PRESENTATION OF SITE INVESTIGATION RESULTS

Havana Power Plant
Havana, Illinois

Prepared for:

AECOM

ConeTec Job No: 15-53077

Project Start Date: 27-Aug-2015
Project End Date: 27-Aug-2015
Report Date: 29-Aug-2015

Prepared by:

ConeTec Inc.
436 Commerce Lane, Unit C
West Berlin, NJ 08091

Tel: (856) 767-8600
Fax: (856) 767-4008
Toll Free: (800) 504-1116

Email: conetecNJ@conetec.com
www.conetec.com
www.conetecdataservices.com

Introduction

The enclosed report presents the results of a seismic piezocone penetration testing (SCPTu or SCPT) program carried out at the Havana Power Plant site located in Havana, Illinois. The site investigation program was conducted by ConeTec Inc., under contract to AECOM of St. Louis, Missouri.

A total of eight seismic cone penetration tests were completed at eight locations. The SCPT program was performed to evaluate the subsurface soil conditions. SCPT sounding locations were selected and numbered under the supervision of AECOM personnel (Ms. Dorian Gohr).

Project Information

Project	
Client	AECOM
Project	Havana Power Plant, Havana, IL
ConeTec project number	15-53077

A map from Google earth including the CPT test locations is presented below.

Rig Description	Deployment System	Test Type
CPT Track Rig	20 ton track mounted (twin cylinders)	SCPT

Coordinates		
Test Type	Collection Method	EPSG Number
SCPT	GPS (Handheld)	32615 (WGS 84 / UTM North)

Cone Penetration Test (CPT)	
Depth reference	Ground surface at the time of the investigation.
Tip and sleeve data offset	0.1 meter. This has been accounted for in the CPT data files.
Pore pressure dissipation (PPD) tests	Sixteen pore pressure dissipation tests were completed primarily to determine the phreatic surface.
Additional Comments	Shear wave velocity tests were conducted at one meter intervals at all locations.

Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
419:T1500F15U500	419	15	225	1500	15	500

Limitations

This report has been prepared for the exclusive use of AECOM (Client) for the project titled "Havana Power Plant, Havana, IL". The report's contents may not be relied upon by any other party without the express written permission of ConeTec, Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

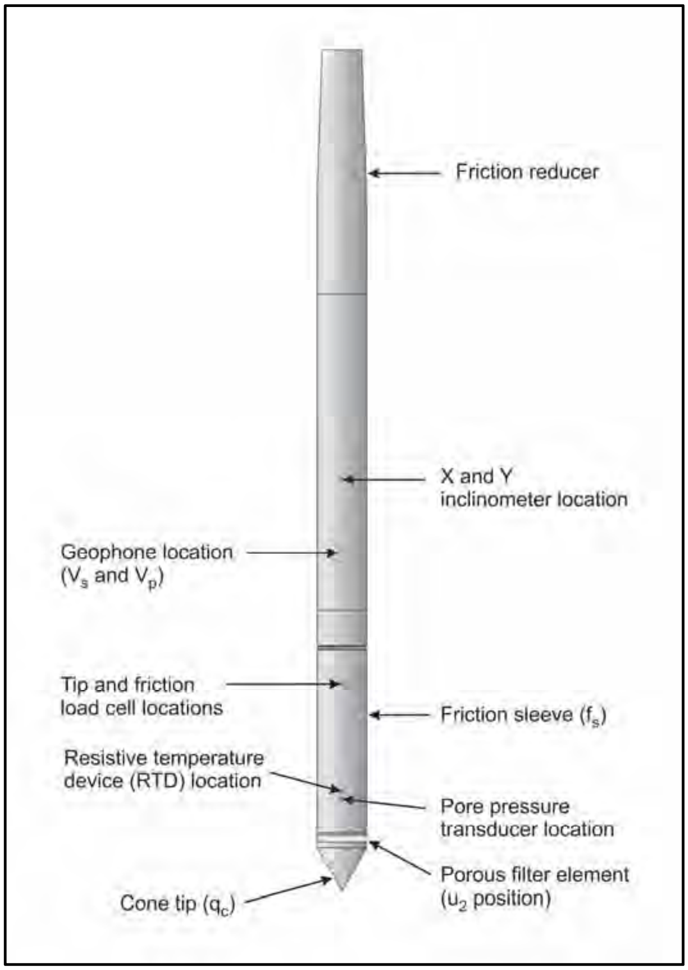


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1\text{-}a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is included in an appendix.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

References

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM, West Conshohocken, US.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, "Cone Penetration Testing in Geotechnical Practice", Blackie Academic and Professional.

Mayne, P.W., 2013, "Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests", Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420.

Mayne, P.W. and Peuchen, J., 2012, "Unit weight trends with cone resistance in soft to firm clays", Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, "Interpretation of geotechnical parameters from seismic piezocone tests", CPT'14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27: 151-158.

Robertson, P.K., 2009, "Interpretation of cone penetration tests – a unified approach", Canadian Geotechnical Journal, Volume 46: 1337-1355.

Shear wave velocity testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave (Vp) velocity is also determined.

ConeTec's piezocone penetrometers are manufactured with a horizontally active geophone (28 hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances an auger source or an imbedded impulsive source maybe used for both shear waves and compression waves. The hammer and beam act as a contact trigger that triggers the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded using an up-hole integrated digital oscilloscope which is part of the SCPTu data acquisition system. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

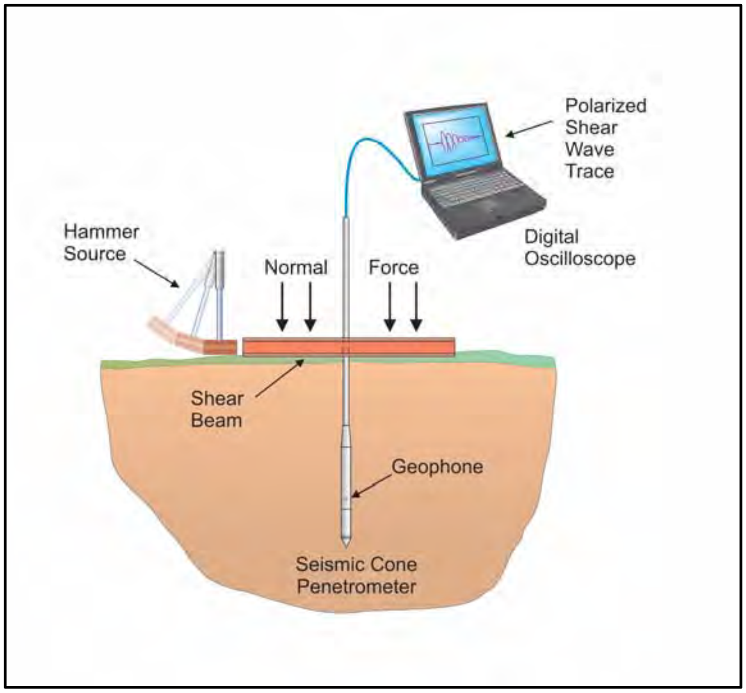


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Multiple wave traces are recorded for quality control purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et.al. (1986).

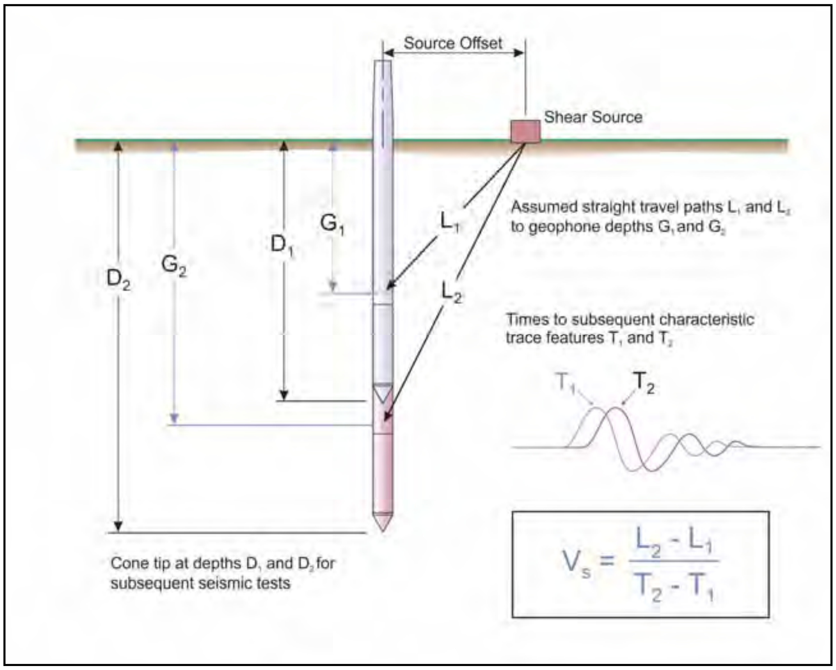


Figure SCPTu-2. Illustration of a seismic cone penetration test

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

The average shear wave velocity to a depth of 100 feet (30 meters) ($\bar{v}_s$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE, 2010.

$$\bar{v}_s = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

Tabular results and SCPTu plots are presented in the relevant appendix.

References

American Society of Civil Engineers (ASCE), 2010, "Minimum Design Loads for Buildings and Other Structures", Standard ASCE/SEI 7-10, American Society of Civil Engineers, ISBN 978-0-7844-1085-1, Reston, Virginia.

Robertson, P.K., Campanella, R.G., Gillespie D and Rice, A., 1986, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8: 791-803.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

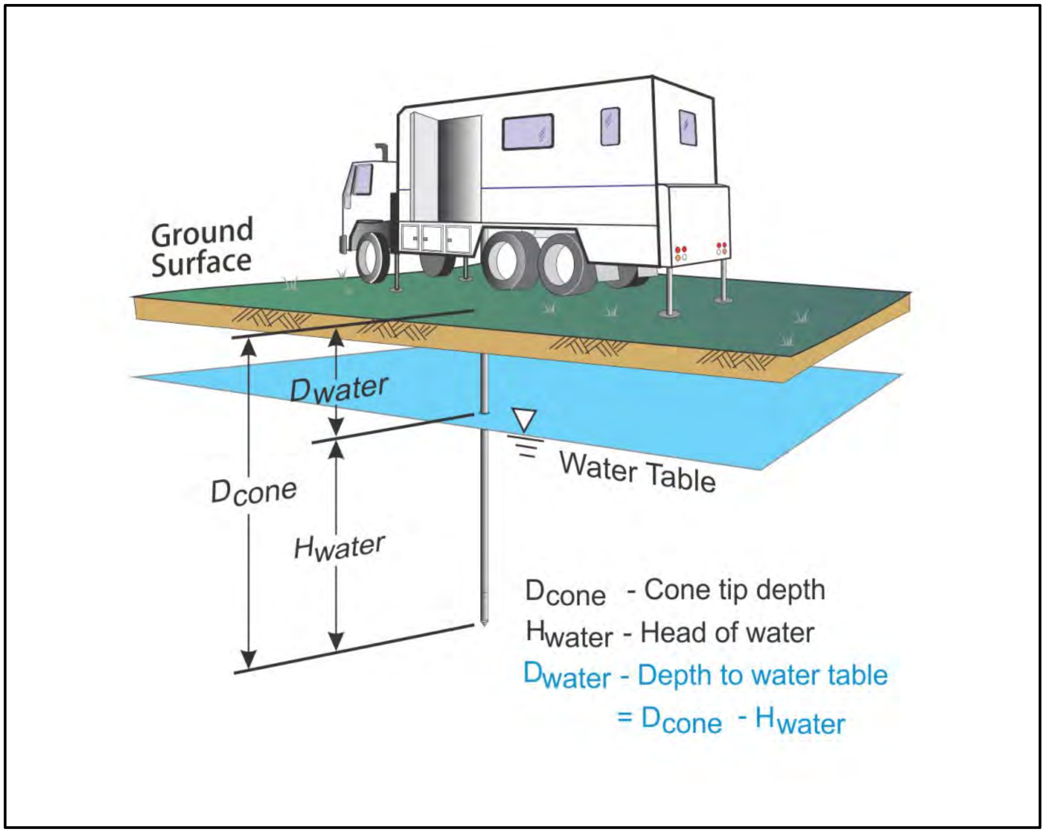


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

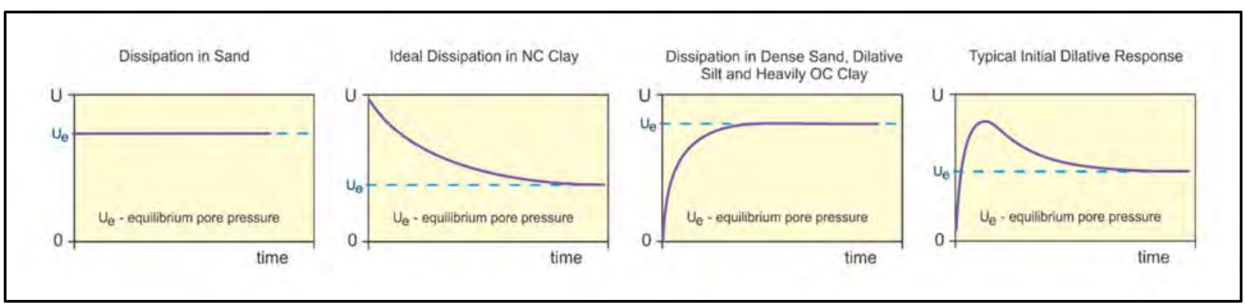


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T*	is the dimensionless time factor (Table Time Factor)
a	is the radius of the cone
I_r	is the rigidity index
t	is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

References

Burns, S.E. and Mayne, P.W., 1998, “Monotonic and dilatory pore pressure decay during piezocone tests”, Canadian Geotechnical Journal 26 (4): 1063-1073.

Burns, S.E. and Mayne, P.W., 2002, “Analytical cavity expansion-critical state model cone dissipation in fine-grained soils”, Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, “The piezometer probe: a useful investigation tool”, Proceedings, 10th International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, “Estimating coefficient of consolidation from piezocone tests”, Canadian Geotechnical Journal, 29(4): 551-557.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, “An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils”, Canadian Geotechnical Journal, 36(2): 369-381.

Teh, C.I., and Houlsby, G.T., 1991, “An analytical study of the cone penetration test in clay”, Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Normalized Cone Penetration Test Plots
- Seismic Cone Penetration Test Plots
- Seismic Cone Penetration Test Tabular Results
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and

Standard Cone Penetration Test Plots

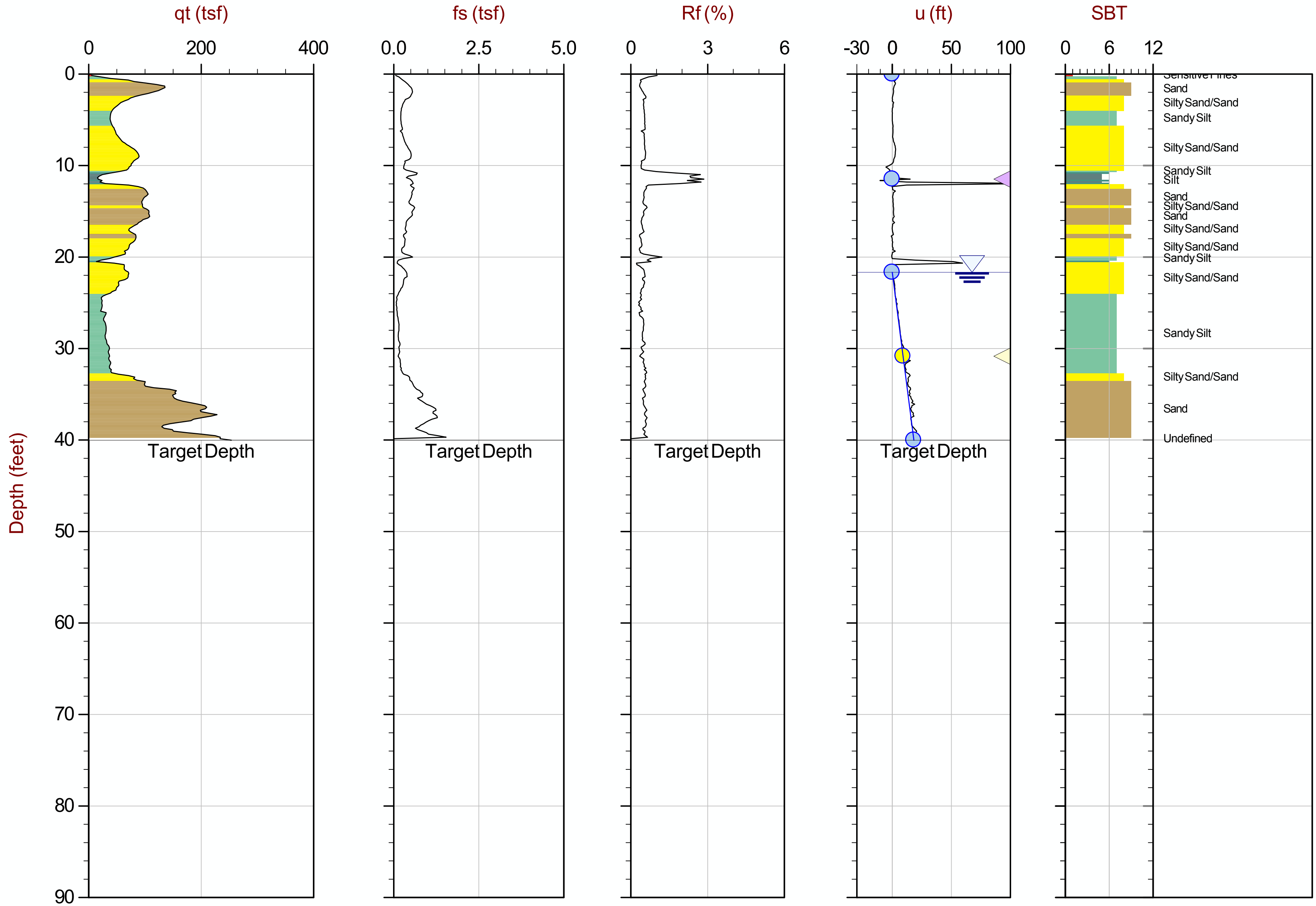
Job No:	15-53077
Client:	AECOM
Project:	Havana Power Plant, Havana, IL
Start Date:	27-Aug-2015
End Date:	27-Aug-2015

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing[2] (m)	Easting (m)
SCPT15-HAV-C001	15-53077_SPHAVC001	27-Aug-2015	419:T1500F15U500	21.7	40.03	4	4463340	749420
SCPT15-HAV-C002	15-53077_SPHAVC002	27-Aug-2015	419:T1500F15U500	14.8	40.03	6	4462865	749220
SCPT15-HAV-C003	15-53077_SPHAVC003	27-Aug-2015	419:T1500F15U500	19.8	45.11	4	4462825	748610
SCPT15-HAV-C004	15-53077_SPHAVC004	27-Aug-2015	419:T1500F15U500	15.0	40.03	9	4463023	748663
SCPT15-HAV-C005	15-53077_SPHAVC005	27-Aug-2015	419:T1500F15U500	13.5	40.03	5	4463163	749032
SCPT15-HAV-C006	15-53077_SPHAVC006	27-Aug-2015	419:T1500F15U500	14.5	40.03	7	4463355	749141
SCPT15-HAV-C007	15-53077_SPHAVC007	27-Aug-2015	419:T1500F15U500	39.7	85.47	8	4462866	748745
SCPT15-HAV-C008	15-53077_SPHAVC008	27-Aug-2015	419:T1500F15U500	38.4	85.47	5	4462757	748754
Totals	8 soundings				416.17	48		

1. Assumed phreatic surface depths were determined from the pore pressure data. Hydrostatic data were used for calculated parameters.
2. Coordinates are WGS 84 / UTM Zone 15 and were collected using a handheld GPS Receiver.

AECOM	Job No: 15-53077 Date: 08:27:15 16:26 Site: Havana Power Plant, Havana, IL	Sounding: SCPT15-HAV-C001 Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC001.COR

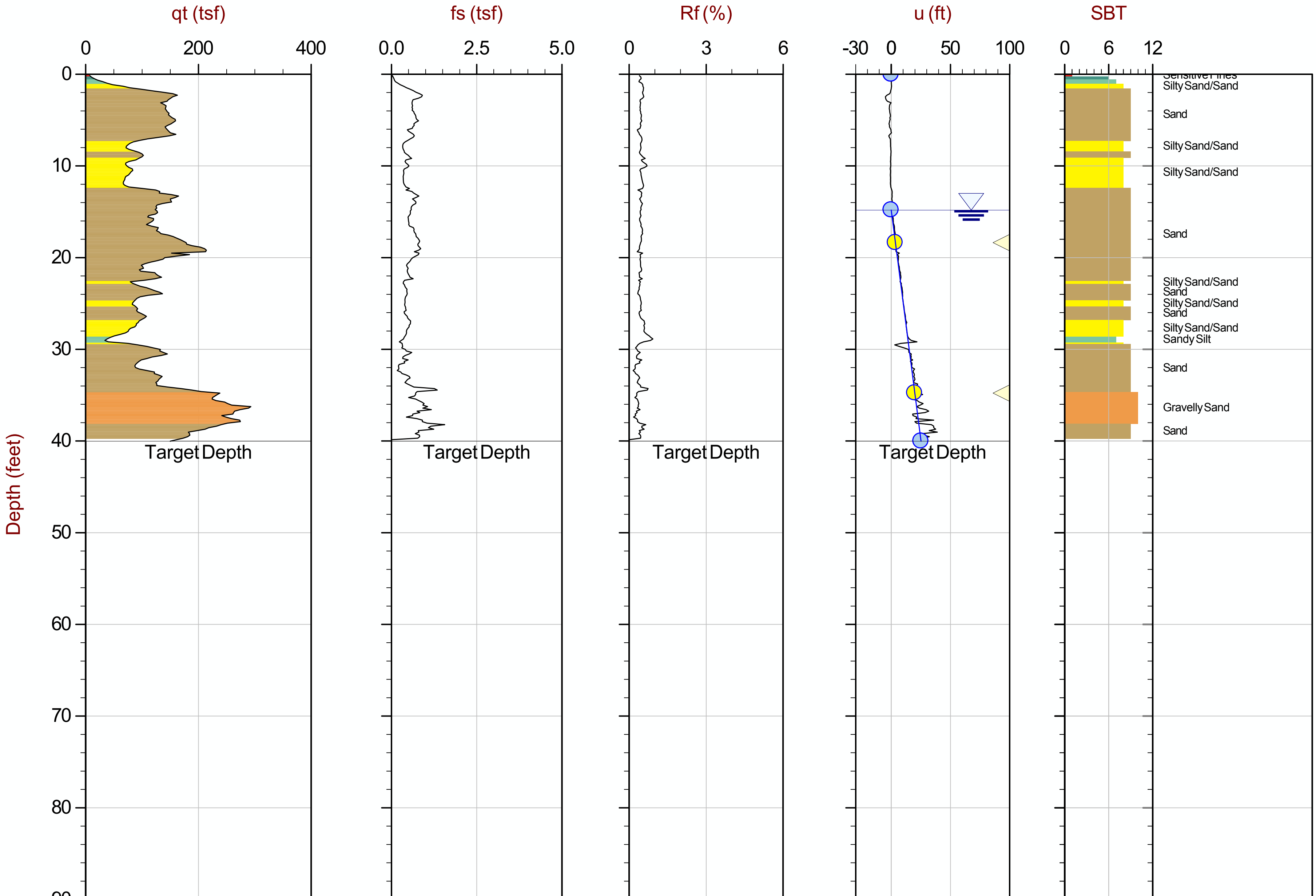
SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463340m E: 749420m

Hydrostatic Line | Ueq | Assumed Ueq | PPD, Ueq achieved | PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC	**AECOM**

Job No: 15-53077
Date: 08:27:15 18:07
Site: Havana Power Plant, Havana, IL
Sounding: SCPT15-HAV-C002
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC002.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462865m E: 749220m

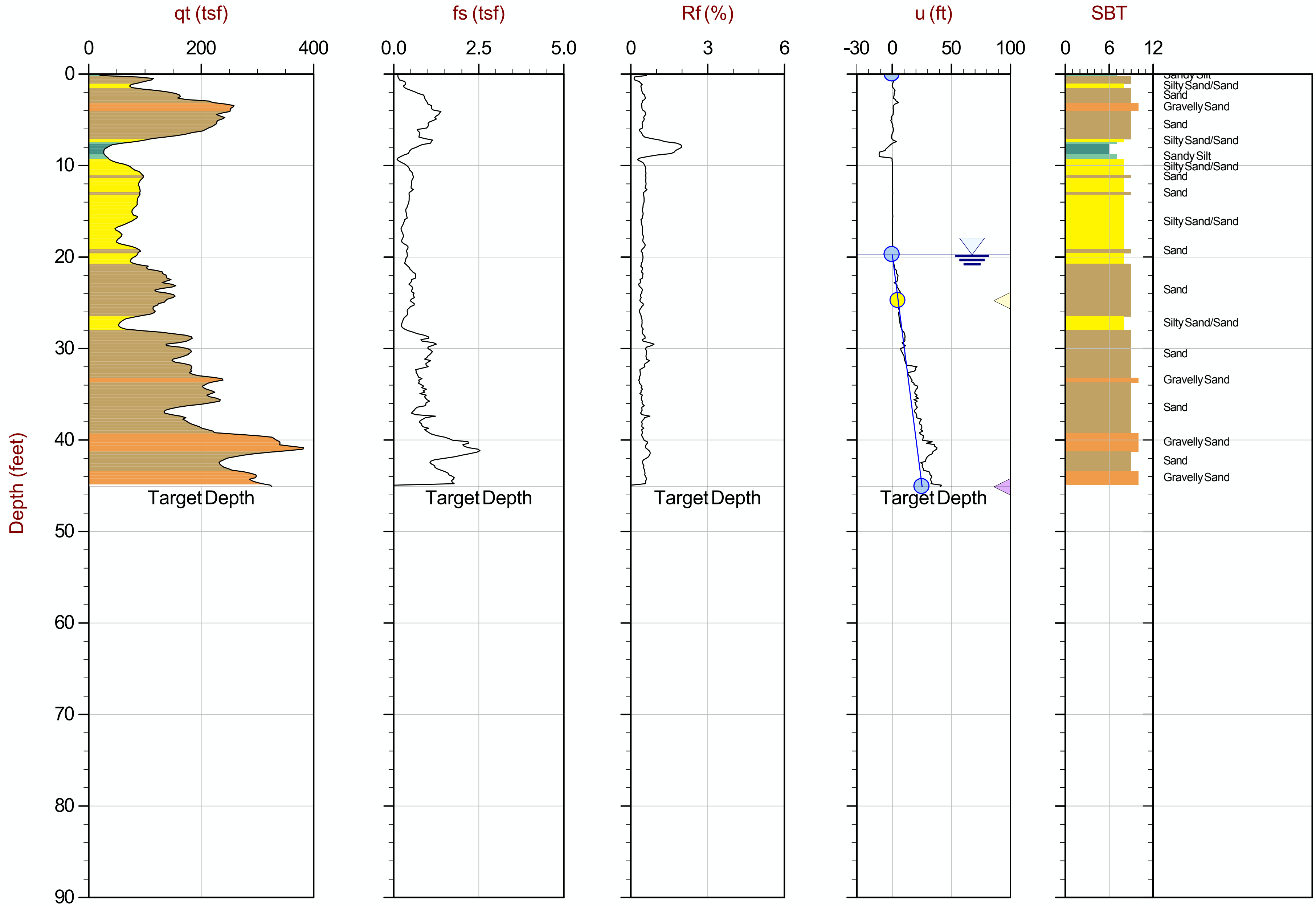
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 15-53077
Date: 08:27:15 11:59
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C003
Cone: 419:T1500F15U500



Max Depth: 13.750 m / 45.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC003.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462825m E: 748610m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

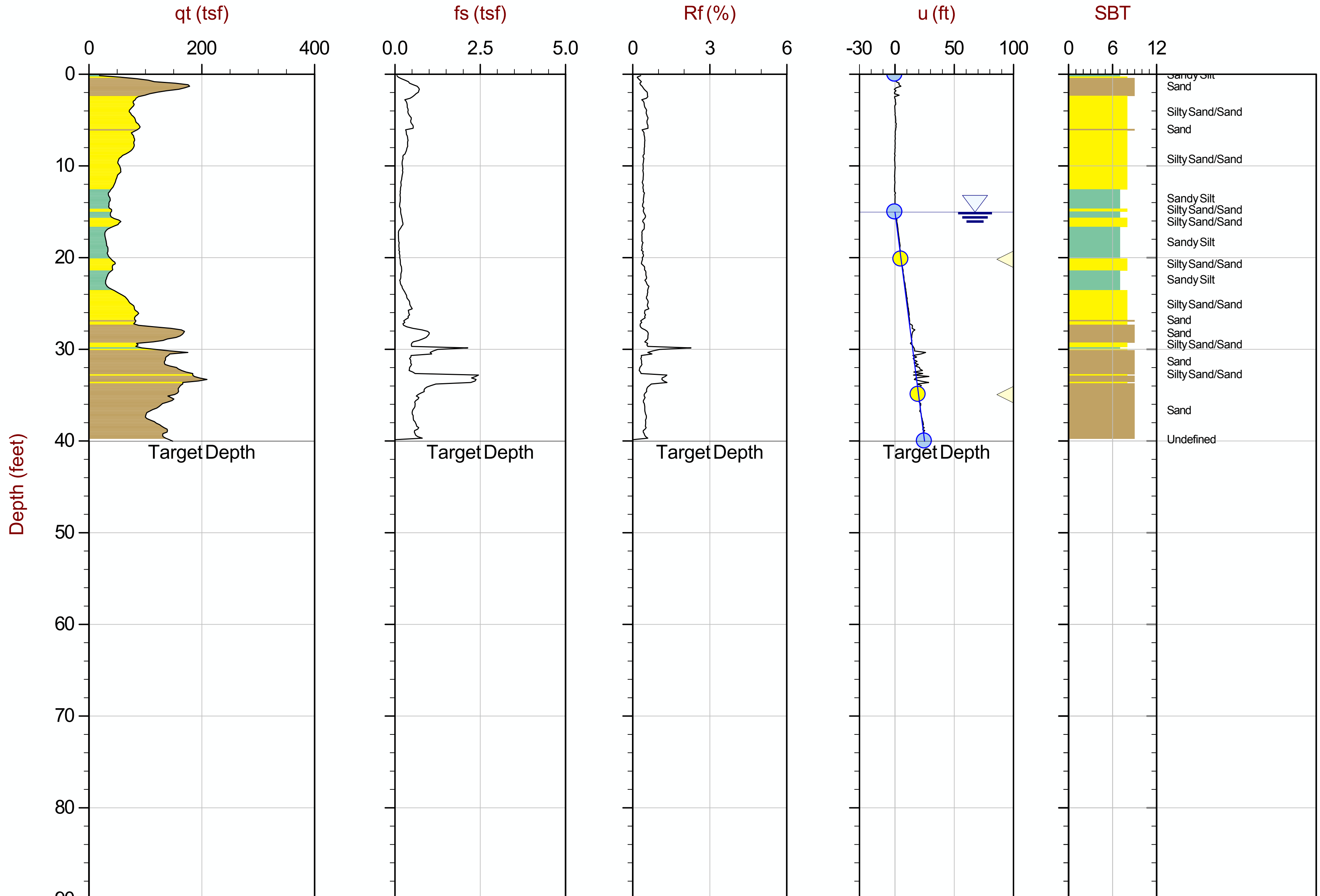
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 13:10
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C004
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC004.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463023m E: 748663m

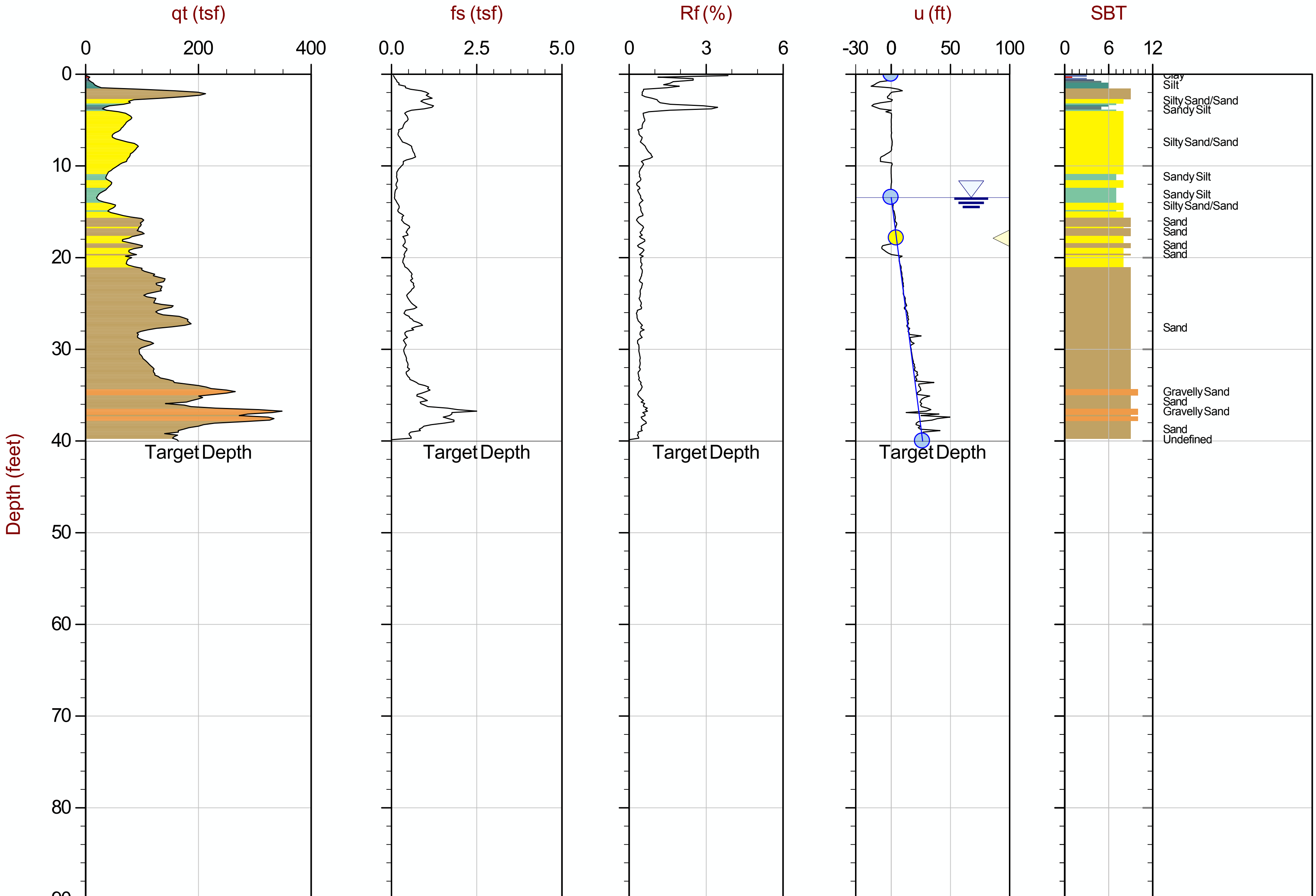
Hydrostatic Line | Ueq | Assumed Ueq | PPD, Ueq achieved | PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 15-53077
Date: 08:27:15 14:08
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C005
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC005.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463163m E: 749032m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

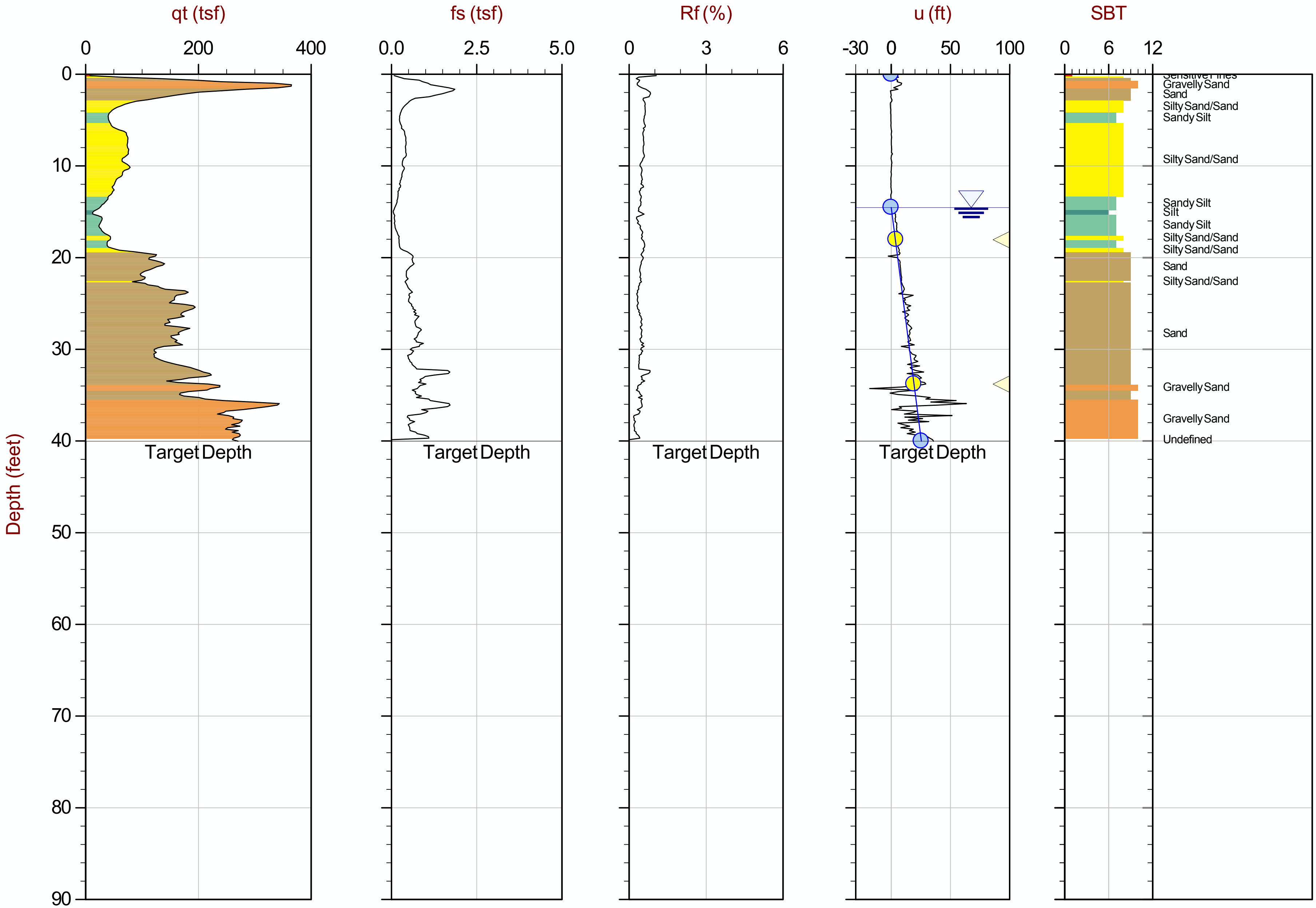
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 15:09
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C006
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC006.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463355m E: 749141m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

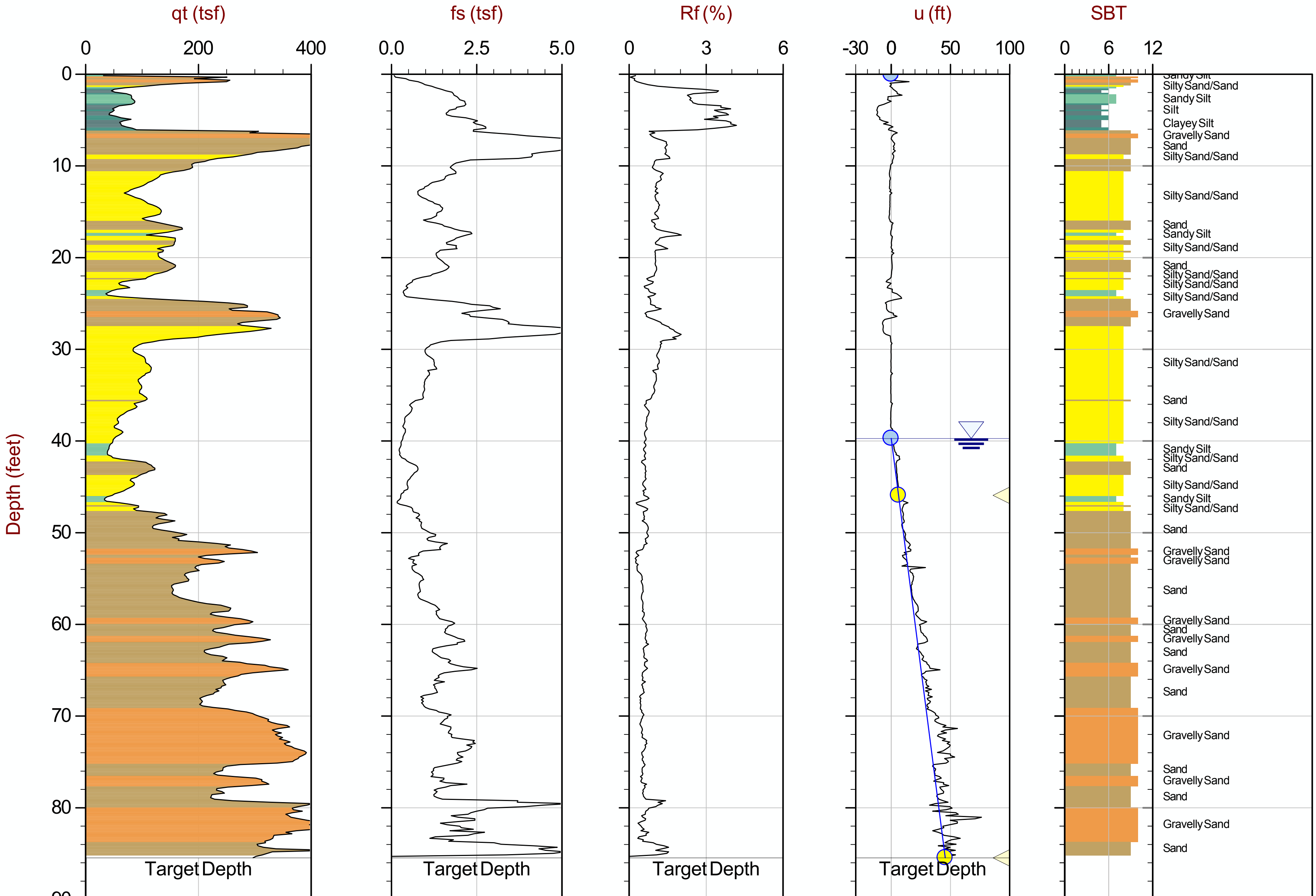
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 08:35
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C007
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC007.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462866m E: 748745m

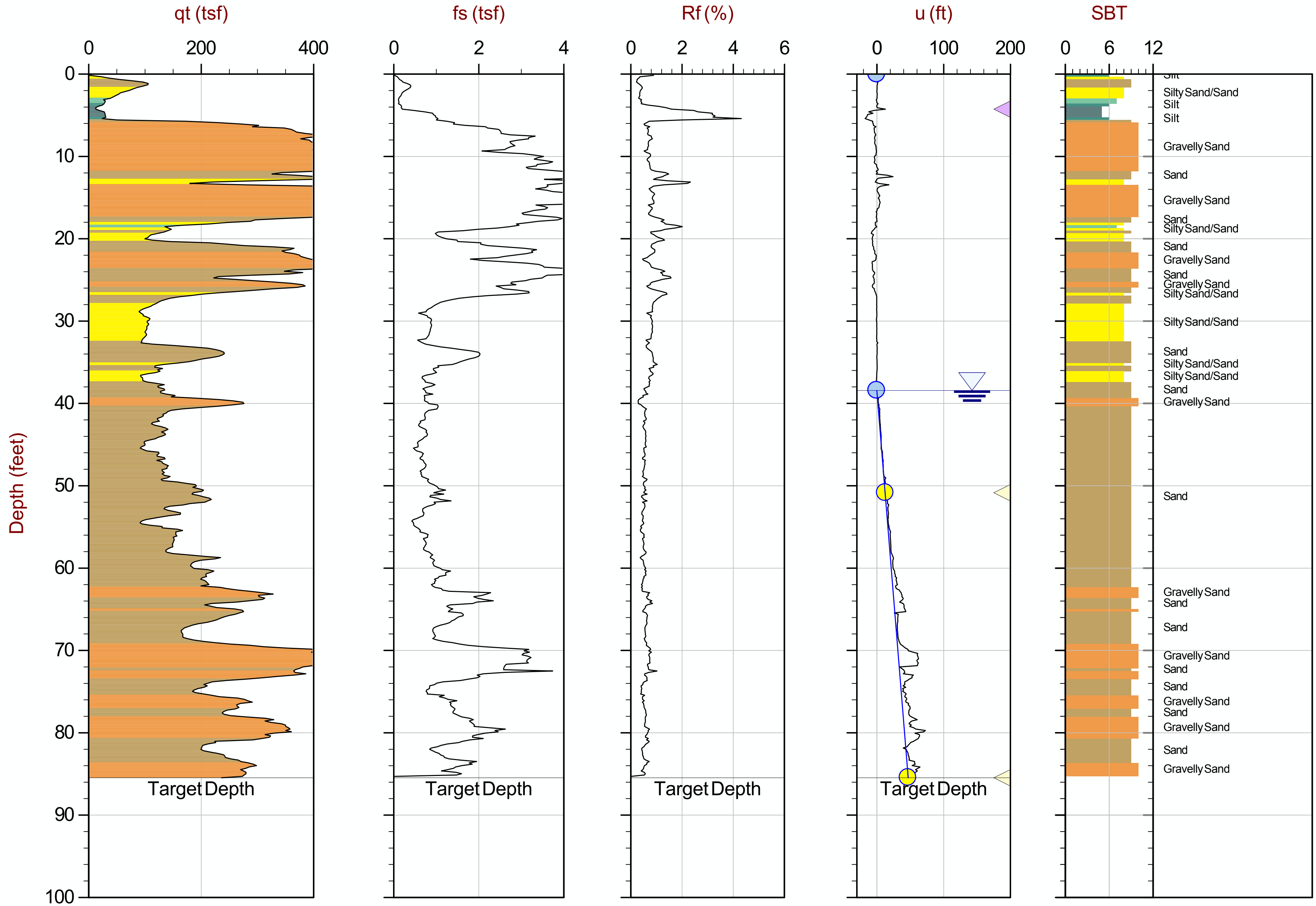
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Haley & Aldrich

Job No: 15-53087
Date: 08:27:15 10:19
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C008
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.100 m

File: 15-53077_SPHAVC008.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462757m E: 748754m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

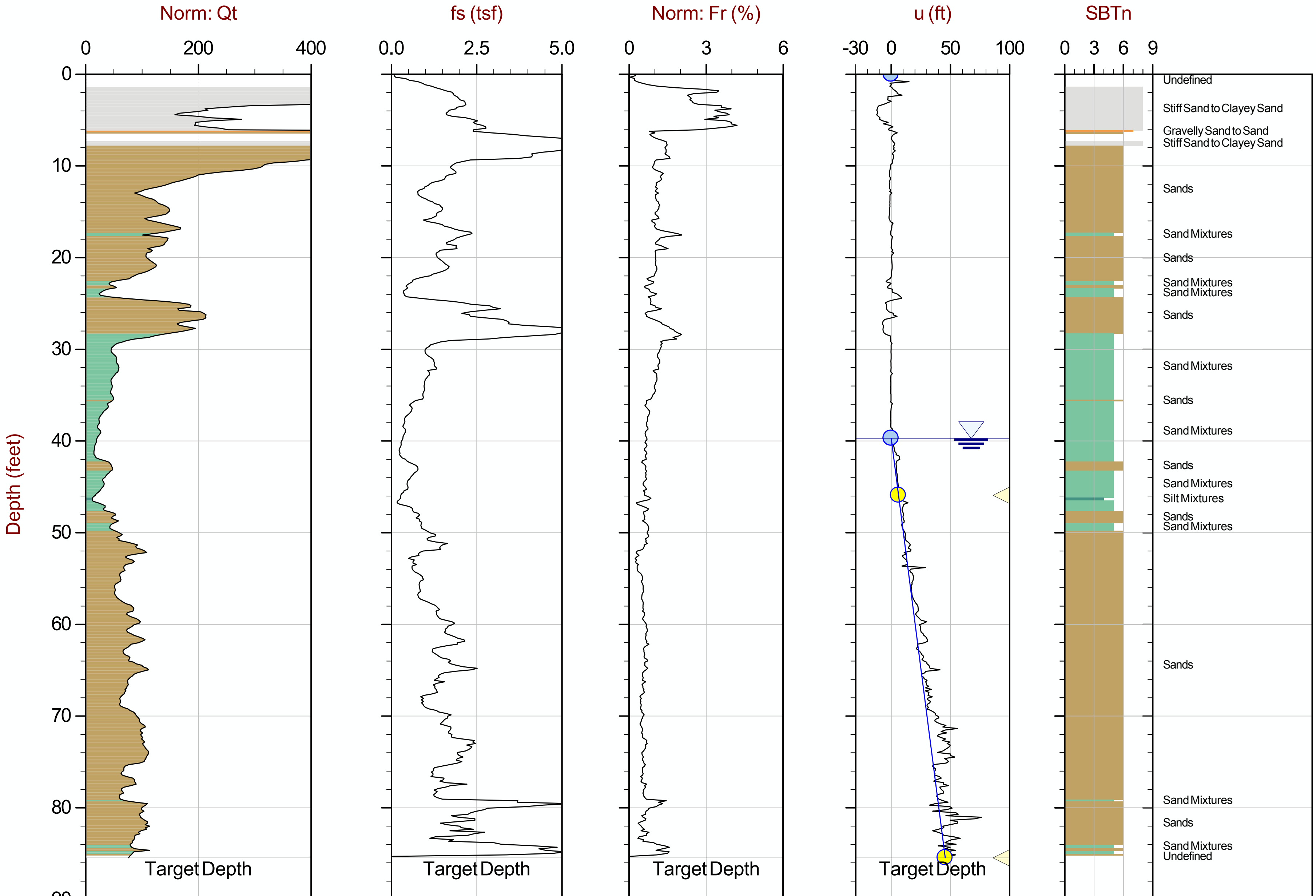
Normalized Cone Penetration Test Plots

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 08:35
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C007
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC007.COR

SBT: Robertson, 1990
Coords: UTM Zone 15 N: 4462866m E: 748745m

Hydrostatic Line · Ueq · Assumed Ueq · PPD, Ueq achieved · PPD, Ueq not achieved

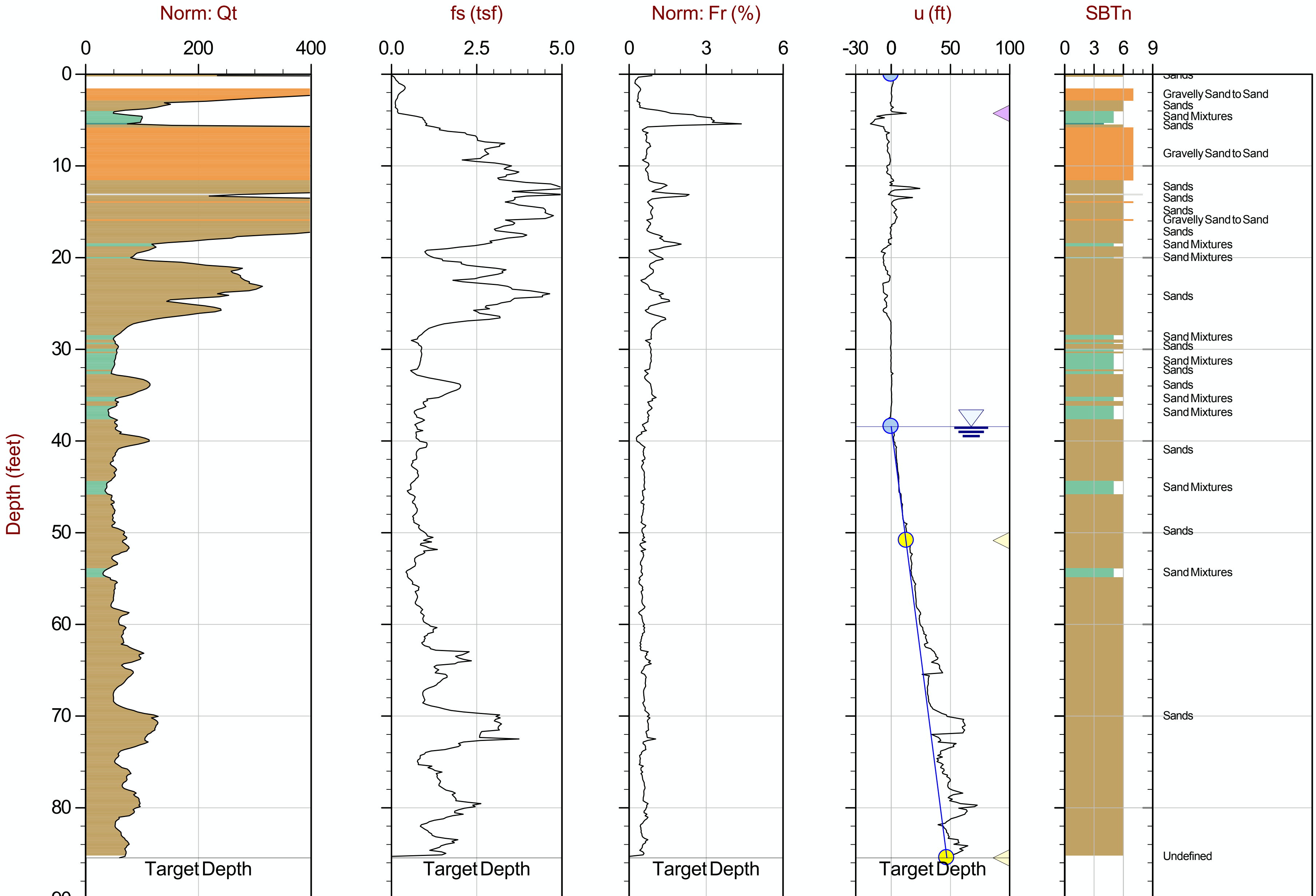
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 10:19
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C008
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC008.COR

SBT: Robertson, 1990
Coords: UTM Zone 15 N: 4462757m E: 748754m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Plots

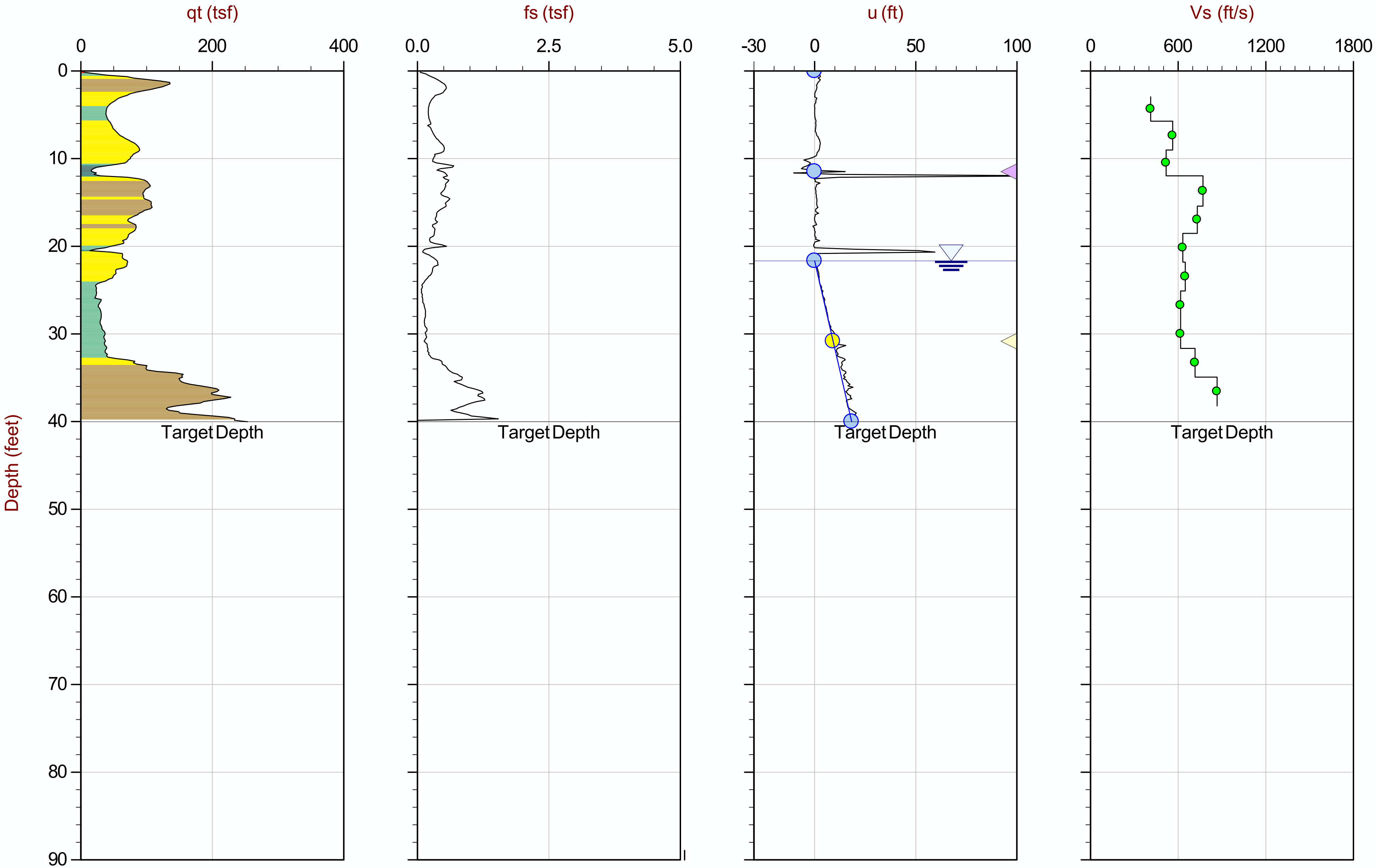
ConeTec

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 16:26
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C001
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC001.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463340m E: 749420m

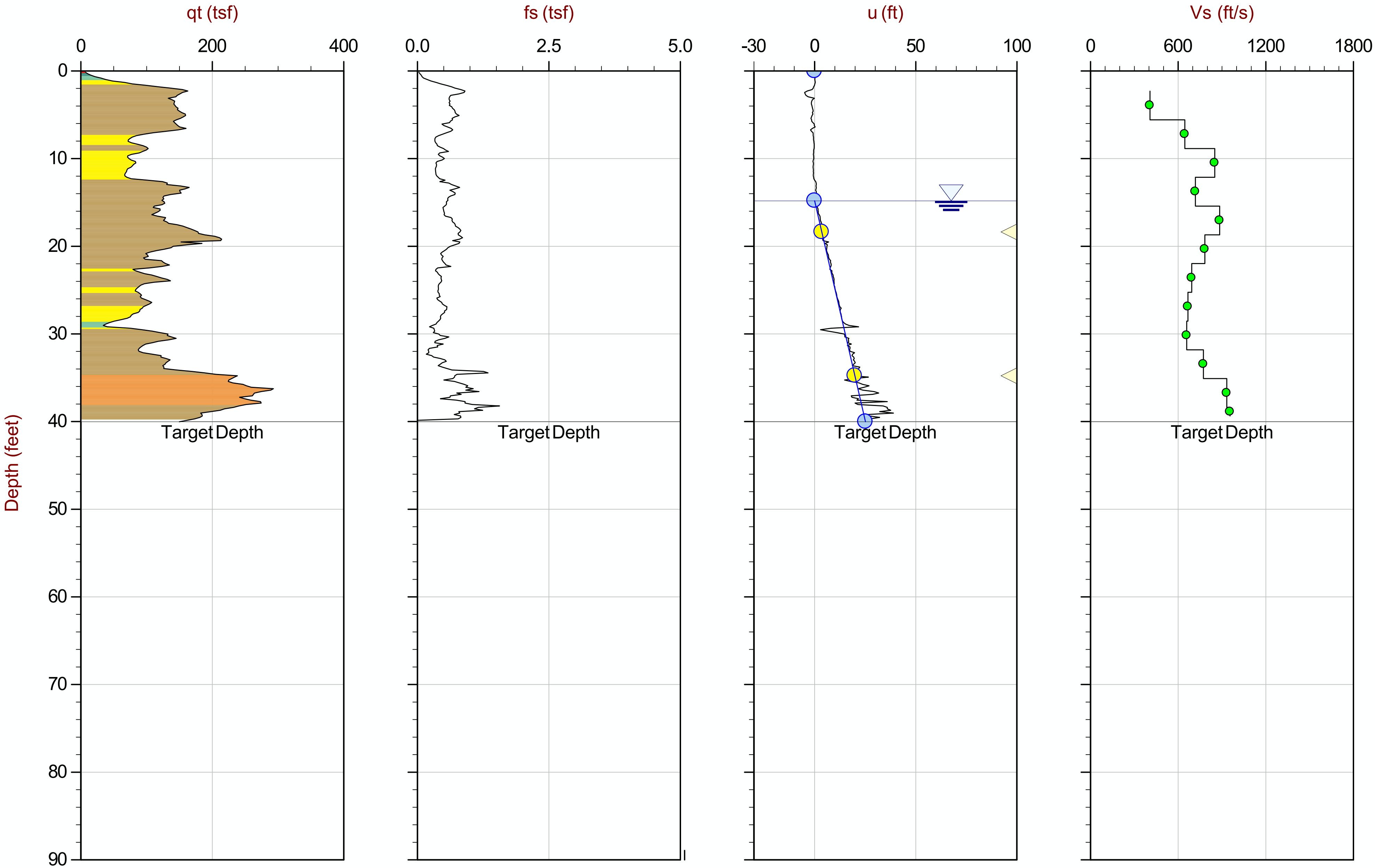
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 15-53077
Date: 08:27:15 18:07
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C002
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC002.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462865m E: 749220m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

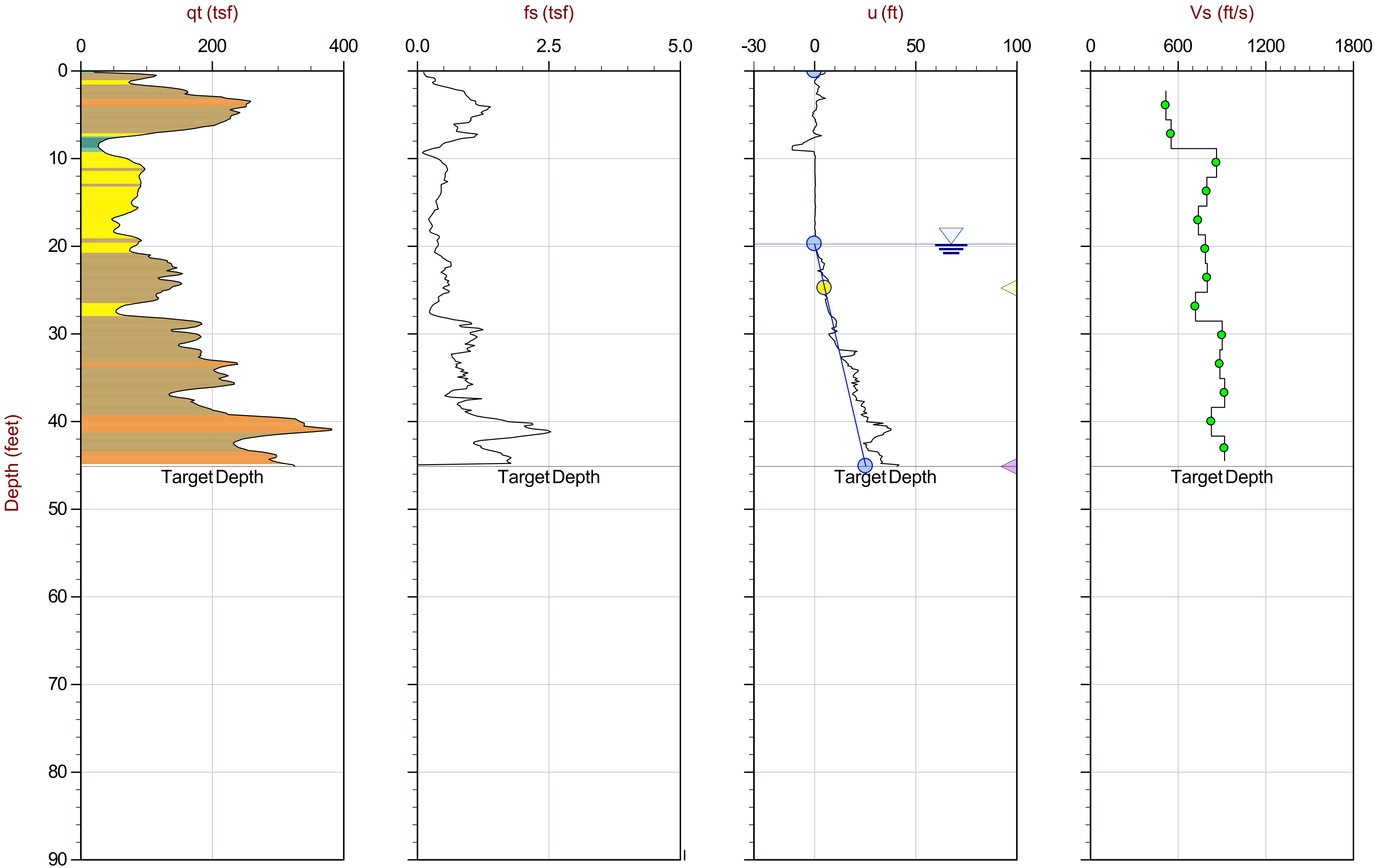
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 11:59
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C003
Cone: 419:T1500F15U500



Max Depth: 13.750 m / 45.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC003.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462825m E: 748610m

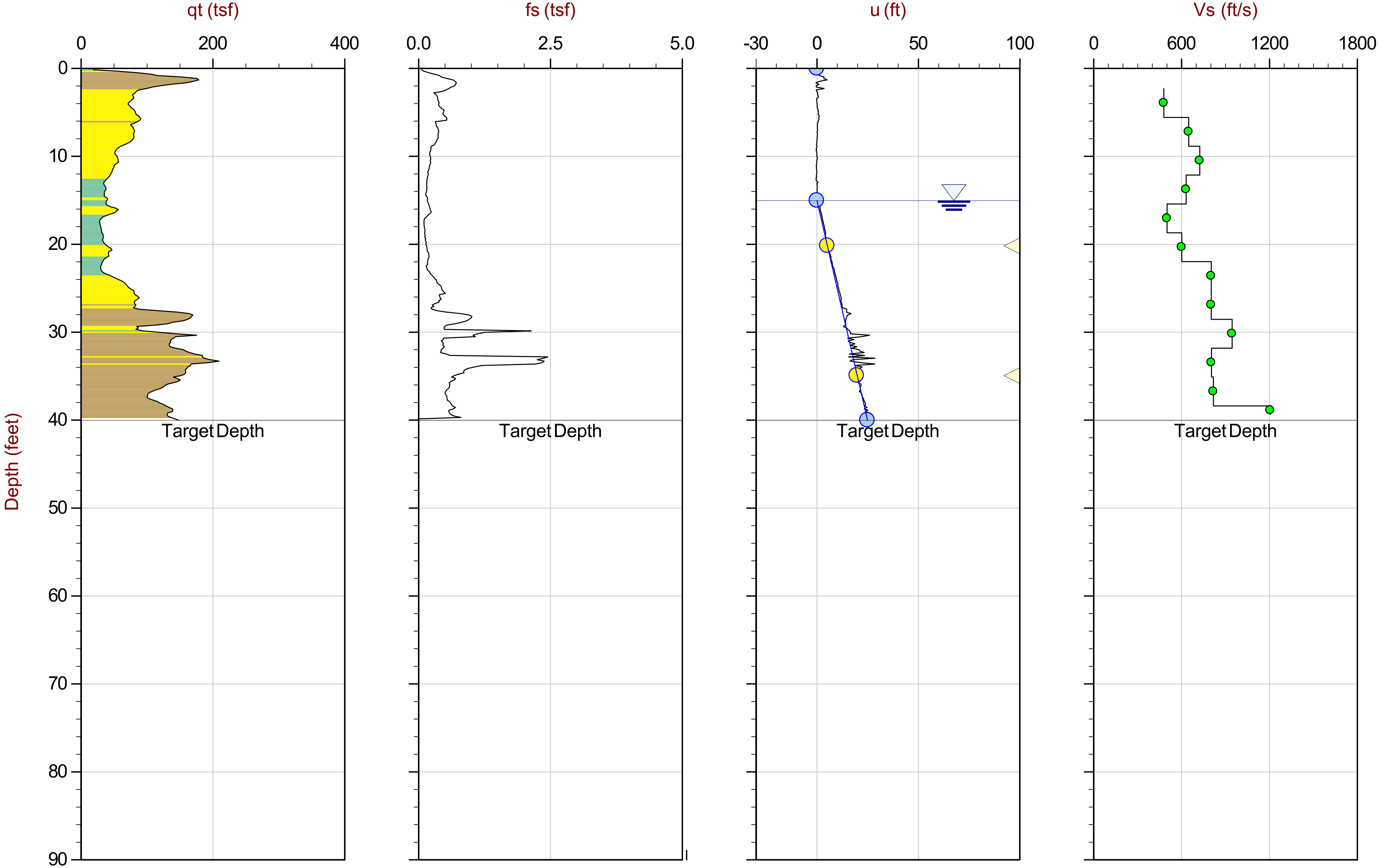
Hydrostatic Line, Ueq, Assumed Ueq, PPD, Ueq achieved, PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

AECOM

Job No: 15-53077
Date: 08:27:15 13:10
Site: Havana Power Plant, Havana, IL
Sounding: SCPT15-HAV-C004
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC004.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463023m E: 748663m

Hydrostatic Line | Ueq | Assumed Ueq | PPD, Ueq achieved | PPD, Ueq not achieved

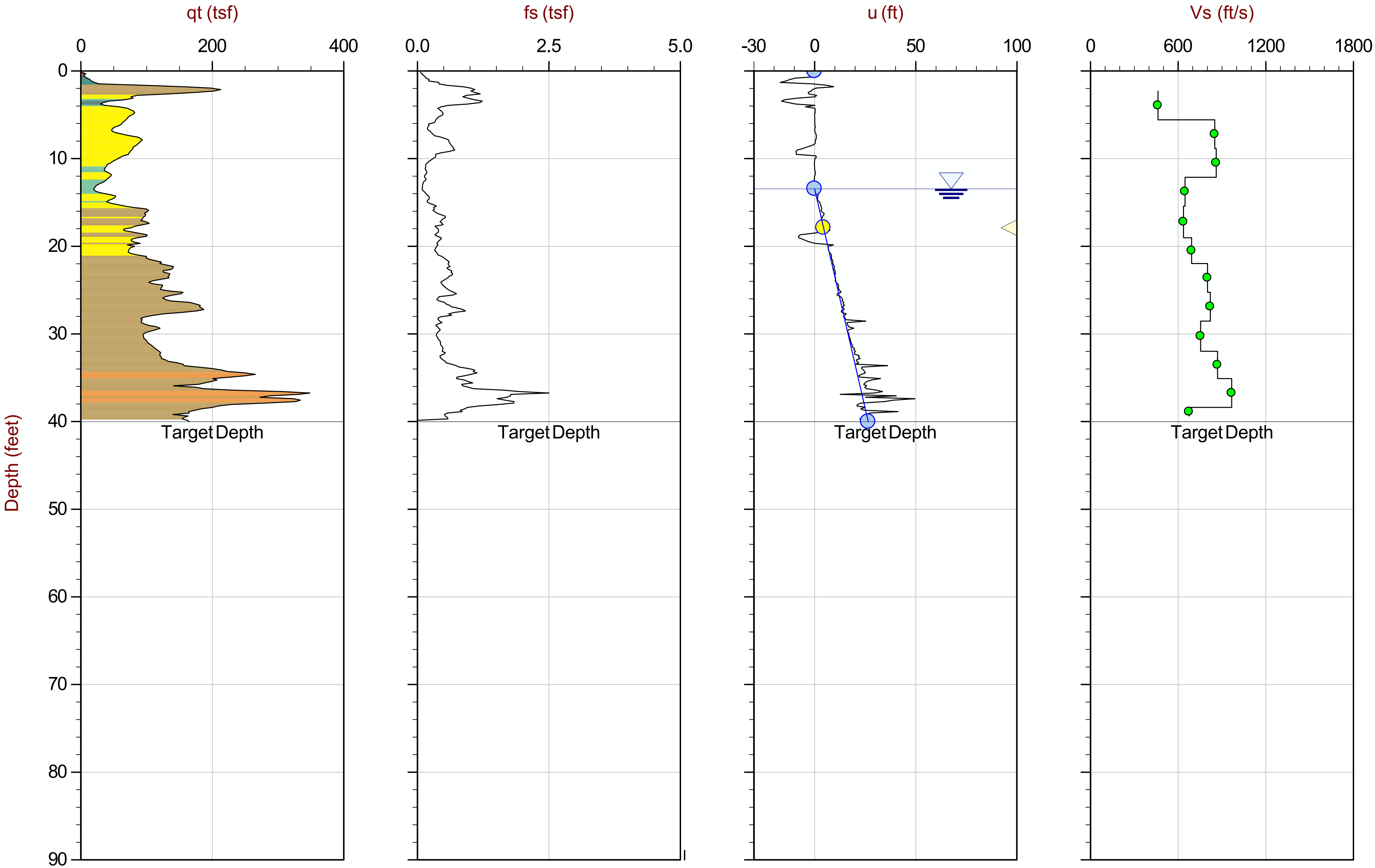
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 15-53077
Date: 08:27:15 14:08
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C005
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC005.COR

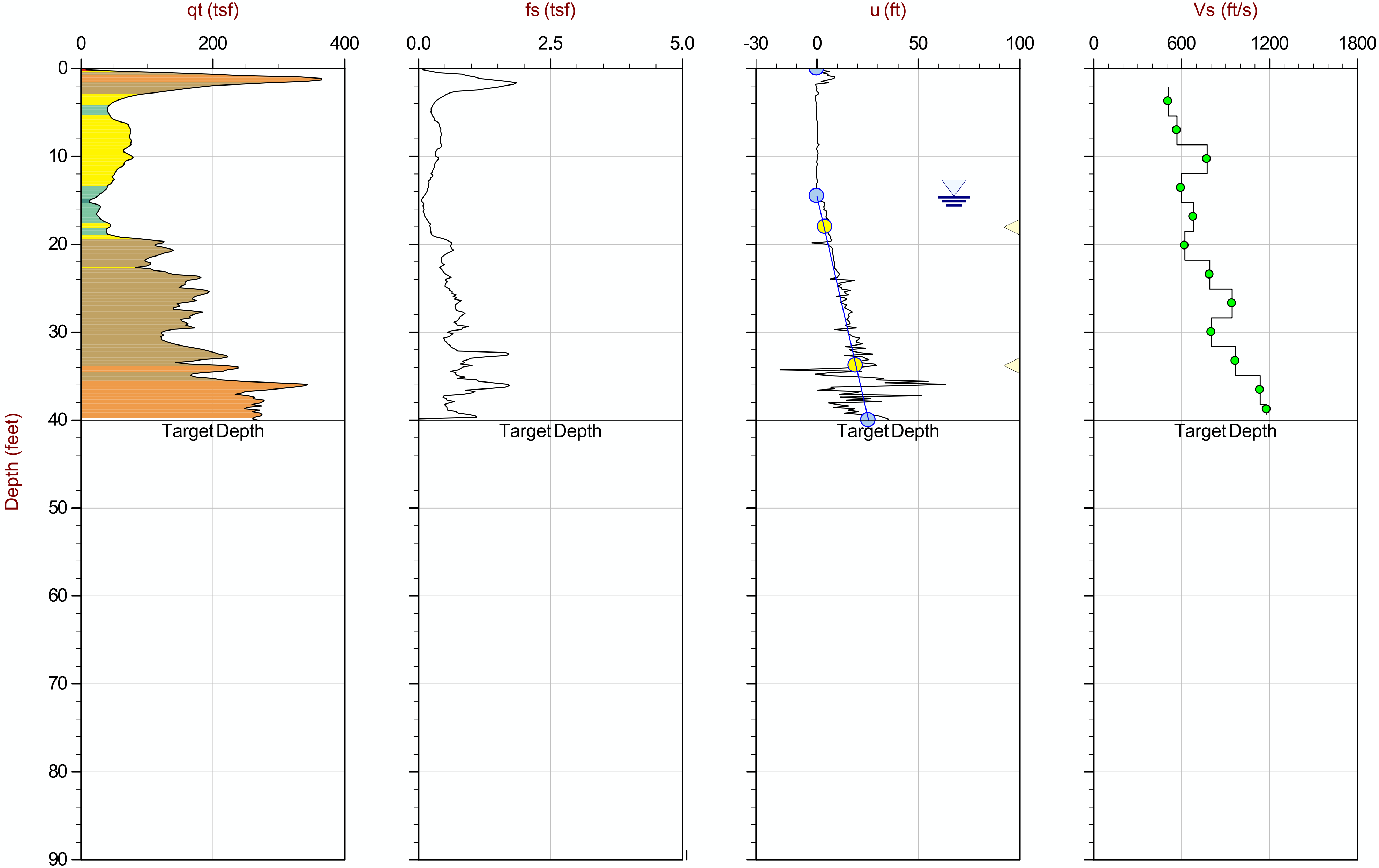
SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463163m E: 749032m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 15-53077
Date: 08:27:15 15:09
Site: Havana Power Plant, Havana, IL
Sounding: SCPT15-HAV-C006
Cone: 419:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC006.COR

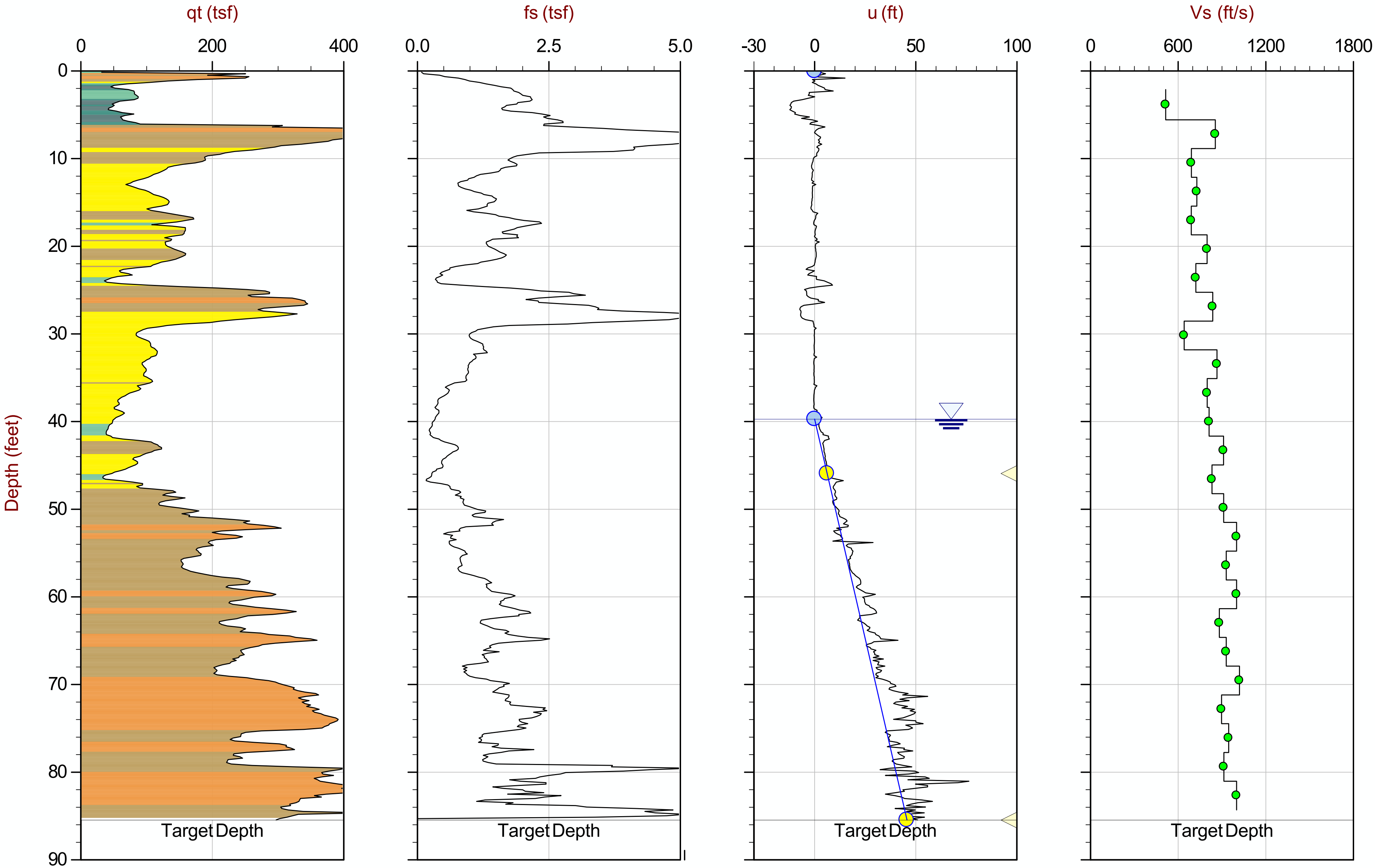
SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4463355m E: 749141m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 15-53077
Date: 08:27:15 08:35
Site: Havana Power Plant, Havana, IL
Sounding: SCPT15-HAV-C007
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC007.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462866m E: 748745m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

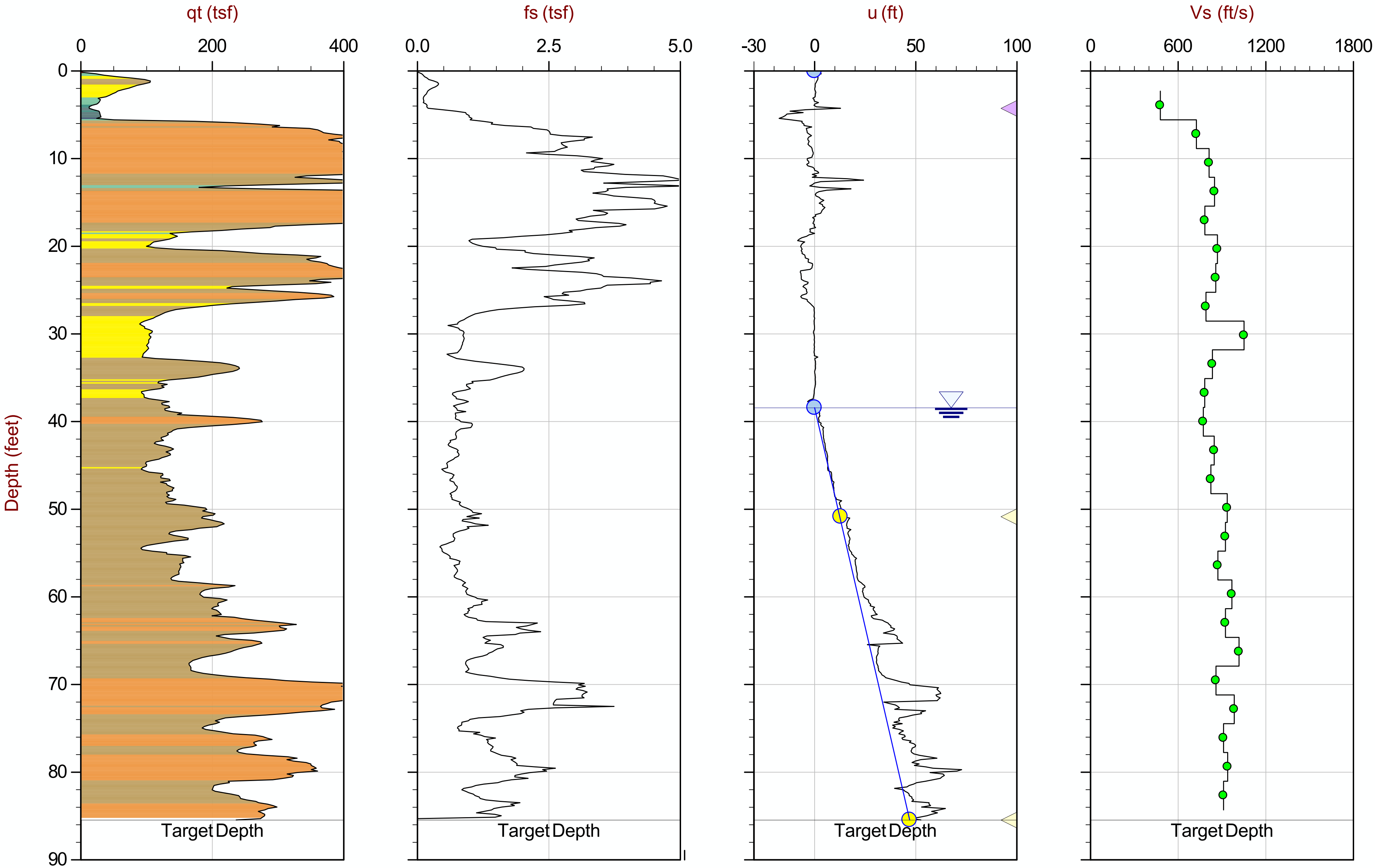
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

AECOM

Job No: 15-53077
Date: 08:27:15 10:19
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C008
Cone: 419:T1500F15U500



Max Depth: 26.050 m / 85.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53077_SPHAVC008.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 15 N: 4462757m E: 748754m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Tabular Results (Vs)

ConeTec

Job No:	15-53077
Client:	AECOM
Project:	Havana Power Plant
Sounding ID:	HAV-C001
Date:	27-Aug-2015

Seismic Source:	Beam
Source Offset (ft):	1.50
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.61	2.95	3.31			
6.40	5.74	5.93	2.62	6.37	412
9.68	9.02	9.15	3.21	5.71	563
12.63	11.97	12.07	2.92	5.64	518
16.08	15.42	15.49	3.42	4.45	770
19.19	18.54	18.60	3.10	4.25	731
22.47	21.82	21.87	3.27	5.17	632
25.75	25.10	25.14	3.27	5.04	649
29.04	28.38	28.42	3.28	5.31	617
32.32	31.66	31.70	3.28	5.31	617
35.60	34.94	34.97	3.28	4.58	716
38.88	38.22	38.25	3.28	3.78	867

Job No: 15-53077
Client: AECOM
Project: Havana Power Plant
Sounding ID: HAV-C002
Date: 27-Aug-2015

Seismic Source: Beam
Source Offset (ft): 1.50
Source Depth (ft): 0.00
Geophone Offset (ft): 0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	2.74			
6.23	5.58	5.78	3.03	7.45	407
9.51	8.86	8.98	3.21	4.97	646
12.80	12.14	12.23	3.25	3.82	851
16.08	15.42	15.49	3.26	4.54	718
19.36	18.70	18.76	3.27	3.70	884
22.64	21.98	22.03	3.27	4.18	783
25.92	25.26	25.31	3.27	4.73	693
29.20	28.54	28.58	3.28	4.91	667
32.48	31.82	31.86	3.28	4.97	659
35.76	35.10	35.14	3.28	4.24	773
39.04	38.39	38.41	3.28	3.51	933
40.03	39.37	39.40	0.98	1.03	955

Job No: 15-53077
Client: AECOM
Project: Havana Power Plant
Sounding ID: HAV-C003
Date: 27-Aug-2015

Seismic Source: Beam
Source Offset (ft): 1.50
Source Depth (ft): 0.00
Geophone Offset (ft): 0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	2.74			
6.23	5.58	5.78	3.03	5.88	516
9.51	8.86	8.98	3.21	5.81	552
12.80	12.14	12.23	3.25	3.76	863
16.08	15.42	15.49	3.26	4.09	797
19.36	18.70	18.76	3.27	4.42	739
22.64	21.98	22.03	3.27	4.16	787
25.92	25.26	25.31	3.27	4.09	800
29.20	28.54	28.58	3.28	4.56	719
32.48	31.82	31.86	3.28	3.63	902
35.76	35.10	35.14	3.28	3.70	886
39.04	38.39	38.41	3.28	3.57	919
42.32	41.67	41.69	3.28	3.96	828
45.11	44.46	44.48	2.79	3.04	918

CONETEC

Job No:	15-53077
Client:	AECOM
Project:	Havana Power Plant
Sounding ID:	HAV-C004
Date:	27-Aug-2015

Seismic Source:	Beam
Source Offset (ft):	1.50
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	2.74			
6.23	5.58	5.78	3.03	6.34	479
9.51	8.86	8.98	3.21	4.94	649
12.80	12.14	12.23	3.25	4.49	724
16.08	15.42	15.49	3.26	5.17	631
19.36	18.70	18.76	3.27	6.53	501
22.64	21.98	22.03	3.27	5.44	602
25.92	25.26	25.31	3.27	4.08	803
29.20	28.54	28.58	3.28	4.08	803
32.48	31.82	31.86	3.28	3.47	945
35.76	35.10	35.14	3.28	4.08	804
39.04	38.39	38.41	3.28	4.01	817
40.03	39.37	39.40	0.98	0.82	1206

Job No: 15-53077
Client: AECOM
Project: Havana Power Plant
Sounding ID: HAV-C005
Date: 27-Aug-2015

Seismic Source: Beam
Source Offset (ft): 1.50
Source Depth (ft): 0.00
Geophone Offset (ft): 0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	2.74			
6.23	5.58	5.78	3.03	6.56	462
9.51	8.86	8.98	3.21	3.77	851
12.80	12.14	12.23	3.25	3.77	861
16.08	15.42	15.49	3.26	5.04	647
19.69	19.03	19.09	3.60	5.64	637
22.64	21.98	22.03	2.94	4.25	692
25.92	25.26	25.31	3.27	4.09	801
29.20	28.54	28.58	3.28	3.99	820
32.64	31.99	32.02	3.44	4.56	754
35.76	35.10	35.14	3.11	3.58	870
39.04	38.39	38.41	3.28	3.39	967
40.03	39.37	39.40	0.98	1.46	675

Job No: 15-53077
Client: AECOM
Project: Havana Power Plant
Sounding ID: HAV-C006
Date: 27-Aug-2015

Seismic Source: Beam
Source Offset (ft): 1.50
Source Depth (ft): 0.00
Geophone Offset (ft): 0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.79	2.13	2.61			
6.07	5.41	5.62	3.01	5.91	510
9.35	8.69	8.82	3.20	5.63	569
12.63	11.97	12.07	3.25	4.19	775
15.91	15.26	15.33	3.26	5.46	597
19.19	18.54	18.60	3.27	4.80	681
22.47	21.82	21.87	3.27	5.25	623
25.75	25.10	25.14	3.27	4.13	792
29.04	28.38	28.42	3.28	3.47	945
32.32	31.66	31.70	3.28	4.08	804
35.60	34.94	34.97	3.28	3.38	969
38.88	38.22	38.25	3.28	2.88	1137
40.03	39.37	39.40	1.15	0.97	1182

Job No:	15-53077	
Client:	AECOM	
Project:	Havana Power Plant	
Sounding ID:	HAV-C007	
Date:	27-Aug-2015	

Seismic Source:	Beam
Source Offset (ft):	1.50
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.79	2.13	2.61			
6.23	5.58	5.78	3.17	6.15	515
9.51	8.86	8.98	3.21	3.76	855
12.80	12.14	12.23	3.25	4.70	691
16.08	15.42	15.49	3.26	4.48	728
19.36	18.70	18.76	3.27	4.73	690
22.64	21.98	22.03	3.27	4.10	798
25.92	25.26	25.31	3.27	4.54	721
29.20	28.54	28.58	3.28	3.91	837
32.48	31.82	31.86	3.28	5.11	641
35.76	35.10	35.14	3.28	3.79	866
39.04	38.39	38.41	3.28	4.10	799
42.32	41.67	41.69	3.28	4.04	812
45.60	44.95	44.97	3.28	3.60	911
48.88	48.23	48.25	3.28	3.94	832
52.17	51.51	51.53	3.28	3.59	912
55.45	54.79	54.81	3.28	3.28	1000
58.73	58.07	58.09	3.28	3.53	929
62.01	61.35	61.37	3.28	3.28	1000
65.29	64.63	64.65	3.28	3.72	882
68.57	67.91	67.93	3.28	3.53	929
71.85	71.19	71.21	3.28	3.22	1020
75.13	74.47	74.49	3.28	3.66	897
78.41	77.76	77.77	3.28	3.47	946
81.69	81.04	81.05	3.28	3.59	913
84.97	84.32	84.33	3.28	3.28	1000

Job No: 15-53077
Client: AECOM
Project: Havana Power Plant
Sounding ID: HAV-C008
Date: 27-Aug-2015

Seismic Source: Beam
Source Offset (ft): 1.50
Source Depth (ft): 0.00
Geophone Offset (ft): 0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.95	2.30	2.74			
6.23	5.58	5.78	3.03	6.35	478
9.51	8.86	8.98	3.21	4.43	725
12.80	12.14	12.23	3.25	4.00	812
16.08	15.42	15.49	3.26	3.84	849
19.36	18.70	18.76	3.27	4.17	783
22.64	21.98	22.03	3.27	3.76	869
25.92	25.26	25.31	3.27	3.82	858
29.20	28.54	28.58	3.28	4.14	791
32.48	31.82	31.86	3.28	3.12	1051
35.76	35.10	35.14	3.28	3.92	835
39.04	38.39	38.41	3.28	4.19	782
42.32	41.67	41.69	3.28	4.25	772
45.60	44.95	44.97	3.28	3.87	847
48.88	48.23	48.25	3.28	3.98	824
52.17	51.51	51.53	3.28	3.51	936
55.45	54.79	54.81	3.28	3.55	924
58.73	58.07	58.09	3.28	3.76	872
62.01	61.35	61.37	3.28	3.39	968
65.29	64.63	64.65	3.28	3.55	924
68.57	67.91	67.93	3.28	3.23	1017
71.85	71.19	71.21	3.28	3.82	859
75.13	74.47	74.49	3.28	3.33	984
78.41	77.76	77.77	3.28	3.60	911
81.69	81.04	81.05	3.28	3.49	939
84.97	84.32	84.33	3.28	3.60	911

Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

	Job No:	15-53077
	Client:	AECOM
	Project:	Havana Power Plant, Havana, IL
	Start Date:	27-Aug-2015
	End Date:	27-Aug-2015

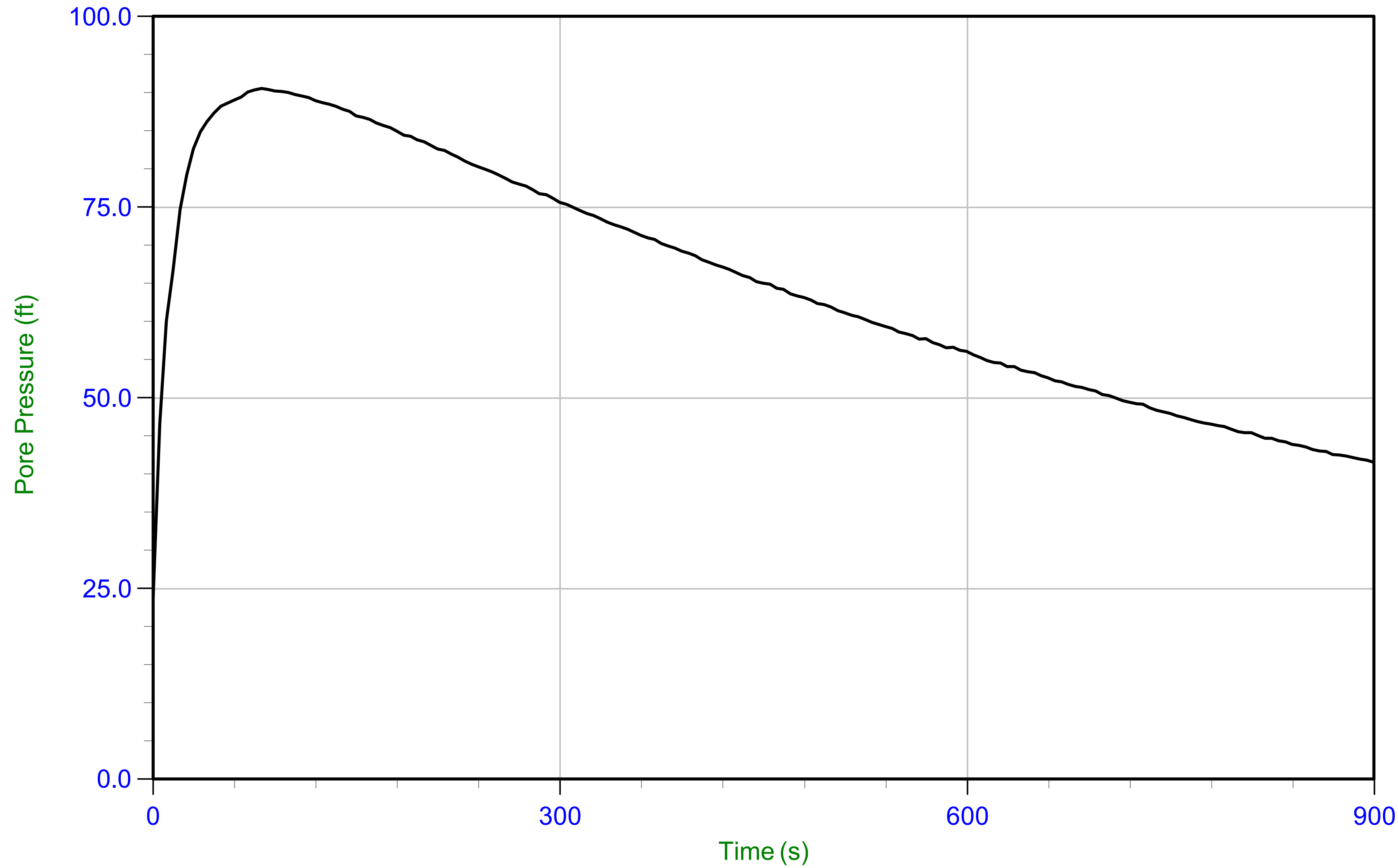
CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t_{50} [a] (s)	Assumed Rigidity Index (I_r)	c_h [b] (cm^2/min)
SCPT15-HAV-C001	15-53077_SPHAVC001	15	900	11.48	0.00			732	100	0.96
SCPT15-HAV-C001	15-53077_SPHAVC001	15	300	30.84	9.17	21.67				
SCPT15-HAV-C002	15-53077_SPHAVC002	15	300	18.37	3.56	14.82		26	100	26.89
SCPT15-HAV-C002	15-53077_SPHAVC002	15	300	34.78	19.92	14.86				
SCPT15-HAV-C003	15-53077_SPHAVC003	15	295	24.77	5.02	19.75		29	100	24.16
SCPT15-HAV-C003	15-53077_SPHAVC003	15	300	45.11						
SCPT15-HAV-C004	15-53077_SPHAVC004	15	300	20.18	5.14	15.04				
SCPT15-HAV-C004	15-53077_SPHAVC004	15	120	34.94	19.68	15.26				
SCPT15-HAV-C005	15-53077_SPHAVC005	15	300	17.88	4.43	13.45		21	100	32.87
SCPT15-HAV-C006	15-53077_SPHAVC006	15	300	18.04	4.11	13.93				
SCPT15-HAV-C006	15-53077_SPHAVC006	15	300	33.79	19.21	14.58				
SCPT15-HAV-C007	15-53077_SPHAVC007	15	120	45.93	6.20	39.73				
SCPT15-HAV-C007	15-53077_SPHAVC007	15	300	85.46	45.65	39.81				
SCPT15-HAV-C008	15-53077_SPHAVC008	15	600	4.27						
SCPT15-HAV-C008	15-53077_SPHAVC008	15	300	50.85	12.88	37.97				
SCPT15-HAV-C008	15-53077_SPHAVC008	15	300	85.46	47.03	38.43				
Totals	16 dissipations		88.9 min							

a. Time is relative to where umax occurred

b. Houlsby and Teh, 1991

AECOM	Job No: 15-53077 Date: 27-Aug-2015 16:26:56 Site: Havana Power Plant, Havana, IL	Sounding: SCPT15-HAV-C001 Cone: AD419 Cone Area: 15 sq cm



Trace Summary:

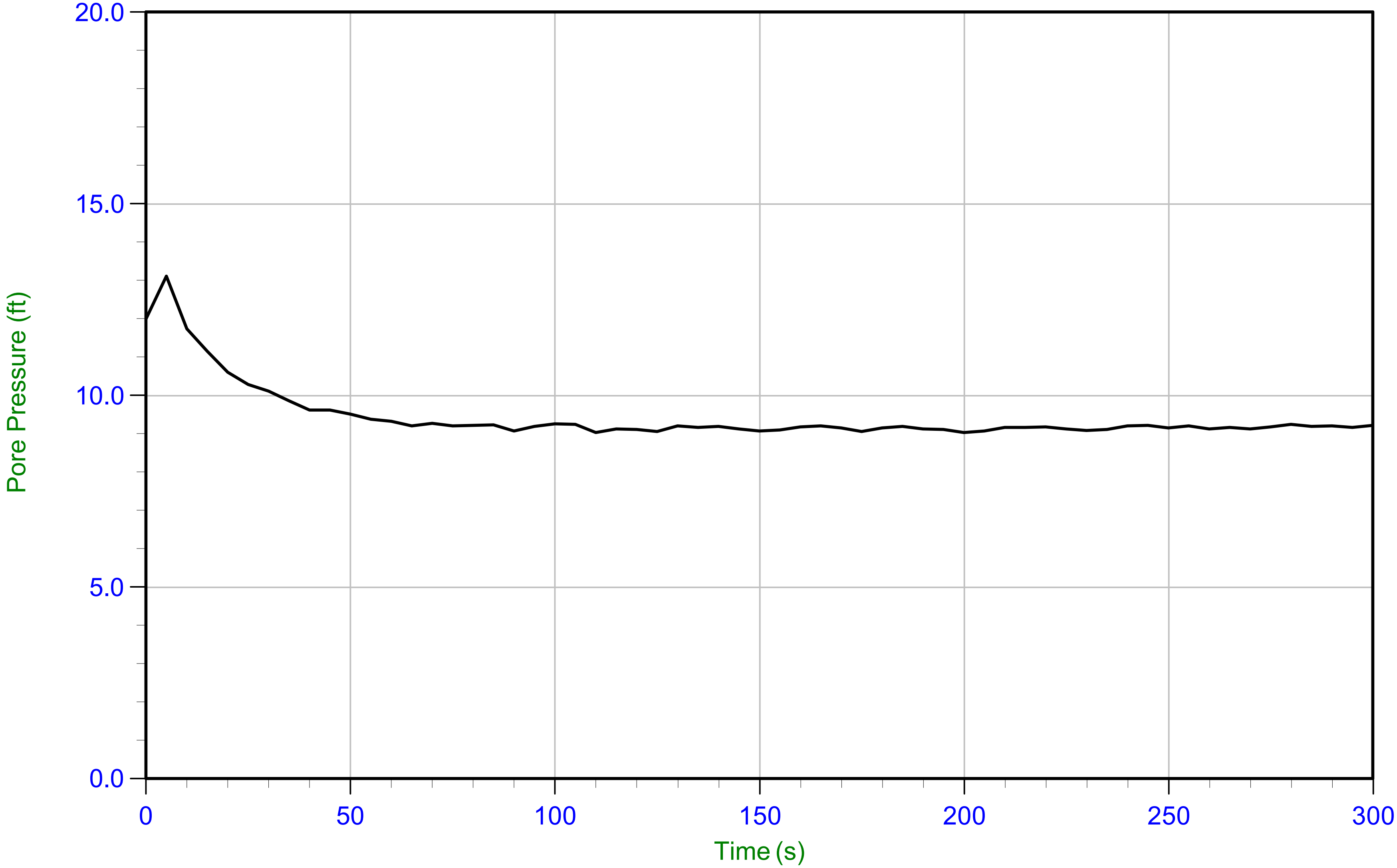
Filename: 15-53077_SPHAVC001.PPD	U Min: 23.8 ft	WT: 3.500 m / 11.482 ft	T(50): 731.9 s
Depth: 3.500 m / 11.483 ft	U Max: 90.6 ft	Ueq: 0.0 ft	Ir: 100
Duration: 900.0 s		U(50): 45.29 ft	Ch: 1.0 sq cm/min

CONETEC

AECOM

Job No: 15-53077
Date: 27-Aug-2015 16:26:56
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C001
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC001.PPD
Depth: 9.400 m / 30.840 ft
Duration: 300.0 s

U Min: 9.0 ft
U Max: 13.1 ft

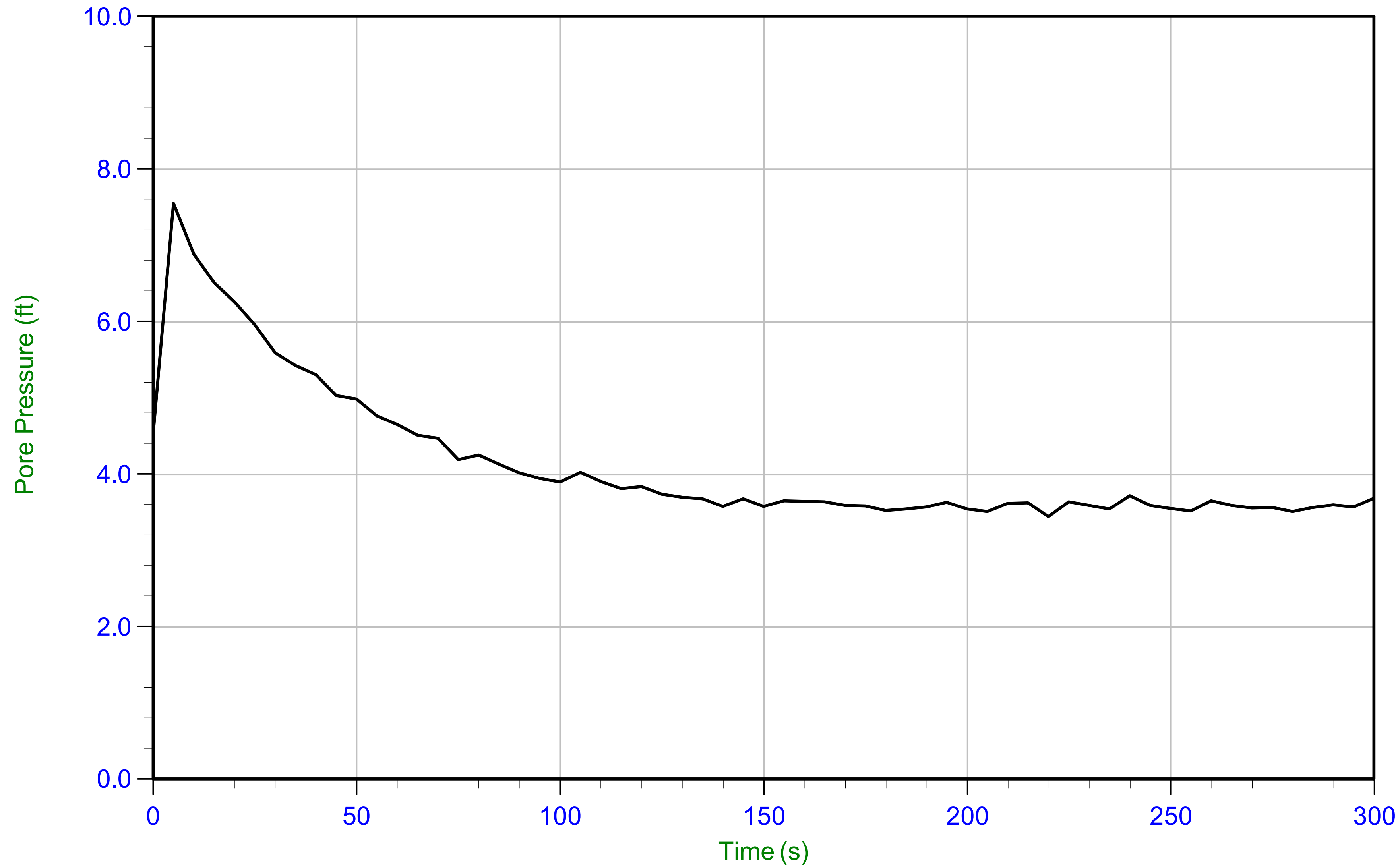
WT: 6.605 m / 21.670 ft
Ueq: 9.2 ft

CONETEC

AECOM

Job No: 15-53077
Date: 27-Aug-2015 18:07:20
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C002
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC002.PPD
Depth: 5.600 m / 18.372 ft
Duration: 300.0 s

U Min: 3.4 ft
U Max: 7.5 ft

WT: 4.516 m / 14.816 ft
Ueq: 3.6 ft
U(50): 5.55 ft

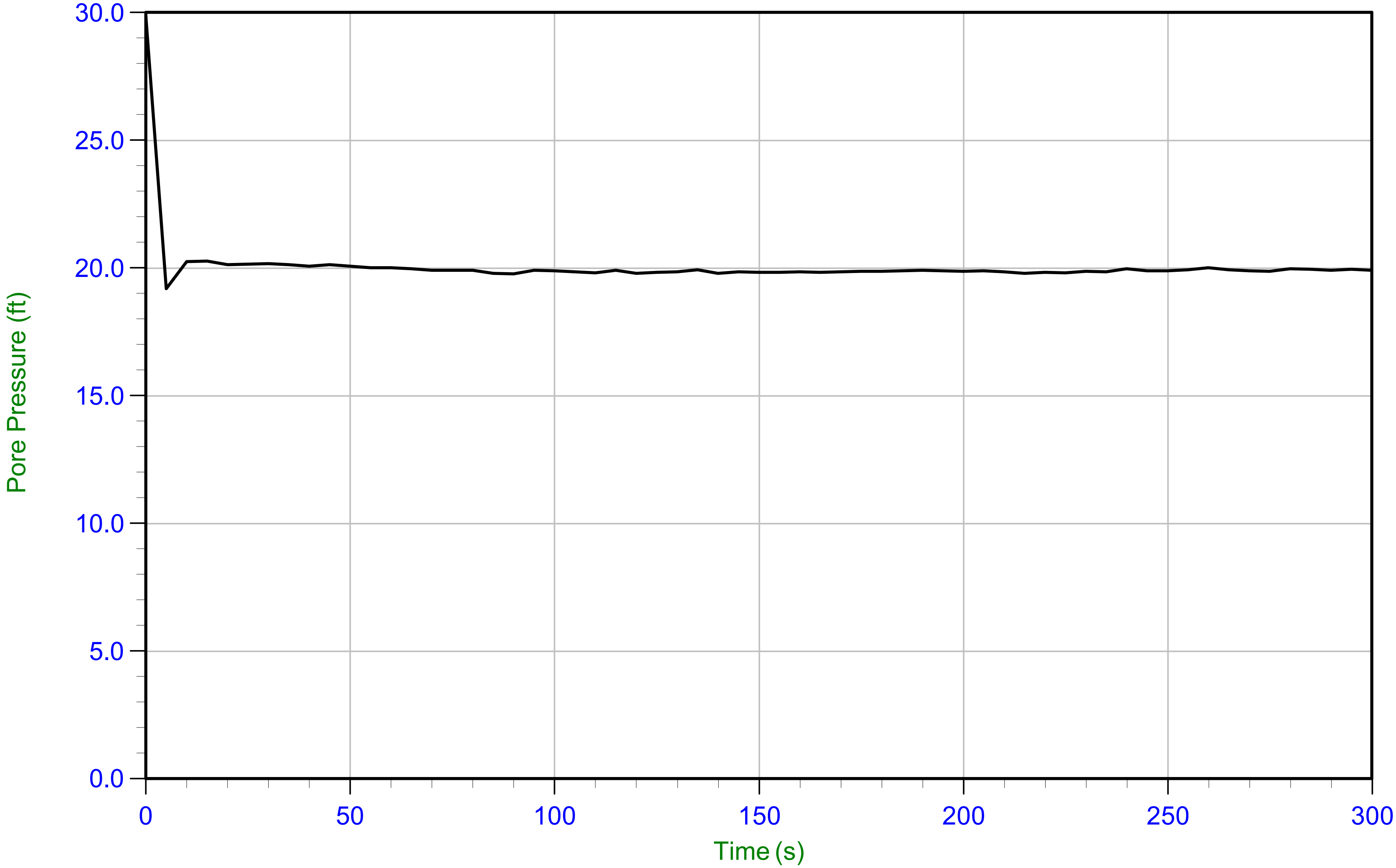
T(50): 26.1 s
Ir: 100
Ch: 26.9 sq cm/min

CONETEC

AECOM

Job No: 15-53077
Date: 27-Aug-2015 18:07:20
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C002
Cone: AD419
Cone Area: 15 sq cm



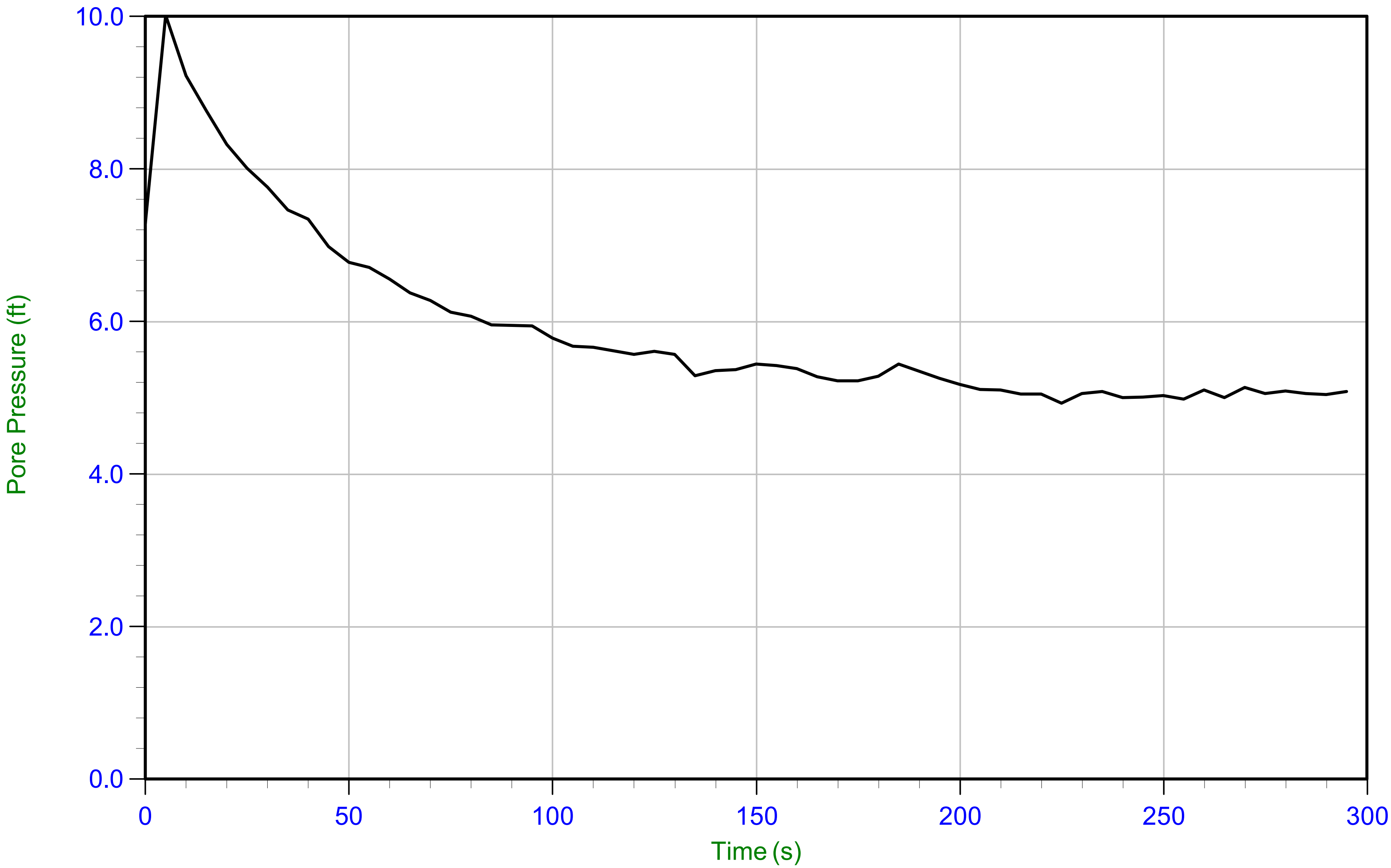
Trace Summary:

Filename: 15-53077_SPHAVC002.PPD
Depth: 10.600 m / 34.776 ft
Duration: 300.0 s

U Min: 19.2 ft
U Max: 29.9 ft

WT: 4.528 m / 14.855 ft
Ueq: 19.9 ft

AECOM	Job No: 15-53077	Sounding: SCPT15-HAV-C003
	Date: 27-Aug-2015 11:59:22	Cone: AD419
	Site: Havana Power Plant, Havana, IL	Cone Area: 15 sq cm



Trace Summary:

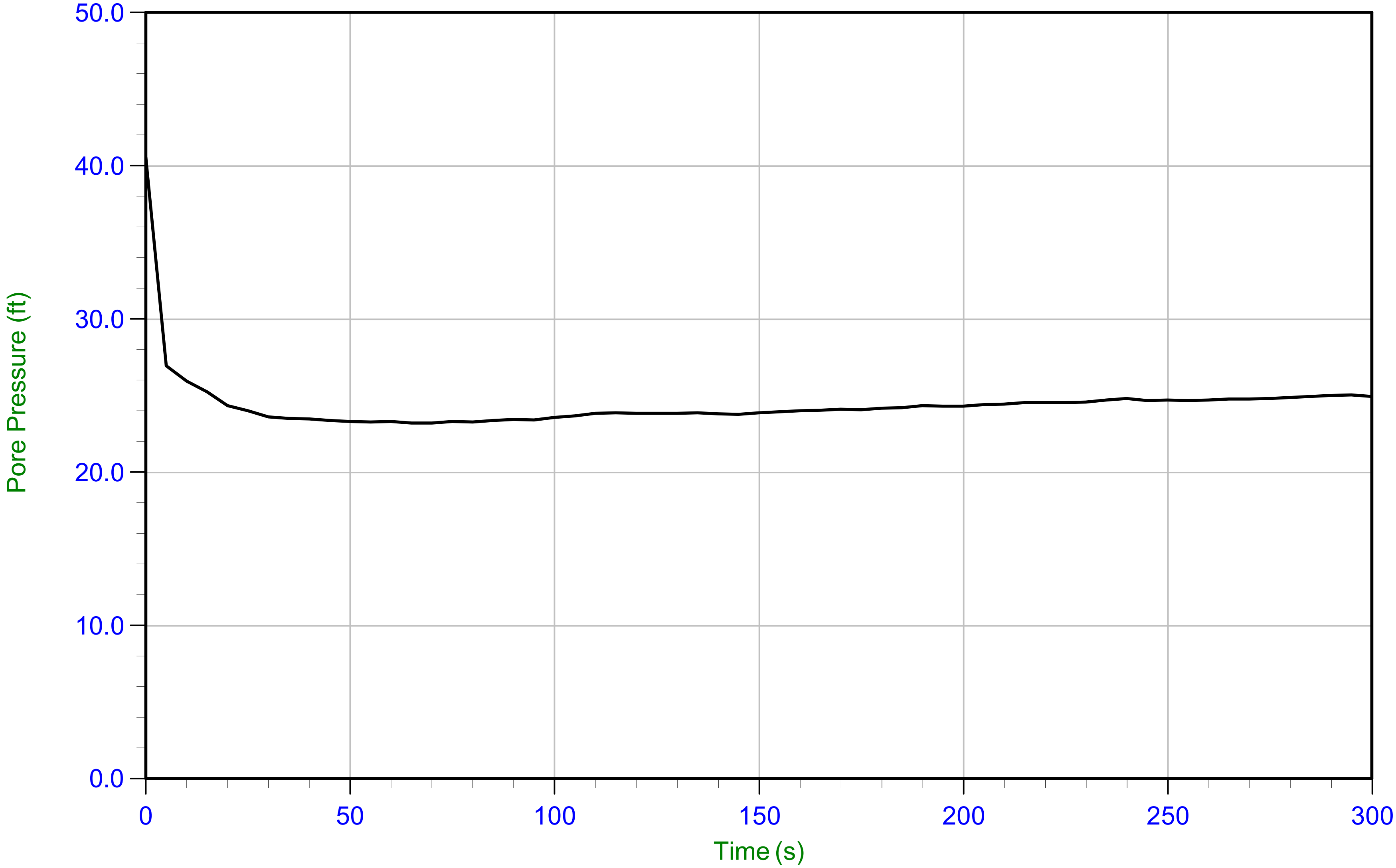
Filename: 15-53077_SPHAVC003.PPD	U Min: 4.9 ft	WT: 6.020 m / 19.750 ft	T(50): 29.1 s
Depth: 7.550 m / 24.770 ft	U Max: 10.0 ft	Ueq: 5.0 ft	Ir: 100
Duration: 295.0 s		U(50): 7.52 ft	Ch: 24.2 sq cm/min

ConeTec

AECOM

Job No: 15-53077
Date: 27-Aug-2015 11:59:22
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C003
Cone: AD419
Cone Area: 15 sq cm

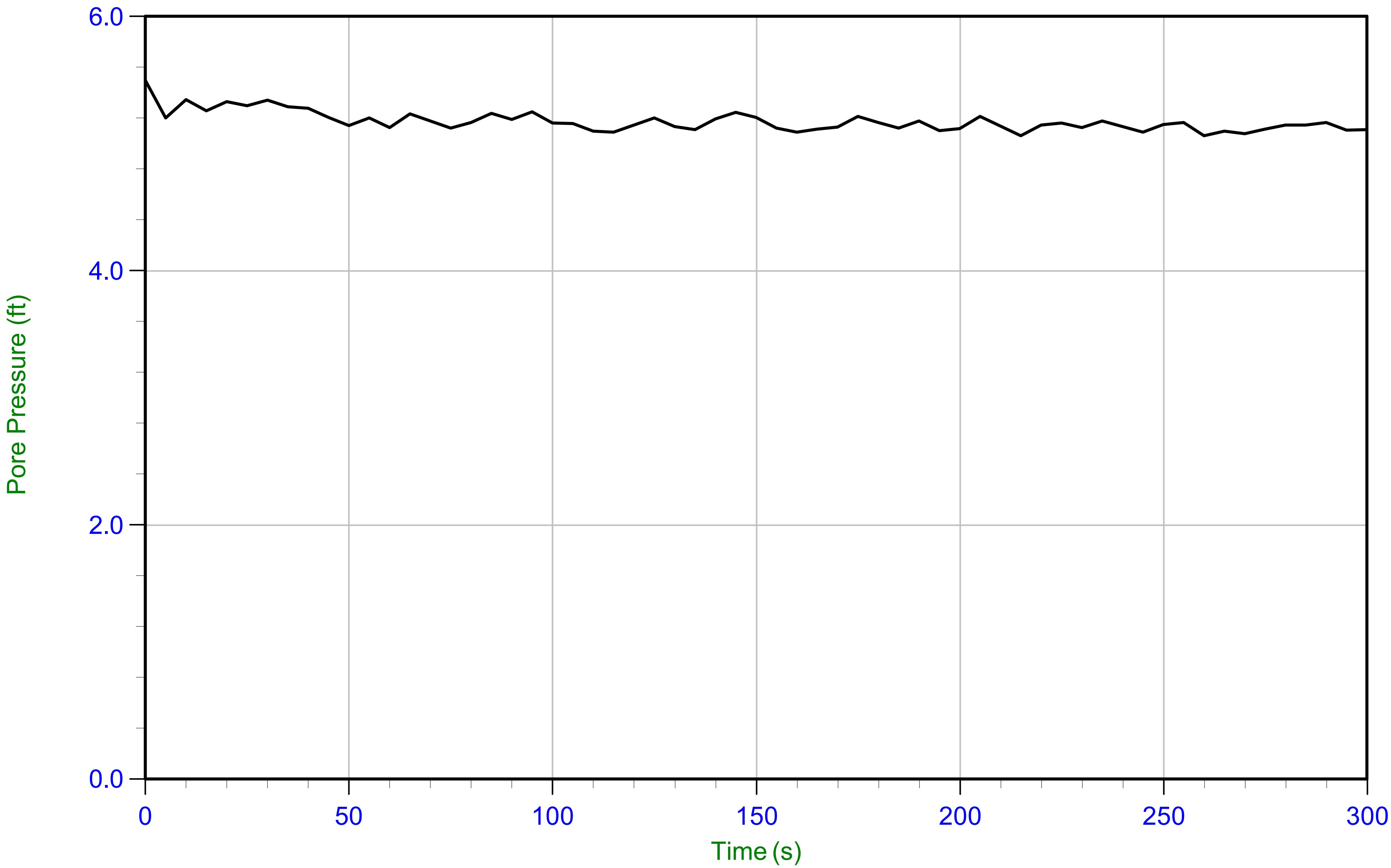


Trace Summary:

Filename: 15-53077_SPHAVC003.PPD
Depth: 13.750 m / 45.111 ft
Duration: 300.0 s

U Min: 23.2 ft
U Max: 40.6 ft

AECOM	Job No: 15-53077 Date: 27-Aug-2015 13:10:23 Site: Havana Power Plant, Havana, IL	Sounding: SCPT15-HAV-C004 Cone: AD419 Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC004.PPD
Depth: 6.150 m / 20.177 ft
Duration: 300.0 s

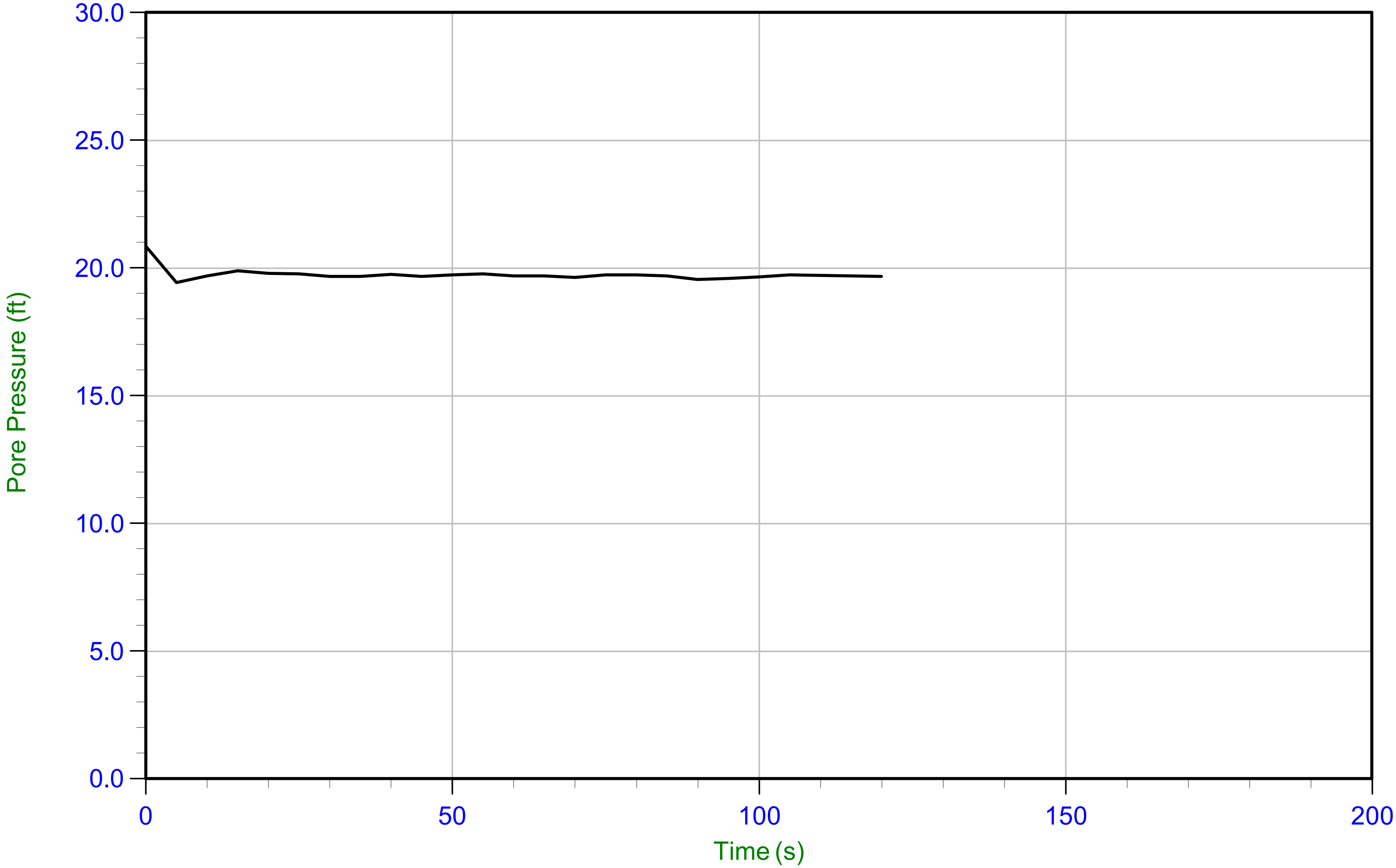
U Min: 5.1 ft
U Max: 5.5 ft

WT: 4.584 m / 15.039 ft
Ueq: 5.1 ft

AECOM

Job No: 15-53077
Date: 27-Aug-2015 13:10:23
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C004
Cone: AD419
Cone Area: 15 sq cm



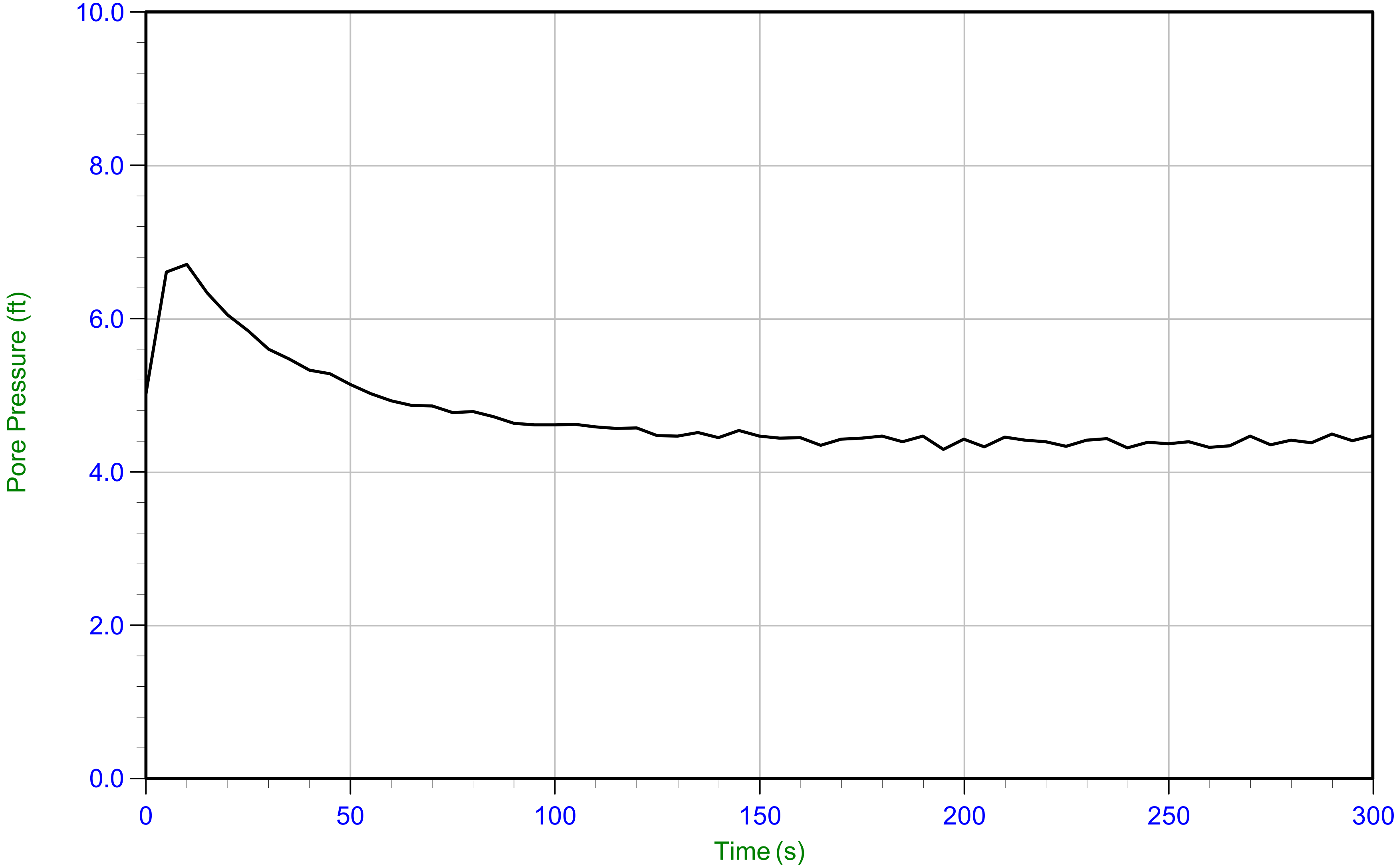
Trace Summary:

Filename: 15-53077_SPHAVC004.PPD
Depth: 10.650 m / 34.941 ft
Duration: 120.0 s

U Min: 19.4 ft
U Max: 20.9 ft

WT: 4.650 m / 15.256 ft
Ueq: 19.7 ft

ConeTec	Job No: 15-53077	Sounding: SCPT15-HAV-C005
AECOM	Date: 27-Aug-2015 14:08:58	Cone: AD419
	Site: Havana Power Plant, Havana, IL	Cone Area: 15 sq cm



Trace Summary:

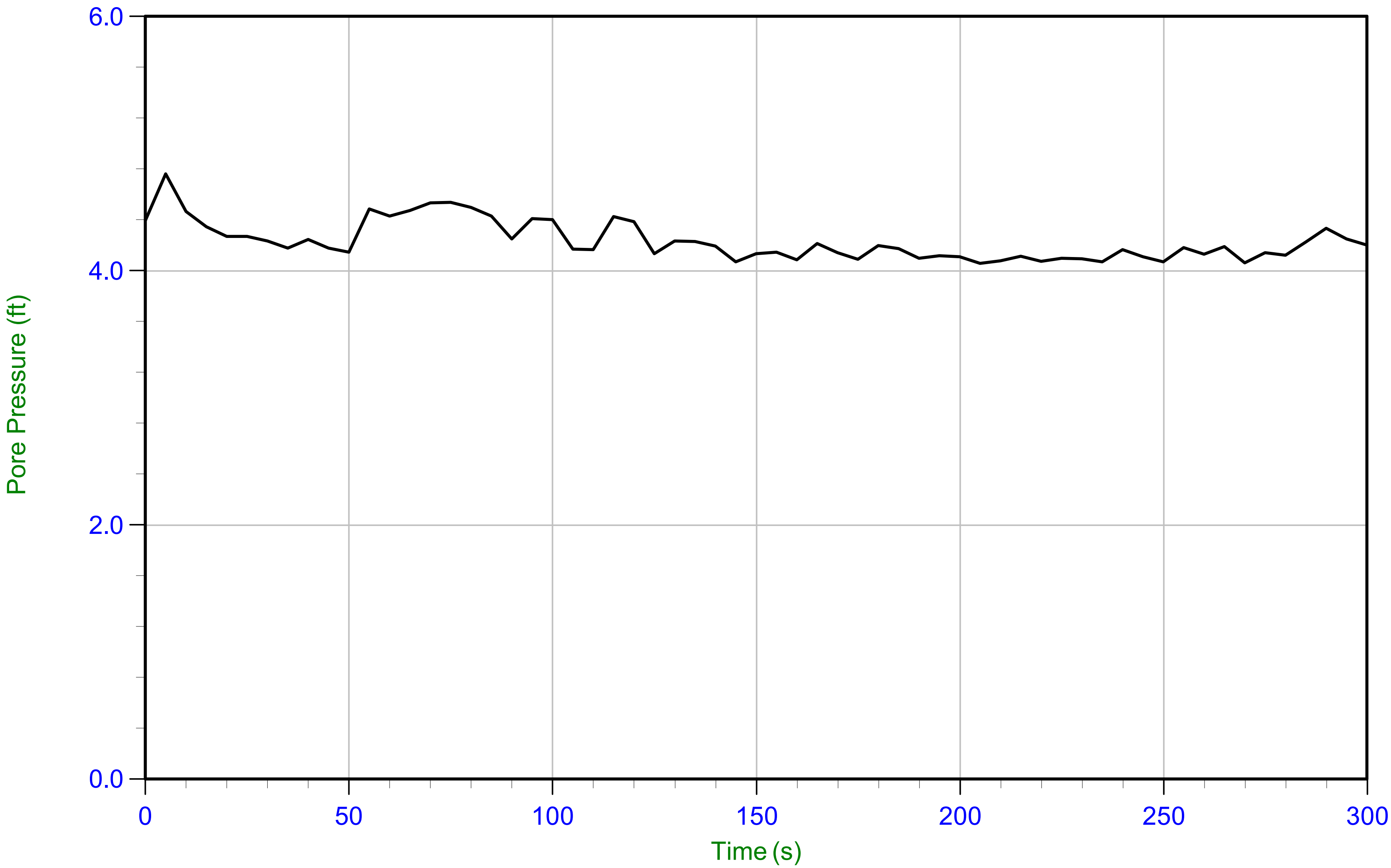
Filename: 15-53077_SPHAVC005.PPD	U Min: 4.3 ft	WT: 4.101 m / 13.455 ft	T(50): 21.4 s
Depth: 5.450 m / 17.880 ft	U Max: 6.7 ft	Ueq: 4.4 ft	Ir: 100
Duration: 300.0 s		U(50): 5.57 ft	Ch: 32.9 sq cm/min

ConeTec

AECOM

Job No: 15-53077
Date: 27-Aug-2015 15:09:56
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C006
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC006.PPD
Depth: 5.500 m / 18.044 ft
Duration: 300.0 s

U Min: 4.1 ft
U Max: 4.8 ft

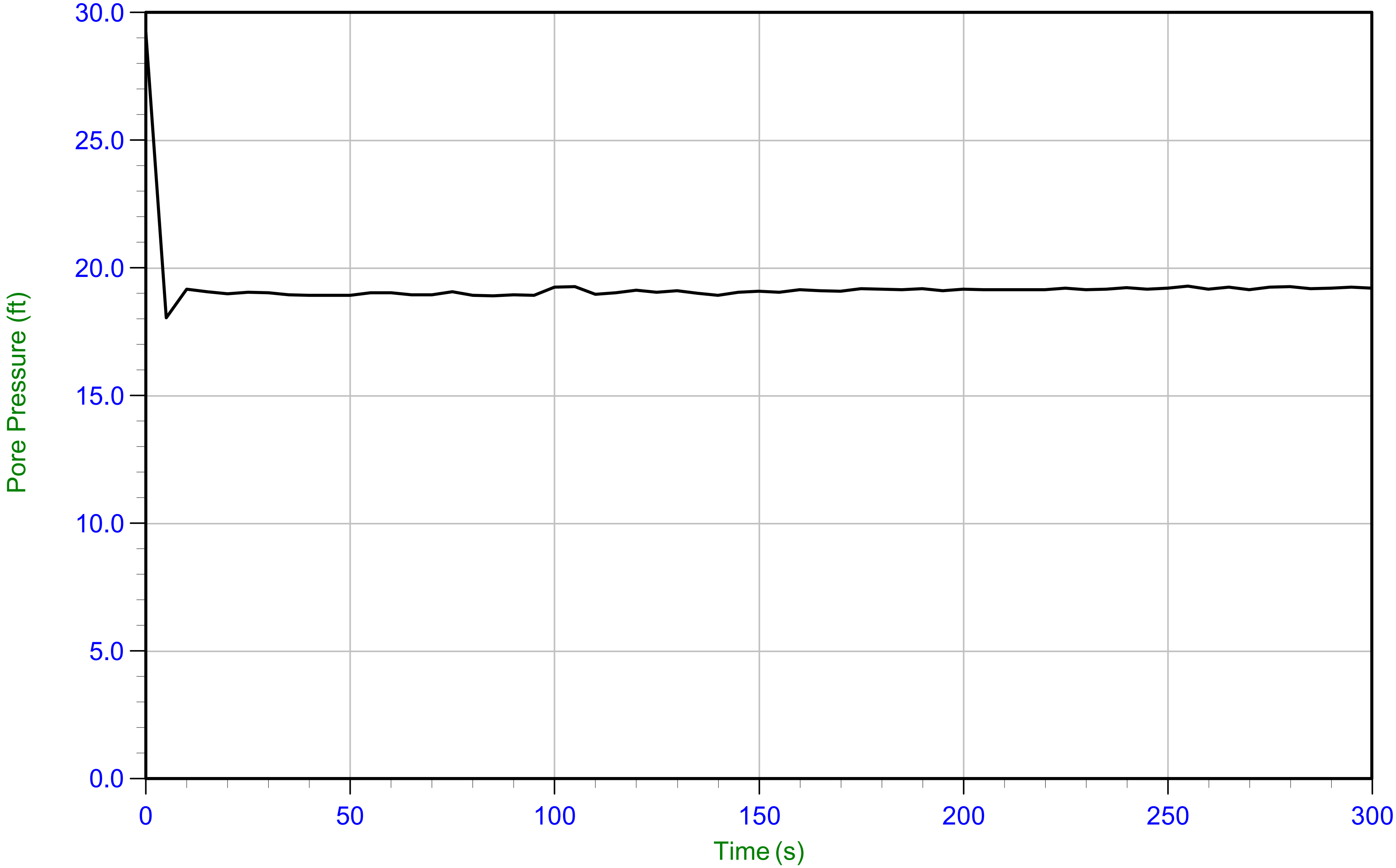
WT: 4.247 m / 13.934 ft
Ueq: 4.1 ft

CONETEC

AECOM

Job No: 15-53077
Date: 27-Aug-2015 15:09:56
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C006
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC006.PPD
Depth: 10.300 m / 33.792 ft
Duration: 300.0 s

U Min: 18.1 ft
U Max: 29.2 ft

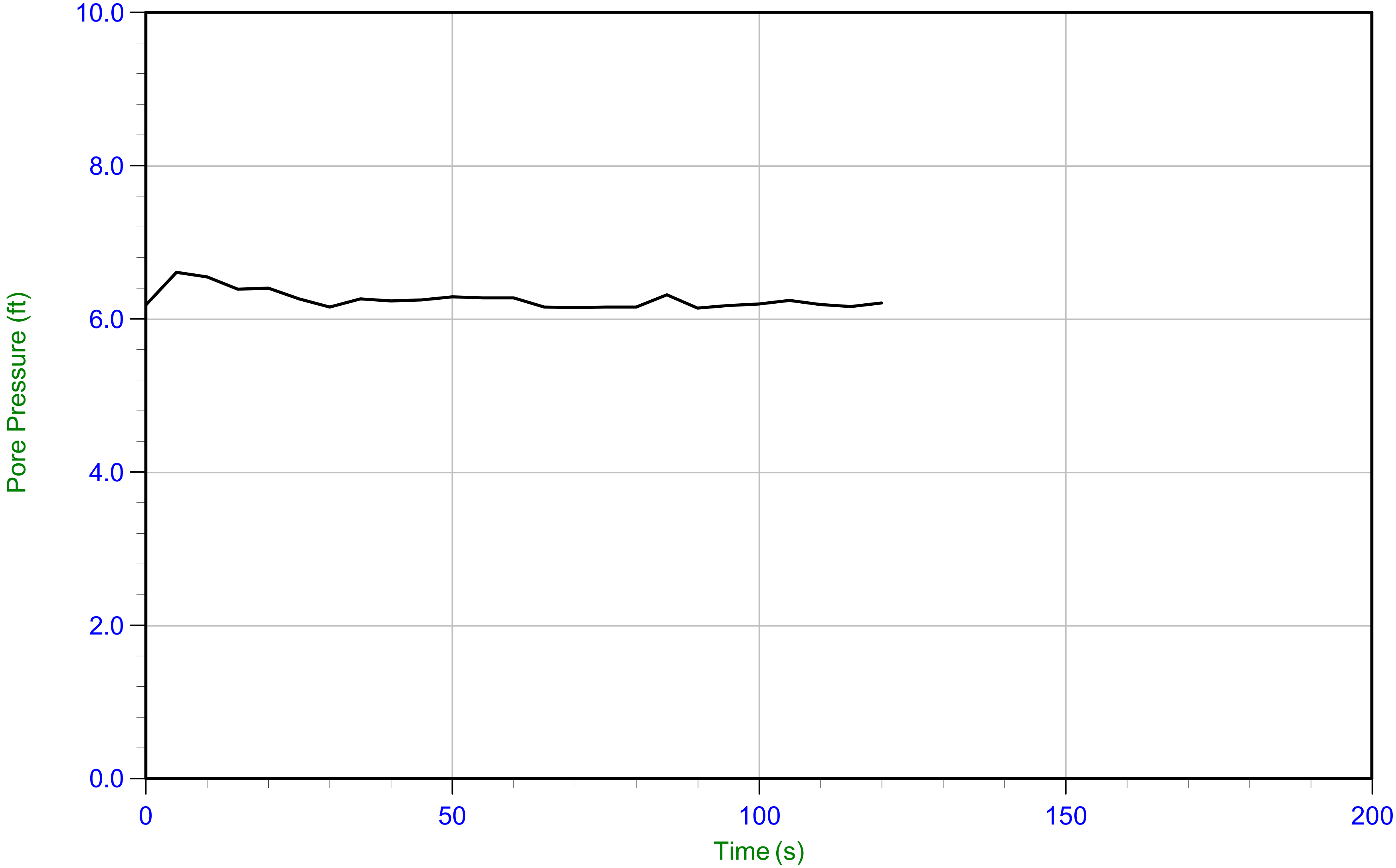
WT: 4.445 m / 14.583 ft
Ueq: 19.2 ft

CONETEC

AECOM

Job No: 15-53077
Date: 27-Aug-2015 08:35:27
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C007
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC007.PPD
Depth: 14.000 m / 45.931 ft
Duration: 120.0 s

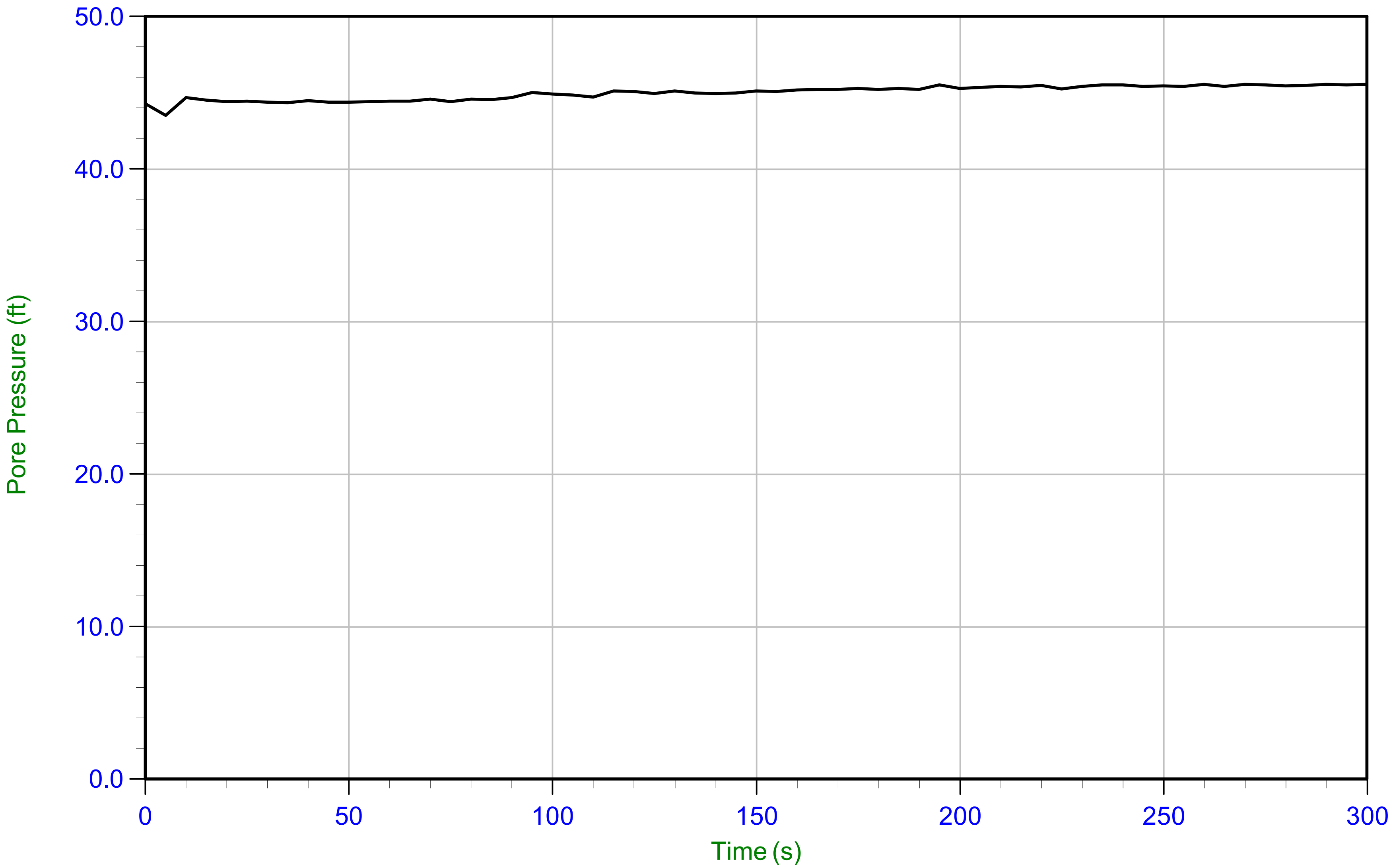
U Min: 6.1 ft
U Max: 6.6 ft

WT: 12.109 m / 39.727 ft
Ueq: 6.2 ft

AECOM

Job No: 15-53077
Date: 27-Aug-2015 08:35:27
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C007
Cone: AD419
Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC007.PPD
Depth: 26.050 m / 85.465 ft
Duration: 300.0 s

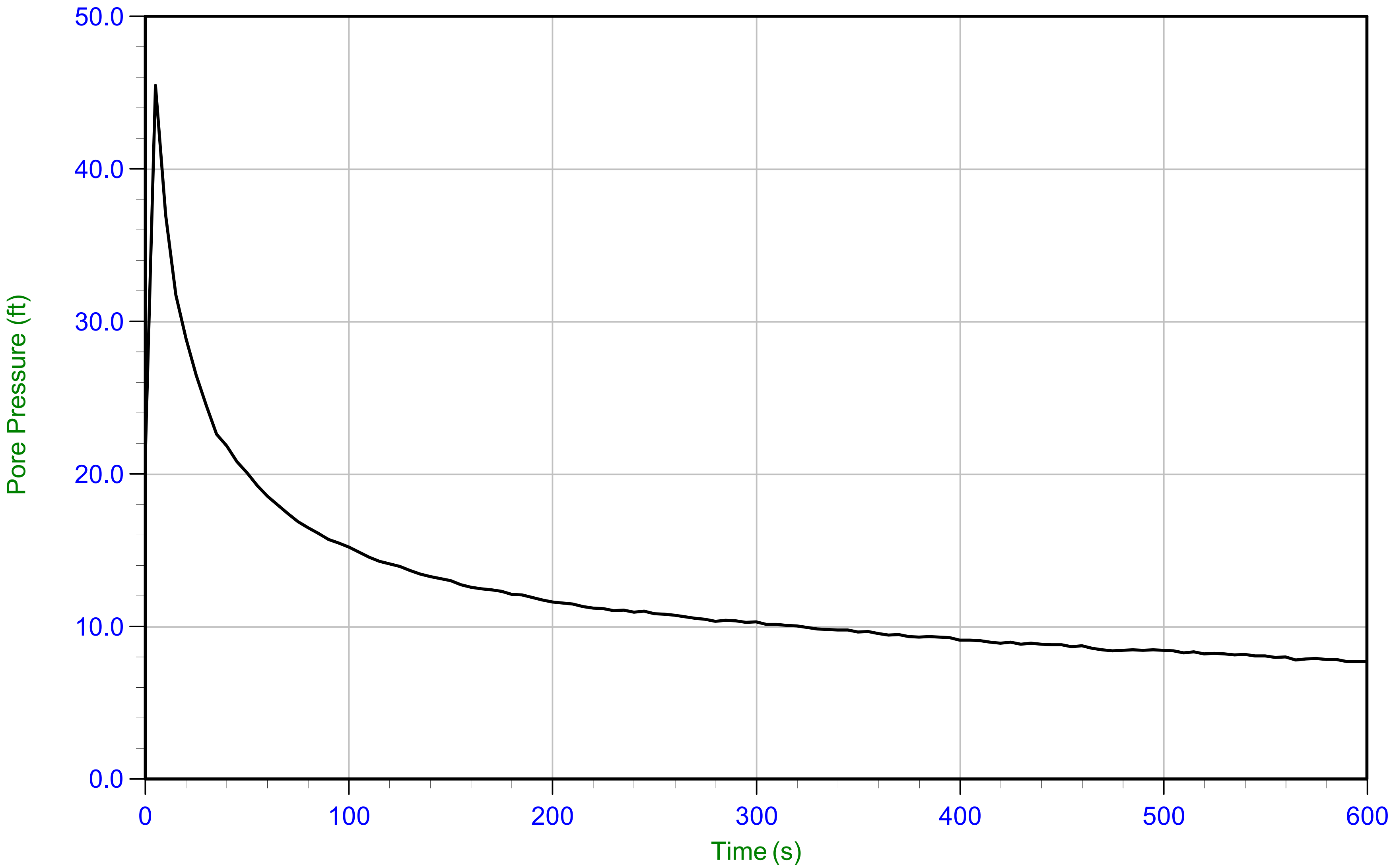
U Min: 43.5 ft
U Max: 45.6 ft

WT: 12.135 m / 39.813 ft
Ueq: 45.7 ft

AECOM

Job No: 15-53077
Date: 27-Aug-2015 10:19:19
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C008
Cone: AD419
Cone Area: 15 sq cm



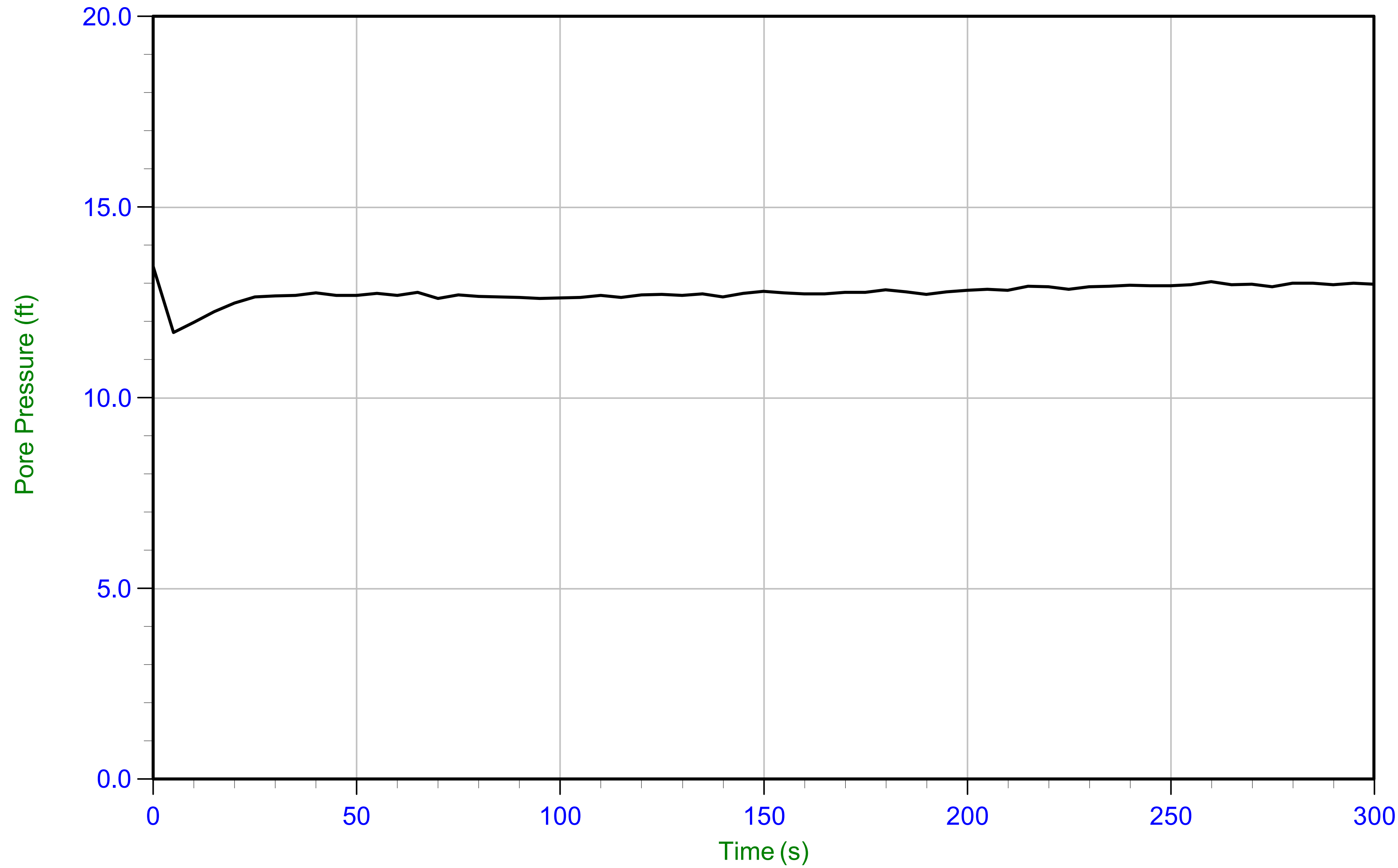
Trace Summary:

Filename: 15-53077_SPHAVC008.PPD
Depth: 1.300 m / 4.265 ft
Duration: 600.0 s
U Min: 7.7 ft
U Max: 45.5 ft

AECOM

Job No: 15-53077
Date: 27-Aug-2015 10:19:19
Site: Havana Power Plant, Havana, IL

Sounding: SCPT15-HAV-C008
Cone: AD419
Cone Area: 15 sq cm



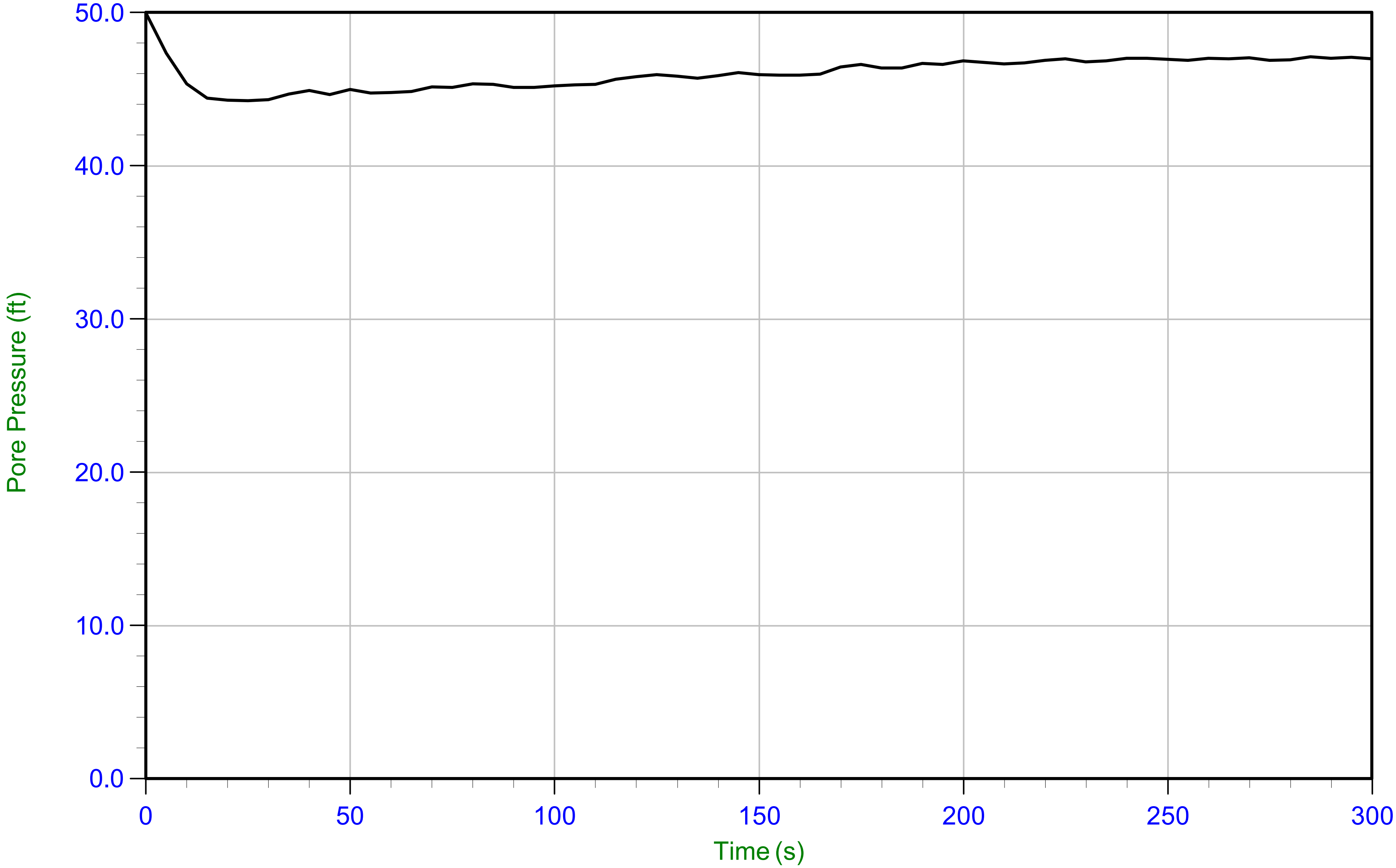
Trace Summary:

Filename: 15-53077_SPHAVC008.PPD
Depth: 15.500 m / 50.852 ft
Duration: 300.0 s

U Min: 11.7 ft
U Max: 13.5 ft

WT: 11.573 m / 37.969 ft
Ueq: 12.9 ft

AECOM	Job No: 15-53077 Date: 27-Aug-2015 10:19:19 Site: Havana Power Plant, Havana, IL	Sounding: SCPT15-HAV-C008 Cone: AD419 Cone Area: 15 sq cm



Trace Summary:

Filename: 15-53077_SPHAVC008.PPD
Depth: 26.050 m / 85.465 ft
Duration: 300.0 s

U Min: 44.2 ft
U Max: 50.0 ft

WT: 11.714 m / 38.431 ft
Ueq: 47.0 ft

ATTACHMENT D

LABORATORY TEST RESULTS

Soil samples obtained during the geotechnical investigation were transported to the AECOM laboratory in Overland Park, Kansas for designation of testing. Selected samples were sent to the Alpha-Omega laboratory located in Kansas City, Kansas. Laboratory tests provide data for classification of soils and evaluation of their engineering properties. Test performed on the samples included those described below.

