOLE DIAMETER=== 2.5 to 4.5 IN.
SAMPLING METHOD=== Sampler w/out Liners

EQ MAGNITUDE SCALING FACTOR
(MSF) = **1.000**

AVG. SHEAR WAVE VELOCITY (top 40')
$V^{*}_{s,40'}$ = **546** FT./SEC.

PGA CALCULATOR
Earthquake Moment Magnitude =
Source-To-Site Distance, R (km) =
Ground Motion Prediction Equations =
PGA =

	BORING DATA							CONDITIONS DURING DRILLING					CONDITIONS DURING EARTHQUAKE							
ELEV. OF SAMPLE (FT.)	BORING SAMPLE DEPTH (FT.)	SPT N VALUE (BLOWS)	UNCONF. COMPR. STR., Q_u (TSF.)	% FINES < #200 (%)	PLAST. INDEX PI	LIQUID LIMIT LL	MOIST. CONTENT w_c (%)	EFFECTIVE UNIT WT. (KCF.)	EFFECTIVE VERT. STRESS (KSF.)	CORR. SPT N VALUE $(N_1)_{60}$	EQUIV. CLN. SAND SPT N VALUE $(N_1)_{60cs}$	CRR RESIST. MAG 7.5 $CRR_{7.5}$	EFFECTIVE UNIT WT. (KCF.)	EFFECTIVE VERT. STRESS (KSF.)	TOTAL VERT. STRESS (KSF.)	OVER-BURDEN CORR. FACT. (Ks)	CORR. RESIST. $CRR_{7.5}$ CRR	SOIL MASS PART. FACTOR (r_d)	EQ INDUCED CSR	FACTOR OF SAFETY * CRR/CSR
348	1	7						0.114	0.114	13.316	13.316	0.144	0.114	0.114	0.114	1.500	**0.215**	0.997	**0.085**	**N.L. (1)**
343	6	7						0.114	0.684	11.137	11.137	0.123	0.114	0.684	0.684	1.310	**0.161**	0.977	**0.083**	**N.L. (1)**
338	11	8						0.116	1.264	11.994	11.994	0.131	0.116	1.264	1.264	1.134	**0.149**	0.948	**0.081**	**N.L. (1)**
333	16	5						0.111	1.819	7.084	7.084	0.088	0.111	1.819	1.819	1.033	**0.091**	0.907	**0.077**	**N.L. (1)**
328	21	7		95.2	27	67		0.114	2.389	9.125	15.950	0.170	0.114	2.389	2.389	0.968	**0.164**	0.855	**0.073**	**N.L. (1)**
323	26	9		95.2	27	67		0.060	2.689	11.280	18.536	0.198	0.060	2.689	3.001	0.935	**0.185**	0.797	**0.076**	**N.L. (2)**
318	31	18						0.066	3.019	22.445	22.445	0.248	0.066	3.019	3.643	0.896	**0.223**	0.740	**0.076**	**2.934 (D)**
313	36	17						0.066	3.349	19.871	19.871	0.214	0.066	3.349	4.285	0.875	**0.187**	0.690	**0.075**	**2.493 (D)**
308	41	45						0.075	3.724	57.013	57.013	0.374	0.075	3.724	4.972	0.798	**0.299**	0.652	**0.074**	**N.L. (3)**
303	46	55						0.077	4.109	66.011	66.011	0.453	0.077	4.109	5.669	0.767	**0.348**	0.624	**0.073**	**N.L. (3)**

* FACTOR OF SAFETY DESCRIPTIONS

N.L. (1) = NOT LIQUEFIABLE, ABOVE EQ GROUND WATER ELEVATION
N.L. (2) = NOT LIQUEFIABLE, PI ≥ 12 OR w_c/LL ≤ 0.85
N.L. (3) = NOT LIQUEFIABLE, $(N_1)_{60}$ > 25
(C) = CONTRACTIVE SOIL TYPES
(D) = DILATIVE SOIL TYPES

LIQUEFACTION ANALYSIS

I.D.O.T. Bureau of Bridges and Structures FOUNDATIONS AND GEOTECHNICAL UNIT

Modified 1/27/2011

REFERENCE BORING NUMBER ====================================== GWA-8
ELEVATION OF BORING GROUND SURFACE ========================== 349.00 FT.
DEPTH TO GROUNDWATER - DURING DRILLING ====================== 24.00 FT. (Below Boring Ground Surface)
DEPTH TO GROUNDWATER - DURING EARTHQUAKE ================== 24.00 FT. (Below Finished Grade Cut or Fill Surface)
PEAK HORIZ. GROUND SURFACE ACCELERATION COEFFICIENT (As) ===== 0.131
EARTHQUAKE MOMENT MAGNITUDE ================================ 7.5
FINISHED GRADE FILL OR CUT FROM BORING SURFACE =============== 0.00 FT.
HAMMER EFFICIENCY== 80 %
BOREHOLE DIAMETER=== 2.5 to 4.5 IN.
SAMPLING METHOD=== Sampler w/out Liners

EQ MAGNITUDE SCALING FACTOR
(MSF) = **1.000**

AVG. SHEAR WAVE VELOCITY (top 40')
$V^{*}_{s,40'}$ = **563** FT./SEC.

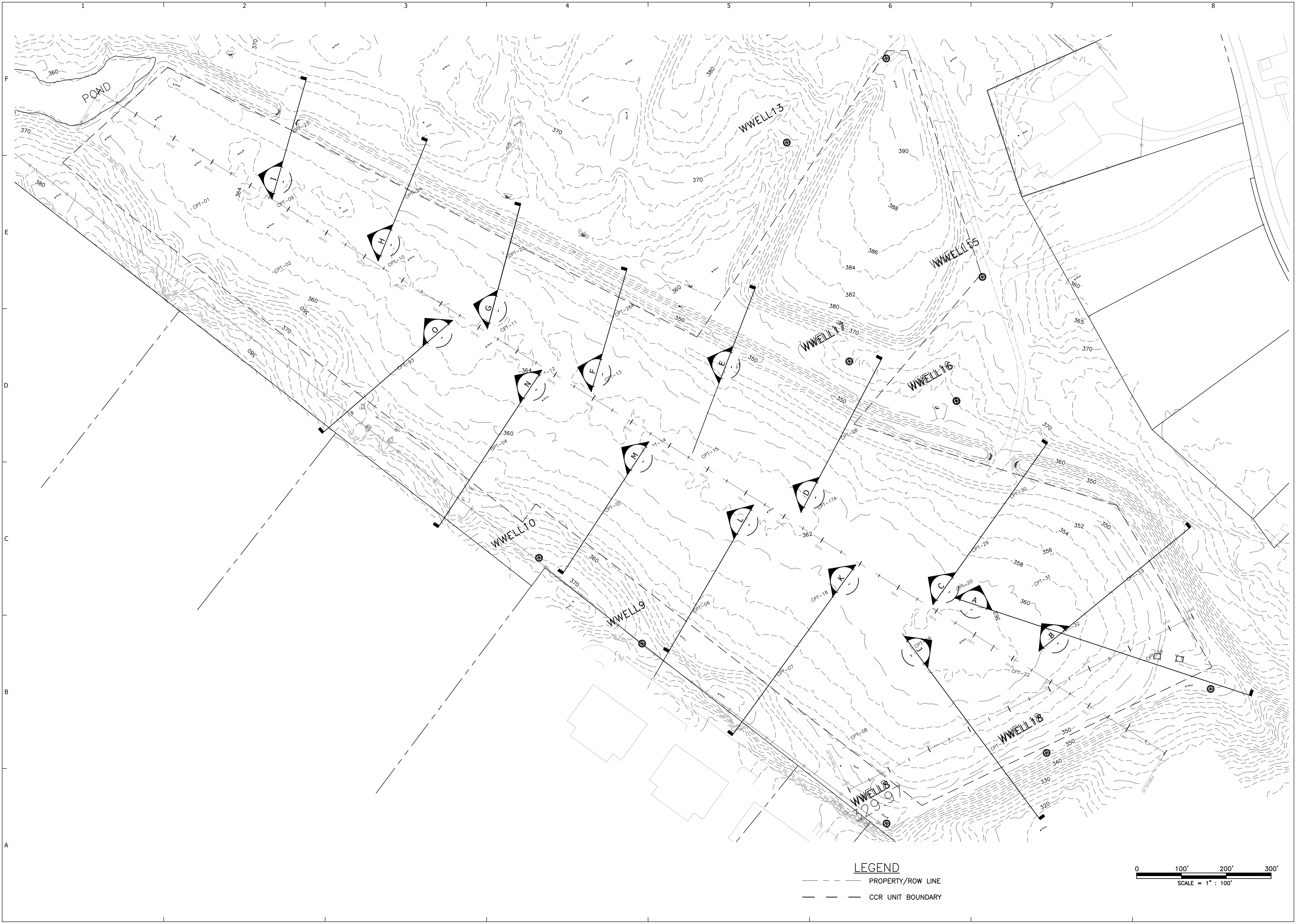
PGA CALCULATOR
Earthquake Moment Magnitude =
Source-To-Site Distance, R (km) =
Ground Motion Prediction Equations =
PGA =

	BORING DATA							CONDITIONS DURING DRILLING						CONDITIONS DURING EARTHQUAKE						
ELEV. OF SAMPLE (FT.)	BORING SAMPLE DEPTH (FT.)	SPT N VALUE (BLOWS)	UNCONF. COMPR. STR., Q_u (TSF.)	% FINES < #200 (%)	PLAST. INDEX PI	LIQUID LIMIT LL	MOIST. CONTENT w_c (%)	EFFECTIVE UNIT WT. (KCF.)	EFFECTIVE VERT. STRESS (KSF.)	CORR. SPT N VALUE $(N_1)_{60}$	EQUIV. CLN. SAND SPT N VALUE $(N_1)_{60cs}$	CRR RESIST. MAG 7.5 $CRR_{7.5}$	EFFECTIVE UNIT WT. (KCF.)	EFFECTIVE VERT. STRESS (KSF.)	TOTAL VERT. STRESS (KSF.)	OVER-BURDEN CORR. FACT. (Ks)	CORR. RESIST. $CRR_{7.5}$ CRR	SOIL MASS PART. FACTOR (r_d)	EQ INDUCED CSR	FACTOR OF SAFETY * CRR/CSR
348	1	11						0.119	0.119	22.197	22.197	0.245	0.119	0.119	0.119	1.500	**0.367**	0.997	**0.085**	**N.L. (1)**
343	6	12						0.120	0.719	20.094	20.094	0.217	0.120	0.719	0.719	1.375	**0.298**	0.980	**0.083**	**N.L. (1)**
338	11	7						0.114	1.289	10.426	10.426	0.117	0.114	1.289	1.289	1.124	**0.131**	0.955	**0.081**	**N.L. (1)**
333	16	7		50.8				0.114	1.859	9.828	16.793	0.179	0.114	1.859	1.859	1.037	**0.185**	0.919	**0.078**	**N.L. (1)**
328	21	7						0.114	2.429	9.052	9.052	0.105	0.114	2.429	2.429	0.970	**0.102**	0.872	**0.074**	**N.L. (1)**
323	26	10		50				0.061	2.734	12.427	19.912	0.214	0.061	2.734	2.859	0.928	**0.199**	0.817	**0.073**	**2.726 (D)**
318	31	14						0.064	3.054	16.832	16.832	0.179	0.064	3.054	3.491	0.905	**0.162**	0.761	**0.074**	**2.189 (D)**
313	36	13						0.063	3.369	14.717	14.717	0.157	0.063	3.369	4.118	0.886	**0.139**	0.711	**0.074**	**1.878 (D)**
308	41	29						0.071	3.724	34.362	34.362	-2.513	0.071	3.724	4.785	0.806	**-2.025**	0.671	**0.073**	**N.L. (3)**

* FACTOR OF SAFETY DESCRIPTIONS

N.L. (1) = NOT LIQUEFIABLE, ABOVE EQ GROUND WATER ELEVATION
N.L. (2) = NOT LIQUEFIABLE, PI ≥ 12 OR w_c/LL ≤ 0.85
N.L. (3) = NOT LIQUEFIABLE, $(N_1)_{60}$ > 25
(C) = CONTRACTIVE SOIL TYPES
(D) = DILATIVE SOIL TYPES

CREATED:12/22/2017 LAST SAVED:10/29/2018 BY:JASHWORT PLOT DATE: 11/15/2018



JACOBS

10 TENTH STREET NW
SUITE 1400
ATLANTA, GEORGIA 30309

FORMER PLANT ARKWRIGHT

GEORGIA POWER COMPANY
FORMER PLANT ARKWRIGHT

BIBB COUNTY, GEORGIA

										REVISION DESCRIPTION
										DATE
										REV

THIS LINE ⌊________⌋ IS ONE INCH
LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

PROJECT NO: 35DK9201

DATE: NOVEMBER 2018

DISC. LEAD:	DESIGNER:	CHECKER:
JLL	JGA	FMP

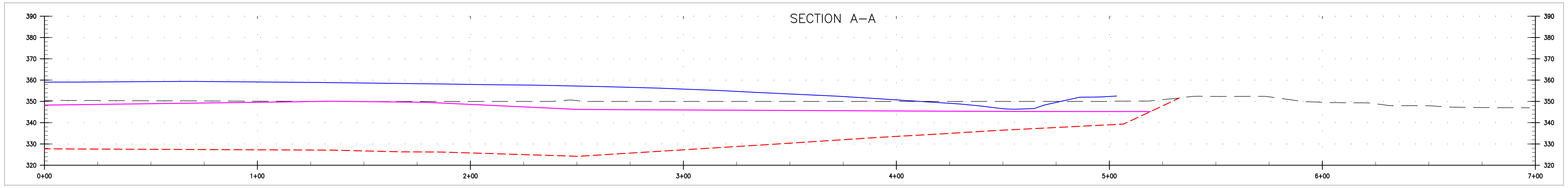
SHEET TITLE

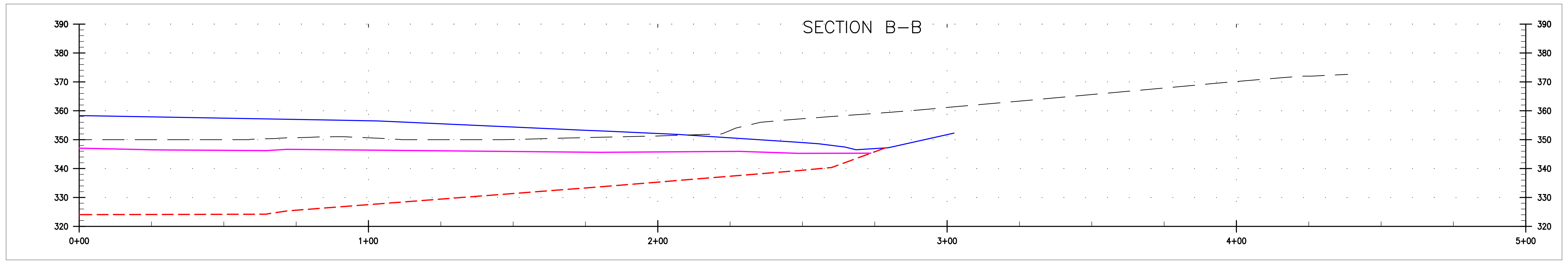
CIVIL

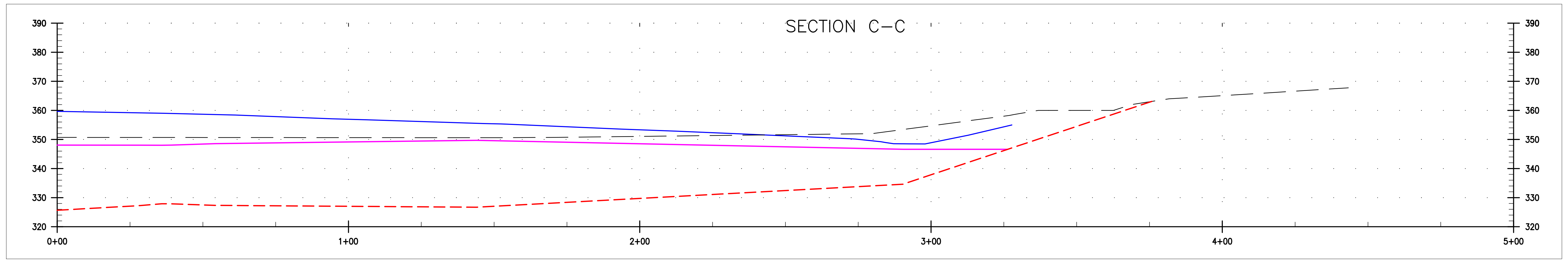
AP3 LANDFILL
SOIL STABILITY SECTION
LOCATION MAP

SKETCH #
FIGURE AP3-1

CREATED:12/22/2017 LAST SAVED:10/29/2018 BY:JASHWORT PLOT DATE: 11/15/2018

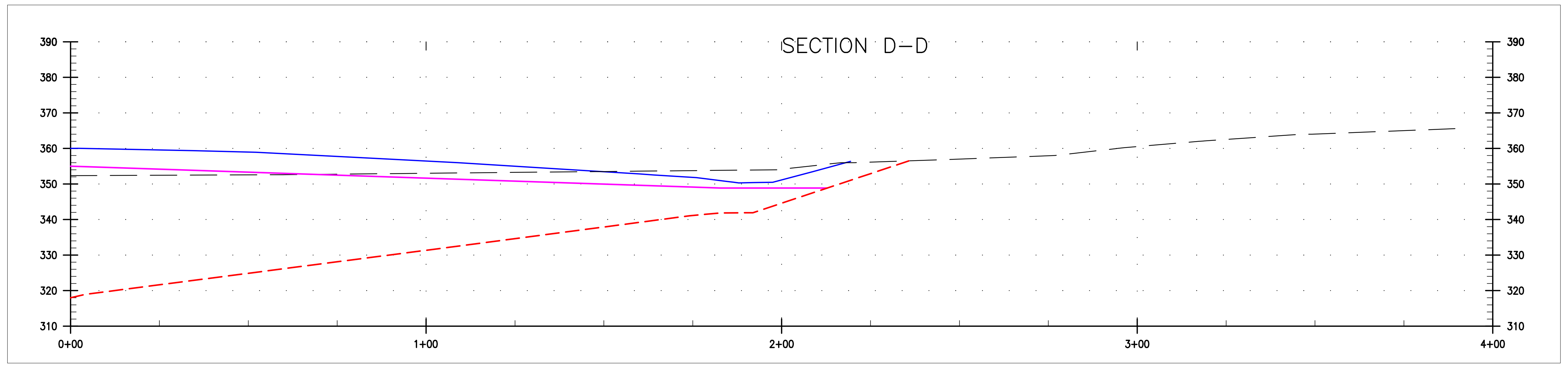


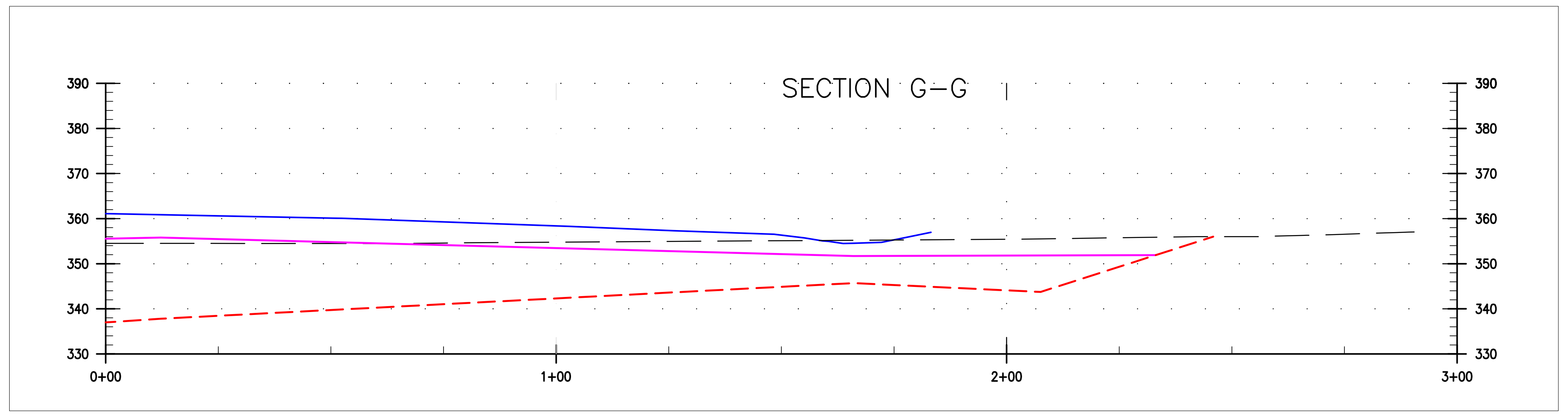


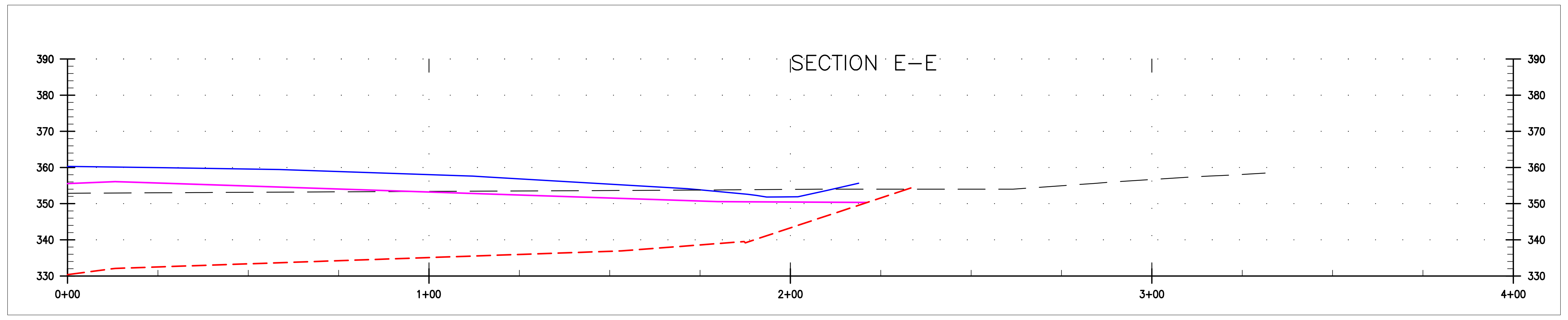


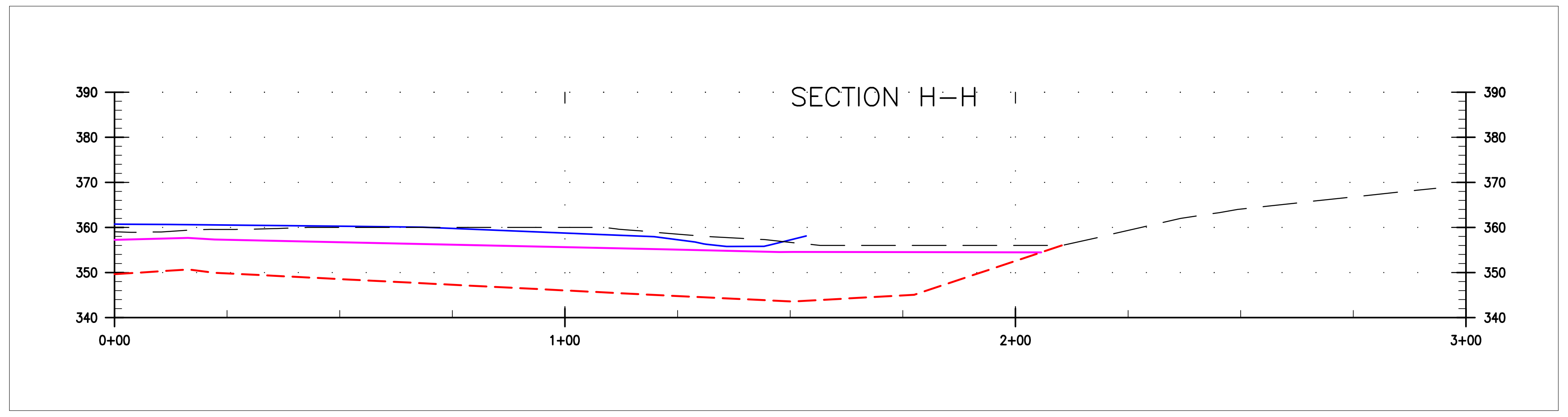
LEGEND

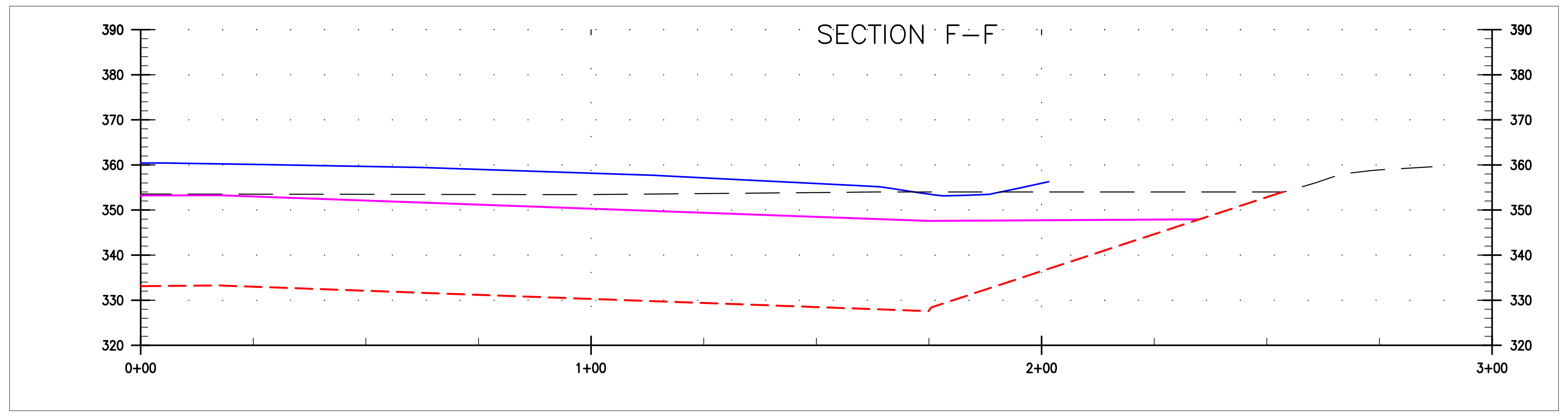
- - - - APPROXIMATE BOTTOM CCR
—— APPROXIMATE TOP OF CCR
—— ASBUILT AP3 LANDFILL
– – – PRE–EXISTING TOPO











0 30' 60' 90'
SCALE = 1" : 30' HORIZ & VERT

JACOBS
10 TENTH STREET NW
SUITE 1400
ATLANTA, GEORGIA 30309

FORMER PLANT ARKWRIGHT
GEORGIA POWER COMPANY
FORMER PLANT ARKWRIGHT
BIBB COUNTY, GEORGIA

REV	DATE	REVISION DESCRIPTION

THIS LINE ⌊______⌋ IS ONE INCH
LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

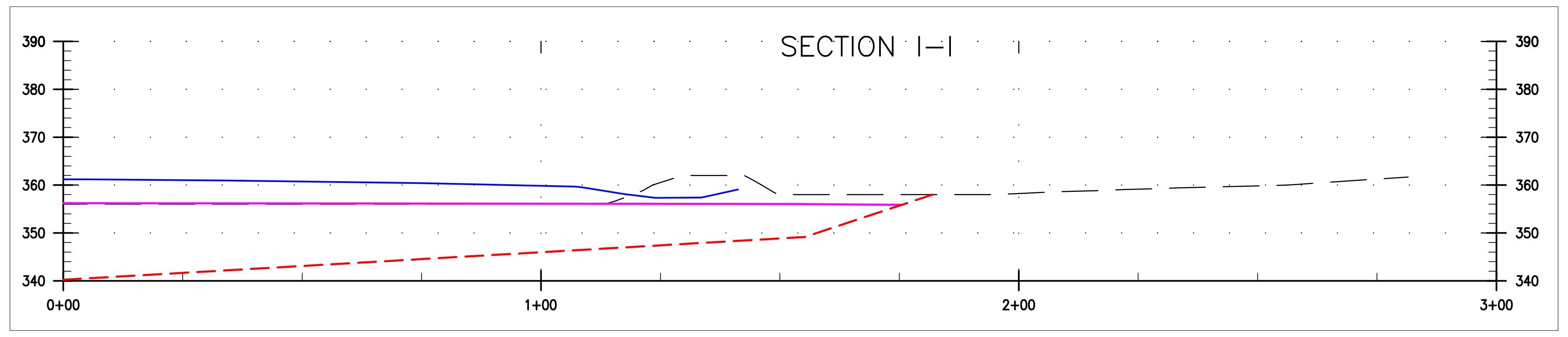
PROJECT NO: 35DK9201
DATE: NOVEMBER 2018

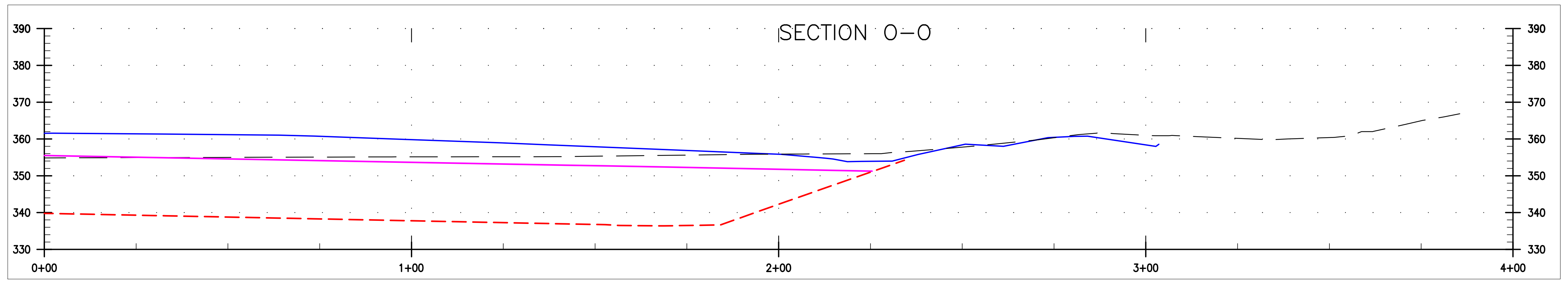
DISC. LEAD:	DESIGNER:	CHECKER:
JLL	JGA	FMP

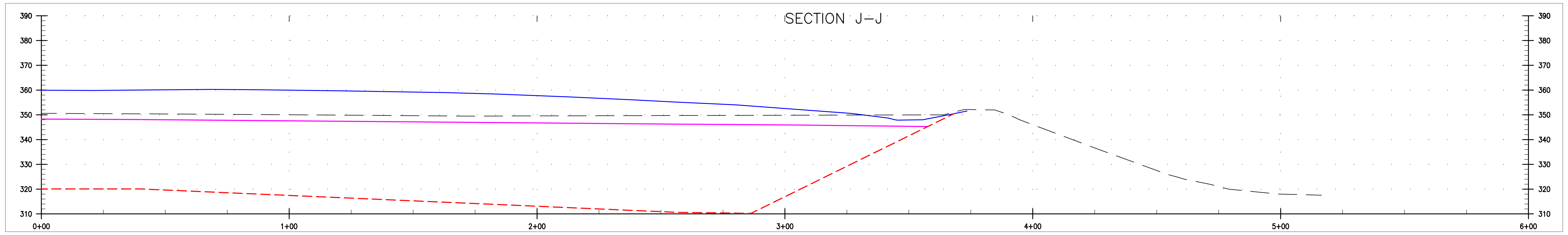
SHEET TITLE
CIVIL

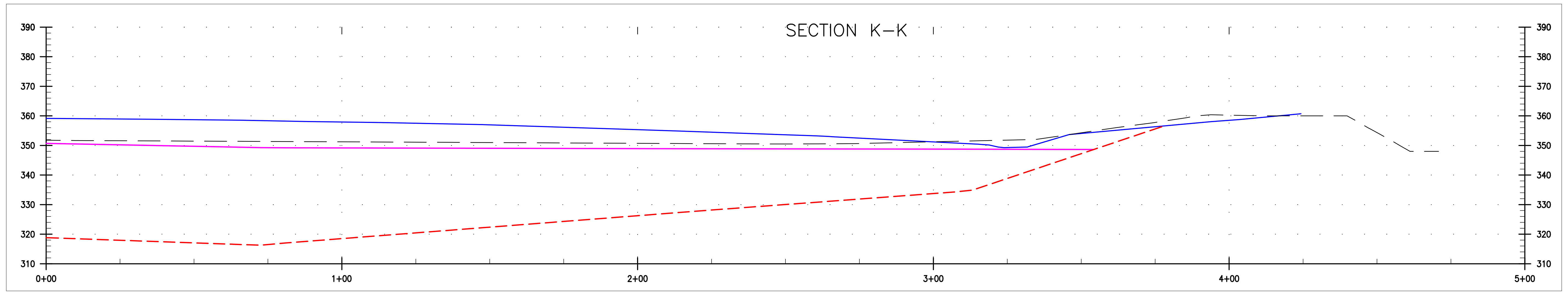
AP3 LANDFILL
SOIL STABILITY SECTION
CROSS SECTIONS

