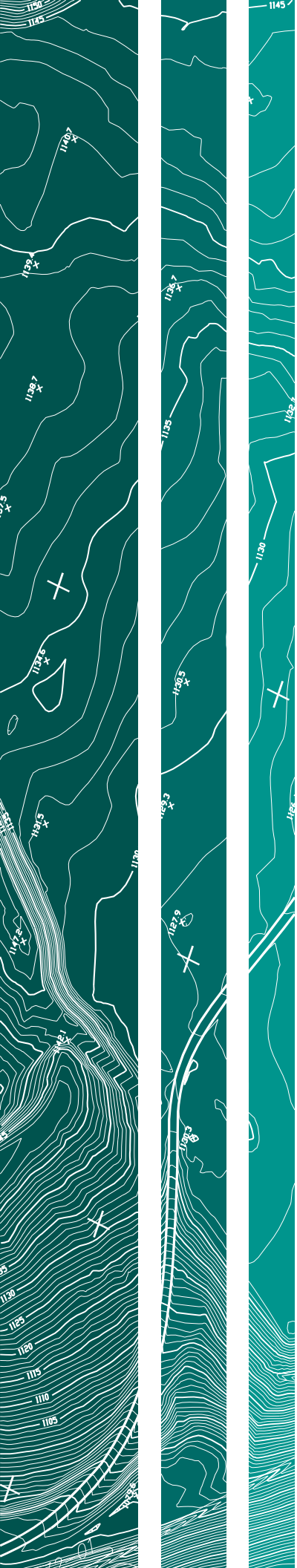


GEOCON

# GEOTECHNICAL INVESTIGATION

PROPOSED MULTI-FAMILY
RESIDENTIAL DEVELOPMENT
21611 SOUTH PERRY STREET
CARSON, CALIFORNIA
APN: 7327-010-014

*AUGUST 8, 2024 - Revised*
PROJECT NO. W1301-06-01

PREPARED FOR:
21611 Perry Street, LLC
West Hollywood, California

Project No. W1301-06-01
*August 8, 2024 - Revised*

21611 Perry Street, LLC
659 North Robertson Boulevard,
West Hollywood, California 90069

Attention: Mr. Darren Embry

Subject: GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
21611 SOUTH PERRY STREET
CARSON, CALIFORNIA
APN: 7327-010-014

Dear Mr. Embry:

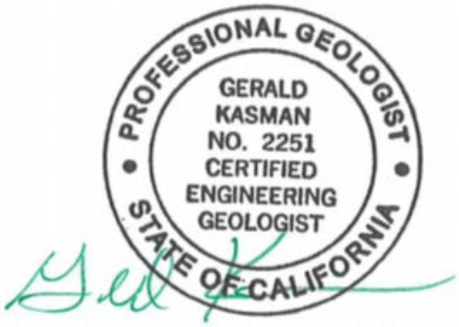
In accordance with your authorization of our proposal dated June 12, 2024, we have performed a geotechnical investigation for the proposed multi-family residential development located at 21611 South Perry Street in the City of Carson, California. The accompanying report presents the findings of our study and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

**GEOCON WEST, INC.**



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# GEOTECHNICAL INVESTIGATION

## 1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed multi-family residential development located at 21611 South Perry Street in the City of Carson, California (see Vicinity Map, Figure 1). The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction.

The scope of this investigation included a review of prior environmental reports for the site provided by the client, a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on February 9, 2021, by drilling five 8-inch diameter borings using a truck-mounted hollow-stem auger drilling machine and advancing five cone penetrometer tests (CPTs). The borings were excavated to depths between approximately 20½ and 51 feet beneath the existing ground surface. The CPTs were advanced to depths of approximately 60 feet below existing ground surface. The approximate locations of the exploratory borings and CPTs are depicted on the Site Plan (see Figure 2). A detailed discussion of the field investigation, including the boring and CPT logs, is presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

## 2. SITE AND PROJECT DESCRIPTION

The subject site is an approximately 2.8-acre irregularly shaped parcel located at 21611 South Perry Street in the City of Carson, California. The site is currently vacant. The site is bounded by South Perry Street on the east, by the Dominguez Channel to the west, by one- to two-story single-family homes to the north, and by East Carson Street to the south. The site is relatively level, with no pronounced highs or lows. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to the city streets.

Based on the information provided by the Client, it is our understanding that the proposed development will consist of 62-units of town-home structures to be constructed at or near present grade. Plans depicting the proposed improvements are provided on the Site Plan (see Figure 2).

Based on the preliminary nature of the design at this time, wall and column loads were not available. It is anticipated that column loads for the proposed structures will be up to 150 kips, and wall loads will be up to 2 kips per linear foot.

Once the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

# 3. BACKGROUND

Prior environmental reports were prepared for the site and provided for our review and include the following:

*Phase 1 Environmental Site Assessment, 21611 S. Perry Street, Carson, CA. 90745-1613, Prepared by Weis Environmental, dated January 25, 2021.*

*2020 First Semi-Annual Groundwater Monitoring Report, January Through June 2020, Dominguez Channel Release, Carson, California, Prepared by AECOM, dated July 14, 2020.*

Our review of these reports was limited to noting any onsite conditions that are relative to the geotechnical aspects of site development.

Based on the prior reports, petroleum hydrocarbon impacted soil and groundwater were previously identified at the site that originated from on-site underground storage tanks (USTs) and migration of contaminants from off-site sources. AECOM (formerly URS) developed a workplan that developed cleanup goals and excavation limits to remove impacted soils that was approved by the LARWQCB. In 2014, approximately 4,800 cubic yards of impacted soils were excavated from four areas and removed from the site. The excavations were approximately 5 to 8 feet deep and were backfilled with clean import soils (Weis Environmental, 2021). The approximate locations and depths of these areas are indicated on the Site Plan (see Figure 2). The backfill was reportedly placed, compacted, and tested as a certified backfill material; however, a copy of the compaction report was not included as an exhibit. Therefore, for the purposes of this report, the backfill is considered to be uncertified fill.

The reports indicate that as part of the prior site remediation, groundwater monitoring wells were installed at the site and the immediately surrounding area. The monitoring wells present at the site are limited to the eastern, western, and southern property boundaries. The Phase I report indicate that groundwater monitoring is ongoing in compliance with a semi-annual groundwater monitoring program required by the LARWQCB; however, monitoring data for the time period of 2021 to present was not available for our review.

The referenced environmental reports conclude that the known soil and groundwater impacts are within acceptable levels for commercial use and further assessment or remediation is not required. However, a soil management plan (SMP) is anticipated for further development of the site. Development of a soil management plan is beyond the scope of the Geotechnical Investigation.

# 4. GEOLOGIC SETTING

The site is located in the southern portion of the Los Angeles Basin, a coastal plain bounded by the Santa Monica Mountains on the north, the Elysian Hills and Repetto Hills on the northeast, the Puente Hills and the Whittier Fault on the east, the Palos Verdes Peninsula and Pacific Ocean on the west and south, and the Santa Ana Mountains and San Joaquin Hills on the southeast. The basin is underlain by a deep structural depression which has been filled by both marine and continental sedimentary deposits underlain by a basement complex of igneous and metamorphic composition. Regionally, the site is located within the northern portion of the Peninsular Ranges geomorphic province. This geomorphic province is characterized by northwest-trending physiographic and geologic features such as the nearby Newport-Inglewood Fault Zone located approximately 2.7 miles to the east-northeast.

# 5. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by artificial fill and Holocene age alluvium consisting of sand, silt, and clay (California Geological Survey, 2010). Detailed stratigraphic profiles of the materials encountered at the site are provided on the boring logs in Appendix A.

## 5.1 Artificial Fill

Artificial fill was encountered in our explorations to depths ranging from 3 to 9 feet below existing ground surface. The deep fill, observed in boring B3, is associated with an area of a former UST removal. The artificial generally consists of light brown to brown or grayish brown sand and silty sand. The artificial fill is characterized as fine-grained with some medium-grained, moist, and loose to dense. The fill is likely the result of past grading, UST removal and environmental remediation, and past construction activities at the site. Deeper fill may exist between excavations and in other portions of the site that were not directly explored.

## 5.2 Alluvium

Holocene age alluvium was encountered beneath the fill to the maximum depth explored (51 feet below the ground surface). The alluvium generally consists of light brown to brown, olive brown, or gray to dark gray interbedded clay, sandy clay, silt, sandy silt, silty sand and clayey sand. The alluvial soils are characterized as primarily fine-grained, moist to wet, and loose to dense or soft to stiff.

# 6. GROUNDWATER

A review of the Seismic Hazard Zone Report for the Torrance Quadrangle (California Division of Mines and Geology [CDMG], 1998) indicates the historically highest groundwater level in the area is approximately 9 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was encountered in borings B1 and B3 at depths of 12.5 feet and 17.6 feet beneath the existing ground surface, respectively. Additionally, readings from groundwater monitoring wells established on the site were taken on February 23, 2021. The locations of the accessible monitoring wells are indicated on the site plan (see Figure 2) and a summary of groundwater levels at the time of the investigation is provided in the table below.

**MONITORING WELL READINGS**

| Well ID | MW-3 | MW-4 | MW-5 | MW-7A | MW-8A | MW-9B |
|---|---|---|---|---|---|---|
| Depth to GW (Below Ground Surface) | 12.0’ | 13.17’ | 12.25’ | 12.33’ | 12.67’ | 14.67’ |

Based on the depth to groundwater and the on-grade nature of the development, groundwater is not expected to have a detrimental effect on the project. Groundwater may be encountered during construction in deep drilled excavations, such as for ground improvement or elevator pistons. It is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 8.13).

# 7. GEOLOGIC HAZARDS

## 7.1 Surface Fault Rupture

The numerous faults in Southern California include Holocene-active, pre-Holocene, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as CDMG) for the Alquist-Priolo Earthquake Fault Zone Program (CGS, 2018). By definition, a Holocene-active fault is one that has had surface displacement within Holocene time (about the last 11,700 years). A pre-Holocene fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years) but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not within a state-designated Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards (CGS, 2021a; CGS, 2021b; CDMG 1986). No Holocene-active or pre-Holocene active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. However, the site is located in the seismically active Southern California region and could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active Southern California faults. The faults in the vicinity of the site are shown in Figure 3, Regional Fault Map.

The closest surface trace of an active fault to the site is the Newport-Inglewood Fault Zone located approximately 2.7 miles to the east-northeast (USGS, 2006; CDMG, 1986). Other nearby active faults are the Palos Verdes Fault, the Cabrillo Fault, and the Whittier Fault located approximately 4.2 miles south-southwest, 8.2 miles south, and 16 miles northeast of the site, respectively. The active San Andreas Fault Zone is located approximately 48 miles northeast of the site.

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin at depth. These faults are not exposed at the ground surface and are typically identified at depths greater than 3.0 kilometers. The October 1, 1987, $M_w$ 5.9 Whittier Narrows earthquake and the January 17, 1994, $M_w$ 6.7 Northridge earthquake were a result of movement on the Puente Hills Blind Thrust and the Northridge Thrust, respectively. These thrust faults and others in the Los Angeles area are not exposed at the surface and do not present a potential surface fault rupture hazard at the site; however, these deep thrust faults are considered active features capable of generating future earthquakes that could result in moderate to significant ground shaking at the site.

## 7.2 Seismicity

As with all of Southern California, the site has experienced historic earthquakes from various regional faults. The seismicity of the region surrounding the site was formulated based on research of an electronic database of earthquake data. The epicenters of recorded earthquakes with magnitudes equal to or greater than 5.0 in the site vicinity are depicted on Figure 4, Regional Seismicity Map. A partial list of moderate to major magnitude earthquakes that have occurred in the Southern California area within the last 100 years is included in the following table.

**LIST OF HISTORIC EARTHQUAKES**

| Earthquake (Oldest to Youngest) | Date of Earthquake | Magnitude | Distance to Epicenter (Miles) | Direction to Epicenter |
|---|---|---|---|---|
| Near Redlands | July 23, 1923 | 6.3 | 59 | E |
| Long Beach | March 10, 1933 | 6.4 | 22 | SE |
| Tehachapi | July 21, 1952 | 7.5 | 91 | NW |
| San Fernando | February 9, 1971 | 6.6 | 41 | NNW |
| Whittier Narrows | October 1, 1987 | 5.9 | 19 | NE |
| Sierra Madre | June 28, 1991 | 5.8 | 33 | NE |
| Landers | June 28, 1992 | 7.3 | 107 | ENE |
| Big Bear | June 28, 1992 | 6.4 | 85 | ENE |
| Northridge | January 17, 1994 | 6.7 | 31 | NW |
| Hector Mine | October 16, 1999 | 7.1 | 125 | ENE |

The site could be subjected to strong ground shaking in the event of an earthquake. However, this hazard is common in Southern California and the effects of ground shaking can be minimized if the proposed structures are designed and constructed in conformance with current building codes and engineering practices.

## 7.3 Seismic Design Criteria

The following table summarizes the site-specific design criteria obtained from the 2022 California Building Code (CBC; Based on the 2021 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application U.S. Seismic Design Maps, provided by the Structural Engineers Association of California (SEAOC). The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2022 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCER).

It should be noted that there are liquefiable soils underlying the site. Should it be determined that the building possesses a fundamental period of more than 0.5 seconds, a site response analysis is in accordance with ASCE 7-16, Section 20.3.1 may be required.

## 2022 CBC SEISMIC DESIGN PARAMETERS

| Parameter | Value | 2022 CBC Reference |
|---|---|---|
| Site Class | D | Section 1613.2.2 |
| $MCE_R$ Ground Motion Spectral Response Acceleration – Class B (short), $S_S$ | 1.711g | Figure 1613.2.1(1) |
| $MCE_R$ Ground Motion Spectral Response Acceleration – Class B (1 sec), $S_1$ | 0.618g | Figure 1613.2.1(2) |
| Site Coefficient, $F_A$ | 1 | Table 1613.2.3(1) |
| Site Coefficient, $F_V$ | 1.7 | Table 1613.2.3(2) |
| Site Class Modified $MCE_R$ Spectral Response Acceleration (short), $S_{MS}$ | 1.711g | Section 1613.2.3 (Eqn 16-20) |
| Site Class Modified $MCE_R$ Spectral Response Acceleration – (1 sec), $S_{M1}$ | 1.05g* | Section 1613.2.3 (Eqn 16-21) |
| 5% Damped Design Spectral Response Acceleration (short), $S_{DS}$ | 1.141g | Section 1613.2.4 (Eqn 16-22) |
| 5% Damped Design Spectral Response Acceleration (1 sec), $S_{D1}$ | 0.7* | Section 1613.2.4 (Eqn 16-23) |

*Per Supplement 3 of ASCE 7-16, a ground motion hazard analysis (GMHA) shall be performed for projects on Site Class "D" sites with 1-second spectral acceleration (S1) greater than or equal to 0.2g, which is true for this site. However, Supplement 3 of ASCE 7-16 provides an exception stating that that the GMHA may be waived provided that the parameter SM1 is increased by 50% for all applications of SM1. The values for parameters SM1 and SD1 presented above have not been increased in accordance with Supplement 3 of ASCE 7-16.

The table below presents the mapped maximum considered geometric mean ($MCE_G$) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

## ASCE 7-16 PEAK GROUND ACCELERATION

| Parameter | Value | ASCE 7-16 Reference |
|---|---|---|
| Mapped $MCE_G$ Peak Ground Acceleration, PGA | 0.748g | Figure 22-9 |
| Site Coefficient, $F_{PGA}$ | 1.1 | Table 11.8-1 |
| Site Class Modified $MCE_G$ Peak Ground Acceleration, $PGA_M$ | 0.823g | Section 11.8.3 (Eqn 11.8-1) |

Deaggregation of the MCE peak ground acceleration was performed using the USGS online Unified Hazard Tool, 2014 Conterminous U.S. Dynamic edition (v4.2.0). The result of the deaggregation analysis indicates that the predominant earthquake contributing to the MCE peak ground acceleration is characterized as a 6.87 magnitude event occurring at a hypocentral distance of 8.35 kilometers from the site.

Deaggregation was also performed for the Design Earthquake (DE) peak ground acceleration, and the result of the analysis indicates that the predominant earthquake contributing to the DE peak ground acceleration is characterized as a 6.68 magnitude occurring at a hypocentral distance of 13.48 kilometers from the site.

Conformance to the criteria in the above tables for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

### 7.4 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Liquefaction is typified by a loss of shear strength in the liquefied layers due to rapid increases in pore water pressure generated by earthquake accelerations.

The current standard of practice, as outlined in the “Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California” and “Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California” requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine- to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

The State of California Seismic Hazard Zone Map for the Torrance Quadrangle (CDMG, 1999) indicates that the site is located in an area designated as having a potential for liquefaction. Also, the City of Carson (2002) indicates the site is located within an area that has a potential for liquefaction.

The Standard Penetration Test (SPT) blow counts obtained from boring B3 were compared with the blow counts estimated from the CPT soundings. SPTs were performed in boring B3 at intervals of approximately 5 feet. In order to supplement the SPT blow count data, California Modified Sampler blow count data were converted to equivalent SPT blow counts based on a correlation factor of 0.55 (Rogers, 2006). The field collected blow counts were corrected for hammer efficiency to N60 blow count values. The boring N60 values were compared with the N60 values generated by the program CpetIT (Version 3.2.1.7). The comparison of CPT-3 and boring B3 are shown as Figure 5. It is our opinion that the boring and CPT N60 values show a very reasonable correlation and that analysis of the liquefaction potential may be based on the CPT data.

Liquefaction analyses of the CPT soundings were performed using the program CLiq (Version 3.5.2.22). This program utilizes the 2001 NCEER method of analysis. This semi-empirical method is based on correlations with the data collected from the CPT soundings and includes consideration of dry-dynamic settlement above the water table.

The liquefaction analysis performed for the Maximum Considered Earthquake level by using a historic groundwater level of 9 feet below the ground surface, a magnitude 6.87 earthquake, and a peak horizontal acceleration of 0.823g (PGAM). The results of the enclosed liquefaction analyses included herein for CPTs 1 through 5 indicate that the alluvial soils could be susceptible to the liquefaction induced settlements summarized in the table below during Maximum Considered Earthquake ground motion. A summary of the anticipated liquefaction induced settlements is provided as Figure 6.

**Liquefaction Induced Settlements (Maximum Considered Earthquake)**

| CPT Number | CPT-1 | CPT-2 | CPT-3 | CPT-4 | CPT-4 |
|---|---|---|---|---|---|
| Liquefaction Settlement (in) | 0.49 | 0.17 | 0.33 | 0.06 | 0.46 |

## 7.5 Lateral Spreading

Due to the presence of the Dominguez Channel located to the west of the site, the potential for lateral spread was evaluated. Lateral spread occurs as a result of liquefaction induced lateral ground movement and typically occurs due to the presence of a slope comprised of and/or underlain by liquefiable soils.

Analysis of the potential for lateral spread was performed using the program CLiq (Version 3.5.2.22). The program utilizes the method proposed by Zhang et. al. (2004) to evaluate the potential for lateral spread and the resulting lateral displacements.

This method of analysis recommends evaluating the potential for lateral displacements to a distance of 50H from the slope, where H is the height of the slope. Beyond a horizontal distance of 50H lateral displacements due to the presence of a slope are not anticipated to occur. This method of analysis considers soils to a depth of twice the total slope height as potentially subject to lateral spread, up to a distance of 50H away from the toe of the slope.

The drainage channel is trapezoidal in shape and consists of two slopes approximately 12 feet in height inclined at a gradient of approximately 2:1 (estimated via satellite images). The proposed structures have a minimum setback of 80 feet from the toe of the drainage channel. Therefore, lateral displacements using a horizontal setback of 80 feet was utilized.

Based on the results of the analyses, it is anticipated that approximately 15 inches of lateral displacements towards the drainage channel could occur at a distance of 80 feet from the toe of the drainage channel during Maximum Considered Earthquake ground motion. The magnitude of lateral spread is anticipated to decrease at further distances from the drainage channel. The lateral displacements are anticipated to occur between depths of 10 and 24 feet below the ground surface. A summary of lateral displacement is provided as Figure 7. Calculations and output from CLiq are provided as Appendix C.

The grading and foundation design recommendations presented in this report are intended to minimize the effects of lateral spread on the proposed improvements.

### 7.6 Slope Stability

The topography at the site is relatively level and the topography in the immediate site vicinity slopes gently to the west-southwest. The County of Los Angeles Safety Element (Leighton, 1990) indicates the site is not located within an area identified as a “hillside area” or having a potential for slope instability. Additionally, the site is not within an area identified as having a potential for seismic slope instability (CDMG, 1999). There are no known landslides near the site, nor is the site in the path of any known or potential landslides. Therefore, the potential for slope stability hazards to adversely affect the proposed development is considered low.

### 7.7 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. Based on a review of the Los Angeles County Safety Element (Leighton, 1990), the site is not located within a potential inundation area for an earthquake-induced dam failure. Therefore, the probability of earthquake-induced flooding is considered very low.

### 7.8 Tsunamis, Seiches, and Flooding

The site is not located within a coastal area. Therefore, tsunamis are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Therefore, flooding resulting from a seismic-induced seiche is considered unlikely.

The site is within an area of minimal flooding (Zone X) as defined by the Federal Emergency Management Agency (FEMA, 2021; LACDPW, 2021).

### 7.9 Oil Fields & Methane Potential

Based on a review of the California Geologic Energy Management Division (CalGEM) Well Finder Website, the site is not located within an oil field and oil or gas wells are not documented in the immediate site vicinity (CalGEM, 2021). However, due to the voluntary nature of record reporting by the oil well drilling companies, wells may be improperly located or not shown on the location map and undocumented wells could be encountered during construction. Any wells encountered during construction will need to be properly abandoned in accordance with the current requirements of the CalGEM.

Since the site is not located within an oil field, the potential for methane or other volatile gases associated with oil and gas fields to be present at the site is considered low. However, as discussed in the Background section of this report (see Section 3), due to the site history there is a potential for low levels of volatile gases to be present, particularly during site grading. Should it be determined that a methane study or further environmental studies are required for the proposed development, it is recommended that a qualified methane or environmental consultant be retained to perform the study and provide mitigation measures as necessary.

### 7.10 Subsidence

Subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. The site is not located within an area of known ground subsidence. No large-scale extraction of groundwater, gas, oil, or geothermal energy is occurring or planned at the site or in the general site vicinity. There appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the site.

# 8. CONCLUSIONS AND RECOMMENDATIONS

## 8.1 General

8.1.1 It is our opinion that neither soil nor geologic conditions were encountered during the investigation that would preclude the construction of the proposed development provided the recommendations presented herein are followed and implemented during design and construction.

8.1.2 This statement is made in accordance with the County of Los Angeles, Section 111. It is the opinion of this office that, provided our recommendations are followed and properly maintained, (1) the proposed grading and proposed structures will be safe for its intended use against hazard from landslide, settlement or slippage and (2) the proposed grading and proposed structures will have no adverse effect on the stability of the site or adjoining properties.

8.1.3 Up to 5 feet of existing artificial fill was encountered during the site investigation with localized areas of deeper fill to 9 feet in depth. The existing fill encountered is believed to be the result of past grading and construction activities at the site. Deeper fill may exist in other areas of the site that were not directly explored. It is our opinion that the existing fill, in its present condition, is not suitable for direct support of proposed foundations or slabs. If needed, the existing fill and site soils are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed (see Section 8.4).

8.1.4 The enclosed liquefaction and seismically-induced settlement analyses indicate that the site soils could be susceptible to approximately ½ inch of total settlement as a result of the Design Earthquake peak ground acceleration ($⅔PGA_M$). Differential settlement at the foundation level is anticipated to be less than ¼ inch over a distance of 20 feet. Additionally, the seismic settlement analyses indicate that lateral spreading of up to 15 inches could occur at a distance of 80 feet from the toe of the existing channel.

8.1.5 The results of the field data and laboratory testing indicate that the upper alluvial soils are relatively soft and compressible in their current condition (see Figure B5 thru B17) and could yield excessive static and differential settlements upon application of foundation loads.

8.1.6 Based on these considerations, it is recommended that the upper 5 feet of existing site soils within the building footprint areas be excavated and properly compacted for foundation and slab support. At a minimum, proposed foundations should be underlain by at least 3 feet of newly placed engineered fill. Deeper excavations should be conducted as needed to remove any encountered fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). The contractor should be aware that up to 9 feet of artificial fill was encountered in Boring B3. The excavation should extend laterally a minimum distance of three feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities. Recommendations for earthwork are provided in the *Grading* section of this report (see Section 8.4).

8.1.7 Subsequent to the recommended grading, the proposed structures may be supported on a reinforced concrete grade beam system deriving support in newly placed engineered fill. Recommendations for the design of a grade beam foundation system are provided in Section 8.6.

8.1.8 It is anticipated that the recommended grading can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures in order to maintain lateral support of existing adjacent improvements will be required. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 8.11).

8.1.9 Based on the relatively shallow groundwater table, the upper alluvial soils have the potential to be very moist and the grading contractor should be aware that the soils may be above optimum moisture content. If the soils are more than 3 percent above the optimum moisture content at the time of construction the soils will likely require some spreading and drying activities in order to achieve proper compaction. Bottom stabilization may also be necessary. Recommendations for bottom stabilization and earthwork are provided in the *Grading* section of this report (see Section 8.4).

8.1.10 Foundations for small outlying structures, such as block walls up to 6 feet high, planter walls or trash enclosures, which will not be tied-in to the proposed structure, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed, foundations may derive support directly in the undisturbed alluvial soils at or below a depth of 2 feet and should be deepened as necessary to maintain a minimum of 12-inch embedment into recommended bearing materials. If the soils exposed in the excavation bottom are soft or loose, compaction of the soft soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved in writing by a Geocon representative.

8.1.11 Where new paving is to be placed, it is recommended that all existing fill soils and soft alluvial soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable soils may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of soil should be scarified and properly compacted for paving support. Paving recommendations are provided in the *Preliminary Pavement Recommendations* section of this report (see Section 8.10).

8.1.12 Based on the shallow groundwater and impermeable nature of the fine grained soils which underly the site, infiltration of stormwater at this site is not considered feasible. Infiltration of stormwater at this site would be considered detrimental to the project. It is recommended that stormwater be retained, filtered, and discharged in accordance with the requirements of the local governing agency.

8.1.13 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements.

8.1.14 It should be noted that implementation of the recommendations presented herein is not intended to completely prevent damage to the structure during the occurrence of strong ground shaking as a result of nearby earthquakes. It is intended that the structure be designed in such a way that the amount of damage incurred as a result of strong ground shaking be minimized.

8.1.15 Once the design and foundation loading configuration for the proposed structure proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Based on the final foundation loading configurations, the potential for settlement should be re-evaluated by this office.

8.1.16 Any changes in the design, location or elevation, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

8.1.17 The most recent ASTM standards apply to this project and must be utilized, even if older ASTM standards are indicated in this report.

## 8.2 Soil and Excavation Characteristics

8.2.1 The in-situ soils can be excavated with moderate effort using conventional excavation equipment. Some caving should be anticipated in unshored excavations, especially where granular soils are encountered.

8.2.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of existing adjacent improvements.

8.2.3 All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping or shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 8.11).

8.2.4 The upper 5 feet of existing site soils encountered during the investigation are considered to have a “medium” expansive potential (EI = 63) and are classified as “expansive” in accordance with the 2022 California Building Code (CBC) Section 1803.5.3. The recommendations presented herein assume that foundations and slabs will derive support in these materials.

## 8.3 Minimum Resistivity, pH, and Water-Soluble Sulfate

8.3.1 Potential of Hydrogen (pH) and resistivity testing as well as chloride content testing were performed on representative samples of soil to generally evaluate the corrosion potential to surface utilities. The tests were performed in accordance with California Test Method Nos. 643 and 422 and indicate that the soils are considered "moderately corrosive" to "severely corrosive" with respect to corrosion of buried ferrous metals on site. The results are presented in Appendix B (Figure B23) and should be considered for design of underground structures. Due to the corrosive potential of the soils, it is recommended that PVC, ABS or other approved plastic piping be utilized in lieu of cast-iron when in direct contact with the site soils.

8.3.2 Laboratory tests were performed on representative samples of the on-site soil to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B23) and indicate that the on-site soil possess a sulfate exposure class of "S0" to concrete structures as defined by 2022 CBC Section 1904 and ACI 318-19 Chapter 19.

8.3.3 Geocon West, Inc. does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

## 8.4 Grading

8.4.1 Grading is anticipated to include preparation of building pads and paving subgrade, excavation of site soils for proposed foundations and utility trenches, as well as placement of backfill for utility trenches.

8.4.2 A preconstruction conference should be held at the site prior to the beginning of excavation operations with the owner, contractor, civil engineer, geotechnical engineer, and building official in attendance. Special soil handling requirements can be discussed at that time.

8.4.3 Earthwork should be observed, and compacted fill tested by representatives of Geocon West, Inc. The existing fill and alluvial soil encountered during exploration are suitable for re-use as an engineered fill, provided any encountered oversize material (greater than 6 inches) and any encountered deleterious debris are removed.

8.4.4 Grading should commence with the removal of all existing vegetation and existing improvements from the area to be graded. Deleterious debris such as wood and root structures should be exported from the site and should not be mixed with the fill soils. Asphalt and concrete should not be mixed with the fill soils unless approved by the Geotechnical Engineer. All existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein. Once a clean excavation bottom has been established it must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.).

8.4.5 As a minimum, it is recommended that the upper 5 feet of existing site soils within the building footprint areas be excavated and properly compacted for foundation and slab support. At a minimum, proposed foundations should be underlain by at least 3 feet of newly placed engineered fill. It is recommended that the grading contractor verify the depth of all building foundations prior to commencement of site grading activities in order to correctly determine the required grading overexcavations for foundations. Deeper excavations should be conducted as needed to remove any encountered fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). The excavation should extend laterally a minimum distance of three feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities.

8.4.6 The contractor should be aware that up to 9 feet of artificial fill was encountered in Boring B3. Existing artificial fill associated with previous removal of USTs is anticipated to be present onsite and is not considered suitable in its present condition for support of proposed structures. All previously placed fill must be excavated and recompacted. Additional recommendations may be provided in the field regarding transitioning the excavation depth to control differential fill thicknesses below foundations.

8.4.7 Subsequent to the recommended grading, the proposed structures may be supported on a reinforced concrete grade beam system deriving support in newly placed engineered fill.

8.4.8 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Prior to placing any fill, the upper 12 inches of the excavation bottom must be scarified, moistened, and proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

8.4.9 Prior to placing fill or constructing proposed improvements, a stable excavation bottom must be established. In areas where the subgrade is saturated or soft, proper compaction will likely not be possible or achieved in a timely manner without introducing stabilization measures. If subgrade stabilization is required at the excavation bottom, rubber tire equipment should not be allowed in the excavation bottom until it is stabilized or extensive soil disturbance could result. It is suggested that excavation and grading be performed during the summer season to promote moisture control of the soils. In addition, the use of track equipment should be used to minimize disturbance to the soils at the excavation bottom.

8.4.10 Bottom stabilization, if necessary, may be achieved placing a thin lift of 3- to 6-inch-diameter crushed angular rock into the soft excavation bottom. The use of crushed concrete will also be acceptable. The crushed rock should be spread thinly across the excavation bottom and pressed into the soils by track rolling or wheel rolling with heavy equipment. It is very important that voids between the rock fragments are not created so the rock must be thoroughly pressed or blended into the soils. All subgrade soils must be properly compacted and proof-rolled in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

8.4.11 An additional method of subgrade stabilization would be to place a minimum 12-inch thick layer of aggregate base over Tensar InterAx NX850 geogrid or equivalent extruded (nonwoven) geotextile. The Tensar geogrids should be installed taught and should overlap in accordance with the manufacturer's recommendations. Prior to placing the geogrid, excessively soft or wet materials should be removed and the resulting excavation bottom should be free of loose material. Non-vibratory compaction methods should be used for compaction of the base material. The aggregate base should be compacted to a dry density of at least 95 percent of the laboratory maximum density near the optimum moisture. If pumping of the subgrade continues, a thicker layer of aggregate base may be placed. It is very important that subgrade stabilization be performed uniformly across the entire excavation bottom.

8.4.12 The upper soils encountered during site exploration were moist to wet and the grading contractor should be aware that the existing soils are currently above optimum moisture content. Conditions could change seasonally. If the soils are more than 3 percent above the optimum moisture content at the time of construction the soils will likely require spreading, processing, and drying activities in order to achieve proper compaction.

8.4.13 All fill and backfill soils should be placed in horizontal loose layers approximately 6 to 8 inches thick, moisture conditioned to near to slightly above optimum moisture content, and properly compacted to a minimum 90 percent of the maximum dry density in accordance with ASTM D 1557 (latest edition).

8.4.14 It is anticipated that stable excavations for the recommended grading can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 8.11).

8.4.15 Although not anticipated for this project, all imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site. Import fill should consist of the characteristics presented in the table below.

**SUMMARY OF IMPORT FILL RECOMMENDATIONS**

| Soil Characteristic | Values |
|---|---|
| Expansion Potential | "Medium" (Expansion Index of 50 or less) |
| Particle Size | Maximum Dimension Less Than 6 Inches |
| | Free of Debris |
| Corrosivity | Less Detrimental Than Existing Onsite Soils |

8.4.16. Where new paving is to be placed, it is recommended that all existing fill and soft alluvium be excavated and properly compacted for paving support. As a minimum, the upper 12 inches of soil should be scarified, moisture conditioned to near to slightly above optimum moisture content, and compacted to at least 92 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 8.10).

8.4.17 Foundations for small outlying structures, such as block walls up to 6 feet high, planter walls or trash enclosures, which will not be tied to the proposed structure, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed, foundations may derive support directly in the undisturbed alluvial soils and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

8.4.18 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements. Utility trenches should be properly backfilled in accordance with the following requirements. The pipe should be bedded with clean sands (Sand Equivalent greater than 30) to a depth of at least 1 foot over the pipe, and the bedding material must be inspected and approved in writing by the Geotechnical Engineer (a representative of Geocon). The use of gravel is not acceptable unless used in conjunction with filter fabric to prevent the gravel from having direct contact with soil. The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained. The use of minimum 2-sack slurry as backfill is also acceptable. Prior to placing any bedding materials or pipes, the excavation bottom must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

8.4.19 All trench and foundation excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing bedding materials, fill, steel, gravel, or concrete.

## 8.5 Shrinkage

8.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor between 10 and 15 percent should be anticipated when excavating and compacting the upper 5 feet of existing earth materials on the site to an average relative compaction of 92 percent.

8.5.2 If import soils will be utilized in the building pad, the soils must be placed uniformly and at equal thickness at the direction of the Geotechnical Engineer (a representative of Geocon West, Inc.). Soils can be borrowed from non-building pad areas and later replaced with imported soils.

## 8.6 Foundation Design

8.7.1 Based on the potential for seismically induced lateral spread, it is recommended that the proposed structures be supported on a reinforced concrete grade beam system deriving support in newly placed engineered fill. The use of a reinforced concrete grade beam system is intended to reduce the impact on seismically induced ground movement on the proposed structures.

8.7.2 The grade beam foundation system consists of a continuous perimeter reinforced concrete grade beam foundation, which is interconnected with interior grade beams and a concrete slab. The system of grade beams, in conjunction with the slab, provides a stiff foundation system capable of distributing building loads and resisting differential settlements. The grade beams and slab should be poured monolithically where possible.

8.6.1 As a minimum, proposed foundations should be underlain by at least 3 feet of newly placed engineered fill. All foundation excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing steel or concrete.

8.6.2 A grade beam foundation system for the proposed structures may be designed using the parameters in the table on the following page.