Basic Properties and Soil Classification Tests:

Index testing including water content, grain size analyses, and liquid and plastic (Atterberg) limits was performed on selected samples. The following test methods were used:

- ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System);
- ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure);
- ASTM D422 – Standard Test Method for Particle Size Analysis for Soils;
- ASTM D1140 – Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve;
- ASTM D2216 – Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass;
- ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils;

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-1C	ST-1	6'-7.5'	Brown poorly graded sand with silt	7.2					SP-SM	7.8				ASTM D2488
EP-1C	SPT-1	11'-12.5'	Brown poorly graded sand with silt	5.8					SP-SM	9.2				ASTM D2488
EP-1C	ST-2	16'-17.5'	Brown poorly graded sand with silt	9.4					SP-SM	9.7				ASTM D2488
EP-1C	SPT-2	21'-22.5'	Brown poorly graded sand with silt	9.8					SP-SM	11.9				ASTM D2488
EP-1C	ST-3	26'-27.5'	Brown and dark brown silty sand	9.6		NV	NP	NP	SM	20.4				ASTM D2487
EP-1C	SPT-4	41'-42.5'	Brown poorly graded sand						SP	3.4				ASTM D2488
EP-1C	SPT-6	51'-52.5'	Brown silty sand						SM	30.8				ASTM D2488
EP-1C	SPT-7	56'-57.5'	Brown poorly graded sand						SP	5.7				ASTM D2488
EP-1T	SPT-1	3.5'-5'	Dark brown silty sand	9.6					SM	25.3				ASTM D2488
EP-1T	SPT-2	8.5'-10'	Brown silty sand	13.9					SM	16.3				ASTM D2488

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT NUMBER: 15-391T
PROJECT LOCATION: Havana, IL
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-1T	SPT-3	13.5'-15'	Brown poorly graded sand	20.5					SP	2.0				ASTM D2488
EP-1T	SPT-5	23.5'-25'	Brown poorly graded sand						SP	6.3				ASTM D2488
EP-1T	SPT-7	33.5'-34.7'	Brown poorly graded sand with gravel						SP	4.8				ASTM D2488
EP-1T	SPT-8	38.5'-39.75'	Brown poorly graded sand						SP	5.0				ASTM D2488
EP-2C	ST-1	3.5'-5'	Brown poorly graded sand with silt	6.5		NV	NP	NP	SP-SM	7.4				ASTM D2487
EP-2C	SPT-1	8.5'-10'	Brown poorly graded sand with silt	7.6					SP-SM					ASTM D2488
EP-2C	ST-2	13.5'-15'	Brown poorly graded sand	5.3					SP	4.6				ASTM D2488
EP-2C	ST-3	23.5'-25'	Brown poorly graded sand	6.4					SP	2.8				ASTM D2488
EP-2C	ST-4	33.5'-35'	Brown poorly graded sand	5.2					SP	3.3				ASTM D2488
EP-2C	SPT-4	38.5'-40'	Light brown poorly graded sand						SP	4.6				ASTM D2488

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-2C	SPT-5	43.5'-45'	Light brown poorly graded sand						SP					ASTM D2488
EP-2C	SPT-6	48.5'-50'	Brown poorly graded sand with silt						SP-SM	8.0				ASTM D2488
EP-2C	SPT-8	55'-56'	Brown poorly graded sand						SP	4.5				ASTM D2488
EP-2T	SPT-1	6'-7.5'	Brown poorly graded sand with silt						SP-SM	6.3				ASTM D2488
EP-2T	SPT-2	11'-12.5'	Brown Clayey sand						SC	22.0				ASTM D2488
EP-2T	SPT-4	21'-22.5'	Brown poorly graded sand						SP	2.0				ASTM D2488
EP-2T	SPT-6	31'-32.5'	Brown poorly graded sand						SP	4.8				ASTM D2488
EP-2T	SPT-8	40'-41.5'	Brown poorly graded sand with gravel						SP	2.3				ASTM D2488

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-3C	ST-1	6'-7.5'	Dark brown silty sand	8.7					SM	21.5				ASTM D2488
EP-3C	SPT-1	11'-12.5'	Brown silty sand	7.8		NV	NP	NP	SM	19.4				ASTM D2487
EP-3C	ST-2	16'-17.5'	Brown poorly graded sand with silt	6.5					SP-SM	6.8				ASTM D2488
EP-3C	ST-3	26'-27.5'	Reddish brown poorly graded sand with silt						SP-SM	10.7				ASTM D2488
EP-3C	ST-4	36'-37.5'	Brown poorly graded sand						SP	3.7				ASTM D2488
EP-3C	SPT-5	46'-47.5'	Brown silty sand						SM	20.2				ASTM D2488
EP-3C	SPT-7	56'-57.5'	Brown poorly graded sand with silt						SP-SM	5.4				ASTM D2488

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-4C	ST-1	3.5'-5'	Brown poorly graded sand with silt						SP-SM	5.2				ASTM D2488
EP-4C	SPT-1	8.5'-10'	Brown silty sand						SM	13.8				ASTM D2488
EP-4C	ST-2	13.5'-15'	Brown poorly graded sand with silt						SP-SM	11.2				ASTM D2488
EP-4C	SPT-2	18.5'-20'	Brown, mottled dark brown silty sand						SM	13.6				ASTM D2488
EP-4C	ST-3	23.5'-25'	Gray, mottled light reddish brown poorly graded sand with silt						SP-SM	7.3				ASTM D2488
EP-4C	SPT-3	28.5'-30'	Brown silty sand						SM	12.9				ASTM D2488
EP-4C	ST-4	33.5'-34'	Dark brown silty sand			14	13	1	SM	28.6				ASTM D2487
EP-4C	SPT-4	38.5'-40'	Light brown poorly graded sand with silt						SP-SM					ASTM D2488

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-5C	ST-1	6'-7.5'	Reddish brown poorly graded sand with silt	9.1					SP-SM	10.1				ASTM D2488
EP-5C	SPT-1	11'-12.5'	Brown poorly graded sand with silt	7.2					SP-SM	9.2				ASTM D2488
EP-5C	ST-2	16'-17'	Brown poorly graded sand with silt	7.0					SP-SM	6.4				ASTM D2488
EP-5C	ST-3	26'-27.5'	Brown poorly graded sand with silt	8.0					SP-SM	5.8				ASTM D2488
EP-5C	ST-4	41'-42.5'	Brown poorly graded sand						SP	0.8				ASTM D2488
EP-5C	SPT-5	46'-47.5'	Brown poorly graded sand						SP	1.1				ASTM D2488
EP-5C	SPT-7	56'-57.5'	Brown poorly graded sand						SP	2.2				ASTM D2488

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-5T	SPT-1	3.5'-5'	Brown poorly graded sand with silt						SP-SM	8.0				ASTM D2488
EP-5T	SPT-2	8.5'-10'	Brown poorly graded sand						SP	4.6				ASTM D2488
EP-5T	SPT-3	13.5'-15'	Brown poorly graded sand with silt						SP-SM	5.8				ASTM D2488
EP-5T	SPT-4	18.5'-20'	Brown poorly graded sand						SP	4.0				ASTM D2488
EP-5T	SPT-5	23.5'-25'	Brown poorly graded sand						SP					ASTM D2488
EP-5T	SPT-6	28.5'-30'	Brown poorly graded sand with silt						SP-SM	5.3				ASTM D2488
EP-5T	SPT-7	33.5'-35'	Brown poorly graded sand						SP					ASTM D2488
EP-5T	SPT-8	38.5'-40'	Brown poorly graded sand						SP	2.2				ASTM D2488

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-6C	ST-1	3.5'-5'	Dark brown, mottled gray clayey sand	12.3		25	14	11	SC	43.1				ASTM D2487
EP-6C	SPT-1	8.5'-10'	Brown silty sand			14	13	1	SM	36.3				ASTM D2487
EP-6C	ST-2	13.5'-15'	Brown poorly graded sand with silt	9.3					SP-SM	10.0				ASTM D2488
EP-6C	ST-3	23.5'-24.25'	Brown and dark brown poorly graded sand with silt	12.1					SP-SM	6.4				ASTM D2488
EP-6C	SPT-3	28.5'-30'	Dark brown silty, clayey sand			18	13	5	SC-SM	37.7				ASTM D2487
EP-6C	ST-4	33.5'-35'	Brown poorly graded sand						SP	3.4				ASTM D2488
EP-6C	SPT-4	38.5'-40'	Brown poorly graded sand						SP	4.1				ASTM D2488

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-7C	ST-1	6'-7.5'	Brown, mottled dark brown and gray silty sand	8.0					SM	21.8				ASTM D2488
EP-7C	SPT-1	11'-12.5'	Brown silty sand	4.6					SM	17.8				ASTM D2488
EP-7C	ST-2	16'-17.5'	Brown poorly graded sand with silt	7.9					SP-SM	11.7				ASTM D2488
EP-7C	SPT-2	21'.22.5'	Brown poorly graded sand with silt	8.2					SP-SM	10.6				ASTM D2488
EP-7C	SPT-4	31'-32.5'	Brown poorly graded sand with silt						SP-SM	10.0				ASTM D2488
EP-7C	SPT-6	41'-42.5'	Brown poorly graded sand with silt						SP-SM	8.7				ASTM D2488

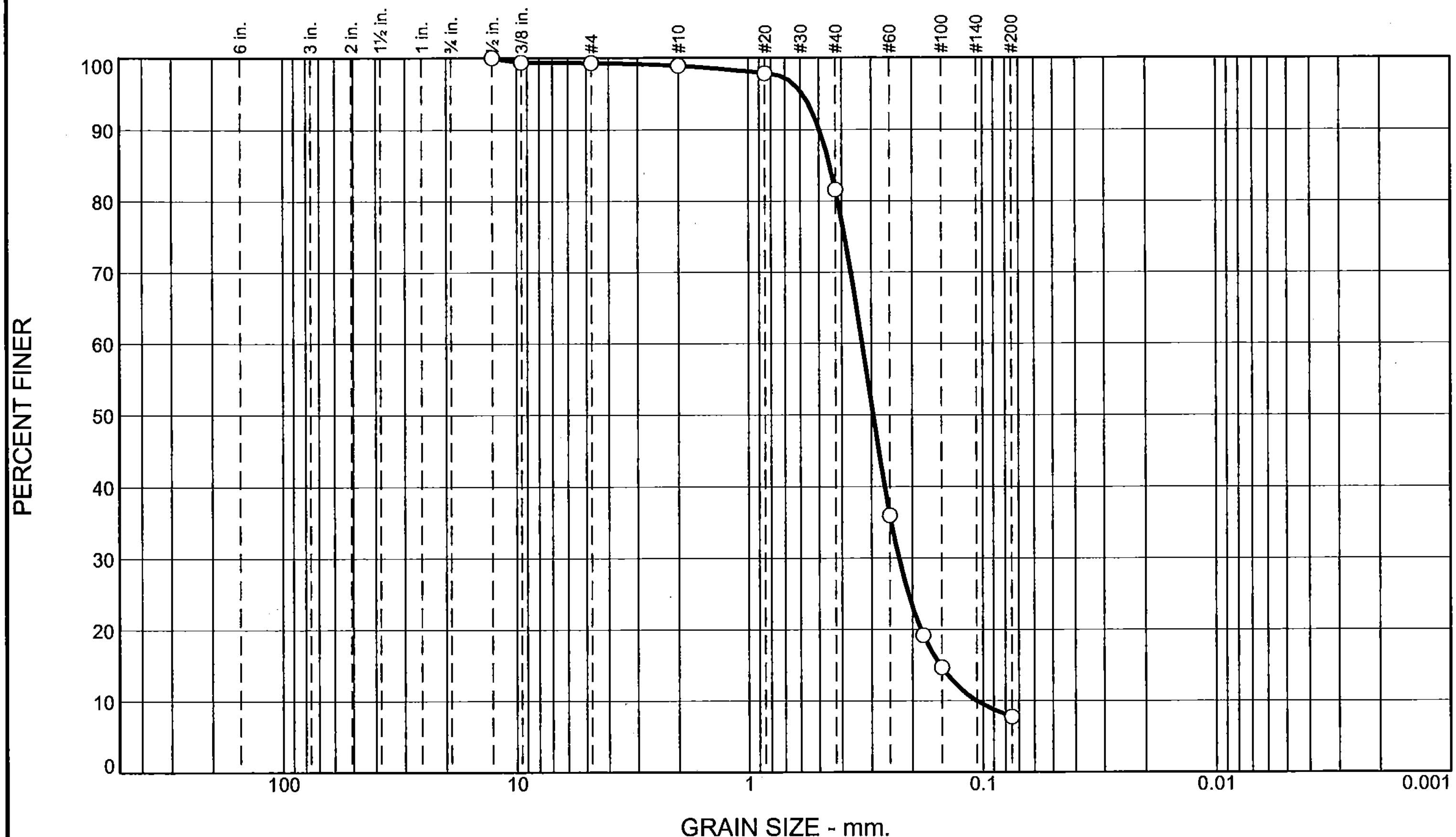
Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: Dynegy CCR Ph 3/7- Havana
PROJECT LOCATION: Havana, IL
PROJECT NUMBER: 15-391T
DATE: 9/28/2015

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	USCS / Visual - Manual	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Material Description per Methodology
EP-8C	ST-1	3.5'-5' Upper Portion	Brown silty sand	17.4					SM	24.7				ASTM D2488
EP-8C	ST-1	3.5'-5' Middle Portion	Dark gray sandy LEAN CLAY	12.8		30	15	15	CL	60.8				ASTM D2487
EP-8C	ST-1	3.5'-5' Lower Portion	Brown silty sand	12.2					SM	17.6				ASTM D2488
EP-8C	SPT-1	8.5'-10'	Brown silty sand	9.1					SM	19.0				ASTM D2488
EP-8C	ST-2	13.5'-15'	Brown poorly graded sand with silt	6.9					SP-SM	6.7				ASTM D2488
EP-8C	SPT-2	18.5'-20'	Brown silty sand	9.5					SM	27.7				ASTM D2488
EP-8C	ST-3	23.5'-25' Upper Portion	Brown poorly graded sand with silt	11.5					SP-SM	8.5				ASTM D2488
EP-8C	ST-3	23.5'-25' Lower Portion	Dark brown silty sand	9.7					SM	26.7				ASTM D2488
EP-8C	ST-4	33.5'-35'	Brown poorly graded sand						SP	3.1				ASTM D2488
EP-8C	SPT-4	38.5'-40'	Brown poorly graded sand						SP	3.1				ASTM D2488

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.4	17.3	73.8	7.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.4		
#4	99.3		
#10	98.9		
#20	97.9		
#40	81.6		
#60	36.0		
#80	19.2		
#100	14.7		
#200	7.8		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4974 D_{85}= 0.4489 D_{60}= 0.3286
D_{50}= 0.2952 D_{30}= 0.2287 D_{15}= 0.1525
D_{10}= 0.1064 C_u= 3.09 C_c= 1.50

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C ST-1 **Depth:** 6'-7.5'

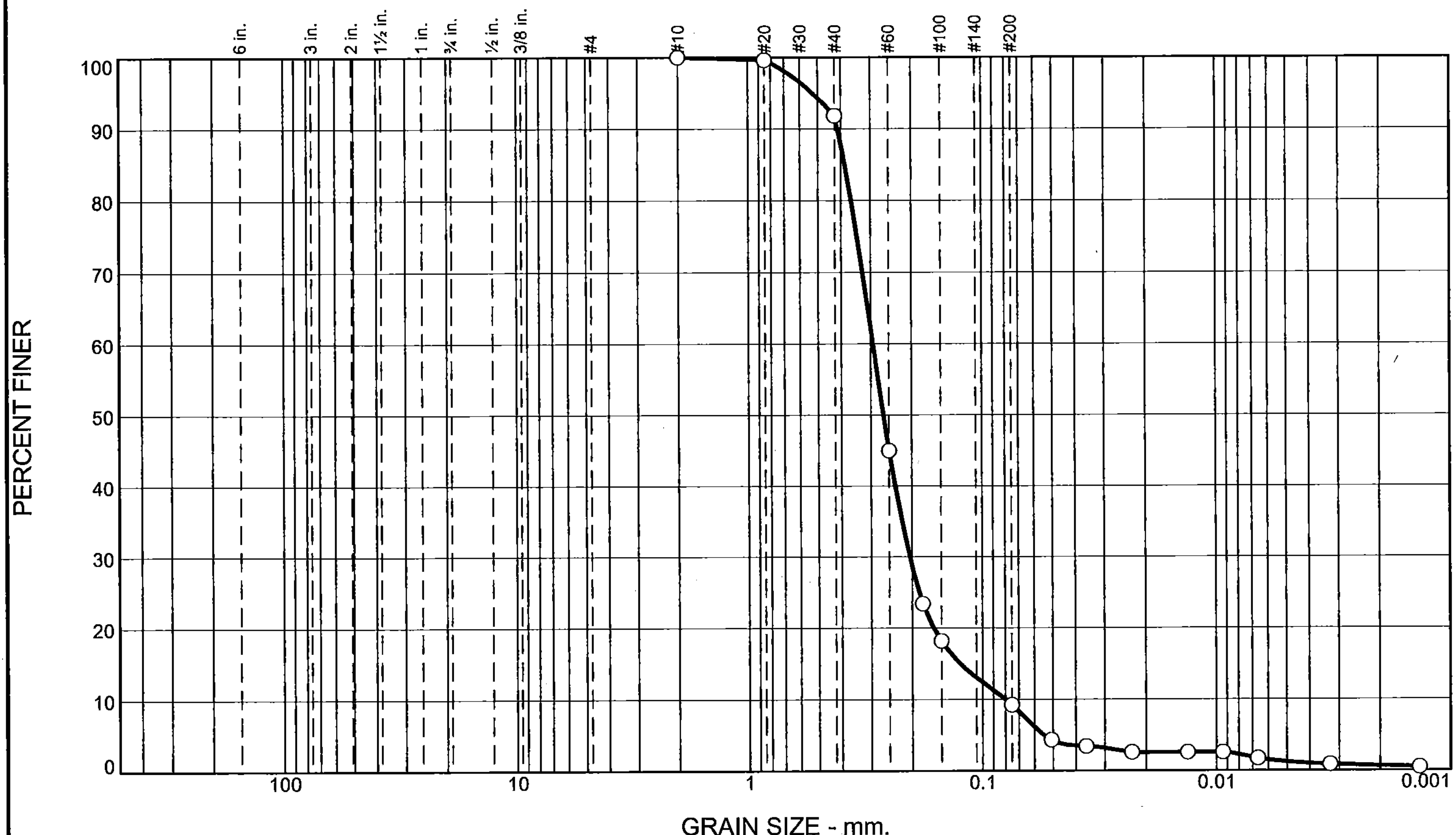
Date: 10/20/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.2	82.6	8.0	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	91.8		
#60	45.0		
#80	23.4		
#100	18.2		
#200	9.2		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4127 D_{85}= 0.3851 D_{60}= 0.2933
D_{50}= 0.2643 D_{30}= 0.2048 D_{15}= 0.1245
D_{10}= 0.0799 C_u= 3.67 C_c= 1.79

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C SPT-1 **Depth:** 11'-12.5'

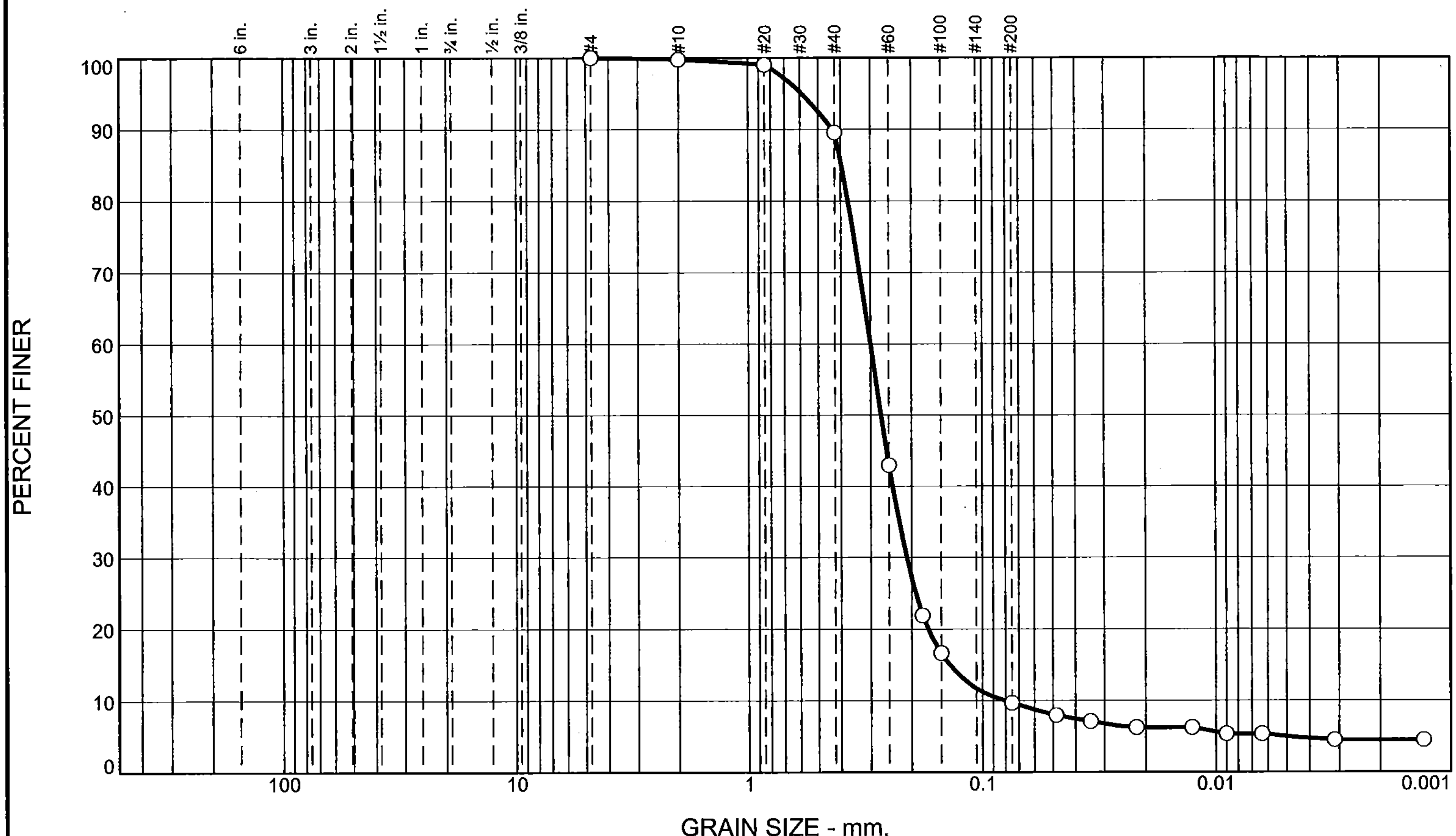
Date: 10/16/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	10.2	79.8	4.7	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.0		
#40	89.5		
#60	42.9		
#80	21.9		
#100	16.6		
#200	9.7		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4352 D_{85}= 0.3972 D_{60}= 0.3003
D_{50}= 0.2705 D_{30}= 0.2104 D_{15}= 0.1379
D_{10}= 0.0807 C_u= 3.72 C_c= 1.83

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C ST-2 **Depth:** 16'-17.5'

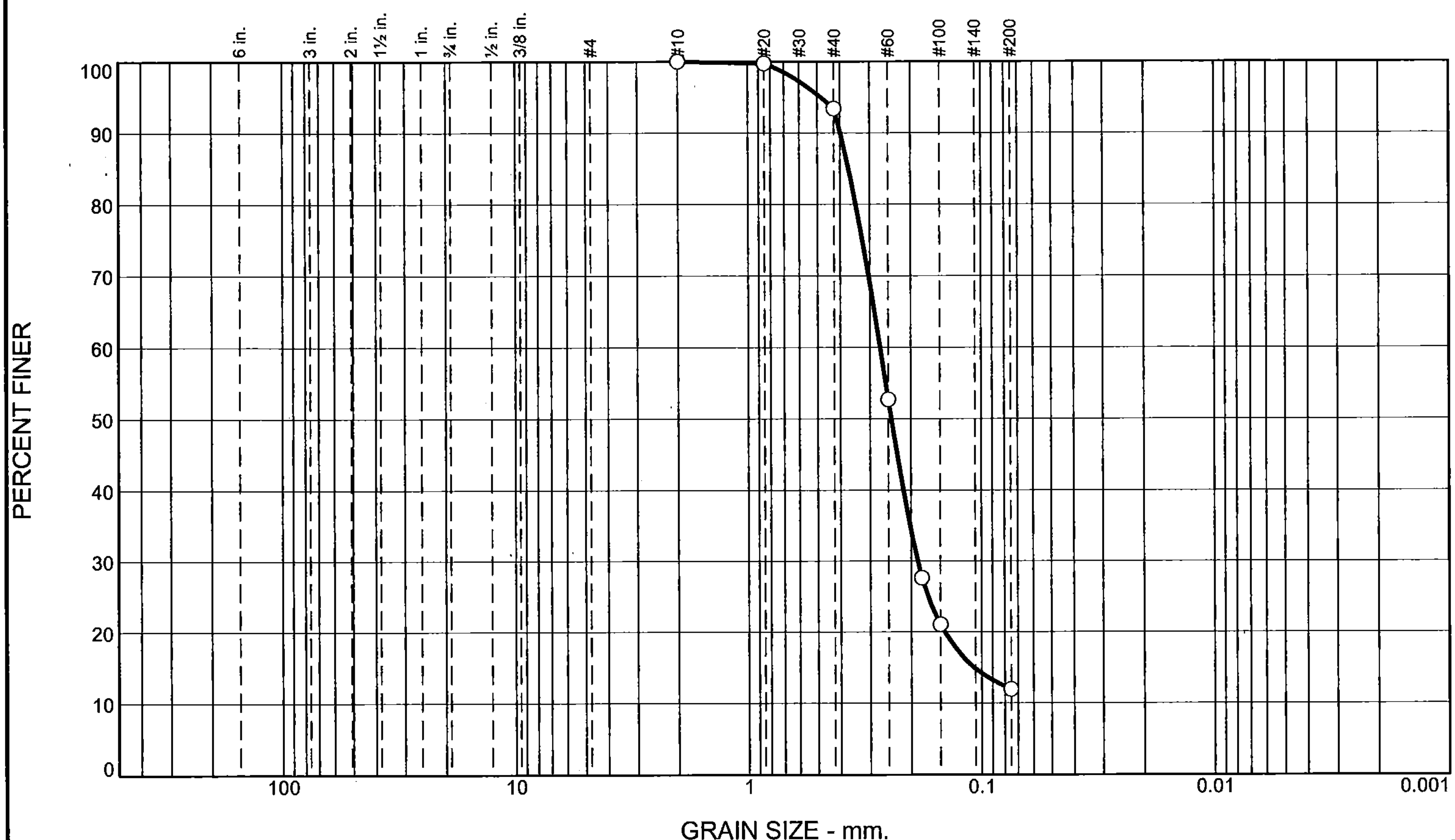
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.6	81.5	11.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	93.4		
#60	52.7		
#80	27.6		
#100	21.0		
#200	11.9		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3984 D_{85}= 0.3681 D_{60}= 0.2713
D_{50}= 0.2427 D_{30}= 0.1878 D_{15}= 0.1079
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C SPT-2 **Depth:** 21'-22.5'

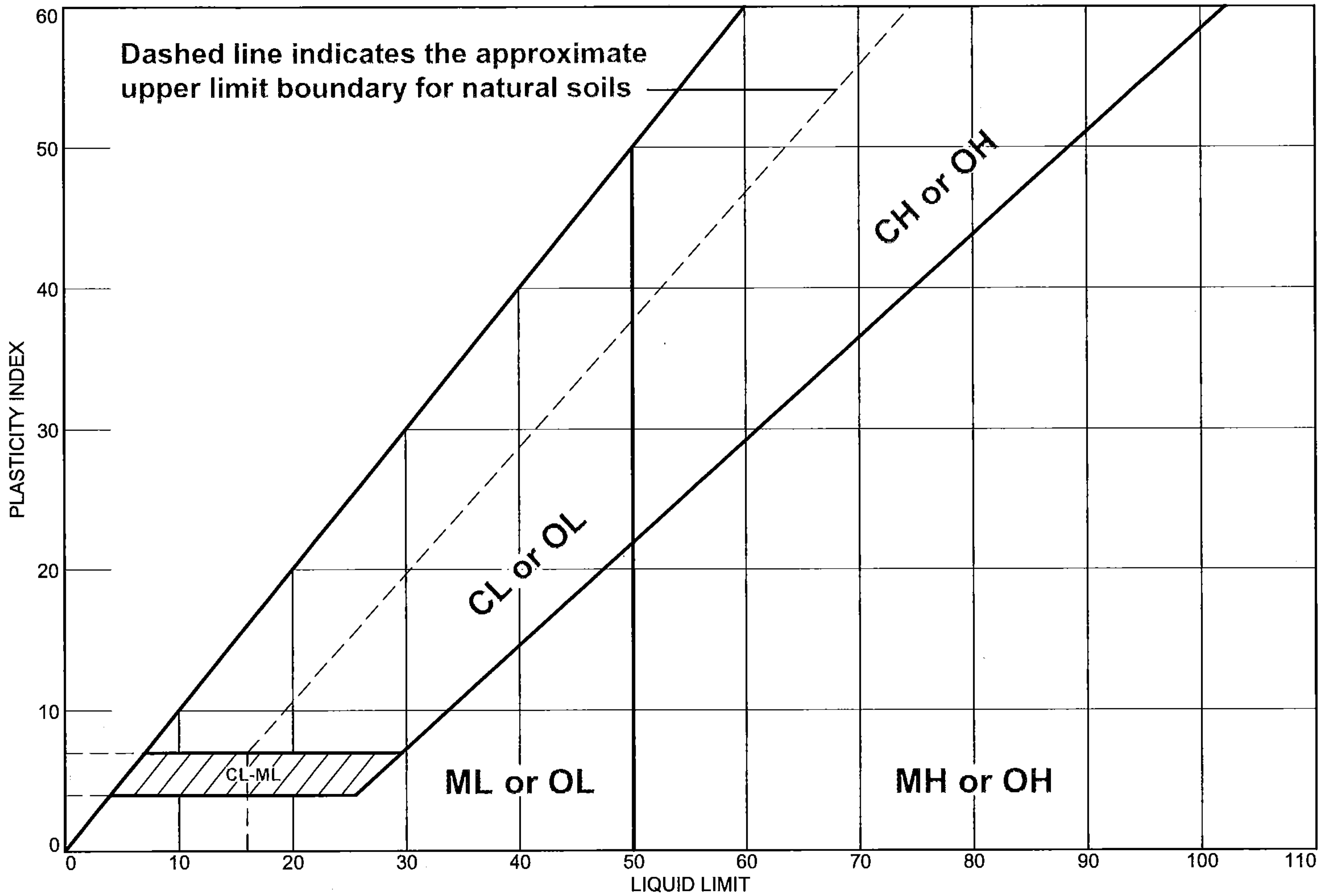
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown and dark brown silty sand	NV	NP	NP	93.5	20.4	SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

● **Depth:** 26'-27.5' **Sample Number:** EP-1C ST-3

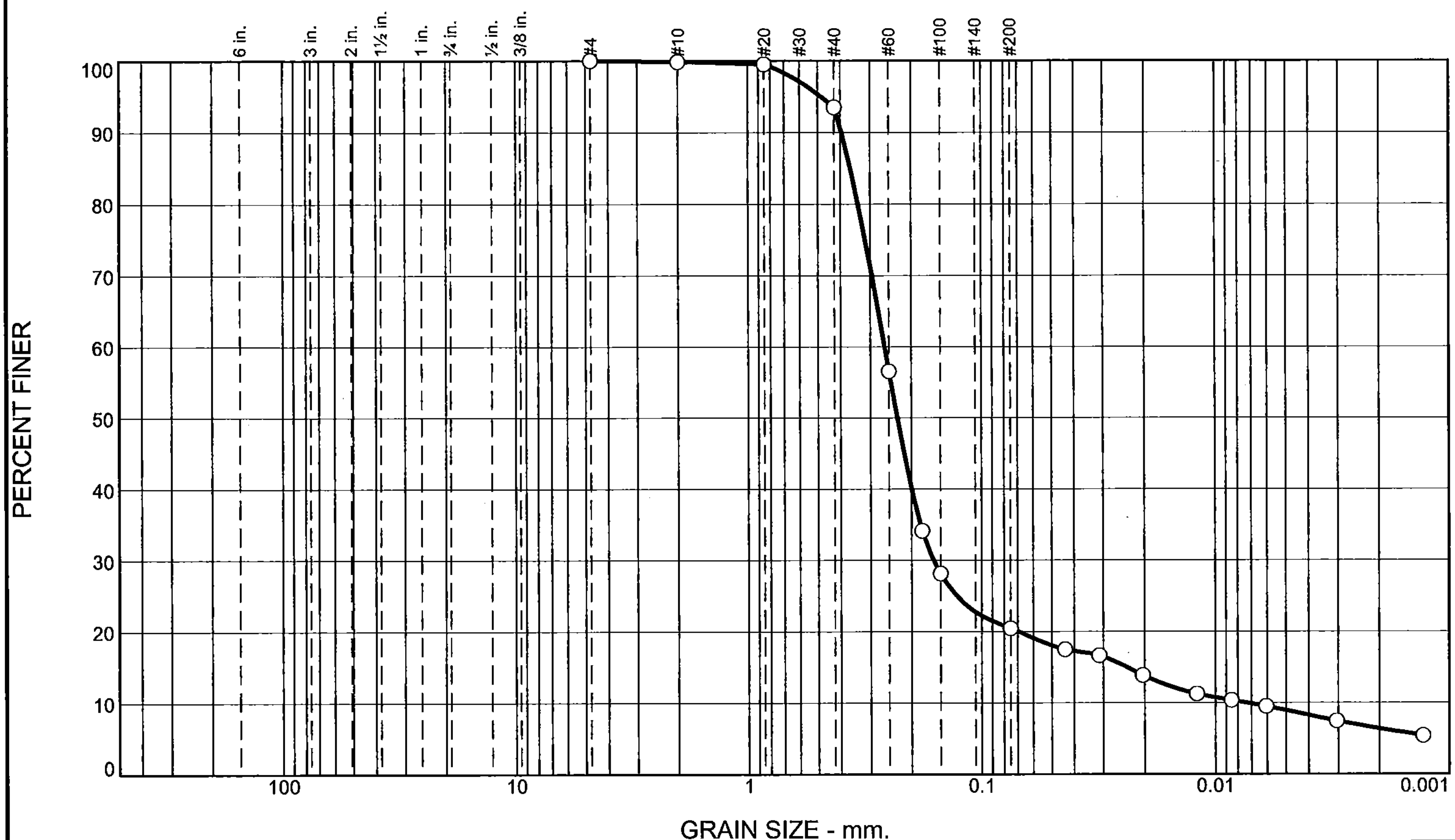
Remarks:

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	6.4	73.1	11.5	8.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.5		
#40	93.5		
#60	56.5		
#80	34.1		
#100	28.1		
#200	20.4		

* (no specification provided)

Material Description

Brown and dark brown silty sand

Atterberg Limits

PL= NP　LL= NV　PI= NP

Coefficients

D_{90}= 0.3954　D_{85}= 0.3633　D_{60}= 0.2610
D_{50}= 0.2302　D_{30}= 0.1610　D_{15}= 0.0239
D_{10}= 0.0074　C_u= 35.39　C_c= 13.47

Classification

USCS= SM　AASHTO= A-2-4(0)

Remarks

Sample Number: EP-1C ST-3　**Depth:** 26'-27.5'

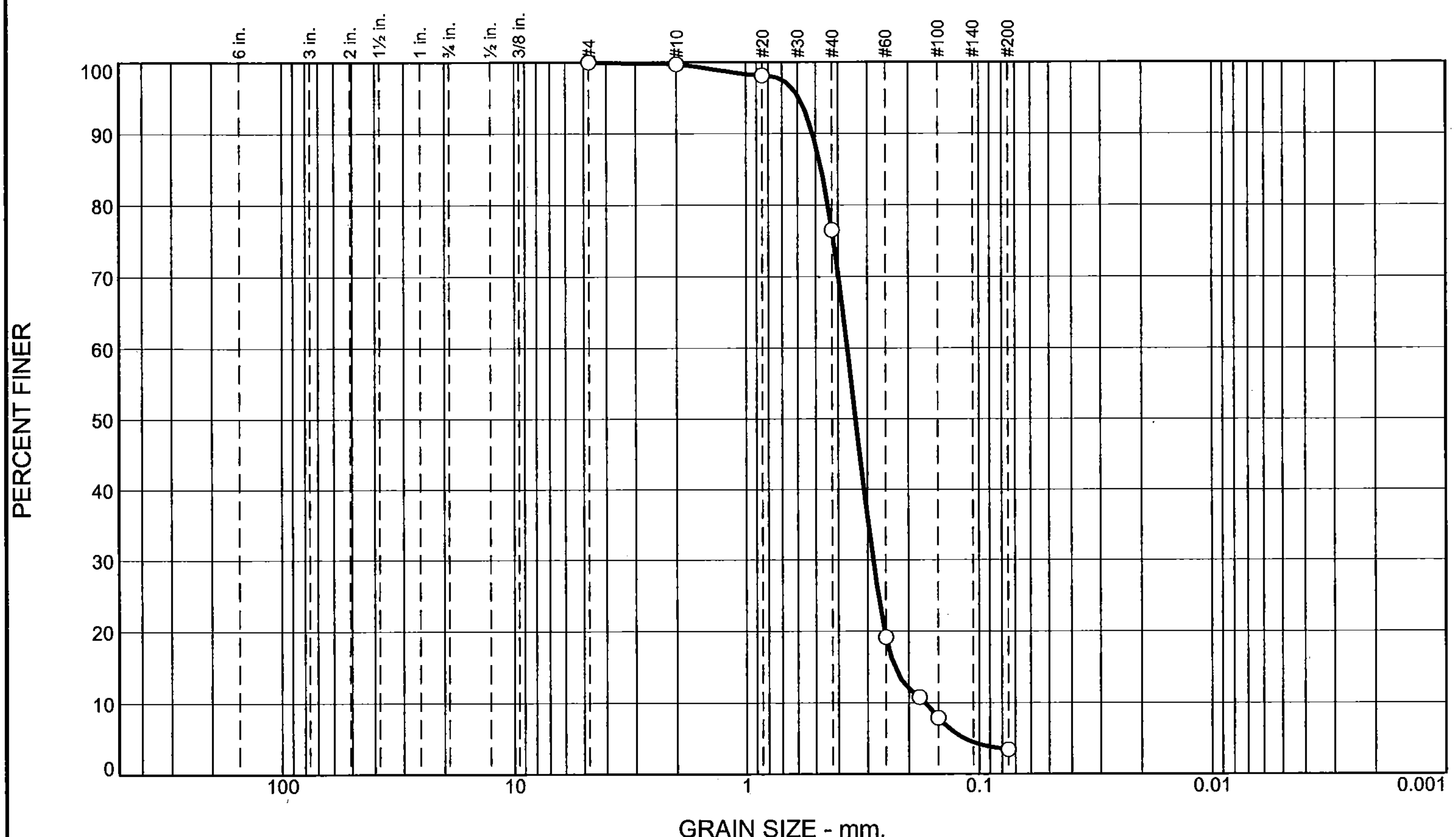
Date: 10/202015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T　**Figure** 1 of 1

Tested By: DB　**Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	23.2	73.1	3.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	98.1		
#40	76.5		
#60	19.2		
#80	10.8		
#100	7.9		
#200	3.4		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5156 D_{85}= 0.4726 D_{60}= 0.3657
D_{50}= 0.3372 D_{30}= 0.2840 D_{15}= 0.2297
D_{10}= 0.1705 C_u= 2.14 C_c= 1.29

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C SPT-4 **Depth:** 41'-42.5'

Date: 10/15/2015

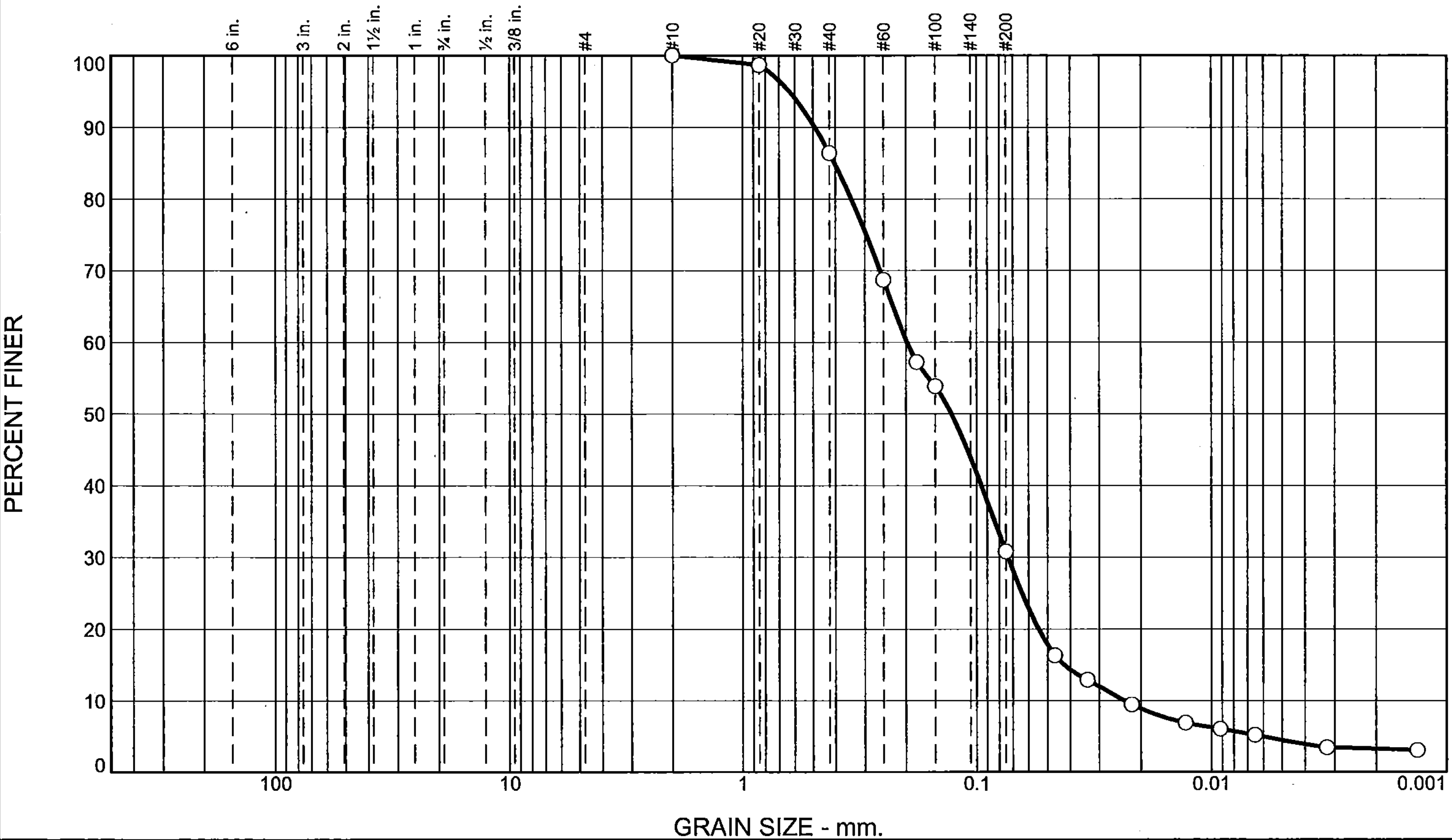
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	13.6	55.6	26.4	4.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.7		
#40	86.4		
#60	68.7		
#80	57.2		
#100	53.8		
#200	30.8		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4902 D_{85}= 0.4035 D_{60}= 0.1985
D_{50}= 0.1280 D_{30}= 0.0735 D_{15}= 0.0425
D_{10}= 0.0236 C_u= 8.42 C_c= 1.15

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C SPT-6 **Depth:** 51'-52.5'

Date: 10/15/2015

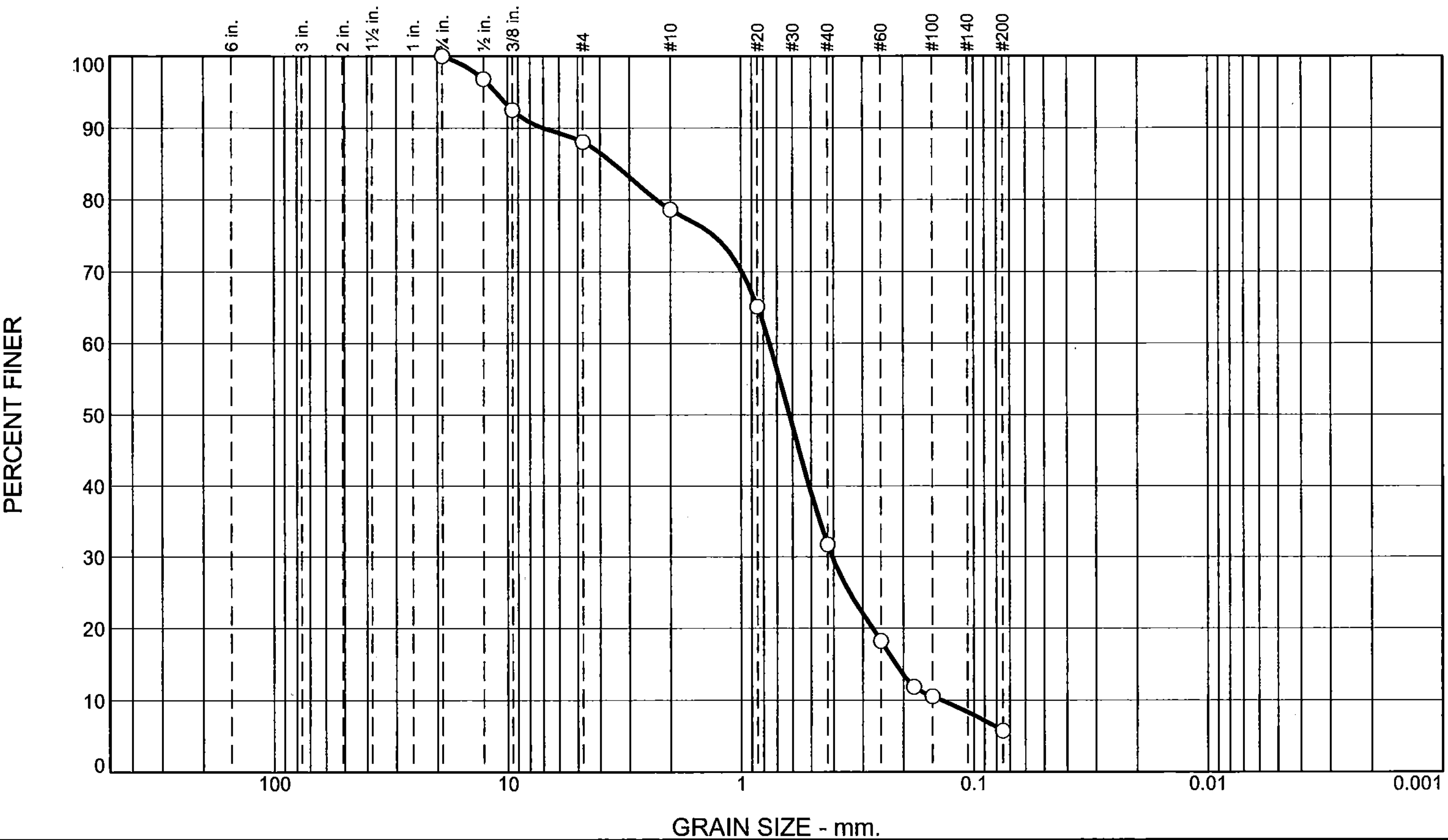
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.0	9.4	46.9	26.0	5.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.8		
.375	92.5		
#4	88.0		
#10	78.6		
#20	65.1		
#40	31.7		
#60	18.2		
#80	11.8		
#100	10.5		
#200	5.7		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 7.0628 D_{85}= 3.4809 D_{60}= 0.7535
D_{50}= 0.6183 D_{30}= 0.4053 D_{15}= 0.2158
D_{10}= 0.1371 C_u= 5.50 C_c= 1.59

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1C SPT-7 **Depth:** 56'-57.5'

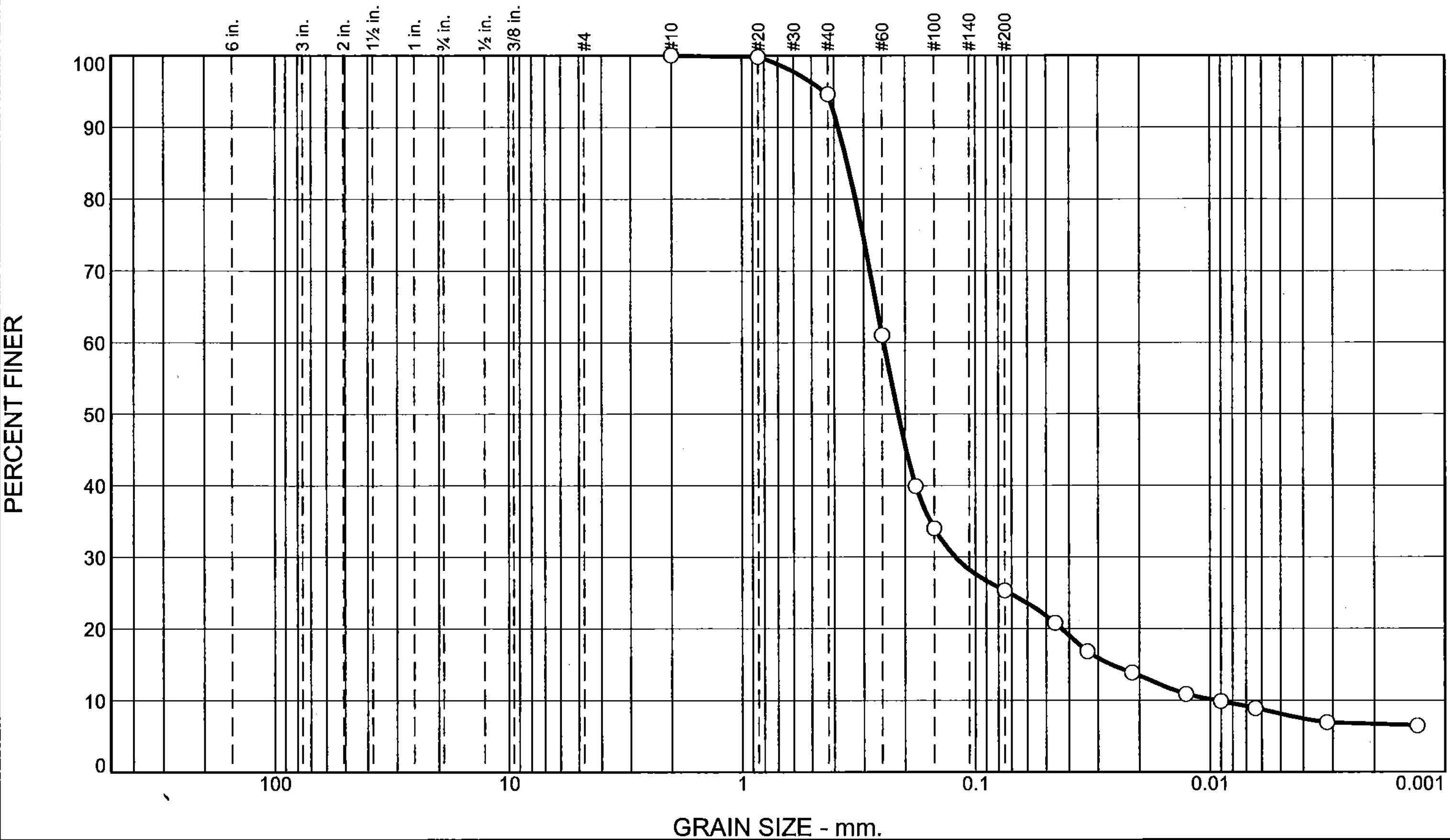
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.4	69.3	17.2	8.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	94.6		
#60	61.0		
#80	39.9		
#100	34.0		
#200	25.3		

* (no specification provided)

Material Description

Dark brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3840 D_{85}= 0.3515 D_{60}= 0.2467
D_{50}= 0.2146 D_{30}= 0.1218 D_{15}= 0.0265
D_{10}= 0.0094 C_u= 26.24 C_c= 6.40

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-1 **Depth:** 3.5'-5'

Date: 10/22/2015

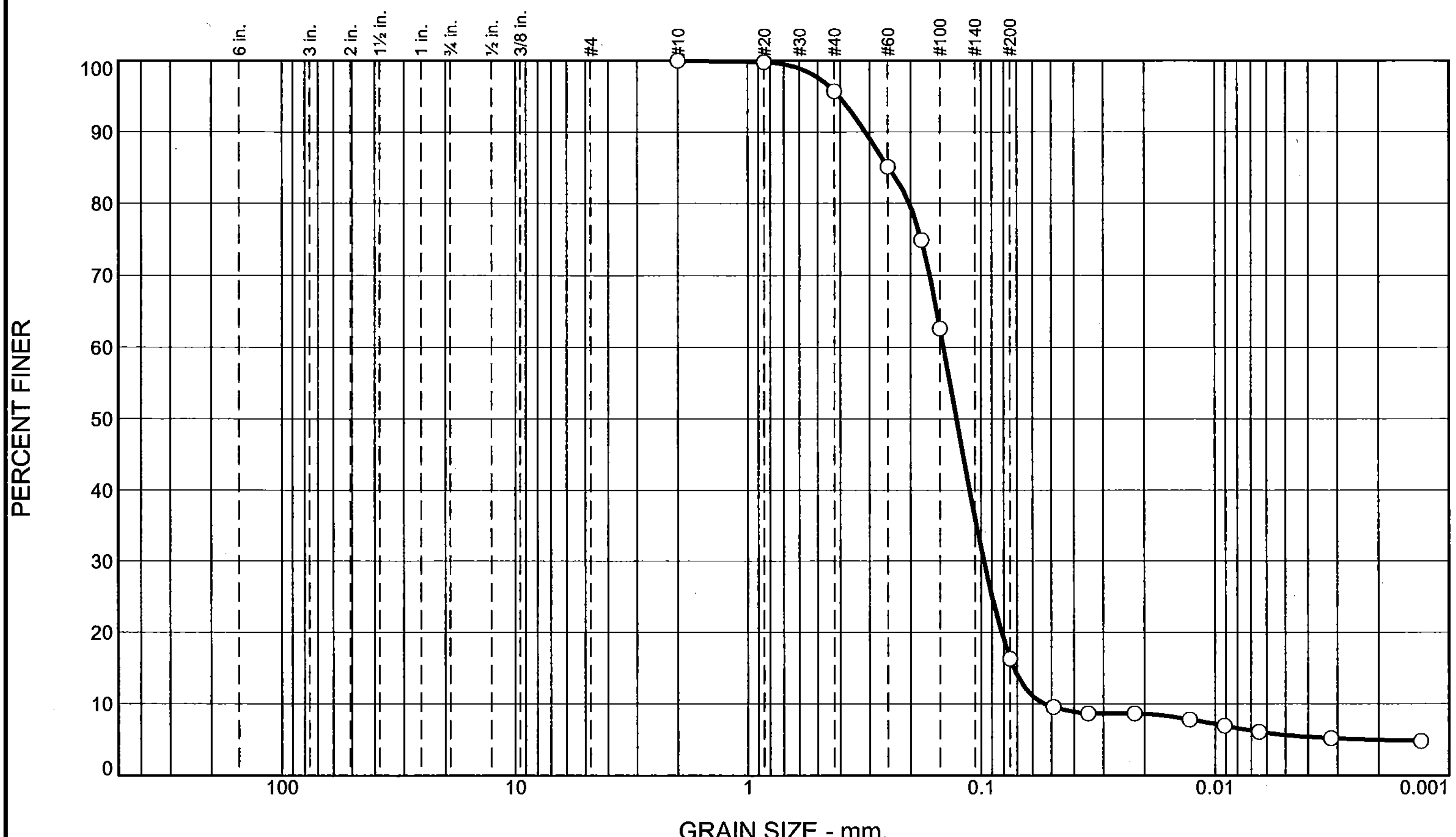
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.3	79.4	10.7	5.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	95.7		
#60	85.1		
#80	74.9		
#100	62.6		
#200	16.3		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3134 D_{85}= 0.2486 D_{60}= 0.1450
D_{50}= 0.1274 D_{30}= 0.0971 D_{15}= 0.0723
D_{10}= 0.0538 C_u= 2.70 C_c= 1.21

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-2 **Depth:** 8.5'-10'

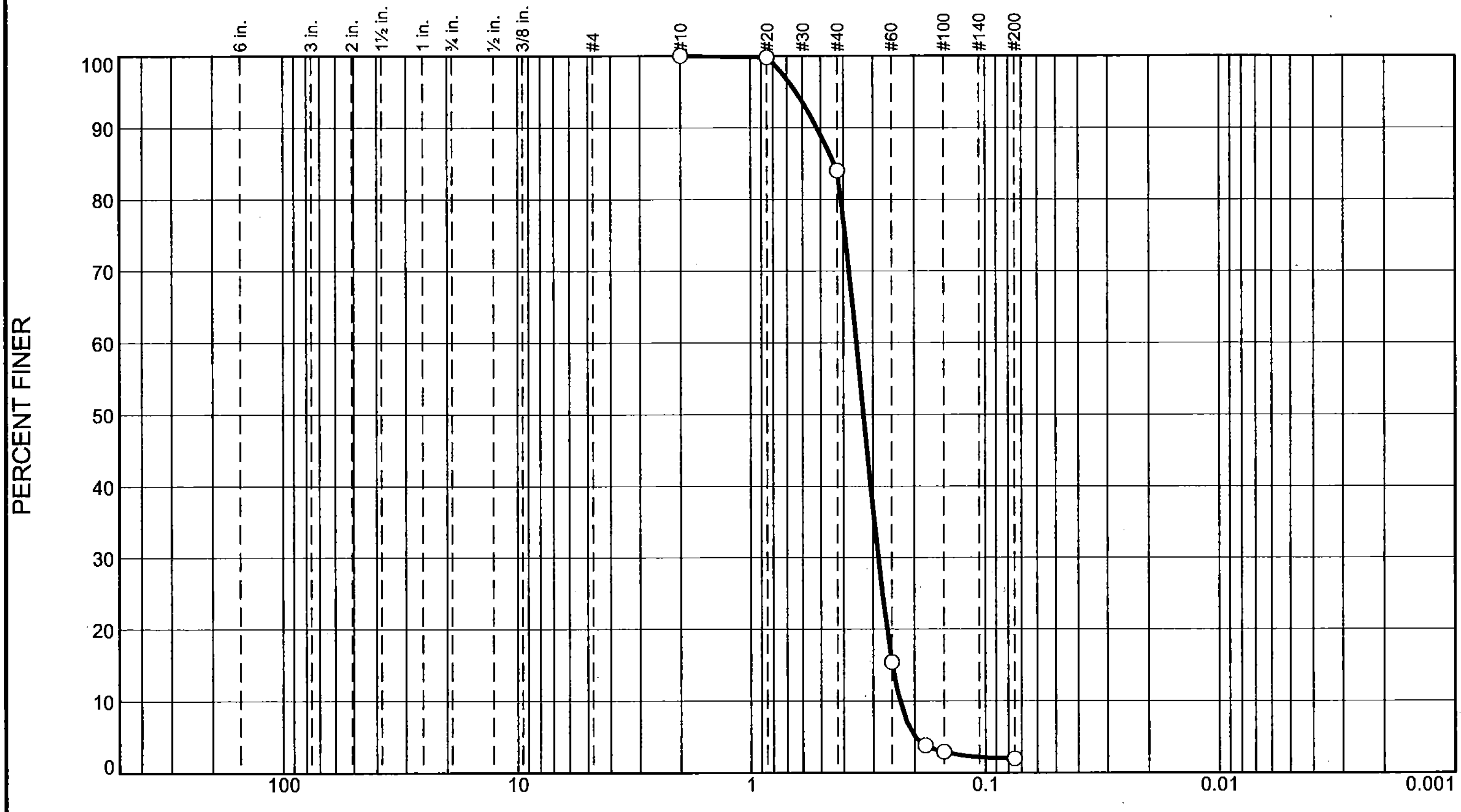
Date: 10/22/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	16.0	82.0	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	84.0		
#60	15.4		
#80	3.8		
#100	2.9		
#200	2.0		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5189 D_{85}= 0.4380 D_{60}= 0.3525
D_{50}= 0.3293 D_{30}= 0.2857 D_{15}= 0.2488
D_{10}= 0.2312 C_u= 1.52 C_c= 1.00

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-3 **Depth:** 13.5'-15'

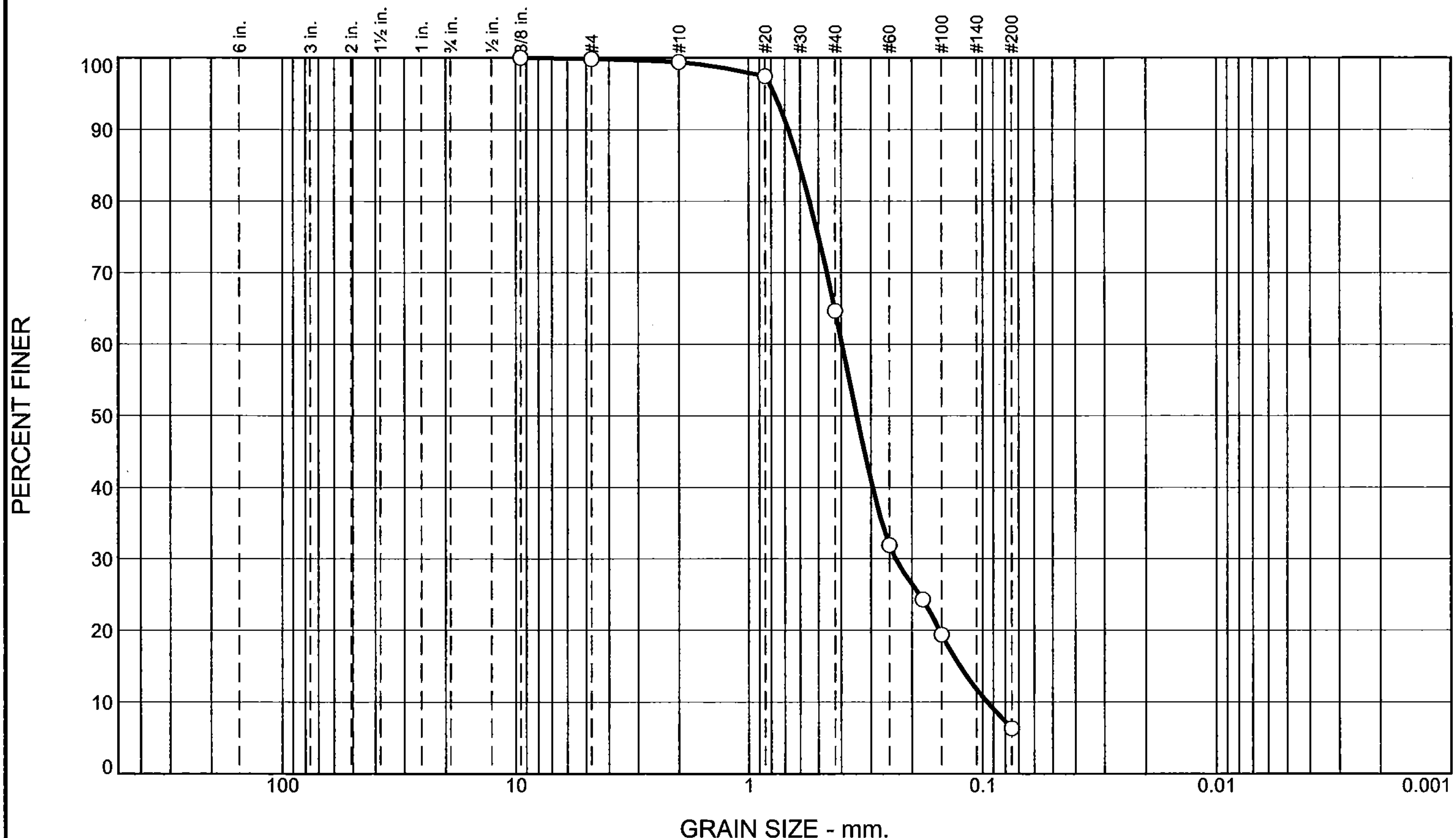
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.5	34.8	58.3	6.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.4		
#20	97.4		
#40	64.6		
#60	31.9		
#80	24.3		
#100	19.4		
#200	6.3		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6738 D_{85}= 0.6021 D_{60}= 0.3974
D_{50}= 0.3447 D_{30}= 0.2356 D_{15}= 0.1253
D_{10}= 0.0957 C_u= 4.15 C_c= 1.46

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-5 **Depth:** 23.5'-25'

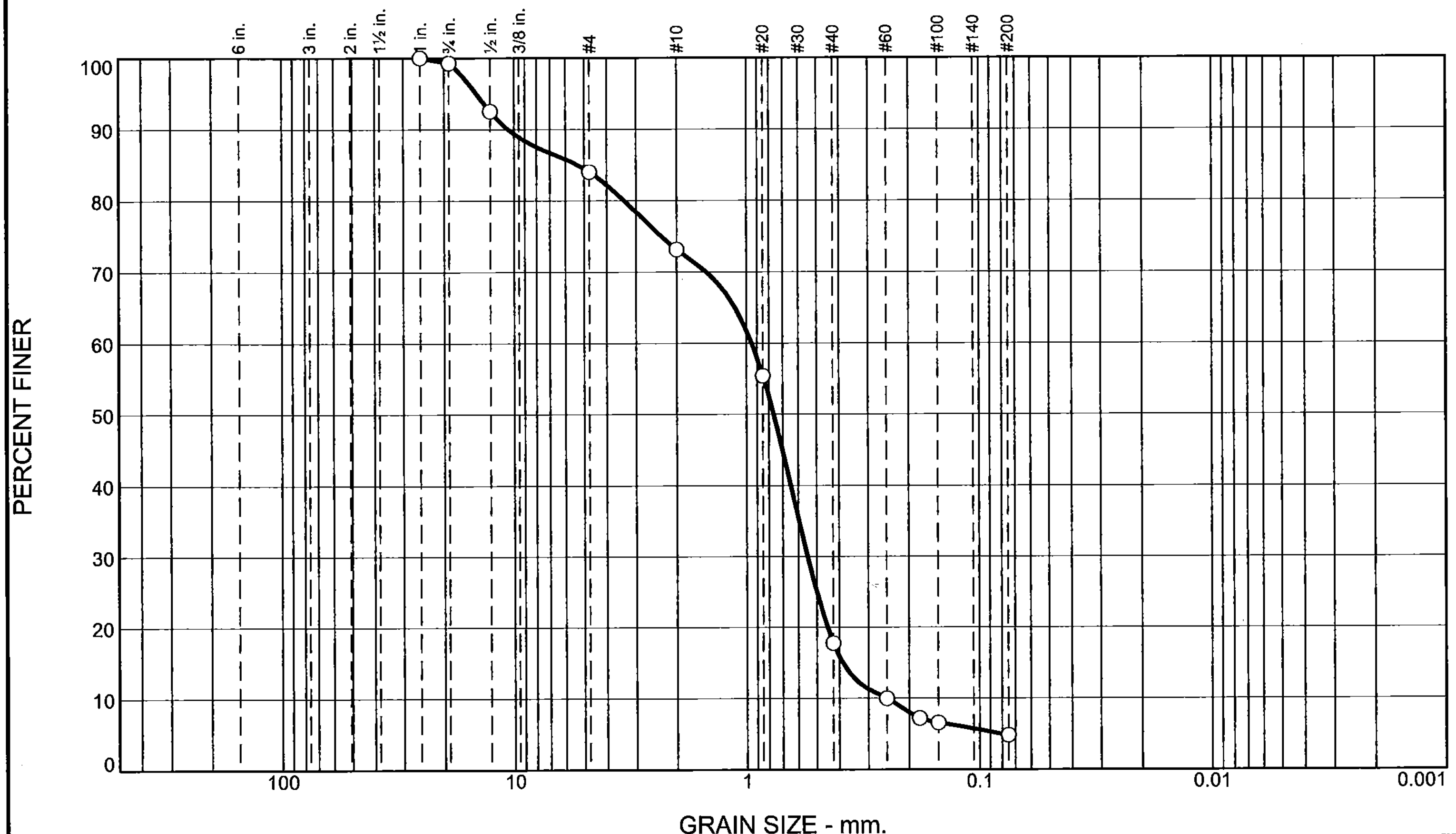
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.7	15.3	10.9	55.4	12.9	4.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	99.3		
.5	92.5		
#4	84.0		
#10	73.1		
#20	55.4		
#40	17.7		
#60	10.0		
#80	7.2		
#100	6.6		
#200	4.8		

* (no specification provided)

Material Description

Brown poorly graded sand with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.6157 D_{85}= 5.3408 D_{60}= 0.9502
D_{50}= 0.7652 D_{30}= 0.5472 D_{15}= 0.3876
D_{10}= 0.2507 C_u= 3.79 C_c= 1.26

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-7 **Depth:** 33.5'-34.7'

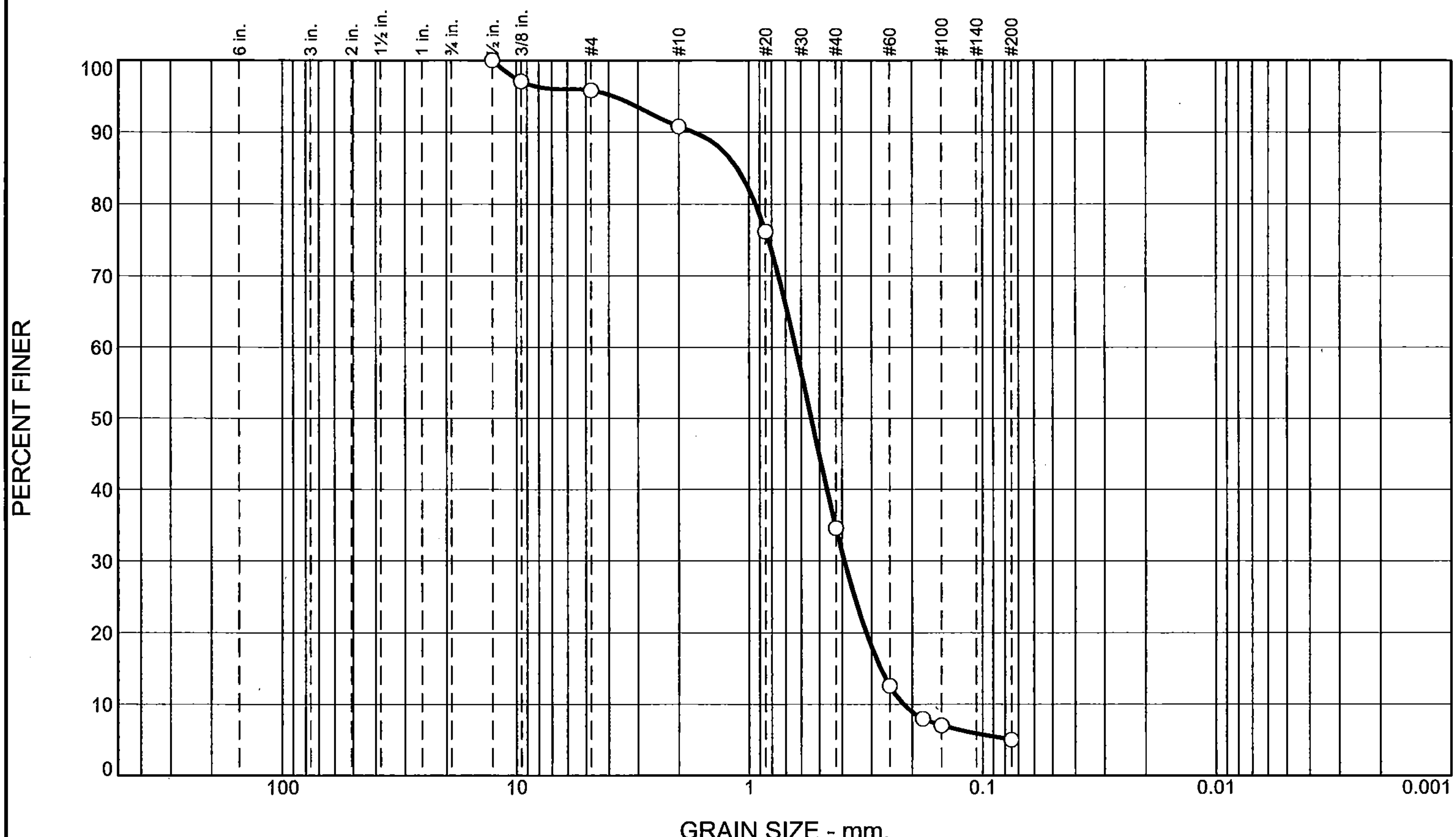
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.2	5.0	56.2	29.6	5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	97.1		
#4	95.8		
#10	90.8		
#20	76.2		
#40	34.6		
#60	12.6		
#80	7.9		
#100	7.0		
#200	5.0		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7286 D_{85}= 1.1224 D_{60}= 0.6341
D_{50}= 0.5433 D_{30}= 0.3916 D_{15}= 0.2739
D_{10}= 0.2187 C_u= 2.90 C_c= 1.11

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-1T SPT-8 **Depth:** 38.5'-39.75'

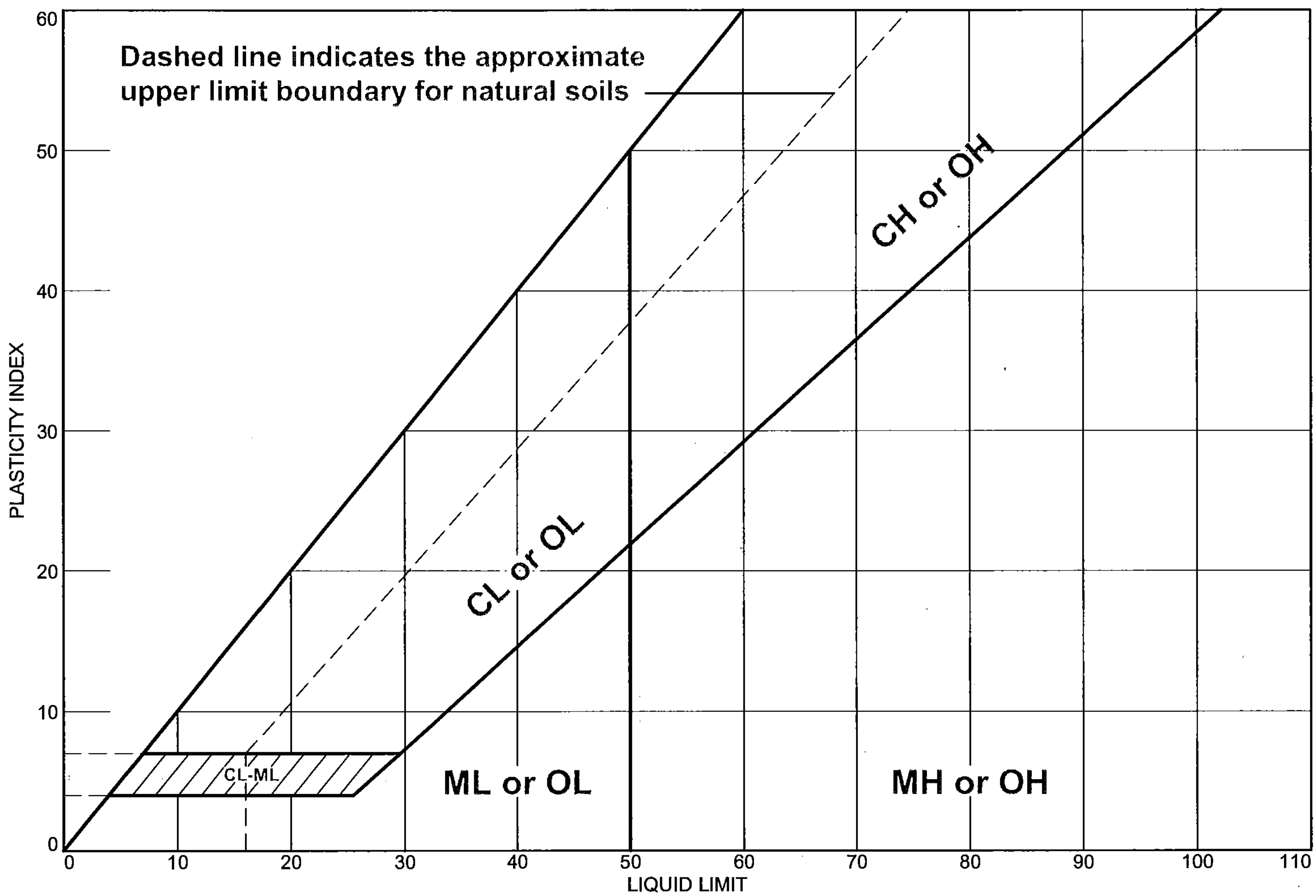
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown poorly graded sand with silt	NV	NP	NP	88.8	7.4	SP-SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

● **Depth:** 3.5'-5' **Sample Number:** EP-2C ST-1

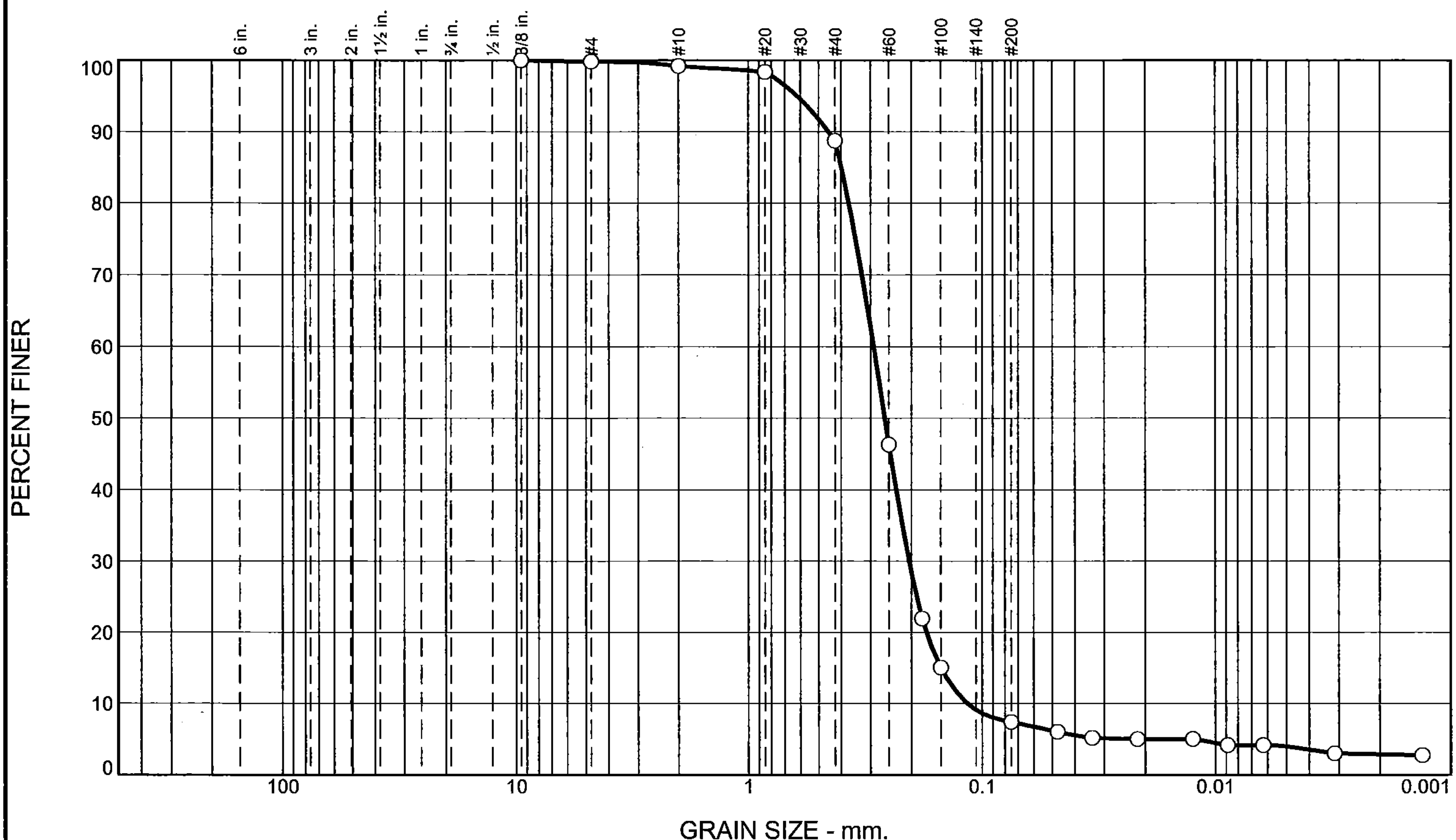
Remarks:

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.7	10.4	81.4	3.5	3.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.2		
#20	98.4		
#40	88.8		
#60	46.3		
#80	21.9		
#100	15.1		
#200	7.4		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4535 D_{85}= 0.3983 D_{60}= 0.2911
D_{50}= 0.2606 D_{30}= 0.2049 D_{15}= 0.1497
D_{10}= 0.1156 C_u= 2.52 C_c= 1.25

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Sample Number: EP-2C ST-1 **Depth:** 3.5'-5'

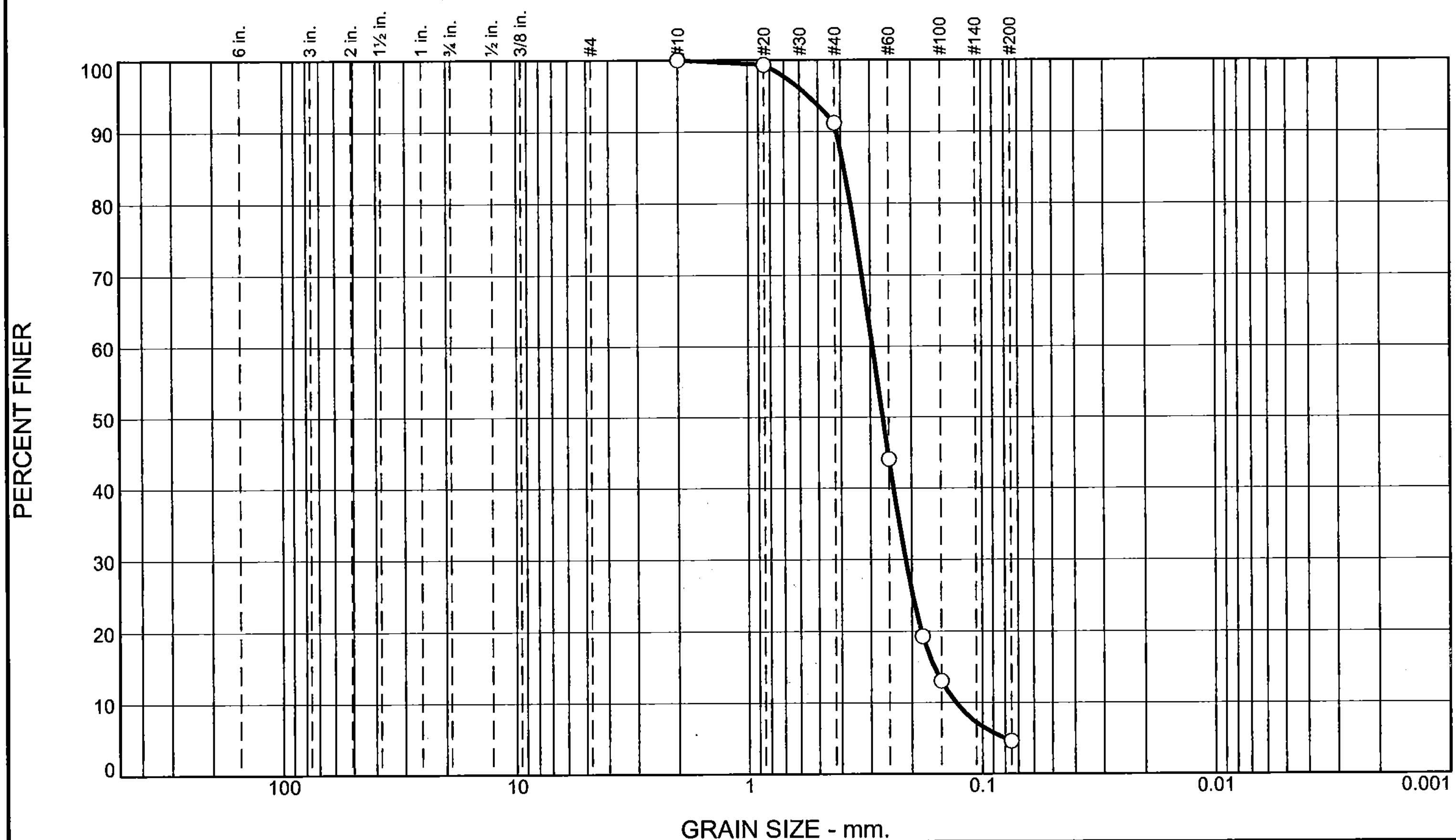
Date: 10/20/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.8	86.6	4.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.3		
#40	91.2		
#60	44.0		
#80	19.3		
#100	13.0		
#200	4.6		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4166 D_{85}= 0.3874 D_{60}= 0.2941
D_{50}= 0.2659 D_{30}= 0.2128 D_{15}= 0.1612
D_{10}= 0.1298 C_u= 2.27 C_c= 1.19

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C ST-2 **Depth:** 13.5'-15'

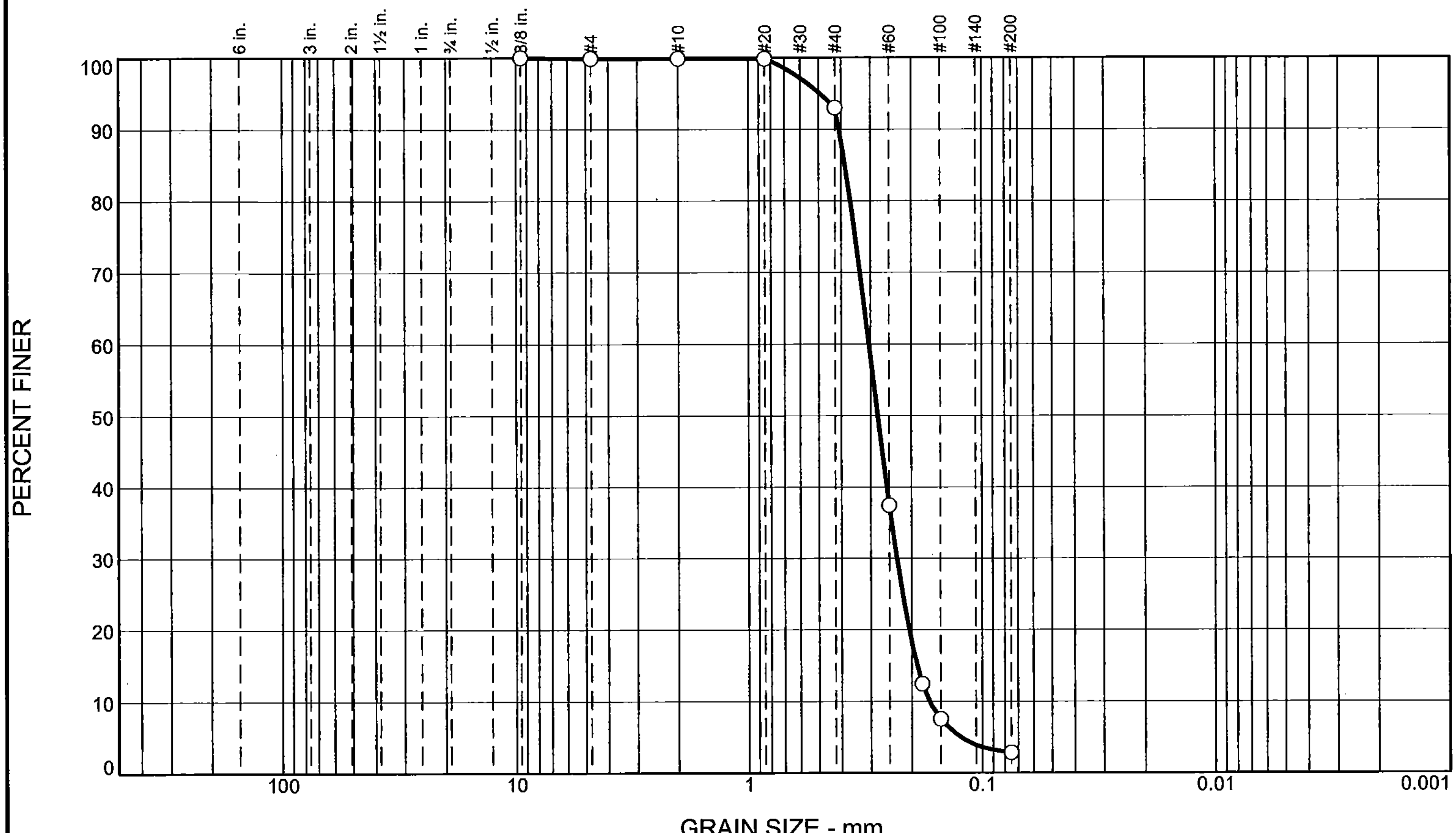
Date: 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	6.9	90.2	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#20	99.9		
#40	93.0		
#60	37.4		
#80	12.4		
#100	7.5		
#200	2.8		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4081 D_{85}= 0.3849 D_{60}= 0.3052
D_{50}= 0.2801 D_{30}= 0.2319 D_{15}= 0.1898
D_{10}= 0.1680 C_u= 1.82 C_c= 1.05

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C ST-3 **Depth:** 23.5'-25'

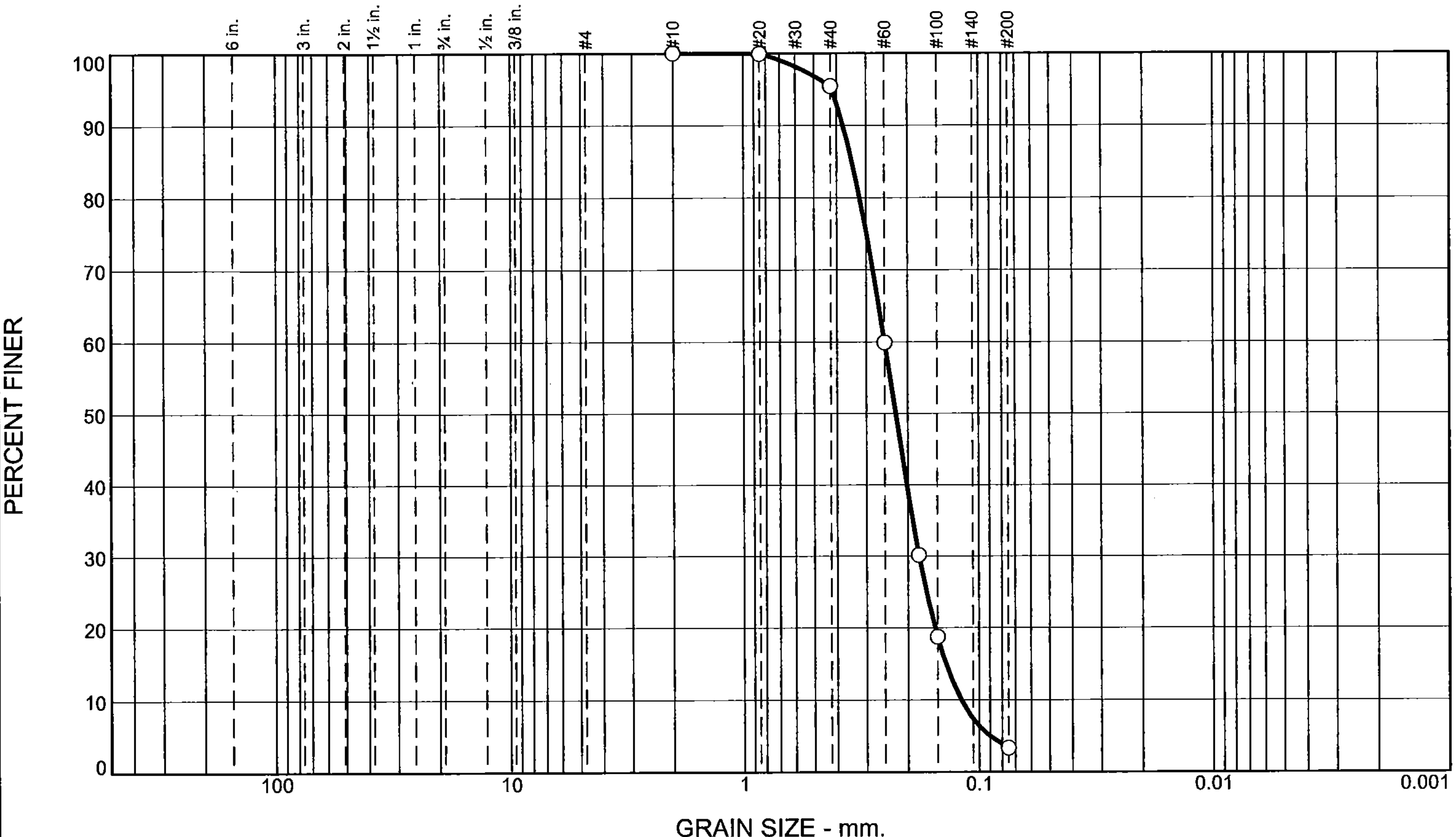
Date: 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.6	92.1	3.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	95.4		
#60	59.9		
#80	30.1		
#100	18.7		
#200	3.3		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3759 D_{85}= 0.3446 D_{60}= 0.2503
D_{50}= 0.2251 D_{30}= 0.1797 D_{15}= 0.1382
D_{10}= 0.1191 C_u= 2.10 C_c= 1.08

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C ST-4 **Depth:** 33.5'-35'

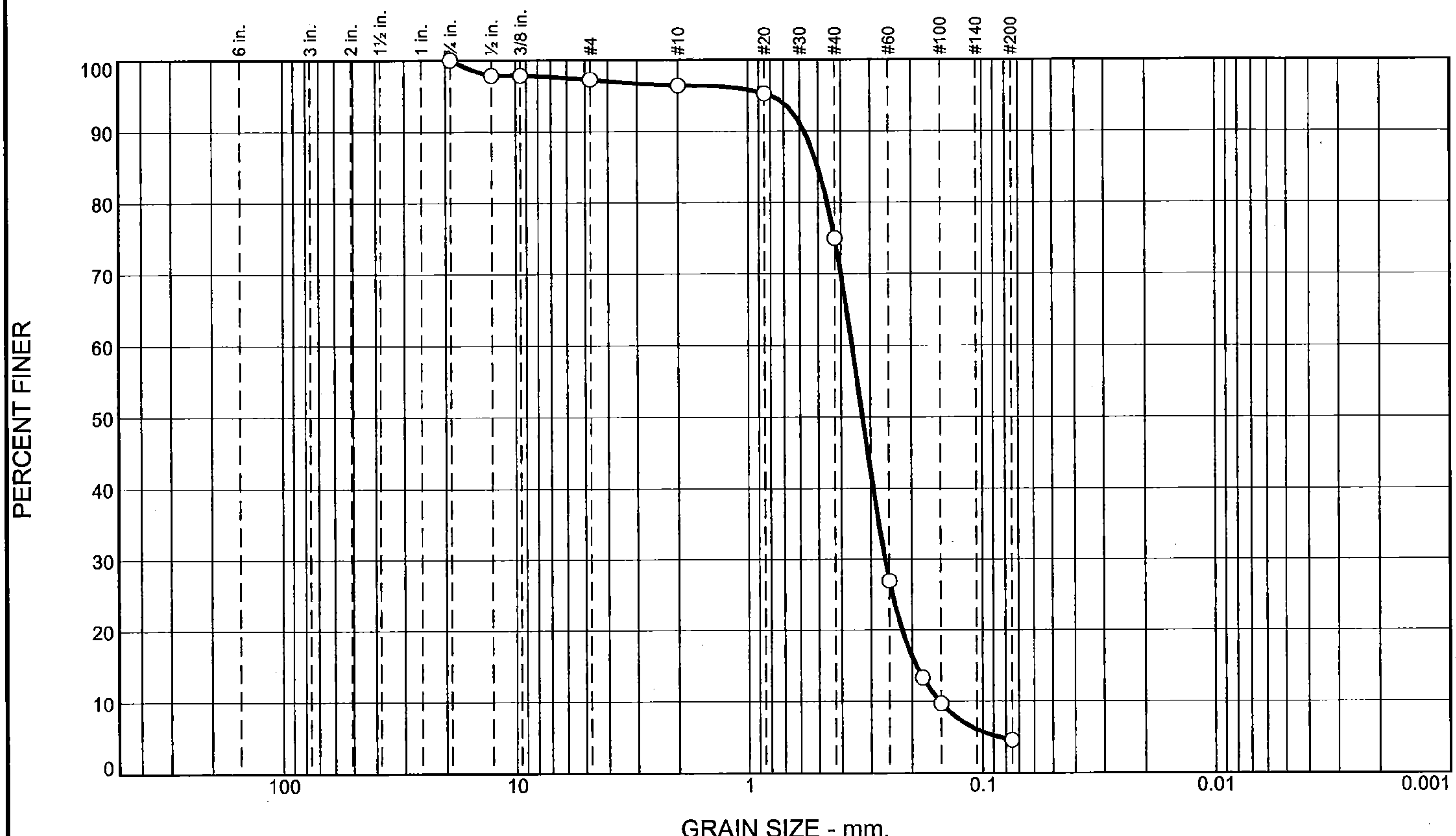
Date: 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	0.9	21.5	70.3	4.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.9		
.375	97.9		
#4	97.3		
#10	96.4		
#20	95.3		
#40	74.9		
#60	26.9		
#80	13.3		
#100	9.7		
#200	4.6		

* (no specification provided)

Material Description

Light brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5727 D_{85}= 0.5016 D_{60}= 0.3589
D_{50}= 0.3245 D_{30}= 0.2608 D_{15}= 0.1922
D_{10}= 0.1525 C_u= 2.35 C_c= 1.24

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C SPT-4 **Depth:** 38.5'-40'

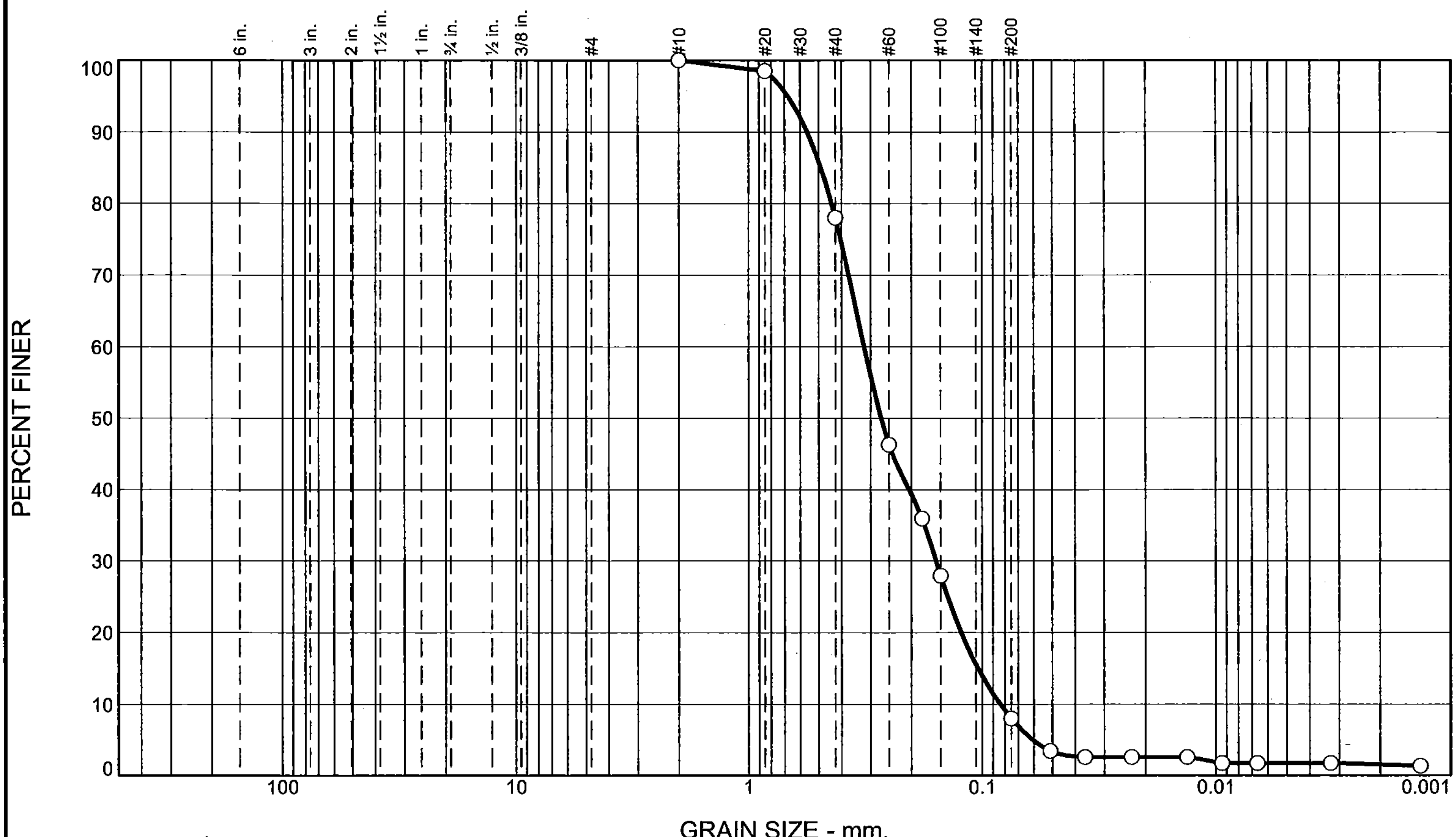
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	22.0	70.0	6.3	1.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.5		
#40	78.0		
#60	46.3		
#80	35.9		
#100	27.9		
#200	8.0		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5591 D_{85}= 0.4897 D_{60}= 0.3203
D_{50}= 0.2708 D_{30}= 0.1571 D_{15}= 0.1039
D_{10}= 0.0837 C_u= 3.83 C_c= 0.92

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C SPT-6 **Depth:** 48.5'-50'

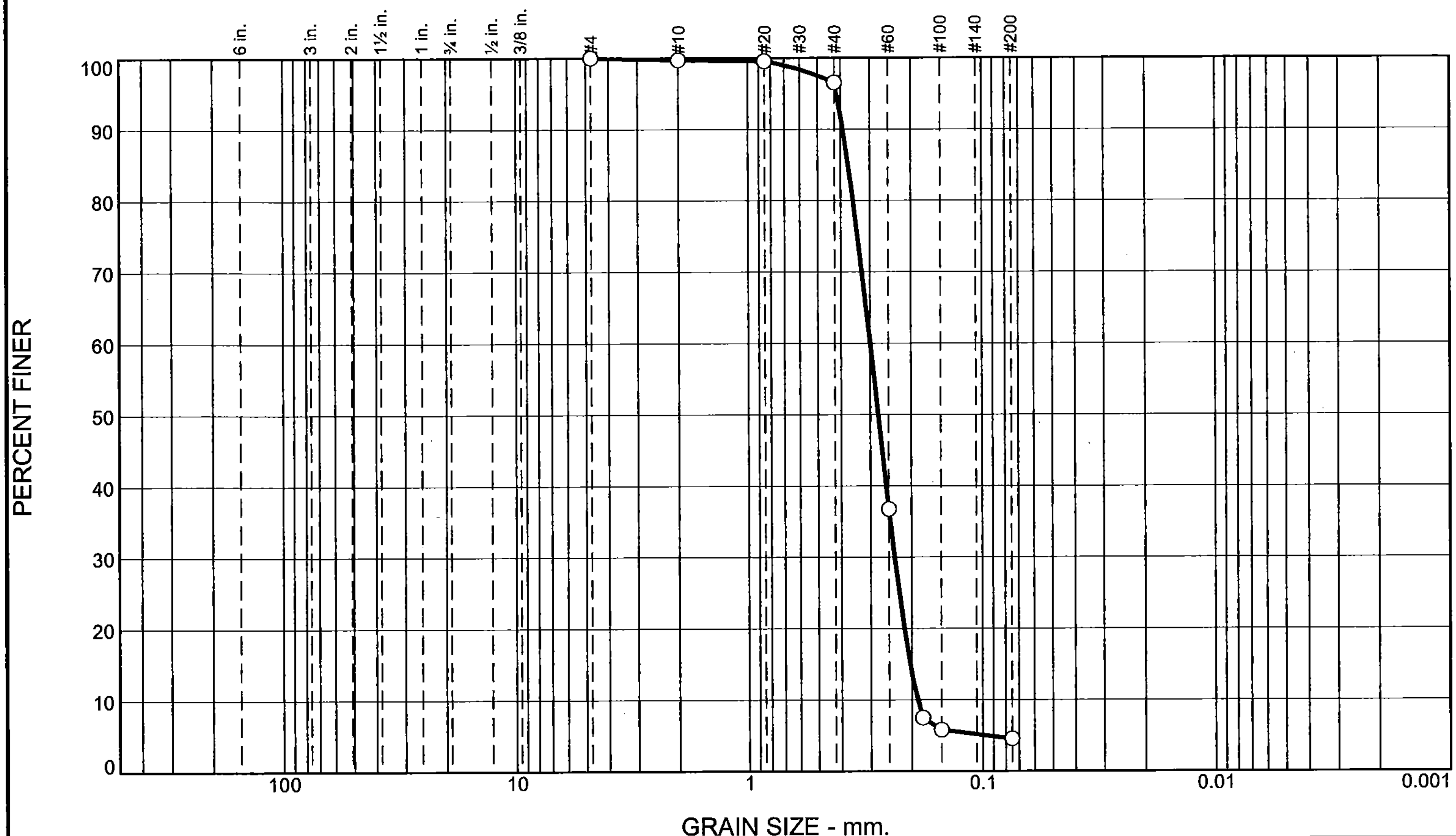
Date: 10/16/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	3.1	92.1	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.5		
#40	96.6		
#60	36.7		
#80	7.5		
#100	5.8		
#200	4.5		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3911 D_{85}= 0.3712 D_{60}= 0.3000
D_{50}= 0.2776 D_{30}= 0.2364 D_{15}= 0.2039
D_{10}= 0.1899 C_u= 1.58 C_c= 0.98

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2C SPT-8 **Depth:** 55'-56'

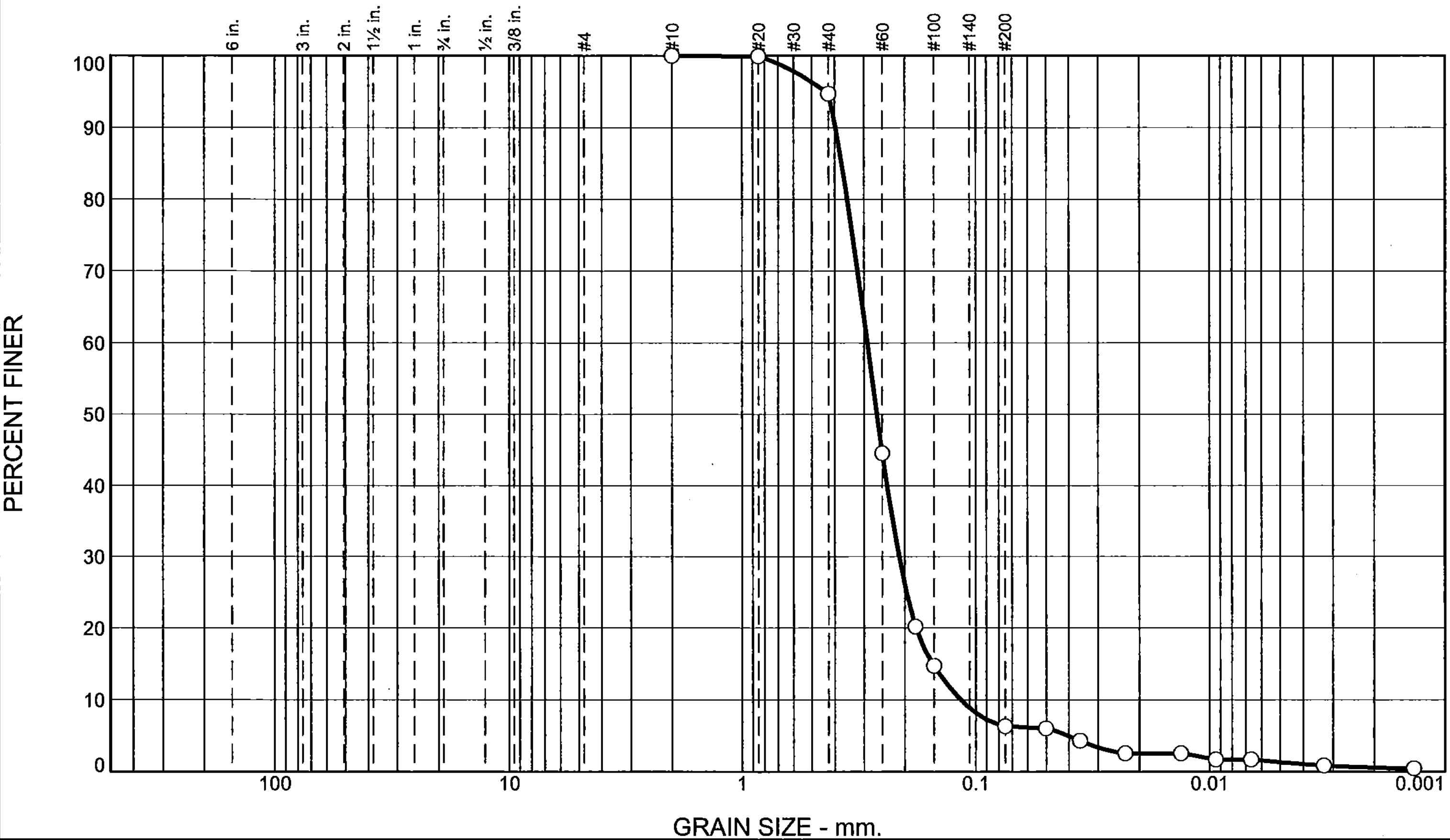
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.3	88.4	5.0	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	94.7		
#60	44.5		
#80	20.2		
#100	14.7		
#200	6.3		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3967 D_{85}= 0.3730 D_{60}= 0.2905
D_{50}= 0.2640 D_{30}= 0.2117 D_{15}= 0.1521
D_{10}= 0.1155 C_u= 2.51 C_c= 1.34

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2T SPT-1 **Depth:** 6'-7.5'

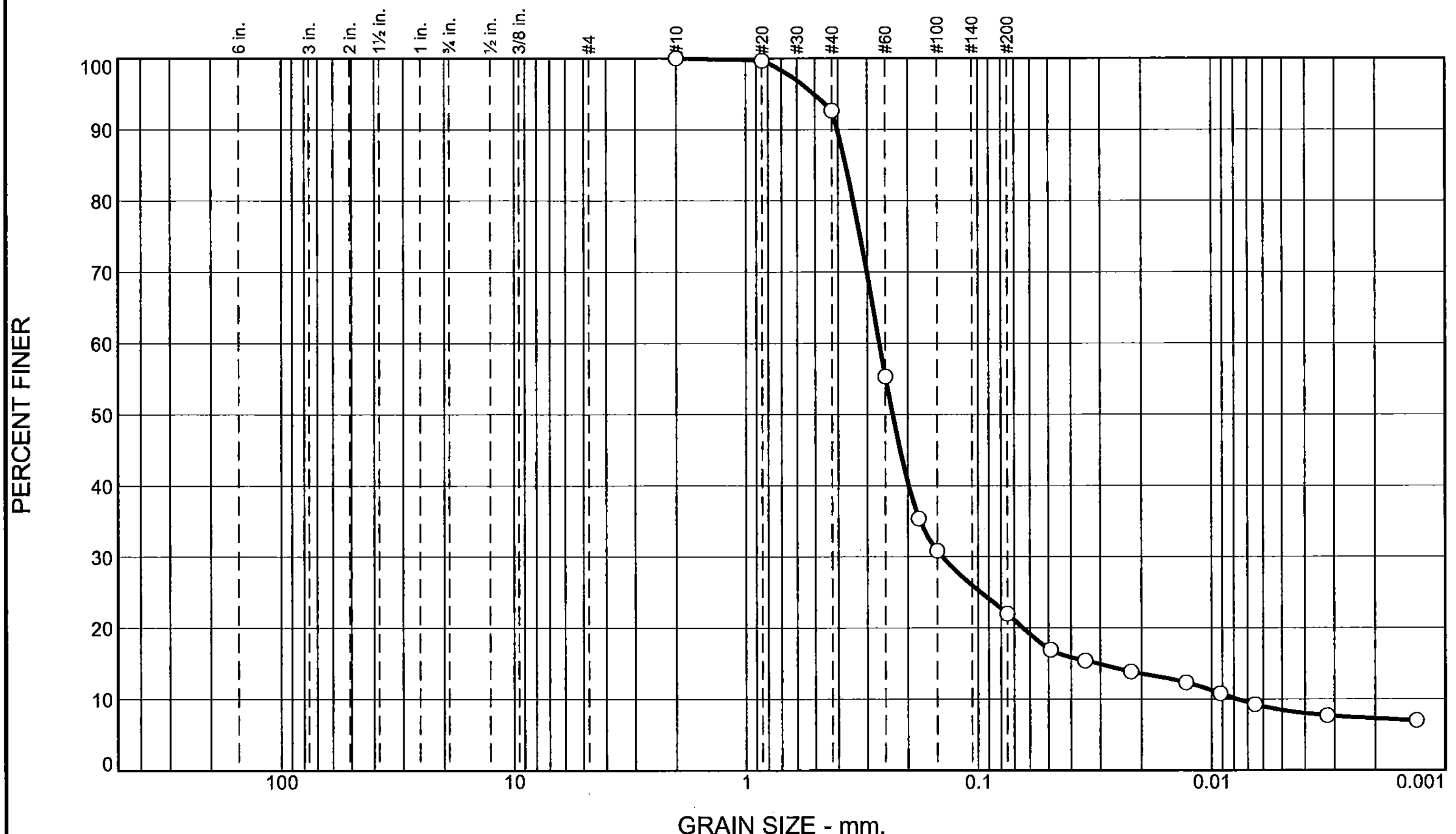
Date: 10/22/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	7.3	70.7	13.6	8.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	92.7		
#60	55.3		
#80	35.4		
#100	30.8		
#200	22.0		

* (no specification provided)

Material Description

Brown Clayey sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4028 D_{85}= 0.3703 D_{60}= 0.2656
D_{50}= 0.2328 D_{30}= 0.1427 D_{15}= 0.0309
D_{10}= 0.0078 C_u= 34.14 C_c= 9.85

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2T SPT-2 **Depth:** 11'-12.5'

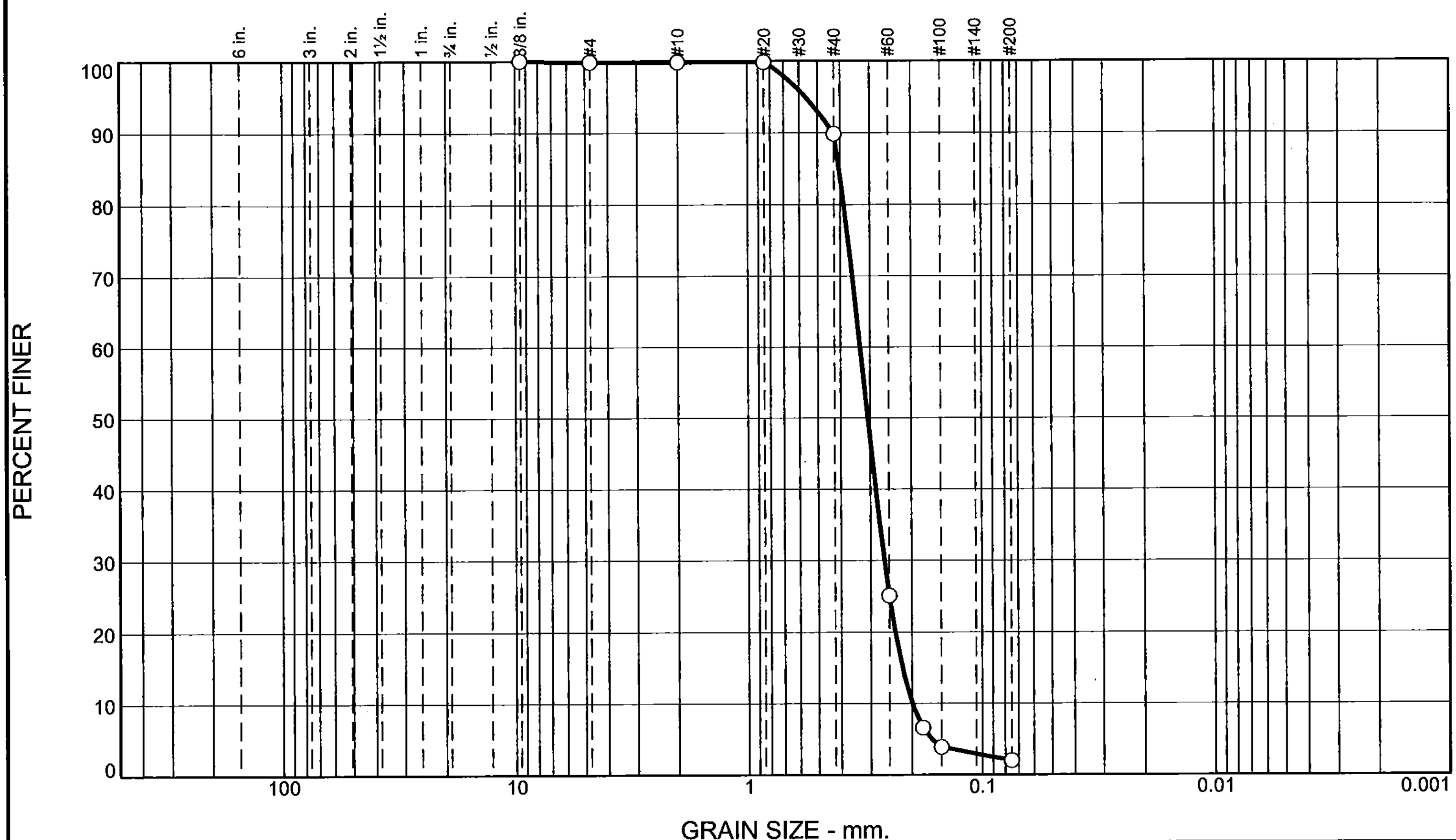
Date: 10/22/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	10.1	87.8	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#20	99.9		
#40	89.8		
#60	25.1		
#80	6.6		
#100	3.8		
#200	2.0		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4281 D_{85}= 0.4042 D_{60}= 0.3305
D_{50}= 0.3072 D_{30}= 0.2620 D_{15}= 0.2202
D_{10}= 0.1999 C_u= 1.65 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2T SPT-4 **Depth:** 21'-22.5'

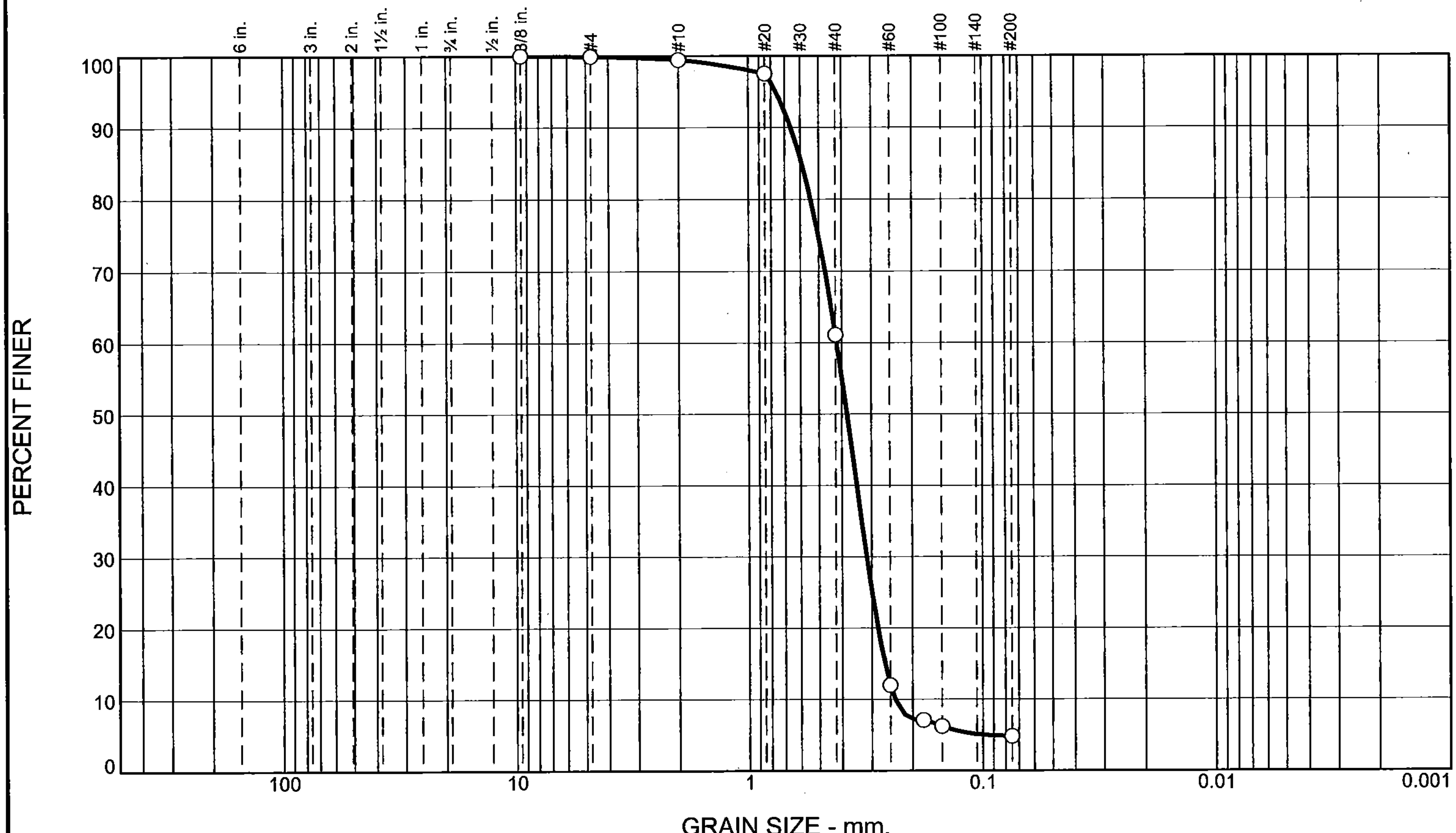
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.4	38.4	56.3	4.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.5		
#20	97.5		
#40	61.1		
#60	12.0		
#80	7.0		
#100	6.2		
#200	4.8		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6584 D_{85}= 0.5910 D_{60}= 0.4201
D_{50}= 0.3809 D_{30}= 0.3151 D_{15}= 0.2638
D_{10}= 0.2382 C_u= 1.76 C_c= 0.99

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2T SPT-6 **Depth:** 31'-32.5'

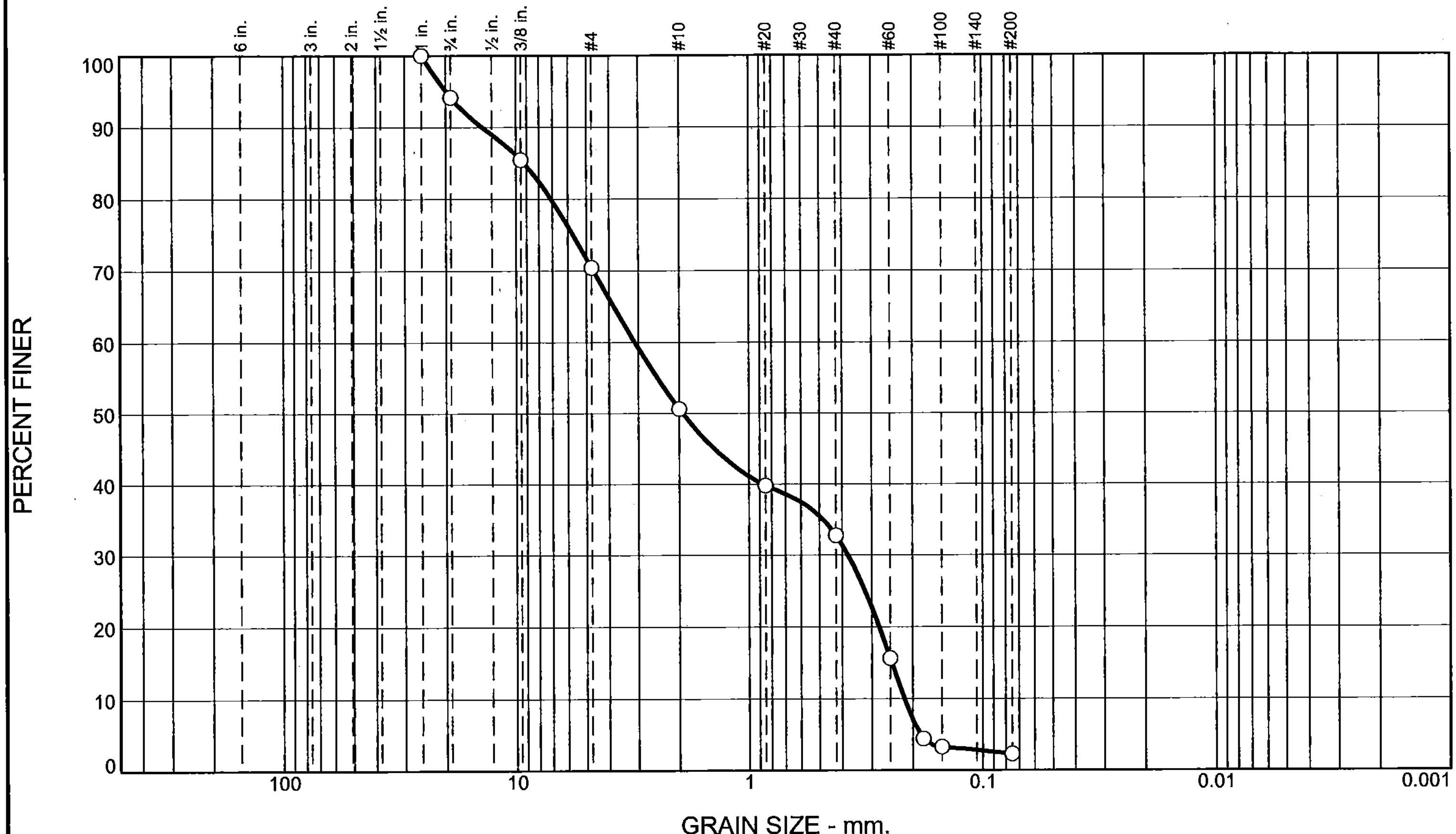
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.8	23.8	19.8	17.9	30.4	2.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.2		
.375	85.5		
#4	70.4		
#10	50.6		
#20	39.8		
#40	32.7		
#60	15.6		
#80	4.4		
#100	3.2		
#200	2.3		

* (no specification provided)

Material Description

Brown poorly graded sand with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.9259 D_{85}= 9.2522 D_{60}= 3.1041
D_{50}= 1.9384 D_{30}= 0.3787 D_{15}= 0.2461
D_{10}= 0.2177 C_u= 14.26 C_c= 0.21

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-2T SPT-8 **Depth:** 40'-41.5'

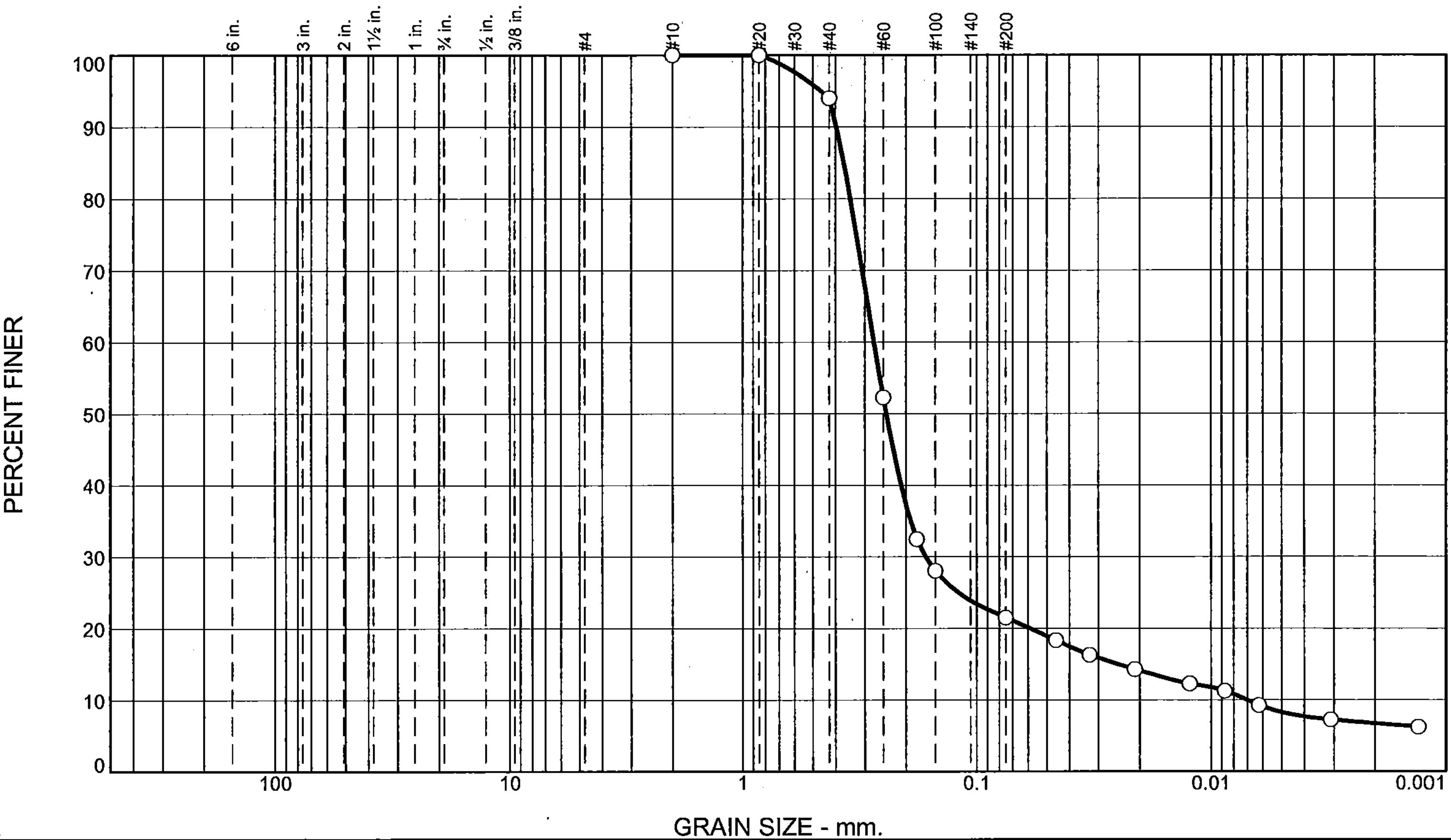
Date: 10/15/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.0	72.5	13.3	8.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	94.0		
#60	52.2		
#80	32.4		
#100	28.1		
#200	21.5		

* (no specification provided)

Material Description

Dark brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3968 D_{85}= 0.3692 D_{60}= 0.2743
D_{50}= 0.2430 D_{30}= 0.1656 D_{15}= 0.0248
D_{10}= 0.0070 C_u= 38.96 C_c= 14.20

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C ST-1 **Depth:** 6'-7.5'

Date: 10/30/2015

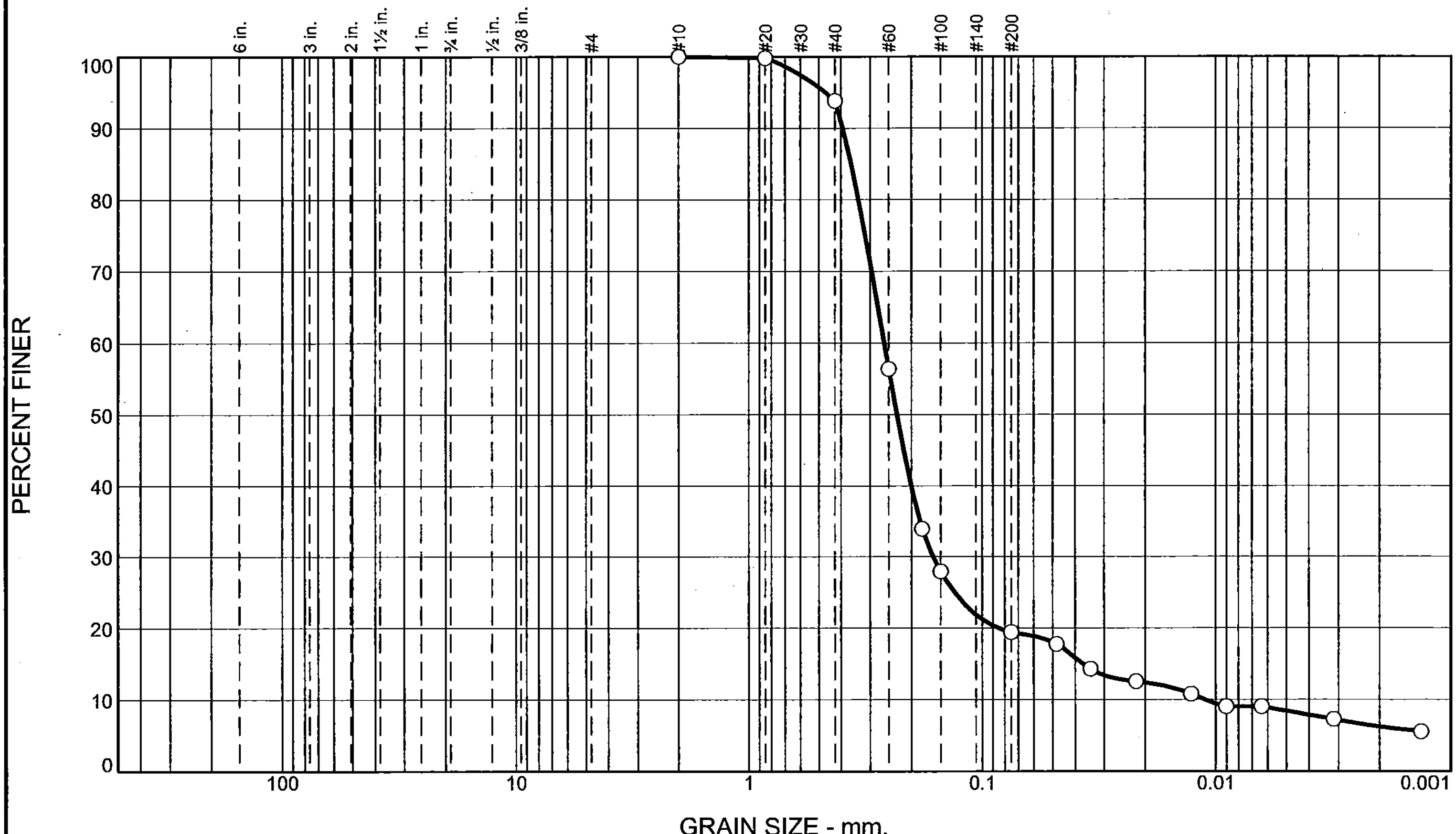
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.2	74.4	11.0	8.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	93.8		
#60	56.4		
#80	33.9		
#100	27.9		
#200	19.4		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3936 D_{85}= 0.3623 D_{60}= 0.2614
D_{50}= 0.2308 D_{30}= 0.1621 D_{15}= 0.0370
D_{10}= 0.0111 C_u= 23.48 C_c= 9.02

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: EP-3C SPT-1 **Depth:** 11'-12.5'

Date: 10/22/2015

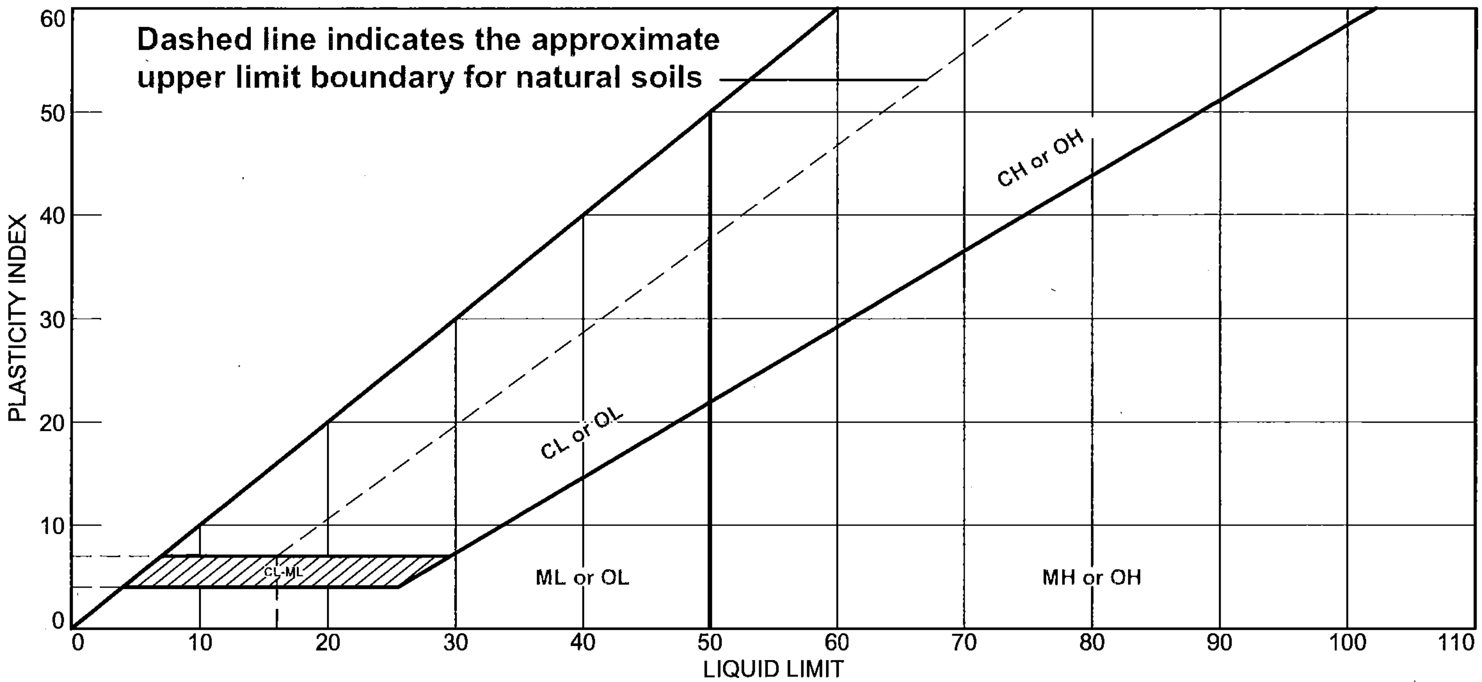
ALPHA-OMEGA GEOTECH

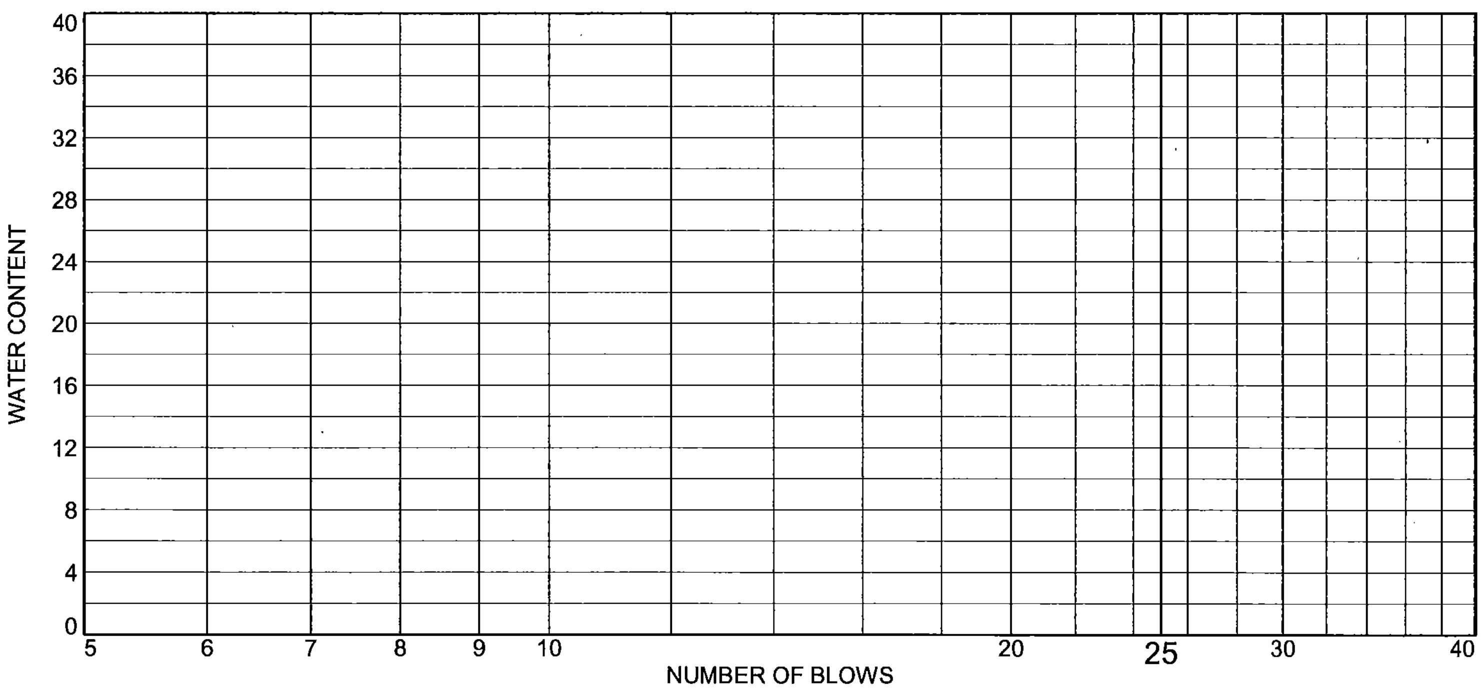
Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown silty sand	NV	NP	NP	93.8	19.4	SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

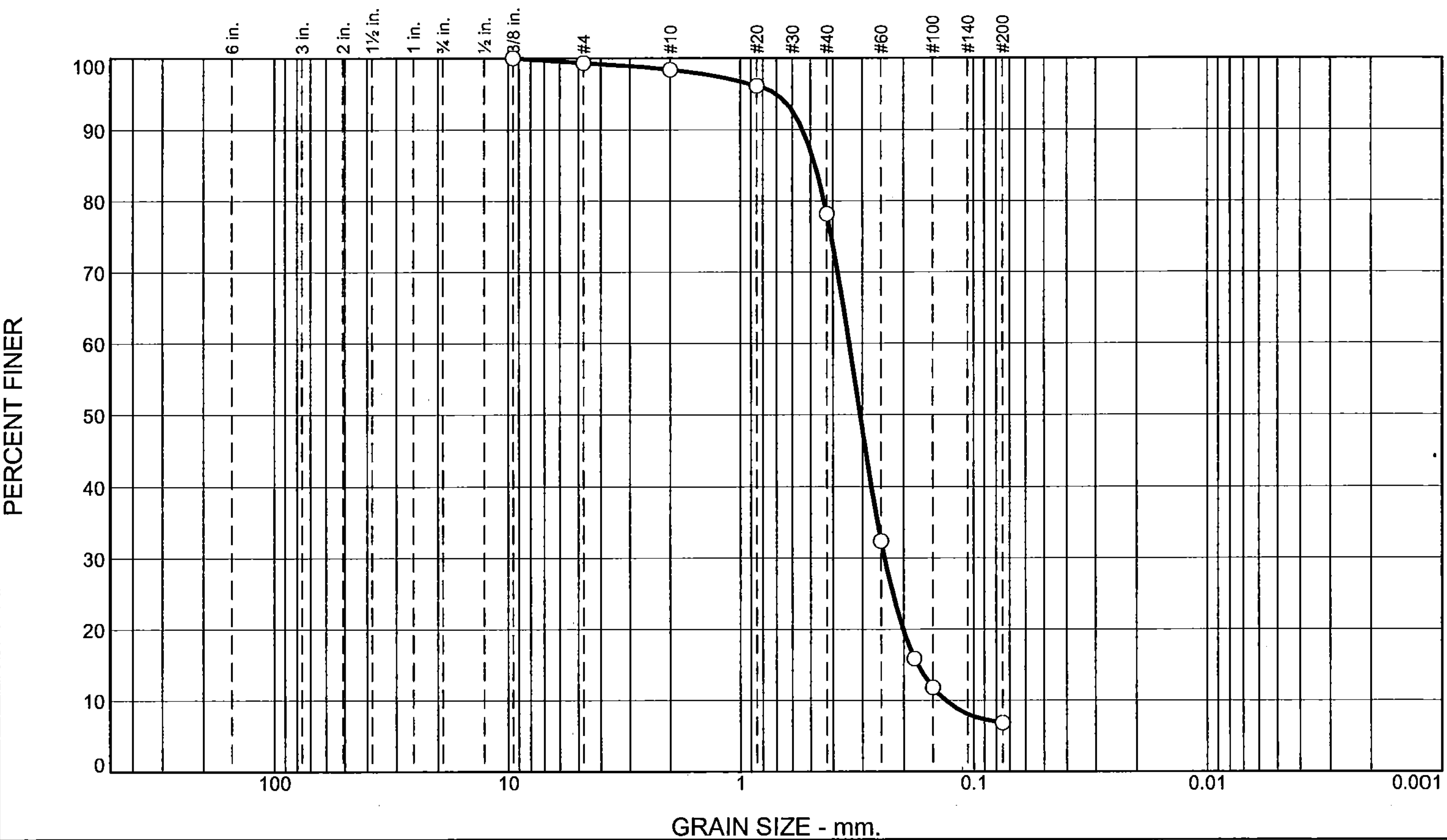
Sample Number: EP-3C SPT-1 **Depth:** 11'-12.5'

ALPHA-OMEGA GEOTECH

Remarks:

Figure 1 of 1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.9	20.2	71.4	6.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.3		
#10	98.4		
#20	96.1		
#40	78.2		
#60	32.4		
#80	15.9		
#100	11.8		
#200	6.8		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5415 D_{85}= 0.4779 D_{60}= 0.3417
D_{50}= 0.3071 D_{30}= 0.2418 D_{15}= 0.1745
D_{10}= 0.1324 C_u= 2.58 C_c= 1.29

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C ST-2 **Depth:** 16'-17.5'

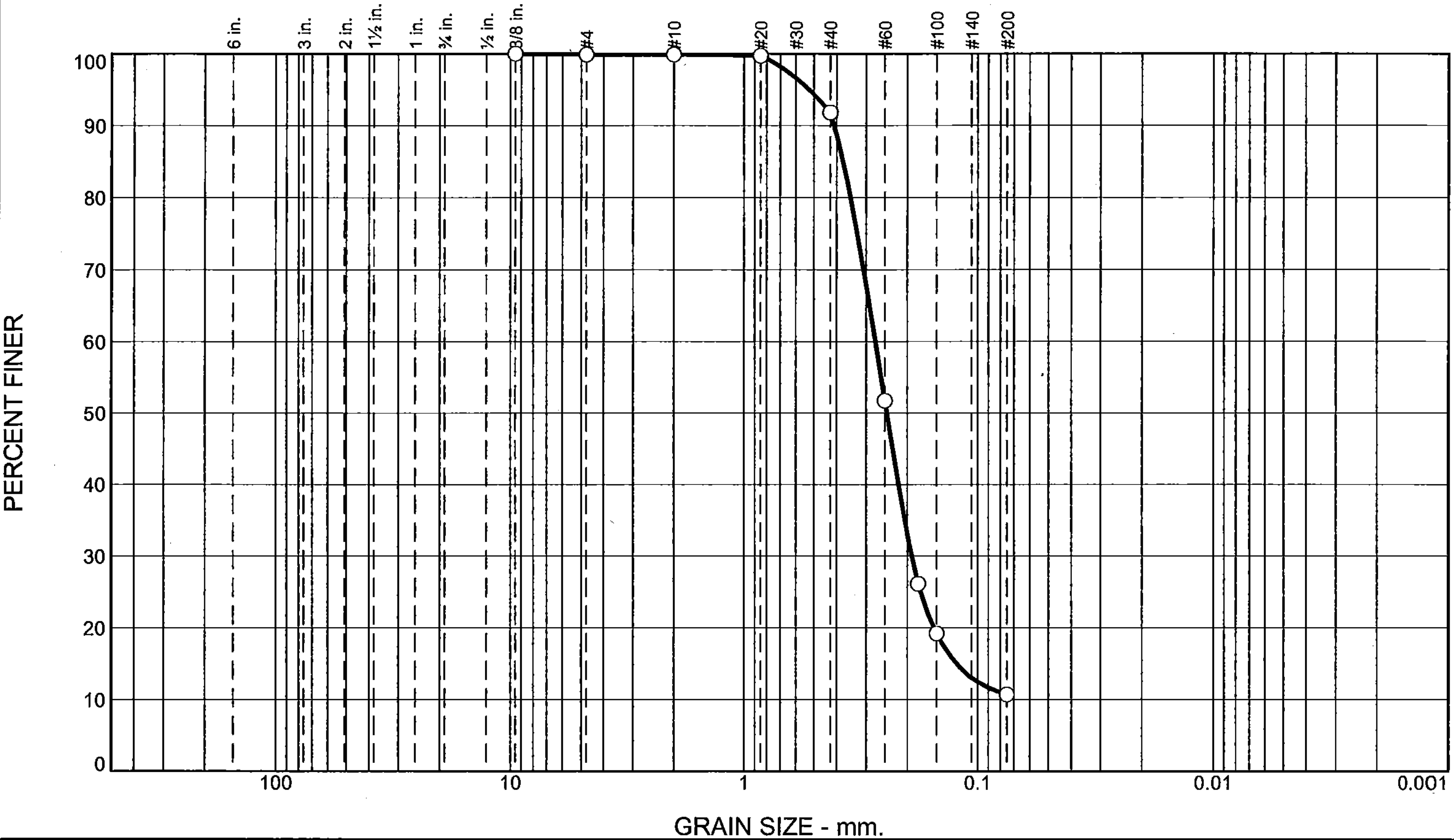
Date: 10/27/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	8.1	81.1	10.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#20	99.7		
#40	91.8		
#60	51.7		
#80	26.1		
#100	19.2		
#200	10.7		

* (no specification provided)

Material Description

Reddish brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4097 D_{85}= 0.3763 D_{60}= 0.2743
D_{50}= 0.2453 D_{30}= 0.1920 D_{15}= 0.1233
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C ST-3 **Depth:** 26'-27.5'

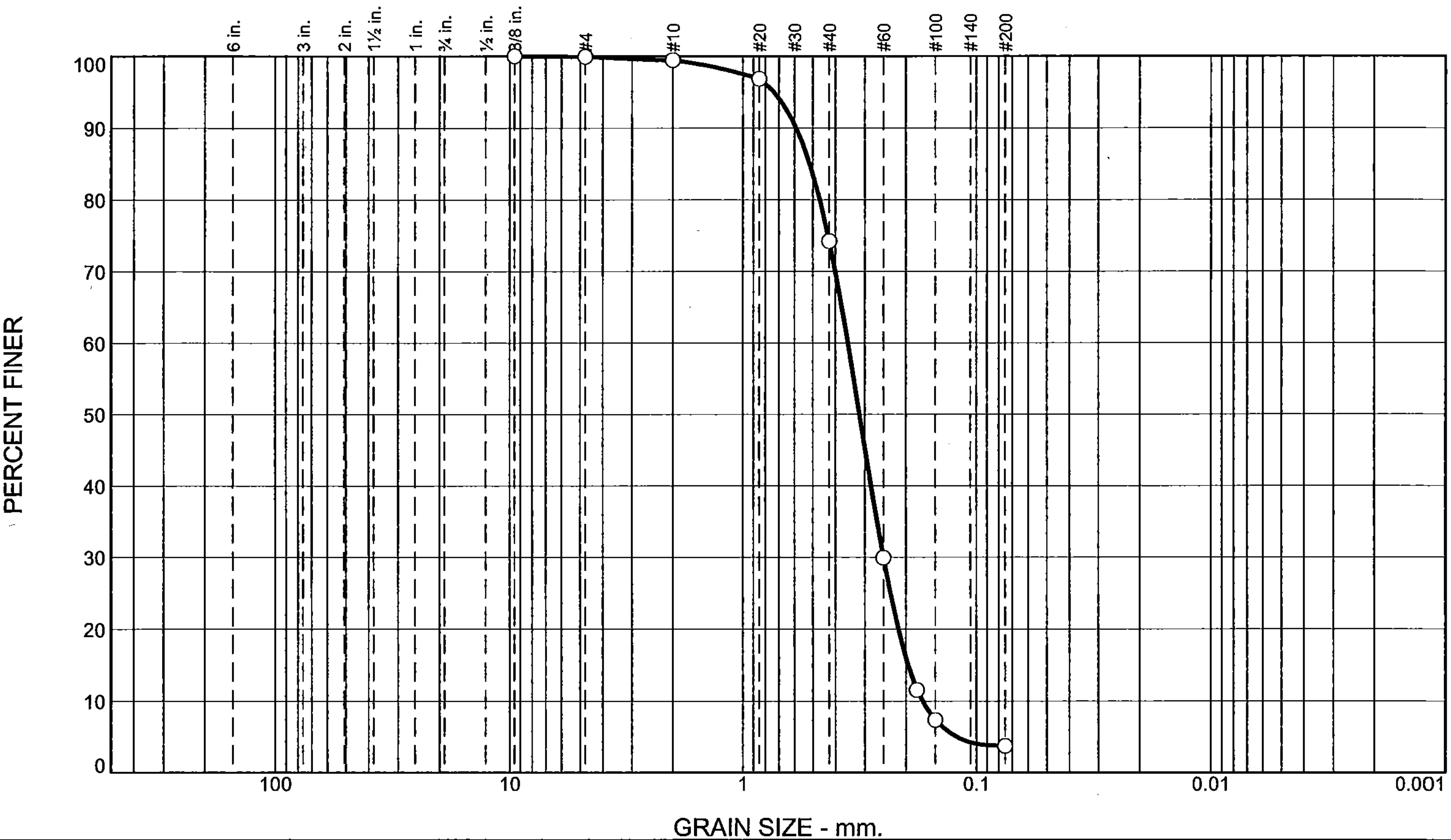
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.4	25.3	70.5	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.5		
#20	96.8		
#40	74.2		
#60	29.9		
#80	11.5		
#100	7.4		
#200	3.7		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5895 D_{85}= 0.5155 D_{60}= 0.3545
D_{50}= 0.3165 D_{30}= 0.2502 D_{15}= 0.1964
D_{10}= 0.1710 C_u= 2.07 C_c= 1.03

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C ST-4 **Depth:** 36'-37.5'

Date: 10/25/2015

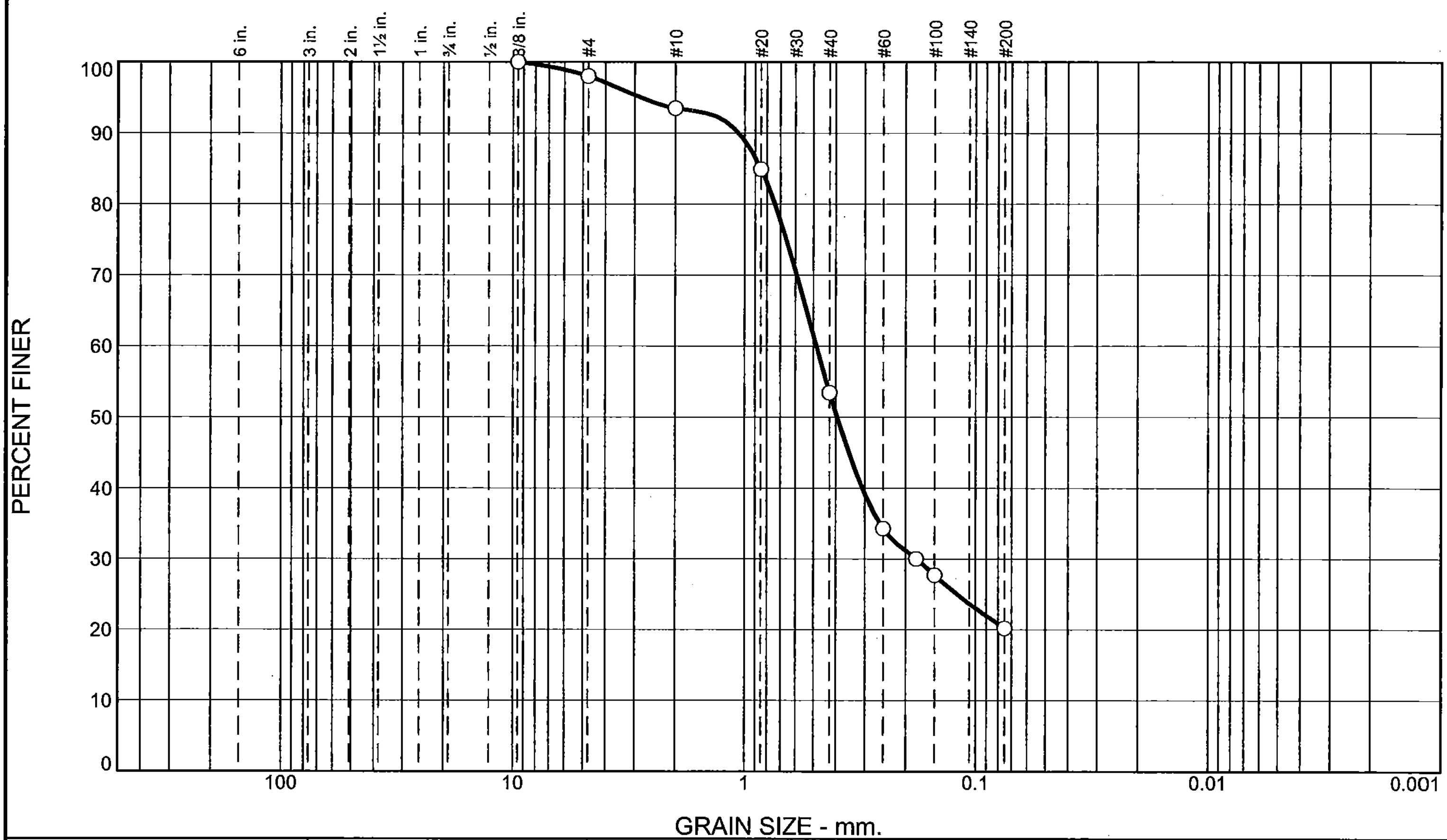
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.0	4.5	40.1	33.2	20.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.0		
#10	93.5		
#20	84.9		
#40	53.4		
#60	34.3		
#80	30.0		
#100	27.7		
#200	20.2		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0641 D_{85}= 0.8525 D_{60}= 0.4856
D_{50}= 0.3950 D_{30}= 0.1795 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C SPT-5 **Depth:** 46'-47.5'

Date: 10/22/2015

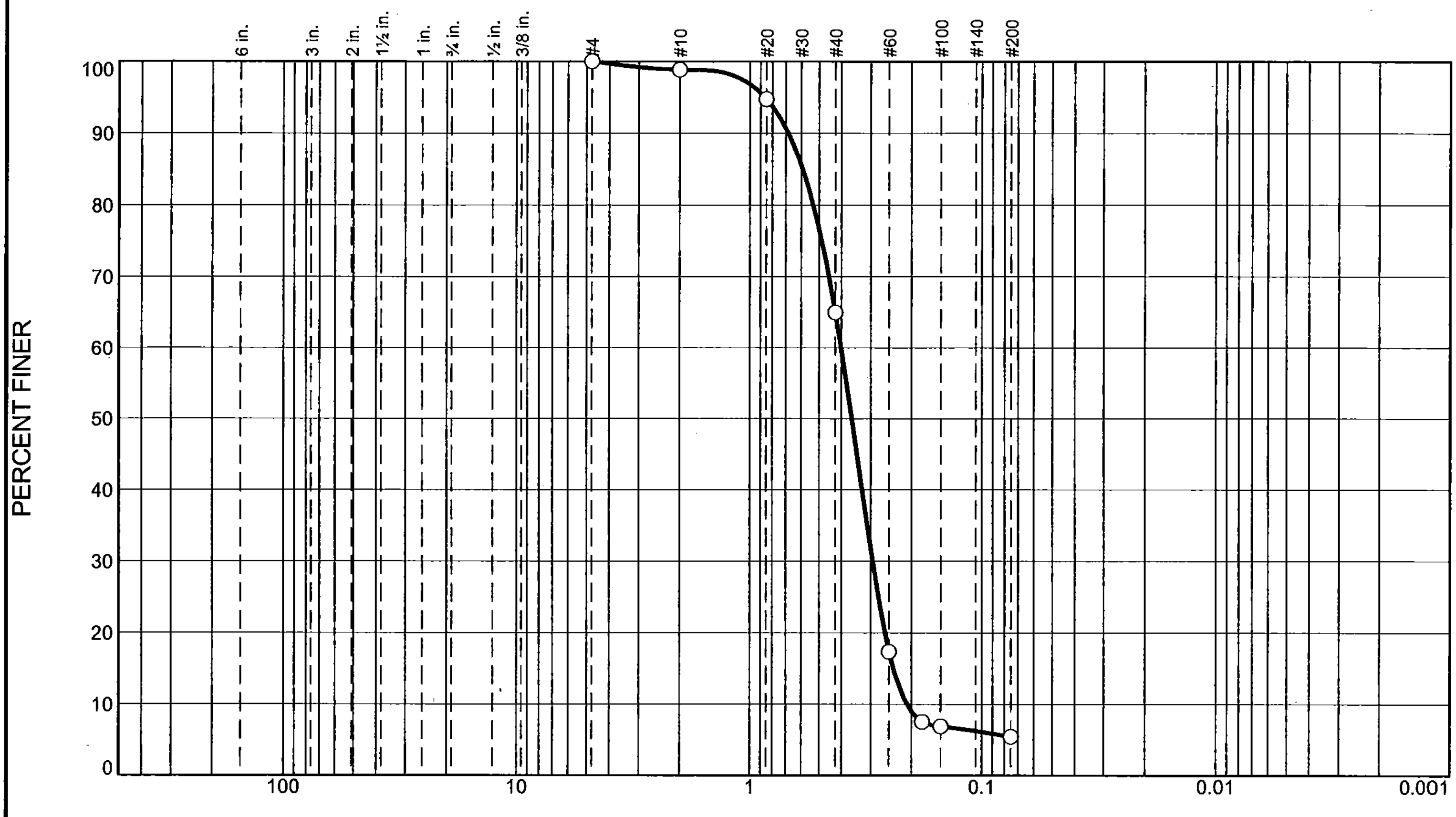
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.1	34.0	59.5	5.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.9		
#20	94.7		
#40	64.9		
#60	17.4		
#80	7.5		
#100	6.9		
#200	5.4		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6818 D_{85}= 0.5904 D_{60}= 0.4016
D_{50}= 0.3618 D_{30}= 0.2945 D_{15}= 0.2395
D_{10}= 0.2097 C_u= 1.92 C_c= 1.03

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-3C SPT-7 **Depth:** 56'-57.5'

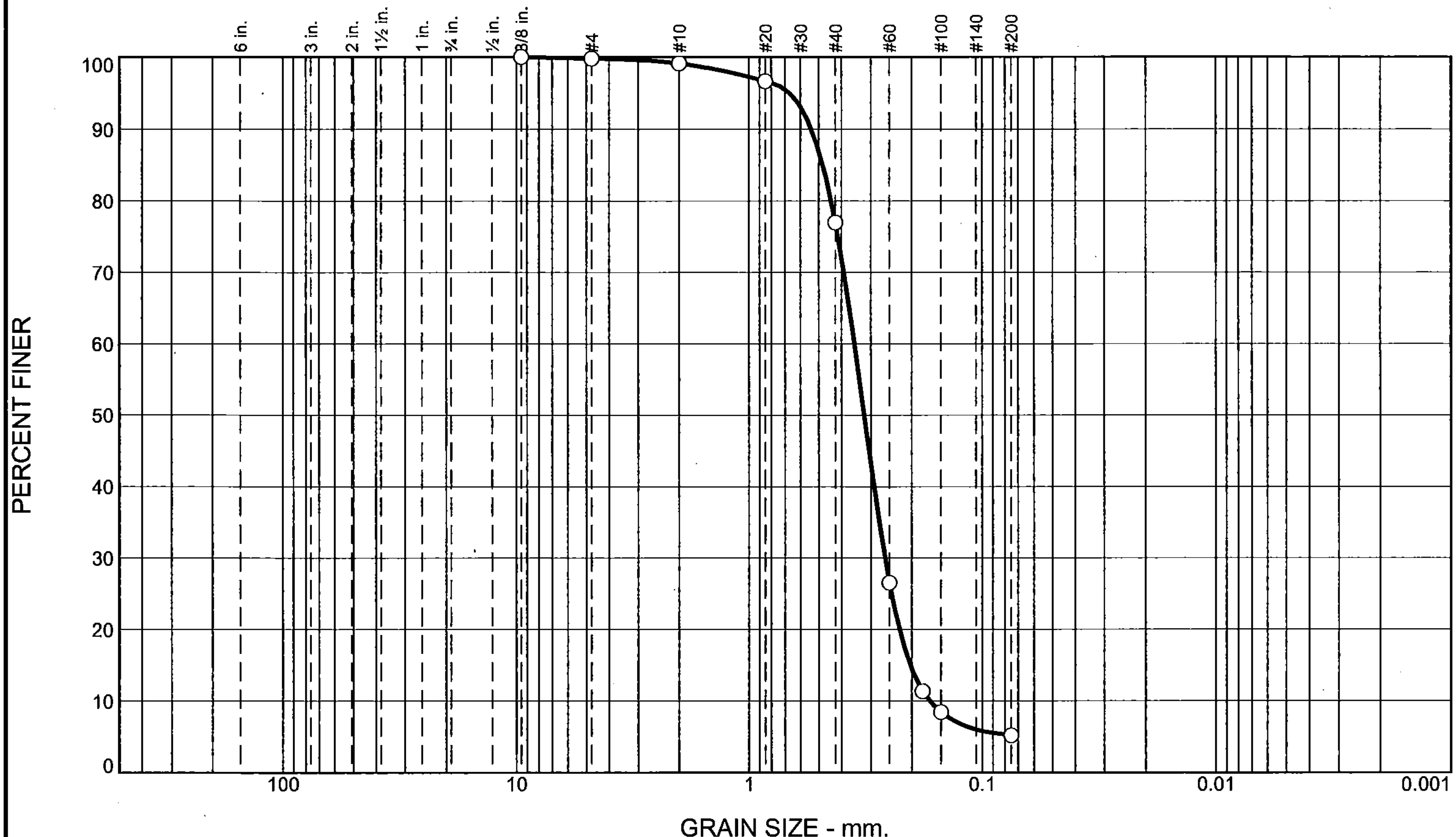
Date: 10/30/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.7	22.1	71.8	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.1		
#20	96.7		
#40	77.0		
#60	26.5		
#80	11.3		
#100	8.4		
#200	5.2		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5383 D_{85}= 0.4809 D_{60}= 0.3533
D_{50}= 0.3208 D_{30}= 0.2611 D_{15}= 0.2034
D_{10}= 0.1685 C_u= 2.10 C_c= 1.15

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C ST-1 **Depth:** 3.5'-5'

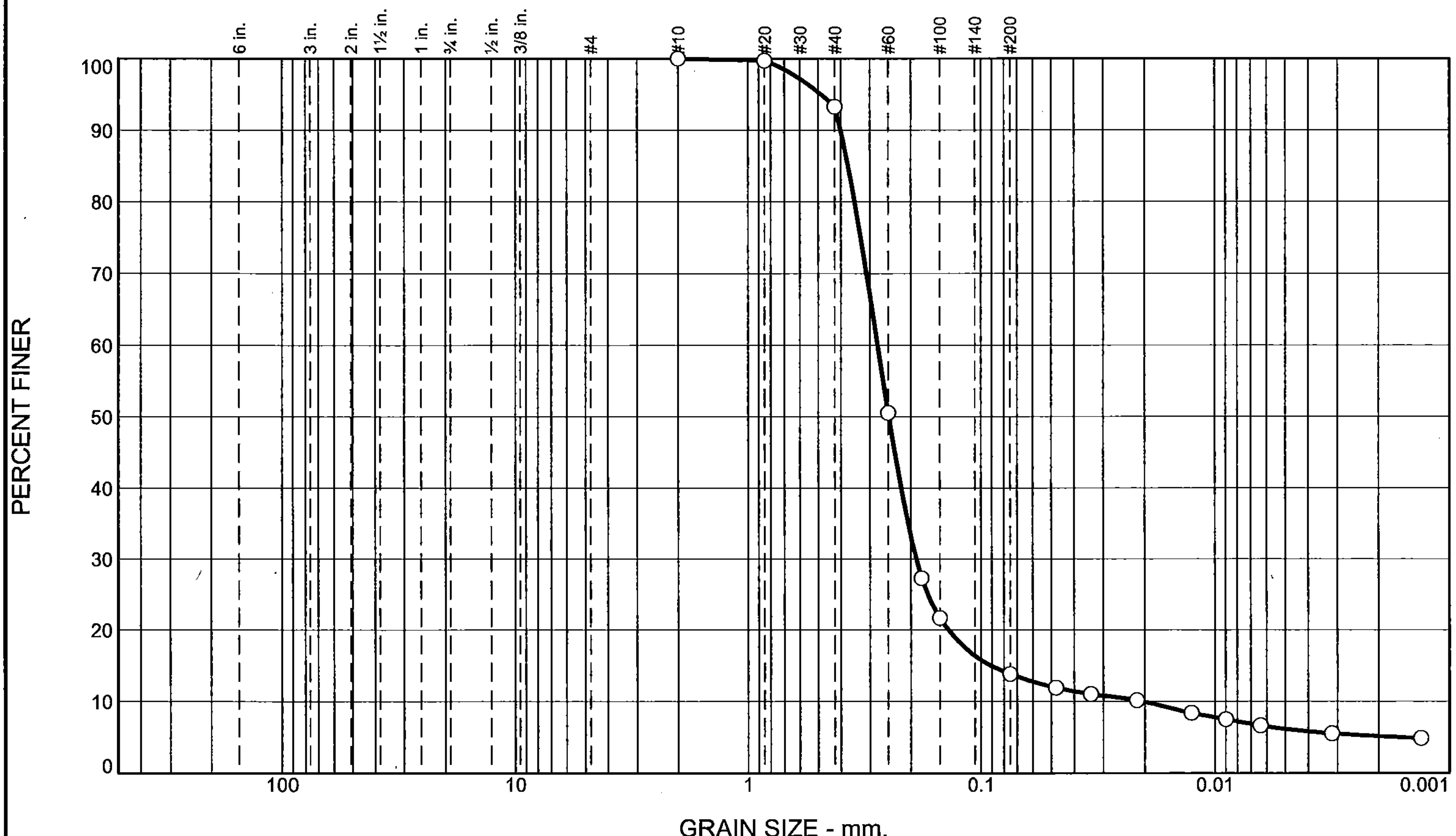
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.7	79.5	7.7	6.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	93.3		
#60	50.5		
#80	27.3		
#100	21.7		
#200	13.8		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4011 D_{85}= 0.3724 D_{60}= 0.2778
D_{50}= 0.2486 D_{30}= 0.1900 D_{15}= 0.0908
D_{10}= 0.0207 C_u= 13.43 C_c= 6.28