SKETCH #
FIGURE AP3-2


SECTION I–I


SECTION O–O


SECTION J–J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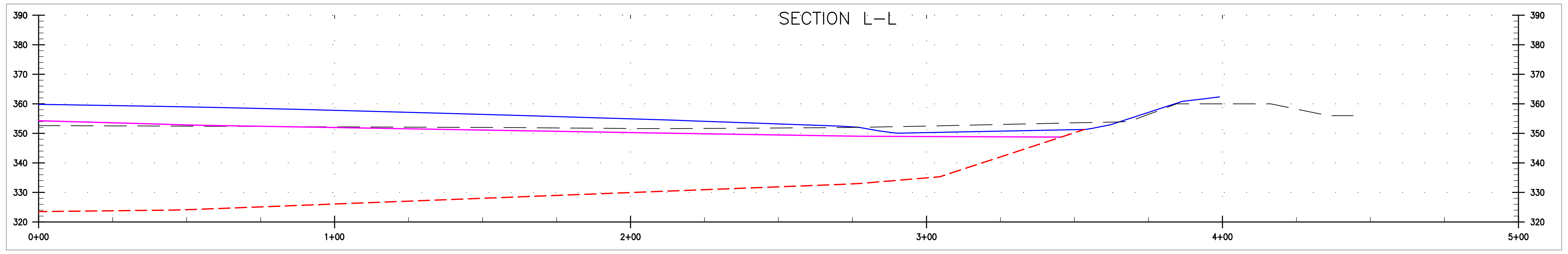
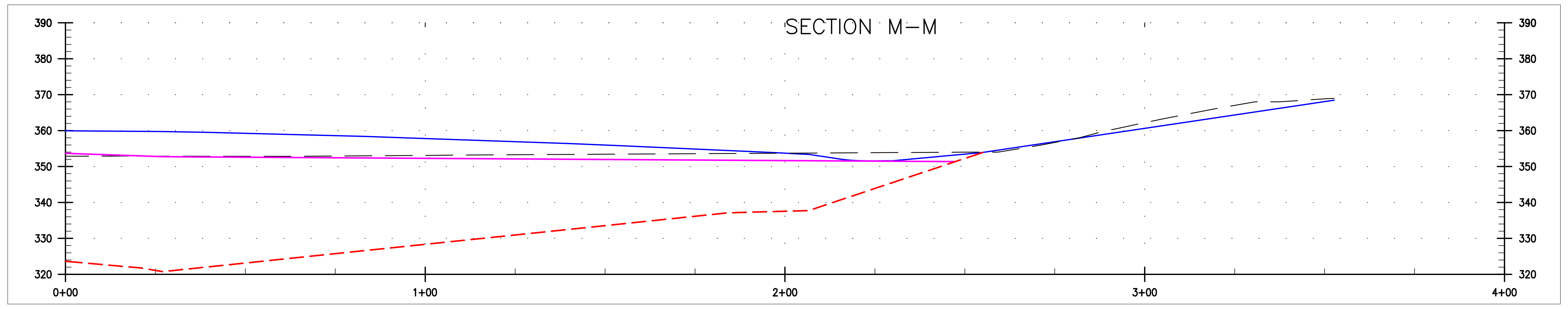
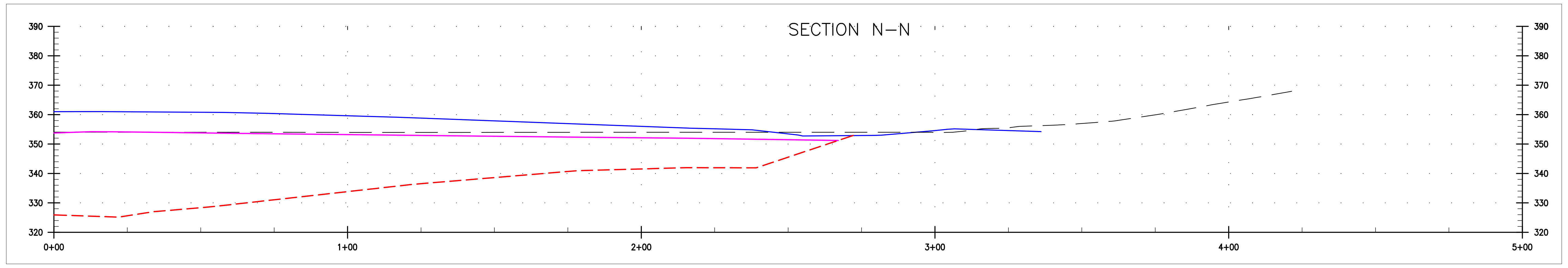

SECTION L–L


SECTION M–M


SECTION N–N

LEGEND

- - - - APPROXIMATE BOTTOM OF CCR
——— APPROXIMATE TOP OF CCR
——— ASBUILT AP3 LANDFILL
— — — PRE–EXISTING TOPO

0 30' 60' 90'
SCALE = 1" : 30' HORIZ & VERT

CREATED:12/22/2017 LAST SAVED:10/29/2018 BY:JASHWORT PLOT DATE: 11/15/2018

JACOBS
10 TENTH STREET NW
SUITE 1400
ATLANTA, GEORGIA 30309

FORMER PLANT ARKWRIGHT
GEORGIA POWER COMPANY
FORMER PLANT ARKWRIGHT
BIBB COUNTY, GEORGIA

REV	DATE	REVISION DESCRIPTION

THIS LINE IS ONE INCH LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

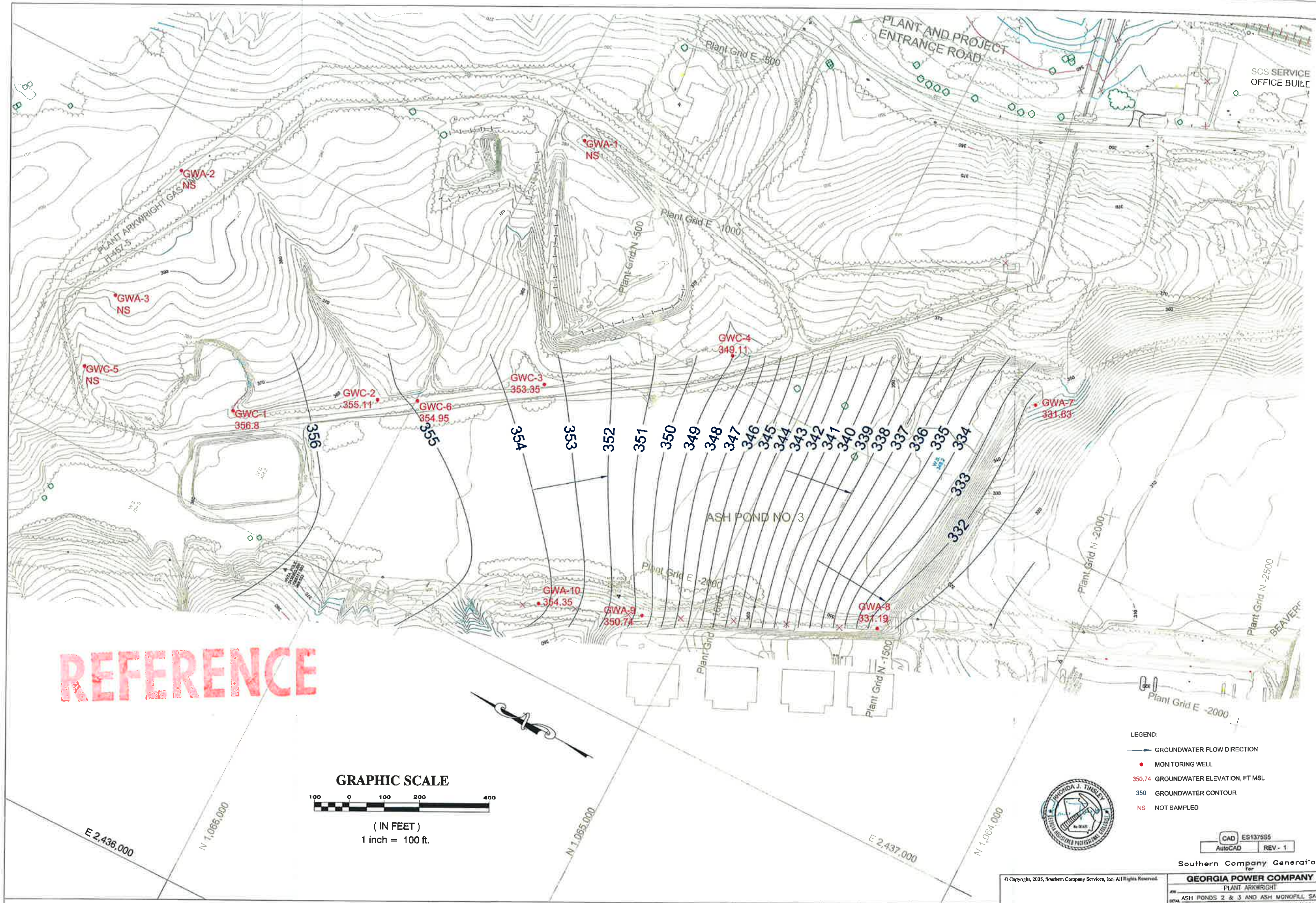
PROJECT NO: 35DK9201
DATE: NOVEMBER 2018

DISC. LEAD:	DESIGNER:	CHECKER:
JLL	JGA	FMP

SHEET TITLE
CIVIL

AP3 LANDFILL
SOIL STABILITY SECTION
CROSS SECTIONS

SKETCH #
FIGURE AP3-3



REFERENCE

LEGEND:

- ➤ GROUNDWATER FLOW DIRECTION
- ● MONITORING WELL
- 350.74 GROUNDWATER ELEVATION, FT MSL
- 350 GROUNDWATER CONTOUR
- NS NOT SAMPLED

RHONDA J. TINSLEY

CAD ES1375S5
AutoCAD REV - 1

Southern Company Generation
for

REV.	DATE:	REV.	DATE:	REV. 1	DATE: 11/17/05
				RE-ISSUED FOR SAR	

DRAWN KDB CHECKED GHM DESIGNED RJT
APPROVED ______ DATE ______
APPROVED ______ DATE ______

GEORGIA POWER COMPANY
PLANT ARKWRIGHT
ASH PONDS 2 & 3 AND ASH MONOFILL SAR
POTENTIOMETRIC SURFACE MAP FOR 2/19/2004
SCALE 1" = 100'
SHEET 1 OF 1 SHEETS
SUPERSEDES
ES1375S5
REV 1

Summary of CPT Probe Results-October 2017
AP3 - Plant Arkwright

REFERENCE

CPT Probe No.	Latitude	Longtitude	Ground Elev. (ft-msl)	Top of Ash Depth (ft bgs)	Top of Ash Elev. (ft-msl)	Bottom of Ash Depth (ft bgs)	Bottom of Ash Elev (ft-msl)	Bottom of Probe Depth (ft bgs)	Bottom of Probe Elev (ft-msl)	Approx GWT Elev (ft-msl)	Approx GWT Depth (ft bgs)	Comment
AP3 CPT-01	32°55'52.27"N	83°42'33.56"W	359.65	4.0	355.7	26.0	333.7	34.4	325.25	351	8.65	
AP3 CPT-02	32°55'50.16"N	83°42'32.54"W	358.30	5.0	353.3	16.5	341.8	24.2	334.10	350	8.30	
AP3 CPT-03	32°55'46.95"N	83°42'31.02"W	357.39	5.0	352.4	21.0	336.4	24.6	332.79	348	9.39	
AP3 CPT-04	32°55'44.38"N	83°42'29.96"W	355.97	4.0	352.0	14.0	342.0	25.9	330.07	347	8.97	
AP3 CPT-05	32°55'41.95"N	83°42'28.17"W	354.22	2.5	351.7	17.0	337.2	21.6	332.62	345	9.22	
AP3 CPT-06	32°55'39.06"N	83°42'27.47"W	352.02	3.0	349.0	19.0	333.0	46.5	305.52	343	9.02	
AP3 CPT-07	32°55'36.92"N	83°42'26.40"W	351.26	2.5	348.8	17.0	334.3	38.2	313.06	339	12.26	
AP3 CPT-08	32°55'34.90"N	83°42'25.55"W	349.73	2.0	347.7	26.0	323.7	52.1	297.63	333	16.73	
AP3 CPT-09	32°55'51.57"N	83°42'31.60"W	361.22	5.0	356.2	21.0	340.2	41.7	319.52	351	10.22	
AP3 CPT-09SL			361.22	5.0	356.2	21.0	340.2	41.5	319.72	351	10.22	This is a slow push, offset from CPT-09. Use Results from
AP3 CPT-10	32°55'49.32"N	83°42'29.85"W	360.68	3.0	357.7	10.0	350.7	32.5	328.18	349	11.68	
AP3 CPT-11	32°55'46.80"N	83°42'28.31"W	360.80	5.0	355.8	23.0	337.8	31.5	329.30	348	12.80	
AP3 CPT-12	32°55'45.24"N	83°42'27.93"W	361.16	7.0	354.2	36.0	325.2	45.8	315.36	347	14.16	
AP3 CPT-13	32°55'44.50"N	83°42'26.72"W	360.27	7.0	353.3	27.0	333.3	59.3	300.97	346	14.27	
AP3 CPT-14	32°55'42.67"N	83°42'26.49"W	359.75	7.0	352.8	39.0	320.8	63.0	296.75	345	14.75	
AP3 CPT-15	32°55'42.18"N	83°42'25.25"W	360.10	4.0	356.1	28.0	332.1	40.9	319.20	345	15.10	
AP3 CPT-16	32°55'40.21"N	83°42'25.11"W	359.02	6.0	353.0	35.0	324.0	44.4	314.62	344	15.02	
AP3 CPT-17A	32°55'39.77"N	83°42'23.68"W	360.00	5.0	355.0	42.0	318.0	53.4	306.60	343	17.00	offset from CPT-17, which is not being used.
AP3 CPT-18A	32°55'37.87"N	83°42'23.89"W	358.27	9.0	349.3	42.0	316.3	66.1	292.17	339	19.27	offset from CPT-18, which is not being used.
AP3 CPT-19	32°55'35.95"N	83°42'22.91"W	360.10	12.0	348.1	40.0	320.1	66.6	293.50	334	26.10	
AP3 CPT-20	32°55'36.69"N	83°42'21.49"W	359.00	11.0	348.0	31.0	328.0	51.2	307.80	335	24.00	
AP3 CPT-21	32°55'33.15"N	83°42'22.52"W	350.66	5.0	345.7	43.0	307.7	56.6	294.06	328	22.66	
AP3 CPT-22	32°55'34.46"N	83°42'21.01"W	359.21	12.0	347.2	36.0	323.2	67.1	292.11	330	29.21	
AP3 CPT-23	32°55'52.63"N	83°42'30.31"W	359.05	3.0	356.1	10.0	349.1	25.2	333.85	351	8.05	
AP3 CPT-24	32°55'50.14"N	83°42'28.61"W	357.57	3.0	354.6	14.0	343.6	29.2	328.37	350	7.57	
AP3 CPT-25	32°55'47.88"N	83°42'27.04"W	354.70	3.0	351.7	9.0	345.7	17.5	337.20	348	6.70	
AP3 CPT-26A	32°55'45.58"N	83°42'25.39"W	353.58	6.0	347.6	26.0	327.6	58.3	295.28	347	6.58	offset from CPT-26, which is not being used.
AP3 CPT-27	32°55'43.27"N	83°42'23.67"W	352.52	2.0	350.5	13.0	339.5	40.7	311.82	345	7.52	
AP3 CPT-28	32°55'40.74"N	83°42'21.87"W	350.85	2.0	348.9	9.0	341.9	43.4	307.45	344	6.85	
AP3 CPT-29	32°55'37.15"N	83°42'20.36"W	355.71	6.0	349.7	29.0	326.7	52.5	303.21	336	19.71	
AP3 CPT-30	32°55'37.76"N	83°42'18.80"W	348.62	2.0	346.6	14.0	334.6	27.8	320.82	338	10.62	
AP3 CPT-31	32°55'35.82"N	83°42'19.39"W	356.63	4.0	352.6	27.0	329.6	48.9	307.73	333	23.63	
AP3 CPT-32	32°55'34.60"N	83°42'19.35"W	357.21	11.0	346.2	33.0	324.2	55.4	301.81	330	27.21	
AP3 CPT-33	32°55'34.90"N	83°42'17.22"W	349.28	4.0	345.3	10.0	339.3	39.3	309.98	331	18.28	
AP3 CPT-34	32°55'33.16"N	83°42'17.82"W	347.28	2.0	345.3	11.0	336.3	26.5	320.78	327	20.28	

c_v, and therefore k_h and k_v, can be assumed to be 5 to 10 and perhaps more. These data indicate the strong anisotropy of fly ash in a pond.

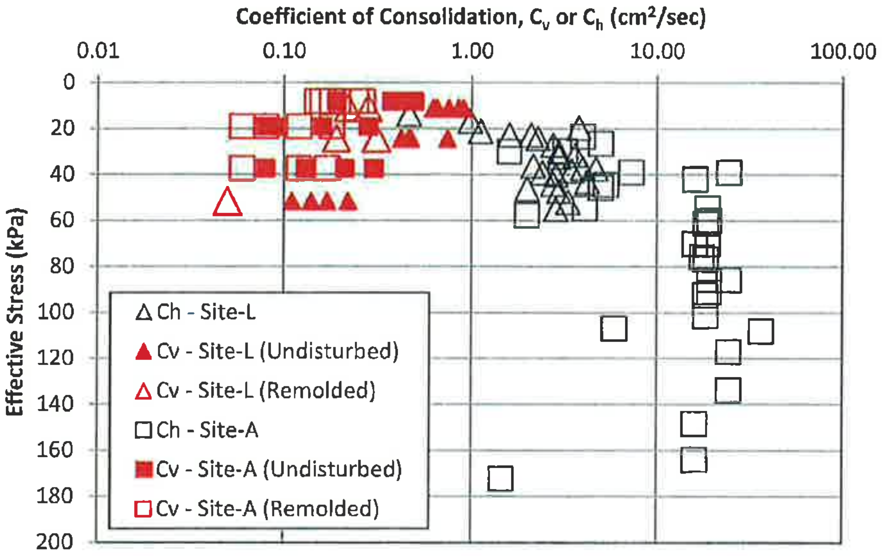


Figure 4-26
Comparison of c_h and c_v for fly ash

4.6 Drained Shear Strength of Fly Ash

4.6.1 Overview

Mayne (2007) describes a method developed by the Norwegian University of Science and Technology (NTNU) to assess an effective stress friction angle for all soil types (see Senneset et al., 1989 for a detailed description of the method). The method can be used for soils where the penetration of the CPT occurs under drained or undrained conditions.

Herein, the method was applied to ponded fly ash and it was assumed that the effective stress cohesion intercept of fly ash is zero. The method is provided in Figure 4-27 and can be expressed (to allow for "line by line" estimates using processed CPT data in a spreadsheet) by the following equation:

$$\varphi' = 29.5° \times B_q^{0.121}\left[0.256 + 0.336\,B_q + logQ_t\right] \qquad \textit{Eq. 4-20}$$

where

$$B_q = \frac{u_2 - u_o}{q_t - \sigma_{vo}} \qquad \textit{Eq. 4-21}$$

$$Q_t = \frac{q_t - \sigma_{vo}}{\sigma'_{vo}} \qquad \textit{Eq. 4-22}$$

REFERENCE

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG
GEOLOGICAL SERVICES

GWA - 7
Sheet 1 of 2

SITE Plant Arkwright, Pond #3 SAR HOLE DEPTH 45 SURF.ELEV. 349.003
LOCATION Southeastern End of Pond COORDINATES N 1064410.279 E 2438355.107
ANGLE 90 BEARING CONTRACTOR SCS DRILL NO. CME 550
OVERBURDEN DEPTH NO. PENT. TESTS 8 NO. U.D. SAMPLES 2
CASING SIZE LENGTH CORE SIZE TOTAL % REC.
WATER TABLE DEPTH 19.3 ELEV. TIME AFTER COMP. TOB DATE TAKEN 12/11/2003
TYPE GROUT QUANTITY MIX DRILLING START DATE 12/11/2003
DRILLER Brad Filipovich RECORDER Stacy Spraybery APPROVED DRILLING COMP. DATE 12/11/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Pen. Test From To	Blows	N	Sample No.	Fluid Chg. %	Rec. %	ROD
	0	349.0								
	1		Reddish brown, silty CLAY (CL) FILL with wood and rock fragments	0-1.5	1-3-4	7	S-1			
	2									
	3									
	4									
	5									
	6		Hit hard object at 5.5'. Could not push tube deeper.	5.0-7.5	TUBE					
	7									
	8	341.0								
	9		Reddish brown, clayey SILT(ML/CL) with SAPROLITE							
	10									
	11			10-11.5	2-4-4	8	S-2			
	12									
	13									
	14									
	15									
	16		Becoming Sandier with depth	15-16.5	2-2-3	5	S-3			
	17									
	18	331.0								
	19		Tan to white, elastic SILT (MH) with SAPROLITE							
	20									
	21		K=1.0E-5 cm/sec	20-22	TUBE					
	22									
	23									
	24									

Form GS9901 9/9/99

REFERENCE

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG
GEOLOGICAL SERVICES

GWA - 7
Sheet 2 of 2

SITE **Plant Arkwright, Pond #3 SAR** TOTAL DEPTH **46.5** SURF.ELEV. **349.003**

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Pen. Test From To	Blows	N	Sample No.	Fluid Chg. %	Rec. %	RQD
	25		Free Water in 25 foot sample							
	26			25-26.5	3-4-5	9	S-4			
	27									
	28									
	29									
	30	319.0								
	31		Tan to white, sandy SILT (ML) with MICA and SAPROLITE	30-31.5	3-5-13	18	S-5			
	32									
	33									
	34									
	35									
	36			35-36.5	4-8-9	17	S-6			
	37	312.0								
	38		Tan to white, silty SAND (SM) with SAPROLITE							
	39									
	40	309.0								
	41		Reddish brown to brown, silty SAND (SM) with SAPROLITE	40-40.5	9-22-23	45	S-7			
	42									
	43									
	44		Well screened from 34.8 feet to 44.8 feet below ground surface							
	45									
	46	302.5		45-46.5	12-23-32	55	S-8			
	47		Boring Terminated at 46.5 Feet							
	48									
	49									
	50									
	51									
	52									
	53									
	54									
	55									
	56									

Form GS9902 4/24/2000

REFERENCE

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG
GEOLOGICAL SERVICES

GWA - 8
Sheet 1 of 2

SITE Plant Arkwright, Pond #3 SAR
HOLE DEPTH 40
SURF.ELEV. 352.169
LOCATION Southwestern Edge of Dike
COORDINATES N 1064521.654
E 2437572.442
ANGLE 90
BEARING
CONTRACTOR SCS
DRILL NO. CME 550
OVERBURDEN DEPTH
NO. PENT. TESTS 7
NO. U.D. SAMPLES 2
CASING SIZE
LENGTH
CORE SIZE
TOTAL % REC.
WATER TABLE DEPTH 23 / 21.1
ELEV.
TIME AFTER COMP. TOB / 24 hours
DATE TAKEN 12/10-11/2003
TYPE GROUT
QUANTITY
MIX
DRILLING START DATE 12/10/2003
DRILLER Brad Filipovich
RECORDER Stacy Spraybery
APPROVED
DRILLING COMP. DATE 12/10/2003

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Pen. Test From To	Blows	N	Sample No.	Fluid Chg. %	Rec. %	RQD
	0	352.2								
	1		Reddish brown, silty CLAY (CL/ML) with MICA FILL	0-1.5	3-3-8	11	S-1			
	2									
	3									
	4									
	5									
	6			5-6.5	4-5-7	12	S-2			
	7									
	8									
	9	343.2								
	10		Reddish brown, clayey SILT (ML/CL) FILL							
	11			10-11.5	2-3-4	7	S-3			
	12									
	13	339.2								
	14		Tan to orange SILT (ML) with SAPROLITE; non-plastic							
	15									
	16		K=6.4E-5 cm/sec	15-17	TUBE					
	17									
	18									
	19									
	20	332.2								
	21		Tan to orange to white, damp to wet, silty SAND (SM) with SAPROLITE	20-21.5	2-4-3	7	S-4			
	22									
	23									
	24									

Form GS9901 9/9/99

REFERENCE

SOUTHERN COMPANY
Energy to Serve Your World

DRILLING LOG
GEOLOGICAL SERVICES

GWA - 8
Sheet 2 of 2

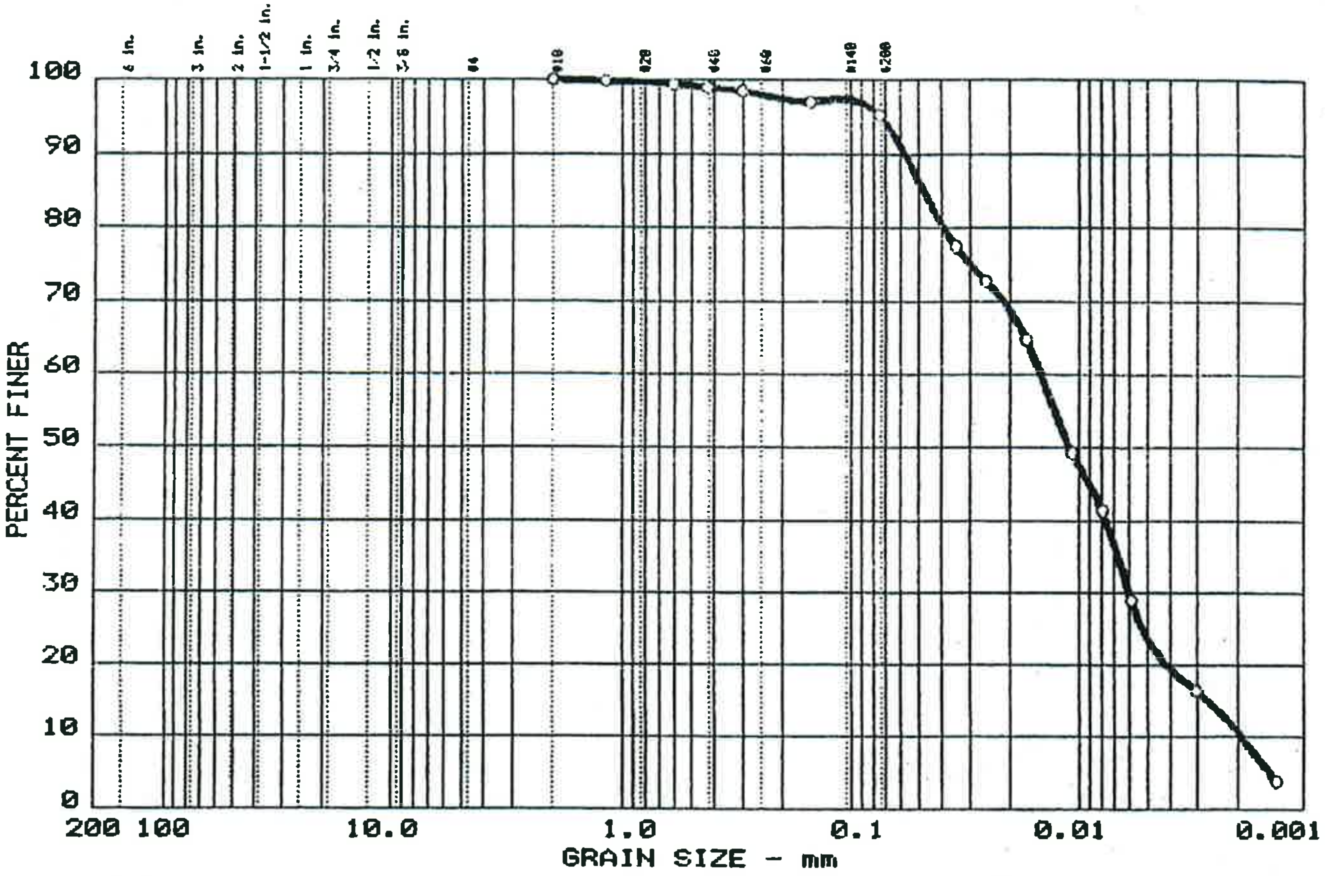
SITE Plant Arkwright, Pond #3 SAR
TOTAL DEPTH 40.5
SURF.ELEV. 352.169

Graphic Log	Depth	Elev.	Material Description, Classification and Remarks	Standard Pen. Test			Sample No.	Fluid Chg. %	Rec. %	ROD
				From To	Blows	N				
	25									
	26		Brown, wet, silty SAND (SM) with MICA; non-plastic	25-27	TUBE					
	27		K=6.4E-5 cm/sec							
	28									
	29									
	30									
	31			30-31.5	2-6-8	14	S-5			
	32									
	33		Well screened from 29.6 feet to 39.6 feet below ground surface							
	34									
	35									
	36			35-36.5	3-5-8	13	S-6			
	37									
	38									
	39									
	40									
	41	311.7	Boring Termindated at 40.5 Feet	40-40.5	6-11-18	29	S-7			
	42									
	43									
	44									
	45									
	46									
	47									
	48									
	49									
	50									
	51									
	52									
	53									
	54									
	55									
	56									

Form GS9902 4/24/2000

REFERENCE

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	0.0	4.8	71.7	23.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	67	27	0.0473	0.0146	0.0110	0.0061	0.0027	0.0019	1.31	7.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ LIGHT YELLOWISH BROWN ELASTIC SILT	MH	A-7-6(33.7)

Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR
○ Location: PLANT ARKWRIGHT

Date: 02/11/2004

Remarks:
SAMPLE TYPE: UD
BORING NO. GWA-7
DEPTH: 20.0-22.0
PERMEABILITY- 1.0 X 10-5

GRAIN SIZE DISTRIBUTION TEST REPORT
SOUTHERN COMPANY SERVICES

Lab No.: 1

REFERENCE

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 1

Date: 02/11/2004
Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR

Sample Data

Location of Sample: PLANT ARKWRIGHT
Sample Description: LIGHT YELLOWISH BROWN ELASTIC SILT
USCS Class: MH
Liquid limit: 67
AASHTO Class: A-7-6(33.7)
Plasticity index: 27

Notes

Remarks: SAMPLE TYPE: UD BORING NO. GWA-7
DEPTH: 20.0-22.0 PERMEABILITY- 1.0 X 10-5
Lab No.: 1

Mechanical Analysis Data

	Initial
Dry sample and tare=	288.60
Tare =	0.00
Dry sample weight =	288.60

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.63 Tare = 0 Sample weight = 62.63
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 16	0.10	99.8
# 30	0.40	99.4
# 40	0.70	98.9
# 50	1.00	98.4
# 100	1.90	97.0
# 200	3.00	95.2

