Appendix E
Geotechnical Report

ALLAN E. SEWARD
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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

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APPENDIX D – Liquefaction Assessment

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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.

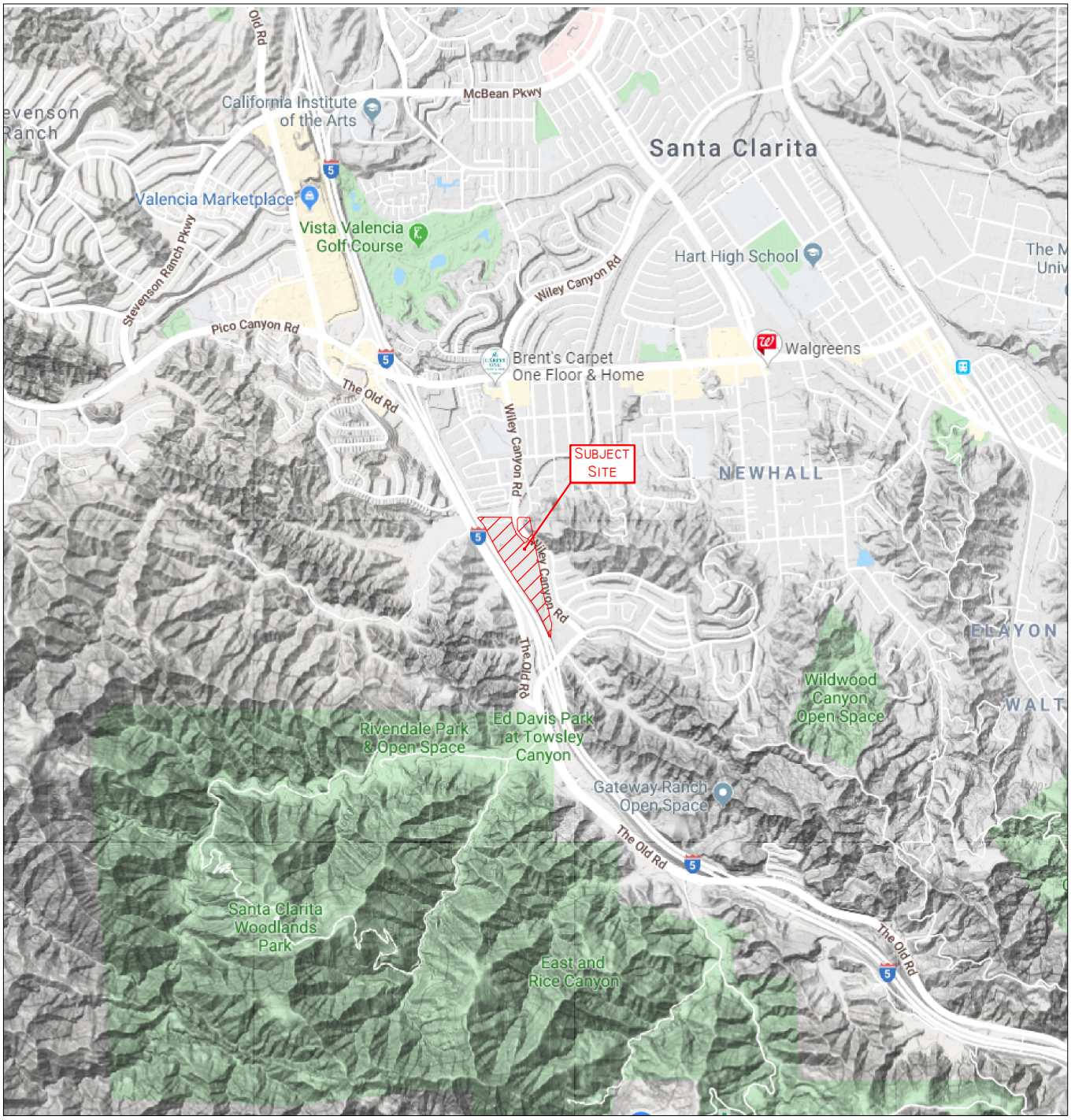
The subject property was previously used as a mule ranch and remains mostly vacant with the exception of the northerly portion, which is roughly paved and occupied by miscellaneous barn and storage structures and two mobile homes. A small, out of service (dry) water reservoir is present at the northwesterly 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.

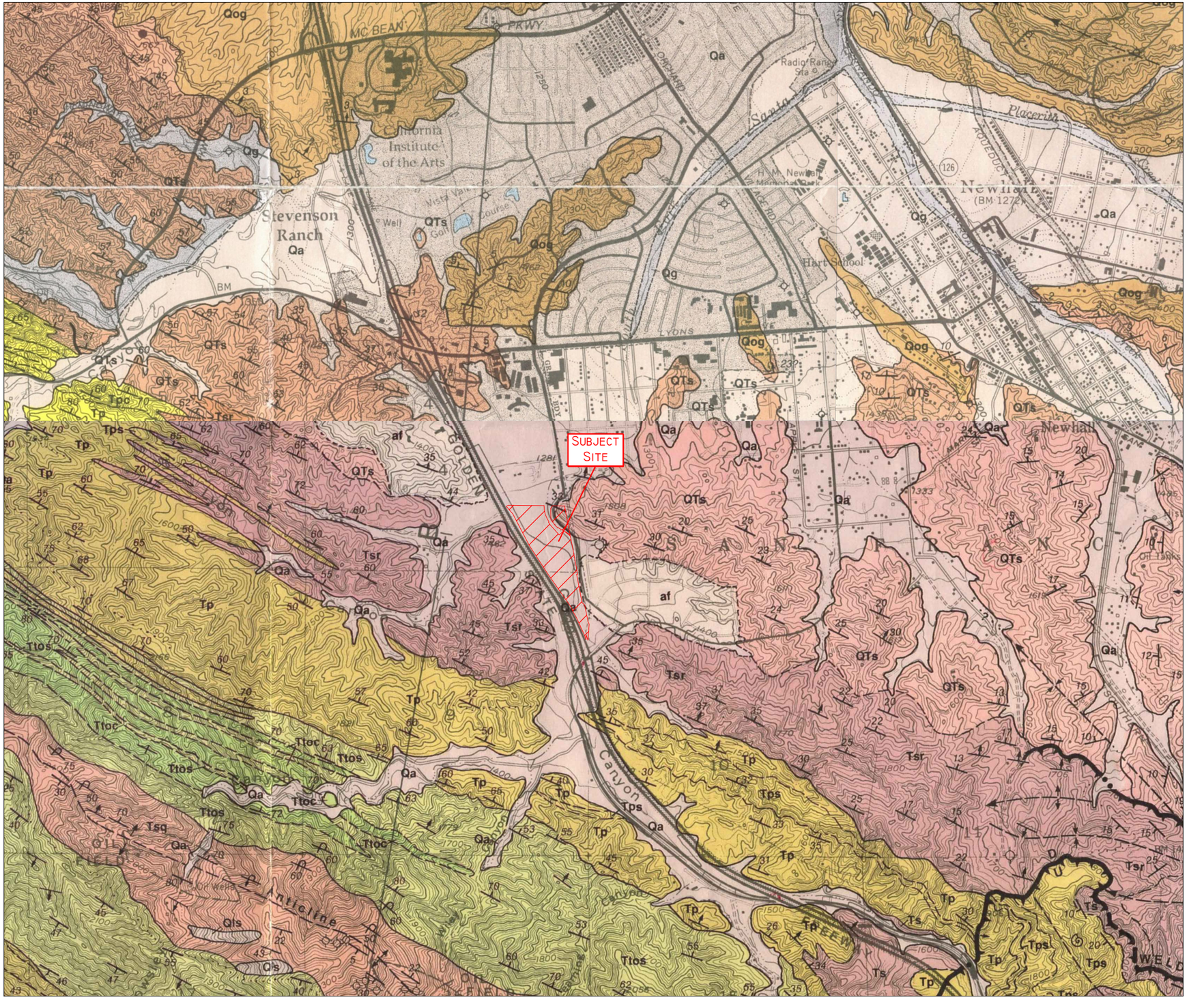
5.0 GENERALIZED GEOTECHNICAL CONDITIONS AND SOIL PROPERTIES

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.*

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: *inclined* — *inclined (approximate)* — *overturned* — *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.

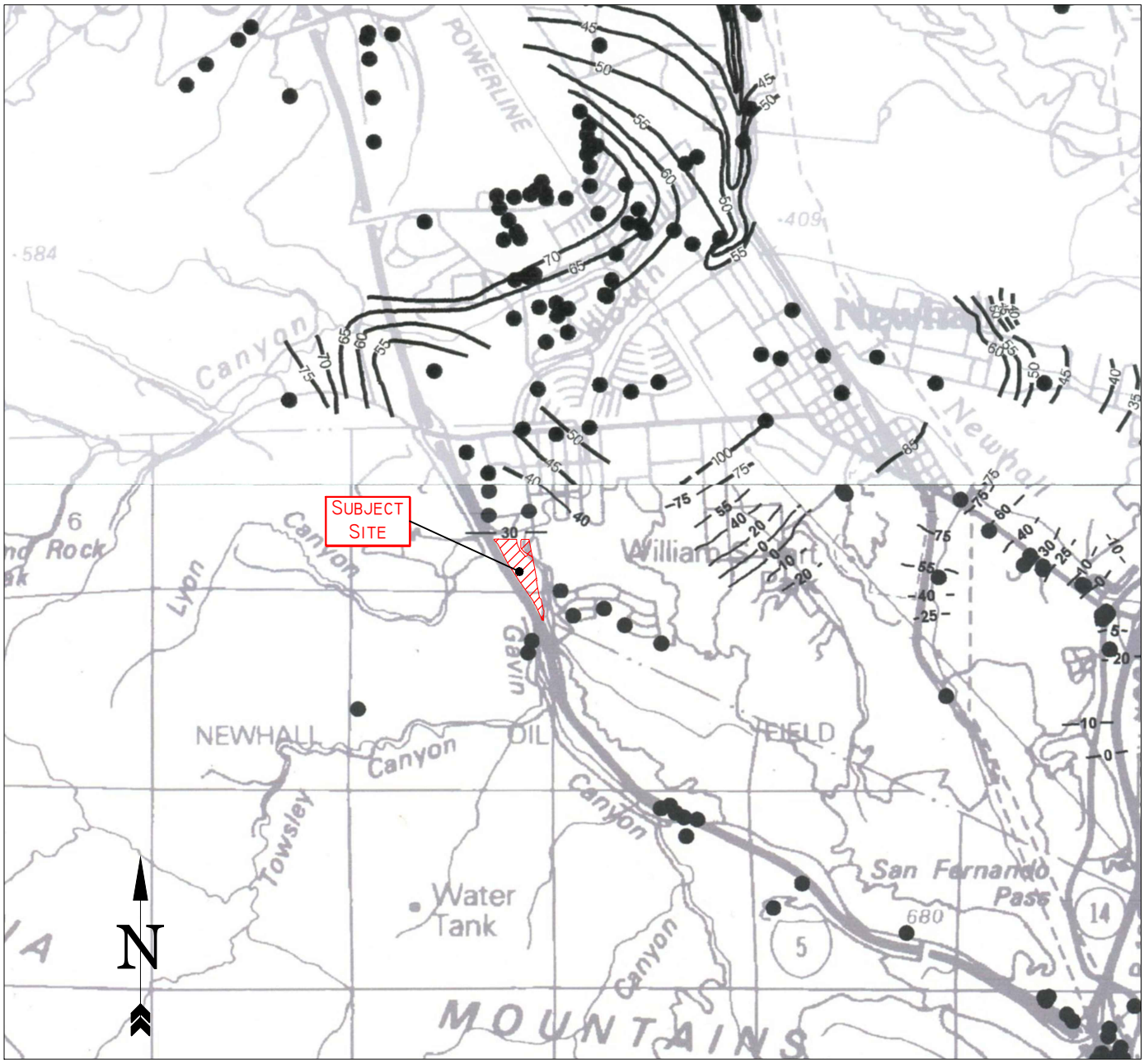
An inactive ground water well is present on the site per the County of Los Angeles Department of Public Works web application (https://dpw.lacounty.gov/general/wells/. This water well is designated as well 5843 and was first measured 10/7/31 and was last measured 11/17/47. The highest water surface was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

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
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						39	
					@ 26' - fine- to coarse-grained; medium dense; damp; light brown			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') No Ground Water				
60									
65									
70									
75									

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-2	
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
0				ML	**ALLUVIUM; Qal (0 - 20')** @ 0 - 9' Sandy SILT; moist; dark brown to medium brown with depth				Surface logged @ 0 - 9' 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') No Ground Water				
25									
30									
35									

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-3	
HAMMER TYPE: Automatic	AVERAGE DROP: 30"		
DRIVING WEIGHTS: 140 lbs.	ELEVATION: 1314'		

DEPTH (feet)	SAMPLE TYPE	BLOWS / 12"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% Fines	Other Tests
0				SM-ML	**<u>ALLUVIUM</u>; Qal (0 - 25')** @ 0 - 12' Silty, fine-grained SAND to sandy SILT; loose/soft; moist; dark brown				Surface logged @ 0 - 12' Infiltration test conducted in adjacent borehole at a depth of 12'
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 TOTAL DEPTH 25' (Elev. 1289') No Ground Water				Small Bulk @ 25' from the cuttings
30									
35									

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE)	GRAVEL AND GRAVELLY SOILS (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 (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 (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

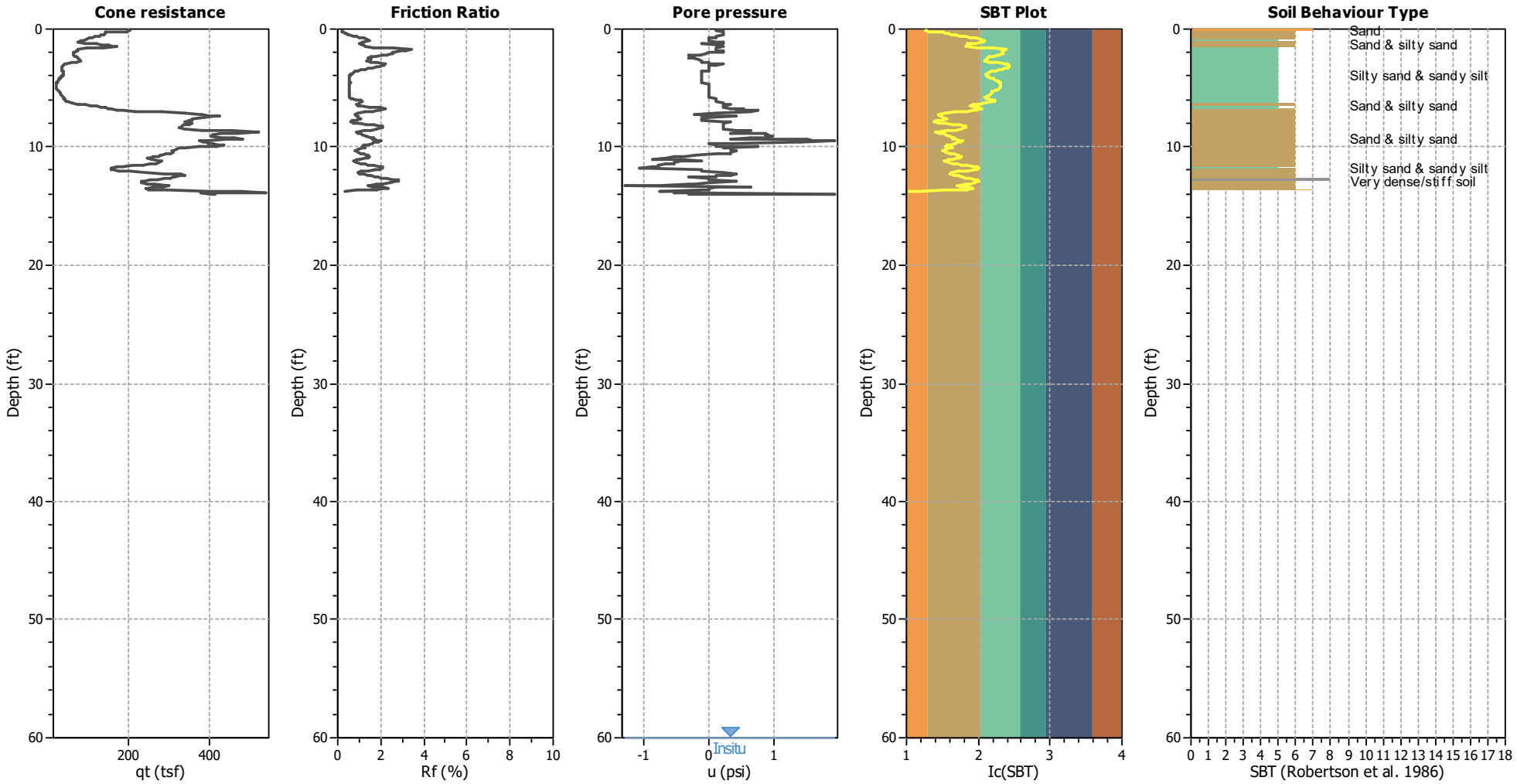
LABORATORY TESTING ABBREVIATIONS

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



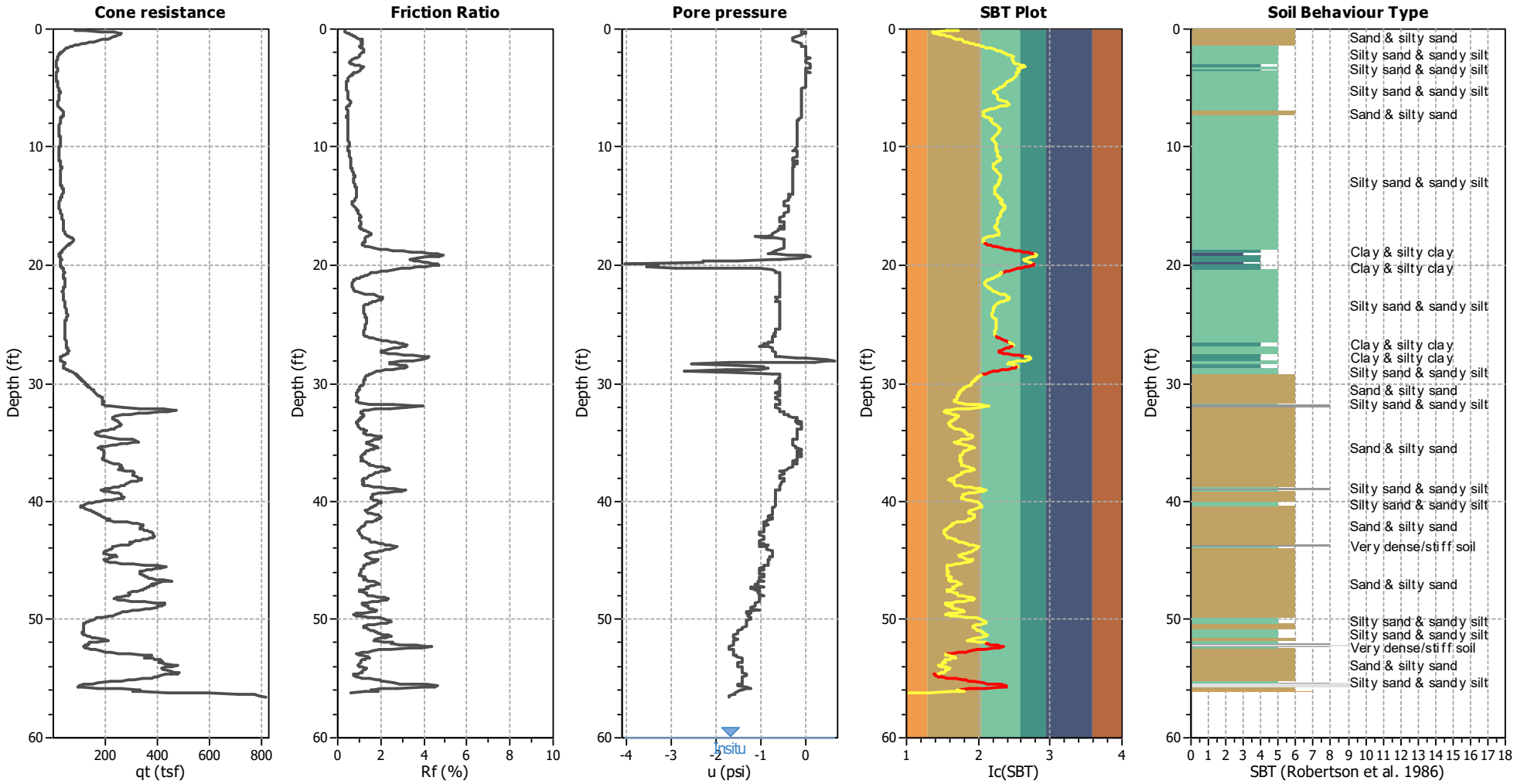
Input parameters and analysis data

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_σ 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

CPT basic interpretation plots



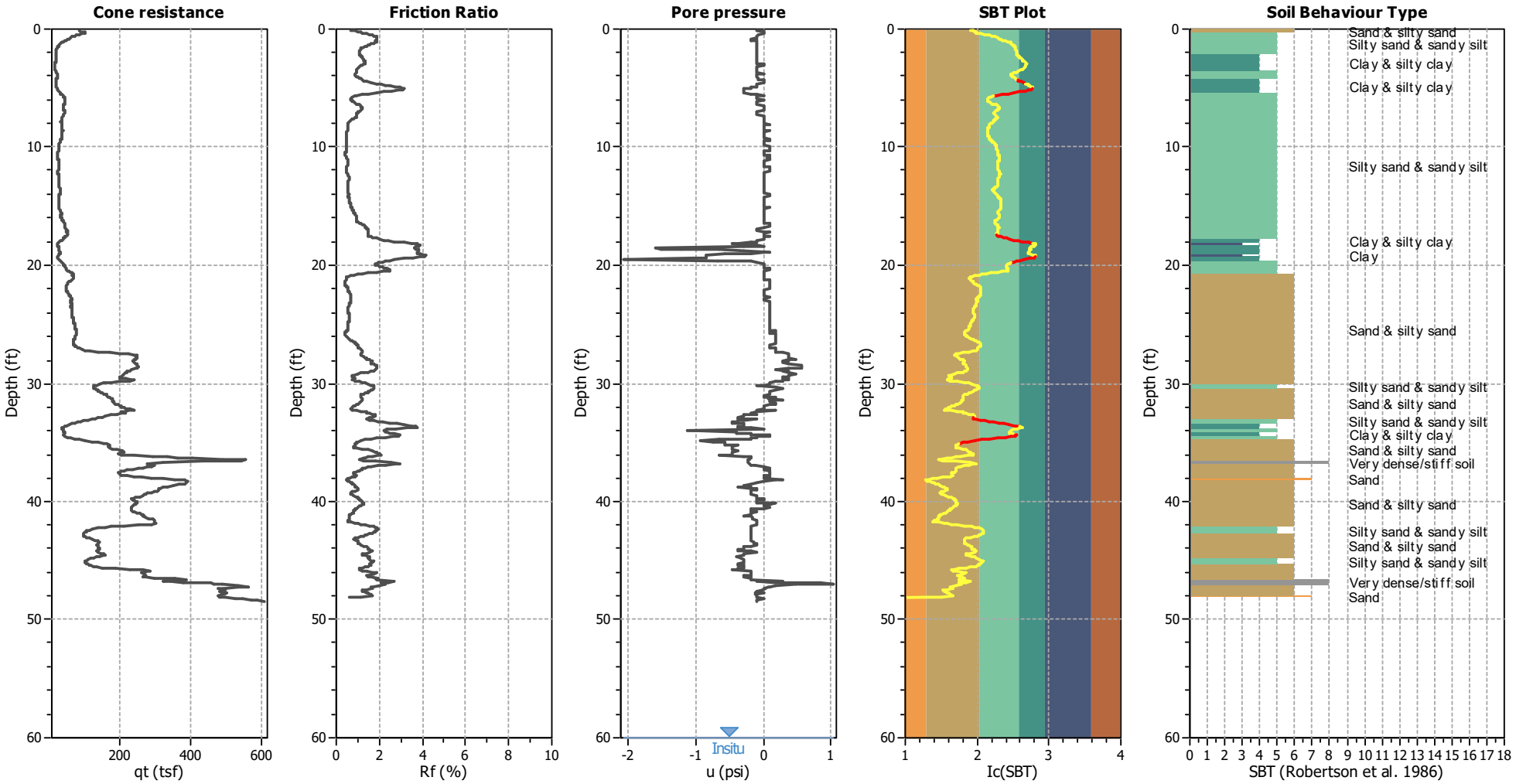
Input parameters and analysis data

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_σ 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

CPT basic interpretation plots



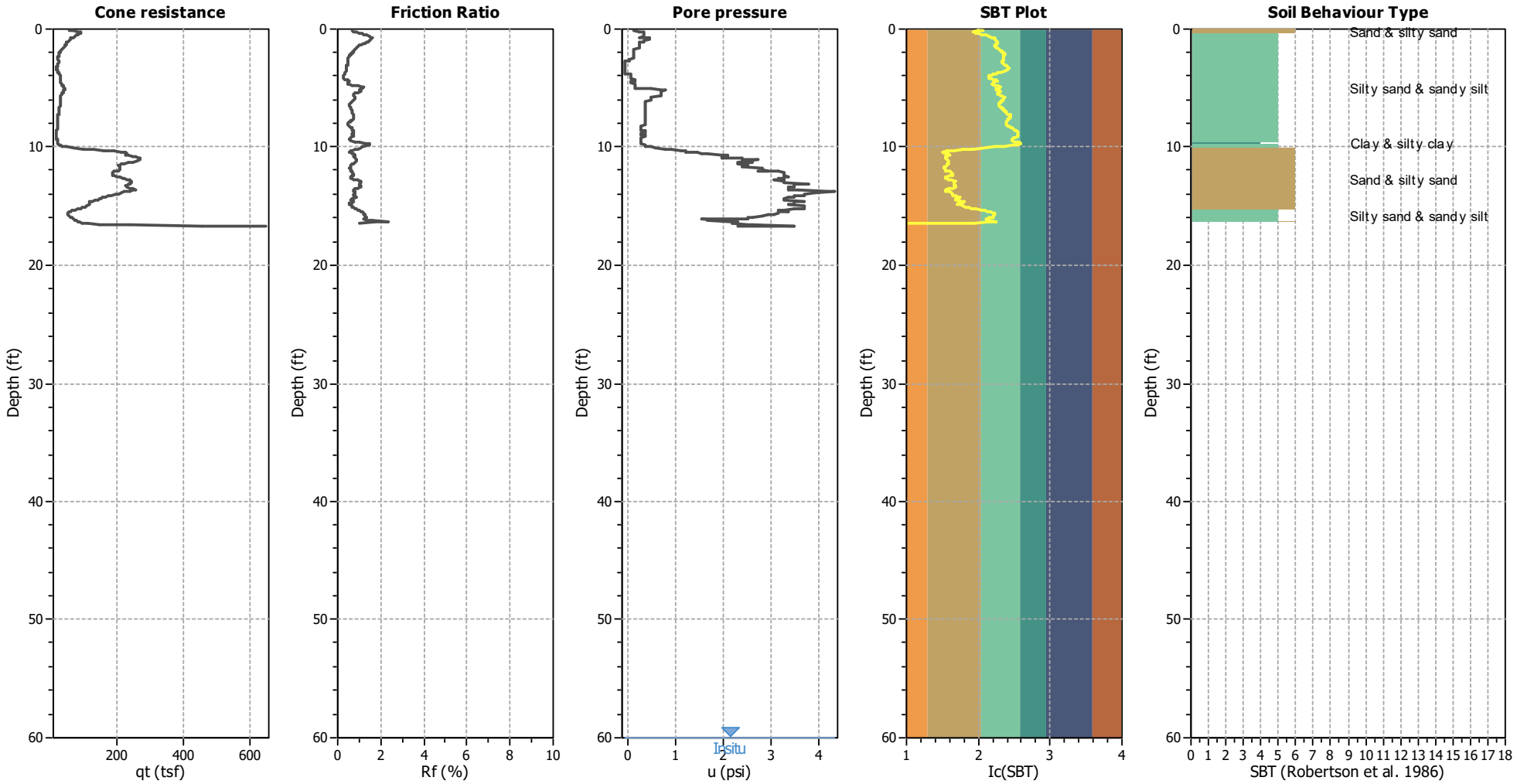
Input parameters and analysis data

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

CPT basic interpretation plots



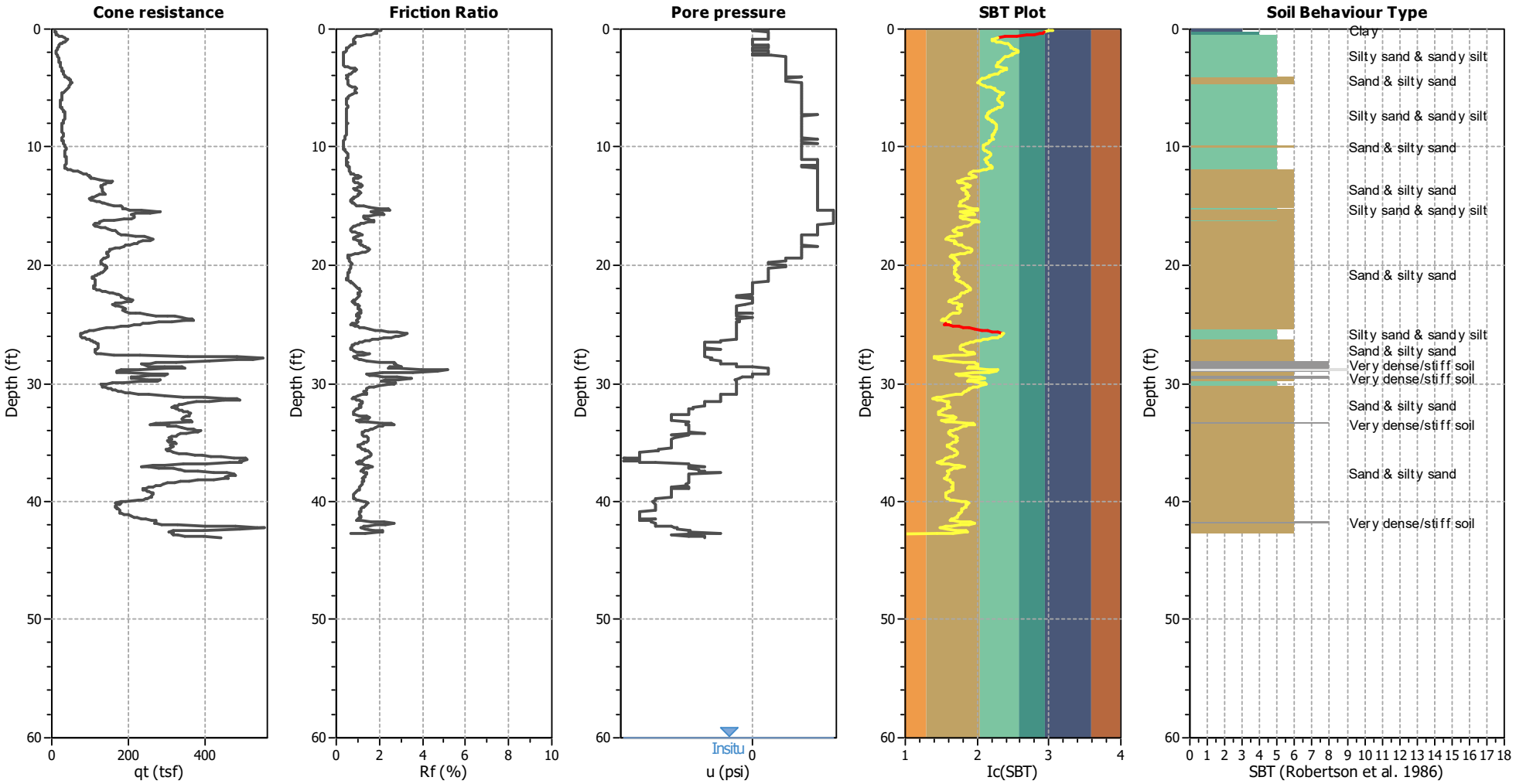
Input parameters and analysis data

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_σ 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

CPT basic interpretation plots



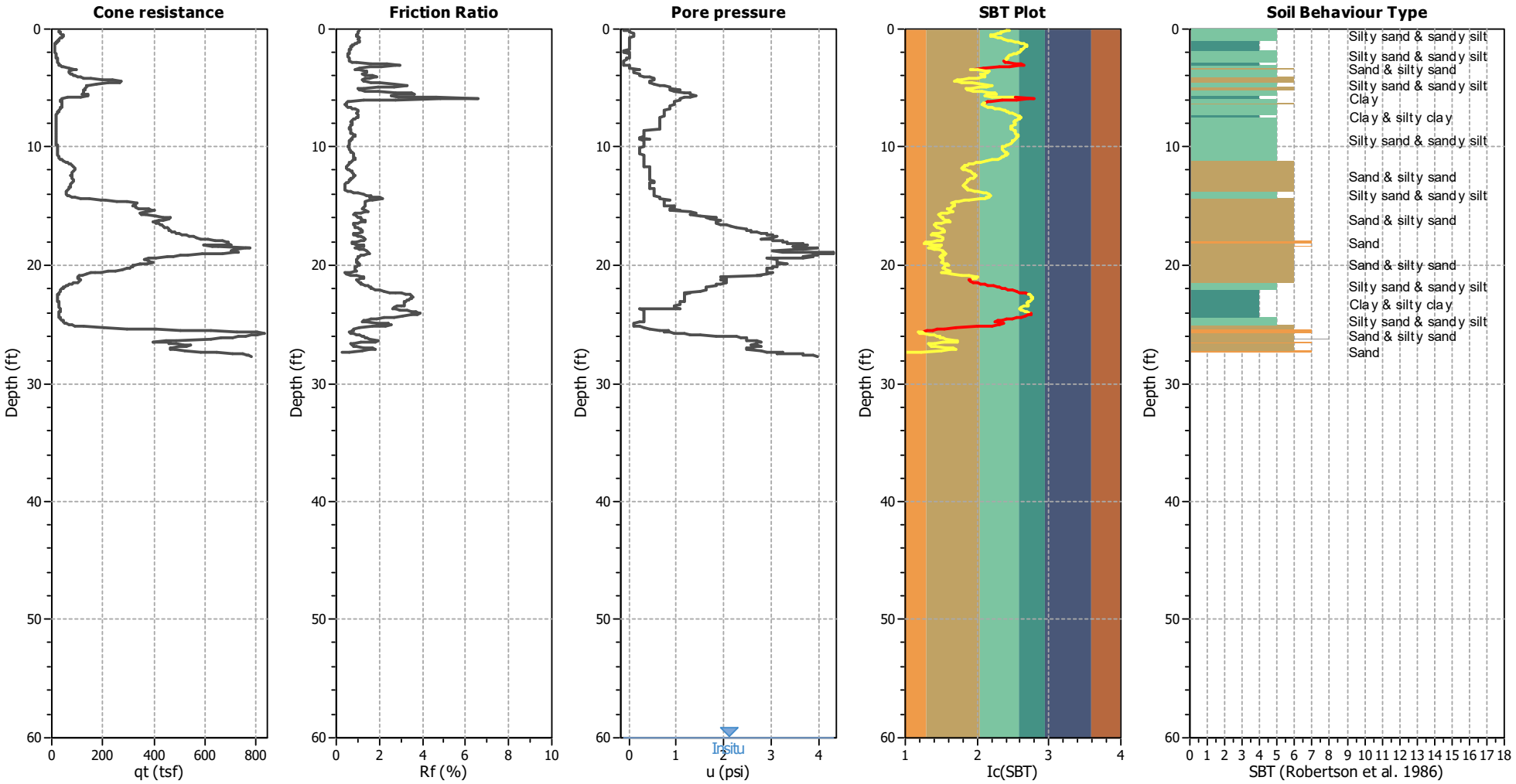
Input parameters and analysis data

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

CPT basic interpretation plots



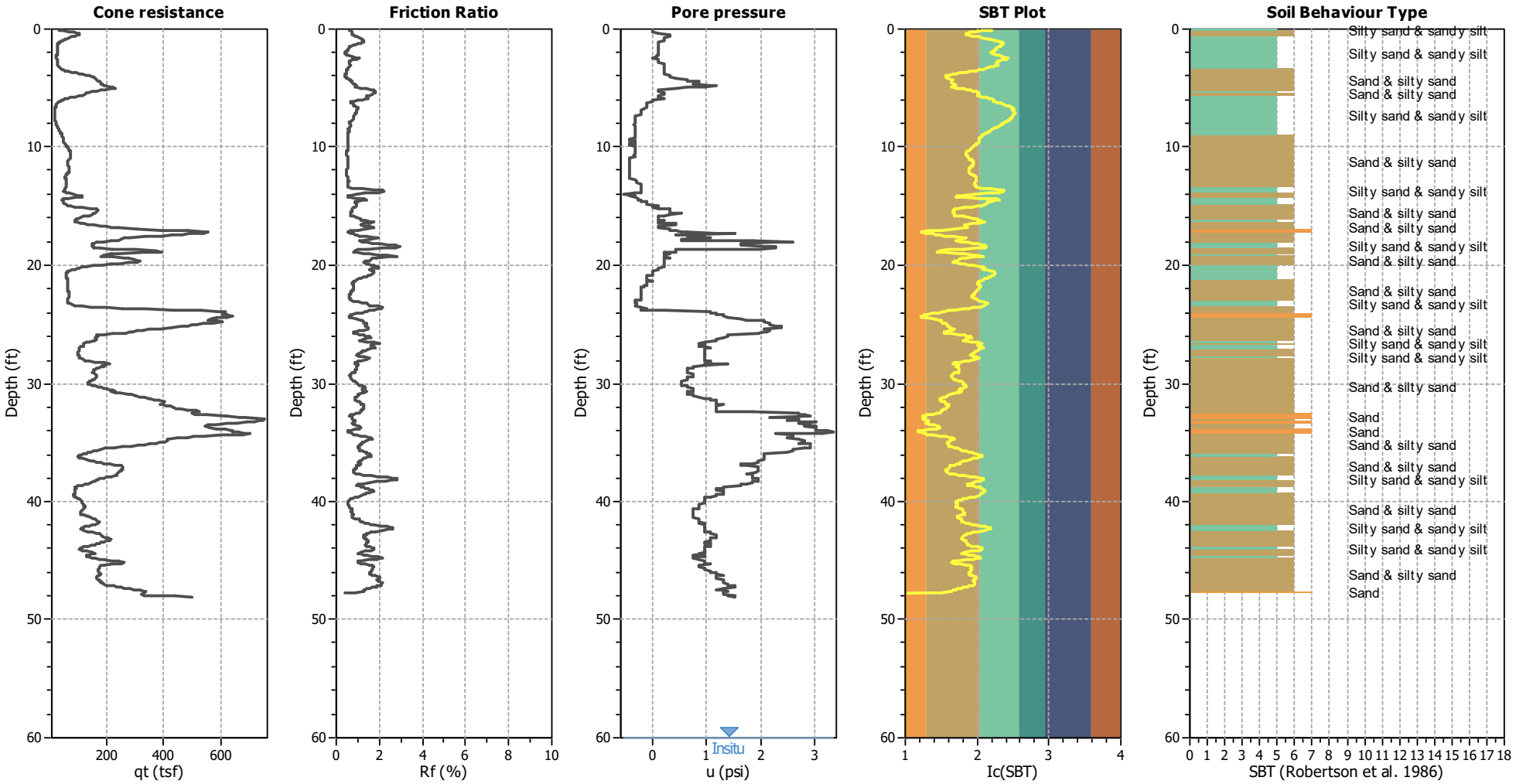
Input parameters and analysis data

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

CPT basic interpretation plots



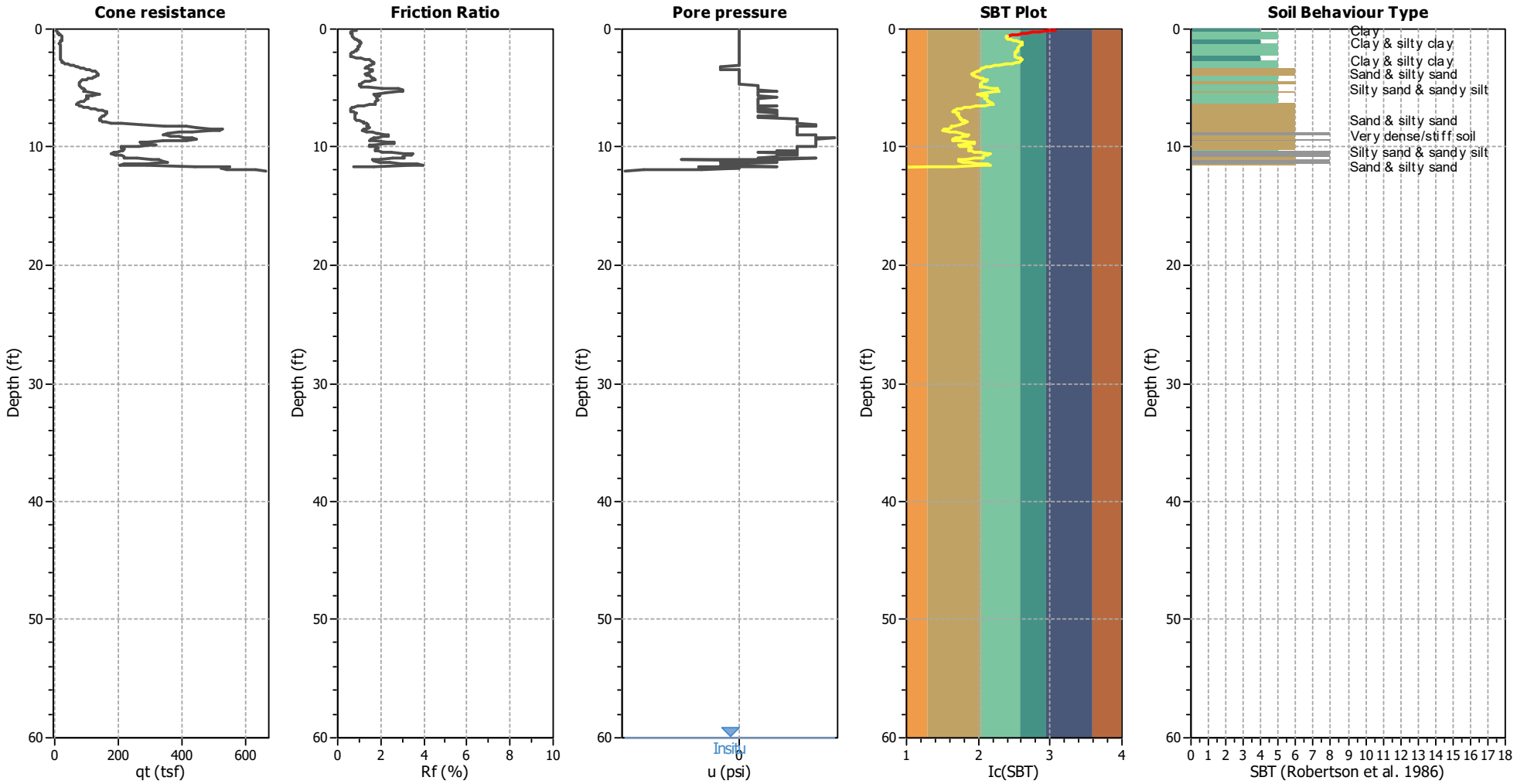
Input parameters and analysis data

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_σ 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

CPT basic interpretation plots



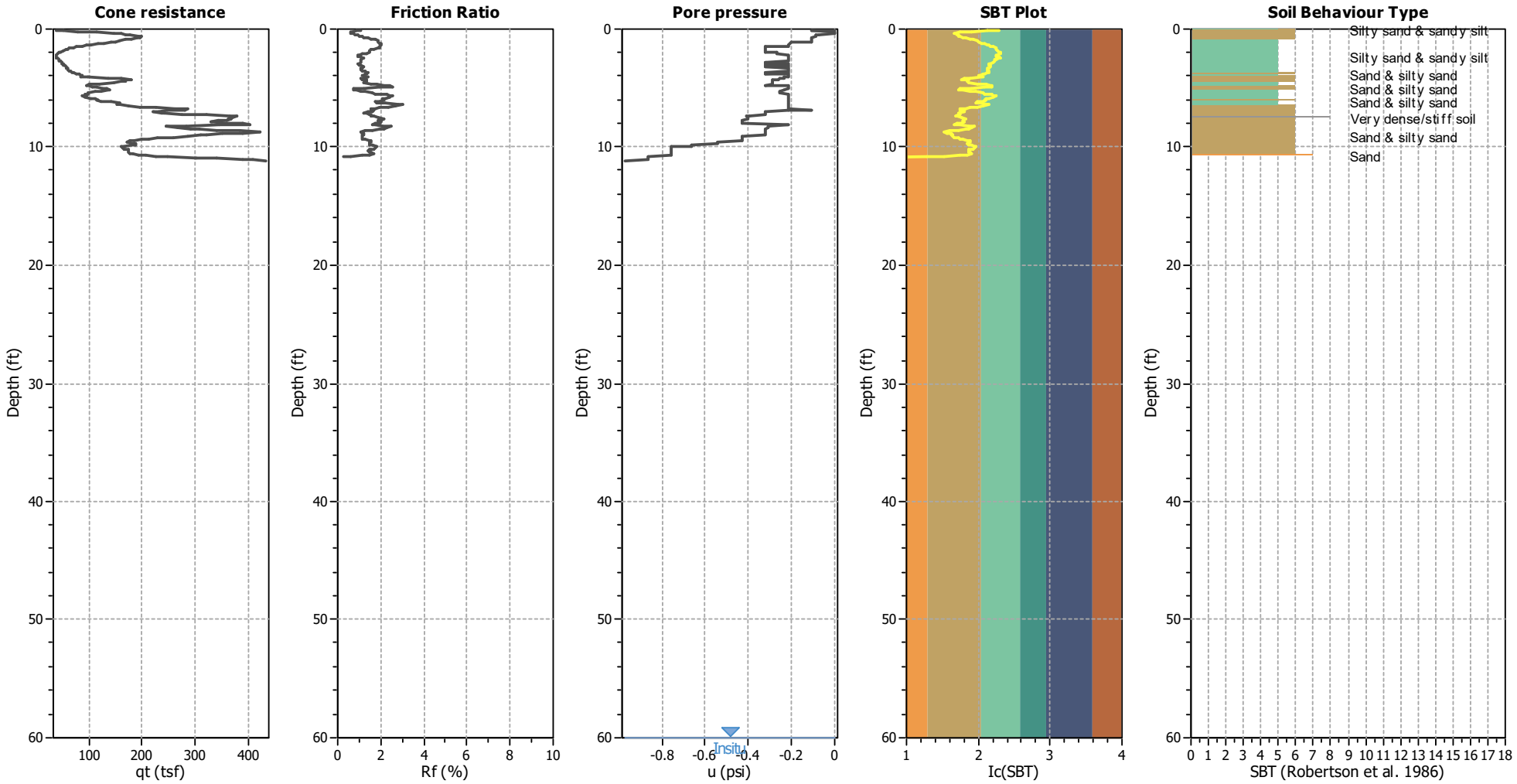
Input parameters and analysis data

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_σ 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

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_σ 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
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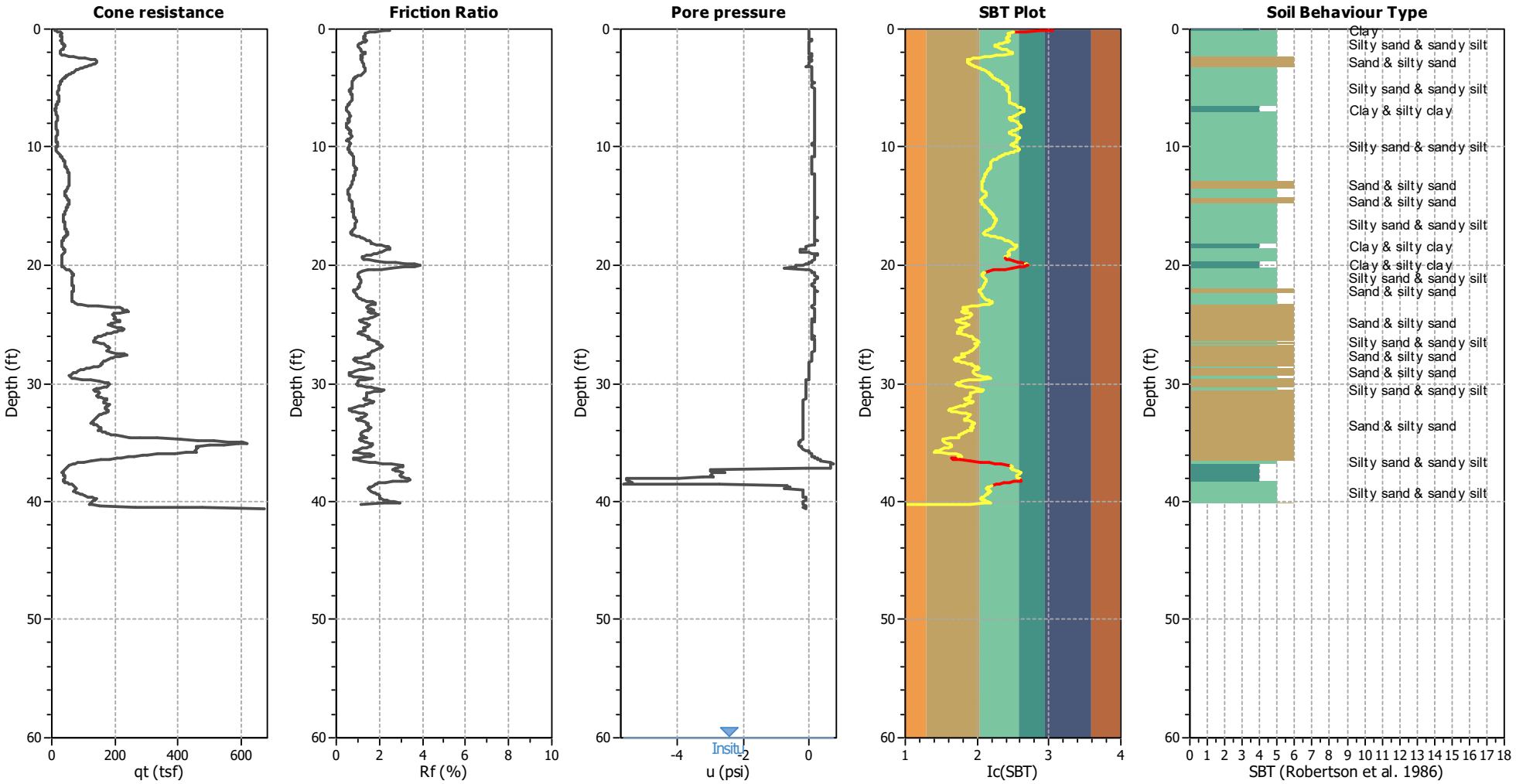
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

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_σ 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

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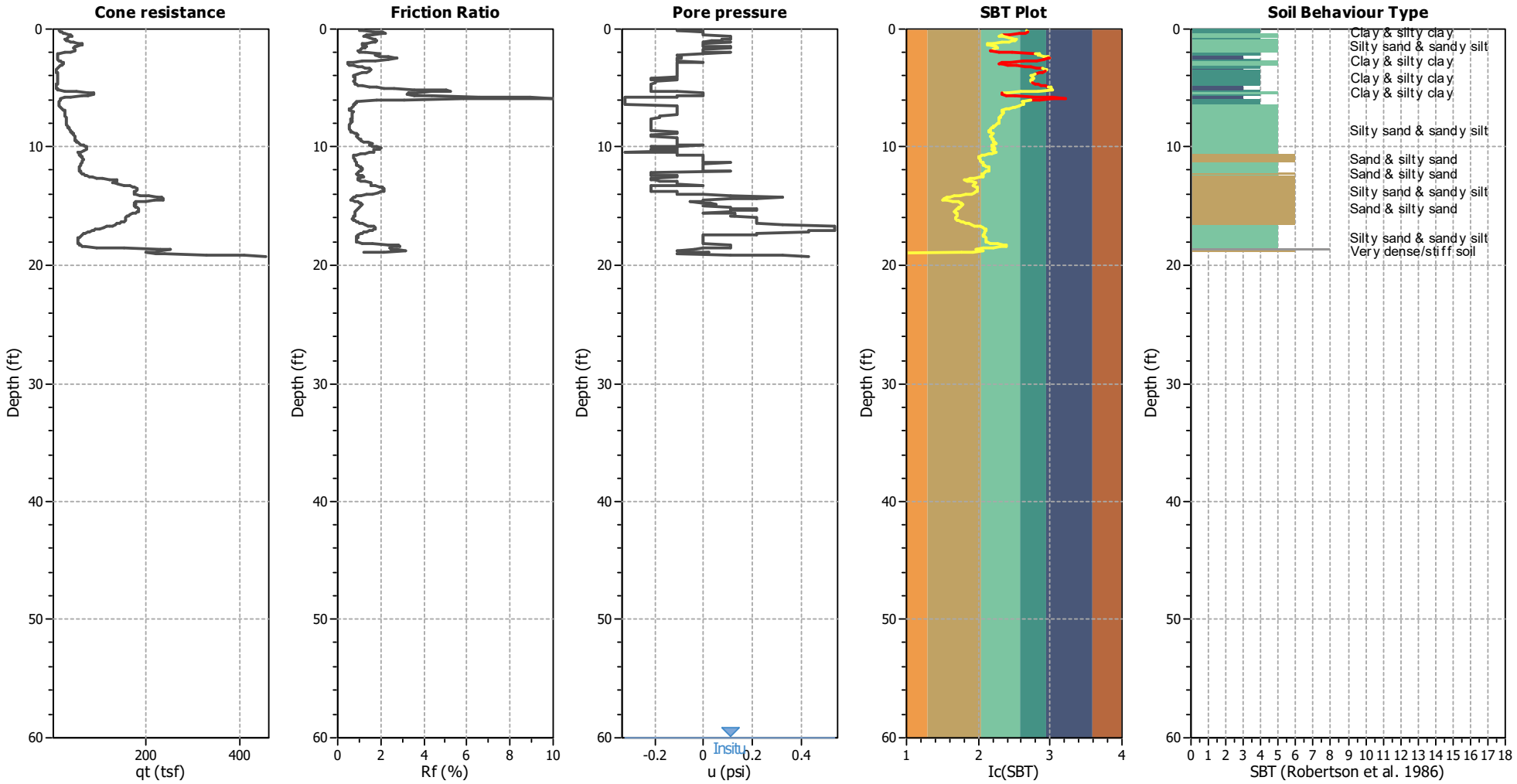
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots



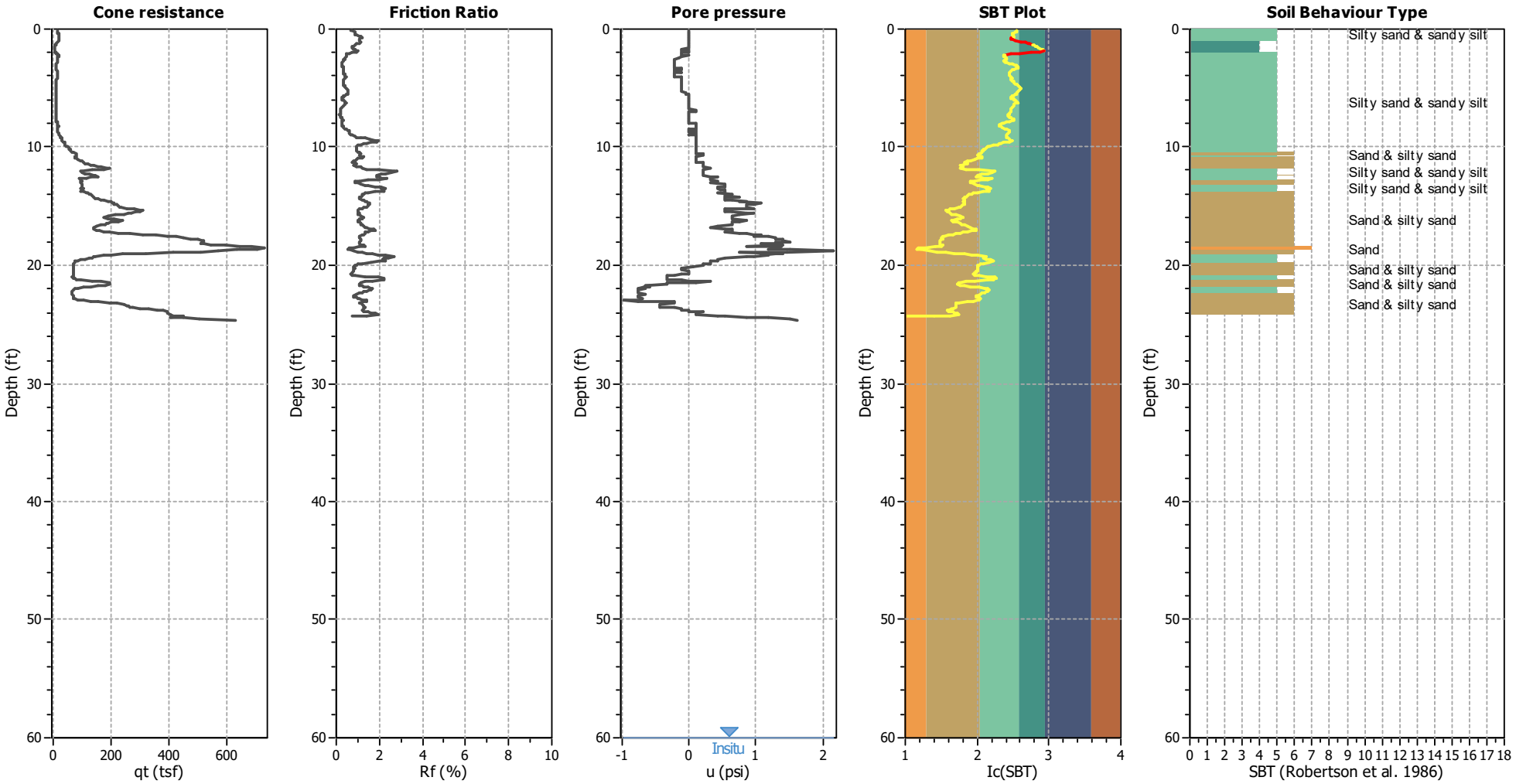
Input parameters and analysis data

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_σ 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

CPT basic interpretation plots



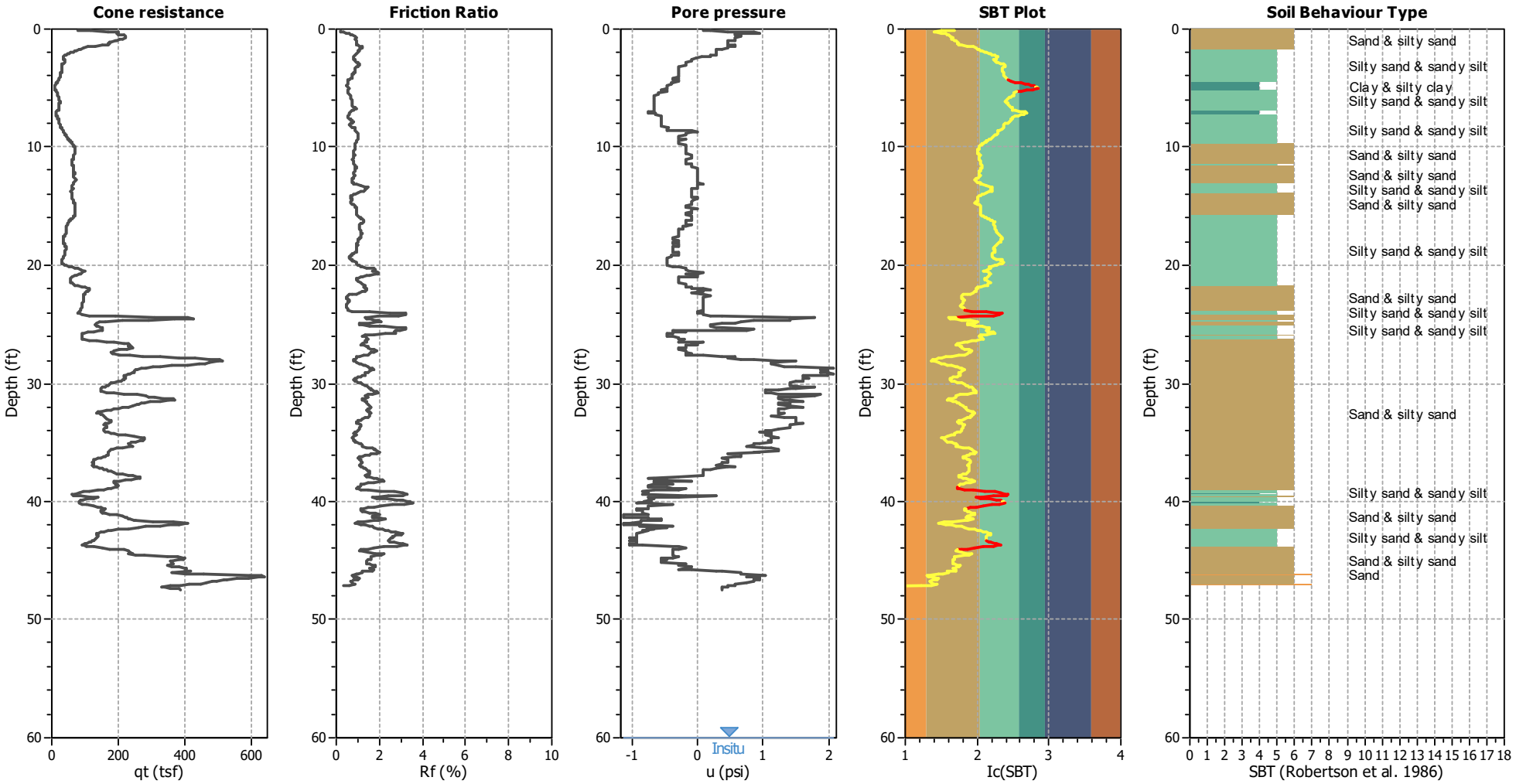
Input parameters and analysis data

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

CPT basic interpretation plots



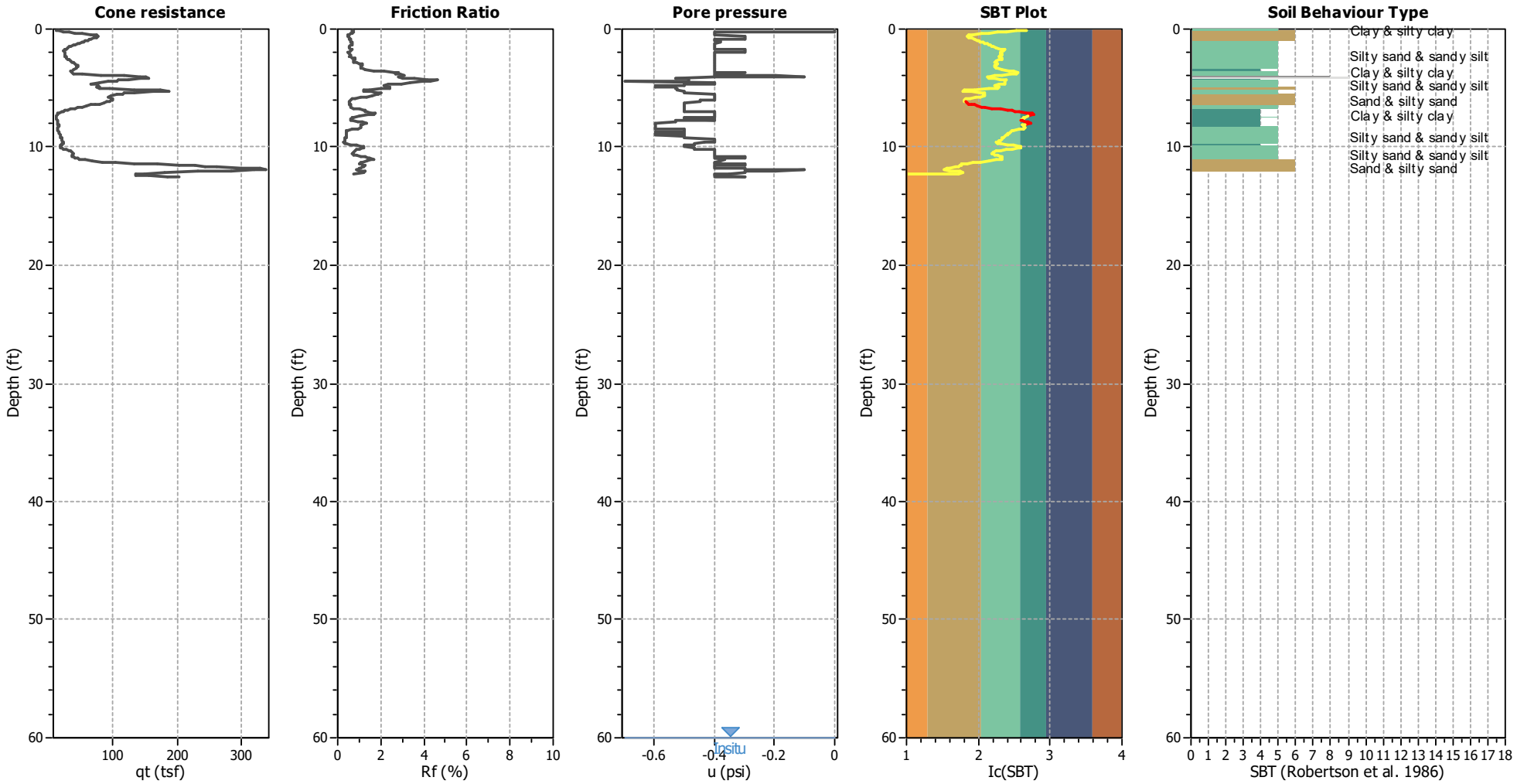
Input parameters and analysis data

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

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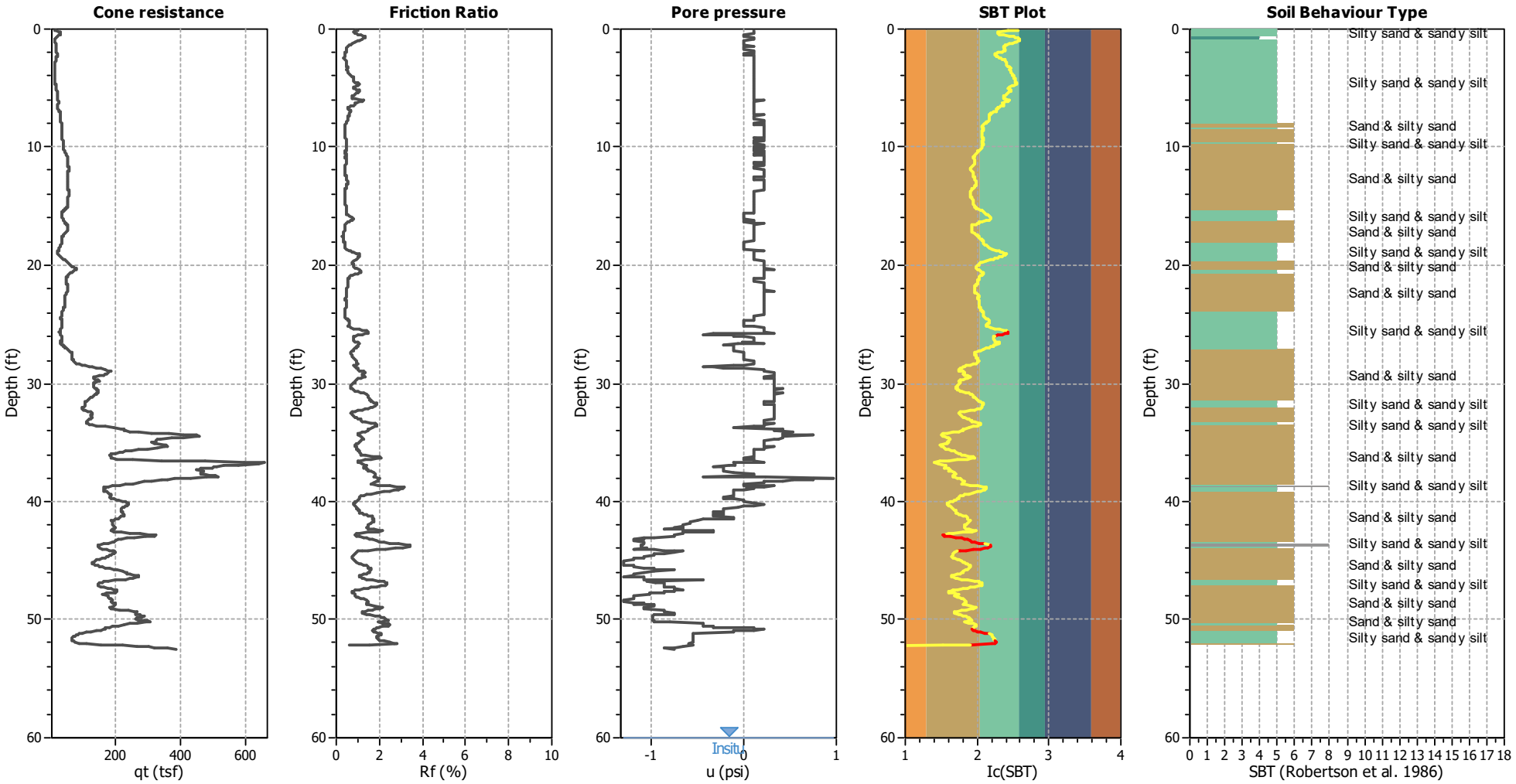
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots



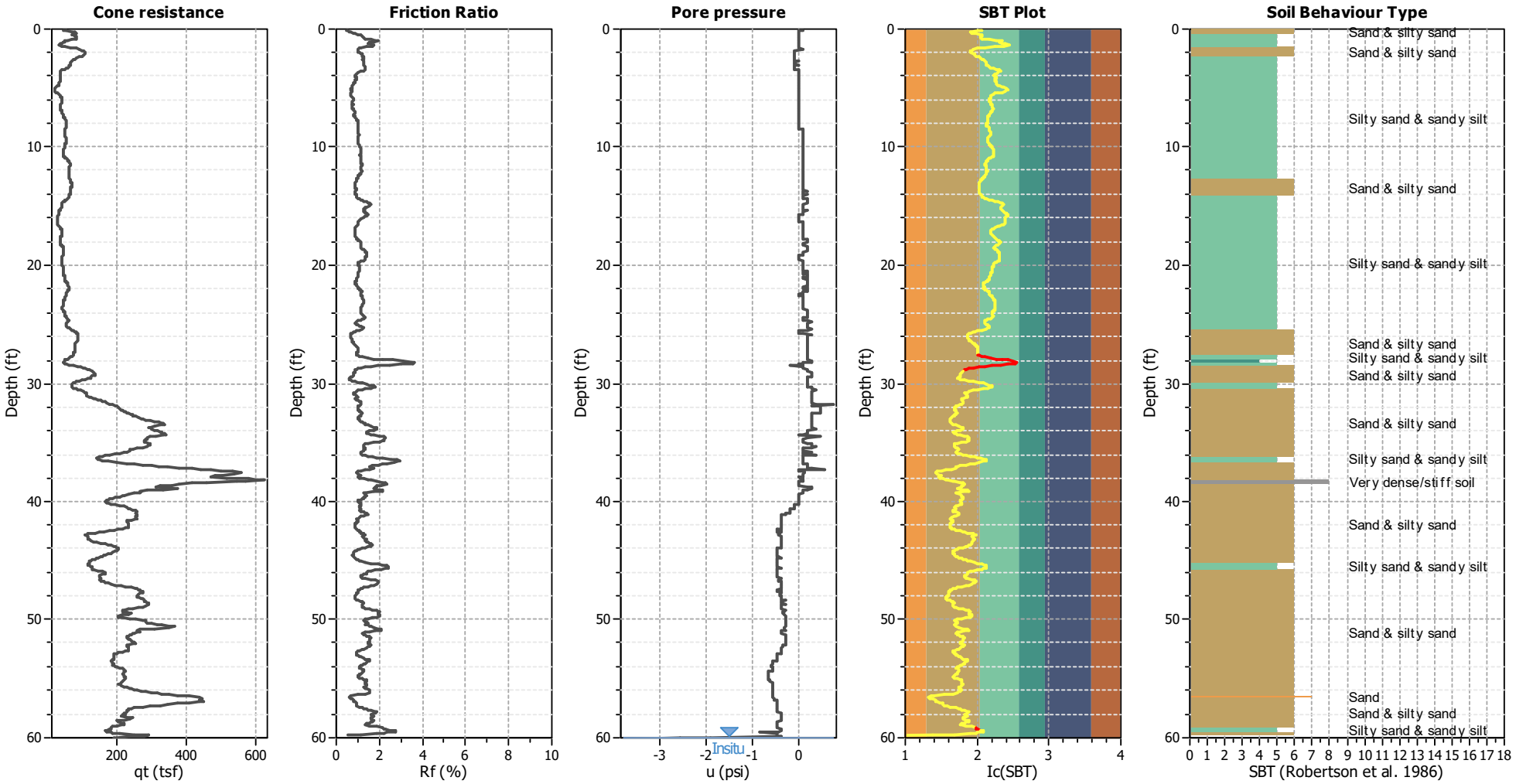
Input parameters and analysis data

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

CPT basic interpretation plots



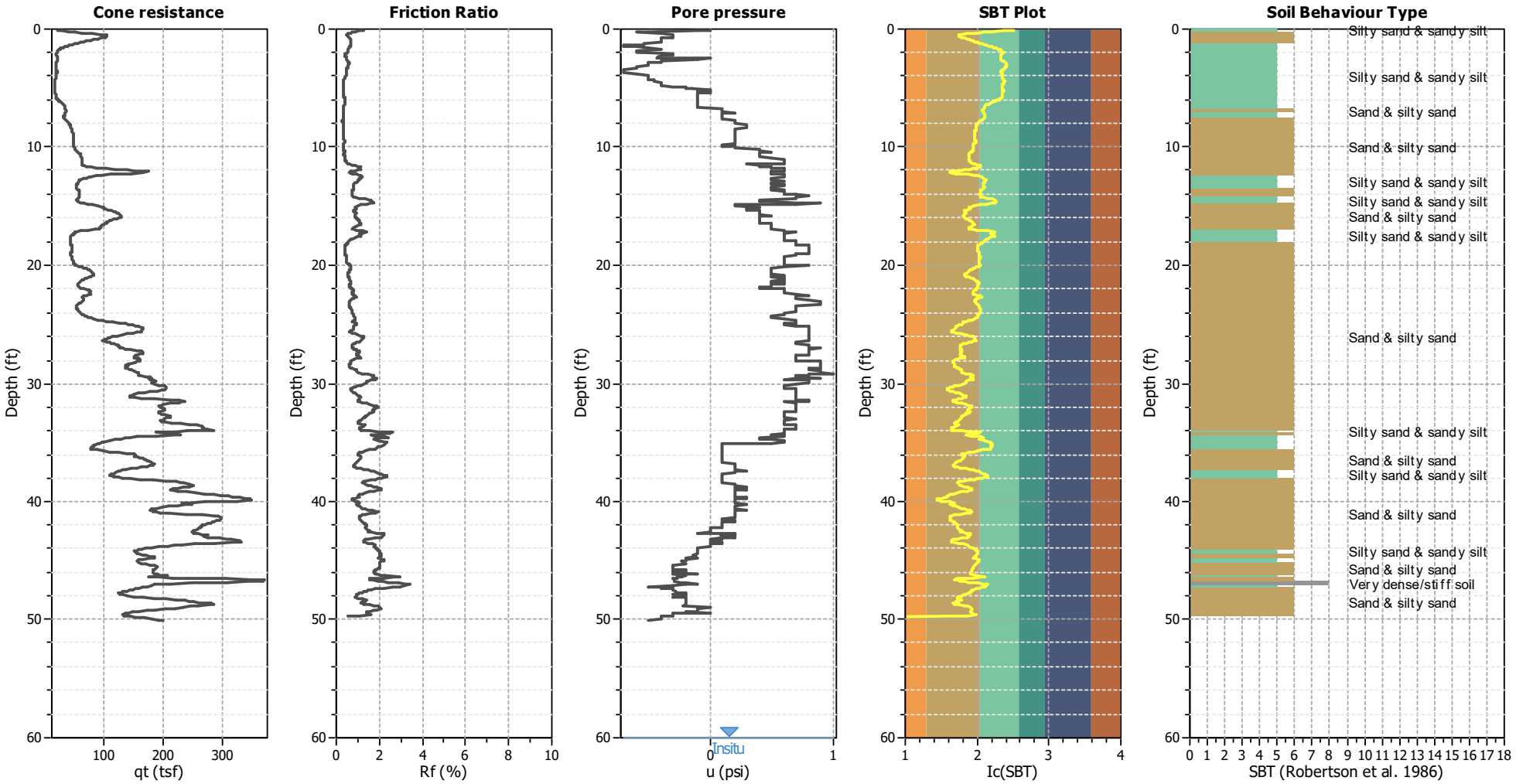
Input parameters and analysis data

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_σ 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

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_σ 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	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	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 Logged By: SLV Sampled By: SLV	Type of Test
1303	0		BULK				SM	**Alluvium (Qal):** 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

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

Geotechnical Boring Log B-LGC-1

Date: 1/02/07	
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 Logged By: SLV 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 @ 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 @ 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								

LGC

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

LGC VALLEY, INC.
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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	Type of Test
								Logged By: SLV ▽ Sampled By: SLV	
1243	60		13	50/6"	124.3	10.3	SP	@ 60' Groundwater Encountered SAND: light reddish-brown, wet, very dense; fine to coarse grained, some gravel	
1238	65		14	11 26 16				@ 65' SAND with Gravel: light reddish-brown, wet (saturated), dense; fine to coarse grained	
1233	70		15	11 24 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:** -Total Depth = 75.5' -Backfilled with Native Soil (Cuttings) -Groundwater Encountered at 60'	
1218	85								
1213	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

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 Logged By: SLV Sampled By: SLV	Type of Test
1300	0		BULK				ML/CL	**Alluvium (Qal):** Clayey SILT to Silty Clay - moderate yellowish-brown, slightly moist	MAX RDS
			1	6 9 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 15 22				@ 5' Same as at 2.5'	
1290	10		3	6 9 12				@ 10' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine grained, trace pinhole pores	
1285	15		4	8 11 13	106.6	7.9		@ 15' Same as at 10', moderate yellowish-brown to light reddish-brown	
1280	20		5	3 3 2			ML	@ 20' Clayey SILT with Sand: moderate yellowish-brown, slightly moist, medium stiff; fine grained sand	
1275	25		6	6 9 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	
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 Logged By: SLV 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								

LGC

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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 Logged By: SLV Sampled By: SLV	Type of Test
1240	60		12	10 27 50/4"			SP	@ 60' SAND: moderate yellowish-brown to light reddish-brown, slightly moist, very dense; fine to coarse grained, some gravel @ 62' Very Hard Drilling	
1235	65		13	26 26 26	124.9	10.1	SC	▽ @ 65' Clayey SAND with Gravel: light reddish-brown, very moist, dense; fine to coarse grained @ 66' Groundwater Encountered	DS
1230	70		14	13 10 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 16 31				**Bedrock: Saugus Formation (QTs):** @ 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:** -Total Depth = 80' 4" -Backfilled with Native Soil (Cuttings) -Groundwater Encountered at 66'	
1210	90								

LGC

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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 Logged By: CRK Sampled By: CRK	Type of Test
1298	0						SM	**Alluvium (Qal):** Silty SAND - moderate yellowish-brown, slightly moist	
			R-1	8 13 18				@ 2.5' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; trace pea gravel	
1293	5		R-2	8 9 7	105.4	6.6		@ 5' Silty SAND: moderate yellowish-brown, slightly moist, loose; trace pea gravel @ 7' Hard Drilling, large gravel in cuttings	
1288	10		R-3	46 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 16 11				@ 15' Silty SAND: dark yellowish-brown, slightly moist, medium dense; fine to medium grained, trace gravel	
1278	20		R-4	4 7 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 22 20				@ 25' Silty SAND with Gravel: dark yellowish-brown, slightly moist, dense; fine to coarse grained	SHA
1268	30								

LGC

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Geotechnical Boring Log B-LGC-3

Date: 1/03/07	
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 Logged By: CRK Sampled By: CRK	Type of Test
1268	30		R-5	30 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 @ 37' Hard Drilling	
1258	40		R-6	19 20 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 11 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							**Notes:** -Total Depth = 50' 6" -Backfilled with Native Soil (Cuttings) -No Groundwater Encountered	
1238	60								

LGC

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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 Logged By: CRK Sampled By: CRK	Type of Test
1302	0		BULK				SM	**Alluvium (Qal):** Silty SAND - moderate yellowish-brown, dry	
			R-1	6 9 15				@ 2.5' Silty SAND with Gravel: moderate yellowish-brown, dry, medium dense; fine grained	
1297	5		NR	17 50/3"				@ 5' No Recovery	
1292	10		R-2	11 13 14	107.3	4.7		@ 10' Silty SAND with Gravel: moderate yellowish-brown, slightly moist, medium dense	
1287	15		R-3	10 39 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 15 9	103.9	6.5	SP	@ 20' SAND: pale yellowish-brown, slightly moist, medium dense; fine to coarse grained	
1277	25		SPT-1	2 3 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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LGC VALLEY, INC.

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Geotechnical Boring Log B-LGC-4

Date: 1/03/07	
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 Logged By: CRK Sampled By: CRK	Type of Test
1272	30		SPT-2	43 18 38			SM	@30' Silty SAND: moderate yellowish-brown, slightly moist, very dense; trace gravel	
1267	35		R-5	26 31 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 10 50/3"			SM	@ 40' Silty SAND: moderate yellowish-brown, slightly moist, very dense; fine to coarse grained, trace gravel	
1257	45		R-6	23 26 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 12 14			SM	@ 50' Silty SAND: moderate yellowish-brown to light reddish-brown, slightly moist, medium dense; fine to medium grained, some gravel @ 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								

LGC

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Geotechnical Boring Log B-LGC-4

Date: 1/03/07	
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 Logged By: CRK 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 ▽ @ 63.5' Groundwater Encountered	
1237	65		SPT-6	22 50/6"				@ 65' Silty SAND: moderate yellowish-brown, moist, very dense; fine grained	
1232	70		SPT-7	50/3"				**Bedrock - Saugus Formation (QTs):** @ 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:** -Total Depth =75' 6" -Backfilled with Native Soil (Cuttings) -Groundwater Encountered at 63' 6"	
1217	85								
1212	90								

LGC

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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 Logged By: CRK Sampled By: CRK	Type of Test
1309	0		BULK				SM	**Alluvium (Qal):** Silty SAND - moderate yellowish-brown, dry	EI COR
			R-1	2 3 5	107.9	9.1		@ 2.5' Silty SAND: moderate yellowish-brown, slightly moist, loose	
1304	5		NR	30 14 13				@ 5' No Sample Recovery - rock in sampler	
1299	10		R-2	19 20 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 3 2			SP	@ 15' SAND: dark yellowish-orange, slightly moist, very loose; clean fine grained, trace gravel	
1289	20		R-3	21 50/6"				@ 20' SAND: dark yellowish-orange, slightly moist, dense; fine grained, some gravel 1mm to 1/2"	
1284	25		SPT-2	10 12 12			SM	@ 25' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to medium grained, trace gravel	SHA
1279	30								

LGC

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Geotechnical Boring Log B-LGC-5

Date: 1/04/07	
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 Logged By: CRK Sampled By: CRK	Type of Test
1279	30		R-4	14 21 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 18 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 29 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 11 15				@ 45' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine to coarse grained, trace gravel	
1259	50		R-6	39 35 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 12 11				@ 55' Silty SAND with Gravel, moderate yellowish-brown, moist-wet, medium dense; fine to coarse, pea to 3/4" gravel ▽	SHA
1249	60								

LGC

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Geotechnical Boring Log B-LGC-5

Date: 1/04/07	
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 Logged By: CRK 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:** -Total Depth = 75' 6" -Backfilled with Native Soil (Cuttings) -Groundwater Encountered at 57' 10"	
1224	85								
1219	90								

LGC

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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 Logged By: CRK Sampled By: CRK	Type of Test
1307	0						SM	@ 0-9": 1" Afu, 2" Asphalt Concrete, 3" Sand, 3" Aggregate Base @ 9"-5.0': Silty SAND with Gravel, dry, first 5.0' hand augered	
1302	5		R-1	33 45 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 28 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 14 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 8 9	115.0	9.1		@ 20' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; fine grained sand	
1282	25		SPT-2	3 4 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	
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 Logged By: CRK Sampled By: CRK	Type of Test
1277	30		R-4	18 32 50/6"	119.6	5.0	SM	@30' Silty SAND: dark yellowish-orange, slightly moist, very dense; trace gravel pea to 3/4" @ 32' Hard Drilling	DS
1272	35		SPT-3	12 9 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:** -Total Depth = 40' 6" -Backfilled with Native Soil (Cuttings) -No Groundwater Encountered	
1257	50								
1252	55								
1247	60								

LGC

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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 Logged By: CRK Sampled By: CRK	Type of Test
1322	0		BULK				ML	**Alluvium (Qal):** Sandy SILT - moderate yellowish-brown, dry	
			R-1	6 11 20	118.5	7.1		@ 2.5' Sandy SILT: moderate yellowish-brown, dry, very stiff	
1317	5		R-2	6 7 6	110.8	8.3	SC	@ 5' Clayey SAND: moderate yellowish-brown, dry, medium stiff; trace pea gravel	DS
1312	10		R-3	36 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 43 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 6 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 48 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

■ = 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

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 Logged By: CRK Sampled By: CRK	Type of Test
1292	30		SPT-2	41 21 24			SM	@ 30' Silty SAND: grayish-orange, slightly moist, dense; fine to coarse grained, abundant gravel pea to 3/4" @ 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 6 6				@ 40' Silty SAND: dark yellowish-orange, slightly moist, medium dense; medium to coarse grained, trace gravel	
1277	45							**Notes:** -Total Depth = 41' 6" -Backfilled with Native Soil (Cuttings) -No Groundwater Encountered	
1272	50								
1267	55								
1262	60								

LGC

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LGC VALLEY, INC.
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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 Logged By: CRK Sampled By: CRK	Type of Test
1328	0		BULK				SC	2.5" Asphalt Concrete over 6" Aggregate Base over Clayey SAND	
			R-1	5 5 5				@ 2.5' Clayey SAND: moderate yellowish-brown, moist, loose	
1323	5		R-2	3 3 10	109.8	10.0		@ 5' Same as at 2.5'	
1318	10		R-3	18 40 33			SM	@ 10' Silty SAND: dusky yellowish-brown, slightly moist, dense; trace pea gravel	
1313	15		SPT-1	4 9 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 25 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 7 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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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

Geotechnical Boring Log B-LGC-8

Date: 1/05/07	
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 Logged By: CRK Sampled By: CRK	Type of Test
1298	30		R-5	24 50/4"	113.4	7.1	SP	@ 30' SAND: moderate yellowish-brown, slightly moist, dense; medium to coarse grained, trace gravel @ 33.5' Hard Drilling	
1293	35		SPT-3	22 20 9			SM	@ 35' Silty SAND: moderate yellowish-brown, slightly moist, medium dense; medium to coarse grained, trace gravel	SA
1288	40		R-6	26 26 29	119.5	15.4	SC	@ 40' Clayey SAND with Gravel: moderate yellowish-brown to light brown, moist, dense; fine grained, some silt ▽ @ 42' Groundwater Encountered	CN
1283	45		SPT-4	15 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 16 24				@ 50' Same as at 45', dense, rust-colored staining	
1273	55		SPT-6	11 25 50/5"				@ 55' Same as at 45', dark yellowish-brown	
1268	60								

LGC

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LGC VALLEY, INC.

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Geotechnical Boring Log B-LGC-8

Date: 1/05/07	
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 Logged By: CRK Sampled By: CRK	Type of Test
1268	60		SPT-7	10 14 39			SM	@ 60' Silty SAND with Gravel: olive gray, wet, very dense; fine to coarse grained, some gravel	
1263	65		SPT-8	36 50/3"				**Bedrock: Saugus Formation (QTs):** @ 65' Sandstone: grayish-green, very dense; medium grained, unoxidized	
1258	70		SPT-9	46 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:** -Total Depth =75.25' -Backfilled with Native Soil (Cuttings) and capped with Asphalt Cold Patch -Groundwater Encountered at 42'	
1243	85								
1238	90								

LGC

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LGC VALLEY, INC.
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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 Logged By: CRK Sampled By: CRK	Type of Test
1336	0		BULK				SM	3" Asphalt Concrete over Silty SAND	
			R-1	8 9 10				@ 2.5' Silty SAND: dark yellowish-brown, slightly moist, medium dense; trace gravel, fine grained	
1331	5		R-2	4 5 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 40 34			SM	@ 10' Silty SAND: dark grayish-brown, slightly moist, dense; coarse grained, caliche blebs, trace gravel	
1321	15		R-4	9 16 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 35 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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BULK = Bulk sample

LGC VALLEY, INC.
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Geotechnical Boring Log B-LGC-9

Date: 1/05/07	
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 Logged By: CRK 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 Logged By: CRK 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):** @ 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:** -Total Depth =75.5' -Backfilled with Native Soil (Cuttings) and capped with Asphalt Cold Patch -Groundwater Encountered at 35'	
1251	85								
1246	90								

LGC

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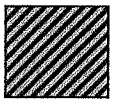
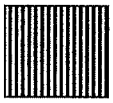
Key to Boring Logs

ASPHALT CONCRETE



CLAY



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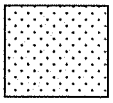
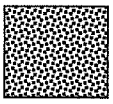


SAND



GRAVEL/COBBLES

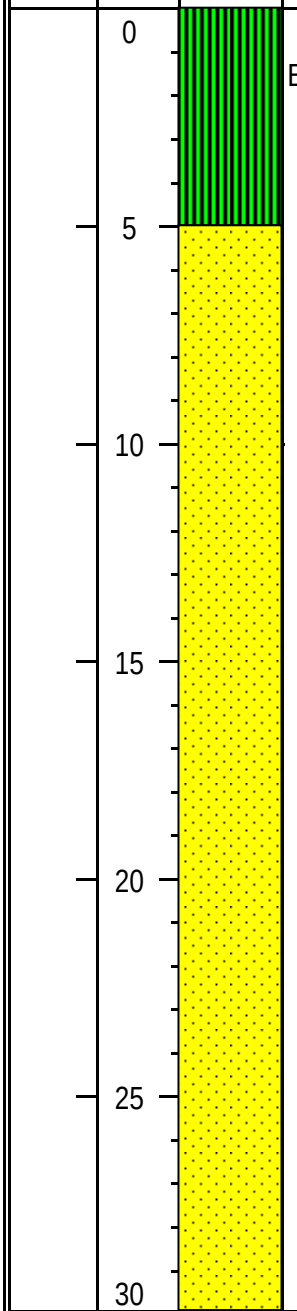
APPROXIMATE GROUNDWATER LEVEL

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)	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: SLV 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) @ 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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: SLV Sampled By: SLV	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 50/3"				@ 44' Hard Drilling @ 45' Same as at 40', very dense, 8" recovery @ 47' Very Hard Drilling (Cobbles) @ 47.5' End of Boring (Refusal)	
	50							**Notes:** -Total Depth = 47.5' -Backfilled with Native Soil (Cuttings) -No Groundwater Encountered	
	55								
	60								

LGC

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☒ = SPT sample
BULK = Bulk sample

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GEOTECHNICAL CONSULTING INC.

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, @ 28.5' End of Boring (Refusal)	
	30								

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

LGC

■ = Ring sample
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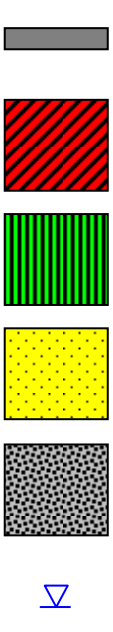
BULK = Bulk sample

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

Key to Boring Logs



ASPHALT CONCRETE

CLAY

SILT

SAND

GRAVEL/COBBLES

APPROXIMATE GROUNDWATER LEVEL

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 Logged By: SLV 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 17 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

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GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV 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 @ 48' Hard drilling	
1248	50		11	35		10.5		@ 50' Very moist, little gravel	
1243	55							**Notes:** -Total Depth = 51.5' -No Groundwater Encountered -Backfilled with Native (Cuttings)	
1238	60								

LGC

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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV 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

LAWSON & ASSOCIATES
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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 Logged By: SLV 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:** -Total Depth = 51.5' -No Groundwater Encountered -Backfilled with Native (Cuttings)	
1241	60								

LGC

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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV 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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV 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 **Notes:** -Total Depth = 31.5' -No Groundwater Encountered -Backfilled with Native (Cuttings)	
1268	35								
1263	40								
1258	45								
1253	50								
1248	55								
1243	60								

LGC

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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV 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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

Geotechnical Boring Log B-LGC-4

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: In Field - See Map**

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: SLV 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 **Notes:** -Total Depth = 31.5' -No Groundwater Encountered -Backfilled with Native (Cuttings)	
1268	35								
1263	40								
1258	45								
1253	50								
1248	55								
1243	60								

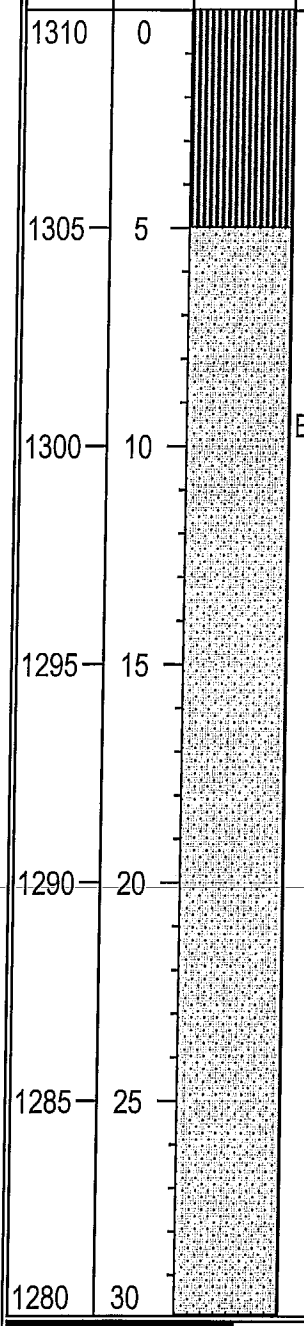
LGC

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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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)	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION Logged By: SLV 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 50/3"				@ 20' Silty SAND: moderate yellowish-brown, slightly moist, very dense; fine grained @ 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

LAWSON & ASSOCIATES
GEOTECHNICAL CONSULTING INC.

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 Logged By: SLV Sampled By: SLV	Type of Test
1280	30		8	12 50/3"			SM	@ Silty SAND with Gravel: moderate yellowish-brown, slightly moist, very dense; fine to course grained, sample disturbed **Notes:** -Total Depth = 30' 9" -No Groundwater Encountered -Backfilled with Native (Cuttings)	
1275	35								
1270	40								
1265	45								
1260	50								
1255	55								
1250	60								

LGC

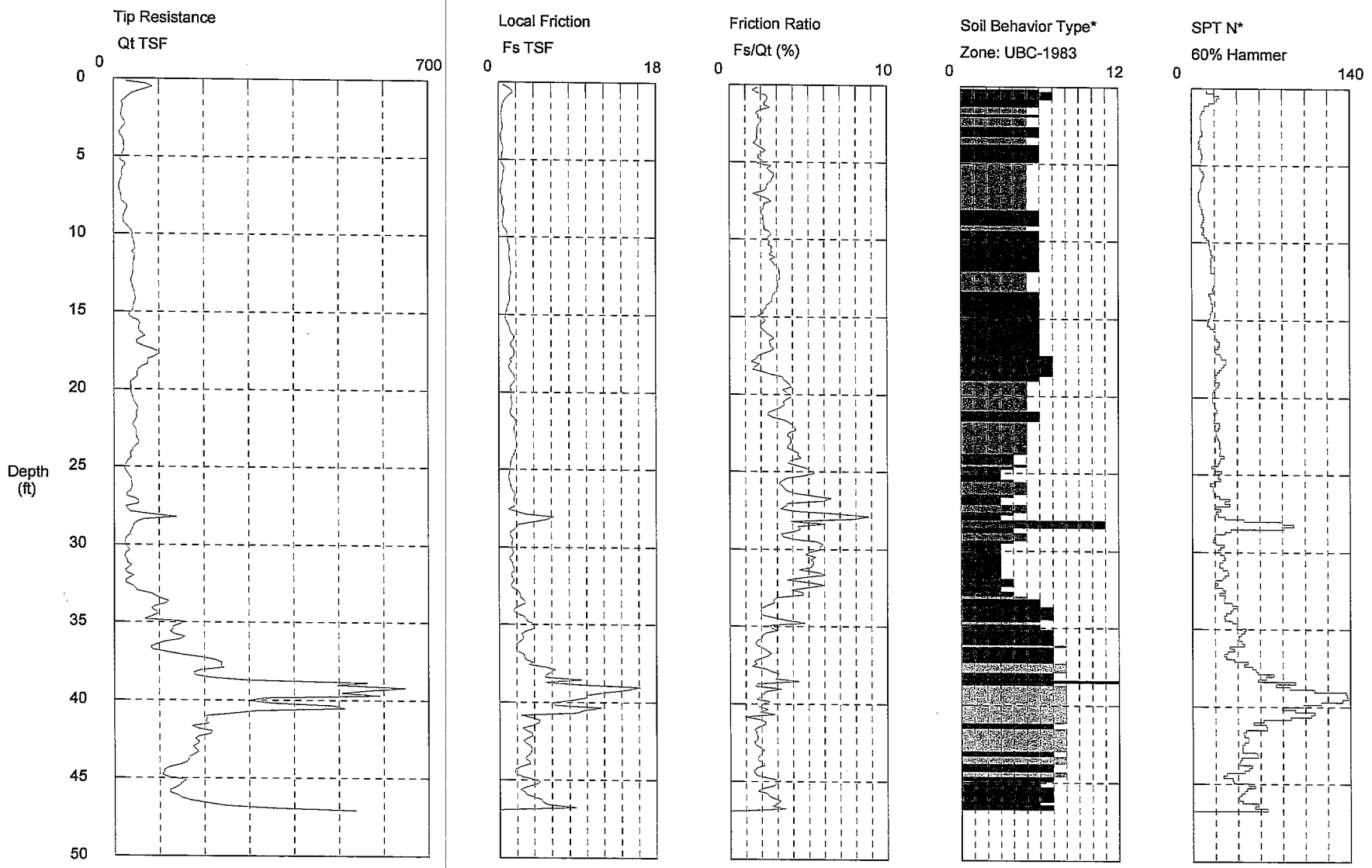
■ = Ring sample
☒ = SPT sample
BULK = Bulk sample

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

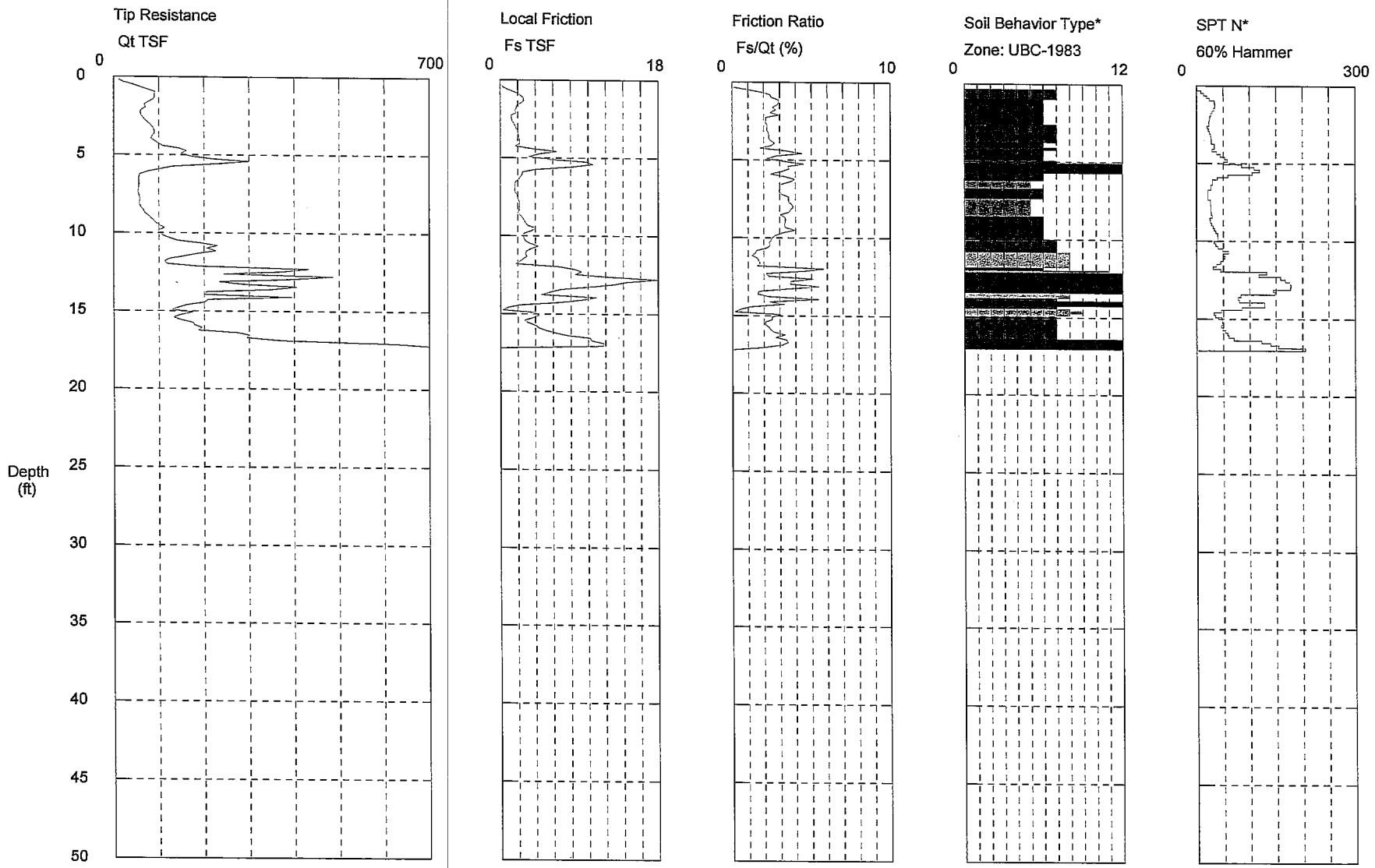
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*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

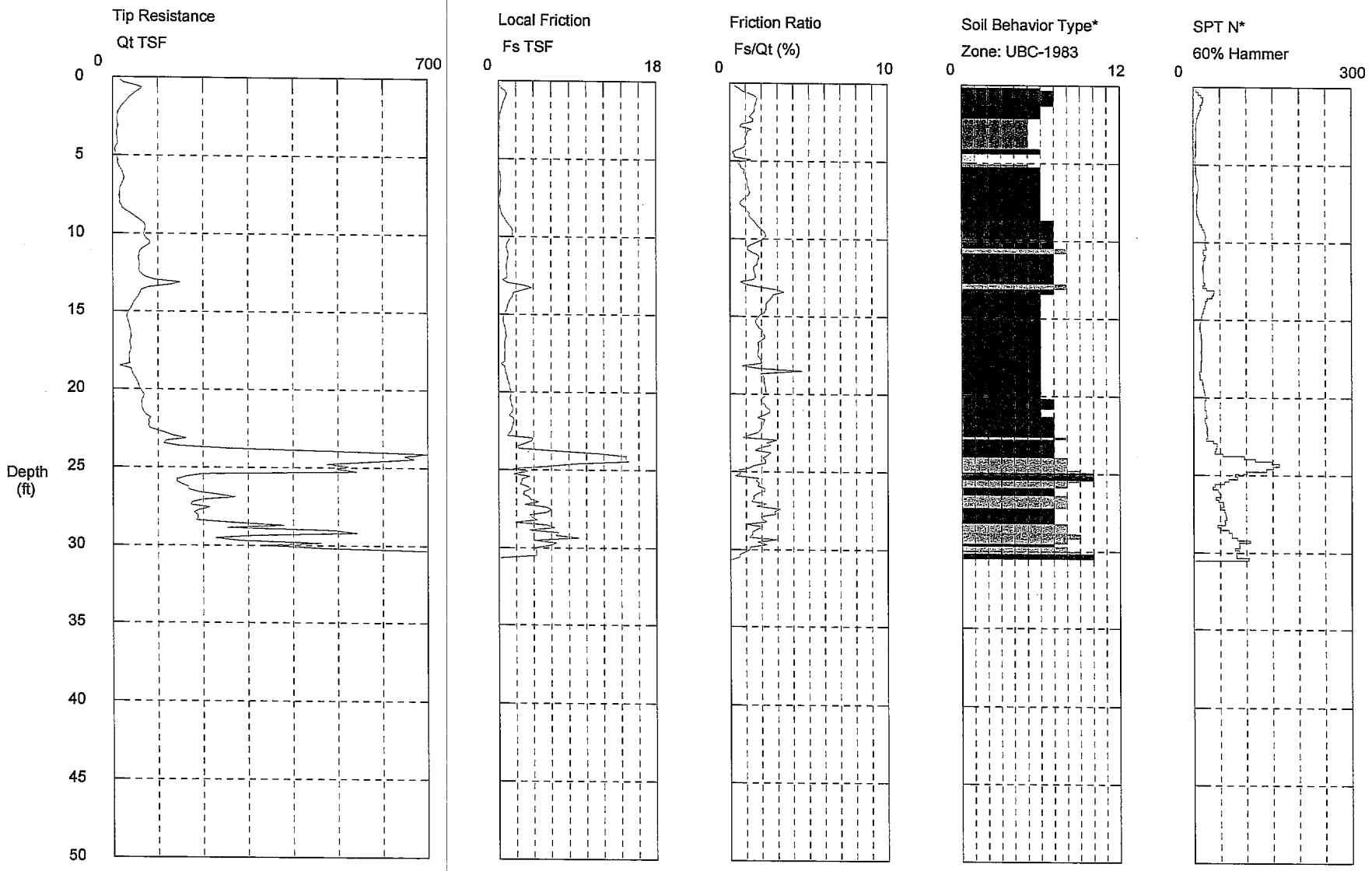
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*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

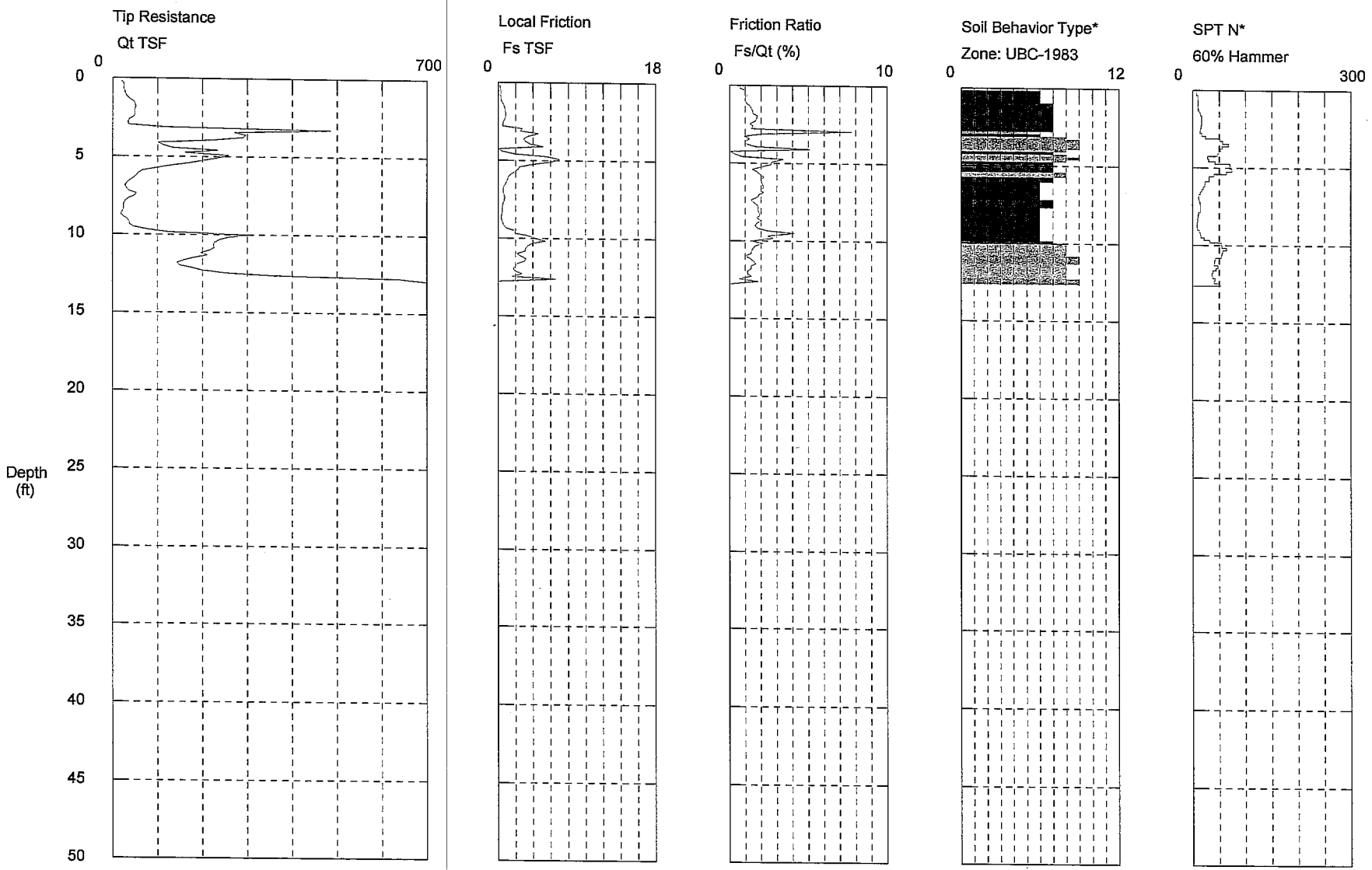
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*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 No.: 033022-01
PROJECT : Jay Rodgers Comm CONE/RIG : DSA0408
DATE/TIME: 2/3/2004 11:32:

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

Interpretations based on: Robertson and Campanella, 1989.

