CP&L

Carolina Power & Light Company
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

ADDITIONAL INFORMATION REQUESTED ON GENERIC LETTER 88-20, "INDIVIDUAL PLANT EVALUATION FOR EXTERNAL EVENTS FOR SEVERE ACCIDENT VULNERABILITIES, 10 CFR 50.54(f)"

Ladies and Gentlemen:

By letter dated January 27, 2000, the NRC issued a Request for Additional Information (RAI) on a February 5, 1999, Carolina Power & Light (CP&L) Company's letter, which provided supplemental information requested during a NRC site visit conducted during September 23-24, 1998. This letter provides CP&L Company's response to that RAI.

CP&L has completed a review of the previously submitted earthquake magnitude and magnitude scaling factors for the Individual Plant Evaluation for External Events (IPEEE) and ground settlements that might result from liquefaction. CP&L concludes that buried piping and structures at H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 are adequate for the expected levels of soil response associated with the 0.3g Review Level Earthquake (RLE).

The following points summarize the attached report, which provides a specific evaluation of the conclusions documented in the Draft Technical Evaluation Report related to the numerical models and criteria used by CP&L in our February 5, 1999, submittal and the above referenced review.

1. An additional 31 boring logs have been incorporated into the liquefaction assessment. The majority of these (23) are from Ebasco Services reports for the pre-construction investigations for Robinson Dam. These borings were not included previously because of a lack of information on the water table elevation at the time of the borings. In the current calculations, conservative estimates of the water table were made to allow use of this data.

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2. The selection of an earthquake magnitude for the RLE (i.e., moment magnitude = 5.15) is taken from the seismic hazard deaggregation study published as U. S. Nuclear Regulatory Commission, NUREG/CR-6606, "Investigation of Techniques for the Development of Seismic Design Basis Using the Probabilistic Seismic Hazard Analysis."
3. The potential impact of a larger near-field earthquake magnitude (i.e., moment magnitude = 5.5) and a large distant earthquake similar to the historical Charleston earthquake (i.e., moment magnitude = 6.6) are explicitly investigated in the report.
4. Liquefaction for the RLE is assessed using a probability of liquefaction, given the RLE, equal to 40% and using the 1997 relationships proposed by Youd and Noble. This probability level was selected because it provides a close match to the baseline liquefaction curve for a magnitude 7.5 earthquake recommended in a 1997 liquefaction workshop to replace the baseline curve contained in Electric Power Research Institute report, EPRI NP-6041, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin."
5. The calculations to determine liquefaction have been completely revised to very clearly present the results from various steps in the calculation procedure. Attachments A and B to the attached report are extracted from that revised calculation.

The assessment of wave propagation effects, the stability of Robinson Dam, and the possible influence of submerged slope instability on the intake water pool are largely unchanged from the previous calculation. However, additional references and discussion are provided to support the quantification of these potential hazards. In addition, as discussed in the CP&L letter dated February 5, 1999, the underground section of the North Service Water Header that had experienced corrosion was replaced and relocated to above ground during Refueling Outage 19.

If you have any questions concerning this matter, please contact Mr. H. K. Chernoff.

Sincerely,

J. Harrison FOR

R. L. Warden
Manager, Regulatory Affairs

PMY/pmy
Attachment I: IPEEE Assessment of Geotechnical Hazards for Critical Structures and Piping for the Carolina Power and Light Company's H. B. Robinson Steam Electric Plant, Unit #2

c: Mr. L. A. Reyes, NRC, Region II
Mr. R. Subbaratnam, NRC, NRR
NRC Resident Inspector, HBRSEP

IPEEE Assessment of Geotechnical Hazards for Critical Structures and Piping for the Carolina Power & Light Company's H.B. Robinson Steam Electric Plant Unit #2

July 2000

Revision 0

Prepared By:

EQE INTERNATIONAL, INC.

Prepared For:

Carolina Power & Light Company

EQE Project Number: 420005

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Revision No.	Date	Description of Revision
0	July 13, 2000	Original Issue

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1.0 Purpose

The purpose of this calculation is to identify potential geotechnical hazards associated with an earthquake producing a peak ground acceleration of 0.3g at the H.B. Robinson Steam Electric Plant Unit #2 (Robinson) site. The first part of this assessment addresses the following geotechnical hazards:

1. Liquefaction
2. Liquefaction-induced ground settlement
3. Ground strains from wave propagation

The second part of the assessment evaluates the response of critical safety-related structures and piping to the geotechnical hazards.

2.0 Approach

Available information from previous geotechnical reports generated for the Robinson site provide the basis for the assessments performed in this calculation. The assessment of liquefaction is based on selection of an earthquake magnitude consistent with a peak ground acceleration of 0.3g at the site. The approach for estimating geotechnical hazards is generally based upon guidelines for assessing liquefaction susceptibility contained in EPRI-6041 (1991) with modifications reflecting an improved understanding of liquefaction and new data from recent earthquakes. To be consistent with the IPEEE assessment of the dynamic response of structures and equipment which rely on median ground shaking estimates, the approach generally focuses on defining geotechnical hazards that are likely to occur and not on computing a very conservative upper bound estimate of the hazards. Upperbound estimates of the geotechnical hazards are used to minimize computational effort in certain cases where it is clear that substantial margin exists in the structural component impacted by the hazard.

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4.0 Nomenclature and Abbreviations

C_B	SPT borehole diameter correction factor
C_E	SPT energy efficiency correction factor
C_N	SPT overburden correction factor = $\sqrt{P_a / \sigma'_{vo}} \leq 2.0$
C_R	SPT rod length correction factor
CRR	cyclic resistance ratio
C_S	SPT sampling method correction factor
CSR	cyclic stress ratio
F	soil force on pipe
F_{max}	maximum soil force on pipe
FC	fines content of soil expressed as a percent
g	acceleration of gravity = 32.2 ft/sec^2
m_{bLg}	local short-period Lg wave magnitude, correlated with short-period body wave magnitude, based on local catalog data (known as m_N in Canada)
MSF	magnitude scaling factor
M_w	moment magnitude
N	raw SPT blow count value
$(N_1)_{60}$	SPT blow count normalized to 2,000 psf overburden pressure, 60% energy efficiency, and other factors = $N\ C_N\ C_E\ C_B\ C_R\ C_S$
$(N_1)_{60cs}$	normalized SPT blow count $(N_1)_{60}$ further normalized to a fines content (FC) less than 5%
P_a	atmospheric pressure = 14.7 psi = 100 kPa
PGA	peak ground acceleration

psf	pounds per square foot
r_d	CSR correction factor to account for the flexibility of the soil profile
SPT	standard penetration test
z	depth of SPT sample
Δ	relative displacement between a buried pipe and the surrounding soil
Δ_{max}	relative displacement between a buried pipe and the surrounding soil to reach the maximum soil force F_{max}
σ'_{vo}	effective overburden stress for SPT data point
σ_{vo}	total overburden stress for SPT data point

5.0 Selection of Earthquake Magnitude

A peak ground acceleration (PGA) of 0.3g is adopted as the review level earthquake (RLE) ground motion to be consistent with the 0.3g bin that the plant was placed in for purposes of re-evaluation under the IPEEE program. However there is no prescribed review level earthquake magnitude associated with this PGA. An estimate of both the RLE magnitude and PGA are required for the geotechnical hazards analyses.

The selection of the magnitude for the RLE is based on the seismic hazard deaggregation study for the Robinson site that is documented in a report by Lawrence Livermore National Laboratory published as NUREG/CR-6606 (Bernreuter et al., 1998).

NUREG/CR-6606 provides estimates of the mean magnitude associated with a 10^{-5} median hazard (i.e., a 100,000-year median return period) for the average of the 5 and 10 Hz spectral acceleration ($S_{a5\text{-}10}$) and the average of the 1 and 2.5 Hz spectral acceleration ($S_{a1\text{-}2.5}$). Based on this study, the mean magnitude at the Robinson site is 5.6 m_b for $S_{a5\text{-}10}$ and 6.7 m_b for $S_{a1\text{-}2.5}$. Note that the magnitude measure m_b that is referred to in NUREG/CR-6606 is actually m_{bLg} (also referred to as m_{Lg} or m_N, depending on the region of the country). This is discussed further below. The larger magnitude for $S_{a1\text{-}2.5}$ was the result of the important contribution from the Charleston earthquake source zone at these lower oscillator frequencies. The 5.6 m_b RLE magnitude is the appropriate magnitude to use in the present application because of its close association to PGA, the ground-motion parameter used to calculate cyclic stress ratio (CSR) in the simplified procedures used in this study.

Sensitivity studies presented in NUREG/CR-6606 indicate that the deaggregation of the $S_{a5\text{-}10}$ hazard curves result in mean magnitudes that are either slightly larger than or the same as the mean magnitudes derived from the PGA hazard curves. This latter result indicates that the hazard associated with PGA is controlled to an even greater extent by smaller, nearby earthquakes than the hazard associated with $S_{a5\text{-}10}$. Therefore, we can conclude that the mean magnitude derived from the deaggregation of the $S_{a5\text{-}10}$ hazard curve is more conservative than that derived from the PGA hazard curve

5.1 Conversion to Moment Magnitude

For assessing liquefaction, the m_b magnitude in NUREG/CR-6606 needs to be converted to moment magnitude, M. First, it is necessary to understand what m_b is in the context of NUREG/CR-6606. The notation m_b normally refers to short-period body wave magnitude

derived from one of the worldwide standard seismographic networks. However, in the context of NUREG/CR-6606, m_b is the short period Lg magnitude that has been adopted as the standard regional magnitude measure in the eastern U.S. It has been calibrated to m_b magnitude, but is calculated from different instruments using different equations. This magnitude is often given alternative notations in professional papers including m_N, m_{Lg}, and m_{bLg}. For this reason, conversion from m_b in NUREG/CR-6606 to M is based on relationships developed for m_N, m_{Lg}, and m_{bLg} for the eastern U.S. and not the world-wide earthquake catalog.

Three relationships for performing the conversion between m_b and M were used: Atkinson (1993), EPRI TR-102293 (1993), and Atkinson and Boore (1987). The results are presented below.

Atkinson (1993)

$$M = -0.39 + 0.98 m_{Lg} \tag{1}$$

M equal to 5.10 for m_{Lg} equal to 5.6

EPRI TR-102293 (1993)

$$m_{Lg} = -10.23 + 6.105M - 0.7632M^2 + 0.03436M^3 \tag{2}$$

M equal to 5.09 gives m_{Lg} equal to 5.6

Atkinson and Boore (1987)

$$M = 2.715 - 0.277 m_{Lg} + 0.127 m_{Lg}^2 \tag{3}$$

M equal to 5.15 for m_{Lg} equal to 5.6

The largest computed magnitude, 5.15, is adopted to be conservative for selection of M needed for the assessment of liquefaction.

5.2 Reasonableness of the Frequency of Occurrence for the RLE

The remaining issue is to demonstrate that a 10^{-5} median hazard is a reasonably conservative level of hazard to use for the RLE. There have been two hazard studies done for the Robinson site that can be used to demonstrate this: one by LLNL (Sobel, 1993) and one by EPRI (McGuire et al., 1989). The LLNL study determined that the PGA corresponding to the 10^{-5} median hazard at the Robinson site is about 0.31g. The EPRI study found the PGA to be about 0.28g for this same

level of hazard. Both of these values are very close to the RLE value of 0.3g adopted for the Robinson IPEEE.

6.0 Liquefaction Assessment

The general approach to estimating the liquefaction potential in EPRI-6041 is based on the procedures developed by Seed and Idriss (1982) using results from standard penetration tests (SPT). This approach essentially consists of plotting the cyclic stress ratio, a parameter related to the earthquake loading of the soil at which SPT data was collected, versus the SPT blow count, normalized to account for depth, soil particle size, and earthquake magnitude effects. The plotted data is compared with an empirical curve developed by Seed and Idriss (1982) for earthquakes with a magnitude of about 7.5

These procedures were substantially modified in a workshop of top experts in the field in 1997 (Youd and Idriss, 1997). The most important changes to the procedures outlined in EPRI-6041 include the following:

1. A recognition that there is an inherent resistance to liquefaction even for very loose saturated sands and that this inherent resistance scales with magnitude. This fact changes the shape of the original Seed and Idriss (1982) curve such that it no longer passes through the origin.
2. The availability of substantially more earthquake data allows scaling factors to correct for earthquake magnitude to be based on actual observations as opposed to the idealized laboratory tests utilized by Seed and Idriss (1982) and Idriss (1997) related to estimates of the number of significant cycles of shaking. With the exception of only one of the twenty-one workshop participants, it was agreed that the original Seed and Idriss (1982) curve overestimated the likelihood of liquefaction for magnitudes less than 7.5 and likely underestimated the likelihood of liquefaction for magnitudes greater than 7.5.

The procedures recommended by the workshop participants differ slightly from those in EPRI NP-6041 in that liquefaction susceptibility is determined by a direct comparison of the cyclic stress ratio (CSS) and the cyclic resistance ratio (CRR) computed with the SPT data as one parameter. The ratio of the cyclic resistance ratio and the cyclic stress ratio provides the factor of safety against liquefaction. Closed form expressions were also recommended in the workshop for computation of the cyclic resistance ratio and factors correcting it for site flexibility and fines content of the soil.

The workshop did not recommend a specific magnitude scaling factor. Instead, a range of factors was suggested with "the engineer allowed to choose factors from within that range requisite with the conservatism required for the given application." The lower bound of this range is the relationship proposed by Idriss, the upper bound of this range are the factors proposed by Andrus and Stokoe that were noted to be consistent with factors proposed in the 1997 liquefaction workshop by Ambraseys, Arango, and Youd and Noble for a probability of liquefaction less than 20% (see Figure 1). The workshop recommendation regarding selection of magnitude scaling factors is based on typical engineering applications using code-based earthquake hazards. This condition is not directly applicable to the IPEEE assessment for Robinson because it is not reasonable to associate such a low probability of liquefaction with the RLE.

For the Robinson liquefaction assessment, preference is given to magnitude scaling factors based on actual observations that encompass natural site and earthquake variability rather than small-scale, idealized laboratory tests with a limited type of soil. Preference is also given to magnitude scaling factors that are based on data analyses that provide a probabilistic framework for estimating the potential for liquefaction. To provide some consistency with the methodology in EPRI NP-6041, the probability of liquefaction for magnitudes less than 7.5 is chosen to be consistent with the inferred probability of liquefaction for a magnitude 7.5 earthquake based on the approach used in EPRI NP-6041. This probability was derived by comparing a suite of curves of different probabilities of liquefaction derived by Youd and Noble (1997a) with the magnitude 7.5 liquefaction boundary curve recommended in the 1997 liquefaction workshop.

The probabilistic quantification of liquefaction potential derived by Youd and Noble (1997a) using logistic regression analyses indicate that the Seed and Idriss (1982) liquefaction boundary curve, as modified in the 1997 workshop, is associated with a probability of liquefaction between 20% and 50%. This is demonstrated in Figure 2 for a magnitude 7.5 earthquake that is the standard measure for the baseline liquefaction boundary curve. A Youd and Noble probability of liquefaction less than 40% is associated with corrected SPT blow counts, $(N_1)_{60cs}$, greater than 17. For $(N_1)_{60cs}$ values between 8 and 17, the liquefaction boundary curve recommended in the 1997 workshop is consistent with a Youd and Noble probability of liquefaction between 40% and 50%. For $(N_1)_{60cs}$ values less than 8, the liquefaction boundary curve recommended in the 1997 workshop is about equal to a Youd and Noble probability of liquefaction equal to 40%.

In a separate study, Toprak et al. (1999) utilized a formulation of logistic regression analyes not dependent on earthquake magnitude to estimate the probability of liquefaction associated with the

liquefaction boundary curve recommended by the 1997 workshop (Workshop Participants, 1997). For liquefaction data from the Loma Prieta earthquake, they determined that the workshop boundary curve corresponds to a probability of liquefaction of about 20% for corrected SPT blow counts less than 10 and about 50% for corrected SPT blow counts greater than 10. Using a world-wide data set, they concluded that the liquefaction boundary curve recommended by the 1997 workshop (Workshop Participants, 1997) corresponds to a probability of liquefaction of approximately 20%, 30% and 40% for corrected SPT blow counts less than 10, 10 to 15, and greater than 15, respectfully. They also noted that the Youd and Noble (1997a) relationship was more conservative than their relationship for corrected SPT blow counts less than 15. For higher corrected SPT blow counts, their relationship was significantly more conservative than that developed by Youd and Noble (1997a) for probabilities of liquefaction less than 50%. These findings generally support the approach to statistical regression used by Youd and Noble (1997b). However, since Toprak et al. (1999) did not include earthquake magnitude as a variable in their statistical regresssion, preference is given to the Youd and Noble (1997) relationship.

For the PGA of interest for Robinson, the significant risk of liquefaction is typically associated with corrected SPT blow counts less than 15. For this reason, the Youd and Noble (1997a) relationship for a probability of liquefaction equal to 40% is adopted to compute the resistance to liquefaction.

6.1 Liquefaction Assessment Procedure

The following procedure is used to assess whether the likelihood of liquefaction exceeds 40% given the RLE.

6.1.1 Cyclic Stress Ratio

The cyclic stress ratio is estimated using the procedures recommended in the 1997 liquefaction workshop. These procedures are as follows:

1. Compute the soil profile flexibility factor, r_d, based on the depth of SPT testing and the observed water table depth at the time the SPT tests were performed

$$r_d = \frac{1 - 0.4113\sqrt{z} + 0.04052z + 0.001753z^{1.5}}{1 - 0.4177\sqrt{z} + 0.05729z - 0.006205z^{1.5} + 0.001210z^2} \tag{4}$$

2. Compute the cyclic stress ratio

$$CSR = 0.65 \times \frac{PGA}{g} \times \left(\frac{\sigma_{vo}}{\sigma'_{vo}} \right) \times r_d \tag{5}$$

6.1.2 Cyclic Resistance Ratio

The cyclic resistance ratio is determined using the logit expression developed by Youd and Noble (1997a). The normalized SPT blow count value, necessary to use this expression, is computed according to the procedures recommended in the 1997 liquefaction workshop.

1. Compute the overburden correction factor, C_N, based on observed water table depth at the time the SPT tests were performed

$$C_N = \sqrt{P_a / \sigma'_{vo}} \leq 2.0 \tag{6}$$

2. Determine the rod length correction factor, C_R, based on the depth of SPT testing using the table below. For z less than 4 m, the value of C_R is taken as 0.75 because the minimum rod length is approximately 3 m. For the Robinson assessment, potentially liquefiable soil layers are those above the stiff clay deposits encounted at depths of 50 to 60 feet (15 to18 m).

z	C_R
3 m to 4 m	0.75
4 m to 6 m	0.85
6 m to 10 m	0.95
10 m to 30 m	1.0

3. Compute the fines content correction factors, α and β

$$FC \leq 5\% \qquad \alpha = 0 \qquad \beta = 1.0 \tag{7a}$$

$$5\% < FC \leq 35\% \qquad \alpha = e^{1.76 - \frac{190}{FC^2}} \qquad \beta = 0.99 + \frac{FC^{1.5}}{1000} \tag{7b}$$

$$FC > 35\% \qquad \alpha = 5.0 \qquad \beta = 1.2 \tag{7c}$$

4. Compute $(N_1)_{60}$ as

$$(N_1)_{60} = N \cdot C_E \cdot C_S \cdot C_B \cdot C_N \cdot C_R \tag{8}$$

Typical values of the blow count correction factors C_E, C_S and C_B are provided below (Youd

and Idriss, 1997). The values of these factors are assumed to be 1.0 in the calculations. The only case in which this assumption could lead to a reduced estimate of $(N_1)_{60}$ is if the value of C_E was less than 1.0. The average of the ranges of correction factors for the three typical hammer release mechanisms is 0.92. The other factors can have values of 1.0 or greater. The value of C_E is dependent upon the energy ratio delivered in driving the SPT sampler. None of the available boring logs provided information on the energy delivered to the drilling rods or whether the reported values accounted for the energy efficiency of the driving method. Considering that the other correction factors have values of 1.0 or greater, assuming 1.0 for all factors was considered reasonable, lacking other information.

Term	Description	Variable	Typical Values
C_B	Borehole Diameter	65 mm to 115 mm 150 mm 200 mm	1.0 1.05 1.10
C_E	Energy Ratio	Donut hammer Safety hammer Automatic-trip-donut hammer	0.5 to 1.0 0.7 to 1.2 0.8 to 1.3
C_S	Sampling Method	Standard sampler Sampler without liners	1.0 1.3

5. Compute $(N_1)_{60cs}$ as

$$(N_1)_{60cs} = \alpha + (N_1)_{60} \cdot \beta \tag{9}$$

6. Compute the CRR to provide a factor of safety against liquefaction of 1.0 using the approach from Youd and Noble (1997a) for a probability of liquefaction equal to 40% and an earthquake magnitude of 5.15.

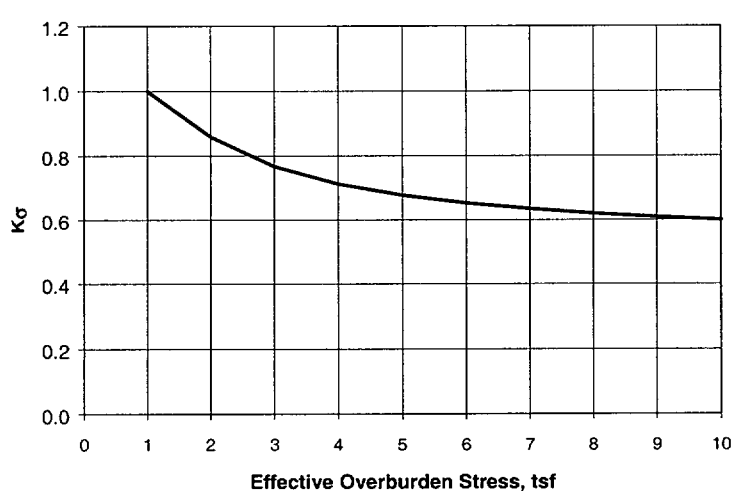
$$
\begin{aligned}
CRR &= \exp\left[2.466 - 0.7289M + 0.0834(N_1)_{60cs} + 0.3231\ln\left(\frac{P_L}{1-P_L}\right)\right] \\
&= \exp\left[2.335 - 0.7289M + 0.0834(N_1)_{60cs}\right] \\
&= \exp\left[-1.419 + 0.0834(N_1)_{60cs}\right]
\end{aligned}
\tag{10}
$$

6.2 Alternate Approach

For comparison with other approaches with a constant magnitude scaling factor, *MSF*, presented in the 1997 liquefaction workshop, an alternate computation of cyclic resistance ratio is also performed utilizing a fixed magnitude correction factor. In this approach, the cyclic resistance ratio is computed as

$$
\begin{aligned}
CRR &= \left(\frac{4.8(10)^{-2} - 4.721(10)^{-3}x + 6.136(10)^{-4}x^2 - 1.673(10)^{-5}x^3}{1 - 1.248(10)^{-1}x + 9.578(10)^{-3}x^2 - 3.285(10)^{-4}x^3 + 3.714(10)^{-6}x^4}\right) MSF \cdot K_\sigma \\
x &= (N_1)_{60sc} \\
K_\sigma &= 1 \text{ for } \sigma'_{vo} \le 2000 \text{ psf} \\
&= 0.514 + \frac{0.897}{\left(\sigma'_{vo}/2000 \text{ psf}\right)} - \frac{0.411}{\left(\sigma'_{vo}/2000 \text{ psf}\right)^2} \text{ for } 2{,}000 \text{ psf} < \sigma'_{vo} < 20{,}000 \text{ psf} \\
&= 0.6 \text{ for } \sigma'_{vo} \ge 20{,}000 \text{ psf}
\end{aligned}
\tag{11}
$$

The expression for K_σ was developed for this assessment from the curve recommended in the 1997 liquefaction workshop to allow computations to be performed using a spreadsheet. A graphical representation of K_σ using the above equation is shown below.



6.3 Available Data for Assessing Liquefaction

Five sources of boring logs are available for the assessment of liquefaction:

1. Ebasco Services Incorporated (1958): 23 borings for investigation of the coal-fired generating plant at the Robinson site (denoted as ESI-xx)
2. Dames & Moore (1966): 17 boring logs using a Dames and Moore sampler (denoted by a number 101-117)
3. Westinghouse (1966): 5 boring logs for load tests of Raymond piles (denoted as Rx)
4. Soils & Material Engineers (1982): 4 boring logs for construction of the Radwaste Building (denoted as SMEx)
5. Law Engineering (1991): Four boring logs for the operational and maintenance facility (denoted as Bx)

Only three grain size distribution curves are available for the Dames & Moore and Westinghouse borings. These curves indicated that the amount of fines (i.e., percent passing the No. 200 sieve) ranged from 10% to 15% for poorly graded (SP) and well-graded (SW) sands. Information from Law (1991) indicates that the amount of fines for silty sands (SM) ranged from 15% to 25%. Additional information on fines content was available from samples collected from the Soils & Materials Engineers subsurface investigations.

Based on the available information, the fines percentages in Table 1 are assumed when specific information is not available:

Liquefaction occurs primarily in loose sand deposits, but to be conservative any deposit in the available boring logs that indicated some sand was present was included in the liquefaction assessment. Fine-grained deposits such as silts and soils with appreciable clay content are not susceptible to liquefaction but may be subject to strength loss under strong ground shaking (Youd, 1998).

Youd (1998) points out that sensitive fine-grained soils are relatively rare in the United States and have only been reported in a few areas, primarily in Alaska and along the St. Lawrence River Valley. They may also exist in lacustrine sediments laid down in ancient saline lakes in the Great Basin or esturine sediments along coastal rivers or bays. Since none of these conditions exist at the Robinson site, there is no reason why there should be sensitive deposits at the site.

Table 1: Fines Content Associated with Unified Classification System When Other Information is Not Available

Soil Classification	Description	% Fines
SW ML-SW	well-graded sands and gravelly sands silt sand mixtures	10
SP-SW	well- to poorly-graded sands and gravelly sands	10
SP ML-SP	poorly-graded sands and gravelly sands silt sand mixtures	10
SM	silty sands and sand-silt mixtures	25
SC ML-SC	clayey sands and sand-clay mixtures	35

Soils meeting all of the following criteria are commonly used to identify whether fine grained soils are subject to loss of strength when subjected to strong ground shaking (Youd, 1998):

Clay Fraction (finer than 0.05 mm) less than 15%

Liquid Limit less than 35%

Moisture content less than 0.9 times the Liquid Limit

Youd (1998) also recommends that any soil classified as a clay in the unified soil classification system (beginning with a "C" in the designation) will not be susceptible to liquefaction or strength loss. However, deposits classified as SC have been retained in the liquefaction assessment to account for the lack of detailed information for review of the criteria for sensitive soils.

Sufficient information on the parameters to assess strength loss is only available for some samples obtained from the Soils & Materials Engineers (1982) investigation. Only one sample from boring SME-4 is found to meet these criteria. The potential for strength loss for the deposit from which this sample was obtained was captured by assigning an SC classification and treating the deposit as a sand-bearing material in the liquefaction assessment.

The Ebasco (1958) boring logs provide only general information regarding the site since their locations do not generally coincide with locations of interest for Robinson Unit #2. The materials encountered in the Ebasco borings were classified as either sand, silty sand, clayey sand, sandy clay, silty clay, clayey silt with layers of silty sand, or clay. Materials identified as sand, silty sand, and clayey sand are considered liquefiable and assigned the unified soil classification symbols of SP, SM, and SC, respectively, for assessing liquefaction.

No water table information is provided for these borings. Also, several of the borings were obtained at elevations that are substantially above or below the present site grade. The following adjustments and assumptions are made to the Ebasco borings for the assessment of liquefaction.

Computation of $(N_1)_{60cs}$ is based on an assumed water table elevation at the time the borings were made of 225 ft based on the typical water table elevation recorded on the Dames & Moore (1966) boring logs but not less than 2 feet below the ground surface. Considering that the original stream elevation at the time of the borings was around 190 feet, this above conditions likely overestimate the actual water table elevation, resulting in an underestimate of $(N_1)_{60cs}$. For computation of CSR, the finished grade elevation is assumed to be 226 feet with the water table elevation at 224 feet. Soils above elevation 226 in the Ebasco borings were assumed to have been removed during site excavation. Borings with elevations below 226 feet at the time they were performed are assumed to have had compacted fill placed to elevation 226 feet. The assumed water table elevation of 224 feet corresponds to a depth that is generally less than that reported in the boring logs where water table depth was noted.

The only exception to the above corrections was for boring ESI-5E, for which the CSR was computed assuming the water table at the ground surface, consistent with the location of this boring near what is currently the center of the intake canal.

Values of Dames & Moore blow counts were related to SPT N-values (N) using the following relationship provided by Dames & Moore (Tillman, 1995),

$$N = N_{D\&M} \times \frac{Drop_Weight(lb) \times Drop_Height(ft)}{780} \tag{12}$$

This relationship is necessary because of the use of non-standard samplers, drop weights, and drop heights for the Dames & Moore data.

Table 2: Estimate of Soil Unit Weight

Soil Type	No. of Obs.	Mean (pcf)
SP	30	124.8
SP-SM	2	121.0
SW	19	125.8
SM	8	127.9
ML	12	123.5
ML-SP	1	126.0
ML-SW	3	128.7
ML-SC	1	126.0
SC	5	130.6
CL	18	131.4
CL-ML	1	130.0
Combined	100	125.8

Soil unit weight information is available from the Dames and Moore and Westinghouse Electric Company reports. The Dames and Moore report including Boring Logs 101-117 and the Westinghouse Electric Company report including Raymond Logs of Borings 1-5 were reviewed to determine the mean and standard deviation of the total unit weights associated with each soil type. The results of this review are summarized in Table 2. A unit weight of 126 pcf is used in all calculations.

6.4 Results of Liquefaction Assessment

The results of the liquefaction assessment are presented in tabular form in Appendix A. These results are also presented graphically in Figure 2. No data points have a computed factor of safety against a 40% chance of liquefaction less than 1.0.

The analyses also confirm the recommendations from the 1997 liquefaction workshop that the use of the Youd and Noble 20% probability of liquefaction relationship is an approximation for the upper range of magnitude scaling factors (Andrus and Stokoe) recommended for general

engineering applications. This comparison is only provided as a means to confirm the liquefaction calculations are providing consistent results.

The following description of the calculation corresponds to the column numbers used in the tables in Appendix A and B

Column	Description
1.	Boring log identification (numbers refer to Dames & Moore borings, RL refers to Westinghouse borings, SME, refers to Soils & Material Engineers borings, ESI refers to Ebasco borings
2.	Depth of penetration test, feet
3.	Raw blow count
4.	Unified soil classification symbol
5.	Depth of water table below surface at the time of the investigation, feet
6.	Hammer drop weight, pounds (780 pounds if not a Dames & Moore boring)
7.	Hammer drop height, feet (1 foot if not a Dames & Moore boring)
8.	Fines content, %
9.	Fines content correction factor parameter, α (Eq. 7 with col. 8)
10.	Fines content correction factor parameter, β (Eq. 7 with col. 8)
11.	Total soil overburden stress, psf
12.	Effective soil overburden stress, psf
13.	Soil flexibility factor, r_d (Eq. 4)
14.	SPT correction factor for effective soil overburden stress (Eq. 6)
15.	SPT correction factor for rod length
16.	Corrected blow count for Dames & Moore sampler (col. 3 x col.6 x col. 7 / 780)
17.	Normalized blow count (col. 16 x col. 14 x col. 15)
18.	Fines corrected blow count (col. 17 x col 10 + col. 9)
19.	Cyclic stress ratio (CSR) computed as 0.65 x PGA x col. 11 / col. 12 x col. 13 except for ESI borings with data in columns 27 through 29 where the calculation i s 0.65 x PGA x col. 27 / col. 28 x col. 13. The CSR is set to zero if col. 27 is EXC.
20.	Deep overburden correction factor (K_σ in Eq. 11)
21.	Cyclic resistance ratio (CRR) for a magnitude 7.5 earthquake using 1997 workshop procedure(Eq. 11). The CRR is set to 5 if col. 18 is greater than 30, and 10 if the

Column	Description
	material (col. 4) is ML or CL.
22.	Factor of safety for magnitude 7.5 earthquake using 1997 workshop procedure (col. 21 / col. 19)
23.	Cyclic resistance ratio for specified probability of liquefaction and magnitude using the approach of Youd and Noble (Eq. 10)
24.	LIQ indicates a factor of safety against liquefaction less than 1.0 using the approach of Youd and Noble (col. 23 / col. 19 < 1.0)
25.	A number indicates the factor of safety against liquefaction when the factor of safety is less than 1.34 using the approach of Youd and Noble
26.	Elevation of ground surface for ESI boring logs
27.	Total stress used to compute CSR for ESI boring logs; EXC indicates that the data is at an elevation above the assumed current grade of 226 feet
28.	Effective stress to compute CSR for ESI boring logs; EXC indicates that the data is at an elevation above the assumed current grade of 226 feet
29.	Sample depth used to compute r_d, (col. 13) used to compute CSR for the ESRI boring logs; EXC indicates that the data is at an elevation above the assumed current grade of 226 feet

6.5 Sensitivity Investigation

6.5.1 Earthquake Magnitude and Probability of Liquefaction

A seismic hazard study conducted for the Savannah River Site by LLNL is another source of information that provides support for the selection of RLE magnitude. The Savannah River Site is appropriate for a general comparison as it lies within the same seismotectonic province as Robinson. The mean magnitude of the earthquake producing approximately 0.3g PGA (0.31g) is associated with a 1 x 10^{-4} mean annual frequency of occurrence (i.e., a 10,000-year mean return period) as derived from seismic hazard analyses performed for the Savannah River Site using the LLNL and EPRI methodologies (Lee, 1994a and 1994b). According to the Savannah River study, this magnitude was estimated to be m_{bLg} 5.9 corresponding to a maximum M equal to 5.5 for the three relationships previously used. This magnitude is selected as an upper estimate of magnitude for judging the sensitivity of the liquefaction assessment to the selected RLE. This

value is 0.35 magnitude units greater than the maximum of the three values estimated for an m_b of 5.6. The value of M from the three equations are derived as follows:

Atkinson (1993)

$$M = -0.39 + 0.98 m_{Lg}$$

M equal to 5.39 for m_{Lg} equal to 5.9

EPRI TR-102293 (1993)

$$m_{Lg} = -10.23 + 6.105M - 0.7632M^2 + 0.03436M^3$$

M equal to 5.41 gives m_{Lg} equal to 5.9

Atkinson and Boore (1987)

$$M = 2.715 - 0.277 m_{Lg} + 0.127 m_{Lg}^2$$

M equal to 5.50 for m_{Lg} equal to 5.9

A probability of liquefaction of 20% is also examined in conjunction with the increased earthquake magnitude. The lower probability is selected to produce results that are much more conservative than those associated with the EPRI NP-6041 approach for a magnitude 7.5 earthquake. This provides results comparable to those from investigators that have not incorporated magnitude in their probabilistic analyses or actual earthquake data into their estimates of earthquake magnitude correction factors. It also represents the probability of liquefaction given by the Youd and Nobel (1997a) procedure necessary to bound the liquefaction boundary curve recommended in the 1997 liquefaction workshop for a magnitude 7.5 earthquake and high blow counts ($(N_1)_{60cs}$ greater than 17). The results of this sensitivity analysis are tabulated in Appendix B. The results are also shown graphically in Figure 4.

A total of 10 data points have a probability of liquefaction greater than 20% for the assumed 5.5 magnitude earthquake. Information for these 10 data points is summarized in Table 3.

Five of these points are from five ESI borings at depths under 6 feet or at 11 feet (borings ESI-5E, ESI-5F, ESI-9D, ESI-10, and ESI-10A). The remaining data points are from Dames & Moore borings 110, 113, and 114 at depths of 6 to 12 feet.

The Dames & Moore data points are all in deposits where thin lenses of silt or clay and obstructions such as tree roots were observed. It is likely that these features played a role in the low observed blow counts.

Table 3:Soils Indicated as Liquefiable for the Sensitivity Analyses

Boring	Depth, ft	Water Table, ft	Factor of Safety	$(N_1)_{60cs}$
110	6	2	.78	4.6
110	12	2	.95	8.2
113	7	0	0.67	7.1
113	11	0	0.99	10.8
114	6	2	0.71	4.4
ESI-5E	5	0	0.85	10.1
ESI-5F	1	2	0.98	5.5
ESI-9D	11	2	0.86	7.3
ESI-10	6	2	0.87	7.0
ESI-10A	11	2	0.95	8.5

ESI-5E and ESI-5F were located near what is currently the northwest corner and bottom of the Robinson 1 intake canal. The shallow materials identified as liquefiable in the sensitivity analysis were removed during construction of the Unit 1 intake canal.

The remaining ESI borings were located near what is currently the site of Unit 1 or Unit 2. It is likely that much of this near surface material was removed or modified as a result of construction.

Similarly, the locations of Dames & Moore borings 110, 113 and 114 were drilled around the perimeter of what is now the Containment Building. It is likely that this material was removed or modified for construction of the Containment Building. Efforts to locate excavation records to verify this were unsuccessful. As a result, these data points are included in an assessment of potential post-liquefaction displacement.

The above observations indicate that liquefaction potential is not highly sensitive to variations in RLE magnitude and liquefaction probability for Robinson. This is based on the fact that less than 2% of the available boring log data indicate liquefaction at various locations around the site of Units 1 and 2.

6.5.2 Impact of Charleston Earthquake

The deaggregation of the $S_{a1\text{-}2.5}$ hazard curve at the Robinson site for sources greater than 100 kilometers from the plant indicates that the Charleston source zone (one that would be included in the group of sources at distances greater than 100 kilometers) has a 36% contribution to the 10^{-5} median hazard of 0.47 g. These same results indicate that this source zone has a negligible contribution to the 10^{-5} median hazard for the $S_{a5\text{-}10}$ ground-shaking parameter. Although the $S_{a1\text{-}2.5}$ hazard has an important contribution from the Charleston source zone, it has too low of an oscillatory frequency to serve as a surrogate for PGA, the ground-motion parameter used for evaluating ground-failure hazards.

The relative impact of the Charleston source zone on the IPEEE liquefaction evaluation can be estimated by taking into account its relative affect on the cyclic stress ratio (CSR) and cyclic resistance ratio (CRR) used in the evaluation of liquefaction. The CSR computed for a Charleston source zone is lower than the CSR for the RLE magnitude selected for Robinson because of the lower PGA and reduced contribution to the hazard. For any specific value of corrected SPT blow count, the CRR is also smaller for the Charleston earthquake zone because of its larger magnitude.

According to NUREG/CR-6606, the controlling magnitude associated with the deaggregation of $S_{a1\text{-}2.5}$ for distances greater than 100 kilometers is m_b 6.7, which corresponds approximately to M_w 6.6 using the relationship of Atkinson and Boore (1987). This information can be used to quantify the amount of reduction in liquefaction resistance of the soils at the Robinson 2 site for a 40% probability of liquefaction compared to the RLE magnitude of 5.15.

$$\frac{CRR_{6.6}}{CRR_{5.15}} = \frac{e^{2.335-0.7289(6.6)+0.0834(N_1)_{60cs}}}{e^{2.335-0.7289(5.15)+0.0834(N_1)_{60cs}}} = \frac{e^{-2.476+0.0834(N_1)_{60cs}}}{e^{-1.419+0.0834(N_1)_{60cs}}} \tag{13}$$

$$\frac{CRR_{6.6}}{CRR_{5.15}} = 0.347$$

Modification of the CRR is also necessary to account for the contribution of the Charleston earthquake to the hazard at the Robinson site. For ground shaking, the RLE for Robinson is stipulated to be the NUREG/CR-0098 median spectral shape for soil anchored to a PGA of 0.3 g. The peak spectral acceleration of this spectral shape is 0.425 g and occurs at a frequency range of

1 Hz to 2.5 Hz where the Charleston earthquake contributes 36% to the exceedance frequency of the hazard. That is, 36% of the 10^{-5} median exceedance frequency that corresponds to the 0.47 g value of $S_{a1\text{-}2.5}$ in the hazard study is contributed by events with a mean magnitude 6.7 m_b at a distance of 100 km or greater from the site. The frequency of smaller-magnitude and closer events can be estimated as 0.64 x 10^{-5}. Therefore, it is 1.78 times more likely (0.64 x 10^{-5}/0.36 x 10^{-5}) that an event with a $S_{a1\text{-}2.5}$ of 0.47 g will not be associated with a Charleston event as defined, giving a weighting factor of 1.78 on the factor of safety against liquefaction. This is equivalent to multiplying the results of Eq. (13) by 1.78 to give a value of 0.62.