Hydrometer Analysis Data

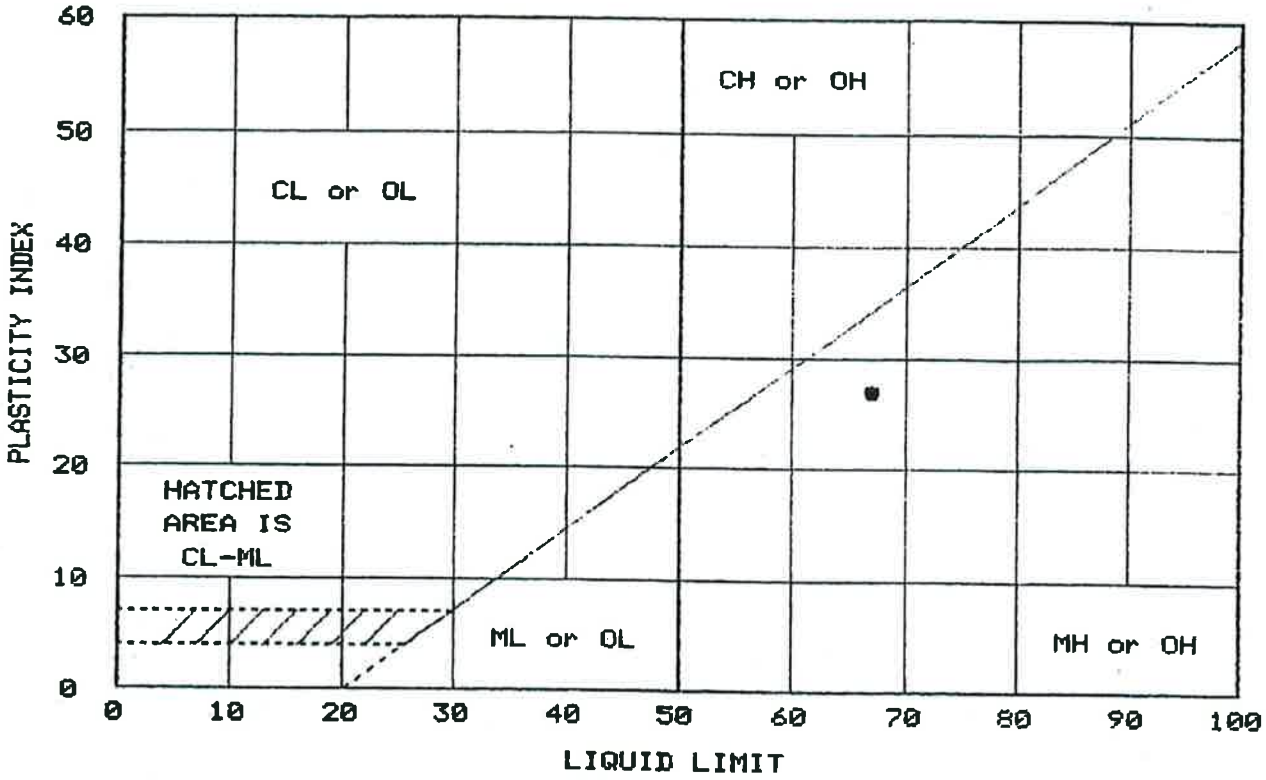
Separation sieve is number 10
Percent -# 10 based on complete sample= 100.0
Weight of hydrometer sample: 62.63
Calculated biased weight= 62.63
Automatic temperature correction
Composite correction at 20 deg C =-8.5
Meniscus correction only= 0
Specific gravity of solids= 2.74
Specific gravity correction factor= 0.980
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1.0	20.0	58.0	49.5	0.0133	58.0	6.8	0.0346	77.4

```
 Elapsed     Temp,  Actual    Corrected  K         Rm     Eff.    Diameter  Percent
 time, min   deg C  reading   reading                     depth   mm        finer
     5.0     20.0   50.0      41.5       0.0133    50.0    8.1    0.0169    64.9
    15.0     20.0   40.0      31.5       0.0133    40.0    9.7    0.0107    49.2
    30.0     20.0   35.0      26.5       0.0133    35.0   10.6    0.0079    41.4
    60.0     20.0   27.0      18.5       0.0133    27.0   11.9    0.0059    28.9
   250.0     20.0   19.0      10.5       0.0133    19.0   13.2    0.0031    16.4
  1440.0     20.0   11.0       2.5       0.0133    11.0   14.5    0.0013     3.9
-------------------------------------------------------------------------------------
                          Fractional Components
-------------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 3 in. =  0.0     % GRAVEL =  0.0    % SAND =  4.8
% SILT = 71.7     % CLAY = 23.5

D85=    0.05  D60=    0.015  D50=    0.011
D30=    0.0061  D15=    0.00271  D10=  0.00192
Cc  =   1.3137  Cu  =    7.6120
```

REFERENCE

LIQUID AND PLASTIC LIMITS TEST REPORT



Location + Description	LL	PL	PI	-200	ASTM D 2487-90
● ARKWRIGHT LAB# 1	67	40	27		

Project No.: 0000
Project: ARKWRIGHT ASH POND

Client: SOUTHERN COMPANY SERVICES
Location: GPC PLANT ARKWRIGHT

Date: 02/10/04

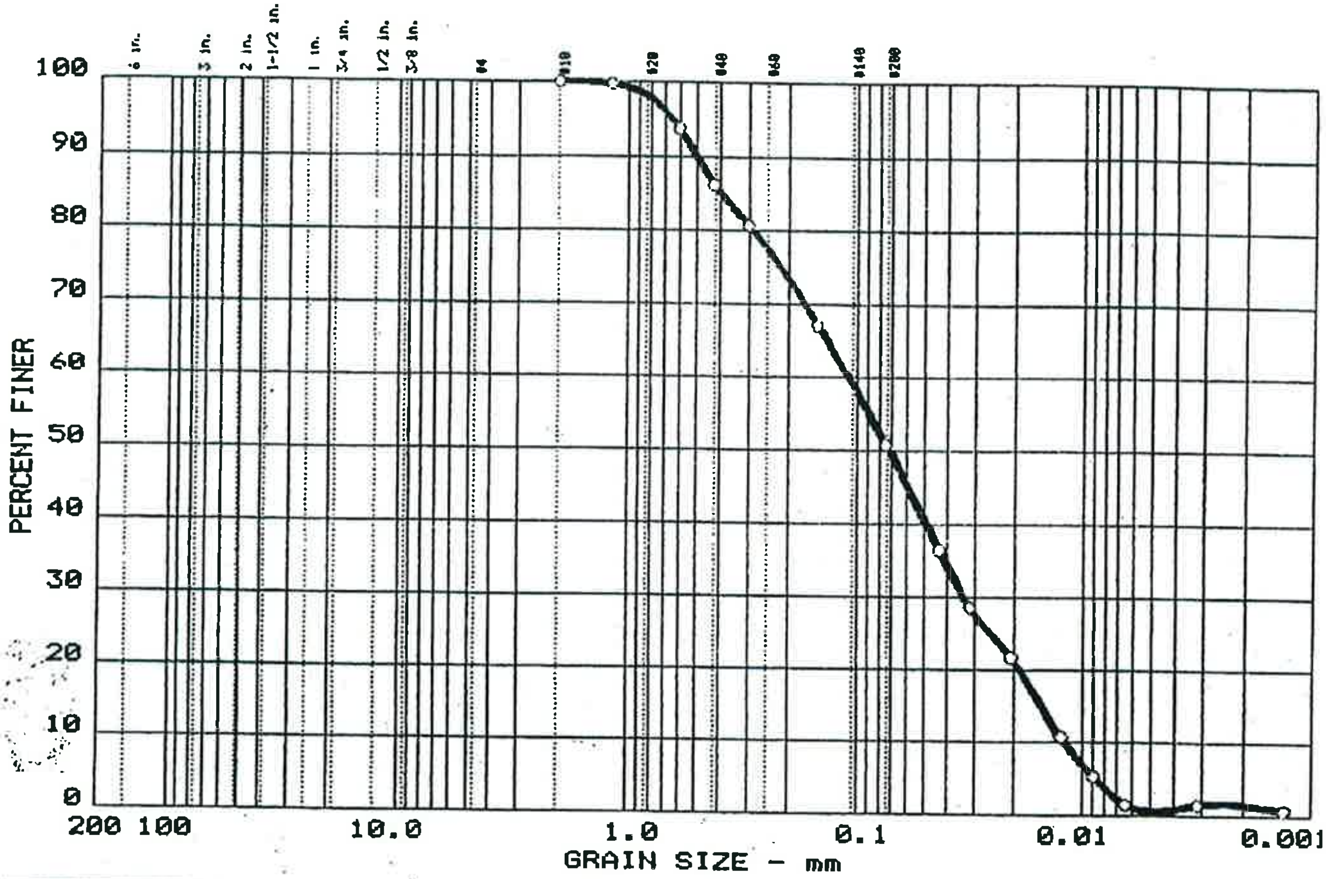
Remarks:
SAMPLE TYPE: UD
DEPTH: 20.0-22.0
BORING: GWA-7

LIQUID AND PLASTIC LIMITS TEST REPORT
SOUTHERN COMPANY SERVICES

Fig. No. 1

REFERENCE

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	0.0	0.0	49.2	50.2	0.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NP	NP	0.398	0.110	0.0724	0.0335	0.0150	0.0119	0.86	9.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ REDDISH BROWN SANDY SILT	ML	A-4(0.0)

Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR
○ Location: PLANT ARKWRIGHT

Date: 02/11/2004

Remarks:
SAMPLE TYPE: UD
BORING NO. GWA-8
DEPTH: 15.0-17.0
PERMEABILITY- 6.4 X 10-5

GRAIN SIZE DISTRIBUTION TEST REPORT
SOUTHERN COMPANY SERVICES

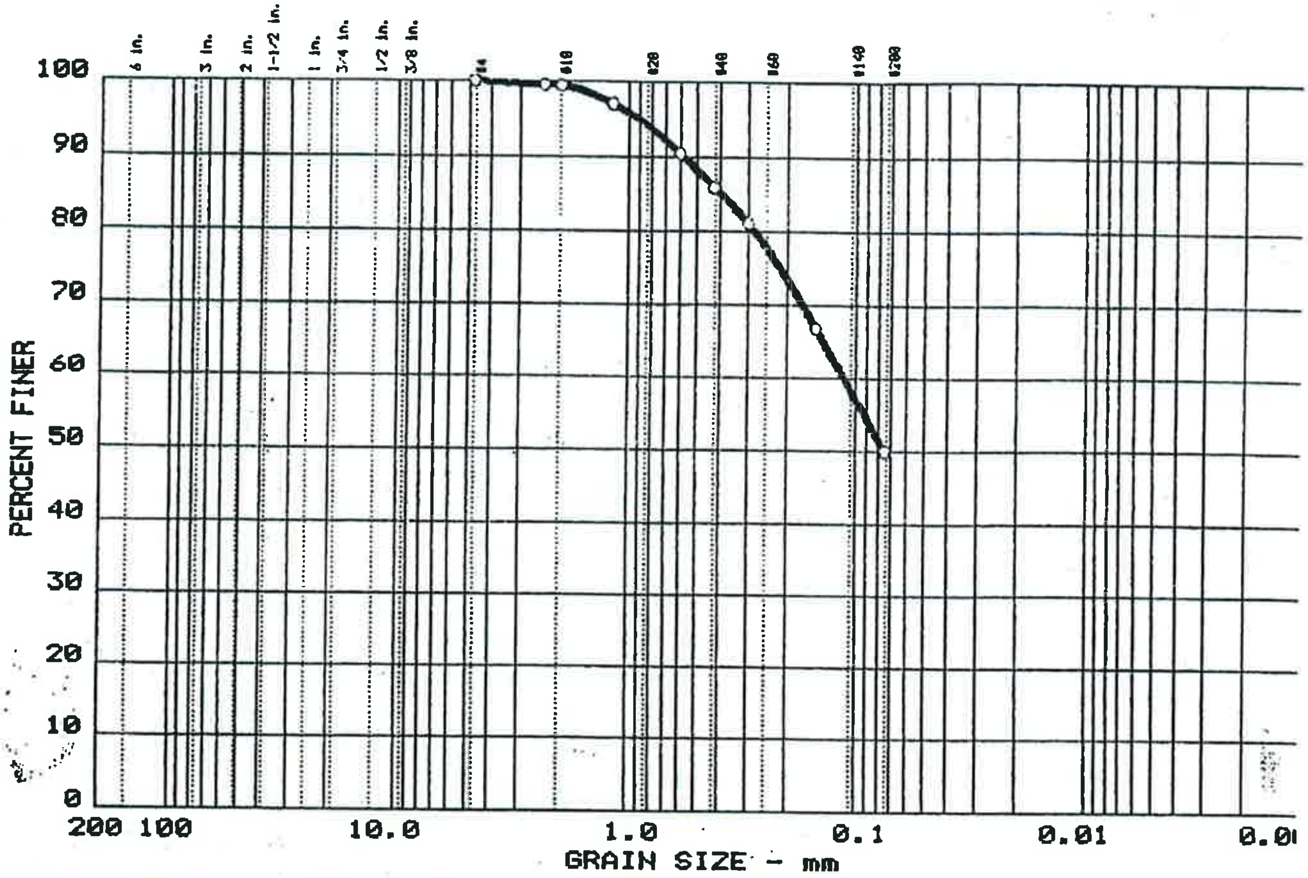
Lab No.: 2

```
================================================================================
                     GRAIN SIZE DISTRIBUTION TEST DATA              Test No.: 2
--------------------------------------------------------------------------------
Date: 02/11/2004
Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR
================================================================================

--------------------------------------------------------------------------------
                                Sample Data
--------------------------------------------------------------------------------
Location of Sample: PLANT ARKWRIGHT
Sample Description: REDDISH BROWN SANDY SILT
USCS Class: ML                          Liquid limit: NP
AASHTO Class: A-4(0.0)                  Plasticity index: NP
--------------------------------------------------------------------------------
                                   Notes
--------------------------------------------------------------------------------
Remarks: SAMPLE TYPE: UD  BORING NO. GWA-8
         DEPTH: 15.0-17.0  PERMEABILITY- 6.4 X 10-5
Lab No.: 2
--------------------------------------------------------------------------------
                          Mechanical Analysis Data
--------------------------------------------------------------------------------
                      Initial
Dry sample and tare=   317.50
Tare               =     0.00
Dry sample weight  =   317.50
Sample split on number 10 sieve
Split sample data:
  Sample and tare = 62.04  Tare =  0  Sample weight = 62.04
  Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0
  Sieve          Cumul. Wt.   Percent
                 retained     finer
  # 10              0.00      100.0
  # 16              0.20       99.7
  # 30              3.90       93.7
  # 40              8.60       86.1
  # 50             12.00       80.7
  # 100            20.40       67.1
  # 200            30.50       50.8
--------------------------------------------------------------------------------
                          Hydrometer Analysis Data
--------------------------------------------------------------------------------
Separation sieve is number 10
Percent -# 10 based on complete sample= 100.0
Weight of hydrometer sample: 62.04
Calculated biased weight=  62.04
Automatic temperature correction
  Composite correction at 20 deg C =-8.5
Meniscus correction only= 0
Specific gravity of solids= 2.83
Specific gravity correction factor= 0.963
Hydrometer type: 152H   Effective depth L= 16.294964 - 0.164 x Rm

  Elapsed     Temp,  Actual     Corrected  K          Rm     Eff.    Diameter    Percent
  time, min   deg C  reading    reading                      depth   mm          finer
     1.0      20.0   32.0       23.5       0.0130     32.0   11.0    0.0431      36.4
```

```
Elapsed      Temp,  Actual     Corrected    K           Rm     Eff.    Diameter   Percent
time, min    deg C  reading    reading                         depth   mm         finer
   5.0       20.0   22.5       14.0         0.0130      22.5   12.6    0.0206     21.7
  15.0       20.0   15.5        7.0         0.0130      15.5   13.8    0.0124     10.8
  30.0       20.0   12.0        3.5         0.0130      12.0   14.3    0.0090      5.4
  60.0       20.0    9.5        1.0         0.0130       9.5   14.7    0.0064      1.5
 250.0       20.0    9.5        1.0         0.0130       9.5   14.7    0.0031      1.5
1440.0       20.0    9.0        0.5         0.0130       9.0   14.8    0.0013      0.7
----------------------------------------------------------------------------------------
                             Fractional Components
----------------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 3 in. =  0.0     % GRAVEL =  0.0    % SAND = 49.2
% SILT = 50.2    % CLAY =  0.6

D85=    0.40   D60=    0.110   D50=    0.072
D30=    0.0335   D15=    0.01496   D10=  0.01189
Cc =    0.8610   Cu =    7.2257
```

REFERENCE

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	0.0	0.0	50.0	50.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NP	NP	0.398	0.112						

MATERIAL DESCRIPTION	USCS	AASHTO
○ LIGHT REDDISH BROWN SILTY SAND	SM	A-4(0.0)

Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR
○ Location: PLANT ARKWRIGHT

Date: 02/11/2004

Remarks:
SAMPLE TYPE: UD
BORING NO. GWA-8
DEPTH: 25.0-27.0
PERMEABILITY- 6.4 X 10

GRAIN SIZE DISTRIBUTION TEST REPORT
SOUTHERN COMPANY SERVICES

Lab No.: 3

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 3

Date: 02/11/2004
Project No.: 0000
Project: GPC- PLANT ARKWRIGHT ASH POND 3 SAR

Sample Data

Location of Sample: PLANT ARKWRIGHT
Sample Description: LIGHT REDDISH BROWN SILTY SAND
USCS Class: SM
Liquid limit: NP
AASHTO Class: A-4(0.0)
Plasticity index: NP

Notes

Remarks: SAMPLE TYPE: UD BORING NO. GWA-8
DEPTH: 25.0-27.0 PERMEABILITY- 6.4 X 10-5
Lab No.: 3

Mechanical Analysis Data

	Initial
Dry sample and tare=	417.20
Tare =	0.00
Dry sample weight =	417.20

Sample split on number 10 sieve
Split sample data:
Sample and tare = 71.2 Tare = 0 Sample weight = 71.2
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
# 4	0.00	100.0
# 8	2.10	99.5
# 10	2.60	99.4
# 16	1.70	97.0
# 30	6.40	90.4
# 40	9.70	85.8
# 50	13.10	81.1
# 100	23.30	66.9
# 200	35.40	50.0

REFERENCE

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 50.0
% FINES = 50.0

D85= 0.40 D60= 0.112

Appendix E. **Monofill Global Stability Analyses**

Purpose:

- Perform global stability analyses of the existing Monofill

References:

- AASHTO LRFD Bridge Design Specifications, 2014
- Fugro USA Land Inc. Report for Piezocone Penetration Testing and Related Services - November 2017
- Electric Power Research Institute - Engineering Correlations for Geotechnical Parameters for Ponded Fly Ash 2014 Technical Report
- Southern Company Generation, Plant Arkwright Ash Ponds 2 and 3 and Ash Monofill Site Acceptability Report Revision 1 - November, 2005
- Southern Company Services Inc., Plant Arkwright Private Industrial Landfill - Geologic Sections (rev. 1), Drawing No. GPC-PA-13 - March 1992.

Assumptions:

Subsurface Conditions:

CCR strength properties are based upon lab results in published literature and consolidated-undrained triaxial testing for remolded CCR samples with 90% to 95% compaction at +2% to +4% moisture. Samples for triaxial testing were collected from AP1 Landfill and AP3 Landfill.

Soil Profile and Soil Parameters

Soil	PI	Unit Weight	Drained Strength		Undrained Strength	
			c'	Φ'	c	Φ'
	(%)	(pcf)	(psf)	(deg.)	(psf)	(deg.)
In-Situ CCR	-	90	0	28	0	28
Sandy Clay (CL)	20	115	100	28	1,500	0
Compacted Silty Sand	-	120	0	34	0	34

Seismic Parameters:

Seismic Site Classification:

The site was determined as Class E based on our understanding of local geology and the presence of CCR fill.

The seismic parameters:

Using USGS Seismic Design Maps Tool, the seismic parameters are determined for Site Class E at: 32.92765°N, 83.70681°W

PGA =	0.052	g	A_s =	0.131	g
S_s =	0.122	g	S_{Ds}=	0.306	g
S_1 =	0.050	g	S_{D1}=	0.174	g

For external and global stability, use height adjusted horizontal peak acceleration

k_{av} = 0.065 g (0.5 x As)

Analysis:

Global Stability

Global stability of the existing Monofill was evaluated under short term and long term loading cases using software SLOPE/W Version 2012 developed by GEO-SLOPE International Ltd. The factor of safety (FOS) of the critical potential failure surface was obtained for each loading case.

The global stability was analyzed at the critical slope geometry.
The groundwater surface was surface was modeled using information from nearby monitoring wells.

Load Condition	Calculated Factor of Safety
Long Term, Drained, Effective Stress	1.59
Short Term, Undrained, Total Stress	1.59
Seismic, Undrained, Total Stress	1.29

Note: Where failure surface passes through only compacted silty sand and in-situ CCR, FOS is the same for short term and long term conditions due to conservative selection of residual shear strengths (friction angles).

Conclusions:

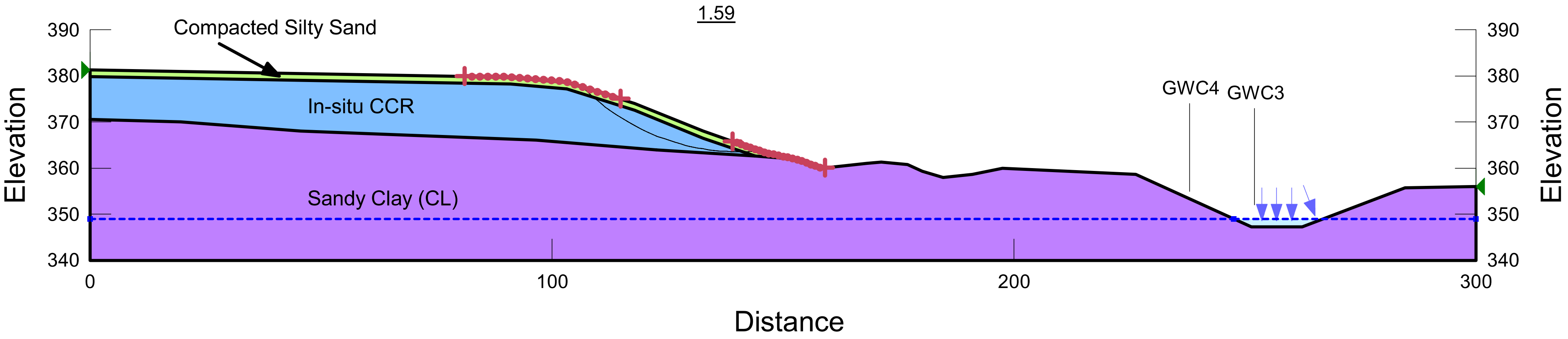
Global stability results indicate that the existing Monofill exhibits acceptable calculated factors of safety.

Former Plant Arkwright
AP3 Landfill & Monofill

Monofill Global Stability
Spencer's Method

Short Term Analysis
Total Stress Parameters

By:KP	10/15/18
CKD: SR	10/15/18
Rev.: KP	10/22/18
CKD:SR	10/22/18



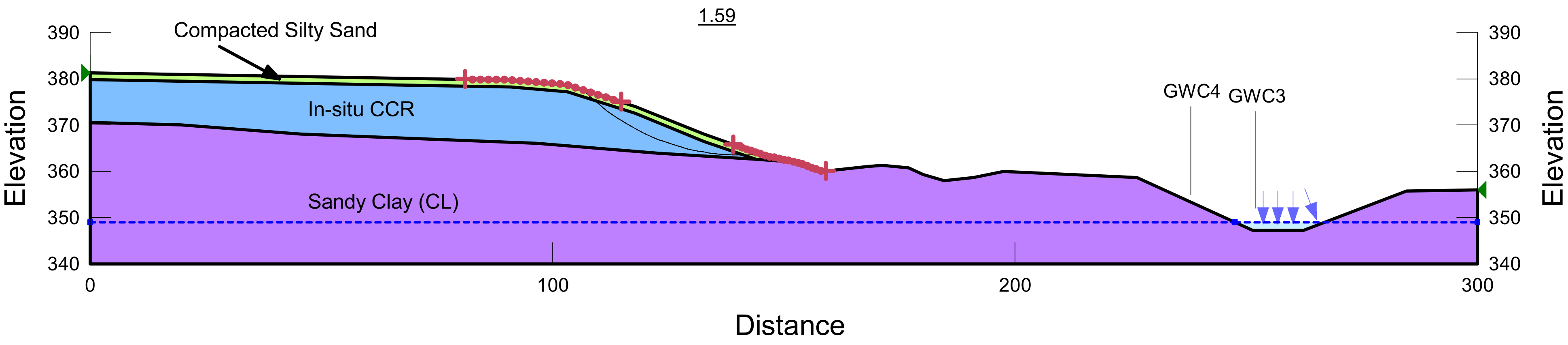
Name: In-situ CCR Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Piezometric Line: 1
Name: Compacted Silty Sand Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 34 ° Piezometric Line: 1
Name: Sandy Clay (CL) Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 1,500 psf Phi': 0 ° Piezometric Line: 1

Former Plant Arkwright
AP3 Landfill & Monofill

Monofill Global Stability
Spencer's Method

Long Term Analysis
Effective Stress Parameters

By:KP	10/15/18
CKD: SR	10/15/18
Rev.: KP	10/22/18
CKD:SR	10/22/18



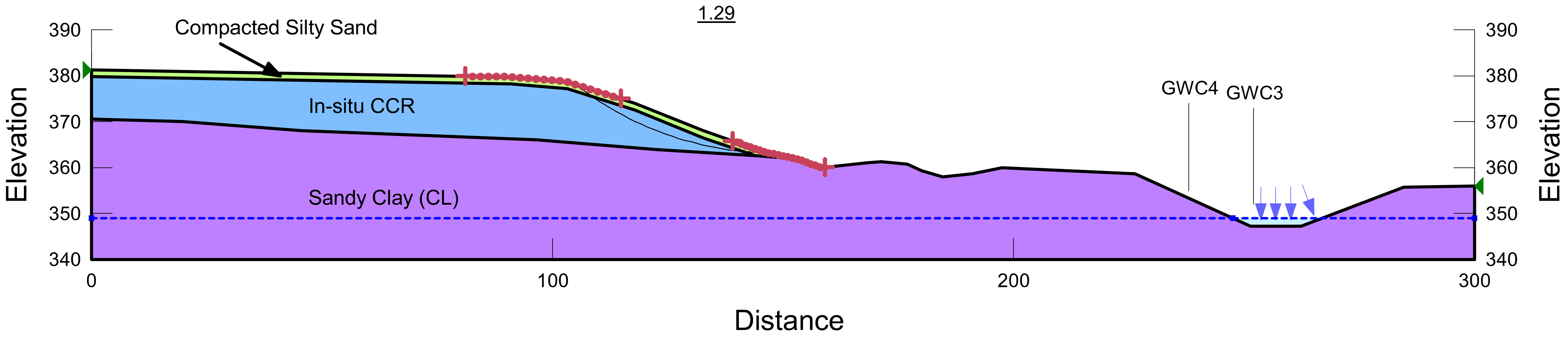
Name: In-situ CCR Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Piezometric Line: 1
Name: Compacted Silty Sand Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 34 ° Piezometric Line: 1
Name: Sandy Clay (CL) Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 100 psf Phi': 28 ° Piezometric Line: 1

Former Plant Arkwright
AP3 Landfill & Monofill

Monofill Global Stability
Spencer's Method

Seismic Analysis
Total Stress Parameters

By:KP	10/15/18
CKD: SR	10/15/18
Rev.:KP	10/22/18
CKD: SR	10/22/18



Name: In-situ CCR Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 28 ° Piezometric Line: 1
Name: Compacted Silty Sand Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 34 ° Piezometric Line: 1
Name: Sandy Clay (CL) Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 1,500 psf Phi': 0 ° Piezometric Line: 1

Horz Seismic Coef.: 0.065

Appendix F. Alternative Final Cover System Demonstration

JACOBS

Project:	Former Plant Arkwright - AP3 Landfill and Monofill	By: JTP	11/2/2018
Job No.:	35DK9203	Ckd: RAK	11/2/2018
Subject:	Alternative Liner Equivalency Calculation	Rvw: MTF	11/2/2018

Purpose:

- Perform calculations of liquid flow rate through a liner to show alternative liner equivalency to the standard liner prescribed by regulations.

References:

- Environmental Protection Agency. (2015). Final Rule - Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities (Vol. 80, No. 74). Federal Register (p. 21474).
- Koerner, R. M. (2012). Designing with Geosynthetics (6th ed., Vol. 2). Revised August 23, 2016. (pp. 780-783).
- Mineral Technologies Inc. (2018). CETCO BENTOMAT® Geosynthetic Ckay Liners. Retrieved from https://www.mineralstech.com/business-segments/performance-materials/cetco/products/environmental-products/gcl/bentomat

Assumptions:

The liquid flow rate comparison shall be made using Equation 1, which is derived from Darcy's Law for gravity flow through porous media.

Equation 1:

$$\frac{Q}{A} = q = k\left(\frac{h}{t} + 1\right)$$

Where,

Q = flow rate (cubic centimeters/second);
A = surface area of the liner (squared centimeters);
q = flow rate per unit area (cubic centimeters/second/squared centimeter);
k = hydraulic conductivity of the liner (centimeters/second);
h = hydraulic head above the liner (centimeters);
t = thickness of the liner (centimeters).

For the alternative geosynthetic clay liner (GCL) to be used as a landfill cover, the following was assumed:

k = 5 x 10^{-9} cm/sec (for the fully hydrated CETCO BENTOMAT® DN GCL)
t = 0.8467 cm (equivalent thickness of 1/3 inch for CETCO BENTOMAT® DN GCL)

For the standard prescribed liner to be used in comparison to the alternative liner, the following was assumed:

k = 1 x 10^{-5} cm/sec (for a compacted soil liner)
t = 45.72 cm (equivalent to an 18-inch layer of compacted soil)

For both flow rate calculations, the following was assumed:

h = 30.48 cm (equivalent to 12 inches of hydraulic head, based on the maximum for design and operation)
A = 10,000 cm^2 (equivalent to a 1 meter x 1 meter area; same for both calculations)

Analysis:

Calculation of liquid flow rate for alternative GCL Liner:

$Q = k\ (h/t + 1)\ A$

$Q = (5 \times 10^{-9}\ \text{cm/sec}) \times [(30.48\ \text{cm} / 0.8467\ \text{cm}) + 1] \times (10{,}000\ \text{cm}^2)$

$Q = 0.00185\ \ \text{cm}^3/\text{sec}$

Calculation of liquid flow rate for standard compacted soil liner:

$Q = k\ (h/t + 1)\ A$

$Q = (10^{-5}\ \text{cm/sec}) \times [(30.48\ \text{cm} / 45.72\ \text{cm}) + 1] \times (10{,}000\ \text{cm}^2)$

$Q = 0.166667\ \ \text{cm}^3/\text{sec}$

Conclusions:

The calculated liquid flow rate through the alternative GCL liner was less than the calculated liquid flow rate through the standard compacted soil liner.

$0.00185\ \text{cm}^3/\text{sec} < 0.166667\ \text{cm}^3/\text{sec}$

Therefore, the alternative geosynthetic clay liner meets the equivalency requirements in comparision to the standard prescribed compacted soil liner and is acceptable for use as a landfill cover.

Appendix G. Monofill Final Cover Thickness

JACOBS

Project: Former Plant Arkwright – Monofill	By: RK	10/19/2018
Job No.: 35DK9203	Ckd: MLH	11/1/2018
Subject: Final Cover Thickness	Rvw: MTF	11/1/2018

Purpose:

To evaluate the soil thickness on the final cover of the Monofill

Procedures:

Ten locations were predetermined for carrying out a hand auger test. The locations are shown in Figure 1. Each test location area was cleared of vegetation before hand augering. Four tests (S1, S2, S3 and S4) were performed on the side slopes of the Monofill. Six tests (T1, T2, T3, T4, T5, and T6) were performed on the top of the Monofill.

Figure 1 – Hand Auger Test Locations

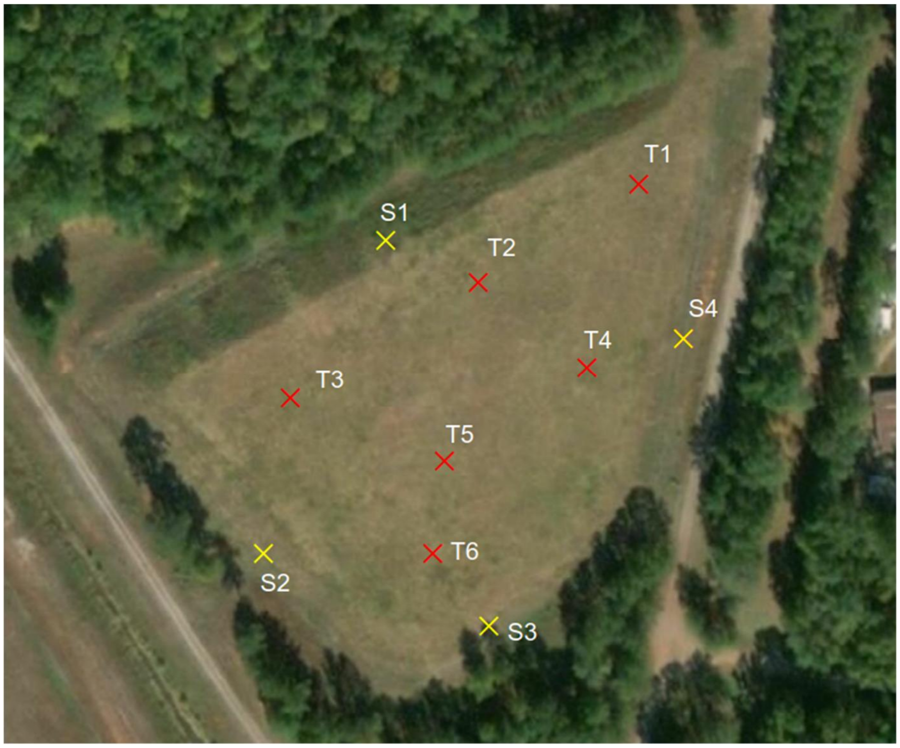


Table 1 shows results of the tests performed including the list of locations and the corresponding auger details. The table includes the depths at which the GCL/Geocomposite element of the final cover layer was encountered, if applicable.

Table 1 – Hand Auger Depths

Location ID	Depth Augered (inches)	GCL or Geocomposite Layer Encountered
S2	17	Yes
S3	20	Yes
S1	22	Yes
T1	22	Yes
T5	22	Yes
T4	24	No
S4	24	No
T2	24	Yes
T3	24	Yes
T6	25	No

After the hand auger test, the locations were filled with bentonite up to six inches from the ground surface. The bentonite was hydrated with water at approximately one-half gallon per hole. The remaining area was filled up to the surface with the cover soil that had been removed during the hand auger.

Additional Field Notes:

1. T1 – Found evidence of GCL/geocomposite layer when augered down to 22 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
2. T2 – Found evidence of GCL/geocomposite layer when augered down to 24 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
3. T3 – Found evidence of GCL/geocomposite layer when augered down to 24 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
4. T4 – Found no evidence of GCL/geocomposite layer when augered down to 24 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
5. T5 – Found evidence of GCL/geocomposite layer when augered down to 22 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
6. T6 – Found no evidence of GCL/geocomposite layer when augered down to 25 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
7. S1 – Found evidence of GCL/geocomposite layer when augered down to 22 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.