**SUMMARY OF FOUNDATION RECOMMENDATIONS**

| Parameter | Value |
|---|---|
| Minimum Continuous Foundation Width | 12 Inches |
| Minimum Isolated Foundation Width | 24 Inches |
| Minimum Foundation Depth | 24 Inches Below Lowest Adjacent Grade & 12 Inches into Recommended Bearing Material |
| Minimum Steel Reinforcement | 4 No. 4 Bars, 2 Top and 2 Bottom |
| Allowable Bearing Capacity – Continuous Foundation | 2,000 psf |
| Allowable Bearing Capacity – Isolated Foundation | 2,500 psf |
| Bearing Capacity Increase | 250 psf per Foot of Width |
| | 500 psf per Foot of Depth |
| Maximum Allowable Bearing Capacity | 3,500 psf |
| Estimated Static Settlement | ½ Inch |
| Estimated Seismic Settlement | ½ Inch |
| Estimated Combined Static and Seismic Differential Settlement | ½ Inch over 30 Feet |
| Estimated Seismic Induced Lateral Spread | 15 inches |

8.6.3 The above foundation dimensions and minimum reinforcement recommendations are based on soil conditions and building code requirements only and are not intended to be used in lieu of those required for structural purposes.

8.6.4 The allowable bearing pressures may be increased by one-third for transient loads due to wind or seismic forces.

8.6.5 Once the design and foundation loading configurations for the proposed structures proceeds to a more finalized plan, the estimated settlements presented in this report should be reviewed and revised, if necessary. If the final foundation loading configurations are greater than the assumed loading conditions, the potential for settlement should be reevaluated by this office.

8.6.6 No special subgrade presaturation is required prior to placement of concrete. However, the moisture in the foundation subgrade should be sprinkled as necessary to maintain a moist condition at the time of concrete placement.

8.6.7 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

8.6.8 This office should be provided with a copy of the final construction plans so that the excavation recommendations presented herein could be properly reviewed and revised if necessary.

## 8.7 Miscellaneous Foundations

8.7.1 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, which will not be tied to the proposed structure, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and compaction cannot be performed, foundations may derive support directly in the competent undisturbed alluvial soils and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials.

8.7.2 If the soils exposed in the excavation bottom are soft, compaction of the soft soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Miscellaneous foundations may be designed for a bearing value of 1,500 psf and should be a minimum of 12 inches in width, 24 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

8.7.3 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

## 8.8 Lateral Design

8.8.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. An allowable coefficient of friction of 0.35 may be used with the dead load forces in the newly placed engineered fill or undisturbed older alluvial soils.

8.8.2 Passive earth pressure for the sides of foundations and slabs poured against newly placed engineered fill or undisturbed older alluvial soils may be computed as an equivalent fluid having a density of 230 pounds per cubic foot (pcf) with a maximum earth pressure of 2,300 psf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third. A one-third increase in the passive value may be used for wind or seismic loads.

## 8.9 Concrete Slabs-on-Grade

8.9.1 Exterior concrete slabs-on-grade subject to vehicle loading should be designed in accordance with the recommendations in the *Preliminary Pavement Recommendations* section of this report (Section 8.10).

8.9.2 Slabs-on-grade at the ground surface that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder placed directly beneath the slab. The vapor retarder and acceptable permeance should be specified by the project architect or developer based on the type of floor covering that will be installed. The vapor retarder selection and design should be consistent with the guidelines presented in Section 9.3 of the American Concrete Institute's (ACI) Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials (ACI 302.2R-06) as well as ASTM E1745 and should be installed in general conformance with ASTM E 1643 (latest edition) and the manufacturer's recommendations. A minimum thickness of 15 mils extruded polyolefin plastic is recommended; vapor retarders which contain recycled content or woven materials are not recommended. The vapor retarder should have a permeance of less than 0.01 perms demonstrated by testing before and after mandatory conditioning is recommended. The vapor retarder should be installed in direct contact with the concrete slab with proper perimeter seal. If the California Green Building Code requirements apply to this project, the vapor retarder should be underlain by 4 inches of clean aggregate. It is important that the vapor retarder be puncture resistant since it will be in direct contact with angular gravel. As an alternative to the clean aggregate suggested in the Green Building Code, it is our opinion that the concrete slab-on-grade may be underlain by a vapor retarder over 4-inches of clean sand (sand equivalent greater than 30), since the sand will serve a capillary break and will minimize the potential for punctures and damage to the vapor barrier.

8.9.3 For seismic design purposes, a coefficient of friction of 0.35 may be utilized between concrete slabs and subgrade soils without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

8.9.4 Exterior slabs for walkways and flatwork, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. Prior to construction of slabs, the upper 12 inches of subgrade should be moistened to near to slightly above optimum moisture content and properly compacted to at least 92 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Crack control joints should be spaced at intervals not greater than 10 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. Construction joints should be designed by the project structural engineer.

8.9.5 Due to the expansive potential of the anticipated subgrade soils, the moisture content of the slab subgrade should be maintained and sprinkled as necessary to maintain a moist condition as would be expected in any concrete placement. Furthermore, consideration should be given to doweling slabs into adjacent curbs and foundations to minimize movements and offsets which could lead to a potential tripping hazard.

8.9.6 The recommendations of this report are intended to reduce the potential for cracking of slabs due to settlement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

## 8.10 Preliminary Pavement Recommendations

8.10.1 Where new paving is to be placed, it is recommended that all existing fill and soft alluvium materials be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing artificial fill and soft alluvium in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable alluvium material may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of paving subgrade should be scarified, moisture conditioned to near to slightly above optimum moisture content, and properly compacted to at least 92 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

8.10.2 The following pavement sections are based on an assumed R-Value of 20. Once site grading activities are complete an R-Value should be obtained by laboratory testing to confirm the properties of the soils serving as paving subgrade, prior to placing pavement.

8.10.3 The Traffic Indices listed below are estimates. Geocon does not practice in the field of traffic engineering. The actual Traffic Index for each area should be determined by the project civil engineer. If pavement sections for Traffic Indices other than those listed below are required, Geocon should be contacted to provide additional recommendations. Pavement thicknesses were determined following procedures outlined in the *California Highway Design Manual* (Caltrans). It is anticipated that the majority of traffic will consist of automobile and large truck traffic.

**PRELIMINARY PAVEMENT DESIGN SECTIONS**

| Location | Estimated Traffic Index (TI) | Asphalt Concrete (inches) | Class 2 Aggregate Base (inches) |
|---|---|---|---|
| Automobile Parking and Driveways | 4.0 | 3.0 | 4.0 |
| Trash Truck & Fire Lanes | 7.0 | 4.0 | 12.0 |

8.10.4 Asphalt concrete should conform to Section 203-6 of the "*Standard Specifications for Public Works Construction"* (Green Book). Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). The use of Crushed Miscellaneous Base (CMB) in lieu of Class 2 aggregate base is acceptable. Crushed Miscellaneous Base should conform to Section 200-2.4 of the "*Standard Specifications for Public Works Construction"* (Green Book).

8.10.5 Unless specifically designed and evaluated by the project structural engineer, where exterior concrete paving will be utilized for support of vehicles, it is recommended that the concrete be a minimum of 6 inches of concrete reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Concrete paving supporting vehicular traffic should be underlain by a minimum of 4 inches of aggregate base and a properly compacted subgrade. The subgrade and base material should be compacted to 92 and 95 percent relative compaction, respectfully, as determined by ASTM Test Method D 1557 (latest edition).

8.10.6 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 12 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving.

## 8.11 Temporary Excavations

8.11.1 Excavations on the order of 6 feet in height are generally anticipated during grading activities, and isolated excavations up to 9 feet in height may also be required. The excavations are expected to expose artificial fill and alluvial soils, which may be subject to caving where granular soils are exposed. Temporary vertical excavations up to 5 feet in height may be attempted where loose soils or caving sands are not present, and where excavations are not surcharged by adjacent traffic or structures.

8.11.2 Vertical excavations greater than 5 feet or where surcharged by existing structures will require sloping or shoring measures in order to provide a stable excavation. Where sufficient space is available, temporary unsurcharged embankments could be sloped back at a uniform 1:1 slope gradient or flatter up to a maximum of 9 feet in height. A uniform slope does not have a vertical portion. Where space is limited, shoring measures will be required. *Shoring* recommendations can be provided under separate cover if necessary.

8.11.3 If excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures such as slot-cutting or shoring may be necessary in order to maintain lateral support of offsite improvements. Recommendations for slot-cutting and shoring can be provided under separate cover.

8.11.4 Where temporary construction slopes are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary construction slopes are to be maintained during the rainy season, berms are suggested along the tops of the slopes where necessary to prevent runoff water from entering the excavation and eroding the slope faces. The soils exposed in the cut slopes should be inspected during excavation by our personnel so that modifications of the slopes can be made if variations in the soil conditions occur. All excavations should be stabilized within 30 days of initial excavation.

## 8.12 Surcharge from Adjacent Structures and Improvements

8.12.1 Additional pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures and should be designed for each condition as the project progresses.

8.12.2 It is recommended that line-load surcharges from adjacent wall footings, use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.20 \times \left(\frac{z}{H}\right)}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.28 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

where *x* is the distance from the face of the excavation or wall to the vertical line-load, *H* is the distance from the bottom of the footing to the bottom of excavation or wall, *z* is the depth at which the horizontal pressure is desired, $Q_L$ is the vertical line-load and $\sigma_H(z)$ is the horizontal pressure at depth *z*.

8.12.3 It is recommended that vertical point-loads, from construction equipment outriggers or adjacent building columns use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.28 \times \left(\frac{z}{H}\right)^2}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.77 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)^2}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

then

$$\sigma'_H(z) = \sigma_H(z) cos^2(1.1\theta)$$

where *x* is the distance from the face of the excavation/wall to the vertical point-load, *H* is distance from the outrigger/bottom of column footing to the bottom of excavation, *z* is the depth at which the horizontal pressure is desired, *Qp* is the vertical point-load, $\sigma_H(z)$ is the horizontal pressure at depth *z*, *Θ* is the angle between a line perpendicular to the excavation/wall and a line from the point-load to location on the excavation/wall where the surcharge is being evaluated, and $\sigma_H(z)$ is the horizontal pressure at depth *z*.

## 8.13 Surface Drainage

8.13.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage should be maintained at all times.

8.13.2 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2022 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within 5 feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within 5 feet of the building perimeter footings except when enclosed in protected planters.

8.13.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures.

8.13.4 Landscaping planters immediately adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Either a subdrain, which collects excess irrigation water and transmits it to drainage structures, or impervious above-grade planter boxes should be used. In addition, where landscaping is planned adjacent to the pavement, it is recommended that consideration be given to providing a cutoff wall along the edge of the pavement that extends at least 12 inches below the base material.

## 8.14 Plan Review

8.14.1 Grading, foundation, and shoring plans should be reviewed by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations.

# LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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5. California Geological Survey, 2021a, CGS Information Warehouse, Regulatory Map Portal, http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps.

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12. Leighton and Associates, Inc., 1990, *Technical Appendix to the Safety Element of the Los Angeles County General Plan, Hazard Reduction in Los Angeles County*.

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14. State Water Resources Control Board, 2021, GeoTracker website, https://geotracker.waterboards.ca.gov/.

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16. U.S. Geological Survey and California Geological Survey, 2006, *Quaternary Fault and Fold Database for the United States,* accessed March 4, 2021 from USGS web site: http//earthquake.usgs.gov/hazards/qfaults/.

17. Yerkes, R. F., McCulloch, T. H., Schoellhamer, J. E., and Vedder, J. G., 1965, *Geology of the Los Angeles Basin–An Introduction*, U.S. Geological Survey Professional Paper 420-A .

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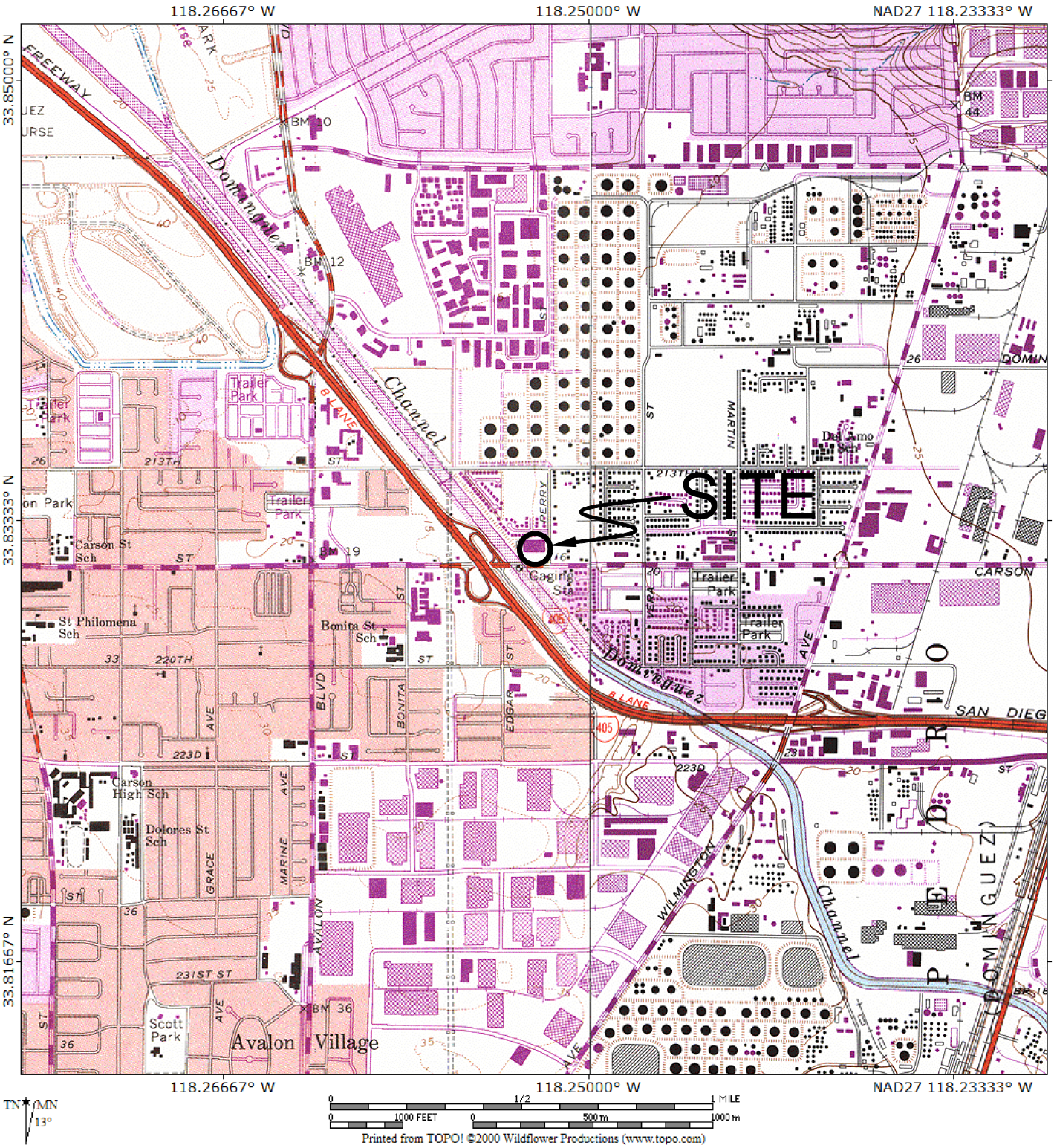



U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, TORRANCE, CA QUADRANGLE

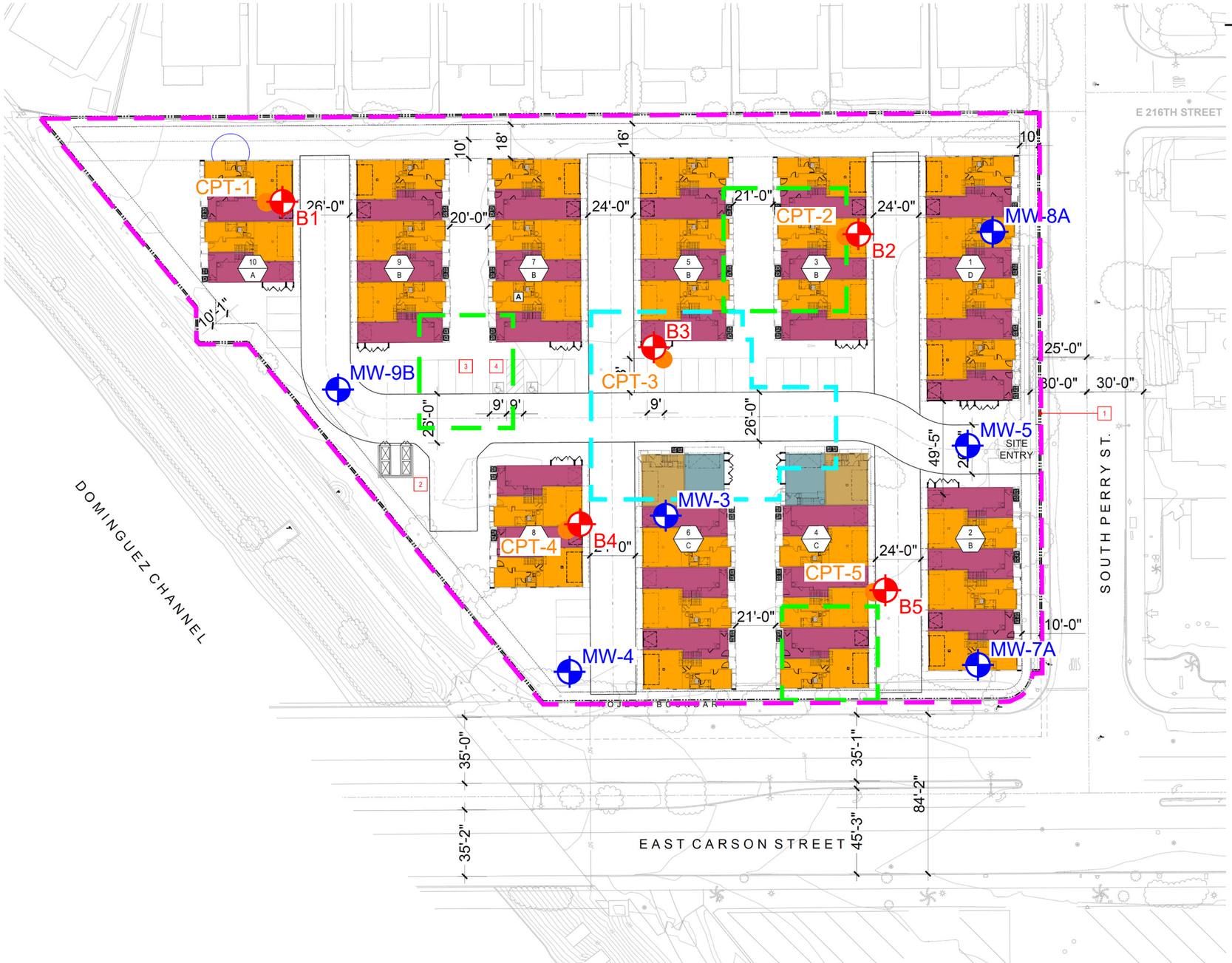
GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
500 N. VICTORY BOULEVARD, BURBANK, CA 91502
PHONE (818) 841-8388 - FAX (818) 841-1704

# VICINITY MAP

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

| DRAFTED BY: CB | CHECKED BY: SFK | AUG. 2024 | PROJECT NO. W1301-06-01 | FIG. 1 |
|---|---|---|---|---|




# LEGEND

- B5 — Approximate Location of Boring
- CPT-5 — Approximate Location of CPT
- MW-9B — Approximate Location of Monitoring Well
- Property Limits
- Approx. Extent of URS Removal and Recompaction (5 FT BGS)
- Approx. Extent of URS Removal and Recompaction (8 FT BGS)

North

0 60' 120'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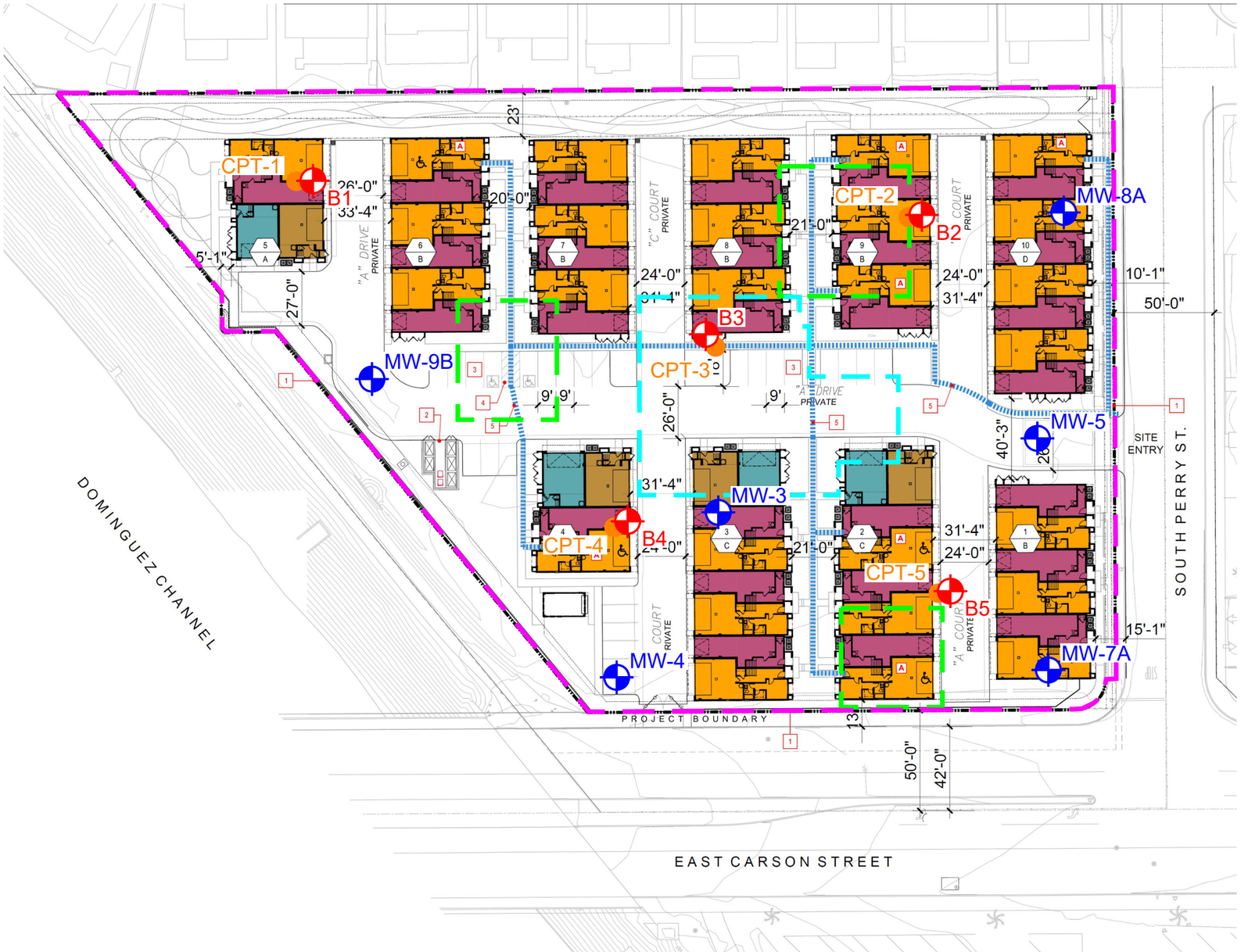
| DRAFTED BY: ACS | CHECKED BY: JTA |
|---|---|

## SITE PLAN

21611 S PERRY STREET
CARSON, CALIFORNIA

| AUG. 2024 | PROJECT NO. W1301-06-01 | FIG. 2 |
|---|---|---|




## LEGEND

- B5 — Approximate Location of Boring
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- Approx. Extent of URS Removal and Recompaction (8 FT BGS)

North

0 60' 120'

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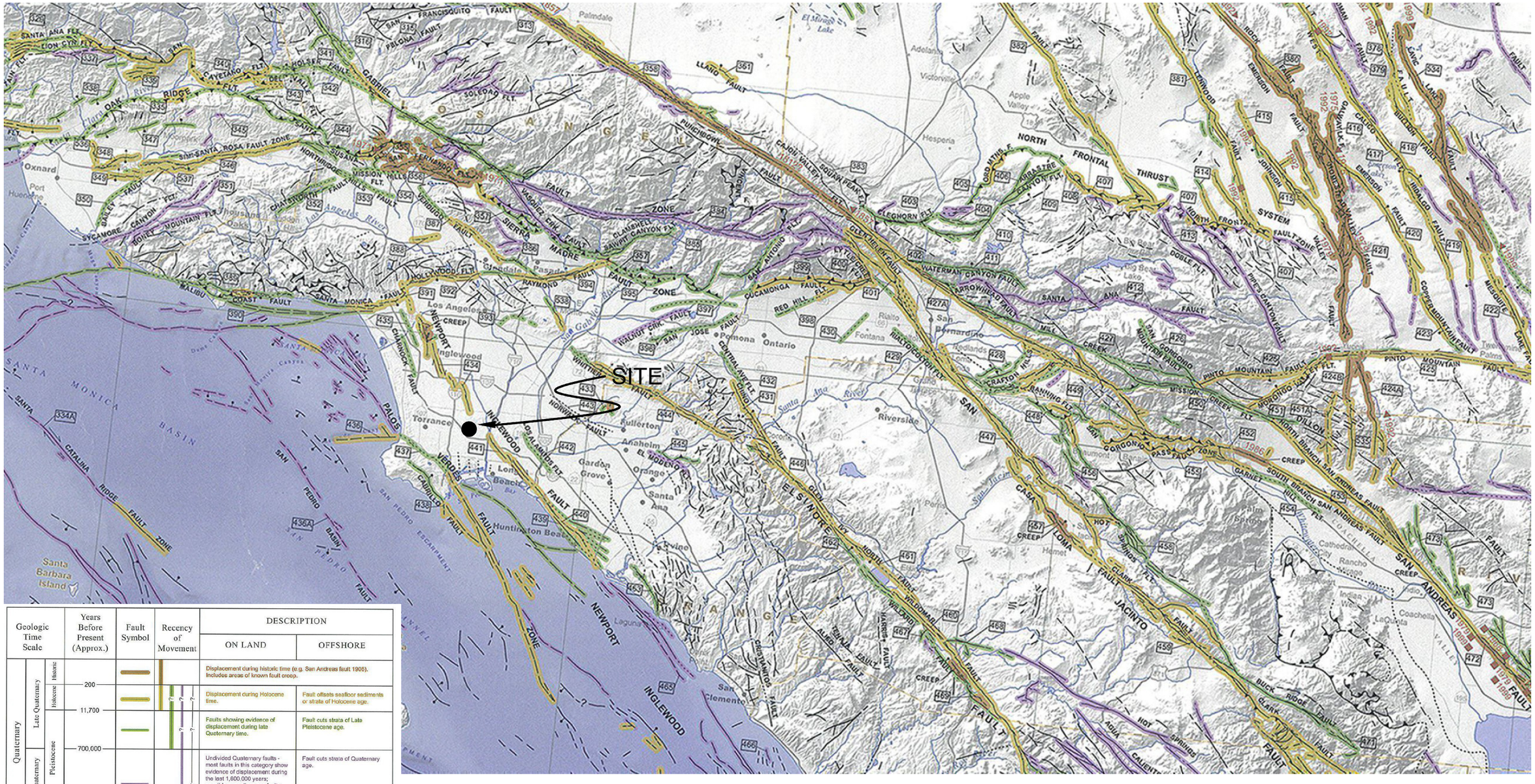
DRAFTED BY: ACS | CHECKED BY: JTA

# SITE PLAN

21611 S PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 | PROJECT NO. W1301-06-01 | FIG. 2

Reference: Jennings, C.W. and Bryant, W. A., 2010, Fault Activity Map of California, California Geological Survey Geologic Data Map No. 6.




| Geologic Time Scale | | | Years Before Present (Approx.) | Fault Symbol | Recency of Movement | DESCRIPTION: ON LAND | DESCRIPTION: OFFSHORE |
|---|---|---|---|---|---|---|---|
| Quaternary | Late Quaternary | Historic | | | | Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep. | |
| | | Holocene | 200 | | | Displacement during Holocene time. | Fault offsets seafloor sediments or strata of Holocene age. |
| | | | 11,700 | | | Faults showing evidence of displacement during late Quaternary time. | Fault cuts strata of Late Pleistocene age. |
| | Early Quaternary | Pleistocene | 700,000 | | | Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. | Fault cuts strata of Quaternary age. |
| Pre-Quaternary | | | 1,600,000* | | | Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive. | Fault cuts strata of Pliocene or older age. |
| | | | 4.5 billion (Age of Earth) | | | | |

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.8 Ma criterion.

N

0 12 24 Miles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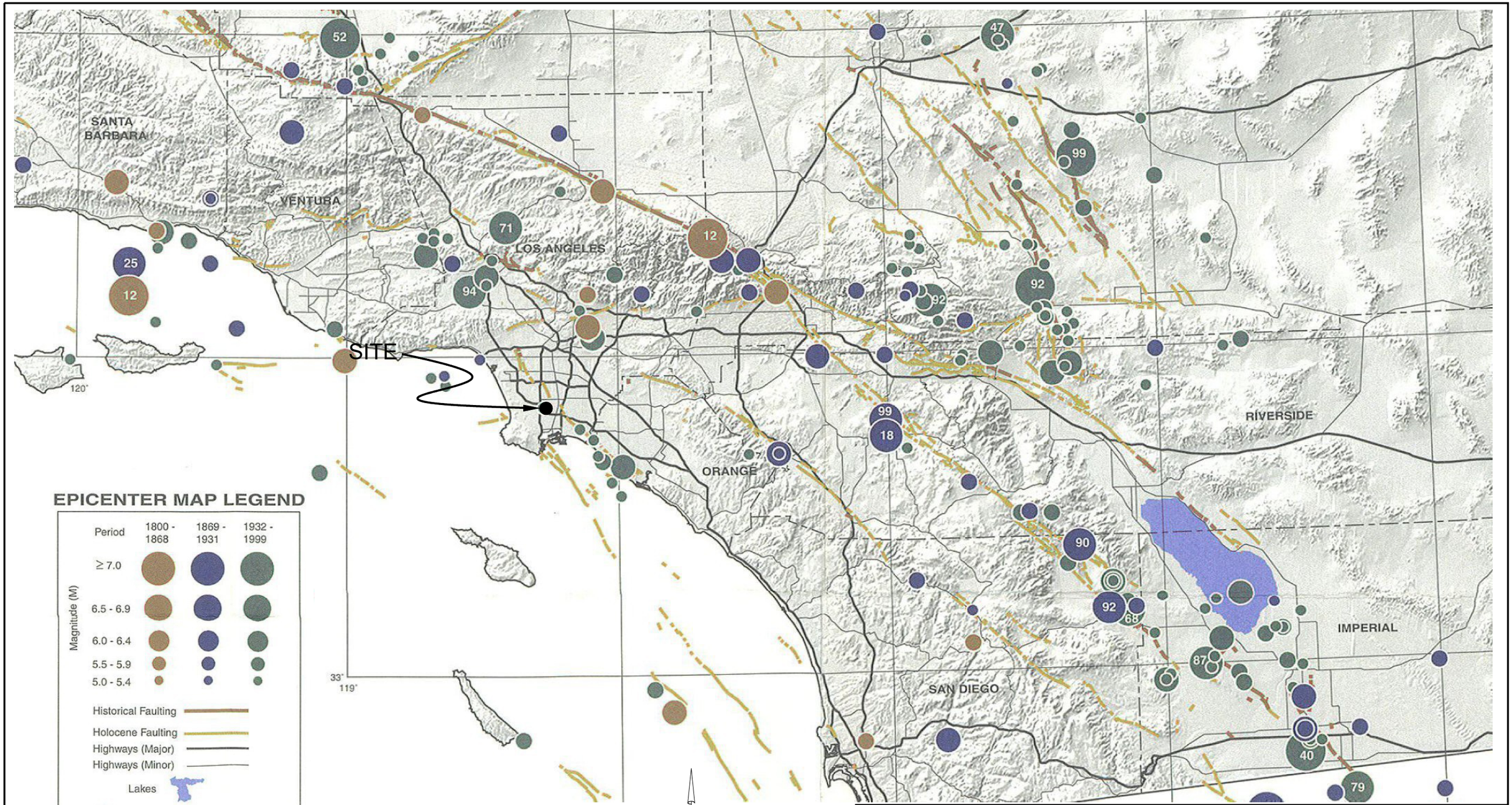
# REGIONAL FAULT MAP

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 | PROJECT NO. W1301-06-01 | FIG. 3




## 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

Reference: Toppozada, T., Branum, D., Petersen, M., Hallstrom, C., Cramer, C., and Reichle, M., 2000, Epicenters and Areas Damaged by M≥5 California Earthquakes, 1800 - 1999, California Geological Survey, Map Sheet 49.