The important earthquake parameter that affects the CSR is the ground-shaking amplitude. As stated previously, the contribution of sources greater than 100 kilometers from the site is shown to be negligible in NUREG/CR-6066. However, a very conservative approach is to use the ratio of PGA to peak spectral acceleration for the NUREG/CR-0098 median spectral shape to adjust the Charleston spectral acceleration to an equivalent PGA. Since the value of $S_{a1\text{-}2.5}$ on soil corresponding to the 10^{-5} median hazard is 0.47 g, the ratio of the cyclic ratios would be calculated as follows.

$$\frac{CSR_{6.6}}{CSR_{5.15}} = \left(\frac{.3}{.425}\right).47 = 0.33 \tag{14}$$

The relative impact of a Charleston earthquake can be estimated as the ratio of the decrease in CSR to the decrease in CRR or 0.33/0.62 = 0.53. That is, the Charleston earthquake is about half as likely to have the same impact on liquefaction as the RLE earthquake used in the liquefaction assessment.

The above approximation is very conservative as it assumes that the $S_{a1\text{-}2.5}$ motions can be directly scaled to PGA. This assumption is contrary to the findings in NUREG/CR-6606 that the Charleston earthquake is not a significant contributor to the $S_{a5\text{-}10}$ hazard at Robinson.

7.0 Estimates of Ground Settlement

Potential hazards from ground settlement are examined using the chart developed by Ishihara (1990) and contained in EPRI NP-6041. This chart, shown in Figure 5, provides an estimate of post-liquefaction volumetric strain as a function of the factor of safety against liquefaction and the corrected SPT blow count. Settlement is estimated by multiplying the volumetric strain by the soil layer thickness for which the corrected blow count data are applicable.

Locations where post-liquefaction settlement may be a potential hazard were first identified by identifying locations with a factor of safety less than 1.34, corresponding to a volumetric strain less than about 0.5%.

Two borings, 113 and 114, exhibit factors of safety less than 1.34. The resulting estimates of potential post-earthquake settlement in the vicinity of these borings is summarized in Table 4. All of the locations where liquefaction settlement is estimated are at very shallow depths. The maximum ground surface settlement estimate is 0.18 inches.

Table 4: Estimated Liquefaction Settlement Displacements for the RLE

Boring	Depth, ft	Factor of Safety	$(N_1)_{60cs}$	Layer Thickness, ft	ε_v	Surface Settlement, in
113	7	1.19	7.1	3	0.5%	0.18
114	6	1.25	4.4	3.5	0.4%	0.17

The estimates of potential settlement were also reviewed for the result of the sensitivity analyses for a magnitude of 5.5 and a 20% probability of liquefaction. The results are summarized in Table 5. As would be expected, the number of locations potentially experiencing liquefaction induced settlement increases compared to the RLE assessment.

The resulting surface settlements for the 14 locations where liquefaction settlement is possible are also summarized in Table 5. The maximum liquefaction settlement estimates approach 3 to 4 inches for two locations. The estimated settlements are 1 inch or less at seven locations.

Table 5. Estimated Liquefaction Settlement Displacements for the Sensitivity Analyses

Boring	Depth, ft	Factor of Safety	$(N_1)_{60cs}$	Layer Thickness, ft	ε_v	Surface Settlement, in	Total Settlement, in
110	6	.78	5.6	3	4.5%	1.62	3.78
110	12	.95	8.2	4.5	4.0%	2.16	
113	5	1.03	12.4	2.5	1.1%	0.33	2.92
113	7	0.67	7.1	3	4.5%	1.62	
113	11	0.99	10.8	3.5	1.5%	0.63	
113	17	1.12	9.5	3.5	0.8%	0.34	
114	6	0.71	4.4	3.5	5.0%	2.1	2.1
116	12	1.03	8.7	4	1.3%	0.62	1.0
116	16	1.16	8.7	4.5	0.7%	0.38	
B3	7	1.03	5.9	2.5	1.3%	0.39	0.39
RL2	10	1.33	11.6	5.5	0.5%	0.33	0.33
ESI-5E	1.5	1.03	12.7	2.5	1.0%	0.30	2.09
ESI-5E	5	0.85	10.1	4.25	3.5%	1.79	
ESI-5F	1	0.98	5.5	2	4.6%	0.41	0.41
ESI-9A	4	1.25	10.1	4	1.0%	0.24	0.24
ESI-9C	29	1.17	5.6	5		0.42	0.42
ESI-9D	11	0.86	7.3	2.5		1.26	1.26
ESI-10	6	0.87	7.0	4.5	4.2%	2.27	2.27
ESI-10A	11	0.95	8.5	3.5	0.7%	1.13	1.13
ESI-13	9	1.07	10.1	8	3.5%	0.96	0.96

8.0 Estimates of Ground Strain from Wave Propagation

An estimate of the ground strain produced by the RLE is necessary for assessing the response of buried pipelines. The ground strain can be estimated based on the peak ground velocity and the effective wave propagation velocity of the seismic energy using the following relationship (ASCE, 1984):

$$\varepsilon_g = \frac{V}{\alpha C} \tag{15}$$

where ε_g = ground strain

V = peak ground velocity

C = effective propagation velocity of seismic energy

α = correction factor based on type of earthquake wave

= 1.0 for compression and Rayleigh waves

= 2.0 for shear waves

For a PGA of 0.3 g, the peak ground velocity for a soil site is estimated as 14.4 inches per second using recommendations in NUREG CR-0098. This is believed to be a very conservative estimate of peak ground velocity and is likely associated with an earthquake magnitude of 6.5 or greater. The most significant earthquake motions for the RLE are from propagating shear waves ($\alpha = 2.0$). The effective propagation velocity is approximately the velocity that seismic energy is propagated from the source of energy release to a location within the bedrock underlying the site (Litehiser et al., 1987). Litehiser et al. (1987) show that amplification of ground strain, as given by (15), is typically less than a factor of two for elastic soil response. Estimates of C can be based on bedrock shear wave velocities and an assumption regarding the ray path from the seismic source to the soil-rock interface. An upperbound estimate of C is the shear wave velocity of the underlying rock. A value of 11,200 feet per second is taken as a representative value based on information contained in the Updated Final Safey Analysis Report.. The resulting estimate of ground strain using an amplification factor of two on (15) is 0.011%.

9.0 Structural Assessments

9.1 Assessment of Dam Stability

Robinson Dam, completed in 1959, is necessary to maintain cooling water supply to the power plant. Excavation for the dam extended to the firm clay strata. The core of the dam was specified to be clay or clayey sand. Clean sand is used for the sand drain downstream of the dam. The remaining upstream and downstream fill is largely sand obtained from borrow pits near the dam site. Rock rip-rap is placed on the upstream face of the dam to prevent wave erosion. All dam materials were placed in lifts of 8 to 12 inches and compacted to a minimum of 95% compaction as measured by the modified AASHO test. Dynamic analysis of the dam indicate a factor of safety of 1.08 against slope failure for an earthquake with a PGA of 0.2g. The dam was also analyzed by the method proposed by Newmark (1965) and predicted displacements were found to be negligible (Wells, 1980).

The presence of a firm clay strata beneath the dam and the high level of compaction provided in the fill material are sufficient conditions to rule out liquefaction for the upstream face of the dam.

To assess the impact of a 0.3g earthquake, the relationship developed for unsymmetrical block sliding (Newmark, 1965) is used. In using this approach, it is assumed that the factor of safety of 1.08 and the Newmark sliding block analysis performed previously used the appropriate soil shear strength values. A bounding relationship to estimate displacements based on the dynamic analysis method proposed by Newmark for an elastic-plastic sliding mechanism is given below (Terzaghi, Peck, and Mesri, 1996):

$$\Delta = \frac{V^2}{2gN}\left(1 - \frac{N}{A}\right)\frac{A}{N} \tag{16}$$

where V = maximum ground velocity

N = sliding resistance as fraction of sliding mass weight

= 1.08(0.2) = 0.216

A = maximum earthquake acceleration = 0.3 g

The bounding Newmark relationship is based on the results of a dynamic sliding block analysis for four earthquake records scaled to a peak ground acceleration of 0.5 g. The earthquakes used by Newmark had Richter magnitudes of 6.6 to 7.1 and measured peak ground accelerations of 0.18 g to 0.32 g. The duration of strong shaking for the four records was 20 to 30 seconds. The

bounding relationship is an upper estimate of displacement that might be expected for the RLE magnitude for Robinson because of the large duration associated with the larger earthquake magnitudes used to develop the bounding relationships.

Assuming the dam, which is excited by the firm clay strata at its base, experiences the RLE ground motions used to compute the NUREG CR-0098 response spectra for soil, the maximum ground velocity is 0.3(48) = 14.4 inches per second. The resulting estimate of displacement along the critical failure surface corresponding to the 1.08 factor of safety for 0.2g static loading is

$$\Delta = \frac{14.4^2}{2(386.4)(0.216)}\left(1-\frac{0.216}{0.3}\right)\frac{0.3}{0.216} = 0.48 \text{ inches}$$

This displacement can be compared to values used to assess regional slope stability. A displacement of about 4 inches has been used to assess the risk of coherent slides such as soil block slides, earth flows, and soil slumps (Wilson and Keefer, 1985). These types of soil slides are similar to what would be expected if a failure were to occur for the Robinson Dam. The displacement limit of 4 inches is an estimate of what might be necessary to break most of the cohesive bonds along the critical slip surface. For slides where a tensile failure mechanism is dominant, such as rock falls, rock avalanches, and soil avalanches, a more restrictive displacement limit of about 1 inch has been used (Wilson and Keefer, 1985). The estimates of displacement for the RLE are well below either of these limits although the cohesive bond failure is more likely because of the materials used to construct the dam. Therefore, Robinson Dam is judged adequate for the RLE.

9.2 Assessment of Intake Pool

Intake water supply is provided by a pool 30 feet by 40 feet in plan with 40 feet of water depth. Following excavation to provide the necessary water depth, rip-rap was placed to protect the side walls of this submerged intake water source. Sheet piles were driven at certain locations to create a submerged dike to channel water to the intake structures. Separation of intake water between the fossil plant intake structure and the nuclear plant intake structure is provided by a submerged dike built up by the placement of 10-15 feet of rip-rap. Rip-rap also exists around the perimeter of Lake Robinson. Except for the boundaries supported by sheet piles near the intake structures and the dam slope, the rip-rap is placed at a slope of 1V:2H.

Two potential failure mechanisms are considered possible; 1) flow of sediments into the intake water pool from the flow of liquefiable soil, and 2) fall of rip-rap and sand into the pool resulting from failure of the sheet piling used to retain the rip-rap.

Four boring logs were reviewed to assess the potential for liquefaction beneath the intake pool:

1. Dames & Moore boring 116 located just west of the intake structure
2. Dames & Moore boring 117 located north of the intake structure but close to the shoreline of Lake Robinson
3. Ebasco boring ESI-5E located at the northwest corner of the intake canal
4. Ebasco boring ESI-5F located near the center of the intake canal approximately 100 feet east of the intake structure

The elevation at the bottom of the intake canal is 180 feet, a depth of approximately 46 feet below plant grade. All boring logs indicate that the material at this depth is either dense sand, or silt and liquefaction of the underlying sediment is not expected for the RLE or the earthquake selected for sensitivity analysis.

Rather than estimating the existing seismic capacity of the sheet piles, it was assumed that the sheet piles failed and allowed material to assume a more natural slope of 1V:2H, consistent with existing rip-rap placement in locations where no sheet piles are present. The material above the assumed slopes was assumed to be well distributed along the bottom of the intake pool, a very unlikely scenario.

The volume of material above the assumed slopes is computed as follows:

$$V = 3\left(\frac{(20)20}{2}\right) = 1,200 \text{ ft}^3$$

If this volume of material is distributed over the bottom of the intake pool, the water depth would be reduced 1 foot. A 1-foot change in intake pool depth does not compromise the function of the intake pumps since over 25 feet of water would remain between the bottom of the intake pool and pump intake. This is the most severe scenario as more localized slope failures wo uld not result in material close to the pump intakes.

This bounding calculation demonstrates that stability of the submerged slopes is not an issue for function of the intake pool following the RLE. It is more realistic to expect the impact to be limited to the immediate vicinity of the sheet piles.

9.3 Assessment of Buried Piping

Critical buried piping at Robinson includes the following:

1. Service water pipelines (2) from the intake structure to the reactor auxiliary building
2. Diesel fuel oil supply lines (2) from the fuel oil storage tank to the day tank
3. Demin Water Line (part of the Primary Water System) from the primary water storage tank to the primary water pumps

9.3.1 Diesel Fuel Oil and Primary Water Supply Lines

The diesel fuel oil and demin water lines are small diameter (2 inches and 4 inches, respectively) welded steel pipelines. The wall thickness is 0.154 inches for the diesel fuel oil line and 0.120 inches for the demin water line.

The maximum axial stress in these pipelines from ground strain associated with wave propagation is less than 3,200 psi based upon a ground strain of 0.011% and a modulus of elasticity of 29,000,000 psi. The wave propagation strain is equivalent to a temperature change of less than 11°F based on an upper bound estimate of thermal expansion coefficient of 10^{-5} in/in-°F. Since this is likely less than the seasonal and operational temperature variation that the lines are exposed to, both lines are judged to have considerable margin against failure from wave propagation.

The diesel fuel oil and demin water lines are buried (3.5 feet and 3 feet below the ground surface, respectively) and tied to the Reactor Auxiliary Building that is supported on piles bearing on the competent soil at a depth of approximately 50 feet. The impact of potential ground settlements can be estimated by comparing them with the displacement capacity of a pipe with guided-fixed end conditions subjected to a uniform load. The length of pipe necessary to accommodate a specified end displacement can be computed using the following equations (Young, 1989):

$$\Delta = \frac{wL^4}{24EI} \tag{17a}$$

$$\sigma = \frac{wL^2 r}{3I} \tag{17b}$$

$$\Delta = \frac{\sigma L^2}{8Er} \tag{17c}$$

$$L = \sqrt{\frac{8E\Delta r}{\sigma}} \tag{17d}$$

where σ = allowable bending stress

E = modulus of elasticity = $29(10)^6$ psi for steel

I = moment of inertia

Δ = end displacement

r = pipe radius (1.19 inches for 2-inch pipe; 2.25 inches for 4-inch pipe)

L = pipe length

The allowable stress used to assess the buried piping is based on the simplified elastic-plastic discontinuity analysis in the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NB. For the butt-welded piping used, the stress in (17) is limited to $3S_m$. The demin water line is A-312 Type 304 stainless steel (S_m = 16.7 ksi) and the diesel fuel line is A-106 Grade B carbon steel (S_m = 16 ksi). The required pipe length to accommodate various displacements is summarized below. Lengths for other displacements can be estimated by scaling according to the ratio of the square root of the imposed displacement as given by (17d) and are summarized in Table 6.

Table 6: Pipe Lengths Necessary to Accommodate Specified Displacements Without Exceeding Stress Allowables

Displacement, inches	2-inch Carbon Steel Pipe	4-inch Stainless Steel Pipe
0.2	2.8 feet	3.8 feet
0.5	4.5 feet	6.0 feet
1.0	6.3 feet	8.5 feet
2.0	8.9 feet	12.0 feet
3.0	10.9 feet	14.7 feet
4.0	12.6 feet	17.0 feet

At the connection to pile supported buildings, any ground settlement that occurs will be largely independent of the building. The effect of relative displacement on the pipelines can be assessed by comparing the soil loads necessary to force the pipe to exceed its allowable stress with the maximum soil loads that can be developed.

None of the borings indicating settlement for the RLE are in the vicinity of the diesel fuel or demin water pipelines. This alone is sufficient to eliminate consideration of potential settlements in the evaluation of these pipelines. However, the following approach is presented to demonstrate the displacement capacity of these pipelines is adequate for the displacements estimated for the RLE.

For a maximum displacement of less than 0.2 inches for the RLE, L must be greater than 3.8 feet for the 4-inch pipeline and 2.8 feet for the 2-inch pipeline. The force necessary to produce a 0.2 deflection can then be calculated to be 1,024 and 1,657 pounds per foot for the 2-inch and 4-inch pipe, respectively. Assuming a moderately dense sand with an internal friction angle of 36° the maximum vertical soil load that can be placed on the pipeline is estimated using standard soil force equations (Trautmann and O'Rourke, 1983) as follows:

H/D = depth to center of pipe/pipe diameter

= 18.2 and 9.8 for the 2-inch and 4-inch pipe, respectively

N_{qv} = 10 and 6 for the 2-inch and 4-inch pipe, respectively

$$S_V = H\gamma N_{qv} D$$

= (43.19/12)126(10)2.375/12) = 898 pounds per foot for the 2-inch pipe

= (38.25/12)126(6)4.5/12) = 904 pounds per foot for the 4-inch pipe

These maximum soil loads are only mobilized after considerable relative displacement has occurred. A lower estimate of this displacement is 0.1 H or 4.3 inches for the 2-inch pipe and 3.8 inches for the 4-inch pipe. The force-displacement relationship can be estimated using the hyperbolic relationships in Trautmann and O'Rourke (1983) for medium dry sand:

$$F = \frac{F_{\max}\Delta}{0.1\Delta_{\max} + 0.9\Delta} \tag{18}$$

where F = soil force on pipe

F_{max} = maximum soil force

Δ = pipe displacement relative to the soil

Δ_{max} = pipe displacement relative to the soil

The loads on the pipe necessary to produce various deflections are summarized in Table 7 along with the soil loads produced by the deflections.

Table 7: Pipe Loads Necessary to Produce Specified Deflections with the Pipe Lengths in Table 6 and Estimates of Soil Restraint Loads

Imposed Deflection, inches	2-inch Pipe Loads, pounds/foot		4-inch Pipe Loads, pounds/foot	
	Pipe Load to Produce Deflection	Soil Load Corresponding to Deflection	Pipe Load to Produce Deflection	Soil Load Corresponding to Deflection
0.2	1,024	294	1,657	323
0.4	514	455	825	489
1	208	675	331	706
2	105	805	167	829
3	70	861	111	881
4	52	891	83	909

The soil loads on the pipes for 0.2 inches of settlement are less than the load required to deflect the pipes. This is clearly insufficient to force the displacement to occur over a length shorter than that necessary to be within stress allowables. The response of the pipe can be expected to be one

where the pipe is pulled up through the settling soil and responds with a much longer effective length at a much lower stress. Therefore, both pipelines are considered acceptable for the RLE.

Examining the borings for which potential surface settlement is likely for the sensitivity analyses reveals that three borings, 110, RL2, and ESI-9C, are in the vicinity of the diesel fuel and demin water pipelines. Eight borings in the vicinity that are not expected to experience surface settlement for the sensitivity analyses, borings 101, 102, 103, 105, 107, 108, ESI-10C, and ESI-10D. Two of these three borings (RC2 and ESI-9C) have a maximum surface settlement of 0.42 inches. Comparison with Table 7 reveals that the soil loads are insufficient to displace the pipe over a length short enough to exceed allowable stresses. The displacements estimated for borings 110 (3.78 inches) cannot be screened out based on soil strength arguments.

The sensitivity analysis displacement estimates for Boring 110 are not considered a significant hazard to the fuel oil and demin water pipelines for the following four reasons. First, boring 110 is very close to the foundation of the containment building. Excavation for the containment building extended to a depth of 9 feet below the elevation of boring 110 and it is very likely that much of the material in the upper 12 feet near boring 110 was removed or significantly densified as a result of construction activities. Second, the two SPT data points from boring 110 leading to an assessment of liquefaction for the sensitivity analysis are immediately above and below a layer of clayey sand. It is very possible that the unusually low blow counts arose from thin lenses of silt or clay. Third, ten other borings as likely to be representative of the behavior of the soil as boring 110 indicate no or minimal surface displacement. Finally, the assessment makes a very conservative assumption that the ground surface settlement is fully developed over a length equal to the minimum length associated with reaching the allowable stress for the pipelines in accommodating the displacement. For a 4-inch displacement, this length is 17 feet and 12.6 feet for the 4-inch and 2-inch pipelines, respectively. An alternate and equally valid assumption would be to adopt half the distance to an adjacent boring as the length over which the ground surface displacement is developed. In all cases, this length is much greater than 17 feet.

Differential settlement along the buried pipelines will not be abrupt away from connections to buildings or other surface structures. The distribution of soil settlement beneath the pipelines is unknown. However, the most severe loading is one that assumes an abrupt vertical offset similar to what was assumed to occur at the building connections. As this condition was shown to be acceptable, the ground settlements that might occur along the pipelines are considered acceptable.

9.3.2 Service Water Pipelines

There are two service water pipelines, the North Header and the South Header. Both pipelines are is composed of 30-inch diameter cement lined AWWA carbon steel pipe (31.375-inch outside diameter) with bell-and-spigot joints with rubber gaskets that have the capability to undergo small rotations and axial movements without leakage. The bell-and-spigot piping is lined with mortar as a corrosion protection measure. The South Header is buried until its entrance into the south side of the Reactor Auxiliary Building. The North Header is buried until it reaches the vicinity of the Radwaste Building, where it is supported aboveground.

Potential modes of earthquake damage to the buried service water piping include joint opening from wave propagation effects and settlements related to liquefaction. For the reasons provided in 9.3.1, wave propagation strains are not large enough to cause damage, being comparable to small temperature variations in the pipeline. This conclusion is further supported by the fact that the gasketed pipe joints isolate the pipe from ground strain from wave propagation by allowing small strains to be accommodated through joint slippage.

As stated above, the gasketed joints in the service water pipelines allow the pipeline to accommodate small strains. This can be quantified by estimating the joint slippage required for a typical pipe segment. The limiting factor for the gasketed joints is the amount of joint displacement that can occur before the joint begins to leak. The displacement from seismic wave propagation can be estimated by assuming the pipe moves with the surrounding ground. With this approach, the joint shortening or elongation for the typical 20-foot segment of service water pipe is 0.03 inches. The minimum specified gasket embedment depth for the service water pipelines is approximately 1.25 inches (Carolina Power and Light, 1991), more than 20 times greater than the upperbound value of joint movement estimated from wave propagation.

The center line elevation of the service water line is 220.56 feet, 5.44 feet below plant grade. The bottom of the pipe is at elevation 219.25 feet, 6.75 feet below plant grade. From Appendix A, and the available boring log elevations, it can be concluded that the pipeline is below or near the bottom of any soil deposits that might undergo liquefaction consolidation for the RLE. Therefore, the buried service water piping is unaffected by potential settlements related to incipient liquefaction.

For the sensitivity analyses, there are several borings that indicate potential liquefaction settlements below the pipeline. The maximum settlement below the pipeline is estimated to be 2.2 inches. The effect of ground settlement can be assessed by comparing the displacement that

can be accommodated by joint rotation by a single 20-foot section of pipe. For a gasket opening of 1.25 inches, the angular joint rotation is $\tan^{-1}(1.25/31.375) = 2.29°$. It is conservative to assume that one 20-foot section of the service water line may experience rotation relative to an adjacent pipe section because of potential liquefaction settlement. A 2.2 inch settlement requires a 0.53° joint rotation. This is less than 25% of the available joint rotation capacity. Therefore, the conclusions regarding the performance of the service water piping are not affected by the sensitivity analyses.

9.4 Assessment of Pile-Supported Structures

The design of the critical pile-supported structures at Robinson neglected the capacity provided by the upper 50 feet of soil. This design assumption is primarily related to the need to limit settlement by resisting pile loads in the deeper, more competent soils. In addition, pile design assumed a 4-inch lateral offset and the piles were required to carry 100% of the lateral load delivered to the pile caps. The evaluation of critical pile-supported structures conservatively neglected the lateral resistance provided by portions of the structure below grade. As no liquefaction is estimated to extend below the upper 50 feet of soil, pile-supported structures are judged to not be exposed to any geotechnical hazard related to the RLE or the more severe conditions postulated in the sensitivity analyses.

10.0 Conclusions

This assessment has concluded that there are no geotechnical hazards that would impair the performance of buried pipelines and structures at the Robinson site. The assessment has included potential hazards related to slope stability, liquefaction, and earthquake wave propagation effects.

A total of 609 SPT data points have been assessed to determine the potential for liquefaction at the site. None of the available boring logs indicate liquefaction for the RLE.

Estimates of the settlements that might be associated with incipient liquefaction have been shown to not pose a threat to the integrity of buried piping at Robinson.

Slope stability of Robinson dam has been reviewed using the bounding relationships developed by Newmark and recommended in EPRI NP-6041. It is concluded that a maximum displacement of less than 0.5 inches along the critical slip surface is possible for the RLE. This estimate is believed to considerably overestimate expected displacements because the procedure has been correlated to earthquakes of larger magnitude than the RLE and a very high peak ground velocity

for a magnitude 5.15 earthquake. The possible displacement of less than 0.5 inches is less than 15% of the value commonly associated with loss of stability for coherent slide movements.

The submerged slopes surrounding the intake pool have been assessed as adequate based on a conservative assumption of loss of sheet pile integrity. This assumption does not result in a change to the intake pool that would impair intake pump function.

Ground strains resulting from ground shaking have been shown to be quite small, even for the large ground velocity assumed in the calculation. The computed ground strains expected to be generated by the RLE are approximately equivalent to only a 11° F temperature change in the pipeline.

Sensitivity analyses have indicated that the conclusions regarding structural response are not sensitive to significant increases in earthquake magnitude and decreases in the acceptable probability of liquefaction.

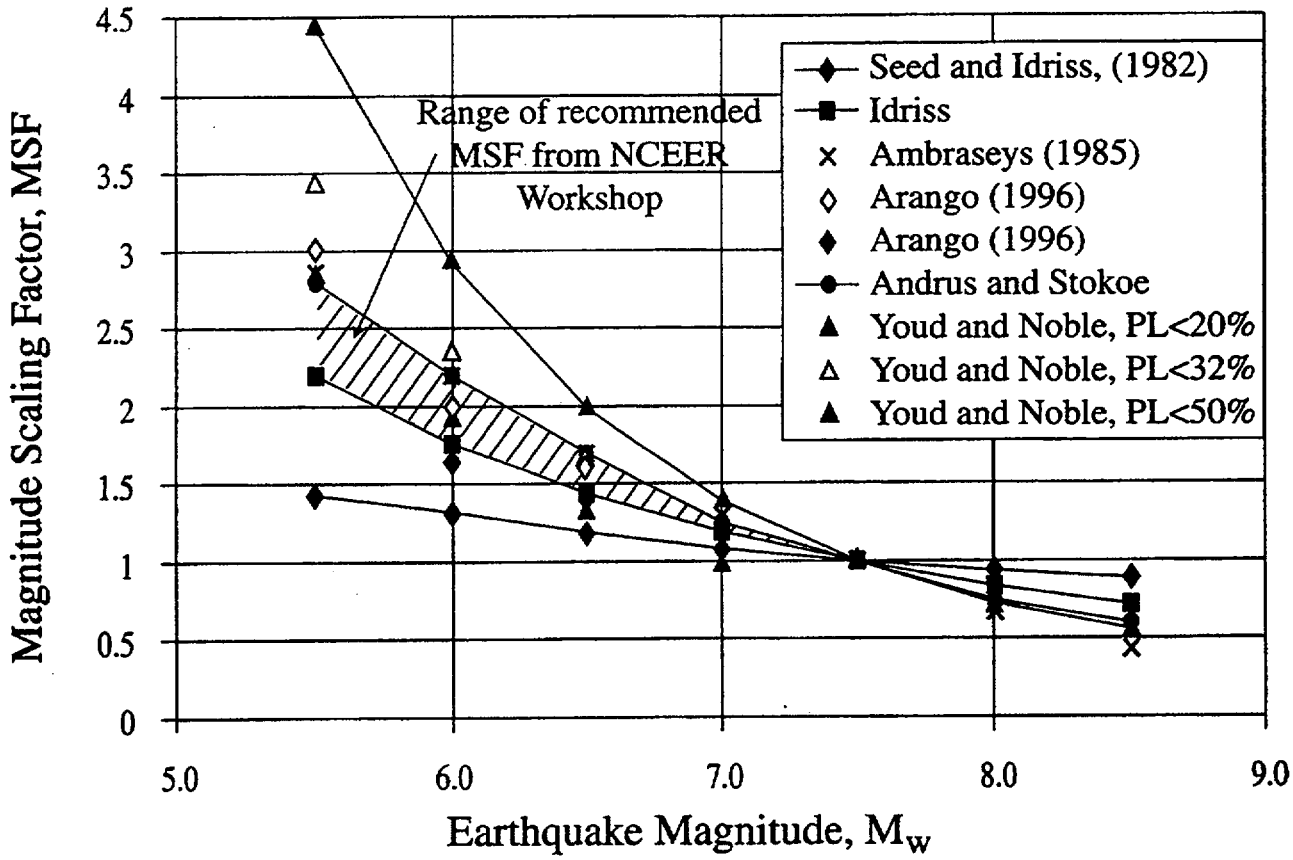


Figure 1: Magnitude Scaling Factors Considered in the 1997 Liquefaction Workshop

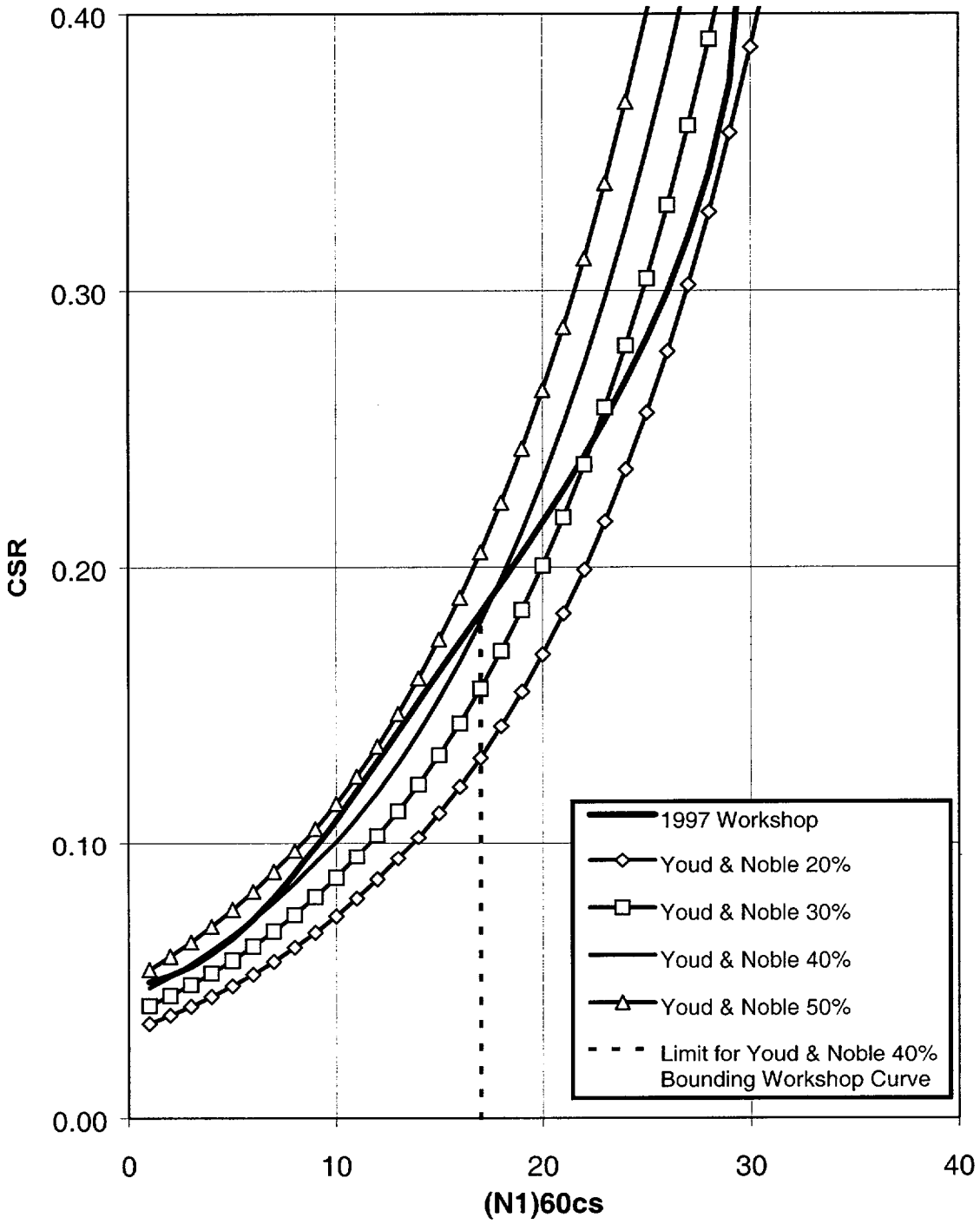


Figure 2: Comparison of Youd and Noble (1997) Curves with 1997 Liquefaction Workshop Baseline Curve

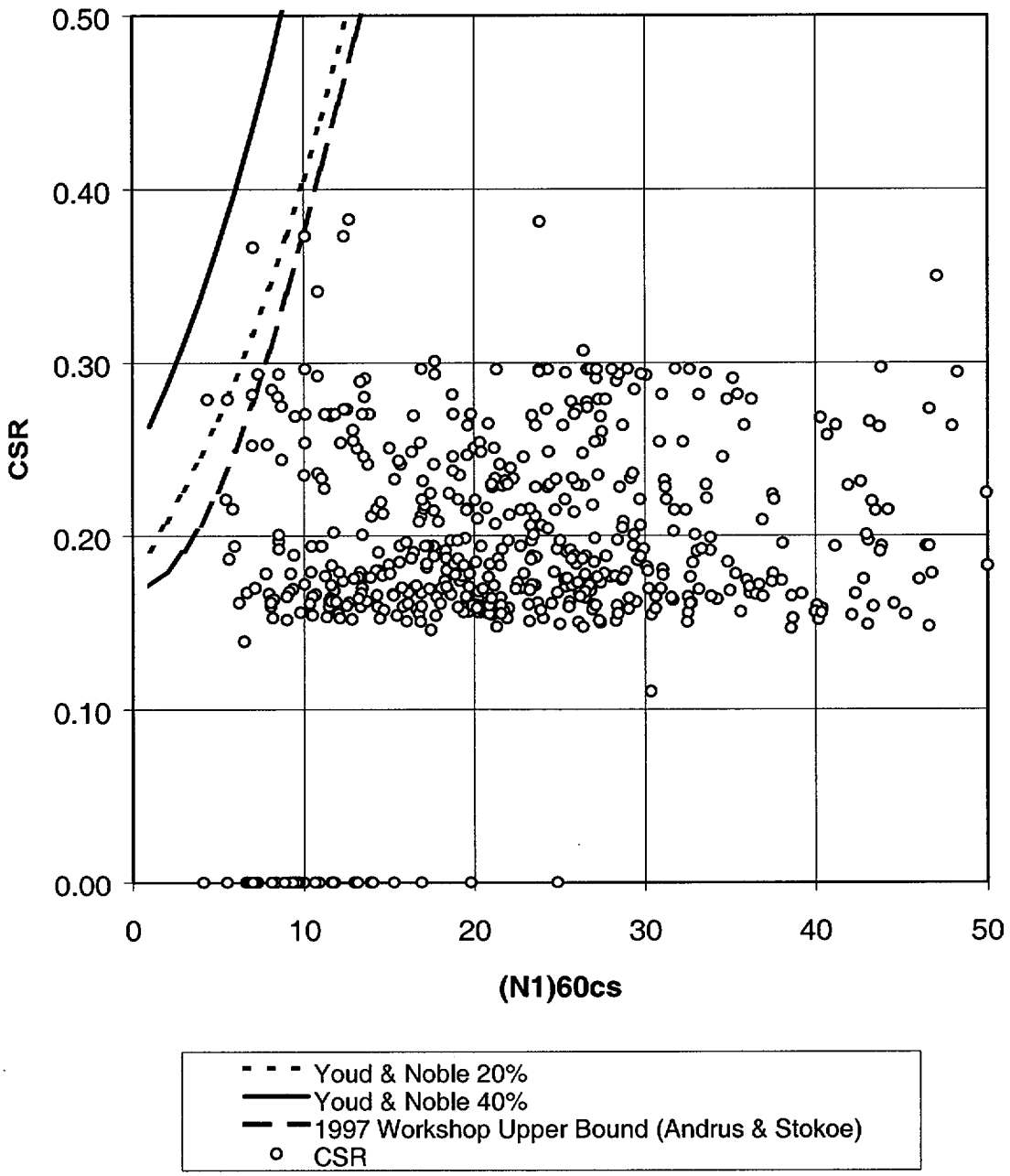


Figure 3: Results of Liquefaction Assessment for the IPEEE RLE

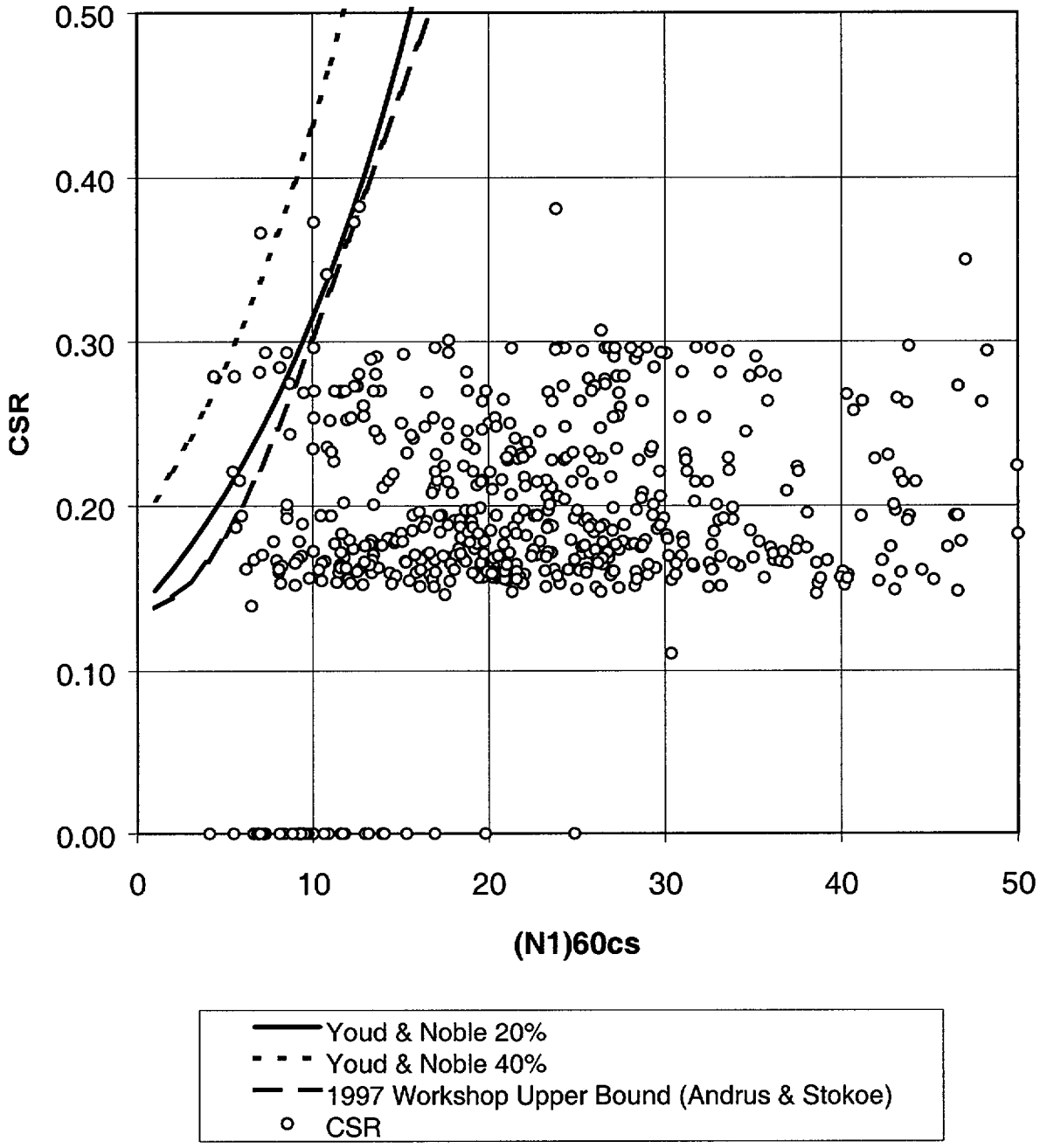


Figure 4: Results of Liquefaction Assessment to Assess the Sensitivity of Conclusions Based on the RLE