8. S2 – Found evidence of GCL/geocomposite layer when augered down to 17 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
9. S3 – Found evidence of GCL/geocomposite layer when augered down to 20 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.
10. S4 – Found no evidence of GCL/geocomposite layer when augered down to 24 inches. Filled augered hole with bentonite up to 6 inches from the surface, poured ½ gallon of water and 6 inches of soil cover.

Appendix H. **Stormwater Management System Calculations**

Stormwater Calculations

AP3 Landfill and Monofill

This appendix presents stormwater calculations for AP3 Landfill and Monofill. Calculations are presented for flow depth and velocity in storm water conveyances. Results are summarized below, and supporting details are on the following pages.

Ditch Calculations

The following output summarizes the Manning's equation calculations for the existing run on/off control ditches at the AP3 Landfill and Monofill facility. The FlowMaster software by Bentley was used to complete calculations based on the completed hydrology model of the site and cross sections taken from the recent aerial survey data.

The calculations are based on cross section and surface condition of the ditch as well as the longitudinal slope. The results include the existing data for each ditch, and also provide the calculated depth of flow and a velocity for the selected design storm flow rate.

Also attached to this Appendix are drainage area maps detailing the location of the modeled ditch cross sections and the associated drainage areas, and the hydrological calculation results for the drainage areas.

Summary of Ditch Calculations

		25 -Yr Event				100 -Yr Event			
Ditch Section	Actual Depth	Flow	Depth	Velocity	Notes	Flow	Depth	Velocity	Notes
AP3 -1	1.5	138	1.5	3.7	OK	188	1.7	4	Depth Exceeds Ditch Capacity
AP3-2	2.1	164	1.37	2.7	OK	225	1.6	3	OK
AP3-3	5.4	50	1.2	2.7	OK	70	1.45	3	OK
AP3-4	3.2	26	0.7	2.1	OK	36	0.84	2.3	OK
Monofill -1	2.6	14	0.37	3.5	OK	19	0.45	3.9	OK
Monofill-2	3	21	0.57	4.9	Velocity Exceeds 4.0	29	0.68	5.4	Velocity Exceeds 4.0
Monofill-3	1	11	0.42	4.3	Velocity Exceeds 4.0	15	0.5	4.8	Velocity Exceeds 4.0
Flow	CFS								
Depth	Feet								
Velocity	FPS								

AP 3 Ditch - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	20.00	ft/ft (H:V)
Right Side Slope	8.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	188.00	ft³/s

Results

Normal Depth	1.70	ft
Flow Area	47.10	ft²
Wetted Perimeter	51.66	ft
Hydraulic Radius	0.91	ft
Top Width	51.51	ft
Critical Depth	1.49	ft
Critical Slope	0.01924	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	1.94	ft
Froude Number	0.74	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.70	ft
Critical Depth	1.49	ft
Channel Slope	0.01000	ft/ft

AP 3 Ditch - 1

GVF Output Data

Critical Slope	0.01924	ft/ft

AP3 Channel - 1 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	20.00	ft/ft (H:V)
Right Side Slope	8.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	138.00	ft³/s

Results

Normal Depth	1.50	ft
Flow Area	37.36	ft²
Wetted Perimeter	46.05	ft
Hydraulic Radius	0.81	ft
Top Width	45.92	ft
Critical Depth	1.30	ft
Critical Slope	0.02005	ft/ft
Velocity	3.69	ft/s
Velocity Head	0.21	ft
Specific Energy	1.71	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.30	ft
Channel Slope	0.01000	ft/ft

AP3 Channel - 1 - 25 yr

GVF Output Data

Critical Slope	0.02005	ft/ft

AP 3 Ditch - 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	225.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00	2.50
0+03	1.80
0+07	1.40
0+36	0.40
0+71	0.00
0+88	2.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.50)	(0+88, 2.50)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.57	ft
Elevation Range	0.00 to 2.50 ft	
Flow Area	75.55	ft²
Wetted Perimeter	76.44	ft
Hydraulic Radius	0.99	ft
Top Width	76.30	ft
Normal Depth	1.57	ft

AP 3 Ditch - 2

Results

Critical Depth		1.16	ft
Critical Slope		0.01997	ft/ft
Velocity		2.98	ft/s
Velocity Head		0.14	ft
Specific Energy		1.70	ft
Froude Number		0.53	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.57	ft
Critical Depth	1.16	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01997	ft/ft

AP 3 Channel - 2 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	164.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.50
0+03	1.80
0+07	1.40
0+36	0.40
0+71	0.00
0+88	2.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.50)	(0+88, 2.50)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.37	ft
Elevation Range	0.00 to 2.50 ft	
Flow Area	61.24	ft²
Wetted Perimeter	72.70	ft
Hydraulic Radius	0.84	ft
Top Width	72.58	ft
Normal Depth	1.37	ft

AP 3 Channel - 2 - 25 yr

Results

Critical Depth	1.00	ft
Critical Slope	0.02098	ft/ft
Velocity	2.68	ft/s
Velocity Head	0.11	ft
Specific Energy	1.49	ft
Froude Number	0.51	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.37	ft
Critical Depth	1.00	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.02098	ft/ft

AP3 Ditch - 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	9.00	ft
Discharge	70.00	ft³/s

Results

Normal Depth	1.45	ft
Flow Area	23.49	ft²
Wetted Perimeter	23.76	ft
Hydraulic Radius	0.99	ft
Top Width	23.47	ft
Critical Depth	1.02	ft
Critical Slope	0.01996	ft/ft
Velocity	2.98	ft/s
Velocity Head	0.14	ft
Specific Energy	1.58	ft
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.45	ft
Critical Depth	1.02	ft
Channel Slope	0.00500	ft/ft

AP3 Ditch - 3

GVF Output Data

Critical Slope	0.01996	ft/ft

AP3 Channel - 3 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	9.00	ft
Discharge	50.00	ft^3/s

Results

Normal Depth	1.22	ft
Flow Area	18.43	ft^2
Wetted Perimeter	21.44	ft
Hydraulic Radius	0.86	ft
Top Width	21.20	ft
Critical Depth	0.84	ft
Critical Slope	0.02102	ft/ft
Velocity	2.71	ft/s
Velocity Head	0.11	ft
Specific Energy	1.33	ft
Froude Number	0.51	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.22	ft
Critical Depth	0.84	ft
Channel Slope	0.00500	ft/ft

AP3 Channel - 3 - 25 yr

GVF Output Data

Critical Slope	0.02102	ft/ft

AP3 Ditch - 4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	7.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	36.00	ft³/s

Results

Normal Depth	0.84	ft
Flow Area	15.87	ft²
Wetted Perimeter	24.16	ft
Hydraulic Radius	0.66	ft
Top Width	24.02	ft
Critical Depth	0.54	ft
Critical Slope	0.02331	ft/ft
Velocity	2.27	ft/s
Velocity Head	0.08	ft
Specific Energy	0.91	ft
Froude Number	0.49	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.84	ft
Critical Depth	0.54	ft
Channel Slope	0.00500	ft/ft

AP3 Ditch - 4

GVF Output Data

Critical Slope	0.02331	ft/ft

AP 3 Channel - 4 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	7.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	26.00	ft³/s

Results

Normal Depth	0.70	ft
Flow Area	12.68	ft²
Wetted Perimeter	22.49	ft
Hydraulic Radius	0.56	ft
Top Width	22.37	ft
Critical Depth	0.44	ft
Critical Slope	0.02471	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.76	ft
Froude Number	0.48	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.70	ft
Critical Depth	0.44	ft
Channel Slope	0.00500	ft/ft

AP 3 Channel - 4 - 25 yr

GVF Output Data

Critical Slope	0.02471	ft/ft

Monofill Ditch - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02800	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	19.30	ft³/s

Results

Normal Depth	0.45	ft
Flow Area	4.99	ft²
Wetted Perimeter	12.42	ft
Hydraulic Radius	0.40	ft
Top Width	12.24	ft
Critical Depth	0.47	ft
Critical Slope	0.02425	ft/ft
Velocity	3.87	ft/s
Velocity Head	0.23	ft
Specific Energy	0.68	ft
Froude Number	1.07	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.47	ft
Channel Slope	0.02800	ft/ft

Monofill Ditch - 1

GVF Output Data

Critical Slope	0.02425	ft/ft

Monofill Channel - 1 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02800	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	14.00	ft³/s

Results

Normal Depth	0.37	ft
Flow Area	4.06	ft²
Wetted Perimeter	12.01	ft
Hydraulic Radius	0.34	ft
Top Width	11.86	ft
Critical Depth	0.38	ft
Critical Slope	0.02575	ft/ft
Velocity	3.45	ft/s
Velocity Head	0.18	ft
Specific Energy	0.56	ft
Froude Number	1.04	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.37	ft
Critical Depth	0.38	ft
Channel Slope	0.02800	ft/ft

Monofill Channel - 1 - 25 yr

GVF Output Data

Critical Slope	0.02575	ft/ft

Monofill Ditch - 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.04200	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	26.80	ft³/s

Results

Normal Depth	0.65	ft
Flow Area	5.12	ft²
Wetted Perimeter	10.97	ft
Hydraulic Radius	0.47	ft
Top Width	10.82	ft
Critical Depth	0.76	ft
Critical Slope	0.02232	ft/ft
Velocity	5.24	ft/s
Velocity Head	0.43	ft
Specific Energy	1.07	ft
Froude Number	1.34	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.76	ft
Channel Slope	0.04200	ft/ft

Monofill Ditch - 2

GVF Output Data

Critical Slope	0.02232	ft/ft

Monofill Channel - 2 - 25 yr

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.04200	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	19.00	ft³/s

Results

Normal Depth	0.54	ft
Flow Area	4.01	ft²
Wetted Perimeter	9.98	ft
Hydraulic Radius	0.40	ft
Top Width	9.86	ft
Critical Depth	0.63	ft
Critical Slope	0.02349	ft/ft
Velocity	4.74	ft/s
Velocity Head	0.35	ft
Specific Energy	0.89	ft
Froude Number	1.31	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.63	ft
Channel Slope	0.04200	ft/ft

Monofill Channel - 2 - 25 yr

GVF Output Data

Critical Slope	0.02349	ft/ft

Monofill Ditch - 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.05000	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	15.30	ft³/s

Results

Normal Depth	0.50	ft
Flow Area	3.21	ft²
Wetted Perimeter	9.06	ft
Hydraulic Radius	0.35	ft
Top Width	8.96	ft
Critical Depth	0.60	ft
Critical Slope	0.02425	ft/ft
Velocity	4.76	ft/s
Velocity Head	0.35	ft
Specific Energy	0.85	ft
Froude Number	1.40	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.60	ft
Channel Slope	0.05000	ft/ft

Monofill Ditch - 3

GVF Output Data

Critical Slope	0.02425	ft/ft

Monofill Channel - 3 - 25 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.05000	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	11.00	ft³/s

Results

Normal Depth	0.42	ft
Flow Area	2.54	ft²
Wetted Perimeter	8.26	ft
Hydraulic Radius	0.31	ft
Top Width	8.18	ft
Critical Depth	0.50	ft
Critical Slope	0.02546	ft/ft
Velocity	4.33	ft/s
Velocity Head	0.29	ft
Specific Energy	0.71	ft
Froude Number	1.37	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Channel Slope	0.05000	ft/ft

Monofill Channel - 3 - 25 yr

GVF Output Data

Critical Slope	0.02546	ft/ft

Hydrology

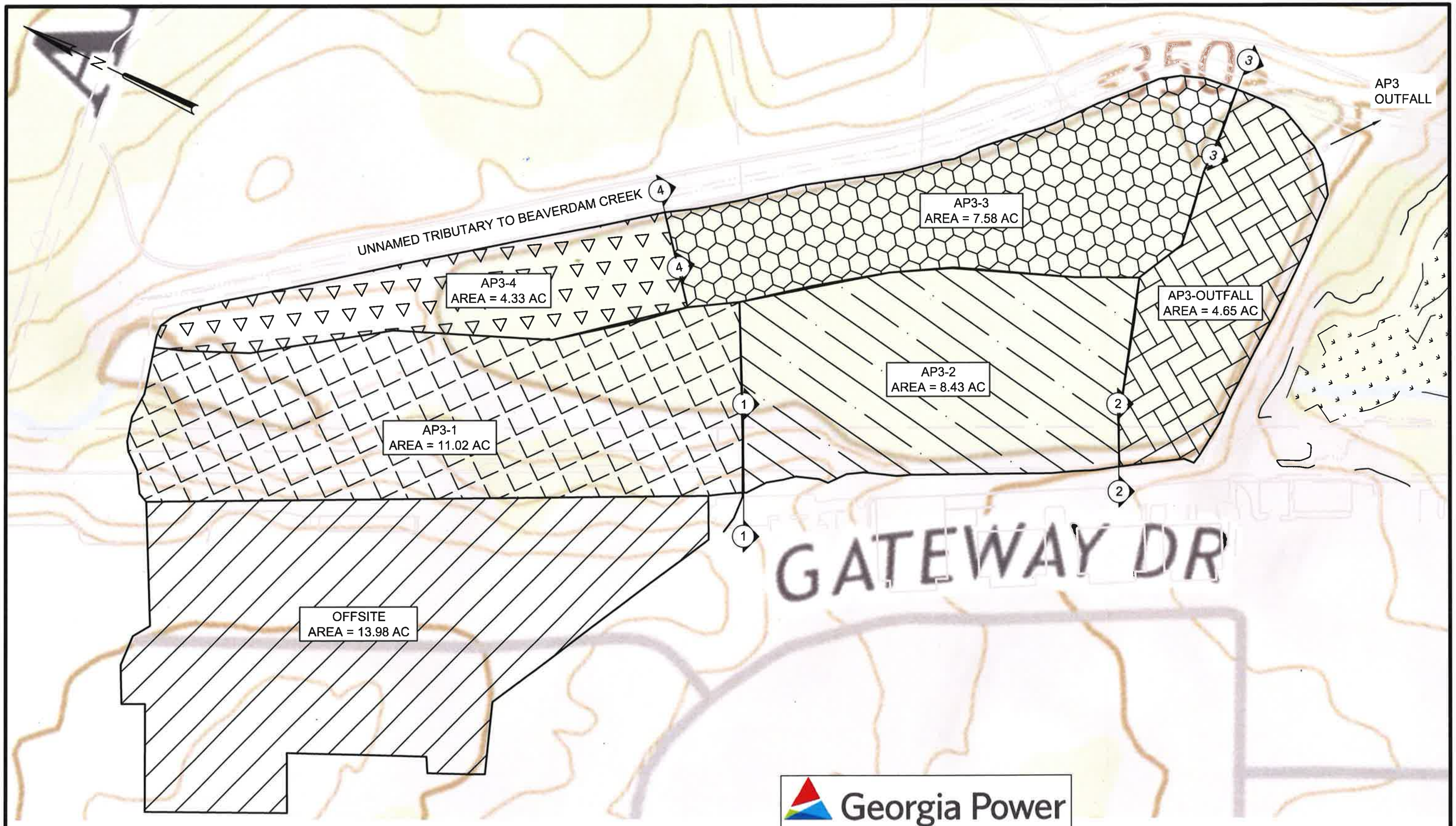
The following output summarizes the Hydrologic calculations for the AP3 Landfill and Monofill. The calculations were completed using the Hydroflow Hydragraphs software to determine flow rates and total runoff volumes for the relevant design storms.

The calculations use drainage area, land use, flow times and rainfall intensities to compute runoff hydrographs representing runoff rates over time. These variables were determined based on site visits, aerial topography, estimations of impervious land cover, and local rainfall data available from NOAA.

Included in this Appendix are drainage area maps associated with the runoff hydrographs detailed in the model and represented in the output.

The AP3 Landfill site is drained by drainage ditches along the east and west perimeter, which convey stormwater to a culvert at the southeast corner of the site. The eastern ditch controls runoff from the facility only. Two drainage basins were delineated to provide flows to a cross section of the ditch to allow determination flow depths and velocities at these points. The same procedure was used along the western ditch. However, on this side of the facility offsite water enters the northern portion of the ditch and two separate hydrographs were modeled and added to determine flow at ditch section 1. Additional offsite areas west of the facility are conveyed to the wetlands by a drainage feature located offsite. The east and west ditches combine in the low area at the southeast corner of the facility. Where the existing culvert conveys flows from the facility into the unnamed tributary of Beaverdam Creek.

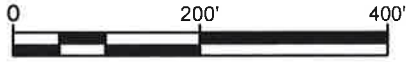
The Monofill site is drainage by two perimeter ditches that convey runoff from the facility. These combine at the low point of the site, at the western corner and discharge into a larger, offsite ditch. Hydrographs were calculated for four onsite basins to allow several determination of flow depths and velocities at several locations along the perimeter of the site.



Georgia Power

LEGEND

X — X DITCH SECTION - PLAN

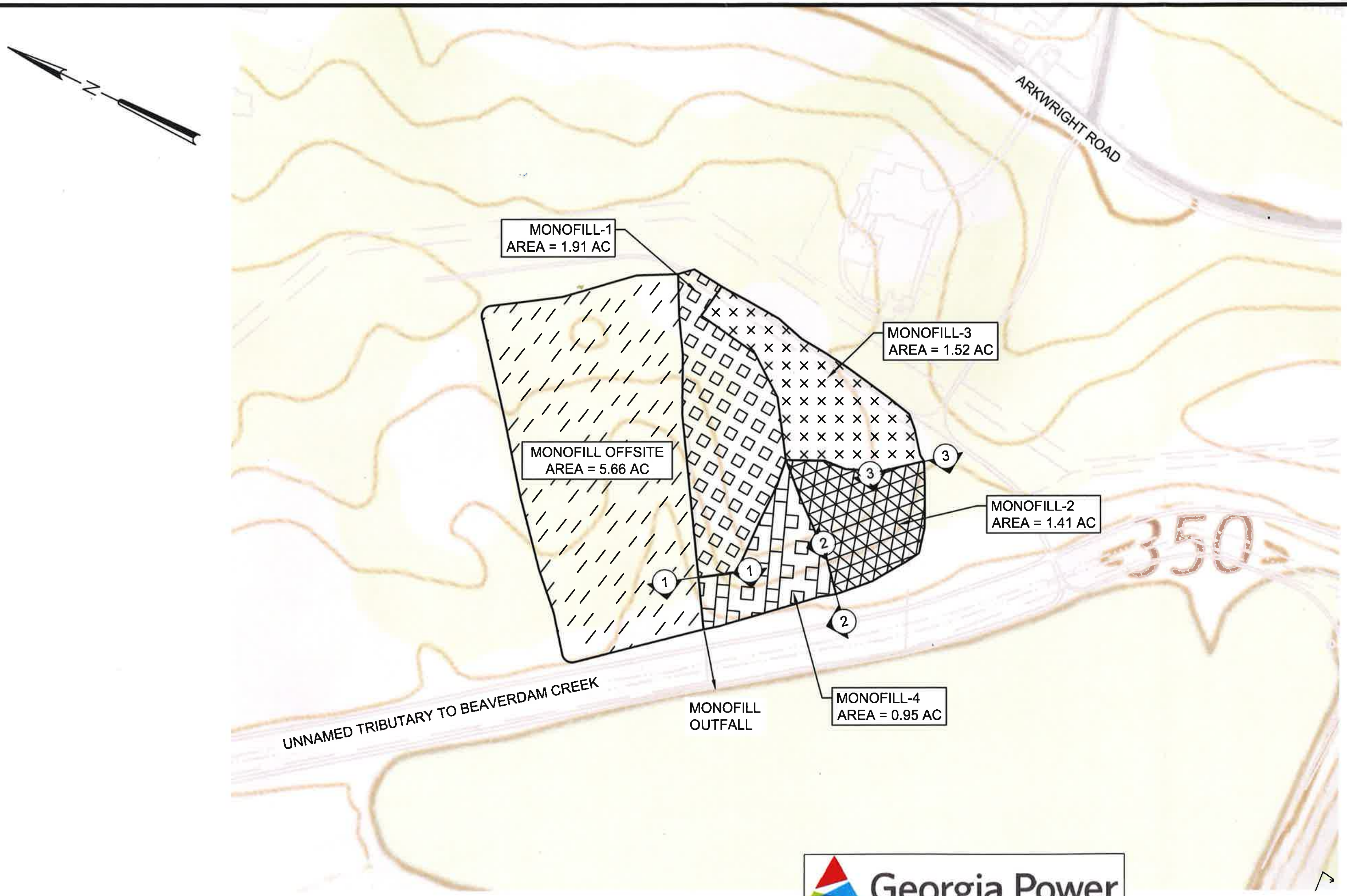


JACOBS

FORMER PLANT ARKWRIGHT
AP3 LANDFILL & MONOFILL

DRAINAGE AREA MAP

PROJECT NO.: 35DK9203
DATE: NOVEMBER 2018
SCALE: AS SHOWN
FIGURE NO.: 1



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LEGEND

Ⓧ——Ⓧ DITCH SECTION - PLAN

0 200' 400'

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FORMER PLANT ARKWRIGHT
AP3 LANDFILL & MONOFILL

DRAINAGE AREA MAP

PROJECT NO.: 35DK9203
DATE: NOVEMBER 2018
SCALE: AS SHOWN
FIGURE NO.: 2

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	9.607	11.99	-------	16.31	20.29	26.27	-------	36.59	AP3 4
2	SCS Runoff	------	10.70	13.42	-------	18.40	23.00	29.93	-------	41.95	AP3 3
4	SCS Runoff	------	17.70	22.19	-------	30.37	37.92	49.27	-------	68.96	AP3 1
5	SCS Runoff	------	40.17	48.37	-------	62.89	76.00	95.38	-------	128.43	AP3 Offsite
6	SCS Runoff	------	11.90	14.93	-------	20.46	25.58	33.28	-------	46.65	AP3 2
9	SCS Runoff	------	11.35	14.10	-------	19.13	23.75	30.67	-------	42.62	AP3 OUTFALL AREA
11	Combine	1, 2,	17.72	22.26	-------	30.55	38.21	49.76	-------	69.80	AP3 Ditch Section 3
13	Combine	4, 5,	54.85	66.92	-------	88.53	108.22	137.55	-------	187.94	AP3 Ditch Section 1
14	Combine	6, 13	63.63	78.10	-------	104.17	128.01	163.64	-------	225.05	AP3 Ditch Section 2
16	Combine	9, 11, 14,	91.06	112.40	-------	150.94	186.28	239.18	-------	330.49	AP3 Outfall
18	Reservoir	16	60.44	67.06	-------	93.65	121.38	149.77	-------	185.31	AP3 Discharge
21	SCS Runoff	------	5.179	6.425	-------	8.677	10.74	13.86	-------	19.26	Monofill-1
22	SCS Runoff	------	2.576	3.196	-------	4.316	5.343	6.896	-------	9.581	Monofill-4
24	SCS Runoff	------	4.122	5.113	-------	6.905	8.548	11.03	-------	15.33	Monofill-3
25	SCS Runoff	------	3.823	4.743	-------	6.405	7.930	10.24	-------	14.22	Monofill-2
27	SCS Runoff	------	5.544	7.906	-------	12.48	16.95	23.98	-------	36.91	Monofill Offsite
29	Combine	24, 25,	7.945	9.856	-------	13.31	16.48	21.27	-------	29.55	Mono Ditch Section 2
30	Combine	21, 22, 27, 29	20.66	26.72	-------	38.01	48.65	64.96	-------	93.84	Mono Outfall

Proj. file: Run On-Off Calcs AP 3.gpw

Monday, Nov 12, 2018

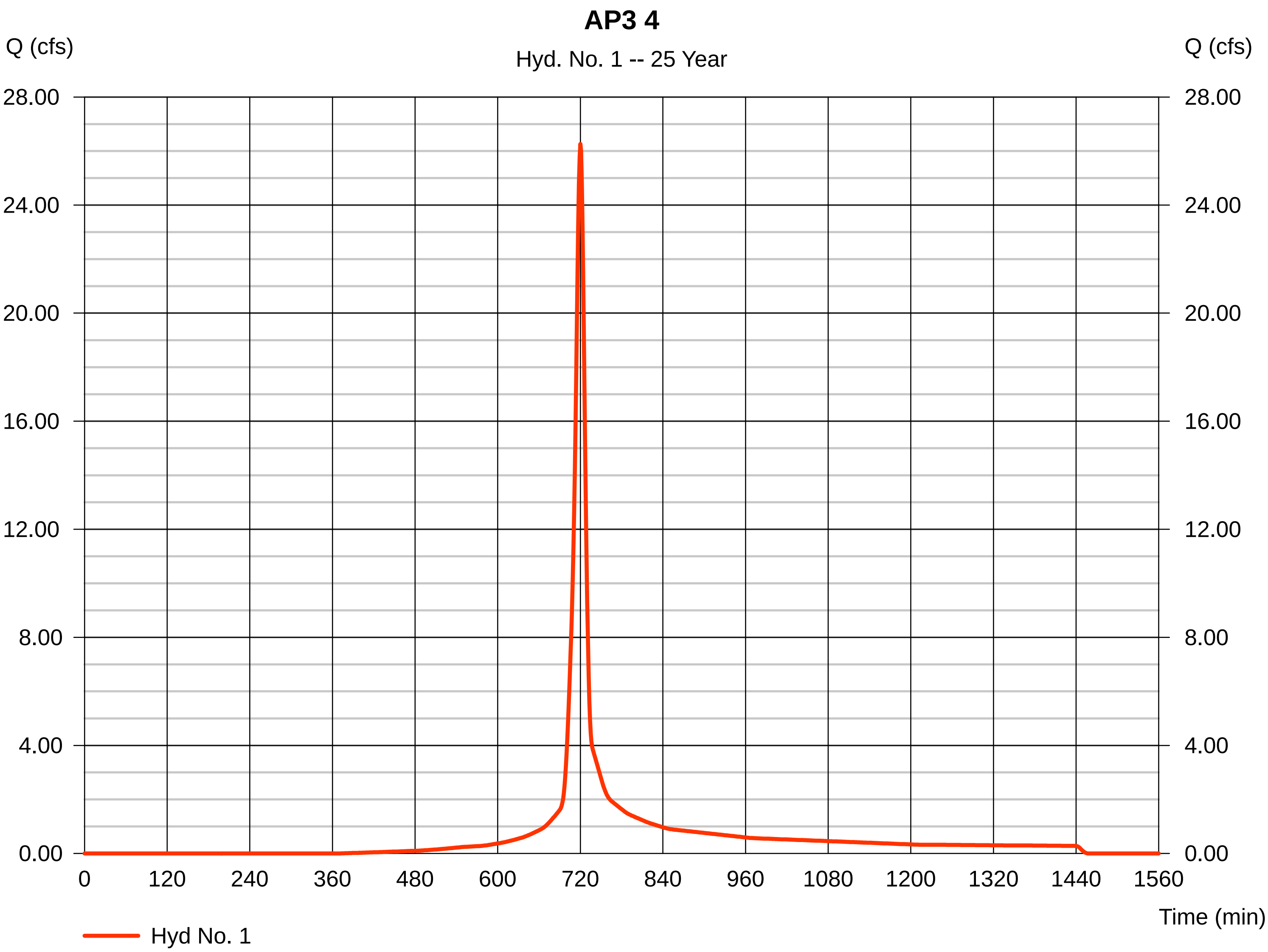
Hydrograph Report

Hyd. No. 1

AP3 4

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 4.330 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 6.27 in
Storm duration = 24 hrs

Peak discharge = 26.27 cfs
Time to peak = 720 min
Hyd. volume = 64,406 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.30 min
Distribution = Type II
Shape factor = 484

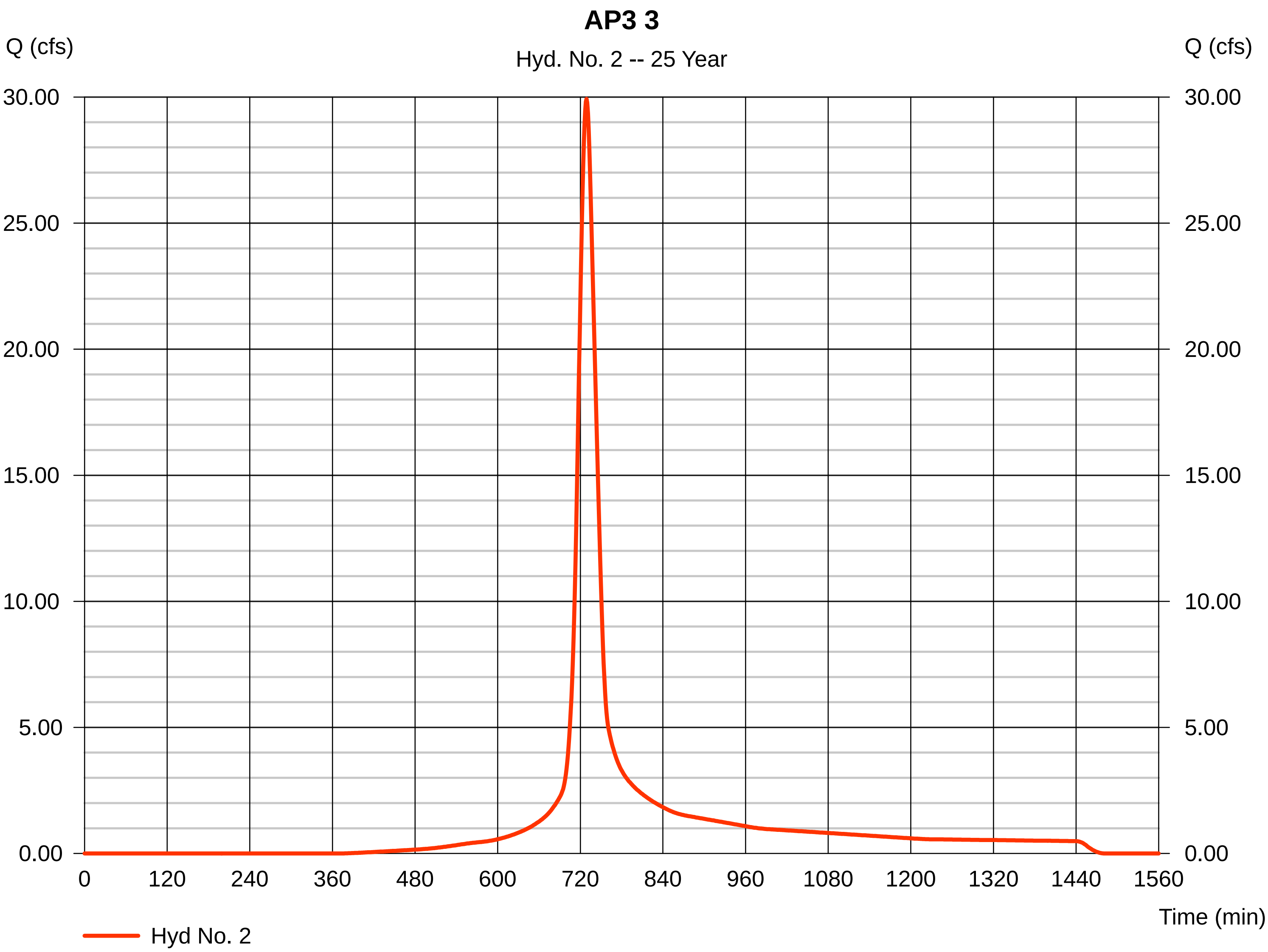


Hydrograph Report

Hyd. No. 2

AP3 3

Hydrograph type	= SCS Runoff	Peak discharge	= 29.93 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 111,635 cuft
Drainage area	= 7.580 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 25.80 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

