# Appendix E
Geotechnical Report

# ALLAN E. SEWARD
## ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants


**GEOTECHNICAL REPORT**
***Review of Tentative Tract Map, dated 5/26/21***

Tentative Tract Map No. 083295
Santa Clarita, California

Prepared for:

Wiley Canyon, LLC
c/o Sheridan Ebbert Development
13120 Telfair Avenue
Sylmar, CA. 91342

Job No.: 21-2593-4
Dated: June 15, 2021


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**APPENDIX A – Subsurface Logs**

**APPENDIX B – Laboratory Test Results**

**APPENDIX C – Seismicity**

**APPENDIX D – Liquefaction Assessment**

**APPENDIX E – General Specifications, Details, Cross Sections & Maps**

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June 15, 2021 Job No.: 21-2593-4

Wiley Canyon LLC
c/o Sheridan Ebbert Development
13120 Telfair Avenue
Sylmar, CA 91342

**Attention:** Mr. Scott Sheridan

**Subject:** **GEOTECHNICAL REPORT**
***Review of Tentative Tract Map 083295 Dated 5/26/21***

**Project:** Tentative Tract Map No. 083295
Santa Clarita, California

**References:** At end of text

Dear Mr. Sheridan:

This report presents our opinions regarding existing geotechnical conditions at the above-referenced site and their effects on the Tentative Tract Map (TTM) No. 083295 prepared by Alliance Land Planning & Engineering Inc., dated May 26, 2021.

The proposed development shown on the Tentative Tract Map is feasible from a geologic and geotechnical standpoint, provided that the recommendations provided in this report are followed and implemented during design and construction.

## 1.0 SCOPE OF REVIEW

This review included the following tasks:

1. Review of the Tentative Tract Map (Sheets 1 to 3 of 3) prepared by Alliance Land Planning & Engineering Inc., dated 5/26/21. This map was provided to our office in computerized format (AutoCAD). Map Sheet 1 was prepared at a scale of 1”=100’ and illustrates site topography relative to proposed grading and street improvements; this map was used as the base for our 100-scale Geotechnical Map. Map Sheets 2 and 3 were prepared at a scale of 1”=50’ and illustrate the proposed development including building locations and street improvements; these maps were used as the base for 50-scale Geotechnical Maps. We make no representations regarding the accuracy of the base maps.
2. Review of pertinent geotechnical reports addressing previously proposed development at

the project site (see References).

3. Review of the published geologic reports and maps referenced at the end of this report.
4. Review of the Seismic Hazard Zones Map and Report for the Oat Mountain Quadrangle.
5. Evaluation of ground water conditions and historic ground water levels based on Los Angeles County Flood Control District (LACFCD) water well data and published maps.
6. Review of the Department of Conversation, Division of Oil, Gas, and Geothermal Resources well finder web page.
7. Review of Alquist-Priolo Fault Rupture Hazard Zones in California (CDMG Special Publication 42).
8. Review of the following aerial photographs:

| Date | Flight | Frame | Scale | Agency |
|---|---|---|---|---|
| 12/31/27 | C-300 | E-154 | 1:18,000± | Fairchild |
| 6/30/29 | C-594 | Z-26 | 1:9,600± | Fairchild |
| 7/17/30 | C-1001B | Z-176 | 1:16,800± | Fairchild |
| 10/23/45 | C-9800 | 12-1237 | 1:14,400± | Fairchild |
| 11/4/52 | AXJ | 3K-23 | 1:20,000± | USDA |
| 3/24/68 | TG-2445 | 4-124 | 1:24,000± | LA County |
| 1/31/76 | TG-7600 | 19-14 | 1:24,000± | LA County |
| 4/14/93 | - | 40008 | 1:200± | Mitchell Specialized Photographic Services |
| 1994 – 2018 | - Various Images | - | - | Google Earth Web Application |

9. Coordination with the Supervising Civil Engineer, Alliance Land Planning & Engineering Inc.
10. Coordination with Underground Service Alert to obtain clearance from potentially impacted utilities prior to the subsurface exploration.
11. Excavation, sampling and logging of 3 hollow-stem-auger borings (HS-1 to HS-3) drilled to a maximum depth of 55 ft, and two percolation borings (PB-1 and PB-2) drilled to a maximum depth of 12 ft.
12. Field infiltration testing using the boring percolation method in borings PB-1 and PB-2.
13. Pushing of 17 cone penetration test (CPT) soundings (CPT-1 through CPT-17) to a maximum depth of 60 feet.
14. Laboratory testing of samples obtained during our subsurface investigation.
15. Geotechnical evaluation of in-situ soil density and moisture content, grain-size characteristics, shear strength, compressibility, corrosion potential, expansion potential,

and shrinkage and bulking factors based on current and prior subsurface investigations and laboratory testing.

16. Evaluation of feasibility of on-site stormwater infiltration.
17. Performed general earthquake ground motion characterization utilizing the latest seismic ground-motion provisions of the 2019 California Building Code (CBC), ASCE 7-16, and Special Publication 117A. Our evaluation included calculation of site-specific response spectrum parameters and potential ground accelerations that could be generated at the site during future earthquakes on nearby faults.
18. Assessment of potential ground rupture hazard at the site.
19. Geotechnical assessment of liquefaction potential of site alluvial soils and calculation of associated seismic settlements and lateral spread displacements based on subsurface data, existing and historic ground water levels, laboratory test results, and estimated earthquake ground motions.
20. Estimation of potential static settlements under future building loads based on SPT blow count data, CPT tip resistance, and laboratory test results.
21. Assessment of recommended grading removal depths based on subsurface conditions, calculated seismic settlements, and estimated static settlements under assumed future building loads.
22. Preparation of one cross section illustrating interpreted subsurface conditions and remedial removals across the length of the site, and 3 cross sections illustrating the proposed soil-cement bank protection configuration relative to temporary excavation slopes and existing/proposed grades.
23. Evaluation of stability of temporary excavation slopes.
24. Preparation of the enclosed Geotechnical Maps illustrating our geotechnical data and recommended mitigation measures in relation to the proposed tentative tract map design.
25. Preparation of figures and illustrations, including Location Map, Fault Location Map, drill hole logs, CPT logs, laboratory test reports, infiltration test reports, seismicity figures, liquefaction results and calculations, and pertinent construction details for inclusion in this report.
26. Preparation of this Geotechnical Report describing the completed scope of work, the geologic and geotechnical conditions at the site, the results of our analyses along with appropriate conclusions and recommendations for the Tentative Tract Map.

## 2.0 SITE DESCRIPTION

The subject site comprises approximately 32 acres and is located at 24924 Hawkbryn Drive (previously known as the Smiser Parcel) generally between Interstate 5 to the west and Wiley Canyon Road to the east in the Newhall area of Santa Clarita (see **Location Map** following page 4). The northeasterly portion of the parcel extends across Wiley Canyon Road and includes hillside area on the east side of the road. No development is proposed in the area east of Wiley Canyon Road. The site borders the developed Mulberry Mobile Home Park to the north, developed residential Tract 30340 to the east and a commercial development to the south. These developments were built in 1960 to 1964, 1966, and between 1978 and 1981, respectively. Access to the site is via a driveway approach off of Wiley Canyon Drive near the northerly portion of the site.

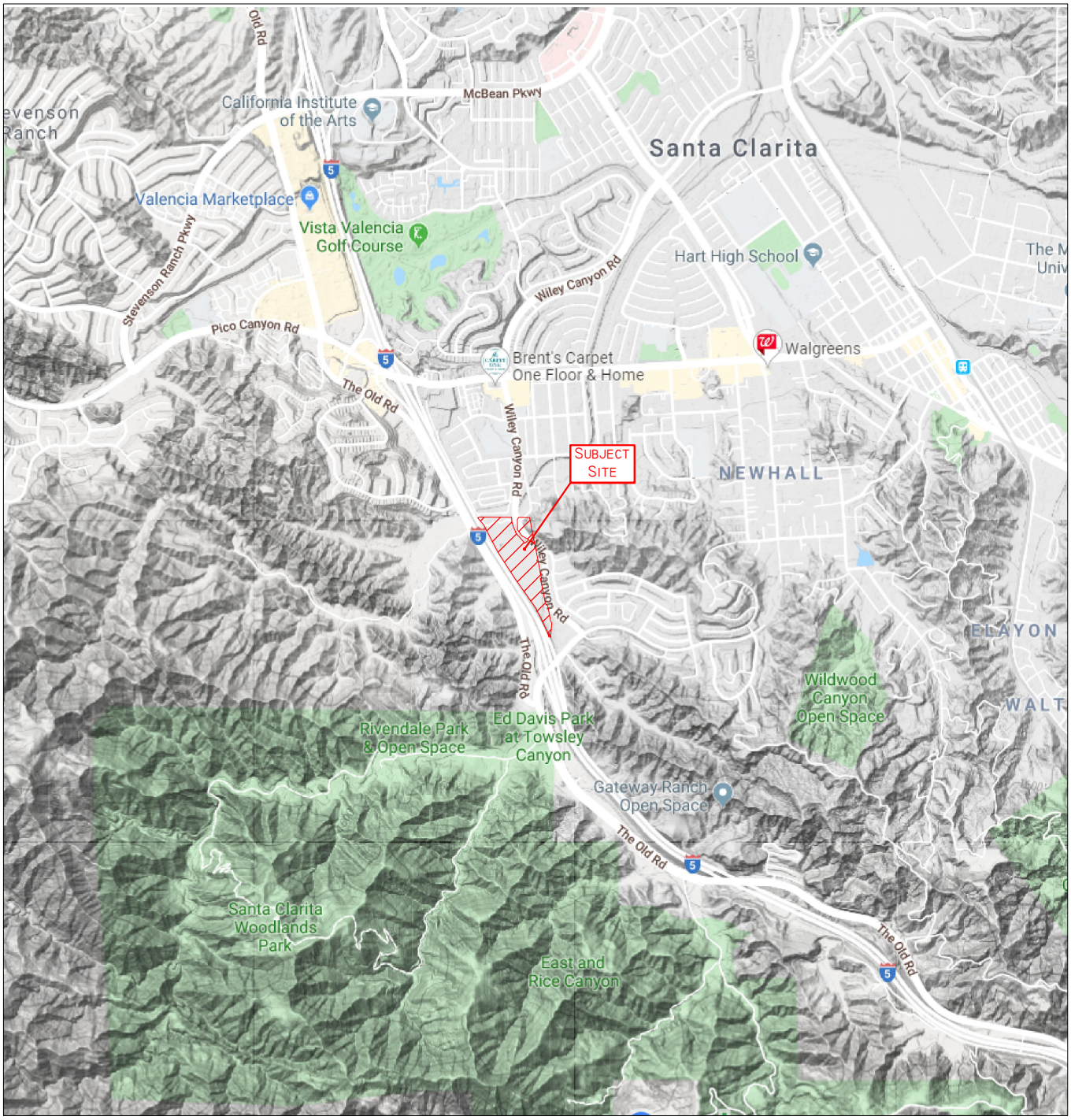
The subject property was previously used as a mule ranch and remains mostly vacant with the exception of the northerly portion, which is roughly paved and occupied by miscellaneous barn and storage structures and two mobile homes. A small, out of service (dry) water reservoir is present at the northwesterly portion of the site. The drainage for the South Fork of the Santa Clara River extends roughly north-south along the east side of the property, adjacent to the west side of Wiley Canyon Road. This narrow drainage ranges from 7 to 15 feet deep from the adjacent relatively level grades and consists of active alluvial deposits, large cobbles and boulders, and thick vegetation with numerous trees. The drainage transitions to a concrete-lined channel within the northern portion of the site.

With the exception of the elevated hillside area at the northeast portion of the site, east of Wiley Canyon Road, the site topography is relatively flat (low gradient) and generally drains by sheet flow to the northwest then to the northeast near the northern portion of the property. The elevations on the site range from a high point of 1402' at the hillside area to a low point of 1290' located within the drainage channel near where the channel bottom transitions to concrete liner. The elevations of the relatively flat field area of the site range from approximately 1321' at the south to 1297' near the site access driveway.

Details of the site topography are illustrated on the Geotechnical Maps included within this report. Vegetation on the site ranges from annual grasses to chaparral, with various scattered trees.

## 3.0 PROPOSED DEVELOPMENT

The currently proposed development consists of an assisted living facility, multi-family and commercial development on relatively flat building pad areas with associated infrastructure, retaining walls, drive aisles, parking areas, carports, trash enclosures, swimming pool and




SOURCE: OPEN TOPOGRAPHY WEB APPLICATION (HTTPS://OPENTOPOGRAPHY.ORG/)

APPROXIMATE SCALE: 1"=2,000'

N

NOTE: THIS IS NOT A SURVEY OF THE PROPERTY

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LOCATION MAP

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|---|---|

cabana areas, and maintenance buildings. The residential and commercial building structures are proposed up to 4 stories. A park is proposed at the south end of the project.

The main access driveway is proposed off Wiley Canyon Road at the north portion of the project and a secondary access driveway is proposed attaching to Hawkbryn Avenue at the northwest corner of the project. The existing box culvert that conveys water from the existing drainage channel beneath Wiley Canyon Road will be extended to accommodate the main access driveway. Additional improvements to the drainage along the eastern margin of the development and western margin of the park on open space Lot 5 include construction of soil-cement bank protection. Two water quality basins, one at the northwest corner and one at the east side of the development, and a drainage basin just south of the development area are also proposed.

Proposed offsite improvements include the expansion of Wiley Canyon Road with the addition of three round-abouts, one at Wiley Canyon Road and Calgrove Boulevard intersection, one at Canerwell Street and Wiley Canyon Road and one at the main entrance to the site and Wiley Canyon Road. Two retaining walls are proposed along the westerly side of Wiley Canyon Road, adjacent to the existing channel drainage to accommodate the expansion of the road.

Conventional cut and fill grading techniques will be utilized to construct the proposed development. Small cut and fill slopes are proposed at gradients of 2:1 (h:v) or flatter. Proposed grades for the building pads are relatively flat. Minor cuts and fills up to approximately 3 feet are proposed in order to achieve the proposed grades for the building pads. The tallest proposed slope is about 17 feet located just east of the proposed water quality basin adjacent to the drainage channel. The tallest proposed cut-slope is about 10 feet located along the east side of the recreational use grass pad. The maximum thickness of proposed fill (vertical) is approximately 10 feet within Lot 2. The maximum depth of proposed cut (vertical) is approximately 11 feet located within the channel improvements adjacent to the proposed water quality basin.

## 4.0 FIELD INVESTIGATION, SAMPLING AND LABORATORY TESTING

### 4.1 Surface Mapping

For this report, surface geologic mapping in conjunction with aerial photo interpretations was undertaken by personnel from Allan E. Seward Engineering Geology Inc. (AESEGI) using the Tentative Tract Map as the base map. We also reviewed existing geologic and geotechnical available data by AESEGI and others in the vicinity of the project.

### 4.2 Prior Field Investigations

Prior subsurface investigations were performed by Lawson & Associates Geotechnical Consulting Inc. (LGC) at the subject site (also referred to as the "Smiser Parcel") in 2004 (Reference 1). LGC also performed a geotechnical investigation in 2005 for a 7.5-acre site adjacent to the southerly portion of the Smiser Parcel, known as the Taylor Parcel (Reference 2). A supplemental geotechnical investigation covering the Smiser Parcel, the Taylor Parcel, and an additional 4.25-acre site located at the corner of Wiley Canyon Road and Calgrove Boulevard was performed by LGC Valley, Inc. (LGC) in 2007 (Reference 3).

The following subsurface exploration was performed by LGC, as documented in the referenced reports that we reviewed. The drill hole logs are included in **Appendix A**.

- Advancement of 4 CPT soundings, CPT-01 through CPT-04 (LGC, 2004), to depths ranging from 12.8 to 46.7 feet.
- Drilling of 5 hollow-stem auger borings, B-1 through B-5 (LGC, 2004), to depths ranging from about 31 to 51.5 feet.
- Drilling of 3 hollow-stem auger borings, B-1 through B-3 (LGC, 2005), to depths ranging from about 28.5 to 47.5 feet.
  (*Note: boring B-LGC-2 was not included in the associated report and not reviewed*).
- Drilling of 9 hollow-stem auger borings, B-1 through B-9 (LGC, 2007), to depths ranging from about 40.5 to 80.3 feet.

Samples collected from the borings included modified California drive (CD) ring samples, Standard Penetration Test (SPT) samples, and bulk samples. The CD and SPT samples were generally obtained at 2.5-ft intervals in the upper 10 feet and every 5 feet thereafter.

Subsequent laboratory testing was performed by LGC on samples collected from the borings and included in-situ moisture content and dry density, grain size distribution, laboratory maximum dry density (modified Proctor), consolidation, hydro-collapse, direct shear, expansion index, and corrosivity (sulfate content, pH and resistivity).

### 4.3 AESEGI Field Investigation

#### 4.3.1 Subsurface Exploration

Subsurface exploration performed to supplement existing data included the drilling, sampling, and logging of three (3) 8-inch diameter hollow-stem auger borings (HS-1 thru HS-3) to a maximum depth of 55 feet. The borings were drilled by Choice Drilling Inc. on 11/14/19 and logged by a staff geologist with oversight by the undersigned Geotechnical Engineer. Following completion of logging, borings were backfilled with the excavated materials.

Additionally, 17 Cone Penetration Test (CPT) soundings (CPT-1 through CPT-17) were performed to a maximum depth of 60 feet. The CPT soundings were performed by Kehoe Testing and Engineering on 11/6/19 and 11/7/19. Following completion of the sounding, the holes were backfilled with bentonite chips.

The drill hole logs and CPT logs are included in **Appendix A**. The drill hole logs represent our interpretation of field data prepared for each boring by our geologic/engineering staff at the time of exploration, along with refinements based on observations and laboratory test results. Unit boundaries shown in the graphic log column of our hollow-stem-auger drill hole logs are approximate and may represent gradual transitions. The CPT logs include a graphic log column with soil descriptions based on soil behavior types interpreted from cone resistance and sleeve friction. The subsurface locations are shown on the attached Geotechnical Maps.

#### 4.3.2 Field Infiltration Testing

Two (2) additional hollow-stem auger borings (PB-1 and PB-2) were excavated to a maximum depth of 12 feet adjacent to hollow-stem auger borings HS-2 and HS-3, respectively, to evaluate the use of Low Impact Development (LID) stormwater quality control measures with an infiltration component. Field infiltration testing was conducted using the "Boring Percolation" test procedure outlined in Administrative Manual GS200.2 (dated 6/30/17), *Guidelines for Investigation and Reporting, Low Impact Development Stormwater Infiltration*, prepared by the County of Los Angeles Department of Public Works, Geotechnical and Materials Engineering Division (referred to herein as GMED LID Guidelines). Test procedures and results of field infiltration testing were presented in our Geotechnical Letter – Preliminary Evaluation of Infiltration Rates (see Reference 4) and summarized in **Section 7.4** of this report.

#### 4.3.3 Sampling Procedures

California drive (relatively undisturbed) ring and Standard Penetration Test (SPT) samples were obtained in the exploratory drill holes at various depths (see logs in **Appendix A**). The SPT samples and associated blow count data were collected in boring HS-1 at 2.5-ft intervals for assessment of liquefaction potential. The CD samples were collected in borings HS-2 and HS-3 at 3- to 5-ft intervals. Recovered soil samples were sealed in plastic containers and brought to our laboratory for further classification and testing.

Bulk (disturbed) samples of the near surface soils were obtained from cuttings developed during excavation of the exploratory drill holes. The bulk samples were collected for classification and testing purposes and represent a mixture of soils within the noted depths.

#### 4.3.4 Laboratory Program

Soil samples were visually classified in the field. Thereafter, the samples were brought to our laboratory, the visual soil classifications were checked using visual-manual procedures (ASTM Standard Practice D2488), and the drill hole logs were reviewed in order to select soil samples for testing.

The laboratory testing on selected samples consisted of in-situ moisture content (ASTM D2216) and dry density (ASTM D7263), Amount of Material in Soil Finer than No. 200 Sieve (ASTM D1140), particle-size distribution of soils using sieve analysis (ASTM D6913), modified Proctor compaction (ASTM D1557), direct shear (ASTM D3080), hydro-collapse (ASTM D2435), expansion index (ASTM D4829) and corrosivity.

Results of the laboratory testing are provided in **Appendix B** of this report, presented on the subsurface logs, or within the following sections of this report.

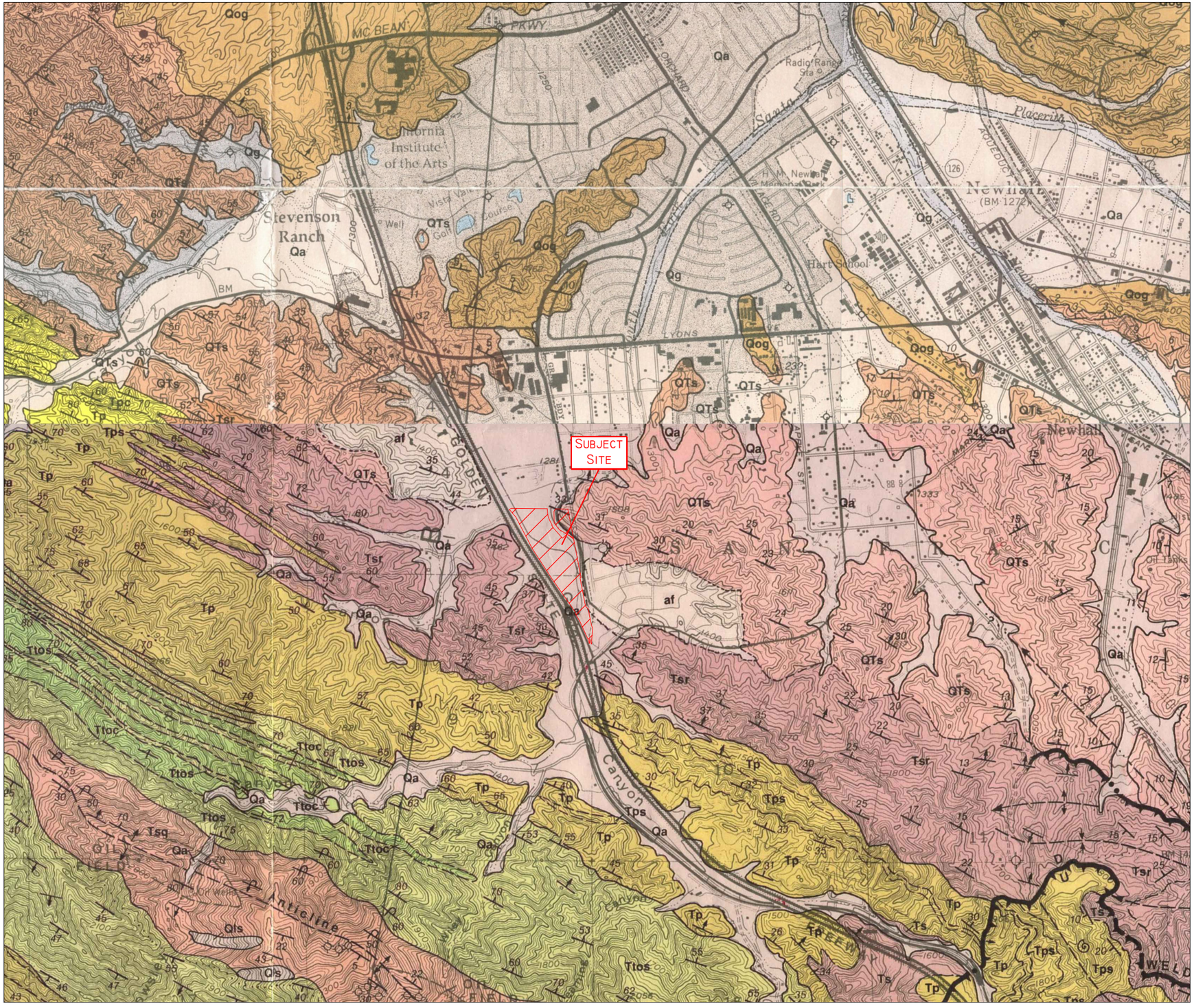
## 5.0 GENERALIZED GEOTECHNICAL CONDITIONS AND SOIL PROPERTIES

### 5.1 Regional Geology

The subject site is located in the Transverse Ranges geomorphic province of southern California in the eastern portion of the Ventura Basin. The Ventura Basin has been tectonically downwarped in the geologic past to produce a large-scale synclinal structure, which has developed a thick accumulation of Cenozoic sediments. The San Gabriel fault is located approximately 3.6 miles northeast of the site.

The area of proposed development is entirely covered with recent alluvium. Bedrock of the Plio-Pleistocene sediments of the Saugus Formation underlies the alluvium (Dibblee, 1992). The Saugus Formation is divided into two members, the lower Sunshine Ranch Member (Tsr) and the upper unnamed member, referred to herein as Saugus Formation (TQs). The ridge located at northeastern portion of the property, Open Space Lot 6, is mapped as the upper member of the Saugus Formation. The ridges located to the southeast of the property are mapped as the Sunshine Ranch Member of the Saugus Formation. Based on published Geologic Maps we judge that the contact between the two members is beneath the subject site. However, the contact location is uncertain owing to existing alluvial deposits. Geologic structure of bedding is relatively uniform with strikes 60 to 65° northwest and dips 30 to 45° to the northeast (see **Geologic Map by T.W. Dibblee, Jr.** following page 8).

The alluvial soils are noted on the State Seismic Hazards Zones Map for the Oat Mountain Quadrangle as having potential for liquefaction. No active (Holocene) faults are known to exist on the site per Alquist-Priolo criteria. The ridge on Lot 6 is noted on the State Seismic Hazards Zones Map for the Oat Mountain Quadrangle as having potential for earthquake-




## LEGEND

af
Qg | Qa
Qls

**SURFICIAL SEDIMENTS**

**af** *artificial cut and fill* **Qls** *landslide debris*
**Qg** *gravel and sand of major stream channels* **Qa** *alluvial gravel, sand and clay of valley areas*

Qae
Qoa
Qog

**OLDER DISSECTED SURFICIAL SEDIMENTS**

**Qae** *similar to* **Qa**, *but slightly elevated and dissected*
**Qoa** *remnants of older, slightly consolidated, dissected alluvial gravel and sand*
**Qog** *high remnants of slightly consolidated, brown coarse alluvial gravel*

—UNCONFORMITY—

QTs
Ts | Tsr

**SAUGUS FORMATION**

*terrestrial, weakly consolidated: Pliocene and Pleistocene age*

**QTs** *light gray pebble-cobble conglomerate, sandstone and greenish to reddish claystone, interbedded; composed of locally derived granitic and gneissic detritus including some of anorthosite and gabbro-norite; deposited by streams; Pliocene and Pleistocene age*
**Ts** *(in Whitney Canyon area) same as* **QTs**, *but correlative in age (Pliocene) with units* **Tsr** *and* **Tps** *(in part lower member of Pico Formation of Oakeshott 1958)*
**Tsr** *Sunshine Ranch Member (of Oakeshott 1958; Winterer and Durham 1962, in part) in Van Norman Lake area; light reddish to greenish claystone and sandstone and interbedded pebble-cobble conglomerate similar to that of* **QTs**

Tps

**PICO FORMATION**

(of Oakeshott 1958; Winterer and Durham 1962)
*shallow marine regressive; Pliocene (?) age*

**Tps** *(at Los Angeles aqueduct) light gray, semi-friable, cross-bedded medium to coarse grained sandstone and some pebble-cobble conglomerate of granitic detritus*

Ttoc | Ttos
Ttog

**TOWSLEY FORMATION**

(of Winterer and Durham 1962; Pico Formation of Hill 1930;
"Repetto" Formation, including Elsmere Member, of Oakeshott 1958)
*terrestrial and shallow marine regressive; latest Miocene and/or early Pliocene age*

**Ttos** *mostly light gray to tan sandstone; minor gray silty claystone and conglomerate*
**Ttoc** *gray silty claystone and siltstone, minor sandstone*
**Ttog** *gray to brown crudely bedded cobble conglomerate of mostly granitic and gneissic detritus and coarse grained sandstone; probably terrestrial, deposited by streams as a fan-delta*

—UNCONFORMITY—
In mountain area

Tsqs
Tsq

**SISQUOC SHALE**

**(included in Modelo Formation by Kew 1924; Winterer and Durham 1958, 1962; Saul 1979; same lithologic unit as Sisquoc Formation in northern Ventura basin)**
*marine clastic; late Miocene age (Mohnian to "Delmontian" Stage)*

**Tsq** *dark gray to brownish gray clay shale, bleaches to light gray; crumbly with spheroidal to sub-platy fracture, gypsiferous in fractures, some layers contain large tan dolomitic concretions; includes some thin interbedded semi-siliceous layers; about 1000 ft (300m) thick*
**Tsqs** *light gray coherent to semi-friable sandstone*

## SYMBOLS

*(not all symbols present on each map)*

**FORMATION CONTACT** *dashed where inferred or indefinite* — **MEMBER CONTACT** *between units of a formation* — **CONTACT BETWEEN SURFICIAL SEDIMENTS** *located only approximately in places*

**FAULT:** *Dashed where indefinite or inferred, dotted where concealed, queried where existence is doubtful. Parallel arrows indicate inferred relative lateral movement. Relative vertical movement is shown by U/D (U=upthrown side, D=downthrown side). Short arrow indicates dip of fault plane. Sawteeth on upper plate of low angle thrust fault.*

U
D
25
?

**FOLDS:**

ANTICLINE — SYNCLINE

*arrow on axial trace of fold indicates direction of plunge; dotted where concealed by surficial sediments*

**STRIKE AND DIP OF STRATIFIED ROCKS**

18 *inclined* — 20 *inclined (approximate)* — 90 *overturned* — 75 *inclined* — *approximate* — *vertical*
*horizontal* — *vertical*
*metamorphic or igneous rock foliation or flow banding*

FOSSIL LOCALITY — DIRECTION OF LANDSLIDE MOVEMENT — SANDSTONE MARKER BED — CONGLOMERATE MARKER BED — ABANDONED EXPLORATORY OIL (OR GAS) WELL — OIL WELLS (ON TOPOGRAPHIC BASE MAP)

0 — 2,000'

*Approximate Scale*

*Source: Geologic Map of the Oat Mountain and Canoga Park (north ½) Quadrangles, 1992, DF-33 and Geologic Map of the Newhall Quadrangle, 1996, DF -56*

N

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Geologic Map by T.W.Dibblee, Jr.

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induced landslides. The geologic structure is anti-dip to neutral to the slope gradients and a landslide has not been mapped on this proposed open space lot per the reviewed references listed. Landslides are not present within the proposed development.

### 5.2 Geologic Units

The project site consists of artificial fill (af), soil/plow pan, and recent alluvial deposits (Qal) that are underlain by Saugus Formation (TQs) bedrock. A general description of these geologic units is presented below and presented on our subsurface logs (**Appendix A**). Distribution of these units is shown on the Geotechnical Maps. In general, the artificial fill is considered to be thin (< 3 feet) and is undifferentiated from the alluvium.

#### 5.2.1 Saugus Formation (TQs)

Bedrock of the Saugus Formation (TQs) was encountered at 4 boring locations (B-2, B-4, B-8, and B-9, LGC 2007) at depths ranging from 65 to 75 feet. This bedrock consisted light gray to pale yellowish-brown to grayish-green to dense to very dense siltstone and sandstone with trace gravel.

#### 5.2.2 Alluvium (Qal)

The subject site is underlain by undifferentiated Quaternary alluvial and fluvial deposits. These deposits consist of brown to yellowish brown, fine silty sand and sandy silt with occasional thin interbeds of clay and silty clay in the upper 20 to 25 feet. Below this depth, the alluvium predominantly consists of fine- to coarse-grained sand and silty sand. Interbedded sands with cobbles and gravel are present within the range of depths explored.

Loose/soft soil layers were encountered in several borings and CPTs within the upper 20 feet where the measured in-situ dry densities were as low as 92 pcf. Below a depth of 20 the dry density was predominantly above 110 pcf. However, at several locations the CPTs encountered very dense layers and refusal at shallow depths. In any case, the soil consistency based on sampler blow count data, CPT tip resistance, and in-situ dry density was generally variable to the depths explored. The loose sands and soft silts are considered susceptible to potentially significant static and seismically-induced settlement.

#### 5.2.3 Artificial Fill (af)

Minor amounts of non-compacted artificial fill (af) are present at the site. These minor fills were generated during prior site development, grading of the minor access roads, and grading for Wiley Canyon Road. Review of historic aerial photographs listed under the scope of work indicate that an excavated reservoir was present at the central portion of the site and an old drainage swale was present at the northerly portion of the property. The reservoir and drainage channel have been backfilled. The approximate locations of the

reservoir and drainage swale are indicated on the Geotechnical Map. The artificial fill typically consists of locally derived alluvial material and dump fill within the recreational use grass pad area. In general, this material is not differentiated from the alluvium and is not shown on the Geotechnical Maps, except for the recreational use area at the south end of the project.

5.2.4 Soil/Plow Pan

Past ranching and brush clearing activities have disturbed the upper portion of the alluvium. The thickness of this material ranges from about 1 to 3 feet with significant, widespread rodent holes. This material is not differentiated from the alluvium on the subsurface logs and is not shown on the Geotechnical Maps.

### 5.3 Ground Water

No natural seeps, or springs or indicators of near surface ground water were observed during our field investigation; however, water was observed within the active drainage channel adjacent to Wiley Canyon Road.

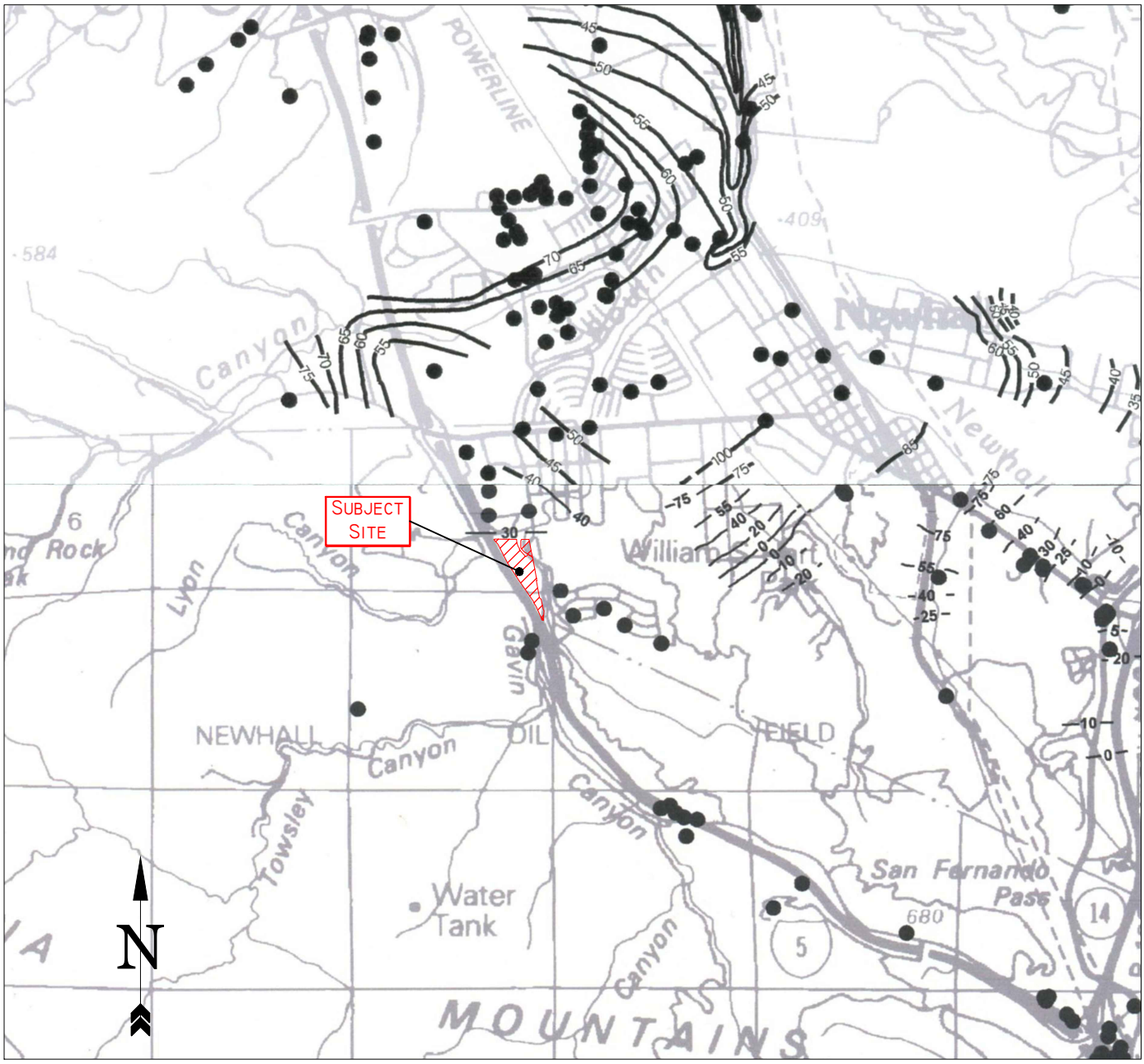
An inactive ground water well is present on the site per the County of Los Angeles Department of Public Works web application (https://dpw.lacounty.gov/general/wells/. This water well is designated as well 5843 and was first measured 10/7/31 and was last measured 11/17/47. The highest water surface was measured within this well on 5/11/32 at elevation 1235.8 (80 feet below the ground surface).

Ground water was encountered in 6 hollow-stem auger borings during LGC's subsurface exploration in 2007. The depth to groundwater ranged from about 58 to 66 feet below the ground surface at borings B-1, -2, -4 and -5, which are located within the central and northerly portions of the site. At borings B-8 and B-9 located within the adjacent parcels to the south, groundwater was encountered from 35 to 42 feet below the ground surface.

Based on the historically highest ground water contours included in the Seismic Hazard Zone Report for the Oat Mountain 7.5-Minute Quadrangle, the interpolated historic high ground water elevation is approximately 30 feet beneath the elevation of the existing ground surface (see **Historic High Ground Water** map following page 10).

### 5.4 Debris Flow Hazard

Following the completion of the proposed grading, no natural slopes will remain on, or immediately adjacent to the proposed development. The potential for debris flow hazard is therefore considered nonexistent.




PORTION OF PLATE 1.2 DEPTH TO HISTORICALLY HIGHEST GROUND WATER CONTOURS AND BOREHOLE LOG DATA LOCATIONS

SOURCE: CALIFORNIA DEPARTMENT OF CONSERVATION CALIFORNIA, GEOLOGIC SURVEY (CGS), SEISMIC HAZARD ZONE REPORT FOR THE OAT MOUNTAIN QUADRANGLE, 1997, UPDATED 1/13/06, AND SEISMIC HAZARD ZONE REPORT FOR THE NEWHALL QUADRANGLE, 1997, UPDATED 1/13/06, SHZR 04.

## LEGEND

30 — DEPTH TO GROUND WATER, IN FEET

● — BOREHOLE SITE

ONE MILE

SCALE

NOTE: THIS IS NOT A SURVEY OF THE PROPERTY

**ALLAN E. SEWARD**
**ENGINEERING GEOLOGY, INC.**
Geological And Geotechnical Consultants

HISTORIC HIGH GROUND WATER

Job No.: 21-2593-4 | Date: 6/15/21

### 5.5 Soil Compressibility

SPT blow count data, CPT tip resistance, in-situ dry density and moisture content, and results of hydro-compression tests performed on soil samples from the borings were used to evaluate potential for in-situ alluvial soils to compress under future static loading conditions. Based on this evaluation, potentially compressible layers were identified in the upper 15 to 25 feet.

Test results of the samples of the alluvium show up to 5% settlement due to hydro-compression in the upper 10 to 15 feet, up to 1.5% between 15 and 20 feet, and less than 0.5% at depths greater than 20 feet (see **Appendix B** for lab test data). Potential for hydro-compression at depths greater than 30 feet was not considered since the historic high groundwater depth is 30 feet and future foundation loads are likely to have a negligible influence at that depth.

The recommended removal depths provided in the Earthwork and Grading Recommendations section of this report were planned to remove loose/soft soils that are subject to potential hydro-compression (based on laboratory test results) and considered potentially subject to static settlement under future building loads (based on SPT blow count data and CPT tip resistance). Total settlement due to hydro-compression and static building loads is estimated to be 1.5 inch, or less, following recommended remedial removals (see **Removals** section of this report).

Based upon this evaluation, **no significant compression effects** due to water incursion or future static loading are expected at the site after the recommended removals are completed. However, potential for soil compressibility should be re-evaluated at the grading plan stage once foundation loads and layouts are more finalized.

### 5.6 Soil Shear Strength

Direct shear testing was performed on remolded samples of alluvial soils to supplement existing shear data from the referenced LGC reports to select design shear strength parameters for compacted fill. Direct shear test results presented in the referenced LGC reports were used to select design shear strength parameters for the upper 30 ft of alluvium to evaluate stability of temporary excavations. Results of the testing are presented in **Appendix B**. The following design shear strength parameters were used in our analyses.

**Summary of Shear Strength Parameters**

| Material | Moist Unit Weight, pcf | Residual Shear Strength | |
|---|---|---|---|
| | | Phi, degrees | Cohesion, psf |
| Proposed Compacted Fill | 135 | 29.5 | 150 |
| Alluvium (Qal) – Upper 30 ft | 125 | 32 | 120 |

### 5.7 Expansion Potential of Soils

Based on subsurface data, alluvial soils at the site generally consist of silty fine-grained sands and non-plastic silts. Results of Expansion Index testing (**Appendix B**) indicate that expansion potential of future fill materials derived from a mixture of alluvial soils will be very low to low (Expansion Index ≤ 50).

### 5.8 Potential Corrosivity of Soils

The Geotechnical and Materials Engineering Division (GMED) of the Los Angeles County Department of Public Works regards soil at a site to be corrosive to concrete and/or steel if the measured resistivity is 1,000 ohm-cm or less, and/or if the sulfate concentration is 2,000 ppm (0.20%) or greater, and/or if the pH is 5.5 or less. Also, a soil with a chloride concentration greater than or equal to 500 ppm is considered deleterious to ferrous metals.

Soil resistivity, chloride content, soluble sulfate content, and pH were measured on a mixture of alluvial soils collected from Boring HS-1 at a depth of 0 to 15 feet. Results of this testing was used in conjunction with previous testing presented in the referenced reports by LGC to assess the potential corrosive effects on concrete and metals. The test results are summarized in Table B1 (**Appendix B**) and are discussed below.

- The measured resistivity values ranged from 940 to 5,440 ohm-cm (which classifies as severely corrosive to corrosive to ferrous metals, per Los Angeles County Department of Public Works classification).
- Chloride content values ranged from 9 to 114 parts per million (ppm). Soils in this chloride content range have a negligible effect on concrete or ferrous metals.
- Sulfate content values ranged from 0.11 to less than 0.02 percent. Soils in this sulfate content range have a moderate to negligible effect on concrete per ACI 318 (Table 4.3.1).
- Based on the pH value measured in the soil samples (7.60 to 8.15), acidity of site soils is low and not anticipated to increase soil corrosivity.

### 5.9 Erosion Potential

The existing provisions in the Grading Ordinance for planting and irrigation of constructed slopes in conjunction with drainage recommendations provided in the section "Surface Drainage and Erosion Control," will be sufficient mitigation against potential erosion within the subject site.

## 6.0 SEISMIC CONSIDERATIONS

### 6.1 Introduction

The subject property is within the Transverse Ranges Geomorphic Province of southern California. The Transverse Ranges consist of a series of west-trending mountains and intervening valleys. These ranges largely resulted from north-south compression, ultimately causing east-west-trending folds and thrust faults. Faults in the vicinity of the site include the Santa Susana, Holser, Northridge blind thrust, San Gabriel, and Sierra Madre (San Fernando) reverse/thrust faults (see Quaternary Fault Location Map, **Figure C1**).

The southern California region is traversed by the San Andreas fault, which is a transform boundary between the Pacific Plate and the North American Plate. The San Andreas fault is part of a system of northwest-striking, right-lateral faults that are generally historically active, as evidenced by the June 28, 1992 Landers (M7.3) earthquake.

The southern California region is seismically active and commonly experiences strong ground shaking resulting from earthquakes along active faults. Earthquakes along these faults are part of a continuous, naturally occurring process, which has contributed to the characteristic landscape of the region. Common geologic hazards associated with earthquakes are discussed below and include **Ground Rupture**, **Ground Motion**, and **Ground Failure**.

### 6.2 Ground Rupture

Earthquake faults in southern California that are defined as active may present a hazard of fault rupture. The California Department of Conservation, California Geologic Survey (CGS), Special Publication 42 defines an active fault as one which has had surface displacement within Holocene time (about the last 11,000 years).

The potential for ground rupture on the site was evaluated utilizing published maps and references. Review of the Earthquake Zones of Required Investigation map for the Oat Mountain Quadrangle, provided digitally on the CGS EQZ web application, indicate that there are not any known active faults (i.e. Earthquake Fault Zones) within the project site, per Alquist-Priolo criteria (see **Figure C2**). However, the nearest Earthquake Fault Zone is delineated for the San Gabriel fault zone located approximately 3.7 miles northeast of the

project site. The active **San Andreas fault** is located about 22 miles northeast of the project site.

Numerous blind (buried) thrust faults are present in the region. The January 17, 1994 Northridge (M6.8) Earthquake occurred on a south-dipping blind thrust fault which uplifted the Santa Susana Mountains at least 40 cm. These faults are not exposed at the ground surface and are not considered to be a potential fault-related ground rupture hazard to the project site.

Based on our research, the possibility of fault-related ground rupture at the site is considered to be low over the design life of the proposed development.

## 6.3 Ground Motion

### 6.3.1 General

The project site is located in southern California, which is in a geologically and seismically active region where large magnitude, potentially destructive earthquakes are common. Therefore, it is reasonable to assume that moderate or large magnitude earthquakes along any of the numerous faults in the region are expected to produce strong ground shaking at the project site in the future.

The current standards for construction provided in the 2019 California Building Code are designed to safeguard against major failures and loss of life, but are not intended to limit damage, maintain functions or provide for easy repair. Per Structural Engineers Association of California (SEAOC), conformance to these recommendations does not constitute any kind of guarantee or assurance that significant structural damage will not occur in the event of a maximum level of earthquake ground motion. However, it is reasonable to expect that a well-planned and constructed structure will not collapse in a major earthquake and that protection of life is reasonably provided, but not with complete assurance.

Although research on earthquakes during the last fifty years has greatly enhanced the level of understanding of earthquake faulting in California, the record is much too short to constrain behavior of all faults in southern California and the attenuation characteristics of all areas relative to each future potential earthquake. Predicted accelerations should, therefore, be considered **rough estimates** rather than precise facts and ground motions from future earthquakes may exceed the predicted accelerations. Neither the **Time, Location, nor Magnitude** of an earthquake can be accurately predicted at this time.

### 6.3.2 Earthquake Magnitude

Earthquake **magnitude** is a quantitative measure of the strength of an earthquake or the strain energy released by it, as determined by seismographic or geologic observations. It does not vary with distance or the underlying earth material. This differs from **intensity**, which is a qualitative measure of the effects a given earthquake has on people, structures, loose objects, and the ground at a specific location. Intensity generally increases with increasing magnitude and in areas underlain by unconsolidated materials and decreases with distance from the epicenter. Approximate locations of historic earthquakes are shown on the appended Earthquake Epicenter Location Map (**Figure C3**).

The table below presents the distances to nearby significant faults located within about 20 miles of the project site. The site-to-source distances were obtained from the USGS fault parameters online database (based on 2008 National Seismic Hazards Map). The maximum earthquake magnitudes (M) were calculated using the Ellsworth-B magnitude-area scaling relationship presented in Appendix E of the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3).#

**Summary of Major Known Faults Within 20 Miles**

| Distance (Miles) | Fault Name | Dip Direction | Dip Degrees | Slip Sense | Magnitude |
|---|---|---|---|---|---|
| 0.44 | Northridge | 35 | S | thrust | 6.9 |
| 3.40 | Holser, alt 1 | 58 | S | reverse | 6.9 |
| 3.59 | Santa Susana, alt 1 | 55 | N | reverse | 6.9 |
| 3.69 | San Gabriel | 61 | N | strike slip | 7.3 |
| 6.38 | Sierra Madre Connected | 51 | | reverse | 7.3 |
| 6.38 | Sierra Madre (San Fernando) | 45 | N | thrust | 6.7 |
| 9.14 | Simi-Santa Rosa | 60 | | strike slip | 6.9 |
| 9.73 | Oak Ridge (Onshore) | 65 | S | reverse | 7.2 |
| 9.73 | Oak Ridge Connected | 53 | | reverse | 7.4 |
| 10.72 | Verdugo | 55 | NE | reverse | 6.9 |
| 12.65 | San Cayetano | 42 | N | thrust | 7.2 |
| 16.53 | Sierra Madre | 53 | N | reverse | 7.2 |
| 21.87 | S. San Andreas | 85 | | strike slip | 7.9 |

### 6.3.3 Peak Ground Acceleration

The peak ground acceleration consistent with maximum considered earthquake geometric mean ($MCE_G$) ground motions was evaluated at the site for stiff soil conditions (Site Class D). The mapped $MCE_G$ peak ground acceleration (ASCE 7-16, Figure 22-9) adjusted for

Site Class effects ($PGA_M$) was determined using the OSHPD Seismic Design Maps web tool by the Structural Engineers Association of California (SEAOC). Based on this evaluation, a $PGA_M$ of 1.17g would be produced by $MCE_G$ ground motions. This mapped value incorporates a 2% probability of exceedance in 50 years (i.e. 2,475-year return period).

Site-specific ground motion procedures were also used to evaluate the $MCE_G$ peak ground acceleration, $PGA_M$, in accordance with ASCE 7-16 Section 21.5. A probabilistic geometric mean PGA of 1.04g was determined using the uniform hazard ground motion (UHGM) with a 2% probability of exceedance in 50 years. The UHGM was calculated using the *USGS Risk-Targeted Ground Motion Calculator*. A deterministic geometric mean PGA of 1.00g was calculated as the largest 84$^{th}$-percentile PGA for the characteristic earthquake. Based on UCERF3 fault data and a weighted average of the 2014 NGA West-2 ground motion prediction equations (GMPEs), the characteristic earthquake that will produce the largest 84$^{th}$-percentile PGA at the site will occur on the Santa Susana fault. The site-specific $PGA_M$ was taken as the lesser of the probabilistic and deterministic geometric mean peak ground accelerations, but no less than 80 percent of the mapped $PGA_M$.

Based on our evaluation, the $MCE_G$ peak ground acceleration ($PGA_M$) used for geotechnical applications is 1.00g.

6.3.4 Deaggregation of Fault Hazard

A probabilistic analysis evaluates a range of magnitudes from 5.0 to the maximum magnitude for each fault. However, the dominant magnitude which statistically generates the peak acceleration within a limited time period (e.g. 2,475 years) is typically less than the maximum magnitude for a given fault. In order to evaluate what dominant magnitude-distance combination produces the site PGA, the hazard was deaggregated using the USGS *Beta – Unified Hazard Tool* and an average shear wave velocity ($V_{S,30}$) for the upper 100 feet (~30 meters) of 259 meters per second based on Site Class D conditions and CPT-1 shear wave velocity profile (**Figure C4**). Review of the magnitude-distance contributions to the hazard (**Table C1**) indicates that the site PGA would most likely be generated by a magnitude 6.69 earthquake within 5.5 km of the project site, as shown graphically in **Figure C5**. The dominant fault controlling maximum potential ground accelerations is the Santa Susana fault.

The peak ground acceleration used for evaluation of liquefaction potential and associated phenomena was corrected to account for an earthquake duration typical of an "average" magnitude 7.5 event. This was accomplished by applying a magnitude scaling factor

based on the empirical relationship by Youd and Idriss (1997). Based on a magnitude 6.69 earthquake, a corrected peak ground acceleration of 0.75g was used in our liquefaction analyses (see **Appendix D**).

### 6.4 Ground Failure

Ground Failure is a general term describing seismically induced secondary permanent ground deformation caused by strong ground motion. This includes liquefaction, lateral spreading, seismic settlement of poorly consolidated materials (dynamic densification), differential materials response, slope failures, sympathetic movement on weak bedding planes or non-causative faults, shattered ridge effects and ground lurching. Review of the Earthquake Zones of Required Investigation map for the Oat Mountain Quadrangle indicates that the subject site is located within an area of required investigation for liquefaction (see **Figure C1**).

Potential secondary seismic hazards to the building are described below. The potential for liquefaction and seismic settlement are evaluated in detail in **Appendix D**. The potential for adverse impacts to the proposed development from liquefaction and other secondary seismic effects is considered to be low to non-existent provided that our recommendations are incorporated into the future grading plan and implemented during construction.

#### 6.4.1 Liquefaction Potential

Potential for liquefaction at the site and the magnitude of associated liquefaction-induced ground failure (i.e. seismic settlement, lateral spread displacements, and surface manifestation) were evaluated using data from our subsurface explorations, in compliance with the procedures and policies of the County of Los Angeles and the State of California. Ground motions estimated using USGS seismic design map web applications and mapped historic high ground water levels were used in this evaluation. The procedures and results of the evaluation are described in detail in **Appendix D**.

In summary, our evaluation indicates that potential for liquefaction is present beneath the site and that liquefaction-induced ground surface settlement ranging up to about 11 inches (prior to recommended removals) could occur if site soils were to liquefy. Remedial measures to reduce the hazard of liquefaction, associated liquefaction-induced ground failure, and dry sand settlement are described in **Appendix D**.

#### 6.4.2 Potential for Other Modes of Ground Failure

Earthquake-induced slope failures include activation and reactivation of landslides, rock falls, debris flows and surficial failures. Based on generally level site conditions and distance from sloping terrain, the potential for earthquake-induced slope failures to

adversely impact the proposed development shown on the tentative tract map is non-existent.

## 7.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

### 7.1 Feasibility of Development

Tentative Tract Map 083295 dated May 26, 2021 is feasible for development from a geologic and geotechnical standpoint, provided that the recommendations presented in our reports are followed and implemented during design and construction.

### 7.2 Earthwork and Grading Recommendations

#### 7.2.1 Removals

To mitigate potential static and seismic settlements and to provide a uniform bearing surface for at-grade foundation elements, remedial removals ranging from 15 to 25 feet in depth are recommended. The depth and lateral limits of structural removals for each proposed building is shown on the attached Geotechnical Map (Sheet 2). These removal depths assume that proposed buildings are of light, wood-frame or masonry construction supported on conventional footing foundations with column loads up to 100 kips and walls loads up to 10 klf. Revision to these remedial removal recommendations may be warranted based on final building layout and building loads.

The following additional removal of existing soils beneath existing or proposed soil subgrade, whichever is deeper, and replacement with compacted fill are recommended:

- Retaining walls (6 ft in height, or less), maintenance buildings, and park restroom: 5 feet;
- Auxiliary structures, including swimming pools, cabanas, shade structures, detached carports, and trash enclosures: 3 feet;
- Vehicle pavements, curbs, and gutters: 3 feet;
- Sidewalks, flatwork, and hardscape elements: 2 feet.

The recommended removal bottoms should extend outside the foundation footprints at a 1:1 or flatter projection from the bottom of the foundation element down to the recommended removal depth.

Removal areas shall be observed by the Geotechnical Engineer, or his authorized representative, prior to placement of compacted fill, to verify the removal of all unsuitable materials. Soft soils identified during field observations should be evaluated and may warrant additional removals. The exact depth and extent of necessary removals will be

decided in the field during the grading operations, when observations and more location-specific evaluations can be performed.

7.2.2 Fill Materials

Onsite soils, except any debris or organic matter, may be used as sources for compacted fills. Rock or similar irreducible material with a maximum dimension greater than twelve (12) inches may not be placed in the fill. Rocks or hard fragments larger than four (4) inches shall not compose more than 25 percent of the fill and/or fill lift. Any large rock fragments over twelve (12) inches in size, may be incorporated into the fill as rockfill in windrows after being reduced to the specific maximum rock fill size (see **Appendix E, Rock Disposal**). Where fill depths are too shallow to allow large rock disposal, special handling or removal may be required.

7.2.3 Fill Compaction

All fill material should be placed in uniform lifts not exceeding 8 inches in thickness prior to compaction, water conditioned to at least optimum moisture content, thoroughly mixed to obtain a near uniform moisture condition and uniform blend of materials, and compacted to at least 90 percent of Maximum Dry Density (MDD), per ASTM Test Method D1557. For fills deeper than 40 feet, the portion of fill below a depth of 40 feet should be compacted to a relative compaction of at least 93 percent.

7.2.4 Proposed Fill Slopes

Fill slopes up to 17 feet in height are proposed at the site. Fill slope inclination should not be steeper than 2:1 (h:v). The fill material within approximately one equipment width (typically 12 feet) of the slope face should be constructed with cohesive material obtained from on-site soils. The finished fill-slope face shall be constructed by over-building the slope and cutting back to the compacted fill material.

Where fill slopes are constructed above natural ground with a gradient of 5:1 (h:v) or steeper, all topsoil, colluvium, and unsuitable material should be removed and a keyway should be constructed at the toe of the fill slope with a minimum width of 15 feet, and a minimum depth of 3 feet into firm undisturbed earth (see **Fill Slope Over Natural Slope** detail in **Appendix E**). Following completion of the keyway excavations, the project Engineering Geologist/Geotechnical Engineer or his representative shall observe and approve the keyway bottom prior to backfilling with compacted fill.

Where fill slopes toe out on relatively level natural ground, the removals should be performed to a minimum 1:1 projection from the toe of slope to the recommended removal depth, (see **Fill Slope Toeing Out on Flat Alluviated Canyon** detail in **Appendix E**).

#### 7.2.5 Proposed Cut Slopes

Minor cut-slopes approximately 10 ft, or less, in height are locally proposed on the site which will expose alluvium or artificial fill. These materials should be removed and replaced with compacted fill; therefore, no cut-slopes will remain on the site following the completion of grading.

#### 7.2.6 Shrinkage Factor

Based on measured in-situ density values within the range of the recommended removal depths and assuming that fill will be compacted to an average of about of 91 percent of maximum dry density (per ASTM D1557), it is anticipated that soil shrinkage (i.e., the reduction in initial soil volume caused by compaction of excavated soil divided by the initial soil volume prior to excavation) will range from 10 to 15 percent. However, actual shrinkage will depend on the degree of compaction achieved during earthwork operations. The supervising civil engineer should design pad grades with sufficient flexibility to accommodate a possible shrinkage of fill of up to 20 percent of the total grading volume.

#### 7.2.7 Oversize Material

Oversized, irreducible rocks are likely present in the alluvium Cobbly layers may be encountered within the structural removals or over-excavation of pavement areas. Any large rock fragments over twelve (12) inches in size may be incorporated into the fill as rockfill in windrows after being reduced to the specific maximum rock fill size (see **Rock Disposal** detail in **Appendix E**). Where fill depths are too shallow to allow large rock disposal, special handling or removal may be required (see **"Recommended Earthwork Specifications," Appendix E**).

#### 7.2.8 Rippability

The project site is underlain by undocumented artificial fill and alluvial deposits that can be ripped using conventional grading equipment.

#### 7.2.9 Import Fill

All imported fill shall be observed, tested and approved by this firm prior to use at the project site. Import soils to be used in the building pad areas should have an expansion index of less than 20 and corrosive characteristics that are equally or less detrimental than that of the existing onsite soils.

## 7.3 Bank Protection

### 7.3.1 General

Bank protection is proposed to protect the eastern margin of the development area and the western margin of the recreation use grass pad from future erosion and scour along the bank of the Santa Clara River South Fork drainage. The bank protection along the eastern margin of the development will consist of a buried soil-cement liner with the top being concealed beneath a 2:1 (h:v) fill berm. The liner will extend 1,500 lineal feet north from the east-facing berm slope adjacent to Interstate 5 at the southern tip of the property, to the southern terminus of the existing concrete-lined portion of the drainage. In general, the bank protection alignment is approximately 50 to 98 feet behind the existing channel bank until it merges and joins the existing concrete channel at the north end. Details of the bank protection for the western margin of the recreation use grass pad are in-progress and not reviewed for this report.

The proposed bank protection alignment is shown on the attached Geotechnical Maps. Details of the design of the proposed bank protection liner for the eastern margin of the development are shown on the Soil Cement Bank Plan and Profile prepared by PACE, dated 5/19/20. Geologic and geotechnical conditions at the site and their impact on the bank protection, including evaluation of on-site aggregate source material and soil-cement mix design, will be further addressed in a separate report.

### 7.3.2 Eastern Margin Liner Configuration

Proposed grades will generally be raised up to 3 feet behind the liner and lowered up to 6 feet within the open space lot in front of the liner. The top of the liner ranges from 4.5 to 9.5 feet above existing grade. The total liner height ranges from 25.7 to 29.5 feet, with a maximum depth of 23.5 feet beneath existing grade at Station 11+03.85. Cross Sections 2-2' through 4-4' illustrate the bank protection configuration relative to existing and proposed grades.

### 7.3.3 Temporary Excavations

Construction of the liner will require temporary excavations up to approximately 24 feet in depth. Preliminary evaluation of excavation slopes indicates that 1.5:1 (h:v) slope gradients will satisfy factor of safety requirements for temporary stability (i.e. greater or equal to 1.25).

Excavation slopes, particularly forecuts that extend beneath the active drainage channel, will likely encounter groundwater beneath channel grade. Pumping or dewatering to

redirect or draw the water down beneath toe grade will be necessary to complete portions of the excavation.

7.3.4 Removals

The upper 5 feet of existing soils behind the liner should be removed and replacement as a compacted fill. These removals should extend at least 10 feet beyond the top of the liner. Additionally, the alluvium should be over-excavated at least 3 feet prior to placement of overlying fill between the back of liner and development area.

7.3.5 Soil-Cement Aggregate

Gradation guidelines for the soil aggregate to be used in soil-cement mixtures are listed in the following table.

| SIEVE NO. | % PASSING |
|---|---|
| 3″ | 98 - 100 |
| ¾″ | 80 - 100 |
| #4 | 60 - 90 |
| #40 | 30 - 50 |
| #200 | 5 - 20 |

Soils that do not meet the gradation guidelines for soil cement can still be used; however, they are not as desirable for use as an aggregate source because they generally would require a higher percentage of cement to produce soil-cement with sufficient durability. Based on our field exploration and laboratory classification testing, on-site granular alluvial soils are considered acceptable for use as soil-cement aggregate source material. The alluvium generally consists of silty, fine-grained sands and sandy silts in the upper 15 to 20 feet with fines contents between 40 and 60 percent. Below this depth, the alluvium generally consists of sand with silt and silty sands with estimated fines contents between 10 and 40 percent. The general profile of the alluvium is shown on Cross Section 1-1'.

Additional laboratory testing, including gradation of on-site soils and soil-cement mix designs, should be conducted at the Grading Plan stage to identify the soil-cement source material and percentage of cement by dry of soil for bank protection purposes.

## 7.4 Low Impact Development

The Wiley Canyon USMP/LID Exhibit prepared by Alliance Land Planning & Engineering, dated 8/18/20, illustrates two drainage basins at the southerly end of the project site, and a water quality basin at the northerly end of the project site. In January 2020, field infiltration testing was conducted at the water quality basin at the northerly portion of the project (PB-1) and at the southerly basin (PB-2) using boring percolation test procedures in accordance

with Administrative Manual GS200.2 (dated 6/30/17), *Guidelines for Geotechnical Investigation and Reporting, Low Impact Development Stormwater Infiltration*, prepared by the County of Los Angeles Department of Public Works, Geotechnical and Materials Engineering Division (GMED). Infiltration rates of alluvium were measured at proposed basin invert elevations, which ranged from 9 to 12 feet below the existing ground surface.

Test procedures and results of field infiltration testing are presented in our Geotechnical Letter – Preliminary Evaluation of Infiltration Rates (see Reference 4). In summary, soils encountered in the borings used for the percolation tests consist of interbedded fine sand to sandy silt and are considered representative of conditions in the upper 20 ft across the project site. Coarse-grained sandy soils are more predominant at depths below 20 ft. The average corrected infiltration rate from the test locations is **less than 0.3 inch/hour**. This infiltration rate is based on an applied reduction factor of 5. This average corrected infiltration rate was not considered suitable for infiltration-based water quality control measures.

### 7.5 Oil Wells and Water Wells

Review of the Department of Conversation, Division of Oil, Gas, and Geothermal Resources well finder web page (https://maps.conservation.ca.gov/doggr/wellfinder/#/) indicates that oil wells are not present within the Tentative Tract Map boundaries. The closest oil well is located approximately 550 ft north of the Tentative Tract Map boundary. This well is designated as Sorenson 76X-4 (API # 0403720828) and listed as being plugged and abandoned in September 1969. Review of the Dibblee Geologic Map for the Oat Mountain Quadrangle indicates that an oil/gas well, not noted on the well finder web page, is located approximately 450 ft easterly of the project site within the developed tract.

Review of the Los Angeles County Department of Public Works online well finder web application (https://dpw.lacounty.gov/general/wells/#) indicates that one inactive water well exists at the southern portion of the tract. This inactive water well was constructed around 1931 and is designated as 5843. The historic high ground water was measured in this well at elevation 1235.8 (80 ft below the reference point elevation) on 5/11/1932. This well was last measured on 11/17/1947. We have added the approximate location of this well on the Geotechnical Maps.

### 7.6 Sewage Disposal

It is our understanding that sewage disposal will be by public sanitary sewers.

### 7.7 Drainage Recommendations

Ground water and soil moisture conditions can vary seasonally or for other reasons. It must be recognized that we do not and cannot have complete knowledge of the subsurface

conditions at the site. It is possible that seepage could be encountered while stripping and excavating during site preparation at some areas (e.g. in drainages). Whenever seepage is observed, the condition must be evaluated by the Engineering Geologist and Geotechnical Engineer prior to covering with fill material.

The existing provisions in the Grading Ordinance for planting and irrigation of constructed slopes in conjunction with the following drainage recommendations will be sufficient mitigation against potential erosion within the site.

Water should never be allowed to stand or pond on Building Pads nor should it be allowed to run over constructed slopes, but should be conducted to paved areas or natural waterways via non-erodible drainage devices and should flow. In addition, it is recommended that all drainage devices be inspected periodically and be kept clear of all debris.

Modification of the existing pad grades after approval of Fine Grading by the Project Supervising Civil Engineer could adversely affect the drainage of the Pads. Future landscaping, construction of walkways, garden walls, etc. **must never** modify the lot drainage unless additional remedial measures to ensure satisfactory drainage (area drains, additional grading, etc.) are designed and constructed in compliance with current County of Los Angeles Codes.

Positive surface drainage should be maintained away from buildings. The recommended drainage patterns should be established at the time of fine grading. Roof drainage should be collected in gutters and downspouts, which terminate at approved discharge points.

It should be expected that, even with the construction of carefully planned and designed erosion control measures, some erosion may occur during the first few wet seasons after the project is completed. Site grading should be observed, particularly after heavy, prolonged rainfall, to identify erosion areas at an early stage. Maintenance work should be done as soon as practical to repair these areas and prevent their enlargement.

### 7.8 Landscaping

All final grades should be sloped away from the building foundations to allow rapid removal of surface water runoff. No ponding of water should be allowed adjacent to the foundations. Plants and other landscaped vegetation requiring excessive watering should be avoided adjacent to the building foundations. Should landscaping be constructed, an effective water-tight barrier should be provided to prevent water from affecting the building foundations.

### 7.9 Restricted Use Areas

No faults or landslides are known to exist on the site; therefore, no Restricted Use Areas are currently recommended.

### 7.10 Building Setbacks

The standard Los Angeles County Building Code setbacks from ascending and descending slopes should be followed, unless superseded by a specific geologic and/or soils engineering evaluation.

### 7.11 Foundation and Settlement Considerations

No specific building foundation designs have been provided at this time. The following general foundation criteria are provided for future design and planning consideration and assume that foundation support is within certified compacted fill following remedial removals as previously discussed. The structural design should include seismic geotechnical parameters in accordance with the latest California Building Code for Seismic Design Category D.

Shallow spread footings for support of lightly-loaded multi-use commercial and residential structures up to 4 stories in height can adequately be founded on engineered fill compacted as previously recommended. Support for heavier structures should be addressed at the Grading Plan stage. Tentatively, an allowable bearing capacity of **2,500 psf** can be used for preliminary design of shallow foundations. This tentative allowable bearing value is subject to revision based on future building loads and foundation layout. Additional foundation parameters will be provided at the Grading Plan stage.

### 7.12 Site Response

#### 7.12.1 General

Based on site soil properties, the site is classified as Site Class D (stiff soils). The mapped risk-targeted $MCE_R$ spectral acceleration parameter at a period of 1 second ($S_1$) is 0.794. Due to deficiencies in capturing site response for Site Class D soils using the general procedure, site-specific ground motion hazard analysis was performed as required by ASCE 7-16 Section 11.4.8 since $S_1$ is greater than or equal to 0.2.

#### 7.12.2 $MCE_R$ Ground Motion Hazard Analysis

Risk-targeted maximum considered earthquake ($MCE_R$) ground motion hazard analysis was completed using the procedures outlined in ASCE 7-16 Section 21.2.

Probabilistic spectral response accelerations were determined using the uniform hazard ground motion (UHGM) with a 2% probability of exceedance in 50 years and corresponding risk-targeted ground motion (RTGM) with a 1% probability of collapse in 50 years. The UHGM and RTGM were calculated using the *USGS Risk-Targeted Ground Motion Calculator*. Scale factors were applied to the RTGM to yield spectral response accelerations in the direction of maximum horizontal response at each spectral ordinate.

Deterministic spectral response accelerations were taken as the largest 84th-percentile 5% damped spectral response acceleration calculated at each period for characteristic earthquakes in the region. Fault parameters and maximum magnitude of characteristic earthquakes were determined based on fault data and magnitude-area relationships (Ellsworth-B) presented in UCERF3. Using this fault data, spectral response accelerations were calculated (Seyhan, 2015) based on a weighted average of the 2014 NGA West-2 ground motion prediction equations (GMPEs). Scale factors were applied to yield spectral response accelerations in the direction of maximum horizontal response at each spectral ordinate. A deterministic lower limit in conformance with Figure 21.2-1 was applied.

The site-specific $MCE_R$ spectral response acceleration at each period was taken as the lesser of the spectral response accelerations from the probabilistic and deterministic ground motions.

7.12.3 Design Response Spectrum and Acceleration Parameters

The design response spectrum and design acceleration parameters were calculated in accordance with Sections 21.3 and 21.4, respectively, and are presented on **Figure C4** in Appendix C. The design spectral response accelerations were taken as 2/3 of the site-specific $MCE_R$ spectral response accelerations at each period, but not less than 80% of code-based values from the general procedure utilizing parameter $F_a$ and $F_v$.

### 7.13 Expansive Soils Considerations

Soil expansion has been found to be a significant consideration for design and construction of foundations and concrete slabs-on-grade. The recommendations presented in the attached **Table E1, Minimum Foundation and Slab Recommendations for Expansive Soils**, in **Appendix E**, have been found to minimize the effects of soil expansion potential in southern California when followed during project design and construction. It is anticipated that compacted fill from the onsite materials will generally have a low expansion potential. The expansion potential of the site soils exposed at rough grade should be tested again after site grading is complete and the final foundation design should be based on those expansion test results.

### 7.14 Soil Corrosivity Considerations

Based on resistivity test data, soils classify as being potentially corrosive to concrete and metal. However, sulfate concentrations were generally negligible to moderate, chloride concentrations were very low, and pH was neutral. Pending additional testing, Type II cement is anticipated for use in structural concrete. Mitigating recommendations against soil corrosivity should be based on additional confirmatory tests that should be performed at the completion of the grading. Final recommendations for concrete will be in accordance

with the latest CBC requirements, and a corrosion specialist should provide mitigation recommendations for potential corrosion of metals.

### 7.15 Soil Compressibility Considerations

Potential compressibility of alluvial soils to remain in place following the completion of rough grade is considered **low**. The earthwork recommendations provided herein should preclude the need to mitigate for short and long-term soil compression.

### 7.16 Retaining Walls and Pavement Design

Geotechnical recommendations for the design and construction of retaining walls and vehicle pavements will be provided at the Grading Plan stage.

## 8.0 GEOLOGIST/GEOTECHNICAL ENGINEER OF RECORD

This report has been prepared assuming that Allan E. Seward Engineering Geology, Inc. will refine all geology and geotechnically-related data for the Grading Plan stage of this project. If the recommendations contained in this report are to be utilized, and expansion of the geology/geotechnical work is performed by others, the party performing the work must review this report and assume full responsibility for recommendations contained herein. That party would then assume the title of responsibility as "Geologist/Geotechnical Engineer of Record" for the specific work.

## 9.0 LIMITATIONS

This report has been prepared for the exclusive use of Wiley Canyon LLC and its design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use by others, this firm should be notified, as additional work may be required to update this report.

In the event that any modifications in the design or location of the proposed development, as discussed herein, are planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

The proposed development is located in southern California, which is in a geologically and seismically active region where large magnitude, potentially destructive earthquakes are common. Therefore, it is reasonable to assume that ground motions from moderate or large magnitude earthquakes could affect the site during the life of a given structure.

Typically, faulting is confined to the area adjacent to a known fault. However, absolute assurance against future fault displacement is not possible in tectonically active regions because new faults can form over time as the orientation and magnitude of deformational forces

change in the earth's crust. Therefore, the location and magnitude of new ground surface ruptures during a seismic event cannot be anticipated.

In performing these professional services, this firm has used the degree of care and skill ordinarily exercised under similar circumstances by reputable geologists and geotechnical engineers practicing in this or similar localities. The data presented in this report are based on results of pertinent field and laboratory testing. It should be recognized that subsurface conditions can vary in time, and laterally, and with depth at a given site and that the conclusions and recommendations presented in this report are based on our observations and testing. Therefore, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature. We make no other **warranty**, either **expressed** or **implied**.

This opportunity to be of service is appreciated. If you have any questions regarding this report, please contact us.

Respectfully submitted,

Eric J. Seward, CEG 2110
Principal Engineering Geologist
Vice President

Kevin P. Callahan, MS, GE 2989
Principal Geotechnical Engineer

**The following attachments and appendices complete this report.**

**Location Map** following page 4
**Geologic Map by T.W. Dibblee, Jr.** following page 8
**Historic High Ground Water** following page 10
**References**

**APPENDIX A – Subsurface Logs**

*AESEGI, 2019*

- Exploratory Boring Logs (HS-1 thru HS-3) and Key to Boring Log Symbols
- Cone Penetration Test Logs (CPT-1 thru CPT-17)

*LGC Valley Inc., 2007*

- Exploratory Boring Logs (B-1 through B-9) and Key to Boring Logs

*Lawson & Associates Geotechnical Consulting Inc., 2005*

- Exploratory Boring Logs (B-1 and B-3) and Key to Boring Logs

*Lawson & Associates Geotechnical Consulting Inc., 2004*

- Exploratory Boring Logs (B-1 through B-5)
- Cone Penetration Test Logs and Interpretations (CPT-1 through CPT-4)

**APPENDIX B – Laboratory Testing**


- Summary of Expansion Index Test Results — Table B1
- Summary of Compaction Test Results — Table B2
- Summary of Corrosivity Test Results — Table B3
- Particle Size Distribution Test Report — Figure B1
- Compaction Test Report — Figure B2
- Direct Shear Test Report — Figure B3
- Consolidation Test Reports — Figures B4.1 thru B4.3
- Particle Size Curve (LGC, 2004) — 5 Sheets
- Particle Size Curve (LGC, 2007) — 5 Sheets
- Direct Shear Test (LGC, 2004) — 6 Sheets
- Direct Shear Test (LGC, 2007) — 13 Sheets
- Consolidation Test Results (LGC, 2004) — 3 Sheets
- Consolidation Test Results (LGC, 2007) — 5 Sheets


**APPENDIX C – Seismicity**


- Ground Motion and Response Spectra References
- Quaternary Fault Location Map — Figure C1
- Earthquake Zones of Required Investigation — Figure C2
- Earthquake Epicenter Location Map — Figure C3
- Shear Wave Velocity Profile (CPT-1) — Figure C4
- USGS Deaggregation Parameters and Output — Table C1
- Magnitude-Distance Contributions to Hazard — Figure C5
- Site-Specific Response Spectra and Seismic Design Parameters — Figure C6
- Ground Motion Hazard Analysis Calculations (4 pages)
- OSHPD Seismic Design Maps Output


**APPENDIX D – Liquefaction Evaluation**


- References - Assessment of Liquefaction Potential and Estimated Cyclic Settlements
- Summary of Estimated Cyclic Settlements and Lateral Displacements — Table D1
- Correlation of $N_{1(60)}$ Blow Count and Percent Fines - Boring vs. CPT Interpretation (HS-1 vs. CPT-17) — Figure D1
- CPT-Based Assessment of Seismic Soil Liquefaction Potential (CPT-1 to CPT-17) — Figures D2.1 thru D2.17
- SPT-Based Assessment of Seismic Soil Liquefaction Potential (HS-1) — Figure D2.18
- Typical Calculations for Liquefaction Triggering Analysis (based on CPT-17)
- Typical Calculations for Cyclic Settlement Analysis (based on CPT-17)

- Typical Calculations for Lateral Spread Displacements (based on CPT-17)

**APPENDIX E – General Specifications, Details, Cross Sections & Maps**

- Recommended Earthwork Specifications
- Minimum Foundation and Slab Recommendations for Expansive Soils **Table E1**
- Construction Details
  - Fill Slope over Natural Slope
  - Fill Slope Toeing Out on Flat Alluviated Canyon
  - Rock Disposal

**Cross Sections 1-1' through 4-4'**
**Geotechnical Map (Sheets 1, 2 and 3)**

**Distribution:**

Wiley Canyon LLC (electronic in PDF format)
Attn: Mr. Scott Sheridan

Alliance Land Planning and Engineering (via email in PDF format)
Attn: Mr. Craig Whittaker

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# REFERENCES

**By: Lawson & Associates Geotechnical Consulting Inc.**

1. **Preliminary Geotechnical Investigation**
   Proposed Development at 24924 Hawkbryn Dr.
   City of Santa Clarita, California
   Dated March 25, 2004 – Project No.: 033022-01

2. **Preliminary Geotechnical Investigation**
   8.28 Acre Site (Known as the Taylor Parcel)
   Located West of Wiley Canyon Road
   City of Santa Clarita, California
   Dated February 3, 2005 – Project No.: 033022-03

**By: LGC Valley, Inc.**

3. **Supplemental Geotechnical Investigation Report**
   Proposed Commons Development
   Located West of Wiley Canyon Road
   City of Santa Clarita, California
   Dated February 23, 2007 – Project No.: 033022-05

**By: Allan E. Seward Engineering Geology, Inc.**

4. **Geotechnical Letter**
   Preliminary Evaluation of Infiltration Rates
   Wiley Canyon
   USMP/LID Exhibit dated 8/18/20
   Santa Clarita, California
   Dated September 21, 2020 – JN: 20-2593-4

# Appendix A

# DRILL HOLE LOG

| | |
|---|---|
| CLIENT: Wiley Canyon LLC | JOB NO.: 21-2593-4 |
| PROJECT: Tentative Tract Map 083295 Wiley Canyon | DATE: 6/15/2021 |
| | LOGGED BY: KPC / CHS |
| DRILLING COMPANY: Choice Dilling Inc. | DRILLED: 11/14/19 |
| DRILLING METHOD: Hollow-stem Auger | HOLE DIA: 8" |
| HAMMER TYPE: Automatic | AVERAGE DROP: 30" |
| DRIVING WEIGHTS: 140 lbs. | ELEVATION: 1301' |

**BORING NO.** HS-1

| DEPTH (feet) | SAMPLE TYPE | BLOWS / 12" | GRAPHIC LOG | USCS SYMBOL | DESCRIPTION | LABORATORY TESTS: Moisture Content (%) | Dry Density (pcf) | % Fines | Other Tests |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM; Qal (0 - 55')** | | | 45 | Bulk @ 0 - 15' Sieve Curve=A Shear Test |
| | | 1 | | | @ 2.5' Silty, fine-grained SAND; very loose; damp; medium brown | | | 39 | |
| 5 | | 3 | | | | | | 39 | |
| | | 7 | | | @ 7.5' - loose | | | 38 | |
| 10 | | 6 | | | @ 10' - moist; dark yellowish brown; trace clay | | | 42 | |
| | | 7 | | | | | | 41 | |
| 15 | | 6 | | | | | | 39 | |
| | | 7 | | | @ 17.5' - damp | | | 33 | |
| 20 | | 6 | | | @ 20' - fine- to medium-grained | | | 27 | |
| | | 8 | | | @ 22.5' - moist; with scattered gravel and trace clay | | | 39 | |
| 25 | | 18 | | | @ 26' - fine- to coarse-grained; medium dense; damp; light brown | | | 39<br>15 | |
| | | 24 | | | @ 27.5' - with gravel; small recovery due to gravel/cobble in tip | | | 17 | |
| 30 | | 30 | | | @ 30' - dense; scattered gravel | | | 19 | |
| | | 14 | | SP-SM | @ 32.5' Poorly graded SAND w/ silt; medium dense; damp; medium brown | | | 11 | |
| 35 | | 36 | | SM | @ 35' Silty, fine- to coarse-grained SAND; very dense; damp; dark brown; scattered gravel and balls of clay | | | 16 | |
| | | 37 | | | @ 37.5' - trace clay | | | 20 | |

| | | | |
|---|---|---|---|
| CLIENT: Wiley Canyon LLC | JOB NO.: 21-2593-4 | **DRILL HOLE LOG** | |
| PROJECT: Tentative Tract Map 083295 Wiley Canyon | DATE: 6/15/2021 | | |
| | LOGGED BY: KPC / CHS | | |
| DRILLING COMPANY: Choice Dilling Inc. | DRILLED: 11/14/19 | | |
| DRILLING METHOD: Hollow-stem Auger | HOLE DIA: 8" | **BORING NO.** HS-1 | |
| HAMMER TYPE: Automatic | AVERAGE DROP: 30" | | |
| DRIVING WEIGHTS: 140 lbs. | ELEVATION: 1301' | | |

| DEPTH (feet) | SAMPLE TYPE | BLOWS / 12" | GRAPHIC LOG | USCS SYMBOL | DESCRIPTION | LABORATORY TESTS: Moisture Content (%) | Dry Density (pcf) | % Fines | Other Tests |
|---|---|---|---|---|---|---|---|---|---|
| 40 | | 40 | | | | | | 18 | |
| | | 50/3" | | | @ 42.5' - no recovery | | | | |
| 45 | | 25 | | | @ 45' - dense; trace clay | | | 20 | Added water @ 45' to loosen up soil; hard drilling |
| | | 36 | | | @ 47.5' Silty, clayey SAND; dense; damp; matrix of dark brown, tan, and iron staining with a yellowish-gray coating on sample chunks; scattered gravel | | | 18 | |
| 50 | | 32 | | SC | @ 50' Clayey, fine- to coarse-grained SAND and gravel; dense; damp; medium brown | | | 22 | |
| | | 43/6" | | SM | @ 52.5' Silty, fine- to coarse-grained SAND; medium dense to dense; damp; medium brown; scattered gravel | | | 20 | |
| 55 | | Ref/ 1" | | | @ 55' - fine- to medium-grained; dense; dark brown; scattered gravel | | | | |
| | | | | | TOTAL DEPTH 55' (Elev. 1246')<br>No Ground Water | | | | |
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |
| 75 | | | | | | | | | |

# DRILL HOLE LOG

| | |
|---|---|
| CLIENT: | Wiley Canyon LLC |
| PROJECT: | Tentative Tract Map 083295<br>Wiley Canyon |
| DRILLING COMPANY: | Choice Dilling Inc. |
| DRILLING METHOD: | Hollow-stem Auger |
| HAMMER TYPE: | Automatic |
| DRIVING WEIGHTS: | 140 lbs. |
| JOB NO.: | 21-2593-4 |
| DATE: | 6/15/2021 |
| LOGGED BY: | KPC / CHS |
| DRILLED: | 11/14/19 |
| HOLE DIA: | 8" |
| AVERAGE DROP: | 30" |
| ELEVATION: | 1301' |

**BORING NO.** HS-2

| DEPTH (feet) | SAMPLE TYPE | BLOWS / 12" | GRAPHIC LOG | USCS SYMBOL | DESCRIPTION | LABORATORY TESTS: Moisture Content (%) | Dry Density (pcf) | % Fines | Other Tests |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | ML | **ALLUVIUM; Qal (0 - 20')**<br>@ 0 - 9' Sandy SILT; moist; dark brown to medium brown with depth | | | | Surface logged @ 0 - 9'<br><br>Infiltration test conducted in adjacent borehole PB-1 at depth of 9' |
| 5 | | | | | | | | | |
| 10 | ■ | 29 | | ML | @ 9' - stiff; damp; yellowish brown | 3.8 | 105 | 52 | Sieve |
| | ■ | 31 | | ML | | 5.5 | 107 | 54 | Swell/Consol |
| 15 | ■ | 24 | | SM | @ 15' Silty, fine-grained SAND; medium dense; damp; yellowish brown | 4.5 | 111 | 44 | Swell/Consol |
| 20 | ■ | 27 | | | | 6.1 | 112 | | |
| | | | | | TOTAL DEPTH 20' (Elev. 1281')<br>No Ground Water | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |

# DRILL HOLE LOG

| | | | |
|---|---|---|---|
| CLIENT: | Wiley Canyon LLC | JOB NO.: | 21-2593-4 |
| PROJECT: | Tentative Tract Map 083295<br>Wiley Canyon | DATE: | 6/15/2021 |
| | | LOGGED BY: | KPC / CHS |
| DRILLING COMPANY: | Choice Dilling Inc. | DRILLED: | 11/14/19 |
| DRILLING METHOD: | Hollow-stem Auger | HOLE DIA: | 8" |
| HAMMER TYPE: | Automatic | AVERAGE DROP: | 30" |
| DRIVING WEIGHTS: | 140 lbs. | ELEVATION: | 1314' |

**BORING NO.** HS-3

| DEPTH (feet) | SAMPLE TYPE | BLOWS / 12" | GRAPHIC LOG | USCS SYMBOL | DESCRIPTION | LABORATORY TESTS: Moisture Content (%) | Dry Density (pcf) | % Fines | Other Tests |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM-ML | **ALLUVIUM; Qal (0 - 25')**<br>@ 0 - 12' Silty, fine-grained SAND to sandy SILT; loose/soft; moist; dark brown | | | | Surface logged @ 0 - 12'<br>Infiltration test conducted in adjacent borehole at a depth of 12' |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| | | 32 | | ML | @ 12' Sandy SILT; very stiff; moist; dark brown | 10.4 | 112 | 54 | Sieve |
| 15 | | 33 | | | | 7.8 | 117 | | |
| 20 | | 29 | | SM | @ 20' Silty, fine-grained SAND; medium dense; damp; medium brown; scattered gravel | 7.8 | 110 | 27 | Swell/Consol |
| 25 | | Ref/ 6" | | | @ 25' - slightly more gravel; no recovey on CD sample | | | | Small Bulk @ 25' from the cuttings |
| | | | | | TOTAL DEPTH 25' (Elev. 1289')<br>No Ground Water | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |

# SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS GRAPH | SYMBOLS LETTER | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS<br>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS<br>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE SIZE | CLEAN GRAVELS (LITTLE OR NO FINES) | | GW | Well-graded gravels, gravel-sand mixtures, little or no fines |
| | | | | GP | Poorly-graded gravels, gravel-sand mixtures, little or no fines |
| | | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | GM | Silty gravels, gravel-sand-silt mixtures |
| | | | | GC | Clayey gravels, gravel-sand-clay mixtures |
| | SAND AND SANDY SOILS<br>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE SIZE | CLEAN SANDS (LITTLE OR NO FINES) | | SW | Well-graded sands, gravelly sands, little or no fines |
| | | | | SP | Poorly-graded sands, gravelly sands, little or no fines |
| | | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | SM | Silty sands, sand-silt mixtures |
| | | | | SC | Clayey sands, sand-clay mixtures |
| FINE GRAINED SOILS<br>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMIT LESS THAN 50 | | ML | Inorganic silts and very fine sands, clayey silts with slight plasticity |
| | | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays |
| | | | | OL | Organic silts and organic silty clays of low plasticity |
| | SILTS AND CLAYS | LIQUID LIMIT GREATER THAN 50 | | MH | Inorganic silts, micaceous or diatomaceous fine, sandy or silty soils, elastic silts |
| | | | | CH | Inorganic clays of high plasticity, fat clays |
| | | | | OH | Organic clays of medium to high plasticity, organic silts |
| HIGHLY ORGANIC SOILS | | | | PT | Peat and other highly organic soils |

Notes:
(1) Dual USCS symbols, such as SP-SM, denote 5 to 12% of minor constituent.
(2) Dual USCS symbols, such as SM/ML, denote borderline soil classifications.
(3) Subsurface information from boring and test pit logs depict conditions only at the specific locations. and dates indicated. Soil conditions and water levels at other locations may differ from conditions at these locations. Also, the conditions at these locations may change with time.
(4) Blow counts on logs are the number of blows to drive the sampler with the weight and drop height indicated on each log.
(5) Split-barrel sampler driving record applies only to hollow-stem-auger and rotary-wash borings.
(6) These logs are subject to the limitations, conclusions, and recommendations in this report.

HS: Hollow-stem-auger boring
RW: Rotary-wash boring
B: Bucket-auger boring

SAMPLE TYPE

STANDARD PENETRATION TEST
Split barrel sampler in accordance with ASTM D-1586 Test Method

CALIFORNIA DRIVE
Split-barrel sampler in accordance with ASTM D-3550 Test Method

DISTURBED CALIFORNIA DRIVE

SHELBY TUBE
Thin-walled sampler in accordance with ASTM D-1587 Test Method

BULK SAMPLE

NO RECOVERY

GROUND WATER DATA

GROUND WATER WHILE DRILLING

GROUND WATER AFTER DRILLING

## DENSITY OF GRANULAR SOILS

| DESCRIPTION | SPT BLOWS PER FOOT |
|---|---|
| Very Loose | < 4 |
| Loose | 4 - 10 |
| Medium Dense | 11 - 30 |
| Dense | 31 - 50 |
| Very Dense | > 50 |

## STRENGTH OF COHESIVE SOILS

| CONSISTENCY | SPT BLOWS PER FOOT |
|---|---|
| Very Soft | < 2 |
| Soft | 2 - 4 |
| Firm | 5 - 8 |
| Stiff | 9 - 15 |
| Very Stiff | 16 - 30 |
| Hard | > 30 |

## SPLIT-BARREL SAMPLER DRIVING RECORD

| BLOW COUNT | DESCRIPTION |
|---|---|
| 25 | 25 blows drove the sampler 12 inches, after initial 6 inches of seating |
| 50/7" | 50 blows drove the sampler 7 inches, after initial 6 inches of seating |
| Ref/3" | 50 blows drove the sampler 3 inches during initial 6-inch seating interval |

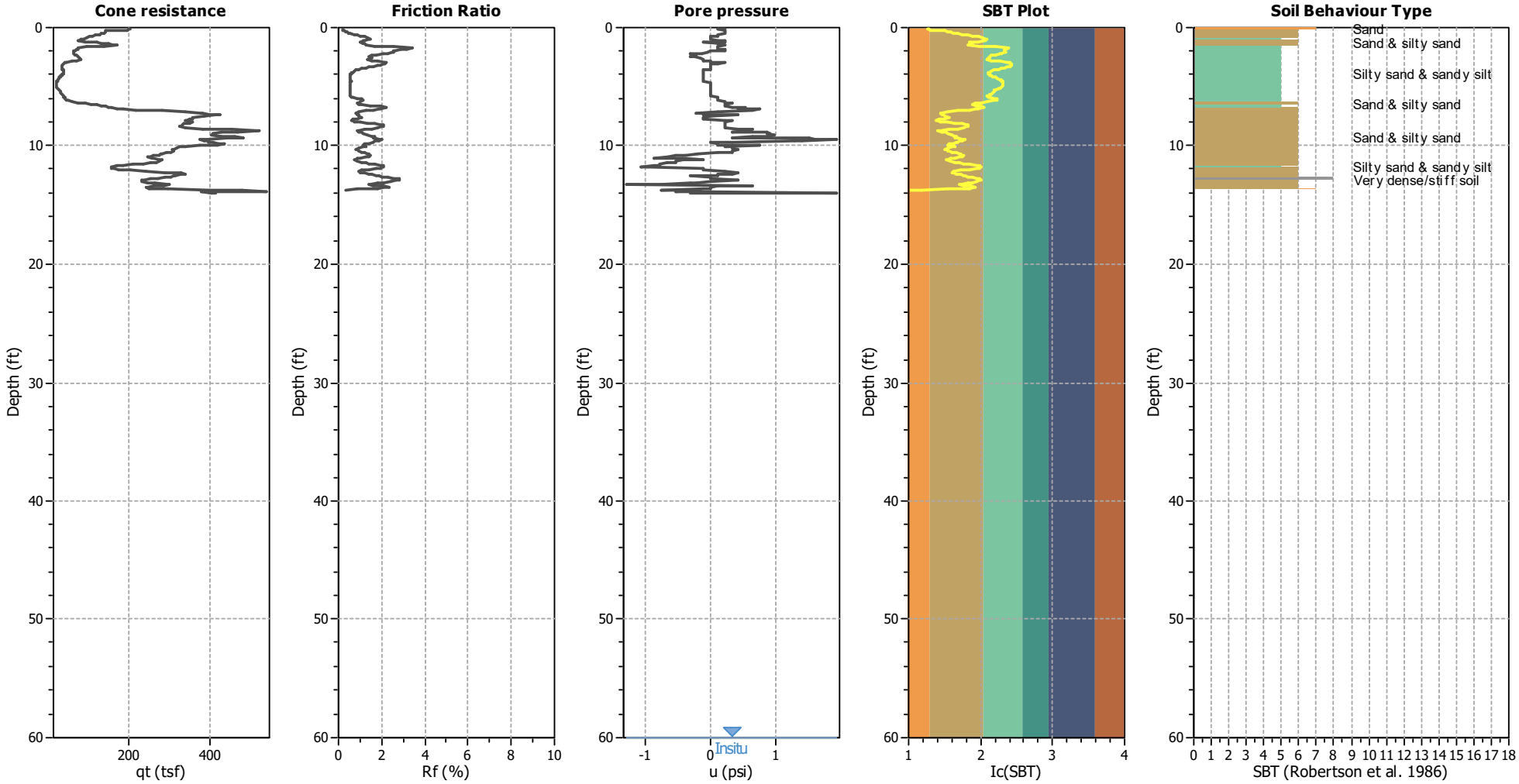
## LABORATORY TESTING ABBREVIATIONS

| | | | |
|---|---|---|---|
| Plasticity Index | PI | Compaction Curve | Curve=A |
| Liquid Limit | LL | Consolidation / Collapse | Consol |
| Hydrometer | %-5 micron | Direct Shear / Reshear / Remold | Shear Test |
| Expansion Index | EI | | |
| Corrosivity Analysis | Cor | | |


ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants


**USCS Soil Classification and Key to Boring Log Symbols**

# CPT basic interpretation plots

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| Peak ground acceleration: | 1.00 | Use fill: | No | Limit depth applied: | Yes |
| Depth to water table (insitu): | 60.00 ft | Fill height: | N/A | Limit depth: | 50.00 ft |

### SBT legend

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2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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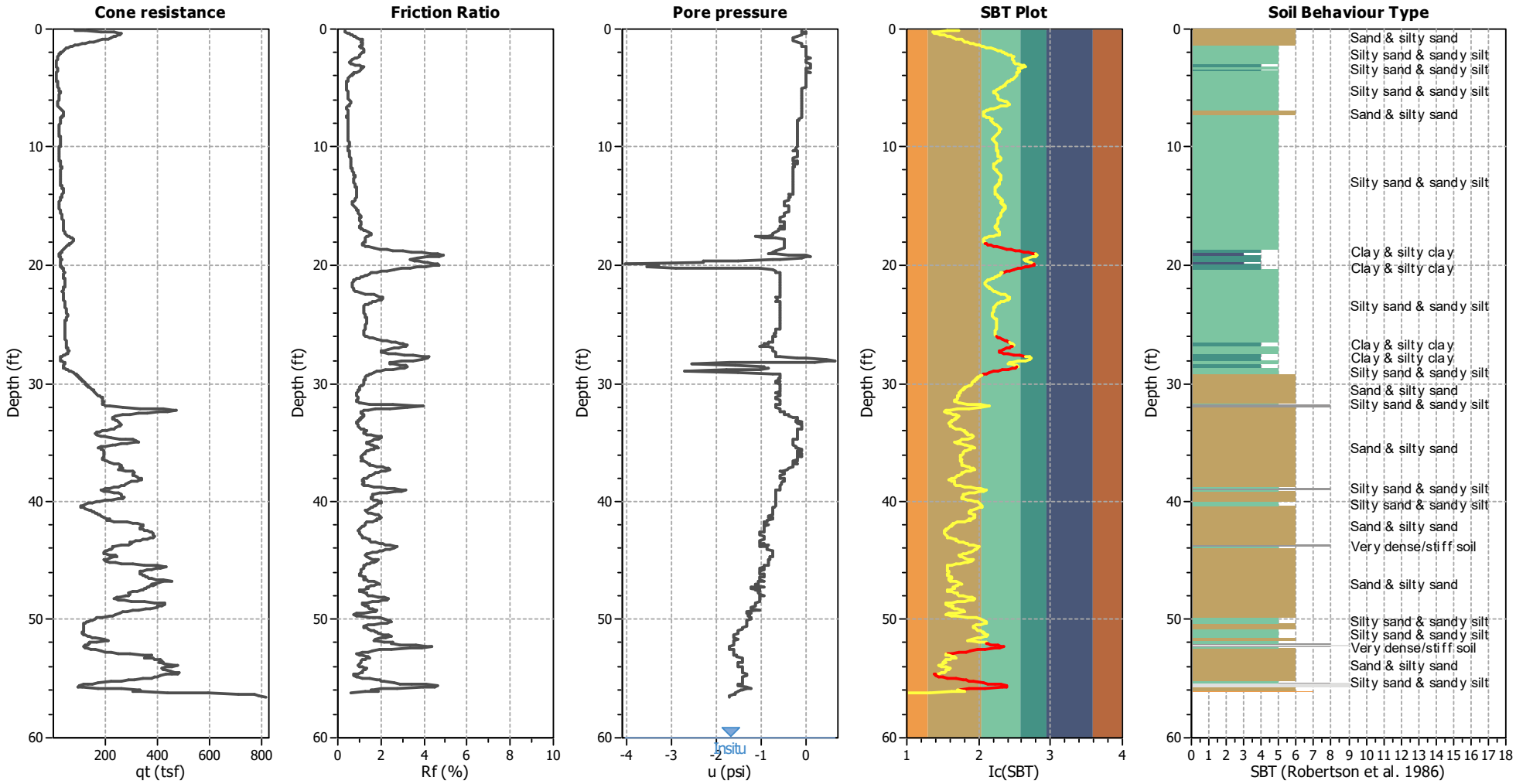


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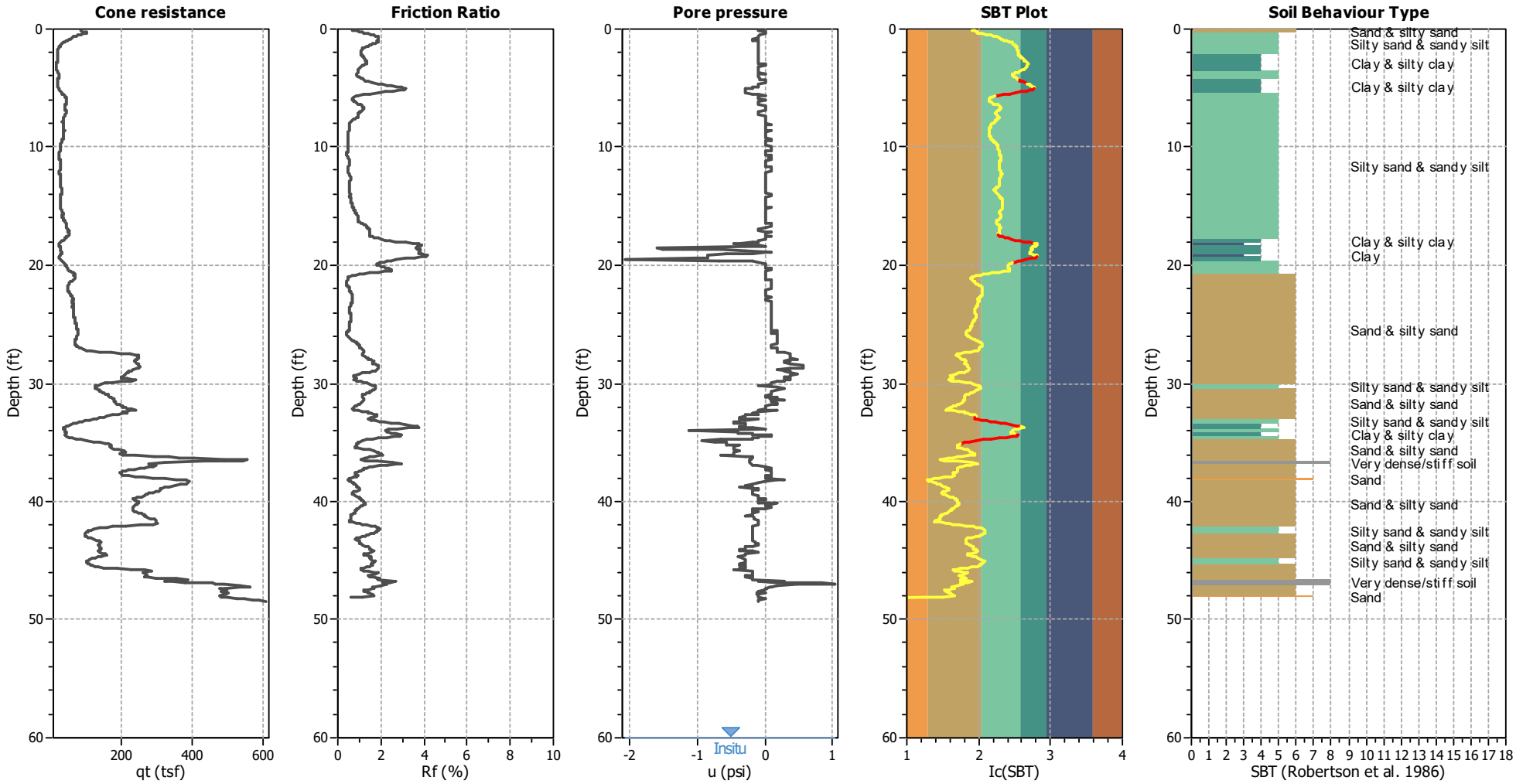


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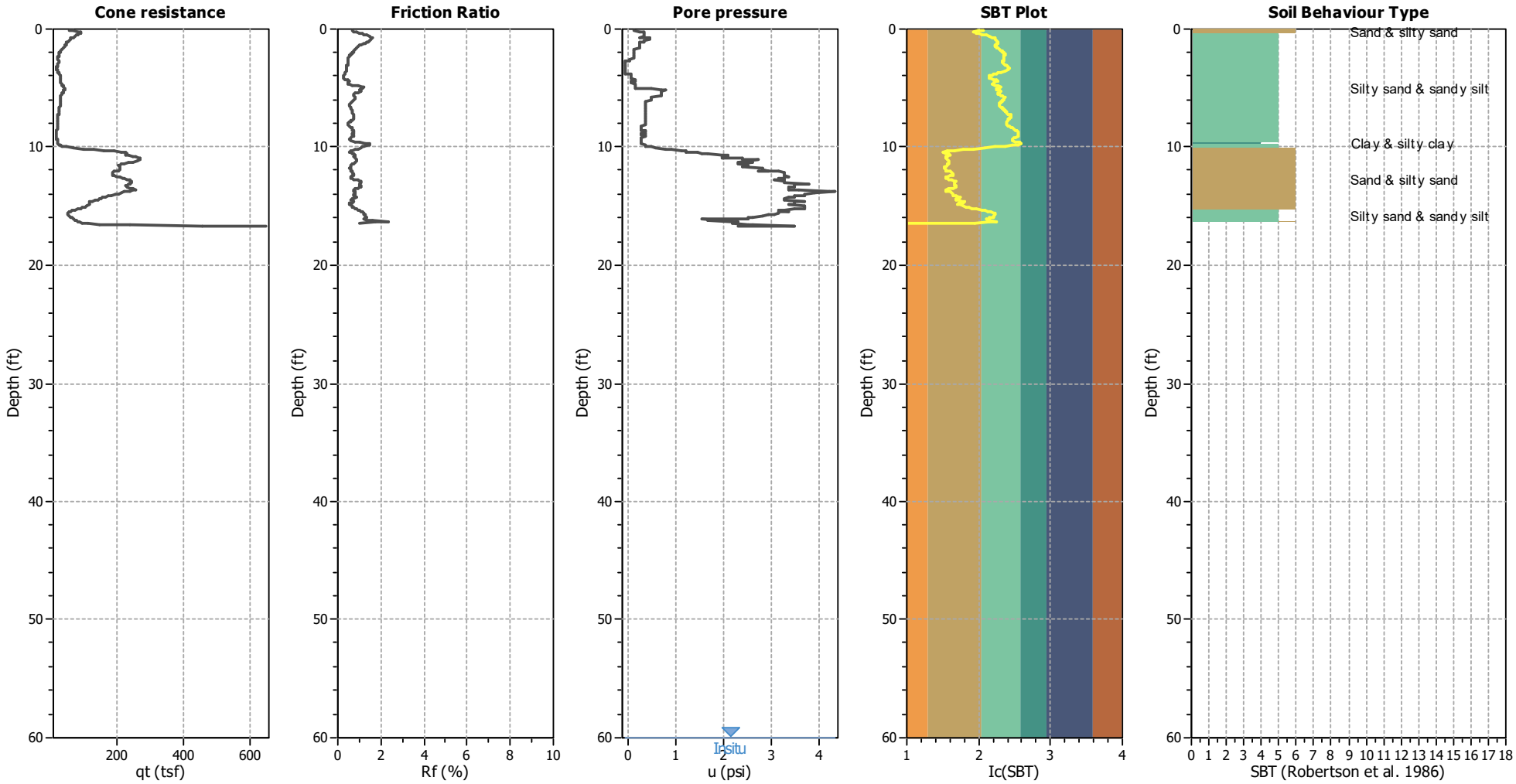


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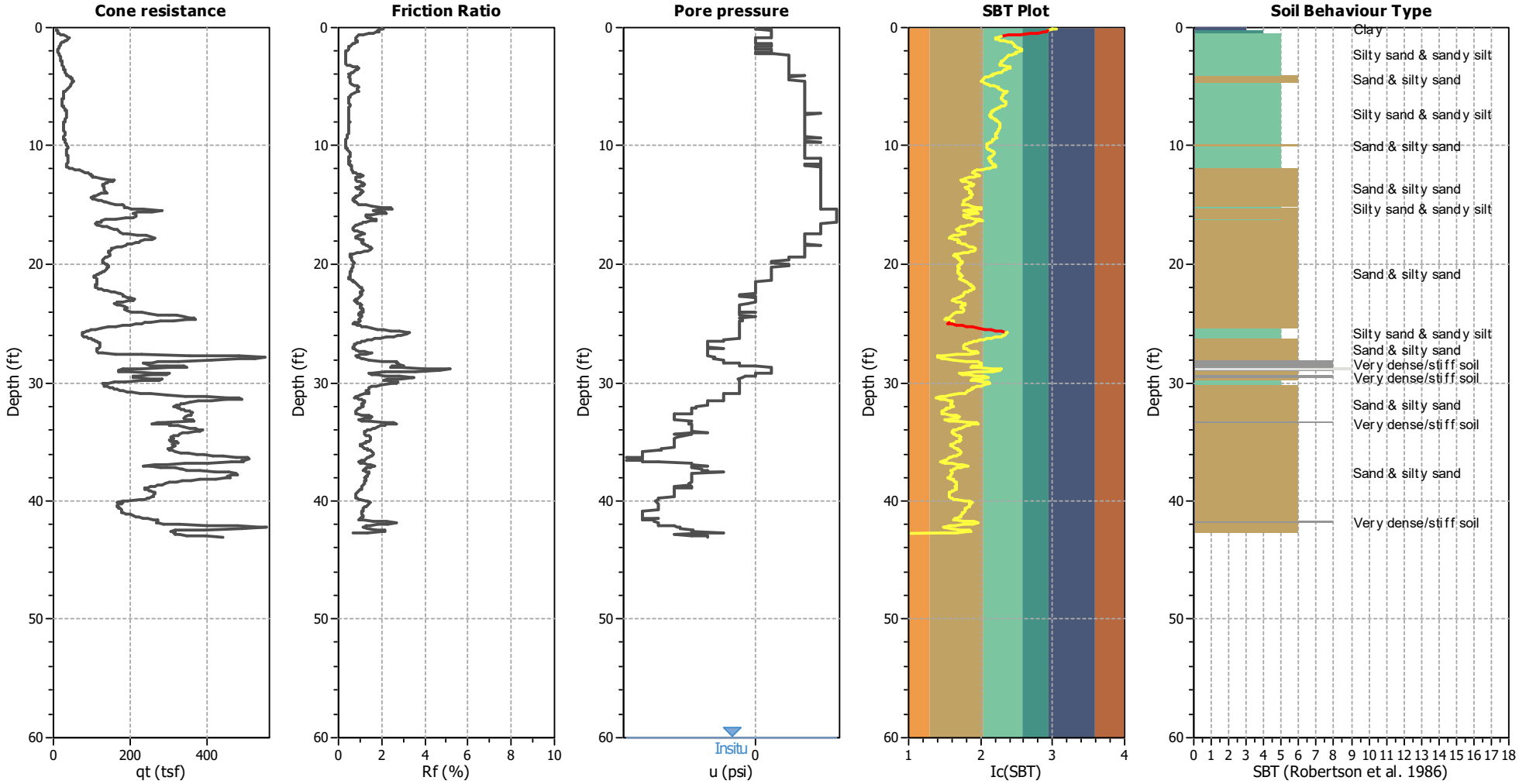


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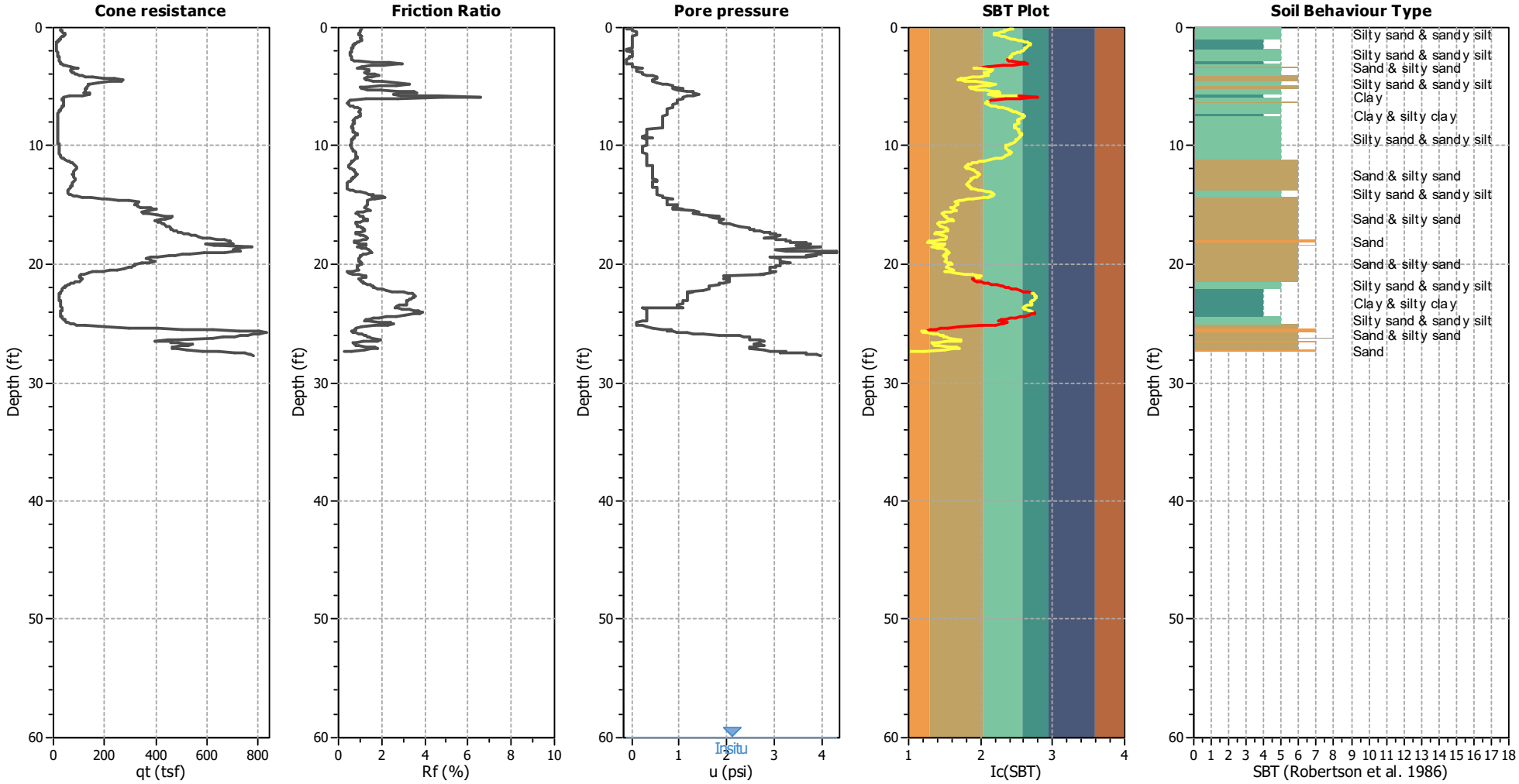


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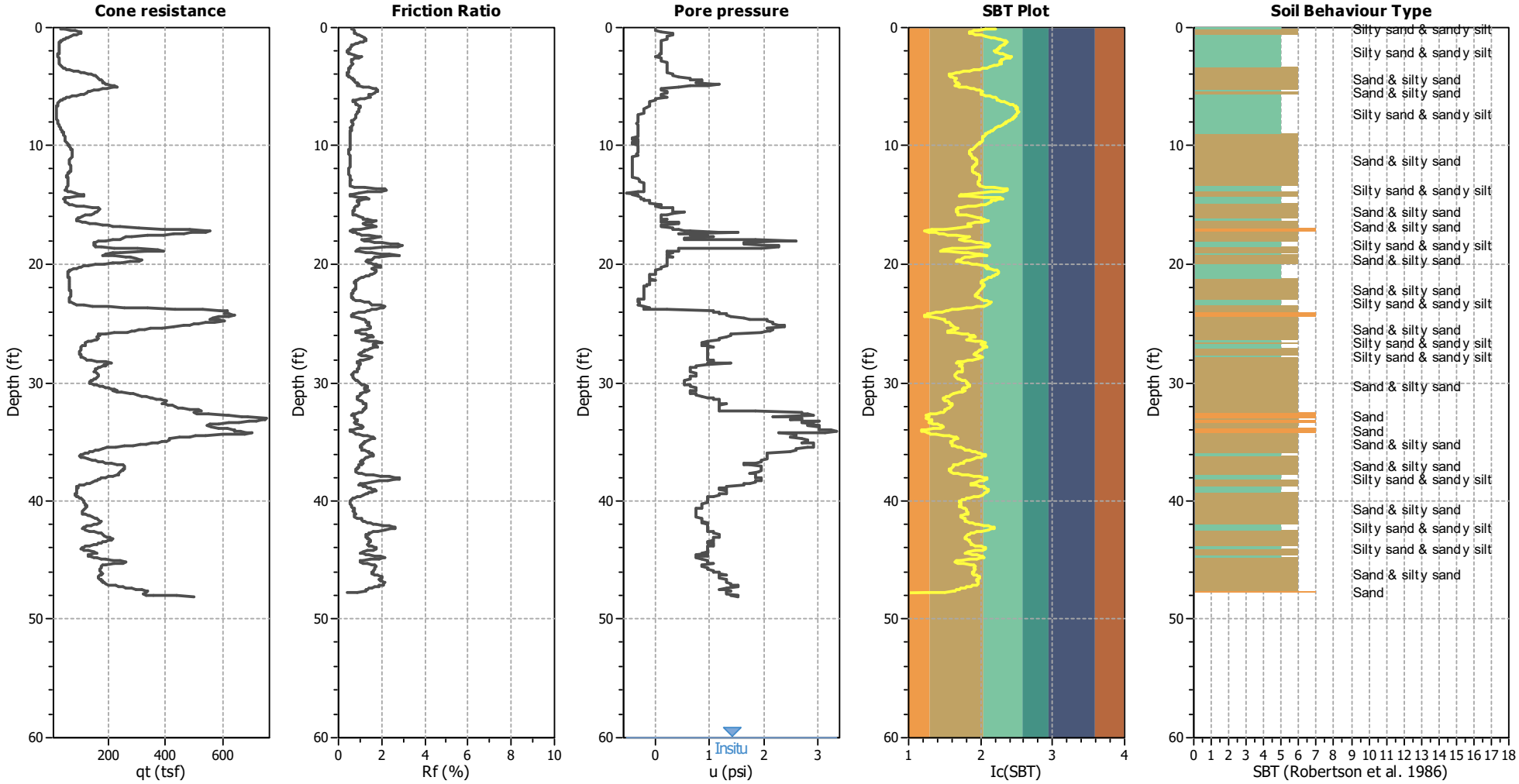


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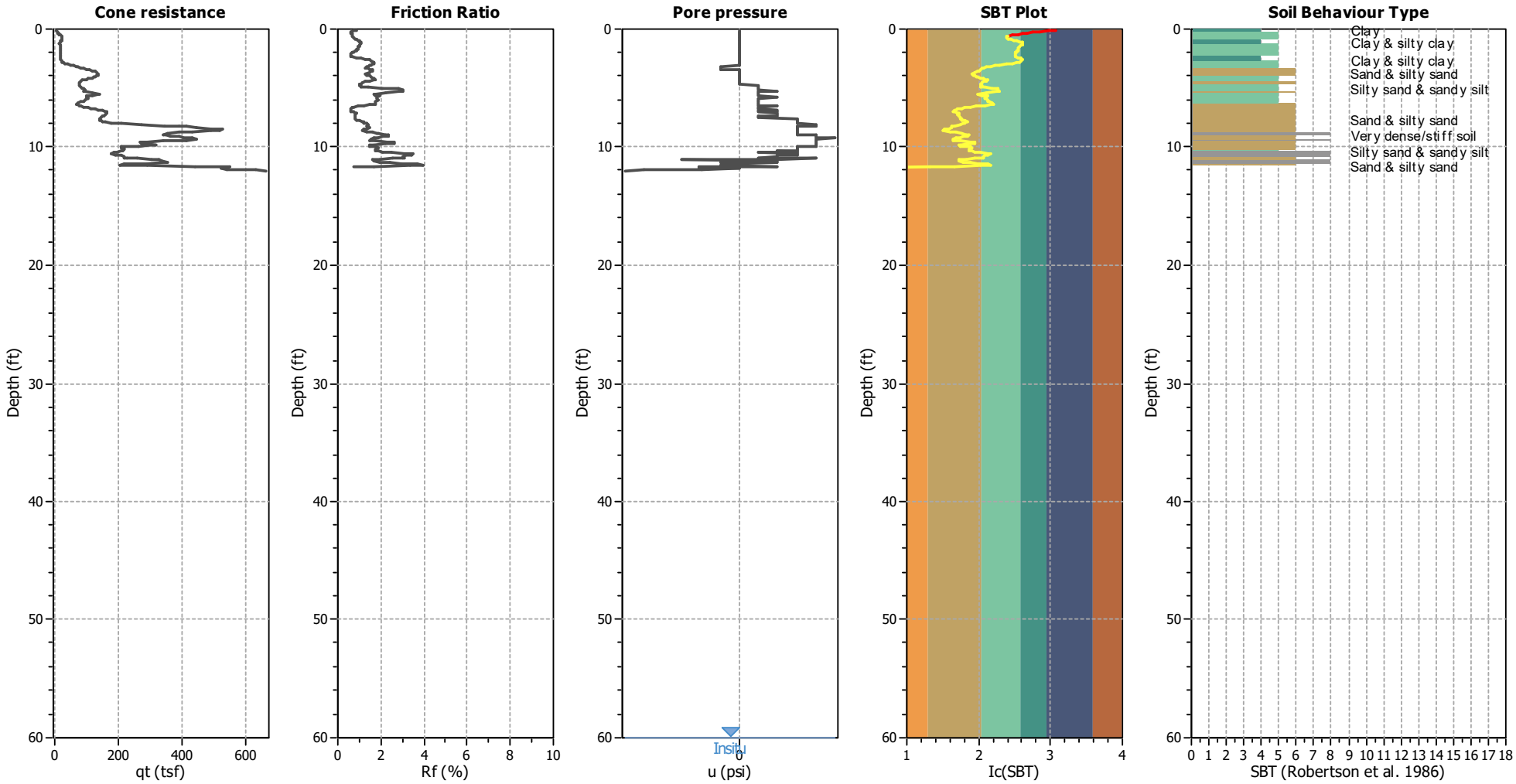


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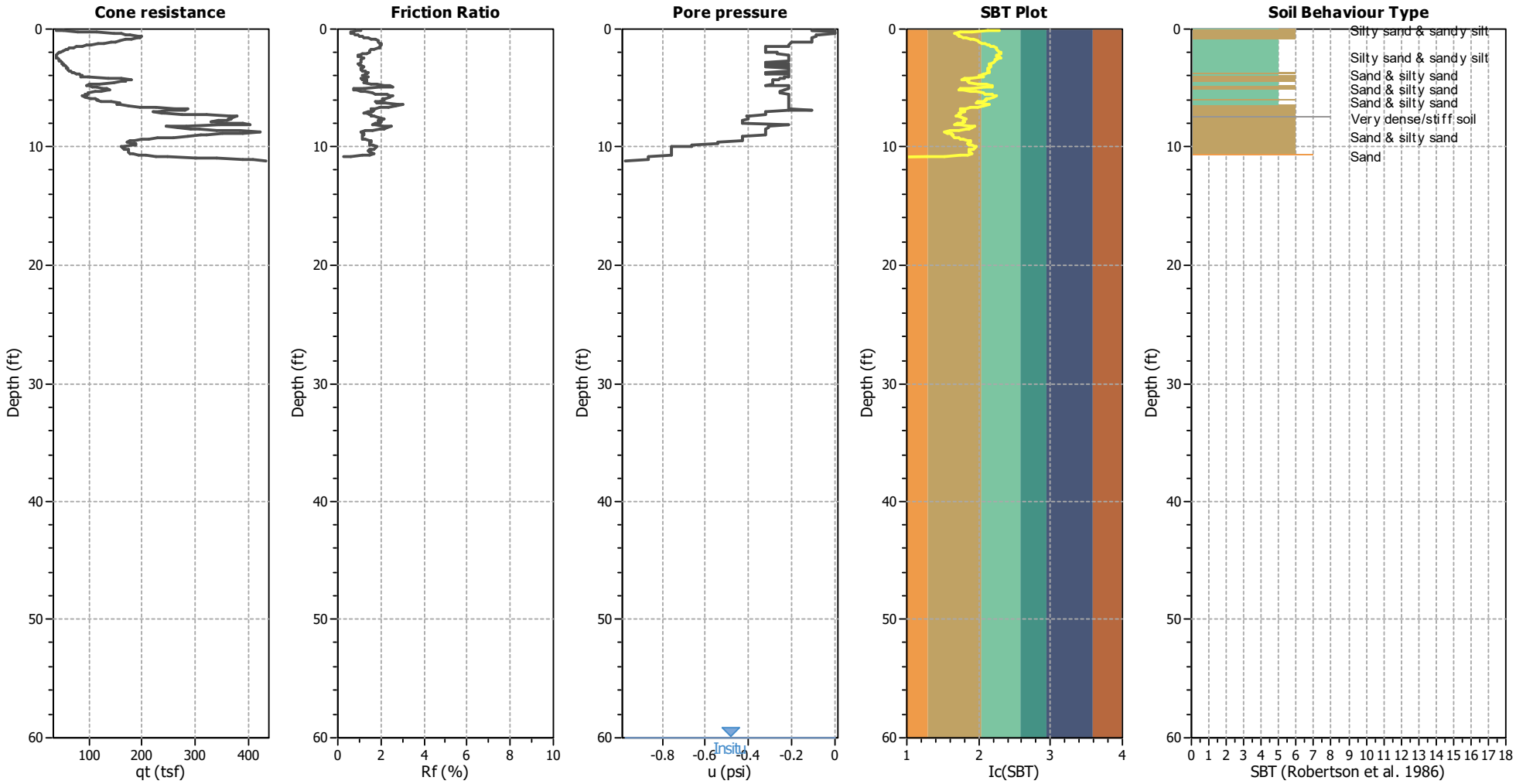


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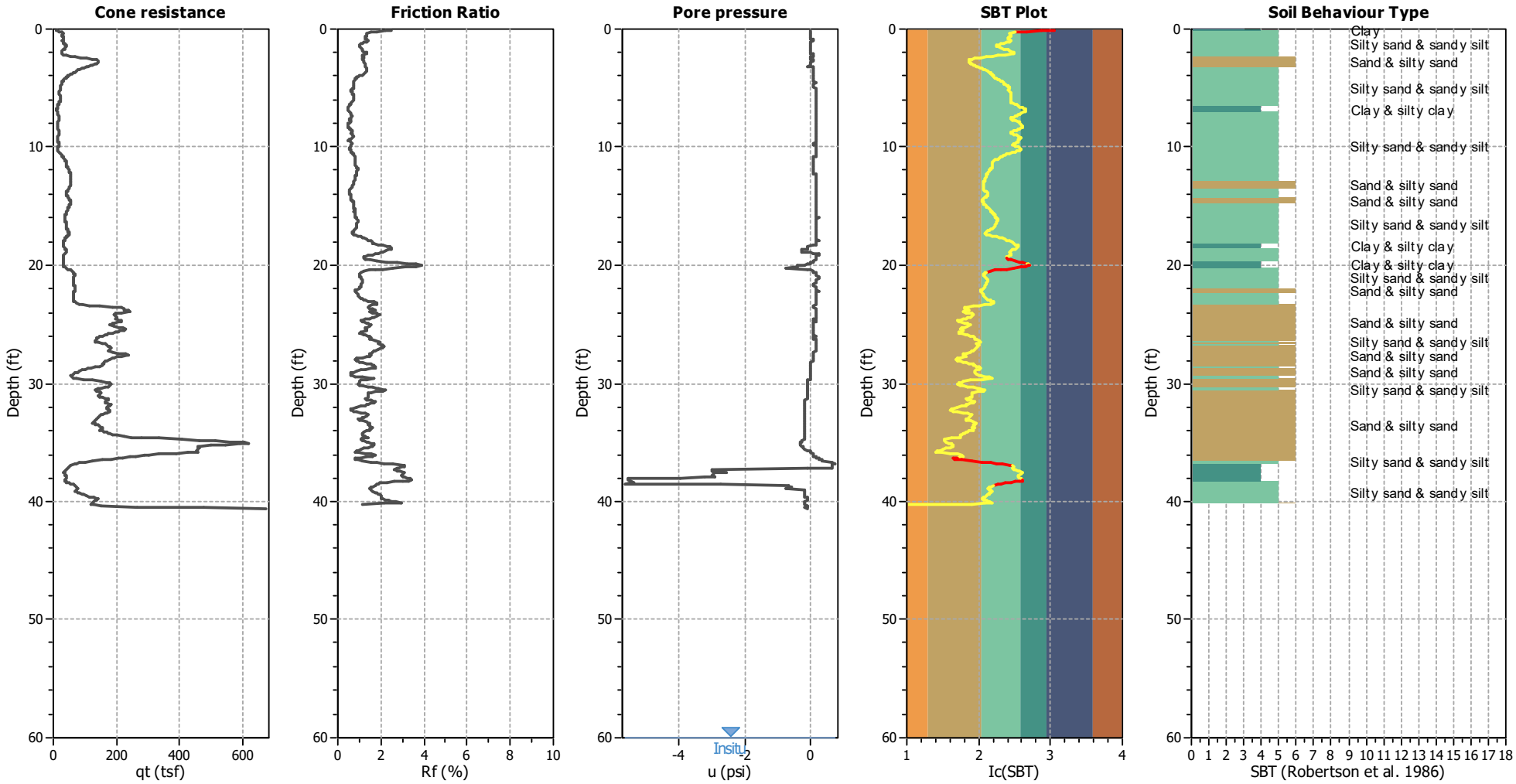


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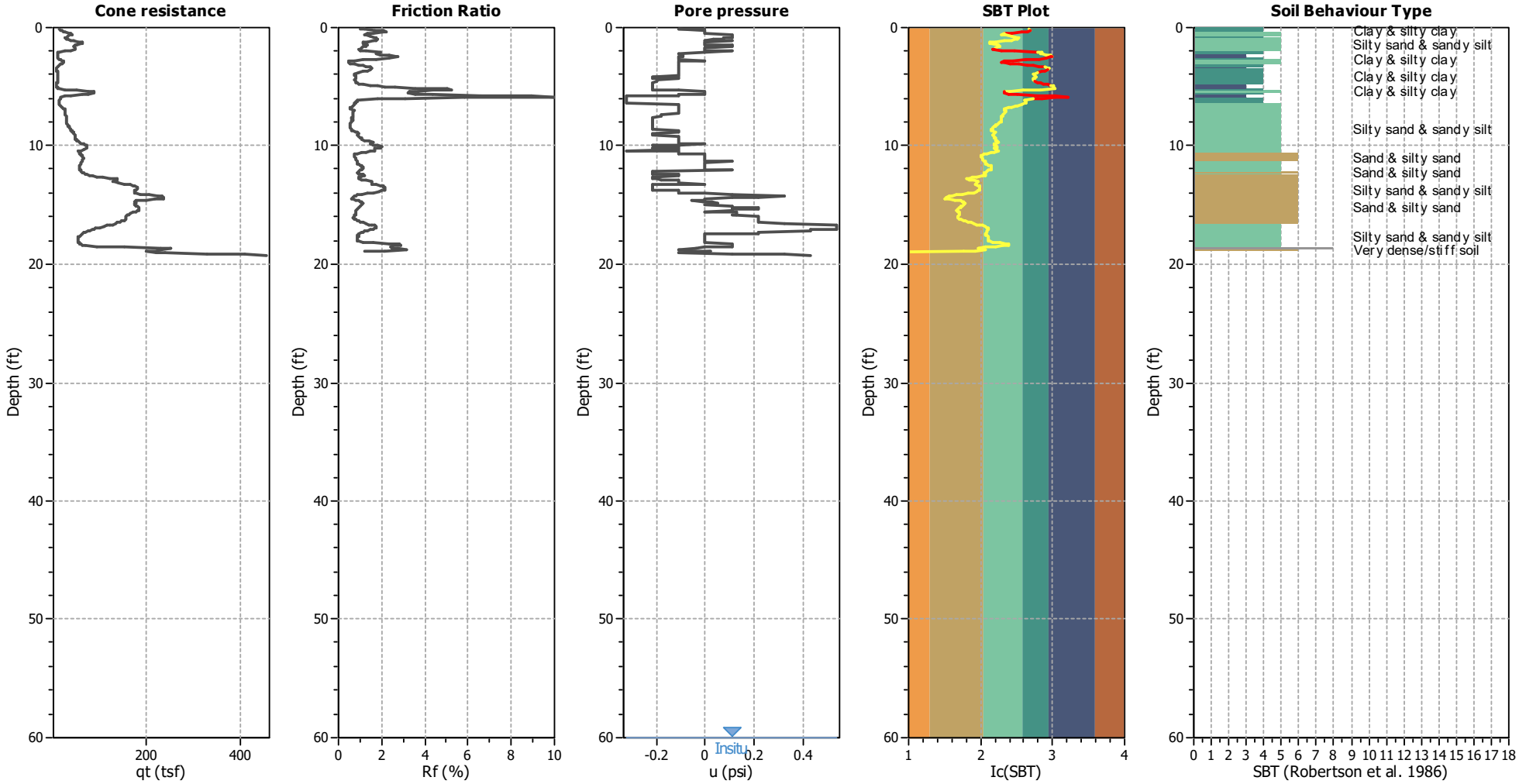


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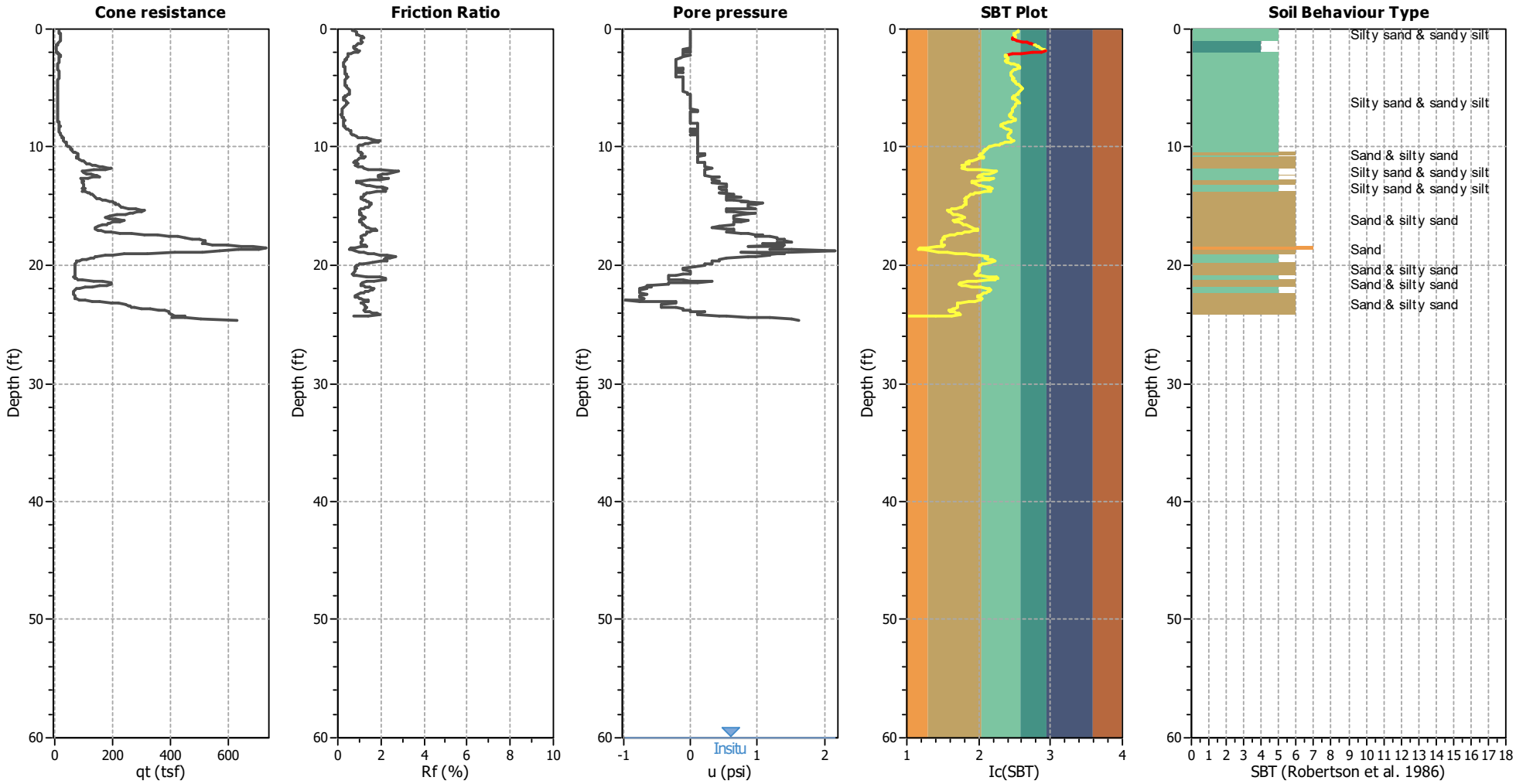


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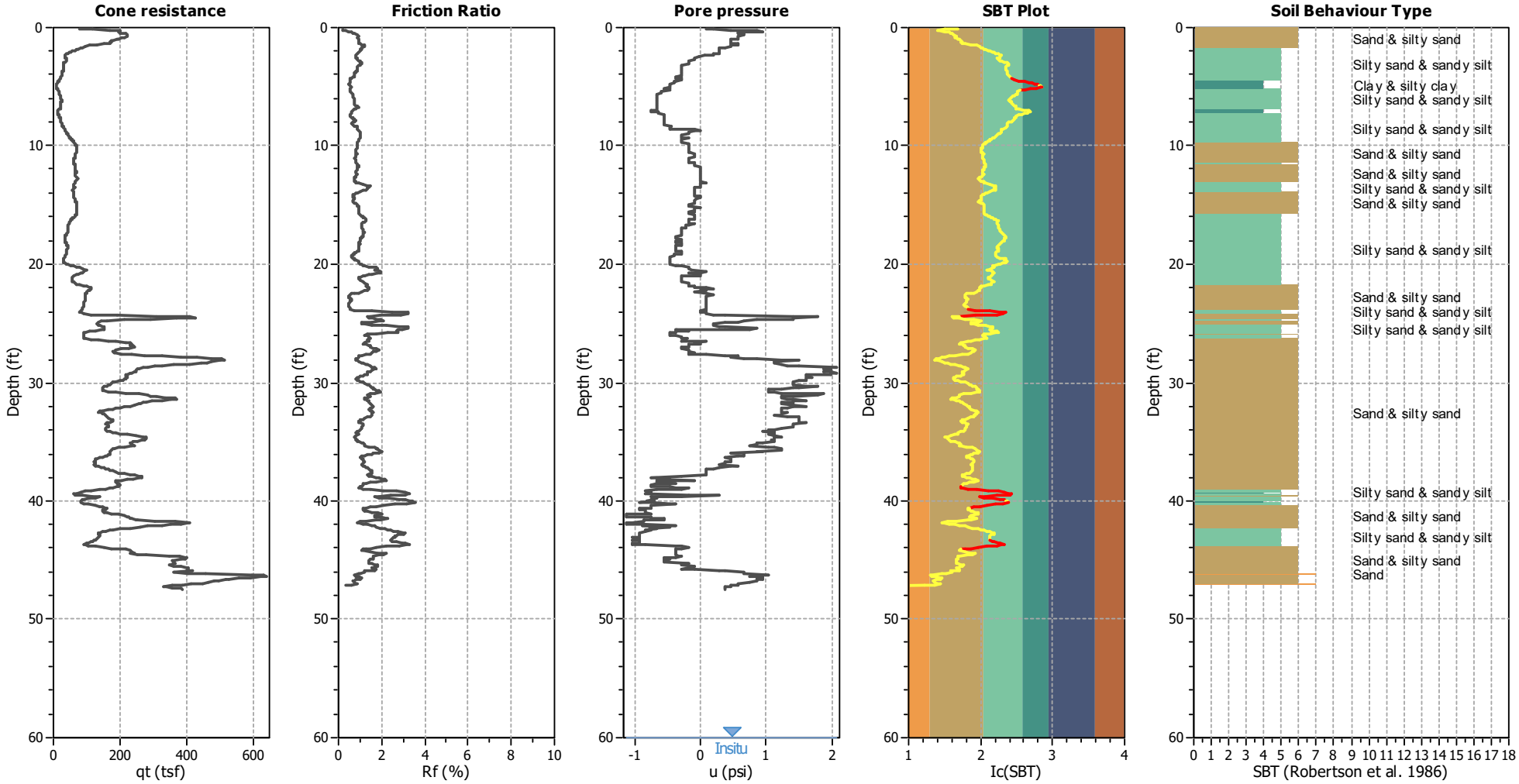


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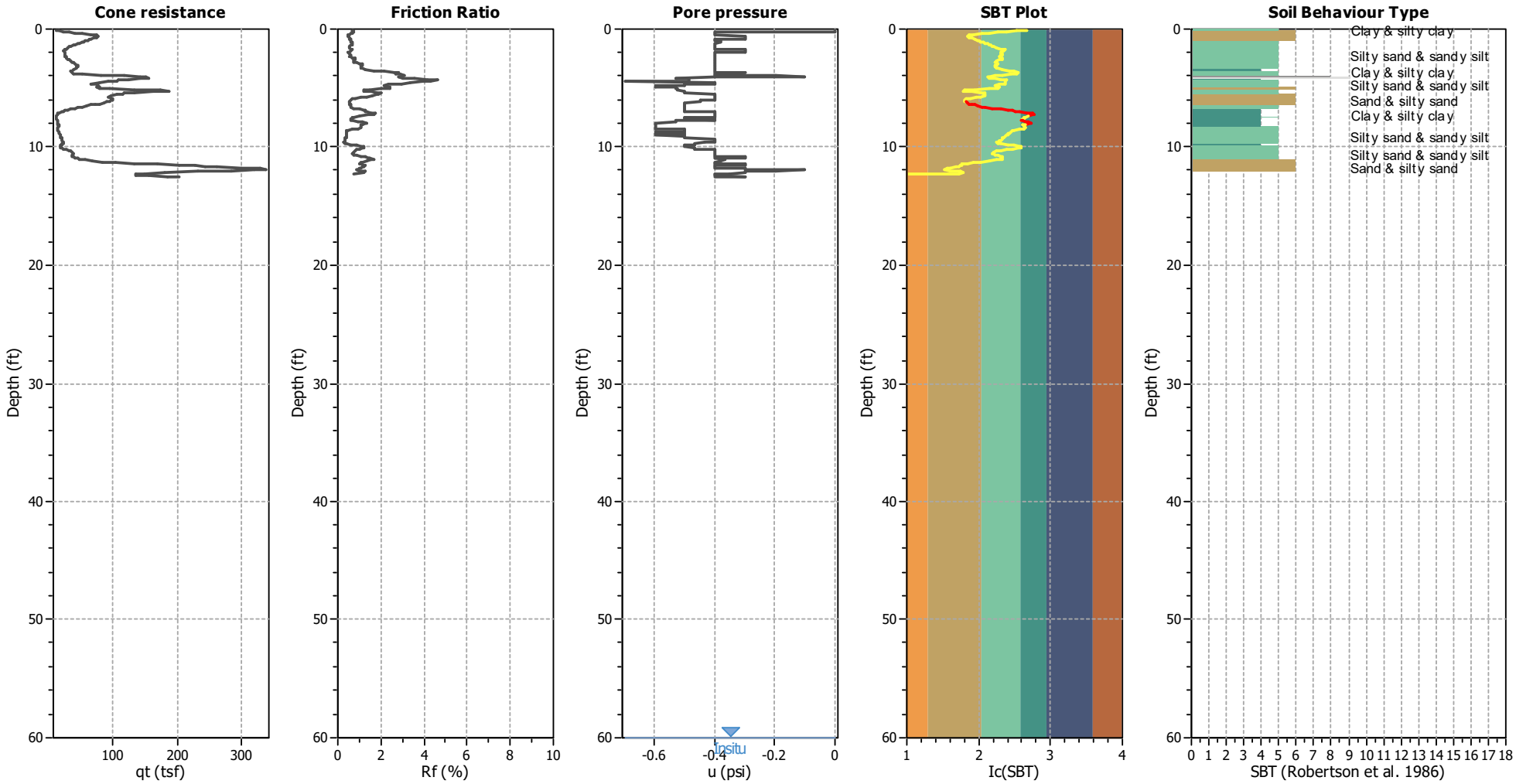