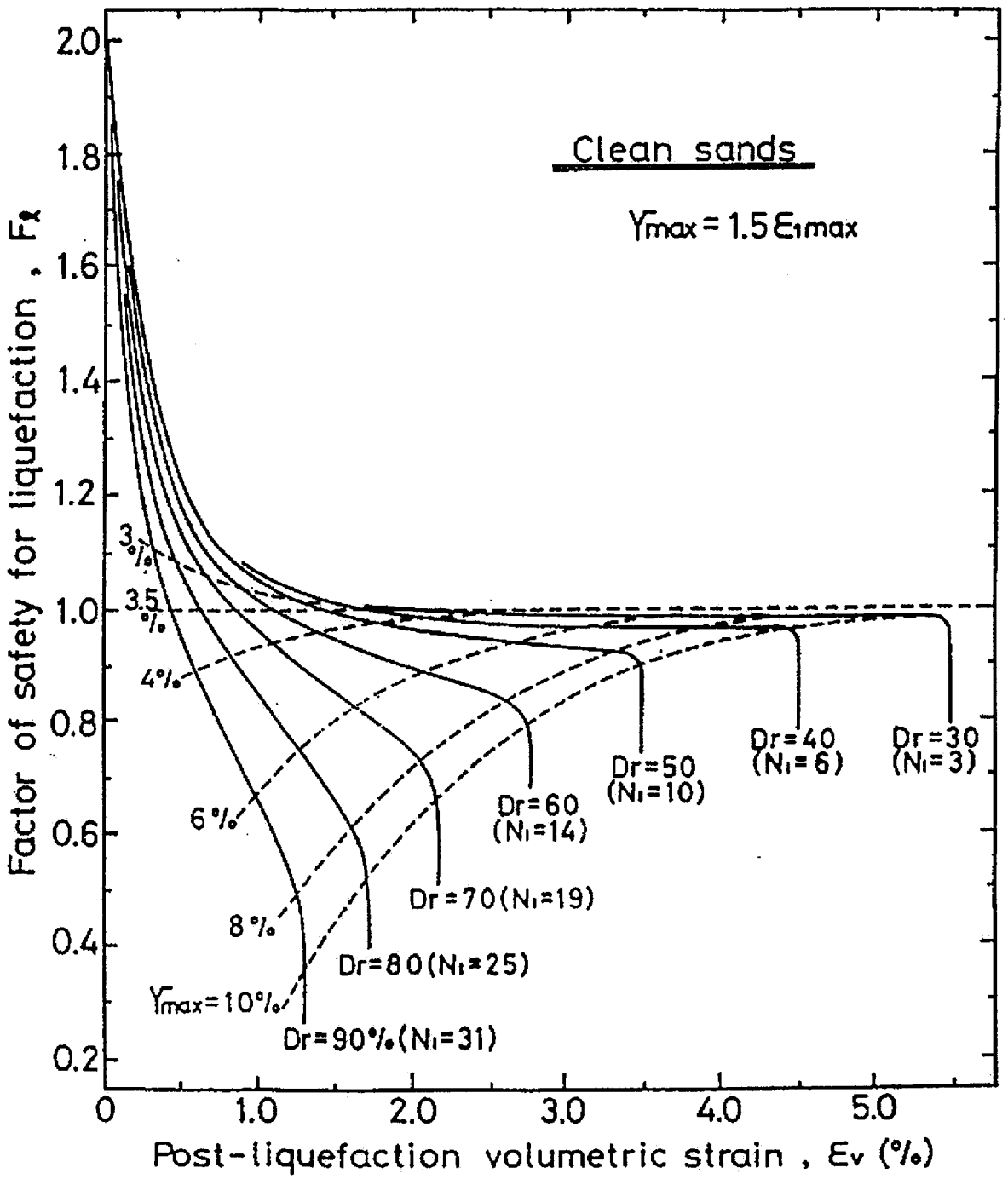


Figure 5: Liquefaction Settlement Estimation Chart (Ishihara, 1990)

Appendix A

Constants		
Soil wt.	126	pcf
Water wt.	62.4	pcf
Pa	2000	psf
PGA	0.3	g
M	5.15	Moment magnitude
PL	0.4	target probability of liquefaction
MSF	3.45731	magnitude scaling factor (Andrus & Stokoe)
CRR-a	0.048	
CRR-b	-0.1248	
CRR-c	-0.00472	
CRR-d	0.009578	
CRR-e	0.000614	
CRR-f	-0.00033	
CRR-g	-1.7E-05	
CRR-h	3.71E-06	
rd-a	-0.4113	
rd-b	0.04052	
rd-c	0.001753	
rd-d	-0.4177	
rd-e	0.05729	
rd-f	-0.00621	
rd-g	0.00121	

2	Default Water Table Depth	
226	Default Ground Surface Elevation	
224	Default Water Table Elevation	

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
101	3	23	SW	3.5	300	2	10	0.9	1	378	409.2	0.98	2.0	0.75	17.7	26.5	28.0	0.18	1.00	0.34	1.94	1.00			101				
101	11	22	SC	3.5	300	2	35	5	1.2	1386	918	0.88	1.5	0.75	16.9	18.7	27.5	0.26	1.00	0.33	1.27	2.39			101				
101	16	19	SW	3.5	300	2	10	0.9	1	2016	1236	0.73	1.3	0.85	14.6	15.8	17.0	0.23	1.00	0.18	0.79	1.00			101				
101	21	22	SW	3.5	300	2	10	0.9	1	2646	1554	0.60	1.1	0.95	16.9	18.2	19.5	0.20	1.00	0.21	1.06	1.23			101				
101	25	32	SW	3.5	300	2	10	0.9	1	3150	1808	0.54	1.1	0.95	24.6	24.6	26.0	0.18	1.00	0.30	1.63	2.11			101				
101	31	6	SC	3.5	300	2	35	5	1.2	3906	2190	0.50	1.0	0.95	4.6	4.2	10.0	0.17	0.99	0.11	0.63	0.56			101				
101	34	8	SC	3.5	300	2	35	5	1.2	4284	2381	0.48	0.9	1	6.2	5.6	11.8	0.17	0.98	0.12	0.74	0.65			101				
101	35	2	SC	3.5	300	2	35	5	1.2	4410	2444	0.48	0.9	1	1.5	1.4	6.7	0.17	0.97	0.08	0.45	0.42			101				
101	39	37	SM	3.5	300	2	25	4.3	1.1	4914	2699	0.46	0.9	1	28.5	24.5	31.6	0.16	0.95	4.77	29.22	1.00			101				
101	41	22	SM	3.5	300	2	25	4.3	1.1	5166	2826	0.45	0.8	1	16.9	14.2	20.2	0.16	0.94	0.21	1.28	1.30			101				
101	46	30	SW	3.5	300	2	10	0.9	1	5796	3144	0.44	0.8	1	23.1	18.4	19.7	0.16	0.92	0.20	1.25	1.25			101				
101	48	48	SW	3.5	300	2	10	0.9	1	6048	3271	0.43	0.8	1	36.9	28.9	30.4	0.15	0.91	4.54	29.36	1.00			101				
101	51	20	SP	3.5	300	2	10	0.9	1	6426	3462	0.42	0.8	1	15.4	11.7	12.8	0.15	0.90	0.12	0.82	0.70			101				
101	56	80	SP	3.5	300	2	10	0.9	1	7056	3780	0.41	0.7	1	81.5	44.8	46.6	0.15	0.87	4.37	29.51	1.00			101				
101	57	200	SP	3.5	300	2	10	0.9	1	7182	3844	0.40	0.7	1	153.8	111.0	114.2	0.15	0.87	4.35	29.53	1.00			101				
102	3	18	SM	2	300	1.5	25	4.3	1.1	378	315.6	0.98	2.0	0.75	10.4	15.6	21.7	0.23	1.00	0.24	1.03	1.47			102				
102	6	24	SM	2	300	1.5	25	4.3	1.1	756	506.4	0.96	2.0	0.75	13.8	20.6	27.3	0.28	1.00	0.33	1.17	2.36			102				
102	11	32	SM	2	300	1.5	25	4.3	1.1	1386	824.4	0.88	1.6	0.75	18.5	21.6	28.3	0.29	1.00	0.35	1.22	2.57			102				
102	17	23	SP	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	13.3	14.5	15.7	0.24	1.00	0.17	0.70	0.90			102				
102	18	23	SP	2	300	1.5	10	0.9	1	2268	1270	0.67	1.3	0.85	13.3	14.2	15.3	0.23	1.00	0.17	0.71	0.87			102				
102	22	36	SP	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	20.8	22.6	24.0	0.21	1.00	0.27	1.29	1.79			102				
102	27	46	SP	2	300	1.5	10	0.9	1	3402	1842	0.52	1.0	0.95	26.5	26.3	27.7	0.19	1.00	0.34	1.78	2.44			102				
102	32	68	SP	2	300	1.5	10	0.9	1	4032	2160	0.49	1.0	0.95	39.2	35.9	37.5	0.18	0.99	4.96	27.81	1.00			102				
102	35	21	SP	2	300	1.5	10	0.9	1	4410	2351	0.48	0.9	1	12.1	11.2	12.3	0.17	0.98	0.13	0.75	0.67			102				
102	38	24	SP	2	300	1.5	10	0.9	1	4788	2542	0.46	0.9	1	13.8	12.3	13.4	0.17	0.97	0.14	0.82	0.74			102				
102	43	42	SP	2	300	1.5	10	0.9	1	5418	2860	0.45	0.8	1	24.2	20.3	21.6	0.16	0.94	0.22	1.34	1.46			102				
102	47	44	SM	2	300	1.5	25	4.3	1.1	5922	3114	0.43	0.8	1	25.4	20.3	27.0	0.16	0.92	0.29	1.83	2.29			102				
102	48	17	ML	2	300	1.5	xxx	5	1.2	6048	3178	0.43	0.8	1	9.8	7.8	14.3	0.16	0.92	9.16	57.48	0.80			102				
102	51	43	SP	2	300	1.5	10	0.9	1	6426	3368	0.42	0.8	1	24.8	19.1	20.4	0.16	0.90	0.20	1.27	1.33			102				
102	54	147	ML	2	300	1.5	xxx	5	1.2	6804	3559	0.41	0.7	1	84.8	63.6	81.3	0.15	0.89	4.44	28.92	1.00			102				
102	57	170	ML	2	300	1.5	xxx	5	1.2	7182	3750	0.40	0.7	1	98.1	71.6	91.0	0.15	0.88	4.38	29.01	1.00			102				
103	3	27	SC	3	300	1.5	35	5	1.2	378	378	0.98	2.0	0.75	15.6	23.4	33.0	0.19	1.00	5.00	26.18	1.00			103				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ'_{vo}	(29) Depth
103	5	30	SP	3	300	1.5	10	0.9	1	630	505.2	0.97	2.0	0.75	17.3	25.8	27.3	0.23	1.00	0.33	1.38	2.35			103				
103	9	37	SP	3	300	1.5	10	0.9	1	1134	759.6	0.92	1.6	0.75	21.3	26.0	27.4	0.27	1.00	0.33	1.22	2.38			103				
103	15	27	SP	3	300	1.5	10	0.9	1	1890	1141	0.76	1.3	0.85	15.6	17.5	18.8	0.25	1.00	0.20	0.82	1.16			103				
103	19	28	SP	3	300	1.5	10	0.9	1	2394	1396	0.64	1.2	0.85	16.2	16.4	17.7	0.21	1.00	0.19	0.89	1.06			103				
103	25	38	SP	3	300	1.5	10	0.9	1	3150	1777	0.54	1.1	0.95	21.9	22.1	23.4	0.19	1.00	0.26	1.39	1.71			103				
103	29	62	SW	3	300	1.5	10	0.9	1	3654	2032	0.51	1.0	0.95	35.8	33.7	35.3	0.18	1.00	4.99	28.04	1.00			103				
103	34	45	SW	3	300	1.5	10	0.9	1	4284	2350	0.48	0.9	1	26.0	24.0	25.3	0.17	0.98	0.28	1.65	2.00			103				
103	36	49	SW	3	300	1.5	10	0.9	1	4536	2477	0.47	0.9	1	28.3	25.4	26.8	0.17	0.97	0.31	1.82	2.27			103				
103	39	62	SW	3	300	1.5	10	0.9	1	4914	2668	0.46	0.9	1	35.8	31.0	32.5	0.17	0.96	4.78	28.95	1.00			103				
103	44	57	SP	3	300	1.5	10	0.9	1	5544	2986	0.44	0.8	1	32.9	26.9	28.4	0.16	0.93	0.33	2.05	2.58			103				
103	46	70	SM	3	300	1.5	25	4.3	1.1	5796	3113	0.44	0.8	1	40.4	32.4	40.4	0.16	0.92	4.60	29.12	1.00			103				
103	48	75	SW	3	300	1.5	10	0.9	1	6048	3240	0.43	0.8	1	43.3	34.0	35.6	0.16	0.91	4.56	29.16	1.00			103				
103	52	52	SW	3	300	1.5	10	0.9	1	6552	3494	0.42	0.8	1	30.0	22.7	24.1	0.15	0.89	0.24	1.57	1.80			103				
103	56	130	ML	3	300	1.5	xxx	5	1.2	7056	3749	0.41	0.7	1	75.0	54.8	70.7	0.15	0.88	4.38	29.33	1.00			103				
104	2	35	SP	3	300	2	10	0.9	1	252	314.4	0.99	2.0	0.75	26.9	40.4	42.1	0.15	1.00	5.00	32.42	1.00			104				
104	7	29	SC	3	300	2	35	5	1.2	882	632.4	0.95	1.8	0.75	22.3	29.8	40.7	0.26	1.00	5.00	19.38	1.00			104				
104	12.5	56	SP	3	300	2	10	0.9	1	1575	982.2	0.84	1.4	0.75	43.1	46.1	48.0	0.26	1.00	5.00	18.99	1.00			104				
104	17	39	SP	3	300	2	10	0.9	1	2142	1268	0.70	1.3	0.85	30.0	32.0	33.6	0.23	1.00	5.00	21.81	1.00			104				
104	23	49	SP	3	300	2	10	0.9	1	2898	1650	0.57	1.1	0.95	37.7	39.4	41.1	0.19	1.00	5.00	25.81	1.00			104				
104	27	65	SP	3	300	2	10	0.9	1	3402	1904	0.52	1.0	0.95	50.0	48.7	50.6	0.18	1.00	5.00	27.46	1.00			104				
104	31	60	SC	3	300	2	35	5	1.2	3906	2159	0.50	1.0	0.95	46.2	42.2	55.6	0.17	0.99	4.96	28.38	1.00			104				
104	35	42	SP	3	300	2	10	0.9	1	4410	2413	0.48	0.9	1	32.3	29.4	30.9	0.17	0.98	4.88	28.76	1.00			104				
104	37	23	SP	3	300	2	10	0.9	1	4662	2540	0.47	0.9	1	17.7	15.7	16.9	0.17	0.97	0.18	1.05	0.99			104				
104	41	29	SP	3	300	2	10	0.9	1	5166	2795	0.45	0.8	1	22.3	18.9	20.1	0.16	0.95	0.21	1.26	1.30			104				
104	44	51	SM	3	300	2	25	4.3	1.1	5544	2986	0.44	0.8	1	39.2	32.1	40.1	0.16	0.93	4.65	29.08	1.00			104				
104	46	36	SM	3	300	2	25	4.3	1.1	5796	3113	0.44	0.8	1	27.7	22.2	29.0	0.16	0.92	0.35	2.19	2.73			104				
104	48	24	SM	3	300	2	25	4.3	1.1	6048	3240	0.43	0.8	1	18.5	14.5	20.5	0.16	0.91	0.20	1.29	1.33			104				
104	52	53	SM	3	300	2	25	4.3	1.1	6552	3494	0.42	0.8	1	40.8	30.8	38.7	0.15	0.89	4.46	29.24	1.00			104				
104	55	130	CL	3	300	2	xxx	5	1.2	6930	3685	0.41	0.7	1	100.0	73.7	93.4	0.15	0.88	4.40	29.31	1.00			104				
105	2	48	SP	1.5	300	1.5	10	0.9	1	252	220.8	0.99	2.0	0.75	27.7	41.5	43.3	0.22	1.00	5.00	22.77	1.00			105				
105	6	41	SM	1.5	300	1.5	25	4.3	1.1	756	475.2	0.96	2.0	0.75	23.7	35.5	43.8	0.30	1.00	5.00	16.83	1.00			105				
105	11	24	SW	1.5	300	1.5	10	0.9	1	1386	793.2	0.88	1.6	0.75	13.8	16.5	17.7	0.30	1.00	0.19	0.64	1.06			105				
105	17	39	SW	1.5	300	1.5	10	0.9	1	2142	1175	0.70	1.3	0.85	22.5	25.0	26.4	0.25	1.00	0.31	1.24	2.18			105				
105	21	30	SW	1.5	300	1.5	10	0.9	1	2646	1429	0.60	1.2	0.95	17.3	19.5	20.7	0.22	1.00	0.22	1.04	1.36			105				
105	27	56	SW	1.5	300	1.5	10	0.9	1	3402	1811	0.52	1.1	0.95	32.3	32.3	33.8	0.19	1.00	5.00	26.11	1.00			105				
105	31	76	SM	1.5	300	1.5	25	4.3	1.1	3906	2065	0.50	1.0	0.95	43.8	41.0	50.0	0.18	1.00	4.99	27.28	1.00			105				
105	35	43	ML	1.5	300	1.5	xxx	5	1.2	4410	2320	0.48	0.9	1	24.8	23.0	32.6	0.18	0.98	4.91	27.84	1.00			105				
105	37	57	SM	1.5	300	1.5	25	4.3	1.1	4662	2447	0.47	0.9	1	32.9	29.7	37.4	0.17	0.97	4.86	28.02	1.00			105				
105	41	24	SM	1.5	300	1.5	25	4.3	1.1	5166	2701	0.45	0.9	1	13.8	11.9	17.6	0.17	0.95	0.18	1.07	1.05			105				
105	45	40	SW	1.5	300	1.5	10	0.9	1	5670	2956	0.44	0.8	1	23.1	19.0	20.3	0.16	0.93	0.20	1.25	1.31			105				
105	48	93	SW	1.5	300	1.5	10	0.9	1	6048	3146	0.43	0.8	1	53.7	42.8	44.6	0.16	0.92	4.59	28.53	1.00			105				
105	54	100	SW	1.5	300	1.5	10	0.9	1	6804	3528	0.41	0.8	1	57.7	43.4	45.2	0.15	0.89	4.45	28.73	1.00			105				
105	58	64	SW	1.5	300	1.5	10	0.9	1	7308	3782	0.40	0.7	1	36.9	26.8	28.3	0.15	0.87	0.31	2.03	2.56			105				
106	2	43	SC	4	300	2	35	5	1.2	252	376.8	0.99	2.0	0.75	33.1	49.6	64.5	0.13	1.00	5.00	38.86	1.00			106				
106	5	27	SM	4	300	2	25	4.3	1.1	630	567.6	0.97	1.9	0.75	20.8	29.2	36.9	0.21	1.00	5.00	23.93	1.00			106				
106	6	29	SM	4	300	2	25	4.3	1.1	756	631.2	0.96	1.8	0.75	22.3	29.8	37.5	0.22	1.00	5.00	22.35	1.00			106				
106	9	20	SM	4	300	2	25	4.3	1.1	1134	822	0.92	1.6	0.75	15.4	18.0	24.4	0.25	1.00	0.27	1.10	1.85			106				
106	13	37	SW	4	300	2	10	0.9	1	1638	1076	0.83	1.4	0.85	28.5	33.0	34.6	0.25	1.00	5.00	20.38	1.00			106				
106	16	80	SW	4	300	2	10	0.9	1	2016	1267	0.73	1.3	0.85	61.5	65.7	68.0	0.23	1.00	5.00	22.15	1.00			106				
106	19	125	SW	4	300	2	10	0.9	1	2394	1458	0.64	1.2	0.85	96.2	95.7	98.7	0.21	1.00	5.00	24.36	1.00			106				
106	26	60	SW	4	300	2	10	0.9	1	3276	1903	0.53	1.0	0.95	46.2	44.9	46.8	0.18	1.00	5.00	28.03	1.00			106				
106	31	22	SW	4	300	2	10	0.9	1	3906	2221	0.50	0.9	0.95	16.9	15.3	16.5	0.17	0.99	0.18	1.03	0.95			106				
106	36	8	ML	4	300	2	xxx	5	1.2	4536	2539	0.47	0.9	1	6.2	5.5	11.6	0.16	0.97	9.66	58.81	0.63			106				
106	41	10	SM	4	300	2	25	4.3	1.1	5166	2857	0.45	0.8	1	7.7	6.4	11.5	0.16	0.94	0.12	0.73	0.63			106				
106	42	25	SM	4	300	2	25	4.3	1.1	5292	2921	0.45	0.8	1	19.2	15.9	22.0	0.16	0.94	0.22	1.42	1.52			106				
106	47	20	SM	4	300	2	25	4.3	1.1	5922	3239	0.43	0.8	1	15.4	12.1	17.8	0.15	0.91	0.17	1.13	1.07			106				
106	52	45	SP	4	300	2	10	0.9	1	6552	3557	0.42	0.7	1	34.6	26.0	27.4	0.15	0.89	0.29	1.94	2.38			106				
106	56	134	CL	4	300	2	xxx	5	1.2	7056	3811	0.41	0.7	1	103.1	74.7	94.6	0.15	0.87	4.36	29.68	1.00			106				
107	5	26	SM	3	1000	1	25	4.3	1.1	630	505.2	0.97	2.0	0.75	33.3	49.7	59.8	0.23	1.00	5.00	21.30	1.00			107				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
107	8	40	SM	3	1000	1	25	4.3	1.1	1008	696	0.94	1.7	0.75	51.3	65.2	77.0	0.26	1.00	5.00	18.89	1.00			107				
107	14	69	SM	3	1000	1	25	4.3	1.1	1764	1078	0.79	1.4	0.85	88.5	102.4	118.5	0.25	1.00	5.00	19.72	1.00			107				
107	18	24	SP	3	1000	1	10	0.9	1	2268	1332	0.67	1.2	0.85	30.8	32.0	33.6	0.22	1.00	5.00	22.58	1.00			107				
107	19	32	SP	3	1000	1	10	0.9	1	2394	1396	0.64	1.2	0.85	41.0	41.7	43.5	0.21	1.00	5.00	23.32	1.00			107				
107	24	60	SP	3	1000	1	10	0.9	1	3024	1714	0.55	1.1	0.95	76.9	78.9	81.5	0.19	1.00	5.00	26.29	1.00			107				
107	29	44	SP	3	1000	1	10	0.9	1	3654	2032	0.51	1.0	0.95	56.4	53.2	55.2	0.18	1.00	4.99	28.04	1.00			107				
107	35	18	SC	3	1000	1	35	5	1.2	4410	2413	0.48	0.9	1	23.1	21.0	30.2	0.17	0.98	4.88	28.76	1.00			107				
107	37	94	SP	3	1000	1	10	0.9	1	4662	2540	0.47	0.9	1	120.5	106.9	110.1	0.17	0.97	4.83	28.87	1.00			107				
107	43	56	SP	3	1000	1	10	0.9	1	5418	2922	0.45	0.8	1	71.8	59.4	61.6	0.16	0.94	4.68	29.06	1.00			107				
107	48	80	SW	3	1000	1	10	0.9	1	6048	3240	0.43	0.8	1	102.6	80.6	83.2	0.16	0.91	4.56	29.16	1.00			107				
107	55	250	CL	3	1000	1	xxx	5	1.2	6930	3685	0.41	0.7	1	320.5	236.1	288.3	0.15	0.88	4.40	29.31	1.00			107				
108	2	18	SC	2	300	2	35	5	1.2	252	252	0.99	2.0	0.75	13.8	20.8	29.9	0.19	1.00	0.44	2.31	1.00			108				
108	5	28	SM	2	300	2	25	4.3	1.1	630	442.8	0.97	2.0	0.75	21.5	32.3	40.3	0.27	1.00	5.00	18.67	1.00			108				
108	8	27	SM	2	300	2	25	4.3	1.1	1008	633.6	0.94	1.8	0.75	20.8	27.7	35.1	0.29	1.00	5.00	17.20	1.00			108				
108	12	26	SM	2	300	2	25	4.3	1.1	1512	888	0.86	1.5	0.75	20.0	22.5	29.4	0.28	1.00	0.39	1.38	2.81			108				
108	16	23	SP	2	300	2	10	0.9	1	2016	1142	0.73	1.3	0.85	17.7	19.9	21.2	0.25	1.00	0.23	0.92	1.42			108				
108	21	26	SP	2	300	2	10	0.9	1	2646	1460	0.60	1.2	0.95	20.0	22.2	23.6	0.21	1.00	0.26	1.24	1.73			108				
108	26	31	SP	2	300	2	10	0.9	1	3276	1778	0.53	1.1	0.95	23.8	24.0	25.4	0.19	1.00	0.29	1.52	2.01			108				
108	31	17	ML	2	300	2	xxx	5	1.2	3906	2096	0.50	1.0	0.95	13.1	12.1	19.6	0.18	1.00	9.96	55.30	1.24			108				
108	37	25	CL	2	300	2	xxx	5	1.2	4662	2478	0.47	0.9	1	19.2	17.3	25.7	0.17	0.97	9.70	56.61	2.07			108				
108	41	57	SP	2	300	2	10	0.9	1	5166	2732	0.45	0.9	1	43.8	37.5	39.2	0.17	0.95	4.75	28.51	1.00			108				
108	47	24	SP	2	300	2	10	0.9	1	5922	3114	0.43	0.8	1	18.5	14.8	16.0	0.16	0.92	0.16	0.99	0.92			108				
108	51	32	SP	2	300	2	10	0.9	1	6426	3368	0.42	0.8	1	24.6	19.0	20.2	0.16	0.90	0.20	1.26	1.31			108				
108	53	143	CL	2	300	2	xxx	5	1.2	6678	3496	0.41	0.8	1	110.0	83.2	104.8	0.15	0.89	4.46	28.89	1.00			108				
109	3	13	SP	2	1000	1	10	0.9	1	378	315.6	0.98	2.0	0.75	16.7	25.0	26.4	0.23	1.00	0.31	1.34	2.19			109				
109	6	13	CL	2	1000	1	xxx	5	1.2	756	506.4	0.96	2.0	0.75	16.7	24.8	34.8	0.28	1.00	5.00	17.93	1.00			109				
109	8	32	CL	2	1000	1	xxx	5	1.2	1008	633.6	0.94	1.8	0.75	41.0	54.7	70.6	0.29	1.00	5.00	17.20	1.00			109				
109	12	28	CL	2	1000	1	xxx	5	1.2	1512	888	0.86	1.5	0.75	35.9	40.4	53.5	0.28	1.00	5.00	17.58	1.00			109				
109	16	13	SW	2	1000	1	10	0.9	1	2016	1142	0.73	1.3	0.85	16.7	18.7	20.0	0.25	1.00	0.22	0.86	1.28			109				
109	19	36	SW	2	1000	1	10	0.9	1	2394	1333	0.64	1.2	0.85	46.2	48.1	50.0	0.22	1.00	5.00	22.28	1.00			109				
109	25	32	SW	2	1000	1	10	0.9	1	3150	1715	0.54	1.1	0.95	41.0	42.1	43.9	0.19	1.00	5.00	25.78	1.00			109				
109	29	16	SW	2	1000	1	10	0.9	1	3654	1969	0.51	1.0	0.95	20.5	19.6	20.9	0.18	1.00	0.23	1.24	1.39			109				
109	35	10	ML	2	1000	1	xxx	5	1.2	4410	2351	0.48	0.9	1	12.8	11.8	19.2	0.17	0.98	9.80	56.30	1.20			109				
109	38	13	ML	2	1000	1	xxx	5	1.2	4788	2542	0.46	0.9	1	16.7	14.8	22.7	0.17	0.97	9.65	56.73	1.61			109				
109	43	28	SP	2	1000	1	10	0.9	1	5418	2860	0.45	0.8	1	35.9	30.0	31.5	0.16	0.94	4.70	28.59	1.00			109				
109	48	12	SP	2	1000	1	10	0.9	1	6048	3178	0.43	0.8	1	15.4	12.2	13.3	0.16	0.92	0.13	0.83	0.74			109				
109	53	239	CL	2	1000	1	xxx	5	1.2	6678	3496	0.41	0.8	1	306.4	231.8	283.1	0.15	0.89	4.46	28.89	1.00			109				
110	2	16	SM	2	300	2	25	4.3	1.1	252	252	0.99	2.0	0.75	12.3	18.5	24.9	0.19	1.00	0.28	1.46	1.00			110				
110	6	4	SP	2	300	2	10	0.9	1	756	506.4	0.96	2.0	0.75	3.1	4.6	5.6	0.28	1.00	0.07	0.25	0.38			110				
110	8	7	SC	2	300	2	35	5	1.2	1008	633.6	0.94	1.8	0.75	5.4	7.2	13.6	0.29	1.00	0.15	0.51	0.75			110				
110	12	4	SM	2	300	2	25	4.3	1.1	1512	888	0.86	1.5	0.75	3.1	3.5	8.2	0.28	1.00	0.09	0.32	0.48			110				
110	17	15	SP	2	300	2	10	0.9	1	2142	1206	0.70	1.3	0.85	11.5	12.6	13.8	0.24	1.00	0.15	0.62	0.76			110				
110	21	15	SP	2	300	2	10	0.9	1	2646	1460	0.60	1.2	0.95	11.5	12.8	14.0	0.21	1.00	0.15	0.72	0.78			110				
110	27	29	SP	2	300	2	10	0.9	1	3402	1842	0.52	1.0	0.95	22.3	22.1	23.4	0.19	1.00	0.26	1.38	1.71			110				
110	31	11	ML	2	300	2	xxx	5	1.2	3906	2096	0.50	1.0	0.95	8.5	7.9	14.4	0.18	1.00	9.96	55.30	0.81			110				
110	37	16	SM	2	300	2	25	4.3	1.1	4662	2478	0.47	0.9	1	12.3	11.1	16.6	0.17	0.97	0.17	1.02	0.97			110				
110	41	5	SM	2	300	2	25	4.3	1.1	5166	2732	0.45	0.9	1	3.8	3.3	8.0	0.17	0.95	0.08	0.50	0.47			110				
110	46	28	SM	2	300	2	25	4.3	1.1	5796	3050	0.44	0.8	1	21.5	17.4	23.7	0.16	0.93	0.24	1.51	1.75			110				
110	51	54	SM	2	300	2	25	4.3	1.1	6426	3368	0.42	0.8	1	41.5	32.0	40.0	0.16	0.90	4.51	28.83	1.00			110				
110	57	39	SP	2	300	2	10	0.9	1	7182	3750	0.40	0.7	1	30.0	21.9	23.3	0.15	0.88	0.22	1.49	1.68			110				
111	3	28	SC	3	300	2	35	5	1.2	378	378	0.98	2.0	0.75	21.5	32.3	43.8	0.19	1.00	5.00	26.18	1.00			111				
111	6	10	SM	3	300	2	25	4.3	1.1	756	568.8	0.96	1.9	0.75	7.7	10.8	16.4	0.25	1.00	0.18	0.71	0.95			111				
111	8	20	SW	3	300	2	10	0.9	1	1008	696	0.94	1.7	0.75	15.4	19.6	20.9	0.26	1.00	0.23	0.85	1.38			111				
111	12	38	SC	3	300	2	35	5	1.2	1512	950.4	0.86	1.5	0.75	29.2	31.8	43.2	0.27	1.00	5.00	18.82	1.00			111				
111	17	30	SW	3	300	2	10	0.9	1	2142	1268	0.70	1.3	0.85	23.1	24.6	26.0	0.23	1.00	0.30	1.31	2.12			111				
111	21	36	SW	3	300	2	10	0.9	1	2646	1523	0.60	1.1	0.95	27.7	30.1	31.7	0.20	1.00	5.00	24.68	1.00			111				
111	26	41	SW	3	300	2	10	0.9	1	3276	1841	0.53	1.0	0.95	31.5	31.2	32.8	0.18	1.00	5.00	27.11	1.00			111				
111	31	34	SW	3	300	2	10	0.9	1	3906	2159	0.50	1.0	0.95	26.2	23.9	25.3	0.17	0.99	0.29	1.63	2.00			111				
111	36	25	SP	3	300	2	10	0.9	1	4536	2477	0.47	0.9	1	19.2	17.3	18.5	0.17	0.97	0.19	1.15	1.13			111				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
111	41	16	SP	3	300	2	10	0.9	1	5166	2795	0.45	0.8	1	12.3	10.4	11.5	0.16	0.95	0.12	0.72	0.63			111				
111	46	25	SP	3	300	2	10	0.9	1	5796	3113	0.44	0.8	1	19.2	15.4	16.6	0.16	0.92	0.17	1.04	0.97			111				
111	51	9	ML	3	300	2	xxx	5	1.2	6426	3431	0.42	0.8	1	6.9	5.3	11.3	0.15	0.90	8.97	58.43	0.62			111				
111	56	210	CL	3	300	2	xxx	5	1.2	7056	3749	0.41	0.7	1	161.5	118.0	146.6	0.15	0.88	4.38	29.33	1.00			111				
112	3	16	SC	2	1000	1	35	5	1.2	378	315.6	0.98	2.0	0.75	20.5	30.8	41.9	0.23	1.00	5.00	21.86	1.00			112				
112	6	15	SM	2	1000	1	25	4.3	1.1	756	506.4	0.96	2.0	0.75	19.2	28.7	36.2	0.28	1.00	5.00	17.93	1.00			112				
112	8	12	SM	2	1000	1	25	4.3	1.1	1008	633.6	0.94	1.8	0.75	15.4	20.5	27.1	0.29	1.00	0.32	1.11	2.33			112				
112	12	36	SM	2	1000	1	25	4.3	1.1	1512	888	0.86	1.5	0.75	46.2	51.9	62.2	0.28	1.00	5.00	17.58	1.00			112				
112	16	47	SP	2	1000	1	10	0.9	1	2016	1142	0.73	1.3	0.85	60.3	67.8	70.1	0.25	1.00	5.00	19.97	1.00			112				
112	21	11	SP	2	1000	1	10	0.9	1	2646	1460	0.60	1.2	0.95	14.1	15.7	16.9	0.21	1.00	0.18	0.86	0.99			112				
112	26	13	SP	2	1000	1	10	0.9	1	3276	1778	0.53	1.1	0.95	16.7	16.8	18.0	0.19	1.00	0.19	1.02	1.09			112				
112	31	11	SP	2	1000	1	10	0.9	1	3906	2096	0.50	1.0	0.95	14.1	13.1	14.2	0.18	1.00	0.15	0.85	0.79			112				
112	36	94	SP	2	1000	1	10	0.9	1	4536	2414	0.47	0.9	1	120.5	109.7	112.9	0.17	0.98	4.88	28.23	1.00			112				
112	41	37	SP	2	1000	1	10	0.9	1	5166	2732	0.45	0.9	1	47.4	40.6	42.3	0.17	0.95	4.75	28.51	1.00			112				
112	46	30	SP	2	1000	1	10	0.9	1	5796	3050	0.44	0.8	1	38.5	31.1	32.7	0.16	0.93	4.63	28.68	1.00			112				
112	51	51	SP	2	1000	1	10	0.9	1	6426	3368	0.42	0.8	1	65.4	50.4	52.3	0.16	0.90	4.51	28.83	1.00			112				
112	57	210	CL	2	1000	1	xxx	5	1.2	7182	3750	0.40	0.7	1	269.2	196.6	240.9	0.15	0.88	4.38	29.01	1.00			112				
113	2	26	SP	0	300	1.5	10	0.9	1	252	127.2	0.99	2.0	0.75	15.0	22.5	23.9	0.38	1.00	0.27	0.70	1.77			113				
113	5	13	SP	0	300	1.5	10	0.9	1	630	318	0.97	2.0	0.75	7.5	11.3	12.4	0.37	1.00	0.13	0.36	0.68			113				
113	7	7	SP	0	300	1.5	10	0.9	1	882	445.2	0.95	2.0	0.75	4.0	6.1	7.1	0.37	1.00	0.08	0.22	0.44		1.189713	113				
113	11	8	SM	0	300	1.5	25	4.3	1.1	1386	699.6	0.88	1.7	0.75	4.6	5.9	10.8	0.34	1.00	0.12	0.34	0.60			113				
113	14	27	SM	0	300	1.5	25	4.3	1.1	1764	890.4	0.79	1.5	0.85	15.6	19.8	26.4	0.31	1.00	0.31	1.00	2.19			113				
113	17	7	SM	0	300	1.5	25	4.3	1.1	2142	1081	0.70	1.4	0.85	4.0	4.7	9.5	0.27	1.00	0.10	0.38	0.53			113				
113	21	61	SW	0	300	1.5	10	0.9	1	2646	1336	0.60	1.2	0.95	35.2	40.9	42.7	0.23	1.00	5.00	21.64	1.00			113				
113	27	18	SW	0	300	1.5	10	0.9	1	3402	1717	0.52	1.1	0.95	10.4	10.6	11.7	0.20	1.00	0.13	0.63	0.64			113				
113	31	31	SW	0	300	1.5	10	0.9	1	3906	1972	0.50	1.0	0.95	17.9	17.1	18.4	0.19	1.00	0.20	1.03	1.12			113				
113	37	21	ML	0	300	1.5	xxx	5	1.2	4662	2353	0.47	0.9	1	12.1	11.2	18.4	0.18	0.98	9.79	54.27	1.12			113				
113	41	68	SP	0	300	1.5	10	0.9	1	5166	2608	0.45	0.9	1	39.2	34.4	36.0	0.17	0.96	4.80	27.49	1.00			113				
113	47	55	SC	0	300	1.5	35	5	1.2	5922	2989	0.43	0.8	1	31.7	26.0	36.1	0.17	0.93	4.65	27.85	1.00			113				
113	51	16	ML	0	300	1.5	xxx	5	1.2	6426	3244	0.42	0.8	1	9.2	7.2	13.7	0.16	0.91	9.11	56.08	0.76			113				
113	55	160	CL	0	300	1.5	xxx	5	1.2	6930	3498	0.41	0.8	1	92.3	69.8	88.8	0.16	0.89	4.46	28.22	1.00			113				
114	2	24	SC	2	300	1.5	35	5	1.2	252	252	0.99	2.0	0.75	13.8	20.8	29.9	0.19	1.00	0.44	2.31	1.00			114				
114	6	4	SP	2	300	1.5	10	0.9	1	756	506.4	0.96	2.0	0.75	2.3	3.4	4.4	0.28	1.00	0.06	0.22	0.35		1.251055	114				
114	9	39	SP	2	300	1.5	10	0.9	1	1134	697.2	0.92	1.7	0.75	22.5	28.6	30.1	0.29	1.00	5.00	17.08	1.00			114				
114	14	8	ML	2	300	1.5	xxx	5	1.2	1764	1015	0.79	1.4	0.85	4.6	5.5	11.6	0.27	1.00	10.00	37.16	0.64			114				
114	17	26	SW	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	15.0	16.4	17.6	0.24	1.00	0.19	0.79	1.05			114				
114	22	35	SW	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	20.2	22.0	23.3	0.21	1.00	0.26	1.25	1.69			114				
114	27	44	SW	2	300	1.5	10	0.9	1	3402	1842	0.52	1.0	0.95	25.4	25.1	26.5	0.19	1.00	0.31	1.65	2.21			114				
114	33	13	ML	2	300	1.5	xxx	5	1.2	4158	2224	0.48	0.9	1	7.5	7.1	13.5	0.18	0.99	9.88	55.89	0.75			114				
114	37	26	ML	2	300	1.5	xxx	5	1.2	4662	2478	0.47	0.9	1	15.0	13.5	21.2	0.17	0.97	9.70	56.61	1.41			114				
114	44	51	ML	2	300	1.5	xxx	5	1.2	5544	2923	0.44	0.8	1	29.4	24.3	34.2	0.16	0.94	4.68	28.62	1.00			114				
114	51	27	ML	2	300	1.5	xxx	5	1.2	6426	3368	0.42	0.8	1	15.6	12.0	19.4	0.16	0.90	9.02	57.65	1.22			114				
114	57	150	CL	2	300	1.5	xxx	5	1.2	7182	3750	0.40	0.7	1	86.5	63.2	80.8	0.15	0.88	4.38	29.01	1.00			114				
115	2	18	SM	2	300	1.5	25	4.3	1.1	252	252	0.99	2.0	0.75	10.4	15.6	21.7	0.19	1.00	0.24	1.23	1.00			115				
115	6	22	SC	2	300	1.5	35	5	1.2	756	506.4	0.96	2.0	0.75	12.7	18.9	27.7	0.28	1.00	0.34	1.20	2.44			115				
115	8	59	SC	2	300	1.5	35	5	1.2	1008	633.6	0.94	1.8	0.75	34.0	45.4	59.4	0.29	1.00	5.00	17.20	1.00			115				
115	13	27	SM	2	300	1.5	25	4.3	1.1	1638	951.6	0.83	1.4	0.85	15.6	19.2	25.7	0.28	1.00	0.29	1.06	2.06			115				
115	17	32	SW	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	18.5	20.2	21.5	0.24	1.00	0.23	0.97	1.46			115				
115	22	45	SW	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	26.0	28.3	29.7	0.21	1.00	0.42	2.04	2.89			115				
115	28	50	SW	2	300	1.5	10	0.9	1	3528	1906	0.51	1.0	0.95	28.8	28.1	29.6	0.19	1.00	0.40	2.17	2.85			115				
115	33	49	SW	2	300	1.5	10	0.9	1	4158	2224	0.48	0.9	1	28.3	26.8	28.3	0.18	0.99	0.35	1.96	2.55			115				
115	38	12	SW	2	300	1.5	10	0.9	1	4788	2542	0.46	0.9	1	6.9	6.1	7.1	0.17	0.97	0.08	0.46	0.44			115				
115	43	52	SW	2	300	1.5	10	0.9	1	5418	2860	0.45	0.8	1	30.0	25.1	26.5	0.16	0.94	0.29	1.77	2.21			115				
115	48	32	SW	2	300	1.5	10	0.9	1	6048	3178	0.43	0.8	1	18.5	14.6	15.8	0.16	0.92	0.16	0.98	0.91			115				
115	56	69	CL	2	300	1.5	xxx	5	1.2	7056	3686	0.41	0.7	1	39.8	29.3	40.2	0.15	0.88	4.40	28.98	1.00			115				
116	3	19	SM	2.5	300	2	25	4.3	1.1	378	346.8	0.98	2.0	0.75	14.6	21.9	28.7	0.21	1.00	0.36	1.75	2.66			116				
116	6	29	SC	2.5	300	2	35	5	1.2	756	537.6	0.96	1.9	0.75	22.3	32.3	43.7	0.26	1.00	5.00	19.04	1.00			116				
116	8	18	SC	2.5	300	2	35	5	1.2	1008	664.8	0.94	1.7	0.75	13.8	18.0	26.6	0.28	1.00	0.31	1.12	2.23			116				
116	12	9	SP	2.5	300	2	10	0.9	1	1512	919.2	0.86	1.5	0.75	6.9	7.7	8.7	0.27	1.00	0.10	0.35	0.50			116				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
116	16	9	SP	2.5	300	2	10	0.9	1	2016	1174	0.73	1.3	0.85	6.9	7.7	8.7	0.24	1.00	0.10	0.39	0.50			116				
116	21	18	SM	2.5	300	2	25	4.3	1.1	2646	1492	0.60	1.2	0.95	13.8	15.2	21.3	0.21	1.00	0.23	1.12	1.43			116				
116	26	29	SP	2.5	300	2	10	0.9	1	3276	1810	0.53	1.1	0.95	22.3	22.3	23.6	0.19	1.00	0.26	1.40	1.74			116				
116	31	19	SP	2.5	300	2	10	0.9	1	3906	2128	0.50	1.0	0.95	14.6	13.5	14.6	0.18	0.99	0.16	0.89	0.82			116				
116	37	46	SP	2.5	300	2	10	0.9	1	4662	2509	0.47	0.9	1	35.4	31.6	33.1	0.17	0.97	4.84	28.59	1.00			116				
116	38	28	SP	2.5	300	2	10	0.9	1	4788	2573	0.46	0.9	1	21.5	19.0	20.3	0.17	0.96	0.21	1.26	1.31			116				
116	43	11	SP	2.5	300	2	10	0.9	1	5418	2891	0.45	0.8	1	8.5	7.0	8.1	0.16	0.94	0.08	0.51	0.47			116				
116	48	42	SP	2.5	300	2	10	0.9	1	6048	3209	0.43	0.8	1	32.3	25.5	26.9	0.16	0.91	0.29	1.84	2.29			116				
116	49	34	SP	2.5	300	2	10	0.9	1	6174	3272	0.43	0.8	1	26.2	20.4	21.8	0.16	0.91	0.22	1.37	1.49			116				
116	52	200	CL	2.5	300	2	xxx	5	1.2	6552	3463	0.42	0.8	1	153.8	116.9	145.3	0.15	0.89	4.47	29.05	1.00			116				
117	2	25	SP	5	300	2	10	0.9	1	252	439.2	0.99	2.0	0.75	19.2	28.8	30.3	0.11	1.00	5.00	45.29	1.00			117				
117	5	16	SP	5	300	2	10	0.9	1	630	630	0.97	1.8	0.75	12.3	16.4	17.7	0.19	1.00	0.19	1.01	1.00			117				
117	7	14	SP	5	300	2	10	0.9	1	882	757.2	0.95	1.6	0.75	10.8	13.1	14.3	0.22	1.00	0.15	0.72	0.80			117				
117	11	12	SP	5	300	2	10	0.9	1	1386	1012	0.88	1.4	0.75	9.2	9.7	10.8	0.24	1.00	0.12	0.50	0.60			117				
117	14	12	SP	5	300	2	10	0.9	1	1764	1202	0.79	1.3	0.85	9.2	10.1	11.2	0.23	1.00	0.12	0.53	0.62			117				
117	19	10	SP	5	300	2	10	0.9	1	2394	1520	0.64	1.1	0.85	7.7	7.5	8.5	0.20	1.00	0.09	0.48	0.49			117				
117	25	59	SW	5	300	2	10	0.9	1	3150	1902	0.54	1.0	0.95	45.4	44.2	46.0	0.17	1.00	5.00	28.60	1.00			117				
117	31	54	SW	5	300	2	10	0.9	1	3906	2284	0.50	0.9	0.95	41.5	36.9	38.6	0.17	0.98	4.92	29.78	1.00			117				
117	37	48	ML	5	300	2	xxx	5	1.2	4662	2665	0.47	0.9	1	36.9	32.0	43.4	0.16	0.96	4.78	29.99	1.00			117				
117	42	11	SM	5	300	2	25	4.3	1.1	5292	2983	0.45	0.8	1	8.5	6.9	12.0	0.16	0.93	0.12	0.78	0.66			117				
117	48	33	SM	5	300	2	25	4.3	1.1	6048	3365	0.43	0.8	1	25.4	19.6	26.1	0.15	0.90	0.27	1.81	2.14			117				
117	53	280	ML	5	300	2	xxx	5	1.2	6678	3683	0.41	0.7	1	215.4	158.7	195.5	0.15	0.88	4.40	30.00	1.00			117				
B1	4.5	20	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	20.0	27.4	28.9	0.18	1.00	0.37	2.07	1.00			B1				
B1	7	18	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	18.0	21.9	23.3	0.22	1.00	0.26	1.19	1.69			B1				
B1	9.5	25	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	25.0	27.7	29.2	0.23	1.00	0.38	1.64	2.76			B1				
B1	14.5	100	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	100.0	108.2	111.4	0.22	1.00	5.00	22.28	1.00			B1				
B1	19.5	15	SP	5	780	1	10	0.9	1	2457	1552	0.63	1.1	0.85	15.0	14.5	15.7	0.19	1.00	0.17	0.87	0.89			B1				
B1	24.5	87	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	87.0	85.5	88.2	0.18	1.00	5.00	28.40	1.00			B1				
B2	4.5	17	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	17.0	23.3	24.7	0.18	1.00	0.28	1.55	1.00			B2				
B2	7	13	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	13.0	15.8	17.1	0.22	1.00	0.18	0.85	1.00			B2				
B2	9.5	18	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	18.0	19.9	21.2	0.23	1.00	0.23	0.99	1.42			B2				
B2	14.5	16	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	16.0	17.3	18.6	0.22	1.00	0.20	0.89	1.14			B2				
B2	19.5	100	SP	5	780	1	10	0.9	1	2457	1552	0.63	1.1	0.85	100.0	96.5	99.4	0.19	1.00	5.00	25.75	1.00			B2				
B2	24.5	100	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	100.0	98.2	101.2	0.18	1.00	5.00	28.40	1.00			B2				
B3	4.5	8	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	8.0	11.0	12.1	0.18	1.00	0.13	0.73	1.00			B3				
B3	7	4	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	4.0	4.9	5.9	0.22	1.00	0.07	0.33	0.39			B3				
B3	9.5	22	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	22.0	24.4	25.8	0.23	1.00	0.30	1.27	2.08			B3				
B3	14.5	15	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	15.0	16.2	17.5	0.22	1.00	0.19	0.84	1.04			B3				
B3	20.5	100	SP	5	780	1	10	0.9	1	2583	1616	0.61	1.1	0.95	100.0	105.7	108.8	0.19	1.00	5.00	26.40	1.00			B3				
B3	24.5	100	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	100.0	98.2	101.2	0.18	1.00	5.00	28.40	1.00			B3				
B4	4.5	10	SM	5	780	1	25	4.3	1.1	567	598.2	0.97	1.8	0.75	10.0	13.7	19.6	0.18	1.00	0.21	1.18	1.00			B4				
B4	7	10	SC	5	780	1	35	5	1.2	882	757.2	0.95	1.6	0.75	10.0	12.2	19.6	0.22	1.00	0.21	0.98	1.24			B4				
B4	9.5	9	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	9.0	10.0	11.1	0.23	1.00	0.12	0.51	0.61			B4				
B4	14.5	16	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	16.0	17.3	18.6	0.22	1.00	0.20	0.89	1.14			B4				
B4	19.5	21	CH	5	780	1	xxx	5	1.2	2457	1552	0.63	1.1	0.85	21.0	20.3	29.3	0.19	1.00	10.00	51.50	2.79			B4				
B4	24.5	13	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	13.0	12.8	13.9	0.18	1.00	0.15	0.86	0.77			B4				
RL1	4	14	SP	2.5	780	1	10	0.9	1	504	410.4	0.97	2.0	0.75	14.0	21.0	22.3	0.23	1.00	0.24	1.05	1.56			RL1				
RL1	9	10	SP	2.5	780	1	10	0.9	1	1134	728.4	0.92	1.7	0.75	10.0	12.4	13.6	0.28	1.00	0.15	0.52	0.75			RL1				
RL1	14	10	SP	2.5	780	1	10	0.9	1	1764	1046	0.79	1.4	0.85	10.0	11.8	12.9	0.26	1.00	0.14	0.53	0.71			RL1				
RL1	19	13	SP	2.5	780	1	10	0.9	1	2394	1364	0.64	1.2	0.85	13.0	13.4	14.5	0.22	1.00	0.16	0.72	0.81			RL1				
RL1	25	15	SP	2.5	780	1	10	0.9	1	3150	1746	0.54	1.1	0.95	15.0	15.3	16.5	0.19	1.00	0.18	0.93	0.95			RL1				
RL1	30	13	SP	2.5	780	1	10	0.9	1	3780	2064	0.50	1.0	0.95	13.0	12.2	13.3	0.18	1.00	0.14	0.80	0.73			RL1				
RL1	35	6	ML	2.5	780	1	xxx	5	1.2	4410	2382	0.48	0.9	1	6.0	5.5	11.6	0.17	0.98	9.77	56.92	0.64			RL1				
RL1	39	8	ML	2.5	780	1	xxx	5	1.2	4914	2636	0.46	0.9	1	8.0	7.0	13.4	0.17	0.96	9.58	57.37	0.74			RL1				
RL1	44	14	SP	2.5	780	1	10	0.9	1	5544	2954	0.44	0.8	1	14.0	11.5	12.6	0.16	0.93	0.13	0.79	0.69			RL1				
RL1	50	12	SP	2.5	780	1	10	0.9	1	6300	3336	0.42	0.8	1	12.0	9.3	10.4	0.16	0.90	0.10	0.65	0.57			RL1				
RL1	55	73	CL	2.5	780	1	xxx	5	1.2	6930	3654	0.41	0.7	1	73.0	54.0	69.8	0.15	0.88	4.41	29.13	1.00			RL1				
RL2	5	12	SP	3	780	1	10	0.9	1	630	505.2	0.97	2.0	0.75	12.0	17.9	19.2	0.23	1.00	0.21	0.88	1.20			RL2				
RL2	10	9	SP	3	780	1	10	0.9	1	1260	823.2	0.90	1.6	0.75	9.0	10.5	11.6	0.27	1.00	0.13	0.47	0.64			RL2				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ'_{vo}	(29) Depth
RL2	16	16	SP	3	780	1	10	0.9	1	2016	1205	0.73	1.3	0.85	16.0	17.5	18.8	0.24	1.00	0.20	0.85	1.16			RL2				
RL2	20	14	SP	3	780	1	10	0.9	1	2520	1459	0.62	1.2	0.95	14.0	15.6	16.8	0.21	1.00	0.18	0.87	0.98			RL2				
RL2	25	15	SP	3	780	1	10	0.9	1	3150	1777	0.54	1.1	0.95	15.0	15.1	16.3	0.19	1.00	0.18	0.94	0.94			RL2				
RL2	30	13	SP	3	780	1	10	0.9	1	3780	2095	0.50	1.0	0.95	13.0	12.1	13.2	0.18	1.00	0.14	0.81	0.73			RL2				
RL2	35	4	SC	3	780	1	35	5	1.2	4410	2413	0.48	0.9	1	4.0	3.6	9.4	0.17	0.98	0.10	0.59	0.53			RL2				
RL2	40	8	SC	3	780	1	35	5	1.2	5040	2731	0.46	0.9	1	8.0	6.8	13.2	0.16	0.95	0.14	0.83	0.73			RL2				
RL2	45	22	SP	3	780	1	10	0.9	1	5670	3049	0.44	0.8	1	22.0	17.8	19.1	0.16	0.93	0.19	1.20	1.19			RL2				
RL2	49	20	SP	3	780	1	10	0.9	1	6174	3304	0.43	0.8	1	20.0	15.6	16.8	0.16	0.91	0.16	1.06	0.98			RL2				
RL2	53	60	CL	3	780	1	xxx	5	1.2	6678	3558	0.41	0.7	1	60.0	45.0	59.0	0.15	0.89	4.44	29.26	1.00			RL2				
RL3	5	6	SP	3	780	1	10	0.9	1	630	505.2	0.97	2.0	0.75	6.0	9.0	10.0	0.23	1.00	0.11	0.46	0.56			RL3				
RL3	10	15	SP	3	780	1	10	0.9	1	1260	823.2	0.90	1.6	0.75	15.0	17.5	18.8	0.27	1.00	0.20	0.75	1.16			RL3				
RL3	15	11	SP	3	780	1	10	0.9	1	1890	1141	0.76	1.3	0.85	11.0	12.4	13.5	0.25	1.00	0.15	0.60	0.75			RL3				
RL3	20	15	SP	3	780	1	10	0.9	1	2520	1459	0.62	1.2	0.95	15.0	16.7	17.9	0.21	1.00	0.19	0.93	1.08			RL3				
RL3	25	17	SP	3	780	1	10	0.9	1	3150	1777	0.54	1.1	0.95	17.0	17.1	18.4	0.19	1.00	0.20	1.06	1.12			RL3				
RL3	30	16	SM	3	780	1	25	4.3	1.1	3780	2095	0.50	1.0	0.95	16.0	14.9	20.8	0.18	1.00	0.23	1.28	1.38			RL3				
RL3	35	16	SM	3	780	1	25	4.3	1.1	4410	2413	0.48	0.9	1	16.0	14.6	20.5	0.17	0.98	0.22	1.28	1.34			RL3				
RL3	40	16	SM	3	780	1	25	4.3	1.1	5040	2731	0.46	0.9	1	16.0	13.7	19.6	0.16	0.95	0.20	1.22	1.24			RL3				
RL3	44	9	SM	3	780	1	25	4.3	1.1	5544	2986	0.44	0.8	1	9.0	7.4	12.5	0.16	0.93	0.13	0.79	0.69			RL3				
RL3	50	13	SM	3	780	1	25	4.3	1.1	6300	3367	0.42	0.8	1	13.0	10.0	15.5	0.15	0.90	0.15	0.98	0.88			RL3				
RL3	54	20	SP	3	780	1	10	0.9	1	6804	3622	0.41	0.7	1	20.0	14.9	16.1	0.15	0.88	0.15	1.02	0.92			RL3				
RL3	60	23	SP	3	780	1	10	0.9	1	7560	4003	0.40	0.7	1	23.0	16.3	17.5	0.15	0.86	0.16	1.11	1.04			RL3				
RL4	4	4	SP	2	780	1	10	0.9	1	504	379.2	0.97	2.0	0.75	4.0	6.0	7.0	0.25	1.00	0.08	0.32	0.43			RL4				
RL4	10	8	SP	2	780	1	10	0.9	1	1260	760.8	0.90	1.6	0.75	8.0	9.7	10.8	0.29	1.00	0.12	0.40	0.60			RL4				
RL4	14	8	CL	2	780	1	xxx	5	1.2	1764	1015	0.79	1.4	0.85	8.0	9.5	16.5	0.27	1.00	10.00	37.16	0.95			RL4				
RL4	20	14	SP	2	780	1	10	0.9	1	2520	1397	0.62	1.2	0.95	14.0	15.9	17.1	0.22	1.00	0.18	0.85	1.01			RL4				
RL4	25	16	SP	2	780	1	10	0.9	1	3150	1715	0.54	1.1	0.95	16.0	16.4	17.6	0.19	1.00	0.19	0.98	1.05			RL4				
RL4	30	17	SP	2	780	1	10	0.9	1	3780	2033	0.50	1.0	0.95	17.0	16.0	17.2	0.18	1.00	0.19	1.02	1.02			RL4				
RL4	35	12	SC	2	780	1	35	5	1.2	4410	2351	0.48	0.9	1	12.0	11.1	18.3	0.17	0.98	0.19	1.11	1.11			RL4				
RL4	40	4	ML	2	780	1	xxx	5	1.2	5040	2669	0.46	0.9	1	4.0	3.5	9.2	0.17	0.96	9.55	56.94	0.52			RL4				
RL4	45	8	SM	2	780	1	25	4.3	1.1	5670	2987	0.44	0.8	1	8.0	6.5	11.6	0.16	0.93	0.12	0.72	0.64			RL4				
RL4	50	12	SM	2	780	1	25	4.3	1.1	6300	3305	0.42	0.8	1	12.0	9.3	14.7	0.16	0.91	0.14	0.92	0.82			RL4				
RL4	55	19	CL	2	780	1	xxx	5	1.2	6930	3623	0.41	0.7	1	19.0	14.1	21.9	0.15	0.88	8.84	57.89	1.51			RL4				
RL4	60	60	CL	2	780	1	xxx	5	1.2	7560	3941	0.40	0.7	1	60.0	42.7	56.3	0.15	0.86	4.32	29.11	1.00			RL4				
RL5	5	8	SP	2.5	780	1	10	0.9	1	630	474	0.97	2.0	0.75	8.0	12.0	13.1	0.25	1.00	0.14	0.57	0.72			RL5				
RL5	9	6	SP	2.5	780	1	10	0.9	1	1134	728.4	0.92	1.7	0.75	6.0	7.5	8.5	0.28	1.00	0.09	0.33	0.49			RL5				
RL5	15	6	SP	2.5	780	1	10	0.9	1	1890	1110	0.76	1.3	0.85	6.0	6.8	7.9	0.25	1.00	0.09	0.35	0.47			RL5				
RL5	20	12	SP	2.5	780	1	10	0.9	1	2520	1428	0.62	1.2	0.95	12.0	13.5	14.7	0.21	1.00	0.16	0.75	0.82			RL5				
RL5	25	13	SP	2.5	780	1	10	0.9	1	3150	1746	0.54	1.1	0.95	13.0	13.2	14.4	0.19	1.00	0.16	0.82	0.80			RL5				
RL5	30	10	SP	2.5	780	1	10	0.9	1	3780	2064	0.50	1.0	0.95	10.0	9.4	10.4	0.18	1.00	0.11	0.63	0.58			RL5				
RL5	35	22	SM	2.5	780	1	25	4.3	1.1	4410	2382	0.48	0.9	1	22.0	20.2	26.8	0.17	0.98	0.31	1.79	2.26			RL5				
RL5	40	9	CL	2.5	780	1	xxx	5	1.2	5040	2700	0.46	0.9	1	9.0	7.7	14.3	0.17	0.95	9.53	57.45	0.80			RL5				
RL5	45	23	SP	2.5	780	1	10	0.9	1	5670	3018	0.44	0.8	1	23.0	18.7	20.0	0.16	0.93	0.20	1.25	1.28			RL5				
RL5	50	40	SP	2.5	780	1	10	0.9	1	6300	3336	0.42	0.8	1	40.0	31.0	32.5	0.16	0.90	4.52	29.00	1.00			RL5				
RL5	55	35	SP	2.5	780	1	10	0.9	1	6930	3654	0.41	0.7	1	35.0	25.9	27.3	0.15	0.88	0.29	1.90	2.36			RL5				
RL5	60	60	CL	2.5	780	1	xxx	5	1.2	7560	3972	0.40	0.7	1	60.0	42.6	56.1	0.15	0.86	4.31	29.28	1.00			RL5				
SME1	11	6		3.8	780	1	70	5	1.2	1386	936.7	0.88	1.5	0.75	6.0	6.6	12.9	0.25	1.00	0.14	0.55	0.71			SME1				
SME1	12.5	8		3.8	780	1	39	5	1.2	1575	1032	0.84	1.4	0.75	8.0	8.4	15.0	0.25	1.00	0.16	0.65	0.85			SME1				
SME1	16	15		3.8	780	1	39	5	1.2	2016	1255	0.73	1.3	0.85	15.0	16.1	24.3	0.23	1.00	0.27	1.19	1.84			SME1				
SME1	18	17		3.8	780	1	39	5	1.2	2268	1382	0.67	1.2	0.85	17.0	17.4	25.9	0.21	1.00	0.30	1.39	2.09			SME1				
SME1	20.5	17		3.8	780	1	39	5	1.2	2583	1541	0.61	1.1	0.95	17.0	18.4	27.1	0.20	1.00	0.32	1.62	2.32			SME1				
SME1	23	20		3.8	780	1	39	5	1.2	2898	1700	0.57	1.1	0.95	20.0	20.6	29.7	0.19	1.00	0.42	2.23	2.89			SME1				
SME1	25.5	22		3.8	780	1	80	5	1.2	3213	1859	0.54	1.0	0.95	22.0	21.7	31.0	0.18	1.00	5.00	27.66	1.00			SME1				
SME1	28.5	21		3.8	780	1	80	5	1.2	3591	2050	0.51	1.0	0.95	21.0	19.7	28.6	0.17	1.00	0.36	2.07	2.64			SME1				
SME1	30.5	17		3.8	780	1	80	5	1.2	3843	2177	0.50	1.0	0.95	17.0	15.5	23.6	0.17	0.99	0.26	1.51	1.73			SME1				
SME1	33	27		3.8	780	1	80	5	1.2	4158	2336	0.48	0.9	1	27.0	25.0	35.0	0.17	0.98	4.90	29.13	1.00			SME1				
SME1	36	24		3.8	780	1	80	5	1.2	4536	2527	0.47	0.9	1	24.0	21.4	30.6	0.16	0.97	4.83	29.29	1.00			SME1				
SME1	39	20		3.8	780	1	80	5	1.2	4914	2718	0.46	0.9	1	20.0	17.2	25.6	0.16	0.95	0.28	1.72	2.04			SME1				
SME1	40.5	18		3.8	780	1	80	5	1.2	5103	2813	0.45	0.8	1	18.0	15.2	23.2	0.16	0.94	0.24	1.51	1.68			SME1				
SME1	43	26		3.8	780	1	80	5	1.2	5418	2972	0.45	0.8	1	26.0	21.3	30.6	0.16	0.93	4.66	29.43	1.00			SME1				