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C SPT-1 **Depth:** 8.5'-10'

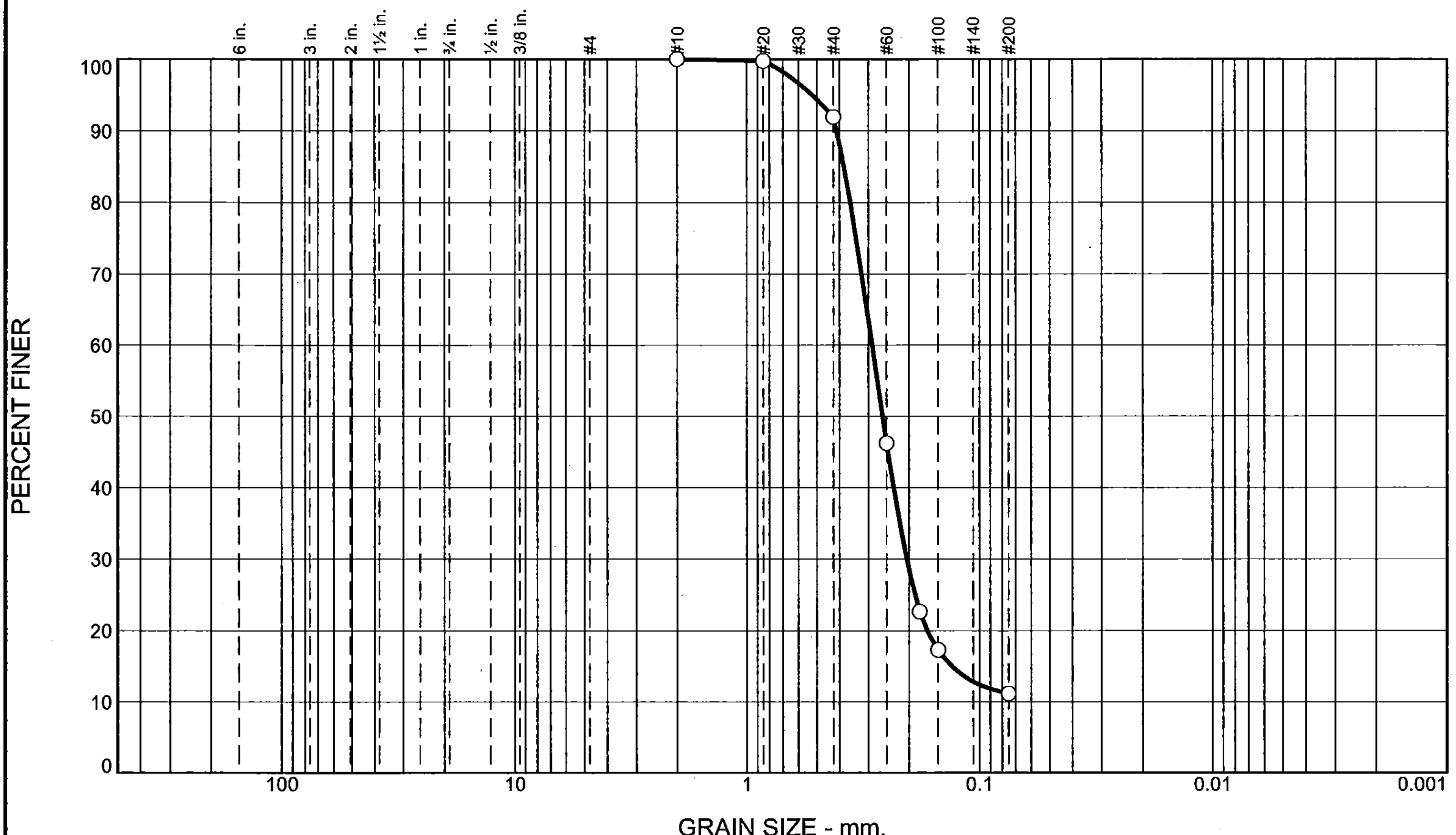
Date: 10/23/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.1	80.7	11.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	91.9		
#60	46.2		
#80	22.7		
#100	17.3		
#200	11.2		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4114 D_{85}= 0.3827 D_{60}= 0.2891
D_{50}= 0.2605 D_{30}= 0.2049 D_{15}= 0.1308
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C ST-2 **Depth:** 13.5'-15'

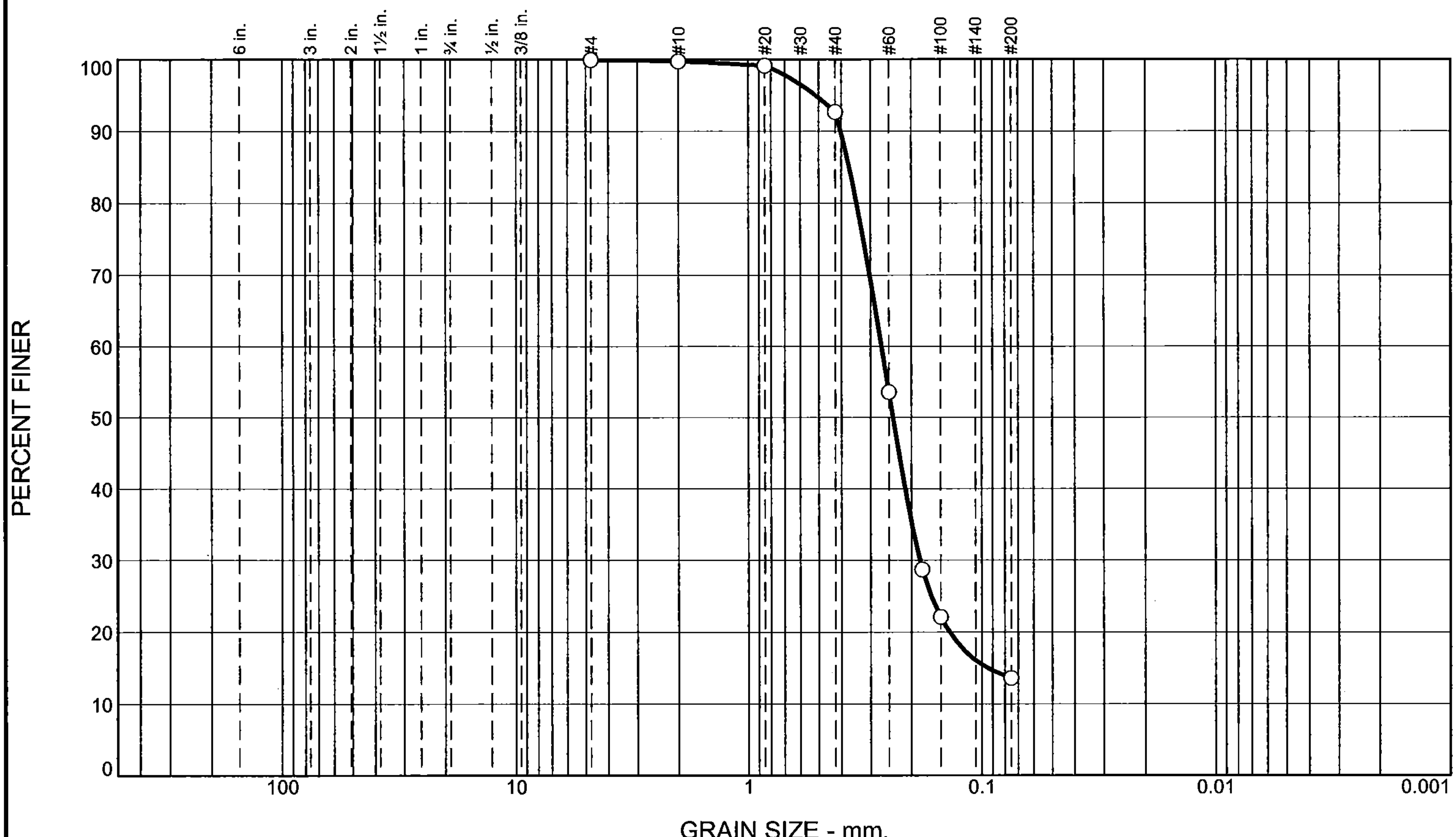
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			0.3	7.0	79.1	13.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.1		
#40	92.7		
#60	53.5		
#80	28.7		
#100	22.1		
#200	13.6		

* (no specification provided)

Material Description

Brown, mottled dark brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4026 D_{85}= 0.3700 D_{60}= 0.2692
D_{50}= 0.2402 D_{30}= 0.1844 D_{15}= 0.0942
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C SPT-2 **Depth:** 18.5'-20'

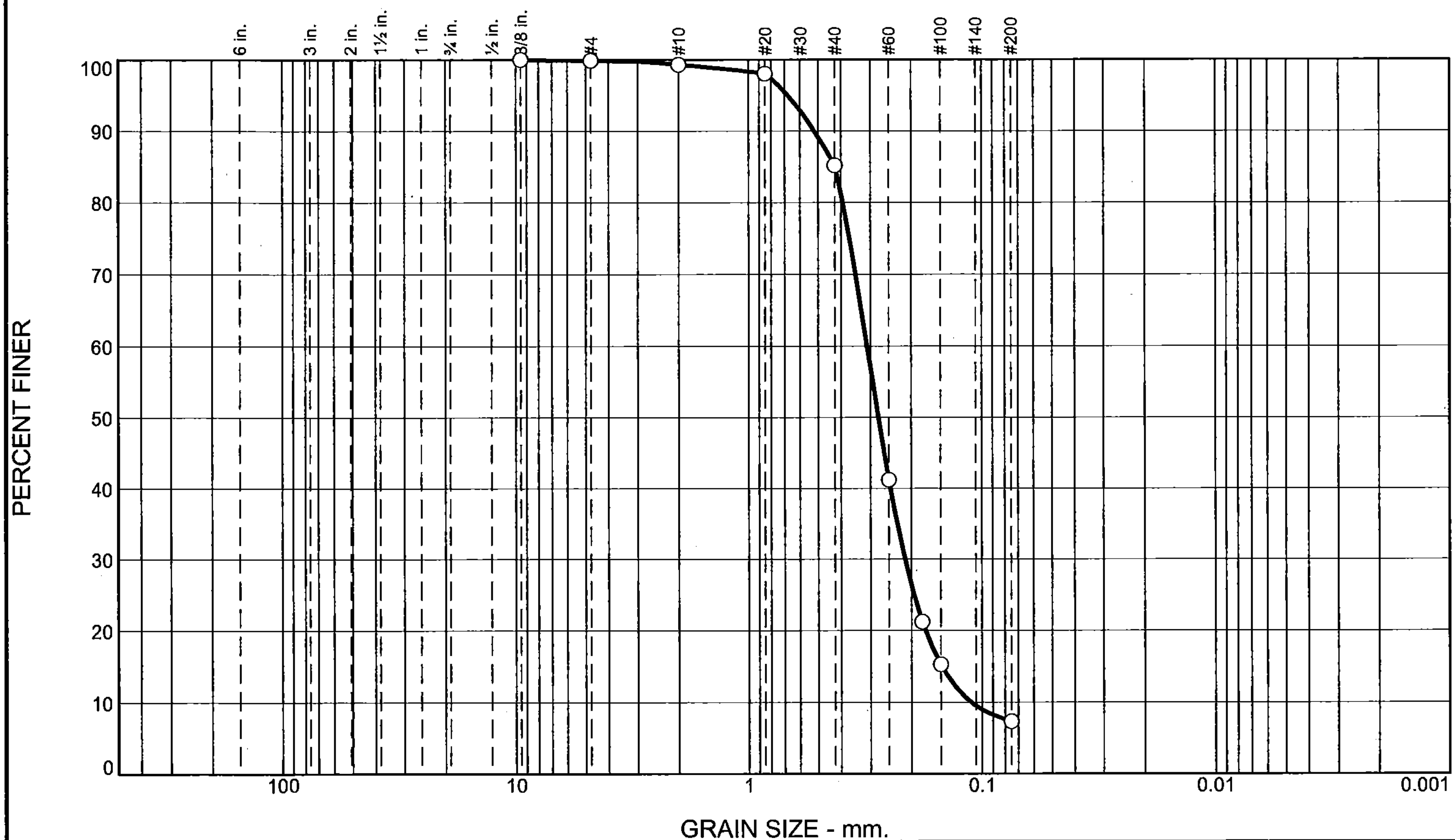
Date: 10/27/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.6	14.1	77.9	7.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.3		
#20	98.0		
#40	85.2		
#60	41.2		
#80	21.2		
#100	15.3		
#200	7.3		

* (no specification provided)

Material Description

Gray, mottled light reddish brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5198 D_{85}= 0.4239 D_{60}= 0.3102
D_{50}= 0.2775 D_{30}= 0.2133 D_{15}= 0.1484
D_{10}= 0.1114 C_u= 2.78 C_c= 1.32

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C ST-3 **Depth:** 23.5'-25'

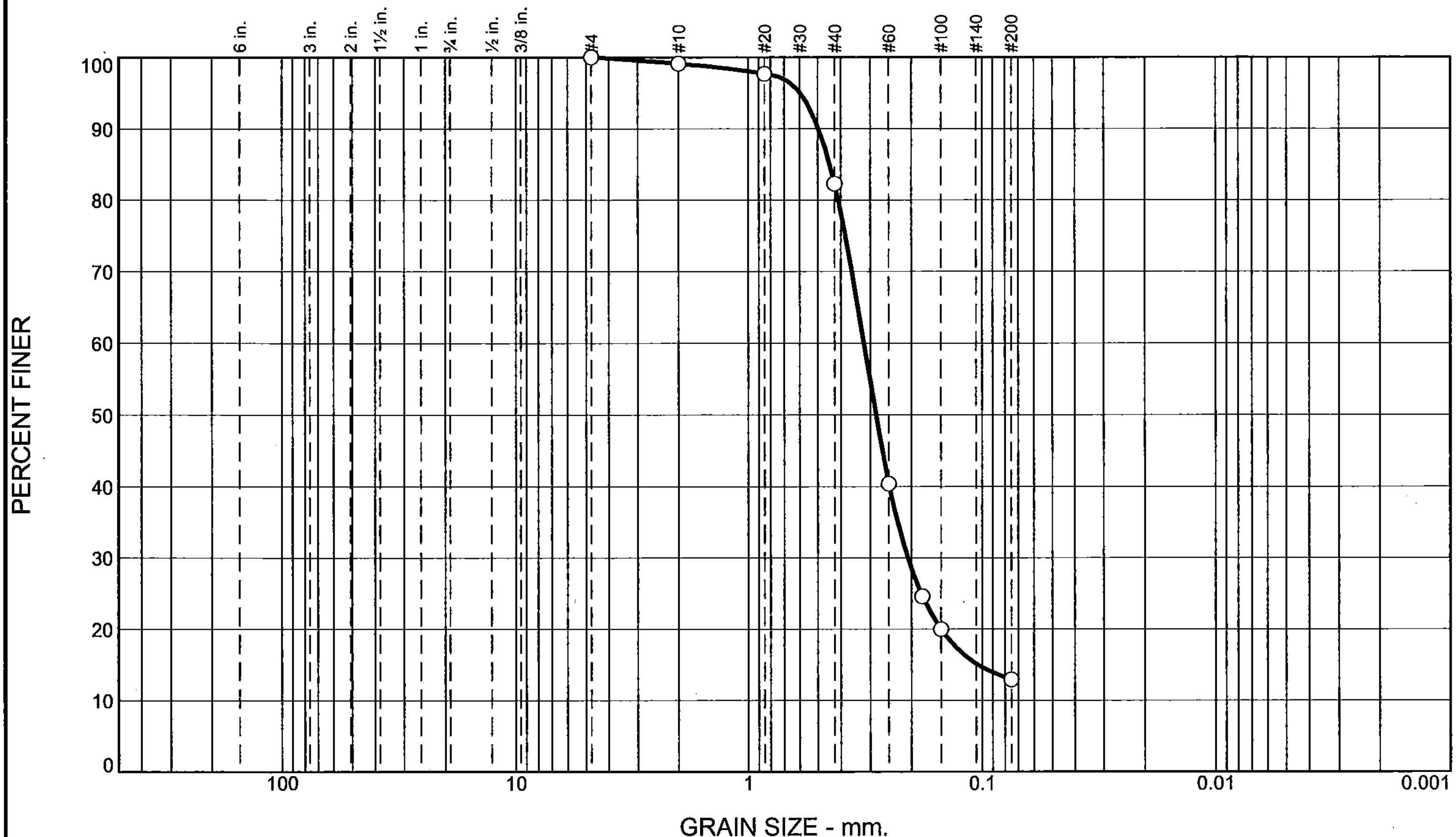
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.9	16.8	69.4	12.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.1		
#20	97.7		
#40	82.3		
#60	40.4		
#80	24.6		
#100	20.0		
#200	12.9		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4966 D_{85}= 0.4454 D_{60}= 0.3193
D_{50}= 0.2838 D_{30}= 0.2076 D_{15}= 0.1044
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-4C SPT-3 **Depth:** 28.5'-30'

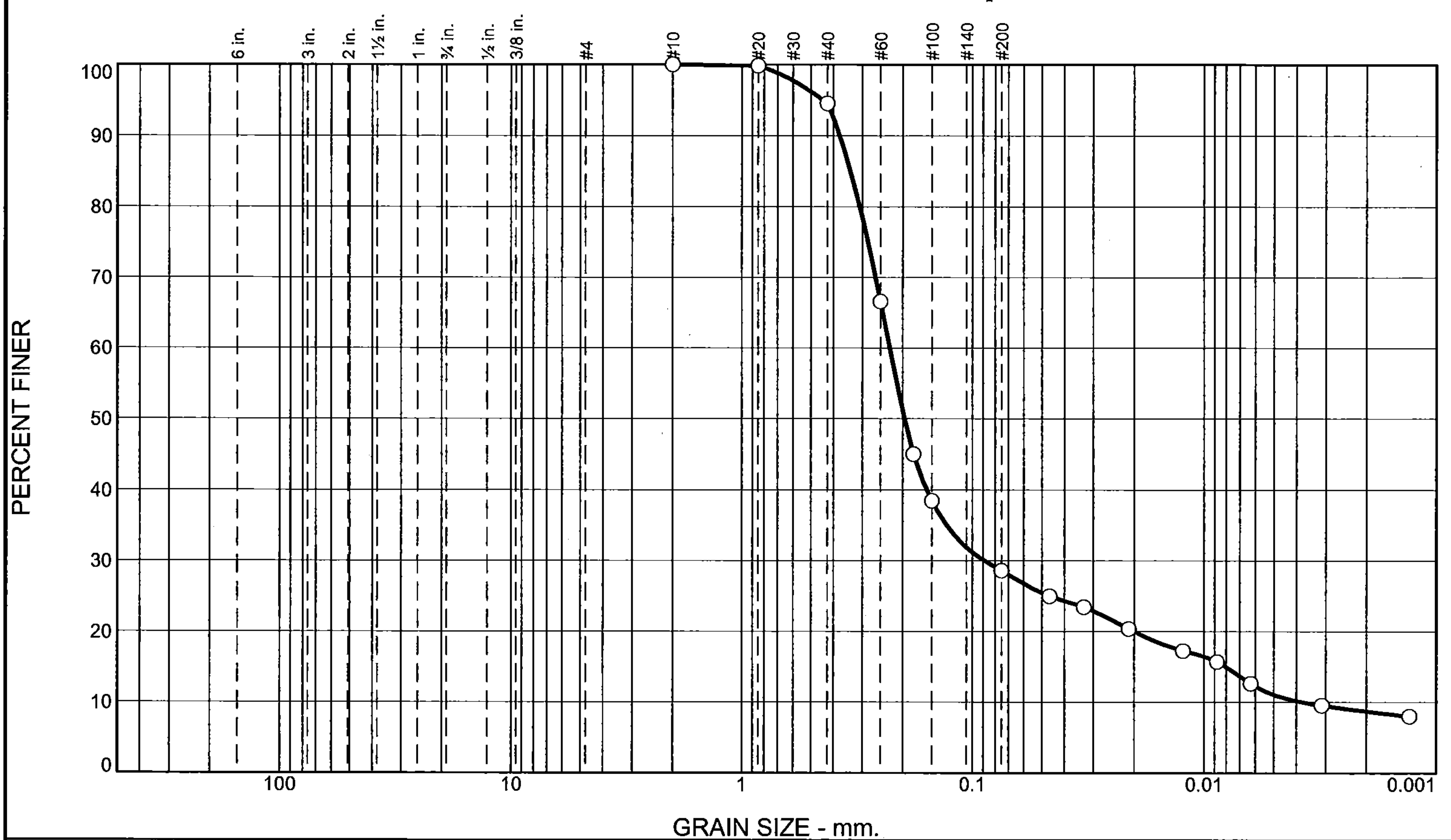
Date: 10/27/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.5	65.9	17.6	11.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	94.5		
#60	66.6		
#80	45.0		
#100	38.4		
#200	28.6		

* (no specification provided)

Material Description

Dark brown silty sand

Atterberg Limits

PL= 13 LL= 14 PI= 1

Coefficients

D_{90}= 0.3753 D_{85}= 0.3374 D_{60}= 0.2281
D_{50}= 0.1969 D_{30}= 0.0887 D_{15}= 0.0080
D_{10}= 0.0038 C_u= 59.83 C_c= 9.04

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: EP-4C ST-4 **Depth:** 33.5'-34'

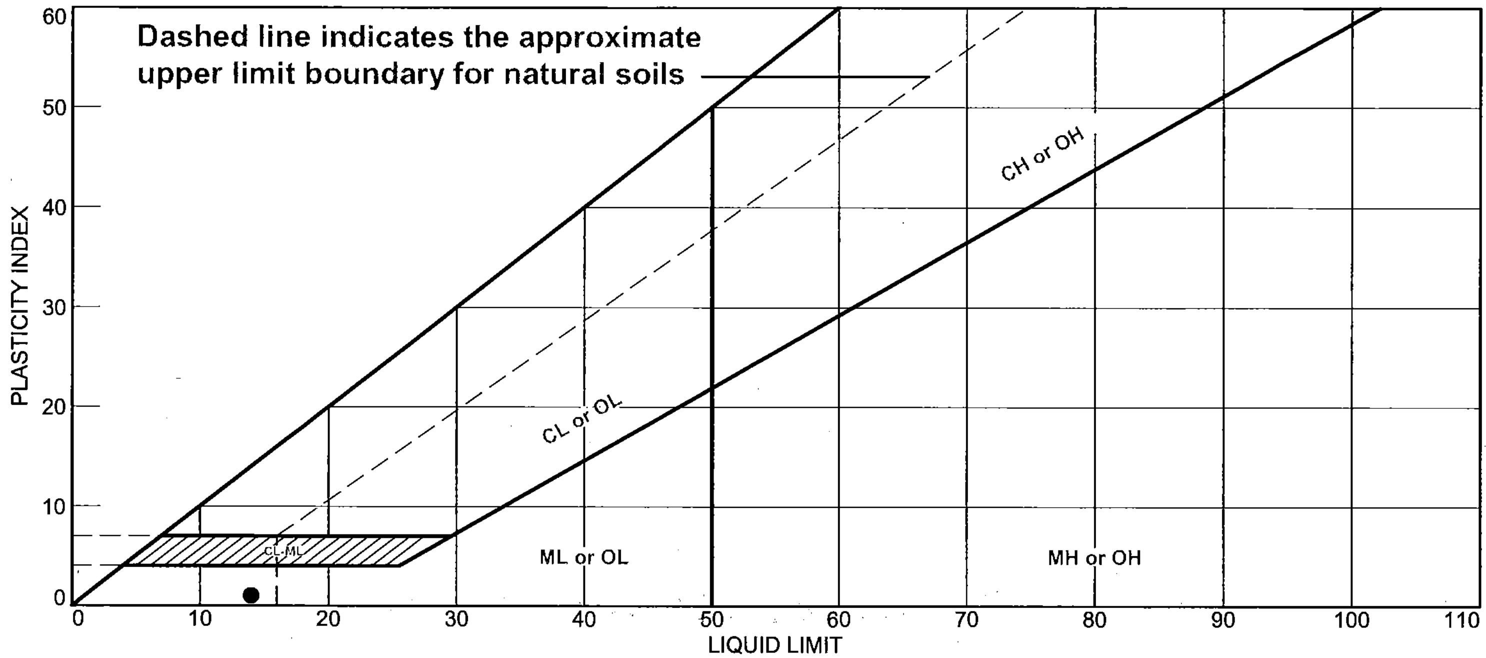
Date: 10/30/2015

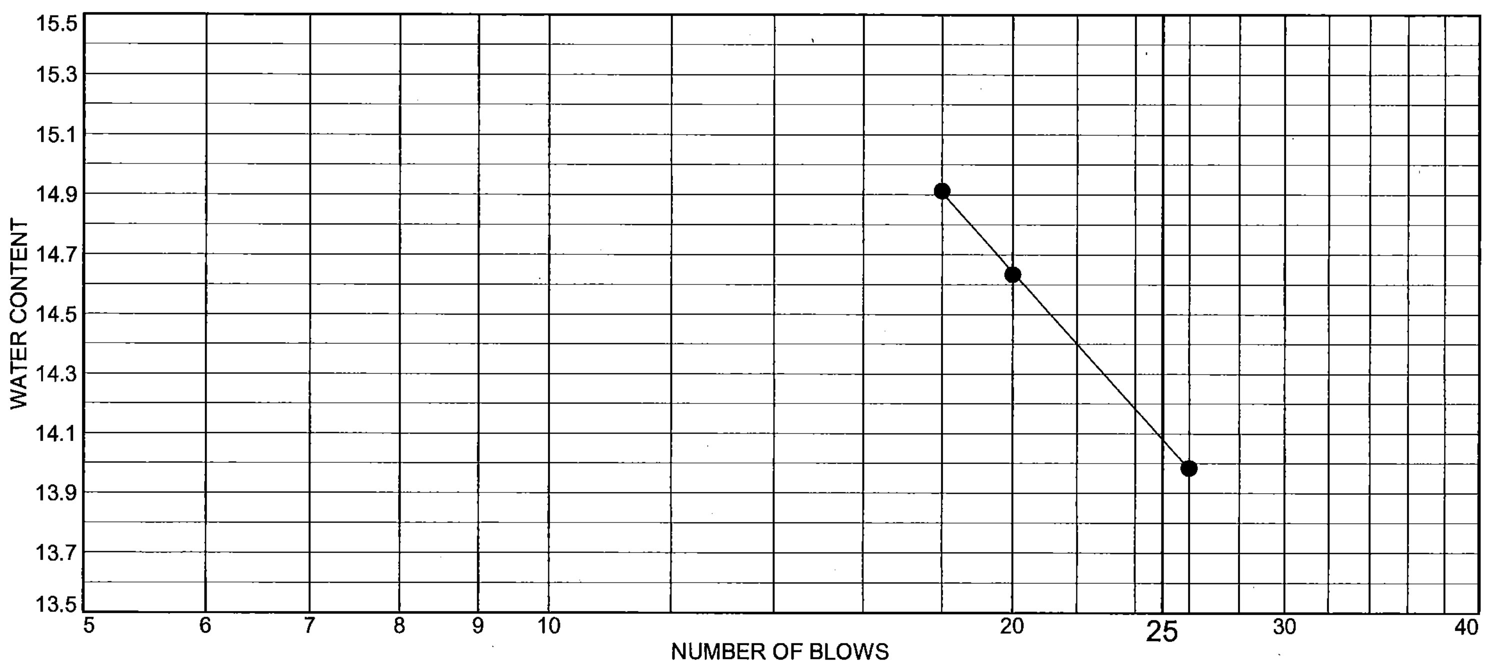
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown silty sand	14	13	1	94.5	28.6	SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

Sample Number: EP-4C ST-4 **Depth:** 33.5'-34'

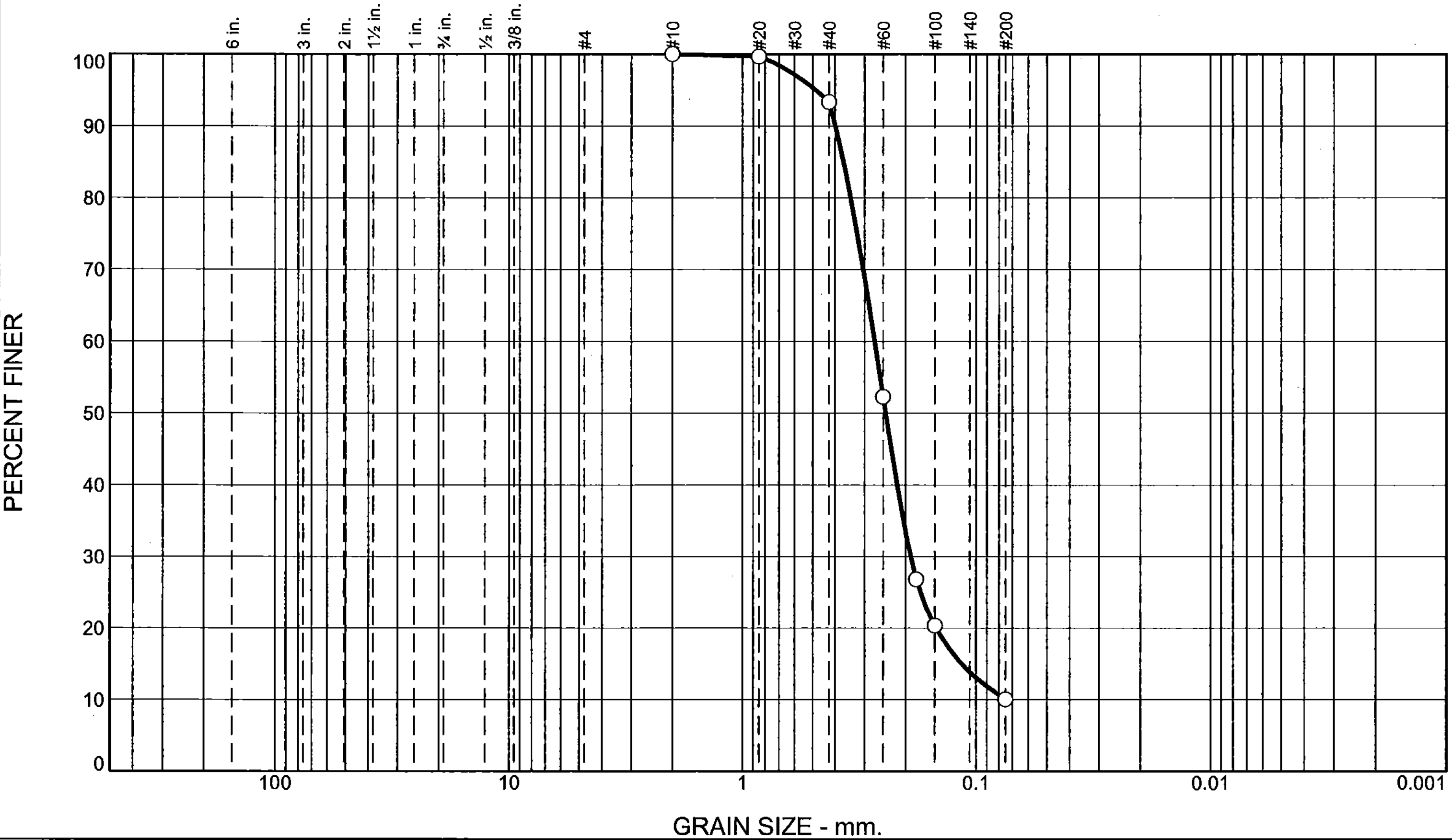
ALPHA-OMEGA GEOTECH

Remarks:

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.7	83.2	10.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	93.3		
#60	52.3		
#80	26.8		
#100	20.3		
#200	10.1		

* (no specification provided)

Material Description

Reddish brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3987 D_{85}= 0.3685 D_{60}= 0.2721
D_{50}= 0.2439 D_{30}= 0.1903 D_{15}= 0.1150
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C ST-1 **Depth:** 6'-7.5'

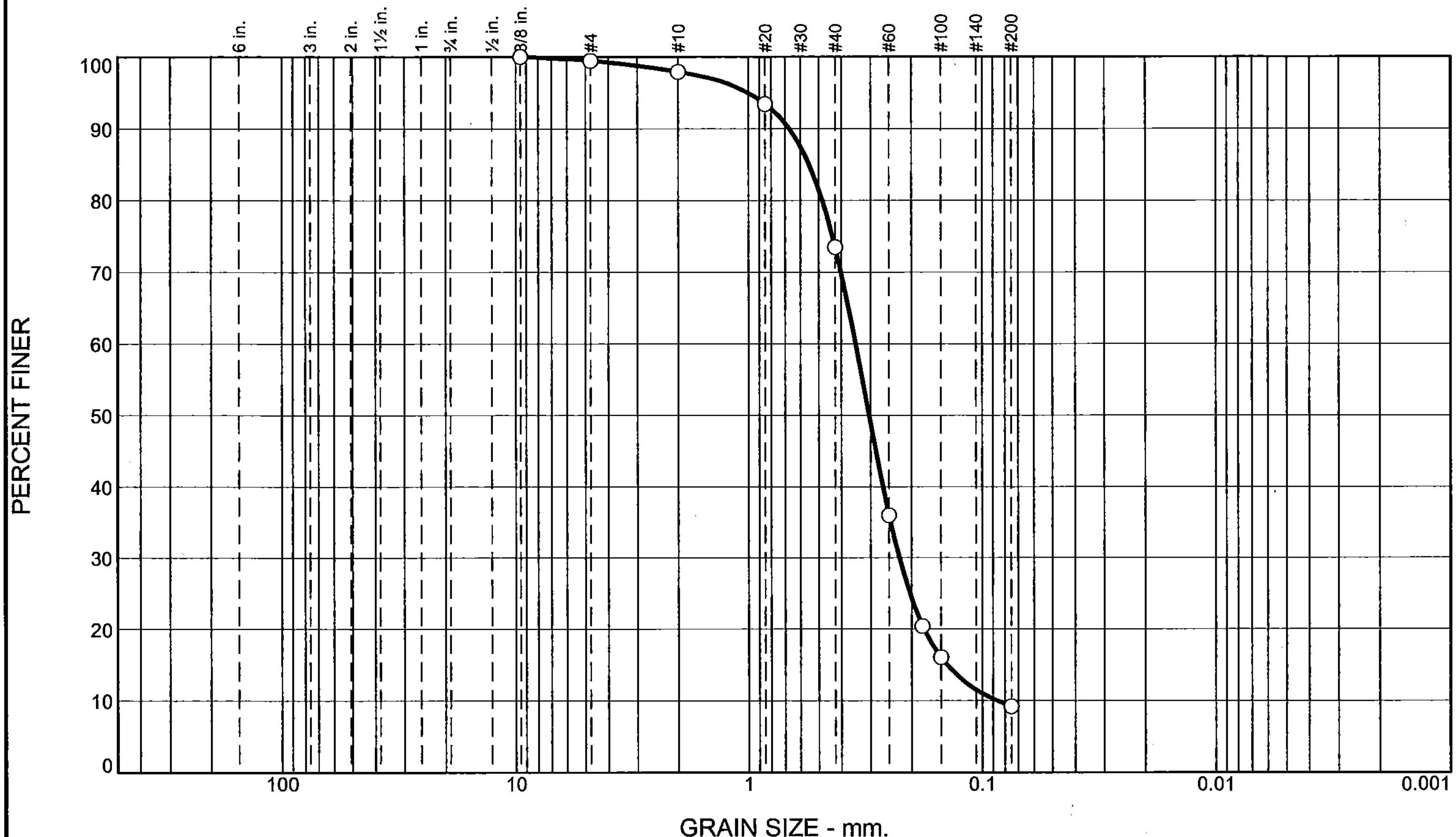
Date: 10/26/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.6	24.4	64.3	9.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#10	97.9		
#20	93.4		
#40	73.5		
#60	36.0		
#80	20.4		
#100	16.0		
#200	9.2		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6692 D_{85}= 0.5502 D_{60}= 0.3482
D_{50}= 0.3049 D_{30}= 0.2259 D_{15}= 0.1414
D_{10}= 0.0863 C_u= 4.04 C_c= 1.70

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C SPT-1 **Depth:** 11'-12.5'

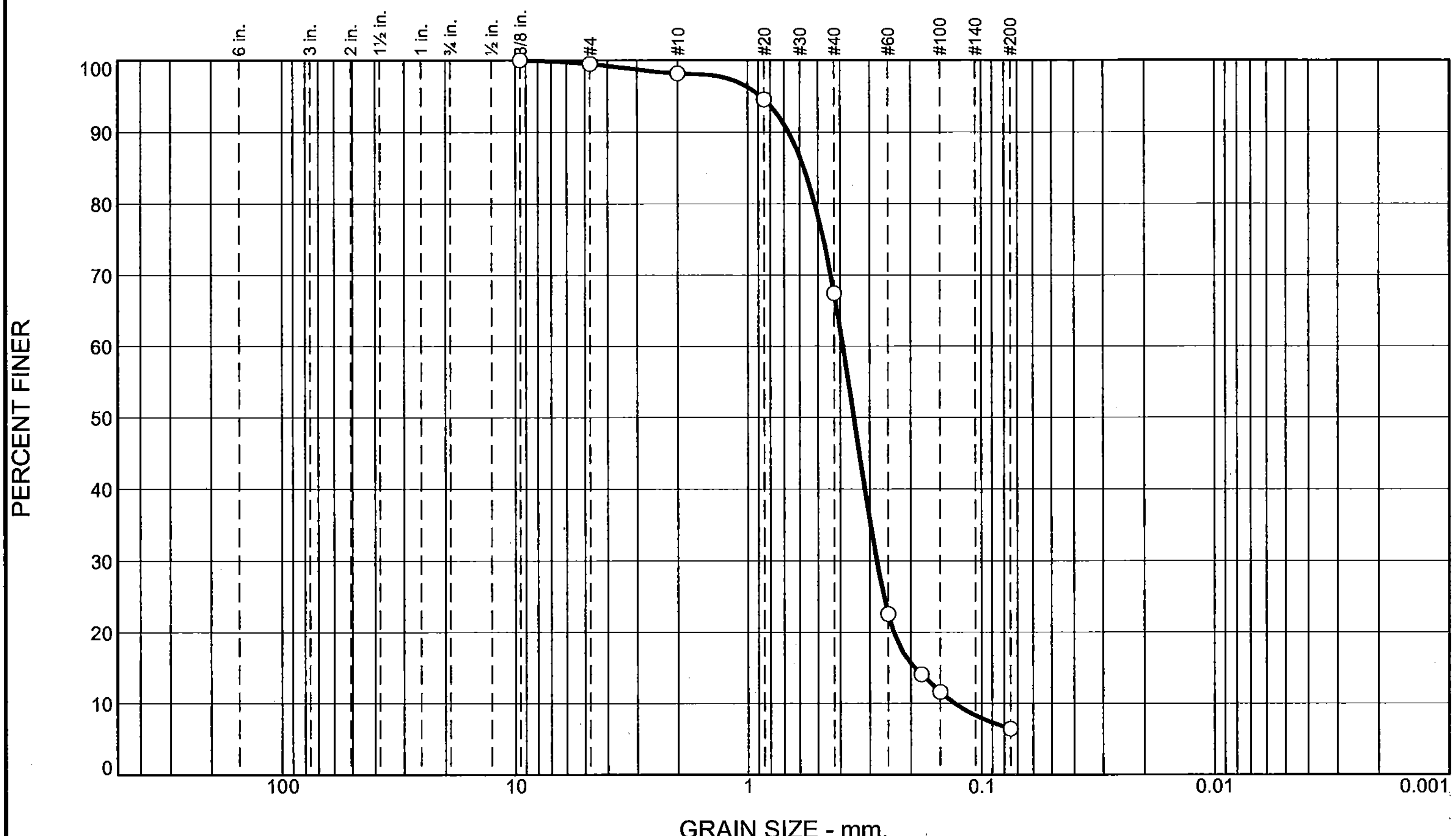
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.3	30.8	61.0	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#10	98.2		
#20	94.5		
#40	67.4		
#60	22.5		
#80	14.1		
#100	11.6		
#200	6.4		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6685 D_{85}= 0.5742 D_{60}= 0.3896
D_{50}= 0.3501 D_{30}= 0.2800 D_{15}= 0.1928
D_{10}= 0.1306 C_u= 2.98 C_c= 1.54

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C ST-2 **Depth:** 16'-17'

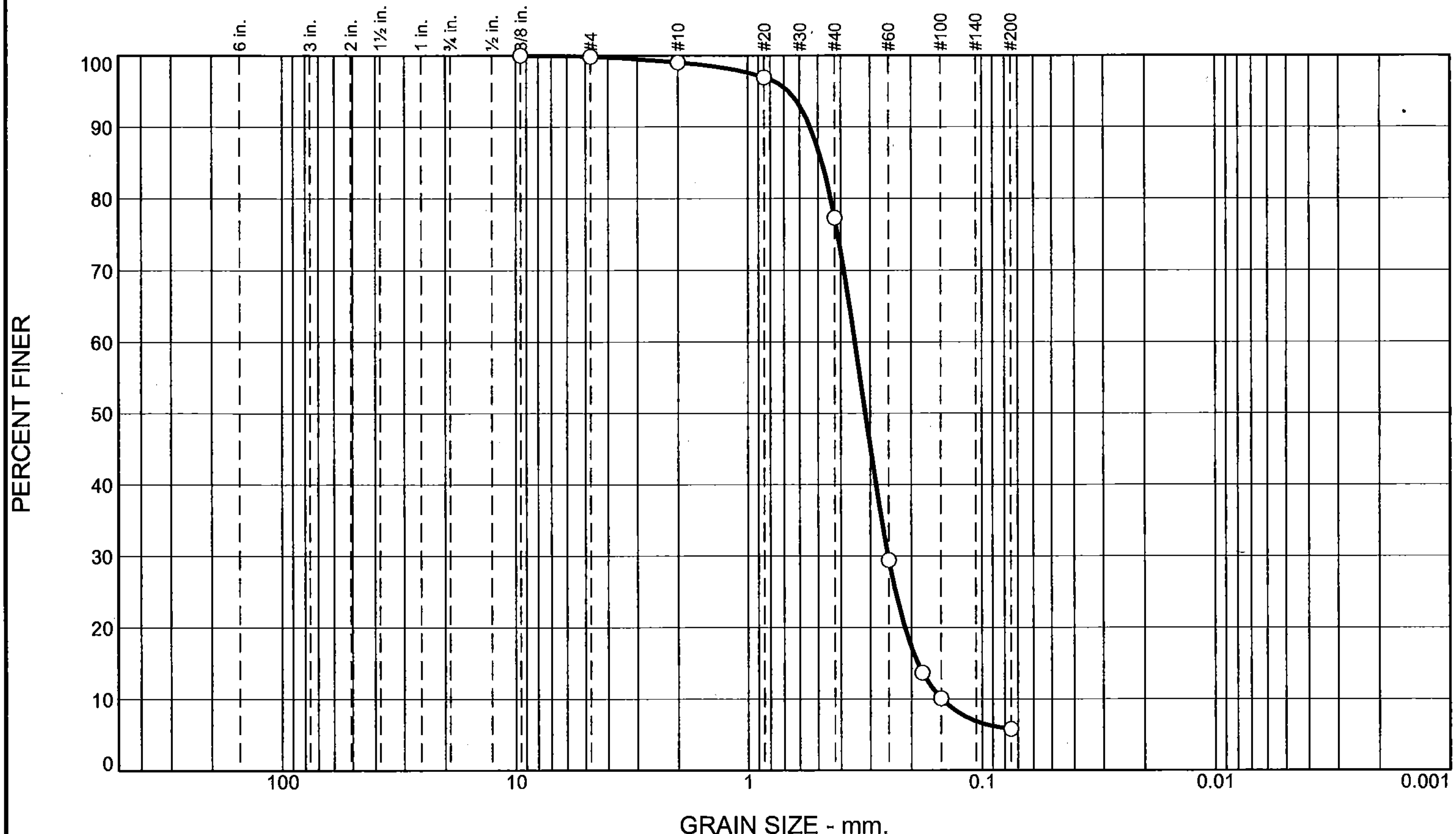
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.8	21.7	71.5	5.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.0		
#20	96.9		
#40	77.3		
#60	29.4		
#80	13.7		
#100	10.1		
#200	5.8		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5404 D_{85}= 0.4811 D_{60}= 0.3486
D_{50}= 0.3148 D_{30}= 0.2519 D_{15}= 0.1882
D_{10}= 0.1490 C_u= 2.34 C_c= 1.22

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C ST-3 **Depth:** 26'-27.5'

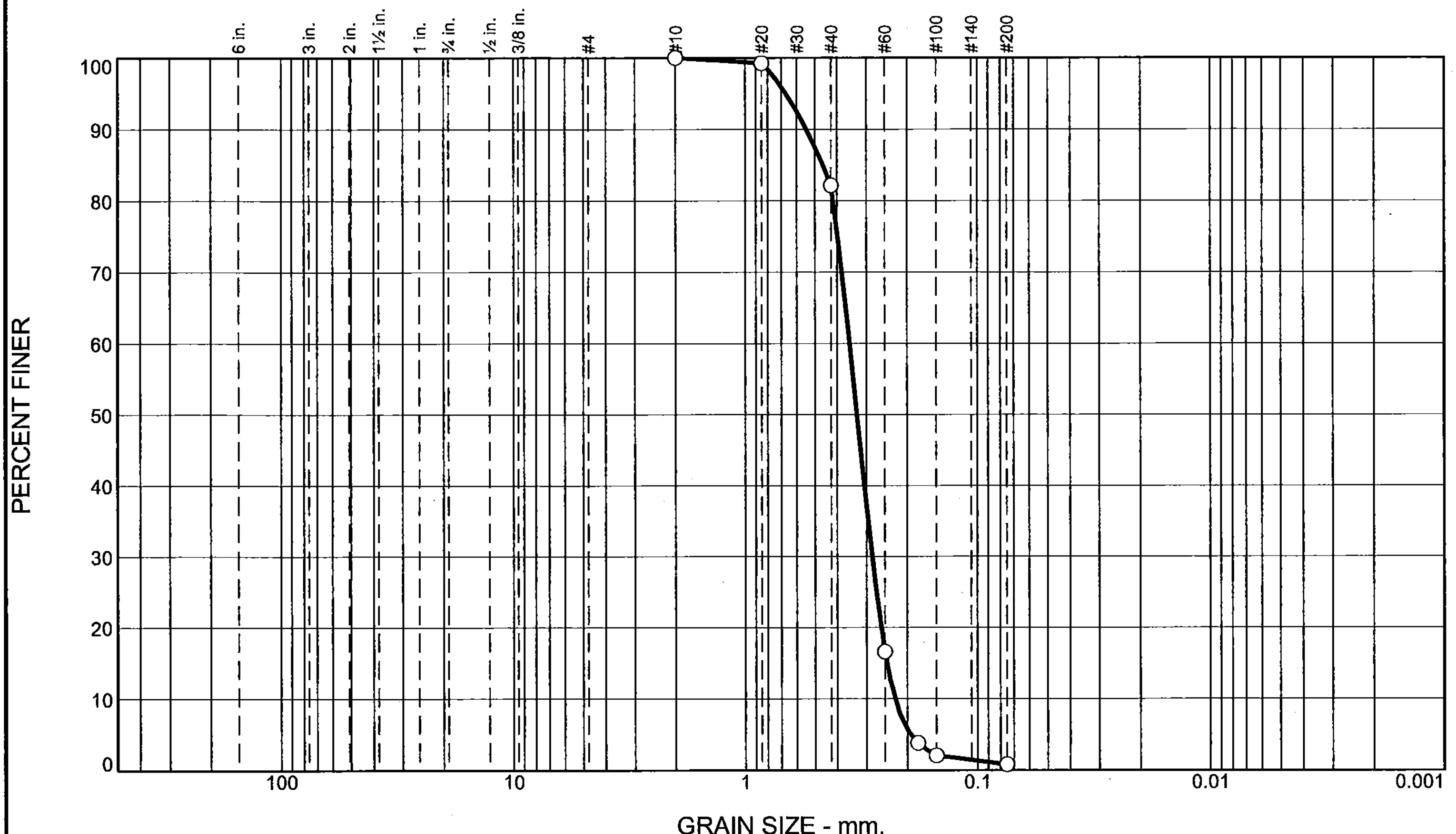
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	17.9	81.3	0.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.3		
#40	82.1		
#60	16.6		
#80	3.8		
#100	2.0		
#200	0.8		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5453 D_{85}= 0.4622 D_{60}= 0.3543
D_{50}= 0.3297 D_{30}= 0.2839 D_{15}= 0.2450
D_{10}= 0.2263 C_u= 1.57 C_c= 1.01

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C ST-4 **Depth:** 41' - 42.5'

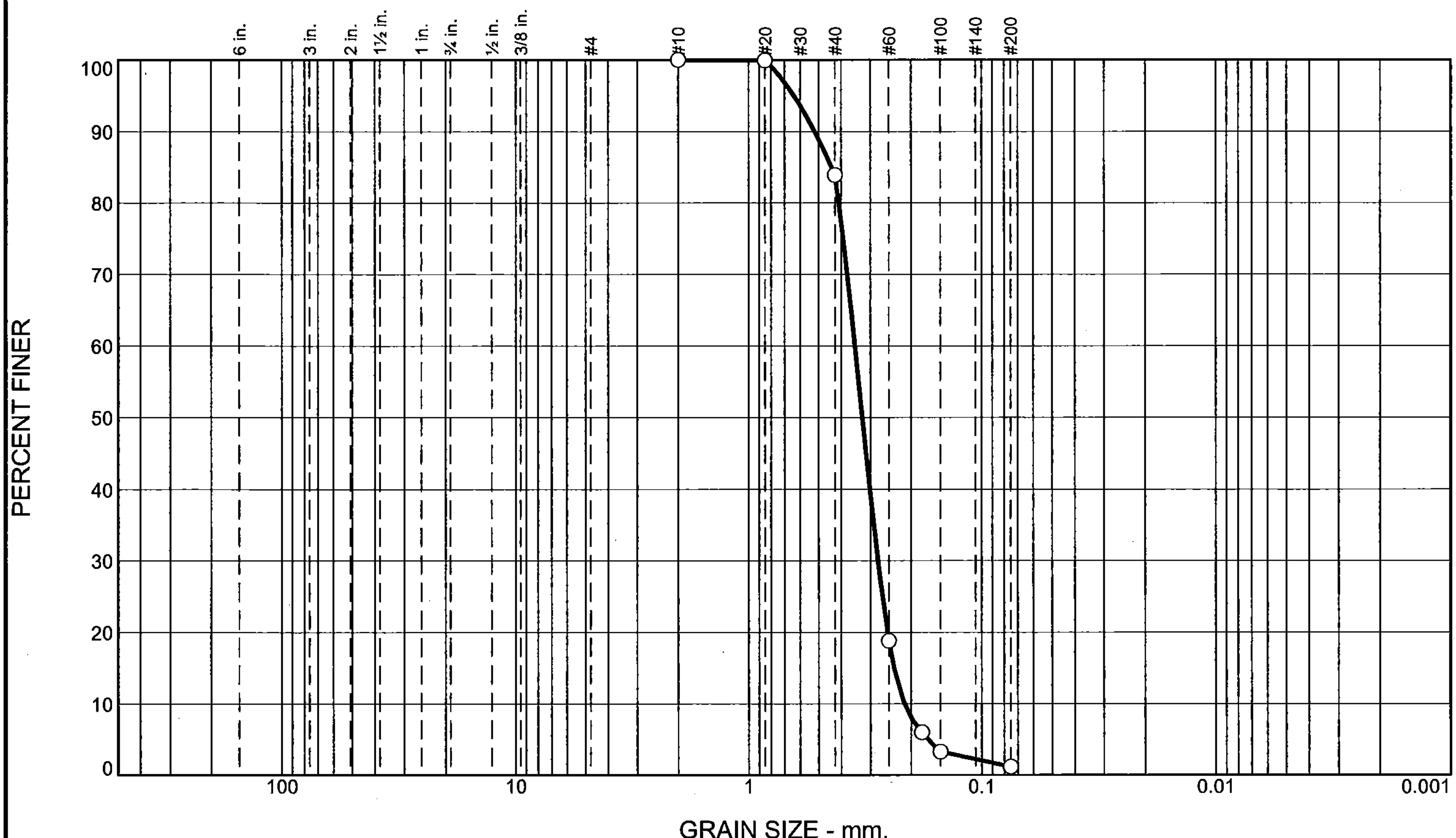
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	16.1	82.8	1.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	83.9		
#60	18.8		
#80	6.0		
#100	3.2		
#200	1.1		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5194 D_{85}= 0.4396 D_{60}= 0.3494
D_{50}= 0.3251 D_{30}= 0.2791 D_{15}= 0.2373
D_{10}= 0.2141 C_u= 1.63 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C SPT-5 **Depth:** 46'-47.5'

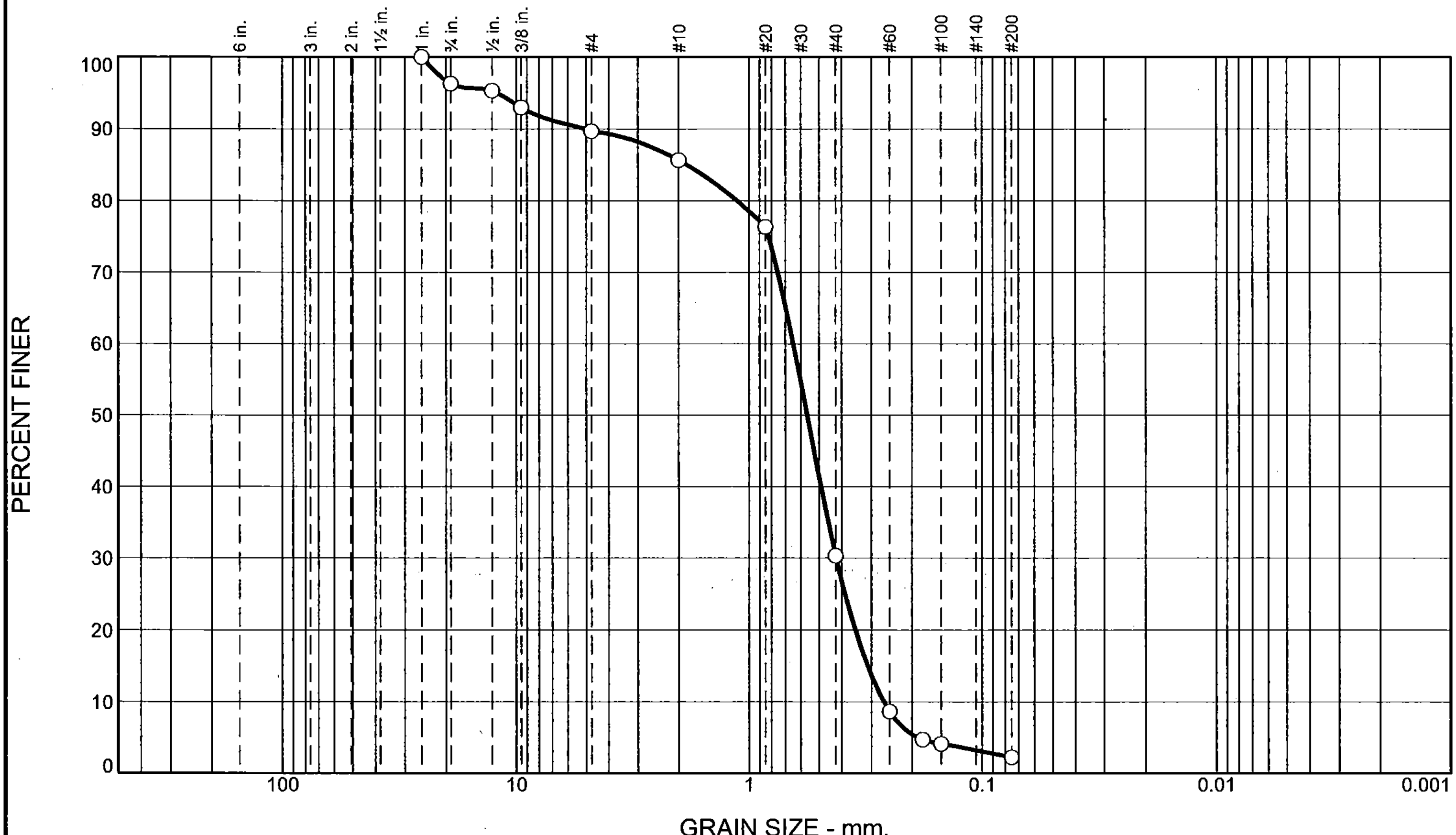
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	6.6	4.1	55.3	28.1	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	96.3		
.5	95.3		
.375	92.9		
#4	89.7		
#10	85.6		
#20	76.4		
#40	30.3		
#60	8.6		
#80	4.7		
#100	4.1		
#200	2.2		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 5.0849 D_{85}= 1.8477 D_{60}= 0.6465
D_{50}= 0.5631 D_{30}= 0.4228 D_{15}= 0.3115
D_{10}= 0.2652 C_u= 2.44 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5C SPT-7 **Depth:** 56'-57.5'

Date: 11/3/2015

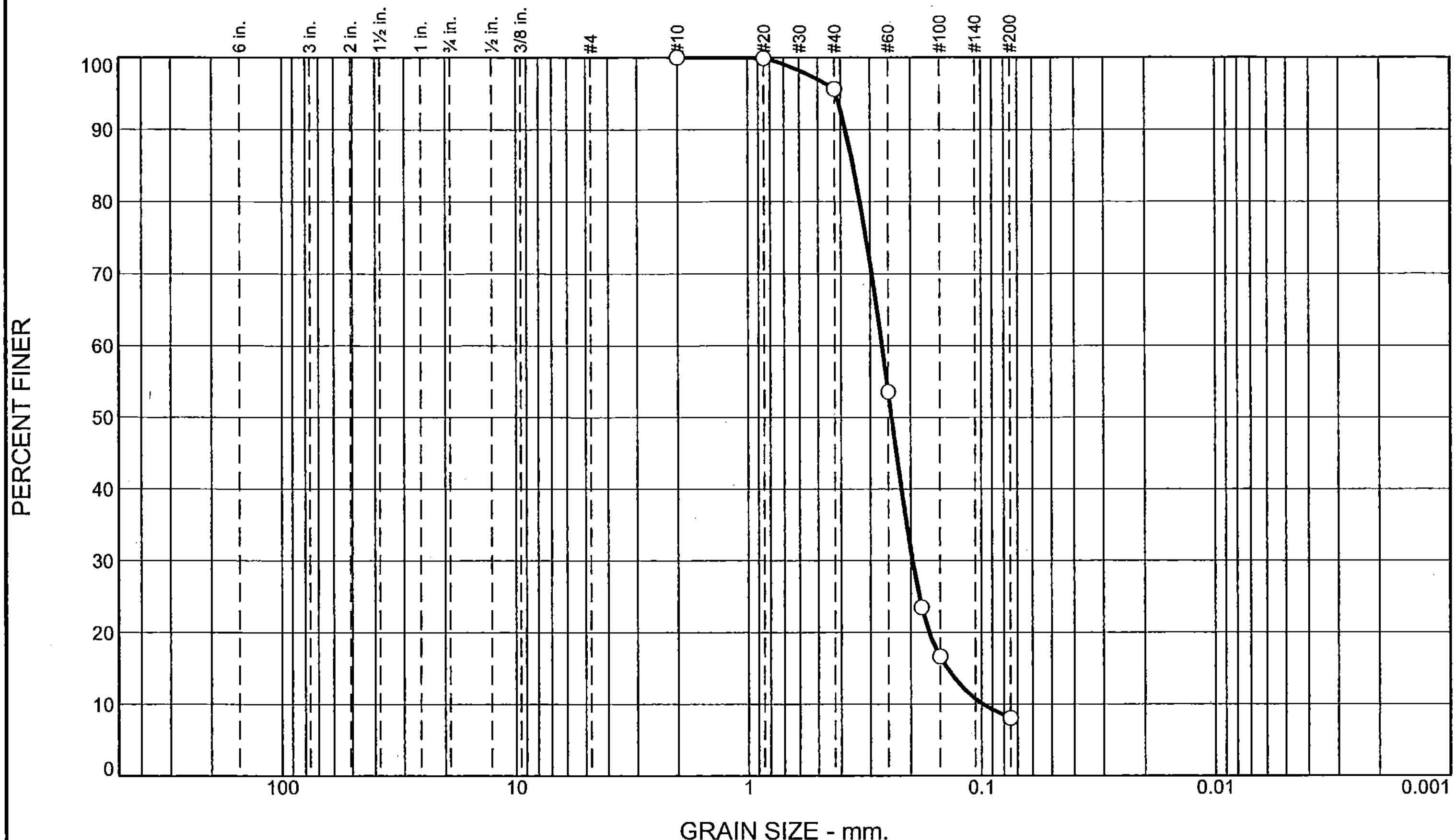
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.3	87.7	8.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	95.7		
#60	53.5		
#80	23.5		
#100	16.6		
#200	8.0		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3818 D_{85}= 0.3542 D_{60}= 0.2663
D_{50}= 0.2416 D_{30}= 0.1970 D_{15}= 0.1398
D_{10}= 0.0986 C_u= 2.70 C_c= 1.48

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-1 **Depth:** 3.5'-5'

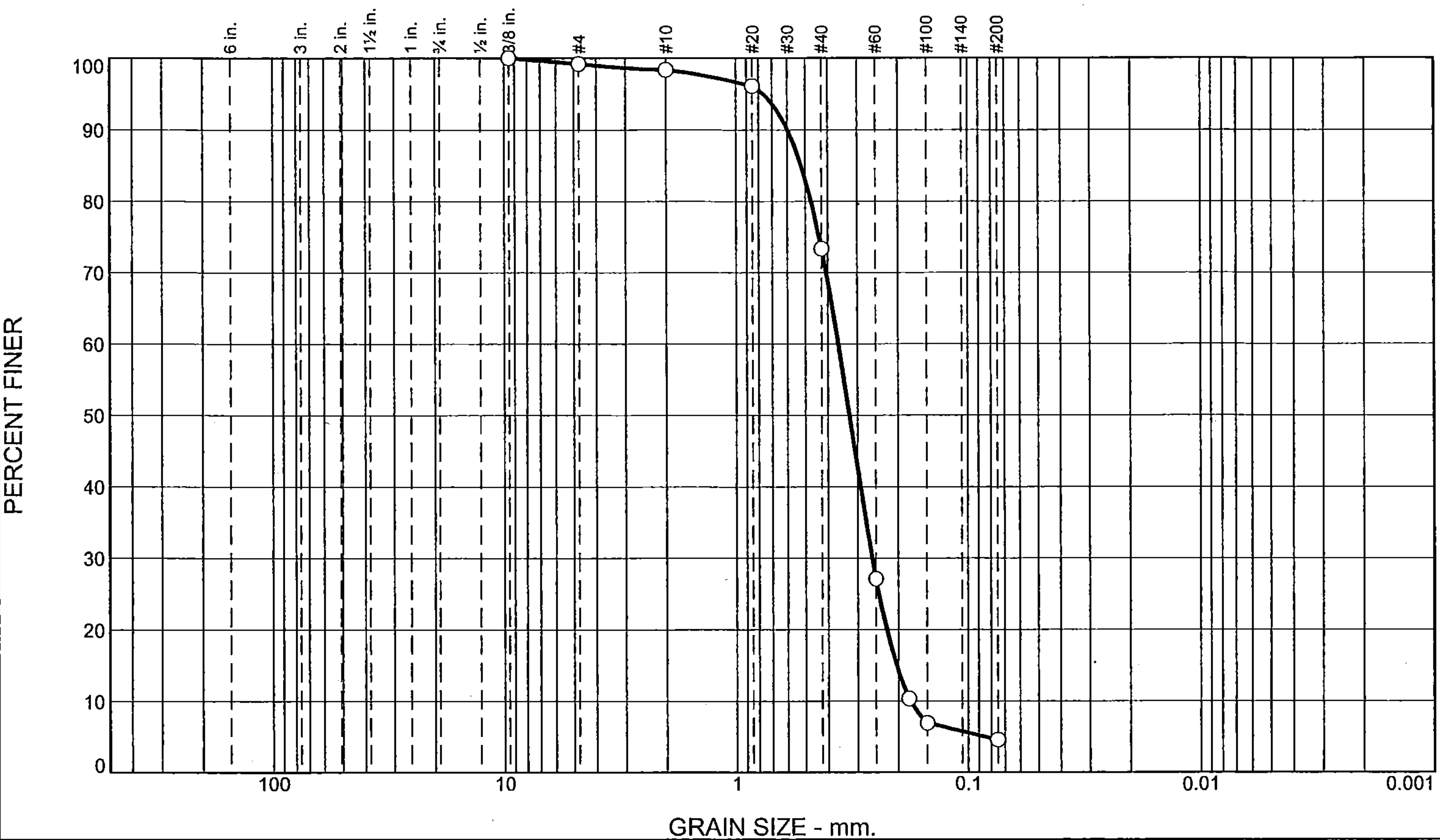
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.8	25.1	68.7	4.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.2		
#10	98.4		
#20	96.1		
#40	73.3		
#60	27.1		
#80	10.4		
#100	6.9		
#200	4.6		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5964 D_{85}= 0.5203 D_{60}= 0.3616
D_{50}= 0.3247 D_{30}= 0.2596 D_{15}= 0.2043
D_{10}= 0.1776 C_u= 2.04 C_c= 1.05

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-2 **Depth:** 8.5'-10'

Date: 10/24/2015

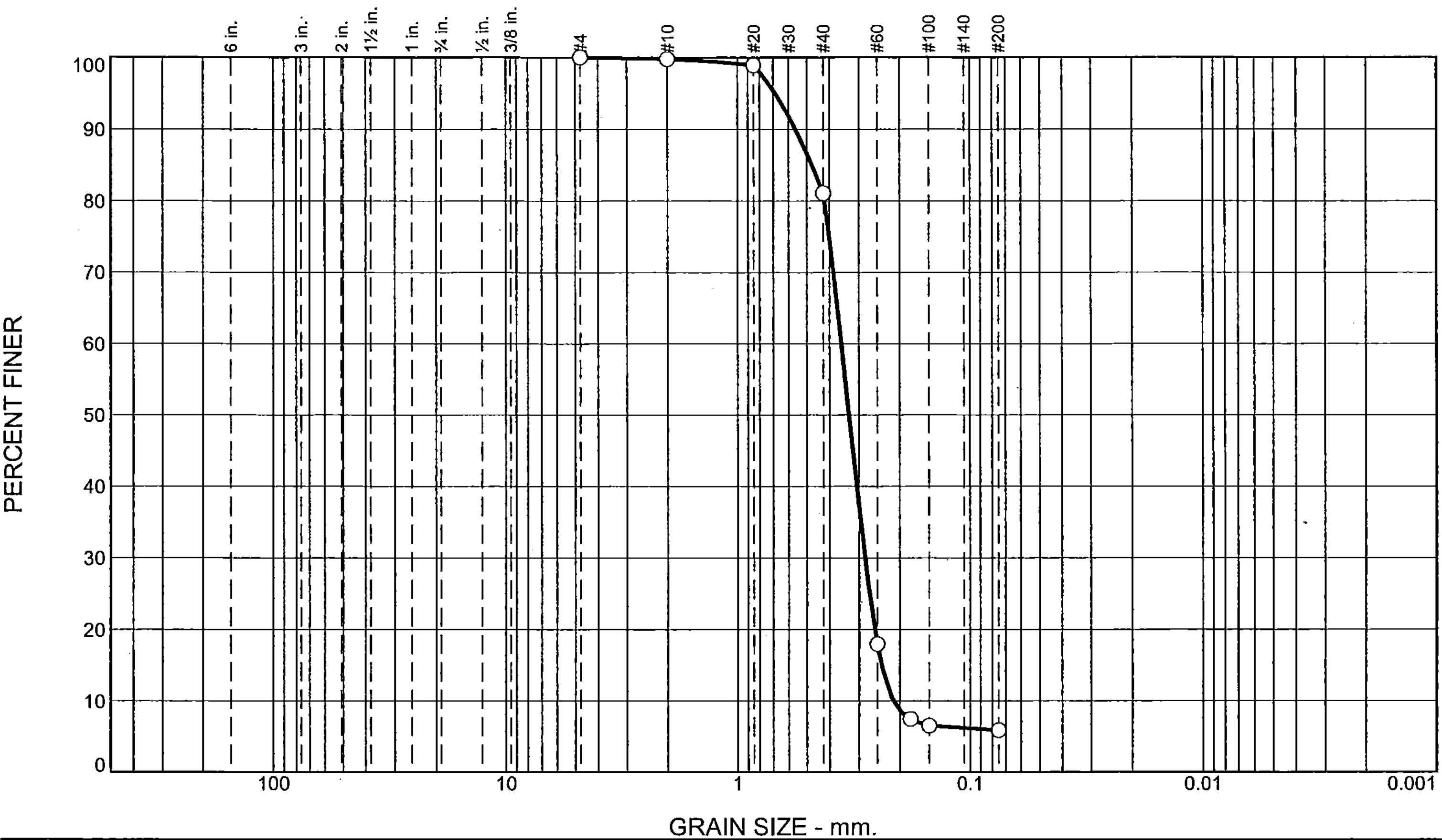
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	18.7	75.3	5.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	98.9		
#40	81.1		
#60	18.0		
#80	7.5		
#100	6.5		
#200	5.8		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5595 D_{85}= 0.4752 D_{60}= 0.3558
D_{50}= 0.3304 D_{30}= 0.2827 D_{15}= 0.2395
D_{10}= 0.2134 C_u= 1.67 C_c= 1.05

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-3 **Depth:** 13.5'-15'

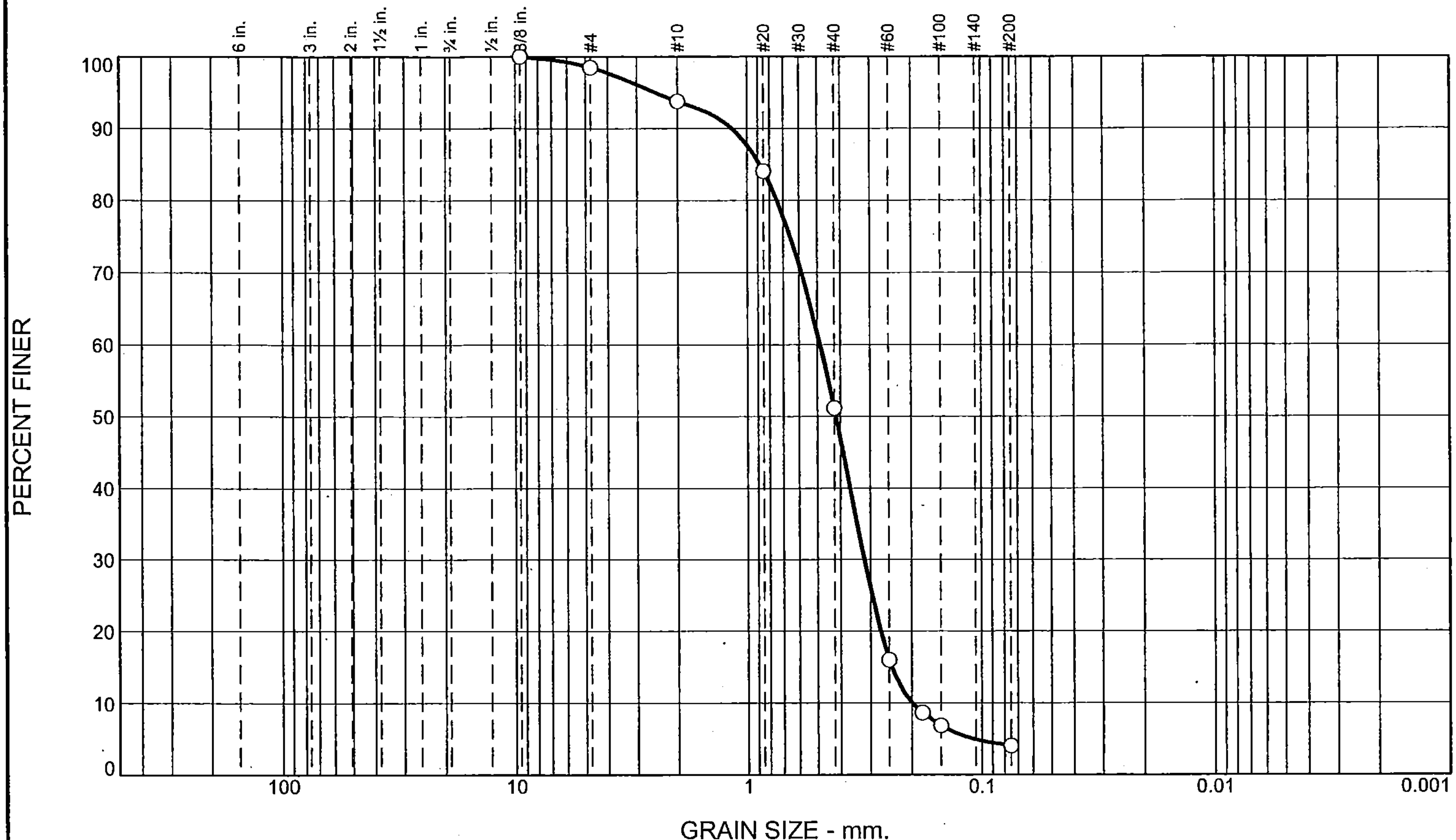
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	4.7	42.7	47.1	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.5		
#10	93.8		
#20	84.1		
#40	51.1		
#60	16.0		
#80	8.7		
#100	6.9		
#200	4.0		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1624 D_{85}= 0.8819 D_{60}= 0.4871
D_{50}= 0.4181 D_{30}= 0.3181 D_{15}= 0.2438
D_{10}= 0.1997 C_u= 2.44 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-4 **Depth:** 18.5'-20'

Date: 10/24/2015

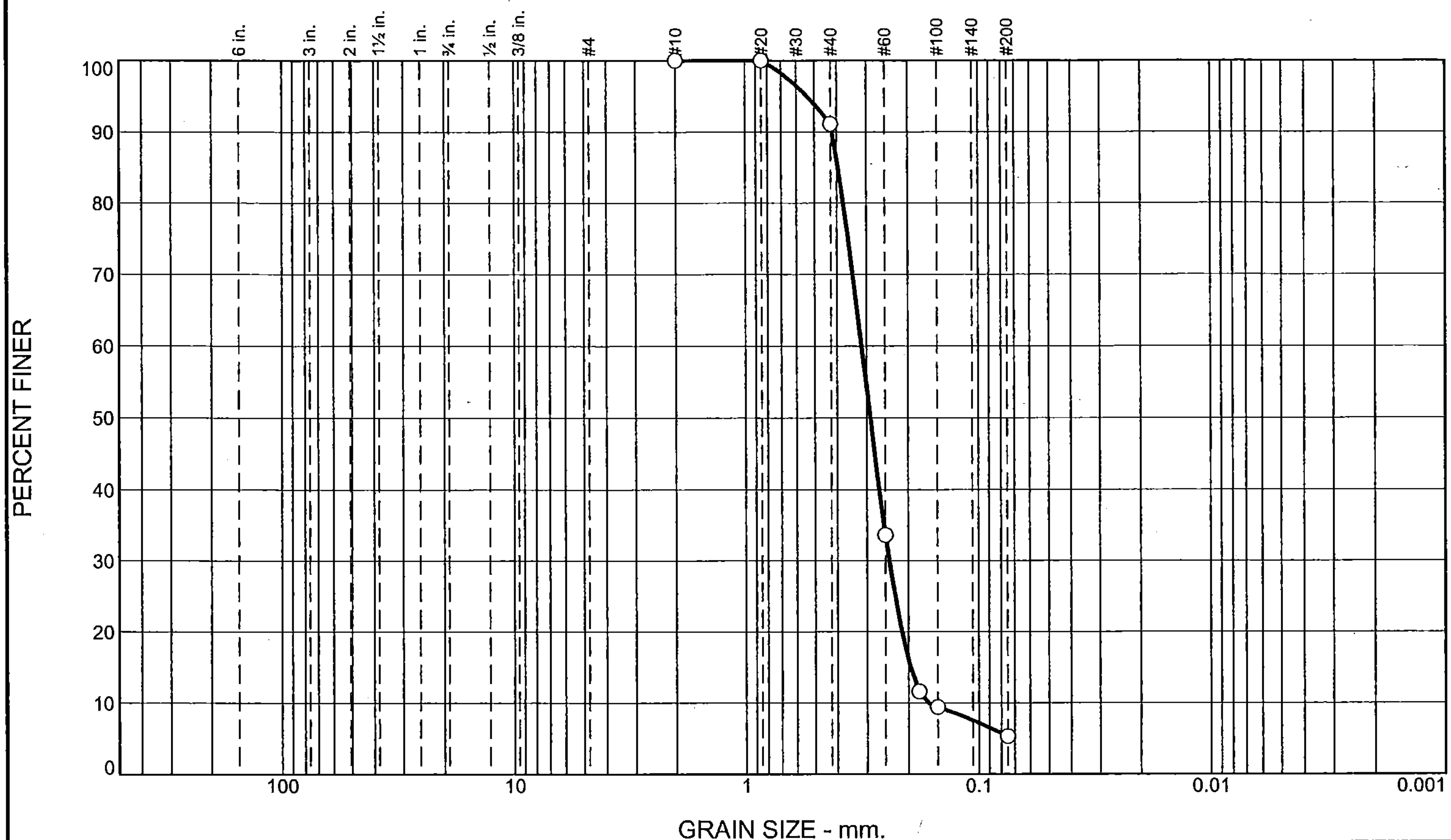
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.9	85.8	5.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	91.1		
#60	33.6		
#80	11.6		
#100	9.4		
#200	5.3		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4187 D_{85}= 0.3950 D_{60}= 0.3147
D_{50}= 0.2895 D_{30}= 0.2410 D_{15}= 0.1964
D_{10}= 0.1652 C_u= 1.91 C_c= 1.12

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-6 **Depth:** 28.5'-30'

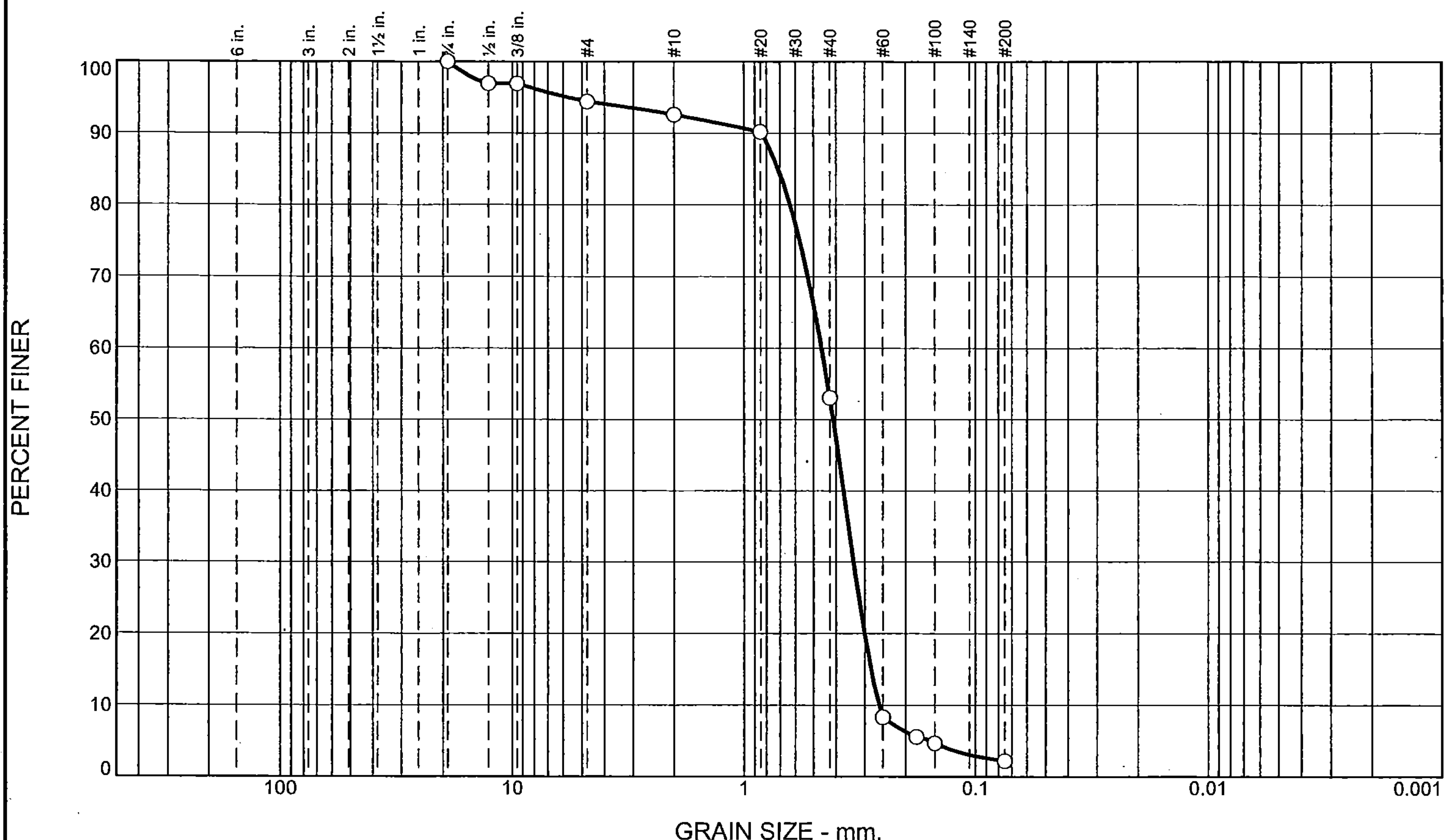
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.6	1.8	39.6	50.8	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.9		
.375	96.9		
#4	94.4		
#10	92.6		
#20	90.2		
#40	53.0		
#60	8.3		
#80	5.5		
#100	4.7		
#200	2.2		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8432 D_{85}= 0.7112 D_{60}= 0.4611
D_{50}= 0.4114 D_{30}= 0.3356 D_{15}= 0.2818
D_{10}= 0.2597 C_u= 1.78 C_c= 0.94

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-5T SPT-8 **Depth:** 38.5'-40'

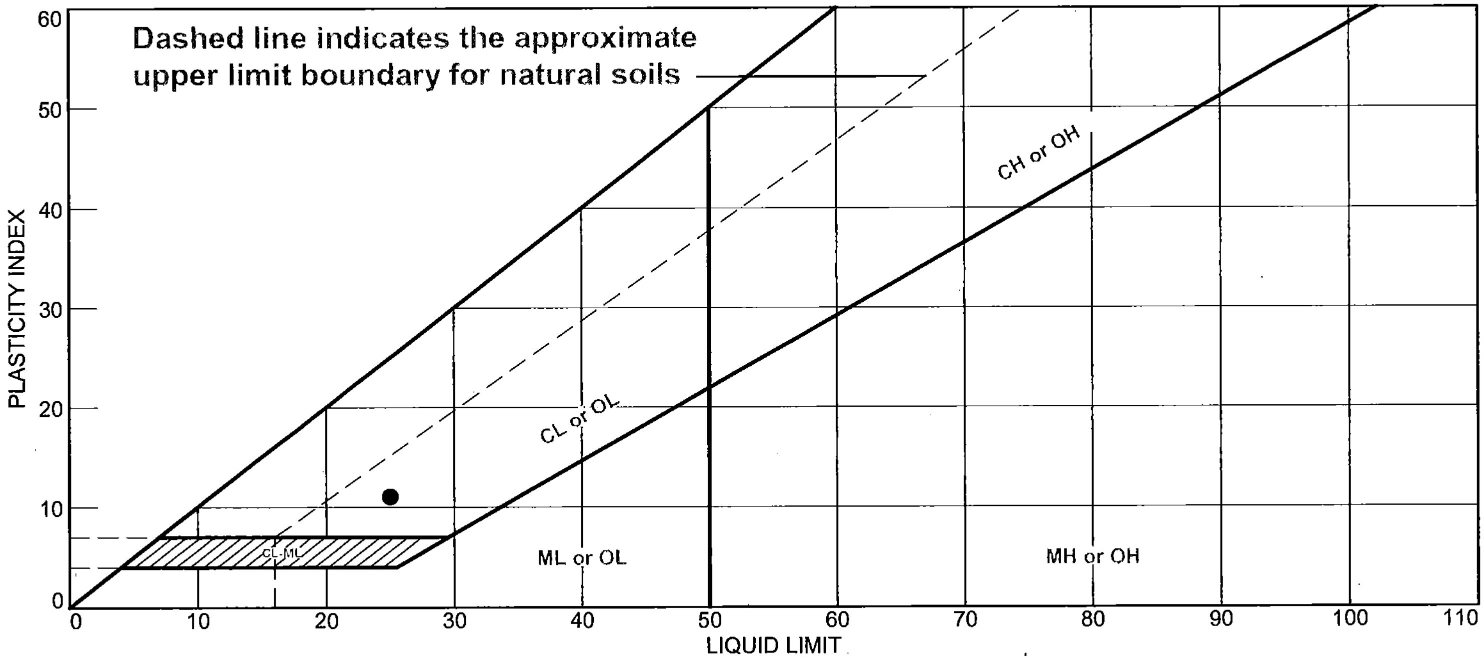
Date: 10/24/2015

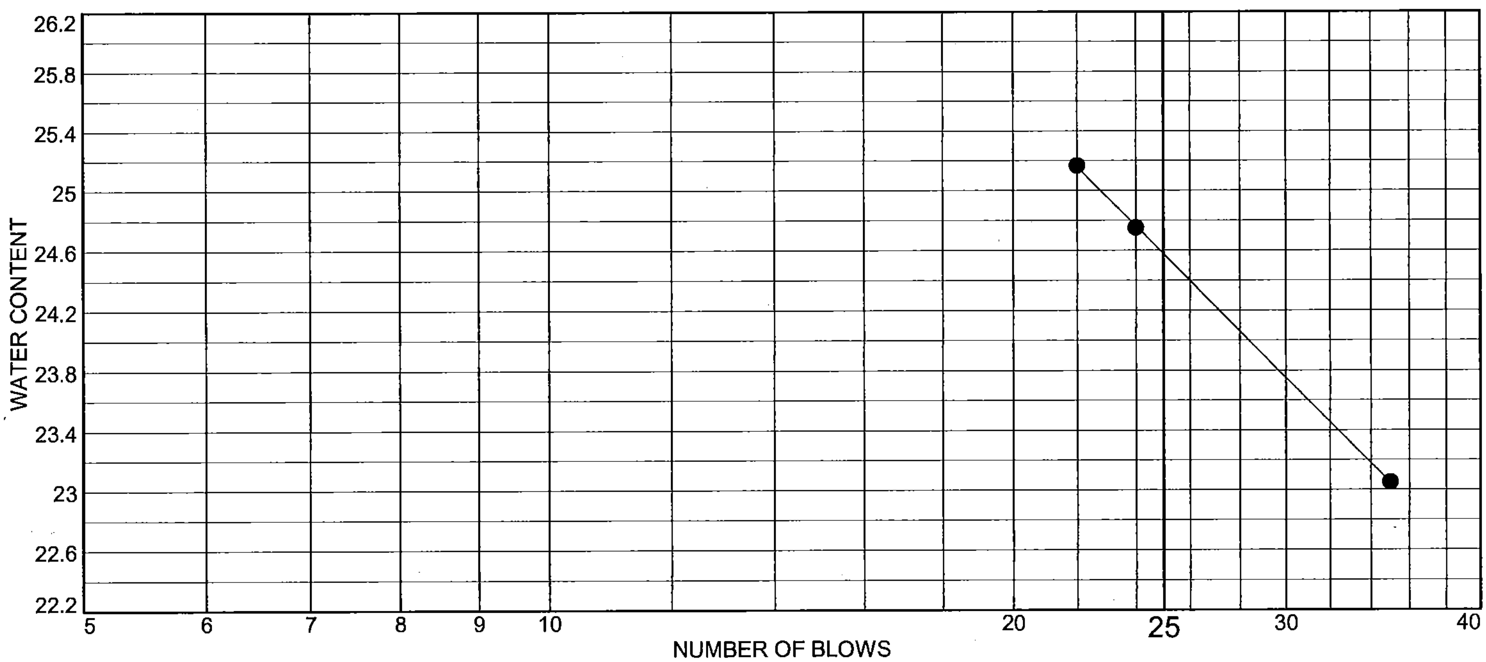
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown, mottled gray clayey sand	25	14	11	88.8	43.1	SC

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

Sample Number: EP-6C ST-1 **Depth:** 3.5'-5'

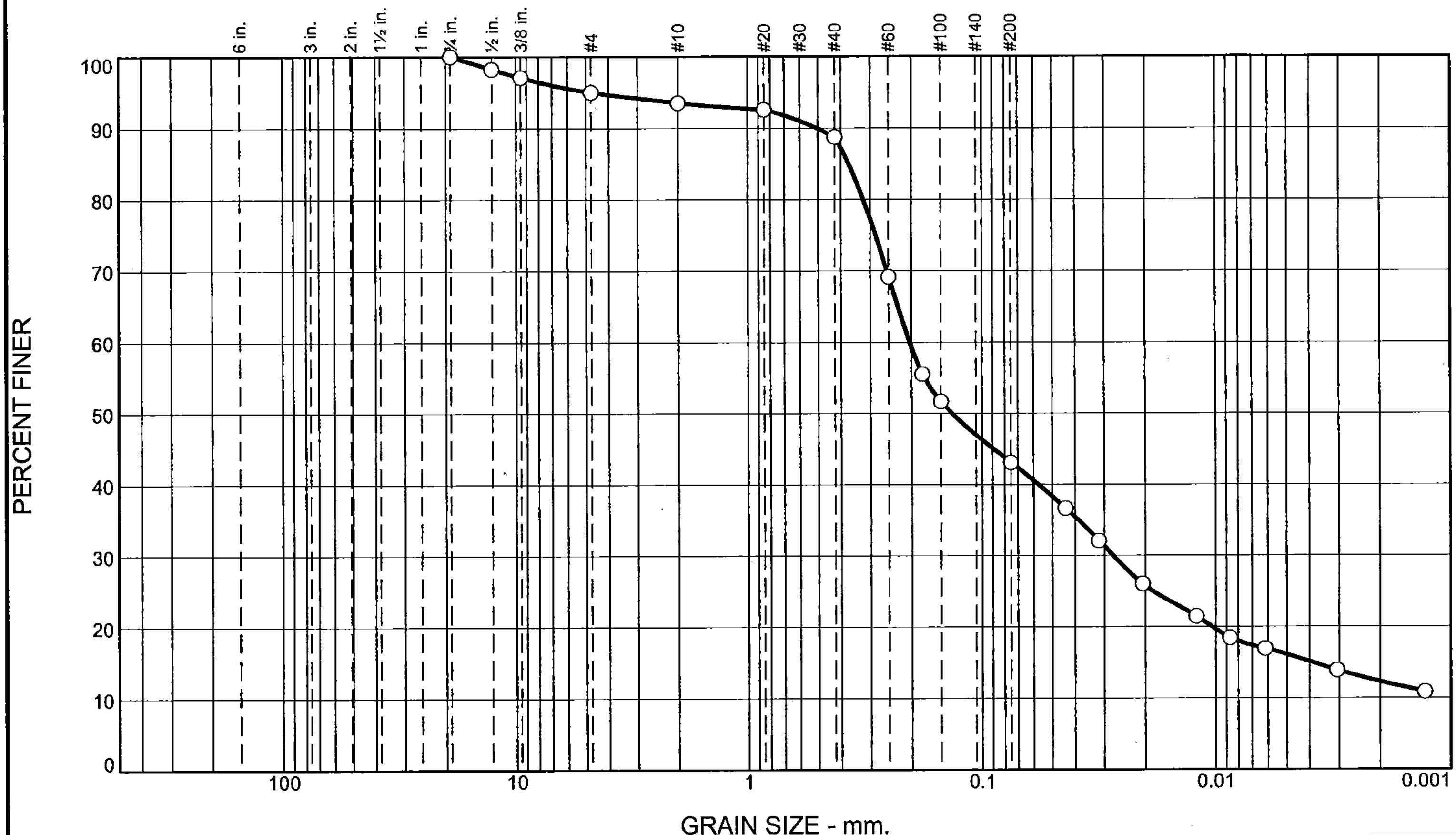
Remarks:

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	1.5	4.7	45.7	27.0	16.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.3		
.375	97.1		
#4	95.0		
#10	93.5		
#20	92.6		
#40	88.8		
#60	69.1		
#80	55.5		
#100	51.7		
#200	43.1		

* (no specification provided)

Material Description

Dark brown, mottled gray clayey sand

Atterberg Limits

PL= 14 LL= 25 PI= 11

Coefficients

D_{90}= 0.5076 D_{85}= 0.3699 D_{60}= 0.2043
D_{50}= 0.1346 D_{30}= 0.0275 D_{15}= 0.0039
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(1)

Remarks

Sample Number: EP-6C ST-1 **Depth:** 3.5'-5'

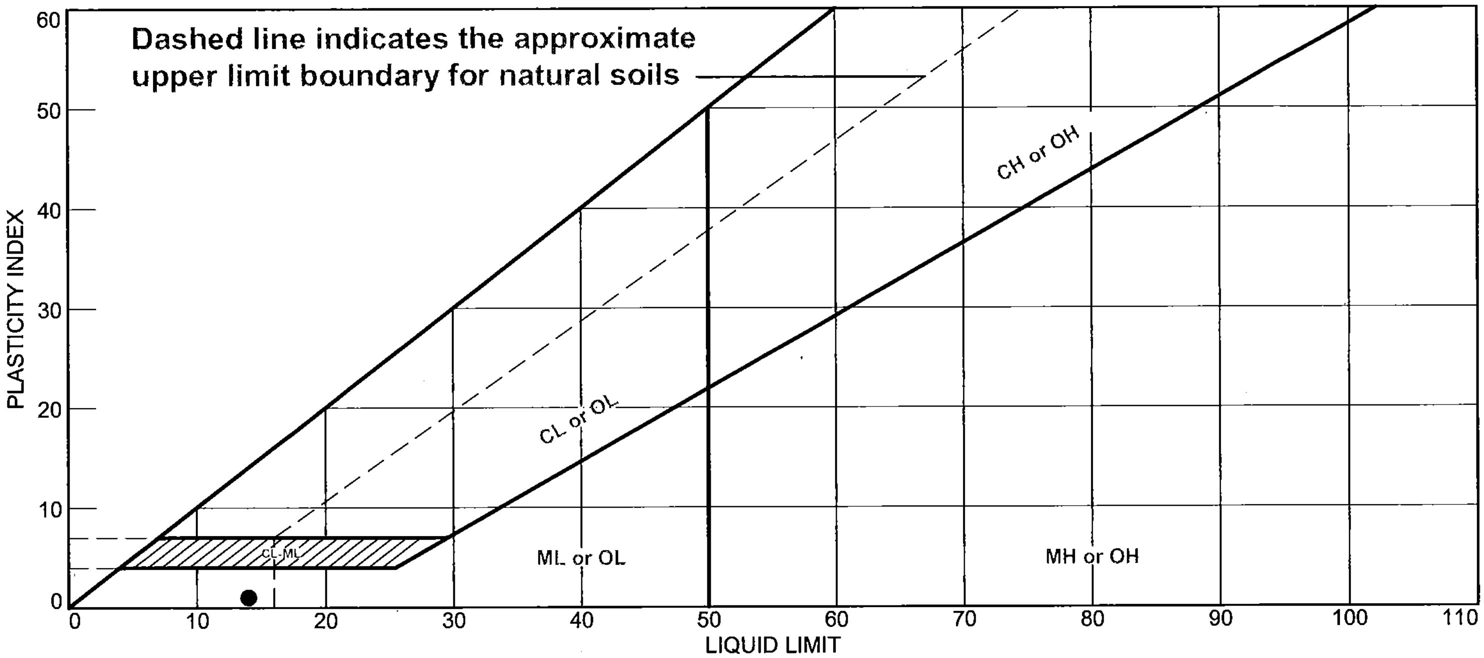
Date: 10/15/2015

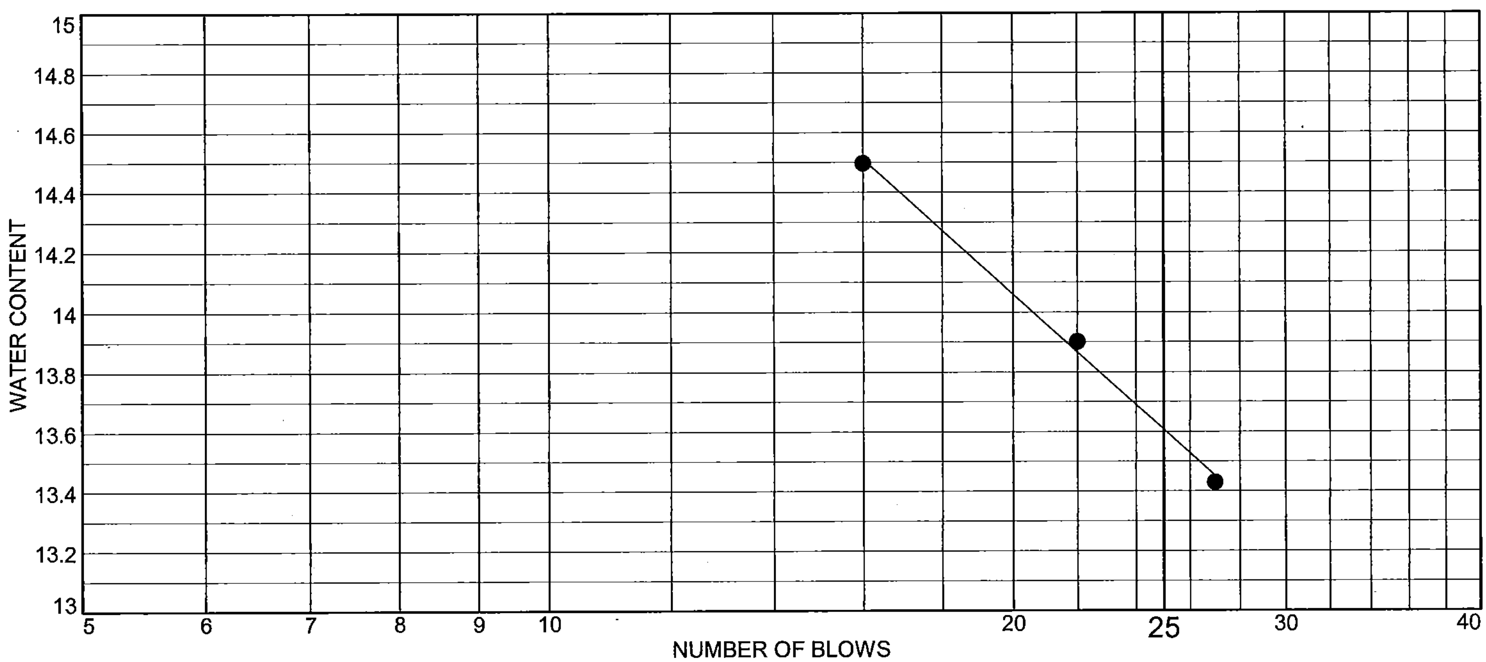
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown silty sand	14	13	1	90.5	36.3	SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

Sample Number: EP-6C SPT-1 **Depth:** 8.5'-10'

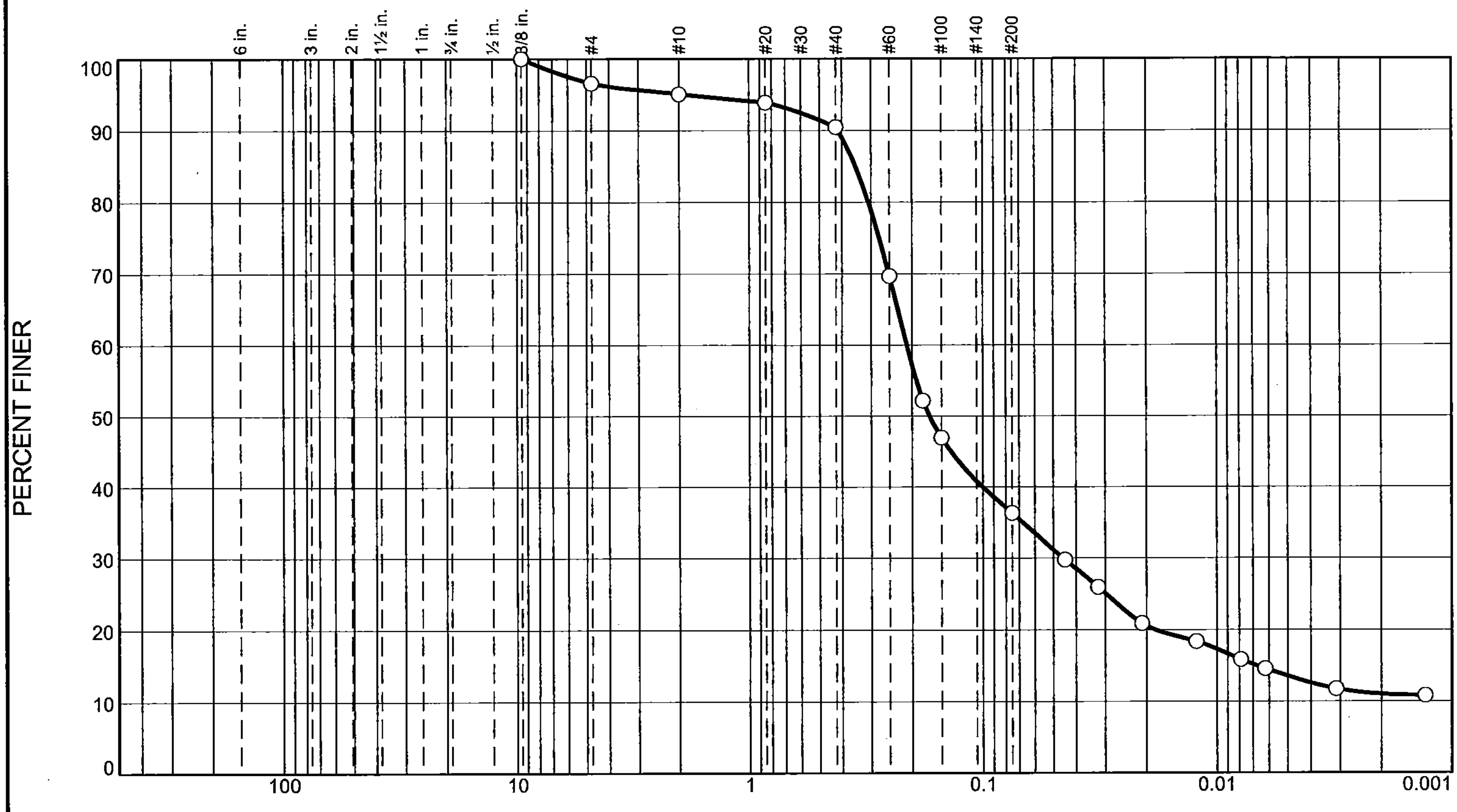
ALPHA-OMEGA GEOTECH

Remarks:

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	1.5	4.6	54.2	22.8	13.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	96.6		
#10	95.1		
#20	93.9		
#40	90.5		
#60	69.6		
#80	52.1		
#100	46.9		
#200	36.3		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= 13 LL= 14 PI= 1

Coefficients

D_{90}= 0.4159 D_{85}= 0.3498 D_{60}= 0.2113
D_{50}= 0.1693 D_{30}= 0.0455 D_{15}= 0.0067
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Sample Number: EP-6C SPT-1 **Depth:** 8.5'-10'

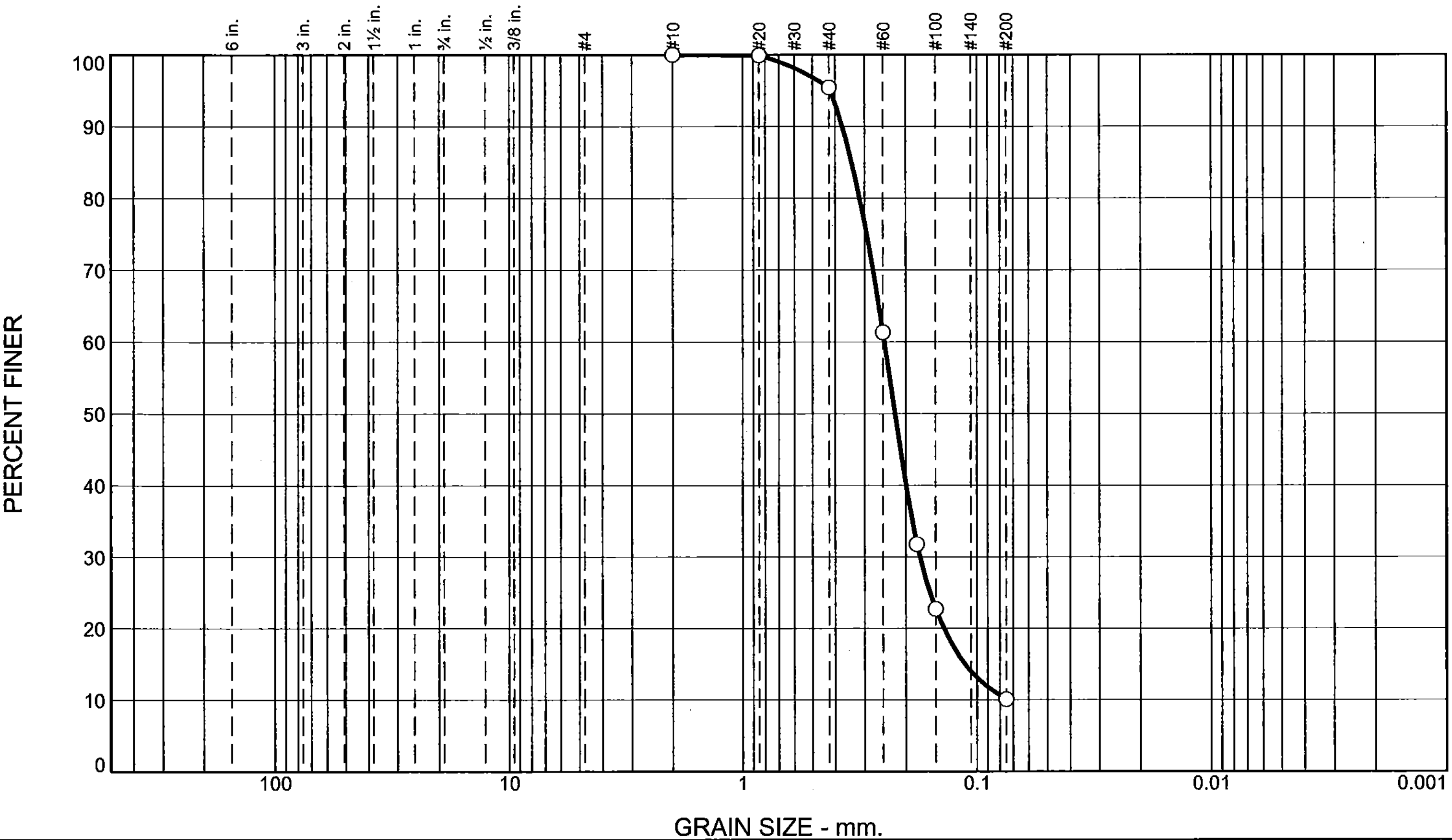
Date: 10/25/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.5	85.5	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	95.5		
#60	61.3		
#80	31.8		
#100	22.7		
#200	10.0		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3726 D_{85}= 0.3401 D_{60}= 0.2465
D_{50}= 0.2223 D_{30}= 0.1751 D_{15}= 0.1127
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-6C ST-2 **Depth:** 13.5'-15'

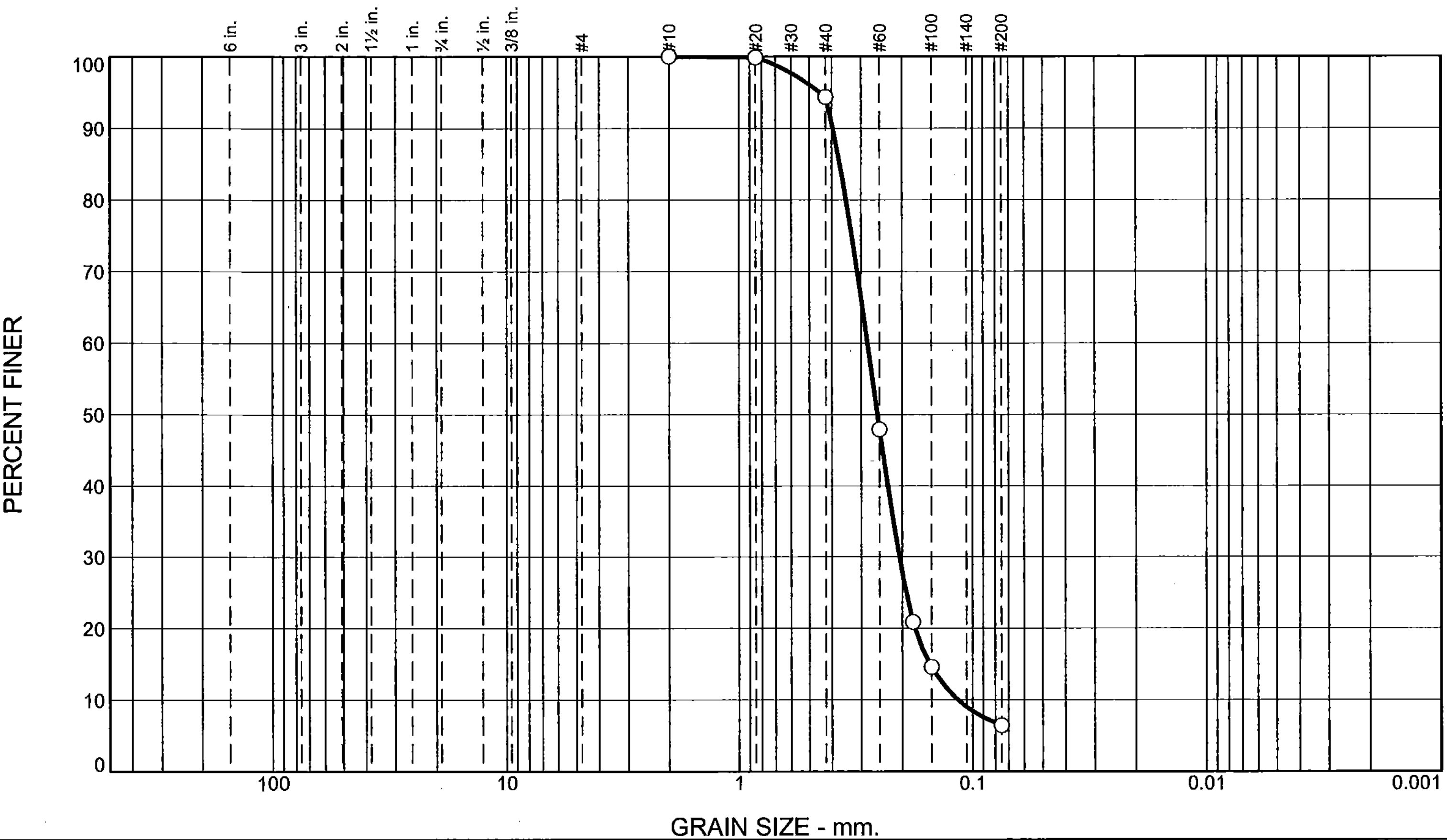
Date: 10/18/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.6	88.0	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	94.4		
#60	47.9		
#80	20.9		
#100	14.6		
#200	6.4		

* (no specification provided)

Material Description

Brown and dark brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3954 D_{85}= 0.3692 D_{60}= 0.2818
D_{50}= 0.2553 D_{30}= 0.2061 D_{15}= 0.1526
D_{10}= 0.1160 C_u= 2.43 C_c= 1.30

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-6C ST-3 **Depth:** 23.5'-24.25'

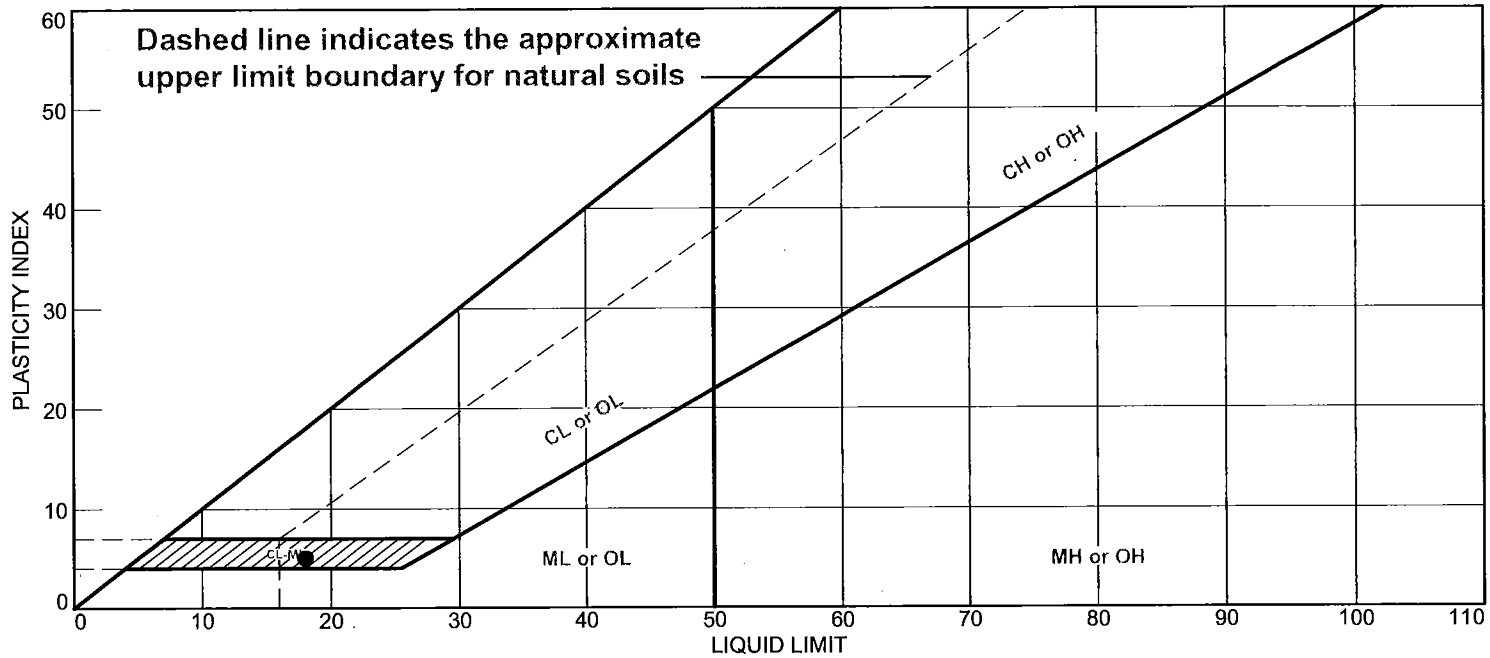
Date: 10/22/2015

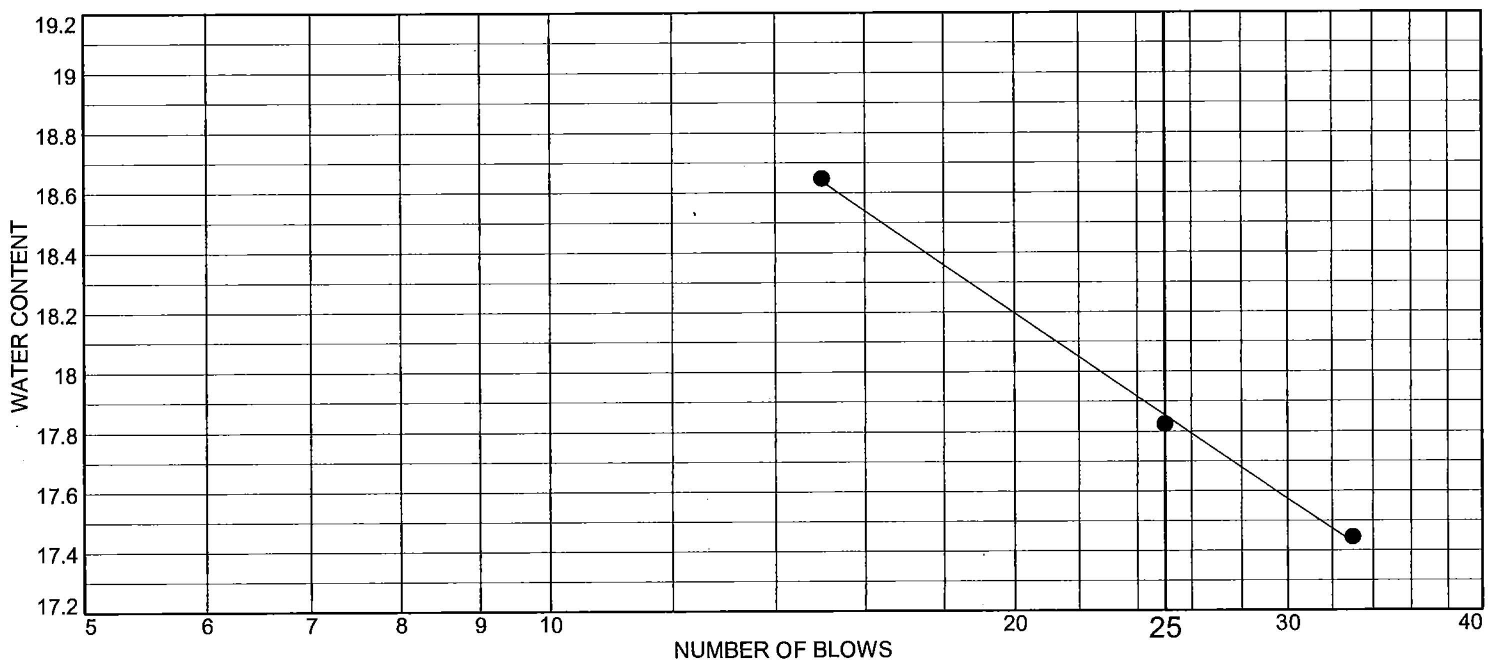
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown silty, clayey sand	18	13	5	97.6	37.7	SC-SM

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

Sample Number: EP-6C SPT-3 **Depth:** 28.5'-30'

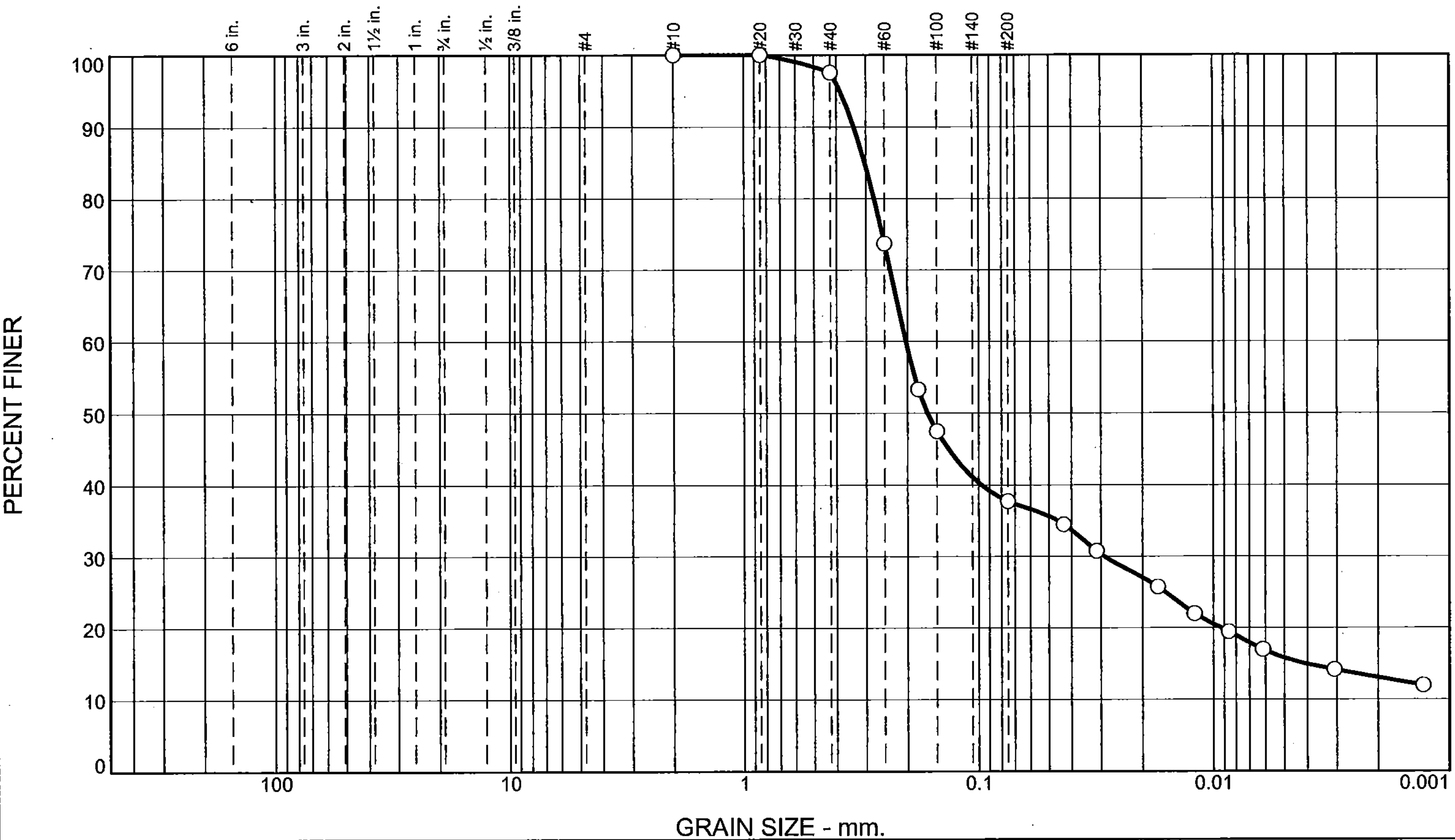
ALPHA-OMEGA GEOTECH

Remarks:

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.4	59.9	21.9	15.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	97.6		
#60	73.7		
#80	53.3		
#100	47.5		
#200	37.7		

* (no specification provided)

Material Description

Dark brown silty, clayey sand

Atterberg Limits

PL= 13 LL= 18 PI= 5

Coefficients

D_{90}= 0.3377 D_{85}= 0.3036 D_{60}= 0.2036
D_{50}= 0.1648 D_{30}= 0.0291 D_{15}= 0.0041
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Sample Number: EP-6C SPT-3 **Depth:** 28.5'-30'

Date: 10/25/2015

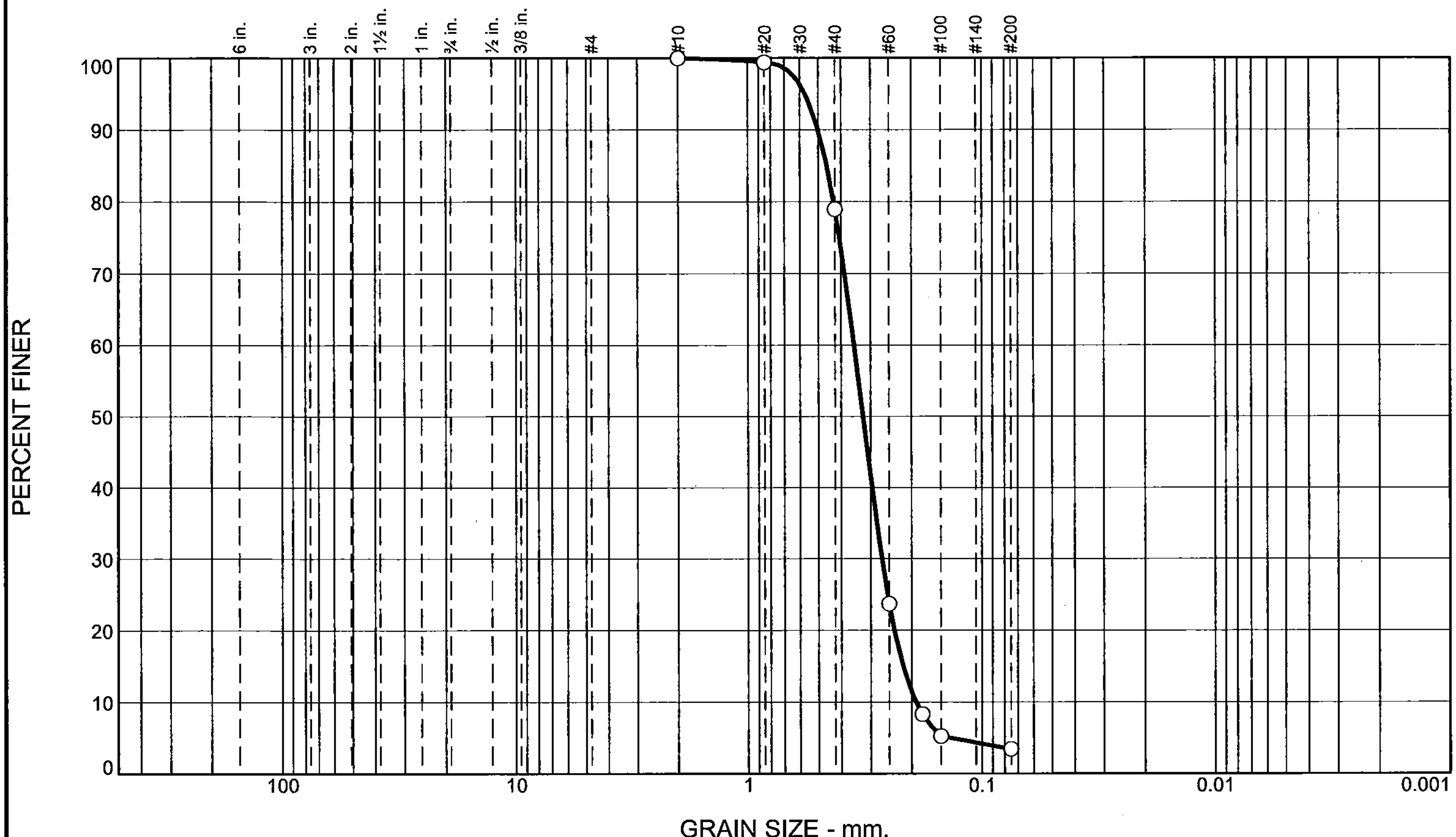
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				21.1	75.5	3.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.4		
#40	78.9		
#60	23.7		
#80	8.3		
#100	5.2		
#200	3.4		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5019 D_{85}= 0.4605 D_{60}= 0.3527
D_{50}= 0.3232 D_{30}= 0.2686 D_{15}= 0.2182
D_{10}= 0.1921 C_u= 1.84 C_c= 1.07

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-6C ST-4 **Depth:** 33.5'-35'

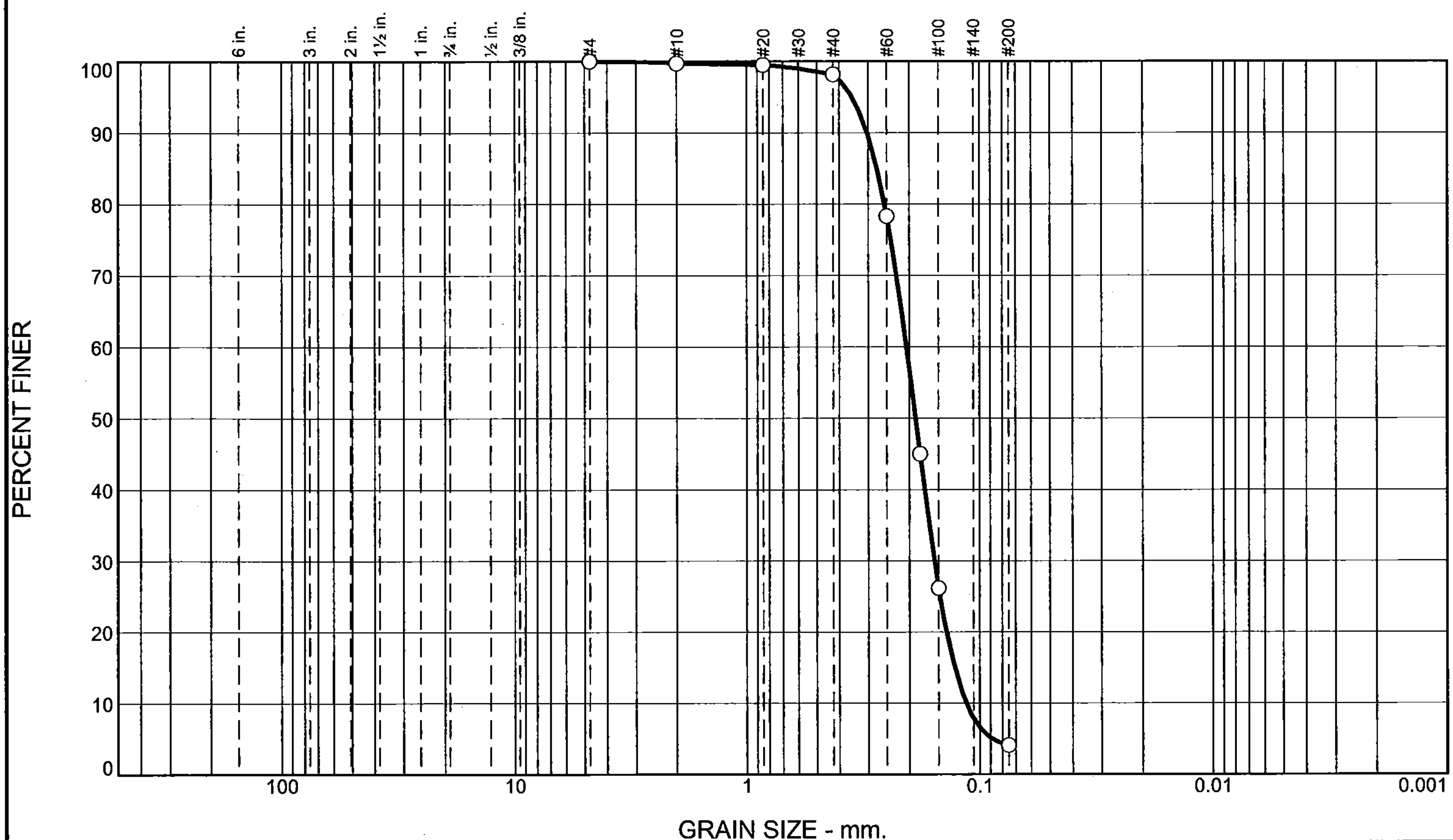
Date: 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.5	94.1	4.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.5		
#40	98.2		
#60	78.3		
#80	45.0		
#100	26.2		
#200	4.1		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3036 D_{85}= 0.2754 D_{60}= 0.2062
D_{50}= 0.1882 D_{30}= 0.1563 D_{15}= 0.1279
D_{10}= 0.1142 C_u= 1.81 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-6C SPT-4 **Depth:** 38.5'-40'

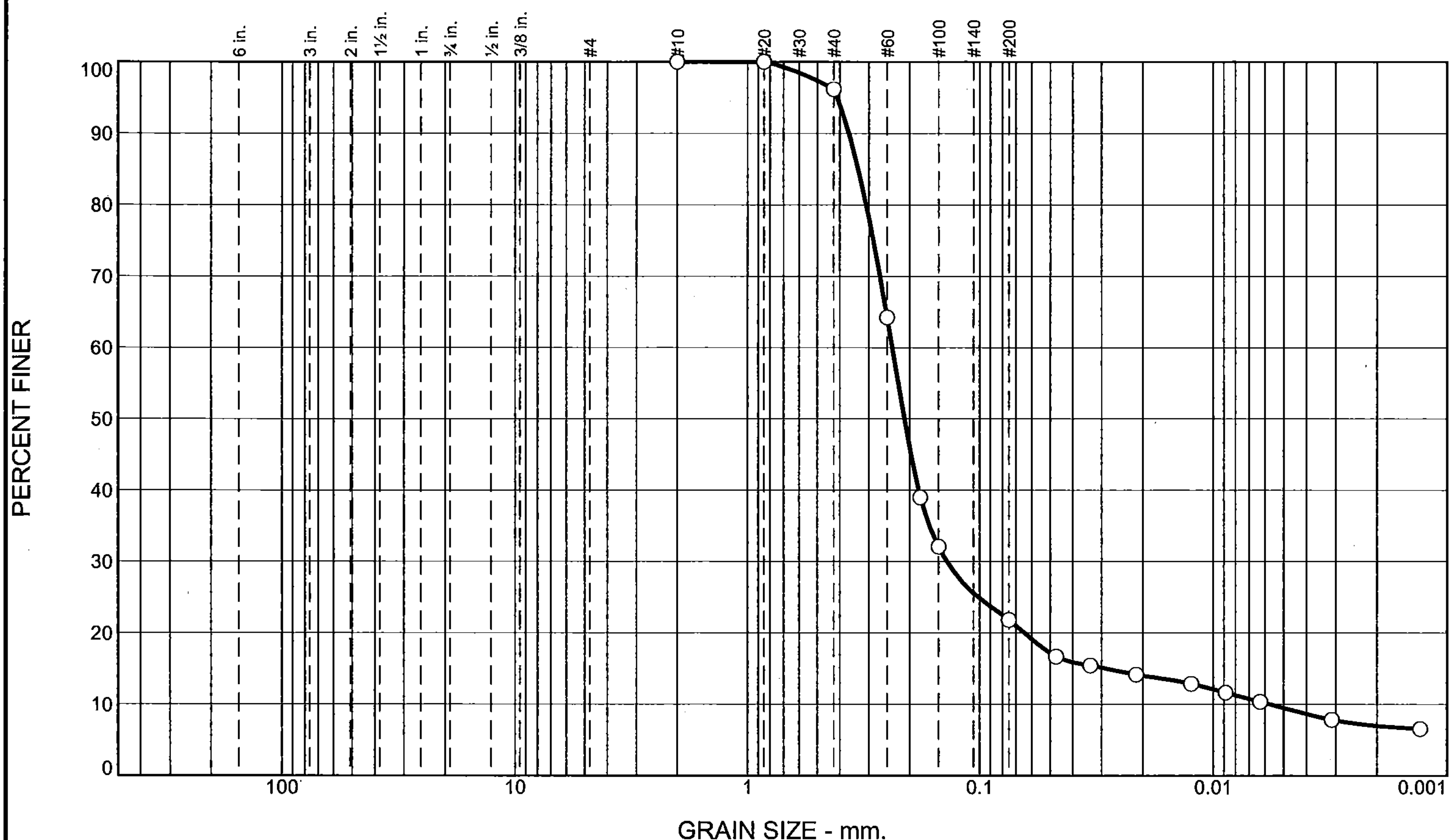
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.8	74.4	12.3	9.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	96.2		
#60	64.2		
#80	39.0		
#100	32.1		
#200	21.8		

* (no specification provided)

Material Description

Brown, mottled dark brown and gray silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3661 D_{85}= 0.3340 D_{60}= 0.2377
D_{50}= 0.2110 D_{30}= 0.1380 D_{15}= 0.0287
D_{10}= 0.0057 C_u= 41.52 C_c= 14.00

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C ST-1 **Depth:** 6'-7.5'

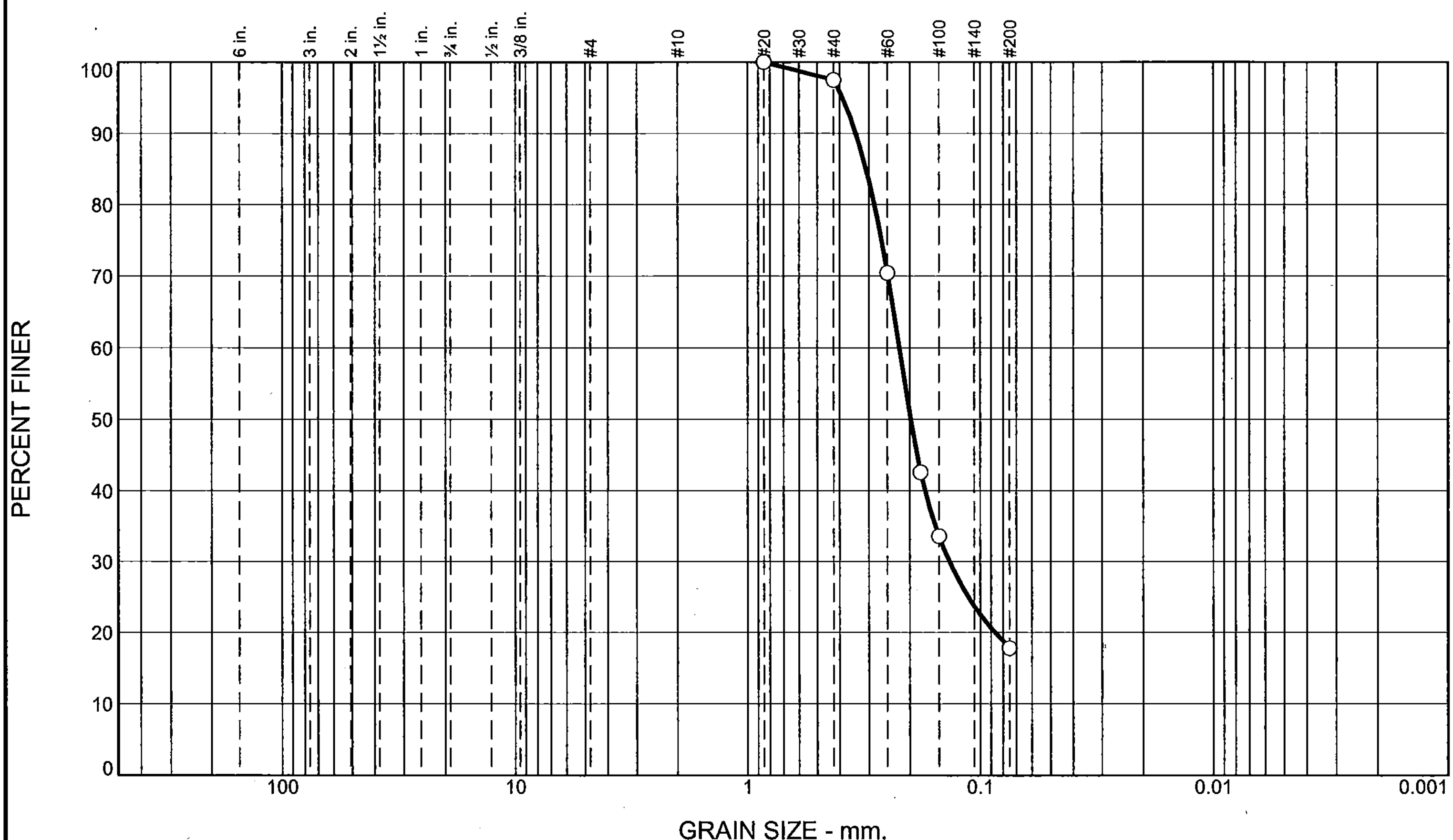
Date: 10/28/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.5	79.7	17.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	100.0		
#40	97.5		
#60	70.4		
#80	42.6		
#100	33.6		
#200	17.8		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3407 D_{85}= 0.3086 D_{60}= 0.2222
D_{50}= 0.1985 D_{30}= 0.1354 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C SPT-1 **Depth:** 11'-12.5'

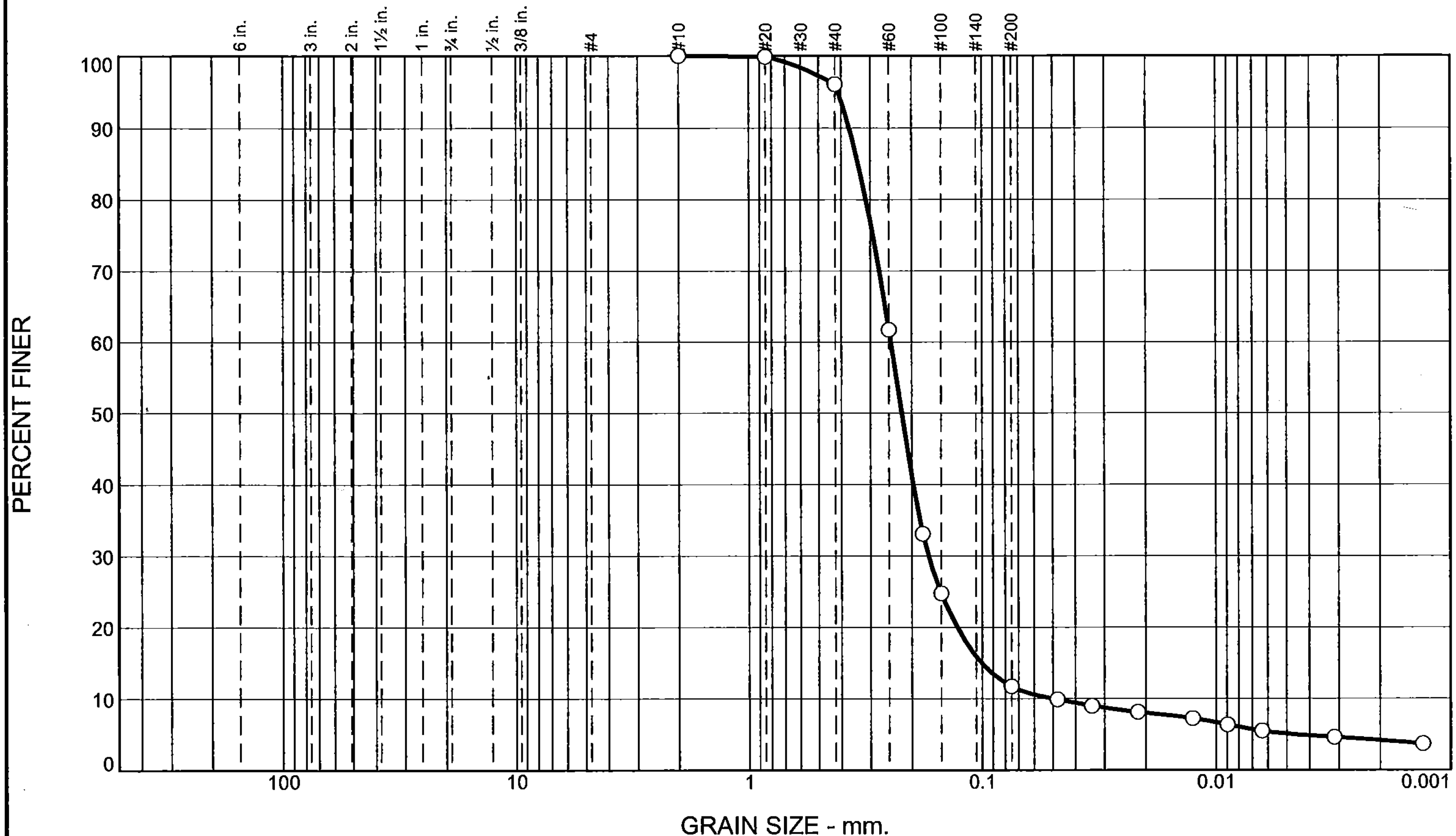
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.9	84.4	6.7	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	96.1		
#60	61.7		
#80	33.1		
#100	24.8		
#200	11.7		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3688 D_{85}= 0.3377 D_{60}= 0.2454
D_{50}= 0.2209 D_{30}= 0.1704 D_{15}= 0.1005
D_{10}= 0.0501 C_u= 4.90 C_c= 2.36

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C ST-2 **Depth:** 16'-17.5'

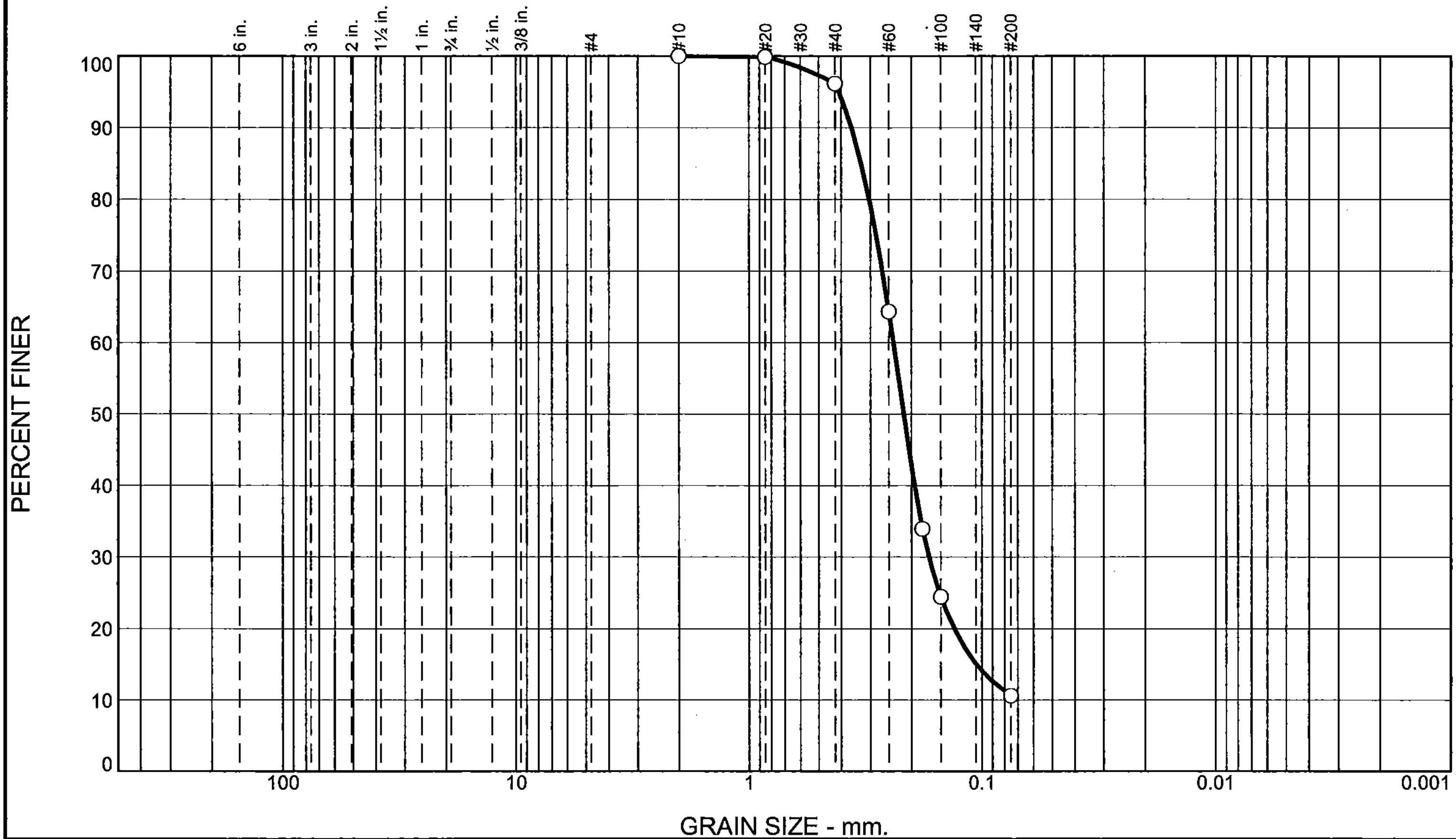
Date: 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.8	85.6	10.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	96.2		
#60	64.3		
#80	33.9		
#100	24.5		
#200	10.6		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3615 D_{85}= 0.3289 D_{60}= 0.2390
D_{50}= 0.2161 D_{30}= 0.1692 D_{15}= 0.1054
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C SPT-2 **Depth:** 21'-22.5'

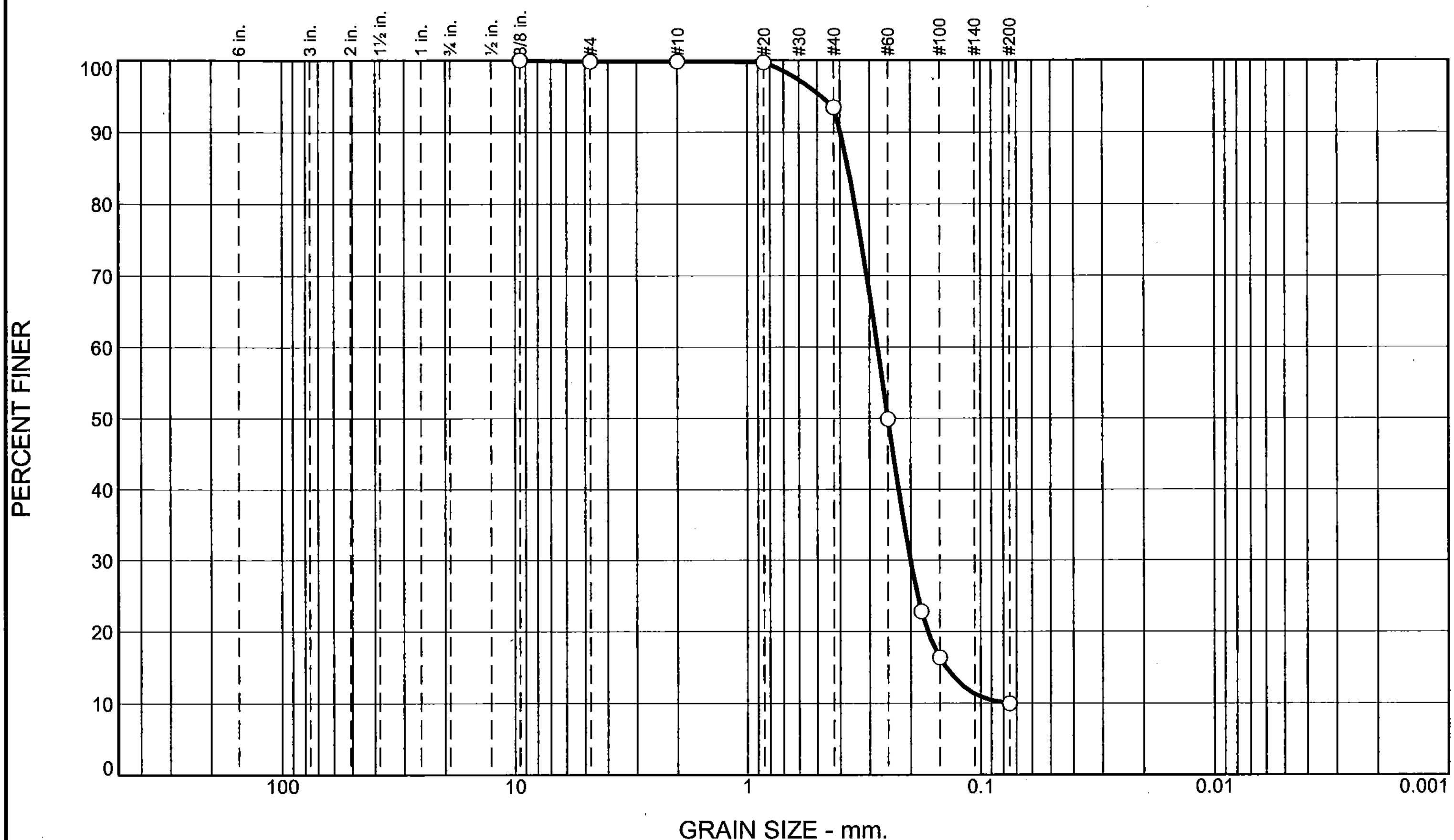
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	6.4	83.5	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#20	99.7		
#40	93.5		
#60	49.9		
#80	22.8		
#100	16.4		
#200	10.0		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3992 D_{85}= 0.3702 D_{60}= 0.2774
D_{50}= 0.2504 D_{30}= 0.2008 D_{15}= 0.1408
D_{10}= 0.0764 C_u= 3.63 C_c= 1.90

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C SPT-4 **Depth:** 31'-32.5'

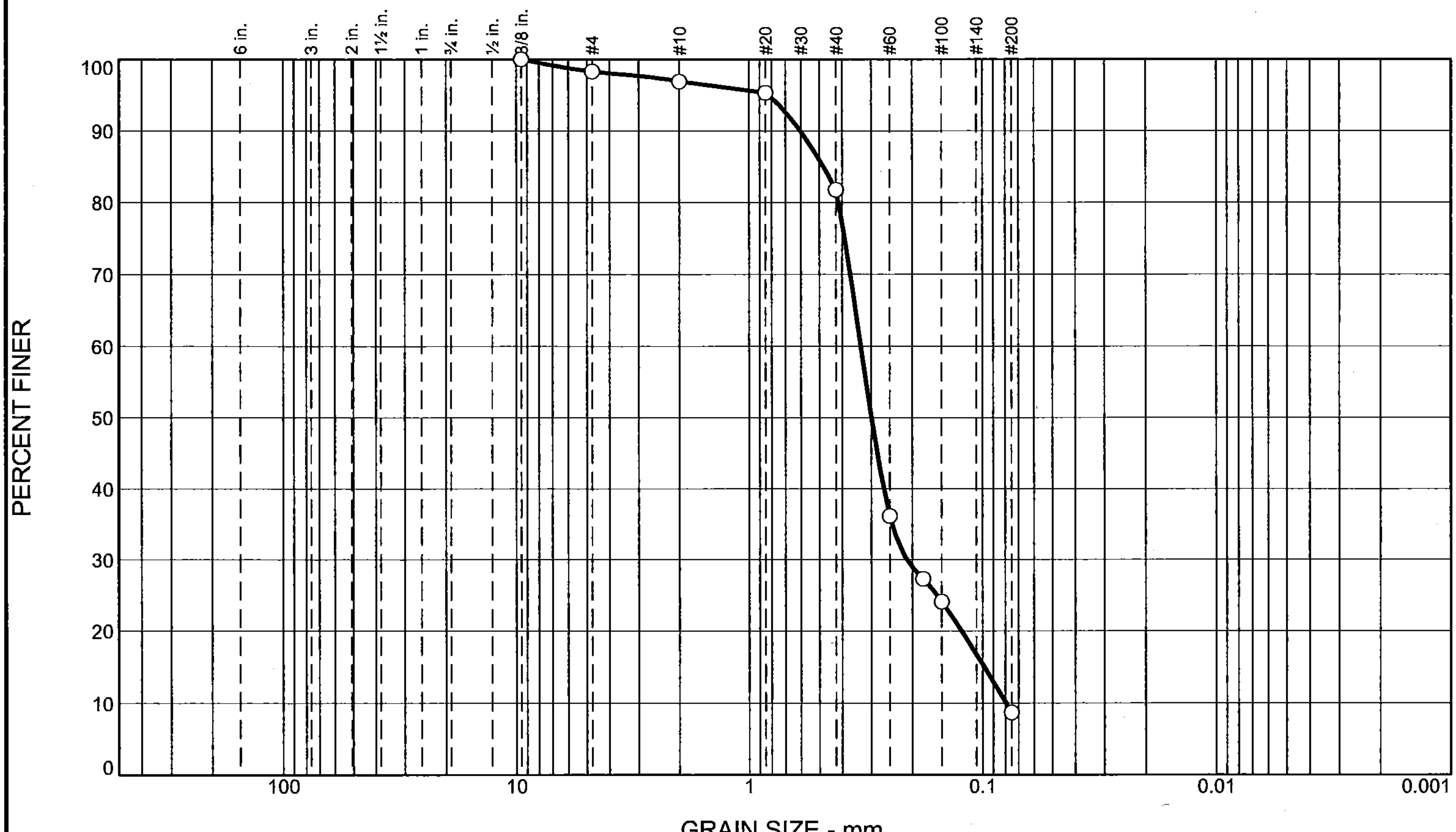
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	1.4	15.1	73.1	8.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.3		
#10	96.9		
#20	95.3		
#40	81.8		
#60	36.1		
#80	27.3		
#100	24.1		
#200	8.7		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6036 D_{85}= 0.4812 D_{60}= 0.3327
D_{50}= 0.2997 D_{30}= 0.2118 D_{15}= 0.0983
D_{10}= 0.0793 C_u= 4.19 C_c= 1.70

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-7C SPT-6 **Depth:** 41'-42.5'

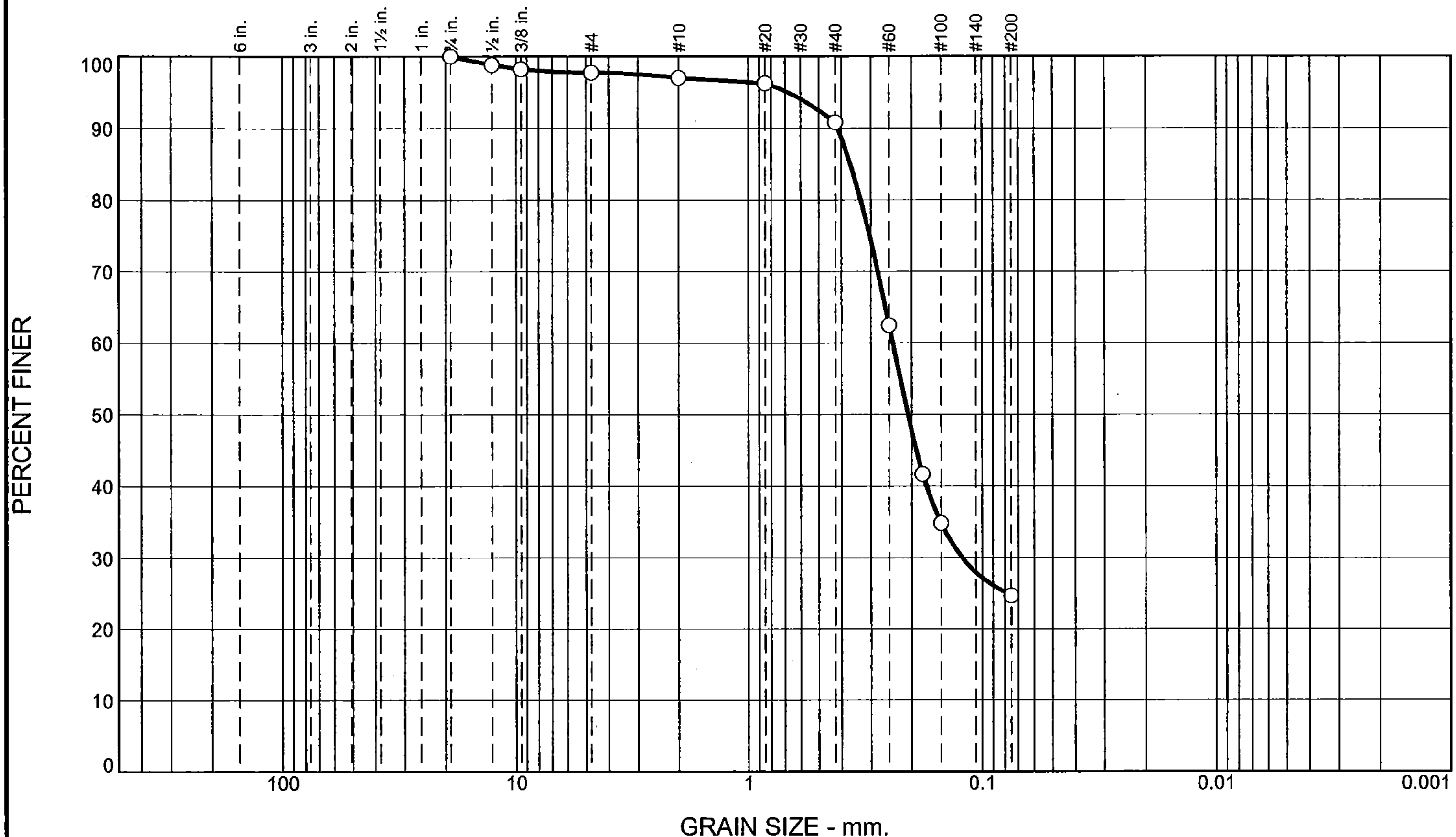
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	0.7	6.2	66.1	24.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.8		
.375	98.2		
#4	97.7		
#10	97.0		
#20	96.3		
#40	90.8		
#60	62.5		
#80	41.6		
#100	34.8		
#200	24.7		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4146 D_{85}= 0.3662 D_{60}= 0.2412
D_{50}= 0.2081 D_{30}= 0.1219 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

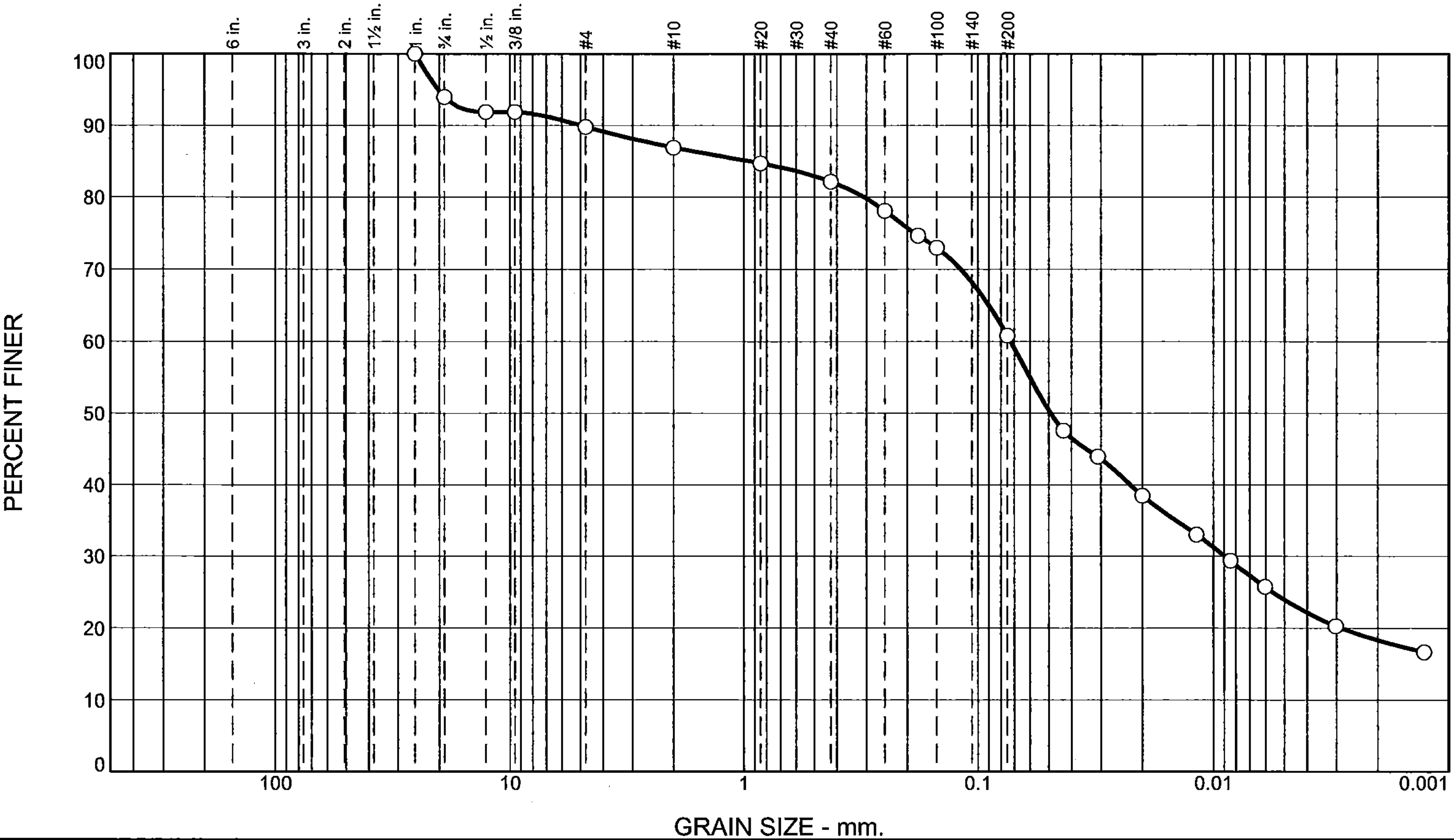
Location: Upper Portion
Sample Number: EP-8C ST-1 **Depth:** 3.5'-5' **Date:** 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.0	4.2	2.9	4.8	21.3	36.9	23.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	94.0		
.5	91.9		
.375	91.9		
#4	89.8		
#10	86.9		
#20	84.7		
#40	82.1		
#60	78.1		
#80	74.6		
#100	72.9		
#200	60.8		

* (no specification provided)

Material Description

Dark gray sandy LEAN CLAY

Atterberg Limits

PL= 15 LL= 30 PI= 15

Coefficients

D_{90}= 4.9822 D_{85}= 0.9507 D_{60}= 0.0726
D_{50}= 0.0491 D_{30}= 0.0089 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

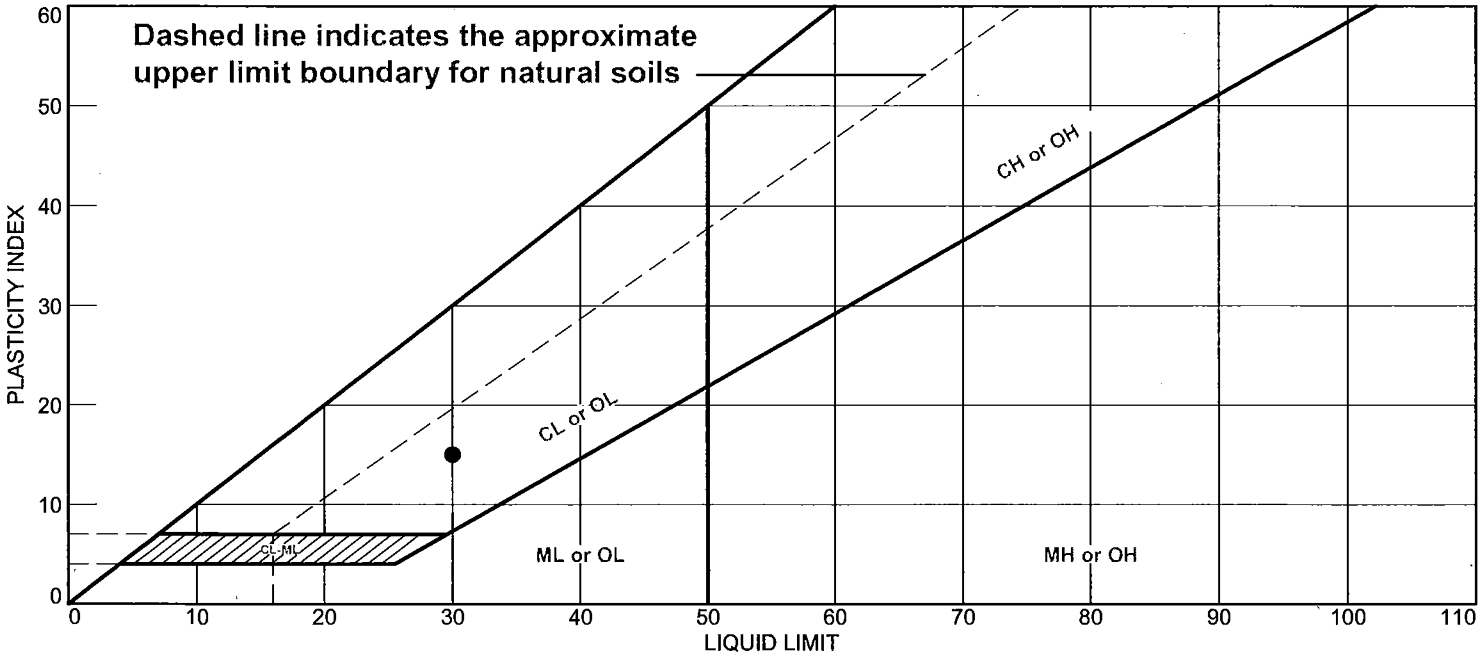
Location: Middle Portion
Sample Number: EP-8C ST-1 **Depth:** 3.5'- 5' **Date:** 10/29/2015