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

Interpretations based on: Robertson and Campanella, 1989.

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

Interpretations based on: Robertson and Campanella, 1989.

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

Interpretations based on: Robertson and Campanella, 1989.

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

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

Interpretations based on: Robertson and Campanella, 1989.

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

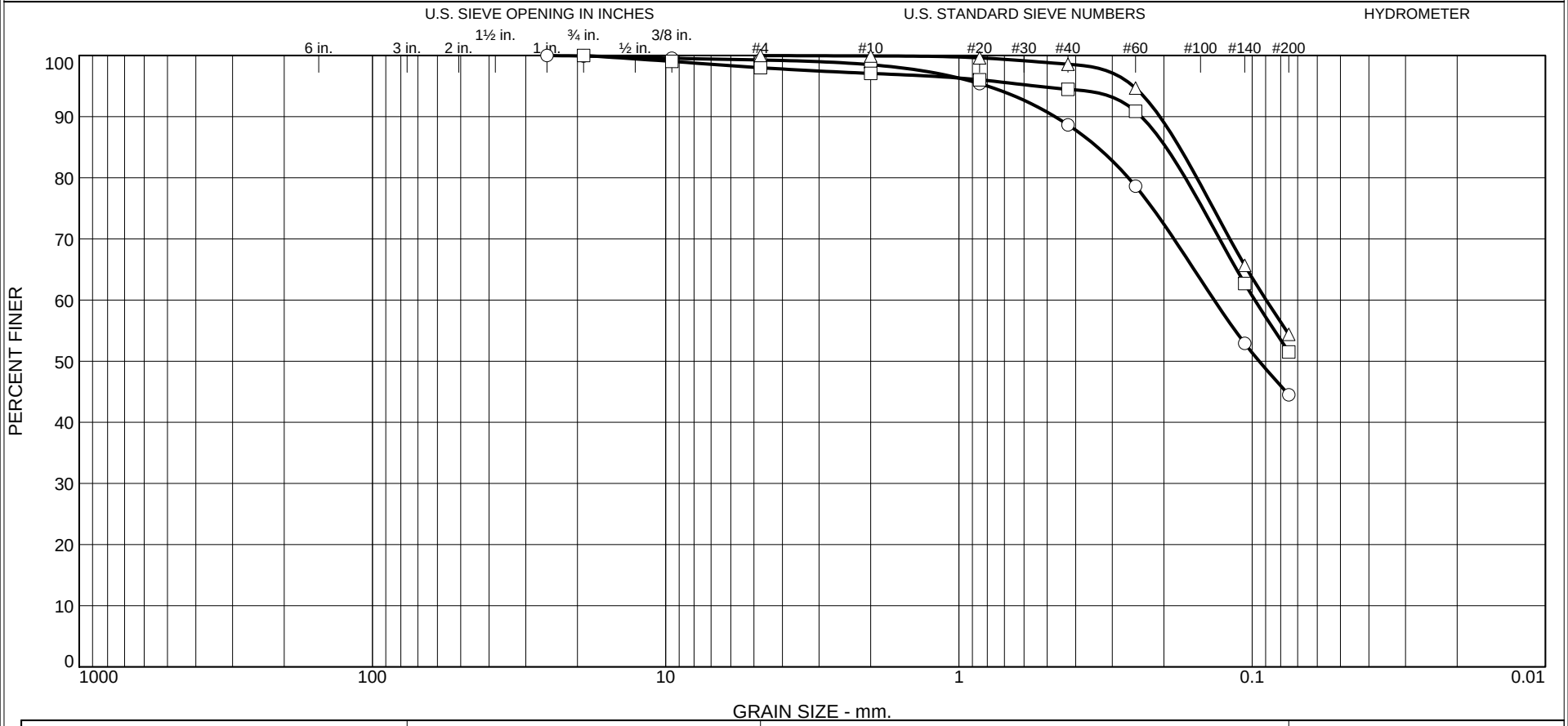
APPENDIX B

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

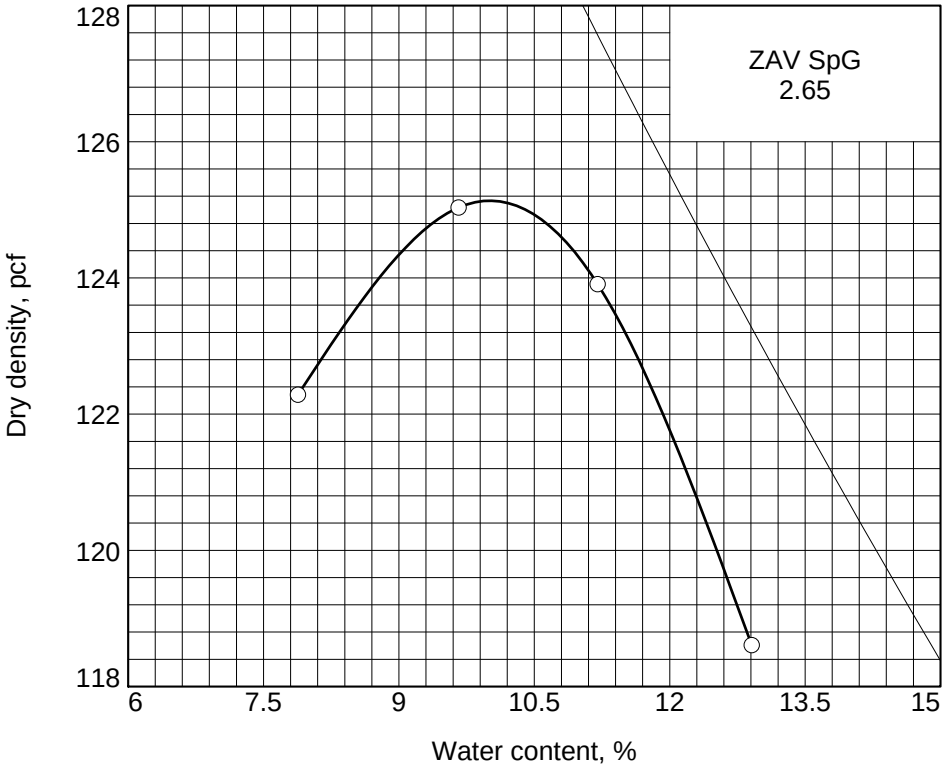
ENGINEERING GEOLOGY, INC.

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

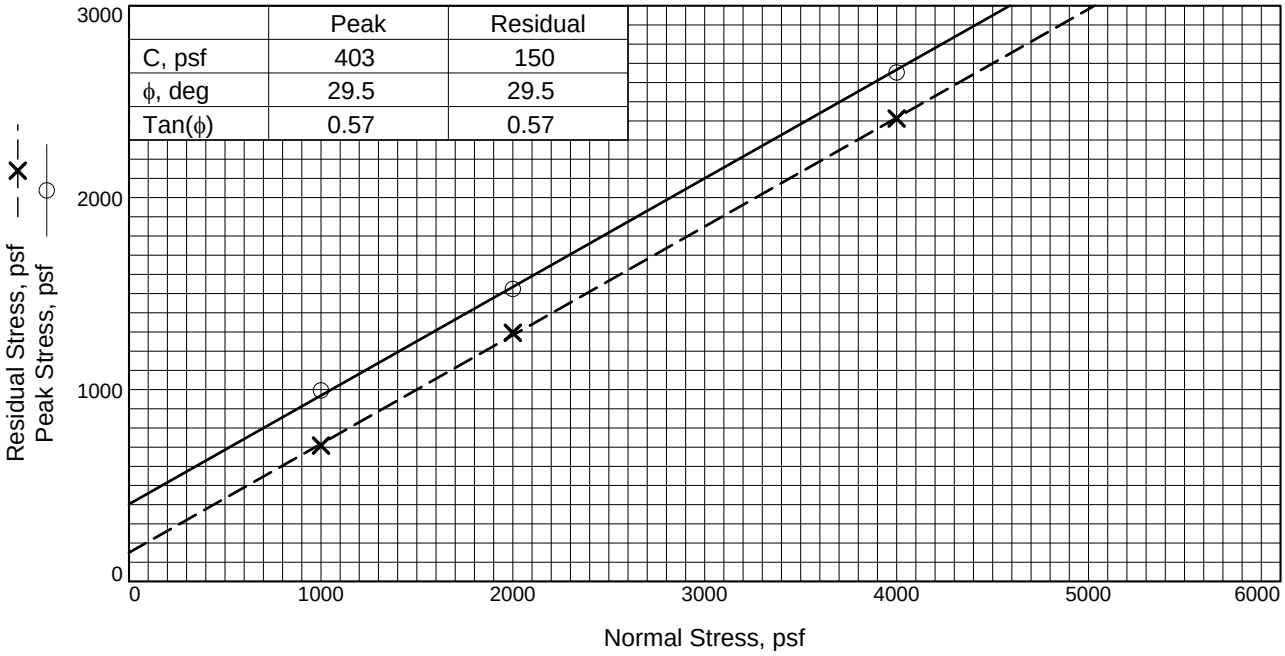
Project No. 21-2593-4 **Client:** Wiley Canyon LLC
Project: Tentative Tract Map 083295
Wiley Canyon
○ **Source of Sample:** HS-1 **Depth:** 0-15'

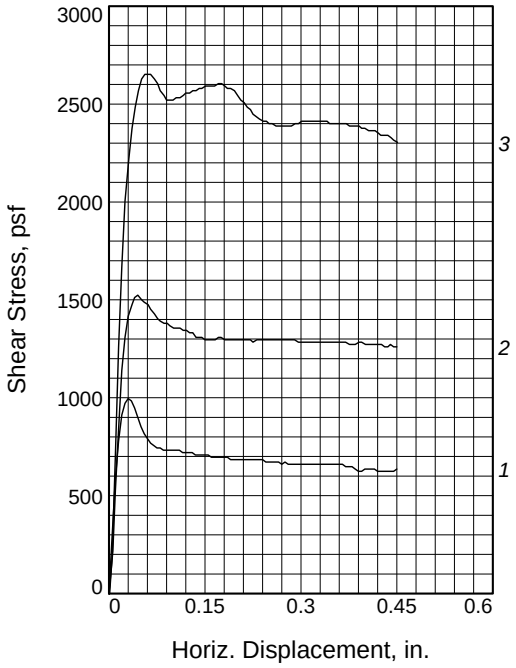
Checked by: K. Callahan
Title: Geotechnical Engineer

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

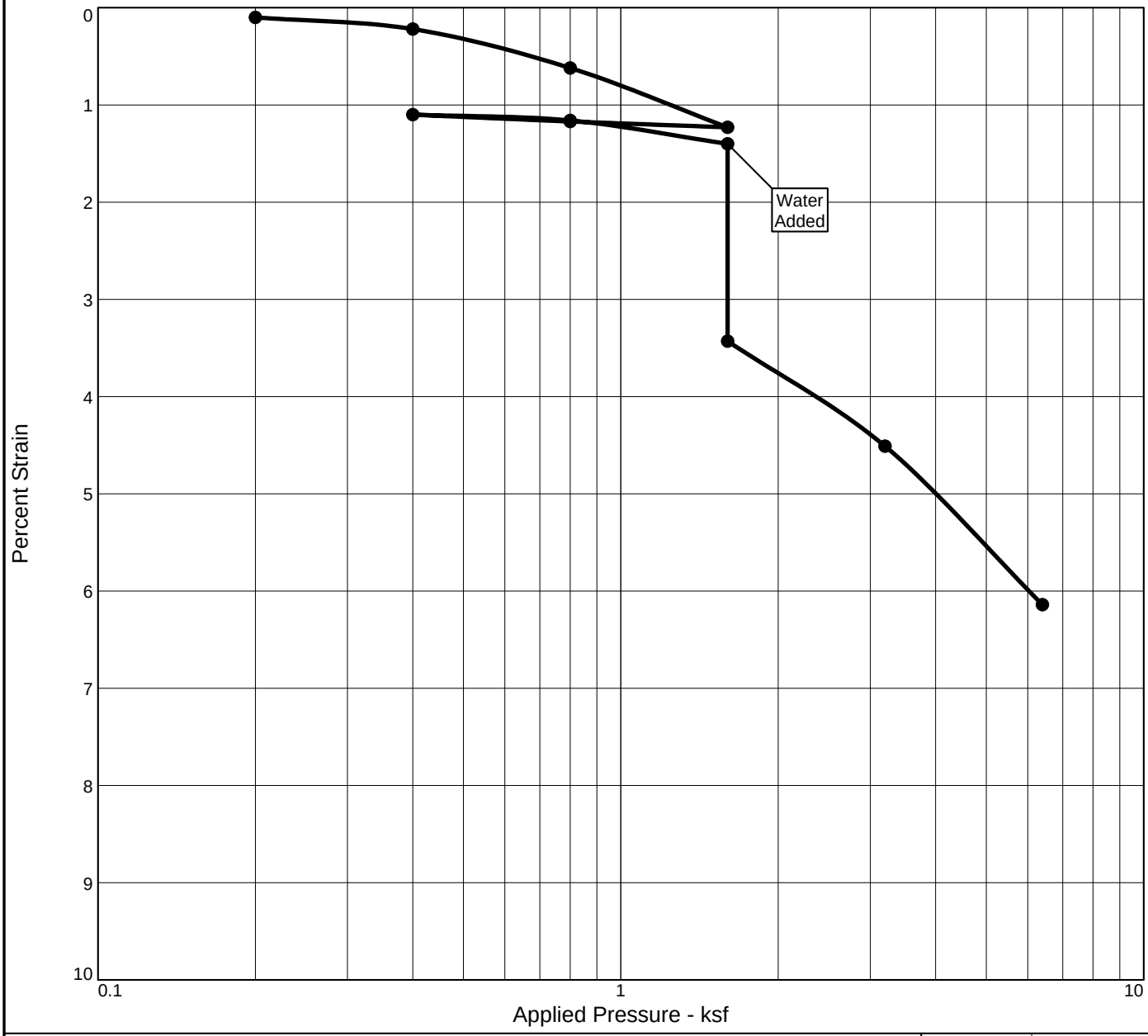
Client: Wiley Canyon LLC

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

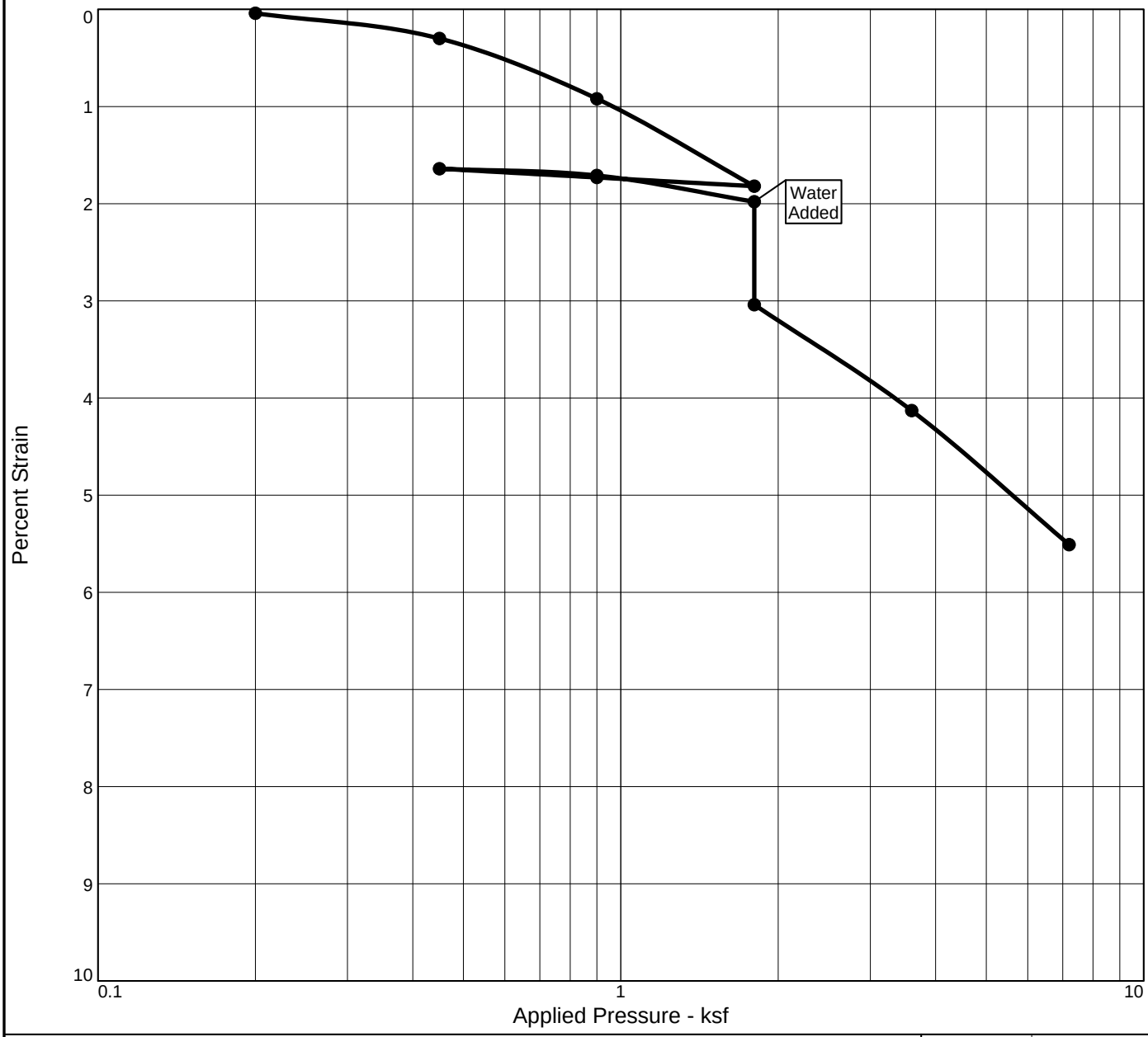
Title: Geotechnical Engineer

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

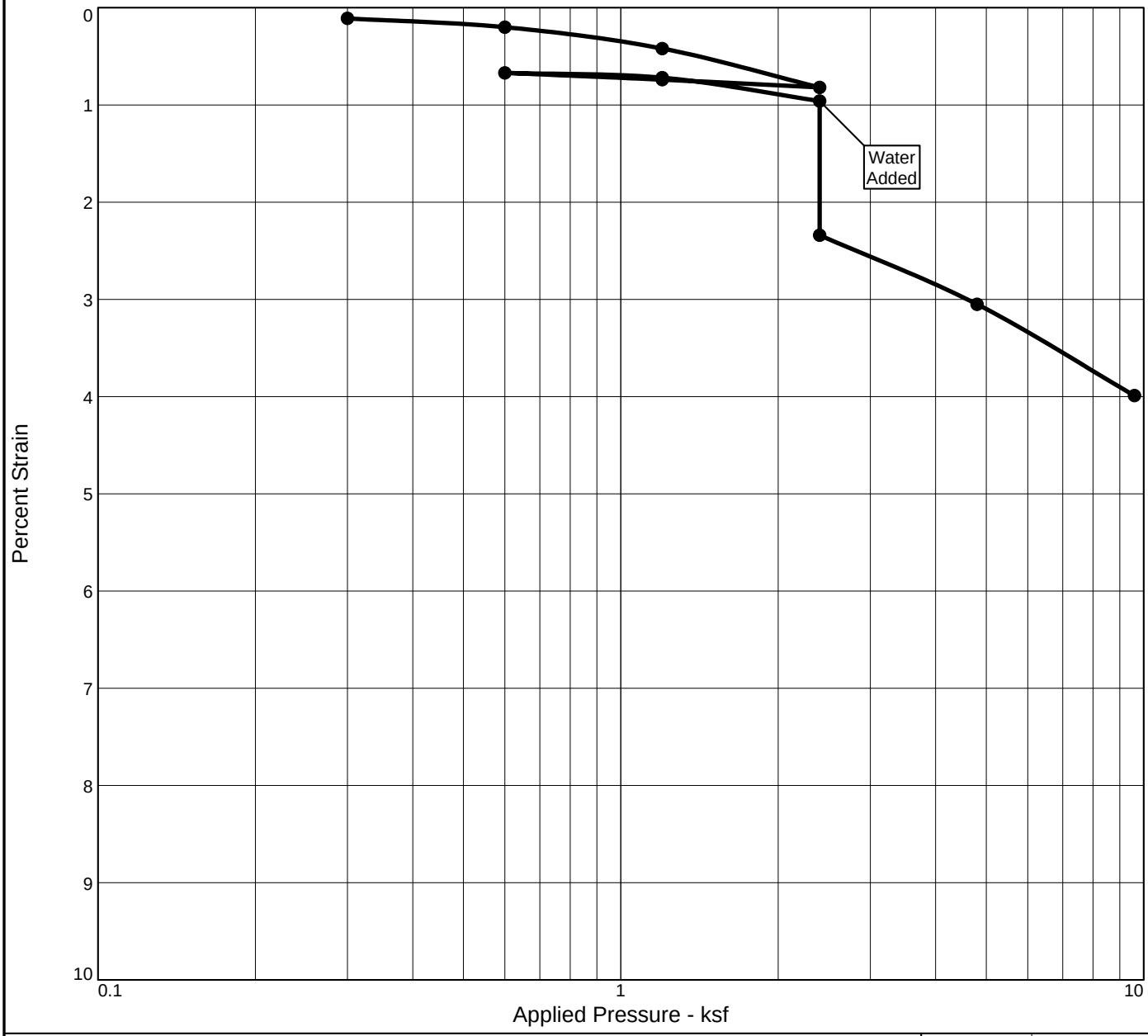
Title: Geotechnical Engineer

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

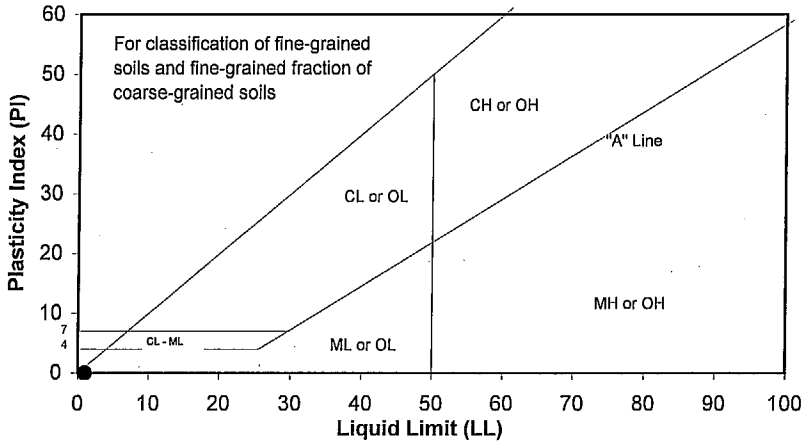
Checked By: K. Callahan

Title: Geotechnical Engineer

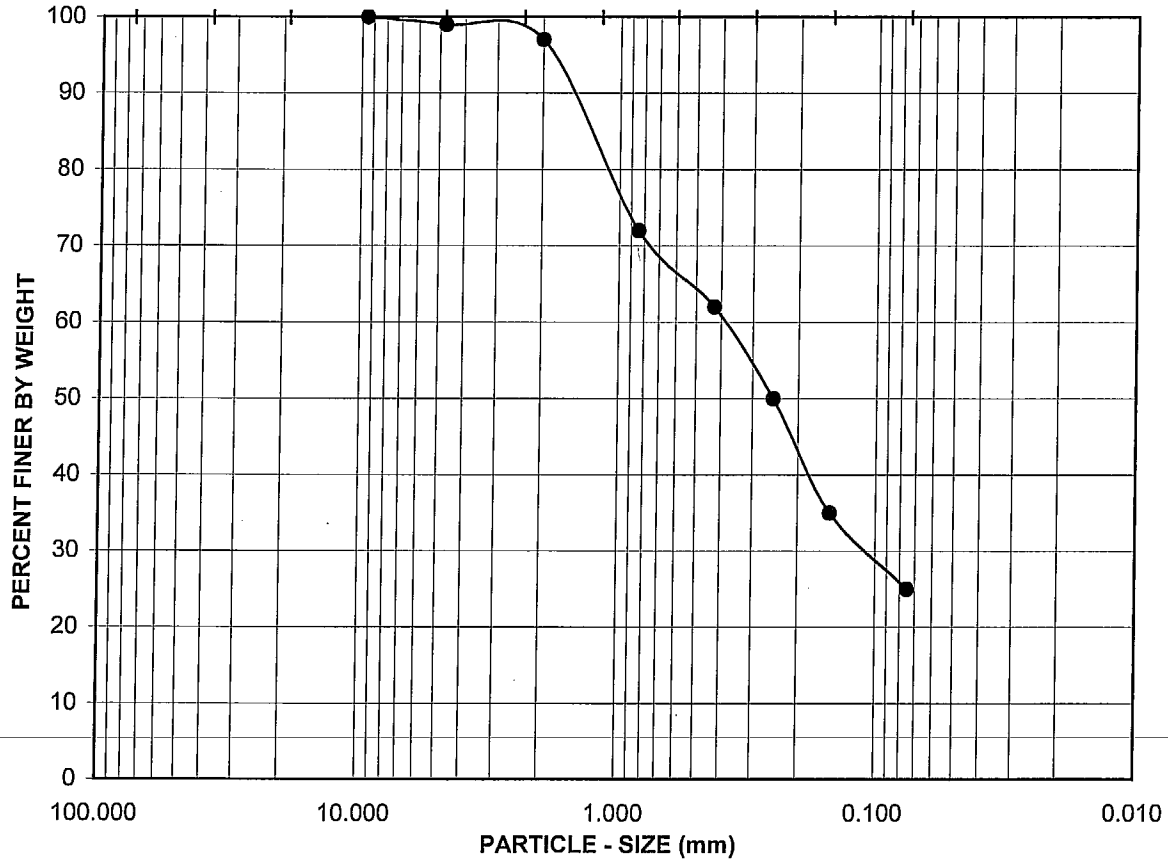
ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

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

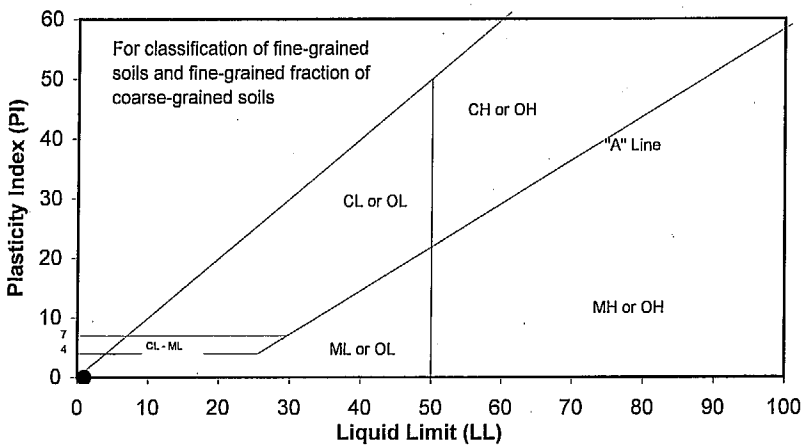
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

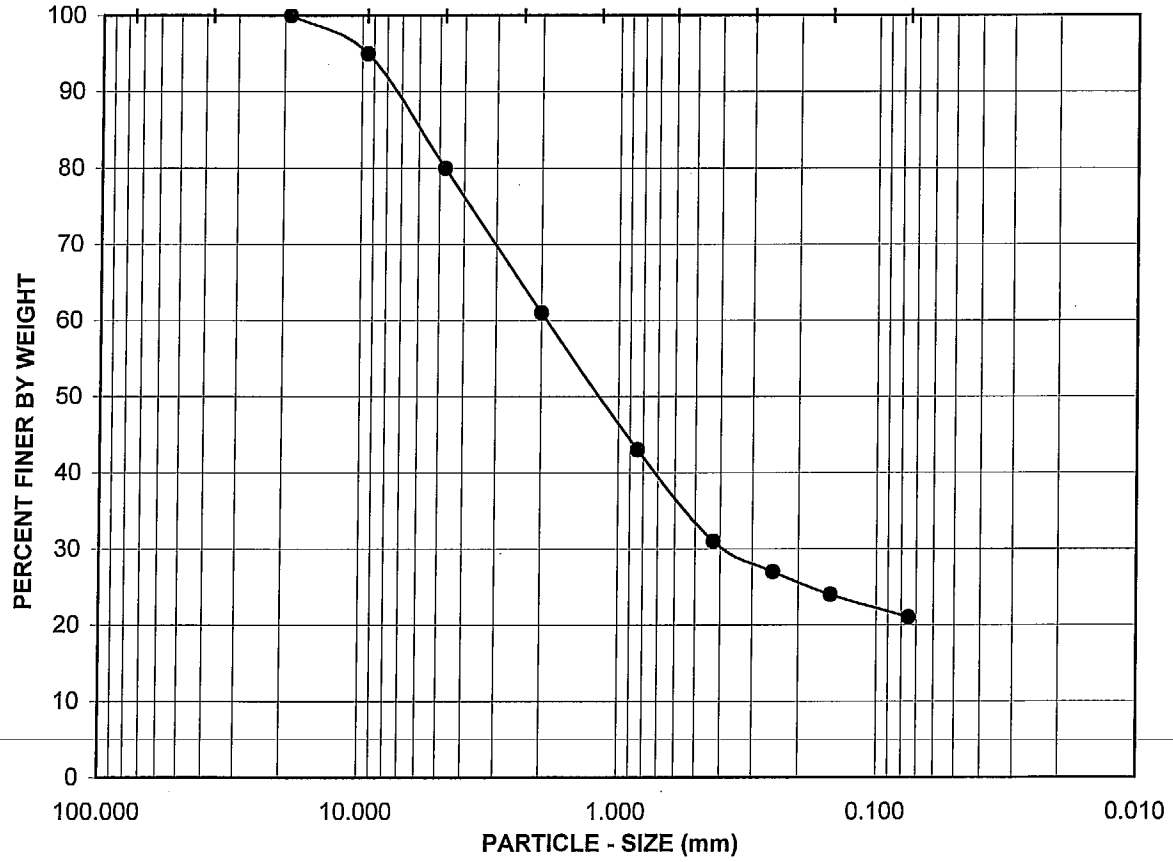
03-04

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

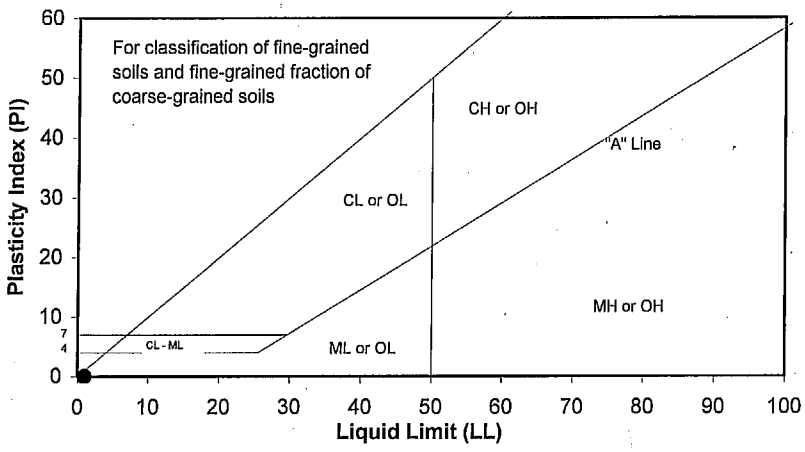
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

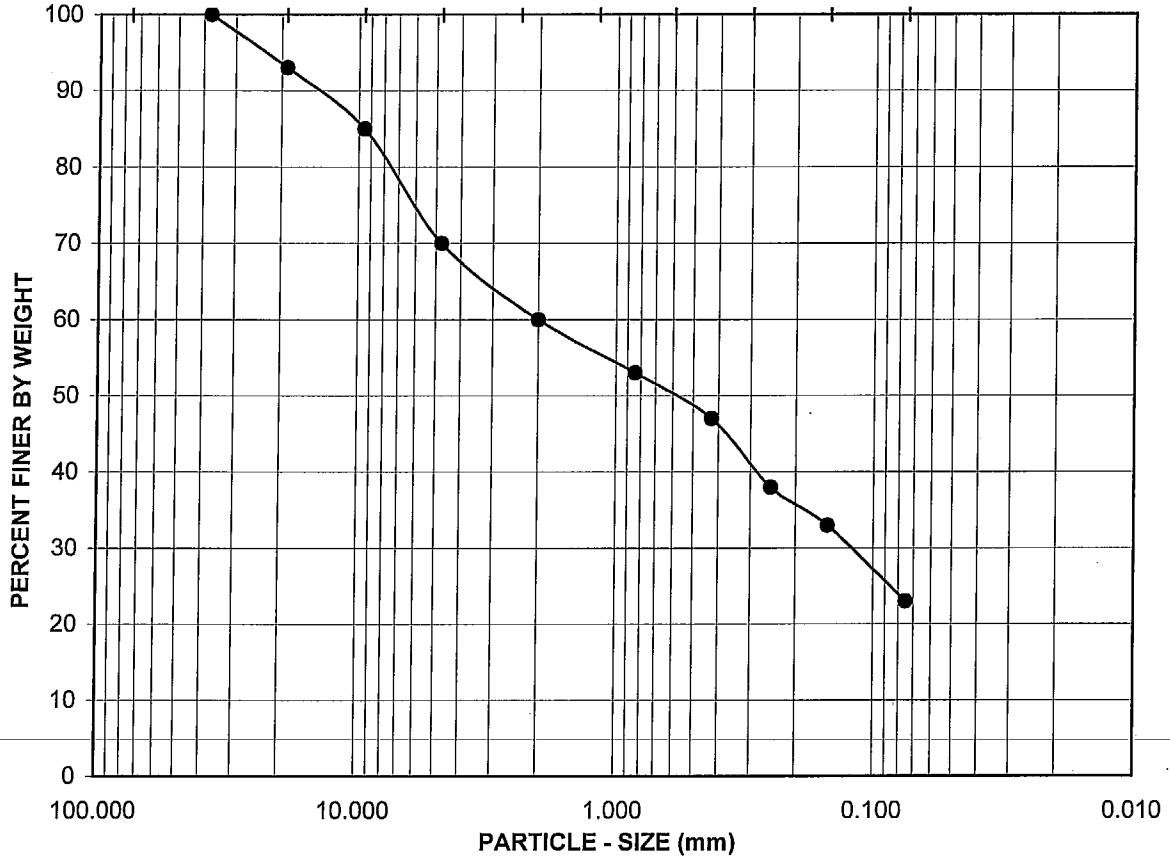
03-04

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

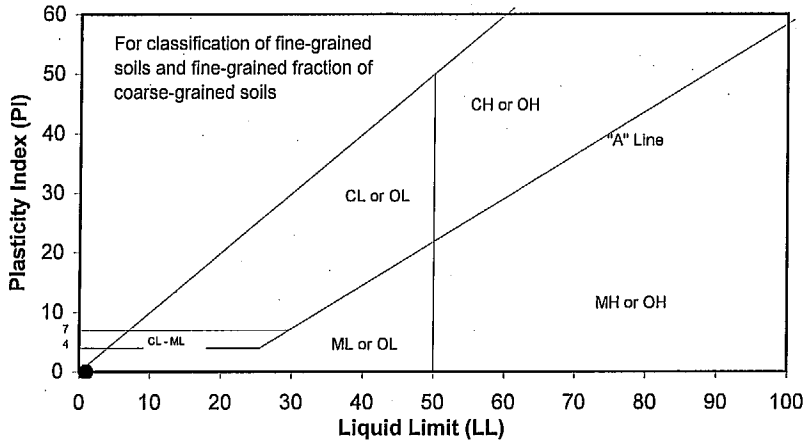
LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

ASTM D 4318, D 422

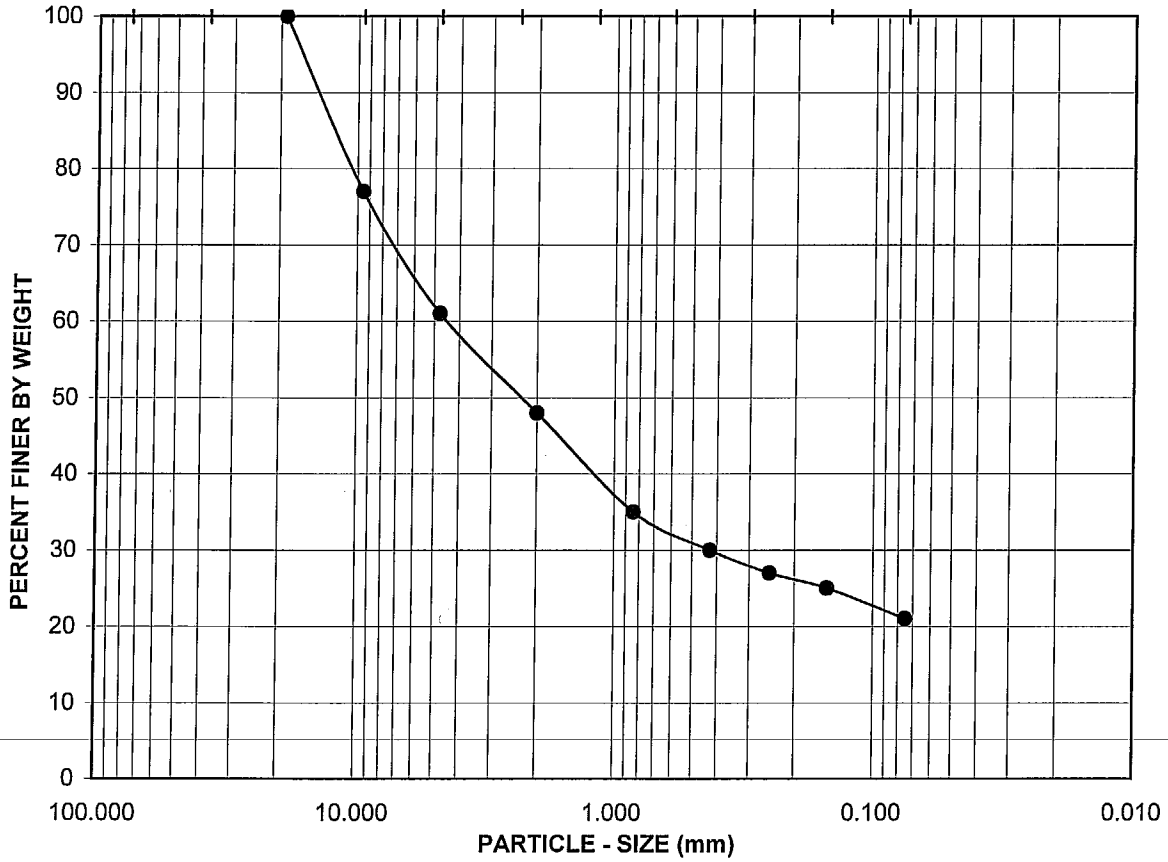
03-04

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

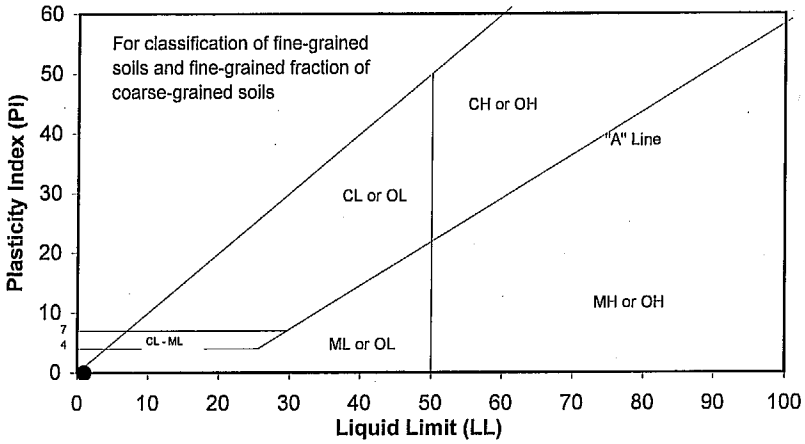
Project No.: 033022-01

LGC/Monteverde

ATTERBERG LIMITS, PARTICLE - SIZE CURVE

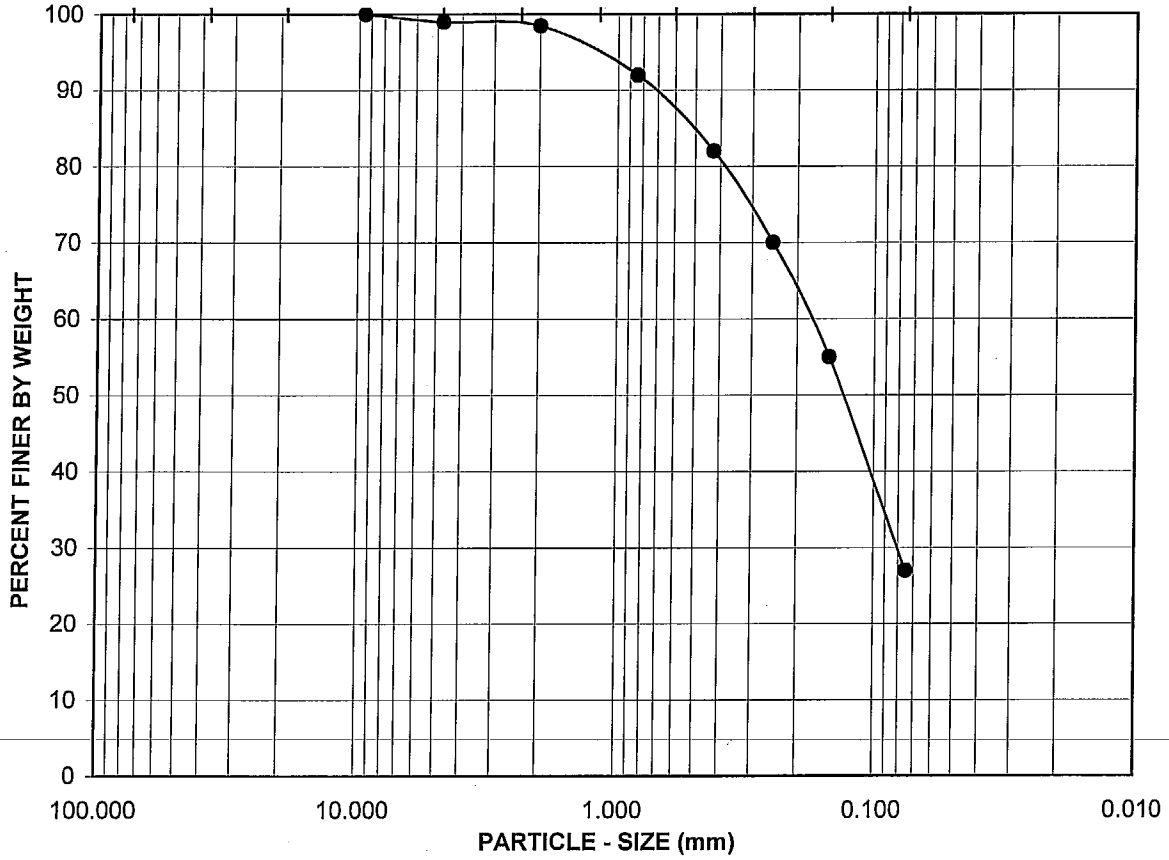
ASTM D 4318, D 422

03-04



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

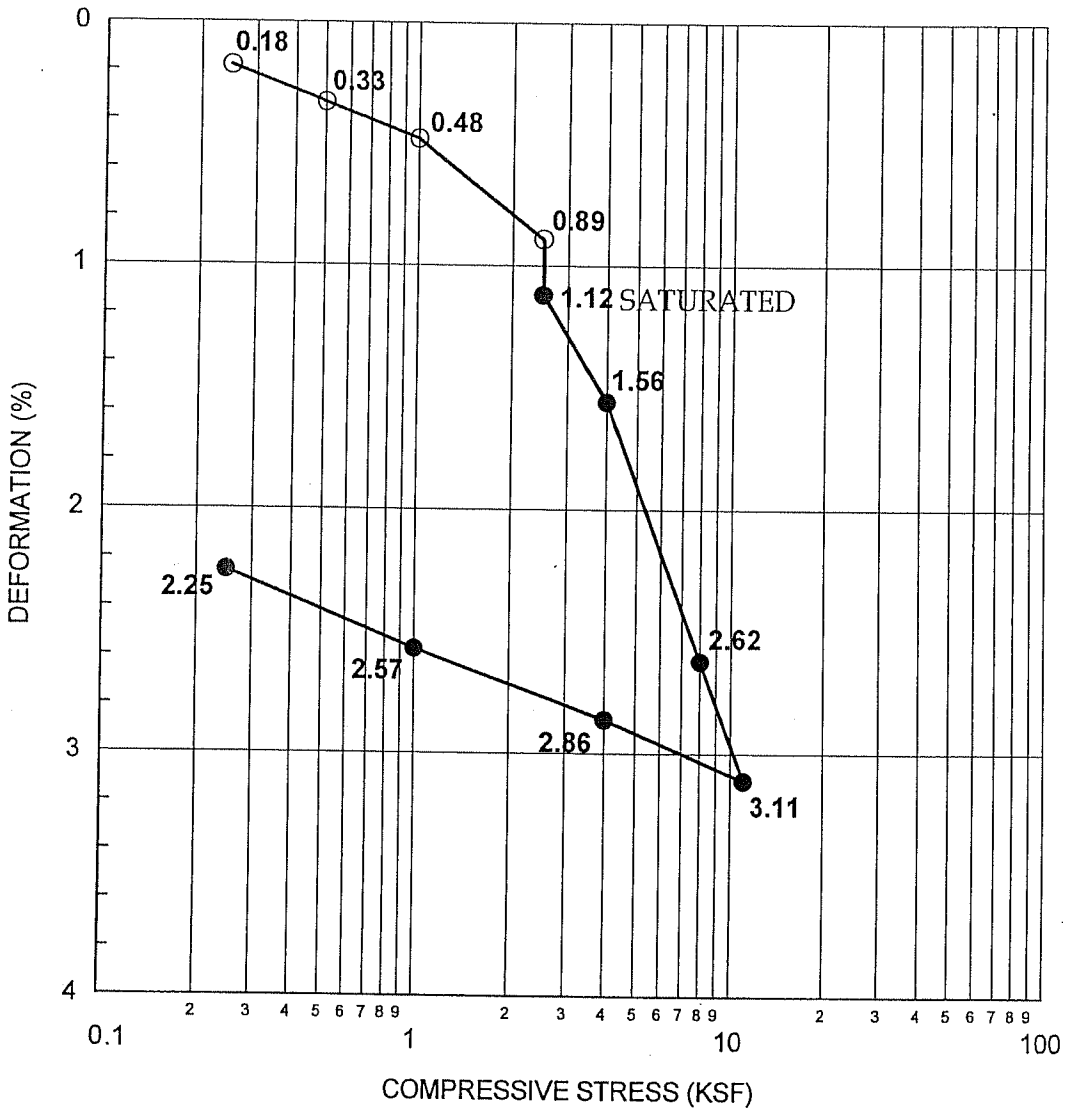
LGC/Monteverde

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

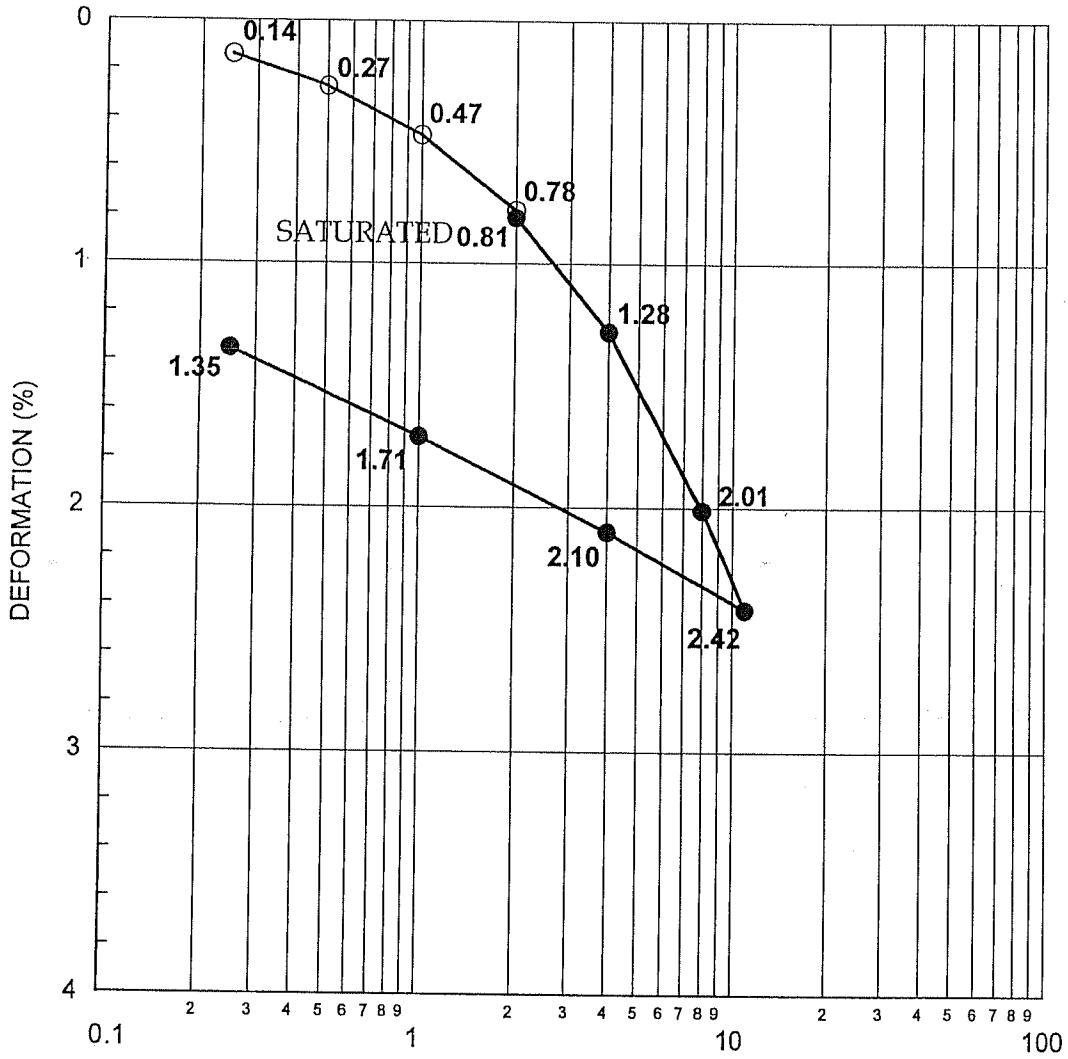
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

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

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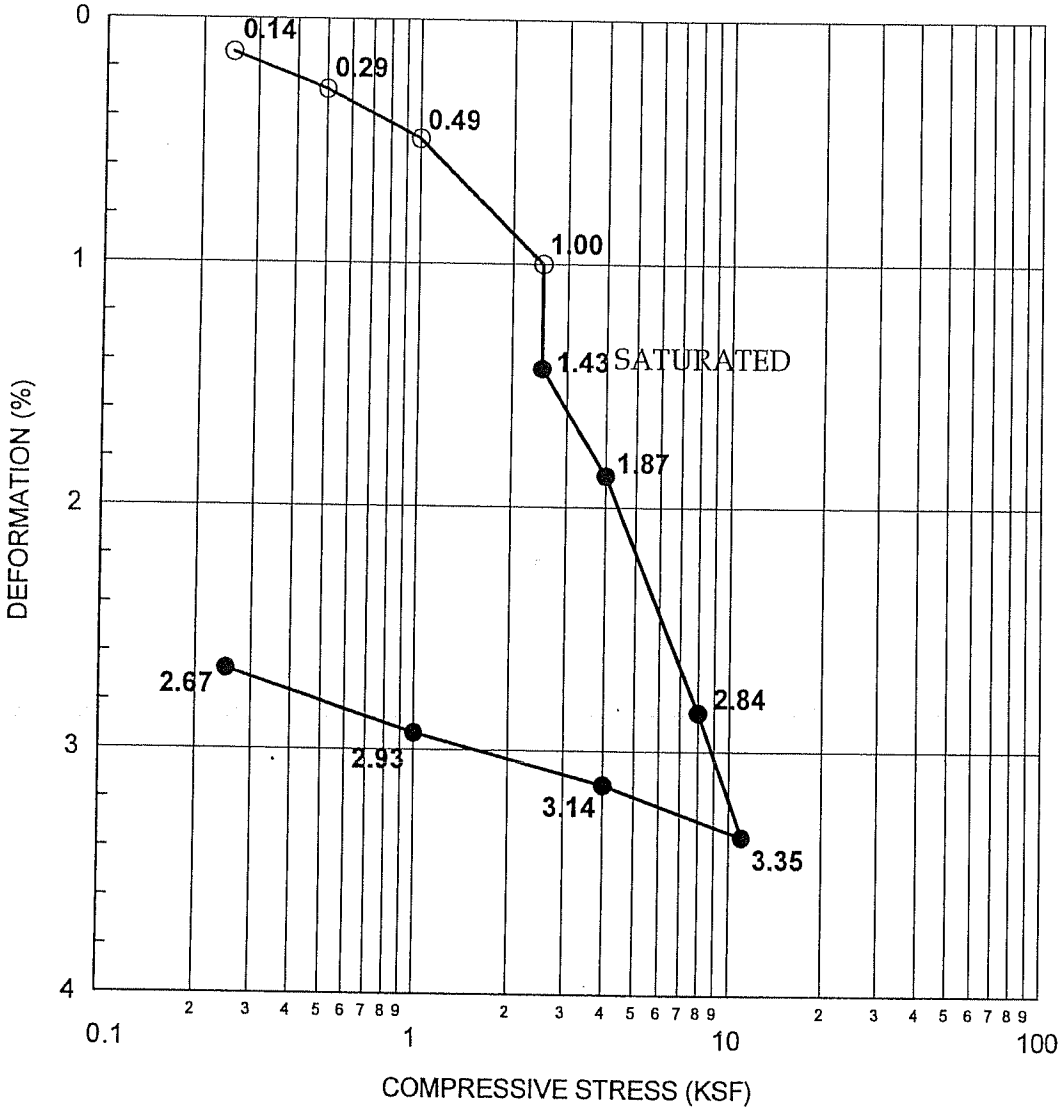
(ASTM D2435)