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(1)	(26)	(27)	(28)	(29)
Boring	Sample Depth, ft	N	Class	Water Table, ft	Drop Weight	Drop Height	FC	α	β	σ_{vo}	σ'_{vo}	rd	CN	CR	Ncorr	(N1)60	(N1)60cs	CSR	K_σ	M7.5 CRR	FS for M7.5	CRR for Specified M & P_L	FS<1 per YOUD & NOBLE at P_L	FS<1.34 YOUD & NOBLE at PL	Boring	ESI Boring Elevation	CSR σ_{vo}	CSR $\sigma_{vo'}$	Depth
SME1	45.5	5		3.8	780	1	80	5	1.2	5733	3131	0.44	0.8	1	5.0	4.0	9.8	0.16	0.92	0.10	0.63	0.55			SME1				
SME1	49	4		3.8	780	1	29	4.6	1.1	6174	3354	0.43	0.8	1	4.0	3.1	8.2	0.15	0.90	0.08	0.53	0.48			SME1				
SME1	50.5	5		3.8	780	1	29	4.6	1.1	6363	3449	0.42	0.8	1	5.0	3.8	9.0	0.15	0.90	0.09	0.58	0.51			SME1				
SME1	53.5	24		3.8	780	1	29	4.6	1.1	6741	3640	0.41	0.7	1	24.0	17.8	25.0	0.15	0.88	0.25	1.67	1.95			SME1				
SME1	55.5	20		3.8	780	1	29	4.6	1.1	6993	3767	0.41	0.7	1	20.0	14.6	21.3	0.15	0.87	0.20	1.37	1.43			SME1				
SME1	57.5	70	CL	3.8	780	1	xxx	5	1.2	7245	3894	0.40	0.7	1	70.0	50.2	65.2	0.15	0.87	4.33	29.64	1.00			SME1				
SME2	11	14		4.3	780	1	19	3.4	1.1	1386	967.9	0.88	1.4	0.75	14.0	15.1	19.6	0.25	1.00	0.21	0.86	1.24			SME2				
SME2	12.5	11		4.3	780	1	19	3.4	1.1	1575	1063	0.84	1.4	0.75	11.0	11.3	15.6	0.24	1.00	0.17	0.69	0.89			SME2				
SME2	15	18		4.3	780	1	19	3.4	1.1	1890	1222	0.76	1.3	0.85	18.0	19.6	24.4	0.23	1.00	0.27	1.19	1.86			SME2				
SME2	17.5	17		4.3	780	1	19	3.4	1.1	2205	1381	0.68	1.2	0.85	17.0	17.4	22.1	0.21	1.00	0.24	1.14	1.53			SME2				
SME2	20	16		4.3	780	1	19	3.4	1.1	2520	1540	0.62	1.1	0.95	16.0	17.3	22.0	0.20	1.00	0.24	1.22	1.52			SME2				
SME2	22.5	18		4.3	780	1	19	3.4	1.1	2835	1699	0.57	1.1	0.95	18.0	18.6	23.3	0.19	1.00	0.26	1.38	1.69			SME2				
SME2	25.5	22		4.3	780	1	19	3.4	1.1	3213	1890	0.54	1.0	0.95	22.0	21.5	26.5	0.18	1.00	0.31	1.74	2.21			SME2				
SME2	30	15		4.3	780	1	19	3.4	1.1	3780	2176	0.50	1.0	0.95	15.0	13.7	18.1	0.17	0.99	0.19	1.14	1.09			SME2				
SME2	32	12	SM	4.3	780	1	25	4.3	1.1	4032	2304	0.49	0.9	0.95	12.0	10.6	16.1	0.17	0.98	0.17	1.02	0.93			SME2				
SME2	35.5	4	SM	4.3	780	1	25	4.3	1.1	4473	2526	0.47	0.9	1	4.0	3.6	8.3	0.16	0.97	0.09	0.54	0.48			SME2				
SME2	37.5	2	SM	4.3	780	1	25	4.3	1.1	4725	2653	0.47	0.9	1	2.0	1.7	6.2	0.16	0.96	0.07	0.44	0.41			SME2				
SME2	39.5	4	SM	4.3	780	1	25	4.3	1.1	4977	2781	0.46	0.8	1	4.0	3.4	8.1	0.16	0.95	0.08	0.53	0.47			SME2				
SME2	45.5	7	SM	4.3	780	1	25	4.3	1.1	5733	3162	0.44	0.8	1	7.0	5.6	10.5	0.15	0.92	0.10	0.68	0.58			SME2				
SME2	47.5	9	SM	4.3	780	1	25	4.3	1.1	5985	3289	0.43	0.8	1	9.0	7.0	12.1	0.15	0.91	0.12	0.78	0.66			SME2				
SME2	50	18		4.3	780	1	15	2.5	1	6300	3448	0.42	0.8	1	18.0	13.7	16.9	0.15	0.90	0.16	1.08	0.99			SME2				
SME2	54	31		4.3	780	1	15	2.5	1	6804	3703	0.41	0.7	1	31.0	22.8	26.4	0.15	0.88	0.27	1.83	2.18			SME2				
SME3	11	17		3.8	780	1	xxx	5	1.2	1386	936.7	0.88	1.5	0.75	17.0	18.6	27.4	0.25	1.00	10.00	39.26	2.37			SME3				
SME3	13.5	13		3.8	780	1	57	5	1.2	1701	1096	0.81	1.4	0.85	13.0	14.9	22.9	0.25	1.00	0.25	1.03	1.64			SME3				
SME3	17	12		3.8	780	1	57	5	1.2	2142	1318	0.70	1.2	0.85	12.0	12.6	20.1	0.22	1.00	0.22	0.98	1.29			SME3				
SME3	19.5	20		3.8	780	1	18	3.2	1.1	2457	1477	0.63	1.2	0.85	20.0	19.8	24.3	0.20	1.00	0.27	1.33	1.84			SME3				
SME3	22	20		3.8	780	1	18	3.2	1.1	2772	1636	0.58	1.1	0.95	20.0	21.0	25.6	0.19	1.00	0.29	1.53	2.05			SME3				
SME3	24.5	11		3.8	780	1	18	3.2	1.1	3087	1795	0.55	1.1	0.95	11.0	11.0	15.0	0.18	1.00	0.16	0.88	0.85			SME3				
SME3	28	7	ML	3.8	780	1	xxx	5	1.2	3528	2018	0.51	1.0	0.95	7.0	6.6	12.9	0.18	1.00	9.99	56.92	0.71			SME3				
SME3	29.5	19	ML	3.8	780	1	xxx	5	1.2	3717	2113	0.50	1.0	0.95	19.0	17.6	26.1	0.17	0.99	9.95	57.48	2.13			SME3				
SME3	31.5	10		3.8	780	1	59	5	1.2	3969	2241	0.49	0.9	0.95	10.0	9.0	15.8	0.17	0.99	0.17	0.99	0.90			SME3				
SME3	36	12		3.8	780	1	59	5	1.2	4536	2527	0.47	0.9	1	12.0	10.7	17.8	0.16	0.97	0.19	1.13	1.07			SME3				
SME3	39.5	3		3.8	780	1	59	5	1.2	4977	2749	0.46	0.9	1	3.0	2.6	8.1	0.16	0.95	0.08	0.52	0.47			SME3				
SME3	42	16		3.8	780	1	30	4.7	1.2	5292	2908	0.45	0.8	1	16.0	13.3	20.0	0.16	0.94	0.20	1.27	1.29			SME3				
SME3	44.5	17		3.8	780	1	30	4.7	1.2	5607	3067	0.44	0.8	1	17.0	13.7	20.6	0.16	0.92	0.21	1.31	1.34			SME3				
SME3	47	18		3.8	780	1	30	4.7	1.2	5922	3226	0.43	0.8	1	18.0	14.2	21.1	0.15	0.91	0.21	1.35	1.40			SME3				
SME3	49.5	11		3.8	780	1	30	4.7	1.2	6237	3385	0.42	0.8	1	11.0	8.5	14.5	0.15	0.90	0.14	0.92	0.81			SME3				
SME3	52	32		3.8	780	1	30	4.7	1.2	6552	3544	0.42	0.8	1	32.0	24.0	32.5	0.15	0.89	4.45	29.54	1.00			SME3				
SME3	54	45		3.8	780	1	30	4.7	1.2	6804	3672	0.41	0.7	1	45.0	33.2	43.0	0.15	0.88	4.40	29.57	1.00			SME3				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ'_{vo}	(29) Depth
ESI-5F	5	5	SP	2	780	1	10	0.9	1	630	442.8	0.55	2.0	0.75	5.0	7.5	8.5	0.20	1.00	0.09	0.47	0.49			ESI-5F	207	3024	1625	24
ESI-5F	10	20	SP	2	780	1	10	0.9	1	1260	760.8	0.51	1.6	0.75	20.0	24.3	25.7	0.19	1.00	0.29	1.58	2.07			ESI-5F	207	3654	1937	29
ESI-5F	15	2	CL	2	780	1	xxx	5	1.2	1890	1079	0.48	1.4	0.85	2.0	2.3	7.8	0.18	1.00	10.00	56.06	0.46			ESI-5F	207	4284	2249	34
ESI-5F	17.5	38	SP	2	780	1	10	0.9	1	2205	1238	0.47	1.3	0.85	38.0	41.1	42.8	0.17	1.00	5.00	28.57	1.00			ESI-5F	207	4599	2405	36.5
ESI-5F	25	34	SP	2	780	1	10	0.9	1	3150	1715	0.44	1.1	0.95	34.0	34.9	36.5	0.17	1.00	5.00	30.07	1.00			ESI-5F	207	5544	2873	44
ESI-5F	30	33	SP	2	780	1	10	0.9	1	3780	2033	0.43	1.0	0.95	33.0	31.1	32.6	0.16	1.00	4.99	30.99	1.00			ESI-5F	207	6174	3185	49
ESI-5F	35	21	SP	2	780	1	10	0.9	1	4410	2351	0.41	0.9	1	21.0	19.4	20.7	0.16	0.98	0.22	1.40	1.36			ESI-5F	207	6804	3497	54
ESI-9	4	4	SP	5	780	1	10	0.9	1	504	566.4	0.00	1.9	0.75	4.0	5.6	6.6	0.00	1.00	0.08	No Liq	0.42	No Liq	No Liq	ESI-9	230	EXC	EXC	EXC
ESI-9	9	9	SP	5	780	1	10	0.9	1	1134	884.4	0.97	1.5	0.75	9.0	10.2	11.2	0.27	1.00	0.12	0.45	1.00			ESI-9	230	630	439	5
ESI-9	14	23	SP	5	780	1	10	0.9	1	1764	1202	0.90	1.3	0.85	23.0	25.2	26.6	0.30	1.00	0.31	1.05	2.23			ESI-9	230	1260	751	10
ESI-9	24	18	SP	5	780	1	10	0.9	1	3024	1838	0.62	1.0	0.95	18.0	17.8	19.1	0.22	1.00	0.21	0.93	1.19			ESI-9	230	2520	1375	20
ESI-9	28.5	35	SP	5	780	1	10	0.9	1	3591	2125	0.55	1.0	0.95	35.0	32.3	33.8	0.20	0.99	4.97	25.01	1.00			ESI-9	230	3067	1656	24.5
ESI-9	39	12	SP	5	780	1	10	0.9	1	4914	2792	0.48	0.8	1	12.0	10.2	11.2	0.18	0.95	0.12	0.65	0.62			ESI-9	230	4410	2311	35
ESI-9	78.5	9	SP	5	780	1	10	0.9	1	9891	5305	0.36	0.6	1	9.0	5.5	6.5	0.14	0.79	0.06	0.43	0.42			ESI-9	230	9387	4776	74.5
ESI-9A	1	4	SM	2	780	1	25	4.3	1.1	126	188.4	0.99	2.0	0.75	4.0	6.0	11.0	0.19	1.00	0.12	0.61	1.00			ESI-9A	226	126	126	1
ESI-9A	4	6	SP	2	780	1	10	0.9	1	504	379.2	0.97	2.0	0.75	6.0	9.0	10.1	0.25	1.00	0.11	0.43	0.56			ESI-9A	226	504	377	4
ESI-9A	9	20	SP	2	780	1	10	0.9	1	1134	697.2	0.92	1.7	0.75	20.0	25.4	26.8	0.30	1.00	0.32	1.07	2.27			ESI-9A	226	1134	689	9
ESI-9A	14	15	SM	2	780	1	25	4.3	1.1	1764	1015	0.79	1.4	0.85	15.0	17.9	24.2	0.27	1.00	0.27	0.99	1.83			ESI-9A	226	1764	1001	14
ESI-9A	19	26	SP	2	780	1	10	0.9	1	2394	1333	0.64	1.2	0.85	26.0	27.1	28.5	0.23	1.00	0.36	1.57	2.61			ESI-9A	226	2394	1313	19
ESI-9A	24	30	SP	2	780	1	10	0.9	1	3024	1651	0.55	1.1	0.95	30.0	31.4	32.9	0.20	1.00	5.00	24.93	1.00			ESI-9A	226	3024	1625	24
ESI-9A	29	21	SP	2	780	1	10	0.9	1	3654	1969	0.51	1.0	0.95	21.0	20.1	21.4	0.19	1.00	0.23	1.25	1.44			ESI-9A	226	3654	1937	29
ESI-9A	34	28	SP	2	780	1	10	0.9	1	4284	2287	0.48	0.9	1	28.0	26.2	27.6	0.18	0.98	0.33	1.84	2.42			ESI-9A	226	4284	2249	34
ESI-9A	39	40	SP	2	780	1	10	0.9	1	4914	2605	0.46	0.9	1	40.0	35.0	36.7	0.17	0.96	4.80	27.94	1.00			ESI-9A	226	4914	2561	39
ESI-9A	44	17	SP	2	780	1	10	0.9	1	5544	2923	0.44	0.8	1	17.0	14.1	15.2	0.17	0.94	0.15	0.93	0.86			ESI-9A	226	5544	2873	44
ESI-9A	49	19	SP	2	780	1	10	0.9	1	6174	3241	0.43	0.8	1	19.0	14.9	16.1	0.16	0.91	0.16	0.98	0.93			ESI-9A	226	6174	3185	49
ESI-9B	1	2	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	2.0	2.6	7.1	0.00	1.00	0.08	No Liq	0.44	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	4	4	SP	10	780	1	10	0.9	1	504	878.4	0.00	1.5	0.75	4.0	4.5	5.5	0.00	1.00	0.07	No Liq	0.38	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	9	11	SP	10	780	1	10	0.9	1	1134	1196	0.00	1.3	0.75	11.0	10.7	11.8	0.00	1.00	0.13	No Liq	0.65	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	14	13	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	13.0	12.7	13.8	0.27	1.00	0.15	0.55	1.00			ESI-9B	235	630	439	5
ESI-9B	19	35	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	35.0	31.1	32.6	0.30	1.00	5.00	16.89	1.00			ESI-9B	235	1260	751	10
ESI-9B	24	63	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	63.0	57.7	59.8	0.26	0.99	4.96	18.82	1.00			ESI-9B	235	1890	1063	15
ESI-9B	29	33	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	33.0	28.2	29.7	0.22	0.97	0.40	1.83	2.88			ESI-9B	235	2520	1375	20
ESI-9B	34	26	SP	10	780	1	10	0.9	1	4284	2786	0.54	0.8	1	26.0	22.0	23.4	0.20	0.95	0.24	1.24	1.70			ESI-9B	235	3150	1687	25
ESI-9B	39	18	SP	10	780	1	10	0.9	1	4914	3104	0.50	0.8	1	18.0	14.4	15.6	0.18	0.92	0.16	0.84	0.89			ESI-9B	235	3780	1999	30
ESI-9B	54	46	SP	10	780	1	10	0.9	1	6804	4058	0.44	0.7	1	46.0	32.3	33.9	0.17	0.86	4.28	25.91	1.00			ESI-9B	235	5670	2935	45
ESI-9B	59	38	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	38.0	25.7	27.1	0.16	0.84	0.27	1.68	2.32			ESI-9B	235	6300	3247	50
ESI-9C	1	2	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	2.0	2.4	6.9	0.00	1.00	0.08	No Liq	0.43	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	5	6	SP	12	780	1	10	0.9	1	630	1067	0.00	1.4	0.75	6.0	6.2	7.2	0.00	1.00	0.08	No Liq	0.44	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	10	9	SP	12	780	1	10	0.9	1	1260	1385	0.00	1.2	0.75	9.0	8.1	9.2	0.00	1.00	0.10	No Liq	0.52	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	15	12	SP	12	780	1	10	0.9	1	1890	1703	0.97	1.1	0.85	12.0	11.1	12.2	0.25	1.00	0.13	0.52	1.00			ESI-9C	237	504	377	4
ESI-9C	20	32	SP	12	780	1	10	0.9	1	2520	2021	0.92	1.0	0.95	32.0	30.2	31.8	0.30	1.00	5.00	16.86	1.00			ESI-9C	237	1134	689	9
ESI-9C	25	13	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	13.0	11.4	12.5	0.27	0.98	0.13	0.49	0.69			ESI-9C	237	1764	1001	14
ESI-9C	30	24	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	24.0	19.8	21.1	0.23	0.96	0.22	0.96	1.40			ESI-9C	237	2394	1313	19
ESI-9C	35	15	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	15.0	12.3	13.4	0.20	0.93	0.14	0.68	0.74			ESI-9C	237	3024	1625	24
ESI-9C	40	6	SP	12	780	1	10	0.9	1	5040	3293	0.51	0.8	1	6.0	4.7	5.6	0.19	0.91	0.06	0.34	0.39			ESI-9C	237	3654	1937	29
ESI-9C	45	29	SP	12	780	1	10	0.9	1	5670	3611	0.48	0.7	1	29.0	21.6	22.9	0.18	0.88	0.22	1.25	1.64			ESI-9C	237	4284	2249	34
ESI-9C	54	34	SP	12	780	1	10	0.9	1	6804	4183	0.45	0.7	1	34.0	23.5	24.9	0.17	0.85	0.24	1.42	1.93			ESI-9C	237	5418	2810	43
ESI-9C	59	42	SP	12	780	1	10	0.9	1	7434	4501	0.43	0.7	1	42.0	28.0	29.5	0.16	0.83	0.33	2.04	2.63			ESI-9C	237	6048	3122	48
ESI-9C	64	35	SP	12	780	1	10	0.9	1	8064	4819	0.41	0.6	1	35.0	22.5	23.9	0.16	0.82	0.22	1.38	1.78			ESI-9C	237	6678	3434	53
ESI-9D	1.5	5	SM	9	780	1	25	4.3	1.1	189	657	0.00	1.7	0.75	5.0	6.5	11.6	0.00	1.00	0.13	No Liq	0.64	No Liq	No Liq	ESI-9D	234	EXC	EXC	EXC
ESI-9D	4	7	SP	9	780	1	10	0.9	1	504	816	0.00	1.6	0.75	7.0	8.2	9.3	0.00	1.00	0.10	No Liq	0.52	No Liq	No Liq	ESI-9D	234	EXC	EXC	EXC
ESI-9D	9	5	SP	9	780	1	10	0.9	1	1134	1134	0.99	1.3	0.75	5.0	5.0	6.0	0.19	1.00	0.07	0.37	1.00			ESI-9D	234	126	126	1
ESI-9D	14	28	SM	9	780	1	25	4.3	1.1	1764	1452	0.96	1.2	0.85	28.0	27.9	35.4	0.28	1.00	5.00	17.76	1.00			ESI-9D	234	756	502	6
ESI-9D	19	7	SP	9	780	1	10	0.9	1	2394	1770	0.88	1.1	0.85	7.0	6.3	7.3	0.29	1.00	0.08	0.28	0.45			ESI-9D	234	1386	814	11
ESI-9D	24	33	SP	9	780	1	10	0.9	1	3024	2088	0.73	1.0	0.95	33.0	30.7	32.2	0.25	1.00	4.98	19.60	1.00			ESI-9D	234	2016	1126	16
ESI-9D	29	27	SP	9	780	1	10	0.9	1	3654	2406	0.60	0.9	0.95	27.0	23.4	24.8	0.21	0.98	0.27	1.27	1.91			ESI-9D	234	2646	1438	21
ESI-9D	34	25	SP	9	780	1	10	0.9	1	4284	2724	0.53	0.9	1	25.0	21.4	22.8	0.19	0.95	0.24	1.22	1.61			ESI-9D	234	3276	1750	26
ESI-9D	39	13	SP	9	780	1	10	0.9	1	4914	3042	0.50	0.8	1	13.0	10.5	11.6	0.18	0.93	0.12	0.64	0.64			ESI-9D	234	3906	2062	31
ESI-9D	54	39	SP	9	780	1	10	0.9	1	6804	3996	0.44	0.7	1	39.0	27.6	29.1	0.16	0.86	0.32	1.98	2.73			ESI-9D	234	5796	2998	46