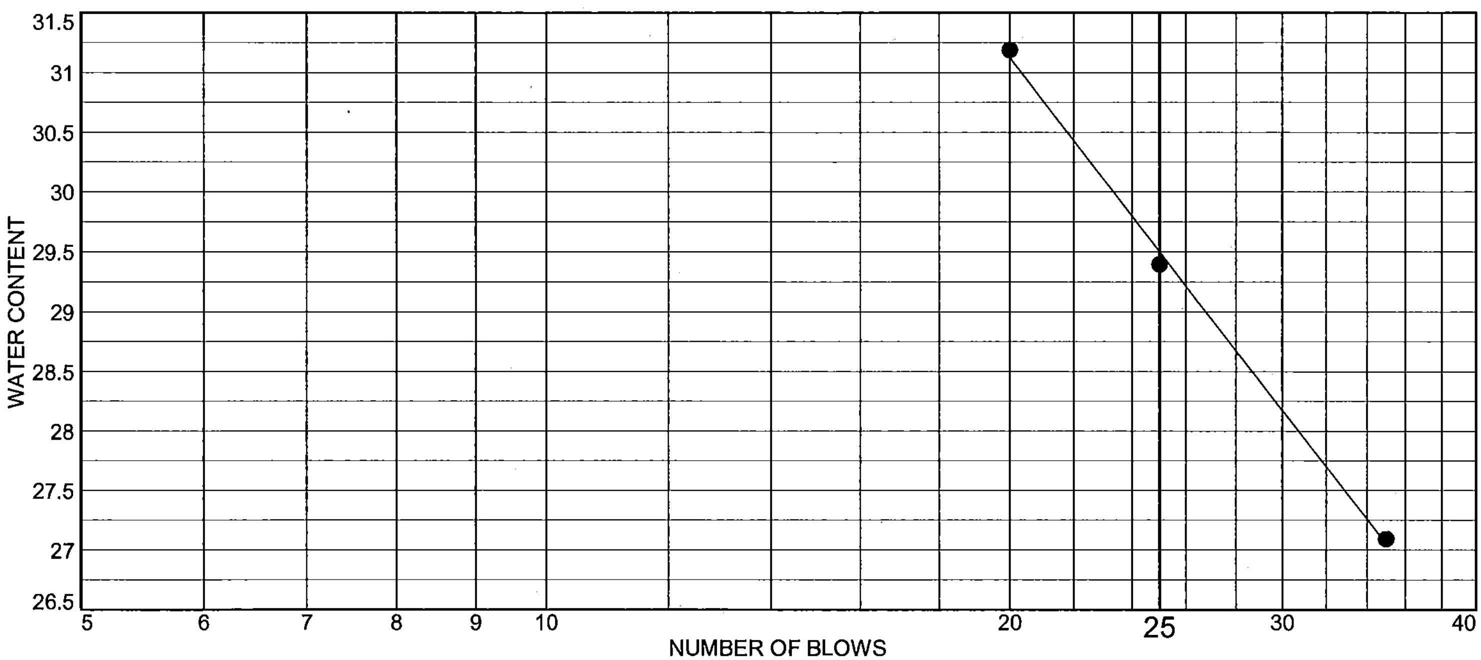
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark gray sandy LEAN CLAY	30	15	15	82.1	60.8	CL

Project No. 15-391T **Client:** AECOM

Project: Dynegy CCR Ph 3/7 - Havana

Location: Middle Portion
Sample Number: EP-8C ST-1 **Depth:** 3.5'- 5'

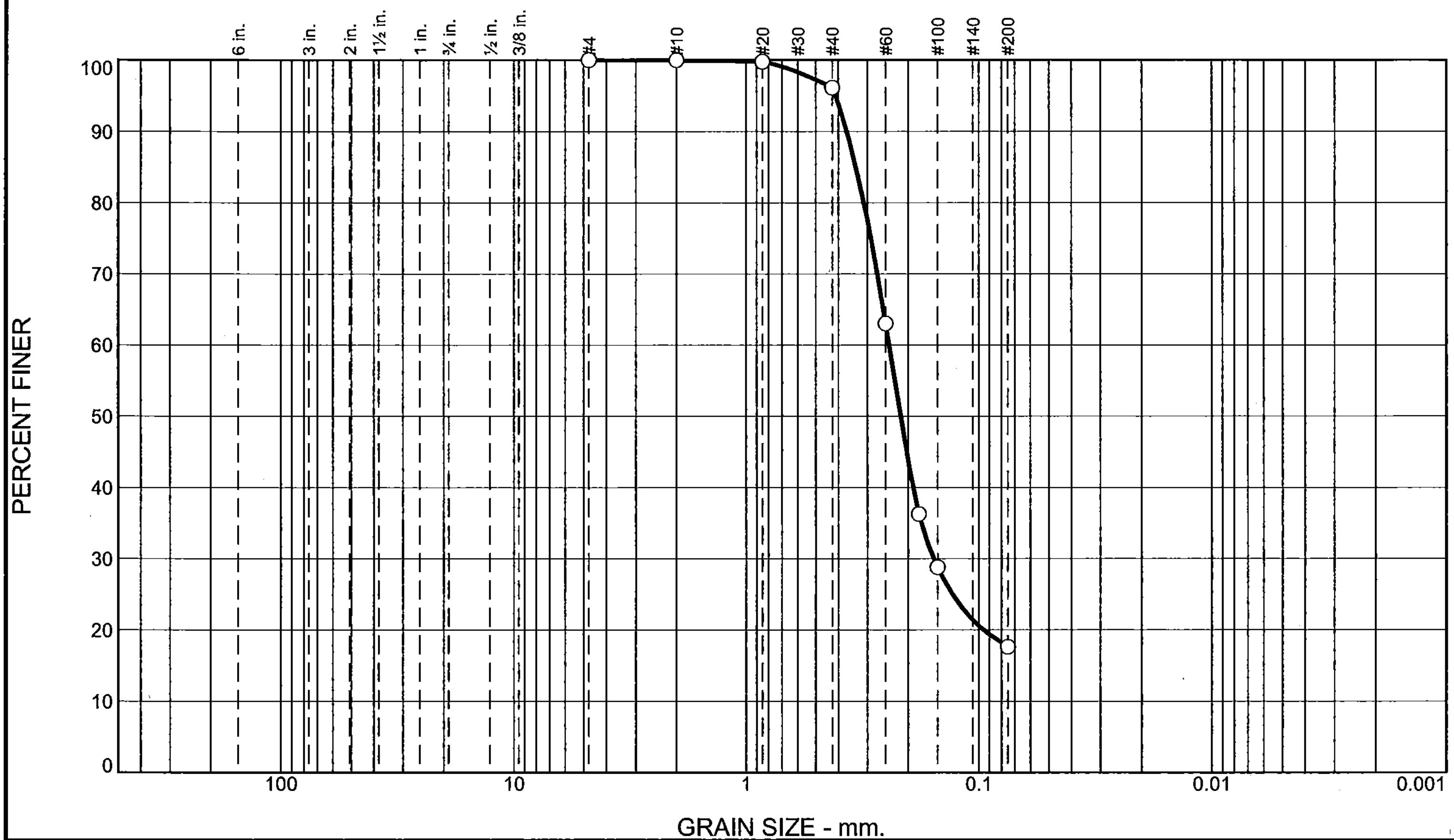
ALPHA-OMEGA GEOTECH

Remarks:

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.9	78.5	17.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.8		
#40	96.1		
#60	63.0		
#80	36.3		
#100	28.8		
#200	17.6		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3674 D_{85}= 0.3358 D_{60}= 0.2416
D_{50}= 0.2159 D_{30}= 0.1560 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

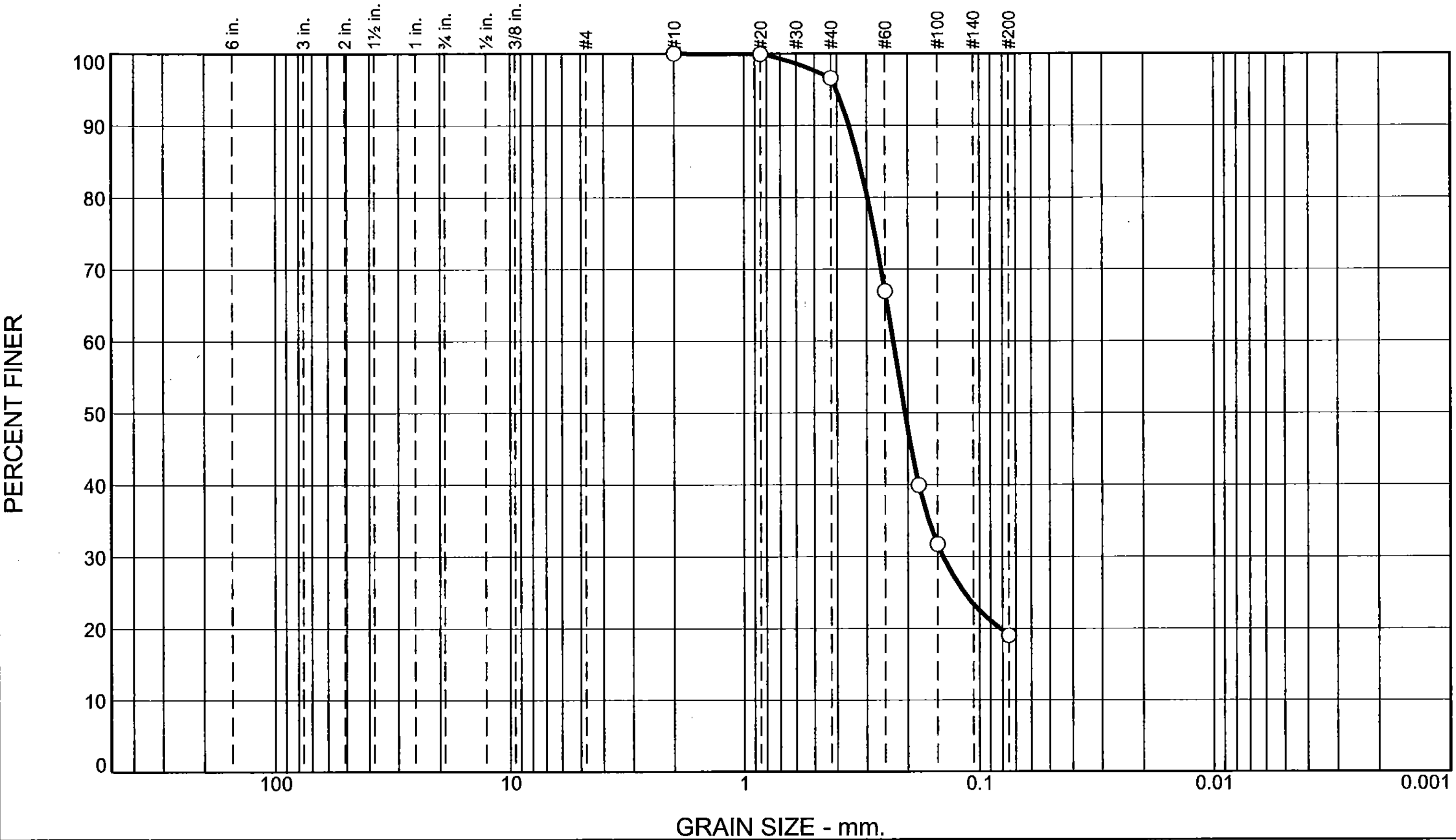
Location: Lower Portion
Sample Number: EP-8C ST-1 **Depth:** 3.5'-5' **Date:** 10/21/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.4	77.6	19.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	96.6		
#60	66.9		
#80	39.9		
#100	31.7		
#200	19.0		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3559 D_{85}= 0.3231 D_{60}= 0.2309
D_{50}= 0.2061 D_{30}= 0.1420 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-8C SPT-1 **Depth:** 8.5'-10'

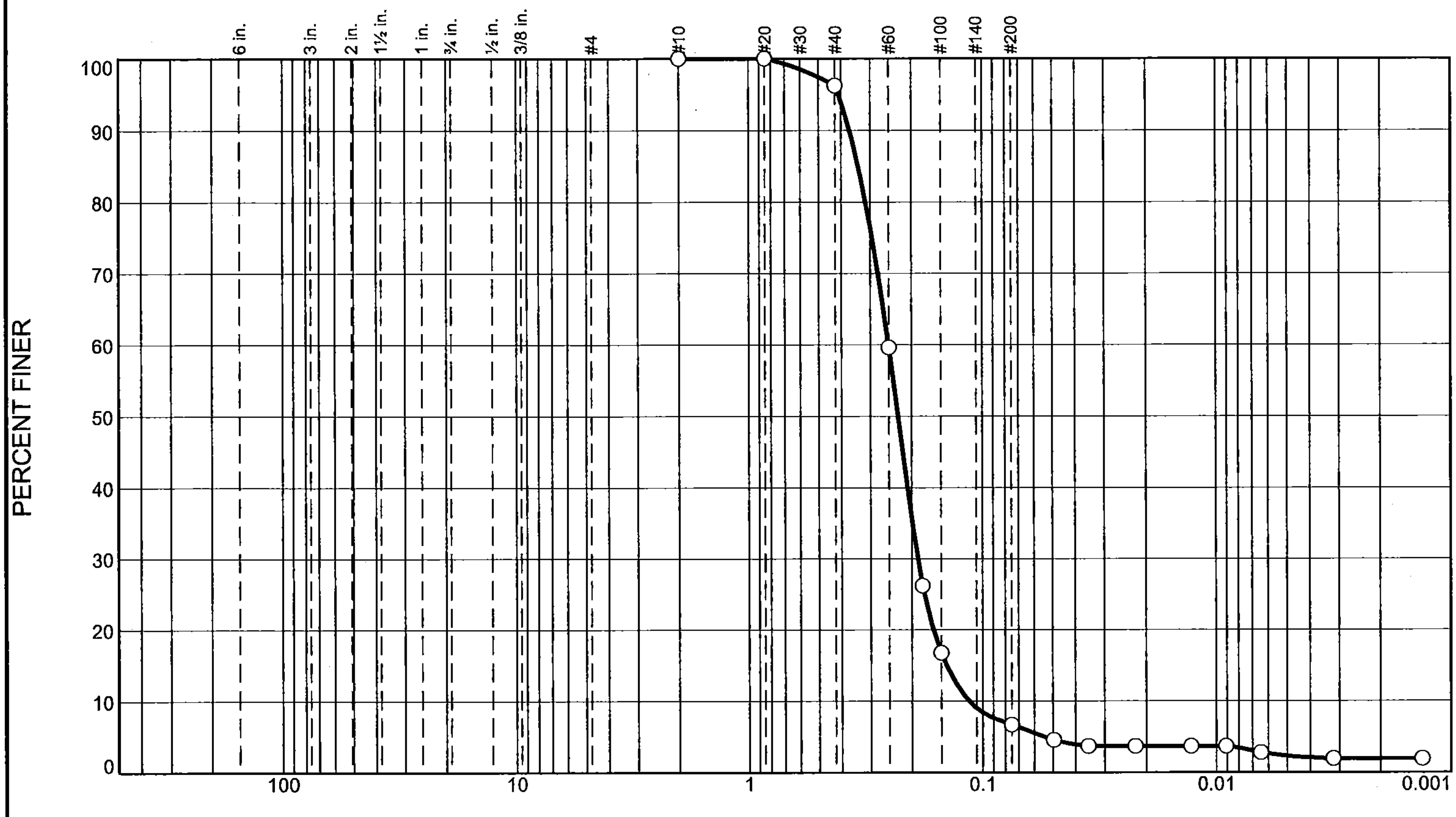
Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.7	89.6	4.4	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	96.3		
#60	59.6		
#80	26.2		
#100	16.8		
#200	6.7		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3678 D_{85}= 0.3377 D_{60}= 0.2509
D_{50}= 0.2288 D_{30}= 0.1886 D_{15}= 0.1424
D_{10}= 0.1143 C_u= 2.20 C_c= 1.24

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-8C ST-2 **Depth:** 13.5'-15'

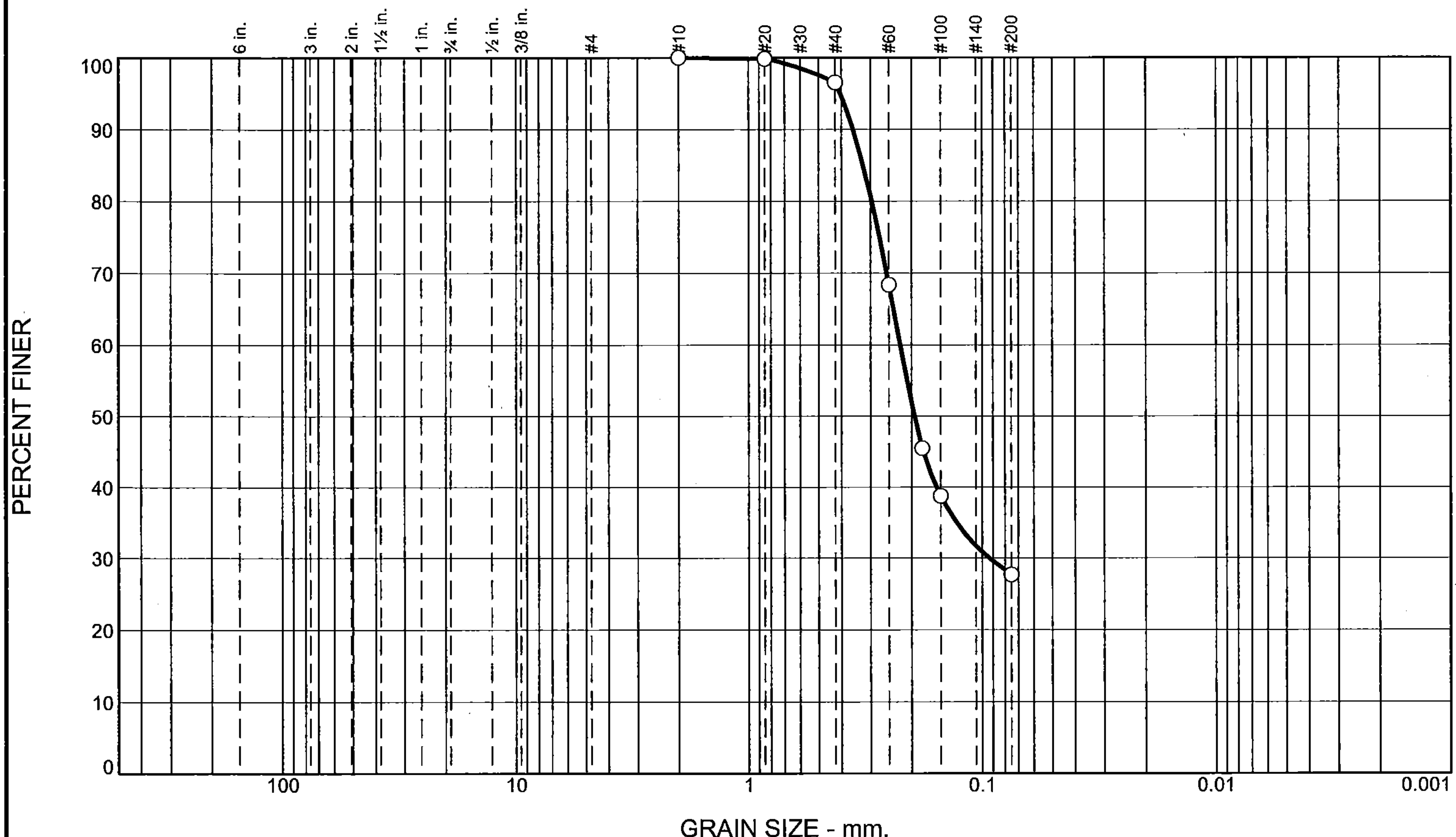
Date: 10/28/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.5	68.8	27.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	96.5		
#60	68.4		
#80	45.5		
#100	38.8		
#200	27.7		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3566 D_{85}= 0.3230 D_{60}= 0.2238
D_{50}= 0.1946 D_{30}= 0.0932 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-8C SPT-2 **Depth:** 18.5'-20'

Date: 10/24/2015

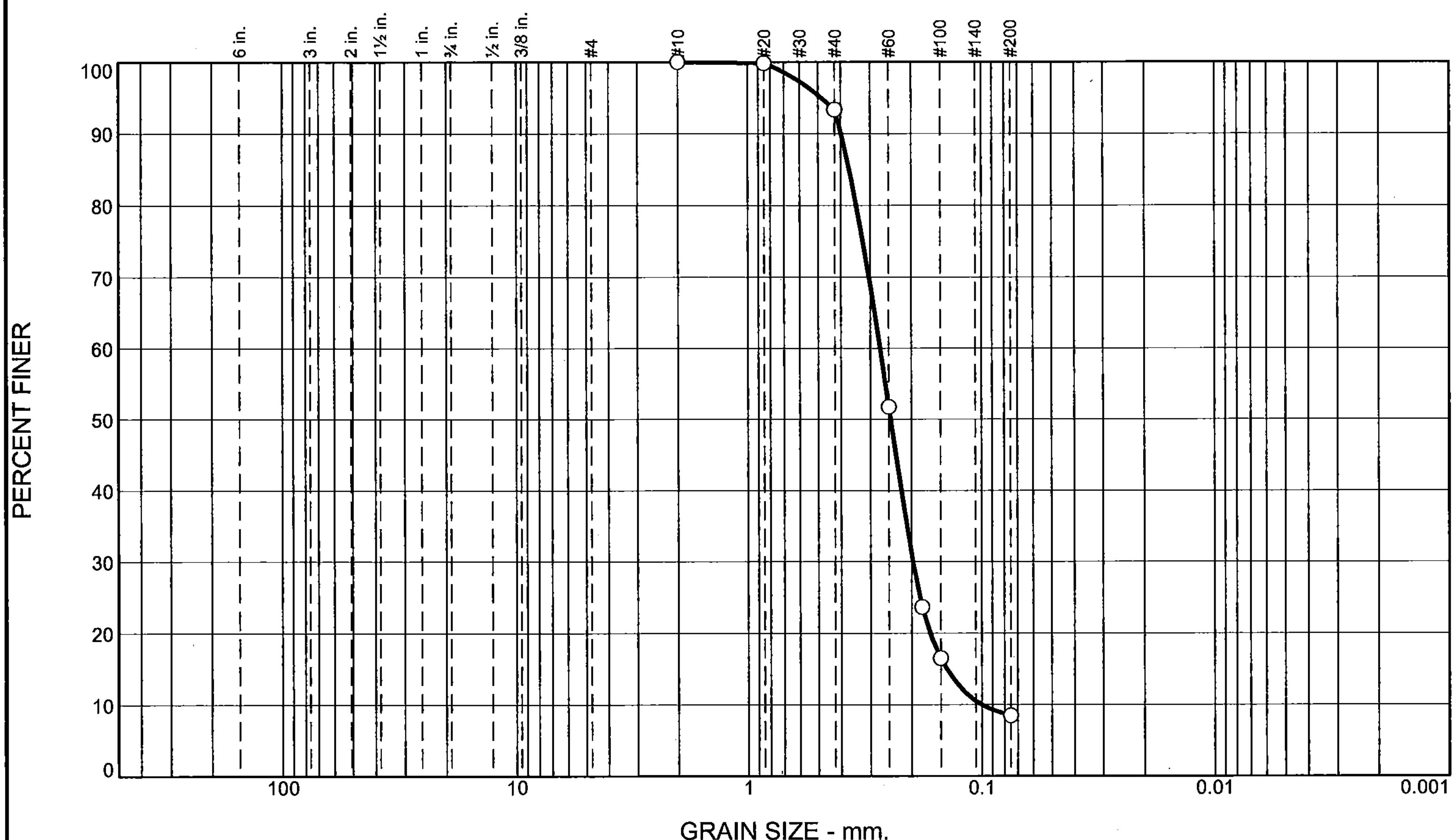
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	6.7	84.8	8.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	93.3		
#60	51.7		
#80	23.6		
#100	16.5		
#200	8.5		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3984 D_{85}= 0.3678 D_{60}= 0.2725
D_{50}= 0.2457 D_{30}= 0.1975 D_{15}= 0.1411
D_{10}= 0.1001 C_u= 2.72 C_c= 1.43

Classification

USCS= AASHTO=

Remarks

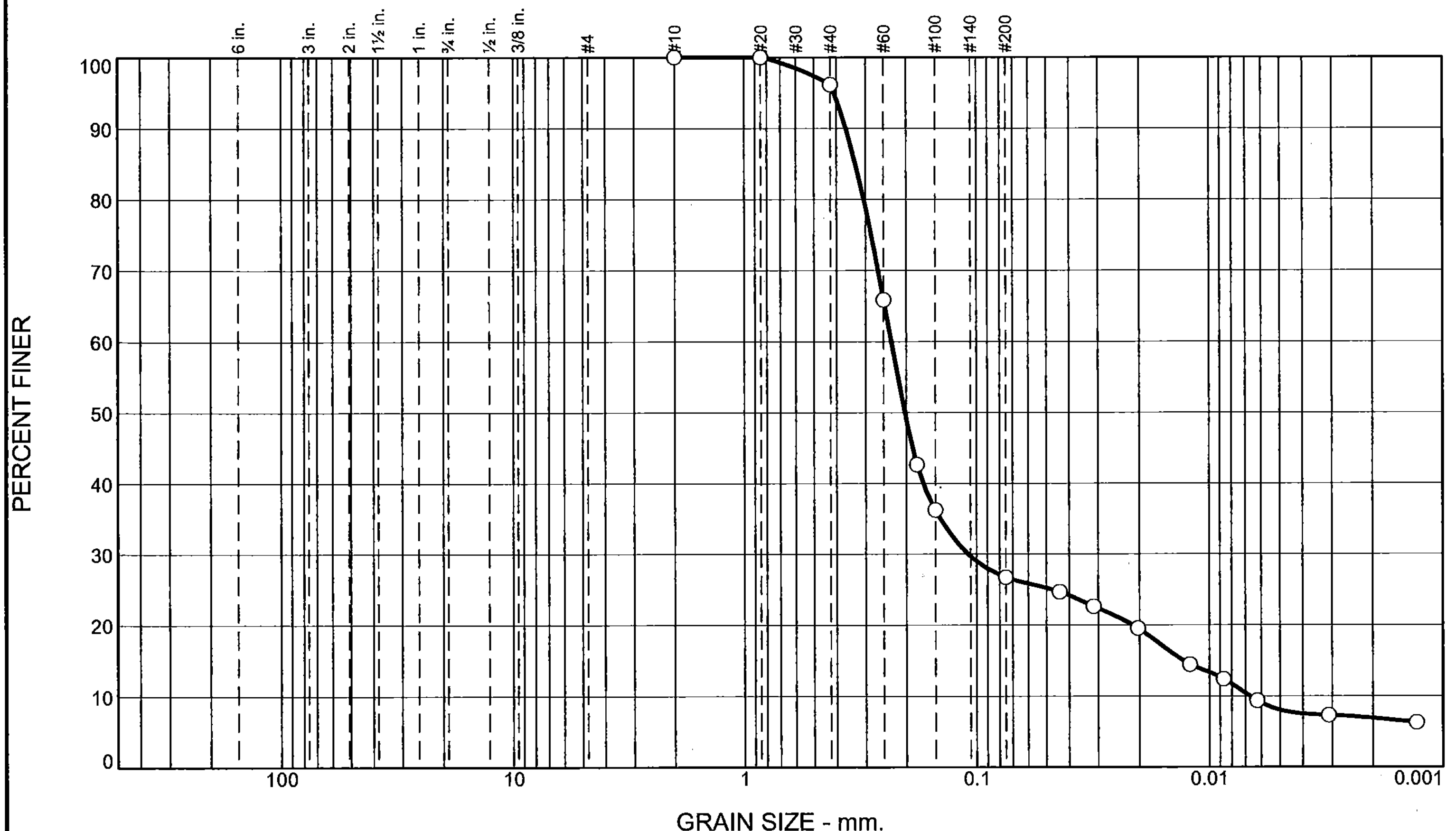
Location: Upper Portion
Sample Number: EP-8C ST-3 **Depth:** 23.5-25' **Date:** 10/28/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.8	69.5	18.6	8.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	96.2		
#60	65.8		
#80	42.6		
#100	36.2		
#200	26.7		

* (no specification provided)

Material Description

Dark brown silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3643 D_{85}= 0.3314 D_{60}= 0.2320
D_{50}= 0.2032 D_{30}= 0.1085 D_{15}= 0.0130
D_{10}= 0.0067 C_u= 34.57 C_c= 7.57

Classification

USCS= AASHTO=

Remarks

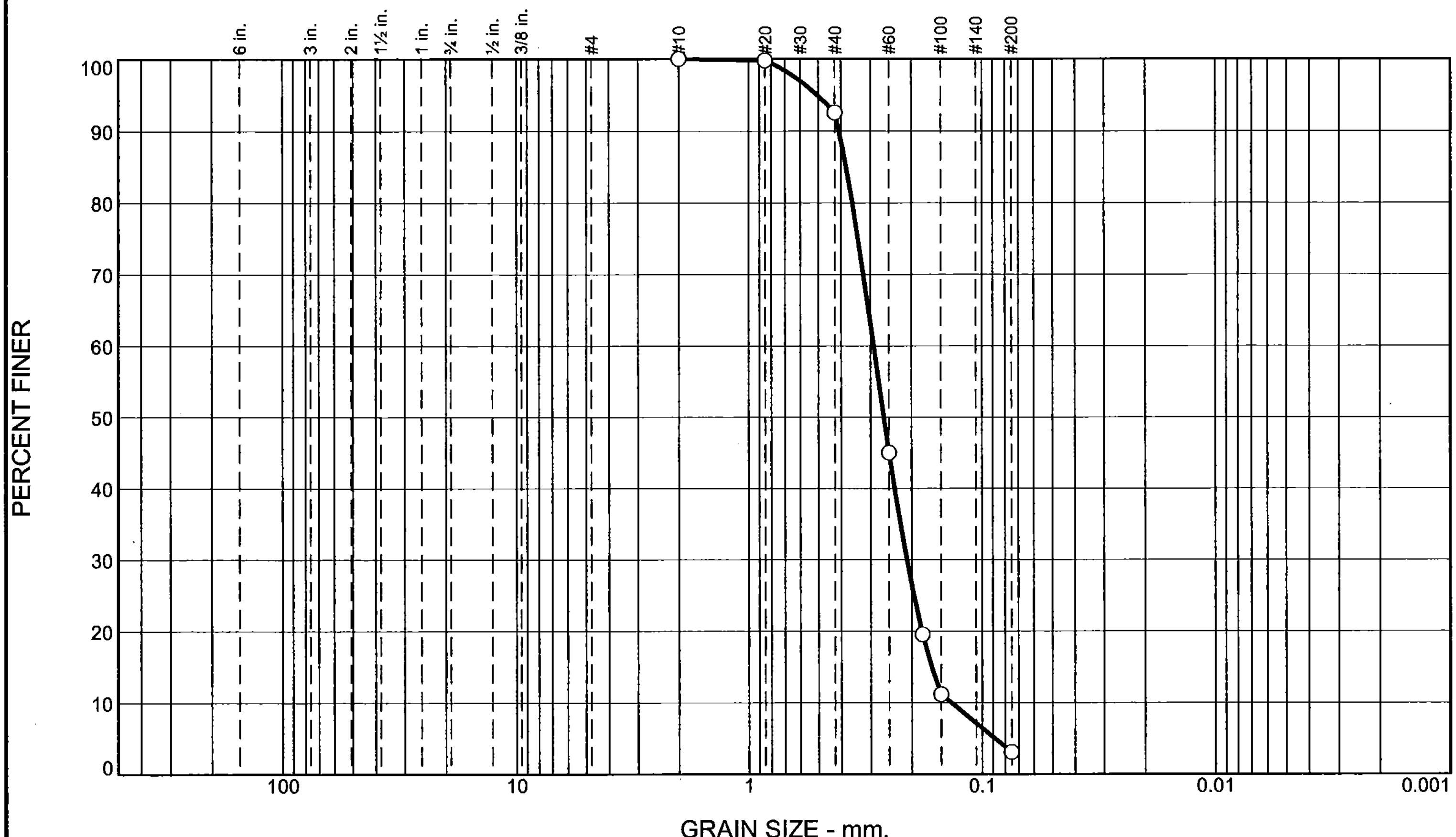
Location: Lower Portion
Sample Number: EP-8C ST-3 **Depth:** 23.5'-25' **Date:** 10/27/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	7.4	89.5	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	92.6		
#60	45.0		
#80	19.6		
#100	11.2		
#200	3.1		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4077 D_{85}= 0.3808 D_{60}= 0.2912
D_{50}= 0.2634 D_{30}= 0.2101 D_{15}= 0.1648
D_{10}= 0.1356 C_u= 2.15 C_c= 1.12

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-8C ST-4 **Depth:** 33.5'-35'

Date: 10/24/2015

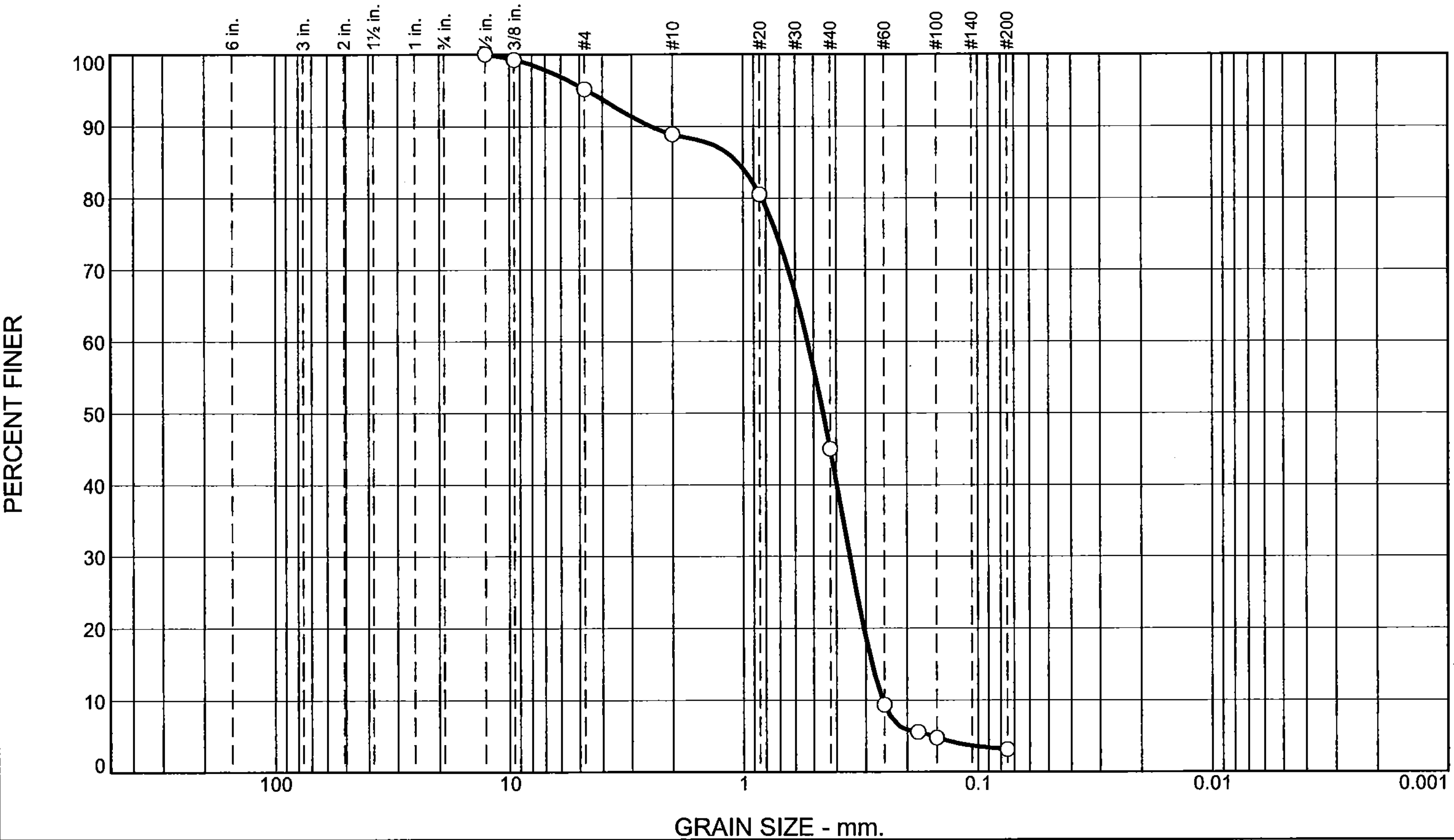
ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana

Project No: 15-391T **Figure** 1 of 1

Tested By: D.B. **Checked By:** T.B.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.8	6.3	43.9	41.9	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.3		
#4	95.2		
#10	88.9		
#20	80.5		
#40	45.0		
#60	9.4		
#80	5.6		
#100	4.8		
#200	3.1		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.4729 D_{85}= 1.0532 D_{60}= 0.5314
D_{50}= 0.4555 D_{30}= 0.3506 D_{15}= 0.2825
D_{10}= 0.2545 C_u= 2.09 C_c= 0.91

Classification

USCS= AASHTO=

Remarks

Sample Number: EP-8C SPT-4 **Depth:** 38.5'-40'

Date: 10/24/2015

ALPHA-OMEGA GEOTECH

Client: AECOM
Project: Dynegy CCR Ph 3/7 - Havana
Project No: 15-391T **Figure** 1 of 1

Tested By: DB **Checked By:** TB

ATTACHMENT E

MATERIAL CHARACTERIZATION CALCULATIONS

I. Objective

The characterization of the materials was performed using the subsurface investigation data for the East Ash Pond at Havana Power Station near Havana, Illinois. This included calculating the material input parameters needed to perform the stability and liquefaction analyses.

II. Subsurface Investigation

The subsurface exploration for the East Ash Pond was conducted from August 27, 2015 to September 4, 2015. The exploration included eleven (11) soil borings and eight (8) cone penetrometer tests (CPT) with seismic shear wave velocity measurements. These tests were primarily to investigate the embankment fill and the native alluvial foundation. The two materials were delineated in the borings and soundings using original ground surface topographic maps and plotting the corrected N- and qc-values. These are attached as **Figures E-1.1 to E-1.8.** Typically, the embankment had higher blow counts and could be distinguished by this when looking at or near the line estimated to be the original ground surface. Zones in HAV-EB-2C, HAV-EB-3C, HAV-EB-6C and HAV-EB-7C were exceptions with layers having low blow counts. These layers are discussed in greater detail below.

The complete boring logs with soil descriptions, choice laboratory test results and results from the standard penetration test (SPT) can be found in **Attachment B**. The complete set of graphical CPT results can be found in **Attachment D**. **Figure 2-1- East Ash Pond Geotechnical Site Plan** in **Attachment A** shows the locations of each investigation point. Two other units are known to exist at the site from historical and current data. These are the clay liner and the fly ash. These were identified from historical reports and were believed to not play a role in stability and were therefore not included in the investigation and testing regimes. The four (4) stratigraphic units are described below in greater detail.

Embankment (Dike) Fill and Compaction: The East Ash Pond embankments consist of poorly graded sand with silt, silty sand and poorly graded sand. From SPT blow counts, the embankment materials are well compacted for the majority of the embankment, ranging from medium dense to very dense. Zones of loose sand were encountered at Boring HAV-EB-2C from 13 ft to 30 ft bgs and at Boring HAV-EB-3C from 32 ft to 44 ft bgs, transitioning from clearly embankment material into what could be foundation material. These zones were considered to be a part of the embankment. Zones of loose sand were encountered at Boring HAV-EB-6C from 7 ft to 12 ft bgs and in Boring HAV-EB-7C from 10 ft to 25 ft bgs and were considered to definitively be in the embankment. Fines content (the material passing the number 200 sieve), where tested, generally ranged between 5% and 25% with an average of 13%, indicating relatively clean sands. A clayey sand (Unified Soil Classification SC) was encountered between depths of 0 and 7 ft bgs in Boring HAV-EB-6C. Boring HAV-EB-6C encountered a layer of silty sand with a fines content of 35% at a depth of 10 ft below the embankment crest. A 0.5 ft thick layer of sandy clay (CL) was encountered between a depth of 4 and 5 ft at Boring HAV-EB-8C. These were the only clayey soils encountered in the embankment at the boring locations. The exploratory borings and CPTs show embankment densities indicative of well compacted materials.

Table E-1: Summary of Subsurface Investigation Data - Embankment Fill

Category	Minimum	Maximum	Average
SPT-N	6	66	32
Cone Resistance, q_c (tsf)	2	544	221
Sleeve Resistance, f (tsf)	0.0	6.2	2.2
Friction Ratio, R_f (%)	0.0	4.3	1.2
SCPTu Shear Wave Velocity (ft/sec)	515	869	709

Native Alluvial Foundation: The native alluvial materials typically consist of poorly graded sand and sand with silt. The native material begins at elevations ranging between approximately 463 and 470 feet at the boring locations. Measured densities from corrected Standard Penetration Tests ranged between very loose (blow count 0 to 4) and medium dense (blow count 11 to 30). Fines content, where tested, ranged between 1% and 30% and averaged 5%. The fines content in the native soils was typically less than the embankment. A clayey sand (SC) layer was encountered between depths of 9 ft and 12 ft bgs in Boring HAV-EB-2T and a silty, clayey sand (SC-SM) was encountered between depths of 27 and 32 ft bgs in boring HAV-EB-6C. These were the only clay layers encountered in the alluvial foundation soils.

A sample of the clayey sand collected between depths of 8.5 and 10 ft HAV-EB-2T had a fines content of 22% and a SPT N=8 blows per foot (bpf). A companion CPT, HAV-C002, identified this layer. A drained friction angle of 33 was estimated from this SPT value. A sample of the silty, clayey sand collected between 28.5 ft and 30 ft from HAV-EB6C had a fines content of 38% and a blow count of 22. A companion CPT, HAV-C006, had a drained friction angle of 35 degrees. The foundation soils were modeled with a drained friction angle of 30 degrees, so no special consideration was given to these higher fines content zones. A summary of the field tests on the native alluvial foundation soils is provided in Table E-2 below.

Table E-2: Summary of Subsurface Investigation Data – Native Alluvial Foundation

Category	Minimum	Maximum	Average
SPT-N	4	34	11
Cone Resistance, q_c (tsf)	2	446	137
Sleeve Resistance, f (tsf)	0.0	5.4	0.7
Friction Ratio, R_f (%)	0.1	3.9	0.6
SCPTu Shear Wave Velocity (ft/sec)	407	1206	789

Clay Liner: No samples of the clay liner were collected for our investigation in order to avoid puncturing the geomembrane liner. For the purpose of obtaining a drained strength of the clay liner for slope stability analysis, we assumed that the clay was high plastic with a plasticity index of 30. The drained strength was obtained from published correlations between PI and friction angle (Reference 3).

Fly Ash: The fly ash was also not sampled or tested. Strength values were obtained from published values (Reference 5)

III. Laboratory Testing Program

There were a total of 81 samples tested using ASTM D422, Standard Test Methods for Particle Size Analysis of Soils, and ASTM D1140, Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve, where appropriate. The tests were split between 35 tests for the embankment material and 46 tests for the natural alluvium. In addition to the sieve and fines content tests, ASTM D2216, Test Method for Laboratorial Determination of Water Content, and ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index, were also performed for certain samples.

A summary of the laboratory testing is provided below in **Tables E-3** and E-4 while complete summaries can be found in **Attachment D**. The maximum fines content are results of the clay layers mentioned previously in the description of the strata.

Table E-3: Summary of Select Laboratory Test Data

	Water Content			Fines Content		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Embankment Fill	4.6	17.4	8.8	4.6	61	13
Native Alluvial Foundation	-	-	-	0.8	38	9

Note: Samples of the foundation soil were primarily sand from below the water table. Consequently, water content data are not included in this summary.

Table E-4: – Summary of Atterberg Limits

Boring Designation	Depth of Sample (ft bgs)	LL	PL	PI
HAV-EB-1C	26-27.5	NV	NP	NP
HAV-EB-2C	3.5-5	NV	NP	NP
HAV-EB-3C	16-17.5	NV	NP	NP
HAV-EB-4C	33.5-34	14	13	1
HAV-EB-6C	3.5-5	25	14	11
HAV-EB-6C	8.5-10	14	13	1
HAV-EB-6C	28.5-30	18	13	5
HAV-EB-8C	3.5-5	30	15	15

IV. Material Properties

Material properties were developed for the East Ash Pond using empirical correlations and conservative estimates based on typical soil properties. Shear strengths were developed for the embankment fill and native alluvial foundation from the SPT and CPT data. As stated previously, the strength properties for the clay liner and the fly ash were assumed using typical values associated with the materials with the knowledge they did not positively or negatively affect the stability. Unit weights were developed using reasonable, engineering judgement.

Unit Weight

The unit weights were estimated based on Table E-5 taken from Coduto (2012)[2]. These unit weight correlations were used due to the difficulty of collecting undisturbed samples in cohesionless materials, such as those present at the East Ash Pond.The total unit weight is used because GeoStudio Slope/W uses total forces in performing limit equilibrium calculations. In this instance, it was suffice to assume total is acceptable for above and below the water table as it does not affect the FS greatly. Unit weights were chosen for the materials while being cognizant of the density descriptions from the boring logs. No lab data was available for unit weight calculations.

Table E-5: Typical Unit Weights from Coduto (2012)

Soil Type and Unified Soil Classification (See Figure 3.3)	Typical Unit Weight, γ: Above Groundwater Table (lb/ft^3)	Above Groundwater Table (kN/m^3)	Below Groundwater Table (lb/ft^3)	Below Groundwater Table (kN/m^3)
GP—Poorly-graded gravel	110–130	17.5–20.5	125–140	19.5–22.0
GW—Well-graded gravel	110–140	17.5–22.0	125–150	19.5–23.5
GM—Silty gravel	100–130	16.0–20.5	125–140	19.5–22.0
GC—Clayey gravel	100–130	16.0–20.5	125–140	19.5–22.0
SP—Poorly-graded sand	95–125	15.0–19.5	120–135	19.0–21.0
SW—Well-graded sand	95–135	15.0–21.0	120–145	19.0–23.0
SM—Silty sand	80–135	12.5–21.0	110–140	17.5–22.0
SC—Clayey sand	85–130	13.5–20.5	110–135	17.5–21.0
ML—Low plasticity silt	75–110	11.5–17.5	80–130	12.5–20.5
MH—High plasticity silt	75–110	11.5–17.5	75–130	11.5–20.5
CL—Low plasticity clay	80–110	12.5–17.5	75–130	11.5–20.5
CH—High plasticity clay	80–110	12.5–17.5	70–125	11.0–19.5

Shear Strength Values

Shear strength values for the embankment and native alluvium were calculated using empirical correlations developed for the SPT-N and the CPT-qc values. Descriptions of the process are below.

Blow Count Corrections (SPT)

In order to properly correlate the SPT data to material properties (mainly the effective internal friction angle, ϕ'), the raw blow counts, N, were corrected for overburden, rod length, and energy ratio. An energy efficiency ratio (ER) of 80% was assumed because an automatic-trip hammer was used but calibration data was not available. The procedure used to correct N was that outlined by Boulanger and Idriss (2008, 2014)[1,4]. Limitations for minimum and maximum values were placed on the calculations as described by Boulanger and Idriss. This resulted in N_{60} values that were usable in further determination of ϕ'. Additionally, the N_{60} value was further corrected for fines content and overburden to be used in the liquefaction analysis. It is this value, $N_{1,60,CS}$, that is plotted in **Figure E-1.1 to E-1.8** and presented in **Table E-5**.

Tip Resistance Corrections (CPT)

The difference between the raw tip resistance q_c and the corrected tip resistance q_t was negligible. However, the correction was made as well as the calculation of a number of other parameters performed by ConeTec. The complete list is provided in **Attachment E.2**[3]. The q_c value was corrected for fines content and overburden ($q_{c,1n,CS}$) according to Boulanger and Idriss (2014)[1] to be used in the liquefaction analysis **Attachment I**. $q_{c,1n,CS}$ is plotted in **Figures E-1.1 to E-1.8** with the corrected N-values as well.

Determination of Phi (ϕ') from SPT

The corrected N_{60} data was correlated to ϕ' using a figure adapted by Coduto from DeMello (1971). The chart, **Figure E-2: Empirical Correlation between N_{60} and ϕ'**, took N_{60} values and matched them with the overburden pressures at the depths given to develop an approximate ϕ'. A weighted average of ϕ' was calculated for each boring and material type. The weighted averages were roughly delineated for the embankment fill and native foundation materials based on the topographic data, providing two averages for most of the borings. These weighted average values were then averaged across the site, with equal weight given to each borehole. The results for the phi calculations from SPT data are below, **Table E-6**. These are not the final values used.

The lesser SPT N-values in the embankment, and corresponding shear strengths, from boring HAV-EB-7C are discussed in the subsurface investigation section of this report. However, a stability analysis was not performed for this cross section because the ϕ' calculated from the CPT results of HAV-C007 indicated a phi equal to that used in the stability analysis.

The lesser SPT N-values near the embankment/foundation interface at borings HAV-EB-2C and HAV-EB-3C were accounted for in Section A stability analysis.

One should note that due to the rather discontinuous nature of the SPT test, discretizing the layers was done to the best of engineering judgement. This led to some layers being placed in either the embankment or foundation layers when they could be justified for either layer.

Determination of Phi (ϕ') from CPT

Correlation to ϕ' was performed by ConeTec and provided with the raw data. The equation used for this is **Equation E-1** below and can be seen on the CPT logs in Attachment C with another correlation that was not used further. These values were averaged in a similar way as the SPT values and are presented below. WSummary of the weighted average is below in **Table E-6** but these are not the final values used in analysis. The average for the foundation sand for the ϕ' calculated from the CPT was considerably higher than that from the SPT data.

Equation E-1: q_t Correlation to Effective Friction Angle (Kulhawy and Mayne 1990)[5]

$$\varphi' = 17.6 + 11.0 * Log[\frac{q_t}{(\sigma'_v)^{0.5}}]$$

Table E-6: Average Effective Friction Angle Values

	SPT Phi			CPT Phi		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Embankment FIll	27	50	43	32	49	43
Native Alluvial Foundation	24	45	32	22	46	40

Determination of Liquefied Foundation Sand and Liquefied fly ash Shear Strengths

The liquefied strength (residual strength) of liquefied layers was estimated using the procedure developed by Idriss and Boulanger (2008). Strength estimates presented in those references are based on empirical observations and back-analyses made at actual sites that have experienced liquefaction in past earthquakes and is based on correlations with SPT and CPT results. It relates the residual strength of a liquefied sand or silt (non- or low-plasticity material) to the normalized, fines-corrected resistance (SPT N-value and CPT tip resistance). For the current evaluation, SPT based correlations were utilized, and a conservative value was selected for all liquefied material. The figure is presented below in figure **E-1.**

A conservative lower-bound estimate of blow count was selected of 3 blows per foot, which correlates to a residual shear strength ratio of approximately 0.05. This value was conservatively selected as the residual strength of fly ash-liquefied layer for modeling purposes.

Based on the SPT data, the minimum (N1)60-cs blow counts are on the order of 4-8 in the native alluvial foundation. Using Idriss and Boulanger figure, this correlates to a lower-bound Sr/σ'vo ratio of 0.06 for the liquefied foundation layer.

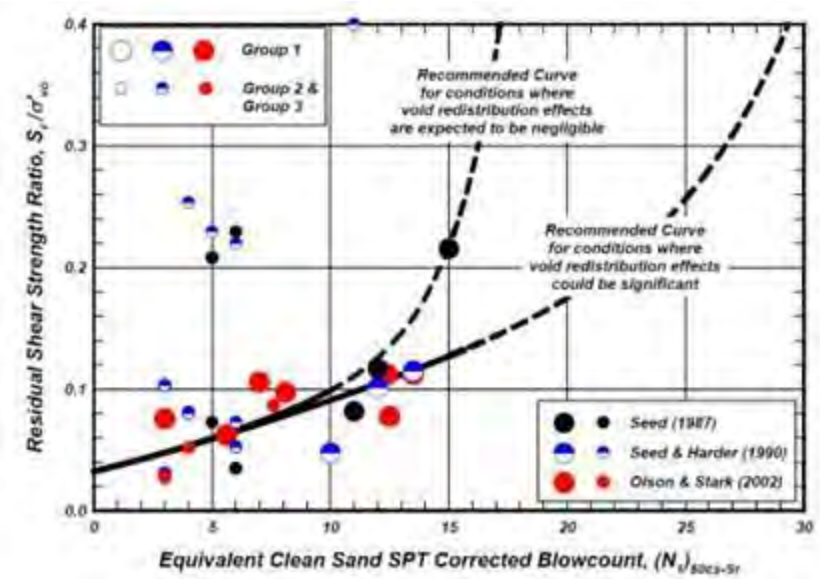


Figure E1: Strength Ratio vs. Equivalent Clean Sand SPT-Corrected Blowcount (Idriss and Boulanger, 2008)

Table E7: Post-Liquefaction Material Properties

Material	Total Unit Weight (pcf)	Residual Undrained Shear Strength Parameters
		Sr/σ'vo
Liquefied Foundation Layer	115	0.06
Flyash - Liquefied	90	0.05

Final Material Properties

The final chosen material properties used in the Static Models are presented below in **Table E-8**. The liquefied shear strengths in Table E-7 above were used as the final material properties for the post-liquefaction stability analysis.

Both the embankment and the foundation were given final ϕ' values lower than the averages to provide analysis believed to be conservative. The lower strength embankment material was given a conservative lower shear strength to reflect the conclusions made from the subsurface investigations and correlations.

A drained friction angle of 20 degrees was selected for the fly ash based on published information (Reference 6). A drained friction angle of 29 degrees was selected for the clay liner based on the assumption that the material was high plastic with a plasticity index of 30.

Table E-8: Static Material Properties

Material	Total Unit Weight (pcf)	Effective (drained) Shear Strength Parameters	
		c' (psf)	Φ' (°)
Embankment Fill	120	0	40
Lower Strength Embankment	120	0	30
Clay Liner	110	50	29
Fly Ash	90	0	20
Native Alluvial Foundation	115	0	30

V. References

1. Boulanger, R. W., and Idriss, I. M. (2014). CPT and SPT Based Liquefaction Triggering Procedures (Report No. UCD/CGM-14/01). Davis, California.
2. Coduto, D., (2012). *Foundation Design Principles and Practices,* 2nd Ed., Pearson, New York, NY.
3. Conetec, (2015). *Calculated CPT Geotechnical Parameters A Detailed Description of the Methods Used in ConeTec's CPT Geotechnical Parameter Calculation and Plotting Software,* Revision 7. Provided to AECOM by ConeTec.
4. Duncan, J.M., Horz, R.C., Yang, T.L Shear Strength Correlations for Geotechnical Engineering, Virginia Polytechnic Institute and State University, August 1989
5. Idriss, I. M., and Boulanger, R. W. (2008). Soil Liquefaction During Earthquakes. Earthquake Engineering Research Institute, Oakland, California, USA. Kulhawy, F.H., Mayne, P. (1990). *Soil Properties Manual* EPRI EL-6800.
6. Lacour, Nicholas, Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples Virginia Polytechnic Institute and State University June 2012.
7. Seed, R.B., et al, 2003. *Recent Advances in Soil Liquefaction Engineering: A Unified And Consistent Framework*, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, Keynote Presentation, H.M.S. Queen Mary, Long Beach, California, April 30, 2003.

ATTACHMENT E.1

MATERIAL CHARACTERIZATION FIGURES

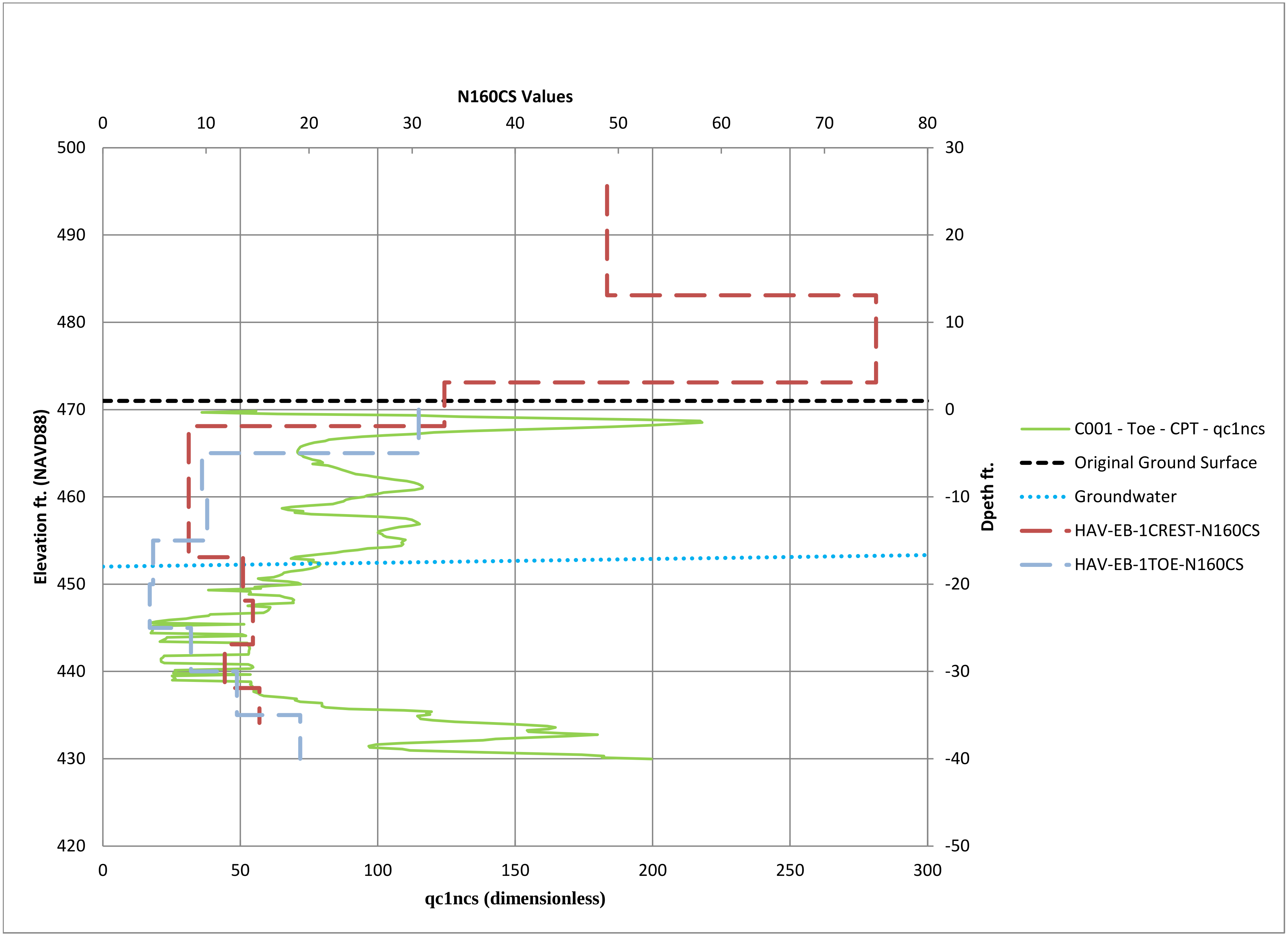


Figure E-1.1 - Site 1 - qc1ncs and N160CS vs. Depth and Elevation

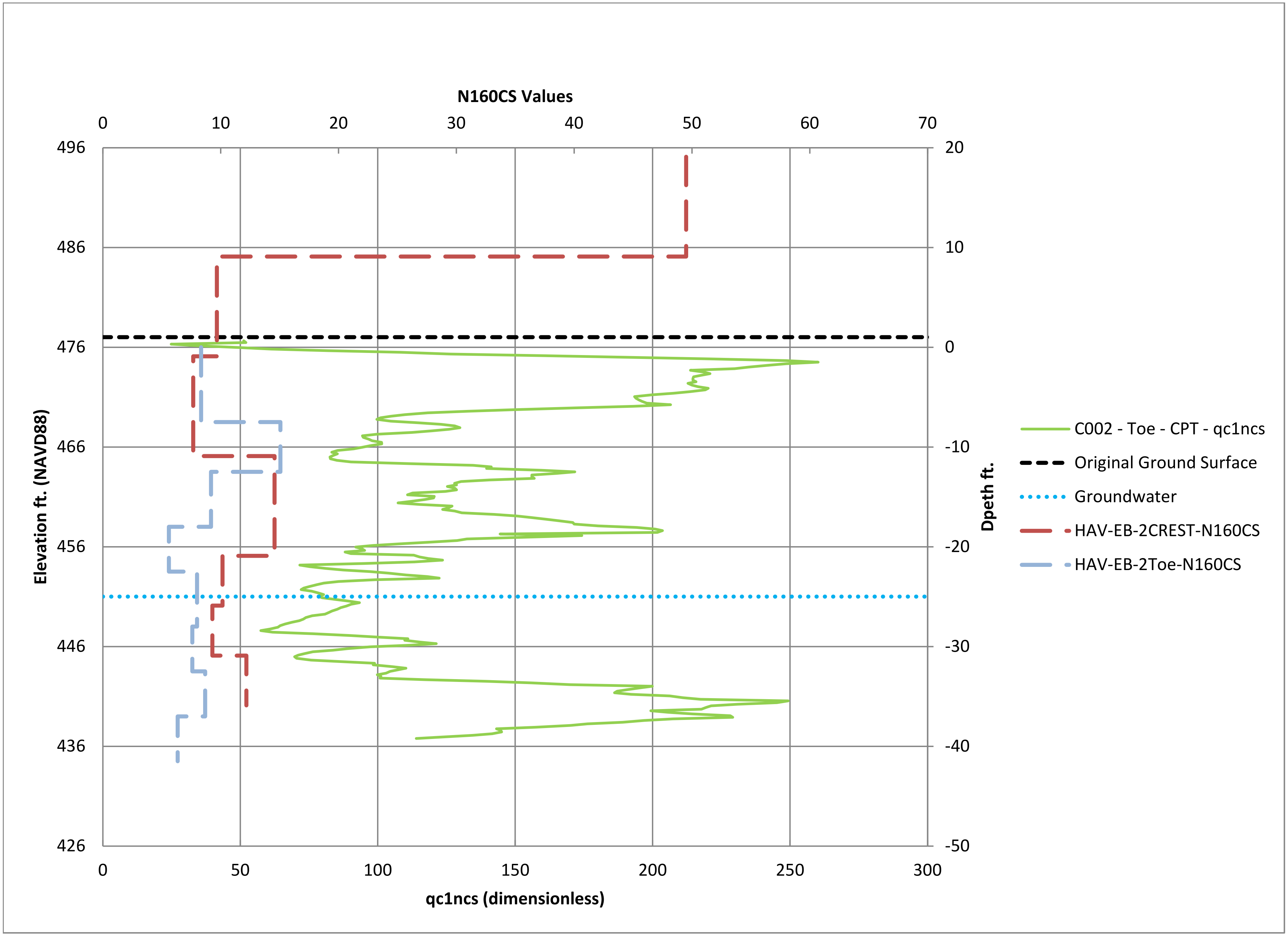


Figure E-1.2 - Site 2- qc1ncs and N160CS vs. Depth and Elevation

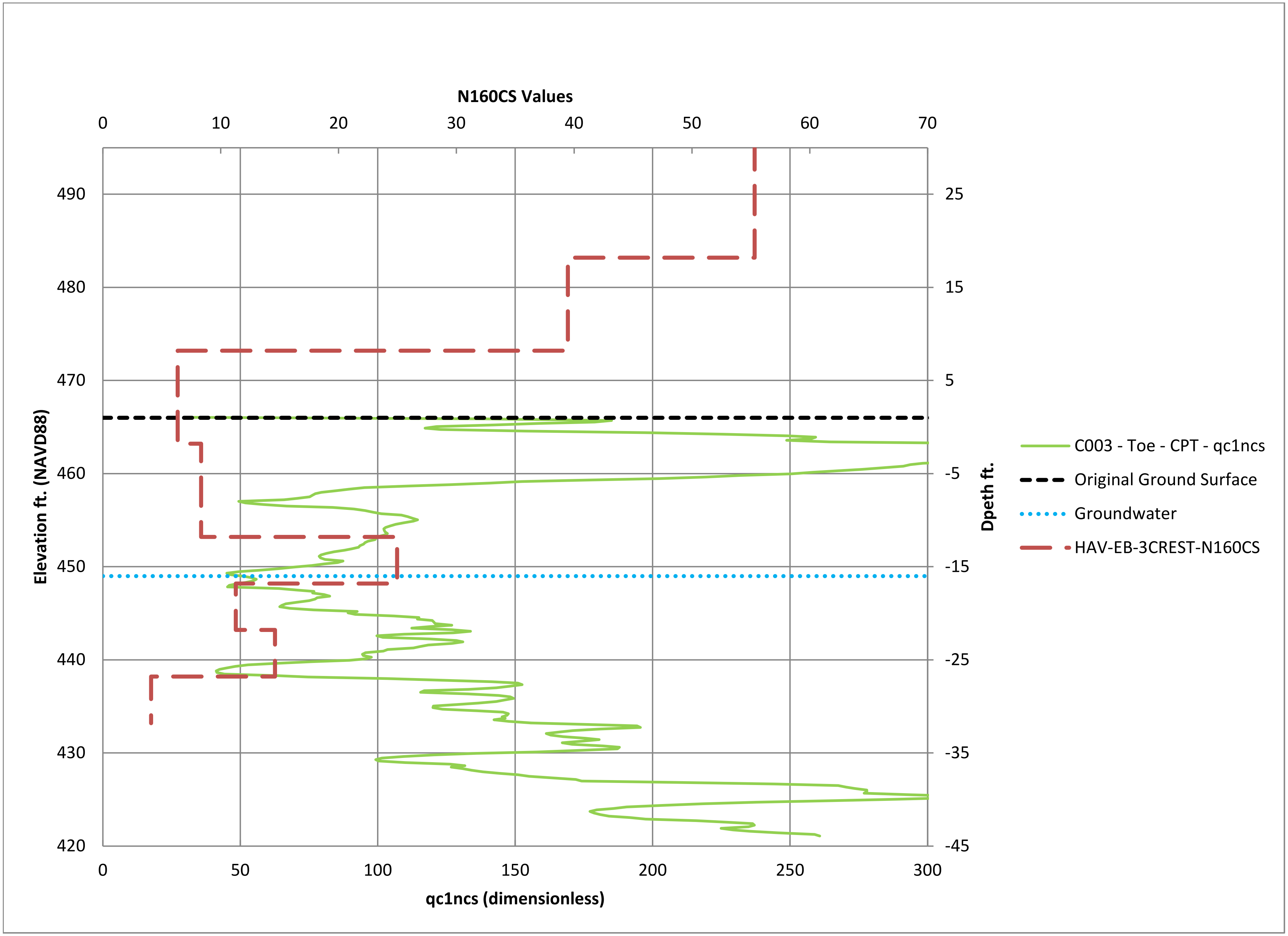


Figure E-1.3 - Site 3- qc1ncs and N160CS vs. Depth and Elevation

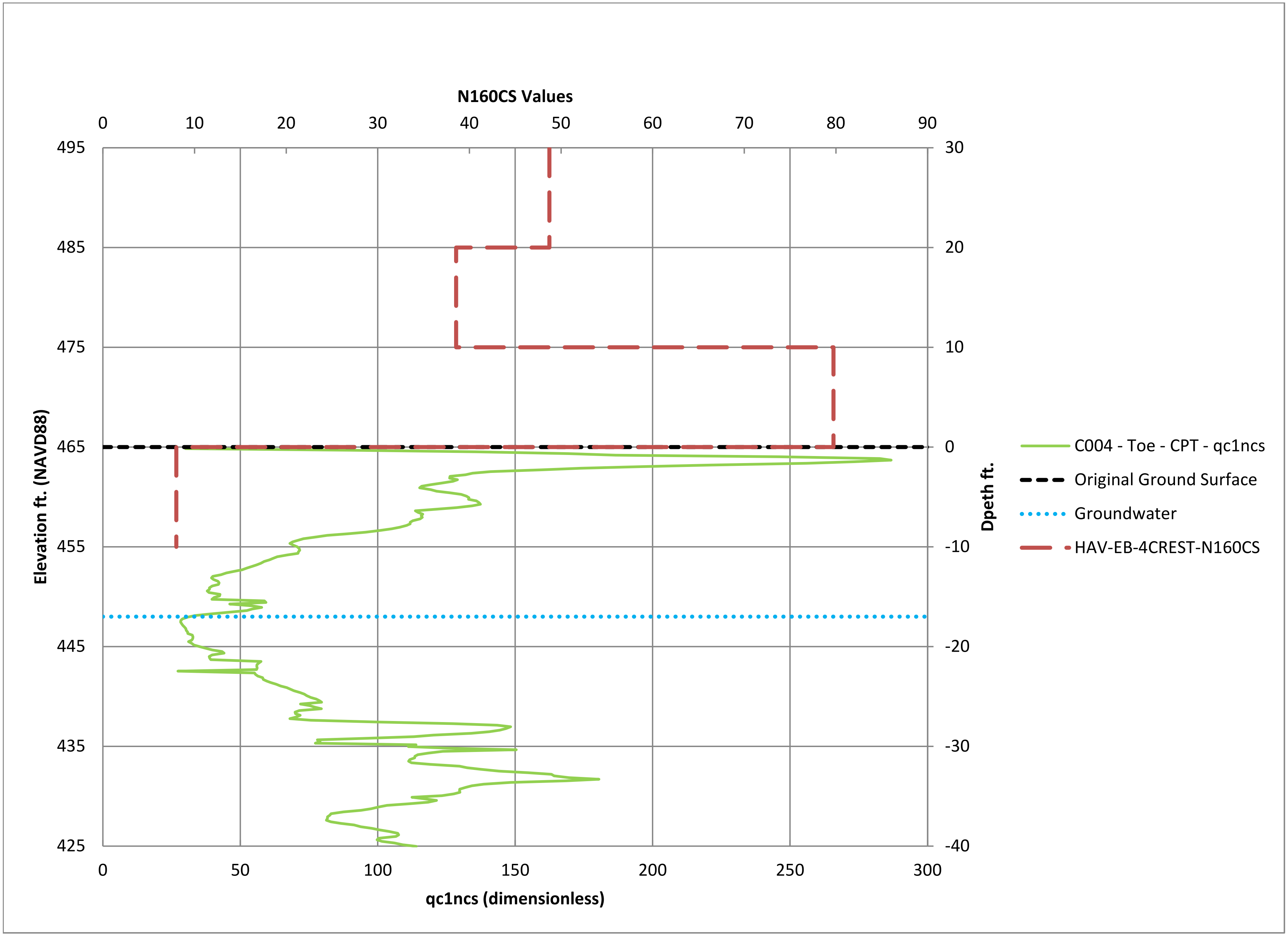


Figure E-1.4 - Site 4- qc1ncs and N160CS vs. Depth and Elevation

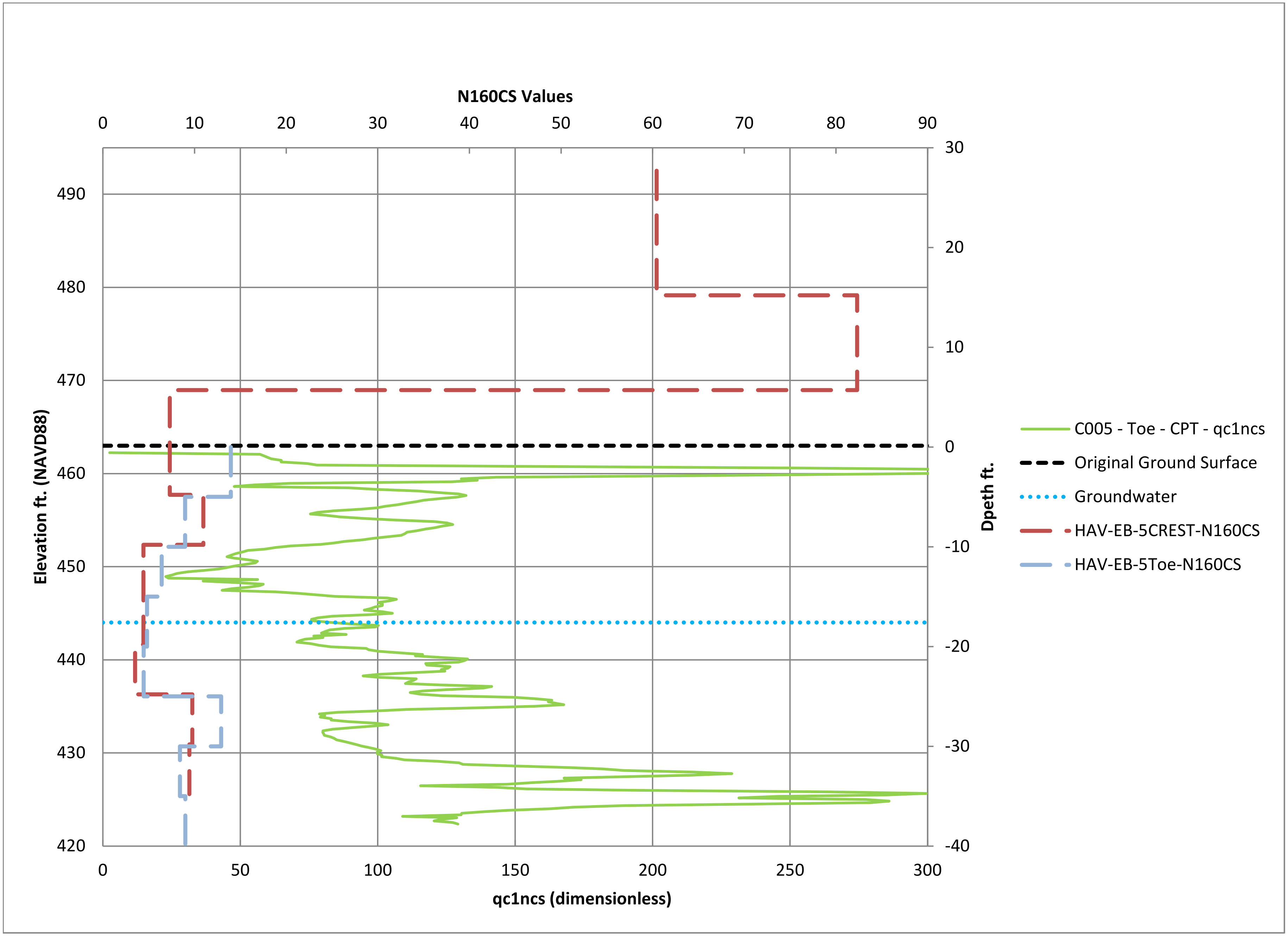


Figure E-1.5 - Site 5- qc1ncs and N160CS vs. Depth and Elevation

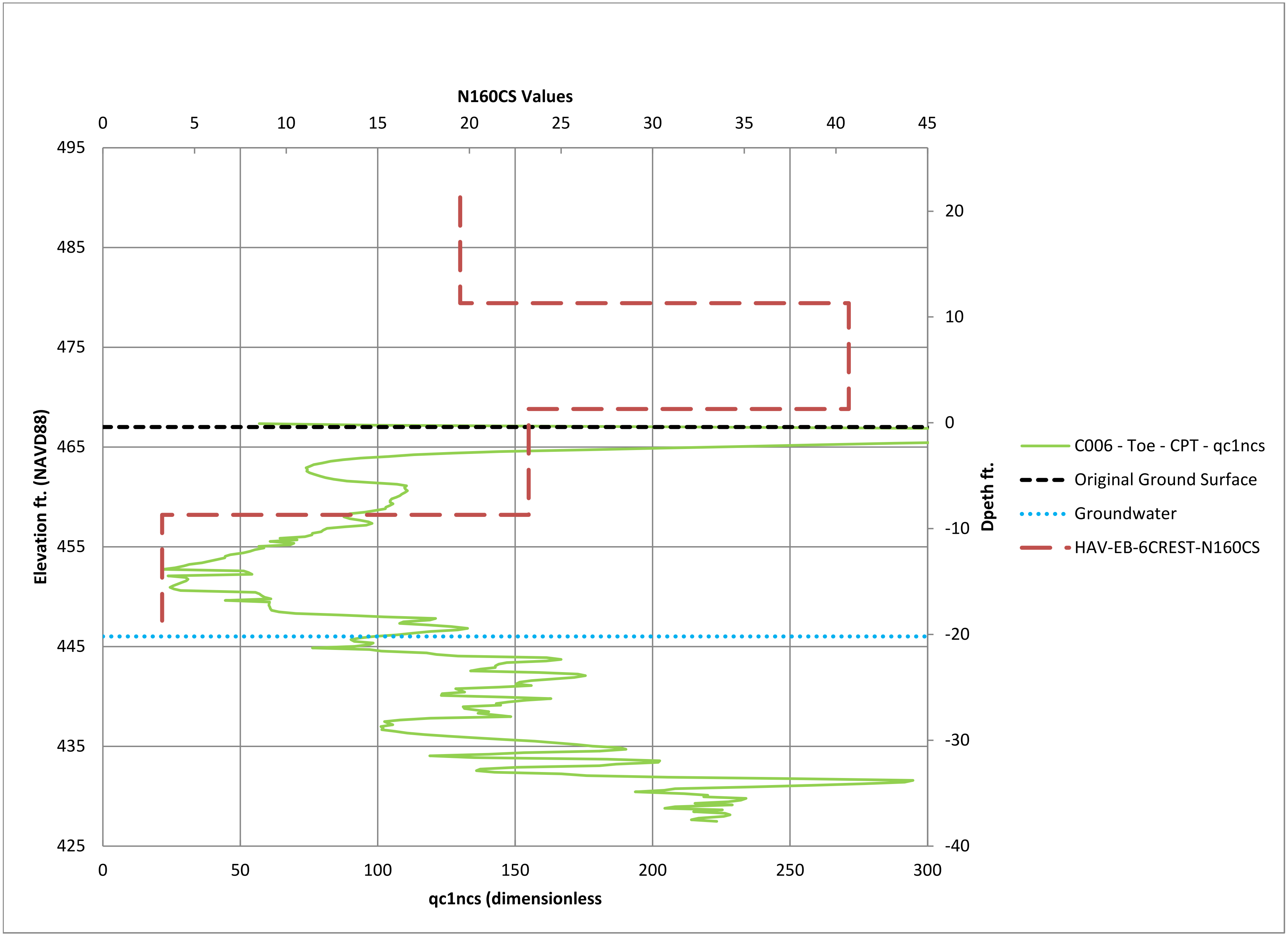


Figure E-1.6 - Site 6- qc1ncs and N160CS vs. Depth and Elevation

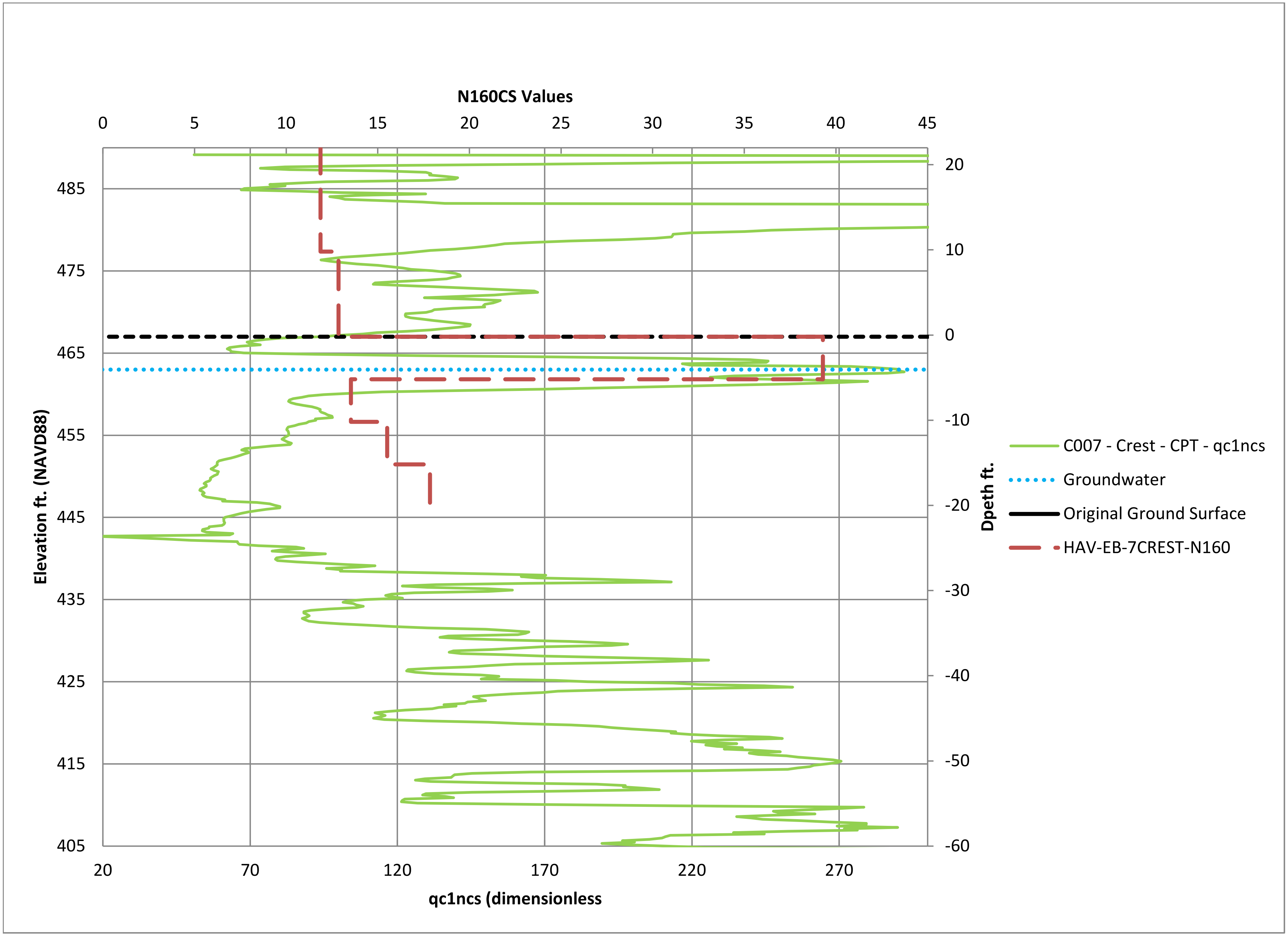


Figure E-1.7 - Site 7 - qc1ncs and N160CS vs. Depth and Elevation

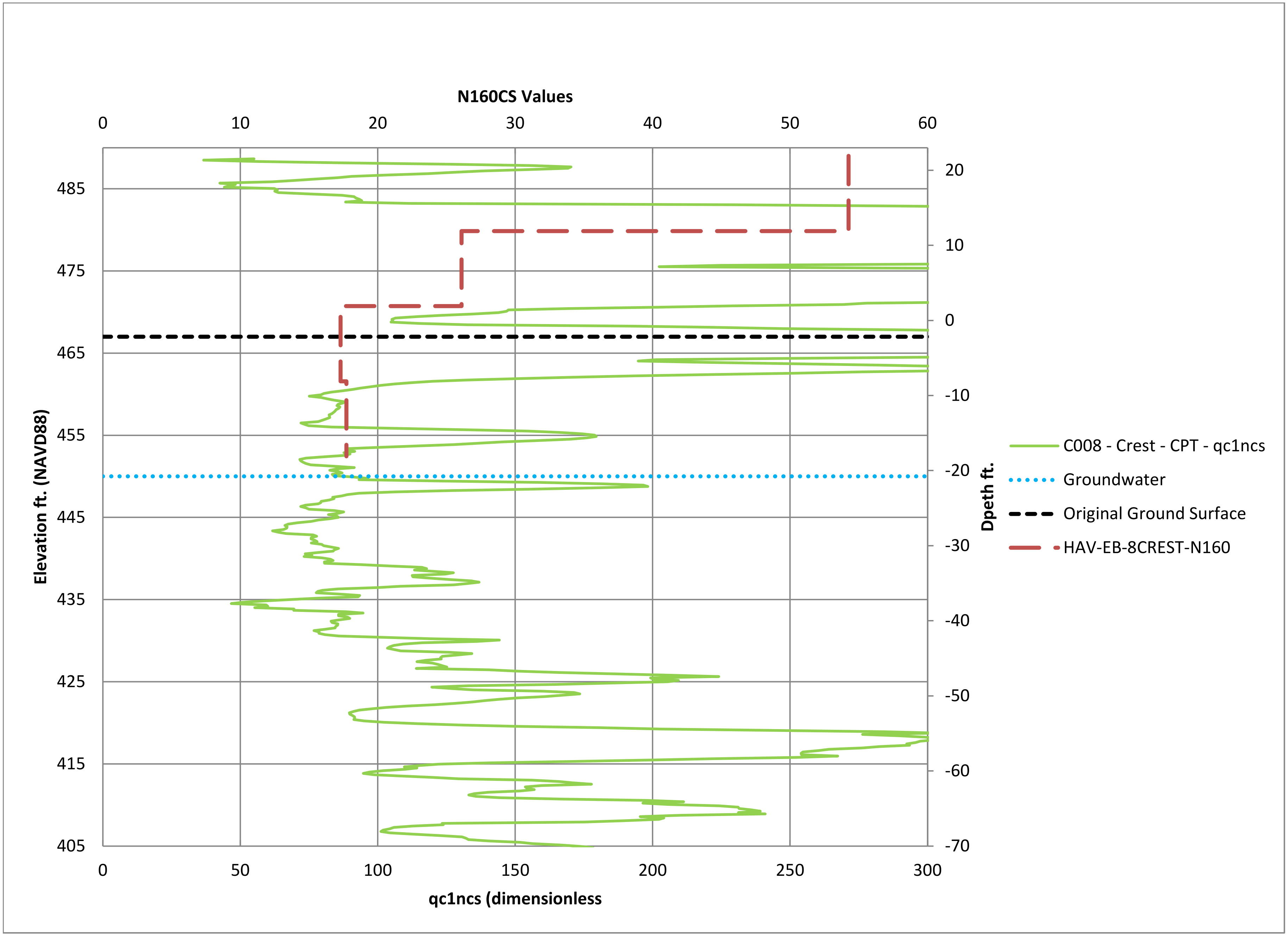


Figure E-1.8 - Site 8 - qc1ncs and N160CS vs. Depth and Elevation

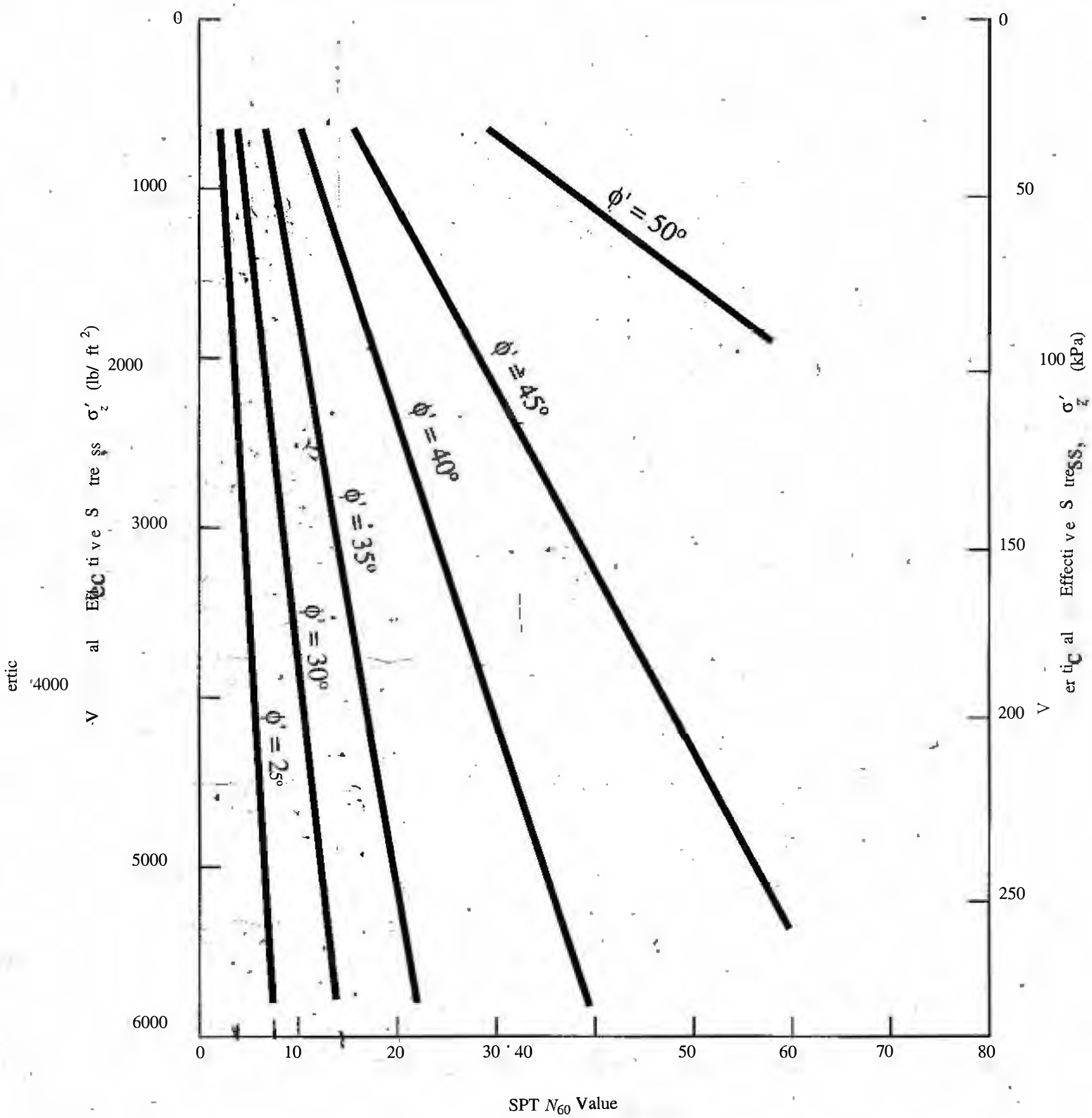


Figure E-2 Empirical correlation between N_{60} and ϕ' for uncemented sands (Adapted from DeMello, 1971).

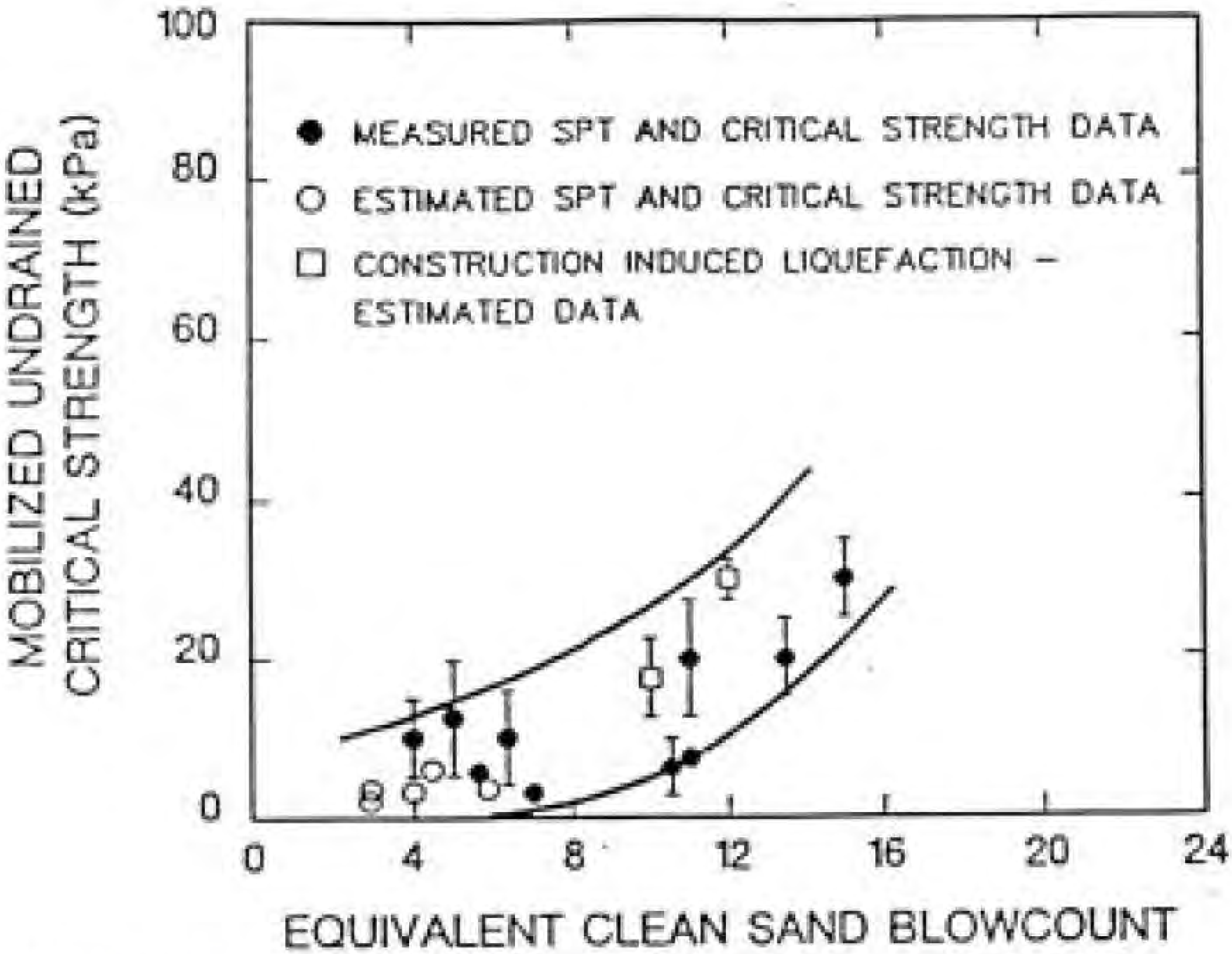


Fig. E-3: Recommended Relationship Between $S_{u,r}$ and $N_{1,60,CS}$ (Seed and Harder, 1990)

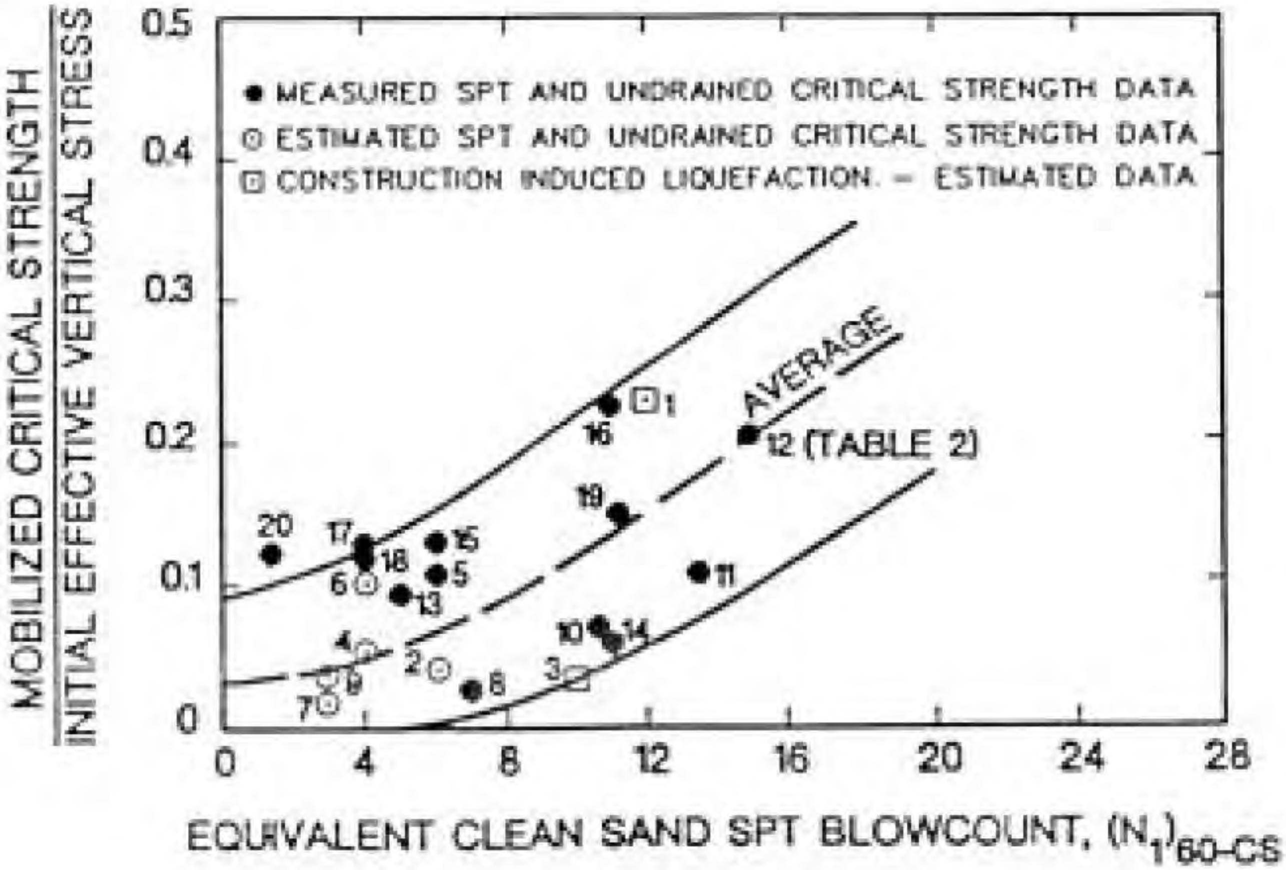


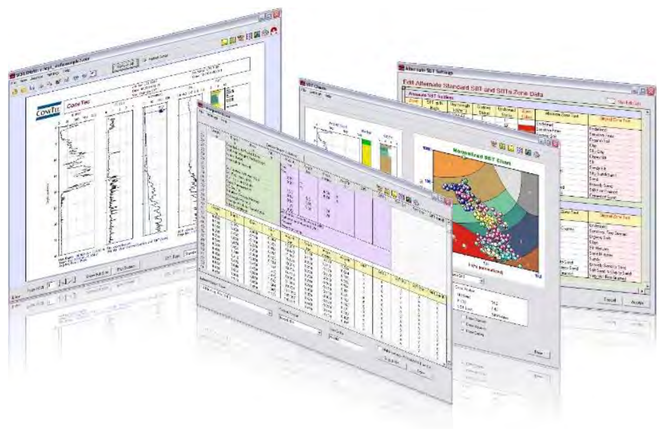
Fig. E-4: Relationship Between $S_{u,r}$/P vs. $N_{1,60,CS}$ as Proposed by Stark and Mesri (1992)

ATTACHMENT E.2

CALCULATED GEOTECHNICAL PARAMETERS GUIDE PROVIDED BY CONETEC

CALCULATED CPT GEOTECHNICAL PARAMETERS

A Detailed Description of the Methods Used in ConeTec's CPT Geotechnical Parameter Calculation and Plotting Software



Revision SZW-Rev 07

Revised April 9, 2015
Prepared by Jim Greig, M.A.Sc, P.Eng (BC)

Limitations

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Investigations Ltd. (ConeTec) or any of its affiliates. For this project, ConeTec has provided site investigation services, prepared factual data reporting and produced geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

To understand the calculations that have been performed and to be able to reproduce the calculated parameters the user is directed to the basic descriptions for the methods in this document and the detailed descriptions and their associated limitations and appropriateness in the technical references cited for each parameter.

ConeTec's Calculated CPT Geotechnical Parameters as of April 9, 2015

ConeTec's CPT parameter calculation and plotting routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. Due to drainage conditions and the basic assumptions and limitations of the correlations, not all geotechnical parameters provided are considered applicable for all soil types. The results are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters calculated by the program and does not assume liability for any use of the results in any design or review. For verification purposes we recommend that representative hand calculations be done for any parameter that is critical for design purposes. The end user of the parameter output should also be fully aware of the techniques and the limitations of any method used by the program. The purpose of this document is to inform the user as to which methods were used and to direct the end user to the appropriate technical papers and/or publications for further reference.

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Investigations Ltd. (ConeTec) or any of its affiliates.

The CPT calculations are based on values of tip resistance, sleeve friction and pore pressures considered at each data point or averaged over a user specified layer thickness (e.g. 0.20 m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. The corrected tip resistance (corrected using u_2 pore pressure values) is used for all of the calculations. Since all ConeTec cones have equal end area friction sleeves pore pressure corrections to sleeve friction, f_s, are not required.

The tip correction is: $q_t = q_c + (1-a) \bullet u_2$ (consistent units are implied)

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weight values that have been assigned to the Soil Behavior Type (SBT) zones, from a user defined unit weight profile, by using a single uniform value used throughout the profile, through unit weight estimation techniques described in various technical papers or from a combination of the these methods. The parameter output files indicate the method(s) used.

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (typically obtained from CPT dissipation tests) or a combination of the two. For over water projects the stress effects of the column of water above the mudline have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at the mudline). The parameter output files indicate the method(s) used.

A majority of parameter calculations are derived or driven by results based on material types as determined by the various soil behavior type charts depicted in Figures 1 through 4. The parameter output files indicate the method(s) used.

The Soil Behavior Type classification chart shown in Figure 1 is the classic non-normalized SBT Chart developed at the University of British Columbia and reported in Robertson, Campanella, Gillespie and Greig (1986). Figure 2 shows the original normalized (linear method) SBT chart developed by Robertson (1990). The Bq classification charts shown in Figures 3a and 3b incorporate pore pressures into the SBT classification and are based on the methods described in Robertson (1990). All of these charts have been summarized in Lunne, Robertson and Powell (1997). The Jefferies and Davies SBT chart shown in Figure 3c is based on the techniques discussed in Jefferies and Davies (1993) which introduced the concept of the Soil Behaviour Type Index parameter, I_c. Please note that the I_c parameter developed by Robertson and Fear (1995), often cited as from Robertson and Wride, (1998), is similar in concept but uses a slightly different calculation method than that used by Jefferies and Davies (1993) as the latter incorporates pore pressure in their technique through the use of the Bq parameter. The normalized Qtn SBT chart shown in Figure 4 is based on the work by Robertson (2009) utilizing a variable stress ratio exponent, n, for normalization based on a slightly modified redefinition and iterative approach for I_c. The boundary curves drawn on the chart are based on the work described in Robertson (2010).

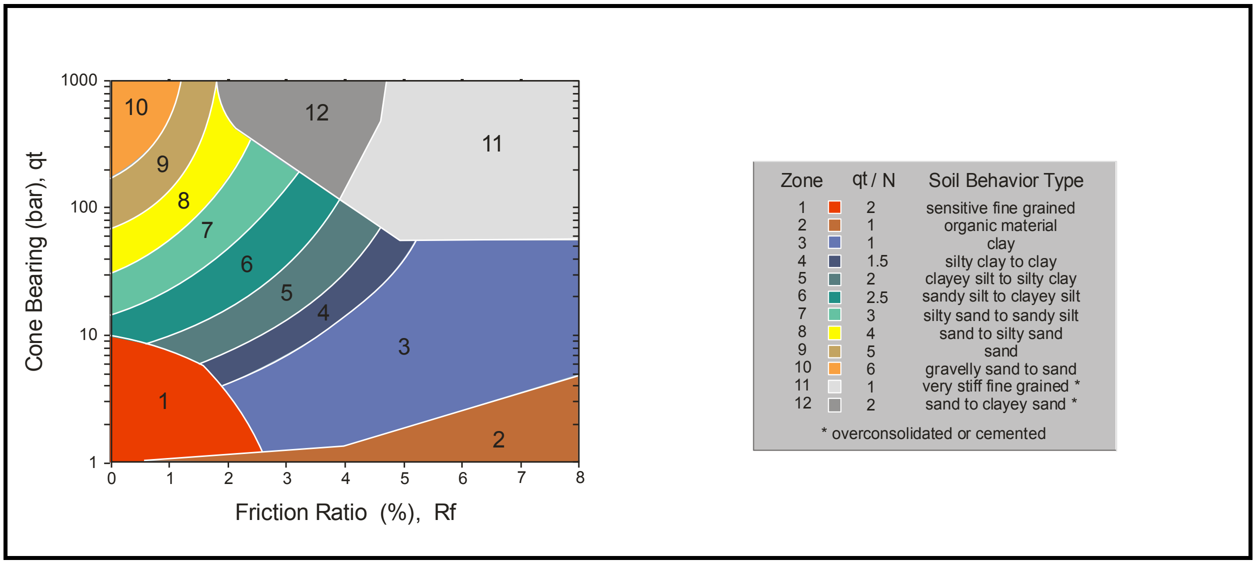


Figure 1. Non-Normalized Soil Behavior Type Classification Chart (SBT)

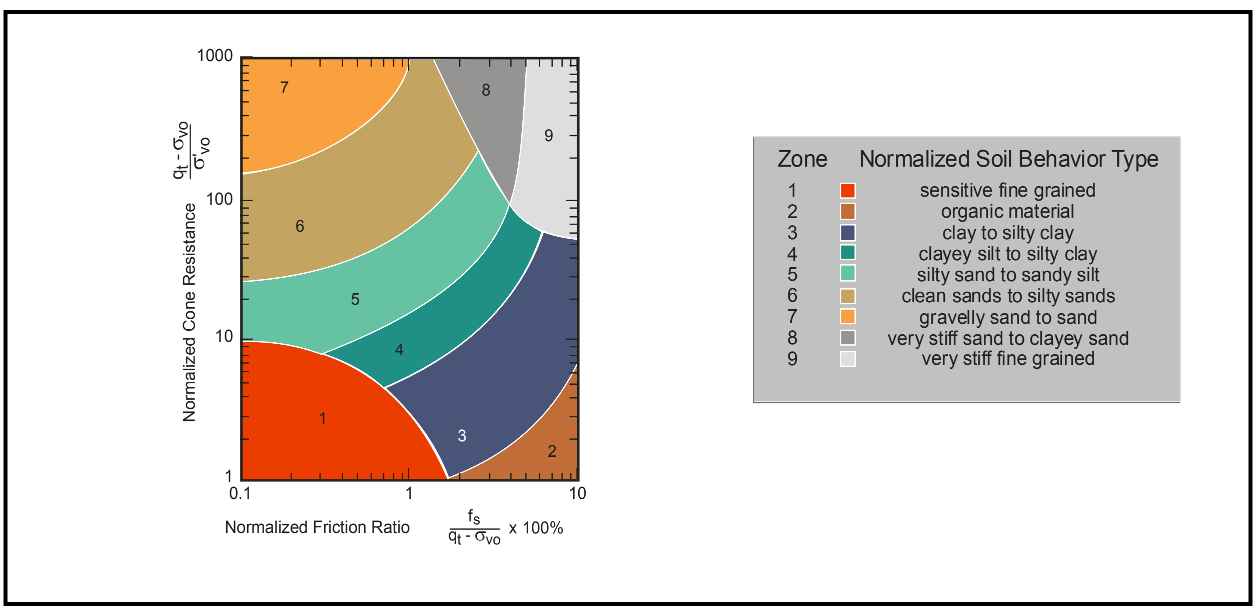


Figure 2. Normalized Soil Behavior Type Classification Chart (SBTn)

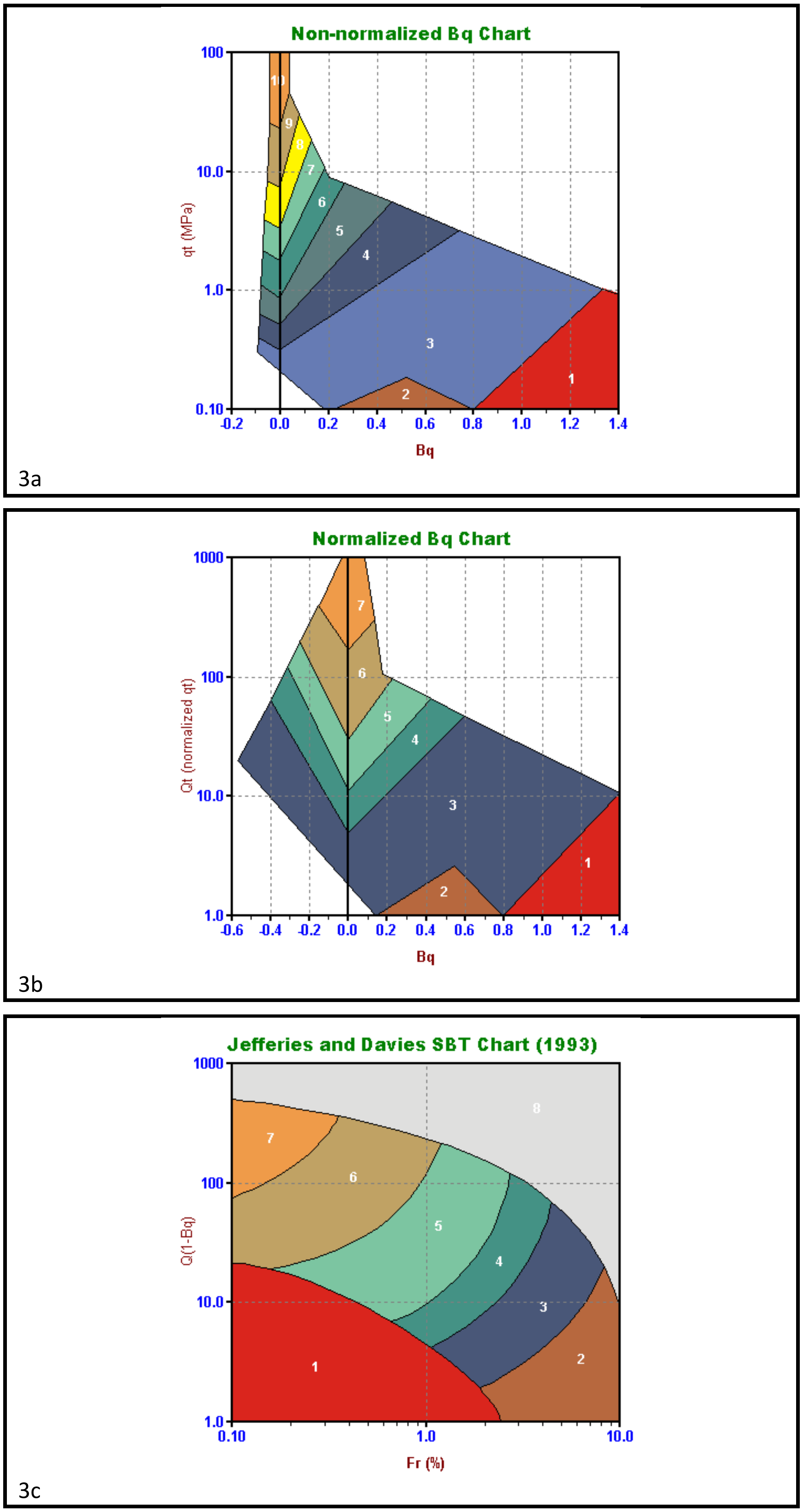


Figure 3. Alternate Soil Behavior Type Charts

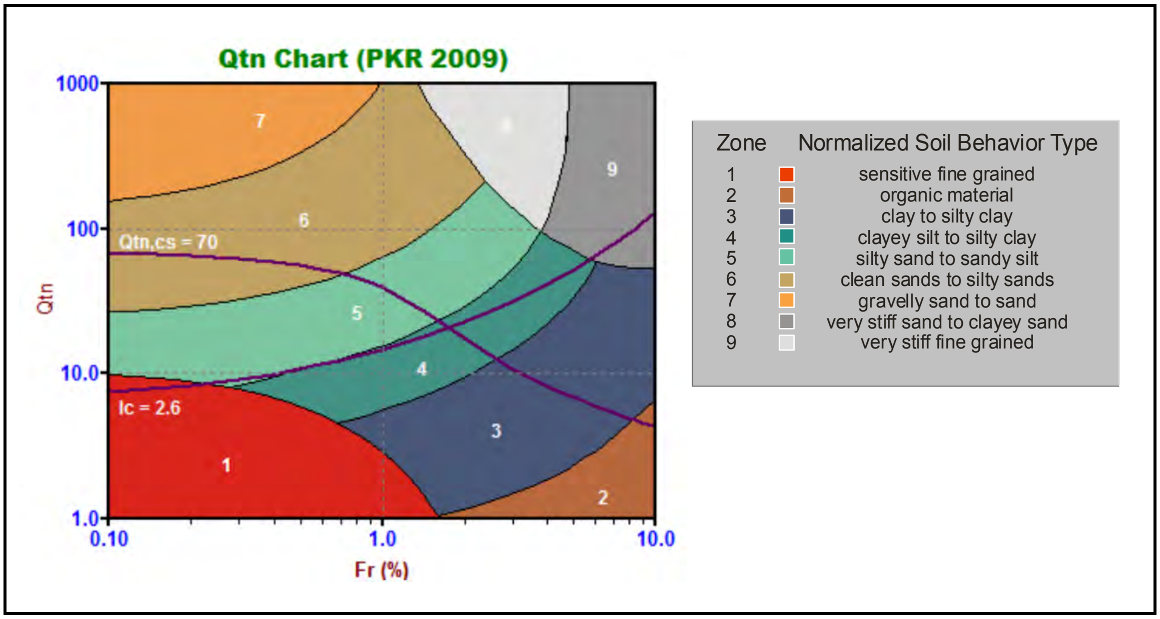


Figure 4. Normalized Soil Behavior Type Chart using Q_{tn} (SBT Qtn)

Details regarding the geotechnical parameter calculations are provided in Tables 1a and 1b. The appropriate references cited are listed in Table 2. Non-liquefaction specific parameters are detailed in Table 1a and liquefaction specific parameters are detailed in Table 1b.

Where methods are based on charts or techniques that are too complex to describe in this summary the user should refer to the cited material. Specific limitations for each method are described in the cited material.

Where the results of a calculation/correlation are deemed *'invalid'* the value will be represented by the text strings "-9999" or "-9999.0" or simply the value 0.0 (Zero). Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).

2. Where the calculation method is inappropriate, for example, drained parameters in a material behaving as an undrained material (and vice versa).

3. Where input values are beyond the range of the referenced charts or specified limitations of the correlation method.

4. Where pre-requisite or intermediate parameter calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the calculated parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are typically provided in Microsoft Excel XLS or XLSX format. The ConeTec software has several options for output depending on the number or types of calculated parameters desired or requested by the client. Each output file is named using the original COR file basename followed by a three or four letter indicator of the output set selected (e.g. BSC, TBL, NLI, NL2, IFI, IFI2) and possibly followed by an operator selected suffix identifying the characteristics of the particular calculation run.

Table 1a. CPT Parameter Calculation Methods – Non liquefaction Parameters

Calculated Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where calculations are done at each point then Mid Layer Depth = Recorded Depth)*	*[Depth (Layer Top) + Depth (Layer Bottom)]/ 2.0*	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client or through site survey	Elevation = Collar Elevation - Depth	
Avg qc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when calculations are done at each point*	
Avg qt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a) \bullet u_2$	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when calculations are done at each point*	
Avg fs	Averaged sleeve friction (f_s)	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when calculations are done at each point*	
Avg Rf	Averaged friction ratio (R_f) where friction ratio is defined as: $Rf = 100\% \bullet \frac{fs}{q_t}$	$AvgRf = 100\% \cdot \frac{Avgfs}{Avgqt}$ *n=1 when calculations are done at each point*	
Avg u	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when calculations are done at each point*	
Avg Res	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} RESISTIVITY_i$ *n=1 when calculations are done at each point*	
Avg UVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when calculations are done at each point*	
Avg Temp	Averaged Temperature (this data is not always available since it requires specialized calibrations)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} TEMPERATURE_i$ *n=1 when calculations are done at each point*	
Avg Gamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA_i$ *n=1 when calculations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson et al 1986 (often referred to as Robertson and Campanella, 1986)	See Figure 1	1, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson 1990 (linear normalization)	See Figure 2	2, 5
SBT-Bq	Non-normalized Soil Behavior type based on the Bq parameter	See Figure 3	2, 5
SBT-Bqn	Normalized Soil Behavior based on the Bq parameter	See Figure 3	2, 5
SBT-JandD	Soil Behaviour Type as defined by Jeffries and Davies (Introduced the concept of an I_c parameter)	See Figure 3	7
SBT Qtn	Soil Behaviour Type as defined by Robertson (2009) using a variable stress ratio exponent for normalization based on I_c	See Figure 4	xx

Calculated Parameter	Description	Equation	Ref
Unit Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile 4) Unit weight estimation techniques (various methods) 5) UW (fs) estimate of unit weight based on sleeve friction, fs	See references	5, 21
TStress σ_v	Total vertical overburden stress at Mid Layer Depth *A layer is defined as the averaging interval specified by the user where depths are reported at their respective mid-layer depth.* *For data calculated at each point layers are still defined using the recorded depth as the mid-point of the layer. Thus, a layer starts half-way between the previous depth and the current depth unless this is the first point in which case the layer start is at zero depth. The layer bottom is half-way from the current depth to the next depth unless it is the last data point.* *Defining layers affects how stresses are calculated since the unit weight attributed to a data point is used throughout the entire layer. This means that to calculate the stresses the total stress at the top of a layer is required to which you add the incremental stresses calculated at the mid layer depth and at the bottom of the layer. The stress at the layer bottom becomes the stress at the top of the subsequent layer. Stresses are NOT calculated from mid-point to mid-point.* *For over-water work the total stress due to the column of water above the mud line is taken into account where appropriate.*	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ *where* γ_i is layer unit weight h_i is layer thickness	
EStress σ_v'	Effective vertical overburden stress at Mid Layer Depth	$\sigma_v' = \sigma_v - u_{eq}$	
Equil u u_{eq} or u_0	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic below water table 2) user supplied profile 3) combination of those above When a user supplied profile is used/provided a linear interpolation is done between equilibrium pore pressures defined for specific depths. If the profile values start below the water table then a linear transition from zero pressure at the water table to the first defined pointed is used. Equilibrium pore pressures may come from dissipation tests, adjacent piezometers or other sources. Occasionally an extra equilibrium point ("assumed value") will be provided in the profile that does not come from a recorded value to smooth out any abrupt changes or to deal with material interfaces. These "assumed" values will be indicated on our plots and in tabular summaries.	For hydrostatic option: $u_{eq} = \gamma_w \cdot (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
K_0	Coefficient of earth pressure at rest, K_0	$= (1 - \sin\Phi')\, OCR^{\sin\Phi'}$	17

CONETEC

Calculated Parameter	Description	Equation	Ref
C_n	Overburden stress correction factor used for $(N_1)_{60}$ and older CPT parameters	$C_n = (P_a/\sigma_v')^{-0.5}$ where *0.0 < C_n < 1.7 (user adjustable)* *P_a is atmospheric pressure (100 kPa)*	12
C_q	Overburden stress normalizing factor	$C_q = 1.8 / (0.8 + (\sigma_v'/P_a))$ where *0.0 < C_q < 1.7 (user adjustable)* *P_a is atmospheric pressure (100 kPa)*	12
N_{60}	SPT N value at 60% energy calculated from q_t/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	4, 5
(N1)60	SPT N_{60} value corrected for overburden pressure	$(N_1)_{60} = C_n \bullet N_{60}$	4
N60Ic	SPT N_{60} values based on the I_c parameter	$(q_t/P_a)/ N_{60} = 8.5\ (1 - I_c/4.6)$ Pa being atmospheric pressure	5
(N1)60Ic	SPT N_{60} value corrected for overburden pressure (using N_{60} I_c). User has 2 options.	1) $(N_1)_{60}Ic = C_n \bullet (N_{60}\, I_c)$ 2) $q_{c1n}/ (N_1)_{60}I_c = 8.5\ (1 - I_c/4.6)$	4 5
Su or Su (Nkt)	Undrained shear strength based on q_t S_u factor N_{kt} is user selectable	$Su = \dfrac{qt - \sigma_v}{N_{kt}}$	1, 5
Su or Su (Ndu)	Undrained shear strength based on pore pressure S_u factor $N_{\Delta u}$ is user selectable	$Su = \dfrac{u_2 - u_{eq}}{N_{\Delta u}}$	1, 5
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann (1978) d) Jamiolkowski (1985) - All Sands e) Jamiolkowski et al (2003) (various compressibilities, K_o)	See reference (methods a through d) Jamiolkowski et al (2003) reference	5 14
PHI ϕ	Friction Angle determined from one of the following user selectable options (methods a through d are for sands and method e is for silts and clays): a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu d) Kulhawy and Mayne e) NTH method (clays and silts)	See appropriate reference	5 5 5 11 23
k	Coefficient of permeability (assigned to each SBT zone)		5
Delta U/qt	Differential pore pressure ratio (older parameter used before B_q was established)	$= \dfrac{\Delta u}{qt}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* *u_{eq} = equilibrium pore pressure*	
Bq	Pore pressure parameter	$Bq = \dfrac{\Delta u}{qt - \sigma_v}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* *u_{eq} = equilibrium pore pressure*	1, 5
Net qt or qtNet	Net tip resistance (used in many subsequent correlations)	$qt - \sigma_v$	

Calculated Parameter	Description	Equation	Ref
qe	Effective tip resistance (using the dynamic pore pressure u_2 and not equilibrium pore pressure)	$qt - u_2$	
qeNorm	Normalized effective tip resistance	$\frac{qt - u_2}{\sigma'_v}$	
Q_t or Norm: Qt	Normalized q_t for Soil Behavior Type classification as defined by Robertson (1990) using a linear stress normalization. Note this is different from Q_{tn}.	$Qt = \frac{qt - \sigma_v}{\sigma'_v}$	2, 5
F_r or Norm: Fr	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson (1990)	$Fr = 100\% \cdot \frac{fs}{qt - \sigma_v}$	2, 5
Q(1-Bq)	Q(1-Bq) grouping as suggested by Jefferies and Davies for their classification chart and the establishment of their I_c parameter	$Q \cdot (1 - Bq)$ *where Bq is defined as above and Q is the same as the normalized tip resistance, Q_t, defined above*	6, 7
qc1	Normalized tip resistance, q_{c1}, using a fixed stress ratio exponent, n (this method has stress units)	$q_{c1} = q_t \cdot (Pa/\sigma_v')^{0.5}$ where: Pa = atmospheric pressure	21
qc1 (Cn)	Normalized tip resistance, q_{c1}, based on C_n (this method has stress units)	$q_{c1}(Cn) = C_n * q_t$	5, 12
qc1 (Cq)	Normalized tip resistance, q_{c1}, based on C_q (this method has stress units)	$q_{c1}(Cq) = C_q * q_t$ (some papers use q_c)	5, 12
qc1n	normalized tip resistance, q_{c1n}, using a variable stress ratio exponent, n (where n=0.0, 0.70, 1.0) (this method is unit-less)	$q_{c1n} = (q_t / P_a)(P_a/\sigma_v')^n$ where: P_a = atm. Pressure and n ranges from 0.5 to 1.0 based on I_c (described below)	3, 5
I_c	Soil Behavior Type Index as defined by Robertson and Fear (1995) and Robertson and Wride (1998) for estimating grain size characteristics and providing smooth gradational changes across the SBTn chart	$I_c = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_a}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *Or* $Q = q_{c1n} = \left(\frac{qt}{P_a}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *depending on the iteration in finding I_c* *And Fr is in percent* *P_a = atmospheric pressure* *n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting I_c*	3, 5, 21
Ic (PKR 2009)	Soil Behavior Type Index, I_c (PKR 2009) based on a variable stress ratio exponent n, which too is based on I_c (PKR 2009)	I_c (PKR 2009) $= [(3.47 - Q_{tn})^2 + (1.22 + F_r)^2]^{0.5}$	15
n (PKR 2009)	Stress ratio exponent n, based on I_c (PKR 2009)	n (PKR 2009) $= 0.381 (I_c) + 0.05 (\sigma_v'/P_a) - 0.15$	15

Calculated Parameter	Description	Equation	Ref
Qtn (PKR 2009)	Normalized tip resistance using a variable stress ratio exponent based on I_c (PKR 2009)	$Q_{tn} = [(qt - \sigma_v)/P_a](P_a/\sigma_v')^n$ where P_a = atmospheric pressure (100 kPa) n = stress ratio exponent described above	15
FC	Apparent fines content (%)	$FC=1.75(Ic^{3.25}) - 3.7$ $FC=100$ for $I_c > 3.5$ $FC=0$ for $I_c < 1.26$ $FC = 5\%$ if $1.64 < I_c < 2.6$ AND $F_r<0.5$	3
I_c Zone	This parameter is the Soil Behavior Type zone based on the I_c parameter (valid for zones 2 through 7 on SBTn chart)	$I_c < 1.31$ Zone = 7 $1.31 < I_c < 2.05$ Zone = 6 $2.05 < I_c < 2.60$ Zone = 5 $2.60 < I_c < 2.95$ Zone = 4 $2.95 < I_c < 3.60$ Zone = 3 $I_c > 3.60$ Zone = 2	3
State Param or State Parameter or ψ	The state parameter index ψ is defined as the difference between the current void ratio, e, and the critical void ratio, e_c. Positive ψ - contractive soil Negative ψ - dilative soil This is based on the work by Been and Jefferies (1985) and Plewes, Davies and Jefferies (1992)	See reference	6, 8
Yield Stress σ_p' or σ_v'	Yield stress is calculated using the following methods a) General method b) 1st order approximation using q_tNet (clays) c) 1st order approximation using Δu_2 (clays) d) 1st order approximation using q_e (clays)	a) $\sigma_p' = 0.33\cdot(q_t - \sigma_v)^{m'} (\sigma_{atm}/100)^{1-m'}$ where $m' = 1 - \frac{0.28}{1+(I_c/2.65)^{25}}$ b) $\sigma_p' = 0.33\cdot(q_t - \sigma_v)$ c) $\sigma_p' = 0.54\cdot(\Delta u_2)$ $\Delta u_2 = u_2 - u_0$ d) $\sigma_p' = 0.60\cdot(q_t - u_2)$	19 20 20 20
OCR	Over Consolidation Ratio based on a) Schmertmann (1978) method involving a plot plot of S_u/σ_v' /($S_u/\sigma_v')_{NC}$ and OCR b) based on Yield stresses described above c) approximate version based on Δu d) approximate version based on effective tip, q_e e) approximate version based on shear wave velocity, V_s	a) requires a user defined value for NC Su/P_c' ratio b) $OCR = \sigma_p'/\sigma_v'$	9 19 20 20 18
Es/qt	Intermediate parameter for calculating Young's Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5
Es Young's Modulus E	Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the E_s/q_t chart.	Mean normal stress is evaluated from: $\sigma_m' = \frac{1}{3}(\sigma_v' + \sigma_h' + \sigma_h')^3$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress and $\sigma_h = K_o \bullet \sigma_v'$ with K_o assumed to be 0.5	5

Calculated Parameter	Description	Equation	Ref
Delta U/TStress	Differential pore pressure ratio with respect to total stress	$= \frac{\Delta u}{\sigma_v}$ *where:* $\Delta u = u - u_{eq}$	
Delta U/EStress	Differential pore pressure ratio with respect to effective stress	$= \frac{\Delta u}{\sigma_v'}$ *where:* $\Delta u = u - u_{eq}$	
Su/EStress	Undrained shear strength ratio with respect to vertical effective overburden stress using the S_u (N_{kt}) method	$= Su / \sigma_v'$	
Alpha	Alpha values are correlation factors based on I_c used to estimate a) Shear wave velocity V_s b) Small strain shear modulus G_0 c) Young's Modulus	a) $\alpha_{vs} = 10^{(0.55\ Ic\ +\ 1.68)}$ b) $\alpha_G = 0.0188\ [10^{(0.55\ Ic\ +\ 1.68)}]$ c) $\alpha E = 0.015\ [10^{(0.55\ Ic\ +\ 1.68)}]$	15
Est Vs or Est Vs (PKR 2009)	Estimate of shear wave velocity (m/s)	$V_s = [\alpha_{vs}\ (qt - \sigma_v)/P_a]^{0.5}$ V_s is in m/s	15
Est Go or Est Go (PKR 2009)	Estimate of the small strain shear modulus G_0	$G_0 = \alpha_G\ (qt - \sigma_v)$	15
Est E25 or Est E25 (PKR 2009)	Estimate of Young's Modulus at a 25% degree of loading, E_{25}'	$E_{25}' = \alpha_E\ (qt - \sigma_v)$	15
Gmax	G_{max} determined from SCPT shear wave velocities (not estimated values)	$G_{max} = \rho V_s^2$ and ρ is the mass density of the soil determined from the estimated unit weights at each test depth	
qtNet/Gmax	Net tip resistance ratio with respect to the small strain modulus G_{max} determined from SCPT shear wave velocities (not estimated values)	$= (qt - \sigma_v) / G_{max}$ where $G_{max} = \rho V_s^2$ and ρ is the mass density of the soil determined from the estimated unit weights at each test depth	

Table 1b. CPT Parameter Calculation Methods – Liquefaction Parameters

Calculated Parameter	Description	Equation	Ref
K_{SPT}	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) \bullet (FC - 5))$	10
K_{CPT}	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference)	10
Kc (PKR 2010)	Clean sand equivalent factor to be applied to Q_{tn}	$K_c = 1.0$ for $I_c \leq 1.64$ $K_c = 5.581\, I_c^4 - 0.403\, I_c^3 - 21.63 I_c^2 + 33.75\, I_c - 17.88$ for $I_c > 1.64$	16
$(N_1)_{60cs}Ic$	Clean sand equivalent SPT $(N_1)_{60}I_c$. User has 3 options.	1) $(N_1)_{60cs}Ic = \alpha + \beta((N_1)_{60}I_c)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}I_c)$ 3) $(q_{c1ncs})/ (N_1)_{60cs}I_c = 8.5\,(1 - I_c/4.6)$ FC ≤ 5%: $\alpha = 0$, $\beta=1.0$ FC ≥ 35% $\alpha = 5.0$, $\beta=1.2$ 5% < FC < 35% $\alpha = exp[1.76 - (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
Qtn,cs (PKR 2010)	Clean sand equivalent for Q_{tn} described above - Q_{tn} being the normalized tip resistance based on a variable stress exponent as defined by Robertson (2009)	$Q_{tn,cs} = K_c \cdot Q_{tn}$	16
Su(Liq)/ESv	Liquefied shear strength ratio as defined by Olson and Stark	$\frac{Su(Liq)}{\sigma_v'} = 0.03 + 0.0143(q_{c1})$ Note: σ_v' and s_v' are synonymous	13
Su(Liq)/ESv (PKR 2010)	Liquefied shear strength ratio as defined by Robertson (2010)	$\frac{Su(Liq)}{\sigma_v'}$ Based on a function involving $Q_{tn,cs}$	16
Su (Liq) (PKR 2010)	Liquefied shear strength derived from the liquefied shear strength ratio and effective overburden stress		16
Cont/Dilat Tip	Contractive / Dilative qc1 Boundary based on $(N_1)_{60}$	$(\sigma_v')_{boundary} = 9.58 \times 10^{-4}\, [(N_1)_{60}]^{4.79}$ *qc1* is calculated from specified qt(MPa)/N ratio	13
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833\, [q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93\, [q_{c1ncs}/1000]^3 + 0.08$	10
CSR	Cyclic Stress Ratio	$CSR = (\tau_{av}/\sigma_v') = 0.65\,(a_{max} / g)\,(\sigma_v/ \sigma_v')\, r_d$ $r_d = 1.0 - 0.00765\, z$ $z \leq 9.15m$ $r_d = 1.174 - 0.0267\, z$ $9.15 < z \leq 23m$ $r_d = 0.744 - 0.008\, z$ $23 < z \leq 30m$ $r_d = 0.50$ $z > 30m$	10

Calculated Parameter	Description	Equation	Ref
MSF	Magnitude Scaling Factor	See Reference	10
FofS	Factor of Safety against Liquefaction	*$FS = (CRR_{7.5} / CSR)\ MSF$*	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account F of S and limitations based on I_c and q_{c1ncs}.	10

Table 2. References

No.	Reference
1	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
2	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
3	Robertson, P.K. and Wride (Fear), C.E., 1998, "Evaluating cyclic liquefaction potential using the cone penetration test", Canadian Geotechnical Journal, 35: 442-459.
4	Robertson, P.K. and Wride, C.E., 1997, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997.
5	Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, " Cone Penetration Testing in Geotechnical Practice," Blackie Academic and Professional.
6	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.
7	Jefferies, M.G. and Davies, M.P., 1993, "Use of CPTu to Estimate equivalent N_{60}", Geotechnical Testing Journal, 16(4): 458-467.
8	Been, K. and Jefferies, M.P., 1985, "A state parameter for sands", Geotechnique, 35(2), 99-112.
9	Schmertmann, 1978, "Guidelines for Cone Penetration Test Performance and Design", Federal Highway Administration Report FHWA-TS-78-209, U.S. Department of Transportation.
10	Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Salt Lake City, 1996, chaired by Leslie Youd.
11	Kulhawy, F.H. and Mayne, P.W., 1990, "Manual on Estimating Soil Properties for Foundation Design, Report No. EL-6800", Electric Power Research Institute, Palo Alto, CA, August 1990, 306 p.
12	Olson, S.M. and Stark, T.D., 2002, "Liquefied strength ratio from liquefied flow failure case histories", Canadian Geotechnical Journal, 39: 951-966.
13	Olson, Scott M. and Stark, Timothy D., 2003, "Yield Strength Ratio and Liquefaction Analysis of Slopes and Embankments", Journal of Geotechnical and Geoenvironmental Engineering, ASCE, August 2003.
14	Jamiolkowski, M.B., Lo Presti, D.C.F. and Manassero, M., 2003, "Evaluation of Relative Density and Shear Strength of Sands from CPT and DMT", Soil Behaviour and Soft Ground Construction, ASCE, GSP N0. 119, 201-238.
15	Robertson, P.K., 2009, "Interpretation of cone penetration tests – a unified approach", Canadian Geotechnical Journal, 46: 1337-1355.
16	Robertson, P.K., 2010, "Evaluation of Flow Liquefaction and Liquefied Strength Using the Cone Penetration Test", Journal of Geotechnical and Geoenvironmental Engineering, ASCE, June 2010.
17	Mayne, P.W. and Kulhawy, F.H., 1982, "Ko-OCR Relationships in Soil", Journal of the Geotechnical Engineering Division, ASCE, Vol. 108, GT6, pp. 851-872.
18	Mayne, P.W., Robertson P.K. and Lunne T., 1998, "Clay stress history evaluated from seismic piezocone tests", Proceedings of the First International Conference on Site Characterization – ISC '98, Atlanta Georgia, Volume 2, 1113-1118.
19	Mayne, P.W., 2014, "Generalized CPT Method for Evaluating Yield Stress in Soils", Geocharacterization for Modeling and Sustainability (GSP 235: Proc. GeoCongress 2014, Atlanta, GA), ASCE, Reston, Virginia: 1336-1346.
20	Mayne, P.W., 2015, "Geocharacterization by In-Situ Testing", Continuing Education Course, Vancouver, BC, January 6-8, 2015.

No.	Reference
21	Robertson, P.K. and Fear, C.E., 1995, "Liquefaction of sands and its evaluation", Proceedings of the First International Conference on Earthquake Engineering, Keynote Lecture IS Tokyo '95, Tokyo Japan, 1995.
22	Mayne, P.W., Peuchen, J. and Boumeester, D., 2010, "Soil unit weight estimation from CPTs", Proceeding of the 2nd International Symposium on Cone Penetration Testing (CPT '10), Vol 2, Huntington Beach, California; Omnipress: 169-176.
23	Mayne, P.W., 2007, "NCHRP Synthesis 368 on Cone Penetration Test", Transportation Research Board, National Academies Press, Washington, D.C., 118 pages.

ATTACHMENT F

STATIC SLOPE STABILITY ANALYSIS

I. Objective

A static slope stability analysis of the Havana Power Station East Ash Pond Cells 1-4 CCR Unit was performed to determine if the criteria outlined by the USEPA Federal Register 40 CFR Part 257.73 (e)(i) and (ii) was met. The detailed description of the static slope stability process is discussed below. The embankments for the East Ash Pond satisfied the criteria by meeting the required Factors of Safety (FS) for the static slope loading conditions. Cases considered involved the long-term steady state seepage condition and the surcharge loading condition for the exterior slope.

II. Model Parameters

Site Stratigraphy

The site consists of four main stratigraphic units as described below. The clay liner and fly ash were delineated based on literature data (Reference 3). Embankment fill and foundation were defined using the plots in **Figure E-1.1 to Figure E1.8** in **Attachment E Material Characterization**.

Geometry

Cross-Sections:

Three cross sections were selected for stability analysis (A, B, and C). The cross section locations are shown in Figure F-2 Cross section A was selected for analysis because the zone of weaker embankment material (modelled as 10 ft thick) and potentially liquefiable materials are present at this cross section. Cross section B was selected for analysis because potentially liquefiable materials were encountered in borings drilled in this area. The thicknesses of potentially liquefiable zones are different at these cross section locations; consequently, both were analyzed to find the lower safety factor. Cross section C was selected for analysis because the embankment is the highest (≈35 ft) at this location.

Topography used for the stability models was obtained from the recent bathymetric and topographic survey (Figure F-2) performed by Weaver Consultants Group and dated November 2015 (Reference 1). The design drawings were used to obtain embankment slopes (see Figure F-3 and F-4). The borings and CPT soundings used to construct the cross sections are shown in Table F-1.

Table F-1: Geotechnical Explorations at Cross Sectional Locations

Cross Section	Geotechnical Subsurface Data Used in Cross-Section
A	HAV-EB-3C, HAV-EB-4C, HAV-C004 and HAV-C003
B'	HAV-EB-1T, HAV-EB-1C, HAV-C001
C	HAV-EB-5T, HAV-EB-5C, HAV-C005

Phreatic Surfaces

Phreatic water level data collected by NRT in November 2015 was used to develop a potentiometric surface beneath the impoundment. These water levels were compared from pore pressure data collected in late August 2015 from the CPT soundings. Estimated water levels at the CPT locations are listed below in Table F-2.

Table F-2: Estimated Water Levels from CPTs

CPT Designation	Estimated Water Level NAVD88
HAV-C001	455
HAV-C002	455
HAV-C003	446
HAV-C004	450
HAV-C005	449
HAV-C006	453
HAV-C007	449
HAV-C008	450

The phreatic water levels from the CPT soundings were typically several feet higher than water levels measured by NRT in November 2015. This may be due to the different times the information was collected. The NRT water levels are direct measurements and were made over a larger area. Consequently, water levels from the NRT November 2015 report were used in the stability analysis

In addition to the groundwater elevations, an additional piezometric surface was created for each model to represent the pool levels of the impoundments. Section A and Section B modeled the normal pool elevation at 492.0 ft based on the hydrologic and hydraulic analysis. Section C had a normal pool elevation of 485.0 ft. The maximum pool elevation for Section A- and Section B were modelled at 493.3 ft. The maximum pool elevation for Section C was modelled at 487.5 ft. The pools primary role in the analyses was as hydrostatic loading on the upstream side.

Material Properties

The final chosen material properties used in the Static Models are presented below in **Table F-3**.

Table F-3: Static Material Properties

Material	**Total Unit Weight (pcf)**	**Effective (drained) Shear Strength Parameters**	
		c' (psf)	Φ' (°)
Embankment Fill	120	0	40
Lower Strength Embankment	120	0	30
Clay Liner	110	50	29
Fly Ash	90	0	20
Native Alluvial Foundation	115	0	30

III. Analysis

Conditions Considered

Static, Long-Term Normal Storage Pool Condition: This case models the conditions for static, long-term conditions, under the normal storage water level within the impoundment. Normal storage pool elevations for Sections A and B are 492.0-ft. Normal storage pool elevation for section C is 485.0 ft. Drained (effective stress) shear strength parameters were used for all materials, and phreatic conditions were estimated based on available well data as described by the **Piezometric Surface** section.

Static, Maximum Surcharge Pool Condition: A static condition with a maximum surcharge pool was analyzed for Section A, B and C. The maximum surcharge pool levels for Section A and B are 492.9 ft. Maximum surcharge pool level for Section C is 486.8 ft. Drained (effective stress) shear strength parameters were used for all materials, and phreatic conditions were estimated based on available well data as described by the **Piezometric Surface** section.

Methodology

GeoStudio Slope/W 2012 was used to calculate the FS. The inputs from the user and the outputs from the programs were verified by comparing the FS from each program. When a discrepancy was noticed, the models were corrected accordingly until the FS matched. The Spencer Method was used in each program because it satisfies both moment and force equilibrium through a series of iterations. The side force inclination is varied until both force and moment equilibrium are satisfied. The pore pressures in the materials were calculated using piezometric surfaces drawn as described in the **Piezometric Surface** section. The number of slices per slip surface was 30. The entry and exit search technique was used for slip surface option in the programs. Section A, B and C used a minimum slip surface depth of 10 ft.

IV. Results

The results of the GeoStudio Slope/W output are summarized in **Table F-4** and are attached. All calculated factors of safety meet the USEPA CCR Rule minimum criteria.

Table F-4: Static Analysis Results

Loading Condition	Program Criteria	A	B	C'
Steady State (Normal Pool)	FS ≥ 1.50	2.23	2.47	2.10
Steady State (Flood Pool)	FS ≥ 1.40	2.23	2.47	2.10

V. References

1. 2015 – Havana Topography Weaver Consultants Group November 2015
2. Duncan, J.M., Horz, R.C., Yang, T.L Shear Strength Correlations for Geotechnical Engineering, Virginia Polytechnic Institute and State University, August 1989
3. Dynegy,(1991). *Design Drawings: E-HAV-C17, E-HAV-C113, and E-HAV-C167*
4. Federal Emergency Management Agency (2012). *Flood Insurance Rate Maps Number 17125C0125D and Number 17125C0112D*
5. GEO-SLOPE International Ltd. (2015). “GeoStudio 2012 (SLOPE/W and SEEP/W).” Calgary, Alberta, Canada.
6. Lacour, Nicholas, Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples Virginia Polytechnic Institute and State University June 2012.
7. Natural Resource Technology, (2015). *Groundwater Monitoring Report, Havana Generating Station*.

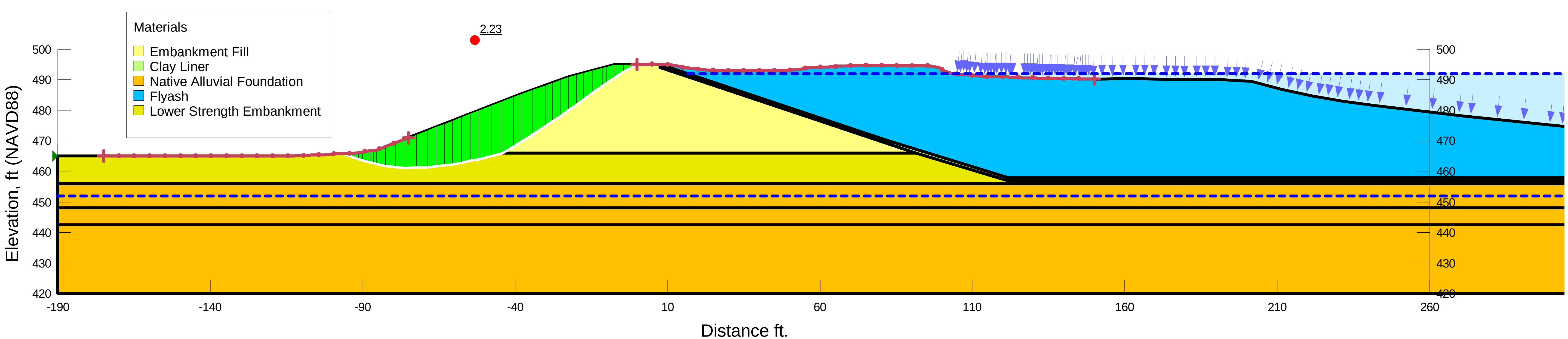
ATTACHMENT F.1

STATIC SLOPE STABILITY FIGURES

PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: A - CELL 3
ANALYSIS: Static, Normal Pool Loading Conditon
SEISMIC LOAD: 0.0 g

9/20/2016
Last Edited by BT
Checked by ZJF

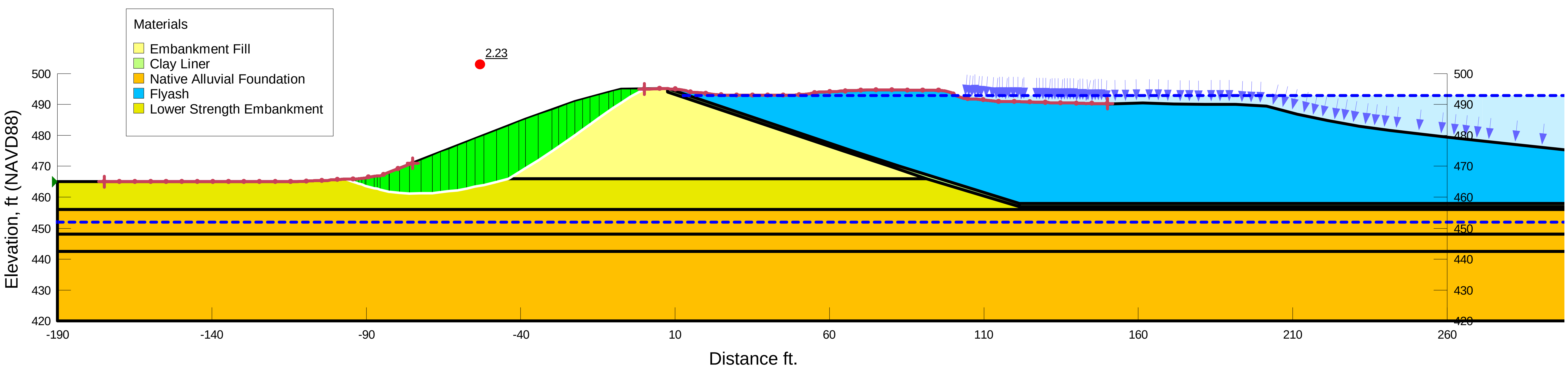
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2
Name: Lower Strength Embankment Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: A - CELL 3
ANALYSIS: Static, Maximum Pool Loading Condition
SEISMIC LOAD: 0.0 g

10/3/2016
Last Edited by BT
Checked by ZJF

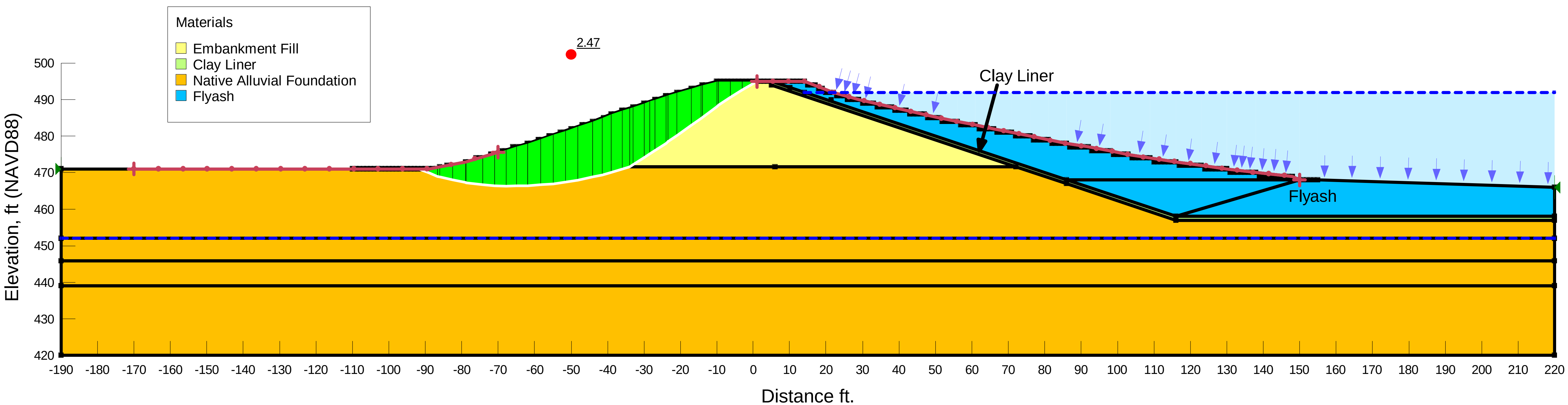
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2
Name: Lower Strength Embankment Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: B - CELL 3
ANALYSIS: Static, Normal Pool Loading Conditon
SEISMIC LOAD: 0.0 g

9/20/2016
Last Edited by BT
Checked by ZJF

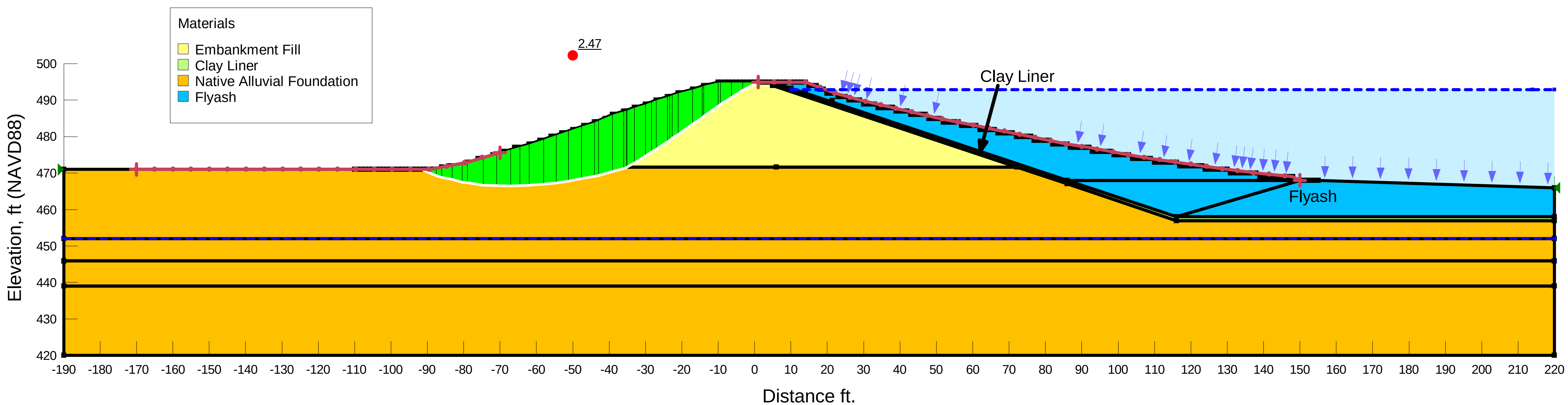
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: B - CELL 3
ANALYSIS: Static, Maximum Pool Loading Condition
SEISMIC LOAD: 0.0 g

10/3/2016
Last Edited by BT
Checked by ZJF

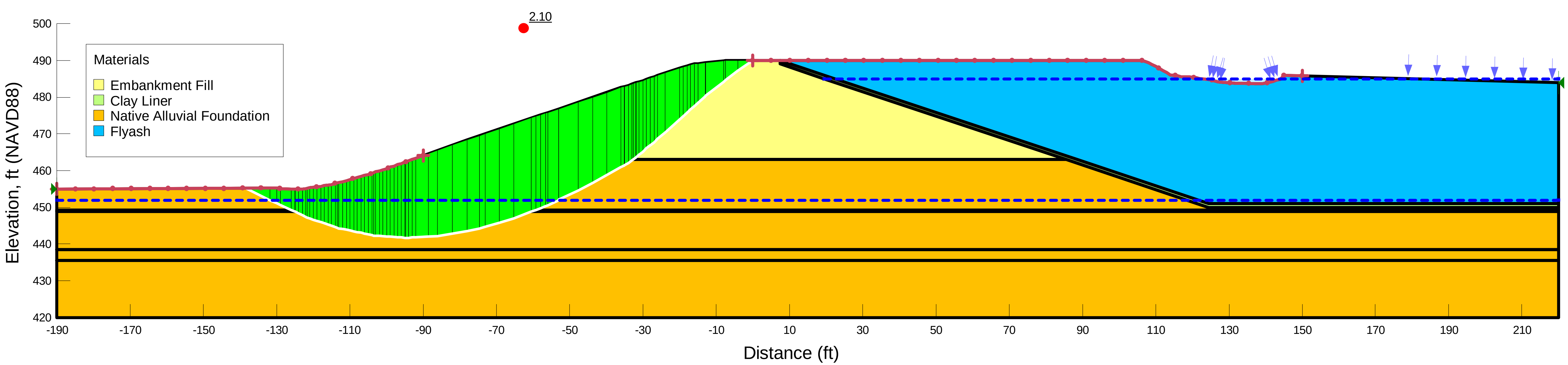
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: C - CELL 2
ANALYSIS: Statc, Normal Pool Loading Condition
SEISMIC LOAD: 0.0 g

9/20/2016
Last Edited by BTH
Checked by ZJF

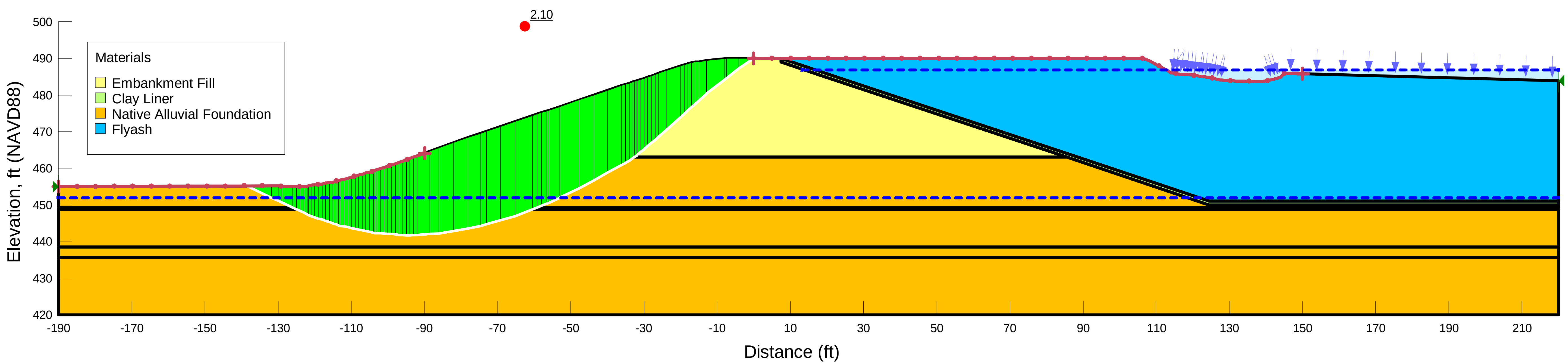
Name: Embankment Fill   Model: Mohr-Coulomb   Unit Weight: 120 pcf   Cohesion': 0 psf   Phi': 40 °   Piezometric Line: 1
Name: Clay Liner   Model: Mohr-Coulomb   Unit Weight: 110 pcf   Cohesion': 50 psf   Phi': 29 °   Piezometric Line: 2
Name: Native Alluvial Foundation   Model: Mohr-Coulomb   Unit Weight: 115 pcf   Cohesion': 0 psf   Phi': 30 °   Piezometric Line: 1
Name: Flyash   Model: Mohr-Coulomb   Unit Weight: 90 pcf   Cohesion': 0 psf   Phi': 20 °   Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: C - CELL 2
ANALYSIS: Static, Max Pool Loading Condition
SEISMIC LOAD: 0.0 g

10/3/2016
Last Edited by BTH
Checked by ZJF

Name: Embankment Fill   Model: Mohr-Coulomb   Unit Weight: 120 pcf   Cohesion': 0 psf   Phi': 40 °   Piezometric Line: 1
Name: Clay Liner   Model: Mohr-Coulomb   Unit Weight: 110 pcf   Cohesion': 50 psf   Phi': 29 °   Piezometric Line: 2
Name: Native Alluvial Foundation   Model: Mohr-Coulomb   Unit Weight: 115 pcf   Cohesion': 0 psf   Phi': 30 °   Piezometric Line: 1
Name: Flyash   Model: Mohr-Coulomb   Unit Weight: 90 pcf   Cohesion': 0 psf   Phi': 20 °   Piezometric Line: 2



ATTACHMENT G

SEISMIC LOADING CALCULATIONS

Job	**Dynegy Havana – East Ash Pond**	Project No.	**60439304**	Sheet	**1**	of	**1**
Description	**Geotechnical Calculations**	Computed by	CHK	Date	**02/25/16**		
	Seismic Loading Calculations	Checked by	**MJN**	Date	**02/26/16**		

I. Objective

Seismic loading was determined using the USGS 2008 online probabilistic seismic hazard deaggregation tool for a probability of exceedance of 2% in 50 years. The output from the USGS website is provided in Figure G-1. The mean moment magnitude (M_w) of 6.95 was used as the input for the liquefaction analysis. The peak ground acceleration (PGA) of rock for the site was also taken from the deaggregation plot. This resulted in a PGA of 0.072 g.

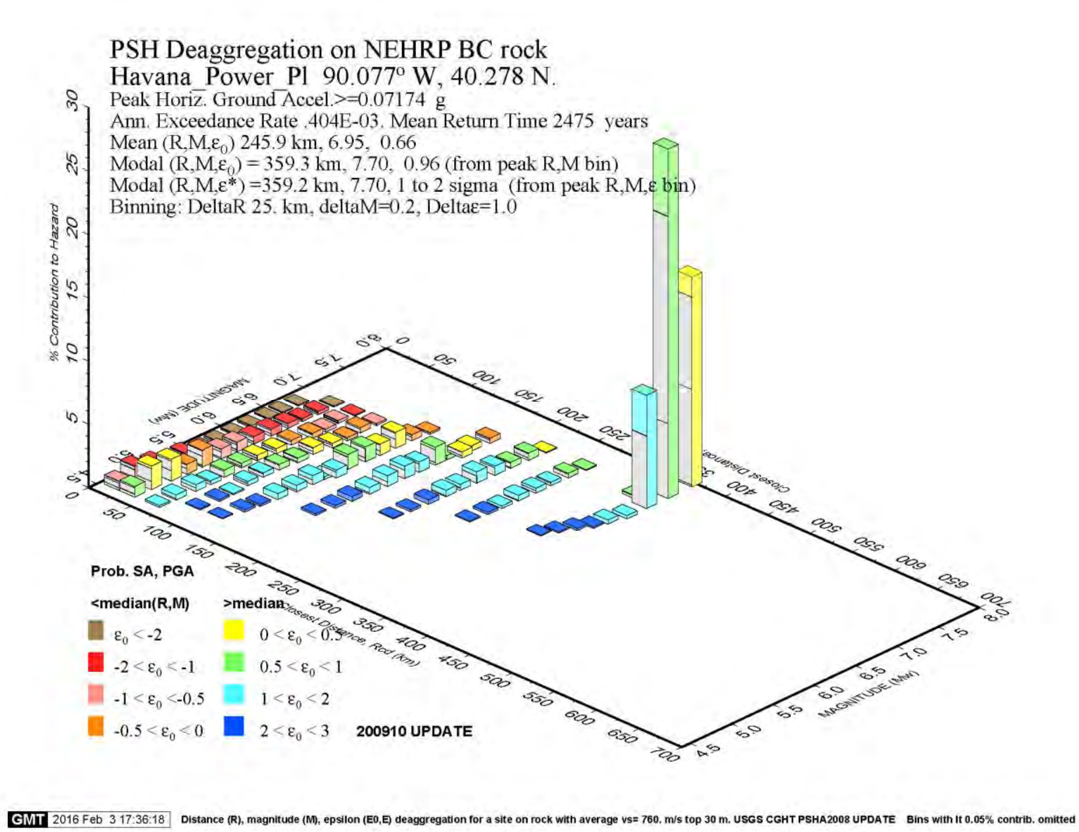


Figure G-1: Deaggregation Curve for Havana Power Station East Ash Pond

ATTACHMENT H

DYNAMIC RESPONSE CALCULATIONS

Job	**Dynegy Havana – East Ash Pond**	Project No.	**60439304**	Sheet	**1** of **2**
Description	**Geotechnical Calculations**	Computed by	CHK	Date	**02/25/16**
	Dynamic Response Analysis	Checked by	**MJN**	Date	**02/26/16**

I. Objective

A dynamic response analysis was performed to estimate ground motion parameters specific to the embankments of the Havana East Ash Pond Complex. The results from Attachment G Seismic Loading were converted into a usable input for the seismic stability study through a dynamic response analysis of the East Ash Pond location.

II. Methodology

As stated in Attachment G, the Peak Ground Acceleration (PGA) for the site was 0.072 g, taken from the USGS Deaggregation Tool. The default site class USGS uses is Class-BC, or rock, so the PGA above corresponds to PGA_{rock}.

In order to develop a site-specific response, the East Ash Pond was classified using the shear velocity (V_s) measurements from the CPT (CPT). The maximum, minimum and average for the V_s measurements for the foundation material are provided in Table H-1; data from the embankment portion of CPT HAV-C007 and HAV-C008 soundings was excluded from the table as to only characterize the foundation material for seismic site classes. The East Ash Pond area was classified as Site Class-D, stiff soil, corresponding to average V_s values in the range of 600-ft/s and 1200-ft/s using the SCPT data. The site class was classified using guidelines from the IBC (2003) as shown in Figure H-1.

After classifying the site, an amplification/deamplification factor is applied to the original PGA_{rock} to develop a PGA_{design} specific to the East Ash Pond. The Factor (F_{PGA}) to multiply by for Site Class D with PGA_{rock}<0.1g is 1.6, taken from NEHRP (2009), Figure H-2. The PGA_{design} is for the base of the embankment structure and another amplification factor is applied to obtain the acceleration at the crest of the embankment, PGA_{crest}. A figure by Idriss (2015), Figure H-3, was used to relate base acceleration to crest acceleration. Then, the procedure by Makdisi and Seed, Figure H-4, was used to get the horizontal force factor, k_h, for input into Slope/W. The assumption was made that the height of the slip surface was the same as that of the embankment for the East Ash Pond Cells. The entire calculation process is provided below in Attachment H.2 Hand Calculations.

Table H-1: V_s Data Summary

CPT Designations	Minimum	Maximum	Average
HAV-C001	412	867	651
HAV-C002	407	955	737
HAV-C003	516	919	787
HAV-C004	479	1206	720
HAV-C005	462	967	759
HAV-C006	510	1182	882
HAV-C007	641	1020	882
HAV-C008	772	1051	894

III. Results

The results for the dynamic response analysis are provided below in Table H-2. These results were used in the liquefaction analysis, Attachment I, and in the seismic slope stability analysis, Attachment J.

Table H-2: Dynamic Response Results

Parameter	Calculated Value (g)
PGA_{rock}	0.072
PGA_{design}	0.12
PGA_{crest}	0.33
k_h	0.11

IV. References

1. International Code Council, (2003), 2003 International Building Code.
2. NEHRP (National Earthquake Hazards Reduction Program), (2009) Recommended Seismic Provisions for New and Other Structures, (FEMA P-750), 2009 Edition.
3. Idriss, I.M., (2015), Personal Communication.
4. Makdisi, F.I., Seed, H.B., (1977) “A Simplified Procedure for Estimating Earthquake Induced Deformation in Dams and Embankments”, Report No. UBC-EERI-77/19, Earthquake Engineering Research Center, August, 1977.
5. Bray, J.D., Travasarou, T., (2011), “Pseudostatic Slope Stability Procedure”, 5th International Conference on Earthquake Geotechnical Engineering, Santiago, Chile, January 10-13, 2011.

ATTACHMENT H.1

DYNAMIC RESPONSE REFERENCE MATERIAL

1615.1.1 Site class definitions. The site shall be classified as one of the site classes defined in Table 1615.1.1. Where the soil shear wave velocity, $\bar{v}_s$, is not known, site class shall be determined, as permitted in Table 1615.1.1, from standard penetration resistance, $\bar{N}$, or from soil undrained shear strength, $\bar{s}_u$, calculated in accordance with Section 1615.1.5. Where site-specific data are not available to a depth of 100 feet (30 480 mm), appropriate soil properties are permitted to be estimated by the registered design professional preparing the soils report based on known geologic conditions.

When the soil properties are not known in sufficient detail to determine the site class, Site Class D shall be used unless the building official determines that Site Class E or F soil is likely to be present at the site.

1615.1.2 Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. The maximum considered earthquake spectral response acceleration for short periods, S_{MS}, and at 1-second period, S_{M1}, adjusted for site class effects, shall be determined by Equations 16-38 and 16-39, respectively:

$$S_{MS} = F_a S_s \qquad \textbf{(Equation 16-38)}$$

$$S_{M1} = F_v S_1 \qquad \textbf{(Equation 16-39)}$$

where:

F_a = Site coefficient defined in Table 1615.1.2(1).

F_v = Site coefficient defined in Table 1615.1.2(2).

S_S = The mapped spectral accelerations for short periods as determined in Section 1615.1.

S_1 = The mapped spectral accelerations for a 1-second period as determined in Section 1615.1.

1615.1.3 Design spectral response acceleration parameters. Five-percent damped design spectral response acceleration at short periods, S_{DS}, and at 1-second period, S_{D1}, shall be determined from Equations 16-40 and 16-41, respectively:

$$S_{DS} = \frac{2}{3} S_{MS} \qquad \textbf{(Equation 16-40)}$$

$$S_{D1} = \frac{2}{3} S_{M1} \qquad \textbf{(Equation 16-41)}$$

where:

S_{MS} = The maximum considered earthquake spectral response accelerations for short period as determined in Section 1615.1.2.

S_{M1} = The maximum considered earthquake spectral response accelerations for 1-second period as determined in Section 1615.1.2.

1615.1.4 General procedure response spectrum. The general design response spectrum curve shall be developed as indicated in Figure 1615.1.4 and as follows:

1. For periods less than or equal to T_O, the design spectral response acceleration, S_a, shall be determined by Equation 16-42.
2. For periods greater than or equal to T_O and less than or equal to T_S, the design spectral response acceleration, S_a, shall be taken equal to S_{DS}.

TABLE 1615.1.1
SITE CLASS DEFINITIONS

SITE CLASS	SOIL PROFILE NAME	AVERAGE PROPERTIES IN TOP 100 feet, AS PER SECTION 1615.1.5		
		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	$2{,}500 < \bar{v}_s \le 5{,}000$	N/A	N/A
C	Very dense soil and soft rock	$1{,}200 < \bar{v}_s \le 2{,}500$	$\bar{N} > 50$	$\bar{s}_u \ge 2{,}000$
D	Stiff soil profile	$600 \le \bar{v}_s \le 1{,}200$	$15 \le \bar{N} \le 50$	$1{,}000 \le \bar{s}_u \le 2{,}000$
E	Soft soil profile	$\bar{v}_s < 600$	$\bar{N} < 15$	$\bar{s}_u < 1{,}000$
E	—	Any profile with more than 10 feet of soil having the following characteristics: 1. Plasticity index $PI > 20$, 2. Moisture content $w \ge 40\%$, 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: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kPa. N/A = Not applicable

Figure H-1: Site Classes from IBC 2003.

accordance with this section. An investigation shall be conducted and a report shall be submitted that shall include an evaluation of the following potential geologic and seismic hazards:

1. Slope instability;
2. Liquefaction;
3. Total and differential settlement; and
4. Surface displacement due to faulting or seismic-induced lateral spreading or lateral flow.