0 20 40 Miles

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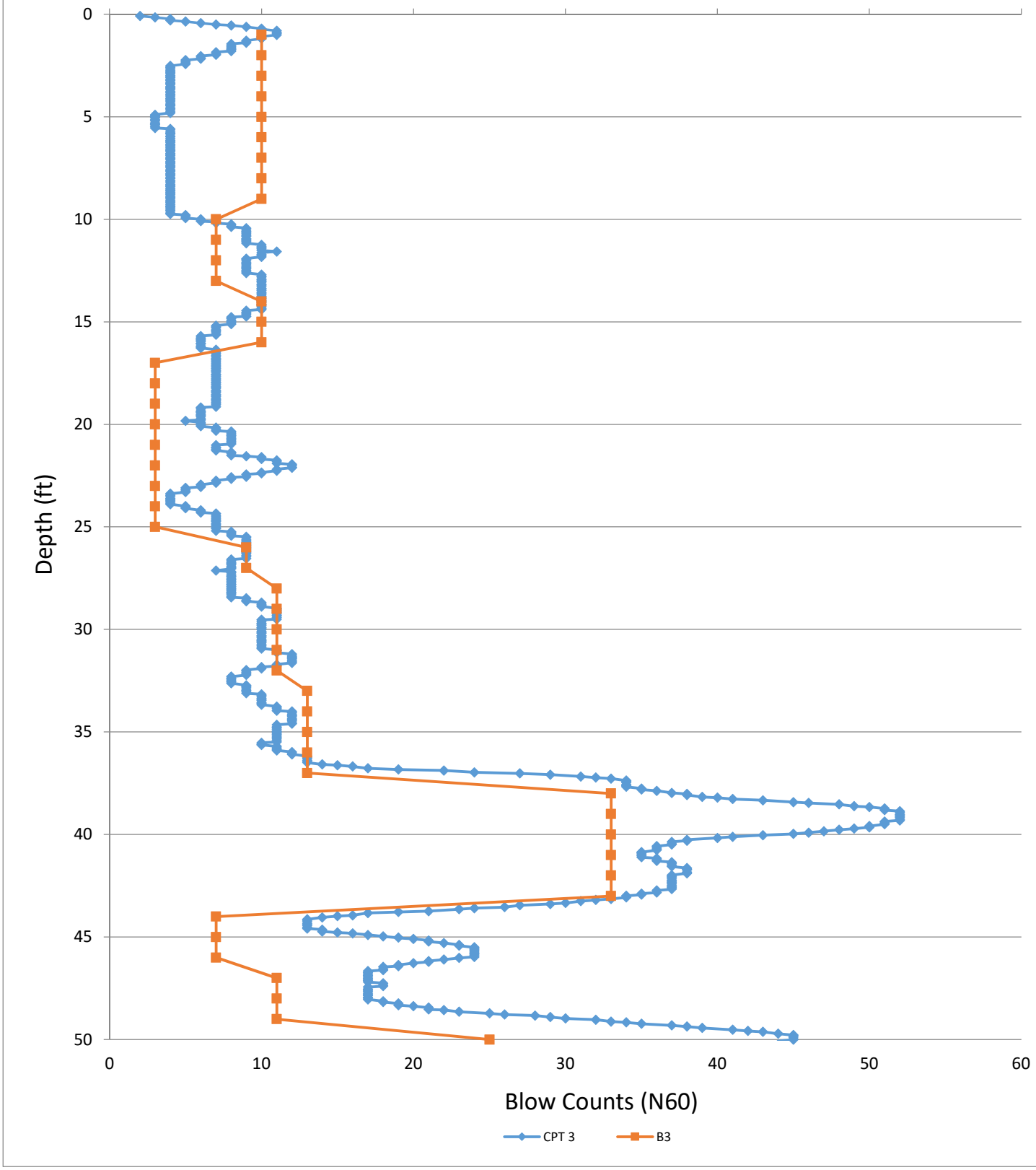
# REGIONAL SEISMICITY MAP

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 | PROJECT NO. W1301-06-01 | FIG.4

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CORRELATION OF BORING & CPT N60

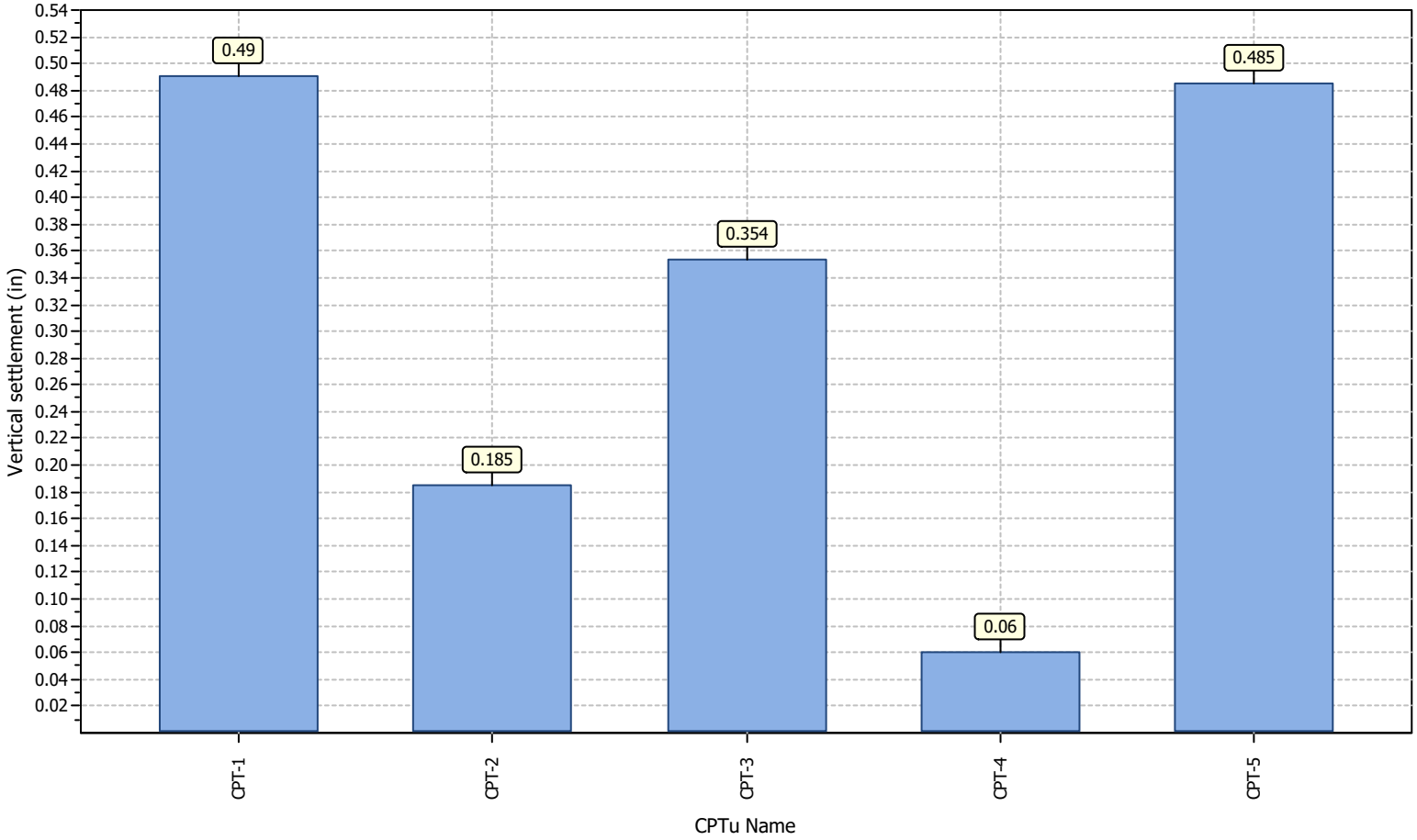
21611 SOUTH PERRY STREET
CARSON, CA

| DRAFTED BY: ACS | CHECKED BY: JTA | AUG. 2024 | PROJECT NO. W1301-06-01 | FIG.5 |
|---|---|---|---|---|

**Project title : Geocon West / 21611 Perry Street**

**Location : Carson, CA**

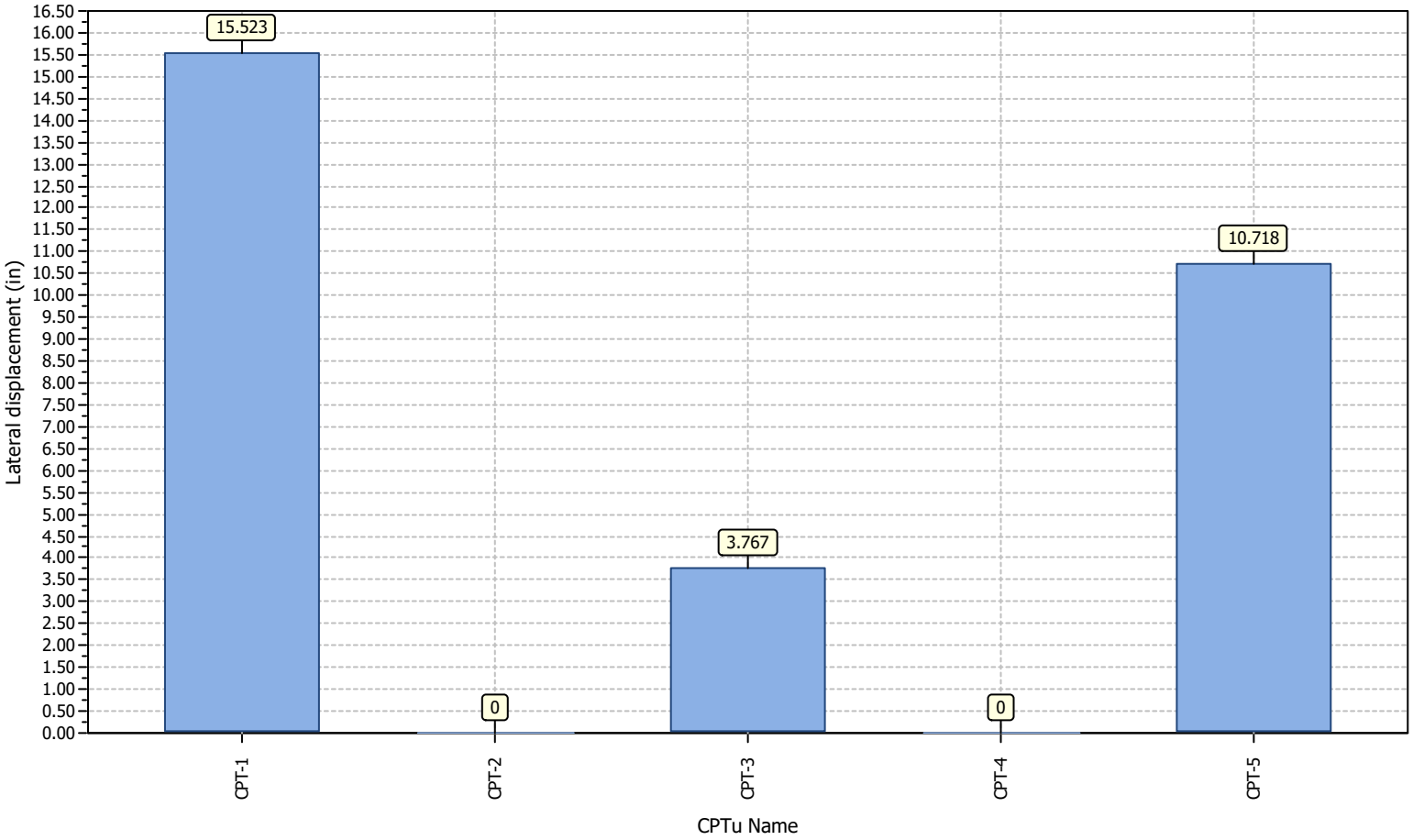
## Overall vertical settlements report



**Project title : Geocon West / 21611 Perry Street**

**Location : Carson, CA**

## Overall lateral displacements report



# APPENDIX A

# APPENDIX A
# FIELD INVESTIGATION

The site was explored on February 9, 2021, by drilling five 8-inch diameter borings using a truck-mounted hollow-stem auger drilling machine and advancing five cone penetrometer tests (CPTs). The borings were excavated to depths between approximately 20½ and 51 feet beneath the existing ground surface. The CPTs were advanced to depths of approximately 60 feet below existing ground surface. Representative and relatively undisturbed samples were obtained by driving a 4 inch, O. D., California Modified Sampler into the "undisturbed" soil mass with blows from a 140 pound hammer falling 30 inches. Bulk samples were also obtained. Standard Penetration Tests were performed in boring B3.

The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). Logs of the borings are presented on Figures A1 through A5. The CPT data is presented as Figures A6 through A10. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the boring logs were revised based on subsequent laboratory testing. The approximate locations of the borings and CPTs are depicted on the Site Plan (see Figure 2)

PROJECT NO. W1301-06-01

## BORING 1

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | BULK 0-5' | | | | **ARTIFICIAL FILL**<br>Silty Sand, poorly graded, dense, moist, light brown, fine-grained, some medium-grained, some gravel. | | | |
| 2 | | | | | | | | |
| 4 | | | | | | | | |
| 6 | B1@5' | | | CH | **ALLUVIUM**<br>Clay, firm, moist, dark gray, high plasticity. | 19 | 105.0 | 24.0 |
| 8 | B1@7.5' | | | | - some sand | 13 | 106.1 | 19.7 |
| 10 | B1@10' | | | | - olive brown mottles | 21 | 103.7 | 22.0 |
| 12 | | | ▼ | | | | | |
| 14 | | | | | Clayey Sand, poorly graded, loose, saturated, brown, fine-grained. | | | |
| 16 | B1@15' | | | SC | | 10 | 111.6 | 19.8 |
| 18 | | | | | Silty Sand, poorly graded, medium dense, saturated, brown, fine-grained. | | | |
| 20 | B1@20' | | | SM | | 22 | 114.5 | 19.2 |

Total depth of boring: 20.5 feet
Fill to 4.5 feet.
Groundwater encountered at 12.5 feet.
Backfilled with grout.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

W1301-06-01 BORING LOGS.GPJ

**Figure A1,**
**Log of Boring 1, Page 1 of 1**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◥ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1301-06-01

## BORING 2

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | BULK 0-5' | | | | **ARTIFICIAL FILL**<br>Silty Sand, poorly graded, loose, moist, brown, fine-grained. | | | |
| 2 | | | | | | | | |
| 4 | B2@3' | | | ML | **ALLUVIUM**<br>Sandy Silt, firm, moist, dark gray. | 14 | 73.4 | 29.6 |
| 6 | B2@6' | | | | Clay, soft, wet, gray, high plasticity. | 10 | 29.3 | 32.0 |
| 8 | | | | | | | | |
| 10 | B2@9' | | | CH | - firm, dark gray | 15 | 73.9 | 49.8 |
| 12 | B2@12' | | | | | 15 | 87.2 | 35.9 |
| 14 | | | | | | | | |
| 16 | B2@15' | | | | - soft | 8 | 75.1 | 45.2 |
| 18 | | | | | | | | |
| 20 | B2@20' | | | | - firm | 17 | 101.7 | 27.4 |

Total depth of boring: 20.5 feet
Fill to 3 feet.
No groundwater encountered.
Backfilled with grout.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

W1301-06-01 BORING LOGS.GPJ

**Figure A2,**
**Log of Boring 2, Page 1 of 1**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1301-06-01

## BORING 3

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | BULK 0-5' | | | | **ARTIFICIAL FILL** Sand, poorly graded, dense, moist, light brown, fine-grained, some medium-grained. | | | |
| 2 | B3@1.5' | | | | | 50 (6") | 107.1 | 4.0 |
| 4 | | | | | | | | |
| 6 | B3@5' | | | | | 50 (6") | | |
| 8 | B3@7' | | | | - grayish brown, some fine gravel | 50 (3") | 103.4 | 8.7 |
| 10 | B3@10' | | | MH | **ALLUVIUM** Silt, soft, moist, dark gray, high plasticity, some sand. | 7 | | |
| 12 | B3@12.5' | | | CH | Clay, firm, moist, dark gray, high plasticity. | 21 | 91.7 | 31.6 |
| 14 | | | | | | | | |
| 16 | B3@15' | | | | | 10 | | |
| 18 | B3@17.5' | | ▼ | | Clay, firm, moist, dark gray. | 14 | 103.7 | 26.1 |
| 20 | B3@20' | | | CL | - soft, wet | 3 | | |
| 22 | B3@22.5' | | | | - firm, light brown | 11 | 105.7 | 27.3 |
| 24 | | | | | | | | |
| 26 | B3@25' | | | CH | Clay, firm, moist, olive brown, some sand, trace gravel, high plasticity. | 9 | | |
| 28 | B3@27.5' | | | | - mottled calcium deposits, increase in sand | 21 | 89.9 | 32.6 |

W1301-06-01 BORING LOGS.GPJ

**Figure A3,**
**Log of Boring 3, Page 1 of 2**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1301-06-01

## BORING 3

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 30 | B3@30' | | | | - decrease in sand | 11 | | |
| 32 | B3@32.5' | | | CH | - stiff | 22 | 98.4 | 27.3 |
| 34 | B3@35' | | | | - firm, increase in sand | 13 | | |
| 36 | | | | | | | | |
| 38 | B3@37.5' | | | | Silty Sand, poorly graded, dense, wet, olive brown, fine-grained. | 67 | 117.6 | 16.4 |
| 40 | B3@40' | | | SM | | 33 | | |
| 42 | B3@42.5' | | | | - medium dense, trace shells | 36 | 101.9 | 25.0 |
| 44 | | | | CL | Sandy Clay, soft, wet, olive brown. | | | |
| 46 | B3@45' | | | | | 7 | | |
| 48 | B3@47.5' | | | SC | Clayey Sand, poorly graded, medium dense, saturated, olive brown with oxidation mottles, fine-grained. | 20 | 100.0 | 25.4 |
| 50 | B3@50' | | | SM | Silty Sand, poorly graded, medium dense, saturated, olive brown. | 25 | | |
| | | | | | Total depth of boring: 51 feet<br>Fill to 9 feet.<br>Groundwater encountered at 17.6 feet.<br>Backfilled with grout.<br><br>*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.<br>NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual. | | | |

W1301-06-01 BORING LOGS.GPJ

**Figure A3,**
**Log of Boring 3, Page 2 of 2**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. W1301-06-01

## BORING 4

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | BULK 0-5' | | | | **ARTIFICIAL FILL**<br>Silty Sand, poorly graded, dense, moist, brown, fine-grained, some medium-grained, some gravel. | | | |
| 2 | | | | | | | | |
| 4 | B4@3' | | | | | 50 (6") | | |
| 6 | B4@5' | | | ML | **ALLUVIUM**<br>Sandy Silt, soft, moist, dark gray. | 10 | 78.1 | 31.1 |
| 8 | B4@7.5' | | | | Clay, soft, wet, dark gray, high plasticity. | 10 | 80.7 | 38.9 |
| 10 | B4@10' | | | | | 8 | 77.8 | 42.4 |
| 12 | | | | CH | | | | |
| 14 | | | | | | | | |
| 16 | B4@15' | | | | | 10 | 85.0 | 38.5 |
| 18 | | | | | | | | |
| 20 | B4@20' | | | | | 4 | 80.0 | 42.3 |

Total depth of boring: 20.5 feet
Fill to 5 feet.
No groundwater encountered.
Backfilled with grout.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

W1301-06-01 BORING LOGS.GPJ

**Figure A4,**
**Log of Boring 4, Page 1 of 1**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◥ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1301-06-01

## BORING 5

ELEV. (MSL.) -- DATE COMPLETED **2/9/2021**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JMH**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT*) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | **ARTIFICIAL FILL**<br>Silty Sand, poorly graded, loose, moist, brown, fine-grained, some medium-grained. | | | |
| 2 | | | | | | | | |
| 4 | | | | | | | | |
| 6 | B5@5' | | | | **ALLUVIUM**<br>Clay, soft, moist, dark gray, high plasticity. | 11 | 79.5 | 42.3 |
| 8 | B5@7.5' | | | | - wet | 10 | 82.2 | 38.4 |
| 10 | B5@10' | | | CH | | 7 | 74.1 | 37.5 |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | B5@15' | | | | - saturated | 11 | 97.9 | 47.5 |
| 18 | | | | | | | | |
| 20 | B5@20' | | | | - firm, no recovery | 17 | | |

Total depth of boring: 20.5 feet
Fill to 5 feet.
No groundwater encountered.
Backfilled with grout.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approx

W1301-06-01 BORING LOGS.GPJ

**Figure A5,**
**Log of Boring 5, Page 1 of 1**

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

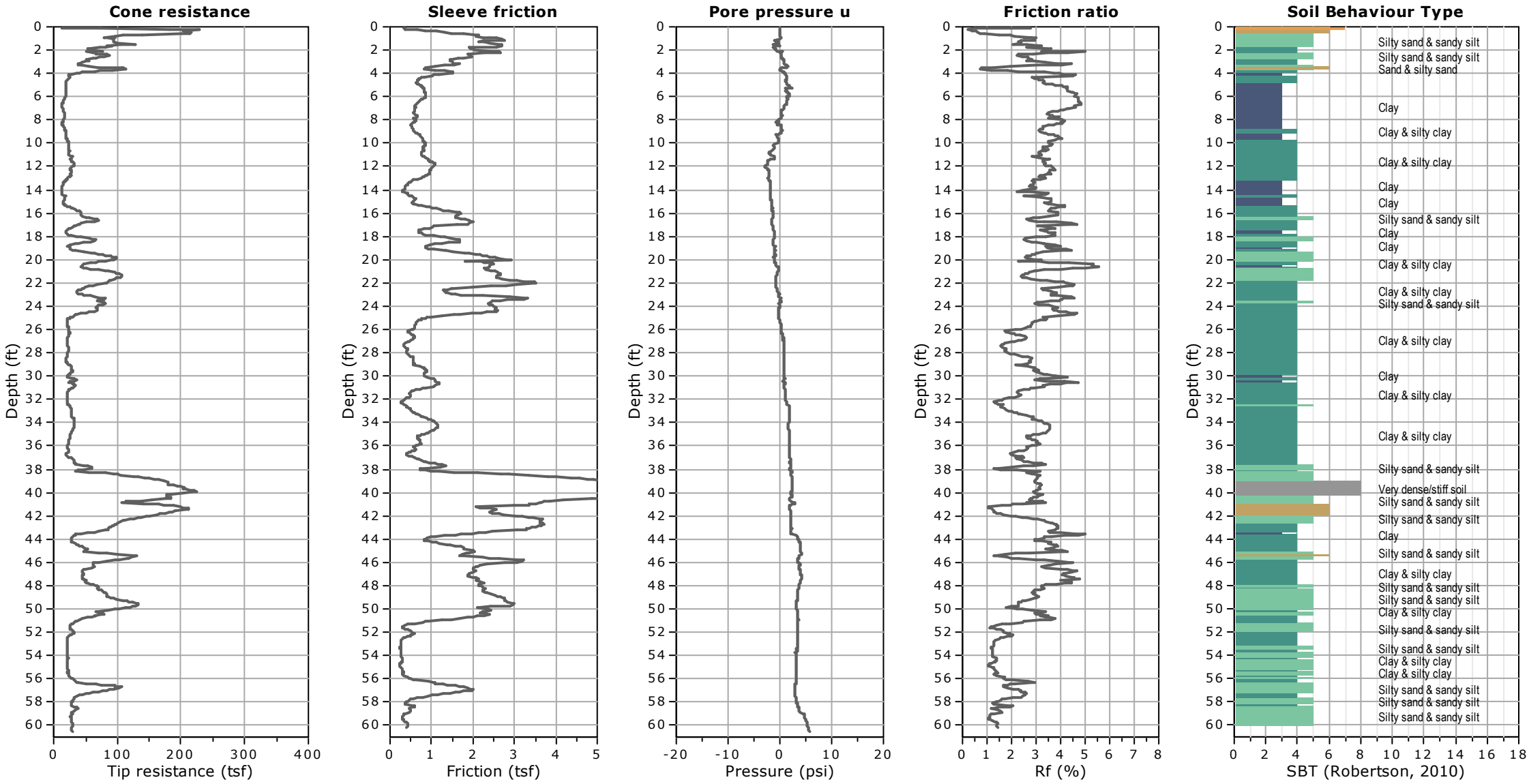
NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

**Kehoe Testing and Engineering**
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

**Project:** **Geocon West / 21611 Perry Street**
**Location:** **Carson, CA**

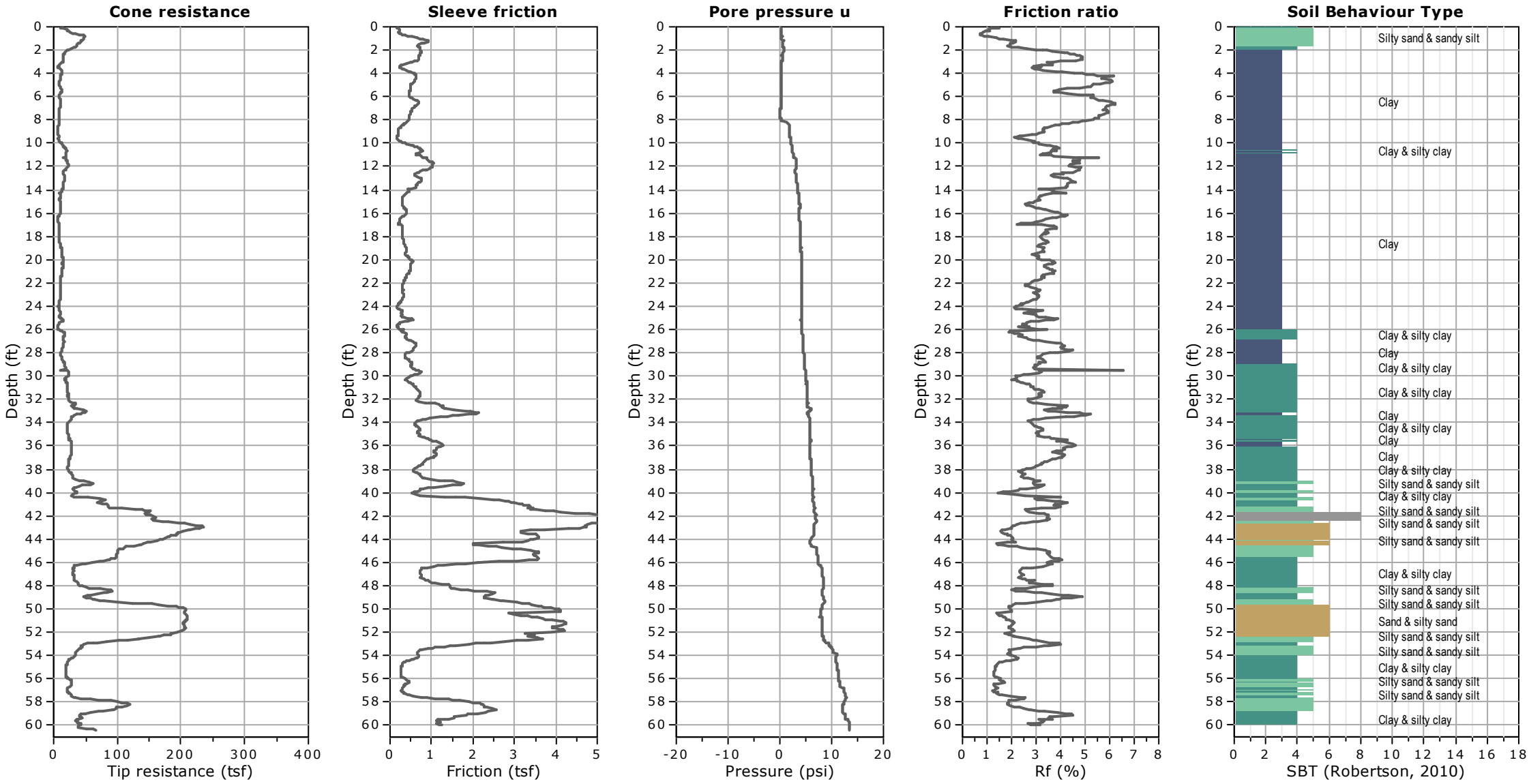
**CPT-1**
Total depth: 60.51 ft, Date: 2/9/2021



**Kehoe Testing and Engineering**
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

**Project:** Geocon West / 21611 Perry Street
**Location:** Carson, CA

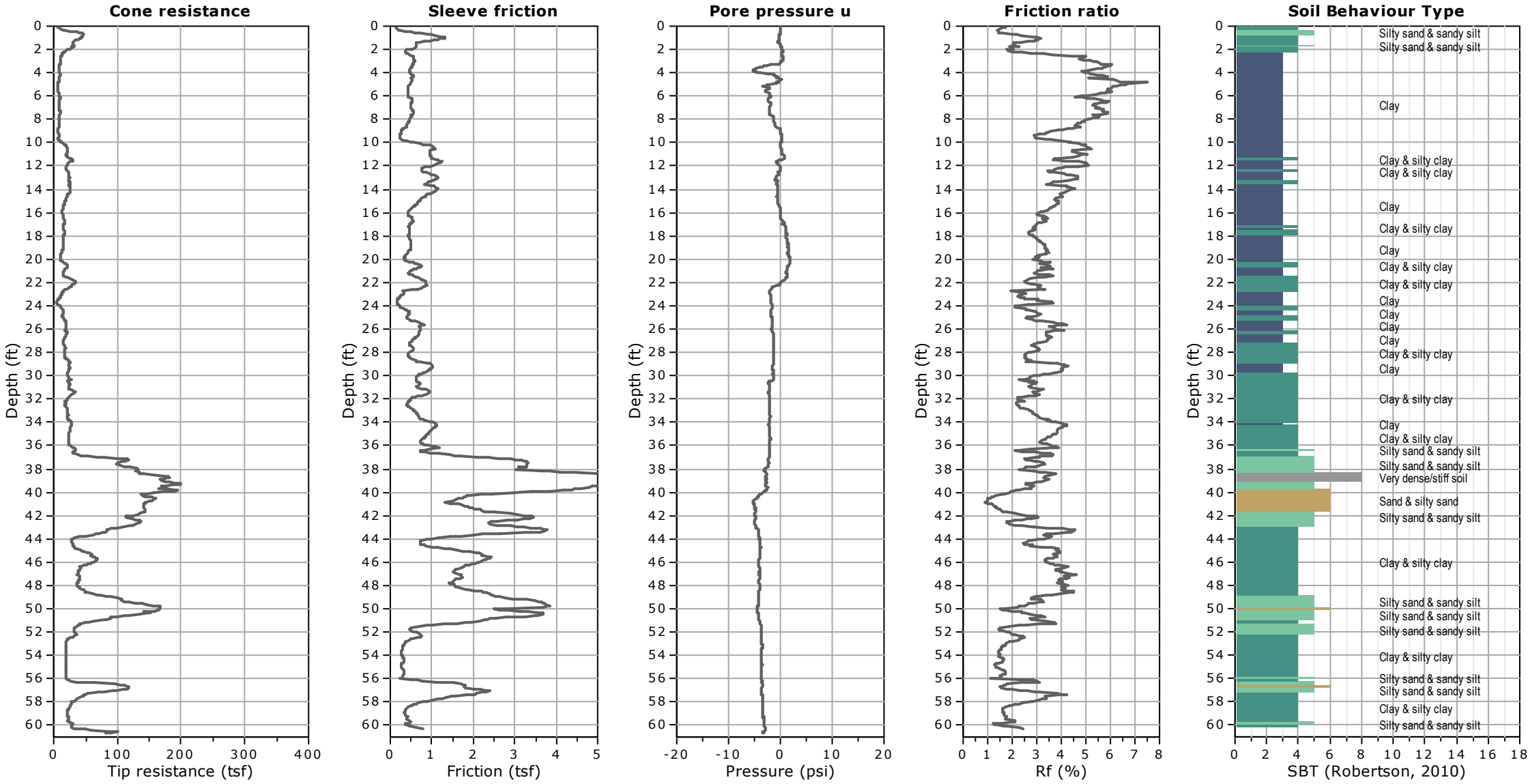
**CPT-2**
Total depth: 60.38 ft, Date: 2/9/2021



**Kehoe Testing and Engineering**
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

**Project:** Geocon West / 21611 Perry Street
**Location:** Carson, CA

**CPT-3**
Total depth: 60.63 ft, Date: 2/9/2021



**Kehoe Testing and Engineering**
714-901-7270
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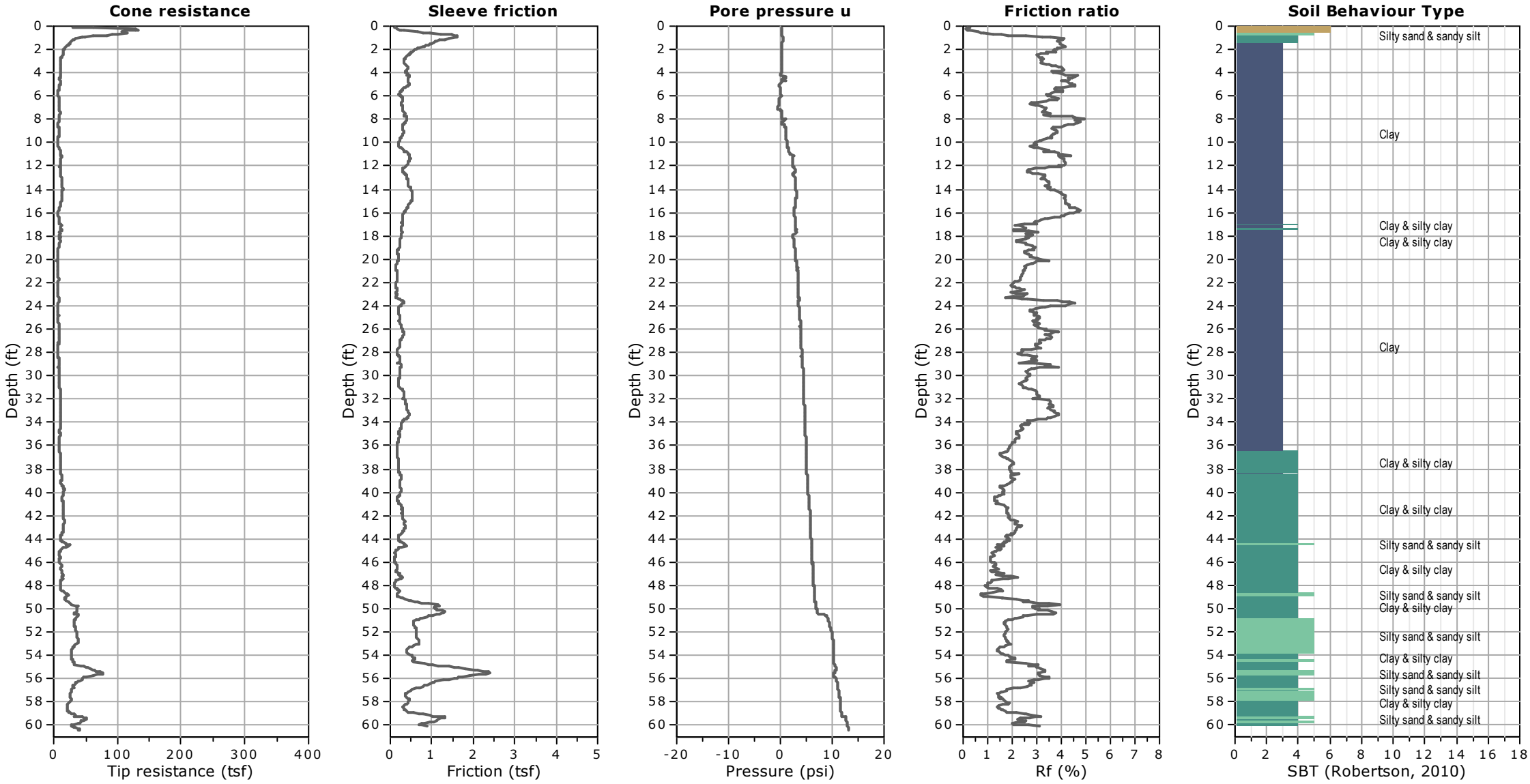
www.kehoetesting.com

**Project:** Geocon West / 21611 Perry Street
**Location:** Carson, CA

**CPT-4**
Total depth: 60.47 ft, Date: 2/9/2021



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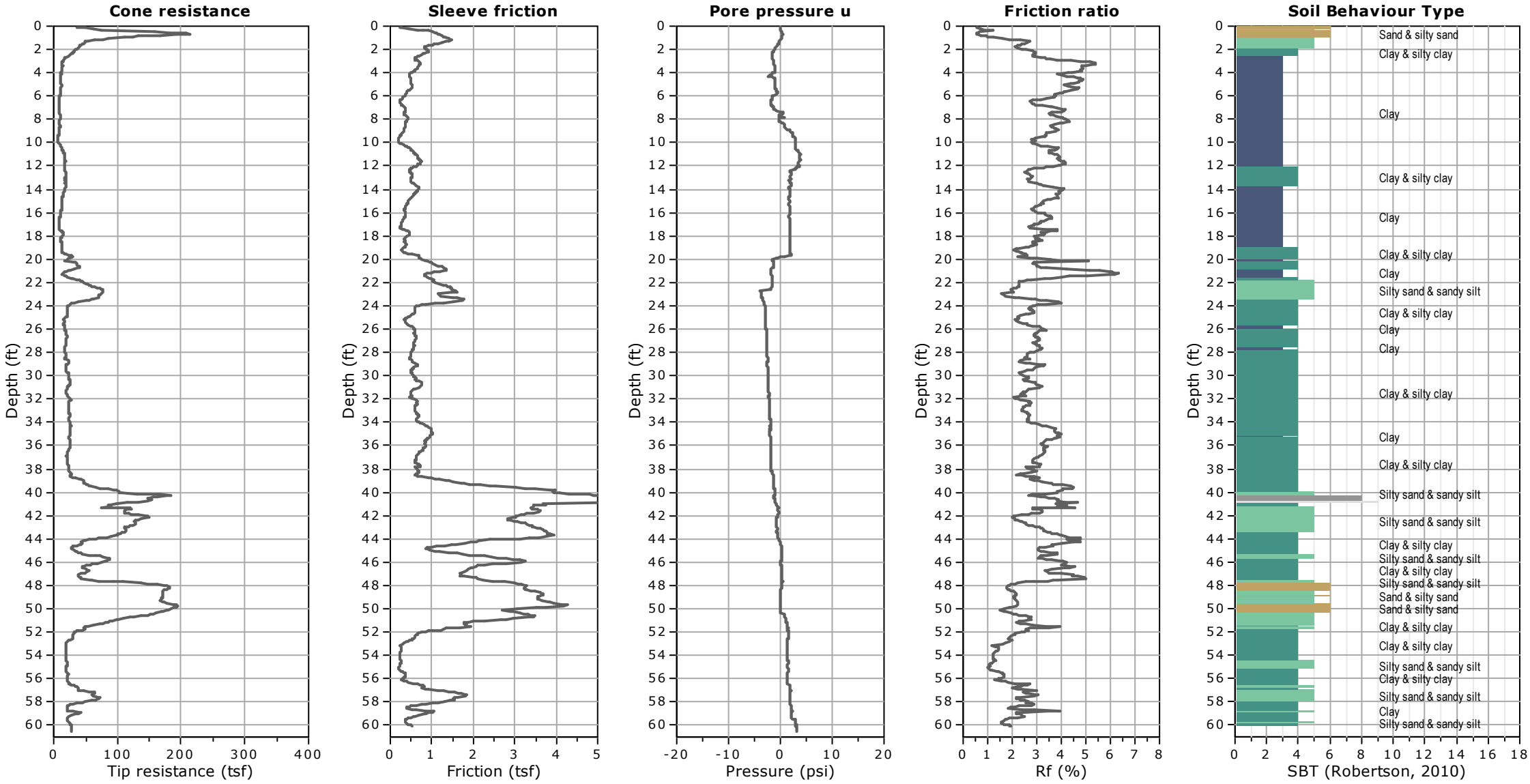
www.kehoetesting.com