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR $\sigma_{vo'}$	(29) Depth
ESI-9D	59	28	SM	9	780	1	25	4.3	1.1	7434	4314	0.42	0.7	1	28.0	19.1	25.5	0.16	0.84	0.25	1.54	2.04			ESI-9D	234	6426	3310	51
ESI-10	4	4	SP	2	780	1	10	0.9	1	504	379.2	0.96	2.0	0.75	4.0	6.0	7.0	0.28	1.00	0.08	0.28	0.43			ESI-10	224	756	502	6
ESI-10	9	18	SM	2	780	1	25	4.3	1.1	1134	697.2	0.88	1.7	0.75	18.0	22.9	29.8	0.29	1.00	0.42	1.45	2.90			ESI-10	224	1386	814	11
ESI-10	19	29	SP	2	780	1	10	0.9	1	2394	1333	0.60	1.2	0.85	29.0	30.2	31.7	0.21	1.00	5.00	23.30	1.00			ESI-10	224	2646	1438	21
ESI-10	31	25	SM	2	780	1	25	4.3	1.1	3906	2096	0.48	1.0	0.95	25.0	23.2	30.2	0.18	1.00	4.98	27.68	1.00			ESI-10	224	4158	2186	33
ESI-10	43	22	SP	2	780	1	10	0.9	1	5418	2860	0.44	0.8	1	22.0	18.4	19.7	0.17	0.94	0.20	1.21	1.25			ESI-10	224	5670	2935	45
ESI-10A	4	5	SP	2	780	1	10	0.9	1	504	379.2	0.88	2.0	0.75	5.0	7.5	8.5	0.29	1.00	0.09	0.32	0.49			ESI-10A	219	1386	814	11
ESI-10A	7	8	SP	2	780	1	10	0.9	1	882	570	0.79	1.9	0.75	8.0	11.2	12.4	0.27	1.00	0.13	0.49	0.68			ESI-10A	219	1764	1001	14
ESI-10A	11.5	21	SM	2	780	1	25	4.3	1.1	1449	856.2	0.65	1.5	0.75	21.0	24.1	31.1	0.23	1.00	5.00	21.57	1.00			ESI-10A	219	2331	1282	18.5
ESI-10A	19	9	SP	2	780	1	10	0.9	1	2394	1333	0.53	1.2	0.85	9.0	9.4	10.4	0.19	1.00	0.11	0.58	0.58			ESI-10A	219	3276	1750	26
ESI-10A	31	28	SP	2	780	1	10	0.9	1	3906	2096	0.46	1.0	0.95	28.0	26.0	27.4	0.17	1.00	0.33	1.89	2.38			ESI-10A	219	4788	2498	38
ESI-10B	4	10	SP	7	780	1	10	0.9	1	504	691.2	0.00	1.7	0.75	10.0	12.8	13.9	0.00	1.00	0.15	No Liq	0.77	No Liq	No Liq	ESI-10B	232	EXC	EXC	EXC
ESI-10B	21	27	SP	7	780	1	10	0.9	1	2646	1772	0.76	1.1	0.95	27.0	27.2	28.7	0.26	1.00	0.36	1.38	2.65			ESI-10B	232	1890	1063	15
ESI-10B	24	29	SP	7	780	1	10	0.9	1	3024	1963	0.67	1.0	0.95	29.0	27.8	29.3	0.24	1.00	0.39	1.64	2.78			ESI-10B	232	2268	1250	18
ESI-10B	27	20	SP	7	780	1	10	0.9	1	3402	2154	0.60	1.0	0.95	20.0	18.3	19.6	0.21	0.99	0.21	0.98	1.24			ESI-10B	232	2646	1438	21
ESI-10B	32	12	CL	7	780	1	xxx	5	1.2	4032	2472	0.53	0.9	0.95	12.0	10.3	17.3	0.19	0.97	9.71	50.02	1.02			ESI-10B	232	3276	1750	26
ESI-10B	44	27	SP	7	780	1	10	0.9	1	5544	3235	0.46	0.8	1	27.0	21.2	22.6	0.17	0.91	0.23	1.30	1.59			ESI-10B	232	4788	2498	38
ESI-10B	49	33	SP	7	780	1	10	0.9	1	6174	3553	0.45	0.8	1	33.0	24.8	26.2	0.17	0.89	0.27	1.61	2.15			ESI-10B	232	5418	2810	43
ESI-10B	54	15	SP	7	780	1	10	0.9	1	6804	3871	0.43	0.7	1	15.0	10.8	11.9	0.16	0.87	0.11	0.69	0.65			ESI-10B	232	6048	3122	48
ESI-10C	3	5	SP	11	780	1	10	0.9	1	378	877.2	0.00	1.5	0.75	5.0	5.7	6.7	0.00	1.00	0.08	No Liq	0.42	No Liq	No Liq	ESI-10C	236	EXC	EXC	EXC
ESI-10C	8	8	SM	11	780	1	25	4.3	1.1	1008	1195	0.00	1.3	0.75	8.0	7.8	12.9	0.00	1.00	0.14	No Liq	0.71	No Liq	No Liq	ESI-10C	236	EXC	EXC	EXC
ESI-10C	19	18	SP	11	780	1	10	0.9	1	2394	1895	0.92	1.0	0.85	18.0	15.7	16.9	0.30	1.00	0.18	0.62	1.00			ESI-10C	236	1134	689	9
ESI-10C	25	25	SP	11	780	1	10	0.9	1	3150	2276	0.76	0.9	0.95	25.0	22.3	23.6	0.26	0.98	0.26	0.98	1.73			ESI-10C	236	1890	1063	15
ESI-10C	31	26	SP	11	780	1	10	0.9	1	3906	2658	0.60	0.9	0.95	26.0	21.4	22.8	0.21	0.96	0.24	1.11	1.61			ESI-10C	236	2646	1438	21
ESI-10C	35	21	SP	11	780	1	10	0.9	1	4410	2912	0.54	0.8	1	21.0	17.4	18.6	0.20	0.94	0.19	0.96	1.15			ESI-10C	236	3150	1687	25
ESI-10C	40.5	13	CL	11	780	1	xxx	5	1.2	5103	3262	0.50	0.8	1	13.0	10.2	17.2	0.18	0.91	9.09	49.44	1.02			ESI-10C	236	3843	2030	30.5
ESI-10C	54	25	SP	11	780	1	10	0.9	1	6804	4121	0.44	0.7	1	25.0	17.4	18.7	0.17	0.85	0.17	1.03	1.15			ESI-10C	236	5544	2873	44
ESI-10C	62	29	SP	11	780	1	10	0.9	1	7812	4630	0.42	0.7	1	29.0	19.1	20.3	0.16	0.82	0.18	1.15	1.32			ESI-10C	236	6552	3372	52
ESI-10D	1	4	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	4.0	5.1	10.0	0.00	1.00	0.11	No Liq	0.56	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	4	7	SM	10	780	1	25	4.3	1.1	504	878.4	0.00	1.5	0.75	7.0	7.9	13.1	0.00	1.00	0.14	No Liq	0.72	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	9	8	SM	10	780	1	25	4.3	1.1	1134	1196	0.00	1.3	0.75	8.0	7.8	12.9	0.00	1.00	0.14	No Liq	0.71	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	14	19	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	19.0	18.6	19.8	0.27	1.00	0.21	0.79	1.00			ESI-10D	235	630	439	5
ESI-10D	19	29	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	29.0	25.8	27.2	0.30	1.00	0.32	1.09	1.00			ESI-10D	235	1260	751	10
ESI-10D	24	26	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	26.0	23.8	25.2	0.26	0.99	0.28	1.08	1.98			ESI-10D	235	1890	1063	15
ESI-10D	29	42	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	42.0	35.9	37.6	0.22	0.97	4.85	21.98	1.00			ESI-10D	235	2520	1375	20
ESI-10D	34	21	SP	10	780	1	10	0.9	1	4284	2786	0.54	0.8	1	21.0	17.8	19.0	0.20	0.95	0.19	0.99	1.18			ESI-10D	235	3150	1687	25
ESI-10D	39.5	22	SP	10	780	1	10	0.9	1	4977	3136	0.50	0.8	1	22.0	17.6	18.8	0.18	0.92	0.19	1.01	1.16			ESI-10D	235	3843	2030	30.5
ESI-10D	53.5	20	SP	10	780	1	10	0.9	1	6741	4027	0.44	0.7	1	20.0	14.1	15.3	0.17	0.86	0.14	0.85	0.86			ESI-10D	235	5607	2904	44.5
ESI-10D	59	30	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	30.0	20.3	21.6	0.16	0.84	0.20	1.23	1.46			ESI-10D	235	6300	3247	50
ESI-10D	63.5	59	SP	10	780	1	10	0.9	1	8001	4663	0.41	0.7	1	59.0	38.6	40.3	0.16	0.82	4.12	26.40	1.00			ESI-10D	235	6867	3528	54.5
ESI-11	1	3	SP	15	780	1	10	0.9	1	126	999.6	0.00	1.4	0.75	3.0	3.2	4.1	0.00	1.00	0.06	No Liq	0.34	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	4	6	SP	15	780	1	10	0.9	1	504	1190	0.00	1.3	0.75	6.0	5.8	6.8	0.00	1.00	0.08	No Liq	0.43	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	9	10	SP	15	780	1	10	0.9	1	1134	1508	0.00	1.2	0.75	10.0	8.6	9.7	0.00	1.00	0.11	No Liq	0.54	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	14	11	SP	15	780	1	10	0.9	1	1764	1826	0.00	1.0	0.85	11.0	9.8	10.9	0.00	1.00	0.12	No Liq	0.60	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	19	10	SM	15	780	1	25	4.3	1.1	2394	2144	0.97	1.0	0.85	10.0	8.2	13.4	0.27	0.99	0.14	0.54	1.00			ESI-11	240	630	439	5
ESI-11	24	21	SM	15	780	1	25	4.3	1.1	3024	2462	0.90	0.9	0.95	21.0	18.0	24.3	0.30	0.97	0.26	0.89	1.00			ESI-11	240	1260	751	10
ESI-11	29	49	SP	15	780	1	10	0.9	1	3654	2780	0.76	0.8	0.95	49.0	39.5	41.2	0.26	0.95	4.73	17.95	1.00			ESI-11	240	1890	1063	15
ESI-11	34	59	SM	15	780	1	25	4.3	1.1	4284	3098	0.62	0.8	1	59.0	47.4	57.1	0.22	0.92	4.61	20.87	1.00			ESI-11	240	2520	1375	20
ESI-11	39	54	SP	15	780	1	10	0.9	1	4914	3416	0.54	0.8	1	54.0	41.3	43.1	0.20	0.90	4.49	22.79	1.00			ESI-11	240	3150	1687	25
ESI-11	44	35	SP	15	780	1	10	0.9	1	5544	3734	0.50	0.7	1	35.0	25.6	27.0	0.18	0.88	0.28	1.52	2.31			ESI-11	240	3780	1999	30
ESI-11	49	17	CL	15	780	1	xxx	5	1.2	6174	4052	0.48	0.7	1	17.0	11.9	19.3	0.18	0.86	8.57	48.40	1.21			ESI-11	240	4410	2311	35
ESI-11	54	51	SP	15	780	1	10	0.9	1	6804	4370	0.46	0.7	1	51.0	34.5	36.1	0.17	0.84	4.19	24.56	1.00			ESI-11	240	5040	2623	40
ESI-11	59	54	SP	15	780	1	10	0.9	1	7434	4688	0.44	0.7	1	54.0	35.3	36.9	0.17	0.82	4.11	24.87	1.00			ESI-11	240	5670	2935	45
ESI-11	64	30	SP	15	780	1	10	0.9	1	8064	5006	0.42	0.6	1	30.0	19.0	20.2	0.16	0.81	0.18	1.10	1.31			ESI-11	240	6300	3247	50
ESI-11	69	32	SP	15	780	1	10	0.9	1	8694	5324	0.41	0.6	1	32.0	19.6	20.9	0.16	0.79	0.18	1.16	1.38			ESI-11	240	6930	3559	55
ESI-11A	1	2	SM	9	780	1	25	4.3	1.1	126	625.2	0.00	1.8	0.75	2.0	2.7	7.3	0.00	1.00	0.08	No Liq	0.44	No Liq	No Liq	ESI-11A	234	EXC	EXC	EXC
ESI-11A	4	9	SP	9	780	1	10	0.9	1	504	816	0.00	1.6	0.75	9.0	10.6	11.7	0.00	1.00	0.13	No Liq	0.64	No Liq	No Liq	ESI-11A	234	EXC	EXC	EXC
ESI-11A	9	16	SP	9	780	1	10	0.9	1	1134	1134	0.99	1.3	0.75	16.0	15.9	17.2	0.19	1.00	0.19	0.95	1.00			ESI-11A	234	126	126	1
ESI-11A	14	24	SM	9	780	1	25	4.3	1.1	1764	1452	0.96	1.2	0.85	24.0	23.9	31.0	0.28	1.00	5.00	17.76	1.00			ESI-11A	234	756	502	6

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(1)	(26)	(27)	(28)	(29)
Boring	Sample Depth, ft	N	Class	Water Table, ft	Drop Weight	Drop Height	FC	α	β	σ_{vo}	σ'_{vo}	rd	CN	CR	Ncorr	(N1)60	(N1)60cs	CSR	K_σ	M7.5 CRR	FS for M7.5	CRR for Specified M & P_L	FS<1 per YOUD & NOBLE at P_L	FS<1.34 YOUD & NOBLE at PL	Boring	ESI Boring Elevation	CSR σ_{vo}	CSR σ'_{vo}	Depth
ESI-11A	19	24	SM	9	780	1	25	4.3	1.1	2394	1770	0.88	1.1	0.85	24.0	21.7	28.5	0.29	1.00	0.36	1.21	2.60			ESI-11A	234	1386	814	11
ESI-11A	24	22	SM	9	780	1	25	4.3	1.1	3024	2088	0.73	1.0	0.95	22.0	20.5	27.1	0.25	1.00	0.32	1.26	2.32			ESI-11A	234	2016	1126	16
ESI-11A	29	49	SP	9	780	1	10	0.9	1	3654	2406	0.60	0.9	0.95	49.0	42.4	44.2	0.21	0.98	4.88	22.73	1.00			ESI-11A	234	2646	1438	21
ESI-11A	34	15	CL	9	780	1	xxx	5	1.2	4284	2724	0.53	0.9	1	15.0	12.9	20.4	0.19	0.95	9.51	49.00	1.33			ESI-11A	234	3276	1750	26
ESI-11A	48	15	CL	9	780	1	xxx	5	1.2	6048	3614	0.46	0.7	1	15.0	11.2	18.4	0.17	0.88	8.85	51.81	1.12			ESI-11A	234	5040	2623	40
ESI-11A	53	17	CL	9	780	1	xxx	5	1.2	6678	3932	0.44	0.7	1	17.0	12.1	19.5	0.17	0.86	8.64	52.29	1.24			ESI-11A	234	5670	2935	45
ESI-11A	58.5	23	SP	9	780	1	10	0.9	1	7371	4282	0.42	0.7	1	23.0	15.7	16.9	0.16	0.84	0.15	0.96	0.99			ESI-11A	234	6363	3278	50.5
ESI-11B	1	2	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	2.0	2.6	7.1	0.00	1.00	0.08	No Liq	0.44	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	4	7	SM	10	780	1	25	4.3	1.1	504	878.4	0.00	1.5	0.75	7.0	7.9	13.1	0.00	1.00	0.14	No Liq	0.72	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	9	9	SM	10	780	1	25	4.3	1.1	1134	1196	0.00	1.3	0.75	9.0	8.7	14.0	0.00	1.00	0.15	No Liq	0.78	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	14	11	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	11.0	10.7	11.8	0.27	1.00	0.13	0.47	1.00			ESI-11B	235	630	439	5
ESI-11B	19	30	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	30.0	26.6	28.1	0.30	1.00	0.35	1.17	1.00			ESI-11B	235	1260	751	10
ESI-11B	24	54	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	54.0	49.5	51.4	0.26	0.99	4.96	18.82	1.00			ESI-11B	235	1890	1063	15
ESI-11B	29	28	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	28.0	23.9	25.3	0.22	0.97	0.28	1.27	2.00			ESI-11B	235	2520	1375	20
ESI-11B	43.5	23	SP	10	780	1	10	0.9	1	5481	3391	0.48	0.8	1	23.0	17.7	18.9	0.18	0.90	0.18	1.03	1.17			ESI-11B	235	4347	2280	34.5
ESI-11B	59	29	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	29.0	19.6	20.9	0.16	0.84	0.19	1.19	1.38			ESI-11B	235	6300	3247	50
ESI-11C	1	2	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	2.0	2.4	6.9	0.00	1.00	0.08	No Liq	0.43	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	4	9	SP	12	780	1	10	0.9	1	504	1003	0.00	1.4	0.75	9.0	9.5	10.6	0.00	1.00	0.11	No Liq	0.59	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	9	13	SP	12	780	1	10	0.9	1	1134	1321	0.00	1.2	0.75	13.0	12.0	13.1	0.00	1.00	0.14	No Liq	0.72	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	14	22	SP	12	780	1	10	0.9	1	1764	1639	0.98	1.1	0.85	22.0	20.7	22.0	0.23	1.00	0.24	1.04	1.00			ESI-11C	237	378	314	3
ESI-11C	19	22	SM	12	780	1	25	4.3	1.1	2394	1957	0.94	1.0	0.85	22.0	18.9	25.4	0.29	1.00	0.29	0.98	1.00			ESI-11C	237	1008	626	8
ESI-11C	25	51	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	51.0	44.8	46.6	0.27	0.98	4.90	17.96	1.00			ESI-11C	237	1764	1001	14
ESI-11C	30	27	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	27.0	22.3	23.6	0.23	0.96	0.25	1.10	1.73			ESI-11C	237	2394	1313	19
ESI-11C	35	34	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	34.0	27.9	29.4	0.20	0.93	0.36	1.82	2.80			ESI-11C	237	3024	1625	24
ESI-11C	40	17	SM	12	780	1	25	4.3	1.1	5040	3293	0.51	0.8	1	17.0	13.2	19.1	0.19	0.91	0.19	1.00	1.19			ESI-11C	237	3654	1937	29
ESI-11C	45	13	SM	12	780	1	25	4.3	1.1	5670	3611	0.48	0.7	1	13.0	9.7	15.1	0.18	0.88	0.14	0.81	0.85			ESI-11C	237	4284	2249	34
ESI-11C	50	24	SM	12	780	1	25	4.3	1.1	6300	3929	0.46	0.7	1	24.0	17.1	23.4	0.17	0.86	0.22	1.30	1.70			ESI-11C	237	4914	2561	39
ESI-11C	55	14	SP	12	780	1	10	0.9	1	6930	4247	0.44	0.7	1	14.0	9.6	10.7	0.17	0.85	0.10	0.59	0.59			ESI-11C	237	5544	2873	44
ESI-11C	60	35	SP	12	780	1	10	0.9	1	7560	4565	0.43	0.7	1	35.0	23.2	24.5	0.16	0.83	0.23	1.41	1.87			ESI-11C	237	6174	3185	49
ESI-11D	1	3	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	3.0	3.5	8.2	0.00	1.00	0.09	No Liq	0.48	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	4.5	8	SP	12	780	1	10	0.9	1	567	1035	0.00	1.4	0.75	8.0	8.3	9.4	0.00	1.00	0.10	No Liq	0.53	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	9	17	SP	12	780	1	10	0.9	1	1134	1321	0.00	1.2	0.75	17.0	15.7	16.9	0.00	1.00	0.18	No Liq	0.99	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	14	16	SM	12	780	1	25	4.3	1.1	1764	1639	0.98	1.1	0.85	16.0	15.0	21.0	0.23	1.00	0.23	0.99	1.00			ESI-11D	237	378	314	3
ESI-11D	19	54	SP	12	780	1	10	0.9	1	2394	1957	0.94	1.0	0.85	54.0	46.4	48.3	0.29	1.00	5.00	17.00	1.00			ESI-11D	237	1008	626	8
ESI-11D	25	28	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	28.0	24.6	26.0	0.27	0.98	0.29	1.08	2.12			ESI-11D	237	1764	1001	14
ESI-11D	30	36	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	36.0	29.7	31.2	0.23	0.96	4.78	20.98	1.00			ESI-11D	237	2394	1313	19
ESI-11D	35	27	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	27.0	22.1	23.5	0.20	0.93	0.24	1.21	1.72			ESI-11D	237	3024	1625	24
ESI-11D	40	32	SP	12	780	1	10	0.9	1	5040	3293	0.51	0.8	1	32.0	24.9	26.3	0.19	0.91	0.28	1.49	2.18			ESI-11D	237	3654	1937	29
ESI-11D	45	11	SP	12	780	1	10	0.9	1	5670	3611	0.48	0.7	1	11.0	8.2	9.2	0.18	0.88	0.09	0.50	0.52			ESI-11D	237	4284	2249	34
ESI-11E	1	3	SM	5	780	1	25	4.3	1.1	126	375.6	0.00	2.0	0.75	3.0	4.5	9.3	0.00	1.00	0.10	No Liq	0.53	No Liq	No Liq	ESI-11E	230	EXC	EXC	EXC
ESI-11E	4	6	SP	5	780	1	10	0.9	1	504	566.4	0.00	1.9	0.75	6.0	8.5	9.5	0.00	1.00	0.10	No Liq	0.53	No Liq	No Liq	ESI-11E	230	EXC	EXC	EXC
ESI-11E	9	8	SP	5	780	1	10	0.9	1	1134	884.4	0.97	1.5	0.75	8.0	9.0	10.1	0.27	1.00	0.11	0.41	1.00			ESI-11E	230	630	439	5
ESI-11E	14	16	SM	5	780	1	25	4.3	1.1	1764	1202	0.90	1.3	0.85	16.0	17.5	23.8	0.30	1.00	0.26	0.90	1.77			ESI-11E	230	1260	751	10
ESI-11E	19	29	SM	5	780	1	25	4.3	1.1	2394	1520	0.76	1.1	0.85	29.0	28.3	35.8	0.26	1.00	5.00	18.96	1.00			ESI-11E	230	1890	1063	15
ESI-11E	24	30	SP	5	780	1	10	0.9	1	3024	1838	0.62	1.0	0.95	30.0	29.7	31.2	0.22	1.00	5.00	22.64	1.00			ESI-11E	230	2520	1375	20
ESI-11E	29	59	SP	5	780	1	10	0.9	1	3654	2156	0.54	1.0	0.95	59.0	54.0	56.0	0.20	0.99	4.96	25.17	1.00			ESI-11E	230	3150	1687	25
ESI-11E	34	14	CL	5	780	1	xxx	5	1.2	4284	2474	0.50	0.9	1	14.0	12.6	20.1	0.18	0.97	9.71	52.49	1.29			ESI-11E	230	3780	1999	30
ESI-11E	44	23	SP	5	780	1	10	0.9	1	5544	3110	0.46	0.8	1	23.0	18.4	19.7	0.17	0.92	0.20	1.15	1.25			ESI-11E	230	5040	2623	40
ESI-11E	49	6	CL	5	780	1	xxx	5	1.2	6174	3428	0.44	0.8	1	6.0	4.8	10.5	0.17	0.90	8.97	54.32	0.58			ESI-11E	230	5670	2935	45
ESI-11F	4	5	SP	3	780	1	10	0.9	1	504	441.6	0.99	2.0	0.75	5.0	7.5	8.5	0.19	1.00	0.09	0.49	1.00			ESI-11F	228	252	252	2
ESI-11F	9	10	SP	3	780	1	10	0.9	1	1134	759.6	0.95	1.6	0.75	10.0	12.2	13.3	0.29	1.00	0.14	0.50	0.73			ESI-11F	228	882	564	7
ESI-11F	12.5	21	SP	3	780	1	10	0.9	1	1575	982.2	0.89	1.4	0.75	21.0	22.5	23.8	0.29	1.00	0.26	0.90	1.77			ESI-11F	228	1323	782	10.5
ESI-11F	15	23	SM	3	780	1	25	4.3	1.1	1890	1141	0.83	1.3	0.85	23.0	25.9	33.1	0.28	1.00	5.00	17.77	1.00			ESI-11F	228	1638	938	13
ESI-11F	25	27	SP	3	780	1	10	0.9	1	3150	1777	0.57	1.1	0.95	27.0	27.2	28.7	0.20	1.00	0.36	1.77	2.64			ESI-11F	228	2898	1562	23
ESI-11F	30	9	SP	3	780	1	10	0.9	1	3780	2095	0.51	1.0	0.95	9.0	8.4	9.4	0.19	1.00	0.10	0.54	0.53			ESI-11F	228	3528	1874	28
ESI-11F	39	42	SP	3	780	1	10	0.9	1	4914	2668	0.47	0.9	1	42.0	36.4	38.0	0.17	0.96	4.78	27.40	1.00			ESI-11F	228	4662	2436	37
ESI-11F	44.5	22	CL	3	780	1	xxx	5	1.2	5607	3017	0.45	0.8	1	22.0	17.9	26.5	0.17	0.93	9.28	55.27	2.20			ESI-11F	228	5355	2779	42.5
ESI-11F	51	22	SP	3	780	1	10	0.9	1	6426	3431	0.43	0.8	1	22.0	16.8	18.0	0.16	0.90	0.17	1.08	1.09			ESI-11F	228	6174	3185	49
ESI-12	1	3	SM	7	780	1	25	4.3	1.1	126	500.4	0.00	2.0	0.75	3.0	4.5	9.3	0.00	1.00	0.10	No Liq	0.53	No Liq	No Liq	ESI-12	232	EXC	EXC	EXC

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR $\sigma_{vo'}$	(29) Depth
ESI-12	5	6	SP	7	780	1	10	0.9	1	630	754.8	0.00	1.6	0.75	6.0	7.3	8.4	0.00	1.00	0.09	No Liq	0.49	No Liq	No Liq	ESI-12	232	EXC	EXC	EXC
ESI-12	10	11	SM	7	780	1	25	4.3	1.1	1260	1073	0.97	1.4	0.75	11.0	11.3	16.8	0.25	1.00	0.18	0.72	1.00			ESI-12	232	504	377	4
ESI-12	15	27	SP	7	780	1	10	0.9	1	1890	1391	0.92	1.2	0.85	27.0	27.5	29.0	0.30	1.00	0.37	1.26	2.71			ESI-12	232	1134	689	9
ESI-12	20	24	SP	7	780	1	10	0.9	1	2520	1709	0.79	1.1	0.95	24.0	24.7	26.1	0.27	1.00	0.30	1.10	2.13			ESI-12	232	1764	1001	14
ESI-12	25	57	SP	7	780	1	10	0.9	1	3150	2027	0.64	1.0	0.95	57.0	53.8	55.8	0.23	1.00	4.99	21.91	1.00			ESI-12	232	2394	1313	19
ESI-12	30	47	SP	7	780	1	10	0.9	1	3780	2345	0.55	0.9	0.95	47.0	41.2	43.0	0.20	0.98	4.90	24.43	1.00			ESI-12	232	3024	1625	24
ESI-12	40	15	CL	7	780	1	xxx	5	1.2	5040	2981	0.48	0.8	1	15.0	12.3	19.7	0.18	0.93	9.31	52.18	1.26			ESI-12	232	4284	2249	34
ESI-12	55	13	SP	7	780	1	10	0.9	1	6930	3935	0.43	0.7	1	13.0	9.3	10.3	0.16	0.86	0.10	0.60	0.57			ESI-12	232	6174	3185	49
ESI-13	5	6	SP	2	780	1	10	0.9	1	630	442.8	0.92	2.0	0.75	6.0	9.0	10.1	0.30	1.00	0.11	0.37	0.56			ESI-13	222	1134	689	9
ESI-13	16	14	SP	2	780	1	10	0.9	1	2016	1142	0.62	1.3	0.85	14.0	15.7	17.0	0.22	1.00	0.18	0.83	1.00			ESI-13	222	2520	1375	20
ESI-13	22	41	SP	2	780	1	10	0.9	1	2772	1524	0.53	1.1	0.95	41.0	44.6	46.5	0.19	1.00	5.00	25.76	1.00			ESI-13	222	3276	1750	26
ESI-13	26	33	SP	2	780	1	10	0.9	1	3276	1778	0.50	1.1	0.95	33.0	33.2	34.8	0.18	1.00	5.00	27.04	1.00			ESI-13	222	3780	1999	30
ESI-13	31.5	28	SP	2	780	1	10	0.9	1	3969	2128	0.47	1.0	0.95	28.0	25.8	27.2	0.18	0.99	0.32	1.83	2.34			ESI-13	222	4473	2342	35.5
ESI-13	37	18	SP	2	780	1	10	0.9	1	4662	2478	0.45	0.9	1	18.0	16.2	17.4	0.17	0.97	0.18	1.07	1.03			ESI-13	222	5166	2686	41
ESI-13	41	29	SP	2	780	1	10	0.9	1	5166	2732	0.44	0.9	1	29.0	24.8	26.2	0.17	0.95	0.29	1.75	2.15			ESI-13	222	5670	2935	45
ESI-13	46	23	SP	2	780	1	10	0.9	1	5796	3050	0.42	0.8	1	23.0	18.6	19.9	0.16	0.93	0.20	1.24	1.27			ESI-13	222	6300	3247	50
ESI-13	51	35	SP	2	780	1	10	0.9	1	6426	3368	0.41	0.8	1	35.0	27.0	28.4	0.16	0.90	0.32	2.06	2.59			ESI-13	222	6930	3559	55
ESI-14	1	9	SM	14	780	1	25	4.3	1.1	126	937.2	0.00	1.5	0.75	9.0	9.9	15.3	0.00	1.00	0.17	No Liq	0.87	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	4	6	SP	14	780	1	10	0.9	1	504	1128	0.00	1.3	0.75	6.0	6.0	7.0	0.00	1.00	0.08	No Liq	0.43	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	9	21	SP	14	780	1	10	0.9	1	1134	1446	0.00	1.2	0.75	21.0	18.5	19.8	0.00	1.00	0.21	No Liq	1.26	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	14	11	SP	14	780	1	10	0.9	1	1764	1764	0.99	1.1	0.85	11.0	10.0	11.0	0.19	1.00	0.12	0.62	1.00			ESI-14	239	126	126	1
ESI-14	19	21	SP	14	780	1	10	0.9	1	2394	2082	0.96	1.0	0.85	21.0	17.5	18.7	0.28	1.00	0.20	0.72	1.00			ESI-14	239	756	502	6
ESI-14	24	19	SP	14	780	1	10	0.9	1	3024	2400	0.88	0.9	0.95	19.0	16.5	17.7	0.29	0.98	0.19	0.64	1.00			ESI-14	239	1386	814	11
ESI-14	29	36	SP	14	780	1	10	0.9	1	3654	2718	0.73	0.9	0.95	36.0	29.3	30.8	0.25	0.95	4.76	18.72	1.00			ESI-14	239	2016	1126	16
ESI-14	34	38	SP	14	780	1	10	0.9	1	4284	3036	0.60	0.8	1	38.0	30.8	32.4	0.21	0.93	4.63	21.58	1.00			ESI-14	239	2646	1438	21
ESI-14	39	58	SP	14	780	1	10	0.9	1	4914	3354	0.53	0.8	1	58.0	44.8	46.6	0.19	0.90	4.51	23.26	1.00			ESI-14	239	3276	1750	26
ESI-14	44	21	SM	14	780	1	25	4.3	1.1	5544	3672	0.50	0.7	1	21.0	15.5	21.6	0.18	0.88	0.21	1.13	1.46			ESI-14	239	3906	2062	31
ESI-14	49	34	SP	14	780	1	10	0.9	1	6174	3990	0.47	0.7	1	34.0	24.1	25.5	0.18	0.86	0.25	1.42	2.02			ESI-14	239	4536	2374	36
ESI-14	54	31	SP	14	780	1	10	0.9	1	6804	4308	0.45	0.7	1	31.0	21.1	22.4	0.17	0.84	0.21	1.22	1.57			ESI-14	239	5166	2686	41
ESI-14	59	30	SP	14	780	1	10	0.9	1	7434	4626	0.44	0.7	1	30.0	19.7	21.0	0.16	0.82	0.19	1.15	1.40			ESI-14	239	5796	2998	46
ESI-15	4	9	SP	20	780	1	10	0.9	1	504	1502	0.00	1.2	0.75	9.0	7.8	8.8	0.00	1.00	0.10	No Liq	0.51	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	9	9	SP	20	780	1	10	0.9	1	1134	1820	0.00	1.0	0.75	9.0	7.1	8.1	0.00	1.00	0.09	No Liq	0.48	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	15	29	SP	20	780	1	10	0.9	1	1890	2202	0.00	1.0	0.85	29.0	23.5	24.9	0.00	0.99	0.28	No Liq	1.93	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	21	38	SP	20	780	1	10	0.9	1	2646	2584	0.99	0.9	0.95	38.0	31.8	33.3	0.19	0.96	4.81	25.00	1.00			ESI-15	245	252	252	2
ESI-15	24	24	SM	20	780	1	25	4.3	1.1	3024	2774	0.97	0.8	0.95	24.0	19.4	25.9	0.27	0.95	0.28	1.04	1.00			ESI-15	245	630	439	5
ESI-15	29	20	SM	20	780	1	25	4.3	1.1	3654	3092	0.90	0.8	0.95	20.0	15.3	21.3	0.30	0.92	0.21	0.72	1.00			ESI-15	245	1260	751	10
ESI-15	34	24	SP	20	780	1	10	0.9	1	4284	3410	0.76	0.8	1	24.0	18.4	19.6	0.26	0.90	0.19	0.72	1.00			ESI-15	245	1890	1063	15
ESI-15	39.5	35	SP	20	780	1	10	0.9	1	4977	3760	0.61	0.7	1	35.0	25.5	26.9	0.22	0.87	0.28	1.28	2.29			ESI-15	245	2583	1406	20.5
ESI-15	44.5	52	SP	20	780	1	10	0.9	1	5607	4078	0.54	0.7	1	52.0	36.4	38.1	0.20	0.86	4.28	21.86	1.00			ESI-15	245	3213	1718	25.5
ESI-15	50	27	SP	20	780	1	10	0.9	1	6300	4428	0.50	0.7	1	27.0	18.1	19.4	0.18	0.84	0.18	0.96	1.22			ESI-15	245	3906	2062	31
ESI-15	55	42	SP	20	780	1	10	0.9	1	6930	4746	0.47	0.6	1	42.0	27.3	28.7	0.18	0.82	0.30	1.70	2.66			ESI-15	245	4536	2374	36
ESI-15	60.5	35	SP	20	780	1	10	0.9	1	7623	5096	0.45	0.6	1	35.0	21.9	23.3	0.17	0.80	0.21	1.22	1.69			ESI-15	245	5229	2717	41.5
ESI-15	64	13	SP	20	780	1	10	0.9	1	8064	5318	0.44	0.6	1	13.0	8.0	9.0	0.17	0.79	0.08	0.47	0.51			ESI-15	245	5670	2935	45
ESI-15	70.5	32	SP	20	780	1	10	0.9	1	8883	5732	0.42	0.6	1	32.0	18.9	20.2	0.16	0.78	0.17	1.07	1.30			ESI-15	245	6489	3341	51.5
ESI-15	74	35	SP	20	780	1	10	0.9	1	9324	5954	0.41	0.6	1	35.0	20.3	21.6	0.16	0.77	0.18	1.16	1.47			ESI-15	245	6930	3559	55
ESI-15	84	67	SP	20	780	1	10	0.9	1	10584	6590	0.38	0.6	1	67.0	36.9	38.6	0.15	0.75	3.74	25.50	1.00			ESI-15	245	8190	4183	65

Appendix B

Constants		
Soil wt.	126	pcf
Water wt.	62.4	pcf
Pa	2000	psf
PGA	0.3	g
M	5.5	Moment magnitude
PL	0.2	target probability of liquefaction
MSF	2.782949	magnitude scaling factor (Andrus & Stokoe)
CRR-a	0.048	
CRR-b	-0.1248	
CRR-c	-0.00472	
CRR-d	0.009578	
CRR-e	0.000614	
CRR-f	-0.00033	
CRR-g	-1.7E-05	
CRR-h	3.71E-06	
rd-a	-0.4113	
rd-b	0.04052	
rd-c	0.001753	
rd-d	-0.4177	
rd-e	0.05729	
rd-f	-0.00621	
rd-g	0.00121	