The report shall contain recommendations for appropriate foundation designs or other measures to mitigate the effects of the above hazards.

> **EXCEPTION:** Where deemed appropriate by the authority having jurisdiction, a site-specific geotechnical report is not required when prior evaluations of nearby sites with similar soil conditions provide sufficient direction relative to the proposed construction.

11.8.3 Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F. The geotechnical investigation report for a structure assigned to Seismic Design Category D, E, or F shall include:

1. The determination of dynamic seismic lateral earth pressures on basement and retaining walls due to design earthquake ground motions.
2. The potential for liquefaction and soil strength loss evaluated for site peak ground acceleration, earthquake magnitude, and source characteristics consistent with the maximum considered earthquake geometric mean peak ground accelerations. Peak ground acceleration shall be determined based on either: (a) a site-specific study taking into account soil amplification effects as specified in Section 11.4.7 or (b) the peak ground acceleration, PGA_M, from Equation 11.8-1:

$$PGA_M = F_{PGA}\, PGA \qquad (11.8\text{-}1)$$

   where

   PGA_M = maximum considered earthquake geometric mean peak ground acceleration adjusted for Site Class effects;

   PGA = mapped maximum considered earthquake geometric mean peak ground acceleration shown in Figures 22-8 through 22-11; and

   F_{PGA} = site coefficient from Table 11.8-1.

3. Assessment of potential consequences of liquefaction and soil strength loss as computed in Item 2, including estimation of total and differential settlement, lateral soil movement, lateral soil loads on foundations, reduction in foundation soil-bearing capacity and lateral soil reaction, soil downdrag and reduction in axial and lateral soil reaction for pile foundations, increases in soil lateral pressures on retaining walls, and flotation of buried structures.
4. Discussion of mitigation measures such as selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements and forces, ground stabilization, or any combination of these measures and how they shall be considered in the design of the structure.

Table 11.8-1 Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.1	PGA = 0.2	PGA = 0.3	PGA = 0.4	PGA ≥ 0.5
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 Section 11.4.7				

Note: Use straight-line interpolation for intermediate values of PGA.

Figure H-2: Site Class Amplification Factors for Calculating $(PGA)_{design}$ from $(PGA)_{rock}$, NEHRP2009

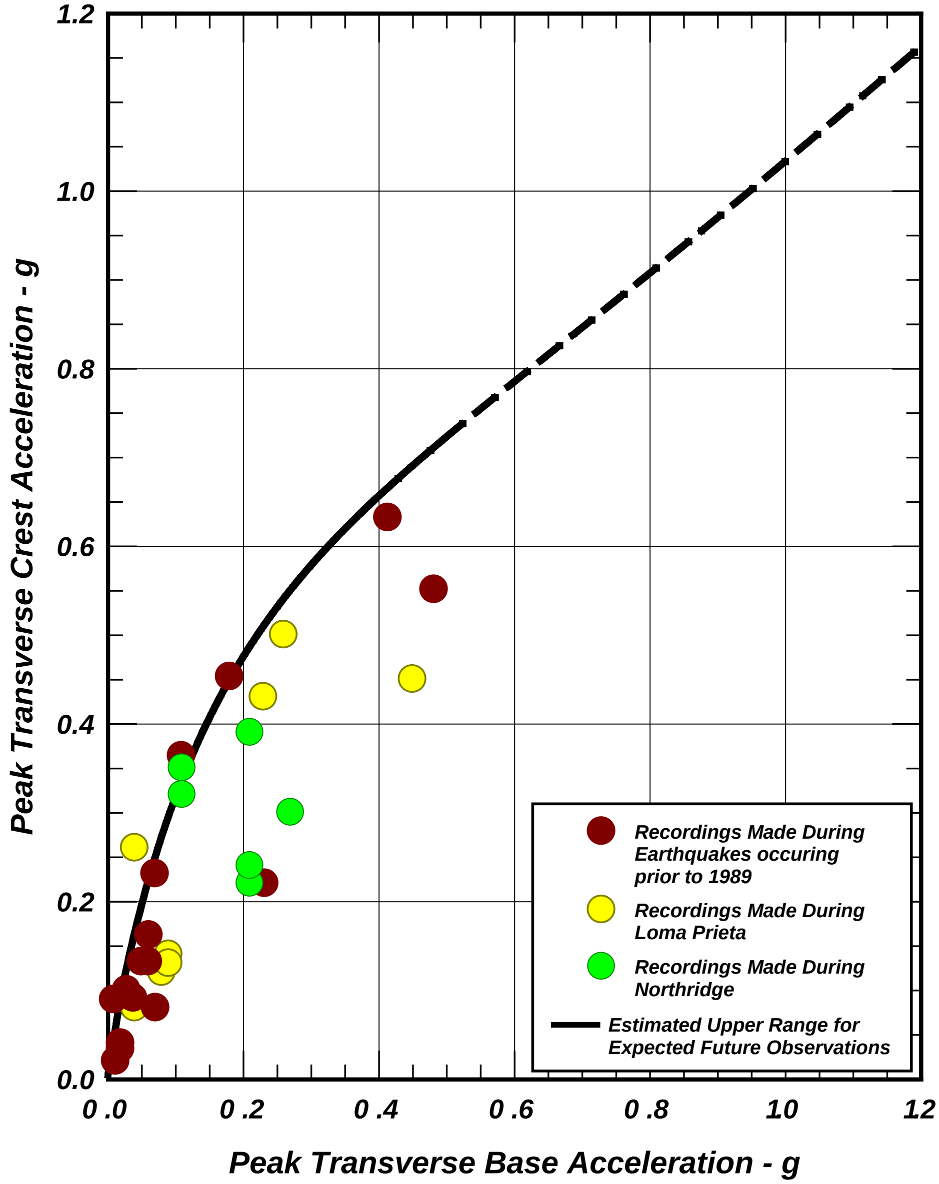


Figure H-3: Variations of Recorded Peak Crest Accelerations versus those Recorded at the Base of Earth and Rock Fill Dams by Idriss (2015). Source of recorded values for Loma Prieta Earthquake and prior earthquakes: Holzer, (1998).

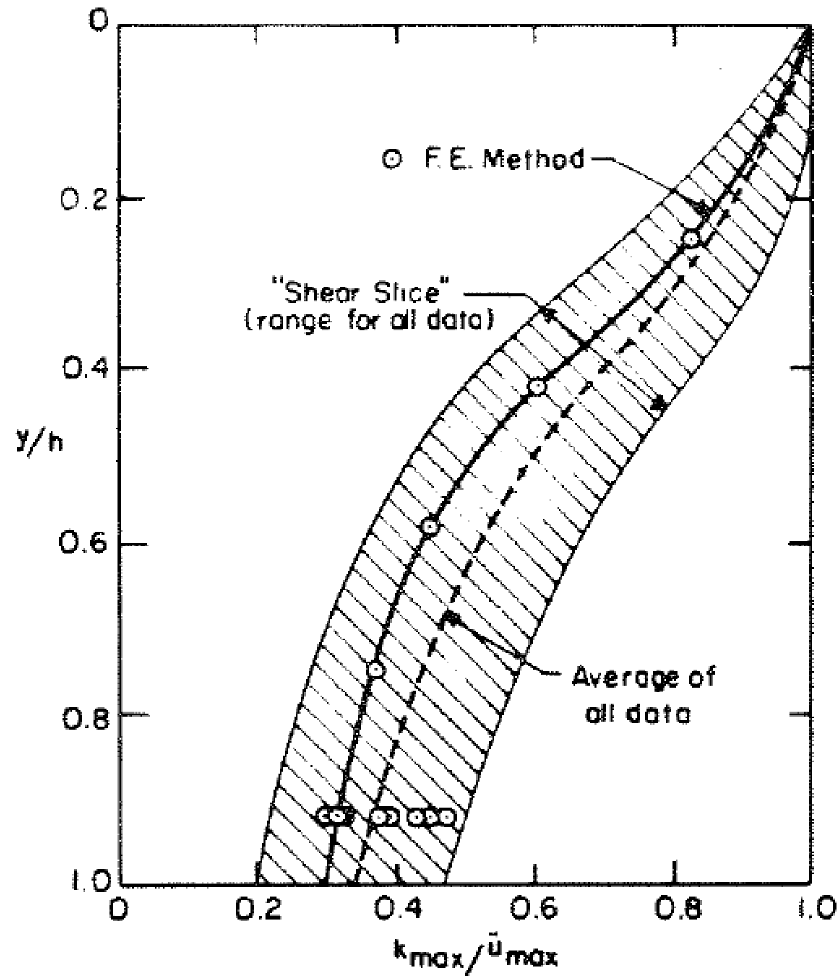


Figure H-4: Variations of Maximum Acceleration Ratio with Depth of Sliding Mass (Makdisi and Seed, 1977). Maximum Acceleration Ratio is the Ratio between $(PGA)_{base\ of\ slide\ mass}$ and $(PGA)_{crest}$.

ATTACHMENT H.2

HAND CALCULATIONS

Owner Dynegy
Plant Havana Power Plant Unit East Ash Pond
Project No. 60439304 File No. Calcs.
Title Seismic Stability Analysis
Seismic Loading

Computed By Krolikowski
Date Jan 26 2016
Verified By MJN
Date February 26 2016

Screening Level (Stage I)

1) Post-Liquefaction Limit Equilibrium Analysis - F.S. > 1.2. Therefore proceed to Step 2 in Screening Level (Stage I) Approach from Tech Memo

2) Perform psuedo-static slope stability analysis
- use peak strength values from above

a) Select PGArock from 2% Probability of exceedance in 50 years (Return 2500 years)
No PSHA done, 2008 Deaggregation Tool $PGA_{rock} = 0.072g$

b) Determine Site Class from Figure 1 IBC 2003
- Site classified as D, Stiff Soil Profile
∘ Based on V_s from CPT data ⇒ $600 < V_s < 1200$

- Then using Fig. 2 to determine F_{PGA} to get → $F_{PGA} = 1.6$ when $PGA \leq 0.1$
(Not sure going from one procedure to next is viable but not my call)

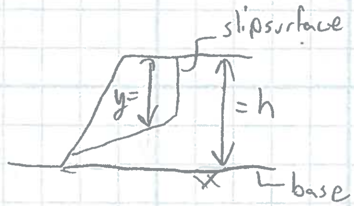
c) $PGA_{design} = F_{PGA} * PGArock$ ⇒ $(1.6)(0.07) = 0.12\,g$

d) Determine Peak Traverse acceleration @ dike crest. From c, we have

$PGA_{design} = PGA_{Base}$ Thus, use fig 3 to get $PGA_{crest} = 0.33$

3) Determine seismic coefficient k_h from Makdisi-Seed procedure (Fig 4)

where



For Havana, assume $y = h$ ⇒ $y/h = 1$ So,

$$k_h = 0.34\,(PGA_{crest}) = (0.34)(0.33) = 0.11$$

4) Enter k_h from step 3 into GeoStudio & determine F.S.

ATTACHMENT I

LIQUEFACTION ANALYSIS

I. Objective

A liquefaction analysis was performed in conjunction with the embankment slope stability analysis, in accordance with the requirements of Section 257.73 of the CCR Rule. The liquefaction analysis was done using the procedure outlined by Idriss and Boulanger (2008, 2014). Once a liquefied stratum was identified, the appropriate shear strength was calculated for it as presented in **Attachment E**. The shear strength was then incorporated into the slope stability model as presented in **Attachment J**.

II. Methodology

The approach Idriss and Boulanger use is stress-based and incorporates two main parameters, the cyclic stress ratio (CSR) and the cyclic resistance ratio (CRR). Data from SPTs and CPTs is empirically correlated to case histories, giving the user a Factor of Safety (FS) against liquefaction where FS<1.2 indicates that the soil is susceptible to liquefaction. If the factor of safety is above 1.2, the soil is assumed to not be susceptible to liquefaction during the design seismic event. FS is defined as CRR/CSR. Each boring and CPT was used in the liquefaction analysis and has a coinciding spreadsheet developed by AECOM. A comprehensive overview of the procedure is provided below, as well as plots of the FS for the SPT and CPT results with depth.

Liquefiable Soils

The soils at the East Ash Pond that were considered for liquefaction included the embankment fill and the native alluvial foundation. These materials may be susceptible to liquefaction, depending on the seismic loading, since zones of relatively clean, loose sand below the water table were encountered at some boring locations. The fly ash material retained by the East Ash Pond is also assumed to be liquefaction-susceptible as it is cohesionless and was placed in a wet-sluiced manner.

Model Parameters

Phreatic Surfaces

The phreatic surface used in the liquefaction analysis was developed from the water levels in the wells that were measured by Natural Resource Technology (NRT) on November 15, 2015. See the **Phreatic Surface** section of the **Static Stability Analysis** (**Attachment F**) for additional details on the selection of the phreatic surface for the stability analysis.

Cyclic Stress Ratio (CSR)

The CSR is the stress induced by the earthquake and is therefore the same for both the SPT and CPT based procedures. This is a result of it being a function of the total and effective stress, peak ground acceleration (PGA, a_{max}) and a function specified as r_d. **Equation I-1** below was used to calculate CSR.

$$CSR_{M,\sigma'_v} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d$$

Equation I-1: CSR Equation from Boulanger and Idriss (2014)

The PGA used for CSR was dependent on whether the boring/CPT was performed on the crest or at the toe of the embankment. The borings and CPTs performed on the crest used the PGA_{crest}=0.33 g, developed in **Attachment H**, at the ground surface. The PGA used for **Equation I-1** at depths within the embankment was linearly interpolated from the top of the crest to the embankment/foundation interface. The foundation material below the embankment used the PGA_{design} of 0.12 g from **Attachment H**. Use of the PGA_{crest} is an upper bound limit and is conservative as a result. The parameter r_d is a shear stress reduction factor that reduces the CSR with depth to account for the dynamic response of the soil profile. The parameter is also a function of the mean moment magnitude (M_w)from **Attachment G.** M_w = 6.95 was used. The above equation for CSR was further corrected to normalize it to 1 atmosphere and for an M_w=7.5 earthquake.

Cyclic Resistance Ratio (CRR)

The cyclic resistance ratio is the resistance a stratified layer has against liquefying when correlated to either corrected N- or qc-values. The N- and q_c values were corrected to $N_{1,60,CS}$ and q_{c1Ncs} through the Boulanger and Idriss (2008, 2014) procedure. The N- values were corrected for rod length and energy efficiency assuming an energy efficiency ratio of 80%, but no other corrections were made for the borehole size or sampling liner. Correction for overburden was performed using effective stress and iteration of the final $N_{1,60,CS}$ and q_{c1Ncs} values. Additionally, correction for fines content (FC) was done in an iterative manner. The SPTs used lab data for this correction, unless a sample was not taken for a given SPT depth. Then, a best estimate was made based on samples above and below the sample with no FC. The value chosen to represent the fines content typically was closer to whichever sample had the lesser fines content of the two bordering layers. The estimated fines content is highlighted green in the spreadsheet. Fines correction for the CPTs was done using the provided information from ConeTec that based fines content on material classification as seen in **Attachment E.2**. These values were matched with appropriate lab data if available and generally were in agreement.

III. Results

Soils were assumed to be susceptible to liquefaction if the available data indicated a continuous zone of soil with a liquefaction triggering factor of safety of below 1.2. Isolated point where the liquefaction factor of safety was below 1.2 were not assumed to be susceptible to liquefaction if the zone was less than 1 foot thick, as such zones are unlikely to form a laterally- or vertically-continuous layer. The analysis found soils susceptible to liquefaction in the following zones:

- CPT HAV-C001: El. 439.0 to 446.0 feet.

- CPT HAV-C004: El. 442.5 to 448.1feet.
- CPT HAV-C006: EL. 450 to 453 feet

All three of these zones were located in the foundation soils, and were not in the dike.
Zones susceptible to liquefaction during the design earthquake, greater than 1 foot in thickness, were not found in the remaining borings or CPTs evaluated for liquefaction susceptibly.

IV. References

1. Boulanger, R. W., and Idriss, I. M., (2014). *CPT and SPT Based Liquefaction Triggering Procedures (Report No. UCD/CGM-14/01)*. Davis, California.
2. Idriss, I. M., and Boulanger, R. W., (2008). *Soil Liquefaction During Earthquakes*. Earthquake Engineering Research Institute, Oakland, California, USA.
3. Seed, R.B., et al, (2003). *Recent Advances in Soil Liquefaction Engineering: A Unified And Consistent Framework*, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, Keynote Presentation, H.M.S. Queen Mary, Long Beach, California, April 30, 2003.
4. USGS “2008 Interactive Deaggregations.” (2008). 2008 Interactive Deaggregations, <http://geohazards.usgs.gov/deaggint/2008/> (Feb. 22, 2016).

ATTACHMENT I.1

LIQUEFACTION ANALYIS FIGURES

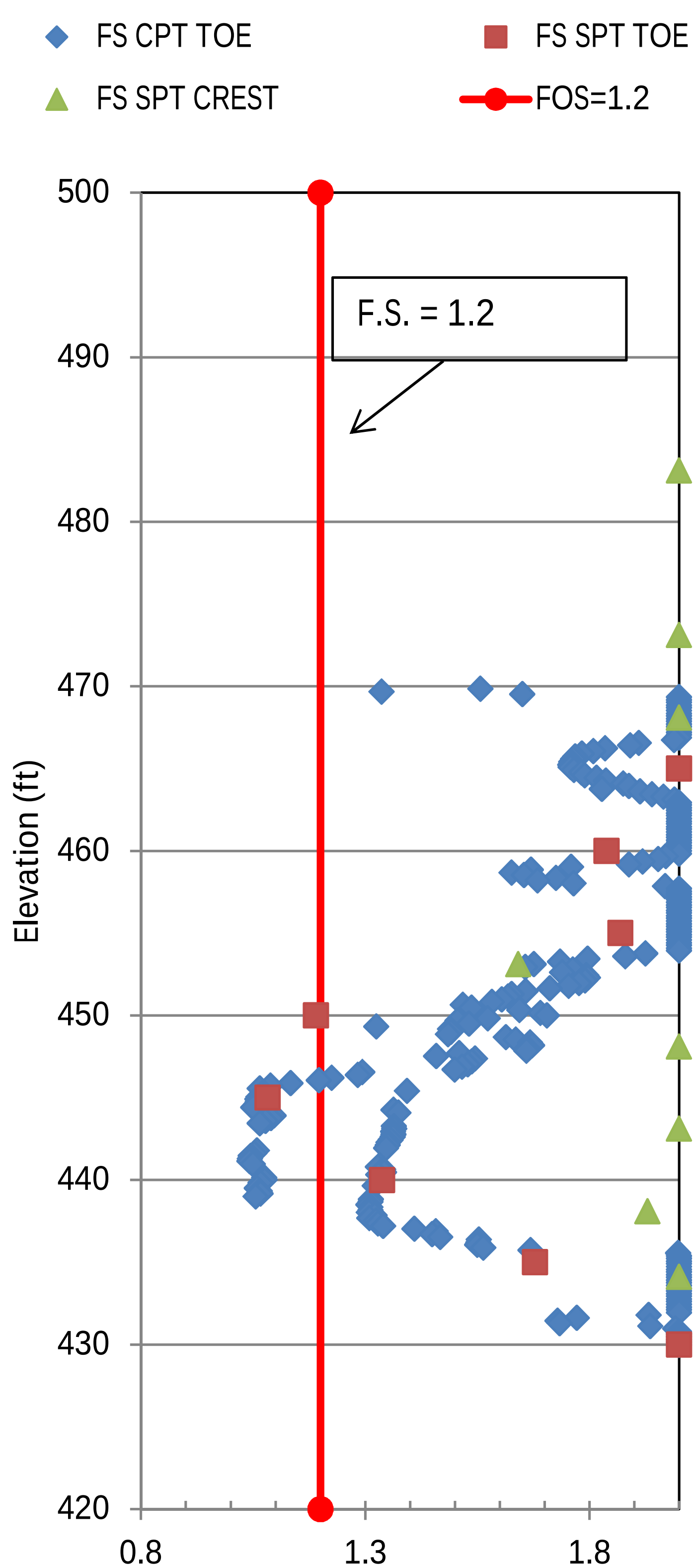


Figure I-1: CPT HAV-C001 and SPT HAV-EB-1C and HAV-EB-1T Factor of Safety Plot

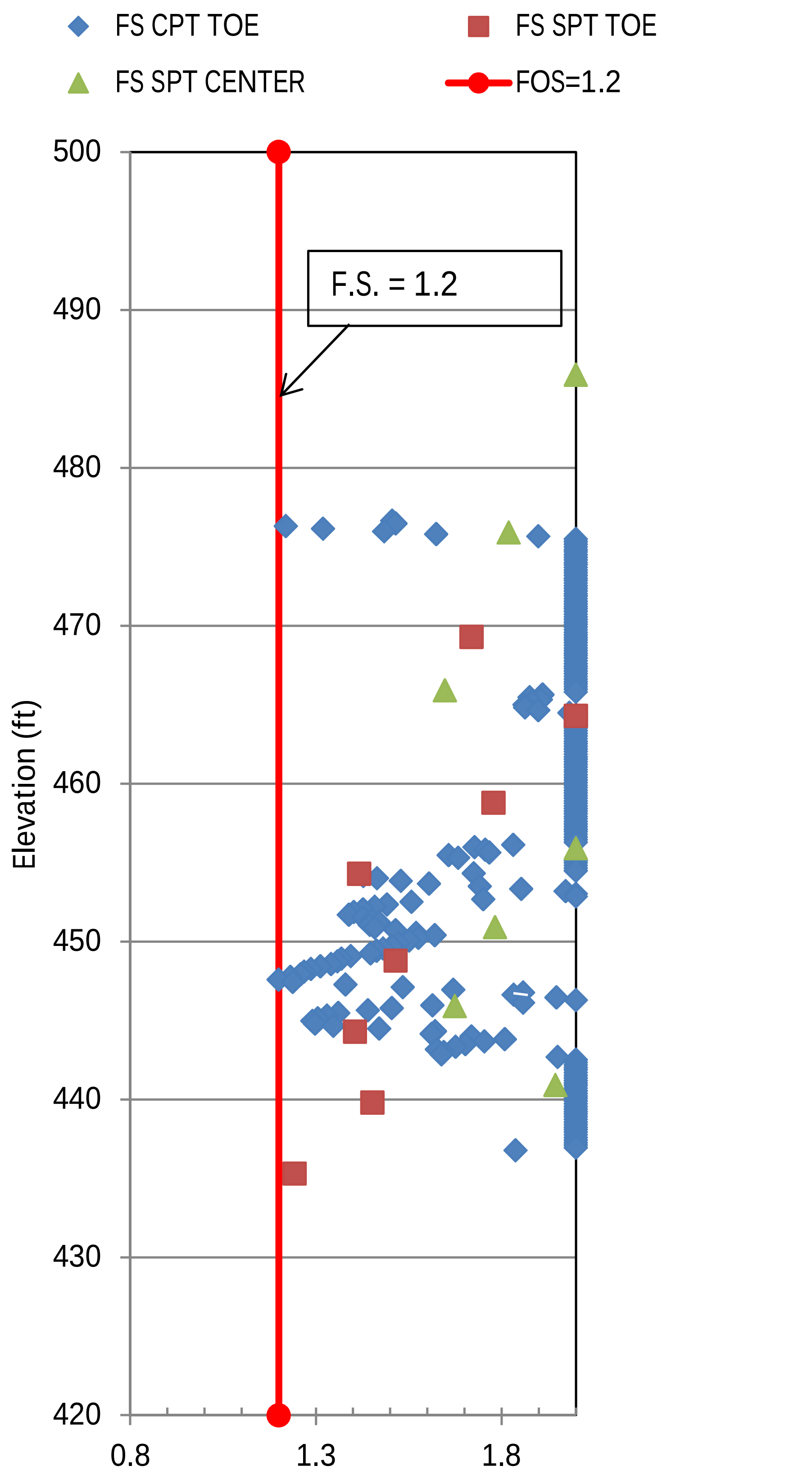


Figure I-2: CPT HAV-C002 and SPT HAV-EB-2C and HAV-EB-2T Factor of Safety Plot

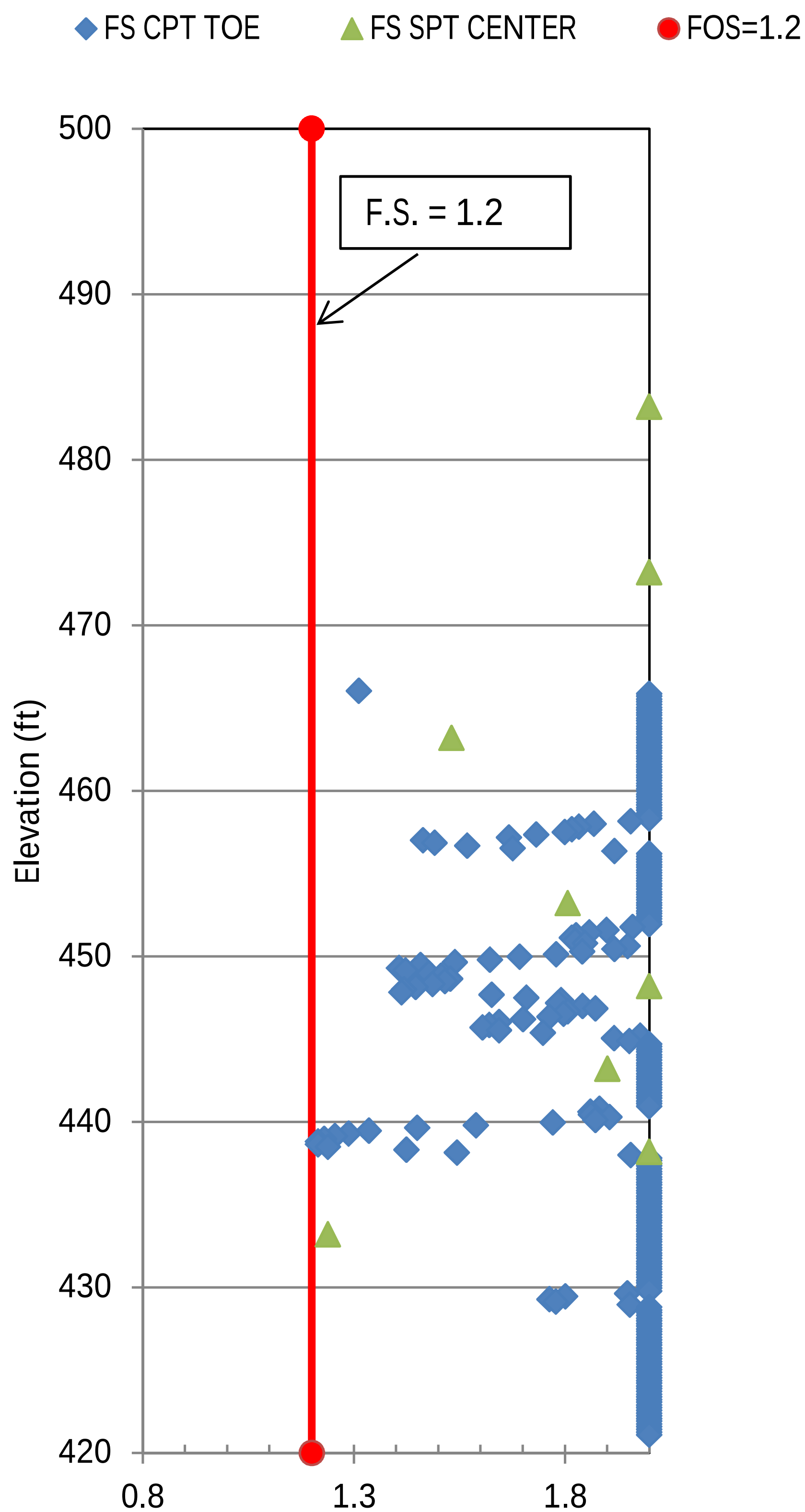


Figure I-3: CPT HAV-C003 and SPT HAV-EB-3C
Factor Safety Plot

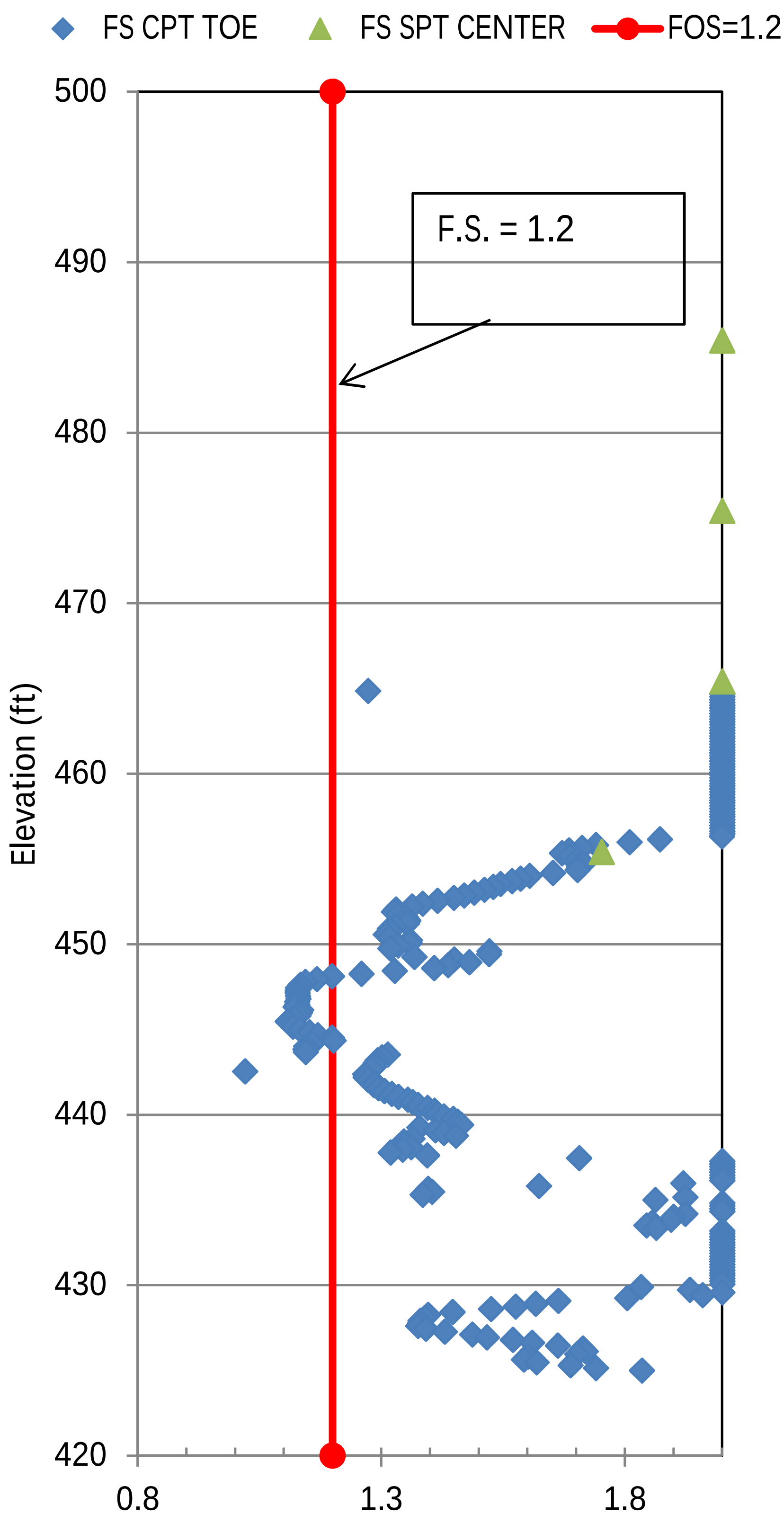


Figure I-4: CPT HAV-C004 and SPT HAV-EB-4C
Factor of Safety Plot

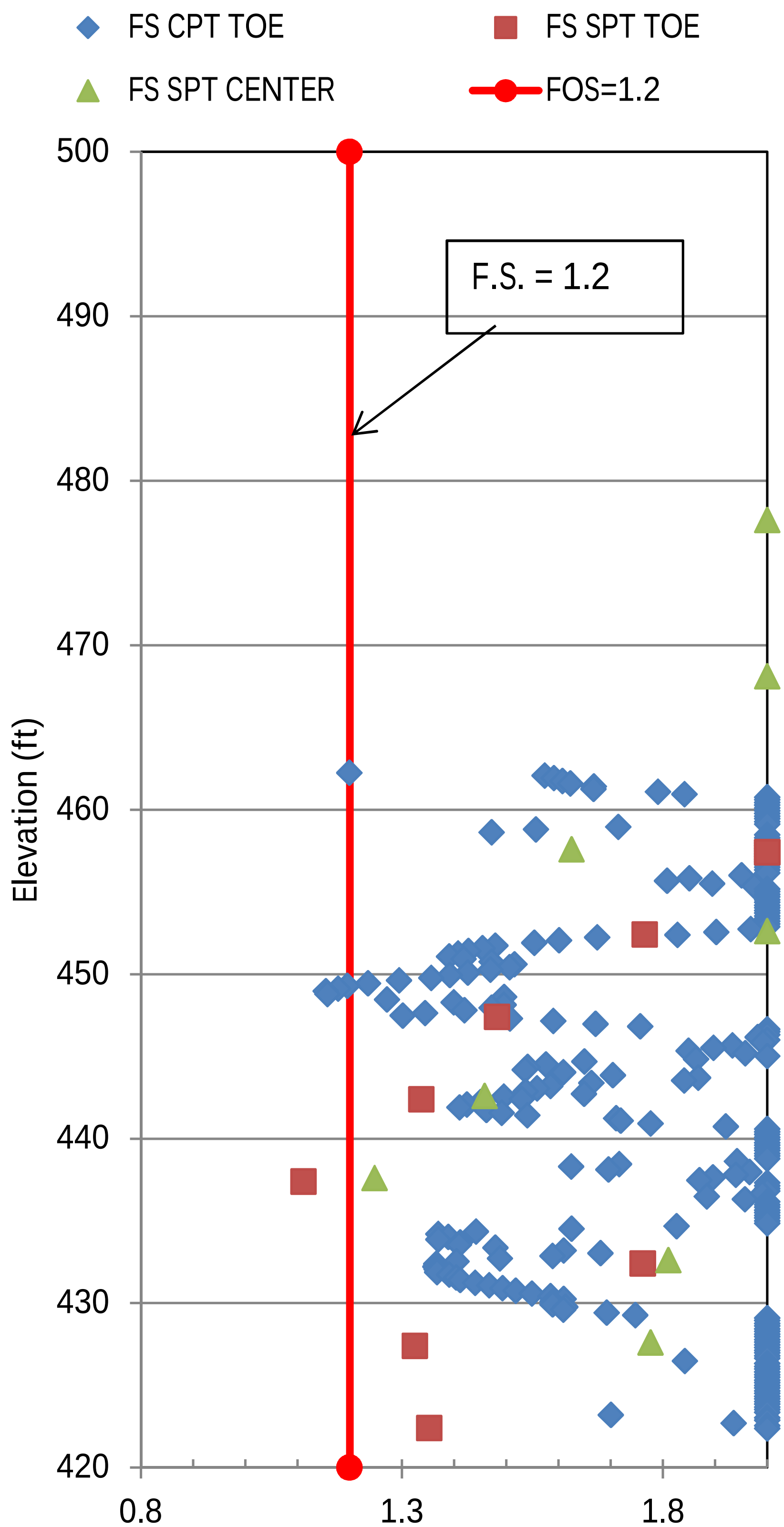


Figure I-5: CPT HAV-C005 and SPT HAV-EB-5C and HAV-EB-5T Factor of Safety Plot

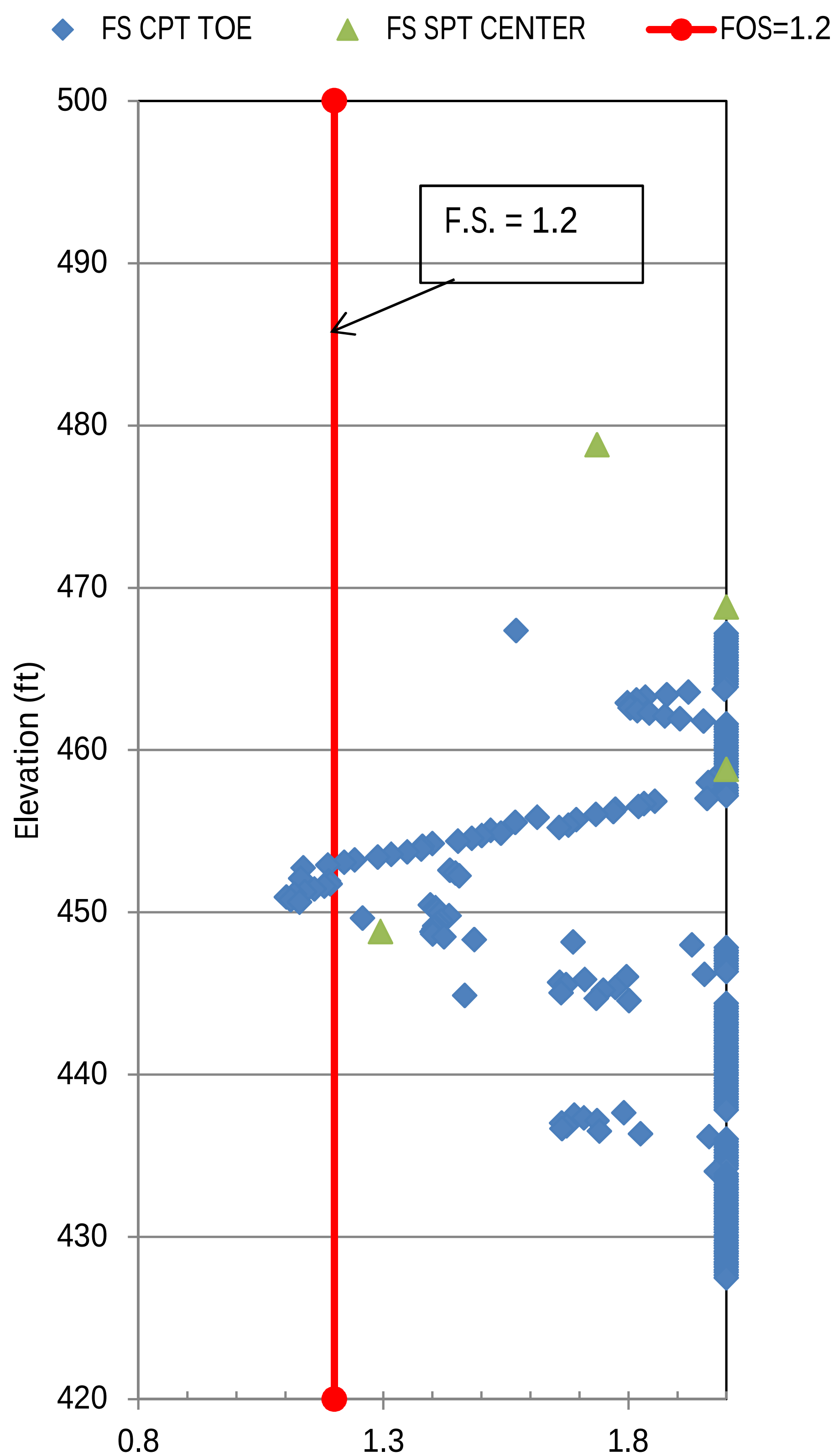


Figure I-6: CPT HAV-C006 and SPT HAV-EB-6C
Factor of Safety Plot

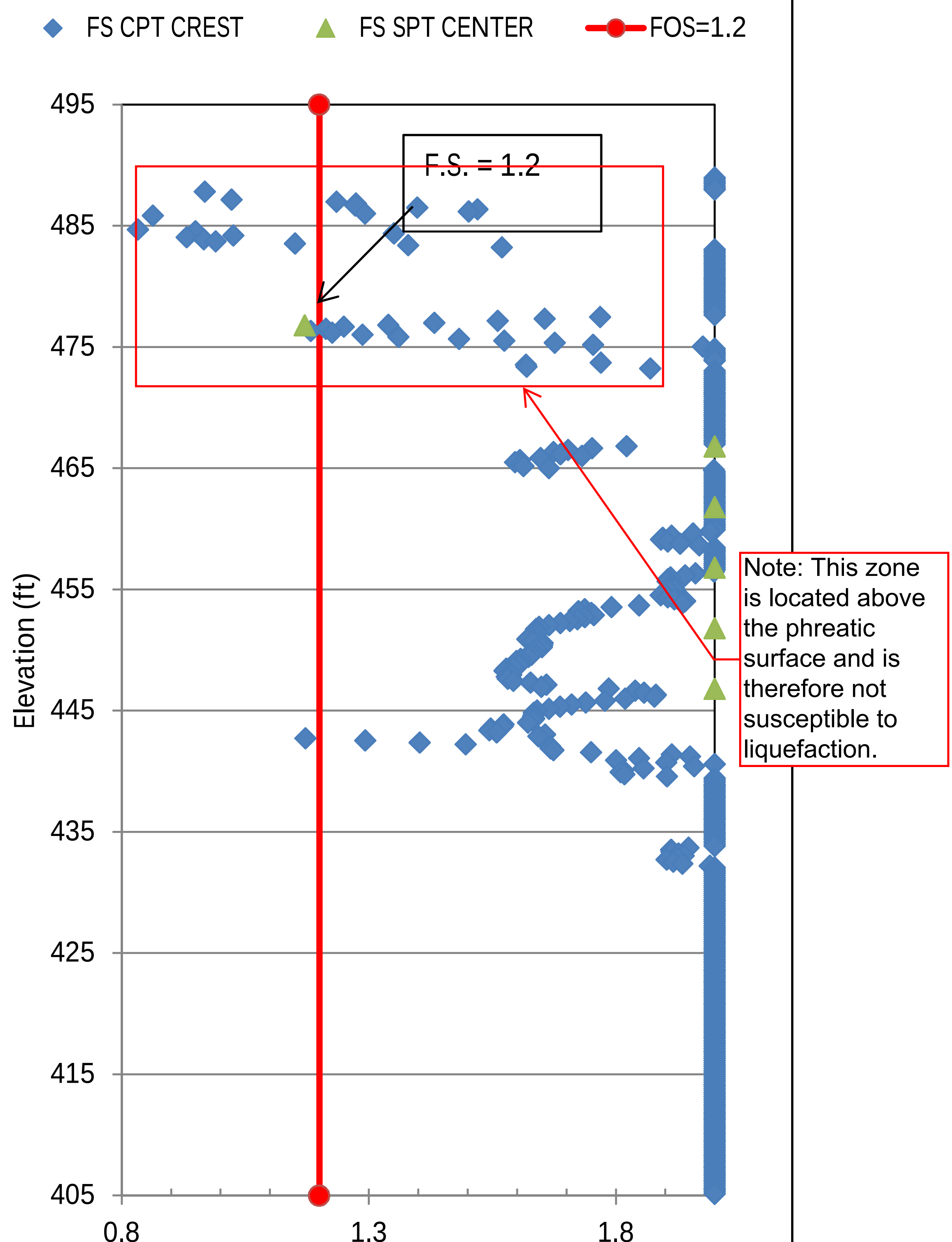


Figure I-7: CPT HAV-C007 and SPT HAV-EB-7C
Factor of Safety Plot

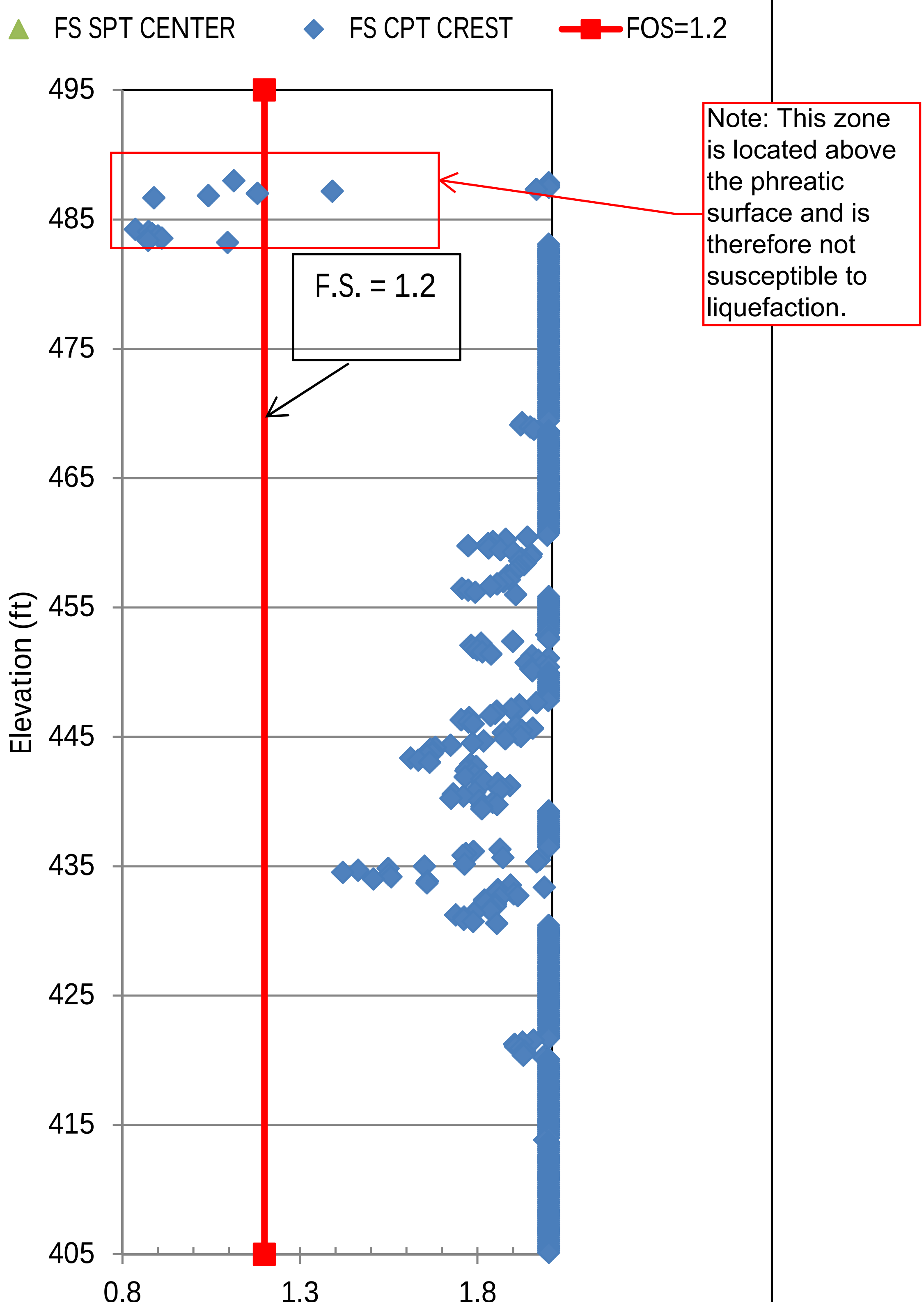


Figure I-8: CPT HAV-C008 and SPT HAV-EB-8C
Factor of Safety Plot

ATTACHMENT I.2

LIQUEFACTION ANALYIS TABLES

Table I-2: SPT Liquefaction Analysis Cont.

Idriss and Blouanger Liquefaction Analysis from SPT Data
Havana East Ash Pond - All Sites
Data Provided by Frontz (Gray Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

PGAsite=	0.12	Mwmean	6.95
PGAcrest=	0.33		

Original Ground Elevation (Embankment/Foundation Interface)
Groundwater Elevation
FC Estimated

*PGA was linearly interpolated from PGAcrest to PGAsite from top of the crest to the embankment/foundation interface. After interface is reached, PGA site is used

	Elev. Ft	Depth (ft)	Depth Meter	N	γ (pcf) est.	σ_z (psf)	σ_z' (psf)	CR	CE 80%	N60	m	CN	N160	FC %	ΔN160	N160cs	α	β	rd	*PGA	CSR	MSF	Cσ	Kσ	CSRcorrected	$CRR_{M=7.5,\sigma v'=1atm,cs}$	FS
	483.1	12.5	3.8	41	115	1437.5	1437.5	0.80	1.3	44	0.2	1.1	48	9.2	0.8	49	-0.185	0.021	0.963	0.223	0.140	1.146	0.300	1.100	0.111	1.108	2.0
	473.1	22.5	6.9	59	115	2587.5	2587.5	0.95	1.3	75	0.1	1.0	73	11.9	2.0	75	-0.409	0.046	0.915	0.138	0.082	1.146	0.300	0.937	0.076	1.108	2.0
	471	24.6			115	2829	2829														0.000						
	463.1	32.5	9.9	30	115	3737.5	3737.5	0.95	1.3	38	0.4	0.8	31	3.0	0.0	31	-0.673	0.075	0.861	0.120	0.067	1.146	0.213	0.877	0.067	0.558	2.0
HAV-EB-1C	455	40.6			115	4669	4669														0.000						
	453.1	42.5	13.0	10	125	5312.5	4787.94	1.00	1.3	13	0.6	0.6	8	3.4	0.0	8	-0.960	0.107	0.804	0.120	0.070	1.146	0.087	0.928	0.065	0.107	1.6
	448.1	47.5	14.5	16	125	5937.5	5100.94	1.00	1.3	21	0.5	0.6	14	3.0	0.0	14	-1.107	0.123	0.776	0.120	0.070	1.146	0.106	0.906	0.068	0.146	2.0
	443.1	52.5	16.0	11	125	6562.5	5413.94	1.00	1.3	15	0.5	0.6	9	30.8	5.4	15	-1.251	0.138	0.748	0.120	0.071	1.146	0.109	0.896	0.069	0.153	2.0
	438.1	57.5	17.5	15	125	7187.5	5726.94	1.00	1.3	20	0.5	0.6	12	5.7	0.0	12	-1.392	0.153	0.722	0.120	0.071	1.146	0.099	0.901	0.068	0.132	1.9
	434.1	61.5	18.7	19	125	7687.5	5977.34	1.00	1.3	25	0.5	0.6	15	5.0	0.0	15	-1.500	0.165	0.701	0.120	0.070	1.146	0.112	0.883	0.070	0.159	2.0
	0.0																										
	465	5	1.5	16	115	575	575	0.75	1.3	16	0.4	1.6	26	25.3	5.1	31	-0.052	0.006	0.992	0.120	0.077	1.146	0.209	1.100	0.061	0.528	2.0
	460	10	3.0	4	115	1150	1150	0.80	1.3	4	0.5	1.4	6	16.3	3.7	10	-0.137	0.016	0.973	0.120	0.076	1.146	0.091	1.055	0.063	0.115	1.8
	455	15	4.6	8	115	1725	1725	0.85	1.3	9	0.5	1.1	10	2.0	0.0	10	-0.236	0.027	0.952	0.120	0.074	1.146	0.093	1.018	0.064	0.119	1.9
	452	18			115	2070	2070													0.120	0.000						
HAV-EB-1T	450	20	6.1	4	125	2500	2195.2	0.95	1.3	5	0.6	1.0	5	2.0	0.0	5	-0.348	0.039	0.928	0.120	0.082	1.146	0.076	0.997	0.072	0.086	1.2
	445	25	7.6	4	125	3125	2508.2	0.95	1.3	5	0.6	0.9	5	6.3	0.0	5	-0.472	0.053	0.902	0.120	0.088	1.146	0.074	0.987	0.078	0.084	1.1
	440	30	9.1	8	125	3750	2821.2	0.95	1.3	10	0.6	0.9	9	4.0	0.0	9	-0.604	0.068	0.875	0.120	0.091	1.146	0.088	0.974	0.081	0.109	1.3
	435	35	10.7	12	125	4375	3134.2	1.00	1.3	16	0.5	0.8	13	4.8	0.0	13	-0.744	0.083	0.847	0.120	0.092	1.146	0.103	0.959	0.084	0.141	1.7
	430	40	12.2	18	125	5000	3447.2	1.00	1.3	24	0.4	0.8	19	5.0	0.0	19	-0.887	0.099	0.819	0.120	0.093	1.146	0.130	0.936	0.086	0.198	2.0
	0.0																										
	485.9	10	3.0	40	115	1150	1150	0.80	1.3	43	0.2	1.2	50	5.0	0.0	50	-0.137	0.016	0.973	0.225	0.142	1.146	0.300	1.100	0.113	1.108	2.0
	475.9	20	6.1	8	115	2300	2300	0.95	1.3	10	0.5	1.0	10	3.0	0.0	10	-0.348	0.039	0.928	0.120	0.072	1.146	0.091	0.992	0.064	0.116	1.8
HAV-EB-2C	465.9	30	9.1	8	115	3450	3450	0.95	1.3	10	0.6	0.8	8	3.0	0.0	8	-0.604	0.068	0.875	0.120	0.068	1.146	0.084	0.958	0.062	0.102	1.6
	455.9	40	12.2	16	115	4600	4600	1.00	1.3	21	0.5	0.7	15	4.6	0.0	15	-0.887	0.099	0.819	0.120	0.064	1.146	0.109	0.914	0.061	0.153	2.0
	450.9	45	13.7	12	125	5625	4913	1.00	1.3	16	0.5	0.6	10	5.0	0.0	10	-1.034	0.115	0.790	0.120	0.071	1.146	0.093	0.921	0.067	0.119	1.8
	445.9	50	15.2	11	125	6250	5226	1.00	1.3	15	0.5	0.6	9	8.0	0.4	9	-1.179	0.131	0.762	0.120	0.071	1.146	0.090	0.918	0.068	0.113	1.7
	440.9	55	16.8	15	125	6875	5539	1.00	1.3	20	0.5	0.6	12	4.5	0.0	12	-1.322	0.146	0.735	0.120	0.071	1.146	0.100	0.903	0.069	0.134	1.9
	0.0																										
	469.3	7.5	2.3	5	115	862.5	862.5	0.75	1.3	5	0.6	1.7	8	6.3	0.0	8	-0.093	0.011	0.983	0.120	0.077	1.146	0.087	1.077	0.062	0.107	1.7
	464.3	12.5	3.8	8	115	1437.5	1437.5	0.80	1.3	9	0.5	1.2	10	22.0	4.8	15	-0.185	0.021	0.963	0.120	0.075	1.146	0.111	1.042	0.063	0.157	2.0
	459.3	17.5	5.3	8	115	2012.5	2012.5	0.85	1.3	9	0.5	1.0	9	2.0	0.0	9	-0.291	0.033	0.940	0.120	0.073	1.146	0.090	1.004	0.064	0.113	1.8
	454.3	22.5	6.9	5	115	2587.5	2587.5	0.95	1.3	6	0.6	0.9	6	2.0	0.0	6	-0.409	0.046	0.915	0.120	0.071	1.146	0.078	0.984	0.063	0.090	1.4
HAV-EB-2T	451	25.8			115	2967	2967													0.120	0.000						
	449.3	27.5	8.4	8	125	3437.5	3073.42	0.95	1.3	10	0.6	0.8	8	2.0	0.0	8	-0.537	0.060	0.889	0.120	0.078	1.146	0.086	0.967	0.070	0.106	1.5
	444.3	32.5	9.9	8	125	4062.5	3386.42	0.95	1.3	10	0.6	0.8	8	4.8	0.0	8	-0.673	0.075	0.861	0.120	0.081	1.146	0.085	0.960	0.073	0.103	1.4
	439.3	37.5	11.4	9	125	4687.5	3699.42	1.00	1.3	12	0.6	0.7	9	2.0	0.0	9	-0.815	0.091	0.833	0.120	0.082	1.146	0.088	0.950	0.076	0.110	1.5
	435.3	41.5	12.6	7	125	5187.5	3949.82	1.00	1.3	9	0.6	0.7	6	2.3	0.0	6	-0.931	0.104	0.810	0.120	0.083	1.146	0.081	0.949	0.076	0.095	1.2
	0.0																										
	483.2	12.5	3.8	44	115	1437.5	1437.5	0.80	1.3	47	0.2	1.1	51	19.4	4.4	55	-0.185	0.021	0.963	0.242	0.151	1.146	0.300	1.100	0.120	1.108	2.0
	473.2	22.5	6.9	33	115	2587.5	2587.5	0.95	1.3	42	0.3	0.9	39	7.0	0.1	39	-0.409	0.046	0.915	0.171	0.102	1.146	0.300	0.937	0.095	1.108	2.0
	466	29.7			115	3415.5	3415.5													0.120	0.000						
HAV-EB-3C	463.2	32.5	9.9	7	115	3737.5	3737.5	0.95	1.3	9	0.6	0.7	6	5.0	0.0	6	-0.673	0.075	0.861	0.120	0.067	1.146	0.080	0.954	0.061	0.094	1.5
	453.2	42.5	13.0	10	115	4887.5	4887.5	1.00	1.3	13	0.6	0.6	8	3.0	0.0	8	-0.960	0.107	0.804	0.120	0.063	1.146	0.087	0.927	0.059	0.107	1.8
	448.2	47.5	14.5	22	125	5937.5	5200.5	1.00	1.3	29	0.4	0.7	20	20.2	4.5	25	-1.107	0.123	0.776	0.120	0.069	1.146	0.162	0.853	0.071	0.290	2.0
	443.2	52.5	16.0	14	125	6562.5	5513.5	1.00	1.3	19	0.5	0.6	11	3.0	0.0	11	-1.251	0.138	0.748	0.120	0.069	1.146	0.097	0.907	0.067	0.127	1.9
	438.2	57.5	17.5	18	125	7187.5	5826.5	1.00	1.3	24	0.5	0.6	15	5.4	0.0	15	-1.392	0.153	0.722	0.120	0.069	1.146	0.109	0.889	0.068	0.153	2.0
	433.2	62.5	19.1	6	125	7812.5	6139.5	1.00	1.3	8	0.6	0.5	4	5.0	0.0	4	-1.526	0.167	0.696	0.120	0.069	1.146	0.073	0.922	0.065	0.081	1.2

Table I-2: SPT Liquefaction Analysis Cont.

HAV-EB-4C	485.4	10	3.0	37	115	1150	1150	0.80	1.3	39	0.2	1.2	46	13.8	2.8	49	-0.137	0.016	0.973	0.260	0.164	1.146	0.300	1.100	0.130	1.108	2.0
	475.4	20	6.1	29	115	2300	2300	0.95	1.3	37	0.3	1.0	36	13.6	2.8	39	-0.348	0.039	0.928	0.190	0.115	1.146	0.300	0.973	0.103	1.108	2.0
	465.4	30	9.1	64	115	3450	3450	0.95	1.3	81	0.1	1.0	77	12.9	2.5	80	-0.604	0.068	0.875	0.120	0.068	1.146	0.300	0.851	0.070	1.108	2.0
	455.4	40	12.2	8	115	4600	4600	1.00	1.3	11	0.6	0.6	7	10.0	1.1	8	-0.887	0.099	0.819	0.120	0.064	1.146	0.086	0.933	0.060	0.105	1.8
	448																										
	0.0																										
HAV-EB-5C	477.6	12.5	3.8	52	115	1437.5	1437.5	0.80	1.3	55	0.2	1.1	60	9.2	0.8	60	-0.185	0.021	0.963	0.233	0.146	1.146	0.300	1.100	0.116	1.108	2.0
	468.1	22	6.7	66	115	2530	2530	0.95	1.3	84	0.1	1.0	82	5.0	0.0	82	-0.396	0.045	0.918	0.160	0.095	1.146	0.300	0.944	0.088	1.108	2.0
	463	27.1			115	3116.5	3116.5													0.120	0.000						
	457.6	32.5	9.9	8	115	3737.5	3737.5	0.95	1.3	10	0.6	0.7	7	1.0	0.0	7	-0.673	0.075	0.861	0.120	0.067	1.146	0.083	0.952	0.062	0.100	1.6
	452.6	37.5	11.4	12	115	4312.5	4312.5	1.00	1.3	16	0.5	0.7	11	1.0	0.0	11	-0.815	0.091	0.833	0.120	0.065	1.146	0.096	0.931	0.061	0.125	2.0
	442.6	47.5	14.5	6	115	5462.5	5462.5	1.00	1.3	8	0.6	0.6	4	1.1	0.0	4	-1.107	0.123	0.776	0.120	0.061	1.146	0.074	0.929	0.057	0.083	1.5
	437.6	52.5	16.0	5	125	6562.5	5775.5	1.00	1.3	7	0.6	0.5	4	1.0	0.0	4	-1.251	0.138	0.748	0.120	0.066	1.146	0.071	0.928	0.062	0.078	1.2
	432.6	57.5	17.5	13	125	7187.5	6088.5	1.00	1.3	17	0.5	0.6	10	2.2	0.0	10	-1.392	0.153	0.722	0.120	0.066	1.146	0.091	0.903	0.064	0.116	1.8
	427.6	62.5	19.1	13	125	7812.5	6401.5	1.00	1.3	17	0.5	0.5	9	1.0	0.0	9	-1.526	0.167	0.696	0.120	0.066	1.146	0.090	0.899	0.064	0.114	1.8
	0.0																										
HAV-EB-5T	457.4	5	1.5	8	115	575	575	0.75	1.3	8	0.5	1.7	14	8.0	0.4	14	-0.052	0.006	0.992	0.120	0.077	1.146	0.107	1.100	0.061	0.148	2.0
	452.4	10	3.0	6	115	1150	1150	0.80	1.3	6	0.6	1.4	9	4.6	0.0	9	-0.137	0.016	0.973	0.120	0.076	1.146	0.089	1.053	0.063	0.111	1.8
	447.4	15	4.6	5	115	1725	1725	0.85	1.3	6	0.6	1.1	6	5.8	0.0	6	-0.236	0.027	0.952	0.120	0.074	1.146	0.080	1.016	0.064	0.095	1.5
	442.4	20	6.1	4	115	2300	2300	0.95	1.3	5	0.6	1.0	5	4.0	0.0	5	-0.348	0.039	0.928	0.120	0.072	1.146	0.075	0.993	0.064	0.085	1.3
	437.4	25	7.6	4	125	3125	2613	0.95	1.3	5	0.6	0.9	4	4.0	0.0	4	-0.472	0.053	0.902	0.120	0.084	1.146	0.074	0.984	0.075	0.083	1.1
	432.4	30	9.1	12	125	3750	2926	0.95	1.3	15	0.5	0.8	13	5.3	0.0	13	-0.604	0.068	0.875	0.120	0.087	1.146	0.103	0.966	0.079	0.139	1.8
	427.4	35	10.7	8	125	4375	3239	1.00	1.3	11	0.6	0.8	8	2.0	0.0	8	-0.744	0.083	0.847	0.120	0.089	1.146	0.087	0.962	0.081	0.107	1.3
	422.4	40	12.2	9	125	5000	3552	1.00	1.3	12	0.6	0.8	9	2.2	0.0	9	-0.887	0.099	0.819	0.120	0.090	1.146	0.089	0.953	0.082	0.111	1.4
	0.0																										
HAV-EB-6C	478.8	10	3.0	10	115	1150	1150	0.80	1.3	11	0.4	1.3	14	36.3	5.5	19	-0.137	0.016	0.973	0.225	0.142	1.146	0.131	1.079	0.115	0.200	1.7
	468.8	20	6.1	32	115	2300	2300	0.95	1.3	41	0.3	1.0	40	10.0	1.1	41	-0.348	0.039	0.928	0.120	0.072	1.146	0.300	0.973	0.065	1.108	2.0
	458.8	30	9.1	22	115	3450	3450	0.95	1.3	28	0.4	0.8	23	37.7	5.5	29	-0.604	0.068	0.875	0.120	0.068	1.146	0.191	0.905	0.066	0.416	2.0
	448.8	40	12.2	4	115	4600	4600	1.00	1.3	5	0.6	0.6	3	4.1	0.0	3	-0.887	0.099	0.819	0.120	0.064	1.146	0.070	0.945	0.059	0.076	1.3
	446																				#DIV/0!						
	0.0																										
HAV-EB-7C	476.8	12.5	3.8	6	115	1437.5	1437.5	0.80	1.3	6	0.5	1.2	8	17.8	4.0	12	-0.185	0.021	0.963	0.213	0.133	1.146	0.099	1.037	0.112	0.131	1.2
	466.8	22.5	6.9	10	115	2587.5	2587.5	0.95	1.3	13	0.5	0.9	11	10.6	1.4	13	-0.409	0.046	0.915	0.120	0.071	1.146	0.103	0.979	0.064	0.139	2.0
	463	26.3			115	3024.5	3024.5													0.120	0.000						
	461.8	27.5	8.4	34	125	3437.5	3099.62	0.95	1.3	43	0.3	0.9	38	10.0	1.1	40	-0.537	0.060	0.889	0.120	0.077	1.146	0.300	0.883	0.076	1.108	2.0
	456.8	32.5	9.9	13	125	4062.5	3412.62	0.95	1.3	16	0.5	0.8	13	10.0	1.1	14	-0.673	0.075	0.861	0.120	0.080	1.146	0.107	0.948	0.074	0.149	2.0
	451.8	37.5	11.4	16	125	4687.5	3725.62	1.00	1.3	21	0.5	0.8	16	9.0	0.7	17	-0.815	0.091	0.833	0.120	0.082	1.146	0.120	0.931	0.077	0.175	2.0
	446.8	42.5	13.0	19	125	5312.5	4038.62	1.00	1.3	25	0.4	0.8	19	8.7	0.6	20	-0.960	0.107	0.804	0.120	0.083	1.146	0.131	0.914	0.079	0.201	2.0
	0.0																										
HAV-EB-8C	478.9	10	3.0	41	115	1150	1150	0.80	1.3	44	0.2	1.1	50	19.0	4.3	54	-0.137	0.016	0.973	0.223	0.141	1.146	0.300	1.100	0.112	1.108	2.0
	468.9	20	6.1	17	115	2300	2300	0.95	1.3	22	0.4	1.0	21	27.7	5.3	26	-0.348	0.039	0.928	0.120	0.072	1.146	0.170	0.985	0.064	0.319	2.0
	458.9	30	9.1	16	115	3450	3450	0.95	1.3	20	0.5	0.8	16	10.0	1.1	17	-0.604	0.068	0.875	0.120	0.068	1.146	0.121	0.940	0.063	0.177	2.0
	448.9	40	12.2	19	115	4600	4600	1.00	1.3	25	0.5	0.7	18	3.1	0.0	18	-0.887	0.099	0.819	0.120	0.064	1.146	0.122	0.904	0.062	0.181	2.0

Table I-3: Liquefaction Analysis for CPT HAV-C001

Idriss and Blouanger Liquefaction Analysis from CPT Data | Groudwater Elevation Used
Havana East Ash Pond - Site 1
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

amax	0.12
Mw	6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	469.84	5.36	0.06	0.19	1.03	111.37	0.009	0.009	0.014	-0.001	1.00	5	0.62	1.7	47.1	9	56	0.096	0.07	1.10	1.15	0.062	1.6
0.100	0.33	469.67	22.41	0.15	1.70	0.69	117.73	0.019	0.019	0.012	-0.001	1.00	21	0.70	1.7	0.0	36	36	0.083	0.06	1.10	1.15	0.062	1.3
0.150	0.49	469.51	39.50	0.21	2.67	0.52	117.73	0.028	0.028	0.010	-0.001	1.00	37	0.59	1.7	0.0	63	63	0.102	0.08	1.10	1.15	0.062	1.7
0.200	0.66	469.34	70.37	0.26	2.86	0.37	120.91	0.038	0.038	0.008	-0.000	1.00	66	0.47	1.7	0.0	113	113	0.157	0.12	1.10	1.15	0.062	2.0
0.250	0.82	469.18	80.68	0.33	1.72	0.40	120.91	0.048	0.048	0.006	-0.000	1.00	76	0.44	1.7	0.0	130	130	0.196	0.13	1.10	1.15	0.062	2.0
0.300	0.98	469.02	101.31	0.38	2.81	0.37	124.10	0.058	0.058	0.004	0.000	1.00	96	0.38	1.7	0.0	163	163	0.401	0.18	1.10	1.15	0.062	2.0
0.350	1.15	468.85	121.04	0.42	2.43	0.35	124.10	0.068	0.068	0.002	0.000	1.00	114	0.34	1.7	0.0	194	194	1.401	0.25	1.10	1.15	0.062	2.0
0.400	1.31	468.69	135.24	0.46	1.65	0.34	124.10	0.078	0.078	-0.000	0.001	1.00	128	0.31	1.7	0.0	217	217	5.798	0.30	1.10	1.15	0.062	2.0
0.450	1.48	468.52	135.71	0.51	1.36	0.38	124.10	0.089	0.089	-0.003	0.001	1.00	128	0.31	1.7	0.0	218	218	6.132	0.30	1.10	1.15	0.062	2.0
0.500	1.64	468.36	129.97	0.54	0.90	0.41	124.10	0.099	0.099	-0.005	0.001	1.00	123	0.32	1.7	0.0	209	209	3.218	0.29	1.10	1.15	0.062	2.0
0.550	1.80	468.20	124.20	0.55	1.17	0.44	124.10	0.109	0.109	-0.007	0.001	1.00	117	0.33	1.7	0.0	200	200	1.840	0.26	1.10	1.15	0.062	2.0
0.600	1.97	468.03	115.14	0.55	1.14	0.48	124.10	0.119	0.119	-0.009	0.001	1.00	109	0.35	1.7	0.0	185	185	0.894	0.22	1.10	1.15	0.062	2.0
0.650	2.13	467.87	105.71	0.53	0.89	0.50	124.10	0.129	0.129	-0.011	0.002	1.00	100	0.37	1.7	0.0	170	170	0.500	0.19	1.10	1.15	0.062	2.0
0.700	2.30	467.70	93.03	0.51	0.65	0.55	124.10	0.139	0.139	-0.013	0.002	1.00	88	0.40	1.7	0.1	149	150	0.285	0.16	1.10	1.15	0.062	2.0
0.750	2.46	467.54	82.56	0.49	0.31	0.59	120.91	0.149	0.149	-0.016	0.002	1.00	78	0.43	1.7	0.4	133	133	0.207	0.14	1.10	1.15	0.062	2.0
0.800	2.62	467.38	74.42	0.44	0.04	0.59	120.91	0.159	0.159	-0.018	0.002	1.00	70	0.46	1.7	0.8	120	120	0.172	0.12	1.10	1.15	0.062	2.0
0.850	2.79	467.21	70.55	0.34	0.20	0.48	120.91	0.169	0.169	-0.020	0.003	1.00	67	0.47	1.7	0.2	113	114	0.158	0.12	1.10	1.15	0.062	2.0
0.900	2.95	467.05	63.30	0.32	0.04	0.51	120.91	0.179	0.179	-0.022	0.003	1.00	60	0.49	1.7	1.1	102	103	0.141	0.11	1.10	1.15	0.062	2.0
0.950	3.12	466.88	57.41	0.29	1.18	0.51	120.91	0.189	0.189	-0.025	0.003	1.00	54	0.51	1.7	2.0	92	94	0.130	0.10	1.10	1.15	0.062	2.0
1.000	3.28	466.72	54.22	0.27	0.75	0.50	120.91	0.199	0.199	-0.027	0.003	1.00	51	0.53	1.7	0.1	87	87	0.123	0.10	1.10	1.15	0.062	2.0
1.050	3.44	466.56	51.10	0.25	0.65	0.50	120.91	0.209	0.209	-0.029	0.004	1.00	48	0.54	1.7	0.1	82	82	0.118	0.09	1.10	1.15	0.062	1.9
1.100	3.61	466.39	47.58	0.24	0.62	0.51	120.91	0.219	0.219	-0.032	0.004	1.00	45	0.54	1.7	4.4	76	81	0.117	0.09	1.10	1.15	0.062	1.9
1.150	3.77	466.23	44.53	0.23	0.07	0.51	120.91	0.229	0.229	-0.034	0.004	1.00	42	0.55	1.7	5.4	72	77	0.113	0.09	1.10	1.15	0.062	1.8
1.200	3.94	466.06	42.48	0.22	0.02	0.52	120.91	0.239	0.239	-0.036	0.005	1.00	40	0.56	1.7	6.8	68	75	0.111	0.09	1.10	1.15	0.062	1.8
1.250	4.10	465.90	40.75	0.21	-0.02	0.53	117.73	0.249	0.249	-0.039	0.005	0.99	39	0.56	1.7	7.6	65	73	0.110	0.09	1.10	1.15	0.062	1.8
1.300	4.27	465.73	39.62	0.21	0.17	0.53	117.73	0.258	0.258	-0.041	0.005	0.99	37	0.57	1.7	8.2	64	72	0.109	0.09	1.10	1.15	0.062	1.8
1.350	4.43	465.57	38.84	0.21	0.05	0.54	117.73	0.268	0.268	-0.044	0.005	0.99	37	0.57	1.7	9.1	62	71	0.108	0.08	1.10	1.15	0.061	1.8
1.400	4.59	465.41	38.60	0.21	0.07	0.54	117.73	0.278	0.278	-0.046	0.006	0.99	36	0.57	1.7	9.0	62	71	0.108	0.08	1.10	1.15	0.061	1.8
1.450	4.76	465.24	38.29	0.21	0.02	0.54	117.73	0.287	0.287	-0.049	0.006	0.99	36	0.57	1.7	9.3	62	71	0.108	0.08	1.10	1.15	0.061	1.8
1.500	4.92	465.08	38.16	0.21	0.09	0.55	117.73	0.297	0.297	-0.051	0.006	0.99	36	0.57	1.7	9.5	61	71	0.108	0.08	1.10	1.15	0.061	1.8
1.550	5.09	464.91	38.64	0.21	0.06	0.54	117.73	0.306	0.306	-0.054	0.006	0.99	37	0.57	1.7	9.2	62	71	0.108	0.08	1.10	1.15	0.061	1.8
1.600	5.25	464.75	39.58	0.22	0.20	0.55	117.73	0.316	0.316	-0.056	0.007	0.99	37	0.57	1.7	8.9	64	72	0.109	0.09	1.10	1.15	0.061	1.8
1.650	5.41	464.59	40.30	0.22	0.31	0.54	117.73	0.326	0.326	-0.059	0.007	0.99	38	0.57	1.7	8.2	65	73	0.110	0.09	1.10	1.15	0.061	1.8
1.700	5.58	464.42	41.62	0.23	0.59	0.55	117.73	0.335	0.335	-0.061	0.007	0.99	39	0.56	1.7	7.9	67	75	0.111	0.09	1.10	1.15	0.061	1.8
1.750	5.74	464.26	43.02	0.24	0.74	0.55	120.91	0.345	0.345	-0.064	0.008	0.99	41	0.56	1.7	7.2	69	76	0.113	0.09	1.10	1.15	0.061	1.8
1.800	5.91	464.09	45.14	0.25	0.50	0.56	120.91	0.355	0.355	-0.066	0.008	0.99	43	0.55	1.7	6.4	73	79	0.115	0.09	1.10	1.15	0.061	1.9
1.850	6.07	463.93	45.99	0.26	0.65	0.56	120.91	0.365	0.365	-0.069	0.008	0.99	43	0.55	1.7	6.1	74	80	0.116	0.09	1.10	1.15	0.061	1.9
1.900	6.23	463.77	47.41	0.19	0.67	0.41	120.91	0.375	0.375	-0.072	0.008	0.99	45	0.56	1.7	0.1	76	76	0.113	0.09	1.09	1.15	0.062	1.8
1.950	6.40	463.60	48.13	0.24	0.60	0.50	120.91	0.385	0.385	-0.074	0.009	0.99	45	0.54	1.7	4.6	77	82	0.118	0.09	1.09	1.15	0.061	1.9
2.000	6.56	463.44	48.98	0.26	0.50	0.53	120.91	0.395	0.395	-0.077	0.009	0.99	46	0.54	1.7	5.1	79	84	0.119	0.09	1.09	1.15	0.061	1.9
2.050	6.73	463.27	51.39	0.27	0.42	0.52	120.91	0.405	0.405	-0.080	0.009	0.99	49	0.53	1.7	4.3	81	85	0.121	0.09	1.09	1.15	0.061	2.0
2.100	6.89	463.11	53.38	0.28	0.38	0.53	120.91	0.415	0.415	-0.082	0.010	0.98	50	0.53	1.6	4.2	83	87	0.122	0.10	1.09	1.15	0.062	2.0
2.150	7.05	462.95	55.63	0.29	0.77	0.53	120.91	0.425	0.425	-0.085	0.010	0.98	53	0.52	1.6	3.7	85	89	0.124	0.10	1.09	1.15	0.062	2.0
2.200	7.22	462.78	57.68	0.31	0.91	0.54	120.91	0.435	0.435	-0.088	0.010	0.98	55	0.52	1.6	3.5	87	90	0.126	0.10	1.09	1.15	0.062	2.0
2.250	7.38	462.62	60.05	0.32	1.16	0.54	120.91	0.444	0.444	-0.091	0.011	0.98	57	0.52	1.6	3.1	89	92	0.128	0.10	1.09	1.15	0.062	2.0
2.300	7.55	462.45	64.56	0.35	1.82	0.53	120.91	0.454	0.454	-0.093	0.011	0.98	61	0.51	1.5	2.3	94	96	0.132	0.10	1.09	1.15	0.062	2.0
2.350	7.71	462.29	67.79	0.36	1.99	0.54	120.91	0.464	0.464	-0.096	0.011	0.98	64	0.50	1.5	1.9	97	99	0.136	0.11	1.09	1.15	0.062	2.0
2.400	7.87	462.13	72.22	0.40	2.48	0.55	120.91	0.474	0.474	-0.099	0.012	0.98	68	0.49	1.5	1.6	101	103	0.141	0.11	1.09	1.15	0.061	2.0
2.450	8.04	461.96	76.01	0.42	2.56	0.55	120.91	0.484	0.484	-0.102	0.012	0.98	72	0.48	1.5	1.3	105	106	0.146	0.11	1.09	1.15	0.061	2.0
2.500	8.20	461.80	80.74	0.44	2.85	0.55	120.91	0.494	0.494	-0.105	0.012	0.98	76	0.48	1.4	0.9	110	111	0.153	0.12	1.09	1.15	0.061	2.0
2.550	8.37	461.63	83.80	0.47	2.79	0.56	120.91	0.504	0.504	-0.107	0.012	0.98	79	0.47	1.4	0.9	112	113	0.157	0.12	1.09	1.15	0.061	2.0
2.600	8.53	461.47	86.00	0.50	2.61	0.58	120.91	0.514	0.514	-0.110	0.013	0.98	81	0.47	1.4	0.9	114	115	0.160	0.12	1.09	1.15	0.061	2.0
2.650	8.69	461.31	87.79	0.51	2.55	0.58	120.91	0.524	0.524	-0.113	0.013	0.98	83	0.46	1.4	0.8	115	116	0.163	0.12	1.08	1.15	0.061	2.0
2.700	8.86	461.14	89.01	0.51	2.37	0.58	120.91	0.534	0.534	-0.116	0.013	0.98	84	0.46	1.4	0.8	116	116	0.164	0.12	1.08	1.15	0.061	2.0
2.750	9.02	460.98	89.66	0.51	2.26	0.57	120.91	0.544	0.544	-0.119	0.014	0.98	85	0.46	1.4	0.7	115	116	0.163	0.12	1.08	1.15	0.062	2.0
2.800	9.19	460.81	87.82	0.50	1.74	0.57	120.91	0.554	0.554	-0.122	0.014	0.98	83	0.47	1.4	0.9	113	113	0.158	0.12	1.08	1.15	0.062	2.0
2.850	9.35	460.65	83.51	0.45	1.22	0.53	120.91	0.564	0.564	-0.125	0.014	0.98	79	0.48	1.4	1.0	107	108	0.149	0.11	1.07	1.15	0.062	2.0
2.900	9.51	460.49	79.74	0.33	1.10	0.41	120.91	0.573	0.573	-0.128	0.015	0.97	75	0.49	1.4	0.2	102	102	0.140	0.11	1.07	1.15	0.062	2.0
2.950	9.68	460.32	78.24	0.34	0.77	0.43	120.91	0.583	0.583	-0.131	0.015	0.97	74	0.50	1.3	0.2	100	100	0.137	0.11	1.06	1.15	0.062	2.0
3.000	9.84	460.16	75.75	0.32	-0.47	0.42	120.91	0.593	0.593	-0.134	0.015	0.97	72	0.51	1.3	0.2	96	96	0.132	0.10	1.06	1.15	0.063	2.0
3.050	10.01	459.99	75.40	0.30	-2.59	0.40	120.91	0.603	0.603	-0.137	0.016	0.97	71	0.51	1.3	0.2	95	95	0.131	0.10	1.06	1.15	0.063	2.0
3.100	10.17	459.83	72.02	0.29	-5.33	0.40	120.91	0.613	0.613	-0.140	0.016	0.97	68	0.52	1.3	0.2	90	91	0.126	0.10	1.05	1.15	0.063	2.0
3.150	10.33	459.67	70.76	0.29	-3.41	0.41	120.91	0.623	0.623	-0.143	0.016	0.97	67	0.52	1.3	0.1	88	88	0.124	0.10	1.05	1.15	0.063	2.0
3.200	10.50	459.50	67.39	0.37	-2.01	0.54	120.91	0.633	0.633	-0.146	0.017	0.97	64	0.53	1.3	4.1	83	88	0.123	0.10	1.05	1.15	0.063	2.0
3.250	10.66	459.34	54.15	0.54	-2.58	1.00	117.73	0.643	0.643	-0.149	0.017	0.97	51	0.53	1.3	18.8	67	85	0.121	0.09	1.05	1.15	0.063	1.9
3.300	10.83	459.17	38.57	0.69	-3.73	1.79	114.55	0.652	0.652	-0.152	0.017	0.97	36	0.54	1.3	36.4	47	84	0.119	0.09	1.05	1.15	0.063	1.9
3.350	10.99	459.01	24.38	0.66	-5.64	2.72	114.55	0.662	0.662	-0.155	0.018	0.97	23	0.56	1.3	45.1	30	75	0.111	0.09	1.04	1.15	0.063	1.8
3.400	11.15	458.85	18.85	0.44	-6.52	2.31	114.55	0.671	0.671	-0.158	0.018	0.97	18	0.58	1.3	45.3	23	68	0.106	0.08	1.04	1.15	0.064	1.7
3.450	11.32	458.68	15.87	0.37	-0.95	2.34	114.55	0.680	0.680	-0.162	0.019	0.97	15	0.59	1.3	45.7	19	65	0.103	0.08	1.04	1.15	0.064	1.6
3.500	11.48	458.52	16.75	0.48	15.14	2.86	114.55	0.690	0.690	-0.165	0.019	0.97	16	0.58	1.3	47.1	20	67	0.105	0.08	1.04	1.15	0.064	1.7
3.550	11.65	458.35	23.78	0.53	-10.34	2.21	114.55	0.699	0.699	-0.168	0.019	0.97	22	0.57	1.3	44.4	28	73	0.110	0.09	1.04	1.15	0.064	1.7
3.600	11.81	458.19	20.16	0.55	12.12	2.75	114.55	0.709	0.709	-0.171	0.020	0.97	19	0.57	1.3	45.8	24	70	0.107	0.08	1.03	1.15	0.064	1.7
3.650	11.97	458.03	29.49	0.57	120.02	1.94	114.55	0.718	0.718	-0.174	0.020	0.96	28	0.56	1.2	41.2	35	76	0.112	0.09	1.03	1.15	0.064	1.8
3.700	12.14	457.86	71.24	0.49	12.25	0.69	120.91	0.728	0.728	-0.177	0.020	0.96	67	0.52	1.2	7.3	82	89	0.125	0.10	1.04	1.15	0.063	2.0
3.750	12.30	457.70	87.82	0.52	-0.18	0.60	120.91	0.738	0.738	-0.181	0.021	0.96	83	0.49	1.2	2.5	99	102	0.139	0.11	1.04	1.15	0.063	2.0
3.800	12.47	457.53	97.20	0.60	0.33	0.62	120.91	0.748	0.748	-0.184	0.021	0.96	92	0.48	1.2	1.7	108	110	0.152	0.12	1.04	1.15	0.063	2.0
3.850	12.63	457.37	100.67	0.58	0.30	0.57	124.10	0.758	0.758	-0.187	0.021	0.96	95	0.47	1.2	1.1	111	112	0.156	0.12	1.04	1.15	0.063	2.0
3.900	12.80	457.20	102.76	0.55	2.71	0.53	124.10	0.768	0.768	-0.190	0.022	0.96	97	0.47	1.2	0.7	113	114	0.158	0.12	1.04	1.15	0.063	2.0
3.950	12.96	457.04	104.49	0.53	1.02	0.51	124.10	0.778	0.778	-0.194	0.022	0.96	99	0.47	1.2	0.5	114	115	0.160	0.12	1.04	1.15	0.063	2.0
4.000	13.12	456.88	105.86	0.54	0.84	0.51	124.10	0.788	0.788	-0.197	0.022	0.96	100	0.47	1.1	0.5	115	115	0.161	0.12	1.04	1.15	0.063	2.0
4.050	13.29	456.71	103.35	0.52	0.55	0.51	124.10	0.798	0.798	-0.200	0.023	0.96	98	0.47	1.1	0.6	112	112	0.156	0.12	1.03	1.15	0.063	2.0
4.100	13.45	456.55	99.40	0.52	0.38	0.52	124.10	0.809	0.809	-0.204	0.023	0.96	94	0.48	1.1	1.0	107	108	0.149	0.11	1.03	1.15	0.063	2.0
4.150	13.62	456.38	97.37	0.50	0.64	0.51	124.10	0.819	0.819	-0.207	0.024	0.96	92	0.49	1.1	1.1	104	105	0.145	0.11	1.03	1.15	0.063	2.0
4.200	13.78	456.22	96.06	0.48	0.70	0.50	124.10	0.829	0.829	-0.210	0.024	0.96	91	0.49	1.1	0.2	102	103	0.141	0.11	1.03	1.15	0.063	2.0
4.250	13.94	456.06	94.43	0.45	0.62	0.47	124.10	0.839	0.839	-0.214	0.024	0.96	89	0.50	1.1	0.2	100	100	0.138	0.11	1.02	1.15	0.064	2.0
4.300	14.11	455.89	94.77	0.45	0.82	0.48	124.10	0.849	0.849	-0.217	0.025	0.96	90	0.50	1.1	0.2	100	100	0.137	0.11	1.02	1.15	0.064	2.0
4.350	14.27	455.73	95.71	0.50	0.92	0.52	124.10	0.859	0.859	-0.221	0.025	0.95	90	0.49	1.1	1.4	100	102	0.139	0.11	1.02	1.15	0.064	2.0
4.400	14.44	455.56	95.45	0.58	0.86	0.61	120.91	0.869	0.869	-0.224	0.025	0.95	90	0.49	1.1	2.7	99	102	0.140	0.11	1.02	1.15	0.064	2.0
4.450	14.60	455.40	96.90	0.62	1.12	0.64	120.91	0.879	0.879	-0.227	0.026	0.95	92	0.49	1.1	2.9	100	103	0.142	0.11	1.02	1.15	0.064	2.0
4.500	14.76	455.24	103.22	0.59	1.20	0.57	120.91	0.889	0.889	-0.231	0.026	0.95	98	0.48	1.1	1.5	106	108	0.148	0.11	1.02	1.15	0.064	2.0
4.550	14.93	455.07	106.94	0.56	1.10	0.52	124.10	0.900	0.900	-0.234	0.027	0.95	101	0.48	1.1	0.8	109	110	0.152	0.12	1.02	1.15	0.064	2.0
4.600	15.09	454.91	107.27	0.53	1.01	0.49	124.10	0.910	0.910	-0.238	0.027	0.95	101	0.48	1.1	0.2	109	109	0.151	0.11	1.02	1.15	0.064	2.0
4.650	15.26	454.74	106.70	0.54	1.11	0.51	124.10	0.920	0.920	-0.241	0.027	0.95	101	0.48	1.1	0.8	108	109	0.150	0.11	1.02	1.15	0.064	2.0
4.700	15.42	454.58	107.87	0.55	1.24	0.51	124.10	0.930	0.930	-0.245	0.028	0.95	102	0.48	1.1	0.8	108	109	0.151	0.11	1.01	1.15	0.064	2.0
4.750	15.58	454.42	108.47	0.51	1.68	0.47	124.10	0.940	0.940	-0.248	0.028	0.95	103	0.48	1.1	0.2	108	109	0.150	0.11	1.01	1.15	0.064	2.0
4.800	15.75	454.25	105.13	0.46	0.69	0.44	124.10	0.951	0.951	-0.252	0.029	0.95	99	0.49	1.1	0.2	105	105	0.144	0.11	1.01	1.15	0.064	2.0
4.850	15.91	454.09	96.95	0.42	0.48	0.43	124.10	0.961	0.961	-0.255	0.029	0.95	92	0.51	1.1	0.2	96	96	0.133	0.10	1.01	1.15	0.064	2.0
4.900	16.08	453.92	93.65	0.38	0.65	0.41	124.10	0.971	0.971	-0.259	0.029	0.95	89	0.51	1.0	0.2	93	93	0.128	0.10	1.01	1.15	0.064	2.0
4.950	16.24	453.76	88.88	0.37	2.03	0.41	124.10	0.981	0.981	-0.263	0.030	0.95	84	0.53	1.0	0.1	87	88	0.123	0.10	1.01	1.15	0.064	1.9
5.000	16.40	453.60	86.45	0.37	0.32	0.42	124.10	0.991	0.991	-0.266	0.030	0.95	82	0.53	1.0	0.1	85	85	0.120	0.09	1.01	1.15	0.064	1.9
5.050	16.57	453.43	80.95	0.36	0.22	0.45	120.91	1.001	1.001	-0.270	0.031	0.94	76	0.55	1.0	0.1	79	79	0.115	0.09	1.00	1.15	0.064	1.8
5.100	16.73	453.27	76.70	0.35	0.05	0.45	120.91	1.011	1.011	-0.273	0.031	0.94	72	0.56	1.0	0.1	74	74	0.111	0.09	1.00	1.15	0.064	1.7
5.150	16.90	453.10	72.42	0.34	-0.02	0.47	120.91	1.021	1.021	-0.277	0.031	0.94	68	0.57	1.0	0.1	70	70	0.107	0.08	1.00	1.15	0.064	1.7
5.200	17.06	452.94	71.19	0.35	0.10	0.49	120.91	1.031	1.031	-0.281	0.032	0.94	67	0.58	1.0	0.1	68	68	0.106	0.08	1.00	1.15	0.064	1.7
5.250	17.22	452.78	73.81	0.38	0.31	0.52	120.91	1.041	1.041	-0.284	0.032	0.94	70	0.56	1.0	6.3	70	77	0.113	0.09	1.00	1.15	0.064	1.8
5.300	17.39	452.61	78.75	0.35	0.72	0.45	120.91	1.051	1.051	-0.288	0.033	0.94	74	0.56	1.0	0.1	75	75	0.111	0.09	1.00	1.15	0.064	1.7
5.350	17.55	452.45	83.36	0.29	1.02	0.35	124.10	1.061	1.061	-0.292	0.033	0.94	79	0.55	1.0	0.1	79	79	0.115	0.09	1.00	1.15	0.064	1.8
5.400	17.72	452.28	84.10	0.29	-0.85	0.34	124.10	1.071	1.071	-0.295	0.033	0.94	79	0.55	1.0	0.1	79	79	0.115	0.09	1.00	1.15	0.064	1.8
5.450	17.88	452.12	84.08	0.31	-0.29	0.37	124.10	1.081	1.081	-0.299	0.034	0.94	79	0.55	1.0	0.1	79	79	0.115	0.09	1.00	1.15	0.064	1.8
5.500	18.04	451.96	83.40	0.34	0.00	0.40	120.91	1.091	1.091	-0.303	0.034	0.94	79	0.55	1.0	0.1	77	78	0.114	0.09	1.00	1.15	0.064	1.8
5.550	18.21	451.79	81.98	0.33	-0.01	0.40	120.91	1.101	1.101	-0.307	0.035	0.94	77	0.56	1.0	0.1	76	76	0.112	0.09	1.00	1.15	0.064	1.8
5.600	18.37	451.63	78.97	0.33	0.41	0.41	120.91	1.111	1.111	-0.310	0.035	0.94	75	0.57	1.0	0.1	73	73	0.109	0.09	1.00	1.15	0.064	1.7

Table I-3: Liquefaction Analysis for CPT HAV-C001 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	CRR M=7.5 σv=1atm Deterministic	Cσ	Kσ	MSF	CSRM,σv	FS
5.650	18.54	451.46	74.74	0.32	0.10	0.43	120.91	1.121	1.121	-0.314	0.036	0.93	71	0.58	1.0	0.1	68	68	0.106	0.08	1.00	1.15	0.064	1.7
5.700	18.70	451.30	72.32	0.32	0.13	0.44	120.91	1.131	1.131	-0.318	0.036	0.93	68	0.59	1.0	0.1	66	66	0.104	0.08	0.99	1.15	0.064	1.6
5.750	18.86	451.14	71.98	0.30	0.14	0.42	120.91	1.141	1.141	-0.322	0.036	0.93	68	0.59	1.0	0.1	65	65	0.103	0.08	0.99	1.15	0.064	1.6
5.800	19.03	450.97	71.04	0.24	0.80	0.34	120.91	1.151	1.151	-0.325	0.037	0.93	67	0.59	1.0	0.1	64	64	0.103	0.08	0.99	1.15	0.064	1.6
5.850	19.19	450.81	69.35	0.23	0.42	0.33	120.91	1.161	1.161	-0.329	0.037	0.93	66	0.60	0.9	0.1	62	62	0.101	0.08	0.99	1.15	0.064	1.6
5.900	19.36	450.64	63.45	0.23	2.55	0.37	120.91	1.171	1.171	-0.333	0.038	0.93	60	0.62	0.9	0.1	56	56	0.097	0.08	0.99	1.15	0.064	1.5
5.950	19.52	450.48	65.65	0.25	0.18	0.37	120.91	1.181	1.181	-0.337	0.038	0.93	62	0.61	0.9	0.1	58	58	0.098	0.08	0.99	1.15	0.064	1.5
6.000	19.68	450.32	64.98	0.33	-0.08	0.50	120.91	1.191	1.191	-0.341	0.038	0.93	61	0.58	0.9	9.9	57	67	0.105	0.08	0.99	1.15	0.064	1.6
6.050	19.85	450.15	56.00	0.47	-0.45	0.84	120.91	1.201	1.201	-0.345	0.039	0.93	53	0.57	0.9	21.7	49	71	0.108	0.08	0.99	1.15	0.064	1.7
6.100	20.01	449.99	45.53	0.55	-0.36	1.22	117.73	1.210	1.210	-0.348	0.039	0.93	43	0.57	0.9	32.2	40	72	0.109	0.09	0.99	1.15	0.064	1.7
6.150	20.18	449.82	36.92	0.28	0.07	0.76	117.73	1.220	1.220	-0.352	0.040	0.93	35	0.60	0.9	29.2	32	61	0.100	0.08	0.99	1.15	0.064	1.6
6.200	20.34	449.66	21.91	0.14	19.29	0.64	117.73	1.230	1.230	-0.356	0.040	0.93	21	0.62	0.9	36.4	19	55	0.096	0.07	0.99	1.15	0.064	1.5
6.250	20.51	449.50	13.70	0.11	51.63	0.79	114.55	1.239	1.239	-0.360	0.041	0.93	13	0.61	0.9	45.7	12	57	0.098	0.08	0.99	1.15	0.064	1.5
6.300	20.67	449.33	45.29	0.10	59.50	0.22	120.91	1.249	1.249	-0.364	0.041	0.92	43	0.69	0.9	0.1	38	38	0.084	0.06	0.99	1.15	0.064	1.3
6.350	20.83	449.17	63.07	0.15	1.33	0.24	120.91	1.259	1.259	-0.368	0.042	0.92	60	0.63	0.9	0.1	53	54	0.095	0.07	0.99	1.15	0.064	1.5
6.400	21.00	449.00	63.54	0.22	1.99	0.35	120.91	1.269	1.269	-0.372	0.042	0.92	60	0.63	0.9	0.1	54	54	0.095	0.07	0.99	1.15	0.064	1.5
6.450	21.16	448.84	63.09	0.26	1.70	0.41	120.91	1.279	1.279	-0.376	0.042	0.92	60	0.63	0.9	0.1	53	53	0.094	0.07	0.99	1.15	0.064	1.5
6.500	21.33	448.67	63.20	0.31	1.93	0.49	120.91	1.289	1.289	-0.380	0.043	0.92	60	0.59	0.9	11.2	53	64	0.103	0.08	0.98	1.15	0.064	1.6
6.550	21.49	448.51	65.57	0.34	2.17	0.52	120.91	1.298	1.298	-0.384	0.043	0.92	62	0.59	0.9	11.2	55	66	0.104	0.08	0.98	1.15	0.064	1.6
6.600	21.65	448.35	70.47	0.37	2.00	0.53	120.91	1.308	1.308	-0.388	0.044	0.92	67	0.58	0.9	9.9	59	69	0.106	0.08	0.98	1.15	0.064	1.7
6.650	21.82	448.18	71.36	0.39	1.75	0.54	120.91	1.318	1.314	-0.392	0.044	0.92	67	0.58	0.9	10.0	60	70	0.107	0.08	0.98	1.15	0.064	1.7
6.700	21.98	448.02	70.23	0.39	1.39	0.55	120.91	1.328	1.318	-0.396	0.045	0.92	66	0.58	0.9	10.6	58	69	0.107	0.08	0.98	1.15	0.064	1.7
6.750	22.15	447.85	70.30	0.40	1.58	0.56	120.91	1.338	1.323	-0.400	0.045	0.92	66	0.58	0.9	10.9	58	69	0.107	0.08	0.98	1.15	0.064	1.7
6.800	22.31	447.69	69.01	0.32	1.41	0.46	120.91	1.348	1.328	-0.404	0.045	0.92	65	0.61	0.9	0.1	57	57	0.097	0.08	0.98	1.15	0.064	1.5
6.850	22.47	447.53	64.29	0.30	1.24	0.46	120.91	1.358	1.333	-0.408	0.046	0.92	61	0.63	0.9	0.1	53	53	0.094	0.07	0.98	1.15	0.065	1.5
6.900	22.64	447.36	54.22	0.29	1.55	0.53	120.91	1.368	1.338	-0.412	0.046	0.91	51	0.60	0.9	16.4	44	61	0.100	0.08	0.98	1.15	0.065	1.5
6.950	22.80	447.20	52.86	0.29	1.70	0.54	120.91	1.378	1.342	-0.416	0.047	0.91	50	0.60	0.9	17.4	43	61	0.100	0.08	0.98	1.15	0.065	1.5
7.000	22.97	447.03	53.51	0.28	2.02	0.52	120.91	1.388	1.347	-0.420	0.047	0.91	51	0.60	0.9	16.5	44	60	0.100	0.08	0.98	1.15	0.065	1.5
7.050	23.13	446.87	53.45	0.27	2.11	0.50	120.91	1.398	1.352	-0.424	0.048	0.91	51	0.61	0.9	16.0	44	60	0.099	0.08	0.98	1.15	0.065	1.5
7.100	23.29	446.71	50.55	0.25	2.04	0.50	120.91	1.408	1.357	-0.428	0.048	0.91	48	0.61	0.9	17.4	41	58	0.098	0.08	0.98	1.15	0.066	1.5
7.150	23.46	446.54	49.00	0.21	2.27	0.43	120.91	1.417	1.362	-0.432	0.049	0.91	46	0.68	0.8	0.1	39	39	0.085	0.06	0.98	1.15	0.066	1.3
7.200	23.62	446.38	48.34	0.20	2.25	0.40	120.91	1.427	1.366	-0.437	0.049	0.91	46	0.69	0.8	0.1	38	38	0.084	0.06	0.98	1.15	0.066	1.3
7.250	23.79	446.21	41.76	0.17	2.29	0.40	120.91	1.437	1.371	-0.441	0.050	0.91	39	0.71	0.8	0.1	33	33	0.081	0.06	0.98	1.15	0.066	1.2
7.300	23.95	446.05	38.63	0.14	2.39	0.37	120.91	1.447	1.376	-0.445	0.050	0.91	37	0.73	0.8	0.1	30	30	0.079	0.06	0.98	1.15	0.066	1.2
7.350	24.11	445.89	31.01	0.13	2.43	0.41	117.73	1.457	1.381	-0.449	0.051	0.91	29	0.76	0.8	0.1	24	24	0.075	0.06	0.99	1.15	0.066	1.1
7.400	24.28	445.72	25.35	0.10	2.55	0.40	117.73	1.467	1.385	-0.453	0.051	0.91	24	0.79	0.8	0.1	19	19	0.072	0.05	0.99	1.15	0.066	1.1
7.450	24.44	445.56	22.51	0.08	2.93	0.37	117.73	1.476	1.390	-0.457	0.051	0.90	21	0.81	0.8	0.1	17	17	0.071	0.05	0.99	1.15	0.066	1.1
7.500	24.61	445.39	22.76	0.10	3.46	0.43	117.73	1.486	1.394	-0.462	0.052	0.90	22	0.63	0.8	33.3	18	51	0.093	0.07	0.98	1.15	0.067	1.4
7.550	24.77	445.23	24.03	0.09	3.43	0.36	117.73	1.496	1.399	-0.466	0.052	0.90	23	0.80	0.8	0.1	18	18	0.071	0.05	0.99	1.15	0.067	1.1
7.600	24.93	445.07	23.43	0.07	3.31	0.31	117.73	1.505	1.403	-0.470	0.053	0.90	22	0.81	0.8	0.1	18	18	0.071	0.05	0.99	1.15	0.067	1.1
7.650	25.10	444.90	23.45	0.08	4.14	0.35	117.73	1.515	1.408	-0.474	0.053	0.90	22	0.81	0.8	0.1	18	18	0.071	0.05	0.99	1.15	0.067	1.1
7.700	25.26	444.74	24.01	0.07	3.87	0.31	117.73	1.525	1.412	-0.478	0.054	0.90	23	0.80	0.8	0.1	18	18	0.071	0.05	0.99	1.15	0.067	1.1
7.750	25.43	444.57	23.79	0.09	3.88	0.37	117.73	1.534	1.417	-0.483	0.054	0.90	22	0.80	0.8	0.1	18	18	0.071	0.05	0.99	1.15	0.067	1.1
7.800	25.59	444.41	23.33	0.10	4.04	0.41	117.73	1.544	1.422	-0.487	0.055	0.90	22	0.81	0.8	0.1	17	17	0.071	0.05	0.99	1.15	0.067	1.1
7.850	25.75	444.25	22.48	0.09	4.26	0.39	117.73	1.554	1.426	-0.491	0.055	0.90	21	0.64	0.8	33.1	18	51	0.093	0.07	0.98	1.15	0.068	1.4
7.900	25.92	444.08	21.26	0.10	4.74	0.47	117.73	1.563	1.431	-0.495	0.056	0.90	20	0.63	0.8	35.4	17	52	0.094	0.07	0.98	1.15	0.068	1.4
7.950	26.08	443.92	31.09	0.10	5.07	0.32	117.73	1.573	1.435	-0.500	0.056	0.90	29	0.77	0.8	0.1	23	23	0.075	0.05	0.98	1.15	0.068	1.1
8.000	26.25	443.75	30.58	0.10	4.87	0.34	117.73	1.583	1.440	-0.504	0.057	0.90	29	0.77	0.8	0.1	23	23	0.074	0.05	0.98	1.15	0.068	1.1
8.050	26.41	443.59	29.28	0.10	4.87	0.35	117.73	1.592	1.444	-0.508	0.057	0.89	28	0.78	0.8	0.1	22	22	0.074	0.05	0.98	1.15	0.068	1.1
8.100	26.57	443.43	27.86	0.12	5.07	0.43	117.73	1.602	1.449	-0.512	0.058	0.89	26	0.78	0.8	0.1	21	21	0.073	0.05	0.98	1.15	0.068	1.1
8.150	26.74	443.26	26.53	0.13	5.17	0.48	117.73	1.612	1.453	-0.517	0.058	0.89	25	0.63	0.8	32.0	21	53	0.094	0.07	0.98	1.15	0.069	1.4
8.200	26.90	443.10	26.52	0.13	5.61	0.50	117.73	1.621	1.458	-0.521	0.059	0.89	25	0.63	0.8	32.4	20	53	0.094	0.07	0.98	1.15	0.069	1.4
8.250	27.07	442.93	28.38	0.14	5.76	0.50	117.73	1.631	1.462	-0.525	0.059	0.89	27	0.63	0.8	31.1	22	53	0.094	0.07	0.98	1.15	0.069	1.4
8.300	27.23	442.77	29.58	0.15	5.89	0.51	117.73	1.641	1.467	-0.530	0.059	0.89	28	0.63	0.8	30.5	23	53	0.095	0.07	0.98	1.15	0.069	1.4
8.350	27.39	442.61	30.20	0.15	5.91	0.51	117.73	1.650	1.471	-0.534	0.060	0.89	29	0.63	0.8	30.2	23	53	0.095	0.07	0.98	1.15	0.070	1.4
8.400	27.56	442.44	30.81	0.15	6.17	0.50	117.73	1.660	1.476	-0.538	0.060	0.89	29	0.63	0.8	29.6	24	53	0.095	0.07	0.98	1.15	0.070	1.4
8.450	27.72	442.28	31.02	0.15	6.36	0.49	117.73	1.670	1.481	-0.543	0.061	0.89	29	0.63	0.8	29.3	24	53	0.094	0.07	0.98	1.15	0.070	1.4
8.500	27.89	442.11	31.07	0.15	6.44	0.49	117.73	1.679	1.485	-0.547	0.061	0.89	29	0.63	0.8	29.4	24	53	0.095	0.07	0.98	1.15	0.070	1.4
8.550	28.05	441.95	31.06	0.15	6.59	0.49	117.73	1.689	1.490	-0.552	0.062	0.89	29	0.63	0.8	29.3	24	53	0.094	0.07	0.98	1.15	0.070	1.3
8.600	28.21	441.79	30.68	0.14	6.68	0.46	117.73	1.699	1.494	-0.556	0.062	0.88	29	0.77	0.8	0.1	22	22	0.074	0.05	0.98	1.15	0.070	1.1
8.650	28.38	441.62	30.16	0.14	6.71	0.45	117.73	1.708	1.499	-0.560	0.063	0.88	29	0.78	0.8	0.1	22	22	0.074	0.05	0.98	1.15	0.070	1.1
8.700	28.54	441.46	29.30	0.13	7.04	0.45	117.73	1.718	1.503	-0.565	0.063	0.88	28	0.78	0.8	0.1	21	21	0.073	0.05	0.98	1.15	0.070	1.0
8.750	28.71	441.29	29.39	0.13	7.30	0.45	117.73	1.727	1.508	-0.569	0.064	0.88	28	0.78	0.8	0.1	21	21	0.073	0.05	0.98	1.15	0.070	1.0
8.800	28.87	441.13	29.54	0.14	7.32	0.47	117.73	1.737	1.512	-0.574	0.064	0.88	28	0.78	0.8	0.1	21	21	0.073	0.05	0.98	1.15	0.070	1.0
8.850	29.04	440.96	31.06	0.14	7.67	0.45	117.73	1.747	1.517	-0.578	0.065	0.88	29	0.77	0.8	0.1	22	22	0.074	0.05	0.98	1.15	0.070	1.0
8.900	29.20	440.80	31.82	0.15	8.10	0.48	117.73	1.756	1.521	-0.582	0.065	0.88	30	0.63	0.8	28.9	24	53	0.094	0.07	0.97	1.15	0.071	1.3
8.950	29.36	440.64	32.04	0.18	7.77	0.55	117.73	1.766	1.526	-0.587	0.066	0.88	30	0.62	0.8	30.2	24	54	0.095	0.07	0.97	1.15	0.071	1.3
9.000	29.53	440.47	32.90	0.19	8.35	0.56	117.73	1.776	1.530	-0.591	0.066	0.88	31	0.62	0.8	30.0	25	55	0.096	0.07	0.97	1.15	0.071	1.3
9.050	29.69	440.31	35.37	0.18	9.11	0.50	117.73	1.785	1.535	-0.596	0.067	0.88	33	0.63	0.8	27.2	26	54	0.095	0.07	0.97	1.15	0.071	1.3
9.100	29.86	440.14	36.62	0.15	9.60	0.40	117.73	1.795	1.540	-0.600	0.067	0.88	35	0.75	0.8	0.1	26	26	0.076	0.06	0.98	1.15	0.071	1.1
9.150	30.02	439.98	37.06	0.16	10.14	0.43	117.73	1.805	1.544	-0.605	0.068	0.87	35	0.75	0.8	0.1	26	27	0.077	0.06	0.98	1.15	0.071	1.1
9.200	30.18	439.82	35.96	0.16	9.29	0.45	117.73	1.814	1.549	-0.609	0.068	0.87	34	0.75	0.8	0.1	26	26	0.076	0.06	0.98	1.15	0.071	1.1
9.250	30.35	439.65	34.86	0.18	9.98	0.50	117.73	1.824	1.553	-0.614	0.069	0.87	33	0.63	0.8	27.8	26	54	0.095	0.07	0.97	1.15	0.072	1.3
9.300	30.51	439.49	35.45	0.16	10.27	0.46	117.73	1.834	1.558	-0.618	0.069	0.87	34	0.75	0.7	0.1	25	25	0.076	0.06	0.98	1.15	0.071	1.1
9.350	30.68	439.32	36.68	0.14	10.78	0.39	117.73	1.843	1.562	-0.623	0.070	0.87	35	0.75	0.7	0.1	26	26	0.076	0.06	0.98	1.15	0.072	1.1
9.400	30.84	439.16	37.28	0.13	11.51	0.35	117.73	1.853	1.567	-0.627	0.070	0.87	35	0.75	0.7	0.1	26	26	0.076	0.06	0.98	1.15	0.072	1.1
9.450	31.00	439.00	35.87	0.16	10.92	0.43	117.73	1.863	1.571	-0.632	0.071	0.87	34	0.75	0.7	0.1	25	25	0.076	0.06	0.98	1.15	0.072	1.1
9.500	31.17	438.83	35.91	0.18	10.74	0.51	117.73	1.872	1.576	-0.636	0.071	0.87	34	0.62	0.8	27.4	26	54	0.095	0.07	0.97	1.15	0.072	1.3
9.550	31.33	438.67	37.02	0.19	15.41	0.51	117.73	1.882	1.580	-0.641	0.072	0.87	35	0.62	0.8	26.7	27	54	0.095	0.07	0.97	1.15	0.072	1.3
9.600	31.50	438.50	39.15	0.19	13.24	0.48	117.73	1.892	1.585	-0.645	0.072	0.87	37	0.63	0.8	24.9	29	54	0.095	0.07	0.97	1.15	0.073	1.3
9.650	31.66	438.34	39.19	0.20	11.33	0.51	117.73	1.901	1.589	-0.650	0.073	0.87	37	0.62	0.8	25.6	29	54	0.095	0.07	0.97	1.15	0.073	1.3
9.700	31.82	438.18	37.67	0.20	10.90	0.53	117.73	1.911	1.594	-0.654	0.073	0.86	36	0.62	0.8	26.9	28	55	0.095	0.07	0.97	1.15	0.073	1.3
9.750	31.99	438.01	36.87	0.19	10.80	0.53	117.73	1.921	1.598	-0.659	0.074	0.86	35	0.62	0.8	27.4	27	54	0.095	0.07	0.97	1.15	0.073	1.3
9.800	32.15	437.85	37.37	0.22	11.27	0.59	117.73	1.930	1.603	-0.663	0.074	0.86	35	0.62	0.8	28.6	27	56	0.096	0.07	0.97	1.15	0.073	1.3
9.850	32.32	437.68	40.40	0.21	11.71	0.52	117.73	1.940	1.608	-0.668	0.075	0.86	38	0.62	0.8	25.3	29	55	0.096	0.07	0.97	1.15	0.073	1.3
9.900	32.48	437.52	39.29	0.24	10.91	0.61	117.73	1.950	1.612	-0.673	0.075	0.86	37	0.62	0.8	27.8	29	56	0.097	0.08	0.97	1.15	0.073	1.3
9.950	32.64	437.36	40.74	0.25	12.39	0.62	117.73	1.959	1.617	-0.677	0.076	0.86	38	0.61	0.8	27.5	30	57	0.097	0.08	0.97	1.15	0.073	1.3
10.000	32.81	437.19	53.21	0.29	14.53	0.55	120.91	1.969	1.621	-0.682	0.076	0.86	50	0.61	0.8	19.8	39	59	0.098	0.08	0.97	1.15	0.073	1.3
10.050	32.97	437.03	71.04	0.41	15.19	0.58	120.91	1.979	1.626	-0.686	0.077	0.86	67	0.59	0.8	13.6	52	66	0.104	0.08	0.97	1.15	0.074	1.4
10.100	33.14	436.86	82.18	0.46	13.90	0.56	120.91	1.989	1.631	-0.691	0.077	0.86	78	0.57	0.8	9.9	61	70	0.108	0.08	0.96	1.15	0.074	1.5
10.150	33.30	436.70	79.91	0.47	13.33	0.59	120.91	1.999	1.636	-0.696	0.078	0.86	76	0.57	0.8	11.1	59	70	0.107	0.08	0.96	1.15	0.074	1.4
10.200	33.46	436.54	85.49	0.47	13.74	0.55	120.91	2.009	1.641	-0.700	0.078	0.86	81	0.57	0.8	8.8	63	72	0.109	0.09	0.96	1.15	0.074	1.5
10.250	33.63	436.37	100.65	0.53	13.52	0.52	124.10	2.019	1.645	-0.705	0.079	0.85	95	0.55	0.8	5.0	75	80	0.116	0.09	0.96	1.15	0.074	1.6
10.300	33.79	436.21	99.80	0.55	12.94	0.55	124.10	2.029	1.650	-0.709	0.079	0.85	94	0.55	0.8	5.8	74	80	0.116	0.09	0.96	1.15	0.074	1.6
10.350	33.96	436.04	98.92	0.57	13.32	0.58	124.10	2.039	1.656	-0.714	0.080	0.85	93	0.55	0.8	6.5	73	80	0.116	0.09	0.96	1.15	0.075	1.5
10.400	34.12	435.88	100.91	0.59	13.66	0.59	124.10	2.049	1.661	-0.719	0.080	0.85	95	0.54	0.8	6.4	75	81	0.117	0.09	0.96	1.15	0.075	1.6
10.450	34.28	435.72	115.60	0.63	15.28	0.55	124.10	2.060	1.666	-0.723	0.081	0.85	109	0.52	0.8	3.4	86	90	0.125	0.10	0.96	1.15	0.075	1.7
10.500	34.45	435.55	143.89	0.67	15.57	0.47	124.10	2.070	1.671	-0.728	0.081	0.85	136	0.48	0.8	0.2	109	109	0.151	0.11	0.95	1.15	0.076	2.0
10.550	34.61	435.39	155.91	0.77	14.68	0.49	124.10	2.080	1.676	-0.733	0.082	0.85	147	0.46	0.8	0.2	119	120	0.170	0.12	0.94	1.15	0.076	2.0
10.600	34.78	435.22	153.33	0.80	14.36	0.52	124.10	2.090	1.681	-0.737	0.082	0.85	145	0.46	0.8	0.6	117	118	0.166	0.12	0.94	1.15	0.076	2.0
10.650	34.94	435.06	154.93	0.85	15.19	0.55	124.10	2.100	1.686	-0.742	0.083	0.85	146	0.46	0.8	0.8	118	119	0.169	0.12	0.94	1.15	0.076	2.0
10.700	35.10	434.90	149.23	0.85	14.26	0.57	124.10	2.110	1.691	-0.747	0.083	0.85	141	0.47	0.8	1.2	113	114	0.160	0.12	0.94	1.15	0.076	2.0
10.750	35.27	434.73	150.51	0.83	15.63	0.55	124.10	2.121	1.696	-0.751	0.084	0.85	142	0.47	0.8	1.0	114	115	0.161	0.12	0.94	1.15	0.076	2.0
10.800	35.43	434.57	152.30	0.70	15.91	0.46	124.10	2.131	1.701	-0.756	0.084	0.84	144	0.47	0.8	0.2	115	116	0.162	0.12	0.94	1.15	0.076	2.0
10.850	35.60	434.40	157.63	0.76	16.66	0.48	124.10	2.141	1.706	-0.761	0.085	0.84	149	0.46	0.8	0.2	120	120	0.171	0.12	0.94	1.15	0.077	2.0
10.900	35.76	434.24	167.23	0.83	17.51	0.50	124.10	2.151	1.711	-0.765	0.085	0.84	158	0.44	0.8	0.3	128	128	0.192	0.13	0.94	1.15	0.077	2.0
10.950	35.92	434.08	181.38	0.90	16.50	0.49	124.10	2.161	1.716	-0.770	0.086	0.84	171	0.42	0.8	0.1	140	140	0.234	0.15	0.93	1.15	0.078	2.0
11.000	36.09	433.91	194.77	0.96	18.99	0.49	124.10	2.172	1.721	-0.775	0.087	0.84	184	0.40	0.8	0.1	151	151	0.299	0.16	0.92	1.15	0.078	2.0
11.050	36.25	433.75	206.51	1.07	16.70	0.52	124.10	2.182	1.726	-0.779	0.087	0.84	195	0.38	0.8	0.0	162	162	0.389	0.18	0.91	1.15	0.079	2.0
11.100	36.42	433.58	209.99	1.16	16.44	0.55	124.10	2.192	1.731	-0.784	0.088	0.84	198	0.38	0.8	0.1	165	165	0.424	0.18	0.91	1.15	0.079	2.0
11.150	36.58	433.42	207.39	1.23	15.41	0.59	124.10	2.202	1.737	-0.789	0.088	0.84	196	0.38	0.8	0.1	162	162	0.395	0.18	0.91	1.15	0.079	2.0
11.200	36.74	433.26	198.59	1.25	16.17	0.63	124.10	2.212	1.742	-0.793	0.089	0.84	188	0.40	0.8	0.3	154	154	0.320	0.17	0.92	1.15	0.079	2.0
11.250	36.91	433.09	199.53	1.16	16.57	0.58	124.10	2.222	1.747	-0.798	0.089	0.84	189	0.40	0.8	0.2	155	155	0.324	0.17	0.92	1.15	0.079	2.0
11.300	37.07	432.93	213.67	1.15	17.91	0.54	124.10	2.233	1.752	-0.803	0.090	0.84	202	0.38	0.8	0.0	167	167	0.458	0.19	0.91	1.15	0.080	2.0
11.350	37.24	432.76	228.23	1.23	17.65	0.54	124.10	2.243	1.757	-0.808	0.090	0.83	216	0.36	0.8	0.0	180	180	0.725	0.21	0.89	1.15	0.081	2.0
11.400	37.40	432.60	217.40	1.27	18.42	0.58	124.10	2.253	1.762	-0.812	0.091	0.83	205	0.37	0.8	0.1	170	170	0.504	0.19	0.90	1.15	0.080	2.0
11.450	37.57	432.43	201.02	1.28	15.74	0.64	124.10	2.263	1.767	-0.817	0.091	0.83	190	0.39	0.8	0.3	155	156	0.330	0.17	0.91	1.15	0.079	2.0
11.500	37.73	432.27	186.86	1.13	15.78	0.60	124.10	2.273	1.772	-0.822	0.092	0.83	177	0.42	0.8	0.4	143	143	0.248	0.15	0.92	1.15	0.079	2.0
11.550	37.89	432.11	181.76	1.03	16.16	0.56	124.10	2.284	1.777	-0.826	0.092	0.83	172	0.42	0.8	0.3	138	138	0.227	0.14	0.93	1.15	0.079	2.0
11.600	38.06	431.94	162.91	0.94	16.23	0.58	124.10	2.294	1.782	-0.831	0.093	0.83	154	0.45	0.8	0.9	122	123	0.177	0.13	0.93	1.15	0.078	2.0
11.650	38.22	431.78	144.75	0.88	16.36	0.61	124.10	2.304	1.787	-0.836	0.093	0.83	137	0.48	0.8	2.1	106	108	0.149	0.11	0.94	1.15	0.077	1.9
11.700	38.39	431.61	132.90	0.79	16.51	0.60	124.10	2.314	1.792	-0.841	0.094	0.83	126	0.50	0.8	2.9	97	99	0.137	0.11	0.94	1.15	0.077	1.8
11.750	38.55	431.45	129.94	0.74	17.45	0.57	124.10	2.324	1.797	-0.845	0.094	0.83	123	0.51	0.8	2.8	94	97	0.133	0.10	0.95	1.15	0.077	1.7
11.800	38.71	431.29	134.22	0.64	18.52	0.47	124.10	2.334	1.802	-0.850	0.095	0.83	127	0.50	0.8	0.2	97	97	0.134	0.10	0.94	1.15	0.077	1.7
11.850	38.88	431.12	148.74	0.71	19.52	0.48	124.10	2.345	1.807	-0.855	0.095	0.82	141	0.48	0.8	0.2	109	109	0.150	0.11	0.94	1.15	0.078	1.9
11.900	39.04	430.96	150.80	0.84	20.69	0.56	124.10	2.355	1.812	-0.860	0.096	0.82	143	0.47	0.8	1.2	110	112	0.155	0.12	0.94	1.15	0.078	2.0
11.950	39.21	430.79	174.14	0.96	19.97	0.55	124.10	2.365	1.817	-0.864	0.096	0.82	165	0.44	0.8	0.5	130	130	0.198	0.14	0.93	1.15	0.079	2.0
12.000	39.37	430.63	201.19	1.02	20.59	0.51	124.10	2.375	1.823	-0.869	0.097	0.82	190	0.40	0.8	0.1	153	153	0.311	0.16	0.91	1.15	0.080	2.0
12.050	39.53	430.47	225.00	1.30	21.00	0.58	124.10	2.385	1.828	-0.874	0.097	0.82	213	0.37	0.8	0.1	174	174	0.582	0.20	0.89	1.15	0.082	2.0
12.100	39.70	430.30	234.09	1.54	20.26	0.66	124.10	2.396	1.833	-0.879	0.098	0.82	221	0.35	0.8	0.1	182	182	0.796	0.22	0.88	1.15	0.083	2.0
12.150	39.86	430.14	233.76	0.00	19.62	0.00	118.62	2.406	1.837	-0.883	0.098	0.82	221	0.35	0.8	0.0	182	182	0.775	0.22	0.88	1.15	0.083	2.0
12.200	40.03	429.97	253.61	0.00	16.93	0.00	118.62	2.415	1.842	-0.888	0.099	0.82	240	0.33	0.8	0.0	200	200	1.845	0.26	0.85	1.15	0.085	2.0

Table I-4: Liquefaction Analysis for CPT HAV-C002

Idriss and Blouanger Liquefaction Analysis from CPT Data — Groudwater Elevation Used
Havana East Ash Pond Site 2
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

amax	0.12
Mw	6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	476.64	7.23	0.03	0.35	0.40	111.37	0.009	0.009	0.014	-0.001	1.000	7	0.63	1.7	40	12	51	0.093	0.07	1.10	1.15	0.062	1.5
0.100	0.33	476.47	10.39	0.05	0.32	0.46	114.55	0.018	0.018	0.012	-0.001	1.000	10	0.63	1.7	35	17	52	0.094	0.07	1.10	1.15	0.062	1.5
0.150	0.49	476.31	15.40	0.07	0.10	0.47	114.55	0.028	0.028	0.010	-0.001	1.000	15	0.76	1.7	0	25	25	0.075	0.06	1.10	1.15	0.062	1.2
0.200	0.66	476.14	21.36	0.09	0.16	0.41	117.73	0.037	0.037	0.008	-0.000	1.000	20	0.70	1.7	0	34	34	0.082	0.06	1.10	1.15	0.062	1.3
0.250	0.82	475.98	30.68	0.12	0.18	0.38	117.73	0.047	0.047	0.006	-0.000	1.000	29	0.64	1.7	0	49	49	0.092	0.07	1.10	1.15	0.062	1.5
0.300	0.98	475.82	38.07	0.19	0.11	0.49	117.73	0.057	0.057	0.004	0.000	1.000	36	0.60	1.7	0	61	61	0.100	0.08	1.10	1.15	0.062	1.6
0.350	1.15	475.65	48.04	0.26	0.22	0.53	120.91	0.066	0.066	0.002	0.000	1.000	45	0.54	1.7	5	77	82	0.118	0.09	1.10	1.15	0.062	1.9
0.400	1.31	475.49	66.57	0.36	0.36	0.54	120.91	0.076	0.076	-0.000	0.001	1.000	63	0.48	1.7	1	107	108	0.149	0.11	1.10	1.15	0.062	2.0
0.450	1.48	475.32	78.39	0.44	0.13	0.57	120.91	0.086	0.086	-0.003	0.001	1.000	74	0.44	1.7	0	126	126	0.187	0.13	1.10	1.15	0.062	2.0
0.500	1.64	475.16	99.26	0.55	-0.02	0.56	124.10	0.096	0.096	-0.005	0.001	1.000	94	0.39	1.7	0	159	159	0.366	0.17	1.10	1.15	0.062	2.0
0.550	1.80	475.00	117.85	0.65	-0.48	0.55	124.10	0.107	0.107	-0.007	0.001	1.000	111	0.34	1.7	0	189	189	1.089	0.23	1.10	1.15	0.062	2.0
0.600	1.97	474.83	136.35	0.72	-0.62	0.52	124.10	0.117	0.117	-0.009	0.001	1.000	129	0.31	1.7	0	219	219	6.626	0.30	1.10	1.15	0.062	2.0
0.650	2.13	474.67	154.69	0.83	-1.26	0.53	124.10	0.127	0.127	-0.011	0.002	1.000	146	0.27	1.7	0	249	249	109.387	0.30	1.10	1.15	0.062	2.0
0.700	2.30	474.50	162.84	0.91	-3.61	0.56	124.10	0.137	0.137	-0.013	0.002	1.000	154	0.26	1.7	0	260	260	473.412	0.30	1.10	1.15	0.062	2.0
0.750	2.46	474.34	154.73	0.89	-4.91	0.57	124.10	0.147	0.147	-0.016	0.002	1.000	146	0.27	1.7	0	249	249	110.149	0.30	1.10	1.15	0.062	2.0
0.800	2.62	474.18	150.83	0.79	-4.63	0.52	124.10	0.157	0.157	-0.018	0.002	0.999	143	0.28	1.7	0	242	242	52.404	0.30	1.10	1.15	0.062	2.0
0.850	2.79	474.01	146.69	0.64	-4.28	0.43	124.10	0.168	0.168	-0.020	0.003	0.999	139	0.29	1.7	0	235	235	25.543	0.30	1.10	1.15	0.062	2.0
0.900	2.95	473.85	144.50	0.61	-3.19	0.42	124.10	0.178	0.178	-0.022	0.003	0.998	137	0.29	1.7	0	230	230	16.127	0.30	1.10	1.15	0.062	2.0
0.950	3.12	473.68	133.02	0.60	-0.07	0.45	124.10	0.188	0.188	-0.025	0.003	0.998	126	0.31	1.7	0	214	214	4.482	0.30	1.10	1.15	0.062	2.0
1.000	3.28	473.52	138.67	0.61	-1.04	0.44	124.10	0.198	0.198	-0.027	0.003	0.997	131	0.31	1.7	0	219	219	6.419	0.30	1.10	1.15	0.062	2.0
1.050	3.44	473.36	142.87	0.62	-1.40	0.43	124.10	0.208	0.208	-0.029	0.004	0.997	135	0.30	1.6	0	221	221	7.608	0.30	1.10	1.15	0.062	2.0
1.100	3.61	473.19	142.10	0.60	-1.55	0.42	124.10	0.219	0.219	-0.032	0.004	0.996	134	0.31	1.6	0	218	218	6.028	0.30	1.10	1.15	0.062	2.0
1.150	3.77	473.03	141.41	0.62	-1.59	0.44	124.10	0.229	0.229	-0.034	0.004	0.996	134	0.31	1.6	0	215	215	4.885	0.30	1.10	1.15	0.062	2.0
1.200	3.94	472.86	143.11	0.61	-1.38	0.42	124.10	0.239	0.239	-0.036	0.005	0.995	135	0.31	1.6	0	215	215	4.803	0.30	1.10	1.15	0.062	2.0
1.250	4.10	472.70	144.94	0.65	-1.21	0.45	124.10	0.249	0.249	-0.039	0.005	0.995	137	0.31	1.6	0	215	215	4.790	0.30	1.10	1.15	0.062	2.0
1.300	4.27	472.53	147.87	0.67	-1.01	0.45	124.10	0.259	0.259	-0.041	0.005	0.994	140	0.31	1.5	0	216	216	5.214	0.30	1.10	1.15	0.062	2.0
1.350	4.43	472.37	146.86	0.70	-0.78	0.48	124.10	0.269	0.269	-0.044	0.005	0.994	139	0.31	1.5	0	213	213	4.232	0.30	1.10	1.15	0.061	2.0
1.400	4.59	472.21	149.94	0.72	-0.68	0.48	124.10	0.280	0.280	-0.046	0.006	0.993	142	0.31	1.5	0	214	214	4.681	0.30	1.10	1.15	0.061	2.0
1.450	4.76	472.04	153.75	0.72	-1.10	0.47	124.10	0.290	0.290	-0.049	0.006	0.992	145	0.31	1.5	0	217	217	5.499	0.30	1.10	1.15	0.061	2.0
1.500	4.92	471.88	158.94	0.74	-0.82	0.47	124.10	0.300	0.300	-0.051	0.006	0.992	150	0.30	1.5	0	220	220	7.251	0.30	1.10	1.15	0.061	2.0
1.550	5.09	471.71	159.50	0.79	-1.26	0.50	124.10	0.310	0.310	-0.054	0.006	0.991	151	0.30	1.5	0	219	219	6.668	0.30	1.10	1.15	0.061	2.0
1.600	5.25	471.55	155.70	0.71	-1.51	0.46	124.10	0.320	0.320	-0.056	0.007	0.991	147	0.31	1.5	0	214	214	4.445	0.30	1.10	1.15	0.061	2.0
1.650	5.41	471.39	151.50	0.66	-1.78	0.43	124.10	0.331	0.331	-0.059	0.007	0.990	143	0.32	1.5	0	208	208	2.986	0.29	1.10	1.15	0.061	2.0
1.700	5.58	471.22	145.43	0.67	-1.47	0.46	124.10	0.341	0.341	-0.061	0.007	0.990	137	0.33	1.5	0	200	200	1.860	0.26	1.10	1.15	0.061	2.0
1.750	5.74	471.06	140.85	0.63	-1.40	0.44	124.10	0.351	0.351	-0.064	0.008	0.989	133	0.34	1.5	0	193	193	1.327	0.24	1.10	1.15	0.061	2.0
1.800	5.91	470.89	142.69	0.61	-0.82	0.43	124.10	0.361	0.361	-0.066	0.008	0.988	135	0.34	1.4	0	194	194	1.361	0.25	1.10	1.15	0.061	2.0
1.850	6.07	470.73	144.97	0.47	-0.16	0.32	124.10	0.371	0.371	-0.069	0.008	0.988	137	0.34	1.4	0	195	195	1.431	0.25	1.10	1.15	0.061	2.0
1.900	6.23	470.57	147.46	0.50	-0.15	0.34	124.10	0.381	0.381	-0.072	0.008	0.987	139	0.33	1.4	0	196	196	1.526	0.25	1.10	1.15	0.061	2.0
1.950	6.40	470.40	150.48	0.58	0.28	0.38	124.10	0.392	0.392	-0.074	0.009	0.987	142	0.33	1.4	0	198	198	1.679	0.26	1.10	1.15	0.061	2.0
2.000	6.56	470.24	160.17	0.64	-1.05	0.40	124.10	0.402	0.402	-0.077	0.009	0.986	151	0.32	1.4	0	207	207	2.785	0.28	1.10	1.15	0.061	2.0
2.050	6.73	470.07	148.31	0.67	-2.01	0.45	124.10	0.412	0.412	-0.080	0.009	0.986	140	0.34	1.4	0	193	193	1.299	0.24	1.10	1.15	0.061	2.0
2.100	6.89	469.91	129.56	0.64	-1.50	0.49	124.10	0.422	0.422	-0.082	0.010	0.985	122	0.37	1.4	0	172	172	0.536	0.20	1.10	1.15	0.061	2.0
2.150	7.05	469.75	110.25	0.55	-0.77	0.50	124.10	0.432	0.432	-0.085	0.010	0.984	104	0.40	1.4	0	150	150	0.286	0.16	1.10	1.15	0.061	2.0
2.200	7.22	469.58	96.13	0.48	-0.69	0.50	124.10	0.443	0.443	-0.088	0.010	0.984	91	0.43	1.5	0	133	133	0.206	0.14	1.10	1.15	0.061	2.0
2.250	7.38	469.42	84.51	0.40	-0.67	0.48	120.91	0.453	0.453	-0.091	0.011	0.983	80	0.46	1.5	0	118	118	0.167	0.12	1.10	1.15	0.061	2.0
2.300	7.55	469.25	78.27	0.35	-0.55	0.45	120.91	0.462	0.462	-0.093	0.011	0.982	74	0.48	1.5	0	110	110	0.152	0.11	1.10	1.15	0.061	2.0
2.350	7.71	469.09	74.76	0.33	-0.52	0.45	120.91	0.472	0.472	-0.096	0.011	0.982	71	0.49	1.5	0	105	105	0.144	0.11	1.09	1.15	0.061	2.0
2.400	7.87	468.93	72.24	0.33	-0.52	0.46	120.91	0.482	0.482	-0.099	0.012	0.981	68	0.50	1.5	0	101	101	0.139	0.11	1.08	1.15	0.062	2.0
2.450	8.04	468.76	71.86	0.33	-0.37	0.46	120.91	0.492	0.492	-0.102	0.012	0.981	68	0.50	1.5	0	99	100	0.137	0.11	1.08	1.15	0.062	2.0
2.500	8.20	468.60	76.95	0.35	-0.33	0.45	120.91	0.502	0.502	-0.105	0.012	0.980	73	0.49	1.4	0	105	105	0.144	0.11	1.08	1.15	0.062	2.0
2.550	8.37	468.43	86.14	0.37	-0.19	0.43	120.91	0.512	0.512	-0.107	0.012	0.979	81	0.47	1.4	0	114	114	0.160	0.12	1.09	1.15	0.061	2.0
2.600	8.53	468.27	94.63	0.38	-0.18	0.40	124.10	0.522	0.522	-0.110	0.013	0.979	89	0.45	1.4	0	123	123	0.178	0.13	1.09	1.15	0.061	2.0
2.650	8.69	468.11	99.97	0.43	-0.22	0.43	124.10	0.532	0.532	-0.113	0.013	0.978	94	0.44	1.4	0	128	128	0.191	0.13	1.09	1.15	0.061	2.0
2.700	8.86	467.94	102.51	0.50	-0.26	0.48	124.10	0.542	0.542	-0.116	0.013	0.977	97	0.44	1.3	0	130	130	0.197	0.13	1.09	1.15	0.061	2.0
2.750	9.02	467.78	99.62	0.54	-0.46	0.54	124.10	0.553	0.553	-0.119	0.014	0.977	94	0.45	1.3	0	126	126	0.186	0.13	1.08	1.15	0.061	2.0
2.800	9.19	467.61	94.05	0.59	-0.45	0.63	120.91	0.563	0.563	-0.122	0.014	0.976	89	0.46	1.3	1	119	120	0.170	0.12	1.08	1.15	0.062	2.0
2.850	9.35	467.45	89.02	0.43	-0.49	0.48	120.91	0.573	0.573	-0.125	0.014	0.976	84	0.47	1.3	0	112	113	0.156	0.12	1.07	1.15	0.062	2.0
2.900	9.51	467.29	77.06	0.40	-0.62	0.52	120.91	0.583	0.583	-0.128	0.015	0.975	73	0.50	1.3	2	98	100	0.137	0.11	1.06	1.15	0.062	2.0
2.950	9.68	467.12	71.45	0.43	-0.46	0.59	120.91	0.592	0.592	-0.131	0.015	0.974	68	0.51	1.3	4	91	94	0.130	0.10	1.06	1.15	0.063	2.0
3.000	9.84	466.96	71.00	0.48	-0.48	0.67	120.91	0.602	0.602	-0.134	0.015	0.974	67	0.51	1.3	5	89	95	0.131	0.10	1.06	1.15	0.063	2.0
3.050	10.01	466.79	73.23	0.51	-0.38	0.70	120.91	0.612	0.612	-0.137	0.016	0.973	69	0.51	1.3	5	91	97	0.133	0.10	1.06	1.15	0.063	2.0
3.100	10.17	466.63	76.70	0.47	-0.64	0.61	120.91	0.622	0.622	-0.140	0.016	0.972	72	0.50	1.3	3	95	98	0.135	0.10	1.06	1.15	0.063	2.0
3.150	10.33	466.47	83.00	0.38	-0.82	0.45	120.91	0.632	0.632	-0.143	0.016	0.972	78	0.50	1.3	0	101	101	0.139	0.11	1.06	1.15	0.063	2.0
3.200	10.50	466.30	83.76	0.35	-0.59	0.42	120.91	0.642	0.642	-0.146	0.017	0.971	79	0.49	1.3	0	101	101	0.139	0.11	1.05	1.15	0.063	2.0
3.250	10.66	466.14	80.42	0.36	-0.59	0.45	120.91	0.652	0.652	-0.149	0.017	0.970	76	0.50	1.3	0	97	97	0.134	0.10	1.05	1.15	0.063	2.0
3.300	10.83	465.97	78.42	0.36	-0.68	0.46	120.91	0.662	0.662	-0.152	0.017	0.970	74	0.51	1.3	0	94	94	0.130	0.10	1.05	1.15	0.063	2.0
3.350	10.99	465.81	76.17	0.35	-0.75	0.46	120.91	0.672	0.672	-0.155	0.018	0.969	72	0.52	1.3	0	91	91	0.127	0.10	1.05	1.15	0.063	2.0
3.400	11.15	465.65	71.42	0.34	-0.66	0.48	120.91	0.682	0.682	-0.158	0.018	0.968	67	0.53	1.3	0	85	85	0.121	0.09	1.04	1.15	0.063	1.9
3.450	11.32	465.48	69.99	0.35	-0.59	0.49	120.91	0.692	0.692	-0.162	0.019	0.968	66	0.54	1.3	0	83	83	0.119	0.09	1.04	1.15	0.063	1.9
3.500	11.48	465.32	69.50	0.35	-0.66	0.50	120.91	0.702	0.702	-0.165	0.019	0.967	66	0.53	1.2	4	82	85	0.121	0.09	1.04	1.15	0.063	1.9
3.550	11.65	465.15	68.03	0.35	-0.55	0.51	120.91	0.712	0.712	-0.168	0.019	0.966	64	0.54	1.2	4	80	84	0.119	0.09	1.04	1.15	0.063	1.9
3.600	11.81	464.99	66.81	0.35	-0.63	0.53	120.91	0.721	0.721	-0.171	0.020	0.965	63	0.54	1.2	5	78	83	0.118	0.09	1.04	1.15	0.063	1.9
3.650	11.97	464.83	67.05	0.37	-0.61	0.55	120.91	0.731	0.731	-0.174	0.020	0.965	63	0.54	1.2	5	77	83	0.118	0.09	1.03	1.15	0.064	1.9
3.700	12.14	464.66	69.96	0.40	-0.46	0.56	120.91	0.741	0.741	-0.177	0.020	0.964	66	0.53	1.2	5	80	85	0.121	0.09	1.03	1.15	0.063	1.9
3.750	12.30	464.50	76.69	0.42	-0.35	0.55	120.91	0.751	0.751	-0.181	0.021	0.963	72	0.52	1.2	4	87	90	0.126	0.10	1.03	1.15	0.063	2.0
3.800	12.47	464.33	101.38	0.53	0.01	0.52	124.10	0.761	0.761	-0.184	0.021	0.963	96	0.47	1.2	1	112	113	0.156	0.12	1.04	1.15	0.063	2.0
3.850	12.63	464.17	124.43	0.43	0.57	0.34	124.10	0.771	0.771	-0.187	0.021	0.962	118	0.43	1.1	0	135	135	0.213	0.14	1.04	1.15	0.063	2.0
3.900	12.80	464.00	131.74	0.60	0.82	0.45	124.10	0.782	0.782	-0.190	0.022	0.961	124	0.42	1.1	0	141	141	0.240	0.15	1.04	1.15	0.063	2.0
3.950	12.96	463.84	130.70	0.65	0.86	0.50	124.10	0.792	0.792	-0.194	0.022	0.961	124	0.42	1.1	0	140	140	0.233	0.15	1.04	1.15	0.063	2.0
4.000	13.12	463.68	151.60	0.73	0.69	0.48	124.10	0.802	0.802	-0.197	0.022	0.960	143	0.39	1.1	0	160	160	0.366	0.17	1.05	1.15	0.062	2.0
4.050	13.29	463.51	164.80	0.80	0.87	0.49	124.10	0.812	0.812	-0.200	0.023	0.959	156	0.37	1.1	0	172	172	0.533	0.20	1.05	1.15	0.062	2.0
4.100	13.45	463.35	158.69	0.72	0.73	0.45	124.10	0.822	0.822	-0.204	0.023	0.958	150	0.38	1.1	0	165	165	0.429	0.18	1.05	1.15	0.062	2.0
4.150	13.62	463.18	150.25	0.62	0.53	0.41	124.10	0.833	0.833	-0.207	0.024	0.958	142	0.39	1.1	0	156	156	0.334	0.17	1.04	1.15	0.062	2.0
4.200	13.78	463.02	150.99	0.68	0.83	0.45	124.10	0.843	0.843	-0.210	0.024	0.957	143	0.39	1.1	0	156	156	0.334	0.17	1.04	1.15	0.063	2.0
4.250	13.94	462.86	152.61	0.72	0.92	0.47	124.10	0.853	0.853	-0.214	0.024	0.956	144	0.39	1.1	0	157	157	0.342	0.17	1.04	1.15	0.063	2.0
4.300	14.11	462.69	136.65	0.71	0.44	0.52	124.10	0.863	0.863	-0.217	0.025	0.956	129	0.42	1.1	0	141	141	0.238	0.15	1.03	1.15	0.063	2.0
4.350	14.27	462.53	126.66	0.63	0.38	0.50	124.10	0.873	0.873	-0.221	0.025	0.955	120	0.44	1.1	0	130	130	0.198	0.14	1.03	1.15	0.063	2.0
4.400	14.44	462.36	124.89	0.59	0.49	0.47	124.10	0.883	0.883	-0.224	0.025	0.954	118	0.44	1.1	0	128	128	0.191	0.13	1.02	1.15	0.063	2.0
4.450	14.60	462.20	126.29	0.58	0.51	0.46	124.10	0.894	0.894	-0.227	0.026	0.953	119	0.44	1.1	0	129	129	0.193	0.13	1.02	1.15	0.063	2.0
4.500	14.76	462.04	123.40	0.58	0.68	0.47	124.10	0.904	0.904	-0.231	0.026	0.953	117	0.45	1.1	0	125	125	0.184	0.13	1.02	1.15	0.064	2.0
4.550	14.93	461.87	126.75	0.55	0.77	0.43	124.10	0.914	0.911	-0.234	0.027	0.952	120	0.44	1.1	0	128	128	0.192	0.13	1.02	1.15	0.064	2.0
4.600	15.09	461.71	127.72	0.55	0.96	0.43	124.10	0.924	0.916	-0.238	0.027	0.951	121	0.44	1.1	0	129	129	0.193	0.13	1.02	1.15	0.064	2.0
4.650	15.26	461.54	123.72	0.55	1.01	0.44	124.10	0.934	0.921	-0.241	0.027	0.950	117	0.45	1.1	0	124	125	0.182	0.13	1.02	1.15	0.065	2.0
4.700	15.42	461.38	111.79	0.52	1.08	0.46	124.10	0.945	0.926	-0.245	0.028	0.950	106	0.47	1.1	0	113	113	0.157	0.12	1.02	1.15	0.065	2.0
4.750	15.58	461.22	110.14	0.49	1.42	0.44	124.10	0.955	0.931	-0.248	0.028	0.949	104	0.48	1.1	0	111	111	0.153	0.12	1.01	1.15	0.065	2.0
4.800	15.75	461.05	120.56	0.49	1.73	0.41	124.10	0.965	0.936	-0.252	0.029	0.948	114	0.46	1.1	0	120	121	0.173	0.13	1.02	1.15	0.066	2.0
4.850	15.91	460.89	120.59	0.50	1.73	0.41	124.10	0.975	0.941	-0.255	0.029	0.947	114	0.46	1.1	0	120	120	0.172	0.12	1.01	1.15	0.066	2.0
4.900	16.08	460.72	117.52	0.51	1.82	0.43	124.10	0.985	0.946	-0.259	0.029	0.947	111	0.46	1.1	0	117	117	0.165	0.12	1.01	1.15	0.066	2.0
4.950	16.24	460.56	112.74	0.52	1.79	0.46	124.10	0.995	0.951	-0.263	0.030	0.946	107	0.47	1.1	0	112	112	0.156	0.12	1.01	1.15	0.067	2.0
5.000	16.40	460.40	107.99	0.51	2.29	0.47	124.10	1.006	0.956	-0.266	0.030	0.945	102	0.48	1.1	0	107	107	0.148	0.11	1.01	1.15	0.067	2.0
5.050	16.57	460.23	116.68	0.53	2.66	0.46	124.10	1.016	0.961	-0.270	0.031	0.944	110	0.47	1.0	0	115	115	0.162	0.12	1.01	1.15	0.067	2.0
5.100	16.73	460.07	128.92	0.64	2.79	0.50	124.10	1.026	0.966	-0.273	0.031	0.943	122	0.44	1.0	0	127	127	0.189	0.13	1.01	1.15	0.067	2.0
5.150	16.90	459.90	127.80	0.66	2.83	0.52	124.10	1.036	0.971	-0.277	0.031	0.943	121	0.45	1.0	0	125	126	0.185	0.13	1.01	1.15	0.068	2.0
5.200	17.06	459.74	125.75	0.66	2.88	0.52	124.10	1.046	0.976	-0.281	0.032	0.942	119	0.45	1.0	0	123	124	0.180	0.13	1.01	1.15	0.068	2.0
5.250	17.22	459.58	130.84	0.67	3.22	0.51	124.10	1.057	0.981	-0.284	0.032	0.941	124	0.44	1.0	0	128	128	0.192	0.13	1.01	1.15	0.068	2.0
5.300	17.39	459.41	133.76	0.71	3.43	0.53	124.10	1.067	0.986	-0.288	0.033	0.940	126	0.44	1.0	0	130	131	0.199	0.14	1.01	1.15	0.069	2.0
5.350	17.55	459.25	146.59	0.72	3.76	0.49	124.10	1.077	0.991	-0.292	0.033	0.940	139	0.42	1.0	0	142	142	0.245	0.15	1.01	1.15	0.069	2.0
5.400	17.72	459.08	155.46	0.73	3.72	0.47	124.10	1.087	0.997	-0.295	0.033	0.939	147	0.40	1.0	0	150	151	0.292	0.16	1.01	1.15	0.069	2.0
5.450	17.88	458.92	161.41	0.77	3.84	0.48	124.10	1.097	1.002	-0.299	0.034	0.938	153	0.39	1.0	0	156	156	0.333	0.17	1.01	1.15	0.069	2.0
5.500	18.04	458.76	167.79	0.81	4.20	0.48	124.10	1.107	1.007	-0.303	0.034	0.937	159	0.38	1.0	0	162	162	0.389	0.18	1.01	1.15	0.070	2.0
5.550	18.21	458.59	173.12	0.83	4.46	0.48	124.10	1.118	1.012	-0.307	0.035	0.936	164	0.38	1.0	0	166	166	0.448	0.19	1.01	1.15	0.070	2.0
5.600	18.37	458.43	178.24	0.81	4.53	0.45	124.10	1.128	1.017	-0.310	0.035	0.936	168	0.37	1.0	0	171	171	0.520	0.19	1.01	1.15	0.070	2.0
5.650	18.54	458.26	179.11	0.77	4.22	0.43	124.10	1.138	1.022	-0.314	0.036	0.935	169	0.37	1.0	0	171	171	0.529	0.19	1.01	1.15	0.070	2.0
5.700	18.70	458.10	188.60	0.78	4.62	0.41	124.10	1.148	1.027	-0.318	0.036	0.934	178	0.36	1.0	0	180	180	0.730	0.21	1.01	1.15	0.071	2.0
5.750	18.86	457.94	203.78	0.82	4.86	0.40	124.10	1.158	1.032	-0.322	0.036	0.933	193	0.34	1.0	0	194	194	1.384	0.25	1.01	1.15	0.071	2.0
5.800	19.03	457.77	211.15	0.86	4.82	0.41	124.10	1.169	1.037	-0.325	0.037	0.932	200	0.33	1.0	0	201	201	1.983	0.27	1.01	1.15	0.071	2.0
5.850	19.19	457.61	214.34	0.80	3.99	0.37	124.10	1.179	1.042	-0.329	0.037	0.932	203	0.32	1.0	0	204	204	2.323	0.27	1.00	1.15	0.071	2.0
5.900	19.36	457.44	212.75	0.67	4.21	0.32	124.10	1.189	1.047	-0.333	0.038	0.931	201	0.33	1.0	0	202	202	2.086	0.27	1.00	1.15	0.072	2.0
5.950	19.52	457.28	152.42	0.81	6.94	0.53	124.10	1.199	1.052	-0.337	0.038	0.930	144	0.41	1.0	0	144	144	0.256	0.15	1.00	1.15	0.072	2.0
6.000	19.68	457.12	184.34	0.79	5.12	0.43	124.10	1.209	1.057	-0.341	0.038	0.929	174	0.37	1.0	0	174	174	0.583	0.20	1.00	1.15	0.072	2.0
6.050	19.85	456.95	160.79	0.71	6.38	0.44	124.10	1.219	1.062	-0.345	0.039	0.928	152	0.40	1.0	0	152	152	0.300	0.16	1.00	1.15	0.073	2.0
6.100	20.01	456.79	140.60	0.63	6.06	0.45	124.10	1.230	1.067	-0.348	0.039	0.928	133	0.43	1.0	0	132	132	0.205	0.14	1.00	1.15	0.073	2.0
6.150	20.18	456.62	137.14	0.58	6.09	0.42	124.10	1.240	1.072	-0.352	0.040	0.927	130	0.44	1.0	0	129	129	0.194	0.13	1.00	1.15	0.073	2.0
6.200	20.34	456.46	127.14	0.55	5.99	0.44	124.10	1.250	1.077	-0.356	0.040	0.926	120	0.46	1.0	0	119	119	0.170	0.12	1.00	1.15	0.073	2.0
6.250	20.51	456.30	114.99	0.52	5.91	0.45	124.10	1.260	1.083	-0.360	0.041	0.925	109	0.48	1.0	0	107	108	0.148	0.11	1.00	1.15	0.074	2.0
6.300	20.67	456.13	105.20	0.47	6.21	0.45	124.10	1.270	1.088	-0.364	0.041	0.924	99	0.50	1.0	0	98	98	0.135	0.10	1.00	1.15	0.074	1.8
6.350	20.83	455.97	98.79	0.44	6.46	0.45	124.10	1.281	1.093	-0.368	0.042	0.924	93	0.52	1.0	0	92	92	0.128	0.10	1.00	1.15	0.074	1.7
6.400	21.00	455.80	101.37	0.46	6.84	0.45	124.10	1.291	1.098	-0.372	0.042	0.923	96	0.51	1.0	0	94	94	0.130	0.10	1.00	1.15	0.074	1.8

Table I-4: Liquefaction Analysis for CPT HAV-C002 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
6.450	21.16	455.64	102.74	0.49	6.93	0.48	124.10	1.301	1.103	-0.376	0.042	0.922	97	0.51	1.0	0	95	95	0.131	0.10	1.00	1.15	0.074	1.8
6.500	21.33	455.47	95.37	0.47	7.02	0.49	124.10	1.311	1.108	-0.380	0.043	0.921	90	0.53	1.0	0	88	88	0.124	0.10	1.00	1.15	0.075	1.7
6.550	21.49	455.31	97.87	0.46	7.36	0.47	124.10	1.321	1.113	-0.384	0.043	0.920	92	0.52	1.0	0	90	90	0.126	0.10	1.00	1.15	0.075	1.7
6.600	21.65	455.15	122.69	0.48	7.94	0.39	124.10	1.331	1.118	-0.388	0.044	0.919	116	0.47	1.0	0	113	113	0.157	0.12	0.99	1.15	0.075	2.0
6.650	21.82	454.98	125.22	0.50	7.83	0.40	124.10	1.342	1.123	-0.392	0.044	0.919	118	0.47	1.0	0	115	115	0.161	0.12	0.99	1.15	0.075	2.0
6.700	21.98	454.82	128.97	0.52	8.14	0.41	124.10	1.352	1.128	-0.396	0.045	0.918	122	0.46	1.0	0	118	118	0.168	0.12	0.99	1.15	0.075	2.0
6.750	22.15	454.65	134.81	0.55	8.22	0.40	124.10	1.362	1.133	-0.400	0.045	0.917	127	0.45	1.0	0	124	124	0.180	0.13	0.99	1.15	0.076	2.0
6.800	22.31	454.49	123.37	0.64	8.05	0.52	124.10	1.372	1.138	-0.404	0.045	0.916	117	0.47	1.0	1	113	113	0.158	0.12	0.99	1.15	0.076	2.0
6.850	22.47	454.33	104.33	0.39	7.68	0.37	124.10	1.382	1.143	-0.408	0.046	0.915	99	0.51	1.0	0	95	95	0.131	0.10	0.99	1.15	0.076	1.7
6.900	22.64	454.16	79.24	0.35	7.54	0.44	120.91	1.392	1.148	-0.412	0.046	0.914	75	0.57	1.0	0	71	72	0.109	0.09	0.99	1.15	0.076	1.4
6.950	22.80	454.00	83.36	0.34	8.63	0.41	120.91	1.402	1.153	-0.416	0.047	0.913	79	0.56	1.0	0	75	75	0.112	0.09	0.99	1.15	0.076	1.5
7.000	22.97	453.83	90.00	0.38	8.52	0.42	124.10	1.412	1.158	-0.420	0.047	0.913	85	0.54	1.0	0	81	81	0.117	0.09	0.99	1.15	0.076	1.5
7.050	23.13	453.67	97.16	0.40	8.76	0.41	124.10	1.423	1.163	-0.424	0.048	0.912	92	0.53	1.0	0	87	88	0.123	0.10	0.99	1.15	0.077	1.6
7.100	23.29	453.51	108.03	0.42	9.15	0.39	124.10	1.433	1.168	-0.428	0.048	0.911	102	0.50	1.0	0	97	97	0.134	0.10	0.99	1.15	0.077	1.7
7.150	23.46	453.34	115.66	0.46	9.24	0.40	124.10	1.443	1.173	-0.432	0.049	0.910	109	0.49	1.0	0	104	104	0.143	0.11	0.99	1.15	0.077	1.9
7.200	23.62	453.18	122.70	0.45	9.48	0.37	124.10	1.453	1.178	-0.437	0.049	0.909	116	0.48	1.0	0	110	110	0.152	0.12	0.99	1.15	0.077	2.0
7.250	23.79	453.01	131.46	0.46	9.63	0.35	124.10	1.463	1.183	-0.441	0.050	0.908	124	0.46	0.9	0	118	118	0.167	0.12	0.99	1.15	0.078	2.0
7.300	23.95	452.85	136.40	0.46	9.60	0.34	124.10	1.473	1.188	-0.445	0.050	0.908	129	0.45	0.9	0	122	122	0.177	0.13	0.99	1.15	0.078	2.0
7.350	24.11	452.69	111.19	0.45	9.67	0.40	124.10	1.484	1.193	-0.449	0.051	0.907	105	0.50	0.9	0	99	99	0.136	0.11	0.99	1.15	0.078	1.8
7.400	24.28	452.52	96.77	0.42	9.69	0.43	124.10	1.494	1.198	-0.453	0.051	0.906	91	0.53	0.9	0	86	86	0.121	0.10	0.99	1.15	0.078	1.6
7.450	24.44	452.36	91.11	0.40	9.62	0.44	124.10	1.504	1.203	-0.457	0.051	0.905	86	0.55	0.9	0	80	80	0.116	0.09	0.99	1.15	0.078	1.5
7.500	24.61	452.19	88.45	0.40	10.00	0.45	124.10	1.514	1.209	-0.462	0.052	0.904	84	0.55	0.9	0	78	78	0.114	0.09	0.99	1.15	0.078	1.5
7.550	24.77	452.03	85.76	0.40	10.03	0.47	120.91	1.524	1.213	-0.466	0.052	0.903	81	0.56	0.9	0	75	75	0.112	0.09	0.99	1.15	0.078	1.4
7.600	24.93	451.87	83.60	0.40	10.21	0.48	120.91	1.534	1.218	-0.470	0.053	0.902	79	0.56	0.9	0	73	73	0.110	0.09	0.99	1.15	0.078	1.4
7.650	25.10	451.70	82.66	0.39	10.35	0.47	120.91	1.544	1.223	-0.474	0.053	0.901	78	0.57	0.9	0	72	72	0.109	0.09	0.99	1.15	0.078	1.4
7.700	25.26	451.54	87.14	0.39	10.67	0.45	120.91	1.554	1.228	-0.478	0.054	0.901	82	0.56	0.9	0	76	76	0.112	0.09	0.99	1.15	0.079	1.4
7.750	25.43	451.37	90.13	0.42	10.83	0.46	124.10	1.564	1.233	-0.483	0.054	0.900	85	0.55	0.9	0	78	78	0.114	0.09	0.99	1.15	0.079	1.5
7.800	25.59	451.21	92.40	0.42	10.95	0.45	124.10	1.574	1.238	-0.487	0.055	0.899	87	0.55	0.9	0	80	80	0.116	0.09	0.99	1.15	0.079	1.5
7.850	25.75	451.05	90.40	0.43	11.04	0.48	124.10	1.584	1.243	-0.491	0.055	0.898	85	0.55	0.9	0	78	78	0.114	0.09	0.99	1.15	0.079	1.4
7.900	25.92	450.88	92.16	0.37	11.23	0.40	124.10	1.595	1.248	-0.495	0.056	0.897	87	0.55	0.9	0	80	80	0.116	0.09	0.99	1.15	0.079	1.5
7.950	26.08	450.72	98.04	0.38	11.52	0.39	124.10	1.605	1.253	-0.500	0.056	0.896	93	0.53	0.9	0	85	85	0.120	0.09	0.98	1.15	0.079	1.5
8.000	26.25	450.55	103.43	0.42	11.83	0.41	124.10	1.615	1.258	-0.504	0.057	0.895	98	0.52	0.9	0	89	89	0.125	0.10	0.98	1.15	0.080	1.6
8.050	26.41	450.39	107.97	0.46	12.01	0.43	124.10	1.625	1.263	-0.508	0.057	0.894	102	0.51	0.9	0	93	93	0.129	0.10	0.98	1.15	0.080	1.6
8.100	26.57	450.23	104.83	0.47	12.08	0.45	124.10	1.635	1.268	-0.512	0.058	0.894	99	0.52	0.9	0	90	90	0.126	0.10	0.98	1.15	0.080	1.6
8.150	26.74	450.06	99.84	0.51	12.23	0.51	124.10	1.646	1.273	-0.517	0.058	0.893	94	0.52	0.9	3	86	89	0.124	0.10	0.98	1.15	0.080	1.6
8.200	26.90	449.90	95.17	0.56	12.52	0.59	120.91	1.656	1.278	-0.521	0.059	0.892	90	0.53	0.9	5	81	87	0.122	0.10	0.98	1.15	0.080	1.5
8.250	27.07	449.73	93.38	0.56	13.17	0.60	120.91	1.665	1.283	-0.525	0.059	0.891	88	0.53	0.9	6	80	85	0.121	0.09	0.98	1.15	0.080	1.5
8.300	27.23	449.57	90.09	0.56	12.73	0.62	120.91	1.675	1.288	-0.530	0.059	0.890	85	0.54	0.9	7	77	83	0.119	0.09	0.98	1.15	0.080	1.5
8.350	27.39	449.41	89.73	0.52	12.66	0.58	120.91	1.685	1.293	-0.534	0.060	0.889	85	0.54	0.9	6	76	82	0.118	0.09	0.98	1.15	0.080	1.5
8.400	27.56	449.24	87.30	0.52	12.73	0.59	120.91	1.695	1.297	-0.538	0.060	0.888	82	0.54	0.9	7	74	81	0.117	0.09	0.98	1.15	0.081	1.4
8.450	27.72	449.08	79.66	0.48	13.07	0.60	120.91	1.705	1.302	-0.543	0.061	0.887	75	0.56	0.9	9	67	76	0.112	0.09	0.98	1.15	0.081	1.4
8.500	27.89	448.91	76.70	0.45	13.15	0.58	120.91	1.715	1.307	-0.547	0.061	0.887	72	0.56	0.9	9	64	74	0.110	0.09	0.98	1.15	0.081	1.4
8.550	28.05	448.75	75.49	0.44	13.33	0.58	120.91	1.725	1.312	-0.552	0.062	0.886	71	0.57	0.9	10	63	73	0.110	0.09	0.98	1.15	0.081	1.4
8.600	28.21	448.59	70.67	0.44	13.40	0.63	120.91	1.735	1.317	-0.556	0.062	0.885	67	0.57	0.9	13	59	71	0.108	0.08	0.98	1.15	0.081	1.3
8.650	28.38	448.42	61.39	0.43	13.59	0.70	120.91	1.745	1.321	-0.560	0.063	0.884	58	0.58	0.9	18	51	69	0.106	0.08	0.98	1.15	0.081	1.3
8.700	28.54	448.26	51.01	0.40	13.77	0.79	120.91	1.755	1.326	-0.565	0.063	0.883	48	0.58	0.9	24	42	66	0.104	0.08	0.98	1.15	0.081	1.3
8.750	28.71	448.09	43.76	0.37	14.40	0.85	117.73	1.765	1.331	-0.569	0.064	0.882	41	0.59	0.9	28	36	64	0.103	0.08	0.98	1.15	0.081	1.3
8.800	28.87	447.93	38.19	0.36	15.27	0.93	117.73	1.774	1.335	-0.574	0.064	0.881	36	0.59	0.9	32	31	64	0.102	0.08	0.98	1.15	0.081	1.3
8.850	29.04	447.76	34.14	0.29	17.10	0.83	117.73	1.784	1.340	-0.578	0.065	0.880	32	0.60	0.9	33	28	61	0.100	0.08	0.98	1.15	0.081	1.2
8.900	29.20	447.60	40.61	0.23	21.74	0.56	117.73	1.794	1.344	-0.582	0.065	0.879	38	0.61	0.9	24	33	57	0.098	0.08	0.98	1.15	0.081	1.2
8.950	29.36	447.44	75.40	0.31	8.21	0.42	120.91	1.803	1.349	-0.587	0.066	0.878	71	0.60	0.9	0	62	62	0.101	0.08	0.98	1.15	0.081	1.2
9.000	29.53	447.27	92.92	0.32	2.96	0.34	124.10	1.813	1.354	-0.591	0.066	0.878	88	0.55	0.9	0	77	77	0.113	0.09	0.98	1.15	0.082	1.4
9.050	29.69	447.11	108.71	0.33	6.73	0.30	124.10	1.824	1.359	-0.596	0.067	0.877	103	0.52	0.9	0	90	90	0.126	0.10	0.98	1.15	0.082	1.5
9.100	29.86	446.94	120.32	0.30	10.98	0.25	124.10	1.834	1.364	-0.600	0.067	0.876	114	0.50	0.9	0	100	100	0.138	0.11	0.97	1.15	0.082	1.7
9.150	30.02	446.78	132.70	0.41	14.64	0.31	124.10	1.844	1.369	-0.605	0.068	0.875	125	0.47	0.9	0	111	111	0.154	0.12	0.97	1.15	0.083	1.9
9.200	30.18	446.62	131.54	0.44	14.92	0.33	124.10	1.854	1.374	-0.609	0.068	0.874	124	0.48	0.9	0	110	110	0.152	0.11	0.97	1.15	0.083	1.8
9.250	30.35	446.45	137.95	0.60	15.01	0.43	124.10	1.864	1.379	-0.614	0.069	0.873	130	0.47	0.9	0	115	115	0.162	0.12	0.97	1.15	0.083	1.9
9.300	30.51	446.29	145.01	0.52	16.96	0.36	124.10	1.874	1.384	-0.618	0.069	0.872	137	0.45	0.9	0	121	121	0.174	0.13	0.97	1.15	0.083	2.0
9.350	30.68	446.12	134.11	0.40	16.67	0.30	124.10	1.885	1.389	-0.623	0.070	0.871	127	0.47	0.9	0	111	111	0.154	0.12	0.97	1.15	0.083	1.9
9.400	30.84	445.96	118.08	0.34	16.93	0.29	124.10	1.895	1.394	-0.627	0.070	0.870	112	0.50	0.9	0	97	97	0.134	0.10	0.97	1.15	0.083	1.6
9.450	31.00	445.80	108.97	0.33	16.41	0.30	124.10	1.905	1.400	-0.632	0.071	0.869	103	0.52	0.9	0	89	89	0.125	0.10	0.97	1.15	0.083	1.5
9.500	31.17	445.63	98.86	0.49	18.18	0.50	124.10	1.915	1.405	-0.636	0.071	0.868	93	0.54	0.9	4	80	84	0.119	0.09	0.97	1.15	0.083	1.4
9.550	31.33	445.47	94.62	0.38	16.21	0.40	124.10	1.925	1.410	-0.641	0.072	0.868	89	0.56	0.9	0	76	76	0.113	0.09	0.97	1.15	0.083	1.4
9.600	31.50	445.30	91.33	0.39	17.50	0.42	124.10	1.936	1.415	-0.645	0.072	0.867	86	0.56	0.8	0	73	73	0.110	0.09	0.97	1.15	0.083	1.3
9.650	31.66	445.14	88.75	0.23	17.54	0.26	124.10	1.946	1.420	-0.650	0.073	0.866	84	0.57	0.8	0	71	71	0.108	0.08	0.98	1.15	0.083	1.3
9.700	31.82	444.98	87.34	0.20	17.28	0.23	124.10	1.956	1.425	-0.654	0.073	0.865	83	0.57	0.8	0	70	70	0.107	0.08	0.98	1.15	0.083	1.3
9.750	31.99	444.81	88.47	0.21	17.56	0.24	124.10	1.966	1.430	-0.659	0.074	0.864	84	0.57	0.8	0	70	71	0.108	0.08	0.97	1.15	0.083	1.3
9.800	32.15	444.65	94.80	0.22	19.76	0.23	124.10	1.976	1.435	-0.663	0.074	0.863	90	0.56	0.8	0	76	76	0.112	0.09	0.97	1.15	0.083	1.3
9.850	32.32	444.48	108.58	0.17	18.80	0.15	124.10	1.986	1.440	-0.668	0.075	0.862	103	0.53	0.8	0	87	87	0.123	0.10	0.97	1.15	0.083	1.5
9.900	32.48	444.32	122.24	0.27	18.50	0.22	124.10	1.997	1.445	-0.673	0.075	0.861	116	0.50	0.8	0	99	99	0.136	0.11	0.97	1.15	0.084	1.6
9.950	32.64	444.16	121.80	0.31	19.35	0.25	124.10	2.007	1.450	-0.677	0.076	0.860	115	0.50	0.9	0	98	98	0.135	0.10	0.97	1.15	0.084	1.6
10.000	32.81	443.99	129.85	0.44	19.62	0.34	124.10	2.017	1.455	-0.682	0.076	0.859	123	0.49	0.9	0	105	105	0.144	0.11	0.96	1.15	0.084	1.7
10.050	32.97	443.83	135.82	0.52	19.15	0.38	124.10	2.027	1.460	-0.686	0.077	0.858	128	0.48	0.9	0	110	110	0.152	0.12	0.96	1.15	0.084	1.8
10.100	33.14	443.66	132.73	0.55	19.79	0.41	124.10	2.037	1.465	-0.691	0.077	0.857	125	0.48	0.9	0	107	107	0.148	0.11	0.96	1.15	0.084	1.8
10.150	33.30	443.50	129.70	0.47	20.11	0.37	124.10	2.048	1.470	-0.696	0.078	0.857	123	0.49	0.9	0	104	105	0.144	0.11	0.96	1.15	0.084	1.7
10.200	33.46	443.34	128.14	0.43	19.34	0.34	124.10	2.058	1.475	-0.700	0.078	0.856	121	0.49	0.8	0	103	103	0.141	0.11	0.96	1.15	0.084	1.7
10.250	33.63	443.17	124.69	0.40	18.69	0.32	124.10	2.068	1.481	-0.705	0.079	0.855	118	0.50	0.8	0	100	100	0.137	0.11	0.96	1.15	0.084	1.6
10.300	33.79	443.01	126.38	0.47	22.39	0.37	124.10	2.078	1.486	-0.709	0.079	0.854	119	0.50	0.8	0	101	101	0.139	0.11	0.96	1.15	0.084	1.6
10.350	33.96	442.84	126.24	0.57	21.82	0.45	124.10	2.088	1.491	-0.714	0.080	0.853	119	0.50	0.8	0	101	101	0.138	0.11	0.96	1.15	0.084	1.6
10.400	34.12	442.68	145.63	0.66	21.75	0.45	124.10	2.098	1.496	-0.719	0.080	0.852	138	0.46	0.9	0	117	117	0.166	0.12	0.96	1.15	0.085	2.0
10.450	34.28	442.52	169.17	1.26	22.49	0.74	124.10	2.109	1.501	-0.723	0.081	0.851	160	0.42	0.9	1	138	139	0.232	0.15	0.95	1.15	0.086	2.0
10.500	34.45	442.35	188.70	1.34	22.86	0.71	124.10	2.119	1.506	-0.728	0.081	0.850	178	0.39	0.9	1	155	156	0.332	0.17	0.94	1.15	0.087	2.0
10.550	34.61	442.19	205.45	0.75	20.88	0.37	124.10	2.129	1.511	-0.733	0.082	0.849	194	0.37	0.9	0	170	170	0.505	0.19	0.93	1.15	0.087	2.0
10.600	34.78	442.02	238.19	0.71	19.60	0.30	127.28	2.139	1.516	-0.737	0.082	0.848	225	0.33	0.9	0	200	200	1.881	0.26	0.91	1.15	0.090	2.0
10.650	34.94	441.86	233.76	0.71	26.60	0.30	127.28	2.150	1.521	-0.742	0.083	0.847	221	0.34	0.9	0	196	196	1.484	0.25	0.91	1.15	0.090	2.0
10.700	35.10	441.70	229.60	0.68	19.90	0.29	127.28	2.160	1.527	-0.747	0.083	0.846	217	0.34	0.9	0	191	191	1.207	0.24	0.91	1.15	0.089	2.0
10.750	35.27	441.53	225.14	0.50	14.83	0.22	127.28	2.171	1.532	-0.751	0.084	0.845	213	0.35	0.9	0	187	187	0.983	0.23	0.92	1.15	0.089	2.0
10.800	35.43	441.37	224.35	0.71	17.81	0.32	127.28	2.181	1.537	-0.756	0.084	0.844	212	0.35	0.9	0	186	186	0.941	0.23	0.92	1.15	0.089	2.0
10.850	35.60	441.20	231.17	0.80	21.96	0.34	127.28	2.192	1.543	-0.761	0.085	0.844	218	0.34	0.9	0	192	192	1.248	0.24	0.91	1.15	0.090	2.0
10.900	35.76	441.04	246.62	0.89	23.76	0.36	127.28	2.202	1.548	-0.765	0.085	0.843	233	0.32	0.9	0	206	206	2.734	0.28	0.89	1.15	0.091	2.0
10.950	35.92	440.88	252.04	0.96	26.96	0.38	127.28	2.212	1.553	-0.770	0.086	0.842	238	0.32	0.9	0	211	211	3.732	0.30	0.88	1.15	0.092	2.0
11.000	36.09	440.71	259.13	0.92	24.52	0.35	127.28	2.223	1.559	-0.775	0.087	0.841	245	0.31	0.9	0	217	217	5.865	0.30	0.88	1.15	0.092	2.0
11.050	36.25	440.55	293.03	1.06	21.58	0.36	127.28	2.233	1.564	-0.779	0.087	0.840	277	0.27	0.9	0	249	249	119.473	0.30	0.88	1.15	0.092	2.0
11.100	36.42	440.38	289.07	0.92	23.83	0.32	127.28	2.244	1.569	-0.784	0.088	0.839	273	0.27	0.9	0	245	245	75.303	0.30	0.88	1.15	0.093	2.0
11.150	36.58	440.22	274.23	1.17	29.43	0.43	127.28	2.254	1.575	-0.789	0.088	0.838	259	0.29	0.9	0	231	231	17.763	0.30	0.88	1.15	0.093	2.0
11.200	36.74	440.06	264.31	0.75	31.74	0.28	127.28	2.265	1.580	-0.793	0.089	0.837	250	0.30	0.9	0	221	221	7.870	0.30	0.88	1.15	0.093	2.0
11.250	36.91	439.89	262.65	0.83	28.62	0.32	127.28	2.275	1.585	-0.798	0.089	0.836	248	0.30	0.9	0	219	219	6.837	0.30	0.88	1.15	0.093	2.0
11.300	37.07	439.73	261.09	0.63	18.12	0.24	127.28	2.286	1.591	-0.803	0.090	0.835	247	0.31	0.9	0	218	218	6.006	0.30	0.88	1.15	0.093	2.0
11.350	37.24	439.56	241.57	0.62	18.44	0.26	127.28	2.296	1.596	-0.808	0.090	0.834	228	0.33	0.9	0	199	199	1.815	0.26	0.89	1.15	0.092	2.0
11.400	37.40	439.40	248.96	0.44	21.69	0.18	127.28	2.306	1.601	-0.812	0.091	0.833	235	0.32	0.9	0	206	206	2.679	0.28	0.88	1.15	0.093	2.0
11.450	37.57	439.23	258.53	0.74	20.94	0.29	127.28	2.317	1.607	-0.817	0.091	0.832	244	0.31	0.9	0	215	215	4.774	0.30	0.87	1.15	0.093	2.0
11.500	37.73	439.07	273.33	0.91	35.95	0.33	127.28	2.327	1.612	-0.822	0.092	0.831	258	0.29	0.9	0	228	228	14.069	0.30	0.87	1.15	0.094	2.0
11.550	37.89	438.91	274.49	0.91	19.99	0.33	127.28	2.338	1.617	-0.826	0.092	0.831	259	0.29	0.9	0	229	229	15.156	0.30	0.87	1.15	0.094	2.0
11.600	38.06	438.74	251.60	1.05	21.39	0.42	127.28	2.348	1.622	-0.831	0.093	0.830	238	0.32	0.9	0	207	207	2.939	0.29	0.88	1.15	0.093	2.0
11.650	38.22	438.58	240.55	1.56	33.94	0.65	124.10	2.358	1.628	-0.836	0.093	0.829	227	0.33	0.9	0	197	197	1.597	0.25	0.89	1.15	0.092	2.0
11.700	38.39	438.41	232.27	1.16	35.96	0.50	124.10	2.369	1.633	-0.841	0.094	0.828	219	0.34	0.9	0	189	189	1.074	0.23	0.90	1.15	0.091	2.0
11.750	38.55	438.25	218.54	1.08	35.98	0.50	124.10	2.379	1.638	-0.845	0.094	0.827	207	0.36	0.9	0	176	176	0.629	0.20	0.91	1.15	0.090	2.0
11.800	38.71	438.09	211.95	1.24	37.65	0.59	124.10	2.389	1.643	-0.850	0.095	0.826	200	0.37	0.8	0	170	170	0.506	0.19	0.92	1.15	0.089	2.0
11.850	38.88	437.92	198.09	0.79	32.14	0.40	124.10	2.399	1.648	-0.855	0.095	0.825	187	0.39	0.8	0	157	157	0.346	0.17	0.92	1.15	0.088	2.0
11.900	39.04	437.76	182.25	0.81	38.98	0.44	124.10	2.409	1.653	-0.860	0.096	0.824	172	0.41	0.8	0	143	143	0.249	0.15	0.93	1.15	0.088	2.0
11.950	39.21	437.59	184.27	0.70	26.15	0.38	124.10	2.420	1.658	-0.864	0.096	0.823	174	0.41	0.8	0	145	145	0.257	0.15	0.93	1.15	0.088	2.0
12.000	39.37	437.43	184.85	0.82	27.19	0.44	124.10	2.430	1.663	-0.869	0.097	0.822	175	0.41	0.8	0	145	145	0.259	0.15	0.93	1.15	0.088	2.0
12.050	39.53	437.27	181.17	0.83	32.18	0.46	124.10	2.440	1.668	-0.874	0.097	0.821	171	0.42	0.8	0	142	142	0.242	0.15	0.93	1.15	0.088	2.0
12.100	39.70	437.10	173.22	0.78	27.37	0.45	124.10	2.450	1.673	-0.879	0.098	0.820	164	0.43	0.8	0	134	135	0.212	0.14	0.94	1.15	0.087	2.0
12.150	39.86	436.94	161.62	0.00	26.34	0.00	118.62	2.460	1.678	-0.883	0.098	0.819	153	0.45	0.8	0	124	124	0.181	0.13	0.94	1.15	0.087	2.0
12.200	40.03	436.77	149.93	0.00	23.59	0.00	118.62	2.470	1.683	-0.888	0.099	0.818	142	0.47	0.8	0	114	114	0.159	0.12	0.94	1.15	0.087	1.8