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

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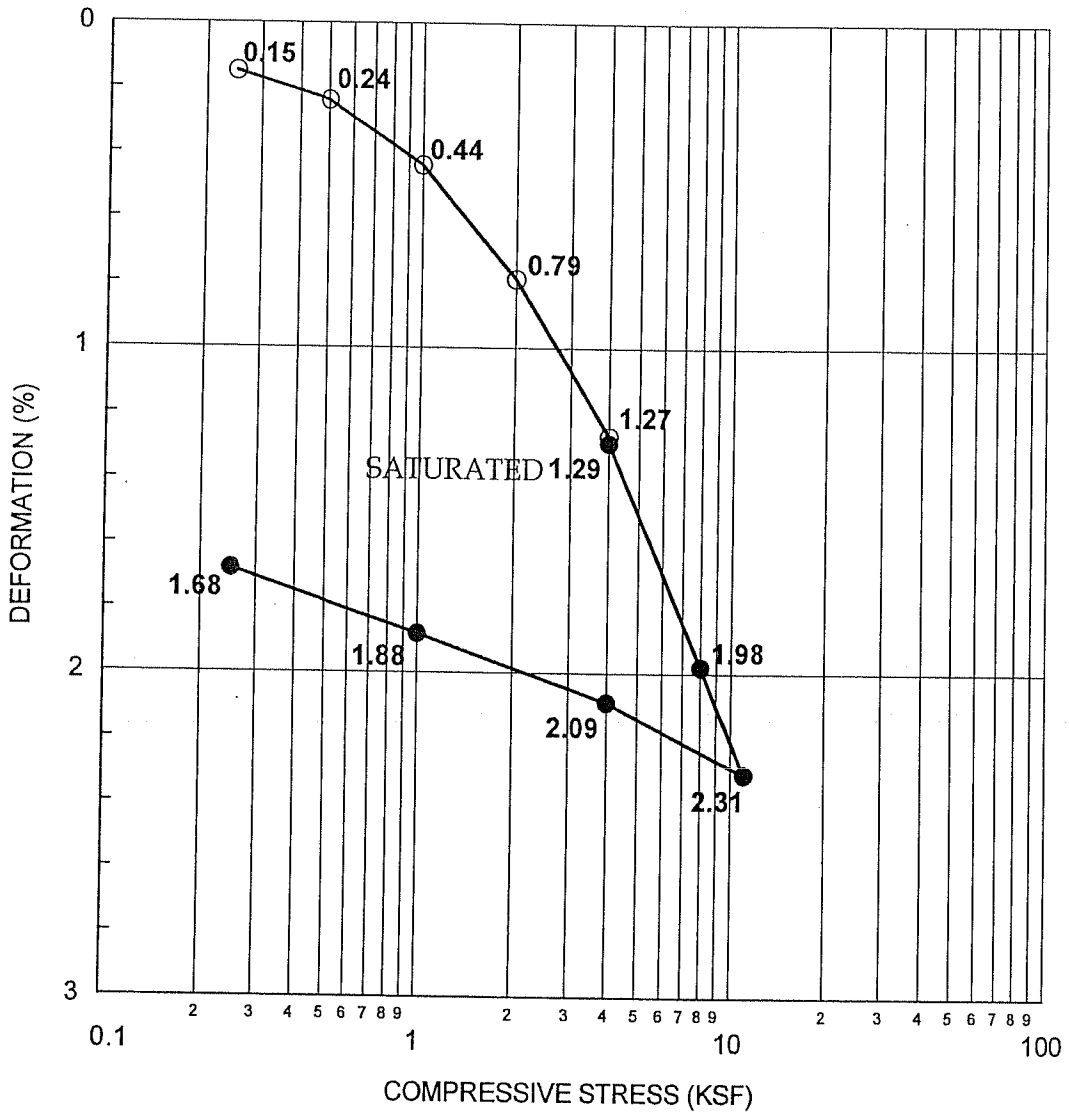

SYMBOL	BORING NO	SAMPLE NO	DEPTH (FT)	SOIL TYPE	INIT. MOISTURE CONTENT (%)	INIT. DRY DENSITY (PCF)	INIT. VOID RATIO
○	B-LGC-8	R-6	40	SC	15.4	119.4	0.410

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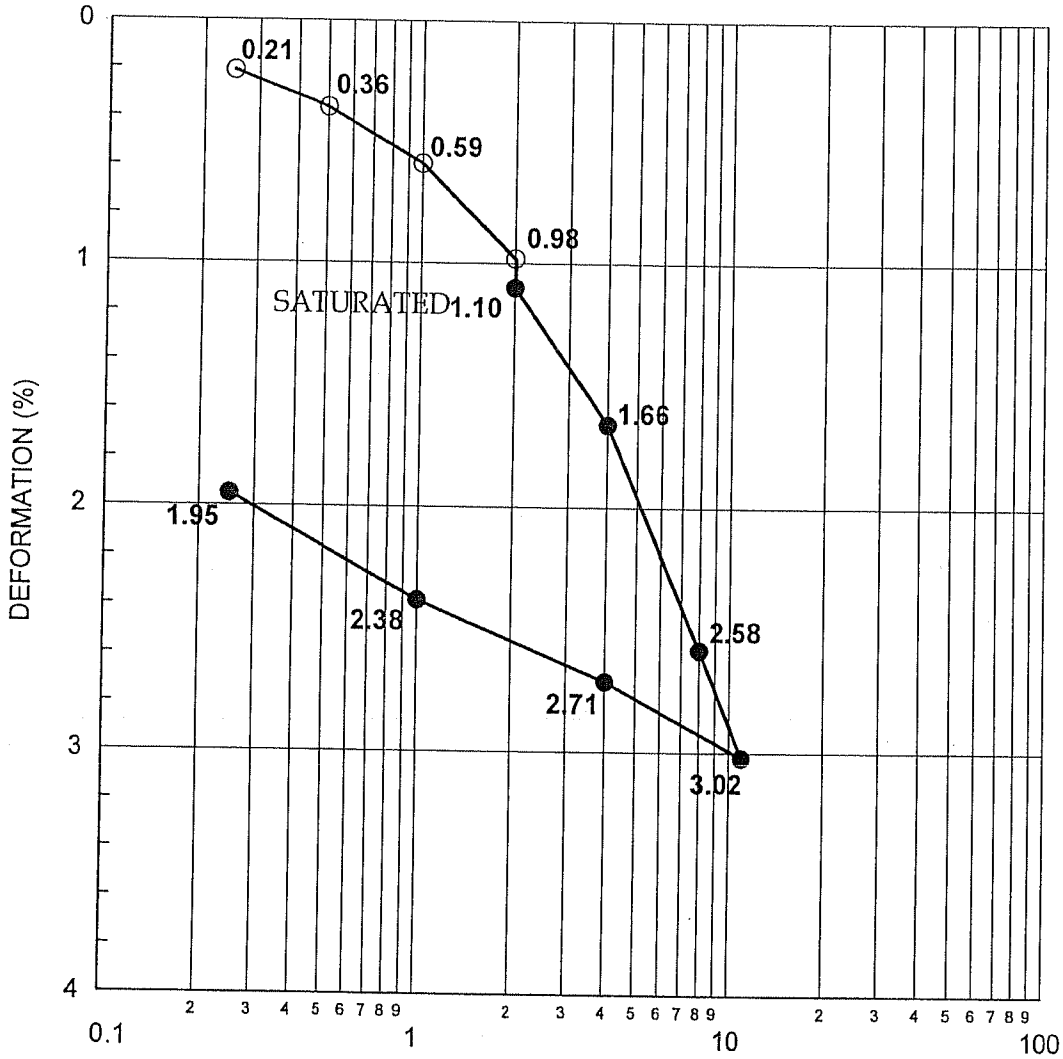

SYMBOL	BORING NO	SAMPLE NO	DEPTH (FT)	SOIL TYPE	INIT. MOISTURE CONTENT (%)	INIT. DRY DENSITY (PCF)	INIT. VOID RATIO
○	B-LGC-9	R-5	25	SM	4.5	121.4	0.388

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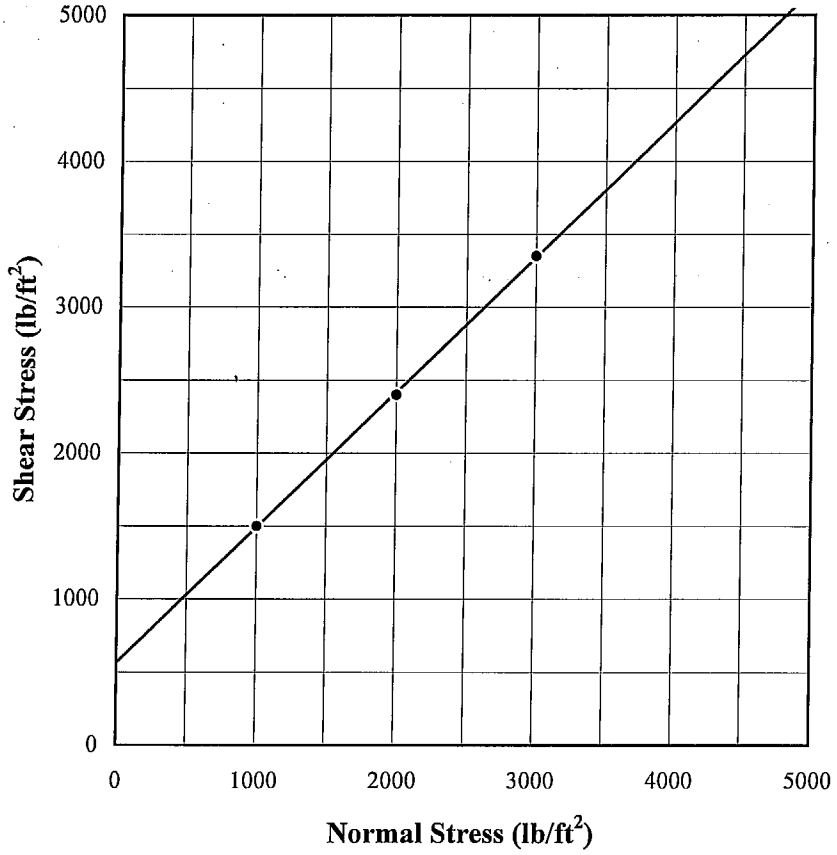
FIGURE



—— 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

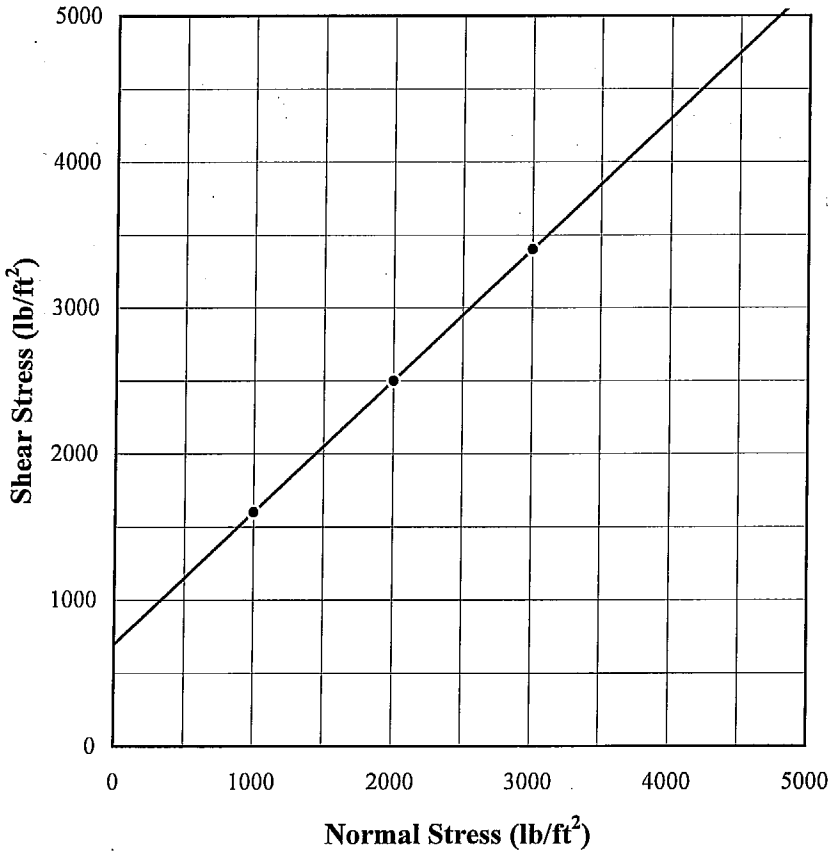
DIRECT SHEAR TEST

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
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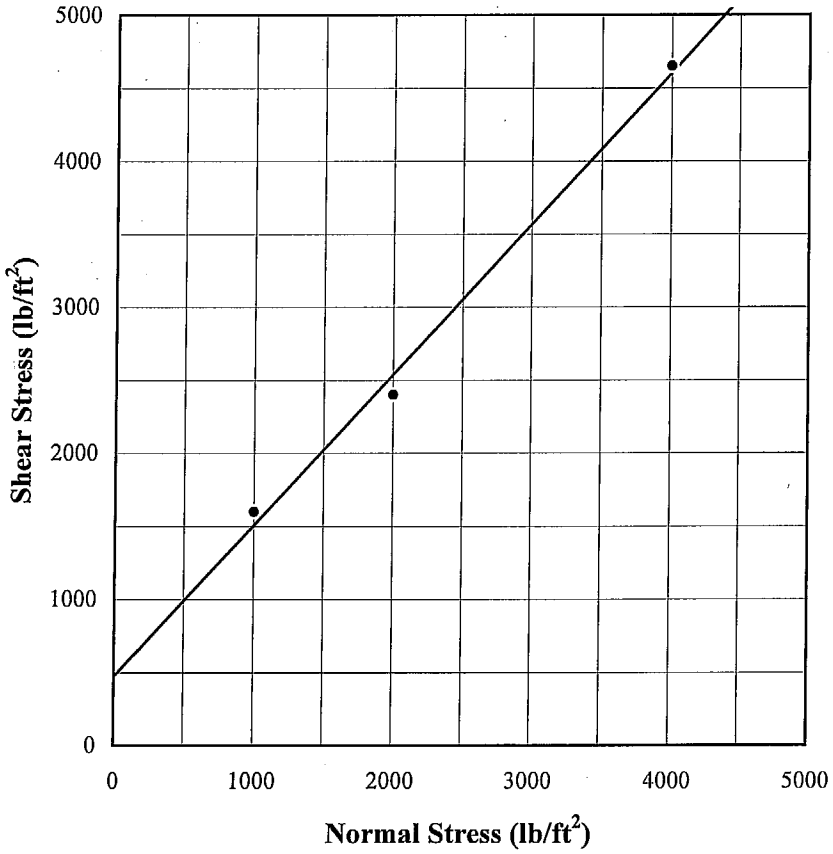
Date : 03/24/04

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

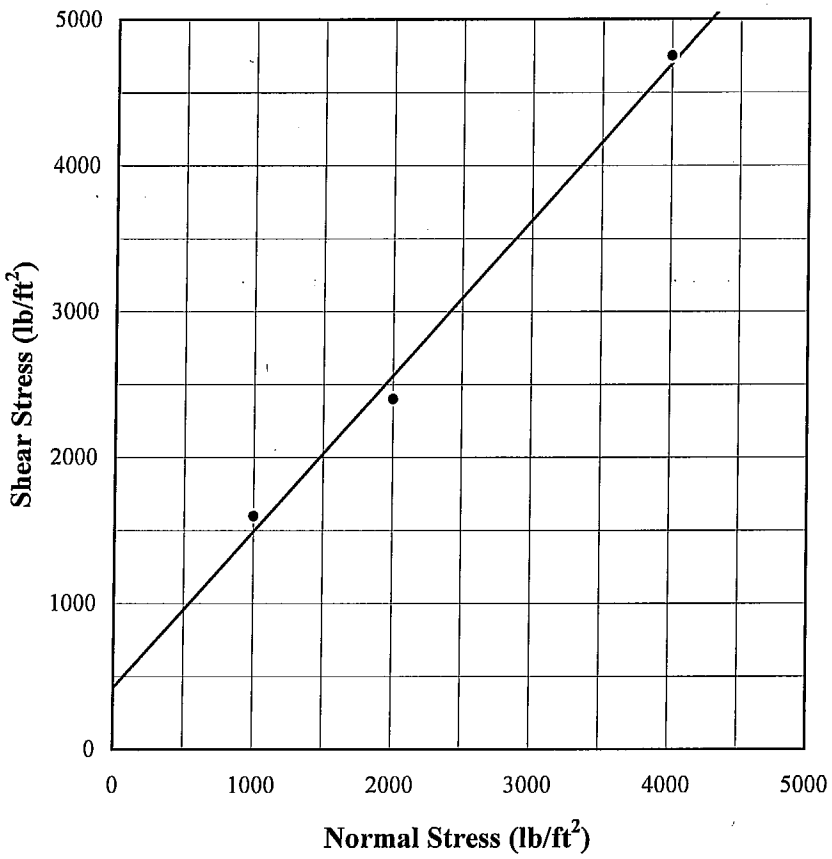
DIRECT SHEAR TEST

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

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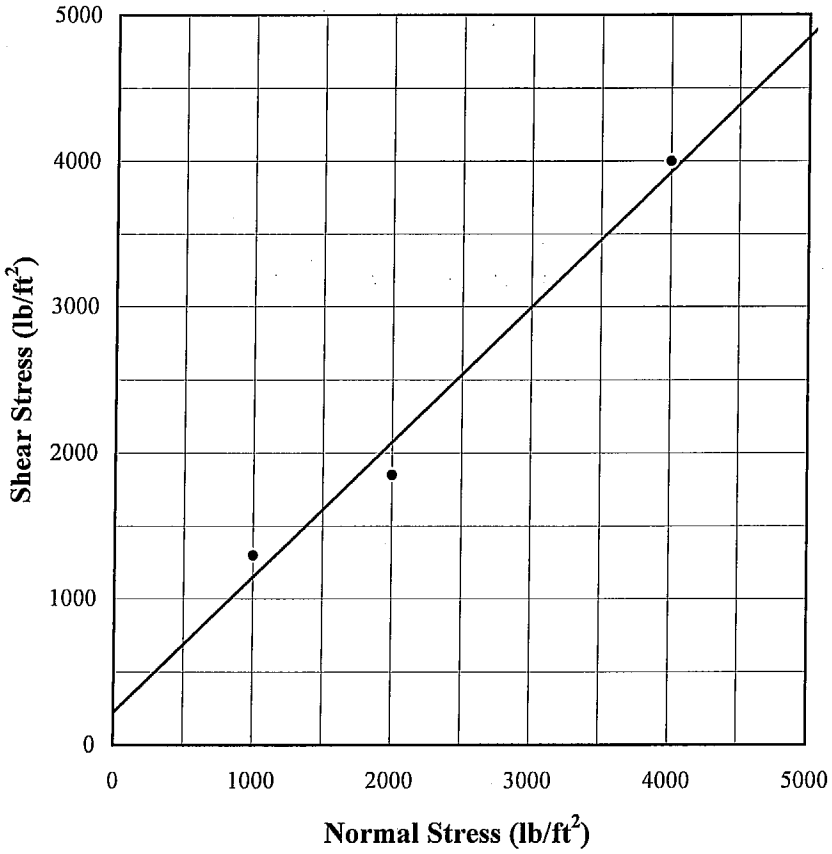
Figure No :

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

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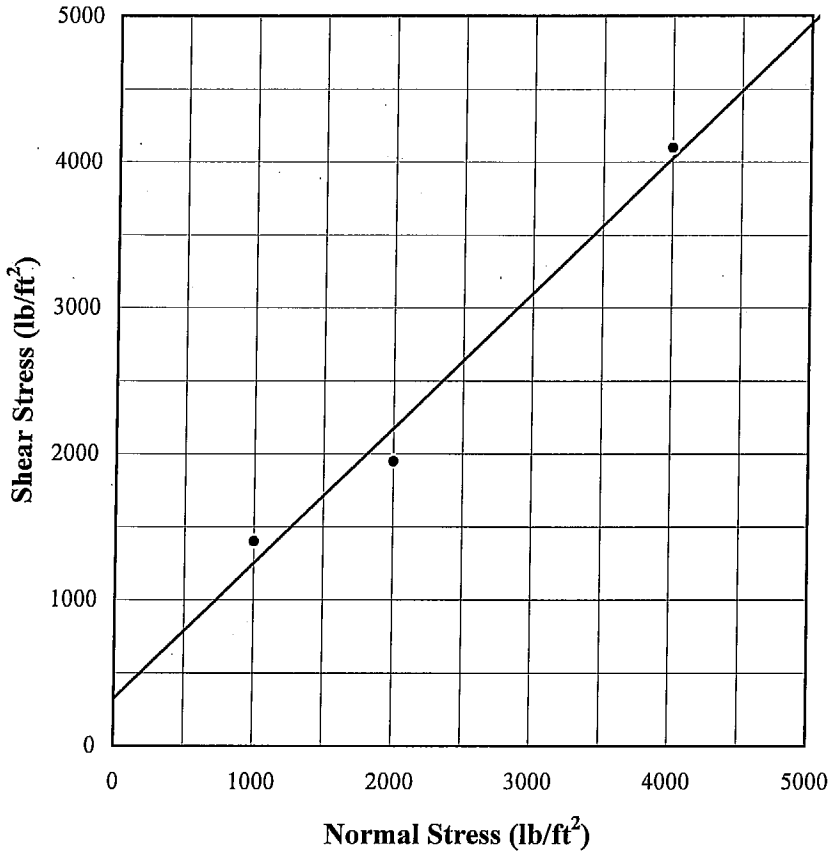
Project No: 033022-01
Drafted By: BIH
Date : 03/24/04

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

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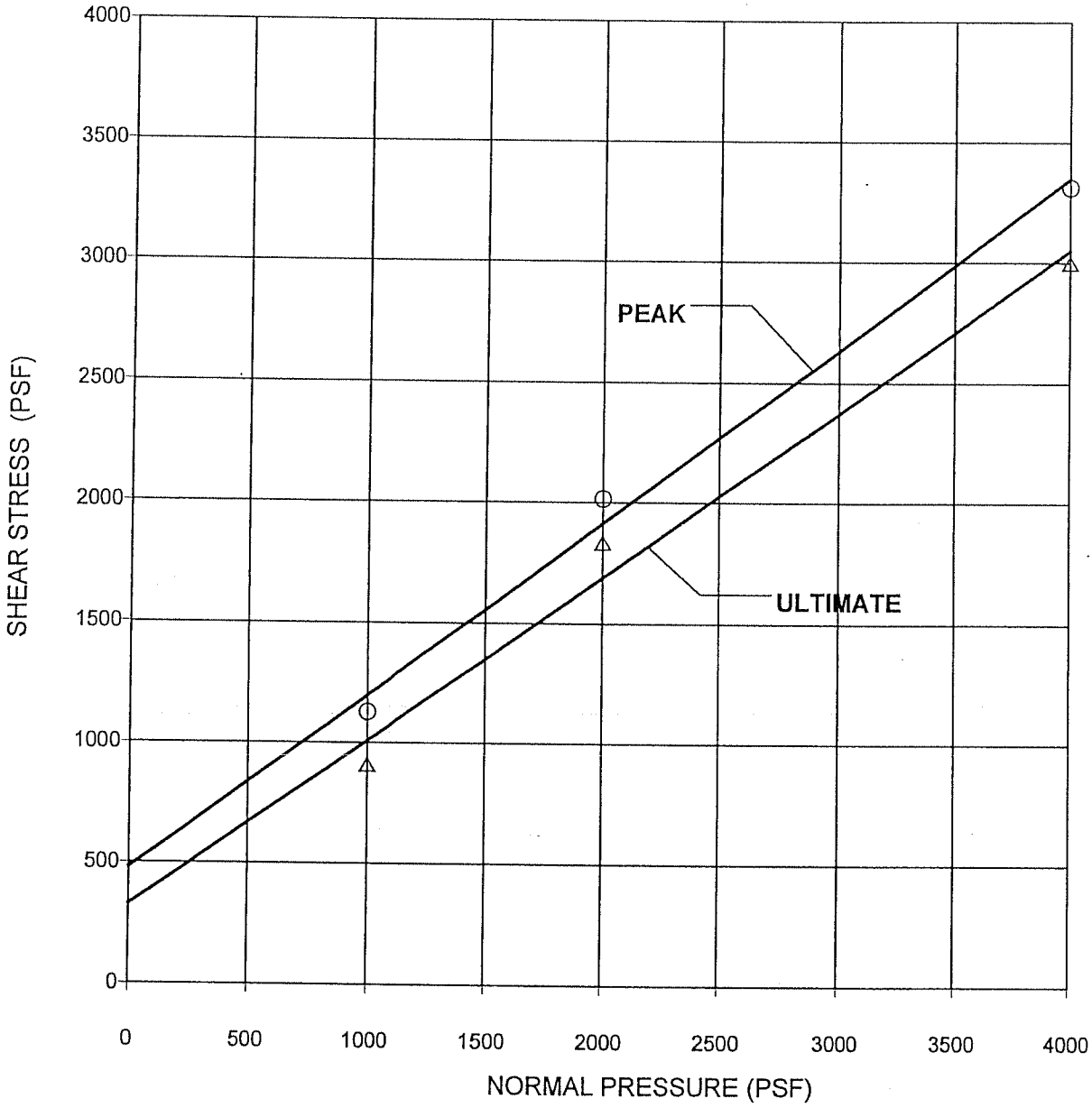
Hawkbryn, Santa Clarita

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

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Project Address:
Monte Verde / Santa Clarita
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FIGURE

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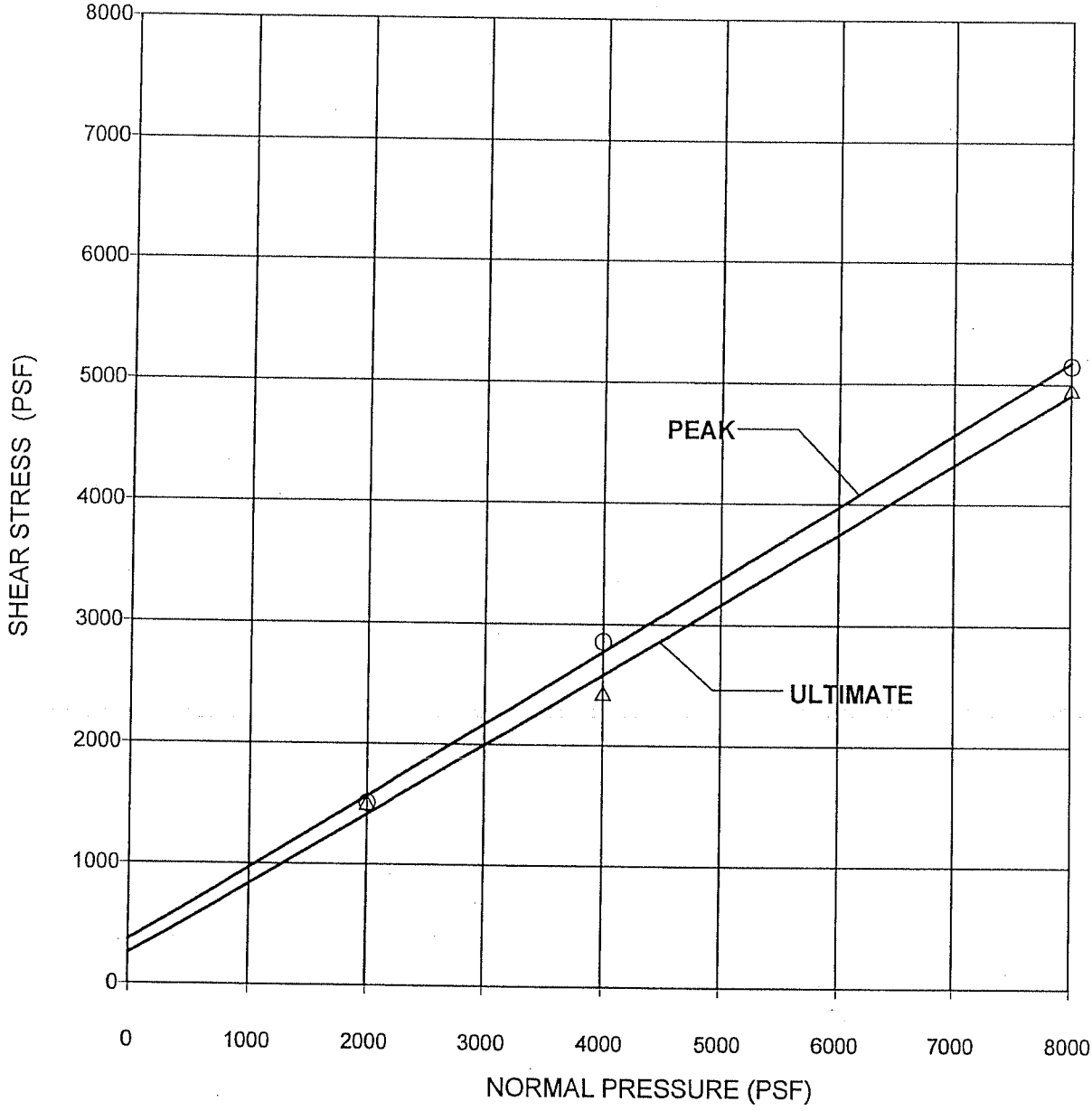

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-1	R-11	50	RING	SM	365	31
△ RESIDUAL						250	30

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

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DIRECT SHEAR

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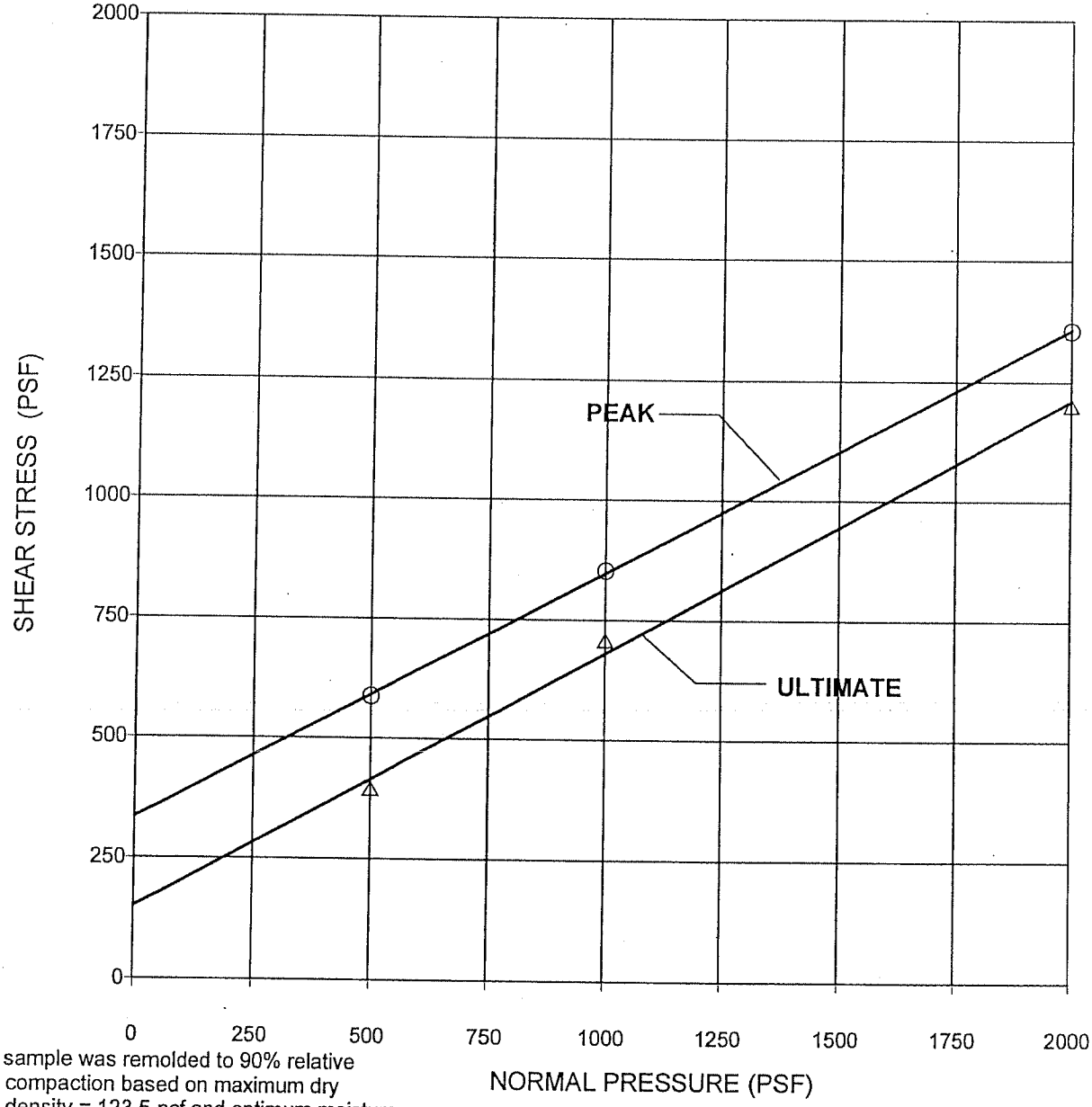

Note: sample was remolded to 90% relative compaction based on maximum dry density = 123.5 pcf and optimum moisture = 11.0%

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

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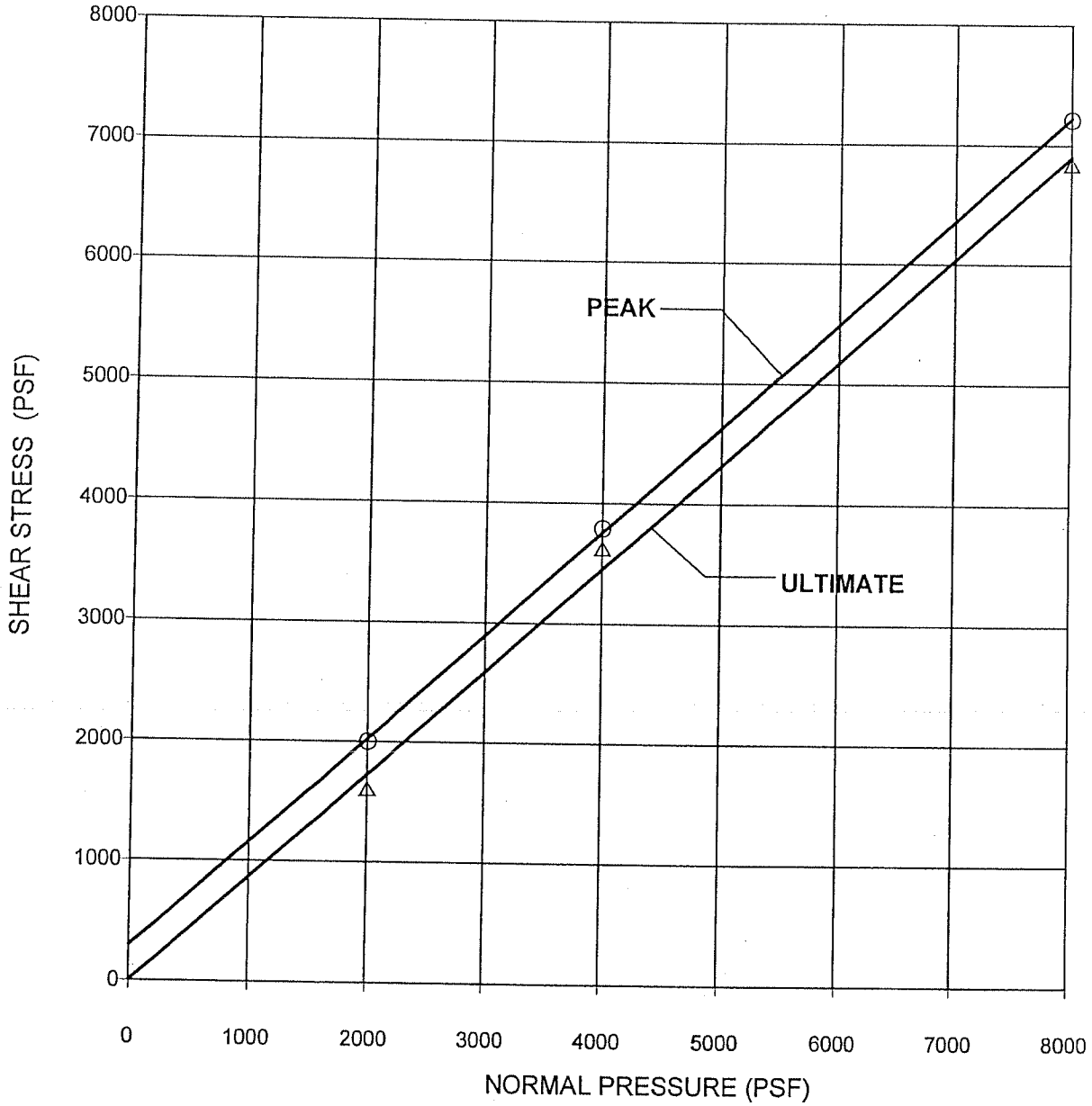

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-2	R-9	45	RING	SM/CL	295	41
△ RESIDUAL						5	41

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

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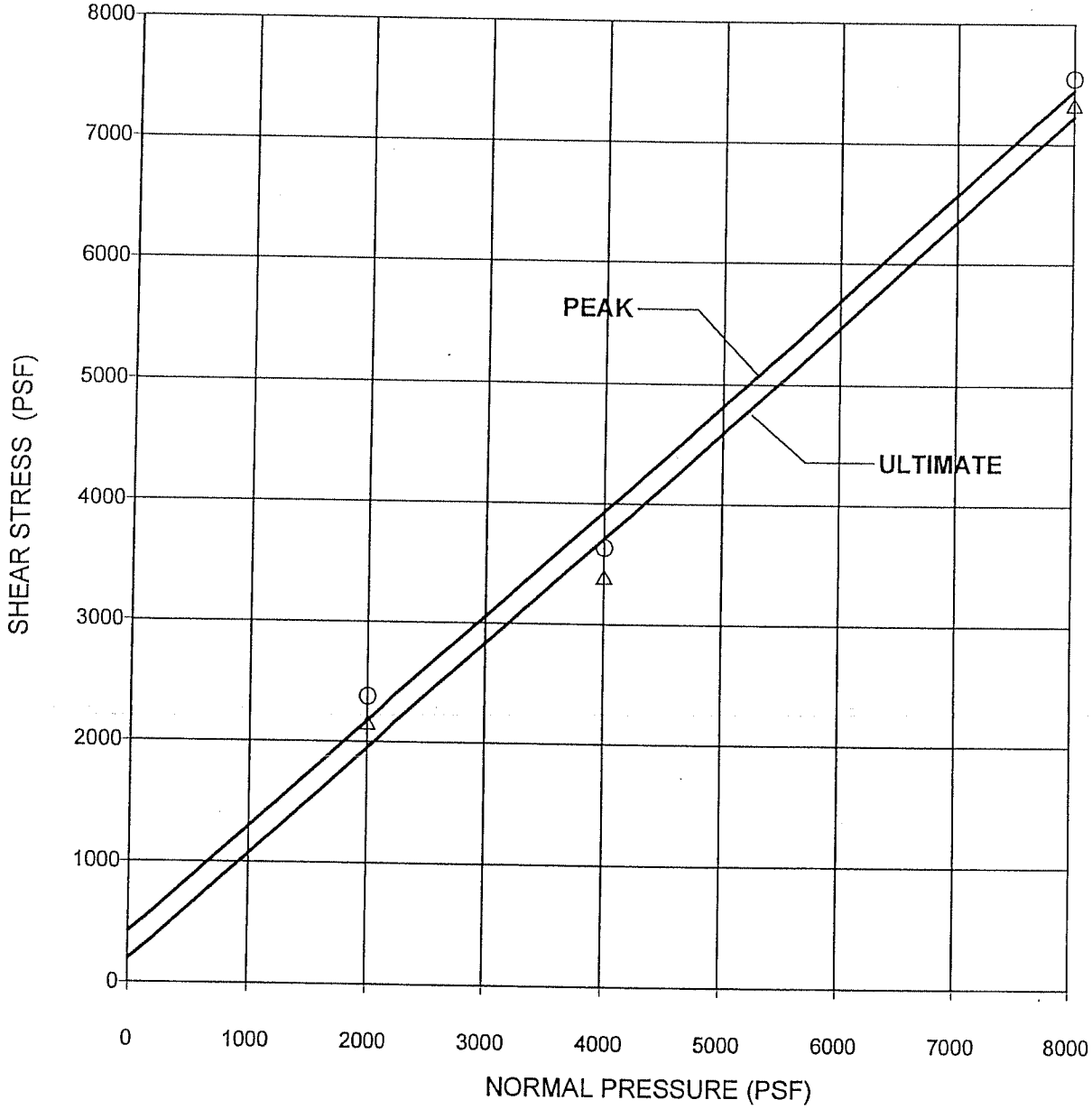

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-2	R-13	65	RING	SC	420	41
△ RESIDUAL						190	41

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

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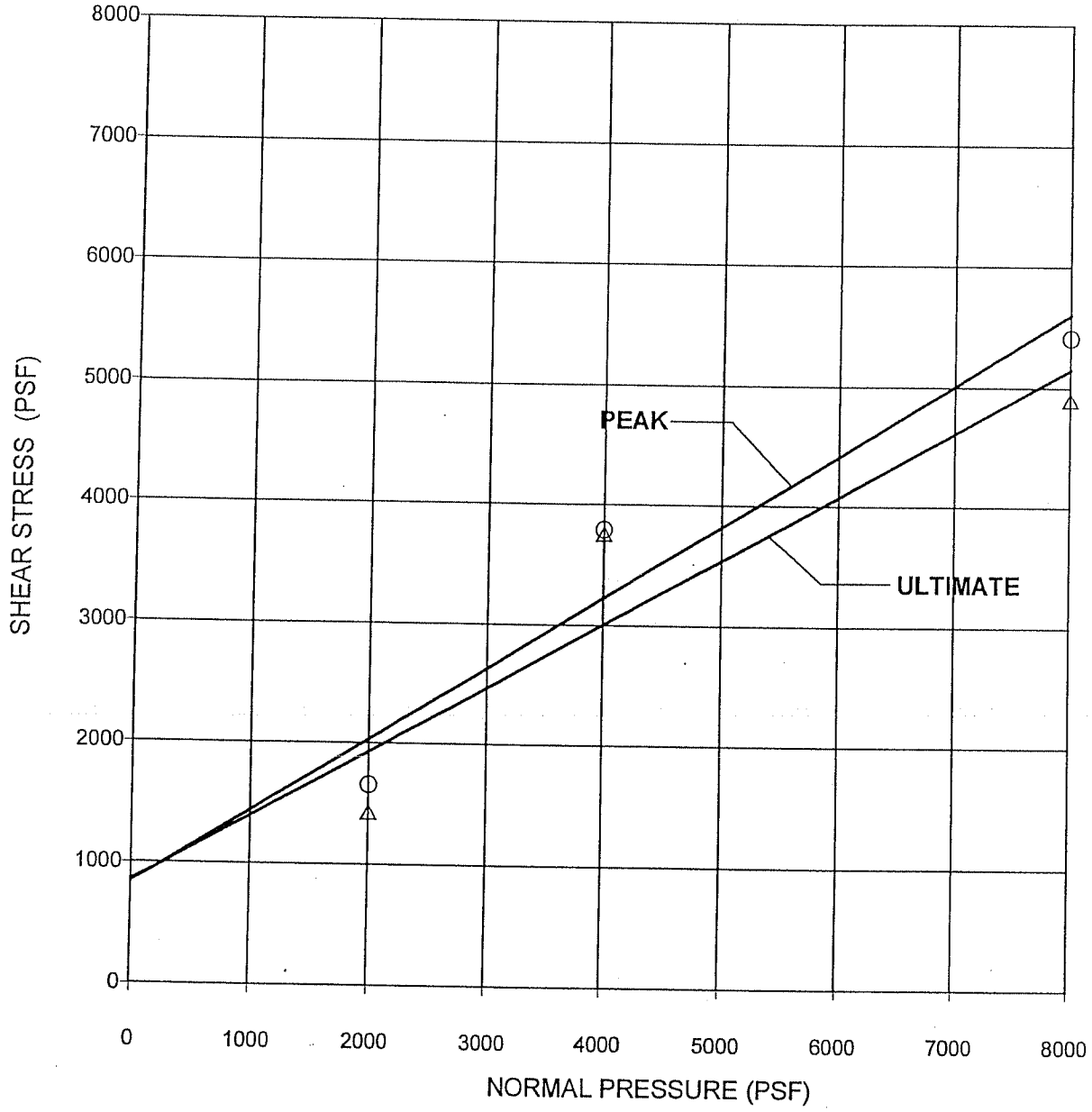

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-3	R-6	40	RING	SM	845	31
△ RESIDUAL						860	28

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

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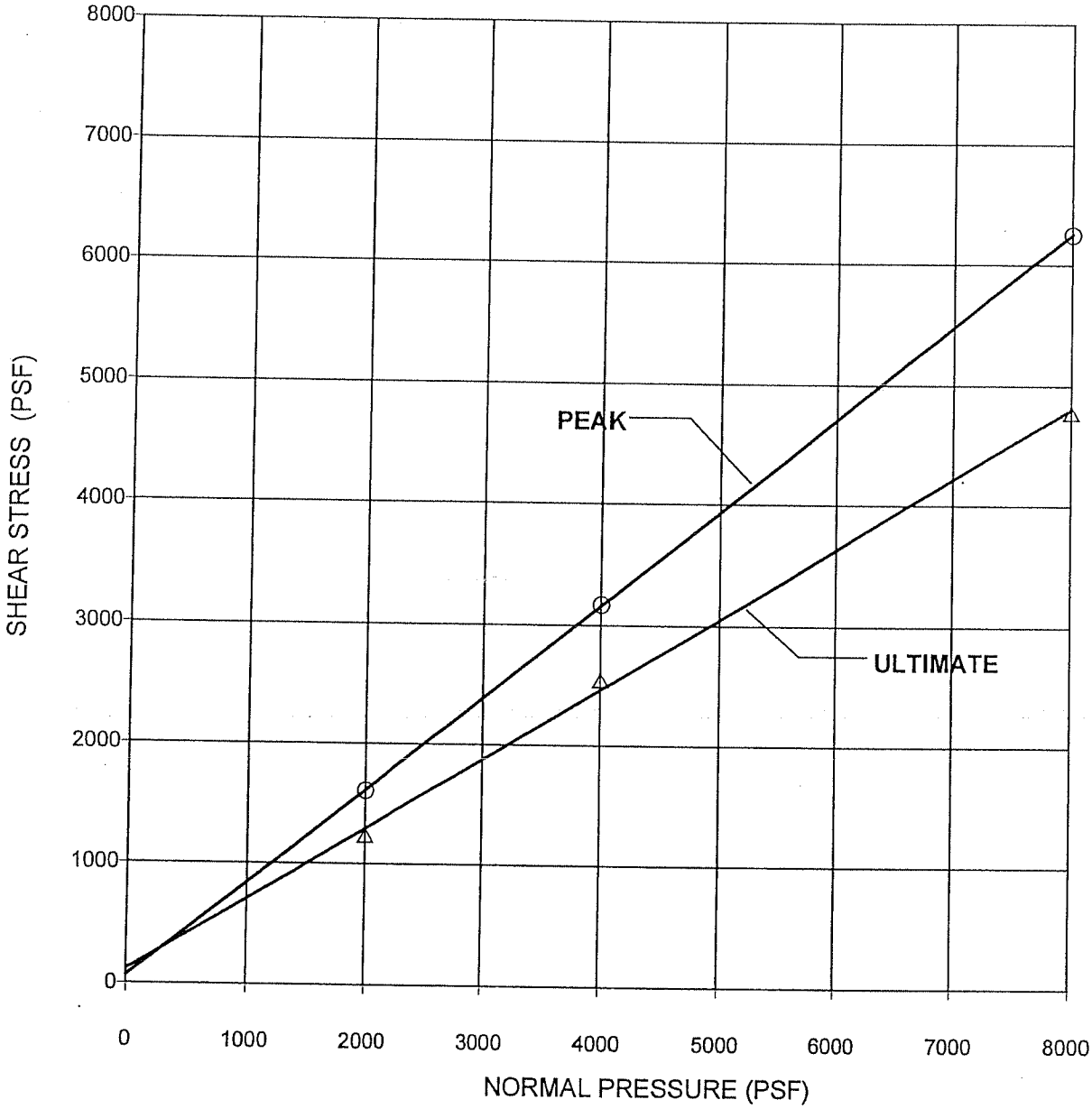

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-4	R-6	45	RING	SP-SM	65	38
△ RESIDUAL						120	30

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

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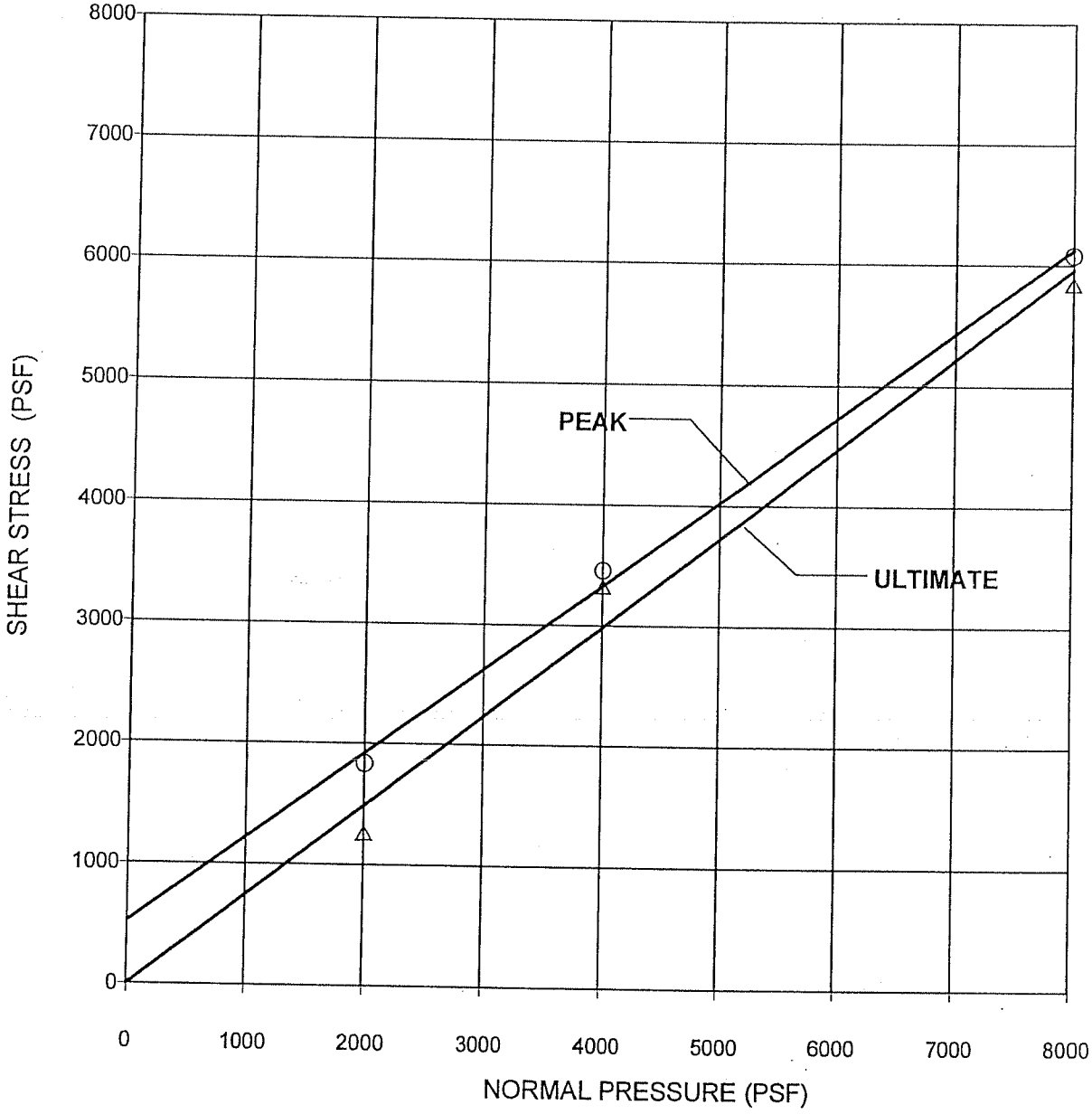

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-5	R-6	50	RING	SM	520	35
△ RESIDUAL						0	37