2	Default Water Table Depth
226	Default Ground Surface Elevation
224	Default Water Table Elevation

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
101	3	23	SW	3.5	300	2	10	0.9	1	378	409.2	0.98	2.0	0.75	17.7	26.5	28.0	0.18	1.00	0.34	1.94	1.00			101				
101	11	22	SC	3.5	300	2	35	5	1.2	1386	918	0.88	1.5	0.75	16.9	18.7	27.5	0.26	1.00	0.33	1.27	1.35			101				
101	16	19	SW	3.5	300	2	10	0.9	1	2016	1236	0.73	1.3	0.85	14.6	15.8	17.0	0.23	1.00	0.18	0.79	0.56			101				
101	21	22	SW	3.5	300	2	10	0.9	1	2646	1554	0.60	1.1	0.95	16.9	18.2	19.5	0.20	1.00	0.21	1.06	0.69			101				
101	25	32	SW	3.5	300	2	10	0.9	1	3150	1808	0.54	1.1	0.95	24.6	24.6	26.0	0.18	1.00	0.30	1.63	1.19			101				
101	31	6	SC	3.5	300	2	35	5	1.2	3906	2190	0.50	1.0	0.95	4.6	4.2	10.0	0.17	0.99	0.11	0.63	0.32			101				
101	34	8	SC	3.5	300	2	35	5	1.2	4284	2381	0.48	0.9	1	6.2	5.6	11.8	0.17	0.98	0.12	0.74	0.36			101				
101	35	2	SC	3.5	300	2	35	5	1.2	4410	2444	0.48	0.9	1	1.5	1.4	6.7	0.17	0.97	0.08	0.45	0.24			101				
101	39	37	SM	3.5	300	2	25	4.3	1.1	4914	2699	0.46	0.9	1	28.5	24.5	31.6	0.16	0.95	4.77	29.22	1.00			101				
101	41	22	SM	3.5	300	2	25	4.3	1.1	5166	2826	0.45	0.8	1	16.9	14.2	20.2	0.16	0.94	0.21	1.28	0.73			101				
101	46	30	SW	3.5	300	2	10	0.9	1	5796	3144	0.44	0.8	1	23.1	18.4	19.7	0.16	0.92	0.20	1.25	0.70			101				
101	48	48	SW	3.5	300	2	10	0.9	1	6048	3271	0.43	0.8	1	36.9	28.9	30.4	0.15	0.91	4.54	29.36	1.00			101				
101	51	20	SP	3.5	300	2	10	0.9	1	6426	3462	0.42	0.8	1	15.4	11.7	12.8	0.15	0.90	0.12	0.82	0.40			101				
101	56	80	SP	3.5	300	2	10	0.9	1	7056	3780	0.41	0.7	1	61.5	44.8	46.6	0.15	0.87	4.37	29.51	1.00			101				
101	57	200	SP	3.5	300	2	10	0.9	1	7182	3844	0.40	0.7	1	153.8	111.0	114.2	0.15	0.87	4.35	29.53	1.00			101				
102	3	18	SM	2	300	1.5	25	4.3	1.1	378	315.6	0.98	2.0	0.75	10.4	15.6	21.7	0.23	1.00	0.24	1.03	0.83			102				
102	6	24	SM	2	300	1.5	25	4.3	1.1	756	506.4	0.96	2.0	0.75	13.8	20.6	27.3	0.28	1.00	0.33	1.17	1.33			102				
102	11	32	SM	2	300	1.5	25	4.3	1.1	1386	824.4	0.88	1.6	0.75	18.5	21.6	28.3	0.29	1.00	0.35	1.22	1.45			102				
102	17	23	SP	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	13.3	14.5	15.7	0.24	1.00	0.17	0.70	0.51			102				
102	18	23	SP	2	300	1.5	10	0.9	1	2268	1270	0.67	1.3	0.85	13.3	14.2	15.3	0.23	1.00	0.17	0.71	0.49			102				
102	22	36	SP	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	20.8	22.6	24.0	0.21	1.00	0.27	1.29	1.01			102				
102	27	46	SP	2	300	1.5	10	0.9	1	3402	1842	0.52	1.0	0.95	26.5	26.3	27.7	0.19	1.00	0.34	1.78	1.38			102				
102	32	68	SP	2	300	1.5	10	0.9	1	4032	2160	0.49	1.0	0.95	39.2	35.9	37.5	0.18	0.99	4.96	27.81	1.00			102				
102	35	21	SP	2	300	1.5	10	0.9	1	4410	2351	0.48	0.9	1	12.1	11.2	12.3	0.17	0.98	0.13	0.75	0.38			102				
102	38	24	SP	2	300	1.5	10	0.9	1	4788	2542	0.46	0.9	1	13.8	12.3	13.4	0.17	0.97	0.14	0.82	0.42			102				
102	43	42	SP	2	300	1.5	10	0.9	1	5418	2860	0.45	0.8	1	24.2	20.3	21.6	0.16	0.94	0.22	1.34	0.83			102				
102	47	44	SM	2	300	1.5	25	4.3	1.1	5922	3114	0.43	0.8	1	25.4	20.3	27.0	0.16	0.92	0.29	1.83	1.30			102				
102	48	17	ML	2	300	1.5	xxx	5	1.2	6048	3178	0.43	0.8	1	9.8	7.8	14.3	0.16	0.92	9.16	57.48	0.45			102				
102	51	43	SP	2	300	1.5	10	0.9	1	6426	3368	0.42	0.8	1	24.8	19.1	20.4	0.16	0.90	0.20	1.27	0.75			102				
102	54	147	ML	2	300	1.5	xxx	5	1.2	6804	3559	0.41	0.7	1	84.8	63.6	81.3	0.15	0.89	4.44	28.92	1.00			102				
102	57	170	ML	2	300	1.5	xxx	5	1.2	7182	3750	0.40	0.7	1	98.1	71.6	91.0	0.15	0.88	4.38	29.01	1.00			102				
103	3	27	SC	3	300	1.5	35	5	1.2	378	378	0.98	2.0	0.75	15.6	23.4	33.0	0.19	1.00	5.00	26.18	1.00			103				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
103	5	30	SP	3	300	1.5	10	0.9	1	630	505.2	0.97	2.0	0.75	17.3	25.8	27.3	0.23	1.00	0.33	1.38	1.33			103				
103	9	37	SP	3	300	1.5	10	0.9	1	1134	759.6	0.92	1.6	0.75	21.3	26.0	27.4	0.27	1.00	0.33	1.22	1.34			103				
103	15	27	SP	3	300	1.5	10	0.9	1	1890	1141	0.76	1.3	0.85	15.6	17.5	18.8	0.25	1.00	0.20	0.82	0.65			103				
103	19	28	SP	3	300	1.5	10	0.9	1	2394	1396	0.64	1.2	0.85	16.2	16.4	17.7	0.21	1.00	0.19	0.89	0.60			103				
103	25	38	SP	3	300	1.5	10	0.9	1	3150	1777	0.54	1.1	0.95	21.9	22.1	23.4	0.19	1.00	0.26	1.39	0.96			103				
103	29	62	SW	3	300	1.5	10	0.9	1	3654	2032	0.51	1.0	0.95	35.8	33.7	35.3	0.18	1.00	4.99	28.04	1.00			103				
103	34	45	SW	3	300	1.5	10	0.9	1	4284	2350	0.48	0.9	1	26.0	24.0	25.3	0.17	0.98	0.28	1.65	1.13			103				
103	36	49	SW	3	300	1.5	10	0.9	1	4536	2477	0.47	0.9	1	28.3	25.4	26.8	0.17	0.97	0.31	1.82	1.28			103				
103	39	62	SW	3	300	1.5	10	0.9	1	4914	2668	0.46	0.9	1	35.8	31.0	32.5	0.17	0.96	4.78	28.95	1.00			103				
103	44	57	SP	3	300	1.5	10	0.9	1	5544	2986	0.44	0.8	1	32.9	26.9	28.4	0.16	0.93	0.33	2.05	1.45			103				
103	46	70	SM	3	300	1.5	25	4.3	1.1	5796	3113	0.44	0.8	1	40.4	32.4	40.4	0.16	0.92	4.60	29.12	1.00			103				
103	48	75	SW	3	300	1.5	10	0.9	1	6048	3240	0.43	0.8	1	43.3	34.0	35.6	0.16	0.91	4.56	29.16	1.00			103				
103	52	52	SW	3	300	1.5	10	0.9	1	6552	3494	0.42	0.8	1	30.0	22.7	24.1	0.15	0.89	0.24	1.57	1.02			103				
103	56	130	ML	3	300	1.5	xxx	5	1.2	7056	3749	0.41	0.7	1	75.0	54.8	70.7	0.15	0.88	4.38	29.33	1.00			103				
104	2	35	SP	3	300	2	10	0.9	1	252	314.4	0.99	2.0	0.75	26.9	40.4	42.1	0.15	1.00	5.00	32.42	1.00			104				
104	7	29	SC	3	300	2	35	5	1.2	882	632.4	0.95	1.8	0.75	22.3	29.8	40.7	0.26	1.00	5.00	19.38	1.00			104				
104	12.5	56	SP	3	300	2	10	0.9	1	1575	982.2	0.84	1.4	0.75	43.1	46.1	48.0	0.26	1.00	5.00	18.99	1.00			104				
104	17	39	SP	3	300	2	10	0.9	1	2142	1268	0.70	1.3	0.85	30.0	32.0	33.6	0.23	1.00	5.00	21.81	1.00			104				
104	23	49	SP	3	300	2	10	0.9	1	2898	1650	0.57	1.1	0.95	37.7	39.4	41.1	0.19	1.00	5.00	25.81	1.00			104				
104	27	65	SP	3	300	2	10	0.9	1	3402	1904	0.52	1.0	0.95	50.0	48.7	50.6	0.18	1.00	5.00	27.46	1.00			104				
104	31	60	SC	3	300	2	35	5	1.2	3906	2159	0.50	1.0	0.95	46.2	42.2	55.6	0.17	0.99	4.96	28.38	1.00			104				
104	35	42	SP	3	300	2	10	0.9	1	4410	2413	0.48	0.9	1	32.3	29.4	30.9	0.17	0.98	4.88	28.76	1.00			104				
104	37	23	SP	3	300	2	10	0.9	1	4662	2540	0.47	0.9	1	17.7	15.7	16.9	0.17	0.97	0.18	1.05	0.56			104				
104	41	29	SP	3	300	2	10	0.9	1	5166	2795	0.45	0.8	1	22.3	18.9	20.1	0.16	0.95	0.21	1.26	0.73			104				
104	44	51	SM	3	300	2	25	4.3	1.1	5544	2986	0.44	0.8	1	39.2	32.1	40.1	0.16	0.93	4.65	29.08	1.00			104				
104	46	36	SM	3	300	2	25	4.3	1.1	5796	3113	0.44	0.8	1	27.7	22.2	29.0	0.16	0.92	0.35	2.19	1.54			104				
104	48	24	SM	3	300	2	25	4.3	1.1	6048	3240	0.43	0.8	1	18.5	14.5	20.5	0.16	0.91	0.20	1.29	0.75			104				
104	52	53	SM	3	300	2	25	4.3	1.1	6552	3494	0.42	0.8	1	40.8	30.8	38.7	0.15	0.89	4.46	29.24	1.00			104				
104	55	130	CL	3	300	2	xxx	5	1.2	6930	3685	0.41	0.7	1	100.0	73.7	93.4	0.15	0.88	4.40	29.31	1.00			104				
105	2	48	SP	1.5	300	1.5	10	0.9	1	252	220.8	0.99	2.0	0.75	27.7	41.5	43.3	0.22	1.00	5.00	22.77	1.00			105				
105	6	41	SM	1.5	300	1.5	25	4.3	1.1	756	475.2	0.96	2.0	0.75	23.7	35.5	43.8	0.30	1.00	5.00	16.83	1.00			105				
105	11	24	SW	1.5	300	1.5	10	0.9	1	1386	793.2	0.88	1.6	0.75	13.8	16.5	17.7	0.30	1.00	0.19	0.64	0.60			105				
105	17	39	SW	1.5	300	1.5	10	0.9	1	2142	1175	0.70	1.3	0.85	22.5	25.0	26.4	0.25	1.00	0.31	1.24	1.23			105				
105	21	30	SW	1.5	300	1.5	10	0.9	1	2646	1429	0.60	1.2	0.95	17.3	19.5	20.7	0.22	1.00	0.22	1.04	0.77			105				
105	27	56	SW	1.5	300	1.5	10	0.9	1	3402	1811	0.52	1.1	0.95	32.3	32.3	33.8	0.19	1.00	5.00	26.11	1.00			105				
105	31	76	SM	1.5	300	1.5	25	4.3	1.1	3906	2065	0.50	1.0	0.95	43.8	41.0	50.0	0.18	1.00	4.99	27.28	1.00			105				
105	35	43	ML	1.5	300	1.5	xxx	5	1.2	4410	2320	0.48	0.9	1	24.8	23.0	32.6	0.18	0.98	4.91	27.84	1.00			105				
105	37	57	SM	1.5	300	1.5	25	4.3	1.1	4662	2447	0.47	0.9	1	32.9	29.7	37.4	0.17	0.97	4.86	28.02	1.00			105				
105	41	24	SM	1.5	300	1.5	25	4.3	1.1	5166	2701	0.45	0.9	1	13.8	11.9	17.6	0.17	0.95	0.18	1.07	0.59			105				
105	45	40	SW	1.5	300	1.5	10	0.9	1	5670	2956	0.44	0.8	1	23.1	19.0	20.3	0.16	0.93	0.20	1.25	0.74			105				
105	48	93	SW	1.5	300	1.5	10	0.9	1	6048	3146	0.43	0.8	1	53.7	42.8	44.6	0.16	0.92	4.59	28.53	1.00			105				
105	54	100	SW	1.5	300	1.5	10	0.9	1	6804	3528	0.41	0.8	1	57.7	43.4	45.2	0.15	0.89	4.45	28.73	1.00			105				
105	58	64	SW	1.5	300	1.5	10	0.9	1	7308	3782	0.40	0.7	1	36.9	26.8	28.3	0.15	0.87	0.31	2.03	1.45			105				
106	2	43	SC	4	300	2	35	5	1.2	252	376.8	0.99	2.0	0.75	33.1	49.6	64.5	0.13	1.00	5.00	38.86	1.00			106				
106	5	27	SM	4	300	2	25	4.3	1.1	630	567.6	0.97	1.9	0.75	20.8	29.2	36.9	0.21	1.00	5.00	23.93	1.00			106				
106	6	29	SM	4	300	2	25	4.3	1.1	756	631.2	0.96	1.8	0.75	22.3	29.8	37.5	0.22	1.00	5.00	22.35	1.00			106				
106	9	20	SM	4	300	2	25	4.3	1.1	1134	822	0.92	1.6	0.75	15.4	18.0	24.4	0.25	1.00	0.27	1.10	1.04			106				
106	13	37	SW	4	300	2	10	0.9	1	1638	1076	0.83	1.4	0.85	28.5	33.0	34.6	0.25	1.00	5.00	20.38	1.00			106				
106	16	80	SW	4	300	2	10	0.9	1	2016	1267	0.73	1.3	0.85	61.5	65.7	68.0	0.23	1.00	5.00	22.15	1.00			106				
106	19	125	SW	4	300	2	10	0.9	1	2394	1458	0.64	1.2	0.85	96.2	95.7	98.7	0.21	1.00	5.00	24.36	1.00			106				
106	26	60	SW	4	300	2	10	0.9	1	3276	1903	0.53	1.0	0.95	46.2	44.9	46.8	0.18	1.00	5.00	28.03	1.00			106				
106	31	22	SW	4	300	2	10	0.9	1	3906	2221	0.50	0.9	0.95	16.9	15.3	16.5	0.17	0.99	0.18	1.03	0.54			106				
106	36	8	ML	4	300	2	xxx	5	1.2	4536	2539	0.47	0.9	1	6.2	5.5	11.6	0.16	0.97	9.66	58.81	0.36			106				
106	41	10	SM	4	300	2	25	4.3	1.1	5166	2857	0.45	0.8	1	7.7	6.4	11.5	0.16	0.94	0.12	0.73	0.36			106				
106	42	25	SM	4	300	2	25	4.3	1.1	5292	2921	0.45	0.8	1	19.2	15.9	22.0	0.16	0.94	0.22	1.42	0.86			106				
106	47	20	SM	4	300	2	25	4.3	1.1	5922	3239	0.43	0.8	1	15.4	12.1	17.8	0.15	0.91	0.17	1.13	0.60			106				
106	52	45	SP	4	300	2	10	0.9	1	6552	3557	0.42	0.7	1	34.6	26.0	27.4	0.15	0.89	0.29	1.94	1.34			106				
106	56	134	CL	4	300	2	xxx	5	1.2	7056	3811	0.41	0.7	1	103.1	74.7	94.6	0.15	0.87	4.36	29.68	1.00			106				
107	5	26	SM	3	1000	1	25	4.3	1.1	630	505.2	0.97	2.0	0.75	33.3	49.7	59.8	0.23	1.00	5.00	21.30	1.00			107				

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(1)	(26)	(27)	(28)	(29)
Boring	Sample Depth, ft	N	Class	Water Table, ft	Drop Weight	Drop Height	FC	α	β	σ_{vo}	σ'_{vo}	rd	CN	CR	Ncorr	(N1)60	(N1)60cs	CSR	K_σ	M7.5 CRR	FS for M7.5	CRR for Specified M & P_L	FS<1 per YOUD & NOBLE at P_L	FS<1.34 YOUD & NOBLE at PL	Boring	ESI Boring Elevation	CSR σ_{vo}	CSR σ_{vo}'	Depth
107	8	40	SM	3	1000	1	25	4.3	1.1	1008	696	0.94	1.7	0.75	51.3	65.2	77.0	0.26	1.00	5.00	18.89	1.00			107				
107	14	69	SM	3	1000	1	25	4.3	1.1	1764	1078	0.79	1.4	0.85	88.5	102.4	118.5	0.25	1.00	5.00	19.72	1.00			107				
107	18	24	SP	3	1000	1	10	0.9	1	2268	1332	0.67	1.2	0.85	30.8	32.0	33.6	0.22	1.00	5.00	22.58	1.00			107				
107	19	32	SP	3	1000	1	10	0.9	1	2394	1396	0.64	1.2	0.85	41.0	41.7	43.5	0.21	1.00	5.00	23.32	1.00			107				
107	24	60	SP	3	1000	1	10	0.9	1	3024	1714	0.55	1.1	0.95	76.9	78.9	81.5	0.19	1.00	5.00	26.29	1.00			107				
107	29	44	SP	3	1000	1	10	0.9	1	3654	2032	0.51	1.0	0.95	56.4	53.2	55.2	0.18	1.00	4.99	28.04	1.00			107				
107	35	18	SC	3	1000	1	35	5	1.2	4410	2413	0.48	0.9	1	23.1	21.0	30.2	0.17	0.98	4.88	28.76	1.00			107				
107	37	94	SP	3	1000	1	10	0.9	1	4662	2540	0.47	0.9	1	120.5	106.9	110.1	0.17	0.97	4.83	28.87	1.00			107				
107	43	56	SP	3	1000	1	10	0.9	1	5418	2922	0.45	0.8	1	71.8	59.4	61.6	0.16	0.94	4.68	29.06	1.00			107				
107	48	80	SW	3	1000	1	10	0.9	1	6048	3240	0.43	0.8	1	102.6	80.6	83.2	0.16	0.91	4.56	29.16	1.00			107				
107	55	250	CL	3	1000	1	xxx	5	1.2	6930	3685	0.41	0.7	1	320.5	236.1	288.3	0.15	0.88	4.40	29.31	1.00			107				
108	2	18	SC	2	300	2	35	5	1.2	252	252	0.99	2.0	0.75	13.8	20.8	29.9	0.19	1.00	0.44	2.31	1.00			108				
108	5	28	SM	2	300	2	25	4.3	1.1	630	442.8	0.97	2.0	0.75	21.5	32.3	40.3	0.27	1.00	5.00	18.67	1.00			108				
108	8	27	SM	2	300	2	25	4.3	1.1	1008	633.6	0.94	1.8	0.75	20.8	27.7	35.1	0.29	1.00	5.00	17.20	1.00			108				
108	12	26	SM	2	300	2	25	4.3	1.1	1512	888	0.86	1.5	0.75	20.0	22.5	29.4	0.28	1.00	0.39	1.38	1.58			108				
108	16	23	SP	2	300	2	10	0.9	1	2016	1142	0.73	1.3	0.85	17.7	19.9	21.2	0.25	1.00	0.23	0.92	0.80			108				
108	21	26	SP	2	300	2	10	0.9	1	2646	1460	0.60	1.2	0.95	20.0	22.2	23.6	0.21	1.00	0.26	1.24	0.98			108				
108	26	31	SP	2	300	2	10	0.9	1	3276	1778	0.53	1.1	0.95	23.8	24.0	25.4	0.19	1.00	0.29	1.52	1.14			108				
108	31	17	ML	2	300	2	xxx	5	1.2	3906	2096	0.50	1.0	0.95	13.1	12.1	19.6	0.18	1.00	9.96	55.30	0.70			108				
108	37	25	CL	2	300	2	xxx	5	1.2	4662	2478	0.47	0.9	1	19.2	17.3	25.7	0.17	0.97	9.70	56.61	1.17			108				
108	41	57	SP	2	300	2	10	0.9	1	5166	2732	0.45	0.9	1	43.8	37.5	39.2	0.17	0.95	4.75	28.51	1.00			108				
108	47	24	SP	2	300	2	10	0.9	1	5922	3114	0.43	0.8	1	18.5	14.8	16.0	0.16	0.92	0.16	0.99	0.52			108				
108	51	32	SP	2	300	2	10	0.9	1	6426	3368	0.42	0.8	1	24.6	19.0	20.2	0.16	0.90	0.20	1.26	0.74			108				
108	53	143	CL	2	300	2	xxx	5	1.2	6678	3496	0.41	0.8	1	110.0	83.2	104.8	0.15	0.89	4.46	28.89	1.00			108				
109	3	13	SP	2	1000	1	10	0.9	1	378	315.6	0.98	2.0	0.75	16.7	25.0	26.4	0.23	1.00	0.31	1.34	1.24			109				
109	6	13	CL	2	1000	1	xxx	5	1.2	756	506.4	0.96	2.0	0.75	16.7	24.8	34.8	0.28	1.00	5.00	17.93	1.00			109				
109	8	32	CL	2	1000	1	xxx	5	1.2	1008	633.6	0.94	1.8	0.75	41.0	54.7	70.6	0.29	1.00	5.00	17.20	1.00			109				
109	12	28	CL	2	1000	1	xxx	5	1.2	1512	888	0.86	1.5	0.75	35.9	40.4	53.5	0.28	1.00	5.00	17.58	1.00			109				
109	16	13	SW	2	1000	1	10	0.9	1	2016	1142	0.73	1.3	0.85	16.7	18.7	20.0	0.25	1.00	0.22	0.86	0.73			109				
109	19	36	SW	2	1000	1	10	0.9	1	2394	1333	0.64	1.2	0.85	46.2	48.1	50.0	0.22	1.00	5.00	22.28	1.00			109				
109	25	32	SW	2	1000	1	10	0.9	1	3150	1715	0.54	1.1	0.95	41.0	42.1	43.9	0.19	1.00	5.00	25.78	1.00			109				
109	29	16	SW	2	1000	1	10	0.9	1	3654	1969	0.51	1.0	0.95	20.5	19.6	20.9	0.18	1.00	0.23	1.24	0.78			109				
109	35	10	ML	2	1000	1	xxx	5	1.2	4410	2351	0.48	0.9	1	12.8	11.8	19.2	0.17	0.98	9.80	56.30	0.68			109				
109	38	13	ML	2	1000	1	xxx	5	1.2	4788	2542	0.46	0.9	1	16.7	14.8	22.7	0.17	0.97	9.65	56.73	0.91			109				
109	43	28	SP	2	1000	1	10	0.9	1	5418	2860	0.45	0.8	1	35.9	30.0	31.5	0.16	0.94	4.70	28.59	1.00			109				
109	48	12	SP	2	1000	1	10	0.9	1	6048	3178	0.43	0.8	1	15.4	12.2	13.3	0.16	0.92	0.13	0.83	0.42			109				
109	53	239	CL	2	1000	1	xxx	5	1.2	6678	3496	0.41	0.8	1	306.4	231.8	283.1	0.15	0.89	4.46	28.89	1.00			109				
110	2	16	SM	2	300	2	25	4.3	1.1	252	252	0.99	2.0	0.75	12.3	18.5	24.9	0.19	1.00	0.28	1.46	1.00			110				
110	6	4	SP	2	300	2	10	0.9	1	756	506.4	0.96	2.0	0.75	3.1	4.6	5.6	0.28	1.00	0.07	0.25	0.22	LIQ	0.778532	110				
110	8	7	SC	2	300	2	35	5	1.2	1008	633.6	0.94	1.8	0.75	5.4	7.2	13.6	0.29	1.00	0.15	0.51	0.42			110				
110	12	4	SM	2	300	2	25	4.3	1.1	1512	888	0.86	1.5	0.75	3.1	3.5	8.2	0.28	1.00	0.09	0.32	0.27	LIQ	0.94771	110				
110	17	15	SP	2	300	2	10	0.9	1	2142	1206	0.70	1.3	0.85	11.5	12.6	13.8	0.24	1.00	0.15	0.62	0.43			110				
110	21	15	SP	2	300	2	10	0.9	1	2646	1460	0.60	1.2	0.95	11.5	12.8	14.0	0.21	1.00	0.15	0.72	0.44			110				
110	27	29	SP	2	300	2	10	0.9	1	3402	1842	0.52	1.0	0.95	22.3	22.1	23.4	0.19	1.00	0.26	1.38	0.98			110				
110	31	11	ML	2	300	2	xxx	5	1.2	3906	2096	0.50	1.0	0.95	8.5	7.9	14.4	0.18	1.00	9.96	55.30	0.45			110				
110	37	16	SM	2	300	2	25	4.3	1.1	4662	2478	0.47	0.9	1	12.3	11.1	16.6	0.17	0.97	0.17	1.02	0.55			110				
110	41	5	SM	2	300	2	25	4.3	1.1	5166	2732	0.45	0.9	1	3.8	3.3	8.0	0.17	0.95	0.08	0.50	0.27			110				
110	46	28	SM	2	300	2	25	4.3	1.1	5796	3050	0.44	0.8	1	21.5	17.4	23.7	0.16	0.93	0.24	1.51	0.99			110				
110	51	54	SM	2	300	2	25	4.3	1.1	6426	3368	0.42	0.8	1	41.5	32.0	40.0	0.16	0.90	4.51	28.83	1.00			110				
110	57	39	SP	2	300	2	10	0.9	1	7182	3750	0.40	0.7	1	30.0	21.9	23.3	0.15	0.88	0.22	1.49	0.95			110				
111	3	28	SC	3	300	2	35	5	1.2	378	378	0.98	2.0	0.75	21.5	32.3	43.8	0.19	1.00	5.00	26.18	1.00			111				
111	6	10	SM	3	300	2	25	4.3	1.1	756	568.8	0.96	1.9	0.75	7.7	10.8	16.4	0.25	1.00	0.18	0.71	0.53			111				
111	8	20	SW	3	300	2	10	0.9	1	1008	696	0.94	1.7	0.75	15.4	19.6	20.9	0.26	1.00	0.23	0.85	0.78			111				
111	12	38	SC	3	300	2	35	5	1.2	1512	950.4	0.86	1.5	0.75	29.2	31.8	43.2	0.27	1.00	5.00	18.82	1.00			111				
111	17	30	SW	3	300	2	10	0.9	1	2142	1268	0.70	1.3	0.85	23.1	24.6	26.0	0.23	1.00	0.30	1.31	1.20			111				
111	21	36	SW	3	300	2	10	0.9	1	2646	1523	0.60	1.1	0.95	27.7	30.1	31.7	0.20	1.00	5.00	24.68	1.00			111				
111	26	41	SW	3	300	2	10	0.9	1	3276	1841	0.53	1.0	0.95	31.5	31.2	32.8	0.18	1.00	5.00	27.11	1.00			111				
111	31	34	SW	3	300	2	10	0.9	1	3906	2159	0.50	1.0	0.95	26.2	23.9	25.3	0.17	0.99	0.29	1.63	1.13			111				
111	36	25	SP	3	300	2	10	0.9	1	4536	2477	0.47	0.9	1	19.2	17.3	18.5	0.17	0.97	0.19	1.15	0.64			111				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
111	41	16	SP	3	300	2	10	0.9	1	5166	2795	0.45	0.8	1	12.3	10.4	11.5	0.16	0.95	0.12	0.72	0.36			111				
111	46	25	SP	3	300	2	10	0.9	1	5796	3113	0.44	0.8	1	19.2	15.4	16.6	0.16	0.92	0.17	1.04	0.55			111				
111	51	9	ML	3	300	2	xxx	5	1.2	6426	3431	0.42	0.8	1	6.9	5.3	11.3	0.15	0.90	8.97	58.43	0.35			111				
111	56	210	CL	3	300	2	xxx	5	1.2	7056	3749	0.41	0.7	1	161.5	118.0	146.6	0.15	0.88	4.38	29.33	1.00			111				
112	3	16	SC	2	1000	1	35	5	1.2	378	315.6	0.98	2.0	0.75	20.5	30.8	41.9	0.23	1.00	5.00	21.86	1.00			112				
112	6	15	SM	2	1000	1	25	4.3	1.1	756	506.4	0.96	2.0	0.75	19.2	28.7	36.2	0.28	1.00	5.00	17.93	1.00			112				
112	8	12	SM	2	1000	1	25	4.3	1.1	1008	633.6	0.94	1.8	0.75	15.4	20.5	27.1	0.29	1.00	0.32	1.11	1.31			112				
112	12	36	SM	2	1000	1	25	4.3	1.1	1512	888	0.86	1.5	0.75	46.2	51.9	62.2	0.28	1.00	5.00	17.58	1.00			112				
112	16	47	SP	2	1000	1	10	0.9	1	2016	1142	0.73	1.3	0.85	60.3	67.8	70.1	0.25	1.00	5.00	19.97	1.00			112				
112	21	11	SP	2	1000	1	10	0.9	1	2646	1460	0.60	1.2	0.95	14.1	15.7	16.9	0.21	1.00	0.18	0.86	0.56			112				
112	26	13	SP	2	1000	1	10	0.9	1	3276	1778	0.53	1.1	0.95	16.7	16.8	18.0	0.19	1.00	0.19	1.02	0.61			112				
112	31	11	SP	2	1000	1	10	0.9	1	3906	2096	0.50	1.0	0.95	14.1	13.1	14.2	0.18	1.00	0.15	0.85	0.45			112				
112	36	94	SP	2	1000	1	10	0.9	1	4536	2414	0.47	0.9	1	120.5	109.7	112.9	0.17	0.98	4.88	28.23	1.00			112				
112	41	37	SP	2	1000	1	10	0.9	1	5166	2732	0.45	0.9	1	47.4	40.6	42.3	0.17	0.95	4.75	28.51	1.00			112				
112	46	30	SP	2	1000	1	10	0.9	1	5796	3050	0.44	0.8	1	38.5	31.1	32.7	0.16	0.93	4.63	28.68	1.00			112				
112	51	51	SP	2	1000	1	10	0.9	1	6426	3368	0.42	0.8	1	65.4	50.4	52.3	0.16	0.90	4.51	28.83	1.00			112				
112	57	210	CL	2	1000	1	xxx	5	1.2	7182	3750	0.40	0.7	1	269.2	196.6	240.9	0.15	0.88	4.38	29.01	1.00			112				
113	2	26	SP	0	300	1.5	10	0.9	1	252	127.2	0.99	2.0	0.75	15.0	22.5	23.9	0.38	1.00	0.27	0.70	1.00			113				
113	5	13	SP	0	300	1.5	10	0.9	1	630	318	0.97	2.0	0.75	7.5	11.3	12.4	0.37	1.00	0.13	0.36	0.38		1.02675	113				
113	7	7	SP	0	300	1.5	10	0.9	1	882	445.2	0.95	2.0	0.75	4.0	6.1	7.1	0.37	1.00	0.08	0.22	0.25	LIQ	0.671454	113				
113	11	8	SM	0	300	1.5	25	4.3	1.1	1386	699.6	0.88	1.7	0.75	4.6	5.9	10.8	0.34	1.00	0.12	0.34	0.34	LIQ	0.986906	113				
113	14	27	SM	0	300	1.5	25	4.3	1.1	1764	890.4	0.79	1.5	0.85	15.6	19.8	26.4	0.31	1.00	0.31	1.00	1.24			113				
113	17	7	SM	0	300	1.5	25	4.3	1.1	2142	1081	0.70	1.4	0.85	4.0	4.7	9.5	0.27	1.00	0.10	0.38	0.30		1.121134	113				
113	21	61	SW	0	300	1.5	10	0.9	1	2646	1336	0.60	1.2	0.95	35.2	40.9	42.7	0.23	1.00	5.00	21.64	1.00			113				
113	27	18	SW	0	300	1.5	10	0.9	1	3402	1717	0.52	1.1	0.95	10.4	10.6	11.7	0.20	1.00	0.13	0.63	0.36			113				
113	31	31	SW	0	300	1.5	10	0.9	1	3906	1972	0.50	1.0	0.95	17.9	17.1	18.4	0.19	1.00	0.20	1.03	0.63			113				
113	37	21	ML	0	300	1.5	xxx	5	1.2	4662	2353	0.47	0.9	1	12.1	11.2	18.4	0.18	0.98	9.79	54.27	0.63			113				
113	41	68	SP	0	300	1.5	10	0.9	1	5166	2608	0.45	0.9	1	39.2	34.4	36.0	0.17	0.96	4.80	27.49	1.00			113				
113	47	55	SC	0	300	1.5	35	5	1.2	5922	2989	0.43	0.8	1	31.7	26.0	36.1	0.17	0.93	4.65	27.85	1.00			113				
113	51	16	ML	0	300	1.5	xxx	5	1.2	6426	3244	0.42	0.8	1	9.2	7.2	13.7	0.16	0.91	9.11	56.08	0.43			113				
113	55	160	CL	0	300	1.5	xxx	5	1.2	6930	3498	0.41	0.8	1	92.3	69.8	88.8	0.16	0.89	4.46	28.22	1.00			113				
114	2	24	SC	2	300	1.5	35	5	1.2	252	252	0.99	2.0	0.75	13.8	20.8	29.9	0.19	1.00	0.44	2.31	1.00			114				
114	6	4	SP	2	300	1.5	10	0.9	1	756	506.4	0.96	2.0	0.75	2.3	3.4	4.4	0.28	1.00	0.06	0.22	0.20	LIQ	0.706075	114				
114	9	39	SP	2	300	1.5	10	0.9	1	1134	697.2	0.92	1.7	0.75	22.5	28.6	30.1	0.29	1.00	5.00	17.08	1.00			114				
114	14	8	ML	2	300	1.5	xxx	5	1.2	1764	1015	0.79	1.4	0.85	4.6	5.5	11.6	0.27	1.00	10.00	37.16	0.36			114				
114	17	26	SW	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	15.0	16.4	17.6	0.24	1.00	0.19	0.79	0.59			114				
114	22	35	SW	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	20.2	22.0	23.3	0.21	1.00	0.26	1.25	0.96			114				
114	27	44	SW	2	300	1.5	10	0.9	1	3402	1842	0.52	1.0	0.95	25.4	25.1	26.5	0.19	1.00	0.31	1.65	1.25			114				
114	33	13	ML	2	300	1.5	xxx	5	1.2	4158	2224	0.48	0.9	1	7.5	7.1	13.5	0.18	0.99	9.88	55.89	0.42			114				
114	37	26	ML	2	300	1.5	xxx	5	1.2	4662	2478	0.47	0.9	1	15.0	13.5	21.2	0.17	0.97	9.70	56.61	0.80			114				
114	44	51	ML	2	300	1.5	xxx	5	1.2	5544	2923	0.44	0.8	1	29.4	24.3	34.2	0.16	0.94	4.68	28.62	1.00			114				
114	51	27	ML	2	300	1.5	xxx	5	1.2	6426	3368	0.42	0.8	1	15.6	12.0	19.4	0.16	0.90	9.02	57.65	0.69			114				
114	57	150	CL	2	300	1.5	xxx	5	1.2	7182	3750	0.40	0.7	1	86.5	63.2	80.8	0.15	0.88	4.38	29.01	1.00			114				
115	2	18	SM	2	300	1.5	25	4.3	1.1	252	252	0.99	2.0	0.75	10.4	15.6	21.7	0.19	1.00	0.24	1.23	1.00			115				
115	6	22	SC	2	300	1.5	35	5	1.2	756	506.4	0.96	2.0	0.75	12.7	18.9	27.7	0.28	1.00	0.34	1.20	1.38			115				
115	8	59	SC	2	300	1.5	35	5	1.2	1008	633.6	0.94	1.8	0.75	34.0	45.4	59.4	0.29	1.00	5.00	17.20	1.00			115				
115	13	27	SM	2	300	1.5	25	4.3	1.1	1638	951.6	0.83	1.4	0.85	15.6	19.2	25.7	0.28	1.00	0.29	1.06	1.16			115				
115	17	32	SW	2	300	1.5	10	0.9	1	2142	1206	0.70	1.3	0.85	18.5	20.2	21.5	0.24	1.00	0.23	0.97	0.82			115				
115	22	45	SW	2	300	1.5	10	0.9	1	2772	1524	0.58	1.1	0.95	26.0	28.3	29.7	0.21	1.00	0.42	2.04	1.63			115				
115	28	50	SW	2	300	1.5	10	0.9	1	3528	1906	0.51	1.0	0.95	28.8	28.1	29.6	0.19	1.00	0.40	2.17	1.61			115				
115	33	49	SW	2	300	1.5	10	0.9	1	4158	2224	0.48	0.9	1	28.3	26.8	28.3	0.18	0.99	0.35	1.96	1.44			115				
115	38	12	SW	2	300	1.5	10	0.9	1	4788	2542	0.46	0.9	1	6.9	6.1	7.1	0.17	0.97	0.08	0.46	0.25			115				
115	43	52	SW	2	300	1.5	10	0.9	1	5418	2860	0.45	0.8	1	30.0	25.1	26.5	0.16	0.94	0.29	1.77	1.25			115				
115	48	32	SW	2	300	1.5	10	0.9	1	6048	3178	0.43	0.8	1	18.5	14.6	15.8	0.16	0.92	0.16	0.98	0.51			115				
115	56	69	CL	2	300	1.5	xxx	5	1.2	7056	3686	0.41	0.7	1	39.8	29.3	40.2	0.15	0.88	4.40	28.98	1.00			115				
116	3	19	SM	2.5	300	2	25	4.3	1.1	378	346.8	0.98	2.0	0.75	14.6	21.9	28.7	0.21	1.00	0.36	1.75	1.50			116				
116	6	29	SC	2.5	300	2	35	5	1.2	756	537.6	0.96	1.9	0.75	22.3	32.3	43.7	0.26	1.00	5.00	19.04	1.00			116				
116	8	18	SC	2.5	300	2	35	5	1.2	1008	664.8	0.94	1.7	0.75	13.8	18.0	26.6	0.28	1.00	0.31	1.12	1.26			116				
116	12	9	SP	2.5	300	2	10	0.9	1	1512	919.2	0.86	1.5	0.75	6.9	7.7	8.7	0.27	1.00	0.10	0.35	0.28		1.026508	116				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
116	16	9	SP	2.5	300	2	10	0.9	1	2016	1174	0.73	1.3	0.85	6.9	7.7	8.7	0.24	1.00	0.10	0.39	0.28		1.159369	116				
116	21	18	SM	2.5	300	2	25	4.3	1.1	2646	1492	0.60	1.2	0.95	13.8	15.2	21.3	0.21	1.00	0.23	1.12	0.81			116				
116	26	29	SP	2.5	300	2	10	0.9	1	3276	1810	0.53	1.1	0.95	22.3	22.3	23.6	0.19	1.00	0.26	1.40	0.98			116				
116	31	19	SP	2.5	300	2	10	0.9	1	3906	2128	0.50	1.0	0.95	14.6	13.5	14.6	0.18	0.99	0.16	0.89	0.46			116				
116	37	46	SP	2.5	300	2	10	0.9	1	4662	2509	0.47	0.9	1	35.4	31.6	33.1	0.17	0.97	4.84	28.59	1.00			116				
116	38	28	SP	2.5	300	2	10	0.9	1	4788	2573	0.46	0.9	1	21.5	19.0	20.3	0.17	0.96	0.21	1.26	0.74			116				
116	43	11	SP	2.5	300	2	10	0.9	1	5418	2891	0.45	0.8	1	8.5	7.0	8.1	0.16	0.94	0.08	0.51	0.27			116				
116	48	42	SP	2.5	300	2	10	0.9	1	6048	3209	0.43	0.8	1	32.3	25.5	26.9	0.16	0.91	0.29	1.84	1.29			116				
116	49	34	SP	2.5	300	2	10	0.9	1	6174	3272	0.43	0.8	1	26.2	20.4	21.8	0.16	0.91	0.22	1.37	0.84			116				
116	52	200	CL	2.5	300	2	xxx	5	1.2	6552	3463	0.42	0.8	1	153.8	116.9	145.3	0.15	0.89	4.47	29.05	1.00			116				
117	2	25	SP	5	300	2	10	0.9	1	252	439.2	0.99	2.0	0.75	19.2	28.8	30.3	0.11	1.00	5.00	45.29	1.00			117				
117	5	16	SP	5	300	2	10	0.9	1	630	630	0.97	1.8	0.75	12.3	16.4	17.7	0.19	1.00	0.19	1.01	1.00			117				
117	7	14	SP	5	300	2	10	0.9	1	882	757.2	0.95	1.6	0.75	10.8	13.1	14.3	0.22	1.00	0.15	0.72	0.45			117				
117	11	12	SP	5	300	2	10	0.9	1	1386	1012	0.88	1.4	0.75	9.2	9.7	10.8	0.24	1.00	0.12	0.50	0.34			117				
117	14	12	SP	5	300	2	10	0.9	1	1764	1202	0.79	1.3	0.85	9.2	10.1	11.2	0.23	1.00	0.12	0.53	0.35			117				
117	19	10	SP	5	300	2	10	0.9	1	2394	1520	0.64	1.1	0.85	7.7	7.5	8.5	0.20	1.00	0.09	0.48	0.28			117				
117	25	59	SW	5	300	2	10	0.9	1	3150	1902	0.54	1.0	0.95	45.4	44.2	46.0	0.17	1.00	5.00	28.60	1.00			117				
117	31	54	SW	5	300	2	10	0.9	1	3906	2284	0.50	0.9	0.95	41.5	36.9	38.6	0.17	0.98	4.92	29.78	1.00			117				
117	37	48	ML	5	300	2	xxx	5	1.2	4662	2665	0.47	0.9	1	36.9	32.0	43.4	0.16	0.96	4.78	29.99	1.00			117				
117	42	11	SM	5	300	2	25	4.3	1.1	5292	2983	0.45	0.8	1	8.5	6.9	12.0	0.16	0.93	0.12	0.78	0.37			117				
117	48	33	SM	5	300	2	25	4.3	1.1	6048	3365	0.43	0.8	1	25.4	19.6	26.1	0.15	0.90	0.27	1.81	1.21			117				
117	53	280	ML	5	300	2	xxx	5	1.2	6678	3683	0.41	0.7	1	215.4	158.7	195.5	0.15	0.88	4.40	30.00	1.00			117				
B1	4.5	20	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	20.0	27.4	28.9	0.18	1.00	0.37	2.07	1.00			B1				
B1	7	18	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	18.0	21.9	23.3	0.22	1.00	0.26	1.19	0.95			B1				
B1	9.5	25	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	25.0	27.7	29.2	0.23	1.00	0.38	1.64	1.56			B1				
B1	14.5	100	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	100.0	108.2	111.4	0.22	1.00	5.00	22.28	1.00			B1				
B1	19.5	15	SP	5	780	1	10	0.9	1	2457	1552	0.63	1.1	0.85	15.0	14.5	15.7	0.19	1.00	0.17	0.87	0.50			B1				
B1	24.5	87	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	87.0	85.5	88.2	0.18	1.00	5.00	28.40	1.00			B1				
B2	4.5	17	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	17.0	23.3	24.7	0.18	1.00	0.28	1.55	1.00			B2				
B2	7	13	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	13.0	15.8	17.1	0.22	1.00	0.18	0.85	0.57			B2				
B2	9.5	18	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	18.0	19.9	21.2	0.23	1.00	0.23	0.99	0.80			B2				
B2	14.5	16	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	16.0	17.3	18.6	0.22	1.00	0.20	0.89	0.64			B2				
B2	19.5	100	SP	5	780	1	10	0.9	1	2457	1552	0.63	1.1	0.85	100.0	96.5	99.4	0.19	1.00	5.00	25.75	1.00			B2				
B2	24.5	100	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	100.0	98.2	101.2	0.18	1.00	5.00	28.40	1.00			B2				
B3	4.5	8	SP	5	780	1	10	0.9	1	567	598.2	0.97	1.8	0.75	8.0	11.0	12.1	0.18	1.00	0.13	0.73	1.00			B3				
B3	7	4	SP	5	780	1	10	0.9	1	882	757.2	0.95	1.6	0.75	4.0	4.9	5.9	0.22	1.00	0.07	0.33	0.22		1.032599	B3				
B3	9.5	22	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	22.0	24.4	25.8	0.23	1.00	0.30	1.27	1.17			B3				
B3	14.5	15	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	15.0	16.2	17.5	0.22	1.00	0.19	0.84	0.59			B3				
B3	20.5	100	SP	5	780	1	10	0.9	1	2563	1616	0.61	1.1	0.95	100.0	105.7	108.8	0.19	1.00	5.00	26.40	1.00			B3				
B3	24.5	100	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	100.0	98.2	101.2	0.18	1.00	5.00	28.40	1.00			B3				
B4	4.5	10	SM	5	780	1	25	4.3	1.1	567	598.2	0.97	1.8	0.75	10.0	13.7	19.6	0.18	1.00	0.21	1.18	1.00			B4				
B4	7	10	SC	5	780	1	35	5	1.2	882	757.2	0.95	1.6	0.75	10.0	12.2	19.6	0.22	1.00	0.21	0.98	0.70			B4				
B4	9.5	9	SP	5	780	1	10	0.9	1	1197	916.2	0.91	1.5	0.75	9.0	10.0	11.1	0.23	1.00	0.12	0.51	0.34			B4				
B4	14.5	16	SP	5	780	1	10	0.9	1	1827	1234	0.78	1.3	0.85	16.0	17.3	18.6	0.22	1.00	0.20	0.89	0.64			B4				
B4	19.5	21	CH	5	780	1	xxx	5	1.2	2457	1552	0.63	1.1	0.85	21.0	20.3	29.3	0.19	1.00	10.00	51.50	1.57			B4				
B4	24.5	13	SP	5	780	1	10	0.9	1	3087	1870	0.55	1.0	0.95	13.0	12.8	13.9	0.18	1.00	0.15	0.86	0.44			B4				
RL1	4	14	SP	2.5	780	1	10	0.9	1	504	410.4	0.97	2.0	0.75	14.0	21.0	22.3	0.23	1.00	0.24	1.05	0.88			RL1				
RL1	9	10	SP	2.5	780	1	10	0.9	1	1134	728.4	0.92	1.7	0.75	10.0	12.4	13.6	0.28	1.00	0.15	0.52	0.42			RL1				
RL1	14	10	SP	2.5	780	1	10	0.9	1	1764	1046	0.79	1.4	0.85	10.0	11.8	12.9	0.26	1.00	0.14	0.53	0.40			RL1				
RL1	19	13	SP	2.5	780	1	10	0.9	1	2394	1364	0.64	1.2	0.85	13.0	13.4	14.5	0.22	1.00	0.16	0.72	0.46			RL1				
RL1	25	15	SP	2.5	780	1	10	0.9	1	3150	1746	0.54	1.1	0.95	15.0	15.3	16.5	0.19	1.00	0.18	0.93	0.54			RL1				
RL1	30	13	SP	2.5	780	1	10	0.9	1	3780	2064	0.50	1.0	0.95	13.0	12.2	13.3	0.18	1.00	0.14	0.80	0.41			RL1				
RL1	35	6	ML	2.5	780	1	xxx	5	1.2	4410	2382	0.48	0.9	1	6.0	5.5	11.6	0.17	0.98	9.77	56.92	0.36			RL1				
RL1	39	8	ML	2.5	780	1	xxx	5	1.2	4914	2636	0.46	0.9	1	8.0	7.0	13.4	0.17	0.96	9.58	57.37	0.42			RL1				
RL1	44	14	SP	2.5	780	1	10	0.9	1	5544	2954	0.44	0.8	1	14.0	11.5	12.6	0.16	0.93	0.13	0.79	0.39			RL1				
RL1	50	12	SP	2.5	780	1	10	0.9	1	6300	3336	0.42	0.8	1	12.0	9.3	10.4	0.16	0.90	0.10	0.65	0.32			RL1				
RL1	55	73	CL	2.5	780	1	xxx	5	1.2	6930	3654	0.41	0.7	1	73.0	54.0	69.8	0.15	0.88	4.41	29.13	1.00			RL1				
RL2	5	12	SP	3	780	1	10	0.9	1	630	505.2	0.97	2.0	0.75	12.0	17.9	19.2	0.23	1.00	0.21	0.88	0.68			RL2				
RL2	10	9	SP	3	780	1	10	0.9	1	1260	823.2	0.90	1.6	0.75	9.0	10.5	11.6	0.27	1.00	0.13	0.47	0.36		1.332513	RL2				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
RL2	16	16	SP	3	780	1	10	0.9	1	2016	1205	0.73	1.3	0.85	16.0	17.5	18.8	0.24	1.00	0.20	0.85	0.65			RL2				
RL2	20	14	SP	3	780	1	10	0.9	1	2520	1459	0.62	1.2	0.95	14.0	15.6	16.8	0.21	1.00	0.18	0.87	0.55			RL2				
RL2	25	15	SP	3	780	1	10	0.9	1	3150	1777	0.54	1.1	0.95	15.0	15.1	16.3	0.19	1.00	0.18	0.94	0.53			RL2				
RL2	30	13	SP	3	780	1	10	0.9	1	3780	2095	0.50	1.0	0.95	13.0	12.1	13.2	0.18	1.00	0.14	0.81	0.41			RL2				
RL2	35	4	SC	3	780	1	35	5	1.2	4410	2413	0.48	0.9	1	4.0	3.6	9.4	0.17	0.98	0.10	0.59	0.30			RL2				
RL2	40	8	SC	3	780	1	35	5	1.2	5040	2731	0.46	0.9	1	8.0	6.8	13.2	0.16	0.95	0.14	0.83	0.41			RL2				
RL2	45	22	SP	3	780	1	10	0.9	1	5670	3049	0.44	0.8	1	22.0	17.8	19.1	0.16	0.93	0.19	1.20	0.67			RL2				
RL2	49	20	SP	3	780	1	10	0.9	1	6174	3304	0.43	0.8	1	20.0	15.6	16.8	0.16	0.91	0.16	1.06	0.55			RL2				
RL2	53	60	CL	3	780	1	xxx	5	1.2	6678	3558	0.41	0.7	1	60.0	45.0	59.0	0.15	0.89	4.44	29.26	1.00			RL2				
RL3	5	6	SP	3	780	1	10	0.9	1	630	505.2	0.97	2.0	0.75	6.0	9.0	10.0	0.23	1.00	0.11	0.46	0.31			RL3				
RL3	10	15	SP	3	780	1	10	0.9	1	1260	823.2	0.90	1.6	0.75	15.0	17.5	18.8	0.27	1.00	0.20	0.75	0.65			RL3				
RL3	15	11	SP	3	780	1	10	0.9	1	1890	1141	0.76	1.3	0.85	11.0	12.4	13.5	0.25	1.00	0.15	0.60	0.42			RL3				
RL3	20	15	SP	3	780	1	10	0.9	1	2520	1459	0.62	1.2	0.95	15.0	16.7	17.9	0.21	1.00	0.19	0.93	0.61			RL3				
RL3	25	17	SP	3	780	1	10	0.9	1	3150	1777	0.54	1.1	0.95	17.0	17.1	18.4	0.19	1.00	0.20	1.06	0.63			RL3				
RL3	30	16	SM	3	780	1	25	4.3	1.1	3780	2095	0.50	1.0	0.95	16.0	14.9	20.8	0.18	1.00	0.23	1.28	0.78			RL3				
RL3	35	16	SM	3	780	1	25	4.3	1.1	4410	2413	0.48	0.9	1	16.0	14.6	20.5	0.17	0.98	0.22	1.28	0.76			RL3				
RL3	40	16	SM	3	780	1	25	4.3	1.1	5040	2731	0.46	0.9	1	16.0	13.7	19.6	0.16	0.95	0.20	1.22	0.70			RL3				
RL3	44	9	SM	3	780	1	25	4.3	1.1	5544	2986	0.44	0.8	1	9.0	7.4	12.5	0.16	0.93	0.13	0.79	0.39			RL3				
RL3	50	13	SM	3	780	1	25	4.3	1.1	6300	3367	0.42	0.8	1	13.0	10.0	15.5	0.15	0.90	0.15	0.98	0.50			RL3				
RL3	54	20	SP	3	780	1	10	0.9	1	6804	3622	0.41	0.7	1	20.0	14.9	16.1	0.15	0.88	0.15	1.02	0.52			RL3				
RL3	60	23	SP	3	780	1	10	0.9	1	7560	4003	0.40	0.7	1	23.0	16.3	17.5	0.15	0.86	0.16	1.11	0.59			RL3				
RL4	4	4	SM	2	780	1	25	4.3	1.1	504	379.2	0.97	2.0	0.75	4.0	6.0	11.0	0.25	1.00	0.12	0.47	0.34			RL4				
RL4	10	8	SM	2	780	1	25	4.3	1.1	1260	760.8	0.90	1.6	0.75	8.0	9.7	15.1	0.29	1.00	0.16	0.56	0.48			RL4				
RL4	14	8	CL	2	780	1	xxx	5	1.2	1764	1015	0.79	1.4	0.85	8.0	9.5	16.5	0.27	1.00	10.00	37.16	0.54			RL4				
RL4	20	14	SM	2	780	1	25	4.3	1.1	2520	1397	0.62	1.2	0.95	14.0	15.9	22.0	0.22	1.00	0.24	1.11	0.86			RL4				
RL4	25	16	SM	2	780	1	25	4.3	1.1	3150	1715	0.54	1.1	0.95	16.0	16.4	22.6	0.19	1.00	0.25	1.28	0.90			RL4				
RL4	30	17	SM	2	780	1	25	4.3	1.1	3780	2033	0.50	1.0	0.95	17.0	16.0	22.2	0.18	1.00	0.24	1.33	0.87			RL4				
RL4	35	12	CL	2	780	1	xxx	5	1.2	4410	2351	0.48	0.9	1	12.0	11.1	18.3	0.17	0.98	9.80	56.30	0.63			RL4				
RL4	40	4	ML	2	780	1	xxx	5	1.2	5040	2669	0.46	0.9	1	4.0	3.5	9.2	0.17	0.96	9.55	56.94	0.29			RL4				
RL4	45	8	SM	2	780	1	25	4.3	1.1	5670	2987	0.44	0.8	1	8.0	6.5	11.6	0.16	0.93	0.12	0.72	0.36			RL4				
RL4	50	12	SM	2	780	1	25	4.3	1.1	6300	3305	0.42	0.8	1	12.0	9.3	14.7	0.16	0.91	0.14	0.92	0.47			RL4				
RL4	55	19	CL	2	780	1	xxx	5	1.2	6930	3623	0.41	0.7	1	19.0	14.1	21.9	0.15	0.88	8.84	57.89	0.85			RL4				
RL4	60	60	CL	2	780	1	xxx	5	1.2	7560	3941	0.40	0.7	1	60.0	42.7	56.3	0.15	0.86	4.32	29.11	1.00			RL4				
RL5	5	8	SM	2.5	780	1	25	4.3	1.1	630	474	0.97	2.0	0.75	8.0	12.0	17.7	0.25	1.00	0.19	0.76	0.60			RL5				
RL5	9	6	SM	2.5	780	1	25	4.3	1.1	1134	728.4	0.92	1.7	0.75	6.0	7.5	12.6	0.28	1.00	0.14	0.49	0.39			RL5				
RL5	15	6	SM	2.5	780	1	25	4.3	1.1	1890	1110	0.76	1.3	0.85	6.0	6.8	11.9	0.25	1.00	0.13	0.51	0.37			RL5				
RL5	20	12	SM	2.5	780	1	25	4.3	1.1	2520	1428	0.62	1.2	0.95	12.0	13.5	19.3	0.21	1.00	0.21	0.98	0.68			RL5				
RL5	25	13	SM	2.5	780	1	25	4.3	1.1	3150	1746	0.54	1.1	0.95	13.0	13.2	19.0	0.19	1.00	0.21	1.08	0.67			RL5				
RL5	30	10	SM	2.5	780	1	25	4.3	1.1	3780	2064	0.50	1.0	0.95	10.0	9.4	14.7	0.18	1.00	0.16	0.89	0.47			RL5				
RL5	35	22	SM	2.5	780	1	25	4.3	1.1	4410	2382	0.48	0.9	1	22.0	20.2	26.8	0.17	0.98	0.31	1.79	1.27			RL5				
RL5	40	9	SM	2.5	780	1	25	4.3	1.1	5040	2700	0.46	0.9	1	9.0	7.7	12.9	0.17	0.95	0.13	0.80	0.40			RL5				
RL5	45	23	SM	2.5	780	1	25	4.3	1.1	5670	3018	0.44	0.8	1	23.0	18.7	25.2	0.16	0.93	0.26	1.65	1.11			RL5				
RL5	50	40	SM	2.5	780	1	25	4.3	1.1	6300	3336	0.42	0.8	1	40.0	31.0	38.8	0.16	0.90	4.52	29.00	1.00			RL5				
RL5	55	35	SM	2.5	780	1	25	4.3	1.1	6930	3654	0.41	0.7	1	35.0	25.9	33.2	0.15	0.88	4.41	29.13	1.00			RL5				
RL5	60	60	SM	2.5	780	1	25	4.3	1.1	7560	3972	0.40	0.7	1	60.0	42.6	51.8	0.15	0.86	4.31	29.28	1.00			RL5				
SME1	11	6		3.8	780	1	70	5	1.2	1386	936.7	0.88	1.5	0.75	6.0	6.6	12.9	0.25	1.00	0.14	0.55	0.40			SME1				
SME1	12.5	8		3.8	780	1	39	5	1.2	1575	1032	0.84	1.4	0.75	8.0	8.4	15.0	0.25	1.00	0.16	0.65	0.48			SME1				
SME1	16	15		3.8	780	1	39	5	1.2	2016	1255	0.73	1.3	0.85	15.0	16.1	24.3	0.23	1.00	0.27	1.19	1.04			SME1				
SME1	18	17		3.8	780	1	39	5	1.2	2268	1382	0.67	1.2	0.85	17.0	17.4	25.9	0.21	1.00	0.30	1.39	1.18			SME1				
SME1	20.5	17		3.8	780	1	39	5	1.2	2583	1541	0.61	1.1	0.95	17.0	18.4	27.1	0.20	1.00	0.32	1.62	1.31			SME1				
SME1	23	20		3.8	780	1	39	5	1.2	2898	1700	0.57	1.1	0.95	20.0	20.6	29.7	0.19	1.00	0.42	2.23	1.63			SME1				
SME1	25.5	22		3.8	780	1	80	5	1.2	3213	1859	0.54	1.0	0.95	22.0	21.7	31.0	0.18	1.00	5.00	27.66	1.00			SME1				
SME1	28.5	21		3.8	780	1	80	5	1.2	3591	2050	0.51	1.0	0.95	21.0	19.7	28.6	0.17	1.00	0.36	2.07	1.49			SME1				
SME1	30.5	17		3.8	780	1	80	5	1.2	3843	2177	0.50	1.0	0.95	17.0	15.5	23.6	0.17	0.99	0.26	1.51	0.98			SME1				
SME1	33	27		3.8	780	1	80	5	1.2	4158	2336	0.48	0.9	1	27.0	25.0	35.0	0.17	0.98	4.90	29.13	1.00			SME1				
SME1	36	24		3.8	780	1	80	5	1.2	4536	2527	0.47	0.9	1	24.0	21.4	30.6	0.16	0.97	4.83	29.29	1.00			SME1				
SME1	39	20		3.8	780	1	80	5	1.2	4914	2718	0.46	0.9	1	20.0	17.2	25.6	0.16	0.95	0.28	1.72	1.15			SME1				
SME1	40.5	18		3.8	780	1	80	5	1.2	5103	2813	0.45	0.8	1	18.0	15.2	23.2	0.16	0.94	0.24	1.51	0.95			SME1				
SME1	43	26		3.8	780	1	80	5	1.2	5418	2972	0.45	0.8	1	26.0	21.3	30.6	0.16	0.93	4.66	29.43	1.00			SME1				