**Project:** Geocon West / 21611 Perry Street
**Location:** Carson, CA

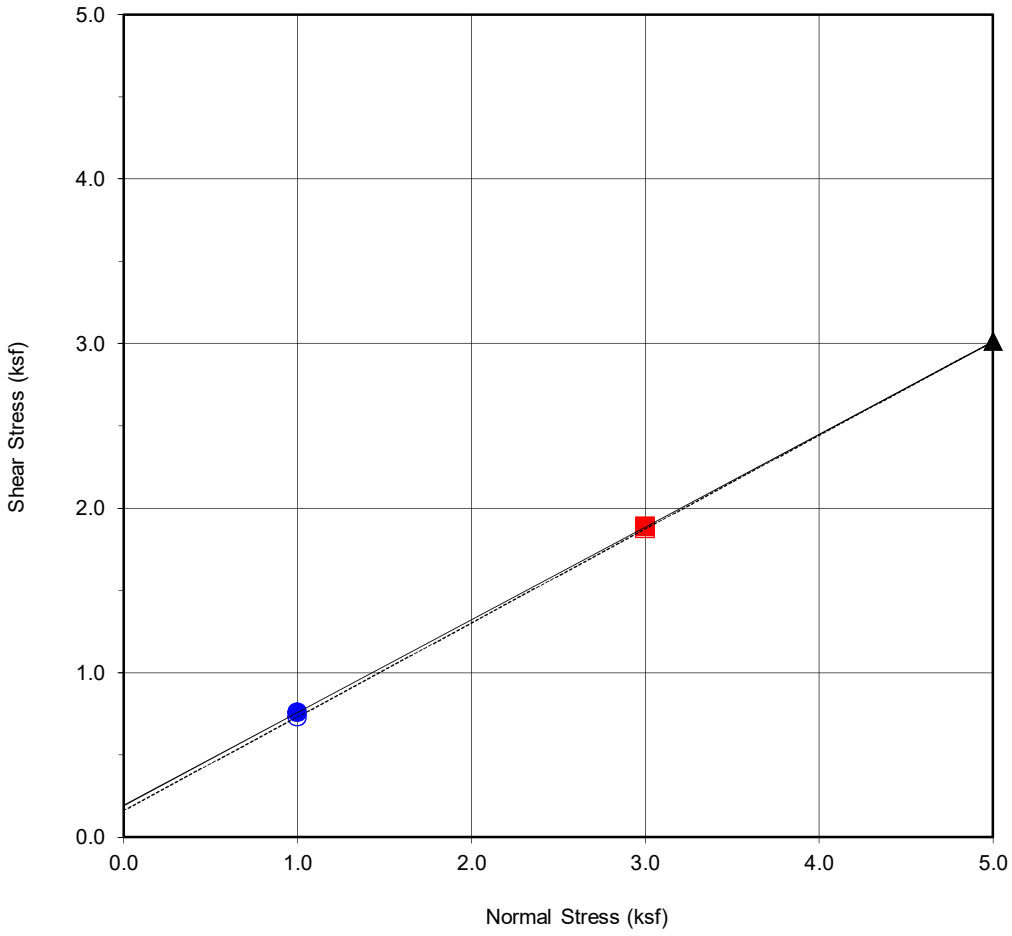
**CPT-5**
Total depth: 60.51 ft, Date: 2/9/2021



# APPENDIX B

# APPENDIX B
# LABORATORY TESTING

Laboratory tests were performed in accordance with “American Society for Testing and Materials (ASTM)”, or other suggested procedures Selected samples were tested for direct shear strength, consolidation and expansion characteristics, Atterberg limits, grain size analysis, maximum dry density and optimum moisture content relationship, in-situ dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B23. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.




| | |
|---|---|
| **Boring No.** | **B1 + B2** |
| **Sample No.** | **B1B2@0-5'** |
| **Depth (ft)** | **0-5'** |
| Sample Type: | Ring |

| Soil Identification: | | |
|---|---|---|
| Brown Silty Sand (SM) | | |
| **Strength Parameters** | | |
| | C (psf) | $\phi$ ($^{o}$) |
| Peak | 192 | 29.4 |
| Ultimate | 162 | 29.7 |

| Normal Strest (kip/ft2) | 1 | 3 | 5 |
|---|---|---|---|
| Peak Shear Stress (kip/ft²) | ● 0.76 | ■ 1.88 | ▲ 3.01 |
| Shear Stress @ End of Test (ksf) | ○ 0.73 | □ 1.87 | △ 3.01 |
| Deformation Rate (in./min.) | 0.05 | 0.05 | 0.05 |
| | | | |
| Initial Sample Height (in.) | 1.0 | 1.0 | 1.0 |
| Ring Inside Diameter (in.) | 2.375 | 2.375 | 2.375 |
| Initial Moisture Content (%) | 13.6 | 14.5 | 14.1 |
| Initial Dry Density (pcf) | 101.0 | 101.0 | 101.0 |
| Initial Degree of Saturation (%) | 54.7 | 58.3 | 56.7 |
| Soil Height Before Shearing (in.) | 1.2 | 1.2 | 1.2 |
| Final Moisture Content (%) | 24.4 | 22.1 | 23.4 |

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**DIRECT SHEAR TEST RESULTS**

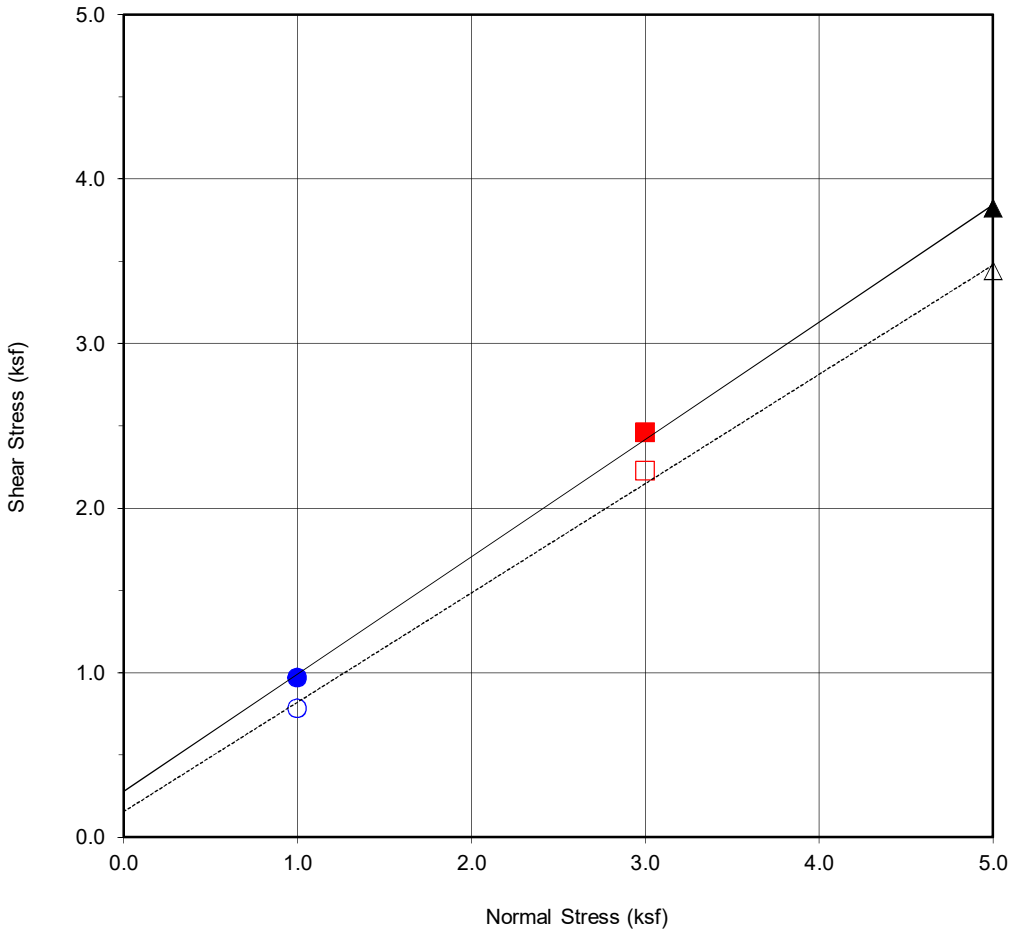
Consolidated Drained ASTM D-3080

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B1




| | |
|---|---|
| **Boring No.** | **B3 + B4** |
| **Sample No.** | **B3B4@0-5'** |
| **Depth (ft)** | **0-5'** |
| Sample Type: | Ring |

| Soil Identification: | | |
|---|---|---|
| Light Brown Silty Sand (SM) | | |
| **Strength Parameters** | | |
| | C (psf) | $\phi$ ($^o$) |
| Peak | 276 | 35.5 |
| Ultimate | 155 | 33.6 |

| Normal Strest (kip/ft2) | 1 | 3 | 5 |
|---|---|---|---|
| Peak Shear Stress (kip/ft²) | ● 0.97 | ■ 2.46 | ▲ 3.82 |
| Shear Stress @ End of Test (ksf) | ○ 0.78 | □ 2.22 | △ 3.44 |
| Deformation Rate (in./min.) | 0.05 | 0.05 | 0.05 |
| | | | |
| Initial Sample Height (in.) | 1.0 | 1.0 | 1.0 |
| Ring Inside Diameter (in.) | 2.375 | 2.375 | 2.375 |
| Initial Moisture Content (%) | 8.2 | 8.0 | 7.6 |
| Initial Dry Density (pcf) | 114.0 | 114.0 | 114.0 |
| Initial Degree of Saturation (%) | 46.3 | 44.9 | 42.7 |
| Soil Height Before Shearing (in.) | 1.2 | 1.2 | 1.2 |
| Final Moisture Content (%) | 14.2 | 14.9 | 14.1 |

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**DIRECT SHEAR TEST RESULTS**

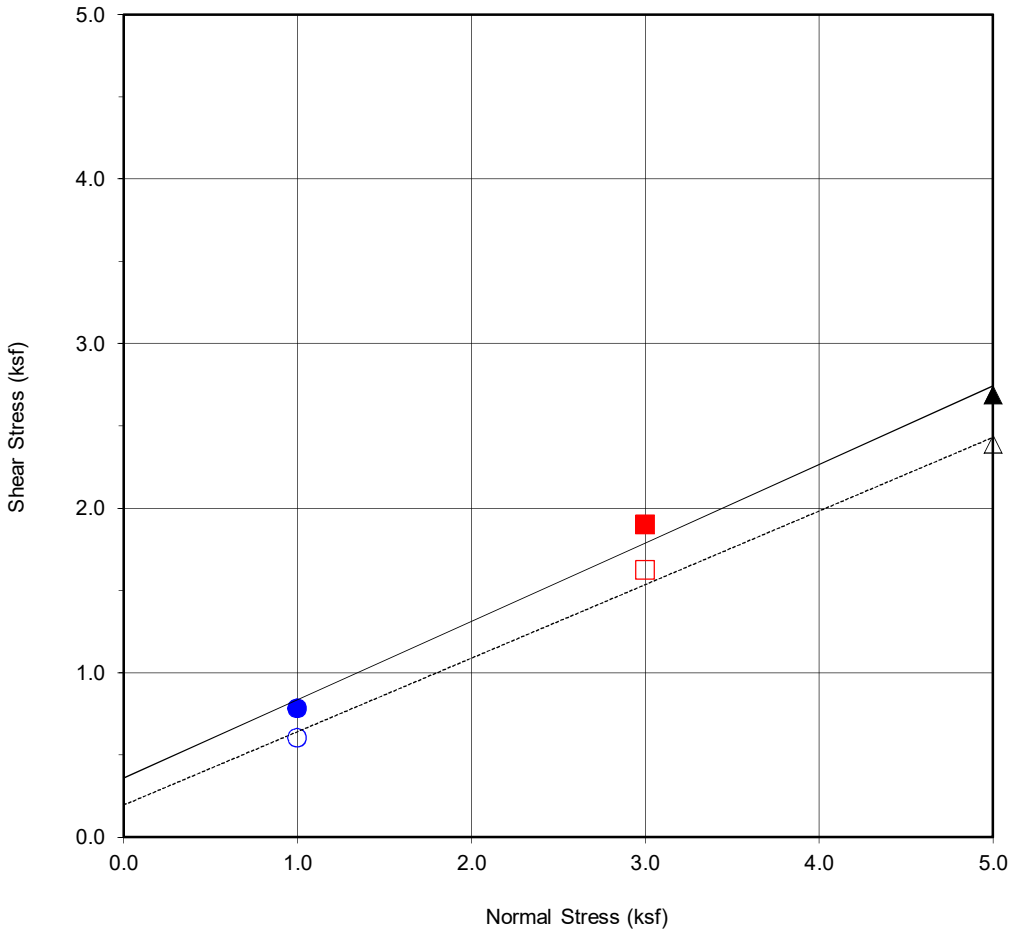
Consolidated Drained ASTM D-3080

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B2




| **Boring No.** | **B2** |
|---|---|
| **Sample No.** | **B2@3'** |
| **Depth (ft)** | **3** |
| Sample Type: | Ring |

| Soil Identification: | | |
|---|---|---|
| Dark Gray Sandy Silt (ML) | | |
| **Strength Parameters** | | |
| | C (psf) | $\phi$ ($^{o}$) |
| Peak | 357 | 25.5 |
| Ultimate | 195 | 24.1 |

| Normal Strest (kip/ft2) | 1 | 3 | 5 |
|---|---|---|---|
| Peak Shear Stress (kip/ft²) | ● 0.78 | ■ 1.90 | ▲ 2.69 |
| Shear Stress @ End of Test (ksf) | ○ 0.60 | □ 1.62 | △ 2.39 |
| Deformation Rate (in./min.) | 0.05 | 0.05 | 0.05 |
| | | | |
| Initial Sample Height (in.) | 1.0 | 1.0 | 1.0 |
| Ring Inside Diameter (in.) | 2.375 | 2.375 | 2.375 |
| Initial Moisture Content (%) | 34.1 | 36.8 | 37.9 |
| Initial Dry Density (pcf) | 80.3 | 83.9 | 82.9 |
| Initial Degree of Saturation (%) | 83.8 | 98.3 | 98.9 |
| Soil Height Before Shearing (in.) | 1.2 | 1.2 | 1.2 |
| Final Moisture Content (%) | 40.3 | 37.8 | 36.6 |

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**DIRECT SHEAR TEST RESULTS**

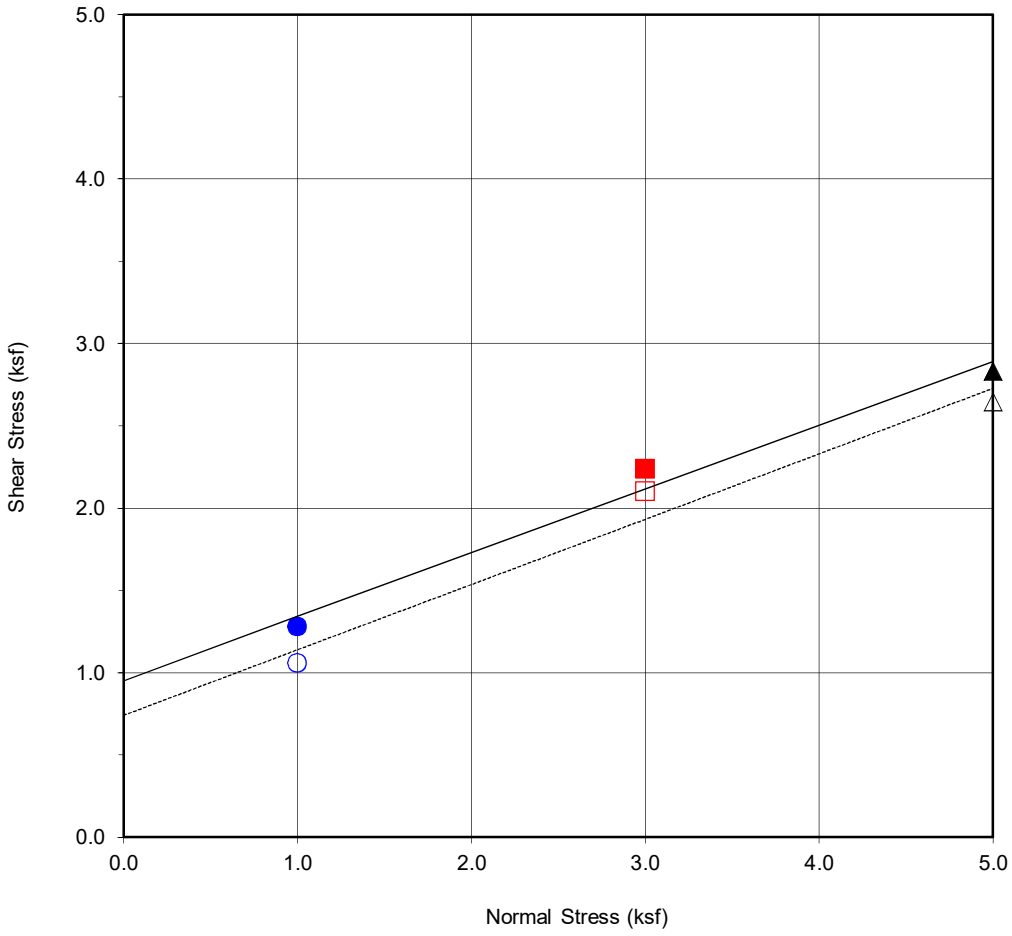
Consolidated Drained ASTM D-3080

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B3




| | |
|---|---|
| **Boring No.** | **B1** |
| **Sample No.** | **B1@5'** |
| **Depth (ft)** | **5** |
| Sample Type: | Ring |

| Soil Identification: | | |
|---|---|---|
| Dark Gray Clay (CH) | | |
| **Strength Parameters** | | |
| | C (psf) | $\phi$ ($^o$) |
| Peak | 951 | 21.2 |
| Ultimate | 740 | 21.7 |

| Normal Strest (kip/ft2) | 1 | 3 | 5 |
|---|---|---|---|
| Peak Shear Stress (kip/ft²) | ● 1.28 | ■ 2.24 | ▲ 2.83 |
| Shear Stress @ End of Test (ksf) | ○ 1.06 | □ 2.10 | △ 2.65 |
| Deformation Rate (in./min.) | 0.05 | 0.05 | 0.05 |
| | | | |
| Initial Sample Height (in.) | 1.0 | 1.0 | 1.0 |
| Ring Inside Diameter (in.) | 2.375 | 2.375 | 2.375 |
| Initial Moisture Content (%) | 22.9 | 22.4 | 22.6 |
| Initial Dry Density (pcf) | 103.1 | 102.5 | 102.3 |
| Initial Degree of Saturation (%) | 97.2 | 93.9 | 94.3 |
| Soil Height Before Shearing (in.) | 1.2 | 1.2 | 1.2 |
| Final Moisture Content (%) | 26.0 | 24.1 | 23.0 |

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**DIRECT SHEAR TEST RESULTS**

Consolidated Drained ASTM D-3080

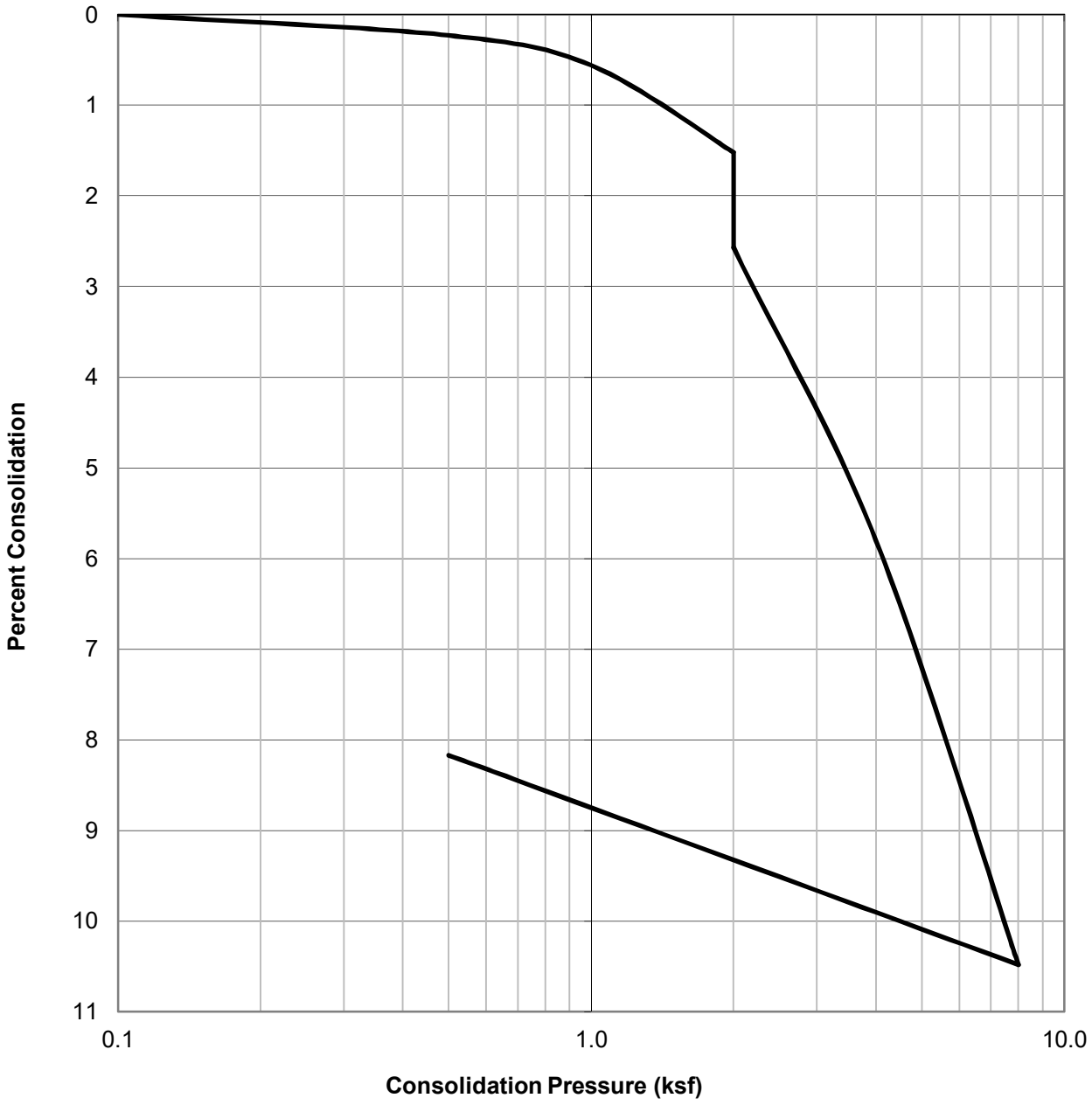
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B4

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B2@3 | Dark Gray Sandy Silt (ML) | 76.2 | 32.7 | 37.3 |

GEOCON

**CONSOLIDATION TEST RESULTS**

ASTM D-2435

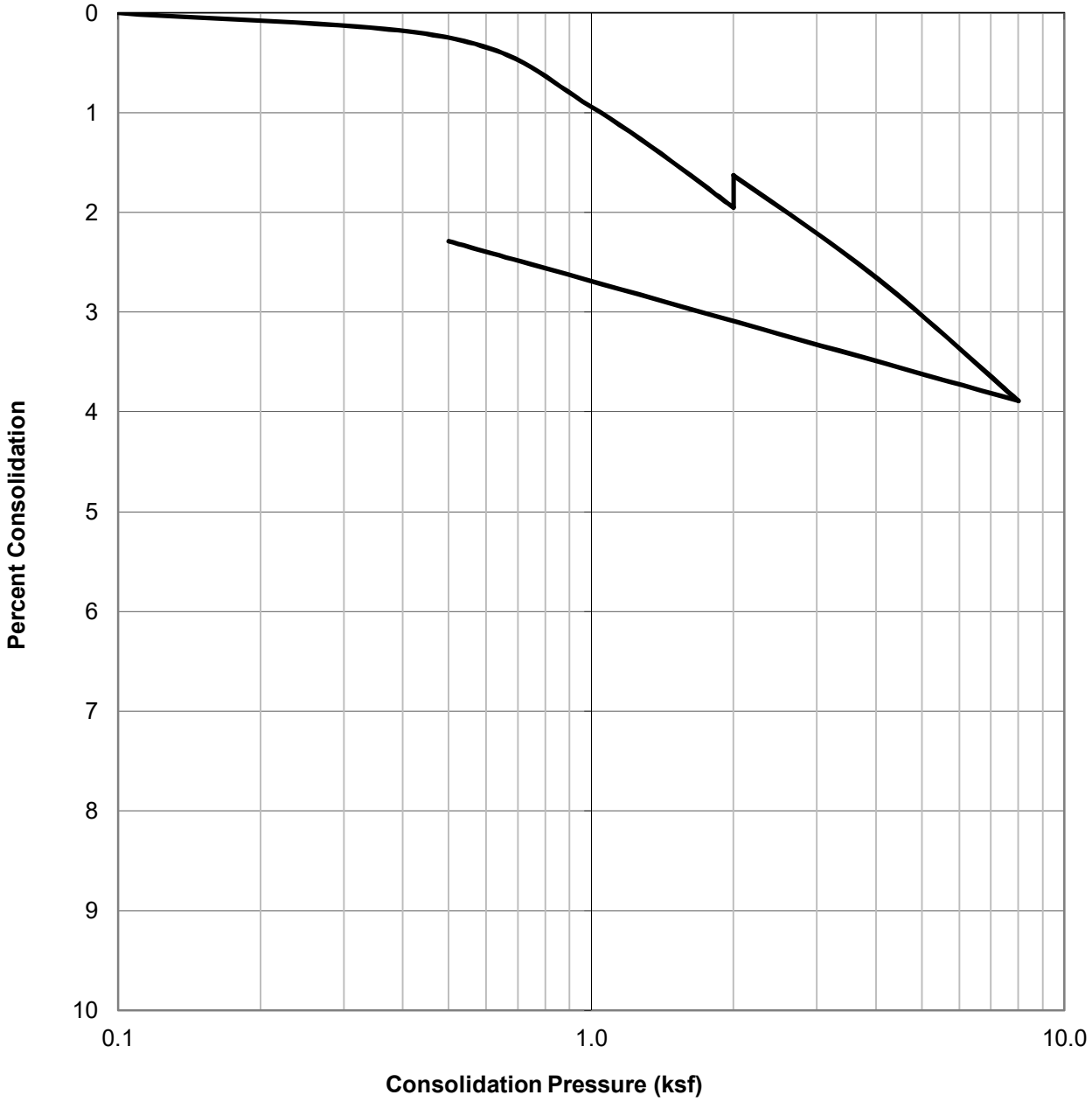
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B5

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B1@5 | Dark Gray Clay (CH) | 101.8 | 24.0 | 24.3 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

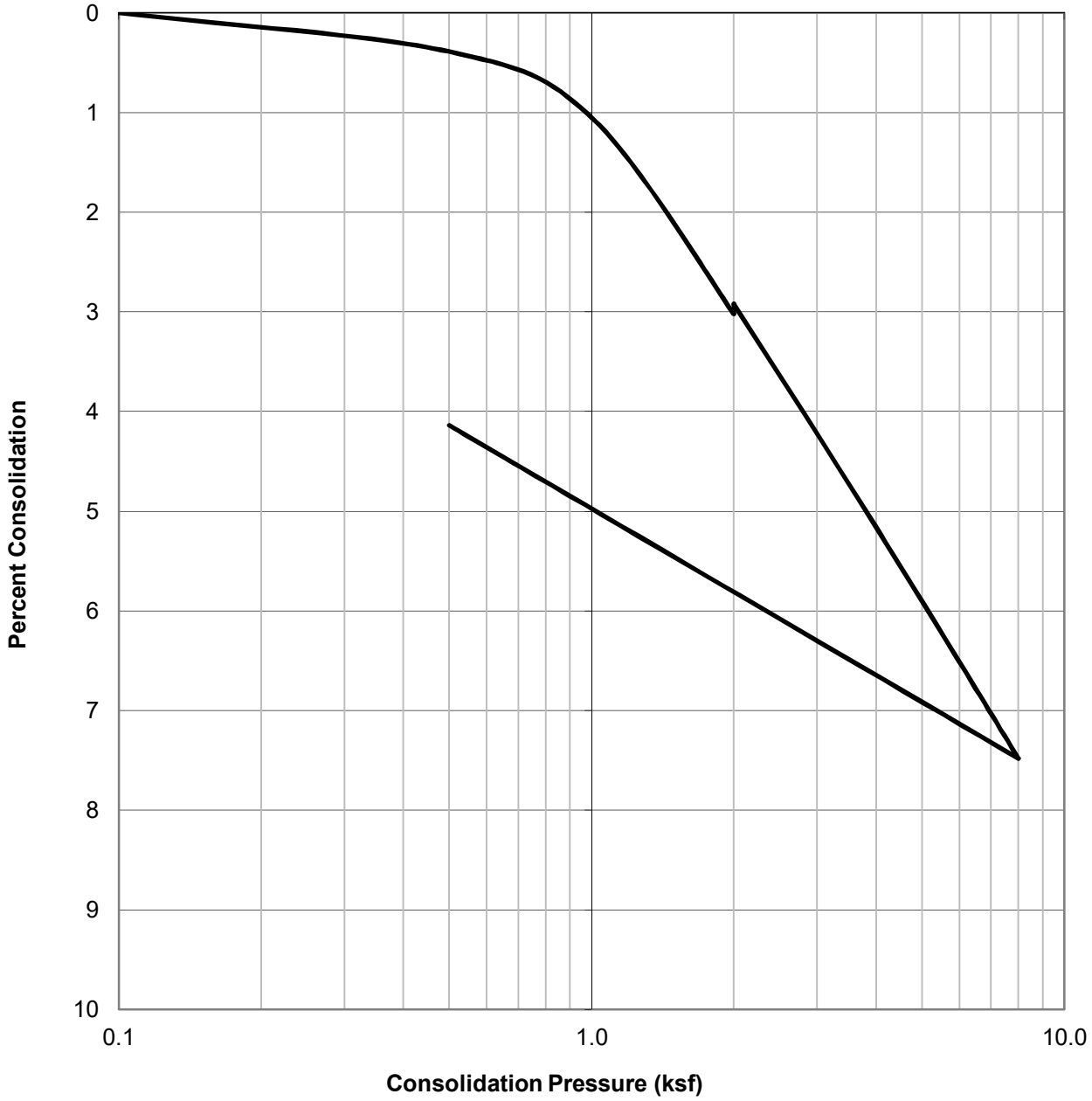
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B6

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B5@5 | Dark Gray Clay (CH) | 81.9 | 38.4 | 39.2 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

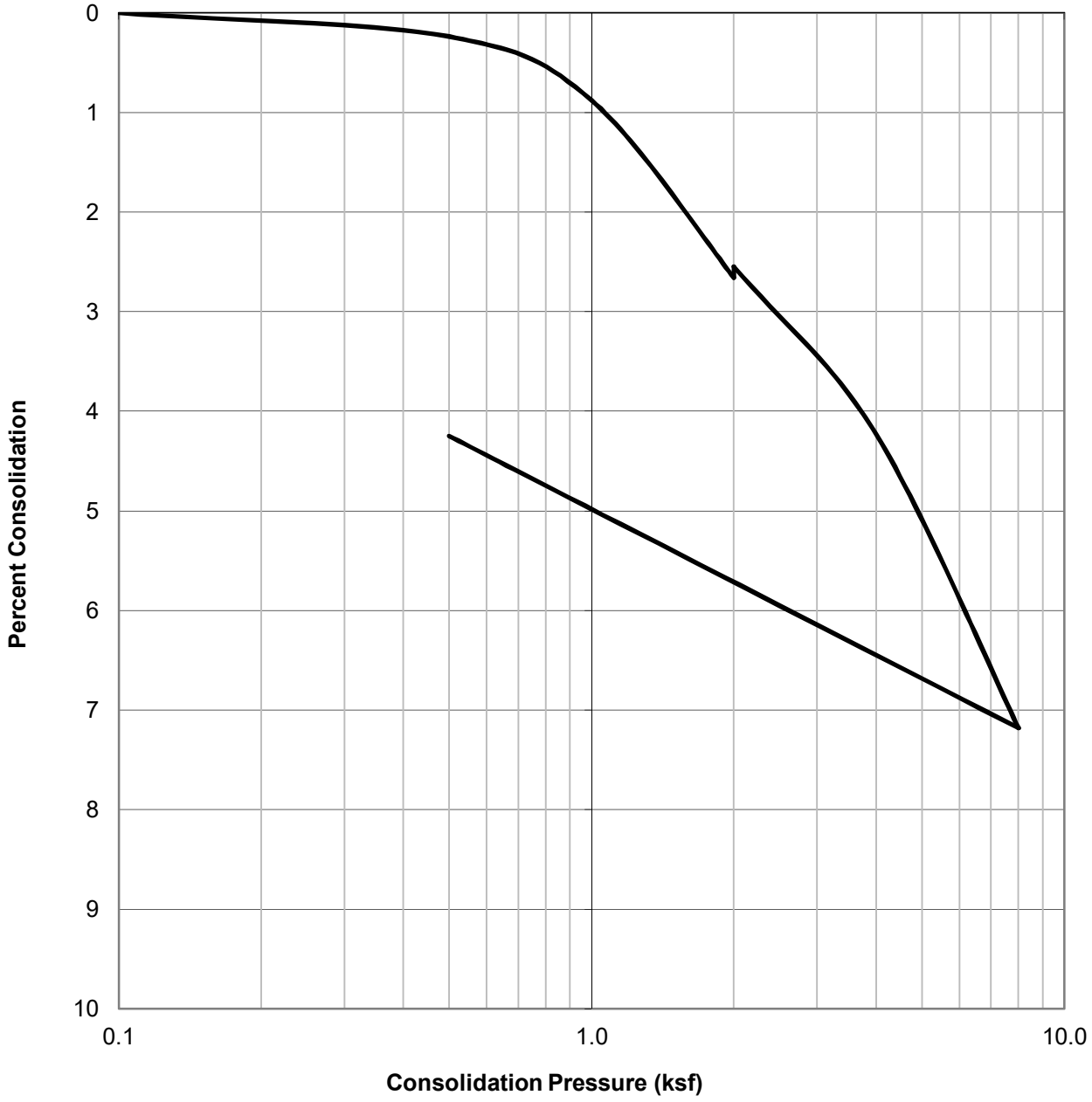
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B7

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B4@7.5 | Dark Gray Clay (CH) | 80.9 | 38.9 | 38.0 |