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

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Monte Verde / Santa Clarita
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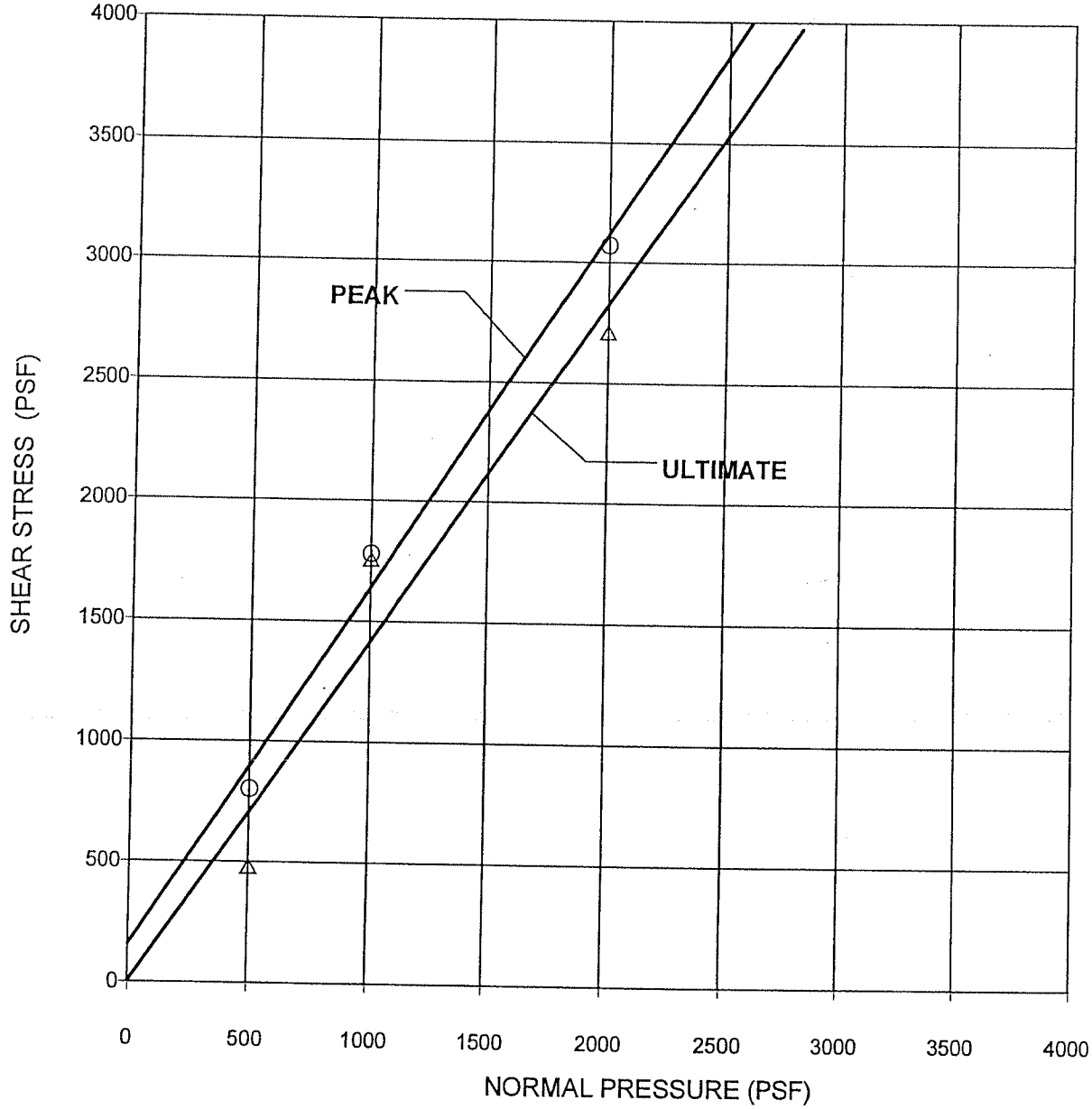

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-6	R-2	10	RING	SM	55	405
△ RESIDUAL						55	0

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

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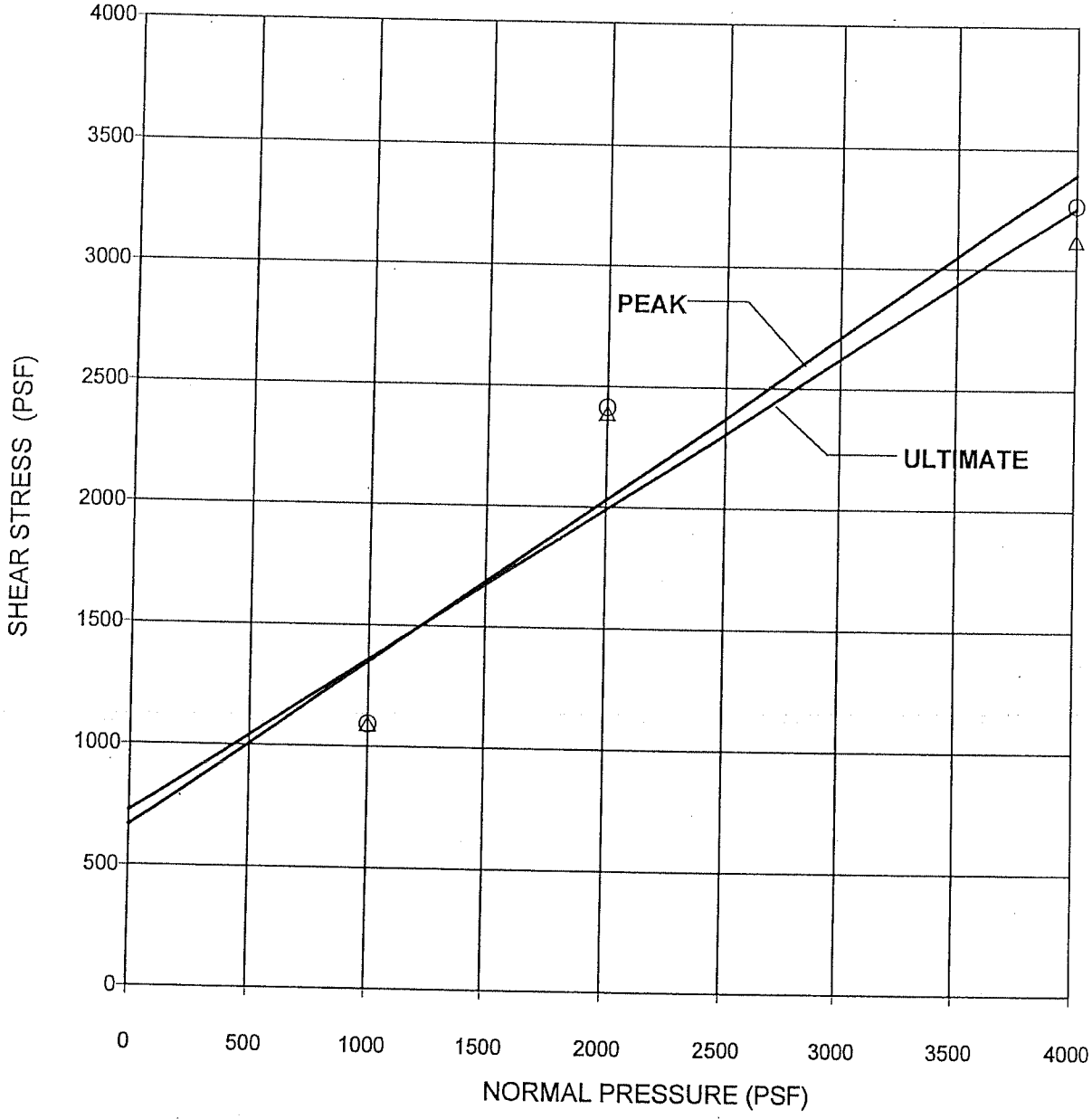

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-6	R-4	30	RING	SM	665	34
△ RESIDUAL						725	32

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

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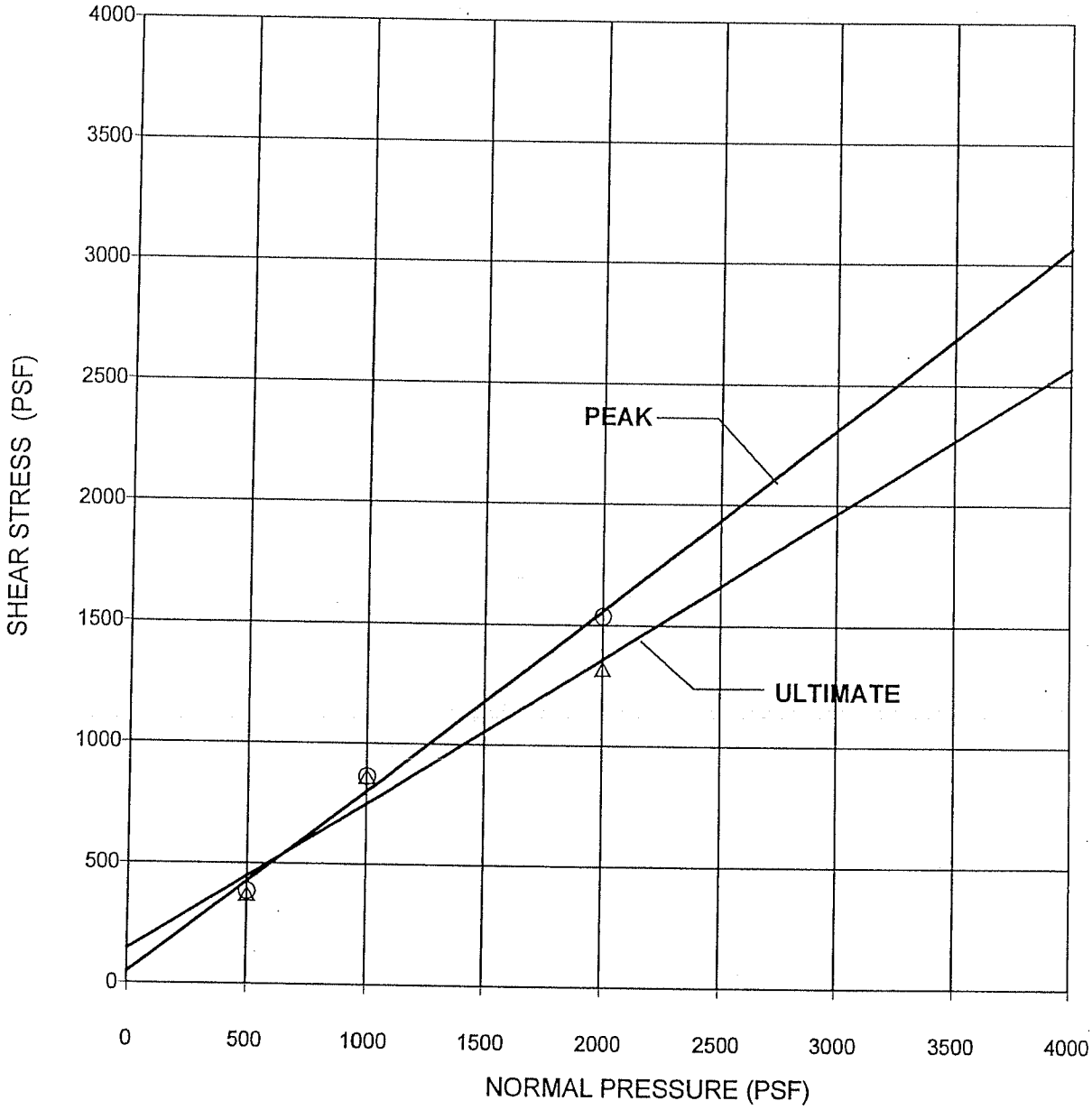

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-7	R-2	5	RING	SC	50	37
△ RESIDUAL						145	31

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:
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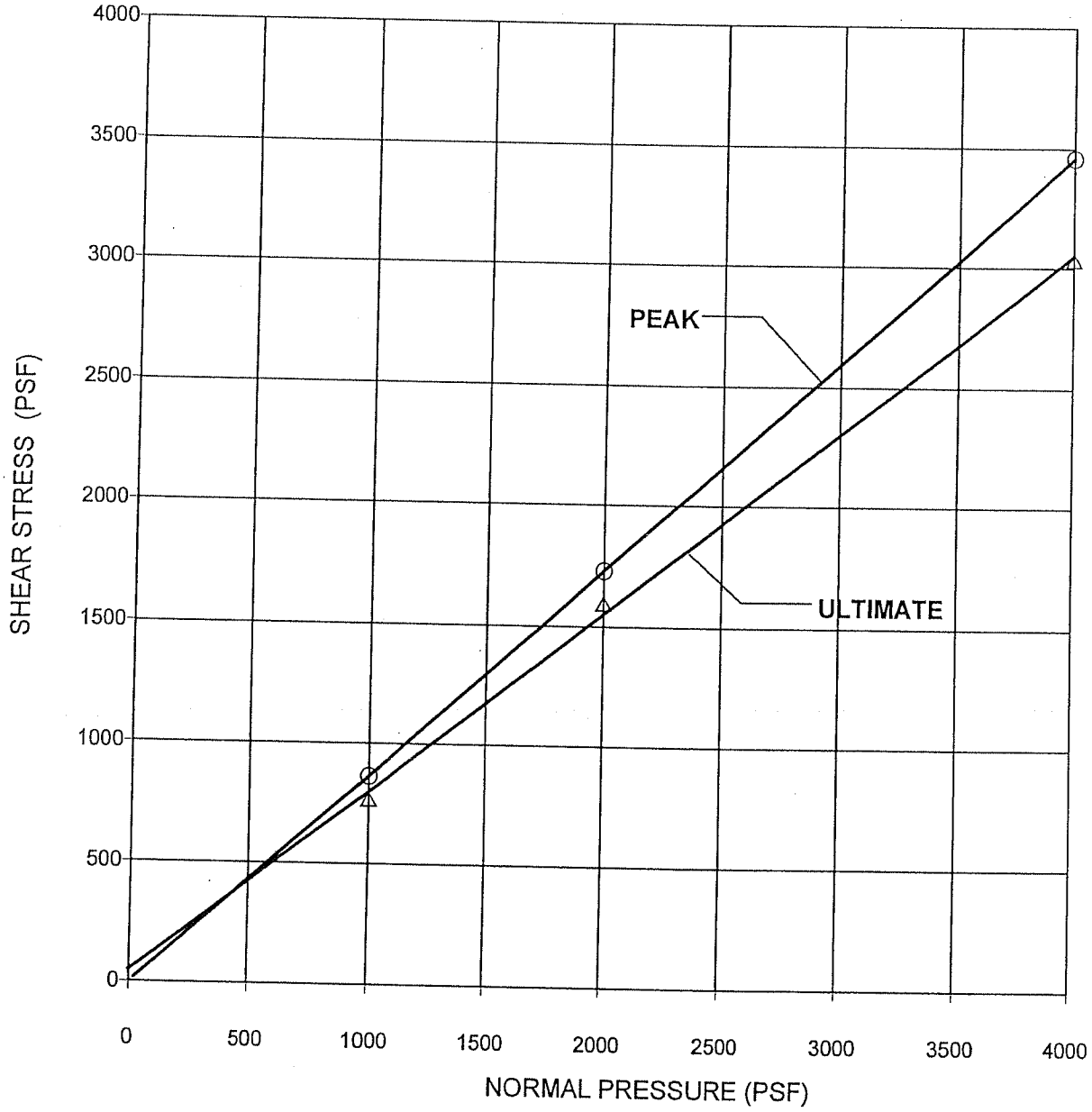

SYMBOL	BOREHOLE NUMBER	SAMPLE NUMBER	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○ ULTIMATE	B-LGC-7	R-5	25	RING	SM	0	41
△ RESIDUAL						50	37

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

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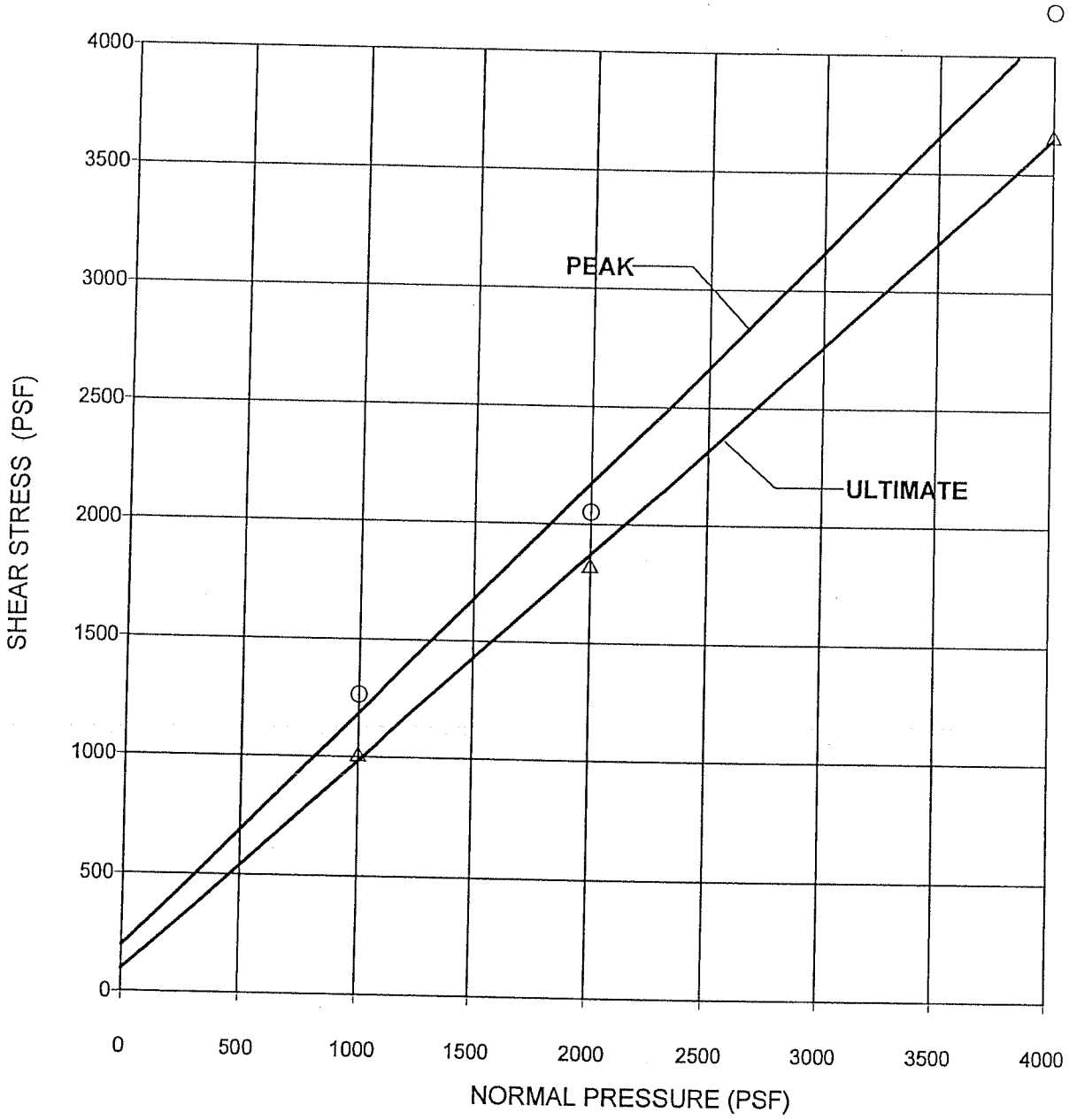
FIGURE



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

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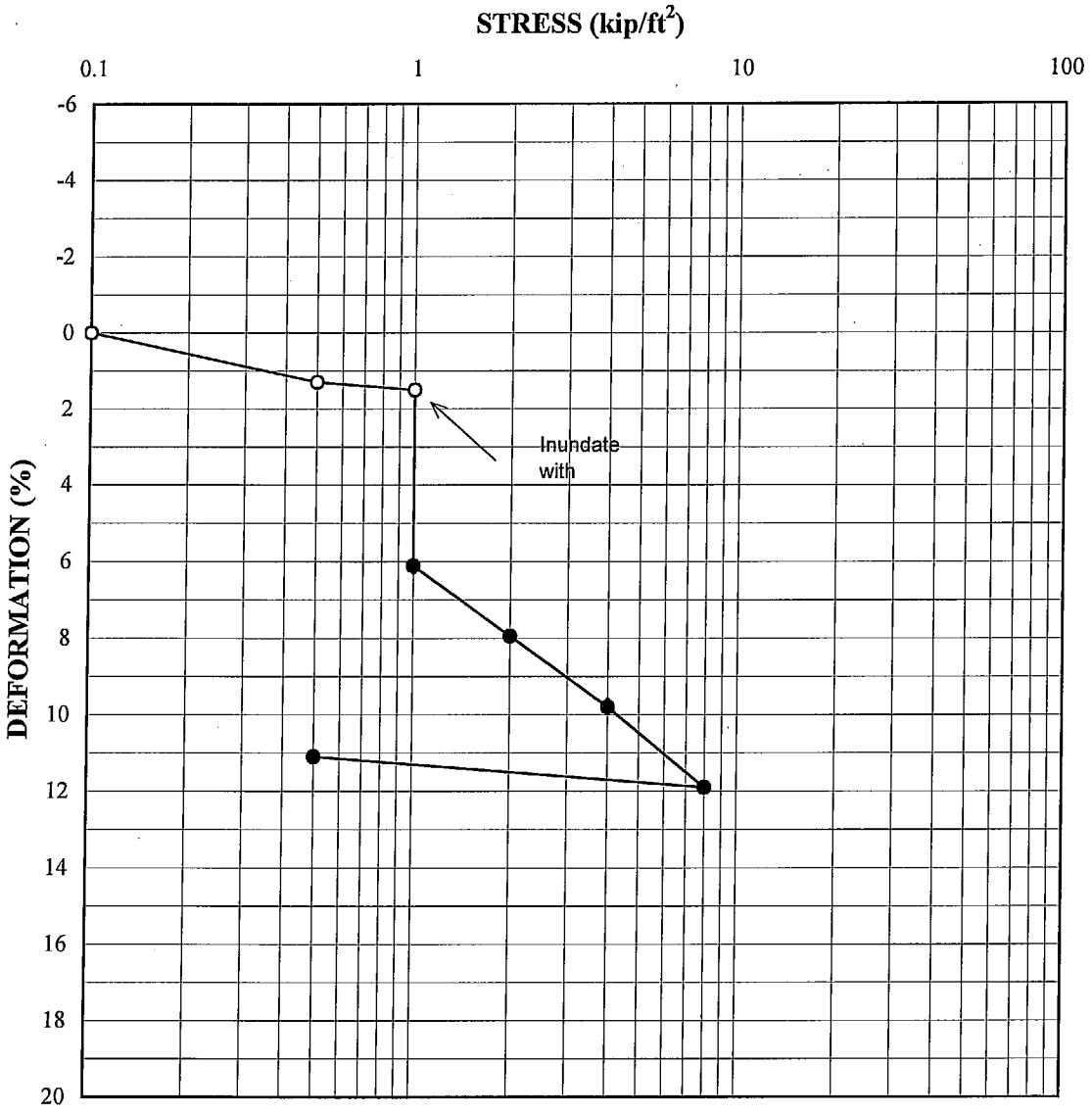
FIGURE

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

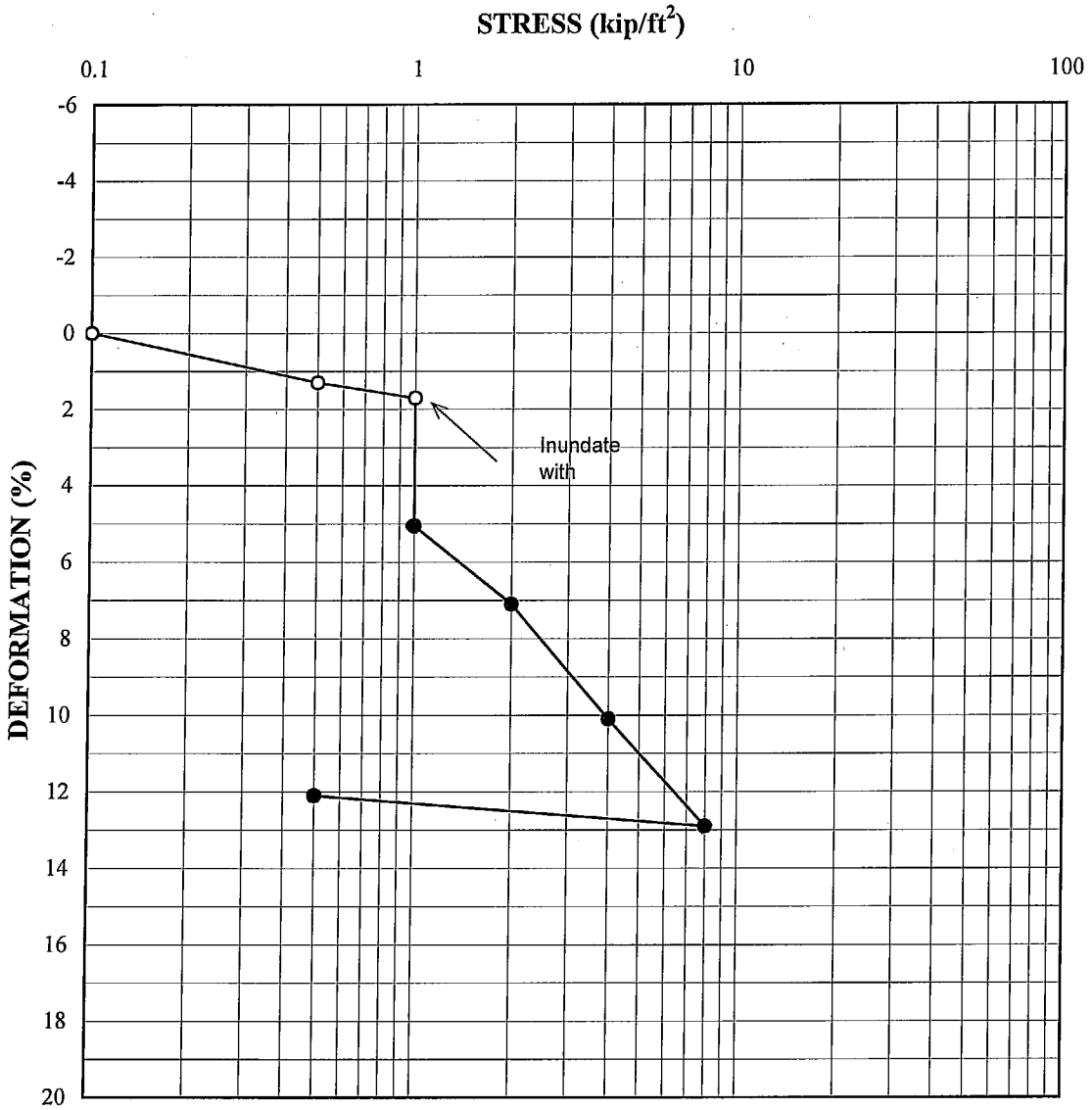
CONSOLIDATION TEST RESULTS

Hawkbryn, Santa Clarita

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

Figure No :

LGC



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

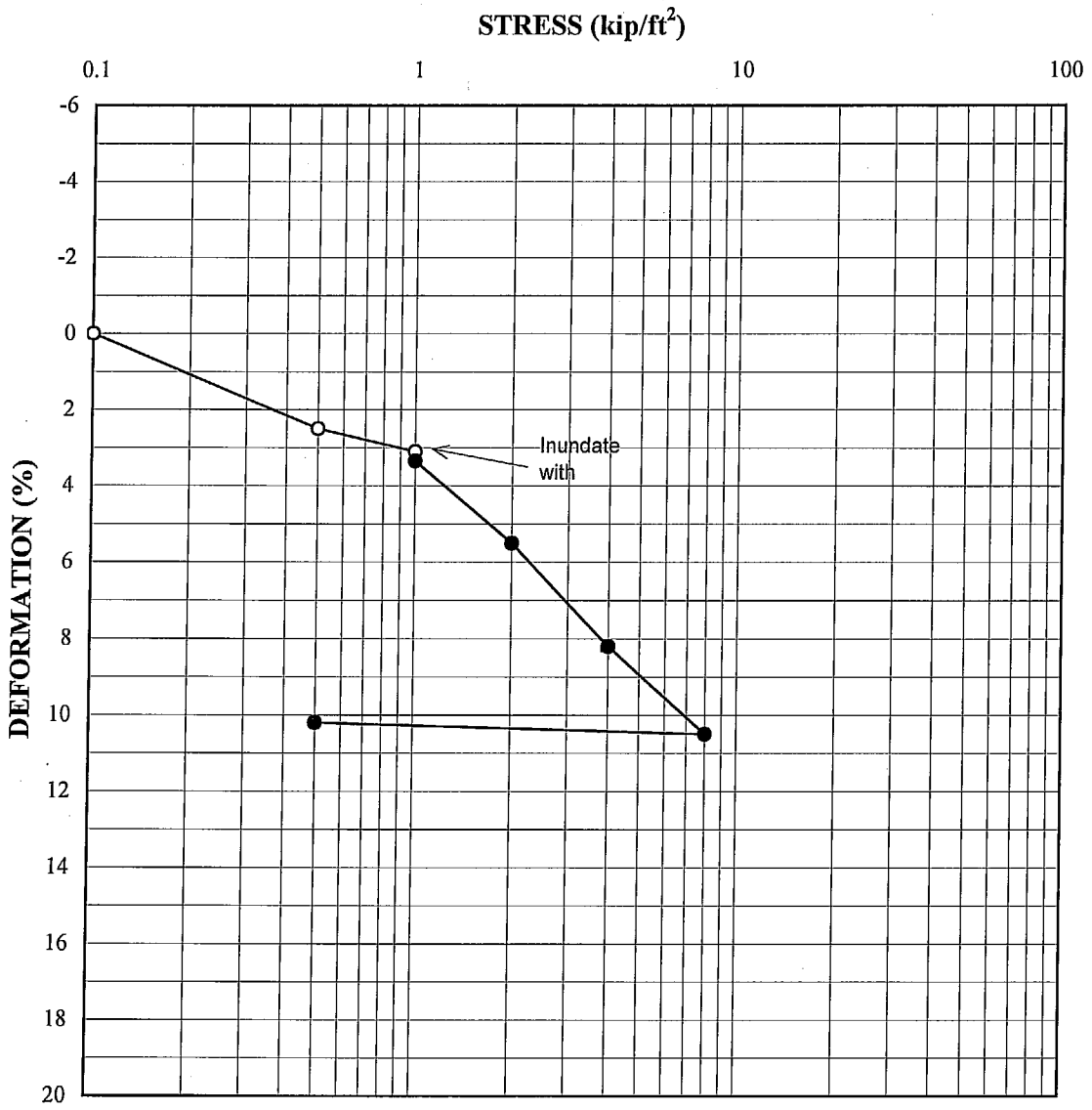
CONSOLIDATION TEST RESULTS

Hawkbryn, Santa Clarita

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

Figure No :

LGC



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

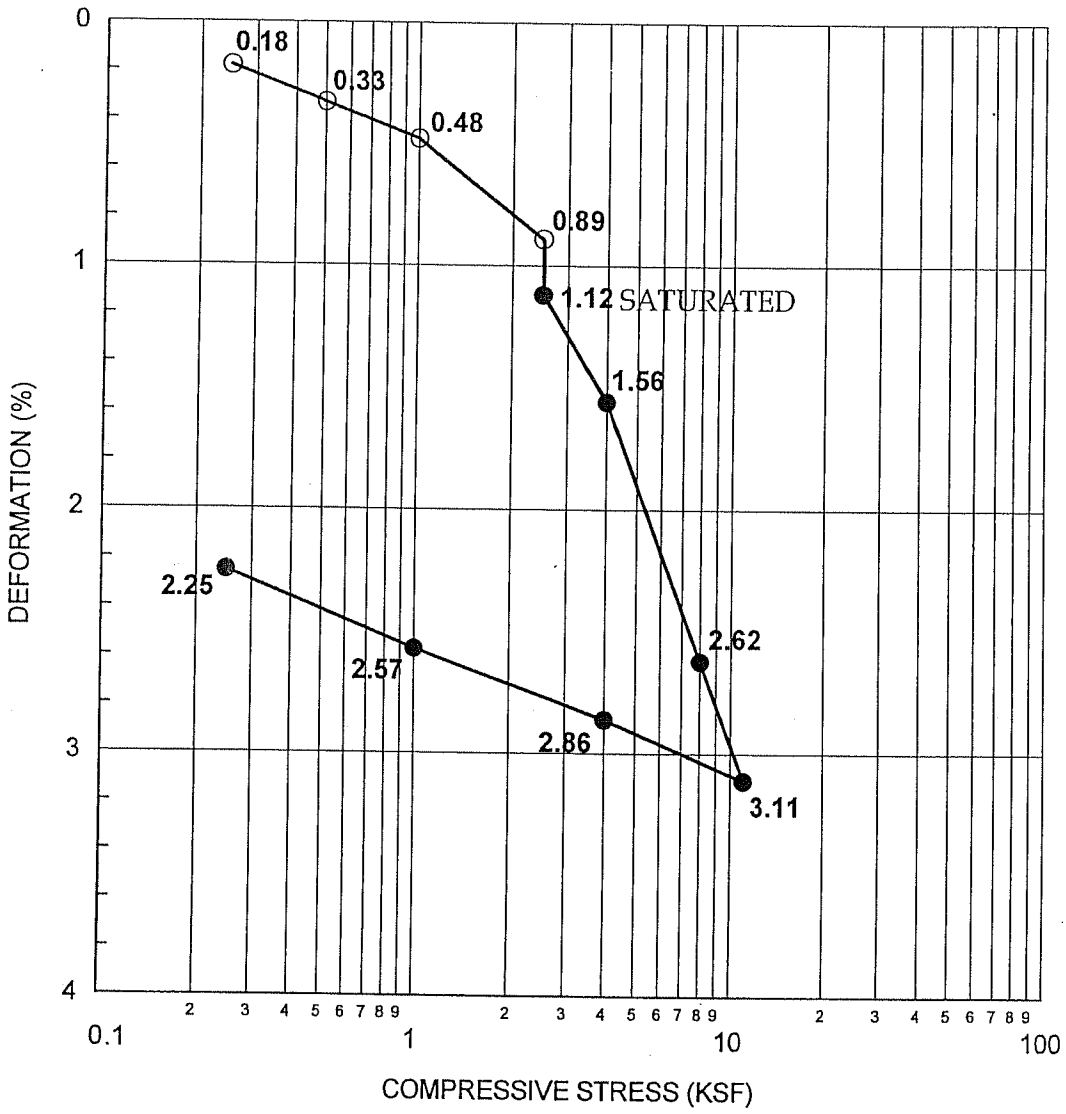
CONSOLIDATION TEST RESULTS

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

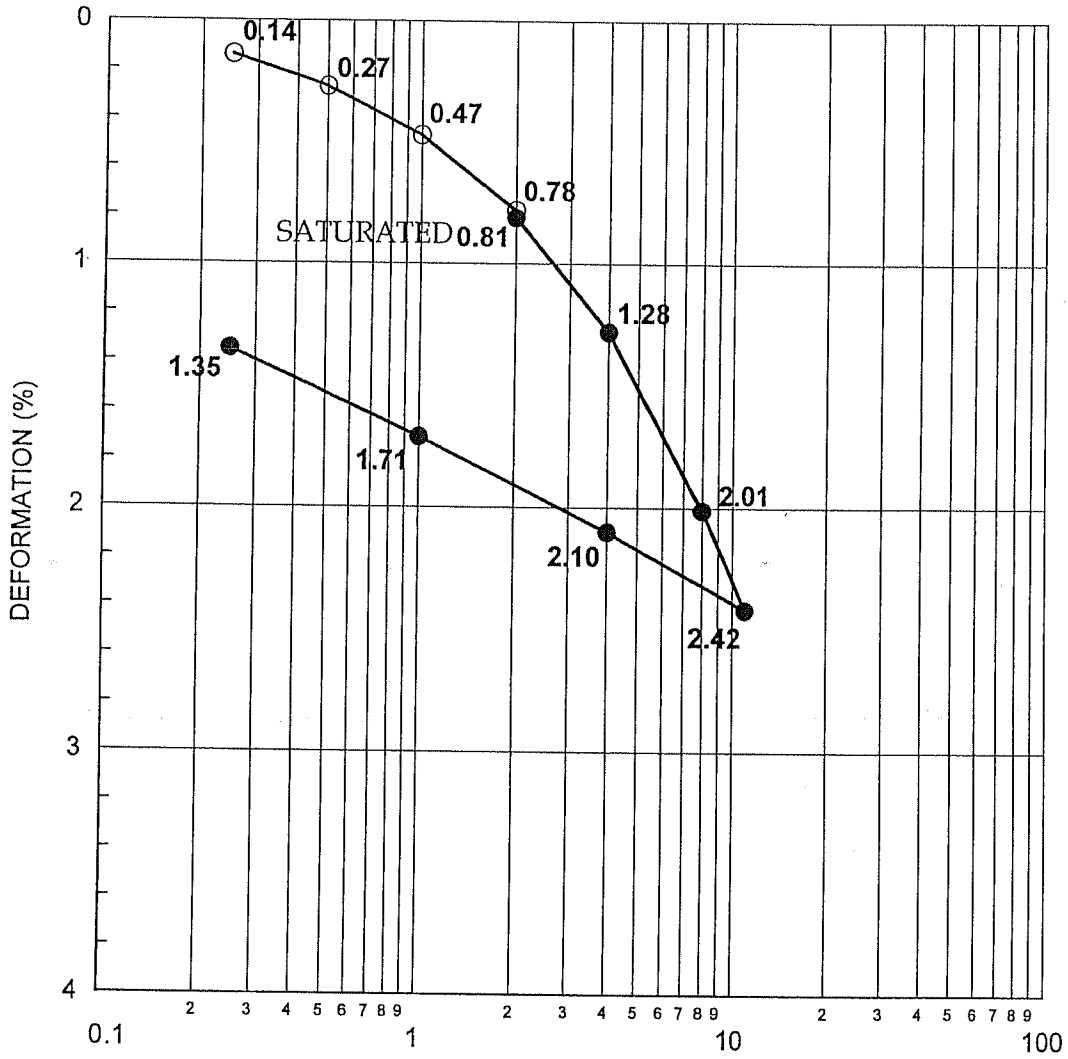
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

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

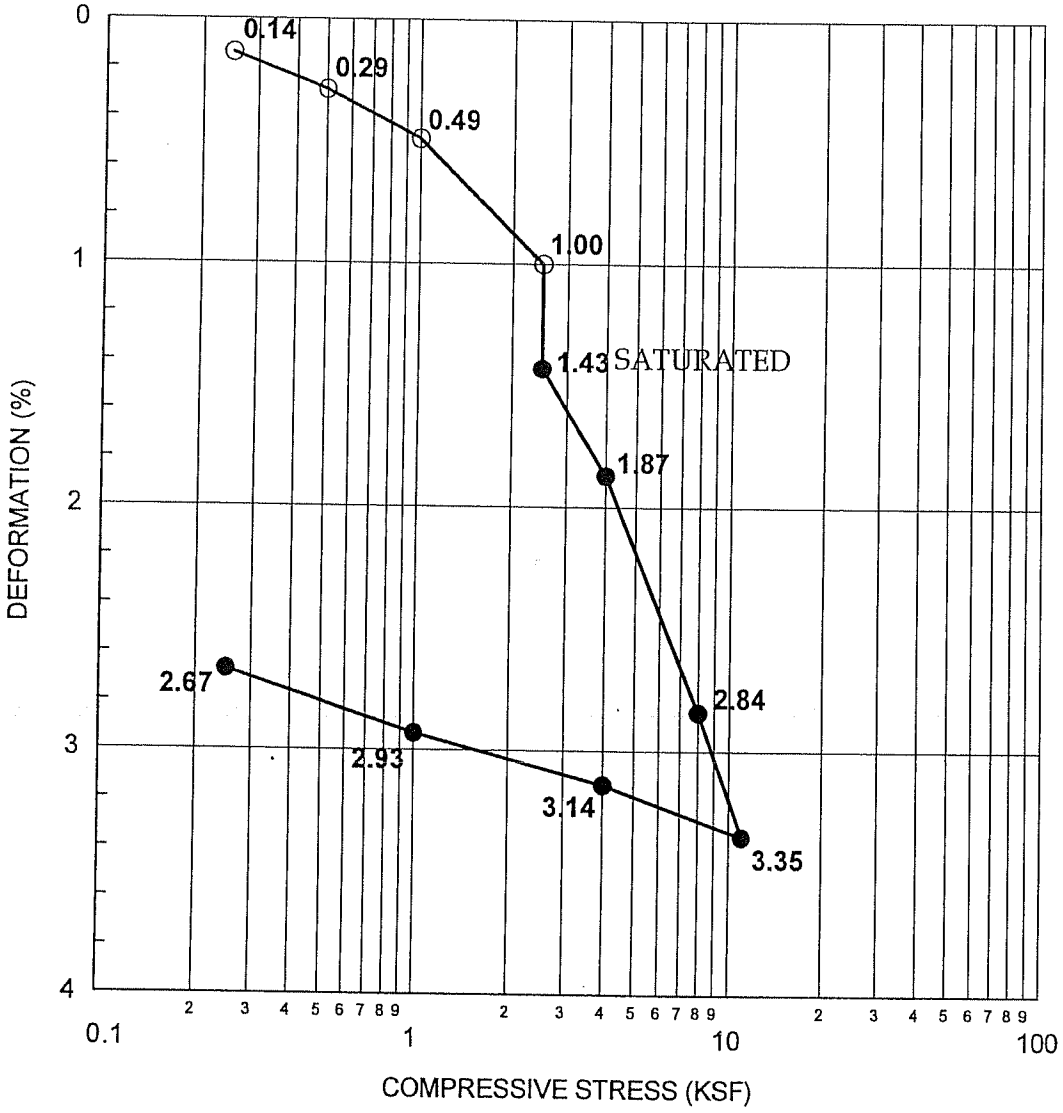
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

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

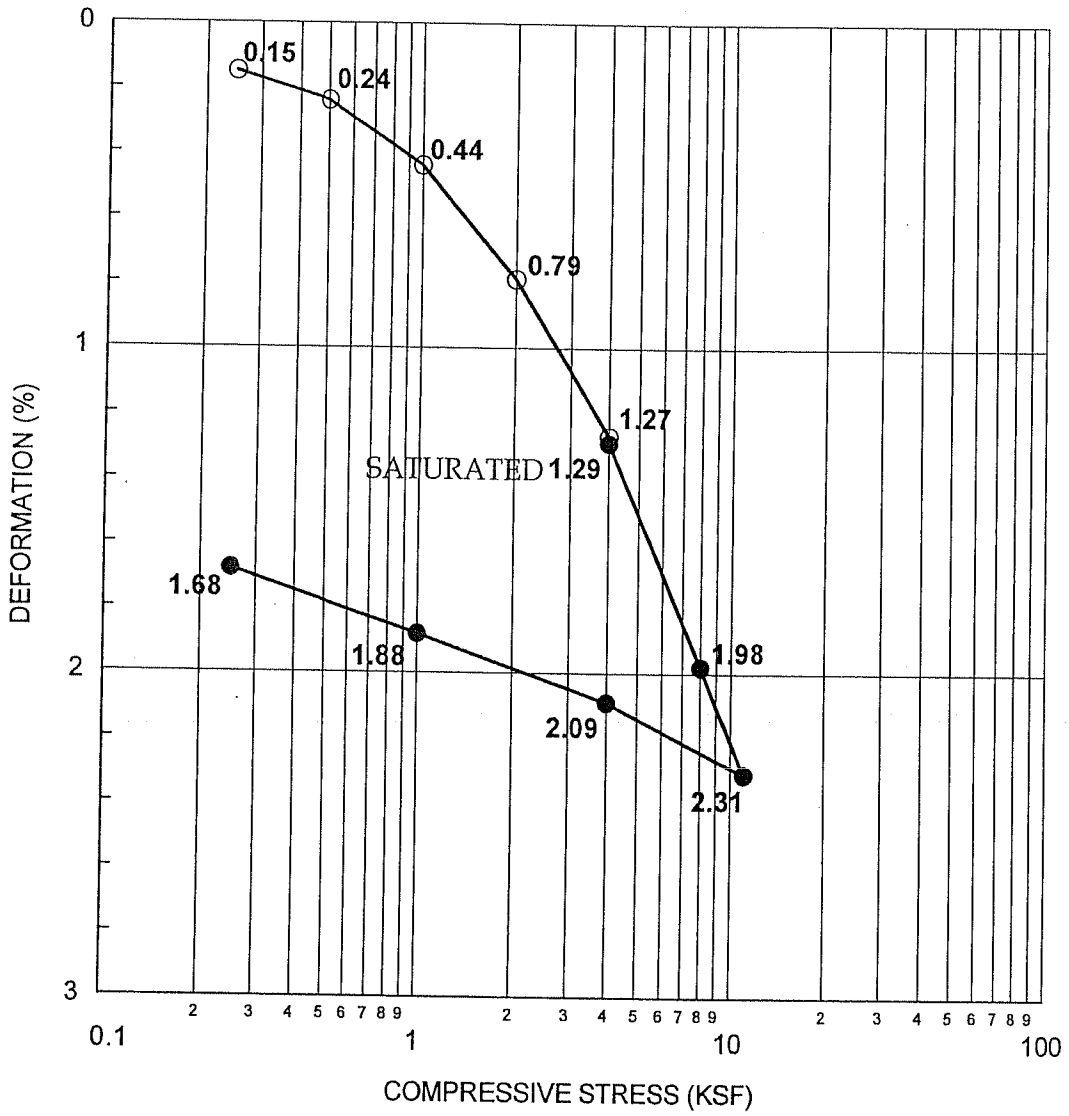
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

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

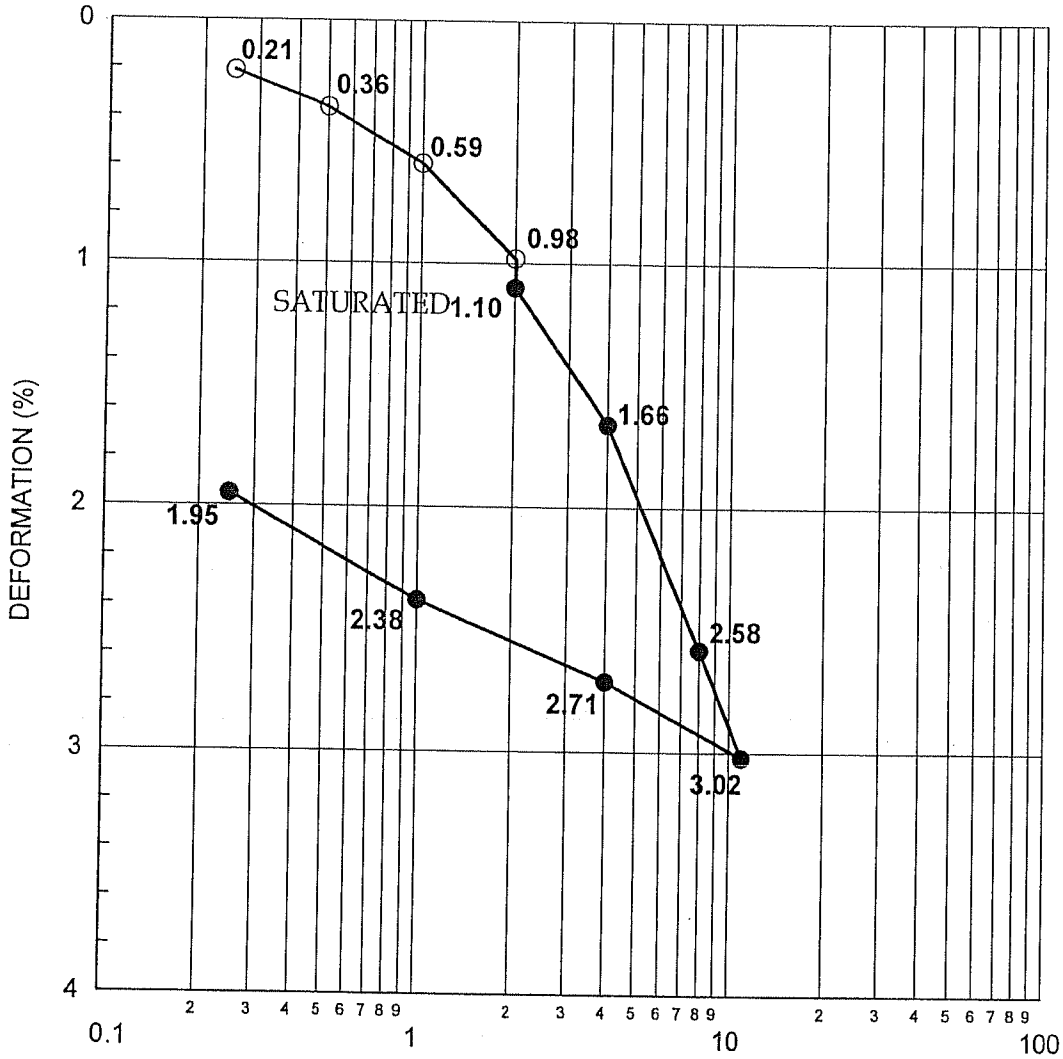
Project Name:
Monte Verde / Santa Clarita
Client: LGC
Job No.: 033022-04
EGL Project No.: 07-059-001

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.

American Society of Civil Engineers, 2016, Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-16), provisions and commentary.

Boore, D.M., Stewart, J.P., Seyhan, E., and Atkinson, G.A., 2014, NGA-West2 equations for predicting PGA, PGV, and 5% damped PSA for shallow crustal earthquakes: Earthquake Spectra, v. 30, no. 3, p. 1057–1085.

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.

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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/

Seyhan, E., (2015), Weighted Average of 2014 NGA West-2 GMPEs, Excel file: NGAW2_GMPE_Spreadsheets_v5.7_041515 (2015), Pacific Earthquake Engineering Research Center.