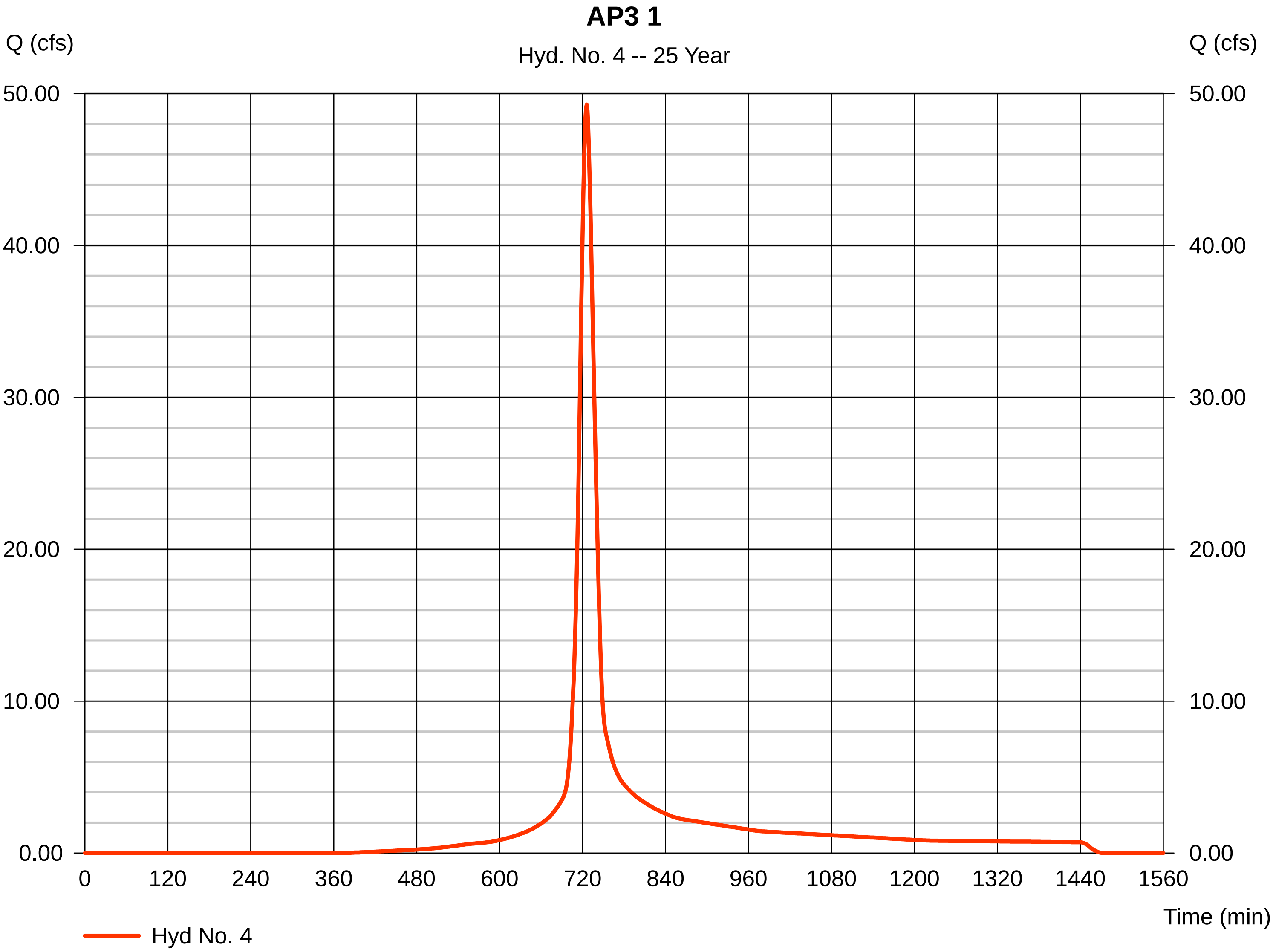


Hydrograph Report

Hyd. No. 4

AP3 1

Hydrograph type	= SCS Runoff	Peak discharge	= 49.27 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 162,589 cuft
Drainage area	= 11.020 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.69 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



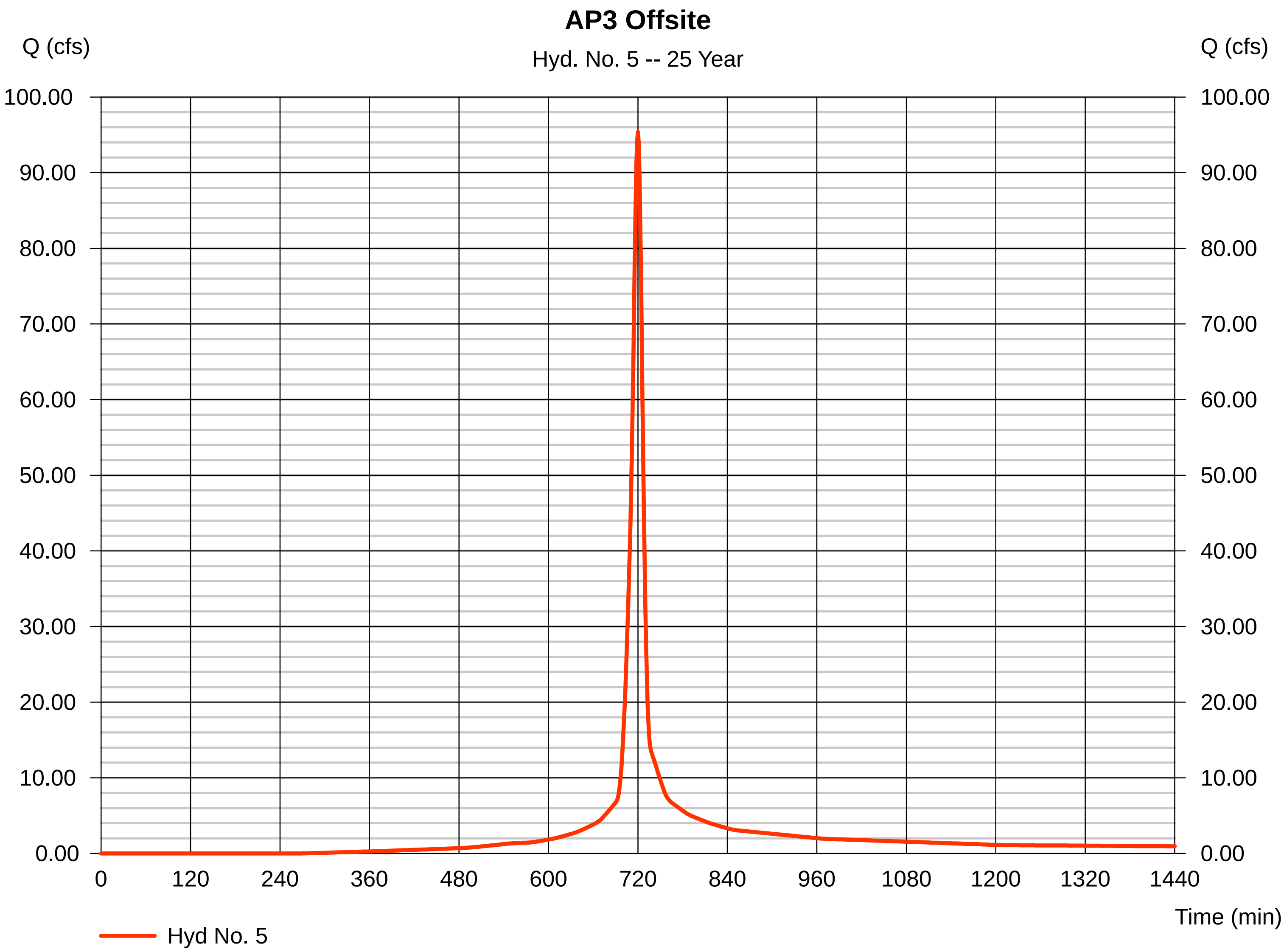
Hydrograph Report

Hyd. No. 5

AP3 Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 95.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 240,178 cuft
Drainage area	= 13.930 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.00 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(10.690 x 91) + (3.240 x 70)] / 13.930



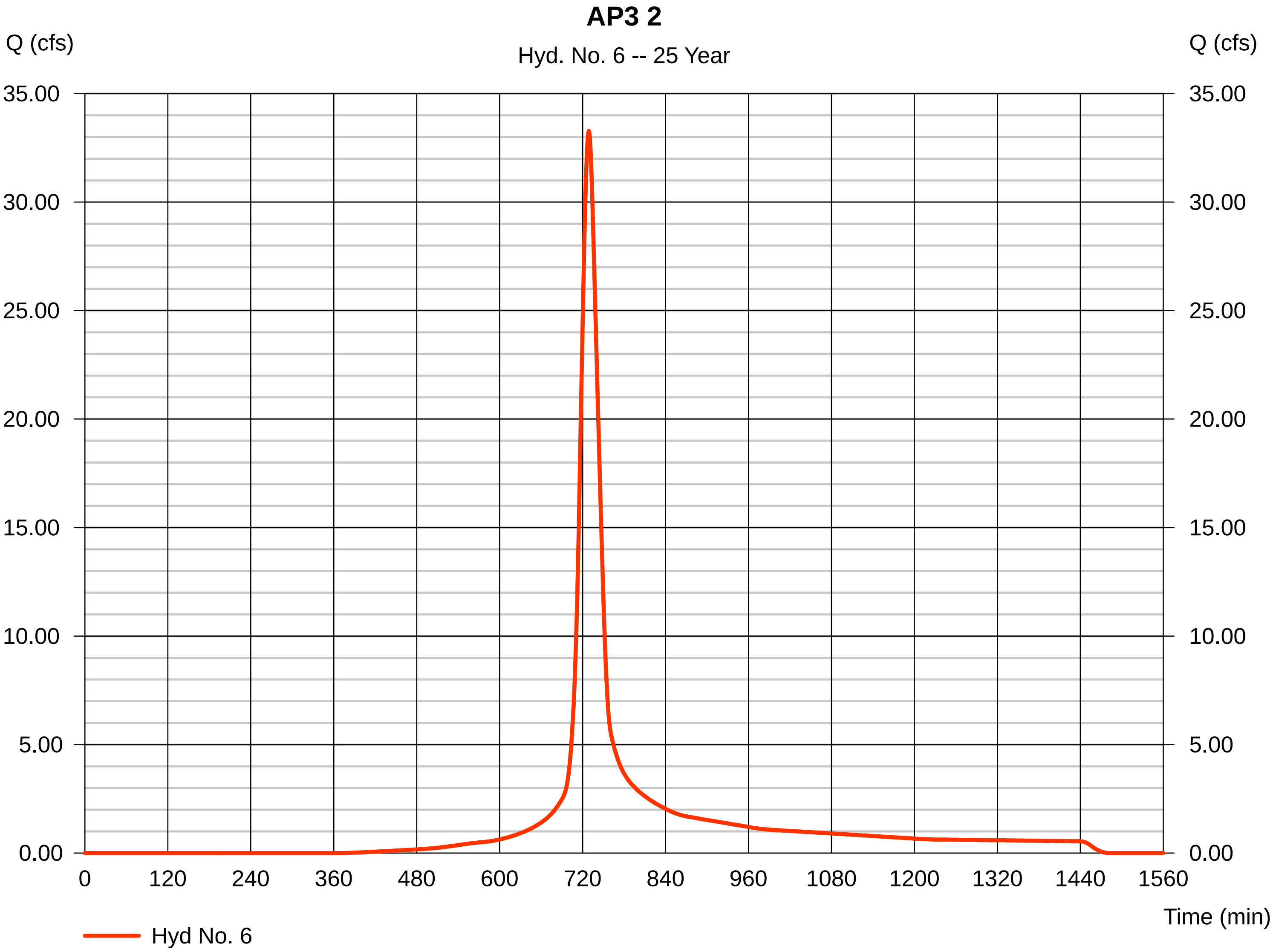
Hydrograph Report

Hyd. No. 6

AP3 2

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 8.430 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 6.27 in
Storm duration = 24 hrs

Peak discharge = 33.28 cfs
Time to peak = 729 min
Hyd. volume = 124,154 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 26.40 min
Distribution = Type II
Shape factor = 484

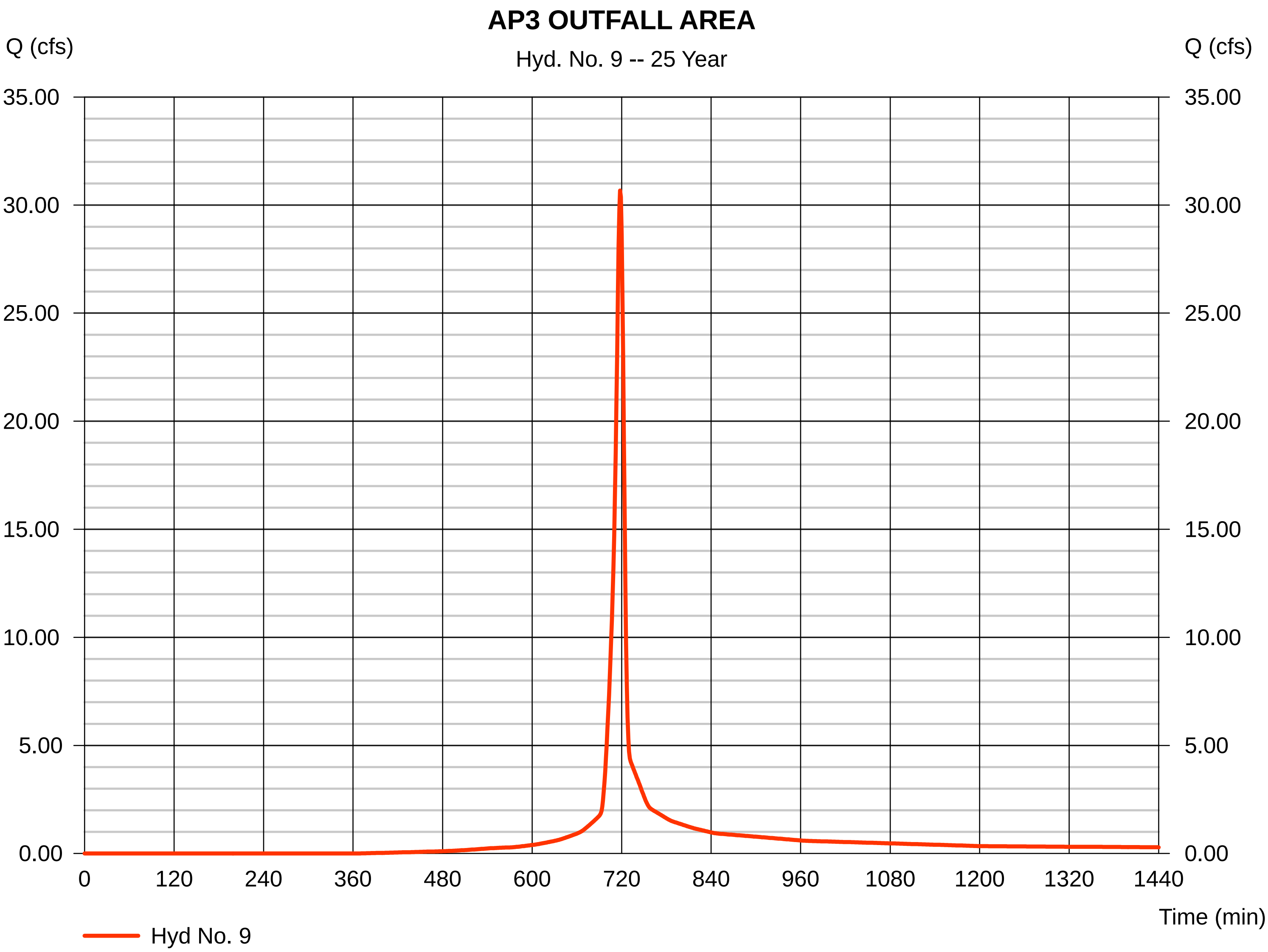


Hydrograph Report

Hyd. No. 9

AP3 OUTFALL AREA

Hydrograph type	= SCS Runoff	Peak discharge	= 30.67 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 66,254 cuft
Drainage area	= 4.650 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.00 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



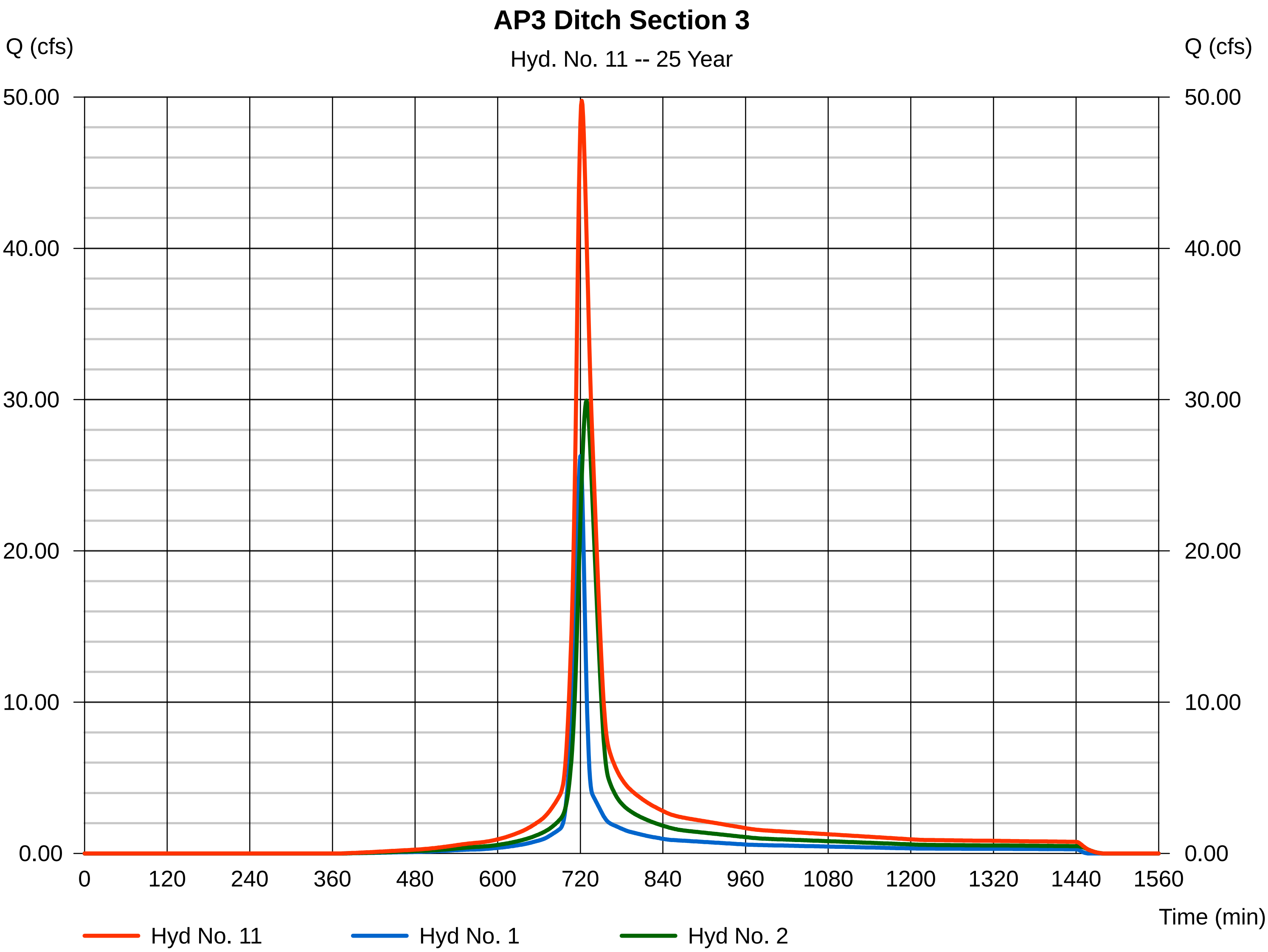
Hydrograph Report

Hyd. No. 11

AP3 Ditch Section 3

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyds. = 1, 2

Peak discharge = 49.76 cfs
Time to peak = 722 min
Hyd. volume = 176,042 cuft
Contrib. drain. area = 11.910 ac

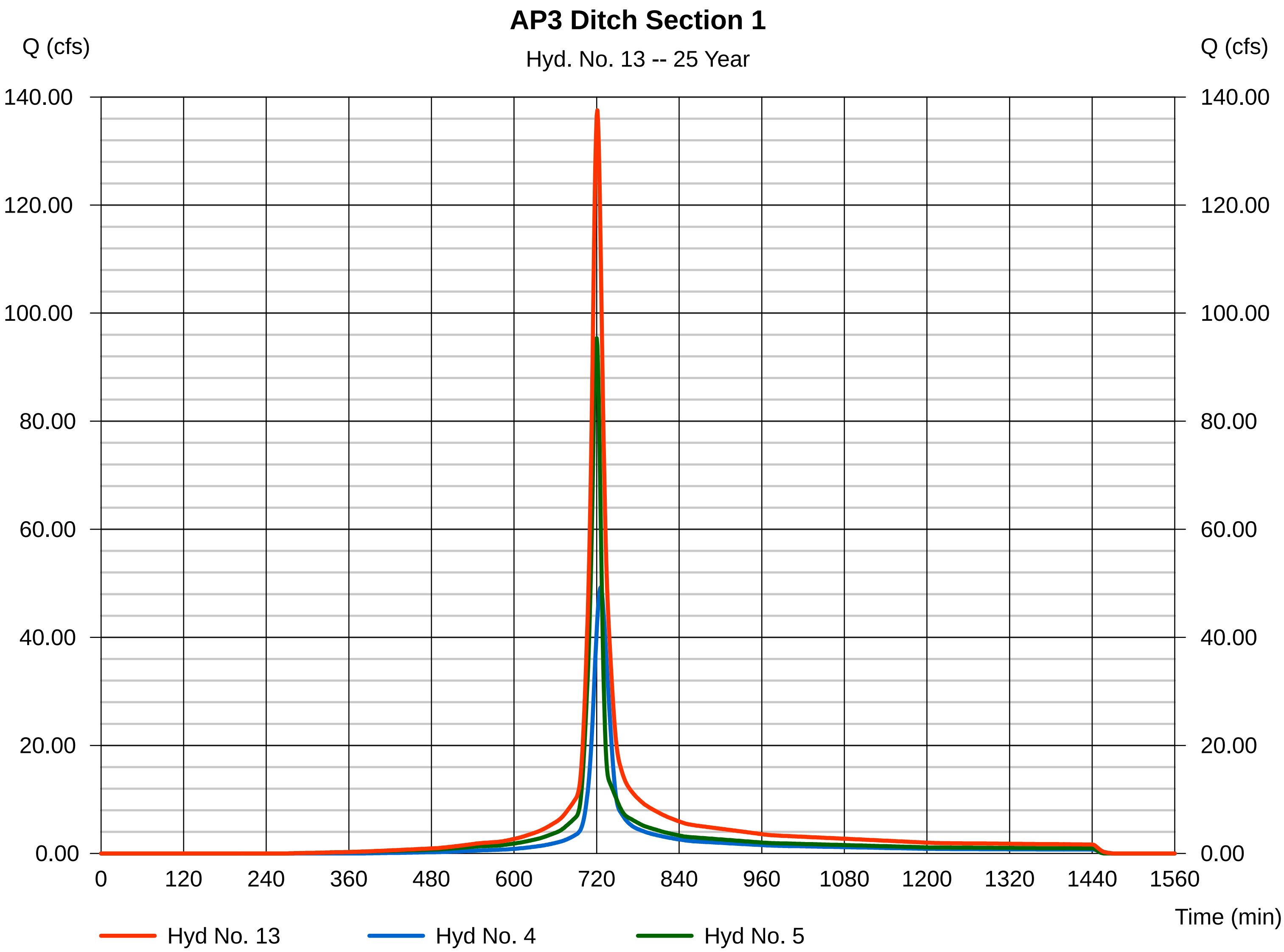


Hydrograph Report

Hyd. No. 13

AP3 Ditch Section 1

Hydrograph type	= Combine	Peak discharge	= 137.55 cfs
Storm frequency	= 25 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 402,767 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 24.950 ac

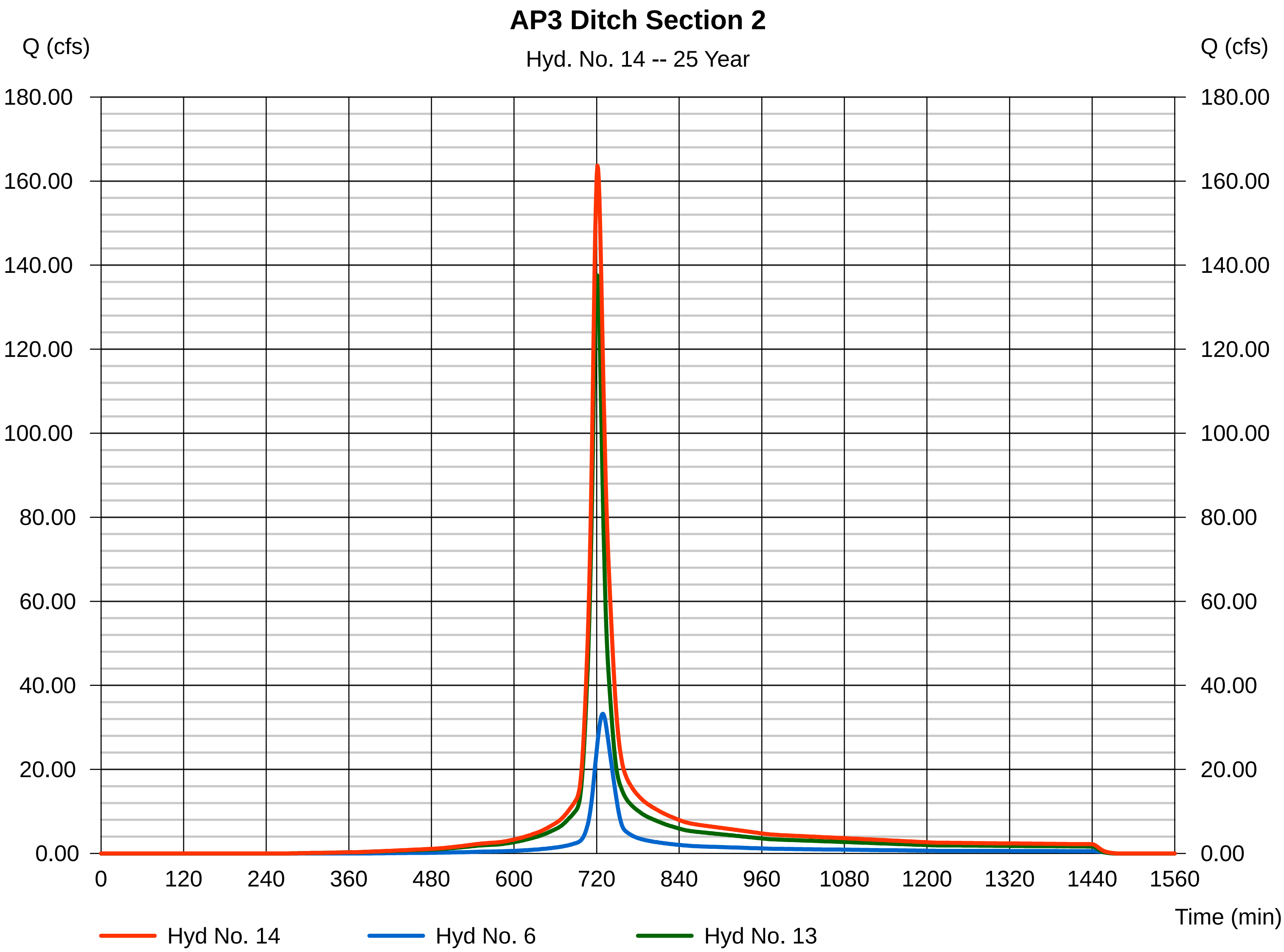


Hydrograph Report

Hyd. No. 14

AP3 Ditch Section 2

Hydrograph type	= Combine	Peak discharge	= 163.64 cfs
Storm frequency	= 25 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 526,921 cuft
Inflow hyds.	= 6, 13	Contrib. drain. area	= 8.430 ac



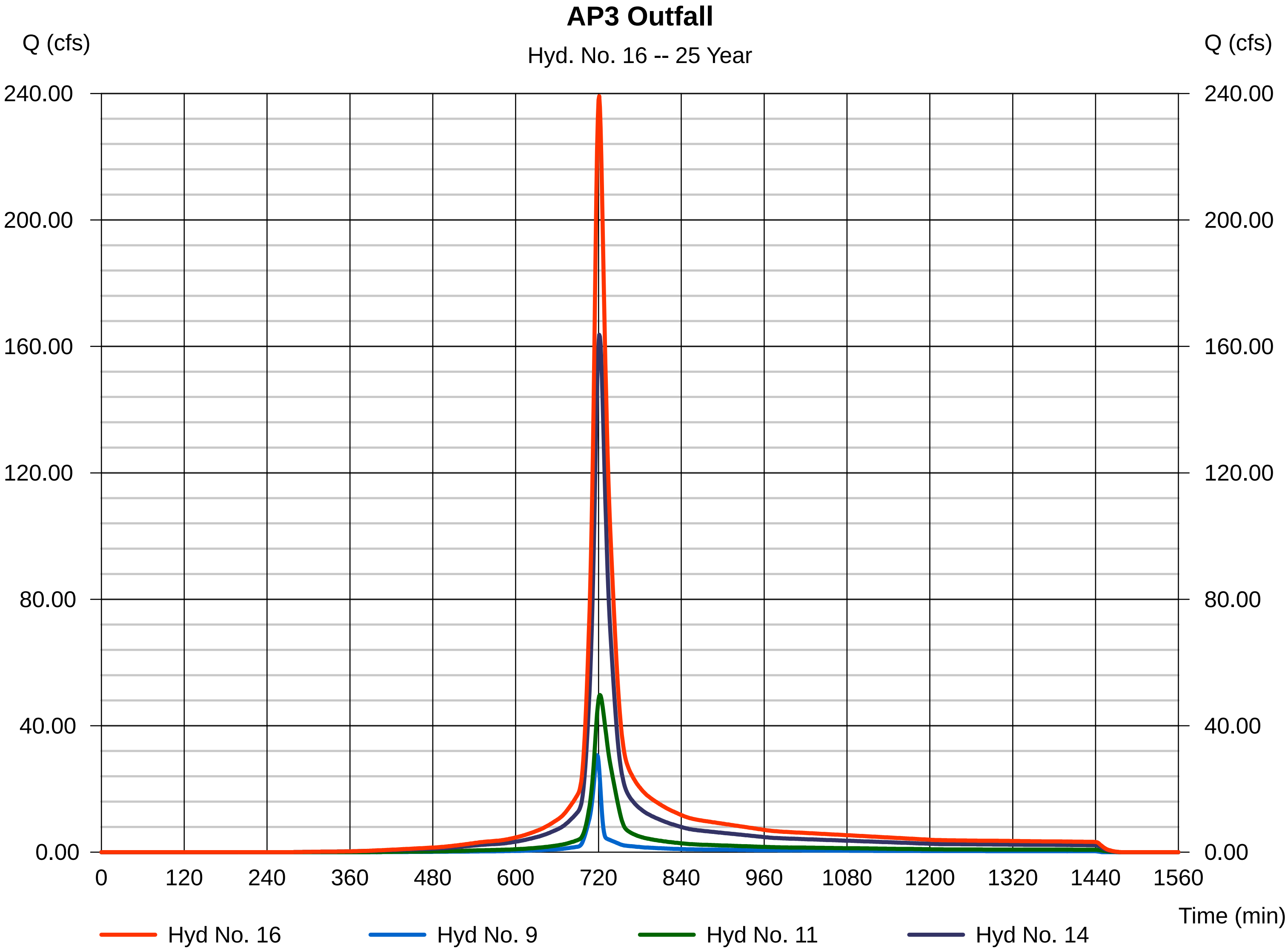
Hydrograph Report

Hyd. No. 16

AP3 Outfall

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyds. = 9, 11, 14

Peak discharge = 239.18 cfs
Time to peak = 721 min
Hyd. volume = 769,216 cuft
Contrib. drain. area = 4.650 ac



Hydrograph Report

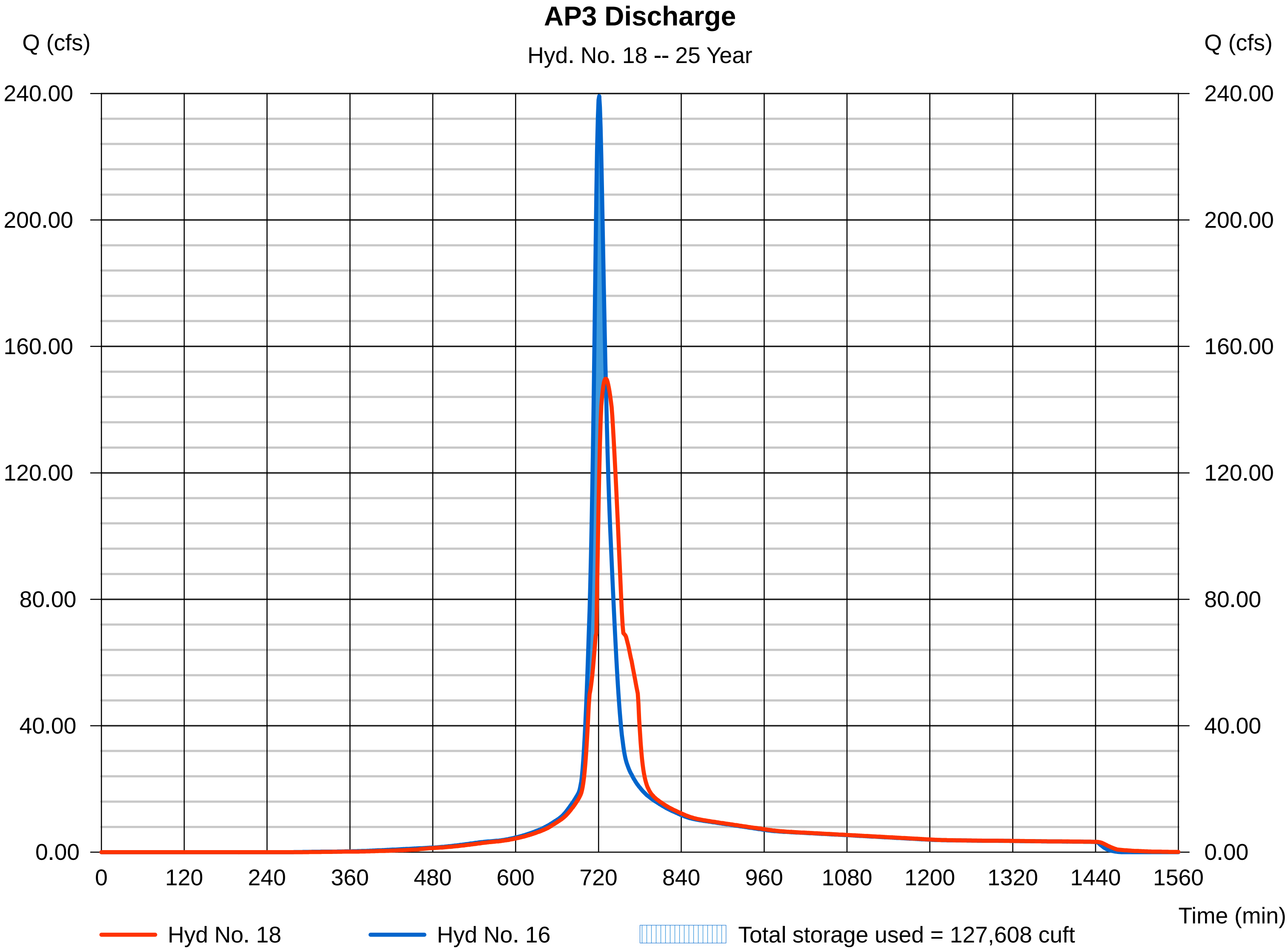
Hyd. No. 18

AP3 Discharge

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyd. No. = 16 - AP3 Outfall
Reservoir name = AP3 Outlet