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR $\sigma_{vo'}$	(29) Depth
SME1	45.5	5		3.8	780	1	80	5	1.2	5733	3131	0.44	0.8	1	5.0	4.0	9.8	0.16	0.92	0.10	0.63	0.31			SME1				
SME1	49	4		3.8	780	1	29	4.6	1.1	6174	3354	0.43	0.8	1	4.0	3.1	8.2	0.15	0.90	0.08	0.53	0.27			SME1				
SME1	50.5	5		3.8	780	1	29	4.6	1.1	6363	3449	0.42	0.8	1	5.0	3.8	9.0	0.15	0.90	0.09	0.58	0.29			SME1				
SME1	53.5	24		3.8	780	1	29	4.6	1.1	6741	3640	0.41	0.7	1	24.0	17.8	25.0	0.15	0.88	0.25	1.67	1.10			SME1				
SME1	55.5	20		3.8	780	1	29	4.6	1.1	6993	3767	0.41	0.7	1	20.0	14.6	21.3	0.15	0.87	0.20	1.37	0.81			SME1				
SME1	57.5	70	CL	3.8	780	1	xxx	5	1.2	7245	3894	0.40	0.7	1	70.0	50.2	65.2	0.15	0.87	4.33	29.64	1.00			SME1				
SME2	11	14		4.3	780	1	19	3.4	1.1	1386	967.9	0.88	1.4	0.75	14.0	15.1	19.6	0.25	1.00	0.21	0.86	0.70			SME2				
SME2	12.5	11		4.3	780	1	19	3.4	1.1	1575	1063	0.84	1.4	0.75	11.0	11.3	15.6	0.24	1.00	0.17	0.69	0.50			SME2				
SME2	15	18		4.3	780	1	19	3.4	1.1	1890	1222	0.76	1.3	0.85	18.0	19.6	24.4	0.23	1.00	0.27	1.19	1.05			SME2				
SME2	17.5	17		4.3	780	1	19	3.4	1.1	2205	1381	0.68	1.2	0.85	17.0	17.4	22.1	0.21	1.00	0.24	1.14	0.86			SME2				
SME2	20	16		4.3	780	1	19	3.4	1.1	2520	1540	0.62	1.1	0.95	16.0	17.3	22.0	0.20	1.00	0.24	1.22	0.86			SME2				
SME2	22.5	18		4.3	780	1	19	3.4	1.1	2835	1699	0.57	1.1	0.95	18.0	18.6	23.3	0.19	1.00	0.26	1.38	0.96			SME2				
SME2	25.5	22		4.3	780	1	19	3.4	1.1	3213	1890	0.54	1.0	0.95	22.0	21.5	26.5	0.18	1.00	0.31	1.74	1.24			SME2				
SME2	30	15		4.3	780	1	19	3.4	1.1	3780	2176	0.50	1.0	0.95	15.0	13.7	18.1	0.17	0.99	0.19	1.14	0.62			SME2				
SME2	32	12	SM	4.3	780	1	25	4.3	1.1	4032	2304	0.49	0.9	0.95	12.0	10.6	16.1	0.17	0.98	0.17	1.02	0.52			SME2				
SME2	35.5	4	SM	4.3	780	1	25	4.3	1.1	4473	2526	0.47	0.9	1	4.0	3.6	8.3	0.16	0.97	0.09	0.54	0.27			SME2				
SME2	37.5	2	SM	4.3	780	1	25	4.3	1.1	4725	2653	0.47	0.9	1	2.0	1.7	6.2	0.16	0.96	0.07	0.44	0.23			SME2				
SME2	39.5	4	SM	4.3	780	1	25	4.3	1.1	4977	2781	0.46	0.8	1	4.0	3.4	8.1	0.16	0.95	0.08	0.53	0.27			SME2				
SME2	45.5	7	SM	4.3	780	1	25	4.3	1.1	5733	3162	0.44	0.8	1	7.0	5.6	10.5	0.15	0.92	0.10	0.68	0.33			SME2				
SME2	47.5	9	SM	4.3	780	1	25	4.3	1.1	5985	3289	0.43	0.8	1	9.0	7.0	12.1	0.15	0.91	0.12	0.78	0.38			SME2				
SME2	50	18		4.3	780	1	15	2.5	1	6300	3448	0.42	0.8	1	18.0	13.7	16.9	0.15	0.90	0.16	1.08	0.56			SME2				
SME2	54	31		4.3	780	1	15	2.5	1	6804	3703	0.41	0.7	1	31.0	22.8	26.4	0.15	0.88	0.27	1.83	1.23			SME2				
SME3	11	17		3.8	780	1	xxx	5	1.2	1386	936.7	0.88	1.5	0.75	17.0	18.6	27.4	0.25	1.00	10.00	39.26	1.34			SME3				
SME3	13.5	13		3.8	780	1	57	5	1.2	1701	1096	0.81	1.4	0.85	13.0	14.9	22.9	0.25	1.00	0.25	1.03	0.92			SME3				
SME3	17	12		3.8	780	1	57	5	1.2	2142	1318	0.70	1.2	0.85	12.0	12.6	20.1	0.22	1.00	0.22	0.98	0.73			SME3				
SME3	19.5	20		3.8	780	1	18	3.2	1.1	2457	1477	0.63	1.2	0.85	20.0	19.8	24.3	0.20	1.00	0.27	1.33	1.04			SME3				
SME3	22	20		3.8	780	1	18	3.2	1.1	2772	1636	0.58	1.1	0.95	20.0	21.0	25.6	0.19	1.00	0.29	1.53	1.16			SME3				
SME3	24.5	11		3.8	780	1	18	3.2	1.1	3087	1795	0.55	1.1	0.95	11.0	11.0	15.0	0.18	1.00	0.16	0.88	0.48			SME3				
SME3	28	7	ML	3.8	780	1	xxx	5	1.2	3528	2018	0.51	1.0	0.95	7.0	6.6	12.9	0.18	1.00	9.99	56.92	0.40			SME3				
SME3	29.5	19	ML	3.8	780	1	xxx	5	1.2	3717	2113	0.50	1.0	0.95	19.0	17.6	26.1	0.17	0.99	9.95	57.48	1.20			SME3				
SME3	31.5	10		3.8	780	1	59	5	1.2	3969	2241	0.49	0.9	0.95	10.0	9.0	15.8	0.17	0.99	0.17	0.99	0.51			SME3				
SME3	36	12		3.8	780	1	59	5	1.2	4536	2527	0.47	0.9	1	12.0	10.7	17.8	0.16	0.97	0.19	1.13	0.60			SME3				
SME3	39.5	3		3.8	780	1	59	5	1.2	4977	2749	0.46	0.9	1	3.0	2.6	8.1	0.16	0.95	0.08	0.52	0.27			SME3				
SME3	42	16		3.8	780	1	30	4.7	1.2	5292	2906	0.45	0.8	1	16.0	13.3	20.0	0.16	0.94	0.20	1.27	0.73			SME3				
SME3	44.5	17		3.8	780	1	30	4.7	1.2	5607	3067	0.44	0.8	1	17.0	13.7	20.6	0.16	0.92	0.21	1.31	0.76			SME3				
SME3	47	18		3.8	780	1	30	4.7	1.2	5922	3226	0.43	0.8	1	18.0	14.2	21.1	0.15	0.91	0.21	1.35	0.79			SME3				
SME3	49.5	11		3.8	780	1	30	4.7	1.2	6237	3385	0.42	0.8	1	11.0	8.5	14.5	0.15	0.90	0.14	0.92	0.46			SME3				
SME3	52	32		3.8	780	1	30	4.7	1.2	6552	3544	0.42	0.8	1	32.0	24.0	32.5	0.15	0.89	4.45	29.54	1.00			SME3				
SME3	54	45		3.8	780	1	30	4.7	1.2	6804	3672	0.41	0.7	1	45.0	33.2	43.0	0.15	0.88	4.40	29.57	1.00			SME3				
SME3	57.5	70	CL	3.8	780	1	xxx	5	1.2	7245	3894	0.40	0.7	1	70.0	50.2	65.2	0.15	0.87	4.33	29.64	1.00			SME3				
SME4	3	13		2.8	780	1	88	5	1.2	378	365.5	0.98	2.0	0.75	13.0	19.5	28.4	0.20	1.00	0.35	1.79	1.46			SME4				
SME4	4.5	11	ML	2.8	780	1	xxx	5	1.2	567	460.9	0.97	2.0	0.75	11.0	16.5	24.8	0.23	1.00	10.00	43.02	1.08			SME4				
SME4	6	9	ML	2.8	780	1	xxx	5	1.2	756	556.3	0.96	1.9	0.75	9.0	12.8	20.4	0.25	1.00	10.00	39.40	0.75			SME4				
SME4	9.5	18		2.8	780	1	19	3.4	1.1	1197	778.9	0.91	1.6	0.75	18.0	21.6	26.6	0.27	1.00	0.31	1.14	1.26			SME4				
SME4	12	17		2.8	780	1	19	3.4	1.1	1512	937.9	0.86	1.5	0.75	17.0	18.6	23.4	0.27	1.00	0.26	0.96	0.96			SME4				
SME4	15	14		2.8	780	1	19	3.4	1.1	1890	1129	0.76	1.3	0.85	14.0	15.8	20.4	0.25	1.00	0.22	0.89	0.75			SME4				
SME4	17	16		2.8	780	1	19	3.4	1.1	2142	1256	0.70	1.3	0.85	16.0	17.2	21.8	0.23	1.00	0.24	1.03	0.84			SME4				
SME4	20	14		2.8	780	1	19	3.4	1.1	2520	1447	0.62	1.2	0.95	14.0	15.6	20.2	0.21	1.00	0.22	1.04	0.74			SME4				
SME4	22.5	19		2.8	780	1	19	3.4	1.1	2835	1606	0.57	1.1	0.95	19.0	20.1	25.0	0.20	1.00	0.28	1.44	1.10			SME4				
SME4	25	21		2.8	780	1	18	3.2	1.1	3150	1765	0.54	1.1	0.95	21.0	21.2	25.9	0.19	1.00	0.30	1.58	1.18			SME4				
SME4	27.5	26		2.8	780	1	18	3.2	1.1	3465	1924	0.52	1.0	0.95	26.0	25.2	30.1	0.18	1.00	5.00	27.44	1.00			SME4				
SME4	30	28		2.8	780	1	18	3.2	1.1	3780	2083	0.50	1.0	0.95	28.0	26.1	31.0	0.18	1.00	4.98	28.07	1.00			SME4				
ESI-5E	1.5	5	SM	0	780	1	25	4.3	1.1	189	95.4	0.99	2.0	0.75	5.0	7.5	12.7	0.38	1.00	0.14	0.36	0.39		1.025282	ESI-5E				
ESI-5E	5	6	SP	0	780	1	10	0.9	1	630	318	0.97	2.0	0.75	6.0	9.0	10.1	0.37	1.00	0.11	0.29	0.32	LIQ	0.847631	ESI-5E				
ESI-5E	10	34	SP	0	780	1	10	0.9	1	1260	636	0.90	1.8	0.75	34.0	45.2	47.1	0.35	1.00	5.00	14.30	1.00			ESI-5E				
ESI-5E	15	26	SP	0	780	1	10	0.9	1	1890	954	0.76	1.4	0.85	26.0	32.0	33.6	0.29	1.00	5.00	17.01	1.00			ESI-5E				
ESI-5E	20	12	CL	0	780	1	xxx	5	1.2	2520	1272	0.62	1.3	0.95	12.0	14.3	22.2	0.24	1.00	10.00	41.88	0.87			ESI-5E				
ESI-5E	29	15	SP	0	780	1	10	0.9	1	3654	1844	0.51	1.0	0.95	15.0	14.8	16.0	0.20	1.00	0.17	0.88	0.52			ESI-5E				
ESI-5F	1	3	SP	2	780	1	10	0.9	1	126	188.4	0.62	2.0	0.75	3.0	4.5	5.5	0.22	1.00	0.07	0.31	0.22	LIQ	0.975696	ESI-5F	207	2520	1375	20

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
ESI-5F	5	5	SP	2	780	1	10	0.9	1	630	442.8	0.55	2.0	0.75	5.0	7.5	8.5	0.20	1.00	0.09	0.47	0.28			ESI-5F	207	3024	1625	24
ESI-5F	10	20	SP	2	780	1	10	0.9	1	1260	760.8	0.51	1.6	0.75	20.0	24.3	25.7	0.19	1.00	0.29	1.58	1.17			ESI-5F	207	3654	1937	29
ESI-5F	15	2	CL	2	780	1	xxx	5	1.2	1890	1079	0.48	1.4	0.85	2.0	2.3	7.8	0.18	1.00	10.00	56.06	0.26			ESI-5F	207	4284	2249	34
ESI-5F	17.5	38	SP	2	780	1	10	0.9	1	2205	1238	0.47	1.3	0.85	38.0	41.1	42.8	0.17	1.00	5.00	28.57	1.00			ESI-5F	207	4599	2405	36.5
ESI-5F	25	34	SP	2	780	1	10	0.9	1	3150	1715	0.44	1.1	0.95	34.0	34.9	36.5	0.17	1.00	5.00	30.07	1.00			ESI-5F	207	5544	2873	44
ESI-5F	30	33	SP	2	780	1	10	0.9	1	3780	2033	0.43	1.0	0.95	33.0	31.1	32.6	0.16	1.00	4.99	30.99	1.00			ESI-5F	207	6174	3185	49
ESI-5F	35	21	SP	2	780	1	10	0.9	1	4410	2351	0.41	0.9	1	21.0	19.4	20.7	0.16	0.98	0.22	1.40	0.76			ESI-5F	207	6804	3497	54
ESI-9	4	4	SP	5	780	1	10	0.9	1	504	566.4	0.00	1.9	0.75	4.0	5.6	6.6	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-9	230	EXC	EXC	EXC
ESI-9	9	9	SP	5	780	1	10	0.9	1	1134	884.4	0.97	1.5	0.75	9.0	10.2	11.2	0.27	1.00	0.12	0.45	1.00			ESI-9	230	630	439	5
ESI-9	14	23	SP	5	780	1	10	0.9	1	1764	1202	0.90	1.3	0.85	23.0	25.2	26.6	0.30	1.00	0.31	1.05	1.26			ESI-9	230	1260	751	10
ESI-9	24	18	SP	5	780	1	10	0.9	1	3024	1838	0.62	1.0	0.95	18.0	17.8	19.1	0.22	1.00	0.21	0.93	0.67			ESI-9	230	2520	1375	20
ESI-9	28.5	35	SP	5	780	1	10	0.9	1	3591	2125	0.55	1.0	0.95	35.0	32.3	33.8	0.20	0.99	4.97	25.01	1.00			ESI-9	230	3087	1656	24.5
ESI-9	39	12	SP	5	780	1	10	0.9	1	4914	2792	0.48	0.8	1	12.0	10.2	11.2	0.18	0.95	0.12	0.65	0.35			ESI-9	230	4410	2311	35
ESI-9	78.5	9	SP	5	780	1	10	0.9	1	9891	5305	0.36	0.6	1	9.0	5.5	6.5	0.14	0.79	0.06	0.43	0.24			ESI-9	230	9387	4776	74.5
ESI-9A	1	4	SM	2	780	1	25	4.3	1.1	126	188.4	0.99	2.0	0.75	4.0	6.0	11.0	0.19	1.00	0.12	0.61	1.00			ESI-9A	226	126	126	1
ESI-9A	4	6	SP	2	780	1	10	0.9	1	504	379.2	0.97	2.0	0.75	6.0	9.0	10.1	0.25	1.00	0.11	0.43	0.32		1.246321	ESI-9A	226	504	377	4
ESI-9A	9	20	SP	2	780	1	10	0.9	1	1134	697.2	0.92	1.7	0.75	20.0	25.4	26.8	0.30	1.00	0.32	1.07	1.28			ESI-9A	226	1134	689	9
ESI-9A	14	15	SM	2	780	1	25	4.3	1.1	1764	1015	0.79	1.4	0.85	15.0	17.9	24.2	0.27	1.00	0.27	0.99	1.03			ESI-9A	226	1764	1001	14
ESI-9A	19	26	SP	2	780	1	10	0.9	1	2394	1333	0.64	1.2	0.85	26.0	27.1	28.5	0.23	1.00	0.36	1.57	1.47			ESI-9A	226	2394	1313	19
ESI-9A	24	30	SP	2	780	1	10	0.9	1	3024	1651	0.55	1.1	0.95	30.0	31.4	32.9	0.20	1.00	5.00	24.93	1.00			ESI-9A	226	3024	1625	24
ESI-9A	29	21	SP	2	780	1	10	0.9	1	3654	1969	0.51	1.0	0.95	21.0	20.1	21.4	0.19	1.00	0.23	1.25	0.81			ESI-9A	226	3654	1937	29
ESI-9A	34	28	SP	2	780	1	10	0.9	1	4284	2287	0.48	0.9	1	28.0	26.2	27.6	0.18	0.98	0.33	1.84	1.37			ESI-9A	226	4284	2249	34
ESI-9A	39	40	SP	2	780	1	10	0.9	1	4914	2605	0.46	0.9	1	40.0	35.0	36.7	0.17	0.96	4.80	27.94	1.00			ESI-9A	226	4914	2561	39
ESI-9A	44	17	SP	2	780	1	10	0.9	1	5544	2923	0.44	0.8	1	17.0	14.1	15.2	0.17	0.94	0.15	0.93	0.49			ESI-9A	226	5544	2873	44
ESI-9A	49	19	SP	2	780	1	10	0.9	1	6174	3241	0.43	0.8	1	19.0	14.9	16.1	0.16	0.91	0.16	0.98	0.52			ESI-9A	226	6174	3185	49
ESI-9B	1	2	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	2.0	2.6	7.1	0.00	1.00	0.08	No Liq	0.25	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	4	4	SP	10	780	1	10	0.9	1	504	878.4	0.00	1.5	0.75	4.0	4.5	5.5	0.00	1.00	0.07	No Liq	0.22	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	9	11	SP	10	780	1	10	0.9	1	1134	1196	0.00	1.3	0.75	11.0	10.7	11.8	0.00	1.00	0.13	No Liq	0.36	No Liq	No Liq	ESI-9B	235	EXC	EXC	EXC
ESI-9B	14	13	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	13.0	12.7	13.8	0.27	1.00	0.15	0.55	1.00			ESI-9B	235	630	439	5
ESI-9B	19	35	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	35.0	31.1	32.6	0.30	1.00	5.00	16.89	1.00			ESI-9B	235	1260	751	10
ESI-9B	24	63	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	63.0	57.7	59.8	0.26	0.99	4.96	18.82	1.00			ESI-9B	235	1890	1063	15
ESI-9B	29	33	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	33.0	28.2	29.7	0.22	0.97	0.40	1.83	1.63			ESI-9B	235	2520	1375	20
ESI-9B	34	26	SP	10	780	1	10	0.9	1	4284	2786	0.54	0.8	1	26.0	22.0	23.4	0.20	0.95	0.24	1.24	0.96			ESI-9B	235	3150	1687	25
ESI-9B	39	18	SP	10	780	1	10	0.9	1	4914	3104	0.50	0.8	1	18.0	14.4	15.6	0.18	0.92	0.16	0.84	0.50			ESI-9B	235	3780	1999	30
ESI-9B	54	46	SP	10	780	1	10	0.9	1	6804	4058	0.44	0.7	1	46.0	32.3	33.9	0.17	0.86	4.28	25.91	1.00			ESI-9B	235	5670	2935	45
ESI-9B	59	38	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	38.0	25.7	27.1	0.16	0.84	0.27	1.68	1.31			ESI-9B	235	6300	3247	50
ESI-9C	1	2	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	2.0	2.4	6.9	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	5	6	SP	12	780	1	10	0.9	1	630	1067	0.00	1.4	0.75	6.0	6.2	7.2	0.00	1.00	0.08	No Liq	0.25	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	10	9	SP	12	780	1	10	0.9	1	1260	1385	0.00	1.2	0.75	9.0	8.1	9.2	0.00	1.00	0.10	No Liq	0.29	No Liq	No Liq	ESI-9C	237	EXC	EXC	EXC
ESI-9C	15	12	SP	12	780	1	10	0.9	1	1890	1703	0.97	1.1	0.85	12.0	11.1	12.2	0.25	1.00	0.13	0.52	1.00			ESI-9C	237	504	377	4
ESI-9C	20	32	SP	12	780	1	10	0.9	1	2520	2021	0.92	1.0	0.95	32.0	30.2	31.8	0.30	1.00	5.00	16.86	1.00			ESI-9C	237	1134	689	9
ESI-9C	25	13	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	13.0	11.4	12.5	0.27	0.98	0.13	0.49	0.39			ESI-9C	237	1764	1001	14
ESI-9C	30	24	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	24.0	19.8	21.1	0.23	0.96	0.22	0.96	0.79			ESI-9C	237	2394	1313	19
ESI-9C	35	15	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	15.0	12.3	13.4	0.20	0.93	0.14	0.68	0.42			ESI-9C	237	3024	1625	24
ESI-9C	40	6	SP	12	780	1	10	0.9	1	5040	3293	0.51	0.8	1	6.0	4.7	5.6	0.19	0.91	0.06	0.34	0.22		1.170649	ESI-9C	237	3654	1937	29
ESI-9C	45	29	SP	12	780	1	10	0.9	1	5670	3611	0.48	0.7	1	29.0	21.6	22.9	0.18	0.88	0.22	1.25	0.92			ESI-9C	237	4284	2249	34
ESI-9C	54	34	SP	12	780	1	10	0.9	1	6804	4183	0.45	0.7	1	34.0	23.5	24.9	0.17	0.85	0.24	1.42	1.09			ESI-9C	237	5418	2810	43
ESI-9C	59	42	SP	12	780	1	10	0.9	1	7434	4501	0.43	0.7	1	42.0	28.0	29.5	0.16	0.83	0.33	2.04	1.60			ESI-9C	237	6048	3122	48
ESI-9C	64	35	SP	12	780	1	10	0.9	1	8064	4819	0.41	0.6	1	35.0	22.5	23.9	0.16	0.82	0.22	1.38	1.00			ESI-9C	237	6678	3434	53
ESI-9D	1.5	5	SM	9	780	1	25	4.3	1.1	189	657	0.00	1.7	0.75	5.0	6.5	11.6	0.00	1.00	0.13	No Liq	0.36	No Liq	No Liq	ESI-9D	234	EXC	EXC	EXC
ESI-9D	4	7	SP	9	780	1	10	0.9	1	504	816	0.00	1.6	0.75	7.0	8.2	9.3	0.00	1.00	0.10	No Liq	0.30	No Liq	No Liq	ESI-9D	234	EXC	EXC	EXC
ESI-9D	9	5	SP	9	780	1	10	0.9	1	1134	1134	0.99	1.3	0.75	5.0	5.0	6.0	0.19	1.00	0.07	0.37	1.00			ESI-9D	234	126	126	1
ESI-9D	14	28	SM	9	780	1	25	4.3	1.1	1764	1452	0.96	1.2	0.85	28.0	27.9	35.4	0.28	1.00	5.00	17.76	1.00			ESI-9D	234	756	502	6
ESI-9D	19	7	SP	9	780	1	10	0.9	1	2394	1770	0.88	1.1	0.85	7.0	6.3	7.3	0.29	1.00	0.08	0.28	0.25	LIQ	0.858336	ESI-9D	234	1386	814	11
ESI-9D	24	33	SP	9	780	1	10	0.9	1	3024	2088	0.73	1.0	0.95	33.0	30.7	32.2	0.25	1.00	4.98	19.60	1.00			ESI-9D	234	2016	1126	16
ESI-9D	29	27	SP	9	780	1	10	0.9	1	3654	2406	0.60	0.9	0.95	27.0	23.4	24.8	0.21	0.98	0.27	1.27	1.08			ESI-9D	234	2646	1438	21
ESI-9D	34	25	SP	9	780	1	10	0.9	1	4284	2724	0.53	0.9	1	25.0	21.4	22.8	0.19	0.95	0.24	1.22	0.91			ESI-9D	234	3276	1750	26
ESI-9D	39	13	SP	9	780	1	10	0.9	1	4914	3042	0.50	0.8	1	13.0	10.5	11.6	0.18	0.93	0.12	0.64	0.36			ESI-9D	234	3906	2062	31
ESI-9D	54	39	SP	9	780	1	10	0.9	1	6804	3996	0.44	0.7	1	39.0	27.6	29.1	0.16	0.86	0.32	1.98	1.54			ESI-9D	234	5796	2998	46