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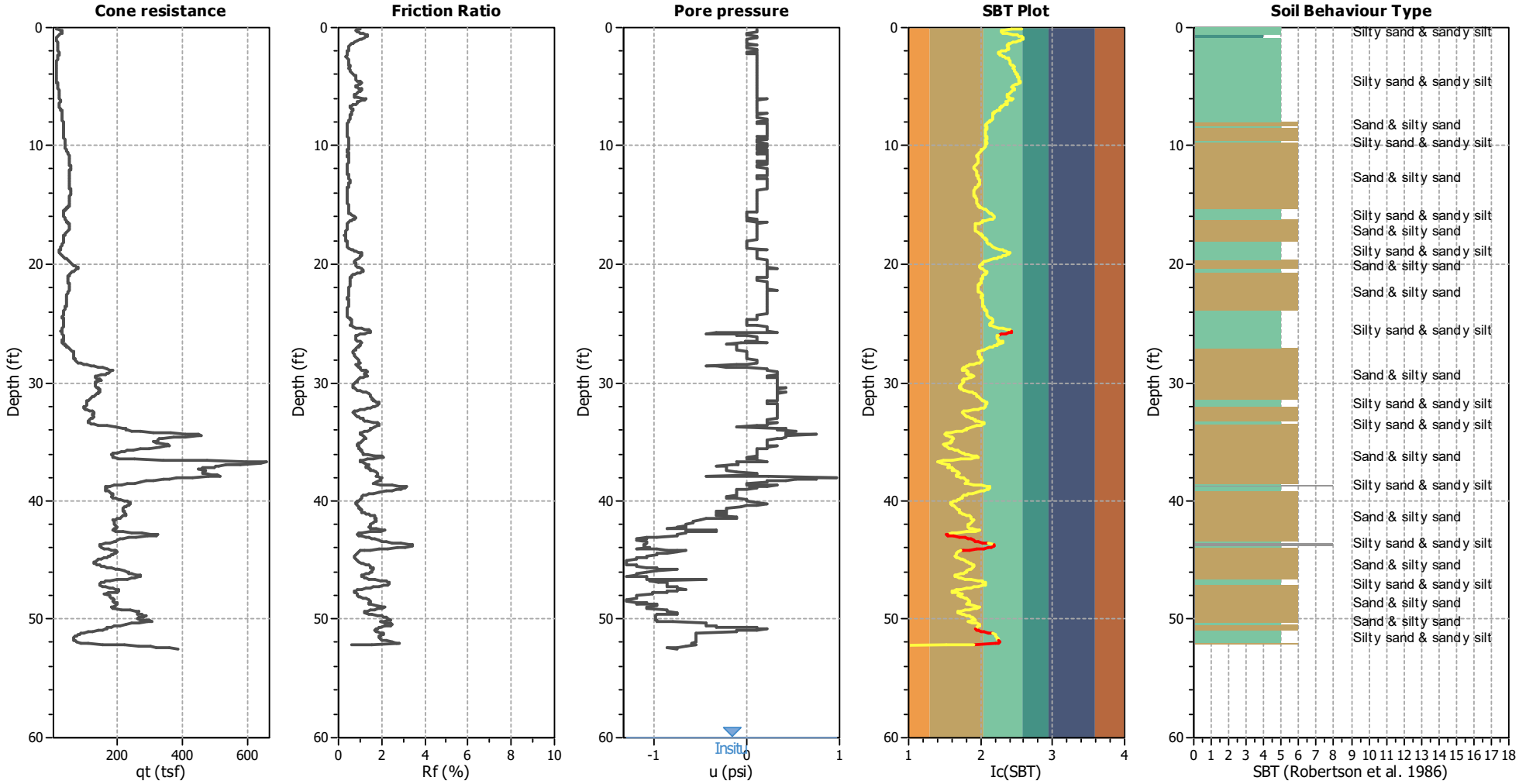


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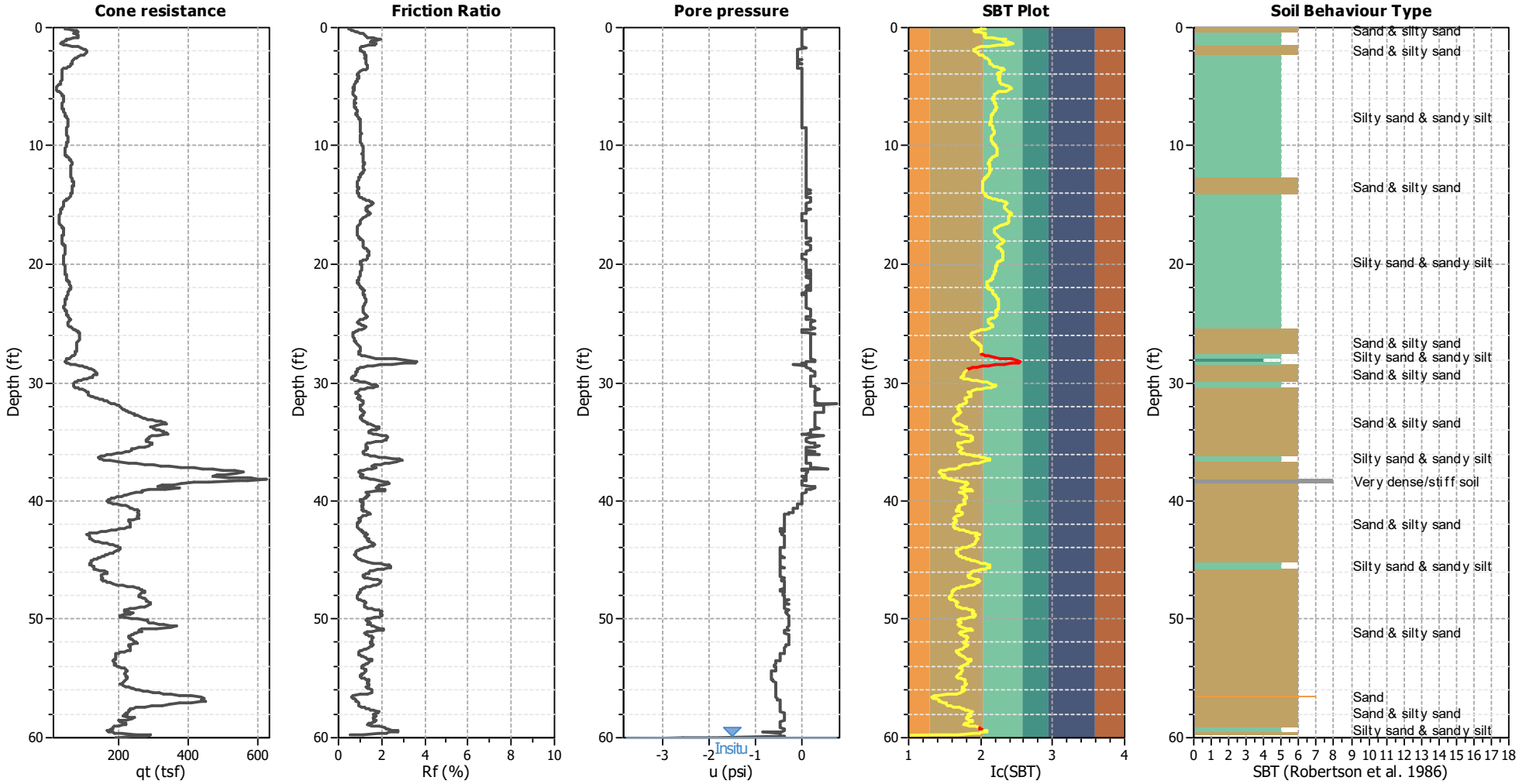


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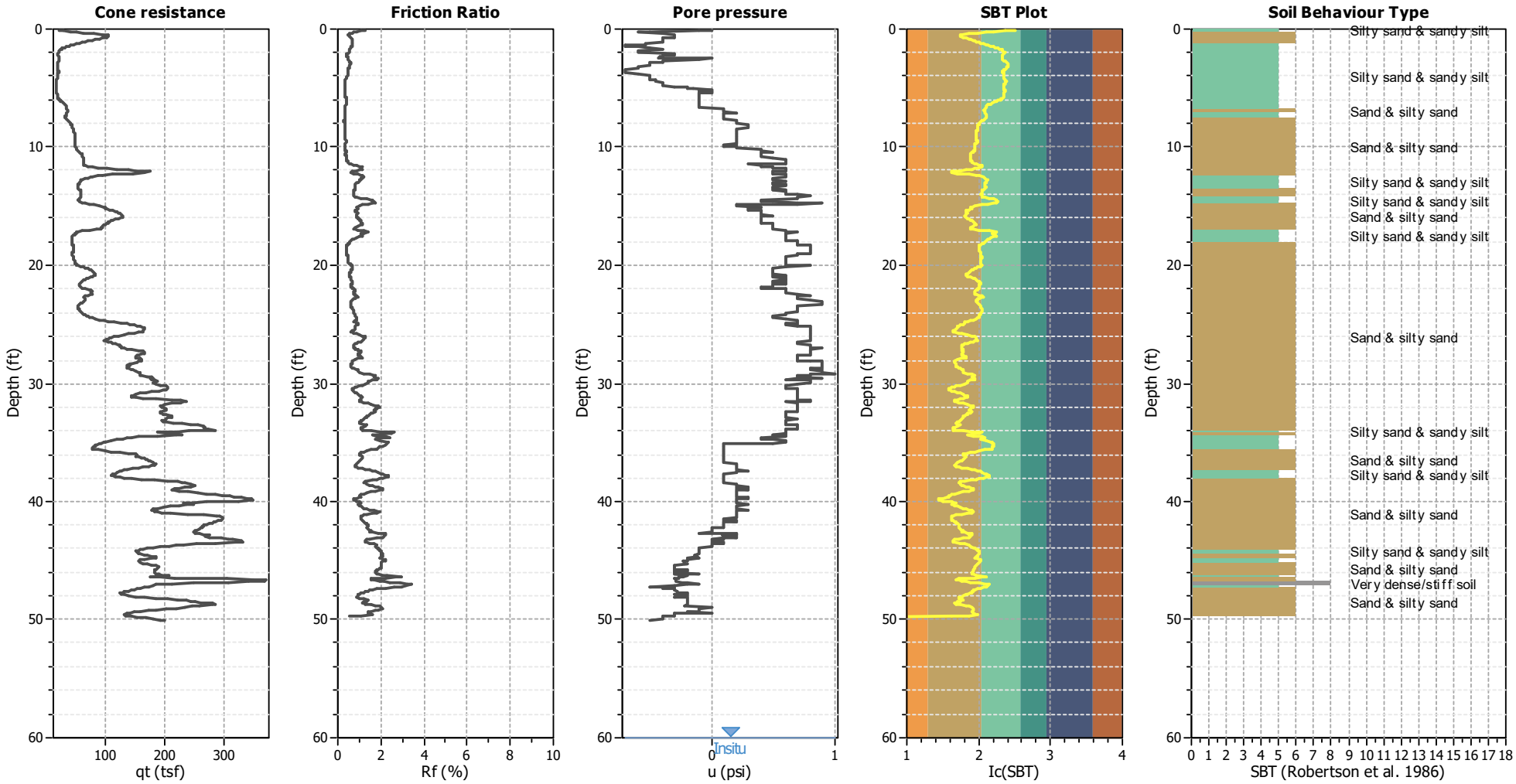
| Earthquake magnitude $M_w$: | 6.69 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 1.00 | Use fill: | No | Limit depth applied: | Yes |
| Depth to water table (insitu): | 60.00 ft | Fill height: | N/A | Limit depth: | 50.00 ft |

**SBT legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

## CPT basic interpretation plots




### Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | Depth to water table (erthq.): | 30.00 ft | Fill weight: | N/A |
| Fines correction method: | Moss et al. (2006) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 4.00 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.69 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 1.00 | Use fill: | No | Limit depth applied: | Yes |
| Depth to water table (insitu): | 60.00 ft | Fill height: | N/A | Limit depth: | 50.00 ft |

**SBT legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 1/02/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1303 | 0 | | BULK | | | | SM | **Alluvium (Qal):**<br>Silty SAND - moderate yellowish-brown, slightly moist | |
| | | | 1 | 1 2 5 | | | | @ 2.5' Silty SAND: moderate yellowish-brown to dark yellowish-brown, slightly moist, loose; fine to medium grained | |
| 1298 | 5 | | 2 | 3 4 6 | 105.1 | 8.2 | | @ 5' Same as at 2.5' | |
| 1293 | 10 | | 3 | 6 9 12 | 109.0 | 9.3 | | @ 10' Same as at 2.5', moderate yellowish-brown, medium dense | |
| 1288 | 15 | | 4 | 4 3 4 | | | | @ 15' Silty SAND: moderate yellowish-brown, slightly moist, loose; fine grained | |
| 1283 | 20 | | 5 | 7 8 12 | 115.5 | 9.7 | | @ 20' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to medium grained | |
| 1278 | 25 | | 6 | 2 3 4 | | | | @ 25' Same as at 20', loose, trace gravel | |
| 1273 | 30 | | | | | | | | |

LGC

■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 1/02/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1273 | 30 | | 7 | 19 21 25 | 109.2 | 6.2 | SM | @ 30' Silty SAND: pale yellowish-brown to moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, trace gravel<br>@ 33' Hard Drilling | CN |
| 1268 | 35 | | 8 | 10 27 21 | | | | @ 35' Same as at 30', dense | |
| 1263 | 40 | | 9 | 17 20 42 | 126.9 | 6.9 | | @ 40' Silty SAND: pale yellowish-brown to moderate yellowish-brown, moist, dense; fine to medium grained | DS |
| 1258 | 45 | | 10 | 7 11 13 | | | SP | @ 45' SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to coarse grained, trace gravel | |
| 1253 | 50 | | 11 | 30 50/5.5 | 110.6 | 10.6 | SM | @ 50' Silty SAND: pale yellowish-brown to moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, trace gravel<br>@ 53' Very Hard Drilling | DS |
| 1248 | 55 | | 12 | 14 10 15 | | | | @ 55' Silty SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to medium grained, trace gravel | SA |
| 1243 | 60 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 1/02/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>▽ Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1243 | 60 | | 13 | 50/6" | 124.3 | 10.3 | SP | @ 60' Groundwater Encountered<br>SAND: light reddish-brown, wet, very dense; fine to coarse grained, some gravel | |
| 1238 | 65 | | 14 | 11<br>26<br>16 | | | | @ 65' SAND with Gravel: light reddish-brown, wet (saturated), dense; fine to coarse grained | |
| 1233 | 70 | | 15 | 11<br>24<br>47 | | | | @ 70' Same as at 65', dark yellowish-brown, very dense | |
| 1228 | 75 | | 16 | 50/6" | | | | @ 75' SAND with Gravel: dark yellowish-brown, wet (saturated), very dense; fine to coarse grained | |
| 1223 | 80 | | | | | | | **Notes:**<br>-Total Depth = 75.5'<br>-Backfilled with Native Soil (Cuttings)<br>-Groundwater Encountered at 60' | |
| 1218 | 85 | | | | | | | | |
| 1213 | 90 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-2

| | |
|---|---|
| Date: 1/02/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1300 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1300 | 0 | | BULK | | | | ML/CL | **Alluvium (Qal):**<br>Clayey SILT to Silty Clay - moderate yellowish-brown, slightly moist | MAX<br>RDS |
| | | | 1 | 6<br>9<br>14 | 97.5 | 5.4 | SM | @ 2.5' Silty SAND: pale to moderate yellowish-brown, slightly moist, medium dense; fine grained | |
| 1295 | 5 | | 2 | 7<br>15<br>22 | | | | @ 5' Same as at 2.5' | |
| 1290 | 10 | | 3 | 6<br>9<br>12 | | | | @ 10' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine grained, trace pinhole pores | |
| 1285 | 15 | | 4 | 8<br>11<br>13 | 106.6 | 7.9 | | @ 15' Same as at 10', moderate yellowish-brown to light reddish-brown | |
| 1280 | 20 | | 5 | 3<br>3<br>2 | | | ML | @ 20' Clayey SILT with Sand: moderate yellowish-brown, slightly moist, medium stiff; fine grained sand | |
| 1275 | 25 | | 6 | 6<br>9<br>11 | 111.1 | 11.4 | SC-SM | @ 25' Clayey SAND to Silty Sand: light reddish-brown, slightly moist, medium dense; fine grained | CN |
| 1270 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-2

| | |
|---|---|
| Date: 1/02/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1300 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1270 | 30 | | 7 | 6 9 12 | | | SP | @30' SAND: light reddish-brown, slightly moist, medium dense; fine to coarse grained, trace gravel | |
| 1265 | 35 | | NS | 7 14 15 | | | | @ 35' SAND with Gravel: pale yellowish-brown to moderate yellowish-brown, slightly moist, medium dense; no sample - 3 rings only | |
| 1260 | 40 | | 8 | 18 10 17 | | | SM | @ 40' Silty SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to coarse grained, some gravel | SA |
| 1255 | 45 | | 9 | 10 26 47 | 113.4 | 12.7 | SM/CL | @ 45' Silty SAND to Sandy Clay: pale yellowish-brown to moderate yellowish-brown, slightly moist, dense; fine to coarse grained, trace silt and gravel | DS |
| 1250 | 50 | | 10 | 6 9 12 | | | SM | @ 50' Silty SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to medium grained | SA |
| 1245 | 55 | | 11 | 25 25 30 | 104.9 | 13.9 | | @ 55' Same as at 50', dense, trace gravel, fine to coarse grained | |
| 1240 | 60 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-2

| | |
|---|---|
| Date: 1/02/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1300 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1240 | 60 | | 12 | 10<br>27<br>50/4" | | | SP | @ 60' SAND: moderate yellowish-brown to light reddish-brown, slightly moist, very dense; fine to coarse grained, some gravel<br>@ 62' Very Hard Drilling | |
| 1235 | 65 | | 13 | 26<br>26<br>26 | 124.9 | 10.1 | SC | ▽ @ 65' Clayey SAND with Gravel: light reddish-brown, very moist, dense; fine to coarse grained<br>@ 66' Groundwater Encountered | DS |
| 1230 | 70 | | 14 | 13<br>10<br>24 | | | SP | @ 70' SAND with Gravel: light reddish-brown, wet (saturated), dense; fine to coarse grained, 3" thick layer of light gray to pale yellowish-brown siltstone with rust-colored staining | |
| 1225 | 75 | | 15 | 27<br>16<br>31 | | | | **Bedrock: Saugus Formation (QTs):**<br>@ 75' Siltstone: light gray with moderate yellowish-brown and rust-colored layering, slightly moist, weathered | |
| 1220 | 80 | | NR | 50/4" | | | | @ 80' No Recovery - material same as at 75' based on contents of shoe | |
| 1215 | 85 | | | | | | | **Notes:**<br>-Total Depth = 80' 4"<br>-Backfilled with Native Soil (Cuttings)<br>-Groundwater Encountered at 66' | |
| 1210 | 90 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-3

| | |
|---|---|
| Date: 1/03/07 | Page: 1 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1298 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1298 | 0 | | | | | | SM | **Alluvium (Qal):**<br>Silty SAND - moderate yellowish-brown, slightly moist | |
| | | | R-1 | 8<br>13<br>18 | | | | @ 2.5' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace pea gravel | |
| 1293 | 5 | | R-2 | 8<br>9<br>7 | 105.4 | 6.6 | | @ 5' Silty SAND: moderate yellowish-brown, slightly moist, loose; trace pea gravel<br>@ 7' Hard Drilling, large gravel in cuttings | |
| 1288 | 10 | | R-3 | 46<br>50/4" | | | | @ 10' Silty SAND with Gravel: pale yellowish-brown to moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, trace silt pockets | |
| 1283 | 15 | | SPT-1 | 13<br>16<br>11 | | | | @ 15' Silty SAND: dark yellowish-brown, slightly moist, medium dense; fine to medium grained, trace gravel | |
| 1278 | 20 | | R-4 | 4<br>7<br>8 | 108.0 | 11.5 | | @ 20' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, loose; fine to medium grained, trace pea to 3/4" gravel | |
| 1273 | 25 | | SPT-2 | 16<br>22<br>20 | | | | @ 25' Silty SAND with Gravel: dark yellowish-brown, slightly moist, dense; fine to coarse grained | SHA |
| 1268 | 30 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-3

| | |
|---|---|
| Date: 1/03/07 | Page: 2 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1298 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1268 | 30 | | R-5 | 30<br>50/6" | 114.3 | 9.3 | SM | @30' Silty SAND with Gravel: dark yellowish-brown to moderate yellowish-brown, slightly moist, dense; fine to coarse grained | CN |
| 1263 | 35 | | SPT-3 | 50/6' | | | | @ 35' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, very dense; fine to medium grained<br>@ 37' Hard Drilling | |
| 1258 | 40 | | R-6 | 19<br>20<br>21 | 112.2 | 6.7 | | @ 40' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense; medium to coarse grained | DS |
| 1253 | 45 | | SPT-4 | 17<br>11<br>10 | | | | @ 45' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; medium to coarse grained, some silt | SA |
| 1248 | 50 | | NR | 50/6" | | | | @ 50' No Recovery | |
| 1243 | 55 | | | | | | | | |
| 1238 | 60 | | | | | | | | |

**Notes:**
-Total Depth = 50' 6"
-Backfilled with Native Soil (Cuttings)
-No Groundwater Encountered

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# Geotechnical Boring Log B-LGC-4

| | |
|---|---|
| Date: 1/03/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1302 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1302 | 0 | | BULK | | | | SM | **Alluvium (Qal):**<br>Silty SAND - moderate yellowish-brown, dry | |
| | | | R-1 | 6<br>9<br>15 | | | | @ 2.5' Silty SAND with Gravel: moderate yellowish-brown, dry, medium dense; fine grained | |
| 1297 | 5 | | NR | 17<br>50/3" | | | | @ 5' No Recovery | |
| 1292 | 10 | | R-2 | 11<br>13<br>14 | 107.3 | 4.7 | | @ 10' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense | |
| 1287 | 15 | | R-3 | 10<br>39<br>50/2" | | | | @ 15' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, very dense; trace clay pockets, trace large gravel | |
| 1282 | 20 | | R-4 | 12<br>15<br>9 | 103.9 | 6.5 | SP | @ 20' SAND: pale yellowish-brown, slightly moist, medium dense; fine to coarse grained | |
| 1277 | 25 | | SPT-1 | 2<br>3<br>4 | | | SM | @ 25' Silty SAND: moderate yellowish-brown, slightly moist, loose; fine to medium grained, trace gravel | SA |
| 1272 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-4

| | |
|---|---|
| Date: 1/03/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1302 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1272 | 30 | | SPT-2 | 43<br>18<br>38 | | | SM | @30' Silty SAND: moderate yellowish-brown, slightly moist, very dense; trace gravel | |
| 1267 | 35 | | R-5 | 26<br>31<br>50 | 109.6 | 4.7 | SP | @ 35' SAND with Gravel: moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, trace gravel | |
| 1262 | 40 | | SPT-3 | 7<br>10<br>50/3" | | | SM | @ 40' Silty SAND: moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, trace gravel | |
| 1257 | 45 | | R-6 | 23<br>26<br>44 | 112.7 | 6.9 | SP-SM | @ 45' SAND to Silty Sand: moderate yellowish-brown, slightly moist, dense; fine to coarse grained, trace gravel | DS |
| 1252 | 50 | | SPT-4 | 10<br>12<br>14 | | | SM | @ 50' Silty SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to medium grained, some gravel<br>@ 53' Hard Drilling, added ~3 gal water | SHA |
| 1247 | 55 | | R-7 | 50/3" | | | | @ 55' Silty SAND: moderate yellowish-brown, slightly moist to moist, dense; fine to coarse grained, some gravel | |
| 1242 | 60 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-4

| | |
|---|---|
| Date: 1/03/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1302 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1242 | 60 | | SPT-5 | 50/4" | | | SM | @ 60' Silty SAND: moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, some gravel<br>@ 63.5' Groundwater Encountered | |
| 1237 | 65 | | SPT-6 | 22<br>50/6" | | | | @ 65' Silty SAND: moderate yellowish-brown, moist, very dense; fine grained | |
| 1232 | 70 | | SPT-7 | 50/3" | | | | **Bedrock - Saugus Formation (QTs):**<br>@ 70' Siltstone to Sandstone: pale yellowish-brown to moderate yellowish-brown, hard | |
| 1227 | 75 | | SPT-8 | 50/5" | | | | @ 75' Siltstone to Sandstone: pale yellowish-brown, hard | |
| 1222 | 80 | | | | | | | **Notes:**<br>-Total Depth =75' 6"<br>-Backfilled with Native Soil (Cuttings)<br>-Groundwater Encountered at 63' 6" | |
| 1217 | 85 | | | | | | | | |
| 1212 | 90 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-5

| | |
|---|---|
| Date: 1/04/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1309 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1309 | 0 | | BULK | | | | SM | **Alluvium (Qal):**<br>Silty SAND - moderate yellowish-brown, dry | EI<br>COR |
| | | | R-1 | 2<br>3<br>5 | 107.9 | 9.1 | | @ 2.5' Silty SAND: moderate yellowish-brown, slightly moist, loose | |
| 1304 | 5 | | NR | 30<br>14<br>13 | | | | @ 5' No Sample Recovery - rock in sampler | |
| 1299 | 10 | | R-2 | 19<br>20<br>21 | 119.2 | 7.3 | | @ 10' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense; gravel up to 3/4" | |
| 1294 | 15 | | SPT-1 | 5<br>3<br>2 | | | SP | @ 15' SAND: dark yellowish-orange, slightly moist, very loose; clean fine grained, trace gravel | |
| 1289 | 20 | | R-3 | 21<br>50/6" | | | | @ 20' SAND: dark yellowish-orange, slightly moist, dense; fine grained, some gravel 1mm to 1/2" | |
| 1284 | 25 | | SPT-2 | 10<br>12<br>12 | | | SM | @ 25' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to medium grained, trace gravel | SHA |
| 1279 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-5

| | |
|---|---|
| Date: 1/04/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1309 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1279 | 30 | | R-4 | 14<br>21<br>50/5" | 115.8 | 9.4 | SM | @30' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, dense; fine to medium grained | |
| 1274 | 35 | | SPT-3 | 13<br>18<br>22 | | | | @ 35' Silty SAND with Gravel: dark yellowish0orange to grayish orange, slightly moist, medium dense; fine grained, 3/4" gravel | |
| 1269 | 40 | | R-5 | 19<br>29<br>40 | 117.8 | 7.8 | | @ 40' Silty SAND with Gravel: moderate yellowish-brown to pale yellowish-brown, slightly moist, dense; fine grained, some gravel | |
| 1264 | 45 | | SPT-4 | 6<br>11<br>15 | | | | @ 45' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, trace gravel | |
| 1259 | 50 | | R-6 | 39<br>35<br>37 | 118.8 | 8.7 | | @ 50' Silty SAND: moderate yellowish-brown to dark yellowish-orange, slightly moist, dense; fine grained, pea to 3/4" gravel, trace fossils | DS |
| 1254 | 55 | | SPT-5 | 11<br>12<br>11 | | | | @ 55' Silty SAND with Gravel, moderate yellowish-brown, moist-wet, medium dense; fine to coarse, pea to 3/4" gravel<br>▽ | SHA |
| 1249 | 60 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-5

| | |
|---|---|
| Date: 1/04/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1309 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1249 | 60 | | SPT-6 | 13 16 20 | | | SM | @ 60' Silty SAND with Gravel: pale yellowish-brown to dark yellowish-orange, wet, dense; fine to medium grained, some gravel pea to 3/4", trace carbon chips | |
| 1244 | 65 | | SPT-7 | 22 50/5" | | | | @ 65' Silty SAND with Gravel: pale yellowish-brown, wet, dense; fine to coarse grained, pea to 1/2" gravel | |
| 1239 | 70 | | SPT-8 | 23 24 32 | | | | @ 70' Silty SAND with Gravel: moderate yellowish-brown, wet, very dense; fine to coarse grained, pea to 3/4" gravel | |
| 1234 | 75 | | SPT-9 | 50/5" | | | SP | @ 75' SAND: pale blue, wet, dense; medium to coarse grained, unoxidized | |
| 1229 | 80 | | | | | | | **Notes:**<br>-Total Depth = 75' 6"<br>-Backfilled with Native Soil (Cuttings)<br>-Groundwater Encountered at 57' 10" | |
| 1224 | 85 | | | | | | | | |
| 1219 | 90 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-6

| | |
|---|---|
| Date: 1/04/07 | Page: 1 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1307 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1307 | 0 | | | | | | SM | @ 0-9": 1" Afu, 2" Asphalt Concrete, 3" Sand, 3" Aggregate Base<br>@ 9"-5.0': Silty SAND with Gravel, dry, first 5.0' hand augered | |
| 1302 | 5 | | R-1 | 33<br>45<br>35 | 114.7 | 3.8 | | @ 5' Silty SAND: pale yellowish-brown, dry, dense; fine grained, abundant 3/4" or larger gravel | |
| 1297 | 10 | | R-2 | 33<br>28<br>25 | 121.8 | 2.5 | | @ 10' Silty SAND: pale yellowish-brown, dry, dense; fine to coarse grained, abundant gravel and rock chips | DS |
| 1292 | 15 | | SPT-1 | 10<br>14<br>7 | | | | @ 15' Silty SAND, moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, some 3/4" minus gravel | |
| 1287 | 20 | | R-3 | 5<br>8<br>9 | 115.0 | 9.1 | | @ 20' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine grained sand | |
| 1282 | 25 | | SPT-2 | 3<br>4<br>4 | | | | @ 25' Silty SAND: moderate yellowish-brown, slightly moist, loose; fine grained | SHA |
| 1277 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-6

| | |
|---|---|
| Date: 1/04/07 | Page: 2 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1307 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1277 | 30 | | R-4 | 18<br>32<br>50/6" | 119.6 | 5.0 | SM | @30' Silty SAND: dark yellowish-orange, slightly moist, very dense; trace gravel pea to 3/4"<br>@ 32' Hard Drilling | DS |
| 1272 | 35 | | SPT-3 | 12<br>9<br>10 | | | | @ 35' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine grained, trace 1/2" gravel | |
| 1267 | 40 | | R-5 | 50/6' | | | | @ 40' Silty SAND: moderate yellowish-brown, slightly moist, dense; fine to coarse grained | |
| 1262 | 45 | | | | | | | **Notes:**<br>-Total Depth = 40' 6"<br>-Backfilled with Native Soil (Cuttings)<br>-No Groundwater Encountered | |
| 1257 | 50 | | | | | | | | |
| 1252 | 55 | | | | | | | | |
| 1247 | 60 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-7

| | |
|---|---|
| Date: 1/04/07 | Page: 1 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1322 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1322 | 0 | | BULK | | | | ML | **Alluvium (Qal):**<br>Sandy SILT - moderate yellowish-brown, dry | |
| | | | R-1 | 6<br>11<br>20 | 118.5 | 7.1 | | @ 2.5' Sandy SILT: moderate yellowish-brown, dry, very stiff | |
| 1317 | 5 | | R-2 | 6<br>7<br>6 | 110.8 | 8.3 | SC | @ 5' Clayey SAND: moderate yellowish-brown, dry, medium stiff; trace pea gravel | DS |
| 1312 | 10 | | R-3 | 36<br>50/3" | 103.0 | 5.3 | SM | @ 10' Silty SAND: moderate yellowish-brown, slightly moist, very dense; some gravel to 3/4" | |
| 1307 | 15 | | R-4 | 17<br>43<br>27 | 124.7 | 2.5 | | @ 15' Silty SAND: moderate yellowish-brown, slightly moist, dense; fine to coarse, some gravel to 3/4" | |
| 1302 | 20 | | SPT-1 | 6<br>6<br>11 | | | | @ 20' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, some gravel pea to 3/4" | |
| 1297 | 25 | | R-5 | 11<br>48<br>35 | 126.1 | 5.2 | | @ 25' Silty SAND: dark yellowish-orange, slightly moist, very dense; fine to coarse grained, some gravel pea to 3/4" | DS |
| 1292 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-7

| | |
|---|---|
| Date: 1/04/07 | Page: 2 of 2 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1322 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1292 | 30 | | SPT-2 | 41<br>21<br>24 | | | SM | @ 30' Silty SAND: grayish-orange, slightly moist, dense; fine to coarse grained, abundant gravel pea to 3/4"<br>@ 32' Hard Drilling | |
| 1287 | 35 | | R-6 | 50/3" | | | | @ 35' Silty SAND: dark yellowish-orange, slightly moist, very dense; fine to coarse, abundant gravel pea to 3/4" | |
| 1282 | 40 | | SPT-3 | 5<br>6<br>6 | | | | @ 40' Silty SAND: dark yellowish-orange, slightly moist, medium dense; medium to coarse grained, trace gravel | |
| 1277 | 45 | | | | | | | **Notes:**<br>-Total Depth = 41' 6"<br>-Backfilled with Native Soil (Cuttings)<br>-No Groundwater Encountered | |
| 1272 | 50 | | | | | | | | |
| 1267 | 55 | | | | | | | | |
| 1262 | 60 | | | | | | | | |

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# Geotechnical Boring Log B-LGC-8

| | |
|---|---|
| Date: 1/05/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1328 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1328 | 0 | | BULK | | | | SC | 2.5" Asphalt Concrete over 6" Aggregate Base over Clayey SAND | |
| | | | R-1 | 5<br>5<br>5 | | | | @ 2.5' Clayey SAND: moderate yellowish-brown, moist, loose | |
| 1323 | 5 | | R-2 | 3<br>3<br>10 | 109.8 | 10.0 | | @ 5' Same as at 2.5' | |
| 1318 | 10 | | R-3 | 18<br>40<br>33 | | | SM | @ 10' Silty SAND: dusky yellowish-brown, slightly moist, dense; trace pea gravel | |
| 1313 | 15 | | SPT-1 | 4<br>9<br>9 | | | | @ 15' Silty SAND: pale yellowish-brown to moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, some gravel | |
| 1308 | 20 | | R-4 | 19<br>25<br>17 | 117.1 | 7.5 | SP | @ 20' SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense, fine to coarse grained | |
| 1303 | 25 | | SPT-2 | 9<br>7<br>7 | | | SM | @ 25' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained | SHA |
| 1298 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-8

| | |
|---|---|
| Date: 1/05/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1328 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1298 | 30 | | R-5 | 24<br>50/4" | 113.4 | 7.1 | SP | @ 30' SAND: moderate yellowish-brown, slightly moist, dense; medium to coarse grained, trace gravel<br>@ 33.5' Hard Drilling | |
| 1293 | 35 | | SPT-3 | 22<br>20<br>9 | | | SM | @ 35' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; medium to coarse grained, trace gravel | SA |
| 1288 | 40 | | R-6 | 26<br>26<br>29 | 119.5 | 15.4 | SC | @ 40' Clayey SAND with Gravel: moderate yellowish-brown to light brown, moist, dense; fine grained, some silt<br>@ 42' Groundwater Encountered | CN |
| 1283 | 45 | | SPT-4 | 15<br>50/5" | | | SM | @ 45' Silty SAND with Gravel: moderate yellowish-brown, wet, very dense; fine to coarse grained, some gravel | |
| 1278 | 50 | | SPT-5 | 13<br>16<br>24 | | | | @ 50' Same as at 45', dense, rust-colored staining | |
| 1273 | 55 | | SPT-6 | 11<br>25<br>50/5" | | | | @ 55' Same as at 45', dark yellowish-brown | |
| 1268 | 60 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-8

| | |
|---|---|
| Date: 1/05/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1328 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1268 | 60 | | SPT-7 | 10<br>14<br>39 | | | SM | @ 60' Silty SAND with Gravel: olive gray, wet, very dense; fine to coarse grained, some gravel | |
| 1263 | 65 | | SPT-8 | 36<br>50/3" | | | | **Bedrock: Saugus Formation (QTs):**<br>@ 65' Sandstone: grayish-green, very dense; medium grained, unoxidized | |
| 1258 | 70 | | SPT-9 | 46<br>50/3" | | | | @ 70' Sandstone: pale olive, very dense; unoxidized, some reddish-purple layers | |
| 1253 | 75 | | SPT-10 | 50/3" | | | | @ 75' Sandstone: pale olive, very dense; fine to coarse grained, unoxidized | |
| 1248 | 80 | | | | | | | **Notes:**<br>-Total Depth =75.25'<br>-Backfilled with Native Soil (Cuttings) and capped with Asphalt Cold Patch<br>-Groundwater Encountered at 42' | |
| 1243 | 85 | | | | | | | | |
| 1238 | 90 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-9

| | |
|---|---|
| Date: 1/05/07 | Page: 1 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1336 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1336 | 0 | | BULK | | | | SM | 3" Asphalt Concrete over Silty SAND | |
| | | | R-1 | 8<br>9<br>10 | | | | @ 2.5' Silty SAND: dark yellowish-brown, slightly moist, medium dense; trace gravel, fine grained | |
| 1331 | 5 | | R-2 | 4<br>5<br>5 | 113.7 | 11.2 | SC | @ 5' Clayey SAND: dark yellowish-brown, slightly moist, loose; trace gravel, fine grained, rootlets | |
| 1326 | 10 | | R-3 | 28<br>40<br>34 | | | SM | @ 10' Silty SAND: dark grayish-brown, slightly moist, dense; coarse grained, caliche blebs, trace gravel | |
| 1321 | 15 | | R-4 | 9<br>16<br>12 | 114.1 | 3.3 | SP | @ 15' SAND: pale yellowish-brown, slightly moist, medium dense; medium to coarse grained | |
| 1316 | 20 | | SPT-1 | 50/6" | | | | @ 20' SAND: pale yellowish-brown, slightly moist, very dense; fine to coarse grained, some gravel | |
| 1311 | 25 | | R-5 | 20<br>35<br>42 | 122.5 | 4.5 | SM | @ 25' Silty SAND: dark yellowish-brown to light reddish-brown, slightly moist, dense; rust-colored staining | CN |
| 1306 | 30 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-9

| | |
|---|---|
| Date: 1/05/07 | Page: 2 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1336 feet | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1306 | 30 | | SPT-2 | 14 19 20 | | | SM | @30' Silty SAND: dark yellowish-brown to dark yellowish-orange, slightly moist, dense; fine to coarse grained | |
| 1301 | 35 | | R-6 | 11 26 47 | 127.8 | 7.8 | SC | ▽ @ 35' Clayey SAND: dark yellowish-brown to dark yellowish-orange, wet, dense; some gravel, Groundwater Encountered | DS |
| 1296 | 40 | | SPT-3 | 10 23 25 | | | SM | @ 40' Silty SAND: dark yellowish-brown, wet, dense | |
| 1291 | 45 | | SPT-4 | 15 15 50/6" | | | | @ 45' Silty SAND: olive-gay to dusky red, wet, very dense | |
| 1286 | 50 | | SPT-5 | 23 23 17 | | | | @ 50' Silty SAND: olive-gray, wet, dense, fine to coarse grained, some silt and gravel | |
| 1281 | 55 | | SPT-6 | 9 13 14 | | | | @ 55' Silty SAND: moderate yellowish-brown, slightly moist to moist, dense; fine to coarse grained, some gravel | |
| 1276 | 60 | | | | | | | | |

LGC

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# Geotechnical Boring Log B-LGC-9

| | |
|---|---|
| Date: 1/05/07 | Page: 3 of 3 |
| Project Name: Monteverde Development | Project Number: 033022-05 |
| Drilling Company: 2R Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1336 feet | Hole Location: See Map |

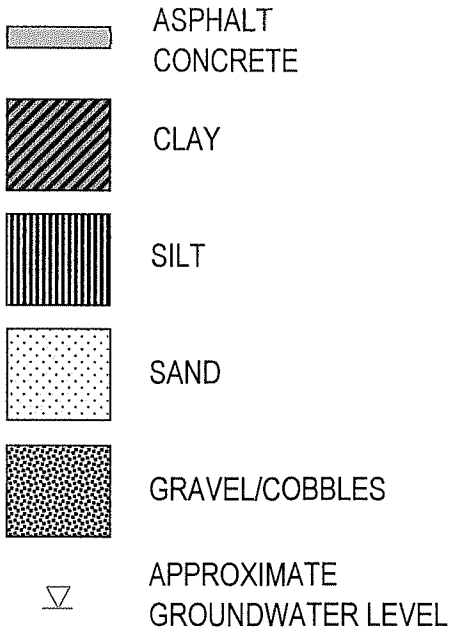
| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: CRK<br>Sampled By: CRK | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1276 | 60 | | SPT-7 | 3 4 7 | | | SM | @ 60' Silty SAND: moderate yellowish-brown, slightly moist to moist, dense; fine grained, some gravel | SHA |
| 1271 | 65 | | SPT-8 | 13 15 18 | | | | @ 65' Silty SAND: olive-gray, wet, dense; trace unoxidized pale blue sand | |
| 1266 | 70 | | SPT-9 | 50/5" | | | | **Bedrock: Saugus Formation (QTs):**<br>@ 70' Sandstone: pale blue, very dense; unoxidized, fine to coarse grained, some gravel | |
| 1261 | 75 | | SPT-10 | 50/5" | | | | @ 75' Sandstone: dusky yellow-green, very dense; unoxidized, trace gravel, some grayish-purple sand layers | |
| 1256 | 80 | | | | | | | **Notes:**<br>-Total Depth =75.5'<br>-Backfilled with Native Soil (Cuttings) and capped with Asphalt Cold Patch<br>-Groundwater Encountered at 35' | |
| 1251 | 85 | | | | | | | | |
| 1246 | 90 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

LGC VALLEY, INC.
THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED

## Key to Boring Logs




## Laboratory Test Symbols

| Symbol | Laboratory Test |
|---|---|
| SA | Sieve Analysis |
| H | Hydrometer Analysis |
| SHA | Sieve & Hydrometer Analysis |
| -200 | Percent Passing #200 Sieve |
| AL | Atterberg Limits |
| MAX | Maximum Density |
| DS | Undisturbed Direct Shear |
| RDS | Remolded Direct Shear |
| TRI | Triaxial Shear |
| EI | Expansion Index |
| P | Permeability |
| CN | Consolidation |
| COL | Collapse |
| UC | Unconfined Compression |
| S | Sulfate Content |
| pHR | pH & Resistivity |
| COR | Corrosion Suite (pH, Resistivity, Chloride, Sulfate) |
| RV | R-Value |

# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 12/06/04 | Page: 1 of 2 |
| Project Name: Monteverde - Phase II | Project Number: 033022-03 |
| Drilling Company: Jet Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: -- | Hole Location: See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | | BULK | | | | ML | @ 0' Sandy SILT: dark yellowish-brown, slightly moist | |
| | | | 1 | 37 | 102.0 | 15.0 | | @ 2.5' Sandy SILT with Gravel and Cobbles: dark yellowish-brown, slightly moist, dense; some red staining | |
| | 5 | | 2 | 66 | 111.6 | 6.7 | SP | @ 5' SAND with Gravel and Cobbles: dark yellowish-brown, slightly moist, dense; some red staining | |
| | 10 | | 3 | 30 | | | SM | @ 10' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; some gravel and cobbles, sand is fine to coarse grained, 12" recovery | |
| | 15 | | NR | 50/3" | | | | @ 14' Hard Drilling (Cobbles)<br>@ 15' No Recovery - Cobbles | |
| | 20 | | 4 | 17 | | | | @ 20' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace gravel | COL |
| | 25 | | 5 | 50 | | | SP | @ 25' SAND with Gravel: moderate yellowish-brown, slightly moist, dense; sand is fine to coarse grained, some silt | |
| | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 12/06/04 |  |
| Project Name: Monteverde - Phase II | Project Number: 033022-03 |
| Drilling Company: Jet Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: -- | Hole Location: See Map |

Logged By: SLV

Sampled By: SLV

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| | 30 | | 6 | 70 | 118.3 | 6.2 | SP | @ 30' SAND with Gravel and Cobbles: moderate yellowish-brown, slightly moist, dense; some silt, some orange-reddish staining, fine to coarse grained sand | |
| | 35 | | 7 | 35 | | | SM | @ 35' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, dense; some dark reddish-brown clay pockets, sand is fine to coarse grained, some silt, 13" recovery | |
| | 40 | | 8 | 31 | | | SP | @ 40' SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense to dense; some silt, fine to coarse grained sand, 13" recovery | |
| | 45 | | 9 | 34<br>50/3" | | | | @ 44' Hard Drilling<br>@ 45' Same as at 40', very dense, 8" recovery<br>@ 47' Very Hard Drilling (Cobbles)<br>@ 47.5' End of Boring (Refusal) | |
| | 50 | | | | | | | **Notes:**<br>-Total Depth = 47.5'<br>-Backfilled with Native Soil (Cuttings)<br>-No Groundwater Encountered | |
| | 55 | | | | | | | | |
| | 60 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-3

| | |
|---|---|
| Date: 12/06/04 | Page: 1 of 1 |
| Project Name: Monteverde - Phase II | Project Number: 033022-03 |
| Drilling Company: Jet Drilling | Type of Rig: CME-75 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: -- | Hole Location: See Map |

Logged By: SLV

Sampled By: SLV

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | ML | @ 0' Sandy SILT: dark yellowish-brown, slightly moist | |
| | | | 1 | 92 | 125.3 | 8.1 | SM | @ 2.5' Silty SAND with Gravel: dark yellowish-brown, slightly moist, very dense; fine to coarse grained sand, scattered orange-red staining | |
| | 5 | | 2 | 64 | 122.2 | 7.0 | | @ 5' Same as at 2.5', moderate yellowish-brown, dense | |
| | 10 | | 3 | 12 | | | | @ 10' Silty SAND: dark grayish-brown, slightly moist, medium dense; some gravel | SHA |
| | 15 | | 4 | 38 | 116.2 | 9.9 | SP | @ 15' SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained sand | |
| | | | | | | | | @ 18' Very Hard Drilling | |
| | 20 | | NR | 50/5" | | | GP | @ 20' No Recovery - Gravel and Cobbles | |
| | | | | | | | | @ 23' Hard Drilling | |
| | 25 | | NR | 50/2" | | | | @ 25' No Recovery - Gravel and Cobbles | |
| | | | 5 | 50/5" | | | | @ 28' Gravel and Cobbles: sample bagged, | |
| | 30 | | | | | | | @ 28.5' End of Boring (Refusal) | |

**Notes:**
-Total Depth = 28.5'
-Backfilled with Native Soil (Cuttings)
-No Groundwater Encountered

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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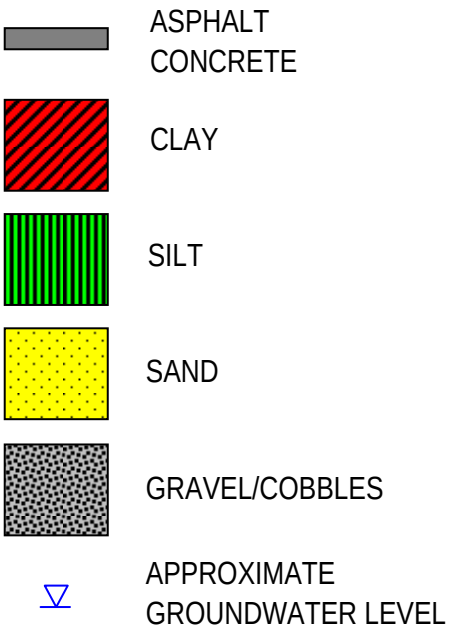
## Key to Boring Logs




## Laboratory Test Symbols

| Symbol | Laboratory Test |
|---|---|
| SA | Sieve Analysis |
| H | Hydrometer Analysis |
| SHA | Sieve & Hydrometer Analysis |
| -200 | Percent Passing #200 Sieve |
| AL | Atterberg Limits |
| MAX | Maximum Density |
| DS | Undisturbed Direct Shear |
| RDS | Remolded Direct Shear |
| TRI | Triaxial Shear |
| EI | Expansion Index |
| P | Permeability |
| CN | Consolidation |
| COL | Collapse |
| UC | Unconfined Compression |
| S | Sulfate Content |
| pHR | pH & Resistivity |
| COR | Corrosion Suite (pH, Resistivity, Chloride, Sulfate) |
| RV | R-Value |

# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 2/03/04 | Page: 1 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1298 ft | Hole Location: On Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1298 | 0 | | BULK | | | | SM | @ 0' Silty SAND with trace clay | |
| | | | 1 | 25 | 99.6 | 6.0 | | @ 2.5' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace clay and gravel | |
| 1293 | 5 | | 2 | 73 | | | | @ 5' More gravel | |
| | | | 3 | 35 | | | | @ 7.5' Silty SAND: moderate yellowish-brown to dark yellowish-brown, slightly moist, dense; little gravel (crushed rock), no clay | |
| 1288 | 10 | | 4 | 5<br>17<br>50/1" | 101.8 | 7.0 | SP-SM | @ 10' SAND to Silty SAND: moderate yellowish-brown, slightly moist, dense; trace gravel | |
| 1283 | 15 | | 5 | 35 | | 5.8 | | @ 15' SAND to Silty SAND with crushed rock: moderate yellowish-brown, slightly moist, dense; only 10" recovered, fine to medium grained | |
| 1278 | 20 | | 6 | 65 | | 9.3 | SM | @ 20' Silty SAND: moderate yellowish-brown, moist, dense; trace clay, some gravel and trace cobbles | |
| 1273 | 25 | | NS | 24 | | | | @ 25' No Sample - sampler empty, medium dense | |
| 1268 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-1

| | |
|---|---|
| Date: 2/03/04 | Page: 2 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1298 ft | Hole Location: On Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1268 | 30 | | 7 | 23 | | 7.0 | SM | @ 30' Silty SAND: moderate yellowish-brown, moist, medium dense; fine to course grained, little gravel | |
| 1263 | 35 | | 8 | 20 | | | SM | @ 35' Silty SAND: moderate yellowish-brown to dark yellowish-brown, moist, medium dense; no gravel | |
| 1258 | 40 | | 9 | 54 | | 8.3 | | @ 40' with gravel (crushed rock), dense | |
| 1253 | 45 | | 10 | 26 | | | SM | @ 45' Silty SAND: moderate yellowish-brown, moist, medium dense; fine to course grained, trace gravel<br>@ 48' Hard drilling | |
| 1248 | 50 | | 11 | 35 | | 10.5 | | @ 50' Very moist, little gravel | |
| 1243 | 55 | | | | | | | **Notes:**<br>-Total Depth = 51.5'<br>-No Groundwater Encountered<br>-Backfilled with Native (Cuttings) | |
| 1238 | 60 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-2

| | |
|---|---|
| Date: 2/03/04 | Page: 1 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1301 ft | Hole Location: In Field - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1301 | 0 | | BULK | | | | | @ 0' Grass/organic material in silty SAND | |
| | | | 1 | 11 | | | SM | @ 2.5' Silty Fine SAND: moderate yellowish brown to pale yellowish-brown, slightly moist, loose; roots, trace gravel and silt | |
| 1296 | 5 | | 2 | 18 | 96.5 | 8.0 | SP-SM | @ 5' SAND to Silty SAND: moderate yellowish-brown, slightly moist, medium dense; roots, little gravel | |
| | | | 3 | 4 | | | SM | @ 7.5' Silty Fine SAND: moderate yellowish-brown, slightly moist, very loose; no gravel | |
| 1291 | 10 | | 4 | 7 | | | | @ 10' Silty SAND: moderate yellowish-brown, slightly moist, loose; moderate yellowish-brown to pale yellowish-brown clay lenses in top 1' of sampler, trace organic material | |
| 1286 | 15 | | 5 | 17 | | 4.9 | SM | @ 15' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to medium grained, no gravel | |
| 1281 | 20 | | 6 | 74 | | | | @ 20' Silty SAND with Gravel: moderate yellowish-brown, slightly moist to moist, dense | |
| 1276 | 25 | | 7 | 44 | | 6.8 | | @ 25' Slightly moist, crushed whitish-gray rock in bottom 4" of sampler, little gravel above | |
| 1271 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-2

| | |
|---|---|
| Date: 2/03/04 | Page: 2 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1301 ft | Hole Location: In Field - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1271 | 30 | | 8 | 29 | | | SM | @ 30' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace gravel, fine to medium grained | |
| 1266 | 35 | | 9 | 23 | | 8.0 | | @ 35' More gravel (crushed rock) | |
| 1261 | 40 | | 10 | 56 | | | | @ 40' Fine to course grained, large crushed rock (rock fragments) at 40.5', only 5 rings, dense | |
| 1256 | 45 | | 11 | 27 | | | | @ 45' Trace gravel, fine to medium grained | |
| 1251 | 50 | | 12 | 84 | | | | @ 50' Fine to course grained with more gravel, very dense | |
| 1246 | 55 | | | | | | | **Notes:**<br>-Total Depth = 51.5'<br>-No Groundwater Encountered<br>-Backfilled with Native (Cuttings) | |
| 1241 | 60 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-3

| | |
|---|---|
| Date: 2/03/04 | Page: 1 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 ft | Hole Location: Side of Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1303 | 0 | | | | | | ML | @ 0' Sandy SILT with grass/small plants | |
| | | | 1 | 9 | | | | @ 2.5' Sandy SILT: moderate yellowish-brown, slightly moist, loose | |
| 1298 | 5 | | 2 | 3 | 93.3 | 8.0 | | @ 5' Trace gravel | |
| | | | 3 | 7 | | | | @ 7.5' No gravel | |
| 1293 | 10 | | 4 | 11 | | | | @ 10' White stringers, trace clay | |
| 1288 | 15 | | 5 | 15 | | 5.8 | SM | @ 15' Silty SAND: moderate yellowish-brown, slightly moist, Medium dense; trace gravel | |
| 1283 | 20 | | 6 | 29 | | | | @ 20' medium dense | |
| 1278 | 25 | | 7 | 16 | | 9.5 | | | |
| 1273 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-3

| | |
|---|---|
| Date: 2/03/04 | Page: 2 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 ft | Hole Location: Side of Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1273 | 30 | | 8 | 27 | | | SM | @ 30' Silty SAND: pale yellowish-brown to moderate yellowish-brown, slightly moist, medium dense; fine-grained<br><br>**Notes:**<br>-Total Depth = 31.5'<br>-No Groundwater Encountered<br>-Backfilled with Native (Cuttings) | |
| 1268 | 35 | | | | | | | | |
| 1263 | 40 | | | | | | | | |
| 1258 | 45 | | | | | | | | |
| 1253 | 50 | | | | | | | | |
| 1248 | 55 | | | | | | | | |
| 1243 | 60 | | | | | | | | |

LGC

■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-4

| | |
|---|---|
| Date: 2/03/04 | Page: 1 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 ft | Hole Location: In Field - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1303 | 0 | | | | | | | @ 0' Grass/organic material in silty SAND | |
| | | | 1 | 16 | | | SM | @ 2.5' Silty SAND: moderate yellowish-brown to pale yellowish-brown, slightly moist, loose; roots, trace gravel, silt | |
| 1298 | 5 | | 2 | 40 | | 4.8 | | @ 5' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace roots, little gravel, sample in bag (disturbed) | |
| | | | 3 | 5 | | | | @ 7.5' Loose, trace gravel, 12" recovered | |
| 1293 | 10 | | 4 | 26 | 109.2 | 4.0 | | @ 10' Moist, medium dense, fine to course grained | |
| 1288 | 15 | | 5 | 43 | | | | @ 15' With gravel (crushed rock), dense | |
| | | | | | | | | @ 17' Hard Drilling | |
| 1283 | 20 | | 6 | 60 | 92.2 | 8.0 | | @ 20' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, dense, course grained | |
| 1278 | 25 | | 7 | 36 | | 4.5 | | @ 25' Only trace gravel | |
| 1273 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-4

| | |
|---|---|
| Date: 2/03/04 |  |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1303 ft | Hole Location: In Field - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1273 | 30 | | 8 | 49 | | 4.6 | SM | @ 30' Silty SAND: moderate yellowish-brown, slightly moist, dense; with white crushed rock and other gravels<br><br>**Notes:**<br>-Total Depth = 31.5'<br>-No Groundwater Encountered<br>-Backfilled with Native (Cuttings) | |
| 1268 | 35 | | | | | | | | |
| 1263 | 40 | | | | | | | | |
| 1258 | 45 | | | | | | | | |
| 1253 | 50 | | | | | | | | |
| 1248 | 55 | | | | | | | | |
| 1243 | 60 | | | | | | | | |

LGC

■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-5

| | |
|---|---|
| Date: 2/03/04 | Page: 1 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1310 ft | Hole Location: Side of Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1310 | 0 | | | | | | | @ 0' Sandy SILT and trace organic material | |
| | | | 1 | 5 | | | ML | @ 2.5' Sandy SILT: moderate yellowish-brown, slightly moist, soft | |
| 1305 | 5 | | 2 | 12 | 99.4 | 6.0 | SM | @ 5' Silty SAND: moderate yellowish-brown, slightly moist, loose; little gravel (crushed rock) | |
| | | | 3 | 5 | | | | @ 7.5' Only trace gravel | |
| | | | BULK | | | | | | |
| 1300 | 10 | | 4 | 9 | | | | @ 10' Silty Fine SAND: moderate yellowish-brown, slightly moist, loose; no gravel | |
| 1295 | 15 | | 5 | 44 | | 4.4 | SM | @ 15' Silty SAND: moderate yellowish-brown to pale yellowish-brown, slightly moist, dense; little gravel (crushed rock) | |
| 1290 | 20 | | 6 | 26<br>50/3" | | | | @ 20' Silty SAND: moderate yellowish-brown, slightly moist, very dense; fine grained<br>@ 22' Hard Drilling | |
| 1285 | 25 | | 7 | 40 | | 6.0 | | @ 25' Dense, little gravel (crushed rock), fine to medium grained | |
| 1280 | 30 | | | | | | | | |

LGC

■ = Ring sample
⊠ = SPT sample
BULK = Bulk sample

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# Geotechnical Boring Log B-LGC-5

| | |
|---|---|
| Date: 2/03/04 | Page: 2 of 2 |
| Project Name: Monteverde/Hawkbryn Ave. | Project Number: 033022-01 |
| Drilling Company: Prosonic | Type of Rig: CME-85 |
| Drive Weight: 140 lbs. | Drop: 30" Hole Dia: 8" |
| Elevation of Top of Hole: 1310 ft | Hole Location: Side of Access Road - See Map |

| Elevation (ft) | Depth (ft) | Graphic Log | Sample Number | Blow Count | Dry Density (pcf) | Moisture (%) | USCS Symbol | DESCRIPTION<br>Logged By: SLV<br>Sampled By: SLV | Type of Test |
|---|---|---|---|---|---|---|---|---|---|
| 1280 | 30 | | 8 | 12<br>50/3" | | | SM | @ Silty SAND with Gravel: moderate yellowish-brown, slightly moist, very dense; fine to course grained, sample disturbed<br><br>**Notes:**<br>-Total Depth = 30' 9"<br>-No Groundwater Encountered<br>-Backfilled with Native (Cuttings) | |
| 1275 | 35 | | | | | | | | |
| 1270 | 40 | | | | | | | | |
| 1265 | 45 | | | | | | | | |
| 1260 | 50 | | | | | | | | |
| 1255 | 55 | | | | | | | | |
| 1250 | 60 | | | | | | | | |

LGC

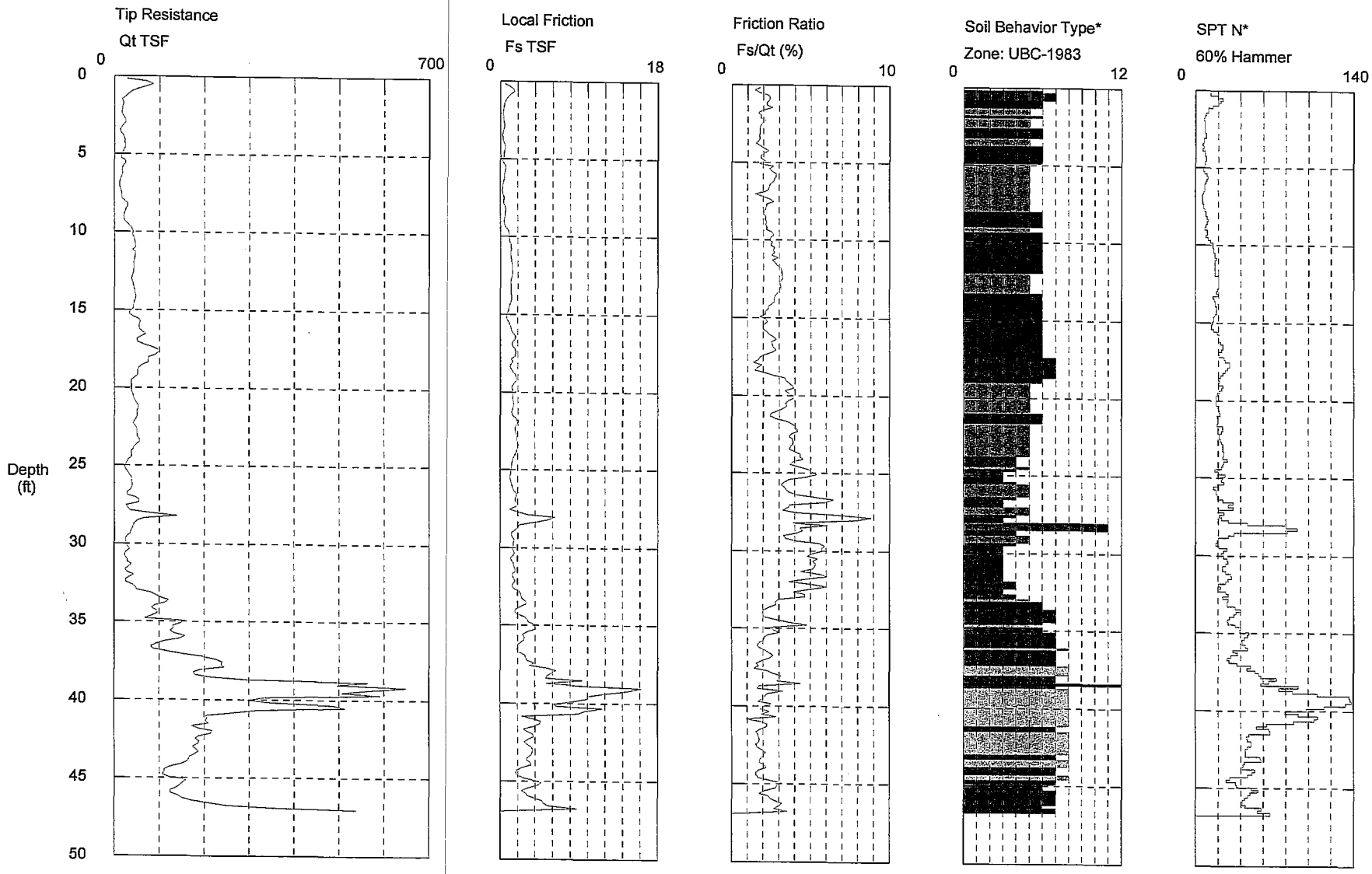
■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

# Lawson & Associates

Operator: Victor & Mike
Sounding: CPT-01
Cone Used: DSA0408

CPT Date/Time: 2/3/2004 11:32:03 AM
Location: Jay Rodgers Comm. Development
Job Number: 033022-01




Maximum Depth = 47.08 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
SDF-01

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

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

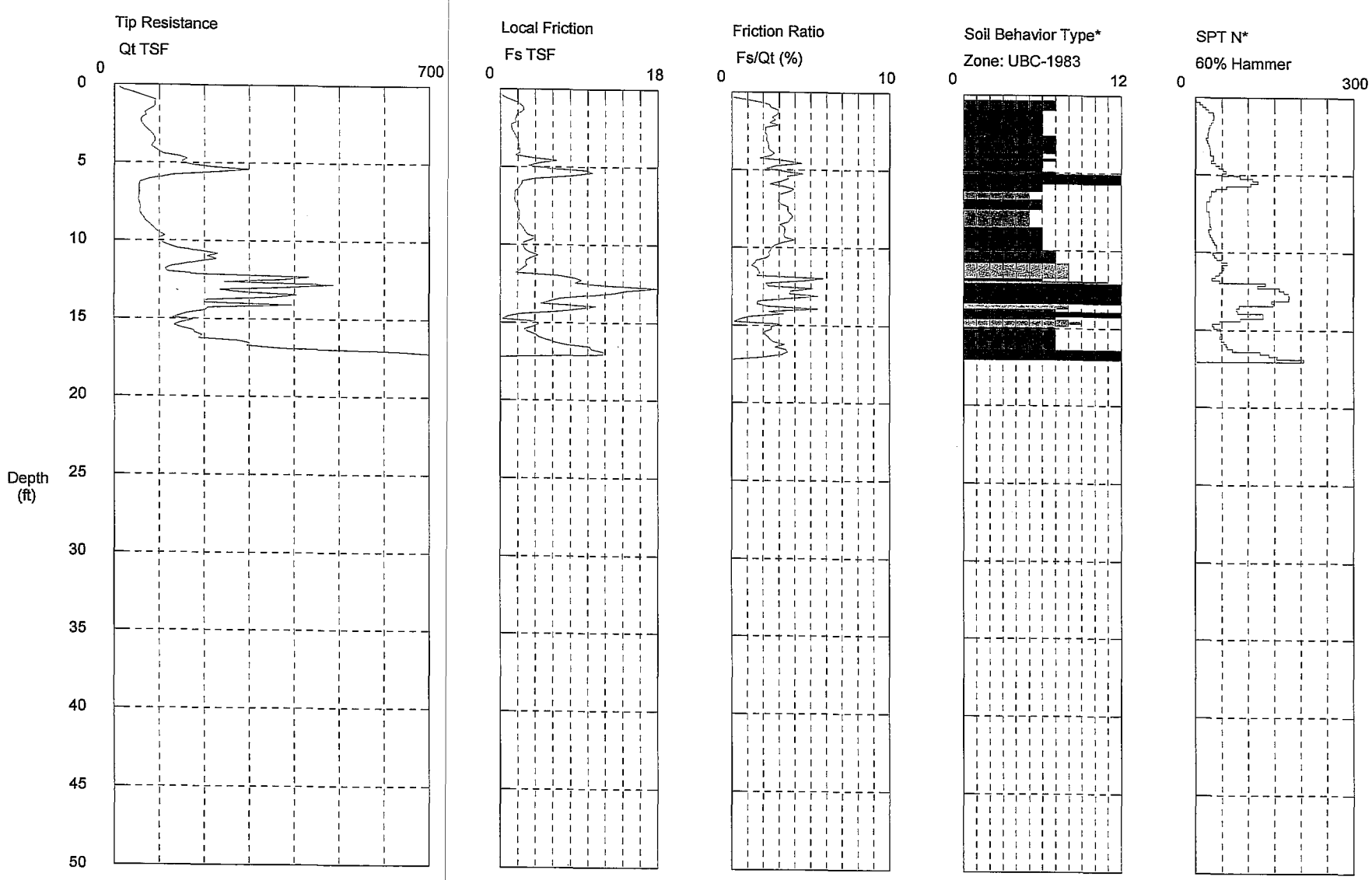
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

# Lawson & Associates

Operator: Victor & Mike
Sounding: CPT-02C
Cone Used: DSA0408

CPT Date/Time: 2/3/2004 3:51:24 PM
Location: Jay Rodgers Comm. Development
Job Number: 033022-01




Maximum Depth = 17.39 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
SDF-10

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

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

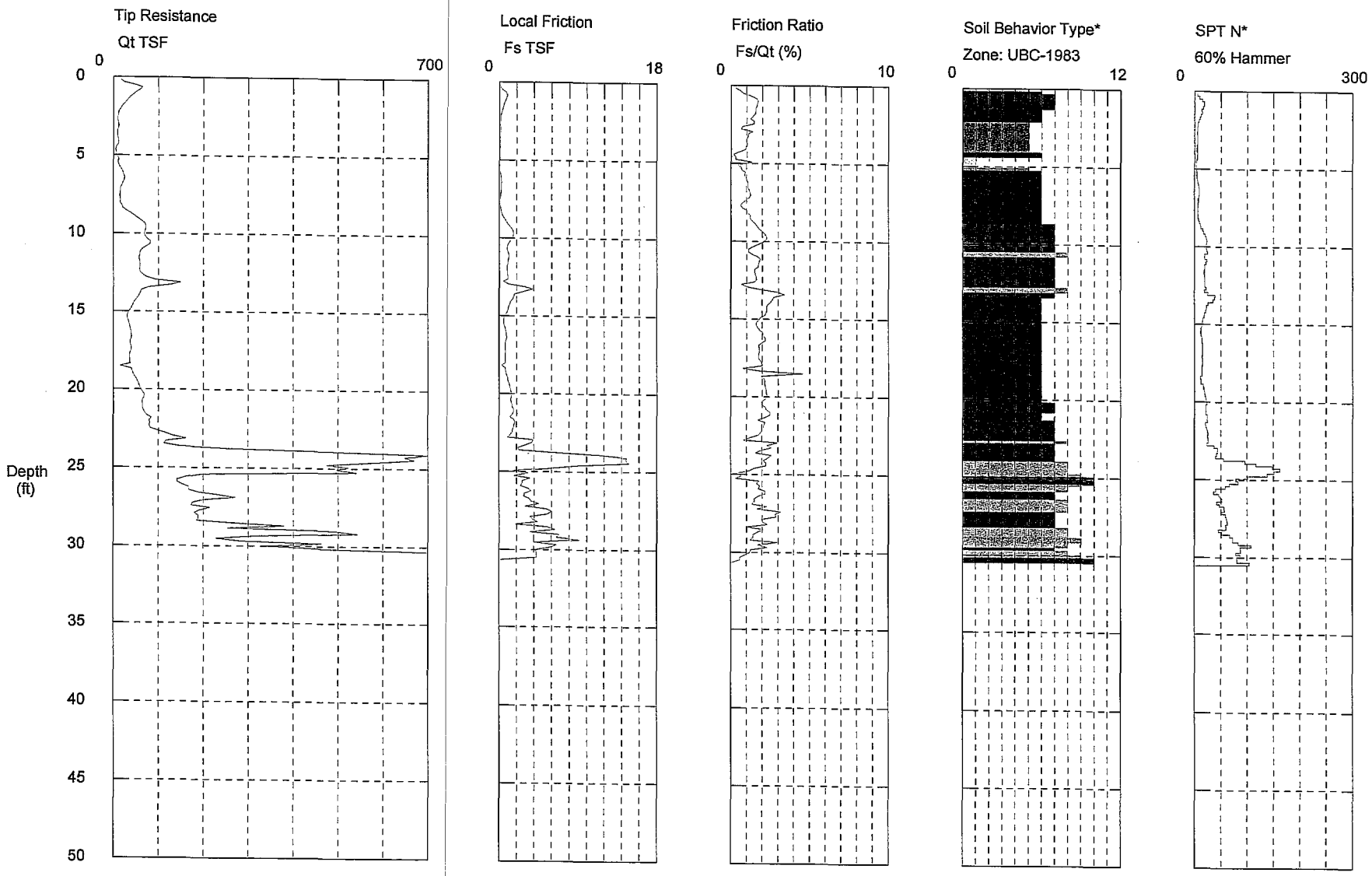
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

# Lawson & Associates

Operator: Victor & Mike
Sounding: CPT-03A
Cone Used: DSA0408

CPT Date/Time: 2/3/2004 1:07:01 PM
Location: Jay Rodgers Comm. Development
Job Number: 033022-01




Maximum Depth = 30.84 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
SDF-03

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

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

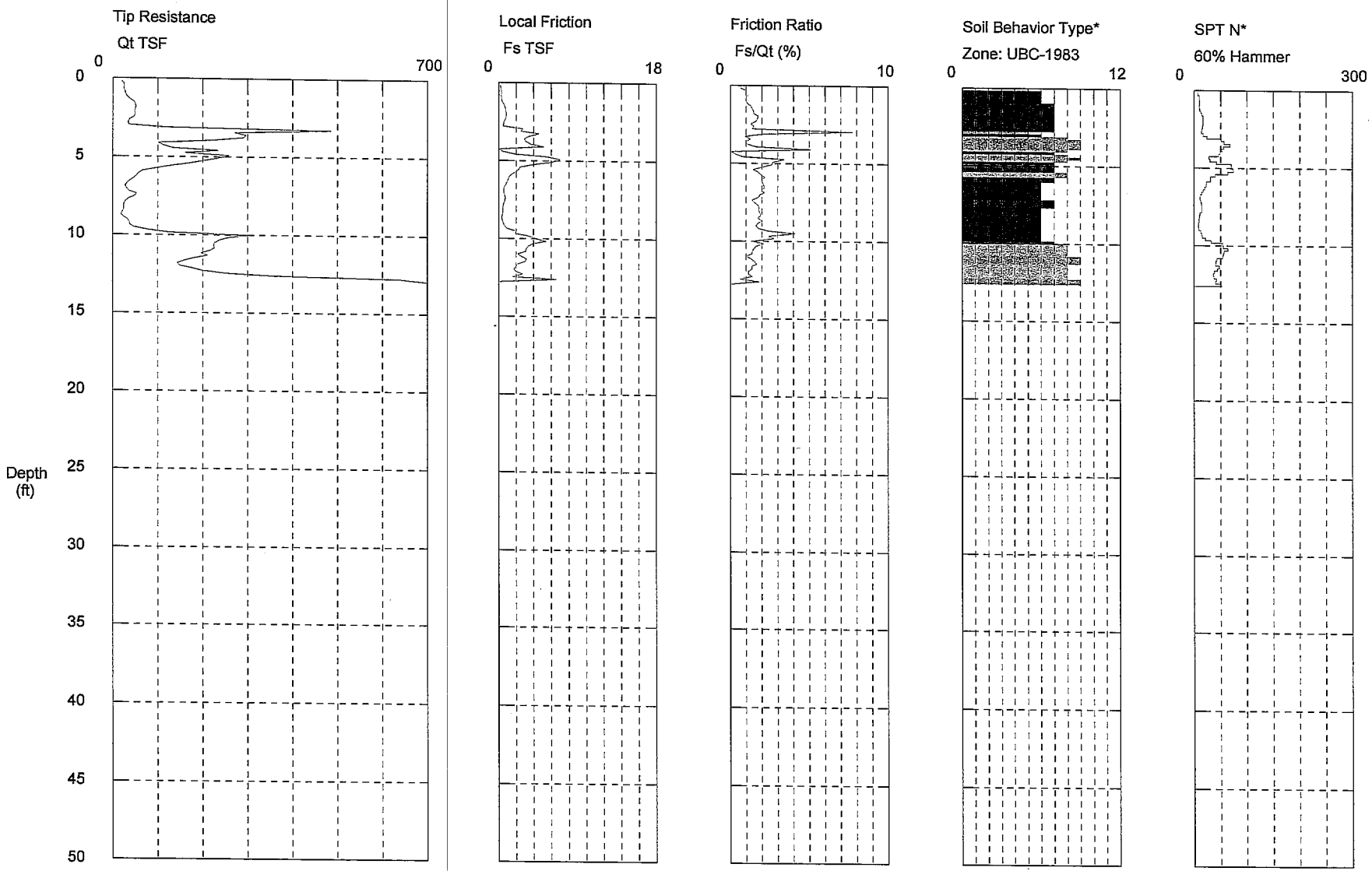
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

# Lawson & Associates

Operator: Victor & Mike
Sounding: CPT-04B
Cone Used: DSA0408

CPT Date/Time: 2/3/2004 2:25:16 PM
Location: Jay Rodgers Comm. Development
Job Number: 033022-01




Maximum Depth = 12.96 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
SFD-06

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

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

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

*Soil behavior type and SPT based on data from UBC-1983

# CPT INTERPRETATIONS

SOUNDING : SDF-01 CPT-01
PROJECT : Jay Rodgers Comm
DATE/TIME: 2/3/2004 11:32:

PROJECT No.: 033022-01
CONE/RIG : DSA0408



| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| .150 | .49 | 84.85 | 1.73 | SILTY SAND to SANDY SILT | 28 | 45 | 72 | | |
| .300 | .98 | 37.14 | 2.35 | SANDY SILT to CLAYEY SILT | 15 | 24 | | 2.5 | |
| .450 | 1.48 | 15.52 | 2.56 | CLAYEY SILT to SILTY CLAY | 8 | 12 | | 1.0 | |
| .600 | 1.97 | 16.38 | 1.83 | CLAYEY SILT to SILTY CLAY | 8 | 13 | | 1.3 | |
| .750 | 2.46 | 16.29 | 1.92 | CLAYEY SILT to SILTY CLAY | 8 | 13 | | 1.3 | |
| .900 | 2.95 | 23.74 | 1.76 | SANDY SILT to CLAYEY SILT | 9 | 15 | | 1.9 | |
| 1.050 | 3.44 | 11.83 | 1.75 | CLAYEY SILT to SILTY CLAY | 6 | 9 | | .9 | |
| 1.200 | 3.94 | 20.33 | 1.78 | SANDY SILT to CLAYEY SILT | 8 | 13 | | 1.6 | |
| 1.350 | 4.43 | 22.95 | 2.02 | SANDY SILT to CLAYEY SILT | 9 | 15 | | 1.8 | |
| 1.500 | 4.92 | 16.70 | 2.10 | CLAYEY SILT to SILTY CLAY | 8 | 13 | | 1.3 | |
| 1.650 | 5.41 | 23.51 | 2.39 | CLAYEY SILT to SILTY CLAY | 12 | 19 | | 1.5 | |
| 1.800 | 5.91 | 17.13 | 2.81 | CLAYEY SILT to SILTY CLAY | 9 | 14 | | 1.1 | |
| 1.950 | 6.40 | 16.54 | 2.45 | CLAYEY SILT to SILTY CLAY | 8 | 13 | | 1.1 | |
| 2.100 | 6.89 | 11.25 | 2.15 | CLAYEY SILT to SILTY CLAY | 6 | 9 | | .9 | |
| 2.250 | 7.38 | 14.08 | 2.39 | CLAYEY SILT to SILTY CLAY | 7 | 11 | | 1.1 | |
| 2.400 | 7.87 | 16.45 | 2.19 | CLAYEY SILT to SILTY CLAY | 8 | 12 | | 1.3 | |
| 2.550 | 8.37 | 28.86 | 2.01 | SANDY SILT to CLAYEY SILT | 12 | 17 | | 2.3 | |
| 2.700 | 8.86 | 21.02 | 2.20 | CLAYEY SILT to SILTY CLAY | 11 | 15 | | 1.6 | |
| 2.850 | 9.35 | 23.77 | 2.20 | SANDY SILT to CLAYEY SILT | 10 | 13 | | 1.5 | |
| 3.000 | 9.84 | 39.37 | 2.46 | SANDY SILT to CLAYEY SILT | 16 | 21 | | 2.6 | |
| 3.150 | 10.33 | 42.89 | 2.44 | SANDY SILT to CLAYEY SILT | 17 | 22 | | 2.8 | |
| 3.300 | 10.83 | 45.86 | 2.70 | SANDY SILT to CLAYEY SILT | 18 | 23 | | 3.0 | |
| 3.450 | 11.32 | 46.50 | 2.56 | SANDY SILT to CLAYEY SILT | 19 | 23 | | 3.1 | |
| 3.600 | 11.81 | 43.50 | 3.09 | CLAYEY SILT to SILTY CLAY | 22 | 26 | | 2.9 | |
| 3.750 | 12.30 | 42.58 | 3.18 | CLAYEY SILT to SILTY CLAY | 21 | 25 | | 2.8 | |
| 3.900 | 12.80 | 39.27 | 3.03 | CLAYEY SILT to SILTY CLAY | 20 | 23 | | 2.6 | |
| 4.050 | 13.29 | 40.31 | 2.98 | CLAYEY SILT to SILTY CLAY | 20 | 23 | | 2.6 | |
| 4.200 | 13.78 | 45.78 | 2.69 | SANDY SILT to CLAYEY SILT | 18 | 21 | | 3.0 | |
| 4.350 | 14.27 | 47.74 | 2.35 | SANDY SILT to CLAYEY SILT | 19 | 21 | | 3.1 | |
| 4.500 | 14.76 | 42.03 | 2.11 | SANDY SILT to CLAYEY SILT | 17 | 18 | | 2.7 | |
| 4.650 | 15.26 | 32.40 | 2.27 | SANDY SILT to CLAYEY SILT | 13 | 14 | | 2.1 | |
| 4.800 | 15.75 | 58.09 | 2.01 | SILTY SAND to SANDY SILT | 19 | 20 | 53 | | 38.0 |
| 4.950 | 16.24 | 55.84 | 2.65 | SANDY SILT to CLAYEY SILT | 22 | 23 | | 3.7 | |
| 5.100 | 16.73 | 58.66 | 2.57 | SANDY SILT to CLAYEY SILT | 23 | 24 | | 3.8 | |
| 5.250 | 17.22 | 64.31 | 2.60 | SANDY SILT to CLAYEY SILT | 26 | 26 | | 4.2 | |
| 5.400 | 17.72 | 98.30 | 1.67 | SILTY SAND to SANDY SILT | 33 | 32 | 66 | | 39.5 |
| 5.550 | 18.21 | 74.97 | 1.61 | SILTY SAND to SANDY SILT | 25 | 24 | 58 | | 38.5 |
| 5.700 | 18.70 | 54.04 | 2.66 | SANDY SILT to CLAYEY SILT | 22 | 21 | | 3.5 | |
| 5.850 | 19.19 | 50.72 | 3.61 | CLAYEY SILT to SILTY CLAY | 25 | 24 | | 2.9 | |
| 6.000 | 19.69 | 37.34 | 3.39 | CLAYEY SILT to SILTY CLAY | 19 | 18 | | 2.4 | |
| 6.150 | 20.18 | 37.70 | 3.88 | CLAYEY SILT to SILTY CLAY | 19 | 18 | | 2.1 | |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : SDF-01 CPT-01

| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| 6.300 | 20.67 | 42.68 | 3.49 | CLAYEY SILT to SILTY CLAY | 21 | 20 | | 2.8 | |
| 6.450 | 21.16 | 53.01 | 2.50 | SANDY SILT to CLAYEY SILT | 21 | 19 | | 3.5 | |
| 6.600 | 21.65 | 49.78 | 3.43 | CLAYEY SILT to SILTY CLAY | 25 | 22 | | 2.9 | |
| 6.750 | 22.15 | 43.52 | 4.15 | CLAYEY SILT to SILTY CLAY | 22 | 19 | | 2.5 | |
| 6.900 | 22.64 | 49.26 | 3.64 | CLAYEY SILT to SILTY CLAY | 25 | 22 | | 2.8 | |
| 7.050 | 23.13 | 50.16 | 3.89 | CLAYEY SILT to SILTY CLAY | 25 | 22 | | 2.9 | |
| 7.200 | 23.62 | 48.68 | 3.97 | CLAYEY SILT to SILTY CLAY | 24 | 21 | | 2.8 | |
| 7.350 | 24.11 | 35.96 | 4.51 | CLAY to SILTY CLAY | 24 | 20 | | 2.0 | |
| 7.500 | 24.61 | 30.49 | 4.26 | CLAY to SILTY CLAY | 20 | 17 | | 1.7 | |
| 7.650 | 25.10 | 22.49 | 5.38 | CLAY | 22 | 19 | | 1.2 | |
| 7.800 | 25.59 | 33.32 | 3.37 | CLAYEY SILT to SILTY CLAY | 17 | 14 | | 2.1 | |
| 7.950 | 26.08 | 38.94 | 3.45 | CLAYEY SILT to SILTY CLAY | 19 | 16 | | 2.5 | |
| 8.100 | 26.57 | 35.17 | 5.35 | CLAY | 35 | 28 | | 2.0 | |
| 8.250 | 27.07 | 46.86 | 3.66 | CLAYEY SILT to SILTY CLAY | 23 | 19 | | 2.7 | |
| 8.400 | 27.56 | 26.05 | 4.05 | CLAY to SILTY CLAY | 17 | 14 | | 1.6 | |
| 8.550 | 28.05 | 77.83 | 7.95 | *VERY STIFF FINE GRAINED | 78 | 61 | | | |
| 8.700 | 28.54 | 50.57 | 4.32 | CLAY to SILTY CLAY | 34 | 26 | | 2.9 | |
| 8.850 | 29.04 | 39.15 | 3.27 | CLAYEY SILT to SILTY CLAY | 20 | 15 | | 2.5 | |
| 9.000 | 29.53 | 28.51 | 5.55 | CLAY | 29 | 22 | | 1.6 | |
| 9.150 | 30.02 | 23.88 | 5.77 | CLAY | 24 | 18 | | 1.3 | |
| 9.300 | 30.51 | 26.80 | 5.44 | CLAY | 27 | 20 | | 1.5 | |
| 9.450 | 31.00 | 28.91 | 5.27 | CLAY | 29 | 22 | | 1.6 | |
| 9.600 | 31.50 | 30.82 | 5.61 | CLAY | 31 | 23 | | 1.7 | |
| 9.750 | 31.99 | 42.62 | 3.61 | CLAYEY SILT to SILTY CLAY | 21 | 16 | | 2.4 | |
| 9.900 | 32.48 | 26.18 | 5.00 | CLAY | 26 | 19 | | 1.4 | |
| 10.050 | 32.97 | 50.20 | 4.64 | CLAY to SILTY CLAY | 33 | 24 | | 2.8 | |
| 10.200 | 33.46 | 103.54 | 2.81 | SANDY SILT to CLAYEY SILT | 41 | 30 | | 6.0 | |
| 10.350 | 33.96 | 89.43 | 1.97 | SILTY SAND to SANDY SILT | 30 | 21 | 54 | | 37.0 |
| 10.500 | 34.45 | 96.02 | 2.92 | SANDY SILT to CLAYEY SILT | 38 | 27 | | 5.5 | |
| 10.650 | 34.94 | 156.24 | 2.49 | SILTY SAND to SANDY SILT | 52 | 37 | 70 | | 39.0 |
| 10.800 | 35.43 | 130.98 | 2.26 | SILTY SAND to SANDY SILT | 44 | 31 | 64 | | 38.0 |
| 10.950 | 35.93 | 156.88 | 1.75 | SAND to SILTY SAND | 39 | 27 | 69 | | 38.5 |
| 11.100 | 36.42 | 93.51 | 2.14 | SILTY SAND to SANDY SILT | 31 | 22 | 54 | | 37.0 |
| 11.250 | 36.91 | 117.32 | 2.37 | SILTY SAND to SANDY SILT | 39 | 27 | 61 | | 38.0 |
| 11.400 | 37.40 | 225.96 | 1.69 | SAND to SILTY SAND | 56 | 39 | 79 | | 40.5 |
| 11.550 | 37.89 | 244.11 | 2.61 | SILTY SAND to SANDY SILT | 81 | 55 | 81 | | 41.0 |
| 11.700 | 38.39 | 180.11 | 2.90 | SILTY SAND to SANDY SILT | 60 | 41 | 73 | | 39.0 |
| 11.850 | 38.88 | 563.75 | 1.63 | SAND | 100 | 76 | 100 | | |
| 12.000 | 39.37 | 568.42 | 2.13 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 12.150 | 39.86 | 334.20 | 2.50 | SILTY SAND to SANDY SILT | 100 | 75 | 90 | | 42.5 |
| 12.300 | 40.35 | 487.50 | 2.39 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 12.450 | 40.85 | 264.41 | .94 | SAND | 53 | 35 | 83 | | 41.0 |
| 12.600 | 41.34 | 202.14 | 2.21 | SILTY SAND to SANDY SILT | 67 | 45 | 75 | | 39.5 |
| 12.750 | 41.83 | 185.87 | 1.65 | SAND to SILTY SAND | 46 | 31 | 73 | | 39.0 |
| 12.900 | 42.32 | 187.06 | 1.71 | SAND to SILTY SAND | 47 | 31 | 73 | | 39.0 |
| 13.050 | 42.81 | 185.04 | 1.89 | SAND to SILTY SAND | 46 | 30 | 73 | | 39.0 |
| 13.200 | 43.31 | 186.50 | 1.89 | SAND to SILTY SAND | 47 | 31 | 73 | | 39.0 |
| 13.350 | 43.80 | 165.15 | 2.03 | SILTY SAND to SANDY SILT | 55 | 36 | 69 | | 38.5 |
| 13.500 | 44.29 | 122.61 | 1.50 | SAND to SILTY SAND | 31 | 20 | 61 | | 37.5 |
| 13.650 | 44.78 | 105.87 | 2.48 | SILTY SAND to SANDY SILT | 35 | 23 | 56 | | 37.0 |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : SDF-01 CPT-01

| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| 13.800 | 45.28 | 151.26 | 2.78 | SILTY SAND to SANDY SILT | 50 | 33 | 66 | | 38.0 |
| 13.950 | 45.77 | 122.52 | 2.30 | SILTY SAND to SANDY SILT | 41 | 26 | 60 | | 37.5 |
| 14.100 | 46.26 | 147.82 | 3.19 | SANDY SILT to CLAYEY SILT | 59 | 38 | | 8.5 | |
| 14.250 | 46.75 | 248.26 | 3.52 | *SAND to CLAYEY SAND | 100 | 80 | | | |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

# CPT INTERPRETATIONS

SOUNDING : SDF-10 CPT-02C
PROJECT : Jay Rodgers Comm
DATE/TIME: 2/3/2004 3:51:2

PROJECT No.: 033022-01
CONE/RIG : DSA0408

| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| .150 | .49 | 41.29 | 1.04 | SILTY SAND to SANDY SILT | 14 | 22 | 51 | | |
| .300 | .98 | 91.23 | 2.46 | SILTY SAND to SANDY SILT | 30 | 49 | 74 | | |
| .450 | 1.48 | 84.91 | 2.83 | SANDY SILT to CLAYEY SILT | 34 | 54 | | 5.0 | |
| .600 | 1.97 | 69.46 | 2.40 | SANDY SILT to CLAYEY SILT | 28 | 44 | | 4.6 | |
| .750 | 2.46 | 59.67 | 2.11 | SANDY SILT to CLAYEY SILT | 24 | 38 | | 4.0 | |
| .900 | 2.95 | 75.59 | 2.17 | SILTY SAND to SANDY SILT | 25 | 40 | 68 | | 47.0 |
| 1.050 | 3.44 | 88.96 | 2.29 | SILTY SAND to SANDY SILT | 30 | 47 | 73 | | 47.0 |
| 1.200 | 3.94 | 82.10 | 2.68 | SANDY SILT to CLAYEY SILT | 33 | 53 | | 5.5 | |
| 1.350 | 4.43 | 108.55 | 3.47 | SANDY SILT to CLAYEY SILT | 43 | 69 | | 6.4 | |
| 1.500 | 4.92 | 149.24 | 2.20 | SILTY SAND to SANDY SILT | 50 | 80 | 88 | | 47.5 |
| 1.650 | 5.41 | 299.29 | 3.51 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 1.800 | 5.91 | 103.69 | 2.44 | SILTY SAND to SANDY SILT | 35 | 55 | 77 | | 45.5 |
| 1.950 | 6.40 | 55.12 | 3.70 | CLAYEY SILT to SILTY CLAY | 28 | 44 | | 3.2 | |
| 2.100 | 6.89 | 56.06 | 3.01 | SANDY SILT to CLAYEY SILT | 22 | 36 | | 3.7 | |
| 2.250 | 7.38 | 53.64 | 3.55 | CLAYEY SILT to SILTY CLAY | 27 | 41 | | 3.1 | |
| 2.400 | 7.87 | 58.07 | 3.76 | CLAYEY SILT to SILTY CLAY | 29 | 43 | | 3.4 | |
| 2.550 | 8.37 | 59.95 | 3.58 | CLAYEY SILT to SILTY CLAY | 30 | 43 | | 3.5 | |
| 2.700 | 8.86 | 74.54 | 3.37 | SANDY SILT to CLAYEY SILT | 30 | 42 | | 4.4 | |
| 2.850 | 9.35 | 92.51 | 3.36 | SANDY SILT to CLAYEY SILT | 37 | 50 | | 5.4 | |
| 3.000 | 9.84 | 98.34 | 2.74 | SANDY SILT to CLAYEY SILT | 39 | 52 | | 5.8 | |
| 3.150 | 10.33 | 123.06 | 2.33 | SILTY SAND to SANDY SILT | 41 | 53 | 80 | | 44.0 |
| 3.300 | 10.83 | 229.37 | 1.55 | SAND to SILTY SAND | 57 | 73 | 98 | | 46.0 |
| 3.450 | 11.32 | 188.31 | 1.59 | SAND to SILTY SAND | 47 | 58 | 91 | | 45.0 |
| 3.600 | 11.81 | 112.31 | 1.56 | SILTY SAND to SANDY SILT | 37 | 45 | 76 | | 43.0 |
| 3.750 | 12.30 | 430.81 | 2.15 | SAND to SILTY SAND | 100 | 100 | 100 | | 48.0 |
| 3.900 | 12.80 | 485.32 | 3.70 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 4.050 | 13.29 | 286.29 | 3.44 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 4.200 | 13.78 | 205.00 | 2.28 | SILTY SAND to SANDY SILT | 68 | 77 | 91 | | 44.5 |
| 4.350 | 14.27 | 209.34 | 3.25 | SANDY SILT to CLAYEY SILT | 84 | 92 | | 12.3 | |
| 4.500 | 14.76 | 142.88 | .17 | SAND | 29 | 31 | 80 | | 43.0 |
| 4.650 | 15.26 | 145.97 | 2.51 | SILTY SAND to SANDY SILT | 49 | 52 | 80 | | 43.0 |
| 4.800 | 15.75 | 174.85 | 2.29 | SILTY SAND to SANDY SILT | 58 | 61 | 84 | | 43.5 |
| 4.950 | 16.24 | 187.16 | 3.33 | SANDY SILT to CLAYEY SILT | 75 | 77 | | 11.0 | |
| 5.100 | 16.73 | 294.22 | 3.53 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 5.250 | 17.22 | 764.35 | ***** | | 0 | 0 | | | |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

# CPT INTERPRETATIONS

SOUNDING : SDF-03 CPT-03A
PROJECT : Jay Rodgers Comm
DATE/TIME: 2/3/2004 1:07:0

PROJECT No.: 033022-01
CONE/RIG : DSA0408



| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| .150 | .49 | 49.04 | .74 | SILTY SAND to SANDY SILT | 16 | 26 | 56 | | |
| .300 | .98 | 48.86 | 1.70 | SILTY SAND to SANDY SILT | 16 | 26 | 56 | | 49.5 |
| .450 | 1.48 | 30.20 | 1.55 | SANDY SILT to CLAYEY SILT | 12 | 19 | | 2.4 | |
| .600 | 1.97 | 15.85 | 1.40 | SANDY SILT to CLAYEY SILT | 6 | 10 | | 1.3 | |
| .750 | 2.46 | 9.83 | 1.44 | CLAYEY SILT to SILTY CLAY | 5 | 8 | | .8 | |
| .900 | 2.95 | 10.43 | 1.35 | CLAYEY SILT to SILTY CLAY | 5 | 8 | | .8 | |
| 1.050 | 3.44 | 8.35 | .97 | SENSITIVE FINE GRAINED | 4 | 7 | | .8 | |
| 1.200 | 3.94 | 10.16 | .93 | CLAYEY SILT to SILTY CLAY | 5 | 8 | | 1.0 | |
| 1.350 | 4.43 | 6.23 | .16 | SENSITIVE FINE GRAINED | 3 | 5 | | .6 | |
| 1.500 | 4.92 | 6.86 | 1.34 | SENSITIVE FINE GRAINED | 3 | 5 | | .7 | |
| 1.650 | 5.41 | 10.52 | .68 | SANDY SILT to CLAYEY SILT | 4 | 7 | | 1.0 | |
| 1.800 | 5.91 | 18.10 | .95 | SANDY SILT to CLAYEY SILT | 7 | 12 | | 1.4 | |
| 1.950 | 6.40 | 24.80 | 1.08 | SANDY SILT to CLAYEY SILT | 10 | 16 | | 2.0 | |
| 2.100 | 6.89 | 19.55 | 1.20 | SANDY SILT to CLAYEY SILT | 8 | 12 | | 1.5 | |
| 2.250 | 7.38 | 15.57 | .94 | SANDY SILT to CLAYEY SILT | 6 | 10 | | 1.2 | |
| 2.400 | 7.87 | 15.47 | .73 | SANDY SILT to CLAYEY SILT | 6 | 9 | | 1.5 | |
| 2.550 | 8.37 | 21.18 | 1.24 | SANDY SILT to CLAYEY SILT | 8 | 12 | | 1.7 | |
| 2.700 | 8.86 | 46.46 | 1.51 | SILTY SAND to SANDY SILT | 15 | 22 | 54 | | 39.5 |
| 2.850 | 9.35 | 69.68 | 1.94 | SILTY SAND to SANDY SILT | 23 | 32 | 66 | | 42.0 |
| 3.000 | 9.84 | 70.24 | 2.28 | SANDY SILT to CLAYEY SILT | 28 | 37 | | 4.6 | |
| 3.150 | 10.33 | 75.29 | 1.42 | SILTY SAND to SANDY SILT | 25 | 33 | 66 | | 42.0 |
| 3.300 | 10.83 | 72.28 | 1.29 | SILTY SAND to SANDY SILT | 24 | 31 | 64 | | 41.0 |
| 3.450 | 11.32 | 58.91 | 1.79 | SILTY SAND to SANDY SILT | 20 | 24 | 58 | | 39.5 |
| 3.600 | 11.81 | 58.40 | 1.52 | SILTY SAND to SANDY SILT | 19 | 24 | 57 | | 39.0 |
| 3.750 | 12.30 | 58.04 | 1.59 | SILTY SAND to SANDY SILT | 19 | 23 | 56 | | 39.0 |
| 3.900 | 12.80 | 72.83 | .66 | SAND to SILTY SAND | 18 | 21 | 62 | | 40.0 |
| 4.050 | 13.29 | 127.24 | 2.95 | SANDY SILT to CLAYEY SILT | 51 | 58 | | 7.4 | |
| 4.200 | 13.78 | 61.08 | 2.64 | SANDY SILT to CLAYEY SILT | 24 | 27 | | 4.0 | |
| 4.350 | 14.27 | 49.81 | 2.26 | SANDY SILT to CLAYEY SILT | 20 | 22 | | 3.3 | |
| 4.500 | 14.76 | 40.19 | 2.16 | SANDY SILT to CLAYEY SILT | 16 | 17 | | 2.6 | |
| 4.650 | 15.26 | 30.84 | 1.61 | SANDY SILT to CLAYEY SILT | 12 | 13 | | 2.4 | |
| 4.800 | 15.75 | 34.58 | 1.85 | SANDY SILT to CLAYEY SILT | 14 | 15 | | 2.7 | |
| 4.950 | 16.24 | 38.57 | 2.16 | SANDY SILT to CLAYEY SILT | 15 | 16 | | 2.5 | |
| 5.100 | 16.73 | 39.66 | 1.78 | SANDY SILT to CLAYEY SILT | 16 | 16 | | 3.1 | |
| 5.250 | 17.22 | 38.44 | 1.79 | SANDY SILT to CLAYEY SILT | 15 | 15 | | 3.0 | |
| 5.400 | 17.72 | 36.50 | 1.86 | SANDY SILT to CLAYEY SILT | 15 | 14 | | 2.8 | |
| 5.550 | 18.21 | 35.81 | .77 | SILTY SAND to SANDY SILT | 12 | 12 | 37 | | 36.0 |
| 5.700 | 18.70 | 39.78 | 1.93 | SANDY SILT to CLAYEY SILT | 16 | 15 | | 2.6 | |
| 5.850 | 19.19 | 47.16 | 2.14 | SANDY SILT to CLAYEY SILT | 19 | 18 | | 3.1 | |
| 6.000 | 19.69 | 55.76 | 2.25 | SANDY SILT to CLAYEY SILT | 22 | 21 | | 3.6 | |
| 6.150 | 20.18 | 64.72 | 2.14 | SILTY SAND to SANDY SILT | 22 | 20 | 52 | | 38.0 |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

*HOLGUIN, FAHAN & ASSOCIATES, INC.*

*Interpretations based on: Robertson and Campanella, 1989.*

SOUNDING : SDF-03 CPT-03A

| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| 6.300 | 20.67 | 64.27 | 2.20 | SANDY SILT to CLAYEY SILT | 26 | 24 | | 4.2 | |
| 6.450 | 21.16 | 64.27 | 2.50 | SANDY SILT to CLAYEY SILT | 26 | 23 | | 4.2 | |
| 6.600 | 21.65 | 74.07 | 2.18 | SILTY SAND to SANDY SILT | 25 | 22 | 55 | | 38.0 |
| 6.750 | 22.15 | 80.10 | 2.00 | SILTY SAND to SANDY SILT | 27 | 24 | 57 | | 38.0 |
| 6.900 | 22.64 | 97.91 | 1.20 | SAND to SILTY SAND | 24 | 21 | 63 | | 38.5 |
| 7.050 | 23.13 | 161.57 | 2.32 | SILTY SAND to SANDY SILT | 54 | 47 | 77 | | 41.5 |
| 7.200 | 23.62 | 145.73 | 1.58 | SAND to SILTY SAND | 36 | 31 | 73 | | 40.5 |
| 7.350 | 24.11 | 708.49 | 2.05 | *SAND to CLAYEY SAND | 100 | 100 | | | |
| 7.500 | 24.61 | 580.12 | 1.50 | SAND | 100 | 98 | 100 | | |
| 7.650 | 25.10 | 496.85 | .66 | GRAVELLY SAND to SAND | 83 | 69 | 100 | | 46.0 |
| 7.800 | 25.59 | 162.77 | 1.64 | SAND to SILTY SAND | 41 | 34 | 75 | | 40.5 |
| 7.950 | 26.08 | 151.75 | 2.16 | SILTY SAND to SANDY SILT | 51 | 41 | 73 | | 40.0 |
| 8.100 | 26.57 | 190.74 | 1.48 | SAND to SILTY SAND | 48 | 39 | 79 | | 41.5 |
| 8.250 | 27.07 | 200.51 | 2.24 | SILTY SAND to SANDY SILT | 67 | 54 | 81 | | 42.0 |
| 8.400 | 27.56 | 213.86 | 2.81 | SILTY SAND to SANDY SILT | 71 | 57 | 82 | | 42.0 |
| 8.550 | 28.05 | 187.34 | 2.02 | SILTY SAND to SANDY SILT | 62 | 49 | 78 | | 41.0 |
| 8.700 | 28.54 | 264.37 | 2.06 | SAND to SILTY SAND | 66 | 52 | 88 | | 42.5 |
| 8.850 | 29.04 | 489.48 | 1.39 | SAND | 98 | 76 | 100 | | 45.5 |
| 9.000 | 29.53 | 228.00 | 1.75 | SAND to SILTY SAND | 57 | 44 | 83 | | 42.0 |
| 9.150 | 30.02 | 337.09 | 1.22 | SAND | 67 | 51 | 94 | | 43.5 |
| 9.300 | 30.51 | 765.61 | .56 | GRAVELLY SAND to SAND | 100 | 96 | 100 | | |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

# CPT INTERPRETATIONS

SOUNDING : SDF-06 CPT-04B
PROJECT : Jay Rodgers Comm
DATE/TIME: 2/3/2004 2:25:1

PROJECT No.: 033022-01
CONE/RIG : DSA0408

| DEPTH (m) | DEPTH (ft) | TIP RESISTANCE (tsf) | FRICTION RATIO (%) | SOIL BEHAVIOR TYPE | N(60) | N1(60) | Dr (%) | Su (tsf) | PHI (Degrees) |
|---|---|---|---|---|---|---|---|---|---|
| .150 | .49 | 25.35 | 1.01 | SANDY SILT to CLAYEY SILT | 10 | 16 | | 2.0 | |
| .300 | .98 | 28.25 | .98 | SILTY SAND to SANDY SILT | 9 | 15 | 40 | | 47.5 |
| .450 | 1.48 | 46.15 | 1.36 | SILTY SAND to SANDY SILT | 15 | 25 | 54 | | 47.5 |
| .600 | 1.97 | 49.13 | 1.75 | SILTY SAND to SANDY SILT | 16 | 26 | 56 | | 46.5 |
| .750 | 2.46 | 46.45 | 1.30 | SILTY SAND to SANDY SILT | 15 | 25 | 54 | | 46.0 |
| .900 | 2.95 | 35.44 | 7.71 | CLAY | 35 | 57 | | 2.1 | |
| 1.050 | 3.44 | 271.51 | 1.25 | SAND | 54 | 87 | 100 | | |
| 1.200 | 3.94 | 221.60 | 1.64 | SAND to SILTY SAND | 55 | 89 | 99 | | |
| 1.350 | 4.43 | 132.32 | .36 | SAND | 26 | 42 | 84 | | 47.5 |
| 1.500 | 4.92 | 258.53 | 2.71 | SILTY SAND to SANDY SILT | 86 | 100 | 100 | | |
| 1.650 | 5.41 | 169.56 | 1.44 | SAND to SILTY SAND | 42 | 68 | 91 | | 47.5 |
| 1.800 | 5.91 | 65.98 | 2.18 | SILTY SAND to SANDY SILT | 22 | 35 | 64 | | 43.5 |
| 1.950 | 6.40 | 45.06 | 2.08 | SANDY SILT to CLAYEY SILT | 18 | 29 | | 3.0 | |
| 2.100 | 6.89 | 26.88 | 2.15 | SANDY SILT to CLAYEY SILT | 11 | 17 | | 1.8 | |
| 2.250 | 7.38 | 52.99 | 1.38 | SILTY SAND to SANDY SILT | 18 | 27 | 58 | | 41.5 |
| 2.400 | 7.87 | 27.69 | 1.82 | SANDY SILT to CLAYEY SILT | 11 | 16 | | 2.2 | |
| 2.550 | 8.37 | 23.82 | 1.92 | SANDY SILT to CLAYEY SILT | 10 | 14 | | 1.9 | |
| 2.700 | 8.86 | 23.66 | 1.73 | SANDY SILT to CLAYEY SILT | 9 | 13 | | 1.9 | |
| 2.850 | 9.35 | 37.60 | 2.41 | SANDY SILT to CLAYEY SILT | 15 | 21 | | 2.5 | |
| 3.000 | 9.84 | 123.70 | 2.76 | SILTY SAND to SANDY SILT | 41 | 55 | 81 | | 44.0 |
| 3.150 | 10.33 | 237.04 | 1.63 | SAND to SILTY SAND | 59 | 77 | 99 | | 46.5 |
| 3.300 | 10.83 | 226.37 | 1.35 | SAND to SILTY SAND | 57 | 72 | 97 | | 46.0 |
| 3.450 | 11.32 | 210.37 | 1.51 | SAND to SILTY SAND | 53 | 65 | 94 | | 46.0 |
| 3.600 | 11.81 | 143.67 | 1.36 | SAND to SILTY SAND | 36 | 44 | 83 | | 44.0 |
| 3.750 | 12.30 | 199.66 | 1.36 | SAND to SILTY SAND | 50 | 59 | 92 | | 45.0 |
| 3.900 | 12.80 | 638.70 | ***** | | 0 | 0 | | | 40.0 |

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 115 pcf
ASSUMED DEPTH OF WATER TABLE = 38.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

*HOLGUIN, FAHAN & ASSOCIATES, INC.*

*Interpretations based on: Robertson and Campanella, 1989.*

# Appendix B

# APPENDIX B

## GEOTECHNICAL LABORATORY INVESTIGATION

1. General

   a. The laboratory investigation used current, accepted test procedures of the American Society of Testing and Materials (ASTM) and/or California Test Standards, wherever practical.

   b. Bulk samples, Standard Penetration Test (SPT) samples, and Modified California Drive ring samples were obtained during the field investigation. Laboratory sample identification is by project name and number, boring number, and depth.

2. Index Parameters Tests

   The following Index Parameters tests were performed by this firm on alluvial soils collected during the field investigation.

| Test Type | Number of Tests | Testing Standard |
|---|---|---|
| In-situ Moisture Content and Dry Density | 7 | ASTM D2216 and D7263 |
| Percent-Finer Than #200 Sieve | 28 | ASTM D1140 |
| Particle-Size Analysis of Soils | 3 | ASTM D6913 |
| Expansion Index | 1 | ASTM D4829 |

   The purpose of each test is briefly described below:

   a. In-Situ Moisture Content (ASTM D2216) and Dry Density (ASTM D7263) testing of soils provide an indication of the strength and compressibility of in-situ soils. These data, in conjunction with sampler blow count data, aid in evaluation of soil consistency and in selection of samples for additional laboratory testing. Results of Moisture Content and Dry Density testing are recorded on the Drill Hole Logs within **Appendix A**.

   b. Percent Finer than #200 Sieve (ASTM D1140) testing was performed on soil samples and drainage aggregate to aid in classification of the samples in accordance with the Unified Soil Classification System (USCS). Results of Percent Finer than #200 Sieve testing are recorded on the Drill Hole Logs within **Appendix A** and on applicable laboratory test reports in this Appendix.

   c. Mechanical particle-size analyses of soil fractions larger than 75 microns (No. 200 sieve) were conducted to aid in classification of soils in accordance with the Unified Soil Classification System (USCS). Results of the particle size analyses are presented on **Figure B1** in this Appendix.

**APPENDIX B**

d. Expansion Index (ASTM D4829) testing was performed to obtain an index of swelling potential of soil when inundated with water by controlling variables that influence expansion behavior of soils. Results of this testing are presented in **Table B1**, which also includes results of prior testing by LGC.

3. Geotechnical Engineering Parameters Tests

The following Geotechnical Engineering Parameter tests were performed by this firm on bulk and ring samples of alluvial soils collected during the field investigation.

| TEST TYPE | NUMBER OF TESTS | TESTING STANDARD |
|---|---|---|
| Modified Proctor | 1 | ASTM D1557 |
| Direct Shear (remold) | 1 | ASTM D3080 |
| Collapse of Soils | 3 | ASTM D2435 |

The Geotechnical Engineering Parameters testing is briefly described below.

a. A modified Proctor (ASTM D1557) test was performed on a mixture of alluvial soils collected from Boring HS-1 at 0-15 ft to assess the laboratory moisture content vs. dry density relationship of future compacted fill materials generated from on-site soils. Results of the testing are presented on **Figure B2** and summarized in **Table B2**, which also includes results of prior testing by LGC.

b. Direct Shear (ASTM D3080) testing was performed on a mixture of soil from Boring HS-1 at 0-15 ft (remolded to approximately 90 percent of maximum dry density) using a displacement-controlled Direct Shear machine. Prior to shearing, the samples were inundated and consolidated under normal pressures ranging from 1,000 psf to 4,000 psf. Thereafter, the samples were sheared horizontally at a controlled displacement rate until the horizontal shear force reduced to a stable value. For remolded specimens, material passing the No. 4 sieve was used. Results of the Direct Shear testing, including interpreted peak strength and residual shear strength parameters, are presented on **Figure B3** within this Appendix.

c. One-dimensional Collapse of Soils (ASTM D4546) testing was performed on California drive ring samples to assess the hydro-compression potential of alluvial soils when inundated with water under future loading conditions. The samples were incrementally loaded to normal pressures ranging from 200 to 9,600 psf in accordance with Procedure B. The "hydro-compression" was taken as the percent strain when inundated with water under an applied pressure approximately equal to the existing overburden pressure plus future applied foundation bearing pressure at that depth. Results of collapse testing are presented on **Figures B4.1** to **B4.3** in this Appendix.

**APPENDIX B**

4. Corrosivity Tests

The following corrosivity tests were performed on a mixture of soils collected from sample S-1 at a depth of 2 feet.

| Test Type | Number of Tests | Testing Standard |
|---|---|---|
| Sulfate-Content | 1 | California Test 417 |
| Chloride-Content | 1 | California Test 422 |
| Resistivity and pH | 1 | California Test 643 |

Soluble Sulfates Content, Chloride Content, Resistivity, and pH tests were performed to evaluate corrosivity of soils to concrete, ferrous metals, and non-ferrous metals. Results of the testing are presented in **Table B3**, which also includes results of prior testing by LGC.

**The following attachments complete this Appendix.**

- Summary of Expansion Index Test Results — Table B1
- Summary of Compaction Test Results — Table B2
- Summary of Corrosivity Test Results — Table B3
- Particle Size Distribution Test Report — Figure B1
- Compaction Test Report — Figure B2
- Direct Shear Test Report — Figure B3
- Consolidation Test Report — Figures B4.1 thru B4.3

- Particle Size Curve (LGC, 2004) — 5 Sheets
- Particle Size Curve (LGC, 2007) — 5 Sheets
- Direct Shear Test (LGC, 2004) — 6 Sheets
- Direct Shear Test (LGC, 2007) — 13 Sheets
- Consolidation Test Results (LGC, 2004) — 3 Sheets
- Consolidation Test Results (LGC, 2007) — 5 Sheets

# APPENDIX B

## Table B1 – Summary of Expansion Index Test Results

| Source | Depth (ft) | Soil Description | USCS | % Fines | Expansion Index | Expansion Potential Classification |
|---|---|---|---|---|---|---|
| B-1 (LGC, 2004) | 1-5 | Silty Sand w/ trace clay | SM | -- | 20 | Low |
| B-5 (LGC, 2004) | 1-5 | Silty Sand w/ trace clay | SM | -- | 22 | Very Low |
| B-2 (LGC, 2005) | 0-10 | Silty Sand | SM | -- | 21 | Low |
| B-5 (LGC, 2007) | 0-5 | Silty Sand | SM | -- | 13 | Very Low |
| S-1 | 2 | Silty Sand | SM | | 10 | Very Low |

## Table B2 – Summary of Compaction (Modified Proctor) Test Results

| Source | Depth (ft) | Soil Description | USCS | % Fines | Maximum Dry Density (pcf) | Optimum Moisture Content[1] (%) |
|---|---|---|---|---|---|---|
| B-2 (LGC, 2004) | 1-5 | Silty Sand with Clay | SC-SM | -- | 125.0 | 10.0 |
| B-2 (LGC, 2007) | 0-5 | Clayey Silt to Silty Clay | CL-ML | -- | 123.5 | 11.0 |
| HS-1 (Curve A) | 0-15 | Dark-brown Silty Sand | SM | 44.5 | 125.1[1] | 10.0 |

[1] Per ASTM Test Method D1557

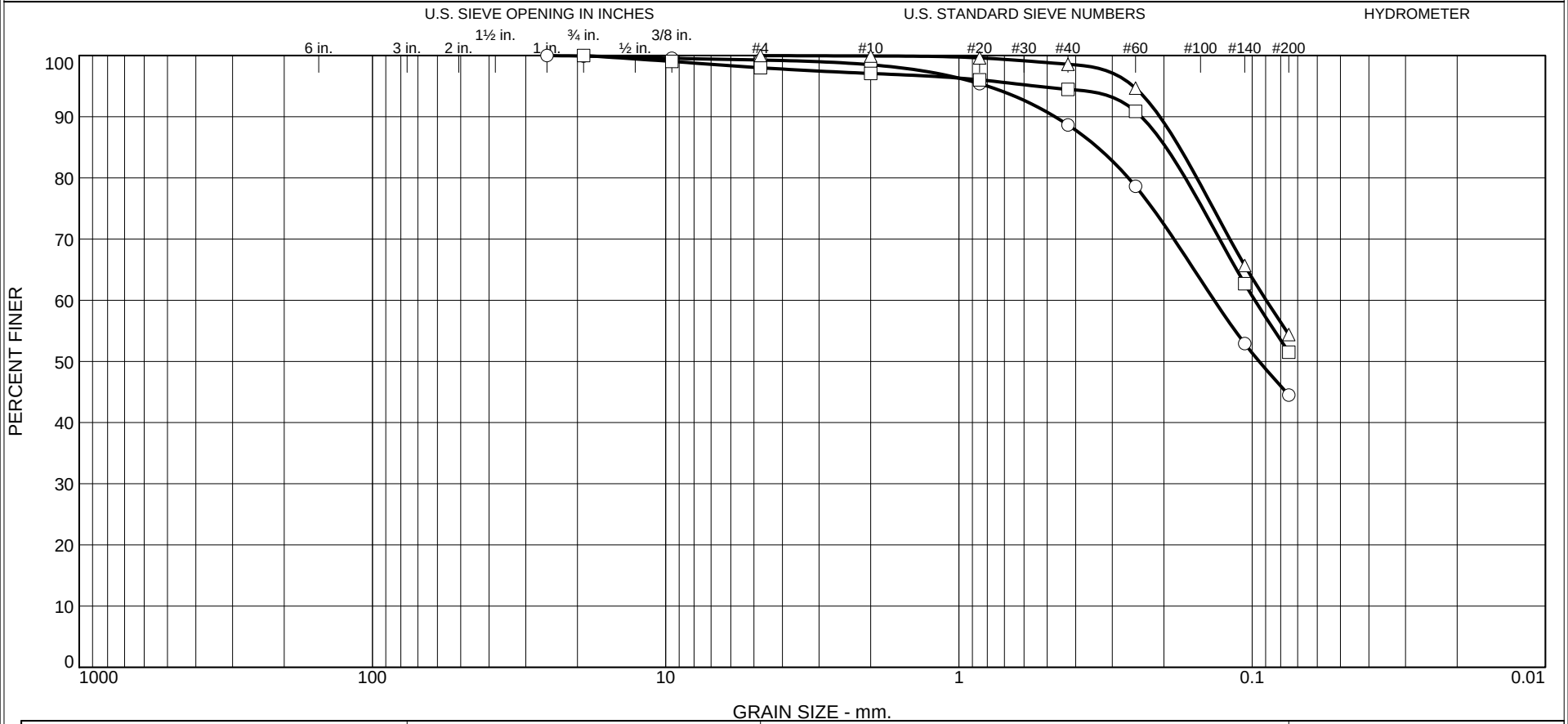
# APPENDIX B

## Table B3 – Summary of Corrosivity Test Results

| Source | Depth (ft) | Soil Description | Resistivity | | Chemical Analyses | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Saturated (OHM-CM) | Corrosion Characteristics[2] | pH | Chloride Cl (PPM) | Sulfate $SO_4$ (%) | Concrete exposure to sulfate[3] |
| B-1 (2004) | 1-5 | Silty Sand w/ trace clay | 940 | Severely Corrosive | 7.6 | 31 | 0.108 | Moderate |
| B-5 (2004) | 1-5 | Silty Sand w/ trace clay | -- | -- | -- | -- | 0.002 | Negligible |
| B-2 (2005) | 0-10 | Silty Sand | -- | -- | -- | -- | 0.005 | Negligible |
| B-5 (2007) | 0-5 | Silty Sand | 1,500 | Corrosive | -- | -- | 0.006 | Negligible |
| SM | 2 | Silty Sand | 5,440 | Moderately Corrosive | 8.15 | 108 | 0.0004 | Negligible |

[2] Per County of Los Angeles classification
[3] Per ACI 318 – Table 4.3.1

# Particle Size Distribution Test Report




| | % +3" | % Gravel | | % Sand | | | % Fines |
|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt |
| ○ | 0.0 | 0.1 | 0.6 | 0.8 | 9.8 | 44.2 | 44.5 |
| □ | 0.0 | 0.0 | 2.0 | 0.9 | 2.6 | 43.0 | 51.5 |
| △ | 0.0 | 0.0 | 0.0 | 0.1 | 1.3 | 44.2 | 54.4 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | HS-1 | | 0-15' | 11/14/19 | SM | Dark-brown, fine-grained, silty SAND | | | |
| □ | HS-2 | | 9' | 11-14-19 | ML | Yellowish-brown sandy SILT | | | |
| △ | HS-3 | | 12' | 11-14-19 | ML | Dark-brown, sandy SILT | | | |

Client Wiley Canyon LLC

Project Tentative Tract Map 083295

Wiley Canyon

Project No. 21-2593-4 Figure B1

**ALLAN E. SEWARD**

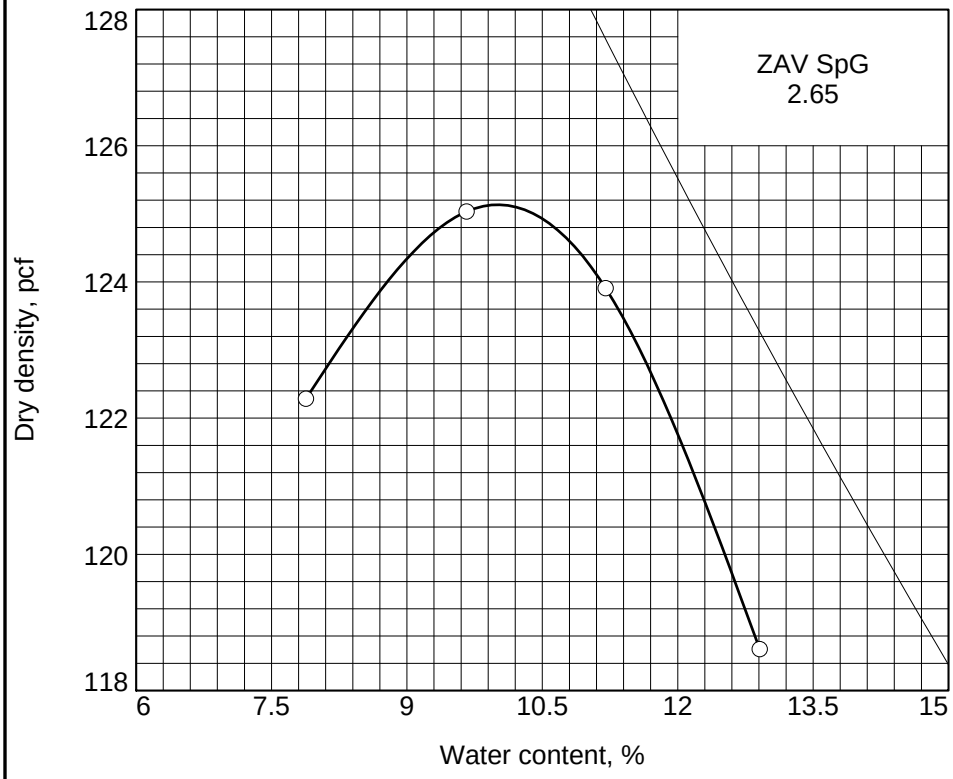
**ENGINEERING GEOLOGY, INC.**

**Valencia, California**

□ Alluvium encountered in vicinity of proposed infiltration invert elevation

△ Alluvium encountered in vicinity of proposed infiltration invert elevation

# COMPACTION TEST REPORT




**Curve No.**
**A**

**Test Specification:**
ASTM D 1557-12 Method A Modified

**Preparation Method** Moist
**Hammer Wt.** 10 lb.
**Hammer Drop** 18 in.
**Number of Layers** five
**Blows per Layer** 25
**Mold Size** 0.03333 cu. ft.
**Test Performed on Material Passing** #4 **Sieve**

**NM** ____ **LL** ____ **PI** ____
**Sp.G. (ASTM D 854)** 2.65
**%>#4** 0.7 **%<No.200** 44.5
**USCS** SM **AASHTO** ____
**Date Sampled** 11/14/19
**Date Tested** 11/27/19
**Tested By** E. Parr

**TESTING DATA**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **WM + WS** | 8.77 | 8.94 | 8.96 | 8.83 | | |
| **WM** | 4.37 | 4.37 | 4.37 | 4.37 | | |
| **WW + T #1** | 952.2 | 985.7 | 940.3 | 948.8 | | |
| **WD + T #1** | 885.9 | 901.7 | 850.0 | 845.4 | | |
| **TARE #1** | 44.8 | 32.1 | 43.6 | 44.3 | | |
| **WW + T #2** | | | | | | |
| **WD + T #2** | | | | | | |
| **TARE #2** | | | | | | |
| **MOISTURE** | 7.9 | 9.7 | 11.2 | 12.9 | | |
| **DRY DENSITY** | 122.3 | 125.0 | 123.9 | 118.6 | | |

**TEST RESULTS**

Maximum dry density = 125.1 pcf

Optimum moisture = 10.0 %

**Material Description**

Dark-brown, fine-grained, silty SAND

**Remarks:**
Quaternary Alluvium (Qal)
Mixture of soils within the noted depth

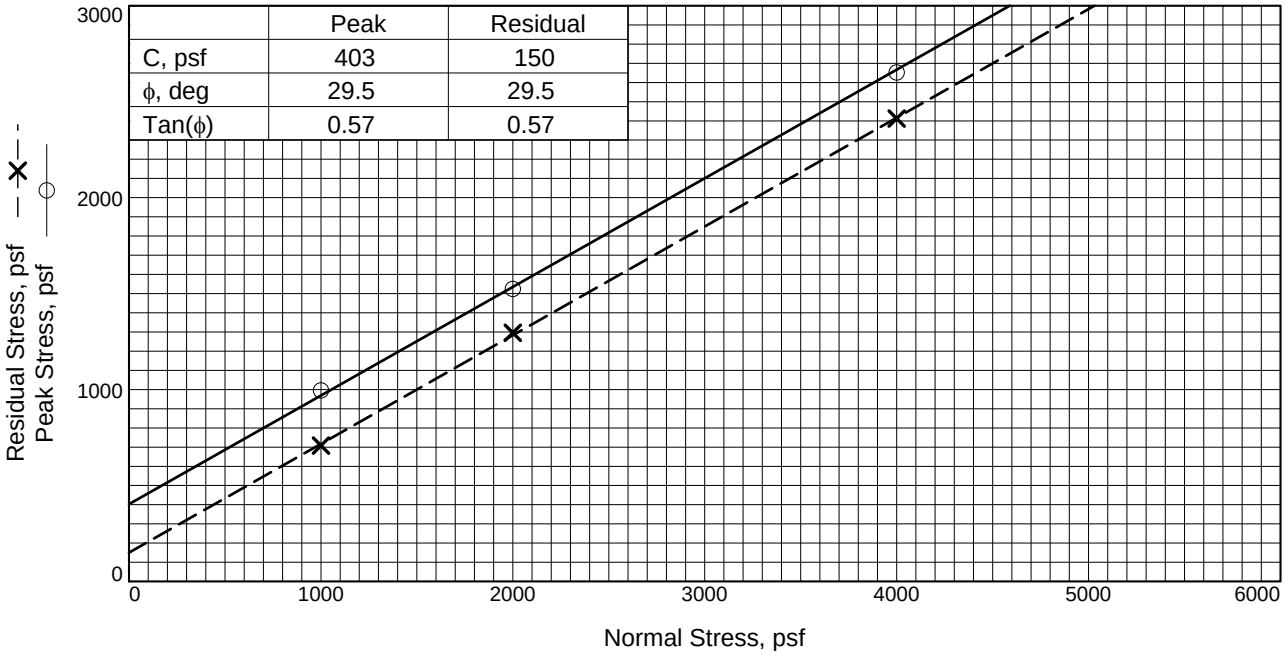
**Project No.** 21-2593-4 **Client:** Wiley Canyon LLC
**Project:** Tentative Tract Map 083295
Wiley Canyon
○ **Source of Sample:** HS-1 **Depth:** 0-15'

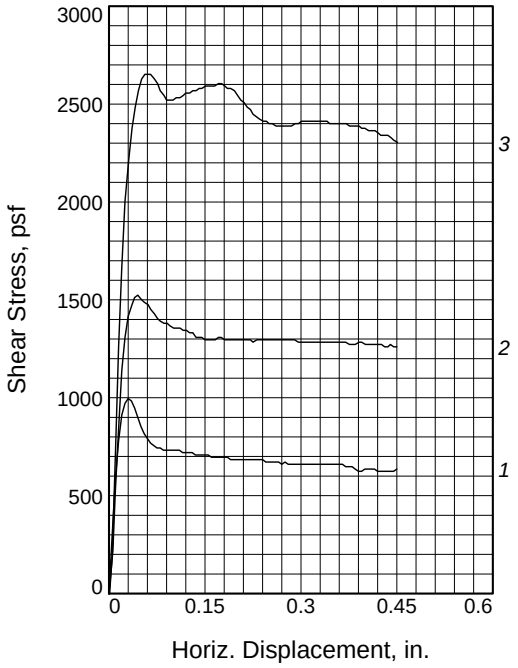
**Checked by:** K. Callahan
**Title:** Geotechnical Engineer

**ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.**

**Valencia, California**

**Figure** B2




| Sample No. | | 1 | 2 | 3 |
|---|---|---|---|---|
| Initial | Water Content, % | 9.9 | 9.9 | 9.9 |
| | Dry Density, pcf | 115.1 | 115.1 | 115.2 |
| | Saturation, % | 59.9 | 60.0 | 60.0 |
| | Void Ratio | 0.4367 | 0.4376 | 0.4364 |
| | Diameter, in. | 2.416 | 2.416 | 2.416 |
| | Height, in. | 1.000 | 1.000 | 1.000 |
| At Test | Water Content, % | 15.9 | 15.4 | 15.3 |
| | Dry Density, pcf | 116.4 | 117.5 | 117.7 |
| | Saturation, % | 100.0 | 100.0 | 100.0 |
| | Void Ratio | 0.4213 | 0.4081 | 0.4052 |
| | Diameter, in. | 2.416 | 2.416 | 2.416 |
| | Height, in. | 0.989 | 0.980 | 0.978 |
| Normal Stress, psf | | 1000 | 2000 | 4000 |
| Peak Stress, psf | | 996 | 1524 | 2652 |
| Displacement, in. | | 0.030 | 0.045 | 0.056 |
| Residual Stress, psf | | 708 | 1296 | 2412 |
| Displacement, in. | | 0.150 | 0.150 | 0.301 |
| Strain rate, %/min. | | 0.01 | 0.01 | 0.01 |

**Sample Type:** Remold
**Description:** Dark-brown, fine-grained, silty SAND

**Assumed Specific Gravity=** 2.65
**Remarks:** Proposed compacted fill
Remolded to about 90% of MDD
% Fines = 44.5

**Figure** B3

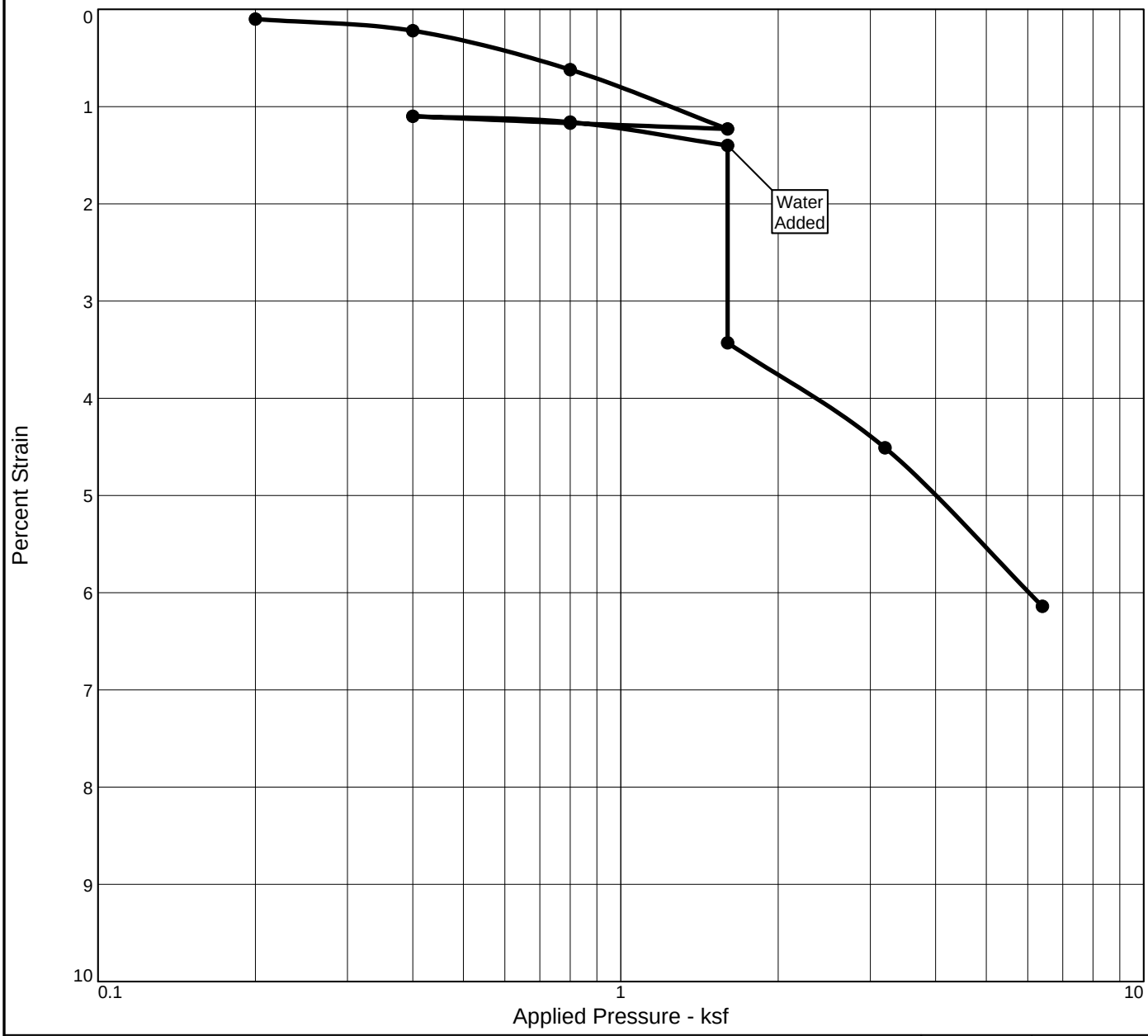
**Client:** Wiley Canyon LLC

**Project:** Tentative Tract Map 083295
Wiley Canyon
**Source of Sample:** HS-1 **Depth:** 0-15'

**Proj. No.:** 21-2593-4 **Date Sampled:** 11/14/19

DIRECT SHEAR TEST REPORT
ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.
Valencia, California

# SWELL/CONSOLIDATION TEST REPORT




| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| Sandy SILT | ML | |

| LL | PI | Sp. Gr. | Overburden (ksf) | Dry Dens. (pcf) | | Moisture | | Saturation | | Void Ratio | | $P_c$ (ksf) | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Init. | Final | Init. | Final | Init. | Final | Init. | Final | | |
| | | 2.65 | 1.5 | 105.2 | 112.1 | 4.3 % | 18.6 | 19.9 % | 100.0 | 0.573 | 0.476 | 3.3 | 0.09 |

**Preparation Process:** Tested directly in a ring from a ring lined sampler

**Condition of Test:** Inundated with distilled water at 1,600 psf

| D2435 Method | $C_s$ | Swell Press. (ksf) | Clpse. % |
|---|---|---|---|
| D4546 | 0.00 | | 2.0 |

**Project No.** 21-2593-4 **Client:** Wiley Canyon LLC

**Project:** Tentative Tract Map 083295
Wiley Canyon

**Source of Sample:** HS-2 **Depth:** 12'

**Remarks:**
Alluvium (Qal)
% Fines = 54.1

**Checked By:** K. Callahan

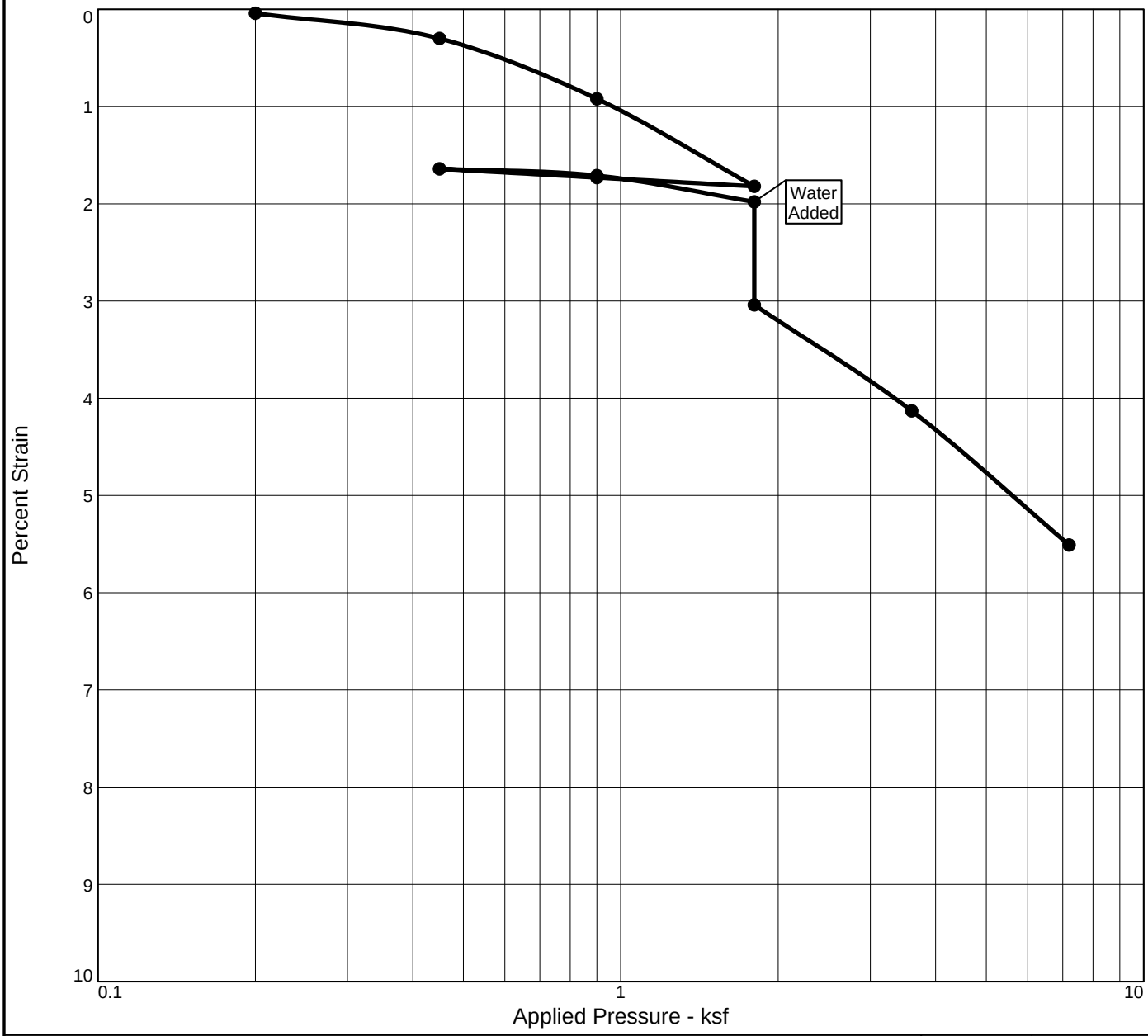
**Title:** Geotechnical Engineer

**ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.**

**Valencia, California**

**Figure** B4.1

# SWELL/CONSOLIDATION TEST REPORT




| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| Silty, fine-grained SAND | SM | |

| LL | PI | Sp. Gr. | Overburden (ksf) | Dry Dens. (pcf) | | Moisture | | Saturation | | Void Ratio | | $P_c$ (ksf) | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Init. | Final | Init. | Final | Init. | Final | Init. | Final | | |
| | | 2.65 | 1.8 | 106.7 | 112.9 | 6.3 % | 17.6 | 30.4 % | 100.0 | 0.551 | 0.465 | 3.7 | 0.07 |

**Preparation Process:** Tested directly in a ring from a ring lined sampler

**Condition of Test:** Inundated with distilled water at 1,800 psf

| D2435 Method | $C_s$ | Swell Press. (ksf) | Clpse. % |
|---|---|---|---|
| D4546 | 0.00 | | 1.1 |

**Project No.** 21-2593-4 **Client:** Wiley Canyon LLC

**Project:** Tentative Tract Map 083295
Wiley Canyon

**Source of Sample:** HS-2 **Depth:** 15'

**Remarks:**
Alluvium (Qal)
% Fines = 43.7

**Checked By:** K. Callahan

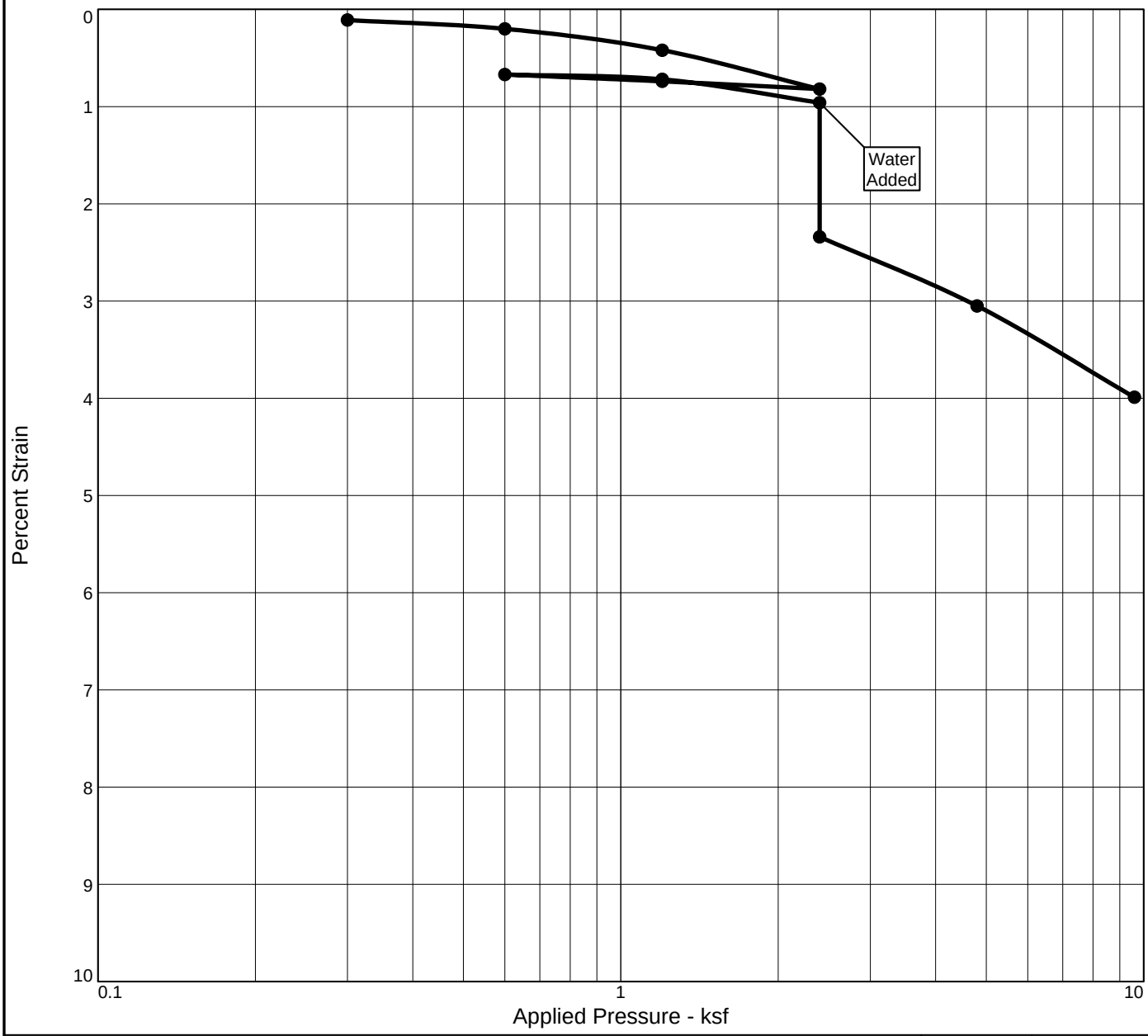
**Title:** Geotechnical Engineer

**ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.**

**Valencia, California**

**Figure** B4.2

# SWELL/CONSOLIDATION TEST REPORT




| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| Silty, fine-grained SAND | SM | |

| LL | PI | Sp. Gr. | Overburden (ksf) | Dry Dens. (pcf) | | Moisture | | Saturation | | Void Ratio | | $P_c$ (ksf) | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Init. | Final | Init. | Final | Init. | Final | Init. | Final | | |
| | | 2.65 | 2.4 | 106.6 | 111.0 | 5.0 % | 18.5 | 23.8 % | 100.0 | 0.551 | 0.490 | 4.9 | 0.05 |

**Preparation Process:** Tested directly in a ring from a ring lined sampler

**Condition of Test:** Inundated with distilled water at 2,400 psf

| D2435 Method | $C_s$ | Swell Press. (ksf) | Clpse. % |
|---|---|---|---|
| D4546 | 0.00 | | 1.4 |

**Project No.** 21-2593-4 **Client:** Wiley Canyon LLC

**Project:** Tentative Tract Map 083295
Wiley Canyon

**Source of Sample:** HS-3 **Depth:** 20'

**Remarks:**
Alluvium (Qal)
% Fines = 27.4

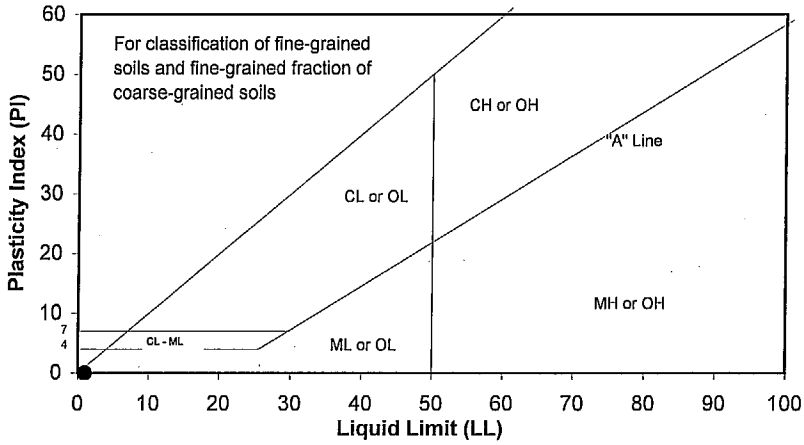
**Checked By:** K. Callahan

**Title:** Geotechnical Engineer

**ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.**

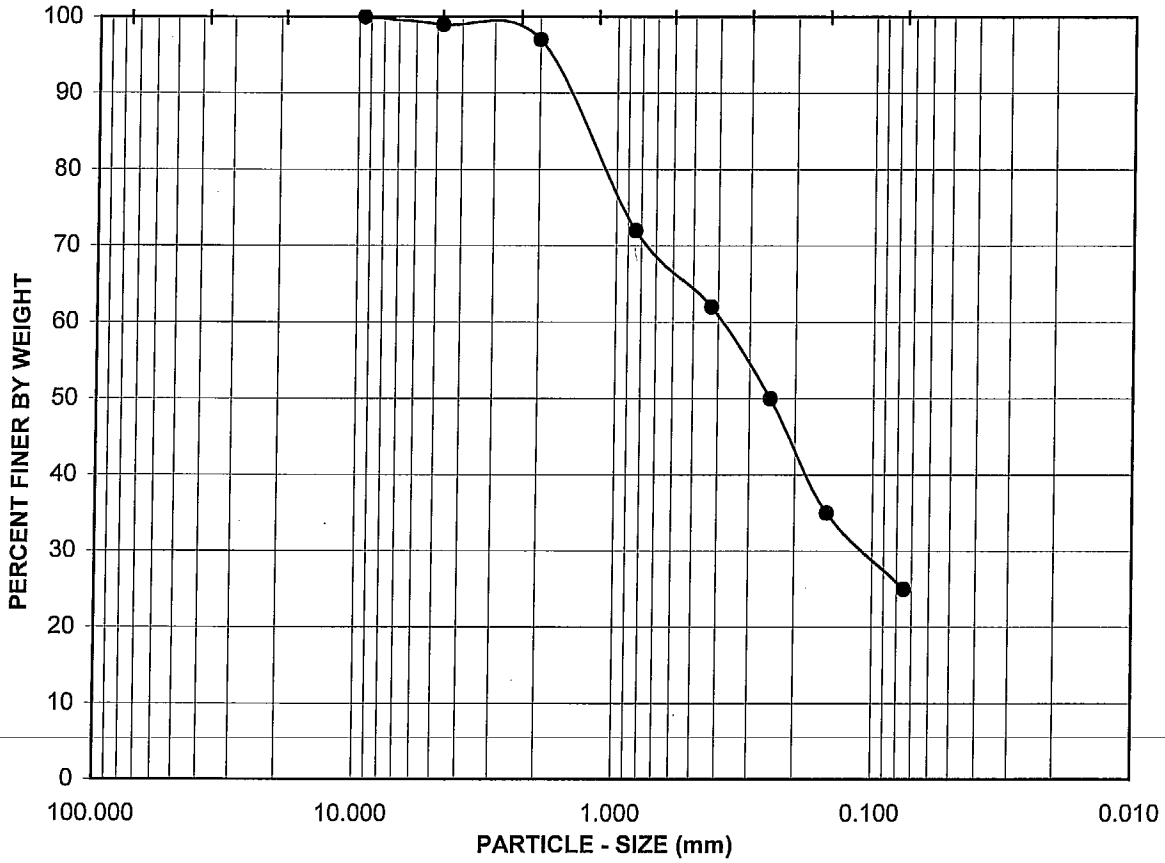
**Valencia, California**

**Figure** B4.3




| GRAVEL | | SAND | | | FINES |
|---|---|---|---|---|---|
| COARSE | FINE | CRSE | MEDIUM | FINE | SILT |

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER




| Boring No.: | Sample No.: | Depth (ft.): | Soil Type | GR:SA:FI | LL,PL,PI |
|---|---|---|---|---|---|
| B-LGC-1 | S-8 | 35 | SM | 1 : 74 : 25 | N/A , N/A , N/A |