Table I-5: Liquefaction Analysis for CPT HAV-C003

Idriss and Boulanger Liquefaction Analysis from CPT Data
Havana East Ash Pond - Site 3
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

Groudwater Elevation Used

amax	0.12
Mw	6.9

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	466.04	20.03	0.12	5.24	0.61	117.73	0.010	0.010	0.014	-0.001	1.00	18.9	0.72	1.7	0.0	32	32	0.080	0.06	1.10	1.16	0.061	1.3
0.100	0.33	465.87	87.07	0.13	4.79	0.14	124.10	0.020	0.020	0.012	-0.001	1.00	82.3	0.42	1.7	0.0	140	140	0.234	0.15	1.10	1.16	0.061	2.0
0.150	0.49	465.71	115.21	0.15	2.13	0.13	124.10	0.030	0.030	0.010	-0.001	1.00	108.9	0.35	1.7	0.0	185	185	0.899	0.22	1.10	1.16	0.061	2.0
0.200	0.66	465.54	111.34	0.17	2.23	0.15	124.10	0.040	0.040	0.008	-0.000	1.00	105.2	0.36	1.7	0.0	179	179	0.694	0.21	1.10	1.16	0.061	2.0
0.250	0.82	465.38	98.80	0.33	1.11	0.33	124.10	0.050	0.050	0.006	-0.000	1.00	93.4	0.39	1.7	0.0	159	159	0.358	0.17	1.10	1.16	0.061	2.0
0.300	0.98	465.22	88.24	0.34	0.56	0.38	124.10	0.060	0.060	0.004	0.000	1.00	83.4	0.42	1.7	0.0	142	142	0.242	0.15	1.10	1.16	0.061	2.0
0.350	1.15	465.05	75.55	0.34	0.03	0.45	120.91	0.070	0.070	0.002	0.000	1.00	71.4	0.45	1.7	0.0	121	121	0.174	0.13	1.10	1.16	0.061	2.0
0.400	1.31	464.89	72.89	0.29	-0.05	0.39	120.91	0.080	0.080	-0.000	0.001	1.00	68.9	0.46	1.7	0.1	117	117	0.165	0.12	1.10	1.16	0.061	2.0
0.450	1.48	464.72	76.44	0.31	0.50	0.41	120.91	0.090	0.090	-0.003	0.001	1.00	72.2	0.45	1.7	0.1	123	123	0.178	0.13	1.10	1.16	0.061	2.0
0.500	1.64	464.56	95.68	0.40	1.66	0.42	124.10	0.100	0.100	-0.005	0.001	1.00	90.4	0.40	1.7	0.0	154	154	0.315	0.17	1.10	1.16	0.061	2.0
0.550	1.80	464.40	122.82	0.52	2.43	0.43	124.10	0.110	0.110	-0.007	0.001	1.00	116.1	0.33	1.7	0.0	197	197	1.629	0.25	1.10	1.16	0.061	2.0
0.600	1.97	464.23	140.65	0.63	1.81	0.45	124.10	0.121	0.121	-0.009	0.001	1.00	132.9	0.30	1.7	0.0	226	226	2.000	0.30	1.10	1.16	0.061	2.0
0.650	2.13	464.07	154.95	0.73	1.61	0.47	124.10	0.131	0.131	-0.011	0.002	1.00	146.4	0.27	1.7	0.0	249	249	2.000	0.30	1.10	1.16	0.061	2.0
0.700	2.30	463.90	161.41	0.87	1.61	0.54	124.10	0.141	0.141	-0.013	0.002	1.00	152.5	0.26	1.7	0.0	259	259	2.000	0.30	1.10	1.16	0.061	2.0
0.750	2.46	463.74	163.16	0.90	1.33	0.55	124.10	0.151	0.151	-0.016	0.002	1.00	154.2	0.26	1.7	0.0	258	258	2.000	0.30	1.10	1.16	0.061	2.0
0.800	2.62	463.58	158.47	0.91	0.81	0.57	124.10	0.161	0.161	-0.018	0.002	1.00	149.7	0.27	1.7	0.0	249	249	2.000	0.30	1.10	1.16	0.061	2.0
0.850	2.79	463.41	173.16	0.93	2.71	0.54	124.10	0.172	0.172	-0.020	0.003	1.00	163.6	0.26	1.6	0.0	264	264	2.000	0.30	1.10	1.16	0.061	2.0
0.900	2.95	463.25	213.44	0.96	3.28	0.45	124.10	0.182	0.182	-0.022	0.003	1.00	201.7	0.26	1.6	0.0	321	321	2.000	0.30	1.10	1.16	0.061	2.0
0.950	3.12	463.08	220.90	0.99	5.36	0.45	124.10	0.192	0.192	-0.025	0.003	1.00	208.8	0.26	1.6	0.0	328	328	2.000	0.30	1.10	1.16	0.061	2.0
1.000	3.28	462.92	243.09	1.00	2.27	0.41	127.28	0.202	0.202	-0.027	0.003	1.00	229.7	0.26	1.5	0.0	355	355	2.000	0.30	1.10	1.16	0.061	2.0
1.050	3.44	462.76	258.51	1.11	0.98	0.43	127.28	0.213	0.213	-0.029	0.004	1.00	244.3	0.26	1.5	0.0	373	373	2.000	0.30	1.10	1.16	0.061	2.0
1.100	3.61	462.59	256.51	1.11	0.86	0.43	127.28	0.223	0.223	-0.032	0.004	1.00	242.4	0.26	1.5	0.0	365	365	2.000	0.30	1.10	1.16	0.061	2.0
1.150	3.77	462.43	251.97	1.11	0.84	0.44	127.28	0.234	0.234	-0.034	0.004	1.00	238.1	0.26	1.5	0.0	355	355	2.000	0.30	1.10	1.16	0.061	2.0
1.200	3.94	462.26	251.77	1.16	1.19	0.46	127.28	0.244	0.244	-0.036	0.005	0.99	237.9	0.26	1.5	0.0	350	350	2.000	0.30	1.10	1.16	0.061	2.0
1.250	4.10	462.10	251.15	1.39	1.12	0.55	124.10	0.254	0.254	-0.039	0.005	0.99	237.3	0.26	1.5	0.0	346	346	2.000	0.30	1.10	1.16	0.061	2.0
1.300	4.27	461.93	237.35	1.35	0.84	0.57	124.10	0.264	0.264	-0.041	0.005	0.99	224.3	0.26	1.4	0.0	323	323	2.000	0.30	1.10	1.16	0.061	2.0
1.350	4.43	461.77	227.00	1.32	0.86	0.58	124.10	0.275	0.275	-0.044	0.005	0.99	214.5	0.26	1.4	0.0	306	306	2.000	0.30	1.10	1.16	0.061	2.0
1.400	4.59	461.61	234.12	1.25	-0.22	0.53	124.10	0.285	0.285	-0.046	0.006	0.99	221.2	0.26	1.4	0.0	313	313	2.000	0.30	1.10	1.16	0.061	2.0
1.450	4.76	461.44	242.05	1.21	-0.83	0.50	124.10	0.295	0.295	-0.049	0.006	0.99	228.7	0.26	1.4	0.0	320	320	2.000	0.30	1.10	1.16	0.061	2.0
1.500	4.92	461.28	237.17	1.25	-0.55	0.53	124.10	0.305	0.305	-0.051	0.006	0.99	224.1	0.26	1.4	0.0	311	311	2.000	0.30	1.10	1.16	0.061	2.0
1.550	5.09	461.11	229.33	1.16	-1.27	0.50	124.10	0.315	0.315	-0.054	0.006	0.99	216.7	0.26	1.4	0.0	298	298	2.000	0.30	1.10	1.16	0.061	2.0
1.600	5.25	460.95	227.77	1.04	-0.52	0.46	124.10	0.326	0.326	-0.056	0.007	0.99	215.2	0.26	1.4	0.0	294	294	2.000	0.30	1.10	1.16	0.061	2.0
1.650	5.41	460.79	227.64	1.01	-0.01	0.44	124.10	0.336	0.336	-0.059	0.007	0.99	215.1	0.26	1.4	0.0	291	291	2.000	0.30	1.10	1.16	0.061	2.0
1.700	5.58	460.62	223.53	1.02	0.49	0.46	124.10	0.346	0.346	-0.061	0.007	0.99	211.2	0.26	1.3	0.0	284	284	2.000	0.30	1.10	1.16	0.060	2.0
1.750	5.74	460.46	219.28	1.00	0.37	0.46	124.10	0.356	0.356	-0.064	0.008	0.99	207.2	0.26	1.3	0.0	276	276	2.000	0.30	1.10	1.16	0.060	2.0
1.800	5.91	460.29	213.10	0.97	0.85	0.45	124.10	0.366	0.366	-0.066	0.008	0.99	201.4	0.26	1.3	0.0	266	266	2.000	0.30	1.10	1.16	0.060	2.0
1.850	6.07	460.13	208.00	0.69	1.04	0.33	124.10	0.376	0.376	-0.069	0.008	0.99	196.6	0.26	1.3	0.0	258	258	2.000	0.30	1.10	1.16	0.060	2.0
1.900	6.23	459.97	202.36	0.71	0.90	0.35	124.10	0.387	0.387	-0.072	0.008	0.99	191.2	0.27	1.3	0.0	250	250	2.000	0.30	1.10	1.16	0.060	2.0
1.950	6.40	459.80	184.64	0.76	0.43	0.41	124.10	0.397	0.397	-0.074	0.009	0.99	174.5	0.29	1.3	0.0	232	232	2.000	0.30	1.10	1.16	0.060	2.0
2.000	6.56	459.64	173.58	0.77	-0.13	0.44	124.10	0.407	0.407	-0.077	0.009	0.99	164.0	0.30	1.3	0.0	219	219	2.000	0.30	1.10	1.16	0.060	2.0
2.050	6.73	459.47	158.00	0.75	-0.45	0.47	124.10	0.417	0.417	-0.080	0.009	0.99	149.3	0.33	1.4	0.0	202	202	2.000	0.27	1.10	1.16	0.060	2.0
2.100	6.89	459.31	136.20	0.74	-0.82	0.54	124.10	0.427	0.427	-0.082	0.010	0.98	128.7	0.36	1.4	0.0	178	178	0.680	0.21	1.10	1.16	0.060	2.0
2.150	7.05	459.15	112.97	0.91	-0.42	0.81	124.10	0.438	0.438	-0.085	0.010	0.98	106.8	0.40	1.4	0.6	152	152	0.305	0.16	1.10	1.16	0.060	2.0
2.200	7.22	458.98	100.11	1.14	0.78	1.14	120.91	0.448	0.448	-0.088	0.010	0.98	94.6	0.42	1.4	5.1	136	141	0.238	0.15	1.10	1.16	0.060	2.0
2.250	7.38	458.82	83.52	1.10	3.46	1.32	120.91	0.458	0.458	-0.091	0.011	0.98	78.9	0.44	1.5	11.6	115	126	0.186	0.13	1.10	1.16	0.060	2.0
2.300	7.55	458.65	61.05	1.09	0.50	1.78	117.73	0.467	0.467	-0.093	0.011	0.98	57.7	0.47	1.5	26.1	85	111	0.154	0.12	1.09	1.16	0.060	2.0
2.350	7.71	458.49	42.94	0.84	-1.37	1.95	114.55	0.477	0.477	-0.096	0.011	0.98	40.6	0.51	1.5	34.3	61	95	0.131	0.10	1.08	1.16	0.061	2.0
2.400	7.87	458.33	37.13	0.74	-2.65	1.99	114.55	0.486	0.486	-0.099	0.012	0.98	35.1	0.52	1.5	36.9	53	90	0.125	0.10	1.08	1.16	0.061	2.0
2.450	8.04	458.16	32.75	0.65	-3.99	1.97	114.55	0.496	0.496	-0.102	0.012	0.98	30.9	0.53	1.5	38.4	46	85	0.120	0.09	1.07	1.16	0.061	2.0
2.500	8.20	458.00	28.36	0.53	-5.38	1.86	114.55	0.505	0.505	-0.105	0.012	0.98	26.8	0.55	1.5	39.3	40	79	0.115	0.09	1.07	1.16	0.062	1.9
2.550	8.37	457.83	27.22	0.48	-6.06	1.74	114.55	0.514	0.514	-0.107	0.012	0.98	25.7	0.55	1.5	38.9	38	77	0.113	0.09	1.06	1.16	0.062	1.8
2.600	8.53	457.67	26.70	0.45	-10.70	1.70	114.55	0.524	0.524	-0.110	0.013	0.98	25.2	0.56	1.5	38.9	37	76	0.112	0.09	1.06	1.16	0.062	1.8
2.650	8.69	457.51	26.98	0.43	-11.06	1.58	114.55	0.533	0.533	-0.113	0.013	0.98	25.5	0.56	1.5	37.8	37	75	0.112	0.09	1.06	1.16	0.062	1.8
2.700	8.86	457.34	28.95	0.29	-11.05	1.02	117.73	0.543	0.543	-0.116	0.013	0.98	27.4	0.57	1.5	30.5	40	71	0.108	0.08	1.06	1.16	0.062	1.7
2.750	9.02	457.18	31.77	0.21	-11.02	0.65	117.73	0.552	0.552	-0.119	0.014	0.98	30.0	0.59	1.5	21.9	44	66	0.104	0.08	1.05	1.16	0.062	1.7
2.800	9.19	457.01	34.79	0.12	-0.39	0.34	117.73	0.562	0.562	-0.122	0.014	0.98	32.9	0.64	1.5	0.1	49	49	0.092	0.07	1.04	1.16	0.063	1.5
2.850	9.35	456.85	37.11	0.10	-0.06	0.26	120.91	0.572	0.572	-0.125	0.014	0.97	35.1	0.63	1.5	0.1	52	52	0.094	0.07	1.04	1.16	0.063	1.5
2.900	9.51	456.69	42.71	0.16	-0.17	0.37	120.91	0.582	0.582	-0.128	0.015	0.97	40.4	0.61	1.4	0.1	58	58	0.098	0.08	1.05	1.16	0.063	1.6
2.950	9.68	456.52	50.31	0.24	0.35	0.47	120.91	0.592	0.592	-0.131	0.015	0.97	47.5	0.58	1.4	0.1	67	67	0.105	0.08	1.05	1.16	0.062	1.7
3.000	9.84	456.36	61.77	0.32	0.35	0.51	120.91	0.602	0.602	-0.134	0.015	0.97	58.4	0.54	1.4	4.5	79	84	0.119	0.09	1.05	1.16	0.062	1.9
3.050	10.01	456.19	70.16	0.38	0.25	0.54	120.91	0.612	0.612	-0.137	0.016	0.97	66.3	0.52	1.3	3.3	88	91	0.127	0.10	1.05	1.16	0.062	2.0
3.100	10.17	456.03	74.55	0.43	0.17	0.58	120.91	0.621	0.621	-0.140	0.016	0.97	70.5	0.51	1.3	3.1	92	95	0.132	0.10	1.05	1.16	0.062	2.0
3.150	10.33	455.87	77.92	0.46	0.17	0.59	120.91	0.631	0.631	-0.143	0.016	0.97	73.6	0.50	1.3	2.8	95	98	0.135	0.10	1.05	1.16	0.062	2.0
3.200	10.50	455.70	81.87	0.47	0.18	0.57	120.91	0.641	0.641	-0.146	0.017	0.97	77.4	0.50	1.3	2.2	99	101	0.139	0.11	1.05	1.16	0.062	2.0
3.250	10.66	455.54	89.89	0.52	0.26	0.58	120.91	0.651	0.651	-0.149	0.017	0.97	84.9	0.48	1.3	1.4	107	109	0.150	0.11	1.06	1.16	0.062	2.0
3.300	10.83	455.37	92.67	0.55	0.21	0.60	120.91	0.661	0.661	-0.152	0.017	0.97	87.6	0.47	1.3	1.4	109	111	0.154	0.12	1.05	1.16	0.062	2.0
3.350	10.99	455.21	95.16	0.56	0.21	0.58	120.91	0.671	0.671	-0.155	0.018	0.97	89.9	0.47	1.2	1.2	111	113	0.157	0.12	1.05	1.16	0.062	2.0
3.400	11.15	455.05	97.69	0.57	0.18	0.58	124.10	0.681	0.681	-0.158	0.018	0.97	92.3	0.47	1.2	1.0	113	114	0.160	0.12	1.05	1.16	0.062	2.0
3.450	11.32	454.88	96.71	0.58	0.20	0.59	124.10	0.691	0.691	-0.162	0.019	0.97	91.4	0.47	1.2	1.3	112	113	0.157	0.12	1.05	1.16	0.062	2.0
3.500	11.48	454.72	94.00	0.55	0.17	0.59	120.91	0.701	0.701	-0.165	0.019	0.97	88.8	0.48	1.2	1.5	108	110	0.151	0.11	1.05	1.16	0.062	2.0
3.550	11.65	454.55	91.57	0.53	0.16	0.58	120.91	0.711	0.711	-0.168	0.019	0.97	86.5	0.48	1.2	1.7	105	107	0.146	0.11	1.04	1.16	0.062	2.0
3.600	11.81	454.39	90.10	0.53	0.25	0.59	120.91	0.721	0.721	-0.171	0.020	0.96	85.1	0.49	1.2	2.0	103	105	0.144	0.11	1.04	1.16	0.062	2.0
3.650	11.97	454.23	88.68	0.53	0.24	0.60	120.91	0.731	0.731	-0.174	0.020	0.96	83.8	0.49	1.2	2.3	101	103	0.141	0.11	1.04	1.16	0.062	2.0
3.700	12.14	454.06	88.67	0.53	0.29	0.59	120.91	0.741	0.741	-0.177	0.020	0.96	83.8	0.49	1.2	2.3	100	102	0.140	0.11	1.04	1.16	0.062	2.0
3.750	12.30	453.90	89.74	0.51	0.29	0.57	120.91	0.751	0.751	-0.181	0.021	0.96	84.8	0.49	1.2	2.0	100	102	0.140	0.11	1.04	1.16	0.062	2.0
3.800	12.47	453.73	90.68	0.51	0.36	0.56	120.91	0.761	0.761	-0.184	0.021	0.96	85.7	0.49	1.2	1.9	101	103	0.141	0.11	1.04	1.16	0.062	2.0
3.850	12.63	453.57	91.23	0.58	0.42	0.63	120.91	0.771	0.771	-0.187	0.021	0.96	86.2	0.49	1.2	2.8	101	103	0.142	0.11	1.03	1.16	0.062	2.0
3.900	12.80	453.40	91.73	0.52	0.28	0.57	120.91	0.781	0.781	-0.190	0.022	0.96	86.7	0.49	1.2	1.9	101	103	0.141	0.11	1.03	1.16	0.063	2.0
3.950	12.96	453.24	90.63	0.45	0.44	0.50	124.10	0.791	0.791	-0.194	0.022	0.96	85.6	0.50	1.2	1.3	99	100	0.138	0.11	1.03	1.16	0.063	2.0
4.000	13.12	453.08	91.37	0.45	0.41	0.49	124.10	0.801	0.801	-0.197	0.022	0.96	86.3	0.50	1.1	0.2	99	99	0.137	0.11	1.03	1.16	0.063	2.0
4.050	13.29	452.91	90.27	0.46	0.25	0.50	120.91	0.811	0.811	-0.200	0.023	0.96	85.3	0.50	1.1	1.5	97	99	0.136	0.11	1.03	1.16	0.063	2.0
4.100	13.45	452.75	88.01	0.45	0.18	0.51	120.91	0.821	0.821	-0.204	0.023	0.96	83.2	0.51	1.1	1.9	95	96	0.133	0.10	1.03	1.16	0.063	2.0
4.150	13.62	452.58	87.30	0.45	0.19	0.52	120.91	0.831	0.831	-0.207	0.024	0.96	82.5	0.51	1.1	2.1	93	95	0.132	0.10	1.02	1.16	0.063	2.0
4.200	13.78	452.42	87.11	0.45	0.18	0.52	120.91	0.841	0.841	-0.210	0.024	0.96	82.3	0.51	1.1	2.2	93	95	0.131	0.10	1.02	1.16	0.063	2.0
4.250	13.94	452.26	86.19	0.45	0.27	0.52	120.91	0.851	0.851	-0.214	0.024	0.96	81.5	0.51	1.1	2.4	91	93	0.129	0.10	1.02	1.16	0.063	2.0
4.300	14.11	452.09	86.30	0.44	0.30	0.51	120.91	0.861	0.861	-0.217	0.025	0.95	81.6	0.51	1.1	2.3	91	93	0.129	0.10	1.02	1.16	0.063	2.0
4.350	14.27	451.93	86.33	0.42	0.30	0.48	120.91	0.871	0.871	-0.221	0.025	0.95	81.6	0.52	1.1	0.2	90	90	0.126	0.10	1.02	1.16	0.063	2.0
4.400	14.44	451.76	84.30	0.40	0.28	0.48	120.91	0.880	0.880	-0.224	0.025	0.95	79.7	0.53	1.1	0.1	88	88	0.123	0.10	1.02	1.16	0.063	2.0
4.450	14.60	451.60	81.01	0.39	0.18	0.48	120.91	0.890	0.890	-0.227	0.026	0.95	76.6	0.54	1.1	0.1	84	84	0.120	0.09	1.02	1.16	0.063	1.9
4.500	14.76	451.44	78.76	0.36	0.17	0.45	120.91	0.900	0.900	-0.231	0.026	0.95	74.4	0.54	1.1	0.1	81	81	0.117	0.09	1.01	1.16	0.063	1.9
4.550	14.93	451.27	77.13	0.35	0.19	0.46	120.91	0.910	0.910	-0.234	0.027	0.95	72.9	0.55	1.1	0.1	79	79	0.115	0.09	1.01	1.16	0.063	1.8
4.600	15.09	451.11	76.92	0.36	0.37	0.47	120.91	0.920	0.920	-0.238	0.027	0.95	72.7	0.55	1.1	0.1	78	79	0.115	0.09	1.01	1.16	0.063	1.8
4.650	15.26	450.94	77.94	0.38	0.37	0.48	120.91	0.930	0.930	-0.241	0.027	0.95	73.7	0.55	1.1	0.1	79	79	0.115	0.09	1.01	1.16	0.063	1.8
4.700	15.42	450.78	80.06	0.38	0.47	0.47	120.91	0.940	0.940	-0.245	0.028	0.95	75.7	0.54	1.1	0.1	81	81	0.117	0.09	1.01	1.16	0.063	1.8
4.750	15.58	450.62	87.19	0.39	0.53	0.44	120.91	0.950	0.950	-0.248	0.028	0.95	82.4	0.53	1.1	0.1	87	87	0.123	0.10	1.01	1.16	0.063	1.9
4.800	15.75	450.45	85.67	0.40	0.35	0.47	120.91	0.960	0.960	-0.252	0.029	0.95	81.0	0.53	1.1	0.1	85	85	0.121	0.09	1.01	1.16	0.063	1.9
4.850	15.91	450.29	80.97	0.32	0.31	0.40	120.91	0.970	0.970	-0.255	0.029	0.95	76.5	0.55	1.0	0.1	80	80	0.116	0.09	1.01	1.16	0.063	1.8
4.900	16.08	450.12	76.95	0.32	0.37	0.41	120.91	0.980	0.980	-0.259	0.029	0.95	72.7	0.56	1.0	0.1	76	76	0.112	0.09	1.01	1.16	0.063	1.8
4.950	16.24	449.96	70.65	0.29	0.38	0.41	120.91	0.990	0.990	-0.263	0.030	0.94	66.8	0.58	1.0	0.1	69	70	0.107	0.08	1.01	1.16	0.063	1.7
5.000	16.40	449.80	65.25	0.28	0.26	0.43	120.91	0.999	0.999	-0.266	0.030	0.94	61.7	0.59	1.0	0.1	64	64	0.102	0.08	1.00	1.16	0.063	1.6
5.050	16.57	449.63	58.34	0.26	0.22	0.44	120.91	1.009	1.009	-0.270	0.031	0.94	55.1	0.61	1.0	0.1	57	57	0.097	0.08	1.00	1.16	0.063	1.5
5.100	16.73	449.47	51.21	0.23	0.10	0.45	120.91	1.019	1.019	-0.273	0.031	0.94	48.4	0.64	1.0	0.1	50	50	0.092	0.07	1.00	1.16	0.063	1.5
5.150	16.90	449.30	46.75	0.21	0.04	0.45	120.91	1.029	1.029	-0.277	0.031	0.94	44.2	0.66	1.0	0.1	45	45	0.089	0.07	1.00	1.16	0.063	1.4
5.200	17.06	449.14	48.54	0.22	0.20	0.46	120.91	1.039	1.039	-0.281	0.032	0.94	45.9	0.65	1.0	0.1	46	47	0.090	0.07	1.00	1.16	0.063	1.4
5.250	17.22	448.98	53.94	0.24	0.11	0.45	120.91	1.049	1.049	-0.284	0.032	0.94	51.0	0.63	1.0	0.1	51	51	0.093	0.07	1.00	1.16	0.063	1.5
5.300	17.39	448.81	57.07	0.26	0.34	0.46	120.91	1.059	1.059	-0.288	0.033	0.94	53.9	0.62	1.0	0.1	54	54	0.095	0.07	1.00	1.16	0.063	1.5
5.350	17.55	448.65	59.31	0.27	0.27	0.46	120.91	1.069	1.069	-0.292	0.033	0.94	56.0	0.62	1.0	0.1	56	56	0.096	0.07	1.00	1.16	0.063	1.5
5.400	17.72	448.48	58.49	0.29	0.06	0.49	120.91	1.079	1.079	-0.295	0.033	0.94	55.3	0.62	1.0	0.1	55	55	0.096	0.07	1.00	1.16	0.063	1.5
5.450	17.88	448.32	55.96	0.27	0.09	0.49	120.91	1.089	1.089	-0.299	0.034	0.94	52.9	0.63	1.0	0.1	52	52	0.094	0.07	1.00	1.16	0.063	1.5
5.500	18.04	448.16	52.41	0.25	0.02	0.48	120.91	1.099	1.099	-0.303	0.034	0.94	49.5	0.64	1.0	0.1	48	48	0.091	0.07	1.00	1.16	0.063	1.4
5.550	18.21	447.99	50.02	0.23	0.39	0.46	120.91	1.109	1.109	-0.307	0.035	0.93	47.3	0.65	1.0	0.1	46	46	0.089	0.07	1.00	1.16	0.063	1.4
5.600	18.37	447.83	49.62	0.24	0.36	0.49	120.91	1.119	1.119	-0.310	0.035	0.93	46.9	0.66	1.0	0.1	45	45	0.089	0.07	1.00	1.16	0.063	1.4
5.650	18.54	447.66	54.53	0.29	0.38	0.54	120.91	1.128	1.128	-0.314	0.036	0.93	51.5	0.59	1.0	14.4	50	64	0.103	0.08	0.99	1.16	0.063	1.6
5.700	18.70	447.50	66.16	0.37	0.47	0.57	120.91	1.138	1.138	-0.318	0.036	0.93	62.5	0.57	1.0	10.7	60	71	0.108	0.08	0.99	1.16	0.063	1.7
5.750	18.86	447.34	77.56	0.42	0.47	0.54	120.91	1.148	1.148	-0.322	0.036	0.93	73.3	0.55	1.0	6.8	70	77	0.113	0.09	0.99	1.16	0.063	1.8
5.800	19.03	447.17	84.75	0.42	0.46	0.49	120.91	1.158	1.158	-0.325	0.037	0.93	80.1	0.56	1.0	0.1	76	76	0.113	0.09	0.99	1.16	0.063	1.8
5.850	19.19	447.01	89.69	0.39	0.34	0.43	124.10	1.168	1.168	-0.329	0.037	0.93	84.8	0.55	0.9	0.1	80	80	0.116	0.09	0.99	1.16	0.063	1.8
5.900	19.36	446.84	92.42	0.37	0.35	0.40	124.10	1.178	1.178	-0.333	0.038	0.93	87.3	0.54	0.9	0.1	82	83	0.118	0.09	0.99	1.16	0.063	1.9
5.950	19.52	446.68	87.79	0.39	0.13	0.45	124.10	1.189	1.189	-0.337	0.038	0.93	83.0	0.55	0.9	0.1	78	78	0.114	0.09	0.99	1.16	0.063	1.8
6.000	19.68	446.52	87.34	0.39	0.62	0.45	120.91	1.199	1.199	-0.341	0.038	0.93	82.5	0.55	0.9	0.1	77	77	0.113	0.09	0.99	1.16	0.063	1.8
6.050	19.85	446.35	85.27	0.40	0.81	0.47	120.91	1.209	1.206	-0.345	0.039	0.93	80.6	0.56	0.9	0.1	75	75	0.111	0.09	0.99	1.16	0.063	1.8
6.100	20.01	446.19	80.57	0.39	0.65	0.48	120.91	1.219	1.210	-0.348	0.039	0.93	76.1	0.57	0.9	0.1	71	71	0.108	0.08	0.99	1.16	0.063	1.7
6.150	20.18	446.02	76.21	0.36	0.93	0.47	120.91	1.228	1.215	-0.352	0.040	0.92	72.0	0.58	0.9	0.1	66	67	0.105	0.08	0.99	1.16	0.064	1.6
6.200	20.34	445.86	74.72	0.35	0.93	0.46	120.91	1.238	1.220	-0.356	0.040	0.92	70.6	0.59	0.9	0.1	65	65	0.103	0.08	0.99	1.16	0.064	1.6
6.250	20.51	445.70	74.03	0.34	1.03	0.46	120.91	1.248	1.225	-0.360	0.041	0.92	70.0	0.59	0.9	0.1	64	64	0.103	0.08	0.99	1.16	0.064	1.6
6.300	20.67	445.53	78.33	0.32	1.22	0.41	120.91	1.258	1.230	-0.364	0.041	0.92	74.0	0.58	0.9	0.1	68	68	0.106	0.08	0.99	1.16	0.064	1.6
6.350	20.83	445.37	88.21	0.37	1.52	0.42	124.10	1.268	1.234	-0.368	0.042	0.92	83.4	0.56	0.9	0.1	77	77	0.113	0.09	0.99	1.16	0.065	1.7
6.400	21.00	445.20	106.05	0.41	1.79	0.39	124.10	1.278	1.240	-0.372	0.042	0.92	100.2	0.52	0.9	0.2	92	93	0.128	0.10	0.98	1.16	0.065	2.0
6.450	21.16	445.04	102.58	0.46	2.00	0.45	124.10	1.289	1.245	-0.376	0.042	0.92	96.9	0.52	0.9	0.2	89	89	0.125	0.10	0.98	1.16	0.065	1.9
6.500	21.33	444.87	105.69	0.48	2.44	0.45	124.10	1.299	1.250	-0.380	0.043	0.92	99.9	0.52	0.9	0.2	92	92	0.128	0.10	0.98	1.16	0.065	2.0

Table I-5: Liquefaction Analysis for CPT HAV-C003 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	CRR$_{M7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
6.550	21.49	444.71	121.49	0.53	3.72	0.43	124.10	1.309	1.255	-0.384	0.043	0.92	114.8	0.49	0.9	0.2	106	106	0.145	0.11	0.98	1.16	0.066	2.0
6.600	21.65	444.55	131.84	0.56	3.38	0.43	124.10	1.319	1.260	-0.388	0.044	0.92	124.6	0.47	0.9	0.2	115	115	0.161	0.12	0.98	1.16	0.066	2.0
6.650	21.82	444.38	131.39	0.63	3.72	0.48	124.10	1.329	1.265	-0.392	0.044	0.92	124.2	0.47	0.9	0.2	114	114	0.160	0.12	0.98	1.16	0.066	2.0
6.700	21.98	444.22	137.61	0.64	4.90	0.46	124.10	1.340	1.270	-0.396	0.045	0.92	130.0	0.46	0.9	0.2	120	120	0.171	0.12	0.98	1.16	0.066	2.0
6.750	22.15	444.05	138.49	0.64	4.73	0.46	124.10	1.350	1.275	-0.400	0.045	0.91	130.9	0.46	0.9	0.2	120	120	0.172	0.12	0.98	1.16	0.067	2.0
6.800	22.31	443.89	139.26	0.64	4.46	0.46	124.10	1.360	1.280	-0.404	0.045	0.91	131.6	0.46	0.9	0.2	121	121	0.173	0.13	0.98	1.16	0.067	2.0
6.850	22.47	443.73	146.42	0.52	4.41	0.36	124.10	1.370	1.285	-0.408	0.046	0.91	138.4	0.44	0.9	0.0	127	127	0.188	0.13	0.97	1.16	0.067	2.0
6.900	22.64	443.56	138.00	0.53	4.22	0.38	124.10	1.380	1.290	-0.412	0.046	0.91	130.4	0.46	0.9	0.1	119	119	0.169	0.12	0.98	1.16	0.067	2.0
6.950	22.80	443.40	130.68	0.50	1.58	0.38	124.10	1.390	1.295	-0.416	0.047	0.91	123.5	0.47	0.9	0.1	112	112	0.156	0.12	0.98	1.16	0.067	2.0
7.000	22.97	443.23	147.11	0.45	3.69	0.30	124.10	1.401	1.300	-0.420	0.047	0.91	139.0	0.44	0.9	0.0	127	127	0.188	0.13	0.97	1.16	0.068	2.0
7.050	23.13	443.07	154.92	0.50	4.04	0.32	124.10	1.411	1.305	-0.424	0.048	0.91	146.4	0.43	0.9	0.0	134	134	0.210	0.14	0.97	1.16	0.068	2.0
7.100	23.29	442.91	148.18	0.55	3.99	0.37	124.10	1.421	1.310	-0.428	0.048	0.91	140.0	0.44	0.9	0.0	127	127	0.190	0.13	0.97	1.16	0.068	2.0
7.150	23.46	442.74	128.57	0.56	5.26	0.43	124.10	1.431	1.315	-0.432	0.049	0.91	121.5	0.48	0.9	0.2	110	110	0.151	0.11	0.98	1.16	0.068	2.0
7.200	23.62	442.58	117.64	0.53	5.74	0.45	124.10	1.441	1.320	-0.437	0.049	0.91	111.2	0.50	0.9	0.2	100	100	0.137	0.11	0.98	1.16	0.068	2.0
7.250	23.79	442.41	120.34	0.52	6.61	0.43	124.10	1.452	1.326	-0.441	0.050	0.91	113.7	0.49	0.9	0.2	102	102	0.140	0.11	0.98	1.16	0.068	2.0
7.300	23.95	442.25	139.54	0.60	6.82	0.43	124.10	1.462	1.331	-0.445	0.050	0.91	131.9	0.46	0.9	0.2	119	119	0.169	0.12	0.97	1.16	0.069	2.0
7.350	24.11	442.09	150.76	0.57	6.65	0.38	124.10	1.472	1.336	-0.449	0.051	0.90	142.5	0.44	0.9	0.0	129	129	0.193	0.13	0.97	1.16	0.069	2.0
7.400	24.28	441.92	153.66	0.59	6.71	0.38	124.10	1.482	1.341	-0.453	0.051	0.90	145.2	0.44	0.9	0.0	131	131	0.200	0.14	0.97	1.16	0.069	2.0
7.450	24.44	441.76	149.40	0.61	7.32	0.41	124.10	1.492	1.346	-0.457	0.051	0.90	141.2	0.44	0.9	0.1	127	127	0.188	0.13	0.97	1.16	0.069	2.0
7.500	24.61	441.59	140.01	0.52	7.46	0.37	124.10	1.502	1.351	-0.462	0.052	0.90	132.3	0.46	0.9	0.1	118	118	0.168	0.12	0.97	1.16	0.070	2.0
7.550	24.77	441.43	136.91	0.48	7.35	0.35	124.10	1.513	1.356	-0.466	0.052	0.90	129.4	0.47	0.9	0.1	115	115	0.162	0.12	0.97	1.16	0.070	2.0
7.600	24.93	441.27	134.49	0.54	5.62	0.40	124.10	1.523	1.361	-0.470	0.053	0.90	127.1	0.47	0.9	0.2	113	113	0.157	0.12	0.97	1.16	0.070	2.0
7.650	25.10	441.10	124.06	0.60	4.87	0.49	124.10	1.533	1.366	-0.474	0.053	0.90	117.2	0.49	0.9	0.2	103	104	0.142	0.11	0.97	1.16	0.070	2.0
7.700	25.26	440.94	122.50	0.60	5.01	0.49	124.10	1.543	1.371	-0.478	0.054	0.90	115.8	0.49	0.9	0.2	102	102	0.140	0.11	0.97	1.16	0.070	2.0
7.750	25.43	440.77	115.34	0.50	4.68	0.43	124.10	1.553	1.376	-0.483	0.054	0.90	109.0	0.51	0.9	0.2	95	96	0.132	0.10	0.97	1.16	0.070	1.9
7.800	25.59	440.61	114.32	0.45	5.16	0.40	124.10	1.564	1.381	-0.487	0.055	0.90	108.0	0.51	0.9	0.2	94	94	0.130	0.10	0.97	1.16	0.070	1.9
7.850	25.75	440.45	114.91	0.40	5.72	0.35	124.10	1.574	1.386	-0.491	0.055	0.90	108.6	0.51	0.9	0.2	95	95	0.131	0.10	0.97	1.16	0.070	1.9
7.900	25.92	440.28	118.43	0.40	6.33	0.33	124.10	1.584	1.391	-0.495	0.056	0.89	111.9	0.50	0.9	0.2	98	98	0.134	0.10	0.97	1.16	0.070	1.9
7.950	26.08	440.12	116.62	0.41	5.27	0.35	124.10	1.594	1.396	-0.500	0.056	0.89	110.2	0.51	0.9	0.2	96	96	0.132	0.10	0.97	1.16	0.071	1.9
8.000	26.25	439.95	109.67	0.41	5.52	0.37	124.10	1.604	1.401	-0.504	0.057	0.89	103.6	0.52	0.9	0.2	89	90	0.125	0.10	0.97	1.16	0.071	1.8
8.050	26.41	439.79	94.01	0.38	5.63	0.40	124.10	1.614	1.406	-0.508	0.057	0.89	88.8	0.56	0.9	0.1	76	76	0.112	0.09	0.97	1.16	0.071	1.6
8.100	26.57	439.63	79.86	0.32	5.80	0.41	120.91	1.624	1.411	-0.512	0.058	0.89	75.5	0.59	0.8	0.1	64	64	0.102	0.08	0.98	1.16	0.071	1.5
8.150	26.74	439.46	66.89	0.29	5.96	0.43	120.91	1.634	1.416	-0.517	0.058	0.89	63.2	0.63	0.8	0.1	53	53	0.094	0.07	0.98	1.16	0.071	1.3
8.200	26.90	439.30	61.45	0.27	6.24	0.44	120.91	1.644	1.421	-0.521	0.059	0.89	58.1	0.65	0.8	0.1	48	48	0.091	0.07	0.98	1.16	0.071	1.3
8.250	27.07	439.13	57.73	0.25	6.46	0.44	120.91	1.654	1.426	-0.525	0.059	0.89	54.6	0.66	0.8	0.1	45	45	0.089	0.07	0.98	1.16	0.071	1.3
8.300	27.23	438.97	54.82	0.24	6.56	0.44	120.91	1.664	1.431	-0.530	0.059	0.89	51.8	0.67	0.8	0.1	42	42	0.087	0.07	0.98	1.16	0.071	1.2
8.350	27.39	438.81	53.41	0.23	6.83	0.43	120.91	1.674	1.435	-0.534	0.060	0.89	50.5	0.67	0.8	0.1	41	41	0.086	0.07	0.98	1.16	0.071	1.2
8.400	27.56	438.64	53.79	0.23	7.02	0.42	120.91	1.684	1.440	-0.538	0.060	0.89	50.8	0.67	0.8	0.1	41	41	0.086	0.07	0.98	1.16	0.071	1.2
8.450	27.72	438.48	57.29	0.25	7.49	0.44	120.91	1.694	1.445	-0.543	0.061	0.88	54.1	0.66	0.8	0.1	44	44	0.088	0.07	0.98	1.16	0.071	1.2
8.500	27.89	438.31	66.22	0.32	7.86	0.49	120.91	1.704	1.450	-0.547	0.061	0.88	62.6	0.59	0.8	11.5	52	63	0.102	0.08	0.97	1.16	0.072	1.4
8.550	28.05	438.15	94.19	0.42	8.70	0.45	124.10	1.714	1.455	-0.552	0.062	0.88	89.0	0.56	0.8	0.1	74	75	0.111	0.09	0.97	1.16	0.072	1.5
8.600	28.21	437.99	127.97	0.57	9.84	0.44	124.10	1.724	1.460	-0.556	0.062	0.88	120.9	0.49	0.9	0.2	103	103	0.142	0.11	0.96	1.16	0.073	2.0
8.650	28.38	437.82	149.87	0.69	10.35	0.46	124.10	1.734	1.465	-0.560	0.063	0.88	141.6	0.45	0.9	0.2	122	122	0.177	0.13	0.96	1.16	0.073	2.0
8.700	28.54	437.66	171.67	0.89	10.69	0.52	124.10	1.744	1.470	-0.565	0.063	0.88	162.2	0.42	0.9	0.1	141	142	0.241	0.15	0.95	1.16	0.074	2.0
8.750	28.71	437.49	182.43	1.01	10.86	0.56	124.10	1.755	1.475	-0.569	0.064	0.88	172.4	0.40	0.9	0.1	151	151	0.295	0.16	0.95	1.16	0.074	2.0
8.800	28.87	437.33	184.39	1.03	10.64	0.56	124.10	1.765	1.480	-0.574	0.064	0.88	174.2	0.40	0.9	0.1	152	153	0.306	0.16	0.95	1.16	0.075	2.0
8.850	29.04	437.16	179.73	0.80	10.66	0.44	124.10	1.775	1.485	-0.578	0.065	0.88	169.8	0.41	0.9	0.0	148	148	0.276	0.16	0.95	1.16	0.074	2.0
8.900	29.20	437.00	174.44	0.83	10.64	0.48	124.10	1.785	1.490	-0.582	0.065	0.88	164.8	0.41	0.9	0.1	143	143	0.249	0.15	0.95	1.16	0.074	2.0
8.950	29.36	436.84	161.50	1.16	8.44	0.72	124.10	1.795	1.495	-0.587	0.066	0.88	152.6	0.43	0.9	1.5	131	133	0.207	0.14	0.95	1.16	0.074	2.0
9.000	29.53	436.67	137.62	1.25	9.14	0.91	124.10	1.806	1.500	-0.591	0.066	0.87	130.0	0.46	0.9	6.2	111	117	0.165	0.12	0.96	1.16	0.074	2.0
9.050	29.69	436.51	138.55	1.12	11.19	0.81	124.10	1.816	1.505	-0.596	0.067	0.87	130.9	0.47	0.8	4.5	111	116	0.162	0.12	0.96	1.16	0.074	2.0
9.100	29.86	436.34	163.00	1.01	9.79	0.62	124.10	1.826	1.510	-0.600	0.067	0.87	154.0	0.43	0.9	0.7	132	133	0.206	0.14	0.95	1.16	0.075	2.0
9.150	30.02	436.18	176.44	1.01	7.04	0.57	124.10	1.836	1.515	-0.605	0.068	0.87	166.7	0.41	0.9	0.2	144	144	0.253	0.15	0.95	1.16	0.075	2.0
9.200	30.18	436.02	181.33	1.09	7.45	0.60	124.10	1.846	1.521	-0.609	0.068	0.87	171.4	0.41	0.9	0.3	148	148	0.277	0.16	0.94	1.16	0.075	2.0
9.250	30.35	435.85	182.94	1.14	8.03	0.62	124.10	1.856	1.526	-0.614	0.069	0.87	172.9	0.40	0.9	0.3	149	149	0.285	0.16	0.94	1.16	0.076	2.0
9.300	30.51	435.69	179.49	1.10	8.80	0.61	124.10	1.867	1.531	-0.618	0.069	0.87	169.6	0.41	0.9	0.3	146	146	0.265	0.15	0.94	1.16	0.076	2.0
9.350	30.68	435.52	176.34	1.06	9.28	0.60	124.10	1.877	1.536	-0.623	0.070	0.87	166.6	0.41	0.9	0.3	143	143	0.249	0.15	0.94	1.16	0.076	2.0
9.400	30.84	435.36	168.94	1.00	10.07	0.59	124.10	1.887	1.541	-0.627	0.070	0.87	159.7	0.43	0.9	0.4	136	136	0.220	0.14	0.95	1.16	0.076	2.0
9.450	31.00	435.20	160.52	0.97	10.06	0.61	124.10	1.897	1.546	-0.632	0.071	0.87	151.7	0.44	0.8	0.7	128	129	0.195	0.13	0.95	1.16	0.075	2.0
9.500	31.17	435.03	150.02	0.91	10.39	0.61	124.10	1.907	1.551	-0.636	0.071	0.87	141.8	0.46	0.8	1.1	119	120	0.172	0.12	0.95	1.16	0.075	2.0
9.550	31.33	434.87	148.10	1.09	10.57	0.74	124.10	1.918	1.556	-0.641	0.072	0.86	140.0	0.46	0.8	2.7	117	120	0.171	0.12	0.95	1.16	0.075	2.0
9.600	31.50	434.70	153.88	1.01	11.24	0.65	124.10	1.928	1.561	-0.645	0.072	0.86	145.4	0.45	0.8	1.4	122	123	0.179	0.13	0.95	1.16	0.075	2.0
9.650	31.66	434.54	169.96	0.94	11.53	0.56	124.10	1.938	1.566	-0.650	0.073	0.86	160.6	0.43	0.8	0.3	136	136	0.219	0.14	0.94	1.16	0.076	2.0
9.700	31.82	434.38	181.03	0.95	12.37	0.53	124.10	1.948	1.571	-0.654	0.073	0.86	171.1	0.41	0.9	0.1	145	146	0.262	0.15	0.94	1.16	0.076	2.0
9.750	31.99	434.21	183.48	1.01	21.01	0.55	124.10	1.958	1.576	-0.659	0.074	0.86	173.4	0.41	0.9	0.2	147	148	0.273	0.16	0.94	1.16	0.077	2.0
9.800	32.15	434.05	183.27	0.83	19.49	0.45	124.10	1.968	1.581	-0.663	0.074	0.86	173.2	0.41	0.8	0.0	147	147	0.270	0.16	0.94	1.16	0.077	2.0
9.850	32.32	433.88	181.51	0.64	19.88	0.35	124.10	1.979	1.586	-0.668	0.075	0.86	171.5	0.41	0.8	0.0	145	145	0.260	0.15	0.94	1.16	0.077	2.0
9.900	32.48	433.72	183.08	0.66	18.55	0.36	124.10	1.989	1.591	-0.673	0.075	0.86	173.0	0.41	0.8	0.0	146	146	0.266	0.15	0.94	1.16	0.077	2.0
9.950	32.64	433.56	178.68	0.66	13.10	0.37	124.10	1.999	1.596	-0.677	0.076	0.86	168.9	0.42	0.8	0.0	142	142	0.245	0.15	0.94	1.16	0.077	2.0
10.000	32.81	433.39	184.90	0.69	13.50	0.38	124.10	2.009	1.601	-0.682	0.076	0.86	174.7	0.41	0.8	0.0	148	148	0.273	0.16	0.94	1.16	0.077	2.0
10.050	32.97	433.23	194.27	0.71	14.32	0.37	124.10	2.019	1.607	-0.686	0.077	0.86	183.6	0.39	0.8	0.0	156	156	0.331	0.17	0.93	1.16	0.078	2.0
10.100	33.14	433.06	218.10	0.73	15.36	0.33	124.10	2.030	1.612	-0.691	0.077	0.85	206.1	0.36	0.9	0.0	177	177	0.646	0.21	0.91	1.16	0.079	2.0
10.150	33.30	432.90	237.21	0.83	15.86	0.35	127.28	2.040	1.617	-0.696	0.078	0.85	224.2	0.34	0.9	0.0	194	194	1.391	0.25	0.90	1.16	0.081	2.0
10.200	33.46	432.74	238.85	0.73	16.83	0.31	127.28	2.050	1.622	-0.700	0.078	0.85	225.7	0.34	0.9	0.0	196	196	1.485	0.25	0.89	1.16	0.081	2.0
10.250	33.63	432.57	223.20	0.75	16.38	0.34	127.28	2.061	1.627	-0.705	0.079	0.85	210.9	0.36	0.9	0.0	181	181	0.755	0.21	0.91	1.16	0.080	2.0
10.300	33.79	432.41	212.49	0.73	18.44	0.34	124.10	2.071	1.633	-0.709	0.079	0.85	200.8	0.37	0.9	0.0	171	171	0.521	0.19	0.92	1.16	0.079	2.0
10.350	33.96	432.24	207.51	0.81	18.42	0.39	124.10	2.081	1.638	-0.714	0.080	0.85	196.1	0.38	0.8	0.0	166	166	0.447	0.19	0.92	1.16	0.079	2.0
10.400	34.12	432.08	202.15	0.88	21.58	0.44	124.10	2.091	1.643	-0.719	0.080	0.85	191.0	0.39	0.8	0.0	161	161	0.385	0.18	0.92	1.16	0.079	2.0
10.450	34.28	431.92	204.22	0.82	21.57	0.40	124.10	2.102	1.648	-0.723	0.081	0.85	193.0	0.38	0.8	0.0	163	163	0.403	0.18	0.92	1.16	0.079	2.0
10.500	34.45	431.75	209.56	0.96	20.41	0.46	124.10	2.112	1.653	-0.728	0.081	0.85	198.0	0.38	0.8	0.0	167	167	0.464	0.19	0.92	1.16	0.079	2.0
10.550	34.61	431.59	218.68	0.87	19.65	0.40	124.10	2.122	1.658	-0.733	0.082	0.85	206.7	0.36	0.8	0.0	176	176	0.611	0.20	0.91	1.16	0.080	2.0
10.600	34.78	431.42	224.45	0.91	19.10	0.40	124.10	2.132	1.663	-0.737	0.082	0.84	212.1	0.36	0.9	0.0	181	181	0.742	0.21	0.90	1.16	0.081	2.0
10.650	34.94	431.26	217.79	0.77	19.20	0.35	124.10	2.142	1.668	-0.742	0.083	0.84	205.8	0.37	0.8	0.0	174	174	0.584	0.20	0.91	1.16	0.080	2.0
10.700	35.10	431.10	210.11	0.96	21.12	0.46	124.10	2.153	1.673	-0.747	0.083	0.84	198.6	0.38	0.8	0.0	167	167	0.458	0.19	0.91	1.16	0.080	2.0
10.750	35.27	430.93	214.36	0.90	19.90	0.42	124.10	2.163	1.678	-0.751	0.084	0.84	202.6	0.37	0.8	0.0	171	171	0.516	0.19	0.91	1.16	0.080	2.0
10.800	35.43	430.77	226.97	0.94	22.13	0.41	124.10	2.173	1.683	-0.756	0.084	0.84	214.5	0.35	0.8	0.0	182	182	0.786	0.22	0.90	1.16	0.081	2.0
10.850	35.60	430.60	233.76	0.98	18.29	0.42	124.10	2.183	1.688	-0.761	0.085	0.84	220.9	0.35	0.9	0.0	188	188	1.021	0.23	0.89	1.16	0.082	2.0
10.900	35.76	430.44	233.21	1.06	21.16	0.45	124.10	2.193	1.693	-0.765	0.085	0.84	220.4	0.35	0.8	0.0	187	187	0.987	0.23	0.89	1.16	0.082	2.0
10.950	35.92	430.28	217.90	0.95	19.20	0.44	124.10	2.203	1.698	-0.770	0.086	0.84	205.9	0.37	0.8	0.0	173	173	0.559	0.20	0.91	1.16	0.081	2.0
11.000	36.09	430.11	201.02	0.95	20.00	0.47	124.10	2.214	1.703	-0.775	0.087	0.84	190.0	0.39	0.8	0.0	158	158	0.349	0.17	0.92	1.16	0.080	2.0
11.050	36.25	429.95	176.16	0.93	20.15	0.53	124.10	2.224	1.708	-0.779	0.087	0.84	166.5	0.43	0.8	0.2	136	136	0.217	0.14	0.93	1.16	0.079	2.0
11.100	36.42	429.78	158.39	0.69	21.33	0.43	124.10	2.234	1.714	-0.784	0.088	0.84	149.7	0.46	0.8	0.2	120	120	0.172	0.12	0.94	1.16	0.078	2.0
11.150	36.58	429.62	145.79	0.64	20.31	0.44	124.10	2.244	1.719	-0.789	0.088	0.83	137.8	0.48	0.8	0.2	109	109	0.151	0.11	0.94	1.16	0.078	1.9
11.200	36.74	429.46	136.51	0.60	19.05	0.44	124.10	2.254	1.724	-0.793	0.089	0.83	129.0	0.49	0.8	0.2	101	101	0.139	0.11	0.95	1.16	0.077	1.8
11.250	36.91	429.29	134.05	0.56	18.72	0.42	124.10	2.265	1.729	-0.798	0.089	0.83	126.7	0.50	0.8	0.2	99	99	0.136	0.11	0.95	1.16	0.077	1.8
11.300	37.07	429.13	135.50	0.52	20.09	0.38	124.10	2.275	1.734	-0.803	0.090	0.83	128.0	0.50	0.8	0.2	100	100	0.138	0.11	0.95	1.16	0.077	1.8
11.350	37.24	428.96	147.32	0.65	20.36	0.44	124.10	2.285	1.739	-0.808	0.090	0.83	139.2	0.48	0.8	0.2	110	110	0.152	0.12	0.94	1.16	0.078	2.0
11.400	37.40	428.80	163.70	1.22	20.87	0.75	124.10	2.295	1.744	-0.812	0.091	0.83	154.7	0.44	0.8	2.4	124	126	0.187	0.13	0.93	1.16	0.079	2.0
11.450	37.57	428.63	172.91	0.93	20.44	0.54	124.10	2.305	1.749	-0.817	0.091	0.83	163.4	0.43	0.8	0.4	131	132	0.203	0.14	0.93	1.16	0.079	2.0
11.500	37.73	428.47	167.39	0.86	24.70	0.51	124.10	2.315	1.754	-0.822	0.092	0.83	158.2	0.44	0.8	0.3	126	127	0.188	0.13	0.93	1.16	0.079	2.0
11.550	37.89	428.31	172.84	0.78	23.84	0.45	124.10	2.326	1.759	-0.826	0.092	0.83	163.3	0.44	0.8	0.1	131	131	0.200	0.14	0.93	1.16	0.079	2.0
11.600	38.06	428.14	176.76	0.75	23.22	0.43	124.10	2.336	1.764	-0.831	0.093	0.83	167.0	0.43	0.8	0.1	134	134	0.211	0.14	0.93	1.16	0.079	2.0
11.650	38.22	427.98	181.71	0.81	22.96	0.45	124.10	2.346	1.769	-0.836	0.093	0.82	171.7	0.42	0.8	0.1	138	138	0.227	0.14	0.93	1.16	0.079	2.0
11.700	38.39	427.81	189.24	0.82	24.86	0.44	124.10	2.356	1.774	-0.841	0.094	0.82	178.8	0.41	0.8	0.0	144	145	0.256	0.15	0.92	1.16	0.080	2.0
11.750	38.55	427.65	196.78	0.86	25.05	0.44	124.10	2.366	1.779	-0.845	0.094	0.82	186.0	0.40	0.8	0.0	151	151	0.295	0.16	0.92	1.16	0.080	2.0
11.800	38.71	427.49	201.65	1.03	24.99	0.51	124.10	2.377	1.784	-0.850	0.095	0.82	190.6	0.40	0.8	0.1	155	155	0.326	0.17	0.91	1.16	0.081	2.0
11.850	38.88	427.32	211.41	0.91	24.15	0.43	124.10	2.387	1.789	-0.855	0.095	0.82	199.8	0.38	0.8	0.0	163	163	0.410	0.18	0.91	1.16	0.081	2.0
11.900	39.04	427.16	221.23	0.97	25.89	0.44	124.10	2.397	1.794	-0.860	0.096	0.82	209.1	0.37	0.8	0.0	172	172	0.540	0.20	0.90	1.16	0.082	2.0
11.950	39.21	426.99	223.77	1.04	22.97	0.46	124.10	2.407	1.800	-0.864	0.096	0.82	211.5	0.37	0.8	0.0	174	174	0.581	0.20	0.89	1.16	0.082	2.0
12.000	39.37	426.83	261.40	1.12	24.05	0.43	127.28	2.417	1.805	-0.869	0.097	0.82	247.0	0.32	0.8	0.0	208	208	2.000	0.29	0.84	1.16	0.087	2.0
12.050	39.53	426.67	299.47	1.28	26.42	0.43	127.28	2.428	1.810	-0.874	0.097	0.82	283.0	0.27	0.9	0.0	244	244	2.000	0.30	0.84	1.16	0.088	2.0
12.100	39.70	426.50	326.43	1.50	26.32	0.46	127.28	2.438	1.815	-0.879	0.098	0.82	308.5	0.26	0.9	0.0	268	268	2.000	0.30	0.84	1.16	0.088	2.0
12.150	39.86	426.34	330.18	1.63	25.98	0.49	127.28	2.449	1.821	-0.883	0.098	0.82	312.0	0.26	0.9	0.0	270	270	2.000	0.30	0.84	1.16	0.088	2.0
12.200	40.03	426.17	334.20	1.73	25.74	0.52	127.28	2.459	1.826	-0.888	0.099	0.81	315.8	0.26	0.9	0.0	273	273	2.000	0.30	0.84	1.16	0.088	2.0
12.250	40.19	426.01	339.89	2.18	33.90	0.64	127.28	2.470	1.831	-0.893	0.099	0.81	321.2	0.26	0.9	0.0	278	278	2.000	0.30	0.84	1.16	0.088	2.0
12.300	40.35	425.85	340.15	2.20	29.02	0.65	127.28	2.480	1.837	-0.898	0.100	0.81	321.4	0.26	0.9	0.0	278	278	2.000	0.30	0.83	1.16	0.088	2.0
12.350	40.52	425.68	339.22	2.03	35.91	0.60	127.28	2.490	1.842	-0.903	0.101	0.81	320.6	0.26	0.9	0.0	277	277	2.000	0.30	0.83	1.16	0.088	2.0
12.400	40.68	425.52	360.51	2.07	35.79	0.58	127.28	2.501	1.847	-0.907	0.101	0.81	340.7	0.26	0.9	0.0	294	294	2.000	0.30	0.83	1.16	0.089	2.0
12.450	40.85	425.35	381.96	2.20	37.83	0.57	127.28	2.511	1.853	-0.912	0.102	0.81	360.9	0.26	0.9	0.0	311	311	2.000	0.30	0.83	1.16	0.089	2.0
12.500	41.01	425.19	381.17	2.47	37.69	0.65	127.28	2.522	1.858	-0.917	0.102	0.81	360.2	0.26	0.9	0.0	310	310	2.000	0.30	0.83	1.16	0.089	2.0
12.550	41.17	425.03	354.02	2.54	35.59	0.72	127.28	2.532	1.863	-0.922	0.103	0.81	334.6	0.26	0.9	0.0	288	288	2.000	0.30	0.83	1.16	0.089	2.0
12.600	41.34	424.86	322.55	2.44	34.10	0.76	124.10	2.543	1.868	-0.926	0.103	0.81	304.8	0.26	0.9	0.0	262	262	2.000	0.30	0.83	1.16	0.089	2.0
12.650	41.50	424.70	295.50	2.23	33.96	0.75	124.10	2.553	1.874	-0.931	0.104	0.81	279.2	0.28	0.9	0.0	238	238	2.000	0.30	0.83	1.16	0.089	2.0
12.700	41.67	424.53	275.04	2.00	31.20	0.73	124.10	2.563	1.879	-0.936	0.104	0.80	259.9	0.31	0.8	0.1	218	218	2.000	0.30	0.83	1.16	0.089	2.0
12.750	41.83	424.37	259.89	1.80	29.70	0.69	124.10	2.573	1.884	-0.941	0.105	0.80	245.6	0.32	0.8	0.1	204	204	2.000	0.27	0.84	1.16	0.088	2.0
12.800	41.99	424.21	245.85	1.50	28.92	0.61	124.10	2.583	1.889	-0.946	0.105	0.80	232.3	0.34	0.8	0.0	191	191	1.156	0.24	0.86	1.16	0.086	2.0
12.850	42.16	424.04	240.75	1.20	28.38	0.50	124.10	2.593	1.894	-0.950	0.106	0.80	227.5	0.35	0.8	0.0	186	186	0.922	0.22	0.87	1.16	0.085	2.0
12.900	42.32	423.88	234.37	1.08	28.16	0.46	124.10	2.604	1.899	-0.955	0.106	0.80	221.5	0.36	0.8	0.0	180	180	0.717	0.21	0.88	1.16	0.084	2.0
12.950	42.49	423.71	231.85	1.07	24.12	0.46	124.10	2.614	1.904	-0.960	0.107	0.80	219.1	0.36	0.8	0.0	177	177	0.651	0.21	0.88	1.16	0.084	2.0
13.000	42.65	423.55	233.71	1.12	25.82	0.48	124.10	2.624	1.909	-0.965	0.107	0.80	220.9	0.36	0.8	0.0	179	179	0.689	0.21	0.88	1.16	0.084	2.0
13.050	42.81	423.39	236.45	1.21	25.32	0.51	124.10	2.634	1.914	-0.970	0.108	0.80	223.4	0.36	0.8	0.0	181	181	0.755	0.21	0.87	1.16	0.085	2.0
13.100	42.98	423.22	240.18	1.21	25.63	0.50	124.10	2.644	1.919	-0.974	0.108	0.80	227.0	0.35	0.8	0.0	184	184	0.862	0.22	0.87	1.16	0.085	2.0
13.150	43.14	423.06	248.61	1.27	26.39	0.51	124.10	2.655	1.924	-0.979	0.109	0.80	234.9	0.34	0.8	0.0	192	192	1.216	0.24	0.86	1.16	0.086	2.0
13.200	43.31	422.89	255.14	1.39	26.43	0.54	124.10	2.665	1.929	-0.984	0.109	0.80	241.1	0.33	0.8	0.0	197	197	1.638	0.26	0.85	1.16	0.087	2.0
13.250	43.47	422.73	275.37	1.51	31.13	0.55	127.28	2.675	1.934	-0.989	0.110	0.79	260.2	0.31	0.8	0.0	216	216	2.000	0.30	0.82	1.16	0.090	2.0
13.300	43.63	422.57	287.62	1.60	31.87	0.56	127.28	2.685	1.940	-0.994	0.110	0.79	271.8	0.29	0.8	0.0	227	227	2.000	0.30	0.82	1.16	0.090	2.0
13.350	43.80	422.40	297.36	1.61	31.96	0.54	127.28	2.696	1.945	-0.998	0.111	0.79	281.0	0.28	0.8	0.0	236	236	2.000	0.30	0.82	1.16	0.090	2.0
13.400	43.96	422.24	298.22	1.72	33.49	0.58	127.28	2.706	1.950	-1.003	0.112	0.79	281.8	0.28	0.8	0.0	237	237	2.000	0.30	0.82	1.16	0.090	2.0
13.450	44.13	422.07	296.29	1.78	33.00	0.60	127.28	2.717	1.956	-1.008	0.112	0.79	280.0	0.29	0.8	0.0	235	235	2.000	0.30	0.82	1.16	0.091	2.0
13.500	44.29	421.91	285.93	1.75	32.53	0.61	127.28	2.727	1.961	-1.013	0.113	0.79	270.2	0.30	0.8	0.0	225	225	2.000	0.30	0.81	1.16	0.091	2.0
13.550	44.45	421.75	290.75	1.70	32.77	0.58	127.28	2.738	1.966	-1.018	0.113	0.79	274.8	0.29	0.8	0.0	229	229	2.000	0.30	0.81	1.16	0.091	2.0
13.600	44.62	421.58	297.45	1.72	33.62	0.58	127.28	2.748	1.972	-1.022	0.114	0.79	281.1	0.29	0.8	0.0	235	235	2.000	0.30	0.81	1.16	0.091	2.0
13.650	44.78	421.42	308.49	1.78	32.75	0.58	127.28	2.759	1.977	-1.027	0.114	0.79	291.5	0.27	0.8	0.0	246	246	2.000	0.30	0.81	1.16	0.091	2.0
13.700	44.95	421.25	323.26	0.00	41.70	0.00	118.62	2.769	1.982	-1.032	0.115	0.79	305.5	0.26	0.8	0.0	259	259	2.000	0.30	0.81	1.16	0.091	2.0
13.750	45.11	421.09	325.80	0.00	40.80	0.00	118.62	2.778	1.987	-1.037	0.115	0.78	307.9	0.26	0.8	0.0	261	261	2.000	0.30	0.81	1.16	0.091	2.0

Table I-6: Liquefaction Analysis for CPT HAV-C004

Idriss and Blouanger Liquefaction Analysis from CPT Data — Groudwater Elevation Used
Havana East Ash Pond - Site 4
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

amax	0.12
Mw	6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	464.84	18.70	0.06	3.03	0.31	118	0.010	0.010	0.014	-0.001	1.00	18	0.73	1.7	0.0	30	30	0.079	0.06	1.10	1.15	0.062	1.3
0.100	0.33	464.67	55.60	0.10	2.85	0.18	121	0.019	0.019	0.012	-0.001	1.00	53	0.52	1.7	0.0	89	89	0.125	0.10	1.10	1.15	0.062	2.0
0.150	0.49	464.51	84.42	0.19	0.89	0.22	124	0.030	0.030	0.010	-0.001	1.00	80	0.43	1.7	0.0	136	136	0.216	0.14	1.10	1.15	0.062	2.0
0.200	0.66	464.34	105.34	0.30	0.83	0.28	124	0.040	0.040	0.008	-0.000	1.00	100	0.37	1.7	0.0	169	169	0.491	0.19	1.10	1.15	0.062	2.0
0.250	0.82	464.18	116.12	0.39	1.07	0.34	124	0.050	0.050	0.006	-0.000	1.00	110	0.35	1.7	0.0	187	187	0.958	0.23	1.10	1.15	0.062	2.0
0.300	0.98	464.02	153.11	0.43	3.54	0.28	124	0.060	0.060	0.004	0.000	1.00	145	0.27	1.7	0.0	246	246	81.875	0.30	1.10	1.15	0.062	2.0
0.350	1.15	463.85	175.93	0.53	3.36	0.30	124	0.070	0.070	0.002	0.000	1.00	166	0.26	1.7	0.0	283	283	15788.682	0.30	1.10	1.15	0.062	2.0
0.400	1.31	463.69	178.51	0.65	5.02	0.36	124	0.080	0.080	-0.000	0.001	1.00	169	0.26	1.7	0.0	287	287	33692.517	0.30	1.10	1.15	0.062	2.0
0.450	1.48	463.52	170.22	0.69	1.12	0.41	124	0.091	0.091	-0.003	0.001	1.00	161	0.26	1.7	0.0	273	273	3346.191	0.30	1.10	1.15	0.062	2.0
0.500	1.64	463.36	159.44	0.72	-0.54	0.45	124	0.101	0.101	-0.005	0.001	1.00	151	0.26	1.7	0.0	256	256	277.624	0.30	1.10	1.15	0.062	2.0
0.550	1.80	463.20	137.35	0.70	0.95	0.51	124	0.111	0.111	-0.007	0.001	1.00	130	0.30	1.7	0.0	221	221	7.499	0.30	1.10	1.15	0.062	2.0
0.600	1.97	463.03	121.71	0.69	-0.35	0.57	124	0.121	0.121	-0.009	0.001	1.00	115	0.34	1.7	0.0	196	196	1.482	0.25	1.10	1.15	0.062	2.0
0.650	2.13	462.87	108.19	0.62	-0.32	0.57	124	0.131	0.131	-0.011	0.002	1.00	102	0.37	1.7	0.0	174	174	0.575	0.20	1.10	1.15	0.062	2.0
0.700	2.30	462.70	99.39	0.57	3.56	0.58	124	0.141	0.141	-0.013	0.002	1.00	94	0.39	1.7	0.1	160	160	0.368	0.17	1.10	1.15	0.062	2.0
0.750	2.46	462.54	87.64	0.52	-0.35	0.59	121	0.152	0.152	-0.016	0.002	1.00	83	0.42	1.7	0.2	141	141	0.239	0.15	1.10	1.15	0.062	2.0
0.800	2.62	462.38	83.58	0.45	-0.11	0.53	121	0.161	0.161	-0.018	0.002	1.00	79	0.43	1.7	0.2	134	134	0.212	0.14	1.10	1.15	0.062	2.0
0.850	2.79	462.21	82.15	0.29	0.40	0.35	121	0.171	0.171	-0.020	0.003	1.00	78	0.43	1.7	0.0	132	132	0.204	0.14	1.10	1.15	0.062	2.0
0.900	2.95	462.05	78.56	0.33	0.36	0.41	121	0.181	0.181	-0.022	0.003	1.00	74	0.44	1.7	0.1	126	126	0.187	0.13	1.10	1.15	0.062	2.0
0.950	3.12	461.88	78.45	0.35	0.60	0.44	121	0.191	0.191	-0.025	0.003	1.00	74	0.45	1.7	0.1	126	126	0.186	0.13	1.10	1.15	0.062	2.0
1.000	3.28	461.72	80.22	0.36	0.73	0.45	121	0.201	0.201	-0.027	0.003	1.00	76	0.44	1.7	0.1	129	129	0.194	0.13	1.10	1.15	0.062	2.0
1.050	3.44	461.56	79.22	0.36	-0.12	0.46	121	0.211	0.211	-0.029	0.004	1.00	75	0.44	1.7	0.1	127	127	0.190	0.13	1.10	1.15	0.062	2.0
1.100	3.61	461.39	76.58	0.36	-0.16	0.47	121	0.221	0.221	-0.032	0.004	1.00	72	0.45	1.7	0.2	123	123	0.179	0.13	1.10	1.15	0.062	2.0
1.150	3.77	461.23	74.02	0.38	-0.04	0.52	121	0.231	0.231	-0.034	0.004	1.00	70	0.46	1.7	0.4	119	119	0.170	0.12	1.10	1.15	0.062	2.0
1.200	3.94	461.06	71.77	0.39	0.01	0.54	121	0.241	0.241	-0.036	0.005	1.00	68	0.46	1.7	0.7	115	116	0.163	0.12	1.10	1.15	0.062	2.0
1.250	4.10	460.90	71.32	0.38	0.01	0.53	121	0.251	0.251	-0.039	0.005	0.99	67	0.47	1.7	0.6	115	115	0.161	0.12	1.10	1.15	0.062	2.0
1.300	4.27	460.73	73.94	0.39	0.27	0.52	121	0.261	0.261	-0.041	0.005	0.99	70	0.46	1.7	0.5	119	119	0.170	0.12	1.10	1.15	0.062	2.0
1.350	4.43	460.57	75.24	0.41	0.05	0.55	121	0.271	0.271	-0.044	0.005	0.99	71	0.45	1.7	0.5	121	121	0.174	0.13	1.10	1.15	0.061	2.0
1.400	4.59	460.41	78.29	0.44	0.44	0.57	121	0.281	0.281	-0.046	0.006	0.99	74	0.44	1.7	0.5	126	126	0.187	0.13	1.10	1.15	0.061	2.0
1.450	4.76	460.24	80.82	0.48	0.57	0.60	121	0.290	0.290	-0.049	0.006	0.99	76	0.44	1.7	0.5	130	130	0.198	0.14	1.10	1.15	0.061	2.0
1.500	4.92	460.08	82.09	0.48	0.61	0.58	121	0.300	0.300	-0.051	0.006	0.99	78	0.43	1.7	0.4	132	132	0.205	0.14	1.10	1.15	0.061	2.0
1.550	5.09	459.91	82.75	0.46	0.77	0.56	121	0.310	0.310	-0.054	0.006	0.99	78	0.43	1.7	0.3	133	133	0.208	0.14	1.10	1.15	0.061	2.0
1.600	5.25	459.75	83.77	0.47	0.57	0.56	121	0.320	0.320	-0.056	0.007	0.99	79	0.43	1.7	0.2	133	133	0.207	0.14	1.10	1.15	0.061	2.0
1.650	5.41	459.59	87.29	0.49	1.21	0.56	121	0.330	0.330	-0.059	0.007	0.99	82	0.43	1.6	0.2	136	136	0.217	0.14	1.10	1.15	0.061	2.0
1.700	5.58	459.42	89.18	0.53	0.86	0.59	121	0.340	0.340	-0.061	0.007	0.99	84	0.43	1.6	0.2	137	137	0.221	0.14	1.10	1.15	0.061	2.0
1.750	5.74	459.26	90.74	0.54	1.05	0.59	121	0.350	0.350	-0.064	0.008	0.99	86	0.42	1.6	0.2	137	137	0.223	0.14	1.10	1.15	0.061	2.0
1.800	5.91	459.09	89.22	0.53	0.77	0.60	121	0.360	0.360	-0.066	0.008	0.99	84	0.43	1.6	0.2	134	134	0.212	0.14	1.10	1.15	0.061	2.0
1.850	6.07	458.93	85.66	0.31	0.67	0.37	124	0.370	0.370	-0.069	0.008	0.99	81	0.44	1.6	0.0	129	129	0.193	0.13	1.10	1.15	0.061	2.0
1.900	6.23	458.77	80.51	0.33	0.22	0.41	121	0.380	0.380	-0.072	0.008	0.99	76	0.45	1.6	0.0	121	121	0.174	0.13	1.10	1.15	0.061	2.0
1.950	6.40	458.60	75.18	0.33	0.25	0.44	121	0.390	0.390	-0.074	0.009	0.99	71	0.47	1.6	0.2	113	114	0.158	0.12	1.10	1.15	0.061	2.0
2.000	6.56	458.44	76.88	0.34	0.31	0.44	121	0.400	0.400	-0.077	0.009	0.99	73	0.47	1.6	0.2	114	115	0.160	0.12	1.10	1.15	0.061	2.0
2.050	6.73	458.27	79.22	0.36	0.18	0.45	121	0.410	0.410	-0.080	0.009	0.99	75	0.46	1.6	0.2	116	116	0.164	0.12	1.10	1.15	0.061	2.0
2.100	6.89	458.11	79.60	0.37	0.28	0.46	121	0.420	0.420	-0.082	0.010	0.98	75	0.46	1.5	0.2	116	116	0.162	0.12	1.10	1.15	0.061	2.0
2.150	7.05	457.95	80.80	0.38	0.33	0.46	121	0.430	0.430	-0.085	0.010	0.98	76	0.46	1.5	0.2	116	116	0.163	0.12	1.10	1.15	0.061	2.0
2.200	7.22	457.78	80.99	0.39	0.05	0.48	121	0.440	0.440	-0.088	0.010	0.98	77	0.47	1.5	0.2	115	115	0.162	0.12	1.10	1.15	0.061	2.0
2.250	7.38	457.62	79.60	0.37	0.14	0.46	121	0.449	0.449	-0.091	0.011	0.98	75	0.47	1.5	0.2	113	113	0.157	0.12	1.10	1.15	0.061	2.0
2.300	7.55	457.45	79.61	0.37	0.27	0.46	121	0.459	0.459	-0.093	0.011	0.98	75	0.47	1.5	0.2	112	112	0.155	0.12	1.10	1.15	0.061	2.0
2.350	7.71	457.29	80.40	0.37	0.16	0.46	121	0.469	0.469	-0.096	0.011	0.98	76	0.47	1.5	0.2	112	112	0.155	0.12	1.09	1.15	0.061	2.0
2.400	7.87	457.13	80.07	0.37	0.04	0.47	121	0.479	0.479	-0.099	0.012	0.98	76	0.48	1.5	0.2	110	110	0.153	0.12	1.09	1.15	0.061	2.0
2.450	8.04	456.96	78.77	0.36	0.22	0.45	121	0.489	0.489	-0.102	0.012	0.98	74	0.48	1.4	0.2	108	108	0.149	0.11	1.09	1.15	0.061	2.0
2.500	8.20	456.80	76.97	0.34	-0.06	0.45	121	0.499	0.499	-0.105	0.012	0.98	73	0.49	1.4	0.2	105	105	0.144	0.11	1.08	1.15	0.062	2.0
2.550	8.37	456.63	74.22	0.33	0.03	0.45	121	0.509	0.509	-0.107	0.012	0.98	70	0.50	1.4	0.2	101	101	0.139	0.11	1.08	1.15	0.062	2.0
2.600	8.53	456.47	70.37	0.31	-0.09	0.44	121	0.519	0.519	-0.110	0.013	0.98	66	0.51	1.4	0.2	95	96	0.132	0.10	1.07	1.15	0.062	2.0
2.650	8.69	456.31	65.53	0.30	-0.33	0.45	121	0.529	0.529	-0.113	0.013	0.98	62	0.52	1.4	0.2	89	89	0.125	0.10	1.07	1.15	0.062	2.0
2.700	8.86	456.14	59.80	0.24	0.12	0.40	121	0.539	0.539	-0.116	0.013	0.98	57	0.54	1.4	0.1	81	82	0.117	0.09	1.06	1.15	0.063	1.9
2.750	9.02	455.98	57.08	0.23	-0.21	0.40	121	0.549	0.549	-0.119	0.014	0.98	54	0.55	1.4	0.1	78	78	0.114	0.09	1.06	1.15	0.063	1.8
2.800	9.19	455.81	53.69	0.24	-0.28	0.44	121	0.559	0.559	-0.122	0.014	0.98	51	0.57	1.4	0.1	73	73	0.110	0.09	1.05	1.15	0.063	1.7
2.850	9.35	455.65	52.56	0.22	-0.36	0.43	121	0.568	0.568	-0.125	0.014	0.98	50	0.57	1.4	0.1	71	71	0.108	0.08	1.05	1.15	0.063	1.7
2.900	9.51	455.49	51.48	0.22	-0.16	0.42	121	0.578	0.578	-0.128	0.015	0.97	49	0.58	1.4	0.1	69	69	0.106	0.08	1.05	1.15	0.063	1.7
2.950	9.68	455.32	51.15	0.21	-0.02	0.41	121	0.588	0.588	-0.131	0.015	0.97	48	0.58	1.4	0.1	68	68	0.106	0.08	1.05	1.15	0.063	1.7
3.000	9.84	455.16	52.75	0.21	-0.05	0.40	121	0.598	0.598	-0.134	0.015	0.97	50	0.58	1.4	0.1	69	69	0.107	0.08	1.05	1.15	0.063	1.7
3.050	10.01	454.99	54.40	0.22	-0.06	0.41	121	0.608	0.608	-0.137	0.016	0.97	51	0.57	1.4	0.1	71	71	0.108	0.08	1.05	1.15	0.063	1.7
3.100	10.17	454.83	55.51	0.23	0.26	0.41	121	0.618	0.618	-0.140	0.016	0.97	52	0.57	1.4	0.1	71	71	0.108	0.08	1.05	1.15	0.063	1.7
3.150	10.33	454.67	56.20	0.23	0.00	0.41	121	0.628	0.628	-0.143	0.016	0.97	53	0.57	1.3	0.1	71	72	0.109	0.09	1.04	1.15	0.063	1.7
3.200	10.50	454.50	56.27	0.22	-0.02	0.39	121	0.638	0.638	-0.146	0.017	0.97	53	0.57	1.3	0.1	71	71	0.108	0.08	1.04	1.15	0.063	1.7
3.250	10.66	454.34	56.63	0.23	-0.14	0.40	121	0.648	0.648	-0.149	0.017	0.97	54	0.57	1.3	0.1	71	71	0.108	0.08	1.04	1.15	0.063	1.7
3.300	10.83	454.17	53.78	0.22	-0.15	0.42	121	0.658	0.658	-0.152	0.017	0.97	51	0.58	1.3	0.1	67	67	0.105	0.08	1.04	1.15	0.064	1.7
3.350	10.99	454.01	50.97	0.21	-0.30	0.42	121	0.668	0.668	-0.155	0.018	0.97	48	0.59	1.3	0.1	63	63	0.102	0.08	1.04	1.15	0.064	1.6
3.400	11.15	453.85	50.12	0.21	-0.33	0.41	121	0.678	0.678	-0.158	0.018	0.97	47	0.60	1.3	0.1	62	62	0.101	0.08	1.04	1.15	0.064	1.6
3.450	11.32	453.68	49.35	0.20	-0.20	0.41	121	0.688	0.688	-0.162	0.019	0.97	47	0.60	1.3	0.1	60	61	0.100	0.08	1.03	1.15	0.064	1.6
3.500	11.48	453.52	48.08	0.20	-0.21	0.41	121	0.697	0.697	-0.165	0.019	0.97	45	0.61	1.3	0.1	59	59	0.099	0.08	1.03	1.15	0.064	1.5
3.550	11.65	453.35	47.43	0.18	-0.15	0.39	121	0.707	0.707	-0.168	0.019	0.97	45	0.61	1.3	0.1	57	57	0.098	0.08	1.03	1.15	0.064	1.5
3.600	11.81	453.19	46.50	0.17	0.00	0.37	121	0.717	0.717	-0.171	0.020	0.97	44	0.62	1.3	0.1	56	56	0.097	0.07	1.03	1.15	0.064	1.5
3.650	11.97	453.03	45.31	0.18	-0.18	0.40	121	0.727	0.727	-0.174	0.020	0.96	43	0.62	1.3	0.1	54	54	0.095	0.07	1.03	1.15	0.064	1.5
3.700	12.14	452.86	44.11	0.18	-0.24	0.41	121	0.737	0.737	-0.177	0.020	0.96	42	0.63	1.3	0.1	52	52	0.094	0.07	1.03	1.15	0.064	1.5
3.750	12.30	452.70	42.85	0.17	-0.26	0.40	121	0.747	0.747	-0.181	0.021	0.96	40	0.64	1.2	0.1	51	51	0.093	0.07	1.02	1.15	0.064	1.4
3.800	12.47	452.53	40.51	0.16	-0.36	0.40	121	0.757	0.757	-0.184	0.021	0.96	38	0.65	1.2	0.1	48	48	0.091	0.07	1.02	1.15	0.064	1.4
3.850	12.63	452.37	38.34	0.16	-0.39	0.42	118	0.767	0.767	-0.187	0.021	0.96	36	0.66	1.2	0.1	45	45	0.089	0.07	1.02	1.15	0.064	1.4
3.900	12.80	452.20	36.85	0.15	-0.31	0.41	118	0.776	0.776	-0.190	0.022	0.96	35	0.67	1.2	0.1	43	43	0.087	0.07	1.02	1.15	0.064	1.4
3.950	12.96	452.04	34.46	0.16	0.56	0.46	118	0.786	0.786	-0.194	0.022	0.96	33	0.68	1.2	0.1	40	40	0.085	0.06	1.02	1.15	0.064	1.3
4.000	13.12	451.88	34.35	0.15	-0.14	0.44	118	0.796	0.796	-0.197	0.022	0.96	32	0.68	1.2	0.1	39	40	0.085	0.06	1.02	1.15	0.064	1.3
4.050	13.29	451.71	35.27	0.15	0.12	0.43	118	0.805	0.805	-0.200	0.023	0.96	33	0.68	1.2	0.1	40	40	0.086	0.07	1.02	1.15	0.064	1.3
4.100	13.45	451.55	37.07	0.16	0.11	0.43	118	0.815	0.815	-0.204	0.023	0.96	35	0.67	1.2	0.1	42	42	0.087	0.07	1.02	1.15	0.064	1.4
4.150	13.62	451.38	37.76	0.16	0.06	0.41	118	0.825	0.825	-0.207	0.024	0.96	36	0.67	1.2	0.1	42	42	0.087	0.07	1.02	1.15	0.064	1.4
4.200	13.78	451.22	37.81	0.16	0.07	0.41	118	0.834	0.834	-0.210	0.024	0.96	36	0.67	1.2	0.1	42	42	0.087	0.07	1.02	1.15	0.064	1.4
4.250	13.94	451.06	35.94	0.15	0.06	0.43	118	0.844	0.844	-0.214	0.024	0.96	34	0.68	1.2	0.1	40	40	0.085	0.06	1.01	1.15	0.064	1.3
4.300	14.11	450.89	35.32	0.14	0.08	0.40	118	0.854	0.854	-0.217	0.025	0.96	33	0.68	1.1	0.1	39	39	0.085	0.06	1.01	1.15	0.064	1.3
4.350	14.27	450.73	35.56	0.14	0.07	0.39	118	0.863	0.863	-0.221	0.025	0.95	34	0.68	1.1	0.1	39	39	0.085	0.06	1.01	1.15	0.064	1.3
4.400	14.44	450.56	35.04	0.13	0.07	0.38	118	0.873	0.873	-0.224	0.025	0.95	33	0.69	1.1	0.1	38	38	0.084	0.06	1.01	1.15	0.064	1.3
4.450	14.60	450.40	36.00	0.16	1.55	0.44	118	0.883	0.883	-0.227	0.026	0.95	34	0.68	1.1	0.1	39	39	0.084	0.06	1.01	1.15	0.064	1.3
4.500	14.76	450.24	40.10	0.17	1.61	0.42	121	0.892	0.892	-0.231	0.026	0.95	38	0.67	1.1	0.1	42	43	0.087	0.07	1.01	1.15	0.064	1.4
4.550	14.93	450.07	40.28	0.17	2.38	0.41	121	0.902	0.902	-0.234	0.027	0.95	38	0.67	1.1	0.1	42	42	0.087	0.07	1.01	1.15	0.064	1.4
4.600	15.09	449.91	38.57	0.17	1.16	0.44	118	0.912	0.911	-0.238	0.027	0.95	36	0.68	1.1	0.1	40	40	0.086	0.07	1.01	1.15	0.064	1.3
4.650	15.26	449.74	37.89	0.18	1.58	0.47	118	0.922	0.915	-0.241	0.027	0.95	36	0.68	1.1	0.1	40	40	0.085	0.06	1.01	1.15	0.065	1.3
4.700	15.42	449.58	38.01	0.19	1.41	0.50	118	0.931	0.920	-0.245	0.028	0.95	36	0.61	1.1	19.7	39	59	0.099	0.08	1.01	1.15	0.065	1.5
4.750	15.58	449.42	39.67	0.20	1.37	0.50	118	0.941	0.924	-0.248	0.028	0.95	37	0.61	1.1	18.7	41	59	0.099	0.08	1.01	1.15	0.065	1.5
4.800	15.75	449.25	44.75	0.21	1.47	0.46	121	0.951	0.929	-0.252	0.029	0.95	42	0.65	1.1	0.1	46	46	0.090	0.07	1.01	1.15	0.065	1.4
4.850	15.91	449.09	53.02	0.21	1.60	0.40	121	0.961	0.934	-0.255	0.029	0.95	50	0.62	1.1	0.1	54	54	0.095	0.07	1.01	1.15	0.066	1.4
4.900	16.08	448.92	56.66	0.22	1.56	0.39	121	0.971	0.938	-0.259	0.029	0.95	54	0.61	1.1	0.1	58	58	0.098	0.08	1.01	1.15	0.066	1.5
4.950	16.24	448.76	53.43	0.24	1.79	0.44	121	0.981	0.943	-0.263	0.030	0.95	50	0.62	1.1	0.1	54	54	0.095	0.07	1.01	1.15	0.066	1.4
5.000	16.40	448.60	51.57	0.24	2.07	0.46	121	0.991	0.948	-0.266	0.030	0.95	49	0.63	1.1	0.1	52	52	0.094	0.07	1.01	1.15	0.067	1.4
5.050	16.57	448.43	44.64	0.20	2.23	0.45	121	1.001	0.953	-0.270	0.031	0.94	42	0.66	1.1	0.1	45	45	0.089	0.07	1.01	1.15	0.067	1.3
5.100	16.73	448.27	38.56	0.18	2.36	0.45	118	1.010	0.957	-0.273	0.031	0.94	36	0.68	1.1	0.1	39	39	0.085	0.06	1.01	1.15	0.067	1.3
5.150	16.90	448.10	33.11	0.15	2.62	0.44	118	1.020	0.962	-0.277	0.031	0.94	31	0.71	1.1	0.1	33	34	0.081	0.06	1.01	1.15	0.068	1.2
5.200	17.06	447.94	30.49	0.12	2.62	0.38	118	1.030	0.967	-0.281	0.032	0.94	29	0.72	1.1	0.1	31	31	0.079	0.06	1.01	1.15	0.068	1.2
5.250	17.22	447.78	28.64	0.10	2.77	0.36	118	1.039	0.971	-0.284	0.032	0.94	27	0.73	1.1	0.1	29	29	0.078	0.06	1.00	1.15	0.068	1.1
5.300	17.39	447.61	28.15	0.10	3.03	0.37	118	1.049	0.976	-0.288	0.033	0.94	27	0.74	1.1	0.1	28	28	0.078	0.06	1.00	1.15	0.069	1.1
5.350	17.55	447.45	28.14	0.10	3.10	0.36	118	1.059	0.980	-0.292	0.033	0.94	27	0.74	1.1	0.1	28	28	0.078	0.06	1.00	1.15	0.069	1.1
5.400	17.72	447.28	28.65	0.10	3.31	0.36	118	1.068	0.985	-0.295	0.033	0.94	27	0.73	1.1	0.1	29	29	0.078	0.06	1.00	1.15	0.069	1.1
5.450	17.88	447.12	29.20	0.11	3.51	0.36	118	1.078	0.989	-0.299	0.034	0.94	28	0.73	1.1	0.1	29	29	0.078	0.06	1.00	1.15	0.069	1.1
5.500	18.04	446.96	29.84	0.11	3.70	0.36	118	1.088	0.994	-0.303	0.034	0.94	28	0.73	1.0	0.1	30	30	0.079	0.06	1.00	1.15	0.070	1.1
5.550	18.21	446.79	30.51	0.11	3.64	0.36	118	1.097	0.998	-0.307	0.035	0.94	29	0.73	1.0	0.1	30	30	0.079	0.06	1.00	1.15	0.070	1.1
5.600	18.37	446.63	30.77	0.12	3.93	0.40	118	1.107	1.003	-0.310	0.035	0.94	29	0.72	1.0	0.1	30	30	0.079	0.06	1.00	1.15	0.070	1.1
5.650	18.54	446.46	31.33	0.12	4.19	0.37	118	1.117	1.007	-0.314	0.036	0.93	30	0.72	1.0	0.1	31	31	0.079	0.06	1.00	1.15	0.070	1.1
5.700	18.70	446.30	31.54	0.12	4.33	0.36	118	1.126	1.012	-0.318	0.036	0.93	30	0.72	1.0	0.1	31	31	0.079	0.06	1.00	1.15	0.071	1.1
5.750	18.86	446.14	33.36	0.12	4.14	0.35	118	1.136	1.016	-0.322	0.036	0.93	32	0.71	1.0	0.1	32	33	0.080	0.06	1.00	1.15	0.071	1.1
5.800	19.03	445.97	33.69	0.12	4.19	0.37	118	1.146	1.021	-0.325	0.037	0.93	32	0.71	1.0	0.1	33	33	0.081	0.06	1.00	1.15	0.071	1.1
5.850	19.19	445.81	33.76	0.11	4.42	0.34	118	1.155	1.026	-0.329	0.037	0.93	32	0.71	1.0	0.1	33	33	0.081	0.06	1.00	1.15	0.071	1.1
5.900	19.36	445.64	33.46	0.14	4.52	0.41	118	1.165	1.030	-0.333	0.038	0.93	32	0.71	1.0	0.1	32	32	0.080	0.06	1.00	1.15	0.072	1.1
5.950	19.52	445.48	32.34	0.12	5.23	0.38	118	1.175	1.035	-0.337	0.038	0.93	31	0.72	1.0	0.1	31	31	0.080	0.06	1.00	1.15	0.072	1.1
6.000	19.68	445.32	33.65	0.14	5.34	0.41	118	1.184	1.039	-0.341	0.038	0.93	32	0.71	1.0	0.1	32	32	0.080	0.06	1.00	1.15	0.072	1.1
6.050	19.85	445.15	34.61	0.15	5.14	0.42	118	1.194	1.044	-0.345	0.039	0.93	33	0.71	1.0	0.1	33	33	0.081	0.06	1.00	1.15	0.072	1.1
6.100	20.01	444.99	36.83	0.14	5.51	0.37	118	1.204	1.048	-0.348	0.039	0.93	35	0.70	1.0	0.1	35	35	0.082	0.06	1.00	1.15	0.072	1.1
6.150	20.18	444.82	39.52	0.15	5.62	0.38	121	1.213	1.053	-0.352	0.040	0.93	37	0.69	1.0	0.1	37	38	0.084	0.06	1.00	1.15	0.073	1.2
6.200	20.34	444.66	42.03	0.15	6.50	0.37	121	1.223	1.058	-0.356	0.040	0.93	40	0.68	1.0	0.1	40	40	0.085	0.06	1.00	1.15	0.073	1.2
6.250	20.51	444.50	45.85	0.16	5.86	0.35	121	1.233	1.062	-0.360	0.041	0.93	43	0.66	1.0	0.1	43	43	0.088	0.07	1.00	1.15	0.073	1.2
6.300	20.67	444.33	46.77	0.16	5.85	0.34	121	1.243	1.067	-0.364	0.041	0.92	44	0.66	1.0	0.1	44	44	0.088	0.07	1.00	1.15	0.073	1.2
6.350	20.83	444.17	42.31	0.17	6.06	0.40	121	1.253	1.072	-0.368	0.042	0.92	40	0.68	1.0	0.1	40	40	0.086	0.06	1.00	1.15	0.074	1.2
6.400	21.00	444.00	41.31	0.19	6.26	0.46	121	1.263	1.077	-0.372	0.042	0.92	39	0.68	1.0	0.1	39	39	0.085	0.06	1.00	1.15	0.074	1.1

Table I-6: Liquefaction Analysis for CPT HAV-C004 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5, \sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
6.450	21.16	443.84	41.59	0.19	6.48	0.46	121	1.273	1.082	-0.376	0.042	0.92	39	0.68	1.0	0.1	39	39	0.085	0.06	1.00	1.15	0.074	1.1
6.500	21.33	443.67	42.20	0.20	6.79	0.46	121	1.283	1.086	-0.380	0.043	0.92	40	0.68	1.0	0.1	39	39	0.085	0.06	1.00	1.15	0.074	1.1
6.550	21.49	443.51	39.09	0.20	6.97	0.51	118	1.293	1.091	-0.384	0.043	0.92	37	0.61	1.0	21.3	36	58	0.098	0.08	1.00	1.15	0.074	1.3
6.600	21.65	443.35	35.82	0.18	6.87	0.51	118	1.302	1.096	-0.388	0.044	0.92	34	0.61	1.0	23.6	33	57	0.097	0.08	1.00	1.15	0.075	1.3
6.650	21.82	443.18	33.96	0.17	7.09	0.51	118	1.312	1.100	-0.392	0.044	0.92	32	0.62	1.0	24.7	31	56	0.097	0.07	1.00	1.15	0.075	1.3
6.700	21.98	443.02	32.97	0.17	7.38	0.52	118	1.322	1.105	-0.396	0.045	0.92	31	0.62	1.0	25.7	30	56	0.097	0.07	1.00	1.15	0.075	1.3
6.750	22.15	442.85	31.64	0.17	7.58	0.54	118	1.331	1.109	-0.400	0.045	0.92	30	0.62	1.0	27.1	29	56	0.097	0.07	1.00	1.15	0.075	1.3
6.800	22.31	442.69	31.00	0.17	7.58	0.54	118	1.341	1.114	-0.404	0.045	0.92	29	0.62	1.0	27.5	28	56	0.096	0.07	1.00	1.15	0.075	1.3
6.850	22.47	442.53	29.94	0.14	7.75	0.47	118	1.351	1.118	-0.408	0.046	0.92	28	0.74	1.0	0.1	27	27	0.077	0.06	1.00	1.15	0.075	1.0
6.900	22.64	442.36	29.68	0.15	8.01	0.52	118	1.360	1.123	-0.412	0.046	0.91	28	0.62	1.0	28.1	27	55	0.096	0.07	1.00	1.15	0.076	1.3
6.950	22.80	442.20	29.50	0.16	8.51	0.54	118	1.370	1.127	-0.416	0.047	0.91	28	0.62	1.0	28.8	27	56	0.096	0.07	1.00	1.15	0.076	1.3
7.000	22.97	442.03	30.68	0.18	8.57	0.57	118	1.379	1.132	-0.420	0.047	0.91	29	0.62	1.0	28.6	28	56	0.097	0.08	0.99	1.15	0.076	1.3
7.050	23.13	441.87	32.27	0.21	8.73	0.64	118	1.389	1.137	-0.424	0.048	0.91	30	0.61	1.0	28.9	29	58	0.098	0.08	0.99	1.15	0.076	1.3
7.100	23.29	441.71	35.17	0.21	8.78	0.61	118	1.399	1.141	-0.428	0.048	0.91	33	0.61	1.0	26.6	32	58	0.098	0.08	0.99	1.15	0.076	1.3
7.150	23.46	441.54	40.24	0.24	9.14	0.59	118	1.408	1.146	-0.432	0.049	0.91	38	0.61	1.0	23.3	36	60	0.099	0.08	0.99	1.15	0.077	1.3
7.200	23.62	441.38	45.45	0.26	9.18	0.58	121	1.418	1.150	-0.437	0.049	0.91	43	0.60	1.0	20.3	41	61	0.100	0.08	0.99	1.15	0.077	1.3
7.250	23.79	441.21	49.99	0.29	9.47	0.59	121	1.428	1.155	-0.441	0.050	0.91	47	0.59	0.9	18.2	45	63	0.102	0.08	0.99	1.15	0.077	1.3
7.300	23.95	441.05	54.90	0.31	9.60	0.57	121	1.438	1.160	-0.445	0.050	0.91	52	0.59	0.9	15.5	49	65	0.103	0.08	0.99	1.15	0.077	1.3
7.350	24.11	440.89	59.69	0.34	9.76	0.57	121	1.448	1.165	-0.449	0.051	0.91	56	0.58	0.9	13.6	53	67	0.105	0.08	0.99	1.15	0.077	1.4
7.400	24.28	440.72	64.04	0.34	9.90	0.54	121	1.458	1.169	-0.453	0.051	0.91	61	0.58	0.9	11.1	57	68	0.106	0.08	0.99	1.15	0.078	1.4
7.450	24.44	440.56	66.67	0.36	10.36	0.54	121	1.468	1.174	-0.457	0.051	0.90	63	0.58	0.9	10.2	59	69	0.107	0.08	0.99	1.15	0.078	1.4
7.500	24.61	440.39	68.82	0.40	10.19	0.58	121	1.478	1.179	-0.462	0.052	0.90	65	0.57	0.9	10.5	61	72	0.109	0.09	0.99	1.15	0.078	1.4
7.550	24.77	440.23	70.58	0.43	10.39	0.60	121	1.488	1.184	-0.466	0.052	0.90	67	0.56	0.9	10.7	63	73	0.110	0.09	0.99	1.15	0.078	1.4
7.600	24.93	440.07	72.45	0.43	10.61	0.60	121	1.498	1.189	-0.470	0.053	0.90	68	0.56	0.9	10.0	64	74	0.111	0.09	0.99	1.15	0.078	1.4
7.650	25.10	439.90	76.00	0.44	10.81	0.58	121	1.508	1.193	-0.474	0.053	0.90	72	0.56	0.9	8.5	67	76	0.112	0.09	0.99	1.15	0.078	1.4
7.700	25.26	439.74	79.49	0.45	10.86	0.57	121	1.517	1.198	-0.478	0.054	0.90	75	0.55	0.9	7.5	70	78	0.114	0.09	0.99	1.15	0.079	1.4
7.750	25.43	439.57	80.48	0.48	11.01	0.60	121	1.527	1.203	-0.483	0.054	0.90	76	0.55	0.9	7.9	71	79	0.115	0.09	0.99	1.15	0.079	1.5
7.800	25.59	439.41	80.65	0.51	11.40	0.63	121	1.537	1.208	-0.487	0.055	0.90	76	0.55	0.9	8.7	71	80	0.115	0.09	0.99	1.15	0.079	1.5
7.850	25.75	439.25	82.03	0.39	11.45	0.48	121	1.547	1.213	-0.491	0.055	0.90	78	0.57	0.9	0.1	72	72	0.109	0.09	0.99	1.15	0.079	1.4
7.900	25.92	439.08	85.98	0.40	11.75	0.47	121	1.557	1.217	-0.495	0.056	0.90	81	0.56	0.9	0.1	75	75	0.112	0.09	0.99	1.15	0.079	1.4
7.950	26.08	438.92	88.21	0.41	11.95	0.46	121	1.567	1.222	-0.500	0.056	0.90	83	0.55	0.9	0.1	77	77	0.113	0.09	0.99	1.15	0.079	1.4
8.000	26.25	438.75	85.84	0.43	12.01	0.50	121	1.577	1.227	-0.504	0.057	0.90	81	0.55	0.9	4.7	75	80	0.115	0.09	0.99	1.15	0.079	1.5
8.050	26.41	438.59	82.26	0.38	11.71	0.47	121	1.587	1.232	-0.508	0.057	0.89	78	0.57	0.9	0.1	71	71	0.108	0.08	0.99	1.15	0.079	1.4
8.100	26.57	438.43	80.75	0.39	12.09	0.48	121	1.597	1.237	-0.512	0.058	0.89	76	0.57	0.9	0.1	70	70	0.107	0.08	0.99	1.15	0.080	1.3
8.150	26.74	438.26	81.14	0.32	12.24	0.39	121	1.607	1.241	-0.517	0.058	0.89	77	0.57	0.9	0.1	70	70	0.107	0.08	0.99	1.15	0.080	1.3
8.200	26.90	438.10	83.26	0.26	12.46	0.31	124	1.617	1.246	-0.521	0.059	0.89	79	0.57	0.9	0.1	72	72	0.109	0.09	0.99	1.15	0.080	1.4
8.250	27.07	437.93	81.68	0.29	12.23	0.35	121	1.627	1.251	-0.525	0.059	0.89	77	0.57	0.9	0.1	70	70	0.107	0.08	0.99	1.15	0.080	1.3
8.300	27.23	437.77	79.31	0.23	12.66	0.30	121	1.637	1.256	-0.530	0.059	0.89	75	0.58	0.9	0.1	68	68	0.106	0.08	0.99	1.15	0.080	1.3
8.350	27.39	437.61	88.14	0.25	14.70	0.29	124	1.647	1.261	-0.534	0.060	0.89	83	0.56	0.9	0.1	76	76	0.112	0.09	0.98	1.15	0.080	1.4
8.400	27.56	437.44	115.91	0.35	14.65	0.30	124	1.657	1.266	-0.538	0.060	0.89	110	0.50	0.9	0.1	100	100	0.138	0.11	0.98	1.15	0.081	1.7
8.450	27.72	437.28	145.67	0.53	14.52	0.36	124	1.667	1.271	-0.543	0.061	0.89	138	0.44	0.9	0.0	127	127	0.188	0.13	0.98	1.15	0.081	2.0
8.500	27.89	437.11	163.95	0.79	16.87	0.48	124	1.677	1.276	-0.547	0.061	0.89	155	0.41	0.9	0.1	143	143	0.250	0.15	0.97	1.15	0.082	2.0
8.550	28.05	436.95	169.53	0.96	15.22	0.57	124	1.688	1.281	-0.552	0.062	0.89	160	0.41	0.9	0.1	148	148	0.278	0.16	0.97	1.15	0.082	2.0
8.600	28.21	436.79	167.80	1.01	14.73	0.60	124	1.698	1.286	-0.556	0.062	0.88	159	0.41	0.9	0.3	146	147	0.268	0.16	0.97	1.15	0.082	2.0
8.650	28.38	436.62	165.60	1.00	14.44	0.60	124	1.708	1.291	-0.560	0.063	0.88	156	0.41	0.9	0.3	144	144	0.256	0.15	0.97	1.15	0.082	2.0
8.700	28.54	436.46	161.60	0.96	14.25	0.59	124	1.718	1.296	-0.565	0.063	0.88	153	0.42	0.9	0.3	140	141	0.237	0.15	0.97	1.15	0.082	2.0
8.750	28.71	436.29	154.59	0.91	14.18	0.59	124	1.728	1.301	-0.569	0.064	0.88	146	0.43	0.9	0.5	134	134	0.211	0.14	0.97	1.15	0.082	2.0
8.800	28.87	436.13	139.15	0.81	13.95	0.58	124	1.738	1.307	-0.574	0.064	0.88	131	0.46	0.9	0.9	119	120	0.172	0.12	0.97	1.15	0.082	2.0
8.850	29.04	435.96	131.45	0.70	14.26	0.53	124	1.749	1.312	-0.578	0.065	0.88	124	0.47	0.9	0.8	112	113	0.157	0.12	0.97	1.15	0.082	1.9
8.900	29.20	435.80	113.82	0.53	14.18	0.47	124	1.759	1.317	-0.582	0.065	0.88	108	0.51	0.9	0.2	96	96	0.133	0.10	0.98	1.15	0.082	1.6
8.950	29.36	435.64	84.32	0.49	13.01	0.58	121	1.769	1.322	-0.587	0.066	0.88	80	0.55	0.9	7.5	70	78	0.114	0.09	0.98	1.15	0.082	1.4
9.000	29.53	435.47	87.15	0.48	14.54	0.55	121	1.779	1.326	-0.591	0.066	0.88	82	0.55	0.9	6.2	73	79	0.115	0.09	0.98	1.15	0.082	1.4
9.050	29.69	435.31	83.18	0.49	15.28	0.59	121	1.789	1.331	-0.596	0.067	0.88	79	0.55	0.9	8.1	69	77	0.113	0.09	0.98	1.15	0.082	1.4
9.100	29.86	435.14	93.94	2.14	16.06	2.27	118	1.798	1.336	-0.600	0.067	0.88	89	0.47	0.9	34.3	80	114	0.159	0.12	0.97	1.15	0.083	1.9
9.150	30.02	434.98	118.85	1.25	16.61	1.05	121	1.808	1.341	-0.605	0.068	0.87	112	0.47	0.9	10.7	100	111	0.154	0.12	0.97	1.15	0.083	1.9
9.200	30.18	434.82	144.41	1.13	16.44	0.78	124	1.818	1.345	-0.609	0.068	0.87	136	0.45	0.9	2.7	123	125	0.184	0.13	0.97	1.15	0.083	2.0
9.250	30.35	434.65	175.33	1.03	25.92	0.59	124	1.829	1.351	-0.614	0.069	0.87	166	0.40	0.9	0.2	150	150	0.291	0.16	0.96	1.15	0.084	2.0
9.300	30.51	434.49	143.44	1.08	21.99	0.75	124	1.839	1.356	-0.618	0.069	0.87	136	0.45	0.9	2.5	121	124	0.180	0.13	0.97	1.15	0.083	2.0
9.350	30.68	434.32	140.59	0.47	15.12	0.34	124	1.849	1.361	-0.623	0.070	0.87	133	0.46	0.9	0.0	118	118	0.168	0.12	0.97	1.15	0.083	2.0
9.400	30.84	434.16	136.51	0.47	18.31	0.34	124	1.859	1.366	-0.627	0.070	0.87	129	0.47	0.9	0.1	114	115	0.160	0.12	0.97	1.15	0.083	1.9
9.450	31.00	434.00	135.64	0.43	15.43	0.32	124	1.869	1.371	-0.632	0.071	0.87	128	0.47	0.9	0.0	114	114	0.158	0.12	0.97	1.15	0.083	1.9
9.500	31.17	433.83	135.69	0.46	16.29	0.34	124	1.879	1.376	-0.636	0.071	0.87	128	0.47	0.9	0.1	113	113	0.158	0.12	0.97	1.15	0.083	1.9
9.550	31.33	433.67	133.93	0.47	18.72	0.35	124	1.890	1.381	-0.641	0.072	0.87	127	0.47	0.9	0.1	112	112	0.155	0.12	0.97	1.15	0.083	1.9
9.600	31.50	433.50	133.40	0.46	16.20	0.34	124	1.900	1.386	-0.645	0.072	0.87	126	0.47	0.9	0.1	111	111	0.154	0.12	0.97	1.15	0.083	1.8
9.650	31.66	433.34	135.04	0.49	19.68	0.36	124	1.910	1.391	-0.650	0.073	0.87	128	0.47	0.9	0.1	112	112	0.156	0.12	0.97	1.15	0.084	1.9
9.700	31.82	433.18	143.18	0.46	17.13	0.32	124	1.920	1.396	-0.654	0.073	0.86	135	0.46	0.9	0.0	119	119	0.169	0.12	0.97	1.15	0.084	2.0
9.750	31.99	433.01	155.23	0.43	20.65	0.28	124	1.930	1.401	-0.659	0.074	0.86	147	0.44	0.9	0.0	130	130	0.196	0.13	0.96	1.15	0.084	2.0
9.800	32.15	432.85	158.64	0.42	21.08	0.27	124	1.941	1.406	-0.663	0.074	0.86	150	0.43	0.9	0.0	133	133	0.206	0.14	0.96	1.15	0.084	2.0
9.850	32.32	432.68	164.50	0.42	23.27	0.25	124	1.951	1.411	-0.668	0.075	0.86	155	0.42	0.9	0.0	138	138	0.224	0.14	0.96	1.15	0.085	2.0
9.900	32.48	432.52	172.10	0.52	15.99	0.30	124	1.961	1.416	-0.673	0.075	0.86	163	0.41	0.9	0.0	144	144	0.254	0.15	0.96	1.15	0.085	2.0
9.950	32.64	432.36	184.02	0.59	23.46	0.32	124	1.971	1.421	-0.677	0.076	0.86	174	0.40	0.9	0.0	155	155	0.323	0.17	0.95	1.15	0.085	2.0
10.000	32.81	432.19	183.97	2.45	15.56	1.33	121	1.981	1.426	-0.682	0.076	0.86	174	0.38	0.9	8.1	155	163	0.406	0.18	0.95	1.15	0.086	2.0
10.050	32.97	432.03	186.84	2.37	28.64	1.27	124	1.991	1.431	-0.686	0.077	0.86	177	0.38	0.9	6.8	157	164	0.418	0.18	0.95	1.15	0.086	2.0
10.100	33.14	431.86	196.08	2.25	17.66	1.15	124	2.001	1.436	-0.691	0.077	0.86	185	0.37	0.9	4.2	165	170	0.496	0.19	0.94	1.15	0.086	2.0
10.150	33.30	431.70	209.26	2.38	16.33	1.14	124	2.012	1.441	-0.696	0.078	0.86	198	0.36	0.9	3.3	177	180	0.739	0.21	0.93	1.15	0.087	2.0
10.200	33.46	431.54	194.05	2.35	21.44	1.21	124	2.022	1.446	-0.700	0.078	0.86	183	0.37	0.9	5.3	163	168	0.479	0.19	0.94	1.15	0.087	2.0
10.250	33.63	431.37	166.40	2.22	28.49	1.34	121	2.032	1.451	-0.705	0.079	0.85	157	0.41	0.9	10.2	138	148	0.279	0.16	0.95	1.15	0.086	2.0
10.300	33.79	431.21	166.25	1.20	18.72	0.72	124	2.042	1.456	-0.709	0.079	0.85	157	0.42	0.9	1.2	137	138	0.228	0.14	0.95	1.15	0.085	2.0
10.350	33.96	431.04	162.15	1.06	22.28	0.65	124	2.052	1.461	-0.714	0.080	0.85	153	0.43	0.9	0.9	133	134	0.211	0.14	0.95	1.15	0.085	2.0
10.400	34.12	430.88	160.31	0.94	21.22	0.58	124	2.062	1.466	-0.719	0.080	0.85	151	0.43	0.9	0.5	131	132	0.204	0.14	0.96	1.15	0.085	2.0
10.450	34.28	430.72	158.22	0.88	20.51	0.55	124	2.072	1.471	-0.723	0.081	0.85	150	0.44	0.9	0.4	129	130	0.197	0.13	0.96	1.15	0.085	2.0
10.500	34.45	430.55	158.40	0.85	21.25	0.54	124	2.083	1.476	-0.728	0.081	0.85	150	0.44	0.9	0.4	129	130	0.196	0.13	0.96	1.15	0.085	2.0
10.550	34.61	430.39	158.85	0.86	21.24	0.54	124	2.093	1.482	-0.733	0.082	0.85	150	0.44	0.9	0.4	130	130	0.197	0.13	0.95	1.15	0.086	2.0
10.600	34.78	430.22	156.80	0.76	21.43	0.49	124	2.103	1.487	-0.737	0.082	0.85	148	0.44	0.9	0.2	127	128	0.190	0.13	0.95	1.15	0.086	2.0
10.650	34.94	430.06	152.11	0.68	21.07	0.45	124	2.113	1.492	-0.742	0.083	0.85	144	0.45	0.9	0.2	123	123	0.179	0.13	0.96	1.15	0.085	2.0
10.700	35.10	429.90	139.96	0.63	20.84	0.45	124	2.123	1.497	-0.747	0.083	0.85	132	0.47	0.8	0.2	112	112	0.156	0.12	0.96	1.15	0.085	1.8
10.750	35.27	429.73	145.54	0.70	20.64	0.48	124	2.133	1.502	-0.751	0.084	0.85	138	0.46	0.9	0.2	117	117	0.165	0.12	0.96	1.15	0.085	1.9
10.800	35.43	429.57	150.60	0.68	19.99	0.45	124	2.144	1.507	-0.756	0.084	0.84	142	0.45	0.9	0.2	121	121	0.174	0.13	0.96	1.15	0.086	2.0
10.850	35.60	429.40	147.42	0.61	21.27	0.42	124	2.154	1.512	-0.761	0.085	0.84	139	0.46	0.8	0.2	118	118	0.168	0.12	0.96	1.15	0.086	2.0
10.900	35.76	429.24	139.51	0.58	20.41	0.41	124	2.164	1.517	-0.765	0.085	0.84	132	0.47	0.8	0.2	111	111	0.154	0.12	0.96	1.15	0.085	1.8
10.950	35.92	429.08	130.51	0.59	21.77	0.45	124	2.174	1.522	-0.770	0.086	0.84	123	0.49	0.8	0.2	103	103	0.142	0.11	0.96	1.15	0.085	1.7
11.000	36.09	428.91	127.30	0.59	21.75	0.46	124	2.184	1.527	-0.775	0.087	0.84	120	0.50	0.8	0.2	100	100	0.138	0.11	0.96	1.15	0.085	1.6
11.050	36.25	428.75	124.21	0.59	21.24	0.47	124	2.195	1.532	-0.779	0.087	0.84	117	0.50	0.8	0.2	97	98	0.134	0.10	0.96	1.15	0.085	1.6
11.100	36.42	428.58	120.12	0.56	21.36	0.47	124	2.205	1.537	-0.784	0.088	0.84	114	0.51	0.8	0.2	94	94	0.130	0.10	0.96	1.15	0.085	1.5
11.150	36.58	428.42	112.76	0.53	21.37	0.47	124	2.215	1.542	-0.789	0.088	0.84	107	0.53	0.8	0.1	87	88	0.123	0.10	0.96	1.15	0.085	1.4
11.200	36.74	428.26	107.63	0.51	20.89	0.47	124	2.225	1.547	-0.793	0.089	0.84	102	0.54	0.8	0.1	83	83	0.119	0.09	0.96	1.15	0.085	1.4
11.250	36.91	428.09	102.71	0.50	21.86	0.49	124	2.235	1.552	-0.798	0.089	0.84	97	0.54	0.8	3.6	79	82	0.118	0.09	0.96	1.15	0.085	1.4
11.300	37.07	427.93	101.44	0.51	22.19	0.50	124	2.245	1.557	-0.803	0.090	0.84	96	0.54	0.8	4.0	78	82	0.117	0.09	0.96	1.15	0.085	1.4
11.350	37.24	427.76	100.65	0.53	22.23	0.53	124	2.256	1.562	-0.808	0.090	0.83	95	0.54	0.8	4.7	77	82	0.117	0.09	0.96	1.15	0.085	1.4
11.400	37.40	427.60	100.05	0.54	22.47	0.53	124	2.266	1.568	-0.812	0.091	0.83	95	0.54	0.8	5.0	76	81	0.117	0.09	0.96	1.15	0.085	1.4
11.450	37.57	427.43	103.02	0.54	22.95	0.52	124	2.276	1.573	-0.817	0.091	0.83	97	0.54	0.8	4.3	79	83	0.118	0.09	0.96	1.15	0.085	1.4
11.500	37.73	427.27	109.17	0.54	23.06	0.50	124	2.286	1.578	-0.822	0.092	0.83	103	0.53	0.8	3.0	83	87	0.122	0.10	0.96	1.15	0.085	1.4
11.550	37.89	427.11	115.96	0.59	23.50	0.51	124	2.296	1.583	-0.826	0.092	0.83	110	0.52	0.8	2.4	89	91	0.127	0.10	0.96	1.15	0.085	1.5
11.600	38.06	426.94	119.51	0.61	23.83	0.51	124	2.307	1.588	-0.831	0.093	0.83	113	0.51	0.8	2.1	92	94	0.130	0.10	0.96	1.15	0.086	1.5
11.650	38.22	426.78	125.15	0.63	23.99	0.50	124	2.317	1.593	-0.836	0.093	0.83	118	0.50	0.8	1.6	96	98	0.135	0.10	0.96	1.15	0.086	1.6
11.700	38.39	426.61	129.03	0.64	23.37	0.49	124	2.327	1.598	-0.841	0.094	0.83	122	0.50	0.8	1.3	99	101	0.138	0.11	0.96	1.15	0.086	1.6
11.750	38.55	426.45	133.24	0.70	24.73	0.53	124	2.337	1.603	-0.845	0.094	0.83	126	0.49	0.8	1.4	103	104	0.143	0.11	0.95	1.15	0.086	1.7
11.800	38.71	426.29	138.71	0.66	23.33	0.48	124	2.347	1.608	-0.850	0.095	0.83	131	0.48	0.8	0.2	107	107	0.148	0.11	0.95	1.15	0.086	1.7
11.850	38.88	426.12	139.36	0.57	25.13	0.41	124	2.357	1.613	-0.855	0.095	0.82	132	0.48	0.8	0.2	107	108	0.148	0.11	0.95	1.15	0.086	1.7
11.900	39.04	425.96	138.41	0.57	23.85	0.41	124	2.368	1.618	-0.860	0.096	0.82	131	0.48	0.8	0.2	106	107	0.147	0.11	0.95	1.15	0.086	1.7
11.950	39.21	425.79	131.16	0.59	25.88	0.45	124	2.378	1.623	-0.864	0.096	0.82	124	0.50	0.8	0.2	100	100	0.138	0.11	0.95	1.15	0.086	1.6
12.000	39.37	425.63	130.68	0.61	23.07	0.46	124	2.388	1.628	-0.869	0.097	0.82	123	0.50	0.8	0.2	100	100	0.137	0.11	0.95	1.15	0.086	1.6
12.050	39.53	425.47	131.41	0.67	24.34	0.51	124	2.398	1.633	-0.874	0.097	0.82	124	0.49	0.8	1.4	100	102	0.139	0.11	0.95	1.15	0.086	1.6
12.100	39.70	425.30	136.06	0.80	27.44	0.59	124	2.408	1.638	-0.879	0.098	0.82	129	0.49	0.8	2.0	104	106	0.146	0.11	0.95	1.15	0.086	1.7
12.150	39.86	425.14	142.49	0.00	27.79	0.00	119	2.418	1.643	-0.883	0.098	0.82	135	0.48	0.8	0.0	109	109	0.150	0.11	0.95	1.15	0.086	1.7
12.200	40.03	424.97	148.49	0.00	28.29	0.00	119	2.428	1.648	-0.888	0.099	0.82	140	0.47	0.8	0.0	114	114	0.159	0.12	0.95	1.15	0.087	1.8

Table I-7: Liquefaction Analysis for CPT HAV-C005

Idriss and Blouanger Liquefaction Analysis from CPT Data — Groudwater Elevation Used
Havana East Ash Pond - Site 5
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

amax	0.12
Mw	6.95

Depth	Depth	Elev	Avg qt	Avg fs	Avg u	Avg Rf	Unit Wt.	TStress	EStress	α	β	rd	qc/Pa	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$	C_σ	K_σ	MSF	CSRM,σv	FS
m	ft	ft	tsf	tsf	ft	%	pcf	tsf	tsf				dimensionless						Deterministic					
0.050	0.16	462.24	1.53	0.06	0.16	3.85	111	0.009	0.009	0.014	-0.001	1.00	1	1.02	1.7	0.0	2	2	0.062	0.04	1.10	1.15	0.062	1.2
0.100	0.33	462.07	7.48	0.08	2.45	1.12	111	0.018	0.018	0.012	-0.001	1.00	7	0.61	1.7	45.1	12	57	0.097	0.08	1.10	1.15	0.062	1.6
0.150	0.49	461.91	4.44	0.11	2.26	2.50	111	0.027	0.027	0.010	-0.001	1.00	4	0.61	1.7	51.5	7	59	0.099	0.08	1.10	1.15	0.062	1.6
0.200	0.66	461.74	5.93	0.15	1.28	2.50	115	0.037	0.037	0.008	-0.000	1.00	6	0.60	1.7	50.4	10	60	0.099	0.08	1.10	1.15	0.062	1.6
0.250	0.82	461.58	9.44	0.16	-9.43	1.72	115	0.046	0.046	0.006	-0.000	1.00	9	0.60	1.7	46.1	15	61	0.100	0.08	1.10	1.15	0.062	1.6
0.300	0.98	461.42	13.98	0.22	-12.27	1.60	115	0.055	0.055	0.004	0.000	1.00	13	0.59	1.7	42.4	22	65	0.103	0.08	1.10	1.15	0.062	1.7
0.350	1.15	461.25	15.82	0.21	-14.07	1.35	115	0.065	0.065	0.002	0.000	1.00	15	0.59	1.7	39.4	25	65	0.103	0.08	1.10	1.15	0.062	1.7
0.400	1.31	461.09	20.76	0.41	-16.96	1.96	115	0.074	0.074	-0.000	0.001	1.00	20	0.56	1.7	41.0	33	74	0.111	0.09	1.10	1.15	0.062	1.8
0.450	1.48	460.92	27.95	0.41	-0.90	1.47	115	0.084	0.084	-0.003	0.001	1.00	26	0.55	1.7	33.1	45	78	0.114	0.09	1.10	1.15	0.062	1.8
0.500	1.64	460.76	98.32	0.56	6.24	0.57	124	0.093	0.093	-0.005	0.001	1.00	93	0.39	1.7	0.0	158	158	0.351	0.17	1.10	1.15	0.062	2.0
0.550	1.80	460.60	157.44	0.87	9.44	0.55	124	0.104	0.104	-0.007	0.001	1.00	149	0.27	1.7	0.0	253	253	2.000	0.30	1.10	1.15	0.062	2.0
0.600	1.97	460.43	198.46	1.02	0.62	0.51	124	0.114	0.114	-0.009	0.001	1.00	188	0.26	1.7	0.0	319	319	2.000	0.30	1.10	1.15	0.062	2.0
0.650	2.13	460.27	212.89	1.09	-0.97	0.51	124	0.124	0.124	-0.011	0.002	1.00	201	0.26	1.7	0.0	342	342	2.000	0.30	1.10	1.15	0.062	2.0
0.700	2.30	460.10	203.08	1.02	-1.70	0.50	124	0.134	0.134	-0.013	0.002	1.00	192	0.26	1.7	0.0	326	326	2.000	0.30	1.10	1.15	0.062	2.0
0.750	2.46	459.94	173.43	1.09	-3.17	0.63	124	0.144	0.144	-0.016	0.002	1.00	164	0.26	1.7	0.0	277	277	2.000	0.30	1.10	1.15	0.062	2.0
0.800	2.62	459.78	133.96	1.19	-2.90	0.89	124	0.155	0.155	-0.018	0.002	1.00	127	0.31	1.7	0.2	215	215	2.000	0.30	1.10	1.15	0.062	2.0
0.850	2.79	459.61	85.77	0.94	1.02	1.09	121	0.165	0.165	-0.020	0.003	1.00	81	0.42	1.7	5.2	138	143	0.248	0.15	1.10	1.15	0.062	2.0
0.900	2.95	459.45	76.36	0.86	0.28	1.13	121	0.175	0.175	-0.022	0.003	1.00	72	0.44	1.7	7.7	123	130	0.199	0.14	1.10	1.15	0.062	2.0
0.950	3.12	459.28	79.46	0.97	-8.94	1.22	121	0.184	0.184	-0.025	0.003	1.00	75	0.43	1.7	8.5	128	136	0.219	0.14	1.10	1.15	0.062	2.0
1.000	3.28	459.12	67.28	1.08	-14.72	1.61	118	0.194	0.194	-0.027	0.003	1.00	64	0.44	1.7	19.0	108	127	0.189	0.13	1.10	1.15	0.062	2.0
1.050	3.44	458.96	42.42	1.23	-16.38	2.91	115	0.204	0.204	-0.029	0.004	1.00	40	0.58	1.7	0.0	68	68	0.106	0.08	1.10	1.15	0.062	1.7
1.100	3.61	458.79	34.35	1.19	-12.90	3.45	115	0.213	0.213	-0.032	0.004	1.00	32	0.62	1.7	0.0	55	55	0.096	0.07	1.10	1.15	0.062	1.6
1.150	3.77	458.63	29.74	0.96	-9.42	3.22	115	0.223	0.223	-0.034	0.004	1.00	28	0.65	1.7	0.0	48	48	0.091	0.07	1.10	1.15	0.062	1.5
1.200	3.94	458.46	37.07	0.59	0.11	1.59	118	0.232	0.232	-0.036	0.005	1.00	35	0.52	1.7	30.0	60	90	0.125	0.10	1.10	1.15	0.062	2.0
1.250	4.10	458.30	58.27	0.45	-4.45	0.78	121	0.242	0.242	-0.039	0.005	0.99	55	0.50	1.7	6.2	94	100	0.137	0.11	1.10	1.15	0.062	2.0
1.300	4.27	458.13	70.90	0.39	0.15	0.55	121	0.252	0.252	-0.041	0.005	0.99	67	0.47	1.7	0.8	114	115	0.160	0.12	1.10	1.15	0.062	2.0
1.350	4.43	457.97	75.68	0.42	0.34	0.56	121	0.262	0.262	-0.044	0.005	0.99	72	0.45	1.7	0.5	122	122	0.176	0.13	1.10	1.15	0.061	2.0
1.400	4.59	457.81	80.28	0.46	0.23	0.57	121	0.272	0.272	-0.046	0.006	0.99	76	0.44	1.7	0.4	129	129	0.195	0.13	1.10	1.15	0.061	2.0
1.450	4.76	457.64	82.01	0.48	0.28	0.58	121	0.282	0.282	-0.049	0.006	0.99	78	0.43	1.7	0.4	132	132	0.204	0.14	1.10	1.15	0.061	2.0
1.500	4.92	457.48	79.97	0.49	0.02	0.61	121	0.291	0.291	-0.051	0.006	0.99	76	0.44	1.7	0.6	128	129	0.195	0.13	1.10	1.15	0.061	2.0
1.550	5.09	457.31	75.69	0.46	0.00	0.61	121	0.301	0.301	-0.054	0.006	0.99	72	0.45	1.7	0.9	122	122	0.177	0.13	1.10	1.15	0.061	2.0
1.600	5.25	457.15	72.19	0.40	0.06	0.55	121	0.311	0.311	-0.056	0.007	0.99	68	0.46	1.7	0.7	116	117	0.164	0.12	1.10	1.15	0.061	2.0
1.650	5.41	456.99	70.68	0.38	0.10	0.53	121	0.321	0.321	-0.059	0.007	0.99	67	0.47	1.7	0.7	114	114	0.159	0.12	1.10	1.15	0.061	2.0
1.700	5.58	456.82	68.33	0.35	0.11	0.51	121	0.331	0.331	-0.061	0.007	0.99	65	0.48	1.7	0.7	110	110	0.153	0.12	1.10	1.15	0.061	2.0
1.750	5.74	456.66	66.16	0.34	0.01	0.51	121	0.341	0.341	-0.064	0.008	0.99	63	0.48	1.7	0.9	106	107	0.147	0.11	1.10	1.15	0.061	2.0
1.800	5.91	456.49	63.20	0.32	0.18	0.51	121	0.351	0.351	-0.066	0.008	0.99	60	0.49	1.7	1.2	102	103	0.141	0.11	1.10	1.15	0.061	2.0
1.850	6.07	456.33	61.90	0.21	0.16	0.34	121	0.361	0.361	-0.069	0.008	0.99	58	0.50	1.7	0.2	99	100	0.137	0.11	1.10	1.15	0.061	2.0
1.900	6.23	456.17	58.20	0.22	0.11	0.38	121	0.371	0.371	-0.072	0.008	0.99	55	0.51	1.7	0.2	93	94	0.130	0.10	1.10	1.15	0.061	2.0
1.950	6.40	456.00	52.22	0.20	0.40	0.38	121	0.381	0.381	-0.074	0.009	0.99	49	0.54	1.7	0.1	84	84	0.120	0.09	1.10	1.15	0.061	2.0
2.000	6.56	455.84	48.52	0.19	0.12	0.39	121	0.391	0.391	-0.077	0.009	0.99	46	0.55	1.7	0.1	78	78	0.114	0.09	1.09	1.15	0.062	1.9
2.050	6.73	455.67	46.90	0.21	0.07	0.44	121	0.401	0.401	-0.080	0.009	0.99	44	0.56	1.7	0.1	75	75	0.112	0.09	1.09	1.15	0.062	1.8
2.100	6.89	455.51	47.89	0.25	0.16	0.51	121	0.411	0.411	-0.082	0.010	0.98	45	0.54	1.7	5.5	76	81	0.117	0.09	1.09	1.15	0.062	1.9
2.150	7.05	455.35	53.55	0.27	0.44	0.50	121	0.420	0.420	-0.085	0.010	0.98	51	0.53	1.6	3.6	83	86	0.122	0.10	1.09	1.15	0.062	2.0
2.200	7.22	455.18	63.61	0.30	0.69	0.47	121	0.430	0.430	-0.088	0.010	0.98	60	0.51	1.6	0.2	95	95	0.131	0.10	1.09	1.15	0.061	2.0
2.250	7.38	455.02	73.54	0.32	0.91	0.44	121	0.440	0.440	-0.091	0.011	0.98	69	0.48	1.5	0.2	106	106	0.146	0.11	1.10	1.15	0.061	2.0
2.300	7.55	454.85	86.48	0.44	0.84	0.51	121	0.450	0.450	-0.093	0.011	0.98	82	0.46	1.5	0.3	121	121	0.173	0.13	1.10	1.15	0.061	2.0
2.350	7.71	454.69	91.04	0.53	0.79	0.58	121	0.460	0.460	-0.096	0.011	0.98	86	0.45	1.5	0.4	125	125	0.184	0.13	1.10	1.15	0.061	2.0
2.400	7.87	454.53	93.55	0.59	0.52	0.63	121	0.470	0.470	-0.099	0.012	0.98	88	0.44	1.4	0.6	127	127	0.189	0.13	1.10	1.15	0.061	2.0
2.450	8.04	454.36	90.79	0.60	0.28	0.66	121	0.480	0.480	-0.102	0.012	0.98	86	0.45	1.4	1.0	122	123	0.179	0.13	1.10	1.15	0.061	2.0
2.500	8.20	454.20	88.92	0.62	0.40	0.69	121	0.490	0.490	-0.105	0.012	0.98	84	0.46	1.4	1.5	119	121	0.173	0.13	1.10	1.15	0.061	2.0
2.550	8.37	454.03	86.13	0.63	-0.04	0.73	121	0.500	0.500	-0.107	0.012	0.98	81	0.46	1.4	2.2	115	117	0.166	0.12	1.09	1.15	0.061	2.0
2.600	8.53	453.87	83.60	0.65	-1.62	0.78	121	0.510	0.510	-0.110	0.013	0.98	79	0.47	1.4	3.3	111	114	0.160	0.12	1.09	1.15	0.061	2.0
2.650	8.69	453.71	79.45	0.68	-3.90	0.85	121	0.520	0.520	-0.113	0.013	0.98	75	0.48	1.4	5.4	105	111	0.153	0.12	1.08	1.15	0.062	2.0
2.700	8.86	453.54	79.00	0.69	-5.88	0.87	121	0.530	0.530	-0.116	0.013	0.98	75	0.48	1.4	5.9	104	110	0.152	0.11	1.08	1.15	0.062	2.0
2.750	9.02	453.38	77.54	0.71	-8.52	0.91	121	0.539	0.539	-0.119	0.014	0.98	73	0.48	1.4	7.3	101	108	0.150	0.11	1.08	1.15	0.062	2.0
2.800	9.19	453.21	75.09	0.61	-9.24	0.81	121	0.549	0.549	-0.122	0.014	0.98	71	0.49	1.4	6.0	98	104	0.143	0.11	1.07	1.15	0.062	2.0
2.850	9.35	453.05	73.41	0.44	-9.00	0.60	121	0.559	0.559	-0.125	0.014	0.98	69	0.50	1.4	3.0	96	98	0.135	0.11	1.07	1.15	0.062	2.0
2.900	9.51	452.89	72.68	0.35	-9.12	0.48	121	0.569	0.569	-0.128	0.015	0.97	69	0.51	1.4	0.2	94	94	0.130	0.10	1.06	1.15	0.062	2.0
2.950	9.68	452.72	64.74	0.35	0.53	0.54	121	0.579	0.579	-0.131	0.015	0.97	61	0.53	1.4	3.9	84	88	0.123	0.10	1.06	1.15	0.063	2.0
3.000	9.84	452.56	60.51	0.34	0.91	0.57	121	0.589	0.589	-0.134	0.015	0.97	57	0.54	1.4	5.8	78	84	0.120	0.09	1.05	1.15	0.063	1.9
3.050	10.01	452.39	56.69	0.30	0.25	0.52	121	0.599	0.599	-0.137	0.016	0.97	54	0.55	1.4	6.1	73	79	0.115	0.09	1.05	1.15	0.063	1.8
3.100	10.17	452.23	52.47	0.26	0.09	0.49	121	0.609	0.609	-0.140	0.016	0.97	50	0.58	1.4	0.1	68	68	0.106	0.08	1.05	1.15	0.063	1.7
3.150	10.33	452.07	48.16	0.21	-0.01	0.44	121	0.619	0.619	-0.143	0.016	0.97	46	0.60	1.4	0.1	63	63	0.102	0.08	1.04	1.15	0.063	1.6
3.200	10.50	451.90	45.41	0.19	-0.09	0.42	121	0.629	0.629	-0.146	0.017	0.97	43	0.61	1.4	0.1	59	59	0.099	0.08	1.04	1.15	0.064	1.6
3.250	10.66	451.74	40.56	0.16	-0.09	0.39	121	0.639	0.639	-0.149	0.017	0.97	38	0.63	1.4	0.1	53	53	0.094	0.07	1.04	1.15	0.064	1.5
3.300	10.83	451.57	39.23	0.16	-0.03	0.40	121	0.649	0.649	-0.152	0.017	0.97	37	0.64	1.4	0.1	51	51	0.093	0.07	1.03	1.15	0.064	1.5
3.350	10.99	451.41	37.60	0.16	0.03	0.42	118	0.658	0.658	-0.155	0.018	0.97	36	0.64	1.4	0.1	48	48	0.091	0.07	1.03	1.15	0.064	1.4
3.400	11.15	451.25	36.52	0.15	0.05	0.40	118	0.668	0.668	-0.158	0.018	0.97	35	0.65	1.3	0.1	47	47	0.090	0.07	1.03	1.15	0.064	1.4
3.450	11.32	451.08	35.56	0.16	0.13	0.45	118	0.678	0.678	-0.162	0.019	0.97	34	0.66	1.3	0.1	45	45	0.089	0.07	1.03	1.15	0.064	1.4
3.500	11.48	450.92	38.07	0.18	0.24	0.46	118	0.687	0.687	-0.165	0.019	0.97	36	0.65	1.3	0.1	48	48	0.091	0.07	1.03	1.15	0.064	1.4
3.550	11.65	450.75	42.54	0.18	0.38	0.42	121	0.697	0.697	-0.168	0.019	0.97	40	0.63	1.3	0.1	52	52	0.094	0.07	1.03	1.15	0.064	1.5
3.600	11.81	450.59	46.28	0.15	0.37	0.33	121	0.707	0.707	-0.171	0.020	0.97	44	0.62	1.3	0.1	56	56	0.097	0.07	1.03	1.15	0.064	1.5
3.650	11.97	450.43	46.00	0.14	0.01	0.29	121	0.717	0.717	-0.174	0.020	0.96	43	0.62	1.3	0.1	55	55	0.096	0.07	1.03	1.15	0.064	1.5
3.700	12.14	450.26	43.60	0.14	-0.04	0.31	121	0.727	0.727	-0.177	0.020	0.96	41	0.63	1.3	0.1	52	52	0.094	0.07	1.03	1.15	0.064	1.5
3.750	12.30	450.10	40.52	0.16	-0.11	0.40	121	0.737	0.737	-0.181	0.021	0.96	38	0.64	1.3	0.1	48	48	0.091	0.07	1.03	1.15	0.064	1.4
3.800	12.47	449.93	38.19	0.16	-0.17	0.42	118	0.747	0.747	-0.184	0.021	0.96	36	0.66	1.3	0.1	45	45	0.089	0.07	1.02	1.15	0.064	1.4
3.850	12.63	449.77	35.63	0.12	-0.21	0.33	118	0.756	0.756	-0.187	0.021	0.96	34	0.67	1.3	0.1	42	42	0.087	0.07	1.02	1.15	0.064	1.4
3.900	12.80	449.60	30.77	0.11	-0.35	0.35	118	0.766	0.766	-0.190	0.022	0.96	29	0.69	1.3	0.1	36	37	0.083	0.06	1.02	1.15	0.064	1.3
3.950	12.96	449.44	25.96	0.10	0.26	0.39	118	0.776	0.776	-0.194	0.022	0.96	25	0.72	1.3	0.1	31	31	0.079	0.06	1.02	1.15	0.064	1.2
4.000	13.12	449.28	22.81	0.10	0.26	0.42	118	0.785	0.785	-0.197	0.022	0.96	22	0.74	1.2	0.1	27	27	0.077	0.06	1.02	1.15	0.064	1.2
4.050	13.29	449.11	21.43	0.10	0.23	0.45	118	0.795	0.795	-0.200	0.023	0.96	20	0.75	1.2	0.1	25	25	0.076	0.06	1.02	1.15	0.064	1.2
4.100	13.45	448.95	19.50	0.09	0.59	0.45	118	0.805	0.805	-0.204	0.023	0.96	18	0.77	1.2	0.1	23	23	0.074	0.05	1.01	1.15	0.064	1.2
4.150	13.62	448.78	20.49	0.10	0.98	0.48	118	0.814	0.809	-0.207	0.024	0.96	19	0.76	1.2	0.1	24	24	0.075	0.05	1.01	1.15	0.065	1.2
4.200	13.78	448.62	23.91	0.13	1.11	0.54	118	0.824	0.814	-0.210	0.024	0.96	23	0.62	1.2	29.7	27	56	0.097	0.08	1.02	1.15	0.065	1.5
4.250	13.94	448.46	32.17	0.15	1.46	0.47	118	0.834	0.818	-0.214	0.024	0.96	30	0.69	1.2	0.1	36	36	0.083	0.06	1.02	1.15	0.065	1.3
4.300	14.11	448.29	44.10	0.18	1.71	0.41	121	0.843	0.823	-0.217	0.025	0.96	42	0.64	1.2	0.1	49	49	0.092	0.07	1.02	1.15	0.065	1.4
4.350	14.27	448.13	53.08	0.21	1.68	0.40	121	0.853	0.828	-0.221	0.025	0.95	50	0.61	1.2	0.1	58	58	0.098	0.08	1.02	1.15	0.066	1.5
4.400	14.44	447.96	52.06	0.23	1.45	0.44	121	0.863	0.833	-0.224	0.025	0.95	49	0.61	1.2	0.1	57	57	0.097	0.08	1.02	1.15	0.066	1.5
4.450	14.60	447.80	48.39	0.22	1.52	0.46	121	0.873	0.837	-0.227	0.026	0.95	46	0.63	1.2	0.1	53	53	0.094	0.07	1.02	1.15	0.067	1.4
4.500	14.76	447.64	42.55	0.19	1.46	0.45	121	0.883	0.842	-0.231	0.026	0.95	40	0.65	1.2	0.1	47	47	0.090	0.07	1.02	1.15	0.067	1.3
4.550	14.93	447.47	39.42	0.19	2.43	0.47	118	0.893	0.847	-0.234	0.027	0.95	37	0.66	1.2	0.1	43	43	0.088	0.07	1.01	1.15	0.067	1.3
4.600	15.09	447.31	44.89	0.22	2.69	0.50	121	0.903	0.852	-0.238	0.027	0.95	42	0.59	1.1	14.6	48	63	0.102	0.08	1.02	1.15	0.067	1.5
4.650	15.26	447.14	56.43	0.30	2.98	0.54	121	0.913	0.856	-0.241	0.027	0.95	53	0.57	1.1	10.4	60	71	0.108	0.08	1.02	1.15	0.068	1.6
4.700	15.42	446.98	66.74	0.36	3.18	0.54	121	0.922	0.861	-0.245	0.028	0.95	63	0.55	1.1	6.9	71	78	0.114	0.09	1.02	1.15	0.068	1.7
4.750	15.58	446.82	80.11	0.31	3.44	0.39	121	0.932	0.866	-0.248	0.028	0.95	76	0.53	1.1	0.1	84	84	0.120	0.09	1.02	1.15	0.068	1.8
4.800	15.75	446.65	99.42	0.32	3.52	0.32	124	0.942	0.871	-0.252	0.029	0.95	94	0.49	1.1	0.1	103	103	0.142	0.11	1.02	1.15	0.068	2.0
4.850	15.91	446.49	103.14	0.30	3.21	0.29	124	0.953	0.876	-0.255	0.029	0.95	97	0.48	1.1	0.0	107	107	0.147	0.11	1.02	1.15	0.069	2.0
4.900	16.08	446.32	100.75	0.34	3.52	0.33	124	0.963	0.881	-0.259	0.029	0.95	95	0.49	1.1	0.1	104	104	0.143	0.11	1.02	1.15	0.069	2.0
4.950	16.24	446.16	96.89	0.37	4.66	0.38	124	0.973	0.886	-0.263	0.030	0.95	92	0.50	1.1	0.2	100	100	0.138	0.11	1.02	1.15	0.069	2.0
5.000	16.40	446.00	98.74	0.45	4.62	0.46	124	0.983	0.891	-0.266	0.030	0.95	93	0.49	1.1	0.2	102	102	0.140	0.11	1.02	1.15	0.070	2.0
5.050	16.57	445.83	97.45	0.53	4.04	0.54	124	0.993	0.896	-0.270	0.031	0.94	92	0.49	1.1	1.7	100	102	0.139	0.11	1.02	1.15	0.070	2.0
5.100	16.73	445.67	94.30	0.54	3.74	0.57	121	1.003	0.901	-0.273	0.031	0.94	89	0.50	1.1	2.4	97	99	0.136	0.11	1.02	1.15	0.070	1.9
5.150	16.90	445.50	93.55	0.48	3.33	0.52	124	1.013	0.906	-0.277	0.031	0.94	88	0.50	1.1	1.8	96	97	0.134	0.10	1.02	1.15	0.071	1.9
5.200	17.06	445.34	91.34	0.46	3.99	0.50	124	1.024	0.911	-0.281	0.032	0.94	86	0.51	1.1	1.9	93	95	0.131	0.10	1.02	1.15	0.071	1.8
5.250	17.22	445.18	99.97	0.43	4.43	0.43	124	1.034	0.916	-0.284	0.032	0.94	94	0.49	1.1	0.2	101	102	0.139	0.11	1.02	1.15	0.071	2.0
5.300	17.39	445.01	104.00	0.47	4.60	0.45	124	1.044	0.921	-0.288	0.033	0.94	98	0.49	1.1	0.2	105	105	0.145	0.11	1.02	1.15	0.071	2.0
5.350	17.55	444.85	94.43	0.49	4.02	0.52	124	1.054	0.926	-0.292	0.033	0.94	89	0.50	1.1	1.9	95	97	0.134	0.10	1.01	1.15	0.072	1.9
5.400	17.72	444.68	82.40	0.33	3.99	0.41	121	1.064	0.931	-0.295	0.033	0.94	78	0.54	1.1	0.1	83	84	0.119	0.09	1.01	1.15	0.072	1.6
5.450	17.88	444.52	77.27	0.37	4.95	0.48	121	1.074	0.936	-0.299	0.034	0.94	73	0.55	1.1	0.1	78	78	0.114	0.09	1.01	1.15	0.072	1.6
5.500	18.04	444.36	65.51	0.40	6.94	0.60	121	1.084	0.941	-0.303	0.034	0.94	62	0.56	1.1	9.8	66	76	0.112	0.09	1.01	1.15	0.073	1.5
5.550	18.21	444.19	65.25	0.40	7.58	0.62	121	1.094	0.946	-0.307	0.035	0.94	62	0.56	1.1	10.3	66	76	0.112	0.09	1.01	1.15	0.073	1.5
5.600	18.37	444.03	77.62	0.40	4.71	0.52	121	1.104	0.950	-0.310	0.035	0.94	73	0.54	1.1	4.6	78	82	0.118	0.09	1.01	1.15	0.073	1.6
5.650	18.54	443.86	89.83	0.37	-1.41	0.41	124	1.114	0.955	-0.314	0.036	0.93	85	0.52	1.1	0.2	90	90	0.125	0.10	1.01	1.15	0.073	1.7
5.700	18.70	443.70	100.92	0.33	-7.17	0.33	124	1.124	0.960	-0.318	0.036	0.93	95	0.50	1.0	0.2	100	100	0.138	0.11	1.01	1.15	0.074	1.9
5.750	18.86	443.54	100.01	0.38	-7.97	0.38	124	1.134	0.965	-0.322	0.036	0.93	95	0.50	1.0	0.2	99	99	0.136	0.11	1.01	1.15	0.074	1.8
5.800	19.03	443.37	85.43	0.45	-7.80	0.53	121	1.144	0.970	-0.325	0.037	0.93	81	0.53	1.0	3.5	84	88	0.123	0.10	1.01	1.15	0.074	1.7
5.850	19.19	443.21	77.17	0.45	-5.92	0.58	121	1.154	0.975	-0.329	0.037	0.93	73	0.54	1.0	6.3	76	83	0.118	0.09	1.01	1.15	0.075	1.6
5.900	19.36	443.04	76.56	0.41	-4.30	0.53	121	1.164	0.980	-0.333	0.038	0.93	72	0.54	1.0	5.4	75	81	0.117	0.09	1.01	1.15	0.075	1.6
5.950	19.52	442.88	80.70	0.39	-2.46	0.48	121	1.174	0.985	-0.337	0.038	0.93	76	0.55	1.0	0.1	79	79	0.115	0.09	1.01	1.15	0.075	1.5
6.000	19.68	442.72	90.31	0.37	0.47	0.41	124	1.184	0.990	-0.341	0.038	0.93	85	0.52	1.0	0.1	88	89	0.124	0.10	1.01	1.15	0.075	1.6