Peak discharge = 149.77 cfs
Time to peak = 730 min
Hyd. volume = 769,214 cuft
Max. Elevation = 350.19 ft
Max. Storage = 127,608 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - AP3 Outlet

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 346.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	346.00	100	0	0
2.00	348.00	17,751	17,851	17,851
4.00	350.00	75,650	93,401	111,252
5.00	351.00	98,000	86,825	198,077

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	36.00	Inactive	0.00	0.00
Span (in)	=	36.00	0.00	0.00	0.00
No. Barrels	=	3	1	0	0
Invert El. (ft)	=	346.01	0.00	0.00	0.00
Length (ft)	=	60.00	60.00	0.00	0.00
Slope (%)	=	0.53	0.18	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	0.00	0.00	0.00	0.00
Crest El. (ft)	=	0.00	0.00	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	---	---	---	---
Multi-Stage	=	No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

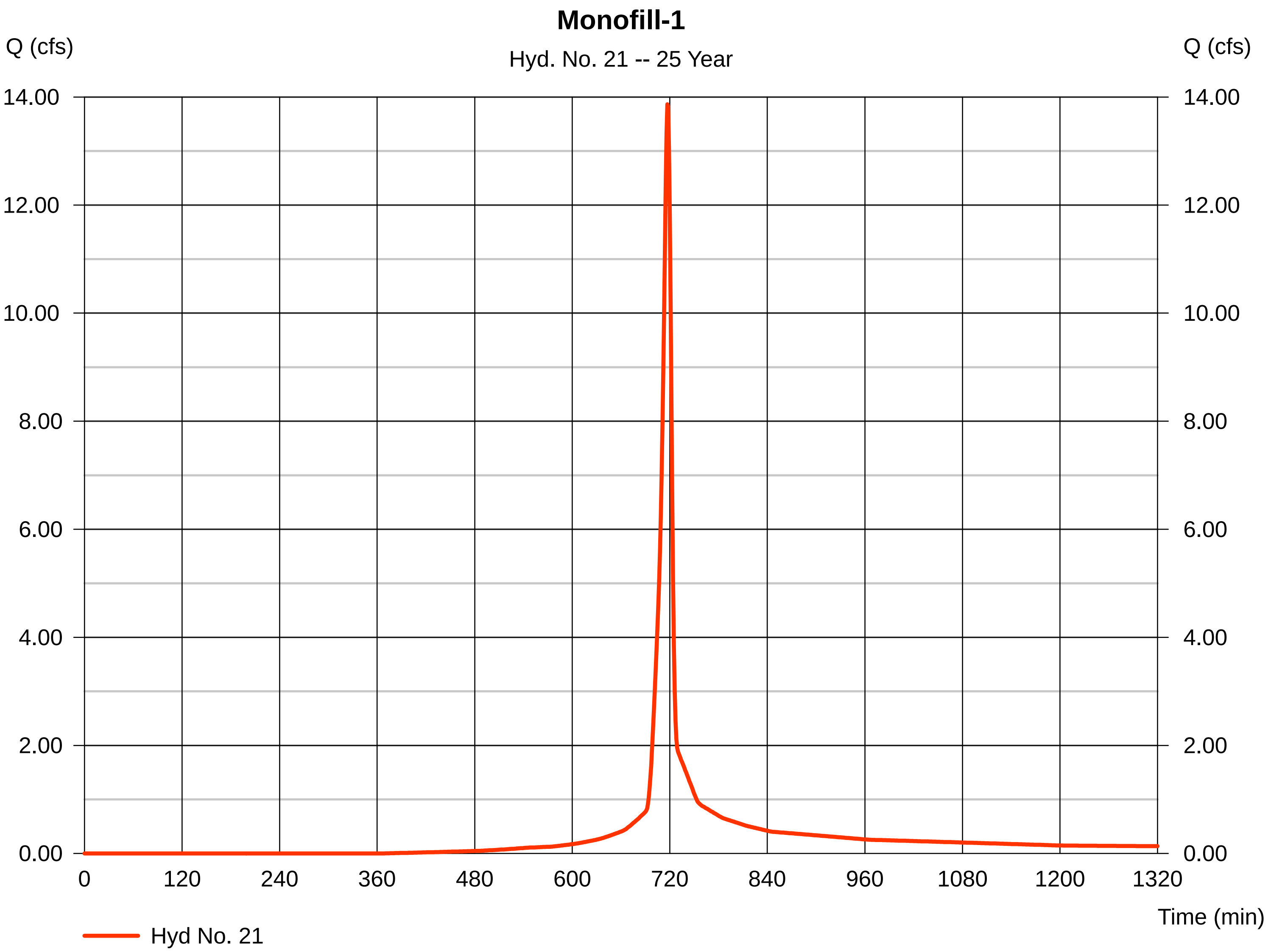
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	346.00	0.00	---	---	---	---	---	---	---	---	---	0.000
2.00	17,851	348.00	49.65 oc	---	---	---	---	---	---	---	---	---	49.65
4.00	111,252	350.00	140.03 oc	---	---	---	---	---	---	---	---	---	140.03
5.00	198,077	351.00	186.01 oc	---	---	---	---	---	---	---	---	---	186.01

Hydrograph Report

Hyd. No. 21

Monofill-1

Hydrograph type	= SCS Runoff	Peak discharge	= 13.86 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 28,784 cuft
Drainage area	= 1.910 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

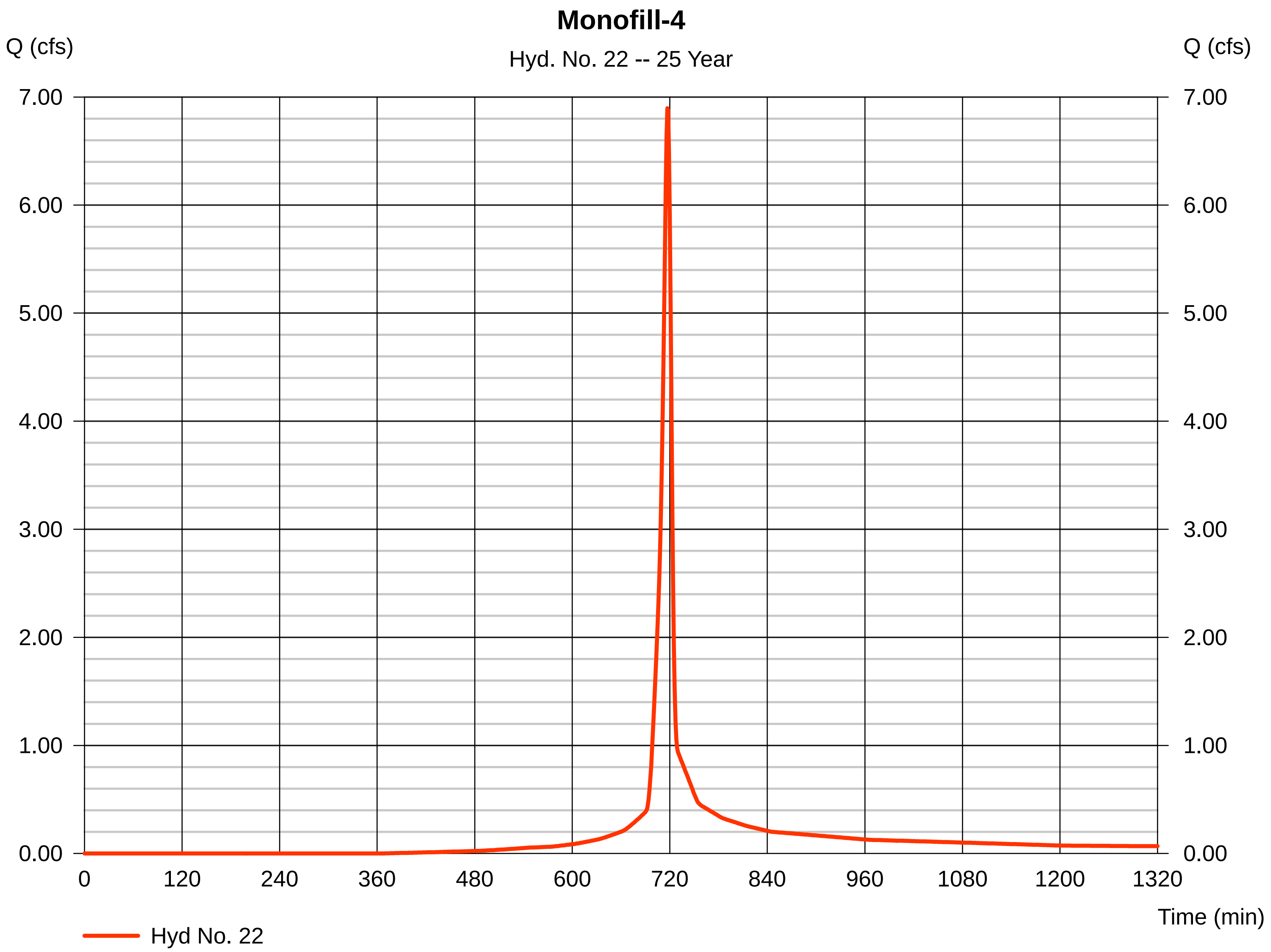
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Nov 12, 2018

Hyd. No. 22

Monofill-4

Hydrograph type	= SCS Runoff	Peak discharge	= 6.896 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 14,317 cuft
Drainage area	= 0.950 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



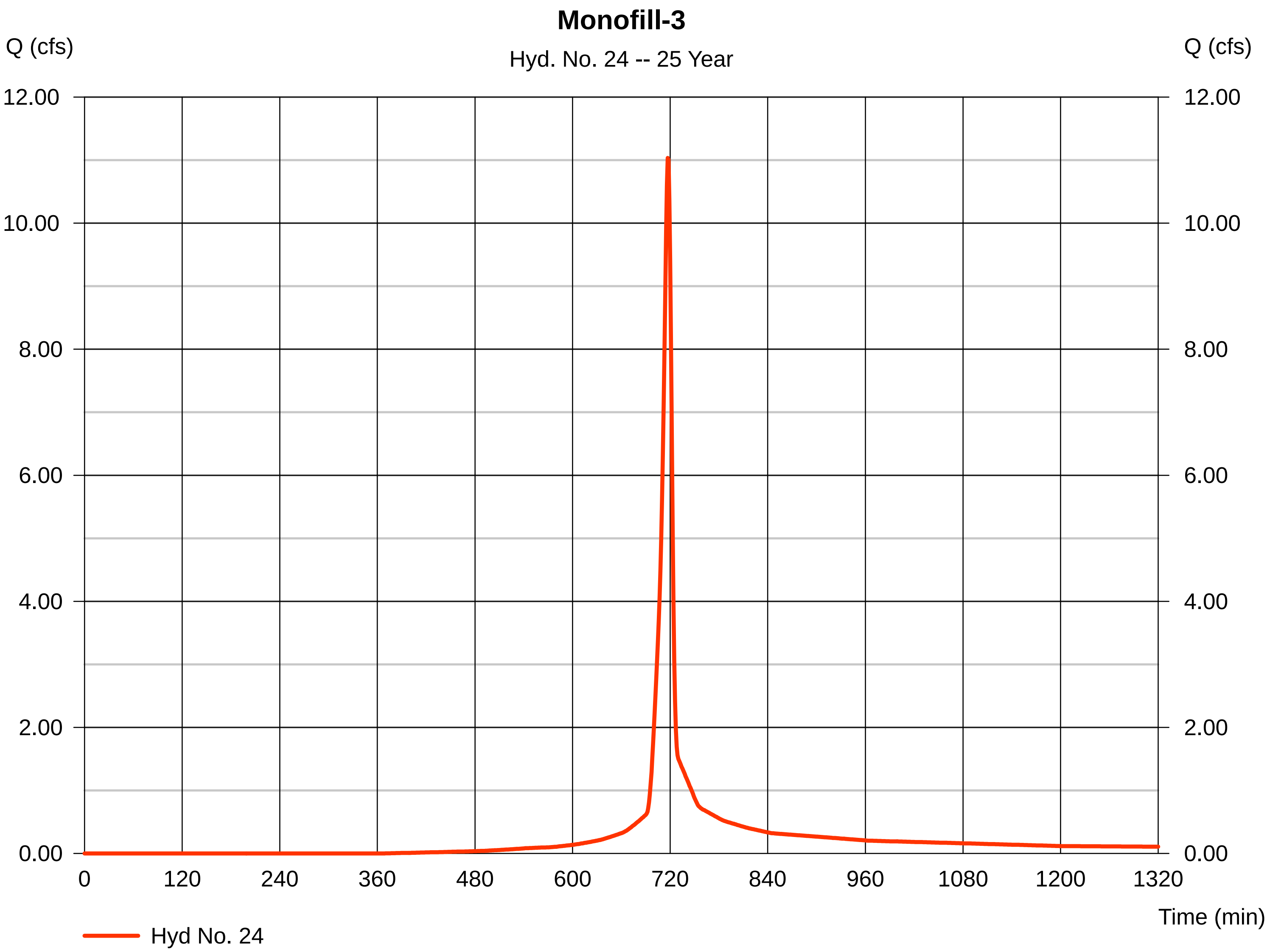
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Nov 12, 2018

Hyd. No. 24

Monofill-3

Hydrograph type	= SCS Runoff	Peak discharge	= 11.03 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 22,907 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



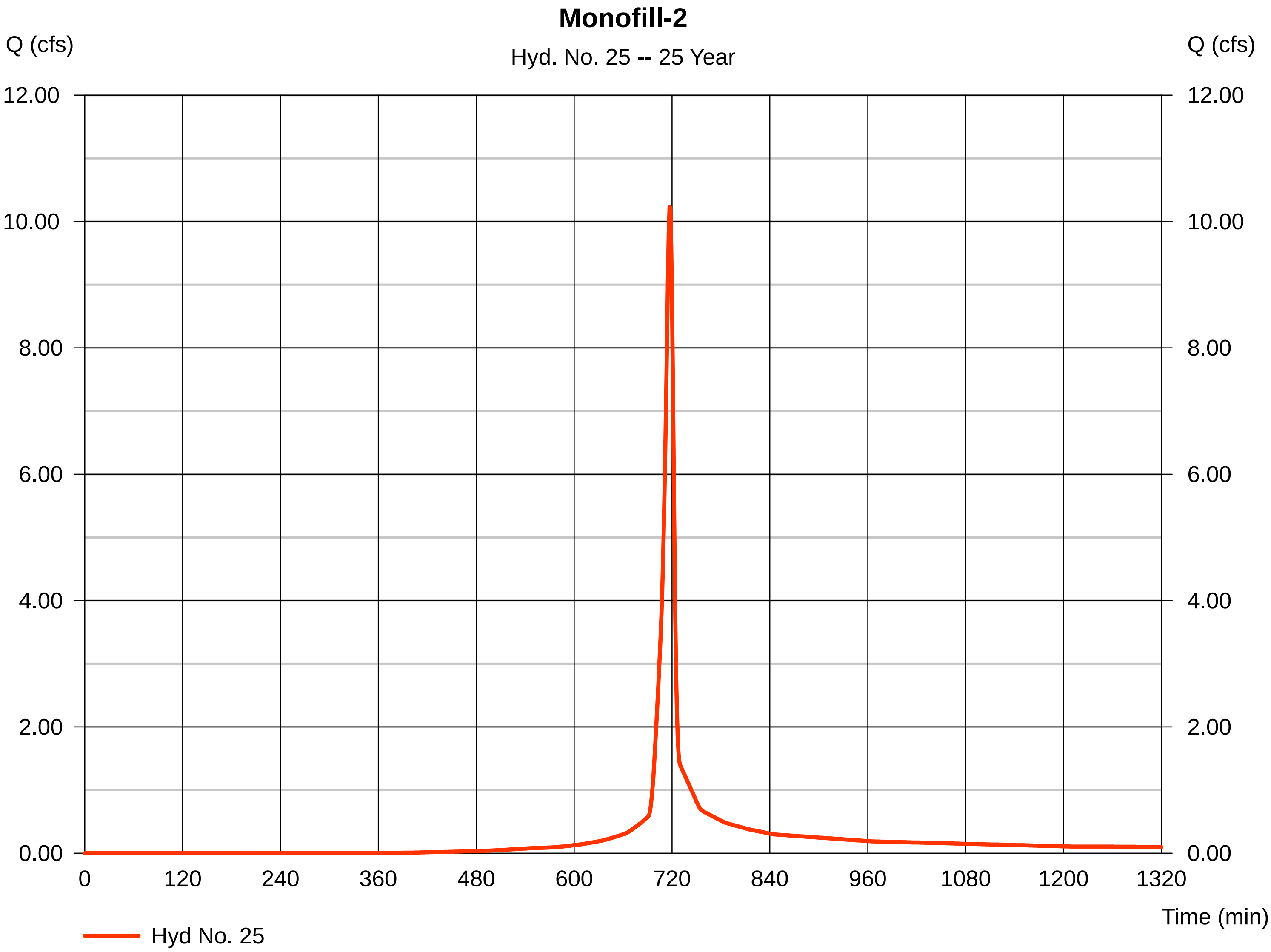
Hydrograph Report

Hyd. No. 25

Monofill-2

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 1.410 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.27 in
Storm duration = 24 hrs

Peak discharge = 10.24 cfs
Time to peak = 717 min
Hyd. volume = 21,249 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Type II
Shape factor = 484



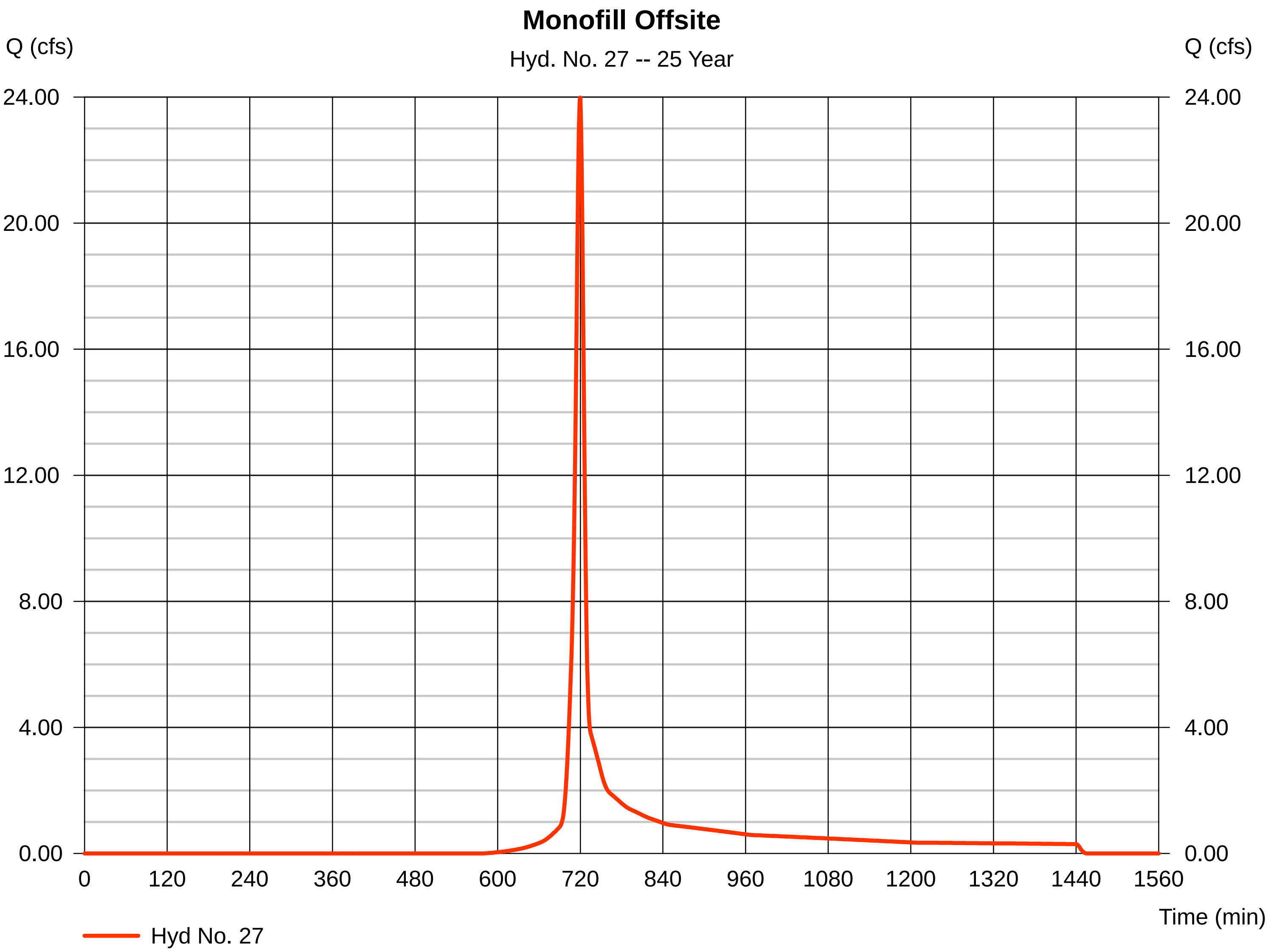
Hydrograph Report

Hyd. No. 27

Monofill Offsite

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 5.660 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.27 in
Storm duration = 24 hrs

Peak discharge = 23.98 cfs
Time to peak = 720 min
Hyd. volume = 54,284 cuft
Curve number = 66
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

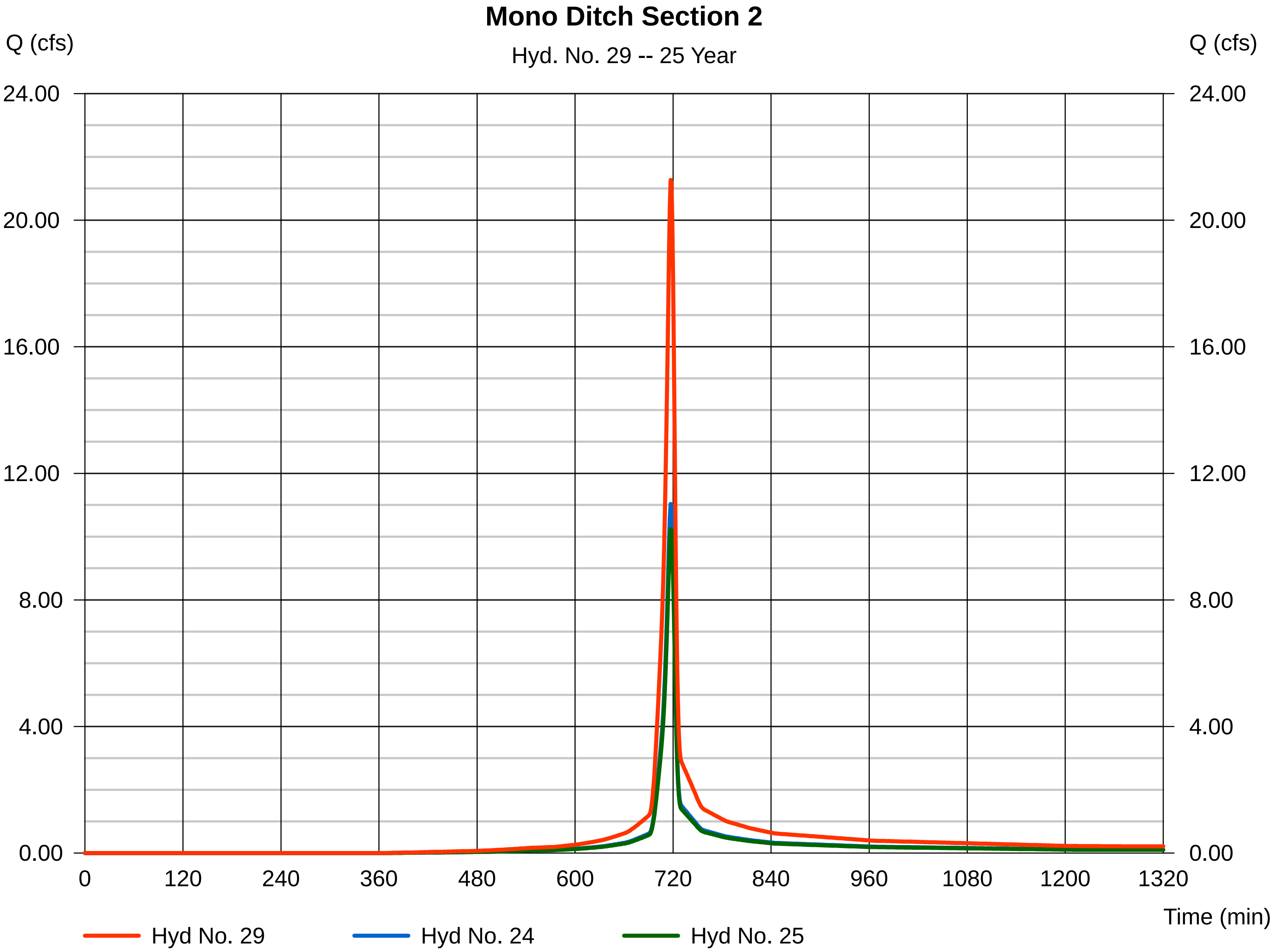
Monday, Nov 12, 2018

Hyd. No. 29

Mono Ditch Section 2

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyds. = 24, 25

Peak discharge = 21.27 cfs
Time to peak = 717 min
Hyd. volume = 44,155 cuft
Contrib. drain. area = 2.930 ac

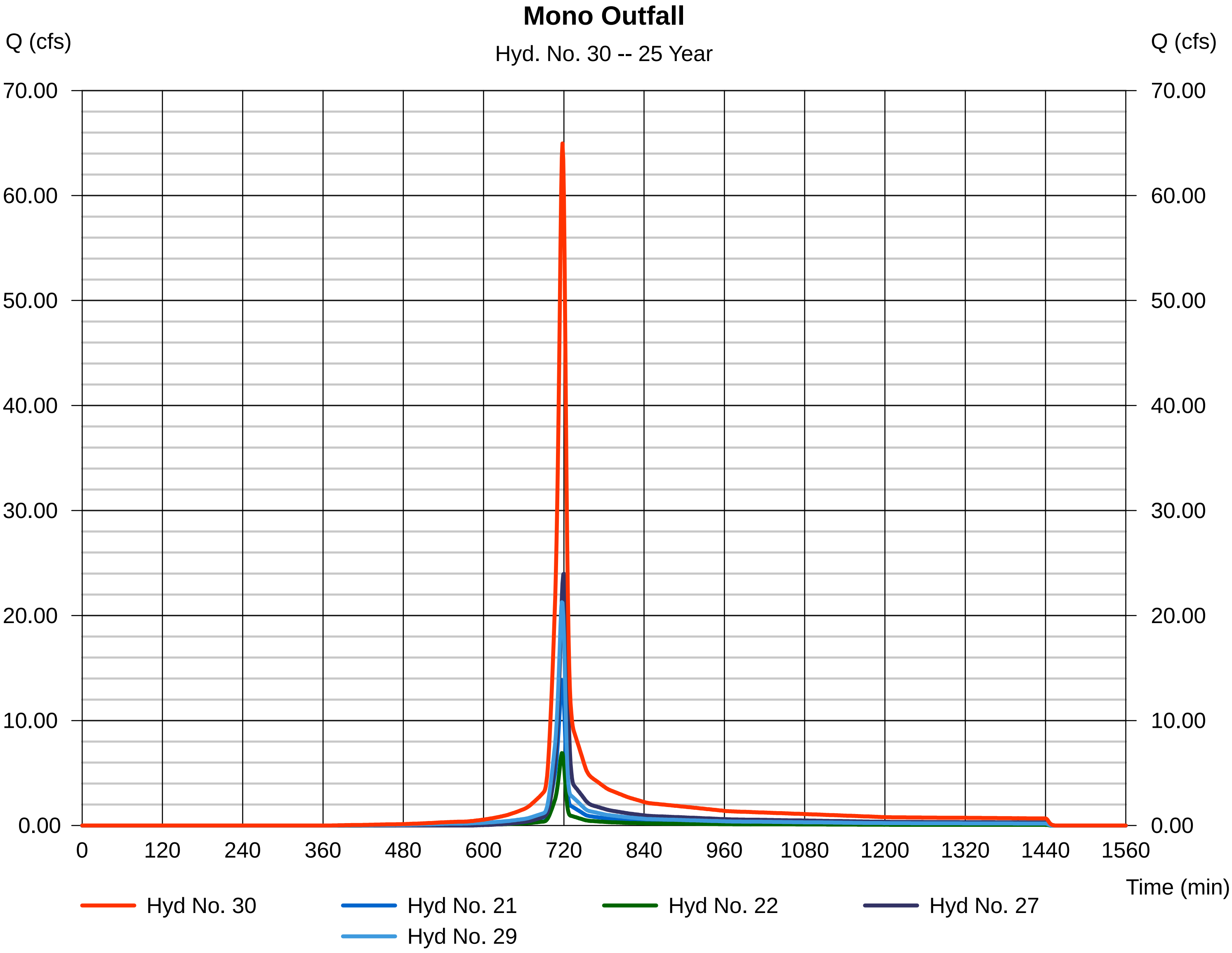


Hydrograph Report

Hyd. No. 30

Mono Outfall

Hydrograph type	= Combine	Peak discharge	= 64.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 141,540 cuft
Inflow hyds.	= 21, 22, 27, 29	Contrib. drain. area	= 8.520 ac



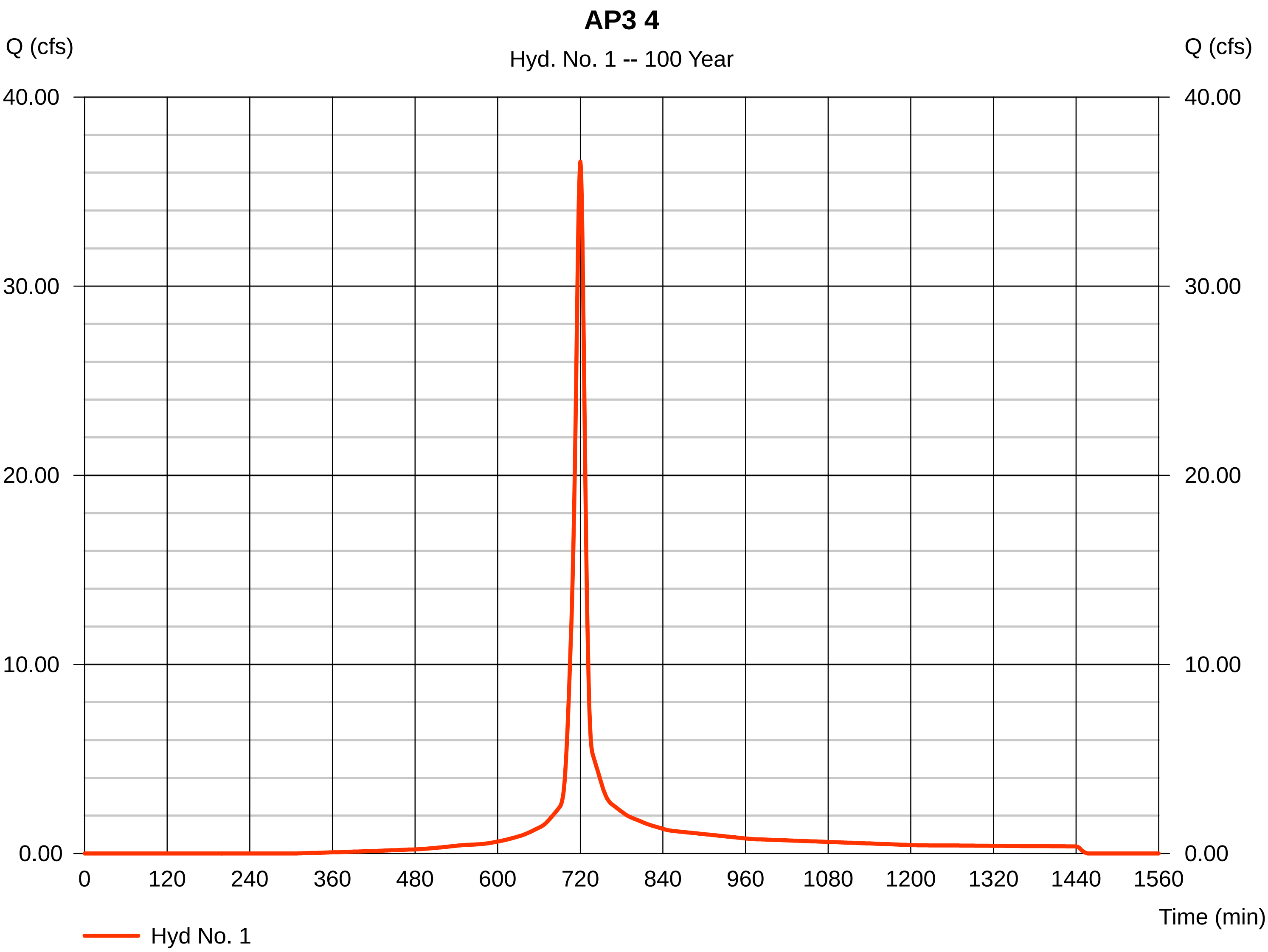
Hydrograph Report

Hyd. No. 1

AP3 4

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 4.330 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 8.07 in
Storm duration = 24 hrs