GEOCON

**CONSOLIDATION TEST RESULTS**

ASTM D-2435

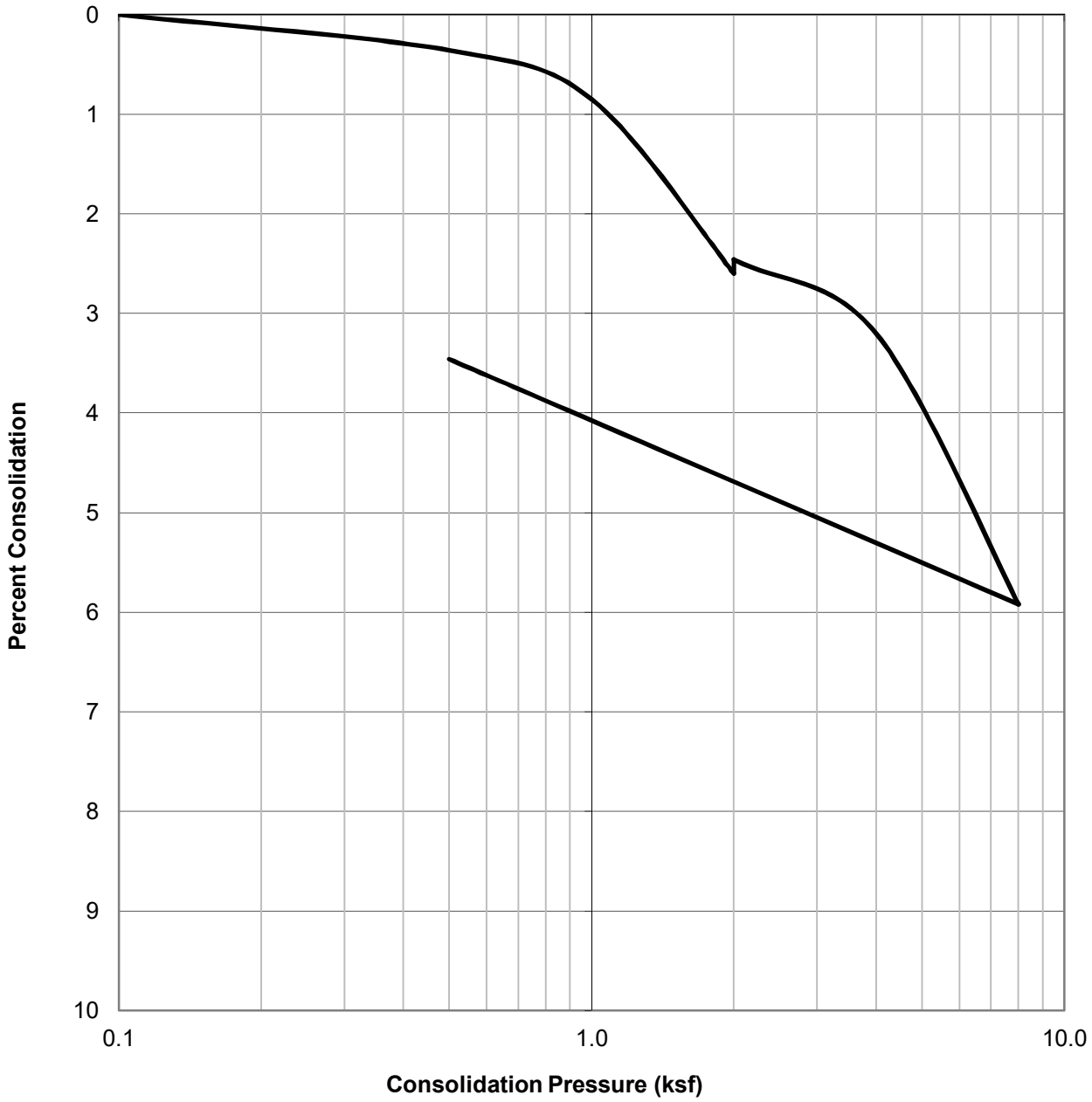
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B8

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B2@9 | Dark Gray Clay (CH) | 70.9 | 49.8 | 48.8 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

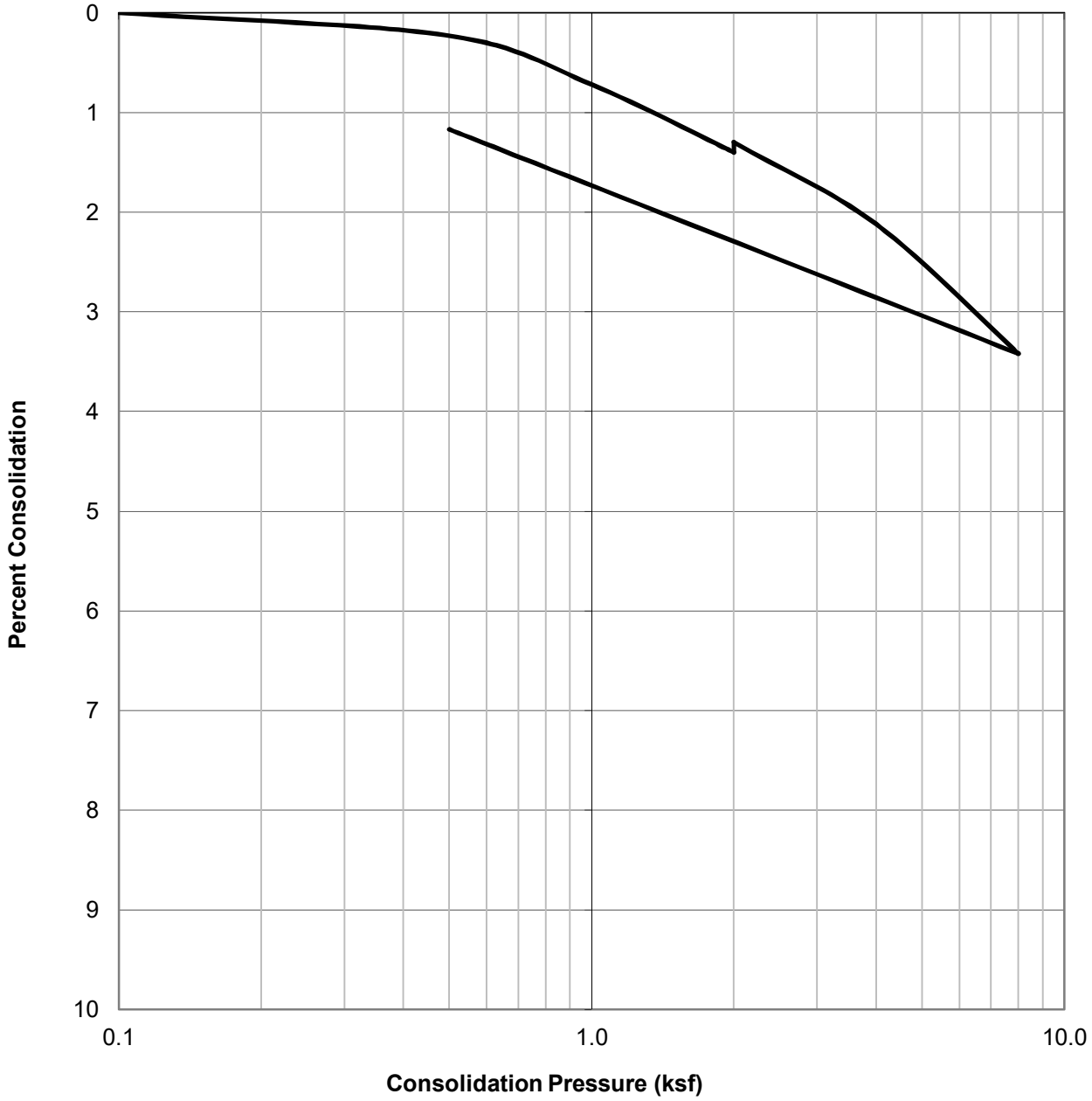
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B9

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B1@10 | Olive Brown Clay (CH) | 105.4 | 22.0 | 22.8 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

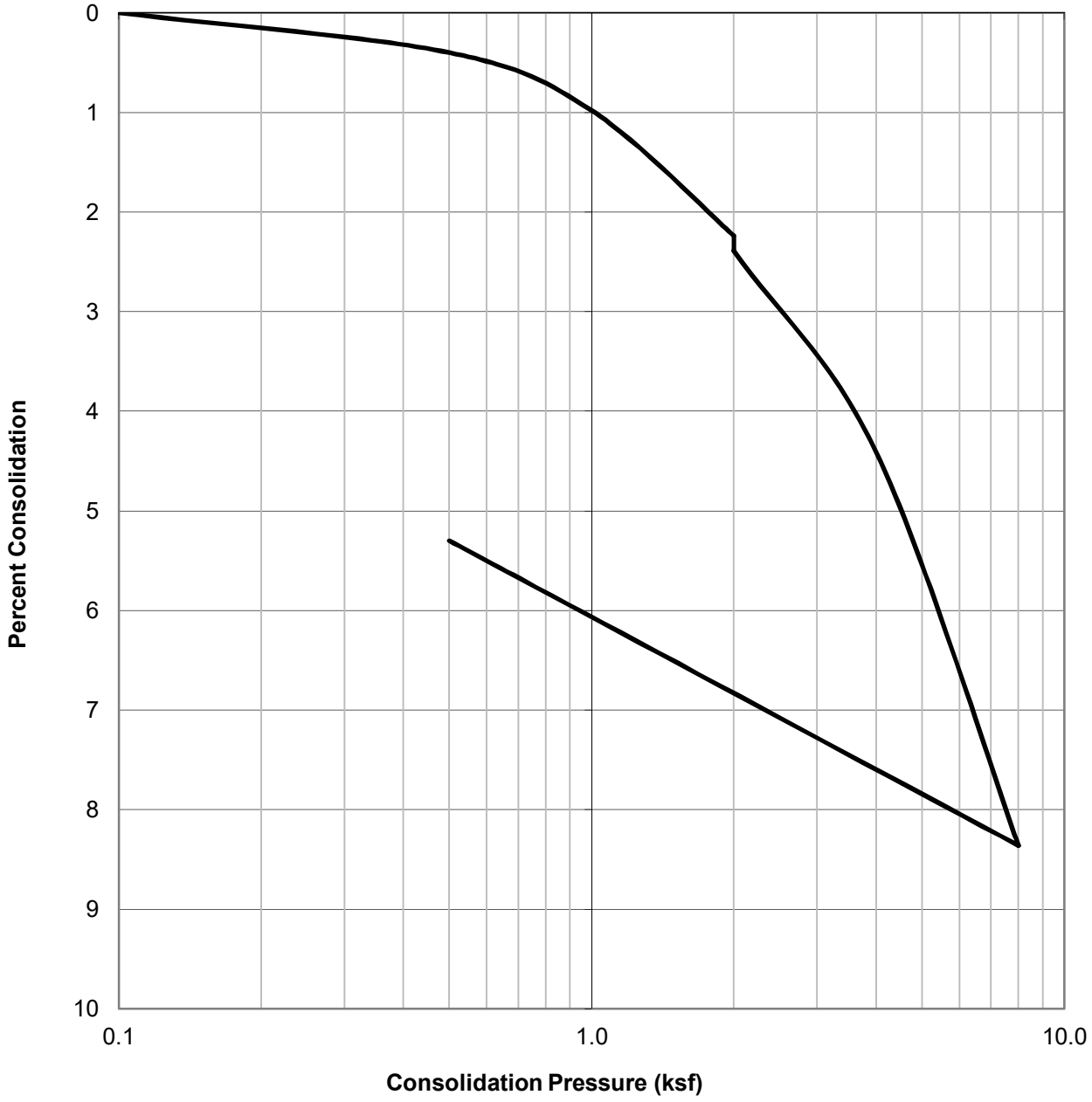
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B10

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B5@10 | Dark Gray Clay (CH) | 71.6 | 47.5 | 46.1 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

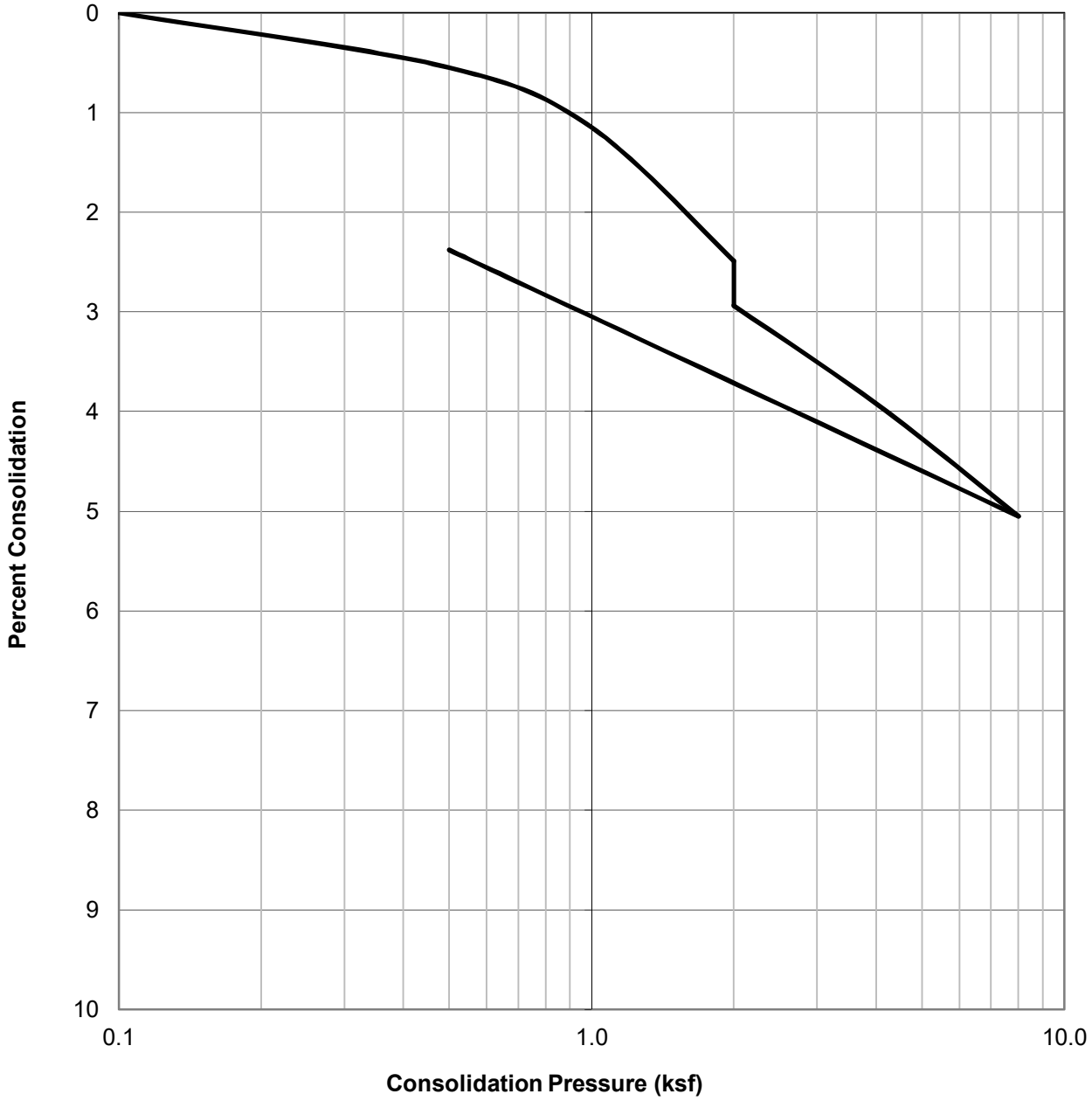
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B11

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B3@12.5 | Dark Gray Clay (CL) | 90.9 | 31.6 | 31.3 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

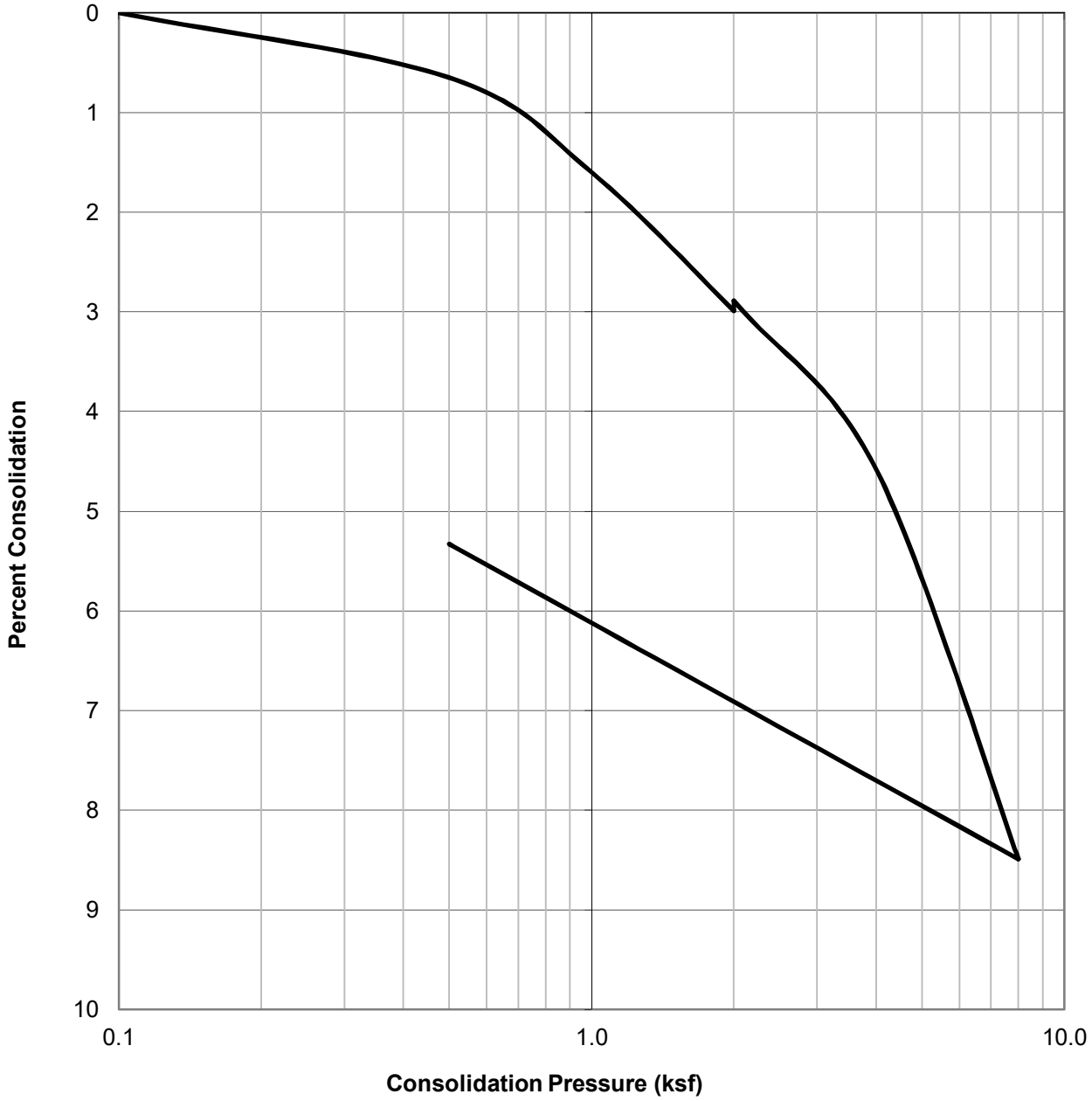
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B12

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B2@15 | Gray Clay (CH) | 75.8 | 45.2 | 41.7 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

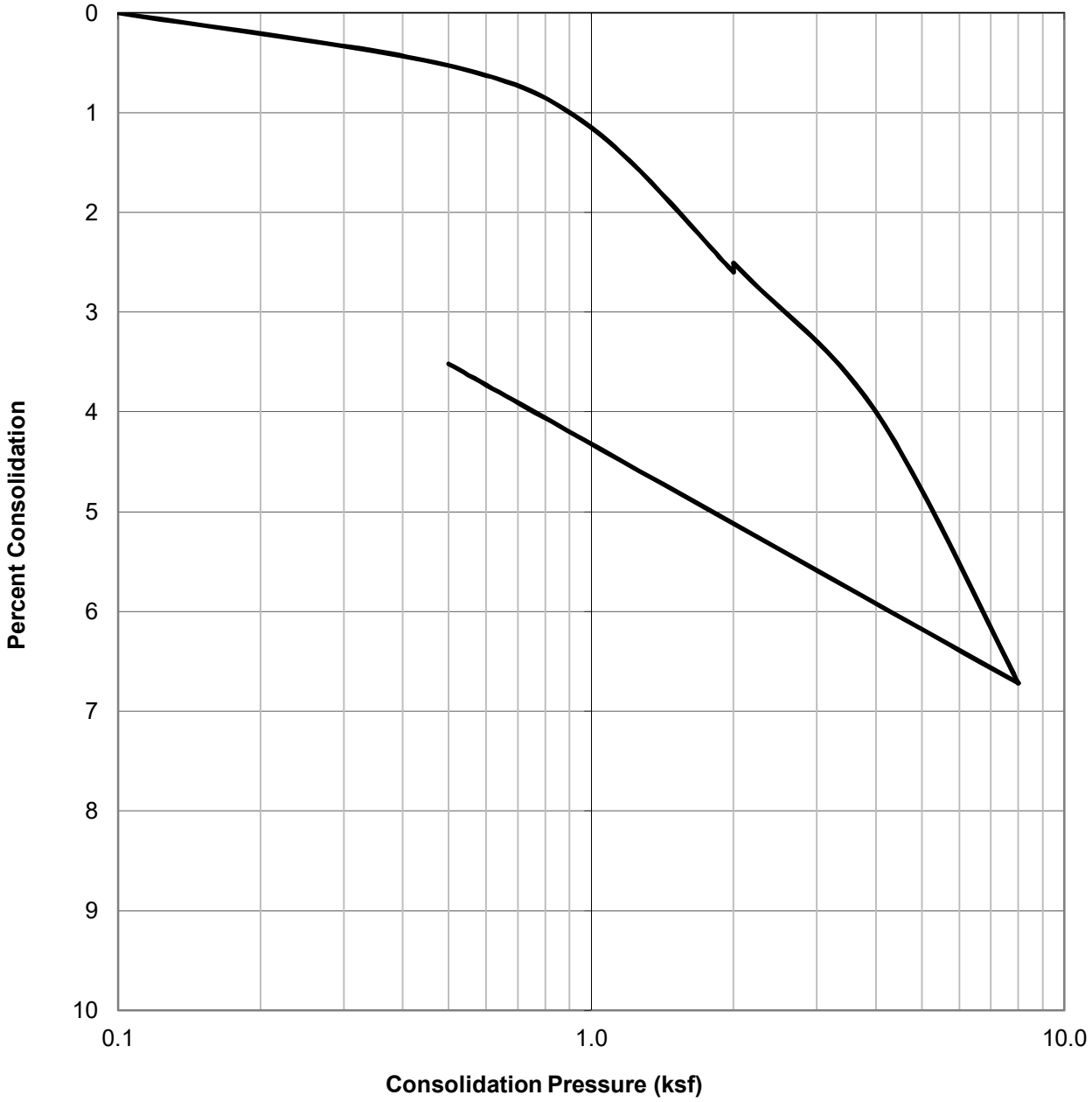
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B13

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B4@15 | Dark Gray Clay (CH) | 83.1 | 38.5 | 37.0 |

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**CONSOLIDATION TEST RESULTS**

ASTM D-2435

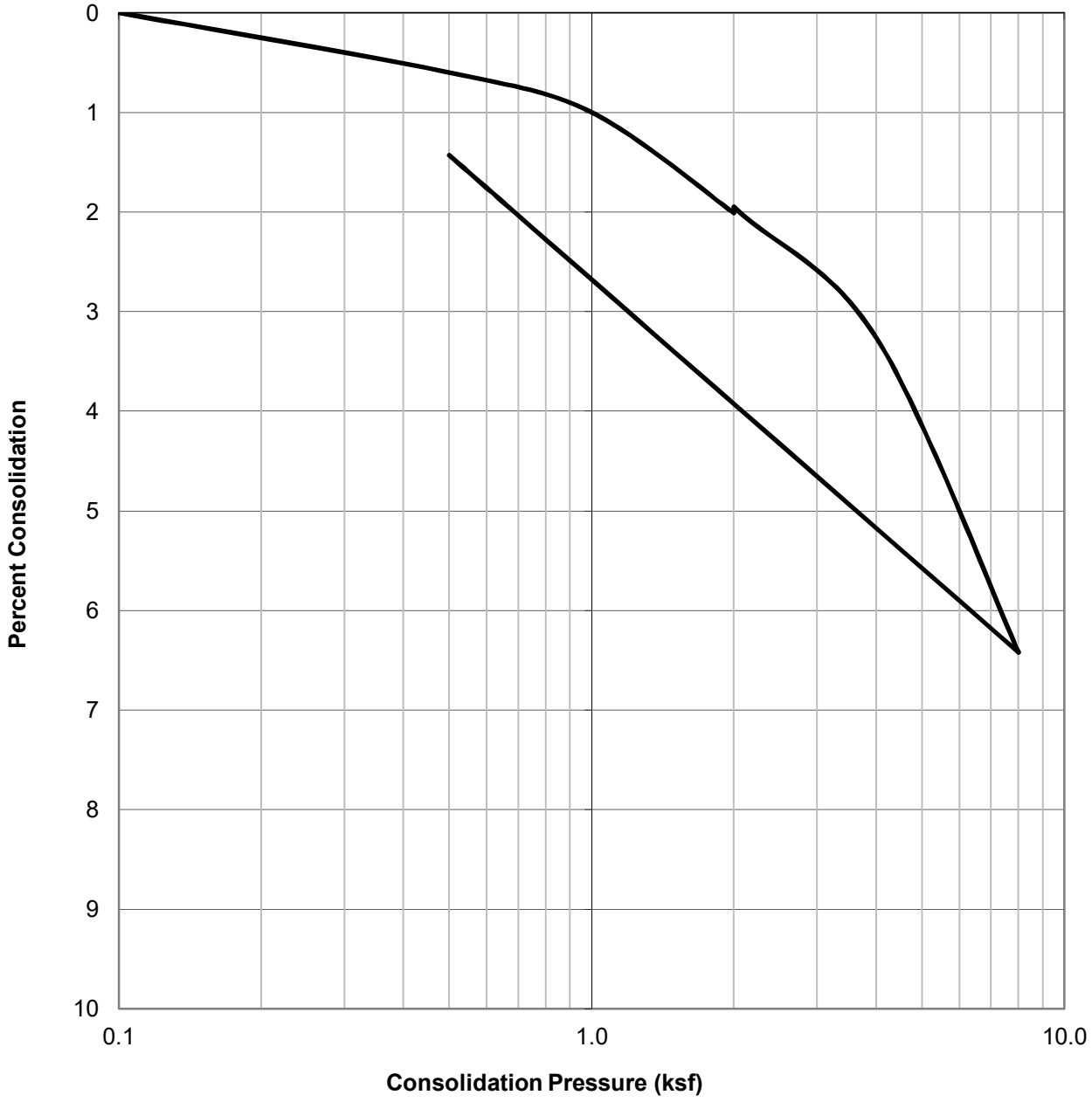
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B14

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B5@15 | Dark Gray Clay (CH) | 96.3 | 29.6 | 29.7 |

GEOCON

**CONSOLIDATION TEST RESULTS**

ASTM D-2435

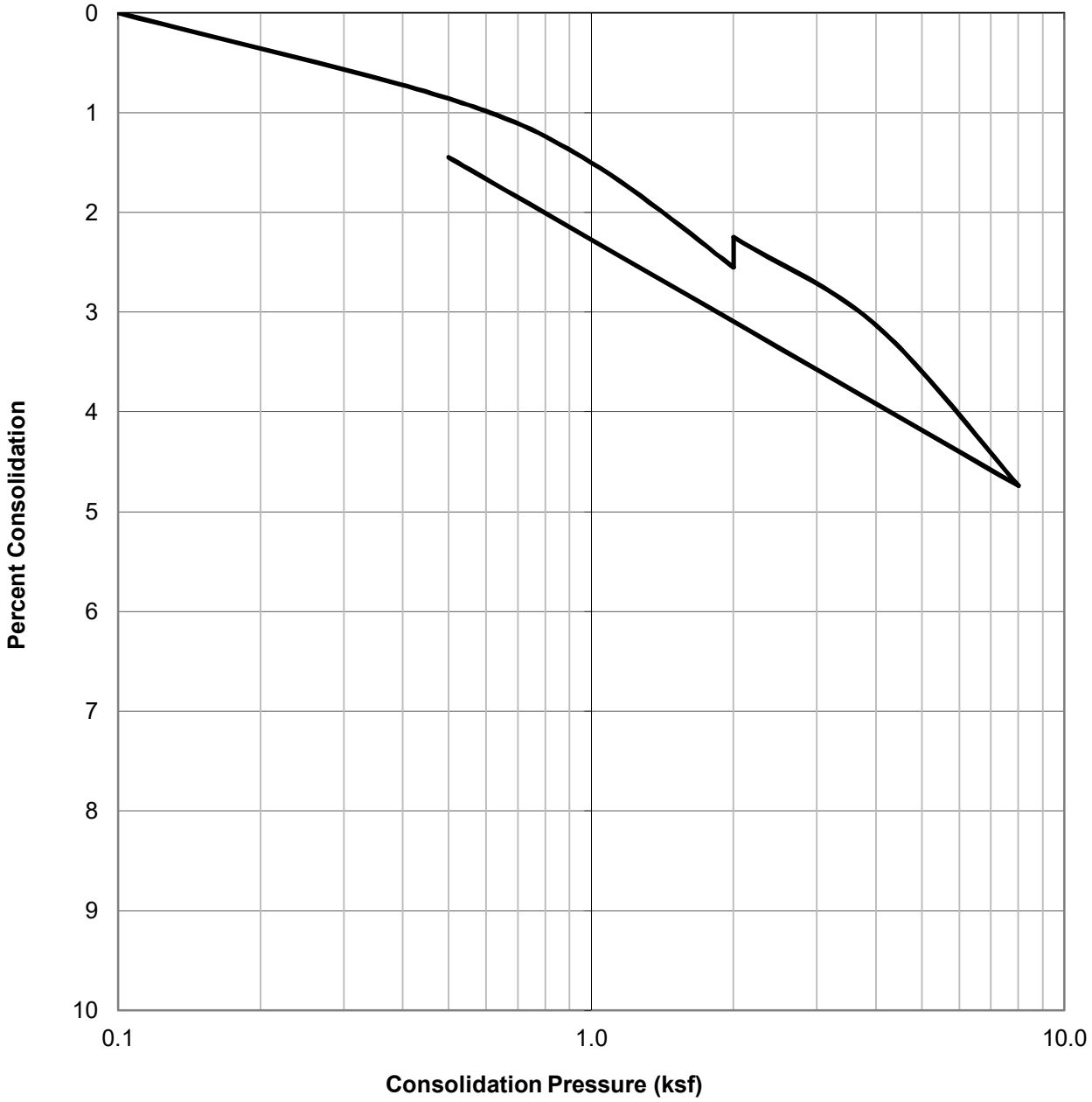
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B15

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B3@17.5 | Dark Gray Clay (CL) | 100.2 | 26.1 | 25.9 |

GEOCON

**CONSOLIDATION TEST RESULTS**

ASTM D-2435

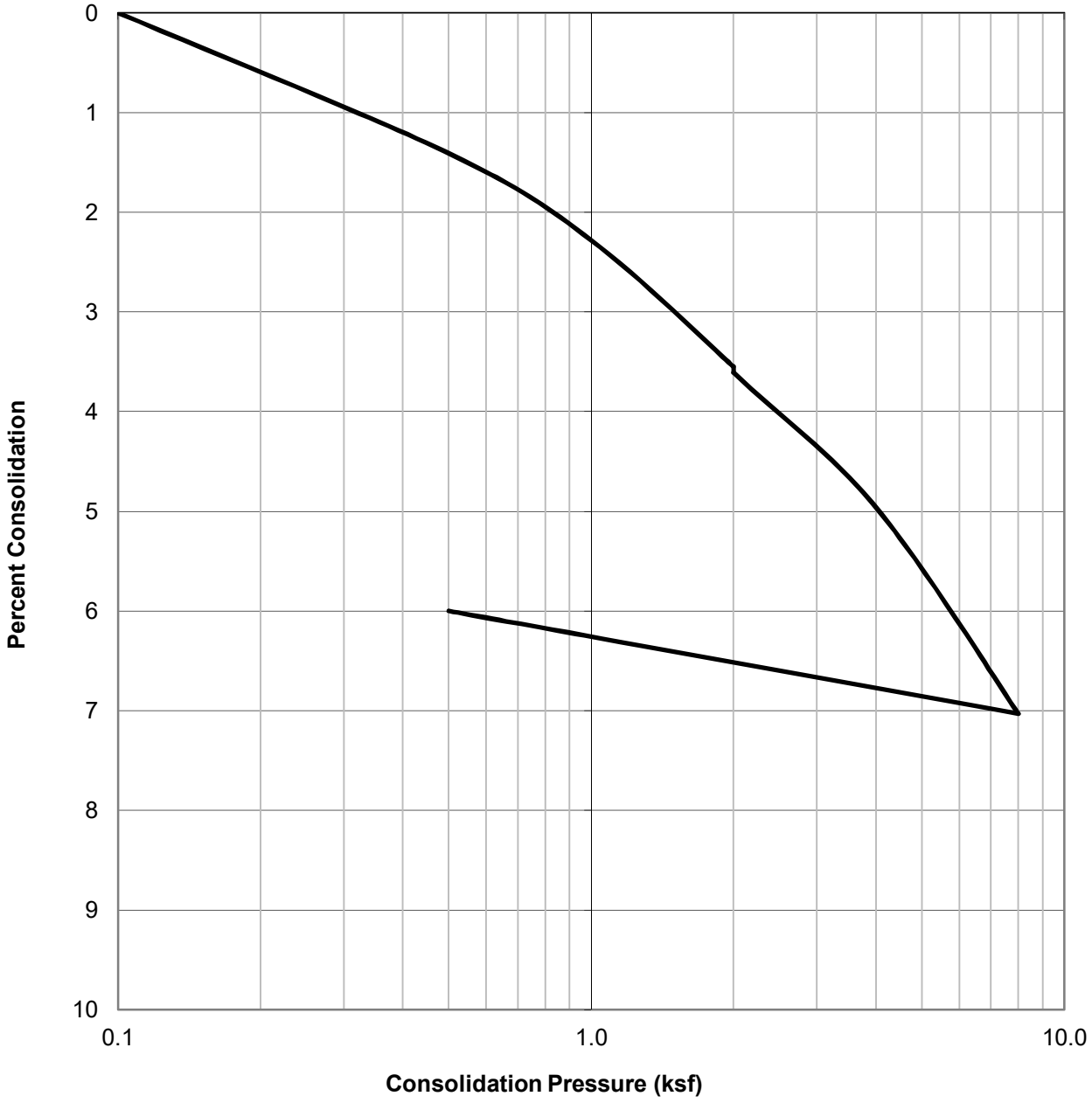
Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B16

WATER ADDED AT 2.0 KSF




| SAMPLE ID. | SOIL TYPE | DRY DENSITY (PCF) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) |
|---|---|---|---|---|
| B3@22.5 | Light Brown Clay (CL) | 98.3 | 27.2 | 23.0 |