Table I-7: Liquefaction Analysis for CPT HAV-C005 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
6.050	19.85	442.55	70.75	0.39	9.27	0.55	121	1.194	0.995	-0.345	0.039	0.93	67	0.56	1.0	7.5	69	77	0.113	0.09	1.01	1.15	0.075	1.5
6.100	20.01	442.39	81.96	0.37	6.81	0.45	121	1.204	0.999	-0.348	0.039	0.93	77	0.55	1.0	0.1	80	80	0.116	0.09	1.01	1.15	0.076	1.5
6.150	20.18	442.22	75.46	0.35	6.76	0.46	121	1.214	1.004	-0.352	0.040	0.93	71	0.56	1.0	0.1	73	74	0.110	0.09	1.00	1.15	0.076	1.5
6.200	20.34	442.06	73.53	0.34	6.76	0.46	121	1.224	1.009	-0.356	0.040	0.93	69	0.57	1.0	0.1	71	72	0.109	0.08	1.00	1.15	0.076	1.4
6.250	20.51	441.90	72.72	0.33	7.04	0.46	121	1.234	1.014	-0.360	0.041	0.93	69	0.57	1.0	0.1	70	71	0.108	0.08	1.00	1.15	0.076	1.4
6.300	20.67	441.73	72.06	0.36	7.27	0.50	121	1.244	1.019	-0.364	0.041	0.92	68	0.56	1.0	6.1	70	76	0.112	0.09	1.00	1.15	0.077	1.5
6.350	20.83	441.57	76.33	0.38	7.81	0.50	121	1.254	1.023	-0.368	0.042	0.92	72	0.55	1.0	5.1	73	79	0.115	0.09	1.00	1.15	0.077	1.5
6.400	21.00	441.40	86.39	0.39	8.39	0.45	121	1.264	1.028	-0.372	0.042	0.92	82	0.54	1.0	0.1	83	83	0.119	0.09	1.00	1.15	0.077	1.5
6.450	21.16	441.24	99.96	0.46	8.40	0.46	121	1.274	1.033	-0.376	0.042	0.92	94	0.51	1.0	0.2	96	96	0.132	0.10	1.00	1.15	0.077	1.7
6.500	21.33	441.07	99.39	0.51	8.24	0.51	124	1.284	1.038	-0.380	0.043	0.92	94	0.51	1.0	1.8	95	97	0.133	0.10	1.00	1.15	0.077	1.7
6.550	21.49	440.91	103.97	0.53	8.55	0.51	124	1.294	1.043	-0.384	0.043	0.92	98	0.50	1.0	1.5	99	100	0.138	0.11	1.00	1.15	0.078	1.8
6.600	21.65	440.75	113.27	0.58	8.95	0.51	124	1.304	1.048	-0.388	0.044	0.92	107	0.48	1.0	0.9	108	108	0.149	0.11	1.00	1.15	0.078	1.9
6.650	21.82	440.58	122.64	0.61	9.06	0.49	124	1.314	1.053	-0.392	0.044	0.92	116	0.46	1.0	0.2	116	116	0.163	0.12	1.00	1.15	0.078	2.0
6.700	21.98	440.42	120.16	0.58	9.00	0.49	124	1.325	1.058	-0.396	0.045	0.92	114	0.47	1.0	0.2	114	114	0.158	0.12	1.00	1.15	0.078	2.0
6.750	22.15	440.25	129.98	0.59	9.38	0.45	124	1.335	1.063	-0.400	0.045	0.92	123	0.45	1.0	0.2	123	123	0.178	0.13	1.00	1.15	0.078	2.0
6.800	22.31	440.09	140.92	0.62	9.76	0.44	124	1.345	1.069	-0.404	0.045	0.92	133	0.43	1.0	0.1	133	133	0.206	0.14	1.00	1.15	0.079	2.0
6.850	22.47	439.93	140.06	0.56	9.68	0.40	124	1.355	1.074	-0.408	0.046	0.92	132	0.44	1.0	0.0	132	132	0.202	0.14	1.00	1.15	0.079	2.0
6.900	22.64	439.76	138.05	0.59	9.66	0.43	124	1.365	1.079	-0.412	0.046	0.91	130	0.44	1.0	0.1	129	129	0.196	0.13	1.00	1.15	0.079	2.0
6.950	22.80	439.60	125.11	0.65	10.23	0.52	124	1.376	1.084	-0.416	0.047	0.91	118	0.46	1.0	0.5	117	117	0.166	0.12	1.00	1.15	0.079	2.0
7.000	22.97	439.43	125.86	0.64	10.05	0.51	124	1.386	1.089	-0.420	0.047	0.91	119	0.46	1.0	0.5	117	118	0.167	0.12	1.00	1.15	0.079	2.0
7.050	23.13	439.27	135.42	0.67	10.42	0.49	124	1.396	1.094	-0.424	0.048	0.91	128	0.44	1.0	0.2	126	126	0.187	0.13	1.00	1.15	0.080	2.0
7.100	23.29	439.11	134.88	0.66	9.93	0.49	124	1.406	1.099	-0.428	0.048	0.91	127	0.45	1.0	0.2	125	125	0.185	0.13	1.00	1.15	0.080	2.0
7.150	23.46	438.94	132.64	0.60	10.13	0.45	124	1.416	1.104	-0.432	0.049	0.91	125	0.45	1.0	0.2	123	123	0.179	0.13	0.99	1.15	0.080	2.0
7.200	23.62	438.78	134.34	0.58	10.35	0.43	124	1.426	1.109	-0.437	0.049	0.91	127	0.45	1.0	0.1	124	124	0.182	0.13	0.99	1.15	0.080	2.0
7.250	23.79	438.61	121.51	0.53	10.29	0.43	124	1.437	1.114	-0.441	0.050	0.91	115	0.47	1.0	0.2	112	112	0.156	0.12	0.99	1.15	0.080	1.9
7.300	23.95	438.45	109.16	0.48	10.21	0.44	124	1.447	1.119	-0.445	0.050	0.91	103	0.50	1.0	0.2	100	100	0.138	0.11	0.99	1.15	0.080	1.7
7.350	24.11	438.29	103.15	0.44	10.58	0.43	124	1.457	1.124	-0.449	0.051	0.91	97	0.51	1.0	0.2	95	95	0.131	0.10	0.99	1.15	0.080	1.6
7.400	24.28	438.12	108.73	0.46	11.33	0.42	124	1.467	1.129	-0.453	0.051	0.91	103	0.50	1.0	0.2	99	100	0.137	0.11	0.99	1.15	0.081	1.7
7.450	24.44	437.96	124.52	0.49	11.90	0.39	124	1.477	1.134	-0.457	0.051	0.90	118	0.47	1.0	0.1	114	114	0.159	0.12	0.99	1.15	0.081	2.0
7.500	24.61	437.79	123.68	0.52	11.75	0.42	124	1.488	1.139	-0.462	0.052	0.90	117	0.47	1.0	0.2	113	113	0.157	0.12	0.99	1.15	0.081	1.9
7.550	24.77	437.63	121.94	0.55	11.88	0.45	124	1.498	1.144	-0.466	0.052	0.90	115	0.47	1.0	0.2	111	111	0.154	0.12	0.99	1.15	0.081	1.9
7.600	24.93	437.47	121.01	0.58	12.02	0.48	124	1.508	1.149	-0.470	0.053	0.90	114	0.48	1.0	0.2	110	110	0.152	0.12	0.99	1.15	0.081	1.9
7.650	25.10	437.30	134.34	0.63	12.68	0.47	124	1.518	1.155	-0.474	0.053	0.90	127	0.45	1.0	0.2	122	122	0.176	0.13	0.99	1.15	0.082	2.0
7.700	25.26	437.14	155.46	0.69	13.09	0.44	124	1.528	1.160	-0.478	0.054	0.90	147	0.42	1.0	0.0	141	141	0.241	0.15	0.99	1.15	0.082	2.0
7.750	25.43	436.97	152.45	0.75	11.14	0.49	124	1.538	1.165	-0.483	0.054	0.90	144	0.42	1.0	0.1	138	138	0.228	0.14	0.99	1.15	0.082	2.0
7.800	25.59	436.81	138.59	0.66	11.20	0.48	124	1.549	1.170	-0.487	0.055	0.90	131	0.45	1.0	0.2	125	125	0.184	0.13	0.99	1.15	0.082	2.0
7.850	25.75	436.65	129.22	0.42	12.92	0.32	124	1.559	1.175	-0.491	0.055	0.90	122	0.46	1.0	0.0	116	116	0.164	0.12	0.99	1.15	0.082	2.0
7.900	25.92	436.48	124.50	0.39	13.39	0.31	124	1.569	1.180	-0.495	0.056	0.90	118	0.47	0.9	0.0	112	112	0.155	0.12	0.99	1.15	0.082	1.9
7.950	26.08	436.32	128.54	0.37	13.97	0.29	124	1.579	1.185	-0.500	0.056	0.90	121	0.47	0.9	0.0	115	115	0.161	0.12	0.99	1.15	0.082	2.0
8.000	26.25	436.15	137.50	0.42	13.64	0.31	124	1.589	1.190	-0.504	0.057	0.90	130	0.45	0.9	0.0	123	123	0.179	0.13	0.98	1.15	0.083	2.0
8.050	26.41	435.99	165.89	0.52	14.42	0.31	124	1.600	1.195	-0.508	0.057	0.89	157	0.40	1.0	0.0	149	149	0.284	0.16	0.98	1.15	0.083	2.0
8.100	26.57	435.83	174.36	0.54	14.12	0.31	124	1.610	1.200	-0.512	0.058	0.89	165	0.39	1.0	0.0	157	157	0.341	0.17	0.98	1.15	0.083	2.0
8.150	26.74	435.66	181.66	0.61	14.75	0.34	124	1.620	1.205	-0.517	0.058	0.89	172	0.38	1.0	0.0	163	163	0.408	0.18	0.98	1.15	0.084	2.0
8.200	26.90	435.50	180.53	0.64	13.89	0.36	124	1.630	1.210	-0.521	0.059	0.89	171	0.38	0.9	0.0	162	162	0.393	0.18	0.98	1.15	0.084	2.0
8.250	27.07	435.33	183.92	0.77	14.32	0.42	124	1.640	1.215	-0.525	0.059	0.89	174	0.38	0.9	0.0	165	165	0.428	0.18	0.97	1.15	0.084	2.0
8.300	27.23	435.17	187.22	0.87	14.64	0.46	124	1.650	1.220	-0.530	0.059	0.89	177	0.38	0.9	0.0	168	168	0.467	0.19	0.97	1.15	0.084	2.0
8.350	27.39	435.01	175.93	0.91	13.20	0.52	124	1.661	1.225	-0.534	0.060	0.89	166	0.39	0.9	0.0	157	157	0.342	0.17	0.98	1.15	0.084	2.0
8.400	27.56	434.84	153.38	0.71	13.53	0.46	124	1.671	1.230	-0.538	0.060	0.89	145	0.43	0.9	0.1	136	136	0.218	0.14	0.98	1.15	0.084	2.0
8.450	27.72	434.68	125.74	0.59	15.64	0.47	124	1.681	1.235	-0.543	0.061	0.89	119	0.48	0.9	0.2	110	111	0.153	0.12	0.98	1.15	0.084	1.8
8.500	27.89	434.51	110.25	0.65	14.86	0.59	124	1.691	1.241	-0.547	0.061	0.89	104	0.50	0.9	2.8	96	99	0.136	0.11	0.98	1.15	0.084	1.6
8.550	28.05	434.35	98.11	0.44	14.22	0.45	124	1.701	1.246	-0.552	0.062	0.89	93	0.53	0.9	0.1	85	85	0.121	0.09	0.98	1.15	0.084	1.4
8.600	28.21	434.19	91.17	0.39	15.29	0.43	124	1.712	1.251	-0.556	0.062	0.88	86	0.55	0.9	0.1	79	79	0.115	0.09	0.98	1.15	0.084	1.4
8.650	28.38	434.02	93.57	0.40	15.21	0.42	124	1.722	1.256	-0.560	0.063	0.88	88	0.54	0.9	0.1	81	81	0.116	0.09	0.98	1.15	0.084	1.4
8.700	28.54	433.86	91.95	0.42	25.30	0.46	124	1.732	1.261	-0.565	0.063	0.88	87	0.55	0.9	0.1	79	79	0.115	0.09	0.98	1.15	0.084	1.4
8.750	28.71	433.69	92.19	0.47	16.02	0.51	124	1.742	1.266	-0.569	0.064	0.88	87	0.54	0.9	4.0	79	83	0.119	0.09	0.98	1.15	0.084	1.4
8.800	28.87	433.53	96.82	0.39	16.07	0.40	124	1.752	1.271	-0.574	0.064	0.88	91	0.54	0.9	0.1	83	83	0.119	0.09	0.98	1.15	0.084	1.4
8.850	29.04	433.36	103.93	0.35	16.54	0.34	124	1.762	1.276	-0.578	0.065	0.88	98	0.52	0.9	0.2	89	89	0.125	0.10	0.98	1.15	0.084	1.5
8.900	29.20	433.20	115.21	0.38	16.92	0.33	124	1.773	1.281	-0.582	0.065	0.88	109	0.50	0.9	0.2	99	99	0.136	0.11	0.98	1.15	0.085	1.6
8.950	29.36	433.04	120.63	0.41	19.39	0.34	124	1.783	1.286	-0.587	0.066	0.88	114	0.49	0.9	0.1	104	104	0.142	0.11	0.98	1.15	0.085	1.7
9.000	29.53	432.87	114.34	0.43	16.94	0.38	124	1.793	1.291	-0.591	0.066	0.88	108	0.50	0.9	0.2	98	98	0.135	0.10	0.98	1.15	0.085	1.6
9.050	29.69	432.71	106.21	0.41	16.18	0.39	124	1.803	1.296	-0.596	0.067	0.88	100	0.52	0.9	0.2	90	90	0.126	0.10	0.98	1.15	0.085	1.5
9.100	29.86	432.54	98.56	0.38	16.67	0.39	124	1.813	1.301	-0.600	0.067	0.88	93	0.54	0.9	0.1	83	83	0.119	0.09	0.98	1.15	0.085	1.4
9.150	30.02	432.38	94.86	0.36	16.95	0.38	124	1.824	1.306	-0.605	0.068	0.87	90	0.55	0.9	0.1	80	80	0.116	0.09	0.98	1.15	0.085	1.4
9.200	30.18	432.22	95.02	0.36	16.97	0.38	124	1.834	1.311	-0.609	0.068	0.87	90	0.55	0.9	0.1	80	80	0.116	0.09	0.98	1.15	0.085	1.4
9.250	30.35	432.05	95.57	0.38	17.21	0.39	124	1.844	1.316	-0.614	0.069	0.87	90	0.55	0.9	0.1	80	80	0.116	0.09	0.98	1.15	0.085	1.4
9.300	30.51	431.89	96.02	0.39	17.49	0.40	124	1.854	1.322	-0.618	0.069	0.87	91	0.54	0.9	0.1	80	81	0.116	0.09	0.98	1.15	0.085	1.4
9.350	30.68	431.72	98.85	0.41	17.67	0.41	124	1.864	1.327	-0.623	0.070	0.87	93	0.54	0.9	0.1	83	83	0.118	0.09	0.98	1.15	0.085	1.4
9.400	30.84	431.56	100.61	0.43	17.86	0.43	124	1.874	1.332	-0.627	0.070	0.87	95	0.54	0.9	0.1	84	84	0.120	0.09	0.98	1.15	0.085	1.4
9.450	31.00	431.40	101.71	0.44	18.05	0.43	124	1.885	1.337	-0.632	0.071	0.87	96	0.53	0.9	0.1	85	85	0.120	0.09	0.98	1.15	0.085	1.4
9.500	31.17	431.23	104.88	0.44	18.31	0.41	124	1.895	1.342	-0.636	0.071	0.87	99	0.53	0.9	0.1	87	88	0.123	0.10	0.98	1.15	0.085	1.4
9.550	31.33	431.07	107.83	0.45	18.77	0.42	124	1.905	1.347	-0.641	0.072	0.87	102	0.52	0.9	0.2	90	90	0.126	0.10	0.98	1.15	0.086	1.5
9.600	31.50	430.90	110.50	0.48	18.67	0.43	124	1.915	1.352	-0.645	0.072	0.87	104	0.52	0.9	0.2	92	92	0.128	0.10	0.98	1.15	0.086	1.5
9.650	31.66	430.74	113.10	0.49	19.75	0.43	124	1.925	1.357	-0.650	0.073	0.87	107	0.51	0.9	0.2	94	94	0.130	0.10	0.97	1.15	0.086	1.5
9.700	31.82	430.58	116.05	0.48	19.40	0.41	124	1.936	1.362	-0.654	0.073	0.86	110	0.51	0.9	0.2	97	97	0.133	0.10	0.97	1.15	0.086	1.5
9.750	31.99	430.41	119.21	0.47	20.23	0.39	124	1.946	1.367	-0.659	0.074	0.86	113	0.50	0.9	0.2	99	99	0.136	0.11	0.97	1.15	0.086	1.6
9.800	32.15	430.25	121.51	0.53	19.75	0.44	124	1.956	1.372	-0.663	0.074	0.86	115	0.50	0.9	0.2	101	101	0.139	0.11	0.97	1.15	0.086	1.6
9.850	32.32	430.08	120.16	0.50	19.78	0.42	124	1.966	1.377	-0.668	0.075	0.86	114	0.50	0.9	0.2	100	100	0.137	0.11	0.97	1.15	0.086	1.6
9.900	32.48	429.92	120.52	0.43	22.12	0.36	124	1.976	1.382	-0.673	0.075	0.86	114	0.50	0.9	0.2	100	100	0.137	0.11	0.97	1.15	0.086	1.6
9.950	32.64	429.76	122.70	0.43	21.65	0.35	124	1.986	1.387	-0.677	0.076	0.86	116	0.49	0.9	0.2	101	102	0.139	0.11	0.97	1.15	0.086	1.6
10.000	32.81	429.59	122.73	0.46	22.53	0.37	124	1.997	1.392	-0.682	0.076	0.86	116	0.50	0.9	0.2	101	101	0.139	0.11	0.97	1.15	0.086	1.6
10.050	32.97	429.43	128.89	0.48	20.64	0.38	124	2.007	1.397	-0.686	0.077	0.86	122	0.48	0.9	0.2	106	107	0.147	0.11	0.97	1.15	0.087	1.7
10.100	33.14	429.26	132.65	0.53	20.88	0.40	124	2.017	1.402	-0.691	0.077	0.86	125	0.48	0.9	0.2	110	110	0.152	0.11	0.97	1.15	0.087	1.7
10.150	33.30	429.10	146.20	0.54	21.77	0.37	124	2.027	1.408	-0.696	0.078	0.86	138	0.45	0.9	0.1	121	121	0.174	0.13	0.96	1.15	0.087	2.0
10.200	33.46	428.94	155.61	0.65	20.29	0.42	124	2.037	1.413	-0.700	0.078	0.86	147	0.44	0.9	0.1	130	130	0.196	0.13	0.96	1.15	0.087	2.0
10.250	33.63	428.77	157.31	0.74	36.15	0.47	124	2.048	1.418	-0.705	0.079	0.85	149	0.44	0.9	0.1	131	131	0.200	0.14	0.96	1.15	0.088	2.0
10.300	33.79	428.61	178.52	0.80	23.36	0.45	124	2.058	1.423	-0.709	0.079	0.85	169	0.40	0.9	0.0	150	150	0.287	0.16	0.95	1.15	0.088	2.0
10.350	33.96	428.44	200.31	0.97	23.27	0.49	124	2.068	1.428	-0.714	0.080	0.85	189	0.37	0.9	0.0	169	169	0.492	0.19	0.94	1.15	0.089	2.0
10.400	34.12	428.28	214.12	1.09	24.22	0.51	124	2.078	1.433	-0.719	0.080	0.85	202	0.35	0.9	0.0	182	182	0.778	0.22	0.93	1.15	0.090	2.0
10.450	34.28	428.12	222.70	1.06	24.70	0.48	124	2.088	1.438	-0.723	0.081	0.85	210	0.34	0.9	0.0	189	189	1.092	0.23	0.93	1.15	0.091	2.0
10.500	34.45	427.95	250.10	1.13	25.10	0.45	127	2.099	1.443	-0.728	0.081	0.85	236	0.31	0.9	0.0	215	215	2.000	0.30	0.91	1.15	0.093	2.0
10.550	34.61	427.79	265.47	1.02	23.24	0.38	127	2.109	1.448	-0.733	0.082	0.85	251	0.29	0.9	0.0	229	229	2.000	0.30	0.91	1.15	0.093	2.0
10.600	34.78	427.62	250.11	0.89	21.84	0.36	127	2.119	1.454	-0.737	0.082	0.85	236	0.31	0.9	0.0	214	214	2.000	0.30	0.90	1.15	0.093	2.0
10.650	34.94	427.46	227.18	0.75	22.37	0.33	127	2.130	1.459	-0.742	0.083	0.85	215	0.34	0.9	0.0	192	192	1.269	0.24	0.92	1.15	0.091	2.0
10.700	35.10	427.30	200.52	0.74	32.63	0.37	124	2.140	1.464	-0.747	0.083	0.85	189	0.38	0.9	0.0	168	168	0.468	0.19	0.94	1.15	0.090	2.0
10.750	35.27	427.13	207.62	0.89	28.15	0.43	124	2.150	1.469	-0.751	0.084	0.85	196	0.37	0.9	0.0	174	174	0.578	0.20	0.93	1.15	0.090	2.0
10.800	35.43	426.97	199.07	0.97	25.88	0.48	124	2.161	1.474	-0.756	0.084	0.84	188	0.38	0.9	0.0	166	166	0.442	0.18	0.94	1.15	0.090	2.0
10.850	35.60	426.80	188.46	1.05	25.00	0.56	124	2.171	1.479	-0.761	0.085	0.84	178	0.39	0.9	0.1	156	156	0.335	0.17	0.94	1.15	0.089	2.0
10.900	35.76	426.64	178.84	0.84	24.31	0.47	124	2.181	1.484	-0.765	0.085	0.84	169	0.41	0.9	0.0	147	147	0.271	0.16	0.95	1.15	0.089	2.0
10.950	35.92	426.48	141.57	0.86	25.80	0.61	124	2.191	1.490	-0.770	0.086	0.84	134	0.47	0.9	1.5	114	116	0.162	0.12	0.96	1.15	0.088	1.8
11.000	36.09	426.31	174.95	0.97	24.80	0.55	124	2.201	1.495	-0.775	0.087	0.84	165	0.41	0.9	0.2	143	143	0.251	0.15	0.95	1.15	0.089	2.0
11.050	36.25	426.15	187.09	1.07	25.71	0.57	124	2.212	1.500	-0.779	0.087	0.84	177	0.40	0.9	0.1	154	154	0.318	0.17	0.94	1.15	0.089	2.0
11.100	36.42	425.98	230.50	1.64	30.51	0.71	124	2.222	1.505	-0.784	0.088	0.84	218	0.34	0.9	0.1	193	193	1.333	0.24	0.91	1.15	0.092	2.0
11.150	36.58	425.82	307.32	1.94	33.59	0.63	127	2.232	1.510	-0.789	0.088	0.84	290	0.26	0.9	0.0	264	264	2.000	0.30	0.89	1.15	0.094	2.0
11.200	36.74	425.66	348.50	2.50	29.44	0.72	127	2.242	1.515	-0.793	0.089	0.84	329	0.26	0.9	0.0	300	300	2.000	0.30	0.89	1.15	0.095	2.0
11.250	36.91	425.49	331.26	1.77	12.66	0.54	127	2.253	1.521	-0.798	0.089	0.84	313	0.26	0.9	0.0	284	284	2.000	0.30	0.89	1.15	0.095	2.0
11.300	37.07	425.33	287.29	1.77	40.35	0.62	127	2.263	1.526	-0.803	0.090	0.84	271	0.27	0.9	0.0	246	246	2.000	0.30	0.89	1.15	0.095	2.0
11.350	37.24	425.16	272.50	1.70	25.22	0.62	124	2.274	1.531	-0.808	0.090	0.83	258	0.29	0.9	0.0	231	231	2.000	0.30	0.89	1.15	0.095	2.0
11.400	37.40	425.00	324.04	1.52	49.62	0.47	127	2.284	1.536	-0.812	0.091	0.83	306	0.26	0.9	0.0	278	278	2.000	0.30	0.89	1.15	0.095	2.0
11.450	37.57	424.83	334.22	1.67	38.97	0.50	127	2.294	1.542	-0.817	0.091	0.83	316	0.26	0.9	0.0	286	286	2.000	0.30	0.89	1.15	0.095	2.0
11.500	37.73	424.67	326.68	1.84	34.48	0.56	127	2.305	1.547	-0.822	0.092	0.83	309	0.26	0.9	0.0	279	279	2.000	0.30	0.89	1.15	0.095	2.0
11.550	37.89	424.51	281.00	1.83	23.06	0.65	124	2.315	1.552	-0.826	0.092	0.83	266	0.28	0.9	0.0	238	238	2.000	0.30	0.89	1.15	0.095	2.0
11.600	38.06	424.34	228.87	1.54	21.17	0.67	124	2.325	1.557	-0.831	0.093	0.83	216	0.34	0.9	0.0	189	189	1.096	0.23	0.91	1.15	0.093	2.0
11.650	38.22	424.18	209.32	1.18	20.95	0.56	124	2.336	1.562	-0.836	0.093	0.83	198	0.37	0.9	0.0	171	171	0.526	0.19	0.92	1.15	0.091	2.0
11.700	38.39	424.01	200.20	0.95	25.09	0.48	124	2.346	1.567	-0.841	0.094	0.83	189	0.38	0.9	0.0	163	163	0.402	0.18	0.93	1.15	0.091	2.0
11.750	38.55	423.85	183.21	0.90	22.83	0.49	124	2.356	1.572	-0.845	0.094	0.83	173	0.41	0.9	0.1	147	147	0.272	0.16	0.94	1.15	0.090	2.0
11.800	38.71	423.69	173.73	0.82	24.67	0.47	124	2.366	1.577	-0.850	0.095	0.83	164	0.42	0.8	0.1	139	139	0.229	0.15	0.94	1.15	0.090	2.0
11.850	38.88	423.52	164.34	0.85	41.22	0.52	124	2.376	1.582	-0.855	0.095	0.82	155	0.44	0.8	0.3	130	131	0.199	0.14	0.95	1.15	0.089	2.0
11.900	39.04	423.36	164.66	0.57	26.98	0.34	124	2.386	1.587	-0.860	0.096	0.82	156	0.44	0.8	0.0	130	130	0.198	0.14	0.95	1.15	0.089	2.0
11.950	39.21	423.19	140.12	0.52	26.34	0.37	124	2.397	1.593	-0.864	0.096	0.82	132	0.48	0.8	0.2	109	109	0.150	0.11	0.95	1.15	0.088	1.7
12.000	39.37	423.03	163.32	0.53	24.81	0.32	124	2.407	1.598	-0.869	0.097	0.82	154	0.44	0.8	0.0	129	129	0.194	0.13	0.94	1.15	0.089	2.0
12.050	39.53	422.87	157.03	0.57	26.18	0.36	124	2.417	1.603	-0.874	0.097	0.82	148	0.45	0.8	0.0	123	123	0.178	0.13	0.95	1.15	0.089	2.0
12.100	39.70	422.70	154.16	0.58	22.34	0.38	124	2.427	1.608	-0.879	0.098	0.82	146	0.46	0.8	0.1	120	120	0.172	0.12	0.95	1.15	0.089	1.9
12.150	39.86	422.54	162.28	0.00	25.29	0.00	119	2.437	1.613	-0.883	0.098	0.82	153	0.44	0.8	0.0	127	127	0.189	0.13	0.94	1.15	0.089	2.0
12.200	40.03	422.37	164.66	0.00	29.15	0.00	119	2.447	1.617	-0.888	0.099	0.82	156	0.44	0.8	0.0	129	129	0.195	0.13	0.94	1.15	0.089	2.0

Table I-8: Liquefaction Analysis for CPT HAV-C006

Idriss and Blouanger Liquefaction Analysis from CPT Data — Groudwater Elevation Used
Havana East Ash Pond - Site 6
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

PGA 0.12
Mw 6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	467.34	7.65	0.08	-0.03	1.06	111	0.009	0.009	0.014	-0.001	1.00	7	0.61	1.7	44.6	12	57	0.097	0.08	1.10	1.15	0.062	1.6
0.100	0.33	467.17	61.78	0.23	6.19	0.37	121	0.019	0.019	0.012	-0.001	1.00	58	0.50	1.7	0.0	99	99	0.136	0.11	1.10	1.15	0.062	2.0
0.150	0.49	467.01	134.37	0.38	2.52	0.28	124	0.029	0.029	0.010	-0.001	1.00	127	0.31	1.7	0.0	216	216	2.000	0.30	1.10	1.15	0.062	2.0
0.200	0.66	466.84	195.89	0.82	5.46	0.42	124	0.039	0.039	0.008	-0.000	1.00	185	0.26	1.7	0.0	315	315	2.000	0.30	1.10	1.15	0.062	2.0
0.250	0.82	466.68	240.73	0.91	5.08	0.38	127	0.049	0.049	0.006	-0.000	1.00	227	0.26	1.7	0.0	387	387	2.000	0.30	1.10	1.15	0.062	2.0
0.300	0.98	466.52	333.69	1.07	8.90	0.32	127	0.060	0.060	0.004	0.000	1.00	315	0.26	1.7	0.0	536	536	2.000	0.30	1.10	1.15	0.062	2.0
0.350	1.15	466.35	365.24	1.15	8.38	0.31	127	0.070	0.070	0.002	0.000	1.00	345	0.26	1.7	0.0	587	587	2.000	0.30	1.10	1.15	0.062	2.0
0.400	1.31	466.19	364.60	1.41	5.28	0.39	127	0.081	0.081	-0.000	0.001	1.00	345	0.26	1.7	0.0	586	586	2.000	0.30	1.10	1.15	0.062	2.0
0.450	1.48	466.02	341.67	1.68	2.13	0.49	127	0.091	0.091	-0.003	0.001	1.00	323	0.26	1.7	0.0	549	549	2.000	0.30	1.10	1.15	0.062	2.0
0.500	1.64	465.86	283.93	1.86	5.73	0.65	124	0.101	0.101	-0.005	0.001	1.00	268	0.26	1.7	0.0	456	456	2.000	0.30	1.10	1.15	0.062	2.0
0.550	1.80	465.70	241.13	1.80	-0.66	0.75	124	0.111	0.111	-0.007	0.001	1.00	228	0.26	1.7	0.0	387	387	2.000	0.30	1.10	1.15	0.062	2.0
0.600	1.97	465.53	200.62	1.65	-0.47	0.82	124	0.122	0.122	-0.009	0.001	1.00	190	0.26	1.7	0.0	322	322	2.000	0.30	1.10	1.15	0.062	2.0
0.650	2.13	465.37	179.24	1.50	-0.21	0.84	124	0.132	0.132	-0.011	0.002	1.00	169	0.26	1.7	0.0	288	288	2.000	0.30	1.10	1.15	0.062	2.0
0.700	2.30	465.20	159.71	1.29	0.04	0.81	124	0.142	0.142	-0.013	0.002	1.00	151	0.26	1.7	0.0	256	256	2.000	0.30	1.10	1.15	0.062	2.0
0.750	2.46	465.04	143.28	1.11	-0.34	0.78	124	0.152	0.152	-0.016	0.002	1.00	135	0.29	1.7	0.0	230	230	2.000	0.30	1.10	1.15	0.062	2.0
0.800	2.62	464.88	125.84	0.70	0.04	0.55	124	0.162	0.162	-0.018	0.002	1.00	119	0.33	1.7	0.0	202	202	2.000	0.27	1.10	1.15	0.062	2.0
0.850	2.79	464.71	110.07	0.60	0.75	0.54	124	0.173	0.173	-0.020	0.003	1.00	104	0.36	1.7	0.0	177	177	0.642	0.21	1.10	1.15	0.062	2.0
0.900	2.95	464.55	89.73	0.53	0.57	0.59	121	0.183	0.183	-0.022	0.003	1.00	85	0.41	1.7	0.2	144	144	0.255	0.15	1.10	1.15	0.062	2.0
0.950	3.12	464.38	78.76	0.49	-0.62	0.62	121	0.193	0.193	-0.025	0.003	1.00	74	0.44	1.7	0.7	127	127	0.189	0.13	1.10	1.15	0.062	2.0
1.000	3.28	464.22	69.40	0.44	-0.74	0.63	121	0.202	0.202	-0.027	0.003	1.00	66	0.47	1.7	1.6	111	113	0.157	0.12	1.10	1.15	0.062	2.0
1.050	3.44	464.06	63.25	0.39	-0.65	0.62	121	0.212	0.212	-0.029	0.004	1.00	60	0.49	1.7	2.3	102	104	0.143	0.11	1.10	1.15	0.062	2.0
1.100	3.61	463.89	55.81	0.35	-0.62	0.63	121	0.222	0.222	-0.032	0.004	1.00	53	0.51	1.7	4.1	90	94	0.130	0.10	1.10	1.15	0.062	2.0
1.150	3.77	463.73	50.99	0.32	-0.47	0.63	121	0.232	0.232	-0.034	0.004	1.00	48	0.53	1.7	5.6	82	88	0.123	0.10	1.10	1.15	0.062	2.0
1.200	3.94	463.56	47.10	0.30	-0.35	0.63	121	0.242	0.242	-0.036	0.005	1.00	45	0.54	1.7	7.2	76	83	0.118	0.09	1.10	1.15	0.062	1.9
1.250	4.10	463.40	44.48	0.28	-0.41	0.63	121	0.252	0.252	-0.039	0.005	0.99	42	0.55	1.7	8.4	71	80	0.116	0.09	1.10	1.15	0.062	1.9
1.300	4.27	463.23	41.86	0.26	-0.41	0.63	118	0.262	0.262	-0.041	0.005	0.99	40	0.55	1.7	9.5	67	77	0.113	0.09	1.10	1.15	0.062	1.8
1.350	4.43	463.07	40.67	0.25	-0.25	0.62	118	0.272	0.272	-0.044	0.005	0.99	38	0.56	1.7	10.0	65	75	0.112	0.09	1.10	1.15	0.061	1.8
1.400	4.59	462.91	40.02	0.24	-0.30	0.59	118	0.281	0.281	-0.046	0.006	0.99	38	0.56	1.7	9.7	64	74	0.111	0.09	1.10	1.15	0.061	1.8
1.450	4.76	462.74	40.38	0.24	-0.28	0.59	118	0.291	0.291	-0.049	0.006	0.99	38	0.56	1.7	9.5	65	74	0.111	0.09	1.10	1.15	0.061	1.8
1.500	4.92	462.58	40.62	0.23	-0.28	0.58	118	0.300	0.300	-0.051	0.006	0.99	38	0.56	1.7	8.9	65	74	0.111	0.09	1.10	1.15	0.061	1.8
1.550	5.09	462.41	41.53	0.24	-0.27	0.58	118	0.310	0.310	-0.054	0.006	0.99	39	0.56	1.7	8.5	67	75	0.112	0.09	1.10	1.15	0.061	1.8
1.600	5.25	462.25	42.90	0.25	-0.20	0.58	118	0.320	0.320	-0.056	0.007	0.99	41	0.55	1.7	8.0	69	77	0.113	0.09	1.10	1.15	0.061	1.8
1.650	5.41	462.09	44.50	0.27	-0.16	0.60	121	0.330	0.330	-0.059	0.007	0.99	42	0.55	1.7	7.5	71	79	0.115	0.09	1.10	1.15	0.061	1.9
1.700	5.58	461.92	45.48	0.29	-0.25	0.63	121	0.340	0.340	-0.061	0.007	0.99	43	0.54	1.7	7.9	73	81	0.117	0.09	1.10	1.15	0.061	1.9
1.750	5.74	461.76	48.09	0.30	-0.12	0.63	121	0.349	0.349	-0.064	0.008	0.99	45	0.54	1.7	6.8	77	84	0.120	0.09	1.10	1.15	0.061	2.0
1.800	5.91	461.59	52.99	0.29	-0.02	0.55	121	0.359	0.359	-0.066	0.008	0.99	50	0.52	1.7	3.6	85	89	0.124	0.10	1.10	1.15	0.061	2.0
1.850	6.07	461.43	59.12	0.35	0.13	0.59	121	0.369	0.369	-0.069	0.008	0.99	56	0.50	1.7	3.0	95	98	0.135	0.10	1.10	1.15	0.061	2.0
1.900	6.23	461.27	68.07	0.38	0.48	0.56	121	0.379	0.379	-0.072	0.008	0.99	64	0.48	1.6	1.3	106	107	0.147	0.11	1.10	1.15	0.061	2.0
1.950	6.40	461.10	72.11	0.39	0.28	0.54	121	0.389	0.389	-0.074	0.009	0.99	68	0.48	1.6	0.8	110	111	0.153	0.12	1.10	1.15	0.061	2.0
2.000	6.56	460.94	72.32	0.39	0.07	0.54	121	0.399	0.399	-0.077	0.009	0.99	68	0.48	1.6	0.9	109	110	0.152	0.11	1.10	1.15	0.061	2.0
2.050	6.73	460.77	73.35	0.41	0.23	0.55	121	0.409	0.409	-0.080	0.009	0.99	69	0.48	1.6	1.0	109	110	0.152	0.12	1.10	1.15	0.061	2.0
2.100	6.89	460.61	74.82	0.42	0.42	0.56	121	0.419	0.419	-0.082	0.010	0.98	71	0.48	1.6	1.0	110	111	0.153	0.12	1.10	1.15	0.061	2.0
2.150	7.05	460.45	74.96	0.42	0.25	0.56	121	0.429	0.429	-0.085	0.010	0.98	71	0.48	1.5	1.1	109	110	0.152	0.12	1.10	1.15	0.061	2.0
2.200	7.22	460.28	74.68	0.42	0.17	0.56	121	0.439	0.439	-0.088	0.010	0.98	71	0.48	1.5	1.2	108	109	0.150	0.11	1.10	1.15	0.061	2.0
2.250	7.38	460.12	74.75	0.43	0.16	0.57	121	0.449	0.449	-0.091	0.011	0.98	71	0.48	1.5	1.3	107	108	0.149	0.11	1.10	1.15	0.061	2.0
2.300	7.55	459.95	74.25	0.43	0.16	0.58	121	0.459	0.459	-0.093	0.011	0.98	70	0.48	1.5	1.5	105	107	0.147	0.11	1.09	1.15	0.061	2.0
2.350	7.71	459.79	73.52	0.42	0.17	0.58	121	0.468	0.468	-0.096	0.011	0.98	69	0.49	1.5	1.7	103	105	0.144	0.11	1.09	1.15	0.061	2.0
2.400	7.87	459.63	73.97	0.41	0.34	0.55	121	0.478	0.478	-0.099	0.012	0.98	70	0.49	1.5	1.5	103	104	0.143	0.11	1.09	1.15	0.061	2.0
2.450	8.04	459.46	74.72	0.41	0.36	0.55	121	0.488	0.488	-0.102	0.012	0.98	71	0.49	1.5	1.5	103	104	0.143	0.11	1.09	1.15	0.062	2.0
2.500	8.20	459.30	76.47	0.42	0.43	0.55	121	0.498	0.498	-0.105	0.012	0.98	72	0.49	1.4	1.3	104	106	0.145	0.11	1.08	1.15	0.062	2.0
2.550	8.37	459.13	76.03	0.42	0.38	0.55	121	0.508	0.508	-0.107	0.012	0.98	72	0.49	1.4	1.5	103	104	0.143	0.11	1.08	1.15	0.062	2.0
2.600	8.53	458.97	75.39	0.42	0.26	0.55	121	0.518	0.518	-0.110	0.013	0.98	71	0.49	1.4	1.7	101	103	0.141	0.11	1.08	1.15	0.062	2.0
2.650	8.69	458.81	75.81	0.44	1.11	0.57	121	0.528	0.528	-0.113	0.013	0.98	72	0.49	1.4	1.9	101	103	0.141	0.11	1.08	1.15	0.062	2.0
2.700	8.86	458.64	72.97	0.44	0.23	0.60	121	0.538	0.538	-0.116	0.013	0.98	69	0.50	1.4	2.8	97	99	0.137	0.11	1.07	1.15	0.062	2.0
2.750	9.02	458.48	69.62	0.41	0.00	0.59	121	0.548	0.548	-0.119	0.014	0.98	66	0.51	1.4	3.4	92	95	0.132	0.10	1.07	1.15	0.062	2.0
2.800	9.19	458.31	65.31	0.35	-0.12	0.54	121	0.558	0.558	-0.122	0.014	0.98	62	0.52	1.4	3.6	86	90	0.125	0.10	1.06	1.15	0.063	2.0
2.850	9.35	458.15	64.43	0.34	0.14	0.53	121	0.568	0.568	-0.125	0.014	0.98	61	0.53	1.4	3.7	84	88	0.124	0.10	1.06	1.15	0.063	2.0
2.900	9.51	457.99	65.03	0.32	0.44	0.50	121	0.578	0.578	-0.128	0.015	0.97	61	0.53	1.4	3.1	85	88	0.123	0.10	1.06	1.15	0.063	2.0
2.950	9.68	457.82	69.79	0.32	0.60	0.46	121	0.588	0.588	-0.131	0.015	0.97	66	0.52	1.4	0.2	90	90	0.125	0.10	1.06	1.15	0.063	2.0
3.000	9.84	457.66	73.74	0.32	0.38	0.43	121	0.597	0.597	-0.134	0.015	0.97	70	0.51	1.3	0.2	93	94	0.129	0.10	1.06	1.15	0.063	2.0
3.050	10.01	457.49	77.11	0.33	0.40	0.43	121	0.607	0.607	-0.137	0.016	0.97	73	0.51	1.3	0.2	96	97	0.133	0.10	1.06	1.15	0.063	2.0
3.100	10.17	457.33	78.94	0.38	0.15	0.48	121	0.617	0.617	-0.140	0.016	0.97	75	0.50	1.3	0.2	98	98	0.135	0.10	1.06	1.15	0.063	2.0
3.150	10.33	457.17	76.28	0.38	0.15	0.50	121	0.627	0.627	-0.143	0.016	0.97	72	0.51	1.3	1.8	94	96	0.132	0.10	1.05	1.15	0.063	2.0
3.200	10.50	457.00	68.77	0.35	0.03	0.51	121	0.637	0.637	-0.146	0.017	0.97	65	0.53	1.3	3.2	85	88	0.124	0.10	1.05	1.15	0.063	2.0
3.250	10.66	456.84	65.94	0.33	-0.11	0.49	121	0.647	0.647	-0.149	0.017	0.97	62	0.54	1.3	0.1	81	82	0.117	0.09	1.05	1.15	0.063	1.9
3.300	10.83	456.67	65.26	0.31	0.14	0.48	121	0.657	0.657	-0.152	0.017	0.97	62	0.55	1.3	0.1	80	80	0.116	0.09	1.04	1.15	0.063	1.8
3.350	10.99	456.51	65.16	0.30	0.12	0.47	121	0.667	0.667	-0.155	0.018	0.97	62	0.55	1.3	0.1	79	79	0.115	0.09	1.04	1.15	0.063	1.8
3.400	11.15	456.35	62.81	0.31	-0.03	0.49	121	0.677	0.677	-0.158	0.018	0.97	59	0.56	1.3	0.1	76	76	0.112	0.09	1.04	1.15	0.063	1.8
3.450	11.32	456.18	57.72	0.29	-0.22	0.50	121	0.687	0.687	-0.162	0.019	0.97	55	0.56	1.3	6.7	69	76	0.112	0.09	1.04	1.15	0.063	1.8
3.500	11.48	456.02	54.46	0.28	-0.26	0.52	121	0.697	0.697	-0.165	0.019	0.97	51	0.56	1.3	8.4	65	74	0.110	0.09	1.04	1.15	0.064	1.7
3.550	11.65	455.85	53.58	0.26	-0.18	0.48	121	0.707	0.707	-0.168	0.019	0.97	51	0.59	1.3	0.1	64	64	0.103	0.08	1.03	1.15	0.064	1.6
3.600	11.81	455.69	52.14	0.26	-0.19	0.50	121	0.717	0.717	-0.171	0.020	0.97	49	0.57	1.2	9.1	62	71	0.108	0.08	1.03	1.15	0.064	1.7
3.650	11.97	455.53	51.23	0.24	-0.23	0.46	121	0.726	0.726	-0.174	0.020	0.96	48	0.60	1.3	0.1	61	61	0.100	0.08	1.03	1.15	0.064	1.6
3.700	12.14	455.36	49.66	0.27	-0.18	0.54	121	0.736	0.736	-0.177	0.020	0.96	47	0.58	1.2	11.7	58	70	0.107	0.08	1.03	1.15	0.064	1.7
3.750	12.30	455.20	47.02	0.27	-0.23	0.56	121	0.746	0.746	-0.181	0.021	0.96	44	0.58	1.2	13.8	54	68	0.106	0.08	1.03	1.15	0.064	1.7
3.800	12.47	455.03	48.68	0.22	-0.01	0.45	121	0.756	0.756	-0.184	0.021	0.96	46	0.62	1.2	0.1	57	57	0.097	0.08	1.03	1.15	0.064	1.5
3.850	12.63	454.87	50.80	0.23	0.03	0.44	121	0.766	0.766	-0.187	0.021	0.96	48	0.61	1.2	0.1	58	59	0.098	0.08	1.02	1.15	0.064	1.5
3.900	12.80	454.70	48.09	0.19	0.33	0.40	121	0.776	0.776	-0.190	0.022	0.96	45	0.62	1.2	0.1	55	55	0.096	0.07	1.02	1.15	0.064	1.5
3.950	12.96	454.54	46.90	0.20	0.19	0.42	121	0.786	0.786	-0.194	0.022	0.96	44	0.63	1.2	0.1	53	54	0.095	0.07	1.02	1.15	0.064	1.5
4.000	13.12	454.38	44.96	0.19	-0.23	0.43	121	0.796	0.796	-0.197	0.022	0.96	42	0.63	1.2	0.1	51	51	0.093	0.07	1.02	1.15	0.064	1.5
4.050	13.29	454.21	41.00	0.19	-0.34	0.47	121	0.806	0.806	-0.200	0.023	0.96	39	0.65	1.2	0.1	46	46	0.090	0.07	1.02	1.15	0.064	1.4
4.100	13.45	454.05	39.57	0.19	-0.17	0.47	118	0.816	0.816	-0.204	0.023	0.96	37	0.66	1.2	0.1	44	45	0.088	0.07	1.02	1.15	0.064	1.4
4.150	13.62	453.88	39.71	0.18	-0.15	0.45	118	0.825	0.825	-0.207	0.024	0.96	38	0.66	1.2	0.1	44	44	0.088	0.07	1.02	1.15	0.064	1.4
4.200	13.78	453.72	37.55	0.16	-0.28	0.43	118	0.835	0.835	-0.210	0.024	0.96	35	0.67	1.2	0.1	42	42	0.087	0.07	1.02	1.15	0.064	1.3
4.250	13.94	453.56	34.94	0.16	-0.42	0.47	118	0.845	0.845	-0.214	0.024	0.96	33	0.68	1.2	0.1	39	39	0.084	0.06	1.01	1.15	0.064	1.3
4.300	14.11	453.39	32.73	0.15	0.15	0.46	118	0.854	0.854	-0.217	0.025	0.96	31	0.70	1.2	0.1	36	36	0.083	0.06	1.01	1.15	0.064	1.3
4.350	14.27	453.23	28.70	0.13	0.51	0.46	118	0.864	0.864	-0.221	0.025	0.95	27	0.72	1.2	0.1	31	31	0.080	0.06	1.01	1.15	0.064	1.2
4.400	14.44	453.06	26.97	0.11	1.17	0.42	118	0.874	0.874	-0.224	0.025	0.95	25	0.73	1.2	0.1	29	29	0.078	0.06	1.01	1.15	0.064	1.2
4.450	14.60	452.90	24.19	0.09	1.28	0.37	118	0.883	0.881	-0.227	0.026	0.95	23	0.75	1.1	0.1	26	26	0.076	0.06	1.01	1.15	0.064	1.2
4.500	14.76	452.74	20.03	0.08	1.14	0.38	118	0.893	0.886	-0.231	0.026	0.95	19	0.78	1.1	0.1	22	22	0.074	0.05	1.01	1.15	0.065	1.1
4.550	14.93	452.57	14.72	0.05	1.27	0.36	115	0.902	0.890	-0.234	0.027	0.95	14	0.63	1.1	35.7	16	51	0.093	0.07	1.01	1.15	0.065	1.4
4.600	15.09	452.41	12.36	0.06	1.68	0.47	115	0.912	0.894	-0.238	0.027	0.95	12	0.63	1.1	40.0	13	53	0.094	0.07	1.01	1.15	0.065	1.4
4.650	15.26	452.24	12.88	0.08	3.69	0.58	115	0.921	0.899	-0.241	0.027	0.95	12	0.62	1.1	40.8	13	54	0.095	0.07	1.01	1.15	0.066	1.5
4.700	15.42	452.08	22.09	0.10	3.59	0.44	118	0.931	0.903	-0.245	0.028	0.95	21	0.76	1.1	0.1	24	24	0.075	0.05	1.01	1.15	0.066	1.1
4.750	15.58	451.92	28.39	0.08	3.89	0.30	118	0.940	0.908	-0.248	0.028	0.95	27	0.73	1.1	0.1	30	30	0.079	0.06	1.01	1.15	0.066	1.2
4.800	15.75	451.75	29.33	0.09	3.33	0.29	118	0.950	0.912	-0.252	0.029	0.95	28	0.72	1.1	0.1	31	31	0.079	0.06	1.01	1.15	0.067	1.2
4.850	15.91	451.59	28.83	0.10	3.59	0.33	118	0.960	0.917	-0.255	0.029	0.95	27	0.72	1.1	0.1	30	30	0.079	0.06	1.01	1.15	0.067	1.2
4.900	16.08	451.42	27.39	0.10	3.38	0.37	118	0.969	0.921	-0.259	0.029	0.95	26	0.73	1.1	0.1	29	29	0.078	0.06	1.01	1.15	0.067	1.2
4.950	16.24	451.26	26.08	0.09	4.76	0.33	118	0.979	0.926	-0.263	0.030	0.95	25	0.74	1.1	0.1	27	27	0.077	0.06	1.01	1.15	0.068	1.1
5.000	16.40	451.10	24.46	0.10	4.80	0.40	118	0.989	0.930	-0.266	0.030	0.95	23	0.75	1.1	0.1	25	26	0.076	0.06	1.01	1.15	0.068	1.1
5.050	16.57	450.93	23.40	0.11	4.61	0.45	118	0.998	0.935	-0.270	0.031	0.94	22	0.76	1.1	0.1	24	24	0.075	0.06	1.01	1.15	0.068	1.1
5.100	16.73	450.77	24.88	0.11	4.75	0.43	118	1.008	0.939	-0.273	0.031	0.94	24	0.75	1.1	0.1	26	26	0.076	0.06	1.01	1.15	0.068	1.1
5.150	16.90	450.60	27.37	0.12	4.44	0.45	118	1.018	0.944	-0.277	0.031	0.94	26	0.74	1.1	0.1	28	28	0.078	0.06	1.01	1.15	0.069	1.1
5.200	17.06	450.44	28.60	0.14	4.82	0.50	118	1.027	0.949	-0.281	0.032	0.94	27	0.62	1.1	26.6	29	56	0.096	0.07	1.01	1.15	0.069	1.4
5.250	17.22	450.28	31.26	0.17	5.88	0.53	118	1.037	0.953	-0.284	0.032	0.94	30	0.61	1.1	25.5	31	57	0.097	0.08	1.01	1.15	0.069	1.4
5.300	17.39	450.11	34.88	0.18	5.44	0.52	118	1.047	0.958	-0.288	0.033	0.94	33	0.61	1.1	22.7	35	58	0.098	0.08	1.01	1.15	0.069	1.4
5.350	17.55	449.95	39.99	0.20	4.96	0.49	118	1.056	0.962	-0.292	0.033	0.94	38	0.61	1.1	18.8	40	59	0.099	0.08	1.01	1.15	0.070	1.4
5.400	17.72	449.78	43.82	0.23	4.58	0.52	121	1.066	0.967	-0.295	0.033	0.94	41	0.60	1.1	17.4	44	61	0.100	0.08	1.01	1.15	0.070	1.4
5.450	17.88	449.62	44.40	0.21	4.29	0.48	121	1.076	0.972	-0.299	0.034	0.94	42	0.66	1.1	0.1	44	45	0.088	0.07	1.01	1.15	0.070	1.3
5.500	18.04	449.46	43.63	0.22	4.18	0.51	121	1.086	0.976	-0.303	0.034	0.94	41	0.60	1.0	17.4	43	61	0.100	0.08	1.01	1.15	0.071	1.4
5.550	18.21	449.29	39.36	0.23	4.75	0.57	118	1.096	0.981	-0.307	0.035	0.94	37	0.60	1.0	21.5	39	60	0.100	0.08	1.01	1.15	0.071	1.4
5.600	18.37	449.13	38.17	0.23	4.77	0.59	118	1.105	0.986	-0.310	0.035	0.94	36	0.60	1.0	22.8	38	60	0.100	0.08	1.01	1.15	0.071	1.4
5.650	18.54	448.96	38.15	0.23	5.09	0.61	118	1.115	0.990	-0.314	0.036	0.93	36	0.60	1.0	23.2	38	61	0.100	0.08	1.01	1.15	0.071	1.4
5.700	18.70	448.80	38.40	0.23	5.36	0.61	118	1.125	0.995	-0.318	0.036	0.93	36	0.60	1.0	23.2	38	61	0.100	0.08	1.00	1.15	0.072	1.4
5.750	18.86	448.64	40.85	0.24	5.82	0.59	118	1.134	0.999	-0.322	0.036	0.93	39	0.60	1.0	21.5	40	61	0.101	0.08	1.00	1.15	0.072	1.4
5.800	19.03	448.47	49.81	0.27	6.43	0.55	121	1.144	1.004	-0.325	0.037	0.93	47	0.59	1.0	15.5	49	64	0.103	0.08	1.00	1.15	0.072	1.4
5.850	19.19	448.31	59.74	0.35	6.91	0.58	121	1.154	1.009	-0.329	0.037	0.93	56	0.57	1.0	12.1	58	70	0.107	0.08	1.00	1.15	0.072	1.5
5.900	19.36	448.14	85.71	0.46	6.47	0.54	121	1.164	1.013	-0.333	0.038	0.93	81	0.53	1.0	4.0	83	87	0.122	0.10	1.00	1.15	0.072	1.7
5.950	19.52	447.98	104.95	0.53	7.47	0.50	124	1.174	1.018	-0.337	0.038	0.93	99	0.49	1.0	1.2	101	102	0.140	0.11	1.00	1.15	0.073	1.9

Table I-8: Liquefaction Analysis for CPT HAV-C006

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
6.000	19.68	447.82	125.96	0.59	6.74	0.47	124	1.184	1.023	-0.341	0.038	0.93	119	0.45	1.0	0.2	121	121	0.174	0.13	1.00	1.15	0.073	2.0
6.050	19.85	447.65	123.87	0.63	-2.50	0.51	124	1.194	1.029	-0.345	0.039	0.93	117	0.46	1.0	0.4	119	119	0.169	0.12	1.00	1.15	0.073	2.0
6.100	20.01	447.49	113.06	0.63	5.26	0.56	124	1.205	1.034	-0.348	0.039	0.93	107	0.48	1.0	1.3	108	109	0.151	0.11	1.00	1.15	0.073	2.0
6.150	20.18	447.32	112.01	0.60	5.91	0.54	124	1.215	1.039	-0.352	0.040	0.93	106	0.48	1.0	1.2	107	108	0.149	0.11	1.00	1.15	0.074	2.0
6.200	20.34	447.16	124.00	0.62	7.15	0.50	124	1.225	1.044	-0.356	0.040	0.93	117	0.46	1.0	0.4	118	118	0.168	0.12	1.00	1.15	0.074	2.0
6.250	20.51	447.00	133.43	0.62	7.62	0.47	124	1.235	1.049	-0.360	0.041	0.93	126	0.44	1.0	0.1	127	127	0.188	0.13	1.00	1.15	0.074	2.0
6.300	20.67	446.83	140.08	0.66	7.46	0.47	124	1.245	1.054	-0.364	0.041	0.92	132	0.43	1.0	0.1	133	133	0.206	0.14	1.00	1.15	0.074	2.0
6.350	20.83	446.67	136.55	0.62	7.62	0.45	124	1.255	1.059	-0.368	0.042	0.92	129	0.44	1.0	0.1	129	129	0.195	0.13	1.00	1.15	0.075	2.0
6.400	21.00	446.50	126.04	0.55	7.71	0.43	124	1.266	1.064	-0.372	0.042	0.92	119	0.46	1.0	0.2	119	119	0.169	0.12	1.00	1.15	0.075	2.0
6.450	21.16	446.34	120.05	0.51	7.87	0.42	124	1.276	1.069	-0.376	0.042	0.92	113	0.47	1.0	0.2	113	113	0.157	0.12	1.00	1.15	0.075	2.0
6.500	21.33	446.17	113.78	0.47	8.00	0.41	124	1.286	1.074	-0.380	0.043	0.92	108	0.48	1.0	0.2	107	107	0.147	0.11	1.00	1.15	0.075	2.0
6.550	21.49	446.01	105.21	0.44	8.10	0.42	124	1.296	1.079	-0.384	0.043	0.92	99	0.50	1.0	0.2	98	99	0.136	0.11	1.00	1.15	0.075	1.8
6.600	21.65	445.85	99.97	0.44	8.24	0.44	124	1.306	1.084	-0.388	0.044	0.92	94	0.51	1.0	0.2	93	93	0.129	0.10	1.00	1.15	0.076	1.7
6.650	21.82	445.68	96.81	0.44	8.28	0.45	124	1.317	1.089	-0.392	0.044	0.92	91	0.52	1.0	0.2	90	90	0.126	0.10	1.00	1.15	0.076	1.7
6.700	21.98	445.52	98.35	0.43	8.51	0.44	124	1.327	1.094	-0.396	0.045	0.92	93	0.52	1.0	0.2	91	91	0.127	0.10	1.00	1.15	0.076	1.7
6.750	22.15	445.35	105.94	0.44	8.87	0.42	124	1.337	1.099	-0.400	0.045	0.92	100	0.50	1.0	0.2	98	98	0.135	0.10	1.00	1.15	0.076	1.8
6.800	22.31	445.19	104.85	0.49	8.71	0.47	124	1.347	1.104	-0.404	0.045	0.92	99	0.50	1.0	0.2	97	97	0.134	0.10	1.00	1.15	0.076	1.7
6.850	22.47	445.03	99.23	0.44	8.75	0.44	124	1.357	1.109	-0.408	0.046	0.92	94	0.52	1.0	0.2	92	92	0.127	0.10	1.00	1.15	0.077	1.7
6.900	22.64	444.86	82.90	0.40	8.39	0.48	121	1.367	1.114	-0.412	0.046	0.91	78	0.56	1.0	0.1	76	76	0.112	0.09	1.00	1.15	0.077	1.5
6.950	22.80	444.70	105.48	0.43	9.08	0.40	124	1.377	1.119	-0.416	0.047	0.91	100	0.50	1.0	0.2	97	97	0.134	0.10	0.99	1.15	0.077	1.7
7.000	22.97	444.53	110.33	0.45	9.53	0.41	124	1.388	1.124	-0.420	0.047	0.91	104	0.50	1.0	0.2	101	101	0.139	0.11	0.99	1.15	0.077	1.8
7.050	23.13	444.37	128.34	0.47	10.16	0.37	124	1.398	1.129	-0.424	0.048	0.91	121	0.46	1.0	0.1	118	118	0.166	0.12	0.99	1.15	0.077	2.0
7.100	23.29	444.21	132.50	0.49	10.80	0.37	124	1.408	1.135	-0.428	0.048	0.91	125	0.45	1.0	0.0	121	121	0.174	0.13	0.99	1.15	0.078	2.0
7.150	23.46	444.04	141.22	0.53	11.20	0.37	124	1.418	1.140	-0.432	0.049	0.91	133	0.44	1.0	0.0	129	129	0.195	0.13	0.99	1.15	0.078	2.0
7.200	23.62	443.88	176.13	0.57	10.49	0.33	124	1.428	1.145	-0.437	0.049	0.91	166	0.38	1.0	0.0	161	161	0.387	0.18	0.99	1.15	0.078	2.0
7.250	23.79	443.71	182.01	0.62	10.10	0.34	124	1.438	1.150	-0.441	0.050	0.91	172	0.38	1.0	0.0	167	167	0.452	0.19	0.98	1.15	0.079	2.0
7.300	23.95	443.55	176.45	0.52	6.40	0.30	124	1.449	1.155	-0.445	0.050	0.91	167	0.39	1.0	0.0	161	161	0.384	0.18	0.98	1.15	0.079	2.0
7.350	24.11	443.39	161.40	0.51	18.58	0.32	124	1.459	1.160	-0.449	0.051	0.91	153	0.41	1.0	0.0	147	147	0.269	0.16	0.99	1.15	0.079	2.0
7.400	24.28	443.22	158.56	0.54	14.72	0.34	124	1.469	1.165	-0.453	0.051	0.91	150	0.41	1.0	0.0	144	144	0.253	0.15	0.99	1.15	0.079	2.0
7.450	24.44	443.06	157.54	0.52	10.75	0.33	124	1.479	1.170	-0.457	0.051	0.90	149	0.42	1.0	0.0	143	143	0.247	0.15	0.98	1.15	0.079	2.0
7.500	24.61	442.89	157.76	0.51	11.99	0.32	124	1.489	1.175	-0.462	0.052	0.90	149	0.42	1.0	0.0	143	143	0.247	0.15	0.98	1.15	0.079	2.0
7.550	24.77	442.73	152.23	0.50	10.37	0.33	124	1.500	1.180	-0.466	0.052	0.90	144	0.42	1.0	0.0	137	137	0.223	0.14	0.98	1.15	0.079	2.0
7.600	24.93	442.57	148.65	0.54	12.19	0.36	124	1.510	1.185	-0.470	0.053	0.90	140	0.43	1.0	0.0	134	134	0.210	0.14	0.98	1.15	0.080	2.0
7.650	25.10	442.40	175.78	0.59	12.27	0.34	124	1.520	1.190	-0.474	0.053	0.90	166	0.39	1.0	0.0	159	159	0.358	0.17	0.98	1.15	0.080	2.0
7.700	25.26	442.24	191.17	0.59	16.57	0.31	124	1.530	1.195	-0.478	0.054	0.90	181	0.37	1.0	0.0	173	173	0.553	0.20	0.98	1.15	0.080	2.0
7.750	25.43	442.07	194.47	0.64	13.49	0.33	124	1.540	1.200	-0.483	0.054	0.90	184	0.36	1.0	0.0	176	176	0.612	0.20	0.97	1.15	0.081	2.0
7.800	25.59	441.91	190.39	0.63	14.03	0.33	124	1.550	1.205	-0.487	0.055	0.90	180	0.37	1.0	0.0	171	171	0.529	0.19	0.97	1.15	0.081	2.0
7.850	25.75	441.75	182.19	0.71	15.65	0.39	124	1.561	1.210	-0.491	0.055	0.90	172	0.38	0.9	0.0	164	164	0.411	0.18	0.98	1.15	0.081	2.0
7.900	25.92	441.58	174.17	0.65	9.55	0.37	124	1.571	1.215	-0.495	0.056	0.90	165	0.39	0.9	0.0	156	156	0.332	0.17	0.98	1.15	0.081	2.0
7.950	26.08	441.42	169.88	0.73	13.36	0.43	124	1.581	1.221	-0.500	0.056	0.90	161	0.40	0.9	0.0	152	152	0.300	0.16	0.98	1.15	0.081	2.0
8.000	26.25	441.25	168.77	0.68	14.78	0.40	124	1.591	1.226	-0.504	0.057	0.90	159	0.40	0.9	0.0	150	150	0.291	0.16	0.98	1.15	0.081	2.0
8.050	26.41	441.09	175.09	0.81	13.18	0.46	124	1.601	1.231	-0.508	0.057	0.89	165	0.39	0.9	0.0	156	156	0.333	0.17	0.97	1.15	0.081	2.0
8.100	26.57	440.93	162.56	0.77	11.49	0.47	124	1.612	1.236	-0.512	0.058	0.89	154	0.41	0.9	0.0	144	144	0.254	0.15	0.98	1.15	0.081	2.0
8.150	26.74	440.76	145.44	0.73	12.53	0.50	124	1.622	1.241	-0.517	0.058	0.89	137	0.44	0.9	0.2	128	128	0.192	0.13	0.98	1.15	0.081	2.0
8.200	26.90	440.60	147.79	0.69	14.85	0.47	124	1.632	1.246	-0.521	0.059	0.89	140	0.44	0.9	0.1	130	130	0.198	0.14	0.98	1.15	0.081	2.0
8.250	27.07	440.43	149.74	0.69	13.87	0.46	124	1.642	1.251	-0.525	0.059	0.89	142	0.43	0.9	0.1	132	132	0.203	0.14	0.98	1.15	0.081	2.0
8.300	27.23	440.27	140.75	0.70	13.60	0.50	124	1.652	1.256	-0.530	0.059	0.89	133	0.45	0.9	0.3	123	123	0.179	0.13	0.98	1.15	0.082	2.0
8.350	27.39	440.11	140.58	0.71	15.15	0.50	124	1.662	1.261	-0.534	0.060	0.89	133	0.45	0.9	0.3	123	123	0.178	0.13	0.98	1.15	0.082	2.0
8.400	27.56	439.94	165.44	0.73	16.58	0.44	124	1.673	1.266	-0.538	0.060	0.89	156	0.41	0.9	0.0	145	145	0.260	0.15	0.97	1.15	0.082	2.0
8.450	27.72	439.78	185.02	0.84	17.40	0.45	124	1.683	1.271	-0.543	0.061	0.89	175	0.38	0.9	0.0	163	163	0.404	0.18	0.97	1.15	0.083	2.0
8.500	27.89	439.61	175.54	0.88	15.98	0.50	124	1.693	1.276	-0.547	0.061	0.89	166	0.40	0.9	0.0	154	154	0.318	0.17	0.97	1.15	0.083	2.0
8.550	28.05	439.45	168.61	0.83	15.37	0.49	124	1.703	1.281	-0.552	0.062	0.89	159	0.41	0.9	0.0	147	147	0.272	0.16	0.97	1.15	0.083	2.0
8.600	28.21	439.29	164.12	0.79	15.93	0.48	124	1.713	1.286	-0.556	0.062	0.88	155	0.41	0.9	0.1	143	143	0.249	0.15	0.97	1.15	0.083	2.0
8.650	28.38	439.12	166.19	0.78	15.55	0.47	124	1.724	1.291	-0.560	0.063	0.88	157	0.41	0.9	0.0	145	145	0.257	0.15	0.97	1.15	0.083	2.0
8.700	28.54	438.96	151.34	0.76	14.70	0.50	124	1.734	1.296	-0.565	0.063	0.88	143	0.44	0.9	0.2	131	131	0.201	0.14	0.97	1.15	0.083	2.0
8.750	28.71	438.79	152.19	0.74	15.52	0.48	124	1.744	1.301	-0.569	0.064	0.88	144	0.44	0.9	0.1	131	132	0.202	0.14	0.97	1.15	0.083	2.0
8.800	28.87	438.63	157.39	0.66	16.07	0.42	124	1.754	1.307	-0.574	0.064	0.88	149	0.43	0.9	0.0	136	136	0.218	0.14	0.97	1.15	0.083	2.0
8.850	29.04	438.46	162.51	0.72	16.44	0.44	124	1.764	1.312	-0.578	0.065	0.88	154	0.42	0.9	0.0	140	140	0.236	0.15	0.97	1.15	0.083	2.0
8.900	29.20	438.30	158.46	0.73	14.01	0.46	124	1.774	1.317	-0.582	0.065	0.88	150	0.43	0.9	0.1	136	136	0.220	0.14	0.97	1.15	0.083	2.0
8.950	29.36	438.14	165.70	0.94	15.35	0.57	124	1.785	1.322	-0.587	0.066	0.88	157	0.42	0.9	0.2	143	143	0.248	0.15	0.97	1.15	0.084	2.0
9.000	29.53	437.97	172.13	0.83	19.47	0.48	124	1.795	1.327	-0.591	0.066	0.88	163	0.41	0.9	0.0	148	148	0.278	0.16	0.96	1.15	0.084	2.0
9.050	29.69	437.81	138.87	0.82	8.56	0.59	124	1.805	1.332	-0.596	0.067	0.88	131	0.46	0.9	1.0	118	119	0.169	0.12	0.97	1.15	0.083	2.0
9.100	29.86	437.64	127.80	0.61	15.60	0.48	124	1.815	1.337	-0.600	0.067	0.88	121	0.48	0.9	0.2	108	108	0.149	0.11	0.97	1.15	0.083	1.8
9.150	30.02	437.48	121.67	0.55	15.30	0.45	124	1.825	1.342	-0.605	0.068	0.87	115	0.49	0.9	0.2	102	102	0.141	0.11	0.97	1.15	0.083	1.7
9.200	30.18	437.32	121.79	0.65	15.47	0.53	124	1.836	1.347	-0.609	0.068	0.87	115	0.49	0.9	1.5	102	104	0.142	0.11	0.97	1.15	0.083	1.7
9.250	30.35	437.15	125.51	0.61	16.80	0.49	124	1.846	1.352	-0.614	0.069	0.87	119	0.49	0.9	0.2	105	105	0.145	0.11	0.97	1.15	0.083	1.7
9.300	30.51	436.99	120.92	0.58	17.62	0.48	124	1.856	1.357	-0.618	0.069	0.87	114	0.50	0.9	0.2	101	101	0.139	0.11	0.97	1.15	0.083	1.7
9.350	30.68	436.82	122.03	0.47	21.09	0.39	124	1.866	1.362	-0.623	0.070	0.87	115	0.49	0.9	0.2	102	102	0.140	0.11	0.97	1.15	0.084	1.7
9.400	30.84	436.66	121.70	0.49	20.45	0.40	124	1.876	1.367	-0.627	0.070	0.87	115	0.49	0.9	0.2	101	101	0.139	0.11	0.97	1.15	0.084	1.7
9.450	31.00	436.50	127.24	0.50	19.30	0.39	124	1.886	1.372	-0.632	0.071	0.87	120	0.48	0.9	0.2	106	106	0.146	0.11	0.97	1.15	0.084	1.7
9.500	31.17	436.33	132.66	0.53	19.58	0.40	124	1.897	1.377	-0.636	0.071	0.87	125	0.48	0.9	0.2	111	111	0.153	0.12	0.97	1.15	0.084	1.8
9.550	31.33	436.17	140.32	0.54	22.52	0.39	124	1.907	1.382	-0.641	0.072	0.87	133	0.46	0.9	0.1	117	117	0.165	0.12	0.97	1.15	0.084	2.0
9.600	31.50	436.00	150.27	0.60	18.67	0.40	124	1.917	1.387	-0.645	0.072	0.87	142	0.45	0.9	0.1	126	126	0.186	0.13	0.96	1.15	0.085	2.0
9.650	31.66	435.84	161.08	0.61	13.82	0.38	124	1.927	1.393	-0.650	0.073	0.87	152	0.43	0.9	0.0	135	135	0.215	0.14	0.96	1.15	0.085	2.0
9.700	31.82	435.68	173.85	0.65	24.04	0.38	124	1.937	1.398	-0.654	0.073	0.86	164	0.41	0.9	0.0	147	147	0.268	0.16	0.96	1.15	0.085	2.0
9.750	31.99	435.51	185.66	0.71	16.05	0.38	124	1.948	1.403	-0.659	0.074	0.86	175	0.39	0.9	0.0	157	157	0.343	0.17	0.95	1.15	0.086	2.0
9.800	32.15	435.35	193.78	0.74	17.23	0.38	124	1.958	1.408	-0.663	0.074	0.86	183	0.38	0.9	0.0	164	164	0.420	0.18	0.95	1.15	0.086	2.0
9.850	32.32	435.18	202.25	1.65	20.75	0.82	124	1.968	1.413	-0.668	0.075	0.86	191	0.37	0.9	0.7	172	172	0.548	0.20	0.94	1.15	0.087	2.0
9.900	32.48	435.02	208.73	1.71	27.47	0.82	124	1.978	1.418	-0.673	0.075	0.86	197	0.36	0.9	0.6	178	178	0.674	0.21	0.94	1.15	0.087	2.0
9.950	32.64	434.86	220.21	1.67	13.48	0.76	124	1.988	1.423	-0.677	0.076	0.86	208	0.35	0.9	0.2	188	188	1.026	0.23	0.93	1.15	0.088	2.0
10.000	32.81	434.69	223.14	1.27	22.48	0.57	124	1.998	1.428	-0.682	0.076	0.86	211	0.34	0.9	0.0	190	190	1.140	0.24	0.93	1.15	0.088	2.0
10.050	32.97	434.53	213.08	0.99	23.80	0.47	124	2.009	1.433	-0.686	0.077	0.86	201	0.36	0.9	0.0	181	181	0.748	0.21	0.94	1.15	0.088	2.0
10.100	33.14	434.36	182.97	0.93	25.61	0.51	124	2.019	1.438	-0.691	0.077	0.86	173	0.40	0.9	0.0	153	153	0.310	0.16	0.95	1.15	0.086	2.0
10.150	33.30	434.20	169.14	0.83	21.26	0.49	124	2.029	1.443	-0.696	0.078	0.86	160	0.42	0.9	0.1	140	140	0.236	0.15	0.95	1.15	0.086	2.0
10.200	33.46	434.04	143.83	0.88	21.18	0.61	124	2.039	1.448	-0.700	0.078	0.86	136	0.46	0.9	1.2	118	119	0.169	0.12	0.96	1.15	0.085	2.0
10.250	33.63	433.87	163.78	0.80	28.21	0.49	124	2.049	1.453	-0.705	0.079	0.85	155	0.43	0.9	0.1	135	135	0.215	0.14	0.96	1.15	0.086	2.0
10.300	33.79	433.71	217.32	1.01	29.23	0.47	124	2.060	1.458	-0.709	0.079	0.85	205	0.35	0.9	0.0	183	183	0.836	0.22	0.93	1.15	0.088	2.0
10.350	33.96	433.54	238.27	0.84	22.53	0.35	127	2.070	1.464	-0.714	0.080	0.85	225	0.33	0.9	0.0	203	203	2.000	0.27	0.91	1.15	0.090	2.0
10.400	34.12	433.38	237.96	0.80	8.60	0.33	127	2.080	1.469	-0.719	0.080	0.85	225	0.33	0.9	0.0	202	202	2.000	0.27	0.91	1.15	0.090	2.0
10.450	34.28	433.22	221.72	0.76	-18.17	0.34	127	2.091	1.474	-0.723	0.081	0.85	210	0.35	0.9	0.0	187	187	0.965	0.23	0.92	1.15	0.089	2.0
10.500	34.45	433.05	215.37	0.61	22.14	0.28	127	2.101	1.479	-0.728	0.081	0.85	204	0.36	0.9	0.0	181	181	0.744	0.21	0.93	1.15	0.089	2.0
10.550	34.61	432.89	182.57	0.71	6.19	0.39	124	2.112	1.485	-0.733	0.082	0.85	173	0.40	0.9	0.0	151	151	0.292	0.16	0.95	1.15	0.087	2.0
10.600	34.78	432.72	167.97	0.70	-0.96	0.42	124	2.122	1.490	-0.737	0.082	0.85	159	0.42	0.9	0.0	137	137	0.223	0.14	0.95	1.15	0.086	2.0
10.650	34.94	432.56	166.55	0.74	5.51	0.44	124	2.132	1.495	-0.742	0.083	0.85	157	0.43	0.9	0.1	136	136	0.217	0.14	0.95	1.15	0.087	2.0
10.700	35.10	432.40	174.28	0.88	22.29	0.51	124	2.142	1.500	-0.747	0.083	0.85	165	0.42	0.9	0.1	142	143	0.246	0.15	0.95	1.15	0.087	2.0
10.750	35.27	432.23	201.52	0.73	32.97	0.36	124	2.152	1.505	-0.751	0.084	0.85	190	0.38	0.9	0.0	167	167	0.453	0.19	0.93	1.15	0.088	2.0
10.800	35.43	432.07	211.96	1.10	29.23	0.52	124	2.162	1.510	-0.756	0.084	0.84	200	0.36	0.9	0.0	176	176	0.624	0.20	0.93	1.15	0.089	2.0
10.850	35.60	431.90	244.16	1.14	54.92	0.47	127	2.173	1.515	-0.761	0.085	0.84	231	0.32	0.9	0.0	206	206	2.000	0.28	0.90	1.15	0.092	2.0
10.900	35.76	431.74	296.79	1.41	33.50	0.48	127	2.183	1.520	-0.765	0.085	0.84	280	0.26	0.9	0.0	255	255	2.000	0.30	0.89	1.15	0.092	2.0
10.950	35.92	431.58	343.45	1.69	63.54	0.49	127	2.194	1.526	-0.770	0.086	0.84	325	0.26	0.9	0.0	295	295	2.000	0.30	0.89	1.15	0.093	2.0
11.000	36.09	431.41	340.24	1.72	39.81	0.51	127	2.204	1.531	-0.775	0.087	0.84	322	0.26	0.9	0.0	292	292	2.000	0.30	0.89	1.15	0.093	2.0
11.050	36.25	431.25	323.16	1.65	6.82	0.51	127	2.215	1.536	-0.779	0.087	0.84	305	0.26	0.9	0.0	277	277	2.000	0.30	0.89	1.15	0.093	2.0
11.100	36.42	431.08	301.32	1.32	8.80	0.44	127	2.225	1.542	-0.784	0.088	0.84	285	0.26	0.9	0.0	258	258	2.000	0.30	0.89	1.15	0.093	2.0
11.150	36.58	430.92	278.92	0.89	0.33	0.32	127	2.235	1.547	-0.789	0.088	0.84	264	0.28	0.9	0.0	237	237	2.000	0.30	0.89	1.15	0.093	2.0
11.200	36.74	430.76	248.93	1.07	21.53	0.43	127	2.246	1.552	-0.793	0.089	0.84	235	0.32	0.9	0.0	208	208	2.000	0.29	0.89	1.15	0.093	2.0
11.250	36.91	430.59	245.01	1.02	18.69	0.41	127	2.256	1.558	-0.798	0.089	0.84	232	0.32	0.9	0.0	204	204	2.000	0.28	0.89	1.15	0.092	2.0
11.300	37.07	430.43	233.79	0.85	11.17	0.37	127	2.267	1.563	-0.803	0.090	0.84	221	0.34	0.9	0.0	194	194	1.343	0.24	0.90	1.15	0.091	2.0
11.350	37.24	430.26	253.26	0.48	51.45	0.19	127	2.277	1.568	-0.808	0.090	0.83	239	0.31	0.9	0.0	211	211	2.000	0.30	0.88	1.15	0.094	2.0
11.400	37.40	430.10	262.69	0.46	11.57	0.18	127	2.288	1.574	-0.812	0.091	0.83	248	0.30	0.9	0.0	220	220	2.000	0.30	0.88	1.15	0.094	2.0
11.450	37.57	429.93	261.39	0.53	26.64	0.20	127	2.298	1.579	-0.817	0.091	0.83	247	0.31	0.9	0.0	219	219	2.000	0.30	0.88	1.15	0.094	2.0
11.500	37.73	429.77	277.98	0.54	14.49	0.19	127	2.308	1.584	-0.822	0.092	0.83	263	0.29	0.9	0.0	234	234	2.000	0.30	0.88	1.15	0.094	2.0
11.550	37.89	429.61	276.28	0.68	31.84	0.25	127	2.319	1.590	-0.826	0.092	0.83	261	0.29	0.9	0.0	232	232	2.000	0.30	0.88	1.15	0.094	2.0
11.600	38.06	429.44	271.70	0.57	5.63	0.21	127	2.329	1.595	-0.831	0.093	0.83	257	0.29	0.9	0.0	228	228	2.000	0.30	0.88	1.15	0.094	2.0
11.650	38.22	429.28	259.04	0.49	10.34	0.19	127	2.340	1.600	-0.836	0.093	0.83	245	0.31	0.9	0.0	215	215	2.000	0.30	0.88	1.15	0.094	2.0
11.700	38.39	429.11	273.78	0.52	15.58	0.19	127	2.350	1.606	-0.841	0.094	0.83	259	0.29	0.9	0.0	229	229	2.000	0.30	0.87	1.15	0.094	2.0
11.750	38.55	428.95	251.86	0.54	8.21	0.21	127	2.361	1.611	-0.845	0.094	0.83	238	0.32	0.9	0.0	208	208	2.000	0.29	0.88	1.15	0.094	2.0
11.800	38.71	428.79	248.05	0.54	18.72	0.22	127	2.371	1.616	-0.850	0.095	0.83	234	0.32	0.9	0.0	204	204	2.000	0.28	0.88	1.15	0.093	2.0
11.850	38.88	428.62	270.75	0.55	15.37	0.20	127	2.382	1.622	-0.855	0.095	0.82	256	0.30	0.9	0.0	225	225	2.000	0.30	0.87	1.15	0.095	2.0
11.900	39.04	428.46	259.88	0.71	20.36	0.27	127	2.392	1.627	-0.860	0.096	0.82	246	0.31	0.9	0.0	215	215	2.000	0.30	0.87	1.15	0.095	2.0
11.950	39.21	428.29	272.21	0.76	13.56	0.28	127	2.402	1.632	-0.864	0.096	0.82	257	0.30	0.9	0.0	226	226	2.000	0.30	0.87	1.15	0.095	2.0
12.000	39.37	428.13	274.50	0.96	22.36	0.35	127	2.413	1.638	-0.869	0.097	0.82	259	0.29	0.9	0.0	228	228	2.000	0.30	0.87	1.15	0.095	2.0
12.050	39.53	427.97	272.32	1.09	30.66	0.40	127	2.423	1.643	-0.874	0.097	0.82	257	0.30	0.9	0.0	226	226	2.000	0.30	0.87	1.15	0.095	2.0
12.100	39.70	427.80	262.82	1.10	32.58	0.42	127	2.434	1.648	-0.879	0.098	0.82	248	0.31	0.9	0.0	217	217	2.000	0.30	0.87	1.15	0.095	2.0
12.150	39.86	427.64	260.30	0.00	34.91	0.00	119	2.444	1.653	-0.883	0.098	0.82	246	0.31	0.9	0.0	214	214	2.000	0.30	0.87	1.15	0.095	2.0
12.200	40.03	427.47	270.35	0.00	35.77	0.00	119	2.454	1.658	-0.888	0.099	0.82	255	0.30	0.9	0.0	223	223	2.000	0.30	0.87	1.15	0.095	2.0

Table I-9: Liquefaction Analysis for CPT HAV-C007

Idriss and Blouanger Liquefaction Analysis from CPT Data
Havana East Ash Pond - Site 7
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

Groudwater Elevation Used
Original Ground Surface

*PGA was linearly interpolated from PGAcrest to PGAsite from top of the crest to the embankment/foundation interface. After interface is reached, PGA site is used

PGA site= 0.12 PGAcrest= 0.33
Mw= 6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.164	489.14	31.73	0.08	2.52	0.25	118	0.010	0.010	0.33	0.014	-0.001	1.00	30	0.64	1.7	0.0	51	51	0.093	0.07	1.10	1.15	0.169	0.5
0.100	0.328	488.97	250.75	0.12	5.41	0.05	127	0.020	0.020	0.33	0.012	-0.001	1.00	237	0.26	1.7	0.0	403	403	2.000	0.30	1.10	1.15	0.169	2.0
0.150	0.492	488.81	192.75	0.42	2.67	0.22	124	0.030	0.030	0.33	0.010	-0.001	1.00	182	0.26	1.7	0.0	310	310	2.000	0.30	1.10	1.15	0.168	2.0
0.200	0.656	488.64	255.87	0.52	-1.31	0.20	127	0.040	0.040	0.32	0.008	-0.000	1.00	242	0.26	1.7	0.0	411	411	2.000	0.30	1.10	1.15	0.167	2.0
0.250	0.820	488.48	250.01	0.78	15.07	0.31	127	0.051	0.051	0.32	0.006	-0.000	1.00	236	0.26	1.7	0.0	402	402	2.000	0.30	1.10	1.15	0.166	2.0
0.300	0.984	488.32	177.49	0.90	-1.08	0.51	124	0.061	0.061	0.32	0.004	0.000	1.00	168	0.26	1.7	0.0	285	285	2.000	0.30	1.10	1.15	0.165	2.0
0.350	1.148	488.15	132.60	0.99	0.21	0.75	124	0.071	0.071	0.32	0.002	0.000	1.00	125	0.31	1.7	0.0	213	213	2.000	0.30	1.10	1.15	0.165	2.0
0.400	1.312	487.99	104.99	1.18	-1.15	1.12	121	0.081	0.081	0.32	-0.000	0.001	1.00	99	0.37	1.7	0.0	169	169	0.482	0.19	1.10	1.15	0.164	2.0
0.450	1.476	487.82	70.58	1.30	0.69	1.85	118	0.091	0.091	0.32	-0.003	0.001	1.00	67	0.47	1.7	0.0	113	113	0.158	0.12	1.10	1.15	0.163	1.0
0.500	1.640	487.66	50.96	1.46	1.75	2.87	118	0.101	0.101	0.31	-0.005	0.001	1.00	48	0.54	1.7	0.0	82	82	0.118	0.09	1.10	1.15	0.162	0.7
0.550	1.804	487.50	45.72	1.60	3.46	3.49	115	0.110	0.110	0.31	-0.007	0.001	1.00	43	0.56	1.7	0.0	73	73	0.110	0.09	1.10	1.15	0.161	0.7
0.600	1.968	487.33	51.94	1.78	4.94	3.42	115	0.119	0.119	0.31	-0.009	0.001	1.00	49	0.54	1.7	0.0	83	83	0.119	0.09	1.10	1.15	0.161	0.7
0.650	2.133	487.17	72.39	1.81	5.17	2.51	115	0.129	0.129	0.31	-0.011	0.002	1.00	68	0.46	1.7	0.0	116	116	0.163	0.12	1.10	1.15	0.160	1.0
0.700	2.297	487.00	80.73	1.84	9.23	2.27	118	0.138	0.138	0.31	-0.013	0.002	1.00	76	0.44	1.7	0.0	130	130	0.196	0.13	1.10	1.15	0.159	1.2
0.750	2.461	486.84	81.76	1.93	-2.69	2.35	118	0.148	0.148	0.31	-0.016	0.002	1.00	77	0.44	1.7	0.0	131	131	0.202	0.14	1.10	1.15	0.158	1.3
0.800	2.625	486.68	81.50	1.97	-2.62	2.41	118	0.158	0.158	0.31	-0.018	0.002	1.00	77	0.44	1.7	0.0	131	131	0.200	0.14	1.10	1.15	0.157	1.3
0.850	2.789	486.51	84.79	2.00	-3.10	2.36	118	0.167	0.167	0.30	-0.020	0.003	1.00	80	0.43	1.7	0.0	136	136	0.219	0.14	1.10	1.15	0.156	1.4
0.900	2.953	486.35	87.46	2.15	0.09	2.46	118	0.177	0.177	0.30	-0.022	0.003	1.00	83	0.42	1.7	0.0	141	141	0.237	0.15	1.10	1.15	0.156	1.5
0.950	3.117	486.18	86.88	2.16	-3.12	2.49	118	0.187	0.187	0.30	-0.025	0.003	1.00	82	0.42	1.7	0.0	140	140	0.232	0.15	1.10	1.15	0.155	1.5
1.000	3.281	486.02	81.22	2.18	-6.12	2.69	115	0.196	0.196	0.30	-0.027	0.003	1.00	77	0.44	1.7	0.0	130	130	0.199	0.14	1.10	1.15	0.154	1.3
1.050	3.445	485.86	59.63	2.14	-10.35	3.59	115	0.206	0.206	0.30	-0.029	0.004	1.00	56	0.51	1.7	0.0	96	96	0.132	0.10	1.10	1.15	0.153	0.9
1.100	3.609	485.69	53.49	1.91	-11.46	3.57	115	0.215	0.215	0.30	-0.032	0.004	1.00	51	0.53	1.7	0.0	86	86	0.121	0.10	1.10	1.15	0.152	0.8
1.150	3.773	485.53	47.72	1.89	-11.75	3.96	115	0.224	0.224	0.29	-0.034	0.004	1.00	45	0.56	1.7	0.0	77	77	0.113	0.09	1.10	1.15	0.151	0.7
1.200	3.937	485.36	50.95	1.70	-12.20	3.33	115	0.234	0.234	0.29	-0.036	0.005	1.00	48	0.54	1.7	0.0	82	82	0.117	0.09	1.10	1.15	0.150	0.8
1.250	4.101	485.20	47.63	1.66	-11.44	3.49	115	0.243	0.243	0.29	-0.039	0.005	0.99	45	0.56	1.7	0.0	77	77	0.113	0.09	1.10	1.15	0.149	0.8
1.300	4.265	485.03	42.33	1.60	-11.60	3.78	115	0.253	0.253	0.29	-0.041	0.005	0.99	40	0.58	1.7	0.0	68	68	0.106	0.08	1.10	1.15	0.149	0.7
1.350	4.429	484.87	41.70	1.62	-12.27	3.88	115	0.262	0.262	0.29	-0.044	0.005	0.99	39	0.58	1.7	0.0	67	67	0.105	0.08	1.10	1.15	0.148	0.7
1.400	4.593	484.71	54.10	1.78	-10.92	3.29	115	0.271	0.271	0.29	-0.046	0.006	0.99	51	0.53	1.7	0.0	87	87	0.122	0.10	1.10	1.15	0.147	0.8
1.450	4.757	484.54	62.87	2.18	-9.46	3.47	115	0.281	0.281	0.29	-0.049	0.006	0.99	59	0.50	1.7	0.0	101	101	0.139	0.11	1.10	1.15	0.146	0.9
1.500	4.921	484.38	80.66	2.37	-9.84	2.94	115	0.290	0.290	0.28	-0.051	0.006	0.99	76	0.44	1.7	0.0	130	130	0.196	0.13	1.10	1.15	0.145	1.4
1.550	5.085	484.21	66.93	2.53	-7.24	3.77	115	0.300	0.300	0.28	-0.054	0.006	0.99	63	0.48	1.7	0.0	108	108	0.148	0.11	1.10	1.15	0.144	1.0
1.600	5.249	484.05	60.41	2.40	-2.55	3.97	115	0.309	0.309	0.28	-0.056	0.007	0.99	57	0.50	1.7	0.0	97	97	0.134	0.10	1.10	1.15	0.143	0.9
1.650	5.413	483.89	62.42	2.47	-6.43	3.96	115	0.318	0.318	0.28	-0.059	0.007	0.99	59	0.50	1.7	0.0	100	100	0.138	0.11	1.10	1.15	0.142	1.0
1.700	5.577	483.72	63.64	2.66	-1.11	4.19	115	0.328	0.328	0.28	-0.061	0.007	0.99	60	0.49	1.7	0.0	102	102	0.140	0.11	1.10	1.15	0.142	1.0
1.750	5.741	483.56	71.94	2.77	1.51	3.84	115	0.337	0.337	0.28	-0.064	0.008	0.99	68	0.47	1.7	0.0	116	116	0.162	0.12	1.10	1.15	0.141	1.2
1.800	5.905	483.39	83.20	2.77	-1.67	3.33	115	0.347	0.347	0.27	-0.066	0.008	0.99	79	0.44	1.6	0.0	129	129	0.193	0.13	1.10	1.15	0.140	1.4
1.850	6.069	483.23	90.44	2.41	-2.33	2.66	115	0.356	0.356	0.27	-0.069	0.008	0.99	85	0.43	1.6	0.0	136	136	0.218	0.14	1.10	1.15	0.139	1.6
1.900	6.234	483.07	306.77	2.40	1.99	0.78	124	0.366	0.366	0.27	-0.072	0.008	0.99	290	0.26	1.3	0.0	384	384	2.000	0.30	1.10	1.15	0.138	2.0
1.950	6.398	482.90	291.31	2.93	5.16	1.00	124	0.376	0.376	0.27	-0.074	0.009	0.99	275	0.26	1.3	0.0	362	362	2.000	0.30	1.10	1.15	0.137	2.0
2.000	6.562	482.74	436.35	3.54	2.12	0.81	127	0.386	0.386	0.27	-0.077	0.009	0.99	412	0.26	1.3	0.0	538	538	2.000	0.30	1.10	1.15	0.136	2.0
2.050	6.726	482.57	458.01	3.98	0.96	0.87	127	0.397	0.397	0.27	-0.080	0.009	0.99	433	0.26	1.3	0.0	561	561	2.000	0.30	1.10	1.15	0.136	2.0
2.100	6.890	482.41	481.59	4.63	0.31	0.96	127	0.407	0.407	0.27	-0.082	0.010	0.98	455	0.26	1.3	0.0	586	586	2.000	0.30	1.10	1.15	0.135	2.0
2.150	7.054	482.25	474.28	5.25	-0.02	1.11	124	0.417	0.417	0.26	-0.085	0.010	0.98	448	0.26	1.3	0.0	573	573	2.000	0.30	1.10	1.15	0.134	2.0
2.200	7.218	482.08	451.78	5.89	0.91	1.30	124	0.428	0.428	0.26	-0.088	0.010	0.98	427	0.26	1.3	0.0	542	542	2.000	0.30	1.10	1.15	0.133	2.0
2.250	7.382	481.92	427.21	6.21	1.80	1.45	124	0.438	0.438	0.26	-0.091	0.011	0.98	404	0.26	1.3	0.0	510	510	2.000	0.30	1.10	1.15	0.132	2.0
2.300	7.546	481.75	416.59	6.05	3.02	1.45	124	0.448	0.448	0.26	-0.093	0.011	0.98	394	0.26	1.3	0.0	494	494	2.000	0.30	1.10	1.15	0.131	2.0
2.350	7.710	481.59	400.52	5.96	2.74	1.49	124	0.458	0.458	0.26	-0.096	0.011	0.98	378	0.26	1.2	0.0	472	472	2.000	0.30	1.10	1.15	0.130	2.0
2.400	7.874	481.43	383.16	5.49	1.85	1.43	124	0.468	0.468	0.26	-0.099	0.012	0.98	362	0.26	1.2	0.0	449	449	2.000	0.30	1.10	1.15	0.129	2.0
2.450	8.038	481.26	376.13	5.24	2.48	1.39	124	0.479	0.479	0.25	-0.102	0.012	0.98	355	0.26	1.2	0.0	438	438	2.000	0.30	1.10	1.15	0.129	2.0
2.500	8.202	481.10	355.72	5.12	1.94	1.44	124	0.489	0.489	0.25	-0.105	0.012	0.98	336	0.26	1.2	0.0	412	412	2.000	0.30	1.10	1.15	0.128	2.0
2.550	8.366	480.93	335.46	4.84	3.53	1.44	124	0.499	0.499	0.25	-0.107	0.012	0.98	317	0.26	1.2	0.1	387	387	2.000	0.30	1.10	1.15	0.127	2.0
2.600	8.530	480.77	304.96	4.39	1.84	1.44	124	0.509	0.509	0.25	-0.110	0.013	0.98	288	0.26	1.2	0.2	350	350	2.000	0.30	1.10	1.15	0.126	2.0
2.650	8.694	480.61	294.89	4.11	1.07	1.39	124	0.519	0.519	0.25	-0.113	0.013	0.98	279	0.26	1.2	0.2	336	336	2.000	0.30	1.10	1.15	0.125	2.0
2.700	8.858	480.44	277.98	4.14	2.14	1.49	121	0.529	0.529	0.25	-0.116	0.013	0.98	263	0.26	1.2	0.5	315	316	2.000	0.30	1.10	1.15	0.124	2.0
2.750	9.022	480.28	261.57	4.11	2.14	1.57	121	0.539	0.539	0.25	-0.119	0.014	0.98	247	0.26	1.2	1.0	295	296	2.000	0.30	1.10	1.15	0.123	2.0
2.800	9.186	480.11	234.20	3.73	1.80	1.59	121	0.549	0.549	0.24	-0.122	0.014	0.98	221	0.26	1.2	1.8	263	265	2.000	0.30	1.10	1.15	0.123	2.0
2.850	9.350	479.95	219.72	2.32	1.19	1.05	124	0.559	0.559	0.24	-0.125	0.014	0.98	208	0.27	1.2	0.1	247	247	2.000	0.30	1.10	1.15	0.122	2.0
2.900	9.514	479.79	211.37	2.10	0.99	0.99	124	0.569	0.569	0.24	-0.128	0.015	0.97	200	0.28	1.2	0.1	238	238	2.000	0.30	1.10	1.15	0.121	2.0
2.950	9.678	479.62	193.22	1.90	1.10	0.98	124	0.580	0.580	0.24	-0.131	0.015	0.97	183	0.30	1.2	0.1	219	219	2.000	0.30	1.10	1.15	0.120	2.0
3.000	9.842	479.46	188.24	1.82	-0.14	0.97	124	0.590	0.590	0.24	-0.134	0.015	0.97	178	0.31	1.2	0.2	213	214	2.000	0.30	1.10	1.15	0.119	2.0
3.050	10.006	479.29	189.15	1.76	-0.57	0.93	124	0.600	0.600	0.24	-0.137	0.016	0.97	179	0.31	1.2	0.1	213	213	2.000	0.30	1.10	1.15	0.118	2.0
3.100	10.170	479.13	189.79	1.72	-0.68	0.91	124	0.610	0.610	0.23	-0.140	0.016	0.97	179	0.31	1.2	0.1	213	213	2.000	0.30	1.10	1.15	0.117	2.0
3.150	10.335	478.97	184.88	1.78	-0.80	0.96	124	0.620	0.620	0.23	-0.143	0.016	0.97	175	0.32	1.2	0.2	207	207	2.000	0.29	1.10	1.15	0.117	2.0
3.200	10.499	478.80	173.92	1.85	-1.15	1.06	124	0.630	0.630	0.23	-0.146	0.017	0.97	164	0.33	1.2	0.7	195	196	1.534	0.25	1.10	1.15	0.116	2.0
3.250	10.663	478.64	155.08	1.90	-1.32	1.22	121	0.641	0.641	0.23	-0.149	0.017	0.97	147	0.36	1.2	2.9	176	178	0.681	0.21	1.10	1.15	0.115	2.0
3.300	10.827	478.47	141.80	1.89	-1.51	1.33	121	0.650	0.650	0.23	-0.152	0.017	0.97	134	0.38	1.2	5.5	161	166	0.449	0.19	1.09	1.15	0.115	2.0
3.350	10.991	478.31	132.60	1.68	-1.48	1.26	121	0.660	0.660	0.23	-0.155	0.018	0.97	125	0.39	1.2	5.6	151	156	0.338	0.17	1.08	1.15	0.115	2.0
3.400	11.155	478.15	130.87	1.59	-1.24	1.21	121	0.670	0.670	0.22	-0.158	0.018	0.97	124	0.40	1.2	5.2	148	154	0.313	0.16	1.08	1.15	0.115	2.0
3.450	11.319	477.98	127.14	1.57	-0.60	1.24	121	0.680	0.680	0.22	-0.162	0.019	0.97	120	0.40	1.2	6.2	144	150	0.287	0.16	1.07	1.15	0.115	2.0
3.500	11.483	477.82	122.45	1.54	-0.89	1.26	121	0.690	0.690	0.22	-0.165	0.019	0.97	116	0.41	1.2	7.2	138	145	0.260	0.15	1.07	1.15	0.114	2.0
3.550	11.647	477.65	117.93	1.41	-1.20	1.19	121	0.700	0.700	0.22	-0.168	0.019	0.97	111	0.42	1.2	6.9	133	140	0.232	0.15	1.06	1.15	0.114	2.0
3.600	11.811	477.49	111.03	1.20	-1.13	1.08	121	0.710	0.710	0.22	-0.171	0.020	0.97	105	0.44	1.2	6.3	125	131	0.201	0.14	1.05	1.15	0.114	1.8
3.650	11.975	477.33	107.10	1.12	-1.20	1.05	121	0.720	0.720	0.22	-0.174	0.020	0.96	101	0.44	1.2	6.5	120	127	0.187	0.13	1.05	1.15	0.113	1.7
3.700	12.139	477.16	102.45	1.08	-1.26	1.05	121	0.730	0.730	0.22	-0.177	0.020	0.96	97	0.45	1.2	7.5	115	122	0.176	0.13	1.05	1.15	0.113	1.6
3.750	12.303	477.00	95.48	0.97	-1.45	1.02	121	0.740	0.740	0.21	-0.181	0.021	0.96	90	0.47	1.2	8.3	107	115	0.161	0.12	1.04	1.15	0.112	1.4
3.800	12.467	476.83	86.65	0.95	-1.47	1.10	121	0.750	0.750	0.21	-0.184	0.021	0.96	82	0.48	1.2	12.0	97	109	0.150	0.11	1.04	1.15	0.112	1.3
3.850	12.631	476.67	79.46	0.82	-0.39	1.04	121	0.760	0.760	0.21	-0.187	0.021	0.96	75	0.50	1.2	12.8	88	101	0.139	0.11	1.04	1.15	0.111	1.2
3.900	12.795	476.50	75.64	0.77	-1.27	1.02	121	0.769	0.769	0.21	-0.190	0.022	0.96	71	0.50	1.2	13.6	84	98	0.134	0.10	1.03	1.15	0.111	1.2
3.950	12.959	476.34	68.52	0.78	0.65	1.13	121	0.779	0.779	0.21	-0.194	0.022	0.96	65	0.51	1.2	18.3	76	94	0.130	0.10	1.03	1.15	0.110	1.2
4.000	13.123	476.18	75.82	0.78	-0.98	1.03	121	0.789	0.789	0.21	-0.197	0.022	0.96	72	0.50	1.2	14.2	83	97	0.134	0.10	1.03	1.15	0.109	1.2
4.050	13.287	476.01	82.45	0.83	-1.03	1.01	121	0.799	0.799	0.20	-0.200	0.023	0.96	78	0.49	1.1	12.0	90	102	0.139	0.11	1.03	1.15	0.108	1.3
4.100	13.451	475.85	88.60	0.91	-1.05	1.02	121	0.809	0.809	0.20	-0.204	0.023	0.96	84	0.48	1.1	10.9	95	106	0.146	0.11	1.03	1.15	0.107	1.4
4.150	13.615	475.68	97.61	1.02	-1.03	1.04	121	0.819	0.819	0.20	-0.207	0.024	0.96	92	0.47	1.1	9.3	104	113	0.158	0.12	1.03	1.15	0.106	1.5
4.200	13.779	475.52	103.21	1.08	-1.05	1.05	121	0.829	0.829	0.20	-0.210	0.024	0.96	98	0.46	1.1	8.5	109	118	0.166	0.12	1.03	1.15	0.106	1.6
4.250	13.943	475.36	107.13	1.21	-1.12	1.13	121	0.839	0.839	0.20	-0.214	0.024	0.96	101	0.45	1.1	9.5	112	122	0.176	0.13	1.03	1.15	0.105	1.7
4.300	14.107	475.19	110.81	1.27	-1.08	1.14	121	0.849	0.849	0.20	-0.217	0.025	0.96	105	0.45	1.1	9.1	116	125	0.182	0.13	1.03	1.15	0.104	1.8
4.350	14.271	475.03	119.16	1.42	-1.09	1.19	121	0.859	0.859	0.20	-0.221	0.025	0.95	113	0.43	1.1	8.6	123	132	0.204	0.14	1.03	1.15	0.103	2.0
4.400	14.436	474.86	125.64	1.45	-1.01	1.15	121	0.869	0.869	0.19	-0.224	0.025	0.95	119	0.43	1.1	7.1	129	136	0.219	0.14	1.03	1.15	0.102	2.0
4.450	14.600	474.70	130.18	1.50	-1.23	1.16	121	0.879	0.879	0.19	-0.227	0.026	0.95	123	0.42	1.1	6.7	133	140	0.233	0.15	1.03	1.15	0.101	2.0
4.500	14.764	474.54	133.15	1.49	-1.25	1.12	121	0.889	0.889	0.19	-0.231	0.026	0.95	126	0.42	1.1	5.8	135	141	0.240	0.15	1.03	1.15	0.101	2.0
4.550	14.928	474.37	134.58	1.46	-1.41	1.08	121	0.898	0.898	0.19	-0.234	0.027	0.95	127	0.42	1.1	5.2	136	141	0.241	0.15	1.02	1.15	0.100	2.0
4.600	15.092	474.21	133.44	1.34	-1.45	1.01	121	0.908	0.908	0.19	-0.238	0.027	0.95	126	0.42	1.1	4.2	134	139	0.229	0.15	1.02	1.15	0.099	2.0
4.650	15.256	474.04	131.75	1.33	-1.35	1.01	121	0.918	0.918	0.19	-0.241	0.027	0.95	125	0.43	1.1	4.5	132	137	0.221	0.14	1.02	1.15	0.098	2.0
4.700	15.420	473.88	122.97	1.33	-1.60	1.08	121	0.928	0.928	0.18	-0.245	0.028	0.95	116	0.44	1.1	6.9	123	130	0.197	0.13	1.02	1.15	0.098	2.0
4.750	15.584	473.72	110.64	1.25	-1.81	1.13	121	0.938	0.938	0.18	-0.248	0.028	0.95	105	0.46	1.1	9.9	110	120	0.172	0.12	1.02	1.15	0.097	1.8
4.800	15.748	473.55	100.46	1.16	-1.73	1.15	121	0.948	0.948	0.18	-0.252	0.029	0.95	95	0.47	1.1	12.5	100	112	0.156	0.12	1.01	1.15	0.096	1.6
4.850	15.912	473.39	106.65	0.94	-1.15	0.88	121	0.958	0.958	0.18	-0.255	0.029	0.95	101	0.47	1.0	6.1	106	112	0.155	0.12	1.01	1.15	0.096	1.6
4.900	16.076	473.22	120.21	1.07	-0.77	0.89	124	0.968	0.968	0.18	-0.259	0.029	0.95	114	0.45	1.0	4.4	118	123	0.177	0.13	1.01	1.15	0.095	1.9
4.950	16.240	473.06	132.87	1.31	1.63	0.99	124	0.978	0.978	0.18	-0.263	0.030	0.95	126	0.43	1.0	4.6	130	134	0.212	0.14	1.01	1.15	0.094	2.0
5.000	16.404	472.90	145.52	1.49	0.86	1.02	124	0.988	0.988	0.18	-0.266	0.030	0.95	138	0.41	1.0	3.9	141	145	0.260	0.15	1.01	1.15	0.093	2.0
5.050	16.568	472.73	158.55	1.55	0.57	0.98	124	0.999	0.999	0.17	-0.270	0.031	0.94	150	0.39	1.0	2.4	153	156	0.331	0.17	1.01	1.15	0.092	2.0
5.100	16.732	472.57	170.77	1.74	0.56	1.02	124	1.009	1.009	0.17	-0.273	0.031	0.94	161	0.38	1.0	2.1	164	166	0.449	0.19	1.01	1.15	0.091	2.0
5.150	16.896	472.40	171.98	1.85	0.38	1.08	124	1.019	1.019	0.17	-0.277	0.031	0.94	163	0.38	1.0	2.8	165	168	0.465	0.19	1.01	1.15	0.091	2.0
5.200	17.060	472.24	159.26	2.03	-0.13	1.27	121	1.029	1.029	0.17	-0.281	0.032	0.94	150	0.39	1.0	6.6	152	159	0.358	0.17	1.00	1.15	0.090	2.0
5.250	17.224	472.08	146.40	2.32	-0.34	1.59	121	1.039	1.039	0.17	-0.284	0.032	0.94	138	0.40	1.0	13.6	139	153	0.309	0.16	1.00	1.15	0.089	2.0
5.300	17.388	471.91	125.78	2.36	-0.45	1.88	118	1.049	1.049	0.17	-0.288	0.033	0.94	119	0.42	1.0	21.8	119	141	0.239	0.15	1.00	1.15	0.089	2.0
5.350	17.552	471.75	107.97	2.20	-0.28	2.03	118	1.058	1.058	0.16	-0.292	0.033	0.94	102	0.44	1.0	27.1	102	129	0.195	0.13	1.00	1.15	0.088	2.0
5.400	17.716	471.58	139.61	2.04	0.98	1.46	121	1.068	1.068	0.16	-0.295	0.033	0.94	132	0.41	1.0	12.7	131	144	0.254	0.15	1.00	1.15	0.087	2.0
5.450	17.880	471.42	159.05	1.90	0.81	1.19	121	1.078	1.078	0.16	-0.299	0.034	0.94	150	0.40	1.0	5.7	149	155	0.325	0.17	1.00	1.15	0.086	2.0
5.500	18.044	471.26	159.04	1.84	0.54	1.16	121	1.088	1.088	0.16	-0.303	0.034	0.94	150	0.40	1.0	5.3	149	154	0.317	0.17	1.00	1.15	0.086	2.0
5.550	18.208	471.09	159.14	1.73	0.29	1.09	124	1.098	1.098	0.16	-0.307	0.035	0.94	150	0.40	1.0	4.3	148	152	0.306	0.16	0.99	1.15	0.085	2.0
5.600	18.372	470.93	157.55	1.61	0.18	1.02	124	1.108	1.108	0.16	-0.310	0.035	0.94	149	0.40	1.0	3.6	146	150	0.292	0.16	0.99	1.15	0.084	2.0
5.650	18.537	470.76	157.31	1.63	0.27	1.04	124	1.118	1.118	0.16	-0.314	0.036	0.93	149	0.40	1.0	3.9	145	149	0.284	0.16	0.99	1.15	0.083	2.0
5.700	18.701	470.60	154.69	1.91	0.35	1.23	121	1.128	1.128	0.15	-0.318	0.036	0.93	146	0.40	1.0	7.2	142	150	0.286	0.16	0.99	1.15	0.082	2.0
5.750	18.865	470.44	138.73	1.89	-0.11	1.36	121	1.138	1.138	0.15	-0.322	0.036	0.93	131	0.42	1.0	11.7	127	139	0.229	0.15	0.99	1.15	0.082	2.0
5.800	19.029	470.27	127.57	1.92	0.47	1.51	121	1.148	1.148	0.15	-0.325	0.037	0.93	121	0.43	1.0	16.1	116	132	0.205	0.14	0.99	1.15	0.081	2.0
5.850	19.193	470.11	138.25	1.43	1.37	1.04	121	1.158	1.158	0.15	-0.329	0.037	0.93	131	0.43	1.0	6.1	126	132	0.203	0.14	0.99	1.15	0.080	2.0
5.900	19.357	469.94	136.97	1.38	0.43	1.01	124	1.168	1.168	0.15	-0.333	0.038	0.93	129	0.44	1.0	5.8	124	130	0.197	0.13	0.99	1.15	0.079	2.0

Table I-9: Liquefaction Analysis for CPT HAV-C007 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
5.950	19.521	469.78	128.35	1.31	2.35	1.02	121	1.178	1.178	0.15	-0.337	0.038	0.93	121	0.45	1.0	7.3	116	123	0.178	0.13	0.99	1.15	0.078	2.0
6.000	19.685	469.62	128.72	1.31	0.74	1.02	121	1.188	1.188	0.14	-0.341	0.038	0.93	122	0.45	0.9	7.2	115	123	0.177	0.13	0.99	1.15	0.077	2.0
6.050	19.849	469.45	129.07	1.33	0.47	1.03	121	1.198	1.198	0.14	-0.345	0.039	0.93	122	0.45	0.9	7.5	115	123	0.178	0.13	0.98	1.15	0.077	2.0
6.100	20.013	469.29	131.84	1.35	0.33	1.02	121	1.208	1.208	0.14	-0.348	0.039	0.93	125	0.45	0.9	7.1	117	124	0.182	0.13	0.98	1.15	0.076	2.0
6.150	20.177	469.12	137.48	1.41	0.40	1.03	121	1.218	1.218	0.14	-0.352	0.040	0.93	130	0.44	0.9	6.5	122	129	0.193	0.13	0.98	1.15	0.075	2.0
6.200	20.341	468.96	142.34	1.48	0.55	1.04	124	1.228	1.228	0.14	-0.356	0.040	0.93	135	0.43	0.9	6.1	126	132	0.204	0.14	0.98	1.15	0.074	2.0
6.250	20.505	468.80	148.52	1.52	0.59	1.03	124	1.238	1.238	0.14	-0.360	0.041	0.93	140	0.43	0.9	5.3	131	137	0.220	0.14	0.98	1.15	0.074	2.0
6.300	20.669	468.63	154.82	1.57	0.74	1.01	124	1.248	1.248	0.14	-0.364	0.041	0.92	146	0.42	0.9	4.6	137	141	0.239	0.15	0.98	1.15	0.073	2.0
6.350	20.833	468.47	159.54	1.64	0.82	1.03	124	1.259	1.259	0.13	-0.368	0.042	0.92	151	0.41	0.9	4.4	140	145	0.258	0.15	0.97	1.15	0.072	2.0
6.400	20.997	468.30	159.11	1.69	0.82	1.06	124	1.269	1.269	0.13	-0.372	0.042	0.92	150	0.41	0.9	5.0	140	145	0.256	0.15	0.97	1.15	0.071	2.0
6.450	21.161	468.14	154.70	1.66	0.82	1.08	124	1.279	1.279	0.13	-0.376	0.042	0.92	146	0.42	0.9	5.7	135	141	0.238	0.15	0.97	1.15	0.070	2.0
6.500	21.325	467.97	149.25	1.60	0.63	1.07	124	1.289	1.289	0.13	-0.380	0.043	0.92	141	0.43	0.9	6.4	130	136	0.218	0.14	0.97	1.15	0.069	2.0
6.550	21.489	467.81	144.15	1.51	0.47	1.05	124	1.299	1.299	0.13	-0.384	0.043	0.92	136	0.44	0.9	6.6	125	131	0.201	0.14	0.97	1.15	0.069	2.0
6.600	21.653	467.65	135.11	1.37	0.31	1.02	121	1.309	1.309	0.13	-0.388	0.044	0.92	128	0.45	0.9	7.2	116	123	0.179	0.13	0.97	1.15	0.068	2.0
6.650	21.817	467.48	122.55	1.21	0.27	0.99	121	1.319	1.319	0.12	-0.392	0.044	0.92	116	0.47	0.9	8.6	104	113	0.157	0.12	0.97	1.15	0.067	2.0
6.700	21.981	467.32	116.58	1.15	0.01	0.98	121	1.329	1.329	0.12	-0.396	0.045	0.92	110	0.48	0.9	9.6	99	108	0.149	0.11	0.97	1.15	0.066	2.0
6.750	22.145	467.15	109.66	0.90	-0.09	0.82	121	1.339	1.339	0.12	-0.400	0.045	0.92	104	0.50	0.9	7.7	92	100	0.137	0.11	0.97	1.15	0.065	2.0
6.800	22.309	466.99	106.30	0.73	-1.13	0.69	124	1.349	1.349	0.12	-0.404	0.045	0.92	100	0.51	0.9	5.6	89	94	0.130	0.10	0.98	1.15	0.064	2.0
6.850	22.473	466.83	82.85	0.62	-3.30	0.75	121	1.359	1.359	0.12	-0.408	0.046	0.92	78	0.55	0.9	12.1	68	80	0.116	0.09	0.98	1.15	0.064	1.8
6.900	22.638	466.66	64.99	0.61	-4.24	0.94	121	1.369	1.369	0.12	-0.412	0.046	0.91	61	0.56	0.9	22.0	53	75	0.112	0.09	0.98	1.15	0.064	1.8
6.950	22.802	466.50	58.76	0.53	-0.10	0.91	121	1.379	1.379	0.12	-0.416	0.047	0.91	56	0.57	0.9	23.6	48	71	0.108	0.08	0.98	1.15	0.064	1.7
7.000	22.966	466.33	60.96	0.46	-1.34	0.76	121	1.389	1.389	0.12	-0.420	0.047	0.91	58	0.58	0.9	19.7	49	69	0.106	0.08	0.98	1.15	0.064	1.7
7.050	23.130	466.17	72.73	0.43	-2.81	0.59	121	1.399	1.399	0.12	-0.424	0.048	0.91	69	0.57	0.9	11.5	59	70	0.107	0.08	0.98	1.15	0.064	1.7
7.100	23.294	466.01	78.27	0.48	-3.41	0.61	121	1.409	1.409	0.12	-0.428	0.048	0.91	74	0.56	0.9	10.6	63	73	0.110	0.09	0.98	1.15	0.064	1.7
7.150	23.458	465.84	56.28	0.43	1.00	0.76	121	1.419	1.419	0.12	-0.432	0.049	0.91	53	0.58	0.8	21.8	45	67	0.105	0.08	0.98	1.15	0.063	1.6
7.200	23.622	465.68	46.67	0.36	0.84	0.77	118	1.429	1.429	0.12	-0.437	0.049	0.91	44	0.59	0.8	26.2	37	63	0.102	0.08	0.98	1.15	0.063	1.6
7.250	23.786	465.51	41.20	0.34	0.95	0.83	118	1.438	1.438	0.12	-0.441	0.050	0.91	39	0.60	0.8	29.8	32	62	0.101	0.08	0.98	1.15	0.063	1.6
7.300	23.950	465.35	35.90	0.37	4.74	1.04	118	1.448	1.448	0.12	-0.445	0.050	0.91	34	0.59	0.8	35.1	28	63	0.102	0.08	0.98	1.15	0.063	1.6
7.350	24.114	465.19	39.85	0.38	6.42	0.95	118	1.458	1.458	0.12	-0.449	0.051	0.91	38	0.59	0.8	32.4	31	64	0.102	0.08	0.97	1.15	0.063	1.6
7.400	24.278	465.02	62.07	0.45	8.14	0.73	121	1.467	1.467	0.12	-0.453	0.051	0.91	59	0.58	0.8	19.3	49	68	0.105	0.08	0.97	1.15	0.063	1.7
7.450	24.442	464.86	102.89	0.84	8.86	0.82	121	1.477	1.477	0.12	-0.457	0.051	0.90	97	0.52	0.8	9.9	82	92	0.127	0.10	0.97	1.15	0.064	2.0
7.500	24.606	464.69	152.04	1.27	2.24	0.83	124	1.487	1.487	0.12	-0.462	0.052	0.90	144	0.44	0.9	3.4	124	127	0.189	0.13	0.96	1.15	0.064	2.0
7.550	24.770	464.53	209.78	1.78	-2.56	0.85	124	1.497	1.497	0.12	-0.466	0.052	0.90	198	0.36	0.9	0.8	175	176	0.611	0.20	0.93	1.15	0.066	2.0
7.600	24.934	464.37	252.58	2.12	-5.00	0.84	124	1.508	1.508	0.12	-0.470	0.053	0.90	239	0.31	0.9	0.2	214	214	2.000	0.30	0.89	1.15	0.069	2.0
7.650	25.098	464.20	280.58	2.35	-4.03	0.84	124	1.518	1.518	0.12	-0.474	0.053	0.90	265	0.28	0.9	0.1	240	240	2.000	0.30	0.89	1.15	0.069	2.0
7.700	25.262	464.04	287.25	2.88	-3.96	1.00	124	1.528	1.528	0.12	-0.478	0.054	0.90	271	0.27	0.9	0.4	246	246	2.000	0.30	0.89	1.15	0.069	2.0
7.750	25.426	463.87	286.94	2.98	-3.91	1.04	124	1.538	1.538	0.12	-0.483	0.054	0.90	271	0.27	0.9	0.5	245	245	2.000	0.30	0.89	1.15	0.069	2.0
7.800	25.590	463.71	254.42	3.20	-3.89	1.26	124	1.548	1.548	0.12	-0.487	0.055	0.90	240	0.31	0.9	2.9	214	217	2.000	0.30	0.89	1.15	0.069	2.0
7.850	25.754	463.55	260.20	2.72	-3.16	1.04	124	1.559	1.559	0.12	-0.491	0.055	0.90	246	0.30	0.9	1.0	219	220	2.000	0.30	0.88	1.15	0.069	2.0
7.900	25.918	463.38	321.61	2.31	-1.84	0.72	127	1.569	1.569	0.12	-0.495	0.056	0.90	304	0.26	0.9	0.0	274	274	2.000	0.30	0.88	1.15	0.069	2.0
7.950	26.082	463.22	332.65	2.07	1.92	0.62	127	1.579	1.579	0.12	-0.500	0.056	0.90	314	0.26	0.9	0.0	283	283	2.000	0.30	0.88	1.15	0.069	2.0
8.000	26.246	463.05	341.21	2.30	1.76	0.67	127	1.590	1.590	0.12	-0.504	0.057	0.90	322	0.26	0.9	0.0	290	290	2.000	0.30	0.88	1.15	0.069	2.0
8.050	26.410	462.89	341.91	2.31	4.96	0.68	127	1.600	1.600	0.12	-0.508	0.057	0.89	323	0.26	0.9	0.0	290	290	2.000	0.30	0.88	1.15	0.070	2.0
8.100	26.574	462.73	345.28	2.76	0.35	0.80	124	1.611	1.611	0.12	-0.512	0.058	0.89	326	0.26	0.9	0.0	292	292	2.000	0.30	0.87	1.15	0.070	2.0
8.150	26.739	462.56	339.02	3.25	-5.24	0.96	124	1.621	1.621	0.12	-0.517	0.058	0.89	320	0.26	0.9	0.1	286	286	2.000	0.30	0.87	1.15	0.070	2.0
8.200	26.903	462.40	307.44	3.38	-6.69	1.10	124	1.631	1.631	0.12	-0.521	0.059	0.89	291	0.26	0.9	0.6	259	260	2.000	0.30	0.87	1.15	0.070	2.0
8.250	27.067	462.23	278.73	3.45	-7.19	1.24	124	1.641	1.641	0.12	-0.525	0.059	0.89	263	0.29	0.9	2.2	232	234	2.000	0.30	0.87	1.15	0.070	2.0
8.300	27.231	462.07	269.62	3.42	-7.30	1.27	124	1.651	1.651	0.12	-0.530	0.059	0.89	255	0.30	0.9	2.8	223	226	2.000	0.30	0.87	1.15	0.070	2.0
8.350	27.395	461.91	277.42	3.89	-6.75	1.40	124	1.661	1.661	0.12	-0.534	0.060	0.89	262	0.29	0.9	4.1	230	234	2.000	0.30	0.86	1.15	0.070	2.0
8.400	27.559	461.74	303.47	4.69	-6.67	1.54	121	1.671	1.671	0.12	-0.538	0.060	0.89	287	0.26	0.9	4.8	254	259	2.000	0.30	0.86	1.15	0.070	2.0
8.450	27.723	461.58	329.07	5.24	-6.88	1.59	121	1.681	1.681	0.12	-0.543	0.061	0.89	311	0.26	0.9	4.5	275	280	2.000	0.30	0.86	1.15	0.070	2.0
8.500	27.887	461.41	312.99	5.42	-6.93	1.73	121	1.691	1.691	0.12	-0.547	0.061	0.89	296	0.26	0.9	7.2	261	269	2.000	0.30	0.86	1.15	0.070	2.0
8.550	28.051	461.25	292.37	5.21	-6.61	1.78	121	1.701	1.701	0.12	-0.552	0.062	0.89	276	0.27	0.9	9.2	244	253	2.000	0.30	0.86	1.15	0.070	2.0
8.600	28.215	461.09	263.45	4.98	-6.01	1.89	121	1.711	1.711	0.12	-0.556	0.062	0.88	249	0.29	0.9	13.0	216	229	2.000	0.30	0.86	1.15	0.070	2.0
8.650	28.379	460.92	235.83	4.79	-4.41	2.03	121	1.721	1.721	0.12	-0.560	0.063	0.88	223	0.32	0.9	17.7	191	209	2.000	0.29	0.86	1.15	0.070	2.0
8.700	28.543	460.76	212.35	4.08	-0.77	1.92	121	1.731	1.731	0.12	-0.565	0.063	0.88	201	0.35	0.8	17.8	169	187	0.976	0.23	0.89	1.15	0.068	2.0
8.750	28.707	460.59	196.30	3.34	-0.64	1.70	121	1.741	1.741	0.12	-0.569	0.064	0.88	185	0.37	0.8	15.4	154	169	0.495	0.19	0.90	1.15	0.066	2.0
8.800	28.871	460.43	155.54	2.86	-0.43	1.84	121	1.751	1.751	0.12	-0.574	0.064	0.88	147	0.42	0.8	22.5	119	142	0.241	0.15	0.93	1.15	0.065	2.0
8.850	29.035	460.26	131.49	1.75	-0.32	1.33	121	1.761	1.761	0.12	-0.578	0.065	0.88	124	0.47	0.8	16.9	98	115	0.161	0.12	0.94	1.15	0.064	2.0
8.900	29.199	460.10	119.15	1.45	-0.30	1.22	121	1.771	1.771	0.12	-0.582	0.065	0.88	113	0.49	0.8	16.9	88	104	0.143	0.11	0.94	1.15	0.063	2.0
8.950	29.363	459.94	101.58	1.29	0.77	1.27	121	1.781	1.781	0.12	-0.587	0.066	0.88	96	0.51	0.8	21.5	74	95	0.131	0.10	0.95	1.15	0.063	2.0
9.000	29.527	459.77	94.57	1.15	-0.06	1.21	121	1.791	1.791	0.12	-0.591	0.066	0.88	89	0.52	0.8	21.9	68	90	0.125	0.10	0.95	1.15	0.063	2.0
9.050	29.691	459.61	89.96	1.11	-0.06	1.23	121	1.800	1.800	0.12	-0.596	0.067	0.88	85	0.53	0.8	23.4	64	88	0.123	0.10	0.95	1.15	0.063	2.0
9.100	29.855	459.44	85.35	1.03	-0.05	1.21	121	1.810	1.810	0.12	-0.600	0.067	0.88	81	0.53	0.8	24.1	61	85	0.120	0.09	0.95	1.15	0.063	1.9
9.150	30.019	459.28	84.15	0.99	-0.06	1.18	121	1.820	1.820	0.12	-0.605	0.068	0.87	80	0.54	0.7	23.9	59	83	0.119	0.09	0.95	1.15	0.063	1.9
9.200	30.183	459.12	84.44	0.98	-0.17	1.16	121	1.830	1.830	0.12	-0.609	0.068	0.87	80	0.54	0.7	23.6	59	83	0.119	0.09	0.95	1.15	0.063	1.9
9.250	30.347	458.95	87.59	0.99	-0.11	1.13	121	1.840	1.840	0.12	-0.614	0.069	0.87	83	0.54	0.7	22.4	62	84	0.119	0.09	0.95	1.15	0.063	1.9
9.300	30.511	458.79	92.72	1.02	-0.07	1.09	121	1.850	1.850	0.12	-0.618	0.069	0.87	88	0.53	0.7	20.5	65	86	0.121	0.09	0.95	1.15	0.063	1.9
9.350	30.675	458.62	98.62	1.06	-0.05	1.07	121	1.860	1.860	0.12	-0.623	0.070	0.87	93	0.53	0.7	18.8	69	88	0.124	0.10	0.95	1.15	0.063	2.0
9.400	30.840	458.46	103.66	1.13	-0.05	1.09	121	1.870	1.870	0.12	-0.627	0.070	0.87	98	0.52	0.7	18.1	73	91	0.127	0.10	0.94	1.15	0.063	2.0
9.450	31.004	458.30	105.41	1.19	-0.10	1.13	121	1.880	1.880	0.12	-0.632	0.071	0.87	100	0.51	0.7	18.6	74	93	0.128	0.10	0.94	1.15	0.063	2.0
9.500	31.168	458.13	106.21	1.24	-0.14	1.17	121	1.890	1.890	0.12	-0.636	0.071	0.87	100	0.51	0.7	19.2	75	94	0.130	0.10	0.94	1.15	0.063	2.0
9.550	31.332	457.97	106.18	1.25	-0.24	1.17	121	1.900	1.900	0.12	-0.641	0.072	0.87	100	0.51	0.7	19.3	74	94	0.130	0.10	0.94	1.15	0.063	2.0
9.600	31.496	457.80	107.21	1.26	-0.20	1.18	121	1.910	1.910	0.12	-0.645	0.072	0.87	101	0.51	0.7	19.2	75	94	0.130	0.10	0.94	1.15	0.063	2.0
9.650	31.660	457.64	112.03	1.25	-0.17	1.12	121	1.920	1.920	0.12	-0.650	0.073	0.87	106	0.51	0.7	17.2	78	95	0.132	0.10	0.94	1.15	0.063	2.0
9.700	31.824	457.48	114.27	1.26	-0.15	1.11	121	1.929	1.929	0.12	-0.654	0.073	0.86	108	0.51	0.7	16.6	80	96	0.133	0.10	0.94	1.15	0.063	2.0
9.750	31.988	457.31	116.49	1.31	-0.06	1.12	121	1.939	1.939	0.12	-0.659	0.074	0.86	110	0.50	0.7	16.6	81	98	0.134	0.10	0.94	1.15	0.063	2.0
9.800	32.152	457.15	116.34	1.33	-0.11	1.14	121	1.949	1.949	0.12	-0.663	0.074	0.86	110	0.50	0.7	17.1	81	98	0.135	0.10	0.94	1.15	0.063	2.0
9.850	32.316	456.98	115.58	1.07	-0.28	0.92	121	1.959	1.959	0.12	-0.668	0.075	0.86	109	0.52	0.7	12.7	79	92	0.128	0.10	0.94	1.15	0.063	2.0
9.900	32.480	456.82	114.22	1.10	-0.25	0.96	121	1.969	1.969	0.12	-0.673	0.075	0.86	108	0.52	0.7	13.9	78	92	0.128	0.10	0.94	1.15	0.063	2.0
9.950	32.644	456.66	106.58	1.12	1.09	1.05	121	1.979	1.979	0.12	-0.677	0.076	0.86	101	0.52	0.7	17.2	73	90	0.125	0.10	0.94	1.15	0.062	2.0
10.000	32.808	456.49	104.96	1.11	-0.16	1.06	121	1.989	1.989	0.12	-0.682	0.076	0.86	99	0.52	0.7	17.8	71	89	0.125	0.10	0.94	1.15	0.062	2.0
10.050	32.972	456.33	100.42	1.06	-0.27	1.06	121	1.999	1.999	0.12	-0.686	0.077	0.86	95	0.53	0.7	18.8	68	87	0.122	0.10	0.94	1.15	0.062	2.0
10.100	33.136	456.16	97.33	1.04	-0.35	1.07	121	2.009	2.009	0.12	-0.691	0.077	0.86	92	0.53	0.7	19.8	65	85	0.121	0.09	0.94	1.15	0.062	1.9
10.150	33.300	456.00	93.38	0.99	-0.41	1.06	121	2.019	2.019	0.12	-0.696	0.078	0.86	88	0.54	0.7	20.7	62	83	0.119	0.09	0.94	1.15	0.062	1.9
10.200	33.464	455.84	93.20	0.98	-0.36	1.05	121	2.029	2.029	0.12	-0.700	0.078	0.86	88	0.54	0.7	20.6	62	83	0.118	0.09	0.94	1.15	0.062	1.9
10.250	33.628	455.67	94.86	0.97	-0.27	1.02	121	2.039	2.039	0.12	-0.705	0.079	0.85	90	0.54	0.7	19.5	63	83	0.118	0.09	0.94	1.15	0.062	1.9
10.300	33.792	455.51	96.60	0.97	-0.26	1.01	121	2.048	2.048	0.12	-0.709	0.079	0.85	91	0.54	0.7	18.9	64	83	0.118	0.09	0.94	1.15	0.062	1.9
10.350	33.956	455.34	98.95	0.96	-0.23	0.97	121	2.058	2.058	0.12	-0.714	0.080	0.85	94	0.54	0.7	17.7	65	83	0.119	0.09	0.94	1.15	0.062	1.9
10.400	34.120	455.18	99.74	0.96	-0.33	0.96	121	2.068	2.068	0.12	-0.719	0.080	0.85	94	0.54	0.7	17.4	66	83	0.119	0.09	0.94	1.15	0.062	1.9
10.450	34.284	455.02	99.02	0.97	-0.24	0.98	121	2.078	2.078	0.12	-0.723	0.081	0.85	94	0.54	0.7	18.0	65	83	0.119	0.09	0.94	1.15	0.062	1.9
10.500	34.448	454.85	96.37	0.97	-0.34	1.01	121	2.088	2.088	0.12	-0.728	0.081	0.85	91	0.54	0.7	19.2	63	82	0.118	0.09	0.94	1.15	0.062	1.9
10.550	34.612	454.69	95.62	0.95	-0.35	0.99	121	2.098	2.098	0.12	-0.733	0.082	0.85	90	0.54	0.7	19.1	62	81	0.117	0.09	0.94	1.15	0.062	1.9
10.600	34.776	454.52	95.58	0.93	-0.31	0.97	121	2.108	2.108	0.12	-0.737	0.082	0.85	90	0.54	0.7	18.7	62	81	0.117	0.09	0.94	1.15	0.062	1.9
10.650	34.941	454.36	100.31	0.92	-0.15	0.92	121	2.118	2.118	0.12	-0.742	0.083	0.85	95	0.54	0.7	16.6	65	82	0.117	0.09	0.94	1.15	0.062	1.9
10.700	35.105	454.20	104.02	0.92	-0.19	0.89	121	2.128	2.128	0.12	-0.747	0.083	0.85	98	0.54	0.7	15.2	67	83	0.118	0.09	0.94	1.15	0.062	1.9
10.750	35.269	454.03	107.97	0.94	-0.14	0.87	121	2.138	2.138	0.12	-0.751	0.084	0.85	102	0.54	0.7	14.0	70	84	0.120	0.09	0.93	1.15	0.062	1.9
10.800	35.433	453.87	109.39	0.91	-0.15	0.83	121	2.148	2.148	0.12	-0.756	0.084	0.84	103	0.54	0.7	12.9	71	84	0.119	0.09	0.93	1.15	0.062	1.9
10.850	35.597	453.70	105.48	0.71	-0.15	0.67	124	2.158	2.158	0.12	-0.761	0.085	0.84	100	0.55	0.7	10.0	67	77	0.113	0.09	0.94	1.15	0.061	1.8
10.900	35.761	453.54	96.76	0.64	-0.38	0.66	121	2.168	2.168	0.12	-0.765	0.085	0.84	91	0.57	0.7	11.8	61	73	0.110	0.09	0.94	1.15	0.061	1.8
10.950	35.925	453.38	86.55	0.58	1.16	0.67	121	2.178	2.178	0.12	-0.770	0.086	0.84	81	0.58	0.7	14.8	53	68	0.106	0.08	0.94	1.15	0.061	1.7
11.000	36.089	453.21	88.50	0.53	0.47	0.60	121	2.188	2.188	0.12	-0.775	0.087	0.84	84	0.58	0.7	12.3	55	67	0.105	0.08	0.94	1.15	0.061	1.7
11.050	36.253	453.05	91.39	0.58	0.25	0.63	121	2.198	2.198	0.12	-0.779	0.087	0.84	86	0.58	0.7	12.5	57	69	0.107	0.08	0.94	1.15	0.061	1.8
11.100	36.417	452.88	88.53	0.61	-0.09	0.69	121	2.207	2.207	0.12	-0.784	0.088	0.84	84	0.58	0.7	14.6	55	69	0.107	0.08	0.94	1.15	0.061	1.8
11.150	36.581	452.72	81.78	0.60	-0.12	0.73	121	2.217	2.217	0.12	-0.789	0.088	0.84	77	0.58	0.7	17.6	50	68	0.106	0.08	0.94	1.15	0.061	1.7
11.200	36.745	452.56	74.44	0.58	-0.22	0.78	121	2.227	2.227	0.12	-0.793	0.089	0.84	70	0.58	0.6	21.0	46	67	0.105	0.08	0.94	1.15	0.061	1.7
11.250	36.909	452.39	70.78	0.55	-0.32	0.78	121	2.237	2.237	0.12	-0.798	0.089	0.84	67	0.59	0.6	22.1	43	65	0.103	0.08	0.94	1.15	0.061	1.7
11.300	37.073	452.23	67.27	0.51	-0.35	0.76	121	2.247	2.247	0.12	-0.803	0.090	0.84	64	0.59	0.6	22.8	41	63	0.102	0.08	0.94	1.15	0.060	1.7
11.350	37.237	452.06	62.12	0.45	-0.38	0.73	121	2.257	2.257	0.12	-0.808	0.090	0.83	59	0.60	0.6	24.1	37	61	0.101	0.08	0.94	1.15	0.060	1.7
11.400	37.401	451.90	59.01	0.41	-0.39	0.69	121	2.267	2.267	0.12	-0.812	0.091	0.83	56	0.61	0.6	24.3	35	59	0.099	0.08	0.94	1.15	0.060	1.6
11.450	37.565	451.73	56.30	0.39	-0.42	0.69	121	2.277	2.277	0.12	-0.817	0.091	0.83	53	0.61	0.6	25.5	33	59	0.099	0.08	0.94	1.15	0.060	1.6
11.500	37.729	451.57	56.26	0.39	-0.34	0.69	121	2.287	2.287	0.12	-0.822	0.092	0.83	53	0.61	0.6	25.5	33	59	0.099	0.08	0.94	1.15	0.060	1.6
11.550	37.893	451.41	58.27	0.39	-0.29	0.67	121	2.297	2.297	0.12	-0.826	0.092	0.83	55	0.61	0.6	24.5	34	59	0.099	0.08	0.94	1.15	0.060	1.6
11.600	38.057	451.24	58.40	0.38	-0.25	0.65	121	2.307	2.307	0.12	-0.831	0.093	0.83	55	0.61	0.6	23.9	34	58	0.098	0.08	0.94	1.15	0.060	1.6
11.650	38.221	451.08	54.61	0.36	-0.42	0.66	121	2.317	2.317	0.12	-0.836	0.093	0.83	52	0.61	0.6	25.7	32	58	0.098	0.08	0.94	1.15	0.060	1.6
11.700	38.385	450.91	50.79	0.33	-0.44	0.66	121	2.327	2.327	0.12	-0.841	0.094	0.83	48	0.61	0.6	27.2	30	57	0.097	0.08	0.94	1.15	0.060	1.6
11.750	38.549	450.75	51.05	0.36	-0.19	0.70	121	2.336	2.336	0.12	-0.845	0.094	0.83	48	0.61	0.6	27.9	30	58	0.098	0.08	0.94	1.15	0.060	1.6
11.800	38.713	450.59	57.78	0.41	1.23	0.71	121	2.346	2.346	0.12	-0.850	0.095	0.83	55	0.61	0.6	25.5	34	59	0.099	0.08	0.94	1.15	0.060	1.7
11.850	38.877	450.42	63.20	0.41	1.20	0.65	121	2.356	2.356	0.12	-0.855	0.095	0.82	60	0.61	0.6	22.3	37	59	0.099	0.08	0.94	1.15	0.060	1.7
11.900	39.042	450.26	66.45	0.41	2.23	0.61	121	2.366	2.366	0.12	-0.860	0.096	0.82	63	0.61	0.6	20.4	39	59	0.099	0.08	0.94	1.15	0.060	1.7
11.950	39.206	450.09	63.55	0.38	1.07	0.60	121	2.376	2.376	0.12	-0.864	0.096	0.82	60	0.61	0.6	21.2	37	58	0.098	0.08	0.94	1.15	0.060	1.6
12.000	39.370	449.93	59.15	0.36	2.42	0.61	121	2.386	2.386	0.12	-0.869	0.097	0.82	56	0.61	0.6	23.1	34	57	0.097	0.08	0.94	1.15	0.060	1.6
12.050	39.534	449.77	54.00	0.34	3.72	0.63	121	2.396	2.396	0.12	-0.874	0.097	0.82	51	0.62	0.6	25.6	31	56	0.097	0.08	0.94	1.15	0.060	1.6
12.100	39.698	449.60	51.16	0.34	3.20	0.66	121	2.406	2.406	0.12	-0.879	0.098	0.82	48	0.62	0.6	27.4	29	57	0.097	0.08	0.94	1.15	0.060	1.6
12.150	39.862	449.44	48.74	0.32	2.83	0.66	121	2.416	2.411	0.12	-0.883	0.098	0.82	46	0.62	0.6	28.4	28	56	0.097	0.07	0.94	1.15	0.060	1.6
12.200	40.026	449.27	48.34	0.29	2.45	0.61	121	2.426	2.416	0.12	-0.888	0.099	0.82	46	0.62	0.6	27.6	27	55	0.096	0.07	0.94	1.15	0.060	1.6

Table I-9: Liquefaction Analysis for CPT HAV-C007 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
12.250	40.190	449.11	47.60	0.28	2.13	0.59	121	2.436	2.421	0.12	-0.893	0.099	0.82	45	0.62	0.6	27.5	27	54	0.095	0.07	0.94	1.15	0.060	1.6
12.300	40.354	448.95	43.95	0.28	2.18	0.65	118	2.445	2.426	0.12	-0.898	0.100	0.82	42	0.62	0.6	30.3	25	55	0.096	0.07	0.94	1.15	0.060	1.6
12.350	40.518	448.78	42.43	0.28	2.14	0.66	118	2.455	2.430	0.12	-0.903	0.101	0.82	40	0.62	0.6	31.1	24	55	0.096	0.07	0.94	1.15	0.060	1.6
12.400	40.682	448.62	41.66	0.26	2.38	0.62	118	2.465	2.435	0.12	-0.907	0.101	0.81	39	0.62	0.6	30.8	23	54	0.095	0.07	0.94	1.15	0.060	1.6
12.450	40.846	448.45	41.47	0.23	2.48	0.56	118	2.474	2.439	0.12	-0.912	0.102	0.81	39	0.63	0.6	29.9	23	53	0.094	0.07	0.94	1.15	0.060	1.6
12.500	41.010	448.29	39.78	0.22	2.88	0.56	118	2.484	2.444	0.12	-0.917	0.102	0.81	38	0.63	0.6	30.7	22	53	0.094	0.07	0.94	1.15	0.060	1.6
12.550	41.174	448.13	38.76	0.24	3.22	0.62	118	2.494	2.448	0.12	-0.922	0.103	0.81	37	0.62	0.6	32.2	22	54	0.095	0.07	0.94	1.15	0.060	1.6
12.600	41.338	447.96	38.57	0.25	4.28	0.65	118	2.503	2.453	0.12	-0.926	0.103	0.81	36	0.62	0.6	32.8	22	54	0.095	0.07	0.94	1.15	0.060	1.6
12.650	41.502	447.80	39.08	0.24	4.17	0.61	118	2.513	2.458	0.12	-0.931	0.104	0.81	37	0.63	0.6	31.9	22	54	0.095	0.07	0.94	1.15	0.060	1.6
12.700	41.666	447.63	45.66	0.27	6.88	0.59	121	2.523	2.462	0.12	-0.936	0.104	0.81	43	0.62	0.6	28.6	25	54	0.095	0.07	0.94	1.15	0.060	1.6
12.750	41.830	447.47	48.35	0.30	6.83	0.63	121	2.533	2.467	0.12	-0.941	0.105	0.81	46	0.62	0.6	28.2	27	55	0.096	0.07	0.94	1.15	0.060	1.6
12.800	41.994	447.31	63.81	0.41	7.28	0.64	121	2.543	2.472	0.12	-0.946	0.105	0.81	60	0.61	0.6	22.5	36	58	0.098	0.08	0.94	1.15	0.060	1.6
12.850	42.158	447.14	88.11	0.45	5.00	0.51	121	2.553	2.477	0.12	-0.950	0.106	0.81	83	0.60	0.6	11.4	50	61	0.101	0.08	0.93	1.15	0.061	1.7
12.900	42.322	446.98	106.97	0.52	4.47	0.48	124	2.563	2.482	0.12	-0.955	0.106	0.81	101	0.60	0.6	0.1	61	61	0.100	0.08	0.93	1.15	0.061	1.6
12.950	42.486	446.81	110.91	0.62	4.06	0.56	124	2.573	2.487	0.12	-0.960	0.107	0.80	105	0.57	0.6	7.8	65	72	0.109	0.09	0.93	1.15	0.061	1.8
13.000	42.650	446.65	116.81	0.72	4.25	0.61	124	2.583	2.492	0.12	-0.965	0.107	0.80	110	0.55	0.6	8.1	69	77	0.113	0.09	0.92	1.15	0.061	1.8
13.050	42.814	446.49	118.55	0.76	4.41	0.64	124	2.593	2.497	0.12	-0.970	0.108	0.80	112	0.55	0.6	8.4	70	78	0.114	0.09	0.92	1.15	0.061	1.9
13.100	42.978	446.32	122.89	0.78	4.56	0.63	124	2.603	2.502	0.12	-0.974	0.108	0.80	116	0.55	0.6	7.5	73	80	0.116	0.09	0.92	1.15	0.062	1.9
13.150	43.143	446.16	122.82	0.78	4.70	0.63	124	2.614	2.507	0.12	-0.979	0.109	0.80	116	0.55	0.6	7.6	72	80	0.116	0.09	0.92	1.15	0.062	1.9
13.200	43.307	445.99	112.08	0.75	4.66	0.67	124	2.624	2.512	0.12	-0.984	0.109	0.80	106	0.56	0.6	10.3	65	76	0.112	0.09	0.92	1.15	0.062	1.8
13.250	43.471	445.83	107.78	0.67	4.71	0.63	124	2.634	2.517	0.12	-0.989	0.110	0.80	102	0.57	0.6	10.2	62	72	0.109	0.09	0.93	1.15	0.061	1.8
13.300	43.635	445.67	99.41	0.64	5.02	0.64	124	2.644	2.522	0.12	-0.994	0.110	0.80	94	0.58	0.6	12.4	57	69	0.107	0.08	0.93	1.15	0.061	1.7
13.350	43.799	445.50	94.28	0.60	5.16	0.63	121	2.654	2.527	0.12	-0.998	0.111	0.80	89	0.58	0.6	13.5	54	67	0.105	0.08	0.93	1.15	0.061	1.7
13.400	43.963	445.34	89.83	0.56	5.30	0.63	121	2.664	2.532	0.12	-1.003	0.112	0.80	85	0.59	0.6	14.4	51	65	0.104	0.08	0.93	1.15	0.061	1.7
13.450	44.127	445.17	80.95	0.54	5.16	0.67	121	2.674	2.537	0.12	-1.008	0.112	0.80	76	0.59	0.6	17.9	46	63	0.102	0.08	0.93	1.15	0.061	1.7
13.500	44.291	445.01	78.93	0.49	5.36	0.62	121	2.684	2.541	0.12	-1.013	0.113	0.79	75	0.60	0.6	17.3	44	61	0.101	0.08	0.93	1.15	0.061	1.6
13.550	44.455	444.85	83.36	0.47	5.50	0.56	121	2.694	2.546	0.12	-1.018	0.113	0.79	79	0.60	0.6	14.5	46	61	0.100	0.08	0.93	1.15	0.061	1.6
13.600	44.619	444.68	86.48	0.46	5.79	0.53	121	2.704	2.551	0.12	-1.022	0.114	0.79	82	0.60	0.6	12.9	48	61	0.100	0.08	0.93	1.15	0.061	1.6
13.650	44.783	444.52	86.44	0.46	5.83	0.53	121	2.714	2.556	0.12	-1.027	0.114	0.79	82	0.60	0.6	13.0	48	61	0.100	0.08	0.93	1.15	0.061	1.6
13.700	44.947	444.35	83.22	0.48	6.02	0.58	121	2.724	2.561	0.12	-1.032	0.115	0.79	79	0.60	0.6	15.1	46	61	0.101	0.08	0.93	1.15	0.061	1.6
13.750	45.111	444.19	77.68	0.49	6.14	0.63	121	2.734	2.565	0.12	-1.037	0.115	0.79	73	0.60	0.6	18.0	43	61	0.100	0.08	0.93	1.15	0.062	1.6
13.800	45.275	444.02	72.23	0.47	6.14	0.65	121	2.743	2.570	0.12	-1.042	0.116	0.79	68	0.60	0.6	20.4	40	60	0.100	0.08	0.93	1.15	0.062	1.6
13.850	45.439	443.86	67.90	0.37	6.03	0.54	121	2.753	2.575	0.12	-1.046	0.116	0.79	64	0.62	0.6	19.0	37	56	0.097	0.07	0.93	1.15	0.061	1.6
13.900	45.603	443.70	60.54	0.36	6.04	0.59	121	2.763	2.580	0.12	-1.051	0.117	0.79	57	0.62	0.6	23.0	33	56	0.097	0.07	0.93	1.15	0.061	1.6
13.950	45.767	443.53	51.49	0.29	6.76	0.56	121	2.773	2.584	0.12	-1.056	0.117	0.79	49	0.62	0.6	26.0	28	54	0.095	0.07	0.93	1.15	0.061	1.5
14.000	45.931	443.37	47.23	0.27	6.19	0.58	121	2.783	2.589	0.12	-1.061	0.118	0.78	45	0.63	0.6	28.2	26	54	0.095	0.07	0.93	1.15	0.061	1.5
14.050	46.095	443.20	37.93	0.27	7.05	0.71	118	2.793	2.594	0.12	-1.066	0.118	0.78	36	0.62	0.6	34.6	21	55	0.096	0.07	0.93	1.15	0.062	1.6
14.100	46.259	443.04	33.90	0.26	7.00	0.78	118	2.803	2.598	0.12	-1.070	0.119	0.78	32	0.59	0.6	45.3	19	64	0.103	0.08	0.93	1.15	0.062	1.7
14.150	46.423	442.88	33.38	0.23	8.01	0.67	118	2.812	2.603	0.12	-1.075	0.119	0.78	32	0.59	0.6	44.6	18	63	0.102	0.08	0.93	1.15	0.062	1.6
14.200	46.587	442.71	37.49	0.17	10.90	0.46	118	2.822	2.608	0.12	-1.080	0.120	0.78	35	0.81	0.5	0.1	17	17	0.071	0.05	0.95	1.15	0.060	1.2
14.250	46.751	442.55	60.68	0.17	14.21	0.27	121	2.832	2.612	0.12	-1.085	0.120	0.78	57	0.73	0.5	0.1	30	30	0.079	0.06	0.95	1.15	0.061	1.3
14.300	46.915	442.38	79.32	0.25	10.73	0.31	121	2.842	2.617	0.12	-1.090	0.121	0.78	75	0.68	0.5	0.1	41	41	0.086	0.07	0.94	1.15	0.061	1.4
14.350	47.079	442.22	93.99	0.44	10.27	0.47	124	2.852	2.622	0.12	-1.094	0.121	0.78	89	0.64	0.6	0.1	50	50	0.092	0.07	0.94	1.15	0.062	1.5
14.400	47.244	442.06	93.93	0.58	9.82	0.62	121	2.862	2.627	0.12	-1.099	0.122	0.78	89	0.59	0.6	13.6	52	66	0.104	0.08	0.93	1.15	0.062	1.7
14.450	47.408	441.89	85.01	0.62	9.28	0.73	121	2.872	2.632	0.12	-1.104	0.122	0.78	80	0.59	0.6	18.7	47	66	0.104	0.08	0.93	1.15	0.062	1.7
14.500	47.572	441.73	89.98	0.62	9.23	0.69	121	2.882	2.636	0.12	-1.109	0.123	0.78	85	0.58	0.6	16.5	50	66	0.104	0.08	0.93	1.15	0.062	1.7
14.550	47.736	441.56	116.53	0.65	9.73	0.55	124	2.892	2.641	0.12	-1.113	0.123	0.77	110	0.57	0.6	7.3	66	73	0.110	0.09	0.92	1.15	0.063	1.8
14.600	47.900	441.40	140.14	0.79	10.28	0.56	124	2.902	2.646	0.12	-1.118	0.124	0.77	132	0.53	0.6	4.3	81	86	0.121	0.09	0.91	1.15	0.063	1.9
14.650	48.064	441.24	144.50	0.83	10.37	0.57	124	2.912	2.652	0.12	-1.123	0.125	0.77	137	0.53	0.6	4.0	84	88	0.124	0.10	0.91	1.15	0.063	2.0
14.700	48.228	441.07	130.15	0.78	9.99	0.60	124	2.922	2.657	0.12	-1.128	0.125	0.77	123	0.54	0.6	6.4	75	81	0.117	0.09	0.92	1.15	0.063	1.8
14.750	48.392	440.91	124.77	0.72	10.03	0.58	124	2.932	2.662	0.12	-1.133	0.126	0.77	118	0.55	0.6	6.6	71	77	0.113	0.09	0.92	1.15	0.063	1.8
14.800	48.556	440.74	138.19	0.83	10.36	0.60	124	2.942	2.667	0.12	-1.137	0.126	0.77	131	0.53	0.6	5.3	80	85	0.121	0.09	0.91	1.15	0.063	1.9
14.850	48.720	440.58	158.57	0.81	11.04	0.51	124	2.953	2.672	0.12	-1.142	0.127	0.77	150	0.51	0.6	2.0	94	96	0.132	0.10	0.90	1.15	0.064	2.0
14.900	48.884	440.42	145.35	0.89	10.85	0.61	124	2.963	2.677	0.12	-1.147	0.127	0.77	137	0.52	0.6	4.7	85	89	0.125	0.10	0.91	1.15	0.064	2.0
14.950	49.048	440.25	129.07	0.87	8.98	0.68	124	2.973	2.682	0.12	-1.152	0.128	0.77	122	0.54	0.6	8.3	74	82	0.118	0.09	0.91	1.15	0.063	1.9
15.000	49.212	440.09	120.58	0.86	9.02	0.72	124	2.983	2.687	0.12	-1.156	0.128	0.77	114	0.55	0.6	10.6	68	79	0.115	0.09	0.92	1.15	0.063	1.8
15.050	49.376	439.92	118.41	0.88	9.24	0.74	124	2.993	2.692	0.12	-1.161	0.129	0.77	112	0.55	0.6	11.6	67	79	0.115	0.09	0.92	1.15	0.063	1.8
15.100	49.540	439.76	119.62	0.89	9.60	0.75	124	3.004	2.697	0.12	-1.166	0.129	0.76	113	0.55	0.6	11.6	68	79	0.115	0.09	0.92	1.15	0.063	1.8
15.150	49.704	439.60	133.63	0.99	10.38	0.74	124	3.014	2.702	0.12	-1.171	0.130	0.76	126	0.53	0.6	9.0	77	86	0.121	0.10	0.91	1.15	0.064	1.9
15.200	49.868	439.43	151.51	1.07	11.01	0.70	124	3.024	2.707	0.12	-1.175	0.130	0.76	143	0.51	0.6	5.9	89	95	0.131	0.10	0.90	1.15	0.064	2.0
15.250	50.032	439.27	166.55	1.15	11.73	0.69	124	3.034	2.712	0.12	-1.180	0.131	0.76	157	0.49	0.6	4.1	99	103	0.142	0.11	0.90	1.15	0.065	2.0
15.300	50.196	439.10	179.54	1.30	12.21	0.72	124	3.044	2.717	0.12	-1.185	0.131	0.76	170	0.47	0.6	3.7	109	112	0.156	0.12	0.89	1.15	0.065	2.0
15.350	50.360	438.94	170.00	1.29	11.88	0.76	124	3.054	2.722	0.12	-1.190	0.132	0.76	161	0.48	0.6	5.0	102	107	0.147	0.11	0.89	1.15	0.065	2.0
15.400	50.524	438.78	153.92	1.10	11.77	0.72	124	3.065	2.727	0.12	-1.194	0.132	0.76	145	0.51	0.6	5.9	90	96	0.132	0.10	0.90	1.15	0.064	2.0
15.450	50.688	438.61	165.67	1.04	12.28	0.63	124	3.075	2.732	0.12	-1.199	0.133	0.76	157	0.50	0.6	3.3	98	101	0.139	0.11	0.90	1.15	0.065	2.0
15.500	50.852	438.45	164.34	1.07	12.48	0.65	124	3.085	2.738	0.12	-1.204	0.133	0.76	155	0.50	0.6	3.8	97	101	0.138	0.11	0.90	1.15	0.065	2.0
15.550	51.016	438.28	201.52	1.29	14.14	0.64	124	3.095	2.743	0.12	-1.209	0.134	0.76	190	0.45	0.7	1.4	125	126	0.186	0.13	0.88	1.15	0.066	2.0
15.600	51.180	438.12	232.12	1.64	15.48	0.71	124	3.105	2.748	0.12	-1.213	0.134	0.76	219	0.40	0.7	1.0	149	150	0.291	0.16	0.85	1.15	0.069	2.0
15.650	51.345	437.96	256.97	1.49	16.12	0.58	124	3.116	2.753	0.12	-1.218	0.135	0.75	243	0.37	0.7	0.1	170	170	0.510	0.19	0.82	1.15	0.071	2.0
15.700	51.509	437.79	247.44	1.44	15.14	0.58	124	3.126	2.758	0.12	-1.223	0.135	0.75	234	0.38	0.7	0.2	162	162	0.393	0.18	0.83	1.15	0.070	2.0
15.750	51.673	437.63	253.90	1.41	14.28	0.56	124	3.136	2.763	0.12	-1.227	0.136	0.75	240	0.38	0.7	0.1	167	167	0.462	0.19	0.82	1.15	0.071	2.0
15.800	51.837	437.46	278.01	1.45	16.69	0.52	127	3.146	2.768	0.12	-1.232	0.136	0.75	263	0.35	0.7	0.0	189	189	1.050	0.23	0.78	1.15	0.075	2.0
15.850	52.001	437.30	294.39	0.93	16.50	0.31	127	3.157	2.773	0.12	-1.237	0.137	0.75	278	0.33	0.7	0.0	203	203	2.000	0.27	0.74	1.15	0.079	2.0
15.900	52.165	437.14	304.84	0.82	10.92	0.27	127	3.167	2.779	0.12	-1.242	0.137	0.75	288	0.31	0.7	0.0	213	213	2.000	0.30	0.71	1.15	0.082	2.0
15.950	52.329	436.97	252.01	0.79	13.23	0.31	127	3.178	2.784	0.12	-1.246	0.138	0.75	238	0.38	0.7	0.0	165	165	0.429	0.18	0.82	1.15	0.071	2.0
16.000	52.493	436.81	214.25	0.81	9.45	0.38	124	3.188	2.789	0.12	-1.251	0.138	0.75	202	0.43	0.7	0.0	133	133	0.208	0.14	0.87	1.15	0.067	2.0
16.050	52.657	436.64	199.92	0.58	10.02	0.29	124	3.198	2.794	0.12	-1.256	0.139	0.75	189	0.45	0.7	0.0	122	122	0.175	0.13	0.88	1.15	0.066	2.0
16.100	52.821	436.48	210.95	0.50	11.21	0.24	127	3.208	2.799	0.12	-1.260	0.139	0.75	199	0.44	0.7	0.0	130	130	0.198	0.14	0.87	1.15	0.067	2.0
16.150	52.985	436.32	235.76	0.67	12.79	0.28	127	3.219	2.805	0.12	-1.265	0.140	0.75	223	0.40	0.7	0.0	150	150	0.292	0.16	0.84	1.15	0.069	2.0
16.200	53.149	436.15	246.03	0.63	13.08	0.26	127	3.229	2.810	0.12	-1.270	0.140	0.74	232	0.39	0.7	0.0	159	159	0.362	0.17	0.83	1.15	0.070	2.0
16.250	53.313	435.99	236.57	0.63	13.92	0.27	127	3.240	2.815	0.12	-1.274	0.141	0.74	224	0.40	0.7	0.0	151	151	0.294	0.16	0.84	1.15	0.069	2.0
16.300	53.477	435.82	205.85	0.74	13.54	0.36	124	3.250	2.821	0.12	-1.279	0.141	0.74	195	0.45	0.6	0.0	126	126	0.185	0.13	0.87	1.15	0.067	2.0
16.350	53.641	435.66	196.40	0.61	9.06	0.31	124	3.260	2.826	0.12	-1.284	0.142	0.74	186	0.46	0.6	0.0	118	118	0.167	0.12	0.88	1.15	0.066	2.0
16.400	53.805	435.49	193.84	0.60	28.94	0.31	124	3.270	2.831	0.12	-1.288	0.142	0.74	183	0.46	0.6	0.0	116	116	0.163	0.12	0.88	1.15	0.066	2.0
16.450	53.969	435.33	197.15	0.61	16.64	0.31	124	3.281	2.836	0.12	-1.293	0.143	0.74	186	0.46	0.6	0.0	118	118	0.168	0.12	0.88	1.15	0.066	2.0
16.500	54.133	435.17	201.54	0.64	15.64	0.32	124	3.291	2.841	0.12	-1.298	0.143	0.74	190	0.45	0.6	0.0	122	122	0.175	0.13	0.88	1.15	0.067	2.0
16.550	54.297	435.00	185.23	0.70	16.35	0.38	124	3.301	2.846	0.12	-1.302	0.144	0.74	175	0.48	0.6	0.2	109	109	0.151	0.11	0.89	1.15	0.066	2.0
16.600	54.461	434.84	177.34	0.78	18.16	0.44	124	3.311	2.851	0.12	-1.307	0.144	0.74	168	0.49	0.6	0.2	103	103	0.142	0.11	0.89	1.15	0.065	2.0
16.650	54.625	434.67	175.31	0.85	18.36	0.48	124	3.321	2.856	0.12	-1.312	0.145	0.74	166	0.49	0.6	0.2	101	102	0.139	0.11	0.89	1.15	0.065	2.0
16.700	54.789	434.51	178.46	0.90	19.02	0.51	124	3.331	2.861	0.12	-1.316	0.145	0.74	169	0.49	0.6	1.2	104	105	0.144	0.11	0.89	1.15	0.066	2.0
16.750	54.953	434.35	179.97	0.91	18.72	0.51	124	3.342	2.866	0.12	-1.321	0.146	0.74	170	0.49	0.6	1.2	105	106	0.146	0.11	0.89	1.15	0.066	2.0
16.800	55.117	434.18	183.32	0.95	18.65	0.52	124	3.352	2.871	0.12	-1.325	0.146	0.73	173	0.48	0.6	1.1	107	108	0.149	0.11	0.89	1.15	0.066	2.0
16.850	55.281	434.02	182.05	0.86	18.23	0.47	124	3.362	2.876	0.12	-1.330	0.147	0.73	172	0.48	0.6	0.2	106	106	0.146	0.11	0.89	1.15	0.066	2.0
16.900	55.446	433.85	169.73	0.83	17.50	0.49	124	3.372	2.881	0.12	-1.335	0.147	0.73	160	0.51	0.6	0.2	97	97	0.133	0.10	0.90	1.15	0.065	2.0
16.950	55.610	433.69	156.95	0.81	17.79	0.52	124	3.382	2.886	0.12	-1.339	0.148	0.73	148	0.52	0.6	2.5	88	91	0.126	0.10	0.90	1.15	0.065	1.9
17.000	55.774	433.53	152.53	0.82	16.72	0.53	124	3.393	2.891	0.12	-1.344	0.148	0.73	144	0.53	0.6	3.2	85	88	0.124	0.10	0.90	1.15	0.065	1.9
17.050	55.938	433.36	152.67	0.82	16.98	0.54	124	3.403	2.896	0.12	-1.348	0.149	0.73	144	0.53	0.6	3.3	85	88	0.124	0.10	0.90	1.15	0.065	1.9
17.100	56.102	433.20	154.56	0.83	17.09	0.54	124	3.413	2.902	0.12	-1.353	0.149	0.73	146	0.52	0.6	3.1	86	89	0.125	0.10	0.90	1.15	0.065	1.9
17.150	56.266	433.03	155.86	0.84	17.37	0.54	124	3.423	2.907	0.12	-1.358	0.150	0.73	147	0.52	0.6	3.1	87	90	0.126	0.10	0.90	1.15	0.065	1.9
17.200	56.430	432.87	154.31	0.85	17.29	0.55	124	3.433	2.912	0.12	-1.362	0.150	0.73	146	0.52	0.6	3.4	86	89	0.125	0.10	0.90	1.15	0.065	1.9
17.250	56.594	432.71	153.05	0.79	17.48	0.52	124	3.443	2.917	0.12	-1.367	0.151	0.73	145	0.53	0.6	2.9	85	88	0.123	0.10	0.90	1.15	0.065	1.9
17.300	56.758	432.54	155.47	0.77	17.53	0.50	124	3.454	2.922	0.12	-1.371	0.151	0.73	147	0.52	0.6	2.4	86	89	0.124	0.10	0.90	1.15	0.065	1.9
17.350	56.922	432.38	161.49	0.78	17.82	0.48	124	3.464	2.927	0.12	-1.376	0.152	0.72	153	0.52	0.6	0.2	90	90	0.126	0.10	0.90	1.15	0.065	1.9
17.400	57.086	432.21	166.83	0.80	18.29	0.48	124	3.474	2.932	0.12	-1.380	0.152	0.72	158	0.51	0.6	0.2	94	94	0.130	0.10	0.90	1.15	0.065	2.0
17.450	57.250	432.05	176.64	0.85	18.70	0.48	124	3.484	2.937	0.12	-1.385	0.153	0.72	167	0.50	0.6	0.2	101	101	0.138	0.11	0.89	1.15	0.066	2.0
17.500	57.414	431.89	187.74	0.97	19.60	0.51	124	3.494	2.942	0.12	-1.389	0.153	0.72	177	0.48	0.6	1.0	109	110	0.152	0.11	0.89	1.15	0.066	2.0
17.550	57.578	431.72	199.65	1.07	20.22	0.54	124	3.505	2.947	0.12	-1.394	0.154	0.72	189	0.46	0.6	0.9	118	119	0.168	0.12	0.87	1.15	0.067	2.0
17.600	57.742	431.56	214.88	1.16	21.20	0.54	124	3.515	2.952	0.12	-1.398	0.154	0.72	203	0.44	0.6	0.5	130	130	0.198	0.14	0.86	1.15	0.068	2.0
17.650	57.906	431.39	239.86	1.28	22.20	0.53	124	3.525	2.957	0.12	-1.403	0.154	0.72	227	0.40	0.7	0.2	150	150	0.288	0.16	0.84	1.15	0.070	2.0
17.700	58.070	431.23	249.36	1.33	22.63	0.53	124	3.535	2.962	0.12	-1.407	0.155	0.72	236	0.39	0.7	0.1	158	158	0.349	0.17	0.82	1.15	0.071	2.0
17.750	58.234	431.07	257.66	1.36	22.80	0.53	124	3.545	2.967	0.12	-1.412	0.155	0.72	243	0.38	0.7	0.1	165	165	0.425	0.18	0.81	1.15	0.072	2.0
17.800	58.398	430.90	256.42	1.41	22.89	0.55	124	3.555	2.972	0.12	-1.416	0.156	0.72	242	0.38	0.7	0.1	163	163	0.410	0.18	0.81	1.15	0.072	2.0
17.850	58.562	430.74	253.68	1.31	22.75	0.51	124	3.566	2.977	0.12	-1.421	0.156	0.72	240	0.39	0.7	0.1	161	161	0.381	0.18	0.82	1.15	0.071	2.0
17.900	58.726	430.57	224.55	1.32	21.26	0.59	124	3.576	2.982	0.12	-1.425	0.157	0.72	212	0.42	0.6	0.6	137	137	0.223	0.14	0.85	1.15	0.069	2.0
17.950	58.890	430.41	221.00	1.31	20.62	0.59	124	3.586	2.988	0.12	-1.430	0.157	0.71	209	0.43	0.6	0.8	134	134	0.212	0.14	0.85	1.15	0.068	2.0
18.000	59.054	430.25	231.66	1.35	21.50	0.58	124	3.596	2.993	0.12	-1.434	0.158	0.71	219	0.42	0.6	0.5	142	143	0.246	0.15	0.84	1.15	0.069	2.0
18.050	59.218	430.08	250.85	1.38	22.80	0.55	124	3.606	2.998	0.12	-1.439	0.158	0.71	237	0.39	0.7	0.2	158	158	0.352	0.17	0.82	1.15	0.071	2.0
18.100	59.382	429.92	274.61	1.41	24.08	0.51	127	3.617	3.003	0.12	-1.443	0.159	0.71	260	0.36	0.7	0.0	178	178	0.681	0.21	0.78	1.15	0.075	2.0
18.150	59.547	429.75	287.37	1.58	25.29	0.55	127	3.627	3.008	0.12	-1.448	0.159	0.71	272	0.34	0.7	0.0	190	190	1.109	0.23	0.76	1.15	0.077	2.0
18.200	59.711	429.59	296.79	1.77	30.08	0.60	127	3.638	3.014	0.12	-1.452	0.160	0.71	280	0.33	0.7	0.1	198	198	1.711	0.26	0.73	1.15	0.080	2.0
18.250	59.875	429.43	290.70	1.86	27.30	0.64	127	3.648	3.019	0.12	-1.456	0.160	0.71	275	0.34	0.7	0.1	192	193	1.274	0.24	0.75	1.15	0.078	2.0
18.300	60.039	429.26	263.94	1.78	23.79	0.67	124	3.658	3.024	0.12	-1.461	0.161	0.71	249	0.37	0.7	0.5	169	169	0.487	0.19	0.80	1.15	0.073	2.0
18.350	60.203	429.10	254.50	1.66	24.61	0.65	124	3.669	3.029	0.12	-1.465	0.161	0.71	241	0.39	0.7	0.5	160	161	0.379	0.18	0.81	1.15	0.072	2.0
18.400	60.367	428.93	243.99	1.64	24.74	0.67	124	3.679	3.034	0.12	-1.470	0.162	0.71	231	0.40	0.7	0.8	151	152	0.303	0.16	0.83	1.15	0.070	2.0
18.450	60.531	428.77	227.20	1.58	24.75	0.69	124	3.689	3.039	0.12	-1.474	0.162	0.71	215	0.42	0.6	1.4	138	139	0.230	0.15	0.85	1.15	0.069	2.0
18.500	60.695	428.61	225.26	1.59	24.99	0.71	124	3.699	3.044	0.12	-1.478	0.162	0.71	213	0.42	0.6	1.6	136	138	0.224	0.14	0.85	1.15	0.069	2.0