Visual Sample Description:

Medium Brown Silty Sand

LGC

Project No.: 033022-01

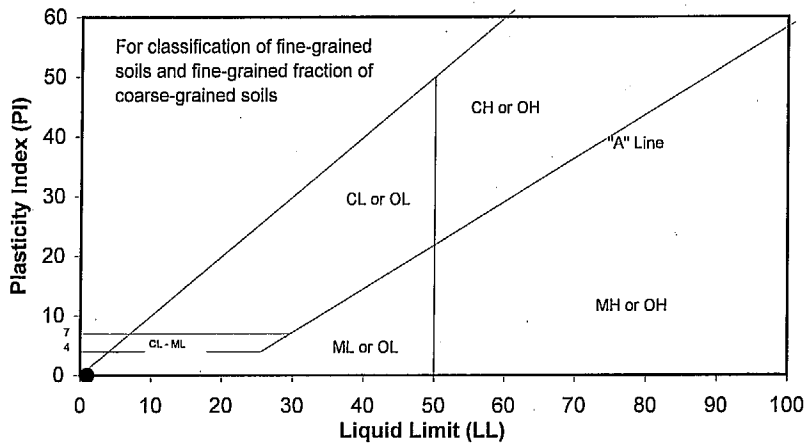
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

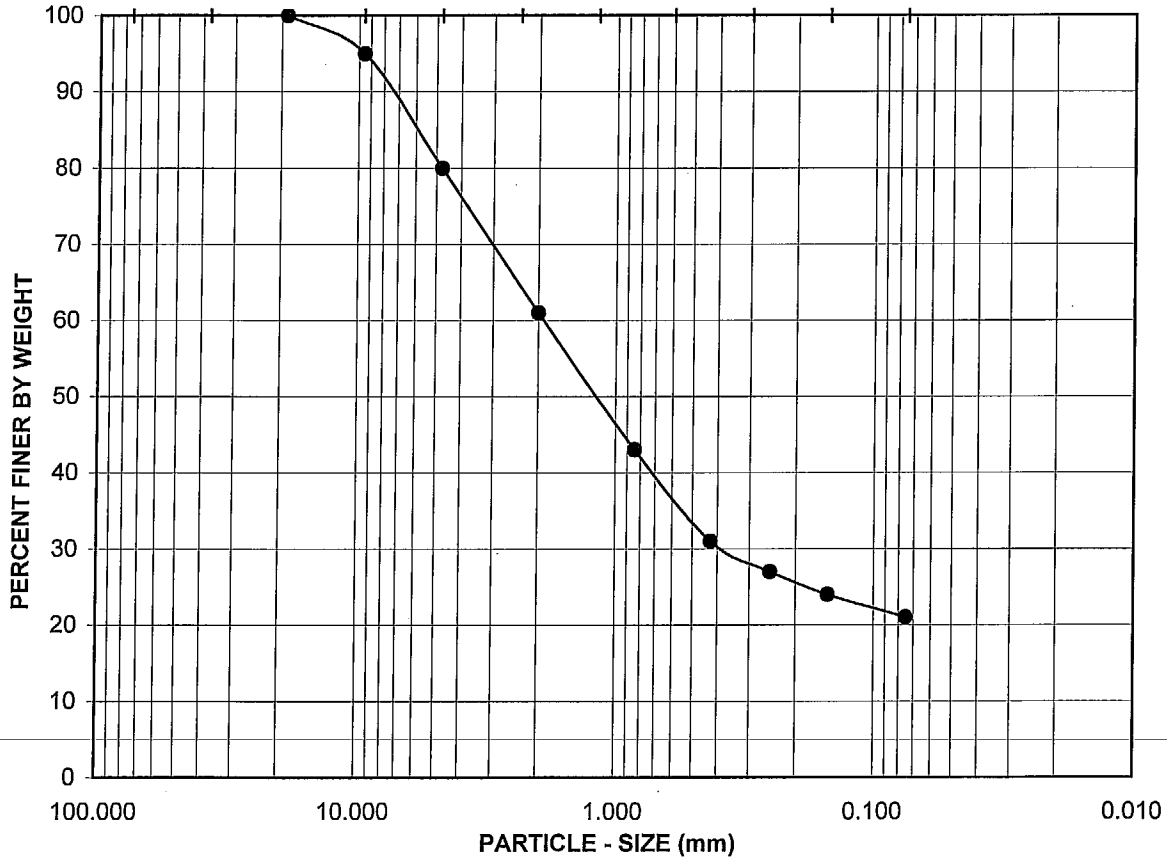
03-04

Sievemontblgc1s8




| GRAVEL | | SAND | | | FINES |
|---|---|---|---|---|---|
| COARSE | FINE | CRSE | MEDIUM | FINE | SILT |

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER




| Boring No.: | Sample No.: | Depth (ft.): | Soil Type | GR:SA:FI | LL,PL,PI |
|---|---|---|---|---|---|
| B-LGC-1 | S-10 | 45 | SM | 20 : 59 : 21 | N/A , N/A , N/A |

Visual Sample Description:

Medium Brown Silty Sand

LGC

Project No.: 033022-01

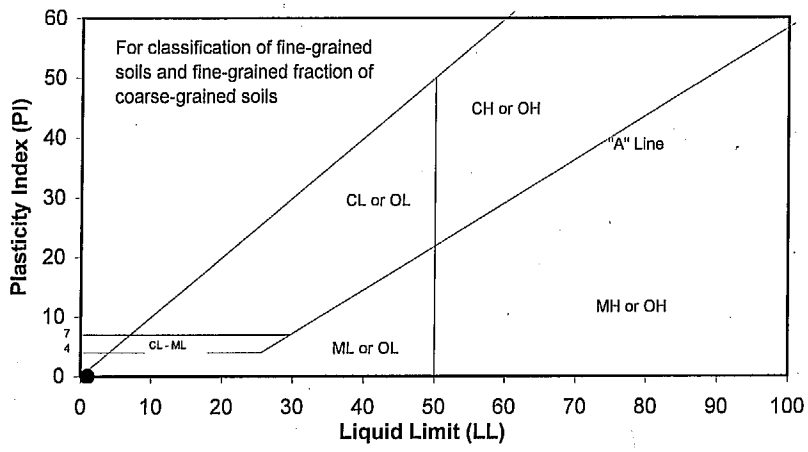
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

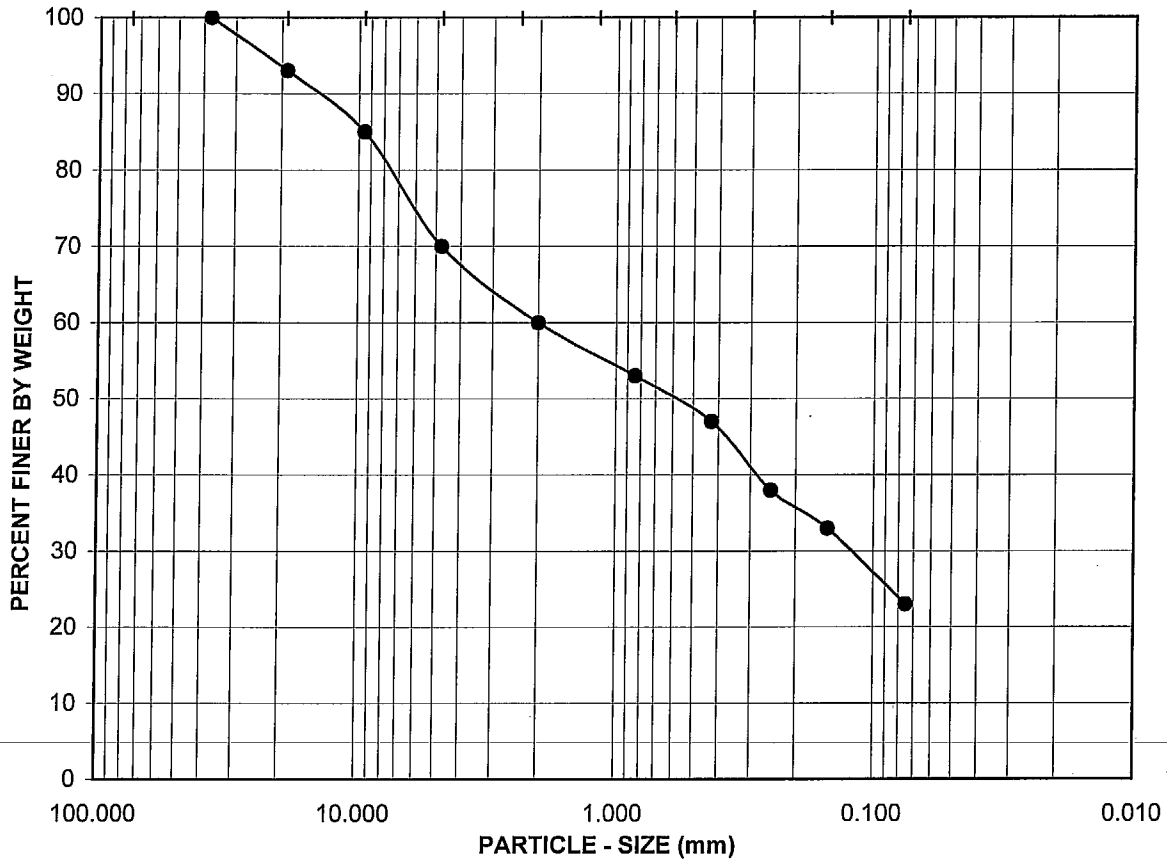
03-04

Sievemontblgc1s10




| GRAVEL | | SAND | | | FINES |
|---|---|---|---|---|---|
| COARSE | FINE | CRSE | MEDIUM | FINE | SILT |

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER




| Boring No.: | Sample No.: | Depth (ft.): | Soil Type | GR:SA:FI | LL,PL,PI |
|---|---|---|---|---|---|
| B-LGC-2 | S-8 | 31 | SM | 30 : 47 : 23 | N/A , N/A , N/A |

Visual Sample Description:

Medium Brown Gravelley Silty Sand

LGC

Project No.: 033022-01

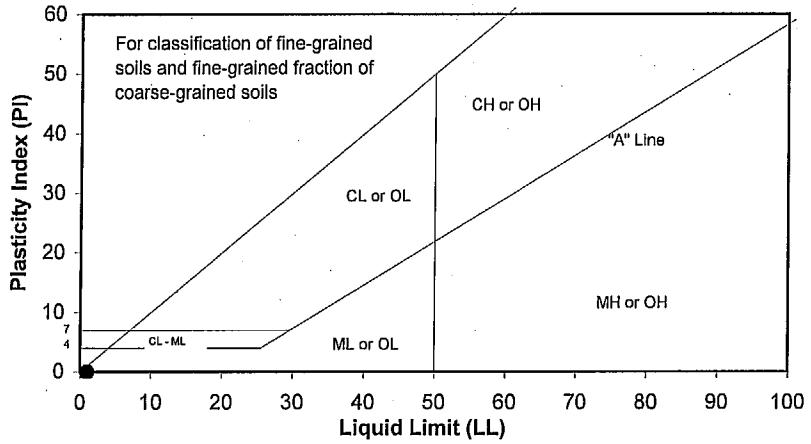
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

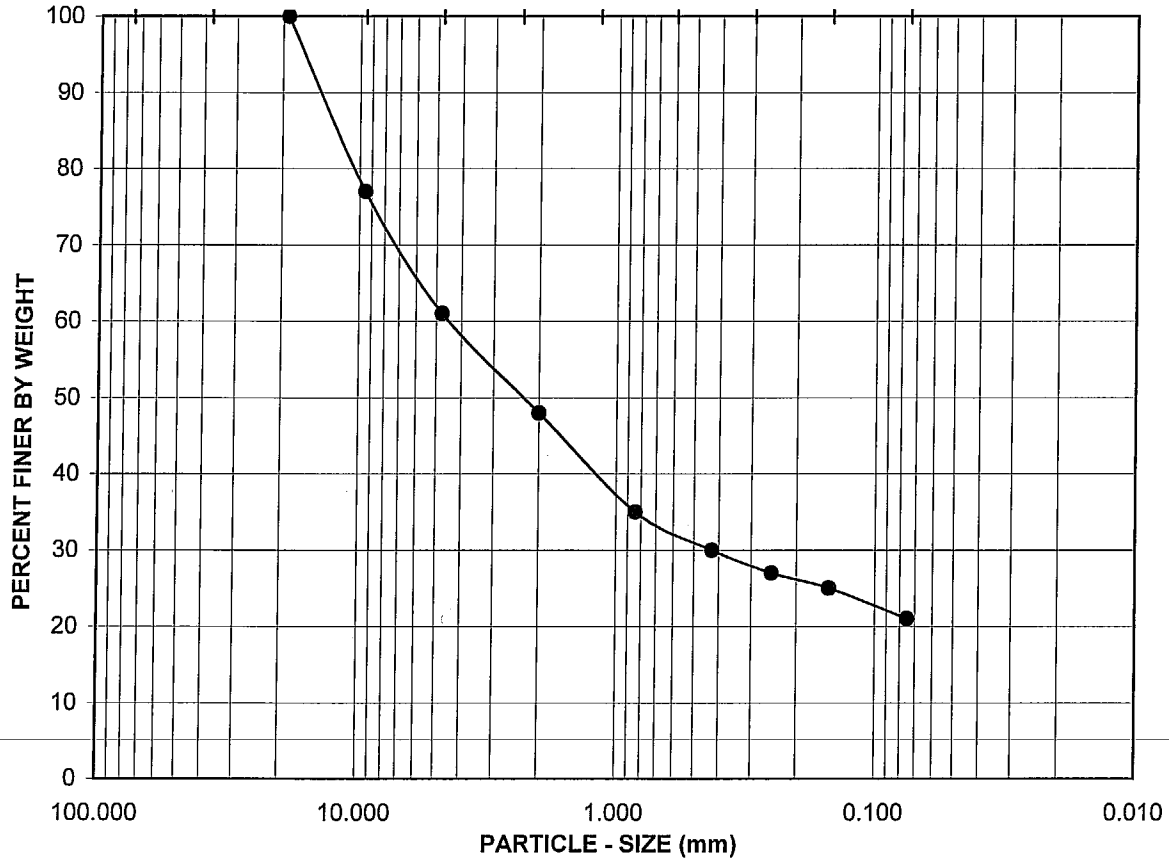
03-04

*Sievemontblgc2s8*




| GRAVEL | | SAND | | | FINES |
|---|---|---|---|---|---|
| COARSE | FINE | CRSE | MEDIUM | FINE | SILT |

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER




| Boring No.: | Sample No.: | Depth (ft.): | Soil Type | GR:SA:FI | LL,PL,PI |
|---|---|---|---|---|---|
| B-LGC-2 | S-11 | 45 | SM | 39 : 40 : 21 | N/A , N/A , N/A |

Visual Sample Description:

Medium Brown Gravelley Sand with Silt

LGC

Project No.: 033022-01

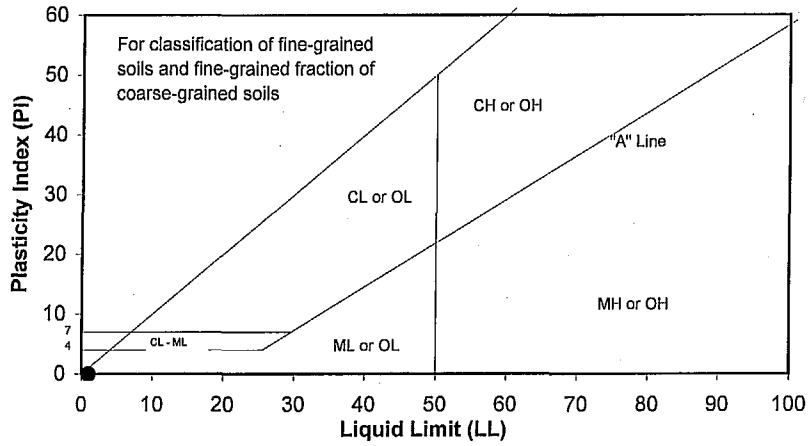
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

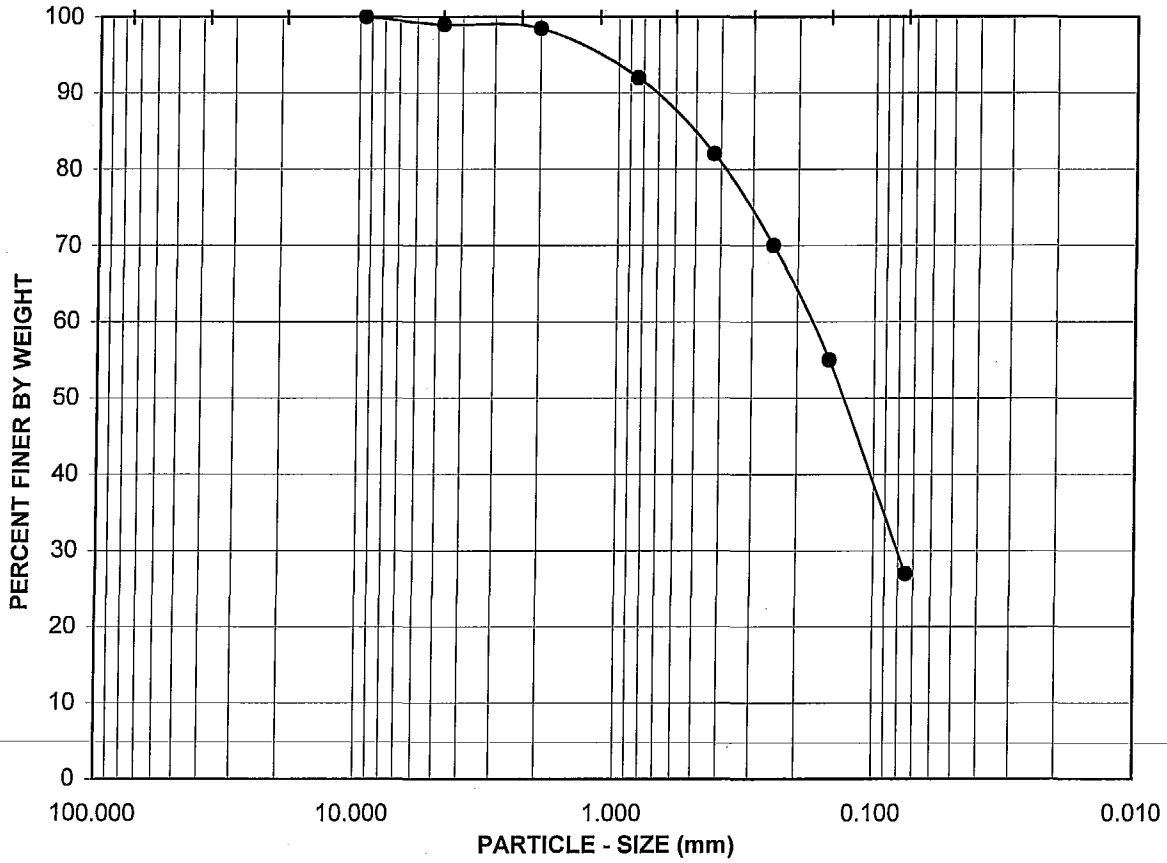
03-04

Sievemontblgc2s11




| GRAVEL | | SAND | | | FINES |
|---|---|---|---|---|---|
| COARSE | FINE | CRSE | MEDIUM | FINE | SILT |

U.S. STANDARD SIEVE OPENING U.S. STANDARD SIEVE NUMBER HYDROMETER




| Boring No.: | Sample No.: | Depth (ft.): | Soil Type | GR:SA:FI | LL,PL,PI |
|---|---|---|---|---|---|
| B-LGC-3 | S-8 | 31 | SM | 1 : 72 : 27 | N/A, N/A, N/A |

Visual Sample Description:

Medium Brown Silty Sand

LGC

Project No.: 033022-01

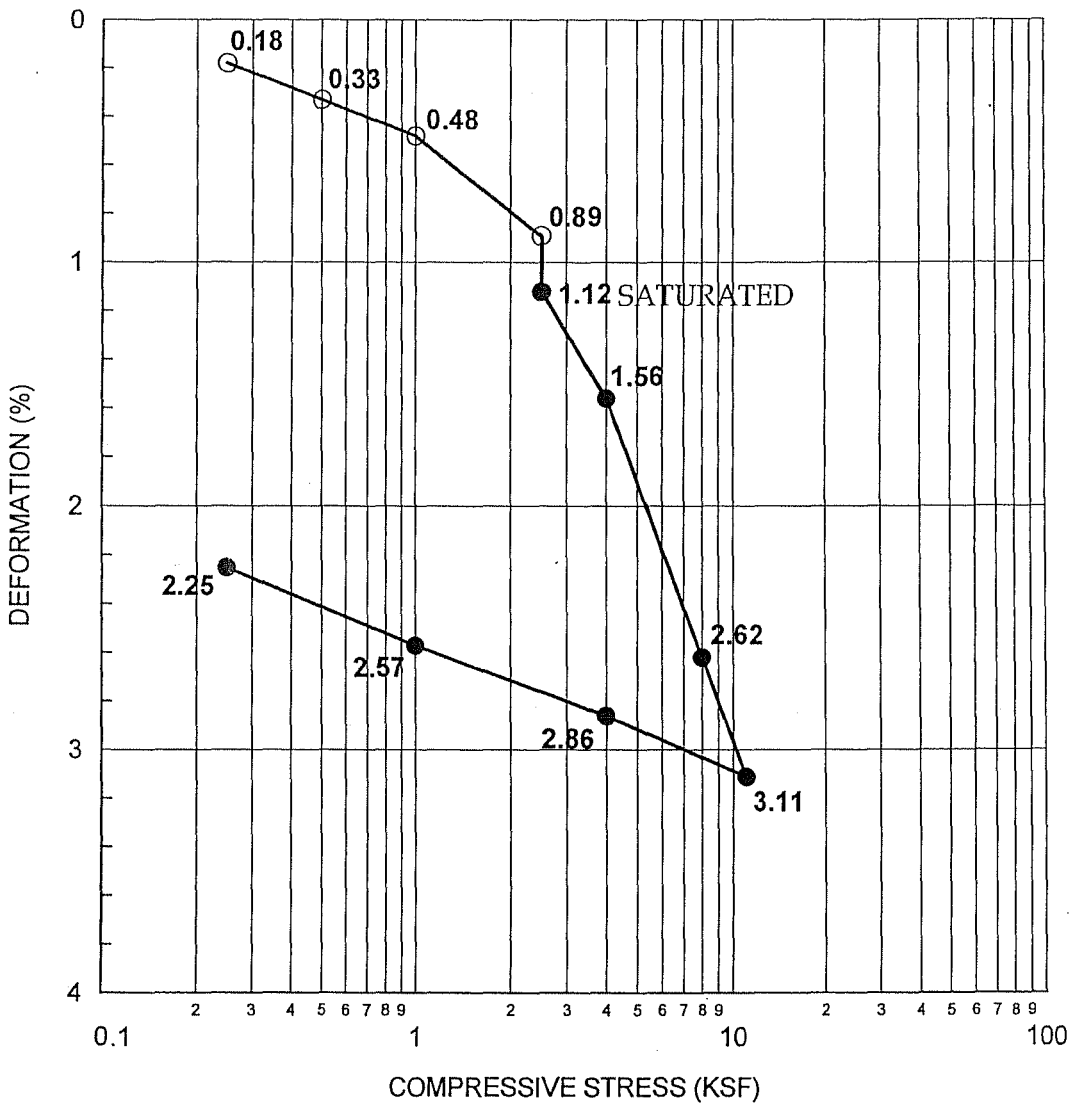
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

03-04

*Sievemontblgc3s8*




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-1 | R-7 | 30 | SM | 6.2 | 106.8 | 0.578 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

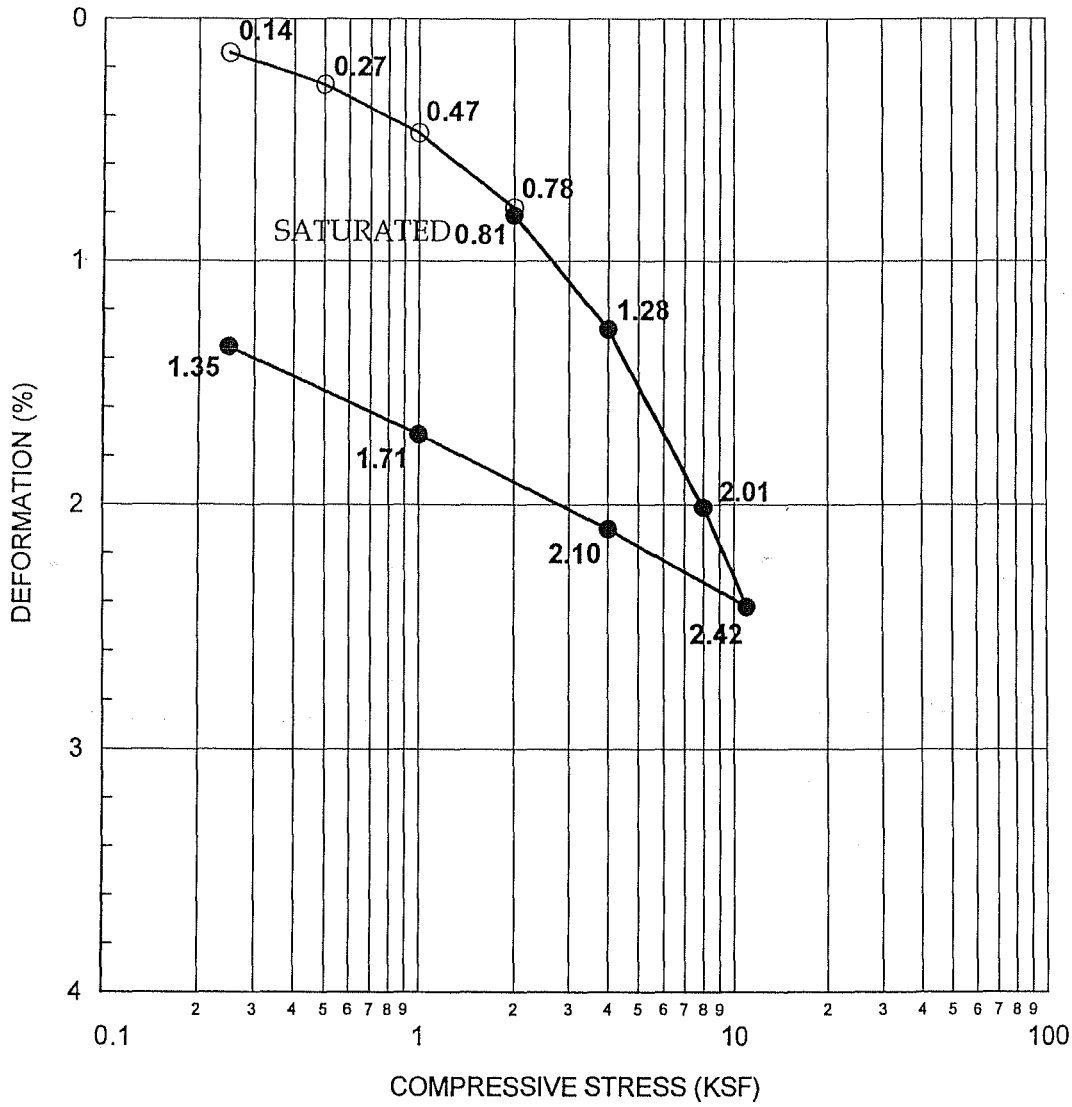
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-2 | R-6 | 25 | SC-SM | 11.4 | 107.4 | 0.568 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

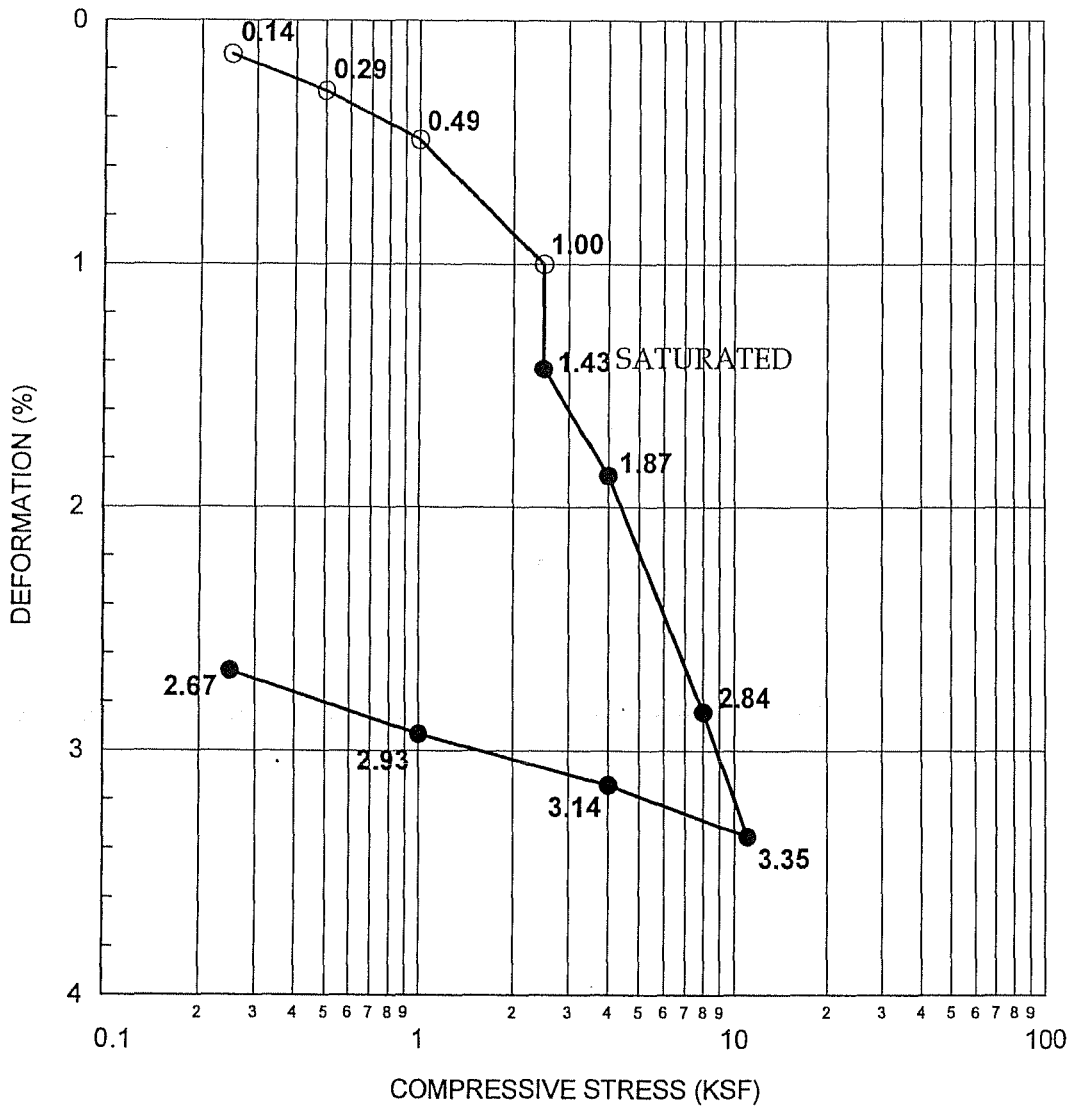
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-3 | R-5 | 30 | SM | 9.3 | 114.2 | 0.475 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

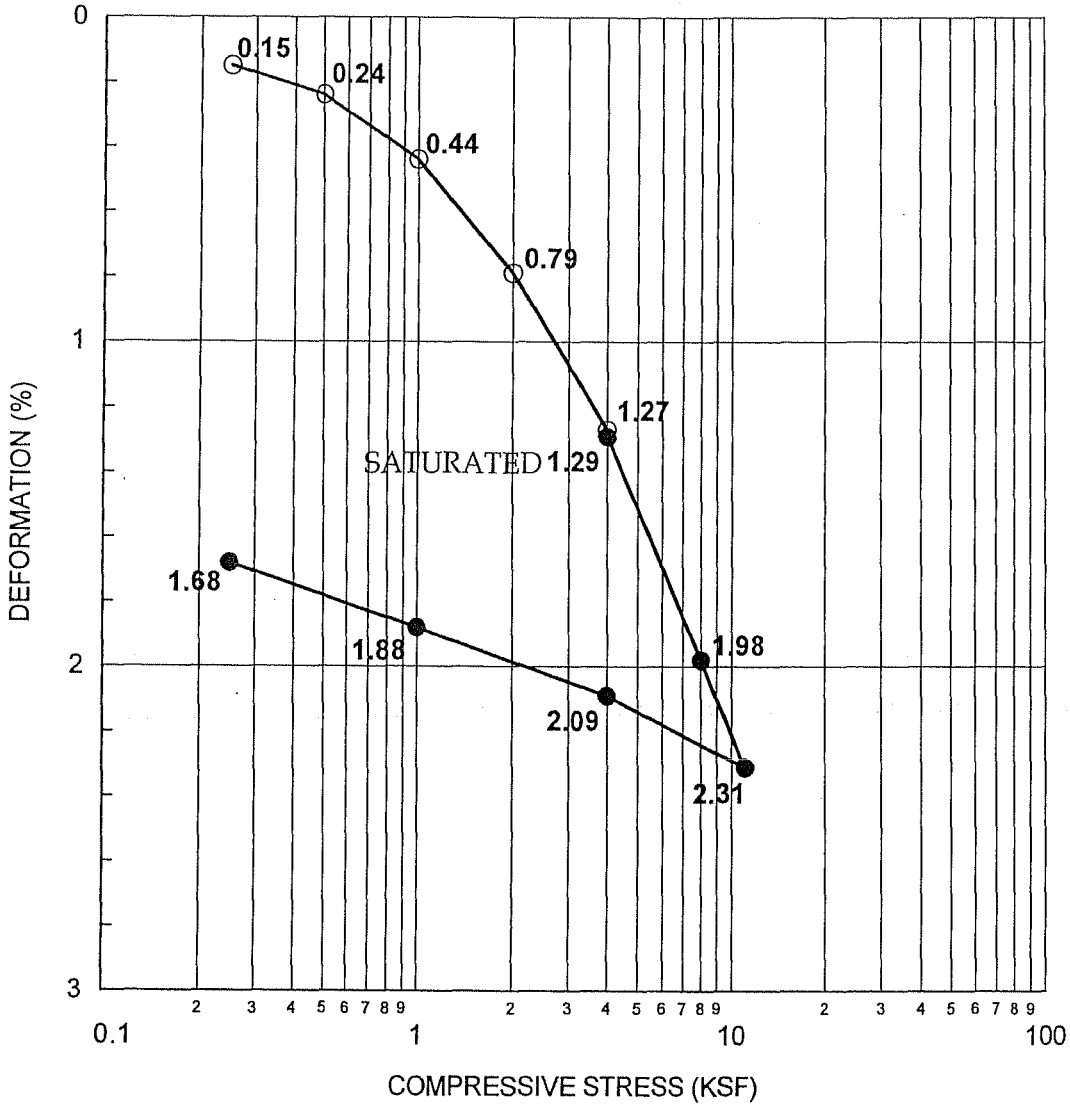
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-8 | R-6 | 40 | SC | 15.4 | 119.4 | 0.410 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

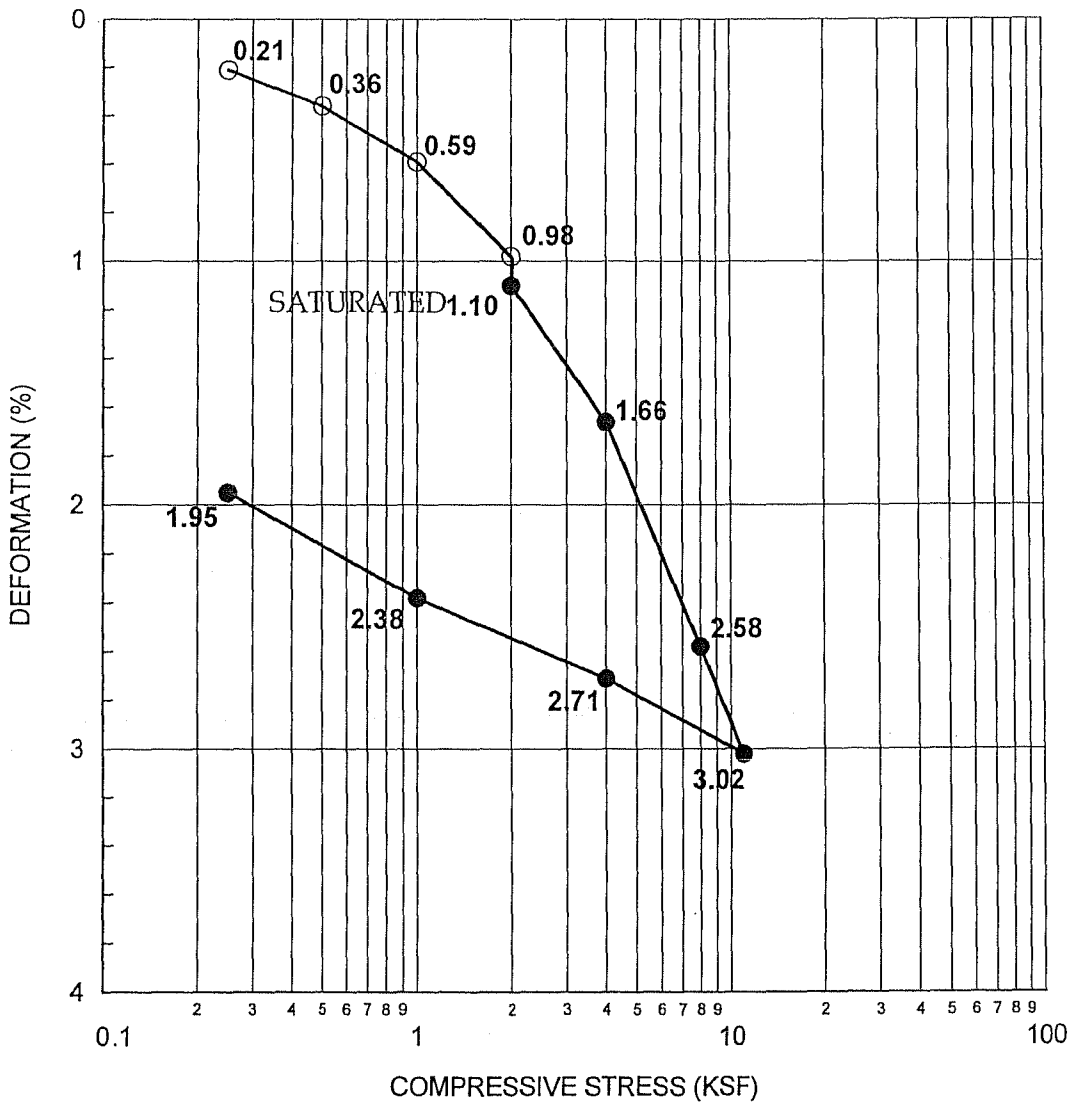
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-9 | R-5 | 25 | SM | 4.5 | 121.4 | 0.388 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

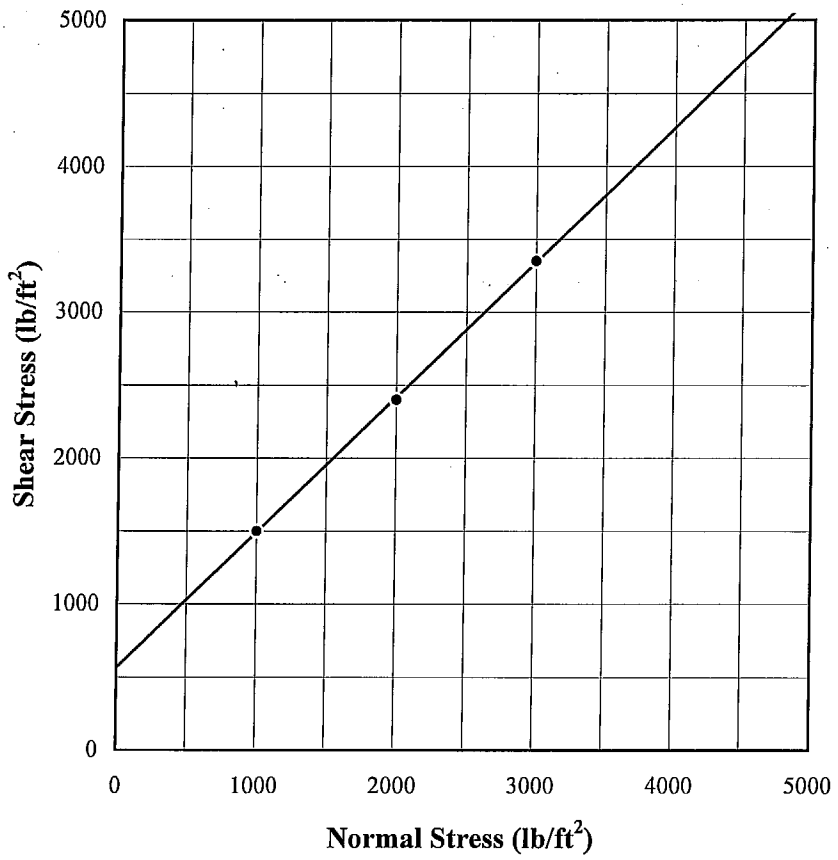
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




—— Least-Squares Best Fit Line (c =550 lb/ft2, phi =43 degrees )

• LGC 2004, B-LGC-1 @ 51', Silty Sand, Undisturbed Sample, 1st-Run Ultimate

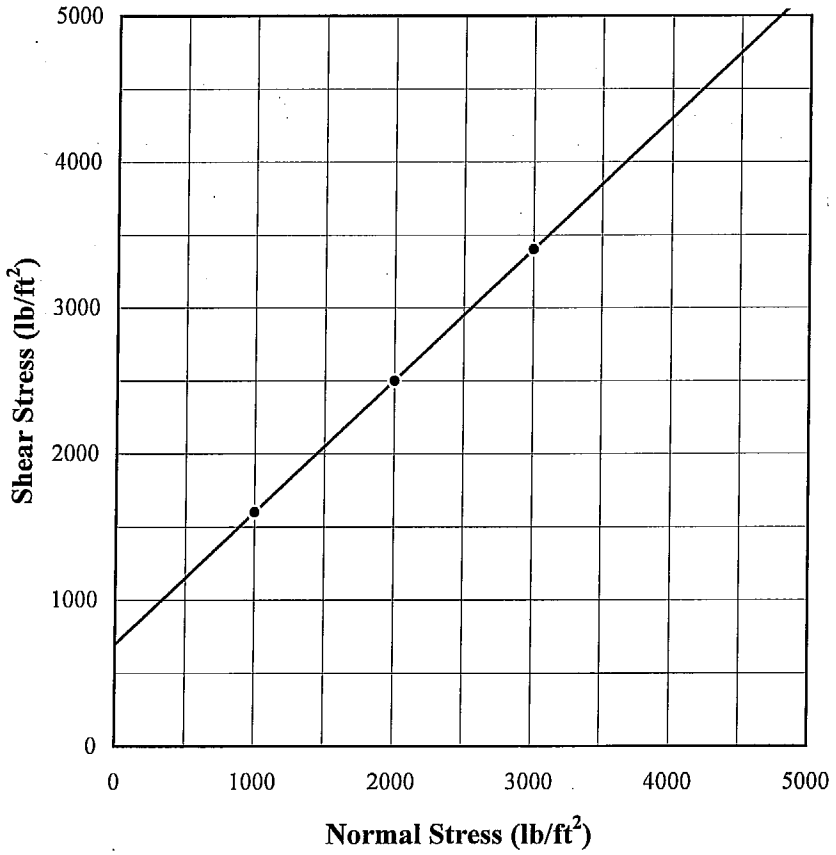
## DIRECT SHEAR TEST

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




—— Least-Squares Best Fit Line (c =700 lb/ft2, phi =42 degrees )

• LGC 2004, B-LGC-1 @ 51', Silty Sand, Undisturbed Sample, 1st-Run Peak

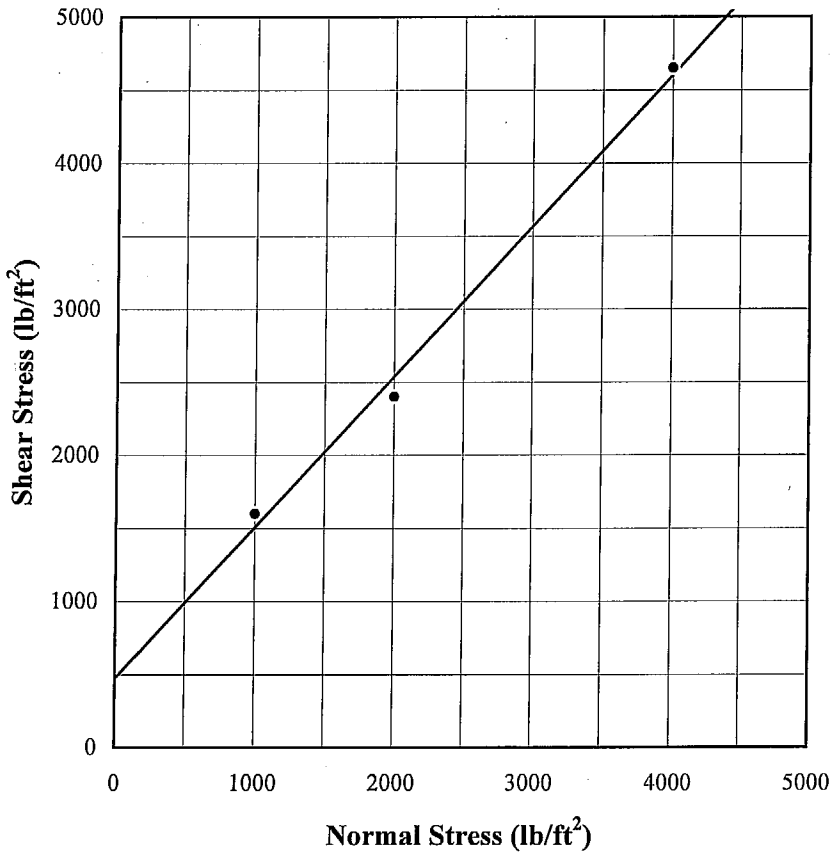
**DIRECT SHEAR TEST**

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




—— Least-Squares Best Fit Line (c =475 lb/ft2, phi =46 degrees )

• LGC 2004, B-LGC-2 @ 0-5', Silty Sand, Remolded Sample to 90%RC, 1st-Run Ultimate

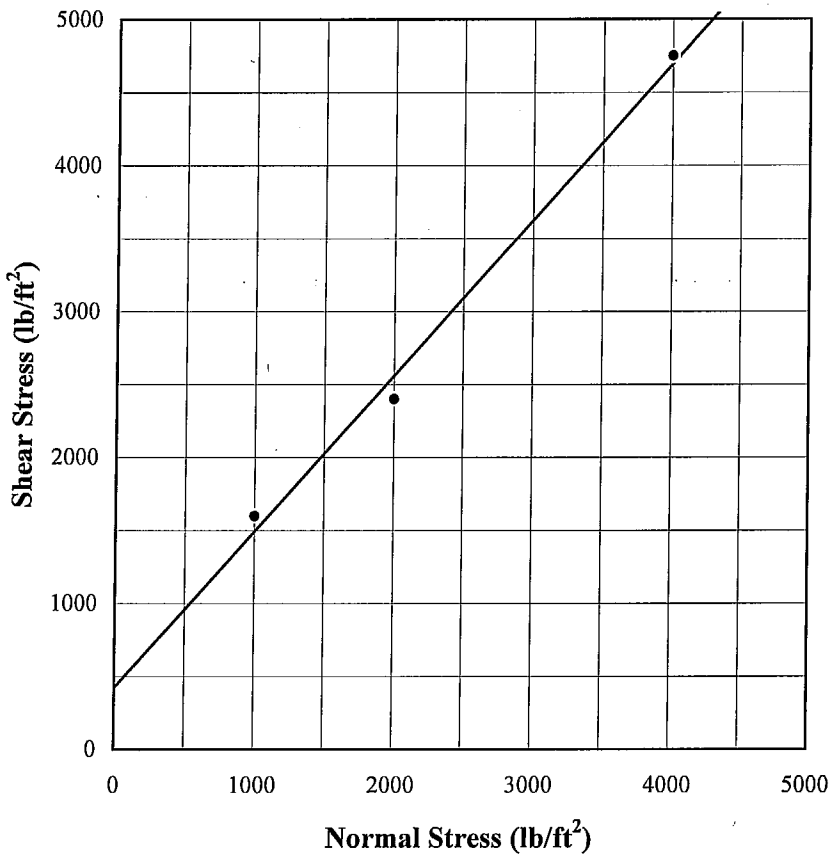
## DIRECT SHEAR TEST

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




——— Least-Squares Best Fit Line (c =425 lb/ft2, phi =47 degrees )

● LGC 2004, B-LGC-2 @ 0-5', Silty Sand, Remolded Sample to 90%RC, 1st-Run Peak

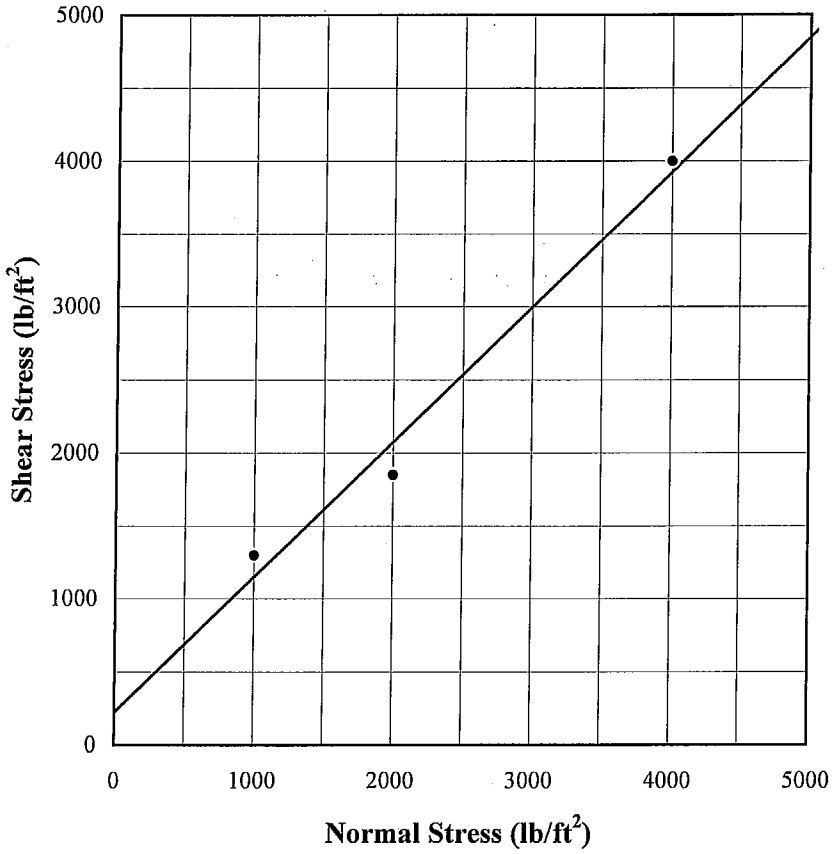
## DIRECT SHEAR TEST

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




——— Least-Squares Best Fit Line (c =225 lb/ft2, phi =43 degrees )

● LGC 2004, B-LGC-3 @ 21', Silty Sand, Undisturbed Sample, 1st-Run Ultimate

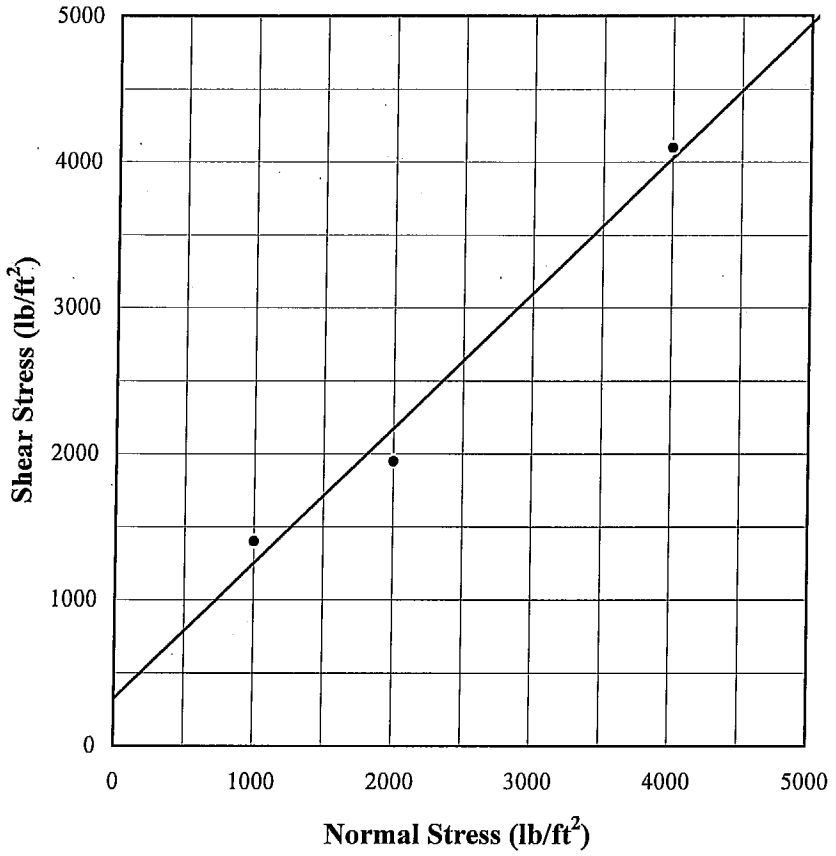
**DIRECT SHEAR TEST**

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




—— Least-Squares Best Fit Line (c =325 lb/ft2, phi =43 degrees )

• LGC 2004, B-LGC-3 @ 21', Silty Sand, Undisturbed Sample, 1st-Run Peak

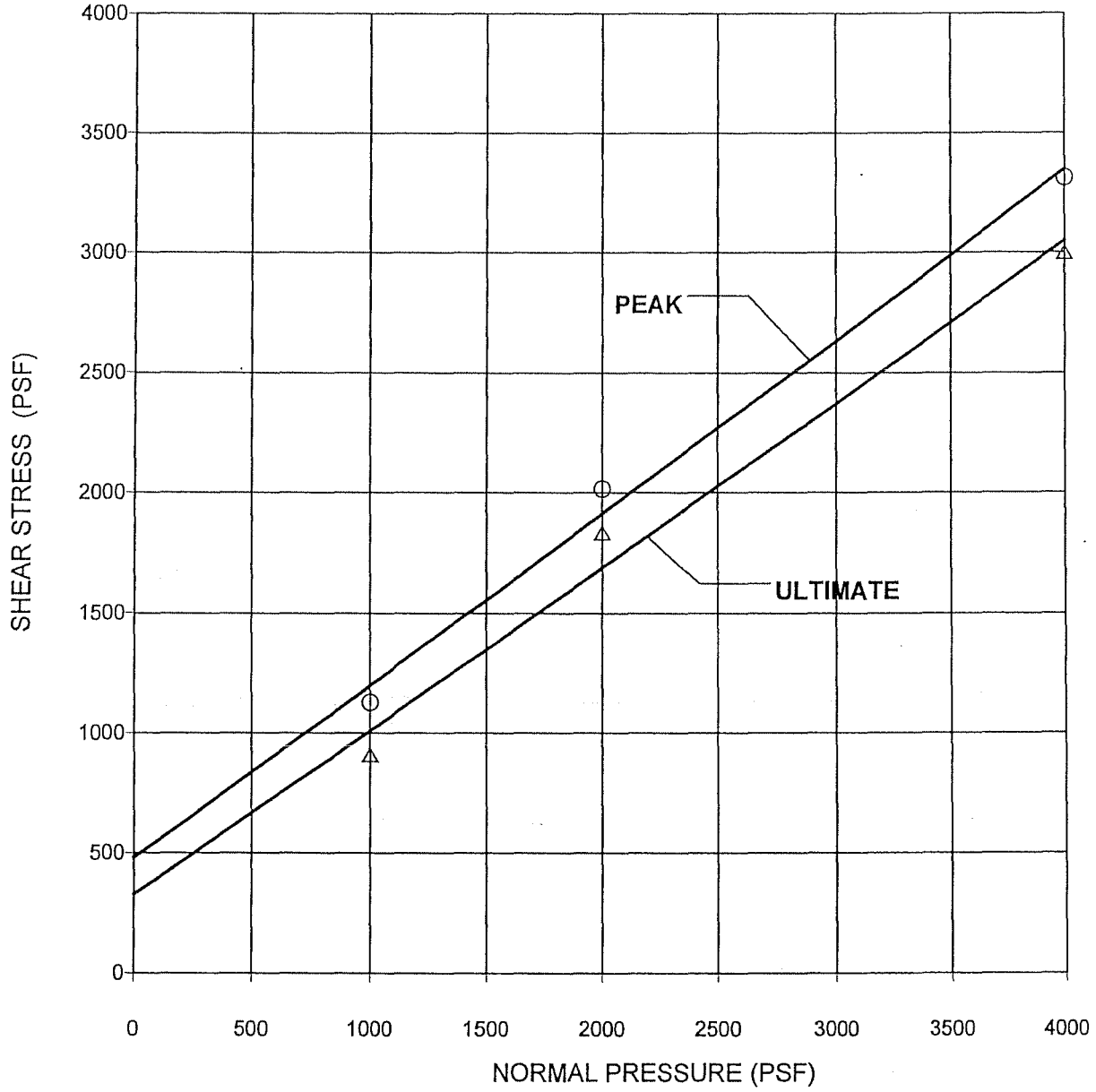
## DIRECT SHEAR TEST

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-1 | R-9 | 40 | RING | SM | 480 | 36 |
| △ RESIDUAL | | | | | | 325 | 34 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 1000 | 6.9 | 16.6 |
| 2000 | 6.9 | 17.0 |
| 4000 | 6.9 | 15.7 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

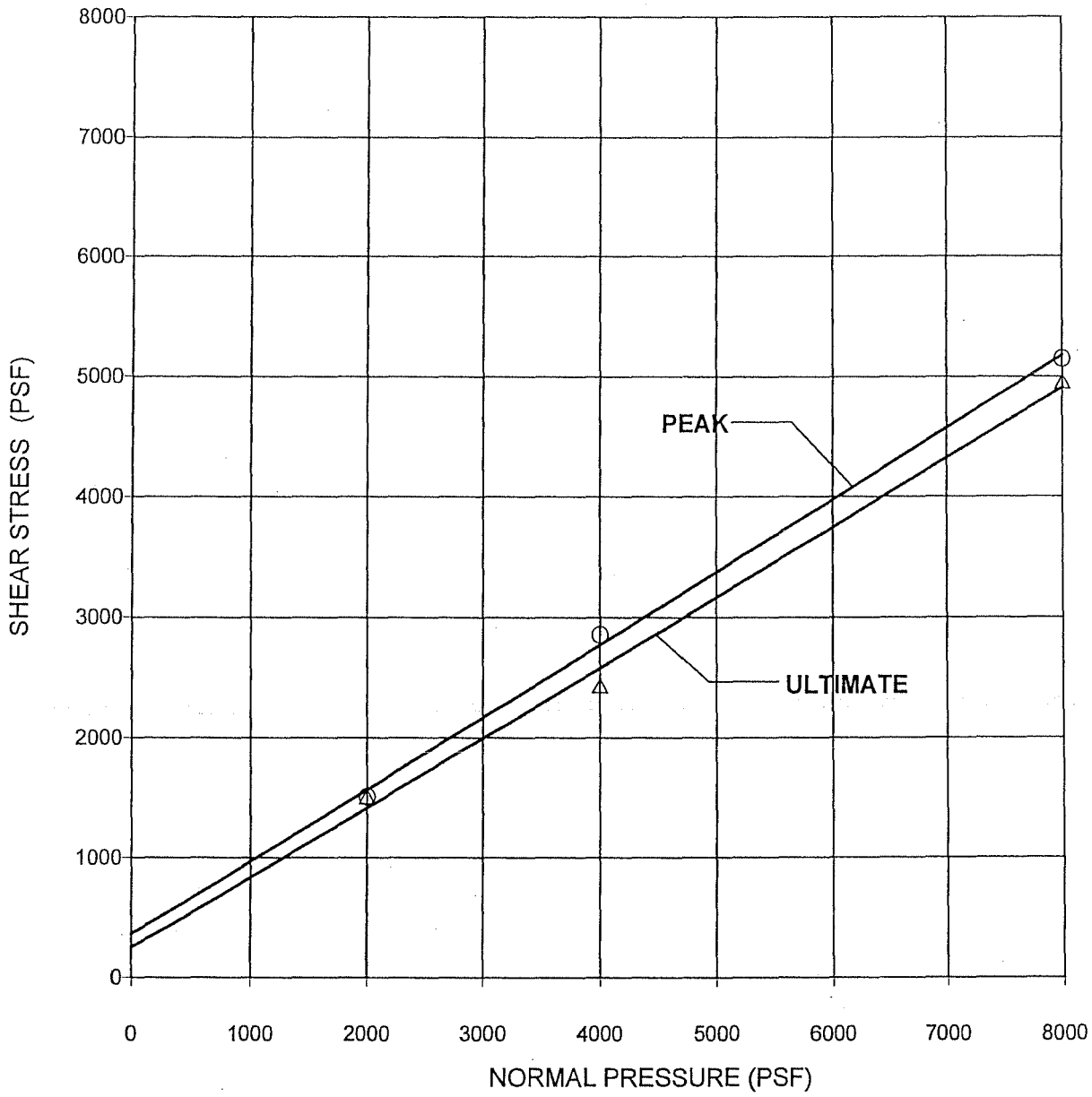
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-1 | R-11 | 50 | RING | SM | 365 | 31 |
| △ RESIDUAL | | | | | | 250 | 30 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 10.6 | 19.3 |
| 4000 | 10.6 | 19.2 |
| 8000 | 10.6 | 17.1 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

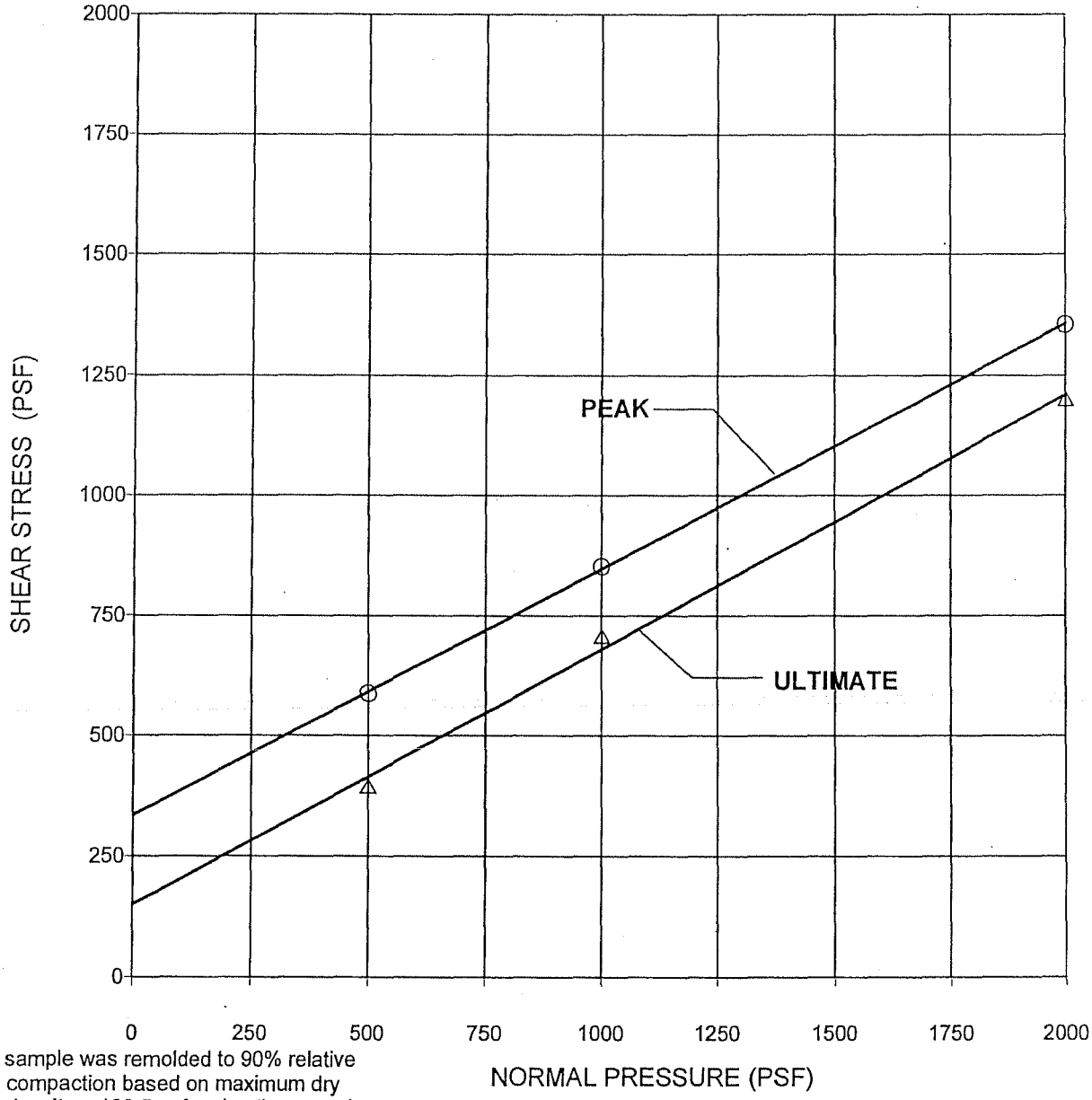
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




Note: sample was remolded to 90% relative compaction based on maximum dry density = 123.5 pcf and optimum moisture = 11.0%

| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-2 | BULK | 0-5 | REMOLD | ML/CL | 335 | 27 |
| △ RESIDUAL | | | | | | 150 | 28 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 500 | 11.0 | 20.6 |
| 1000 | 11.0 | 20.1 |
| 2000 | 11.0 | 19.0 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

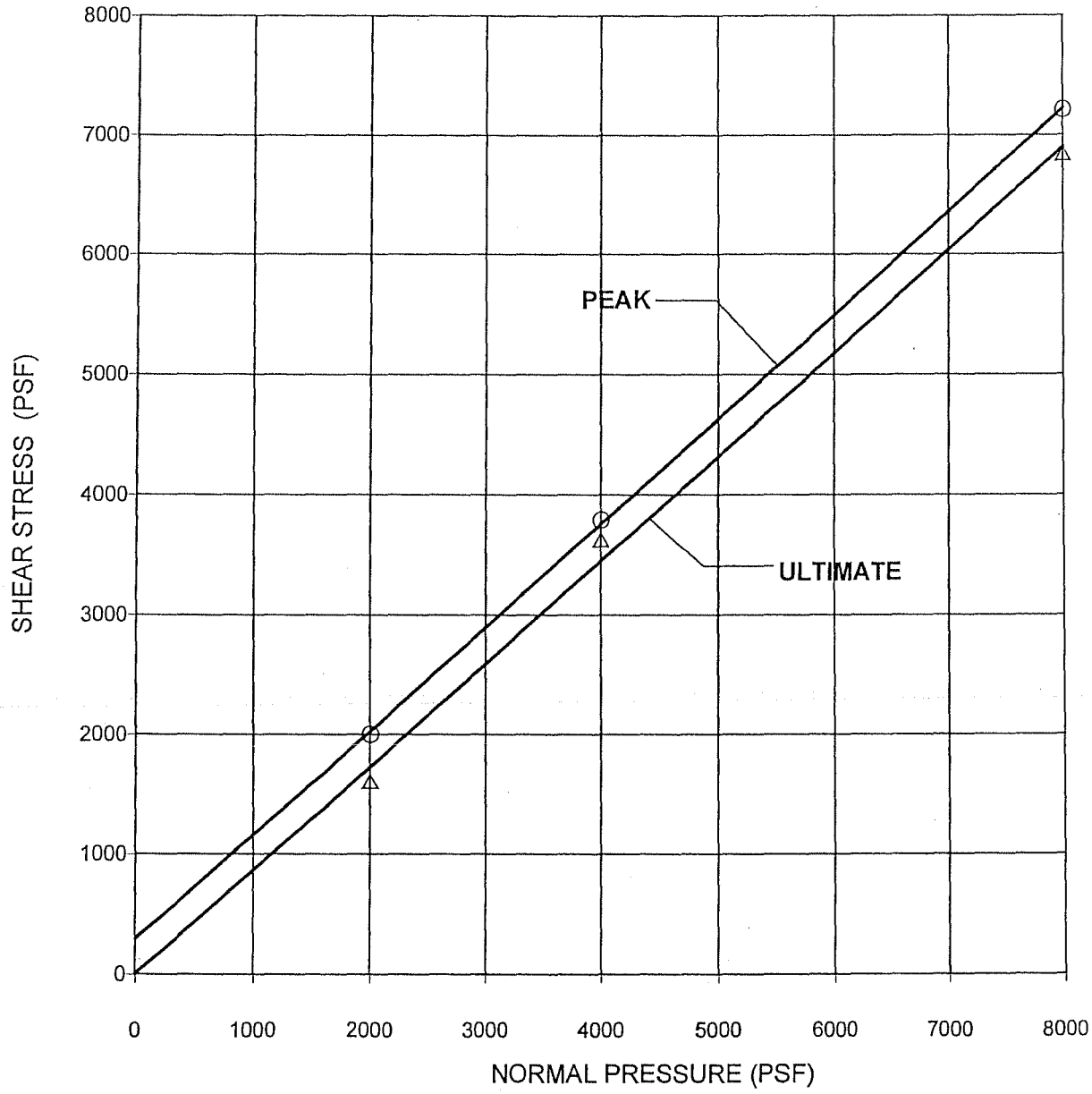
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-2 | R-9 | 45 | RING | SM/CL | 295 | 41 |
| △ RESIDUAL | | | | | | 5 | 41 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 12.7 | 27.1 |
| 4000 | 12.7 | 20.8 |
| 8000 | 12.7 | 22.2 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

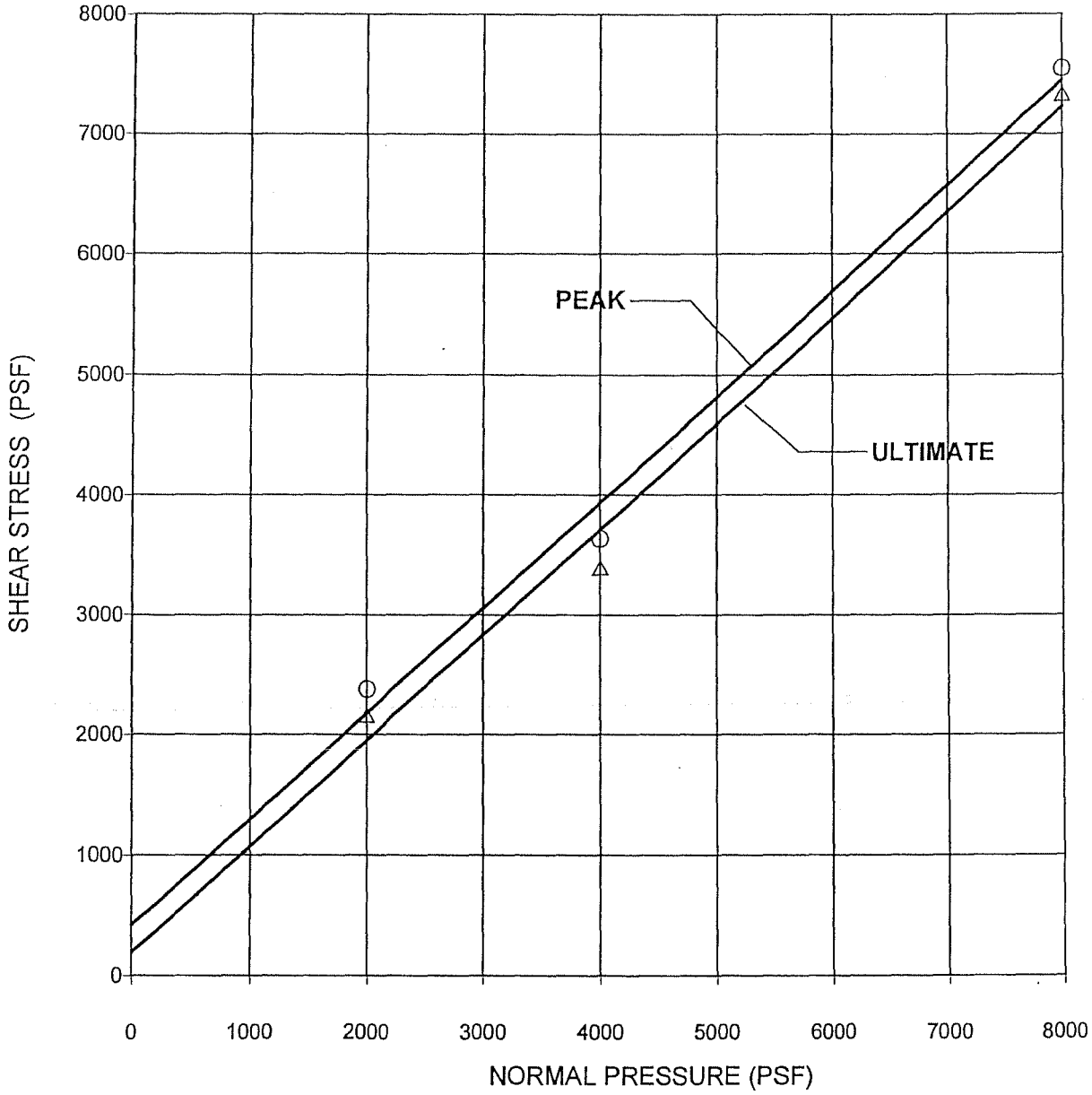
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-2 | R-13 | 65 | RING | SC | 420 | 41 |
| △ RESIDUAL | | | | | | 190 | 41 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 10.1 | 17.1 |
| 4000 | 10.1 | 16.8 |
| 8000 | 10.1 | 14.9 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

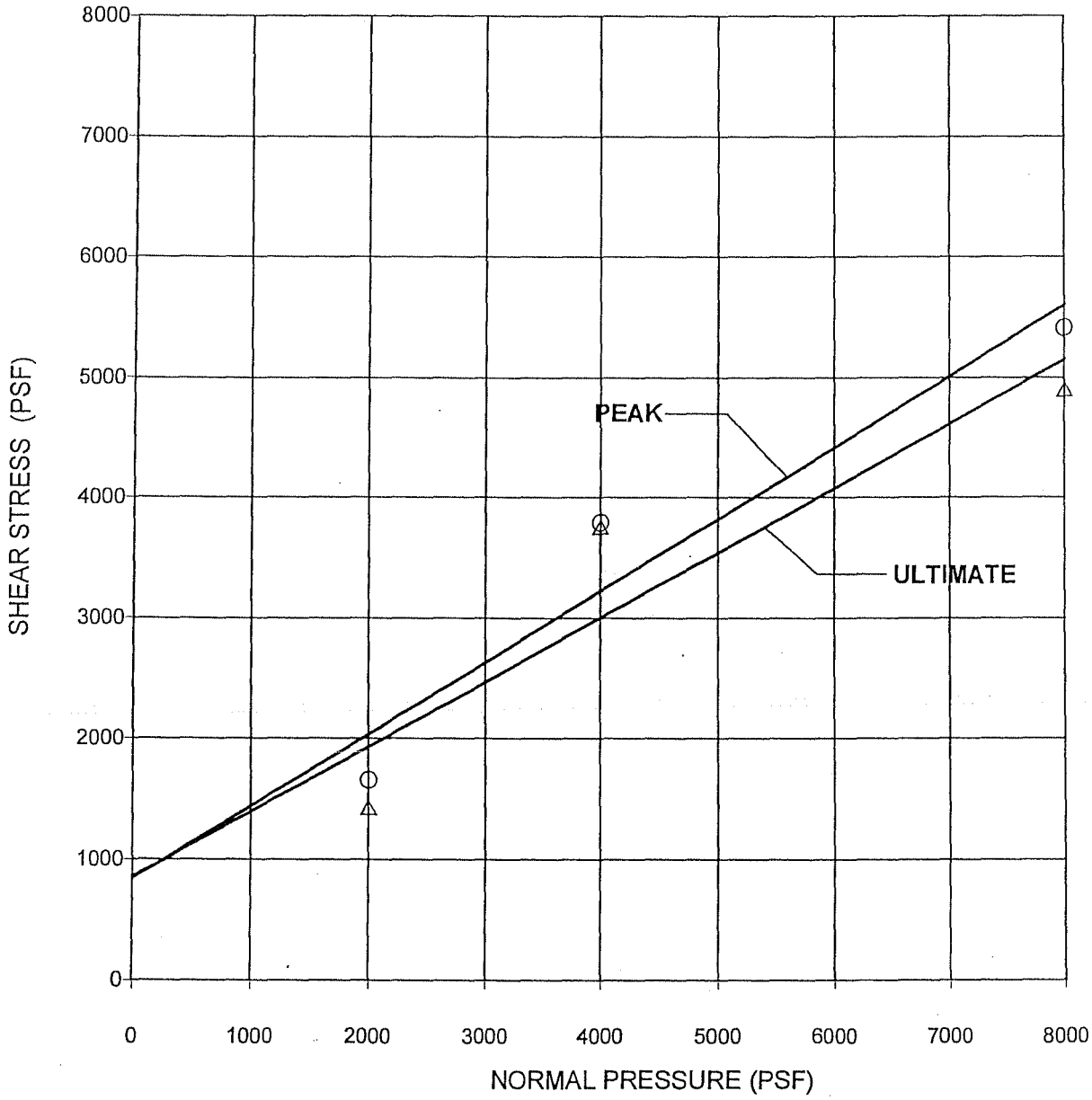
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-3 | R-6 | 40 | RING | SM | 845 | 31 |
| △ RESIDUAL | | | | | | 860 | 28 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 6.7 | 19.6 |
| 4000 | 6.7 | 19.0 |
| 8000 | 6.7 | 19.6 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

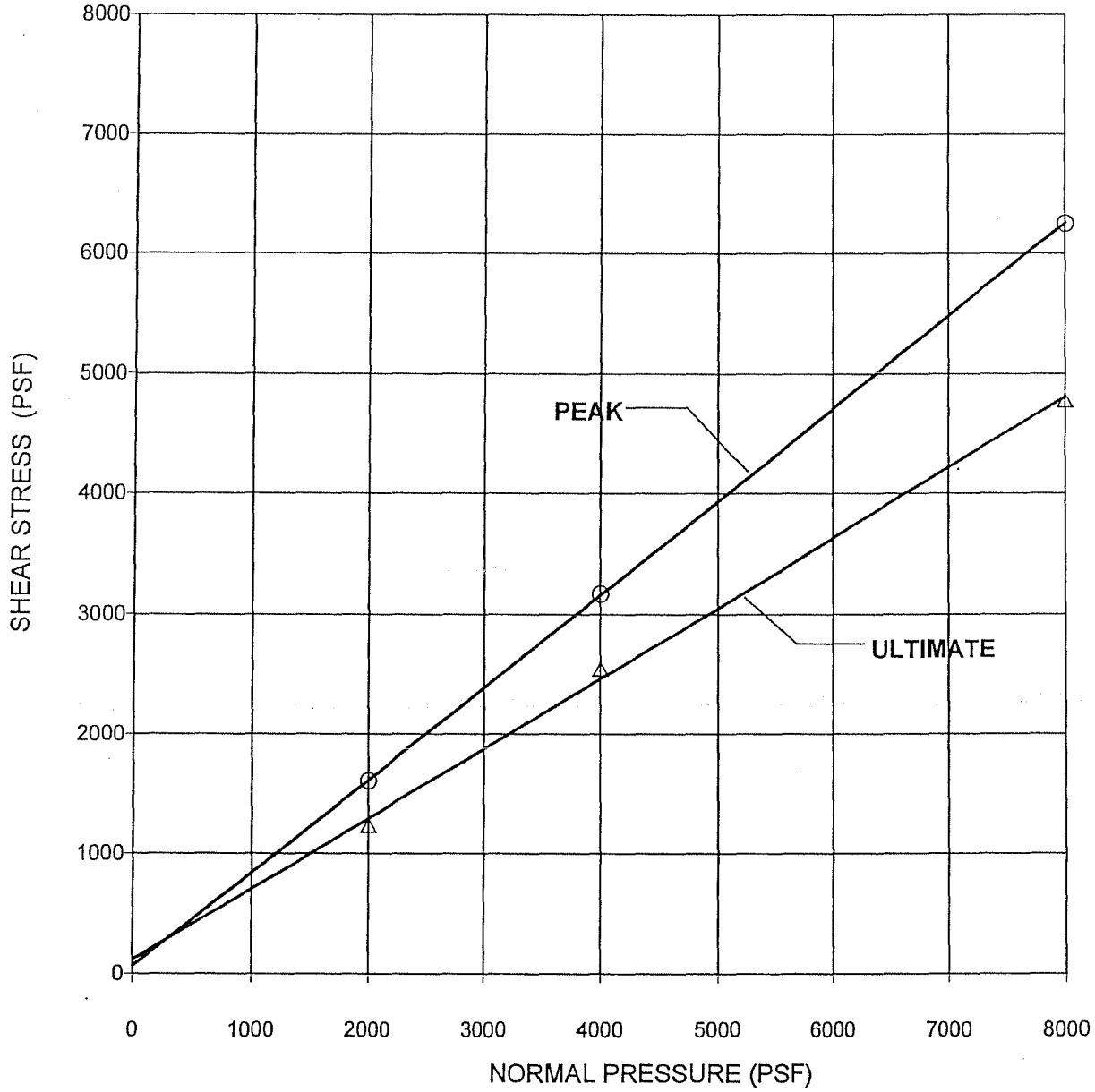
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-4 | R-6 | 45 | RING | SP-SM | 65 | 38 |
| △ RESIDUAL | | | | | | 120 | 30 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 6.9 | 20.1 |
| 4000 | 6.9 | 18.6 |
| 8000 | 6.9 | 15.7 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

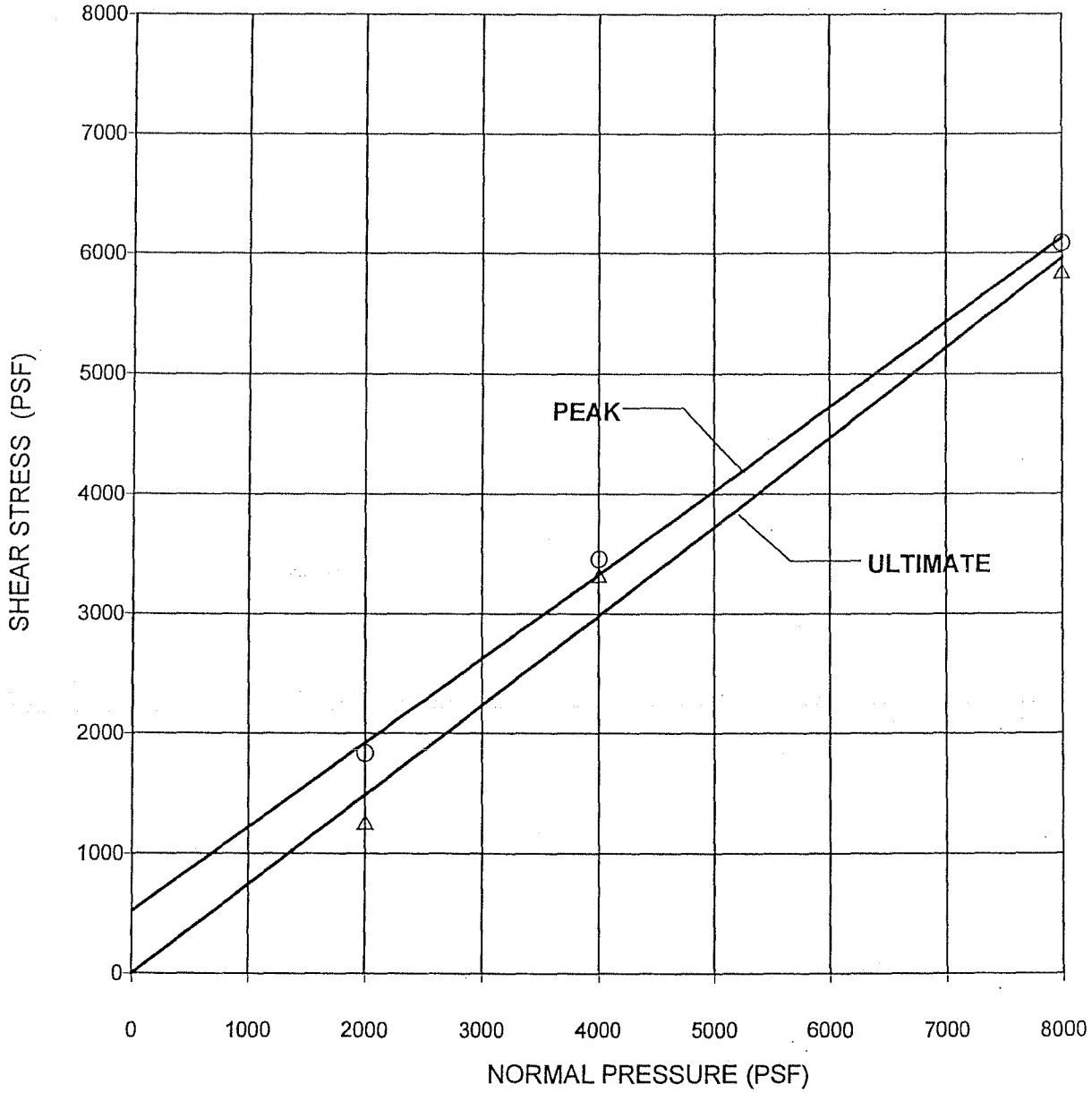
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-5 | R-6 | 50 | RING | SM | 520 | 35 |
| △ RESIDUAL | | | | | | 0 | 37 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 2000 | 8.7 | 18.0 |
| 4000 | 8.7 | 18.0 |
| 8000 | 8.7 | 15.3 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

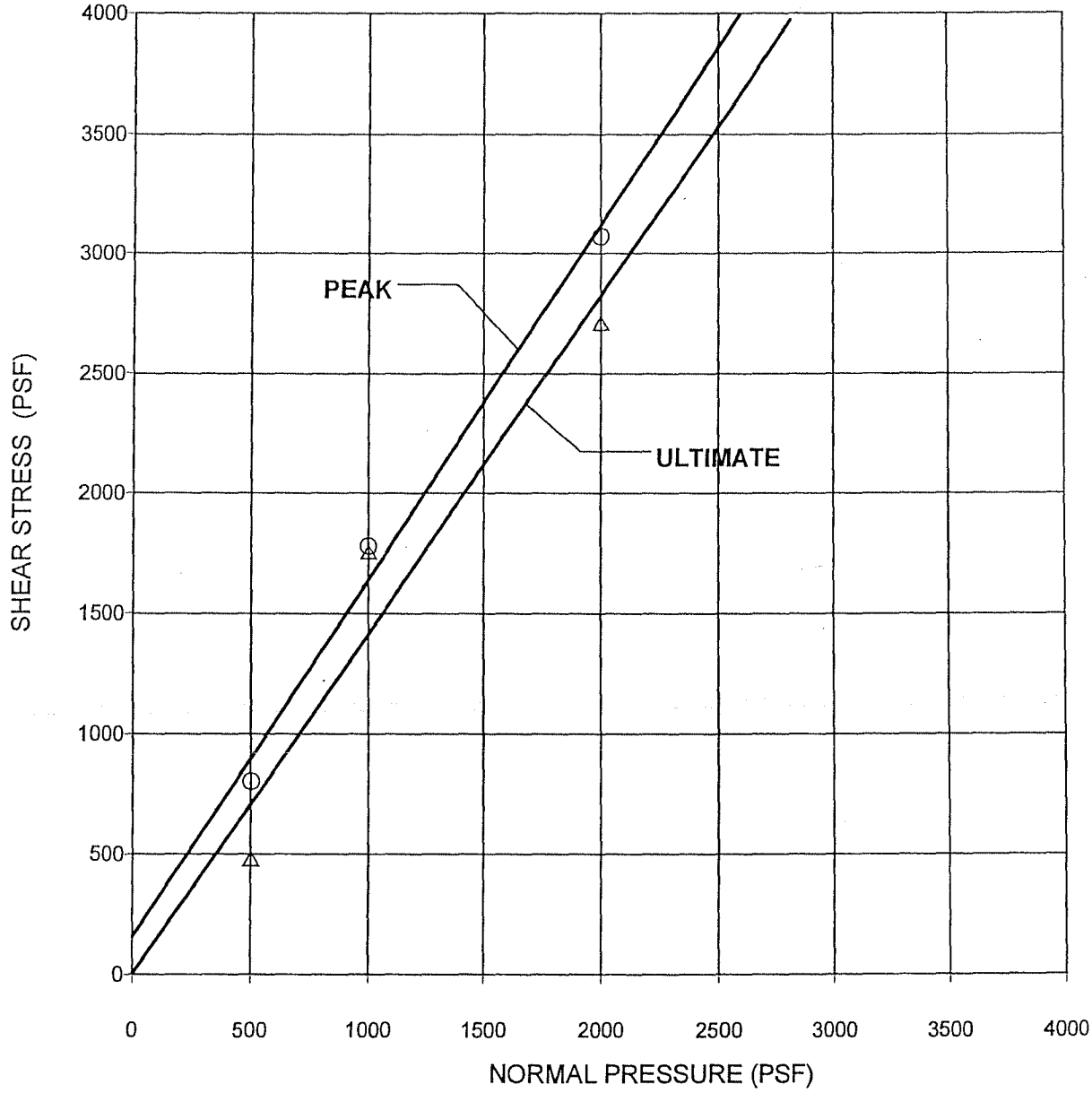
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-6 | R-2 | 10 | RING | SM | 55 | 405 |
| △ RESIDUAL | | | | | | 55 | 0 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 500 | 2.5 | 17.7 |
| 1000 | 2.5 | 17.9 |
| 2000 | 2.5 | 14.3 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

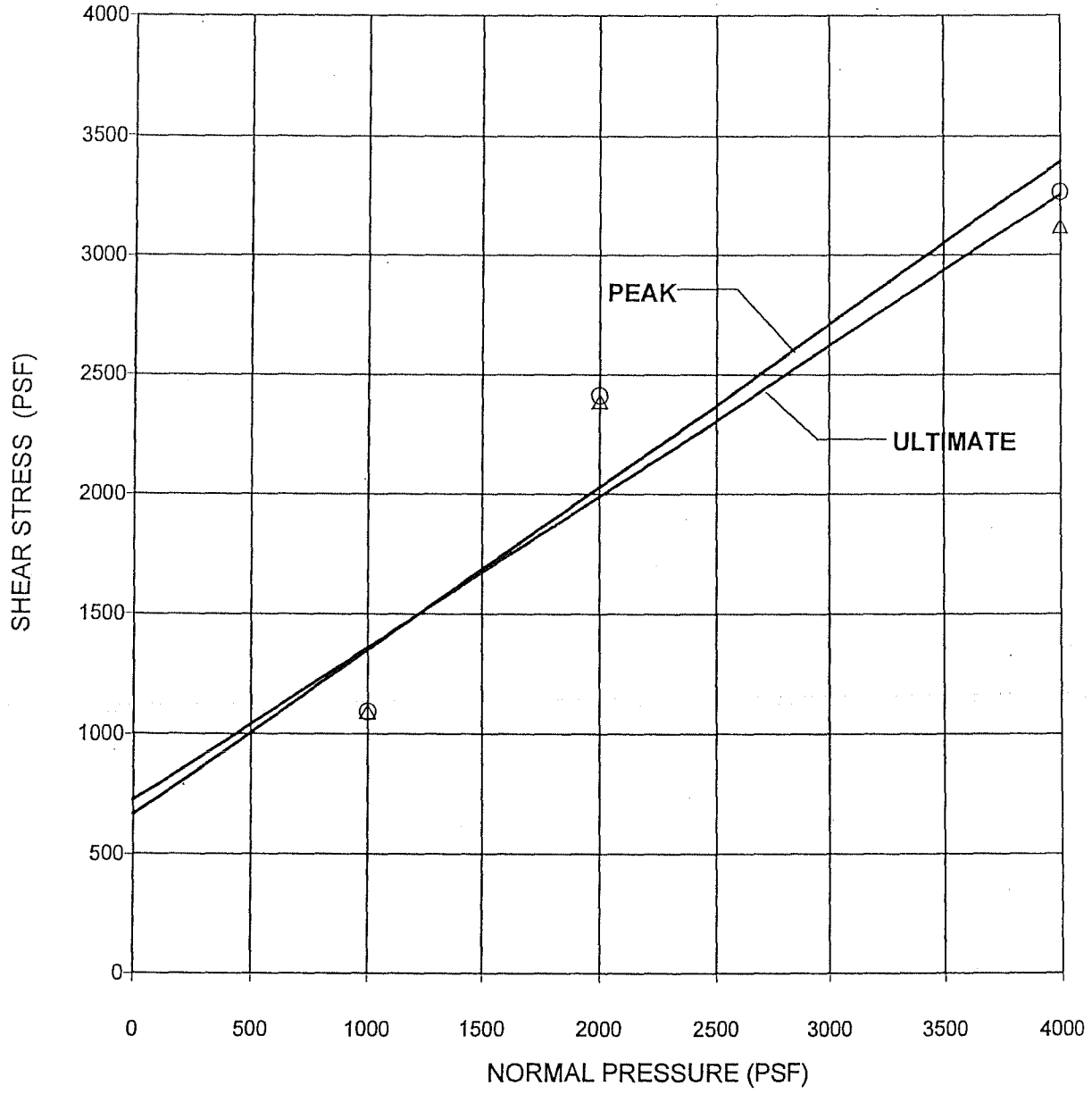
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-6 | R-4 | 30 | RING | SM | 665 | 34 |
| △ RESIDUAL | | | | | | 725 | 32 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 1000 | 5.0 | 18.6 |
| 2000 | 5.0 | 17.0 |
| 4000 | 5.0 | 15.7 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

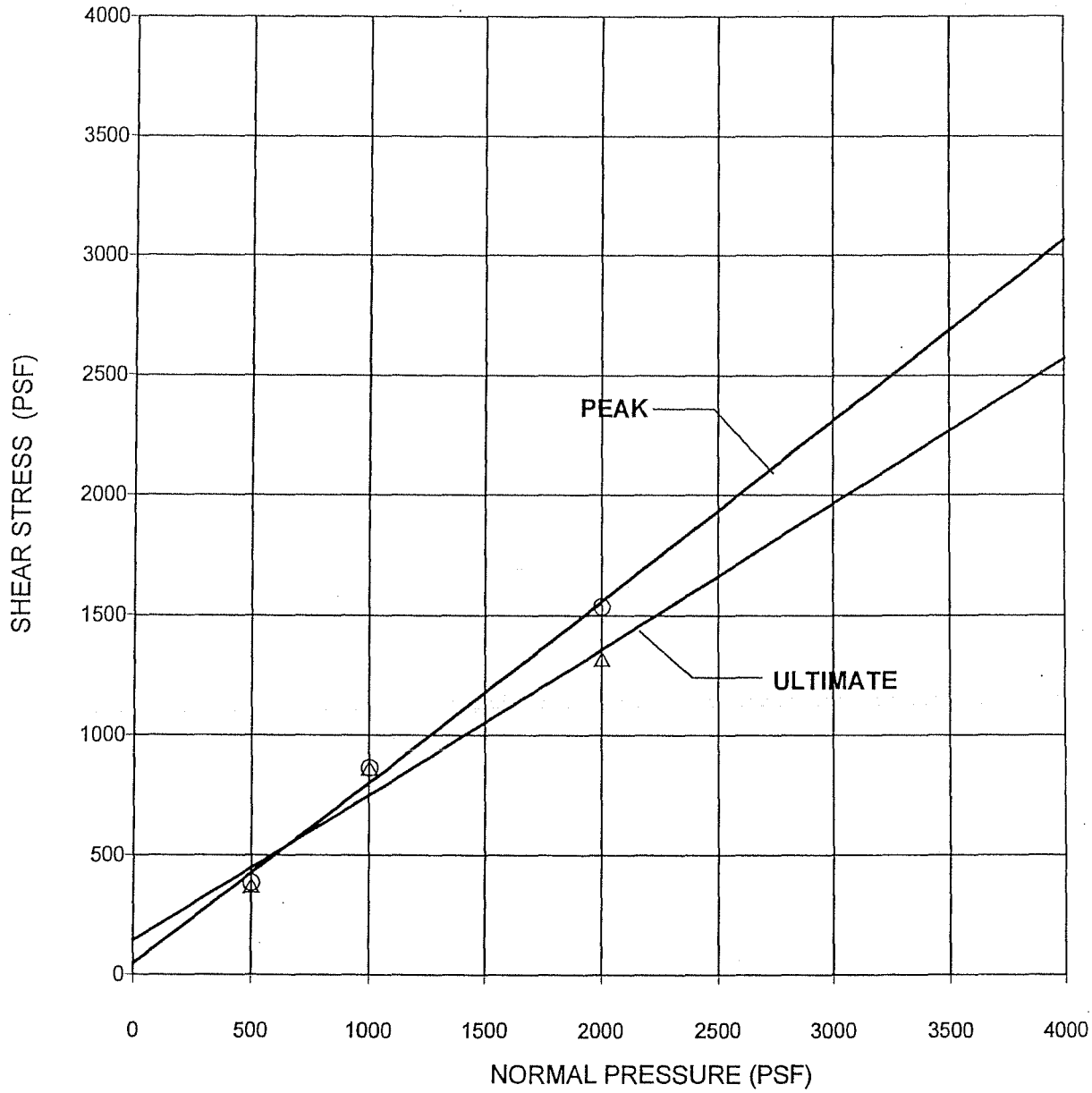
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-7 | R-2 | 5 | RING | SC | 50 | 37 |
| △ RESIDUAL | | | | | | 145 | 31 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 500 | 8.3 | 22.0 |
| 1000 | 8.3 | 21.4 |
| 2000 | 8.3 | 18.0 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

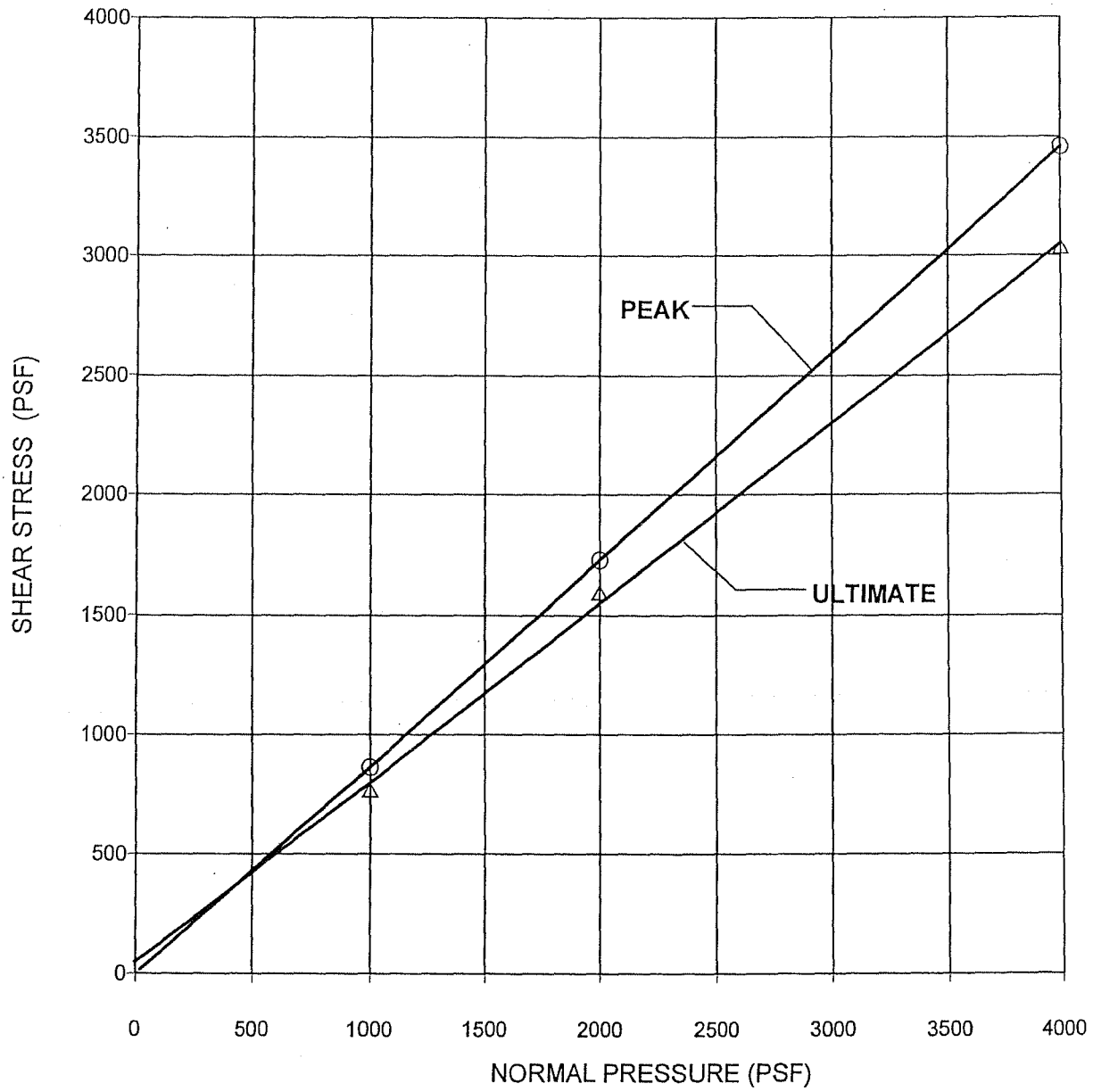
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-7 | R-5 | 25 | RING | SM | 0 | 41 |
| △ RESIDUAL | | | | | | 50 | 37 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 1000 | 5.2 | 17.6 |
| 2000 | 5.2 | 18.7 |
| 4000 | 5.2 | 15.3 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

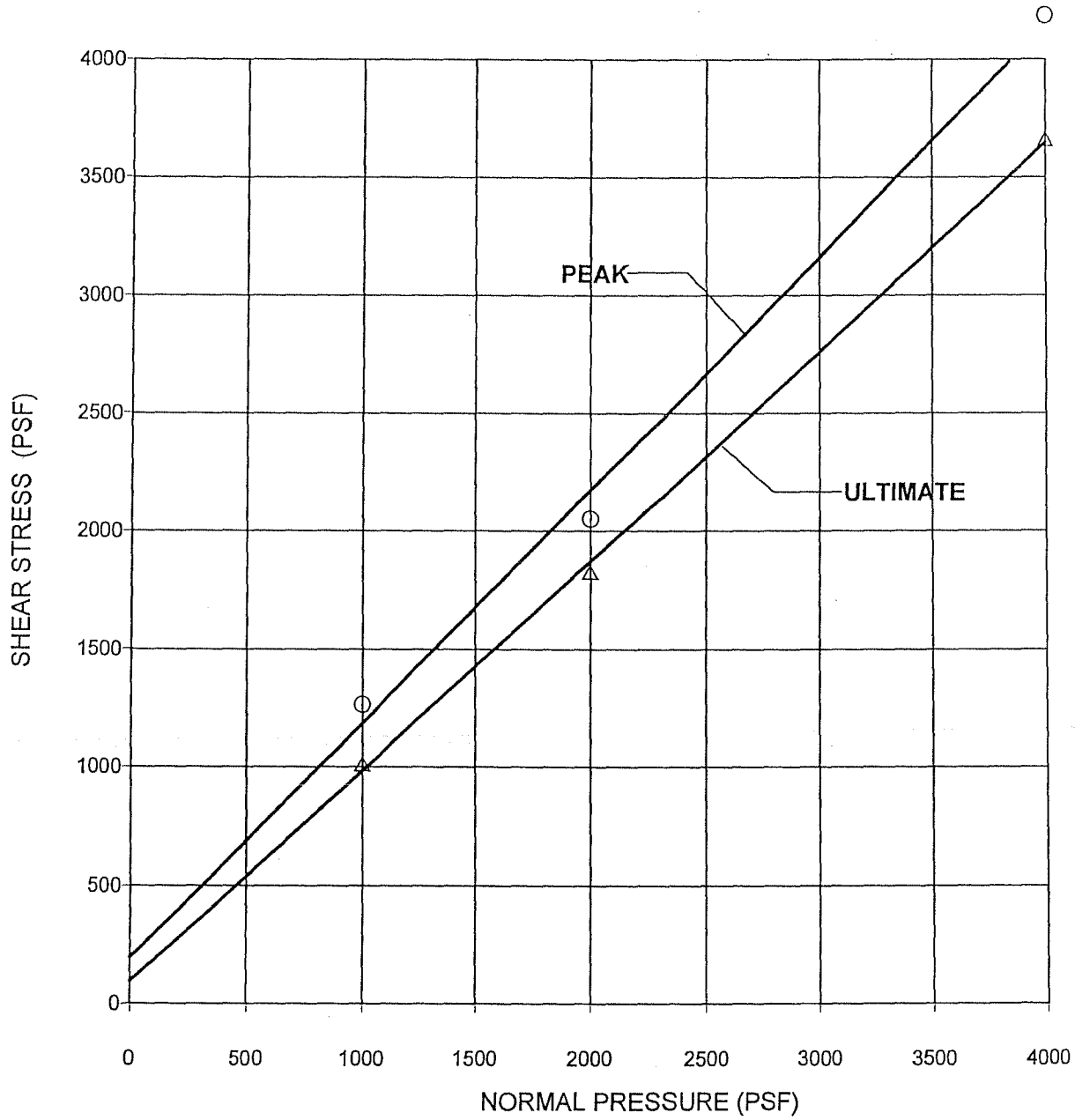
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




| SYMBOL | BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (FT) | SAMPLE TYPE | SOIL TYPE | COHESION (PSF) | FRICTION ANGLE (DEG) |
|---|---|---|---|---|---|---|---|
| ○ ULTIMATE | B-LGC-9 | R-6 | 35 | RING | SC | 195 | 45 |
| △ RESIDUAL | | | | | | 95 | 42 |

| Vertical Loads (PSF) | Moisture Content Before Test (%) | Moisture Content After Test (%) |
|---|---|---|
| 1000 | 7.8 | 21.7 |
| 2000 | 7.8 | 19.3 |
| 4000 | 7.8 | 15.4 |

Environmental Geotechnology Laboratory

Project Address:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

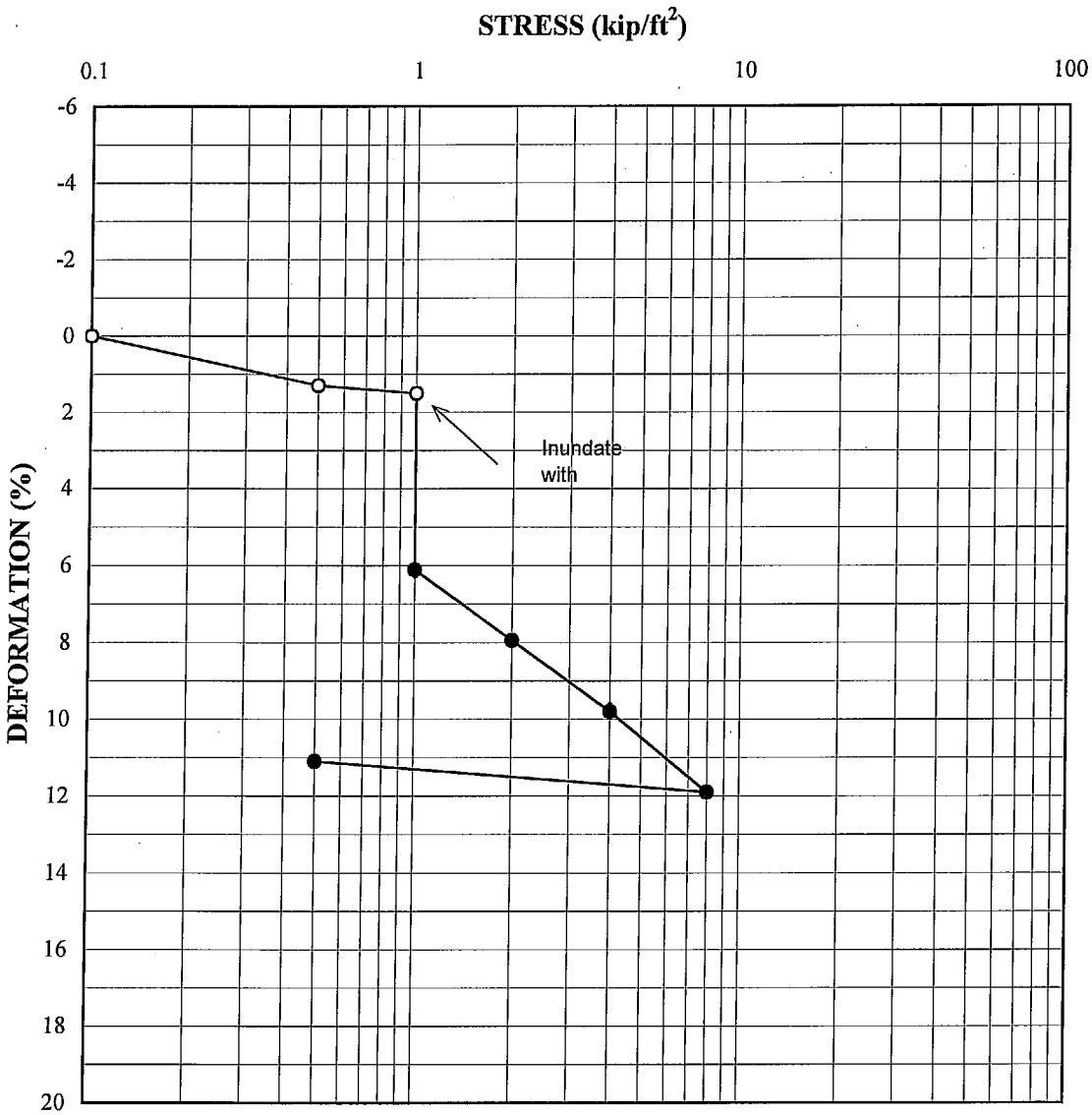
# DIRECT SHEAR

(ASTM D3080)

01/07

FIGURE

11819 Goldring Road, Unit A, Arcadia, CA 91006. Tel: (626) 263-3588; Fax: (626) 263-3599




—O— LGC 2004, B-LGC-3 @ 11.0', S-4, Silty Sand with Clay

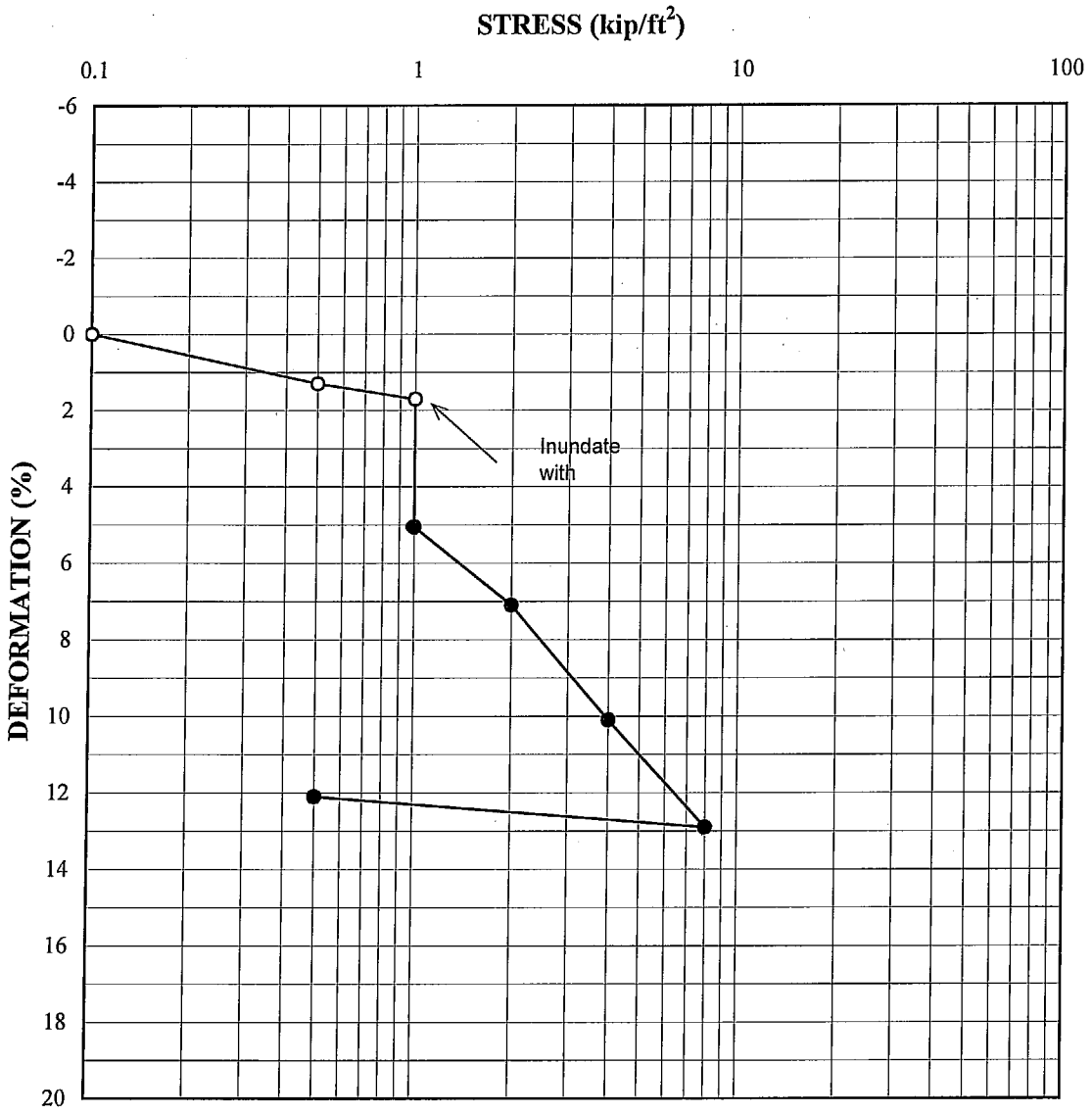
## CONSOLIDATION TEST RESULTS

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




—O— LGC 2004, B-LGC-5 @ 11.0', S-4, Silty Sand with Clay

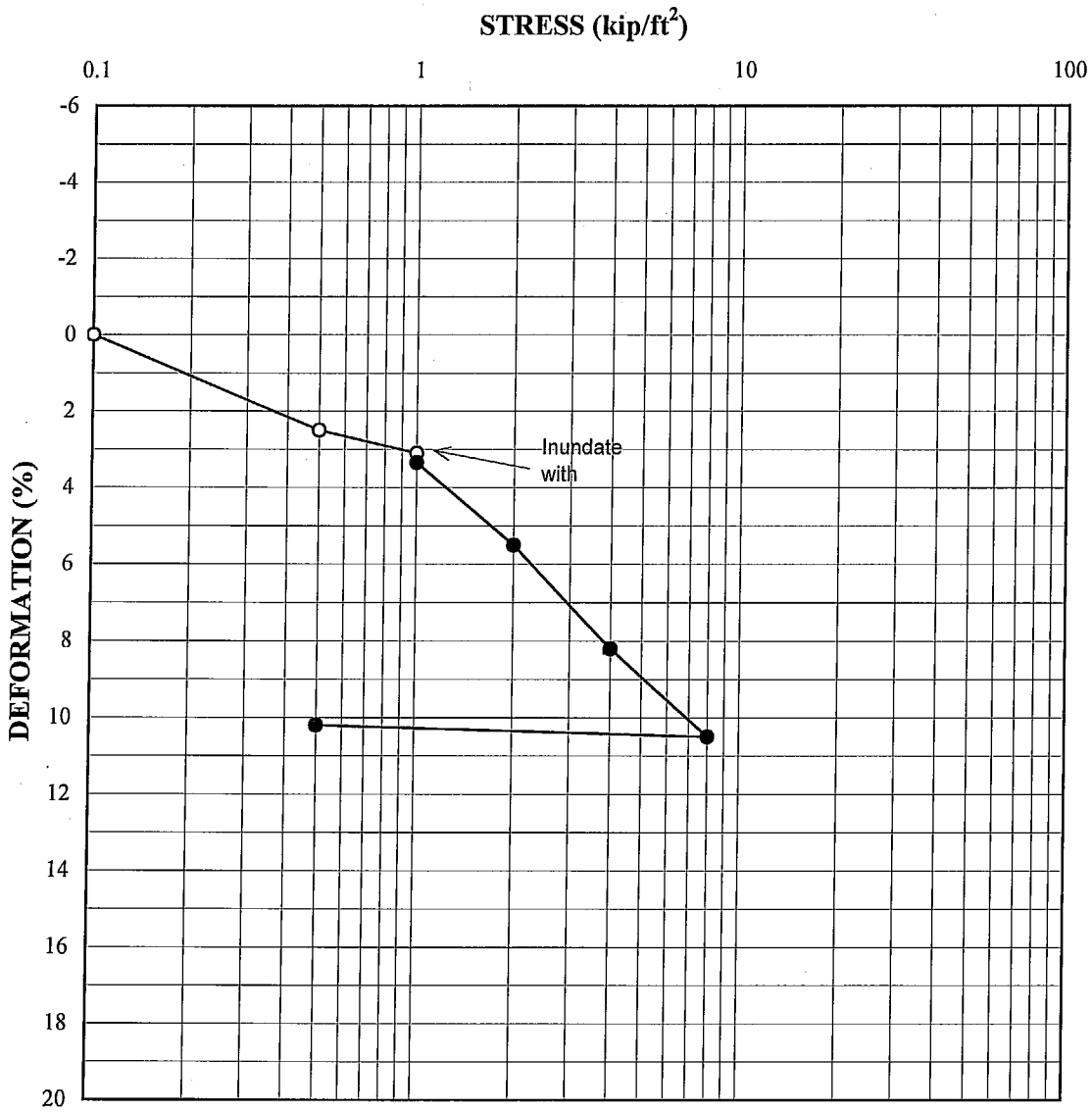
## CONSOLIDATION TEST RESULTS

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

Figure No :

LGC




—O— LGC 2004, B-LGC-3 @ 21.0', S-6, Silty Sand with Clay

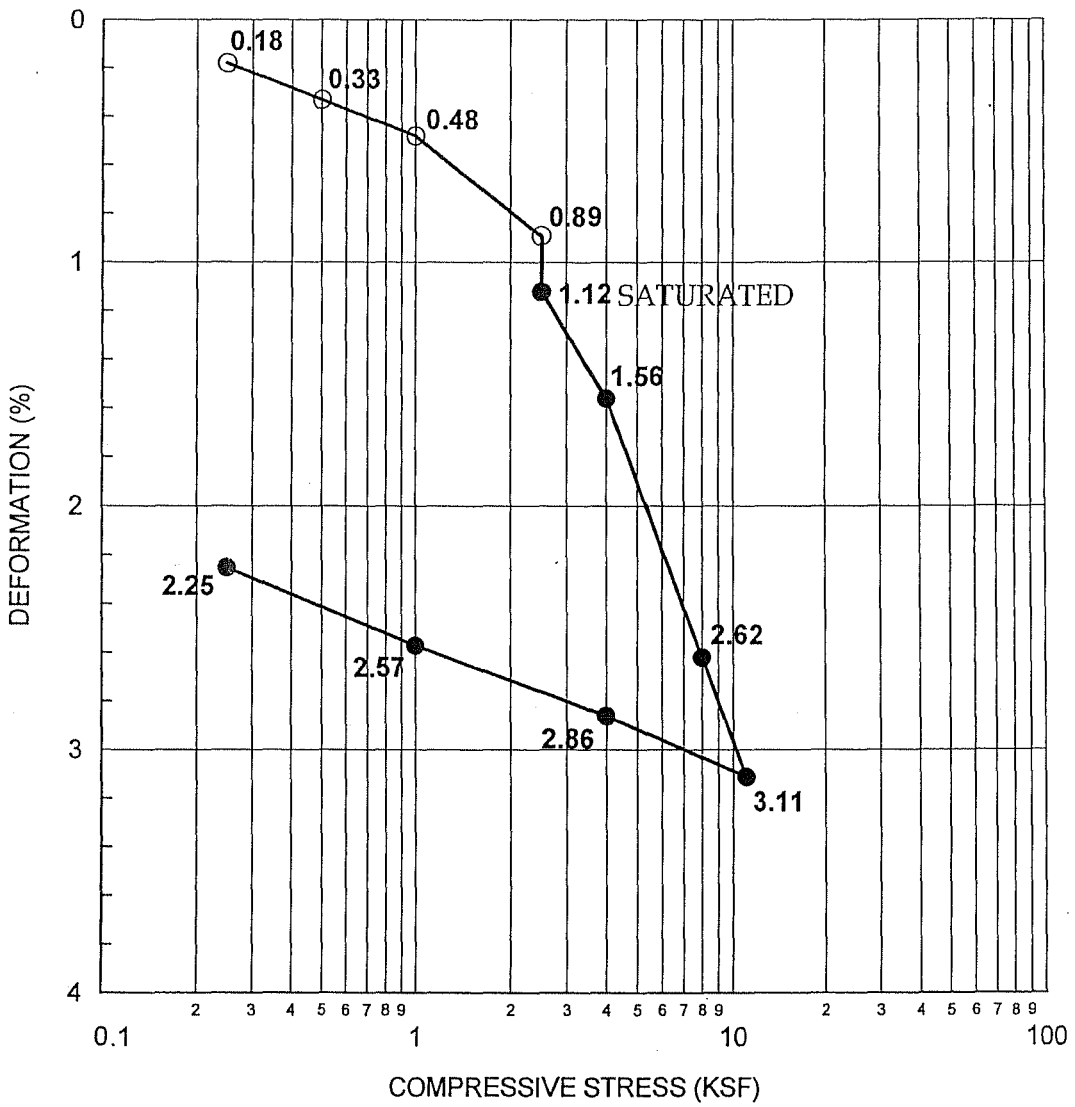
## CONSOLIDATION TEST RESULTS

**Hawkbryn, Santa Clarita**

Project No: 033022-01
Drafted By: BIH
Date : 3/24/04

Figure No :

LGC




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-1 | R-7 | 30 | SM | 6.2 | 106.8 | 0.578 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

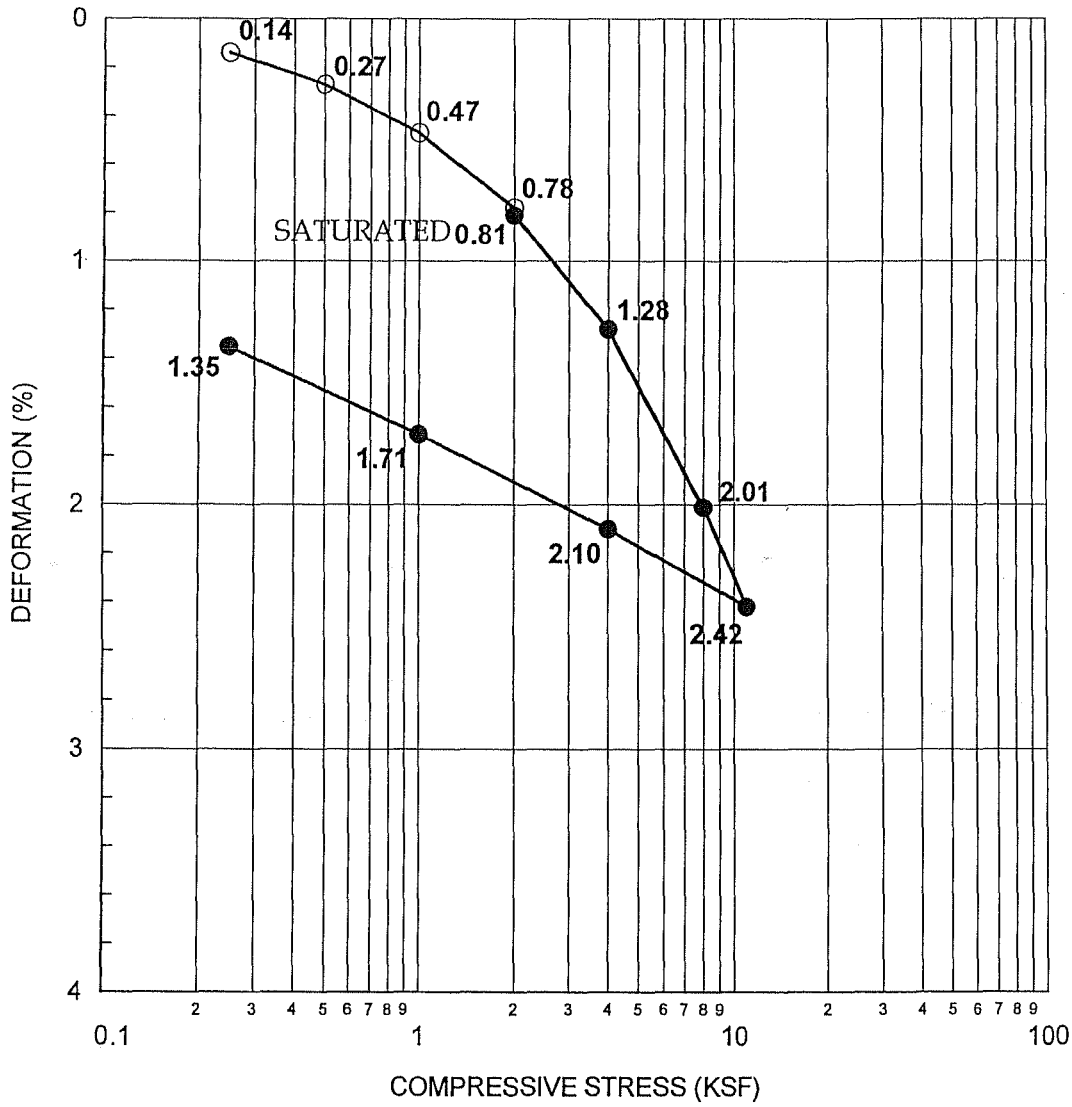
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-2 | R-6 | 25 | SC-SM | 11.4 | 107.4 | 0.568 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

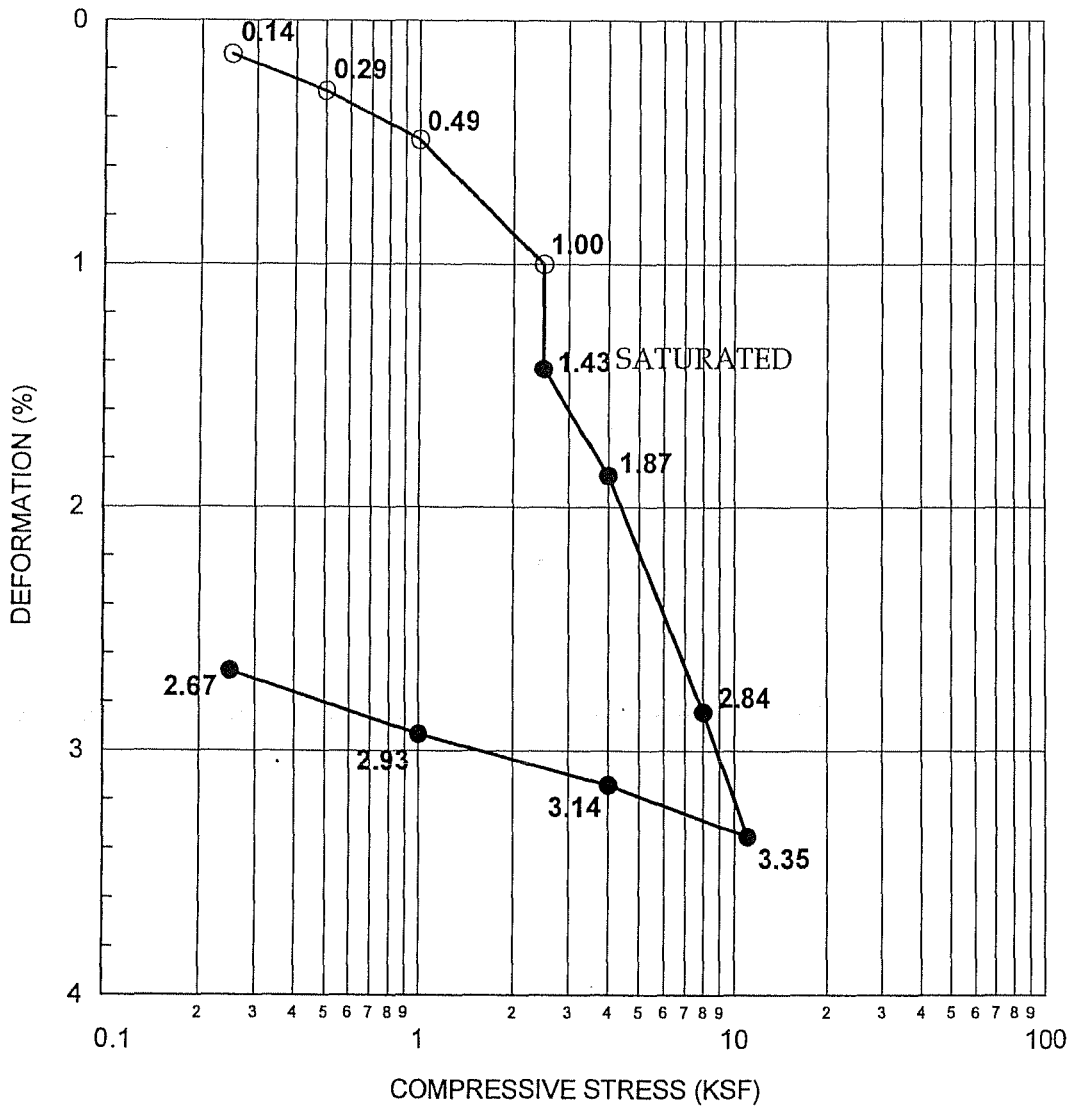
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-3 | R-5 | 30 | SM | 9.3 | 114.2 | 0.475 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

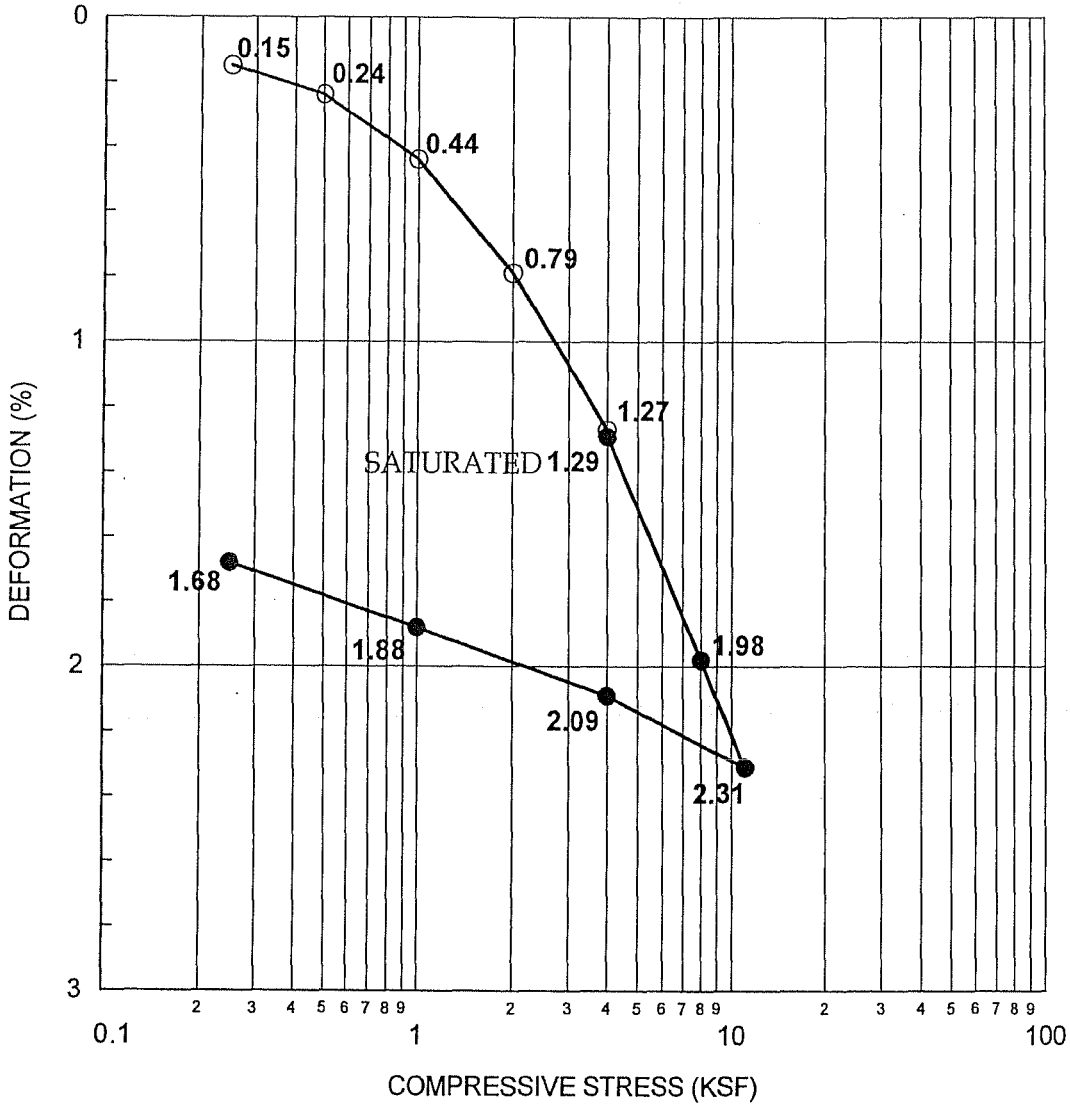
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-8 | R-6 | 40 | SC | 15.4 | 119.4 | 0.410 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

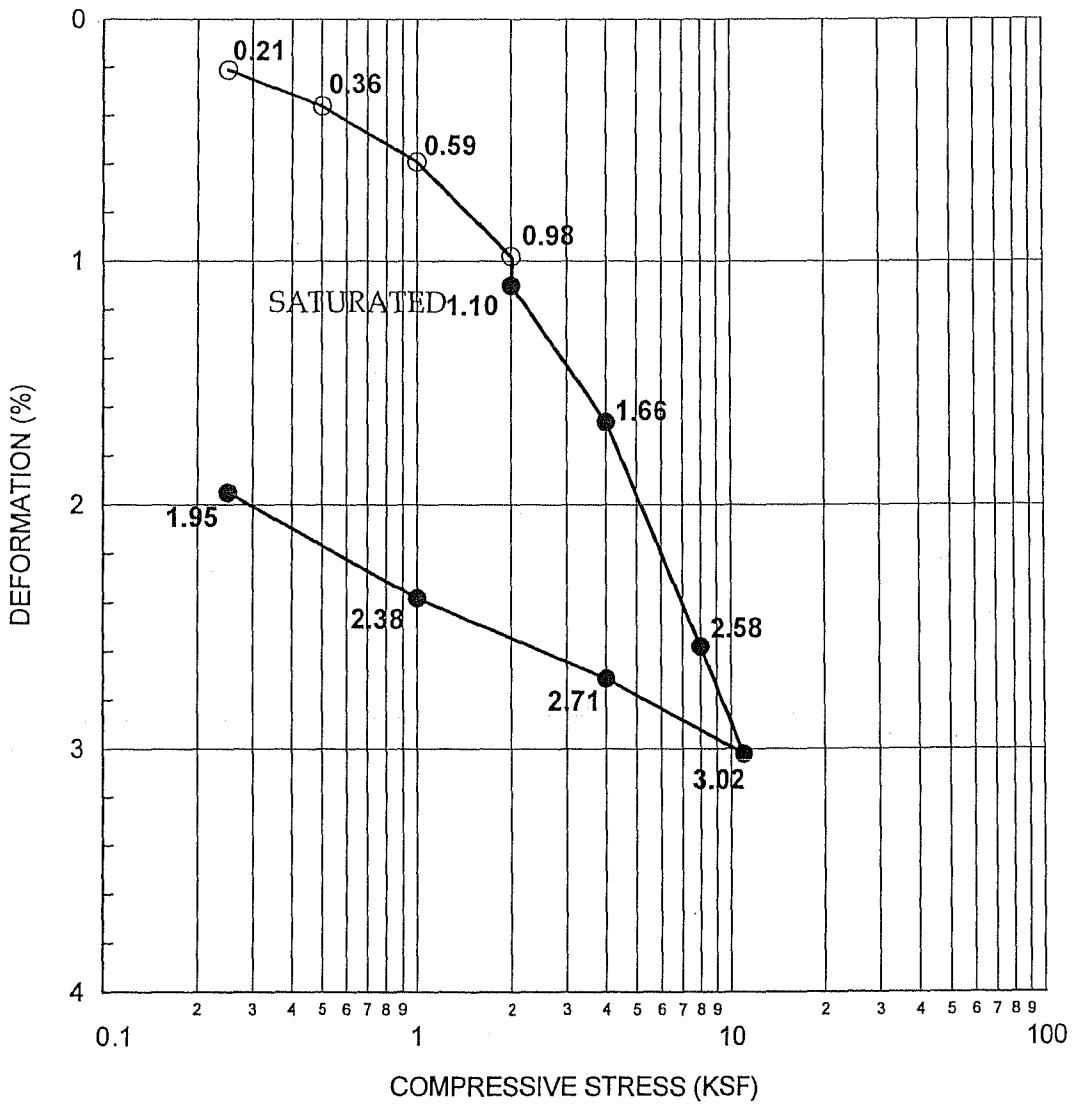
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE




| SYMBOL | BORING NO | SAMPLE NO | DEPTH (FT) | SOIL TYPE | INIT. MOISTURE CONTENT (%) | INIT. DRY DENSITY (PCF) | INIT. VOID RATIO |
|---|---|---|---|---|---|---|---|
| ○ | B-LGC-9 | R-5 | 25 | SM | 4.5 | 121.4 | 0.388 |

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

# CONSOLIDATION

**(ASTM D2435)**

01/07

FIGURE

# Appendix C

# APPENDIX C

## GROUND MOTION AND RESPONSE SPECTRA REFERENCES

Abrahamson, N., Atkinson, G., Boore, D., Bozorgnia, Y., Campbell, K., Chiou, B., Idriss, I.M., Silva, W., Youngs, R., 2008, Comparisons of the NGA ground-motion relations: Earthquake Spectra, v. 24, no.1, p. 45–66.

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Campbell, K.W., and Bozorgnia, Y., 2014, NGA-West2 ground motion model for the average horizontal components of PGA, PGV, and 5% damped linear acceleration response spectra: Earthquake Spectra, v. 30, no. 3, p. 1087–1115.

Chiou, B.S.-J., and Youngs, R.R., 2014, Update of the Chiou and Youngs NGA model for the average horizontal component of peak ground motion and response spectra: Earthquake Spectra, v. 30, no. 3, p. 1117–1153.

Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, K.R., Jackson, D.D., Johnson, K.M., Jordan, T.H., Madden, C., Michael, A.J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon, R.J., II, and Zeng, Y., 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013–1165, 97 p., California Geological Survey Special Report 228, and Southern California Earthquake Center Publication 1792, http://pubs.usgs.gov/of/2013/1165/

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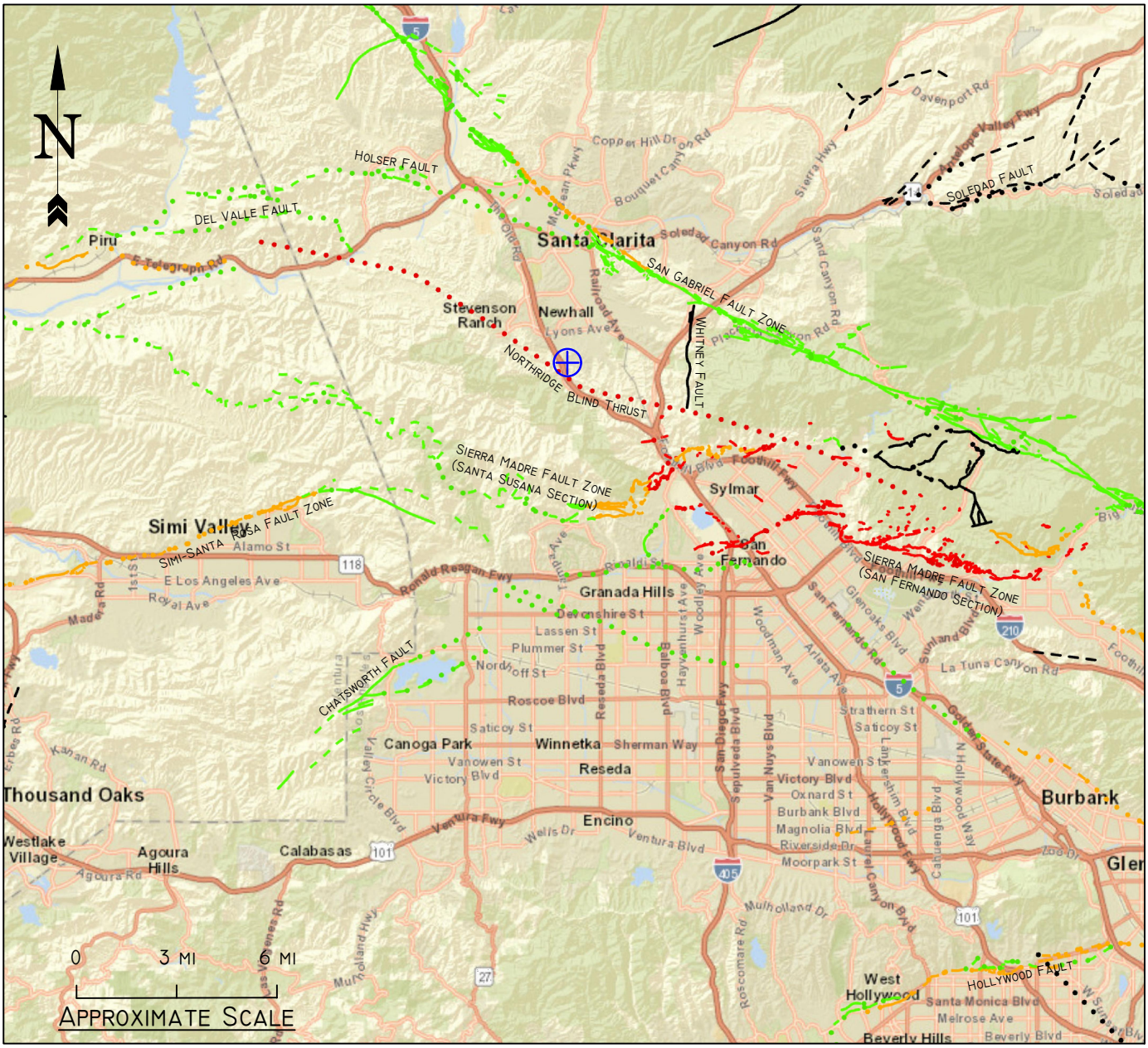
U.S. Geological Survey, Risk-Targeted Ground Motion Calculator, https://earthquake.usgs.gov/designmaps/rtgm/

U.S. Geological Survey, 2008 National Seismic Hazards Map – Source Parameters, https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/query_main.cfm




## EXPLANATION

- Historic (< 150 years), well constrained location
- Historic (< 150 years), moderately constrained location
- Historic (< 150 years), inferred location
- Latest Quaternary (<15,000 years), well constrained location
- Latest Quaternary (<15,000 years), moderately constrained location
- Latest Quaternary (<15,000 years), inferred location
- Late Quaternary (< 130,000 years), well constrained location
- Late Quaternary (< 130,000 years), moderately contrained location
- Late Quaternary (< 130,000 years), inferred location

APPROXIMATE LOCATION OF SUBJECT SITE

SOURCE; U.S. GEOLOGICAL SURVEY INTERACTIVE FAULT MAP - QUATERNARY FAULTS

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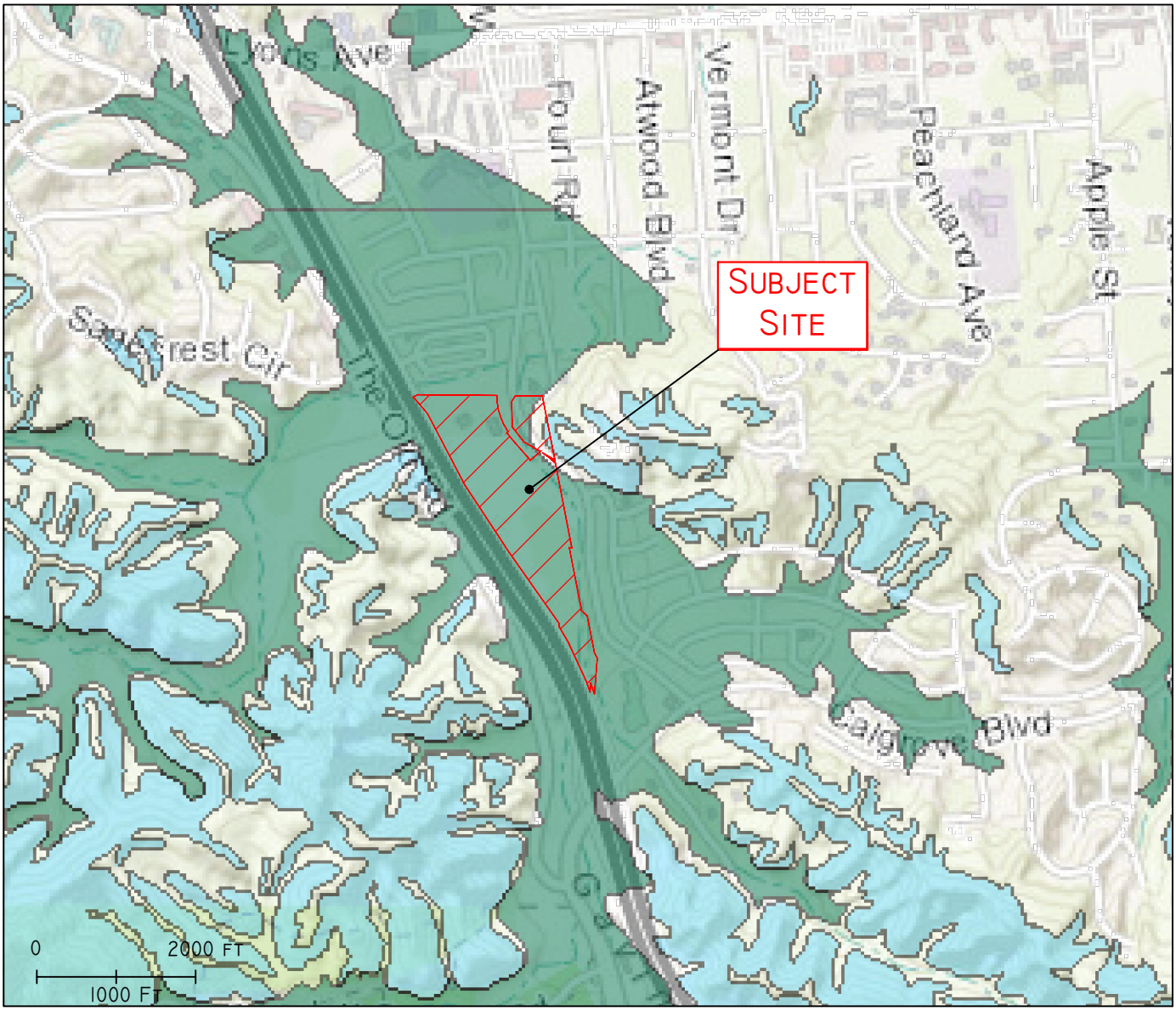
**ENGINEERING GEOLOGY, INC.**
Geological And Geotechnical Consultants

QUATERNARY FAULT LOCATION MAP

JOB NO.: 21-2593-4

DATE: 6/15/21 | FIGURE: C1




LEGEND

**Fault Traces**

- Accurately Located
- Approximately Located
- Approximately Located, Queried
- Inferred
- Inferred, Queried
- Concealed
- Concealed, Queried
- Aerial Photo Lineament

**Fault Zone**

**Liquefaction Zone**

**Landslide Zone**

APPROXIMATE LOCATION OF SUBJECT SITE

SOURCE; CALIFORNIA GEOLOGIC SURVEY
EARTHQUAKE ZONES WEB APPLICATION
HTTPS://MAPS.CONSERVATION.CA.GOV/CGS/EQZAPP/APP/

N

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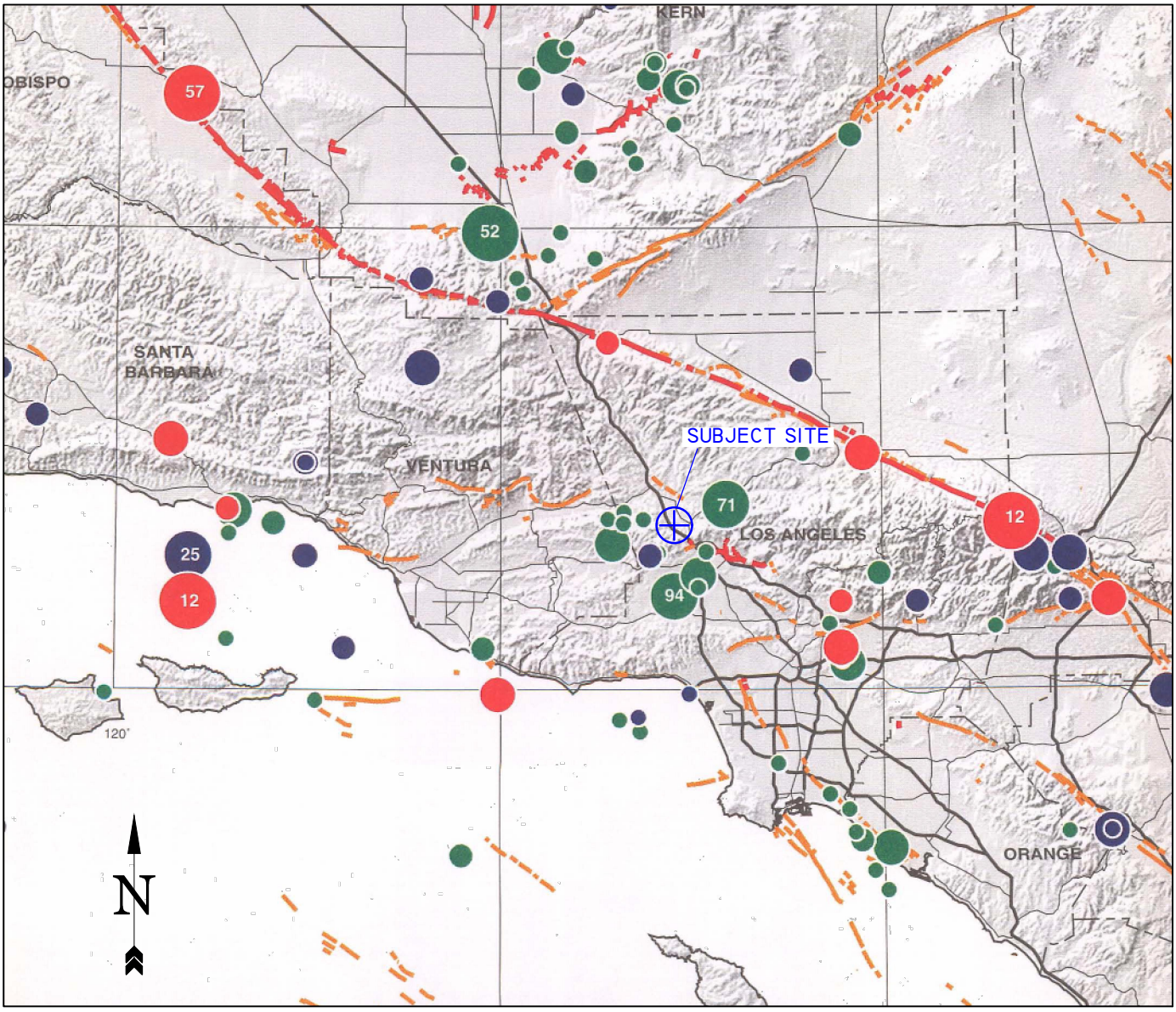
Geological And Geotechnical Consultants

EARTHQUAKE ZONES OF
REQUIRED INVESTIGATION

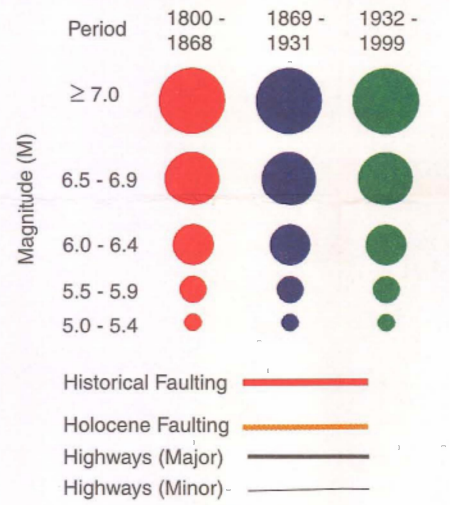
JOB NO.: 21-2593-4

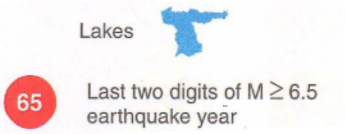
DATE: 6/15/21

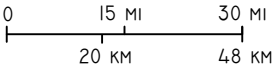
FIGURE: C2




## Epicenter map legend




Approximate Scale

SOURCE; California Geologic Survey, Epicenters and Areas Damaged by M≥5 California Earthquakes, 1800-1999 by T. Toppozada, D. Branum, M. Peterson, C. Hallstrom, C. Cramer, M. Reichle, 2000

**Allan E. Seward**
**Engineering Geology, Inc.**
Geological And Geotechnical Consultants

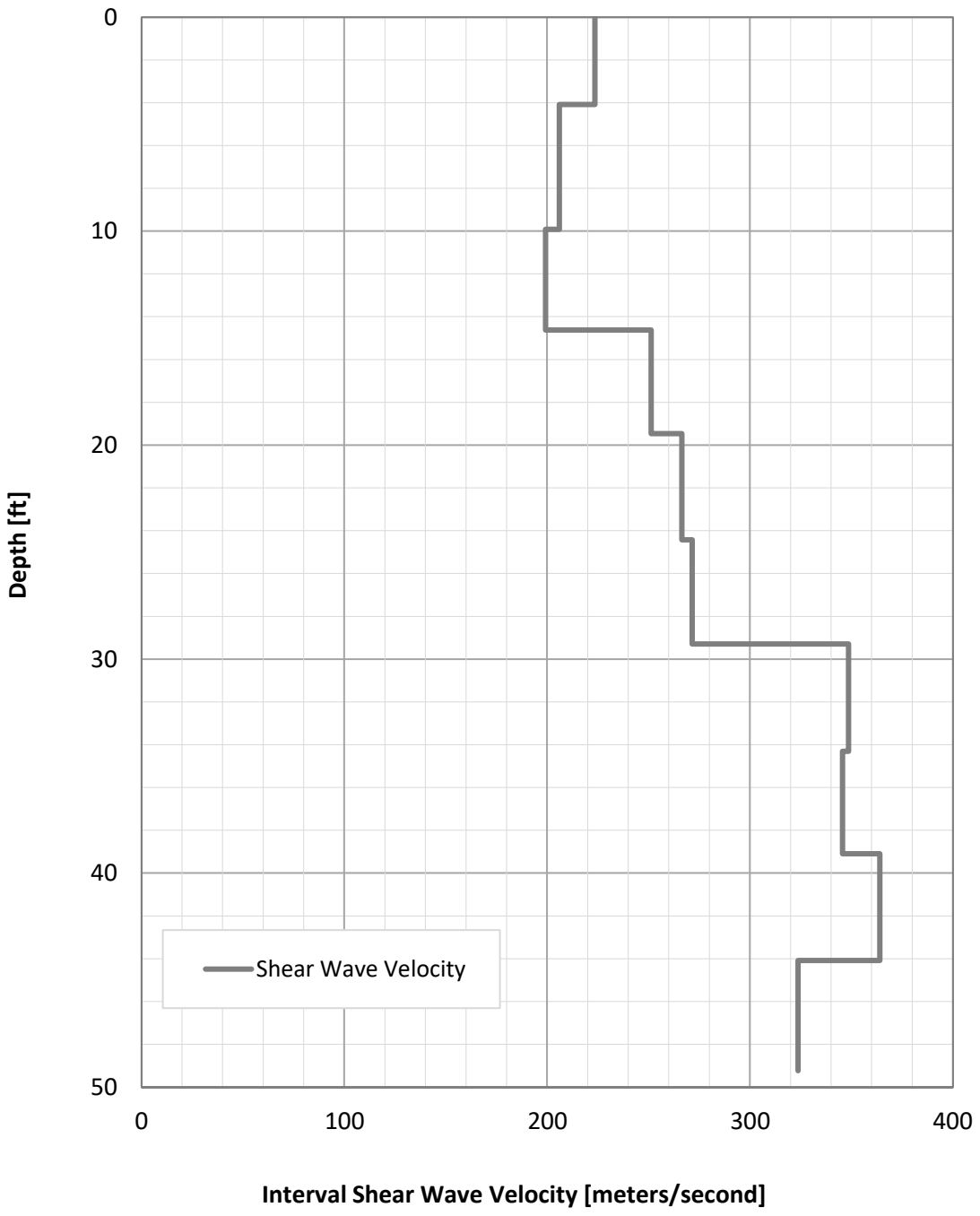
# EQ Epicenter Location Map

Job No.: 21-2593-4

Date: 6/15/21

Figure: C3

**Location……. CPT-17**




# Shear Wave Velocity Profile

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Geological and Geotechnical Consultants

| | | | |
|---|---|---|---|
| Client: | Wiley Canyon LLC | | |
| Project: | Wiley Canyon<br>TTM 083295 | | |
| Proj. No.: | 21-2593-4 | | |
| Date: | 6/15/21 | Figure: | C4 |

# APPENDIX C

## Table C1 - USGS Deaggregation of Seismic Hazard

*** Deaggregation of Seismic Hazard at One Period of Spectral Acceleration ***
*** Data from Dynamic: Conterminous U.S. 2008 (v3.3.3) ****

PSHA Deaggregation. %contributions.
site: Wiley Canyon, TTM 083295
longitude: 118.557°W
latitude: 34.368°E
imt: Peak Ground Acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.

This deaggregation corresponds to: Total

**Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:**

Deaggregation targets:
Return period: 2475 yrs
Exceedance rate: 0.0004040404 $yr^{-1}$
PGA ground motion: 1.0362719 g

Recovered targets:
Return period: 2760.618 yrs
Exceedance rate: 0.00036223772 $yr^{-1}$

Totals:
Binned: 100 %
Residual: 0 %
Trace: 0.01 %

Mean (over all sources):
m: 6.72
r: 5.8 km
$\varepsilon_0$: 1.31 σ

Mode (largest m-r bin):
m: 6.69
r: 5.5 km
$\varepsilon_0$: 1.25 σ
Contribution: 47.74 %

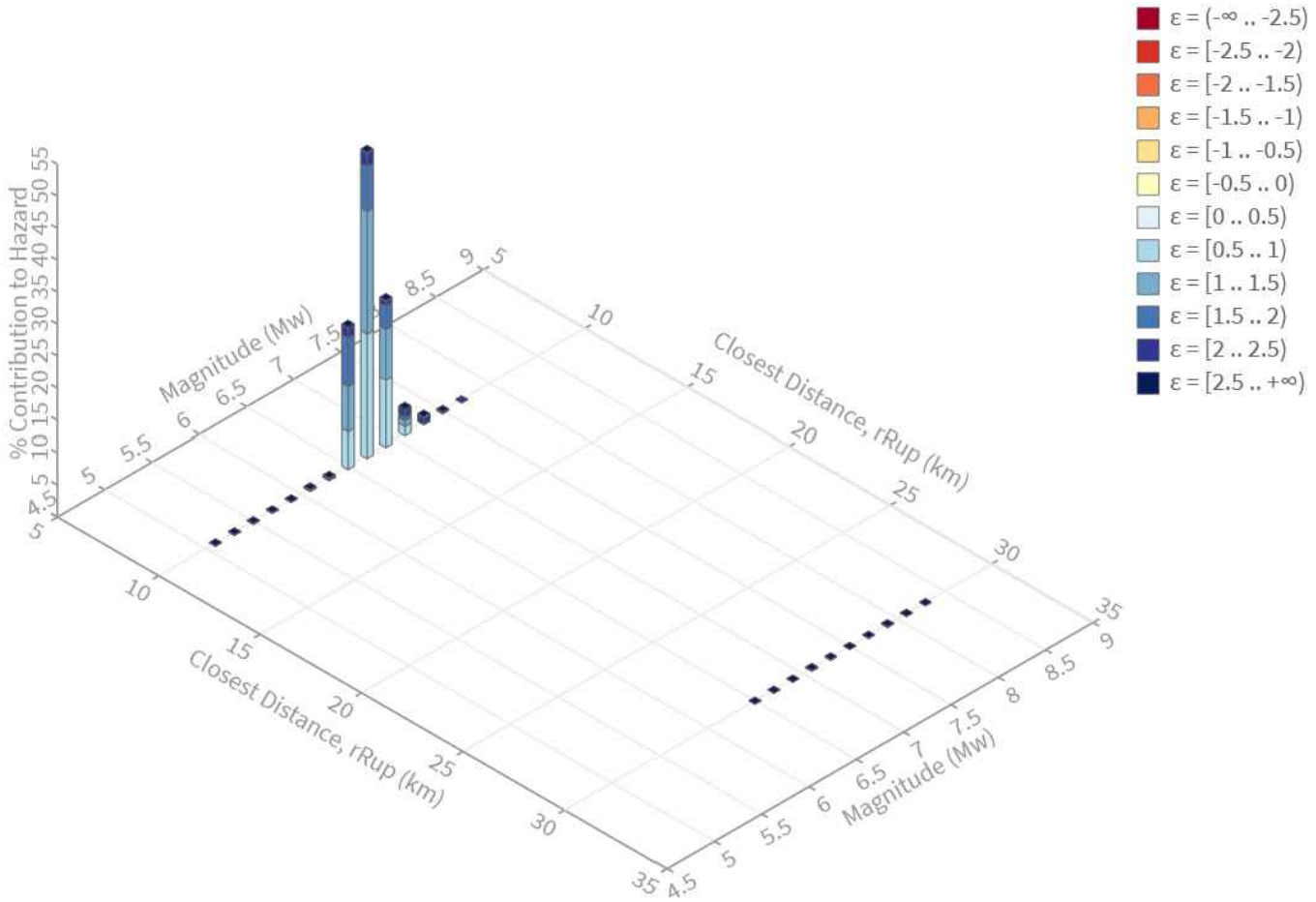
Mode (largest m-r-$\varepsilon_0$ bin):
m: 6.69
r: 4.88 km
$\varepsilon_0$: 0.84 σ
Contribution: 19.35 %

Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

**Deaggregation Contributors**

| Source Set ⍰ Source | Type | r | m | $\varepsilon_0$ | lon | lat | az | % |
|---|---|---|---|---|---|---|---|---|
| bFault.ch | Fault | | | | | | | 57.96 |
| Santa Susana - alt 1 | | 4.90 | 6.78 | 1.06 | 118.581°W | 34.320°N | 202.32 | 40.38 |
| Northridge | | 7.44 | 6.78 | 1.59 | 118.545°W | 34.354°N | 144.84 | 10.91 |
| Holser - alt 1 | | 4.66 | 6.68 | 1.15 | 118.548°W | 34.417°N | 8.51 | 3.2 |
| bFault.gr | Fault | | | | | | | 36.65 |
| Santa Susana - alt 1 | | 4.93 | 6.64 | 1.22 | 118.581°W | 34.320°N | 202.32 | 28.56 |
| Northridge | | 7.44 | 6.64 | 1.62 | 118.545°W | 34.354°N | 144.84 | 8.57 |
| Holser - alt 1 | | 4.98 | 6.60 | 1.39 | 118.548°W | 34.417°N | 8.51 | 1.61 |

## HAZARD CONTRIBUTIONS

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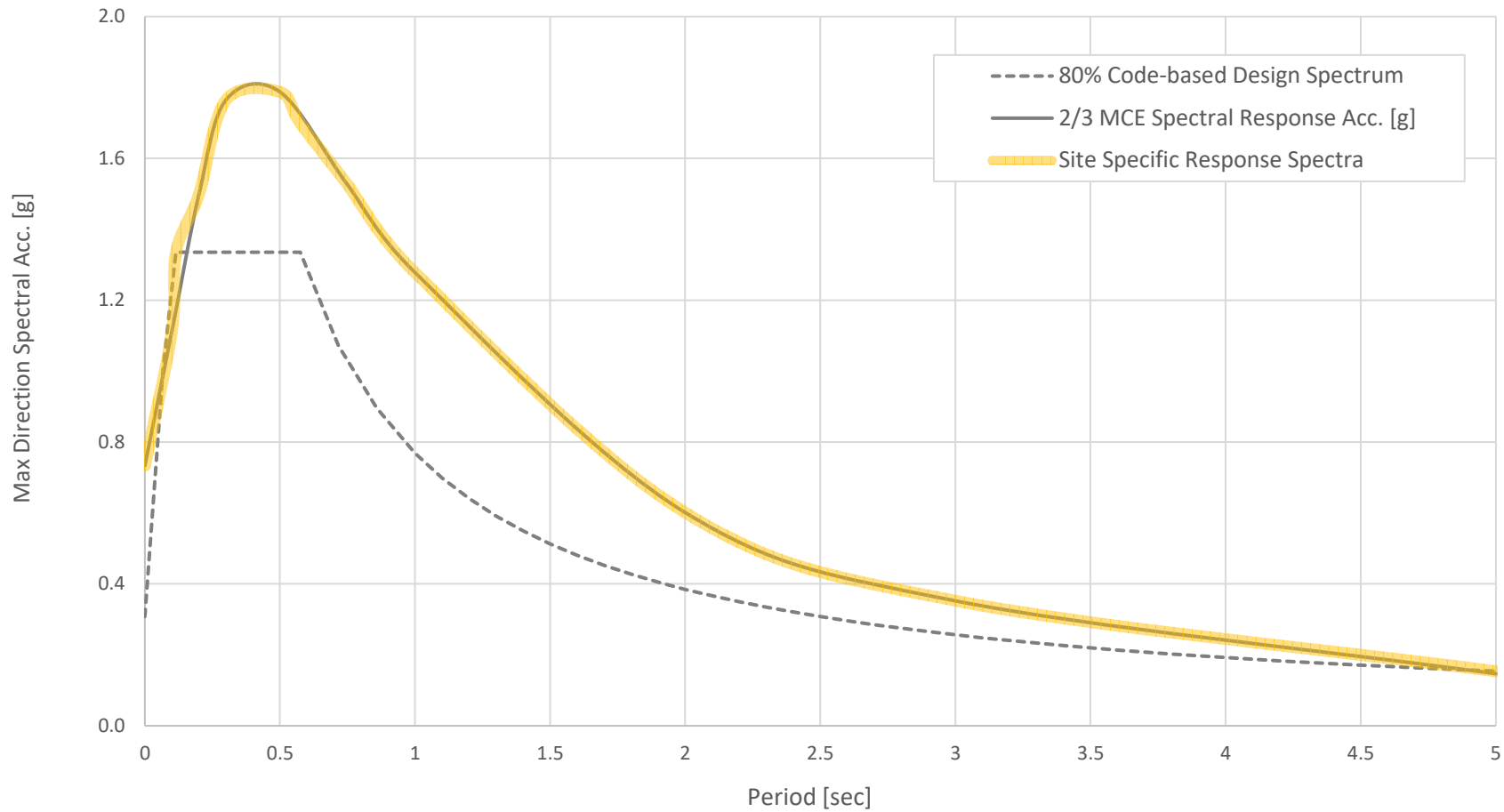
Geological and Geotechnical Consultants

MAGNITUDE-DISTANCE CONTRIBUTIONS TO HAZARD

JOB NO.: 21-2593-4

DATE: 6/15/21 | FIGURE: C5




| Site Coordinates | | Site Class | Risk Category | SDC | $S_{MS}$ | $S_{M1}$ | $S_{DS}$ | $S_{D1}$ | PGA |
|---|---|---|---|---|---|---|---|---|---|
| Lat | Long | | | | | | | | |
| 34.3684 | 118.5572 | D | I, II or III | D | 2.413 | 1.918 | 1.609 | 1.278 | 0.73 |

Design Reference: 2019 CBC and ASCE 7-16

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Geological and Geotechnical Consultants

Site-Specific Response Spectra and Seismic Design Parameters

| | | | |
|---|---|---|---|
| Client: | Wiley Canyon LLC | Job No.: | 21-2593-4 |
| Project: | Wiley Canyon | Date: | 6/15/21 |
| | Tentative Tract Map 083295 | Figure: | C6 |

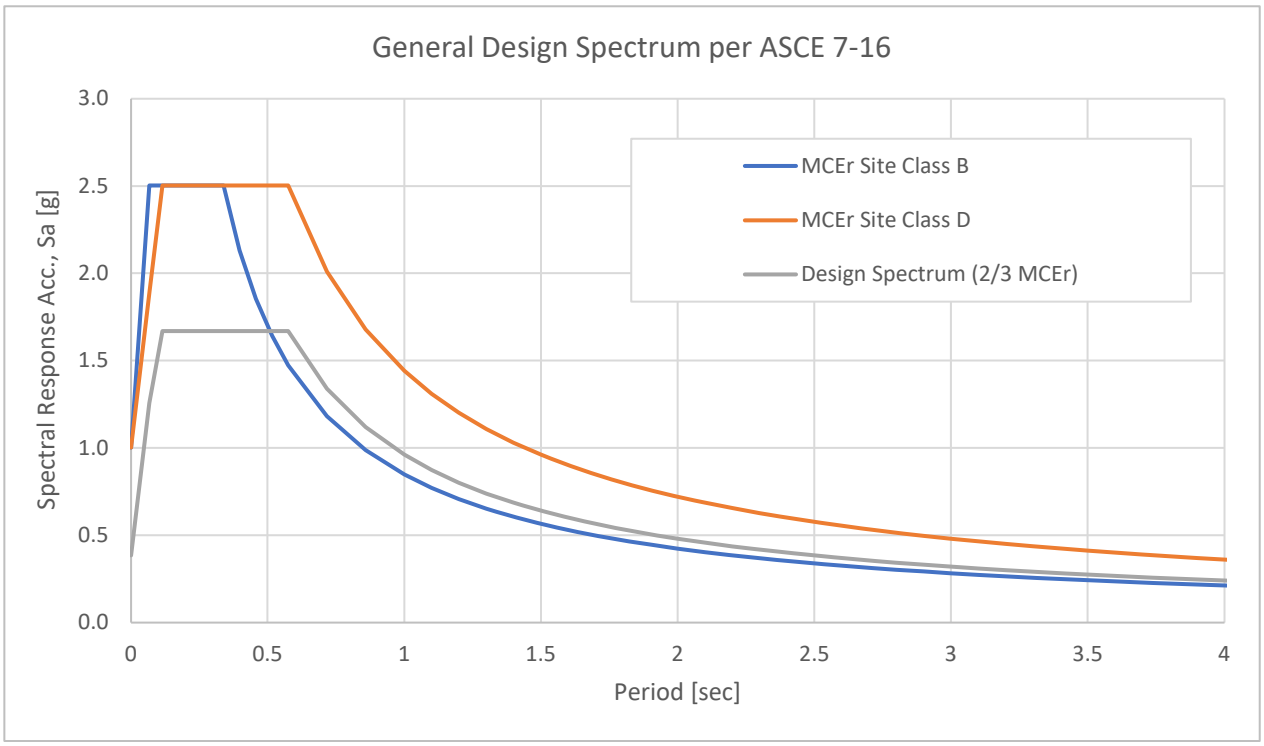
## Code-Based Ground Motions

Wiley Canyon LLC

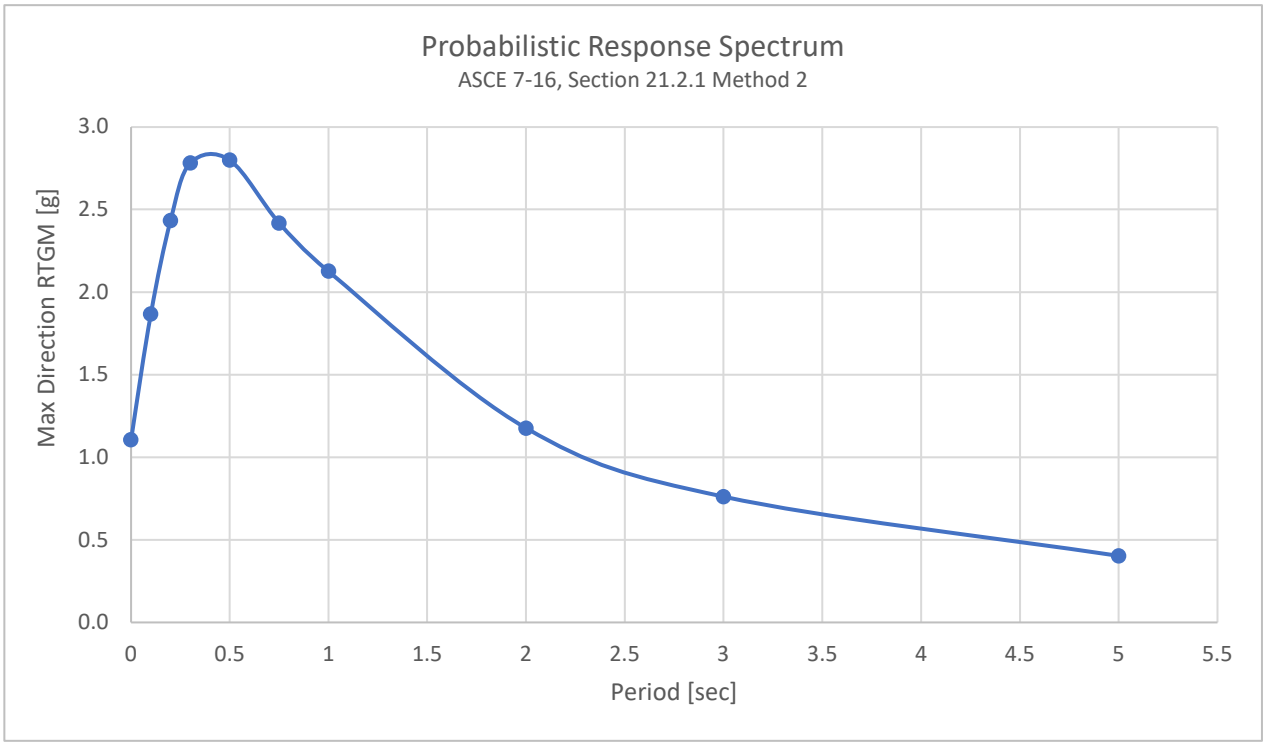
Design Reference: ASCE 7-16, Sections 11.4 and 21.3

Job No.: 21-2593-4

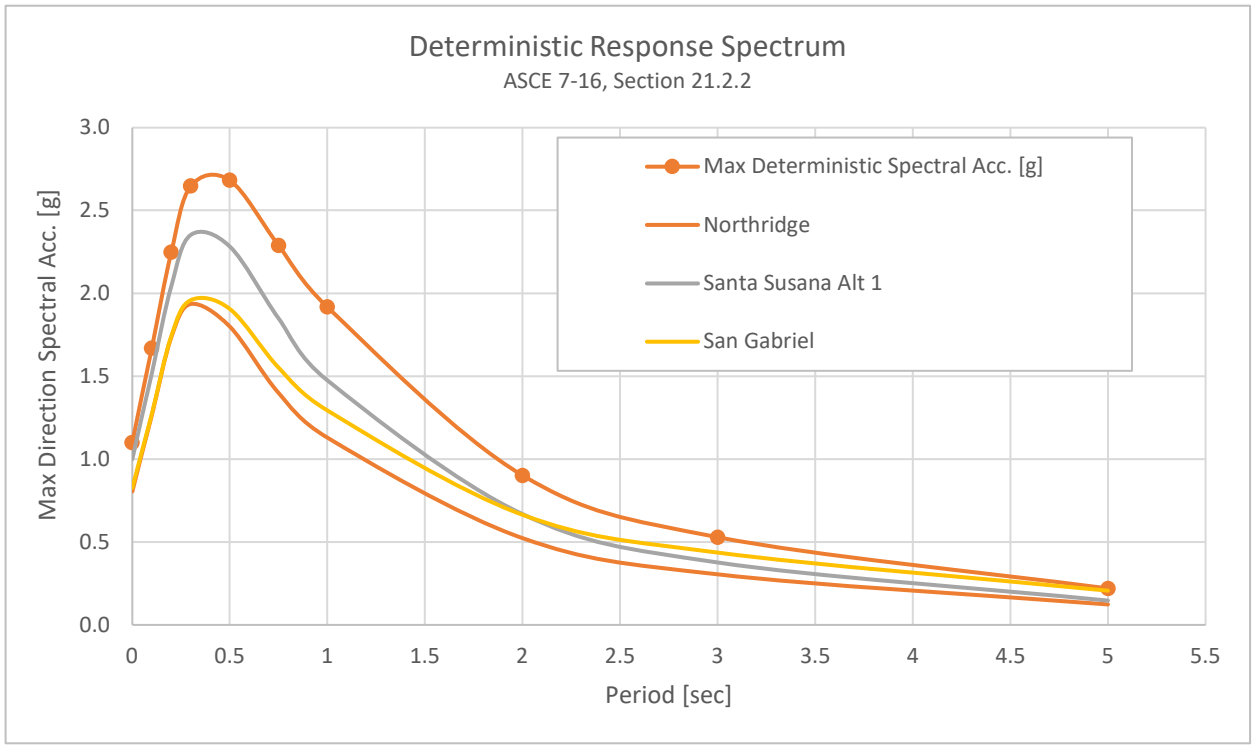
| Parameter | Value | Description |
|---|---|---|
| $S_S$ | 2.504 | $MCE_R$ ground motion (0.2 sec) |
| $S_1$ | 0.848 | $MCE_R$ ground motion (1.0 sec) |
| $F_a$ | 1.0 | Site amplification factor (0.2 sec) |
| $F_v$ | 1.7 | Site amplification factor (1.0 sec) |
| $S_{MS}$ | 2.504 | Site-modified spectral acc. (0.2 sec) |
| $S_{M1}$ | 1.442 | Site-modified spectral acc. (1.0 sec) |
| $S_{DS}$ | 1.669 | Design spectral acc. value (0.2 sec) |
| $S_{D1}$ | 0.961 | Design spectral acc. value (1.0 sec) |
| PGA | 1.066 | $MCE_G$ peak ground acceleration |
| $F_{PGA}$ | 1.1 | Site amplification factor at PGA |
| $PGA_M$ | 1.17 | Site-modified peak ground acc. (Eq. 11.8-1) |



| Period [sec] | UHGM [g] | RTGM [g] | Max Direction Scale Factor | Max Dir RTGM [g] |
|---|---|---|---|---|
| 0 | 1.036 | 1.005 | 1.1 | 1.106 |
| 0.1 | 1.727 | 1.698 | 1.1 | 1.868 |
| 0.2 | 2.242 | 2.211 | 1.1 | 2.432 |
| 0.3 | 2.552 | 2.472 | 1.125 | 2.781 |
| 0.5 | 2.546 | 2.382 | 1.175 | 2.799 |
| 0.75 | 2.148 | 1.954 | 1.2375 | 2.418 |
| 1 | 1.802 | 1.636 | 1.3 | 2.127 |
| 2 | 0.979 | 0.871 | 1.35 | 1.176 |
| 3 | 0.610 | 0.544 | 1.4 | 0.762 |
| 5 | 0.303 | 0.269 | 1.5 | 0.404 |



| Period [sec] | 84th Percentile Spectral Acc. [g] | Max Direction Scale Factor | Max Deterministic Spectral Acc. [g] |
|---|---|---|---|
| 0 | 1.000 | 1.1 | 1.100 |
| 0.1 | 1.518 | 1.1 | 1.670 |
| 0.2 | 2.044 | 1.1 | 2.248 |
| 0.3 | 2.353 | 1.125 | 2.647 |
| 0.5 | 2.282 | 1.175 | 2.681 |
| 0.75 | 1.850 | 1.2375 | 2.289 |
| 1 | 1.475 | 1.3 | 1.918 |
| 2 | 0.668 | 1.35 | 0.902 |
| 3 | 0.378 | 1.4 | 0.529 |
| 5 | 0.147 | 1.5 | 0.221 |



## Site-Specific Design Ground Motions

Design Reference: ASCE 7-16, Sections 21.3 to 21.5

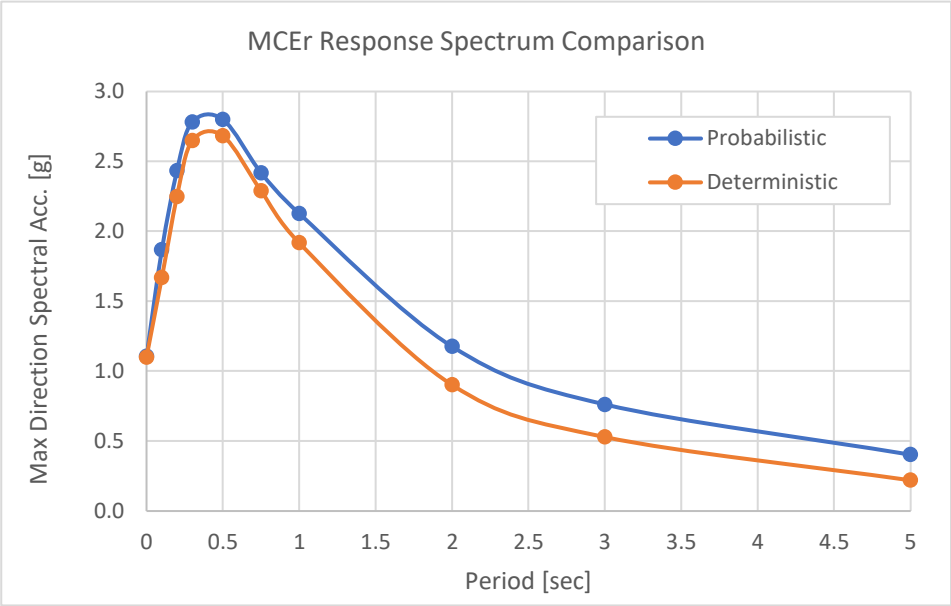
Wiley Canyon LLC
Job No.: 21-2593-4

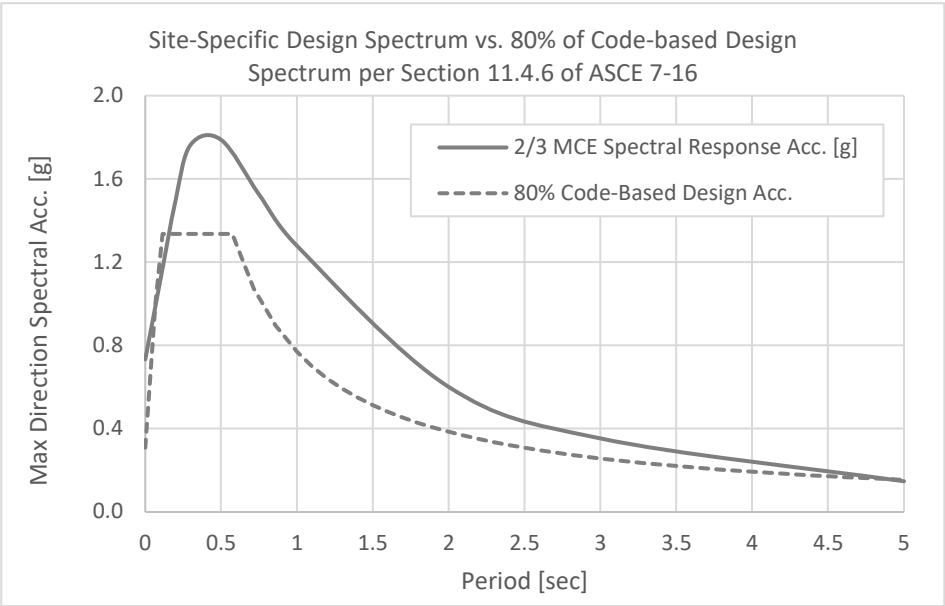
| Period, T [sec] | Max Probabilistic Spectral Acc. [g] | Max Deterministic Spectral Acc. [g] | MCE Spectral Response Acc. [g] [a] | 2/3 MCE Spectral Response Acc. [g] | 80% Code-based Design Spectrum | Site-Specific Design Acc. [g] [b] |
|---|---|---|---|---|---|---|
| 0 | 1.106 | 1.100 | 1.100 | 0.733 | 0.308 | 0.733 |
| 0.1 | 1.868 | 1.670 | 1.670 | 1.113 | 0.989 | 1.113 |
| 0.2 | 2.432 | 2.248 | 2.248 | 1.499 | 1.340 | 1.499 |
| 0.3 | 2.781 | 2.647 | 2.647 | 1.765 | 1.340 | 1.765 |
| 0.5 | 2.799 | 2.681 | 2.681 | 1.788 | 1.340 | 1.788 |
| 0.75 | 2.418 | 2.289 | 2.289 | 1.526 | 1.340 | 1.526 |
| 1 | 2.127 | 1.918 | 1.918 | 1.278 | 0.769 | 1.278 |
| 2 | 1.176 | 0.902 | 0.902 | 0.601 | 0.384 | 0.601 |
| 3 | 0.762 | 0.529 | 0.529 | 0.353 | 0.256 | 0.353 |
| 5 | 0.404 | 0.221 | 0.221 | 0.147 | 0.154 | 0.154 |
| 0.115 | | | | 1.172 | 1.335 | 1.335 |
| 0.576 | | | | 1.699 | 1.335 | 1.699 |

| Design Parameters |
|---|
| $SD_S$ |
| 1.609 |
| $SD_1$ |
| 1.278 |
| $SM_S$ |
| 2.413 |
| $SM_1$ |
| 1.918 |
| PGA |
| 0.73 |

[a] Equal to the lesser of the MCEr probabilistic and deterministic spectral acceleration at each ordinate

[b] Equal to 2/3 of the MCE Spectral Response Acceleration



# TTM 083295, Wiley Canyon

**Latitude, Longitude: 34.3684, -118.5572**

| | |
|---|---|
| **Date** | 1/14/2021, 10:49:15 AM |
| **Design Code Reference Document** | ASCE7-16 |
| **Risk Category** | II |
| **Site Class** | D - Default (See Section 11.4.3) |

| Type | Value | Description |
|---|---|---|
| $S_S$ | 2.504 | $MCE_R$ ground motion. (for 0.2 second period) |
| $S_1$ | 0.848 | $MCE_R$ ground motion. (for 1.0s period) |
| $S_{MS}$ | 3.005 | Site-modified spectral acceleration value |
| $S_{M1}$ | null -See Section 11.4.8 | Site-modified spectral acceleration value |
| $S_{DS}$ | 2.003 | Numeric seismic design value at 0.2 second SA |
| $S_{D1}$ | null -See Section 11.4.8 | Numeric seismic design value at 1.0 second SA |

| Type | Value | Description |
|---|---|---|
| SDC | null -See Section 11.4.8 | Seismic design category |
| $F_a$ | 1.2 | Site amplification factor at 0.2 second |
| $F_v$ | null -See Section 11.4.8 | Site amplification factor at 1.0 second |
| PGA | 1.066 | $MCE_G$ peak ground acceleration |
| $F_{PGA}$ | 1.2 | Site amplification factor at PGA |
| $PGA_M$ | 1.279 | Site modified peak ground acceleration |
| $T_L$ | 8 | Long-period transition period in seconds |
| SsRT | 2.504 | Probabilistic risk-targeted ground motion. (0.2 second) |
| SsUH | 2.758 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration |
| SsD | 2.712 | Factored deterministic acceleration value. (0.2 second) |
| S1RT | 0.895 | Probabilistic risk-targeted ground motion. (1.0 second) |
| S1UH | 1.002 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration. |
| S1D | 0.848 | Factored deterministic acceleration value. (1.0 second) |
| PGAd | 1.091 | Factored deterministic acceleration value. (Peak Ground Acceleration) |
| $C_{RS}$ | 0.908 | Mapped value of the risk coefficient at short periods |

# Appendix D

# APPENDIX D

## EVALUATION OF LIQUEFACTION POTENTIAL AND ASSOCIATED GROUND FAILURE

1. Introduction

Potential at the site for seismic soil liquefaction and associated ground failure (i.e., earthquake-induced settlement, lateral spread displacements, surface manifestations, and loss of bearing capacity) has been assessed by Allan E. Seward Engineering Geology, Inc. (AESEGI) using data from Cone Penetration Test (CPT) soundings. Soil Behavior Type (SBT) data, apparent fines content (FC), and cone tip resistance ($q_c$) interpreted from a representative CPT sounding (CPT-17) were correlated with visual soil classifications, measured fines content, and SPT blow count data in adjacent hollow-stem auger boring HS-1, as discussed herein. The calculation procedures described in the following references were used for assessment of liquefaction potential (and associated ground failure):

- *Cyclic Liquefaction and its Evaluation Based on the SPT and CPT*, by Robertson and Wride, 1997.
- *Liquefaction Resistance of Soils: Summary Report* (NCEER/NSF), by Youd, Idriss, et al., 2001.
- *Interpretation of Cone Penetration Tests – A Unified Approach*, by Robertson, 2009.
- *CPT-Based Probabilistic and Deterministic Assessment of In Situ Seismic Soil Liquefaction Potential*, by Moss, et. al., 2006.
- *SPT-Based Probabilistic Assessment of Seismic Soil Liquefaction Potential*, by Cetin, et. al., 2004.
- *Estimating Liquefaction-Induced Ground Settlements from CPT for Level Ground,* by Zhang, et. al., 2002.
- *Estimation of Seismic Compression in Dry Soils Using the CPT,* by Robertson and Shao, 2010.
- *Evaluation of Settlements in Sands Due to Earthquake Shaking,* Tokimatsu and Seed, ASCE, August, 1987.
- *Estimating Liquefaction-Induced Lateral Displacements using the Standard Penetration Test or Cone Penetration Test,* by Zhang et. al., 2004.

**APPENDIX D**

Our analyses of liquefaction potential and associated phenomena at the site were performed in accordance with the guidelines and requirements contained in the following documents:

- *Review of Geotechnical Reports Addressing Liquefaction,* memorandum from Los Angeles County Department of Public Works (LACDPW), dated February 24, 2009.
- *Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California*, revised and re-adopted by California State Mining and Geology Board, September 11, 2008.
- *Manual for Preparation of Geotechnical Reports*, LACDPW, July 2013.

2. Data and Assumptions

Factors that affect potential for liquefaction triggering at the site include estimated ground motion parameters, engineering characteristics of site soils, historic high ground water depth, and proposed grading (i.e., removals and/or raising of grade).

a. Estimated Ground Motion Parameters

Based on our seismic hazard analyses the Peak Ground Acceleration ($PGA_M$) at the site, consistent with maximum considered earthquake ($MCE_R$) ground motions and generated by a magnitude 6.69 earthquake, is 1.00g. This magnitude-acceleration pair is considered to be equivalent to a magnitude 7.5 earthquake (i.e., the "standard" magnitude used to evaluate liquefaction triggering) and a corresponding PGA of 0.75g. This magnitude-acceleration pair was used in our liquefaction potential analyses.

b. Engineering Characteristics of Site Soils

The appended CPT logs include raw cone tip resistance ($q_c$), sleeve friction ($f_s$), friction ratio ($R_f$), pore water pressure (u), and soil behavior type (SBT). Engineering characteristics of site soils were interpreted from these data and used herein for assessment of probabilistic seismic soil liquefaction potential and associated seismic settlements and lateral spread displacements. The interpreted soil characteristics used in include SBT Index ($I_c$), apparent fines content (FC), equivalent SPT $N_{1,60}$ values, relative density ($D_r$), and liquefied shear strength ($s_{u,liq}$). These interpreted data were calculated using the procedures in the referenced article by Youd and Idriss (2001) with updates by Zhang et. al. (2002) and Robertson (2009). The CPT logs are presented in **Appendix A**.

Per the guidelines of SP117A, the accuracy of the CPT interpretations used for assessment of liquefaction potential should be checked by comparison with data

obtained from a correlation boring adjacent to a representative CPT sounding. The visual classifications of soils and results of laboratory testing (measured fines content) on select soil samples from hollow-stem auger boring HS-1 were used to check the SBT classification and apparent fines content (FC) interpreted from adjacent CPT-17. Additionally, boring $N_{1,60}$ values from SPT blow count data were used to check the equivalent SPT $N_{1,60}$ values interpreted from the CPT. The classifications of soils and blow count data obtained from boring HS-1 are generally consistent with data interpreted from adjacent CPT-17 (see **Figure D1**). However, the apparent fines content interpreted from the CPT is typically less (and more conservative) than the measured fines content from the boring. Therefore, it may be concluded that the data interpreted from the CPT soundings at the site are an accurate representation of soil conditions at the site and that data from the CPT soundings at the site are appropriate for use in interpretation of liquefaction potential.

c. Ground Water Depth

Based on measurements taken at the CPT sounding and boring locations at the site during the various phases of subsurface exploration, ground water was encountered as shallow as 35 feet. As discussed in the Ground Water section of the report, the historic high ground water depth at the site is shown as 30 feet on the seismic hazard map. The measured and historic high ground water depths at the location of each CPT sounding and boring analyzed are shown on the **Analysis of Liquefaction Potential** sheets at the end of this appendix (**Figures D2.1** through **D2.18**).

Effective vertical soil pressure based on measured ground water depths at the time of the exploration (if encountered) was used in our calculations to adjust CPT tip resistance and friction ratio data to the standard effective vertical soil pressure (i.e., 1.0 ton/ft$^2$), and ultimately for calculation of the soils cyclic resistance to earthquake shaking. Effective vertical soil pressure based on the historic high ground water depth was used to estimate cyclic shear stress that would be induced by earthquake shaking.

d. Proposed Grading

The liquefaction potential analyses do not assume remedial removals and replacement. Proposed remedial removals and associated seismic settlement are shown in **Table D1.**

**APPENDIX D**

3. Methods of Analysis

a. Liquefaction Potential

Liquefaction is a phenomenon in which pore water pressure generated by earthquake shaking causes sudden, temporary reduction or loss of shear strength in saturated soils with negligible to low plasticity. Structures founded on liquefied soils may experience subsidence and/or lateral movement.

Analyses to evaluate liquefaction potential typically are performed by a method first proposed by Seed and Idriss (1970) and subsequently revised by Youd and Idriss (2001). In these methods, estimated earthquake-induced cyclic shear stress in the ground is compared with cyclic shear strength (i.e., soil resistance to liquefaction) derived empirically from earthquake case histories.

The Moss et al. (2006) methodology was used herein for a deterministic assessment of seismic soil liquefaction potential. This procedure estimates seismic demand represented by the equivalent uniform cyclic stress ratio (CSR or $\tau_{av}/\sigma'_v$) and cyclic shear strength against liquefaction represented by the cyclic resistance ratio (CRR). For the deterministic procedure, the triggering curve is based on a 15% probability of liquefaction and is a function of CSR*, i.e., CSR corrected using a magnitude-correlated duration weighting factor ($DWF_M$), and fines-adjusted CPT tip resistance normalized to 1.0 ton/ft$^2$ vertical effective soil pressure ($q_{c1,mod}$) for magnitude $M_w$=7.5 event. Soil layers with CRR and $q_{c1,mod}$ values that plot above this curve are potentially liquefiable, and soil layers with CRR and $q_{c1,mod}$ values that plot below this curve generally are not liquefiable. In accordance with the guidelines of the County of Los Angeles Department of Public Works, a soil layer is considered to be potentially liquefiable if its factor of safety against liquefaction (i.e., CRR divided by CSR*) is less than 1.3.

The corrected cyclic stress ratio (CSR*) at each depth represents the CSR for a duration typical of an average of $M_W$=7.5 and is calculated using the following equations (Moss et al, 2006):

$$CSR^* = CSR/DWF_M = 0.65 \cdot (a_{max}/g) \cdot \sigma_o/\sigma'_v \cdot r_d / DWF_M$$

$$DWF_M = DWF_M = 17.84 * M_W^{-1.43}$$

where: $a_{max}/g$ = Peak ground acceleration ($PGA_M$) at the ground surface divided by the acceleration of gravity

$\sigma_o$ = Total vertical soil pressure at the depth in question

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$\sigma'_v$ = Effective vertical soil pressure at the depth in question

$r_d$ = Nonlinear shear mass participation factor to account for soil deformability at the depth in question

$DWF_M$ = Magnitude correlated duration weighting factor; $DWF_M = 17.84 * M_W^{-1.43}$

$M_W$ = Moment magnitude

Normalized CPT cone tip resistance ($q_{c,1}$) is used to calculate the cyclic resistance ratio (CRR) for clean sandy soils subjected to a $M_W$=7.5 earthquake. Normalization of the tip resistance is performed using the following equations (Moss et al, 2006):

$C_q$ = $(P_a/\sigma'_v)^c$, $C_q \leq 1.7$,

$q_{c,1}$ = $C_q \cdot q_c$

where: c = Normalization exponent

$\sigma'_v$ = Effective vertical soil pressure [tsf]

$P_a$ = Reference pressure [tsf]

$q_c$ = CPT raw tip resistance [tsf]

The cyclic resistance ratio (CRR) for a 15% probability of liquefaction is calculated using the following equation (Moss et al, 2006). The term $q_{c,1}$ is corrected using a "fines" adjustment factor and taken as $q_{c,1,mod}$.

$$CRR = \exp\left\{\frac{[q_{c,1}^{1.045} + q_{c,1}(0.110 \cdot R_f) + (0.001 \cdot R_f) + c(1 + 0.850 \cdot R_f) - 0.848 \cdot \ln(M_w) - 0.002 \cdot \ln(\sigma'_v) - 20.923 + 1.632 \cdot \Phi^{-1}(P_L)]}{7.177}\right\}$$

$q_{c,1,\,mod} = q_{c,1} \cdot K_c$

where: $K_c$ = Fines adjustment factor

$R_f$ = Friction ratio [percent]

$\sigma'_v$ = Effective vertical soil pressure [tsf]

c = Normalization exponent

$M_W$ = Moment magnitude

$P_L$ = Probability of liquefaction [percent]

**APPENDIX D**

The normalized cone resistance with "fines" adjustment factor ($q_{c,1,mod}$), soil behavior type index ($I_c$), and CSR* and CRR values are shown graphically for each CPT at the end of this appendix, **Figures D2.1** through **D2.17**.

Values of the factor of safety against liquefaction for the soil profiles in each of the CPT logs are calculated at 2-inch intervals using the *CLiq* computer software. Typical calculations for CPT interpretation and liquefaction triggering are provided for CPT-17 in this appendix.

b. Earthquake-Induced Settlement of Soils

Saturated soils that liquefy as a result of earthquake shaking can compress as earthquake-induced excess pore water pressure in the soil dissipates. Likewise, earthquake shaking can densify predominantly granular, dry and partly saturated soils. The *Cliq* computer program was used for estimation of seismic compression of unsaturated soils that occurs in the absence of liquefaction (Robertson and Shao, 2010) and earthquake-induced ground settlement of soils that occurs as the result of liquefaction (Zhang et al, 2002).

One-dimensional volumetric strain of unsaturated sandy soils caused by earthquake shaking is estimated based on $N1_{60}$ values (interpreted from the CPT sounding data) and earthquake-induced cyclic shear strain (interpreted from CSR and CPT tip resistance and sleeve friction). This one-dimensional volumetric strain is doubled in order to account for the multi-directional nature of earthquake shaking. Settlement is calculated by multiplying the volumetric strain value by the thickness of the soil layer. This procedure for estimating earthquake-induced densification was developed based on data from clean to slightly silty sands, therefore the $N1_{60}$ values estimated based on the normalized CPT tip resistance of unsaturated soils were corrected for fines content ($Q_{tn,cs}$).

Post-liquefaction volumetric strain of saturated soils caused by earthquake shaking is estimated based on the normalized, fines-adjusted CPT tip resistance ($q_{c1N,mod}$) and calculated factor of safety (FS) against liquefaction. The CPT tip resistance ($q_{c1N,mod}$) is evaluated using the procedure by Robertson (2010) for compatibility with Zhang, et. al. (2002). Since the volumetric strain obtained from the analysis method for saturated sands includes the effect of multi-directional earthquake shaking, it is not necessary to double the volumetric strain calculated for saturated deposits. Settlement is calculated by multiplying the thickness of the saturated soil layer by the volumetric strain.

The estimated post-earthquake ground surface settlement profile is shown graphically for each CPT at the end of this appendix, **Figures D2.1** through **D2.17**. **Table D1** summarizes total post-earthquake settlements before and after remedial removals. Typical calculations for post-earthquake settlement of dry sands and post-earthquake settlement due to liquefaction are provided for CPT-17 in this appendix.

c. Potential for Lateral Spreading

Regression equations for potential lateral spread displacement associated with liquefaction of soil beneath a gently sloping site are presented in the referenced article by Zhang, et al (2004). According to these equations, the magnitude of lateral spreading displacement depends on the factor of safety (FS) against liquefaction (evaluated using the CPT-based method described above), thickness of liquefied layers, maximum cyclic shear strains of saturated sands under seismic loading ($\gamma_{max}$), relative density ($D_r$), grain size characteristics and percent fines, and ground surface geometry. The effects of earthquake characteristics on lateral spread displacements, including magnitude, PGA, and site to fault distance, are assumed to be quantified by their effects on FS determined in the liquefaction analysis. The effect of fines content on lateral spreading is assumed to be similar as on liquefaction triggering. The equivalent clean sand normalized cone resistance, $(Q_{t,1N})_{cs}$ is used to account for fines content when estimating $\gamma_{max}$.

In summary, the $(Q_{t,1N})_{cs}$ and FS estimated from the CPT-based evaluation of liquefaction potential were subsequently used to estimate $\gamma_{max}$ from the regression equations for different values of relative density, Dr, where,

$$D_r = -85 + 76 \log (Q_{t,1N})_{cs} \qquad (Q_{t,1N})_{cs} \leq 200$$

Integrating $\gamma_{max}$ with depth yields a value defined as the Lateral Displacement Index (LDI) that quantifies potential for lateral displacement. Based on the analyzed case histories where lateral displacement was observed, empirical correlations were developed to estimate lateral displacement (LD) based on the calculated LDI, ground slope, and/or free face height and distance to free face.

The data base used to develop the lateral spread displacement regression equations is based on case histories in which the liquefiable layers extended laterally for substantial distances without being impeded by boundary effects. It may be inferred that significant lateral spreading has not been observed at narrow sites that are bounded by denser soils or bedrock, or at sites where liquefiable layers are laterally discontinuous. In addition, significant lateral spreading is expected only if a site is

underlain by a **laterally continuous**, liquefiable layer of sufficient thickness that has a relative density that corresponds to an equivalent **$N1_{60}$ blow count ≤ 15**. Per the guidelines established by the County of Los Angeles Department of Public Works, soil layers with equivalent $N1_{60}$ blow counts < 15 should be evaluated for lateral spreading hazard. For the CPT-based analyses included herein, potentially liquefiable soil layers (i.e. safety factor against liquefaction ≤ 1.3) with a corrected CPT cone resistance of $(Q_{t,1N})_{cs} \leq 84$ (equivalent to an $N1_{60}$ blow count of 15 with correction for fines content) were included in the evaluation.

The estimated cumulative lateral displacements for gently sloping ground surface (e.g., 1 percent) is shown graphically for each CPT the end of this appendix, **Figures D2.1** through **D2.17**, and summarized in **Table D1**. Typical calculations for post-earthquake lateral displacements due to liquefaction are provided for CPT-17 in this appendix.

d. Surface Manifestations and Loss of Bearing Capacity

Surface manifestations of liquefaction, such as sand boils and fissures, do not occur provided there is a sufficient thickness of non-liquefiable soil over potentially liquefiable soil layers with low blow count (i.e. $N1_{60} \leq 10$). Although there is no analytical model available for evaluating the required thickness of this cover, an empirical model for estimation of the cover thickness needed to mitigate surface manifestations of liquefaction was developed by Professor Kenji Ishihara ("Stability Of Natural Deposits During Earthquakes", Proceedings of 11th ICSMFE, 1985) based on a limited number of case histories of vertically continuous liquefied sand deposits subjected to peak horizontal ground acceleration values up to about 0.5g.

4. Results of Analysis

a. Liquefaction Potential Assessment

Results of our liquefaction potential assessment at the site are graphically summarized herein on individual sheets for analyzed CPT soundings (CPT-Based Assessment of Seismic Soil Liquefaction Potential, **Figures D2.1** through **D2.17**) and boring location (SPT-Based Assessment of Seismic Soil Liquefaction Potential, **Figure D2.18**). The CPT plots present depth vs. normalized CPT cone resistance and friction ratio, cyclic shear stress induced by earthquake shaking, resistance to liquefaction, cumulative settlement that would be caused by earthquake shaking (before recommended removals), and cumulative lateral displacement that would be caused by liquefied soils. The SPT-based plots present depth vs. field blow count and $N1_{60,cs}$

blow count, laboratory fines content, cyclic shear stress and cyclic resistance, and cumulative settlement (before and after removals). The sheets also display ground water depths at the time of the CPT soundings and boring and estimated historic high ground water depths. Based on data from our CPT soundings, potentially liquefiable soil layers are present at depths ranging from 30 feet (historic high ground water level) to 50 feet (maximum depth analyzed).

b. Earthquake-Induced Settlement

The results of the analyses of potential earthquake-induced settlement are presented on **Figures D2.1** through **D2.18**. Based on these analyses, estimated potential earthquake-induced total settlement at the site ranges from less than 1 inch up to about 11 inches.

The Los Angeles County Department of Public Works, Geotechnical and Materials Engineering Division (GMED) has developed criteria to determine when structural mitigation and ground improvement is required to mitigate seismically-induced settlement. Total seismic settlements up to 4 inches and differential seismic settlements up to 2 inches (over a horizontal distance of 30 feet) can be mitigated using structural methods, such as additional foundation reinforcement or alternate foundation types. Calculated settlements in excess of these values would warrant ground improvement, or a combination of ground improvement and structural methods.

Remedial removals are proposed to generally reduce total seismic settlement to less than 2.0 inches and differential seismic settlement to less than 1.0 inch.

c. Lateral Spreading

The results of the analyses of potential liquefaction-induced lateral spread displacements are presented on **Figures D2.1** through **D2.17**. Based on these analyses, potential lateral displacements at the site range from less than 1 inch to about 7 inches.

As stated above, lateral displacements are expected only if a site is underlain by a laterally continuous liquefiable layer that a relative density that corresponds to a corrected CPT cone resistance of $(Q_{t,1N})_{cs} \leq 84$ or $N1_{60,cs}$ blow count less than 15. Additionally, GMED has developed criteria to determine when structural mitigation and ground improvement is required to mitigate liquefaction-induced lateral displacements. Total calculated lateral spread displacements up to 12 inches can be mitigated using structural methods. Calculated displacements in excess of this value

would warrant ground improvement, or a combination of ground improvement and structural methods. Based on our evaluation of lateral spreading hazard, continuous, potentially liquefiable layers with substantial thicknesses of material with a relative density that corresponds to $N1_{60} \leq 15$ blows/ft were not identified.

d. Surface Manifestations

Based on the proposed grading, a cap of non-liquefiable material at least 30 ft in thickness will be present over potentially liquefiable soils within the tract boundaries where structures are proposed. The thickness of the non-liquefiable surface layer and the effective thickness of underlying liquefiable layers with interpreted $N1_{60}$ blow counts ≤ 10 following the recommended removals were reviewed at each analyzed CPT location. Based on this review, the effective thickness of potentially liquefiable layers with low interpreted blow counts is predominantly < 1 ft. Using the Ishihara model in conjunction with the thickness of potentially liquefiable soils with low blow counts that would remain following the removals, the thickness of the cap of non-liquefiable materials above the remaining potentially liquefiable materials will be sufficient to mitigate the hazard of surface manifestations of liquefaction.

e. Conclusions and Recommendations

The principal findings of our liquefaction analyses are as follows:

- Susceptibility of alluvial soils to earthquake-induced densification is potentially significant, particularly for the dry and partly saturated soils in the upper 15 to 20 ft. Total seismic settlement at the ground surface is estimated to exceed 4 inches at many CPT locations, up to a maximum of about 11 inches. Since this potential total settlement exceeds the maximum potential total settlement considered to be tolerable by Los Angeles County (i.e., 4 inches), removal of in-situ site soils and replacement with compacted fill are recommended as shown on the Geotechnical Map and on the Summary of Estimated Cyclic Settlements and Lateral Displacements (**Table D1**).

- Following the recommended removals and replacement, potential liquefaction and earthquake-induced densification of soils could cause total ground settlement over most of the site generally up to about 2 inches. The corresponding differential ground settlement (between locations of adjacent footing foundations or over a horizontal distance of 30 ft) would be up to 1.0 inch.

- Based on the depth of potentially liquefiable soils that may susceptible to lateral spreading (i.e., greater than 30 ft), in conjunction with the estimated magnitude

of calculated displacements, the hazard for lateral spread displacements to adversely impact the proposed development is considered to be **low**.

- The cap of non-liquefiable soils (i.e. the upper 30 ft) will be thick enough to mitigate surface manifestations of potential liquefaction, such as sand boils, fissures, and loss of bearing capacity.

**The following attachments complete this Appendix.**

- References - Assessment of Liquefaction Potential and Estimated Cyclic Settlements
- Summary of Estimated Cyclic Settlements and Lateral Displacements — Table D1
- Correlation of $N_{1(60)}$ Blow Count and Percent Fines - Boring vs. CPT Interpretation (HS-1 vs. CPT-17) — Figure D1
- CPT-Based Assessment of Seismic Soil Liquefaction Potential (CPT-1 to CPT-17) — Figures D2.1 thru D2.17
- SPT-Based Assessment of Seismic Soil Liquefaction Potential (HS-1) — Figure D2.18
- Typical Calculations for Liquefaction Triggering Analysis (based on CPT-17) (6 sheets)
- Typical Calculations for Cyclic Settlement Analysis (based on CPT-17) (6 sheets)
- Typical Calculations for Lateral Spread Displacements (based on CPT-17) (6 sheets)

# APPENDIX D

## REFERENCES FOR ASSESSMENT OF LIQUEFACTION POTENTIAL AND ESTIMATED CYCLIC SETTLEMENTS

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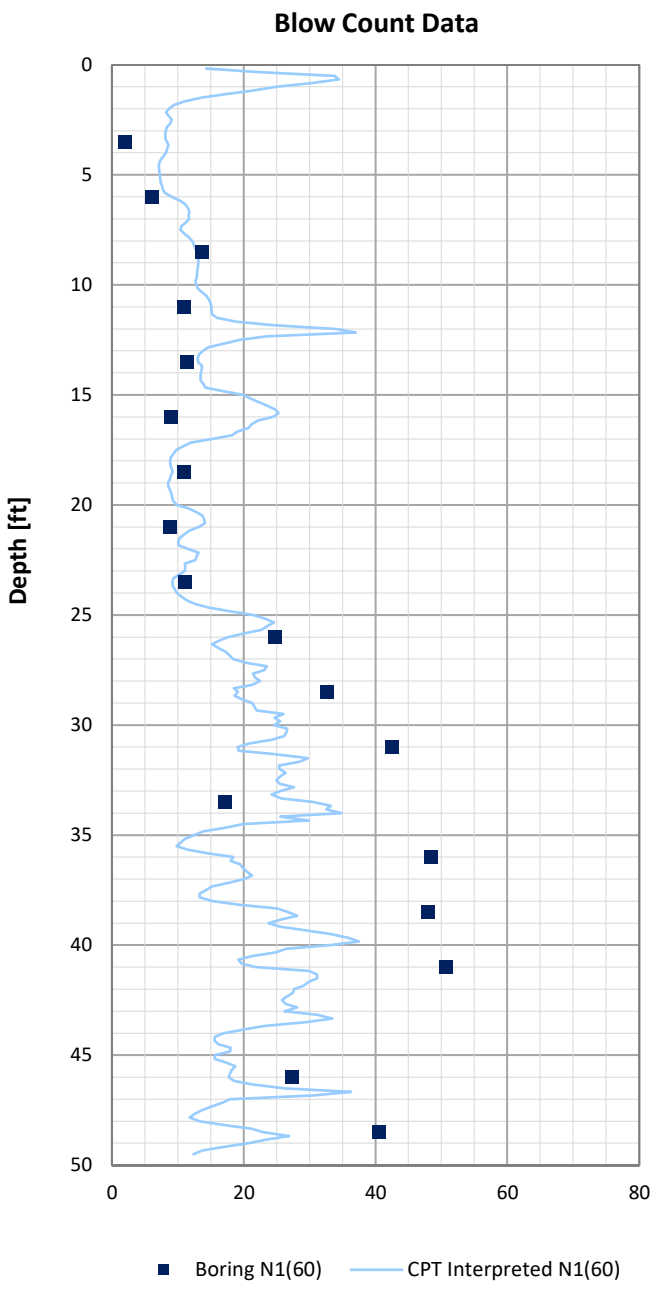
# APPENDIX D

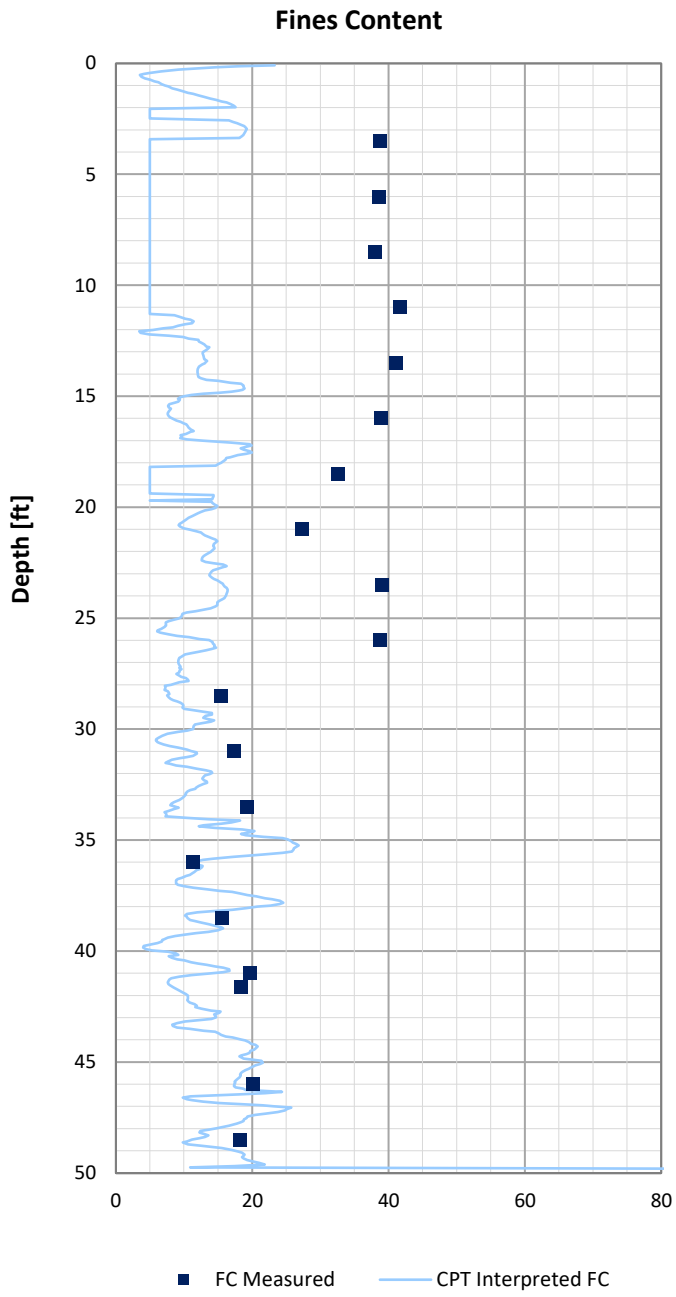
## Table D1 - Summary of Estimated Cyclic Settlements and Lateral Displacements

| Analyzed Location | Total Depth (feet) | Groundwater Depth | | Liquefaction Settlements (inches) | Dry Sand Settlements (inches) | Total Seismic Settlement Before Removals (inches) | Removal Depth (ft) [1] | Total Seismic Settlement After Removals (inches) | Lateral Displacements (inches) |
|---|---|---|---|---|---|---|---|---|---|
| | | Existing GWT | Historical GWT | | | | | | |
| CPT-01A | 14.0 | -- | 30 | -- | 1.1 | 1.1 | 14 | 0.0* | n/a |
| CPT-02 | 56.5 | -- | 30 | 0.4 | 8.1 | 8.5 | 15 | ≤ 2.0 | 1.1 |
| CPT-03 | 48.4 | -- | 30 | 1.5 | 6.8 | 8.3 | 17 | ≤ 2.0 | 5.2 |
| CPT-04A | 16.7 | -- | 30 | -- | 4.2 | 4.2 | 15 | 0.0* | n/a |
| CPT-05 | 43.0 | -- | 30 | 0.3 | 5.3 | 5.6 | 10 | ≤ 2.0 | 0.3 |
| CPT-06 | 27.7 | -- | 30 | -- | 3.8 | 3.8 | 15 | 0.0* | n/a |
| CPT-07A | 48.1 | -- | 30 | 1.9 | 2.9 | 4.8 | 16 | ~ 2.0 | 6.8 |
| CPT-08A | 12.0 | -- | 30 | -- | 0.3 | 0.3 | 12 | 0.0* | n/a |
| CPT-09A | 11.2 | -- | 30 | -- | 0.0 | 0.0 | 11 | 0.0* | n/a |
| CPT-10 | 40.6 | -- | 30 | 1.4 | 5.7 | 7.1 | 16 | ≤ 2.0 | 6.2 |
| CPT-11 | 19.2 | -- | 30 | -- | 2.4 | 2.4 | 15 | < 0.25* | n/a |
| CPT-12 | 24.6 | -- | 30 | -- | 4.6 | 4.6 | 15 | 0.0* | n/a |
| CPT-13 | 47.5 | -- | 30 | 0.7 | 3.8 | 4.5 | 10 | ≤ 2.0 | 2.1 |
| CPT-14 | 12.5 | -- | 30 | -- | 1.8 | 1.8 | 13 | 0.0* | n/a |
| CPT-15 | 52.5 | -- | 30 | 1.2 | 9.8 | 11.0 | 24 | ≤ 2.0 | 4.2 |
| CPT-16 | 60.1 | -- | 30 | 1.3 | 2.5 | 3.8 | 17 | ≤ 2.0 | 4.2 |
| CPT-17 | 50.1 | -- | 30 | 1.2 | 6.6 | 7.8 | 19 | ≤ 2.0 | 3.6 |
| HS-1 | 55.0 | -- | 30 | 0.6 | 5.2 | 5.8 | 17 | ≤ 2.0 | -- |

[1] Removal depths with asterisks (*) apply to CPTs with shallow refusal; removal depth taken as the total depth of the CPT or the local removal depth at the CPT location, whichever is shallower.

**Location……. HS-1**
**CPT-17**




**Correlation of N1(60) Blow Count and Percent Fines - Boring vs. CPT Interpretation**

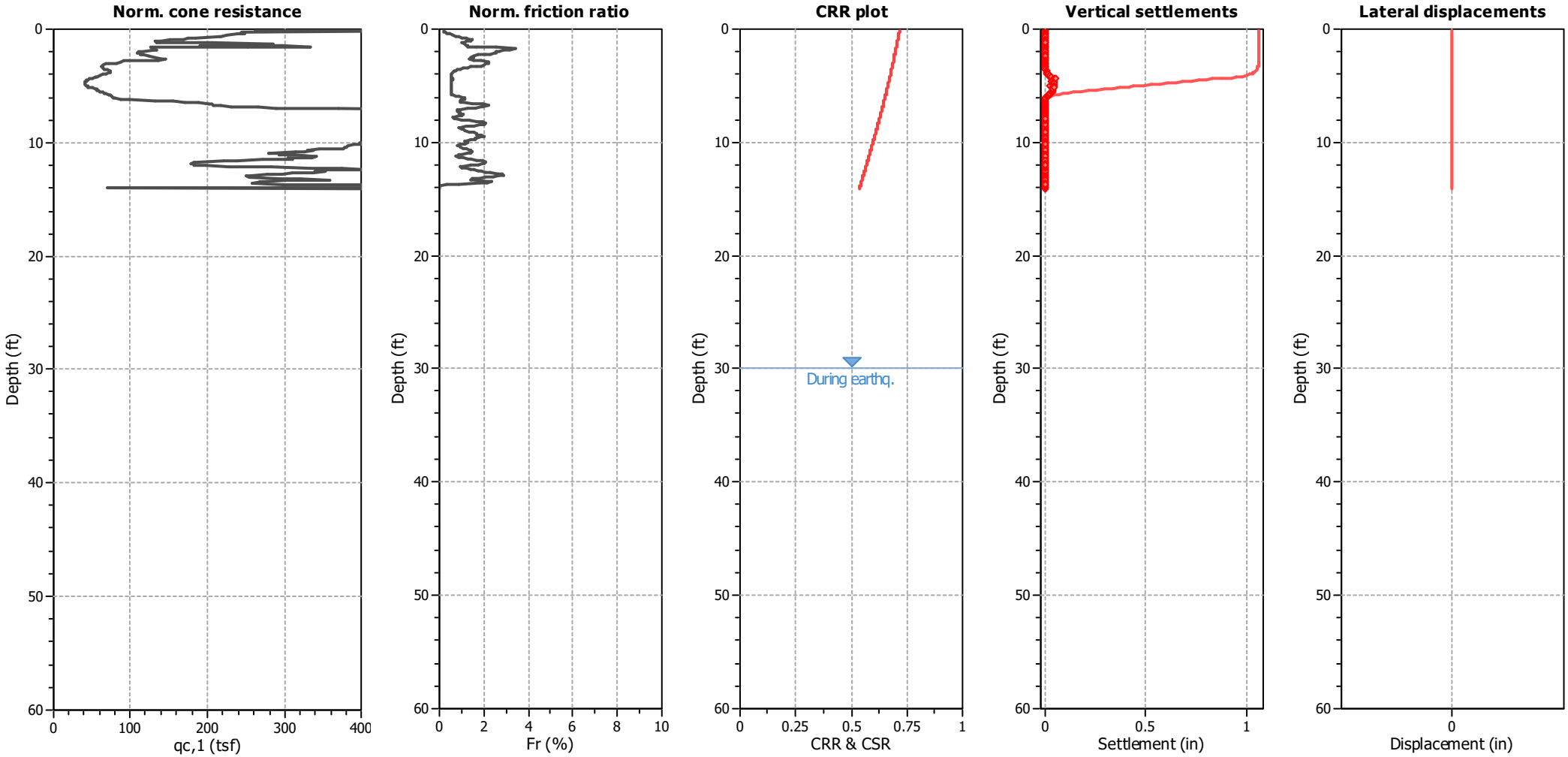
| | | | |
|---|---|---|---|
| **ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.** Geological and Geotechnical Consultants | Client: | Wiley Canyon LLC | |
| | Project: | Wiley Canyon TTM 083295 | |
| | Proj. No.: | 21-2593-4 | |
| | Date: | 6/15/21 | Figure: D1 |

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-1A**
Total depth: 14.05 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



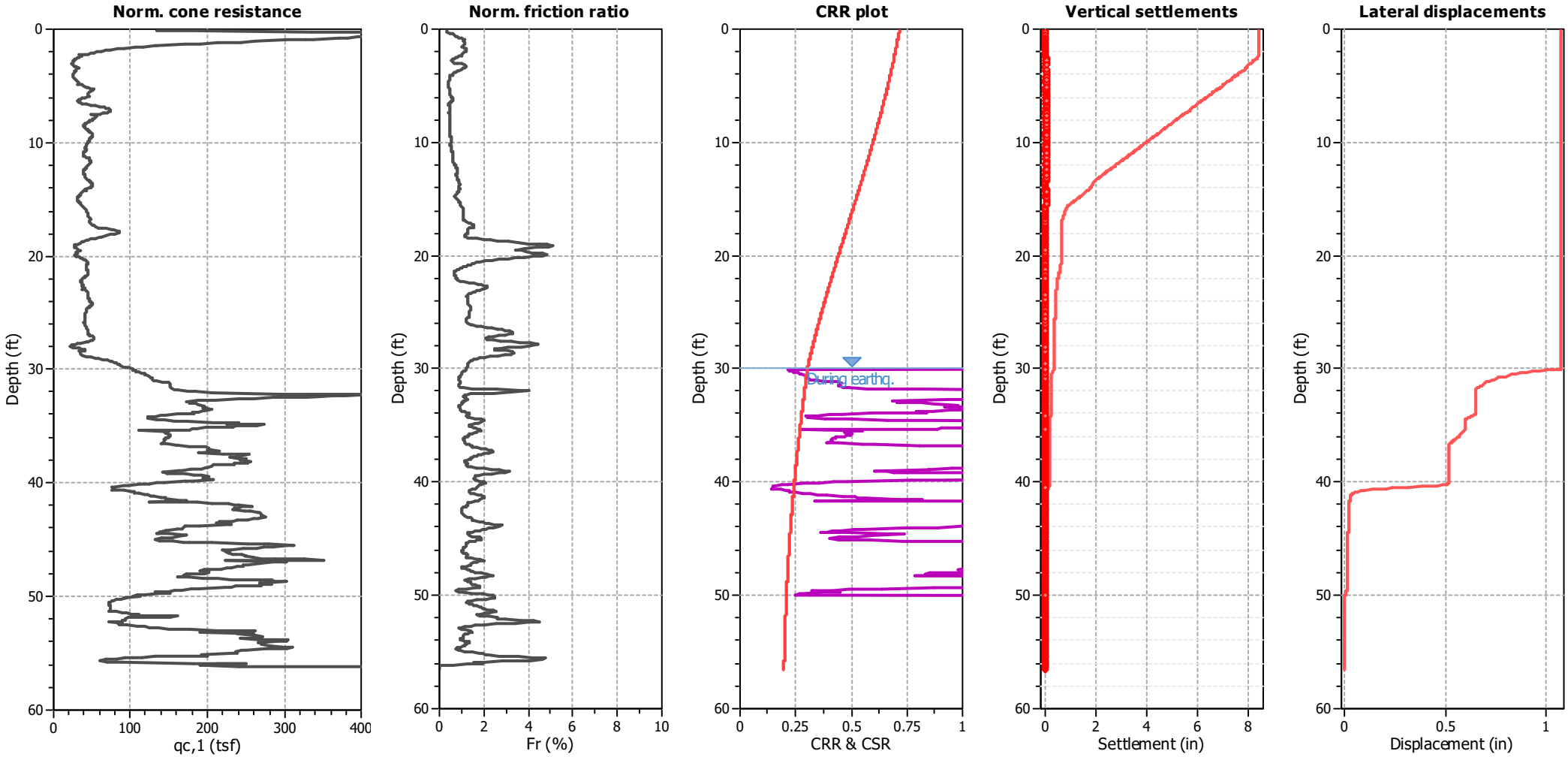
Figure D2.1

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-2**
Total depth: 56.52 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



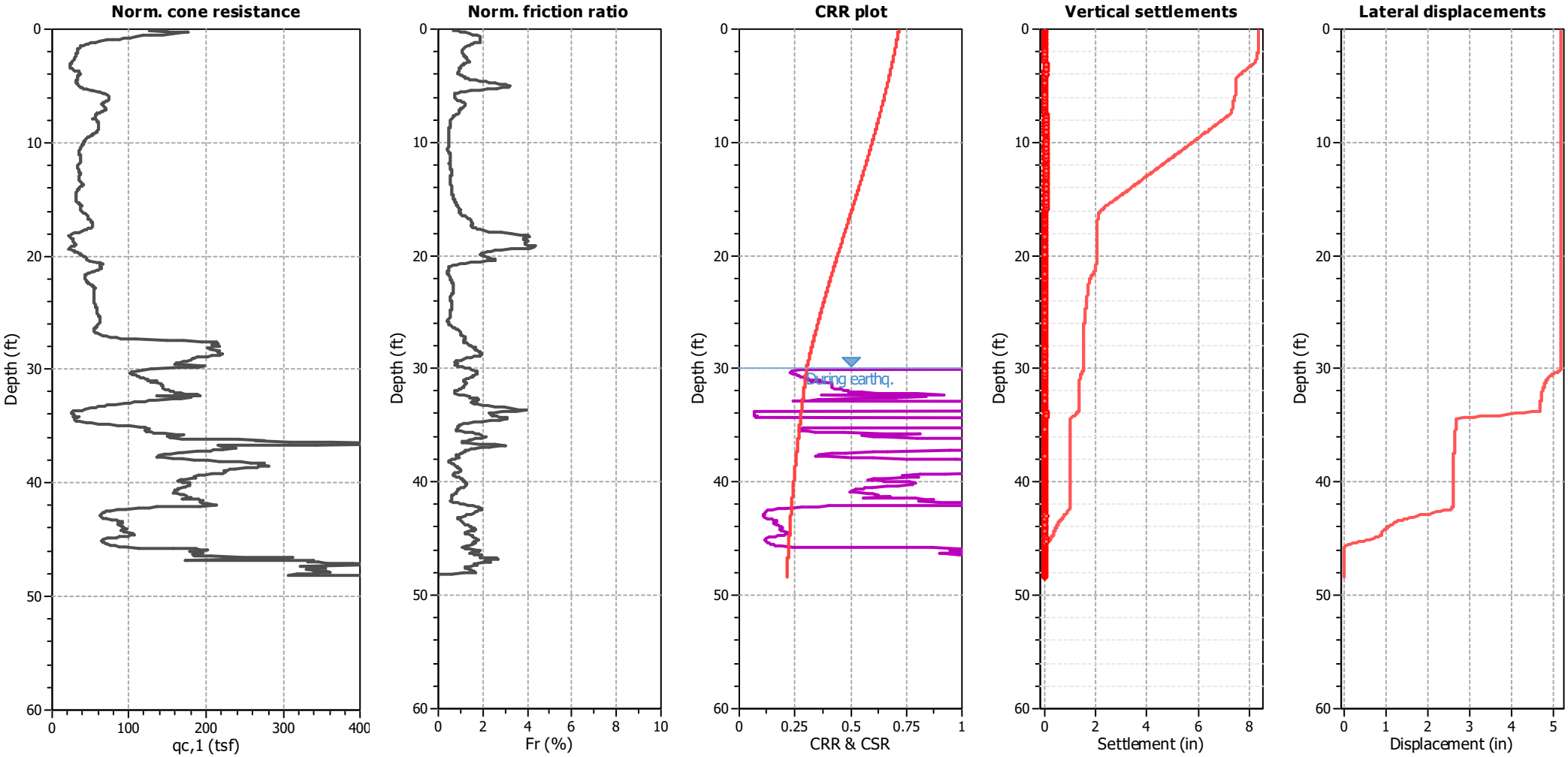
Figure D2.2

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-3**
Total depth: 48.43 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



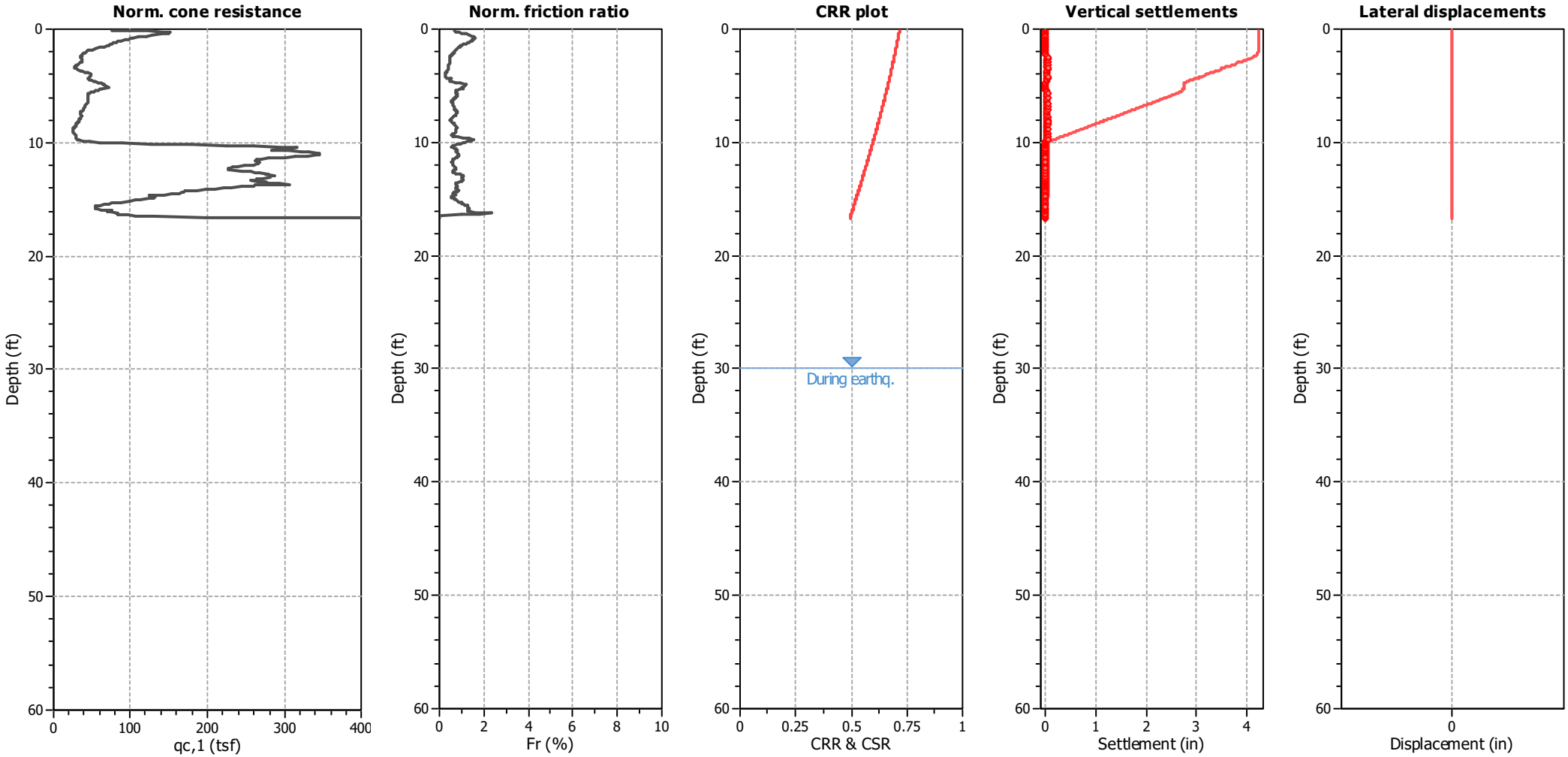
Figure D2.3

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-4A**
Total depth: 16.74 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



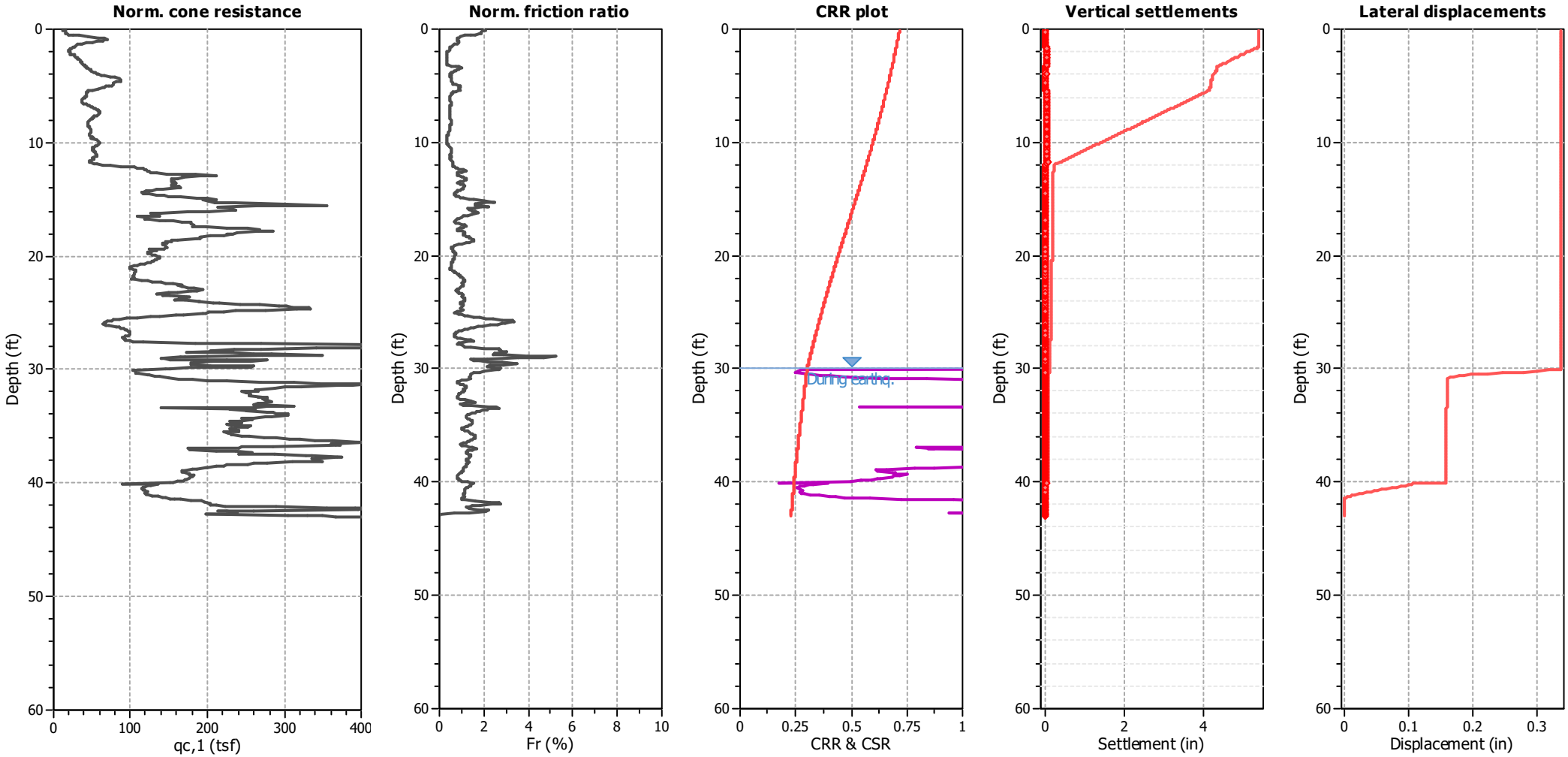
Figure D2.4

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-5**
Total depth: 43.05 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



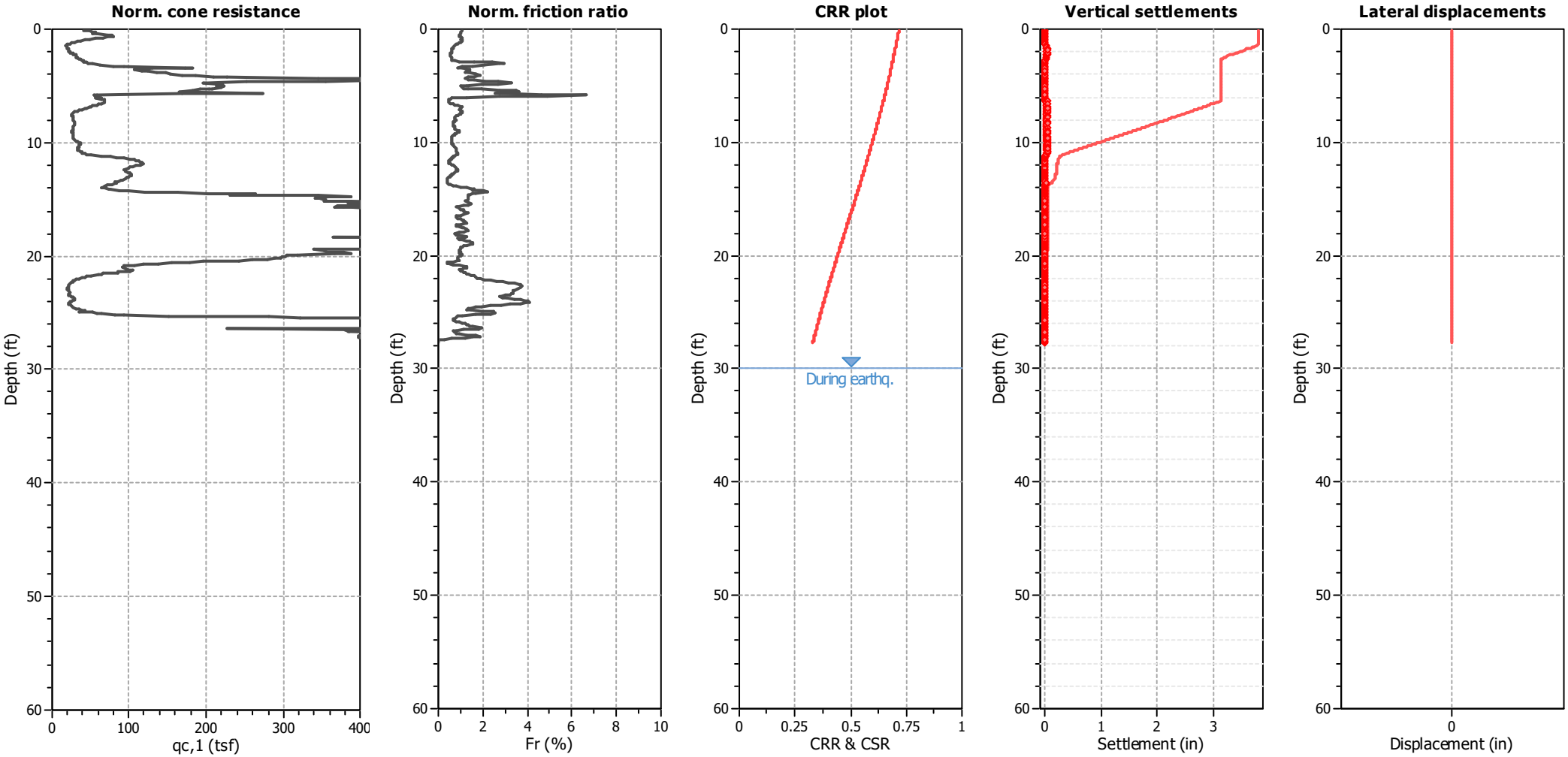
Figure D2.5

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-6**
Total depth: 27.69 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



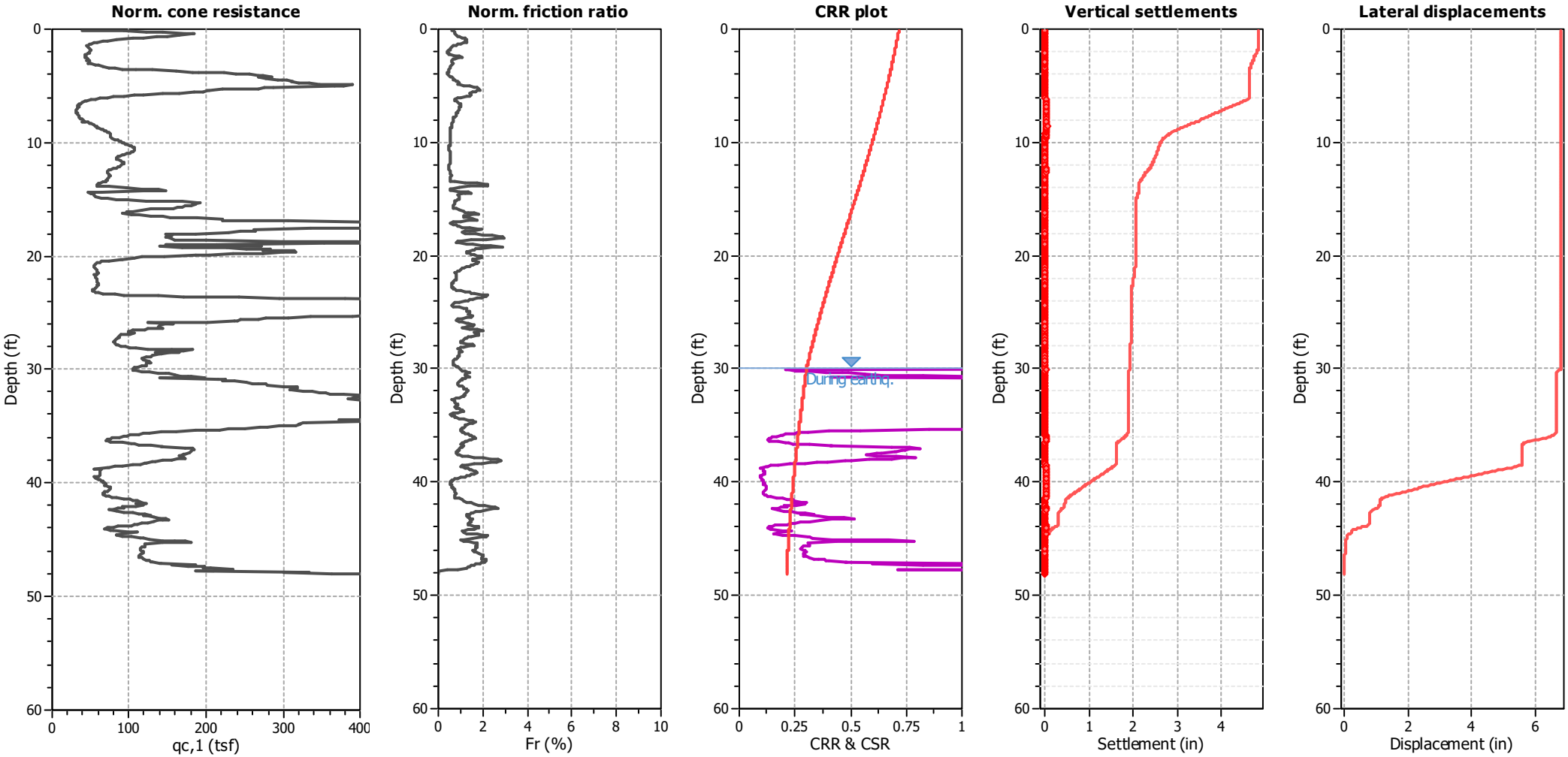
Figure D2.6

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-7A**
Total depth: 48.10 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



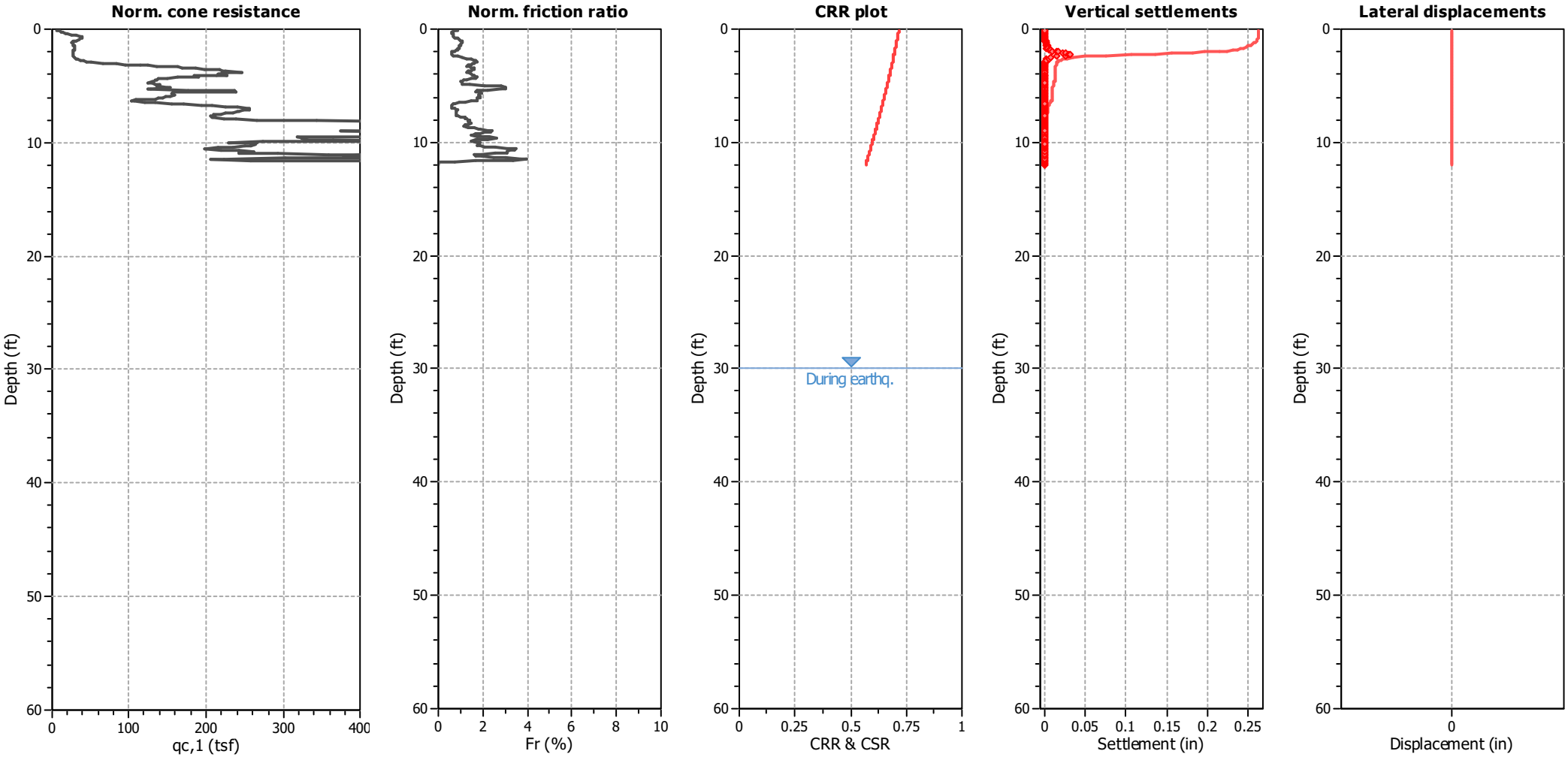
Figure D2.7

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-8A**
Total depth: 12.01 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



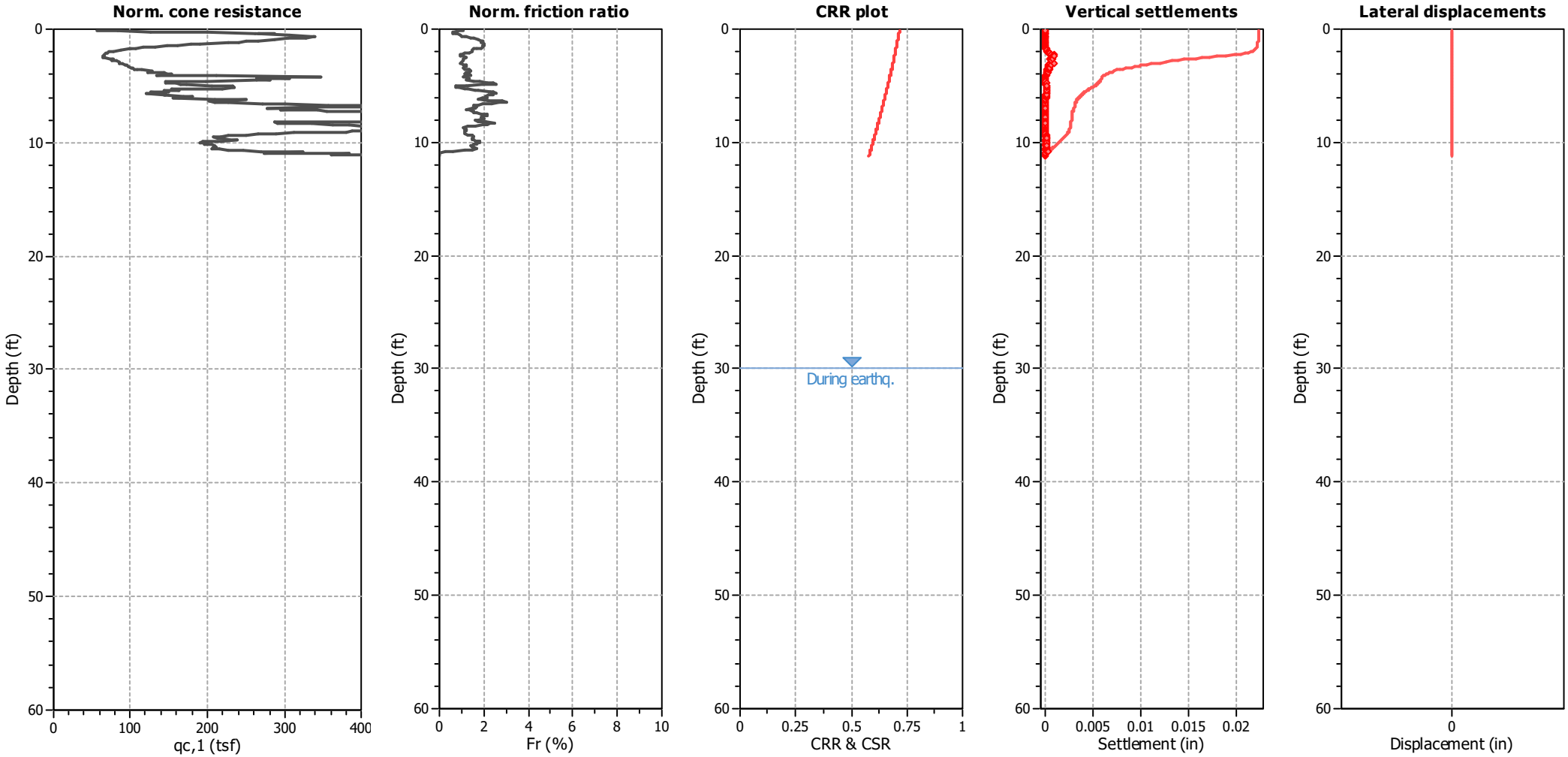
Figure D2.8

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-9A**
Total depth: 11.16 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



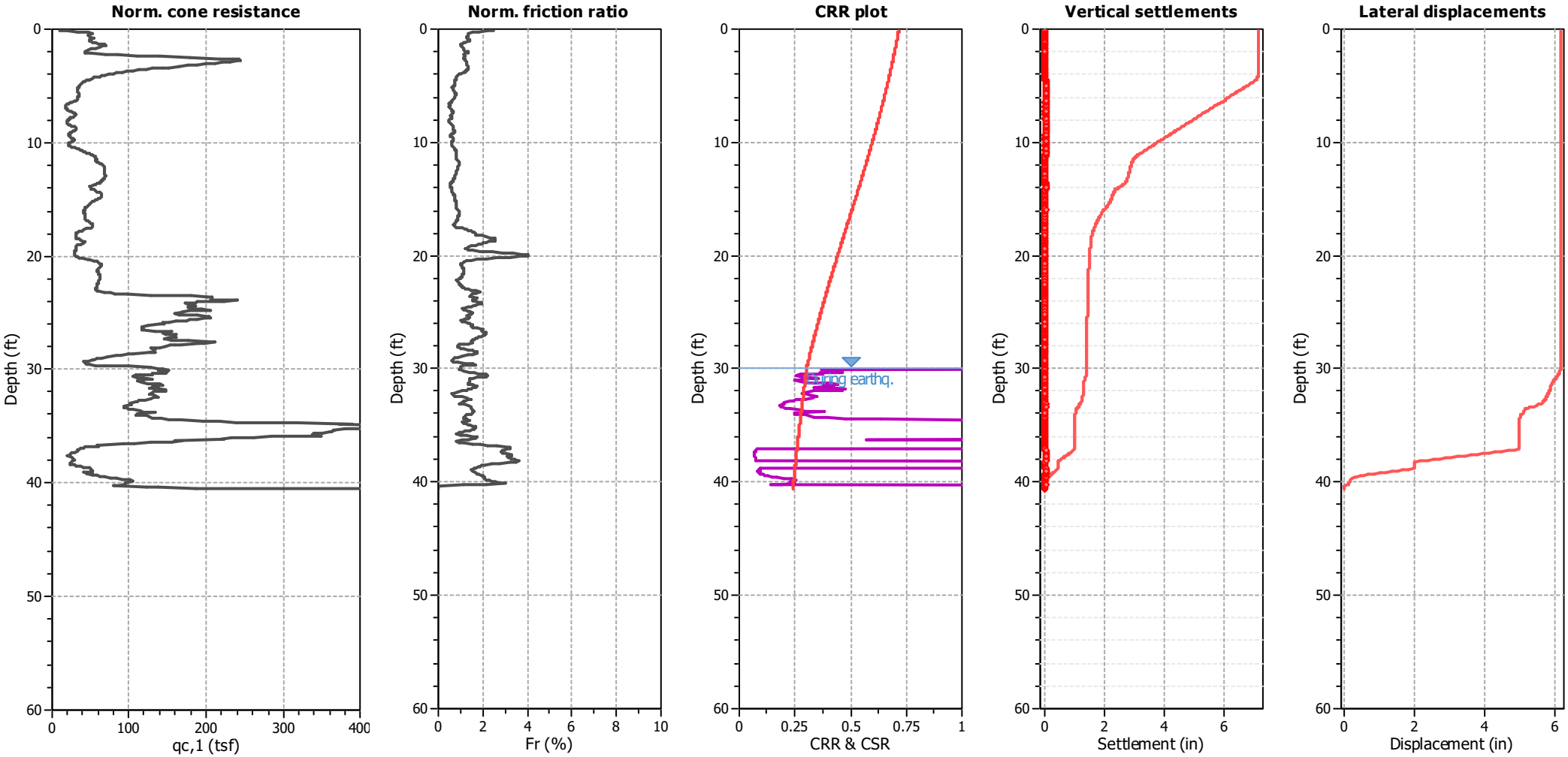
Figure D2.9

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-10**
Total depth: 40.57 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



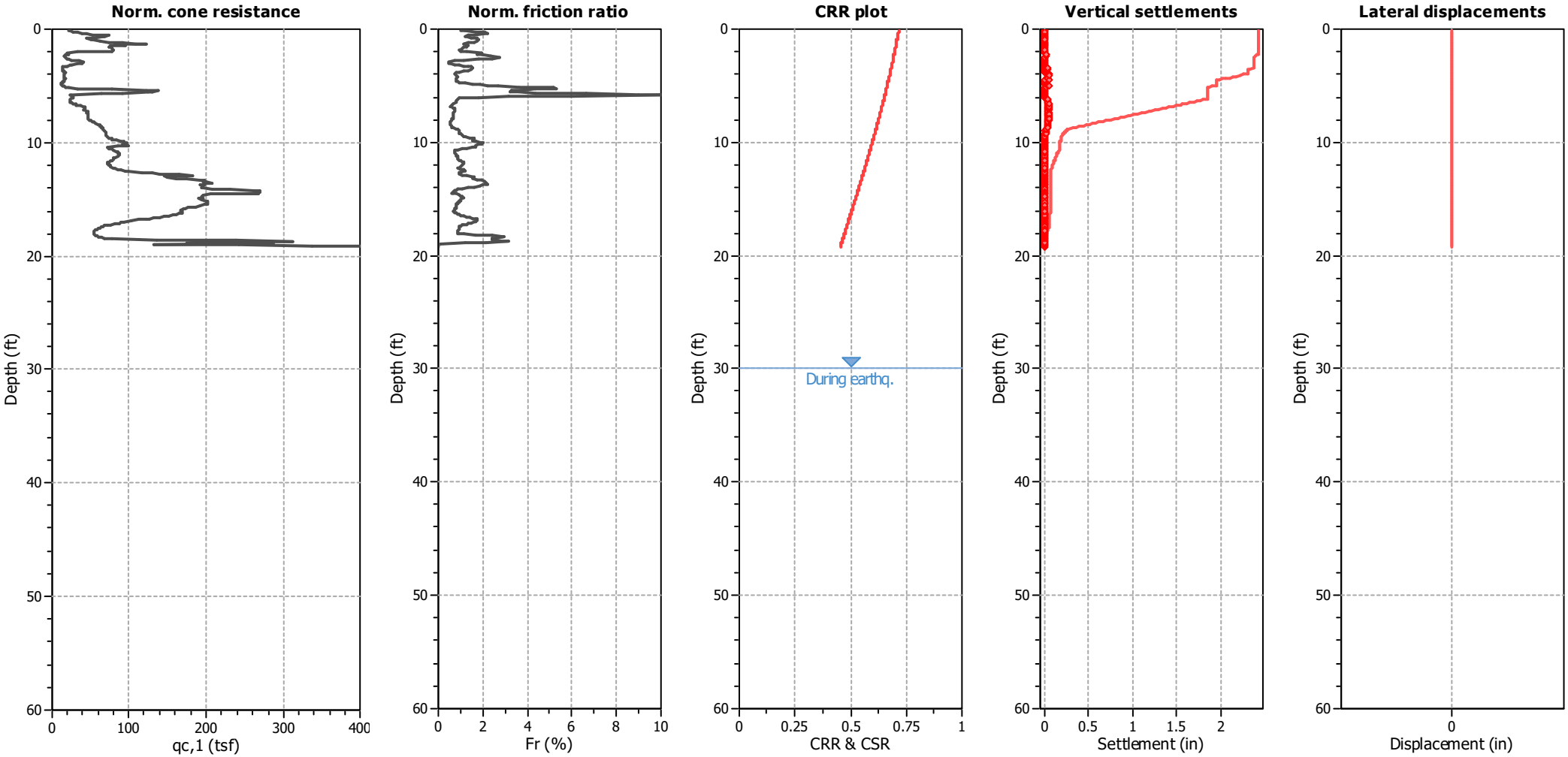
Figure D2.10

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-11**
Total depth: 19.23 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



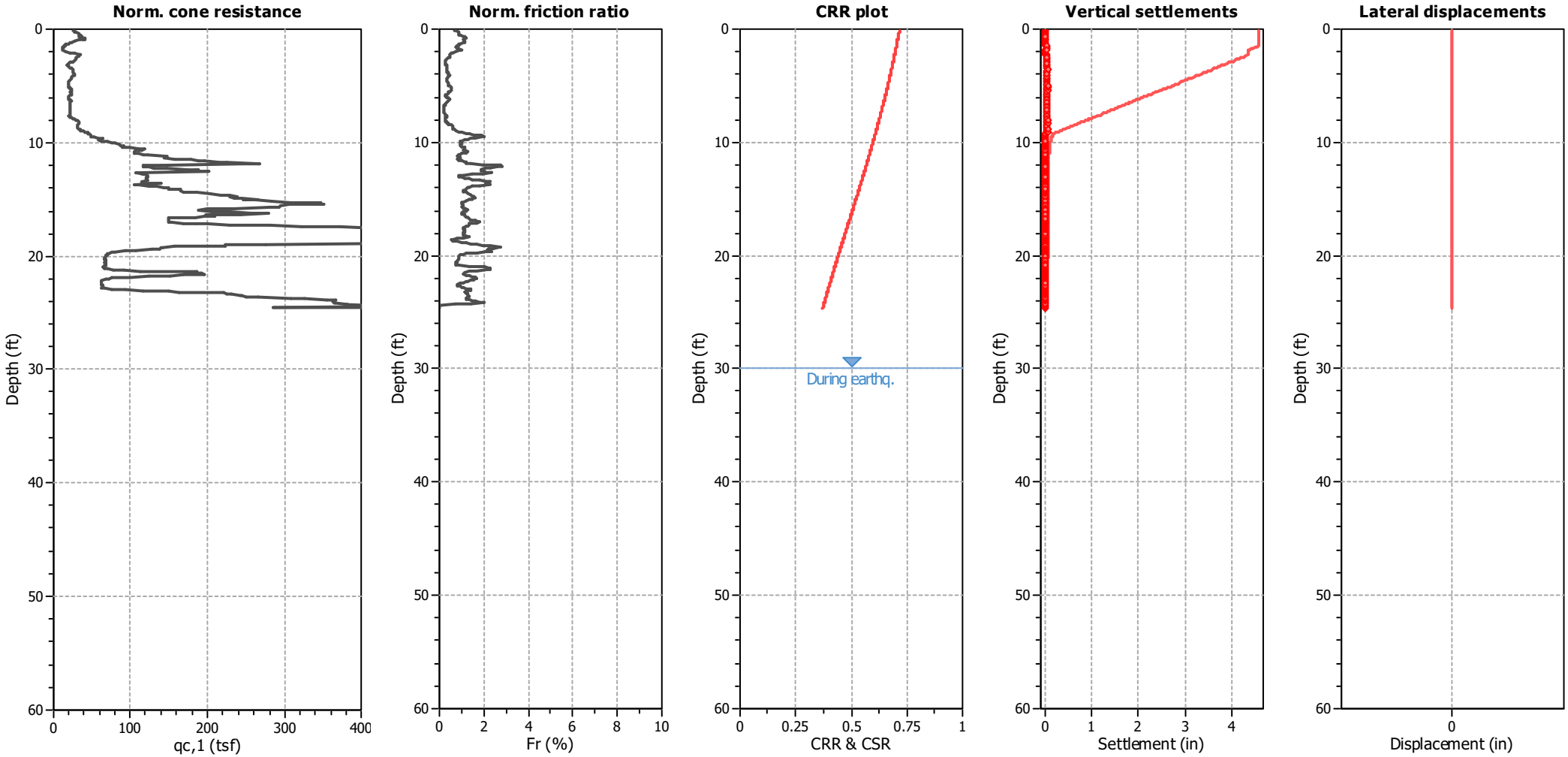
Figure D2.11

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-12A**
Total depth: 24.62 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



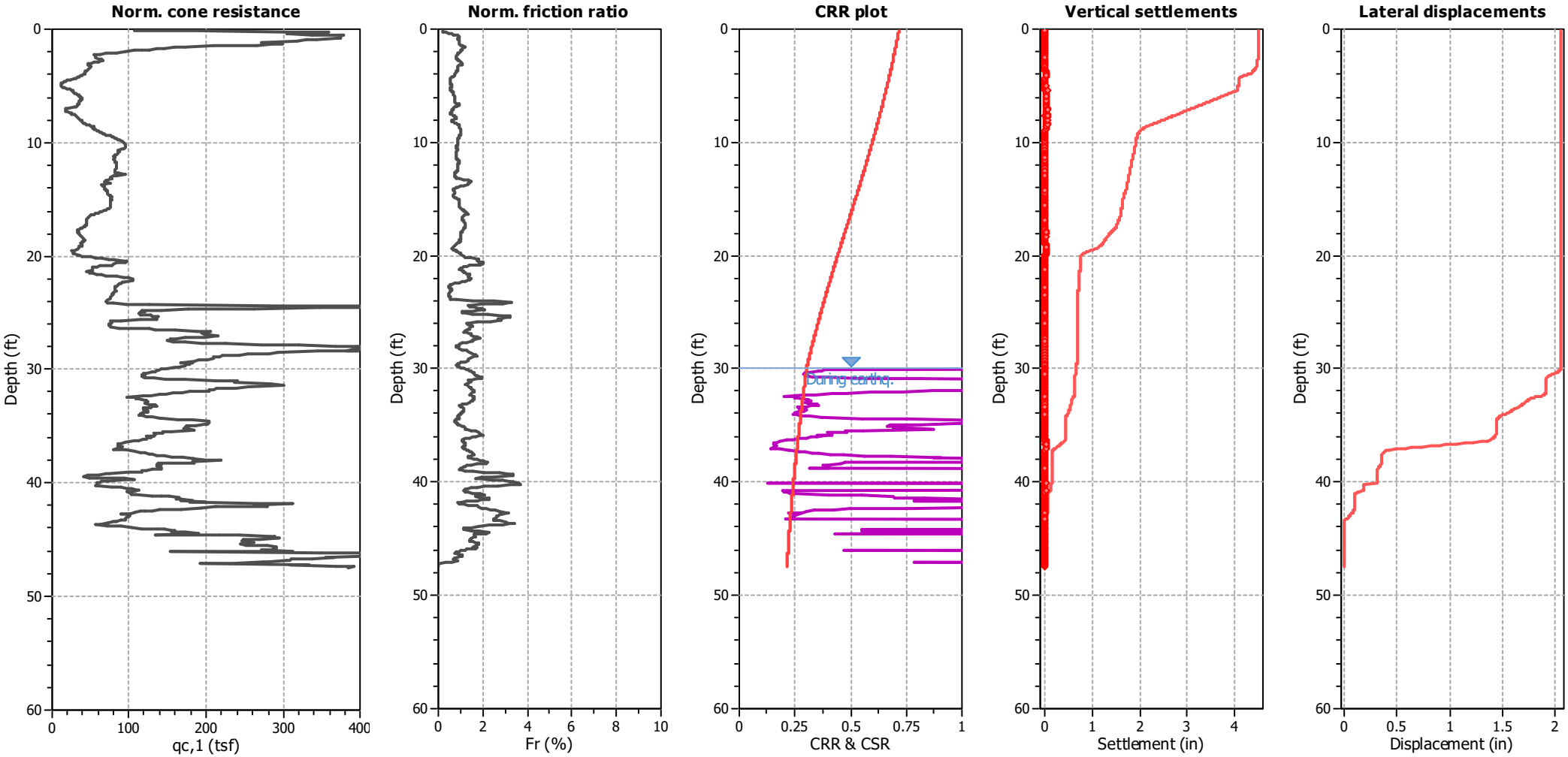
Figure D2.12

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-13**
Total depth: 47.45 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



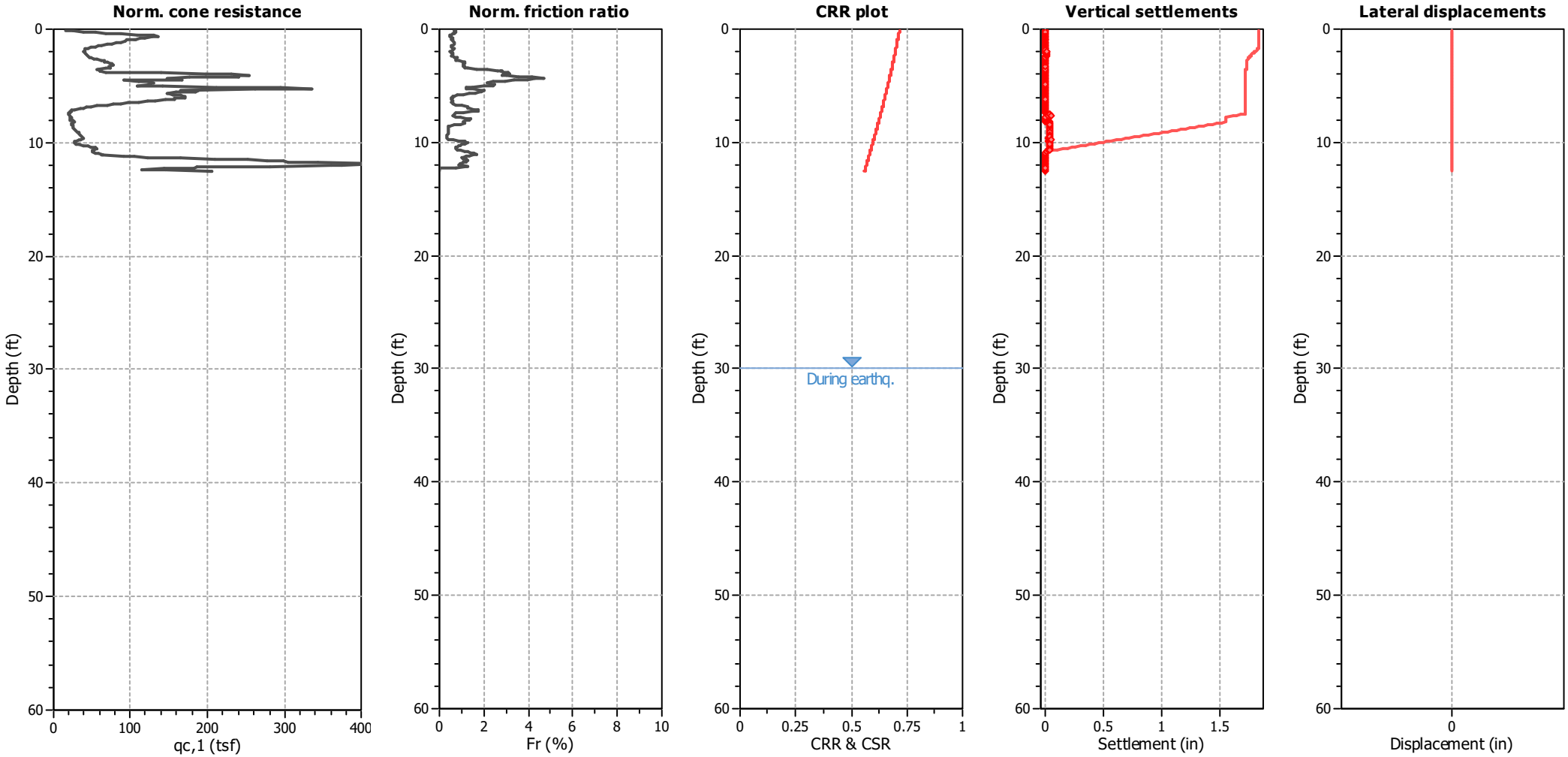
Figure D2.13

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-14**
Total depth: 12.54 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



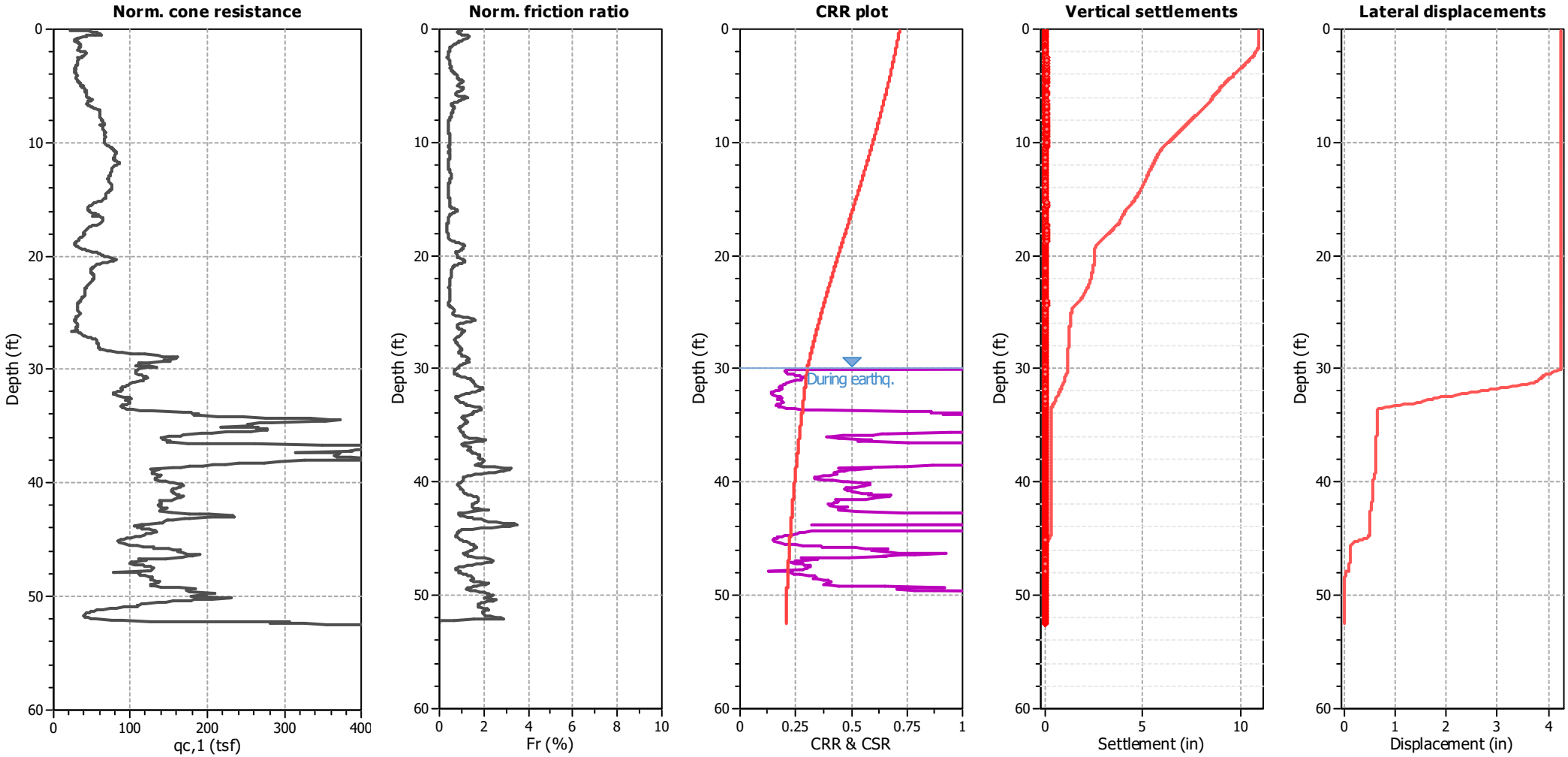
Figure D2.14

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-15**
Total depth: 52.50 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



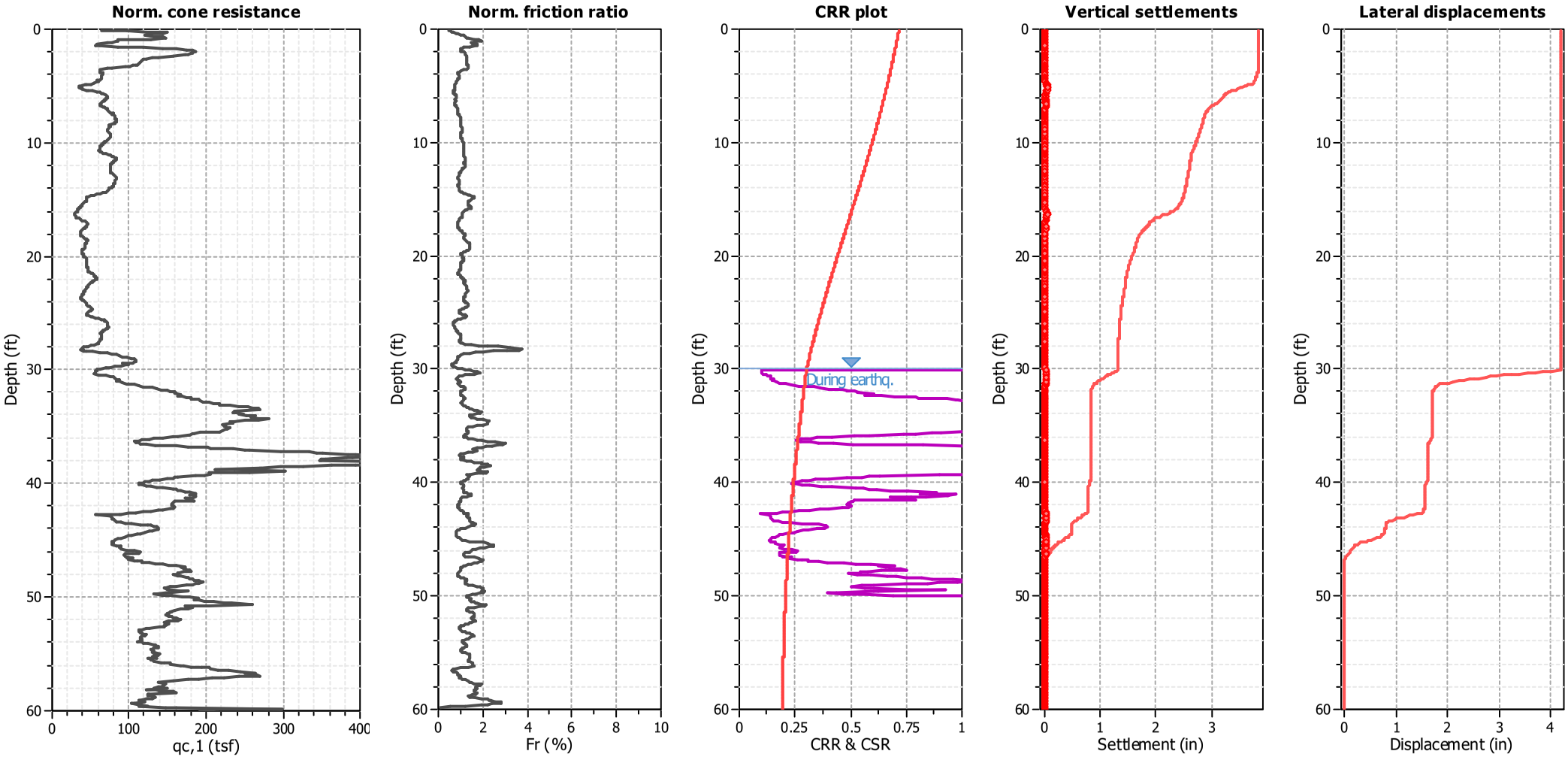
Figure D2.15

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-16**
Total depth: 60.12 ft




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



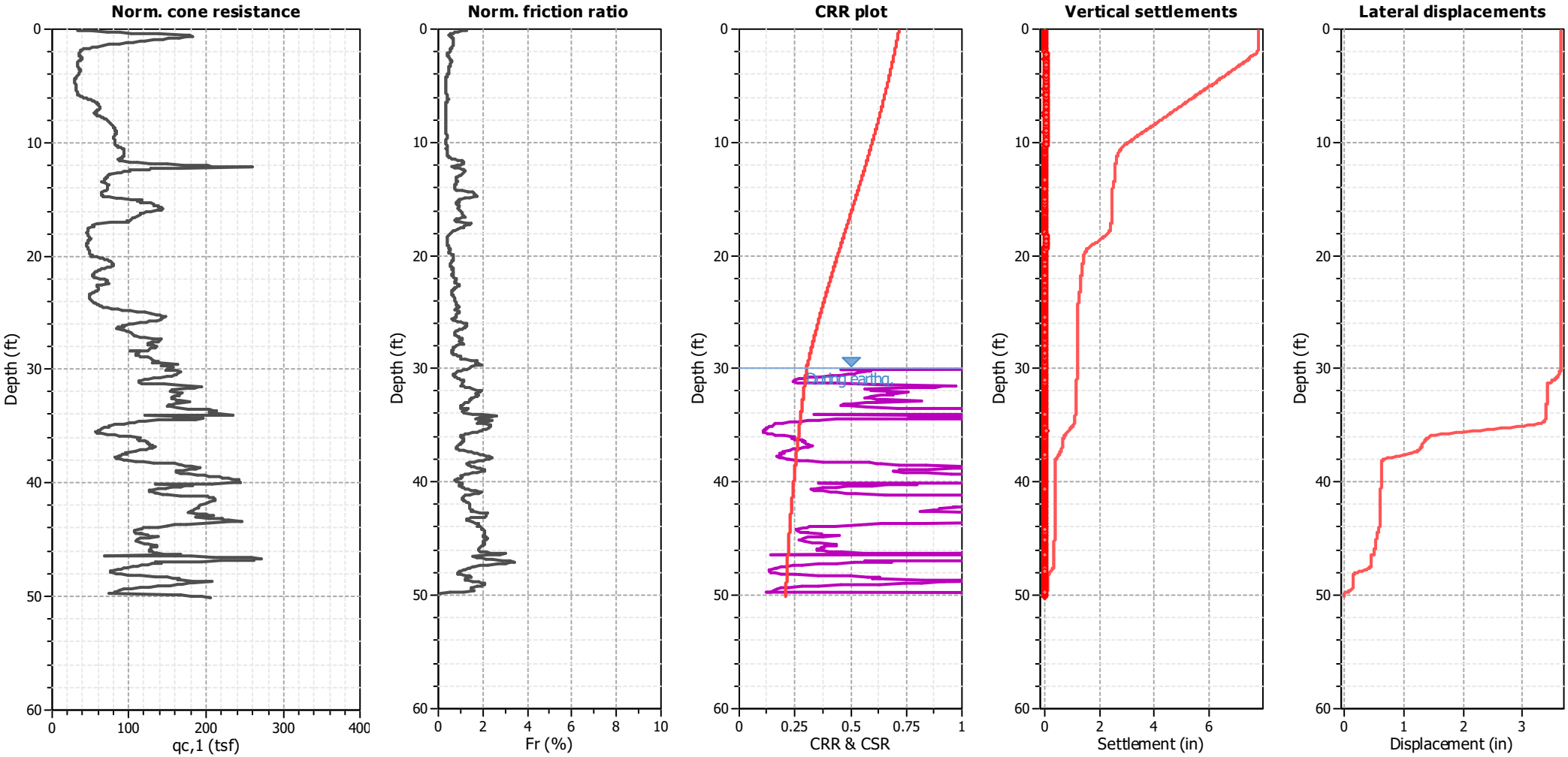
Figure D2.16

**Allan E. Seward Engineering Geology, Inc.**
Geologic and Geotechnical Consultants

**Project:** **Wiley Canyon**
**Location:** **Santa Clarita, CA**

# CPT-Based Assessment of Seismic Soil Liquefaction Potential

**CPT: CPT-17**
Total depth: 50.07 ft

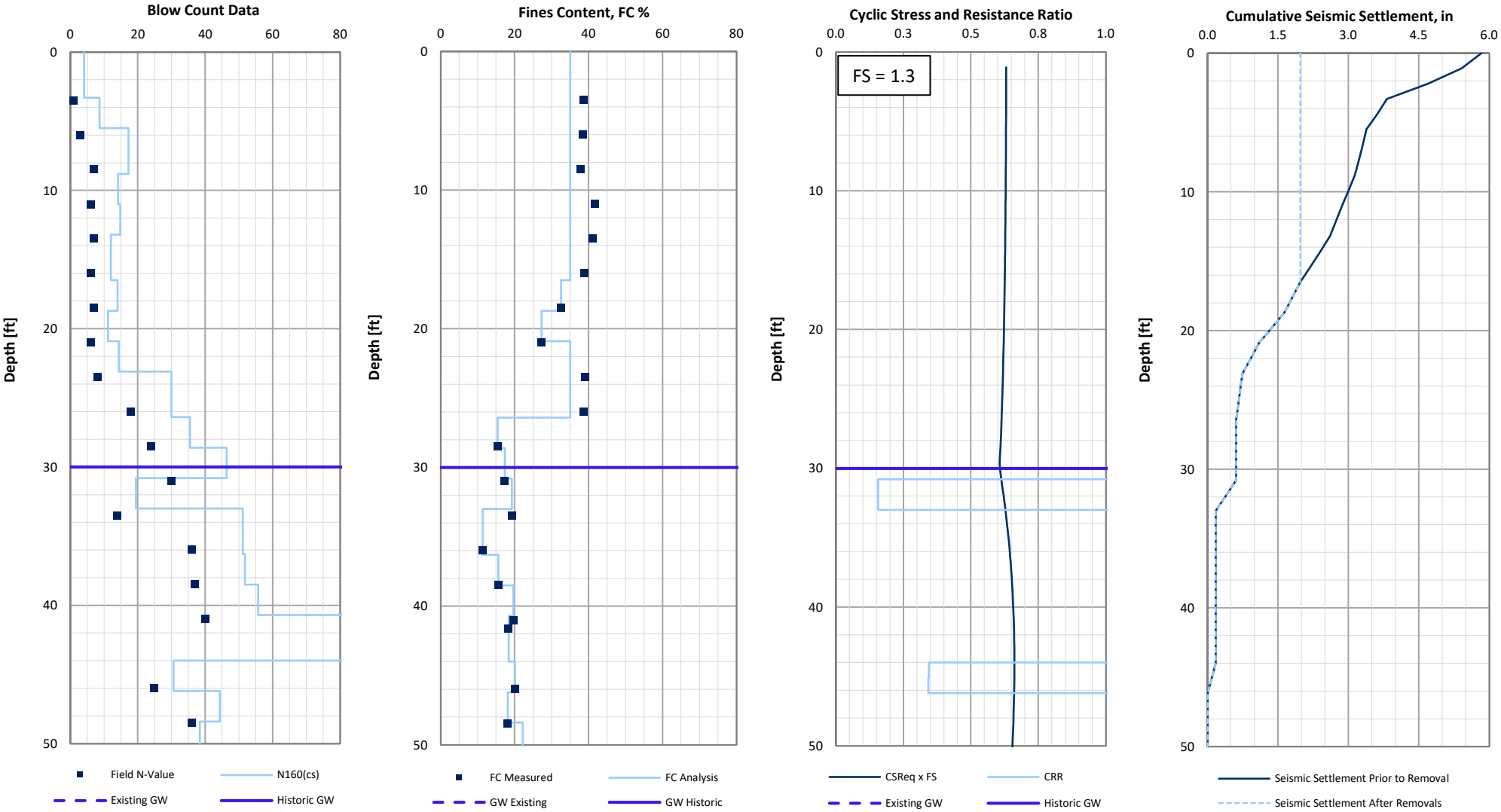



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | Moss et al. (2006) | G.W.T. (in-situ): | 60.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | Moss et al. (2006) | G.W.T. (earthq.): | 30.00 ft | Fill height: | N/A | Limit depth applied: | Yes |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | 50.00 ft |
| Earthquake magnitude $M_w$: | 6.69 | Ic cut-off value: | 4.00 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 1.00 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |



Figure D2.17

# SPT-Based Assessment of Seismic Soil Liquefaction Potential




References:

1. Cetin, et al., ASCE Journal of Geotechnical and Environmental Engineering,December 2004, pp. 1314 - 1340
2. Tokimatsu and Seed, ASCE Journal of Geotechnical Engineering,August, 1987

| | |
|---|---|
| **Location:** | **HS-1** |
| Elevation (MSL): | 1301 |
| **Removal Depth (ft):** | 17 |
| **Total Settlement (in)** | |
| *Prior to Removal:* | 5.83 |
| *After Removal:* | 1.98 |

SPT Liq v1a; Feb 2017

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Geological and Geotechnical Consultants

| | | | |
|---|---|---|---|
| Client: | Wiley Canyon LLC | Magnitude, $M_w$ ..... | 6.69 |
| Project: | Wiley Canyon | Acceleration, PGA (g) ..... | 1 |
| | TTM 083295 | Magnitude Weighted PGA (g) ..... | 0.75 |
| Job No.: | 21-2593-4 | Existing GW Elev. (ft) ..... | 60 |
| Date: | 6/15/21 | Historic GW Elev. (ft) ..... | 30 |

**Figure:** D2.18

**:: Field input data ::**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 19.50 | 0.29 | 0.00 | 23.31 | 109.03 |
| 2 | 0.14 | 30.07 | 0.32 | -0.10 | 18.01 | 110.42 |
| 3 | 0.20 | 42.56 | 0.37 | -0.50 | 13.48 | 112.00 |
| 4 | 0.26 | 51.40 | 0.41 | -0.60 | 10.54 | 113.15 |
| 5 | 0.33 | 60.96 | 0.42 | -0.40 | 7.87 | 114.18 |
| 6 | 0.41 | 81.10 | 0.45 | -0.40 | 5.49 | 115.24 |
| 7 | 0.48 | 101.42 | 0.50 | -0.30 | 4.09 | 116.16 |
| 8 | 0.53 | 104.89 | 0.52 | -0.30 | 3.54 | 116.86 |
| 9 | 0.61 | 106.89 | 0.55 | -0.30 | 3.77 | 117.34 |
| 10 | 0.68 | 102.43 | 0.60 | -0.30 | 4.28 | 117.73 |
| 11 | 0.74 | 97.05 | 0.62 | -0.40 | 5.03 | 117.83 |
| 12 | 0.81 | 89.49 | 0.62 | -0.40 | 5.68 | 117.63 |
| 13 | 0.86 | 84.75 | 0.59 | -0.40 | 6.27 | 117.07 |
| 14 | 0.94 | 77.55 | 0.53 | -0.40 | 6.73 | 116.23 |
| 15 | 1.00 | 70.62 | 0.47 | -0.40 | 7.20 | 115.35 |
| 16 | 1.05 | 66.89 | 0.45 | -0.40 | 7.72 | 114.58 |
| 17 | 1.13 | 61.97 | 0.42 | -0.40 | 8.28 | 113.95 |
| 18 | 1.19 | 57.32 | 0.39 | -0.53 | 9.02 | 113.21 |
| 19 | 1.26 | 51.58 | 0.36 | -0.53 | 9.84 | 112.33 |
| 20 | 1.33 | 46.47 | 0.32 | -0.53 | 10.61 | 111.33 |
| 21 | 1.38 | 43.10 | 0.28 | -0.70 | 11.35 | 110.16 |
| 22 | 1.45 | 38.27 | 0.25 | -0.70 | 12.12 | 108.95 |
| 23 | 1.52 | 34.26 | 0.21 | -0.60 | 13.05 | 107.66 |
| 24 | 1.59 | 30.98 | 0.19 | -0.50 | 13.89 | 106.40 |
| 25 | 1.65 | 28.34 | 0.16 | -0.50 | 14.72 | 105.23 |
| 26 | 1.72 | 25.79 | 0.15 | -0.40 | 15.52 | 104.31 |
| 27 | 1.77 | 24.42 | 0.14 | -0.40 | 16.27 | 103.59 |
| 28 | 1.84 | 23.15 | 0.13 | -0.60 | 16.84 | 103.03 |
| 29 | 1.91 | 22.14 | 0.12 | -0.50 | 17.28 | 102.50 |
| 30 | 1.98 | 21.51 | 0.12 | -0.60 | 17.56 | 101.94 |
| 31 | 2.05 | 20.78 | 0.11 | -0.30 | 5.00 | 101.10 |
| 32 | 2.11 | 20.59 | 0.09 | -0.30 | 5.00 | 99.94 |
| 33 | 2.19 | 20.59 | 0.07 | -0.30 | 5.00 | 99.20 |
| 34 | 2.25 | 20.87 | 0.08 | -0.40 | 5.00 | 99.45 |
| 35 | 2.32 | 21.42 | 0.09 | -0.40 | 5.00 | 100.21 |
| 36 | 2.39 | 22.24 | 0.10 | -0.42 | 5.00 | 100.71 |
| 37 | 2.44 | 20.96 | 0.10 | -0.43 | 5.00 | 101.10 |
| 38 | 2.49 | 22.78 | 0.11 | 0.00 | 5.00 | 101.48 |
| 39 | 2.57 | 22.51 | 0.11 | -0.10 | 16.61 | 101.86 |
| 40 | 2.64 | 22.05 | 0.12 | -0.40 | 17.19 | 101.99 |
| 41 | 2.71 | 21.23 | 0.12 | -0.40 | 17.80 | 101.98 |
| 42 | 2.78 | 20.59 | 0.12 | -0.40 | 18.37 | 101.92 |
| 43 | 2.83 | 20.23 | 0.12 | -0.50 | 18.84 | 101.87 |
| 44 | 2.90 | 19.77 | 0.12 | -0.50 | 19.10 | 101.75 |
| 45 | 2.96 | 19.59 | 0.11 | -0.50 | 19.21 | 101.60 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 46 | 3.03 | 19.59 | 0.11 | -0.50 | 19.10 | 101.40 |
| 47 | 3.09 | 19.59 | 0.11 | -0.50 | 18.98 | 101.26 |
| 48 | 3.16 | 19.59 | 0.11 | -0.60 | 18.86 | 101.11 |
| 49 | 3.23 | 19.59 | 0.10 | -0.60 | 18.69 | 100.95 |
| 50 | 3.29 | 19.68 | 0.10 | -0.60 | 18.46 | 100.76 |
| 51 | 3.36 | 19.77 | 0.10 | -0.60 | 18.14 | 100.60 |
| 52 | 3.42 | 20.14 | 0.10 | -0.70 | 5.00 | 100.51 |
| 53 | 3.49 | 20.41 | 0.10 | -0.70 | 5.00 | 100.46 |
| 54 | 3.55 | 20.96 | 0.09 | -0.70 | 5.00 | 100.41 |
| 55 | 3.62 | 21.42 | 0.09 | -0.70 | 5.00 | 100.40 |
| 56 | 3.68 | 21.32 | 0.09 | -0.70 | 5.00 | 100.42 |
| 57 | 3.74 | 21.14 | 0.09 | -0.70 | 5.00 | 100.44 |
| 58 | 3.81 | 20.78 | 0.10 | -0.60 | 5.00 | 100.41 |
| 59 | 3.87 | 20.50 | 0.09 | -0.50 | 5.00 | 100.33 |
| 60 | 3.94 | 20.41 | 0.09 | -0.50 | 5.00 | 100.09 |
| 61 | 4.00 | 20.23 | 0.09 | -0.50 | 5.00 | 99.54 |
| 62 | 4.07 | 19.77 | 0.08 | -0.50 | 5.00 | 98.95 |
| 63 | 4.15 | 19.41 | 0.07 | -0.50 | 5.00 | 98.34 |
| 64 | 4.22 | 18.77 | 0.07 | -0.50 | 5.00 | 98.01 |
| 65 | 4.27 | 18.50 | 0.07 | -0.50 | 5.00 | 97.59 |
| 66 | 4.35 | 18.04 | 0.06 | -0.45 | 5.00 | 97.30 |
| 67 | 4.41 | 17.50 | 0.06 | -0.45 | 5.00 | 97.13 |
| 68 | 4.46 | 17.50 | 0.06 | -0.45 | 5.00 | 97.00 |
| 69 | 4.53 | 17.50 | 0.06 | -0.40 | 5.00 | 96.68 |
| 70 | 4.61 | 17.59 | 0.06 | -0.40 | 5.00 | 96.29 |
| 71 | 4.69 | 17.59 | 0.05 | -0.40 | 5.00 | 96.02 |
| 72 | 4.74 | 17.68 | 0.05 | -0.40 | 5.00 | 95.97 |
| 73 | 4.82 | 17.77 | 0.05 | -0.40 | 5.00 | 95.99 |
| 74 | 4.87 | 17.86 | 0.05 | -0.30 | 5.00 | 96.05 |
| 75 | 4.95 | 17.95 | 0.06 | -0.20 | 5.00 | 96.18 |
| 76 | 4.99 | 18.04 | 0.06 | -0.20 | 5.00 | 96.36 |
| 77 | 5.07 | 18.23 | 0.06 | -0.15 | 5.00 | 96.53 |
| 78 | 5.13 | 18.04 | 0.06 | 0.00 | 5.00 | 96.73 |
| 79 | 5.21 | 18.04 | 0.06 | -0.10 | 5.00 | 96.87 |
| 80 | 5.27 | 18.04 | 0.06 | 0.00 | 5.00 | 96.98 |
| 81 | 5.32 | 18.04 | 0.06 | -0.10 | 5.00 | 97.14 |
| 82 | 5.38 | 18.32 | 0.07 | 0.00 | 5.00 | 97.31 |
| 83 | 5.46 | 18.68 | 0.07 | -0.10 | 5.00 | 97.47 |
| 84 | 5.53 | 18.95 | 0.07 | -0.10 | 5.00 | 97.51 |
| 85 | 5.59 | 19.05 | 0.07 | -0.10 | 5.00 | 97.53 |
| 86 | 5.67 | 19.14 | 0.07 | -0.10 | 5.00 | 97.61 |
| 87 | 5.71 | 19.23 | 0.07 | -0.10 | 5.00 | 97.95 |
| 88 | 5.81 | 19.59 | 0.07 | -0.10 | 5.00 | 98.40 |
| 89 | 5.84 | 20.14 | 0.08 | -0.10 | 5.00 | 99.00 |
| 90 | 5.91 | 21.14 | 0.08 | -0.10 | 5.00 | 99.66 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 91 | 5.98 | 22.42 | 0.09 | -0.10 | 5.00 | 100.41 |
| 92 | 6.04 | 23.60 | 0.10 | -0.10 | 5.00 | 101.29 |
| 93 | 6.12 | 25.97 | 0.11 | -0.10 | 5.00 | 102.11 |
| 94 | 6.19 | 27.79 | 0.12 | -0.10 | 5.00 | 102.86 |
| 95 | 6.26 | 29.53 | 0.13 | -0.10 | 5.00 | 103.29 |
| 96 | 6.32 | 30.98 | 0.13 | -0.10 | 5.00 | 103.47 |
| 97 | 6.39 | 32.26 | 0.12 | -0.10 | 5.00 | 103.52 |
| 98 | 6.44 | 32.90 | 0.12 | -0.10 | 5.00 | 103.50 |
| 99 | 6.51 | 33.81 | 0.12 | -0.10 | 5.00 | 103.49 |
| 100 | 6.57 | 34.63 | 0.12 | -0.10 | 5.00 | 103.61 |
| 101 | 6.65 | 35.27 | 0.13 | -0.10 | 5.00 | 103.83 |
| 102 | 6.70 | 35.45 | 0.13 | 0.10 | 5.00 | 103.95 |
| 103 | 6.77 | 35.63 | 0.13 | 0.10 | 5.00 | 103.77 |
| 104 | 6.83 | 36.00 | 0.12 | 0.10 | 5.00 | 103.66 |
| 105 | 6.90 | 36.54 | 0.12 | 0.10 | 5.00 | 103.72 |
| 106 | 6.97 | 36.45 | 0.13 | 0.10 | 5.00 | 103.89 |
| 107 | 7.04 | 36.18 | 0.13 | 0.10 | 5.00 | 103.90 |
| 108 | 7.10 | 35.90 | 0.13 | 0.20 | 5.00 | 103.78 |
| 109 | 7.17 | 34.63 | 0.12 | 0.10 | 5.00 | 103.45 |
| 110 | 7.24 | 34.08 | 0.11 | 0.10 | 5.00 | 102.91 |
| 111 | 7.31 | 33.17 | 0.10 | 0.10 | 5.00 | 102.37 |
| 112 | 7.35 | 32.81 | 0.10 | 0.10 | 5.00 | 102.09 |
| 113 | 7.43 | 32.44 | 0.10 | 0.10 | 5.00 | 102.10 |
| 114 | 7.50 | 32.71 | 0.10 | 0.10 | 5.00 | 102.27 |
| 115 | 7.57 | 33.72 | 0.11 | 0.10 | 5.00 | 102.49 |
| 116 | 7.61 | 34.63 | 0.11 | 0.10 | 5.00 | 102.71 |
| 117 | 7.68 | 36.00 | 0.11 | 0.20 | 5.00 | 102.88 |
| 118 | 7.76 | 37.73 | 0.11 | 0.20 | 5.00 | 103.16 |
| 119 | 7.83 | 39.28 | 0.12 | 0.20 | 5.00 | 103.57 |
| 120 | 7.88 | 40.19 | 0.13 | 0.20 | 5.00 | 104.07 |
| 121 | 7.95 | 41.28 | 0.13 | 0.20 | 5.00 | 104.56 |
| 122 | 8.03 | 42.19 | 0.14 | 0.20 | 5.00 | 104.85 |
| 123 | 8.08 | 42.74 | 0.14 | 0.30 | 5.00 | 104.96 |
| 124 | 8.14 | 43.38 | 0.14 | 0.30 | 5.00 | 105.01 |
| 125 | 8.21 | 43.92 | 0.14 | 0.30 | 5.00 | 105.10 |
| 126 | 8.29 | 44.56 | 0.14 | 0.30 | 5.00 | 105.33 |
| 127 | 8.34 | 44.83 | 0.15 | 0.30 | 5.00 | 105.60 |
| 128 | 8.40 | 45.47 | 0.16 | 0.30 | 5.00 | 105.88 |
| 129 | 8.47 | 46.06 | 0.16 | 0.20 | 5.00 | 106.08 |
| 130 | 8.54 | 46.29 | 0.16 | 0.20 | 5.00 | 106.14 |
| 131 | 8.60 | 46.66 | 0.16 | 0.20 | 5.00 | 106.19 |
| 132 | 8.67 | 47.20 | 0.16 | 0.20 | 5.00 | 106.24 |
| 133 | 8.74 | 47.75 | 0.16 | 0.20 | 5.00 | 106.34 |
| 134 | 8.80 | 47.93 | 0.16 | 0.20 | 5.00 | 106.43 |
| 135 | 8.86 | 48.30 | 0.16 | 0.20 | 5.00 | 106.55 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 136 | 8.93 | 48.39 | 0.17 | 0.20 | 5.00 | 106.66 |
| 137 | 9.01 | 48.57 | 0.17 | 0.20 | 5.00 | 106.79 |
| 138 | 9.09 | 48.66 | 0.17 | 0.20 | 5.00 | 106.88 |
| 139 | 9.13 | 48.57 | 0.17 | 0.20 | 5.00 | 106.93 |
| 140 | 9.20 | 48.57 | 0.18 | 0.20 | 5.00 | 107.01 |
| 141 | 9.28 | 48.39 | 0.18 | 0.20 | 5.00 | 107.04 |
| 142 | 9.35 | 48.39 | 0.18 | 0.20 | 5.00 | 107.08 |
| 143 | 9.40 | 48.39 | 0.18 | 0.20 | 5.00 | 107.20 |
| 144 | 9.46 | 48.39 | 0.19 | 0.20 | 5.00 | 107.36 |
| 145 | 9.53 | 48.48 | 0.19 | 0.20 | 5.00 | 107.45 |
| 146 | 9.60 | 48.66 | 0.19 | 0.20 | 5.00 | 107.42 |
| 147 | 9.65 | 48.84 | 0.18 | 0.20 | 5.00 | 107.20 |
| 148 | 9.73 | 49.21 | 0.17 | 0.20 | 5.00 | 106.76 |
| 149 | 9.79 | 49.21 | 0.15 | 0.10 | 5.00 | 106.40 |
| 150 | 9.85 | 49.48 | 0.16 | 0.20 | 5.00 | 106.30 |
| 151 | 9.92 | 49.85 | 0.16 | 0.10 | 5.00 | 106.47 |
| 152 | 9.99 | 50.30 | 0.16 | 0.20 | 5.00 | 106.62 |
| 153 | 10.05 | 50.76 | 0.17 | 0.20 | 5.00 | 106.87 |
| 154 | 10.13 | 50.76 | 0.18 | 0.40 | 5.00 | 107.20 |
| 155 | 10.18 | 51.76 | 0.19 | 0.40 | 5.00 | 107.62 |
| 156 | 10.25 | 52.85 | 0.20 | 0.40 | 5.00 | 108.01 |
| 157 | 10.32 | 54.31 | 0.20 | 0.40 | 5.00 | 108.34 |
| 158 | 10.38 | 55.41 | 0.21 | 0.50 | 5.00 | 108.60 |
| 159 | 10.45 | 57.32 | 0.21 | 0.40 | 5.00 | 108.82 |
| 160 | 10.52 | 59.32 | 0.22 | 0.40 | 5.00 | 109.00 |
| 161 | 10.57 | 60.14 | 0.22 | 0.40 | 5.00 | 109.16 |
| 162 | 10.64 | 61.06 | 0.22 | 0.40 | 5.00 | 109.34 |
| 163 | 10.71 | 61.51 | 0.23 | 0.40 | 5.00 | 109.60 |
| 164 | 10.78 | 62.06 | 0.24 | 0.40 | 5.00 | 109.84 |
| 165 | 10.83 | 62.51 | 0.24 | 0.40 | 5.00 | 110.03 |
| 166 | 10.90 | 62.88 | 0.25 | 0.50 | 5.00 | 110.20 |
| 167 | 10.96 | 63.24 | 0.25 | 0.50 | 5.00 | 110.38 |
| 168 | 11.03 | 63.61 | 0.26 | 0.60 | 5.00 | 110.51 |
| 169 | 11.10 | 63.79 | 0.26 | 0.60 | 5.00 | 110.63 |
| 170 | 11.16 | 63.79 | 0.27 | 0.60 | 5.00 | 110.81 |
| 171 | 11.22 | 63.61 | 0.28 | 0.60 | 5.00 | 111.18 |
| 172 | 11.29 | 63.42 | 0.30 | 0.60 | 5.00 | 111.63 |
| 173 | 11.36 | 63.42 | 0.32 | 0.60 | 8.64 | 112.29 |
| 174 | 11.43 | 61.15 | 0.37 | 0.30 | 9.37 | 113.49 |
| 175 | 11.51 | 64.61 | 0.48 | 0.40 | 10.19 | 114.91 |
| 176 | 11.55 | 66.43 | 0.56 | 0.40 | 10.97 | 116.79 |
| 177 | 11.63 | 70.35 | 0.76 | 0.40 | 11.42 | 118.49 |
| 178 | 11.71 | 77.91 | 0.90 | 0.50 | 11.22 | 119.83 |
| 179 | 11.76 | 85.84 | 0.94 | 0.50 | 10.20 | 120.92 |
| 180 | 11.83 | 101.15 | 1.05 | 0.60 | 9.14 | 122.26 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 181 | 11.90 | 119.19 | 1.32 | 0.60 | 8.39 | 124.01 |
| 182 | 11.95 | 136.14 | 1.62 | 0.60 | 6.98 | 124.90 |
| 183 | 12.02 | 160.29 | 1.35 | 0.60 | 5.48 | 124.54 |
| 184 | 12.08 | 161.66 | 0.98 | 0.50 | 3.45 | 123.73 |
| 185 | 12.15 | 204.31 | 1.05 | 0.50 | 3.62 | 122.97 |
| 186 | 12.22 | 131.04 | 1.07 | 0.50 | 4.95 | 122.81 |
| 187 | 12.28 | 101.15 | 1.05 | 0.60 | 7.83 | 122.04 |
| 188 | 12.34 | 102.25 | 0.99 | 0.60 | 9.87 | 121.58 |
| 189 | 12.41 | 81.38 | 1.04 | 0.60 | 10.68 | 121.20 |
| 190 | 12.47 | 82.01 | 0.96 | 0.60 | 12.13 | 120.73 |
| 191 | 12.54 | 74.82 | 0.91 | 0.60 | 12.20 | 120.06 |
| 192 | 12.60 | 72.26 | 0.82 | 0.50 | 12.56 | 119.34 |
| 193 | 12.67 | 69.17 | 0.75 | 0.50 | 12.98 | 118.26 |
| 194 | 12.76 | 58.41 | 0.63 | 0.50 | 13.32 | 117.38 |
| 195 | 12.80 | 60.14 | 0.61 | 0.50 | 13.73 | 116.59 |
| 196 | 12.88 | 57.77 | 0.59 | 0.60 | 13.43 | 116.12 |
| 197 | 12.95 | 57.50 | 0.52 | 0.50 | 13.14 | 115.42 |
| 198 | 13.01 | 57.14 | 0.47 | 0.50 | 12.78 | 114.82 |
| 199 | 13.07 | 56.32 | 0.47 | 0.50 | 12.75 | 114.47 |
| 200 | 13.13 | 55.22 | 0.46 | 0.50 | 12.86 | 114.24 |
| 201 | 13.19 | 54.40 | 0.43 | 0.60 | 12.85 | 114.04 |
| 202 | 13.27 | 55.09 | 0.43 | 0.60 | 12.92 | 113.93 |
| 203 | 13.33 | 54.04 | 0.44 | 0.50 | 12.96 | 114.01 |
| 204 | 13.41 | 54.95 | 0.44 | 0.50 | 13.42 | 114.02 |
| 205 | 13.45 | 51.40 | 0.44 | 0.50 | 13.27 | 114.11 |
| 206 | 13.52 | 56.32 | 0.45 | 0.50 | 13.09 | 114.20 |
| 207 | 13.60 | 57.59 | 0.45 | 0.60 | 12.49 | 114.35 |
| 208 | 13.66 | 58.60 | 0.45 | 0.50 | 12.23 | 114.38 |
| 209 | 13.74 | 59.51 | 0.45 | 0.60 | 12.08 | 114.38 |
| 210 | 13.80 | 59.51 | 0.45 | 0.60 | 11.98 | 114.32 |
| 211 | 13.85 | 59.42 | 0.44 | 0.60 | 11.98 | 114.26 |
| 212 | 13.93 | 59.23 | 0.44 | 0.60 | 11.99 | 114.20 |
| 213 | 13.99 | 59.32 | 0.44 | 0.60 | 12.04 | 114.19 |
| 214 | 14.04 | 59.05 | 0.44 | 0.70 | 12.04 | 114.16 |
| 215 | 14.13 | 59.14 | 0.44 | 0.80 | 12.13 | 114.18 |
| 216 | 14.19 | 58.96 | 0.44 | 0.70 | 12.52 | 114.47 |
| 217 | 14.26 | 57.87 | 0.49 | 0.70 | 13.30 | 115.09 |
| 218 | 14.31 | 57.14 | 0.56 | 0.70 | 15.03 | 116.44 |
| 219 | 14.39 | 55.22 | 0.76 | 0.70 | 16.84 | 117.83 |
| 220 | 14.44 | 55.41 | 0.88 | 0.40 | 18.40 | 118.90 |
| 221 | 14.52 | 55.13 | 0.92 | 0.40 | 18.76 | 119.24 |
| 222 | 14.59 | 55.95 | 0.87 | 0.40 | 18.76 | 119.40 |
| 223 | 14.65 | 57.14 | 0.93 | 0.50 | 18.90 | 119.83 |
| 224 | 14.71 | 58.41 | 1.07 | 0.70 | 18.60 | 120.58 |
| 225 | 14.78 | 65.79 | 1.12 | 0.90 | 17.34 | 121.04 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 226 | 14.84 | 72.81 | 1.04 | 0.70 | 15.17 | 120.94 |
| 227 | 14.90 | 78.73 | 0.93 | 0.20 | 12.67 | 120.56 |
| 228 | 14.97 | 90.95 | 0.86 | 0.20 | 10.51 | 120.39 |
| 229 | 15.04 | 102.61 | 0.87 | 0.40 | 9.49 | 120.47 |
| 230 | 15.11 | 98.14 | 0.90 | 0.30 | 9.14 | 120.73 |
| 231 | 15.16 | 102.15 | 0.92 | 0.30 | 9.42 | 120.99 |
| 232 | 15.24 | 101.70 | 0.97 | 0.30 | 9.20 | 121.30 |
| 233 | 15.29 | 108.08 | 0.98 | 0.30 | 8.71 | 121.32 |
| 234 | 15.36 | 112.91 | 0.90 | 0.40 | 7.88 | 121.16 |
| 235 | 15.43 | 117.74 | 0.87 | 0.40 | 7.69 | 121.47 |
| 236 | 15.51 | 118.83 | 1.07 | 0.40 | 7.79 | 122.10 |
| 237 | 15.56 | 123.02 | 1.12 | 0.40 | 8.12 | 122.79 |
| 238 | 15.64 | 123.66 | 1.15 | 0.40 | 7.92 | 122.97 |
| 239 | 15.69 | 127.85 | 1.13 | 0.40 | 7.77 | 123.08 |
| 240 | 15.77 | 129.86 | 1.16 | 0.50 | 7.61 | 123.16 |
| 241 | 15.82 | 130.04 | 1.17 | 0.40 | 7.63 | 123.25 |
| 242 | 15.89 | 129.49 | 1.17 | 0.40 | 7.75 | 123.27 |
| 243 | 15.95 | 127.67 | 1.17 | 0.40 | 7.96 | 123.24 |
| 244 | 16.02 | 124.39 | 1.17 | 0.40 | 8.45 | 123.18 |
| 245 | 16.09 | 116.46 | 1.17 | 0.40 | 8.92 | 122.94 |
| 246 | 16.15 | 112.18 | 1.11 | 0.40 | 9.52 | 122.82 |
| 247 | 16.22 | 109.44 | 1.17 | 0.40 | 9.97 | 122.69 |
| 248 | 16.27 | 105.53 | 1.15 | 0.40 | 10.37 | 122.71 |
| 249 | 16.34 | 105.07 | 1.14 | 0.40 | 10.55 | 122.65 |
| 250 | 16.41 | 105.34 | 1.15 | 0.40 | 10.66 | 122.63 |
| 251 | 16.50 | 103.70 | 1.15 | 0.50 | 11.02 | 122.69 |
| 252 | 16.57 | 100.06 | 1.19 | 0.50 | 11.44 | 122.68 |
| 253 | 16.60 | 98.33 | 1.17 | 0.50 | 11.01 | 121.76 |
| 254 | 16.70 | 96.05 | 0.76 | 0.50 | 10.32 | 120.65 |
| 255 | 16.76 | 95.23 | 0.76 | 0.50 | 9.52 | 119.42 |
| 256 | 16.82 | 94.41 | 0.77 | 0.50 | 9.69 | 119.23 |
| 257 | 16.89 | 90.58 | 0.72 | 0.50 | 9.47 | 118.75 |
| 258 | 16.95 | 92.68 | 0.63 | 0.50 | 10.46 | 118.14 |
| 259 | 17.01 | 70.44 | 0.66 | 0.60 | 12.80 | 117.91 |
| 260 | 17.09 | 56.68 | 0.75 | 0.60 | 16.90 | 118.13 |
| 261 | 17.16 | 54.59 | 0.83 | 0.60 | 19.64 | 118.15 |
| 262 | 17.22 | 50.30 | 0.75 | 0.70 | 19.91 | 117.52 |
| 263 | 17.28 | 50.03 | 0.59 | 0.60 | 19.13 | 116.38 |
| 264 | 17.35 | 50.94 | 0.53 | 0.60 | 18.32 | 115.46 |
| 265 | 17.41 | 48.84 | 0.53 | 0.60 | 18.75 | 115.04 |
| 266 | 17.48 | 44.47 | 0.52 | 0.60 | 19.64 | 114.85 |
| 267 | 17.54 | 44.47 | 0.51 | 0.60 | 19.99 | 114.43 |
| 268 | 17.60 | 44.29 | 0.46 | 0.60 | 19.14 | 113.61 |
| 269 | 17.66 | 44.20 | 0.36 | 0.60 | 17.89 | 112.31 |
| 270 | 17.75 | 43.92 | 0.30 | 0.60 | 16.78 | 111.04 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 271 | 17.78 | 43.83 | 0.29 | 0.60 | 16.23 | 110.23 |
| 272 | 17.87 | 43.10 | 0.27 | 0.60 | 16.06 | 109.87 |
| 273 | 17.93 | 43.29 | 0.26 | 0.70 | 15.81 | 109.49 |
| 274 | 18.00 | 43.47 | 0.25 | 0.70 | 15.45 | 109.19 |
| 275 | 18.06 | 44.01 | 0.23 | 0.70 | 15.06 | 108.88 |
| 276 | 18.13 | 44.47 | 0.22 | 0.70 | 14.69 | 108.63 |
| 277 | 18.19 | 44.83 | 0.22 | 0.70 | 5.00 | 108.31 |
| 278 | 18.25 | 45.47 | 0.20 | 0.70 | 5.00 | 107.93 |
| 279 | 18.32 | 46.20 | 0.19 | 0.80 | 5.00 | 107.60 |
| 280 | 18.38 | 47.11 | 0.19 | 0.80 | 5.00 | 107.50 |
| 281 | 18.44 | 47.75 | 0.19 | 0.80 | 5.00 | 107.71 |
| 282 | 18.51 | 48.12 | 0.20 | 0.80 | 5.00 | 107.85 |
| 283 | 18.57 | 47.66 | 0.20 | 0.80 | 5.00 | 107.91 |
| 284 | 18.64 | 46.11 | 0.20 | 0.80 | 5.00 | 107.76 |
| 285 | 18.73 | 46.47 | 0.19 | 0.80 | 5.00 | 107.60 |
| 286 | 18.80 | 46.20 | 0.19 | 0.80 | 5.00 | 107.47 |
| 287 | 18.86 | 45.65 | 0.19 | 0.80 | 5.00 | 107.41 |
| 288 | 18.92 | 44.83 | 0.19 | 0.80 | 5.00 | 107.34 |
| 289 | 18.99 | 44.38 | 0.19 | 0.80 | 5.00 | 107.24 |
| 290 | 19.05 | 44.20 | 0.18 | 0.70 | 5.00 | 107.19 |
| 291 | 19.12 | 44.56 | 0.19 | 0.70 | 5.00 | 107.33 |
| 292 | 19.18 | 45.20 | 0.20 | 0.70 | 5.00 | 107.77 |
| 293 | 19.23 | 45.84 | 0.22 | 0.60 | 5.00 | 108.25 |
| 294 | 19.29 | 46.29 | 0.22 | 0.60 | 5.00 | 108.62 |
| 295 | 19.38 | 46.75 | 0.23 | 0.60 | 5.00 | 108.82 |
| 296 | 19.45 | 47.20 | 0.23 | 0.60 | 14.36 | 109.04 |
| 297 | 19.51 | 48.02 | 0.24 | 0.60 | 14.34 | 109.21 |
| 298 | 19.57 | 48.12 | 0.24 | 0.60 | 14.26 | 109.30 |
| 299 | 19.64 | 48.48 | 0.24 | 0.60 | 14.17 | 109.24 |
| 300 | 19.70 | 48.57 | 0.23 | 0.60 | 5.00 | 109.14 |
| 301 | 19.76 | 49.03 | 0.23 | 0.60 | 14.05 | 109.37 |
| 302 | 19.82 | 49.66 | 0.26 | 0.60 | 14.22 | 109.94 |
| 303 | 19.89 | 50.85 | 0.29 | 0.60 | 14.51 | 110.88 |
| 304 | 19.95 | 52.94 | 0.33 | 0.60 | 14.89 | 111.72 |
| 305 | 20.04 | 52.49 | 0.36 | 0.80 | 14.61 | 112.53 |
| 306 | 20.09 | 59.05 | 0.38 | 0.60 | 14.08 | 113.22 |
| 307 | 20.15 | 62.97 | 0.41 | 0.60 | 13.06 | 113.88 |
| 308 | 20.22 | 67.80 | 0.44 | 0.50 | 12.48 | 114.45 |
| 309 | 20.28 | 70.44 | 0.46 | 0.50 | 12.03 | 114.94 |
| 310 | 20.34 | 73.08 | 0.48 | 0.50 | 11.69 | 115.27 |
| 311 | 20.41 | 75.36 | 0.48 | 0.50 | 11.20 | 115.46 |
| 312 | 20.48 | 79.01 | 0.48 | 0.50 | 10.69 | 115.44 |
| 313 | 20.57 | 80.01 | 0.46 | 0.50 | 10.30 | 115.36 |
| 314 | 20.63 | 80.47 | 0.46 | 0.50 | 10.03 | 115.26 |
| 315 | 20.69 | 82.01 | 0.45 | 0.50 | 9.69 | 115.14 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 316 | 20.75 | 84.20 | 0.43 | 0.50 | 9.35 | 114.96 |
| 317 | 20.81 | 84.20 | 0.42 | 0.60 | 9.21 | 114.80 |
| 318 | 20.87 | 82.65 | 0.42 | 0.50 | 9.40 | 114.61 |
| 319 | 20.96 | 79.28 | 0.41 | 0.60 | 9.96 | 114.57 |
| 320 | 21.02 | 75.73 | 0.43 | 0.50 | 10.85 | 114.65 |
| 321 | 21.08 | 71.26 | 0.46 | 0.60 | 11.81 | 114.67 |
| 322 | 21.15 | 67.53 | 0.44 | 0.60 | 12.49 | 114.45 |
| 323 | 21.21 | 65.98 | 0.41 | 0.60 | 12.79 | 114.03 |
| 324 | 21.27 | 64.43 | 0.40 | 0.60 | 13.07 | 113.77 |
| 325 | 21.33 | 62.51 | 0.40 | 0.50 | 13.56 | 113.67 |
| 326 | 21.40 | 60.42 | 0.40 | 0.60 | 14.12 | 113.56 |
| 327 | 21.46 | 58.41 | 0.40 | 0.50 | 14.62 | 113.49 |
| 328 | 21.53 | 57.77 | 0.40 | 0.60 | 14.92 | 113.42 |
| 329 | 21.59 | 57.41 | 0.40 | 0.60 | 14.69 | 113.00 |
| 330 | 21.66 | 57.36 | 0.33 | 0.50 | 14.41 | 112.60 |
| 331 | 21.75 | 57.36 | 0.34 | 0.50 | 14.31 | 112.43 |
| 332 | 21.81 | 57.32 | 0.37 | 0.50 | 14.46 | 112.82 |
| 333 | 21.87 | 59.32 | 0.39 | 0.40 | 14.48 | 113.29 |
| 334 | 21.93 | 60.96 | 0.41 | 0.40 | 14.20 | 114.18 |
| 335 | 22.01 | 67.34 | 0.50 | 0.60 | 13.95 | 115.47 |
| 336 | 22.07 | 73.63 | 0.60 | 0.60 | 13.65 | 116.79 |
| 337 | 22.13 | 77.37 | 0.66 | 0.60 | 13.31 | 117.29 |
| 338 | 22.20 | 76.91 | 0.60 | 0.60 | 12.95 | 117.23 |
| 339 | 22.25 | 77.46 | 0.57 | 0.60 | 12.76 | 116.87 |
| 340 | 22.31 | 75.91 | 0.57 | 0.60 | 12.65 | 116.79 |
| 341 | 22.40 | 77.55 | 0.58 | 0.70 | 12.60 | 116.92 |
| 342 | 22.47 | 80.01 | 0.60 | 0.70 | 13.16 | 116.99 |
| 343 | 22.53 | 70.17 | 0.60 | 0.80 | 14.33 | 116.93 |
| 344 | 22.59 | 64.06 | 0.60 | 0.70 | 15.76 | 116.72 |
| 345 | 22.65 | 64.06 | 0.59 | 0.70 | 16.25 | 116.52 |
| 346 | 22.72 | 64.06 | 0.57 | 0.70 | 15.63 | 116.05 |
| 347 | 22.78 | 65.52 | 0.48 | 0.70 | 14.91 | 115.52 |
| 348 | 22.84 | 66.07 | 0.47 | 0.70 | 14.29 | 115.11 |
| 349 | 22.90 | 66.61 | 0.48 | 0.80 | 14.05 | 114.91 |
| 350 | 23.00 | 66.25 | 0.44 | 0.80 | 13.85 | 114.53 |
| 351 | 23.06 | 65.07 | 0.40 | 0.90 | 13.71 | 113.95 |
| 352 | 23.10 | 63.15 | 0.39 | 0.90 | 13.81 | 113.42 |
| 353 | 23.17 | 60.87 | 0.36 | 0.90 | 14.09 | 112.91 |
| 354 | 23.24 | 58.60 | 0.34 | 0.90 | 14.38 | 112.40 |
| 355 | 23.30 | 56.77 | 0.33 | 0.90 | 14.94 | 112.11 |
| 356 | 23.39 | 54.04 | 0.34 | 0.70 | 15.37 | 112.03 |
| 357 | 23.45 | 54.77 | 0.34 | 0.70 | 15.72 | 112.08 |
| 358 | 23.51 | 54.59 | 0.34 | 0.70 | 15.78 | 112.19 |
| 359 | 23.58 | 54.49 | 0.35 | 0.70 | 16.00 | 112.39 |
| 360 | 23.64 | 54.68 | 0.37 | 0.70 | 16.25 | 112.73 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 361 | 23.71 | 55.31 | 0.39 | 0.70 | 16.41 | 113.10 |
| 362 | 23.77 | 56.13 | 0.40 | 0.70 | 16.43 | 113.42 |
| 363 | 23.83 | 57.14 | 0.41 | 0.70 | 16.36 | 113.65 |
| 364 | 23.89 | 57.77 | 0.42 | 0.70 | 16.25 | 113.87 |
| 365 | 23.98 | 58.87 | 0.43 | 0.70 | 16.18 | 114.12 |
| 366 | 24.03 | 59.96 | 0.45 | 0.60 | 16.09 | 114.49 |
| 367 | 24.10 | 61.69 | 0.48 | 0.60 | 15.92 | 114.90 |
| 368 | 24.16 | 63.88 | 0.50 | 0.60 | 15.61 | 115.30 |
| 369 | 24.22 | 66.34 | 0.51 | 0.60 | 15.23 | 115.64 |
| 370 | 24.29 | 68.44 | 0.53 | 0.50 | 14.93 | 115.99 |
| 371 | 24.34 | 70.35 | 0.56 | 0.50 | 14.89 | 116.58 |
| 372 | 24.41 | 72.72 | 0.63 | 0.50 | 14.89 | 117.30 |
| 373 | 24.48 | 76.09 | 0.69 | 0.50 | 14.62 | 118.18 |
| 374 | 24.56 | 83.02 | 0.76 | 0.60 | 13.94 | 118.86 |
| 375 | 24.62 | 88.94 | 0.78 | 0.70 | 12.95 | 119.49 |
| 376 | 24.69 | 97.14 | 0.82 | 0.70 | 11.72 | 119.79 |
| 377 | 24.75 | 105.53 | 0.79 | 0.70 | 10.42 | 120.01 |
| 378 | 24.81 | 114.46 | 0.78 | 0.70 | 9.79 | 121.06 |
| 379 | 24.89 | 127.03 | 1.11 | 0.70 | 9.70 | 122.65 |
| 380 | 24.96 | 137.42 | 1.35 | 0.60 | 9.57 | 123.96 |
| 381 | 25.02 | 145.07 | 1.32 | 0.70 | 9.18 | 124.33 |
| 382 | 25.08 | 145.44 | 1.25 | 0.60 | 8.41 | 124.19 |
| 383 | 25.13 | 155.10 | 1.22 | 0.70 | 7.77 | 124.05 |
| 384 | 25.20 | 160.57 | 1.21 | 0.80 | 7.37 | 124.28 |
| 385 | 25.27 | 163.85 | 1.32 | 0.80 | 7.34 | 124.74 |
| 386 | 25.33 | 168.49 | 1.43 | 0.80 | 7.40 | 124.97 |
| 387 | 25.39 | 165.12 | 1.32 | 0.80 | 7.17 | 124.64 |
| 388 | 25.48 | 163.30 | 1.14 | 0.80 | 6.69 | 123.86 |
| 389 | 25.55 | 164.85 | 1.04 | 0.80 | 6.13 | 123.11 |
| 390 | 25.60 | 165.94 | 0.98 | 0.80 | 6.07 | 122.82 |
| 391 | 25.66 | 158.56 | 1.03 | 0.80 | 6.55 | 122.73 |
| 392 | 25.73 | 146.62 | 1.04 | 0.80 | 7.73 | 123.25 |
| 393 | 25.80 | 141.61 | 1.26 | 0.80 | 8.97 | 123.59 |
| 394 | 25.86 | 132.59 | 1.25 | 0.80 | 10.77 | 124.28 |
| 395 | 25.95 | 119.83 | 1.48 | 0.80 | 12.29 | 124.52 |
| 396 | 25.99 | 116.37 | 1.49 | 0.80 | 13.67 | 124.56 |
| 397 | 26.08 | 108.99 | 1.37 | 0.80 | 14.20 | 124.21 |
| 398 | 26.14 | 105.25 | 1.34 | 0.80 | 14.27 | 123.79 |
| 399 | 26.21 | 108.17 | 1.29 | 0.80 | 14.49 | 123.42 |
| 400 | 26.27 | 99.78 | 1.21 | 0.80 | 14.44 | 123.01 |
| 401 | 26.34 | 99.60 | 1.15 | 0.80 | 14.70 | 122.55 |
| 402 | 26.39 | 97.41 | 1.11 | 0.80 | 14.06 | 122.36 |
| 403 | 26.45 | 106.07 | 1.10 | 0.70 | 13.27 | 122.23 |
| 404 | 26.52 | 109.63 | 1.06 | 0.70 | 12.07 | 122.04 |
| 405 | 26.58 | 114.09 | 0.97 | 0.70 | 11.10 | 121.66 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 406 | 26.64 | 117.19 | 0.91 | 0.70 | 10.16 | 121.36 |
| 407 | 26.74 | 122.93 | 0.91 | 0.80 | 9.63 | 121.27 |
| 408 | 26.80 | 124.02 | 0.91 | 0.80 | 9.34 | 121.33 |
| 409 | 26.87 | 124.84 | 0.91 | 0.80 | 9.23 | 121.33 |
| 410 | 26.93 | 125.76 | 0.90 | 0.80 | 9.16 | 121.44 |
| 411 | 26.99 | 128.12 | 0.94 | 0.80 | 9.18 | 121.76 |
| 412 | 27.05 | 130.59 | 1.02 | 0.90 | 9.25 | 122.35 |
| 413 | 27.12 | 136.24 | 1.11 | 0.80 | 9.38 | 123.25 |
| 414 | 27.18 | 143.98 | 1.30 | 0.80 | 9.51 | 124.51 |
| 415 | 27.24 | 155.65 | 1.58 | 0.80 | 9.30 | 125.54 |
| 416 | 27.30 | 167.04 | 1.61 | 0.80 | 9.63 | 126.68 |
| 417 | 27.36 | 165.21 | 1.98 | 0.80 | 9.36 | 126.77 |
| 418 | 27.45 | 166.13 | 1.61 | 0.80 | 9.33 | 126.61 |
| 419 | 27.51 | 164.12 | 1.51 | 0.80 | 8.92 | 125.81 |
| 420 | 27.58 | 156.10 | 1.48 | 0.80 | 9.25 | 125.52 |
| 421 | 27.64 | 149.54 | 1.48 | 0.70 | 9.60 | 125.51 |
| 422 | 27.70 | 154.73 | 1.54 | 0.70 | 10.30 | 125.92 |
| 423 | 27.77 | 148.72 | 1.76 | 0.70 | 10.57 | 126.34 |
| 424 | 27.83 | 153.37 | 1.75 | 0.70 | 10.70 | 126.48 |
| 425 | 27.89 | 155.65 | 1.64 | 0.70 | 9.31 | 125.65 |
| 426 | 28.01 | 164.30 | 1.16 | 0.70 | 8.12 | 124.65 |
| 427 | 28.05 | 163.03 | 1.14 | 0.70 | 7.21 | 123.58 |
| 428 | 28.11 | 157.47 | 1.10 | 0.80 | 7.29 | 123.33 |
| 429 | 28.16 | 155.83 | 1.06 | 0.90 | 7.28 | 123.01 |
| 430 | 28.23 | 155.83 | 1.02 | 0.90 | 7.17 | 122.68 |
| 431 | 28.29 | 153.55 | 0.96 | 0.90 | 7.65 | 121.98 |
| 432 | 28.35 | 126.12 | 0.85 | 0.90 | 7.77 | 121.54 |
| 433 | 28.42 | 143.53 | 0.88 | 0.90 | 7.89 | 121.13 |
| 434 | 28.48 | 142.34 | 0.84 | 0.90 | 7.53 | 121.19 |
| 435 | 28.57 | 137.33 | 0.84 | 0.90 | 7.75 | 121.13 |
| 436 | 28.64 | 136.69 | 0.87 | 0.90 | 8.07 | 121.25 |
| 437 | 28.70 | 136.51 | 0.90 | 0.90 | 8.45 | 121.82 |
| 438 | 28.76 | 139.33 | 1.05 | 0.80 | 9.06 | 122.81 |
| 439 | 28.82 | 142.34 | 1.26 | 0.90 | 9.50 | 123.81 |
| 440 | 28.88 | 147.54 | 1.34 | 0.80 | 9.86 | 124.74 |
| 441 | 28.94 | 151.91 | 1.50 | 0.90 | 9.92 | 125.37 |
| 442 | 29.03 | 156.65 | 1.59 | 0.90 | 9.80 | 125.73 |
| 443 | 29.09 | 159.84 | 1.51 | 0.90 | 10.02 | 126.14 |
| 444 | 29.15 | 156.83 | 1.75 | 1.00 | 11.32 | 127.49 |
| 445 | 29.21 | 159.38 | 2.57 | 0.80 | 12.84 | 128.94 |
| 446 | 29.28 | 162.94 | 2.78 | 0.80 | 14.13 | 129.93 |
| 447 | 29.34 | 155.10 | 2.78 | 0.70 | 14.11 | 130.16 |
| 448 | 29.41 | 166.85 | 2.78 | 0.70 | 13.17 | 130.42 |
| 449 | 29.49 | 192.92 | 2.91 | 0.70 | 12.86 | 130.92 |
| 450 | 29.55 | 179.07 | 3.25 | 0.90 | 13.48 | 131.47 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 451 | 29.61 | 169.04 | 3.47 | 0.70 | 14.43 | 131.72 |
| 452 | 29.67 | 177.70 | 3.33 | 0.60 | 13.95 | 131.53 |
| 453 | 29.73 | 185.35 | 2.96 | 0.80 | 12.63 | 131.05 |
| 454 | 29.80 | 188.00 | 2.74 | 0.80 | 11.64 | 130.55 |
| 455 | 29.86 | 189.09 | 2.67 | 0.80 | 11.44 | 130.23 |
| 456 | 29.93 | 181.07 | 2.63 | 0.80 | 11.41 | 130.04 |
| 457 | 29.99 | 182.89 | 2.55 | 0.80 | 11.40 | 129.69 |
| 458 | 30.07 | 178.97 | 2.36 | 0.70 | 10.49 | 129.33 |
| 459 | 30.12 | 196.74 | 2.20 | 0.60 | 9.21 | 128.78 |
| 460 | 30.19 | 205.77 | 1.95 | 0.60 | 7.93 | 128.26 |
| 461 | 30.25 | 207.95 | 1.82 | 0.60 | 7.18 | 127.62 |
| 462 | 30.33 | 204.31 | 1.67 | 0.60 | 6.70 | 127.00 |
| 463 | 30.40 | 205.04 | 1.51 | 0.60 | 6.29 | 126.37 |
| 464 | 30.46 | 204.85 | 1.41 | 0.70 | 5.94 | 125.88 |
| 465 | 30.52 | 204.03 | 1.38 | 0.70 | 5.91 | 125.61 |
| 466 | 30.59 | 198.02 | 1.37 | 0.70 | 6.11 | 125.43 |
| 467 | 30.65 | 191.00 | 1.34 | 0.70 | 6.62 | 125.28 |
| 468 | 30.73 | 179.43 | 1.35 | 0.70 | 7.35 | 125.15 |
| 469 | 30.78 | 167.77 | 1.37 | 0.70 | 8.31 | 125.14 |
| 470 | 30.84 | 159.38 | 1.42 | 0.70 | 9.23 | 125.11 |
| 471 | 30.91 | 151.91 | 1.41 | 0.70 | 10.20 | 125.22 |
| 472 | 30.99 | 145.17 | 1.51 | 0.70 | 11.07 | 125.39 |
| 473 | 31.05 | 142.80 | 1.57 | 0.70 | 11.85 | 125.71 |
| 474 | 31.11 | 142.16 | 1.65 | 0.70 | 11.88 | 125.83 |
| 475 | 31.20 | 147.63 | 1.58 | 0.70 | 11.33 | 126.07 |
| 476 | 31.26 | 161.39 | 1.66 | 0.70 | 10.39 | 126.77 |
| 477 | 31.31 | 184.17 | 1.98 | 0.70 | 9.45 | 128.00 |
| 478 | 31.38 | 210.78 | 2.29 | 0.70 | 8.23 | 129.17 |
| 479 | 31.46 | 243.95 | 2.38 | 0.80 | 7.62 | 129.71 |
| 480 | 31.52 | 230.01 | 2.33 | 0.80 | 7.29 | 129.99 |
| 481 | 31.57 | 236.93 | 2.47 | 0.60 | 8.02 | 130.44 |
| 482 | 31.64 | 230.46 | 2.88 | 0.70 | 8.86 | 130.94 |
| 483 | 31.69 | 216.06 | 2.93 | 0.70 | 10.43 | 131.26 |
| 484 | 31.79 | 191.55 | 3.03 | 0.70 | 11.85 | 131.55 |
| 485 | 31.85 | 196.11 | 3.42 | 0.70 | 13.21 | 132.07 |
| 486 | 31.91 | 195.20 | 3.73 | 0.70 | 14.03 | 132.54 |
| 487 | 31.97 | 186.45 | 3.74 | 0.70 | 14.14 | 132.80 |
| 488 | 32.03 | 202.48 | 3.77 | 0.70 | 13.79 | 132.82 |
| 489 | 32.09 | 206.13 | 3.70 | 0.70 | 13.07 | 132.71 |
| 490 | 32.18 | 203.12 | 3.47 | 0.70 | 12.79 | 132.41 |
| 491 | 32.23 | 200.30 | 3.34 | 0.70 | 12.68 | 132.21 |
| 492 | 32.30 | 202.30 | 3.44 | 0.70 | 12.93 | 132.19 |
| 493 | 32.36 | 195.56 | 3.49 | 0.70 | 13.34 | 132.25 |
| 494 | 32.42 | 191.28 | 3.47 | 0.60 | 13.41 | 132.07 |
| 495 | 32.48 | 194.69 | 3.24 | 0.60 | 12.84 | 131.55 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 496 | 32.56 | 193.83 | 2.80 | 0.60 | 12.19 | 131.22 |
| 497 | 32.63 | 198.66 | 3.01 | 0.60 | 11.79 | 131.07 |
| 498 | 32.69 | 201.67 | 3.02 | 0.60 | 11.65 | 131.34 |
| 499 | 32.75 | 207.86 | 3.06 | 0.60 | 10.90 | 131.38 |
| 500 | 32.81 | 224.45 | 2.93 | 0.60 | 10.53 | 131.18 |
| 501 | 32.90 | 207.31 | 2.75 | 0.60 | 10.25 | 130.81 |
| 502 | 32.94 | 204.13 | 2.64 | 0.60 | 10.30 | 130.31 |
| 503 | 33.02 | 204.85 | 2.47 | 0.70 | 10.09 | 129.85 |
| 504 | 33.09 | 198.57 | 2.31 | 0.60 | 9.79 | 129.29 |
| 505 | 33.15 | 195.29 | 2.13 | 0.60 | 9.57 | 128.77 |
| 506 | 33.21 | 195.10 | 2.03 | 0.60 | 9.23 | 128.47 |
| 507 | 33.27 | 200.57 | 2.04 | 0.60 | 8.71 | 128.46 |
| 508 | 33.36 | 213.42 | 2.05 | 0.60 | 8.20 | 128.85 |
| 509 | 33.43 | 228.27 | 2.25 | 0.60 | 8.00 | 129.79 |
| 510 | 33.48 | 244.59 | 2.76 | 0.60 | 8.62 | 131.52 |
| 511 | 33.54 | 258.35 | 3.75 | 0.70 | 9.22 | 132.97 |
| 512 | 33.60 | 267.00 | 3.98 | 0.70 | 8.57 | 132.93 |
| 513 | 33.69 | 272.93 | 2.59 | 0.70 | 7.75 | 132.23 |
| 514 | 33.75 | 264.54 | 2.78 | 0.70 | 7.14 | 131.50 |
| 515 | 33.81 | 264.00 | 3.11 | 0.70 | 7.41 | 131.91 |
| 516 | 33.88 | 279.12 | 3.05 | 0.60 | 7.44 | 132.24 |
| 517 | 33.93 | 279.21 | 3.14 | 0.60 | 7.31 | 132.73 |
| 518 | 34.00 | 295.80 | 3.62 | 0.60 | 10.64 | 133.25 |
| 519 | 34.06 | 153.19 | 4.35 | 0.60 | 13.61 | 134.13 |
| 520 | 34.12 | 215.06 | 4.96 | 0.60 | 18.26 | 134.65 |
| 521 | 34.20 | 194.74 | 5.35 | 0.60 | 16.98 | 135.22 |
| 522 | 34.26 | 204.58 | 5.09 | 0.60 | 15.45 | 134.96 |
| 523 | 34.33 | 245.77 | 4.19 | 0.50 | 12.86 | 134.05 |
| 524 | 34.38 | 236.02 | 3.37 | 0.60 | 12.18 | 132.76 |
| 525 | 34.45 | 174.78 | 3.21 | 0.50 | 14.54 | 132.04 |
| 526 | 34.52 | 152.91 | 3.68 | 0.60 | 18.57 | 131.72 |
| 527 | 34.60 | 141.16 | 3.56 | 0.40 | 20.35 | 131.39 |
| 528 | 34.65 | 136.51 | 3.03 | 0.40 | 19.58 | 129.98 |
| 529 | 34.73 | 130.77 | 2.03 | 0.40 | 18.39 | 128.30 |
| 530 | 34.78 | 121.84 | 1.91 | 0.50 | 19.08 | 127.29 |
| 531 | 34.85 | 105.98 | 2.30 | 0.60 | 21.60 | 127.29 |
| 532 | 34.91 | 99.33 | 2.22 | 0.60 | 24.50 | 127.61 |
| 533 | 34.97 | 96.78 | 2.38 | 0.60 | 25.25 | 127.42 |
| 534 | 35.04 | 95.87 | 2.20 | 0.50 | 25.69 | 127.03 |
| 535 | 35.12 | 89.40 | 1.94 | 0.10 | 25.98 | 126.43 |
| 536 | 35.18 | 85.48 | 1.95 | 0.10 | 26.54 | 125.92 |
| 537 | 35.25 | 84.11 | 1.87 | 0.10 | 26.83 | 125.62 |
| 538 | 35.30 | 83.20 | 1.76 | 0.10 | 26.48 | 125.07 |
| 539 | 35.37 | 81.10 | 1.58 | 0.10 | 26.11 | 124.35 |
| 540 | 35.43 | 77.73 | 1.41 | 0.10 | 26.06 | 123.81 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 541 | 35.52 | 77.09 | 1.46 | 0.10 | 25.84 | 123.55 |
| 542 | 35.58 | 79.83 | 1.43 | 0.10 | 24.49 | 123.54 |
| 543 | 35.64 | 88.21 | 1.35 | 0.10 | 21.97 | 123.51 |
| 544 | 35.70 | 98.78 | 1.33 | 0.10 | 18.96 | 123.60 |
| 545 | 35.77 | 112.63 | 1.32 | 0.10 | 16.63 | 123.84 |
| 546 | 35.83 | 121.56 | 1.33 | 0.10 | 14.48 | 124.30 |
| 547 | 35.89 | 140.06 | 1.43 | 0.10 | 12.79 | 124.90 |
| 548 | 35.97 | 156.01 | 1.51 | 0.10 | 11.83 | 125.52 |
| 549 | 36.04 | 156.65 | 1.59 | 0.10 | 11.77 | 125.90 |
| 550 | 36.12 | 150.82 | 1.63 | 0.10 | 12.24 | 126.19 |
| 551 | 36.16 | 152.64 | 1.71 | 0.10 | 12.73 | 126.53 |
| 552 | 36.23 | 154.55 | 1.84 | 0.10 | 12.64 | 126.97 |
| 553 | 36.31 | 163.94 | 1.90 | 0.10 | 12.30 | 127.24 |
| 554 | 36.35 | 168.04 | 1.86 | 0.10 | 11.87 | 127.29 |
| 555 | 36.44 | 166.58 | 1.83 | 0.10 | 11.52 | 127.20 |
| 556 | 36.49 | 170.77 | 1.80 | 0.10 | 11.27 | 127.13 |
| 557 | 36.57 | 172.69 | 1.79 | 0.10 | 10.88 | 127.03 |
| 558 | 36.62 | 174.69 | 1.73 | 0.10 | 10.37 | 126.86 |
| 559 | 36.70 | 180.07 | 1.64 | 0.10 | 9.72 | 126.62 |
| 560 | 36.76 | 184.99 | 1.58 | 0.20 | 9.10 | 126.37 |
| 561 | 36.81 | 186.90 | 1.54 | 0.20 | 8.87 | 126.25 |
| 562 | 36.89 | 183.99 | 1.55 | 0.20 | 8.83 | 126.00 |
| 563 | 36.96 | 179.79 | 1.45 | 0.20 | 8.86 | 125.59 |
| 564 | 37.01 | 174.42 | 1.32 | 0.20 | 9.13 | 125.13 |
| 565 | 37.08 | 163.94 | 1.35 | 0.20 | 10.00 | 125.08 |
| 566 | 37.15 | 154.28 | 1.49 | 0.20 | 11.41 | 125.53 |
| 567 | 37.22 | 150.45 | 1.65 | 0.20 | 13.39 | 126.08 |
| 568 | 37.29 | 133.96 | 1.80 | 0.20 | 15.29 | 126.57 |
| 569 | 37.34 | 129.67 | 1.93 | 0.20 | 17.07 | 127.01 |
| 570 | 37.41 | 130.40 | 2.08 | 0.30 | 18.25 | 127.31 |
| 571 | 37.48 | 122.29 | 2.10 | 0.20 | 19.34 | 127.60 |
| 572 | 37.54 | 120.38 | 2.24 | 0.20 | 20.65 | 127.85 |
| 573 | 37.62 | 118.19 | 2.38 | 0.10 | 21.90 | 128.07 |
| 574 | 37.67 | 111.18 | 2.38 | 0.10 | 22.95 | 128.10 |
| 575 | 37.74 | 108.81 | 2.35 | 0.10 | 24.11 | 128.36 |
| 576 | 37.82 | 110.45 | 2.69 | 0.10 | 24.56 | 128.87 |
| 577 | 37.88 | 116.10 | 2.87 | 0.10 | 24.07 | 129.38 |
| 578 | 37.95 | 124.30 | 2.79 | 0.10 | 22.68 | 129.54 |
| 579 | 38.00 | 130.59 | 2.72 | 0.10 | 20.76 | 129.66 |
| 580 | 38.07 | 144.80 | 2.81 | 0.10 | 19.10 | 130.03 |
| 581 | 38.14 | 158.47 | 2.98 | 0.10 | 17.11 | 130.48 |
| 582 | 38.20 | 177.88 | 2.96 | 0.10 | 14.35 | 130.86 |
| 583 | 38.26 | 215.88 | 2.85 | 0.10 | 11.97 | 130.89 |
| 584 | 38.33 | 224.54 | 2.69 | 0.10 | 10.47 | 130.92 |
| 585 | 38.40 | 227.91 | 2.77 | 0.10 | 10.17 | 131.10 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 586 | 38.45 | 234.02 | 2.99 | 0.10 | 10.39 | 131.74 |
| 587 | 38.52 | 242.58 | 3.38 | 0.20 | 10.55 | 132.50 |
| 588 | 38.60 | 254.34 | 3.65 | 0.20 | 10.93 | 133.30 |
| 589 | 38.65 | 254.43 | 4.03 | 0.20 | 11.59 | 133.90 |
| 590 | 38.72 | 245.32 | 4.33 | 0.30 | 12.56 | 134.27 |
| 591 | 38.79 | 236.11 | 4.37 | 0.20 | 13.64 | 134.42 |
| 592 | 38.87 | 225.36 | 4.47 | 0.30 | 14.72 | 134.39 |
| 593 | 38.94 | 211.78 | 4.49 | 0.20 | 15.50 | 134.33 |
| 594 | 38.98 | 211.96 | 4.42 | 0.30 | 15.75 | 134.15 |
| 595 | 39.06 | 212.14 | 4.24 | 0.20 | 15.01 | 133.89 |
| 596 | 39.13 | 222.35 | 3.96 | 0.20 | 13.60 | 133.52 |
| 597 | 39.20 | 238.94 | 3.63 | 0.20 | 11.77 | 133.12 |
| 598 | 39.26 | 256.16 | 3.38 | 0.20 | 10.01 | 132.73 |
| 599 | 39.33 | 272.02 | 3.16 | 0.20 | 8.72 | 132.45 |
| 600 | 39.39 | 282.59 | 3.07 | 0.20 | 7.63 | 132.29 |
| 601 | 39.48 | 302.54 | 3.00 | 0.20 | 7.03 | 132.34 |
| 602 | 39.50 | 308.28 | 3.10 | 0.20 | 6.83 | 132.77 |
| 603 | 39.57 | 316.67 | 3.49 | 0.20 | 6.79 | 133.16 |
| 604 | 39.64 | 326.69 | 3.44 | 0.30 | 6.12 | 133.02 |
| 605 | 39.71 | 343.73 | 2.79 | 0.30 | 5.02 | 132.19 |
| 606 | 39.77 | 346.01 | 2.37 | 0.20 | 4.13 | 131.42 |
| 607 | 39.84 | 350.84 | 2.52 | 0.20 | 4.00 | 131.34 |
| 608 | 39.91 | 350.57 | 2.69 | 0.20 | 4.46 | 131.73 |
| 609 | 39.97 | 332.07 | 2.83 | 0.20 | 5.34 | 131.81 |
| 610 | 40.03 | 290.97 | 2.77 | 0.20 | 7.70 | 131.40 |
| 611 | 40.10 | 192.73 | 2.71 | 0.20 | 8.79 | 130.82 |
| 612 | 40.18 | 257.34 | 2.44 | 0.20 | 9.19 | 130.18 |
| 613 | 40.23 | 249.42 | 2.25 | 0.30 | 7.76 | 129.86 |
| 614 | 40.30 | 240.12 | 2.25 | 0.30 | 8.25 | 129.50 |
| 615 | 40.38 | 222.08 | 2.22 | 0.20 | 9.05 | 129.32 |
| 616 | 40.42 | 210.96 | 2.20 | 0.20 | 10.07 | 129.10 |
| 617 | 40.50 | 196.84 | 2.20 | 0.20 | 11.04 | 128.94 |
| 618 | 40.57 | 186.08 | 2.20 | 0.20 | 12.08 | 128.85 |
| 619 | 40.62 | 178.97 | 2.25 | 0.20 | 13.35 | 129.29 |
| 620 | 40.70 | 177.52 | 2.69 | 0.30 | 14.56 | 130.05 |
| 621 | 40.75 | 180.52 | 3.01 | 0.20 | 15.80 | 131.07 |
| 622 | 40.82 | 181.80 | 3.42 | 0.20 | 16.63 | 131.90 |
| 623 | 40.89 | 185.44 | 3.74 | 0.20 | 16.68 | 132.38 |
| 624 | 40.96 | 195.20 | 3.61 | 0.20 | 15.74 | 132.44 |
| 625 | 41.01 | 206.40 | 3.35 | 0.20 | 13.76 | 132.29 |
| 626 | 41.08 | 232.10 | 3.25 | 0.20 | 11.14 | 132.35 |
| 627 | 41.15 | 281.86 | 3.26 | 0.20 | 9.32 | 132.55 |
| 628 | 41.22 | 288.14 | 3.26 | 0.20 | 8.16 | 132.73 |
| 629 | 41.28 | 295.62 | 3.25 | 0.20 | 7.89 | 132.75 |
| 630 | 41.36 | 297.44 | 3.23 | 0.20 | 7.71 | 132.75 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 631 | 41.41 | 298.81 | 3.23 | 0.20 | 7.63 | 132.74 |
| 632 | 41.49 | 299.26 | 3.21 | 0.10 | 7.72 | 132.78 |
| 633 | 41.54 | 295.44 | 3.29 | 0.20 | 7.98 | 132.84 |
| 634 | 41.61 | 288.42 | 3.35 | 0.10 | 8.33 | 132.92 |
| 635 | 41.67 | 286.32 | 3.37 | 0.20 | 8.72 | 133.00 |
| 636 | 41.75 | 280.58 | 3.46 | 0.10 | 9.07 | 133.16 |
| 637 | 41.81 | 280.22 | 3.61 | 0.10 | 9.46 | 133.36 |
| 638 | 41.87 | 278.94 | 3.70 | 0.10 | 9.89 | 133.50 |
| 639 | 41.94 | 268.55 | 3.72 | 0.10 | 10.27 | 133.53 |
| 640 | 42.01 | 265.36 | 3.72 | 0.10 | 10.57 | 133.49 |
| 641 | 42.06 | 265.36 | 3.71 | 0.10 | 10.61 | 133.46 |
| 642 | 42.15 | 265.82 | 3.68 | 0.10 | 10.58 | 133.37 |
| 643 | 42.20 | 263.36 | 3.59 | 0.10 | 10.48 | 133.27 |
| 644 | 42.26 | 264.73 | 3.55 | 0.00 | 10.62 | 133.20 |
| 645 | 42.32 | 257.53 | 3.62 | 0.00 | 10.87 | 133.19 |
| 646 | 42.40 | 253.70 | 3.62 | 0.00 | 11.59 | 133.49 |
| 647 | 42.46 | 250.87 | 4.06 | 0.00 | 11.92 | 133.53 |
| 648 | 42.53 | 247.68 | 3.74 | 0.00 | 11.67 | 133.19 |
| 649 | 42.59 | 248.50 | 3.14 | 0.00 | 12.54 | 134.01 |
| 650 | 42.68 | 256.34 | 5.33 | -0.10 | 13.96 | 135.18 |
| 651 | 42.73 | 252.15 | 5.82 | 0.20 | 15.36 | 136.59 |
| 652 | 42.78 | 268.73 | 6.03 | 0.20 | 15.21 | 136.87 |
| 653 | 42.86 | 275.07 | 5.84 | 0.08 | 14.45 | 136.92 |
| 654 | 42.92 | 281.40 | 5.72 | 0.20 | 14.64 | 136.71 |
| 655 | 42.99 | 252.42 | 5.66 | 0.10 | 14.74 | 136.76 |
| 656 | 43.06 | 274.57 | 5.96 | 0.20 | 14.06 | 136.69 |
| 657 | 43.12 | 302.45 | 5.41 | 0.10 | 12.13 | 136.28 |
| 658 | 43.18 | 306.64 | 4.39 | 0.00 | 10.15 | 135.37 |
| 659 | 43.25 | 313.84 | 3.91 | 0.10 | 9.02 | 134.72 |
| 660 | 43.32 | 323.87 | 4.16 | 0.00 | 8.29 | 134.76 |
| 661 | 43.38 | 349.02 | 4.28 | 0.10 | 8.37 | 135.03 |
| 662 | 43.44 | 325.69 | 4.32 | 0.00 | 8.98 | 134.95 |
| 663 | 43.51 | 286.14 | 4.19 | 0.10 | 10.88 | 134.68 |
| 664 | 43.59 | 244.22 | 4.31 | 0.00 | 12.91 | 134.36 |
| 665 | 43.64 | 232.10 | 4.25 | 0.00 | 14.57 | 134.09 |
| 666 | 43.71 | 221.08 | 4.10 | 0.00 | 15.10 | 133.60 |
| 667 | 43.78 | 209.78 | 3.68 | 0.00 | 15.46 | 132.83 |
| 668 | 43.85 | 194.01 | 3.27 | 0.00 | 16.12 | 132.04 |
| 669 | 43.90 | 177.97 | 3.21 | -0.10 | 17.18 | 131.48 |
| 670 | 43.98 | 168.59 | 3.16 | -0.10 | 18.30 | 131.23 |
| 671 | 44.03 | 164.39 | 3.11 | -0.10 | 18.93 | 131.05 |
| 672 | 44.10 | 161.48 | 3.09 | -0.10 | 19.51 | 130.84 |
| 673 | 44.18 | 152.64 | 2.99 | -0.10 | 19.90 | 130.60 |
| 674 | 44.23 | 151.82 | 2.90 | -0.10 | 20.51 | 130.62 |
| 675 | 44.30 | 152.36 | 3.17 | -0.10 | 20.80 | 130.86 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 676 | 44.37 | 154.73 | 3.29 | -0.10 | 20.59 | 131.18 |
| 677 | 44.44 | 163.76 | 3.22 | -0.10 | 20.30 | 131.28 |
| 678 | 44.50 | 160.02 | 3.25 | -0.13 | 19.73 | 131.66 |
| 679 | 44.58 | 175.69 | 3.67 | -0.13 | 19.67 | 132.10 |
| 680 | 44.64 | 177.88 | 3.75 | -0.13 | 19.16 | 132.54 |
| 681 | 44.70 | 183.17 | 3.75 | -0.12 | 18.44 | 132.62 |
| 682 | 44.75 | 193.37 | 3.68 | -0.20 | 18.15 | 132.47 |
| 683 | 44.84 | 179.25 | 3.51 | -0.10 | 18.75 | 132.21 |
| 684 | 44.90 | 163.03 | 3.49 | -0.20 | 20.31 | 131.94 |
| 685 | 44.95 | 156.83 | 3.54 | -0.20 | 21.40 | 131.78 |
| 686 | 45.03 | 156.56 | 3.44 | -0.20 | 21.59 | 131.61 |
| 687 | 45.09 | 155.87 | 3.30 | -0.23 | 21.17 | 131.27 |
| 688 | 45.15 | 154.92 | 3.09 | -0.22 | 20.48 | 131.11 |
| 689 | 45.23 | 163.94 | 3.18 | -0.22 | 19.91 | 131.31 |
| 690 | 45.30 | 171.23 | 3.45 | -0.20 | 19.50 | 131.84 |
| 691 | 45.36 | 177.79 | 3.67 | -0.30 | 19.05 | 132.38 |
| 692 | 45.43 | 188.91 | 3.80 | -0.30 | 18.62 | 132.73 |
| 693 | 45.49 | 191.37 | 3.85 | -0.30 | 18.38 | 132.90 |
| 694 | 45.56 | 188.72 | 3.86 | -0.30 | 18.26 | 132.91 |
| 695 | 45.61 | 191.91 | 3.79 | -0.30 | 18.32 | 132.72 |
| 696 | 45.69 | 184.35 | 3.61 | -0.30 | 18.15 | 132.48 |
| 697 | 45.74 | 185.08 | 3.52 | -0.30 | 17.98 | 132.12 |
| 698 | 45.82 | 184.17 | 3.30 | -0.20 | 17.63 | 131.86 |
| 699 | 45.88 | 183.99 | 3.25 | -0.20 | 17.46 | 131.61 |
| 700 | 45.94 | 181.53 | 3.22 | -0.30 | 17.53 | 131.60 |
| 701 | 46.00 | 182.44 | 3.29 | -0.30 | 17.39 | 131.62 |
| 702 | 46.09 | 187.90 | 3.25 | -0.10 | 17.37 | 131.87 |
| 703 | 46.14 | 190.46 | 3.50 | -0.30 | 17.59 | 132.35 |
| 704 | 46.20 | 193.19 | 3.90 | -0.20 | 18.71 | 133.51 |
| 705 | 46.26 | 202.76 | 4.99 | -0.20 | 19.02 | 134.70 |
| 706 | 46.35 | 225.72 | 5.40 | -0.23 | 24.41 | 135.04 |
| 707 | 46.40 | 100.51 | 5.40 | -0.27 | 21.93 | 135.16 |
| 708 | 46.46 | 251.51 | 4.78 | -0.27 | 17.95 | 134.80 |
| 709 | 46.55 | 299.99 | 4.08 | -0.30 | 10.97 | 135.51 |
| 710 | 46.60 | 367.43 | 5.15 | -0.29 | 9.84 | 136.75 |
| 711 | 46.68 | 382.28 | 6.65 | -0.29 | 10.45 | 137.28 |
| 712 | 46.74 | 363.42 | 7.18 | -0.29 | 11.62 | 137.28 |
| 713 | 46.80 | 358.31 | 7.37 | -0.29 | 13.37 | 137.28 |
| 714 | 46.85 | 301.45 | 7.43 | -0.24 | 15.51 | 137.28 |
| 715 | 46.92 | 261.72 | 7.31 | -0.20 | 19.84 | 137.28 |
| 716 | 46.99 | 184.26 | 6.78 | -0.10 | 23.12 | 137.28 |
| 717 | 47.05 | 192.83 | 6.36 | -0.20 | 25.77 | 136.49 |
| 718 | 47.12 | 179.98 | 5.79 | -0.30 | 25.08 | 135.77 |
| 719 | 47.18 | 172.69 | 5.13 | -0.50 | 24.82 | 134.76 |
| 720 | 47.26 | 165.49 | 4.38 | -0.30 | 23.77 | 133.47 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|
| 721 | 47.33 | 159.20 | 3.50 | -0.40 | 21.99 | 131.82 |
| 722 | 47.38 | 155.65 | 2.63 | -0.30 | 20.44 | 130.19 |
| 723 | 47.45 | 147.99 | 2.38 | -0.30 | 19.30 | 128.82 |
| 724 | 47.52 | 143.98 | 2.12 | -0.30 | 19.20 | 128.00 |
| 725 | 47.58 | 138.42 | 1.96 | -0.28 | 18.78 | 127.11 |
| 726 | 47.66 | 134.91 | 1.70 | -0.28 | 18.74 | 126.20 |
| 727 | 47.71 | 125.85 | 1.52 | -0.28 | 18.34 | 125.20 |
| 728 | 47.77 | 124.66 | 1.35 | -0.20 | 17.82 | 124.36 |
| 729 | 47.85 | 126.67 | 1.24 | -0.20 | 16.87 | 123.86 |
| 730 | 47.91 | 130.86 | 1.23 | -0.30 | 15.98 | 123.83 |
| 731 | 47.97 | 138.15 | 1.29 | -0.20 | 14.96 | 124.12 |
| 732 | 48.04 | 149.90 | 1.32 | -0.30 | 13.67 | 124.58 |
| 733 | 48.11 | 165.21 | 1.38 | -0.20 | 12.44 | 125.43 |
| 734 | 48.18 | 184.99 | 1.63 | -0.20 | 12.27 | 127.36 |
| 735 | 48.25 | 205.95 | 2.43 | -0.20 | 13.03 | 129.94 |
| 736 | 48.31 | 225.45 | 3.42 | -0.20 | 13.60 | 131.85 |
| 737 | 48.38 | 236.38 | 3.60 | -0.20 | 13.08 | 132.49 |
| 738 | 48.44 | 247.23 | 3.09 | -0.20 | 12.23 | 132.37 |
| 739 | 48.50 | 248.87 | 3.14 | -0.20 | 11.19 | 131.96 |
| 740 | 48.58 | 256.61 | 2.98 | -0.20 | 10.44 | 132.00 |
| 741 | 48.63 | 277.76 | 3.02 | -0.20 | 9.83 | 132.79 |
| 742 | 48.71 | 311.11 | 3.94 | -0.20 | 10.58 | 133.71 |
| 743 | 48.76 | 269.65 | 4.26 | -0.20 | 12.18 | 134.65 |
| 744 | 48.82 | 258.62 | 4.64 | -0.22 | 14.43 | 134.94 |
| 745 | 48.89 | 244.86 | 4.84 | -0.22 | 15.88 | 135.17 |
| 746 | 48.96 | 235.20 | 4.91 | 0.00 | 16.94 | 135.02 |
| 747 | 49.02 | 222.35 | 4.58 | -0.10 | 17.82 | 134.46 |
| 748 | 49.08 | 200.30 | 4.07 | -0.10 | 18.50 | 133.54 |
| 749 | 49.17 | 185.81 | 3.62 | -0.10 | 18.88 | 132.25 |
| 750 | 49.23 | 172.14 | 2.91 | -0.10 | 18.77 | 130.80 |
| 751 | 49.29 | 159.47 | 2.39 | -0.10 | 18.52 | 129.21 |
| 752 | 49.35 | 147.72 | 2.07 | -0.20 | 18.76 | 128.03 |
| 753 | 49.42 | 139.24 | 1.95 | 0.00 | 19.28 | 127.44 |
| 754 | 49.48 | 138.24 | 1.99 | -0.30 | 20.01 | 127.16 |
| 755 | 49.55 | 131.22 | 1.92 | -0.30 | 21.06 | 127.34 |
| 756 | 49.62 | 128.58 | 2.15 | -0.30 | 21.84 | 127.59 |
| 757 | 49.69 | 133.23 | 2.22 | -0.30 | 17.46 | 124.98 |
| 758 | 49.75 | 140.79 | 0.00 | -0.40 | 10.91 | 120.18 |
| 759 | 49.82 | 155.65 | 0.00 | -0.40 | 100.00 | 87.36 |
| 760 | 49.87 | 167.22 | 0.00 | -0.40 | 100.00 | 87.36 |
| 761 | 49.94 | 180.80 | 0.00 | -0.40 | 100.00 | 87.36 |
| 762 | 50.00 | 193.55 | 0.00 | -0.50 | 100.00 | 87.36 |
| 763 | 50.07 | 205.49 | 0.00 | -0.50 | 100.00 | 87.36 |

**:: Field input data :: (continued)**

| Point ID | Depth (ft) | $q_c$ (tsf) | $f_s$ (tsf) | u (tsf) | Fines content (%) | Unit weight (pcf) |
|---|---|---|---|---|---|---|