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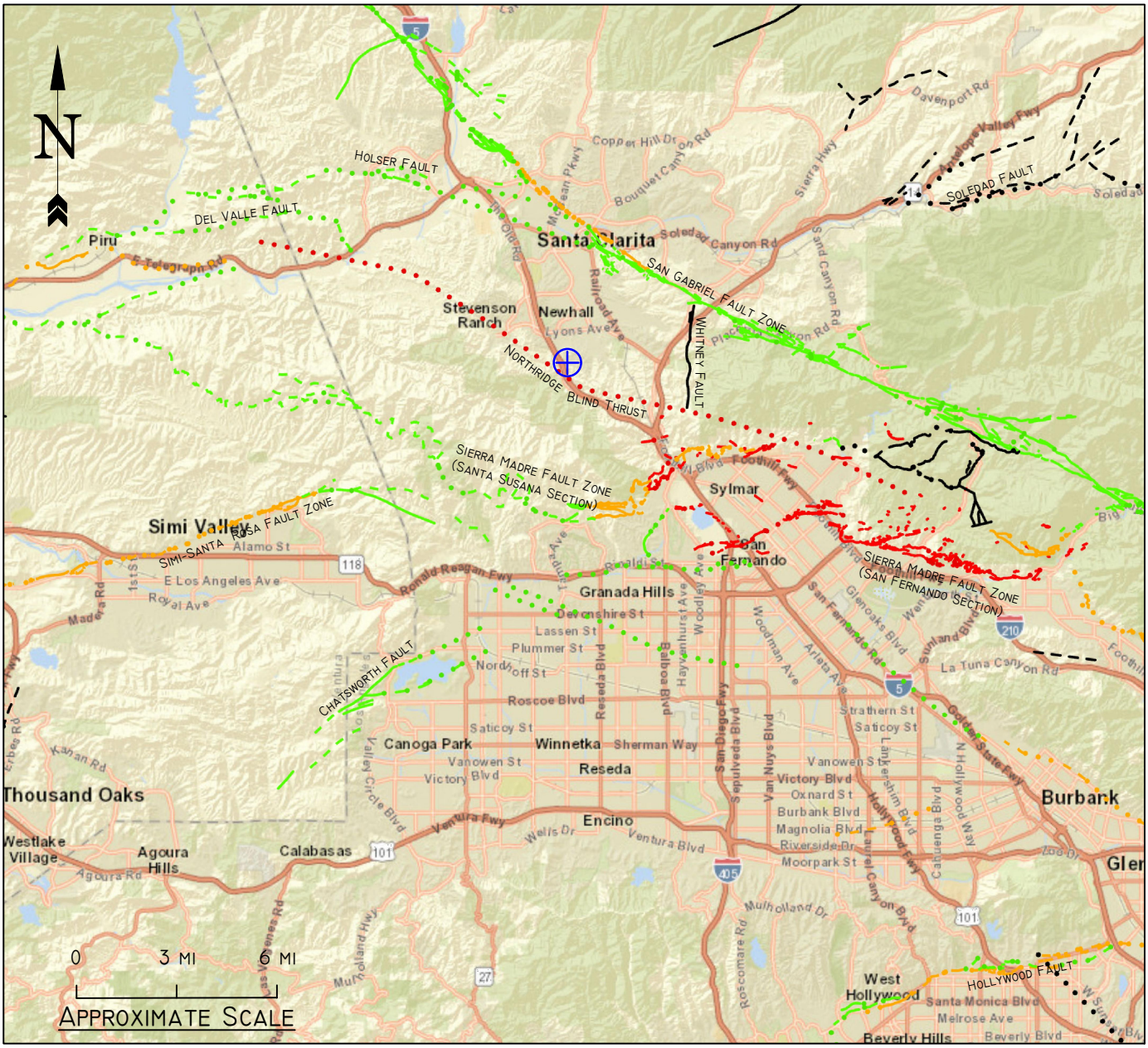
U.S. Geological Survey, Beta – Unified Hazard Tool, Interactive Hazard Curve and Deaggregation web applications, https://earthquake.usgs.gov/hazards/interactive/

U.S. Geological Survey, Quaternary Faults and Folds in the U.S., Google Earth .kmz file, https://www.usgs.gov/natural-hazards/earthquake-hazards/google-earth-kml-files

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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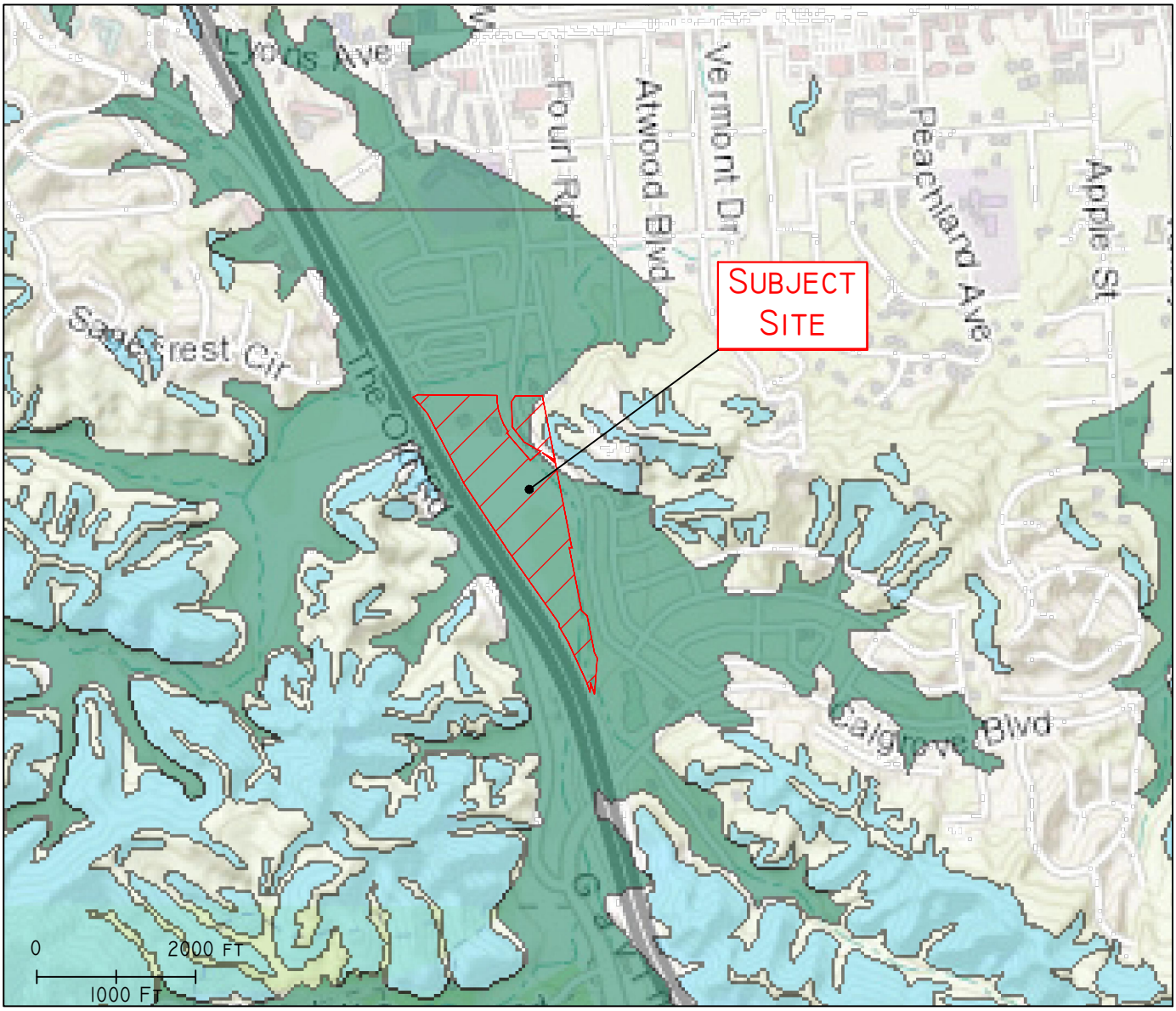
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

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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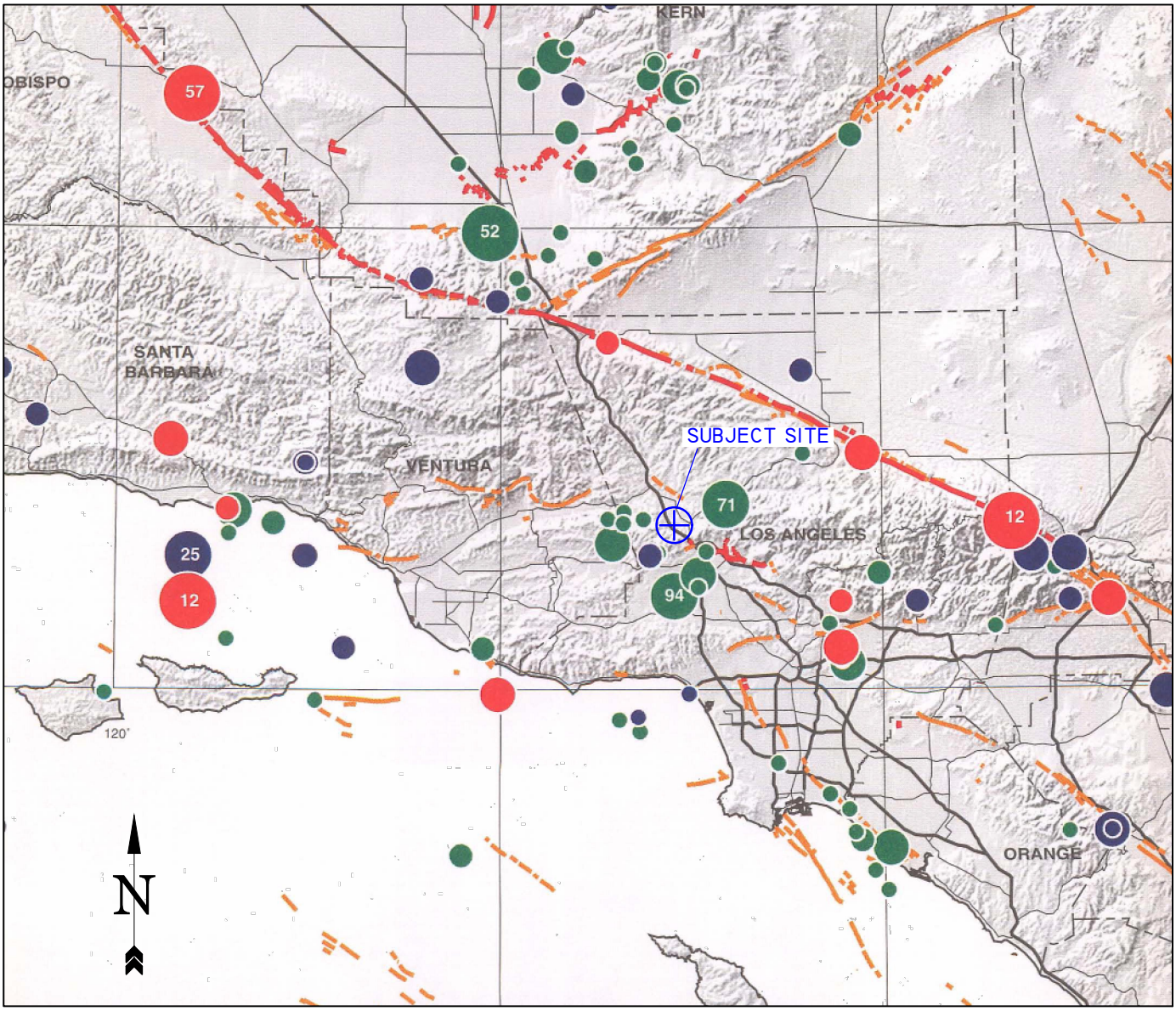
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

EARTHQUAKE ZONES OF
REQUIRED INVESTIGATION

JOB NO.: 21-2593-4

DATE: 6/15/21

FIGURE: C2



EPICENTER MAP LEGEND

Period	1800 - 1868	1869 - 1931	1932 - 1999
Magnitude (M) ≥ 7.0			
6.5 - 6.9			
6.0 - 6.4			
5.5 - 5.9			
5.0 - 5.4			

Historical Faulting

Holocene Faulting

Highways (Major)

Highways (Minor)

Lakes

65 — Last two digits of M ≥ 6.5 earthquake year

0 — 15 MI — 30 MI

20 KM — 48 KM

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

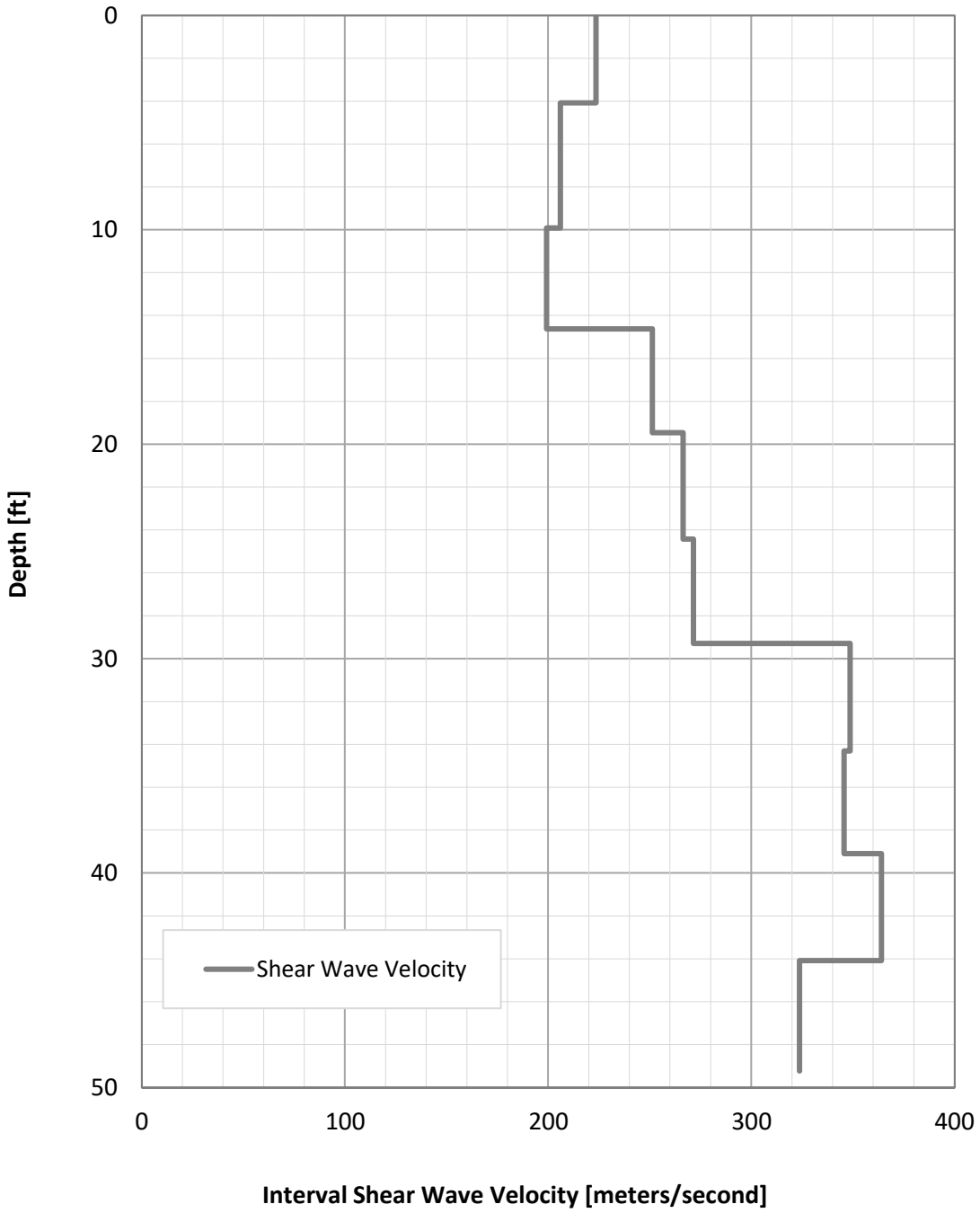
EQ EPICENTER LOCATION MAP

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 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
ε_0: 1.31 σ

Mode (largest m-r bin):
m: 6.69
r: 5.5 km
ε_0: 1.25 σ
Contribution: 47.74 %

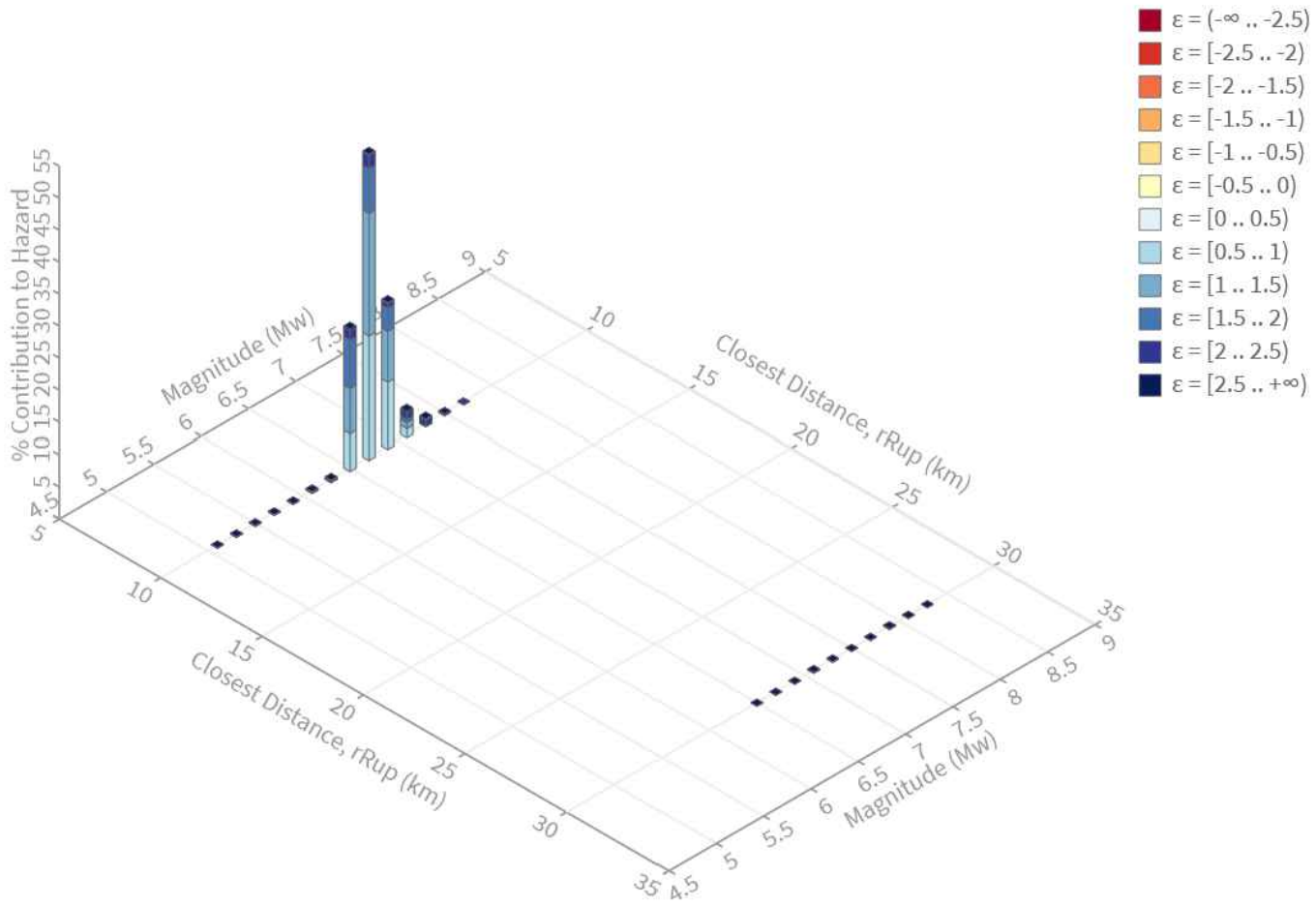
Mode (largest m-r-ε_0 bin):
m: 6.69
r: 4.88 km
ε_0: 0.84 σ
Contribution: 19.35 %

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	ε_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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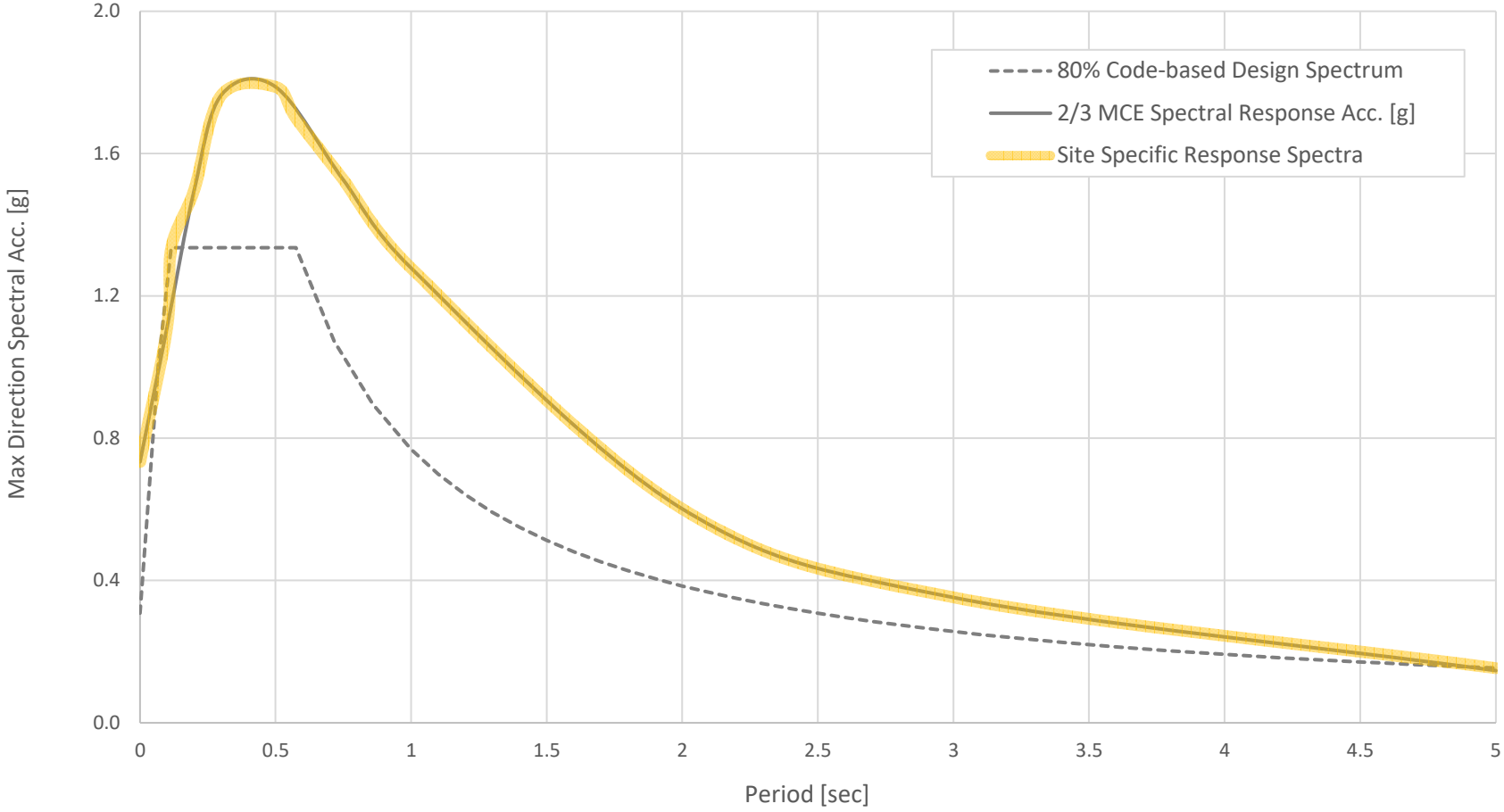
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

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

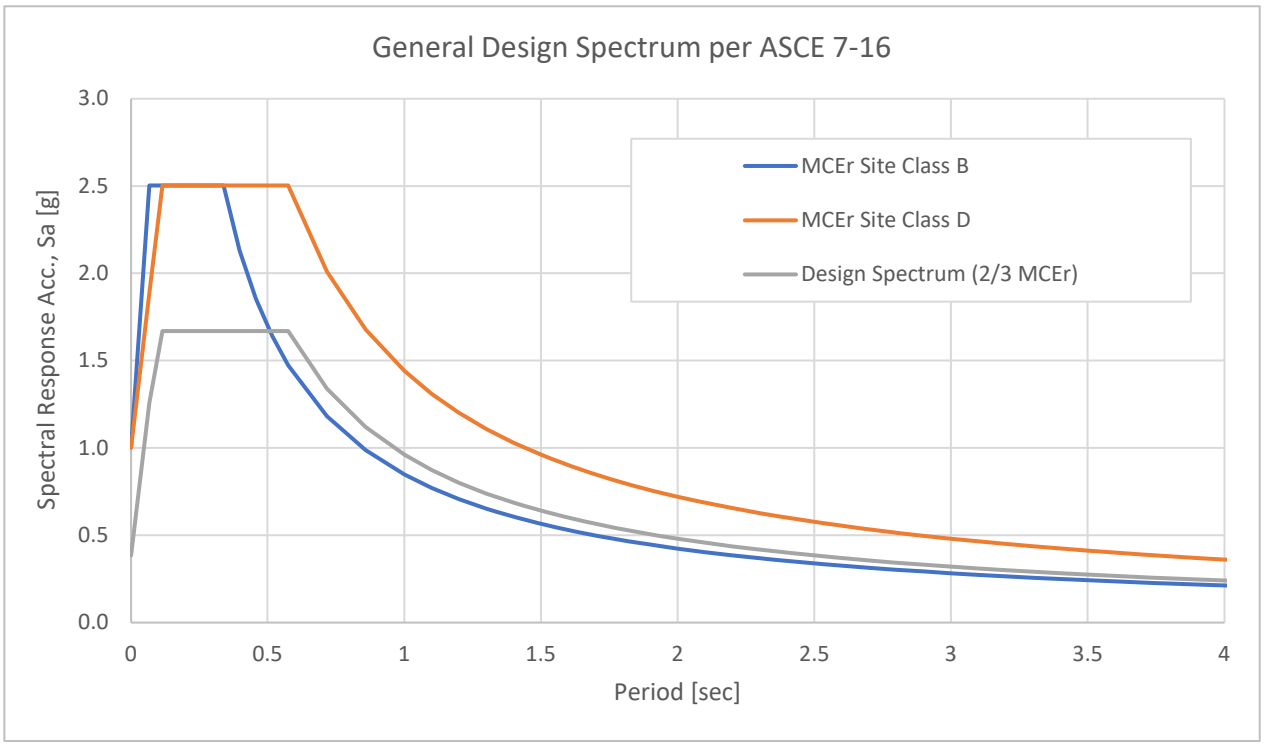
Design Reference: 2019 CBC and ASCE 7-16

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

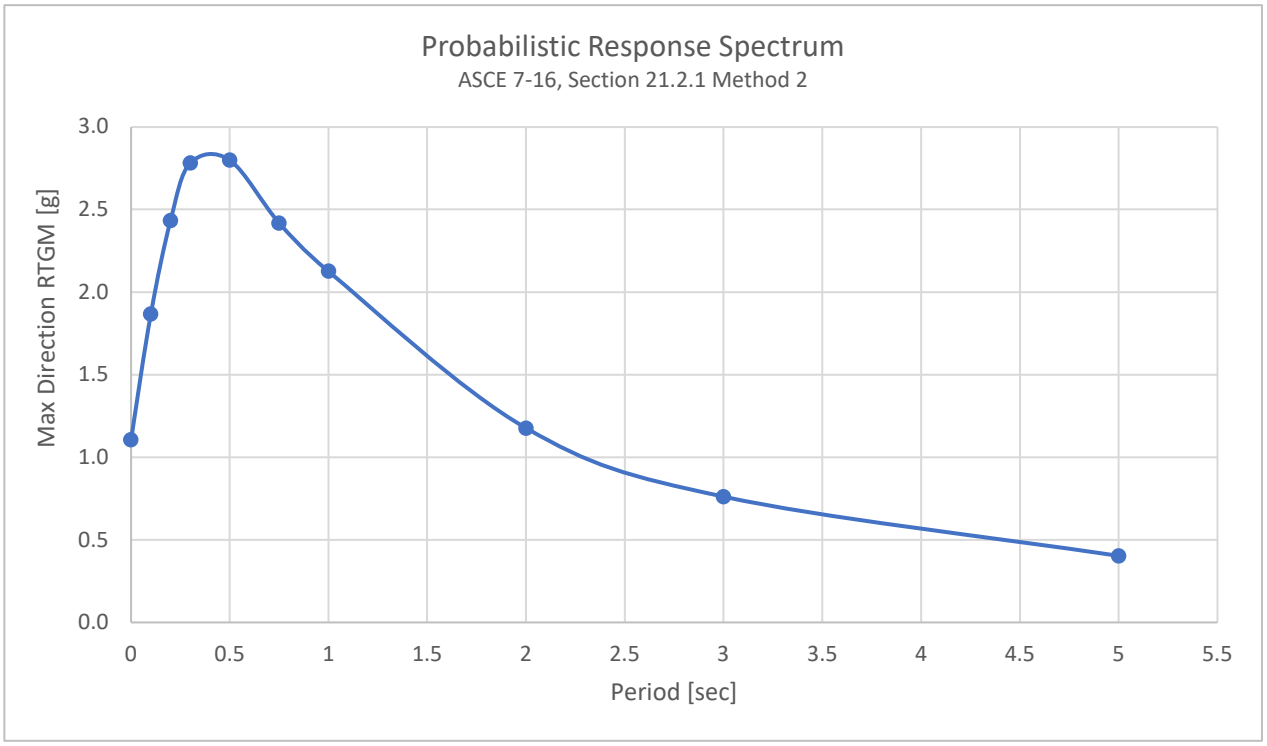
Site-Specific Response Spectra and Seismic Design Parameters

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

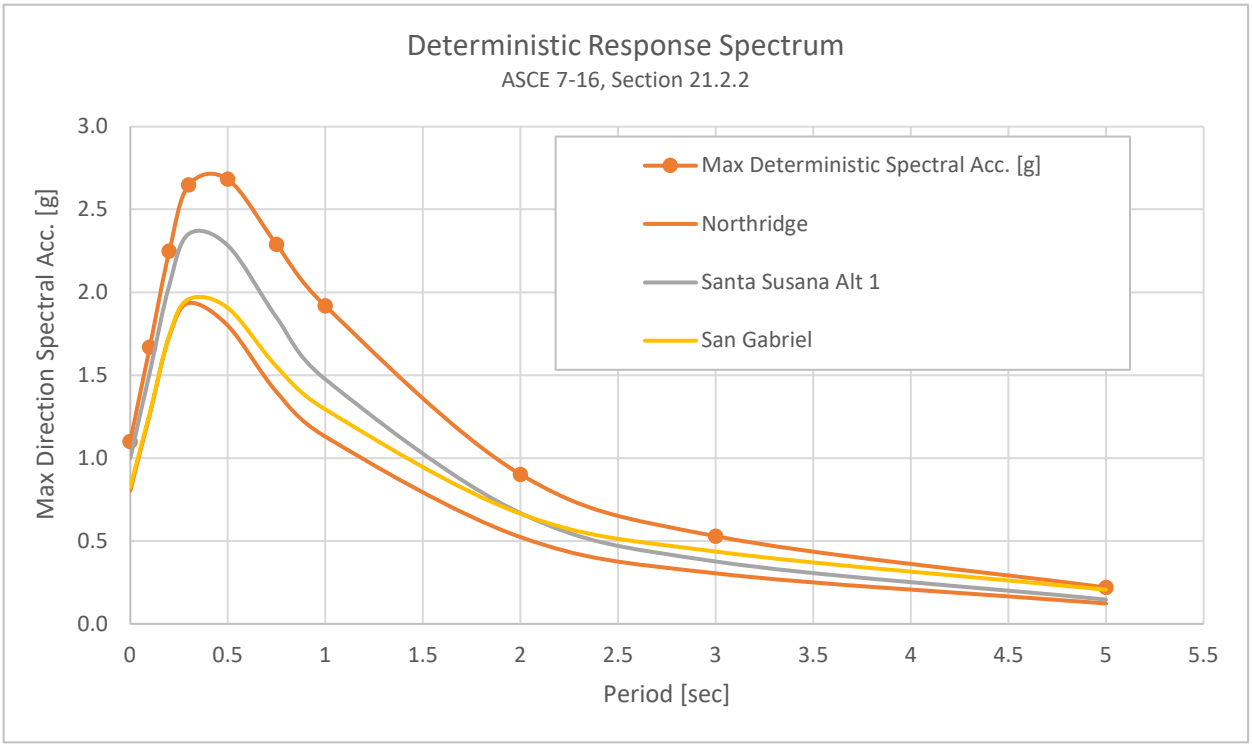
Parameter	Value	Description
S_S	2.504	MCE_R ground motion (0.2 sec)
S_1	0.848	MCE_R ground motion (1.0 sec)
F_a	1.0	Site amplification factor (0.2 sec)
F_v	1.7	Site amplification factor (1.0 sec)
S_{MS}	2.504	Site-modified spectral acc. (0.2 sec)
S_{M1}	1.442	Site-modified spectral acc. (1.0 sec)
S_{DS}	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

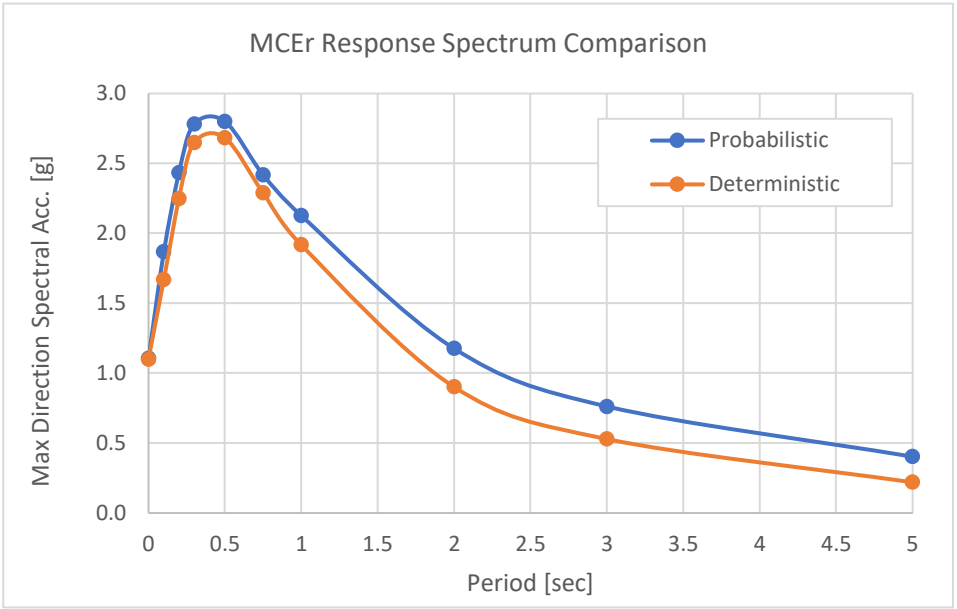


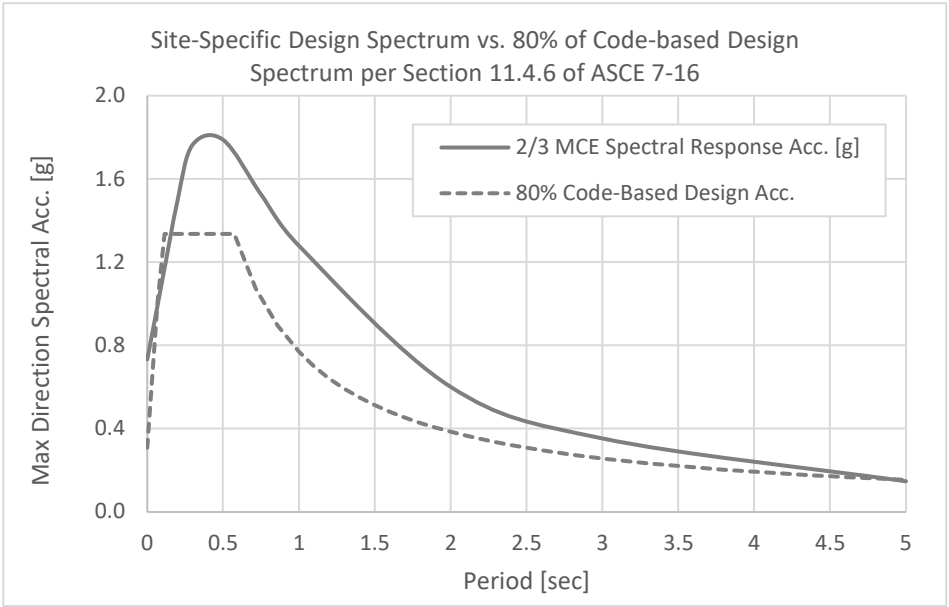
Period, T [sec]	Max Probabilistic Spectral Acc. [g]	Max Deterministic Spectral Acc. [g]	MCE Spectral Response Acc. [g] [a]	2/3 MCE Spectral Response Acc. [g]	80% Code-based Design Spectrum	Site-Specific Design Acc. [g] [b]
0	1.106	1.100	1.100	0.733	0.308	0.733
0.1	1.868	1.670	1.670	1.113	0.989	1.113
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

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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.

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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

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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.**

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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 τ_{av}/σ'_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

σ_o = Total vertical soil pressure at the depth in question

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σ'_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

σ'_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]

σ'_v = Effective vertical soil pressure [tsf]

c = Normalization exponent

M_W = Moment magnitude

P_L = Probability of liquefaction [percent]

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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.

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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 (γ_{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 γ_{max}.

In summary, the $(Q_{t,1N})_{cs}$ and FS estimated from the CPT-based evaluation of liquefaction potential were subsequently used to estimate γ_{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 γ_{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

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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 $N1_{60,cs}$

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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

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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

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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)

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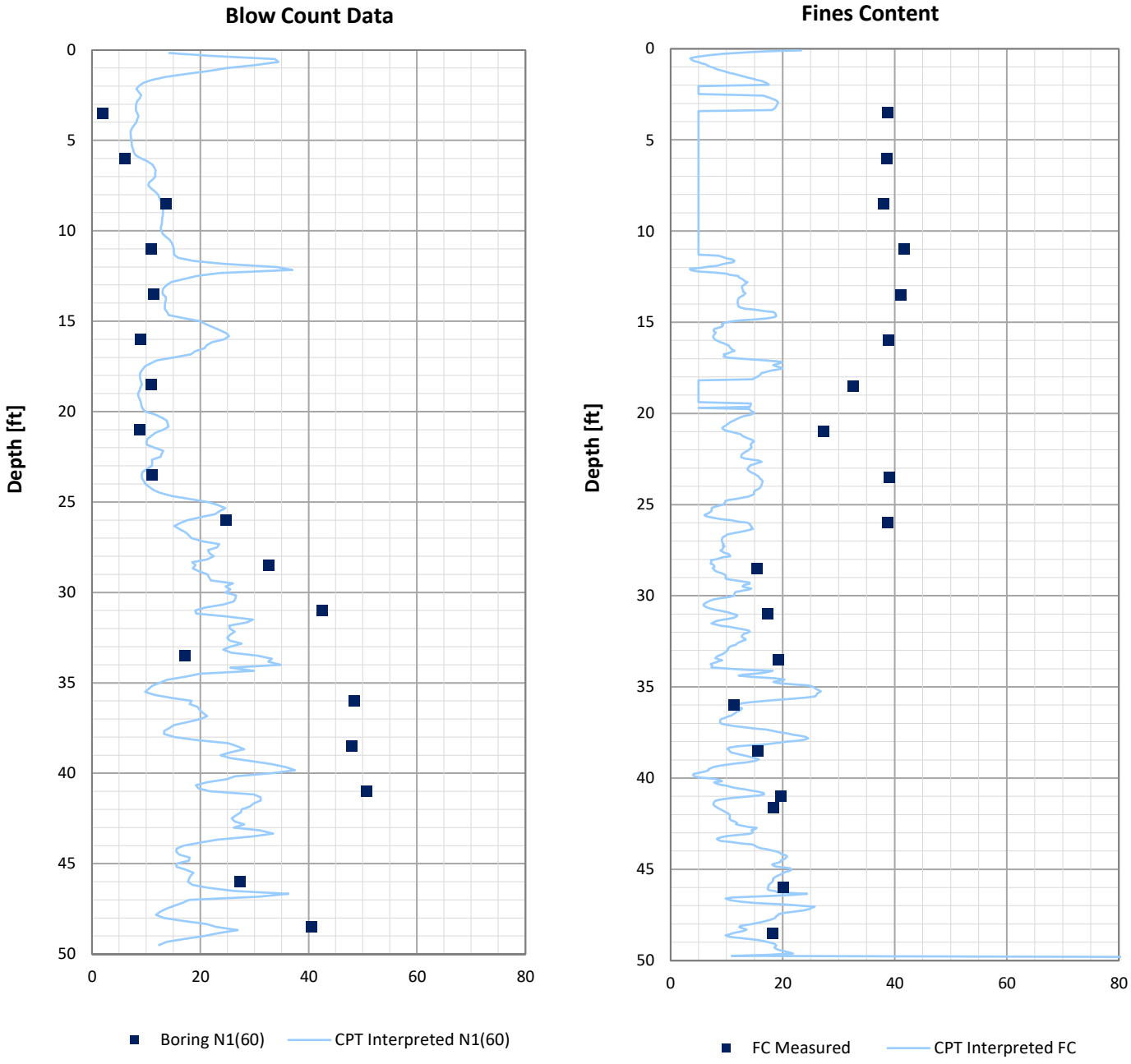
Table D1 - Summary of Estimated Cyclic Settlements and Lateral Displacements

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

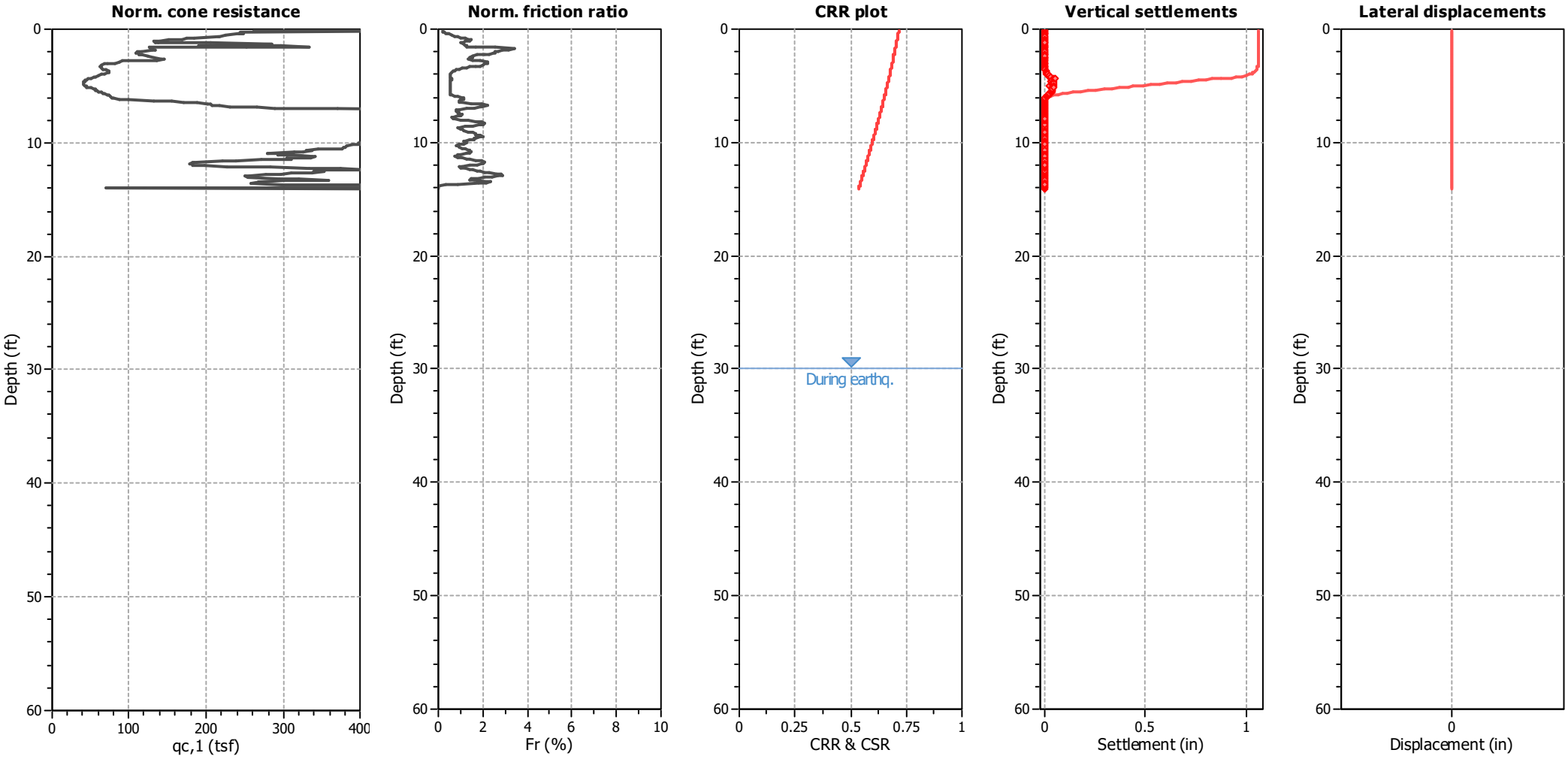
Figure: D1

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



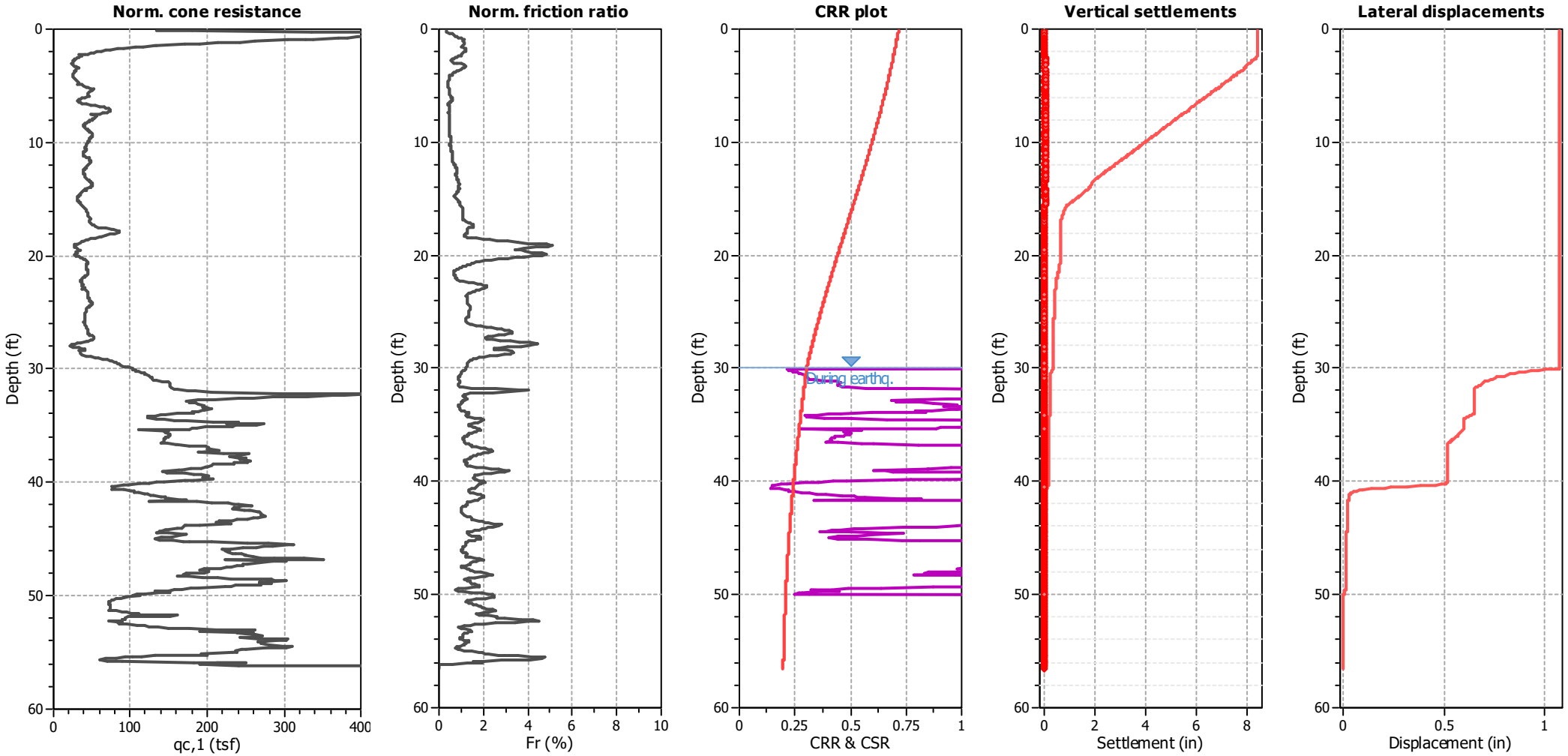
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.1