GEOCON

**CONSOLIDATION TEST RESULTS**

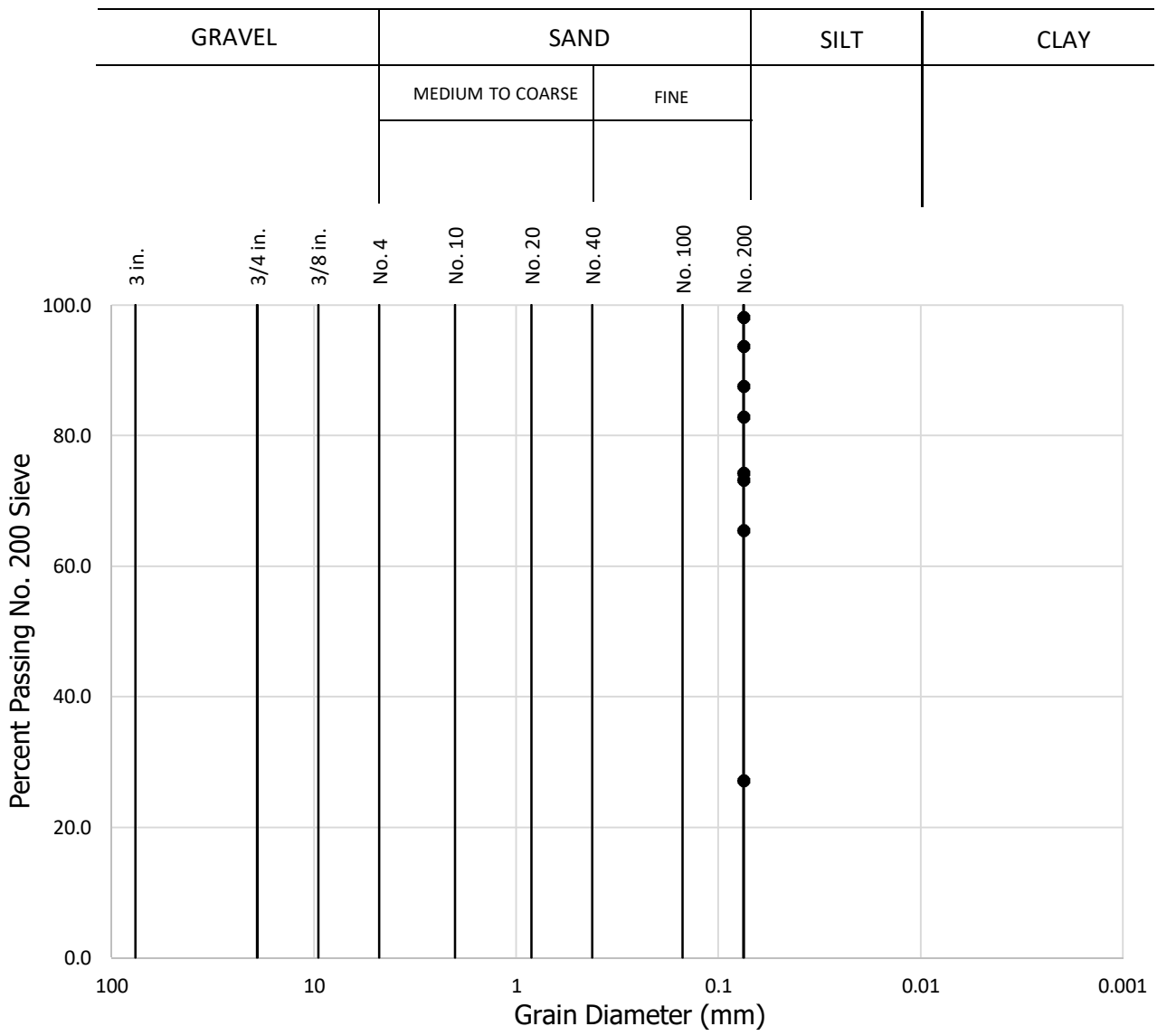
ASTM D-2435

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B17




| Sample No. | Percent Passing No. 200 Sieve |
|---|---|
| B3 @ 10' | 82.8 |
| B3 @ 15' | 87.6 |
| B3 @ 20' | 73.2 |
| B3 @ 25' | 98.1 |
| B3 @ 30' | 93.7 |
| B3 @ 35' | 74.2 |
| B3 @ 40' | 65.4 |
| B3 @ 50' | 27.1 |

GEOCON

**GRAIN SIZE ANALYSIS**

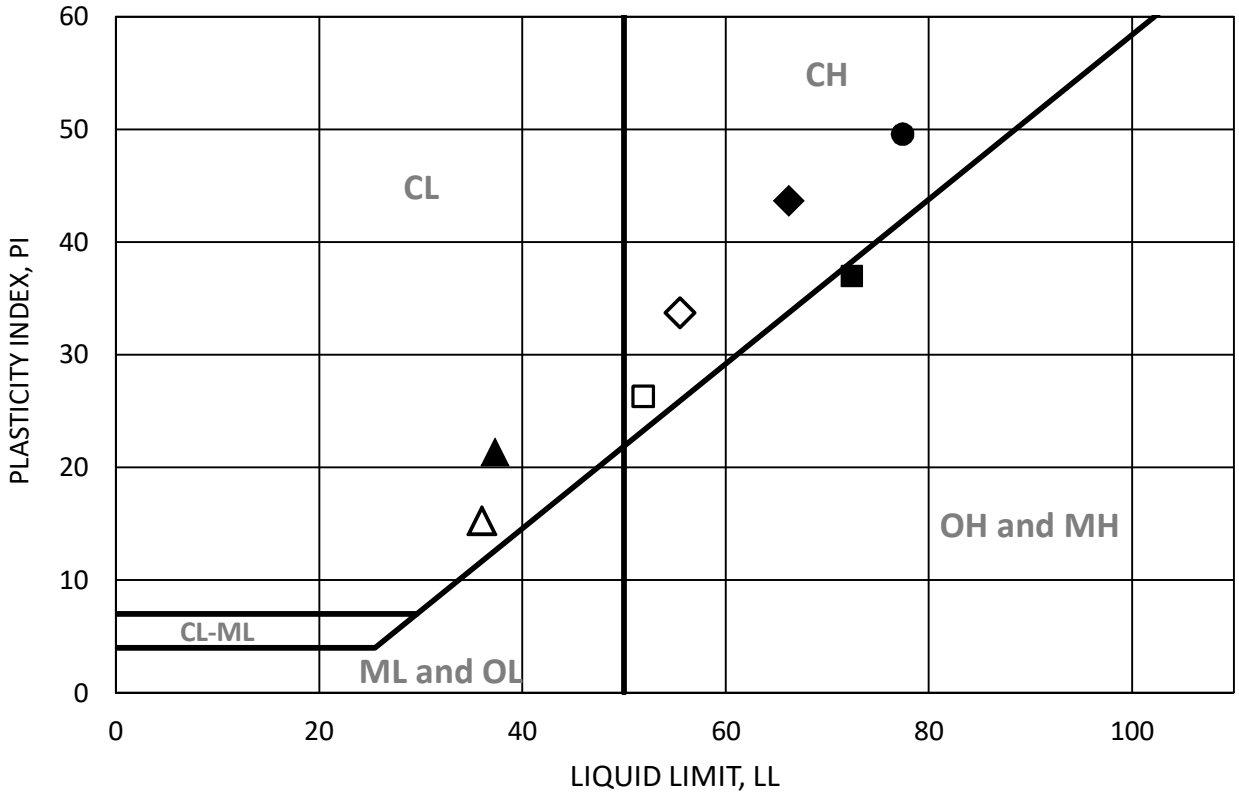
ASTM D-1140

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B18




| SYMBOL | BORING | DEPTH (ft) | LL | PL | PI | MOISTURE CONTENT AT SATURATION | SOIL BEHAVIOR |
|---|---|---|---|---|---|---|---|
| ■ | B3 | 10' | 72.5 | 36 | 37 | | MH |
| ◆ | B3 | 15' | 66 | 23 | 44 | | CH |
| ▲ | B3 | 20' | 37 | 16 | 21 | | CL |
| ● | B3 | 25' | 78 | 28 | 50 | | CH |
| □ | B3 | 30' | 52 | 26 | 26 | | CH |
| ◇ | B3 | 35' | 56 | 22 | 34 | | CH |
| △ | B3 | 45' | 36 | 21 | 15 | | CL |
| ○ | B3 | 50' | N/P | N/P | N/P | | SM |

N/P = Non-Plastic

GEOCON

**ATTERBERG LIMITS**

ASTM D-4318

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B19

# B1B2@0-5'

| MOLDED SPECIMEN | | BEFORE TEST | AFTER TEST |
|---|---|---|---|
| Specimen Diameter | (in.) | 4.0 | 4.0 |
| Specimen Height | (in.) | 1.0 | 1.1 |
| Wt. Comp. Soil + Mold | (gm) | 740.3 | 787.1 |
| Wt. of Mold | (gm) | 367.6 | 367.6 |
| Specific Gravity | (Assumed) | 2.7 | 2.7 |
| Wet Wt. of Soil + Cont. | (gm) | 484.4 | 787.1 |
| Dry Wt. of Soil + Cont. | (gm) | 451.5 | 331.9 |
| Wt. of Container | (gm) | 184.4 | 367.6 |
| Moisture Content | (%) | 12.3 | 26.4 |
| Wet Density | (pcf) | 112.4 | 126.4 |
| Dry Density | (pcf) | 100.1 | 100.0 |
| Void Ratio | | 0.7 | 0.8 |
| Total Porosity | | 0.4 | 0.4 |
| Pore Volume | (cc) | 84.1 | 97.0 |
| Degree of Saturation | (%) [$S_{meas}$] | 49.0 | 90.3 |

| Date | Time | Pressure (psi) | Elapsed Time (min) | Dial Readings (in.) |
|---|---|---|---|---|
| 3/8/2021 | 10:00 | 1.0 | 0 | 0.3035 |
| 3/8/2021 | 10:10 | 1.0 | 10 | 0.302 |
| Add Distilled Water to the Specimen | | | | |
| 3/9/2021 | 10:00 | 1.0 | 1430 | 0.3645 |
| 3/9/2021 | 11:00 | 1.0 | 1490 | 0.3645 |

| | |
|---|---|
| Expansion Index (EI meas) = | 62.5 |
| Expansion Index ( Report ) = | **63** |

| Expansion Index, $EI_{50}$ | CBC CLASSIFICATION * | UBC CLASSIFICATION ** |
|---|---|---|
| 0-20 | Non-Expansive | Very Low |
| 21-50 | Expansive | Low |
| 51-90 | Expansive | Medium |
| 91-130 | Expansive | High |
| >130 | Expansive | Very High |

* Reference: 2019 California Building Code, Section 1803.5.3

** Reference: 1997 Uniform Building Code, Table 18-I-B.

GEOCON

**EXPANSION INDEX TEST RESULTS**

ASTM D-4829

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B20

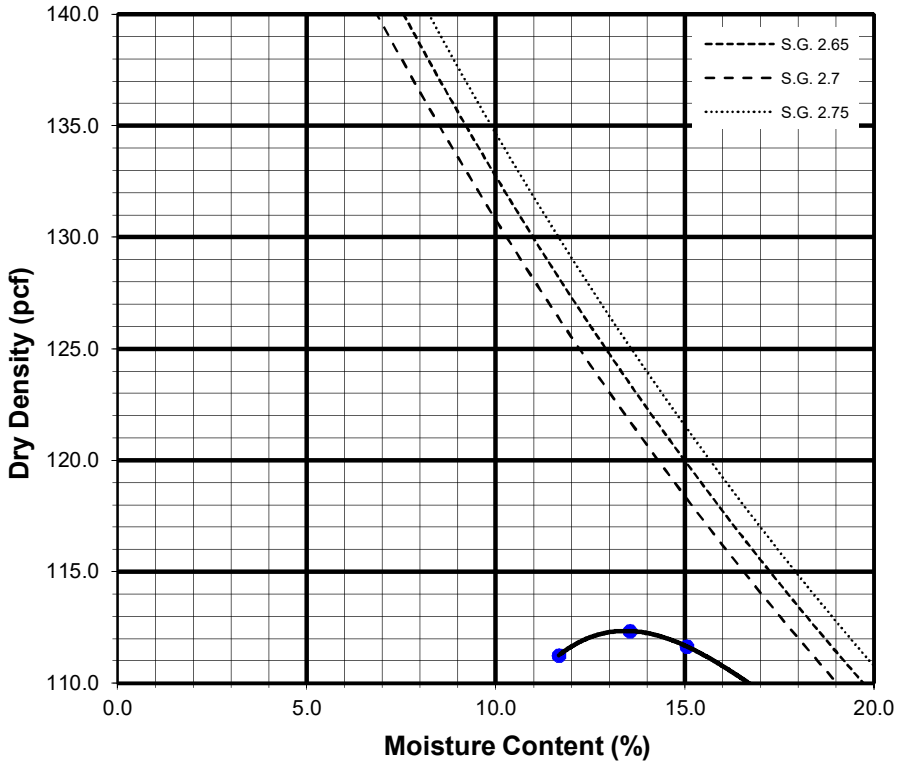
Sample No:

| | |
|---|---|
| **B1B2@0-5'** | Brown Silty Sand (SM) |

| TEST NO. | | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Wt. Compacted Soil + Mold | (g) | 6008 | 6058 | 6072 | 6069 | | |
| Weight of Mold | (g) | 4132 | 4132 | 4132 | 4132 | | |
| Net Weight of Soil | (g) | 1876 | 1927 | 1940 | 1937 | | |
| Wet Weight of Soil + Cont. | (g) | 630.8 | 626.4 | 653.1 | 674.5 | | |
| Dry Weight of Soil + Cont. | (g) | 580.0 | 569.3 | 585.6 | 594.2 | | |
| Weight of Container | (g) | 144.4 | 147.6 | 137.1 | 125.4 | | |
| Moisture Content | (%) | 11.7 | 13.5 | 15.1 | 17.1 | | |
| Wet Density | (pcf) | 124.2 | 127.6 | 128.5 | 128.2 | | |
| Dry Density | (pcf) | 111.2 | 112.3 | 111.7 | 109.5 | | |

| **Maximum Dry Density (pcf)** | **112.5** |
|---|---|

| **Optimum Moisture Content (%)** | **14.0** |
|---|---|




Preparation Method: A

GEOCON

**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS**

ASTM D-1557

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B21

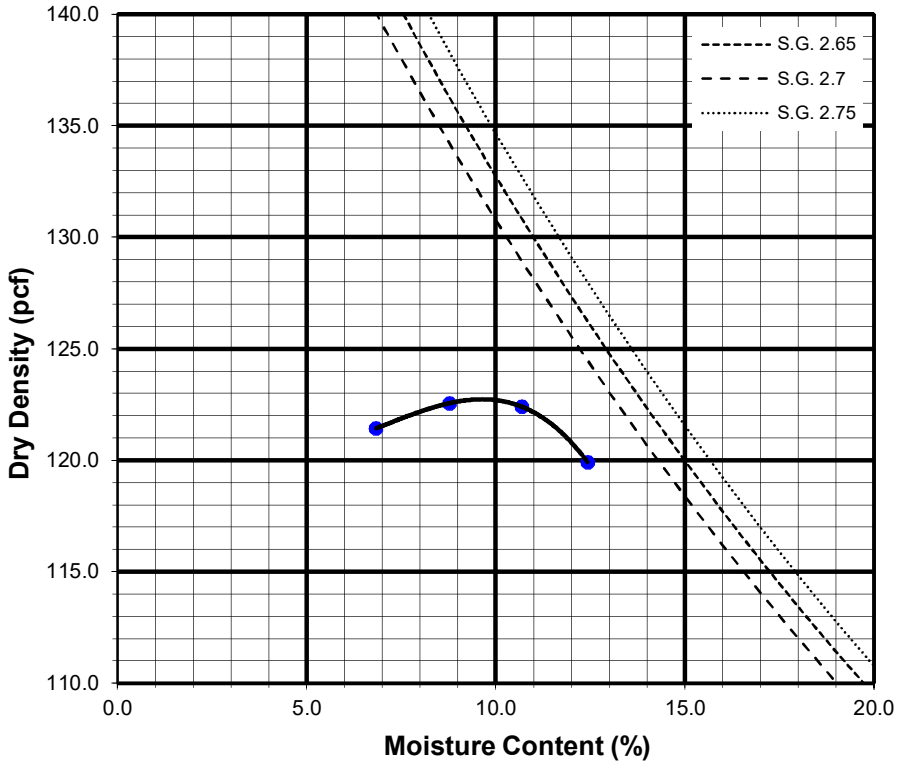
Sample No:

| | |
|---|---|
| **B3B4@0-5'** | Light Brown Silty Sand (SM) |

| TEST NO. | | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Wt. Compacted Soil + Mold | (g) | 6085 | 6139 | 6172 | 6162 | | |
| Weight of Mold | (g) | 4132 | 4132 | 4132 | 4132 | | |
| Net Weight of Soil | (g) | 1954 | 2008 | 2040 | 2030 | | |
| Wet Weight of Soil + Cont. | (g) | 659.1 | 662.9 | 668.4 | 663.2 | | |
| Dry Weight of Soil + Cont. | (g) | 626.4 | 619.6 | 618.1 | 606.0 | | |
| Weight of Container | (g) | 148.0 | 126.1 | 147.5 | 145.6 | | |
| Moisture Content | (%) | 6.8 | 8.8 | 10.7 | 12.4 | | |
| Wet Density | (pcf) | 129.7 | 133.3 | 135.5 | 134.8 | | |
| Dry Density | (pcf) | 121.4 | 122.6 | 122.4 | 119.9 | | |

| | |
|---|---|
| **Maximum Dry Density (pcf)** | **123.0** |
| **Bulk Specific Gravity (dry)** | **2.36** |
| **Corrected Maximum Dry Density (pcf)** | **127.0** |

| | |
|---|---|
| **Optimum Moisture Content (%)** | **10.0** |
| **Oversized Fraction (%)** | **18.0** |
| **Corrected Moisture Content (%)** | **8.0** |




Preparation Method: A

GEOCON

**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS**

ASTM D-1557

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B22

SUMMARY OF LABORATORY POTENTIAL
OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS
CALIFORNIA TEST NO. 643

| Sample No. | pH | Resistivity (ohm centimeters) |
|---|---|---|
| B1 + B2 @ 0-5' | 8.1 | 910 (Severely Corrosive) |
| B3 + B4 @ 0-5' | 10.5 | 3900 (Moderately Corrosive) |
| | | |

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
EPA NO. 325.3

| Sample No. | Chloride Ion Content (%) |
|---|---|
| B1 + B2@0-5' | 0.006 |
| B3 + B4@0-5' | 0.003 |
| | |

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

| Sample No. | Water Soluble Sulfate (% $SO_4$) | Sulfate Exposure* |
|---|---|---|
| B1 + B2@0-5' | 0.070 | S0 |
| B3 + B4@0-5' | 0.013 | S0 |
| | | |

GEOCON

**CORROSIVITY TEST RESULTS**

Checked by: JMH

Project No.: W1301-06-01

21611 SOUTH PERRY STREET
CARSON, CALIFORNIA

AUG. 2024 Figure B23

# APPENDIX C

# APPENDIX C
# CPT LIQUEFACTION ANALYSIS

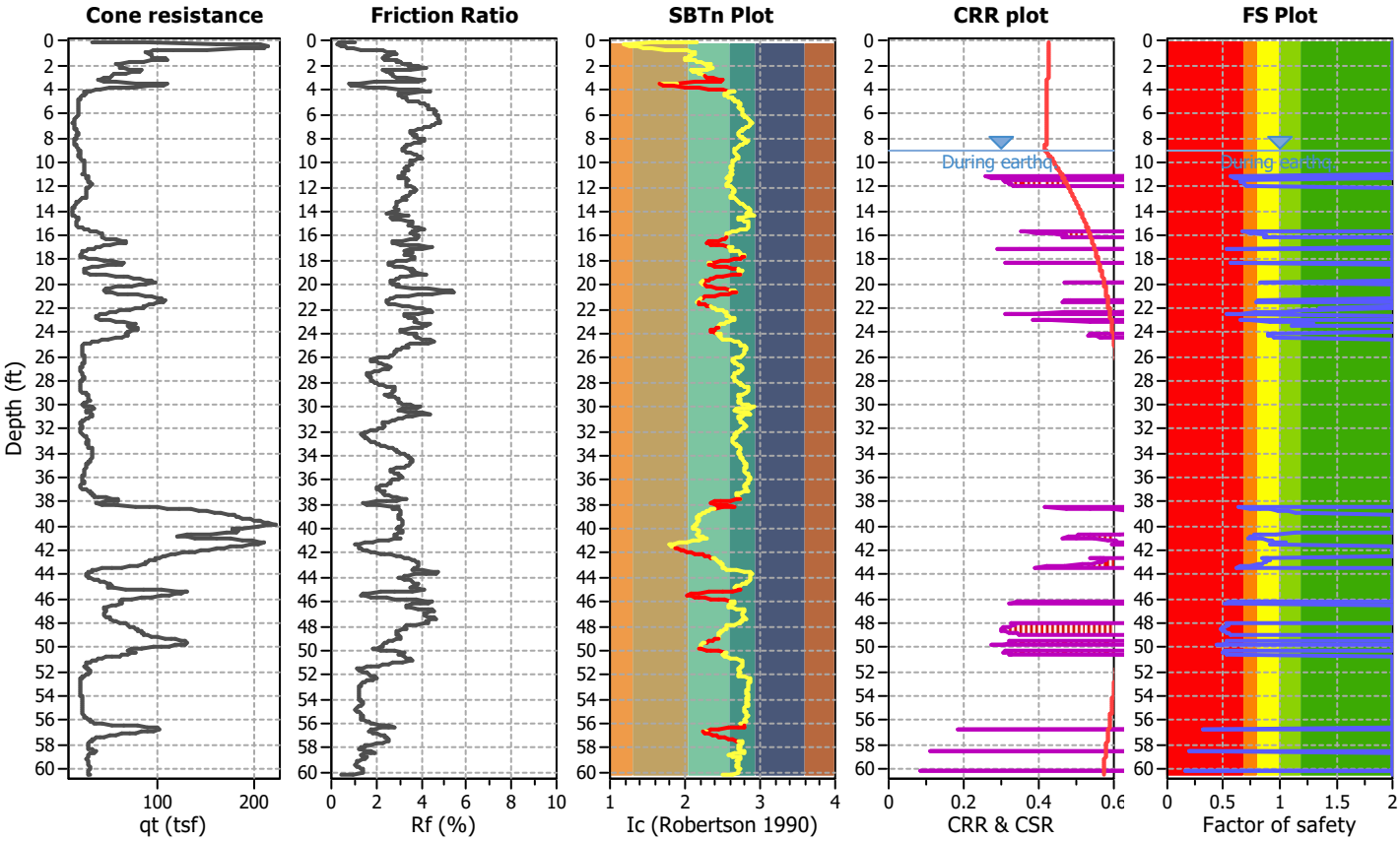
# LIQUEFACTION ANALYSIS REPORT

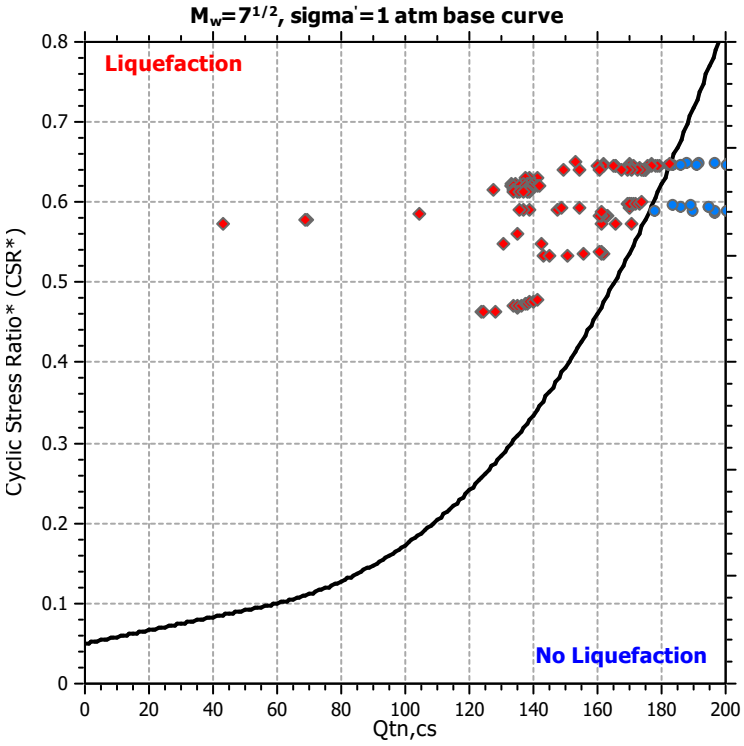
**Project title : Geocon West / 21611 Perry Street** **Location : Carson, CA**

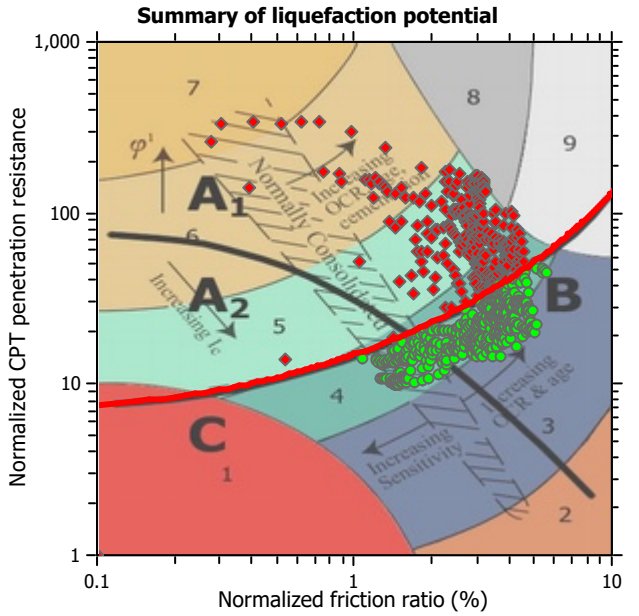
**CPT file : CPT-1**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | G.W.T. (in-situ): | 12.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | NCEER (1998) | G.W.T. (earthq.): | 9.00 ft | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 6.87 | Ic cut-off value: | 2.60 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 0.82 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

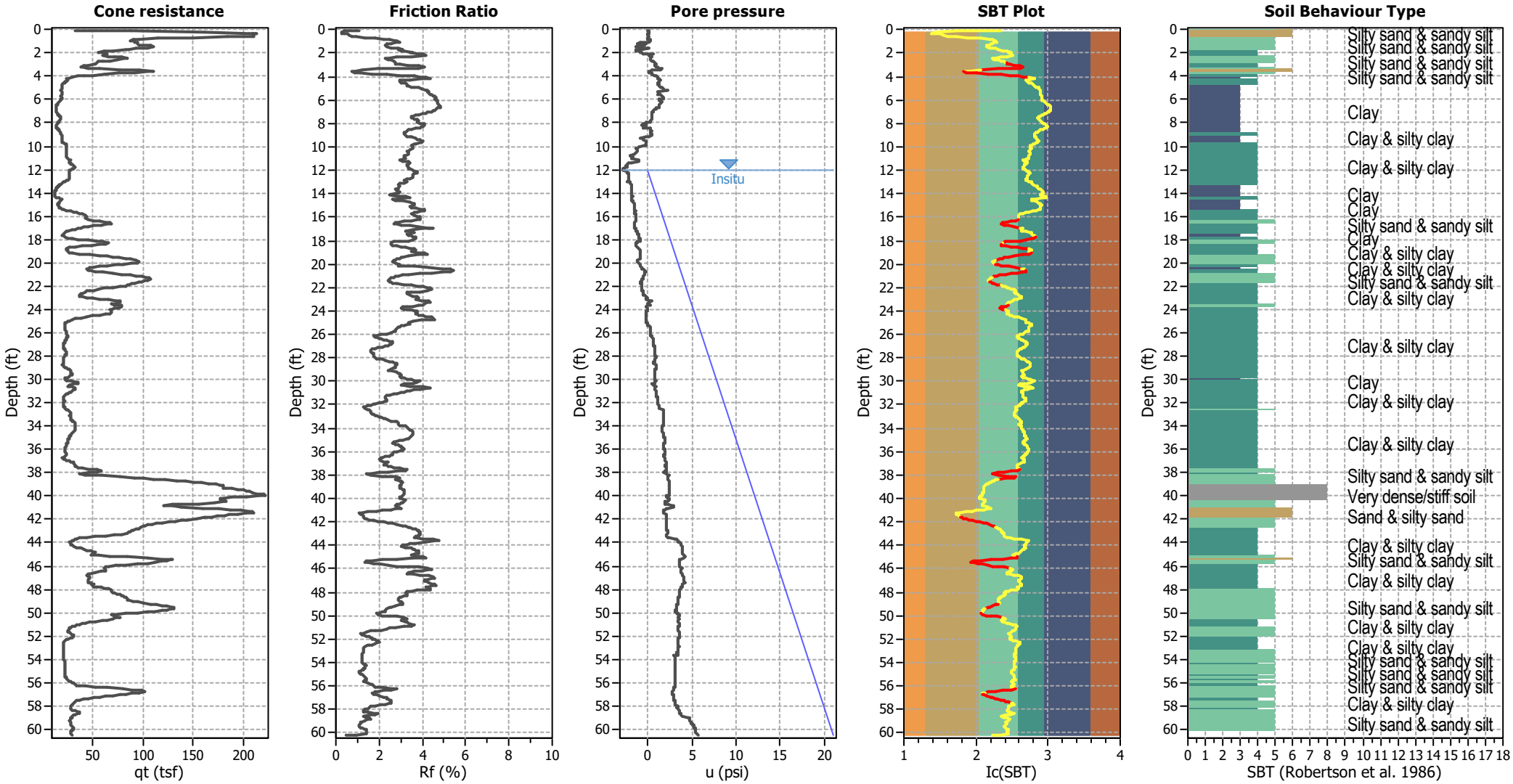



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# CPT basic interpretation plots



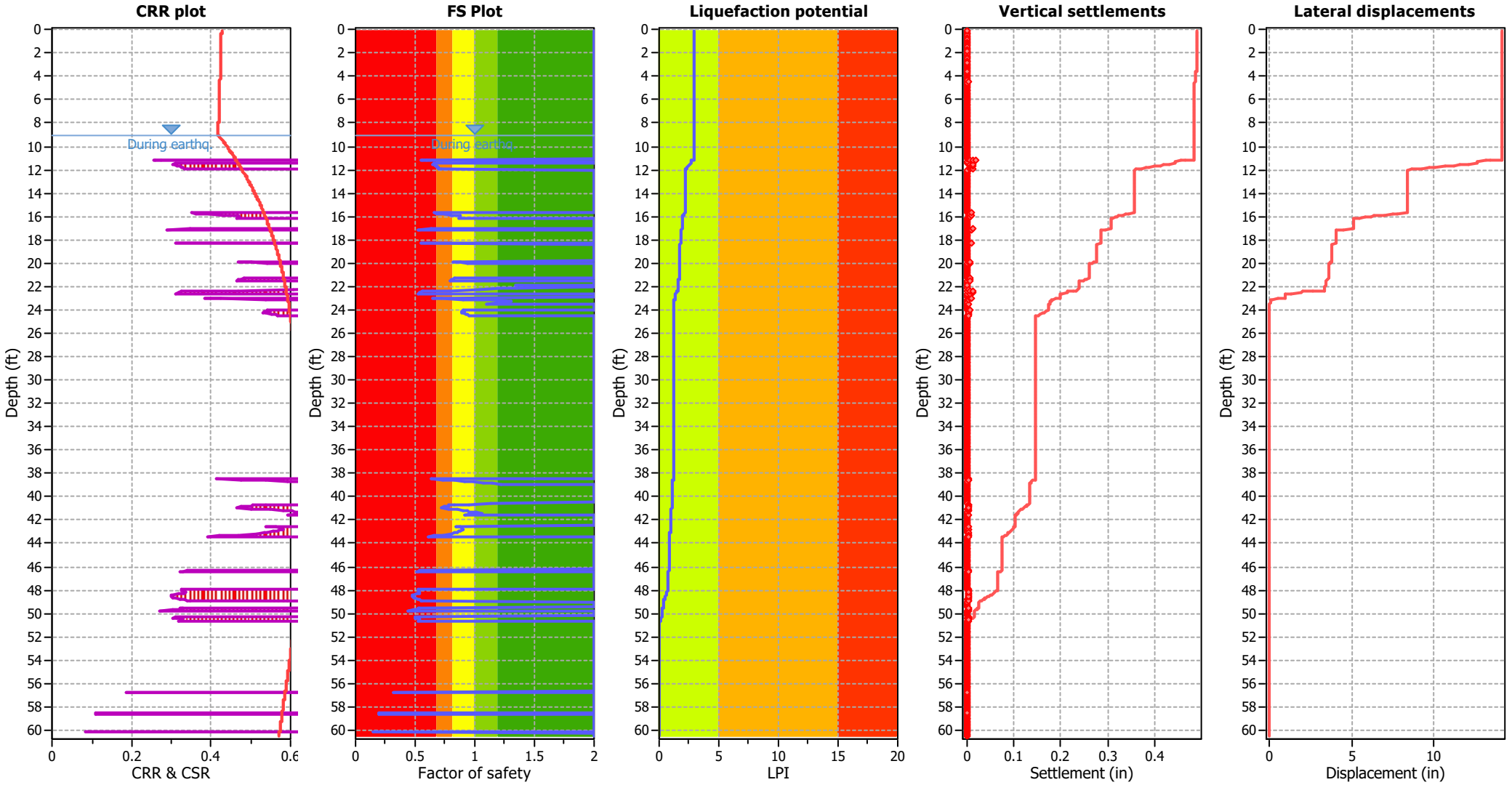

## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

**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

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

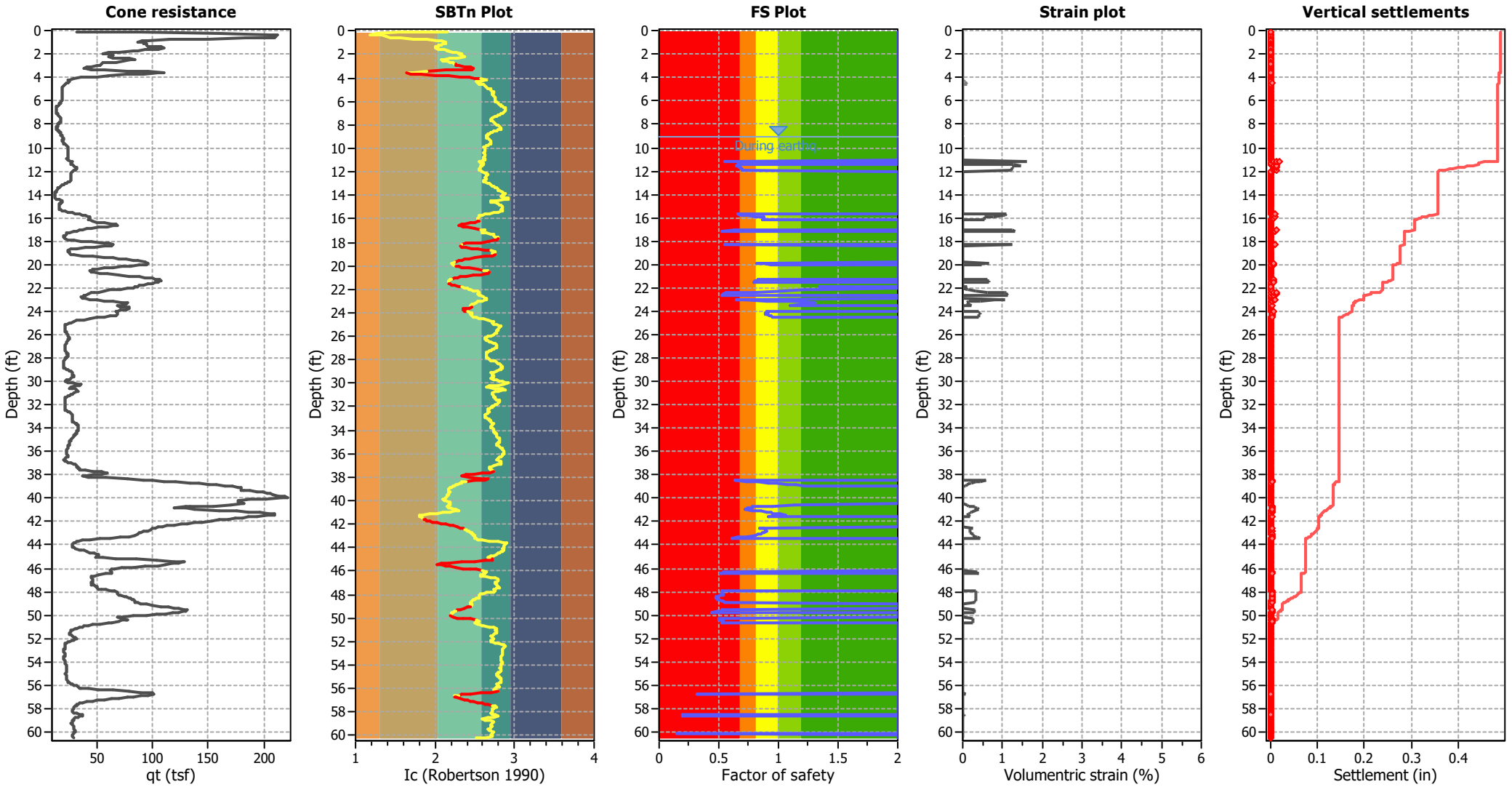
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