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_σ	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
ESI-9D	59	28	SM	9	780	1	25	4.3	1.1	7434	4314	0.42	0.7	1	28.0	19.1	25.5	0.16	0.84	0.25	1.54	1.15			ESI-9D	234	6426	3310	51
ESI-10	4	4	SP	2	780	1	10	0.9	1	504	379.2	0.96	2.0	0.75	4.0	6.0	7.0	0.28	1.00	0.08	0.28	0.24	LIQ	0.869878	ESI-10	224	756	502	6
ESI-10	9	18	SM	2	780	1	25	4.3	1.1	1134	697.2	0.88	1.7	0.75	18.0	22.9	29.8	0.29	1.00	0.42	1.45	1.64			ESI-10	224	1386	814	11
ESI-10	19	29	SP	2	780	1	10	0.9	1	2394	1333	0.60	1.2	0.85	29.0	30.2	31.7	0.21	1.00	5.00	23.30	1.00			ESI-10	224	2646	1438	21
ESI-10	31	25	SM	2	780	1	25	4.3	1.1	3906	2096	0.48	1.0	0.95	25.0	23.2	30.2	0.18	1.00	4.98	27.68	1.00			ESI-10	224	4158	2186	33
ESI-10	43	22	SP	2	780	1	10	0.9	1	5418	2860	0.44	0.8	1	22.0	18.4	19.7	0.17	0.94	0.20	1.21	0.70			ESI-10	224	5670	2935	45
ESI-10A	4	5	SP	2	780	1	10	0.9	1	504	379.2	0.88	2.0	0.75	5.0	7.5	8.5	0.29	1.00	0.09	0.32	0.28	LIQ	0.948734	ESI-10A	219	1386	814	11
ESI-10A	7	8	SP	2	780	1	10	0.9	1	882	570	0.79	1.9	0.75	8.0	11.2	12.4	0.27	1.00	0.13	0.49	0.38			ESI-10A	219	1764	1001	14
ESI-10A	11.5	21	SM	2	780	1	25	4.3	1.1	1449	856.2	0.65	1.5	0.75	21.0	24.1	31.1	0.23	1.00	5.00	21.57	1.00			ESI-10A	219	2331	1282	18.5
ESI-10A	19	9	SP	2	780	1	10	0.9	1	2394	1333	0.53	1.2	0.85	9.0	9.4	10.4	0.19	1.00	0.11	0.58	0.33			ESI-10A	219	3276	1750	26
ESI-10A	31	28	SP	2	780	1	10	0.9	1	3906	2096	0.46	1.0	0.95	28.0	26.0	27.4	0.17	1.00	0.33	1.89	1.34			ESI-10A	219	4788	2498	38
ESI-10B	4	10	SP	7	780	1	10	0.9	1	504	691.2	0.00	1.7	0.75	10.0	12.8	13.9	0.00	1.00	0.15	No Liq	0.44	No Liq	No Liq	ESI-10B	232	EXC	EXC	EXC
ESI-10B	21	27	SP	7	780	1	10	0.9	1	2646	1772	0.76	1.1	0.95	27.0	27.2	28.7	0.26	1.00	0.36	1.38	1.50			ESI-10B	232	1890	1063	15
ESI-10B	24	29	SP	7	780	1	10	0.9	1	3024	1963	0.67	1.0	0.95	29.0	27.8	29.3	0.24	1.00	0.39	1.64	1.57			ESI-10B	232	2268	1250	18
ESI-10B	27	20	SP	7	780	1	10	0.9	1	3402	2154	0.60	1.0	0.95	20.0	18.3	19.6	0.21	0.99	0.21	0.98	0.70			ESI-10B	232	2646	1438	21
ESI-10B	32	12	CL	7	780	1	xxx	5	1.2	4032	2472	0.53	0.9	0.95	12.0	10.3	17.3	0.19	0.97	9.71	50.02	0.58			ESI-10B	232	3276	1750	26
ESI-10B	44	27	SP	7	780	1	10	0.9	1	5544	3235	0.46	0.8	1	27.0	21.2	22.6	0.17	0.91	0.23	1.30	0.90			ESI-10B	232	4788	2498	38
ESI-10B	49	33	SP	7	780	1	10	0.9	1	6174	3553	0.45	0.8	1	33.0	24.8	26.2	0.17	0.89	0.27	1.61	1.21			ESI-10B	232	5418	2810	43
ESI-10B	54	15	SP	7	780	1	10	0.9	1	6804	3871	0.43	0.7	1	15.0	10.8	11.9	0.16	0.87	0.11	0.69	0.37			ESI-10B	232	6048	3122	48
ESI-10C	3	5	SP	11	780	1	10	0.9	1	378	877.2	0.00	1.5	0.75	5.0	5.7	6.7	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-10C	236	EXC	EXC	EXC
ESI-10C	8	8	SM	11	780	1	25	4.3	1.1	1008	1195	0.00	1.3	0.75	8.0	7.8	12.9	0.00	1.00	0.14	No Liq	0.40	No Liq	No Liq	ESI-10C	236	EXC	EXC	EXC
ESI-10C	19	18	SP	11	780	1	10	0.9	1	2394	1895	0.92	1.0	0.85	18.0	15.7	16.9	0.30	1.00	0.18	0.62	1.00			ESI-10C	236	1134	689	9
ESI-10C	25	25	SP	11	780	1	10	0.9	1	3150	2276	0.76	0.9	0.95	25.0	22.3	23.6	0.26	0.98	0.26	0.98	0.98			ESI-10C	236	1890	1063	15
ESI-10C	31	26	SP	11	780	1	10	0.9	1	3906	2658	0.60	0.9	0.95	26.0	21.4	22.8	0.21	0.96	0.24	1.11	0.91			ESI-10C	236	2646	1438	21
ESI-10C	35	21	SP	11	780	1	10	0.9	1	4410	2912	0.54	0.8	1	21.0	17.4	18.6	0.20	0.94	0.19	0.96	0.65			ESI-10C	236	3150	1687	25
ESI-10C	40.5	13	CL	11	780	1	xxx	5	1.2	5103	3262	0.50	0.8	1	13.0	10.2	17.2	0.18	0.91	9.09	49.44	0.57			ESI-10C	236	3843	2030	30.5
ESI-10C	54	25	SP	11	780	1	10	0.9	1	6804	4121	0.44	0.7	1	25.0	17.4	18.7	0.17	0.85	0.17	1.03	0.65			ESI-10C	236	5544	2873	44
ESI-10C	62	29	SP	11	780	1	10	0.9	1	7812	4630	0.42	0.7	1	29.0	19.1	20.3	0.16	0.82	0.18	1.15	0.75			ESI-10C	236	6552	3372	52
ESI-10D	1	4	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	4.0	5.1	10.0	0.00	1.00	0.11	No Liq	0.31	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	4	7	SM	10	780	1	25	4.3	1.1	504	878.4	0.00	1.5	0.75	7.0	7.9	13.1	0.00	1.00	0.14	No Liq	0.41	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	9	8	SM	10	780	1	25	4.3	1.1	1134	1196	0.00	1.3	0.75	8.0	7.8	12.9	0.00	1.00	0.14	No Liq	0.40	No Liq	No Liq	ESI-10D	235	EXC	EXC	EXC
ESI-10D	14	19	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	19.0	18.6	19.8	0.27	1.00	0.21	0.79	1.00			ESI-10D	235	630	439	5
ESI-10D	19	29	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	29.0	25.8	27.2	0.30	1.00	0.32	1.09	1.00			ESI-10D	235	1260	751	10
ESI-10D	24	26	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	26.0	23.8	25.2	0.26	0.99	0.28	1.08	1.12			ESI-10D	235	1890	1063	15
ESI-10D	29	42	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	42.0	35.9	37.6	0.22	0.97	4.85	21.98	1.00			ESI-10D	235	2520	1375	20
ESI-10D	34	21	SP	10	780	1	10	0.9	1	4284	2786	0.54	0.8	1	21.0	17.8	19.0	0.20	0.95	0.19	0.99	0.67			ESI-10D	235	3150	1687	25
ESI-10D	39.5	22	SP	10	780	1	10	0.9	1	4977	3136	0.50	0.8	1	22.0	17.6	18.8	0.18	0.92	0.19	1.01	0.66			ESI-10D	235	3843	2030	30.5
ESI-10D	53.5	20	SP	10	780	1	10	0.9	1	6741	4027	0.44	0.7	1	20.0	14.1	15.3	0.17	0.86	0.14	0.85	0.49			ESI-10D	235	5607	2904	44.5
ESI-10D	59	30	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	30.0	20.3	21.6	0.16	0.84	0.20	1.23	0.83			ESI-10D	235	6300	3247	50
ESI-10D	63.5	59	SP	10	780	1	10	0.9	1	8001	4663	0.41	0.7	1	59.0	38.6	40.3	0.16	0.82	4.12	26.40	1.00			ESI-10D	235	6867	3528	54.5
ESI-11	1	3	SP	15	780	1	10	0.9	1	126	999.6	0.00	1.4	0.75	3.0	3.2	4.1	0.00	1.00	0.06	No Liq	0.19	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	4	6	SP	15	780	1	10	0.9	1	504	1190	0.00	1.3	0.75	6.0	5.8	6.8	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	9	10	SP	15	780	1	10	0.9	1	1134	1508	0.00	1.2	0.75	10.0	8.6	9.7	0.00	1.00	0.11	No Liq	0.31	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	14	11	SP	15	780	1	10	0.9	1	1764	1826	0.00	1.0	0.85	11.0	9.8	10.9	0.00	1.00	0.12	No Liq	0.34	No Liq	No Liq	ESI-11	240	EXC	EXC	EXC
ESI-11	19	10	SM	15	780	1	25	4.3	1.1	2394	2144	0.97	1.0	0.85	10.0	8.2	13.4	0.27	0.99	0.14	0.54	1.00			ESI-11	240	630	439	5
ESI-11	24	21	SM	15	780	1	25	4.3	1.1	3024	2462	0.90	0.9	0.95	21.0	18.0	24.3	0.30	0.97	0.26	0.89	1.00			ESI-11	240	1260	751	10
ESI-11	29	49	SP	15	780	1	10	0.9	1	3654	2780	0.76	0.8	0.95	49.0	39.5	41.2	0.26	0.95	4.73	17.95	1.00			ESI-11	240	1890	1063	15
ESI-11	34	59	SM	15	780	1	25	4.3	1.1	4284	3098	0.62	0.8	1	59.0	47.4	57.1	0.22	0.92	4.61	20.87	1.00			ESI-11	240	2520	1375	20
ESI-11	39	54	SP	15	780	1	10	0.9	1	4914	3416	0.54	0.8	1	54.0	41.3	43.1	0.20	0.90	4.49	22.79	1.00			ESI-11	240	3150	1687	25
ESI-11	44	35	SP	15	780	1	10	0.9	1	5544	3734	0.50	0.7	1	35.0	25.6	27.0	0.18	0.88	0.28	1.52	1.30			ESI-11	240	3780	1999	30
ESI-11	49	17	CL	15	780	1	xxx	5	1.2	6174	4052	0.48	0.7	1	17.0	11.9	19.3	0.18	0.86	8.57	48.40	0.68			ESI-11	240	4410	2311	35
ESI-11	54	51	SP	15	780	1	10	0.9	1	6804	4370	0.46	0.7	1	51.0	34.5	36.1	0.17	0.84	4.19	24.56	1.00			ESI-11	240	5040	2623	40
ESI-11	59	54	SP	15	780	1	10	0.9	1	7434	4688	0.44	0.7	1	54.0	35.3	36.9	0.17	0.82	4.11	24.87	1.00			ESI-11	240	5670	2935	45
ESI-11	64	30	SP	15	780	1	10	0.9	1	8064	5006	0.42	0.6	1	30.0	19.0	20.2	0.16	0.81	0.18	1.10	0.74			ESI-11	240	6300	3247	50
ESI-11	69	32	SP	15	780	1	10	0.9	1	8694	5324	0.41	0.6	1	32.0	19.6	20.9	0.16	0.79	0.18	1.16	0.78			ESI-11	240	6930	3559	55
ESI-11A	1	2	SM	9	780	1	25	4.3	1.1	126	625.2	0.00	1.8	0.75	2.0	2.7	7.3	0.00	1.00	0.08	No Liq	0.25	No Liq	No Liq	ESI-11A	234	EXC	EXC	EXC
ESI-11A	4	9	SP	9	780	1	10	0.9	1	504	816	0.00	1.6	0.75	9.0	10.6	11.7	0.00	1.00	0.13	No Liq	0.36	No Liq	No Liq	ESI-11A	234	EXC	EXC	EXC
ESI-11A	9	16	SP	9	780	1	10	0.9	1	1134	1134	0.99	1.3	0.75	16.0	15.9	17.2	0.19	1.00	0.19	0.95	1.00			ESI-11A	234	126	126	1
ESI-11A	14	24	SM	9	780	1	25	4.3	1.1	1764	1452	0.96	1.2	0.85	24.0	23.9	31.0	0.28	1.00	5.00	17.76	1.00			ESI-11A	234	756	502	6

(1) Boring	(2) Sample Depth, ft	(3) N	(4) Class	(5) Water Table, ft	(6) Drop Weight	(7) Drop Height	(8) FC	(9) α	(10) β	(11) σ_{vo}	(12) σ'_{vo}	(13) rd	(14) CN	(15) CR	(16) Ncorr	(17) (N1)60	(18) (N1)60cs	(19) CSR	(20) K_o	(21) M7.5 CRR	(22) FS for M7.5	(23) CRR for Specified M & P_L	(24) FS<1 per YOUD & NOBLE at P_L	(25) FS<1.34 YOUD & NOBLE at PL	(1) Boring	(26) ESI Boring Elevation	(27) CSR σ_{vo}	(28) CSR σ_{vo}'	(29) Depth
ESI-11A	19	24	SM	9	780	1	25	4.3	1.1	2394	1770	0.88	1.1	0.85	24.0	21.7	28.5	0.29	1.00	0.36	1.21	1.47			ESI-11A	234	1386	814	11
ESI-11A	24	22	SM	9	780	1	25	4.3	1.1	3024	2088	0.73	1.0	0.95	22.0	20.5	27.1	0.25	1.00	0.32	1.26	1.31			ESI-11A	234	2016	1126	16
ESI-11A	29	49	SP	9	780	1	10	0.9	1	3654	2406	0.60	0.9	0.95	49.0	42.4	44.2	0.21	0.98	4.88	22.73	1.00			ESI-11A	234	2646	1438	21
ESI-11A	34	15	CL	9	780	1	xxx	5	1.2	4284	2724	0.53	0.9	1	15.0	12.9	20.4	0.19	0.95	9.51	49.00	0.75			ESI-11A	234	3276	1750	26
ESI-11A	48	15	CL	9	780	1	xxx	5	1.2	6048	3614	0.46	0.7	1	15.0	11.2	18.4	0.17	0.88	8.85	51.81	0.63			ESI-11A	234	5040	2623	40
ESI-11A	53	17	CL	9	780	1	xxx	5	1.2	6678	3932	0.44	0.7	1	17.0	12.1	19.5	0.17	0.86	8.64	52.29	0.70			ESI-11A	234	5670	2935	45
ESI-11A	58.5	23	SP	9	780	1	10	0.9	1	7371	4282	0.42	0.7	1	23.0	15.7	16.9	0.16	0.84	0.15	0.96	0.56			ESI-11A	234	6363	3278	50.5
ESI-11B	1	2	SM	10	780	1	25	4.3	1.1	126	687.6	0.00	1.7	0.75	2.0	2.6	7.1	0.00	1.00	0.08	No Liq	0.25	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	4	7	SM	10	780	1	25	4.3	1.1	504	878.4	0.00	1.5	0.75	7.0	7.9	13.1	0.00	1.00	0.14	No Liq	0.41	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	9	9	SM	10	780	1	25	4.3	1.1	1134	1196	0.00	1.3	0.75	9.0	8.7	14.0	0.00	1.00	0.15	No Liq	0.44	No Liq	No Liq	ESI-11B	235	EXC	EXC	EXC
ESI-11B	14	11	SP	10	780	1	10	0.9	1	1764	1514	0.97	1.1	0.85	11.0	10.7	11.8	0.27	1.00	0.13	0.47	1.00			ESI-11B	235	630	439	5
ESI-11B	19	30	SP	10	780	1	10	0.9	1	2394	1832	0.90	1.0	0.85	30.0	26.6	28.1	0.30	1.00	0.35	1.17	1.00			ESI-11B	235	1260	751	10
ESI-11B	24	54	SP	10	780	1	10	0.9	1	3024	2150	0.76	1.0	0.95	54.0	49.5	51.4	0.26	0.99	4.96	18.82	1.00			ESI-11B	235	1890	1063	15
ESI-11B	29	28	SP	10	780	1	10	0.9	1	3654	2468	0.62	0.9	0.95	28.0	23.9	25.3	0.22	0.97	0.28	1.27	1.13			ESI-11B	235	2520	1375	20
ESI-11B	43.5	23	SP	10	780	1	10	0.9	1	5481	3391	0.48	0.8	1	23.0	17.7	18.9	0.18	0.90	0.18	1.03	0.66			ESI-11B	235	4347	2280	34.5
ESI-11B	59	29	SP	10	780	1	10	0.9	1	7434	4376	0.42	0.7	1	29.0	19.6	20.9	0.16	0.84	0.19	1.19	0.78			ESI-11B	235	6300	3247	50
ESI-11C	1	2	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	2.0	2.4	6.9	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	4	9	SP	12	780	1	10	0.9	1	504	1003	0.00	1.4	0.75	9.0	9.5	10.6	0.00	1.00	0.11	No Liq	0.33	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	9	13	SP	12	780	1	10	0.9	1	1134	1321	0.00	1.2	0.75	13.0	12.0	13.1	0.00	1.00	0.14	No Liq	0.41	No Liq	No Liq	ESI-11C	237	EXC	EXC	EXC
ESI-11C	14	22	SP	12	780	1	10	0.9	1	1764	1639	0.98	1.1	0.85	22.0	20.7	22.0	0.23	1.00	0.24	1.04	1.00			ESI-11C	237	378	314	3
ESI-11C	19	22	SM	12	780	1	25	4.3	1.1	2394	1957	0.94	1.0	0.85	22.0	18.9	25.4	0.29	1.00	0.29	0.98	1.00			ESI-11C	237	1008	626	8
ESI-11C	25	51	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	51.0	44.8	46.6	0.27	0.98	4.90	17.96	1.00			ESI-11C	237	1764	1001	14
ESI-11C	30	27	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	27.0	22.3	23.6	0.23	0.96	0.25	1.10	0.98			ESI-11C	237	2394	1313	19
ESI-11C	35	34	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	34.0	27.9	29.4	0.20	0.93	0.36	1.82	1.58			ESI-11C	237	3024	1625	24
ESI-11C	40	17	SM	12	780	1	25	4.3	1.1	5040	3293	0.51	0.8	1	17.0	13.2	19.1	0.19	0.91	0.19	1.00	0.67			ESI-11C	237	3654	1937	29
ESI-11C	45	13	SM	12	780	1	25	4.3	1.1	5670	3611	0.48	0.7	1	13.0	9.7	15.1	0.18	0.88	0.14	0.81	0.48			ESI-11C	237	4284	2249	34
ESI-11C	50	24	SM	12	780	1	25	4.3	1.1	6300	3929	0.46	0.7	1	24.0	17.1	23.4	0.17	0.86	0.22	1.30	0.96			ESI-11C	237	4914	2561	39
ESI-11C	55	14	SP	12	780	1	10	0.9	1	6930	4247	0.44	0.7	1	14.0	9.6	10.7	0.17	0.85	0.10	0.59	0.33			ESI-11C	237	5544	2873	44
ESI-11C	60	35	SP	12	780	1	10	0.9	1	7560	4565	0.43	0.7	1	35.0	23.2	24.5	0.16	0.83	0.23	1.41	1.06			ESI-11C	237	6174	3185	49
ESI-11D	1	3	SM	12	780	1	25	4.3	1.1	126	812.4	0.00	1.6	0.75	3.0	3.5	8.2	0.00	1.00	0.09	No Liq	0.27	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	4.5	8	SP	12	780	1	10	0.9	1	567	1035	0.00	1.4	0.75	8.0	8.3	9.4	0.00	1.00	0.10	No Liq	0.30	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	9	17	SP	12	780	1	10	0.9	1	1134	1321	0.00	1.2	0.75	17.0	15.7	16.9	0.00	1.00	0.18	No Liq	0.56	No Liq	No Liq	ESI-11D	237	EXC	EXC	EXC
ESI-11D	14	16	SM	12	780	1	25	4.3	1.1	1764	1639	0.98	1.1	0.85	16.0	15.0	21.0	0.23	1.00	0.23	0.99	1.00			ESI-11D	237	378	314	3
ESI-11D	19	54	SP	12	780	1	10	0.9	1	2394	1957	0.94	1.0	0.85	54.0	46.4	48.3	0.29	1.00	5.00	17.00	1.00			ESI-11D	237	1008	626	8
ESI-11D	25	28	SP	12	780	1	10	0.9	1	3150	2339	0.79	0.9	0.95	28.0	24.6	26.0	0.27	0.98	0.29	1.08	1.19			ESI-11D	237	1764	1001	14
ESI-11D	30	36	SP	12	780	1	10	0.9	1	3780	2657	0.64	0.9	0.95	36.0	29.7	31.2	0.23	0.96	4.78	20.98	1.00			ESI-11D	237	2394	1313	19
ESI-11D	35	27	SP	12	780	1	10	0.9	1	4410	2975	0.55	0.8	1	27.0	22.1	23.5	0.20	0.93	0.24	1.21	0.97			ESI-11D	237	3024	1625	24
ESI-11D	40	32	SP	12	780	1	10	0.9	1	5040	3293	0.51	0.8	1	32.0	24.9	26.3	0.19	0.91	0.28	1.49	1.23			ESI-11D	237	3654	1937	29
ESI-11D	45	11	SP	12	780	1	10	0.9	1	5670	3611	0.48	0.7	1	11.0	8.2	9.2	0.18	0.88	0.09	0.50	0.29			ESI-11D	237	4284	2249	34
ESI-11E	1	3	SM	5	780	1	25	4.3	1.1	126	375.6	0.00	2.0	0.75	3.0	4.5	9.3	0.00	1.00	0.10	No Liq	0.30	No Liq	No Liq	ESI-11E	230	EXC	EXC	EXC
ESI-11E	4	6	SP	5	780	1	10	0.9	1	504	566.4	0.00	1.9	0.75	6.0	8.5	9.5	0.00	1.00	0.10	No Liq	0.30	No Liq	No Liq	ESI-11E	230	EXC	EXC	EXC
ESI-11E	9	8	SP	5	780	1	10	0.9	1	1134	884.4	0.97	1.5	0.75	8.0	9.0	10.1	0.27	1.00	0.11	0.41	1.00			ESI-11E	230	630	439	5
ESI-11E	14	16	SM	5	780	1	25	4.3	1.1	1764	1202	0.90	1.3	0.85	16.0	17.5	23.8	0.30	1.00	0.26	0.90	1.00			ESI-11E	230	1260	751	10
ESI-11E	19	29	SM	5	780	1	25	4.3	1.1	2394	1520	0.76	1.1	0.85	29.0	28.3	35.8	0.26	1.00	5.00	18.96	1.00			ESI-11E	230	1890	1063	15
ESI-11E	24	30	SP	5	780	1	10	0.9	1	3024	1838	0.62	1.0	0.95	30.0	29.7	31.2	0.22	1.00	5.00	22.64	1.00			ESI-11E	230	2520	1375	20
ESI-11E	29	59	SP	5	780	1	10	0.9	1	3654	2156	0.54	1.0	0.95	59.0	54.0	56.0	0.20	0.99	4.96	25.17	1.00			ESI-11E	230	3150	1687	25
ESI-11E	34	14	CL	5	780	1	xxx	5	1.2	4284	2474	0.50	0.9	1	14.0	12.6	20.1	0.18	0.97	9.71	52.49	0.73			ESI-11E	230	3780	1999	30
ESI-11E	44	23	SP	5	780	1	10	0.9	1	5544	3110	0.46	0.8	1	23.0	18.4	19.7	0.17	0.92	0.20	1.15	0.71			ESI-11E	230	5040	2623	40
ESI-11E	49	6	CL	5	780	1	xxx	5	1.2	6174	3428	0.44	0.8	1	6.0	4.6	10.5	0.17	0.90	8.97	54.32	0.33			ESI-11E	230	5670	2935	45
ESI-11F	4	5	SP	3	780	1	10	0.9	1	504	441.6	0.99	2.0	0.75	5.0	7.5	8.5	0.19	1.00	0.09	0.49	1.00			ESI-11F	228	252	252	2
ESI-11F	9	10	SP	3	780	1	10	0.9	1	1134	759.6	0.95	1.6	0.75	10.0	12.2	13.3	0.29	1.00	0.14	0.50	0.41			ESI-11F	228	882	564	7
ESI-11F	12.5	21	SP	3	780	1	10	0.9	1	1575	982.2	0.89	1.4	0.75	21.0	22.5	23.8	0.29	1.00	0.26	0.90	1.00			ESI-11F	228	1323	782	10.5
ESI-11F	15	23	SM	3	780	1	25	4.3	1.1	1890	1141	0.83	1.3	0.85	23.0	25.9	33.1	0.28	1.00	5.00	17.77	1.00			ESI-11F	228	1638	938	13
ESI-11F	25	27	SP	3	780	1	10	0.9	1	3150	1777	0.57	1.1	0.95	27.0	27.2	28.7	0.20	1.00	0.36	1.77	1.49			ESI-11F	228	2898	1562	23
ESI-11F	30	9	SP	3	780	1	10	0.9	1	3780	2095	0.51	1.0	0.95	9.0	8.4	9.4	0.19	1.00	0.10	0.54	0.30			ESI-11F	228	3528	1874	28
ESI-11F	39	42	SP	3	780	1	10	0.9	1	4914	2668	0.47	0.9	1	42.0	36.4	38.0	0.17	0.96	4.78	27.40	1.00			ESI-11F	228	4662	2436	37
ESI-11F	44.5	22	CL	3	780	1	xxx	5	1.2	5607	3017	0.45	0.8	1	22.0	17.9	26.5	0.17	0.93	9.28	55.27	1.24			ESI-11F	228	5355	2779	42.5
ESI-11F	51	22	SP	3	780	1	10	0.9	1	6426	3431	0.43	0.8	1	22.0	16.8	18.0	0.16	0.90	0.17	1.08	0.61			ESI-11F	228	6174	3185	49
ESI-12	1	3	SM	7	780	1	25	4.3	1.1	126	500.4	0.00	2.0	0.75	3.0	4.5	9.3	0.00	1.00	0.10	No Liq	0.30	No Liq	No Liq	ESI-12	232	EXC	EXC	EXC

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(1)	(26)	(27)	(28)	(29)
Boring	Sample Depth, ft	N	Class	Water Table, ft	Drop Weight	Drop Height	FC	α	β	σ_{vo}	σ'_{vo}	rd	CN	CR	Ncorr	(N1)60	(N1)60cs	CSR	K_σ	M7.5 CRR	FS for M7.5	CRR for Specified M & P_L	FS<1 per YOUD & NOBLE at P_L	FS<1.34 YOUD & NOBLE at PL	Boring	ESI Boring Elevation	CSR σ_{vo}	CSR σ'_{vo}	Depth
ESI-12	5	6	SP	7	780	1	10	0.9	1	630	754.8	0.00	1.6	0.75	6.0	7.3	8.4	0.00	1.00	0.09	No Liq	0.27	No Liq	No Liq	ESI-12	232	EXC	EXC	EXC
ESI-12	10	11	SM	7	780	1	25	4.3	1.1	1260	1073	0.97	1.4	0.75	11.0	11.3	16.8	0.25	1.00	0.18	0.72	1.00			ESI-12	232	504	377	4
ESI-12	15	27	SP	7	780	1	10	0.9	1	1890	1391	0.92	1.2	0.85	27.0	27.5	29.0	0.30	1.00	0.37	1.26	1.53			ESI-12	232	1134	689	9
ESI-12	20	24	SP	7	780	1	10	0.9	1	2520	1709	0.79	1.1	0.95	24.0	24.7	26.1	0.27	1.00	0.30	1.10	1.20			ESI-12	232	1764	1001	14
ESI-12	25	57	SP	7	780	1	10	0.9	1	3150	2027	0.64	1.0	0.95	57.0	53.8	55.8	0.23	1.00	4.99	21.91	1.00			ESI-12	232	2394	1313	19
ESI-12	30	47	SP	7	780	1	10	0.9	1	3780	2345	0.55	0.9	0.95	47.0	41.2	43.0	0.20	0.98	4.90	24.43	1.00			ESI-12	232	3024	1625	24
ESI-12	40	15	CL	7	780	1	xxx	5	1.2	5040	2981	0.48	0.8	1	15.0	12.3	19.7	0.18	0.93	9.31	52.18	0.71			ESI-12	232	4284	2249	34
ESI-12	55	13	SP	7	780	1	10	0.9	1	6930	3935	0.43	0.7	1	13.0	9.3	10.3	0.16	0.86	0.10	0.60	0.32			ESI-12	232	6174	3185	49
ESI-13	5	6	SP	2	780	1	10	0.9	1	630	442.8	0.92	2.0	0.75	6.0	9.0	10.1	0.30	1.00	0.11	0.37	0.32		1.067029	ESI-13	222	1134	689	9
ESI-13	16	14	SP	2	780	1	10	0.9	1	2016	1142	0.62	1.3	0.85	14.0	15.7	17.0	0.22	1.00	0.18	0.83	0.56			ESI-13	222	2520	1375	20
ESI-13	22	41	SP	2	780	1	10	0.9	1	2772	1524	0.53	1.1	0.95	41.0	44.6	46.5	0.19	1.00	5.00	25.76	1.00			ESI-13	222	3276	1750	26
ESI-13	26	33	SP	2	780	1	10	0.9	1	3276	1778	0.50	1.1	0.95	33.0	33.2	34.8	0.18	1.00	5.00	27.04	1.00			ESI-13	222	3780	1999	30
ESI-13	31.5	28	SP	2	780	1	10	0.9	1	3969	2128	0.47	1.0	0.95	28.0	25.8	27.2	0.18	0.99	0.32	1.83	1.32			ESI-13	222	4473	2342	35.5
ESI-13	37	18	SP	2	780	1	10	0.9	1	4662	2478	0.45	0.9	1	18.0	16.2	17.4	0.17	0.97	0.18	1.07	0.58			ESI-13	222	5166	2686	41
ESI-13	41	29	SP	2	780	1	10	0.9	1	5166	2732	0.44	0.9	1	29.0	24.8	26.2	0.17	0.95	0.29	1.75	1.22			ESI-13	222	5670	2935	45
ESI-13	46	23	SP	2	780	1	10	0.9	1	5796	3050	0.42	0.8	1	23.0	18.6	19.9	0.16	0.93	0.20	1.24	0.72			ESI-13	222	6300	3247	50
ESI-13	51	35	SP	2	780	1	10	0.9	1	6426	3368	0.41	0.8	1	35.0	27.0	28.4	0.16	0.90	0.32	2.06	1.46			ESI-13	222	6930	3559	55
ESI-14	1	9	SM	14	780	1	25	4.3	1.1	126	937.2	0.00	1.5	0.75	9.0	9.9	15.3	0.00	1.00	0.17	No Liq	0.49	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	4	6	SP	14	780	1	10	0.9	1	504	1128	0.00	1.3	0.75	6.0	6.0	7.0	0.00	1.00	0.08	No Liq	0.24	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	9	21	SP	14	780	1	10	0.9	1	1134	1446	0.00	1.2	0.75	21.0	18.5	19.8	0.00	1.00	0.21	No Liq	0.71	No Liq	No Liq	ESI-14	239	EXC	EXC	EXC
ESI-14	14	11	SP	14	780	1	10	0.9	1	1764	1764	0.99	1.1	0.85	11.0	10.0	11.0	0.19	1.00	0.12	0.62	1.00			ESI-14	239	126	126	1
ESI-14	19	21	SP	14	780	1	10	0.9	1	2394	2082	0.96	1.0	0.85	21.0	17.5	18.7	0.28	1.00	0.20	0.72	1.00			ESI-14	239	756	502	6
ESI-14	24	19	SP	14	780	1	10	0.9	1	3024	2400	0.88	0.9	0.95	19.0	16.5	17.7	0.29	0.98	0.19	0.64	1.00			ESI-14	239	1386	814	11
ESI-14	29	36	SP	14	780	1	10	0.9	1	3654	2718	0.73	0.9	0.95	36.0	29.3	30.8	0.25	0.95	4.76	18.72	1.00			ESI-14	239	2016	1126	16
ESI-14	34	38	SP	14	780	1	10	0.9	1	4284	3036	0.60	0.8	1	38.0	30.8	32.4	0.21	0.93	4.63	21.58	1.00			ESI-14	239	2646	1438	21
ESI-14	39	58	SP	14	780	1	10	0.9	1	4914	3354	0.53	0.8	1	58.0	44.8	46.6	0.19	0.90	4.51	23.26	1.00			ESI-14	239	3276	1750	26
ESI-14	44	21	SM	14	780	1	25	4.3	1.1	5544	3672	0.50	0.7	1	21.0	15.5	21.6	0.18	0.88	0.21	1.13	0.83			ESI-14	239	3906	2062	31
ESI-14	49	34	SP	14	780	1	10	0.9	1	6174	3990	0.47	0.7	1	34.0	24.1	25.5	0.18	0.86	0.25	1.42	1.14			ESI-14	239	4536	2374	36
ESI-14	54	31	SP	14	780	1	10	0.9	1	6804	4308	0.45	0.7	1	31.0	21.1	22.4	0.17	0.84	0.21	1.22	0.89			ESI-14	239	5166	2686	41
ESI-14	59	30	SP	14	780	1	10	0.9	1	7434	4626	0.44	0.7	1	30.0	19.7	21.0	0.16	0.82	0.19	1.15	0.79			ESI-14	239	5796	2998	46
ESI-15	4	9	SP	20	780	1	10	0.9	1	504	1502	0.00	1.2	0.75	9.0	7.8	8.8	0.00	1.00	0.10	No Liq	0.29	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	9	9	SP	20	780	1	10	0.9	1	1134	1820	0.00	1.0	0.75	9.0	7.1	8.1	0.00	1.00	0.09	No Liq	0.27	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	15	29	SP	20	780	1	10	0.9	1	1890	2202	0.00	1.0	0.85	29.0	23.5	24.9	0.00	0.99	0.28	No Liq	1.09	No Liq	No Liq	ESI-15	245	EXC	EXC	EXC
ESI-15	21	38	SP	20	780	1	10	0.9	1	2646	2584	0.99	0.9	0.95	38.0	31.8	33.3	0.19	0.96	4.81	25.00	1.00			ESI-15	245	252	252	2
ESI-15	24	24	SM	20	780	1	25	4.3	1.1	3024	2774	0.97	0.8	0.95	24.0	19.4	25.9	0.27	0.95	0.28	1.04	1.00			ESI-15	245	630	439	5
ESI-15	29	20	SM	20	780	1	25	4.3	1.1	3654	3092	0.90	0.8	0.95	20.0	15.3	21.3	0.30	0.92	0.21	0.72	1.00			ESI-15	245	1260	751	10
ESI-15	34	24	SP	20	780	1	10	0.9	1	4284	3410	0.76	0.8	1	24.0	18.4	19.6	0.26	0.90	0.19	0.72	1.00			ESI-15	245	1890	1063	15
ESI-15	39.5	35	SP	20	780	1	10	0.9	1	4977	3760	0.61	0.7	1	35.0	25.5	26.9	0.22	0.87	0.28	1.28	1.29			ESI-15	245	2583	1406	20.5
ESI-15	44.5	52	SP	20	780	1	10	0.9	1	5607	4078	0.54	0.7	1	52.0	36.4	38.1	0.20	0.86	4.28	21.86	1.00			ESI-15	245	3213	1718	25.5
ESI-15	50	27	SP	20	780	1	10	0.9	1	6300	4428	0.50	0.7	1	27.0	18.1	19.4	0.18	0.84	0.18	0.96	0.69			ESI-15	245	3906	2062	31
ESI-15	55	42	SP	20	780	1	10	0.9	1	6930	4746	0.47	0.6	1	42.0	27.3	28.7	0.18	0.82	0.30	1.70	1.50			ESI-15	245	4536	2374	36
ESI-15	60.5	35	SP	20	780	1	10	0.9	1	7623	5096	0.45	0.6	1	35.0	21.9	23.3	0.17	0.80	0.21	1.22	0.95			ESI-15	245	5229	2717	41.5
ESI-15	64	13	SP	20	780	1	10	0.9	1	8064	5318	0.44	0.6	1	13.0	8.0	9.0	0.17	0.79	0.08	0.47	0.29			ESI-15	245	5670	2935	45
ESI-15	70.5	32	SP	20	780	1	10	0.9	1	8883	5732	0.42	0.6	1	32.0	18.9	20.2	0.16	0.78	0.17	1.07	0.74			ESI-15	245	6489	3341	51.5
ESI-15	74	35	SP	20	780	1	10	0.9	1	9324	5954	0.41	0.6	1	35.0	20.3	21.6	0.16	0.77	0.18	1.16	0.83			ESI-15	245	6930	3559	55
ESI-15	84	67	SP	20	780	1	10	0.9	1	10584	6590	0.38	0.6	1	67.0	36.9	38.6	0.15	0.75	3.74	25.50	1.00			ESI-15	245	8190	4183	65