Peak discharge = 36.59 cfs
Time to peak = 720 min
Hyd. volume = 91,042 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.30 min
Distribution = Type II
Shape factor = 484



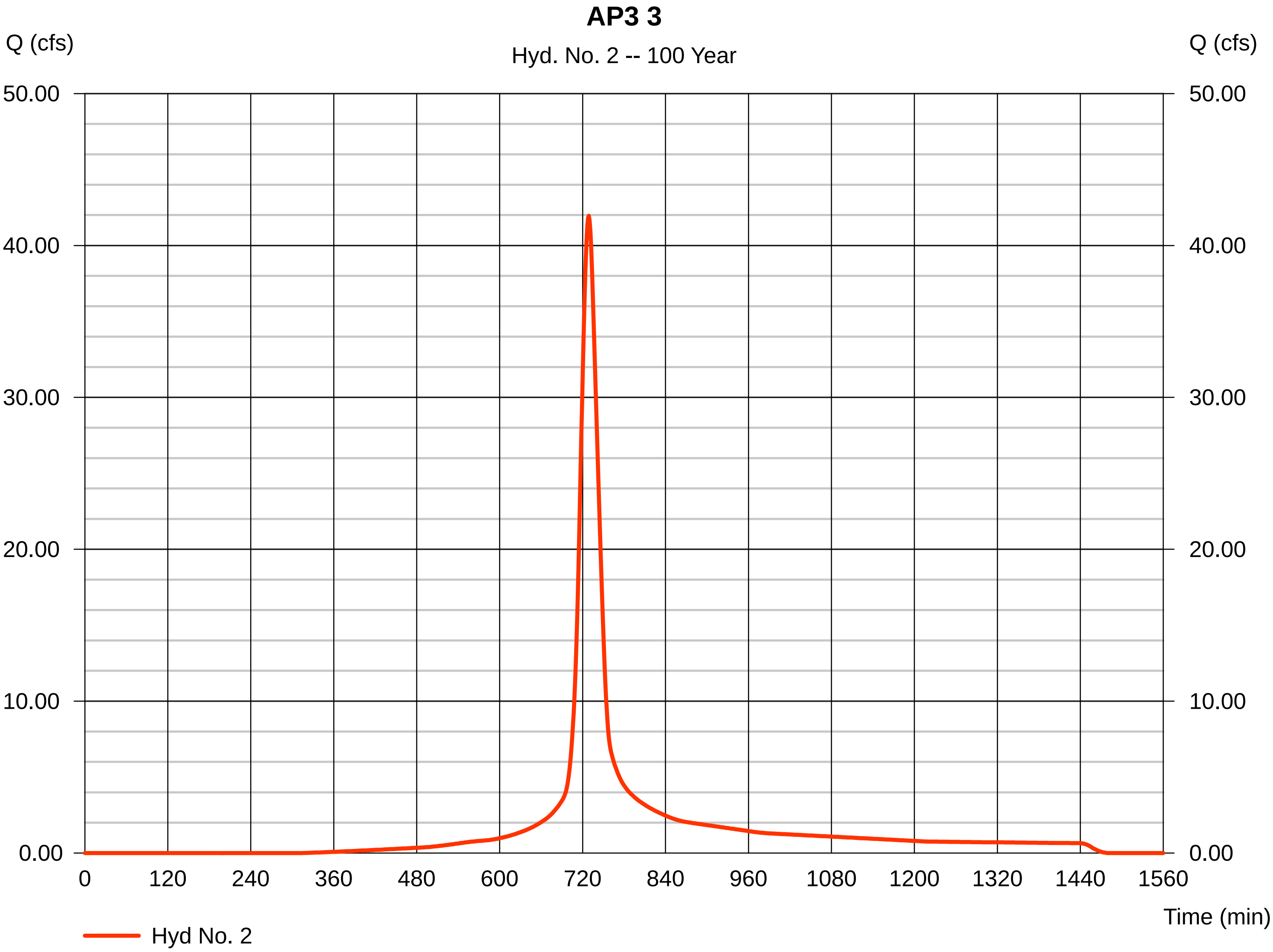
Hydrograph Report

Hyd. No. 2

AP3 3

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 7.580 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 8.07 in
Storm duration = 24 hrs

Peak discharge = 41.95 cfs
Time to peak = 729 min
Hyd. volume = 157,804 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.80 min
Distribution = Type II
Shape factor = 484

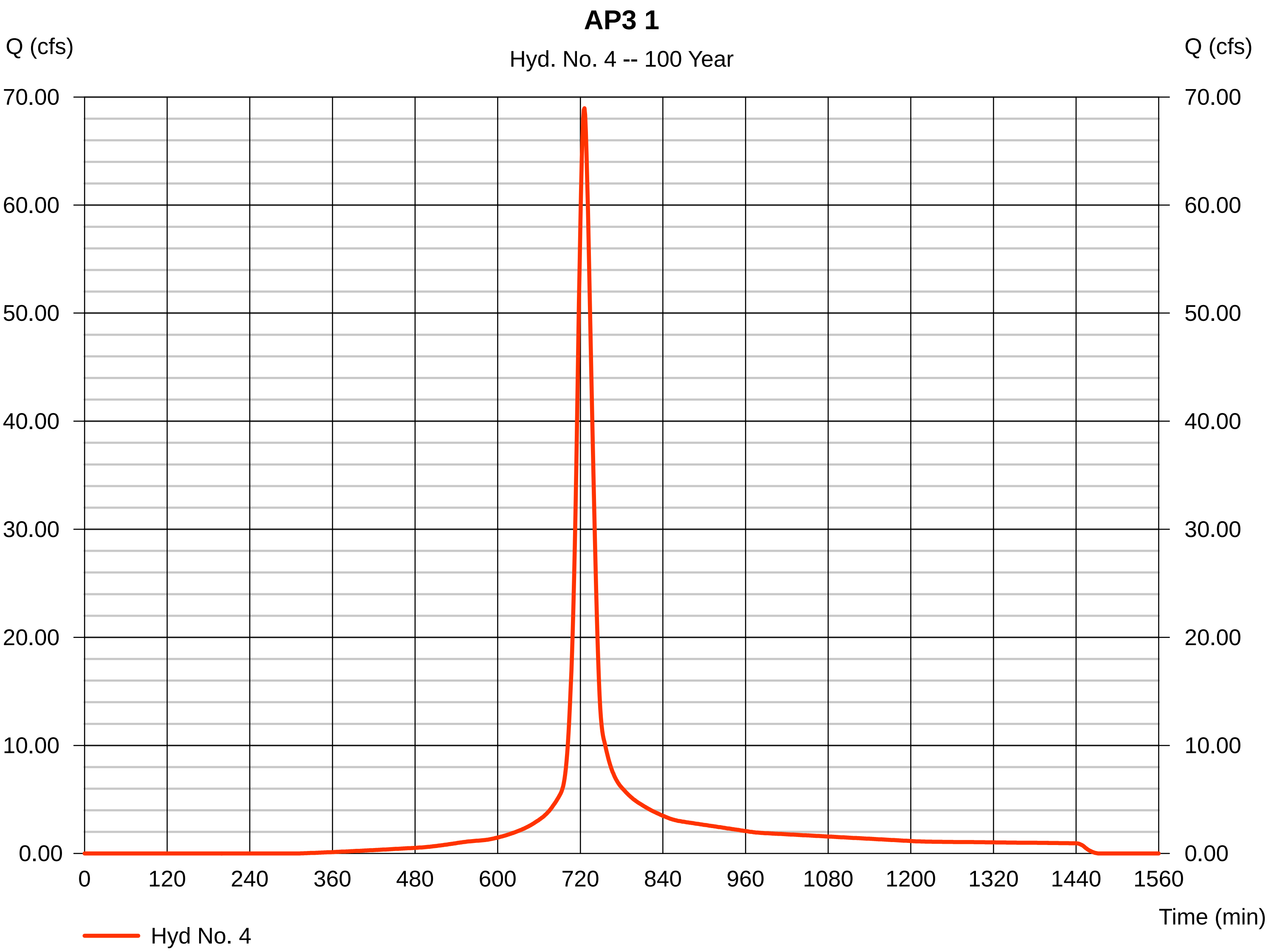


Hydrograph Report

Hyd. No. 4

AP3 1

Hydrograph type	= SCS Runoff	Peak discharge	= 68.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 229,830 cuft
Drainage area	= 11.020 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.69 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



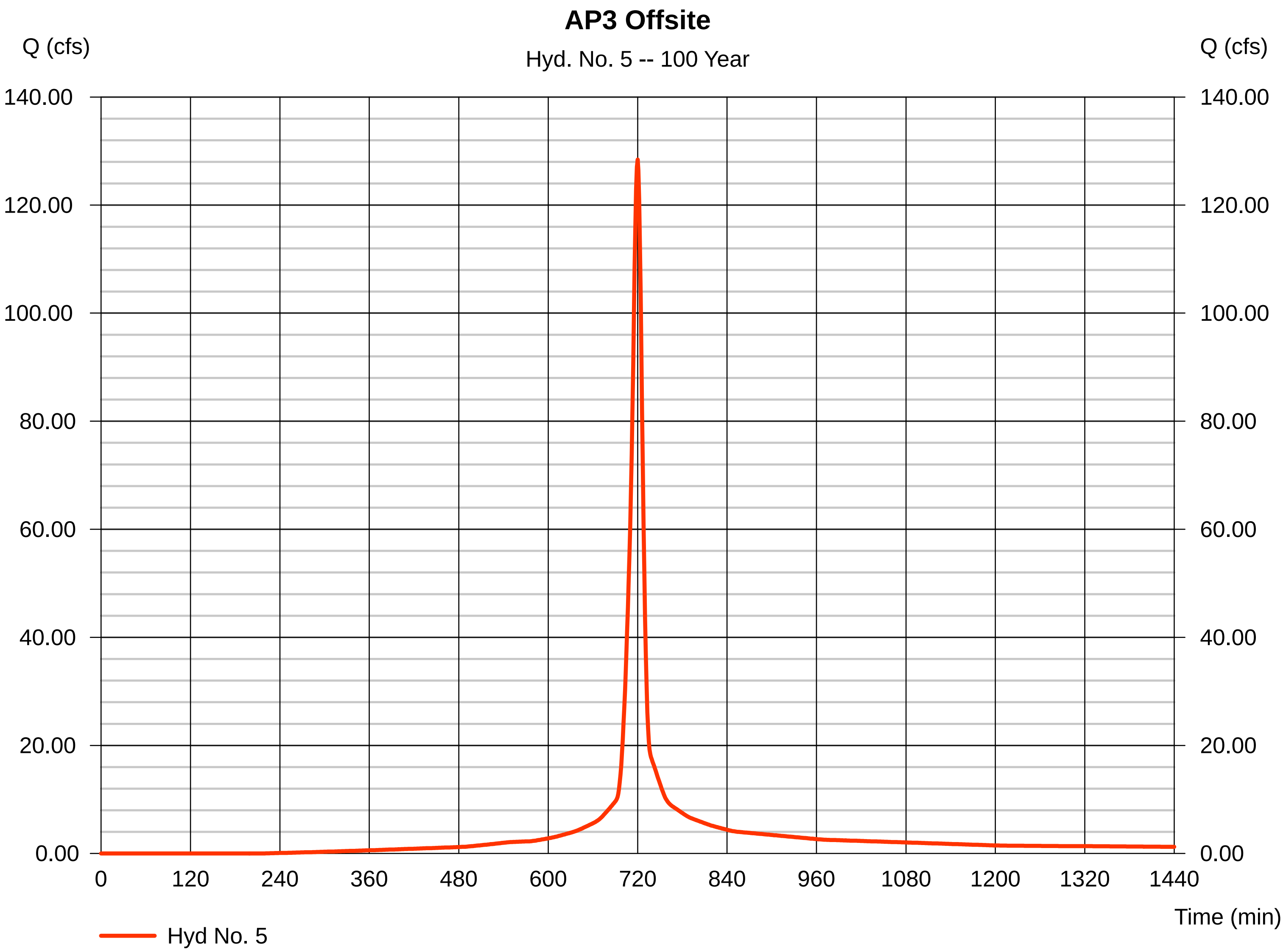
Hydrograph Report

Hyd. No. 5

AP3 Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 128.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 329,363 cuft
Drainage area	= 13.930 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(10.690 x 91) + (3.240 x 70)] / 13.930

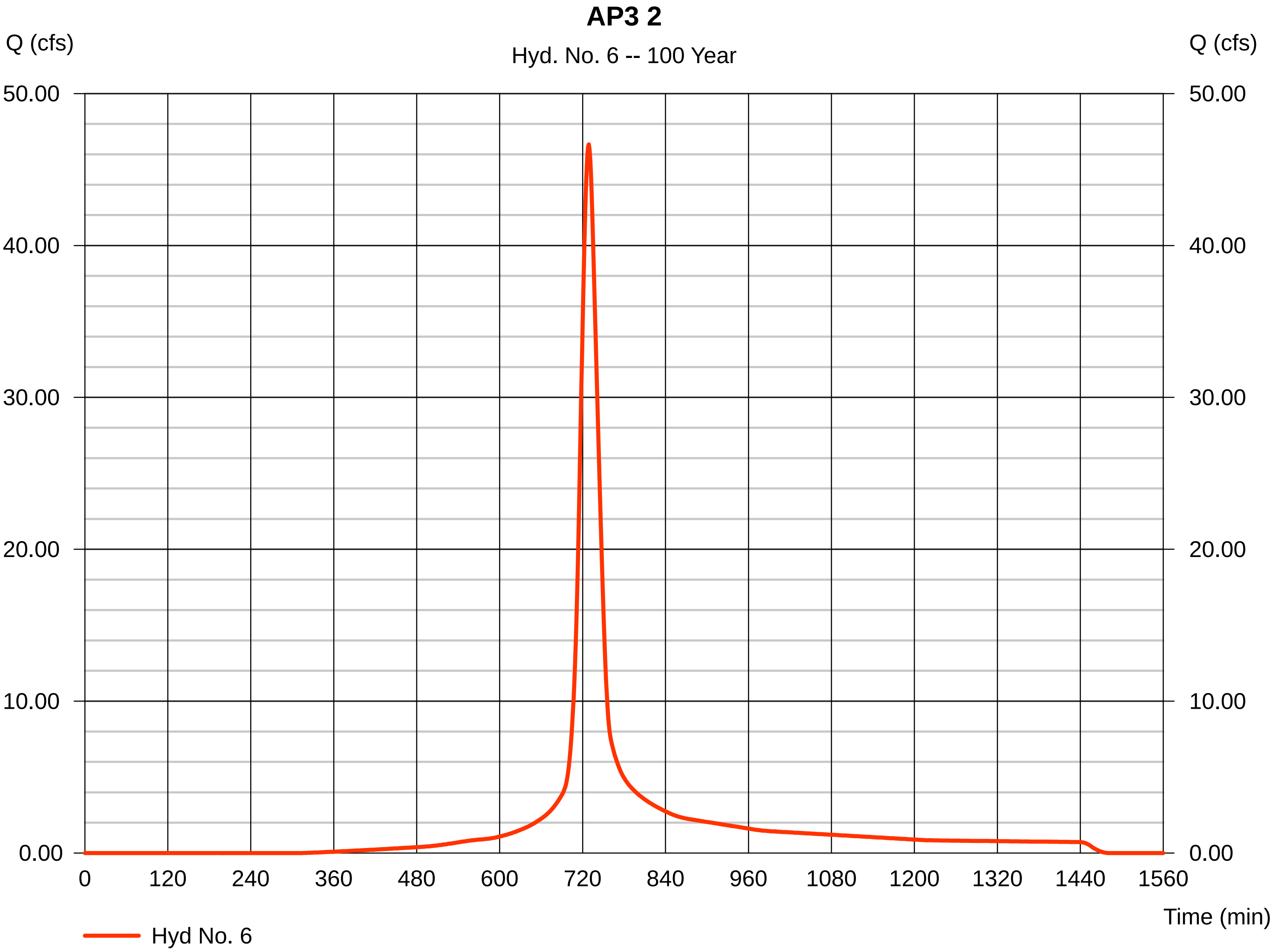


Hydrograph Report

Hyd. No. 6

AP3 2

Hydrograph type	= SCS Runoff	Peak discharge	= 46.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 175,499 cuft
Drainage area	= 8.430 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 26.40 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

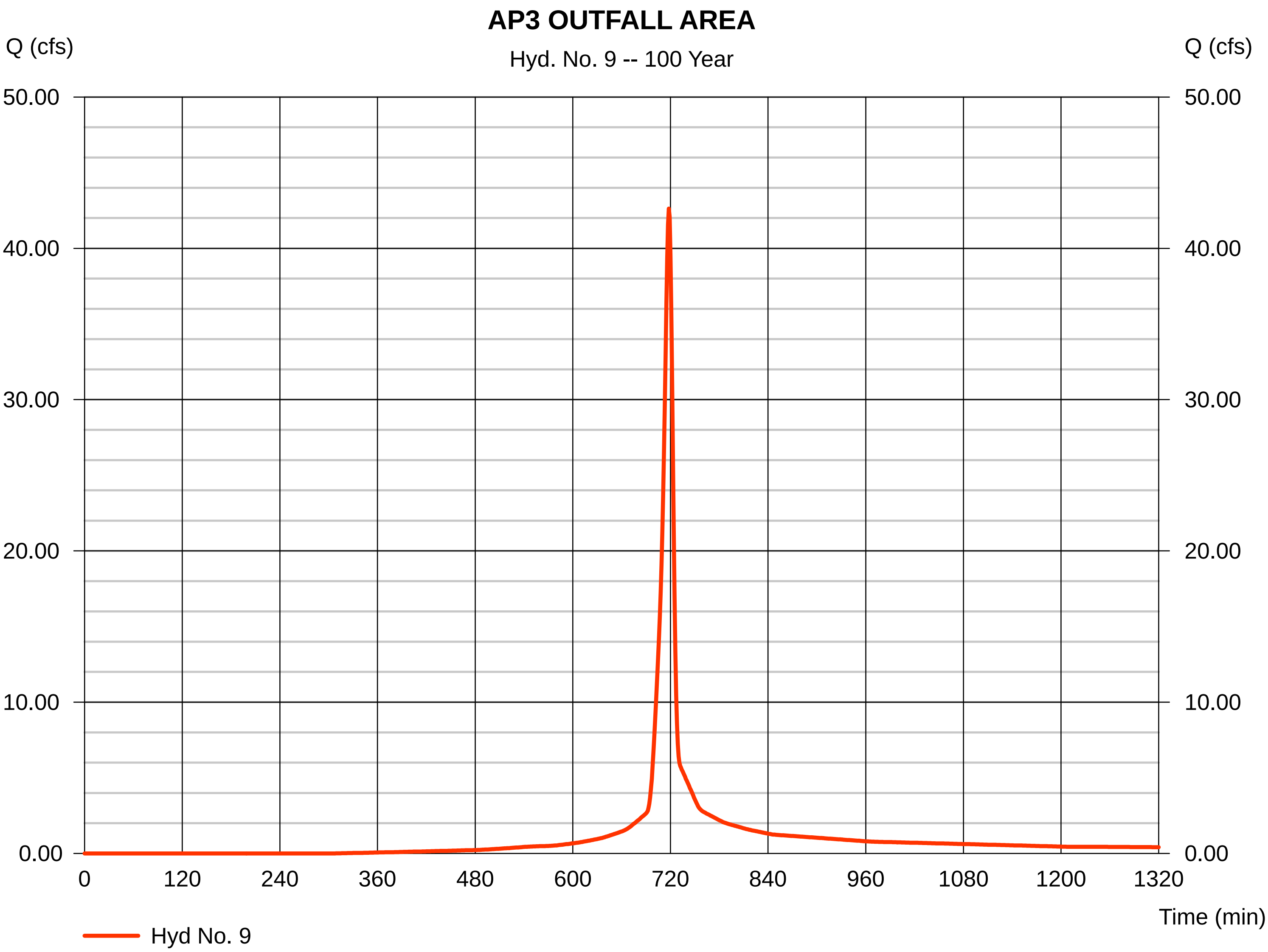
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Nov 12, 2018

Hyd. No. 9

AP3 OUTFALL AREA

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 4.650 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 8.07 in
Storm duration = 24 hrs

Peak discharge = 42.62 cfs
Time to peak = 718 min
Hyd. volume = 93,654 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Type II
Shape factor = 484

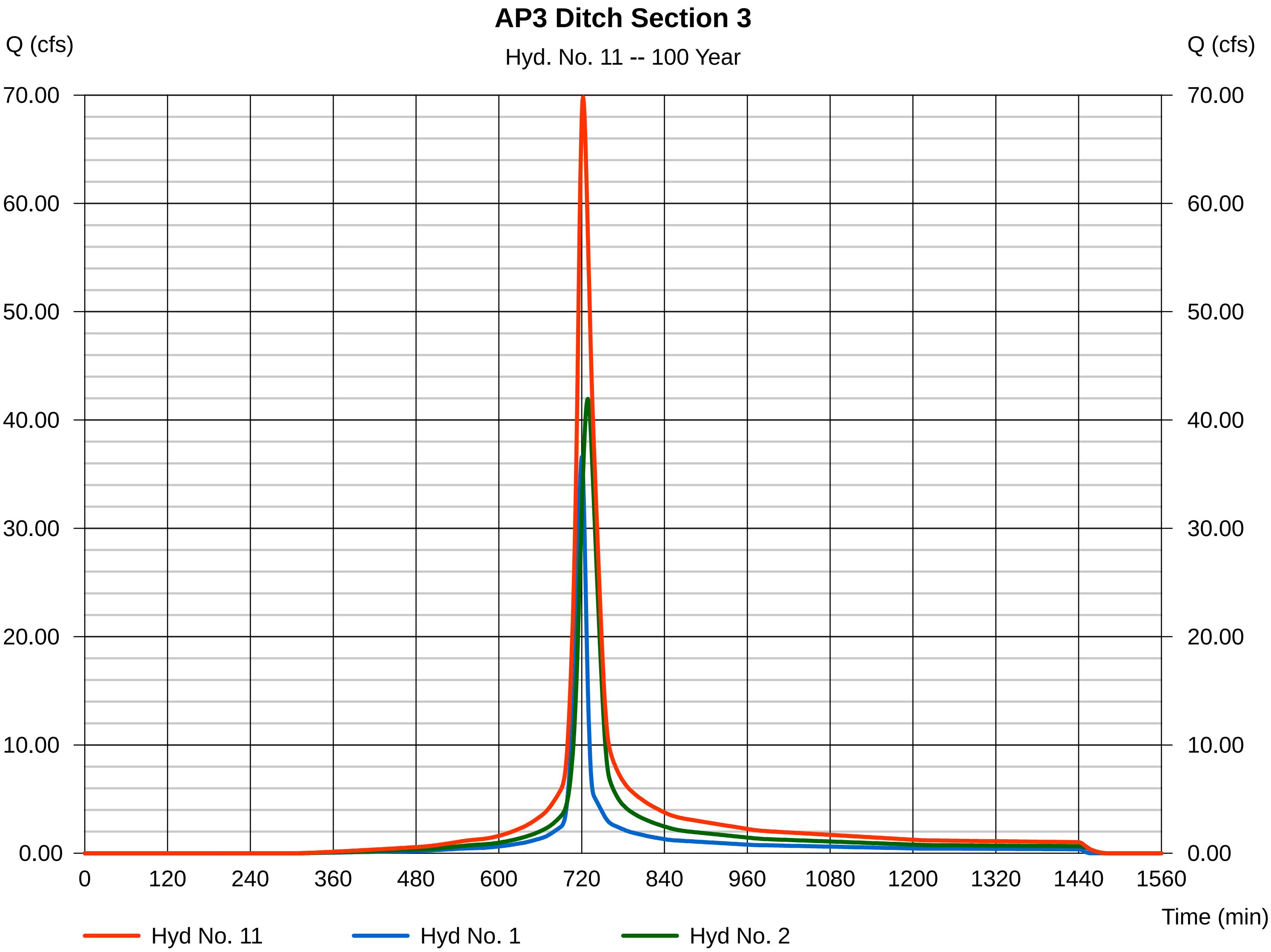


Hydrograph Report

Hyd. No. 11

AP3 Ditch Section 3

Hydrograph type	= Combine	Peak discharge	= 69.80 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 248,846 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 11.910 ac



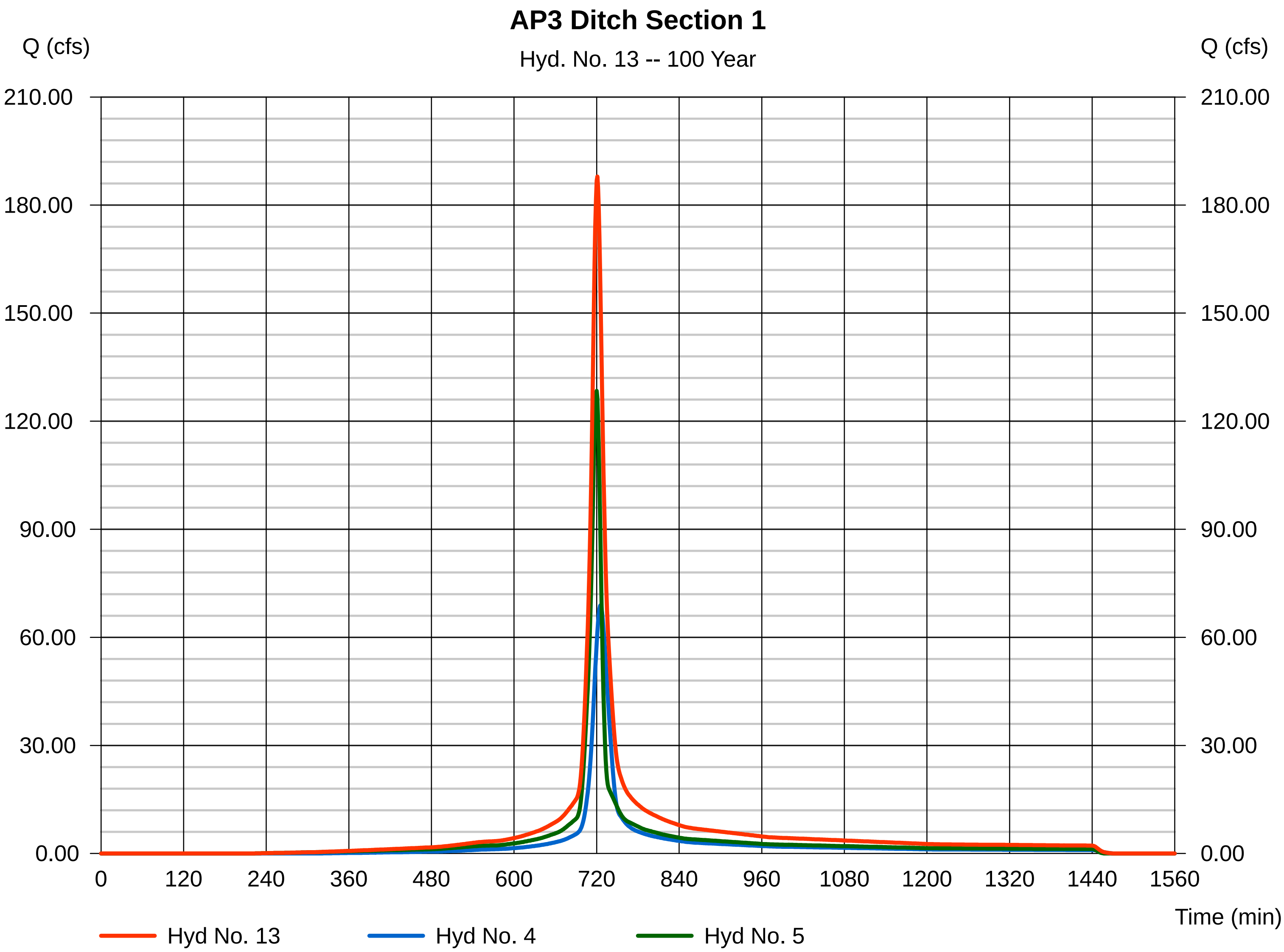
Hydrograph Report

Hyd. No. 13

AP3 Ditch Section 1

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 4, 5

Peak discharge = 187.94 cfs
Time to peak = 721 min
Hyd. volume = 559,192 cuft
Contrib. drain. area = 24.950 ac



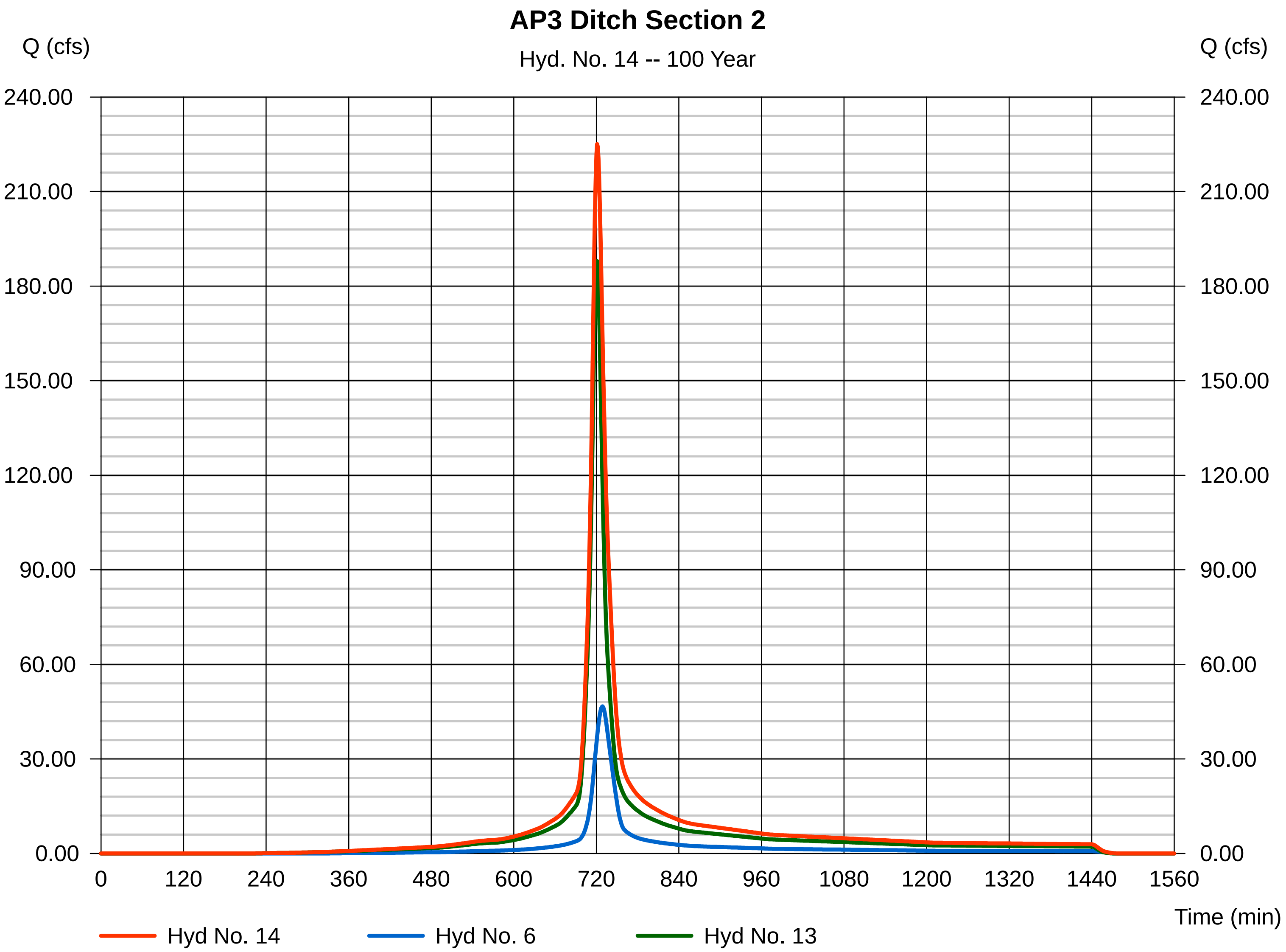
Hydrograph Report

Hyd. No. 14

AP3 Ditch Section 2

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 6, 13

Peak discharge = 225.05 cfs
Time to peak = 721 min
Hyd. volume = 734,692 cuft
Contrib. drain. area = 8.430 ac