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_σ applied:	Yes		

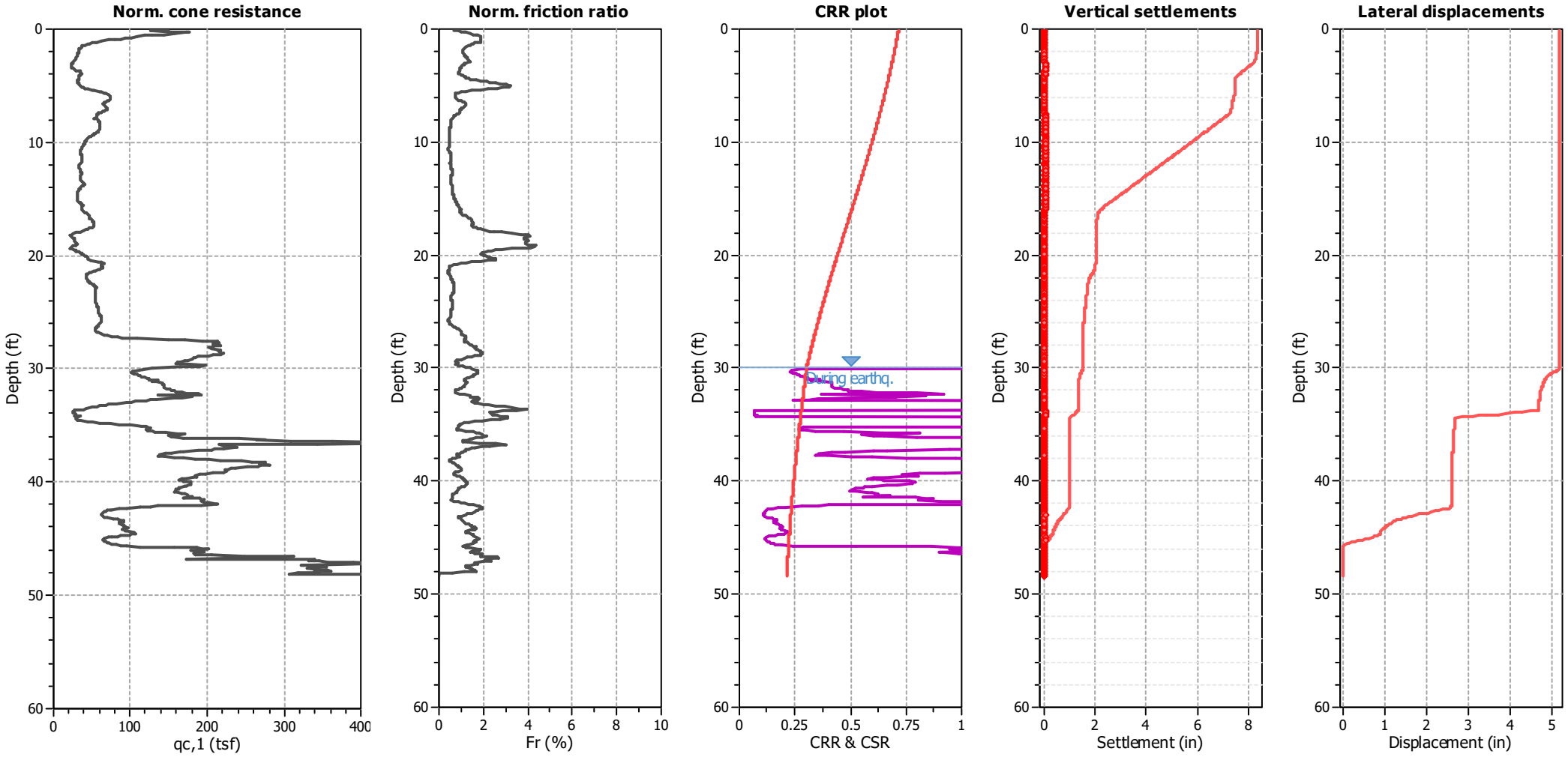
Figure D2.2

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

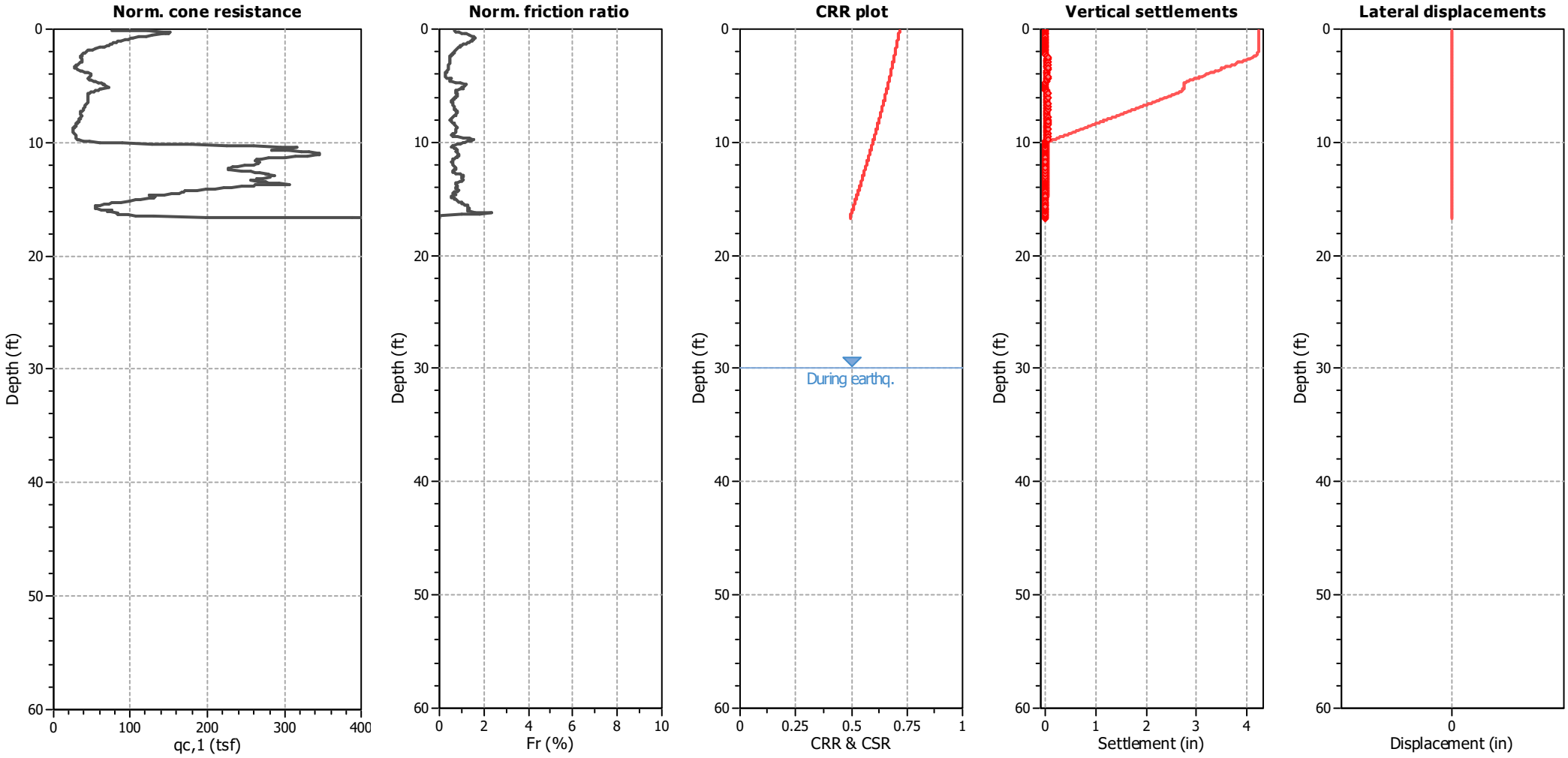


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-4A
Total depth: 16.74 ft

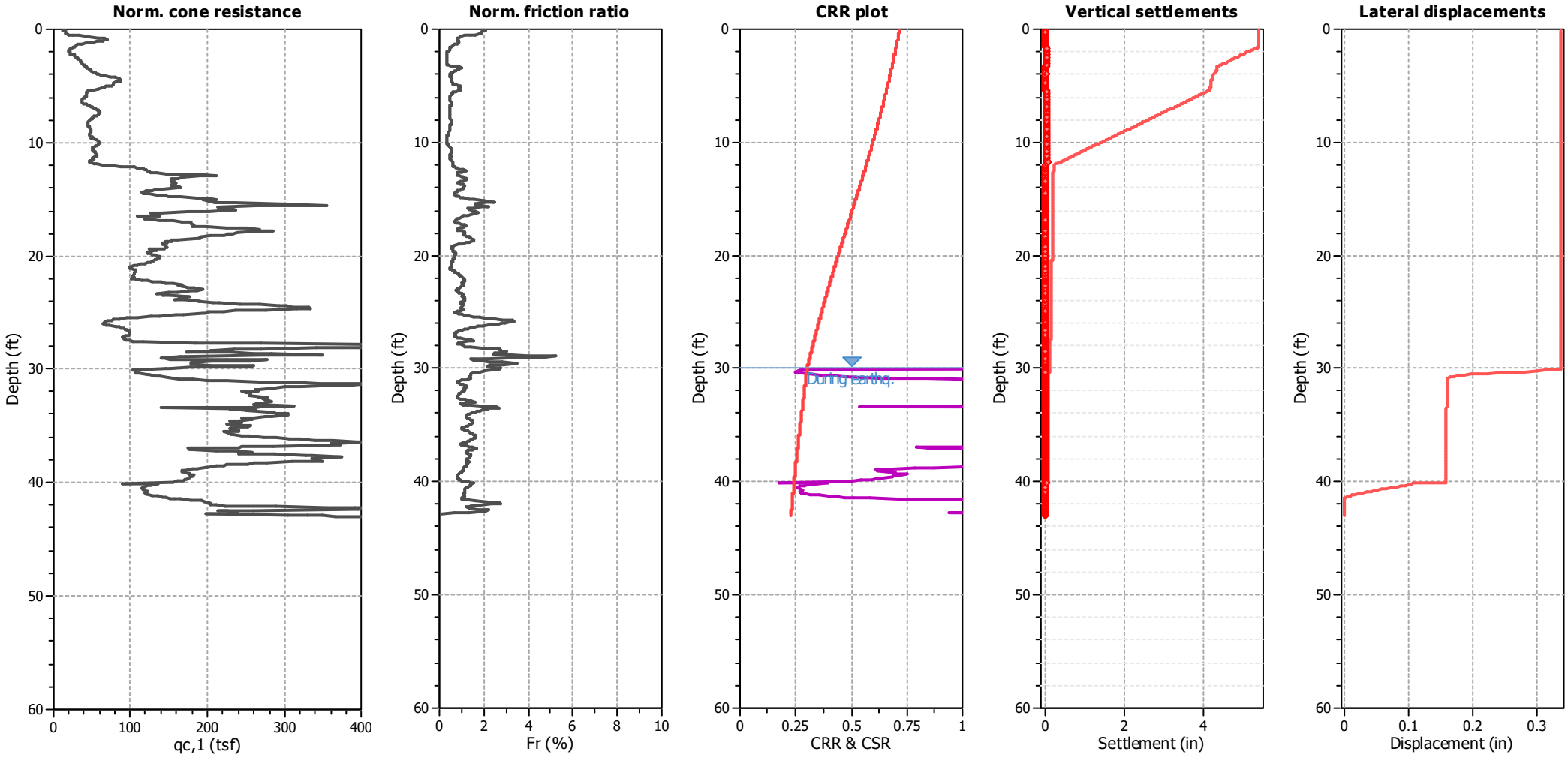


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-5
Total depth: 43.05 ft

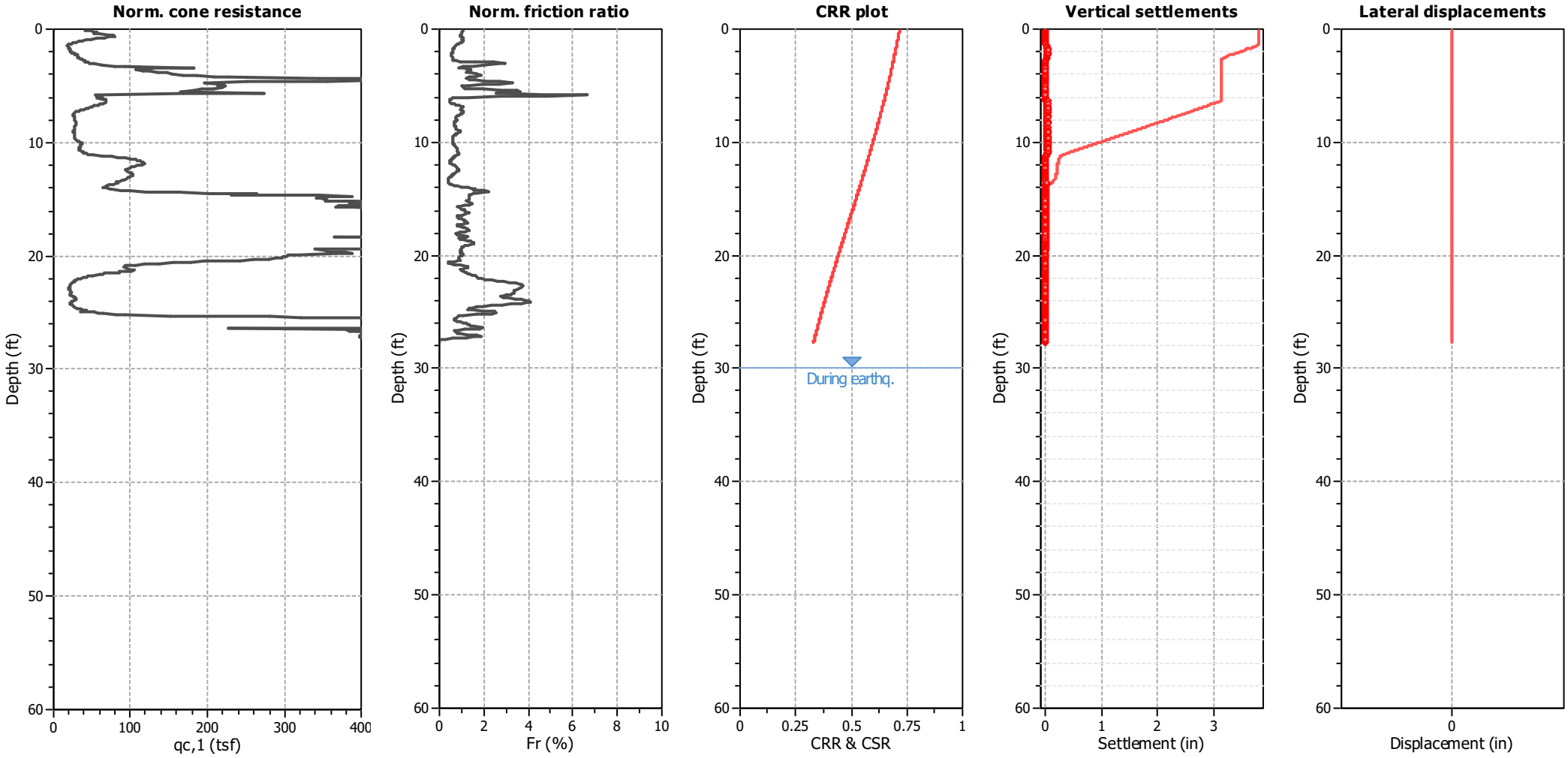


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-6
Total depth: 27.69 ft

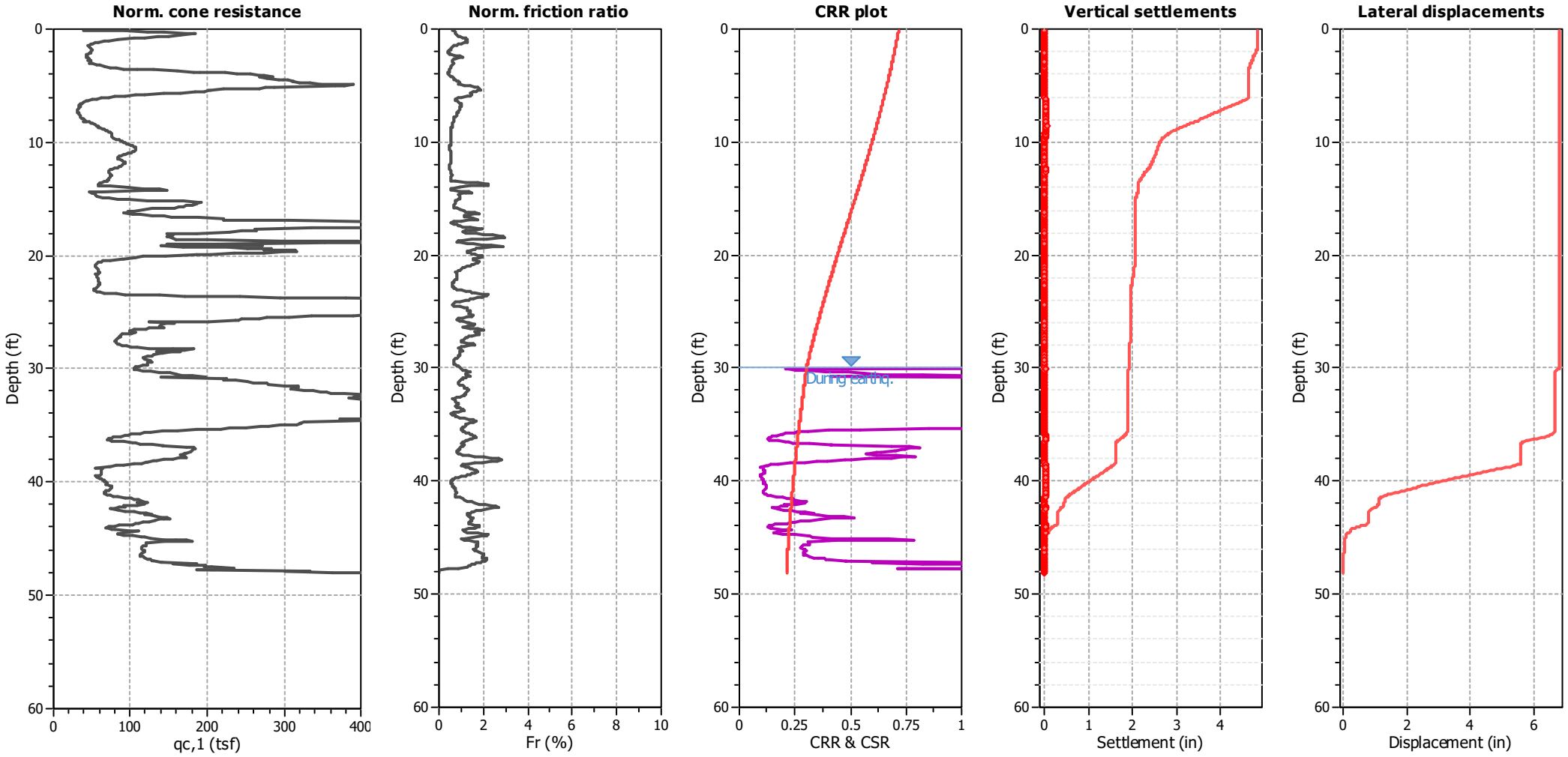


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-7A
Total depth: 48.10 ft

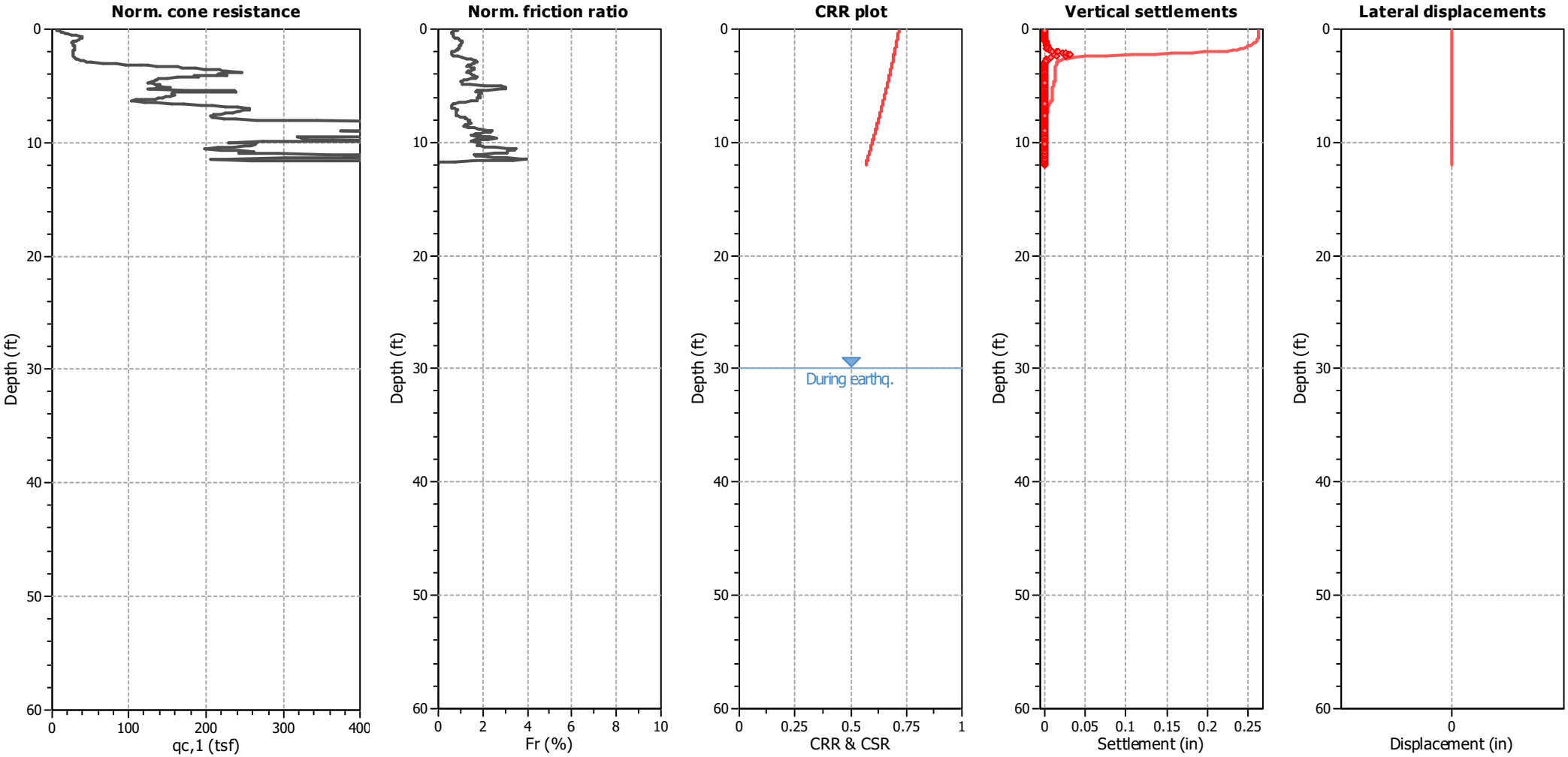


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-8A
Total depth: 12.01 ft

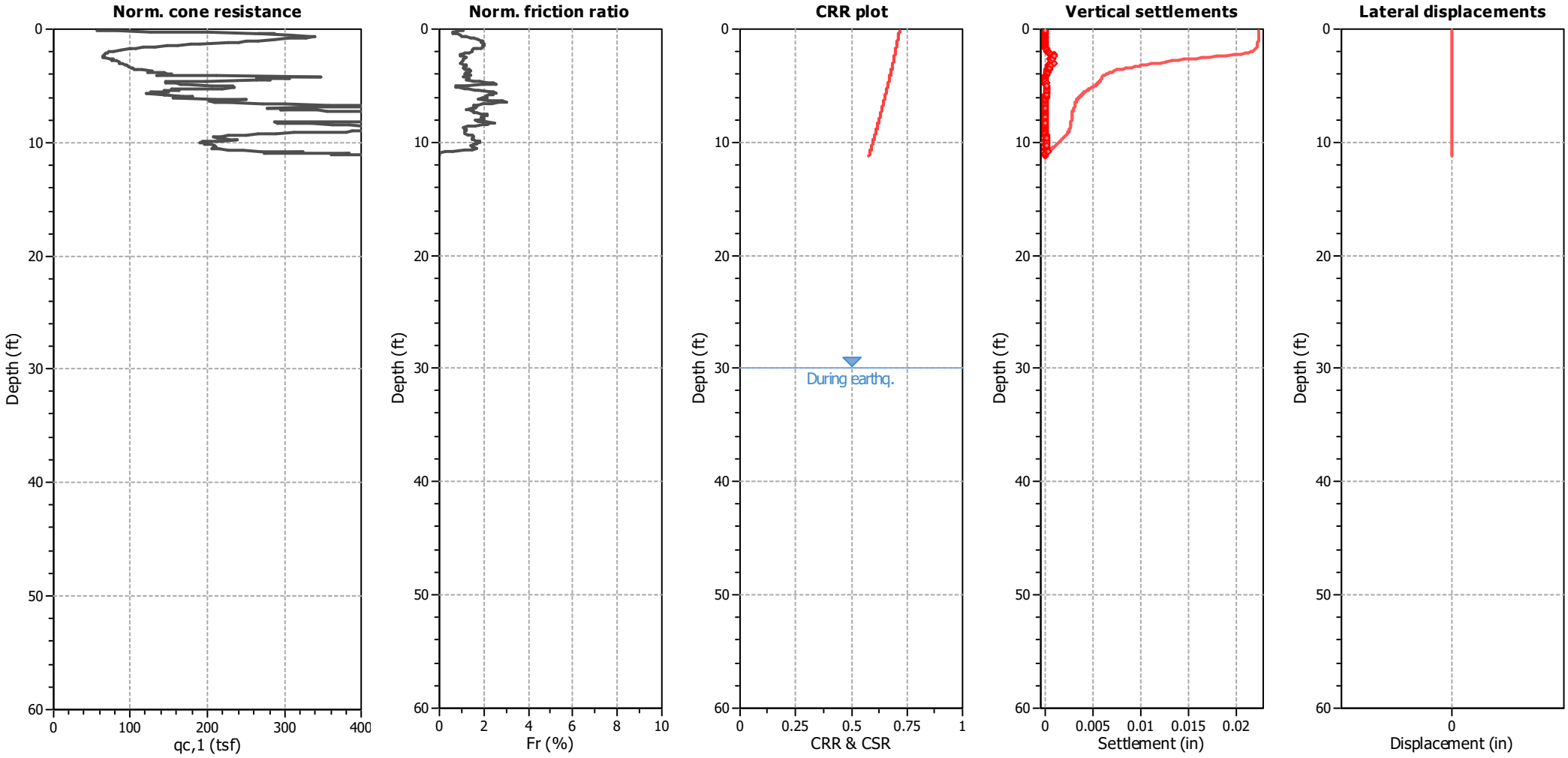


Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-9A
Total depth: 11.16 ft



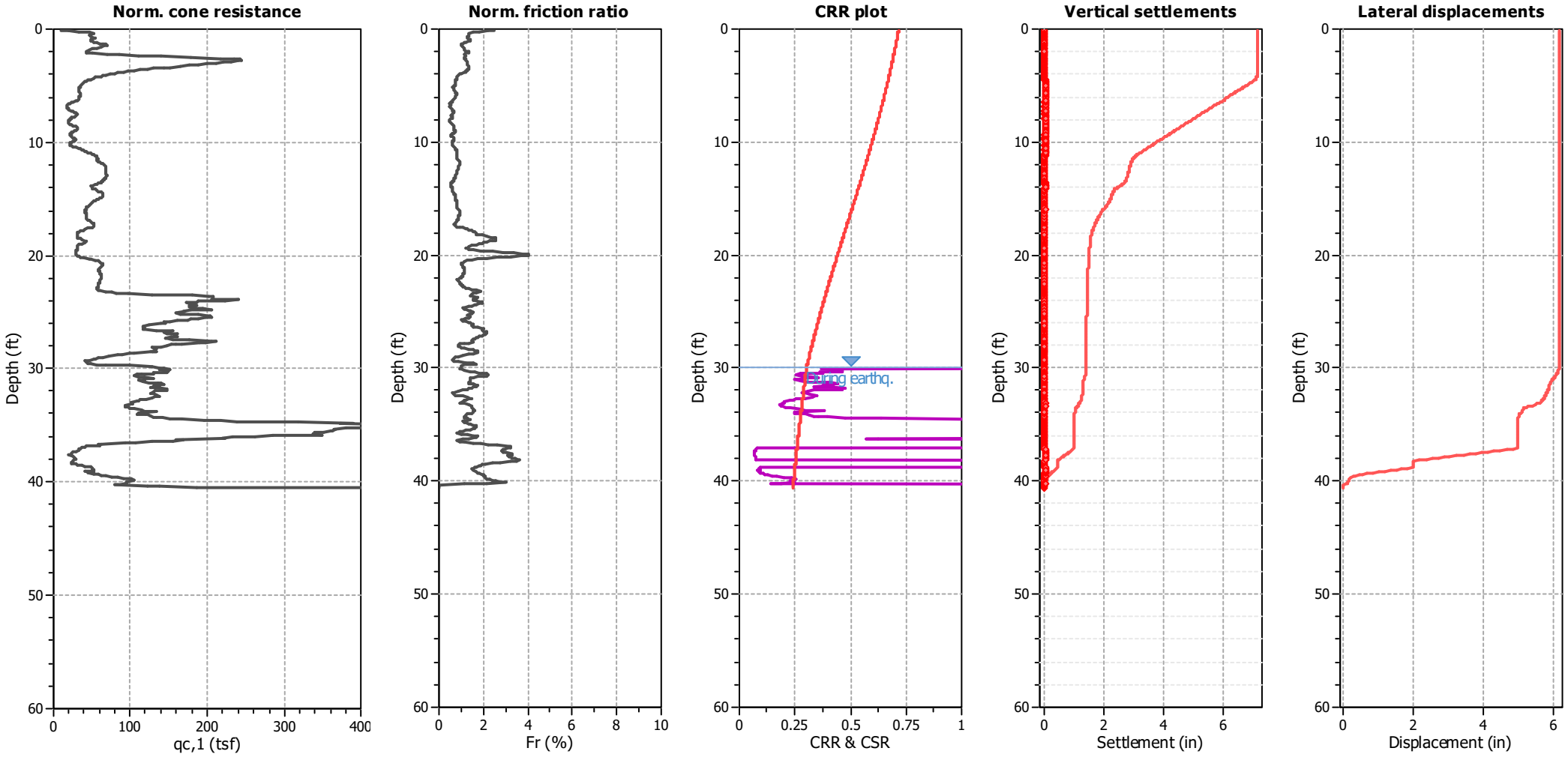
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.9

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_σ applied:	Yes		

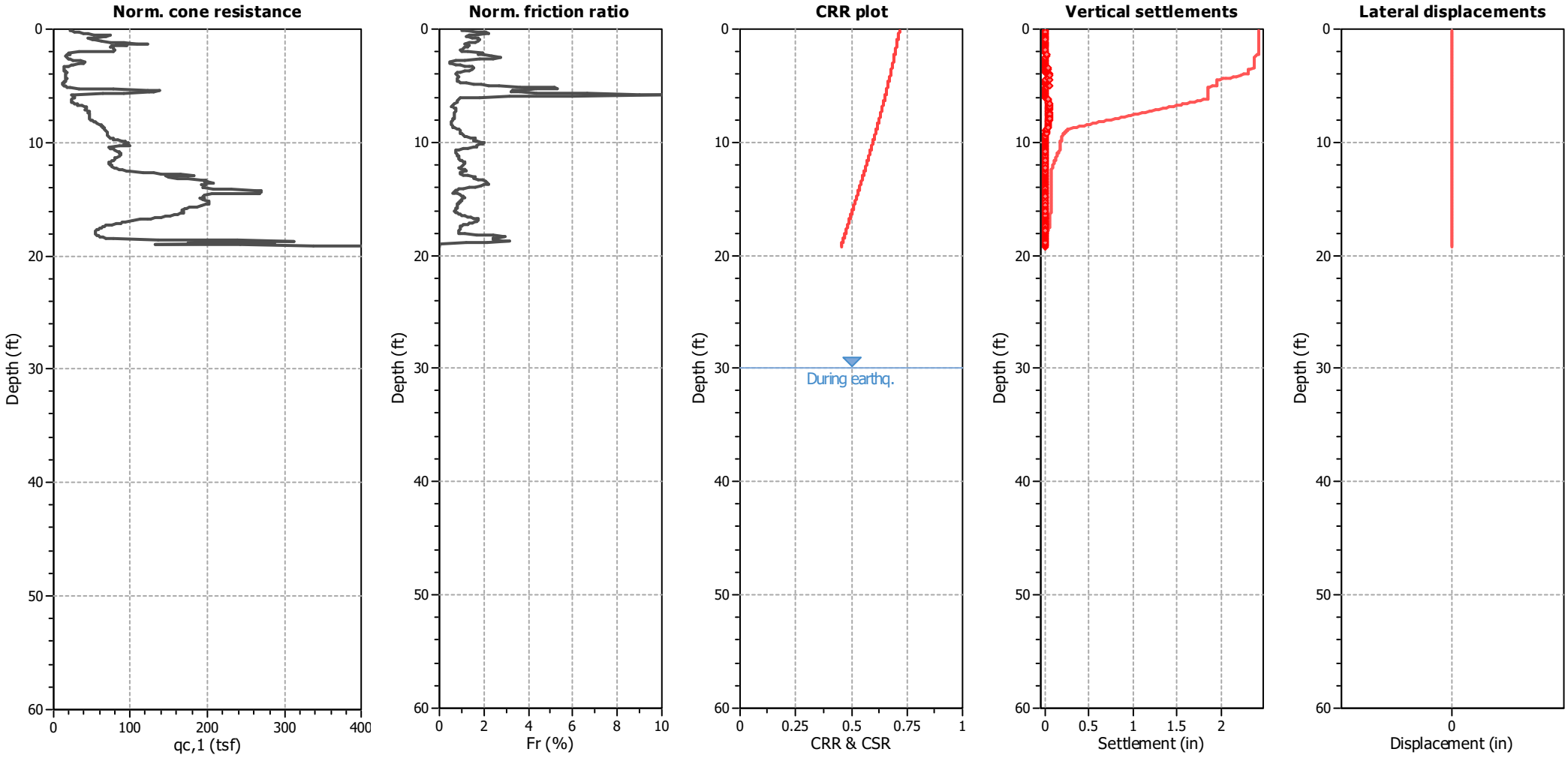
Figure D2.10

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



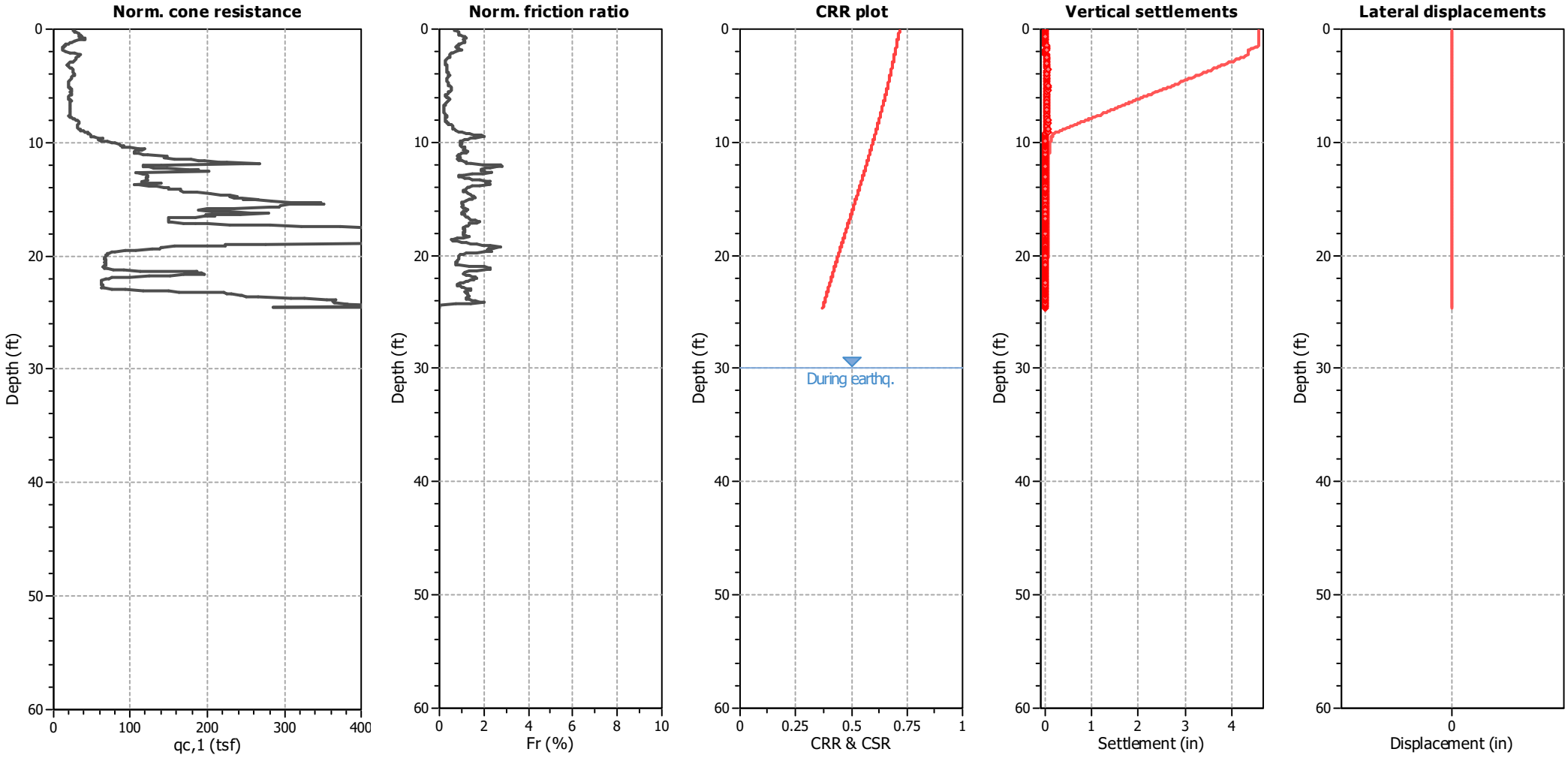
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.11

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-12A
Total depth: 24.62 ft



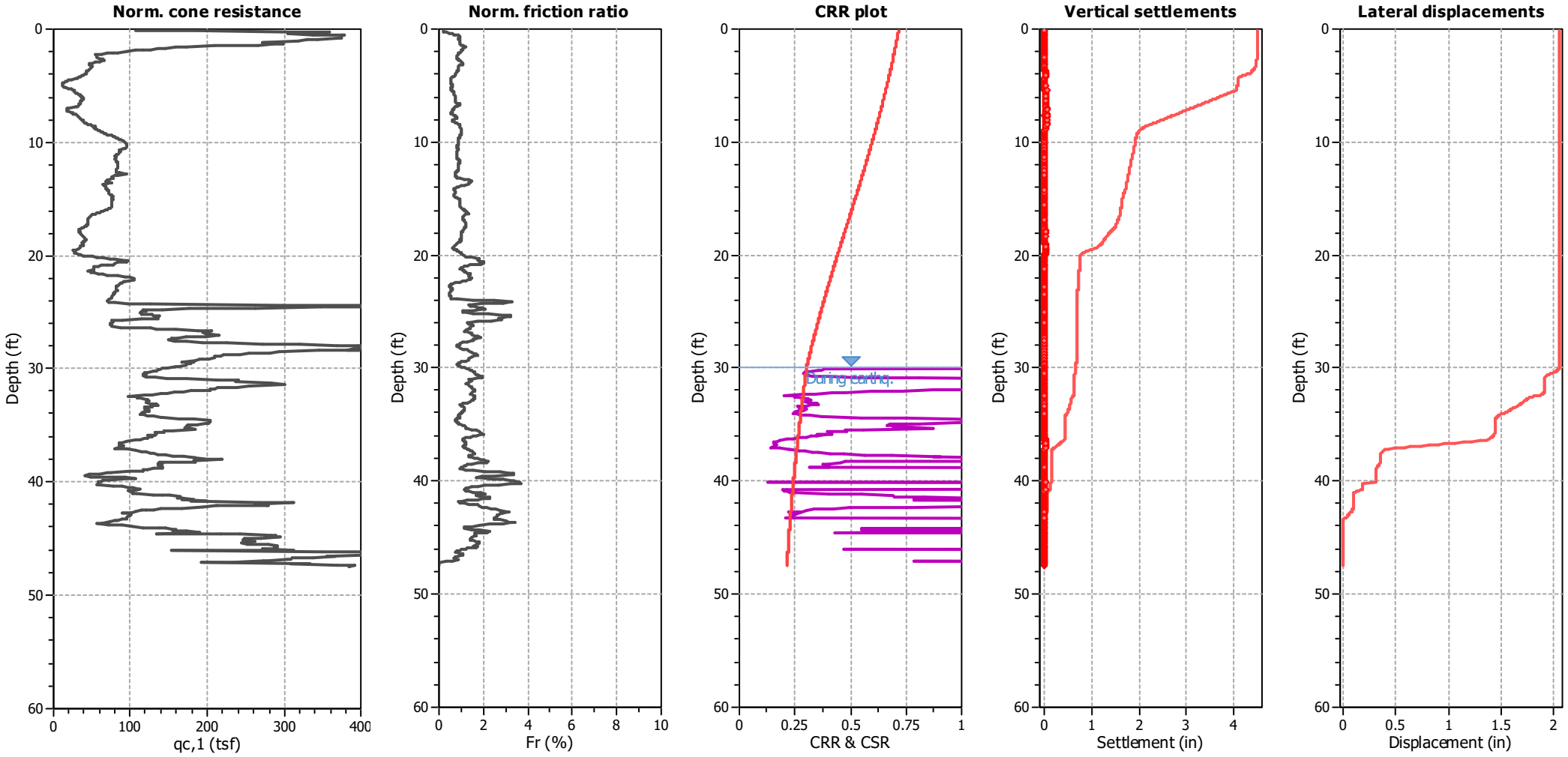
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.12

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-13
Total depth: 47.45 ft



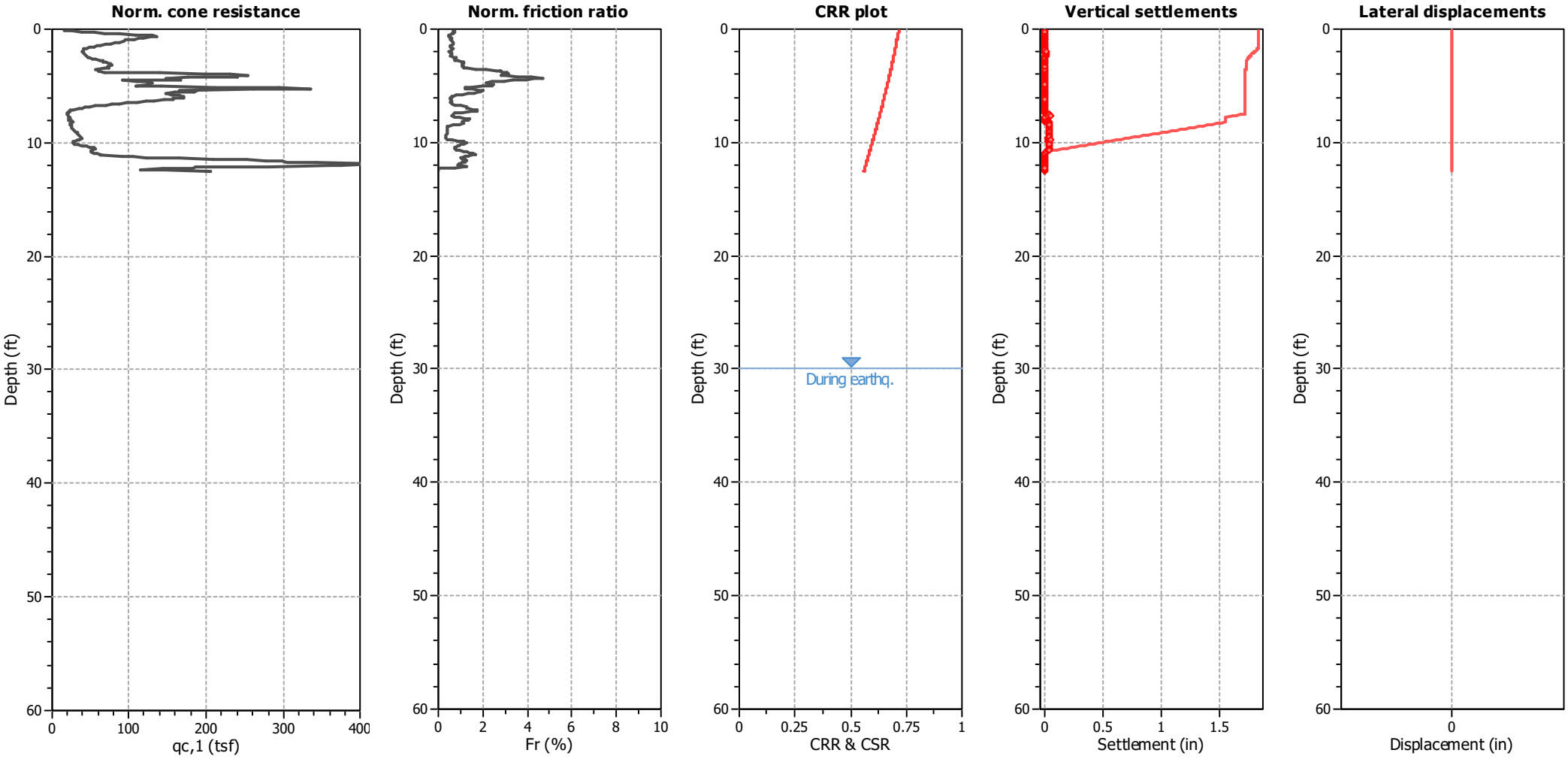
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.13

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-14
Total depth: 12.54 ft



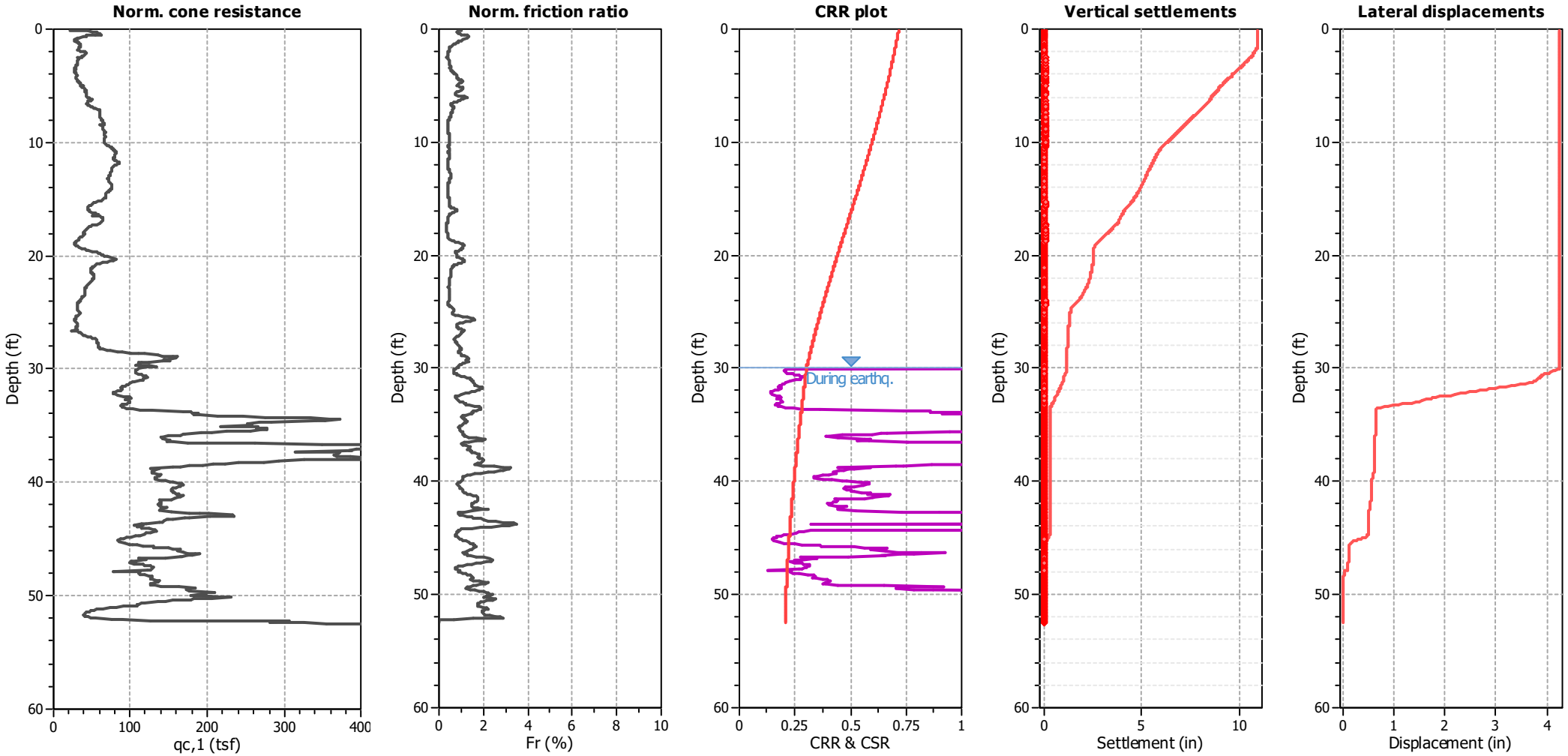
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.14

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-15
Total depth: 52.50 ft



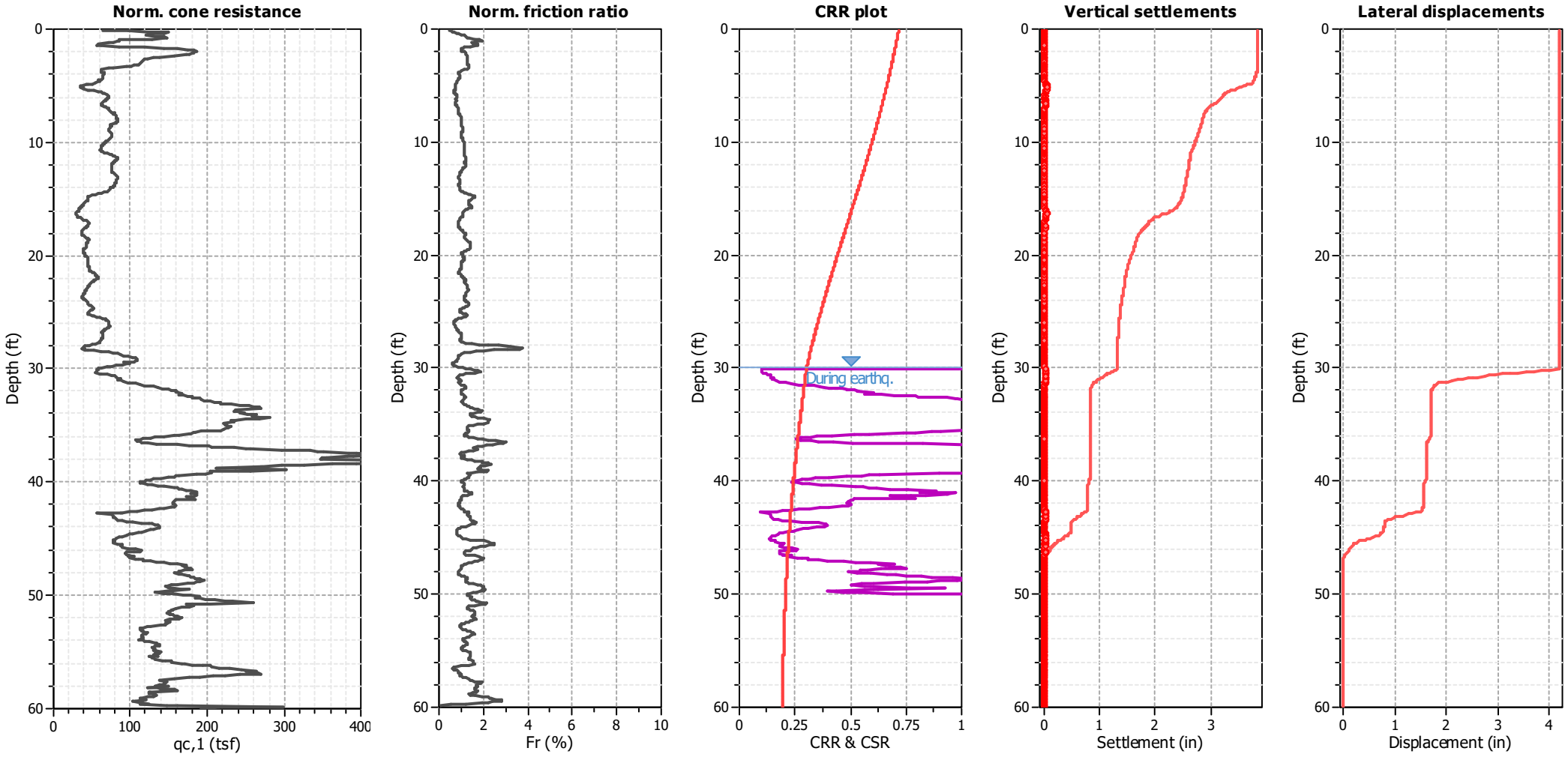
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.15

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

CPT: CPT-16
Total depth: 60.12 ft



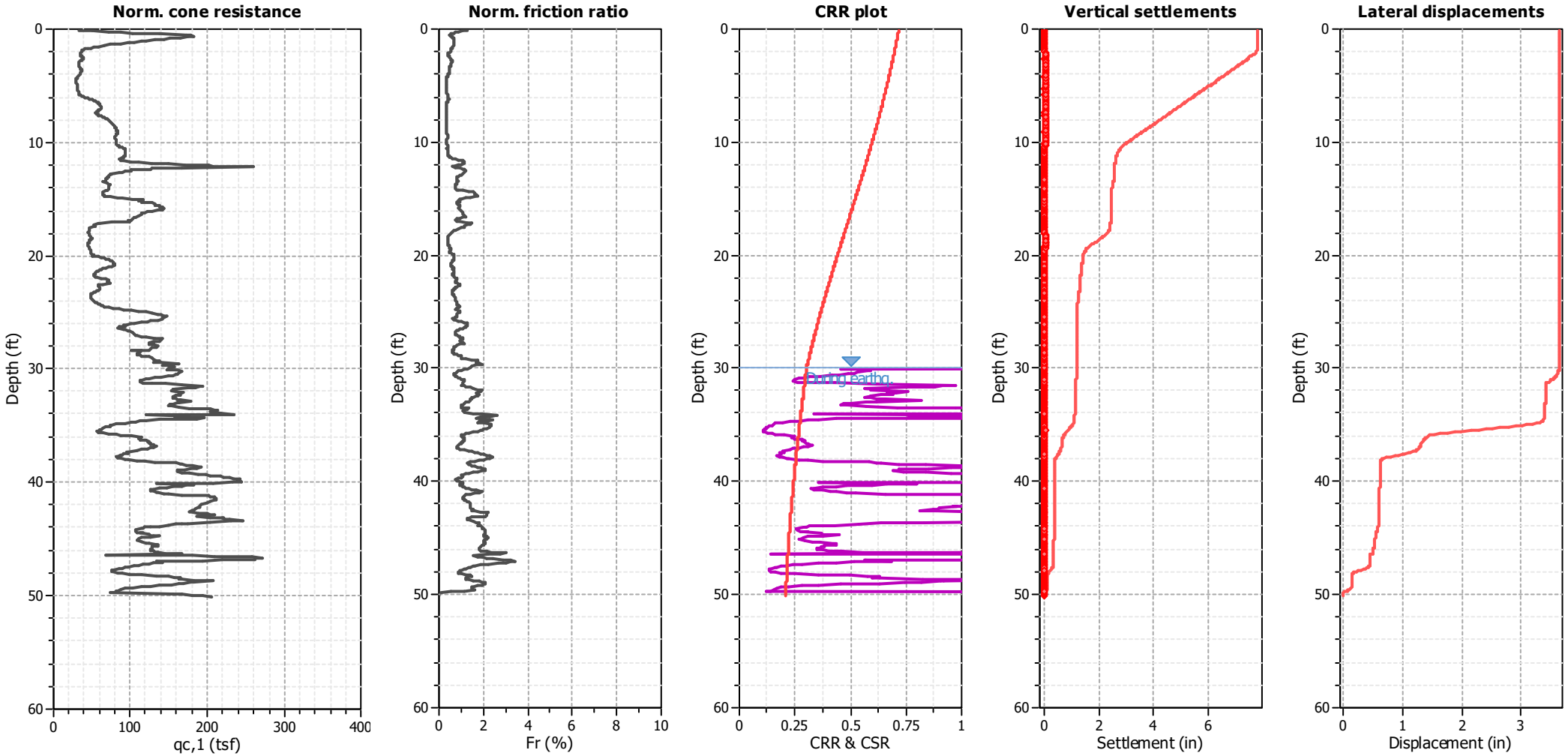
Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	60.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	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_σ applied:	Yes		

Figure D2.16

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

CPT-Based Assessment of Seismic Soil Liquefaction Potential

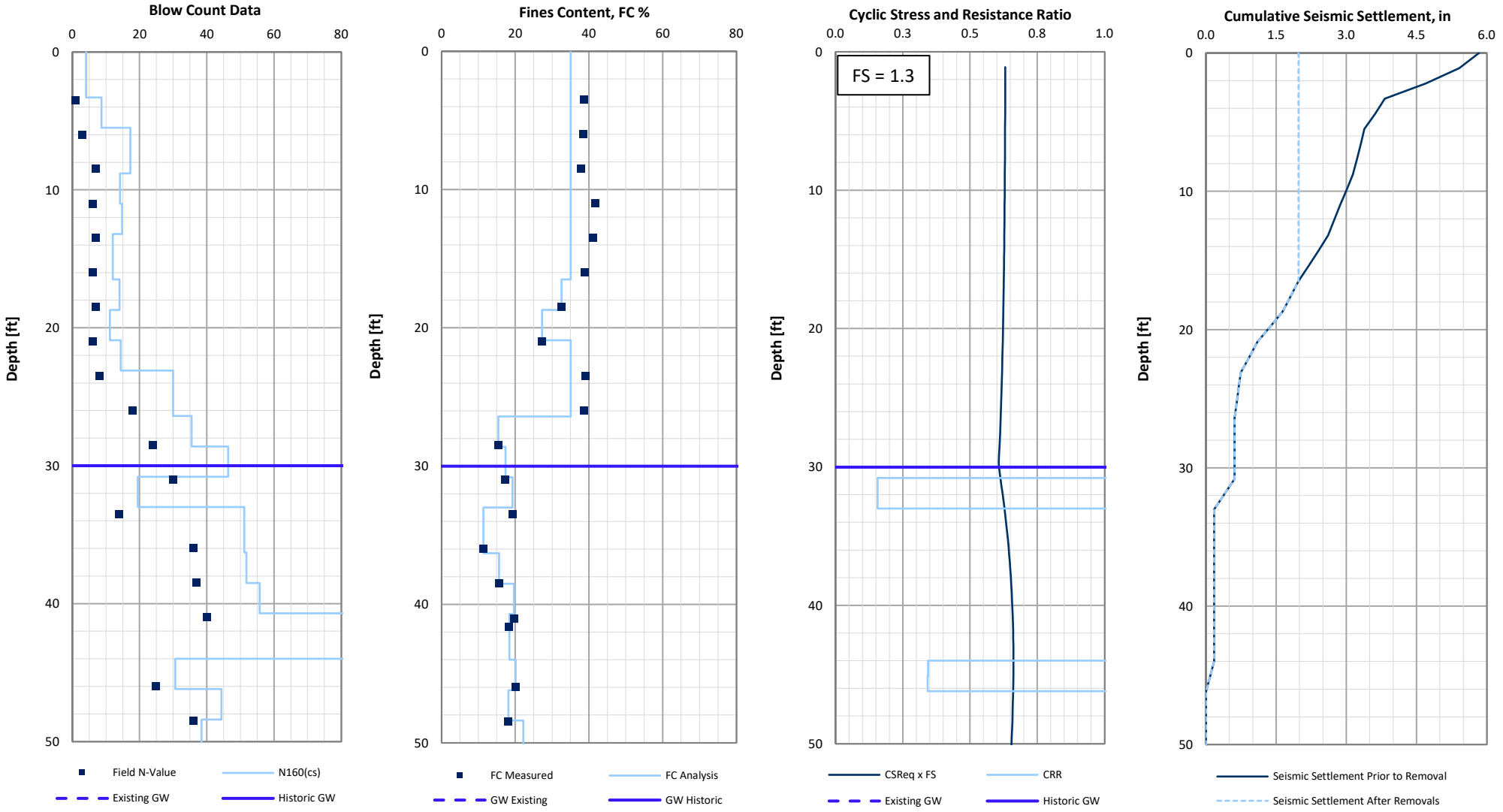
CPT: CPT-17
Total depth: 50.07 ft



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_σ 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

Figure: D2.18

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

Client:	Wiley Canyon LLC
Project:	Wiley Canyon
	TTM 083295
Job No.:	21-2593-4
Date:	6/15/21

Magnitude, M_w	6.69
Acceleration, PGA (g)	1
Magnitude Weighted PGA (g)	0.75
Existing GW Elev. (ft)	60
Historic GW Elev. (ft)	30

:: 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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	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)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_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_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	σ_v' (tsf)	c	C_q	$q_{c,1}$ (tsf)	Δq_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)	$q_{t,1N}$	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

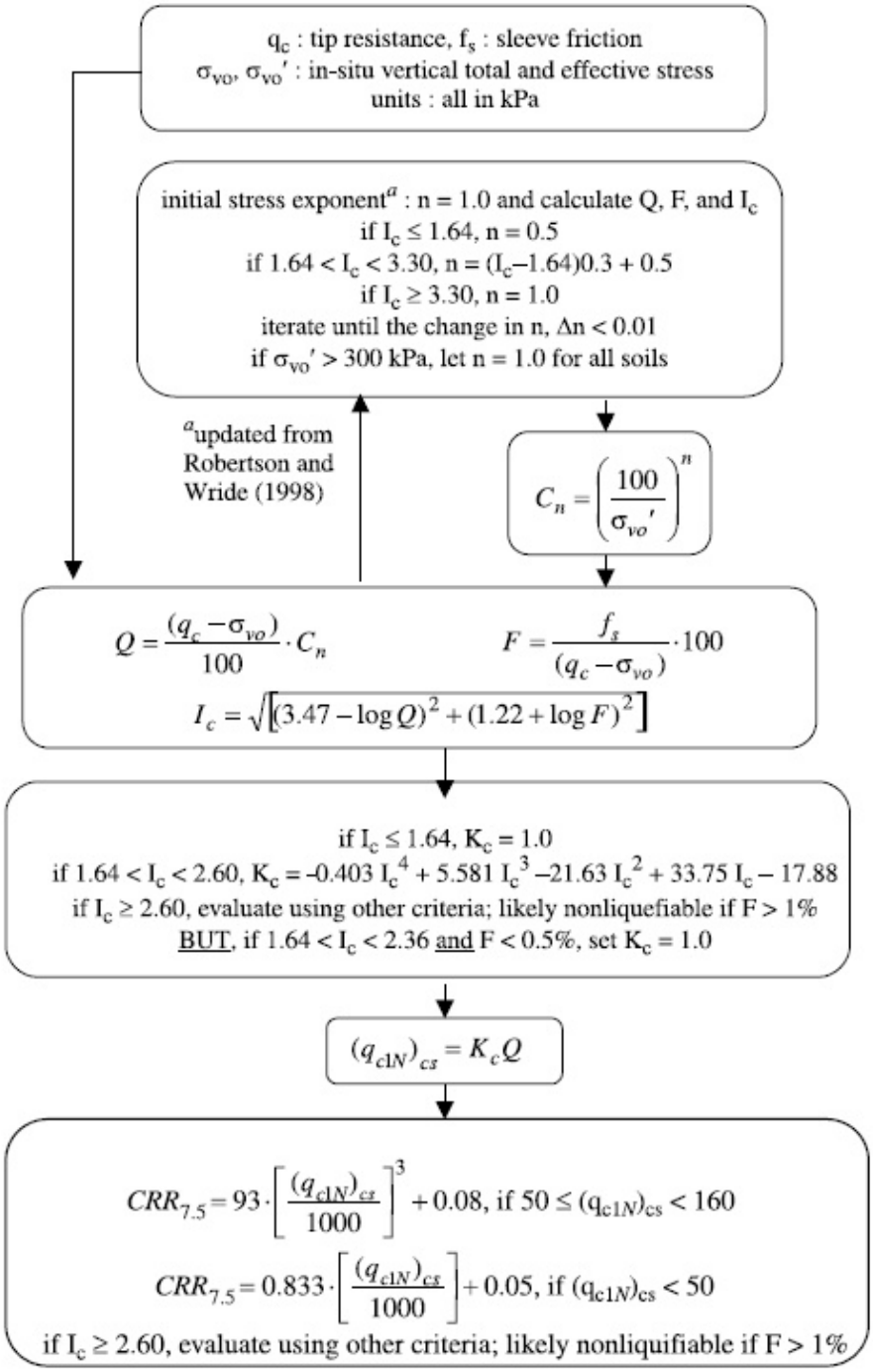
Total estimated displacement: 3.64

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)