**Abbreviations**

| | |
|---|---|
| Depth: | Depth from free surface, at which CPT was performed (ft) |
| $q_c$: | Measured cone resistance (tsf) |
| $f_s$: | Sleeve friction resistance (tsf) |
| u: | Pore pressure (tsf) |
| Fines content: | Percentage of fines in soil (%) |
| Unit weight: | Bulk soil unit weight (pcf) |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.00 | 0.00 | 0.00 | 1.00 | 0.649 | 1.18 | 0.551 | 1.00 | 1.30 | 2.000 | No |
| 2 | 0.14 | 0.01 | 0.00 | 0.01 | 1.00 | 0.649 | 1.18 | 0.551 | 1.00 | 1.30 | 2.000 | No |
| 3 | 0.20 | 0.01 | 0.00 | 0.01 | 1.00 | 0.648 | 1.18 | 0.550 | 1.00 | 1.30 | 2.000 | No |
| 4 | 0.26 | 0.01 | 0.00 | 0.01 | 1.00 | 0.648 | 1.18 | 0.550 | 1.00 | 1.30 | 2.000 | No |
| 5 | 0.33 | 0.02 | 0.00 | 0.02 | 1.00 | 0.647 | 1.18 | 0.550 | 1.00 | 1.30 | 2.000 | No |
| 6 | 0.41 | 0.02 | 0.00 | 0.02 | 0.99 | 0.647 | 1.18 | 0.549 | 1.00 | 1.30 | 2.000 | No |
| 7 | 0.48 | 0.03 | 0.00 | 0.03 | 0.99 | 0.646 | 1.18 | 0.548 | 1.00 | 1.30 | 2.000 | No |
| 8 | 0.53 | 0.03 | 0.00 | 0.03 | 0.99 | 0.645 | 1.18 | 0.548 | 1.00 | 1.30 | 2.000 | No |
| 9 | 0.61 | 0.03 | 0.00 | 0.03 | 0.99 | 0.645 | 1.18 | 0.547 | 1.00 | 1.30 | 2.000 | No |
| 10 | 0.68 | 0.04 | 0.00 | 0.04 | 0.99 | 0.644 | 1.18 | 0.547 | 1.00 | 1.30 | 2.000 | No |
| 11 | 0.74 | 0.04 | 0.00 | 0.04 | 0.99 | 0.644 | 1.18 | 0.547 | 1.00 | 1.30 | 2.000 | No |
| 12 | 0.81 | 0.05 | 0.00 | 0.05 | 0.99 | 0.643 | 1.18 | 0.546 | 1.00 | 1.30 | 2.000 | No |
| 13 | 0.86 | 0.05 | 0.00 | 0.05 | 0.99 | 0.643 | 1.18 | 0.546 | 1.00 | 1.30 | 2.000 | No |
| 14 | 0.94 | 0.05 | 0.00 | 0.05 | 0.99 | 0.642 | 1.18 | 0.545 | 1.00 | 1.30 | 2.000 | No |
| 15 | 1.00 | 0.06 | 0.00 | 0.06 | 0.99 | 0.641 | 1.18 | 0.545 | 1.00 | 1.30 | 2.000 | No |
| 16 | 1.05 | 0.06 | 0.00 | 0.06 | 0.99 | 0.641 | 1.18 | 0.544 | 1.00 | 1.30 | 2.000 | No |
| 17 | 1.13 | 0.06 | 0.00 | 0.06 | 0.98 | 0.640 | 1.18 | 0.544 | 1.00 | 1.30 | 2.000 | No |
| 18 | 1.19 | 0.07 | 0.00 | 0.07 | 0.98 | 0.640 | 1.18 | 0.543 | 1.00 | 1.30 | 2.000 | No |
| 19 | 1.26 | 0.07 | 0.00 | 0.07 | 0.98 | 0.639 | 1.18 | 0.543 | 1.00 | 1.30 | 2.000 | No |
| 20 | 1.33 | 0.08 | 0.00 | 0.08 | 0.98 | 0.638 | 1.18 | 0.542 | 1.00 | 1.30 | 2.000 | No |
| 21 | 1.38 | 0.08 | 0.00 | 0.08 | 0.98 | 0.638 | 1.18 | 0.542 | 1.00 | 1.30 | 2.000 | No |
| 22 | 1.45 | 0.08 | 0.00 | 0.08 | 0.98 | 0.637 | 1.18 | 0.541 | 1.00 | 1.30 | 2.000 | No |
| 23 | 1.52 | 0.09 | 0.00 | 0.09 | 0.98 | 0.637 | 1.18 | 0.541 | 1.00 | 1.30 | 2.000 | No |
| 24 | 1.59 | 0.09 | 0.00 | 0.09 | 0.98 | 0.636 | 1.18 | 0.540 | 1.00 | 1.30 | 2.000 | No |
| 25 | 1.65 | 0.09 | 0.00 | 0.09 | 0.98 | 0.635 | 1.18 | 0.539 | 1.00 | 1.30 | 2.000 | No |
| 26 | 1.72 | 0.10 | 0.00 | 0.10 | 0.98 | 0.635 | 1.18 | 0.539 | 1.00 | 1.30 | 2.000 | No |
| 27 | 1.77 | 0.10 | 0.00 | 0.10 | 0.98 | 0.634 | 1.18 | 0.539 | 1.00 | 1.30 | 2.000 | No |
| 28 | 1.84 | 0.10 | 0.00 | 0.10 | 0.97 | 0.634 | 1.18 | 0.538 | 1.00 | 1.30 | 2.000 | No |
| 29 | 1.91 | 0.11 | 0.00 | 0.11 | 0.97 | 0.633 | 1.18 | 0.537 | 1.00 | 1.30 | 2.000 | No |
| 30 | 1.98 | 0.11 | 0.00 | 0.11 | 0.97 | 0.632 | 1.18 | 0.537 | 1.00 | 1.30 | 2.000 | No |
| 31 | 2.05 | 0.11 | 0.00 | 0.11 | 0.97 | 0.632 | 1.18 | 0.536 | 1.00 | 1.30 | 2.000 | No |
| 32 | 2.11 | 0.12 | 0.00 | 0.12 | 0.97 | 0.631 | 1.18 | 0.536 | 1.00 | 1.30 | 2.000 | No |
| 33 | 2.19 | 0.12 | 0.00 | 0.12 | 0.97 | 0.630 | 1.18 | 0.535 | 1.00 | 1.30 | 2.000 | No |
| 34 | 2.25 | 0.12 | 0.00 | 0.12 | 0.97 | 0.630 | 1.18 | 0.535 | 1.00 | 1.30 | 2.000 | No |
| 35 | 2.32 | 0.13 | 0.00 | 0.13 | 0.97 | 0.629 | 1.18 | 0.534 | 1.00 | 1.30 | 2.000 | No |
| 36 | 2.39 | 0.13 | 0.00 | 0.13 | 0.97 | 0.628 | 1.18 | 0.534 | 1.00 | 1.30 | 2.000 | No |
| 37 | 2.44 | 0.13 | 0.00 | 0.13 | 0.97 | 0.628 | 1.18 | 0.533 | 1.00 | 1.30 | 2.000 | No |
| 38 | 2.49 | 0.14 | 0.00 | 0.14 | 0.97 | 0.627 | 1.18 | 0.533 | 1.00 | 1.30 | 2.000 | No |
| 39 | 2.57 | 0.14 | 0.00 | 0.14 | 0.96 | 0.627 | 1.18 | 0.532 | 1.00 | 1.30 | 2.000 | No |
| 40 | 2.64 | 0.14 | 0.00 | 0.14 | 0.96 | 0.626 | 1.18 | 0.531 | 1.00 | 1.30 | 2.000 | No |
| 41 | 2.71 | 0.15 | 0.00 | 0.15 | 0.96 | 0.625 | 1.18 | 0.531 | 1.00 | 1.30 | 2.000 | No |
| 42 | 2.78 | 0.15 | 0.00 | 0.15 | 0.96 | 0.625 | 1.18 | 0.530 | 1.00 | 1.30 | 2.000 | No |
| 43 | 2.83 | 0.15 | 0.00 | 0.15 | 0.96 | 0.624 | 1.18 | 0.530 | 1.00 | 1.30 | 2.000 | No |
| 44 | 2.90 | 0.16 | 0.00 | 0.16 | 0.96 | 0.623 | 1.18 | 0.529 | 1.00 | 1.30 | 2.000 | No |
| 45 | 2.96 | 0.16 | 0.00 | 0.16 | 0.96 | 0.623 | 1.18 | 0.529 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 3.03 | 0.16 | 0.00 | 0.16 | 0.96 | 0.622 | 1.18 | 0.528 | 1.00 | 1.30 | 2.000 | No |
| 47 | 3.09 | 0.17 | 0.00 | 0.17 | 0.96 | 0.621 | 1.18 | 0.528 | 1.00 | 1.30 | 2.000 | No |
| 48 | 3.16 | 0.17 | 0.00 | 0.17 | 0.95 | 0.621 | 1.18 | 0.527 | 1.00 | 1.30 | 2.000 | No |
| 49 | 3.23 | 0.17 | 0.00 | 0.17 | 0.95 | 0.620 | 1.18 | 0.527 | 1.00 | 1.30 | 2.000 | No |
| 50 | 3.29 | 0.18 | 0.00 | 0.18 | 0.95 | 0.619 | 1.18 | 0.526 | 1.00 | 1.30 | 2.000 | No |
| 51 | 3.36 | 0.18 | 0.00 | 0.18 | 0.95 | 0.619 | 1.18 | 0.525 | 1.00 | 1.30 | 2.000 | No |
| 52 | 3.42 | 0.18 | 0.00 | 0.18 | 0.95 | 0.618 | 1.18 | 0.525 | 1.00 | 1.30 | 2.000 | No |
| 53 | 3.49 | 0.19 | 0.00 | 0.19 | 0.95 | 0.617 | 1.18 | 0.524 | 1.00 | 1.30 | 2.000 | No |
| 54 | 3.55 | 0.19 | 0.00 | 0.19 | 0.95 | 0.617 | 1.18 | 0.524 | 1.00 | 1.30 | 2.000 | No |
| 55 | 3.62 | 0.19 | 0.00 | 0.19 | 0.95 | 0.616 | 1.18 | 0.523 | 1.00 | 1.30 | 2.000 | No |
| 56 | 3.68 | 0.20 | 0.00 | 0.20 | 0.95 | 0.616 | 1.18 | 0.523 | 1.00 | 1.30 | 2.000 | No |
| 57 | 3.74 | 0.20 | 0.00 | 0.20 | 0.95 | 0.615 | 1.18 | 0.522 | 1.00 | 1.30 | 2.000 | No |
| 58 | 3.81 | 0.20 | 0.00 | 0.20 | 0.94 | 0.614 | 1.18 | 0.521 | 1.00 | 1.30 | 2.000 | No |
| 59 | 3.87 | 0.21 | 0.00 | 0.21 | 0.94 | 0.613 | 1.18 | 0.521 | 1.00 | 1.30 | 2.000 | No |
| 60 | 3.94 | 0.21 | 0.00 | 0.21 | 0.94 | 0.613 | 1.18 | 0.520 | 1.00 | 1.30 | 2.000 | No |
| 61 | 4.00 | 0.21 | 0.00 | 0.21 | 0.94 | 0.612 | 1.18 | 0.520 | 1.00 | 1.30 | 2.000 | No |
| 62 | 4.07 | 0.22 | 0.00 | 0.22 | 0.94 | 0.611 | 1.18 | 0.519 | 1.00 | 1.30 | 2.000 | No |
| 63 | 4.15 | 0.22 | 0.00 | 0.22 | 0.94 | 0.611 | 1.18 | 0.518 | 1.00 | 1.30 | 2.000 | No |
| 64 | 4.22 | 0.22 | 0.00 | 0.22 | 0.94 | 0.610 | 1.18 | 0.518 | 1.00 | 1.30 | 2.000 | No |
| 65 | 4.27 | 0.23 | 0.00 | 0.23 | 0.94 | 0.609 | 1.18 | 0.517 | 1.00 | 1.30 | 2.000 | No |
| 66 | 4.35 | 0.23 | 0.00 | 0.23 | 0.94 | 0.609 | 1.18 | 0.517 | 1.00 | 1.30 | 2.000 | No |
| 67 | 4.41 | 0.23 | 0.00 | 0.23 | 0.94 | 0.608 | 1.18 | 0.516 | 1.00 | 1.30 | 2.000 | No |
| 68 | 4.46 | 0.23 | 0.00 | 0.23 | 0.93 | 0.607 | 1.18 | 0.516 | 1.00 | 1.30 | 2.000 | No |
| 69 | 4.53 | 0.24 | 0.00 | 0.24 | 0.93 | 0.607 | 1.18 | 0.515 | 1.00 | 1.30 | 2.000 | No |
| 70 | 4.61 | 0.24 | 0.00 | 0.24 | 0.93 | 0.606 | 1.18 | 0.514 | 1.00 | 1.30 | 2.000 | No |
| 71 | 4.69 | 0.25 | 0.00 | 0.25 | 0.93 | 0.605 | 1.18 | 0.514 | 1.00 | 1.30 | 2.000 | No |
| 72 | 4.74 | 0.25 | 0.00 | 0.25 | 0.93 | 0.604 | 1.18 | 0.513 | 1.00 | 1.30 | 2.000 | No |
| 73 | 4.82 | 0.25 | 0.00 | 0.25 | 0.93 | 0.603 | 1.18 | 0.512 | 1.00 | 1.30 | 2.000 | No |
| 74 | 4.87 | 0.25 | 0.00 | 0.25 | 0.93 | 0.603 | 1.18 | 0.512 | 1.00 | 1.30 | 2.000 | No |
| 75 | 4.95 | 0.26 | 0.00 | 0.26 | 0.93 | 0.602 | 1.18 | 0.511 | 1.00 | 1.30 | 2.000 | No |
| 76 | 4.99 | 0.26 | 0.00 | 0.26 | 0.93 | 0.602 | 1.18 | 0.511 | 1.00 | 1.30 | 2.000 | No |
| 77 | 5.07 | 0.26 | 0.00 | 0.26 | 0.92 | 0.601 | 1.18 | 0.510 | 1.00 | 1.30 | 2.000 | No |
| 78 | 5.13 | 0.27 | 0.00 | 0.27 | 0.92 | 0.600 | 1.18 | 0.510 | 1.00 | 1.30 | 2.000 | No |
| 79 | 5.21 | 0.27 | 0.00 | 0.27 | 0.92 | 0.599 | 1.18 | 0.509 | 1.00 | 1.30 | 2.000 | No |
| 80 | 5.27 | 0.27 | 0.00 | 0.27 | 0.92 | 0.598 | 1.18 | 0.508 | 1.00 | 1.30 | 2.000 | No |
| 81 | 5.32 | 0.28 | 0.00 | 0.28 | 0.92 | 0.598 | 1.18 | 0.508 | 1.00 | 1.30 | 2.000 | No |
| 82 | 5.38 | 0.28 | 0.00 | 0.28 | 0.92 | 0.597 | 1.18 | 0.507 | 1.00 | 1.30 | 2.000 | No |
| 83 | 5.46 | 0.28 | 0.00 | 0.28 | 0.92 | 0.596 | 1.18 | 0.506 | 1.00 | 1.30 | 2.000 | No |
| 84 | 5.53 | 0.29 | 0.00 | 0.29 | 0.92 | 0.596 | 1.18 | 0.506 | 1.00 | 1.30 | 2.000 | No |
| 85 | 5.59 | 0.29 | 0.00 | 0.29 | 0.92 | 0.595 | 1.18 | 0.505 | 1.00 | 1.30 | 2.000 | No |
| 86 | 5.67 | 0.29 | 0.00 | 0.29 | 0.91 | 0.594 | 1.18 | 0.504 | 1.00 | 1.30 | 2.000 | No |
| 87 | 5.71 | 0.30 | 0.00 | 0.30 | 0.91 | 0.594 | 1.18 | 0.504 | 1.00 | 1.30 | 2.000 | No |
| 88 | 5.81 | 0.30 | 0.00 | 0.30 | 0.91 | 0.593 | 1.18 | 0.503 | 1.00 | 1.30 | 2.000 | No |
| 89 | 5.84 | 0.30 | 0.00 | 0.30 | 0.91 | 0.592 | 1.18 | 0.503 | 1.00 | 1.30 | 2.000 | No |
| 90 | 5.91 | 0.31 | 0.00 | 0.31 | 0.91 | 0.591 | 1.18 | 0.502 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91 | 5.98 | 0.31 | 0.00 | 0.31 | 0.91 | 0.591 | 1.18 | 0.501 | 1.00 | 1.30 | 2.000 | No |
| 92 | 6.04 | 0.31 | 0.00 | 0.31 | 0.91 | 0.590 | 1.18 | 0.501 | 1.00 | 1.30 | 2.000 | No |
| 93 | 6.12 | 0.32 | 0.00 | 0.32 | 0.91 | 0.589 | 1.18 | 0.500 | 1.00 | 1.30 | 2.000 | No |
| 94 | 6.19 | 0.32 | 0.00 | 0.32 | 0.90 | 0.588 | 1.18 | 0.499 | 1.00 | 1.30 | 2.000 | No |
| 95 | 6.26 | 0.32 | 0.00 | 0.32 | 0.90 | 0.587 | 1.18 | 0.499 | 1.00 | 1.30 | 2.000 | No |
| 96 | 6.32 | 0.33 | 0.00 | 0.33 | 0.90 | 0.587 | 1.18 | 0.498 | 1.00 | 1.30 | 2.000 | No |
| 97 | 6.39 | 0.33 | 0.00 | 0.33 | 0.90 | 0.586 | 1.18 | 0.497 | 1.00 | 1.30 | 2.000 | No |
| 98 | 6.44 | 0.33 | 0.00 | 0.33 | 0.90 | 0.585 | 1.18 | 0.497 | 1.00 | 1.30 | 2.000 | No |
| 99 | 6.51 | 0.34 | 0.00 | 0.34 | 0.90 | 0.584 | 1.18 | 0.496 | 1.00 | 1.30 | 2.000 | No |
| 100 | 6.57 | 0.34 | 0.00 | 0.34 | 0.90 | 0.584 | 1.18 | 0.496 | 1.00 | 1.30 | 2.000 | No |
| 101 | 6.65 | 0.34 | 0.00 | 0.34 | 0.90 | 0.583 | 1.18 | 0.495 | 1.00 | 1.30 | 2.000 | No |
| 102 | 6.70 | 0.35 | 0.00 | 0.35 | 0.90 | 0.582 | 1.18 | 0.494 | 1.00 | 1.30 | 2.000 | No |
| 103 | 6.77 | 0.35 | 0.00 | 0.35 | 0.89 | 0.581 | 1.18 | 0.494 | 1.00 | 1.30 | 2.000 | No |
| 104 | 6.83 | 0.35 | 0.00 | 0.35 | 0.89 | 0.581 | 1.18 | 0.493 | 1.00 | 1.30 | 2.000 | No |
| 105 | 6.90 | 0.36 | 0.00 | 0.36 | 0.89 | 0.580 | 1.18 | 0.492 | 1.00 | 1.30 | 2.000 | No |
| 106 | 6.97 | 0.36 | 0.00 | 0.36 | 0.89 | 0.579 | 1.18 | 0.492 | 1.00 | 1.30 | 2.000 | No |
| 107 | 7.04 | 0.36 | 0.00 | 0.36 | 0.89 | 0.578 | 1.18 | 0.491 | 1.00 | 1.30 | 2.000 | No |
| 108 | 7.10 | 0.37 | 0.00 | 0.37 | 0.89 | 0.578 | 1.18 | 0.490 | 1.00 | 1.30 | 2.000 | No |
| 109 | 7.17 | 0.37 | 0.00 | 0.37 | 0.89 | 0.577 | 1.18 | 0.490 | 1.00 | 1.30 | 2.000 | No |
| 110 | 7.24 | 0.37 | 0.00 | 0.37 | 0.89 | 0.576 | 1.18 | 0.489 | 1.00 | 1.30 | 2.000 | No |
| 111 | 7.31 | 0.38 | 0.00 | 0.38 | 0.88 | 0.575 | 1.18 | 0.488 | 1.00 | 1.30 | 2.000 | No |
| 112 | 7.35 | 0.38 | 0.00 | 0.38 | 0.88 | 0.574 | 1.18 | 0.488 | 1.00 | 1.30 | 2.000 | No |
| 113 | 7.43 | 0.38 | 0.00 | 0.38 | 0.88 | 0.574 | 1.18 | 0.487 | 1.00 | 1.30 | 2.000 | No |
| 114 | 7.50 | 0.39 | 0.00 | 0.39 | 0.88 | 0.573 | 1.18 | 0.486 | 1.00 | 1.30 | 2.000 | No |
| 115 | 7.57 | 0.39 | 0.00 | 0.39 | 0.88 | 0.572 | 1.18 | 0.486 | 1.00 | 1.30 | 2.000 | No |
| 116 | 7.61 | 0.39 | 0.00 | 0.39 | 0.88 | 0.571 | 1.18 | 0.485 | 1.00 | 1.30 | 2.000 | No |
| 117 | 7.68 | 0.40 | 0.00 | 0.40 | 0.88 | 0.570 | 1.18 | 0.484 | 1.00 | 1.30 | 2.000 | No |
| 118 | 7.76 | 0.40 | 0.00 | 0.40 | 0.88 | 0.570 | 1.18 | 0.484 | 1.00 | 1.30 | 2.000 | No |
| 119 | 7.83 | 0.40 | 0.00 | 0.40 | 0.87 | 0.569 | 1.18 | 0.483 | 1.00 | 1.30 | 2.000 | No |
| 120 | 7.88 | 0.41 | 0.00 | 0.41 | 0.87 | 0.568 | 1.18 | 0.482 | 1.00 | 1.30 | 2.000 | No |
| 121 | 7.95 | 0.41 | 0.00 | 0.41 | 0.87 | 0.567 | 1.18 | 0.482 | 1.00 | 1.30 | 2.000 | No |
| 122 | 8.03 | 0.41 | 0.00 | 0.41 | 0.87 | 0.566 | 1.18 | 0.481 | 1.00 | 1.30 | 2.000 | No |
| 123 | 8.08 | 0.42 | 0.00 | 0.42 | 0.87 | 0.566 | 1.18 | 0.480 | 1.00 | 1.30 | 2.000 | No |
| 124 | 8.14 | 0.42 | 0.00 | 0.42 | 0.87 | 0.565 | 1.18 | 0.480 | 1.00 | 1.30 | 2.000 | No |
| 125 | 8.21 | 0.42 | 0.00 | 0.42 | 0.87 | 0.564 | 1.18 | 0.479 | 1.00 | 1.30 | 2.000 | No |
| 126 | 8.29 | 0.43 | 0.00 | 0.43 | 0.87 | 0.563 | 1.18 | 0.478 | 1.00 | 1.30 | 2.000 | No |
| 127 | 8.34 | 0.43 | 0.00 | 0.43 | 0.87 | 0.562 | 1.18 | 0.478 | 1.00 | 1.30 | 2.000 | No |
| 128 | 8.40 | 0.43 | 0.00 | 0.43 | 0.86 | 0.562 | 1.18 | 0.477 | 1.00 | 1.30 | 2.000 | No |
| 129 | 8.47 | 0.44 | 0.00 | 0.44 | 0.86 | 0.561 | 1.18 | 0.476 | 1.00 | 1.30 | 2.000 | No |
| 130 | 8.54 | 0.44 | 0.00 | 0.44 | 0.86 | 0.560 | 1.18 | 0.475 | 1.00 | 1.30 | 2.000 | No |
| 131 | 8.60 | 0.44 | 0.00 | 0.44 | 0.86 | 0.559 | 1.18 | 0.475 | 1.00 | 1.30 | 2.000 | No |
| 132 | 8.67 | 0.45 | 0.00 | 0.45 | 0.86 | 0.558 | 1.18 | 0.474 | 1.00 | 1.30 | 2.000 | No |
| 133 | 8.74 | 0.45 | 0.00 | 0.45 | 0.86 | 0.557 | 1.18 | 0.473 | 1.00 | 1.30 | 2.000 | No |
| 134 | 8.80 | 0.45 | 0.00 | 0.45 | 0.86 | 0.557 | 1.18 | 0.473 | 1.00 | 1.30 | 2.000 | No |
| 135 | 8.86 | 0.46 | 0.00 | 0.46 | 0.86 | 0.556 | 1.18 | 0.472 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 136 | 8.93 | 0.46 | 0.00 | 0.46 | 0.85 | 0.555 | 1.18 | 0.471 | 1.00 | 1.30 | 2.000 | No |
| 137 | 9.01 | 0.47 | 0.00 | 0.47 | 0.85 | 0.554 | 1.18 | 0.470 | 1.00 | 1.30 | 2.000 | No |
| 138 | 9.09 | 0.47 | 0.00 | 0.47 | 0.85 | 0.553 | 1.18 | 0.470 | 1.00 | 1.30 | 2.000 | No |
| 139 | 9.13 | 0.47 | 0.00 | 0.47 | 0.85 | 0.552 | 1.18 | 0.469 | 1.00 | 1.30 | 2.000 | No |
| 140 | 9.20 | 0.48 | 0.00 | 0.48 | 0.85 | 0.552 | 1.18 | 0.468 | 1.00 | 1.30 | 2.000 | No |
| 141 | 9.28 | 0.48 | 0.00 | 0.48 | 0.85 | 0.551 | 1.18 | 0.467 | 1.00 | 1.30 | 2.000 | No |
| 142 | 9.35 | 0.48 | 0.00 | 0.48 | 0.85 | 0.550 | 1.18 | 0.467 | 1.00 | 1.30 | 2.000 | No |
| 143 | 9.40 | 0.49 | 0.00 | 0.49 | 0.84 | 0.549 | 1.18 | 0.466 | 1.00 | 1.30 | 2.000 | No |
| 144 | 9.46 | 0.49 | 0.00 | 0.49 | 0.84 | 0.548 | 1.18 | 0.465 | 1.00 | 1.30 | 2.000 | No |
| 145 | 9.53 | 0.49 | 0.00 | 0.49 | 0.84 | 0.547 | 1.18 | 0.465 | 1.00 | 1.30 | 2.000 | No |
| 146 | 9.60 | 0.50 | 0.00 | 0.50 | 0.84 | 0.546 | 1.18 | 0.464 | 1.00 | 1.30 | 2.000 | No |
| 147 | 9.65 | 0.50 | 0.00 | 0.50 | 0.84 | 0.546 | 1.18 | 0.463 | 1.00 | 1.30 | 2.000 | No |
| 148 | 9.73 | 0.50 | 0.00 | 0.50 | 0.84 | 0.545 | 1.18 | 0.463 | 1.00 | 1.30 | 2.000 | No |
| 149 | 9.79 | 0.51 | 0.00 | 0.51 | 0.84 | 0.544 | 1.18 | 0.462 | 1.00 | 1.30 | 2.000 | No |
| 150 | 9.85 | 0.51 | 0.00 | 0.51 | 0.84 | 0.543 | 1.18 | 0.461 | 1.00 | 1.30 | 2.000 | No |
| 151 | 9.92 | 0.52 | 0.00 | 0.52 | 0.83 | 0.542 | 1.18 | 0.460 | 1.00 | 1.30 | 2.000 | No |
| 152 | 9.99 | 0.52 | 0.00 | 0.52 | 0.83 | 0.541 | 1.18 | 0.460 | 1.00 | 1.30 | 2.000 | No |
| 153 | 10.05 | 0.52 | 0.00 | 0.52 | 0.83 | 0.541 | 1.18 | 0.459 | 1.00 | 1.30 | 2.000 | No |
| 154 | 10.13 | 0.53 | 0.00 | 0.53 | 0.83 | 0.540 | 1.18 | 0.458 | 1.00 | 1.30 | 2.000 | No |
| 155 | 10.18 | 0.53 | 0.00 | 0.53 | 0.83 | 0.539 | 1.18 | 0.458 | 1.00 | 1.30 | 2.000 | No |
| 156 | 10.25 | 0.53 | 0.00 | 0.53 | 0.83 | 0.538 | 1.18 | 0.457 | 1.00 | 1.30 | 2.000 | No |
| 157 | 10.32 | 0.54 | 0.00 | 0.54 | 0.83 | 0.537 | 1.18 | 0.456 | 1.00 | 1.30 | 2.000 | No |
| 158 | 10.38 | 0.54 | 0.00 | 0.54 | 0.83 | 0.536 | 1.18 | 0.455 | 1.00 | 1.30 | 2.000 | No |
| 159 | 10.45 | 0.54 | 0.00 | 0.54 | 0.82 | 0.535 | 1.18 | 0.455 | 1.00 | 1.30 | 2.000 | No |
| 160 | 10.52 | 0.55 | 0.00 | 0.55 | 0.82 | 0.534 | 1.18 | 0.454 | 1.00 | 1.30 | 2.000 | No |
| 161 | 10.57 | 0.55 | 0.00 | 0.55 | 0.82 | 0.534 | 1.18 | 0.453 | 1.00 | 1.30 | 2.000 | No |
| 162 | 10.64 | 0.55 | 0.00 | 0.55 | 0.82 | 0.533 | 1.18 | 0.452 | 1.00 | 1.30 | 2.000 | No |
| 163 | 10.71 | 0.56 | 0.00 | 0.56 | 0.82 | 0.532 | 1.18 | 0.452 | 1.00 | 1.30 | 2.000 | No |
| 164 | 10.78 | 0.56 | 0.00 | 0.56 | 0.82 | 0.531 | 1.18 | 0.451 | 1.00 | 1.30 | 2.000 | No |
| 165 | 10.83 | 0.56 | 0.00 | 0.56 | 0.82 | 0.530 | 1.18 | 0.450 | 1.00 | 1.30 | 2.000 | No |
| 166 | 10.90 | 0.57 | 0.00 | 0.57 | 0.81 | 0.529 | 1.18 | 0.449 | 1.00 | 1.30 | 2.000 | No |
| 167 | 10.96 | 0.57 | 0.00 | 0.57 | 0.81 | 0.528 | 1.18 | 0.449 | 1.00 | 1.30 | 2.000 | No |
| 168 | 11.03 | 0.58 | 0.00 | 0.58 | 0.81 | 0.528 | 1.18 | 0.448 | 1.00 | 1.30 | 2.000 | No |
| 169 | 11.10 | 0.58 | 0.00 | 0.58 | 0.81 | 0.527 | 1.18 | 0.447 | 1.00 | 1.30 | 2.000 | No |
| 170 | 11.16 | 0.58 | 0.00 | 0.58 | 0.81 | 0.526 | 1.18 | 0.447 | 1.00 | 1.30 | 2.000 | No |
| 171 | 11.22 | 0.59 | 0.00 | 0.59 | 0.81 | 0.525 | 1.18 | 0.446 | 1.00 | 1.30 | 2.000 | No |
| 172 | 11.29 | 0.59 | 0.00 | 0.59 | 0.81 | 0.524 | 1.18 | 0.445 | 1.00 | 1.30 | 2.000 | No |
| 173 | 11.36 | 0.59 | 0.00 | 0.59 | 0.80 | 0.523 | 1.18 | 0.444 | 1.00 | 1.30 | 2.000 | No |
| 174 | 11.43 | 0.60 | 0.00 | 0.60 | 0.80 | 0.522 | 1.18 | 0.443 | 1.00 | 1.30 | 2.000 | No |
| 175 | 11.51 | 0.60 | 0.00 | 0.60 | 0.80 | 0.521 | 1.18 | 0.442 | 1.00 | 1.30 | 2.000 | No |
| 176 | 11.55 | 0.60 | 0.00 | 0.60 | 0.80 | 0.521 | 1.18 | 0.442 | 1.00 | 1.30 | 2.000 | No |
| 177 | 11.63 | 0.61 | 0.00 | 0.61 | 0.80 | 0.519 | 1.18 | 0.441 | 1.00 | 1.30 | 2.000 | No |
| 178 | 11.71 | 0.61 | 0.00 | 0.61 | 0.80 | 0.518 | 1.18 | 0.440 | 1.00 | 1.30 | 2.000 | No |
| 179 | 11.76 | 0.62 | 0.00 | 0.62 | 0.80 | 0.518 | 1.18 | 0.440 | 1.00 | 1.30 | 2.000 | No |
| 180 | 11.83 | 0.62 | 0.00 | 0.62 | 0.79 | 0.517 | 1.18 | 0.439 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 181 | 11.90 | 0.63 | 0.00 | 0.63 | 0.79 | 0.516 | 1.18 | 0.438 | 1.00 | 1.30 | 2.000 | No |
| 182 | 11.95 | 0.63 | 0.00 | 0.63 | 0.79 | 0.515 | 1.18 | 0.437 | 1.00 | 1.30 | 2.000 | No |
| 183 | 12.02 | 0.63 | 0.00 | 0.63 | 0.79 | 0.514 | 1.18 | 0.436 | 1.00 | 1.30 | 2.000 | No |
| 184 | 12.08 | 0.64 | 0.00 | 0.64 | 0.79 | 0.513 | 1.18 | 0.436 | 1.00 | 1.30 | 2.000 | No |
| 185 | 12.15 | 0.64 | 0.00 | 0.64 | 0.79 | 0.512 | 1.18 | 0.435 | 1.00 | 1.30 | 2.000 | No |
| 186 | 12.22 | 0.65 | 0.00 | 0.65 | 0.79 | 0.511 | 1.18 | 0.434 | 1.00 | 1.30 | 2.000 | No |
| 187 | 12.28 | 0.65 | 0.00 | 0.65 | 0.79 | 0.511 | 1.18 | 0.434 | 1.00 | 1.30 | 2.000 | No |
| 188 | 12.34 | 0.65 | 0.00 | 0.65 | 0.78 | 0.510 | 1.18 | 0.433 | 1.00 | 1.30 | 2.000 | No |
| 189 | 12.41 | 0.66 | 0.00 | 0.66 | 0.78 | 0.509 | 1.18 | 0.432 | 1.00 | 1.30 | 2.000 | No |
| 190 | 12.47 | 0.66 | 0.00 | 0.66 | 0.78 | 0.508 | 1.18 | 0.431 | 1.00 | 1.30 | 2.000 | No |
| 191 | 12.54 | 0.67 | 0.00 | 0.67 | 0.78 | 0.507 | 1.18 | 0.430 | 1.00 | 1.30 | 2.000 | No |
| 192 | 12.60 | 0.67 | 0.00 | 0.67 | 0.78 | 0.506 | 1.18 | 0.430 | 1.00 | 1.30 | 2.000 | No |
| 193 | 12.67 | 0.67 | 0.00 | 0.67 | 0.78 | 0.505 | 1.18 | 0.429 | 1.00 | 1.30 | 2.000 | No |
| 194 | 12.76 | 0.68 | 0.00 | 0.68 | 0.78 | 0.504 | 1.18 | 0.428 | 1.00 | 1.30 | 2.000 | No |
| 195 | 12.80 | 0.68 | 0.00 | 0.68 | 0.77 | 0.503 | 1.18 | 0.427 | 1.00 | 1.30 | 2.000 | No |
| 196 | 12.88 | 0.68 | 0.00 | 0.68 | 0.77 | 0.502 | 1.18 | 0.426 | 1.00 | 1.30 | 2.000 | No |
| 197 | 12.95 | 0.69 | 0.00 | 0.69 | 0.77 | 0.501 | 1.18 | 0.426 | 1.00 | 1.30 | 2.000 | No |
| 198 | 13.01 | 0.69 | 0.00 | 0.69 | 0.77 | 0.500 | 1.18 | 0.425 | 1.00 | 1.30 | 2.000 | No |
| 199 | 13.07 | 0.70 | 0.00 | 0.70 | 0.77 | 0.500 | 1.18 | 0.424 | 1.00 | 1.30 | 2.000 | No |
| 200 | 13.13 | 0.70 | 0.00 | 0.70 | 0.77 | 0.499 | 1.18 | 0.423 | 1.00 | 1.30 | 2.000 | No |
| 201 | 13.19 | 0.70 | 0.00 | 0.70 | 0.77 | 0.498 | 1.18 | 0.423 | 1.00 | 1.30 | 2.000 | No |
| 202 | 13.27 | 0.71 | 0.00 | 0.71 | 0.76 | 0.497 | 1.18 | 0.422 | 1.00 | 1.30 | 2.000 | No |
| 203 | 13.33 | 0.71 | 0.00 | 0.71 | 0.76 | 0.496 | 1.18 | 0.421 | 1.00 | 1.30 | 2.000 | No |
| 204 | 13.41 | 0.72 | 0.00 | 0.72 | 0.76 | 0.495 | 1.18 | 0.420 | 1.00 | 1.30 | 2.000 | No |
| 205 | 13.45 | 0.72 | 0.00 | 0.72 | 0.76 | 0.494 | 1.18 | 0.420 | 1.00 | 1.30 | 2.000 | No |
| 206 | 13.52 | 0.72 | 0.00 | 0.72 | 0.76 | 0.493 | 1.18 | 0.419 | 1.00 | 1.30 | 2.000 | No |
| 207 | 13.60 | 0.73 | 0.00 | 0.73 | 0.76 | 0.492 | 1.18 | 0.418 | 1.00 | 1.30 | 2.000 | No |
| 208 | 13.66 | 0.73 | 0.00 | 0.73 | 0.76 | 0.491 | 1.18 | 0.417 | 1.00 | 1.30 | 2.000 | No |
| 209 | 13.74 | 0.73 | 0.00 | 0.73 | 0.75 | 0.490 | 1.18 | 0.416 | 1.00 | 1.30 | 2.000 | No |
| 210 | 13.80 | 0.74 | 0.00 | 0.74 | 0.75 | 0.489 | 1.18 | 0.415 | 1.00 | 1.30 | 2.000 | No |
| 211 | 13.85 | 0.74 | 0.00 | 0.74 | 0.75 | 0.489 | 1.18 | 0.415 | 1.00 | 1.30 | 2.000 | No |
| 212 | 13.93 | 0.75 | 0.00 | 0.75 | 0.75 | 0.487 | 1.18 | 0.414 | 1.00 | 1.30 | 2.000 | No |
| 213 | 13.99 | 0.75 | 0.00 | 0.75 | 0.75 | 0.487 | 1.18 | 0.413 | 1.00 | 1.30 | 2.000 | No |
| 214 | 14.04 | 0.75 | 0.00 | 0.75 | 0.75 | 0.486 | 1.18 | 0.413 | 1.00 | 1.30 | 2.000 | No |
| 215 | 14.13 | 0.76 | 0.00 | 0.76 | 0.75 | 0.485 | 1.18 | 0.412 | 1.00 | 1.30 | 2.000 | No |
| 216 | 14.19 | 0.76 | 0.00 | 0.76 | 0.74 | 0.484 | 1.18 | 0.411 | 1.00 | 1.30 | 2.000 | No |
| 217 | 14.26 | 0.76 | 0.00 | 0.76 | 0.74 | 0.483 | 1.18 | 0.410 | 1.00 | 1.30 | 2.000 | No |
| 218 | 14.31 | 0.77 | 0.00 | 0.77 | 0.74 | 0.482 | 1.18 | 0.409 | 1.00 | 1.30 | 2.000 | No |
| 219 | 14.39 | 0.77 | 0.00 | 0.77 | 0.74 | 0.481 | 1.18 | 0.408 | 1.00 | 1.30 | 2.000 | No |
| 220 | 14.44 | 0.77 | 0.00 | 0.77 | 0.74 | 0.480 | 1.18 | 0.408 | 1.00 | 1.30 | 2.000 | No |
| 221 | 14.52 | 0.78 | 0.00 | 0.78 | 0.74 | 0.479 | 1.18 | 0.407 | 1.00 | 1.30 | 2.000 | No |
| 222 | 14.59 | 0.78 | 0.00 | 0.78 | 0.74 | 0.478 | 1.18 | 0.406 | 1.00 | 1.30 | 2.000 | No |
| 223 | 14.65 | 0.79 | 0.00 | 0.79 | 0.73 | 0.477 | 1.18 | 0.405 | 1.00 | 1.30 | 2.000 | No |
| 224 | 14.71 | 0.79 | 0.00 | 0.79 | 0.73 | 0.476 | 1.18 | 0.405 | 1.00 | 1.30 | 2.000 | No |
| 225 | 14.78 | 0.79 | 0.00 | 0.79 | 0.73 | 0.475 | 1.18 | 0.404 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 226 | 14.84 | 0.80 | 0.00 | 0.80 | 0.73 | 0.475 | 1.18 | 0.403 | 1.00 | 1.30 | 2.000 | No |
| 227 | 14.90 | 0.80 | 0.00 | 0.80 | 0.73 | 0.474 | 1.18 | 0.402 | 1.00 | 1.30 | 2.000 | No |
| 228 | 14.97 | 0.81 | 0.00 | 0.81 | 0.73 | 0.473 | 1.18 | 0.401 | 1.00 | 1.30 | 2.000 | No |
| 229 | 15.04 | 0.81 | 0.00 | 0.81 | 0.73 | 0.472 | 1.18 | 0.400 | 1.00 | 1.30 | 2.000 | No |
| 230 | 15.11 | 0.81 | 0.00 | 0.81 | 0.72 | 0.471 | 1.18 | 0.400 | 1.00 | 1.30 | 2.000 | No |
| 231 | 15.16 | 0.82 | 0.00 | 0.82 | 0.72 | 0.470 | 1.18 | 0.399 | 1.00 | 1.30 | 2.000 | No |
| 232 | 15.24 | 0.82 | 0.00 | 0.82 | 0.72 | 0.469 | 1.18 | 0.398 | 1.00 | 1.30 | 2.000 | No |
| 233 | 15.29 | 0.83 | 0.00 | 0.83 | 0.72 | 0.468 | 1.18 | 0.397 | 1.00 | 1.30 | 2.000 | No |
| 234 | 15.36 | 0.83 | 0.00 | 0.83 | 0.72 | 0.467 | 1.18 | 0.397 | 1.00 | 1.30 | 2.000 | No |
| 235 | 15.43 | 0.83 | 0.00 | 0.83 | 0.72 | 0.466 | 1.18 | 0.396 | 1.00 | 1.30 | 2.000 | No |
| 236 | 15.51 | 0.84 | 0.00 | 0.84 | 0.72 | 0.465 | 1.18 | 0.395 | 1.00 | 1.30 | 2.000 | No |
| 237 | 15.56 | 0.84 | 0.00 | 0.84 | 0.71 | 0.464 | 1.18 | 0.394 | 1.00 | 1.30 | 2.000 | No |
| 238 | 15.64 | 0.85 | 0.00 | 0.85 | 0.71 | 0.463 | 1.18 | 0.393 | 1.00 | 1.30 | 2.000 | No |
| 239 | 15.69 | 0.85 | 0.00 | 0.85 | 0.71 | 0.462 | 1.18 | 0.393 | 1.00 | 1.30 | 2.000 | No |
| 240 | 15.77 | 0.85 | 0.00 | 0.85 | 0.71 | 0.461 | 1.18 | 0.392 | 1.00 | 1.30 | 2.000 | No |
| 241 | 15.82 | 0.86 | 0.00 | 0.86 | 0.71 | 0.460 | 1.18 | 0.391 | 1.00 | 1.30 | 2.000 | No |
| 242 | 15.89 | 0.86 | 0.00 | 0.86 | 0.71 | 0.459 | 1.18 | 0.390 | 1.00 | 1.30 | 2.000 | No |
| 243 | 15.95 | 0.87 | 0.00 | 0.87 | 0.71 | 0.459 | 1.18 | 0.389 | 1.00 | 1.30 | 2.000 | No |
| 244 | 16.02 | 0.87 | 0.00 | 0.87 | 0.70 | 0.458 | 1.18 | 0.389 | 1.00 | 1.30 | 2.000 | No |
| 245 | 16.09 | 0.87 | 0.00 | 0.87 | 0.70 | 0.457 | 1.18 | 0.388 | 1.00 | 1.30 | 2.000 | No |
| 246 | 16.15 | 0.88 | 0.00 | 0.88 | 0.70 | 0.456 | 1.18 | 0.387 | 1.00 | 1.30 | 2.000 | No |
| 247 | 16.22 | 0.88 | 0.00 | 0.88 | 0.70 | 0.455 | 1.18 | 0.386 | 1.00 | 1.30 | 2.000 | No |
| 248 | 16.27 | 0.89 | 0.00 | 0.89 | 0.70 | 0.454 | 1.18 | 0.385 | 1.00 | 1.30 | 2.000 | No |
| 249 | 16.34 | 0.89 | 0.00 | 0.89 | 0.70 | 0.453 | 1.18 | 0.385 | 1.00 | 1.30 | 2.000 | No |
| 250 | 16.41 | 0.89 | 0.00 | 0.89 | 0.70 | 0.452 | 1.18 | 0.384 | 1.00 | 1.30 | 2.000 | No |
| 251 | 16.50 | 0.90 | 0.00 | 0.90 | 0.69 | 0.451 | 1.18 | 0.383 | 1.00 | 1.30 | 2.000 | No |
| 252 | 16.57 | 0.90 | 0.00 | 0.90 | 0.69 | 0.450 | 1.18 | 0.382 | 1.00 | 1.30 | 2.000 | No |
| 253 | 16.60 | 0.91 | 0.00 | 0.91 | 0.69 | 0.449 | 1.18 | 0.381 | 1.00 | 1.30 | 2.000 | No |
| 254 | 16.70 | 0.91 | 0.00 | 0.91 | 0.69 | 0.448 | 1.18 | 0.380 | 1.00 | 1.30 | 2.000 | No |
| 255 | 16.76 | 0.92 | 0.00 | 0.92 | 0.69 | 0.447 | 1.18 | 0.379 | 1.00 | 1.30 | 2.000 | No |
| 256 | 16.82 | 0.92 | 0.00 | 0.92 | 0.69 | 0.446 | 1.18 | 0.379 | 1.00 | 1.30 | 2.000 | No |
| 257 | 16.89 | 0.92 | 0.00 | 0.92 | 0.68 | 0.445 | 1.18 | 0.378 | 1.00 | 1.30 | 2.000 | No |
| 258 | 16.95 | 0.93 | 0.00 | 0.93 | 0.68 | 0.444 | 1.18 | 0.377 | 1.00 | 1.30 | 2.000 | No |
| 259 | 17.01 | 0.93 | 0.00 | 0.93 | 0.68 | 0.443 | 1.18 | 0.376 | 1.00 | 1.30 | 2.000 | No |
| 260 | 17.09 | 0.94 | 0.00 | 0.94 | 0.68 | 0.442 | 1.18 | 0.375 | 1.00 | 1.30 | 2.000 | No |
| 261 | 17.16 | 0.94 | 0.00 | 0.94 | 0.68 | 0.441 | 1.18 | 0.375 | 1.00 | 1.30 | 2.000 | No |
| 262 | 17.22 | 0.94 | 0.00 | 0.94 | 0.68 | 0.440 | 1.18 | 0.374 | 1.00 | 1.30 | 2.000 | No |
| 263 | 17.28 | 0.95 | 0.00 | 0.95 | 0.68 | 0.439 | 1.18 | 0.373 | 1.00 | 1.30 | 2.000 | No |
| 264 | 17.35 | 0.95 | 0.00 | 0.95 | 0.67 | 0.438 | 1.18 | 0.372 | 1.00 | 1.30 | 2.000 | No |
| 265 | 17.41 | 0.95 | 0.00 | 0.95 | 0.67 | 0.438 | 1.18 | 0.372 | 1.00 | 1.30 | 2.000 | No |
| 266 | 17.48 | 0.96 | 0.00 | 0.96 | 0.67 | 0.437 | 1.18 | 0.371 | 1.00 | 1.30 | 2.000 | No |
| 267 | 17.54 | 0.96 | 0.00 | 0.96 | 0.67 | 0.436 | 1.18 | 0.370 | 1.00 | 1.30 | 2.000 | No |
| 268 | 17.60 | 0.96 | 0.00 | 0.96 | 0.67 | 0.435 | 1.18 | 0.369 | 1.00 | 1.30 | 2.000 | No |
| 269 | 17.66 | 0.97 | 0.00 | 0.97 | 0.67 | 0.434 | 1.18 | 0.368 | 1.00 | 1.30 | 2.000 | No |
| 270 | 17.75 | 0.97 | 0.00 | 0.97 | 0.67 | 0.433 | 1.18 | 0.367 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 | 17.78 | 0.98 | 0.00 | 0.98 | 0.66 | 0.432 | 1.18 | 0.367 | 1.00 | 1.30 | 2.000 | No |
| 272 | 17.87 | 0.98 | 0.00 | 0.98 | 0.66 | 0.431 | 1.18 | 0.366 | 1.00 | 1.30 | 2.000 | No |
| 273 | 17.93 | 0.98 | 0.00 | 0.98 | 0.66 | 0.430 | 1.18 | 0.365 | 1.00 | 1.30 | 2.000 | No |
| 274 | 18.00 | 0.99 | 0.00 | 0.99 | 0.66 | 0.429 | 1.18 | 0.364 | 1.00 | 1.30 | 2.000 | No |
| 275 | 18.06 | 0.99 | 0.00 | 0.99 | 0.66 | 0.428 | 1.18 | 0.364 | 1.00 | 1.30 | 2.000 | No |
| 276 | 18.13 | 0.99 | 0.00 | 0.99 | 0.66 | 0.427 | 1.18 | 0.363 | 1.00 | 1.30 | 2.000 | No |
| 277 | 18.19 | 1.00 | 0.00 | 1.00 | 0.66 | 0.426 | 1.18 | 0.362 | 1.00 | 1.30 | 2.000 | No |
| 278 | 18.25 | 1.00 | 0.00 | 1.00 | 0.65 | 0.425 | 1.18 | 0.361 | 1.00 | 1.30 | 2.000 | No |
| 279 | 18.32 | 1.00 | 0.00 | 1.00 | 0.65 | 0.424 | 1.18 | 0.360 | 1.00 | 1.30 | 2.000 | No |
| 280 | 18.38 | 1.01 | 0.00 | 1.01 | 0.65 | 0.423 | 1.18 | 0.360 | 1.00 | 1.30 | 2.000 | No |
| 281 | 18.44 | 1.01 | 0.00 | 1.01 | 0.65 | 0.423 | 1.18 | 0.359 | 1.00 | 1.30 | 2.000 | No |
| 282 | 18.51 | 1.01 | 0.00 | 1.01 | 0.65 | 0.422 | 1.18 | 0.358 | 1.00 | 1.30 | 2.000 | No |
| 283 | 18.57 | 1.02 | 0.00 | 1.02 | 0.65 | 0.421 | 1.18 | 0.357 | 1.00 | 1.30 | 2.000 | No |
| 284 | 18.64 | 1.02 | 0.00 | 1.02 | 0.65 | 0.420 | 1.18 | 0.356 | 1.00 | 1.30 | 2.000 | No |
| 285 | 18.73 | 1.03 | 0.00 | 1.03 | 0.64 | 0.418 | 1.18 | 0.355 | 1.00 | 1.30 | 2.000 | No |
| 286 | 18.80 | 1.03 | 0.00 | 1.03 | 0.64 | 0.418 | 1.18 | 0.355 | 1.00 | 1.30 | 2.000 | No |
| 287 | 18.86 | 1.03 | 0.00 | 1.03 | 0.64 | 0.417 | 1.18 | 0.354 | 1.00 | 1.30 | 2.000 | No |
| 288 | 18.92 | 1.04 | 0.00 | 1.04 | 0.64 | 0.416 | 1.18 | 0.353 | 1.00 | 1.30 | 2.000 | No |
| 289 | 18.99 | 1.04 | 0.00 | 1.04 | 0.64 | 0.415 | 1.18 | 0.352 | 1.00 | 1.30 | 2.000 | No |
| 290 | 19.05 | 1.04 | 0.00 | 1.04 | 0.64 | 0.414 | 1.18 | 0.351 | 1.00 | 1.30 | 2.000 | No |
| 291 | 19.12 | 1.05 | 0.00 | 1.05 | 0.64 | 0.413 | 1.18 | 0.351 | 1.00 | 1.30 | 2.000 | No |
| 292 | 19.18 | 1.05 | 0.00 | 1.05 | 0.63 | 0.412 | 1.18 | 0.350 | 1.00 | 1.30 | 2.000 | No |
| 293 | 19.23 | 1.05 | 0.00 | 1.05 | 0.63 | 0.411 | 1.18 | 0.349 | 1.00 | 1.30 | 2.000 | No |
| 294 | 19.29 | 1.06 | 0.00 | 1.06 | 0.63 | 0.410 | 1.18 | 0.348 | 1.00 | 1.30 | 2.000 | No |
| 295 | 19.38 | 1.06 | 0.00 | 1.06 | 0.63 | 0.409 | 1.18 | 0.347 | 1.00 | 1.30 | 2.000 | No |
| 296 | 19.45 | 1.06 | 0.00 | 1.06 | 0.63 | 0.408 | 1.18 | 0.347 | 1.00 | 1.30 | 2.000 | No |
| 297 | 19.51 | 1.07 | 0.00 | 1.07 | 0.63 | 0.407 | 1.18 | 0.346 | 1.00 | 1.30 | 2.000 | No |
| 298 | 19.57 | 1.07 | 0.00 | 1.07 | 0.63 | 0.406 | 1.18 | 0.345 | 1.00 | 1.30 | 2.000 | No |
| 299 | 19.64 | 1.08 | 0.00 | 1.08 | 0.62 | 0.406 | 1.18 | 0.344 | 1.00 | 1.30 | 2.000 | No |
| 300 | 19.70 | 1.08 | 0.00 | 1.08 | 0.62 | 0.405 | 1.18 | 0.344 | 1.00 | 1.30 | 2.000 | No |
| 301 | 19.76 | 1.08 | 0.00 | 1.08 | 0.62 | 0.404 | 1.18 | 0.343 | 1.00 | 1.30 | 2.000 | No |
| 302 | 19.82 | 1.09 | 0.00 | 1.09 | 0.62 | 0.403 | 1.18 | 0.342 | 1.00 | 1.30 | 2.000 | No |
| 303 | 19.89 | 1.09 | 0.00 | 1.09 | 0.62 | 0.402 | 1.18 | 0.341 | 1.00 | 1.30 | 2.000 | No |
| 304 | 19.95 | 1.09 | 0.00 | 1.09 | 0.62 | 0.401 | 1.18 | 0.341 | 1.00 | 1.30 | 2.000 | No |
| 305 | 20.04 | 1.10 | 0.00 | 1.10 | 0.62 | 0.400 | 1.18 | 0.339 | 1.00 | 1.30 | 2.000 | No |
| 306 | 20.09 | 1.10 | 0.00 | 1.10 | 0.61 | 0.399 | 1.18 | 0.339 | 1.00 | 1.30 | 2.000 | No |
| 307 | 20.15 | 1.10 | 0.00 | 1.10 | 0.61 | 0.398 | 1.18 | 0.338 | 1.00 | 1.30 | 2.000 | No |
| 308 | 20.22 | 1.11 | 0.00 | 1.11 | 0.61 | 0.397 | 1.18 | 0.337 | 1.00 | 1.30 | 2.000 | No |
| 309 | 20.28 | 1.11 | 0.00 | 1.11 | 0.61 | 0.396 | 1.18 | 0.337 | 1.00 | 1.30 | 2.000 | No |
| 310 | 20.34 | 1.11 | 0.00 | 1.11 | 0.61 | 0.395 | 1.18 | 0.336 | 1.00 | 1.30 | 2.000 | No |
| 311 | 20.41 | 1.12 | 0.00 | 1.12 | 0.61 | 0.395 | 1.18 | 0.335 | 1.00 | 1.30 | 2.000 | No |
| 312 | 20.48 | 1.12 | 0.00 | 1.12 | 0.61 | 0.394 | 1.18 | 0.334 | 1.00 | 1.30 | 2.000 | No |
| 313 | 20.57 | 1.13 | 0.00 | 1.13 | 0.60 | 0.392 | 1.18 | 0.333 | 1.00 | 1.30 | 2.000 | No |
| 314 | 20.63 | 1.13 | 0.00 | 1.13 | 0.60 | 0.391 | 1.18 | 0.332 | 1.00 | 1.30 | 2.000 | No |
| 315 | 20.69 | 1.13 | 0.00 | 1.13 | 0.60 | 0.391 | 1.18 | 0.332 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 316 | 20.75 | 1.14 | 0.00 | 1.14 | 0.60 | 0.390 | 1.18 | 0.331 | 1.00 | 1.30 | 2.000 | No |
| 317 | 20.81 | 1.14 | 0.00 | 1.14 | 0.60 | 0.389 | 1.18 | 0.330 | 1.00 | 1.30 | 2.000 | No |
| 318 | 20.87 | 1.15 | 0.00 | 1.15 | 0.60 | 0.388 | 1.18 | 0.329 | 1.00 | 1.30 | 2.000 | No |
| 319 | 20.96 | 1.15 | 0.00 | 1.15 | 0.59 | 0.387 | 1.18 | 0.328 | 1.00 | 1.30 | 2.000 | No |
| 320 | 21.02 | 1.15 | 0.00 | 1.15 | 0.59 | 0.386 | 1.18 | 0.328 | 1.00 | 1.30 | 2.000 | No |
| 321 | 21.08 | 1.16 | 0.00 | 1.16 | 0.59 | 0.385 | 1.18 | 0.327 | 1.00 | 1.30 | 2.000 | No |
| 322 | 21.15 | 1.16 | 0.00 | 1.16 | 0.59 | 0.384 | 1.18 | 0.326 | 1.00 | 1.30 | 2.000 | No |
| 323 | 21.21 | 1.16 | 0.00 | 1.16 | 0.59 | 0.383 | 1.18 | 0.325 | 1.00 | 1.30 | 2.000 | No |
| 324 | 21.27 | 1.17 | 0.00 | 1.17 | 0.59 | 0.382 | 1.18 | 0.325 | 1.00 | 1.30 | 2.000 | No |
| 325 | 21.33 | 1.17 | 0.00 | 1.17 | 0.59 | 0.382 | 1.18 | 0.324 | 1.00 | 1.30 | 2.000 | No |
| 326 | 21.40 | 1.18 | 0.00 | 1.18 | 0.59 | 0.381 | 1.18 | 0.323 | 1.00 | 1.30 | 2.000 | No |
| 327 | 21.46 | 1.18 | 0.00 | 1.18 | 0.58 | 0.380 | 1.18 | 0.322 | 1.00 | 1.30 | 2.000 | No |
| 328 | 21.53 | 1.18 | 0.00 | 1.18 | 0.58 | 0.379 | 1.18 | 0.322 | 1.00 | 1.30 | 2.000 | No |
| 329 | 21.59 | 1.19 | 0.00 | 1.19 | 0.58 | 0.378 | 1.18 | 0.321 | 1.00 | 1.30 | 2.000 | No |
| 330 | 21.66 | 1.19 | 0.00 | 1.19 | 0.58 | 0.377 | 1.18 | 0.320 | 1.00 | 1.30 | 2.000 | No |
| 331 | 21.75 | 1.20 | 0.00 | 1.20 | 0.58 | 0.376 | 1.18 | 0.319 | 1.00 | 1.30 | 2.000 | No |
| 332 | 21.81 | 1.20 | 0.00 | 1.20 | 0.58 | 0.375 | 1.18 | 0.318 | 1.00 | 1.30 | 2.000 | No |
| 333 | 21.87 | 1.20 | 0.00 | 1.20 | 0.58 | 0.374 | 1.18 | 0.318 | 1.00 | 1.30 | 2.000 | No |
| 334 | 21.93 | 1.21 | 0.00 | 1.21 | 0.57 | 0.373 | 1.18 | 0.317 | 1.00 | 1.30 | 2.000 | No |
| 335 | 22.01 | 1.21 | 0.00 | 1.21 | 0.57 | 0.372 | 1.18 | 0.316 | 1.00 | 1.30 | 2.000 | No |
| 336 | 22.07 | 1.21 | 0.00 | 1.21 | 0.57 | 0.371 | 1.18 | 0.315 | 1.00 | 1.30 | 2.000 | No |
| 337 | 22.13 | 1.22 | 0.00 | 1.22 | 0.57 | 0.370 | 1.18 | 0.315 | 1.00 | 1.30 | 2.000 | No |
| 338 | 22.20 | 1.22 | 0.00 | 1.22 | 0.57 | 0.370 | 1.18 | 0.314 | 1.00 | 1.30 | 2.000 | No |
| 339 | 22.25 | 1.22 | 0.00 | 1.22 | 0.57 | 0.369 | 1.18 | 0.313 | 1.00 | 1.30 | 2.000 | No |
| 340 | 22.31 | 1.23 | 0.00 | 1.23 | 0.57 | 0.368 | 1.18 | 0.312 | 1.00 | 1.30 | 2.000 | No |
| 341 | 22.40 | 1.23 | 0.00 | 1.23 | 0.56 | 0.367 | 1.18 | 0.311 | 1.00 | 1.30 | 2.000 | No |
| 342 | 22.47 | 1.24 | 0.00 | 1.24 | 0.56 | 0.366 | 1.18 | 0.311 | 1.00 | 1.30 | 2.000 | No |
| 343 | 22.53 | 1.24 | 0.00 | 1.24 | 0.56 | 0.365 | 1.18 | 0.310 | 1.00 | 1.30 | 2.000 | No |
| 344 | 22.59 | 1.24 | 0.00 | 1.24 | 0.56 | 0.364 | 1.18 | 0.309 | 1.00 | 1.30 | 2.000 | No |
| 345 | 22.65 | 1.25 | 0.00 | 1.25 | 0.56 | 0.363 | 1.18 | 0.309 | 1.00 | 1.30 | 2.000 | No |
| 346 | 22.72 | 1.25 | 0.00 | 1.25 | 0.56 | 0.362 | 1.18 | 0.308 | 1.00 | 1.30 | 2.000 | No |
| 347 | 22.78 | 1.26 | 0.00 | 1.26 | 0.56 | 0.362 | 1.18 | 0.307 | 1.00 | 1.30 | 2.000 | No |
| 348 | 22.84 | 1.26 | 0.00 | 1.26 | 0.56 | 0.361 | 1.18 | 0.306 | 1.00 | 1.30 | 2.000 | No |
| 349 | 22.90 | 1.26 | 0.00 | 1.26 | 0.55 | 0.360 | 1.18 | 0.306 | 1.00 | 1.30 | 2.000 | No |
| 350 | 23.00 | 1.27 | 0.00 | 1.27 | 0.55 | 0.359 | 1.18 | 0.305 | 1.00 | 1.30 | 2.000 | No |
| 351 | 23.06 | 1.27 | 0.00 | 1.27 | 0.55 | 0.358 | 1.18 | 0.304 | 1.00 | 1.30 | 2.000 | No |
| 352 | 23.10 | 1.27 | 0.00 | 1.27 | 0.55 | 0.357 | 1.18 | 0.303 | 1.00 | 1.30 | 2.000 | No |
| 353 | 23.17 | 1.28 | 0.00 | 1.28 | 0.55 | 0.356 | 1.18 | 0.303 | 1.00 | 1.30 | 2.000 | No |
| 354 | 23.24 | 1.28 | 0.00 | 1.28 | 0.55 | 0.355 | 1.18 | 0.302 | 1.00 | 1.30 | 2.000 | No |
| 355 | 23.30 | 1.28 | 0.00 | 1.28 | 0.55 | 0.355 | 1.18 | 0.301 | 1.00 | 1.30 | 2.000 | No |
| 356 | 23.39 | 1.29 | 0.00 | 1.29 | 0.54 | 0.353 | 1.18 | 0.300 | 1.00 | 1.30 | 2.000 | No |
| 357 | 23.45 | 1.29 | 0.00 | 1.29 | 0.54 | 0.353 | 1.18 | 0.299 | 1.00 | 1.30 | 2.000 | No |
| 358 | 23.51 | 1.30 | 0.00 | 1.30 | 0.54 | 0.352 | 1.18 | 0.299 | 1.00 | 1.30 | 2.000 | No |
| 359 | 23.58 | 1.30 | 0.00 | 1.30 | 0.54 | 0.351 | 1.18 | 0.298 | 1.00 | 1.30 | 2.000 | No |
| 360 | 23.64 | 1.30 | 0.00 | 1.30 | 0.54 | 0.350 | 1.18 | 0.297 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 361 | 23.71 | 1.31 | 0.00 | 1.31 | 0.54 | 0.349 | 1.18 | 0.296 | 1.00 | 1.30 | 2.000 | No |
| 362 | 23.77 | 1.31 | 0.00 | 1.31 | 0.54 | 0.348 | 1.18 | 0.296 | 1.00 | 1.30 | 2.000 | No |
| 363 | 23.83 | 1.31 | 0.00 | 1.31 | 0.53 | 0.347 | 1.18 | 0.295 | 1.00 | 1.30 | 2.000 | No |
| 364 | 23.89 | 1.32 | 0.00 | 1.32 | 0.53 | 0.347 | 1.18 | 0.294 | 1.00 | 1.30 | 2.000 | No |
| 365 | 23.98 | 1.32 | 0.00 | 1.32 | 0.53 | 0.346 | 1.18 | 0.293 | 1.00 | 1.30 | 2.000 | No |
| 366 | 24.03 | 1.33 | 0.00 | 1.33 | 0.53 | 0.345 | 1.18 | 0.293 | 1.00 | 1.30 | 2.000 | No |
| 367 | 24.10 | 1.33 | 0.00 | 1.33 | 0.53 | 0.344 | 1.18 | 0.292 | 1.00 | 1.30 | 2.000 | No |
| 368 | 24.16 | 1.33 | 0.00 | 1.33 | 0.53 | 0.343 | 1.18 | 0.291 | 1.00 | 1.30 | 2.000 | No |
| 369 | 24.22 | 1.34 | 0.00 | 1.34 | 0.53 | 0.342 | 1.18 | 0.291 | 1.00 | 1.30 | 2.000 | No |
| 370 | 24.29 | 1.34 | 0.00 | 1.34 | 0.53 | 0.342 | 1.18 | 0.290 | 1.00 | 1.30 | 2.000 | No |
| 371 | 24.34 | 1.34 | 0.00 | 1.34 | 0.52 | 0.341 | 1.18 | 0.289 | 1.00 | 1.30 | 2.000 | No |
| 372 | 24.41 | 1.35 | 0.00 | 1.35 | 0.52 | 0.340 | 1.18 | 0.289 | 1.00 | 1.30 | 2.000 | No |
| 373 | 24.48 | 1.35 | 0.00 | 1.35 | 0.52 | 0.339 | 1.18 | 0.288 | 1.00 | 1.30 | 2.000 | No |
| 374 | 24.56 | 1.36 | 0.00 | 1.36 | 0.52 | 0.338 | 1.18 | 0.287 | 1.00 | 1.30 | 2.000 | No |
| 375 | 24.62 | 1.36 | 0.00 | 1.36 | 0.52 | 0.337 | 1.18 | 0.286 | 1.00 | 1.30 | 2.000 | No |
| 376 | 24.69 | 1.36 | 0.00 | 1.36 | 0.52 | 0.336 | 1.18 | 0.286 | 1.00 | 1.30 | 2.000 | No |
| 377 | 24.75 | 1.37 | 0.00 | 1.37 | 0.52 | 0.336 | 1.18 | 0.285 | 1.00 | 1.30 | 2.000 | No |
| 378 | 24.81 | 1.37 | 0.00 | 1.37 | 0.52 | 0.335 | 1.18 | 0.284 | 1.00 | 1.30 | 2.000 | No |
| 379 | 24.89 | 1.38 | 0.00 | 1.38 | 0.51 | 0.334 | 1.18 | 0.283 | 1.00 | 1.30 | 2.000 | No |
| 380 | 24.96 | 1.38 | 0.00 | 1.38 | 0.51 | 0.333 | 1.18 | 0.283 | 1.00 | 1.30 | 2.000 | No |
| 381 | 25.02 | 1.39 | 0.00 | 1.39 | 0.51 | 0.332 | 1.18 | 0.282 | 1.00 | 1.30 | 2.000 | No |
| 382 | 25.08 | 1.39 | 0.00 | 1.39 | 0.51 | 0.331 | 1.18 | 0.281 | 1.00 | 1.30 | 2.000 | No |
| 383 | 25.13 | 1.39 | 0.00 | 1.39 | 0.51 | 0.331 | 1.18 | 0.281 | 1.00 | 1.30 | 2.000 | No |
| 384 | 25.20 | 1.40 | 0.00 | 1.40 | 0.51 | 0.330 | 1.18 | 0.280 | 1.00 | 1.30 | 2.000 | No |
| 385 | 25.27 | 1.40 | 0.00 | 1.40 | 0.51 | 0.329 | 1.18 | 0.279 | 1.00 | 1.30 | 2.000 | No |
| 386 | 25.33 | 1.40 | 0.00 | 1.40 | 0.50 | 0.328 | 1.18 | 0.279 | 1.00 | 1.30 | 2.000 | No |
| 387 | 25.39 | 1.41 | 0.00 | 1.41 | 0.50 | 0.327 | 1.18 | 0.278 | 1.00 | 1.30 | 2.000 | No |
| 388 | 25.48 | 1.41 | 0.00 | 1.41 | 0.50 | 0.326 | 1.18 | 0.277 | 1.00 | 1.30 | 2.000 | No |
| 389 | 25.55 | 1.42 | 0.00 | 1.42 | 0.50 | 0.325 | 1.18 | 0.276 | 1.00 | 1.30 | 2.000 | No |
| 390 | 25.60 | 1.42 | 0.00 | 1.42 | 0.50 | 0.325 | 1.18 | 0.276 | 1.00 | 1.30 | 2.000 | No |
| 391 | 25.66 | 1.42 | 0.00 | 1.42 | 0.50 | 0.324 | 1.18 | 0.275 | 1.00 | 1.30 | 2.000 | No |
| 392 | 25.73 | 1.43 | 0.00 | 1.43 | 0.50 | 0.323 | 1.18 | 0.274 | 1.00 | 1.30 | 2.000 | No |
| 393 | 25.80 | 1.43 | 0.00 | 1.43 | 0.50 | 0.322 | 1.18 | 0.274 | 1.00 | 1.30 | 2.000 | No |
| 394 | 25.86 | 1.44 | 0.00 | 1.44 | 0.49 | 0.321 | 1.18 | 0.273 | 1.00 | 1.30 | 2.000 | No |
| 395 | 25.95 | 1.44 | 0.00 | 1.44 | 0.49 | 0.320 | 1.18 | 0.272 | 1.00 | 1.30 | 2.000 | No |
| 396 | 25.99 | 1.44 | 0.00 | 1.44 | 0.49 | 0.320 | 1.18 | 0.272 | 1.00 | 1.30 | 2.000 | No |
| 397 | 26.08 | 1.45 | 0.00 | 1.45 | 0.49 | 0.319 | 1.18 | 0.271 | 1.00 | 1.30 | 2.000 | No |
| 398 | 26.14 | 1.45 | 0.00 | 1.45 | 0.49 | 0.318 | 1.18 | 0.270 | 1.00 | 1.30 | 2.000 | No |
| 399 | 26.21 | 1.46 | 0.00 | 1.46 | 0.49 | 0.317 | 1.18 | 0.269 | 1.00 | 1.30 | 2.000 | No |
| 400 | 26.27 | 1.46 | 0.00 | 1.46 | 0.49 | 0.316 | 1.18 | 0.269 | 1.00 | 1.30 | 2.000 | No |
| 401 | 26.34 | 1.47 | 0.00 | 1.47 | 0.49 | 0.316 | 1.18 | 0.268 | 1.00 | 1.30 | 2.000 | No |
| 402 | 26.39 | 1.47 | 0.00 | 1.47 | 0.48 | 0.315 | 1.18 | 0.267 | 1.00 | 1.30 | 2.000 | No |
| 403 | 26.45 | 1.47 | 0.00 | 1.47 | 0.48 | 0.314 | 1.18 | 0.267 | 1.00 | 1.30 | 2.000 | No |
| 404 | 26.52 | 1.48 | 0.00 | 1.48 | 0.48 | 0.313 | 1.18 | 0.266 | 1.00 | 1.30 | 2.000 | No |
| 405 | 26.58 | 1.48 | 0.00 | 1.48 | 0.48 | 0.313 | 1.18 | 0.265 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 406 | 26.64 | 1.48 | 0.00 | 1.48 | 0.48 | 0.312 | 1.18 | 0.265 | 1.00 | 1.30 | 2.000 | No |
| 407 | 26.74 | 1.49 | 0.00 | 1.49 | 0.48 | 0.311 | 1.18 | 0.264 | 1.00 | 1.30 | 2.000 | No |
| 408 | 26.80 | 1.49 | 0.00 | 1.49 | 0.48 | 0.310 | 1.18 | 0.263 | 1.00 | 1.30 | 2.000 | No |
| 409 | 26.87 | 1.50 | 0.00 | 1.50 | 0.48 | 0.309 | 1.18 | 0.262 | 1.00 | 1.30 | 2.000 | No |
| 410 | 26.93 | 1.50 | 0.00 | 1.50 | 0.47 | 0.308 | 1.18 | 0.262 | 1.00 | 1.30 | 2.000 | No |
| 411 | 26.99 | 1.51 | 0.00 | 1.51 | 0.47 | 0.308 | 1.18 | 0.261 | 1.00 | 1.30 | 2.000 | No |
| 412 | 27.05 | 1.51 | 0.00 | 1.51 | 0.47 | 0.307 | 1.18 | 0.261 | 1.00 | 1.30 | 2.000 | No |
| 413 | 27.12 | 1.51 | 0.00 | 1.51 | 0.47 | 0.306 | 1.18 | 0.260 | 1.00 | 1.30 | 2.000 | No |
| 414 | 27.18 | 1.52 | 0.00 | 1.52 | 0.47 | 0.305 | 1.18 | 0.259 | 1.00 | 1.30 | 2.000 | No |
| 415 | 27.24 | 1.52 | 0.00 | 1.52 | 0.47 | 0.305 | 1.18 | 0.259 | 1.00 | 1.30 | 2.000 | No |
| 416 | 27.30 | 1.53 | 0.00 | 1.53 | 0.47 | 0.304 | 1.18 | 0.258 | 1.00 | 1.30 | 2.000 | No |
| 417 | 27.36 | 1.53 | 0.00 | 1.53 | 0.47 | 0.303 | 1.18 | 0.257 | 1.00 | 1.30 | 2.000 | No |
| 418 | 27.45 | 1.54 | 0.00 | 1.54 | 0.46 | 0.302 | 1.18 | 0.256 | 1.00 | 1.30 | 2.000 | No |
| 419 | 27.51 | 1.54 | 0.00 | 1.54 | 0.46 | 0.301 | 1.18 | 0.256 | 1.00 | 1.30 | 2.000 | No |
| 420 | 27.58 | 1.54 | 0.00 | 1.54 | 0.46 | 0.301 | 1.18 | 0.255 | 1.00 | 1.30 | 2.000 | No |
| 421 | 27.64 | 1.55 | 0.00 | 1.55 | 0.46 | 0.300 | 1.18 | 0.255 | 1.00 | 1.30 | 2.000 | No |
| 422 | 27.70 | 1.55 | 0.00 | 1.55 | 0.46 | 0.299 | 1.18 | 0.254 | 1.00 | 1.30 | 2.000 | No |
| 423 | 27.77 | 1.55 | 0.00 | 1.55 | 0.46 | 0.298 | 1.18 | 0.253 | 1.00 | 1.30 | 2.000 | No |
| 424 | 27.83 | 1.56 | 0.00 | 1.56 | 0.46 | 0.298 | 1.18 | 0.253 | 1.00 | 1.30 | 2.000 | No |
| 425 | 27.89 | 1.56 | 0.00 | 1.56 | 0.46 | 0.297 | 1.18 | 0.252 | 1.00 | 1.30 | 2.000 | No |
| 426 | 28.01 | 1.57 | 0.00 | 1.57 | 0.45 | 0.296 | 1.18 | 0.251 | 1.00 | 1.30 | 2.000 | No |
| 427 | 28.05 | 1.57 | 0.00 | 1.57 | 0.45 | 0.295 | 1.18 | 0.251 | 1.00 | 1.30 | 2.000 | No |
| 428 | 28.11 | 1.58 | 0.00 | 1.58 | 0.45 | 0.294 | 1.18 | 0.250 | 1.00 | 1.30 | 2.000 | No |
| 429 | 28.16 | 1.58 | 0.00 | 1.58 | 0.45 | 0.294 | 1.18 | 0.250 | 1.00 | 1.30 | 2.000 | No |
| 430 | 28.23 | 1.58 | 0.00 | 1.58 | 0.45 | 0.293 | 1.18 | 0.249 | 1.00 | 1.30 | 2.000 | No |
| 431 | 28.29 | 1.59 | 0.00 | 1.59 | 0.45 | 0.292 | 1.18 | 0.248 | 1.00 | 1.30 | 2.000 | No |
| 432 | 28.35 | 1.59 | 0.00 | 1.59 | 0.45 | 0.292 | 1.18 | 0.248 | 1.00 | 1.30 | 2.000 | No |
| 433 | 28.42 | 1.59 | 0.00 | 1.59 | 0.45 | 0.291 | 1.18 | 0.247 | 1.00 | 1.30 | 2.000 | No |
| 434 | 28.48 | 1.60 | 0.00 | 1.60 | 0.45 | 0.290 | 1.18 | 0.246 | 1.00 | 1.30 | 2.000 | No |
| 435 | 28.57 | 1.60 | 0.00 | 1.60 | 0.44 | 0.289 | 1.18 | 0.246 | 1.00 | 1.30 | 2.000 | No |
| 436 | 28.64 | 1.61 | 0.00 | 1.61 | 0.44 | 0.288 | 1.18 | 0.245 | 1.00 | 1.30 | 2.000 | No |
| 437 | 28.70 | 1.61 | 0.00 | 1.61 | 0.44 | 0.288 | 1.18 | 0.244 | 1.00 | 1.30 | 2.000 | No |
| 438 | 28.76 | 1.62 | 0.00 | 1.62 | 0.44 | 0.287 | 1.18 | 0.244 | 1.00 | 1.30 | 2.000 | No |
| 439 | 28.82 | 1.62 | 0.00 | 1.62 | 0.44 | 0.286 | 1.18 | 0.243 | 1.00 | 1.30 | 2.000 | No |
| 440 | 28.88 | 1.62 | 0.00 | 1.62 | 0.44 | 0.286 | 1.18 | 0.243 | 1.00 | 1.30 | 2.000 | No |
| 441 | 28.94 | 1.63 | 0.00 | 1.63 | 0.44 | 0.285 | 1.18 | 0.242 | 1.00 | 1.30 | 2.000 | No |
| 442 | 29.03 | 1.63 | 0.00 | 1.63 | 0.44 | 0.284 | 1.18 | 0.241 | 1.00 | 1.30 | 2.000 | No |
| 443 | 29.09 | 1.64 | 0.00 | 1.64 | 0.44 | 0.283 | 1.18 | 0.241 | 1.00 | 1.30 | 2.000 | No |
| 444 | 29.15 | 1.64 | 0.00 | 1.64 | 0.43 | 0.283 | 1.18 | 0.240 | 1.00 | 1.30 | 2.000 | No |
| 445 | 29.21 | 1.64 | 0.00 | 1.64 | 0.43 | 0.282 | 1.18 | 0.239 | 1.00 | 1.30 | 2.000 | No |
| 446 | 29.28 | 1.65 | 0.00 | 1.65 | 0.43 | 0.281 | 1.18 | 0.239 | 1.00 | 1.30 | 2.000 | No |
| 447 | 29.34 | 1.65 | 0.00 | 1.65 | 0.43 | 0.281 | 1.18 | 0.238 | 1.00 | 1.30 | 2.000 | No |
| 448 | 29.41 | 1.66 | 0.00 | 1.66 | 0.43 | 0.280 | 1.18 | 0.238 | 1.00 | 1.30 | 2.000 | No |
| 449 | 29.49 | 1.66 | 0.00 | 1.66 | 0.43 | 0.279 | 1.18 | 0.237 | 1.00 | 1.30 | 2.000 | No |
| 450 | 29.55 | 1.67 | 0.00 | 1.67 | 0.43 | 0.278 | 1.18 | 0.236 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 451 | 29.61 | 1.67 | 0.00 | 1.67 | 0.43 | 0.278 | 1.18 | 0.236 | 1.00 | 1.30 | 2.000 | No |
| 452 | 29.67 | 1.67 | 0.00 | 1.67 | 0.43 | 0.277 | 1.18 | 0.235 | 1.00 | 1.30 | 2.000 | No |
| 453 | 29.73 | 1.68 | 0.00 | 1.68 | 0.43 | 0.276 | 1.18 | 0.235 | 1.00 | 1.30 | 2.000 | No |
| 454 | 29.80 | 1.68 | 0.00 | 1.68 | 0.42 | 0.276 | 1.18 | 0.234 | 1.00 | 1.30 | 2.000 | No |
| 455 | 29.86 | 1.69 | 0.00 | 1.69 | 0.42 | 0.275 | 1.18 | 0.234 | 1.00 | 1.30 | 2.000 | No |
| 456 | 29.93 | 1.69 | 0.00 | 1.69 | 0.42 | 0.274 | 1.18 | 0.233 | 1.00 | 1.30 | 2.000 | No |
| 457 | 29.99 | 1.70 | 0.00 | 1.70 | 0.42 | 0.274 | 1.18 | 0.232 | 1.00 | 1.30 | 2.000 | No |
| 458 | 30.07 | 1.70 | 0.00 | 1.70 | 0.42 | 0.273 | 1.18 | 0.232 | 1.00 | 1.30 | 0.302 | No |
| 459 | 30.12 | 1.70 | 0.00 | 1.70 | 0.42 | 0.273 | 1.18 | 0.232 | 1.00 | 1.30 | 0.301 | No |
| 460 | 30.19 | 1.71 | 0.01 | 1.70 | 0.42 | 0.272 | 1.18 | 0.231 | 1.00 | 1.30 | 0.301 | No |
| 461 | 30.25 | 1.71 | 0.01 | 1.70 | 0.42 | 0.272 | 1.18 | 0.231 | 1.00 | 1.30 | 0.300 | No |
| 462 | 30.33 | 1.72 | 0.01 | 1.71 | 0.42 | 0.272 | 1.18 | 0.231 | 1.00 | 1.30 | 0.300 | No |
| 463 | 30.40 | 1.72 | 0.01 | 1.71 | 0.41 | 0.271 | 1.18 | 0.230 | 1.00 | 1.30 | 0.300 | No |
| 464 | 30.46 | 1.73 | 0.01 | 1.71 | 0.41 | 0.271 | 1.18 | 0.230 | 1.00 | 1.30 | 0.299 | No |
| 465 | 30.52 | 1.73 | 0.02 | 1.71 | 0.41 | 0.271 | 1.18 | 0.230 | 1.00 | 1.30 | 0.299 | No |
| 466 | 30.59 | 1.73 | 0.02 | 1.71 | 0.41 | 0.270 | 1.18 | 0.229 | 1.00 | 1.30 | 0.298 | No |
| 467 | 30.65 | 1.74 | 0.02 | 1.72 | 0.41 | 0.270 | 1.18 | 0.229 | 1.00 | 1.30 | 0.298 | No |
| 468 | 30.73 | 1.74 | 0.02 | 1.72 | 0.41 | 0.270 | 1.18 | 0.229 | 1.00 | 1.30 | 0.297 | No |
| 469 | 30.78 | 1.75 | 0.02 | 1.72 | 0.41 | 0.269 | 1.18 | 0.229 | 1.00 | 1.30 | 0.297 | No |
| 470 | 30.84 | 1.75 | 0.03 | 1.72 | 0.41 | 0.269 | 1.18 | 0.228 | 1.00 | 1.30 | 0.297 | No |
| 471 | 30.91 | 1.75 | 0.03 | 1.72 | 0.41 | 0.268 | 1.18 | 0.228 | 1.00 | 1.30 | 0.296 | No |
| 472 | 30.99 | 1.76 | 0.03 | 1.73 | 0.41 | 0.268 | 1.18 | 0.228 | 1.00 | 1.30 | 0.296 | No |
| 473 | 31.05 | 1.76 | 0.03 | 1.73 | 0.40 | 0.268 | 1.18 | 0.227 | 1.00 | 1.30 | 0.295 | No |
| 474 | 31.11 | 1.77 | 0.03 | 1.73 | 0.40 | 0.267 | 1.18 | 0.227 | 1.00 | 1.30 | 0.295 | No |
| 475 | 31.20 | 1.77 | 0.04 | 1.73 | 0.40 | 0.267 | 1.18 | 0.227 | 1.00 | 1.30 | 0.295 | No |
| 476 | 31.26 | 1.78 | 0.04 | 1.74 | 0.40 | 0.267 | 1.18 | 0.226 | 1.00 | 1.30 | 0.294 | No |
| 477 | 31.31 | 1.78 | 0.04 | 1.74 | 0.40 | 0.266 | 1.18 | 0.226 | 1.00 | 1.30 | 0.294 | No |
| 478 | 31.38 | 1.78 | 0.04 | 1.74 | 0.40 | 0.266 | 1.18 | 0.226 | 1.00 | 1.30 | 0.293 | No |
| 479 | 31.46 | 1.79 | 0.05 | 1.74 | 0.40 | 0.265 | 1.18 | 0.225 | 1.00 | 1.30 | 0.293 | No |
| 480 | 31.52 | 1.79 | 0.05 | 1.74 | 0.40 | 0.265 | 1.18 | 0.225 | 1.00 | 1.30 | 0.293 | No |
| 481 | 31.57 | 1.80 | 0.05 | 1.75 | 0.40 | 0.265 | 1.18 | 0.225 | 1.00 | 1.30 | 0.292 | No |
| 482 | 31.64 | 1.80 | 0.05 | 1.75 | 0.40 | 0.264 | 1.18 | 0.224 | 1.00 | 1.30 | 0.292 | No |
| 483 | 31.69 | 1.80 | 0.05 | 1.75 | 0.39 | 0.264 | 1.18 | 0.224 | 1.00 | 1.30 | 0.291 | No |
| 484 | 31.79 | 1.81 | 0.06 | 1.75 | 0.39 | 0.264 | 1.18 | 0.224 | 1.00 | 1.30 | 0.291 | No |
| 485 | 31.85 | 1.81 | 0.06 | 1.76 | 0.39 | 0.263 | 1.18 | 0.223 | 1.00 | 1.30 | 0.291 | No |
| 486 | 31.91 | 1.82 | 0.06 | 1.76 | 0.39 | 0.263 | 1.18 | 0.223 | 1.00 | 1.30 | 0.290 | No |
| 487 | 31.97 | 1.82 | 0.06 | 1.76 | 0.39 | 0.263 | 1.18 | 0.223 | 1.00 | 1.30 | 0.290 | No |
| 488 | 32.03 | 1.83 | 0.06 | 1.76 | 0.39 | 0.262 | 1.18 | 0.223 | 1.00 | 1.30 | 0.289 | No |
| 489 | 32.09 | 1.83 | 0.07 | 1.76 | 0.39 | 0.262 | 1.18 | 0.222 | 1.00 | 1.30 | 0.289 | No |
| 490 | 32.18 | 1.84 | 0.07 | 1.77 | 0.39 | 0.261 | 1.18 | 0.222 | 1.00 | 1.30 | 0.288 | No |
| 491 | 32.23 | 1.84 | 0.07 | 1.77 | 0.39 | 0.261 | 1.18 | 0.222 | 1.00 | 1.30 | 0.288 | No |
| 492 | 32.30 | 1.84 | 0.07 | 1.77 | 0.39 | 0.261 | 1.18 | 0.221 | 1.00 | 1.30 | 0.288 | No |
| 493 | 32.36 | 1.85 | 0.07 | 1.77 | 0.38 | 0.260 | 1.18 | 0.221 | 1.00 | 1.30 | 0.287 | No |
| 494 | 32.42 | 1.85 | 0.08 | 1.78 | 0.38 | 0.260 | 1.18 | 0.221 | 1.00 | 1.30 | 0.287 | No |
| 495 | 32.48 | 1.86 | 0.08 | 1.78 | 0.38 | 0.260 | 1.18 | 0.220 | 1.00 | 1.30 | 0.287 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 496 | 32.56 | 1.86 | 0.08 | 1.78 | 0.38 | 0.259 | 1.18 | 0.220 | 1.00 | 1.30 | 0.286 | No |
| 497 | 32.63 | 1.87 | 0.08 | 1.78 | 0.38 | 0.259 | 1.18 | 0.220 | 1.00 | 1.30 | 0.286 | No |
| 498 | 32.69 | 1.87 | 0.08 | 1.79 | 0.38 | 0.258 | 1.18 | 0.219 | 1.00 | 1.30 | 0.285 | No |
| 499 | 32.75 | 1.87 | 0.09 | 1.79 | 0.38 | 0.258 | 1.18 | 0.219 | 1.00 | 1.30 | 0.285 | No |
| 500 | 32.81 | 1.88 | 0.09 | 1.79 | 0.38 | 0.258 | 1.18 | 0.219 | 1.00 | 1.30 | 0.285 | No |
| 501 | 32.90 | 1.88 | 0.09 | 1.79 | 0.38 | 0.257 | 1.18 | 0.218 | 1.00 | 1.30 | 0.284 | No |
| 502 | 32.94 | 1.89 | 0.09 | 1.79 | 0.38 | 0.257 | 1.18 | 0.218 | 1.00 | 1.30 | 0.284 | No |
| 503 | 33.02 | 1.89 | 0.09 | 1.80 | 0.38 | 0.257 | 1.18 | 0.218 | 1.00 | 1.30 | 0.283 | No |
| 504 | 33.09 | 1.90 | 0.10 | 1.80 | 0.37 | 0.256 | 1.18 | 0.218 | 1.00 | 1.30 | 0.283 | No |
| 505 | 33.15 | 1.90 | 0.10 | 1.80 | 0.37 | 0.256 | 1.18 | 0.217 | 1.00 | 1.30 | 0.282 | No |
| 506 | 33.21 | 1.90 | 0.10 | 1.80 | 0.37 | 0.256 | 1.18 | 0.217 | 1.00 | 1.30 | 0.282 | No |
| 507 | 33.27 | 1.91 | 0.10 | 1.80 | 0.37 | 0.255 | 1.18 | 0.217 | 1.00 | 1.30 | 0.282 | No |
| 508 | 33.36 | 1.91 | 0.10 | 1.81 | 0.37 | 0.255 | 1.18 | 0.216 | 1.00 | 1.30 | 0.281 | No |
| 509 | 33.43 | 1.92 | 0.11 | 1.81 | 0.37 | 0.254 | 1.18 | 0.216 | 1.00 | 1.30 | 0.281 | No |
| 510 | 33.48 | 1.92 | 0.11 | 1.81 | 0.37 | 0.254 | 1.18 | 0.216 | 1.00 | 1.30 | 0.280 | No |
| 511 | 33.54 | 1.92 | 0.11 | 1.81 | 0.37 | 0.254 | 1.18 | 0.215 | 1.00 | 1.30 | 0.280 | No |
| 512 | 33.60 | 1.93 | 0.11 | 1.82 | 0.37 | 0.253 | 1.18 | 0.215 | 1.00 | 1.30 | 0.280 | No |
| 513 | 33.69 | 1.93 | 0.11 | 1.82 | 0.37 | 0.253 | 1.18 | 0.215 | 1.00 | 1.30 | 0.279 | No |
| 514 | 33.75 | 1.94 | 0.12 | 1.82 | 0.37 | 0.253 | 1.18 | 0.214 | 1.00 | 1.30 | 0.279 | No |
| 515 | 33.81 | 1.94 | 0.12 | 1.82 | 0.36 | 0.252 | 1.18 | 0.214 | 1.00 | 1.30 | 0.278 | No |
| 516 | 33.88 | 1.95 | 0.12 | 1.83 | 0.36 | 0.252 | 1.18 | 0.214 | 1.00 | 1.30 | 0.278 | No |
| 517 | 33.93 | 1.95 | 0.12 | 1.83 | 0.36 | 0.252 | 1.18 | 0.214 | 1.00 | 1.30 | 0.278 | No |
| 518 | 34.00 | 1.95 | 0.12 | 1.83 | 0.36 | 0.251 | 1.18 | 0.213 | 1.00 | 1.30 | 0.277 | No |
| 519 | 34.06 | 1.96 | 0.13 | 1.83 | 0.36 | 0.251 | 1.18 | 0.213 | 1.00 | 1.30 | 0.277 | No |
| 520 | 34.12 | 1.96 | 0.13 | 1.83 | 0.36 | 0.251 | 1.18 | 0.213 | 1.00 | 1.30 | 0.277 | No |
| 521 | 34.20 | 1.97 | 0.13 | 1.84 | 0.36 | 0.250 | 1.18 | 0.212 | 1.00 | 1.30 | 0.276 | No |
| 522 | 34.26 | 1.97 | 0.13 | 1.84 | 0.36 | 0.250 | 1.18 | 0.212 | 1.00 | 1.30 | 0.276 | No |
| 523 | 34.33 | 1.98 | 0.13 | 1.84 | 0.36 | 0.249 | 1.18 | 0.212 | 1.00 | 1.30 | 0.275 | No |
| 524 | 34.38 | 1.98 | 0.14 | 1.84 | 0.36 | 0.249 | 1.18 | 0.211 | 1.00 | 1.30 | 0.275 | No |
| 525 | 34.45 | 1.99 | 0.14 | 1.85 | 0.36 | 0.249 | 1.18 | 0.211 | 1.00 | 1.30 | 0.275 | No |
| 526 | 34.52 | 1.99 | 0.14 | 1.85 | 0.36 | 0.248 | 1.18 | 0.211 | 1.00 | 1.30 | 0.274 | No |
| 527 | 34.60 | 1.99 | 0.14 | 1.85 | 0.35 | 0.248 | 1.18 | 0.210 | 1.00 | 1.30 | 0.274 | No |
| 528 | 34.65 | 2.00 | 0.15 | 1.85 | 0.35 | 0.248 | 1.18 | 0.210 | 1.00 | 1.30 | 0.273 | No |
| 529 | 34.73 | 2.00 | 0.15 | 1.86 | 0.35 | 0.247 | 1.18 | 0.210 | 1.00 | 1.30 | 0.273 | No |
| 530 | 34.78 | 2.01 | 0.15 | 1.86 | 0.35 | 0.247 | 1.18 | 0.210 | 1.00 | 1.30 | 0.273 | No |
| 531 | 34.85 | 2.01 | 0.15 | 1.86 | 0.35 | 0.247 | 1.18 | 0.209 | 1.00 | 1.30 | 0.272 | No |
| 532 | 34.91 | 2.01 | 0.15 | 1.86 | 0.35 | 0.246 | 1.18 | 0.209 | 1.00 | 1.30 | 0.272 | No |
| 533 | 34.97 | 2.02 | 0.16 | 1.86 | 0.35 | 0.246 | 1.18 | 0.209 | 1.00 | 1.30 | 0.271 | No |
| 534 | 35.04 | 2.02 | 0.16 | 1.87 | 0.35 | 0.245 | 1.18 | 0.208 | 1.00 | 1.30 | 0.271 | No |
| 535 | 35.12 | 2.03 | 0.16 | 1.87 | 0.35 | 0.245 | 1.18 | 0.208 | 1.00 | 1.30 | 0.271 | No |
| 536 | 35.18 | 2.03 | 0.16 | 1.87 | 0.35 | 0.245 | 1.18 | 0.208 | 1.00 | 1.30 | 0.270 | No |
| 537 | 35.25 | 2.04 | 0.16 | 1.87 | 0.35 | 0.244 | 1.18 | 0.208 | 1.00 | 1.30 | 0.270 | No |
| 538 | 35.30 | 2.04 | 0.17 | 1.87 | 0.35 | 0.244 | 1.18 | 0.207 | 1.00 | 1.30 | 0.269 | No |
| 539 | 35.37 | 2.04 | 0.17 | 1.88 | 0.34 | 0.244 | 1.18 | 0.207 | 1.00 | 1.30 | 0.269 | No |
| 540 | 35.43 | 2.05 | 0.17 | 1.88 | 0.34 | 0.243 | 1.18 | 0.207 | 1.00 | 1.30 | 0.269 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 541 | 35.52 | 2.05 | 0.17 | 1.88 | 0.34 | 0.243 | 1.18 | 0.206 | 1.00 | 1.30 | 0.268 | No |
| 542 | 35.58 | 2.06 | 0.17 | 1.88 | 0.34 | 0.243 | 1.18 | 0.206 | 1.00 | 1.30 | 0.268 | No |
| 543 | 35.64 | 2.06 | 0.18 | 1.88 | 0.34 | 0.242 | 1.18 | 0.206 | 1.00 | 1.30 | 0.268 | No |
| 544 | 35.70 | 2.06 | 0.18 | 1.89 | 0.34 | 0.242 | 1.18 | 0.205 | 1.00 | 1.30 | 0.267 | No |
| 545 | 35.77 | 2.07 | 0.18 | 1.89 | 0.34 | 0.242 | 1.18 | 0.205 | 1.00 | 1.30 | 0.267 | No |
| 546 | 35.83 | 2.07 | 0.18 | 1.89 | 0.34 | 0.241 | 1.18 | 0.205 | 1.00 | 1.30 | 0.266 | No |
| 547 | 35.89 | 2.08 | 0.18 | 1.89 | 0.34 | 0.241 | 1.18 | 0.205 | 1.00 | 1.30 | 0.266 | No |
| 548 | 35.97 | 2.08 | 0.19 | 1.89 | 0.34 | 0.241 | 1.18 | 0.204 | 1.00 | 1.30 | 0.266 | No |
| 549 | 36.04 | 2.09 | 0.19 | 1.90 | 0.34 | 0.240 | 1.18 | 0.204 | 1.00 | 1.30 | 0.265 | No |
| 550 | 36.12 | 2.09 | 0.19 | 1.90 | 0.34 | 0.240 | 1.18 | 0.204 | 1.00 | 1.30 | 0.265 | No |
| 551 | 36.16 | 2.09 | 0.19 | 1.90 | 0.33 | 0.240 | 1.18 | 0.203 | 1.00 | 1.30 | 0.265 | No |
| 552 | 36.23 | 2.10 | 0.19 | 1.90 | 0.33 | 0.239 | 1.18 | 0.203 | 1.00 | 1.30 | 0.264 | No |
| 553 | 36.31 | 2.10 | 0.20 | 1.91 | 0.33 | 0.239 | 1.18 | 0.203 | 1.00 | 1.30 | 0.264 | No |
| 554 | 36.35 | 2.11 | 0.20 | 1.91 | 0.33 | 0.239 | 1.18 | 0.203 | 1.00 | 1.30 | 0.263 | No |
| 555 | 36.44 | 2.11 | 0.20 | 1.91 | 0.33 | 0.238 | 1.18 | 0.202 | 1.00 | 1.30 | 0.263 | No |
| 556 | 36.49 | 2.11 | 0.20 | 1.91 | 0.33 | 0.238 | 1.18 | 0.202 | 1.00 | 1.30 | 0.263 | No |
| 557 | 36.57 | 2.12 | 0.21 | 1.91 | 0.33 | 0.238 | 1.18 | 0.202 | 1.00 | 1.30 | 0.262 | No |
| 558 | 36.62 | 2.12 | 0.21 | 1.92 | 0.33 | 0.237 | 1.18 | 0.201 | 1.00 | 1.30 | 0.262 | No |
| 559 | 36.70 | 2.13 | 0.21 | 1.92 | 0.33 | 0.237 | 1.18 | 0.201 | 1.00 | 1.30 | 0.261 | No |
| 560 | 36.76 | 2.13 | 0.21 | 1.92 | 0.33 | 0.237 | 1.18 | 0.201 | 1.00 | 1.30 | 0.261 | No |
| 561 | 36.81 | 2.13 | 0.21 | 1.92 | 0.33 | 0.236 | 1.18 | 0.201 | 1.00 | 1.30 | 0.261 | No |
| 562 | 36.89 | 2.14 | 0.21 | 1.92 | 0.33 | 0.236 | 1.18 | 0.200 | 1.00 | 1.30 | 0.260 | No |
| 563 | 36.96 | 2.14 | 0.22 | 1.93 | 0.33 | 0.236 | 1.18 | 0.200 | 1.00 | 1.30 | 0.260 | No |
| 564 | 37.01 | 2.15 | 0.22 | 1.93 | 0.33 | 0.235 | 1.18 | 0.200 | 1.00 | 1.30 | 0.260 | No |
| 565 | 37.08 | 2.15 | 0.22 | 1.93 | 0.32 | 0.235 | 1.18 | 0.200 | 1.00 | 1.30 | 0.259 | No |
| 566 | 37.15 | 2.16 | 0.22 | 1.93 | 0.32 | 0.235 | 1.18 | 0.199 | 1.00 | 1.30 | 0.259 | No |
| 567 | 37.22 | 2.16 | 0.23 | 1.93 | 0.32 | 0.234 | 1.18 | 0.199 | 1.00 | 1.30 | 0.259 | No |
| 568 | 37.29 | 2.16 | 0.23 | 1.94 | 0.32 | 0.234 | 1.18 | 0.199 | 1.00 | 1.30 | 0.258 | No |
| 569 | 37.34 | 2.17 | 0.23 | 1.94 | 0.32 | 0.234 | 1.18 | 0.198 | 1.00 | 1.30 | 0.258 | No |
| 570 | 37.41 | 2.17 | 0.23 | 1.94 | 0.32 | 0.233 | 1.18 | 0.198 | 1.00 | 1.30 | 0.258 | No |
| 571 | 37.48 | 2.18 | 0.23 | 1.94 | 0.32 | 0.233 | 1.18 | 0.198 | 1.00 | 1.30 | 0.257 | No |
| 572 | 37.54 | 2.18 | 0.24 | 1.95 | 0.32 | 0.233 | 1.18 | 0.198 | 1.00 | 1.30 | 0.257 | No |
| 573 | 37.62 | 2.19 | 0.24 | 1.95 | 0.32 | 0.232 | 1.18 | 0.197 | 1.00 | 1.30 | 0.256 | No |
| 574 | 37.67 | 2.19 | 0.24 | 1.95 | 0.32 | 0.232 | 1.18 | 0.197 | 1.00 | 1.30 | 0.256 | No |
| 575 | 37.74 | 2.19 | 0.24 | 1.95 | 0.32 | 0.232 | 1.18 | 0.197 | 1.00 | 1.30 | 0.256 | No |
| 576 | 37.82 | 2.20 | 0.24 | 1.95 | 0.32 | 0.231 | 1.18 | 0.196 | 1.00 | 1.30 | 0.255 | No |
| 577 | 37.88 | 2.20 | 0.25 | 1.96 | 0.32 | 0.231 | 1.18 | 0.196 | 1.00 | 1.30 | 0.255 | No |
| 578 | 37.95 | 2.21 | 0.25 | 1.96 | 0.32 | 0.231 | 1.18 | 0.196 | 1.00 | 1.30 | 0.255 | No |
| 579 | 38.00 | 2.21 | 0.25 | 1.96 | 0.31 | 0.230 | 1.18 | 0.196 | 1.00 | 1.30 | 0.254 | No |
| 580 | 38.07 | 2.21 | 0.25 | 1.96 | 0.31 | 0.230 | 1.18 | 0.195 | 1.00 | 1.30 | 0.254 | No |
| 581 | 38.14 | 2.22 | 0.25 | 1.97 | 0.31 | 0.230 | 1.18 | 0.195 | 1.00 | 1.30 | 0.254 | No |
| 582 | 38.20 | 2.22 | 0.26 | 1.97 | 0.31 | 0.230 | 1.18 | 0.195 | 1.00 | 1.30 | 0.253 | No |
| 583 | 38.26 | 2.23 | 0.26 | 1.97 | 0.31 | 0.229 | 1.18 | 0.195 | 1.00 | 1.30 | 0.253 | No |
| 584 | 38.33 | 2.23 | 0.26 | 1.97 | 0.31 | 0.229 | 1.18 | 0.194 | 1.00 | 1.30 | 0.253 | No |
| 585 | 38.40 | 2.24 | 0.26 | 1.97 | 0.31 | 0.229 | 1.18 | 0.194 | 1.00 | 1.30 | 0.252 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 586 | 38.45 | 2.24 | 0.26 | 1.98 | 0.31 | 0.228 | 1.18 | 0.194 | 1.00 | 1.30 | 0.252 | No |
| 587 | 38.52 | 2.24 | 0.27 | 1.98 | 0.31 | 0.228 | 1.18 | 0.194 | 1.00 | 1.30 | 0.252 | No |
| 588 | 38.60 | 2.25 | 0.27 | 1.98 | 0.31 | 0.228 | 1.18 | 0.193 | 1.00 | 1.30 | 0.251 | No |
| 589 | 38.65 | 2.25 | 0.27 | 1.98 | 0.31 | 0.227 | 1.18 | 0.193 | 1.00 | 1.30 | 0.251 | No |
| 590 | 38.72 | 2.26 | 0.27 | 1.99 | 0.31 | 0.227 | 1.18 | 0.193 | 1.00 | 1.30 | 0.251 | No |
| 591 | 38.79 | 2.26 | 0.27 | 1.99 | 0.31 | 0.227 | 1.18 | 0.193 | 1.00 | 1.30 | 0.250 | No |
| 592 | 38.87 | 2.27 | 0.28 | 1.99 | 0.31 | 0.226 | 1.18 | 0.192 | 1.00 | 1.30 | 0.250 | No |
| 593 | 38.94 | 2.27 | 0.28 | 1.99 | 0.31 | 0.226 | 1.18 | 0.192 | 1.00 | 1.30 | 0.250 | No |
| 594 | 38.98 | 2.27 | 0.28 | 1.99 | 0.30 | 0.226 | 1.18 | 0.192 | 1.00 | 1.30 | 0.249 | No |
| 595 | 39.06 | 2.28 | 0.28 | 2.00 | 0.30 | 0.226 | 1.18 | 0.191 | 1.00 | 1.30 | 0.249 | No |
| 596 | 39.13 | 2.28 | 0.28 | 2.00 | 0.30 | 0.225 | 1.18 | 0.191 | 1.00 | 1.30 | 0.249 | No |
| 597 | 39.20 | 2.29 | 0.29 | 2.00 | 0.30 | 0.225 | 1.18 | 0.191 | 1.00 | 1.30 | 0.248 | No |
| 598 | 39.26 | 2.29 | 0.29 | 2.00 | 0.30 | 0.225 | 1.18 | 0.191 | 1.00 | 1.30 | 0.248 | No |
| 599 | 39.33 | 2.30 | 0.29 | 2.01 | 0.30 | 0.224 | 1.18 | 0.190 | 1.00 | 1.30 | 0.248 | No |
| 600 | 39.39 | 2.30 | 0.29 | 2.01 | 0.30 | 0.224 | 1.18 | 0.190 | 1.00 | 1.30 | 0.247 | No |
| 601 | 39.48 | 2.31 | 0.30 | 2.01 | 0.30 | 0.224 | 1.18 | 0.190 | 1.00 | 1.30 | 0.247 | No |
| 602 | 39.50 | 2.31 | 0.30 | 2.01 | 0.30 | 0.223 | 1.18 | 0.190 | 1.00 | 1.30 | 0.247 | No |
| 603 | 39.57 | 2.31 | 0.30 | 2.02 | 0.30 | 0.223 | 1.18 | 0.189 | 1.00 | 1.30 | 0.246 | No |
| 604 | 39.64 | 2.32 | 0.30 | 2.02 | 0.30 | 0.223 | 1.18 | 0.189 | 1.00 | 1.30 | 0.246 | No |
| 605 | 39.71 | 2.32 | 0.30 | 2.02 | 0.30 | 0.223 | 1.18 | 0.189 | 1.00 | 1.30 | 0.246 | No |
| 606 | 39.77 | 2.33 | 0.30 | 2.02 | 0.30 | 0.222 | 1.18 | 0.189 | 1.00 | 1.30 | 0.245 | No |
| 607 | 39.84 | 2.33 | 0.31 | 2.02 | 0.30 | 0.222 | 1.18 | 0.188 | 1.00 | 1.30 | 0.245 | No |
| 608 | 39.91 | 2.34 | 0.31 | 2.03 | 0.30 | 0.222 | 1.18 | 0.188 | 1.00 | 1.30 | 0.245 | No |
| 609 | 39.97 | 2.34 | 0.31 | 2.03 | 0.30 | 0.221 | 1.18 | 0.188 | 1.00 | 1.30 | 0.244 | No |
| 610 | 40.03 | 2.34 | 0.31 | 2.03 | 0.29 | 0.221 | 1.18 | 0.188 | 1.00 | 1.30 | 0.244 | No |
| 611 | 40.10 | 2.35 | 0.32 | 2.03 | 0.29 | 0.221 | 1.18 | 0.188 | 1.00 | 1.30 | 0.244 | No |
| 612 | 40.18 | 2.35 | 0.32 | 2.04 | 0.29 | 0.220 | 1.18 | 0.187 | 1.00 | 1.30 | 0.243 | No |
| 613 | 40.23 | 2.36 | 0.32 | 2.04 | 0.29 | 0.220 | 1.18 | 0.187 | 1.00 | 1.30 | 0.243 | No |
| 614 | 40.30 | 2.36 | 0.32 | 2.04 | 0.29 | 0.220 | 1.18 | 0.187 | 1.00 | 1.30 | 0.243 | No |
| 615 | 40.38 | 2.37 | 0.32 | 2.04 | 0.29 | 0.220 | 1.18 | 0.186 | 1.00 | 1.30 | 0.242 | No |
| 616 | 40.42 | 2.37 | 0.33 | 2.04 | 0.29 | 0.219 | 1.18 | 0.186 | 1.00 | 1.30 | 0.242 | No |
| 617 | 40.50 | 2.38 | 0.33 | 2.05 | 0.29 | 0.219 | 1.18 | 0.186 | 1.00 | 1.30 | 0.242 | No |
| 618 | 40.57 | 2.38 | 0.33 | 2.05 | 0.29 | 0.219 | 1.18 | 0.186 | 1.00 | 1.30 | 0.242 | No |
| 619 | 40.62 | 2.38 | 0.33 | 2.05 | 0.29 | 0.219 | 1.18 | 0.186 | 1.00 | 1.30 | 0.241 | No |
| 620 | 40.70 | 2.39 | 0.33 | 2.05 | 0.29 | 0.218 | 1.18 | 0.185 | 1.00 | 1.30 | 0.241 | No |
| 621 | 40.75 | 2.39 | 0.34 | 2.06 | 0.29 | 0.218 | 1.18 | 0.185 | 1.00 | 1.30 | 0.241 | No |
| 622 | 40.82 | 2.40 | 0.34 | 2.06 | 0.29 | 0.218 | 1.18 | 0.185 | 1.00 | 1.30 | 0.240 | No |
| 623 | 40.89 | 2.40 | 0.34 | 2.06 | 0.29 | 0.217 | 1.18 | 0.185 | 1.00 | 1.30 | 0.240 | No |
| 624 | 40.96 | 2.40 | 0.34 | 2.06 | 0.29 | 0.217 | 1.18 | 0.184 | 1.00 | 1.30 | 0.240 | No |
| 625 | 41.01 | 2.41 | 0.34 | 2.07 | 0.29 | 0.217 | 1.18 | 0.184 | 1.00 | 1.30 | 0.239 | No |
| 626 | 41.08 | 2.41 | 0.35 | 2.07 | 0.29 | 0.217 | 1.18 | 0.184 | 1.00 | 1.30 | 0.239 | No |
| 627 | 41.15 | 2.42 | 0.35 | 2.07 | 0.29 | 0.216 | 1.18 | 0.184 | 1.00 | 1.30 | 0.239 | No |
| 628 | 41.22 | 2.42 | 0.35 | 2.07 | 0.28 | 0.216 | 1.18 | 0.184 | 1.00 | 1.30 | 0.239 | No |
| 629 | 41.28 | 2.43 | 0.35 | 2.07 | 0.28 | 0.216 | 1.18 | 0.183 | 1.00 | 1.30 | 0.238 | No |
| 630 | 41.36 | 2.43 | 0.35 | 2.08 | 0.28 | 0.216 | 1.18 | 0.183 | 1.00 | 1.30 | 0.238 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 631 | 41.41 | 2.44 | 0.36 | 2.08 | 0.28 | 0.215 | 1.18 | 0.183 | 1.00 | 1.30 | 0.238 | No |
| 632 | 41.49 | 2.44 | 0.36 | 2.08 | 0.28 | 0.215 | 1.18 | 0.183 | 1.00 | 1.30 | 0.237 | No |
| 633 | 41.54 | 2.44 | 0.36 | 2.08 | 0.28 | 0.215 | 1.18 | 0.182 | 1.00 | 1.30 | 0.237 | No |
| 634 | 41.61 | 2.45 | 0.36 | 2.09 | 0.28 | 0.215 | 1.18 | 0.182 | 1.00 | 1.30 | 0.237 | No |
| 635 | 41.67 | 2.45 | 0.36 | 2.09 | 0.28 | 0.214 | 1.18 | 0.182 | 1.00 | 1.30 | 0.237 | No |
| 636 | 41.75 | 2.46 | 0.37 | 2.09 | 0.28 | 0.214 | 1.18 | 0.182 | 1.00 | 1.30 | 0.236 | No |
| 637 | 41.81 | 2.46 | 0.37 | 2.09 | 0.28 | 0.214 | 1.18 | 0.181 | 1.00 | 1.30 | 0.236 | No |
| 638 | 41.87 | 2.47 | 0.37 | 2.10 | 0.28 | 0.213 | 1.18 | 0.181 | 1.00 | 1.30 | 0.236 | No |
| 639 | 41.94 | 2.47 | 0.37 | 2.10 | 0.28 | 0.213 | 1.18 | 0.181 | 1.00 | 1.30 | 0.235 | No |
| 640 | 42.01 | 2.47 | 0.37 | 2.10 | 0.28 | 0.213 | 1.18 | 0.181 | 1.00 | 1.30 | 0.235 | No |
| 641 | 42.06 | 2.48 | 0.38 | 2.10 | 0.28 | 0.213 | 1.18 | 0.181 | 1.00 | 1.30 | 0.235 | No |
| 642 | 42.15 | 2.48 | 0.38 | 2.11 | 0.28 | 0.212 | 1.18 | 0.180 | 1.00 | 1.30 | 0.234 | No |
| 643 | 42.20 | 2.49 | 0.38 | 2.11 | 0.28 | 0.212 | 1.18 | 0.180 | 1.00 | 1.30 | 0.234 | No |
| 644 | 42.26 | 2.49 | 0.38 | 2.11 | 0.28 | 0.212 | 1.18 | 0.180 | 1.00 | 1.30 | 0.234 | No |
| 645 | 42.32 | 2.50 | 0.38 | 2.11 | 0.28 | 0.212 | 1.18 | 0.180 | 1.00 | 1.30 | 0.234 | No |
| 646 | 42.40 | 2.50 | 0.39 | 2.11 | 0.27 | 0.211 | 1.18 | 0.180 | 1.00 | 1.30 | 0.233 | No |
| 647 | 42.46 | 2.50 | 0.39 | 2.12 | 0.27 | 0.211 | 1.18 | 0.179 | 1.00 | 1.30 | 0.233 | No |
| 648 | 42.53 | 2.51 | 0.39 | 2.12 | 0.27 | 0.211 | 1.18 | 0.179 | 1.00 | 1.30 | 0.233 | No |
| 649 | 42.59 | 2.51 | 0.39 | 2.12 | 0.27 | 0.211 | 1.18 | 0.179 | 1.00 | 1.30 | 0.233 | No |
| 650 | 42.68 | 2.52 | 0.40 | 2.12 | 0.27 | 0.210 | 1.18 | 0.179 | 1.00 | 1.30 | 0.232 | No |
| 651 | 42.73 | 2.52 | 0.40 | 2.13 | 0.27 | 0.210 | 1.18 | 0.178 | 1.00 | 1.30 | 0.232 | No |
| 652 | 42.78 | 2.53 | 0.40 | 2.13 | 0.27 | 0.210 | 1.18 | 0.178 | 1.00 | 1.30 | 0.232 | No |
| 653 | 42.86 | 2.53 | 0.40 | 2.13 | 0.27 | 0.210 | 1.18 | 0.178 | 1.00 | 1.30 | 0.231 | No |
| 654 | 42.92 | 2.54 | 0.40 | 2.13 | 0.27 | 0.209 | 1.18 | 0.178 | 1.00 | 1.30 | 0.231 | No |
| 655 | 42.99 | 2.54 | 0.41 | 2.14 | 0.27 | 0.209 | 1.18 | 0.178 | 1.00 | 1.30 | 0.231 | No |
| 656 | 43.06 | 2.55 | 0.41 | 2.14 | 0.27 | 0.209 | 1.18 | 0.177 | 1.00 | 1.30 | 0.231 | No |
| 657 | 43.12 | 2.55 | 0.41 | 2.14 | 0.27 | 0.209 | 1.18 | 0.177 | 1.00 | 1.30 | 0.230 | No |
| 658 | 43.18 | 2.55 | 0.41 | 2.14 | 0.27 | 0.209 | 1.18 | 0.177 | 1.00 | 1.30 | 0.230 | No |
| 659 | 43.25 | 2.56 | 0.41 | 2.15 | 0.27 | 0.208 | 1.18 | 0.177 | 1.00 | 1.30 | 0.230 | No |
| 660 | 43.32 | 2.56 | 0.42 | 2.15 | 0.27 | 0.208 | 1.18 | 0.177 | 1.00 | 1.30 | 0.230 | No |
| 661 | 43.38 | 2.57 | 0.42 | 2.15 | 0.27 | 0.208 | 1.18 | 0.176 | 1.00 | 1.30 | 0.229 | No |
| 662 | 43.44 | 2.57 | 0.42 | 2.15 | 0.27 | 0.208 | 1.18 | 0.176 | 1.00 | 1.30 | 0.229 | No |
| 663 | 43.51 | 2.58 | 0.42 | 2.15 | 0.27 | 0.207 | 1.18 | 0.176 | 1.00 | 1.30 | 0.229 | No |
| 664 | 43.59 | 2.58 | 0.42 | 2.16 | 0.27 | 0.207 | 1.18 | 0.176 | 1.00 | 1.30 | 0.229 | No |
| 665 | 43.64 | 2.59 | 0.43 | 2.16 | 0.27 | 0.207 | 1.18 | 0.176 | 1.00 | 1.30 | 0.228 | No |
| 666 | 43.71 | 2.59 | 0.43 | 2.16 | 0.27 | 0.207 | 1.18 | 0.175 | 1.00 | 1.30 | 0.228 | No |
| 667 | 43.78 | 2.59 | 0.43 | 2.16 | 0.26 | 0.206 | 1.18 | 0.175 | 1.00 | 1.30 | 0.228 | No |
| 668 | 43.85 | 2.60 | 0.43 | 2.17 | 0.26 | 0.206 | 1.18 | 0.175 | 1.00 | 1.30 | 0.228 | No |
| 669 | 43.90 | 2.60 | 0.43 | 2.17 | 0.26 | 0.206 | 1.18 | 0.175 | 1.00 | 1.30 | 0.227 | No |
| 670 | 43.98 | 2.61 | 0.44 | 2.17 | 0.26 | 0.206 | 1.18 | 0.175 | 1.00 | 1.30 | 0.227 | No |
| 671 | 44.03 | 2.61 | 0.44 | 2.17 | 0.26 | 0.205 | 1.18 | 0.174 | 1.00 | 1.30 | 0.227 | No |
| 672 | 44.10 | 2.61 | 0.44 | 2.18 | 0.26 | 0.205 | 1.18 | 0.174 | 1.00 | 1.30 | 0.227 | No |
| 673 | 44.18 | 2.62 | 0.44 | 2.18 | 0.26 | 0.205 | 1.18 | 0.174 | 1.00 | 1.30 | 0.226 | No |
| 674 | 44.23 | 2.62 | 0.44 | 2.18 | 0.26 | 0.205 | 1.18 | 0.174 | 1.00 | 1.30 | 0.226 | No |
| 675 | 44.30 | 2.63 | 0.45 | 2.18 | 0.26 | 0.205 | 1.18 | 0.174 | 1.00 | 1.30 | 0.226 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 676 | 44.37 | 2.63 | 0.45 | 2.18 | 0.26 | 0.204 | 1.18 | 0.174 | 1.00 | 1.30 | 0.226 | No |
| 677 | 44.44 | 2.64 | 0.45 | 2.19 | 0.26 | 0.204 | 1.18 | 0.173 | 1.00 | 1.30 | 0.225 | No |
| 678 | 44.50 | 2.64 | 0.45 | 2.19 | 0.26 | 0.204 | 1.18 | 0.173 | 1.00 | 1.30 | 0.225 | No |
| 679 | 44.58 | 2.65 | 0.45 | 2.19 | 0.26 | 0.204 | 1.18 | 0.173 | 1.00 | 1.30 | 0.225 | No |
| 680 | 44.64 | 2.65 | 0.46 | 2.19 | 0.26 | 0.203 | 1.18 | 0.173 | 1.00 | 1.30 | 0.225 | No |
| 681 | 44.70 | 2.65 | 0.46 | 2.20 | 0.26 | 0.203 | 1.18 | 0.173 | 1.00 | 1.30 | 0.224 | No |
| 682 | 44.75 | 2.66 | 0.46 | 2.20 | 0.26 | 0.203 | 1.18 | 0.172 | 1.00 | 1.30 | 0.224 | No |
| 683 | 44.84 | 2.66 | 0.46 | 2.20 | 0.26 | 0.203 | 1.18 | 0.172 | 1.00 | 1.30 | 0.224 | No |
| 684 | 44.90 | 2.67 | 0.46 | 2.20 | 0.26 | 0.203 | 1.18 | 0.172 | 1.00 | 1.30 | 0.224 | No |
| 685 | 44.95 | 2.67 | 0.47 | 2.20 | 0.26 | 0.202 | 1.18 | 0.172 | 1.00 | 1.30 | 0.223 | No |
| 686 | 45.03 | 2.68 | 0.47 | 2.21 | 0.26 | 0.202 | 1.18 | 0.172 | 1.00 | 1.30 | 0.223 | No |
| 687 | 45.09 | 2.68 | 0.47 | 2.21 | 0.26 | 0.202 | 1.18 | 0.172 | 1.00 | 1.30 | 0.223 | No |
| 688 | 45.15 | 2.68 | 0.47 | 2.21 | 0.26 | 0.202 | 1.18 | 0.171 | 1.00 | 1.30 | 0.223 | No |
| 689 | 45.23 | 2.69 | 0.48 | 2.21 | 0.26 | 0.202 | 1.18 | 0.171 | 1.00 | 1.30 | 0.222 | No |
| 690 | 45.30 | 2.69 | 0.48 | 2.22 | 0.25 | 0.201 | 1.18 | 0.171 | 1.00 | 1.30 | 0.222 | No |
| 691 | 45.36 | 2.70 | 0.48 | 2.22 | 0.25 | 0.201 | 1.18 | 0.171 | 1.00 | 1.30 | 0.222 | No |
| 692 | 45.43 | 2.70 | 0.48 | 2.22 | 0.25 | 0.201 | 1.18 | 0.171 | 1.00 | 1.30 | 0.222 | No |
| 693 | 45.49 | 2.71 | 0.48 | 2.22 | 0.25 | 0.201 | 1.18 | 0.170 | 1.00 | 1.30 | 0.222 | No |
| 694 | 45.56 | 2.71 | 0.49 | 2.23 | 0.25 | 0.201 | 1.18 | 0.170 | 1.00 | 1.30 | 0.221 | No |
| 695 | 45.61 | 2.71 | 0.49 | 2.23 | 0.25 | 0.200 | 1.18 | 0.170 | 1.00 | 1.30 | 0.221 | No |
| 696 | 45.69 | 2.72 | 0.49 | 2.23 | 0.25 | 0.200 | 1.18 | 0.170 | 1.00 | 1.30 | 0.221 | No |
| 697 | 45.74 | 2.72 | 0.49 | 2.23 | 0.25 | 0.200 | 1.18 | 0.170 | 1.00 | 1.30 | 0.221 | No |
| 698 | 45.82 | 2.73 | 0.49 | 2.23 | 0.25 | 0.200 | 1.18 | 0.170 | 1.00 | 1.30 | 0.220 | No |
| 699 | 45.88 | 2.73 | 0.50 | 2.24 | 0.25 | 0.200 | 1.18 | 0.169 | 1.00 | 1.30 | 0.220 | No |
| 700 | 45.94 | 2.74 | 0.50 | 2.24 | 0.25 | 0.199 | 1.18 | 0.169 | 1.00 | 1.30 | 0.220 | No |
| 701 | 46.00 | 2.74 | 0.50 | 2.24 | 0.25 | 0.199 | 1.18 | 0.169 | 1.00 | 1.30 | 0.220 | No |
| 702 | 46.09 | 2.75 | 0.50 | 2.24 | 0.25 | 0.199 | 1.18 | 0.169 | 1.00 | 1.30 | 0.220 | No |
| 703 | 46.14 | 2.75 | 0.50 | 2.25 | 0.25 | 0.199 | 1.18 | 0.169 | 1.00 | 1.30 | 0.219 | No |
| 704 | 46.20 | 2.75 | 0.51 | 2.25 | 0.25 | 0.199 | 1.18 | 0.169 | 1.00 | 1.30 | 0.219 | No |
| 705 | 46.26 | 2.76 | 0.51 | 2.25 | 0.25 | 0.198 | 1.18 | 0.168 | 1.00 | 1.30 | 0.219 | No |
| 706 | 46.35 | 2.76 | 0.51 | 2.25 | 0.25 | 0.198 | 1.18 | 0.168 | 1.00 | 1.30 | 0.219 | No |
| 707 | 46.40 | 2.77 | 0.51 | 2.26 | 0.25 | 0.198 | 1.18 | 0.168 | 1.00 | 1.30 | 0.219 | No |
| 708 | 46.46 | 2.77 | 0.51 | 2.26 | 0.25 | 0.198 | 1.18 | 0.168 | 1.00 | 1.30 | 0.218 | No |
| 709 | 46.55 | 2.78 | 0.52 | 2.26 | 0.25 | 0.198 | 1.18 | 0.168 | 1.00 | 1.30 | 0.218 | No |
| 710 | 46.60 | 2.78 | 0.52 | 2.26 | 0.25 | 0.197 | 1.18 | 0.168 | 1.00 | 1.30 | 0.218 | No |
| 711 | 46.68 | 2.79 | 0.52 | 2.27 | 0.25 | 0.197 | 1.18 | 0.167 | 1.00 | 1.30 | 0.218 | No |
| 712 | 46.74 | 2.79 | 0.52 | 2.27 | 0.25 | 0.197 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 713 | 46.80 | 2.79 | 0.52 | 2.27 | 0.25 | 0.197 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 714 | 46.85 | 2.80 | 0.53 | 2.27 | 0.25 | 0.197 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 715 | 46.92 | 2.80 | 0.53 | 2.27 | 0.25 | 0.197 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 716 | 46.99 | 2.81 | 0.53 | 2.28 | 0.25 | 0.196 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 717 | 47.05 | 2.81 | 0.53 | 2.28 | 0.24 | 0.196 | 1.18 | 0.167 | 1.00 | 1.30 | 0.217 | No |
| 718 | 47.12 | 2.82 | 0.53 | 2.28 | 0.24 | 0.196 | 1.18 | 0.166 | 1.00 | 1.30 | 0.216 | No |
| 719 | 47.18 | 2.82 | 0.54 | 2.28 | 0.24 | 0.196 | 1.18 | 0.166 | 1.00 | 1.30 | 0.216 | No |
| 720 | 47.26 | 2.83 | 0.54 | 2.29 | 0.24 | 0.196 | 1.18 | 0.166 | 1.00 | 1.30 | 0.216 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 721 | 47.33 | 2.83 | 0.54 | 2.29 | 0.24 | 0.195 | 1.18 | 0.166 | 1.00 | 1.30 | 0.216 | No |
| 722 | 47.38 | 2.83 | 0.54 | 2.29 | 0.24 | 0.195 | 1.18 | 0.166 | 1.00 | 1.30 | 0.216 | No |
| 723 | 47.45 | 2.84 | 0.54 | 2.29 | 0.24 | 0.195 | 1.18 | 0.166 | 1.00 | 1.30 | 0.215 | No |
| 724 | 47.52 | 2.84 | 0.55 | 2.30 | 0.24 | 0.195 | 1.18 | 0.165 | 1.00 | 1.30 | 0.215 | No |
| 725 | 47.58 | 2.85 | 0.55 | 2.30 | 0.24 | 0.195 | 1.18 | 0.165 | 1.00 | 1.30 | 0.215 | No |
| 726 | 47.66 | 2.85 | 0.55 | 2.30 | 0.24 | 0.195 | 1.18 | 0.165 | 1.00 | 1.30 | 0.215 | No |
| 727 | 47.71 | 2.85 | 0.55 | 2.30 | 0.24 | 0.194 | 1.18 | 0.165 | 1.00 | 1.30 | 0.215 | No |
| 728 | 47.77 | 2.86 | 0.55 | 2.30 | 0.24 | 0.194 | 1.18 | 0.165 | 1.00 | 1.30 | 0.214 | No |
| 729 | 47.85 | 2.86 | 0.56 | 2.31 | 0.24 | 0.194 | 1.18 | 0.165 | 1.00 | 1.30 | 0.214 | No |
| 730 | 47.91 | 2.87 | 0.56 | 2.31 | 0.24 | 0.194 | 1.18 | 0.165 | 1.00 | 1.30 | 0.214 | No |
| 731 | 47.97 | 2.87 | 0.56 | 2.31 | 0.24 | 0.194 | 1.18 | 0.165 | 1.00 | 1.30 | 0.214 | No |
| 732 | 48.04 | 2.87 | 0.56 | 2.31 | 0.24 | 0.194 | 1.18 | 0.164 | 1.00 | 1.30 | 0.214 | No |
| 733 | 48.11 | 2.88 | 0.57 | 2.31 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.214 | No |
| 734 | 48.18 | 2.88 | 0.57 | 2.32 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.213 | No |
| 735 | 48.25 | 2.89 | 0.57 | 2.32 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.213 | No |
| 736 | 48.31 | 2.89 | 0.57 | 2.32 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.213 | No |
| 737 | 48.38 | 2.90 | 0.57 | 2.32 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.213 | No |
| 738 | 48.44 | 2.90 | 0.58 | 2.33 | 0.24 | 0.193 | 1.18 | 0.164 | 1.00 | 1.30 | 0.213 | No |
| 739 | 48.50 | 2.90 | 0.58 | 2.33 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 740 | 48.58 | 2.91 | 0.58 | 2.33 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 741 | 48.63 | 2.91 | 0.58 | 2.33 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 742 | 48.71 | 2.92 | 0.58 | 2.34 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 743 | 48.76 | 2.92 | 0.59 | 2.34 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 744 | 48.82 | 2.93 | 0.59 | 2.34 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.212 | No |
| 745 | 48.89 | 2.93 | 0.59 | 2.34 | 0.24 | 0.192 | 1.18 | 0.163 | 1.00 | 1.30 | 0.211 | No |
| 746 | 48.96 | 2.94 | 0.59 | 2.34 | 0.24 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.211 | No |
| 747 | 49.02 | 2.94 | 0.59 | 2.35 | 0.23 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.211 | No |
| 748 | 49.08 | 2.94 | 0.60 | 2.35 | 0.23 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.211 | No |
| 749 | 49.17 | 2.95 | 0.60 | 2.35 | 0.23 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.211 | No |
| 750 | 49.23 | 2.95 | 0.60 | 2.35 | 0.23 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.211 | No |
| 751 | 49.29 | 2.96 | 0.60 | 2.36 | 0.23 | 0.191 | 1.18 | 0.162 | 1.00 | 1.30 | 0.210 | No |
| 752 | 49.35 | 2.96 | 0.60 | 2.36 | 0.23 | 0.190 | 1.18 | 0.162 | 1.00 | 1.30 | 0.210 | No |
| 753 | 49.42 | 2.97 | 0.61 | 2.36 | 0.23 | 0.190 | 1.18 | 0.162 | 1.00 | 1.30 | 0.210 | No |
| 754 | 49.48 | 2.97 | 0.61 | 2.36 | 0.23 | 0.190 | 1.18 | 0.161 | 1.00 | 1.30 | 0.210 | No |
| 755 | 49.55 | 2.97 | 0.61 | 2.36 | 0.23 | 0.190 | 1.18 | 0.161 | 1.00 | 1.30 | 0.210 | No |
| 756 | 49.62 | 2.98 | 0.61 | 2.37 | 0.23 | 0.190 | 1.18 | 0.161 | 1.00 | 1.30 | 0.210 | No |
| 757 | 49.69 | 2.98 | 0.61 | 2.37 | 0.23 | 0.190 | 1.18 | 0.161 | 1.00 | 1.30 | 0.209 | No |
| 758 | 49.75 | 2.99 | 0.62 | 2.37 | 0.23 | 0.190 | 1.18 | 0.161 | 1.00 | 1.30 | 0.209 | No |
| 759 | 49.82 | 2.99 | 0.62 | 2.37 | 0.23 | 0.189 | 1.18 | 0.161 | 1.00 | 1.30 | 0.209 | No |
| 760 | 49.87 | 2.99 | 0.62 | 2.37 | 0.23 | 0.189 | 1.18 | 0.161 | 1.00 | 1.30 | 0.209 | No |
| 761 | 49.94 | 3.00 | 0.62 | 2.37 | 0.23 | 0.189 | 1.18 | 0.161 | 1.00 | 1.30 | 0.209 | No |
| 762 | 50.00 | 3.00 | 0.62 | 2.37 | 0.23 | 0.189 | 1.18 | 0.161 | 1.00 | 1.30 | 2.000 | No |
| 763 | 50.07 | 3.00 | 0.63 | 2.37 | 0.23 | 0.189 | 1.18 | 0.160 | 1.00 | 1.30 | 2.000 | No |

**:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)**

| Point ID | Depth (ft) | $\sigma_v$ (tsf) | $u_0$ (tsf) | $\sigma_v'$ (tsf) | $r_d$ | CSR | MSF | $CSR_{eq}$ | $K_\sigma$ | User FS | $CSR^*$ | Belongs to transition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Abbreviations**

Depth: Depth from free surface, at which CPT was performed (ft)
$\sigma_v$: Total overburden pressure at test point (tsf)
$u_0$: Water pressure at test point (tsf)
$\sigma_v'$: Effective overburden pressure based on GWT during earthquake (tsf)
$r_d$: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
$CSR_{eq}$: CSR adjusted for M=7.5
$K_\sigma$: Effective overburden stress factor
$CSR^*$: CSR fully adjusted

**:: Cyclic Resistance Ratio (CRR) calculation data ::**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.08 | 23.02 | 0.00 | 0.58 | 1.70 | 33.15 | 10.68 | 43.83 | 4.000 | No | No | 2.00 |
| 2 | 0.14 | 30.71 | 0.01 | 0.55 | 1.70 | 51.12 | 7.59 | 58.71 | 4.000 | No | No | 2.00 |
| 3 | 0.20 | 41.34 | 0.01 | 0.53 | 1.70 | 72.35 | 5.22 | 77.57 | 4.000 | No | No | 2.00 |
| 4 | 0.26 | 51.63 | 0.01 | 0.53 | 1.70 | 87.38 | 3.67 | 91.05 | 4.000 | No | No | 2.00 |
| 5 | 0.33 | 64.48 | 0.02 | 0.54 | 1.70 | 103.63 | 2.16 | 105.79 | 4.000 | No | No | 2.00 |
| 6 | 0.41 | 81.15 | 0.02 | 0.54 | 1.70 | 137.87 | 0.83 | 138.70 | 4.000 | No | No | 2.00 |
| 7 | 0.48 | 95.80 | 0.03 | 0.54 | 1.70 | 172.41 | 0.14 | 172.55 | 4.000 | No | No | 2.00 |
| 8 | 0.53 | 104.40 | 0.03 | 0.55 | 1.70 | 178.31 | 0.01 | 178.32 | 4.000 | No | No | 2.00 |
| 9 | 0.61 | 104.73 | 0.03 | 0.53 | 1.70 | 181.71 | 0.44 | 182.15 | 4.000 | No | No | 2.00 |
| 10 | 0.68 | 102.12 | 0.04 | 0.52 | 1.70 | 174.13 | 1.09 | 175.22 | 4.000 | No | No | 2.00 |
| 11 | 0.74 | 96.32 | 0.04 | 0.51 | 1.70 | 164.99 | 1.84 | 166.83 | 4.000 | No | No | 2.00 |
| 12 | 0.81 | 90.42 | 0.05 | 0.51 | 1.70 | 152.13 | 2.34 | 154.48 | 4.000 | No | No | 2.00 |
| 13 | 0.86 | 83.92 | 0.05 | 0.51 | 1.70 | 144.07 | 2.55 | 146.62 | 4.000 | No | No | 2.00 |
| 14 | 0.94 | 77.63 | 0.05 | 0.52 | 1.70 | 131.84 | 2.45 | 134.29 | 4.000 | No | No | 2.00 |
| 15 | 1.00 | 71.68 | 0.06 | 0.53 | 1.70 | 120.05 | 2.32 | 122.37 | 4.000 | No | No | 2.00 |
| 16 | 1.05 | 66.49 | 0.06 | 0.53 | 1.70 | 113.71 | 2.28 | 115.99 | 4.000 | No | No | 2.00 |
| 17 | 1.13 | 62.05 | 0.06 | 0.54 | 1.70 | 105.35 | 2.34 | 107.69 | 4.000 | No | No | 2.00 |
| 18 | 1.19 | 56.95 | 0.07 | 0.54 | 1.70 | 97.44 | 2.46 | 99.90 | 4.000 | No | No | 2.00 |
| 19 | 1.26 | 51.78 | 0.07 | 0.55 | 1.70 | 87.69 | 2.51 | 90.20 | 4.000 | No | No | 2.00 |
| 20 | 1.33 | 47.04 | 0.08 | 0.56 | 1.70 | 79.00 | 2.43 | 81.42 | 4.000 | No | No | 2.00 |
| 21 | 1.38 | 42.60 | 0.08 | 0.57 | 1.70 | 73.27 | 2.18 | 75.45 | 4.000 | No | No | 2.00 |
| 22 | 1.45 | 38.53 | 0.08 | 0.59 | 1.70 | 65.06 | 1.90 | 66.96 | 4.000 | No | No | 2.00 |
| 23 | 1.52 | 34.49 | 0.09 | 0.61 | 1.70 | 58.24 | 1.65 | 59.90 | 4.000 | No | No | 2.00 |
| 24 | 1.59 | 31.19 | 0.09 | 0.63 | 1.70 | 52.67 | 1.35 | 54.02 | 4.000 | No | No | 2.00 |
| 25 | 1.65 | 28.36 | 0.09 | 0.65 | 1.70 | 48.18 | 1.08 | 49.26 | 4.000 | No | No | 2.00 |
| 26 | 1.72 | 26.18 | 0.10 | 0.66 | 1.70 | 43.84 | 0.94 | 44.78 | 4.000 | No | No | 2.00 |
| 27 | 1.77 | 24.45 | 0.10 | 0.67 | 1.70 | 41.51 | 0.88 | 42.39 | 4.000 | No | No | 2.00 |
| 28 | 1.84 | 23.23 | 0.10 | 0.68 | 1.70 | 39.36 | 0.82 | 40.17 | 4.000 | No | No | 2.00 |
| 29 | 1.91 | 22.26 | 0.11 | 0.69 | 1.70 | 37.64 | 0.70 | 38.34 | 4.000 | No | No | 2.00 |
| 30 | 1.98 | 21.47 | 0.11 | 0.70 | 1.70 | 36.57 | 0.50 | 37.06 | 4.000 | No | No | 2.00 |
| 31 | 2.05 | 20.95 | 0.11 | 0.72 | 1.70 | 35.33 | 0.00 | 35.33 | 4.000 | No | No | 2.00 |
| 32 | 2.11 | 20.65 | 0.12 | 0.74 | 1.70 | 35.00 | 0.00 | 35.00 | 4.000 | No | No | 2.00 |
| 33 | 2.19 | 20.68 | 0.12 | 0.76 | 1.70 | 35.00 | 0.00 | 35.00 | 4.000 | No | No | 2.00 |
| 34 | 2.25 | 20.95 | 0.12 | 0.76 | 1.70 | 35.48 | 0.00 | 35.48 | 4.000 | No | No | 2.00 |
| 35 | 2.32 | 21.50 | 0.13 | 0.74 | 1.70 | 36.41 | 0.00 | 36.41 | 4.000 | No | No | 2.00 |
| 36 | 2.39 | 21.53 | 0.13 | 0.72 | 1.70 | 37.81 | 0.00 | 37.81 | 4.000 | No | No | 2.00 |
| 37 | 2.44 | 21.99 | 0.13 | 0.73 | 1.70 | 35.63 | 0.00 | 35.63 | 4.000 | No | No | 2.00 |
| 38 | 2.49 | 22.08 | 0.14 | 0.71 | 1.70 | 38.73 | 0.00 | 38.73 | 4.000 | No | No | 2.00 |
| 39 | 2.57 | 22.44 | 0.14 | 0.70 | 1.70 | 38.27 | 0.01 | 38.28 | 4.000 | No | No | 2.00 |
| 40 | 2.64 | 21.93 | 0.14 | 0.70 | 1.70 | 37.49 | 0.34 | 37.82 | 4.000 | No | No | 2.00 |
| 41 | 2.71 | 21.28 | 0.15 | 0.70 | 1.70 | 36.09 | 0.61 | 36.71 | 4.000 | No | No | 2.00 |
| 42 | 2.78 | 20.68 | 0.15 | 0.70 | 1.70 | 35.00 | 0.84 | 35.85 | 4.000 | No | No | 2.00 |
| 43 | 2.83 | 20.19 | 0.15 | 0.70 | 1.70 | 34.39 | 1.03 | 35.42 | 4.000 | No | No | 2.00 |
| 44 | 2.90 | 19.86 | 0.16 | 0.70 | 1.70 | 33.61 | 1.07 | 34.68 | 4.000 | No | No | 2.00 |
| 45 | 2.96 | 19.64 | 0.16 | 0.70 | 1.70 | 33.30 | 1.03 | 34.33 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 3.03 | 19.58 | 0.16 | 0.70 | 1.70 | 33.30 | 0.85 | 34.16 | 4.000 | No | No | 2.00 |
| 47 | 3.09 | 19.58 | 0.17 | 0.71 | 1.70 | 33.30 | 0.70 | 34.00 | 4.000 | No | No | 2.00 |
| 48 | 3.16 | 19.58 | 0.17 | 0.71 | 1.70 | 33.30 | 0.56 | 33.86 | 4.000 | No | No | 2.00 |
| 49 | 3.23 | 19.61 | 0.17 | 0.71 | 1.70 | 33.30 | 0.38 | 33.69 | 4.000 | No | No | 2.00 |
| 50 | 3.29 | 19.67 | 0.18 | 0.72 | 1.70 | 33.46 | 0.17 | 33.63 | 4.000 | No | No | 2.00 |
| 51 | 3.36 | 19.85 | 0.18 | 0.72 | 1.70 | 33.61 | 0.00 | 33.61 | 4.000 | No | No | 2.00 |
| 52 | 3.42 | 20.10 | 0.18 | 0.73 | 1.70 | 34.24 | 0.00 | 34.24 | 4.000 | No | No | 2.00 |
| 53 | 3.49 | 20.49 | 0.19 | 0.73 | 1.70 | 34.70 | 0.00 | 34.70 | 4.000 | No | No | 2.00 |
| 54 | 3.55 | 20.92 | 0.19 | 0.73 | 1.70 | 35.63 | 0.00 | 35.63 | 4.000 | No | No | 2.00 |
| 55 | 3.62 | 21.22 | 0.19 | 0.73 | 1.70 | 36.41 | 0.00 | 36.41 | 4.000 | No | No | 2.00 |
| 56 | 3.68 | 21.28 | 0.20 | 0.73 | 1.70 | 36.24 | 0.00 | 36.24 | 4.000 | No | No | 2.00 |
| 57 | 3.74 | 21.07 | 0.20 | 0.73 | 1.70 | 35.94 | 0.00 | 35.94 | 4.000 | No | No | 2.00 |
| 58 | 3.81 | 20.80 | 0.20 | 0.73 | 1.70 | 35.33 | 0.00 | 35.33 | 4.000 | No | No | 2.00 |
| 59 | 3.87 | 20.56 | 0.21 | 0.73 | 1.70 | 34.85 | 0.00 | 34.85 | 4.000 | No | No | 2.00 |
| 60 | 3.94 | 20.37 | 0.21 | 0.74 | 1.70 | 34.70 | 0.00 | 34.70 | 4.000 | No | No | 2.00 |
| 61 | 4.00 | 20.13 | 0.21 | 0.75 | 1.70 | 34.39 | 0.00 | 34.39 | 4.000 | No | No | 2.00 |
| 62 | 4.07 | 19.80 | 0.22 | 0.76 | 1.70 | 33.61 | 0.00 | 33.61 | 4.000 | No | No | 2.00 |
| 63 | 4.15 | 19.31 | 0.22 | 0.78 | 1.70 | 33.00 | 0.00 | 33.00 | 4.000 | No | No | 2.00 |
| 64 | 4.22 | 18.89 | 0.22 | 0.78 | 1.70 | 31.91 | 0.00 | 31.91 | 4.000 | No | No | 2.00 |
| 65 | 4.27 | 18.43 | 0.23 | 0.79 | 1.70 | 31.45 | 0.00 | 31.45 | 4.000 | No | No | 2.00 |
| 66 | 4.35 | 18.01 | 0.23 | 0.80 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 67 | 4.41 | 17.67 | 0.23 | 0.80 | 1.70 | 29.75 | 0.00 | 29.75 | 4.000 | No | No | 2.00 |
| 68 | 4.46 | 17.49 | 0.23 | 0.80 | 1.70 | 29.75 | 0.00 | 29.75 | 4.000 | No | No | 2.00 |
| 69 | 4.53 | 17.52 | 0.24 | 0.81 | 1.70 | 29.75 | 0.00 | 29.75 | 4.000 | No | No | 2.00 |
| 70 | 4.61 | 17.55 | 0.24 | 0.82 | 1.70 | 29.90 | 0.00 | 29.90 | 4.000 | No | No | 2.00 |
| 71 | 4.69 | 17.61 | 0.25 | 0.83 | 1.70 | 29.90 | 0.00 | 29.90 | 4.000 | No | No | 2.00 |
| 72 | 4.74 | 17.67 | 0.25 | 0.83 | 1.70 | 30.06 | 0.00 | 30.06 | 4.000 | No | No | 2.00 |
| 73 | 4.82 | 17.76 | 0.25 | 0.83 | 1.70 | 30.21 | 0.00 | 30.21 | 4.000 | No | No | 2.00 |
| 74 | 4.87 | 17.86 | 0.25 | 0.83 | 1.70 | 30.36 | 0.00 | 30.36 | 4.000 | No | No | 2.00 |
| 75 | 4.95 | 17.95 | 0.26 | 0.82 | 1.70 | 30.52 | 0.00 | 30.52 | 4.000 | No | No | 2.00 |
| 76 | 4.99 | 18.07 | 0.26 | 0.82 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 77 | 5.07 | 18.10 | 0.26 | 0.81 | 1.70 | 30.99 | 0.00 | 30.99 | 4.000 | No | No | 2.00 |
| 78 | 5.13 | 18.10 | 0.27 | 0.81 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 79 | 5.21 | 18.04 | 0.27 | 0.81 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 80 | 5.27 | 18.04 | 0.27 | 0.80 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 81 | 5.32 | 18.13 | 0.28 | 0.80 | 1.70 | 30.67 | 0.00 | 30.67 | 4.000 | No | No | 2.00 |
| 82 | 5.38 | 18.35 | 0.28 | 0.80 | 1.70 | 31.14 | 0.00 | 31.14 | 4.000 | No | No | 2.00 |
| 83 | 5.46 | 18.65 | 0.28 | 0.79 | 1.70 | 31.76 | 0.00 | 31.76 | 4.000 | No | No | 2.00 |
| 84 | 5.53 | 18.89 | 0.29 | 0.79 | 1.70 | 32.22 | 0.00 | 32.22 | 4.000 | No | No | 2.00 |
| 85 | 5.59 | 19.05 | 0.29 | 0.80 | 1.70 | 32.39 | 0.00 | 32.39 | 4.000 | No | No | 2.00 |
| 86 | 5.67 | 19.14 | 0.29 | 0.79 | 1.70 | 32.54 | 0.00 | 32.54 | 4.000 | No | No | 2.00 |
| 87 | 5.71 | 19.32 | 0.30 | 0.79 | 1.70 | 32.69 | 0.00 | 32.69 | 4.000 | No | No | 2.00 |
| 88 | 5.81 | 19.65 | 0.30 | 0.78 | 1.70 | 33.30 | 0.00 | 33.30 | 4.000 | No | No | 2.00 |
| 89 | 5.84 | 20.29 | 0.30 | 0.76 | 1.70 | 34.24 | 0.00 | 34.24 | 4.000 | No | No | 2.00 |
| 90 | 5.91 | 21.23 | 0.31 | 0.75 | 1.70 | 35.94 | 0.00 | 35.94 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91 | 5.98 | 22.39 | 0.31 | 0.74 | 1.70 | 38.11 | 0.00 | 38.11 | 4.000 | No | No | 2.00 |
| 92 | 6.04 | 24.00 | 0.31 | 0.73 | 1.70 | 40.12 | 0.00 | 40.12 | 4.000 | No | No | 2.00 |
| 93 | 6.12 | 25.79 | 0.32 | 0.71 | 1.70 | 44.15 | 0.00 | 44.15 | 4.000 | No | No | 2.00 |
| 94 | 6.19 | 27.76 | 0.32 | 0.70 | 1.70 | 47.24 | 0.00 | 47.24 | 4.000 | No | No | 2.00 |
| 95 | 6.26 | 29.43 | 0.32 | 0.69 | 1.70 | 50.20 | 0.00 | 50.20 | 4.000 | No | No | 2.00 |
| 96 | 6.32 | 30.92 | 0.33 | 0.70 | 1.70 | 52.67 | 0.00 | 52.67 | 4.000 | No | No | 2.00 |
| 97 | 6.39 | 32.05 | 0.33 | 0.70 | 1.70 | 54.84 | 0.00 | 54.84 | 4.000 | No | No | 2.00 |
| 98 | 6.44 | 32.99 | 0.33 | 0.70 | 1.70 | 55.93 | 0.00 | 55.93 | 4.000 | No | No | 2.00 |
| 99 | 6.51 | 33.78 | 0.34 | 0.71 | 1.70 | 57.48 | 0.00 | 57.48 | 4.000 | No | No | 2.00 |
| 100 | 6.57 | 34.57 | 0.34 | 0.71 | 1.70 | 58.87 | 0.00 | 58.87 | 4.000 | No | No | 2.00 |
| 101 | 6.65 | 35.12 | 0.34 | 0.70 | 1.70 | 59.96 | 0.00 | 59.96 | 4.000 | No | No | 2.00 |
| 102 | 6.70 | 35.45 | 0.35 | 0.70 | 1.70 | 60.27 | 0.00 | 60.27 | 4.000 | No | No | 2.00 |
| 103 | 6.77 | 35.69 | 0.35 | 0.71 | 1.70 | 60.57 | 0.00 | 60.57 | 4.000 | No | No | 2.00 |
| 104 | 6.83 | 36.06 | 0.35 | 0.71 | 1.70 | 61.20 | 0.00 | 61.20 | 4.000 | No | No | 2.00 |
| 105 | 6.90 | 36.33 | 0.36 | 0.71 | 1.70 | 62.12 | 0.00 | 62.12 | 4.000 | No | No | 2.00 |
| 106 | 6.97 | 36.39 | 0.36 | 0.70 | 1.70 | 61.97 | 0.00 | 61.97 | 4.000 | No | No | 2.00 |
| 107 | 7.04 | 36.18 | 0.36 | 0.70 | 1.70 | 61.51 | 0.00 | 61.51 | 4.000 | No | No | 2.00 |
| 108 | 7.10 | 35.57 | 0.37 | 0.70 | 1.70 | 61.03 | 0.00 | 61.03 | 4.000 | No | No | 2.00 |
| 109 | 7.17 | 34.87 | 0.37 | 0.71 | 1.70 | 58.87 | 0.00 | 58.87 | 4.000 | No | No | 2.00 |
| 110 | 7.24 | 33.96 | 0.37 | 0.72 | 1.70 | 57.94 | 0.00 | 57.94 | 4.000 | No | No | 2.00 |
| 111 | 7.31 | 33.35 | 0.38 | 0.73 | 1.70 | 56.39 | 0.00 | 56.39 | 4.000 | No | No | 2.00 |
| 112 | 7.35 | 32.81 | 0.38 | 0.74 | 1.70 | 55.78 | 0.00 | 55.78 | 4.000 | No | No | 2.00 |
| 113 | 7.43 | 32.65 | 0.38 | 0.74 | 1.70 | 55.15 | 0.00 | 55.15 | 4.000 | No | No | 2.00 |
| 114 | 7.50 | 32.96 | 0.39 | 0.74 | 1.70 | 55.61 | 0.00 | 55.61 | 4.000 | No | No | 2.00 |
| 115 | 7.57 | 33.69 | 0.39 | 0.73 | 1.70 | 57.32 | 0.00 | 57.32 | 4.000 | No | No | 2.00 |
| 116 | 7.61 | 34.79 | 0.39 | 0.73 | 1.70 | 58.87 | 0.00 | 58.87 | 4.000 | No | No | 2.00 |
| 117 | 7.68 | 36.12 | 0.40 | 0.73 | 1.70 | 61.20 | 0.00 | 61.20 | 4.000 | No | No | 2.00 |
| 118 | 7.76 | 37.67 | 0.40 | 0.73 | 1.70 | 64.14 | 0.00 | 64.14 | 4.000 | No | No | 2.00 |
| 119 | 7.83 | 39.07 | 0.40 | 0.72 | 1.70 | 66.78 | 0.00 | 66.78 | 4.000 | No | No | 2.00 |
| 120 | 7.88 | 40.25 | 0.41 | 0.72 | 1.70 | 68.32 | 0.00 | 68.32 | 4.000 | No | No | 2.00 |
| 121 | 7.95 | 41.22 | 0.41 | 0.71 | 1.70 | 70.18 | 0.00 | 70.18 | 4.000 | No | No | 2.00 |
| 122 | 8.03 | 42.07 | 0.41 | 0.70 | 1.70 | 71.72 | 0.00 | 71.72 | 4.000 | No | No | 2.00 |
| 123 | 8.08 | 42.77 | 0.42 | 0.70 | 1.70 | 72.66 | 0.00 | 72.66 | 4.000 | No | No | 2.00 |
| 124 | 8.14 | 43.35 | 0.42 | 0.70 | 1.70 | 73.75 | 0.00 | 73.75 | 4.000 | No | No | 2.00 |
| 125 | 8.21 | 43.96 | 0.42 | 0.70 | 1.70 | 74.66 | 0.00 | 74.66 | 4.000 | No | No | 2.00 |
| 126 | 8.29 | 44.44 | 0.43 | 0.70 | 1.70 | 75.75 | 0.00 | 75.75 | 4.000 | No | No | 2.00 |
| 127 | 8.34 | 44.96 | 0.43 | 0.69 | 1.70 | 76.21 | 0.00 | 76.21 | 4.000 | No | No | 2.00 |
| 128 | 8.40 | 45.46 | 0.43 | 0.69 | 1.70 | 77.30 | 0.00 | 77.30 | 4.000 | No | No | 2.00 |
| 129 | 8.47 | 45.94 | 0.44 | 0.68 | 1.70 | 78.30 | 0.00 | 78.30 | 4.000 | No | No | 2.00 |
| 130 | 8.54 | 46.34 | 0.44 | 0.68 | 1.70 | 78.69 | 0.00 | 78.69 | 4.000 | No | No | 2.00 |
| 131 | 8.60 | 46.72 | 0.44 | 0.68 | 1.70 | 79.32 | 0.00 | 79.32 | 4.000 | No | No | 2.00 |
| 132 | 8.67 | 47.21 | 0.45 | 0.68 | 1.70 | 80.24 | 0.00 | 80.24 | 4.000 | No | No | 2.00 |
| 133 | 8.74 | 47.63 | 0.45 | 0.68 | 1.70 | 81.18 | 0.00 | 81.18 | 4.000 | No | No | 2.00 |
| 134 | 8.80 | 48.00 | 0.45 | 0.68 | 1.70 | 81.48 | 0.00 | 81.48 | 4.000 | No | No | 2.00 |
| 135 | 8.86 | 48.21 | 0.46 | 0.68 | 1.70 | 82.11 | 0.00 | 82.11 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 136 | 8.93 | 48.42 | 0.46 | 0.68 | 1.70 | 82.26 | 0.00 | 82.26 | 4.000 | No | No | 2.00 |
| 137 | 9.01 | 48.54 | 0.47 | 0.67 | 1.70 | 82.57 | 0.00 | 82.57 | 4.000 | No | No | 2.00 |
| 138 | 9.09 | 48.60 | 0.47 | 0.67 | 1.70 | 82.72 | 0.00 | 82.72 | 4.000 | No | No | 2.00 |
| 139 | 9.13 | 48.60 | 0.47 | 0.67 | 1.70 | 82.57 | 0.00 | 82.57 | 4.000 | No | No | 2.00 |
| 140 | 9.20 | 48.51 | 0.48 | 0.67 | 1.70 | 82.57 | 0.00 | 82.57 | 4.000 | No | No | 2.00 |
| 141 | 9.28 | 48.45 | 0.48 | 0.67 | 1.69 | 81.82 | 0.00 | 81.82 | 4.000 | No | No | 2.00 |
| 142 | 9.35 | 48.39 | 0.48 | 0.67 | 1.68 | 81.37 | 0.00 | 81.37 | 4.000 | No | No | 2.00 |
| 143 | 9.40 | 48.39 | 0.49 | 0.66 | 1.67 | 80.90 | 0.00 | 80.90 | 4.000 | No | No | 2.00 |
| 144 | 9.46 | 48.42 | 0.49 | 0.66 | 1.66 | 80.33 | 0.00 | 80.33 | 4.000 | No | No | 2.00 |
| 145 | 9.53 | 48.51 | 0.49 | 0.66 | 1.65 | 79.98 | 0.00 | 79.98 | 4.000 | No | No | 2.00 |
| 146 | 9.60 | 48.66 | 0.50 | 0.66 | 1.64 | 80.00 | 0.00 | 80.00 | 4.000 | No | No | 2.00 |
| 147 | 9.65 | 48.91 | 0.50 | 0.67 | 1.65 | 80.39 | 0.00 | 80.39 | 4.000 | No | No | 2.00 |
| 148 | 9.73 | 49.09 | 0.50 | 0.68 | 1.65 | 81.24 | 0.00 | 81.24 | 4.000 | No | No | 2.00 |
| 149 | 9.79 | 49.30 | 0.51 | 0.69 | 1.66 | 81.46 | 0.00 | 81.46 | 4.000 | No | No | 2.00 |
| 150 | 9.85 | 49.52 | 0.51 | 0.69 | 1.65 | 81.76 | 0.00 | 81.76 | 4.000 | No | No | 2.00 |
| 151 | 9.92 | 49.88 | 0.52 | 0.69 | 1.64 | 81.81 | 0.00 | 81.81 | 4.000 | No | No | 2.00 |
| 152 | 9.99 | 50.31 | 0.52 | 0.69 | 1.63 | 82.04 | 0.00 | 82.04 | 4.000 | No | No | 2.00 |
| 153 | 10.05 | 50.61 | 0.52 | 0.68 | 1.62 | 82.14 | 0.00 | 82.14 | 4.000 | No | No | 2.00 |
| 154 | 10.13 | 51.10 | 0.53 | 0.68 | 1.60 | 81.38 | 0.00 | 81.38 | 4.000 | No | No | 2.00 |
| 155 | 10.18 | 51.80 | 0.53 | 0.67 | 1.59 | 82.22 | 0.00 | 82.22 | 4.000 | No | No | 2.00 |
| 156 | 10.25 | 52.98 | 0.53 | 0.66 | 1.57 | 83.22 | 0.00 | 83.22 | 4.000 | No | No | 2.00 |
| 157 | 10.32 | 54.20 | 0.54 | 0.66 | 1.56 | 84.85 | 0.00 | 84.85 | 4.000 | No | No | 2.00 |
| 158 | 10.38 | 55.69 | 0.54 | 0.66 | 1.56 | 86.17 | 0.00 | 86.17 | 4.000 | No | No | 2.00 |
| 159 | 10.45 | 57.36 | 0.54 | 0.65 | 1.55 | 88.66 | 0.00 | 88.66 | 4.000 | No | No | 2.00 |
| 160 | 10.52 | 58.93 | 0.55 | 0.65 | 1.54 | 91.29 | 0.00 | 91.29 | 4.000 | No | No | 2.00 |
| 161 | 10.57 | 60.18 | 0.55 | 0.65 | 1.53 | 92.24 | 0.00 | 92.24 | 4.000 | No | No | 2.00 |
| 162 | 10.64 | 60.91 | 0.55 | 0.65 | 1.52 | 93.08 | 0.00 | 93.08 | 4.000 | No | No | 2.00 |
| 163 | 10.71 | 61.55 | 0.56 | 0.65 | 1.51 | 93.13 | 0.00 | 93.13 | 4.000 | No | No | 2.00 |
| 164 | 10.78 | 62.03 | 0.56 | 0.64 | 1.50 | 93.27 | 0.00 | 93.27 | 4.000 | No | No | 2.00 |
| 165 | 10.83 | 62.49 | 0.56 | 0.64 | 1.49 | 93.45 | 0.00 | 93.45 | 4.000 | No | No | 2.00 |
| 166 | 10.90 | 62.88 | 0.57 | 0.64 | 1.49 | 93.48 | 0.00 | 93.48 | 4.000 | No | No | 2.00 |
| 167 | 10.96 | 63.25 | 0.57 | 0.63 | 1.48 | 93.45 | 0.00 | 93.45 | 4.000 | No | No | 2.00 |
| 168 | 11.03 | 63.55 | 0.58 | 0.63 | 1.47 | 93.51 | 0.00 | 93.51 | 4.000 | No | No | 2.00 |
| 169 | 11.10 | 63.74 | 0.58 | 0.63 | 1.46 | 93.27 | 0.00 | 93.27 | 4.000 | No | No | 2.00 |
| 170 | 11.16 | 63.74 | 0.58 | 0.63 | 1.45 | 92.72 | 0.00 | 92.72 | 4.000 | No | No | 2.00 |
| 171 | 11.22 | 63.62 | 0.59 | 0.62 | 1.44 | 91.64 | 0.00 | 91.64 | 4.000 | No | No | 2.00 |
| 172 | 11.29 | 63.49 | 0.59 | 0.61 | 1.43 | 90.45 | 0.00 | 90.45 | 4.000 | No | No | 2.00 |
| 173 | 11.36 | 62.67 | 0.59 | 0.59 | 1.41 | 89.19 | 0.38 | 89.56 | 4.000 | No | No | 2.00 |
| 174 | 11.43 | 63.07 | 0.60 | 0.57 | 1.38 | 84.66 | 1.51 | 86.16 | 4.000 | No | No | 2.00 |
| 175 | 11.51 | 64.07 | 0.60 | 0.54 | 1.36 | 87.56 | 2.98 | 90.54 | 4.000 | No | No | 2.00 |
| 176 | 11.55 | 67.14 | 0.60 | 0.51 | 1.33 | 88.33 | 4.98 | 93.31 | 4.000 | No | No | 2.00 |
| 177 | 11.63 | 71.57 | 0.61 | 0.48 | 1.31 | 91.92 | 6.76 | 98.68 | 4.000 | No | No | 2.00 |
| 178 | 11.71 | 78.04 | 0.61 | 0.47 | 1.29 | 100.49 | 7.69 | 108.17 | 4.000 | No | No | 2.00 |
| 179 | 11.76 | 88.31 | 0.62 | 0.46 | 1.28 | 110.14 | 7.45 | 117.58 | 4.000 | No | No | 2.00 |
| 180 | 11.83 | 102.07 | 0.62 | 0.45 | 1.27 | 128.60 | 7.32 | 135.92 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 181 | 11.90 | 118.84 | 0.63 | 0.44 | 1.26 | 149.81 | 7.81 | 157.62 | 4.000 | No | No | 2.00 |
| 182 | 11.95 | 138.55 | 0.63 | 0.44 | 1.26 | 170.92 | 6.69 | 177.61 | 4.000 | No | No | 2.00 |
| 183 | 12.02 | 152.70 | 0.63 | 0.45 | 1.26 | 202.15 | 4.56 | 206.71 | 4.000 | No | No | 2.00 |
| 184 | 12.08 | 175.43 | 0.64 | 0.50 | 1.29 | 207.90 | 1.77 | 209.68 | 4.000 | No | No | 2.00 |
| 185 | 12.15 | 165.68 | 0.64 | 0.49 | 1.28 | 260.70 | 1.55 | 262.25 | 4.000 | No | No | 2.00 |
| 186 | 12.22 | 145.51 | 0.65 | 0.49 | 1.27 | 166.92 | 2.83 | 169.74 | 4.000 | No | No | 2.00 |
| 187 | 12.28 | 111.49 | 0.65 | 0.47 | 1.26 | 127.40 | 5.41 | 132.81 | 4.000 | No | No | 2.00 |
| 188 | 12.34 | 94.94 | 0.65 | 0.45 | 1.24 | 127.17 | 7.32 | 134.49 | 4.000 | No | No | 2.00 |
| 189 | 12.41 | 88.56 | 0.66 | 0.46 | 1.25 | 101.50 | 7.88 | 109.39 | 4.000 | No | No | 2.00 |
| 190 | 12.47 | 79.41 | 0.66 | 0.45 | 1.24 | 101.51 | 9.08 | 110.59 | 4.000 | No | No | 2.00 |
| 191 | 12.54 | 76.37 | 0.67 | 0.47 | 1.24 | 92.90 | 8.48 | 101.38 | 4.000 | No | No | 2.00 |
| 192 | 12.60 | 72.09 | 0.67 | 0.47 | 1.24 | 89.75 | 8.16 | 97.91 | 4.000 | No | No | 2.00 |
| 193 | 12.67 | 66.62 | 0.67 | 0.48 | 1.24 | 86.03 | 7.57 | 93.60 | 4.000 | No | No | 2.00 |
| 194 | 12.76 | 62.58 | 0.68 | 0.50 | 1.25 | 73.07 | 7.06 | 80.13 | 4.000 | No | No | 2.00 |
| 195 | 12.80 | 58.78 | 0.68 | 0.50 | 1.25 | 75.14 | 6.73 | 81.87 | 4.000 | No | No | 2.00 |
| 196 | 12.88 | 58.48 | 0.68 | 0.52 | 1.25 | 72.31 | 6.00 | 78.31 | 4.000 | No | No | 2.00 |
| 197 | 12.95 | 57.48 | 0.69 | 0.53 | 1.25 | 72.07 | 5.14 | 77.21 | 4.000 | No | No | 2.00 |
| 198 | 13.01 | 56.99 | 0.69 | 0.54 | 1.26 | 71.77 | 4.35 | 76.12 | 4.000 | No | No | 2.00 |
| 199 | 13.07 | 56.23 | 0.70 | 0.54 | 1.26 | 70.72 | 4.05 | 74.78 | 4.000 | No | No | 2.00 |
| 200 | 13.13 | 55.32 | 0.70 | 0.55 | 1.25 | 69.27 | 3.95 | 73.22 | 4.000 | No | No | 2.00 |
| 201 | 13.19 | 54.91 | 0.70 | 0.55 | 1.25 | 68.18 | 3.76 | 71.95 | 4.000 | No | No | 2.00 |
| 202 | 13.27 | 54.52 | 0.71 | 0.55 | 1.25 | 68.79 | 3.70 | 72.49 | 4.000 | No | No | 2.00 |
| 203 | 13.33 | 54.70 | 0.71 | 0.55 | 1.25 | 67.34 | 3.78 | 71.11 | 4.000 | No | No | 2.00 |
| 204 | 13.41 | 53.47 | 0.72 | 0.55 | 1.24 | 68.08 | 4.09 | 72.18 | 4.000 | No | No | 2.00 |
| 205 | 13.45 | 54.23 | 0.72 | 0.56 | 1.24 | 63.76 | 4.03 | 67.79 | 4.000 | No | No | 2.00 |
| 206 | 13.52 | 55.11 | 0.72 | 0.55 | 1.23 | 69.44 | 3.93 | 73.37 | 4.000 | No | No | 2.00 |
| 207 | 13.60 | 57.51 | 0.73 | 0.55 | 1.23 | 70.85 | 3.56 | 74.41 | 4.000 | No | No | 2.00 |
| 208 | 13.66 | 58.57 | 0.73 | 0.55 | 1.23 | 71.95 | 3.37 | 75.32 | 4.000 | No | No | 2.00 |
| 209 | 13.74 | 59.21 | 0.73 | 0.55 | 1.22 | 72.83 | 3.22 | 76.05 | 4.000 | No | No | 2.00 |
| 210 | 13.80 | 59.49 | 0.74 | 0.56 | 1.22 | 72.71 | 3.09 | 75.80 | 4.000 | No | No | 2.00 |
| 211 | 13.85 | 59.40 | 0.74 | 0.56 | 1.22 | 72.47 | 3.03 | 75.50 | 4.000 | No | No | 2.00 |
| 212 | 13.93 | 59.33 | 0.75 | 0.56 | 1.22 | 72.03 | 2.97 | 75.00 | 4.000 | No | No | 2.00 |
| 213 | 13.99 | 59.21 | 0.75 | 0.56 | 1.21 | 71.95 | 2.97 | 74.93 | 4.000 | No | No | 2.00 |
| 214 | 14.04 | 59.18 | 0.75 | 0.56 | 1.21 | 71.50 | 2.95 | 74.45 | 4.000 | No | No | 2.00 |
| 215 | 14.13 | 59.06 | 0.76 | 0.56 | 1.21 | 71.35 | 2.99 | 74.34 | 4.000 | No | No | 2.00 |
| 216 | 14.19 | 58.67 | 0.76 | 0.55 | 1.20 | 70.78 | 3.45 | 74.22 | 4.000 | No | No | 2.00 |
| 217 | 14.26 | 58.00 | 0.76 | 0.54 | 1.19 | 68.99 | 4.46 | 73.45 | 4.000 | No | No | 2.00 |
| 218 | 14.31 | 56.75 | 0.77 | 0.51 | 1.18 | 67.38 | 6.99 | 74.37 | 4.000 | No | No | 2.00 |
| 219 | 14.39 | 55.93 | 0.77 | 0.49 | 1.17 | 64.44 | 10.03 | 74.47 | 4.000 | No | No | 2.00 |
| 220 | 14.44 | 55.26 | 0.77 | 0.47 | 1.16 | 64.12 | 12.90 | 77.03 | 4.000 | No | No | 2.00 |
| 221 | 14.52 | 55.50 | 0.78 | 0.46 | 1.15 | 63.53 | 13.66 | 77.19 | 4.000 | No | No | 2.00 |
| 222 | 14.59 | 56.08 | 0.78 | 0.46 | 1.15 | 64.28 | 13.81 | 78.09 | 4.000 | No | No | 2.00 |
| 223 | 14.65 | 57.17 | 0.79 | 0.46 | 1.14 | 65.39 | 14.49 | 79.87 | 4.000 | No | No | 2.00 |
| 224 | 14.71 | 60.46 | 0.79 | 0.45 | 1.14 | 66.59 | 15.07 | 81.66 | 4.000 | No | No | 2.00 |
| 225 | 14.78 | 65.68 | 0.79 | 0.44 | 1.14 | 74.70 | 14.06 | 88.76 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 226 | 14.84 | 72.45 | 0.80 | 0.45 | 1.14 | 82.70 | 11.35 | 94.04 | 4.000 | No | No | 2.00 |
| 227 | 14.90 | 80.84 | 0.80 | 0.47 | 1.14 | 89.68 | 8.20 | 97.88 | 4.000 | No | No | 2.00 |
| 228 | 14.97 | 90.77 | 0.81 | 0.48 | 1.14 | 103.66 | 5.86 | 109.52 | 4.000 | No | No | 2.00 |
| 229 | 15.04 | 97.24 | 0.81 | 0.48 | 1.14 | 116.72 | 4.93 | 121.65 | 4.000 | No | No | 2.00 |
| 230 | 15.11 | 100.97 | 0.81 | 0.49 | 1.14 | 111.54 | 4.76 | 116.30 | 4.000 | No | No | 2.00 |
| 231 | 15.16 | 100.67 | 0.82 | 0.48 | 1.13 | 115.63 | 5.19 | 120.82 | 4.000 | No | No | 2.00 |
| 232 | 15.24 | 103.98 | 0.82 | 0.48 | 1.13 | 114.79 | 5.17 | 119.97 | 4.000 | No | No | 2.00 |
| 233 | 15.29 | 107.57 | 0.83 | 0.48 | 1.13 | 121.82 | 4.70 | 126.52 | 4.000 | No | No | 2.00 |
| 234 | 15.36 | 112.92 | 0.83 | 0.49 | 1.13 | 127.25 | 3.80 | 131.06 | 4.000 | No | No | 2.00 |
| 235 | 15.43 | 116.50 | 0.83 | 0.49 | 1.12 | 132.28 | 3.81 | 136.09 | 4.000 | No | No | 2.00 |
| 236 | 15.51 | 119.87 | 0.84 | 0.48 | 1.12 | 132.89 | 4.30 | 137.19 | 4.000 | No | No | 2.00 |
| 237 | 15.56 | 121.84 | 0.84 | 0.47 | 1.11 | 136.94 | 5.08 | 142.02 | 4.000 | No | No | 2.00 |
| 238 | 15.64 | 124.85 | 0.85 | 0.47 | 1.11 | 137.30 | 4.98 | 142.28 | 4.000 | No | No | 2.00 |
| 239 | 15.69 | 127.13 | 0.85 | 0.47 | 1.11 | 141.69 | 4.88 | 146.58 | 4.000 | No | No | 2.00 |
| 240 | 15.77 | 129.26 | 0.85 | 0.47 | 1.11 | 143.54 | 4.75 | 148.30 | 4.000 | No | No | 2.00 |
| 241 | 15.82 | 129.80 | 0.86 | 0.47 | 1.10 | 143.46 | 4.82 | 148.28 | 4.000 | No | No | 2.00 |
| 242 | 15.89 | 129.07 | 0.86 | 0.47 | 1.10 | 142.47 | 4.93 | 147.40 | 4.000 | No | No | 2.00 |
| 243 | 15.95 | 127.19 | 0.87 | 0.47 | 1.10 | 140.17 | 5.11 | 145.28 | 4.000 | No | No | 2.00 |
| 244 | 16.02 | 122.85 | 0.87 | 0.46 | 1.09 | 136.17 | 5.53 | 141.70 | 4.000 | No | No | 2.00 |
| 245 | 16.09 | 117.68 | 0.87 | 0.47 | 1.09 | 127.25 | 5.81 | 133.06 | 4.000 | No | No | 2.00 |
| 246 | 16.15 | 112.70 | 0.88 | 0.46 | 1.09 | 122.27 | 6.31 | 128.58 | 4.000 | No | No | 2.00 |
| 247 | 16.22 | 109.06 | 0.88 | 0.46 | 1.09 | 118.98 | 6.64 | 125.63 | 4.000 | No | No | 2.00 |
| 248 | 16.27 | 106.69 | 0.89 | 0.46 | 1.08 | 114.49 | 7.05 | 121.54 | 4.000 | No | No | 2.00 |
| 249 | 16.34 | 105.32 | 0.89 | 0.46 | 1.08 | 113.74 | 7.15 | 120.89 | 4.000 | No | No | 2.00 |
| 250 | 16.41 | 104.71 | 0.89 | 0.46 | 1.08 | 113.78 | 7.23 | 121.01 | 4.000 | No | No | 2.00 |
| 251 | 16.50 | 103.04 | 0.90 | 0.46 | 1.08 | 111.63 | 7.62 | 119.25 | 4.000 | No | No | 2.00 |
| 252 | 16.57 | 100.70 | 0.90 | 0.46 | 1.07 | 107.47 | 8.02 | 115.49 | 4.000 | No | No | 2.00 |
| 253 | 16.60 | 98.15 | 0.91 | 0.47 | 1.08 | 105.74 | 6.78 | 112.52 | 4.000 | No | No | 2.00 |
| 254 | 16.70 | 96.54 | 0.91 | 0.49 | 1.08 | 103.29 | 5.21 | 108.50 | 4.000 | No | No | 2.00 |
| 255 | 16.76 | 95.24 | 0.92 | 0.51 | 1.08 | 102.54 | 3.65 | 106.19 | 4.000 | No | No | 2.00 |
| 256 | 16.82 | 93.41 | 0.92 | 0.51 | 1.07 | 101.45 | 3.64 | 105.09 | 4.000 | No | No | 2.00 |
| 257 | 16.89 | 92.56 | 0.92 | 0.52 | 1.07 | 97.28 | 3.14 | 100.42 | 4.000 | No | No | 2.00 |
| 258 | 16.95 | 84.57 | 0.93 | 0.52 | 1.07 | 99.24 | 3.48 | 102.72 | 4.000 | No | No | 2.00 |
| 259 | 17.01 | 73.27 | 0.93 | 0.52 | 1.07 | 75.30 | 5.13 | 80.42 | 4.000 | No | No | 2.00 |
| 260 | 17.09 | 60.58 | 0.94 | 0.50 | 1.06 | 60.32 | 8.78 | 69.10 | 4.000 | No | No | 2.00 |
| 261 | 17.16 | 53.87 | 0.94 | 0.49 | 1.06 | 57.86 | 11.30 | 69.16 | 4.000 | No | No | 2.00 |
| 262 | 17.22 | 51.65 | 0.94 | 0.50 | 1.06 | 53.30 | 10.80 | 64.10 | 4.000 | No | No | 2.00 |
| 263 | 17.28 | 50.43 | 0.95 | 0.52 | 1.06 | 53.01 | 8.84 | 61.84 | 4.000 | No | No | 2.00 |
| 264 | 17.35 | 49.95 | 0.95 | 0.53 | 1.06 | 53.93 | 7.23 | 61.17 | 4.000 | No | No | 2.00 |
| 265 | 17.41 | 48.09 | 0.95 | 0.54 | 1.06 | 51.65 | 7.15 | 58.79 | 4.000 | No | No | 2.00 |
| 266 | 17.48 | 45.94 | 0.96 | 0.55 | 1.06 | 46.96 | 7.61 | 54.57 | 4.000 | No | No | 2.00 |
| 267 | 17.54 | 44.42 | 0.96 | 0.55 | 1.05 | 46.87 | 7.43 | 54.31 | 4.000 | No | No | 2.00 |
| 268 | 17.60 | 44.33 | 0.96 | 0.56 | 1.05 | 46.66 | 6.05 | 52.71 | 4.000 | No | No | 2.00 |
| 269 | 17.66 | 44.15 | 0.97 | 0.59 | 1.05 | 46.58 | 4.13 | 50.71 | 4.000 | No | No | 2.00 |
| 270 | 17.75 | 43.99 | 0.97 | 0.62 | 1.05 | 46.24 | 2.57 | 48.81 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 | 17.78 | 43.63 | 0.98 | 0.63 | 1.05 | 46.16 | 1.76 | 47.92 | 4.000 | No | No | 2.00 |
| 272 | 17.87 | 43.42 | 0.98 | 0.64 | 1.05 | 45.28 | 1.43 | 46.71 | 4.000 | No | No | 2.00 |
| 273 | 17.93 | 43.30 | 0.98 | 0.65 | 1.05 | 45.41 | 1.09 | 46.50 | 4.000 | No | No | 2.00 |
| 274 | 18.00 | 43.60 | 0.99 | 0.66 | 1.05 | 45.51 | 0.74 | 46.25 | 4.000 | No | No | 2.00 |
| 275 | 18.06 | 43.99 | 0.99 | 0.67 | 1.05 | 46.00 | 0.39 | 46.38 | 4.000 | No | No | 2.00 |
| 276 | 18.13 | 44.45 | 0.99 | 0.67 | 1.04 | 46.39 | 0.09 | 46.48 | 4.000 | No | No | 2.00 |
| 277 | 18.19 | 44.93 | 1.00 | 0.68 | 1.04 | 46.68 | 0.00 | 46.68 | 4.000 | No | No | 2.00 |
| 278 | 18.25 | 45.51 | 1.00 | 0.69 | 1.04 | 47.27 | 0.00 | 47.27 | 4.000 | No | No | 2.00 |
| 279 | 18.32 | 46.27 | 1.00 | 0.70 | 1.04 | 47.93 | 0.00 | 47.93 | 4.000 | No | No | 2.00 |
| 280 | 18.38 | 47.03 | 1.01 | 0.71 | 1.04 | 48.77 | 0.00 | 48.77 | 4.000 | No | No | 2.00 |
| 281 | 18.44 | 47.67 | 1.01 | 0.70 | 1.03 | 49.31 | 0.00 | 49.31 | 4.000 | No | No | 2.00 |
| 282 | 18.51 | 47.85 | 1.01 | 0.70 | 1.03 | 49.57 | 0.00 | 49.57 | 4.000 | No | No | 2.00 |
| 283 | 18.57 | 47.31 | 1.02 | 0.70 | 1.03 | 48.97 | 0.00 | 48.97 | 4.000 | No | No | 2.00 |
| 284 | 18.64 | 46.76 | 1.02 | 0.70 | 1.03 | 47.27 | 0.00 | 47.27 | 4.000 | No | No | 2.00 |
| 285 | 18.73 | 46.27 | 1.03 | 0.70 | 1.02 | 47.47 | 0.00 | 47.47 | 4.000 | No | No | 2.00 |
| 286 | 18.80 | 46.12 | 1.03 | 0.71 | 1.02 | 47.09 | 0.00 | 47.09 | 4.000 | No | No | 2.00 |
| 287 | 18.86 | 45.57 | 1.03 | 0.71 | 1.02 | 46.42 | 0.00 | 46.42 | 4.000 | No | No | 2.00 |
| 288 | 18.92 | 44.96 | 1.04 | 0.71 | 1.01 | 45.49 | 0.00 | 45.49 | 4.000 | No | No | 2.00 |
| 289 | 18.99 | 44.48 | 1.04 | 0.71 | 1.01 | 44.92 | 0.00 | 44.92 | 4.000 | No | No | 2.00 |
| 290 | 19.05 | 44.39 | 1.04 | 0.71 | 1.01 | 44.64 | 0.00 | 44.64 | 4.000 | No | No | 2.00 |
| 291 | 19.12 | 44.66 | 1.05 | 0.71 | 1.01 | 44.89 | 0.00 | 44.89 | 4.000 | No | No | 2.00 |
| 292 | 19.18 | 45.21 | 1.05 | 0.70 | 1.01 | 45.44 | 0.00 | 45.44 | 4.000 | No | No | 2.00 |
| 293 | 19.23 | 45.79 | 1.05 | 0.69 | 1.00 | 45.98 | 0.00 | 45.98 | 4.000 | No | No | 2.00 |
| 294 | 19.29 | 46.30 | 1.06 | 0.68 | 1.00 | 46.34 | 0.00 | 46.34 | 4.000 | No | No | 2.00 |
| 295 | 19.38 | 46.76 | 1.06 | 0.68 | 1.00 | 46.65 | 0.00 | 46.65 | 4.000 | No | No | 2.00 |
| 296 | 19.45 | 47.33 | 1.06 | 0.68 | 1.00 | 46.99 | 0.00 | 46.99 | 4.000 | No | No | 2.00 |
| 297 | 19.51 | 47.79 | 1.07 | 0.67 | 0.99 | 47.71 | 0.00 | 47.71 | 4.000 | No | No | 2.00 |
| 298 | 19.57 | 48.22 | 1.07 | 0.67 | 0.99 | 47.71 | 0.00 | 47.71 | 4.000 | No | No | 2.00 |
| 299 | 19.64 | 48.40 | 1.08 | 0.67 | 0.99 | 47.96 | 0.00 | 47.96 | 4.000 | No | No | 2.00 |
| 300 | 19.70 | 48.70 | 1.08 | 0.68 | 0.99 | 47.94 | 0.00 | 47.94 | 4.000 | No | No | 2.00 |
| 301 | 19.76 | 49.10 | 1.08 | 0.67 | 0.98 | 48.29 | 0.00 | 48.29 | 4.000 | No | No | 2.00 |
| 302 | 19.82 | 49.86 | 1.09 | 0.66 | 0.98 | 48.83 | 0.24 | 49.07 | 4.000 | No | No | 2.00 |
| 303 | 19.89 | 51.16 | 1.09 | 0.64 | 0.98 | 49.92 | 0.84 | 50.75 | 4.000 | No | No | 2.00 |
| 304 | 19.95 | 52.10 | 1.09 | 0.62 | 0.98 | 51.89 | 1.47 | 53.36 | 4.000 | No | No | 2.00 |
| 305 | 20.04 | 54.84 | 1.10 | 0.62 | 0.98 | 51.31 | 1.78 | 53.10 | 4.000 | No | No | 2.00 |
| 306 | 20.09 | 58.18 | 1.10 | 0.60 | 0.98 | 57.68 | 1.90 | 59.58 | 4.000 | No | No | 2.00 |
| 307 | 20.15 | 63.28 | 1.10 | 0.60 | 0.98 | 61.40 | 1.73 | 63.13 | 4.000 | No | No | 2.00 |
| 308 | 20.22 | 67.08 | 1.11 | 0.59 | 0.97 | 66.00 | 1.73 | 67.72 | 4.000 | No | No | 2.00 |
| 309 | 20.28 | 70.45 | 1.11 | 0.58 | 0.97 | 68.45 | 1.74 | 70.19 | 4.000 | No | No | 2.00 |
| 310 | 20.34 | 72.97 | 1.11 | 0.58 | 0.97 | 70.89 | 1.72 | 72.61 | 4.000 | No | No | 2.00 |
| 311 | 20.41 | 75.82 | 1.12 | 0.58 | 0.97 | 72.96 | 1.54 | 74.50 | 4.000 | No | No | 2.00 |
| 312 | 20.48 | 78.13 | 1.12 | 0.58 | 0.97 | 76.33 | 1.23 | 77.56 | 4.000 | No | No | 2.00 |
| 313 | 20.57 | 79.84 | 1.13 | 0.59 | 0.96 | 77.05 | 0.96 | 78.01 | 4.000 | No | No | 2.00 |
| 314 | 20.63 | 80.84 | 1.13 | 0.59 | 0.96 | 77.33 | 0.75 | 78.09 | 4.000 | No | No | 2.00 |
| 315 | 20.69 | 82.23 | 1.13 | 0.60 | 0.96 | 78.64 | 0.51 | 79.15 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 316 | 20.75 | 83.48 | 1.14 | 0.60 | 0.96 | 80.55 | 0.24 | 80.79 | 4.000 | No | No | 2.00 |
| 317 | 20.81 | 83.69 | 1.14 | 0.61 | 0.95 | 80.39 | 0.09 | 80.47 | 4.000 | No | No | 2.00 |
| 318 | 20.87 | 82.05 | 1.15 | 0.61 | 0.95 | 78.74 | 0.08 | 78.82 | 4.000 | No | No | 2.00 |
| 319 | 20.96 | 79.23 | 1.15 | 0.61 | 0.95 | 75.34 | 0.33 | 75.66 | 4.000 | No | No | 2.00 |
| 320 | 21.02 | 75.43 | 1.15 | 0.60 | 0.95 | 71.89 | 0.82 | 72.70 | 4.000 | No | No | 2.00 |
| 321 | 21.08 | 71.51 | 1.16 | 0.59 | 0.95 | 67.55 | 1.32 | 68.87 | 4.000 | No | No | 2.00 |
| 322 | 21.15 | 68.27 | 1.16 | 0.60 | 0.95 | 63.89 | 1.54 | 65.43 | 4.000 | No | No | 2.00 |
| 323 | 21.21 | 65.99 | 1.16 | 0.60 | 0.94 | 62.28 | 1.46 | 63.74 | 4.000 | No | No | 2.00 |
| 324 | 21.27 | 64.31 | 1.17 | 0.60 | 0.94 | 60.68 | 1.44 | 62.12 | 4.000 | No | No | 2.00 |
| 325 | 21.33 | 62.46 | 1.17 | 0.60 | 0.94 | 58.77 | 1.62 | 60.39 | 4.000 | No | No | 2.00 |
| 326 | 21.40 | 60.45 | 1.18 | 0.60 | 0.94 | 56.70 | 1.83 | 58.53 | 4.000 | No | No | 2.00 |
| 327 | 21.46 | 58.87 | 1.18 | 0.60 | 0.94 | 54.71 | 2.03 | 56.74 | 4.000 | No | No | 2.00 |
| 328 | 21.53 | 57.87 | 1.18 | 0.60 | 0.93 | 54.01 | 2.13 | 56.15 | 4.000 | No | No | 2.00 |
| 329 | 21.59 | 57.52 | 1.19 | 0.61 | 0.93 | 53.53 | 1.75 | 55.28 | 4.000 | No | No | 2.00 |
| 330 | 21.66 | 57.38 | 1.19 | 0.62 | 0.93 | 53.32 | 1.38 | 54.70 | 4.000 | No | No | 2.00 |
| 331 | 21.75 | 57.35 | 1.20 | 0.63 | 0.93 | 53.15 | 1.22 | 54.37 | 4.000 | No | No | 2.00 |
| 332 | 21.81 | 58.01 | 1.20 | 0.62 | 0.93 | 53.05 | 1.49 | 54.54 | 4.000 | No | No | 2.00 |
| 333 | 21.87 | 59.21 | 1.20 | 0.61 | 0.93 | 54.89 | 1.76 | 56.65 | 4.000 | No | No | 2.00 |
| 334 | 21.93 | 62.55 | 1.21 | 0.60 | 0.92 | 56.38 | 2.12 | 58.51 | 4.000 | No | No | 2.00 |
| 335 | 22.01 | 67.32 | 1.21 | 0.57 | 0.93 | 62.35 | 2.76 | 65.11 | 4.000 | No | No | 2.00 |
| 336 | 22.07 | 72.79 | 1.21 | 0.55 | 0.93 | 68.27 | 3.41 | 71.68 | 4.000 | No | No | 2.00 |
| 337 | 22.13 | 75.98 | 1.22 | 0.54 | 0.93 | 71.68 | 3.52 | 75.20 | 4.000 | No | No | 2.00 |
| 338 | 22.20 | 77.26 | 1.22 | 0.55 | 0.92 | 71.08 | 3.24 | 74.32 | 4.000 | No | No | 2.00 |
| 339 | 22.25 | 76.77 | 1.22 | 0.56 | 0.92 | 71.42 | 2.88 | 74.30 | 4.000 | No | No | 2.00 |
| 340 | 22.31 | 76.98 | 1.23 | 0.56 | 0.92 | 69.83 | 2.75 | 72.58 | 4.000 | No | No | 2.00 |
| 341 | 22.40 | 77.83 | 1.23 | 0.56 | 0.92 | 71.19 | 2.78 | 73.97 | 4.000 | No | No | 2.00 |
| 342 | 22.47 | 75.92 | 1.24 | 0.55 | 0.92 | 73.44 | 3.15 | 76.59 | 4.000 | No | No | 2.00 |
| 343 | 22.53 | 71.42 | 1.24 | 0.55 | 0.92 | 64.27 | 3.80 | 68.07 | 4.000 | No | No | 2.00 |
| 344 | 22.59 | 66.11 | 1.24 | 0.55 | 0.91 | 58.58 | 4.53 | 63.11 | 4.000 | No | No | 2.00 |
| 345 | 22.65 | 64.07 | 1.25 | 0.55 | 0.91 | 58.51 | 4.67 | 63.18 | 4.000 | No | No | 2.00 |
| 346 | 22.72 | 64.56 | 1.25 | 0.56 | 0.91 | 58.29 | 3.93 | 62.23 | 4.000 | No | No | 2.00 |
| 347 | 22.78 | 65.23 | 1.26 | 0.57 | 0.91 | 59.42 | 3.14 | 62.56 | 4.000 | No | No | 2.00 |
| 348 | 22.84 | 66.08 | 1.26 | 0.58 | 0.90 | 59.71 | 2.52 | 62.24 | 4.000 | No | No | 2.00 |
| 349 | 22.90 | 66.32 | 1.26 | 0.59 | 0.90 | 60.06 | 2.26 | 62.32 | 4.000 | No | No | 2.00 |
| 350 | 23.00 | 65.99 | 1.27 | 0.60 | 0.90 | 59.50 | 1.91 | 61.41 | 4.000 | No | No | 2.00 |
| 351 | 23.06 | 64.84 | 1.27 | 0.61 | 0.89 | 58.22 | 1.51 | 59.73 | 4.000 | No | No | 2.00 |
| 352 | 23.10 | 63.04 | 1.27 | 0.62 | 0.89 | 56.33 | 1.26 | 57.58 | 4.000 | No | No | 2.00 |
| 353 | 23.17 | 60.89 | 1.28 | 0.63 | 0.89 | 54.10 | 1.11 | 55.21 | 4.000 | No | No | 2.00 |
| 354 | 23.24 | 58.76 | 1.28 | 0.63 | 0.89 | 51.91 | 0.96 | 52.86 | 4.000 | No | No | 2.00 |
| 355 | 23.30 | 56.48 | 1.28 | 0.64 | 0.88 | 50.17 | 1.04 | 51.21 | 4.000 | No | No | 2.00 |
| 356 | 23.39 | 55.20 | 1.29 | 0.64 | 0.88 | 47.61 | 1.17 | 48.78 | 4.000 | No | No | 2.00 |
| 357 | 23.45 | 54.48 | 1.29 | 0.63 | 0.88 | 48.22 | 1.34 | 49.56 | 4.000 | No | No | 2.00 |
| 358 | 23.51 | 54.63 | 1.30 | 0.63 | 0.88 | 47.99 | 1.41 | 49.40 | 4.000 | No | No | 2.00 |
| 359 | 23.58 | 54.60 | 1.30 | 0.63 | 0.88 | 47.86 | 1.61 | 49.47 | 4.000 | No | No | 2.00 |
| 360 | 23.64 | 54.84 | 1.30 | 0.62 | 0.88 | 48.01 | 1.90 | 49.92 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 361 | 23.71 | 55.38 | 1.31 | 0.61 | 0.88 | 48.56 | 2.18 | 50.74 | 4.000 | No | No | 2.00 |
| 362 | 23.77 | 56.20 | 1.31 | 0.61 | 0.88 | 49.26 | 2.37 | 51.63 | 4.000 | No | No | 2.00 |
| 363 | 23.83 | 57.02 | 1.31 | 0.60 | 0.88 | 50.11 | 2.47 | 52.57 | 4.000 | No | No | 2.00 |
| 364 | 23.89 | 57.94 | 1.32 | 0.60 | 0.88 | 50.61 | 2.54 | 53.15 | 4.000 | No | No | 2.00 |
| 365 | 23.98 | 58.88 | 1.32 | 0.60 | 0.87 | 51.51 | 2.64 | 54.15 | 4.000 | No | No | 2.00 |
| 366 | 24.03 | 60.18 | 1.33 | 0.59 | 0.87 | 52.45 | 2.81 | 55.26 | 4.000 | No | No | 2.00 |
| 367 | 24.10 | 61.85 | 1.33 | 0.59 | 0.87 | 53.95 | 2.96 | 56.92 | 4.000 | No | No | 2.00 |
| 368 | 24.16 | 63.98 | 1.33 | 0.58 | 0.87 | 55.87 | 3.04 | 58.91 | 4.000 | No | No | 2.00 |
| 369 | 24.22 | 66.23 | 1.34 | 0.58 | 0.87 | 57.99 | 3.04 | 61.03 | 4.000 | No | No | 2.00 |
| 370 | 24.29 | 68.38 | 1.34 | 0.57 | 0.87 | 59.79 | 3.09 | 62.88 | 4.000 | No | No | 2.00 |
| 371 | 24.34 | 70.51 | 1.34 | 0.56 | 0.87 | 61.50 | 3.44 | 64.94 | 4.000 | No | No | 2.00 |
| 372 | 24.41 | 73.06 | 1.35 | 0.55 | 0.88 | 63.65 | 3.90 | 67.55 | 4.000 | No | No | 2.00 |
| 373 | 24.48 | 77.28 | 1.35 | 0.54 | 0.88 | 66.69 | 4.34 | 71.03 | 4.000 | No | No | 2.00 |
| 374 | 24.56 | 82.69 | 1.36 | 0.53 | 0.88 | 72.79 | 4.35 | 77.14 | 4.000 | No | No | 2.00 |
| 375 | 24.62 | 89.71 | 1.36 | 0.52 | 0.88 | 77.96 | 4.13 | 82.09 | 4.000 | No | No | 2.00 |
| 376 | 24.69 | 97.21 | 1.36 | 0.53 | 0.87 | 84.98 | 3.52 | 88.50 | 4.000 | No | No | 2.00 |
| 377 | 24.75 | 105.72 | 1.37 | 0.53 | 0.87 | 92.09 | 2.80 | 94.89 | 4.000 | No | No | 2.00 |
| 378 | 24.81 | 115.68 | 1.37 | 0.52 | 0.87 | 100.03 | 3.00 | 103.03 | 4.000 | No | No | 2.00 |
| 379 | 24.89 | 126.31 | 1.38 | 0.50 | 0.88 | 111.49 | 3.88 | 115.37 | 4.000 | No | No | 2.00 |
| 380 | 24.96 | 136.52 | 1.38 | 0.48 | 0.88 | 121.00 | 4.61 | 125.61 | 4.000 | No | No | 2.00 |
| 381 | 25.02 | 142.65 | 1.39 | 0.47 | 0.88 | 127.66 | 4.53 | 132.19 | 4.000 | No | No | 2.00 |
| 382 | 25.08 | 148.55 | 1.39 | 0.49 | 0.88 | 127.45 | 3.82 | 131.28 | 4.000 | No | No | 2.00 |
| 383 | 25.13 | 153.71 | 1.39 | 0.49 | 0.87 | 135.59 | 3.24 | 138.83 | 4.000 | No | No | 2.00 |
| 384 | 25.20 | 159.85 | 1.40 | 0.49 | 0.87 | 140.13 | 3.05 | 143.18 | 4.000 | No | No | 2.00 |
| 385 | 25.27 | 164.31 | 1.40 | 0.49 | 0.87 | 143.01 | 3.28 | 146.28 | 4.000 | No | No | 2.00 |
| 386 | 25.33 | 165.83 | 1.40 | 0.48 | 0.87 | 147.05 | 3.45 | 150.50 | 4.000 | No | No | 2.00 |
| 387 | 25.39 | 165.65 | 1.41 | 0.49 | 0.87 | 143.59 | 3.07 | 146.65 | 4.000 | No | No | 2.00 |
| 388 | 25.48 | 164.43 | 1.41 | 0.50 | 0.86 | 141.08 | 2.28 | 143.36 | 4.000 | No | No | 2.00 |
| 389 | 25.55 | 164.71 | 1.42 | 0.52 | 0.86 | 141.53 | 1.51 | 143.04 | 4.000 | No | No | 2.00 |
| 390 | 25.60 | 163.13 | 1.42 | 0.52 | 0.86 | 142.14 | 1.33 | 143.47 | 4.000 | No | No | 2.00 |
| 391 | 25.66 | 157.05 | 1.42 | 0.52 | 0.86 | 135.74 | 1.59 | 137.33 | 4.000 | No | No | 2.00 |
| 392 | 25.73 | 148.94 | 1.43 | 0.51 | 0.86 | 125.94 | 2.65 | 128.59 | 4.000 | No | No | 2.00 |
| 393 | 25.80 | 140.28 | 1.43 | 0.49 | 0.86 | 122.07 | 3.72 | 125.79 | 4.000 | No | No | 2.00 |
| 394 | 25.86 | 131.35 | 1.44 | 0.47 | 0.87 | 114.89 | 5.54 | 120.43 | 4.000 | No | No | 2.00 |
| 395 | 25.95 | 122.94 | 1.44 | 0.46 | 0.87 | 103.91 | 6.94 | 110.85 | 4.000 | No | No | 2.00 |
| 396 | 25.99 | 115.07 | 1.44 | 0.45 | 0.87 | 101.15 | 8.15 | 109.30 | 4.000 | No | No | 2.00 |
| 397 | 26.08 | 110.21 | 1.45 | 0.45 | 0.87 | 94.42 | 8.26 | 102.68 | 4.000 | No | No | 2.00 |
| 398 | 26.14 | 107.48 | 1.45 | 0.46 | 0.86 | 90.88 | 7.93 | 98.81 | 4.000 | No | No | 2.00 |
| 399 | 26.21 | 104.41 | 1.46 | 0.46 | 0.86 | 93.31 | 7.76 | 101.07 | 4.000 | No | No | 2.00 |
| 400 | 26.27 | 102.53 | 1.46 | 0.47 | 0.86 | 85.63 | 7.35 | 92.98 | 4.000 | No | No | 2.00 |
| 401 | 26.34 | 98.94 | 1.47 | 0.47 | 0.86 | 85.30 | 7.15 | 92.45 | 4.000 | No | No | 2.00 |
| 402 | 26.39 | 101.04 | 1.47 | 0.48 | 0.85 | 83.07 | 6.49 | 89.55 | 4.000 | No | No | 2.00 |
| 403 | 26.45 | 104.38 | 1.47 | 0.49 | 0.85 | 90.32 | 5.78 | 96.11 | 4.000 | No | No | 2.00 |
| 404 | 26.52 | 109.94 | 1.48 | 0.50 | 0.85 | 92.89 | 4.77 | 97.66 | 4.000 | No | No | 2.00 |
| 405 | 26.58 | 113.65 | 1.48 | 0.51 | 0.84 | 96.20 | 3.84 | 100.03 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 406 | 26.64 | 118.08 | 1.48 | 0.52 | 0.84 | 98.30 | 3.04 | 101.34 | 4.000 | No | No | 2.00 |
| 407 | 26.74 | 121.39 | 1.49 | 0.52 | 0.84 | 102.77 | 2.63 | 105.40 | 4.000 | No | No | 2.00 |
| 408 | 26.80 | 123.94 | 1.49 | 0.52 | 0.83 | 103.47 | 2.48 | 105.95 | 4.000 | No | No | 2.00 |
| 409 | 26.87 | 124.88 | 1.50 | 0.53 | 0.83 | 103.95 | 2.39 | 106.35 | 4.000 | No | No | 2.00 |
| 410 | 26.93 | 126.25 | 1.50 | 0.53 | 0.83 | 104.62 | 2.40 | 107.02 | 4.000 | No | No | 2.00 |
| 411 | 26.99 | 128.17 | 1.51 | 0.52 | 0.83 | 106.64 | 2.58 | 109.22 | 4.000 | No | No | 2.00 |
| 412 | 27.05 | 131.66 | 1.51 | 0.51 | 0.83 | 108.88 | 2.94 | 111.82 | 4.000 | No | No | 2.00 |
| 413 | 27.12 | 136.95 | 1.51 | 0.50 | 0.84 | 114.01 | 3.53 | 117.54 | 4.000 | No | No | 2.00 |
| 414 | 27.18 | 145.30 | 1.52 | 0.48 | 0.84 | 121.15 | 4.39 | 125.54 | 4.000 | No | No | 2.00 |
| 415 | 27.24 | 155.57 | 1.52 | 0.47 | 0.84 | 131.44 | 4.88 | 136.32 | 4.000 | No | No | 2.00 |
| 416 | 27.30 | 162.64 | 1.53 | 0.45 | 0.85 | 141.87 | 5.90 | 147.77 | 4.000 | No | No | 2.00 |
| 417 | 27.36 | 166.14 | 1.53 | 0.45 | 0.85 | 139.98 | 5.71 | 145.70 | 4.000 | No | No | 2.00 |
| 418 | 27.45 | 165.16 | 1.54 | 0.45 | 0.85 | 140.45 | 5.56 | 146.01 | 4.000 | No | No | 2.00 |
| 419 | 27.51 | 162.13 | 1.54 | 0.46 | 0.84 | 137.93 | 4.68 | 142.61 | 4.000 | No | No | 2.00 |
| 420 | 27.58 | 156.60 | 1.54 | 0.47 | 0.84 | 130.86 | 4.74 | 135.60 | 4.000 | No | No | 2.00 |
| 421 | 27.64 | 153.47 | 1.55 | 0.47 | 0.84 | 125.24 | 5.00 | 130.24 | 4.000 | No | No | 2.00 |
| 422 | 27.70 | 151.01 | 1.55 | 0.45 | 0.84 | 130.10 | 5.81 | 135.91 | 4.000 | No | No | 2.00 |
| 423 | 27.77 | 152.28 | 1.55 | 0.45 | 0.84 | 125.06 | 6.33 | 131.39 | 4.000 | No | No | 2.00 |
| 424 | 27.83 | 152.59 | 1.56 | 0.45 | 0.84 | 129.06 | 6.52 | 135.57 | 4.000 | No | No | 2.00 |
| 425 | 27.89 | 157.78 | 1.56 | 0.47 | 0.83 | 129.75 | 4.79 | 134.54 | 4.000 | No | No | 2.00 |
| 426 | 28.01 | 161.00 | 1.57 | 0.49 | 0.83 | 135.56 | 3.28 | 138.84 | 4.000 | No | No | 2.00 |
| 427 | 28.05 | 161.61 | 1.57 | 0.51 | 0.82 | 133.14 | 2.09 | 135.23 | 4.000 | No | No | 2.00 |
| 428 | 28.11 | 158.79 | 1.58 | 0.52 | 0.81 | 128.19 | 2.00 | 130.20 | 4.000 | No | No | 2.00 |
| 429 | 28.16 | 156.39 | 1.58 | 0.52 | 0.81 | 126.50 | 1.84 | 128.33 | 4.000 | No | No | 2.00 |
| 430 | 28.23 | 155.08 | 1.58 | 0.53 | 0.81 | 126.02 | 1.60 | 127.62 | 4.000 | No | No | 2.00 |
| 431 | 28.29 | 145.18 | 1.59 | 0.53 | 0.81 | 123.91 | 1.55 | 125.46 | 4.000 | No | No | 2.00 |
| 432 | 28.35 | 141.08 | 1.59 | 0.55 | 0.80 | 100.79 | 1.40 | 102.19 | 4.000 | No | No | 2.00 |
| 433 | 28.42 | 137.34 | 1.59 | 0.54 | 0.80 | 114.93 | 1.27 | 116.20 | 4.000 | No | No | 2.00 |
| 434 | 28.48 | 141.08 | 1.60 | 0.55 | 0.80 | 113.57 | 1.09 | 114.66 | 4.000 | No | No | 2.00 |
| 435 | 28.57 | 138.80 | 1.60 | 0.55 | 0.80 | 109.31 | 1.17 | 110.49 | 4.000 | No | No | 2.00 |
| 436 | 28.64 | 136.86 | 1.61 | 0.54 | 0.80 | 108.91 | 1.40 | 110.31 | 4.000 | No | No | 2.00 |
| 437 | 28.70 | 137.52 | 1.61 | 0.53 | 0.80 | 109.15 | 1.88 | 111.03 | 4.000 | No | No | 2.00 |
| 438 | 28.76 | 139.41 | 1.62 | 0.51 | 0.81 | 112.23 | 2.75 | 114.98 | 4.000 | No | No | 2.00 |
| 439 | 28.82 | 143.08 | 1.62 | 0.49 | 0.81 | 115.37 | 3.60 | 118.97 | 4.000 | No | No | 2.00 |
| 440 | 28.88 | 147.28 | 1.62 | 0.48 | 0.82 | 120.28 | 4.40 | 124.68 | 4.000 | No | No | 2.00 |
| 441 | 28.94 | 152.05 | 1.63 | 0.47 | 0.82 | 124.17 | 4.83 | 129.00 | 4.000 | No | No | 2.00 |
| 442 | 29.03 | 156.15 | 1.63 | 0.46 | 0.82 | 128.07 | 4.95 | 133.03 | 4.000 | No | No | 2.00 |
| 443 | 29.09 | 157.79 | 1.64 | 0.46 | 0.82 | 130.97 | 5.38 | 136.35 | 4.000 | No | No | 2.00 |
| 444 | 29.15 | 158.70 | 1.64 | 0.43 | 0.83 | 129.67 | 7.42 | 137.09 | 4.000 | No | No | 2.00 |
| 445 | 29.21 | 159.73 | 1.64 | 0.41 | 0.84 | 133.16 | 10.03 | 143.19 | 4.000 | No | No | 2.00 |
| 446 | 29.28 | 159.15 | 1.65 | 0.39 | 0.84 | 137.14 | 12.28 | 149.42 | 4.000 | No | No | 2.00 |
| 447 | 29.34 | 161.64 | 1.65 | 0.39 | 0.84 | 130.27 | 12.46 | 142.72 | 4.000 | No | No | 2.00 |
| 448 | 29.41 | 171.63 | 1.66 | 0.39 | 0.84 | 139.99 | 11.67 | 151.66 | 4.000 | No | No | 2.00 |
| 449 | 29.49 | 179.62 | 1.66 | 0.38 | 0.84 | 162.45 | 11.80 | 174.25 | 4.000 | No | No | 2.00 |
| 450 | 29.55 | 180.35 | 1.67 | 0.38 | 0.84 | 150.88 | 13.01 | 163.88 | 4.000 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 451 | 29.61 | 175.28 | 1.67 | 0.37 | 0.84 | 142.58 | 14.34 | 156.92 | 4.000 | No | No | 2.00 |
| 452 | 29.67 | 177.37 | 1.67 | 0.37 | 0.84 | 149.67 | 13.55 | 163.23 | 4.000 | No | No | 2.00 |
| 453 | 29.73 | 183.69 | 1.68 | 0.38 | 0.84 | 155.20 | 11.56 | 166.76 | 4.000 | No | No | 2.00 |
| 454 | 29.80 | 187.49 | 1.68 | 0.40 | 0.83 | 156.45 | 10.02 | 166.47 | 4.000 | No | No | 2.00 |
| 455 | 29.86 | 186.06 | 1.69 | 0.40 | 0.83 | 156.93 | 9.53 | 166.45 | 4.000 | No | No | 2.00 |
| 456 | 29.93 | 184.36 | 1.69 | 0.40 | 0.83 | 149.76 | 9.30 | 159.06 | 4.000 | No | No | 2.00 |
| 457 | 29.99 | 180.99 | 1.70 | 0.41 | 0.83 | 150.97 | 8.98 | 159.94 | 4.000 | No | No | 2.00 |
| 458 | 30.07 | 186.21 | 1.70 | 0.42 | 0.82 | 146.63 | 7.80 | 154.43 | 0.453 | No | No | 1.50 |
| 459 | 30.12 | 193.84 | 1.70 | 0.43 | 0.81 | 160.22 | 6.24 | 166.47 | 0.553 | No | No | 1.84 |
| 460 | 30.19 | 203.50 | 1.71 | 0.45 | 0.81 | 166.11 | 4.81 | 170.92 | 0.590 | No | No | 1.96 |
| 461 | 30.25 | 206.02 | 1.71 | 0.46 | 0.80 | 166.52 | 3.83 | 170.35 | 0.579 | No | No | 1.93 |
| 462 | 30.33 | 205.78 | 1.72 | 0.48 | 0.79 | 162.31 | 3.13 | 165.43 | 0.530 | No | No | 1.77 |
| 463 | 30.40 | 204.74 | 1.72 | 0.49 | 0.79 | 161.74 | 2.50 | 164.24 | 0.517 | No | No | 1.73 |
| 464 | 30.46 | 204.65 | 1.73 | 0.50 | 0.78 | 160.56 | 2.02 | 162.58 | 0.501 | No | No | 1.67 |
| 465 | 30.52 | 202.31 | 1.73 | 0.50 | 0.78 | 159.45 | 1.86 | 161.32 | 0.490 | No | No | 1.64 |
| 466 | 30.59 | 197.69 | 1.73 | 0.50 | 0.78 | 154.48 | 1.91 | 156.38 | 0.451 | No | No | 1.51 |
| 467 | 30.65 | 189.49 | 1.74 | 0.50 | 0.78 | 149.07 | 2.16 | 151.23 | 0.415 | No | No | 1.39 |
| 468 | 30.73 | 179.41 | 1.74 | 0.50 | 0.78 | 140.12 | 2.56 | 142.69 | 0.361 | No | No | 1.21 |
| 469 | 30.78 | 168.87 | 1.75 | 0.49 | 0.78 | 131.34 | 3.19 | 134.53 | 0.316 | No | No | 1.06 |
| 470 | 30.84 | 159.70 | 1.75 | 0.48 | 0.78 | 125.05 | 3.78 | 128.83 | 0.288 | No | No | 0.97 |
| 471 | 30.91 | 152.16 | 1.75 | 0.47 | 0.79 | 119.54 | 4.51 | 124.05 | 0.266 | No | No | 0.90 |
| 472 | 30.99 | 146.64 | 1.76 | 0.47 | 0.79 | 114.46 | 5.22 | 119.68 | 0.248 | No | No | 0.84 |
| 473 | 31.05 | 143.39 | 1.76 | 0.46 | 0.79 | 113.01 | 6.00 | 119.02 | 0.245 | No | No | 0.83 |
| 474 | 31.11 | 144.21 | 1.77 | 0.46 | 0.79 | 112.44 | 6.10 | 118.54 | 0.243 | No | No | 0.82 |
| 475 | 31.20 | 150.40 | 1.77 | 0.46 | 0.79 | 116.58 | 5.83 | 122.41 | 0.260 | No | No | 0.88 |
| 476 | 31.26 | 164.41 | 1.78 | 0.45 | 0.79 | 127.56 | 5.58 | 133.14 | 0.311 | No | No | 1.06 |
| 477 | 31.31 | 185.46 | 1.78 | 0.44 | 0.79 | 146.27 | 5.66 | 151.93 | 0.429 | No | No | 1.46 |
| 478 | 31.38 | 212.98 | 1.78 | 0.44 | 0.80 | 167.74 | 5.40 | 173.14 | 0.617 | No | No | 2.00 |
| 479 | 31.46 | 228.26 | 1.79 | 0.43 | 0.80 | 194.58 | 5.21 | 199.79 | 0.976 | No | No | 2.00 |
| 480 | 31.52 | 236.97 | 1.79 | 0.44 | 0.79 | 182.76 | 5.08 | 187.84 | 0.792 | No | No | 2.00 |
| 481 | 31.57 | 232.48 | 1.80 | 0.42 | 0.80 | 189.48 | 5.99 | 195.47 | 0.914 | No | No | 2.00 |
| 482 | 31.64 | 227.83 | 1.80 | 0.41 | 0.80 | 185.24 | 7.09 | 192.33 | 0.877 | No | No | 2.00 |
| 483 | 31.69 | 212.70 | 1.80 | 0.40 | 0.81 | 174.77 | 8.83 | 183.59 | 0.766 | No | No | 2.00 |
| 484 | 31.79 | 201.25 | 1.81 | 0.39 | 0.81 | 155.27 | 10.49 | 165.76 | 0.565 | No | No | 1.94 |
| 485 | 31.85 | 194.30 | 1.81 | 0.38 | 0.82 | 160.19 | 12.41 | 172.60 | 0.649 | No | No | 2.00 |
| 486 | 31.91 | 192.60 | 1.82 | 0.37 | 0.82 | 160.07 | 13.78 | 173.85 | 0.671 | No | No | 2.00 |
| 487 | 31.97 | 194.72 | 1.82 | 0.37 | 0.82 | 152.72 | 14.16 | 166.88 | 0.592 | No | No | 2.00 |
| 488 | 32.03 | 198.36 | 1.83 | 0.36 | 0.82 | 165.97 | 13.75 | 179.73 | 0.748 | No | No | 2.00 |
| 489 | 32.09 | 203.92 | 1.83 | 0.37 | 0.82 | 168.36 | 12.79 | 181.15 | 0.761 | No | No | 2.00 |
| 490 | 32.18 | 203.19 | 1.84 | 0.37 | 0.81 | 165.23 | 12.16 | 177.39 | 0.707 | No | No | 2.00 |
| 491 | 32.23 | 201.92 | 1.84 | 0.38 | 0.81 | 162.51 | 11.82 | 174.34 | 0.667 | No | No | 2.00 |
| 492 | 32.30 | 199.40 | 1.84 | 0.38 | 0.81 | 164.20 | 12.06 | 176.26 | 0.692 | No | No | 2.00 |
| 493 | 32.36 | 196.39 | 1.85 | 0.37 | 0.81 | 158.70 | 12.53 | 171.23 | 0.634 | No | No | 2.00 |
| 494 | 32.42 | 193.85 | 1.85 | 0.38 | 0.81 | 154.89 | 12.41 | 167.30 | 0.590 | No | No | 2.00 |
| 495 | 32.48 | 193.28 | 1.86 | 0.38 | 0.81 | 156.90 | 11.28 | 168.18 | 0.595 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 496 | 32.56 | 195.74 | 1.86 | 0.39 | 0.80 | 155.34 | 10.30 | 165.63 | 0.564 | No | No | 1.97 |
| 497 | 32.63 | 198.06 | 1.87 | 0.40 | 0.80 | 158.80 | 9.75 | 168.55 | 0.592 | No | No | 2.00 |
| 498 | 32.69 | 202.74 | 1.87 | 0.39 | 0.80 | 161.21 | 9.82 | 171.03 | 0.619 | No | No | 2.00 |
| 499 | 32.75 | 211.34 | 1.87 | 0.40 | 0.80 | 165.59 | 9.09 | 174.68 | 0.657 | No | No | 2.00 |
| 500 | 32.81 | 213.22 | 1.88 | 0.40 | 0.80 | 178.64 | 8.55 | 187.19 | 0.816 | No | No | 2.00 |
| 501 | 32.90 | 211.97 | 1.88 | 0.41 | 0.79 | 163.76 | 7.98 | 171.74 | 0.618 | No | No | 2.00 |
| 502 | 32.94 | 205.44 | 1.89 | 0.41 | 0.79 | 160.73 | 7.65 | 168.38 | 0.581 | No | No | 2.00 |
| 503 | 33.02 | 202.53 | 1.89 | 0.42 | 0.78 | 160.59 | 7.10 | 167.69 | 0.571 | No | No | 2.00 |
| 504 | 33.09 | 199.58 | 1.90 | 0.43 | 0.78 | 154.61 | 6.43 | 161.04 | 0.506 | No | No | 1.79 |
| 505 | 33.15 | 196.33 | 1.90 | 0.44 | 0.77 | 151.20 | 5.88 | 157.08 | 0.471 | No | No | 1.67 |
| 506 | 33.21 | 197.00 | 1.90 | 0.44 | 0.77 | 150.35 | 5.40 | 155.75 | 0.459 | No | No | 1.63 |
| 507 | 33.27 | 203.04 | 1.91 | 0.45 | 0.77 | 154.05 | 4.97 | 159.02 | 0.483 | No | No | 1.72 |
| 508 | 33.36 | 214.10 | 1.91 | 0.45 | 0.77 | 163.86 | 4.80 | 168.66 | 0.569 | No | No | 2.00 |
| 509 | 33.43 | 228.77 | 1.92 | 0.44 | 0.77 | 176.16 | 5.20 | 181.36 | 0.711 | No | No | 2.00 |
| 510 | 33.48 | 243.75 | 1.92 | 0.41 | 0.78 | 191.49 | 6.86 | 198.34 | 0.975 | No | No | 2.00 |
| 511 | 33.54 | 256.66 | 1.92 | 0.39 | 0.79 | 204.53 | 8.46 | 212.99 | 1.292 | No | No | 2.00 |
| 512 | 33.60 | 266.10 | 1.93 | 0.40 | 0.79 | 210.59 | 7.77 | 218.36 | 1.407 | No | No | 2.00 |
| 513 | 33.69 | 268.17 | 1.93 | 0.41 | 0.78 | 213.34 | 6.49 | 219.82 | 1.415 | No | No | 2.00 |
| 514 | 33.75 | 267.17 | 1.94 | 0.42 | 0.77 | 204.73 | 5.45 | 210.19 | 1.177 | No | No | 2.00 |
| 515 | 33.81 | 269.23 | 1.94 | 0.42 | 0.78 | 204.89 | 5.93 | 210.82 | 1.198 | No | No | 2.00 |
| 516 | 33.88 | 274.12 | 1.95 | 0.41 | 0.78 | 217.25 | 6.17 | 223.42 | 1.500 | No | No | 2.00 |
| 517 | 33.93 | 284.72 | 1.95 | 0.41 | 0.78 | 217.44 | 6.34 | 223.78 | 1.514 | No | No | 2.00 |
| 518 | 34.00 | 242.74 | 1.95 | 0.37 | 0.80 | 235.87 | 10.02 | 245.89 | 2.405 | No | No | 2.00 |
| 519 | 34.06 | 221.36 | 1.96 | 0.38 | 0.79 | 121.06 | 14.13 | 135.19 | 0.333 | No | No | 1.20 |
| 520 | 34.12 | 187.67 | 1.96 | 0.33 | 0.82 | 175.80 | 20.51 | 196.31 | 1.095 | No | No | 2.00 |
| 521 | 34.20 | 204.80 | 1.97 | 0.34 | 0.81 | 158.04 | 19.55 | 177.58 | 0.756 | No | No | 2.00 |
| 522 | 34.26 | 215.04 | 1.97 | 0.34 | 0.81 | 165.10 | 17.22 | 182.31 | 0.814 | No | No | 2.00 |
| 523 | 34.33 | 228.80 | 1.98 | 0.36 | 0.80 | 196.63 | 13.07 | 209.70 | 1.301 | No | No | 2.00 |
| 524 | 34.38 | 218.86 | 1.98 | 0.37 | 0.79 | 186.76 | 11.09 | 197.85 | 1.021 | No | No | 2.00 |
| 525 | 34.45 | 187.91 | 1.99 | 0.38 | 0.79 | 137.53 | 12.83 | 150.36 | 0.437 | No | No | 1.59 |
| 526 | 34.52 | 156.29 | 1.99 | 0.37 | 0.79 | 121.29 | 16.80 | 138.09 | 0.354 | No | No | 1.29 |
| 527 | 34.60 | 143.53 | 1.99 | 0.37 | 0.79 | 111.96 | 18.31 | 130.27 | 0.307 | No | No | 1.12 |
| 528 | 34.65 | 136.15 | 2.00 | 0.38 | 0.78 | 107.05 | 15.63 | 122.68 | 0.266 | No | No | 0.97 |
| 529 | 34.73 | 129.71 | 2.00 | 0.41 | 0.77 | 100.90 | 12.52 | 113.42 | 0.225 | No | No | 0.82 |
| 530 | 34.78 | 119.54 | 2.01 | 0.42 | 0.77 | 93.34 | 12.01 | 105.34 | 0.195 | No | No | 0.72 |
| 531 | 34.85 | 109.06 | 2.01 | 0.41 | 0.77 | 81.21 | 14.19 | 95.41 | 0.163 | No | No | 0.60 |
| 532 | 34.91 | 100.71 | 2.01 | 0.40 | 0.77 | 76.63 | 17.27 | 93.90 | 0.157 | No | No | 0.58 |
| 533 | 34.97 | 97.33 | 2.02 | 0.40 | 0.77 | 74.58 | 17.69 | 92.27 | 0.152 | No | No | 0.56 |
| 534 | 35.04 | 94.02 | 2.02 | 0.41 | 0.77 | 73.72 | 17.52 | 91.24 | 0.150 | No | No | 0.55 |
| 535 | 35.12 | 90.25 | 2.03 | 0.42 | 0.76 | 68.19 | 16.90 | 85.09 | 0.135 | No | No | 0.50 |
| 536 | 35.18 | 86.33 | 2.03 | 0.42 | 0.76 | 64.87 | 16.65 | 81.51 | 0.126 | No | No | 0.47 |
| 537 | 35.25 | 84.26 | 2.04 | 0.43 | 0.76 | 63.65 | 16.46 | 80.11 | 0.123 | No | No | 0.46 |
| 538 | 35.30 | 82.80 | 2.04 | 0.43 | 0.75 | 62.60 | 15.39 | 77.99 | 0.120 | No | No | 0.44 |
| 539 | 35.37 | 80.68 | 2.04 | 0.44 | 0.75 | 60.51 | 14.11 | 74.62 | 0.113 | No | No | 0.42 |
| 540 | 35.43 | 78.64 | 2.05 | 0.46 | 0.74 | 57.55 | 13.39 | 70.93 | 0.107 | No | No | 0.40 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 541 | 35.52 | 78.22 | 2.05 | 0.46 | 0.74 | 56.81 | 12.86 | 69.67 | 0.105 | No | No | 0.39 |
| 542 | 35.58 | 81.71 | 2.06 | 0.46 | 0.73 | 58.65 | 11.83 | 70.48 | 0.107 | No | No | 0.40 |
| 543 | 35.64 | 88.94 | 2.06 | 0.47 | 0.73 | 64.59 | 9.98 | 74.57 | 0.115 | No | No | 0.43 |
| 544 | 35.70 | 99.87 | 2.06 | 0.47 | 0.73 | 71.94 | 8.03 | 79.97 | 0.127 | No | No | 0.48 |
| 545 | 35.77 | 110.99 | 2.07 | 0.48 | 0.73 | 81.86 | 6.70 | 88.56 | 0.147 | No | No | 0.55 |
| 546 | 35.83 | 124.75 | 2.07 | 0.48 | 0.72 | 87.95 | 5.68 | 93.63 | 0.161 | No | No | 0.60 |
| 547 | 35.89 | 139.21 | 2.08 | 0.48 | 0.72 | 101.50 | 5.02 | 106.52 | 0.199 | No | No | 0.75 |
| 548 | 35.97 | 150.91 | 2.08 | 0.47 | 0.73 | 113.42 | 4.80 | 118.22 | 0.242 | No | No | 0.91 |
| 549 | 36.04 | 154.49 | 2.09 | 0.47 | 0.73 | 114.02 | 5.00 | 119.01 | 0.246 | No | No | 0.93 |
| 550 | 36.12 | 153.37 | 2.09 | 0.46 | 0.73 | 109.94 | 5.48 | 115.42 | 0.232 | No | No | 0.87 |
| 551 | 36.16 | 152.67 | 2.09 | 0.46 | 0.73 | 111.85 | 6.05 | 117.90 | 0.242 | No | No | 0.91 |
| 552 | 36.23 | 157.04 | 2.10 | 0.45 | 0.73 | 113.46 | 6.28 | 119.73 | 0.250 | No | No | 0.95 |
| 553 | 36.31 | 162.18 | 2.10 | 0.45 | 0.74 | 120.55 | 6.21 | 126.77 | 0.281 | No | No | 1.07 |
| 554 | 36.35 | 166.19 | 2.11 | 0.45 | 0.73 | 123.36 | 5.94 | 129.30 | 0.294 | No | No | 1.11 |
| 555 | 36.44 | 168.46 | 2.11 | 0.45 | 0.73 | 121.70 | 5.61 | 127.31 | 0.283 | No | No | 1.08 |
| 556 | 36.49 | 170.01 | 2.11 | 0.46 | 0.73 | 124.58 | 5.38 | 129.96 | 0.296 | No | No | 1.13 |
| 557 | 36.57 | 172.72 | 2.12 | 0.46 | 0.73 | 125.47 | 5.03 | 130.50 | 0.299 | No | No | 1.14 |
| 558 | 36.62 | 175.82 | 2.12 | 0.47 | 0.72 | 126.30 | 4.57 | 130.87 | 0.300 | No | No | 1.14 |
| 559 | 36.70 | 179.92 | 2.13 | 0.47 | 0.72 | 129.40 | 4.00 | 133.39 | 0.312 | No | No | 1.19 |
| 560 | 36.76 | 183.99 | 2.13 | 0.48 | 0.71 | 132.12 | 3.46 | 135.57 | 0.323 | No | No | 1.24 |
| 561 | 36.81 | 185.30 | 2.13 | 0.48 | 0.71 | 133.07 | 3.24 | 136.31 | 0.326 | No | No | 1.25 |
| 562 | 36.89 | 183.56 | 2.14 | 0.49 | 0.71 | 130.44 | 3.07 | 133.52 | 0.311 | No | No | 1.20 |
| 563 | 36.96 | 179.40 | 2.14 | 0.49 | 0.71 | 126.79 | 2.87 | 129.66 | 0.292 | No | No | 1.12 |
| 564 | 37.01 | 172.72 | 2.15 | 0.50 | 0.70 | 122.54 | 2.78 | 125.32 | 0.271 | No | No | 1.04 |
| 565 | 37.08 | 164.22 | 2.15 | 0.49 | 0.70 | 115.40 | 3.25 | 118.64 | 0.243 | No | No | 0.94 |
| 566 | 37.15 | 156.23 | 2.16 | 0.48 | 0.71 | 109.60 | 4.33 | 113.93 | 0.225 | No | No | 0.87 |
| 567 | 37.22 | 146.23 | 2.16 | 0.46 | 0.72 | 108.44 | 5.94 | 114.38 | 0.228 | No | No | 0.88 |
| 568 | 37.29 | 138.03 | 2.16 | 0.45 | 0.73 | 97.13 | 7.59 | 104.73 | 0.194 | No | No | 0.75 |
| 569 | 37.34 | 131.35 | 2.17 | 0.43 | 0.73 | 94.92 | 9.25 | 104.17 | 0.192 | No | No | 0.75 |
| 570 | 37.41 | 127.46 | 2.17 | 0.42 | 0.74 | 96.14 | 10.41 | 106.55 | 0.200 | No | No | 0.78 |
| 571 | 37.48 | 124.36 | 2.18 | 0.42 | 0.74 | 90.30 | 11.56 | 101.85 | 0.184 | No | No | 0.72 |
| 572 | 37.54 | 120.29 | 2.18 | 0.41 | 0.74 | 89.36 | 12.88 | 102.24 | 0.186 | No | No | 0.72 |
| 573 | 37.62 | 116.59 | 2.19 | 0.40 | 0.75 | 88.10 | 14.17 | 102.27 | 0.185 | No | No | 0.72 |
| 574 | 37.67 | 112.73 | 2.19 | 0.40 | 0.74 | 82.83 | 15.11 | 97.94 | 0.171 | No | No | 0.67 |
| 575 | 37.74 | 110.15 | 2.19 | 0.40 | 0.75 | 81.34 | 16.47 | 97.81 | 0.170 | No | No | 0.67 |
| 576 | 37.82 | 111.79 | 2.20 | 0.39 | 0.75 | 82.94 | 17.55 | 100.49 | 0.178 | No | No | 0.70 |
| 577 | 37.88 | 116.95 | 2.20 | 0.39 | 0.75 | 87.50 | 17.74 | 105.24 | 0.195 | No | No | 0.76 |
| 578 | 37.95 | 123.66 | 2.21 | 0.39 | 0.75 | 93.60 | 16.58 | 110.18 | 0.213 | No | No | 0.84 |
| 579 | 38.00 | 133.23 | 2.21 | 0.39 | 0.75 | 97.89 | 14.89 | 112.78 | 0.224 | No | No | 0.88 |
| 580 | 38.07 | 144.62 | 2.21 | 0.39 | 0.75 | 108.59 | 13.75 | 122.34 | 0.266 | No | No | 1.05 |
| 581 | 38.14 | 160.38 | 2.22 | 0.39 | 0.75 | 118.57 | 12.40 | 130.97 | 0.310 | No | No | 1.22 |
| 582 | 38.20 | 184.08 | 2.22 | 0.40 | 0.74 | 132.25 | 10.27 | 142.52 | 0.378 | No | No | 1.49 |
| 583 | 38.26 | 206.10 | 2.23 | 0.40 | 0.74 | 159.78 | 8.23 | 168.02 | 0.586 | No | No | 2.00 |
| 584 | 38.33 | 222.78 | 2.23 | 0.42 | 0.73 | 164.73 | 7.00 | 171.73 | 0.618 | No | No | 2.00 |
| 585 | 38.40 | 228.82 | 2.24 | 0.42 | 0.73 | 167.00 | 6.87 | 173.87 | 0.640 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 586 | 38.45 | 234.84 | 2.24 | 0.41 | 0.74 | 172.49 | 7.49 | 179.97 | 0.718 | No | No | 2.00 |
| 587 | 38.52 | 243.65 | 2.24 | 0.40 | 0.74 | 179.94 | 8.17 | 188.11 | 0.836 | No | No | 2.00 |
| 588 | 38.60 | 250.45 | 2.25 | 0.39 | 0.75 | 190.25 | 9.12 | 199.37 | 1.035 | No | No | 2.00 |
| 589 | 38.65 | 251.37 | 2.25 | 0.38 | 0.75 | 191.60 | 10.24 | 201.84 | 1.100 | No | No | 2.00 |
| 590 | 38.72 | 245.29 | 2.26 | 0.37 | 0.76 | 185.71 | 11.52 | 197.22 | 1.029 | No | No | 2.00 |
| 591 | 38.79 | 235.60 | 2.26 | 0.36 | 0.76 | 179.47 | 12.75 | 192.23 | 0.953 | No | No | 2.00 |
| 592 | 38.87 | 224.42 | 2.27 | 0.36 | 0.76 | 171.71 | 13.85 | 185.56 | 0.853 | No | No | 2.00 |
| 593 | 38.94 | 216.37 | 2.27 | 0.36 | 0.76 | 161.32 | 14.59 | 175.91 | 0.718 | No | No | 2.00 |
| 594 | 38.98 | 211.96 | 2.27 | 0.36 | 0.76 | 161.44 | 14.65 | 176.09 | 0.721 | No | No | 2.00 |
| 595 | 39.06 | 215.49 | 2.28 | 0.36 | 0.76 | 160.61 | 13.56 | 174.17 | 0.689 | No | No | 2.00 |
| 596 | 39.13 | 224.48 | 2.28 | 0.37 | 0.75 | 166.98 | 11.73 | 178.71 | 0.736 | No | No | 2.00 |
| 597 | 39.20 | 239.15 | 2.29 | 0.38 | 0.74 | 177.56 | 9.60 | 187.16 | 0.838 | No | No | 2.00 |
| 598 | 39.26 | 255.71 | 2.29 | 0.40 | 0.73 | 188.15 | 7.70 | 195.84 | 0.954 | No | No | 2.00 |
| 599 | 39.33 | 270.26 | 2.30 | 0.41 | 0.73 | 197.89 | 6.38 | 204.28 | 1.087 | No | No | 2.00 |
| 600 | 39.39 | 285.72 | 2.30 | 0.42 | 0.72 | 203.70 | 5.37 | 209.07 | 1.163 | No | No | 2.00 |
| 601 | 39.48 | 297.81 | 2.31 | 0.42 | 0.72 | 217.38 | 4.90 | 222.28 | 1.452 | No | No | 2.00 |
| 602 | 39.50 | 309.17 | 2.31 | 0.42 | 0.72 | 221.83 | 4.97 | 226.80 | 1.573 | No | No | 2.00 |
| 603 | 39.57 | 317.22 | 2.31 | 0.42 | 0.72 | 228.42 | 5.16 | 233.57 | 1.778 | No | No | 2.00 |
| 604 | 39.64 | 329.03 | 2.32 | 0.43 | 0.72 | 234.00 | 4.51 | 238.51 | 1.912 | No | No | 2.00 |
| 605 | 39.71 | 338.81 | 2.32 | 0.44 | 0.70 | 242.27 | 3.22 | 245.49 | 2.099 | No | No | 2.00 |
| 606 | 39.77 | 346.86 | 2.33 | 0.47 | 0.69 | 239.71 | 2.21 | 241.92 | 1.930 | No | No | 2.00 |
| 607 | 39.84 | 349.14 | 2.33 | 0.47 | 0.69 | 242.39 | 2.08 | 244.46 | 2.010 | No | No | 2.00 |
| 608 | 39.91 | 344.50 | 2.34 | 0.46 | 0.70 | 244.13 | 2.57 | 246.71 | 2.113 | No | No | 2.00 |
| 609 | 39.97 | 324.54 | 2.34 | 0.45 | 0.70 | 233.04 | 3.25 | 236.30 | 1.793 | No | No | 2.00 |
| 610 | 40.03 | 271.93 | 2.34 | 0.43 | 0.71 | 207.05 | 4.80 | 211.85 | 1.210 | No | No | 2.00 |
| 611 | 40.10 | 247.02 | 2.35 | 0.45 | 0.70 | 134.73 | 5.27 | 140.00 | 0.353 | No | No | 1.45 |
| 612 | 40.18 | 233.17 | 2.35 | 0.43 | 0.71 | 182.44 | 5.16 | 187.61 | 0.799 | No | No | 2.00 |
| 613 | 40.23 | 248.96 | 2.36 | 0.45 | 0.70 | 173.76 | 3.96 | 177.72 | 0.664 | No | No | 2.00 |
| 614 | 40.30 | 237.21 | 2.36 | 0.45 | 0.70 | 167.08 | 4.09 | 171.18 | 0.595 | No | No | 2.00 |
| 615 | 40.38 | 224.39 | 2.37 | 0.45 | 0.70 | 154.60 | 4.53 | 159.13 | 0.486 | No | No | 2.00 |
| 616 | 40.42 | 209.96 | 2.37 | 0.44 | 0.70 | 147.35 | 5.08 | 152.44 | 0.436 | No | No | 1.80 |
| 617 | 40.50 | 197.96 | 2.38 | 0.44 | 0.70 | 137.65 | 5.63 | 143.29 | 0.374 | No | No | 1.55 |
| 618 | 40.57 | 187.30 | 2.38 | 0.44 | 0.70 | 130.49 | 6.29 | 136.78 | 0.336 | No | No | 1.39 |
| 619 | 40.62 | 180.86 | 2.38 | 0.43 | 0.71 | 126.62 | 7.51 | 134.13 | 0.323 | No | No | 1.34 |
| 620 | 40.70 | 179.01 | 2.39 | 0.41 | 0.72 | 127.03 | 9.02 | 136.05 | 0.337 | No | No | 1.40 |
| 621 | 40.75 | 179.95 | 2.39 | 0.39 | 0.73 | 131.04 | 10.94 | 141.98 | 0.378 | No | No | 1.57 |
| 622 | 40.82 | 182.59 | 2.40 | 0.38 | 0.73 | 133.19 | 12.47 | 145.66 | 0.407 | No | No | 1.70 |
| 623 | 40.89 | 187.48 | 2.40 | 0.38 | 0.74 | 136.33 | 12.99 | 149.33 | 0.437 | No | No | 1.82 |
| 624 | 40.96 | 195.68 | 2.40 | 0.38 | 0.73 | 143.14 | 12.15 | 155.28 | 0.485 | No | No | 2.00 |
| 625 | 41.01 | 211.24 | 2.41 | 0.39 | 0.73 | 149.85 | 10.21 | 160.06 | 0.520 | No | No | 2.00 |
| 626 | 41.08 | 240.12 | 2.41 | 0.40 | 0.72 | 166.60 | 7.98 | 174.58 | 0.660 | No | No | 2.00 |
| 627 | 41.15 | 267.37 | 2.42 | 0.41 | 0.72 | 201.64 | 6.60 | 208.23 | 1.173 | No | No | 2.00 |
| 628 | 41.22 | 288.54 | 2.42 | 0.41 | 0.71 | 204.39 | 5.76 | 210.15 | 1.196 | No | No | 2.00 |
| 629 | 41.28 | 293.74 | 2.43 | 0.42 | 0.71 | 209.31 | 5.54 | 214.85 | 1.294 | No | No | 2.00 |
| 630 | 41.36 | 297.29 | 2.43 | 0.42 | 0.71 | 210.07 | 5.39 | 215.46 | 1.304 | No | No | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 631 | 41.41 | 298.51 | 2.44 | 0.42 | 0.71 | 210.78 | 5.31 | 216.10 | 1.317 | No | No | 2.00 |
| 632 | 41.49 | 297.84 | 2.44 | 0.42 | 0.71 | 211.14 | 5.40 | 216.53 | 1.330 | No | No | 2.00 |
| 633 | 41.54 | 294.38 | 2.44 | 0.41 | 0.71 | 208.77 | 5.63 | 214.40 | 1.286 | No | No | 2.00 |
| 634 | 41.61 | 290.06 | 2.45 | 0.41 | 0.71 | 204.10 | 5.94 | 210.04 | 1.198 | No | No | 2.00 |
| 635 | 41.67 | 285.11 | 2.45 | 0.41 | 0.71 | 203.18 | 6.30 | 209.48 | 1.194 | No | No | 2.00 |
| 636 | 41.75 | 282.38 | 2.46 | 0.40 | 0.71 | 199.50 | 6.68 | 206.18 | 1.134 | No | No | 2.00 |
| 637 | 41.81 | 279.91 | 2.46 | 0.40 | 0.71 | 199.99 | 7.13 | 207.12 | 1.162 | No | No | 2.00 |
| 638 | 41.87 | 275.90 | 2.47 | 0.39 | 0.72 | 199.76 | 7.58 | 207.34 | 1.175 | No | No | 2.00 |
| 639 | 41.94 | 270.95 | 2.47 | 0.39 | 0.72 | 192.38 | 7.92 | 200.30 | 1.042 | No | No | 2.00 |
| 640 | 42.01 | 266.42 | 2.47 | 0.39 | 0.72 | 190.20 | 8.14 | 198.34 | 1.010 | No | No | 2.00 |
| 641 | 42.06 | 265.51 | 2.48 | 0.39 | 0.72 | 190.09 | 8.14 | 198.23 | 1.008 | No | No | 2.00 |
| 642 | 42.15 | 264.85 | 2.48 | 0.39 | 0.72 | 190.09 | 8.03 | 198.11 | 1.005 | No | No | 2.00 |
| 643 | 42.20 | 264.64 | 2.49 | 0.40 | 0.71 | 187.83 | 7.85 | 195.68 | 0.960 | No | No | 2.00 |
| 644 | 42.26 | 261.87 | 2.49 | 0.39 | 0.71 | 188.84 | 7.91 | 196.75 | 0.979 | No | No | 2.00 |
| 645 | 42.32 | 258.65 | 2.50 | 0.39 | 0.71 | 183.62 | 8.10 | 191.72 | 0.898 | No | No | 2.00 |
| 646 | 42.40 | 254.03 | 2.50 | 0.39 | 0.72 | 181.88 | 8.93 | 190.82 | 0.894 | No | No | 2.00 |
| 647 | 42.46 | 250.75 | 2.50 | 0.38 | 0.72 | 180.08 | 9.24 | 189.32 | 0.874 | No | No | 2.00 |
| 648 | 42.53 | 249.02 | 2.51 | 0.39 | 0.71 | 176.82 | 8.74 | 185.56 | 0.812 | No | No | 2.00 |
| 649 | 42.59 | 250.84 | 2.51 | 0.38 | 0.72 | 179.32 | 10.17 | 189.49 | 0.888 | No | No | 2.00 |
| 650 | 42.68 | 252.33 | 2.52 | 0.36 | 0.73 | 188.11 | 12.57 | 200.67 | 1.126 | No | No | 2.00 |
| 651 | 42.73 | 259.07 | 2.52 | 0.34 | 0.74 | 187.74 | 15.49 | 203.23 | 1.231 | No | No | 2.00 |
| 652 | 42.78 | 265.32 | 2.53 | 0.34 | 0.75 | 200.74 | 15.60 | 216.34 | 1.583 | No | No | 2.00 |
| 653 | 42.86 | 275.07 | 2.53 | 0.34 | 0.74 | 204.73 | 14.77 | 219.51 | 1.660 | No | No | 2.00 |
| 654 | 42.92 | 269.63 | 2.54 | 0.34 | 0.74 | 209.53 | 14.74 | 224.27 | 1.816 | No | No | 2.00 |
| 655 | 42.99 | 269.47 | 2.54 | 0.34 | 0.74 | 186.92 | 14.88 | 201.80 | 1.189 | No | No | 2.00 |
| 656 | 43.06 | 276.48 | 2.55 | 0.34 | 0.74 | 203.19 | 14.04 | 217.22 | 1.572 | No | No | 2.00 |
| 657 | 43.12 | 294.55 | 2.55 | 0.35 | 0.73 | 221.54 | 11.60 | 233.13 | 2.025 | No | No | 2.00 |
| 658 | 43.18 | 307.64 | 2.55 | 0.38 | 0.72 | 220.23 | 8.90 | 229.13 | 1.785 | No | No | 2.00 |
| 659 | 43.25 | 314.78 | 2.56 | 0.39 | 0.71 | 222.46 | 7.39 | 229.86 | 1.755 | No | No | 2.00 |
| 660 | 43.32 | 328.91 | 2.56 | 0.39 | 0.71 | 228.35 | 6.77 | 235.12 | 1.903 | No | No | 2.00 |
| 661 | 43.38 | 332.86 | 2.57 | 0.39 | 0.71 | 247.42 | 7.00 | 254.42 | 2.699 | No | No | 2.00 |
| 662 | 43.44 | 320.28 | 2.57 | 0.39 | 0.71 | 231.05 | 7.48 | 238.53 | 2.054 | No | No | 2.00 |
| 663 | 43.51 | 285.35 | 2.58 | 0.38 | 0.71 | 204.22 | 8.97 | 213.19 | 1.341 | No | No | 2.00 |
| 664 | 43.59 | 254.15 | 2.58 | 0.37 | 0.72 | 174.80 | 10.54 | 185.34 | 0.829 | No | No | 2.00 |
| 665 | 43.64 | 232.47 | 2.59 | 0.37 | 0.72 | 167.03 | 11.82 | 178.85 | 0.748 | No | No | 2.00 |
| 666 | 43.71 | 220.99 | 2.59 | 0.37 | 0.72 | 158.53 | 11.81 | 170.34 | 0.640 | No | No | 2.00 |
| 667 | 43.78 | 208.29 | 2.59 | 0.38 | 0.71 | 149.40 | 11.39 | 160.79 | 0.536 | No | No | 2.00 |
| 668 | 43.85 | 193.92 | 2.60 | 0.39 | 0.71 | 137.19 | 11.19 | 148.38 | 0.428 | No | No | 1.88 |
| 669 | 43.90 | 180.19 | 2.60 | 0.39 | 0.70 | 125.34 | 11.52 | 136.86 | 0.348 | No | No | 1.53 |
| 670 | 43.98 | 170.32 | 2.61 | 0.39 | 0.70 | 118.72 | 12.18 | 130.89 | 0.314 | No | No | 1.38 |
| 671 | 44.03 | 164.82 | 2.61 | 0.39 | 0.70 | 115.73 | 12.50 | 128.23 | 0.299 | No | No | 1.32 |
| 672 | 44.10 | 159.50 | 2.61 | 0.39 | 0.70 | 113.64 | 12.74 | 126.38 | 0.290 | No | No | 1.28 |
| 673 | 44.18 | 155.31 | 2.62 | 0.39 | 0.70 | 106.89 | 12.78 | 119.67 | 0.257 | No | No | 1.13 |
| 674 | 44.23 | 152.27 | 2.62 | 0.39 | 0.70 | 106.57 | 13.28 | 119.85 | 0.258 | No | No | 1.14 |
| 675 | 44.30 | 152.97 | 2.63 | 0.39 | 0.70 | 107.24 | 13.78 | 121.01 | 0.264 | No | No | 1.17 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 676 | 44.37 | 156.95 | 2.63 | 0.38 | 0.70 | 109.05 | 13.93 | 122.98 | 0.273 | No | No | 1.21 |
| 677 | 44.44 | 159.50 | 2.64 | 0.38 | 0.71 | 115.73 | 13.77 | 129.49 | 0.308 | No | No | 1.37 |
| 678 | 44.50 | 166.49 | 2.64 | 0.38 | 0.70 | 112.76 | 13.68 | 126.44 | 0.291 | No | No | 1.29 |
| 679 | 44.58 | 171.19 | 2.65 | 0.37 | 0.71 | 124.87 | 14.09 | 138.95 | 0.367 | No | No | 1.63 |
| 680 | 44.64 | 178.91 | 2.65 | 0.37 | 0.71 | 126.47 | 14.11 | 140.58 | 0.378 | No | No | 1.68 |
| 681 | 44.70 | 184.80 | 2.65 | 0.37 | 0.71 | 129.98 | 13.53 | 143.50 | 0.398 | No | No | 1.77 |
| 682 | 44.75 | 185.26 | 2.66 | 0.37 | 0.71 | 137.29 | 13.09 | 150.38 | 0.450 | No | No | 2.00 |
| 683 | 44.84 | 178.55 | 2.66 | 0.38 | 0.71 | 126.67 | 13.31 | 139.98 | 0.373 | No | No | 1.66 |
| 684 | 44.90 | 166.37 | 2.67 | 0.38 | 0.71 | 115.07 | 14.36 | 129.43 | 0.308 | No | No | 1.38 |
| 685 | 44.95 | 158.80 | 2.67 | 0.38 | 0.71 | 110.81 | 15.12 | 125.93 | 0.290 | No | No | 1.30 |
| 686 | 45.03 | 156.42 | 2.68 | 0.38 | 0.71 | 110.48 | 15.06 | 125.54 | 0.288 | No | No | 1.29 |
| 687 | 45.09 | 155.78 | 2.68 | 0.38 | 0.70 | 109.40 | 14.28 | 123.68 | 0.278 | No | No | 1.24 |
| 688 | 45.15 | 158.24 | 2.68 | 0.39 | 0.70 | 108.09 | 13.49 | 121.58 | 0.267 | No | No | 1.20 |
| 689 | 45.23 | 163.36 | 2.69 | 0.38 | 0.70 | 114.58 | 13.20 | 127.78 | 0.298 | No | No | 1.34 |
| 690 | 45.30 | 170.98 | 2.69 | 0.38 | 0.70 | 120.14 | 13.40 | 133.54 | 0.332 | No | No | 1.49 |
| 691 | 45.36 | 179.31 | 2.70 | 0.37 | 0.70 | 125.17 | 13.58 | 138.76 | 0.365 | No | No | 1.64 |
| 692 | 45.43 | 186.02 | 2.70 | 0.37 | 0.71 | 133.47 | 13.56 | 147.03 | 0.425 | No | No | 1.92 |
| 693 | 45.49 | 189.66 | 2.71 | 0.37 | 0.71 | 135.21 | 13.51 | 148.71 | 0.439 | No | No | 1.98 |
| 694 | 45.56 | 190.66 | 2.71 | 0.37 | 0.70 | 133.03 | 13.39 | 146.42 | 0.420 | No | No | 1.90 |
| 695 | 45.61 | 188.32 | 2.71 | 0.37 | 0.70 | 135.23 | 13.22 | 148.46 | 0.436 | No | No | 1.97 |
| 696 | 45.69 | 187.11 | 2.72 | 0.38 | 0.70 | 129.08 | 12.81 | 141.89 | 0.385 | No | No | 1.74 |
| 697 | 45.74 | 184.53 | 2.72 | 0.38 | 0.70 | 129.09 | 12.26 | 141.36 | 0.381 | No | No | 1.72 |
| 698 | 45.82 | 184.41 | 2.73 | 0.39 | 0.69 | 127.79 | 11.69 | 139.48 | 0.367 | No | No | 1.66 |
| 699 | 45.88 | 183.23 | 2.73 | 0.39 | 0.69 | 127.20 | 11.29 | 138.49 | 0.359 | No | No | 1.63 |
| 700 | 45.94 | 182.65 | 2.74 | 0.39 | 0.69 | 125.33 | 11.32 | 136.64 | 0.348 | No | No | 1.58 |
| 701 | 46.00 | 183.95 | 2.74 | 0.39 | 0.69 | 125.83 | 11.21 | 137.04 | 0.350 | No | No | 1.59 |
| 702 | 46.09 | 186.93 | 2.75 | 0.39 | 0.69 | 129.96 | 11.41 | 141.37 | 0.379 | No | No | 1.73 |
| 703 | 46.14 | 190.51 | 2.75 | 0.38 | 0.70 | 132.43 | 12.05 | 144.48 | 0.403 | No | No | 1.83 |
| 704 | 46.20 | 195.47 | 2.75 | 0.36 | 0.71 | 136.34 | 14.24 | 150.58 | 0.457 | No | No | 2.00 |
| 705 | 46.26 | 207.22 | 2.76 | 0.35 | 0.71 | 144.84 | 15.87 | 160.71 | 0.559 | No | No | 2.00 |
| 706 | 46.35 | 176.33 | 2.76 | 0.32 | 0.74 | 166.73 | 21.92 | 188.64 | 1.016 | No | No | 2.00 |
| 707 | 46.40 | 192.58 | 2.77 | 0.39 | 0.68 | 68.75 | 19.38 | 88.13 | 0.144 | No | No | 0.66 |
| 708 | 46.46 | 217.33 | 2.77 | 0.34 | 0.72 | 180.82 | 14.87 | 195.70 | 1.072 | No | No | 2.00 |
| 709 | 46.55 | 306.31 | 2.78 | 0.38 | 0.70 | 208.79 | 9.03 | 217.81 | 1.469 | No | No | 2.00 |
| 710 | 46.60 | 349.90 | 2.78 | 0.37 | 0.70 | 258.18 | 8.92 | 267.09 | 3.593 | No | No | 2.00 |
| 711 | 46.68 | 371.04 | 2.79 | 0.35 | 0.71 | 272.81 | 10.61 | 283.41 | 4.000 | No | No | 2.00 |
| 712 | 46.74 | 368.00 | 2.79 | 0.34 | 0.72 | 262.08 | 12.50 | 274.58 | 4.000 | No | No | 2.00 |
| 713 | 46.80 | 341.06 | 2.79 | 0.33 | 0.73 | 261.29 | 14.49 | 275.78 | 4.000 | No | No | 2.00 |
| 714 | 46.85 | 307.16 | 2.80 | 0.32 | 0.73 | 220.39 | 16.69 | 237.08 | 2.448 | No | No | 2.00 |
| 715 | 46.92 | 249.14 | 2.80 | 0.31 | 0.74 | 193.37 | 20.90 | 214.27 | 1.679 | No | No | 2.00 |
| 716 | 46.99 | 212.93 | 2.81 | 0.32 | 0.73 | 134.57 | 23.73 | 158.30 | 0.562 | No | No | 2.00 |
| 717 | 47.05 | 185.69 | 2.81 | 0.31 | 0.74 | 142.05 | 25.46 | 167.50 | 0.684 | No | No | 2.00 |
| 718 | 47.12 | 181.83 | 2.82 | 0.32 | 0.73 | 130.96 | 23.43 | 154.38 | 0.519 | No | No | 2.00 |
| 719 | 47.18 | 172.71 | 2.82 | 0.34 | 0.72 | 124.29 | 21.52 | 145.81 | 0.435 | No | No | 2.00 |
| 720 | 47.26 | 165.79 | 2.83 | 0.35 | 0.71 | 117.09 | 18.55 | 135.64 | 0.353 | No | No | 1.64 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 721 | 47.33 | 160.11 | 2.83 | 0.38 | 0.69 | 109.95 | 14.80 | 124.75 | 0.285 | No | No | 1.32 |
| 722 | 47.38 | 154.28 | 2.83 | 0.40 | 0.67 | 105.00 | 11.74 | 116.74 | 0.244 | No | No | 1.13 |
| 723 | 47.45 | 149.20 | 2.84 | 0.42 | 0.66 | 97.50 | 9.58 | 107.08 | 0.205 | No | No | 0.95 |
| 724 | 47.52 | 143.46 | 2.84 | 0.43 | 0.65 | 93.79 | 8.77 | 102.56 | 0.189 | No | No | 0.88 |
| 725 | 47.58 | 139.10 | 2.85 | 0.45 | 0.64 | 88.79 | 7.75 | 96.54 | 0.171 | No | No | 0.79 |
| 726 | 47.66 | 133.06 | 2.85 | 0.46 | 0.63 | 85.45 | 6.99 | 92.44 | 0.159 | No | No | 0.74 |
| 727 | 47.71 | 128.47 | 2.85 | 0.48 | 0.62 | 78.05 | 6.01 | 84.05 | 0.138 | No | No | 0.64 |
| 728 | 47.77 | 125.72 | 2.86 | 0.50 | 0.61 | 76.17 | 5.15 | 81.32 | 0.132 | No | No | 0.62 |
| 729 | 47.85 | 127.39 | 2.86 | 0.51 | 0.60 | 76.45 | 4.36 | 80.81 | 0.131 | No | No | 0.61 |
| 730 | 47.91 | 131.89 | 2.87 | 0.51 | 0.60 | 78.57 | 3.93 | 82.51 | 0.135 | No | No | 0.63 |
| 731 | 47.97 | 139.63 | 2.87 | 0.51 | 0.60 | 82.91 | 3.64 | 86.55 | 0.144 | No | No | 0.67 |
| 732 | 48.04 | 151.08 | 2.87 | 0.51 | 0.60 | 90.06 | 3.31 | 93.36 | 0.161 | No | No | 0.75 |
| 733 | 48.11 | 166.70 | 2.88 | 0.50 | 0.60 | 99.86 | 3.18 | 103.05 | 0.189 | No | No | 0.88 |
| 734 | 48.18 | 185.38 | 2.88 | 0.47 | 0.62 | 115.08 | 4.16 | 119.24 | 0.248 | No | No | 1.16 |
| 735 | 48.25 | 205.46 | 2.89 | 0.43 | 0.65 | 133.36 | 6.22 | 139.58 | 0.355 | No | No | 1.67 |
| 736 | 48.31 | 222.59 | 2.89 | 0.40 | 0.67 | 150.03 | 7.97 | 158.01 | 0.498 | No | No | 2.00 |
| 737 | 48.38 | 236.35 | 2.90 | 0.40 | 0.67 | 157.92 | 8.07 | 165.99 | 0.574 | No | No | 2.00 |
| 738 | 48.44 | 244.16 | 2.90 | 0.41 | 0.66 | 164.24 | 7.34 | 171.58 | 0.628 | No | No | 2.00 |
| 739 | 48.50 | 250.90 | 2.90 | 0.42 | 0.66 | 163.22 | 6.31 | 169.53 | 0.598 | No | No | 2.00 |
| 740 | 48.58 | 261.08 | 2.91 | 0.42 | 0.65 | 167.38 | 5.81 | 173.19 | 0.634 | No | No | 2.00 |
| 741 | 48.63 | 281.82 | 2.91 | 0.42 | 0.66 | 182.22 | 5.87 | 188.10 | 0.823 | No | No | 2.00 |
| 742 | 48.71 | 286.17 | 2.92 | 0.39 | 0.67 | 208.44 | 7.01 | 215.45 | 1.360 | No | No | 2.00 |
| 743 | 48.76 | 279.79 | 2.92 | 0.38 | 0.68 | 182.74 | 8.94 | 191.69 | 0.919 | No | No | 2.00 |
| 744 | 48.82 | 257.71 | 2.93 | 0.37 | 0.69 | 178.08 | 11.09 | 189.17 | 0.907 | No | No | 2.00 |
| 745 | 48.89 | 246.22 | 2.93 | 0.36 | 0.69 | 169.79 | 12.57 | 182.36 | 0.816 | No | No | 2.00 |
| 746 | 48.96 | 234.14 | 2.94 | 0.36 | 0.70 | 163.48 | 13.37 | 176.85 | 0.744 | No | No | 2.00 |
| 747 | 49.02 | 219.28 | 2.94 | 0.36 | 0.69 | 154.07 | 13.55 | 167.62 | 0.628 | No | No | 2.00 |
| 748 | 49.08 | 202.82 | 2.94 | 0.37 | 0.69 | 137.30 | 13.16 | 150.47 | 0.455 | No | No | 2.00 |
| 749 | 49.17 | 186.08 | 2.95 | 0.38 | 0.68 | 125.58 | 12.13 | 137.71 | 0.358 | No | No | 1.70 |
| 750 | 49.23 | 172.47 | 2.95 | 0.40 | 0.66 | 114.07 | 10.60 | 124.67 | 0.281 | No | No | 1.34 |
| 751 | 49.29 | 159.77 | 2.96 | 0.42 | 0.65 | 103.28 | 8.98 | 112.26 | 0.225 | No | No | 1.07 |
| 752 | 49.35 | 148.81 | 2.96 | 0.44 | 0.64 | 94.00 | 8.11 | 102.11 | 0.188 | No | No | 0.89 |
| 753 | 49.42 | 141.73 | 2.97 | 0.45 | 0.63 | 87.82 | 7.91 | 95.73 | 0.168 | No | No | 0.80 |
| 754 | 49.48 | 136.23 | 2.97 | 0.45 | 0.63 | 87.26 | 8.10 | 95.35 | 0.167 | No | No | 0.80 |
| 755 | 49.55 | 132.68 | 2.97 | 0.44 | 0.63 | 83.01 | 8.85 | 91.87 | 0.158 | No | No | 0.75 |
| 756 | 49.62 | 131.01 | 2.98 | 0.44 | 0.64 | 81.70 | 9.53 | 91.23 | 0.156 | No | No | 0.74 |
| 757 | 49.69 | 134.20 | 2.98 | 0.49 | 0.60 | 80.11 | 5.07 | 85.18 | 0.141 | No | No | 0.67 |
| 758 | 49.75 | 143.22 | 2.99 | 0.61 | 0.53 | 74.56 | 0.15 | 74.71 | 0.120 | No | No | 0.57 |
| 759 | 49.82 | 154.55 | 2.99 | 0.00 | 1.00 | 155.65 | 0.00 | 155.65 | 4.000 | No | Yes | 2.00 |
| 760 | 49.87 | 167.88 | 2.99 | 0.00 | 1.00 | 167.22 | 0.00 | 167.22 | 4.000 | No | Yes | 2.00 |
| 761 | 49.94 | 180.52 | 3.00 | 0.00 | 1.00 | 180.80 | 0.00 | 180.80 | 4.000 | No | Yes | 2.00 |
| 762 | 50.00 | 193.27 | 3.00 | 0.00 | 1.00 | 193.55 | 0.00 | 193.55 | 4.000 | No | Yes | 2.00 |
| 763 | 50.07 | 201.50 | 3.00 | 0.00 | 1.00 | 205.49 | 0.00 | 205.49 | 4.000 | No | Yes | 2.00 |

**:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)**

| Point ID | Depth (ft) | $q_t$ (tsf) | $\sigma_v'$ (tsf) | c | $C_q$ | $q_{c,1}$ (tsf) | $\Delta q_c$ | $q_{c,1,mod}$ (tsf) | $CRR_{7.5}$ | Belongs to trans. layer | Clay-like behaviour | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Abbreviations**

| | |
|---|---|
| Depth: | Depth from free surface, at which CPT was performed (ft) |
| $q_t$: | Total cone resistance |
| $I_c$: | Soil behavior type index |
| Fr: | Normalized friction ratio (%) |
| n: | Stress exponent |
| $Q_{tn}$: | Normalized cone resistance |
| $K_c$: | Cone resistance correction factor due to fines |
| $Q_{tn,cs}$: | Normalized and adjusted cone resistance |
| $CRR_{7.5}$: | Cydic resistance ratio for $M_w$=7.5 |
| FS: | Factor of safety against soil liquefaction |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.08 | 2.32 | 36.98 | 74.64 | 18 | 0.0 | 392 | 0.72 | 0.001 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.14 | 2.17 | 49.32 | 78.75 | 18 | 0.0 | 431 | 0.72 | 0.001 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.20 | 2.02 | 66.40 | 88.06 | 18 | 0.0 | 480 | 0.72 | 0.002 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.26 | 1.91 | 82.93 | 99.06 | 20 | 0.0 | 519 | 0.72 | 0.003 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.33 | 1.79 | 103.57 | 113.71 | 22 | 0.0 | 558 | 0.71 | 0.003 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.41 | 1.67 | 130.35 | 132.25 | 24 | 0.0 | 602 | 0.71 | 0.003 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.48 | 1.58 | 153.87 | 153.87 | 28 | 0.0 | 640 | 0.71 | 0.004 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.53 | 1.55 | 167.68 | 167.68 | 30 | 0.0 | 667 | 0.71 | 0.004 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.61 | 1.56 | 168.21 | 168.21 | 30 | 0.0 | 682 | 0.71 | 0.005 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.68 | 1.59 | 164.01 | 164.01 | 30 | 0.0 | 692 | 0.71 | 0.005 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.74 | 1.64 | 154.68 | 154.68 | 28 | 0.0 | 691 | 0.71 | 0.006 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.81 | 1.68 | 145.20 | 148.37 | 27 | 0.0 | 680 | 0.71 | 0.007 | 0.00 | 8.56 | 0.00 | 0.000 |
| 0.86 | 1.71 | 134.76 | 140.58 | 26 | 0.0 | 656 | 0.71 | 0.008 | 0.01 | 8.56 | 0.00 | 0.000 |
| 0.94 | 1.73 | 124.64 | 132.05 | 25 | 0.0 | 626 | 0.71 | 0.010 | 0.01 | 8.56 | 0.01 | 0.000 |
| 1.00 | 1.76 | 115.07 | 123.77 | 24 | 0.0 | 596 | 0.71 | 0.012 | 0.01 | 8.56 | 0.01 | 0.000 |
| 1.05 | 1.78 | 106.72 | 116.66 | 22 | 0.0 | 570 | 0.71 | 0.015 | 0.01 | 8.56 | 0.01 | 0.000 |
| 1.13 | 1.81 | 99.59 | 110.74 | 21 | 0.0 | 550 | 0.71 | 0.018 | 0.02 | 8.56 | 0.01 | 0.000 |
| 1.19 | 1.84 | 91.39 | 103.99 | 20 | 0.0 | 527 | 0.71 | 0.022 | 0.02 | 8.56 | 0.02 | 0.000 |
| 1.26 | 1.88 | 83.08 | 97.01 | 19 | 0.0 | 501 | 0.71 | 0.028 | 0.03 | 8.56 | 0.02 | 0.000 |
| 1.33 | 1.91 | 75.46 | 90.36 | 18 | 0.0 | 474 | 0.70 | 0.037 | 0.04 | 8.56 | 0.03 | 0.000 |
| 1.38 | 1.94 | 68.32 | 83.89 | 17 | 0.0 | 446 | 0.70 | 0.049 | 0.06 | 8.56 | 0.05 | 0.000 |
| 1.45 | 1.97 | 61.78 | 77.92 | 16 | 0.0 | 419 | 0.70 | 0.070 | 0.09 | 8.56 | 0.07 | 0.001 |
| 1.52 | 2.00 | 55.28 | 72.14 | 15 | 0.0 | 392 | 0.70 | 0.103 | 0.14 | 8.56 | 0.11 | 0.001 |
| 1.59 | 2.03 | 49.96 | 67.30 | 14 | 0.0 | 368 | 0.70 | 0.153 | 0.23 | 8.56 | 0.18 | 0.001 |
| 1.65 | 2.06 | 45.42 | 63.21 | 13 | 0.0 | 347 | 0.70 | 0.228 | 0.37 | 8.56 | 0.28 | 0.002 |
| 1.72 | 2.09 | 41.90 | 60.23 | 13 | 0.0 | 331 | 0.70 | 0.326 | 0.55 | 8.56 | 0.43 | 0.003 |
| 1.77 | 2.12 | 39.12 | 58.01 | 13 | 0.0 | 319 | 0.70 | 0.438 | 0.76 | 8.56 | 0.59 | 0.004 |
| 1.84 | 2.13 | 37.16 | 56.44 | 12 | 0.0 | 310 | 0.70 | 0.577 | 1.03 | 8.56 | 0.80 | 0.007 |
| 1.91 | 2.15 | 35.59 | 55.07 | 12 | 0.0 | 302 | 0.70 | 0.748 | 1.36 | 8.56 | 1.06 | 0.008 |
| 1.98 | 2.16 | 34.32 | 53.74 | 12 | 0.0 | 295 | 0.70 | 0.979 | 1.83 | 8.56 | 1.42 | 0.012 |
| 2.05 | 2.15 | 33.48 | 33.48 | 7 | 0.0 | 286 | 0.70 | 1.343 | 4.43 | 8.56 | 3.44 | 0.028 |
| 2.11 | 2.13 | 32.99 | 32.99 | 7 | 0.0 | 275 | 0.70 | 1.964 | 6.66 | 8.56 | 5.00 | 0.041 |
| 2.19 | 2.11 | 33.03 | 33.03 | 7 | 0.0 | 269 | 0.70 | 2.572 | 8.78 | 8.56 | 5.00 | 0.046 |
| 2.25 | 2.11 | 33.47 | 33.47 | 7 | 0.0 | 271 | 0.70 | 2.583 | 8.69 | 8.56 | 5.00 | 0.035 |
| 2.32 | 2.11 | 34.34 | 34.34 | 7 | 0.0 | 279 | 0.69 | 2.313 | 7.54 | 8.56 | 5.00 | 0.044 |
| 2.39 | 2.12 | 34.39 | 34.39 | 8 | 0.0 | 283 | 0.69 | 2.241 | 7.25 | 8.56 | 5.00 | 0.039 |
| 2.44 | 2.12 | 35.11 | 35.11 | 8 | 0.0 | 288 | 0.69 | 2.110 | 6.67 | 8.56 | 5.00 | 0.029 |
| 2.49 | 2.13 | 35.26 | 35.26 | 8 | 0.0 | 292 | 0.69 | 2.057 | 6.45 | 8.56 | 5.00 | 0.034 |
| 2.57 | 2.13 | 35.83 | 53.90 | 12 | 0.0 | 296 | 0.69 | 2.019 | 3.81 | 8.56 | 2.96 | 0.028 |
| 2.64 | 2.14 | 35.00 | 53.94 | 12 | 0.0 | 296 | 0.69 | 2.194 | 4.10 | 8.56 | 3.18 | 0.026 |
| 2.71 | 2.16 | 33.96 | 53.74 | 12 | 0.0 | 295 | 0.69 | 2.489 | 4.62 | 8.56 | 3.59 | 0.031 |
| 2.78 | 2.18 | 32.98 | 53.49 | 12 | 0.0 | 293 | 0.69 | 2.834 | 5.25 | 8.56 | 4.08 | 0.033 |
| 2.83 | 2.20 | 32.19 | 53.29 | 12 | 0.0 | 291 | 0.69 | 3.145 | 5.81 | 8.56 | 4.51 | 0.028 |
| 2.90 | 2.20 | 31.65 | 53.00 | 12 | 0.0 | 289 | 0.69 | 3.567 | 6.61 | 8.56 | 5.00 | 0.039 |
| 2.96 | 2.21 | 31.30 | 52.67 | 12 | 0.0 | 287 | 0.69 | 4.042 | 7.53 | 8.56 | 5.00 | 0.039 |
| 3.03 | 2.20 | 31.20 | 52.25 | 12 | 0.0 | 285 | 0.69 | 4.576 | 8.62 | 8.56 | 5.00 | 0.038 |
| 3.09 | 2.20 | 31.19 | 51.95 | 12 | 0.0 | 283 | 0.69 | 5.089 | 9.67 | 8.56 | 5.00 | 0.038 |
| 3.16 | 2.20 | 31.19 | 51.67 | 12 | 0.0 | 282 | 0.69 | 5.711 | 10.94 | 8.56 | 5.00 | 0.044 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.23 | 2.19 | 31.23 | 51.35 | 12 | 0.0 | 280 | 0.68 | 6.381 | 12.35 | 8.56 | 5.00 | 0.041 |
| 3.29 | 2.18 | 31.32 | 51.01 | 11 | 0.0 | 279 | 0.68 | 7.113 | 13.93 | 8.56 | 5.00 | 0.037 |
| 3.36 | 2.17 | 31.61 | 50.76 | 11 | 0.0 | 278 | 0.68 | 7.783 | 15.40 | 8.56 | 5.00 | 0.038 |
| 3.42 | 2.16 | 31.99 | 31.99 | 7 | 0.0 | 278 | 0.68 | 8.342 | 28.87 | 8.56 | 5.00 | 0.040 |
| 3.49 | 2.15 | 32.63 | 32.63 | 7 | 0.0 | 278 | 0.68 | 8.716 | 29.66 | 8.56 | 5.00 | 0.040 |
| 3.55 | 2.14 | 33.31 | 33.31 | 7 | 0.0 | 279 | 0.68 | 9.046 | 30.24 | 8.56 | 5.00 | 0.038 |
| 3.62 | 2.13 | 33.79 | 33.79 | 7 | 0.0 | 280 | 0.68 | 9.413 | 31.07 | 8.56 | 5.00 | 0.040 |
| 3.68 | 2.13 | 33.88 | 33.88 | 7 | 0.0 | 280 | 0.68 | 9.854 | 32.44 | 8.56 | 5.00 | 0.037 |
| 3.74 | 2.13 | 33.53 | 33.53 | 7 | 0.0 | 280 | 0.68 | 10.572 | 35.12 | 8.56 | 5.00 | 0.038 |
| 3.81 | 2.14 | 33.09 | 33.09 | 7 | 0.0 | 279 | 0.68 | 11.551 | 38.84 | 8.56 | 5.00 | 0.039 |
| 3.87 | 2.15 | 32.69 | 32.69 | 7 | 0.0 | 277 | 0.68 | 12.743 | 43.35 | 8.56 | 5.00 | 0.039 |
| 3.94 | 2.15 | 32.40 | 32.40 | 7 | 0.0 | 275 | 0.68 | 14.658 | 50.42 | 8.56 | 5.00 | 0.041 |
| 4.00 | 2.14 | 32.00 | 32.00 | 7 | 0.0 | 270 | 0.68 | 18.365 | 64.28 | 8.56 | 5.00 | 0.038 |
| 4.07 | 2.14 | 31.46 | 31.46 | 7 | 0.0 | 264 | 0.67 | 23.540 | 84.22 | 8.56 | 5.00 | 0.040 |
| 4.15 | 2.14 | 30.67 | 30.67 | 7 | 0.0 | 258 | 0.67 | 31.191 | 114.93 | 8.56 | 5.00 | 0.048 |
| 4.22 | 2.15 | 29.98 | 29.98 | 7 | 0.0 | 254 | 0.67 | 37.878 | 142.94 | 8.56 | 5.00 | 0.043 |
| 4.27 | 2.15 | 29.25 | 29.25 | 6 | 0.0 | 250 | 0.67 | 46.497 | 180.24 | 8.56 | 5.00 | 0.027 |
| 4.35 | 2.16 | 28.56 | 28.56 | 6 | 0.0 | 247 | 0.67 | 56.630 | 224.95 | 8.56 | 5.00 | 0.048 |
| 4.41 | 2.17 | 28.02 | 28.02 | 6 | 0.0 | 245 | 0.67 | 65.008 | 263.16 | 8.56 | 5.00 | 0.035 |
| 4.46 | 2.17 | 27.73 | 27.73 | 6 | 0.0 | 243 | 0.67 | 72.395 | 296.26 | 8.56 | 5.00 | 0.035 |
| 4.53 | 2.16 | 27.77 | 27.77 | 6 | 0.0 | 241 | 0.67 | 83.118 | 340.79 | 8.56 | 5.00 | 0.041 |
| 4.61 | 2.16 | 27.81 | 27.81 | 6 | 0.0 | 239 | 0.67 | 97.821 | 402.08 | 8.56 | 5.00 | 0.047 |
| 4.69 | 2.15 | 27.91 | 27.91 | 6 | 0.0 | 237 | 0.67 | 110.922 | 455.83 | 8.56 | 5.00 | 0.046 |
| 4.74 | 2.15 | 28.00 | 28.00 | 6 | 0.0 | 237 | 0.67 | 115.957 | 475.31 | 8.56 | 5.00 | 0.032 |
| 4.82 | 2.14 | 28.14 | 28.14 | 6 | 0.0 | 238 | 0.67 | 120.784 | 492.81 | 8.56 | 5.00 | 0.045 |
| 4.87 | 2.14 | 28.28 | 28.28 | 6 | 0.0 | 238 | 0.67 | 122.250 | 496.21 | 8.56 | 5.00 | 0.034 |
| 4.95 | 2.14 | 28.42 | 28.42 | 6 | 0.0 | 239 | 0.66 | 123.137 | 496.94 | 8.56 | 5.00 | 0.045 |
| 4.99 | 2.14 | 28.61 | 28.61 | 6 | 0.0 | 241 | 0.66 | 119.370 | 477.93 | 8.56 | 5.00 | 0.028 |
| 5.07 | 2.14 | 28.66 | 28.66 | 6 | 0.0 | 242 | 0.66 | 120.139 | 479.55 | 8.56 | 5.00 | 0.047 |
| 5.13 | 2.15 | 28.65 | 28.65 | 6 | 0.0 | 243 | 0.66 | 118.430 | 471.85 | 8.56 | 5.00 | 0.034 |
| 5.21 | 2.15 | 28.55 | 28.55 | 6 | 0.0 | 244 | 0.66 | 120.894 | 482.58 | 8.56 | 5.00 | 0.045 |
| 5.27 | 2.15 | 28.54 | 28.54 | 6 | 0.0 | 245 | 0.66 | 122.766 | 489.61 | 8.56 | 5.00 | 0.040 |
| 5.32 | 2.15 | 28.69 | 28.69 | 6 | 0.0 | 246 | 0.66 | 119.547 | 473.80 | 8.56 | 5.00 | 0.027 |
| 5.38 | 2.15 | 29.03 | 29.03 | 6 | 0.0 | 248 | 0.66 | 115.818 | 453.42 | 8.56 | 5.00 | 0.040 |
| 5.46 | 2.14 | 29.51 | 29.51 | 7 | 0.0 | 250 | 0.66 | 111.527 | 429.45 | 8.56 | 5.00 | 0.045 |
| 5.53 | 2.14 | 29.89 | 29.89 | 7 | 0.0 | 251 | 0.66 | 111.904 | 425.76 | 8.56 | 5.00 | 0.040 |
| 5.59 | 2.13 | 30.13 | 30.13 | 7 | 0.0 | 251 | 0.66 | 113.900 | 430.14 | 8.56 | 5.00 | 0.040 |
| 5.67 | 2.13 | 30.28 | 30.28 | 7 | 0.0 | 252 | 0.66 | 115.005 | 432.07 | 8.56 | 5.00 | 0.044 |
| 5.71 | 2.13 | 30.56 | 30.56 | 7 | 0.0 | 255 | 0.66 | 105.199 | 390.51 | 8.56 | 5.00 | 0.029 |
| 5.81 | 2.13 | 31.09 | 31.09 | 7 | 0.0 | 259 | 0.65 | 93.752 | 341.04 | 8.56 | 5.00 | 0.055 |
| 5.84 | 2.13 | 32.11 | 32.11 | 7 | 0.0 | 265 | 0.65 | 75.024 | 263.38 | 8.56 | 5.00 | 0.023 |
| 5.91 | 2.11 | 33.62 | 33.62 | 7 | 0.0 | 273 | 0.65 | 58.490 | 195.59 | 8.56 | 5.00 | 0.042 |
| 5.98 | 2.10 | 35.47 | 35.47 | 8 | 0.0 | 282 | 0.65 | 43.888 | 138.71 | 8.56 | 5.00 | 0.038 |
| 6.04 | 2.07 | 38.05 | 38.05 | 8 | 0.0 | 294 | 0.65 | 30.786 | 90.42 | 8.56 | 5.00 | 0.037 |
| 6.12 | 2.05 | 40.92 | 40.92 | 9 | 0.0 | 306 | 0.65 | 22.310 | 60.79 | 8.56 | 5.00 | 0.050 |
| 6.19 | 2.02 | 44.09 | 44.09 | 9 | 0.0 | 318 | 0.65 | 16.461 | 41.57 | 8.56 | 5.00 | 0.040 |
| 6.26 | 1.99 | 46.77 | 46.77 | 10 | 0.0 | 326 | 0.65 | 13.737 | 32.72 | 8.56 | 5.00 | 0.043 |
| 6.32 | 1.96 | 49.16 | 49.16 | 10 | 0.0 | 331 | 0.65 | 12.420 | 28.22 | 8.56 | 5.00 | 0.039 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.39 | 1.94 | 50.96 | 50.96 | 10 | 0.0 | 334 | 0.65 | 11.952 | 26.27 | 8.56 | 5.00 | 0.040 |
| 6.44 | 1.92 | 52.47 | 52.47 | 11 | 0.0 | 336 | 0.65 | 11.682 | 25.00 | 8.56 | 5.00 | 0.028 |
| 6.51 | 1.91 | 53.73 | 53.73 | 11 | 0.0 | 337 | 0.65 | 11.668 | 24.44 | 8.56 | 5.00 | 0.044 |
| 6.57 | 1.90 | 54.99 | 54.99 | 11 | 0.0 | 340 | 0.64 | 11.193 | 22.91 | 8.56 | 5.00 | 0.039 |
| 6.65 | 1.89 | 55.87 | 55.87 | 11 | 0.0 | 343 | 0.64 | 10.646 | 21.43 | 8.56 | 5.00 | 0.045 |
| 6.70 | 1.89 | 56.40 | 56.40 | 11 | 0.0 | 345 | 0.64 | 10.412 | 20.75 | 8.56 | 5.00 | 0.031 |
| 6.77 | 1.88 | 56.79 | 56.79 | 11 | 0.0 | 344 | 0.64 | 11.125 | 22.08 | 8.56 | 5.00 | 0.044 |
| 6.83 | 1.87 | 57.37 | 57.37 | 11 | 0.0 | 343 | 0.64 | 11.504 | 22.64 | 8.56 | 5.00 | 0.031 |
| 6.90 | 1.87 | 57.80 | 57.80 | 11 | 0.0 | 345 | 0.64 | 11.560 | 22.58 | 8.56 | 5.00 | 0.047 |
| 6.97 | 1.87 | 57.89 | 57.89 | 11 | 0.0 | 347 | 0.64 | 11.353 | 22.10 | 8.56 | 5.00 | 0.043 |
| 7.04 | 1.87 | 57.54 | 57.54 | 11 | 0.0 | 346 | 0.64 | 11.785 | 23.07 | 8.56 | 5.00 | 0.041 |
| 7.10 | 1.88 | 56.56 | 56.56 | 11 | 0.0 | 344 | 0.64 | 12.768 | 25.43 | 8.56 | 5.00 | 0.031 |
| 7.17 | 1.89 | 55.43 | 55.43 | 11 | 0.0 | 339 | 0.64 | 14.802 | 30.14 | 8.56 | 5.00 | 0.042 |
| 7.24 | 1.89 | 53.96 | 53.96 | 11 | 0.0 | 332 | 0.64 | 18.358 | 38.53 | 8.56 | 5.00 | 0.044 |
| 7.31 | 1.89 | 52.98 | 52.98 | 11 | 0.0 | 325 | 0.63 | 22.472 | 48.24 | 8.56 | 5.00 | 0.044 |
| 7.35 | 1.89 | 52.10 | 52.10 | 10 | 0.0 | 321 | 0.63 | 25.369 | 55.47 | 8.56 | 5.00 | 0.026 |
| 7.43 | 1.90 | 51.85 | 51.85 | 10 | 0.0 | 321 | 0.63 | 26.276 | 57.70 | 8.56 | 5.00 | 0.047 |
| 7.50 | 1.90 | 52.33 | 52.33 | 10 | 0.0 | 323 | 0.63 | 25.415 | 55.24 | 8.56 | 5.00 | 0.043 |
| 7.57 | 1.89 | 53.50 | 53.50 | 11 | 0.0 | 327 | 0.63 | 23.619 | 50.19 | 8.56 | 5.00 | 0.040 |
| 7.61 | 1.87 | 55.26 | 55.26 | 11 | 0.0 | 331 | 0.63 | 21.321 | 43.87 | 8.56 | 5.00 | 0.025 |
| 7.68 | 1.85 | 57.40 | 57.40 | 11 | 0.0 | 336 | 0.63 | 19.531 | 38.73 | 8.56 | 5.00 | 0.041 |
| 7.76 | 1.83 | 59.88 | 59.88 | 12 | 0.0 | 341 | 0.63 | 17.286 | 32.86 | 8.56 | 5.00 | 0.047 |
| 7.83 | 1.82 | 62.12 | 62.12 | 12 | 0.0 | 348 | 0.63 | 14.970 | 27.39 | 8.56 | 5.00 | 0.040 |
| 7.88 | 1.81 | 64.02 | 64.02 | 12 | 0.0 | 355 | 0.63 | 12.788 | 22.64 | 8.56 | 5.00 | 0.032 |
| 7.95 | 1.81 | 65.47 | 65.47 | 13 | 0.0 | 363 | 0.63 | 11.060 | 19.09 | 8.56 | 5.00 | 0.043 |
| 8.03 | 1.81 | 66.41 | 66.41 | 13 | 0.0 | 369 | 0.63 | 9.946 | 16.90 | 8.56 | 5.00 | 0.046 |
| 8.08 | 1.80 | 67.15 | 67.15 | 13 | 0.0 | 372 | 0.62 | 9.363 | 15.73 | 8.56 | 5.00 | 0.031 |
| 8.14 | 1.79 | 67.66 | 67.66 | 13 | 0.0 | 375 | 0.62 | 9.017 | 15.05 | 8.56 | 5.00 | 0.038 |
| 8.21 | 1.79 | 68.20 | 68.20 | 13 | 0.0 | 378 | 0.62 | 8.615 | 14.27 | 8.56 | 5.00 | 0.042 |
| 8.29 | 1.79 | 68.61 | 68.61 | 13 | 0.0 | 383 | 0.62 | 8.041 | 13.22 | 8.56 | 5.00 | 0.047 |
| 8.34 | 1.79 | 69.22 | 69.22 | 13 | 0.0 | 387 | 0.62 | 7.408 | 12.05 | 8.56 | 5.00 | 0.028 |
| 8.40 | 1.79 | 69.73 | 69.73 | 13 | 0.0 | 392 | 0.62 | 6.831 | 11.00 | 8.56 | 5.00 | 0.040 |
| 8.47 | 1.79 | 70.16 | 70.16 | 14 | 0.0 | 396 | 0.62 | 6.432 | 10.28 | 8.56 | 5.00 | 0.040 |
| 8.54 | 1.79 | 70.40 | 70.40 | 14 | 0.0 | 399 | 0.62 | 6.251 | 9.96 | 8.56 | 5.00 | 0.044 |
| 8.60 | 1.79 | 70.66 | 70.66 | 14 | 0.0 | 401 | 0.62 | 6.103 | 9.69 | 8.56 | 5.00 | 0.036 |
| 8.67 | 1.79 | 71.02 | 71.02 | 14 | 0.0 | 403 | 0.62 | 5.932 | 9.38 | 8.56 | 5.00 | 0.040 |
| 8.74 | 1.78 | 71.24 | 71.24 | 14 | 0.0 | 407 | 0.62 | 5.698 | 8.98 | 8.56 | 5.00 | 0.041 |
| 8.80 | 1.78 | 71.51 | 71.51 | 14 | 0.0 | 409 | 0.61 | 5.518 | 8.66 | 8.56 | 5.00 | 0.034 |
| 8.86 | 1.78 | 71.57 | 71.57 | 14 | 0.0 | 412 | 0.61 | 5.352 | 8.38 | 8.56 | 5.00 | 0.040 |
| 8.93 | 1.79 | 71.62 | 71.62 | 14 | 0.0 | 414 | 0.61 | 5.196 | 8.13 | 8.56 | 5.00 | 0.040 |
| 9.01 | 1.79 | 71.50 | 71.50 | 14 | 0.0 | 417 | 0.61 | 5.052 | 7.91 | 8.56 | 5.00 | 0.050 |
| 9.09 | 1.79 | 71.31 | 71.31 | 14 | 0.0 | 419 | 0.61 | 4.966 | 7.79 | 8.56 | 5.00 | 0.046 |
| 9.13 | 1.79 | 71.18 | 71.18 | 14 | 0.0 | 420 | 0.61 | 4.914 | 7.72 | 8.56 | 5.00 | 0.024 |
| 9.20 | 1.80 | 70.84 | 70.84 | 14 | 0.0 | 422 | 0.61 | 4.871 | 7.68 | 8.56 | 5.00 | 0.041 |
| 9.28 | 1.80 | 70.47 | 70.47 | 14 | 0.0 | 423 | 0.61 | 4.864 | 7.70 | 8.56 | 5.00 | 0.049 |
| 9.35 | 1.81 | 70.17 | 70.17 | 14 | 0.0 | 424 | 0.61 | 4.844 | 7.70 | 8.56 | 5.00 | 0.040 |
| 9.40 | 1.81 | 70.01 | 70.01 | 14 | 0.0 | 426 | 0.61 | 4.737 | 7.54 | 8.56 | 5.00 | 0.033 |
| 9.46 | 1.81 | 69.88 | 69.88 | 14 | 0.0 | 429 | 0.61 | 4.580 | 7.29 | 8.56 | 5.00 | 0.038 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.53 | 1.82 | 69.77 | 69.77 | 14 | 0.0 | 431 | 0.60 | 4.479 | 7.14 | 8.56 | 5.00 | 0.042 |
| 9.60 | 1.82 | 69.68 | 69.68 | 14 | 0.0 | 432 | 0.60 | 4.494 | 7.18 | 8.56 | 5.00 | 0.040 |
| 9.65 | 1.81 | 69.68 | 69.68 | 14 | 0.0 | 430 | 0.60 | 4.675 | 7.49 | 8.56 | 5.00 | 0.030 |
| 9.73 | 1.80 | 69.42 | 69.42 | 13 | 0.0 | 426 | 0.60 | 5.112 | 8.26 | 8.56 | 5.00 | 0.046 |
| 9.79 | 1.79 | 69.28 | 69.28 | 13 | 0.0 | 423 | 0.60 | 5.466 | 8.89 | 8.56 | 5.00 | 0.040 |
| 9.85 | 1.79 | 69.28 | 69.28 | 13 | 0.0 | 423 | 0.60 | 5.533 | 9.01 | 8.56 | 5.00 | 0.035 |
| 9.92 | 1.79 | 69.54 | 69.54 | 13 | 0.0 | 426 | 0.60 | 5.272 | 8.54 | 8.56 | 5.00 | 0.041 |
| 9.99 | 1.79 | 69.87 | 69.87 | 13 | 0.0 | 430 | 0.60 | 5.027 | 8.10 | 8.56 | 5.00 | 0.040 |
| 10.05 | 1.79 | 70.12 | 70.12 | 13 | 0.0 | 434 | 0.60 | 4.727 | 7.58 | 8.56 | 5.00 | 0.037 |
| 10.13 | 1.79 | 70.56 | 70.56 | 14 | 0.0 | 441 | 0.60 | 4.331 | 6.88 | 8.56 | 5.00 | 0.047 |
| 10.18 | 1.80 | 71.39 | 71.39 | 14 | 0.0 | 448 | 0.59 | 3.867 | 6.05 | 8.56 | 4.70 | 0.027 |
| 10.25 | 1.79 | 72.68 | 72.68 | 14 | 0.0 | 457 | 0.59 | 3.427 | 5.25 | 8.56 | 4.08 | 0.037 |
| 10.32 | 1.79 | 73.99 | 73.99 | 14 | 0.0 | 465 | 0.59 | 3.073 | 4.62 | 8.56 | 3.59 | 0.030 |
| 10.38 | 1.78 | 75.66 | 75.66 | 15 | 0.0 | 473 | 0.59 | 2.775 | 4.08 | 8.56 | 3.17 | 0.020 |
| 10.45 | 1.77 | 77.42 | 77.42 | 15 | 0.0 | 480 | 0.59 | 2.527 | 3.63 | 8.56 | 2.82 | 0.025 |
| 10.52 | 1.76 | 79.06 | 79.06 | 15 | 0.0 | 487 | 0.59 | 2.327 | 3.27 | 8.56 | 2.54 | 0.021 |
| 10.57 | 1.75 | 80.36 | 80.36 | 15 | 0.0 | 493 | 0.59 | 2.181 | 3.02 | 8.56 | 2.34 | 0.015 |
| 10.64 | 1.75 | 81.02 | 81.02 | 15 | 0.0 | 498 | 0.59 | 2.063 | 2.83 | 8.56 | 2.20 | 0.018 |
| 10.71 | 1.75 | 81.62 | 81.62 | 16 | 0.0 | 504 | 0.59 | 1.928 | 2.62 | 8.56 | 2.03 | 0.016 |
| 10.78 | 1.75 | 82.00 | 82.00 | 16 | 0.0 | 510 | 0.59 | 1.817 | 2.45 | 8.56 | 1.90 | 0.017 |
| 10.83 | 1.75 | 82.41 | 82.41 | 16 | 0.0 | 514 | 0.59 | 1.730 | 2.32 | 8.56 | 1.80 | 0.011 |
| 10.90 | 1.76 | 82.69 | 82.69 | 16 | 0.0 | 519 | 0.58 | 1.660 | 2.21 | 8.56 | 1.72 | 0.013 |
| 10.96 | 1.76 | 82.95 | 82.95 | 16 | 0.0 | 523 | 0.58 | 1.586 | 2.10 | 8.56 | 1.64 | 0.013 |
| 11.03 | 1.76 | 83.11 | 83.11 | 16 | 0.0 | 527 | 0.58 | 1.536 | 2.03 | 8.56 | 1.58 | 0.012 |
| 11.10 | 1.76 | 83.09 | 83.09 | 16 | 0.0 | 530 | 0.58 | 1.496 | 1.98 | 8.56 | 1.54 | 0.013 |
| 11.16 | 1.77 | 82.95 | 82.95 | 16 | 0.0 | 534 | 0.58 | 1.443 | 1.91 | 8.56 | 1.48 | 0.010 |
| 11.22 | 1.78 | 82.73 | 82.73 | 16 | 0.0 | 541 | 0.58 | 1.344 | 1.77 | 8.56 | 1.38 | 0.011 |
| 11.29 | 1.80 | 82.53 | 82.53 | 16 | 0.0 | 550 | 0.58 | 1.229 | 1.62 | 8.56 | 1.26 | 0.011 |
| 11.36 | 1.82 | 81.66 | 91.82 | 18 | 0.0 | 563 | 0.58 | 1.089 | 1.24 | 8.56 | 0.97 | 0.008 |
| 11.43 | 1.86 | 82.45 | 94.84 | 19 | 0.0 | 590 | 0.58 | 0.841 | 0.91 | 8.56 | 0.71 | 0.006 |
| 11.51 | 1.89 | 84.06 | 99.26 | 20 | 0.0 | 627 | 0.58 | 0.616 | 0.62 | 8.56 | 0.48 | 0.004 |
| 11.55 | 1.92 | 88.51 | 107.27 | 22 | 0.0 | 684 | 0.57 | 0.401 | 0.36 | 8.56 | 0.28 | 0.001 |
| 11.63 | 1.94 | 94.32 | 116.08 | 24 | 0.0 | 747 | 0.57 | 0.274 | 0.22 | 8.56 | 0.17 | 0.002 |
| 11.71 | 1.93 | 102.31 | 125.06 | 25 | 0.0 | 807 | 0.57 | 0.202 | 0.15 | 8.56 | 0.12 | 0.001 |
| 11.76 | 1.89 | 114.54 | 135.30 | 27 | 0.0 | 866 | 0.57 | 0.155 | 0.11 | 8.56 | 0.08 | 0.001 |
| 11.83 | 1.85 | 130.74 | 149.33 | 29 | 0.0 | 946 | 0.57 | 0.116 | 0.07 | 8.56 | 0.06 | 0.000 |
| 11.90 | 1.81 | 150.71 | 168.15 | 33 | 0.0 | 1056 | 0.57 | 0.084 | 0.05 | 8.56 | 0.04 | 0.000 |
| 11.95 | 1.74 | 172.96 | 184.70 | 35 | 0.0 | 1130 | 0.57 | 0.070 | 0.04 | 8.56 | 0.03 | 0.000 |
| 12.02 | 1.67 | 187.10 | 189.76 | 35 | 0.0 | 1128 | 0.57 | 0.071 | 0.04 | 8.56 | 0.03 | 0.000 |
| 12.08 | 1.54 | 209.44 | 209.44 | 37 | 0.0 | 1108 | 0.57 | 0.075 | 0.04 | 8.56 | 0.03 | 0.000 |
| 12.15 | 1.55 | 197.51 | 197.51 | 35 | 0.0 | 1062 | 0.57 | 0.085 | 0.04 | 8.56 | 0.03 | 0.000 |
| 12.22 | 1.63 | 175.53 | 175.53 | 32 | 0.0 | 1034 | 0.56 | 0.092 | 0.05 | 8.56 | 0.04 | 0.000 |
| 12.28 | 1.79 | 137.76 | 151.08 | 29 | 0.0 | 958 | 0.56 | 0.117 | 0.07 | 8.56 | 0.06 | 0.000 |
| 12.34 | 1.88 | 118.84 | 138.92 | 28 | 0.0 | 915 | 0.56 | 0.137 | 0.09 | 8.56 | 0.07 | 0.000 |
| 12.41 | 1.91 | 111.03 | 133.28 | 27 | 0.0 | 891 | 0.56 | 0.151 | 0.11 | 8.56 | 0.08 | 0.001 |
| 12.47 | 1.97 | 100.17 | 126.39 | 26 | 0.0 | 858 | 0.56 | 0.174 | 0.13 | 8.56 | 0.10 | 0.001 |
| 12.54 | 1.97 | 95.97 | 121.40 | 25 | 0.0 | 828 | 0.56 | 0.201 | 0.15 | 8.56 | 0.12 | 0.001 |
| 12.60 | 1.99 | 90.45 | 115.90 | 24 | 0.0 | 794 | 0.56 | 0.237 | 0.19 | 8.56 | 0.15 | 0.001 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.67 | 2.00 | 83.42 | 108.57 | 23 | 0.0 | 748 | 0.56 | 0.306 | 0.26 | 8.56 | 0.21 | 0.002 |
| 12.76 | 2.01 | 78.09 | 102.93 | 22 | 0.0 | 713 | 0.56 | 0.382 | 0.35 | 8.56 | 0.27 | 0.003 |
| 12.80 | 2.03 | 73.34 | 98.21 | 21 | 0.0 | 682 | 0.56 | 0.472 | 0.45 | 8.56 | 0.35 | 0.002 |
| 12.88 | 2.02 | 72.49 | 95.95 | 20 | 0.0 | 669 | 0.55 | 0.522 | 0.52 | 8.56 | 0.40 | 0.004 |
| 12.95 | 2.01 | 70.83 | 92.72 | 19 | 0.0 | 649 | 0.55 | 0.613 | 0.64 | 8.56 | 0.50 | 0.004 |
| 13.01 | 1.99 | 69.85 | 90.24 | 19 | 0.0 | 633 | 0.55 | 0.702 | 0.76 | 8.56 | 0.59 | 0.004 |
| 13.07 | 1.99 | 68.68 | 88.62 | 18 | 0.0 | 623 | 0.55 | 0.764 | 0.85 | 8.56 | 0.66 | 0.005 |
| 13.13 | 2.00 | 67.39 | 87.34 | 18 | 0.0 | 616 | 0.55 | 0.815 | 0.92 | 8.56 | 0.71 | 0.005 |
| 13.19 | 2.00 | 66.67 | 86.36 | 18 | 0.0 | 611 | 0.55 | 0.856 | 0.97 | 8.56 | 0.76 | 0.005 |
| 13.27 | 2.00 | 65.93 | 85.62 | 18 | 0.0 | 609 | 0.55 | 0.881 | 1.01 | 8.56 | 0.79 | 0.008 |
| 13.33 | 2.00 | 65.97 | 85.81 | 18 | 0.0 | 612 | 0.55 | 0.860 | 0.98 | 8.56 | 0.77 | 0.005 |
| 13.41 | 2.02 | 64.37 | 85.17 | 18 | 0.0 | 611 | 0.55 | 0.875 | 1.00 | 8.56 | 0.78 | 0.007 |
| 13.45 | 2.01 | 65.09 | 85.63 | 18 | 0.0 | 615 | 0.55 | 0.844 | 0.96 | 8.56 | 0.75 | 0.004 |
| 13.52 | 2.01 | 65.87 | 86.08 | 18 | 0.0 | 620 | 0.54 | 0.813 | 0.93 | 8.56 | 0.72 | 0.006 |
| 13.60 | 1.98 | 68.27 | 87.28 | 18 | 0.0 | 630 | 0.54 | 0.755 | 0.85 | 8.56 | 0.66 | 0.006 |
| 13.66 | 1.97 | 69.26 | 87.71 | 18 | 0.0 | 633 | 0.54 | 0.735 | 0.83 | 8.56 | 0.65 | 0.004 |
| 13.74 | 1.97 | 69.68 | 87.75 | 18 | 0.0 | 635 | 0.54 | 0.727 | 0.82 | 8.56 | 0.64 | 0.006 |
| 13.80 | 1.96 | 69.77 | 87.57 | 18 | 0.0 | 635 | 0.54 | 0.730 | 0.83 | 8.56 | 0.64 | 0.004 |
| 13.85 | 1.96 | 69.48 | 87.19 | 18 | 0.0 | 634 | 0.54 | 0.739 | 0.84 | 8.56 | 0.66 | 0.004 |
| 13.93 | 1.96 | 69.13 | 86.78 | 18 | 0.0 | 634 | 0.54 | 0.746 | 0.86 | 8.56 | 0.67 | 0.007 |
| 13.99 | 1.97 | 68.80 | 86.52 | 18 | 0.0 | 634 | 0.54 | 0.748 | 0.86 | 8.56 | 0.67 | 0.005 |
| 14.04 | 1.97 | 68.61 | 86.30 | 18 | 0.0 | 634 | 0.54 | 0.751 | 0.87 | 8.56 | 0.67 | 0.004 |
| 14.13 | 1.97 | 68.23 | 86.08 | 18 | 0.0 | 635 | 0.54 | 0.747 | 0.86 | 8.56 | 0.67 | 0.007 |
| 14.19 | 1.98 | 67.67 | 86.59 | 18 | 0.0 | 643 | 0.53 | 0.705 | 0.80 | 8.56 | 0.63 | 0.005 |
| 14.26 | 2.01 | 66.91 | 88.13 | 18 | 0.0 | 659 | 0.53 | 0.624 | 0.69 | 8.56 | 0.53 | 0.004 |
| 14.31 | 2.07 | 65.79 | 92.70 | 20 | 0.0 | 696 | 0.53 | 0.479 | 0.48 | 8.56 | 0.38 | 0.002 |
| 14.39 | 2.13 | 65.03 | 98.78 | 22 | 0.0 | 740 | 0.53 | 0.364 | 0.33 | 8.56 | 0.26 | 0.002 |
| 14.44 | 2.18 | 64.43 | 104.65 | 23 | 0.0 | 777 | 0.53 | 0.296 | 0.24 | 8.56 | 0.19 | 0.001 |
| 14.52 | 2.19 | 64.50 | 106.41 | 24 | 0.0 | 792 | 0.53 | 0.276 | 0.22 | 8.56 | 0.17 | 0.002 |
| 14.59 | 2.19 | 64.94 | 107.14 | 24 | 0.0 | 800 | 0.53 | 0.265 | 0.21 | 8.56 | 0.16 | 0.001 |
| 14.65 | 2.20 | 66.03 | 109.60 | 25 | 0.0 | 820 | 0.53 | 0.241 | 0.19 | 8.56 | 0.15 | 0.001 |
| 14.71 | 2.19 | 69.57 | 113.96 | 26 | 0.0 | 858 | 0.53 | 0.204 | 0.15 | 8.56 | 0.12 | 0.001 |
| 14.78 | 2.15 | 75.05 | 116.43 | 26 | 0.0 | 888 | 0.52 | 0.180 | 0.13 | 8.56 | 0.10 | 0.001 |
| 14.84 | 2.08 | 82.01 | 116.24 | 25 | 0.0 | 897 | 0.52 | 0.175 | 0.13 | 8.56 | 0.10 | 0.001 |
| 14.90 | 1.99 | 90.45 | 116.41 | 24 | 0.0 | 895 | 0.52 | 0.177 | 0.14 | 8.56 | 0.11 | 0.001 |
| 14.97 | 1.90 | 100.43 | 119.87 | 24 | 0.0 | 904 | 0.52 | 0.171 | 0.14 | 8.56 | 0.11 | 0.001 |
| 15.04 | 1.86 | 106.86 | 123.41 | 24 | 0.0 | 917 | 0.52 | 0.163 | 0.13 | 8.56 | 0.10 | 0.001 |
| 15.11 | 1.85 | 110.50 | 126.20 | 25 | 0.0 | 934 | 0.52 | 0.154 | 0.12 | 8.56 | 0.09 | 0.001 |
| 15.16 | 1.86 | 110.05 | 126.80 | 25 | 0.0 | 946 | 0.52 | 0.148 | 0.11 | 8.56 | 0.09 | 0.001 |
| 15.24 | 1.85 | 113.17 | 129.49 | 25 | 0.0 | 965 | 0.52 | 0.139 | 0.10 | 8.56 | 0.08 | 0.001 |
| 15.29 | 1.83 | 116.61 | 131.41 | 26 | 0.0 | 971 | 0.52 | 0.137 | 0.10 | 8.56 | 0.08 | 0.000 |
| 15.36 | 1.79 | 121.68 | 133.67 | 26 | 0.0 | 972 | 0.52 | 0.137 | 0.10 | 8.56 | 0.08 | 0.001 |
| 15.43 | 1.78 | 125.11 | 136.63 | 26 | 0.0 | 991 | 0.51 | 0.129 | 0.09 | 8.56 | 0.07 | 0.001 |
| 15.51 | 1.78 | 128.39 | 140.64 | 27 | 0.0 | 1026 | 0.51 | 0.116 | 0.08 | 8.56 | 0.06 | 0.001 |
| 15.56 | 1.80 | 130.43 | 144.31 | 28 | 0.0 | 1064 | 0.51 | 0.105 | 0.07 | 8.56 | 0.05 | 0.000 |
| 15.64 | 1.79 | 133.10 | 146.41 | 28 | 0.0 | 1078 | 0.51 | 0.102 | 0.07 | 8.56 | 0.05 | 0.001 |
| 15.69 | 1.78 | 135.21 | 147.99 | 28 | 0.0 | 1087 | 0.51 | 0.099 | 0.07 | 8.56 | 0.05 | 0.000 |
| 15.77 | 1.78 | 136.94 | 149.16 | 29 | 0.0 | 1095 | 0.51 | 0.098 | 0.06 | 8.56 | 0.05 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15.82 | 1.78 | 137.24 | 149.60 | 29 | 0.0 | 1101 | 0.51 | 0.096 | 0.06 | 8.56 | 0.05 | 0.000 |
| 15.89 | 1.78 | 136.12 | 148.93 | 29 | 0.0 | 1103 | 0.51 | 0.096 | 0.06 | 8.56 | 0.05 | 0.000 |
| 15.95 | 1.79 | 133.91 | 147.47 | 28 | 0.0 | 1100 | 0.51 | 0.097 | 0.06 | 8.56 | 0.05 | 0.000 |
| 16.02 | 1.82 | 129.16 | 144.38 | 28 | 0.0 | 1093 | 0.51 | 0.099 | 0.07 | 8.56 | 0.05 | 0.000 |
| 16.09 | 1.84 | 123.55 | 140.15 | 27 | 0.0 | 1076 | 0.50 | 0.104 | 0.07 | 8.56 | 0.06 | 0.000 |
| 16.15 | 1.86 | 118.20 | 136.63 | 27 | 0.0 | 1065 | 0.50 | 0.107 | 0.07 | 8.56 | 0.06 | 0.000 |
| 16.22 | 1.88 | 114.17 | 133.86 | 27 | 0.0 | 1055 | 0.50 | 0.110 | 0.08 | 8.56 | 0.06 | 0.000 |
| 16.27 | 1.90 | 111.53 | 132.48 | 27 | 0.0 | 1055 | 0.50 | 0.111 | 0.08 | 8.56 | 0.06 | 0.000 |
| 16.34 | 1.91 | 109.82 | 131.23 | 26 | 0.0 | 1051 | 0.50 | 0.112 | 0.08 | 8.56 | 0.06 | 0.001 |
| 16.41 | 1.91 | 108.91 | 130.60 | 26 | 0.0 | 1050 | 0.50 | 0.113 | 0.08 | 8.56 | 0.06 | 0.000 |
| 16.50 | 1.93 | 106.82 | 129.68 | 26 | 0.0 | 1053 | 0.50 | 0.112 | 0.08 | 8.56 | 0.06 | 0.001 |
| 16.57 | 1.94 | 104.18 | 128.30 | 26 | 0.0 | 1051 | 0.50 | 0.113 | 0.08 | 8.56 | 0.06 | 0.001 |
| 16.60 | 1.93 | 101.28 | 122.92 | 25 | 0.0 | 1002 | 0.50 | 0.131 | 0.10 | 8.56 | 0.08 | 0.000 |
| 16.70 | 1.90 | 99.04 | 117.45 | 24 | 0.0 | 951 | 0.49 | 0.155 | 0.13 | 8.56 | 0.10 | 0.001 |
| 16.76 | 1.86 | 97.27 | 112.42 | 22 | 0.0 | 898 | 0.49 | 0.189 | 0.17 | 8.56 | 0.13 | 0.001 |
| 16.82 | 1.87 | 95.18 | 110.62 | 22 | 0.0 | 889 | 0.49 | 0.196 | 0.18 | 8.56 | 0.14 | 0.001 |
| 16.89 | 1.86 | 94.02 | 108.50 | 21 | 0.0 | 870 | 0.49 | 0.212 | 0.19 | 8.56 | 0.15 | 0.001 |
| 16.95 | 1.90 | 85.80 | 102.22 | 21 | 0.0 | 838 | 0.49 | 0.245 | 0.24 | 8.56 | 0.18 | 0.001 |
| 17.01 | 1.99 | 74.35 | 96.12 | 20 | 0.0 | 814 | 0.49 | 0.274 | 0.27 | 8.56 | 0.21 | 0.002 |
| 17.09 | 2.14 | 61.52 | 93.68 | 21 | 0.0 | 802 | 0.49 | 0.291 | 0.28 | 8.56 | 0.22 | 0.002 |
| 17.16 | 2.22 | 54.63 | 93.68 | 21 | 0.0 | 791 | 0.49 | 0.307 | 0.29 | 8.56 | 0.22 | 0.002 |
| 17.22 | 2.23 | 52.21 | 90.60 | 21 | 0.0 | 766 | 0.49 | 0.353 | 0.34 | 8.56 | 0.26 | 0.002 |
| 17.28 | 2.20 | 50.75 | 85.10 | 19 | 0.0 | 726 | 0.48 | 0.445 | 0.47 | 8.56 | 0.36 | 0.003 |
| 17.35 | 2.18 | 50.05 | 81.01 | 18 | 0.0 | 697 | 0.48 | 0.537 | 0.60 | 8.56 | 0.47 | 0.004 |
| 17.41 | 2.19 | 48.06 | 79.26 | 18 | 0.0 | 682 | 0.48 | 0.597 | 0.69 | 8.56 | 0.53 | 0.004 |
| 17.48 | 2.22 | 45.76 | 78.49 | 18 | 0.0 | 673 | 0.48 | 0.637 | 0.73 | 8.56 | 0.57 | 0.005 |
| 17.54 | 2.23 | 44.12 | 76.81 | 18 | 0.0 | 658 | 0.48 | 0.709 | 0.83 | 8.56 | 0.65 | 0.005 |
| 17.60 | 2.20 | 43.87 | 73.60 | 17 | 0.0 | 636 | 0.48 | 0.840 | 1.05 | 8.56 | 0.81 | 0.006 |
| 17.66 | 2.17 | 43.50 | 69.10 | 15 | 0.0 | 604 | 0.48 | 1.108 | 1.52 | 8.56 | 1.18 | 0.009 |
| 17.75 | 2.13 | 43.14 | 65.35 | 14 | 0.0 | 576 | 0.48 | 1.445 | 2.16 | 8.56 | 1.68 | 0.018 |
| 17.78 | 2.11 | 42.69 | 63.20 | 14 | 0.0 | 558 | 0.48 | 1.729 | 2.71 | 8.56 | 2.10 | 0.008 |
| 17.87 | 2.11 | 42.32 | 62.19 | 14 | 0.0 | 551 | 0.48 | 1.856 | 2.97 | 8.56 | 2.31 | 0.025 |
| 17.93 | 2.10 | 42.10 | 61.25 | 13 | 0.0 | 544 | 0.47 | 2.005 | 3.28 | 8.56 | 2.55 | 0.017 |
| 18.00 | 2.09 | 42.27 | 60.60 | 13 | 0.0 | 540 | 0.47 | 2.100 | 3.50 | 8.56 | 2.72 | 0.023 |
| 18.06 | 2.07 | 42.54 | 60.01 | 13 | 0.0 | 535 | 0.47 | 2.201 | 3.74 | 8.56 | 2.90 | 0.022 |
| 18.13 | 2.06 | 42.87 | 59.59 | 13 | 0.0 | 533 | 0.47 | 2.272 | 3.92 | 8.56 | 3.04 | 0.024 |
| 18.19 | 2.05 | 43.23 | 43.23 | 9 | 0.0 | 529 | 0.47 | 2.374 | 6.06 | 8.56 | 4.70 | 0.035 |
| 18.25 | 2.03 | 43.68 | 43.68 | 9 | 0.0 | 524 | 0.47 | 2.504 | 6.36 | 8.56 | 4.94 | 0.037 |
| 18.32 | 2.01 | 44.30 | 44.30 | 9 | 0.0 | 521 | 0.47 | 2.591 | 6.52 | 8.56 | 5.00 | 0.040 |
| 18.38 | 2.00 | 44.93 | 44.93 | 9 | 0.0 | 521 | 0.47 | 2.567 | 6.39 | 8.56 | 4.97 | 0.039 |
| 18.44 | 2.00 | 45.45 | 45.45 | 9 | 0.0 | 527 | 0.47 | 2.401 | 5.90 | 8.56 | 4.59 | 0.033 |
| 18.51 | 2.00 | 45.53 | 45.53 | 9 | 0.0 | 530 | 0.47 | 2.303 | 5.64 | 8.56 | 4.39 | 0.033 |
| 18.57 | 2.01 | 44.90 | 44.90 | 9 | 0.0 | 531 | 0.46 | 2.287 | 5.67 | 8.56 | 4.41 | 0.034 |
| 18.64 | 2.01 | 44.26 | 44.26 | 9 | 0.0 | 527 | 0.46 | 2.367 | 5.96 | 8.56 | 4.63 | 0.038 |
| 18.73 | 2.02 | 43.64 | 43.64 | 9 | 0.0 | 524 | 0.46 | 2.443 | 6.25 | 8.56 | 4.85 | 0.055 |
| 18.80 | 2.02 | 43.39 | 43.39 | 9 | 0.0 | 523 | 0.46 | 2.490 | 6.41 | 8.56 | 4.98 | 0.038 |
| 18.86 | 2.03 | 42.77 | 42.77 | 9 | 0.0 | 521 | 0.46 | 2.534 | 6.62 | 8.56 | 5.00 | 0.039 |
| 18.92 | 2.03 | 42.10 | 42.10 | 9 | 0.0 | 519 | 0.46 | 2.593 | 6.87 | 8.56 | 5.00 | 0.034 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18.99 | 2.04 | 41.53 | 41.53 | 9 | 0.0 | 517 | 0.46 | 2.647 | 7.11 | 8.56 | 5.00 | 0.043 |
| 19.05 | 2.04 | 41.36 | 41.36 | 9 | 0.0 | 516 | 0.46 | 2.657 | 7.17 | 8.56 | 5.00 | 0.037 |
| 19.12 | 2.04 | 41.52 | 41.52 | 9 | 0.0 | 520 | 0.46 | 2.541 | 6.83 | 8.56 | 5.00 | 0.040 |
| 19.18 | 2.04 | 41.95 | 41.95 | 9 | 0.0 | 529 | 0.45 | 2.273 | 6.02 | 8.56 | 4.68 | 0.033 |
| 19.23 | 2.05 | 42.41 | 42.41 | 9 | 0.0 | 539 | 0.45 | 2.024 | 5.28 | 8.56 | 4.10 | 0.029 |
| 19.29 | 2.05 | 42.81 | 42.81 | 9 | 0.0 | 547 | 0.45 | 1.840 | 4.74 | 8.56 | 3.68 | 0.026 |
| 19.38 | 2.05 | 43.09 | 43.09 | 9 | 0.0 | 553 | 0.45 | 1.731 | 4.42 | 8.56 | 3.44 | 0.037 |
| 19.45 | 2.05 | 43.54 | 59.74 | 13 | 0.0 | 559 | 0.45 | 1.620 | 2.80 | 8.56 | 2.17 | 0.017 |
| 19.51 | 2.05 | 43.87 | 60.14 | 13 | 0.0 | 564 | 0.45 | 1.537 | 2.64 | 8.56 | 2.05 | 0.015 |
| 19.57 | 2.05 | 44.17 | 60.38 | 13 | 0.0 | 567 | 0.45 | 1.484 | 2.54 | 8.56 | 1.97 | 0.015 |
| 19.64 | 2.04 | 44.24 | 60.24 | 13 | 0.0 | 567 | 0.45 | 1.485 | 2.55 | 8.56 | 1.98 | 0.015 |
| 19.70 | 2.04 | 44.43 | 44.43 | 9 | 0.0 | 566 | 0.45 | 1.490 | 3.69 | 8.56 | 2.87 | 0.022 |
| 19.76 | 2.04 | 44.69 | 60.58 | 13 | 0.0 | 572 | 0.45 | 1.402 | 2.39 | 8.56 | 1.86 | 0.014 |
| 19.82 | 2.05 | 45.30 | 61.82 | 13 | 0.0 | 586 | 0.44 | 1.228 | 2.04 | 8.56 | 1.59 | 0.011 |
| 19.89 | 2.06 | 46.40 | 64.03 | 14 | 0.0 | 609 | 0.44 | 0.995 | 1.58 | 8.56 | 1.23 | 0.009 |
| 19.95 | 2.07 | 47.15 | 66.07 | 14 | 0.0 | 631 | 0.44 | 0.828 | 1.26 | 8.56 | 0.98 | 0.008 |
| 20.04 | 2.06 | 49.53 | 68.64 | 15 | 0.0 | 656 | 0.44 | 0.677 | 0.99 | 8.56 | 0.77 | 0.008 |
| 20.09 | 2.04 | 52.53 | 71.29 | 15 | 0.0 | 681 | 0.44 | 0.569 | 0.80 | 8.56 | 0.62 | 0.003 |
| 20.15 | 2.00 | 57.13 | 74.59 | 16 | 0.0 | 708 | 0.44 | 0.475 | 0.64 | 8.56 | 0.50 | 0.004 |
| 20.22 | 1.98 | 60.50 | 77.32 | 16 | 0.0 | 731 | 0.44 | 0.413 | 0.54 | 8.56 | 0.42 | 0.003 |
| 20.28 | 1.97 | 63.47 | 79.80 | 16 | 0.0 | 752 | 0.44 | 0.367 | 0.47 | 8.56 | 0.36 | 0.003 |
| 20.34 | 1.95 | 65.65 | 81.56 | 17 | 0.0 | 766 | 0.44 | 0.339 | 0.42 | 8.56 | 0.33 | 0.003 |
| 20.41 | 1.93 | 68.13 | 83.22 | 17 | 0.0 | 777 | 0.44 | 0.319 | 0.39 | 8.56 | 0.30 | 0.002 |
| 20.48 | 1.91 | 70.11 | 84.18 | 17 | 0.0 | 781 | 0.43 | 0.313 | 0.38 | 8.56 | 0.30 | 0.002 |
| 20.57 | 1.90 | 71.47 | 84.71 | 17 | 0.0 | 782 | 0.43 | 0.311 | 0.38 | 8.56 | 0.29 | 0.003 |
| 20.63 | 1.88 | 72.26 | 84.91 | 17 | 0.0 | 781 | 0.43 | 0.313 | 0.38 | 8.56 | 0.30 | 0.002 |
| 20.69 | 1.87 | 73.41 | 85.32 | 17 | 0.0 | 780 | 0.43 | 0.313 | 0.38 | 8.56 | 0.30 | 0.002 |
| 20.75 | 1.86 | 74.41 | 85.54 | 17 | 0.0 | 777 | 0.43 | 0.318 | 0.39 | 8.56 | 0.30 | 0.002 |
| 20.81 | 1.85 | 74.48 | 85.26 | 17 | 0.0 | 773 | 0.43 | 0.324 | 0.40 | 8.56 | 0.31 | 0.002 |
| 20.87 | 1.86 | 72.84 | 83.88 | 17 | 0.0 | 766 | 0.43 | 0.336 | 0.42 | 8.56 | 0.33 | 0.003 |
| 20.96 | 1.88 | 70.04 | 82.10 | 16 | 0.0 | 761 | 0.43 | 0.342 | 0.44 | 8.56 | 0.34 | 0.004 |
| 21.02 | 1.92 | 66.44 | 80.19 | 16 | 0.0 | 759 | 0.43 | 0.346 | 0.45 | 8.56 | 0.35 | 0.002 |
| 21.08 | 1.96 | 62.72 | 78.25 | 16 | 0.0 | 755 | 0.43 | 0.353 | 0.46 | 8.56 | 0.36 | 0.003 |
| 21.15 | 1.98 | 59.65 | 76.23 | 16 | 0.0 | 744 | 0.42 | 0.375 | 0.50 | 8.56 | 0.39 | 0.003 |
| 21.21 | 1.99 | 57.48 | 74.29 | 15 | 0.0 | 729 | 0.42 | 0.407 | 0.56 | 8.56 | 0.43 | 0.003 |
| 21.27 | 2.00 | 55.85 | 72.94 | 15 | 0.0 | 719 | 0.42 | 0.429 | 0.60 | 8.56 | 0.46 | 0.004 |
| 21.33 | 2.02 | 54.06 | 71.93 | 15 | 0.0 | 714 | 0.42 | 0.441 | 0.62 | 8.56 | 0.48 | 0.004 |
| 21.40 | 2.04 | 52.14 | 70.88 | 15 | 0.0 | 709 | 0.42 | 0.456 | 0.64 | 8.56 | 0.50 | 0.004 |
| 21.46 | 2.06 | 50.60 | 70.13 | 15 | 0.0 | 705 | 0.42 | 0.466 | 0.66 | 8.56 | 0.51 | 0.004 |
| 21.53 | 2.07 | 49.59 | 69.58 | 15 | 0.0 | 702 | 0.42 | 0.473 | 0.67 | 8.56 | 0.52 | 0.004 |
| 21.59 | 2.06 | 49.19 | 68.40 | 15 | 0.0 | 691 | 0.42 | 0.507 | 0.74 | 8.56 | 0.58 | 0.004 |
| 21.66 | 2.05 | 48.98 | 67.35 | 14 | 0.0 | 680 | 0.42 | 0.540 | 0.81 | 8.56 | 0.63 | 0.005 |
| 21.75 | 2.05 | 48.82 | 66.85 | 14 | 0.0 | 677 | 0.41 | 0.551 | 0.83 | 8.56 | 0.65 | 0.007 |
| 21.81 | 2.05 | 49.26 | 67.84 | 14 | 0.0 | 689 | 0.41 | 0.507 | 0.75 | 8.56 | 0.58 | 0.005 |
| 21.87 | 2.05 | 50.21 | 69.22 | 15 | 0.0 | 704 | 0.41 | 0.459 | 0.66 | 8.56 | 0.52 | 0.003 |
| 21.93 | 2.05 | 53.01 | 72.29 | 15 | 0.0 | 736 | 0.41 | 0.381 | 0.53 | 8.56 | 0.41 | 0.003 |
| 22.01 | 2.04 | 57.01 | 76.98 | 16 | 0.0 | 784 | 0.41 | 0.295 | 0.38 | 8.56 | 0.29 | 0.003 |
| 22.07 | 2.03 | 61.64 | 82.27 | 17 | 0.0 | 837 | 0.41 | 0.231 | 0.28 | 8.56 | 0.21 | 0.002 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22.13 | 2.01 | 64.28 | 84.70 | 18 | 0.0 | 861 | 0.41 | 0.209 | 0.24 | 8.56 | 0.19 | 0.001 |
| 22.20 | 2.00 | 65.29 | 84.88 | 18 | 0.0 | 861 | 0.41 | 0.209 | 0.24 | 8.56 | 0.19 | 0.001 |
| 22.25 | 1.99 | 64.77 | 83.61 | 17 | 0.0 | 848 | 0.41 | 0.220 | 0.26 | 8.56 | 0.20 | 0.001 |
| 22.31 | 1.99 | 64.84 | 83.37 | 17 | 0.0 | 846 | 0.41 | 0.221 | 0.26 | 8.56 | 0.21 | 0.002 |
| 22.40 | 1.99 | 65.38 | 83.90 | 17 | 0.0 | 853 | 0.40 | 0.215 | 0.25 | 8.56 | 0.20 | 0.002 |
| 22.47 | 2.01 | 63.53 | 83.24 | 17 | 0.0 | 854 | 0.40 | 0.213 | 0.25 | 8.56 | 0.20 | 0.002 |
| 22.53 | 2.05 | 59.44 | 81.45 | 17 | 0.0 | 847 | 0.40 | 0.220 | 0.26 | 8.56 | 0.20 | 0.001 |
| 22.59 | 2.10 | 54.65 | 79.35 | 17 | 0.0 | 832 | 0.40 | 0.233 | 0.28 | 8.56 | 0.22 | 0.002 |
| 22.65 | 2.11 | 52.77 | 78.19 | 17 | 0.0 | 823 | 0.40 | 0.242 | 0.29 | 8.56 | 0.23 | 0.002 |
| 22.72 | 2.09 | 53.13 | 76.73 | 17 | 0.0 | 808 | 0.40 | 0.258 | 0.32 | 8.56 | 0.25 | 0.002 |
| 22.78 | 2.07 | 53.66 | 75.27 | 16 | 0.0 | 792 | 0.40 | 0.278 | 0.36 | 8.56 | 0.28 | 0.002 |
| 22.84 | 2.05 | 54.34 | 74.36 | 16 | 0.0 | 780 | 0.40 | 0.292 | 0.39 | 8.56 | 0.30 | 0.002 |
| 22.90 | 2.04 | 54.47 | 73.84 | 16 | 0.0 | 775 | 0.40 | 0.299 | 0.40 | 8.56 | 0.31 | 0.002 |
| 23.00 | 2.03 | 54.05 | 72.70 | 15 | 0.0 | 764 | 0.40 | 0.315 | 0.43 | 8.56 | 0.34 | 0.004 |
| 23.06 | 2.03 | 53.01 | 70.91 | 15 | 0.0 | 746 | 0.40 | 0.346 | 0.49 | 8.56 | 0.38 | 0.003 |
| 23.10 | 2.03 | 51.42 | 69.06 | 15 | 0.0 | 728 | 0.39 | 0.380 | 0.56 | 8.56 | 0.43 | 0.002 |
| 23.17 | 2.04 | 49.48 | 67.18 | 14 | 0.0 | 711 | 0.39 | 0.417 | 0.63 | 8.56 | 0.49 | 0.004 |
| 23.24 | 2.05 | 47.59 | 65.34 | 14 | 0.0 | 695 | 0.39 | 0.459 | 0.71 | 8.56 | 0.55 | 0.004 |
| 23.30 | 2.07 | 45.54 | 63.95 | 14 | 0.0 | 684 | 0.39 | 0.490 | 0.77 | 8.56 | 0.60 | 0.005 |
| 23.39 | 2.09 | 44.32 | 63.32 | 14 | 0.0 | 681 | 0.39 | 0.498 | 0.79 | 8.56 | 0.61 | 0.006 |
| 23.45 | 2.10 | 43.59 | 63.18 | 14 | 0.0 | 681 | 0.39 | 0.494 | 0.78 | 8.56 | 0.61 | 0.005 |
| 23.51 | 2.10 | 43.62 | 63.37 | 14 | 0.0 | 685 | 0.39 | 0.481 | 0.76 | 8.56 | 0.59 | 0.004 |
| 23.58 | 2.11 | 43.47 | 63.75 | 14 | 0.0 | 691 | 0.39 | 0.462 | 0.72 | 8.56 | 0.56 | 0.004 |
| 23.64 | 2.11 | 43.55 | 64.53 | 14 | 0.0 | 701 | 0.39 | 0.432 | 0.66 | 8.56 | 0.51 | 0.004 |
| 23.71 | 2.12 | 43.89 | 65.45 | 14 | 0.0 | 713 | 0.39 | 0.402 | 0.60 | 8.56 | 0.47 | 0.004 |
| 23.77 | 2.12 | 44.46 | 66.36 | 14 | 0.0 | 724 | 0.38 | 0.376 | 0.55 | 8.56 | 0.43 | 0.003 |
| 23.83 | 2.12 | 45.04 | 67.04 | 15 | 0.0 | 733 | 0.38 | 0.357 | 0.52 | 8.56 | 0.40 | 0.003 |
| 23.89 | 2.11 | 45.70 | 67.72 | 15 | 0.0 | 741 | 0.38 | 0.340 | 0.49 | 8.56 | 0.38 | 0.003 |
| 23.98 | 2.11 | 46.34 | 68.45 | 15 | 0.0 | 751 | 0.38 | 0.322 | 0.46 | 8.56 | 0.36 | 0.004 |
| 24.03 | 2.11 | 47.32 | 69.63 | 15 | 0.0 | 766 | 0.38 | 0.299 | 0.42 | 8.56 | 0.32 | 0.002 |
| 24.10 | 2.10 | 48.58 | 70.99 | 15 | 0.0 | 782 | 0.38 | 0.276 | 0.38 | 8.56 | 0.29 | 0.002 |
| 24.16 | 2.09 | 50.24 | 72.49 | 16 | 0.0 | 799 | 0.38 | 0.254 | 0.34 | 8.56 | 0.27 | 0.002 |
| 24.22 | 2.08 | 51.99 | 73.88 | 16 | 0.0 | 814 | 0.38 | 0.237 | 0.31 | 8.56 | 0.24 | 0.002 |
| 24.29 | 2.07 | 53.66 | 75.31 | 16 | 0.0 | 830 | 0.38 | 0.221 | 0.29 | 8.56 | 0.22 | 0.002 |
| 24.34 | 2.07 | 55.26 | 77.43 | 17 | 0.0 | 855 | 0.38 | 0.200 | 0.25 | 8.56 | 0.19 | 0.001 |
| 24.41 | 2.07 | 57.17 | 80.12 | 17 | 0.0 | 887 | 0.38 | 0.178 | 0.21 | 8.56 | 0.17 | 0.001 |
| 24.48 | 2.06 | 60.47 | 83.84 | 18 | 0.0 | 928 | 0.37 | 0.154 | 0.18 | 8.56 | 0.14 | 0.001 |
| 24.56 | 2.04 | 64.75 | 87.39 | 18 | 0.0 | 964 | 0.37 | 0.137 | 0.15 | 8.56 | 0.12 | 0.001 |
| 24.62 | 2.00 | 70.45 | 91.59 | 19 | 0.0 | 1001 | 0.37 | 0.124 | 0.13 | 8.56 | 0.10 | 0.001 |
| 24.69 | 1.95 | 76.61 | 95.29 | 19 | 0.0 | 1024 | 0.37 | 0.116 | 0.12 | 8.56 | 0.09 | 0.001 |
| 24.75 | 1.90 | 83.70 | 99.59 | 20 | 0.0 | 1043 | 0.37 | 0.111 | 0.11 | 8.56 | 0.09 | 0.001 |
| 24.81 | 1.87 | 91.76 | 106.98 | 21 | 0.0 | 1105 | 0.37 | 0.096 | 0.09 | 8.56 | 0.07 | 0.001 |
| 24.89 | 1.87 | 100.08 | 116.33 | 23 | 0.0 | 1202 | 0.37 | 0.078 | 0.07 | 8.56 | 0.05 | 0.001 |
| 24.96 | 1.86 | 108.10 | 125.14 | 25 | 0.0 | 1290 | 0.37 | 0.067 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.02 | 1.85 | 112.99 | 129.21 | 25 | 0.0 | 1320 | 0.37 | 0.064 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.08 | 1.81 | 117.93 | 131.67 | 26 | 0.0 | 1316 | 0.37 | 0.065 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.13 | 1.78 | 122.28 | 133.86 | 26 | 0.0 | 1312 | 0.36 | 0.065 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.20 | 1.76 | 127.23 | 137.55 | 26 | 0.0 | 1331 | 0.36 | 0.063 | 0.05 | 8.56 | 0.04 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25.27 | 1.76 | 130.60 | 141.06 | 27 | 0.0 | 1366 | 0.36 | 0.060 | 0.04 | 8.56 | 0.03 | 0.000 |
| 25.33 | 1.77 | 131.53 | 142.36 | 27 | 0.0 | 1384 | 0.36 | 0.058 | 0.04 | 8.56 | 0.03 | 0.000 |
| 25.39 | 1.75 | 131.33 | 141.09 | 27 | 0.0 | 1362 | 0.36 | 0.060 | 0.04 | 8.56 | 0.03 | 0.000 |
| 25.48 | 1.73 | 130.40 | 137.95 | 26 | 0.0 | 1311 | 0.36 | 0.065 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.55 | 1.70 | 130.80 | 135.83 | 25 | 0.0 | 1266 | 0.36 | 0.069 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.60 | 1.70 | 129.41 | 134.10 | 25 | 0.0 | 1249 | 0.36 | 0.072 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.66 | 1.72 | 124.01 | 130.58 | 25 | 0.0 | 1241 | 0.36 | 0.072 | 0.06 | 8.56 | 0.04 | 0.000 |
| 25.73 | 1.78 | 116.55 | 127.43 | 24 | 0.0 | 1267 | 0.36 | 0.069 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.80 | 1.84 | 108.79 | 123.61 | 24 | 0.0 | 1283 | 0.36 | 0.067 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.86 | 1.92 | 100.72 | 121.23 | 24 | 0.0 | 1322 | 0.35 | 0.063 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.95 | 1.98 | 93.28 | 118.36 | 24 | 0.0 | 1334 | 0.35 | 0.062 | 0.05 | 8.56 | 0.04 | 0.000 |
| 25.99 | 2.03 | 86.61 | 115.72 | 24 | 0.0 | 1331 | 0.35 | 0.062 | 0.05 | 8.56 | 0.04 | 0.000 |
| 26.08 | 2.05 | 82.48 | 112.47 | 24 | 0.0 | 1305 | 0.35 | 0.065 | 0.05 | 8.56 | 0.04 | 0.000 |
| 26.14 | 2.05 | 80.22 | 109.70 | 23 | 0.0 | 1276 | 0.35 | 0.068 | 0.06 | 8.56 | 0.04 | 0.000 |
| 26.21 | 2.06 | 77.68 | 107.13 | 23 | 0.0 | 1251 | 0.35 | 0.071 | 0.06 | 8.56 | 0.05 | 0.000 |
| 26.27 | 2.05 | 76.12 | 104.77 | 22 | 0.0 | 1225 | 0.35 | 0.074 | 0.06 | 8.56 | 0.05 | 0.000 |
| 26.34 | 2.06 | 73.19 | 101.79 | 22 | 0.0 | 1195 | 0.35 | 0.078 | 0.07 | 8.56 | 0.05 | 0.000 |
| 26.39 | 2.04 | 74.86 | 101.51 | 21 | 0.0 | 1187 | 0.35 | 0.079 | 0.07 | 8.56 | 0.06 | 0.000 |
| 26.45 | 2.01 | 77.50 | 101.96 | 21 | 0.0 | 1183 | 0.35 | 0.079 | 0.07 | 8.56 | 0.06 | 0.000 |
| 26.52 | 1.97 | 81.99 | 103.23 | 21 | 0.0 | 1178 | 0.35 | 0.080 | 0.07 | 8.56 | 0.06 | 0.000 |
| 26.58 | 1.93 | 85.05 | 103.51 | 21 | 0.0 | 1161 | 0.35 | 0.082 | 0.08 | 8.56 | 0.06 | 0.000 |
| 26.64 | 1.89 | 88.70 | 104.65 | 21 | 0.0 | 1149 | 0.34 | 0.084 | 0.08 | 8.56 | 0.06 | 0.000 |
| 26.74 | 1.87 | 91.24 | 105.82 | 21 | 0.0 | 1149 | 0.34 | 0.084 | 0.08 | 8.56 | 0.06 | 0.001 |
| 26.80 | 1.86 | 93.17 | 107.10 | 21 | 0.0 | 1155 | 0.34 | 0.083 | 0.08 | 8.56 | 0.06 | 0.000 |
| 26.87 | 1.85 | 93.78 | 107.41 | 21 | 0.0 | 1156 | 0.34 | 0.083 | 0.08 | 8.56 | 0.06 | 0.000 |
| 26.93 | 1.85 | 94.72 | 108.23 | 21 | 0.0 | 1164 | 0.34 | 0.081 | 0.08 | 8.56 | 0.06 | 0.000 |
| 26.99 | 1.85 | 96.00 | 109.79 | 22 | 0.0 | 1184 | 0.34 | 0.078 | 0.07 | 8.56 | 0.06 | 0.000 |
| 27.05 | 1.85 | 98.44 | 112.81 | 22 | 0.0 | 1221 | 0.34 | 0.073 | 0.06 | 8.56 | 0.05 | 0.000 |
| 27.12 | 1.86 | 102.18 | 117.57 | 23 | 0.0 | 1280 | 0.34 | 0.066 | 0.06 | 8.56 | 0.04 | 0.000 |
| 27.18 | 1.86 | 108.22 | 125.05 | 25 | 0.0 | 1369 | 0.34 | 0.058 | 0.05 | 8.56 | 0.04 | 0.000 |
| 27.24 | 1.85 | 115.89 | 133.05 | 26 | 0.0 | 1450 | 0.34 | 0.052 | 0.04 | 8.56 | 0.03 | 0.000 |
| 27.30 | 1.87 | 120.77 | 140.08 | 28 | 0.0 | 1544 | 0.34 | 0.047 | 0.03 | 8.56 | 0.02 | 0.000 |
| 27.36 | 1.86 | 123.37 | 141.88 | 28 | 0.0 | 1554 | 0.33 | 0.046 | 0.03 | 8.56 | 0.02 | 0.000 |
| 27.45 | 1.85 | 122.36 | 140.60 | 28 | 0.0 | 1542 | 0.33 | 0.047 | 0.03 | 8.56 | 0.02 | 0.000 |
| 27.51 | 1.84 | 120.22 | 136.36 | 27 | 0.0 | 1479 | 0.33 | 0.050 | 0.04 | 8.56 | 0.03 | 0.000 |
| 27.58 | 1.85 | 115.61 | 132.50 | 26 | 0.0 | 1455 | 0.33 | 0.052 | 0.04 | 8.56 | 0.03 | 0.000 |
| 27.64 | 1.87 | 112.85 | 130.78 | 26 | 0.0 | 1453 | 0.33 | 0.052 | 0.04 | 8.56 | 0.03 | 0.000 |
| 27.70 | 1.90 | 110.35 | 130.77 | 26 | 0.0 | 1484 | 0.33 | 0.050 | 0.04 | 8.56 | 0.03 | 0.000 |
| 27.77 | 1.91 | 110.91 | 132.65 | 27 | 0.0 | 1519 | 0.33 | 0.048 | 0.03 | 8.56 | 0.03 | 0.000 |
| 27.83 | 1.91 | 110.86 | 133.13 | 27 | 0.0 | 1531 | 0.33 | 0.047 | 0.03 | 8.56 | 0.03 | 0.000 |
| 27.89 | 1.85 | 115.49 | 132.60 | 26 | 0.0 | 1470 | 0.33 | 0.051 | 0.04 | 8.56 | 0.03 | 0.000 |
| 28.01 | 1.80 | 118.44 | 131.06 | 25 | 0.0 | 1402 | 0.33 | 0.055 | 0.04 | 8.56 | 0.03 | 0.000 |
| 28.05 | 1.76 | 119.58 | 128.62 | 24 | 0.0 | 1331 | 0.33 | 0.061 | 0.05 | 8.56 | 0.04 | 0.000 |
| 28.11 | 1.76 | 117.21 | 126.39 | 24 | 0.0 | 1314 | 0.33 | 0.062 | 0.05 | 8.56 | 0.04 | 0.000 |
| 28.16 | 1.76 | 115.29 | 124.29 | 24 | 0.0 | 1293 | 0.32 | 0.064 | 0.05 | 8.56 | 0.04 | 0.000 |
| 28.23 | 1.75 | 114.20 | 122.69 | 23 | 0.0 | 1273 | 0.32 | 0.066 | 0.05 | 8.56 | 0.04 | 0.000 |
| 28.29 | 1.78 | 106.30 | 115.93 | 22 | 0.0 | 1227 | 0.32 | 0.071 | 0.06 | 8.56 | 0.05 | 0.000 |
| 28.35 | 1.78 | 103.01 | 112.75 | 22 | 0.0 | 1201 | 0.32 | 0.074 | 0.07 | 8.56 | 0.05 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | $N_{1,60}$ (blows) | Vs (ft/s) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $S_{vol,15}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28.42 | 1.79 | 100.01 | 109.87 | 21 | 0.0 | 1177 | 0.32 | 0.077 | 0.07 | 8.56 | 0.06 | 0.000 |
| 28.48 | 1.77 | 102.88 | 111.78 | 21 | 0.0 | 1183 | 0.32 | 0.076 | 0.07 | 8.56 | 0.05 | 0.000 |
| 28.57 | 1.78 | 100.79 | 110.27 | 21 | 0.0 | 1180 | 0.32 | 0.076 | 0.07 | 8.56 | 0.06 | 0.001 |
| 28.64 | 1.80 | 98.97 | 109.37 | 21 | 0.0 | 1186 | 0.32 | 0.075 | 0.07 | 8.56 | 0.05 | 0.000 |
| 28.70 | 1.82 | 99.03 | 110.71 | 22 | 0.0 | 1218 | 0.32 | 0.071 | 0.07 | 8.56 | 0.05 | 0.000 |
| 28.76 | 1.84 | 99.80 | 113.70 | 22 | 0.0 | 1279 | 0.32 | 0.065 | 0.06 | 8.56 | 0.04 | 0.000 |
| 28.82 | 1.86 | 101.98 | 117.82 | 23 | 0.0 | 1346 | 0.32 | 0.059 | 0.05 | 8.56 | 0.04 | 0.000 |
| 28.88 | 1.88 | 104.58 | 122.22 | 24 | 0.0 | 1413 | 0.32 | 0.054 | 0.04 | 8.56 | 0.03 | 0.000 |
| 28.94 | 1.88 | 107.79 | 126.18 | 25 | 0.0 | 1464 | 0.31 | 0.050 | 0.04 | 8.56 | 0.03 | 0.000 |
| 29.03 | 1.88 | 110.56 | 128.95 | 26 | 0.0 | 1494 | 0.31 | 0.049 | 0.04 | 8.56 | 0.03 | 0.000 |
| 29.09 | 1.88 | 111.38 | 130.84 | 26 | 0.0 | 1528 | 0.31 | 0.047 | 0.03 | 8.56 | 0.03 | 0.000 |
| 29.15 | 1.94 | 110.86 | 135.96 | 28 | 0.0 | 1644 | 0.31 | 0.041 | 0.03 | 8.56 | 0.02 | 0.000 |
| 29.21 | 2.00 | 110.31 | 142.81 | 30 | 0.0 | 1781 | 0.31 | 0.037 | 0.02 | 8.56 | 0.02 | 0.000 |
| 29.28 | 2.04 | 108.84 | 148.02 | 31 | 0.0 | 1883 | 0.31 | 0.034 | 0.02 | 8.56 | 0.02 | 0.000 |
| 29.34 | 2.04 | 110.35 | 149.93 | 32 | 0.0 | 1911 | 0.31 | 0.033 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.41 | 2.01 | 117.70 | 154.29 | 32 | 0.0 | 1945 | 0.31 | 0.032 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.49 | 2.00 | 123.18 | 159.64 | 33 | 0.0 | 2008 | 0.31 | 0.031 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.55 | 2.02 | 122.98 | 163.10 | 34 | 0.0 | 2075 | 0.31 | 0.029 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.61 | 2.05 | 118.57 | 163.14 | 35 | 0.0 | 2103 | 0.31 | 0.029 | 0.01 | 8.56 | 0.01 | 0.000 |
| 29.67 | 2.04 | 120.17 | 162.25 | 34 | 0.0 | 2083 | 0.31 | 0.029 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.73 | 1.99 | 125.32 | 160.99 | 33 | 0.0 | 2031 | 0.31 | 0.030 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.80 | 1.95 | 128.53 | 159.39 | 33 | 0.0 | 1976 | 0.30 | 0.031 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.86 | 1.94 | 127.50 | 157.05 | 32 | 0.0 | 1942 | 0.30 | 0.032 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.93 | 1.94 | 126.11 | 155.17 | 32 | 0.0 | 1921 | 0.30 | 0.033 | 0.02 | 8.56 | 0.01 | 0.000 |
| 29.99 | 1.94 | 123.59 | 151.99 | 31 | 0.0 | 1884 | 0.30 | 0.033 | 0.02 | 8.56 | 0.02 | 0.000 |