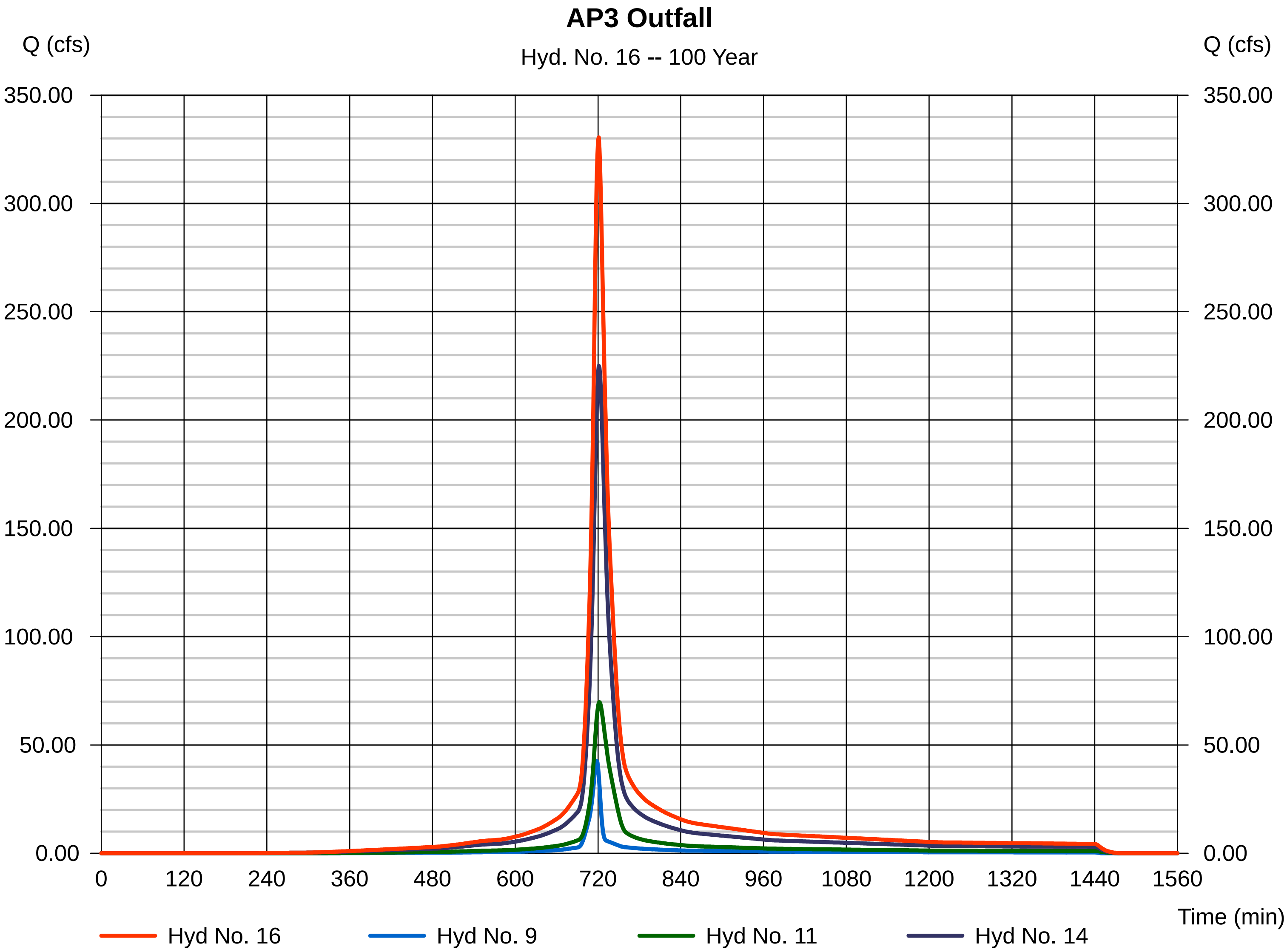


Hydrograph Report

Hyd. No. 16

AP3 Outfall

Hydrograph type	= Combine	Peak discharge	= 330.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 1,077,192 cuft
Inflow hyds.	= 9, 11, 14	Contrib. drain. area	= 4.650 ac



Hydrograph Report

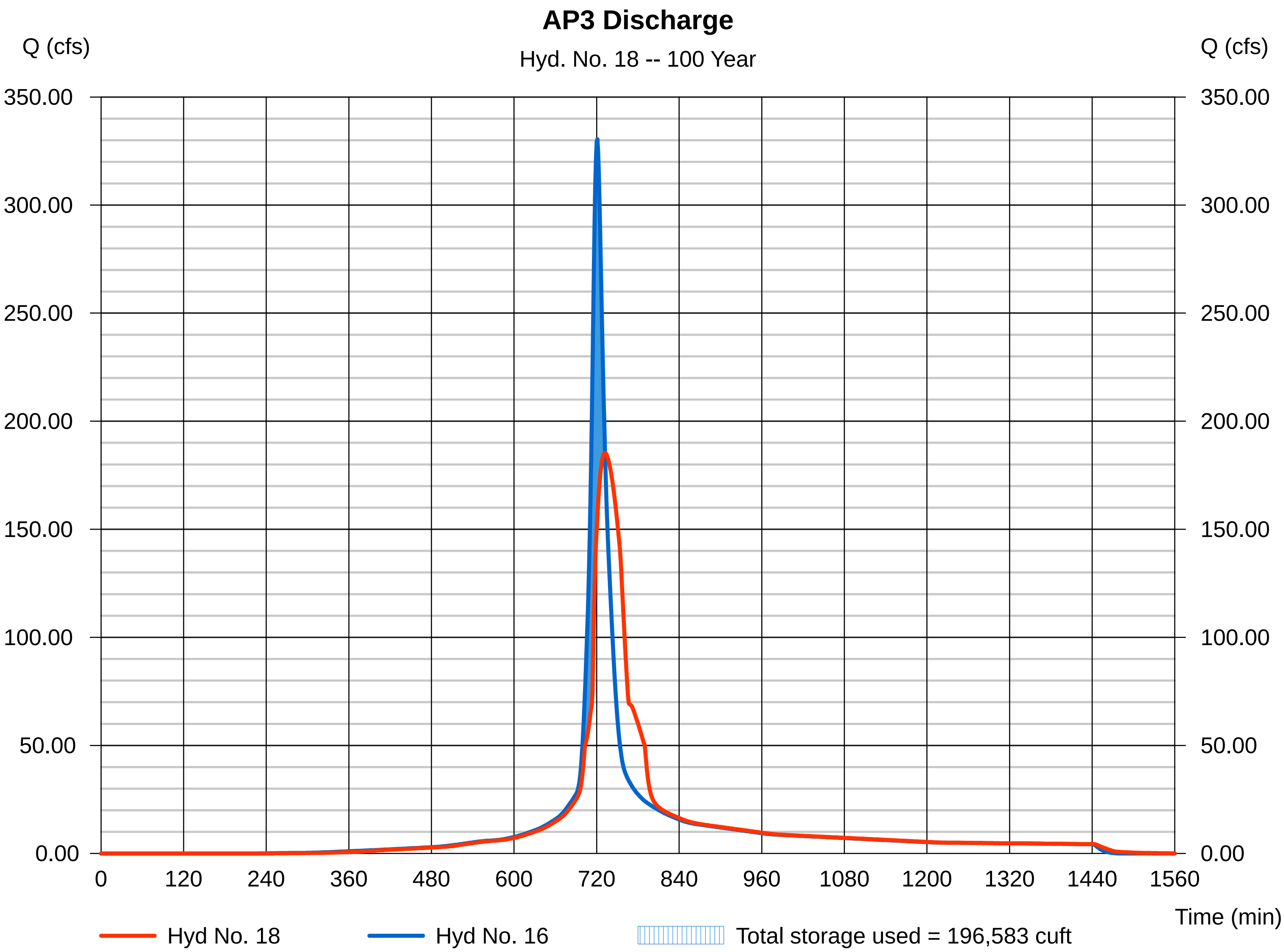
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Nov 12, 2018

Hyd. No. 18

AP3 Discharge

Hydrograph type	= Reservoir	Peak discharge	= 185.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 1,077,191 cuft
Inflow hyd. No.	= 16 - AP3 Outfall	Max. Elevation	= 350.98 ft
Reservoir name	= AP3 Outlet	Max. Storage	= 196,583 cuft

Storage Indication method used.



Hydrograph Report

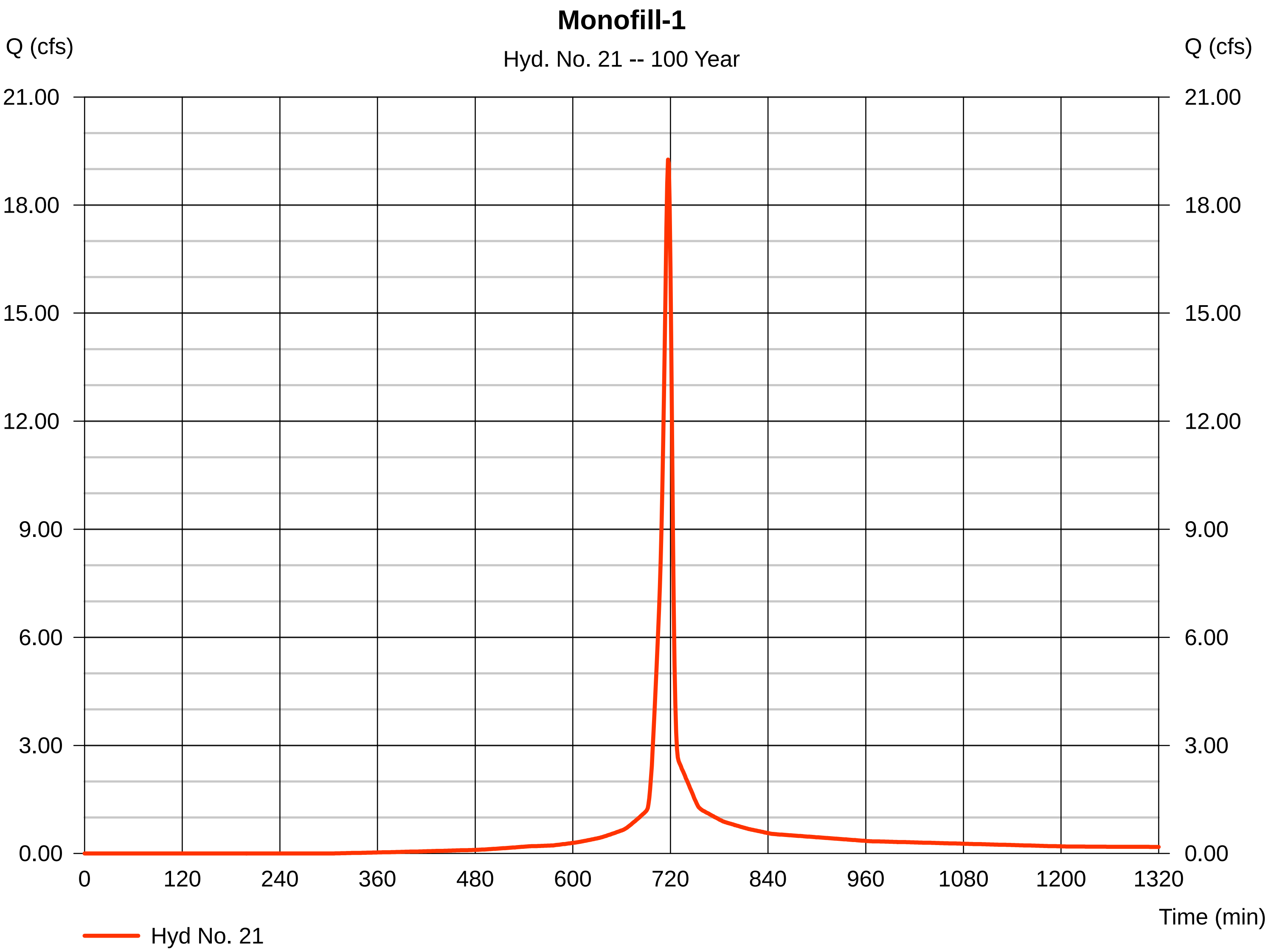
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Nov 12, 2018

Hyd. No. 21

Monofill-1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.910 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 8.07 in
Storm duration = 24 hrs

Peak discharge = 19.26 cfs
Time to peak = 717 min
Hyd. volume = 40,688 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Type II
Shape factor = 484

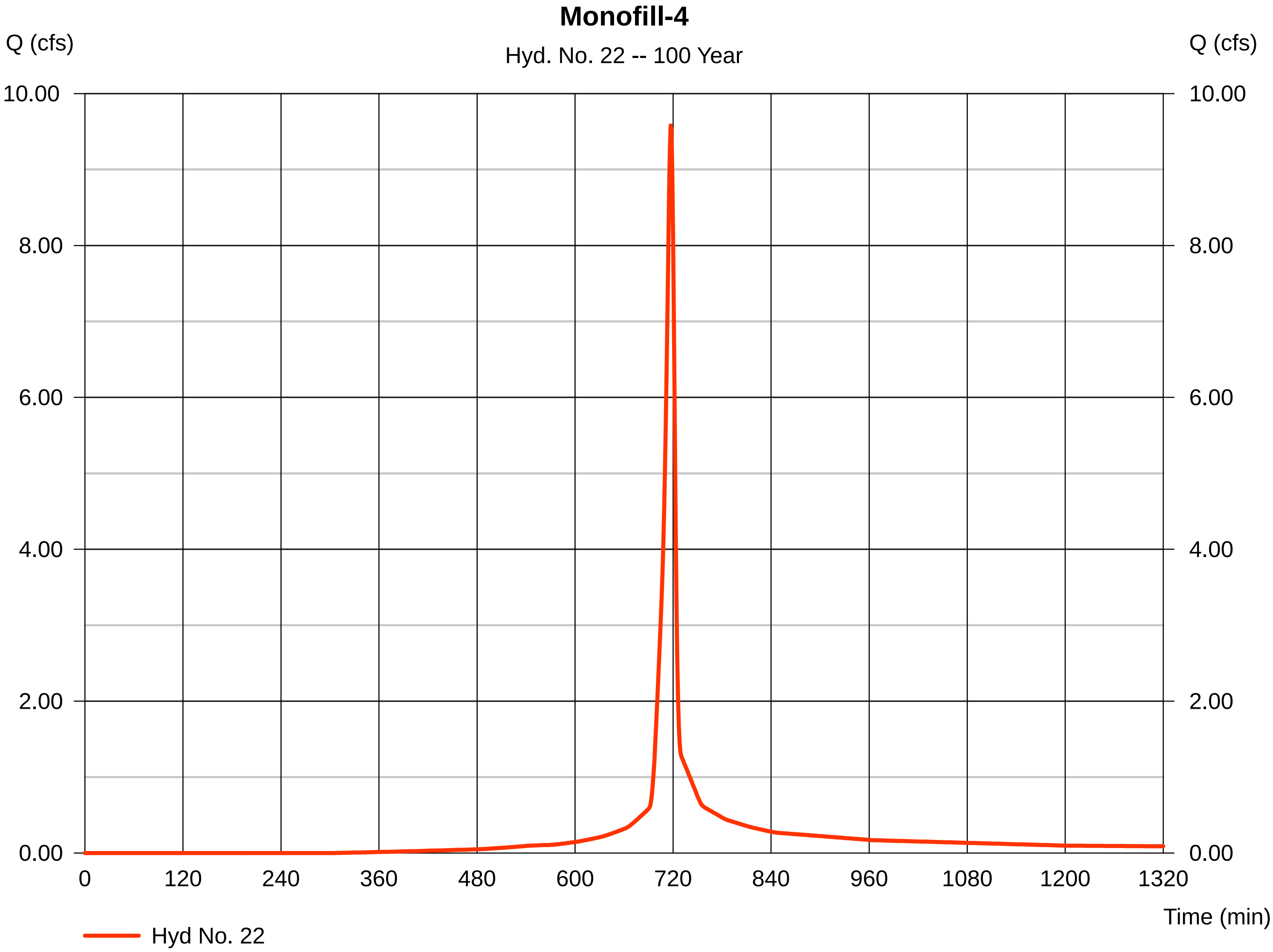


Hydrograph Report

Hyd. No. 22

Monofill-4

Hydrograph type	= SCS Runoff	Peak discharge	= 9.581 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 20,237 cuft
Drainage area	= 0.950 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

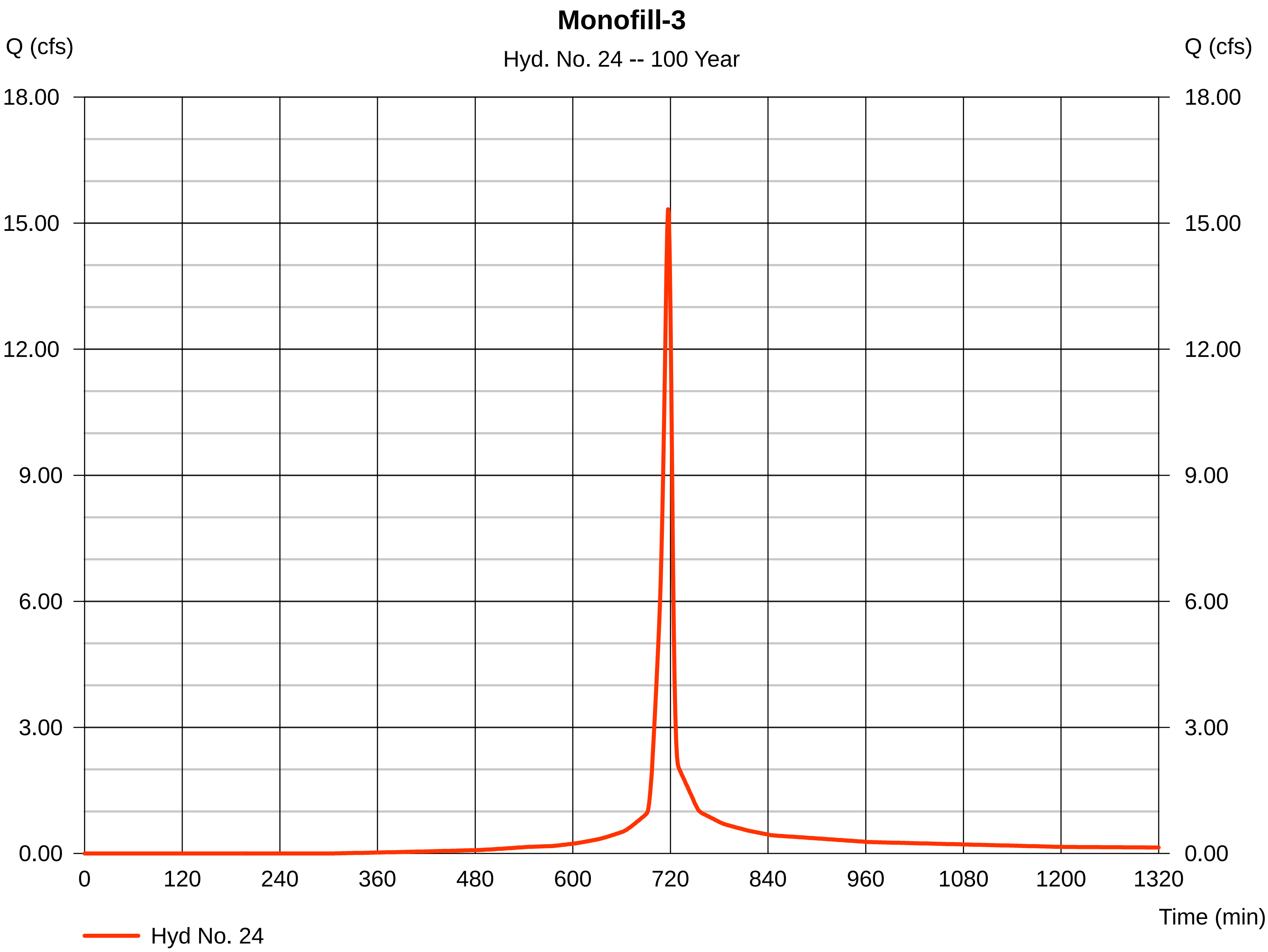


Hydrograph Report

Hyd. No. 24

Monofill-3

Hydrograph type	= SCS Runoff	Peak discharge	= 15.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 32,380 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

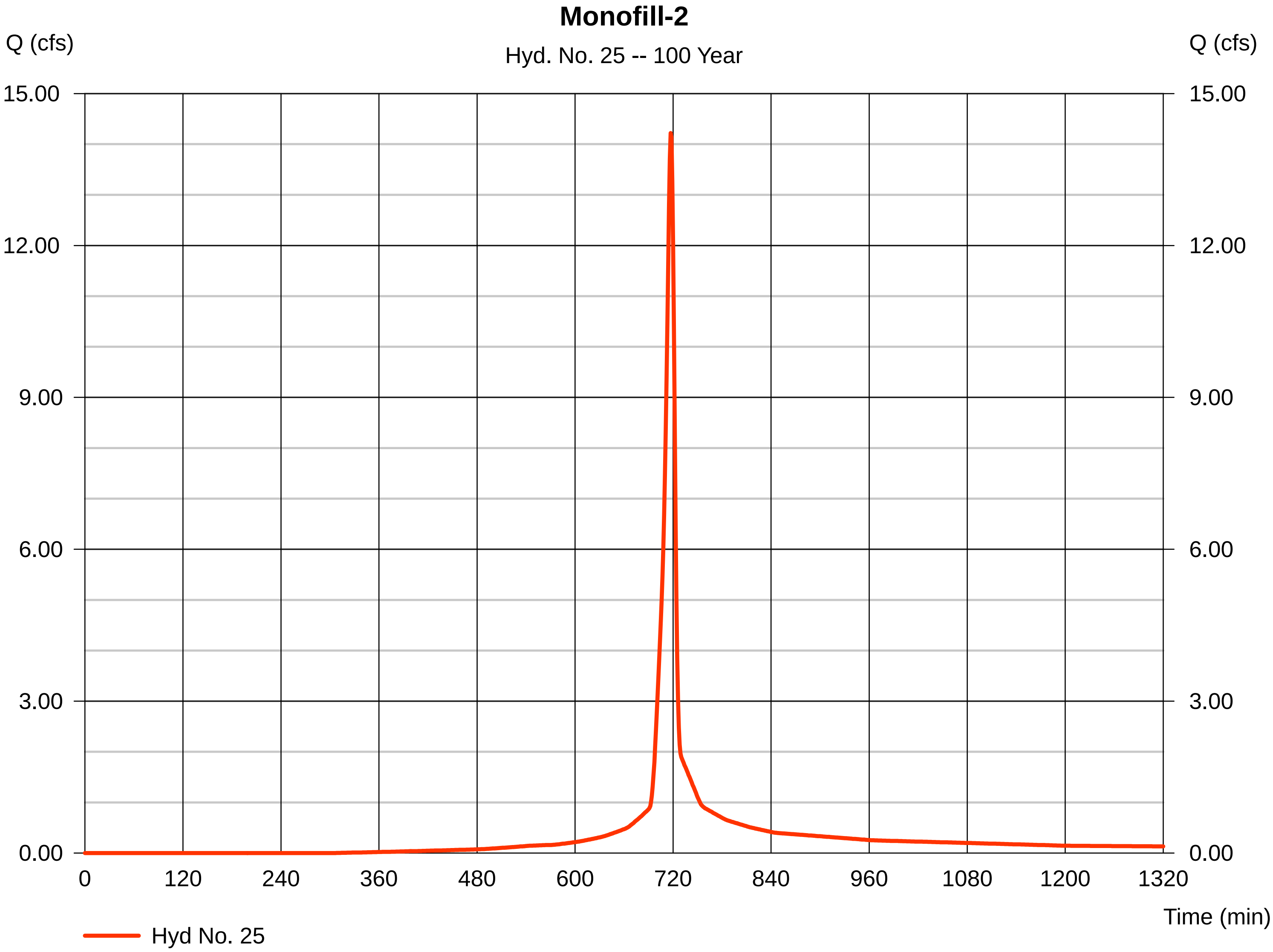


Hydrograph Report

Hyd. No. 25

Monofill-2

Hydrograph type	= SCS Runoff	Peak discharge	= 14.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 30,037 cuft
Drainage area	= 1.410 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

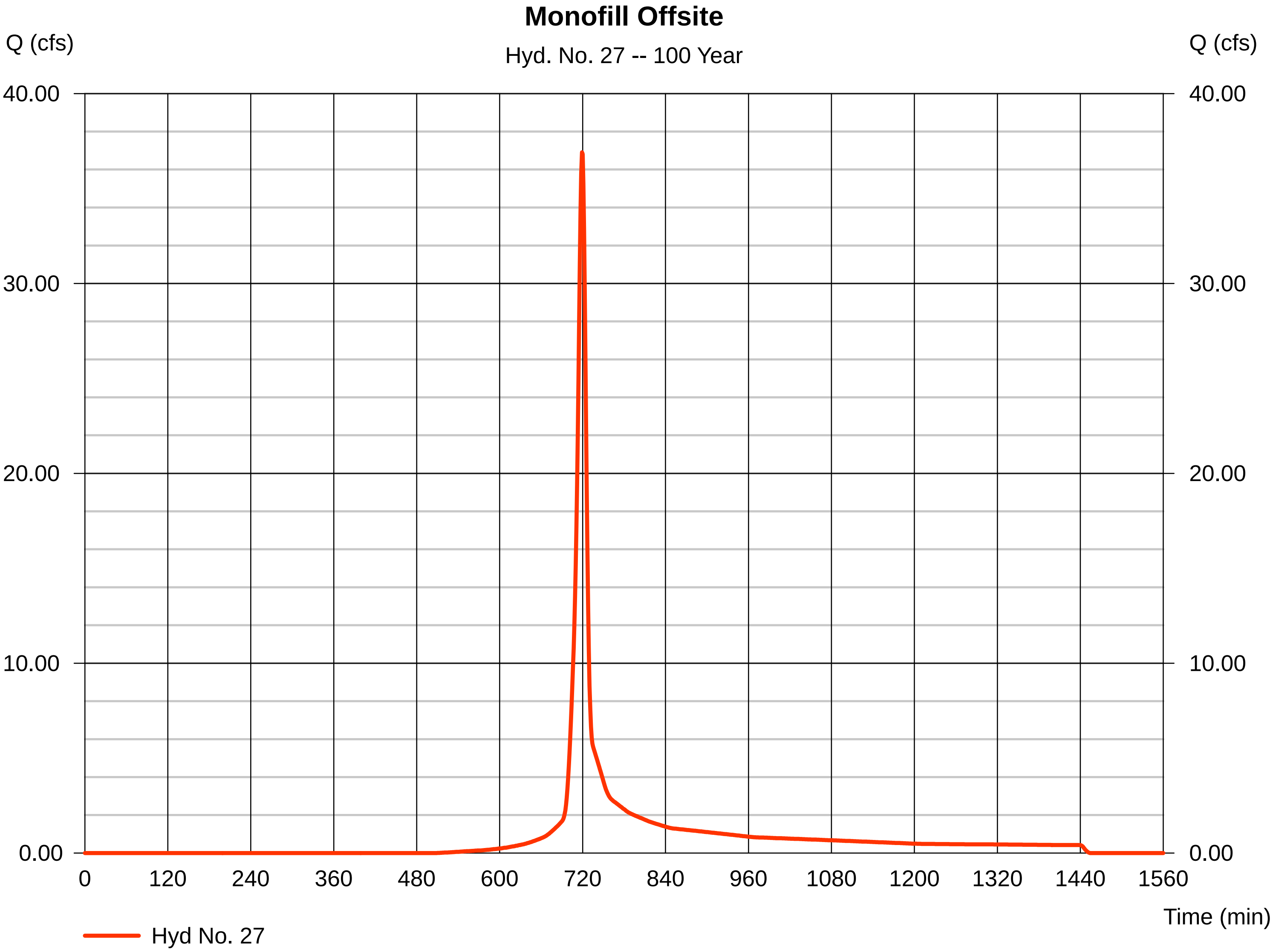


Hydrograph Report

Hyd. No. 27

Monofill Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 36.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 83,519 cuft
Drainage area	= 5.660 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

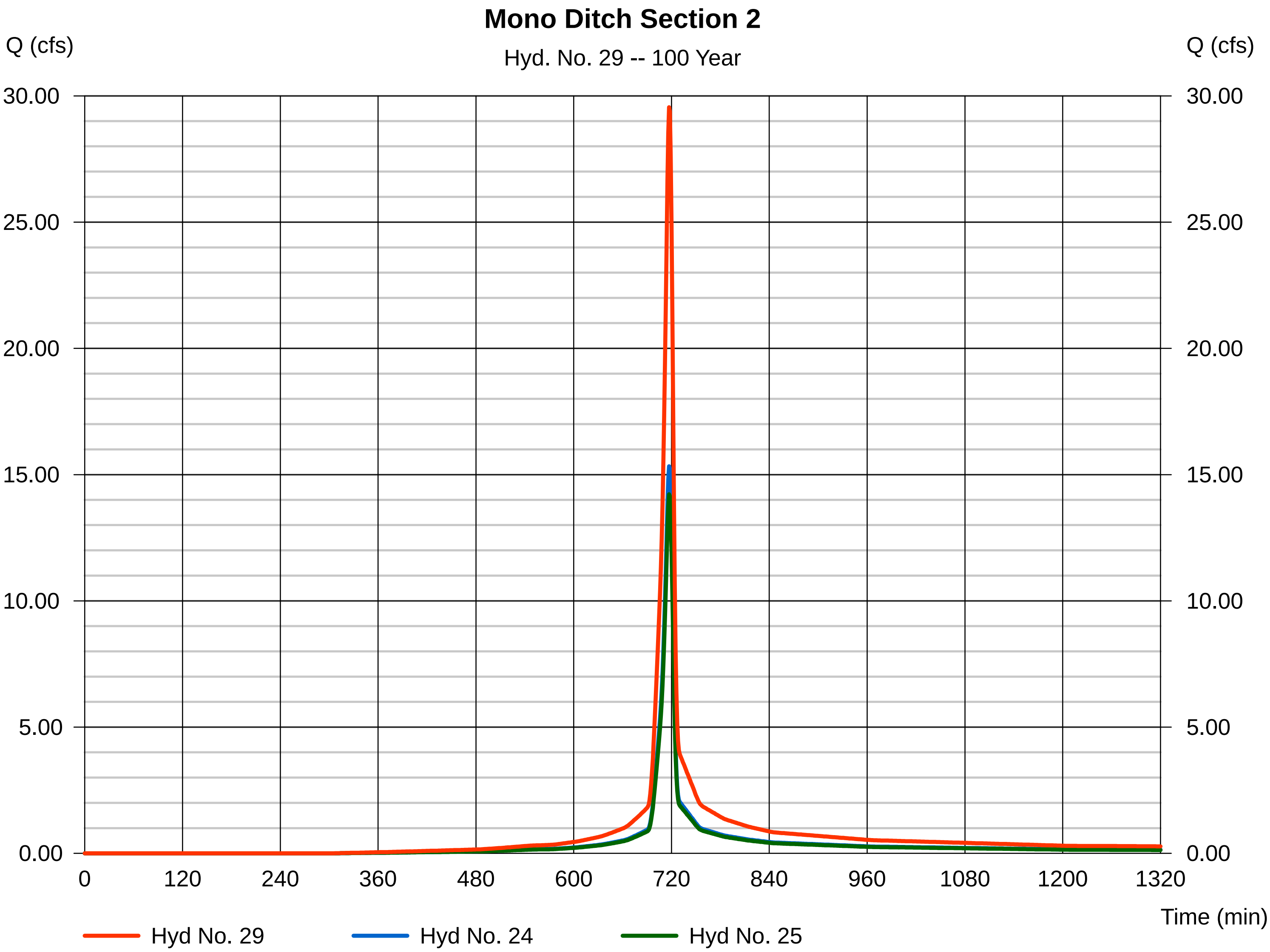


Hydrograph Report

Hyd. No. 29

Mono Ditch Section 2

Hydrograph type	= Combine	Peak discharge	= 29.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 62,417 cuft
Inflow hyds.	= 24, 25	Contrib. drain. area	= 2.930 ac



Hydrograph Report

Hyd. No. 30

Mono Outfall

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 21, 22, 27, 29

Peak discharge = 93.84 cfs
Time to peak = 718 min
Hyd. volume = 206,861 cuft
Contrib. drain. area = 8.520 ac