Table I-9: Liquefaction Analysis for CPT HAV-C007 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
18.550	60.859	428.44	231.32	1.56	25.34	0.67	124	3.709	3.049	0.12	-1.483	0.163	0.70	219	0.42	0.6	1.1	141	142	0.242	0.15	0.84	1.15	0.069	2.0
18.600	61.023	428.28	249.93	1.61	27.01	0.64	124	3.719	3.054	0.12	-1.487	0.163	0.70	236	0.39	0.7	0.5	156	156	0.336	0.17	0.82	1.15	0.071	2.0
18.650	61.187	428.11	265.54	1.74	27.49	0.65	124	3.730	3.059	0.12	-1.491	0.164	0.70	251	0.37	0.7	0.4	169	169	0.491	0.19	0.80	1.15	0.073	2.0
18.700	61.351	427.95	289.98	1.85	29.15	0.64	127	3.740	3.065	0.12	-1.496	0.164	0.70	274	0.34	0.7	0.2	190	191	1.156	0.24	0.75	1.15	0.078	2.0
18.750	61.515	427.79	312.76	1.95	30.01	0.62	127	3.750	3.070	0.12	-1.500	0.165	0.70	296	0.31	0.7	0.1	211	211	2.000	0.30	0.68	1.15	0.086	2.0
18.800	61.679	427.62	327.74	2.13	30.51	0.65	127	3.761	3.075	0.12	-1.504	0.165	0.70	310	0.30	0.7	0.1	226	226	2.000	0.30	0.68	1.15	0.086	2.0
18.850	61.843	427.46	313.28	2.16	30.68	0.69	127	3.771	3.081	0.12	-1.509	0.166	0.70	296	0.31	0.7	0.1	212	212	2.000	0.30	0.68	1.15	0.086	2.0
18.900	62.007	427.29	292.02	1.93	28.02	0.66	124	3.782	3.086	0.12	-1.513	0.166	0.70	276	0.34	0.7	0.2	192	192	1.231	0.24	0.74	1.15	0.078	2.0
18.950	62.171	427.13	254.22	1.93	22.23	0.76	124	3.792	3.091	0.12	-1.517	0.167	0.70	240	0.39	0.7	1.3	159	160	0.370	0.17	0.81	1.15	0.072	2.0
19.000	62.335	426.96	245.09	1.63	22.51	0.66	124	3.802	3.096	0.12	-1.522	0.167	0.70	232	0.40	0.7	0.8	151	151	0.298	0.16	0.83	1.15	0.071	2.0
19.050	62.499	426.80	237.27	1.39	21.94	0.59	124	3.812	3.101	0.12	-1.526	0.167	0.70	224	0.41	0.6	0.5	144	144	0.255	0.15	0.84	1.15	0.070	2.0
19.100	62.663	426.64	221.82	1.22	21.29	0.55	124	3.822	3.106	0.12	-1.530	0.168	0.70	210	0.43	0.6	0.6	131	132	0.203	0.14	0.85	1.15	0.068	2.0
19.150	62.827	426.47	210.91	1.20	23.02	0.57	124	3.832	3.111	0.12	-1.534	0.168	0.69	199	0.45	0.6	0.9	123	124	0.180	0.13	0.86	1.15	0.068	2.0
19.200	62.991	426.31	210.38	1.20	24.37	0.57	124	3.843	3.116	0.12	-1.539	0.169	0.69	199	0.45	0.6	1.0	122	123	0.179	0.13	0.86	1.15	0.068	2.0
19.250	63.155	426.14	214.34	1.26	25.27	0.59	124	3.853	3.121	0.12	-1.543	0.169	0.69	203	0.45	0.6	1.0	125	126	0.186	0.13	0.86	1.15	0.068	2.0
19.300	63.319	425.98	222.72	1.33	26.01	0.60	124	3.863	3.126	0.12	-1.547	0.170	0.69	210	0.43	0.6	0.9	132	132	0.205	0.14	0.85	1.15	0.068	2.0
19.350	63.483	425.82	243.16	1.39	27.39	0.57	124	3.873	3.131	0.12	-1.551	0.170	0.69	230	0.41	0.6	0.4	148	148	0.277	0.16	0.83	1.15	0.070	2.0
19.400	63.648	425.65	250.80	1.47	27.13	0.58	124	3.883	3.136	0.12	-1.555	0.171	0.69	237	0.40	0.7	0.3	154	154	0.321	0.17	0.82	1.15	0.071	2.0
19.450	63.812	425.49	246.16	1.68	26.02	0.68	124	3.894	3.141	0.12	-1.560	0.171	0.69	233	0.40	0.6	0.9	150	151	0.297	0.16	0.82	1.15	0.071	2.0
19.500	63.976	425.32	242.34	1.74	27.42	0.72	124	3.904	3.146	0.12	-1.564	0.171	0.69	229	0.41	0.6	1.3	147	148	0.279	0.16	0.83	1.15	0.070	2.0
19.550	64.140	425.16	273.71	1.67	29.99	0.61	127	3.914	3.152	0.12	-1.568	0.172	0.69	259	0.37	0.7	0.2	173	174	0.570	0.20	0.78	1.15	0.074	2.0
19.600	64.304	425.00	286.46	1.74	30.25	0.61	127	3.924	3.157	0.12	-1.572	0.172	0.69	271	0.35	0.7	0.1	185	185	0.882	0.22	0.76	1.15	0.077	2.0
19.650	64.468	424.83	317.99	1.90	31.80	0.60	127	3.935	3.162	0.12	-1.576	0.173	0.69	300	0.31	0.7	0.0	214	214	2.000	0.30	0.67	1.15	0.087	2.0
19.700	64.632	424.67	326.95	2.11	32.37	0.65	127	3.945	3.167	0.12	-1.581	0.173	0.69	309	0.30	0.7	0.1	222	222	2.000	0.30	0.67	1.15	0.087	2.0
19.750	64.796	424.50	349.60	2.51	32.77	0.72	127	3.956	3.173	0.12	-1.585	0.174	0.68	330	0.27	0.7	0.1	244	244	2.000	0.30	0.67	1.15	0.087	2.0
19.800	64.960	424.34	359.51	2.35	41.25	0.65	127	3.966	3.178	0.12	-1.589	0.174	0.68	340	0.26	0.7	0.0	254	254	2.000	0.30	0.67	1.15	0.087	2.0
19.850	65.124	424.18	326.16	1.87	29.38	0.57	127	3.976	3.183	0.12	-1.593	0.174	0.68	308	0.30	0.7	0.0	221	221	2.000	0.30	0.67	1.15	0.087	2.0
19.900	65.288	424.01	296.25	1.55	28.23	0.52	127	3.987	3.189	0.12	-1.597	0.175	0.68	280	0.34	0.7	0.0	192	192	1.269	0.24	0.73	1.15	0.079	2.0
19.950	65.452	423.85	276.39	1.43	25.59	0.52	127	3.997	3.194	0.12	-1.601	0.175	0.68	261	0.37	0.7	0.1	174	175	0.589	0.20	0.78	1.15	0.075	2.0
20.000	65.616	423.68	270.57	1.37	25.67	0.51	127	4.008	3.199	0.12	-1.605	0.176	0.68	256	0.37	0.7	0.1	169	169	0.492	0.19	0.79	1.15	0.074	2.0
20.050	65.780	423.52	258.33	1.40	27.47	0.54	124	4.018	3.204	0.12	-1.609	0.176	0.68	244	0.39	0.6	0.2	159	159	0.359	0.17	0.81	1.15	0.072	2.0
20.100	65.944	423.36	249.93	1.32	27.90	0.53	124	4.028	3.210	0.12	-1.613	0.177	0.68	236	0.40	0.6	0.2	151	152	0.299	0.16	0.82	1.15	0.071	2.0
20.150	66.108	423.19	243.12	1.25	30.37	0.52	124	4.038	3.215	0.12	-1.617	0.177	0.68	230	0.41	0.6	0.2	146	146	0.263	0.15	0.83	1.15	0.070	2.0
20.200	66.272	423.03	244.34	1.55	29.13	0.64	124	4.049	3.220	0.12	-1.621	0.177	0.68	231	0.41	0.6	0.7	147	147	0.272	0.16	0.83	1.15	0.070	2.0
20.250	66.436	422.86	246.07	1.33	29.76	0.54	124	4.059	3.225	0.12	-1.625	0.178	0.68	233	0.41	0.6	0.3	148	148	0.276	0.16	0.82	1.15	0.070	2.0
20.300	66.600	422.70	248.71	1.23	29.74	0.49	124	4.069	3.230	0.12	-1.629	0.178	0.68	235	0.40	0.6	0.1	150	150	0.288	0.16	0.82	1.15	0.071	2.0
20.350	66.764	422.54	241.19	1.28	31.82	0.53	124	4.079	3.235	0.12	-1.633	0.179	0.68	228	0.41	0.6	0.3	144	144	0.253	0.15	0.83	1.15	0.070	2.0
20.400	66.928	422.37	240.22	1.27	29.02	0.53	124	4.089	3.240	0.12	-1.637	0.179	0.67	227	0.42	0.6	0.3	143	143	0.248	0.15	0.83	1.15	0.070	2.0
20.450	67.092	422.21	231.03	1.31	34.03	0.57	124	4.100	3.245	0.12	-1.641	0.179	0.67	218	0.43	0.6	0.6	135	136	0.217	0.14	0.84	1.15	0.069	2.0
20.500	67.256	422.04	236.56	1.33	28.93	0.56	124	4.110	3.250	0.12	-1.645	0.180	0.67	224	0.42	0.6	0.5	139	140	0.234	0.15	0.84	1.15	0.069	2.0
20.550	67.420	421.88	228.90	1.35	31.91	0.59	124	4.120	3.255	0.12	-1.649	0.180	0.67	216	0.43	0.6	0.8	133	134	0.211	0.14	0.84	1.15	0.069	2.0
20.600	67.584	421.72	226.72	1.19	31.52	0.53	124	4.130	3.260	0.12	-1.653	0.181	0.67	214	0.43	0.6	0.4	131	132	0.203	0.14	0.85	1.15	0.069	2.0
20.650	67.749	421.55	215.57	0.95	31.15	0.44	124	4.140	3.265	0.12	-1.657	0.181	0.67	204	0.45	0.6	0.2	122	123	0.177	0.13	0.86	1.15	0.068	2.0
20.700	67.913	421.39	208.16	0.86	34.77	0.41	124	4.150	3.270	0.12	-1.661	0.181	0.67	197	0.46	0.6	0.2	117	117	0.165	0.12	0.86	1.15	0.067	2.0
20.750	68.077	421.22	202.43	0.95	30.38	0.47	124	4.161	3.275	0.12	-1.665	0.182	0.67	191	0.47	0.6	0.2	112	112	0.156	0.12	0.87	1.15	0.067	2.0
20.800	68.241	421.06	204.97	0.88	31.02	0.43	124	4.171	3.280	0.12	-1.669	0.182	0.67	194	0.47	0.6	0.2	114	114	0.159	0.12	0.87	1.15	0.067	2.0
20.850	68.405	420.90	207.32	0.94	33.16	0.45	124	4.181	3.285	0.12	-1.673	0.183	0.67	196	0.46	0.6	0.2	116	116	0.163	0.12	0.86	1.15	0.067	2.0
20.900	68.569	420.73	205.42	0.88	32.60	0.43	124	4.191	3.291	0.12	-1.677	0.183	0.67	194	0.47	0.6	0.2	114	114	0.160	0.12	0.86	1.15	0.067	2.0
20.950	68.733	420.57	202.34	0.93	30.47	0.46	124	4.201	3.296	0.12	-1.681	0.183	0.67	191	0.47	0.6	0.2	112	112	0.155	0.12	0.87	1.15	0.067	2.0
21.000	68.897	420.40	207.34	0.95	30.27	0.46	124	4.212	3.301	0.12	-1.685	0.184	0.67	196	0.47	0.6	0.2	115	116	0.162	0.12	0.86	1.15	0.067	2.0
21.050	69.061	420.24	226.01	1.00	31.55	0.44	124	4.222	3.306	0.12	-1.688	0.184	0.67	214	0.44	0.6	0.2	130	130	0.197	0.13	0.85	1.15	0.068	2.0
21.100	69.225	420.08	252.56	1.11	30.30	0.44	127	4.232	3.311	0.12	-1.692	0.185	0.66	239	0.40	0.6	0.0	151	151	0.295	0.16	0.82	1.15	0.071	2.0
21.150	69.389	419.91	265.73	1.32	33.47	0.49	127	4.242	3.316	0.12	-1.696	0.185	0.66	251	0.38	0.6	0.1	162	162	0.393	0.18	0.80	1.15	0.073	2.0
21.200	69.553	419.75	285.36	1.39	35.76	0.49	127	4.253	3.322	0.12	-1.700	0.185	0.66	270	0.36	0.7	0.0	179	179	0.696	0.21	0.76	1.15	0.076	2.0
21.250	69.717	419.58	296.03	1.61	37.41	0.54	127	4.263	3.327	0.12	-1.704	0.186	0.66	280	0.35	0.7	0.0	188	188	1.043	0.23	0.74	1.15	0.079	2.0
21.300	69.881	419.42	301.15	1.75	37.54	0.58	127	4.274	3.332	0.12	-1.707	0.186	0.66	285	0.34	0.7	0.1	193	193	1.300	0.24	0.72	1.15	0.080	2.0
21.350	70.045	419.25	308.56	1.64	39.72	0.53	127	4.284	3.337	0.12	-1.711	0.187	0.66	292	0.33	0.7	0.0	200	200	1.847	0.26	0.70	1.15	0.083	2.0
21.400	70.209	419.09	317.12	1.65	40.25	0.52	127	4.295	3.343	0.12	-1.715	0.187	0.66	300	0.32	0.7	0.0	207	207	2.000	0.29	0.67	1.15	0.086	2.0
21.450	70.373	418.93	324.69	1.56	37.20	0.48	127	4.305	3.348	0.12	-1.719	0.187	0.66	307	0.31	0.7	0.0	215	215	2.000	0.30	0.65	1.15	0.088	2.0
21.500	70.537	418.76	323.14	1.52	36.78	0.47	127	4.316	3.353	0.12	-1.722	0.188	0.66	305	0.31	0.7	0.0	213	213	2.000	0.30	0.65	1.15	0.088	2.0
21.550	70.701	418.60	329.92	1.48	38.70	0.45	127	4.326	3.359	0.12	-1.726	0.188	0.66	312	0.30	0.7	0.0	219	219	2.000	0.30	0.65	1.15	0.088	2.0
21.600	70.865	418.43	340.72	1.43	41.70	0.42	127	4.336	3.364	0.12	-1.730	0.188	0.66	322	0.29	0.7	0.0	230	230	2.000	0.30	0.65	1.15	0.088	2.0
21.650	71.029	418.27	357.37	1.59	46.26	0.45	127	4.347	3.369	0.12	-1.734	0.189	0.66	338	0.27	0.7	0.0	246	246	2.000	0.30	0.65	1.15	0.088	2.0
21.700	71.193	418.11	361.84	1.74	43.56	0.48	127	4.357	3.375	0.12	-1.737	0.189	0.66	342	0.27	0.7	0.0	251	251	2.000	0.30	0.65	1.15	0.088	2.0
21.750	71.357	417.94	342.57	1.74	55.95	0.51	127	4.368	3.380	0.12	-1.741	0.190	0.65	324	0.29	0.7	0.0	231	231	2.000	0.30	0.65	1.15	0.088	2.0
21.800	71.521	417.78	331.22	1.72	45.80	0.52	127	4.378	3.385	0.12	-1.745	0.190	0.65	313	0.30	0.7	0.0	220	220	2.000	0.30	0.65	1.15	0.088	2.0
21.850	71.685	417.61	336.51	1.68	42.19	0.50	127	4.389	3.391	0.12	-1.748	0.190	0.65	318	0.30	0.7	0.0	225	225	2.000	0.30	0.65	1.15	0.089	2.0
21.900	71.850	417.45	347.23	1.67	46.73	0.48	127	4.399	3.396	0.12	-1.752	0.191	0.65	328	0.29	0.7	0.0	235	235	2.000	0.30	0.65	1.15	0.089	2.0
21.950	72.014	417.29	336.71	1.77	40.19	0.53	127	4.410	3.401	0.12	-1.755	0.191	0.65	318	0.30	0.7	0.0	225	225	2.000	0.30	0.65	1.15	0.089	2.0
22.000	72.178	417.12	340.75	1.75	39.08	0.51	127	4.420	3.407	0.12	-1.759	0.191	0.65	322	0.29	0.7	0.0	228	228	2.000	0.30	0.65	1.15	0.089	2.0
22.050	72.342	416.96	349.56	1.77	41.80	0.51	127	4.430	3.412	0.12	-1.763	0.192	0.65	330	0.28	0.7	0.0	237	237	2.000	0.30	0.65	1.15	0.089	2.0
22.100	72.506	416.79	343.52	2.08	45.97	0.61	127	4.441	3.417	0.12	-1.766	0.192	0.65	325	0.29	0.7	0.0	231	231	2.000	0.30	0.65	1.15	0.089	2.0
22.150	72.670	416.63	355.14	2.43	43.19	0.69	127	4.451	3.423	0.12	-1.770	0.192	0.65	336	0.28	0.7	0.1	242	243	2.000	0.30	0.65	1.15	0.089	2.0
22.200	72.834	416.47	362.65	2.39	49.38	0.66	127	4.462	3.428	0.12	-1.773	0.193	0.65	343	0.27	0.7	0.0	250	250	2.000	0.30	0.65	1.15	0.089	2.0
22.250	72.998	416.30	352.32	2.46	47.24	0.70	127	4.472	3.433	0.12	-1.777	0.193	0.65	333	0.28	0.7	0.1	239	239	2.000	0.30	0.65	1.15	0.089	2.0
22.300	73.162	416.14	355.62	2.21	49.94	0.62	127	4.483	3.439	0.12	-1.780	0.194	0.65	336	0.28	0.7	0.0	242	243	2.000	0.30	0.65	1.15	0.089	2.0
22.350	73.326	415.97	365.18	2.36	49.31	0.65	127	4.493	3.444	0.12	-1.784	0.194	0.65	345	0.27	0.7	0.0	252	252	2.000	0.30	0.65	1.15	0.089	2.0
22.400	73.490	415.81	370.04	2.33	47.55	0.63	127	4.504	3.449	0.12	-1.787	0.194	0.65	350	0.26	0.7	0.0	256	256	2.000	0.30	0.65	1.15	0.089	2.0
22.450	73.654	415.65	379.17	2.26	45.61	0.60	127	4.514	3.455	0.12	-1.791	0.195	0.65	358	0.26	0.7	0.0	262	262	2.000	0.30	0.65	1.15	0.089	2.0
22.500	73.818	415.48	387.69	2.17	43.73	0.56	127	4.524	3.460	0.12	-1.794	0.195	0.64	366	0.26	0.7	0.0	268	268	2.000	0.30	0.64	1.15	0.089	2.0
22.550	73.982	415.32	391.69	1.94	39.04	0.49	127	4.535	3.465	0.12	-1.798	0.195	0.64	370	0.26	0.7	0.0	271	271	2.000	0.30	0.64	1.15	0.089	2.0
22.600	74.146	415.15	390.02	1.94	50.05	0.50	127	4.545	3.470	0.12	-1.801	0.196	0.64	369	0.26	0.7	0.0	269	269	2.000	0.30	0.64	1.15	0.089	2.0
22.650	74.310	414.99	384.80	1.99	50.13	0.52	127	4.556	3.476	0.12	-1.805	0.196	0.64	364	0.26	0.7	0.0	266	266	2.000	0.30	0.64	1.15	0.089	2.0
22.700	74.474	414.83	378.76	2.10	53.66	0.55	127	4.566	3.481	0.12	-1.808	0.196	0.64	358	0.26	0.7	0.0	261	261	2.000	0.30	0.64	1.15	0.089	2.0
22.750	74.638	414.66	376.91	1.94	45.10	0.51	127	4.577	3.486	0.12	-1.811	0.197	0.64	356	0.26	0.7	0.0	260	260	2.000	0.30	0.64	1.15	0.089	2.0
22.800	74.802	414.50	370.80	1.90	47.22	0.51	127	4.587	3.492	0.12	-1.815	0.197	0.64	350	0.26	0.7	0.0	256	256	2.000	0.30	0.64	1.15	0.089	2.0
22.850	74.966	414.33	367.03	2.07	48.43	0.56	127	4.598	3.497	0.12	-1.818	0.197	0.64	347	0.27	0.7	0.0	253	253	2.000	0.30	0.64	1.15	0.089	2.0
22.900	75.130	414.17	339.48	1.94	46.39	0.57	127	4.608	3.502	0.12	-1.821	0.198	0.64	321	0.30	0.7	0.0	224	224	2.000	0.30	0.64	1.15	0.089	2.0
22.950	75.294	414.01	274.63	1.71	35.76	0.62	124	4.618	3.508	0.12	-1.825	0.198	0.64	260	0.38	0.6	0.4	165	165	0.431	0.18	0.78	1.15	0.073	2.0
23.000	75.458	413.84	250.89	1.49	34.94	0.59	124	4.628	3.513	0.12	-1.828	0.198	0.64	237	0.41	0.6	0.6	145	145	0.261	0.15	0.82	1.15	0.070	2.0
23.050	75.622	413.68	244.17	1.27	36.23	0.52	124	4.639	3.518	0.12	-1.831	0.199	0.64	231	0.42	0.6	0.3	139	139	0.232	0.15	0.82	1.15	0.069	2.0
23.100	75.786	413.51	243.54	1.23	37.58	0.50	124	4.649	3.523	0.12	-1.835	0.199	0.64	230	0.42	0.6	0.3	138	139	0.229	0.15	0.83	1.15	0.069	2.0
23.150	75.951	413.35	243.03	1.24	37.07	0.51	124	4.659	3.528	0.12	-1.838	0.199	0.64	230	0.42	0.6	0.3	138	138	0.227	0.14	0.83	1.15	0.069	2.0
23.200	76.115	413.19	231.60	1.17	36.41	0.51	124	4.669	3.533	0.12	-1.841	0.200	0.63	219	0.44	0.6	0.4	129	129	0.195	0.13	0.84	1.15	0.068	2.0
23.250	76.279	413.02	227.10	1.22	37.02	0.54	124	4.679	3.538	0.12	-1.844	0.200	0.63	215	0.45	0.6	0.7	125	126	0.186	0.13	0.84	1.15	0.068	2.0
23.300	76.443	412.86	234.34	1.22	36.69	0.52	124	4.690	3.543	0.12	-1.848	0.200	0.63	221	0.44	0.6	0.5	131	131	0.201	0.14	0.84	1.15	0.068	2.0
23.350	76.607	412.69	263.71	1.16	40.79	0.44	127	4.700	3.548	0.12	-1.851	0.201	0.63	249	0.40	0.6	0.0	154	154	0.320	0.17	0.80	1.15	0.071	2.0
23.400	76.771	412.53	302.02	1.54	42.37	0.51	127	4.710	3.554	0.12	-1.854	0.201	0.63	285	0.35	0.7	0.0	188	188	1.006	0.23	0.72	1.15	0.079	2.0
23.450	76.935	412.37	312.79	1.53	38.56	0.49	127	4.721	3.559	0.12	-1.857	0.201	0.63	296	0.33	0.7	0.0	197	197	1.633	0.25	0.69	1.15	0.083	2.0
23.500	77.099	412.20	312.27	1.42	35.98	0.45	127	4.731	3.564	0.12	-1.860	0.201	0.63	295	0.33	0.7	0.0	197	197	1.579	0.25	0.69	1.15	0.082	2.0
23.550	77.263	412.04	319.95	1.59	44.43	0.50	127	4.742	3.569	0.12	-1.863	0.202	0.63	302	0.32	0.7	0.0	204	204	2.000	0.27	0.67	1.15	0.086	2.0
23.600	77.427	411.87	325.22	2.22	44.11	0.68	127	4.752	3.575	0.12	-1.867	0.202	0.63	307	0.32	0.7	0.2	209	209	2.000	0.29	0.64	1.15	0.089	2.0
23.650	77.591	411.71	293.86	1.74	48.59	0.59	127	4.763	3.580	0.12	-1.870	0.202	0.63	278	0.36	0.6	0.2	180	180	0.719	0.21	0.74	1.15	0.077	2.0
23.700	77.755	411.55	252.66	1.59	41.07	0.63	124	4.773	3.585	0.12	-1.873	0.203	0.63	239	0.41	0.6	0.8	145	145	0.261	0.15	0.81	1.15	0.070	2.0
23.750	77.919	411.38	232.79	1.37	41.73	0.59	124	4.783	3.590	0.12	-1.876	0.203	0.63	220	0.44	0.6	0.9	129	130	0.196	0.13	0.84	1.15	0.068	2.0
23.800	78.083	411.22	232.00	1.25	42.98	0.54	124	4.793	3.595	0.12	-1.879	0.203	0.63	219	0.44	0.6	0.6	128	129	0.193	0.13	0.84	1.15	0.068	2.0
23.850	78.247	411.05	242.01	1.34	44.44	0.55	124	4.803	3.601	0.12	-1.882	0.204	0.63	229	0.43	0.6	0.5	136	136	0.218	0.14	0.83	1.15	0.069	2.0
23.900	78.411	410.89	246.21	1.30	44.09	0.53	124	4.814	3.606	0.12	-1.885	0.204	0.63	233	0.42	0.6	0.4	139	139	0.230	0.15	0.82	1.15	0.069	2.0
23.950	78.575	410.72	224.02	1.24	39.05	0.55	124	4.824	3.611	0.12	-1.888	0.204	0.63	212	0.45	0.6	0.9	122	122	0.177	0.13	0.84	1.15	0.067	2.0
24.000	78.739	410.56	222.87	1.25	38.35	0.56	124	4.834	3.616	0.12	-1.891	0.204	0.62	211	0.45	0.6	1.0	121	122	0.175	0.13	0.84	1.15	0.067	2.0
24.050	78.903	410.40	221.79	1.35	39.29	0.61	124	4.844	3.621	0.12	-1.894	0.205	0.62	210	0.45	0.6	1.5	120	121	0.174	0.13	0.85	1.15	0.067	2.0
24.100	79.067	410.23	228.70	1.50	40.32	0.65	124	4.854	3.626	0.12	-1.897	0.205	0.62	216	0.44	0.6	1.7	125	127	0.188	0.13	0.84	1.15	0.068	2.0
24.150	79.231	410.07	260.57	3.71	43.90	1.42	124	4.864	3.631	0.12	-1.900	0.205	0.62	246	0.37	0.6	12.9	155	168	0.471	0.19	0.77	1.15	0.074	2.0
24.200	79.395	409.90	327.28	3.69	48.07	1.13	124	4.875	3.636	0.12	-1.903	0.206	0.62	309	0.31	0.7	3.8	211	215	2.000	0.30	0.63	1.15	0.090	2.0
24.250	79.559	409.74	402.95	5.23	37.35	1.30	124	4.885	3.641	0.12	-1.906	0.206	0.62	381	0.26	0.7	3.5	275	278	2.000	0.30	0.63	1.15	0.090	2.0
24.300	79.723	409.58	392.95	4.45	32.38	1.13	124	4.895	3.646	0.12	-1.909	0.206	0.62	371	0.26	0.7	2.0	268	270	2.000	0.30	0.63	1.15	0.090	2.0
24.350	79.887	409.41	377.31	3.92	49.51	1.04	124	4.905	3.651	0.12	-1.912	0.206	0.62	357	0.26	0.7	1.5	257	259	2.000	0.30	0.63	1.15	0.090	2.0
24.400	80.052	409.25	366.43	2.82	51.47	0.77	127	4.916	3.656	0.12	-1.915	0.207	0.62	346	0.27	0.7	0.2	247	248	2.000	0.30	0.63	1.15	0.090	2.0
24.450	80.216	409.08	368.25	2.72	46.62	0.74	127	4.926	3.662	0.12	-1.917	0.207	0.62	348	0.27	0.7	0.1	249	249	2.000	0.30	0.63	1.15	0.090	2.0
24.500	80.380	408.92	384.46	2.50	35.05	0.65	127	4.936	3.667	0.12	-1.920	0.207	0.62	363	0.26	0.7	0.0	262	262	2.000	0.30	0.63	1.15	0.090	2.0
24.550	80.544	408.76	366.79	2.33	54.62	0.64	127	4.947	3.672	0.12	-1.923	0.207	0.62	347	0.27	0.7	0.0	247	247	2.000	0.30	0.63	1.15	0.090	2.0
24.600	80.708	408.59	355.10	2.25	56.69	0.63	127	4.957	3.678	0.12	-1.926	0.208	0.62	336	0.29	0.7	0.0	235	235	2.000	0.30	0.63	1.15	0.090	2.0
24.650	80.872	408.43	360.22	1.75	46.15	0.49	127	4.968	3.683	0.12	-1.929	0.208	0.62	340	0.28	0.7	0.0	240	240	2.000	0.30	0.63	1.15	0.091	2.0
24.700	81.036	408.26	364.12	1.96	76.30	0.54	127	4.978	3.688	0.12	-1.932	0.208	0.62	344	0.28	0.7	0.0	244	244	2.000	0.30	0.63	1.15	0.091	2.0
24.750	81.200	408.10	378.48	2.45	70.91	0.65	127	4.989	3.694	0.12	-1.934	0.209	0.62	358	0.26	0.7	0.0	257	257	2.000	0.30	0.62	1.15	0.091	2.0
24.800	81.364	407.94	392.95	2.45	49.91	0.62	127	4.999	3.699	0.12	-1.937	0.209	0.62	371	0.26	0.7	0.0	267	267	2.000	0.30	0.62	1.15	0.091	2.0
24.850	81.528	407.77	411.29	1.93	55.90	0.47	127	5.010	3.704	0.12	-1.940	0.209	0.61	389	0.26	0.7	0.0	279	279	2.000	0.30	0.62	1.15	0.091	2.0
24.900	81.692	407.61	411.29	1.44	55.90	0.35	127	5.020	3.709	0.12	-1.942	0.209	0.61	389	0.26	0.7	0.0	279	279	2.000	0.30	0.62	1.15	0.091	2.0
24.950	81.856	407.44	396.95	1.63	49.69	0.41	127	5.030	3.715	0.12	-1.945	0.210	0.61	375	0.26	0.7	0.0	269	269	2.000	0.30	0.62	1.15	0.091	2.0
25.000	82.020	407.28	427.39	2.00	43.65	0.47	127	5.041	3.720	0.12	-1.948	0.210	0.61	404	0.26	0.7	0.0	290	290	2.000	0.30	0.62	1.15	0.091	2.0
25.050	82.184	407.12	400.83	2.05	44.46	0.51	127	5.051	3.725	0.12	-1.950	0.210	0.61	379	0.26	0.7	0.0	272	272	2.000	0.30	0.62	1.15	0.091	2.0
25.100	82.348	406.95	407.49	2.40	39.96	0.59	127	5.062	3.731	0.12	-1.953	0.210	0.61	385	0.26	0.7	0.0	276	276	2.000	0.30	0.62	1.15	0.091	2.0
25.150	82.512	406.79	373.62	1.72	35.03	0.46	127	5.072	3.736	0.12	-1.956	0.211	0.61	353	0.27	0.7	0.0	253	253	2.000	0.30	0.62	1.15	0.091	2.0
25.200	82.676	406.62	355.38	2.73	39.61	0.77	124	5.083	3.741	0.12	-1.958	0.211	0.61	336	0.29	0.7	0.3	234	234	2.000	0.30	0.62	1.15	0.091	2.0
25.250	82.840	406.46	366.11	2.42	42.93	0.66	127	5.093	3.747	0.12	-1.961	0.211	0.61	346	0.27	0.7	0.1	245	245	2.000	0.30	0.62	1.15	0.091	2.0
25.300	83.004	406.30	334.25	2.24	44.48	0.67	124	5.103	3.752	0.12	-1.964	0.211	0.61	316	0.31	0.7	0.2	213	213	2.000	0.30	0.62	1.15	0.091	2.0
25.350	83.168	406.13	332.90	1.29	52.94	0.39	127	5.114	3.757	0.12	-1.966	0.211	0.61	315	0.32	0.7	0.0	211	211	2.000	0.30	0.62	1.15	0.091	2.0
25.400	83.332	405.97	331.88	1.13	58.32	0.34	127	5.124	3.763	0.12	-1.969	0.212	0.61	314	0.32	0.7	0.0	210	210	2.000	0.30	0.62	1.15	0.090	2.0
25.450	83.496	405.80	327.48	1.82	51.11	0.56	127	5.135	3.768	0.12	-1.971	0.212	0.61	309	0.32	0.7	0.0	206	206	2.000	0.28	0.64	1.15	0.088	2.0
25.500	83.660	405.64	317.85	1.68	47.71	0.53	127	5.145	3.773	0.12	-1.974	0.212	0.61	300	0.33	0.7	0.0	196	196	1.549	0.25	0.68	1.15	0.083	2.0
25.550	83.824	405.48	319.21	3.01	45.42	0.94	124	5.156	3.779	0.12	-1.976	0.212	0.61	302	0.33	0.7	2.1	198	201	1.949	0.26	0.66	1.15	0.085	2.0
25.600	83.988	405.31	304.07	3.22	54.84	1.06	124	5.166	3.784	0.12	-1.979	0.213	0.61	287	0.34	0.6	4.0	185	189	1.096	0.23	0.70	1.15	0.080	2.0
25.650	84.153	405.15	305.81	4.16	39.81	1.36	124	5.176	3.789	0.12	-1.981	0.213	0.61	289	0.33	0.7	9.1	189	198	1.733	0.26	0.67	1.15	0.084	2.0
25.700	84.317	404.98	315.34	4.86	49.77	1.54	124	5.186	3.794	0.12	-1.984	0.213	0.60	298	0.31	0.7	12.1	199	212	2.000	0.30	0.62	1.15	0.091	2.0
25.750	84.481	404.82	337.94	4.33	45.54	1.28	124	5.196	3.799	0.12	-1.986	0.213	0.60	319	0.30	0.7	6.1	218	224	2.000	0.30	0.62	1.15	0.091	2.0
25.800	84.645	404.66	436.51	4.52	54.26	1.04	124	5.206	3.804	0.12	-1.988	0.214	0.60	413	0.26	0.7	0.6	294	295	2.000	0.30	0.62	1.15	0.091	2.0
25.850	84.809	404.49	331.12	5.10	45.18	1.54	124	5.217	3.809	0.12	-1.991	0.214	0.60	313	0.30	0.7	11.2	214	225	2.000	0.30	0.62	1.15	0.091	2.0
25.900	84.973	404.33	322.39	4.75	43.13	1.47	124	5.227	3.814	0.12	-1.993	0.214	0.60	305	0.31	0.7	10.4	205	215	2.000	0.30	0.62	1.15	0.091	2.0
25.950	85.137	404.16	313.77	3.37	54.33	1.07	124	5.237	3.819	0.12	-1.995	0.214	0.60	297	0.33	0.7	3.9	193	197	1.627	0.25	0.67	1.15	0.084	2.0
26.000	85.301	404.00	302.17	0.00	48.17	0.00	119	5.247	3.824	0.12	-1.998	0.214	0.60	286	0.36	0.6	0.0	181	181	0.746	0.21	0.73	1.15	0.077	2.0
26.050	85.465	403.84	297.13	0.00	50.95	0.00	119	5.257	3.828	0.12	-2.000	0.215	0.60	281	0.36	0.6	0.0	176	176	0.624	0.20	0.74	1.15	0.076	2.0

Table I-10: Liquefaction Analysis for CPT HAV-C008

Idriss and Blouanger Liquefaction Analysis from CPT Data
Havana East Ash Pond - Site 8
Data Provided by ConeTec (Yellow Highlight)
Liquefaction Calculations and Inputs (Blue Highlight)
Performed by: Charlie Krolikowski
Date 2/1/2016

Groudwater Elevation Used
Original Ground Surface

*PGA was linearly interpolated from PGAcrest to PGAsite from top of the crest to the embankment/foundation interface. After interface is reached, PGA site is used

PGAsite 0.12 PGAcres 0.33
Mw 6.95

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA α	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
0.050	0.16	488.64	2.14	0.02	0.40	0.89	111	0.009	0.009	0.33	0.014	-0.001	1.00	2	0.621	1.7	51.5	3	55	0.096	0.07	1.10	1.15	0.169	0.6
0.100	0.33	488.47	22.81	0.08	3.35	0.36	118	0.019	0.019	0.33	0.012	-0.001	1.00	22	0.694	1.7	0.0	37	37	0.083	0.06	1.10	1.15	0.169	0.5
0.150	0.49	488.31	35.21	0.11	0.76	0.32	118	0.028	0.028	0.33	0.010	-0.001	1.00	33	0.615	1.7	0.0	57	57	0.097	0.08	1.10	1.15	0.168	0.6
0.200	0.66	488.14	54.37	0.13	1.69	0.25	121	0.038	0.038	0.32	0.008	-0.000	1.00	51	0.528	1.7	0.0	87	87	0.123	0.10	1.10	1.15	0.167	0.7
0.250	0.82	487.98	78.23	0.19	1.70	0.24	121	0.048	0.048	0.32	0.006	-0.000	1.00	74	0.446	1.7	0.0	126	126	0.185	0.13	1.10	1.15	0.166	1.1
0.300	0.98	487.82	97.22	0.22	1.58	0.22	124	0.058	0.058	0.32	0.004	0.000	1.00	92	0.393	1.7	0.0	156	156	0.335	0.17	1.10	1.15	0.165	2.0
0.350	1.15	487.65	106.00	0.31	1.14	0.30	124	0.068	0.068	0.32	0.002	0.000	1.00	100	0.371	1.7	0.0	170	170	0.508	0.19	1.10	1.15	0.164	2.0
0.400	1.31	487.49	105.29	0.39	0.78	0.37	124	0.078	0.078	0.32	-0.000	0.001	1.00	100	0.373	1.7	0.0	169	169	0.490	0.19	1.10	1.15	0.164	2.0
0.450	1.48	487.32	96.08	0.40	0.34	0.42	124	0.089	0.089	0.32	-0.003	0.001	1.00	91	0.396	1.7	0.0	154	154	0.320	0.17	1.10	1.15	0.163	2.0
0.500	1.64	487.16	85.81	0.39	0.29	0.45	121	0.099	0.099	0.31	-0.005	0.001	1.00	81	0.424	1.7	0.0	138	138	0.225	0.14	1.10	1.15	0.162	1.4
0.550	1.80	487.00	79.39	0.34	0.30	0.43	121	0.108	0.108	0.31	-0.007	0.001	1.00	75	0.442	1.7	0.1	128	128	0.190	0.13	1.10	1.15	0.161	1.2
0.600	1.97	486.83	73.46	0.28	0.16	0.38	121	0.118	0.118	0.31	-0.009	0.001	1.00	69	0.460	1.7	0.1	118	118	0.167	0.12	1.10	1.15	0.160	1.0
0.650	2.13	486.67	64.26	0.23	0.09	0.36	121	0.128	0.128	0.31	-0.011	0.002	1.00	61	0.491	1.7	0.2	103	103	0.142	0.11	1.10	1.15	0.160	0.9
0.700	2.30	486.50	56.26	0.20	0.39	0.35	121	0.138	0.138	0.31	-0.013	0.002	1.00	53	0.520	1.7	0.2	90	91	0.126	0.10	1.10	1.15	0.159	0.8
0.750	2.46	486.34	53.02	0.18	0.63	0.35	121	0.148	0.148	0.31	-0.016	0.002	1.00	50	0.533	1.7	0.1	85	85	0.121	0.09	1.10	1.15	0.158	0.8
0.800	2.62	486.18	47.91	0.17	0.40	0.36	121	0.158	0.158	0.30	-0.018	0.002	1.00	45	0.554	1.7	0.1	77	77	0.113	0.09	1.10	1.15	0.157	0.7
0.850	2.79	486.01	43.38	0.14	0.35	0.32	121	0.168	0.168	0.30	-0.020	0.003	1.00	41	0.574	1.7	0.1	70	70	0.107	0.08	1.10	1.15	0.156	0.7
0.900	2.95	485.85	38.26	0.12	0.28	0.31	121	0.178	0.178	0.30	-0.022	0.003	1.00	36	0.599	1.7	0.1	61	62	0.101	0.08	1.10	1.15	0.155	0.6
0.950	3.12	485.68	26.41	0.11	-0.86	0.42	118	0.188	0.188	0.30	-0.025	0.003	1.00	25	0.668	1.7	0.1	42	43	0.087	0.07	1.10	1.15	0.154	0.6
1.000	3.28	485.52	29.91	0.12	-0.24	0.39	118	0.197	0.197	0.30	-0.027	0.003	1.00	28	0.645	1.7	0.1	48	48	0.091	0.07	1.10	1.15	0.153	0.6
1.050	3.44	485.36	28.64	0.12	-0.16	0.43	118	0.207	0.207	0.30	-0.029	0.004	1.00	27	0.653	1.7	0.1	46	46	0.090	0.07	1.10	1.15	0.153	0.6
1.100	3.61	485.19	27.43	0.11	1.95	0.41	118	0.217	0.217	0.30	-0.032	0.004	1.00	26	0.661	1.7	0.1	44	44	0.088	0.07	1.10	1.15	0.152	0.6
1.150	3.77	485.03	24.47	0.17	0.14	0.67	118	0.226	0.226	0.29	-0.034	0.004	1.00	23	0.597	1.7	23.1	39	62	0.101	0.08	1.10	1.15	0.151	0.7
1.200	3.94	484.86	16.93	0.19	-0.33	1.09	115	0.236	0.236	0.29	-0.036	0.005	1.00	16	0.593	1.7	36.4	27	64	0.102	0.08	1.10	1.15	0.150	0.7
1.250	4.10	484.70	12.60	0.18	0.95	1.40	115	0.245	0.245	0.29	-0.039	0.005	0.99	12	0.596	1.7	42.3	20	63	0.101	0.08	1.10	1.15	0.149	0.7
1.300	4.27	484.53	12.74	0.20	12.84	1.59	115	0.255	0.255	0.29	-0.041	0.005	0.99	12	0.592	1.7	43.4	20	64	0.102	0.08	1.10	1.15	0.148	0.7
1.350	4.43	484.37	19.16	0.47	-4.32	2.46	115	0.264	0.264	0.29	-0.044	0.005	0.99	18	0.559	1.7	44.4	31	75	0.112	0.09	1.10	1.15	0.147	0.8
1.400	4.59	484.21	27.60	0.73	-12.15	2.63	115	0.273	0.273	0.29	-0.046	0.006	0.99	26	0.529	1.7	42.6	44	87	0.122	0.10	1.10	1.15	0.146	0.8
1.450	4.76	484.04	28.77	0.92	-5.65	3.19	115	0.283	0.283	0.28	-0.049	0.006	0.99	27	0.518	1.7	45.1	46	91	0.127	0.10	1.10	1.15	0.145	0.9
1.500	4.92	483.88	29.29	0.93	-13.67	3.18	115	0.292	0.292	0.28	-0.051	0.006	0.99	28	0.516	1.7	45.0	47	92	0.128	0.10	1.10	1.15	0.145	0.9
1.550	5.09	483.71	29.85	0.98	-14.42	3.29	115	0.302	0.302	0.28	-0.054	0.006	0.99	28	0.513	1.7	45.4	48	93	0.129	0.10	1.10	1.15	0.144	0.9
1.600	5.25	483.55	30.66	0.98	-15.66	3.21	115	0.311	0.311	0.28	-0.056	0.007	0.99	29	0.511	1.7	44.9	49	94	0.130	0.10	1.10	1.15	0.143	0.9
1.650	5.41	483.39	24.06	1.04	-17.55	4.32	115	0.320	0.320	0.28	-0.059	0.007	0.99	23	0.525	1.7	49.6	39	88	0.124	0.10	1.10	1.15	0.142	0.9
1.700	5.58	483.22	50.94	1.00	-11.62	1.97	118	0.330	0.330	0.28	-0.061	0.007	0.99	48	0.474	1.7	29.7	82	111	0.155	0.12	1.10	1.15	0.141	1.1
1.750	5.74	483.06	173.48	1.25	-6.16	0.72	124	0.340	0.340	0.27	-0.064	0.008	0.99	164	0.293	1.4	0.0	229	229	2.000	0.30	1.10	1.15	0.140	2.0
1.800	5.91	482.89	231.05	1.43	-6.27	0.62	124	0.350	0.350	0.27	-0.066	0.008	0.99	218	0.264	1.3	0.0	292	292	2.000	0.30	1.10	1.15	0.139	2.0
1.850	6.07	482.73	272.01	1.40	-5.28	0.52	127	0.360	0.360	0.27	-0.069	0.008	0.99	257	0.264	1.3	0.0	342	342	2.000	0.30	1.10	1.15	0.138	2.0
1.900	6.23	482.57	302.46	1.66	-5.18	0.55	127	0.371	0.371	0.27	-0.072	0.008	0.99	286	0.264	1.3	0.0	377	377	2.000	0.30	1.10	1.15	0.137	2.0
1.950	6.40	482.40	291.21	2.16	-1.39	0.74	124	0.381	0.381	0.27	-0.074	0.009	0.99	275	0.264	1.3	0.0	360	360	2.000	0.30	1.10	1.15	0.137	2.0
2.000	6.56	482.24	347.93	2.21	-4.11	0.63	127	0.391	0.391	0.27	-0.077	0.009	0.99	329	0.264	1.3	0.0	427	427	2.000	0.30	1.10	1.15	0.136	2.0
2.050	6.73	482.07	360.54	2.47	-3.86	0.68	127	0.402	0.402	0.27	-0.080	0.009	0.99	341	0.264	1.3	0.0	440	440	2.000	0.30	1.10	1.15	0.135	2.0
2.100	6.89	481.91	365.55	2.51	-3.71	0.69	127	0.412	0.412	0.26	-0.082	0.010	0.98	345	0.264	1.3	0.0	443	443	2.000	0.30	1.10	1.15	0.134	2.0
2.150	7.05	481.75	369.54	2.52	-3.63	0.68	127	0.423	0.423	0.26	-0.085	0.010	0.98	349	0.264	1.3	0.0	445	445	2.000	0.30	1.10	1.15	0.133	2.0
2.200	7.22	481.58	385.39	2.53	-2.60	0.66	127	0.433	0.433	0.26	-0.088	0.010	0.98	364	0.264	1.3	0.0	461	461	2.000	0.30	1.10	1.15	0.132	2.0
2.250	7.38	481.42	407.48	2.75	-1.50	0.67	127	0.444	0.444	0.26	-0.091	0.011	0.98	385	0.264	1.3	0.0	484	484	2.000	0.30	1.10	1.15	0.131	2.0
2.300	7.55	481.25	416.15	3.33	-2.83	0.80	127	0.454	0.454	0.26	-0.093	0.011	0.98	393	0.264	1.2	0.0	492	492	2.000	0.30	1.10	1.15	0.130	2.0
2.350	7.71	481.09	391.88	3.17	-3.31	0.81	127	0.465	0.465	0.26	-0.096	0.011	0.98	370	0.264	1.2	0.0	460	460	2.000	0.30	1.10	1.15	0.130	2.0
2.400	7.87	480.93	377.00	3.17	-3.28	0.84	127	0.475	0.475	0.25	-0.099	0.012	0.98	356	0.264	1.2	0.0	440	440	2.000	0.30	1.10	1.15	0.129	2.0
2.450	8.04	480.76	393.16	2.92	-2.67	0.74	127	0.485	0.485	0.25	-0.102	0.012	0.98	372	0.264	1.2	0.0	456	456	2.000	0.30	1.10	1.15	0.128	2.0
2.500	8.20	480.60	394.88	2.73	-2.98	0.69	127	0.496	0.496	0.25	-0.105	0.012	0.98	373	0.264	1.2	0.0	456	456	2.000	0.30	1.10	1.15	0.127	2.0
2.550	8.37	480.43	401.52	2.75	-3.26	0.68	127	0.506	0.506	0.25	-0.107	0.012	0.98	379	0.264	1.2	0.0	461	461	2.000	0.30	1.10	1.15	0.126	2.0
2.600	8.53	480.27	409.14	2.79	-2.60	0.68	127	0.517	0.517	0.25	-0.110	0.013	0.98	387	0.264	1.2	0.0	467	467	2.000	0.30	1.10	1.15	0.125	2.0
2.650	8.69	480.11	409.91	2.85	-1.63	0.70	127	0.527	0.527	0.25	-0.113	0.013	0.98	387	0.264	1.2	0.0	466	466	2.000	0.30	1.10	1.15	0.124	2.0
2.700	8.86	479.94	409.45	2.74	-1.27	0.67	127	0.538	0.538	0.24	-0.116	0.013	0.98	387	0.264	1.2	0.0	463	463	2.000	0.30	1.10	1.15	0.123	2.0
2.750	9.02	479.78	405.65	2.66	-1.13	0.66	127	0.548	0.548	0.24	-0.119	0.014	0.98	383	0.264	1.2	0.0	456	456	2.000	0.30	1.10	1.15	0.122	2.0
2.800	9.19	479.61	398.18	2.61	-0.92	0.65	127	0.559	0.559	0.24	-0.122	0.014	0.98	376	0.264	1.2	0.0	445	445	2.000	0.30	1.10	1.15	0.122	2.0
2.850	9.35	479.45	399.74	2.07	-0.63	0.52	127	0.569	0.569	0.24	-0.125	0.014	0.98	378	0.264	1.2	0.0	445	445	2.000	0.30	1.10	1.15	0.121	2.0
2.900	9.51	479.29	406.77	2.48	-0.77	0.61	127	0.579	0.579	0.24	-0.128	0.015	0.97	384	0.264	1.2	0.0	451	451	2.000	0.30	1.10	1.15	0.120	2.0
2.950	9.68	479.12	406.08	3.04	-1.14	0.75	127	0.590	0.590	0.24	-0.131	0.015	0.97	384	0.264	1.2	0.0	448	448	2.000	0.30	1.10	1.15	0.119	2.0
3.000	9.84	478.96	428.44	3.31	-1.26	0.77	127	0.600	0.600	0.24	-0.134	0.015	0.97	405	0.264	1.2	0.0	470	470	2.000	0.30	1.10	1.15	0.118	2.0
3.050	10.01	478.79	464.42	3.52	-3.63	0.76	127	0.611	0.611	0.23	-0.137	0.016	0.97	439	0.264	1.2	0.0	507	507	2.000	0.30	1.10	1.15	0.117	2.0
3.100	10.17	478.63	484.04	3.38	-3.61	0.70	127	0.621	0.621	0.23	-0.140	0.016	0.97	457	0.264	1.2	0.0	526	526	2.000	0.30	1.10	1.15	0.116	2.0
3.150	10.33	478.47	516.32	3.30	-2.87	0.64	127	0.632	0.632	0.23	-0.143	0.016	0.97	488	0.264	1.1	0.0	559	559	2.000	0.30	1.10	1.15	0.115	2.0
3.200	10.50	478.30	544.44	3.52	-2.79	0.65	127	0.642	0.642	0.23	-0.146	0.017	0.97	514	0.264	1.1	0.0	587	587	2.000	0.30	1.10	1.15	0.115	2.0
3.250	10.66	478.14	531.17	3.74	-3.86	0.70	127	0.653	0.653	0.23	-0.149	0.017	0.97	502	0.264	1.1	0.0	570	570	2.000	0.30	1.10	1.15	0.114	2.0
3.300	10.83	477.97	494.31	3.63	-3.34	0.73	127	0.663	0.663	0.23	-0.152	0.017	0.97	467	0.264	1.1	0.0	528	528	2.000	0.30	1.10	1.15	0.113	2.0
3.350	10.99	477.81	461.88	3.37	-0.84	0.73	127	0.673	0.673	0.22	-0.155	0.018	0.97	436	0.264	1.1	0.0	492	492	2.000	0.30	1.10	1.15	0.112	2.0
3.400	11.15	477.65	447.75	3.36	-0.10	0.75	127	0.684	0.684	0.22	-0.158	0.018	0.97	423	0.264	1.1	0.0	475	475	2.000	0.30	1.10	1.15	0.111	2.0
3.450	11.32	477.48	415.00	3.12	-0.01	0.75	127	0.694	0.694	0.22	-0.162	0.019	0.97	392	0.264	1.1	0.0	438	438	2.000	0.30	1.10	1.15	0.110	2.0
3.500	11.48	477.32	417.44	3.17	1.60	0.76	127	0.705	0.705	0.22	-0.165	0.019	0.97	394	0.264	1.1	0.0	439	439	2.000	0.30	1.10	1.15	0.109	2.0
3.550	11.65	477.15	442.06	3.56	2.06	0.81	127	0.715	0.715	0.22	-0.168	0.019	0.97	418	0.264	1.1	0.0	463	463	2.000	0.30	1.10	1.15	0.109	2.0
3.600	11.81	476.99	406.62	3.94	-1.11	0.97	124	0.726	0.726	0.22	-0.171	0.020	0.97	384	0.264	1.1	0.0	424	424	2.000	0.30	1.10	1.15	0.108	2.0
3.650	11.97	476.83	343.51	4.67	0.99	1.36	124	0.736	0.736	0.21	-0.174	0.020	0.96	325	0.264	1.1	0.1	357	357	2.000	0.30	1.10	1.15	0.107	2.0
3.700	12.14	476.66	325.95	4.82	-1.11	1.48	124	0.746	0.746	0.21	-0.177	0.020	0.96	308	0.264	1.1	0.5	338	338	2.000	0.30	1.10	1.15	0.106	2.0
3.750	12.30	476.50	370.36	4.95	16.16	1.34	124	0.756	0.756	0.21	-0.181	0.021	0.96	350	0.264	1.1	0.1	382	383	2.000	0.30	1.10	1.15	0.105	2.0
3.800	12.47	476.33	408.56	5.07	24.22	1.24	124	0.766	0.766	0.21	-0.184	0.021	0.96	386	0.264	1.1	0.0	420	420	2.000	0.30	1.10	1.15	0.105	2.0
3.850	12.63	476.17	430.97	4.35	3.03	1.01	124	0.776	0.776	0.21	-0.187	0.021	0.96	407	0.264	1.1	0.0	442	442	2.000	0.30	1.09	1.15	0.104	2.0
3.900	12.80	476.00	399.06	3.54	-0.11	0.89	124	0.787	0.787	0.21	-0.190	0.022	0.96	377	0.264	1.1	0.0	408	408	2.000	0.30	1.09	1.15	0.104	2.0
3.950	12.96	475.84	301.48	4.28	-0.95	1.42	124	0.797	0.797	0.21	-0.194	0.022	0.96	285	0.264	1.1	0.6	307	308	2.000	0.30	1.09	1.15	0.103	2.0
4.000	13.12	475.68	219.79	5.13	-2.42	2.33	118	0.807	0.807	0.20	-0.197	0.022	0.96	208	0.297	1.1	0.0	225	225	2.000	0.30	1.08	1.15	0.103	2.0
4.050	13.29	475.51	179.76	3.97	2.76	2.21	118	0.816	0.816	0.20	-0.200	0.023	0.96	170	0.326	1.1	17.5	185	202	2.000	0.27	1.07	1.15	0.103	2.0
4.100	13.45	475.35	277.59	3.61	18.02	1.30	124	0.826	0.826	0.20	-0.204	0.023	0.96	262	0.264	1.1	0.5	280	281	2.000	0.30	1.07	1.15	0.101	2.0
4.150	13.62	475.18	406.40	3.63	6.08	0.89	124	0.836	0.836	0.20	-0.207	0.024	0.96	384	0.264	1.1	0.0	409	409	2.000	0.30	1.07	1.15	0.101	2.0
4.200	13.78	475.02	446.22	3.57	2.17	0.80	127	0.847	0.847	0.20	-0.210	0.024	0.96	422	0.264	1.1	0.0	447	447	2.000	0.30	1.07	1.15	0.100	2.0
4.250	13.94	474.86	465.64	3.34	0.78	0.72	127	0.857	0.857	0.20	-0.214	0.024	0.96	440	0.264	1.1	0.0	465	465	2.000	0.30	1.06	1.15	0.100	2.0
4.300	14.11	474.69	466.43	3.59	0.33	0.77	127	0.868	0.868	0.19	-0.217	0.025	0.96	441	0.264	1.1	0.0	464	464	2.000	0.30	1.06	1.15	0.099	2.0
4.350	14.27	474.53	463.57	3.73	0.72	0.81	127	0.878	0.878	0.19	-0.221	0.025	0.95	438	0.264	1.1	0.0	460	460	2.000	0.30	1.06	1.15	0.099	2.0
4.400	14.44	474.36	459.03	4.11	2.31	0.89	127	0.889	0.889	0.19	-0.224	0.025	0.95	434	0.264	1.0	0.0	454	454	2.000	0.30	1.05	1.15	0.098	2.0
4.450	14.60	474.20	477.87	4.45	2.94	0.93	127	0.899	0.899	0.19	-0.227	0.026	0.95	452	0.264	1.0	0.0	471	471	2.000	0.30	1.05	1.15	0.098	2.0
4.500	14.76	474.04	511.41	4.51	4.60	0.88	127	0.909	0.909	0.19	-0.231	0.026	0.95	483	0.264	1.0	0.0	503	503	2.000	0.30	1.05	1.15	0.097	2.0
4.550	14.93	473.87	532.25	4.52	3.40	0.85	127	0.920	0.920	0.19	-0.234	0.027	0.95	503	0.264	1.0	0.0	522	522	2.000	0.30	1.04	1.15	0.097	2.0
4.600	15.09	473.71	535.92	4.50	2.26	0.84	127	0.930	0.930	0.18	-0.238	0.027	0.95	506	0.264	1.0	0.0	524	524	2.000	0.30	1.04	1.15	0.096	2.0
4.650	15.26	473.54	535.11	4.61	3.91	0.86	127	0.941	0.941	0.18	-0.241	0.027	0.95	506	0.264	1.0	0.0	522	522	2.000	0.30	1.04	1.15	0.095	2.0
4.700	15.42	473.38	527.02	4.75	4.00	0.90	127	0.951	0.951	0.18	-0.245	0.028	0.95	498	0.264	1.0	0.0	512	512	2.000	0.30	1.03	1.15	0.095	2.0
4.750	15.58	473.22	513.07	4.66	5.14	0.91	127	0.962	0.962	0.18	-0.248	0.028	0.95	485	0.264	1.0	0.0	497	497	2.000	0.30	1.03	1.15	0.094	2.0
4.800	15.75	473.05	501.22	4.51	4.43	0.90	127	0.972	0.972	0.18	-0.252	0.029	0.95	474	0.264	1.0	0.0	484	484	2.000	0.30	1.03	1.15	0.094	2.0
4.850	15.91	472.89	489.19	3.35	3.73	0.68	127	0.983	0.983	0.18	-0.255	0.029	0.95	462	0.264	1.0	0.0	471	471	2.000	0.30	1.02	1.15	0.093	2.0
4.900	16.08	472.72	463.89	3.54	3.44	0.76	127	0.993	0.993	0.18	-0.259	0.029	0.95	438	0.264	1.0	0.0	446	446	2.000	0.30	1.02	1.15	0.092	2.0
4.950	16.24	472.56	433.32	3.62	3.01	0.84	127	1.003	1.003	0.17	-0.263	0.030	0.95	409	0.264	1.0	0.0	415	415	2.000	0.30	1.02	1.15	0.092	2.0
5.000	16.40	472.40	428.51	3.57	0.42	0.83	127	1.014	1.014	0.17	-0.266	0.030	0.95	405	0.264	1.0	0.0	410	410	2.000	0.30	1.01	1.15	0.091	2.0
5.050	16.57	472.23	426.43	3.29	0.57	0.77	127	1.024	1.024	0.17	-0.270	0.031	0.94	403	0.264	1.0	0.0	406	406	2.000	0.30	1.01	1.15	0.090	2.0
5.100	16.73	472.07	421.67	3.17	-0.97	0.75	127	1.035	1.035	0.17	-0.273	0.031	0.94	398	0.264	1.0	0.0	401	401	2.000	0.30	1.01	1.15	0.090	2.0
5.150	16.90	471.90	434.87	3.02	-0.06	0.69	127	1.045	1.045	0.17	-0.277	0.031	0.94	411	0.264	1.0	0.0	412	412	2.000	0.30	1.00	1.15	0.089	2.0
5.200	17.06	471.74	435.72	3.06	-0.17	0.70	127	1.056	1.056	0.17	-0.281	0.032	0.94	412	0.264	1.0	0.0	412	412	2.000	0.30	1.00	1.15	0.088	2.0
5.250	17.22	471.58	428.31	3.42	-0.53	0.80	127	1.066	1.066	0.16	-0.284	0.032	0.94	405	0.264	1.0	0.0	404	404	2.000	0.30	1.00	1.15	0.088	2.0
5.300	17.39	471.41	400.19	3.83	-0.82	0.96	124	1.076	1.076	0.16	-0.288	0.033	0.94	378	0.264	1.0	0.0	376	376	2.000	0.30	0.99	1.15	0.087	2.0
5.350	17.55	471.25	345.22	3.97	-0.05	1.15	124	1.087	1.087	0.16	-0.292	0.033	0.94	326	0.264	1.0	0.1	324	324	2.000	0.30	0.99	1.15	0.086	2.0
5.400	17.72	471.08	295.84	3.85	-0.23	1.30	124	1.097	1.097	0.16	-0.295	0.033	0.94	280	0.264	1.0	0.8	277	278	2.000	0.30	0.99	1.15	0.086	2.0
5.450	17.88	470.92	288.01	3.40	0.53	1.18	124	1.107	1.107	0.16	-0.299	0.034	0.94	272	0.264	1.0	0.5	269	269	2.000	0.30	0.99	1.15	0.085	2.0
5.500	18.04	470.76	243.95	3.17	-2.36	1.30	124	1.117	1.117	0.16	-0.303	0.034	0.94	231	0.293	1.0	2.1	227	229	2.000	0.30	0.98	1.15	0.084	2.0
5.550	18.21	470.59	214.04	2.89	-2.12	1.35	124	1.127	1.127	0.15	-0.307	0.035	0.94	202	0.327	1.0	4.0	198	202	2.000	0.27	0.98	1.15	0.084	2.0
5.600	18.37	470.43	167.43	2.95	-2.27	1.76	121	1.137	1.137	0.15	-0.310	0.035	0.94	158	0.373	1.0	15.0	154	169	0.487	0.19	0.99	1.15	0.082	2.0
5.650	18.54	470.26	135.65	2.73	0.04	2.01	118	1.147	1.147	0.15	-0.314	0.036	0.93	128	0.407	1.0	23.5	124	147	0.273	0.16	0.99	1.15	0.081	2.0
5.700	18.70	470.10	141.47	2.44	-2.73	1.72	121	1.157	1.157	0.15	-0.318	0.036	0.93	134	0.409	1.0	17.9	129	147	0.269	0.16	0.99	1.15	0.081	2.0
5.750	18.86	469.94	147.11	1.97	-3.94	1.34	121	1.167	1.167	0.15	-0.322	0.036	0.93	139	0.414	1.0	10.4	133	144	0.253	0.15	0.99	1.15	0.080	2.0
5.800	19.03	469.77	140.56	1.63	-6.29	1.16	121	1.177	1.177	0.15	-0.325	0.037	0.93	133	0.429	1.0	8.1	127	135	0.214	0.14	0.99	1.15	0.079	2.0
5.850	19.19	469.61	134.42	1.04	-7.57	0.78	124	1.187	1.187	0.15	-0.329	0.037	0.93	127	0.450	0.9	2.7	121	123	0.179	0.13	0.99	1.15	0.078	2.0
5.900	19.36	469.44	123.04	0.98	-8.41	0.80	124	1.197	1.197	0.14	-0.333	0.038	0.93	116	0.469	0.9	4.2	110	114	0.159	0.12	0.99	1.15	0.077	2.0

Table I-10: Liquefaction Analysis for CPT HAV-C008 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
5.950	19.52	469.28	110.99	1.01	-4.90	0.91	121	1.207	1.207	0.14	-0.337	0.038	0.93	105	0.484	0.9	8.1	98	106	0.146	0.11	0.99	1.15	0.076	1.9
6.000	19.68	469.12	107.62	1.05	-6.04	0.98	121	1.217	1.217	0.14	-0.341	0.038	0.93	102	0.487	0.9	10.2	95	105	0.144	0.11	0.98	1.15	0.075	1.9
6.050	19.85	468.95	105.54	1.13	-6.53	1.07	121	1.227	1.227	0.14	-0.345	0.039	0.93	100	0.486	0.9	12.6	93	105	0.145	0.11	0.98	1.15	0.074	1.9
6.100	20.01	468.79	99.90	1.24	-6.89	1.25	121	1.237	1.237	0.14	-0.348	0.039	0.93	94	0.488	0.9	17.3	87	105	0.144	0.11	0.98	1.15	0.073	2.0
6.150	20.18	468.62	112.95	1.49	-6.52	1.32	121	1.247	1.247	0.14	-0.352	0.040	0.93	107	0.467	0.9	16.1	99	115	0.161	0.12	0.98	1.15	0.073	2.0
6.200	20.34	468.46	144.42	1.50	-6.14	1.04	124	1.257	1.257	0.13	-0.356	0.040	0.93	136	0.433	0.9	6.1	127	133	0.207	0.14	0.98	1.15	0.072	2.0
6.250	20.51	468.30	215.67	2.05	-6.66	0.95	124	1.267	1.267	0.13	-0.360	0.041	0.93	204	0.340	0.9	0.8	192	193	1.272	0.24	0.96	1.15	0.073	2.0
6.300	20.67	468.13	247.41	2.05	-6.16	0.83	124	1.277	1.277	0.13	-0.364	0.041	0.92	234	0.303	0.9	0.1	221	221	2.000	0.30	0.94	1.15	0.073	2.0
6.350	20.83	467.97	276.10	2.21	-6.18	0.80	124	1.287	1.287	0.13	-0.368	0.042	0.92	261	0.271	0.9	0.0	247	247	2.000	0.30	0.94	1.15	0.072	2.0
6.400	21.00	467.80	329.60	2.61	-4.87	0.79	124	1.298	1.298	0.13	-0.372	0.042	0.92	311	0.264	0.9	0.0	295	295	2.000	0.30	0.94	1.15	0.071	2.0
6.450	21.16	467.64	365.17	3.07	-4.65	0.84	124	1.308	1.308	0.13	-0.376	0.042	0.92	345	0.264	0.9	0.0	326	326	2.000	0.30	0.94	1.15	0.070	2.0
6.500	21.33	467.47	357.89	3.36	-4.58	0.94	124	1.318	1.318	0.12	-0.380	0.043	0.92	338	0.264	0.9	0.0	319	319	2.000	0.30	0.93	1.15	0.070	2.0
6.550	21.49	467.31	343.76	3.24	-2.90	0.94	124	1.328	1.328	0.12	-0.384	0.043	0.92	325	0.264	0.9	0.0	306	306	2.000	0.30	0.93	1.15	0.069	2.0
6.600	21.65	467.15	349.97	3.27	-3.19	0.93	124	1.338	1.338	0.12	-0.388	0.044	0.92	331	0.264	0.9	0.0	311	311	2.000	0.30	0.93	1.15	0.068	2.0
6.650	21.82	466.98	365.06	3.12	-3.19	0.86	124	1.348	1.348	0.12	-0.392	0.044	0.92	345	0.264	0.9	0.0	324	324	2.000	0.30	0.93	1.15	0.067	2.0
6.700	21.98	466.82	374.43	2.86	-1.07	0.76	127	1.359	1.359	0.12	-0.396	0.045	0.92	354	0.264	0.9	0.0	331	331	2.000	0.30	0.92	1.15	0.068	2.0
6.750	22.15	466.65	377.28	2.61	-0.94	0.69	127	1.369	1.369	0.12	-0.400	0.045	0.92	357	0.264	0.9	0.0	333	333	2.000	0.30	0.92	1.15	0.068	2.0
6.800	22.31	466.49	384.77	2.44	-1.19	0.63	127	1.380	1.380	0.12	-0.404	0.045	0.92	364	0.264	0.9	0.0	339	339	2.000	0.30	0.92	1.15	0.068	2.0
6.850	22.47	466.33	394.01	1.80	-1.32	0.46	127	1.390	1.390	0.12	-0.408	0.046	0.92	372	0.264	0.9	0.0	346	346	2.000	0.30	0.92	1.15	0.068	2.0
6.900	22.64	466.16	408.37	2.09	-2.20	0.51	127	1.400	1.400	0.12	-0.412	0.046	0.91	386	0.264	0.9	0.0	358	358	2.000	0.30	0.92	1.15	0.068	2.0
6.950	22.80	466.00	410.45	2.60	-6.93	0.63	127	1.411	1.411	0.12	-0.416	0.047	0.91	388	0.264	0.9	0.0	360	360	2.000	0.30	0.91	1.15	0.068	2.0
7.000	22.97	465.83	431.66	3.12	-7.08	0.72	127	1.421	1.421	0.12	-0.420	0.047	0.91	408	0.264	0.9	0.0	377	377	2.000	0.30	0.91	1.15	0.068	2.0
7.050	23.13	465.67	450.55	3.41	-6.67	0.76	127	1.432	1.432	0.12	-0.424	0.048	0.91	426	0.264	0.9	0.0	393	393	2.000	0.30	0.91	1.15	0.068	2.0
7.100	23.29	465.51	446.34	3.50	-6.68	0.79	127	1.442	1.442	0.12	-0.428	0.048	0.91	422	0.264	0.9	0.0	389	389	2.000	0.30	0.91	1.15	0.068	2.0
7.150	23.46	465.34	440.48	3.54	-6.58	0.80	127	1.453	1.453	0.12	-0.432	0.049	0.91	416	0.264	0.9	0.0	383	383	2.000	0.30	0.90	1.15	0.068	2.0
7.200	23.62	465.18	425.71	4.07	-6.56	0.96	124	1.463	1.463	0.12	-0.437	0.049	0.91	402	0.264	0.9	0.0	369	369	2.000	0.30	0.90	1.15	0.069	2.0
7.250	23.79	465.01	365.00	4.36	-6.51	1.19	124	1.473	1.473	0.12	-0.441	0.050	0.91	345	0.264	0.9	0.3	316	316	2.000	0.30	0.90	1.15	0.069	2.0
7.300	23.95	464.85	348.12	4.64	-5.29	1.33	124	1.483	1.483	0.12	-0.445	0.050	0.91	329	0.264	0.9	1.0	301	302	2.000	0.30	0.90	1.15	0.069	2.0
7.350	24.11	464.69	380.68	4.43	-3.15	1.16	124	1.494	1.494	0.12	-0.449	0.051	0.91	360	0.264	0.9	0.2	328	329	2.000	0.30	0.90	1.15	0.069	2.0
7.400	24.28	464.52	357.47	4.43	-3.39	1.24	124	1.504	1.504	0.12	-0.453	0.051	0.91	338	0.264	0.9	0.5	308	308	2.000	0.30	0.89	1.15	0.069	2.0
7.450	24.44	464.36	290.56	3.61	-5.07	1.24	124	1.514	1.514	0.12	-0.457	0.051	0.90	275	0.267	0.9	1.5	250	251	2.000	0.30	0.89	1.15	0.069	2.0
7.500	24.61	464.19	230.23	3.54	-5.77	1.54	121	1.524	1.524	0.12	-0.462	0.052	0.90	218	0.328	0.9	8.2	193	201	2.000	0.27	0.90	1.15	0.068	2.0
7.550	24.77	464.03	222.22	3.49	-4.64	1.57	121	1.534	1.534	0.12	-0.466	0.052	0.90	210	0.337	0.9	9.4	185	195	1.419	0.25	0.91	1.15	0.068	2.0
7.600	24.93	463.87	258.02	3.22	-3.93	1.25	124	1.544	1.544	0.12	-0.470	0.053	0.90	244	0.304	0.9	2.7	217	220	2.000	0.30	0.89	1.15	0.069	2.0
7.650	25.10	463.70	293.91	3.10	-4.07	1.05	124	1.554	1.554	0.12	-0.474	0.053	0.90	278	0.267	0.9	0.5	251	251	2.000	0.30	0.88	1.15	0.069	2.0
7.700	25.26	463.54	331.03	2.78	-3.65	0.84	124	1.564	1.564	0.12	-0.478	0.054	0.90	313	0.264	0.9	0.0	282	282	2.000	0.30	0.88	1.15	0.069	2.0
7.750	25.43	463.37	360.77	2.75	-4.01	0.76	127	1.575	1.575	0.12	-0.483	0.054	0.90	341	0.264	0.9	0.0	307	307	2.000	0.30	0.88	1.15	0.070	2.0
7.800	25.59	463.21	380.95	2.88	-6.22	0.76	127	1.585	1.585	0.12	-0.487	0.055	0.90	360	0.264	0.9	0.0	324	324	2.000	0.30	0.88	1.15	0.070	2.0
7.850	25.75	463.05	384.99	2.41	-6.86	0.63	127	1.596	1.596	0.12	-0.491	0.055	0.90	364	0.264	0.9	0.0	326	326	2.000	0.30	0.88	1.15	0.070	2.0
7.900	25.92	462.88	370.04	2.52	-6.25	0.68	127	1.606	1.606	0.12	-0.495	0.056	0.90	350	0.264	0.9	0.0	313	313	2.000	0.30	0.87	1.15	0.070	2.0
7.950	26.08	462.72	326.98	2.59	-3.68	0.79	124	1.616	1.616	0.12	-0.500	0.056	0.90	309	0.264	0.9	0.0	276	276	2.000	0.30	0.87	1.15	0.070	2.0
8.000	26.25	462.55	298.74	2.90	-3.62	0.97	124	1.626	1.626	0.12	-0.504	0.057	0.90	282	0.266	0.9	0.3	252	252	2.000	0.30	0.87	1.15	0.070	2.0
8.050	26.41	462.39	264.47	3.17	-2.77	1.20	124	1.637	1.637	0.12	-0.508	0.057	0.89	250	0.302	0.9	2.3	219	221	2.000	0.30	0.87	1.15	0.070	2.0
8.100	26.57	462.23	228.96	3.19	-1.95	1.39	121	1.647	1.647	0.12	-0.512	0.058	0.89	216	0.339	0.9	6.6	186	193	1.290	0.24	0.89	1.15	0.068	2.0
8.150	26.74	462.06	201.68	2.87	-1.29	1.42	121	1.657	1.657	0.12	-0.517	0.058	0.89	191	0.371	0.8	9.3	161	171	0.516	0.19	0.91	1.15	0.067	2.0
8.200	26.90	461.90	182.16	2.23	-0.52	1.22	124	1.667	1.667	0.12	-0.521	0.059	0.89	172	0.401	0.8	7.8	143	151	0.297	0.16	0.93	1.15	0.066	2.0
8.250	27.07	461.73	160.48	1.85	-0.16	1.15	124	1.677	1.677	0.12	-0.525	0.059	0.89	152	0.432	0.8	8.9	124	133	0.208	0.14	0.94	1.15	0.065	2.0
8.300	27.23	461.57	144.77	1.55	-0.23	1.07	124	1.687	1.687	0.12	-0.530	0.059	0.89	137	0.457	0.8	9.4	111	120	0.171	0.12	0.94	1.15	0.064	2.0
8.350	27.39	461.41	135.97	1.37	-0.20	1.01	124	1.697	1.697	0.12	-0.534	0.060	0.89	128	0.472	0.8	9.4	103	112	0.156	0.12	0.94	1.15	0.064	2.0
8.400	27.56	461.24	128.65	1.23	-0.11	0.96	124	1.707	1.707	0.12	-0.538	0.060	0.89	122	0.485	0.8	9.6	96	106	0.146	0.11	0.95	1.15	0.064	2.0
8.450	27.72	461.08	123.83	1.10	-0.14	0.89	124	1.718	1.718	0.12	-0.543	0.061	0.89	117	0.496	0.8	9.1	92	101	0.139	0.11	0.95	1.15	0.064	2.0
8.500	27.89	460.91	119.38	1.04	-0.18	0.87	124	1.728	1.728	0.12	-0.547	0.061	0.89	113	0.504	0.8	9.5	88	98	0.134	0.10	0.95	1.15	0.064	2.0
8.550	28.05	460.75	114.05	0.98	-0.26	0.86	121	1.738	1.738	0.12	-0.552	0.062	0.89	108	0.512	0.8	10.2	84	94	0.130	0.10	0.95	1.15	0.063	2.0
8.600	28.21	460.59	110.11	0.93	0.09	0.84	121	1.748	1.748	0.12	-0.556	0.062	0.88	104	0.519	0.8	10.7	80	91	0.127	0.10	0.95	1.15	0.063	2.0
8.650	28.38	460.42	103.50	0.89	-0.12	0.86	121	1.758	1.758	0.12	-0.560	0.063	0.88	98	0.528	0.8	12.4	75	87	0.123	0.10	0.95	1.15	0.063	1.9
8.700	28.54	460.26	96.74	0.82	-0.26	0.84	121	1.768	1.768	0.12	-0.565	0.063	0.88	91	0.538	0.8	13.7	69	83	0.119	0.09	0.95	1.15	0.063	1.9
8.750	28.71	460.09	92.00	0.77	-0.22	0.84	121	1.777	1.777	0.12	-0.569	0.064	0.88	87	0.545	0.8	14.9	66	80	0.116	0.09	0.95	1.15	0.063	1.8
8.800	28.87	459.93	89.44	0.77	-0.21	0.86	121	1.787	1.787	0.12	-0.574	0.064	0.88	85	0.548	0.8	15.9	63	79	0.115	0.09	0.95	1.15	0.063	1.8
8.850	29.04	459.76	93.02	0.58	-0.06	0.63	121	1.797	1.797	0.12	-0.578	0.065	0.88	88	0.559	0.7	9.7	65	75	0.111	0.09	0.95	1.15	0.063	1.8
8.900	29.20	459.60	97.04	0.70	-0.01	0.72	121	1.807	1.807	0.12	-0.582	0.065	0.88	92	0.548	0.7	11.0	68	79	0.115	0.09	0.95	1.15	0.063	1.8
8.950	29.36	459.44	97.06	0.79	-0.04	0.81	121	1.817	1.817	0.12	-0.587	0.066	0.88	92	0.542	0.7	13.2	68	82	0.117	0.09	0.95	1.15	0.063	1.9
9.000	29.53	459.27	104.16	0.80	-0.11	0.77	121	1.827	1.827	0.12	-0.591	0.066	0.88	98	0.535	0.7	10.8	73	84	0.120	0.09	0.95	1.15	0.063	1.9
9.050	29.69	459.11	108.98	0.87	-0.45	0.80	121	1.837	1.837	0.12	-0.596	0.067	0.88	103	0.527	0.7	10.5	77	88	0.123	0.10	0.95	1.15	0.063	2.0
9.100	29.86	458.94	108.07	0.89	-0.60	0.82	121	1.847	1.847	0.12	-0.600	0.067	0.88	102	0.527	0.7	11.3	76	87	0.123	0.10	0.95	1.15	0.063	2.0
9.150	30.02	458.78	103.98	0.88	-0.31	0.84	121	1.857	1.857	0.12	-0.605	0.068	0.87	98	0.532	0.7	12.7	73	86	0.121	0.09	0.95	1.15	0.063	1.9
9.200	30.18	458.62	104.21	0.86	-0.22	0.83	121	1.867	1.867	0.12	-0.609	0.068	0.87	98	0.533	0.7	12.4	73	85	0.121	0.09	0.95	1.15	0.063	1.9
9.250	30.35	458.45	106.82	0.88	-0.07	0.82	121	1.877	1.877	0.12	-0.614	0.069	0.87	101	0.530	0.7	11.7	74	86	0.122	0.10	0.95	1.15	0.063	1.9
9.300	30.51	458.29	105.36	0.89	-0.08	0.85	121	1.887	1.887	0.12	-0.618	0.069	0.87	100	0.531	0.7	12.6	73	86	0.121	0.10	0.94	1.15	0.063	1.9
9.350	30.68	458.12	103.43	0.88	-0.21	0.85	121	1.897	1.897	0.12	-0.623	0.070	0.87	98	0.534	0.7	13.2	72	85	0.120	0.09	0.94	1.15	0.063	1.9
9.400	30.84	457.96	103.47	0.87	-0.05	0.84	121	1.906	1.906	0.12	-0.627	0.070	0.87	98	0.535	0.7	13.1	71	84	0.120	0.09	0.94	1.15	0.063	1.9
9.450	31.00	457.80	103.45	0.86	-0.02	0.83	121	1.916	1.916	0.12	-0.632	0.071	0.87	98	0.536	0.7	12.8	71	84	0.119	0.09	0.94	1.15	0.063	1.9
9.500	31.17	457.63	101.77	0.86	-0.22	0.84	121	1.926	1.926	0.12	-0.636	0.071	0.87	96	0.538	0.7	13.6	70	83	0.119	0.09	0.94	1.15	0.063	1.9
9.550	31.33	457.47	100.01	0.85	-0.21	0.85	121	1.936	1.936	0.12	-0.641	0.072	0.87	95	0.540	0.7	14.1	68	82	0.118	0.09	0.94	1.15	0.063	1.9
9.600	31.50	457.30	101.98	0.84	-0.05	0.82	121	1.946	1.946	0.12	-0.645	0.072	0.87	96	0.540	0.7	13.1	69	82	0.118	0.09	0.94	1.15	0.063	1.9
9.650	31.66	457.14	103.17	0.83	-0.19	0.80	121	1.956	1.956	0.12	-0.650	0.073	0.87	97	0.540	0.7	12.5	70	82	0.118	0.09	0.94	1.15	0.062	1.9
9.700	31.82	456.98	101.22	0.81	-0.11	0.80	121	1.966	1.966	0.12	-0.654	0.073	0.86	96	0.543	0.7	12.9	68	81	0.117	0.09	0.94	1.15	0.062	1.9
9.750	31.99	456.81	99.09	0.79	-0.25	0.79	121	1.976	1.976	0.12	-0.659	0.074	0.86	94	0.547	0.7	13.3	67	80	0.116	0.09	0.94	1.15	0.062	1.9
9.800	32.15	456.65	96.56	0.76	-0.26	0.79	121	1.986	1.986	0.12	-0.663	0.074	0.86	91	0.551	0.7	13.8	65	78	0.114	0.09	0.94	1.15	0.062	1.8
9.850	32.32	456.48	94.76	0.56	-0.01	0.59	121	1.996	1.996	0.12	-0.668	0.075	0.86	90	0.568	0.7	9.6	62	72	0.109	0.09	0.95	1.15	0.062	1.8
9.900	32.48	456.32	94.39	0.61	-0.16	0.65	121	2.006	2.006	0.12	-0.673	0.075	0.86	89	0.564	0.7	11.2	62	73	0.110	0.09	0.94	1.15	0.062	1.8
9.950	32.64	456.16	93.27	0.68	1.62	0.73	121	2.016	2.016	0.12	-0.677	0.076	0.86	88	0.560	0.7	13.4	61	75	0.111	0.09	0.94	1.15	0.062	1.8
10.000	32.81	455.99	113.53	0.75	0.11	0.66	124	2.026	2.026	0.12	-0.682	0.076	0.86	107	0.538	0.7	7.6	76	83	0.119	0.09	0.94	1.15	0.062	1.9
10.050	32.97	455.83	152.28	0.92	0.21	0.60	124	2.036	2.036	0.12	-0.686	0.077	0.86	144	0.483	0.7	2.1	105	107	0.147	0.11	0.93	1.15	0.063	2.0
10.100	33.14	455.66	184.27	1.11	0.46	0.60	124	2.046	2.046	0.12	-0.691	0.077	0.86	174	0.435	0.8	0.7	131	131	0.202	0.14	0.91	1.15	0.064	2.0
10.150	33.30	455.50	212.12	1.36	0.46	0.64	124	2.056	2.056	0.12	-0.696	0.078	0.86	200	0.396	0.8	0.4	154	154	0.321	0.17	0.89	1.15	0.066	2.0
10.200	33.46	455.34	225.77	1.59	0.53	0.70	124	2.066	2.066	0.12	-0.700	0.078	0.86	213	0.378	0.8	0.5	166	166	0.445	0.19	0.88	1.15	0.066	2.0
10.250	33.63	455.17	234.95	1.82	0.41	0.77	124	2.077	2.077	0.12	-0.705	0.079	0.85	222	0.366	0.8	0.7	174	174	0.582	0.20	0.87	1.15	0.067	2.0
10.300	33.79	455.01	240.40	2.00	0.49	0.83	124	2.087	2.087	0.12	-0.709	0.079	0.85	227	0.359	0.8	0.9	178	179	0.696	0.21	0.86	1.15	0.068	2.0
10.350	33.96	454.84	241.38	2.03	0.46	0.84	124	2.097	2.097	0.12	-0.714	0.080	0.85	228	0.358	0.8	0.9	179	180	0.712	0.21	0.86	1.15	0.068	2.0
10.400	34.12	454.68	237.77	2.02	0.25	0.85	124	2.107	2.107	0.12	-0.719	0.080	0.85	225	0.363	0.8	1.1	175	176	0.625	0.20	0.86	1.15	0.067	2.0
10.450	34.28	454.52	231.01	1.99	0.00	0.86	124	2.117	2.117	0.12	-0.723	0.081	0.85	218	0.372	0.8	1.4	169	170	0.505	0.19	0.87	1.15	0.067	2.0
10.500	34.45	454.35	217.34	1.91	0.07	0.88	124	2.127	2.127	0.12	-0.728	0.081	0.85	205	0.390	0.8	2.1	156	159	0.357	0.17	0.88	1.15	0.066	2.0
10.550	34.61	454.19	201.42	1.77	0.22	0.88	124	2.138	2.138	0.12	-0.733	0.082	0.85	190	0.411	0.7	2.9	143	145	0.261	0.15	0.89	1.15	0.065	2.0
10.600	34.78	454.02	190.43	1.66	0.30	0.87	124	2.148	2.148	0.12	-0.737	0.082	0.85	180	0.426	0.7	3.5	133	137	0.220	0.14	0.90	1.15	0.064	2.0
10.650	34.94	453.86	178.68	1.57	0.42	0.88	124	2.158	2.158	0.12	-0.742	0.083	0.85	169	0.442	0.7	4.5	123	128	0.191	0.13	0.91	1.15	0.064	2.0
10.700	35.10	453.70	157.97	1.49	0.38	0.94	124	2.168	2.168	0.12	-0.747	0.083	0.85	149	0.468	0.7	7.7	107	114	0.160	0.12	0.91	1.15	0.063	2.0
10.750	35.27	453.53	133.00	1.38	0.34	1.04	121	2.178	2.178	0.12	-0.751	0.084	0.85	126	0.496	0.7	13.3	88	101	0.139	0.11	0.92	1.15	0.062	2.0
10.800	35.43	453.37	118.64	1.04	0.46	0.87	124	2.188	2.188	0.12	-0.756	0.084	0.84	112	0.524	0.7	12.3	77	89	0.124	0.10	0.93	1.15	0.062	2.0
10.850	35.60	453.20	117.25	1.06	0.47	0.90	121	2.198	2.198	0.12	-0.761	0.085	0.84	111	0.524	0.7	13.2	76	89	0.124	0.10	0.93	1.15	0.062	2.0
10.900	35.76	453.04	131.45	0.93	0.49	0.71	124	2.208	2.208	0.12	-0.765	0.085	0.84	124	0.517	0.7	6.7	85	92	0.127	0.10	0.93	1.15	0.062	2.0
10.950	35.92	452.88	122.64	0.93	0.30	0.76	124	2.219	2.219	0.12	-0.770	0.086	0.84	116	0.527	0.7	9.2	78	88	0.123	0.10	0.93	1.15	0.062	2.0
11.000	36.09	452.71	126.80	0.97	0.20	0.77	124	2.229	2.229	0.12	-0.775	0.087	0.84	120	0.521	0.7	8.7	81	90	0.126	0.10	0.93	1.15	0.062	2.0
11.050	36.25	452.55	120.12	1.01	-0.03	0.84	124	2.239	2.239	0.12	-0.779	0.087	0.84	114	0.526	0.7	11.5	77	88	0.123	0.10	0.93	1.15	0.062	2.0
11.100	36.42	452.38	103.92	0.91	-0.14	0.88	121	2.249	2.249	0.12	-0.784	0.088	0.84	98	0.544	0.7	15.6	65	81	0.116	0.09	0.93	1.15	0.061	1.9
11.150	36.58	452.22	92.39	0.75	-0.20	0.82	121	2.259	2.259	0.12	-0.789	0.088	0.84	87	0.563	0.7	16.9	57	74	0.111	0.09	0.93	1.15	0.061	1.8
11.200	36.74	452.06	92.77	0.67	-0.20	0.73	121	2.269	2.269	0.12	-0.793	0.089	0.84	88	0.569	0.6	14.8	57	72	0.109	0.09	0.94	1.15	0.061	1.8
11.250	36.91	451.89	95.91	0.67	-0.32	0.69	121	2.279	2.279	0.12	-0.798	0.089	0.84	91	0.568	0.6	13.3	59	72	0.109	0.09	0.93	1.15	0.061	1.8
11.300	37.07	451.73	96.22	0.70	-0.44	0.72	121	2.289	2.289	0.12	-0.803	0.090	0.84	91	0.566	0.6	14.0	59	73	0.110	0.09	0.93	1.15	0.061	1.8
11.350	37.24	451.56	96.41	0.74	-0.57	0.76	121	2.299	2.299	0.12	-0.808	0.090	0.83	91	0.563	0.6	15.0	59	74	0.110	0.09	0.93	1.15	0.061	1.8
11.400	37.40	451.40	103.95	0.74	-0.65	0.71	124	2.309	2.309	0.12	-0.812	0.091	0.83	98	0.558	0.6	12.1	64	76	0.112	0.09	0.93	1.15	0.061	1.8
11.450	37.57	451.23	119.66	0.89	-2.50	0.74	124	2.319	2.319	0.12	-0.817	0.091	0.83	113	0.536	0.7	9.7	74	84	0.119	0.09	0.93	1.15	0.061	2.0
11.500	37.73	451.07	134.49	0.97	-3.43	0.72	124	2.329	2.329	0.12	-0.822	0.092	0.83	127	0.518	0.7	7.0	84	91	0.127	0.10	0.92	1.15	0.061	2.0
11.550	37.89	450.91	123.06	0.89	-0.56	0.72	124	2.339	2.339	0.12	-0.826	0.092	0.83	116	0.533	0.7	8.8	76	85	0.120	0.09	0.93	1.15	0.061	2.0
11.600	38.06	450.74	123.72	0.77	1.68	0.62	124	2.349	2.349	0.12	-0.831	0.093	0.83	117	0.540	0.7	6.5	76	83	0.118	0.09	0.93	1.15	0.061	1.9
11.650	38.22	450.58	133.81	0.68	1.95	0.51	124	2.360	2.360	0.12	-0.836	0.093	0.83	126	0.532	0.7	3.2	83	86	0.121	0.10	0.92	1.15	0.061	2.0
11.700	38.39	450.41	135.44	0.73	1.64	0.54	124	2.370	2.370	0.12	-0.841	0.094	0.83	128	0.528	0.7	3.4	84	87	0.123	0.10	0.92	1.15	0.061	2.0
11.750	38.55	450.25	127.53	0.75	2.00	0.59	124	2.380	2.376	0.12	-0.845	0.094	0.83	121	0.537	0.6	5.4	78	83	0.119	0.09	0.92	1.15	0.061	2.0
11.800	38.71	450.09	128.30	0.76	1.90	0.59	124	2.390	2.381	0.12	-0.850	0.095	0.83	121	0.536	0.6	5.4	78	84	0.119	0.09	0.92	1.15	0.061	2.0
11.850	38.88	449.92	137.79	0.92	2.22	0.67	124	2.400	2.386	0.12	-0.855	0.095	0.82	130	0.519	0.7	5.7	85	91	0.127	0.10	0.92	1.15	0.061	2.0
11.900	39.04	449.76	153.74	0.72	2.50	0.47	124	2.410	2.391	0.12	-0.860	0.096	0.82	145	0.507	0.7	0.2	96	96	0.133	0.10	0.92	1.15	0.062	2.0
11.950	39.21	449.59	146.96	0.72	2.38	0.49	124	2.421	2.396	0.12	-0.864	0.096	0.82	139	0.514	0.7	1.9	91	93	0.129	0.10	0.92	1.15	0.062	2.0
12.000	39.37	449.43	190.12	0.73	2.67	0.39	124	2.431	2.401	0.12	-0.869	0.097	0.82	180	0.448	0.7	0.1	124	125	0.182	0.13	0.89	1.15	0.063	2.0
12.050	39.53	449.27	231.57	0.72	2.06	0.31	127	2.441	2.407	0.12	-0.874	0.097	0.82	219	0.389	0.7	0.0	159	159	0.361	0.17	0.86	1.15	0.066	2.0
12.100	39.70	449.10	256.74	0.73	1.93	0.28	127	2.452	2.412	0.12	-0.879	0.098	0.82	243	0.356	0.7	0.0	181	181	0.755	0.21	0.82	1.15	0.069	2.0
12.150	39.86	448.94	274.15	0.80	2.21	0.29	127	2.462	2.417	0.12	-0.883	0.098	0.82	259	0.334	0.8	0.0	197	197	1.567	0.25	0.79	1.15	0.072	2.0
12.200	40.03	448.77	276.12	0.83	2.08	0.30	127	2.472	2.423	0.12	-0.888	0.099	0.82	261	0.332	0.8	0.0	198	198	1.711	0.26	0.79	1.15	0.072	2.0

Table I-10: Liquefaction Analysis for CPT HAV-C008 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
12.250	40.19	448.61	255.42	1.03	3.29	0.40	127	2.483	2.428	0.12	-0.893	0.099	0.82	241	0.358	0.7	0.0	179	179	0.705	0.21	0.83	1.15	0.069	2.0
12.300	40.35	448.45	228.75	1.05	2.99	0.46	124	2.493	2.433	0.12	-0.898	0.100	0.82	216	0.394	0.7	0.0	156	156	0.331	0.17	0.86	1.15	0.066	2.0
12.350	40.52	448.28	194.42	1.04	3.57	0.53	124	2.503	2.438	0.12	-0.903	0.101	0.82	184	0.443	0.7	0.5	127	127	0.190	0.13	0.89	1.15	0.064	2.0
12.400	40.68	448.12	165.36	1.02	4.54	0.61	124	2.514	2.443	0.12	-0.907	0.101	0.81	156	0.484	0.7	2.4	104	107	0.147	0.11	0.91	1.15	0.063	2.0
12.450	40.85	447.95	146.72	0.83	4.12	0.56	124	2.524	2.448	0.12	-0.912	0.102	0.81	139	0.514	0.6	3.1	90	93	0.129	0.10	0.92	1.15	0.062	2.0
12.500	41.01	447.79	140.54	0.78	4.22	0.55	124	2.534	2.453	0.12	-0.917	0.102	0.81	133	0.524	0.6	3.5	85	89	0.124	0.10	0.92	1.15	0.062	2.0
12.550	41.17	447.63	137.85	0.74	4.29	0.54	124	2.544	2.458	0.12	-0.922	0.103	0.81	130	0.529	0.6	3.5	83	87	0.122	0.10	0.92	1.15	0.062	2.0
12.600	41.34	447.46	131.91	0.73	4.25	0.55	124	2.554	2.463	0.12	-0.926	0.103	0.81	125	0.537	0.6	4.4	79	84	0.119	0.09	0.92	1.15	0.062	1.9
12.650	41.50	447.30	133.15	0.73	4.31	0.55	124	2.564	2.468	0.12	-0.931	0.104	0.81	126	0.536	0.6	4.2	80	84	0.120	0.09	0.92	1.15	0.062	1.9
12.700	41.67	447.13	129.11	0.74	4.41	0.57	124	2.575	2.474	0.12	-0.936	0.104	0.81	122	0.540	0.6	5.2	77	82	0.118	0.09	0.92	1.15	0.062	1.9
12.750	41.83	446.97	122.14	0.74	4.35	0.61	124	2.585	2.479	0.12	-0.941	0.105	0.81	115	0.548	0.6	7.0	72	79	0.115	0.09	0.92	1.15	0.062	1.9
12.800	41.99	446.81	122.59	0.73	4.61	0.60	124	2.595	2.484	0.12	-0.946	0.105	0.81	116	0.548	0.6	6.7	73	79	0.115	0.09	0.92	1.15	0.062	1.9
12.850	42.16	446.64	125.89	0.62	4.72	0.49	124	2.605	2.489	0.12	-0.950	0.106	0.81	119	0.550	0.6	4.1	74	78	0.114	0.09	0.92	1.15	0.062	1.8
12.900	42.32	446.48	114.17	0.63	4.73	0.55	124	2.615	2.494	0.12	-0.955	0.106	0.81	108	0.563	0.6	7.1	67	74	0.110	0.09	0.93	1.15	0.062	1.8
12.950	42.49	446.31	111.71	0.60	5.14	0.54	124	2.626	2.499	0.12	-0.960	0.107	0.80	106	0.568	0.6	7.2	65	72	0.109	0.09	0.93	1.15	0.062	1.8
13.000	42.65	446.15	117.88	0.58	5.20	0.49	124	2.636	2.504	0.12	-0.965	0.107	0.80	111	0.563	0.6	5.2	69	74	0.110	0.09	0.93	1.15	0.062	1.8
13.050	42.81	445.99	128.42	0.61	5.24	0.47	124	2.646	2.509	0.12	-0.970	0.108	0.80	121	0.560	0.6	0.1	75	75	0.111	0.09	0.92	1.15	0.062	1.8
13.100	42.98	445.82	136.66	0.67	5.33	0.49	124	2.656	2.514	0.12	-0.974	0.108	0.80	129	0.535	0.6	3.0	81	84	0.120	0.09	0.92	1.15	0.063	1.9
13.150	43.14	445.66	141.21	0.74	5.47	0.53	124	2.666	2.519	0.12	-0.979	0.109	0.80	133	0.527	0.6	3.2	84	88	0.123	0.10	0.92	1.15	0.063	2.0
13.200	43.31	445.49	136.52	0.78	5.51	0.57	124	2.676	2.524	0.12	-0.984	0.109	0.80	129	0.532	0.6	4.4	81	86	0.121	0.10	0.92	1.15	0.063	1.9
13.250	43.47	445.33	129.63	0.76	5.96	0.58	124	2.687	2.529	0.12	-0.989	0.110	0.80	122	0.541	0.6	5.6	76	82	0.118	0.09	0.92	1.15	0.063	1.9
13.300	43.63	445.17	135.43	0.78	6.15	0.58	124	2.697	2.534	0.12	-0.994	0.110	0.80	128	0.533	0.6	4.7	80	85	0.121	0.09	0.92	1.15	0.063	1.9
13.350	43.80	445.00	136.65	0.79	6.32	0.58	124	2.707	2.539	0.12	-0.998	0.111	0.80	129	0.532	0.6	4.7	81	86	0.121	0.10	0.92	1.15	0.063	1.9
13.400	43.96	444.84	131.01	0.78	6.46	0.59	124	2.717	2.544	0.12	-1.003	0.112	0.80	124	0.539	0.6	5.6	77	83	0.118	0.09	0.92	1.15	0.063	1.9
13.450	44.13	444.67	123.36	0.72	6.41	0.58	124	2.727	2.549	0.12	-1.008	0.112	0.80	117	0.551	0.6	6.5	72	78	0.114	0.09	0.92	1.15	0.063	1.8
13.500	44.29	444.51	118.81	0.69	6.38	0.58	124	2.738	2.554	0.12	-1.013	0.113	0.79	112	0.557	0.6	7.2	69	76	0.112	0.09	0.92	1.15	0.063	1.8
13.550	44.45	444.35	107.70	0.63	6.42	0.59	124	2.748	2.560	0.12	-1.018	0.113	0.79	102	0.571	0.6	9.5	61	71	0.108	0.08	0.93	1.15	0.063	1.7
13.600	44.62	444.18	99.59	0.58	6.38	0.59	124	2.758	2.565	0.12	-1.022	0.114	0.79	94	0.581	0.6	11.2	56	67	0.105	0.08	0.93	1.15	0.063	1.7
13.650	44.78	444.02	98.46	0.56	6.50	0.56	124	2.768	2.570	0.12	-1.027	0.114	0.79	93	0.585	0.6	10.9	55	66	0.104	0.08	0.93	1.15	0.063	1.7
13.700	44.95	443.85	100.42	0.57	6.56	0.57	124	2.778	2.575	0.12	-1.032	0.115	0.79	95	0.582	0.6	10.5	57	67	0.105	0.08	0.93	1.15	0.063	1.7
13.750	45.11	443.69	99.67	0.57	6.55	0.57	124	2.788	2.580	0.12	-1.037	0.115	0.79	94	0.583	0.6	10.9	56	67	0.105	0.08	0.93	1.15	0.063	1.7
13.800	45.28	443.52	93.95	0.57	6.49	0.61	121	2.799	2.585	0.12	-1.042	0.116	0.79	89	0.586	0.6	13.2	53	66	0.104	0.08	0.93	1.15	0.063	1.7
13.850	45.44	443.36	91.89	0.46	6.53	0.50	124	2.809	2.590	0.12	-1.046	0.116	0.79	87	0.599	0.6	10.9	51	62	0.101	0.08	0.93	1.15	0.063	1.6
13.900	45.60	443.20	97.00	0.50	6.68	0.51	124	2.819	2.595	0.12	-1.051	0.117	0.79	92	0.592	0.6	9.9	54	64	0.102	0.08	0.93	1.15	0.063	1.6
13.950	45.77	443.03	103.49	0.54	8.25	0.52	124	2.829	2.600	0.12	-1.056	0.117	0.79	98	0.583	0.6	8.8	58	67	0.105	0.08	0.93	1.15	0.063	1.7
14.000	45.93	442.87	124.43	0.65	8.40	0.52	124	2.839	2.605	0.12	-1.061	0.118	0.78	118	0.556	0.6	5.2	71	76	0.113	0.09	0.92	1.15	0.063	1.8
14.050	46.10	442.70	125.11	0.70	8.44	0.56	124	2.849	2.610	0.12	-1.066	0.118	0.78	118	0.552	0.6	5.9	72	78	0.114	0.09	0.92	1.15	0.063	1.8
14.100	46.26	442.54	121.47	0.68	8.43	0.56	124	2.859	2.615	0.12	-1.070	0.119	0.78	115	0.557	0.6	6.5	69	76	0.112	0.09	0.92	1.15	0.063	1.8
14.150	46.42	442.38	121.84	0.67	8.47	0.55	124	2.870	2.620	0.12	-1.075	0.119	0.78	115	0.558	0.6	6.3	69	76	0.112	0.09	0.92	1.15	0.063	1.8
14.200	46.59	442.21	134.78	0.62	8.63	0.46	124	2.880	2.625	0.12	-1.080	0.120	0.78	127	0.554	0.6	0.1	77	77	0.113	0.09	0.92	1.15	0.063	1.8
14.250	46.75	442.05	136.00	0.62	8.68	0.46	124	2.890	2.630	0.12	-1.085	0.120	0.78	129	0.552	0.6	0.1	78	78	0.114	0.09	0.92	1.15	0.064	1.8
14.300	46.92	441.88	121.10	0.69	9.59	0.57	124	2.900	2.635	0.12	-1.090	0.121	0.78	114	0.557	0.6	7.0	69	76	0.112	0.09	0.92	1.15	0.063	1.8
14.350	47.08	441.72	130.21	0.71	9.39	0.54	124	2.910	2.640	0.12	-1.094	0.121	0.78	123	0.547	0.6	5.0	75	80	0.115	0.09	0.92	1.15	0.064	1.8
14.400	47.24	441.56	131.32	0.72	9.26	0.55	124	2.921	2.645	0.12	-1.099	0.122	0.78	124	0.545	0.6	5.0	75	80	0.116	0.09	0.92	1.15	0.064	1.8
14.450	47.41	441.39	136.11	0.76	9.33	0.56	124	2.931	2.650	0.12	-1.104	0.122	0.78	129	0.538	0.6	4.6	78	83	0.119	0.09	0.91	1.15	0.064	1.9
14.500	47.57	441.23	141.75	0.76	9.52	0.53	124	2.941	2.655	0.12	-1.109	0.123	0.78	134	0.532	0.6	3.6	82	86	0.121	0.10	0.91	1.15	0.064	1.9
14.550	47.74	441.06	139.28	0.75	9.51	0.53	124	2.951	2.660	0.12	-1.113	0.123	0.77	132	0.535	0.6	3.9	80	84	0.120	0.09	0.91	1.15	0.064	1.9
14.600	47.90	440.90	139.38	0.72	9.60	0.52	124	2.961	2.666	0.12	-1.118	0.124	0.77	132	0.536	0.6	3.5	80	84	0.119	0.09	0.91	1.15	0.064	1.9
14.650	48.06	440.74	130.43	0.67	9.59	0.51	124	2.971	2.671	0.12	-1.123	0.125	0.77	123	0.550	0.6	4.4	74	79	0.114	0.09	0.92	1.15	0.064	1.8
14.700	48.23	440.57	131.15	0.62	9.76	0.47	124	2.982	2.676	0.12	-1.128	0.125	0.77	124	0.563	0.6	0.1	73	74	0.110	0.09	0.92	1.15	0.064	1.7
14.750	48.39	440.41	134.78	0.65	9.90	0.48	124	2.992	2.681	0.12	-1.133	0.126	0.77	127	0.557	0.6	0.1	76	76	0.112	0.09	0.92	1.15	0.064	1.8
14.800	48.56	440.24	130.83	0.64	10.01	0.49	124	3.002	2.686	0.12	-1.137	0.126	0.77	124	0.565	0.6	0.1	73	73	0.110	0.09	0.92	1.15	0.064	1.7
14.850	48.72	440.08	134.06	0.66	10.60	0.49	124	3.012	2.691	0.12	-1.142	0.127	0.77	127	0.547	0.6	3.7	76	80	0.116	0.09	0.92	1.15	0.064	1.8
14.900	48.88	439.92	144.78	0.66	10.84	0.45	124	3.022	2.696	0.12	-1.147	0.127	0.77	137	0.539	0.6	0.1	83	83	0.118	0.09	0.91	1.15	0.064	1.8
14.950	49.05	439.75	139.95	0.74	13.38	0.53	124	3.033	2.701	0.12	-1.152	0.128	0.77	132	0.536	0.6	3.8	80	84	0.119	0.09	0.91	1.15	0.064	1.9
15.000	49.21	439.59	129.00	0.82	12.37	0.64	124	3.043	2.706	0.12	-1.156	0.128	0.77	122	0.545	0.6	7.4	73	81	0.116	0.09	0.91	1.15	0.064	1.8
15.050	49.38	439.42	130.92	0.79	12.25	0.61	124	3.053	2.711	0.12	-1.161	0.129	0.77	124	0.545	0.6	6.5	74	81	0.116	0.09	0.91	1.15	0.064	1.8
15.100	49.54	439.26	157.34	0.81	12.62	0.52	124	3.063	2.716	0.12	-1.166	0.129	0.76	149	0.512	0.6	2.2	92	94	0.130	0.10	0.90	1.15	0.065	2.0
15.150	49.70	439.10	173.32	0.86	12.77	0.49	124	3.073	2.721	0.12	-1.171	0.130	0.76	164	0.489	0.6	1.1	103	104	0.143	0.11	0.90	1.15	0.066	2.0
15.200	49.87	438.93	189.58	0.94	13.05	0.49	124	3.083	2.726	0.12	-1.175	0.130	0.76	179	0.465	0.6	0.6	115	116	0.163	0.12	0.89	1.15	0.066	2.0
15.250	50.03	438.77	191.82	1.00	13.00	0.52	124	3.094	2.731	0.12	-1.180	0.131	0.76	181	0.461	0.6	0.7	117	118	0.166	0.12	0.88	1.15	0.066	2.0
15.300	50.20	438.60	185.41	1.04	13.20	0.56	124	3.104	2.736	0.12	-1.185	0.131	0.76	175	0.470	0.6	1.3	112	113	0.158	0.12	0.89	1.15	0.066	2.0
15.350	50.36	438.44	195.51	1.05	13.00	0.54	124	3.114	2.741	0.12	-1.190	0.132	0.76	185	0.456	0.6	0.8	120	120	0.172	0.13	0.88	1.15	0.067	2.0
15.400	50.52	438.28	204.25	1.22	13.35	0.60	124	3.124	2.746	0.12	-1.194	0.132	0.76	193	0.442	0.7	1.0	127	128	0.190	0.13	0.87	1.15	0.067	2.0
15.450	50.69	438.11	201.38	1.06	13.52	0.53	124	3.134	2.752	0.12	-1.199	0.133	0.76	190	0.448	0.7	0.6	124	125	0.182	0.13	0.88	1.15	0.067	2.0
15.500	50.85	437.95	185.70	0.94	13.27	0.51	124	3.145	2.757	0.12	-1.204	0.133	0.76	175	0.472	0.6	0.8	112	113	0.156	0.12	0.89	1.15	0.066	2.0
15.550	51.02	437.78	183.69	1.18	17.43	0.64	124	3.155	2.762	0.12	-1.209	0.134	0.76	174	0.471	0.6	2.3	110	113	0.157	0.12	0.89	1.15	0.066	2.0
15.600	51.18	437.62	195.35	0.87	16.88	0.44	124	3.165	2.767	0.12	-1.213	0.134	0.76	185	0.459	0.6	0.2	119	119	0.169	0.12	0.88	1.15	0.067	2.0
15.650	51.34	437.46	204.39	0.85	16.45	0.42	124	3.175	2.772	0.12	-1.218	0.135	0.75	193	0.446	0.7	0.1	126	126	0.186	0.13	0.87	1.15	0.067	2.0
15.700	51.51	437.29	214.48	1.01	16.11	0.47	124	3.185	2.777	0.12	-1.223	0.135	0.75	203	0.431	0.7	0.2	134	134	0.210	0.14	0.87	1.15	0.068	2.0
15.750	51.67	437.13	218.16	1.10	15.91	0.51	124	3.195	2.782	0.12	-1.227	0.136	0.75	206	0.426	0.7	0.2	137	137	0.221	0.14	0.86	1.15	0.068	2.0
15.800	51.84	436.96	211.75	1.35	15.83	0.64	124	3.206	2.787	0.12	-1.232	0.136	0.75	200	0.433	0.7	1.1	132	133	0.206	0.14	0.87	1.15	0.068	2.0
15.850	52.00	436.80	206.94	0.95	16.09	0.46	124	3.216	2.792	0.12	-1.237	0.137	0.75	196	0.443	0.7	0.2	127	127	0.190	0.13	0.87	1.15	0.068	2.0
15.900	52.16	436.64	180.66	0.98	16.05	0.54	124	3.226	2.797	0.12	-1.242	0.137	0.75	171	0.480	0.6	1.4	107	108	0.149	0.11	0.89	1.15	0.066	2.0
15.950	52.33	436.47	168.18	0.91	17.94	0.54	124	3.236	2.802	0.12	-1.246	0.138	0.75	159	0.499	0.6	2.0	98	100	0.137	0.11	0.90	1.15	0.066	2.0
16.000	52.49	436.31	144.76	0.81	17.05	0.56	124	3.246	2.807	0.12	-1.251	0.138	0.75	137	0.532	0.6	4.1	81	85	0.121	0.09	0.91	1.15	0.065	1.9
16.050	52.66	436.14	135.60	0.73	16.56	0.54	124	3.257	2.812	0.12	-1.256	0.139	0.75	128	0.546	0.6	4.8	75	80	0.116	0.09	0.91	1.15	0.065	1.8
16.100	52.82	435.98	133.85	0.68	16.48	0.51	124	3.267	2.817	0.12	-1.260	0.139	0.75	126	0.551	0.6	4.4	74	78	0.114	0.09	0.91	1.15	0.065	1.8
16.150	52.98	435.82	140.91	0.68	16.80	0.48	124	3.277	2.822	0.12	-1.265	0.140	0.75	133	0.553	0.6	0.1	77	78	0.114	0.09	0.91	1.15	0.065	1.8
16.200	53.15	435.65	153.49	0.68	17.07	0.44	124	3.287	2.827	0.12	-1.270	0.140	0.74	145	0.530	0.6	0.1	86	86	0.122	0.10	0.91	1.15	0.065	1.9
16.250	53.31	435.49	163.55	0.71	17.48	0.44	124	3.297	2.833	0.12	-1.274	0.141	0.74	155	0.513	0.6	0.2	93	93	0.129	0.10	0.90	1.15	0.065	2.0
16.300	53.48	435.32	162.99	0.70	17.46	0.43	124	3.307	2.838	0.12	-1.279	0.141	0.74	154	0.514	0.6	0.2	93	93	0.129	0.10	0.90	1.15	0.065	2.0
16.350	53.64	435.16	142.25	0.69	17.10	0.49	124	3.318	2.843	0.12	-1.284	0.142	0.74	134	0.551	0.6	0.1	78	78	0.114	0.09	0.91	1.15	0.065	1.8
16.400	53.81	434.99	128.14	0.62	17.17	0.48	124	3.328	2.848	0.12	-1.288	0.142	0.74	121	0.578	0.6	0.1	68	68	0.106	0.08	0.92	1.15	0.064	1.7
16.450	53.97	434.83	113.92	0.55	17.02	0.48	124	3.338	2.853	0.12	-1.293	0.143	0.74	108	0.607	0.5	0.1	59	59	0.099	0.08	0.92	1.15	0.064	1.5
16.500	54.13	434.67	101.03	0.46	16.60	0.45	124	3.348	2.858	0.12	-1.298	0.143	0.74	95	0.635	0.5	0.1	51	51	0.093	0.07	0.93	1.15	0.064	1.5
16.550	54.30	434.50	94.28	0.43	17.03	0.45	124	3.358	2.863	0.12	-1.302	0.144	0.74	89	0.651	0.5	0.1	47	47	0.090	0.07	0.93	1.15	0.063	1.4
16.600	54.46	434.34	91.33	0.46	17.04	0.50	124	3.369	2.868	0.12	-1.307	0.144	0.74	86	0.606	0.5	12.2	47	59	0.099	0.08	0.92	1.15	0.064	1.6
16.650	54.63	434.17	93.64	0.47	17.17	0.50	124	3.379	2.873	0.12	-1.312	0.145	0.74	88	0.604	0.5	11.6	48	60	0.100	0.08	0.92	1.15	0.064	1.6
16.700	54.79	434.01	108.38	0.47	17.77	0.43	124	3.389	2.878	0.12	-1.316	0.145	0.74	102	0.620	0.5	0.1	55	55	0.096	0.07	0.93	1.15	0.064	1.5
16.750	54.95	433.85	130.61	0.50	18.34	0.38	124	3.399	2.883	0.12	-1.321	0.146	0.74	123	0.575	0.6	0.1	69	69	0.107	0.08	0.92	1.15	0.064	1.7
16.800	55.12	433.68	130.61	0.56	18.34	0.43	124	3.409	2.888	0.12	-1.325	0.146	0.73	123	0.575	0.6	0.1	69	69	0.107	0.08	0.92	1.15	0.064	1.7
16.850	55.28	433.52	158.26	0.60	19.18	0.38	124	3.419	2.893	0.12	-1.330	0.147	0.73	150	0.525	0.6	0.1	88	88	0.124	0.10	0.90	1.15	0.065	1.9
16.900	55.45	433.35	167.24	0.63	19.66	0.37	124	3.430	2.898	0.12	-1.335	0.147	0.73	158	0.510	0.6	0.2	95	95	0.131	0.10	0.90	1.15	0.066	2.0
16.950	55.61	433.19	154.90	0.61	20.78	0.40	124	3.440	2.903	0.12	-1.339	0.148	0.73	146	0.532	0.6	0.1	86	86	0.121	0.10	0.90	1.15	0.065	1.9
17.000	55.77	433.03	155.03	0.74	20.05	0.47	124	3.450	2.908	0.12	-1.344	0.148	0.73	146	0.532	0.6	0.1	86	86	0.121	0.10	0.90	1.15	0.065	1.9
17.050	55.94	432.86	154.95	0.81	20.08	0.52	124	3.460	2.913	0.12	-1.348	0.149	0.73	146	0.524	0.6	2.9	86	89	0.125	0.10	0.90	1.15	0.065	1.9
17.100	56.10	432.70	156.97	0.79	20.15	0.51	124	3.470	2.919	0.12	-1.353	0.149	0.73	148	0.522	0.6	2.5	87	90	0.125	0.10	0.90	1.15	0.065	1.9
17.150	56.27	432.53	150.32	0.80	20.15	0.53	124	3.481	2.924	0.12	-1.358	0.150	0.73	142	0.530	0.6	3.4	83	86	0.122	0.10	0.90	1.15	0.065	1.9
17.200	56.43	432.37	151.78	0.70	20.36	0.46	124	3.491	2.929	0.12	-1.362	0.150	0.73	143	0.538	0.6	0.1	83	83	0.119	0.09	0.91	1.15	0.065	1.8
17.250	56.59	432.21	152.28	0.72	20.58	0.47	124	3.501	2.934	0.12	-1.367	0.151	0.73	144	0.538	0.6	0.1	83	83	0.119	0.09	0.90	1.15	0.065	1.8
17.300	56.76	432.04	150.76	0.74	20.63	0.49	124	3.511	2.939	0.12	-1.371	0.151	0.73	142	0.532	0.6	2.8	83	85	0.121	0.09	0.90	1.15	0.065	1.9
17.350	56.92	431.88	150.26	0.76	20.69	0.51	124	3.521	2.944	0.12	-1.376	0.152	0.72	142	0.532	0.6	3.1	82	85	0.121	0.09	0.90	1.15	0.065	1.8
17.400	57.09	431.71	148.79	0.76	20.77	0.51	124	3.531	2.949	0.12	-1.380	0.152	0.72	141	0.534	0.6	3.3	81	85	0.120	0.09	0.90	1.15	0.065	1.8
17.450	57.25	431.55	149.33	0.74	20.98	0.50	124	3.542	2.954	0.12	-1.385	0.153	0.72	141	0.535	0.6	3.0	82	85	0.120	0.09	0.90	1.15	0.065	1.8
17.500	57.41	431.39	149.52	0.73	21.09	0.48	124	3.552	2.959	0.12	-1.389	0.153	0.72	141	0.544	0.6	0.1	81	81	0.117	0.09	0.91	1.15	0.065	1.8
17.550	57.58	431.22	143.57	0.70	21.07	0.49	124	3.562	2.964	0.12	-1.394	0.154	0.72	136	0.555	0.6	0.1	77	77	0.115	0.09	0.91	1.15	0.065	1.7
17.600	57.74	431.06	139.06	0.70	20.98	0.50	124	3.572	2.969	0.12	-1.398	0.154	0.72	131	0.550	0.6	4.2	75	79	0.115	0.09	0.91	1.15	0.065	1.8
17.650	57.91	430.89	136.88	0.75	21.21	0.55	124	3.582	2.974	0.12	-1.403	0.154	0.72	129	0.550	0.6	5.3	73	79	0.115	0.09	0.91	1.15	0.065	1.8
17.700	58.07	430.73	138.51	0.83	21.42	0.60	124	3.593	2.979	0.12	-1.407	0.155	0.72	131	0.544	0.6	6.3	75	81	0.117	0.09	0.91	1.15	0.065	1.8
17.750	58.23	430.57	149.13	0.87	21.91	0.58	124	3.603	2.984	0.12	-1.412	0.155	0.72	141	0.531	0.6	4.6	81	86	0.121	0.10	0.90	1.15	0.065	1.9
17.800	58.40	430.40	178.08	0.92	23.08	0.51	124	3.613	2.989	0.12	-1.416	0.156	0.72	168	0.493	0.6	1.5	101	102	0.140	0.11	0.89	1.15	0.066	2.0
17.850	58.56	430.24	202.74	0.87	23.82	0.43	124	3.623	2.994	0.12	-1.421	0.156	0.72	192	0.459	0.6	0.2	119	119	0.169	0.12	0.87	1.15	0.068	2.0
17.900	58.73	430.07	234.71	0.86	24.73	0.36	127	3.633	3.000	0.12	-1.425	0.157	0.72	222	0.413	0.7	0.0	144	144	0.255	0.15	0.84	1.15	0.070	2.0
17.950	58.89	429.91	224.73	0.91	24.96	0.41	124	3.644	3.005	0.12	-1.430	0.157	0.71	212	0.427	0.6	0.1	136	136	0.218	0.14	0.85	1.15	0.069	2.0
18.000	59.05	429.75	199.35	0.96	23.87	0.48	124	3.654	3.010	0.12	-1.434	0.158	0.71	188	0.464	0.6	0.2	116	116	0.163	0.12	0.87	1.15	0.067	2.0
18.050	59.22	429.58	188.95	0.93	23.97	0.49	124	3.664	3.015	0.12	-1.439	0.158	0.71	179	0.479	0.6	0.9	108	109	0.150	0.11	0.88	1.15	0.067	2.0
18.100	59.38	429.42	184.39	0.92	23.64	0.50	124	3.674	3.020	0.12	-1.443	0.159	0.71	174	0.486	0.6	1.1	105	106	0.145	0.11	0.88	1.15	0.067	2.0
18.150	59.55	429.25	182.16	0.93	23.98	0.51	124	3.684	3.025	0.12	-1.448	0.159	0.71	172	0.489	0.6	1.3	103	104	0.143	0.11	0.88	1.15	0.067	2.0
18.200	59.71	429.09	180.94	0.94	24.07	0.52	124	3.695	3.030	0.12	-1.452	0.160	0.71	171	0.490	0.6	1.5	102	104	0.142	0.11	0.89	1.15	0.067	2.0
18.250	59.87	428.93	183.89	1.01	24.27	0.55	124	3.705	3.035	0.12	-1.456	0.160	0.71	174	0.485	0.6	1.7	104	106	0.145	0.11	0.88	1.15	0.067	2.0
18.300	60.04	428.76	186.92	1.10	24.51	0.59	124	3.715	3.040	0.12	-1.461	0.161	0.71	177	0.480	0.6	2.0	106	108	0.149	0.11	0.88	1.15	0.067	2.0
18.350	60.20	428.60	211.89	1.14	25.39	0.54	124	3.725	3.045	0.12	-1.465	0.161	0.71	200	0.446	0.6	0.6	125	126	0.185	0.13	0.86	1.15	0.068	2.0
18.400	60.37	428.43	222.69	1.34	26.68	0.60	124	3.735	3.050	0.12	-1.470	0.162	0.71	210	0.430	0.6	0.8	133	134	0.211	0.14	0.85	1.15	0.069	2.0
18.450	60.53	428.27	216.55	1.23	26.66	0.57	124	3.746	3.055	0.12	-1.474	0.162	0.71	205	0.440	0.6	0.7	128	129	0.195	0.13	0.86	1.15	0.069	2.0
18.500	60.69	428.11	209.01	1.22	26.97	0.58	124	3.756	3.060	0.12	-1.478	0.162	0.71	198	0.450	0.6	1.1	122	124	0.180	0.13	0.86	1.15	0.068	2.0

Table I-10: Liquefaction Analysis for CPT HAV-C008 cont.

Depth m	Depth ft	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	Unit Wt. pcf	TStress tsf	EStress tsf	*PGA g	α	β	rd	qc/Pa dimensionless	m	CN	Δqc1N	qc1n	qc1ncs	$CRR_{M=7.5,\sigma v=1atm}$ Deterministic	C_σ	K_σ	MSF	CSRM,σv	FS
18.550	60.86	427.94	208.17	1.23	27.79	0.59	124	3.766	3.066	0.12	-1.483	0.163	0.70	197	0.451	0.6	1.2	122	123	0.178	0.13	0.86	1.15	0.068	2.0
18.600	61.02	427.78	209.68	1.07	27.51	0.51	124	3.776	3.071	0.12	-1.487	0.163	0.70	198	0.451	0.6	0.5	123	123	0.178	0.13	0.86	1.15	0.068	2.0
18.650	61.19	427.61	201.96	1.05	29.71	0.52	124	3.786	3.076	0.12	-1.491	0.164	0.70	191	0.462	0.6	0.8	117	117	0.166	0.12	0.87	1.15	0.068	2.0
18.700	61.35	427.45	199.09	0.96	28.94	0.48	124	3.796	3.081	0.12	-1.496	0.164	0.70	188	0.468	0.6	0.2	114	114	0.159	0.12	0.87	1.15	0.067	2.0
18.750	61.52	427.29	206.43	0.99	29.12	0.48	124	3.807	3.086	0.12	-1.500	0.165	0.70	195	0.457	0.6	0.2	120	120	0.171	0.12	0.87	1.15	0.068	2.0
18.800	61.68	427.12	209.33	0.96	29.84	0.46	124	3.817	3.091	0.12	-1.504	0.165	0.70	198	0.453	0.6	0.2	122	122	0.175	0.13	0.86	1.15	0.068	2.0
18.850	61.84	426.96	211.55	0.96	29.98	0.46	124	3.827	3.096	0.12	-1.509	0.166	0.70	200	0.450	0.6	0.2	123	123	0.179	0.13	0.86	1.15	0.068	2.0
18.900	62.01	426.79	213.85	0.89	30.99	0.41	124	3.837	3.101	0.12	-1.513	0.166	0.70	202	0.447	0.6	0.1	125	125	0.184	0.13	0.86	1.15	0.068	2.0
18.950	62.17	426.63	199.54	0.91	28.05	0.46	124	3.847	3.106	0.12	-1.517	0.167	0.70	189	0.469	0.6	0.2	114	114	0.159	0.12	0.87	1.15	0.067	2.0
19.000	62.34	426.46	233.51	0.97	28.34	0.42	124	3.858	3.111	0.12	-1.522	0.167	0.70	221	0.419	0.6	0.1	140	140	0.236	0.15	0.84	1.15	0.070	2.0
19.050	62.50	426.30	246.21	1.12	29.26	0.46	127	3.868	3.116	0.12	-1.526	0.167	0.70	233	0.402	0.6	0.1	151	151	0.294	0.16	0.83	1.15	0.071	2.0
19.100	62.66	426.14	264.42	1.14	33.51	0.43	127	3.878	3.122	0.12	-1.530	0.168	0.70	250	0.378	0.7	0.0	166	166	0.443	0.18	0.80	1.15	0.074	2.0
19.150	62.83	425.97	287.01	1.30	34.70	0.45	127	3.889	3.127	0.12	-1.534	0.168	0.69	271	0.349	0.7	0.0	186	186	0.929	0.22	0.76	1.15	0.078	2.0
19.200	62.99	425.81	308.87	2.28	36.32	0.74	127	3.899	3.132	0.12	-1.539	0.169	0.69	292	0.321	0.7	0.3	206	206	2.000	0.28	0.69	1.15	0.085	2.0
19.250	63.16	425.64	327.96	2.18	36.91	0.67	127	3.909	3.137	0.12	-1.543	0.169	0.69	310	0.299	0.7	0.1	224	224	2.000	0.30	0.67	1.15	0.087	2.0
19.300	63.32	425.48	301.80	2.08	37.79	0.69	127	3.920	3.142	0.12	-1.547	0.170	0.69	285	0.331	0.7	0.2	199	199	1.810	0.26	0.72	1.15	0.082	2.0
19.350	63.48	425.32	303.31	1.88	37.67	0.62	127	3.930	3.148	0.12	-1.551	0.170	0.69	287	0.329	0.7	0.1	200	200	1.921	0.26	0.71	1.15	0.082	2.0
19.400	63.65	425.15	313.23	1.97	39.58	0.63	127	3.940	3.153	0.12	-1.555	0.171	0.69	296	0.317	0.7	0.1	209	209	2.000	0.29	0.68	1.15	0.087	2.0
19.450	63.81	424.99	309.16	2.11	39.01	0.68	127	3.951	3.158	0.12	-1.560	0.171	0.69	292	0.322	0.7	0.2	205	206	2.000	0.28	0.69	1.15	0.085	2.0
19.500	63.98	424.82	285.03	2.34	36.47	0.82	127	3.961	3.163	0.12	-1.564	0.171	0.69	269	0.351	0.7	1.1	183	185	0.878	0.22	0.76	1.15	0.078	2.0
19.550	64.14	424.66	262.82	1.95	34.06	0.74	127	3.971	3.169	0.12	-1.568	0.172	0.69	248	0.380	0.7	1.0	164	165	0.426	0.18	0.80	1.15	0.073	2.0
19.600	64.30	424.50	219.14	1.86	39.35	0.85	124	3.982	3.174	0.12	-1.572	0.172	0.69	207	0.433	0.6	4.0	129	133	0.206	0.14	0.85	1.15	0.069	2.0
19.650	64.47	424.33	206.09	1.32	40.72	0.64	124	3.992	3.179	0.12	-1.576	0.173	0.69	195	0.457	0.6	1.9	118	120	0.170	0.12	0.86	1.15	0.068	2.0
19.700	64.63	424.17	216.92	1.25	40.98	0.57	124	4.002	3.184	0.12	-1.581	0.173	0.69	205	0.444	0.6	0.9	126	127	0.187	0.13	0.86	1.15	0.069	2.0
19.750	64.80	424.00	227.65	1.30	40.75	0.57	124	4.012	3.189	0.12	-1.585	0.174	0.68	215	0.430	0.6	0.6	134	135	0.212	0.14	0.85	1.15	0.069	2.0
19.800	64.96	423.84	259.65	1.39	41.78	0.53	124	4.022	3.194	0.12	-1.589	0.174	0.68	245	0.387	0.7	0.1	160	160	0.373	0.18	0.81	1.15	0.073	2.0
19.850	65.12	423.68	273.10	1.32	42.61	0.48	127	4.033	3.199	0.12	-1.593	0.174	0.68	258	0.370	0.7	0.0	171	171	0.529	0.19	0.78	1.15	0.075	2.0
19.900	65.29	423.51	275.59	1.28	43.55	0.47	127	4.043	3.204	0.12	-1.597	0.175	0.68	260	0.367	0.7	0.0	173	173	0.568	0.20	0.78	1.15	0.075	2.0
19.950	65.45	423.35	268.07	1.59	26.09	0.59	124	4.053	3.210	0.12	-1.601	0.175	0.68	253	0.376	0.7	0.2	167	167	0.458	0.19	0.79	1.15	0.074	2.0
20.000	65.62	423.18	260.55	1.64	32.25	0.63	124	4.064	3.215	0.12	-1.605	0.176	0.68	246	0.386	0.7	0.4	160	161	0.379	0.18	0.80	1.15	0.073	2.0
20.050	65.78	423.02	248.24	1.63	31.60	0.66	124	4.074	3.220	0.12	-1.609	0.176	0.68	235	0.402	0.6	0.8	150	151	0.294	0.16	0.82	1.15	0.071	2.0
20.100	65.94	422.86	240.46	1.52	31.44	0.63	124	4.084	3.225	0.12	-1.613	0.177	0.68	227	0.413	0.6	0.8	143	144	0.254	0.15	0.83	1.15	0.071	2.0
20.150	66.11	422.69	233.71	1.47	31.38	0.63	124	4.094	3.230	0.12	-1.617	0.177	0.68	221	0.422	0.6	0.9	138	139	0.229	0.15	0.84	1.15	0.070	2.0
20.200	66.27	422.53	228.19	1.43	31.26	0.63	124	4.104	3.235	0.12	-1.621	0.177	0.68	216	0.430	0.6	1.0	133	134	0.212	0.14	0.84	1.15	0.069	2.0
20.250	66.44	422.36	220.16	1.36	31.44	0.62	124	4.114	3.240	0.12	-1.625	0.178	0.68	208	0.441	0.6	1.2	127	128	0.192	0.13	0.85	1.15	0.069	2.0
20.300	66.60	422.20	209.88	1.32	31.18	0.63	124	4.125	3.245	0.12	-1.629	0.178	0.68	198	0.455	0.6	1.7	119	121	0.173	0.13	0.86	1.15	0.068	2.0
20.350	66.76	422.04	195.22	1.24	30.74	0.63	124	4.135	3.250	0.12	-1.633	0.179	0.68	184	0.475	0.6	2.5	108	111	0.153	0.12	0.87	1.15	0.067	2.0
20.400	66.93	421.87	184.69	1.10	30.55	0.60	124	4.145	3.255	0.12	-1.637	0.179	0.67	175	0.491	0.6	2.6	100	103	0.141	0.11	0.88	1.15	0.067	2.0
20.450	67.09	421.71	177.68	1.01	30.68	0.57	124	4.155	3.260	0.12	-1.641	0.179	0.67	168	0.503	0.6	2.6	95	98	0.135	0.10	0.88	1.15	0.066	2.0
20.500	67.26	421.54	170.60	0.94	30.73	0.55	124	4.165	3.265	0.12	-1.645	0.180	0.67	161	0.513	0.6	2.9	90	93	0.129	0.10	0.89	1.15	0.066	2.0
20.550	67.42	421.38	167.34	0.92	30.59	0.55	124	4.176	3.270	0.12	-1.649	0.180	0.67	158	0.518	0.6	3.1	88	91	0.127	0.10	0.89	1.15	0.066	1.9
20.600	67.58	421.22	164.58	0.92	30.75	0.56	124	4.186	3.275	0.12	-1.653	0.181	0.67	156	0.522	0.6	3.4	86	90	0.125	0.10	0.89	1.15	0.066	1.9
20.650	67.75	421.05	164.85	0.92	31.09	0.56	124	4.196	3.280	0.12	-1.657	0.181	0.67	156	0.522	0.6	3.5	86	90	0.125	0.10	0.89	1.15	0.066	1.9
20.700	67.91	420.89	166.43	0.95	31.37	0.57	124	4.206	3.285	0.12	-1.661	0.181	0.67	157	0.519	0.6	3.5	87	91	0.126	0.10	0.89	1.15	0.066	1.9
20.750	68.08	420.72	167.64	0.96	31.39	0.57	124	4.216	3.290	0.12	-1.665	0.182	0.67	158	0.518	0.6	3.5	88	92	0.127	0.10	0.89	1.15	0.066	1.9
20.800	68.24	420.56	167.40	0.98	31.68	0.59	124	4.226	3.296	0.12	-1.669	0.182	0.67	158	0.517	0.6	3.7	88	92	0.127	0.10	0.89	1.15	0.066	1.9
20.850	68.40	420.40	167.49	0.96	31.64	0.57	124	4.237	3.301	0.12	-1.673	0.183	0.67	158	0.518	0.6	3.5	88	91	0.127	0.10	0.89	1.15	0.066	1.9
20.900	68.57	420.23	175.45	0.92	32.22	0.52	124	4.247	3.306	0.12	-1.677	0.183	0.67	166	0.510	0.6	2.2	93	95	0.131	0.10	0.88	1.15	0.066	2.0
20.950	68.73	420.07	186.30	1.02	32.94	0.55	124	4.257	3.311	0.12	-1.681	0.183	0.67	176	0.493	0.6	1.9	100	102	0.140	0.11	0.88	1.15	0.067	2.0
21.000	68.90	419.90	203.70	1.16	33.24	0.57	124	4.267	3.316	0.12	-1.685	0.184	0.67	192	0.468	0.6	1.4	113	114	0.159	0.12	0.86	1.15	0.067	2.0
21.050	69.06	419.74	224.37	1.39	34.46	0.62	124	4.277	3.321	0.12	-1.688	0.184	0.67	212	0.439	0.6	1.2	128	130	0.196	0.13	0.85	1.15	0.069	2.0
21.100	69.22	419.58	251.06	1.55	35.20	0.62	124	4.288	3.326	0.12	-1.692	0.185	0.66	237	0.403	0.6	0.6	150	150	0.289	0.16	0.82	1.15	0.071	2.0
21.150	69.39	419.41	287.57	1.75	37.81	0.61	127	4.298	3.331	0.12	-1.696	0.185	0.66	272	0.356	0.7	0.2	181	181	0.751	0.21	0.76	1.15	0.077	2.0
21.200	69.55	419.25	311.50	2.12	40.45	0.68	127	4.308	3.336	0.12	-1.700	0.185	0.66	294	0.326	0.7	0.2	202	203	2.000	0.27	0.69	1.15	0.085	2.0
21.250	69.72	419.08	352.96	2.63	42.95	0.74	127	4.319	3.342	0.12	-1.704	0.186	0.66	334	0.276	0.7	0.1	243	243	2.000	0.30	0.65	1.15	0.089	2.0
21.300	69.88	418.92	407.60	3.18	46.64	0.78	127	4.329	3.347	0.12	-1.707	0.186	0.66	385	0.264	0.7	0.1	284	284	2.000	0.30	0.65	1.15	0.089	2.0
21.350	70.05	418.75	436.12	3.07	47.17	0.70	127	4.340	3.352	0.12	-1.711	0.187	0.66	412	0.264	0.7	0.0	304	304	2.000	0.30	0.65	1.15	0.089	2.0
21.400	70.21	418.59	396.47	3.19	54.23	0.81	127	4.350	3.358	0.12	-1.715	0.187	0.66	375	0.264	0.7	0.1	276	276	2.000	0.30	0.65	1.15	0.089	2.0
21.450	70.37	418.43	415.77	3.05	61.30	0.73	127	4.360	3.363	0.12	-1.719	0.187	0.66	393	0.264	0.7	0.0	290	290	2.000	0.30	0.65	1.15	0.089	2.0
21.500	70.54	418.26	429.39	3.02	60.53	0.70	127	4.371	3.368	0.12	-1.722	0.188	0.66	406	0.264	0.7	0.0	299	299	2.000	0.30	0.65	1.15	0.089	2.0
21.550	70.70	418.10	437.13	3.15	61.17	0.72	127	4.381	3.374	0.12	-1.726	0.188	0.66	413	0.264	0.7	0.0	304	304	2.000	0.30	0.65	1.15	0.089	2.0
21.600	70.87	417.93	435.51	3.23	61.99	0.74	127	4.392	3.379	0.12	-1.730	0.188	0.66	412	0.264	0.7	0.0	303	303	2.000	0.30	0.65	1.15	0.089	2.0
21.650	71.03	417.77	427.54	3.17	62.44	0.74	127	4.402	3.384	0.12	-1.734	0.189	0.66	404	0.264	0.7	0.0	297	297	2.000	0.30	0.65	1.15	0.089	2.0
21.700	71.19	417.61	425.43	3.14	59.99	0.74	127	4.413	3.390	0.12	-1.737	0.189	0.66	402	0.264	0.7	0.0	296	296	2.000	0.30	0.65	1.15	0.089	2.0
21.750	71.36	417.44	420.90	3.13	60.50	0.74	127	4.423	3.395	0.12	-1.741	0.189	0.65	398	0.264	0.7	0.0	292	292	2.000	0.30	0.65	1.15	0.089	2.0
21.800	71.52	417.28	422.52	3.17	62.12	0.75	127	4.434	3.400	0.12	-1.745	0.190	0.65	399	0.264	0.7	0.0	293	293	2.000	0.30	0.65	1.15	0.089	2.0
21.850	71.69	417.11	406.78	2.65	61.23	0.65	127	4.444	3.406	0.12	-1.748	0.190	0.65	384	0.264	0.7	0.0	282	282	2.000	0.30	0.65	1.15	0.089	2.0
21.900	71.85	416.95	398.21	2.62	60.65	0.66	127	4.454	3.411	0.12	-1.752	0.191	0.65	376	0.264	0.7	0.0	276	276	2.000	0.30	0.65	1.15	0.089	2.0
21.950	72.01	416.79	380.93	2.60	34.27	0.68	127	4.465	3.416	0.12	-1.755	0.191	0.65	360	0.264	0.7	0.0	264	264	2.000	0.30	0.65	1.15	0.089	2.0
22.000	72.18	416.62	375.08	2.59	36.97	0.69	127	4.475	3.422	0.12	-1.759	0.191	0.65	354	0.264	0.7	0.0	260	260	2.000	0.30	0.65	1.15	0.090	2.0
22.050	72.34	416.46	367.32	2.59	39.99	0.70	127	4.486	3.427	0.12	-1.763	0.192	0.65	347	0.264	0.7	0.1	255	255	2.000	0.30	0.65	1.15	0.090	2.0
22.100	72.51	416.29	364.66	3.74	41.19	1.03	124	4.496	3.432	0.12	-1.766	0.192	0.65	345	0.264	0.7	1.4	253	254	2.000	0.30	0.65	1.15	0.090	2.0
22.150	72.67	416.13	366.88	2.61	41.94	0.71	127	4.506	3.437	0.12	-1.770	0.192	0.65	347	0.264	0.7	0.1	254	254	2.000	0.30	0.65	1.15	0.090	2.0
22.200	72.83	415.97	386.23	2.11	39.64	0.55	127	4.517	3.443	0.12	-1.773	0.193	0.65	365	0.264	0.7	0.0	267	267	2.000	0.30	0.65	1.15	0.090	2.0
22.250	73.00	415.80	365.73	1.96	54.88	0.54	127	4.527	3.448	0.12	-1.777	0.193	0.65	346	0.265	0.7	0.0	253	253	2.000	0.30	0.65	1.15	0.090	2.0
22.300	73.16	415.64	334.86	2.03	52.48	0.61	127	4.538	3.453	0.12	-1.780	0.194	0.65	316	0.302	0.7	0.0	221	221	2.000	0.30	0.65	1.15	0.090	2.0
22.350	73.33	415.47	310.34	1.96	52.91	0.63	127	4.548	3.459	0.12	-1.784	0.194	0.65	293	0.332	0.7	0.1	198	198	1.693	0.26	0.70	1.15	0.083	2.0
22.400	73.49	415.31	280.23	1.76	48.51	0.63	127	4.559	3.464	0.12	-1.787	0.194	0.65	265	0.370	0.6	0.3	171	171	0.521	0.19	0.77	1.15	0.075	2.0
22.450	73.65	415.15	244.21	1.57	45.71	0.64	124	4.569	3.469	0.12	-1.791	0.195	0.65	231	0.417	0.6	1.0	141	142	0.241	0.15	0.82	1.15	0.070	2.0
22.500	73.82	414.98	220.12	1.17	41.96	0.53	124	4.579	3.474	0.12	-1.794	0.195	0.64	208	0.453	0.6	0.7	121	122	0.176	0.13	0.85	1.15	0.068	2.0
22.550	73.98	414.82	212.04	1.00	41.52	0.47	124	4.589	3.479	0.12	-1.798	0.195	0.64	200	0.466	0.6	0.2	115	115	0.161	0.12	0.86	1.15	0.067	2.0
22.600	74.15	414.65	204.70	0.97	42.05	0.47	124	4.599	3.484	0.12	-1.801	0.196	0.64	193	0.477	0.6	0.2	110	110	0.151	0.11	0.86	1.15	0.067	2.0
22.650	74.31	414.49	211.03	0.85	39.26	0.40	124	4.609	3.489	0.12	-1.805	0.196	0.64	199	0.468	0.6	0.2	114	114	0.159	0.12	0.86	1.15	0.067	2.0
22.700	74.47	414.33	205.08	0.84	43.34	0.41	124	4.620	3.494	0.12	-1.808	0.196	0.64	194	0.477	0.6	0.2	110	110	0.152	0.11	0.86	1.15	0.067	2.0
22.750	74.64	414.16	194.42	0.84	38.56	0.43	124	4.630	3.499	0.12	-1.811	0.197	0.64	184	0.494	0.6	0.2	102	102	0.140	0.11	0.87	1.15	0.066	2.0
22.800	74.80	414.00	187.76	0.78	39.95	0.41	124	4.640	3.504	0.12	-1.815	0.197	0.64	177	0.505	0.5	0.2	97	97	0.134	0.10	0.88	1.15	0.066	2.0
22.850	74.97	413.83	184.44	0.76	38.65	0.41	124	4.650	3.509	0.12	-1.818	0.197	0.64	174	0.510	0.5	0.2	95	95	0.131	0.10	0.88	1.15	0.066	2.0
22.900	75.13	413.67	190.10	0.79	42.00	0.42	124	4.660	3.514	0.12	-1.821	0.198	0.64	180	0.501	0.5	0.2	98	99	0.135	0.11	0.87	1.15	0.066	2.0
22.950	75.29	413.51	205.05	0.79	43.95	0.38	124	4.671	3.519	0.12	-1.825	0.198	0.64	194	0.478	0.6	0.2	109	109	0.151	0.11	0.86	1.15	0.067	2.0
23.000	75.46	413.34	218.77	1.19	42.47	0.54	124	4.681	3.524	0.12	-1.828	0.198	0.64	207	0.456	0.6	0.9	119	120	0.172	0.12	0.85	1.15	0.068	2.0
23.050	75.62	413.18	232.14	1.07	41.71	0.46	124	4.691	3.529	0.12	-1.831	0.199	0.64	219	0.439	0.6	0.2	129	129	0.196	0.13	0.84	1.15	0.069	2.0
23.100	75.79	413.01	265.29	1.21	44.52	0.45	127	4.701	3.535	0.12	-1.835	0.199	0.64	251	0.394	0.6	0.1	156	156	0.334	0.17	0.80	1.15	0.072	2.0
23.150	75.95	412.85	276.97	1.28	44.81	0.46	127	4.712	3.540	0.12	-1.838	0.199	0.64	262	0.378	0.6	0.0	166	166	0.440	0.18	0.78	1.15	0.074	2.0
23.200	76.11	412.69	283.01	1.48	43.20	0.52	127	4.722	3.545	0.12	-1.841	0.200	0.63	267	0.370	0.6	0.1	171	171	0.520	0.19	0.77	1.15	0.075	2.0
23.250	76.28	412.52	291.00	1.31	43.63	0.45	127	4.733	3.551	0.12	-1.844	0.200	0.63	275	0.360	0.6	0.0	178	178	0.665	0.21	0.75	1.15	0.077	2.0
23.300	76.44	412.36	270.09	1.35	47.66	0.50	127	4.743	3.556	0.12	-1.848	0.200	0.63	255	0.388	0.6	0.1	159	160	0.367	0.17	0.79	1.15	0.073	2.0
23.350	76.61	412.19	263.15	1.33	46.92	0.51	127	4.753	3.561	0.12	-1.851	0.201	0.63	249	0.397	0.6	0.1	154	154	0.315	0.17	0.80	1.15	0.072	2.0
23.400	76.77	412.03	264.01	1.35	49.15	0.51	127	4.764	3.567	0.12	-1.854	0.201	0.63	249	0.396	0.6	0.2	154	154	0.320	0.17	0.80	1.15	0.072	2.0
23.450	76.93	411.87	267.32	1.40	50.01	0.52	127	4.774	3.572	0.12	-1.857	0.201	0.63	253	0.392	0.6	0.2	157	157	0.342	0.17	0.79	1.15	0.072	2.0
23.500	77.10	411.70	261.06	1.44	49.79	0.55	124	4.785	3.577	0.12	-1.860	0.201	0.63	247	0.400	0.6	0.3	151	152	0.301	0.16	0.80	1.15	0.072	2.0
23.550	77.26	411.54	246.34	1.43	48.23	0.58	124	4.795	3.582	0.12	-1.863	0.202	0.63	233	0.420	0.6	0.6	139	140	0.235	0.15	0.82	1.15	0.070	2.0
23.600	77.43	411.37	240.05	1.40	48.05	0.58	124	4.805	3.587	0.12	-1.867	0.202	0.63	227	0.429	0.6	0.7	134	135	0.215	0.14	0.83	1.15	0.069	2.0
23.650	77.59	411.21	237.41	1.39	47.71	0.59	124	4.815	3.592	0.12	-1.870	0.202	0.63	224	0.432	0.6	0.8	132	133	0.207	0.14	0.83	1.15	0.069	2.0
23.700	77.75	411.05	240.73	1.46	47.99	0.61	124	4.825	3.597	0.12	-1.873	0.203	0.63	227	0.428	0.6	0.9	135	136	0.217	0.14	0.83	1.15	0.069	2.0
23.750	77.92	410.88	252.11	1.53	49.07	0.61	124	4.836	3.602	0.12	-1.876	0.203	0.63	238	0.413	0.6	0.7	144	144	0.255	0.15	0.81	1.15	0.071	2.0
23.800	78.08	410.72	279.86	1.60	51.84	0.57	127	4.846	3.608	0.12	-1.879	0.203	0.63	264	0.377	0.6	0.2	167	167	0.454	0.19	0.77	1.15	0.074	2.0
23.850	78.25	410.55	314.85	1.79	56.22	0.57	127	4.856	3.613	0.12	-1.882	0.204	0.63	298	0.332	0.7	0.1	198	198	1.680	0.26	0.69	1.15	0.084	2.0
23.900	78.41	410.39	329.19	1.87	60.50	0.57	127	4.867	3.618	0.12	-1.885	0.204	0.63	311	0.315	0.7	0.0	211	211	2.000	0.30	0.63	1.15	0.091	2.0
23.950	78.58	410.22	313.62	1.78	52.53	0.57	127	4.877	3.624	0.12	-1.888	0.204	0.63	296	0.334	0.7	0.1	196	196	1.556	0.25	0.69	1.15	0.083	2.0
24.000	78.74	410.06	323.53	1.82	49.76	0.56	127	4.888	3.629	0.12	-1.891	0.204	0.62	306	0.322	0.7	0.1	206	206	2.000	0.28	0.65	1.15	0.088	2.0
24.050	78.90	409.90	342.86	1.87	48.16	0.54	127	4.898	3.634	0.12	-1.894	0.205	0.62	324	0.299	0.7	0.0	224	224	2.000	0.30	0.63	1.15	0.091	2.0
24.100	79.07	409.73	350.00	1.90	51.68	0.54	127	4.908	3.640	0.12	-1.897	0.205	0.62	331	0.290	0.7	0.0	231	231	2.000	0.30	0.63	1.15	0.091	2.0
24.150	79.23	409.57	350.54	1.89	49.31	0.54	127	4.919	3.645	0.12	-1.900	0.205	0.62	331	0.290	0.7	0.0	231	231	2.000	0.30	0.63	1.15	0.091	2.0
24.200	79.40	409.40	355.09	2.24	55.02	0.63	127	4.929	3.650	0.12	-1.903	0.206	0.62	336	0.285	0.7	0.0	236	236	2.000	0.30	0.63	1.15	0.091	2.0
24.250	79.56	409.24	358.20	2.62	58.55	0.73	127	4.940	3.655	0.12	-1.906	0.206	0.62	338	0.281	0.7	0.2	239	239	2.000	0.30	0.63	1.15	0.091	2.0
24.300	79.72	409.08	350.58	2.38	72.71	0.68	127	4.950	3.661	0.12	-1.909	0.206	0.62	331	0.290	0.7	0.1	231	231	2.000	0.30	0.63	1.15	0.091	2.0
24.350	79.89	408.91	360.36	2.46	70.43	0.68	127	4.961	3.666	0.12	-1.912	0.206	0.62	341	0.279	0.7	0.1	241	241	2.000	0.30	0.63	1.15	0.091	2.0
24.400	80.05	408.75	329.36	2.15	57.08	0.65	127	4.971	3.671	0.12	-1.915	0.207	0.62	311	0.316	0.7	0.1	210	210	2.000	0.30	0.63	1.15	0.091	2.0
24.450	80.22	408.58	313.88	1.98	63.46	0.63	127	4.982	3.677	0.12	-1.917	0.207	0.62	297	0.336	0.7	0.2	195	195	1.474	0.25	0.69	1.15	0.083	2.0
24.500	80.38	408.42	323.46	1.86	64.21	0.57	127	4.992	3.682	0.12	-1.920	0.207	0.62	306	0.324	0.7	0.1	204	204	2.000	0.28	0.66	1.15	0.087	2.0
24.550	80.54	408.26	321.72	1.85	62.96	0.58	127	5.002	3.687	0.12	-1.923	0.207	0.62	304	0.326	0.7	0.1	202	202	2.000	0.27	0.66	1.15	0.086	2.0
24.600	80.71	408.09	308.07	2.11	62.16	0.68	127	5.013	3.693	0.12	-1.926	0.208	0.62	291	0.343	0.7	0.4	190	190	1.121	0.23	0.71	1.15	0.081	2.0
24.650	80.87	407.93	291.86	1.79	58.55	0.61	127	5.023	3.698	0.12	-1.929	0.208	0.62	276	0.364	0.6	0.3	175	175	0.601	0.20	0.75	1.15	0.076	2.0
24.700	81.04	407.76	224.24	1.62	54.92	0.72	124	5.034	3.703	0.12	-1.932	0.208	0.62	212	0.450	0.6	2.9	121	123	0.179	0.13	0.84	1.15	0.068	2.0
24.750	81.20	407.60	226.10	1.53	50.51	0.68	124	5.044	3.708	0.12	-1.934	0.209	0.62	214	0.449	0.6	2.2	122	124	0.180	0.13	0.84	1.15	0.068	2.0
24.800	81.36	407.44	211.70	1.26	48.93	0.60	124	5.054	3.713	0.12	-1.937	0.209	0.62	200	0.472	0.6	1.9	111	113	0.156	0.12	0.85	1.15	0.067	2.0
24.850	81.53	407.27	202.81	1.11	46.82	0.55	124	5.064	3.718	0.12	-1.940	0.209	0.61	192	0.486	0.5	1.7	104	106	0.145	0.11	0.86	1.15	0.066	2.0
24.900	81.69	407.11	201.59	1.04	45.68	0.51	124	5.074	3.723	0.12	-1.942	0.209	0.61	190	0.489	0.5	1.4	103	104	0.143	0.11	0.86	1.15	0.066	2.0
24.950	81.86	406.94	200.69	0.88	39.56	0.44	124	5.085	3.728	0.12	-1.945	0.210	0.61	190	0.494	0.5	0.2	102	102	0.140	0.11	0.86	1.15	0.066	2.0
25.000	82.02	406.78	199.66	0.84	43.97	0.42	124	5.095	3.734	0.12	-1.948	0.210	0.61	189	0.496	0.5	0.2	101	101	0.139	0.11	0.86	1.15	0.066	2.0
25.050	82.18	406.62	204.35	0.92	44.70	0.45	124	5.105	3.739	0.12	-1.950	0.210	0.61	193	0.489	0.5	0.2	104	104	0.143	0.11	0.86	1.15	0.066	2.0
25.100	82.35	406.45	216.56	0.98	46.09	0.45	124	5.115	3.744	0.12	-1.953	0.210	0.61	205	0.470	0.6	0.2	113	113	0.157	0.12	0.85	1.15	0.067	2.0
25.150	82.51	406.29	229.36	1.06	46.75	0.46	124	5.125	3.749	0.12	-1.956	0.211	0.61	217	0.452	0.6	0.2	122	123	0.177	0.13	0.84	1.15	0.068	2.0
25.200	82.68	406.12	240.03	1.10	46.79	0.46	124	5.135	3.754	0.12	-1.958	0.211	0.61	227	0.437	0.6	0.2	130	131	0.199	0.14	0.83	1.15	0.068	2.0
25.250	82.84	405.96	242.03	1.18	48.11	0.49	124	5.146	3.759	0.12	-1.961	0.211	0.61	229	0.434	0.6	0.2	132	132	0.204	0.14	0.83	1.15	0.069	2.0
25.300	83.00	405.80	243.06	1.19	48.10	0.49	124	5.156	3.764	0.12	-1.964	0.211	0.61	230	0.433	0.6	0.3	133	133	0.207	0.14	0.82	1.15	0.069	2.0
25.350	83.17	405.63	252.48	1.30	48.98	0.51	124	5.166	3.769	0.12	-1.966	0.211	0.61	239	0.420	0.6	0.3	140	140	0.235	0.15	0.81	1.15	0.070	2.0
25.400	83.33	405.47	266.31	1.58	48.09	0.59	124	5.176	3.774	0.12	-1.969	0.212	0.61	252	0.401	0.6	0.5	151	152	0.300	0.16	0.79	1.15	0.072	2.0
25.450	83.50	405.30	270.75	1.95	56.60	0.72	124	5.186	3.779	0.12	-1.971	0.212	0.61	256	0.393	0.6	1.2	155	156	0.337	0.17	0.78	1.15	0.072	2.0
25.500	83.66	405.14	284.31	1.77	56.61	0.62	127	5.197	3.784	0.12	-1.974	0.212	0.61	269	0.377	0.6	0.4	166	166	0.450	0.19	0.76	1.15	0.074	2.0
25.550	83.82	404.98	292.62	1.85	57.40	0.63	127	5.207	3.790	0.12	-1.976	0.212	0.61	277	0.367	0.6	0.3	173	174	0.570	0.20	0.75	1.15	0.076	2.0
25.600	83.99	404.81	298.49	1.61	52.93	0.54	127	5.218	3.795	0.12	-1.979	0.213	0.61	282	0.360	0.6	0.1	178	178	0.678	0.21	0.73	1.15	0.077	2.0
25.650	84.15	404.65	285.13	1.46	64.72	0.51	127	5.228	3.800	0.12	-1.981	0.213	0.61	269	0.377	0.6	0.1	166	166	0.449	0.19	0.76	1.15	0.074	2.0
25.700	84.32	404.48	279.72	1.41	61.54	0.50	127	5.238	3.806	0.12	-1.984	0.213	0.60	264	0.385	0.6	0.1	162	162	0.389	0.18	0.77	1.15	0.073	2.0
25.750	84.48	404.32	269.98	1.27	57.88	0.47	127	5.249	3.811	0.12	-1.986	0.213	0.60	255	0.398	0.6	0.1	153	153	0.312	0.16	0.79	1.15	0.072	2.0
25.800	84.64	404.16	275.42	1.12	60.81	0.41	127	5.259	3.816	0.12	-1.988	0.214	0.60	260	0.391	0.6	0.0	158	158	0.348	0.17	0.78	1.15	0.073	2.0
25.850	84.81	403.99	279.84	1.47	57.93	0.52	127	5.270	3.822	0.12	-1.991	0.214	0.60	264	0.385	0.6	0.1	161	161	0.387	0.18	0.77	1.15	0.073	2.0
25.900	84.97	403.83	279.69	1.60	55.54	0.57	127	5.280	3.827	0.12	-1.993	0.214	0.60	264	0.385	0.6	0.3	161	161	0.386	0.18	0.77	1.15	0.073	2.0
25.950	85.14	403.66	276.42	1.48	51.93	0.54	127	5.291	3.832	0.12	-1.995	0.214	0.60	261	0.390	0.6	0.2	158	158	0.355	0.17	0.78	1.15	0.073	2.0
26.000	85.30	403.50	273.38	0.00	47.90	0.00	119	5.301	3.837	0.12	-1.998	0.214	0.60	258	0.394	0.6	0.0	155	155	0.329	0.17	0.78	1.15	0.072	2.0
26.050	85.46	403.34	236.27	0.00	52.56	0.00	119	5.310	3.842	0.12	-2.000	0.215	0.60	223	0.446	0.6	0.0	126	126	0.185	0.13	0.83	1.15	0.068	2.0

ATTACHMENT J

SEISMIC SLOPE STABILITY ANALYSIS

I. Objective

A seismic slope stability analysis of the Havana Power Station East Ash Pond Cells 1-4 CCR Unit was performed to determine if the criteria outlined by the USEPA Federal Register 40 CFR Part 257.73 (e)(iii) and (iv) was met. The detailed description of the seismic slope stability process is discussed below. The embankments for the East Ash Pond satisfied the criteria by meeting the required Factors of Safety (FS) for the seismic slope loading conditions and screening analysis.

II. Model Parameters

Site Stratigraphy

The site consists of 4 main stratigraphic units as described in Attachment E Material Characterization and used in Attachment F Static Stability. However, an additional unit was defined for the seismic analysis to represent a liquefiable layer delineated in Attachment I Liquefaction Analysis.

Liquefiable Foundation Layer: The liquefiable layer is a part of the native alluvial foundation and shares its properties. For the CPT-analysis, the points that had FS<1.2 for Section B had calculated fines content (FC) of 5%. This was generally in agreement with the SPT points at Section B. The CPT analysis was used to check the results of the SPT analysis because assumptions about the SPT had introduced uncertainties into the calculations. The SPT results were needed, however, for calculating the residual strength of a liquefied layer by correlating N values and so could not be ignored. There was good agreement between the two analyses overall, and the SPT data was used for characterizing the liquefied material.

Geometry

Piezometric Surfaces

The groundwater and pool conditions were the same as the static, maximum storage conditions in Attachment F.

Cross-Sections

The three cross-sections introduced in Attachment F were used to represent the East Ash Pond in the Seismic Slope Stability Analysis. Section A , Section B and Section C from the static analysis were used as the basis for the pseudo-static screening analysis.

Addition of the liquefied layers to Section A and Section B were done for the post-earthquake liquefaction stability analysis. Section A had a 6-ft thick layer extending from elevation 442.5 ft to elevation 448.1 ft. Section B had an estimated 7-ft thick layer extending from elevation 439-ft to elevation 446-ft. Thickness of the layers for Section A and Section B were based on the upper and lower bounds of the CPT analysis where FS<1.2

Section A had an estimated 5-ft thick layer extending from elevation 435-ft to elevation 440-ft. The 5-ft thickness was estimated to extend above and below where the SPT was taken. Only localized points of liquefaction were found at Section C. The liquefied layers are isolated and thin layers. They do not correspond to a vertically continuous zone of liquefied material. Therefore no liquefaction was considered in section C.

Material Properties

The material properties used in the model were calculated in Attachment E Material Characterization and for the most part were the same as those used in Attachment F Static Stability. The two main materials, the embankment fill and native foundation soil, were not expected to have a reduction in strength from a seismic event because they are coarse grained. Therefore, the properties were the same and no need for use of undrained material properties was needed. However, the liquefied material required characterization and the process for getting the shear strength of the liquefied layer is discussed in greater detail in Attachment E. Summary of the liquefied shear strength is below.

Liquefied Shear Strength

The liquefied strength (residual strength) of liquefied foundation layer and fly ash-liquefied were estimated using the procedure developed by Idriss and Boulanger (2008). The assumption was made to use the lowest $N_{1,60,CS}$ value to account for the worst possible case, although the average for the layers would have been higher. This adds some conservatism to the final results. The median curves were used in correlating the $N_{1,60,CS}$ to the undrained residual shear strengths in Figure E-3 and Figure E-4 in Attachment E. Table J-1 presents the material properties used in the analysis for the liquefied-layers.

Table J-1:- Post- Earthquake Liquefaction Material Properties

Material	Total Unit Weight (pcf)	Residual Undrained Shear Strength Parameters
		S_r/σ'_{vo}
Liquefied Foundation Layer	115	0.06
Flyash - Liquefied	90	0.05

Seismic Loading

The seismic loading and dynamic response input into GeoStudio Slope/W for the pseudo-static screening analysis was from the calculated results in Attachments G and H. The horizontal force applied, k_h, was equal to 0.11. This force is applied to each slice as a separate force and does not have any oscillation of movement. No seismic force is applied for the post-liquefaction stability analyses, and the analyses are treated as static analyses.

III. Analysis

Conditions Considered

Seismic (Pseudo-static) Normal Storage Pool Condition (Screening Analysis): The seismic analysis performed is a screening analysis based on research and case histories that relate a factor of safety to allowable deformations. The deformations are considered acceptable for the embankments if the FS is greater than 1. These analyses incorporate a horizontal seismic coefficient k_h selected to be representative of expected loading during the design earthquake event (i.e., a “pseudo static” analysis). The analyses utilized the same drained strengths as used previously because no difference in strengths is expected in the soils. The normal storage pool condition is used because the likelihood of a flood event and earthquake occurring at the same time is low. Target Factor of Safety = 1.00.

Post-Earthquake Liquefaction Condition: These analyses were performed at cross sections A and B where liquefaction screening indicates probable liquefaction; in this study, the same cross-sections used in the static analysis. The purpose of the post-liquefaction stability analysis is to assess stability conditions immediately following a seismic event. No horizontal seismic coefficient is included in these analyses, but selection of strength parameters for the analyses takes into account the potential for softening/ weakening of the soils as a result of pore pressures generated by the earthquake shaking. However, for the Havana East Ash Pond, no soils experienced softening from shaking, except the liquefied layers. Target Factor of Safety = 1.20.

IV. Results

The results for the seismic analysis are provided below in Table J-2. Seismic pseudo-static analysis was run on Section A, Section B and Section C. Post- Earthquake Liquefaction analysis was run on section A and Section B only . Post- Earthquake Liquefaction analysis was not run on section C because the liquefied layers in Section C are isolated and thin layers. They are not expected to correspond to a vertically –continuous zone of liquefied layer. Therefore no liquefaction is expected in section C .

Table J-2: Seismic Analysis Results

Loading Condition	Program Criteria	A	B-	C
Seismic pseudo-static (Normal Pool)	FS ≥ 1.00	1.64	1.76	1.51
Post-Earthquake Liquefaction (Normal Pool)	FS ≥ 1.20	1.31	1.78	(1)

Note: (1) Analysis was not run for reasons stated above.

V. References

1. GEO-SLOPE International Ltd. (2015). "GeoStudio 2012 (SLOPE/W and SEEP/W)." Calgary, Alberta, Canada.
2. Seed, R.B., et al, (2003). *Recent Advances in Soil Liquefaction Engineering: A Unified And Consistent Framework*, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, Keynote Presentation, H.M.S. Queen Mary, Long Beach, California, April 30, 2003.

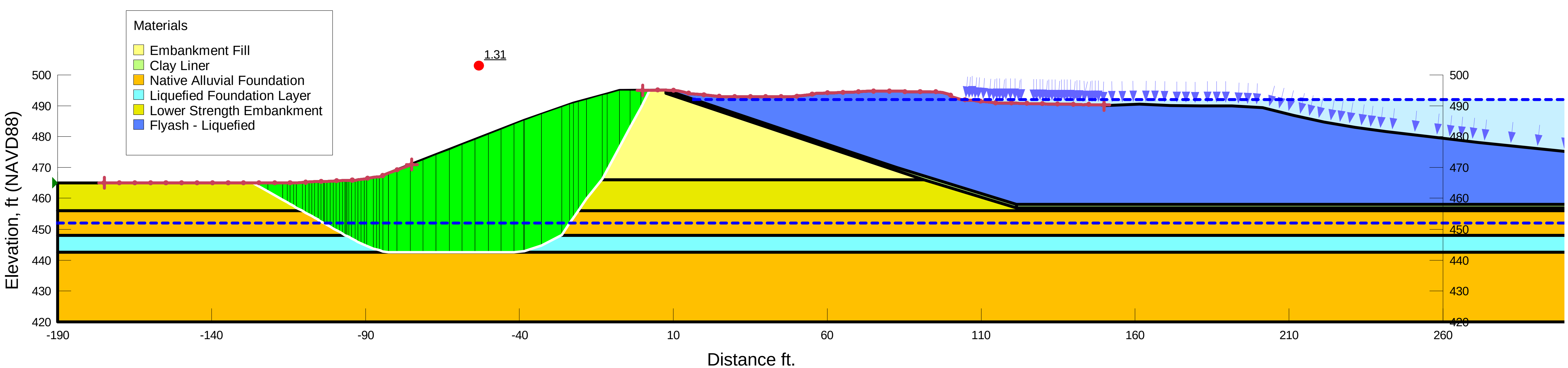
ATTACHMENT J.1

SEICMIC SLOPE STABILITY FIGURES

PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: A - CELL 3
ANALYSIS: Post-liquefaction Condition
SEISMIC LOAD: 0.0 g

9/21/2016
Last Edited by BT
Checked by ZJF

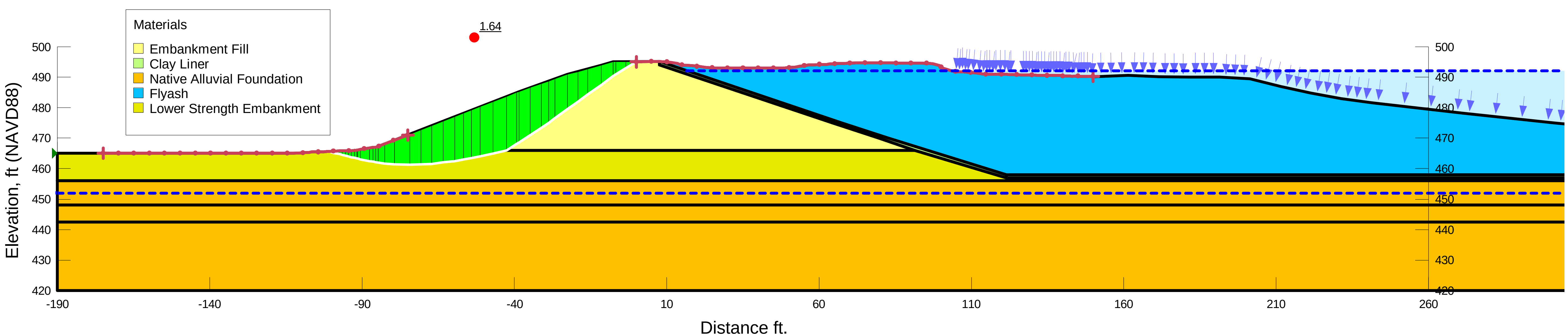
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Liquefied Foundation Layer Model: S=f(overburden) Unit Weight: 115 pcf Tau/Sigma Ratio: 0.06 Piezometric Line: 1
Name: Lower Strength Embankment Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash - Liquefied Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: A - CELL 3
ANALYSIS: Seismic (Psuedostatic) Loading Conditon
SEISMIC LOAD: 0.11 g

9/20/2016
Last Edited by BT
Checked by ZJF

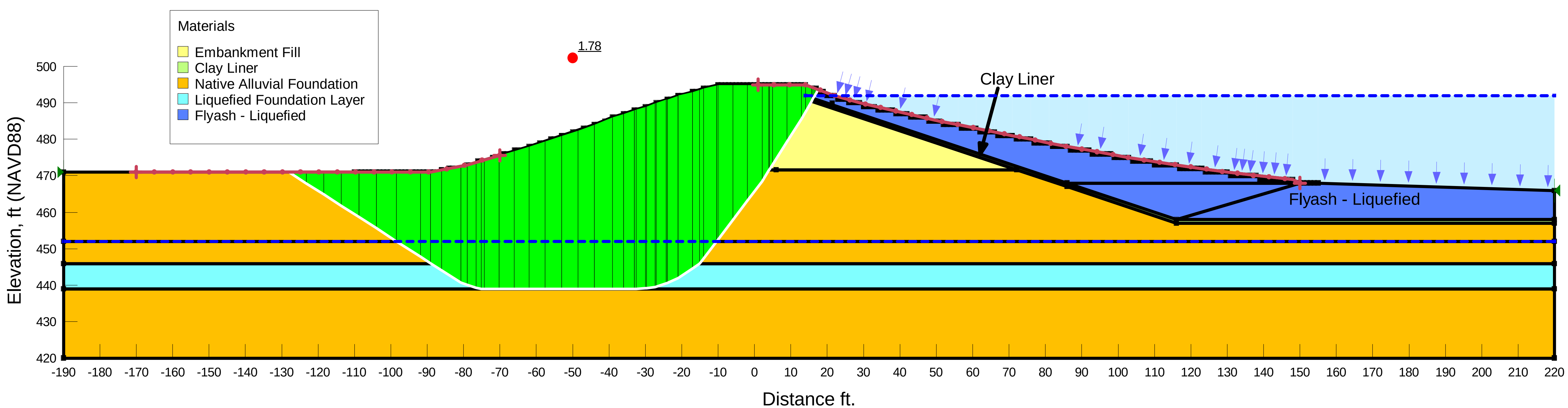
Name: Embankment Fill   Model: Mohr-Coulomb   Unit Weight: 120 pcf   Cohesion': 0 psf   Phi': 40 °   Piezometric Line: 1
Name: Clay Liner   Model: Mohr-Coulomb   Unit Weight: 110 pcf   Cohesion': 50 psf   Phi': 29 °   Piezometric Line: 2
Name: Native Alluvial Foundation   Model: Mohr-Coulomb   Unit Weight: 115 pcf   Cohesion': 0 psf   Phi': 30 °   Piezometric Line: 1
Name: Flyash   Model: Mohr-Coulomb   Unit Weight: 90 pcf   Cohesion': 0 psf   Phi': 20 °   Piezometric Line: 2
Name: Lower Strength Embankment   Model: Mohr-Coulomb   Unit Weight: 120 pcf   Cohesion': 0 psf   Phi': 30 °   Piezometric Line: 1



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: B - CELL 3
ANALYSIS: Post-Liquefaction Condition
SEISMIC LOAD: 0.0 g

9/21/2016
Last Edited by BT
Checked by ZJF

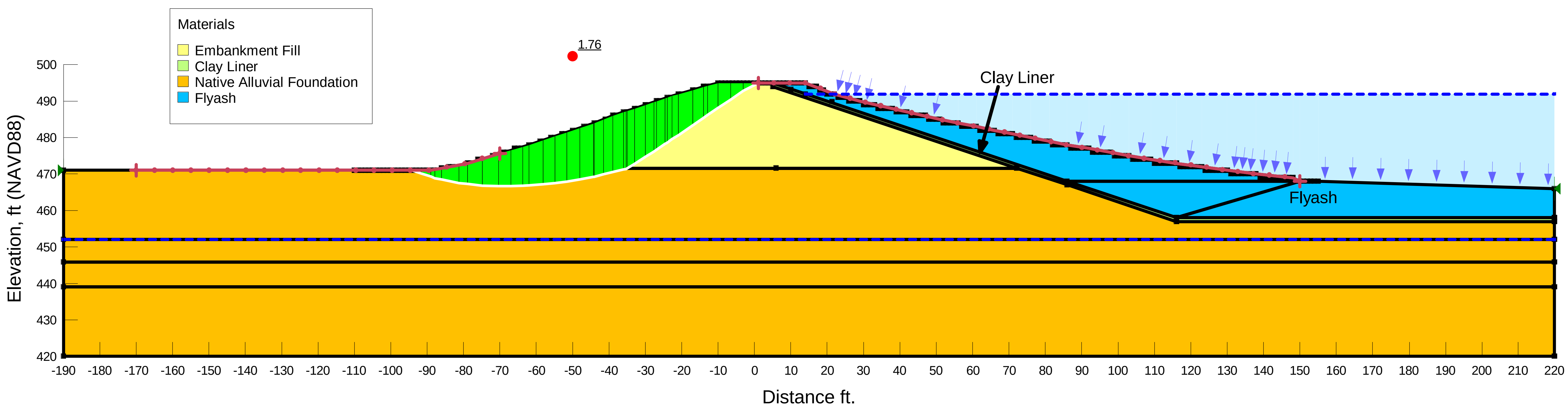
Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Liquefied Foundation Layer Model: S=f(overburden) Unit Weight: 115 pcf Tau/Sigma Ratio: 0.06 Minimum Strength: 0 psf Piezometric Line: 1
Name: Flyash - Liquefied Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: B - CELL 3
ANALYSIS: Seismic (Psuedostatic) Loading Conditon
SEISMIC LOAD: 0.11 g

9/20/2016
Last Edited by BT
Checked by ZJF

Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2



PROJECT: DYNEGY - HAVANA POWER STATION
PROJECT LOCATION: HAVANA, IL
AECOM PROJECT NO.: 60439304
CROSS SECTION: C - CELL 2
ANALYSIS: Seismic (Psuedostatic) Loading Condition
SEISMIC LOAD: 0.11 g

9/20/2016
Last Edited by BTH
Checked by ZJF

Name: Embankment Fill Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 40 ° Piezometric Line: 1
Name: Clay Liner Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion': 50 psf Phi': 29 ° Piezometric Line: 2
Name: Native Alluvial Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 0 psf Phi': 30 ° Piezometric Line: 1
Name: Flyash Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 20 ° Piezometric Line: 2