**Total estimated settlement: 6.60**

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.07 | 154.43 | 145.95 | 1.50 | 0.00 | 1.00 | 0.00 | 30.12 | 166.47 | 157.33 | 1.84 | 0.00 | 1.00 | 0.00 |
| 30.19 | 170.92 | 161.53 | 1.96 | 0.00 | 1.00 | 0.00 | 30.25 | 170.35 | 161.00 | 1.93 | 0.00 | 1.00 | 0.00 |
| 30.33 | 165.43 | 156.35 | 1.77 | 0.00 | 1.00 | 0.00 | 30.40 | 164.24 | 155.22 | 1.73 | 0.00 | 1.00 | 0.00 |
| 30.46 | 162.58 | 153.65 | 1.67 | 0.00 | 1.00 | 0.00 | 30.52 | 161.32 | 152.46 | 1.64 | 0.00 | 1.00 | 0.00 |
| 30.59 | 156.38 | 147.79 | 1.51 | 0.00 | 1.00 | 0.00 | 30.65 | 151.23 | 142.92 | 1.39 | 0.00 | 1.00 | 0.00 |
| 30.73 | 142.69 | 134.85 | 1.21 | 0.32 | 1.00 | 0.00 | 30.78 | 134.53 | 127.14 | 1.06 | 0.45 | 1.00 | 0.00 |
| 30.84 | 128.83 | 121.75 | 0.97 | 0.70 | 1.00 | 0.01 | 30.91 | 124.05 | 117.24 | 0.90 | 1.14 | 1.00 | 0.01 |
| 30.99 | 119.68 | 113.11 | 0.84 | 1.56 | 1.00 | 0.02 | 31.05 | 119.02 | 112.48 | 0.83 | 1.58 | 1.00 | 0.01 |
| 31.11 | 118.54 | 112.03 | 0.82 | 1.59 | 1.00 | 0.01 | 31.20 | 122.41 | 115.69 | 0.88 | 1.16 | 1.00 | 0.01 |
| 31.26 | 133.14 | 125.83 | 1.06 | 0.46 | 1.00 | 0.00 | 31.31 | 151.93 | 143.58 | 1.46 | 0.00 | 1.00 | 0.00 |
| 31.38 | 173.14 | 163.63 | 2.00 | 0.00 | 1.00 | 0.00 | 31.46 | 199.79 | 188.81 | 2.00 | 0.00 | 1.00 | 0.00 |
| 31.52 | 187.84 | 177.52 | 2.00 | 0.00 | 1.00 | 0.00 | 31.57 | 195.47 | 184.74 | 2.00 | 0.00 | 1.00 | 0.00 |
| 31.64 | 192.33 | 181.77 | 2.00 | 0.00 | 1.00 | 0.00 | 31.69 | 183.59 | 173.51 | 2.00 | 0.00 | 1.00 | 0.00 |
| 31.79 | 165.76 | 156.66 | 1.94 | 0.00 | 1.00 | 0.00 | 31.85 | 172.60 | 163.12 | 2.00 | 0.00 | 1.00 | 0.00 |
| 31.91 | 173.85 | 164.31 | 2.00 | 0.00 | 1.00 | 0.00 | 31.97 | 166.88 | 157.71 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.03 | 179.73 | 169.86 | 2.00 | 0.00 | 1.00 | 0.00 | 32.09 | 181.15 | 171.20 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.18 | 177.39 | 167.64 | 2.00 | 0.00 | 1.00 | 0.00 | 32.23 | 174.34 | 164.76 | 2.00 | 0.00 | 1.00 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.30 | 176.26 | 166.58 | 2.00 | 0.00 | 1.00 | 0.00 | 32.36 | 171.23 | 161.83 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.42 | 167.30 | 158.11 | 2.00 | 0.00 | 1.00 | 0.00 | 32.48 | 168.18 | 158.95 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.56 | 165.63 | 156.54 | 1.97 | 0.00 | 1.00 | 0.00 | 32.63 | 168.55 | 159.29 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.69 | 171.03 | 161.64 | 2.00 | 0.00 | 1.00 | 0.00 | 32.75 | 174.68 | 165.09 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.81 | 187.19 | 176.91 | 2.00 | 0.00 | 1.00 | 0.00 | 32.90 | 171.74 | 162.31 | 2.00 | 0.00 | 1.00 | 0.00 |
| 32.94 | 168.38 | 159.13 | 2.00 | 0.00 | 1.00 | 0.00 | 33.02 | 167.69 | 158.48 | 2.00 | 0.00 | 1.00 | 0.00 |
| 33.09 | 161.04 | 152.19 | 1.79 | 0.00 | 1.00 | 0.00 | 33.15 | 157.08 | 148.46 | 1.67 | 0.00 | 1.00 | 0.00 |
| 33.21 | 155.75 | 147.20 | 1.63 | 0.00 | 1.00 | 0.00 | 33.27 | 159.02 | 150.29 | 1.72 | 0.00 | 1.00 | 0.00 |
| 33.36 | 168.66 | 159.40 | 2.00 | 0.00 | 1.00 | 0.00 | 33.43 | 181.36 | 171.40 | 2.00 | 0.00 | 1.00 | 0.00 |
| 33.48 | 198.34 | 187.45 | 2.00 | 0.00 | 1.00 | 0.00 | 33.54 | 212.99 | 201.29 | 2.00 | 0.00 | 1.00 | 0.00 |
| 33.60 | 218.36 | 206.37 | 2.00 | 0.00 | 1.00 | 0.00 | 33.69 | 219.82 | 207.75 | 2.00 | 0.00 | 1.00 | 0.00 |
| 33.75 | 210.19 | 198.65 | 2.00 | 0.00 | 1.00 | 0.00 | 33.81 | 210.82 | 199.24 | 2.00 | 0.00 | 1.00 | 0.00 |
| 33.88 | 223.42 | 211.15 | 2.00 | 0.00 | 1.00 | 0.00 | 33.93 | 223.78 | 211.49 | 2.00 | 0.00 | 1.00 | 0.00 |
| 34.00 | 245.89 | 232.39 | 2.00 | 0.00 | 1.00 | 0.00 | 34.06 | 135.19 | 127.76 | 1.20 | 0.33 | 1.00 | 0.00 |
| 34.12 | 196.31 | 185.53 | 2.00 | 0.00 | 1.00 | 0.00 | 34.20 | 177.58 | 167.83 | 2.00 | 0.00 | 1.00 | 0.00 |
| 34.26 | 182.31 | 172.30 | 2.00 | 0.00 | 1.00 | 0.00 | 34.33 | 209.70 | 198.18 | 2.00 | 0.00 | 1.00 | 0.00 |
| 34.38 | 197.85 | 186.98 | 2.00 | 0.00 | 1.00 | 0.00 | 34.45 | 150.36 | 142.10 | 1.59 | 0.00 | 1.00 | 0.00 |
| 34.52 | 138.09 | 130.51 | 1.29 | 0.23 | 1.00 | 0.00 | 34.60 | 130.27 | 123.12 | 1.12 | 0.46 | 1.00 | 0.00 |
| 34.65 | 122.68 | 115.94 | 0.97 | 0.73 | 1.00 | 0.00 | 34.73 | 113.42 | 107.20 | 0.82 | 1.69 | 1.00 | 0.02 |
| 34.78 | 105.34 | 99.56 | 0.72 | 2.24 | 1.00 | 0.01 | 34.85 | 95.41 | 90.17 | 0.60 | 2.43 | 1.00 | 0.02 |
| 34.91 | 93.90 | 88.74 | 0.58 | 2.46 | 1.00 | 0.02 | 34.97 | 92.27 | 87.20 | 0.56 | 2.50 | 1.00 | 0.02 |
| 35.04 | 91.24 | 86.23 | 0.55 | 2.52 | 1.00 | 0.02 | 35.12 | 85.09 | 80.42 | 0.50 | 2.67 | 1.00 | 0.02 |
| 35.18 | 81.51 | 77.04 | 0.47 | 2.76 | 1.00 | 0.02 | 35.25 | 80.11 | 75.71 | 0.46 | 2.80 | 1.00 | 0.02 |
| 35.30 | 77.99 | 73.70 | 0.44 | 2.87 | 1.00 | 0.02 | 35.37 | 74.62 | 70.52 | 0.42 | 2.97 | 1.00 | 0.02 |
| 35.43 | 70.93 | 67.04 | 0.40 | 3.10 | 1.00 | 0.02 | 35.52 | 69.67 | 65.84 | 0.39 | 3.14 | 1.00 | 0.03 |
| 35.58 | 70.48 | 66.61 | 0.40 | 3.11 | 1.00 | 0.02 | 35.64 | 74.57 | 70.48 | 0.43 | 2.97 | 1.00 | 0.02 |
| 35.70 | 79.97 | 75.58 | 0.48 | 2.81 | 1.00 | 0.02 | 35.77 | 88.56 | 83.70 | 0.55 | 2.58 | 1.00 | 0.02 |
| 35.83 | 93.63 | 88.49 | 0.60 | 2.47 | 1.00 | 0.02 | 35.89 | 106.52 | 100.67 | 0.75 | 2.22 | 1.00 | 0.02 |
| 35.97 | 118.22 | 111.73 | 0.91 | 1.22 | 1.00 | 0.01 | 36.04 | 119.01 | 112.48 | 0.93 | 1.21 | 1.00 | 0.01 |
| 36.12 | 115.42 | 109.08 | 0.87 | 1.27 | 1.00 | 0.01 | 36.16 | 117.90 | 111.42 | 0.91 | 1.23 | 1.00 | 0.01 |
| 36.23 | 119.73 | 113.16 | 0.95 | 1.20 | 1.00 | 0.01 | 36.31 | 126.77 | 119.80 | 1.07 | 0.47 | 1.00 | 0.00 |
| 36.35 | 129.30 | 122.20 | 1.11 | 0.47 | 1.00 | 0.00 | 36.44 | 127.31 | 120.32 | 1.08 | 0.47 | 1.00 | 0.01 |
| 36.49 | 129.96 | 122.82 | 1.13 | 0.46 | 1.00 | 0.00 | 36.57 | 130.50 | 123.34 | 1.14 | 0.46 | 1.00 | 0.00 |
| 36.62 | 130.87 | 123.69 | 1.14 | 0.46 | 1.00 | 0.00 | 36.70 | 133.39 | 126.07 | 1.19 | 0.33 | 1.00 | 0.00 |
| 36.76 | 135.57 | 128.13 | 1.24 | 0.33 | 1.00 | 0.00 | 36.81 | 136.31 | 128.83 | 1.25 | 0.23 | 1.00 | 0.00 |
| 36.89 | 133.52 | 126.19 | 1.20 | 0.33 | 1.00 | 0.00 | 36.96 | 129.66 | 122.54 | 1.12 | 0.47 | 1.00 | 0.00 |
| 37.01 | 125.32 | 118.43 | 1.04 | 0.72 | 1.00 | 0.00 | 37.08 | 118.64 | 112.13 | 0.94 | 1.22 | 1.00 | 0.01 |
| 37.15 | 113.93 | 107.67 | 0.87 | 1.29 | 1.00 | 0.01 | 37.22 | 114.38 | 108.10 | 0.88 | 1.29 | 1.00 | 0.01 |
| 37.29 | 104.73 | 98.98 | 0.75 | 1.90 | 1.00 | 0.02 | 37.34 | 104.17 | 98.45 | 0.75 | 2.26 | 1.00 | 0.01 |
| 37.41 | 106.55 | 100.70 | 0.78 | 1.85 | 1.00 | 0.01 | 37.48 | 101.85 | 96.26 | 0.72 | 2.30 | 1.00 | 0.02 |
| 37.54 | 102.24 | 96.63 | 0.72 | 2.29 | 1.00 | 0.02 | 37.62 | 102.27 | 96.65 | 0.72 | 2.29 | 1.00 | 0.02 |
| 37.67 | 97.94 | 92.56 | 0.67 | 2.38 | 1.00 | 0.01 | 37.74 | 97.81 | 92.44 | 0.67 | 2.38 | 1.00 | 0.02 |
| 37.82 | 100.49 | 94.97 | 0.70 | 2.33 | 1.00 | 0.02 | 37.88 | 105.24 | 99.46 | 0.76 | 1.89 | 1.00 | 0.01 |
| 37.95 | 110.18 | 104.13 | 0.84 | 1.76 | 1.00 | 0.02 | 38.00 | 112.78 | 106.59 | 0.88 | 1.31 | 1.00 | 0.01 |
| 38.07 | 122.34 | 115.62 | 1.05 | 0.73 | 1.00 | 0.01 | 38.14 | 130.97 | 123.78 | 1.22 | 0.34 | 1.00 | 0.00 |
| 38.20 | 142.52 | 134.69 | 1.49 | 0.00 | 1.00 | 0.00 | 38.26 | 168.02 | 158.79 | 2.00 | 0.00 | 1.00 | 0.00 |
| 38.33 | 171.73 | 162.30 | 2.00 | 0.00 | 1.00 | 0.00 | 38.40 | 173.87 | 164.32 | 2.00 | 0.00 | 1.00 | 0.00 |
| 38.45 | 179.97 | 170.09 | 2.00 | 0.00 | 1.00 | 0.00 | 38.52 | 188.11 | 177.78 | 2.00 | 0.00 | 1.00 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.60 | 199.37 | 188.42 | 2.00 | 0.00 | 1.00 | 0.00 | 38.65 | 201.84 | 190.76 | 2.00 | 0.00 | 1.00 | 0.00 |
| 38.72 | 197.22 | 186.39 | 2.00 | 0.00 | 1.00 | 0.00 | 38.79 | 192.23 | 181.67 | 2.00 | 0.00 | 1.00 | 0.00 |
| 38.87 | 185.56 | 175.37 | 2.00 | 0.00 | 1.00 | 0.00 | 38.94 | 175.91 | 166.25 | 2.00 | 0.00 | 1.00 | 0.00 |
| 38.98 | 176.09 | 166.42 | 2.00 | 0.00 | 1.00 | 0.00 | 39.06 | 174.17 | 164.60 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.13 | 178.71 | 168.89 | 2.00 | 0.00 | 1.00 | 0.00 | 39.20 | 187.16 | 176.88 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.26 | 195.84 | 185.09 | 2.00 | 0.00 | 1.00 | 0.00 | 39.33 | 204.28 | 193.06 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.39 | 209.07 | 197.58 | 2.00 | 0.00 | 1.00 | 0.00 | 39.48 | 222.28 | 210.07 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.50 | 226.80 | 214.35 | 2.00 | 0.00 | 1.00 | 0.00 | 39.57 | 233.57 | 220.75 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.64 | 238.51 | 225.41 | 2.00 | 0.00 | 1.00 | 0.00 | 39.71 | 245.49 | 232.01 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.77 | 241.92 | 228.63 | 2.00 | 0.00 | 1.00 | 0.00 | 39.84 | 244.46 | 231.04 | 2.00 | 0.00 | 1.00 | 0.00 |
| 39.91 | 246.71 | 233.16 | 2.00 | 0.00 | 1.00 | 0.00 | 39.97 | 236.30 | 223.32 | 2.00 | 0.00 | 1.00 | 0.00 |
| 40.03 | 211.85 | 200.22 | 2.00 | 0.00 | 1.00 | 0.00 | 40.10 | 140.00 | 132.31 | 1.45 | 0.00 | 1.00 | 0.00 |
| 40.18 | 187.61 | 177.30 | 2.00 | 0.00 | 1.00 | 0.00 | 40.23 | 177.72 | 167.96 | 2.00 | 0.00 | 1.00 | 0.00 |
| 40.30 | 171.18 | 161.78 | 2.00 | 0.00 | 1.00 | 0.00 | 40.38 | 159.13 | 150.39 | 2.00 | 0.00 | 1.00 | 0.00 |
| 40.42 | 152.44 | 144.07 | 1.80 | 0.00 | 1.00 | 0.00 | 40.50 | 143.29 | 135.42 | 1.55 | 0.00 | 1.00 | 0.00 |
| 40.57 | 136.78 | 129.27 | 1.39 | 0.00 | 1.00 | 0.00 | 40.62 | 134.13 | 126.76 | 1.34 | 0.23 | 1.00 | 0.00 |
| 40.70 | 136.05 | 128.58 | 1.40 | 0.00 | 1.00 | 0.00 | 40.75 | 141.98 | 134.18 | 1.57 | 0.00 | 1.00 | 0.00 |
| 40.82 | 145.66 | 137.66 | 1.70 | 0.00 | 1.00 | 0.00 | 40.89 | 149.33 | 141.13 | 1.82 | 0.00 | 1.00 | 0.00 |
| 40.96 | 155.28 | 146.76 | 2.00 | 0.00 | 1.00 | 0.00 | 41.01 | 160.06 | 151.27 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.08 | 174.58 | 164.99 | 2.00 | 0.00 | 1.00 | 0.00 | 41.15 | 208.23 | 196.80 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.22 | 210.15 | 198.61 | 2.00 | 0.00 | 1.00 | 0.00 | 41.28 | 214.85 | 203.05 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.36 | 215.46 | 203.63 | 2.00 | 0.00 | 1.00 | 0.00 | 41.41 | 216.10 | 204.23 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.49 | 216.53 | 204.64 | 2.00 | 0.00 | 1.00 | 0.00 | 41.54 | 214.40 | 202.62 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.61 | 210.04 | 198.51 | 2.00 | 0.00 | 1.00 | 0.00 | 41.67 | 209.48 | 197.97 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.75 | 206.18 | 194.86 | 2.00 | 0.00 | 1.00 | 0.00 | 41.81 | 207.12 | 195.75 | 2.00 | 0.00 | 1.00 | 0.00 |
| 41.87 | 207.34 | 195.95 | 2.00 | 0.00 | 1.00 | 0.00 | 41.94 | 200.30 | 189.30 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.01 | 198.34 | 187.45 | 2.00 | 0.00 | 1.00 | 0.00 | 42.06 | 198.23 | 187.34 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.15 | 198.11 | 187.23 | 2.00 | 0.00 | 1.00 | 0.00 | 42.20 | 195.68 | 184.93 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.26 | 196.75 | 185.95 | 2.00 | 0.00 | 1.00 | 0.00 | 42.32 | 191.72 | 181.19 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.40 | 190.82 | 180.34 | 2.00 | 0.00 | 1.00 | 0.00 | 42.46 | 189.32 | 178.93 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.53 | 185.56 | 175.37 | 2.00 | 0.00 | 1.00 | 0.00 | 42.59 | 189.49 | 179.08 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.68 | 200.67 | 189.65 | 2.00 | 0.00 | 1.00 | 0.00 | 42.73 | 203.23 | 192.07 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.78 | 216.34 | 204.46 | 2.00 | 0.00 | 1.00 | 0.00 | 42.86 | 219.51 | 207.45 | 2.00 | 0.00 | 1.00 | 0.00 |
| 42.92 | 224.27 | 211.96 | 2.00 | 0.00 | 1.00 | 0.00 | 42.99 | 201.80 | 190.71 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.06 | 217.22 | 205.29 | 2.00 | 0.00 | 1.00 | 0.00 | 43.12 | 233.13 | 220.33 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.18 | 229.13 | 216.55 | 2.00 | 0.00 | 1.00 | 0.00 | 43.25 | 229.86 | 217.23 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.32 | 235.12 | 222.21 | 2.00 | 0.00 | 1.00 | 0.00 | 43.38 | 254.42 | 240.45 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.44 | 238.53 | 225.43 | 2.00 | 0.00 | 1.00 | 0.00 | 43.51 | 213.19 | 201.49 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.59 | 185.34 | 175.16 | 2.00 | 0.00 | 1.00 | 0.00 | 43.64 | 178.85 | 169.03 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.71 | 170.34 | 160.99 | 2.00 | 0.00 | 1.00 | 0.00 | 43.78 | 160.79 | 151.96 | 2.00 | 0.00 | 1.00 | 0.00 |
| 43.85 | 148.38 | 140.23 | 1.88 | 0.00 | 1.00 | 0.00 | 43.90 | 136.86 | 129.35 | 1.53 | 0.00 | 1.00 | 0.00 |
| 43.98 | 130.89 | 123.70 | 1.38 | 0.00 | 1.00 | 0.00 | 44.03 | 128.23 | 121.19 | 1.32 | 0.24 | 1.00 | 0.00 |
| 44.10 | 126.38 | 119.44 | 1.28 | 0.24 | 1.00 | 0.00 | 44.18 | 119.67 | 113.09 | 1.13 | 0.49 | 1.00 | 0.01 |
| 44.23 | 119.85 | 113.27 | 1.14 | 0.49 | 1.00 | 0.00 | 44.30 | 121.01 | 114.37 | 1.17 | 0.35 | 1.00 | 0.00 |
| 44.37 | 122.98 | 116.22 | 1.21 | 0.35 | 1.00 | 0.00 | 44.44 | 129.49 | 122.38 | 1.37 | 0.00 | 1.00 | 0.00 |
| 44.50 | 126.44 | 119.50 | 1.29 | 0.24 | 1.00 | 0.00 | 44.58 | 138.95 | 131.32 | 1.63 | 0.00 | 1.00 | 0.00 |
| 44.64 | 140.58 | 132.86 | 1.68 | 0.00 | 1.00 | 0.00 | 44.70 | 143.50 | 135.62 | 1.77 | 0.00 | 1.00 | 0.00 |
| 44.75 | 150.38 | 142.12 | 2.00 | 0.00 | 1.00 | 0.00 | 44.84 | 139.98 | 132.29 | 1.66 | 0.00 | 1.00 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $q_{c,1,mod}$ (tsf) | $q_{c,1N,mod}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44.90 | 129.43 | 122.32 | 1.38 | 0.00 | 1.00 | 0.00 | 44.95 | 125.93 | 119.02 | 1.30 | 0.25 | 1.00 | 0.00 |
| 45.03 | 125.54 | 118.64 | 1.29 | 0.25 | 1.00 | 0.00 | 45.09 | 123.68 | 116.88 | 1.24 | 0.35 | 1.00 | 0.00 |
| 45.15 | 121.58 | 114.90 | 1.20 | 0.35 | 1.00 | 0.00 | 45.23 | 127.78 | 120.76 | 1.34 | 0.24 | 1.00 | 0.00 |
| 45.30 | 133.54 | 126.20 | 1.49 | 0.00 | 1.00 | 0.00 | 45.36 | 138.76 | 131.14 | 1.64 | 0.00 | 1.00 | 0.00 |
| 45.43 | 147.03 | 138.96 | 1.92 | 0.00 | 1.00 | 0.00 | 45.49 | 148.71 | 140.55 | 1.98 | 0.00 | 1.00 | 0.00 |
| 45.56 | 146.42 | 138.38 | 1.90 | 0.00 | 1.00 | 0.00 | 45.61 | 148.46 | 140.30 | 1.97 | 0.00 | 1.00 | 0.00 |
| 45.69 | 141.89 | 134.10 | 1.74 | 0.00 | 1.00 | 0.00 | 45.74 | 141.36 | 133.59 | 1.72 | 0.00 | 1.00 | 0.00 |
| 45.82 | 139.48 | 131.82 | 1.66 | 0.00 | 1.00 | 0.00 | 45.88 | 138.49 | 130.89 | 1.63 | 0.00 | 1.00 | 0.00 |
| 45.94 | 136.64 | 129.14 | 1.58 | 0.00 | 1.00 | 0.00 | 46.00 | 137.04 | 129.51 | 1.59 | 0.00 | 1.00 | 0.00 |
| 46.09 | 141.37 | 133.61 | 1.73 | 0.00 | 1.00 | 0.00 | 46.14 | 144.48 | 136.54 | 1.83 | 0.00 | 1.00 | 0.00 |
| 46.20 | 150.58 | 142.31 | 2.00 | 0.00 | 1.00 | 0.00 | 46.26 | 160.71 | 151.88 | 2.00 | 0.00 | 1.00 | 0.00 |
| 46.35 | 188.64 | 178.28 | 2.00 | 0.00 | 1.00 | 0.00 | 46.40 | 88.13 | 83.29 | 0.66 | 2.59 | 1.00 | 0.02 |
| 46.46 | 195.70 | 184.95 | 2.00 | 0.00 | 1.00 | 0.00 | 46.55 | 217.81 | 205.85 | 2.00 | 0.00 | 1.00 | 0.00 |
| 46.60 | 267.09 | 252.43 | 2.00 | 0.00 | 1.00 | 0.00 | 46.68 | 283.41 | 267.85 | 2.00 | 0.00 | 1.00 | 0.00 |
| 46.74 | 274.58 | 259.50 | 2.00 | 0.00 | 1.00 | 0.00 | 46.80 | 275.78 | 260.64 | 2.00 | 0.00 | 1.00 | 0.00 |
| 46.85 | 237.08 | 224.06 | 2.00 | 0.00 | 1.00 | 0.00 | 46.92 | 214.27 | 202.51 | 2.00 | 0.00 | 1.00 | 0.00 |
| 46.99 | 158.30 | 149.60 | 2.00 | 0.00 | 1.00 | 0.00 | 47.05 | 167.50 | 158.30 | 2.00 | 0.00 | 1.00 | 0.00 |
| 47.12 | 154.38 | 145.90 | 2.00 | 0.00 | 1.00 | 0.00 | 47.18 | 145.81 | 137.80 | 2.00 | 0.00 | 1.00 | 0.00 |
| 47.26 | 135.64 | 128.19 | 1.64 | 0.00 | 1.00 | 0.00 | 47.33 | 124.75 | 117.90 | 1.32 | 0.25 | 1.00 | 0.00 |
| 47.38 | 116.74 | 110.33 | 1.13 | 0.50 | 1.00 | 0.00 | 47.45 | 107.08 | 101.20 | 0.95 | 0.83 | 1.00 | 0.01 |
| 47.52 | 102.56 | 96.93 | 0.88 | 1.51 | 1.00 | 0.01 | 47.58 | 96.54 | 91.24 | 0.79 | 2.14 | 1.00 | 0.01 |
| 47.66 | 92.44 | 87.36 | 0.74 | 2.49 | 1.00 | 0.02 | 47.71 | 84.05 | 79.44 | 0.64 | 2.69 | 1.00 | 0.02 |
| 47.77 | 81.32 | 76.85 | 0.62 | 2.77 | 1.00 | 0.02 | 47.85 | 80.81 | 76.37 | 0.61 | 2.78 | 1.00 | 0.03 |
| 47.91 | 82.51 | 77.97 | 0.63 | 2.74 | 1.00 | 0.02 | 47.97 | 86.55 | 81.79 | 0.67 | 2.63 | 1.00 | 0.02 |
| 48.04 | 93.36 | 88.24 | 0.75 | 2.25 | 1.00 | 0.02 | 48.11 | 103.05 | 97.39 | 0.88 | 1.50 | 1.00 | 0.01 |
| 48.18 | 119.24 | 112.70 | 1.16 | 0.36 | 1.00 | 0.00 | 48.25 | 139.58 | 131.91 | 1.67 | 0.00 | 1.00 | 0.00 |
| 48.31 | 158.01 | 149.33 | 2.00 | 0.00 | 1.00 | 0.00 | 48.38 | 165.99 | 156.87 | 2.00 | 0.00 | 1.00 | 0.00 |
| 48.44 | 171.58 | 162.16 | 2.00 | 0.00 | 1.00 | 0.00 | 48.50 | 169.53 | 160.22 | 2.00 | 0.00 | 1.00 | 0.00 |
| 48.58 | 173.19 | 163.68 | 2.00 | 0.00 | 1.00 | 0.00 | 48.63 | 188.10 | 177.77 | 2.00 | 0.00 | 1.00 | 0.00 |
| 48.71 | 215.45 | 203.62 | 2.00 | 0.00 | 1.00 | 0.00 | 48.76 | 191.69 | 181.16 | 2.00 | 0.00 | 1.00 | 0.00 |
| 48.82 | 189.17 | 178.78 | 2.00 | 0.00 | 1.00 | 0.00 | 48.89 | 182.36 | 172.35 | 2.00 | 0.00 | 1.00 | 0.00 |
| 48.96 | 176.85 | 167.14 | 2.00 | 0.00 | 1.00 | 0.00 | 49.02 | 167.62 | 158.42 | 2.00 | 0.00 | 1.00 | 0.00 |
| 49.08 | 150.47 | 142.20 | 2.00 | 0.00 | 1.00 | 0.00 | 49.17 | 137.71 | 130.14 | 1.70 | 0.00 | 1.00 | 0.00 |
| 49.23 | 124.67 | 117.83 | 1.34 | 0.25 | 1.00 | 0.00 | 49.29 | 112.26 | 106.09 | 1.07 | 0.51 | 1.00 | 0.00 |
| 49.35 | 102.11 | 96.50 | 0.89 | 1.52 | 1.00 | 0.01 | 49.42 | 95.73 | 90.47 | 0.80 | 2.17 | 1.00 | 0.02 |
| 49.48 | 95.35 | 90.12 | 0.80 | 2.18 | 1.00 | 0.02 | 49.55 | 91.87 | 86.82 | 0.75 | 2.30 | 1.00 | 0.02 |
| 49.62 | 91.23 | 86.22 | 0.74 | 2.52 | 1.00 | 0.02 | 49.69 | 85.18 | 80.50 | 0.67 | 2.67 | 1.00 | 0.02 |
| 49.75 | 74.71 | 70.61 | 0.57 | 2.97 | 1.00 | 0.02 | 49.82 | 155.65 | 147.10 | 2.00 | 0.00 | 1.00 | 0.00 |
| 49.87 | 167.22 | 158.04 | 2.00 | 0.00 | 1.00 | 0.00 | 49.94 | 180.80 | 170.87 | 2.00 | 0.00 | 1.00 | 0.00 |
| 50.00 | 193.55 | 182.92 | 2.00 | 0.00 | 1.00 | 0.00 | 50.07 | 205.49 | 194.21 | 2.00 | 0.00 | 1.00 | 0.00 |

**Total estimated settlement: 1.19**

**Abbreviations**

$q_{c,1,mod}$: Equivalent dean sand cone resistance
$q_{c,1N,mod}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
$e_v$ (%): Post-liquefaction volumentric strain
DF: $e_v$ depth weighting factor
Settlement: Calculated settlement

**:: Lateral displacement index calculation ::**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 30.07 | 186.21 | 138.58 | 1.50 | 77.77 | 1.38 | 0.01 |
| 30.12 | 193.84 | 151.42 | 1.84 | 80.69 | 0.91 | 0.00 |
| 30.19 | 203.50 | 156.98 | 1.96 | 81.89 | 0.79 | 0.00 |
| 30.25 | 206.02 | 157.38 | 1.93 | 81.97 | 0.82 | 0.00 |
| 30.33 | 205.78 | 153.40 | 1.77 | 81.12 | 0.99 | 0.01 |
| 30.40 | 204.74 | 152.85 | 1.73 | 81.01 | 1.04 | 0.01 |
| 30.46 | 204.65 | 151.75 | 1.67 | 80.77 | 1.10 | 0.00 |
| 30.52 | 202.31 | 150.70 | 1.64 | 80.54 | 1.15 | 0.00 |
| 30.59 | 197.69 | 145.99 | 1.51 | 79.49 | 1.36 | 0.01 |
| 30.65 | 189.49 | 140.88 | 1.39 | 78.31 | 1.62 | 0.01 |
| 30.73 | 179.41 | 132.43 | 1.21 | 76.27 | 2.16 | 0.01 |
| 30.78 | 168.87 | 124.13 | 1.06 | 74.13 | 2.69 | 0.01 |
| 30.84 | 159.70 | 118.18 | 0.97 | 72.51 | 3.50 | 0.01 |
| 30.91 | 152.16 | 112.97 | 0.90 | 71.03 | 4.37 | 0.02 |
| 30.99 | 146.64 | 108.17 | 0.84 | 69.59 | 5.35 | 0.03 |
| 31.05 | 143.39 | 106.81 | 0.83 | 69.17 | 5.49 | 0.02 |
| 31.11 | 144.21 | 106.26 | 0.82 | 69.01 | 5.59 | 0.02 |
| 31.20 | 150.40 | 110.17 | 0.88 | 70.20 | 4.61 | 0.03 |
| 31.26 | 164.41 | 120.56 | 1.06 | 73.17 | 2.72 | 0.01 |
| 31.31 | 185.46 | 138.24 | 1.46 | 77.69 | 1.46 | 0.01 |
| 31.38 | 212.98 | 158.53 | 2.00 | 82.21 | 0.00 | 0.00 |
| 31.46 | 228.26 | 183.89 | 2.00 | 87.11 | 0.00 | 0.00 |
| 31.52 | 236.97 | 172.72 | 2.00 | 85.04 | 0.00 | 0.00 |
| 31.57 | 232.48 | 179.08 | 2.00 | 86.23 | 0.00 | 0.00 |
| 31.64 | 227.83 | 175.06 | 2.00 | 85.48 | 0.00 | 0.00 |
| 31.69 | 212.70 | 165.17 | 2.00 | 83.56 | 0.00 | 0.00 |
| 31.79 | 201.25 | 146.74 | 1.94 | 79.66 | 0.81 | 0.00 |
| 31.85 | 194.30 | 151.39 | 2.00 | 80.69 | 0.00 | 0.00 |
| 31.91 | 192.60 | 151.28 | 2.00 | 80.66 | 0.00 | 0.00 |
| 31.97 | 194.72 | 144.33 | 2.00 | 79.11 | 0.00 | 0.00 |
| 32.03 | 198.36 | 156.86 | 2.00 | 81.86 | 0.00 | 0.00 |
| 32.09 | 203.92 | 159.11 | 2.00 | 82.33 | 0.00 | 0.00 |
| 32.18 | 203.19 | 156.15 | 2.00 | 81.71 | 0.00 | 0.00 |
| 32.23 | 201.92 | 153.59 | 2.00 | 81.16 | 0.00 | 0.00 |
| 32.30 | 199.40 | 155.18 | 2.00 | 81.50 | 0.00 | 0.00 |
| 32.36 | 196.39 | 149.98 | 2.00 | 80.38 | 0.00 | 0.00 |
| 32.42 | 193.85 | 146.38 | 2.00 | 79.58 | 0.00 | 0.00 |
| 32.48 | 193.28 | 148.28 | 2.00 | 80.00 | 0.00 | 0.00 |
| 32.56 | 195.74 | 146.81 | 1.97 | 79.67 | 0.78 | 0.00 |
| 32.63 | 198.06 | 150.07 | 2.00 | 80.40 | 0.00 | 0.00 |
| 32.69 | 202.74 | 152.36 | 2.00 | 80.90 | 0.00 | 0.00 |
| 32.75 | 211.34 | 156.50 | 2.00 | 81.78 | 0.00 | 0.00 |
| 32.81 | 213.22 | 168.83 | 2.00 | 84.29 | 0.00 | 0.00 |
| 32.90 | 211.97 | 154.77 | 2.00 | 81.42 | 0.00 | 0.00 |
| 32.94 | 205.44 | 151.91 | 2.00 | 80.80 | 0.00 | 0.00 |
| 33.02 | 202.53 | 151.77 | 2.00 | 80.77 | 0.00 | 0.00 |
| 33.09 | 199.58 | 146.12 | 1.79 | 79.52 | 0.96 | 0.00 |
| 33.15 | 196.33 | 142.90 | 1.67 | 78.78 | 1.11 | 0.00 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 33.21 | 197.00 | 142.09 | 1.63 | 78.59 | 1.17 | 0.00 |
| 33.27 | 203.04 | 145.59 | 1.72 | 79.40 | 1.05 | 0.00 |
| 33.36 | 214.10 | 154.86 | 2.00 | 81.44 | 0.00 | 0.00 |
| 33.43 | 228.77 | 166.48 | 2.00 | 83.82 | 0.00 | 0.00 |
| 33.48 | 243.75 | 180.97 | 2.00 | 86.58 | 0.00 | 0.00 |
| 33.54 | 256.66 | 193.30 | 2.00 | 88.75 | 0.00 | 0.00 |
| 33.60 | 266.10 | 199.02 | 2.00 | 89.72 | 0.00 | 0.00 |
| 33.69 | 268.17 | 201.62 | 2.00 | 90.15 | 0.00 | 0.00 |
| 33.75 | 267.17 | 193.49 | 2.00 | 88.79 | 0.00 | 0.00 |
| 33.81 | 269.23 | 193.64 | 2.00 | 88.81 | 0.00 | 0.00 |
| 33.88 | 274.12 | 205.32 | 2.00 | 90.75 | 0.00 | 0.00 |
| 33.93 | 284.72 | 205.50 | 2.00 | 90.77 | 0.00 | 0.00 |
| 34.00 | 242.74 | 222.92 | 2.00 | 93.46 | 0.00 | 0.00 |
| 34.06 | 221.36 | 114.41 | 1.20 | 71.44 | 1.87 | 0.01 |
| 34.12 | 187.67 | 166.14 | 2.00 | 83.76 | 0.00 | 0.00 |
| 34.20 | 204.80 | 149.36 | 2.00 | 80.24 | 0.00 | 0.00 |
| 34.26 | 215.04 | 156.03 | 2.00 | 81.68 | 0.00 | 0.00 |
| 34.33 | 228.80 | 185.83 | 2.00 | 87.45 | 0.00 | 0.00 |
| 34.38 | 218.86 | 176.50 | 2.00 | 85.75 | 0.00 | 0.00 |
| 34.45 | 187.91 | 129.98 | 1.59 | 75.65 | 1.22 | 0.01 |
| 34.52 | 156.29 | 114.63 | 1.29 | 71.51 | 1.53 | 0.01 |
| 34.60 | 143.53 | 105.81 | 1.12 | 68.86 | 2.30 | 0.01 |
| 34.65 | 136.15 | 101.17 | 0.97 | 67.38 | 3.46 | 0.01 |
| 34.73 | 129.71 | 95.36 | 0.82 | 65.43 | 5.58 | 0.03 |
| 34.78 | 119.54 | 88.21 | 0.72 | 62.86 | 15.66 | 0.05 |
| 34.85 | 109.06 | 76.75 | 0.60 | 58.27 | 22.70 | 0.09 |
| 34.91 | 100.71 | 72.42 | 0.58 | 56.35 | 22.70 | 0.09 |
| 34.97 | 97.33 | 70.48 | 0.56 | 55.45 | 22.70 | 0.08 |
| 35.04 | 94.02 | 69.67 | 0.55 | 55.07 | 22.70 | 0.09 |
| 35.12 | 90.25 | 64.45 | 0.50 | 52.50 | 34.10 | 0.15 |
| 35.18 | 86.33 | 61.30 | 0.47 | 50.85 | 34.10 | 0.13 |
| 35.25 | 84.26 | 60.15 | 0.46 | 50.22 | 34.10 | 0.13 |
| 35.30 | 82.80 | 59.16 | 0.44 | 49.67 | 34.10 | 0.10 |
| 35.37 | 80.68 | 57.18 | 0.42 | 48.55 | 34.10 | 0.13 |
| 35.43 | 78.64 | 54.39 | 0.40 | 46.90 | 34.10 | 0.13 |
| 35.52 | 78.22 | 53.69 | 0.39 | 46.47 | 34.10 | 0.17 |
| 35.58 | 81.71 | 55.43 | 0.40 | 47.52 | 34.10 | 0.10 |
| 35.64 | 88.94 | 61.04 | 0.43 | 50.71 | 34.10 | 0.13 |
| 35.70 | 99.87 | 67.99 | 0.48 | 54.26 | 34.10 | 0.12 |
| 35.77 | 110.99 | 77.37 | 0.55 | 58.53 | 22.70 | 0.09 |
| 35.83 | 124.75 | 83.12 | 0.60 | 60.90 | 22.70 | 0.07 |
| 35.89 | 139.21 | 95.93 | 0.75 | 65.63 | 7.38 | 0.03 |
| 35.97 | 150.91 | 107.19 | 0.91 | 69.29 | 4.17 | 0.02 |
| 36.04 | 154.49 | 107.76 | 0.93 | 69.47 | 3.99 | 0.02 |
| 36.12 | 153.37 | 103.90 | 0.87 | 68.26 | 4.71 | 0.02 |
| 36.16 | 152.67 | 105.71 | 0.91 | 68.83 | 4.15 | 0.01 |
| 36.23 | 157.04 | 107.23 | 0.95 | 69.30 | 3.77 | 0.01 |
| 36.31 | 162.18 | 113.93 | 1.07 | 71.31 | 2.65 | 0.01 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 36.35 | 166.19 | 116.59 | 1.11 | 72.07 | 2.34 | 0.01 |
| 36.44 | 168.46 | 115.02 | 1.08 | 71.62 | 2.57 | 0.01 |
| 36.49 | 170.01 | 117.74 | 1.13 | 72.39 | 2.26 | 0.01 |
| 36.57 | 172.72 | 118.58 | 1.14 | 72.62 | 2.20 | 0.01 |
| 36.62 | 175.82 | 119.36 | 1.14 | 72.84 | 2.16 | 0.01 |
| 36.70 | 179.92 | 122.29 | 1.19 | 73.64 | 1.92 | 0.01 |
| 36.76 | 183.99 | 124.86 | 1.24 | 74.33 | 1.73 | 0.01 |
| 36.81 | 185.30 | 125.77 | 1.25 | 74.57 | 1.67 | 0.00 |
| 36.89 | 183.56 | 123.28 | 1.20 | 73.91 | 1.91 | 0.01 |
| 36.96 | 179.40 | 119.83 | 1.12 | 72.97 | 2.30 | 0.01 |
| 37.01 | 172.72 | 115.81 | 1.04 | 71.84 | 2.82 | 0.01 |
| 37.08 | 164.22 | 109.06 | 0.94 | 69.86 | 3.85 | 0.01 |
| 37.15 | 156.23 | 103.58 | 0.87 | 68.16 | 4.78 | 0.02 |
| 37.22 | 146.23 | 102.48 | 0.88 | 67.81 | 4.60 | 0.02 |
| 37.29 | 138.03 | 91.80 | 0.75 | 64.18 | 12.68 | 0.05 |
| 37.34 | 131.35 | 89.71 | 0.75 | 63.42 | 13.14 | 0.03 |
| 37.41 | 127.46 | 90.86 | 0.78 | 63.84 | 10.87 | 0.04 |
| 37.48 | 124.36 | 85.34 | 0.72 | 61.77 | 15.55 | 0.06 |
| 37.54 | 120.29 | 84.46 | 0.72 | 61.42 | 15.07 | 0.05 |
| 37.62 | 116.59 | 83.26 | 0.72 | 60.95 | 15.02 | 0.07 |
| 37.67 | 112.73 | 78.28 | 0.67 | 58.92 | 21.23 | 0.05 |
| 37.74 | 110.15 | 76.88 | 0.67 | 58.32 | 21.61 | 0.08 |
| 37.82 | 111.79 | 78.39 | 0.70 | 58.96 | 17.49 | 0.07 |
| 37.88 | 116.95 | 82.69 | 0.76 | 60.73 | 11.85 | 0.04 |
| 37.95 | 123.66 | 88.46 | 0.84 | 62.95 | 7.81 | 0.03 |
| 38.00 | 133.23 | 92.51 | 0.88 | 64.43 | 6.27 | 0.02 |
| 38.07 | 144.62 | 102.63 | 1.05 | 67.86 | 2.79 | 0.01 |
| 38.14 | 160.38 | 112.06 | 1.22 | 70.76 | 1.79 | 0.01 |
| 38.20 | 184.08 | 124.99 | 1.49 | 74.36 | 1.00 | 0.00 |
| 38.26 | 206.10 | 151.01 | 2.00 | 80.60 | 0.00 | 0.00 |
| 38.33 | 222.78 | 155.68 | 2.00 | 81.61 | 0.00 | 0.00 |
| 38.40 | 228.82 | 157.83 | 2.00 | 82.06 | 0.00 | 0.00 |
| 38.45 | 234.84 | 163.01 | 2.00 | 83.13 | 0.00 | 0.00 |
| 38.52 | 243.65 | 170.06 | 2.00 | 84.53 | 0.00 | 0.00 |
| 38.60 | 250.45 | 179.80 | 2.00 | 86.36 | 0.00 | 0.00 |
| 38.65 | 251.37 | 181.08 | 2.00 | 86.60 | 0.00 | 0.00 |
| 38.72 | 245.29 | 175.51 | 2.00 | 85.57 | 0.00 | 0.00 |
| 38.79 | 235.60 | 169.62 | 2.00 | 84.44 | 0.00 | 0.00 |
| 38.87 | 224.42 | 162.28 | 2.00 | 82.98 | 0.00 | 0.00 |
| 38.94 | 216.37 | 152.46 | 2.00 | 80.92 | 0.00 | 0.00 |
| 38.98 | 211.96 | 152.57 | 2.00 | 80.94 | 0.00 | 0.00 |
| 39.06 | 215.49 | 151.79 | 2.00 | 80.77 | 0.00 | 0.00 |
| 39.13 | 224.48 | 157.81 | 2.00 | 82.06 | 0.00 | 0.00 |
| 39.20 | 239.15 | 167.81 | 2.00 | 84.09 | 0.00 | 0.00 |
| 39.26 | 255.71 | 177.82 | 2.00 | 86.00 | 0.00 | 0.00 |
| 39.33 | 270.26 | 187.02 | 2.00 | 87.66 | 0.00 | 0.00 |
| 39.39 | 285.72 | 192.51 | 2.00 | 88.62 | 0.00 | 0.00 |
| 39.48 | 297.81 | 205.44 | 2.00 | 90.76 | 0.00 | 0.00 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 39.50 | 309.17 | 209.64 | 2.00 | 91.43 | 0.00 | 0.00 |
| 39.57 | 317.22 | 215.87 | 2.00 | 92.40 | 0.00 | 0.00 |
| 39.64 | 329.03 | 221.15 | 2.00 | 93.20 | 0.00 | 0.00 |
| 39.71 | 338.81 | 228.96 | 2.00 | 94.34 | 0.00 | 0.00 |
| 39.77 | 346.86 | 226.54 | 2.00 | 93.99 | 0.00 | 0.00 |
| 39.84 | 349.14 | 229.08 | 2.00 | 94.36 | 0.00 | 0.00 |
| 39.91 | 344.50 | 230.73 | 2.00 | 94.60 | 0.00 | 0.00 |
| 39.97 | 324.54 | 220.24 | 2.00 | 93.06 | 0.00 | 0.00 |
| 40.03 | 271.93 | 195.68 | 2.00 | 89.16 | 0.00 | 0.00 |
| 40.10 | 247.02 | 127.33 | 1.45 | 74.97 | 1.10 | 0.00 |
| 40.18 | 233.17 | 172.43 | 2.00 | 84.98 | 0.00 | 0.00 |
| 40.23 | 248.96 | 164.22 | 2.00 | 83.37 | 0.00 | 0.00 |
| 40.30 | 237.21 | 157.91 | 2.00 | 82.08 | 0.00 | 0.00 |
| 40.38 | 224.39 | 146.11 | 2.00 | 79.52 | 0.00 | 0.00 |
| 40.42 | 209.96 | 139.26 | 1.80 | 77.93 | 0.95 | 0.00 |
| 40.50 | 197.96 | 130.09 | 1.55 | 75.68 | 1.30 | 0.00 |
| 40.57 | 187.30 | 123.32 | 1.39 | 73.92 | 1.23 | 0.00 |
| 40.62 | 180.86 | 119.67 | 1.34 | 72.93 | 1.38 | 0.00 |
| 40.70 | 179.01 | 120.06 | 1.40 | 73.03 | 1.22 | 0.00 |
| 40.75 | 179.95 | 123.84 | 1.57 | 74.06 | 0.87 | 0.00 |
| 40.82 | 182.59 | 125.87 | 1.70 | 74.60 | 0.70 | 0.00 |
| 40.89 | 187.48 | 128.84 | 1.82 | 75.37 | 0.93 | 0.00 |
| 40.96 | 195.68 | 135.28 | 2.00 | 76.97 | 0.00 | 0.00 |
| 41.01 | 211.24 | 141.63 | 2.00 | 78.49 | 0.00 | 0.00 |
| 41.08 | 240.12 | 157.45 | 2.00 | 81.98 | 0.00 | 0.00 |
| 41.15 | 267.37 | 190.56 | 2.00 | 88.28 | 0.00 | 0.00 |
| 41.22 | 288.54 | 193.17 | 2.00 | 88.73 | 0.00 | 0.00 |
| 41.28 | 293.74 | 197.82 | 2.00 | 89.52 | 0.00 | 0.00 |
| 41.36 | 297.29 | 198.54 | 2.00 | 89.64 | 0.00 | 0.00 |
| 41.41 | 298.51 | 199.21 | 2.00 | 89.75 | 0.00 | 0.00 |
| 41.49 | 297.84 | 199.54 | 2.00 | 89.80 | 0.00 | 0.00 |
| 41.54 | 294.38 | 197.30 | 2.00 | 89.43 | 0.00 | 0.00 |
| 41.61 | 290.06 | 192.89 | 2.00 | 88.68 | 0.00 | 0.00 |
| 41.67 | 285.11 | 192.02 | 2.00 | 88.53 | 0.00 | 0.00 |
| 41.75 | 282.38 | 188.55 | 2.00 | 87.93 | 0.00 | 0.00 |
| 41.81 | 279.91 | 189.01 | 2.00 | 88.01 | 0.00 | 0.00 |
| 41.87 | 275.90 | 188.79 | 2.00 | 87.97 | 0.00 | 0.00 |
| 41.94 | 270.95 | 181.81 | 2.00 | 86.73 | 0.00 | 0.00 |
| 42.01 | 266.42 | 179.76 | 2.00 | 86.36 | 0.00 | 0.00 |
| 42.06 | 265.51 | 179.65 | 2.00 | 86.34 | 0.00 | 0.00 |
| 42.15 | 264.85 | 179.65 | 2.00 | 86.34 | 0.00 | 0.00 |
| 42.20 | 264.64 | 177.51 | 2.00 | 85.94 | 0.00 | 0.00 |
| 42.26 | 261.87 | 178.47 | 2.00 | 86.12 | 0.00 | 0.00 |
| 42.32 | 258.65 | 173.54 | 2.00 | 85.19 | 0.00 | 0.00 |
| 42.40 | 254.03 | 171.90 | 2.00 | 84.88 | 0.00 | 0.00 |
| 42.46 | 250.75 | 170.19 | 2.00 | 84.55 | 0.00 | 0.00 |
| 42.53 | 249.02 | 167.11 | 2.00 | 83.95 | 0.00 | 0.00 |
| 42.59 | 250.84 | 169.47 | 2.00 | 84.41 | 0.00 | 0.00 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 42.68 | 252.33 | 177.78 | 2.00 | 85.99 | 0.00 | 0.00 |
| 42.73 | 259.07 | 177.43 | 2.00 | 85.93 | 0.00 | 0.00 |
| 42.78 | 265.32 | 189.71 | 2.00 | 88.14 | 0.00 | 0.00 |
| 42.86 | 275.07 | 193.49 | 2.00 | 88.79 | 0.00 | 0.00 |
| 42.92 | 269.63 | 198.03 | 2.00 | 89.55 | 0.00 | 0.00 |
| 42.99 | 269.47 | 176.65 | 2.00 | 85.78 | 0.00 | 0.00 |
| 43.06 | 276.48 | 192.03 | 2.00 | 88.54 | 0.00 | 0.00 |
| 43.12 | 294.55 | 209.37 | 2.00 | 91.39 | 0.00 | 0.00 |
| 43.18 | 307.64 | 208.14 | 2.00 | 91.19 | 0.00 | 0.00 |
| 43.25 | 314.78 | 210.25 | 2.00 | 91.53 | 0.00 | 0.00 |
| 43.32 | 328.91 | 215.81 | 2.00 | 92.39 | 0.00 | 0.00 |
| 43.38 | 332.86 | 233.83 | 2.00 | 95.04 | 0.00 | 0.00 |
| 43.44 | 320.28 | 218.36 | 2.00 | 92.78 | 0.00 | 0.00 |
| 43.51 | 285.35 | 193.01 | 2.00 | 88.70 | 0.00 | 0.00 |
| 43.59 | 254.15 | 165.20 | 2.00 | 83.57 | 0.00 | 0.00 |
| 43.64 | 232.47 | 157.86 | 2.00 | 82.07 | 0.00 | 0.00 |
| 43.71 | 220.99 | 149.82 | 2.00 | 80.34 | 0.00 | 0.00 |
| 43.78 | 208.29 | 141.20 | 2.00 | 78.39 | 0.00 | 0.00 |
| 43.85 | 193.92 | 129.66 | 1.88 | 75.57 | 0.87 | 0.00 |
| 43.90 | 180.19 | 118.46 | 1.53 | 72.59 | 0.93 | 0.00 |
| 43.98 | 170.32 | 112.20 | 1.38 | 70.80 | 1.26 | 0.00 |
| 44.03 | 164.82 | 109.38 | 1.32 | 69.96 | 1.44 | 0.00 |
| 44.10 | 159.50 | 107.40 | 1.28 | 69.36 | 1.57 | 0.00 |
| 44.18 | 155.31 | 101.02 | 1.13 | 67.34 | 2.22 | 0.01 |
| 44.23 | 152.27 | 100.72 | 1.14 | 67.24 | 2.19 | 0.00 |
| 44.30 | 152.97 | 101.35 | 1.17 | 67.44 | 2.05 | 0.00 |
| 44.37 | 156.95 | 103.06 | 1.21 | 68.00 | 1.84 | 0.01 |
| 44.44 | 159.50 | 109.37 | 1.37 | 69.96 | 1.30 | 0.00 |
| 44.50 | 166.49 | 106.57 | 1.29 | 69.10 | 1.52 | 0.00 |
| 44.58 | 171.19 | 118.01 | 1.63 | 72.47 | 0.78 | 0.00 |
| 44.64 | 178.91 | 119.53 | 1.68 | 72.89 | 0.71 | 0.00 |
| 44.70 | 184.80 | 122.84 | 1.77 | 73.79 | 0.61 | 0.00 |
| 44.75 | 185.26 | 129.75 | 2.00 | 75.60 | 0.00 | 0.00 |
| 44.84 | 178.55 | 119.71 | 1.66 | 72.94 | 0.73 | 0.00 |
| 44.90 | 166.37 | 108.75 | 1.38 | 69.77 | 1.26 | 0.00 |
| 44.95 | 158.80 | 104.72 | 1.30 | 68.52 | 1.51 | 0.00 |
| 45.03 | 156.42 | 104.41 | 1.29 | 68.43 | 1.54 | 0.00 |
| 45.09 | 155.78 | 103.39 | 1.24 | 68.10 | 1.70 | 0.00 |
| 45.15 | 158.24 | 102.15 | 1.20 | 67.70 | 1.90 | 0.00 |
| 45.23 | 163.36 | 108.29 | 1.34 | 69.63 | 1.37 | 0.00 |
| 45.30 | 170.98 | 113.54 | 1.49 | 71.19 | 1.01 | 0.00 |
| 45.36 | 179.31 | 118.30 | 1.64 | 72.55 | 0.76 | 0.00 |
| 45.43 | 186.02 | 126.14 | 1.92 | 74.67 | 0.49 | 0.00 |
| 45.49 | 189.66 | 127.78 | 1.98 | 75.09 | 0.78 | 0.00 |
| 45.56 | 190.66 | 125.72 | 1.90 | 74.56 | 0.50 | 0.00 |
| 45.61 | 188.32 | 127.81 | 1.97 | 75.10 | 0.79 | 0.00 |
| 45.69 | 187.11 | 121.99 | 1.74 | 73.56 | 0.64 | 0.00 |
| 45.74 | 184.53 | 122.00 | 1.72 | 73.56 | 0.66 | 0.00 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 45.82 | 184.41 | 120.77 | 1.66 | 73.23 | 0.74 | 0.00 |
| 45.88 | 183.23 | 120.22 | 1.63 | 73.08 | 0.78 | 0.00 |
| 45.94 | 182.65 | 118.45 | 1.58 | 72.59 | 0.85 | 0.00 |
| 46.00 | 183.95 | 118.92 | 1.59 | 72.72 | 0.83 | 0.00 |
| 46.09 | 186.93 | 122.83 | 1.73 | 73.79 | 0.66 | 0.00 |
| 46.14 | 190.51 | 125.15 | 1.83 | 74.41 | 0.55 | 0.00 |
| 46.20 | 195.47 | 128.85 | 2.00 | 75.37 | 0.00 | 0.00 |
| 46.26 | 207.22 | 136.88 | 2.00 | 77.36 | 0.00 | 0.00 |
| 46.35 | 176.33 | 157.57 | 2.00 | 82.01 | 0.00 | 0.00 |
| 46.40 | 192.58 | 64.98 | 0.66 | 52.77 | 34.10 | 0.05 |
| 46.46 | 217.33 | 170.89 | 2.00 | 84.69 | 0.00 | 0.00 |
| 46.55 | 306.31 | 197.32 | 2.00 | 89.43 | 0.00 | 0.00 |
| 46.60 | 349.90 | 244.00 | 2.00 | 96.44 | 0.00 | 0.00 |
| 46.68 | 371.04 | 257.83 | 2.00 | 98.26 | 0.00 | 0.00 |
| 46.74 | 368.00 | 247.69 | 2.00 | 96.94 | 0.00 | 0.00 |
| 46.80 | 341.06 | 246.94 | 2.00 | 96.84 | 0.00 | 0.00 |
| 46.85 | 307.16 | 208.28 | 2.00 | 91.22 | 0.00 | 0.00 |
| 46.92 | 249.14 | 182.75 | 2.00 | 86.90 | 0.00 | 0.00 |
| 46.99 | 212.93 | 127.18 | 2.00 | 74.94 | 0.00 | 0.00 |
| 47.05 | 185.69 | 134.24 | 2.00 | 76.72 | 0.00 | 0.00 |
| 47.12 | 181.83 | 123.76 | 2.00 | 74.04 | 0.00 | 0.00 |
| 47.18 | 172.71 | 117.46 | 2.00 | 72.31 | 0.00 | 0.00 |
| 47.26 | 165.79 | 110.66 | 1.64 | 70.34 | 0.77 | 0.00 |
| 47.33 | 160.11 | 103.91 | 1.32 | 68.27 | 1.43 | 0.00 |
| 47.38 | 154.28 | 99.23 | 1.13 | 66.75 | 2.23 | 0.00 |
| 47.45 | 149.20 | 92.14 | 0.95 | 64.30 | 4.45 | 0.01 |
| 47.52 | 143.46 | 88.64 | 0.88 | 63.02 | 6.30 | 0.01 |
| 47.58 | 139.10 | 83.91 | 0.79 | 61.21 | 9.97 | 0.02 |
| 47.66 | 133.06 | 80.76 | 0.74 | 59.95 | 13.52 | 0.03 |
| 47.71 | 128.47 | 73.76 | 0.64 | 56.95 | 22.70 | 0.03 |
| 47.77 | 125.72 | 71.99 | 0.62 | 56.15 | 22.70 | 0.04 |
| 47.85 | 127.39 | 72.25 | 0.61 | 56.27 | 22.70 | 0.05 |
| 47.91 | 131.89 | 74.26 | 0.63 | 57.18 | 22.70 | 0.04 |
| 47.97 | 139.63 | 78.36 | 0.67 | 58.95 | 20.54 | 0.03 |
| 48.04 | 151.08 | 85.11 | 0.75 | 61.68 | 12.50 | 0.02 |
| 48.11 | 166.70 | 94.38 | 0.88 | 65.09 | 4.56 | 0.01 |
| 48.18 | 185.38 | 108.76 | 1.16 | 69.77 | 2.07 | 0.00 |
| 48.25 | 205.46 | 126.04 | 1.67 | 74.64 | 0.73 | 0.00 |
| 48.31 | 222.59 | 141.79 | 2.00 | 78.53 | 0.00 | 0.00 |
| 48.38 | 236.35 | 149.24 | 2.00 | 80.22 | 0.00 | 0.00 |
| 48.44 | 244.16 | 155.22 | 2.00 | 81.51 | 0.00 | 0.00 |
| 48.50 | 250.90 | 154.25 | 2.00 | 81.31 | 0.00 | 0.00 |
| 48.58 | 261.08 | 158.19 | 2.00 | 82.14 | 0.00 | 0.00 |
| 48.63 | 281.82 | 172.21 | 2.00 | 84.94 | 0.00 | 0.00 |
| 48.71 | 286.17 | 196.99 | 2.00 | 89.38 | 0.00 | 0.00 |
| 48.76 | 279.79 | 172.71 | 2.00 | 85.04 | 0.00 | 0.00 |
| 48.82 | 257.71 | 168.30 | 2.00 | 84.18 | 0.00 | 0.00 |
| 48.89 | 246.22 | 160.47 | 2.00 | 82.61 | 0.00 | 0.00 |

**:: Estimation of post-earthquake lateral Displacements :: (continued)**

| Depth (ft) | $q_t$ (tsf) | $q_{c,1N}$ | FS | $D_r$ | $Gamma_{max}$ (%) | Lat. disp. (in) |
|---|---|---|---|---|---|---|
| 48.96 | 234.14 | 154.50 | 2.00 | 81.36 | 0.00 | 0.00 |
| 49.02 | 219.28 | 145.61 | 2.00 | 79.40 | 0.00 | 0.00 |
| 49.08 | 202.82 | 129.76 | 2.00 | 75.60 | 0.00 | 0.00 |
| 49.17 | 186.08 | 118.68 | 1.70 | 72.65 | 0.69 | 0.00 |
| 49.23 | 172.47 | 107.81 | 1.34 | 69.48 | 1.39 | 0.00 |
| 49.29 | 159.77 | 97.61 | 1.07 | 66.20 | 2.65 | 0.00 |
| 49.35 | 148.81 | 88.84 | 0.89 | 63.10 | 5.87 | 0.01 |
| 49.42 | 141.73 | 82.99 | 0.80 | 60.85 | 9.50 | 0.02 |
| 49.48 | 136.23 | 82.46 | 0.80 | 60.64 | 9.74 | 0.01 |
| 49.55 | 132.68 | 78.46 | 0.75 | 58.99 | 12.62 | 0.02 |
| 49.62 | 131.01 | 77.21 | 0.74 | 58.46 | 13.21 | 0.02 |
| 49.69 | 134.20 | 75.71 | 0.67 | 57.81 | 20.61 | 0.03 |
| 49.75 | 143.22 | 70.47 | 0.57 | 55.45 | 22.70 | 0.03 |
| 49.82 | 154.55 | 147.10 | 2.00 | 79.74 | 0.00 | 0.00 |
| 49.87 | 167.88 | 158.04 | 2.00 | 82.11 | 0.00 | 0.00 |
| 49.94 | 180.52 | 170.87 | 2.00 | 84.68 | 0.00 | 0.00 |
| 50.00 | 193.27 | 182.92 | 2.00 | 86.93 | 0.00 | 0.00 |
| 50.07 | 201.50 | 194.21 | 2.00 | 88.91 | 0.00 | 0.00 |

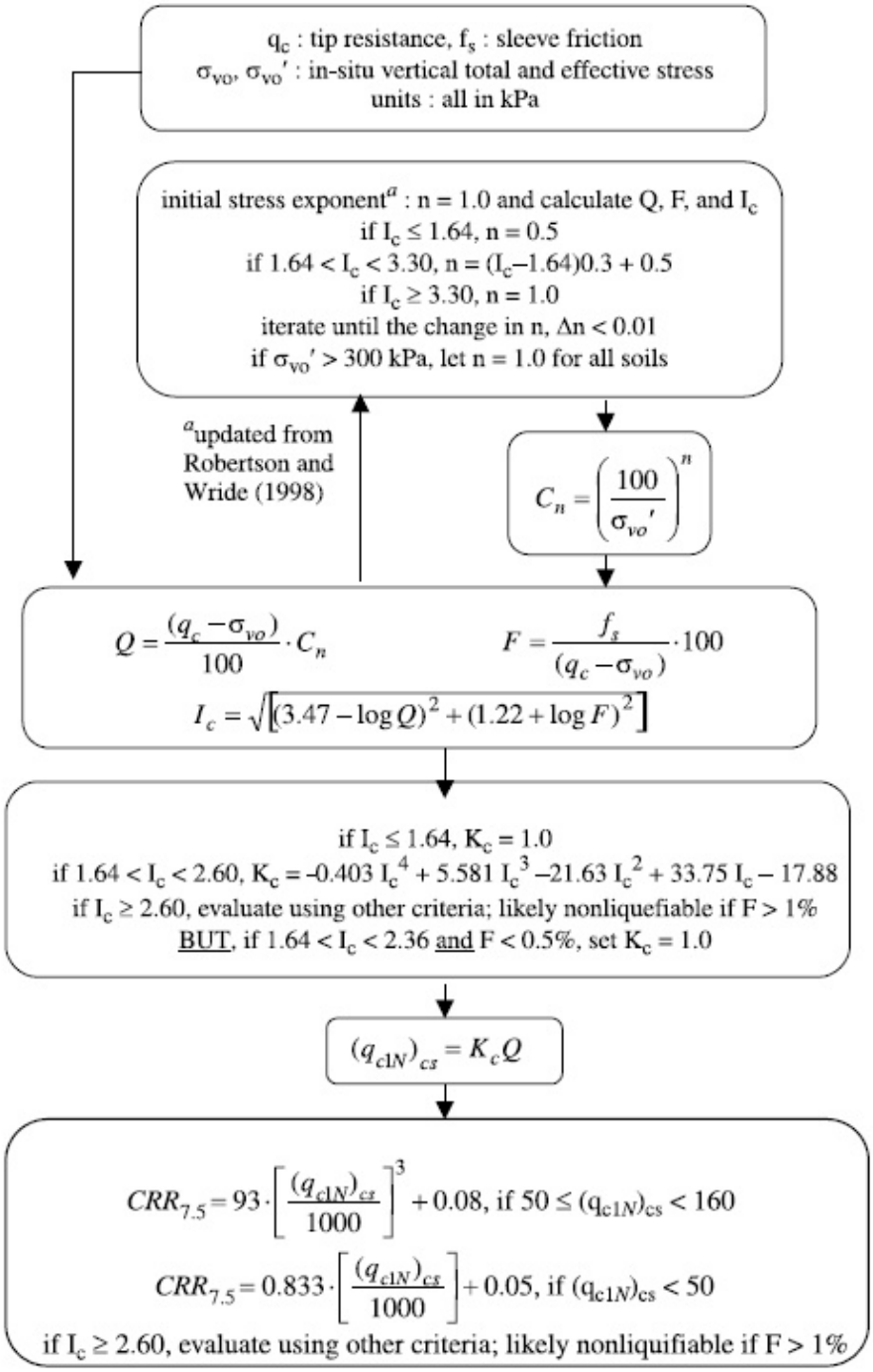
**Total estimated displacement: 3.64**

**Abbreviations**

$q_t$: Total cone resistance
$q_{c,1N}$: Adjusted cone resistance to an effective overburden stress of 1 atm
FS: Calculated factor of safety against liquefaction
$D_r$: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

## Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

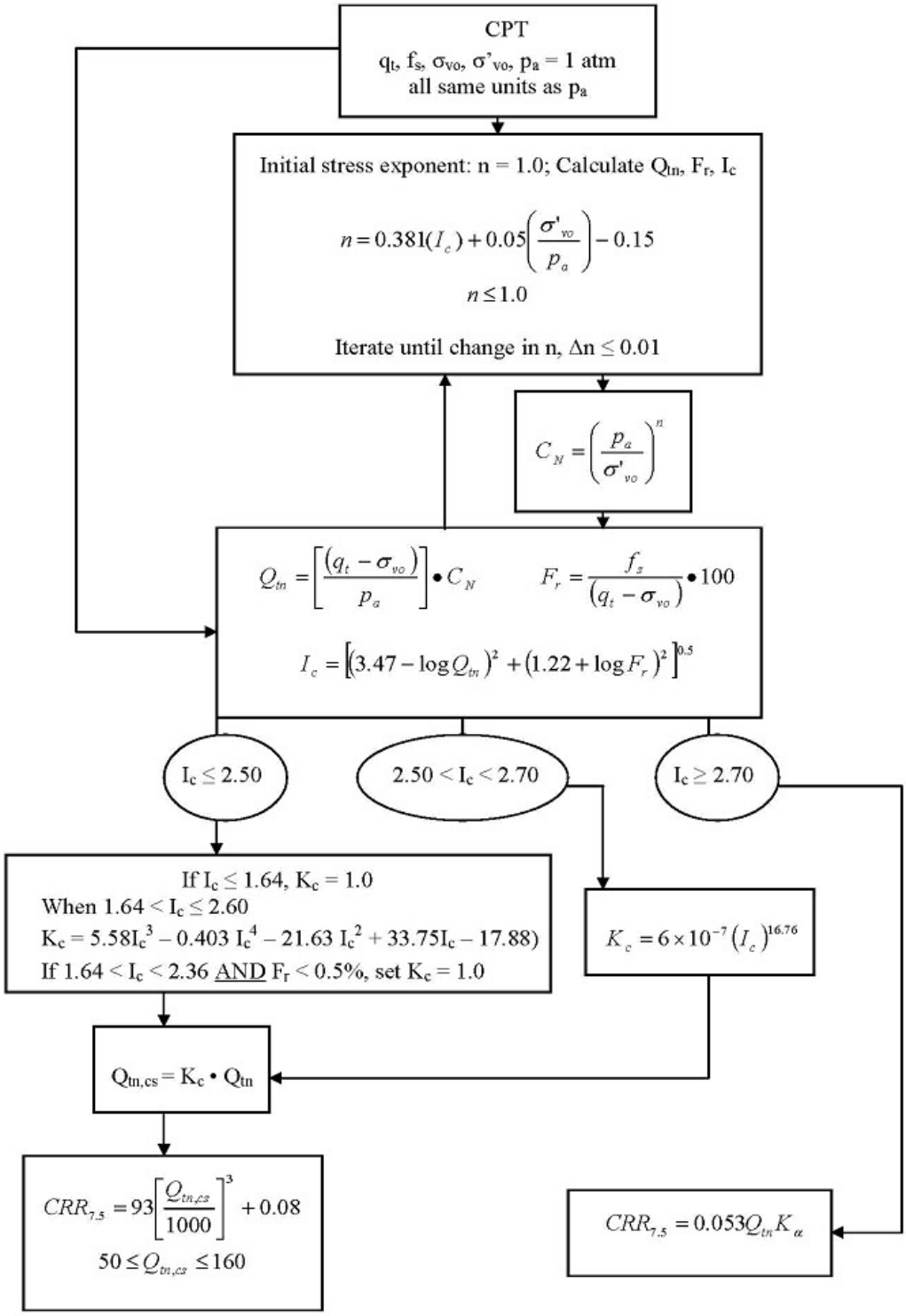
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:




[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

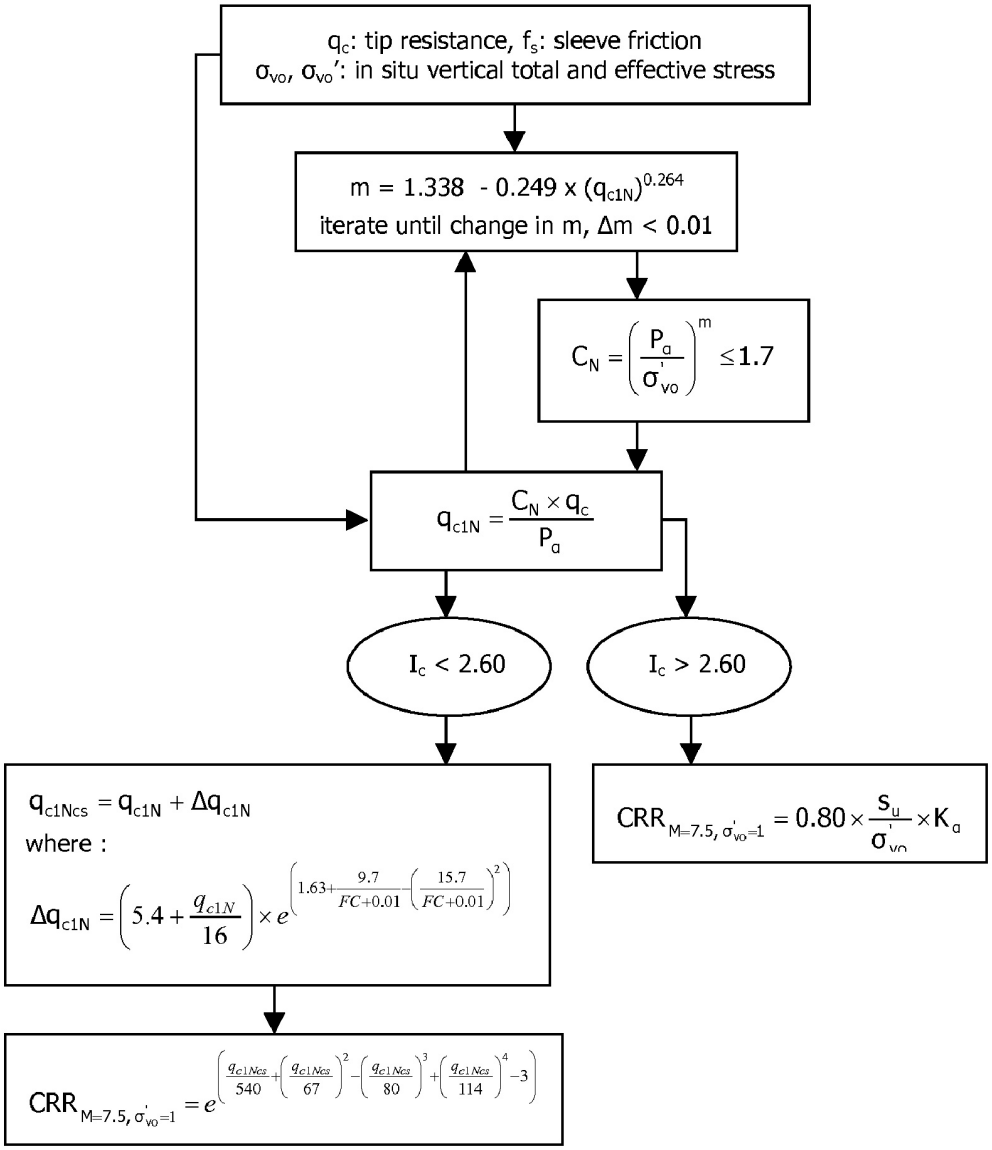
## Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

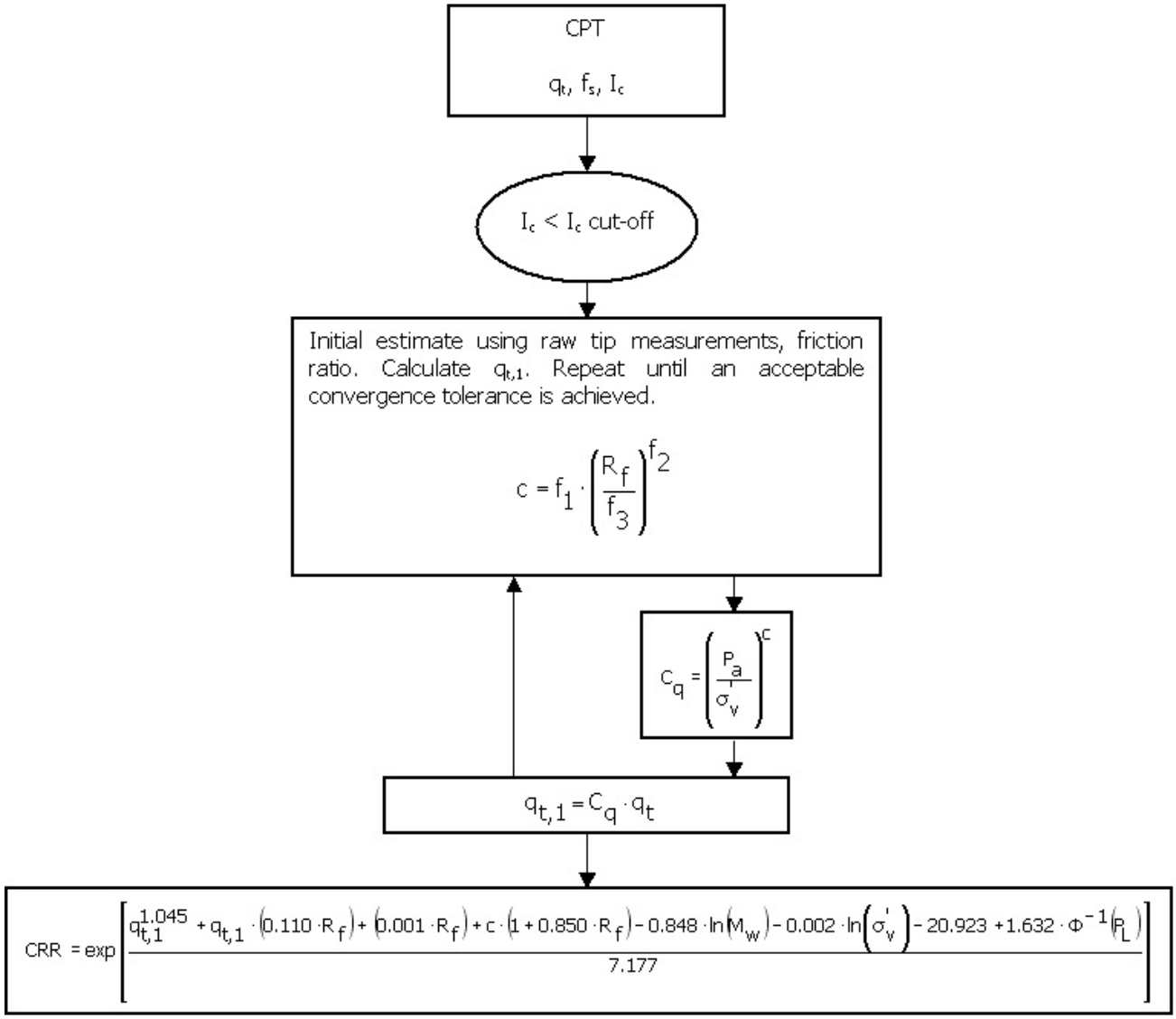



[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

**Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)**



**Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)**



**Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)**

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65\frac{\sigma_v}{\sigma'_v}\frac{a_{\max}}{g}r_d\frac{1}{MSF}\frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z)+\beta(z)\cdot M\right]$$

$$\alpha(z) = -1.012-1.126\sin\left(\frac{z}{11.73}+5.133\right)$$

$$\beta(z) = 0.106+0.118\sin\left(\frac{z}{11.28}+5.142\right)$$

$$K_\sigma = 1-C_\sigma\ln\left(\frac{\sigma'_v}{P_a}\right)\le 1.1$$

$$C_\sigma = \frac{1}{37.3-8.27\left(q_{c1Ncs}\right)^{0.264}}\le 0.3$$

$$MSF = 1+\left(MSF_{max}-1\right)\left(8.64\exp\left(\frac{-M}{4}\right)-1.325\right)$$

$$MSF_{max} = 1.09+\left(\frac{q_{c1Ncs}}{180}\right)^3\le 2.2$$

$\sigma'_v$ *and* $\sigma_v$ *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113}+\left(\frac{q_{c1Ncs}}{1000}\right)^2-\left(\frac{q_{c1Ncs}}{140}\right)^3+\left(\frac{q_{c1Ncs}}{137}\right)^4-2.80\right)$$

$$q_{c1Ncs} = q_{c1N}+\Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9+\frac{q_{c1N}}{14.6}\right)\exp\left(1.63-\frac{9.7}{FC+2}-\left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne}\frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m\le 1.7$$

$$m = 1.338-0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264\le m\le 0.782$$

$$FC = 80\left(I_C+C_{FC}\right)-137 \quad with \quad 0\%\le FC\le 100\%$$

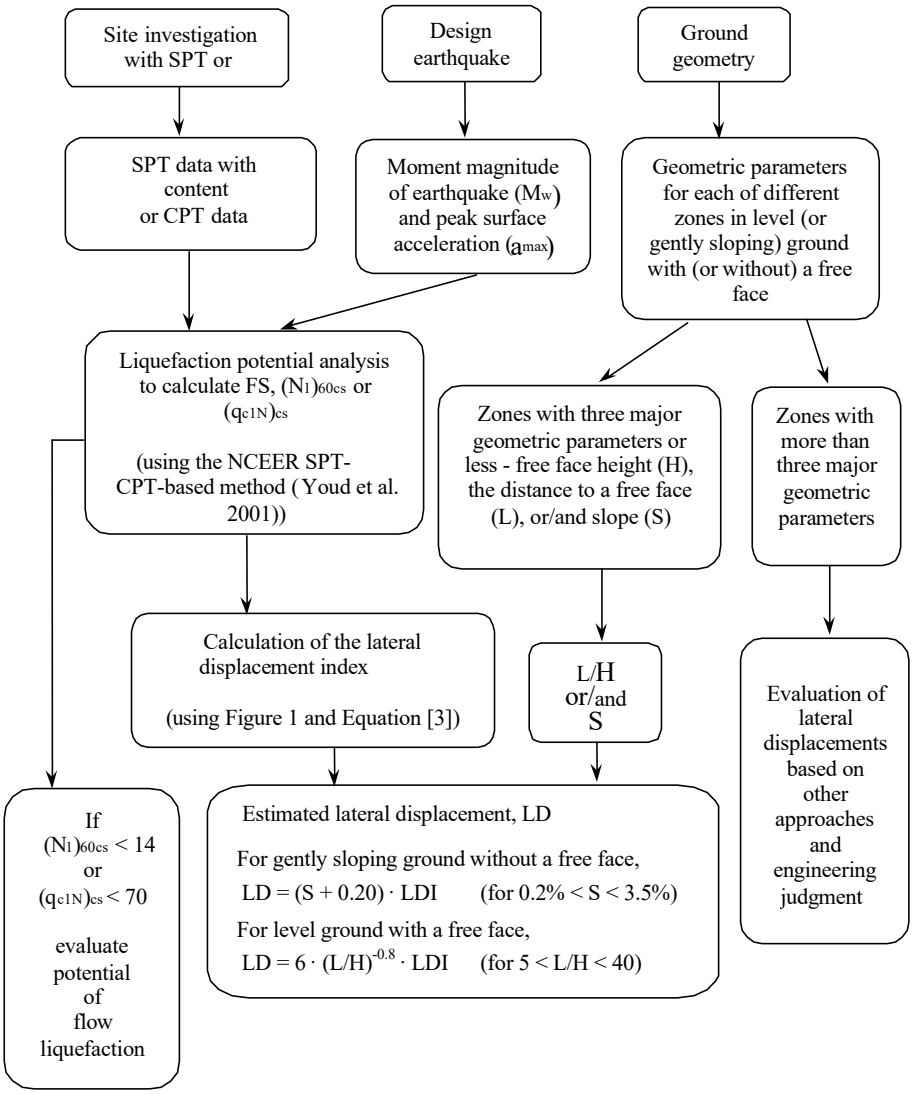
$$I_c = \left[\left(3.47-\log(Q)\right)^2+\left(1.22+\log(F)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c-\sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with\; 0.5\le n\le 1.0 \; per\; Robertson\;\&\;Wride\,(1998)$$

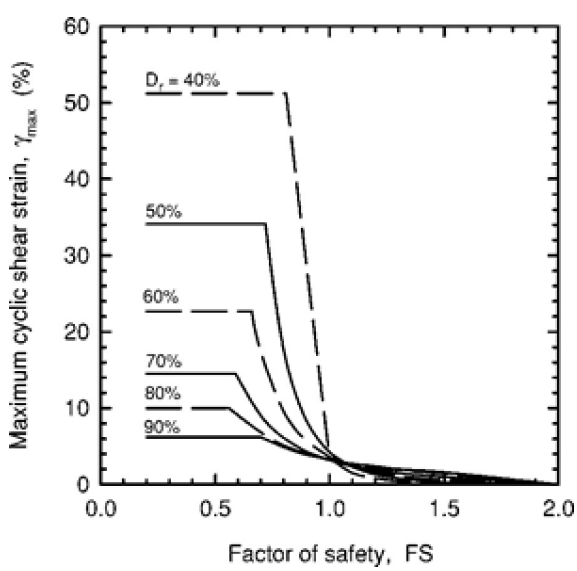
$$F = \left(\frac{f_s}{q_c-\sigma_{vc}}\right)\cdot 100\%$$

$\sigma'_v$ *at time of CPT sounding*

## Procedure for the evaluation of liquefaction-induced lateral spreading displacements




[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach




[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

**Procedure for the estimation of seismic induced settlements in dry sands**

**Average shear stress, $\tau_{av}$**

$$\tau_{av} = CSR^{*} \cdot \sigma_{v0}' = 0.65 \cdot \frac{a_{max}}{g} \cdot \sigma_{v0} \cdot r_a$$

**Estimate small shear strain modulus, $G_0$**

$$G_0 = 0.0188 \cdot \left[10^{(0.55 I_c + 1.68)}\right] \cdot (q_t - \sigma_v)$$

**Estimate shear strain amplitude, $\gamma$**

**(based on Pradel (1998))**

$$\gamma = \left[\frac{1 + \alpha \cdot e^{bR}}{1 + \alpha}\right] \cdot R \cdot 100 \ (\%)$$

$$R = \frac{\tau_{av}}{G_0} \text{ (Note } \tau_{av} \text{ and } G_0 \text{ same units)}$$

$$\alpha = 0.0389 \cdot \left(\frac{\sigma_v}{p_a}\right) + 0.124$$

$$b = 6400 \cdot \left(\frac{\sigma_v}{p_a}\right)$$

**Estimate volumetric strain in 15 cycles**

$$\varepsilon_{vol(15)} = \gamma \cdot \left[\frac{(N_1)_{60,cs}}{20}\right]^{-1.20}$$

$$(N_1)_{60,cs} = \frac{Q_{tn,cs}}{8.5 \cdot \left[1 - \frac{I_c}{4.6}\right]}$$

**Volumetric strain in design earthquake**

$$\Sigma_{vol} = \varepsilon_{vol(15)} \cdot \left[\frac{N_c}{15}\right]^{0.45}$$

$$N_c = (M - 4)^{2.17}$$

**Seismic settlement, s**

$$s = 2 \cdot \int_0^{GWT} \Sigma_{vol} \cdot dz$$

Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

## Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

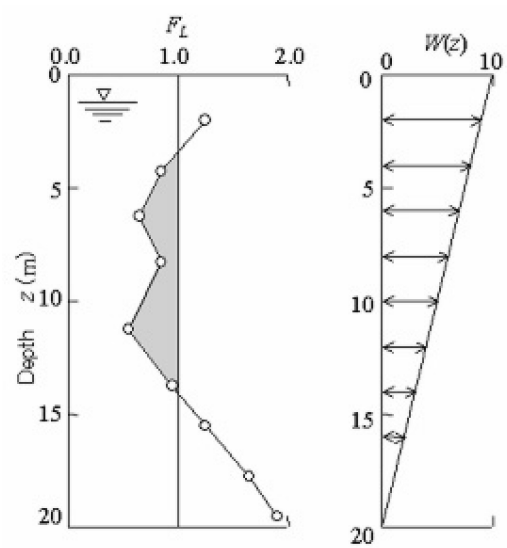
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\textbf{LPI} = \int_0^{20} (10 - 0{,}5_z) \times F_L \times d_z$$

where:
$F_L$ = 1 - F.S. when F.S. less than 1
$F_L$ = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high




**Graphical presentation of the LPI calculation procedure**

### Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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# Appendix E

# APPENDIX E

## RECOMMENDED EARTHWORK SPECIFICATIONS

The following specifications are recommended to provide a basis for quality control during the placement of compacted fill or backfill, as applicable.

1. Areas on which compacted fill will be placed shall be observed by Allan E. Seward Engineering Geology, Inc. (AESEGI) prior to the placement of fill.
2. All drainage devices shall be properly installed and observed by AESEGI and/or the owner's representative(s) prior to placement of backfill.
3. Fill soils shall consist of imported soils or on-site soils which are free of organics, cobbles, and deleterious material, provided that each material is approved by AESEGI. AESEGI shall evaluate and/or test the import material for its conformance with the report recommendations prior to its delivery to the site. The contractor shall notify AESEGI at least 72 hours prior to importing material to the site
4. The thickness of the controlled lifts in which Fill is placed shall be compatible with the type of compaction equipment used. The fill materials shall be brought to Optimum Moisture Content or above, thoroughly mixed during spreading to obtain a near uniform water content and a uniform blend of materials, and then placed in lifts with a pre-compaction thickness not exceeding 8 inches. Each lift shall be compacted to the specified percentage of Maximum Dry Density determined in accordance with ASTM Test Method D1557. Density testing shall be performed by AESEGI to verify relative compaction. The contractor shall provide proper access and level areas for testing.
5. Rocks or rock fragments less than eight (8) inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets. However, rocks larger than four (4) inches in dimension shall not be placed within three (3) ft of finish grade.
6. Rocks greater than eight (8) inches in largest dimension shall be taken offsite, or placed in areas designated by the Geotechnical Engineer to be suitable for rock disposal.
7. Where space limitations do not allow for conventional fill compaction operations, special backfill materials and procedures may be required. Pea gravel or other select fill can be used in areas of limited space. A sand and Portland Cement slurry (2 sacks per cubic-yard of slurry mix) shall be used in limited space areas for shallow backfill near final pad grade, and pea gravel shall be placed in deeper backfill near drainage systems.
8. AESEGI shall observe the placement of fill and conduct in-place field density tests on the compacted fill in order to check adequacy of in-situ water content and relative compaction. Where measured in-situ density of compacted fill soil is lower than the required relative compaction, the soil shall be water-conditioned and recompacted until adequate relative

**APPENDIX E**

compaction is achieved.

9. The Contractor shall achieve with the specified relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills, as set forth in the specifications for compacted fill. This may be achieved either by overbuilding the slope and cutting back as necessary, by direct compaction of the slope face with suitable equipment, or by other procedures which produce the required result.

10. Any abandoned underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or others not discovered prior to grading are to be removed or treated to the satisfaction of the Geotechnical Engineer and/or the controlling agency for the project.

11. The Contractor shall have suitable and sufficient equipment during a particular operation to handle the volume of fill being placed. When necessary, fill placement equipment shall be shut down temporarily in order to permit proper compaction of fill, correction of deficient areas, or to facilitate required field testing.

12. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

13. Final reports shall be submitted after completion of earthwork and after the Geotechnical Engineer and Engineering Geologist have finished their observations of the work. No additional excavation or filling shall be performed without prior notification to the Geotechnical Engineer and/or Engineering Geologist.

14. Whenever the words "supervision", "inspection", or "control" are used, they shall mean <u>observation</u> of the work and/or testing of the compacted fill by AESEGI to assess whether substantial compliance with plans, specifications and design concepts has been achieved. However, these words do not refer to direction by AESEGI of the actual work of the Contractor or the Contractor's workers.

# APPENDIX E

## Minimum Foundation and Slab Recommendations for Expansive Soils

### Minimum Design Parameters for Footing Foundations

| Expansion potential Classification | Expansion Index (UBC) | Footing Embedment (inches) | | | | Reinforcement Of Continuous Footings |
|---|---|---|---|---|---|---|
| | | One-story and Two-Story structures | | Three-Story structures | | |
| | | Perimeter locations | Interior locations | Perimeter locations | Interior locations | |
| Very Low | 0 to 20 | 18 | 12 | 24 | 18 | Per structural requirements |
| Low | 21 to 50 | 18 | 12 | 24 | 18 | Two # 4 Rebars, top and bottom |
| Medium | 51 to 90 | 24 | 18 | 30 | 24 | |
| High | 91 to 130 | 30 | 18 | 36 | 30 | |

- Width of continuous footings shall be at least 12 inches (one-story structures); 15 inches (two-story structures); 18 inches (three-story structures). Width of isolated footings that support individual columns shall be at least 24 inches.
- Isolated footings that support exterior structural columns shall be structurally connected to the main foundation system in at least two orthogonal horizontal directions.
- The sides of footings that support interior columns should be connected to the closest adjacent (isolated spread footing and/or continuous footing) foundations using reinforced concrete tie beams. The tie beams should be at least 12 inches wide and should be embedded at least 12 inches beneath pad grade. Reinforcement of the tie beams should be at least $\rho_{min}$ $(200/f_y)$.
- Foundation excavations should be observed by a representative of this firm to verify that the excavations are embedded to the recommended depth into the recommended material, prior to placement of forms, reinforcement, or concrete in the excavations. The excavations should be moisture-conditioned and free of all loose or sloughed material prior to casting of concrete.
- Footing foundations to be underlain by soils with an Expansion Index higher than 130 should be individually designed by the Structural Engineer, based on consultation with the Geotechnical Engineer. Proposed buildings that will be underlain by soils with an Expansion Index higher than 130 may also be supported on post-tensioned slabs or on structural mats, to be designed on a case-by-case basis by a structural engineer in consultation with the geotechnical engineer. General recommendations for design of post-tensioned slabs and structural mats for soil subgrades with an Expansion Index higher than 130 are provided after the following table.

# APPENDIX E

## Minimum Foundation and Slab Recommendations for Expansive Soils

### Minimum Design Parameters for Slab on Grade Floors

| Expansion Potential Classification (ASTM D4829) | Expansion Index | Moisture Conditioning of Slab subgrade | Slab Reinforcement | Minimum Slab Thickness | Thickness of Compacted Granular Material over subgrade and beneath slab |
|---|---|---|---|---|---|
| Very Low | 0 to 20 | None | #3 Rebar at 24", each way | 4 inches | 2 inches of sand[5] plus 2 inches of sand over vapor retarder |
| Low | 21 to 50 | 120 percent of Optimum Moisture Content[6] to 18 inches depth | #3 Rebar at 18", each way | | |
| Medium | 51 to 90 | 130 percent of Optimum Moisture Content to 24 inches depth | #4 Rebar at 16", each way | 5 inches | 4 inches of aggregate base plus 2 inches of sand over vapor retarder |
| High | 91 to 130 | 140 percent of Optimum Moisture Content to 36 inches depth | #4 Rebar at 14", each way | 6 inches | 6 inches of aggregate base plus 2 inches of sand over vapor retarder |

- Slabs should be constructed using low-slump concrete and with crack control joints spaced 8 ft apart, or closer, in both horizontal directions. In any case, concrete used in slabs-on-grade should satisfy the requirements of Chapter 19 of the California Building Code.
- Interior floor slabs should be structurally tied to continuous footing foundations as directed by the Structural Engineer. As a minimum, slabs constructed over subgrades with medium or high expansion potential should be structurally tied to continuous footing foundations using No. 3 rebars on 36-inch horizontal spacings and to interior column footing foundations by bending No. 3 rebars into the slab on alternating 24-inch and 36-inch horizontal spacings.
- Welded wire mesh should not be substituted for the steel rebar reinforcement recommended in the preceding table because sagging of welded wire mesh between support points during casting of floor slabs typically results in insufficient concrete cover beneath the mesh, even if extra measures are used to keep the mesh at slab mid-height.
- If buildup of water vapor beneath interior floor slabs is acceptable, the floor slabs may be cast directly on the recommended surficial lift of compacted granular material. Otherwise, a membrane vapor retarder with a thickness of at least 10 mils should be placed over the lift of compacted granular material, a 2-inch thick protective cushion of compacted well-

[5] Sand "base" should have a Sand Equivalent of at least 30 (e.g., washed concrete sand).

[6] Optimum Moisture Content of subgrade soils, per ASTM D1557.

**APPENDIX E**

**Minimum Foundation and Slab Recommendations for Expansive Soils**

graded clean sand should be placed over the membrane, and the floor slab should be cast on the sand cushion. The membrane should be lapped and/or sealed, and sealed around all plumbing structures and other openings. Care should be taken to avoid puncturing the membrane during placement/compaction of the sand cushion and during casting of the slab. Suitability of materials that will be placed directly above and below the membrane should be evaluated in our geotechnical laboratory prior to transporting them to the project site.

- In order to minimize entry of water beneath interior slab-on-grade floors, utility trenches that cross perimeter footing foundations should be backfilled with lean concrete or with concrete slurry. The slurry plug should extend under the full width of the footing and along the trench for at least 24 inches in the direction of the slab.
- Materials from foundation and/or utility trench excavations should not be spread on areas where concrete slabs will be cast unless the materials are compacted and tested.
- Floor slabs underlain by soils with an Expansion Index greater than 130 should be individually designed by the Structural Engineer based on consultation with the Geotechnical Engineer.

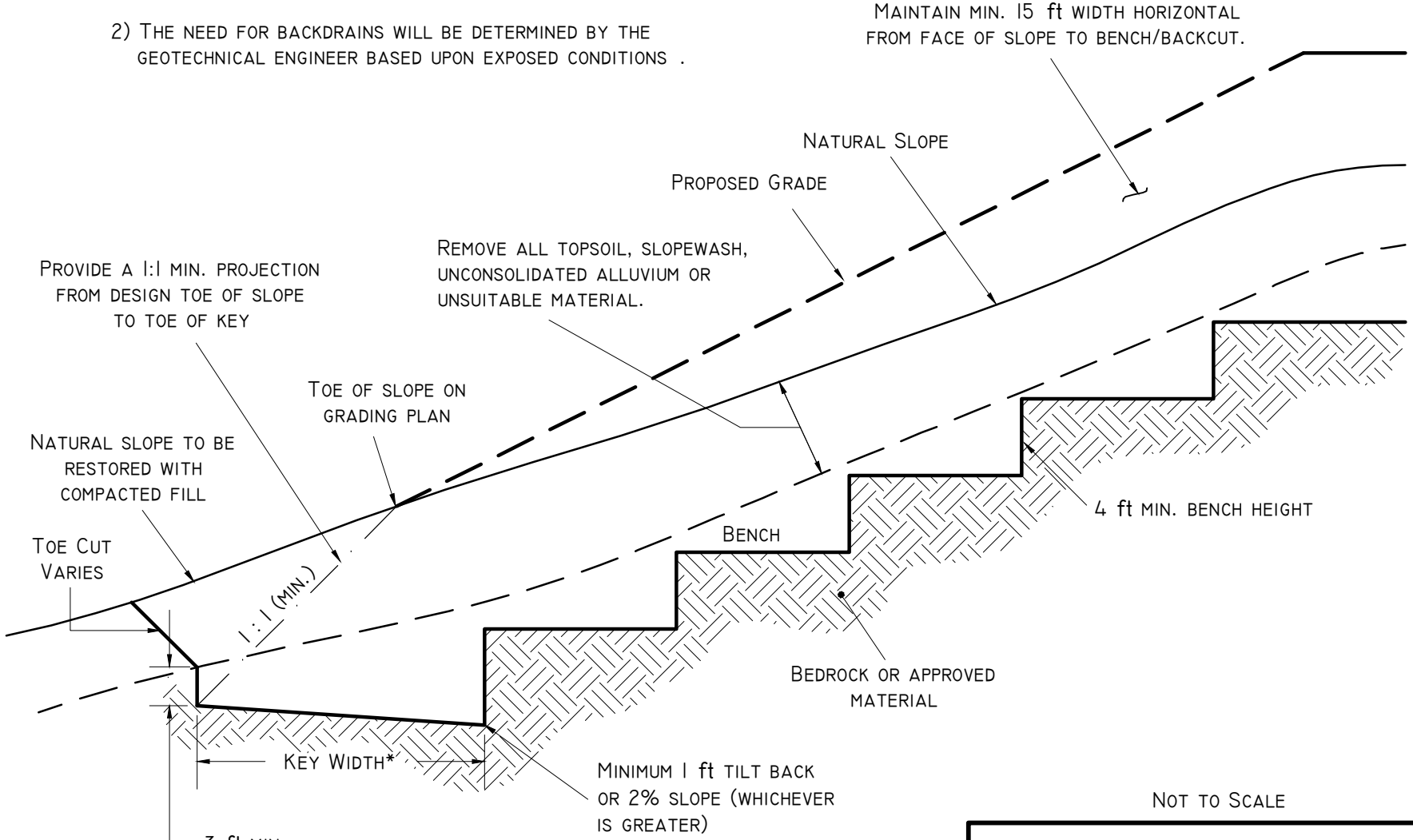
**Post-Tensioned Slabs**

The following general geotechnical recommendations may be used for design of post-tensioned floors slabs that will be constructed over subgrades with VERY HIGH expansion potential (i.e., Expansion Index higher than 130).

- The upper 3 ft of the subgrade beneath post-tensioned slabs should be water conditioned to at least 130 percent of Optimum Moisture Content and compacted to between 90 and 93 of Maximum Dry Density, per ASTM D1557.
- A vapor barrier between two 2-inch thick layers of compacted sand should be placed on the subgrade of post-tensioned slabs.
- Post-tensioned slabs should be designed to accommodate a vertical deflection as great as 1.0 inch (up or down) over a horizontal distance of 30 feet, as a result of potential swelling/shrinking of the underlying subgrade.

NOTE: 1) Where the natural slope approaches or exceeds the design slope ratio, special recommendations will be provided by the geotechnical engineer.

2) The need for backdrains will be determined by the geotechnical engineer based upon exposed conditions .




*Keyway width in competent material minimum of 15 ft or as recommended by the Geotechnical Engineer.

Not to Scale

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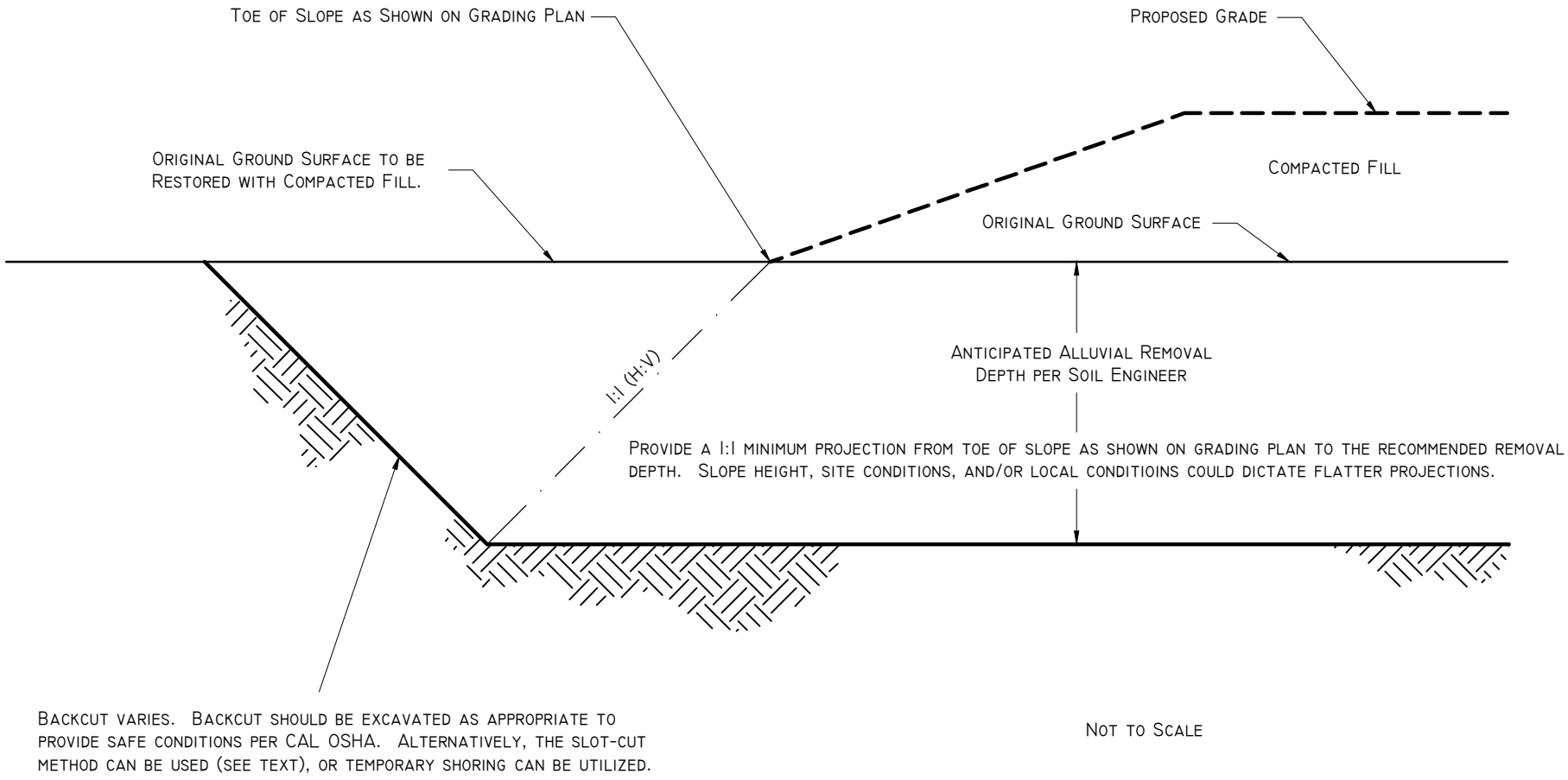
FILL SLOPE OVER NATURAL SLOPE
5:1 or steeper

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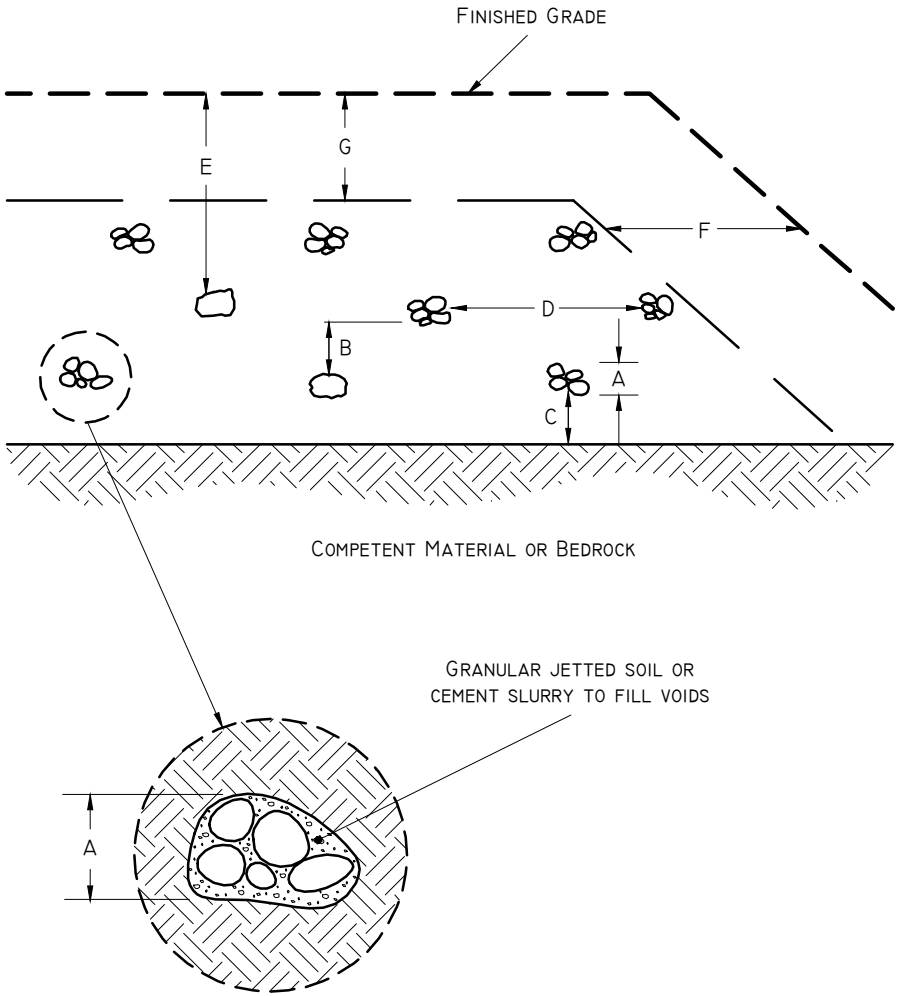
# Fill Slope Toeing Out on Flat Alluviated Canyon




## EXPLANATION

A) ± 4 ft, Height and Width may vary depending on rock size

B) Minimum of 4 ft from stagger windrow

C) Minimum of 5 ft from first set of windrow to competent material or bedrock

D) Minimum of 15 ft between windrows

E) Minimum of 23 ft from oversized rocks (largest dimension ≥ 4 ft) to finished subgrade. All oversized rocks must be individually placed.

F) Minimum of 25 ft from projected windrow area to finished slope surface.

G) Minimum of 15 ft beneath finished grade to provide clearance for foundations and pools, or 5 ft below the deepest adjacent utility trench, whichever is deepest.

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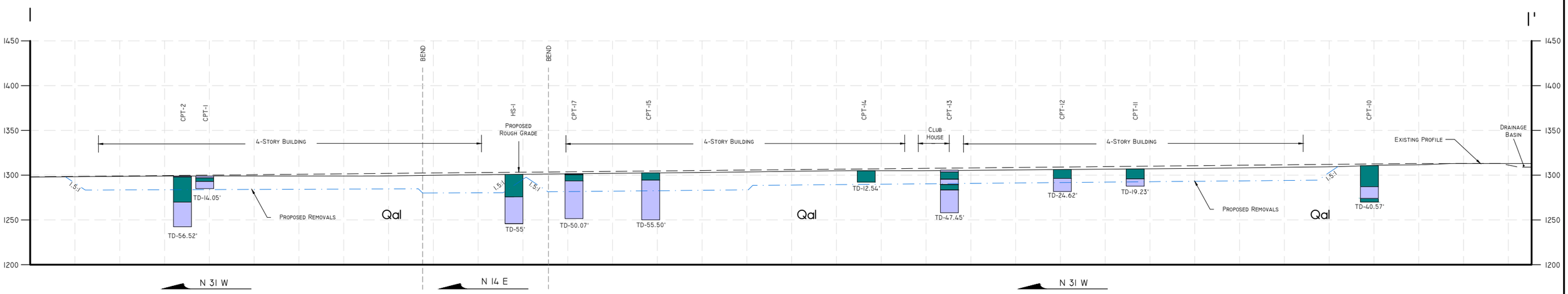
# ROCK DISPOSAL (WINDROWS)

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Cross Section I-I'

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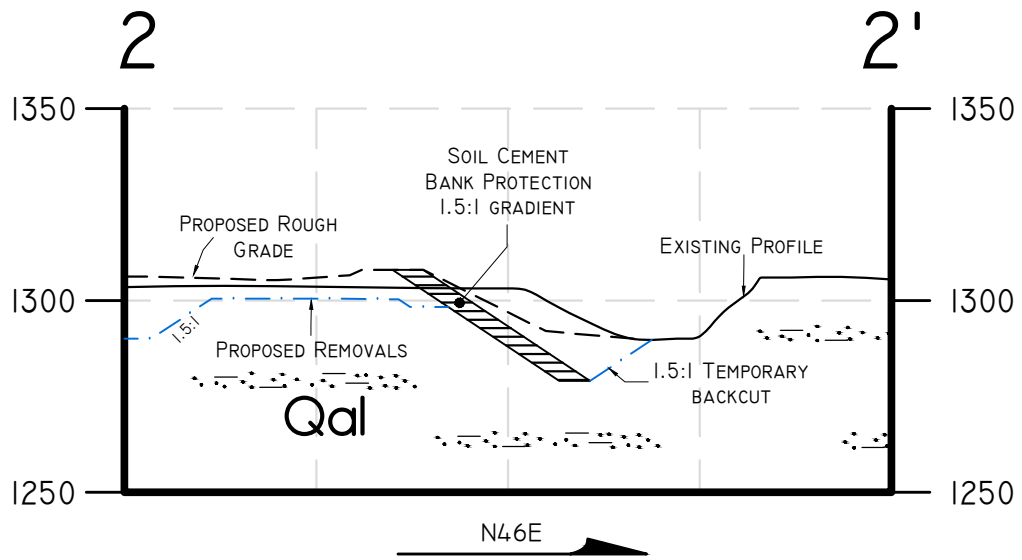
Date: 6/15/21

Scale: 1"=50' (H=V)

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Cross Section 2-2'

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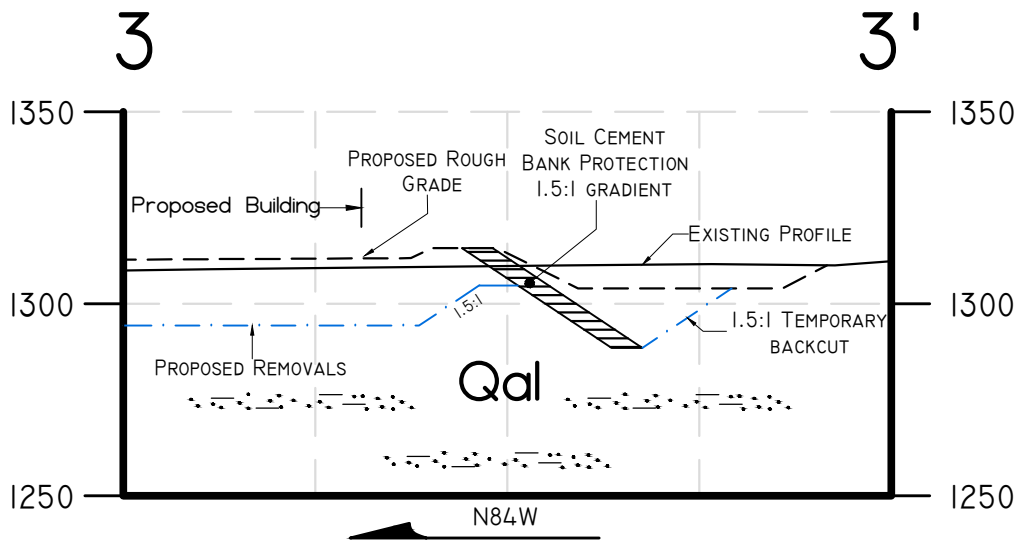


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Cross Section 3-3'

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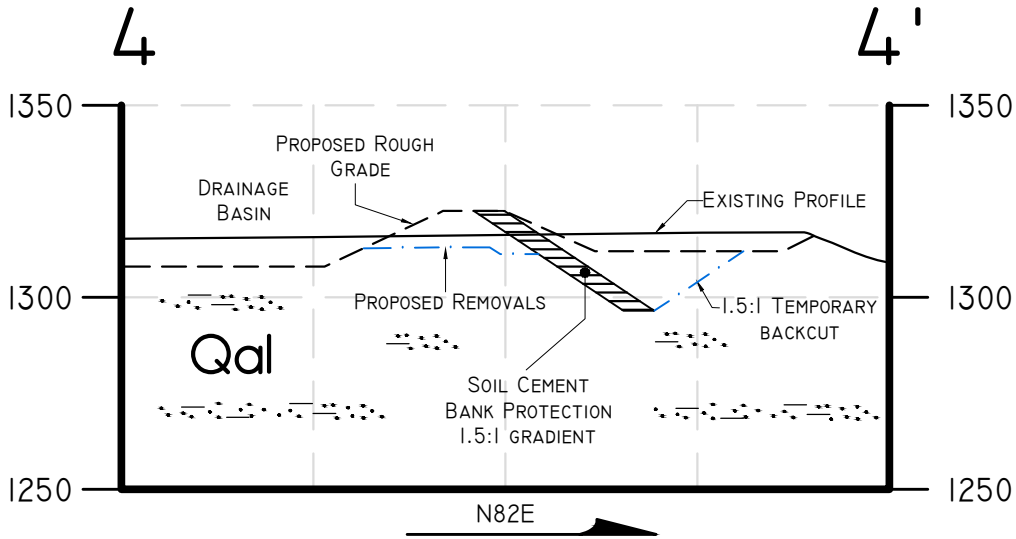


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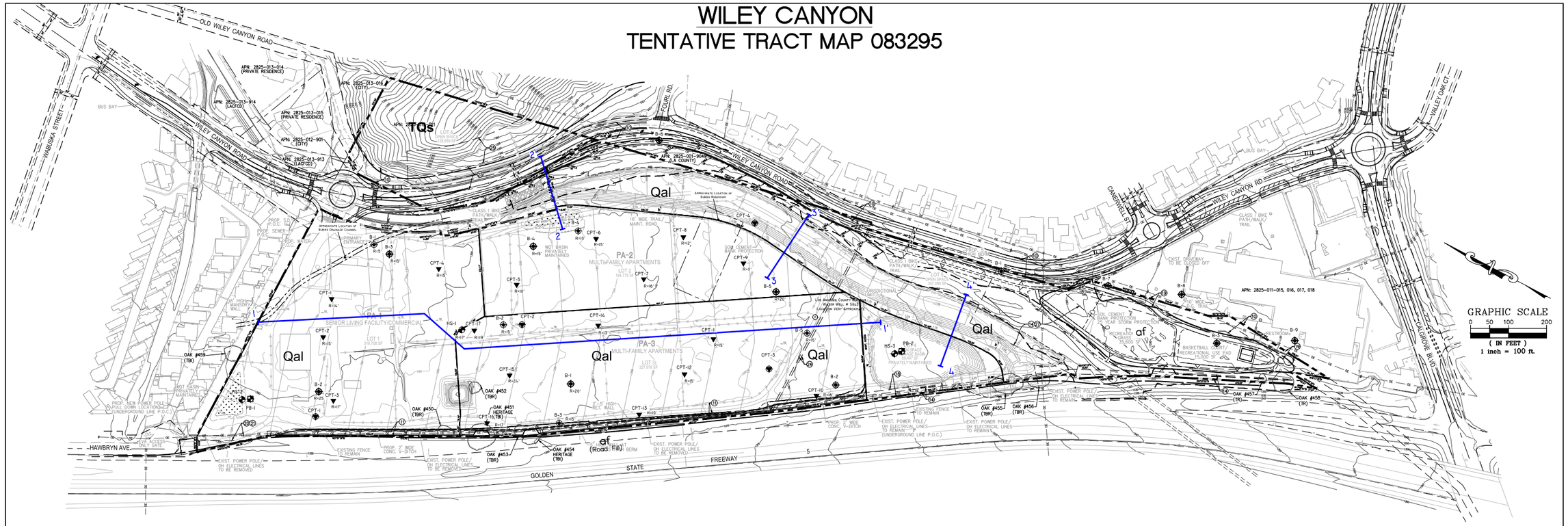
## Cross Section 4-4'

Job No.: 21-2593-4

Date: 6/15/21 | Scale: 1"=50'

# WILEY CANYON
## TENTATIVE TRACT MAP 083295




## LEGAL DESCRIPTION:

PARCEL A:
PARCEL 1:

ALL THAT CERTAIN PARCEL OF LAND ACQUIRED BY THE STATE OF CALIFORNIA BY PARCEL 4 OF DEED 63, RECORDED MARCH 22, 1951 AS INSTRUMENT NO. 3206 IN BOOK 35868 PAGE 28, OF OFFICIAL RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY AND THAT CERTAIN PARCEL OF LAND ACQUIRED BY THE STATE OF CALIFORNIA BY DEED 31, RECORDED IN BOOK 8172 PAGE 187, OF SAID OFFICIAL RECORDS, BOUNDED NORTHWESTERLY BY THAT CERTAIN COURSE HAVING A BEARING AND DISTANCE OF NORTH 62°16'58" EAST 50.27 FEET IN PARCEL 2 OF STATE HIGHWAY RELINQUISHMENT NUMBER 602, RECORDED IN BOOK R6678 PAGE 858 OF SAID OFFICIAL RECORDS, AND BOUNDED SOUTHWESTERLY BY THE FOLLOWING DESCRIBED LINE:

BEGINNING AT THE SOUTHWESTERLY CORNER OF SAID PARCEL 4; THENCE NORTHWESTERLY IN A DIRECT LINE TO THE SOUTHWESTERLY TERMINUS OF SAID COURSE, HAVING A BEARING OF NORTH 62°16'18" EAST, TOGETHER WITH ALL THE RIGHTS OF ACCESS AS ACQUIRED BY THE STATE OF CALIFORNIA BY SAID PARCEL 4.

EXCEPT THEREFROM ALL OIL, GAS, MINERALS, AND OTHER HYDROCARBON SUBSTANCES LYING BELOW THE SURFACE OF SAID LAND, BUT WITH NO RIGHT OF SURFACE ENTRY AS PROVIDED IN DEEDS OF RECORDS.

ALSO EXCEPT THEREFROM, ALL OIL, MINERALS, NATURAL GAS AND OTHER HYDROCARBONS BY WHATSOEVER NAME KNOWN THAT MAY BE WITHIN OR UNDER THE HEREIN CONVEYED PARCEL OF LAND, AND THE RIGHTS THERETO, TOGETHER WITH CERTAIN OTHER CONDITIONS, AS ACCEPTED AND RESERVED IN SAID DEED 63.

ALL THAT CERTAIN PARCEL OF LAND AS DESCRIBED IN AND CONVEYED BY THAT CERTAIN DIRECTOR'S DEED AS RECORDED ON APRIL 14, 1971 AS INSTRUMENT NO. 1770 OF THE OFFICIAL RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

PARCEL 2:

THAT PORTION OF LOT 7 AND OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 4, TOWNSHIP 3 NORTH, RANGE 16 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF SANTA CLARITA, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT MAP THEREOF, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID SECTION 4; THENCE NORTHERLY ALONG THE EASTERLY LINE OF SAID SECTION TO THE NORTHEAST CORNER OF SAID LOT 7; THENCE WESTERLY ALONG THE NORTHERLY LINE OF SAID LOT 7 TO THE EASTERLY LINE OF THE WESTERLY 380 FEET OF SAID LOT 7; THENCE SOUTHERLY ALONG SAID LAST MENTIONED EASTERLY LINE TO THE SOUTHERLY LINE OF THE NORTHERLY 270 FEET OF SAID LOT 7; THENCE WESTERLY ALONG SAID SOUTHERLY LINE AND ITS WESTERLY PROLONGATION TO THE NORTHEASTERLY LINE OF THE LAND DESCRIBED IN THE DEED TO THE STATE OF CALIFORNIA, RECORDED ON JUNE 28, 1929 AS INSTRUMENT NO. 1085, IN BOOK 8172 PAGE 187, OFFICIAL RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE SOUTHEASTERLY ALONG SAID NORTHEASTERLY LINE, TO AND ALONG THE NORTHEASTERLY LINE TO THE LAND DESCRIBED IN PARCEL 2-A (AMENDED) OF THE FINAL ORDER OF CONDEMNATION ENTERED IN CASE NO. 860012, SUPERIOR COURT OF THE STATE OF CALIFORNIA FOR THE COUNTY OF LOS ANGELES, A CERTIFIED COPY OF WHICH BEING RECORDED ON MAY 13, 1966 AS INSTRUMENT NO. 3063 IN BOOK D3304 PAGE 451, OFFICIAL RECORDS, OF SAID COUNTY TO THE SOUTHERLY LINE OF SAID SECTION; THENCE EASTERLY ALONG SAID SOUTHERLY LINE TO THE POINT OF BEGINNING.

EXCEPT THEREFROM THAT PORTION OF SAID LAND DESCRIBED AS PARCEL NO. 117A IN THE FINAL ORDER OF CONDEMNATION, ENTERED IN CASE NO. C 546819, SUPERIOR COURT OF LOS ANGELES, RECORDED MAY 22, 1990 AS INSTRUMENT NO. 90-925383, OCTOBER 1, 1990 AS INSTRUMENT NO. 90-1674164, AND FEBRUARY 4, 1991 AS INSTRUMENT NO. 91-166097, ALL OF OFFICIAL RECORDS.

ALSO EXCEPT THEREFROM THAT PORTION OF SAID LAND DESCRIBED IN EXHIBIT "A" AND DEPICTED IN EXHIBIT "B" IN THE DEED TO THE CITY OF SANTA CLARITA, RECORDED SEPTEMBER 28, 1998 AS INSTRUMENT NO. 98-1754090, OFFICIAL RECORDS.

PARCEL 3:

THAT PORTION OF LOT 7 AND OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 4, TOWNSHIP 3 NORTH, RANGE 16 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT MAP THEREOF, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE NORTHERLY LINE OF SAID LOT 7 WITH THE EASTERLY LINE OF THE WESTERLY 380 FEET OF SAID LOT 7; THENCE SOUTHERLY ALONG SAID EASTERLY LINE TO THE SOUTHERLY LINE OF THE NORTHERLY 270 FEET OF LOT 7; THENCE WESTERLY ALONG SAID SOUTHERLY LINE AND ITS WESTERLY PROLONGATION TO THE NORTHEASTERLY LINE OF THE LAND DESCRIBED IN THE DEED TO THE STATE OF CALIFORNIA, RECORDED ON JUNE 28, 1929 AS INSTRUMENT NO. 1085, IN BOOK 8172 PAGE 187, OFFICIAL RECORDS, IN SAID OFFICE OF THE COUNTY RECORDER; THENCE NORTHWESTERLY ALONG SAID NORTHEASTERLY LINE TO THE NORTHERLY LINE OF SAID SOUTHWEST QUARTER THENCE EASTERLY ALONG SAID NORTHERLY LINE AND SAID NORTHERLY LINE OF LOT 7 TO THE POINT OF BEGINNING.

EXCEPT THAT PORTION WITHIN THE LINES OF THE LAND DESCRIBED IN PARCEL 4 OF THE DEED TO THE STATE OF CALIFORNIA, RECORDED MARCH 22, 1951 AS INSTRUMENT NO. 3206, IN BOOK 35868 PAGE 28, OF SAID OFFICIAL RECORDS.

PARCEL B:
PARCEL 1:

THAT PORTION OF THE NORTHEAST QUARTER OF FRACTIONAL SECTION 9, TOWNSHIP 3 NORTH, RANGE 16 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF SANTA CLARITA, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE ON JUNE 29, 1897, DESCRIBED AS FOLLOWS:

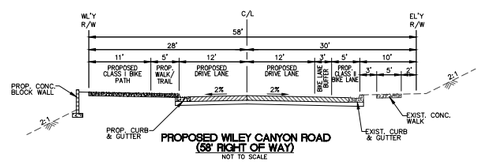
BEGINNING AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SAID SECTION 9; THENCE ALONG THE EAST LINE OF SAID QUARTER SECTION, NORTH 0° 12' EAST 1558.90 FEET TO THE TRUE POINT OF BEGINNING; THENCE SOUTH 4° 25' WEST 200.90 FEET; THENCE SOUTH 12° 35' WEST 356.04 FEET; THENCE SOUTH 32° 25' WEST TO THE EASTERLY
TERMINUS OF THAT CERTAIN COURSE DESCRIBED IN THE DEED TO THE STATE OF CALIFORNIA, RECORDED APRIL 6, 1951 AS INSTRUMENT NO. 3492, IN BOOK 35992 PAGE 102, OFFICIAL RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, AS HAVING A BEARING AND LENGTH OF "NORTH 75° 26' 10" EAST 251.75 FEET"; THENCE WESTERLY
ALONG SAID CERTAIN COURSE TO THE WESTERLY LINE OF WILEY CANYON ROAD, 40 FEET WIDE, AS SHOWN ON COUNTY SURVEYOR'S MAP NO. 6664 ON FILE IN THE OFFICE OF THE COUNTY ENGINEER OF SAID COUNTY, SAID WESTERLY LINE BEING ALSO THE EASTERLY LINE OF THE LAND DESCRIBED IN PARCEL 1 OF THE DEED TO THE STATE OF CALIFORNIA,
RECORDED ON JUNE 21, 1965 AS INSTRUMENT NO. 940, IN BOOK D-2947 PAGE 229, OFFICIAL RECORDS OF SAID COUNTY; THENCE NORTHERLY AND NORTHWESTERLY ALONG THE EASTERLY AND NORTHEASTERLY LINES OF SAID PARCEL 1 TO THE NORTHERLY LINE OF SAID SECTION; THENCE EASTERLY AND SOUTHERLY ALONG THE NORTHERLY AND EASTERLY LINES OF SAID SECTION TO THE POINT OF BEGINNING.

EXCEPT ANY PORTION LYING EASTERLY OF THE WESTERLY LINE OF WILEY CANYON ROAD, 40 FEET WIDE, AS DESCRIBED IN BOOK 761 PAGE 303 OF DEEDS.

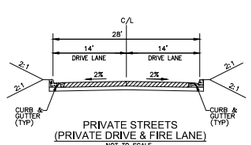
PARCEL 2:

THAT PORTION OF WILEY CANYON ROAD, 40 FEET WIDE, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON MAP OF TRACT NO. 30340, FILED IN BOOK 741 PAGES 62 TO 68 INCLUSIVE OF MAPS, IN THE OFFICE OF THE RECORDER OF SAID COUNTY, WHICH EXTENDS FROM THE NORTHERLY PROLONGATION OF THAT CERTAIN COURSE OF NORTH 18° 50' 39" WEST 260.94 FEET IN THE WESTERLY BOUNDARY OF LOT 135 OF SAID TRACT, NORTHERLY TO THE NORTHWESTERLY CONTINUATION OF THAT CERTAIN 1240 FOOT RADIUS CURVE IN THE NORTHEASTERLY BOUNDARY OF SAID LOT.

APN: 2825-012-007 (Affects: Parcel 1 of Parcel A)
2825-012-011 (Affects: Parcels 2 and 3 of Parcel A)
and 2825-012-010 (Affects: Parcel B)




PROPOSED WILEY CANYON ROAD
(58' RIGHT OF WAY)
NOT TO SCALE




PRIVATE STREETS
(PRIVATE DRIVE & FIRE LANE)
NOT TO SCALE

EASEMENTS BASED ON FIRST AMERICAN TITLE INSURANCE COMPANY
PRELIMINARY TITLE REPORT ORDER NO. NCS-1032560-LA2 DATED OCTOBER 3, 2020

| TITLE REPORT ITEM NO. | OWNER | PURPOSE | REFERENCE | FUTURE DISPOSITION | ADDITIONAL COMMENTS | TENTATIVE MAP SHEET NO. |
|---|---|---|---|---|---|---|
| (10) | COUNTY OF LOS ANGELES | ROAD | DATE UNKNOWN COUNTY SURVEYOR'S MAP NO. 6664 | TO BE QUITCLAIMED | COVERS PORTIONS OF WILEY CANYON ROAD ALONG EAST PROPERTY LINE. | 1 |
| (11) | STATE OF CALIFORNIA | PUBLIC UTILITY | MAY 13, 1966 INST. NO. 3063 IN BOOK D3304 PAGE 451 | TO QUITCLAIMED & RELOCATED | LOCATED ALONG CHAIN LINK FENCE ADJACENT TO GOLDEN STATE FREEWAY 5 WITHIN LOTS 1 & 3 | 1 |
| (14) | STATE OF CALIFORNIA | DRAINAGE, PIPE, COMM. & POWER LINES | JUNE 21, 1965 INST. NO. 940 IN BOOK D2947 PAGE 229 | PORTIONS TO QUITCLAIMED & RELOCATED | LOCATED ALONG CHAIN LINK FENCE ADJACENT TO GOLDEN STATE FREEWAY 5 WITHIN LOTS 3, 4 & 5 | 1 |
| (18) | THE PACIFIC TELEPHONE & TELEGRAPH COMPANY | PUBLIC UTILITIES | OCTOBER 17, 1973 INST. NO. 1770 OF OFFICIAL RECORDS | TO QUITCLAIMED & RELOCATED | LOCATED ALONG CHAIN LINK FENCE ADJACENT TO GOLDEN STATE FREEWAY 5 WITHIN LOTS 3 & 4 | 1 |
| (19) | COUNTY OF LOS ANGELES | ROAD | MAY 24, 1974 INST. NO. 4414 OF OFFICIAL RECORDS | TO BE VACATED | LOCATED ALONG SOUTHER PROPERTY LINE WITHIN LOT 5 | 1 |
| (20) | SOUTHERN CALIFORNIA EDISON COMPANY | PUBLIC UTILITIES | MARCH 20, 1975 BOOK 2388 OF OFFICIAL RECORDS | TO QUITCLAIMED & RELOCATED | LOCATED ALONG NORTHWEST CORNER OF PROPERTY LINE WITHIN LOT 1 | 1 |
| (21) | THE PACIFIC TELEPHONE & TELEGRAPH COMPANY | UNDERGROUND CABLES, WIRES & CONDUITS | APRIL 10, 1975 INST. NO. 1597 OF OFFICIAL RECORDS | TO QUITCLAIMED & RELOCATED | LOCATED ALONG NORTHWEST CORNER OF PROPERTY LINE WITHIN LOT 1 | 1 |
| (24) | PACIFIC BELL | PUBLIC UTILITIES | JULY 22, 1985 INST. NO. 85-839958 OF OFFICIAL RECORDS | TO QUITCLAIMED & RELOCATED | LOCATED WITHIN LOTS 3, 4 & 5 | 1 |
| (25) | CITY OF SANTA CLARITA | SLOPE | SEPTEMBER 28, 1998 INST. NO. 98-1754090 OFFICIAL RECORDS | TO BE QUITCLAIMED | LOCATED EAST SIDE OF WILEY CANYON ROAD, NORTHEAST CORNER OF PROPERTY LINE WITHIN LOT 6 | 1 |
| (27) | STATE OF CALIFORNIA | DRAINAGE | DATE UNKNOWN BOOK 2585, PAGE 012 OF ASSESSOR'S MAPS | TO BE QUITCLAIMED | LOCATED WITHIN LOT 5 | 1 |

## PROJECT SUMMARY:

| | |
|---|---|
| GROSS AREA: | 31.8 AC |
| TOTAL LOTS: | 6 |
| EXISTING ZONING: | MX-N |
| MULTI-FAMILY APARTMENTS: | 379 UNITS |
| SENIOR LIVING FACILITY: | 258,104 SF |
| ASSISTED LIVING: | 60 UNITS |
| INDEPENDENT LIVING: | 130 UNITS |
| MEMORY CARE: | 26 BEDS |
| COMMERCIAL: | 10,886 SF |

## NOTES:

1. PARKING STALLS ARE 9' LONG X 18' WIDE.
2. MAXIMUM BLDG. HEIGHT IS 50'.
3. ALL ON-SITE STORM DRAIN SYSTEMS ARE PRIVATELY MAINTAINED.

## EARTHWORK SUMMARY:

CUT: 65,000 cy
FILL: 77,000 cy
OVEREX: 500,000 cy
10% SHRINKAGE: 50,000 cy
IMPORT: 62,000 cy

## OWNER:

WILEY CANYON, LLC
SHERIDAN-EBBERT DEVELOPMENT/
ROYAL CLARK DEVELOPMENT COMPANY
13120 TELFAIR AVENUE
SYLMAR, CA 91342
PHONE: (818) 364-7505
ATTN: SCOTT SHERIDAN

## PUBLIC UTILITIES:

CABLE TV — TIME WARNER, 550 NORTH CONTINENTAL BLVD., EL SEGUNDO, CA 90245, (818) 407-4404

ELECTRIC — SOUTHERN CALIFORNIA EDISION CO., 3589 FOOTHILL DRIVE, THOUSAND OAKS, CA 91361, (661) 607-0512

GAS — SOUTHERN CA. GAS COMPANY, 9400 OAKDALE AVENUE, CHATSWORTH, CA. 91313, (818) 701-7567

SEWER — LOS ANGELES COUNTY SEWER MAINTENANCE DEPARTMENT, 45712 NORTH DIVISION, LANCASTER, CA. 93535, (626) 300-3370

TELEPHONE — AT&T, 26971 N. FURNIVALL AVENUE, SANTA CLARITA, CA 91351, (661) 251-8799

WATER — SANTA CLARITA VALLEY WATER AGENCY, 26521 SUMMIT CIRCLE, SANTA CLARITA, CA 91350, (661) 259-2737

## GENERAL NOTES:

1. LOT LINES CAN BE ADJUSTED, ADDITIONAL RESIDENTIAL OR COMMERCIAL LOTS MAY BE CREATED TO THE SATISFACTION OF THE CITY PLANNING DEPARTMENT.
2. ALIGNMENT AND GEOMETRICS OF STREETS ARE APPROXIMATE. ADJUSTMENTS TO STREETS CAN BE MADE WITH APPROVAL BY THE CITY OF SANTA CLARITA PLANNING DEPARTMENT AND THE ENGINEERING DEPARTMENTS.
3. GRADES SHOWN ON THIS TENTATIVE MAP ARE APPROXIMATE. GRADES MAY DEVIATE UP TO TEN FEET WITH APPROVAL OF CITY PLANNING AND ENGINEERING DEPARTMENTS.
4. PERMISSION IS REQUESTED TO CREATE ADDITIONAL LANDSCAPE/OPEN SPACE OR PUBLIC USE LOTS TO THE SATISFACTION OF THE CITY PLANNING DEPARTMENT.
5. PERMISSION IS REQUESTED TO RECORD ADDITIONAL UTILITY LOTS AND PROVIDE MAINTENANCE EASEMENTS TO THE SATISFACTION OF THE CITY OF SANTA CLARITA PLANNING AND ENGINEERING DEPARTMENTS.
6. THE LOCATIONS OF APPURTENANT STRUCTURES (E.G., PASEOS, TRANSIT SHELTERS, WATER QUALITY BASINS, ETC.) MAY BE RELOCATED TO THE SATISFACTION OF THE CITY OF SANTA CLARITA PLANNING AND ENGINEERING DEPARTMENTS.
7. PERMISSION IS REQUESTED TO MASS GRADE.
8. LOTS DESIGNATED FOR MULTI-FAMILY HOUSING MAY BE FURTHER SUBDIVIDED FOR CONDOMINIUM PURPOSES.

## CONDOMINIUM NOTE:

ALL RESIDENTIAL COMMERCIAL AND OFFICE LOTS WITHIN THIS TENTATIVE MAP MAY BE FURTHER AIRSPACE SUBDIVIDED FOR CONDOMINIUM PURPOSES.

## FLOOD ZONE:

FLOOD INSURANCE RATE MAP COMMUNITY PANEL NO. 06037C1031F, ZONE A AND AO

## TOPOGRAPHY:

CONTOURS ARE BASED ON AN AERIAL PHOTOGRAMETRIC SURVEY PERFORMED BY VERTEX SURVEY, INC. AND McELHANNEY CONSULTING SERVICES LTD. FLOWN ON APRIL 2018.

## BENCHMARK:

BENCHMARK: L-4528 DATUM: 1995 ELEVATION: 1285.578

ESTABLISHED BY THE NEWHALL QUAD

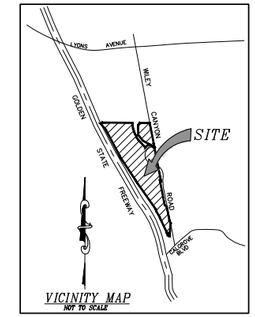
DESCRIPTION: BEING AN FC DISC IN CONCRETE FOOTING S/W LEG OF EDISON TOWER #3/7 35M S & 6.4M W/O C/L INTERSECTION WILEY CANYON ROAD & WABUSKA STREET MARKED (BM 128-05980).

## BASIS OF BEARINGS:

THE BEARING SHOWN HEREON ARE BASED ON THE BEARING NORTH 10°55'20" WEST OF THE WESTERLY LINE OF THE RANCHO SAN FRANCISCO AS SHOWN ON RECORD OF SURVEY FILED IN BOOK 258 PAGES 31 THROUGH 38, INCLUSIVE, OF RECORD SURVEY, IN THE OFFICE OF THE COUNTY RECORDER OF LOS ANGELES COUNTY, AND SHOWN AS NORTH 10°55'18" WEST ON THIS MAP.

## ASSESSOR PARCEL NUMBER:

2825-012-007, 2825-012-011, 2825-012-901,
2825-012-902 (CITY)




## ABBREVIATIONS:

| | |
|---|---|
| AC | ACRES |
| APWA | AMERICAN PUBLIC WORKS ASSOCIATION |
| BVC | BEGINNING VERTICAL CURB |
| EVC | END VERTICAL CURB |
| EX | EXISTING |
| FF | FINISH FLOOR |
| FM | FORCE MAIN |
| FS | FINISHED SURFACE |
| FW | FIRE WATER |
| GB | GRADE BREAK |
| HP | HIGH POINT |
| L | LENGTH |
| MIN | MINIMUM |
| P.C.C. | PORTLAND CEMENT CONCRETE |
| PI | POINT OF INTERSECTION |
| PROP | PROPOSED |
| R | RADIUS |
| R/W | RIGHT OF WAY |
| SF | SQUARE FOOT |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |
| STD | STANDARD |
| TBI | TO BE IMPACTED |
| TBR | TO BE REMOVED |
| TR | TO REMAIN |
| W | WATER |

## LEGEND:

- PROJECT BOUNDARY
- PROPOSED LOT LINE
- 1300 — EXISTING CONTOUR
- 1300 — PROPOSED CONTOUR
- PROPOSED TOP/TOE OF SLOPE
- PROPOSED DAYLIGHT
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- EXISTING CURB
- PROPOSED CURB
- SD — PROPOSED STORM DRAIN
- W — PROPOSED WATER
- S — PROPOSED SEWER
- E — ELECTRICAL CONDUIT
- ET — ELECTRICAL TRANSFORMER
- 1300 — SPOT ELEVATION
- FLOW DIRECTION
- CARPORT
- OAK #XX (TR) — OAK TREE (TR)= TO REMAIN (TBI)= TO BE IMPACTED (TBR)= TO BE REMOVED

SEE SHEET 2 FOR LEGEND

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOTECHNICAL MAP

DATE: 6/15/21 | Job No.: JI-2593-4
SCALE: 1" = 100' | FILE NAME: AES TTM 5.26.21_1640-Tentative Plan
SHEET 1 | GEOLOGY BY: VCG | DRAWN BY: CHS/VCG | REVISED:


ALLIANCE
LAND PLANNING & ENGINEERING INC.
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VALENCIA, CA 91355
TEL: (661) 799-2760
CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING


PLAN PREPARED FOR:
WILEY CANYON, LLC
SHERIDAN-EBBERT DEVELOPMENT/
ROYAL CLARK DEVELOPMENT COMPANY
13120 TELFAIR AVENUE
SYLMAR, CA 91342
TEL: (818) 364-7505

PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE.
CARLSBAD, CA 92008
(760) 431-9896
PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG WHITTEKER — 5/26/21
R.C.E. 51929 — DATE

REGISTERED PROFESSIONAL ENGINEER — CRAIG A. WHITTEKER — NO. 51929 — EXP. 6-30-22 — CIVIL — STATE OF CALIFORNIA

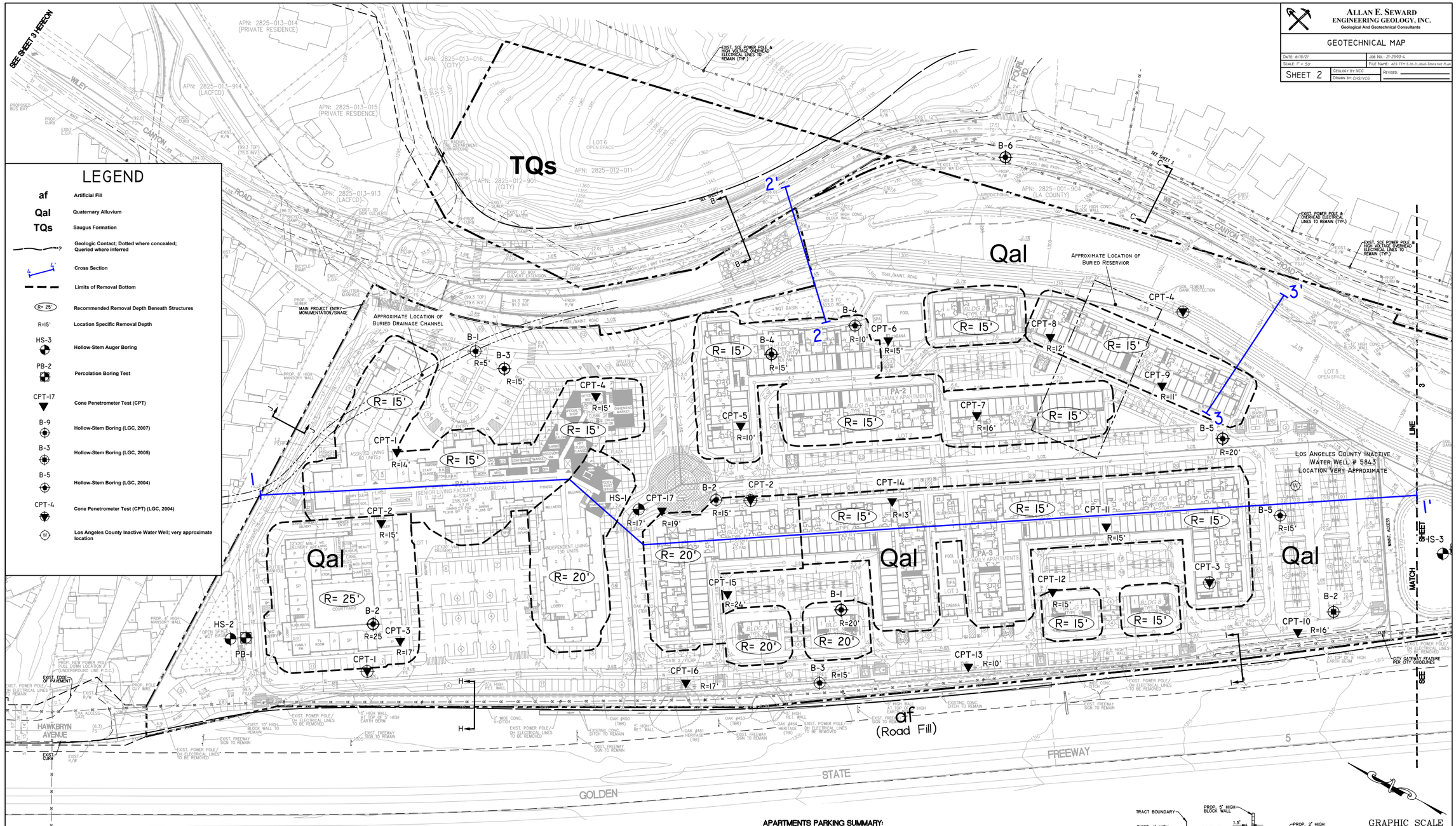
| NO. | DATE | REVISIONS | BY | APPR |
|---|---|---|---|---|

SHEET 1 OF 3 SHEETS

CITY OF SANTA CLARITA

WILEY CANYON
TENTATIVE TRACT MAP 083295
FOR CONDOMINIUM PURPOSES

G:\2593 acad\In Progress\AES TTM Dated 5.26.21 1640_TENTATIVE_MAP_PLAN.dwg




**ALLAN E. SEWARD**
**ENGINEERING GEOLOGY, INC.**
Geological And Geotechnical Consultants

GEOTECHNICAL MAP

| | |
|---|---|
| DATE: 6/15/21 | JOB NO.: 21-2593-4 |
| SCALE: 1" = 50' | FILE NAME: AES TTM 5.26.21_WILEY-TENTATIVE PLAN |
| SHEET 2 | GEOLOGY BY: VCG / DRAWN BY: CHS/VCG / REVISED: |

## PLANNING AREA 1 SUMMARY:

SENIOR LIVING BUILDING AREA:

| | |
|---|---|
| 1ST FLOOR | 81,356 SF |
| 2ND FLOOR | 65,080 SF |
| 3RD FLOOR | 55,834 SF |
| 4TH FLOOR | 55,834 SF |
| TOTAL= | 258,104 SF |
| COMMERCIAL AREA: | |
| 1ST FLOOR | 10,886 SF |
| GROSS BUILDING AREA= | 268,990 SF |
| INDEPENDENT LIVING: | 130 UNITS |
| ASSISTED LIVING: | 60 UNITS |
| MEMORY CARE: | 26 BEDS |

## PLANNING AREA 2 SUMMARY:

MULTI-FAMILY APARTMENTS:

| BLDG NO. | 1ST FLOOR | 2ND FLOOR | 3RD FLOOR | TOTAL AREA (SF) |
|---|---|---|---|---|
| 1 | 11,935 | 18,419 | 18,419 | 48,773 |
| 2 | 2,478 | 5,100 | 5,100 | 12,678 |
| 3 | 6,694 | 13,824 | 13,824 | 34,342 |
| 4 | 4,633 | 9,610 | 9,610 | 23,853 |
| 5 | 6,148 | 10,898 | 10,898 | 27,944 |
| TOTAL= | 31,888 | 57,851 | 57,851 | 147,590 (138,154 WITHOUT BALCONIES) |

AMENITY AREAS:

| | |
|---|---|
| CABANA & POOL EQUIPMENT | 834 SF |

## PLANNING AREA 3 SUMMARY:

MULTI-FAMILY APARTMENTS:

| BLDG NO. | 1ST FLOOR | 2ND FLOOR | 3RD FLOOR | 4TH FLOOR | TOTAL AREA (SF) |
|---|---|---|---|---|---|
| 1 | 11,094 | 15,460 | 15,460 | 15,460 | 57,474 |
| 2 | 13,276 | 18,374 | 18,374 | 18,374 | 68,398 |
| 3 | 12,592 | 17,310 | 17,310 | 17,310 | 64,522 |
| 4 | 12,974 | 17,429 | 17,429 | 17,429 | 65,261 |
| 5 | 161 | 2,257 | | | 9,672 |
| 6 | 161 | 2,257 | | | 9,672 |
| 7 | 161 | 2,257 | | | 9,672 |
| 8 | 161 | 2,257 | | | 9,672 |
| TOTAL= | 50,097 | 70,830 | 68,573 | 68,573 | 265,327 (250,531 WITHOUT BALCONIES) |

AMENITY AREAS:

| | |
|---|---|
| CABANA & POOL EQUIPMENT | 834 SF |
| CLUBHOUSE | 1,708 SF |
| TOTAL= | 2,672 SF |

## SENIOR LIVING PARKING SUMMARY:

PARKING REQUIRED:

| | |
|---|---|
| ASSISTED LIVING= 60 UNITS x 0.5/UNIT PLUS | 30 STALLS |
| INDEPENDENT LIVING= 130 UNITS x 0.5/UNIT PLUS (1 STALL/8 GUESTS) | 82 STALLS |
| MEMORY CARE= 26 BEDS x 0.5/BED PLUS | 13 STALLS |
| COMMERCIAL= 10,886 SF x 1/250 SF | 44 STALLS |
| TOTAL= | 169 STALLS |

PARKING PROVIDED:

| | |
|---|---|
| ASSISTED LIVING= | 30 STALLS |
| INDEPENDENT LIVING= | 82 STALLS |
| MEMORY CARE= | 13 STALLS |
| COMMERCIAL= | 44 STALLS |
| VISITOR= | 59 STALLS |
| TOTAL= | 228 STALLS |

*6 BICYCLE PARKING SPACES PROVIDED (BICYCLE RACKS).

## APARTMENTS PARKING SUMMARY:

PARKING REQUIRED:

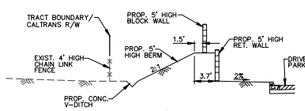
| | PA2 | PA3 | TOTAL |
|---|---|---|---|
| RESIDENT= | 234 | 368 | 602 STALLS (602 COVERED) |
| GUEST= | 76 | 114 | 190 STALLS |
| TOTAL= | 310 | 482 | 792 STALLS |

PARKING PROVIDED:

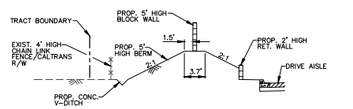
| | |
|---|---|
| GARAGES= | 199 STALLS |
| CARPORTS= | 404 STALLS |
| GUESTS= | 108 STALLS |
| TOTAL= | 711 STALLS (603 COVERED) |

*BICYCLE STORAGE/PARKING WILL BE PROVIDED WITHIN EACH BUILDING.

*SHARED PARKING ANALYSIS IS BEING PERFORMED AND WILL BE PROVIDED AT A LATER DATE.

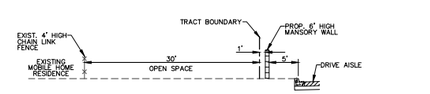



BERM/WALL DETAIL
SECTION H-H
NOT TO SCALE




BERM/WALL DETAIL
SECTION H
NOT TO SCALE

GRAPHIC SCALE
0 25 50 100
( IN FEET )
1 inch = 50 ft.




SECTION J-J
NOT TO SCALE


ALLIANCE
LAND PLANNING & ENGINEERING INC.
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27413 TOURNEY ROAD
SUITE 120
VALENCIA, CA 91355
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PLAN PREPARED FOR:
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PLANS PREPARED BY:
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CARLSBAD, CA 92008
(760) 431-9896
PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG M. WHITTEKER R.C.E. 51929 — 5/26/21 DATE

REGISTERED PROFESSIONAL ENGINEER — CRAIG M. WHITTEKER — NO. 51929 — EXP. 6-30-22 — CIVIL — STATE OF CALIFORNIA

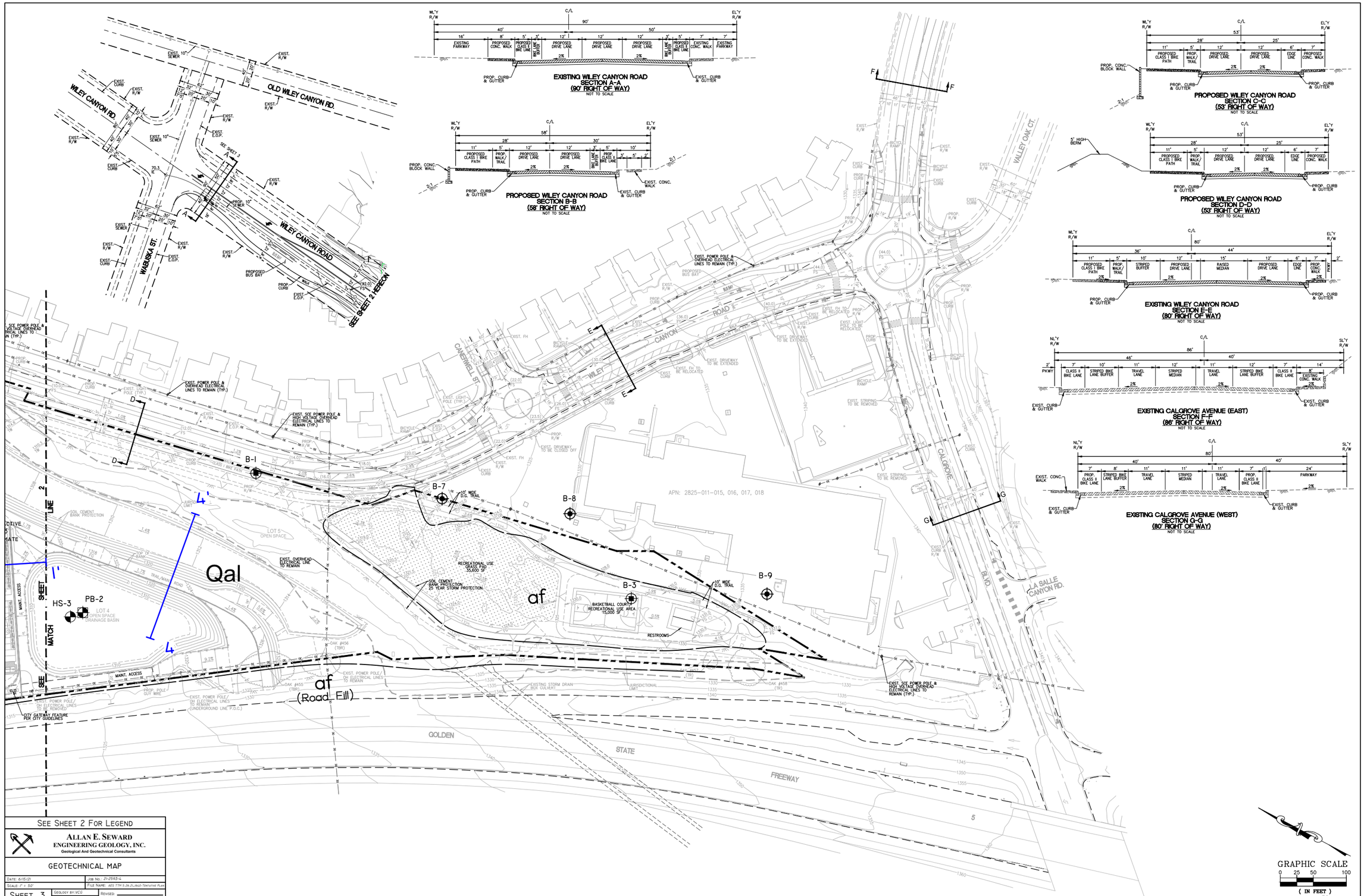
| NO. | DATE | REVISIONS | BY | APPR |
|---|---|---|---|---|

SHEET 2 OF 3 SHEETS

CITY OF SANTA CLARITA

WILEY CANYON
TENTATIVE TRACT MAP 083295
FOR CONDOMINIUM PURPOSES

G:\2593 acad\In Progress\AES TTM Dated 5.26.21 1640_TENTATIVE_MAP_PLAN.dwg




SEE SHEET 2 FOR LEGEND

**ALLAN E. SEWARD**
**ENGINEERING GEOLOGY, INC.**
Geological And Geotechnical Consultants

GEOTECHNICAL MAP

| | | |
|---|---|---|
| DATE: 6/15/21 | | JOB NO.: ZI-2593-4 |
| SCALE: 1" = 50' | | FILE NAME: AES TTM 5.26.21_NLMJD-Tentative Plan |
| SHEET 3 | GEOLOGY BY: VCG | |
| | DRAWN BY: CHD/VCG | REVISED: |

**ALLIANCE**
LAND PLANNING & ENGINEERING INC.
CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING

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PLAN PREPARED FOR:
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SHERIDAN-EBBERT DEVELOPMENT/
ROYAL CLARK DEVELOPMENT COMPANY
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PLANS PREPARED BY:
ALLIANCE LAND PLANNING & ENGINEERING INC.
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PLANS PREPARED UNDER THE DIRECTION OF:
CRAIG M. WHITTEKER R.C.E. 51929 — 5/26/21 DATE

REGISTERED PROFESSIONAL ENGINEER — CRAIG M. WHITTEKER — NO. 51929 — EXP. 6-30-22 — CIVIL — STATE OF CALIFORNIA

| NO. | DATE | REVISIONS | BY | APPR |
|---|---|---|---|---|

SHEET 3 OF 3 SHEETS — CITY OF SANTA CLARITA

WILEY CANYON
TENTATIVE TRACT MAP 083295
FOR CONDOMINIUM PURPOSES

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