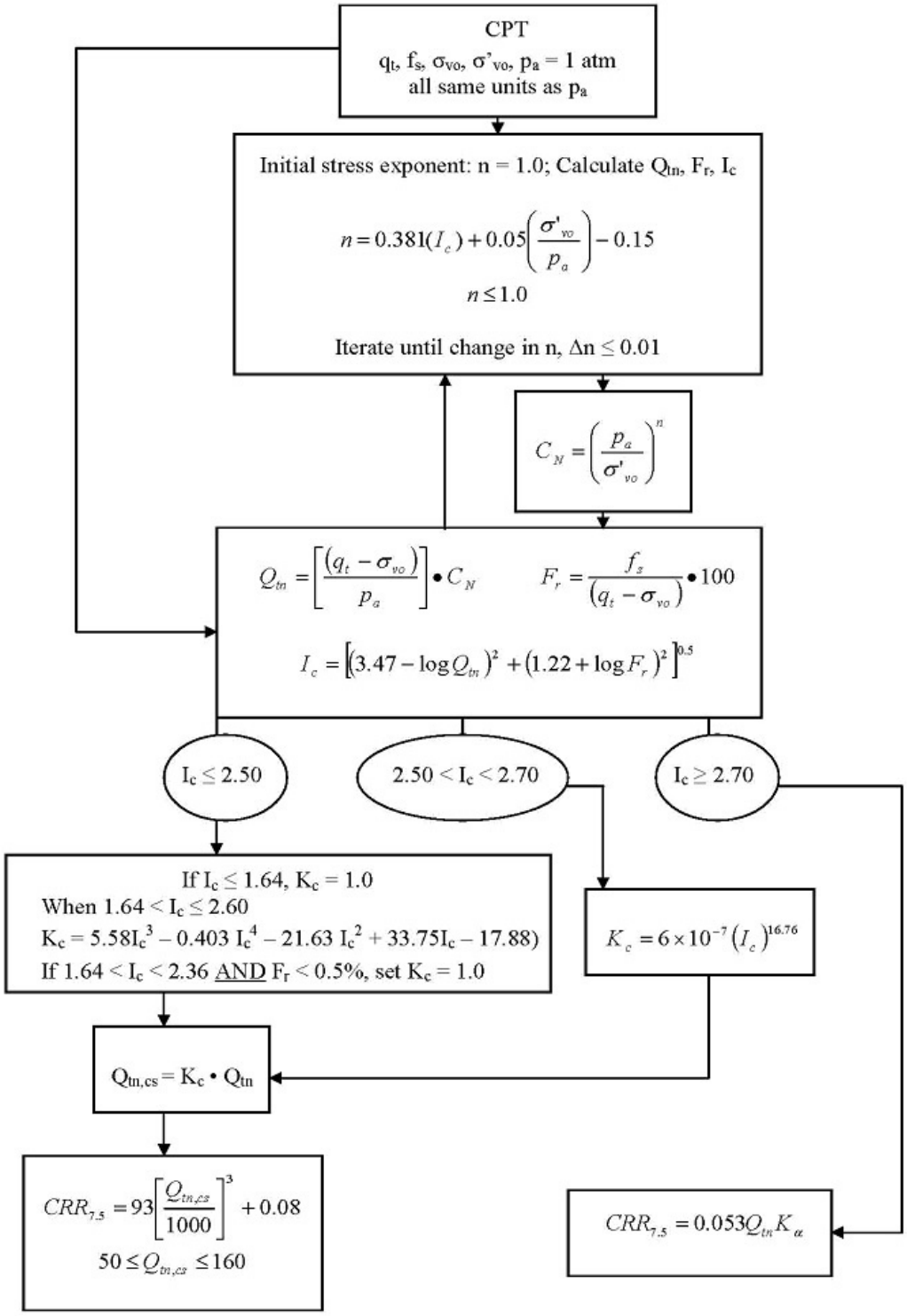
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

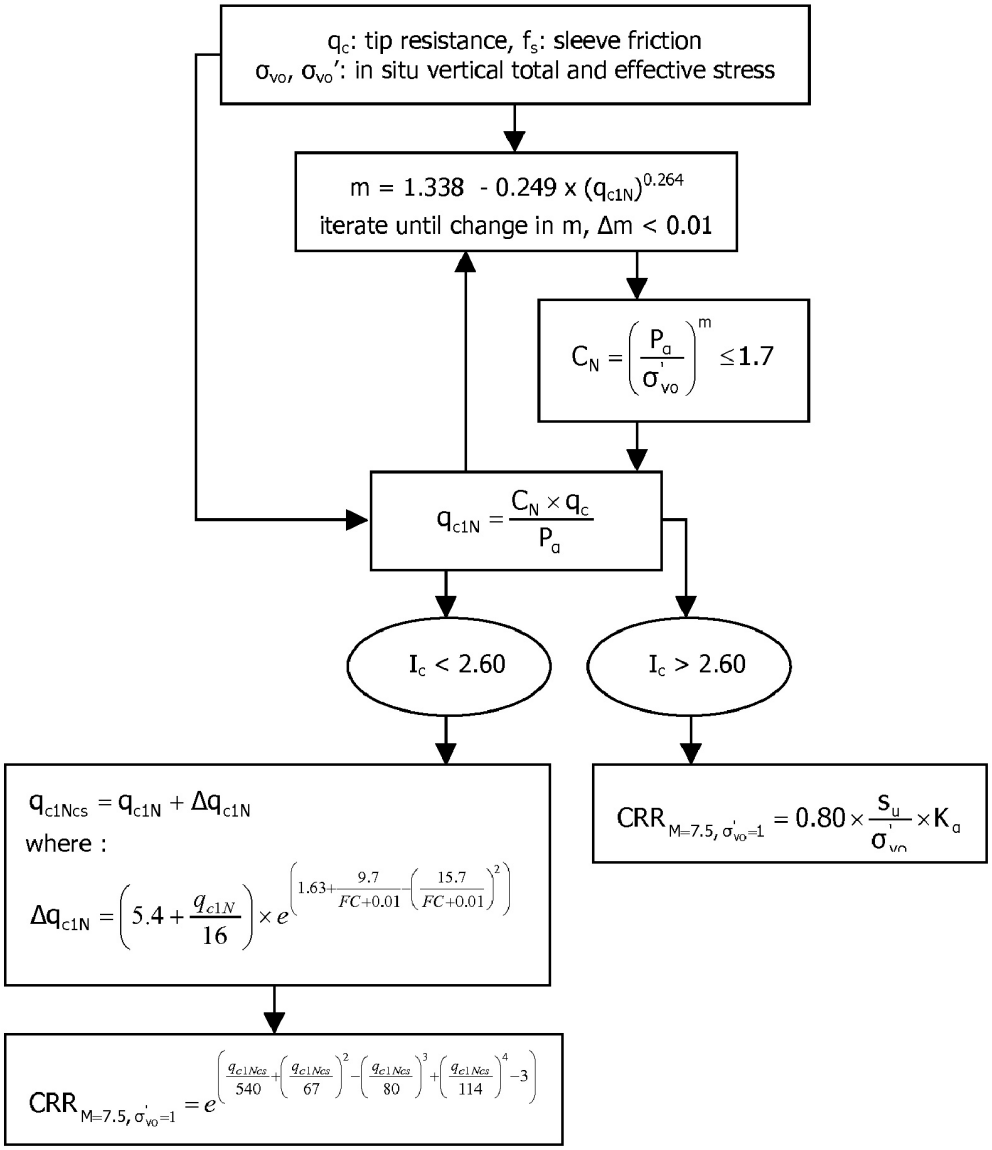
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

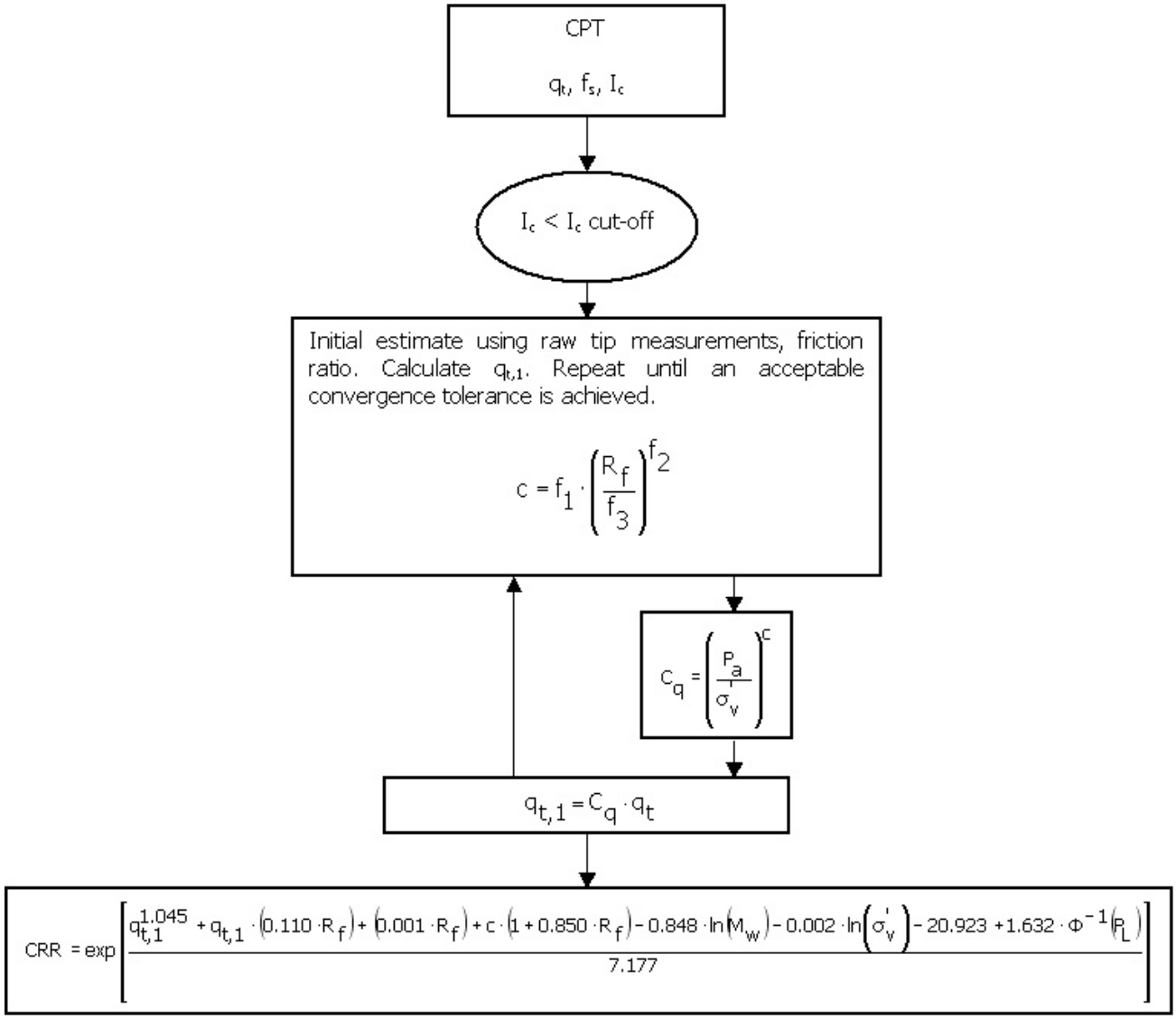


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ns} \frac{q_c}{P_a}$$

$$C_{Ns} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

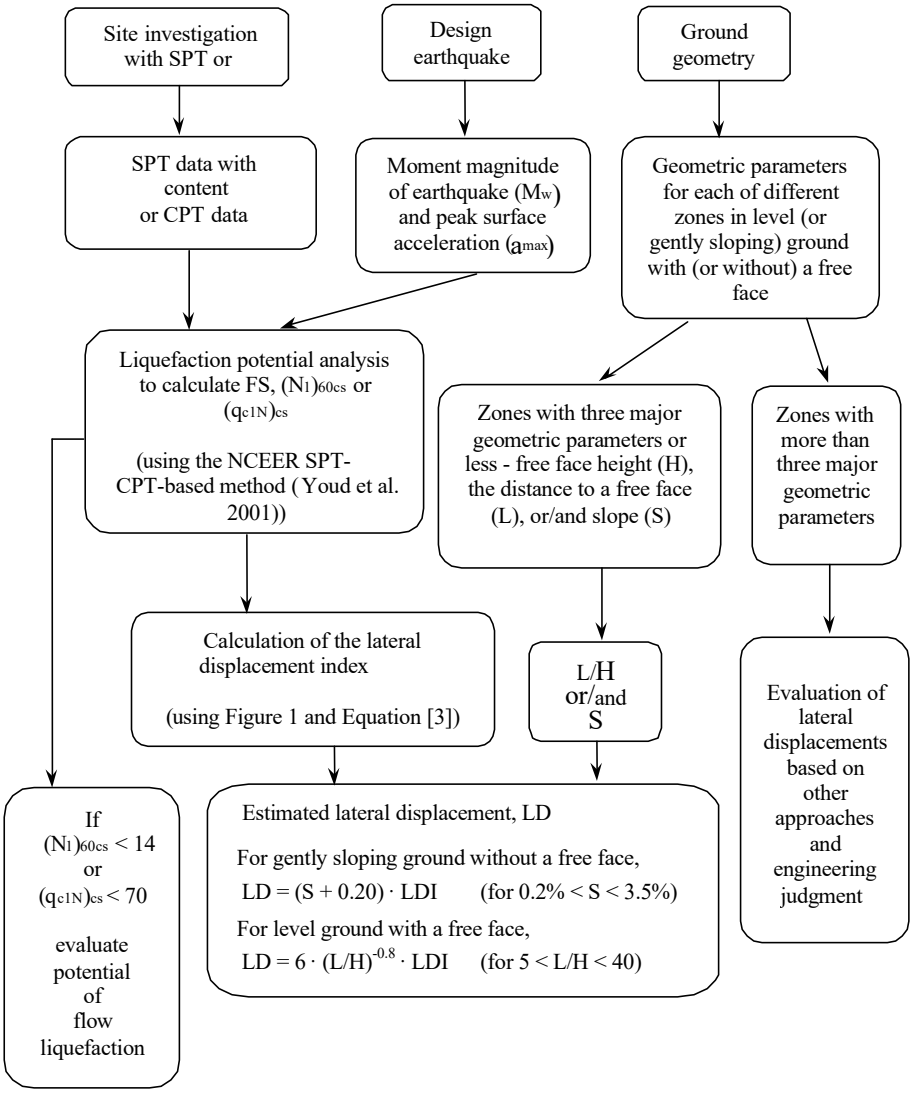
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

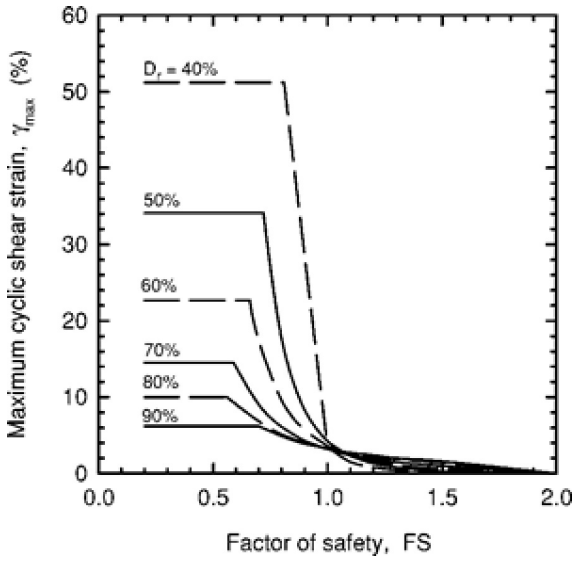
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



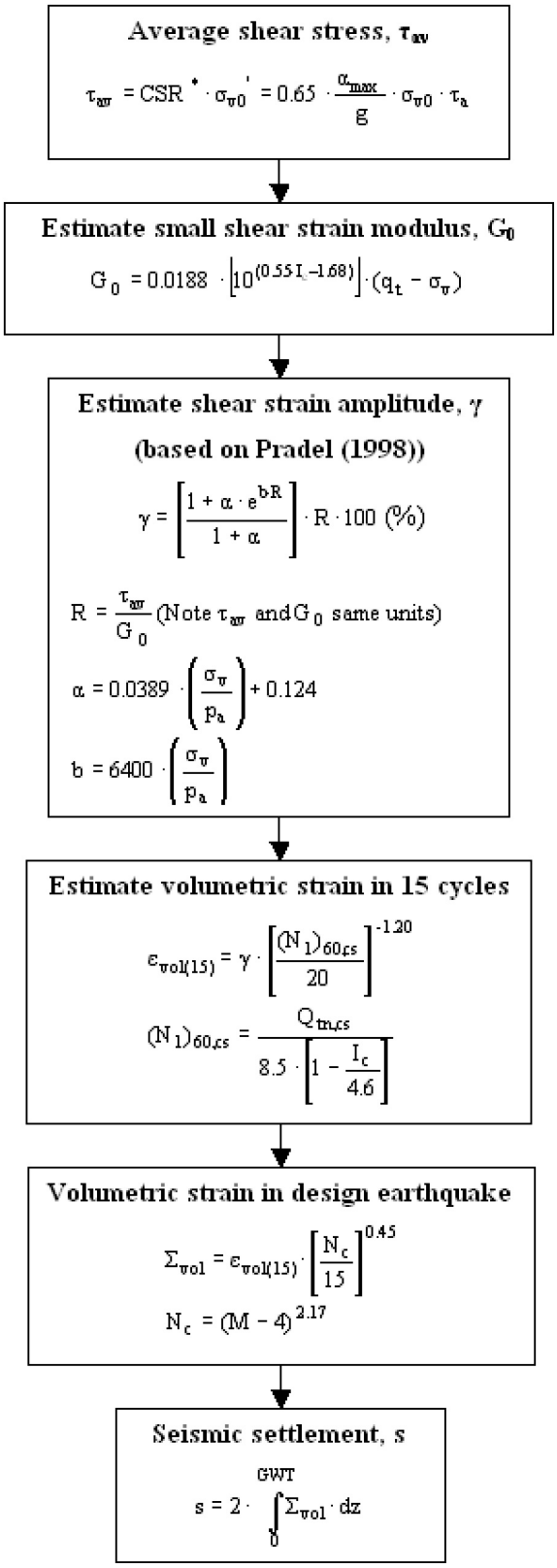
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

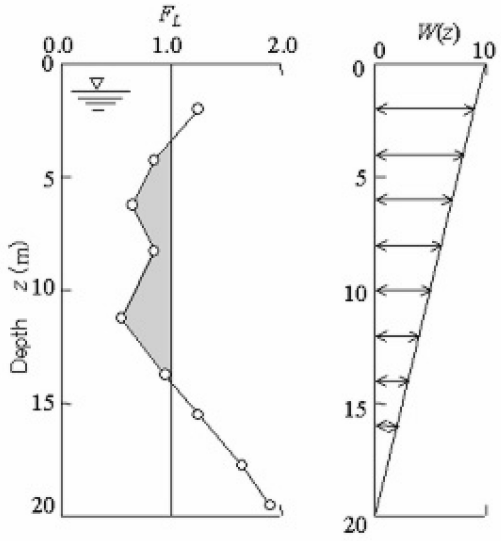
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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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 observation 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 ρ_{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.

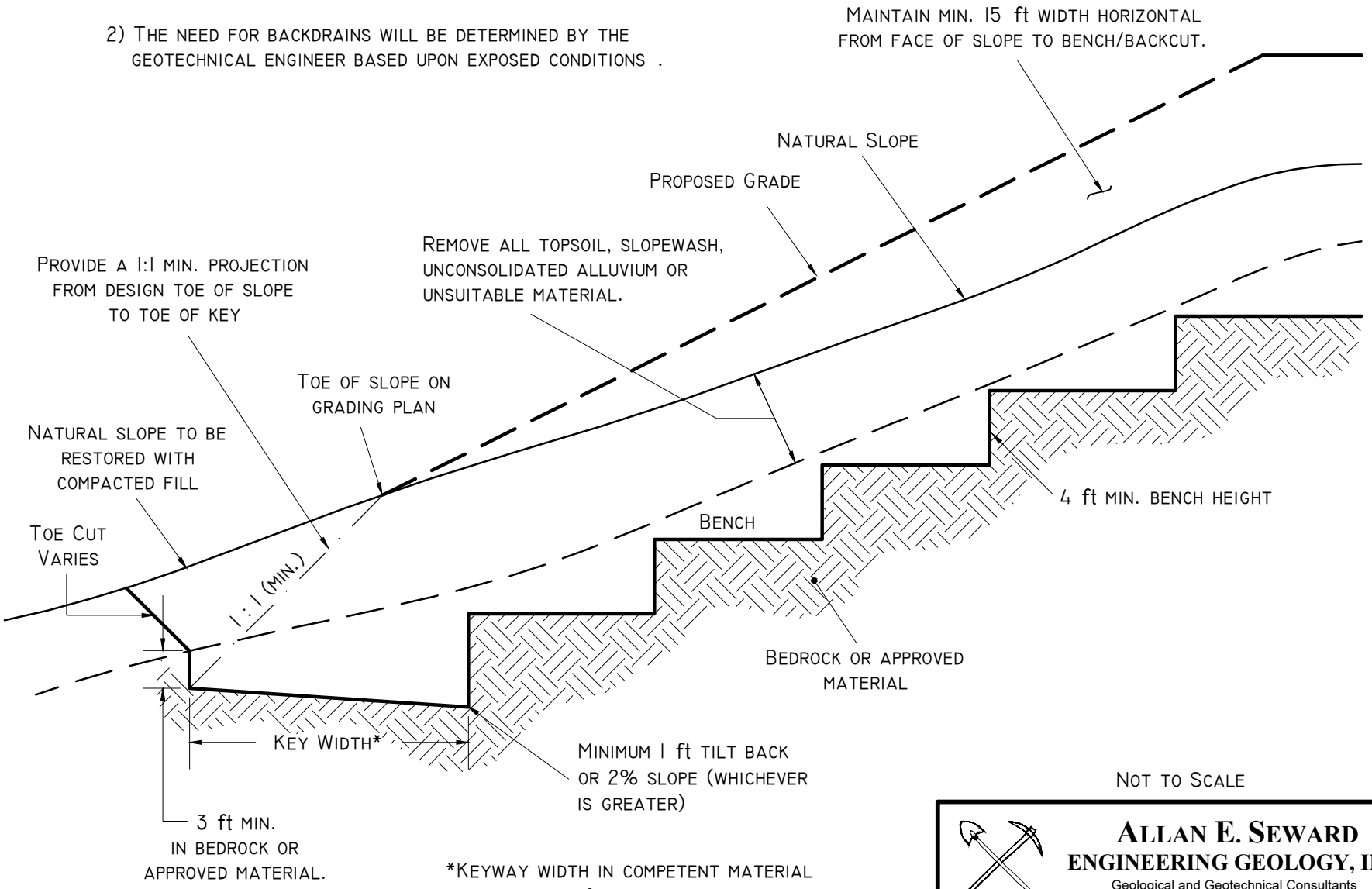
Post-Tensioned Slabs

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 .

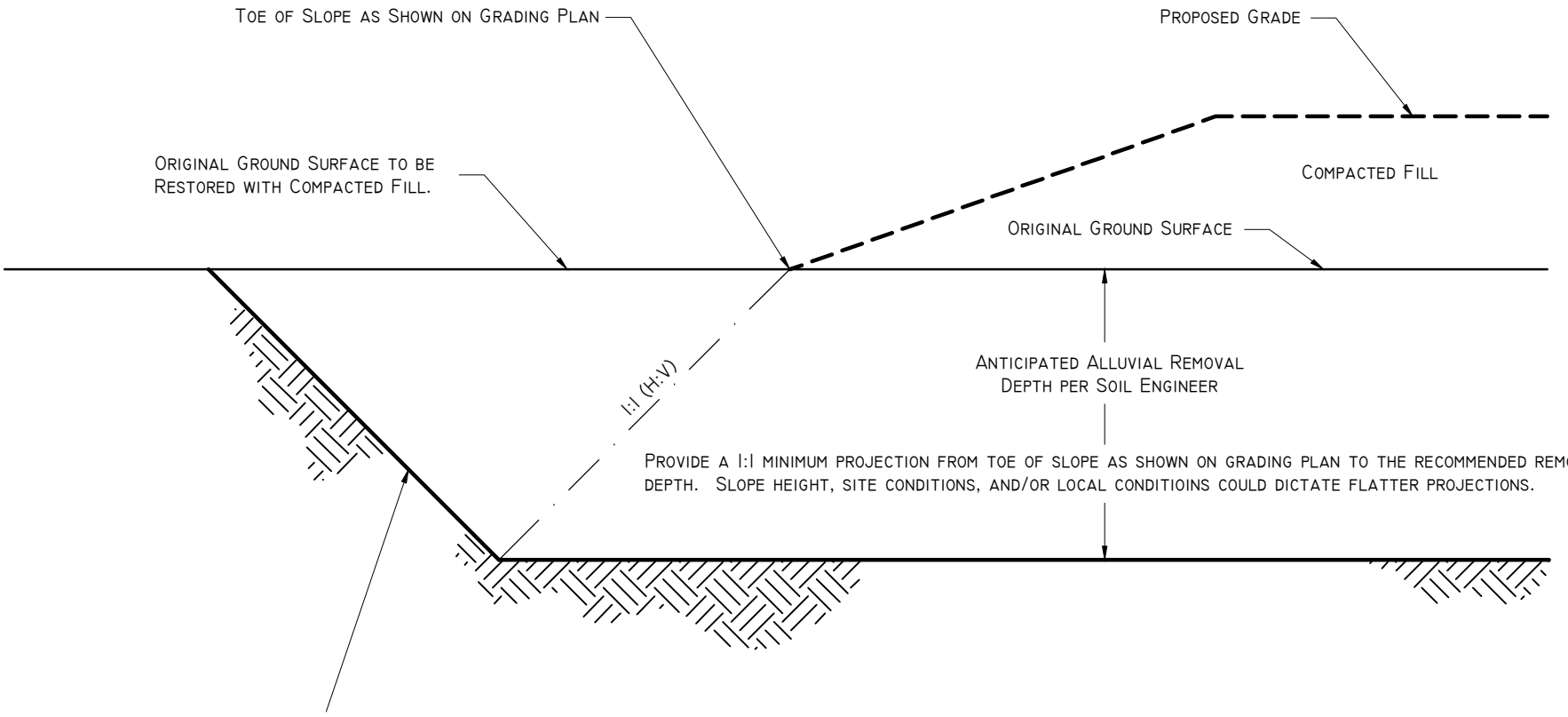


*KEYWAY WIDTH IN COMPETENT MATERIAL MINIMUM OF 15 ft OR AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

NOT TO SCALE

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

FILL SLOPE OVER NATURAL SLOPE
5:1 OR STEEPER



BACKCUT VARIES. BACKCUT SHOULD BE EXCAVATED AS APPROPRIATE TO PROVIDE SAFE CONDITIONS PER CAL OSHA. ALTERNATIVELY, THE SLOT-CUT METHOD CAN BE USED (SEE TEXT), OR TEMPORARY SHORING CAN BE UTILIZED.

NOT TO SCALE

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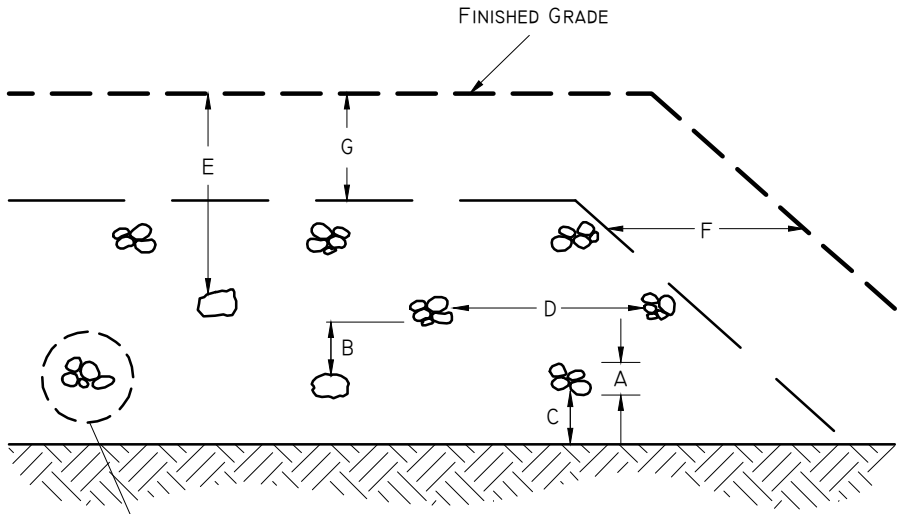
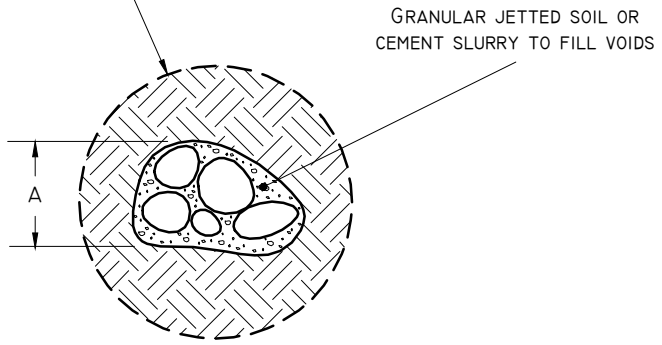
Geological and Geotechnical Consultants

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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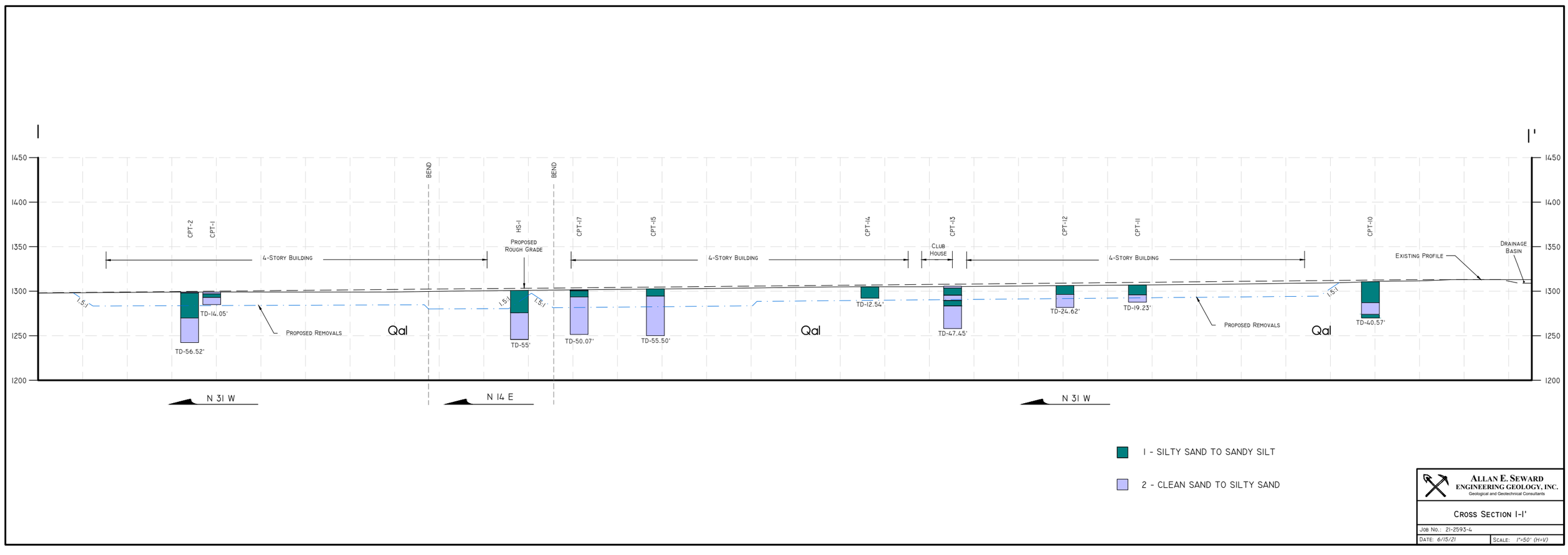
ROCK DISPOSAL (WINDROWS)



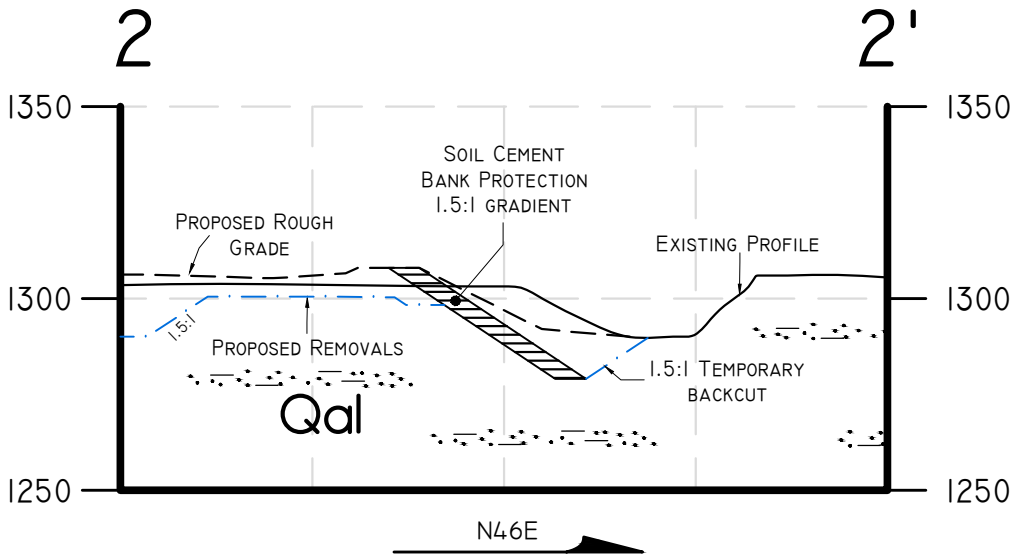
Allan E. Seward Engineering Geology, Inc.
Geological and Geotechnical Consultants

Cross Section I-I'

Job No.: 21-2593-4

Date: 6/15/21

Scale: 1"=50' (H=V)



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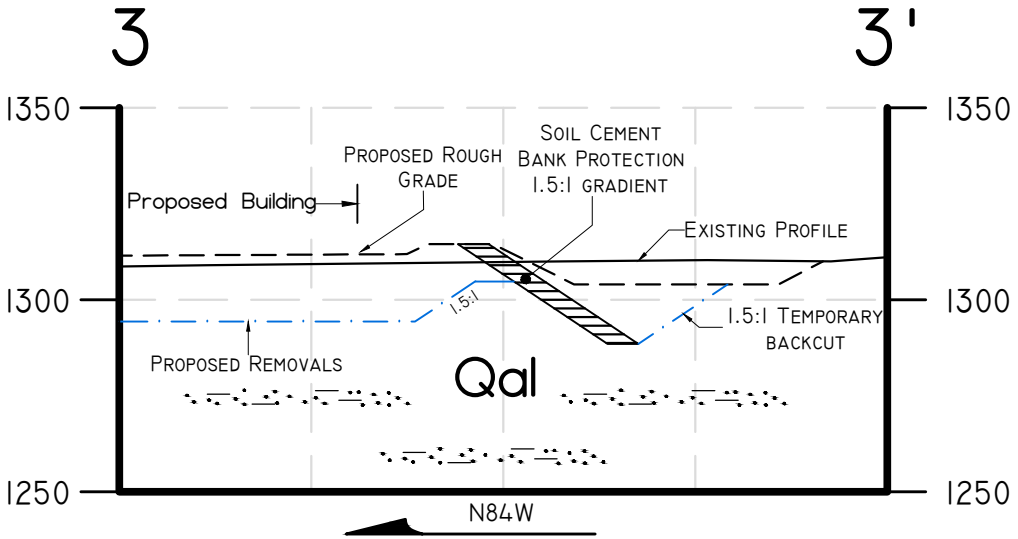
Geological and Geotechnical Consultants

CROSS SECTION 2-2'

JOB NO.: *21-2593-4*

DATE: *6/15/21*

SCALE: *1"=50'*



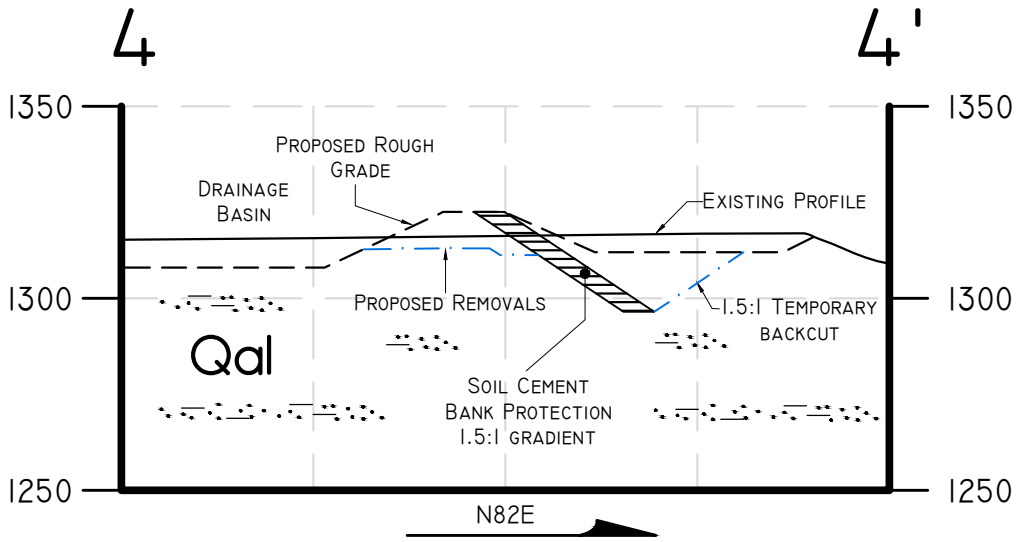
Allan E. Seward
Engineering Geology, Inc.
Geological and Geotechnical Consultants

Cross Section 3-3'

Job No.: *21-2593-4*

Date: *6/15/21*

Scale: *1"=50'*



Allan E. Seward
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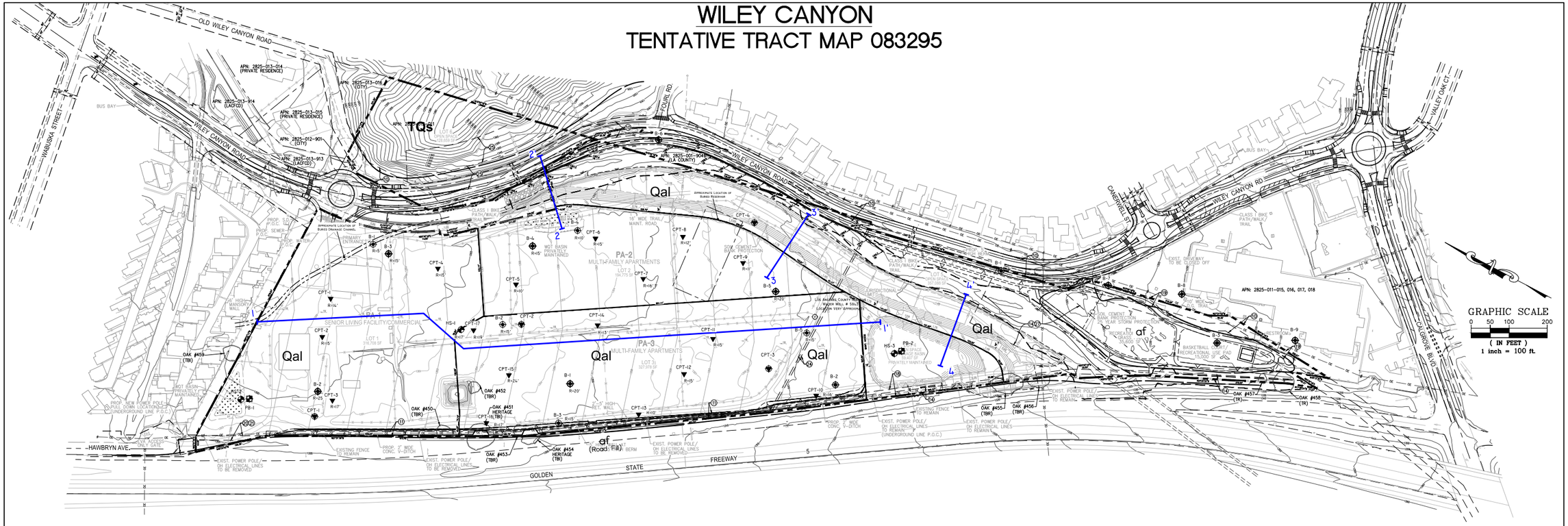
Cross Section 4-4'

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 R6078 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°16'58" 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, 1960 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. 90-1674166, 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:

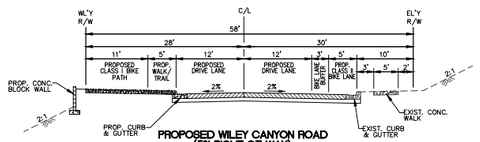
BEGINNING AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SAID SECTION 9; THENCE ALONG THE EAST LINE OF SAID QUARTER SECTION, NORTH 0° 12' EAST 1980.60 FEET TO THE TRUE POINT OF BEGINNING; THENCE SOUTH 4° 25' WEST 200.90 FEET; THENCE SOUTH 12° 35' WEST 356.04 FEET; THENCE SOUTH 32° 25' WEST TO THE 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.

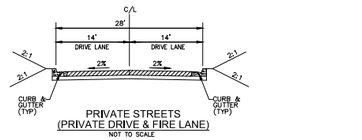
PARCEL 2:

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 (56' 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, 1960 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
(15)	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 SOUTHERN PROPERTY LINE WITHIN LOT 5	1
(20)	SOUTHERN CALIFORNIA EDISON COMPANY	PUBLIC UTILITIES	MARCH 20, 1975 BOOK D388 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

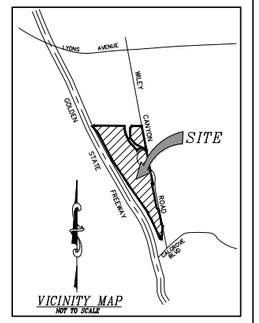
DESCRIPTION: BEING AN FC DISC IN CONCRETE FOOTING S/W LEG OF EDISON TOWER #3/7 35M S & 6.4M W/O C/L INTERSECTION WILEY CANYON ROAD & WABUSKA STREET MARKED (BM 128-05980).

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)



VICINITY MAP
NOT TO SCALE

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
- ELECTRICAL TRANSFORMER
- 1300 SPOT ELEVATION
- FLOW DIRECTION
- CARPORT
- OAK XXX (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.: 11-2593-4
SCALE: 1" = 100' | FILE NAME: AES TTM 5.26.21_Wiley-Tentative Plan
SHEET 1 | GEOLOGY BY: VCG | DRAWN BY: CHS/VCG | REVISED:

ALLIANCE
LAND PLANNING & ENGINEERING INC.
CIVIL ENGINEERING • LAND PLANNING • HILLSIDE DESIGN • SURVEYING
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FAX: (760) 431-8802
27413 TOURNEY ROAD
SUITE 120
VALENCIA, CA 91355
TEL: (661) 799-2760

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 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 1 OF **CITY OF SANTA CLARITA** 3 SHEETS

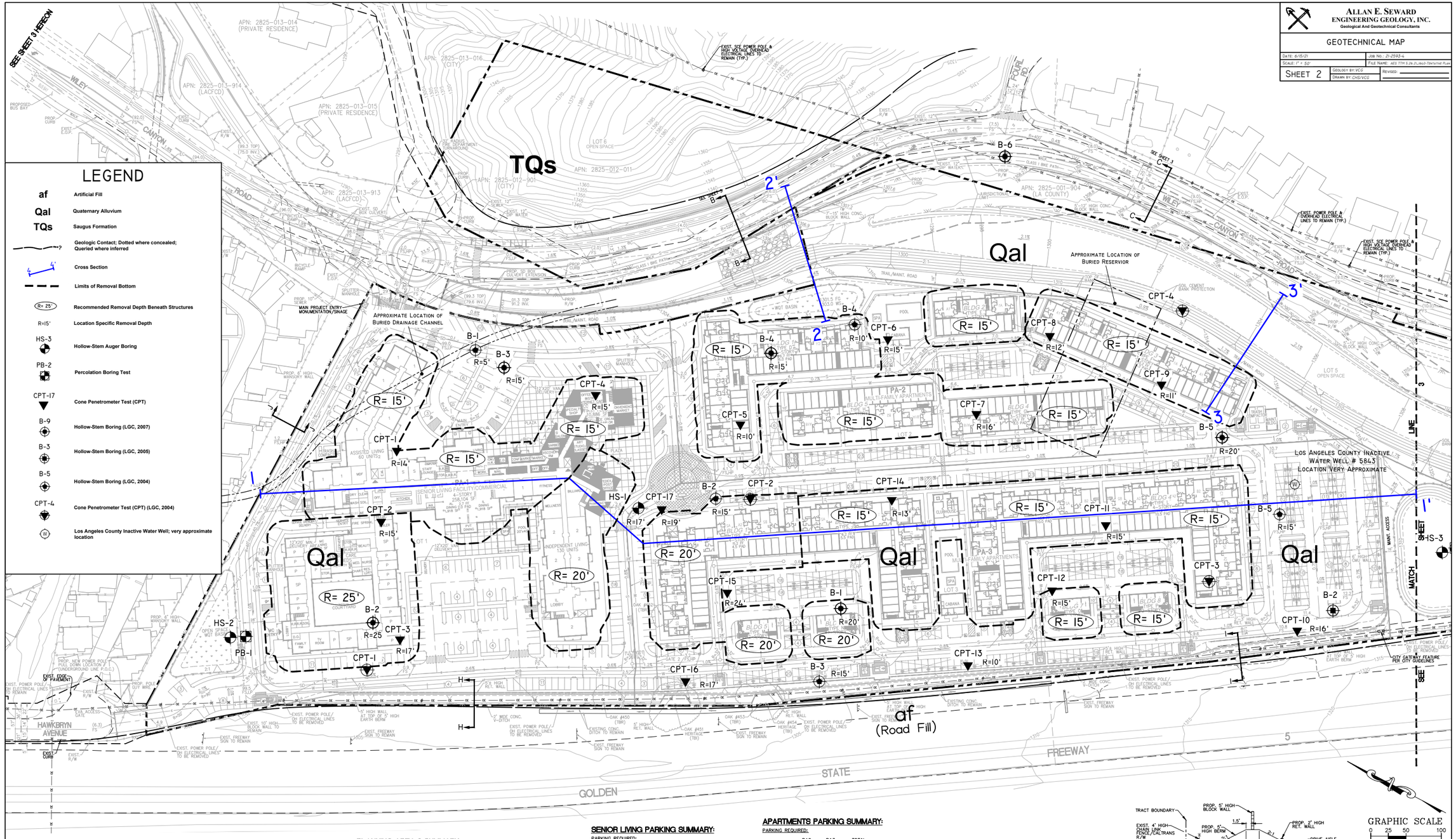
WILEY CANYON
TENTATIVE TRACT MAP 083295
FOR CONDOMINIUM PURPOSES

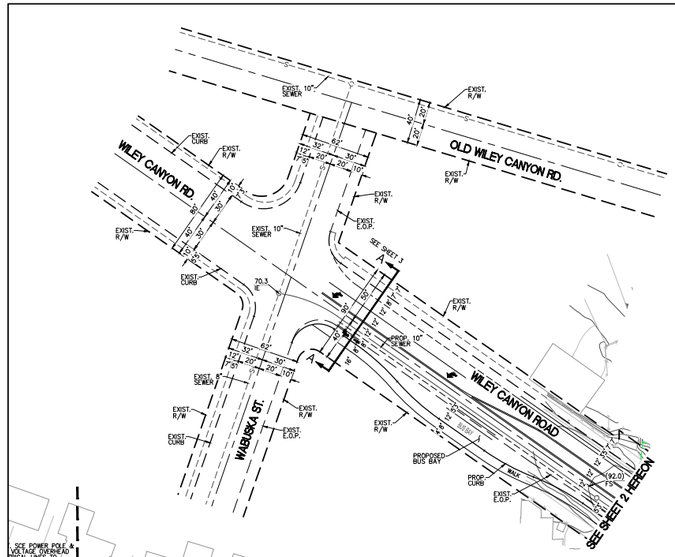
G:\2593 acad\In Progress\AES TTM Dated 5.26.21 1640_TENTATIVE_MAP_PLAN.dwg

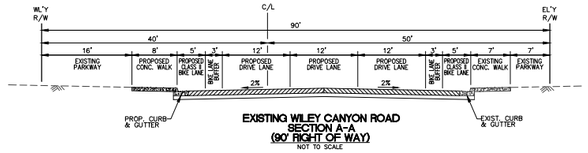
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOTECHNICAL MAP

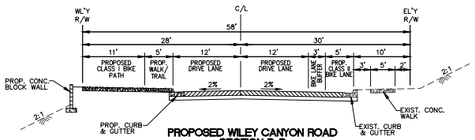
DATE: 6/15/21 | JOB NO.: 21-2593-G
SCALE: 1" = 50' | FILE NAME: AES TTM 5.26.21_WILD-TENTATIVE PLAN
SHEET 2 | GEOLOGY BY: VCC | DRAWN BY: CHS/VCC | REVISED:


SEE SHEET 9 HEREON
WILEY CANYON ROAD
TQs
Qal
af
(Road Fill)
APPROXIMATE LOCATION OF BURIED DRAINAGE CHANNEL
APPROXIMATE LOCATION OF BURIED RESERVOIR
MAIN PROJECT ENTRY—MONUMENTATION/SIGNAGE
HAWKBRYN AVENUE
GOLDEN STATE FREEWAY
LOS ANGELES COUNTY INACTIVE WATER WELL # 5843 LOCATION VERY APPROXIMATE
CITY GATEWAY FEATURE PER CITY GUIDELINES
SEE SHEET 1
SEE SHEET 3
MATCH LINE
APN: 2825-013-014 (PRIVATE RESIDENCE)
APN: 2825-013-016 (CITY)
APN: 2825-013-914 (LACFCD)
APN: 2825-013-015 (PRIVATE RESIDENCE)
APN: 2825-012-011
APN: 2825-012-901 (CITY)
APN: 2825-013-913 (LACFCD)
APN: 2825-001-904 (LA COUNTY)
LOT 6 OPEN SPACE
LOT 5 OPEN SPACE
PA-1 ASSISTED LIVING 60 UNITS±2
PA-2 MULTI-FAMILY APARTMENTS
PA-3 MULTI-FAMILY APARTMENTS
SENIOR LIVING FACILITY/COMMERCIAL 4-STORY ± 258,104 SF
INDEPENDENT LIVING 130 UNITS
EXIST. SCE POWER POLE & HIGH VOLTAGE OVERHEAD ELECTRICAL LINES TO REMAIN (TYP.)
EXIST. POWER POLE & OVERHEAD ELECTRICAL LINES TO REMAIN (TYP.)
PROP. NEW POWER POLE PULL DOWN LOCATION (UNDERGROUND LINE P.O.C.)
EXIST. POWER POLE/ ON ELECTRICAL LINES TO BE REMOVED
EXIST. FREEWAY SIGN TO REMAIN
EXIST. 10' HIGH BLOCK WALL TO REMAIN
EXIST. 6' HIGH MASONRY WALL
EXIST. EDGE OF PAVEMENT
EXIST. CURB
EXIST. R/W
PROP. R/W
PROP. CURB
PROP. 6" HIGH MASONRY WALL
PROP. 10' SEWER
PROP. 8" WATER
PROP. SD BOX CULVERT EXTENSION
EXIST. SD BOX CULVERT
EXIST. 12" WATER
EXIST. 12" SEWER
EXIST. 24" SD
EXIST. 36" SD
EXIST. 42" SD
EXIST. 48" SD
EXIST. 54" SD
EXIST. 60" SD
EXIST. 72" SD
EXIST. 84" SD
EXIST. 96" SD
EXIST. 108" SD
EXIST. 120" SD
EXIST. 132" SD
EXIST. 144" SD
EXIST. 156" SD
EXIST. 168" SD
EXIST. 180" SD
EXIST. 192" SD
EXIST. 204" SD
EXIST.

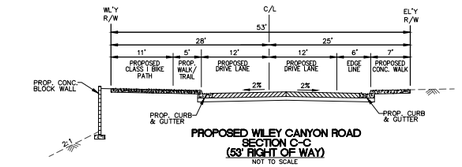




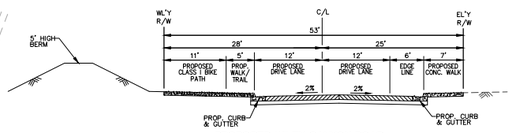
EXISTING WILEY CANYON ROAD
SECTION A-A
(90' RIGHT OF WAY)
NOT TO SCALE



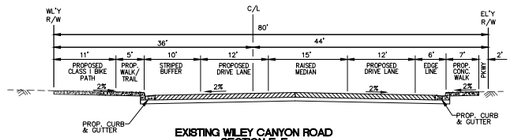
PROPOSED WILEY CANYON ROAD
SECTION B-B
(58' RIGHT OF WAY)
NOT TO SCALE



PROPOSED WILEY CANYON ROAD
SECTION C-C
(53' RIGHT OF WAY)
NOT TO SCALE



PROPOSED WILEY CANYON ROAD
SECTION D-D
(53' RIGHT OF WAY)
NOT TO SCALE



EXISTING WILEY CANYON ROAD
SECTION E-E
(80' RIGHT OF WAY)
NOT TO SCALE

EXISTING CALGROVE AVENUE (EAST)
SECTION F-F
(86' RIGHT OF WAY)
NOT TO SCALE

EXISTING CALGROVE AVENUE (WEST)
SECTION G-G
(80' RIGHT OF WAY)
NOT TO SCALE

SEE SHEET 2 FOR LEGEND

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_MAP-Tentative Plan
SHEET 3 | GEOLOGY BY: VCG | DRAWN BY: CHD/VCG | REVISED:

ALLIANCE LAND PLANNING & ENGINEERING INC.
2248 FARADAY AVE.
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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

G:\2593 acad\In Progress\AES TTM Dated 5.26.21 1640_TENTATIVE_MAP_PLAN.dwg