# Estimation of post-earthquake settlements




**Abbreviations**

| | |
|---|---|
| $q_t$: | Total cone resistance (cone resistance $q_c$ corrected for pore water effects) |
| $I_c$: | Soil Behaviour Type Index |
| FS: | Calculated Factor of Safety against liquefaction |
| Volumentric strain: | Post-liquefaction volumentric strain |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.09 | 2.15 | 51.61 | 1.50 | 77.67 | 17 | 440 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.15 | 1.55 | 142.10 | 1.00 | 142.10 | 25 | 565 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.21 | 1.25 | 258.70 | 1.00 | 258.70 | 42 | 705 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.29 | 1.18 | 329.79 | 1.00 | 329.79 | 52 | 824 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.34 | 1.25 | 341.53 | 1.00 | 341.53 | 55 | 933 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.40 | 1.33 | 334.12 | 1.00 | 334.12 | 55 | 1013 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.49 | 1.38 | 338.31 | 1.00 | 338.31 | 57 | 1089 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.55 | 1.43 | 336.88 | 1.00 | 336.88 | 58 | 1161 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.59 | 1.57 | 295.90 | 1.00 | 295.90 | 53 | 1204 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.69 | 1.73 | 240.60 | 1.05 | 252.40 | 48 | 1205 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.74 | 1.91 | 185.25 | 1.24 | 229.81 | 46 | 1159 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.81 | 2.03 | 153.10 | 1.33 | 204.32 | 43 | 1122 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.89 | 2.08 | 145.48 | 1.39 | 201.56 | 43 | 1129 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.94 | 2.13 | 139.51 | 1.46 | 203.82 | 45 | 1155 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.99 | 2.11 | 147.29 | 1.44 | 212.11 | 46 | 1200 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.08 | 2.13 | 146.67 | 1.47 | 215.69 | 47 | 1222 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.14 | 2.10 | 151.24 | 1.42 | 214.48 | 46 | 1210 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.19 | 2.07 | 151.42 | 1.38 | 209.45 | 45 | 1173 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.26 | 2.05 | 151.41 | 1.35 | 205.02 | 43 | 1136 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.34 | 2.04 | 154.23 | 1.35 | 208.12 | 44 | 1151 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.38 | 2.00 | 172.36 | 1.31 | 225.45 | 47 | 1217 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.50 | 2.00 | 177.56 | 1.31 | 232.53 | 48 | 1257 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.53 | 2.05 | 168.87 | 1.35 | 228.10 | 48 | 1262 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.59 | 2.12 | 150.01 | 1.45 | 217.61 | 47 | 1232 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.68 | 2.17 | 138.20 | 1.53 | 212.05 | 47 | 1201 | 0.43 | 0.006 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.72 | 2.16 | 132.17 | 1.52 | 200.55 | 44 | 1137 | 0.43 | 0.006 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.78 | 2.22 | 112.68 | 1.66 | 186.80 | 42 | 1046 | 0.43 | 0.008 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.87 | 2.27 | 97.87 | 1.82 | 178.07 | 41 | 972 | 0.42 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.93 | 2.33 | 89.70 | 2.05 | 183.71 | 44 | 962 | 0.42 | 0.010 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.98 | 2.29 | 100.39 | 1.89 | 189.81 | 44 | 1023 | 0.42 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.06 | 2.33 | 99.25 | 2.04 | 202.74 | 48 | 1062 | 0.42 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.13 | 2.34 | 102.50 | 2.08 | 213.64 | 51 | 1111 | 0.42 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.17 | 2.36 | 96.82 | 2.20 | 212.74 | 52 | 1083 | 0.42 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.28 | 2.29 | 104.39 | 1.87 | 195.54 | 46 | 1057 | 0.42 | 0.010 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.32 | 2.19 | 114.85 | 1.58 | 181.45 | 41 | 1025 | 0.42 | 0.011 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.39 | 2.11 | 126.97 | 1.43 | 181.48 | 39 | 1025 | 0.42 | 0.011 | 0.01 | 9.85 | 0.00 | 0.000 |
| 2.43 | 2.07 | 134.32 | 1.38 | 185.89 | 40 | 1041 | 0.42 | 0.011 | 0.00 | 9.85 | 0.00 | 0.000 |
| 2.52 | 2.10 | 129.59 | 1.42 | 184.32 | 40 | 1040 | 0.42 | 0.012 | 0.01 | 9.85 | 0.00 | 0.000 |
| 2.57 | 2.15 | 118.07 | 1.50 | 177.48 | 39 | 1006 | 0.42 | 0.013 | 0.01 | 9.85 | 0.00 | 0.000 |
| 2.66 | 2.19 | 108.04 | 1.58 | 170.64 | 38 | 964 | 0.42 | 0.014 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.69 | 2.22 | 96.62 | 1.67 | 161.68 | 37 | 903 | 0.42 | 0.017 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.77 | 2.25 | 88.98 | 1.75 | 156.13 | 36 | 862 | 0.42 | 0.019 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.86 | 2.26 | 85.87 | 1.78 | 152.98 | 35 | 840 | 0.42 | 0.021 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.92 | 2.26 | 85.29 | 1.79 | 153.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.96 | 2.30 | 80.90 | 1.93 | 155.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.06 | 2.37 | 72.43 | 2.24 | 162.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.11 | 2.45 | 65.17 | 2.67 | 173.89 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.15 | 2.49 | 61.49 | 2.91 | 178.62 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.26 | 2.46 | 62.87 | 2.72 | 171.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.30 | 2.33 | 72.47 | 2.03 | 147.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.37 | 2.14 | 89.94 | 1.48 | 132.75 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.46 | 1.89 | 124.45 | 1.23 | 153.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.51 | 1.73 | 153.51 | 1.06 | 162.28 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.56 | 1.65 | 176.56 | 1.00 | 176.56 | 32 | 796 | 0.42 | 0.032 | 0.02 | 9.85 | 0.01 | 0.000 |
| 3.64 | 1.70 | 168.25 | 1.00 | 168.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.71 | 1.83 | 147.89 | 1.18 | 175.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.76 | 2.01 | 121.82 | 1.31 | 159.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.81 | 2.18 | 97.18 | 1.56 | 152.04 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.90 | 2.31 | 80.32 | 1.96 | 157.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.94 | 2.43 | 65.61 | 2.55 | 167.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.00 | 2.50 | 56.73 | 2.96 | 168.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.09 | 2.57 | 47.18 | 3.54 | 167.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.15 | 2.65 | 39.34 | 4.16 | 163.69 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.20 | 2.63 | 38.14 | 3.99 | 152.23 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.30 | 2.56 | 39.99 | 3.46 | 138.29 | 37 | 576 | 0.42 | 0.125 | 0.06 | 9.85 | 0.05 | 0.001 |
| 4.35 | 2.51 | 40.85 | 3.08 | 125.75 | 33 | 552 | 0.42 | 0.152 | 0.08 | 9.85 | 0.06 | 0.001 |
| 4.41 | 2.53 | 38.65 | 3.21 | 124.18 | 33 | 535 | 0.42 | 0.179 | 0.10 | 9.85 | 0.08 | 0.001 |
| 4.50 | 2.56 | 36.30 | 3.44 | 124.85 | 33 | 522 | 0.42 | 0.210 | 0.11 | 9.85 | 0.09 | 0.002 |
| 4.55 | 2.59 | 34.29 | 3.68 | 126.08 | 34 | 511 | 0.42 | 0.236 | 0.13 | 9.85 | 0.10 | 0.001 |
| 4.60 | 2.61 | 32.85 | 3.86 | 126.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.68 | 2.63 | 31.60 | 4.03 | 127.38 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.75 | 2.64 | 30.93 | 4.11 | 127.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.79 | 2.65 | 30.45 | 4.18 | 127.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.88 | 2.66 | 30.01 | 4.33 | 129.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.95 | 2.68 | 29.62 | 4.51 | 133.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.99 | 2.70 | 29.47 | 4.70 | 138.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.06 | 2.71 | 29.47 | 4.81 | 141.85 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.14 | 2.72 | 29.23 | 4.97 | 145.27 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.21 | 2.73 | 29.20 | 5.03 | 146.90 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.25 | 2.73 | 29.39 | 5.04 | 148.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.33 | 2.73 | 29.85 | 4.98 | 148.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.40 | 2.72 | 30.15 | 4.95 | 149.27 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.45 | 2.72 | 30.19 | 4.96 | 149.67 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.51 | 2.73 | 29.90 | 5.04 | 150.60 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.60 | 2.74 | 29.57 | 5.14 | 151.98 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.66 | 2.75 | 29.28 | 5.26 | 153.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.71 | 2.75 | 29.32 | 5.30 | 155.33 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.78 | 2.75 | 29.45 | 5.31 | 156.32 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.86 | 2.75 | 29.73 | 5.26 | 156.27 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.93 | 2.75 | 29.68 | 5.26 | 156.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.01 | 2.76 | 29.24 | 5.33 | 155.90 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.05 | 2.77 | 28.33 | 5.50 | 155.71 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.11 | 2.79 | 27.27 | 5.68 | 154.76 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.21 | 2.80 | 26.36 | 5.81 | 153.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.25 | 2.81 | 25.44 | 5.95 | 151.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.31 | 2.82 | 24.48 | 6.12 | 149.72 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.39 | 2.84 | 23.38 | 6.33 | 147.98 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.45 | 2.85 | 22.42 | 6.54 | 146.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.51 | 2.87 | 21.65 | 6.73 | 145.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.58 | 2.88 | 21.02 | 6.88 | 144.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.66 | 2.89 | 20.53 | 7.00 | 143.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.70 | 2.88 | 20.43 | 6.95 | 141.97 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.78 | 2.88 | 20.47 | 6.87 | 140.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.85 | 2.87 | 20.65 | 6.78 | 139.95 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.89 | 2.86 | 21.03 | 6.62 | 139.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.00 | 2.85 | 21.40 | 6.45 | 138.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.03 | 2.83 | 21.92 | 6.21 | 136.15 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.09 | 2.82 | 22.24 | 6.05 | 134.58 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.19 | 2.80 | 22.75 | 5.84 | 132.81 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.25 | 2.78 | 23.51 | 5.56 | 130.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.30 | 2.75 | 24.37 | 5.28 | 128.69 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.37 | 2.73 | 25.46 | 4.99 | 126.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.44 | 2.71 | 26.22 | 4.83 | 126.61 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.49 | 2.70 | 27.03 | 4.73 | 127.84 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.56 | 2.70 | 27.59 | 4.71 | 130.08 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.64 | 2.70 | 27.97 | 4.74 | 132.48 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.68 | 2.72 | 27.58 | 4.90 | 135.14 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.79 | 2.73 | 26.85 | 5.02 | 134.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.83 | 2.74 | 25.85 | 5.10 | 131.84 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.89 | 2.75 | 24.93 | 5.26 | 131.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.98 | 2.77 | 23.97 | 5.54 | 132.72 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.02 | 2.80 | 23.19 | 5.86 | 135.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.09 | 2.81 | 22.52 | 6.00 | 135.12 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.15 | 2.82 | 21.89 | 6.07 | 132.95 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.23 | 2.83 | 21.07 | 6.23 | 131.19 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.29 | 2.83 | 20.78 | 6.21 | 128.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.34 | 2.82 | 20.73 | 6.13 | 127.14 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.40 | 2.80 | 21.49 | 5.80 | 124.62 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.48 | 2.77 | 22.53 | 5.44 | 122.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.55 | 2.74 | 23.72 | 5.11 | 121.22 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.60 | 2.72 | 24.73 | 4.90 | 121.15 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.66 | 2.70 | 25.58 | 4.75 | 121.52 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.74 | 2.69 | 26.53 | 4.59 | 121.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.83 | 2.67 | 27.43 | 4.43 | 121.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.89 | 2.66 | 28.09 | 4.31 | 121.09 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.94 | 2.65 | 28.66 | 4.25 | 121.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Total estimated settlement: 0.01**

**Abbreviations**

$Q_{tn}$: Equivalent clean sand normalized cone resistance
$K_c$: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
$G_{max}$: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
$N_c$: Equivalent number of cycles
$e_v$: Volumetric strain
Settle.: Calculated settlement

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.01 | 123.94 | 2.00 | 0.00 | 0.85 | 0.00 | 9.09 | 126.83 | 2.00 | 0.00 | 0.85 | 0.00 |
| 9.15 | 129.84 | 2.00 | 0.00 | 0.84 | 0.00 | 9.20 | 133.09 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.29 | 136.19 | 2.00 | 0.00 | 0.84 | 0.00 | 9.35 | 138.95 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.39 | 140.80 | 2.00 | 0.00 | 0.84 | 0.00 | 9.45 | 142.66 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.54 | 143.79 | 2.00 | 0.00 | 0.84 | 0.00 | 9.63 | 143.77 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.65 | 142.45 | 2.00 | 0.00 | 0.84 | 0.00 | 9.73 | 139.48 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.79 | 137.51 | 2.00 | 0.00 | 0.83 | 0.00 | 9.84 | 136.44 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.91 | 136.98 | 2.00 | 0.00 | 0.83 | 0.00 | 9.99 | 138.26 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.08 | 138.90 | 2.00 | 0.00 | 0.83 | 0.00 | 10.14 | 138.89 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.19 | 137.13 | 2.00 | 0.00 | 0.83 | 0.00 | 10.25 | 134.50 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.34 | 132.13 | 2.00 | 0.00 | 0.82 | 0.00 | 10.38 | 130.80 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.44 | 130.44 | 2.00 | 0.00 | 0.82 | 0.00 | 10.52 | 131.85 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.59 | 132.48 | 2.00 | 0.00 | 0.82 | 0.00 | 10.63 | 132.21 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.70 | 129.09 | 2.00 | 0.00 | 0.82 | 0.00 | 10.78 | 126.34 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.87 | 125.31 | 2.00 | 0.00 | 0.82 | 0.00 | 10.93 | 125.83 | 2.00 | 0.00 | 0.81 | 0.00 |
| 10.97 | 126.44 | 2.00 | 0.00 | 0.81 | 0.00 | 11.03 | 125.71 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.12 | 123.80 | 0.55 | 1.59 | 0.81 | 0.02 | 11.16 | 124.57 | 0.56 | 1.58 | 0.81 | 0.01 |
| 11.23 | 128.01 | 0.59 | 1.54 | 0.81 | 0.01 | 11.31 | 133.86 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.37 | 135.35 | 2.00 | 0.00 | 0.81 | 0.00 | 11.44 | 135.10 | 0.66 | 1.29 | 0.81 | 0.01 |
| 11.51 | 134.04 | 0.65 | 1.48 | 0.80 | 0.01 | 11.56 | 134.87 | 0.65 | 1.29 | 0.80 | 0.01 |
| 11.63 | 136.26 | 0.67 | 1.27 | 0.80 | 0.01 | 11.71 | 137.37 | 0.68 | 1.26 | 0.80 | 0.01 |
| 11.76 | 138.38 | 0.69 | 1.24 | 0.80 | 0.01 | 11.83 | 138.69 | 0.69 | 1.24 | 0.80 | 0.01 |
| 11.91 | 139.81 | 0.70 | 1.22 | 0.80 | 0.01 | 11.94 | 141.18 | 0.72 | 1.20 | 0.80 | 0.01 |
| 12.05 | 142.00 | 2.00 | 0.00 | 0.80 | 0.00 | 12.10 | 141.76 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.14 | 141.66 | 2.00 | 0.00 | 0.79 | 0.00 | 12.25 | 141.15 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.29 | 139.55 | 2.00 | 0.00 | 0.79 | 0.00 | 12.35 | 137.89 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.44 | 136.61 | 2.00 | 0.00 | 0.79 | 0.00 | 12.49 | 136.63 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.55 | 137.02 | 2.00 | 0.00 | 0.79 | 0.00 | 12.61 | 136.20 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.70 | 133.86 | 2.00 | 0.00 | 0.78 | 0.00 | 12.74 | 130.24 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.81 | 126.89 | 2.00 | 0.00 | 0.78 | 0.00 | 12.89 | 125.86 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.94 | 125.62 | 2.00 | 0.00 | 0.78 | 0.00 | 12.99 | 124.04 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.07 | 118.75 | 2.00 | 0.00 | 0.78 | 0.00 | 13.15 | 112.54 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.20 | 109.17 | 2.00 | 0.00 | 0.78 | 0.00 | 13.27 | 108.09 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.32 | 107.80 | 2.00 | 0.00 | 0.77 | 0.00 | 13.39 | 106.47 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.48 | 104.94 | 2.00 | 0.00 | 0.77 | 0.00 | 13.54 | 102.95 | 2.00 | 0.00 | 0.77 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.59 | 100.94 | 2.00 | 0.00 | 0.77 | 0.00 | 13.65 | 99.34 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.74 | 99.15 | 2.00 | 0.00 | 0.77 | 0.00 | 13.80 | 99.68 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.88 | 100.10 | 2.00 | 0.00 | 0.76 | 0.00 | 13.93 | 99.13 | 2.00 | 0.00 | 0.76 | 0.00 |
| 13.99 | 96.05 | 2.00 | 0.00 | 0.76 | 0.00 | 14.07 | 91.73 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.12 | 91.42 | 2.00 | 0.00 | 0.76 | 0.00 | 14.18 | 97.15 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.26 | 104.59 | 2.00 | 0.00 | 0.76 | 0.00 | 14.34 | 108.39 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.38 | 107.10 | 2.00 | 0.00 | 0.76 | 0.00 | 14.47 | 104.07 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.53 | 102.53 | 2.00 | 0.00 | 0.75 | 0.00 | 14.57 | 106.16 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.64 | 112.58 | 2.00 | 0.00 | 0.75 | 0.00 | 14.72 | 118.51 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.80 | 120.68 | 2.00 | 0.00 | 0.75 | 0.00 | 14.83 | 120.79 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.92 | 120.03 | 2.00 | 0.00 | 0.75 | 0.00 | 14.97 | 118.08 | 2.00 | 0.00 | 0.75 | 0.00 |
| 15.06 | 115.85 | 2.00 | 0.00 | 0.74 | 0.00 | 15.10 | 114.88 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.17 | 116.61 | 2.00 | 0.00 | 0.74 | 0.00 | 15.25 | 121.37 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.31 | 127.56 | 2.00 | 0.00 | 0.74 | 0.00 | 15.37 | 134.20 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.44 | 138.46 | 2.00 | 0.00 | 0.74 | 0.00 | 15.51 | 140.25 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.56 | 140.44 | 2.00 | 0.00 | 0.74 | 0.00 | 15.63 | 141.37 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.71 | 142.91 | 0.66 | 1.09 | 0.73 | 0.01 | 15.76 | 145.04 | 0.68 | 1.06 | 0.73 | 0.01 |
| 15.82 | 150.37 | 0.74 | 1.01 | 0.73 | 0.01 | 15.90 | 155.79 | 0.81 | 0.78 | 0.73 | 0.01 |
| 15.95 | 160.94 | 0.87 | 0.57 | 0.73 | 0.00 | 16.01 | 161.62 | 0.88 | 0.56 | 0.73 | 0.00 |
| 16.10 | 161.51 | 0.88 | 0.56 | 0.73 | 0.01 | 16.16 | 160.60 | 0.86 | 0.56 | 0.73 | 0.00 |
| 16.21 | 157.64 | 2.00 | 0.00 | 0.73 | 0.00 | 16.29 | 151.56 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.36 | 145.37 | 2.00 | 0.00 | 0.72 | 0.00 | 16.41 | 141.64 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.48 | 141.36 | 2.00 | 0.00 | 0.72 | 0.00 | 16.55 | 143.41 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.60 | 147.61 | 2.00 | 0.00 | 0.72 | 0.00 | 16.70 | 152.54 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.74 | 159.56 | 2.00 | 0.00 | 0.72 | 0.00 | 16.80 | 167.01 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.89 | 174.59 | 2.00 | 0.00 | 0.71 | 0.00 | 16.93 | 174.81 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.00 | 159.18 | 2.00 | 0.00 | 0.71 | 0.00 | 17.09 | 142.28 | 0.63 | 1.24 | 0.71 | 0.01 |
| 17.14 | 130.61 | 0.52 | 1.33 | 0.71 | 0.01 | 17.20 | 133.43 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.28 | 133.22 | 2.00 | 0.00 | 0.71 | 0.00 | 17.34 | 128.68 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.41 | 122.37 | 2.00 | 0.00 | 0.70 | 0.00 | 17.48 | 119.38 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.56 | 119.36 | 2.00 | 0.00 | 0.70 | 0.00 | 17.62 | 120.89 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.67 | 123.19 | 2.00 | 0.00 | 0.70 | 0.00 | 17.72 | 126.06 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.78 | 128.84 | 2.00 | 0.00 | 0.70 | 0.00 | 17.87 | 133.26 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.94 | 136.11 | 2.00 | 0.00 | 0.70 | 0.00 | 18.01 | 136.64 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.06 | 132.30 | 2.00 | 0.00 | 0.69 | 0.00 | 18.12 | 131.10 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.21 | 132.04 | 2.00 | 0.00 | 0.69 | 0.00 | 18.25 | 134.00 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.31 | 135.19 | 0.55 | 1.26 | 0.69 | 0.01 | 18.40 | 136.74 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.44 | 136.99 | 2.00 | 0.00 | 0.69 | 0.00 | 18.51 | 137.16 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.58 | 135.12 | 2.00 | 0.00 | 0.69 | 0.00 | 18.64 | 134.97 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.71 | 133.70 | 2.00 | 0.00 | 0.68 | 0.00 | 18.80 | 131.61 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.86 | 130.14 | 2.00 | 0.00 | 0.68 | 0.00 | 18.91 | 127.90 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.98 | 130.07 | 2.00 | 0.00 | 0.68 | 0.00 | 19.05 | 134.74 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.10 | 144.69 | 2.00 | 0.00 | 0.68 | 0.00 | 19.20 | 151.02 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.23 | 149.44 | 2.00 | 0.00 | 0.67 | 0.00 | 19.30 | 145.65 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.39 | 145.10 | 2.00 | 0.00 | 0.67 | 0.00 | 19.43 | 148.17 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.50 | 149.77 | 2.00 | 0.00 | 0.67 | 0.00 | 19.57 | 151.50 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.63 | 152.80 | 2.00 | 0.00 | 0.67 | 0.00 | 19.70 | 154.99 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.77 | 157.82 | 2.00 | 0.00 | 0.66 | 0.00 | 19.84 | 161.05 | 0.82 | 0.67 | 0.66 | 0.01 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.90 | 165.57 | 0.88 | 0.49 | 0.66 | 0.00 | 19.99 | 170.43 | 0.94 | 0.47 | 0.66 | 0.01 |
| 20.02 | 161.66 | 2.00 | 0.00 | 0.66 | 0.00 | 20.09 | 155.60 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.19 | 149.93 | 2.00 | 0.00 | 0.66 | 0.00 | 20.21 | 167.07 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.29 | 181.99 | 2.00 | 0.00 | 0.66 | 0.00 | 20.38 | 194.98 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.42 | 200.12 | 2.00 | 0.00 | 0.65 | 0.00 | 20.52 | 199.86 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.55 | 200.70 | 2.00 | 0.00 | 0.65 | 0.00 | 20.62 | 198.53 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.68 | 191.93 | 2.00 | 0.00 | 0.65 | 0.00 | 20.75 | 182.50 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.81 | 171.52 | 2.00 | 0.00 | 0.65 | 0.00 | 20.89 | 163.49 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.96 | 159.56 | 2.00 | 0.00 | 0.64 | 0.00 | 21.01 | 159.83 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.09 | 161.15 | 2.00 | 0.00 | 0.64 | 0.00 | 21.15 | 162.37 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.21 | 163.12 | 2.00 | 0.00 | 0.64 | 0.00 | 21.30 | 163.04 | 0.83 | 0.64 | 0.64 | 0.01 |
| 21.36 | 162.23 | 0.82 | 0.64 | 0.64 | 0.00 | 21.40 | 161.25 | 0.81 | 0.64 | 0.64 | 0.00 |
| 21.49 | 160.42 | 0.79 | 0.65 | 0.64 | 0.01 | 21.56 | 160.10 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.60 | 161.03 | 2.00 | 0.00 | 0.63 | 0.00 | 21.66 | 164.62 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.75 | 170.92 | 2.00 | 0.00 | 0.63 | 0.00 | 21.80 | 179.52 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.85 | 188.95 | 2.00 | 0.00 | 0.63 | 0.00 | 21.95 | 196.83 | 1.34 | 0.11 | 0.63 | 0.00 |
| 21.99 | 201.78 | 2.00 | 0.00 | 0.63 | 0.00 | 22.05 | 200.83 | 2.00 | 0.00 | 0.63 | 0.00 |
| 22.14 | 197.19 | 1.35 | 0.11 | 0.62 | 0.00 | 22.19 | 190.19 | 1.22 | 0.16 | 0.62 | 0.00 |
| 22.26 | 178.44 | 1.03 | 0.32 | 0.62 | 0.00 | 22.35 | 161.20 | 0.80 | 0.63 | 0.62 | 0.01 |
| 22.44 | 147.37 | 0.64 | 1.07 | 0.62 | 0.01 | 22.45 | 138.52 | 0.55 | 1.11 | 0.62 | 0.00 |
| 22.54 | 137.03 | 0.54 | 1.12 | 0.62 | 0.01 | 22.58 | 135.56 | 0.53 | 1.12 | 0.62 | 0.01 |
| 22.65 | 136.96 | 2.00 | 0.00 | 0.62 | 0.00 | 22.73 | 140.03 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.79 | 143.15 | 2.00 | 0.00 | 0.61 | 0.00 | 22.84 | 146.10 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.93 | 146.96 | 2.00 | 0.00 | 0.61 | 0.00 | 22.99 | 148.47 | 0.65 | 1.04 | 0.61 | 0.01 |
| 23.04 | 154.63 | 0.71 | 0.81 | 0.61 | 0.00 | 23.12 | 170.00 | 0.90 | 0.43 | 0.61 | 0.00 |
| 23.19 | 186.48 | 1.15 | 0.16 | 0.61 | 0.00 | 23.27 | 195.05 | 1.30 | 0.11 | 0.61 | 0.00 |
| 23.30 | 195.26 | 1.30 | 0.11 | 0.61 | 0.00 | 23.38 | 189.18 | 1.19 | 0.16 | 0.60 | 0.00 |
| 23.47 | 183.49 | 1.10 | 0.22 | 0.60 | 0.00 | 23.50 | 175.16 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.57 | 167.17 | 2.00 | 0.00 | 0.60 | 0.00 | 23.66 | 160.24 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.69 | 156.12 | 2.00 | 0.00 | 0.60 | 0.00 | 23.77 | 155.21 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.84 | 157.18 | 2.00 | 0.00 | 0.60 | 0.00 | 23.92 | 162.11 | 2.00 | 0.00 | 0.59 | 0.00 |
| 23.97 | 168.18 | 2.00 | 0.00 | 0.59 | 0.00 | 24.06 | 170.75 | 0.91 | 0.42 | 0.59 | 0.00 |
| 24.11 | 171.51 | 0.92 | 0.42 | 0.59 | 0.00 | 24.16 | 169.75 | 0.89 | 0.42 | 0.59 | 0.00 |
| 24.23 | 169.29 | 0.89 | 0.42 | 0.59 | 0.00 | 24.31 | 170.12 | 0.90 | 0.42 | 0.59 | 0.00 |
| 24.36 | 172.07 | 0.92 | 0.41 | 0.59 | 0.00 | 24.42 | 173.21 | 0.94 | 0.41 | 0.59 | 0.00 |
| 24.51 | 173.63 | 0.95 | 0.41 | 0.58 | 0.00 | 24.54 | 173.17 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.62 | 169.82 | 2.00 | 0.00 | 0.58 | 0.00 | 24.71 | 164.43 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.74 | 154.24 | 2.00 | 0.00 | 0.58 | 0.00 | 24.81 | 142.09 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.89 | 129.49 | 2.00 | 0.00 | 0.58 | 0.00 | 24.96 | 122.02 | 2.00 | 0.00 | 0.58 | 0.00 |
| 25.01 | 119.50 | 2.00 | 0.00 | 0.58 | 0.00 | 25.10 | 118.18 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.14 | 115.24 | 2.00 | 0.00 | 0.57 | 0.00 | 25.21 | 112.02 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.30 | 109.06 | 2.00 | 0.00 | 0.57 | 0.00 | 25.34 | 106.90 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.41 | 105.58 | 2.00 | 0.00 | 0.57 | 0.00 | 25.50 | 104.38 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.55 | 103.92 | 2.00 | 0.00 | 0.57 | 0.00 | 25.60 | 103.66 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.70 | 103.42 | 2.00 | 0.00 | 0.56 | 0.00 | 25.75 | 103.01 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.80 | 101.70 | 2.00 | 0.00 | 0.56 | 0.00 | 25.89 | 99.33 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.95 | 95.76 | 2.00 | 0.00 | 0.56 | 0.00 | 25.99 | 89.28 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.06 | 83.95 | 2.00 | 0.00 | 0.56 | 0.00 | 26.15 | 80.96 | 2.00 | 0.00 | 0.56 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26.19 | 82.39 | 2.00 | 0.00 | 0.56 | 0.00 | 26.25 | 85.01 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.34 | 87.44 | 2.00 | 0.00 | 0.55 | 0.00 | 26.38 | 89.74 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.45 | 92.10 | 2.00 | 0.00 | 0.55 | 0.00 | 26.52 | 95.26 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.61 | 98.27 | 2.00 | 0.00 | 0.55 | 0.00 | 26.67 | 99.65 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.71 | 99.42 | 2.00 | 0.00 | 0.55 | 0.00 | 26.82 | 98.64 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.86 | 96.88 | 2.00 | 0.00 | 0.54 | 0.00 | 26.94 | 94.69 | 2.00 | 0.00 | 0.54 | 0.00 |
| 26.98 | 91.32 | 2.00 | 0.00 | 0.54 | 0.00 | 27.06 | 88.21 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.10 | 83.86 | 2.00 | 0.00 | 0.54 | 0.00 | 27.17 | 80.10 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.25 | 77.03 | 2.00 | 0.00 | 0.54 | 0.00 | 27.31 | 75.77 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.39 | 75.24 | 2.00 | 0.00 | 0.54 | 0.00 | 27.44 | 75.48 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.51 | 76.95 | 2.00 | 0.00 | 0.53 | 0.00 | 27.58 | 78.99 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.63 | 80.62 | 2.00 | 0.00 | 0.53 | 0.00 | 27.71 | 80.99 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.79 | 80.79 | 2.00 | 0.00 | 0.53 | 0.00 | 27.86 | 80.37 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.89 | 80.78 | 2.00 | 0.00 | 0.53 | 0.00 | 27.96 | 81.90 | 2.00 | 0.00 | 0.53 | 0.00 |
| 28.05 | 83.33 | 2.00 | 0.00 | 0.52 | 0.00 | 28.09 | 85.26 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.16 | 87.42 | 2.00 | 0.00 | 0.52 | 0.00 | 28.23 | 90.54 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.29 | 94.43 | 2.00 | 0.00 | 0.52 | 0.00 | 28.35 | 98.07 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.44 | 100.43 | 2.00 | 0.00 | 0.52 | 0.00 | 28.50 | 101.01 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.55 | 100.76 | 2.00 | 0.00 | 0.52 | 0.00 | 28.64 | 100.20 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.69 | 100.01 | 2.00 | 0.00 | 0.51 | 0.00 | 28.75 | 99.74 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.82 | 99.44 | 2.00 | 0.00 | 0.51 | 0.00 | 28.89 | 99.58 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.98 | 98.31 | 2.00 | 0.00 | 0.51 | 0.00 | 29.04 | 96.19 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.08 | 97.85 | 2.00 | 0.00 | 0.51 | 0.00 | 29.14 | 102.84 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.24 | 108.93 | 2.00 | 0.00 | 0.50 | 0.00 | 29.29 | 111.09 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.34 | 112.16 | 2.00 | 0.00 | 0.50 | 0.00 | 29.43 | 113.57 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.47 | 114.22 | 2.00 | 0.00 | 0.50 | 0.00 | 29.53 | 114.41 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.62 | 113.94 | 2.00 | 0.00 | 0.50 | 0.00 | 29.66 | 114.58 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.77 | 115.51 | 2.00 | 0.00 | 0.50 | 0.00 | 29.81 | 116.56 | 2.00 | 0.00 | 0.49 | 0.00 |
| 29.86 | 118.31 | 2.00 | 0.00 | 0.49 | 0.00 | 29.92 | 119.45 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.01 | 122.79 | 2.00 | 0.00 | 0.49 | 0.00 | 30.09 | 123.96 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.16 | 124.30 | 2.00 | 0.00 | 0.49 | 0.00 | 30.20 | 121.29 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.27 | 119.84 | 2.00 | 0.00 | 0.49 | 0.00 | 30.32 | 121.12 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.39 | 126.12 | 2.00 | 0.00 | 0.48 | 0.00 | 30.47 | 133.50 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.55 | 137.59 | 2.00 | 0.00 | 0.48 | 0.00 | 30.61 | 138.20 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.66 | 134.41 | 2.00 | 0.00 | 0.48 | 0.00 | 30.72 | 130.07 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.81 | 126.28 | 2.00 | 0.00 | 0.48 | 0.00 | 30.85 | 124.44 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.91 | 120.14 | 2.00 | 0.00 | 0.48 | 0.00 | 31.00 | 114.63 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.05 | 107.99 | 2.00 | 0.00 | 0.47 | 0.00 | 31.11 | 103.64 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.20 | 98.67 | 2.00 | 0.00 | 0.47 | 0.00 | 31.26 | 94.36 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.31 | 91.52 | 2.00 | 0.00 | 0.47 | 0.00 | 31.38 | 90.46 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.46 | 89.70 | 2.00 | 0.00 | 0.47 | 0.00 | 31.50 | 90.13 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.60 | 90.97 | 2.00 | 0.00 | 0.46 | 0.00 | 31.65 | 91.15 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.74 | 89.81 | 2.00 | 0.00 | 0.46 | 0.00 | 31.80 | 87.20 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.85 | 84.17 | 2.00 | 0.00 | 0.46 | 0.00 | 31.89 | 80.60 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.00 | 77.51 | 2.00 | 0.00 | 0.46 | 0.00 | 32.04 | 74.54 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.09 | 71.25 | 2.00 | 0.00 | 0.46 | 0.00 | 32.19 | 68.40 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.23 | 66.66 | 2.00 | 0.00 | 0.45 | 0.00 | 32.29 | 67.69 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.37 | 69.19 | 2.00 | 0.00 | 0.45 | 0.00 | 32.44 | 71.97 | 2.00 | 0.00 | 0.45 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.49 | 73.87 | 2.00 | 0.00 | 0.45 | 0.00 | 32.58 | 75.53 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.62 | 76.21 | 2.00 | 0.00 | 0.45 | 0.00 | 32.69 | 78.15 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.78 | 79.77 | 2.00 | 0.00 | 0.44 | 0.00 | 32.82 | 81.47 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.89 | 83.18 | 2.00 | 0.00 | 0.44 | 0.00 | 32.97 | 85.28 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.02 | 87.78 | 2.00 | 0.00 | 0.44 | 0.00 | 33.09 | 90.20 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.15 | 92.48 | 2.00 | 0.00 | 0.44 | 0.00 | 33.20 | 94.57 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.27 | 97.84 | 2.00 | 0.00 | 0.44 | 0.00 | 33.38 | 101.85 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.43 | 105.85 | 2.00 | 0.00 | 0.43 | 0.00 | 33.47 | 108.68 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.57 | 110.40 | 2.00 | 0.00 | 0.43 | 0.00 | 33.63 | 111.60 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.70 | 112.77 | 2.00 | 0.00 | 0.43 | 0.00 | 33.74 | 115.20 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.82 | 117.88 | 2.00 | 0.00 | 0.43 | 0.00 | 33.86 | 120.59 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.93 | 122.38 | 2.00 | 0.00 | 0.42 | 0.00 | 34.02 | 123.75 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.06 | 124.74 | 2.00 | 0.00 | 0.42 | 0.00 | 34.13 | 125.90 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.21 | 127.03 | 2.00 | 0.00 | 0.42 | 0.00 | 34.28 | 127.69 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.32 | 127.67 | 2.00 | 0.00 | 0.42 | 0.00 | 34.41 | 127.25 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.46 | 126.63 | 2.00 | 0.00 | 0.42 | 0.00 | 34.52 | 125.34 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.61 | 124.19 | 2.00 | 0.00 | 0.41 | 0.00 | 34.65 | 122.92 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.71 | 121.81 | 2.00 | 0.00 | 0.41 | 0.00 | 34.79 | 120.05 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.86 | 117.73 | 2.00 | 0.00 | 0.41 | 0.00 | 34.93 | 114.96 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.01 | 111.20 | 2.00 | 0.00 | 0.41 | 0.00 | 35.06 | 107.37 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.10 | 103.32 | 2.00 | 0.00 | 0.41 | 0.00 | 35.18 | 101.01 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.26 | 100.19 | 2.00 | 0.00 | 0.40 | 0.00 | 35.34 | 101.20 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.40 | 102.56 | 2.00 | 0.00 | 0.40 | 0.00 | 35.44 | 104.20 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.51 | 105.63 | 2.00 | 0.00 | 0.40 | 0.00 | 35.58 | 106.40 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.66 | 106.77 | 2.00 | 0.00 | 0.40 | 0.00 | 35.71 | 107.23 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.77 | 107.70 | 2.00 | 0.00 | 0.39 | 0.00 | 35.84 | 106.62 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.92 | 104.11 | 2.00 | 0.00 | 0.39 | 0.00 | 35.97 | 100.65 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.03 | 98.07 | 2.00 | 0.00 | 0.39 | 0.00 | 36.11 | 96.74 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.16 | 96.93 | 2.00 | 0.00 | 0.39 | 0.00 | 36.26 | 97.50 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.31 | 97.03 | 2.00 | 0.00 | 0.38 | 0.00 | 36.36 | 94.78 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.43 | 91.25 | 2.00 | 0.00 | 0.38 | 0.00 | 36.51 | 88.05 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.55 | 84.88 | 2.00 | 0.00 | 0.38 | 0.00 | 36.65 | 82.97 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.71 | 81.37 | 2.00 | 0.00 | 0.38 | 0.00 | 36.76 | 83.59 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.85 | 87.05 | 2.00 | 0.00 | 0.38 | 0.00 | 36.89 | 91.67 | 2.00 | 0.00 | 0.37 | 0.00 |
| 36.96 | 92.84 | 2.00 | 0.00 | 0.37 | 0.00 | 37.02 | 93.51 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.11 | 93.53 | 2.00 | 0.00 | 0.37 | 0.00 | 37.15 | 96.38 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.24 | 99.37 | 2.00 | 0.00 | 0.37 | 0.00 | 37.30 | 102.77 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.35 | 106.79 | 2.00 | 0.00 | 0.37 | 0.00 | 37.42 | 112.56 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.51 | 118.46 | 2.00 | 0.00 | 0.36 | 0.00 | 37.55 | 123.39 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.60 | 123.83 | 2.00 | 0.00 | 0.36 | 0.00 | 37.67 | 120.29 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.74 | 112.00 | 2.00 | 0.00 | 0.36 | 0.00 | 37.81 | 100.13 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.88 | 88.88 | 2.00 | 0.00 | 0.36 | 0.00 | 37.93 | 81.56 | 2.00 | 0.00 | 0.36 | 0.00 |
| 38.00 | 84.64 | 2.00 | 0.00 | 0.36 | 0.00 | 38.08 | 96.56 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.14 | 110.63 | 2.00 | 0.00 | 0.35 | 0.00 | 38.20 | 119.42 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.26 | 124.28 | 2.00 | 0.00 | 0.35 | 0.00 | 38.34 | 132.94 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.43 | 142.05 | 2.00 | 0.00 | 0.35 | 0.00 | 38.45 | 153.19 | 0.64 | 0.57 | 0.35 | 0.00 |
| 38.53 | 161.80 | 0.73 | 0.43 | 0.35 | 0.00 | 38.62 | 169.98 | 0.83 | 0.32 | 0.35 | 0.00 |
| 38.65 | 176.86 | 0.92 | 0.23 | 0.34 | 0.00 | 38.72 | 182.27 | 0.99 | 0.17 | 0.34 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.80 | 187.97 | 1.07 | 0.13 | 0.34 | 0.00 | 38.88 | 192.18 | 1.14 | 0.12 | 0.34 | 0.00 |
| 38.92 | 196.90 | 1.22 | 0.09 | 0.34 | 0.00 | 39.01 | 201.12 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.07 | 204.73 | 2.00 | 0.00 | 0.34 | 0.00 | 39.12 | 207.30 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.20 | 209.62 | 2.00 | 0.00 | 0.34 | 0.00 | 39.27 | 211.91 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.31 | 214.72 | 2.00 | 0.00 | 0.33 | 0.00 | 39.38 | 218.25 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.45 | 222.40 | 2.00 | 0.00 | 0.33 | 0.00 | 39.51 | 226.05 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.57 | 228.27 | 2.00 | 0.00 | 0.33 | 0.00 | 39.64 | 229.82 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.72 | 231.56 | 2.00 | 0.00 | 0.33 | 0.00 | 39.79 | 233.91 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.84 | 236.60 | 2.00 | 0.00 | 0.32 | 0.00 | 39.90 | 236.51 | 2.00 | 0.00 | 0.32 | 0.00 |
| 39.96 | 231.71 | 2.00 | 0.00 | 0.32 | 0.00 | 40.05 | 223.09 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.13 | 215.81 | 2.00 | 0.00 | 0.32 | 0.00 | 40.17 | 210.98 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.26 | 207.51 | 2.00 | 0.00 | 0.32 | 0.00 | 40.31 | 204.93 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.36 | 204.59 | 2.00 | 0.00 | 0.32 | 0.00 | 40.43 | 204.01 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.51 | 200.93 | 2.00 | 0.00 | 0.31 | 0.00 | 40.56 | 191.34 | 1.13 | 0.11 | 0.31 | 0.00 |
| 40.64 | 179.50 | 0.96 | 0.16 | 0.31 | 0.00 | 40.70 | 170.03 | 0.83 | 0.29 | 0.31 | 0.00 |
| 40.75 | 165.82 | 0.78 | 0.30 | 0.31 | 0.00 | 40.83 | 165.38 | 0.78 | 0.30 | 0.31 | 0.00 |
| 40.88 | 162.18 | 0.74 | 0.38 | 0.31 | 0.00 | 40.95 | 160.30 | 0.72 | 0.38 | 0.31 | 0.00 |
| 41.03 | 165.29 | 0.77 | 0.30 | 0.30 | 0.00 | 41.08 | 171.37 | 0.85 | 0.28 | 0.30 | 0.00 |
| 41.15 | 175.41 | 0.90 | 0.21 | 0.30 | 0.00 | 41.24 | 178.09 | 0.94 | 0.20 | 0.30 | 0.00 |
| 41.27 | 178.59 | 0.95 | 0.20 | 0.30 | 0.00 | 41.35 | 183.50 | 1.02 | 0.15 | 0.30 | 0.00 |
| 41.41 | 186.21 | 1.06 | 0.11 | 0.30 | 0.00 | 41.48 | 182.79 | 1.01 | 0.15 | 0.30 | 0.00 |
| 41.55 | 176.61 | 0.92 | 0.20 | 0.30 | 0.00 | 41.63 | 170.40 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.68 | 166.57 | 2.00 | 0.00 | 0.29 | 0.00 | 41.74 | 162.90 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.83 | 159.38 | 2.00 | 0.00 | 0.29 | 0.00 | 41.87 | 156.12 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.98 | 154.37 | 2.00 | 0.00 | 0.29 | 0.00 | 42.02 | 154.06 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.09 | 155.11 | 2.00 | 0.00 | 0.29 | 0.00 | 42.14 | 157.79 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.22 | 160.78 | 2.00 | 0.00 | 0.28 | 0.00 | 42.29 | 163.79 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.38 | 165.50 | 2.00 | 0.00 | 0.28 | 0.00 | 42.41 | 166.67 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.46 | 168.19 | 2.00 | 0.00 | 0.28 | 0.00 | 42.57 | 170.31 | 0.84 | 0.26 | 0.28 | 0.00 |
| 42.61 | 173.01 | 0.88 | 0.19 | 0.28 | 0.00 | 42.68 | 174.53 | 0.90 | 0.19 | 0.28 | 0.00 |
| 42.76 | 175.26 | 0.91 | 0.19 | 0.28 | 0.00 | 42.80 | 175.07 | 0.90 | 0.19 | 0.27 | 0.00 |
| 42.87 | 174.62 | 0.90 | 0.19 | 0.27 | 0.00 | 42.92 | 173.57 | 0.88 | 0.19 | 0.27 | 0.00 |
| 42.98 | 172.25 | 0.87 | 0.19 | 0.27 | 0.00 | 43.06 | 170.76 | 0.85 | 0.25 | 0.27 | 0.00 |
| 43.11 | 169.45 | 0.83 | 0.25 | 0.27 | 0.00 | 43.18 | 167.26 | 0.80 | 0.26 | 0.27 | 0.00 |
| 43.26 | 160.87 | 0.73 | 0.33 | 0.27 | 0.00 | 43.32 | 154.10 | 0.66 | 0.35 | 0.27 | 0.00 |
| 43.39 | 149.54 | 0.61 | 0.45 | 0.26 | 0.00 | 43.45 | 151.17 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.52 | 152.70 | 2.00 | 0.00 | 0.26 | 0.00 | 43.61 | 150.30 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.64 | 143.06 | 2.00 | 0.00 | 0.26 | 0.00 | 43.70 | 132.98 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.79 | 122.86 | 2.00 | 0.00 | 0.26 | 0.00 | 43.84 | 115.59 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.90 | 111.12 | 2.00 | 0.00 | 0.26 | 0.00 | 43.97 | 107.79 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.05 | 105.49 | 2.00 | 0.00 | 0.25 | 0.00 | 44.10 | 106.74 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.18 | 110.95 | 2.00 | 0.00 | 0.25 | 0.00 | 44.24 | 116.47 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.30 | 120.24 | 2.00 | 0.00 | 0.25 | 0.00 | 44.38 | 124.39 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.45 | 128.23 | 2.00 | 0.00 | 0.25 | 0.00 | 44.49 | 132.93 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.56 | 136.25 | 2.00 | 0.00 | 0.24 | 0.00 | 44.64 | 138.36 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.72 | 137.96 | 2.00 | 0.00 | 0.24 | 0.00 | 44.79 | 136.45 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.84 | 138.48 | 2.00 | 0.00 | 0.24 | 0.00 | 44.92 | 142.85 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.96 | 148.41 | 2.00 | 0.00 | 0.24 | 0.00 | 45.03 | 149.82 | 2.00 | 0.00 | 0.24 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45.09 | 141.26 | 2.00 | 0.00 | 0.24 | 0.00 | 45.19 | 127.48 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.23 | 114.20 | 2.00 | 0.00 | 0.23 | 0.00 | 45.28 | 110.71 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.38 | 114.77 | 2.00 | 0.00 | 0.23 | 0.00 | 45.43 | 120.01 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.48 | 121.55 | 2.00 | 0.00 | 0.23 | 0.00 | 45.58 | 123.87 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.62 | 128.66 | 2.00 | 0.00 | 0.23 | 0.00 | 45.67 | 135.83 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.78 | 145.58 | 2.00 | 0.00 | 0.22 | 0.00 | 45.82 | 157.07 | 2.00 | 0.00 | 0.22 | 0.00 |
| 45.88 | 164.64 | 2.00 | 0.00 | 0.22 | 0.00 | 45.98 | 170.46 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.02 | 171.42 | 2.00 | 0.00 | 0.22 | 0.00 | 46.07 | 164.27 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.17 | 154.53 | 2.00 | 0.00 | 0.22 | 0.00 | 46.21 | 145.68 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.27 | 141.12 | 0.54 | 0.38 | 0.22 | 0.00 | 46.37 | 138.65 | 0.52 | 0.38 | 0.21 | 0.00 |
| 46.39 | 137.22 | 0.51 | 0.39 | 0.21 | 0.00 | 46.47 | 140.58 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.57 | 145.36 | 2.00 | 0.00 | 0.21 | 0.00 | 46.62 | 150.35 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.67 | 152.98 | 2.00 | 0.00 | 0.21 | 0.00 | 46.77 | 153.26 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.81 | 151.15 | 2.00 | 0.00 | 0.21 | 0.00 | 46.90 | 147.88 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.92 | 145.69 | 2.00 | 0.00 | 0.20 | 0.00 | 47.01 | 145.48 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.05 | 145.37 | 2.00 | 0.00 | 0.20 | 0.00 | 47.12 | 145.75 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.21 | 147.74 | 2.00 | 0.00 | 0.20 | 0.00 | 47.28 | 150.65 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.32 | 153.73 | 2.00 | 0.00 | 0.20 | 0.00 | 47.40 | 155.22 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.45 | 153.26 | 2.00 | 0.00 | 0.20 | 0.00 | 47.55 | 151.16 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.58 | 150.72 | 2.00 | 0.00 | 0.19 | 0.00 | 47.66 | 153.64 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.74 | 154.74 | 2.00 | 0.00 | 0.19 | 0.00 | 47.80 | 151.94 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.85 | 146.09 | 2.00 | 0.00 | 0.19 | 0.00 | 47.93 | 141.11 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.98 | 138.25 | 0.52 | 0.33 | 0.19 | 0.00 | 48.04 | 138.01 | 0.52 | 0.33 | 0.19 | 0.00 |
| 48.11 | 138.96 | 0.53 | 0.33 | 0.18 | 0.00 | 48.20 | 140.05 | 0.54 | 0.32 | 0.18 | 0.00 |
| 48.24 | 139.70 | 0.54 | 0.32 | 0.18 | 0.00 | 48.30 | 137.11 | 0.51 | 0.33 | 0.18 | 0.00 |
| 48.39 | 134.22 | 0.49 | 0.33 | 0.18 | 0.00 | 48.44 | 133.12 | 0.48 | 0.33 | 0.18 | 0.00 |
| 48.53 | 133.10 | 0.48 | 0.33 | 0.18 | 0.00 | 48.59 | 133.23 | 0.48 | 0.33 | 0.18 | 0.00 |
| 48.63 | 133.75 | 0.49 | 0.32 | 0.18 | 0.00 | 48.70 | 135.51 | 0.50 | 0.32 | 0.17 | 0.00 |
| 48.78 | 137.62 | 0.52 | 0.31 | 0.17 | 0.00 | 48.82 | 139.54 | 0.54 | 0.31 | 0.17 | 0.00 |
| 48.89 | 141.09 | 0.55 | 0.30 | 0.17 | 0.00 | 48.98 | 141.92 | 0.56 | 0.30 | 0.17 | 0.00 |
| 49.05 | 142.01 | 2.00 | 0.00 | 0.17 | 0.00 | 49.09 | 140.67 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.16 | 138.35 | 2.00 | 0.00 | 0.17 | 0.00 | 49.23 | 136.14 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.31 | 135.25 | 2.00 | 0.00 | 0.16 | 0.00 | 49.38 | 135.29 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.43 | 136.59 | 2.00 | 0.00 | 0.16 | 0.00 | 49.52 | 137.85 | 0.52 | 0.29 | 0.16 | 0.00 |
| 49.58 | 138.95 | 0.53 | 0.28 | 0.16 | 0.00 | 49.63 | 138.19 | 0.53 | 0.28 | 0.16 | 0.00 |
| 49.71 | 133.96 | 0.49 | 0.29 | 0.16 | 0.00 | 49.77 | 127.27 | 0.44 | 0.30 | 0.16 | 0.00 |
| 49.82 | 120.79 | 2.00 | 0.00 | 0.16 | 0.00 | 49.88 | 118.88 | 2.00 | 0.00 | 0.15 | 0.00 |
| 49.97 | 121.37 | 2.00 | 0.00 | 0.15 | 0.00 | 50.01 | 126.84 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.07 | 132.51 | 2.00 | 0.00 | 0.15 | 0.00 | 50.17 | 137.52 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.22 | 138.02 | 2.00 | 0.00 | 0.15 | 0.00 | 50.29 | 135.28 | 0.51 | 0.27 | 0.15 | 0.00 |
| 50.37 | 133.84 | 0.49 | 0.27 | 0.15 | 0.00 | 50.42 | 135.81 | 0.51 | 0.26 | 0.15 | 0.00 |
| 50.47 | 138.65 | 0.54 | 0.26 | 0.14 | 0.00 | 50.57 | 138.22 | 0.53 | 0.26 | 0.14 | 0.00 |
| 50.63 | 137.18 | 0.52 | 0.26 | 0.14 | 0.00 | 50.68 | 134.52 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.73 | 134.89 | 2.00 | 0.00 | 0.14 | 0.00 | 50.79 | 132.34 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.88 | 126.49 | 2.00 | 0.00 | 0.14 | 0.00 | 50.93 | 115.71 | 2.00 | 0.00 | 0.14 | 0.00 |
| 51.03 | 105.98 | 2.00 | 0.00 | 0.14 | 0.00 | 51.07 | 98.64 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.13 | 93.09 | 2.00 | 0.00 | 0.13 | 0.00 | 51.23 | 86.54 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.27 | 79.39 | 2.00 | 0.00 | 0.13 | 0.00 | 51.33 | 74.31 | 2.00 | 0.00 | 0.13 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 51.42 | 69.27 | 2.00 | 0.00 | 0.13 | 0.00 | 51.48 | 65.19 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.52 | 63.19 | 2.00 | 0.00 | 0.13 | 0.00 | 51.59 | 63.92 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.68 | 65.67 | 2.00 | 0.00 | 0.12 | 0.00 | 51.72 | 69.61 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.81 | 73.12 | 2.00 | 0.00 | 0.12 | 0.00 | 51.87 | 75.87 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.91 | 76.95 | 2.00 | 0.00 | 0.12 | 0.00 | 51.98 | 78.43 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.07 | 80.51 | 2.00 | 0.00 | 0.12 | 0.00 | 52.10 | 82.16 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.17 | 82.52 | 2.00 | 0.00 | 0.12 | 0.00 | 52.24 | 81.84 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.30 | 79.87 | 2.00 | 0.00 | 0.11 | 0.00 | 52.37 | 76.53 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.46 | 72.79 | 2.00 | 0.00 | 0.11 | 0.00 | 52.51 | 70.03 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.56 | 67.62 | 2.00 | 0.00 | 0.11 | 0.00 | 52.66 | 65.60 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.71 | 64.17 | 2.00 | 0.00 | 0.11 | 0.00 | 52.78 | 63.72 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.86 | 63.35 | 2.00 | 0.00 | 0.10 | 0.00 | 52.91 | 63.09 | 2.00 | 0.00 | 0.10 | 0.00 |
| 52.99 | 62.95 | 2.00 | 0.00 | 0.10 | 0.00 | 53.06 | 62.88 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.09 | 62.88 | 2.00 | 0.00 | 0.10 | 0.00 | 53.16 | 62.61 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.25 | 62.13 | 2.00 | 0.00 | 0.10 | 0.00 | 53.29 | 61.52 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.36 | 61.45 | 2.00 | 0.00 | 0.10 | 0.00 | 53.45 | 61.62 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.50 | 61.97 | 2.00 | 0.00 | 0.09 | 0.00 | 53.55 | 62.11 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.64 | 62.15 | 2.00 | 0.00 | 0.09 | 0.00 | 53.69 | 62.24 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.76 | 62.31 | 2.00 | 0.00 | 0.09 | 0.00 | 53.84 | 62.40 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.88 | 62.21 | 2.00 | 0.00 | 0.09 | 0.00 | 53.96 | 61.99 | 2.00 | 0.00 | 0.09 | 0.00 |
| 54.03 | 62.25 | 2.00 | 0.00 | 0.08 | 0.00 | 54.08 | 63.82 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.17 | 65.33 | 2.00 | 0.00 | 0.08 | 0.00 | 54.23 | 66.43 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.27 | 66.33 | 2.00 | 0.00 | 0.08 | 0.00 | 54.38 | 66.21 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.42 | 65.89 | 2.00 | 0.00 | 0.08 | 0.00 | 54.47 | 65.40 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.53 | 64.53 | 2.00 | 0.00 | 0.08 | 0.00 | 54.60 | 63.26 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.68 | 61.69 | 2.00 | 0.00 | 0.07 | 0.00 | 54.73 | 60.40 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.80 | 59.66 | 2.00 | 0.00 | 0.07 | 0.00 | 54.88 | 59.81 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.95 | 60.73 | 2.00 | 0.00 | 0.07 | 0.00 | 55.02 | 62.11 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.07 | 63.43 | 2.00 | 0.00 | 0.07 | 0.00 | 55.15 | 64.48 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.21 | 65.27 | 2.00 | 0.00 | 0.06 | 0.00 | 55.27 | 65.98 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.34 | 66.54 | 2.00 | 0.00 | 0.06 | 0.00 | 55.42 | 66.95 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.47 | 66.55 | 2.00 | 0.00 | 0.06 | 0.00 | 55.54 | 65.73 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.62 | 64.92 | 2.00 | 0.00 | 0.06 | 0.00 | 55.65 | 65.55 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.72 | 68.90 | 2.00 | 0.00 | 0.06 | 0.00 | 55.81 | 72.51 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.84 | 75.34 | 2.00 | 0.00 | 0.05 | 0.00 | 55.91 | 76.24 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.98 | 77.76 | 2.00 | 0.00 | 0.05 | 0.00 | 56.05 | 80.81 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.11 | 89.31 | 2.00 | 0.00 | 0.05 | 0.00 | 56.21 | 98.48 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.26 | 105.76 | 2.00 | 0.00 | 0.05 | 0.00 | 56.31 | 103.91 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.39 | 99.45 | 2.00 | 0.00 | 0.04 | 0.00 | 56.45 | 95.72 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.50 | 96.32 | 2.00 | 0.00 | 0.04 | 0.00 | 56.60 | 98.89 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.65 | 102.15 | 2.00 | 0.00 | 0.04 | 0.00 | 56.72 | 104.69 | 0.32 | 0.09 | 0.04 | 0.00 |
| 56.78 | 107.26 | 2.00 | 0.00 | 0.04 | 0.00 | 56.87 | 110.30 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.93 | 113.42 | 2.00 | 0.00 | 0.04 | 0.00 | 56.97 | 114.07 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.05 | 112.87 | 2.00 | 0.00 | 0.03 | 0.00 | 57.11 | 111.57 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.17 | 111.10 | 2.00 | 0.00 | 0.03 | 0.00 | 57.25 | 109.92 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.31 | 107.37 | 2.00 | 0.00 | 0.03 | 0.00 | 57.37 | 104.53 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.42 | 101.73 | 2.00 | 0.00 | 0.03 | 0.00 | 57.48 | 98.36 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.56 | 93.14 | 2.00 | 0.00 | 0.02 | 0.00 | 57.64 | 86.57 | 2.00 | 0.00 | 0.02 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.70 | 80.19 | 2.00 | 0.00 | 0.02 | 0.00 | 57.74 | 75.91 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.81 | 73.24 | 2.00 | 0.00 | 0.02 | 0.00 | 57.90 | 71.07 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.95 | 68.25 | 2.00 | 0.00 | 0.02 | 0.00 | 58.06 | 66.68 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.09 | 65.68 | 2.00 | 0.00 | 0.02 | 0.00 | 58.15 | 66.66 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.20 | 71.54 | 2.00 | 0.00 | 0.01 | 0.00 | 58.29 | 77.45 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.33 | 82.03 | 2.00 | 0.00 | 0.01 | 0.00 | 58.40 | 79.94 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.48 | 74.75 | 2.00 | 0.00 | 0.01 | 0.00 | 58.55 | 69.08 | 0.19 | 0.02 | 0.01 | 0.00 |
| 58.60 | 68.92 | 0.19 | 0.02 | 0.01 | 0.00 | 58.66 | 71.14 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.75 | 74.07 | 2.00 | 0.00 | 0.00 | 0.00 | 58.80 | 74.52 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.88 | 71.80 | 2.00 | 0.00 | 0.00 | 0.00 | 58.97 | 68.47 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.02 | 64.84 | 2.00 | 0.00 | 0.00 | 0.00 | 59.06 | 63.37 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.12 | 62.53 | 2.00 | 0.00 | 0.00 | 0.00 | 59.20 | 61.90 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.26 | 61.81 | 2.00 | 0.00 | 0.00 | 0.00 | 59.35 | 61.33 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.41 | 61.04 | 2.00 | 0.00 | 0.00 | 0.00 | 59.46 | 61.02 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.52 | 62.29 | 2.00 | 0.00 | 0.00 | 0.00 | 59.61 | 64.51 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.68 | 67.09 | 2.00 | 0.00 | 0.00 | 0.00 | 59.72 | 69.11 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.78 | 70.18 | 2.00 | 0.00 | 0.00 | 0.00 | 59.86 | 70.38 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.91 | 70.19 | 2.00 | 0.00 | 0.00 | 0.00 | 60.01 | 69.95 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.06 | 69.78 | 2.00 | 0.00 | 0.00 | 0.00 | 60.15 | 57.66 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.19 | 42.91 | 0.15 | 0.00 | 0.00 | 0.00 | 60.26 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.35 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.40 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.45 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.51 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |

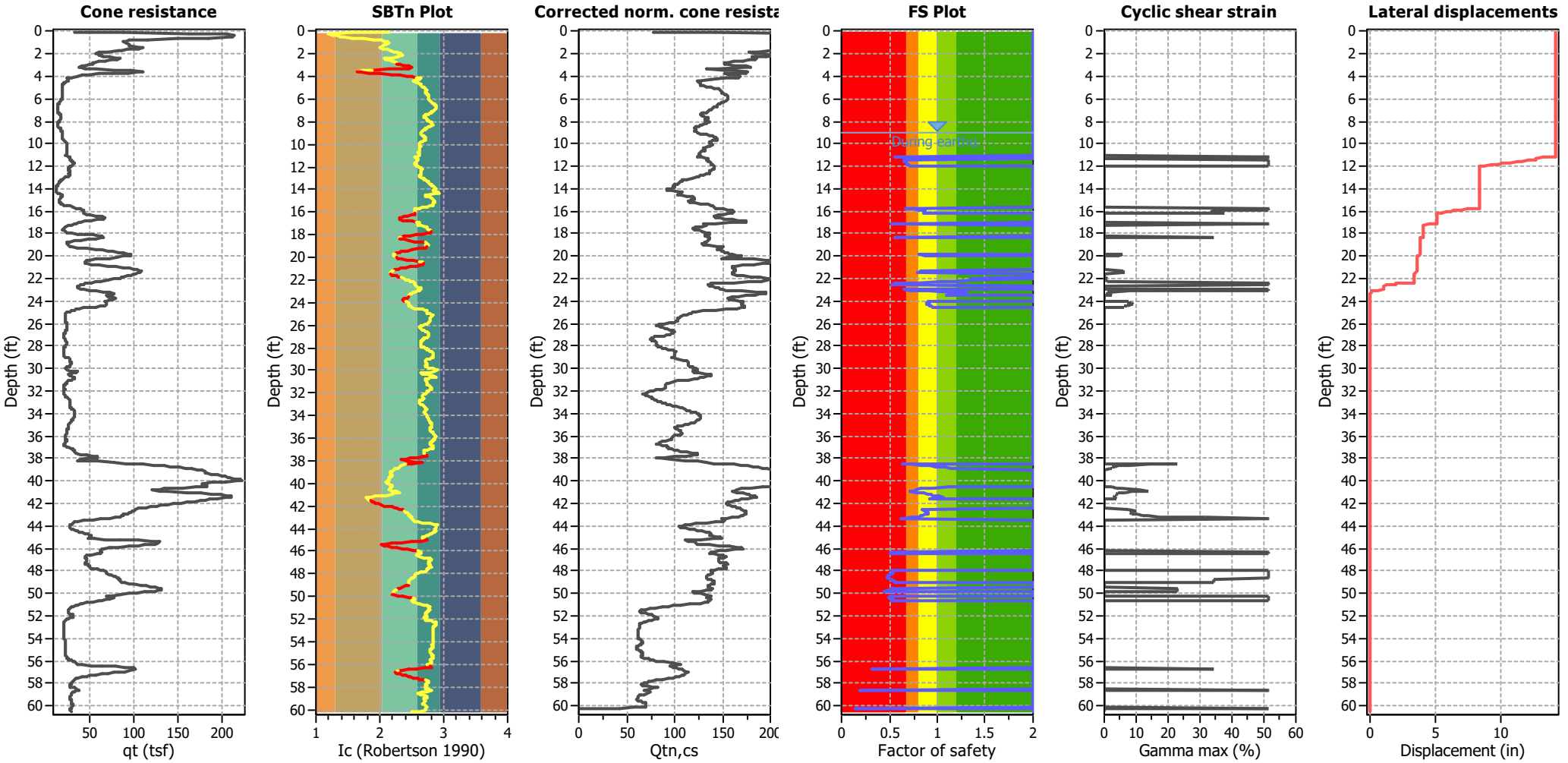
**Total estimated settlement: 0.48**

**Abbreviations**

| | |
|---|---|
| $Q_{tn,cs}$: | 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 |

# Estimation of post-earthquake lateral Displacements

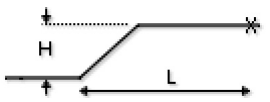
**Geometric parameters: Level ground (or gently sloping) with free face (L: 90.00 ft - H: 12.00 ft)**




**Abbreviations**

$q_t$: Total cone resistance (cone resistance $q_c$ corrected for pore water effects)
$I_c$: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
$\gamma_{max}$: Maximum cyclic shear strain
LDI: Lateral displacement index

**Surface condition**



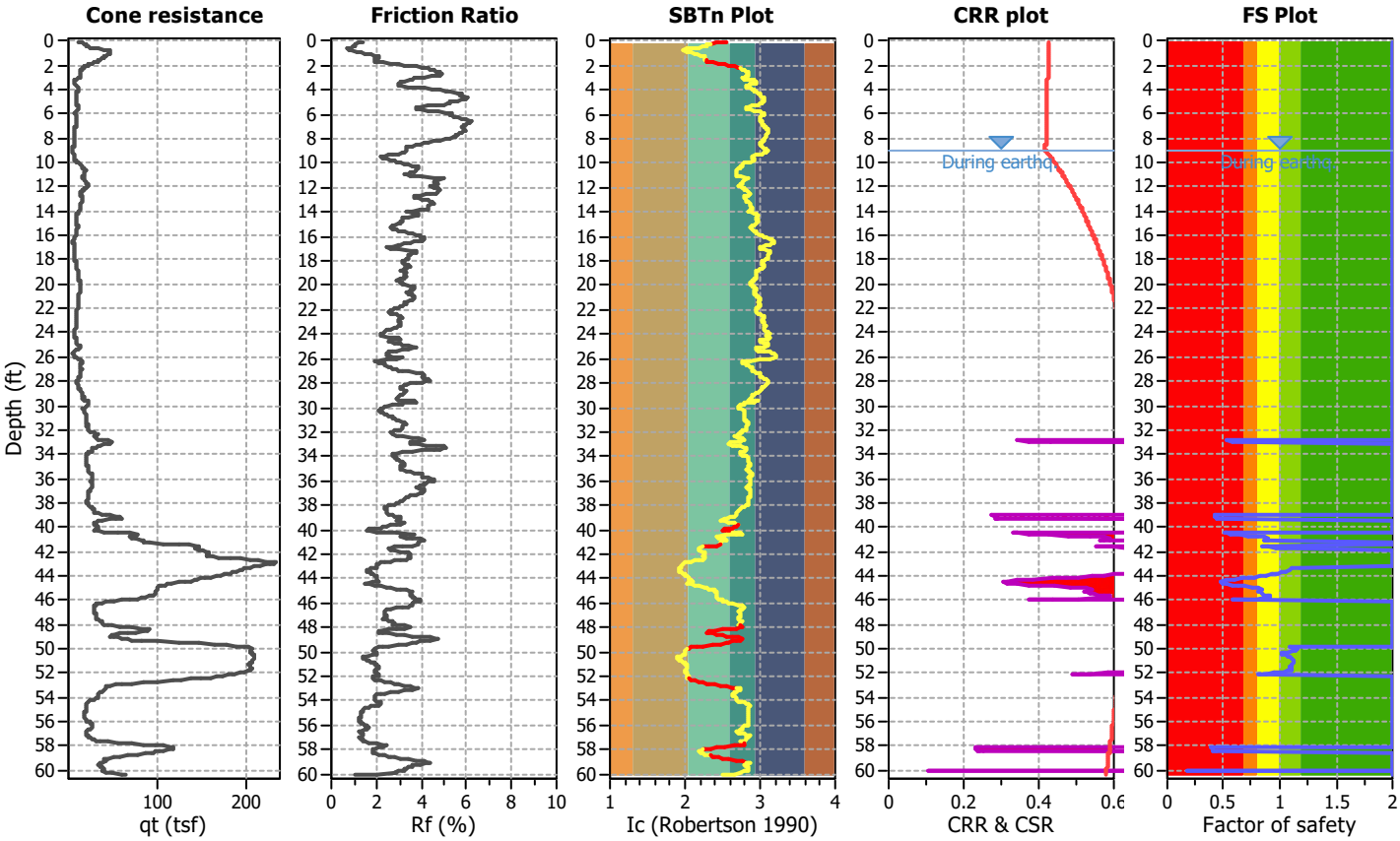
## LIQUEFACTION ANALYSIS REPORT

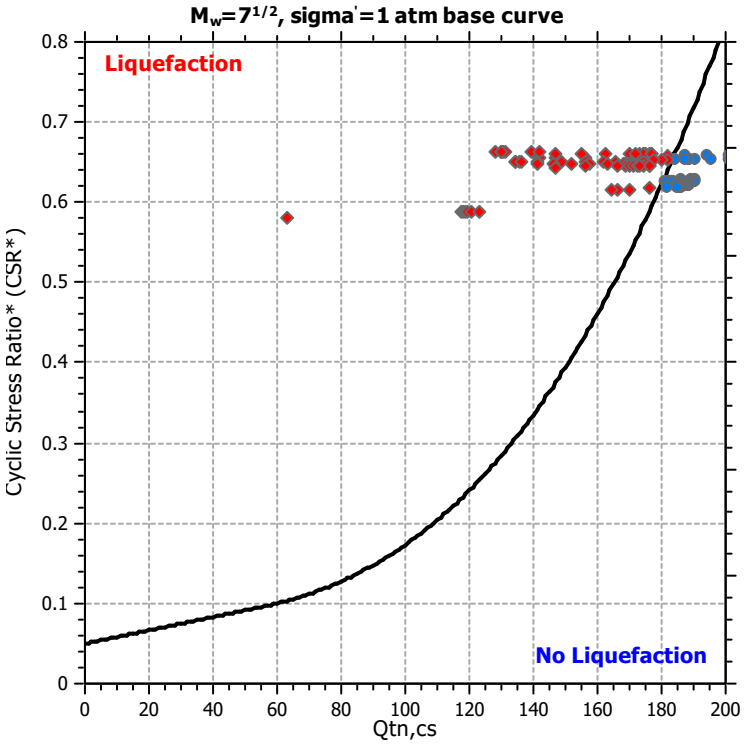
**Project title : Geocon West / 21611 Perry Street** **Location : Carson, CA**

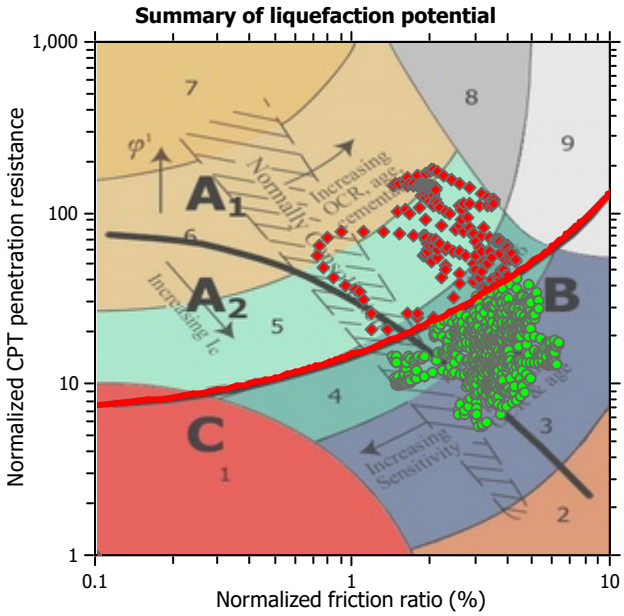
**CPT file : CPT-2**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | G.W.T. (in-situ): | 12.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | NCEER (1998) | G.W.T. (earthq.): | 9.00 ft | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 6.87 | Ic cut-off value: | 2.60 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 0.82 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

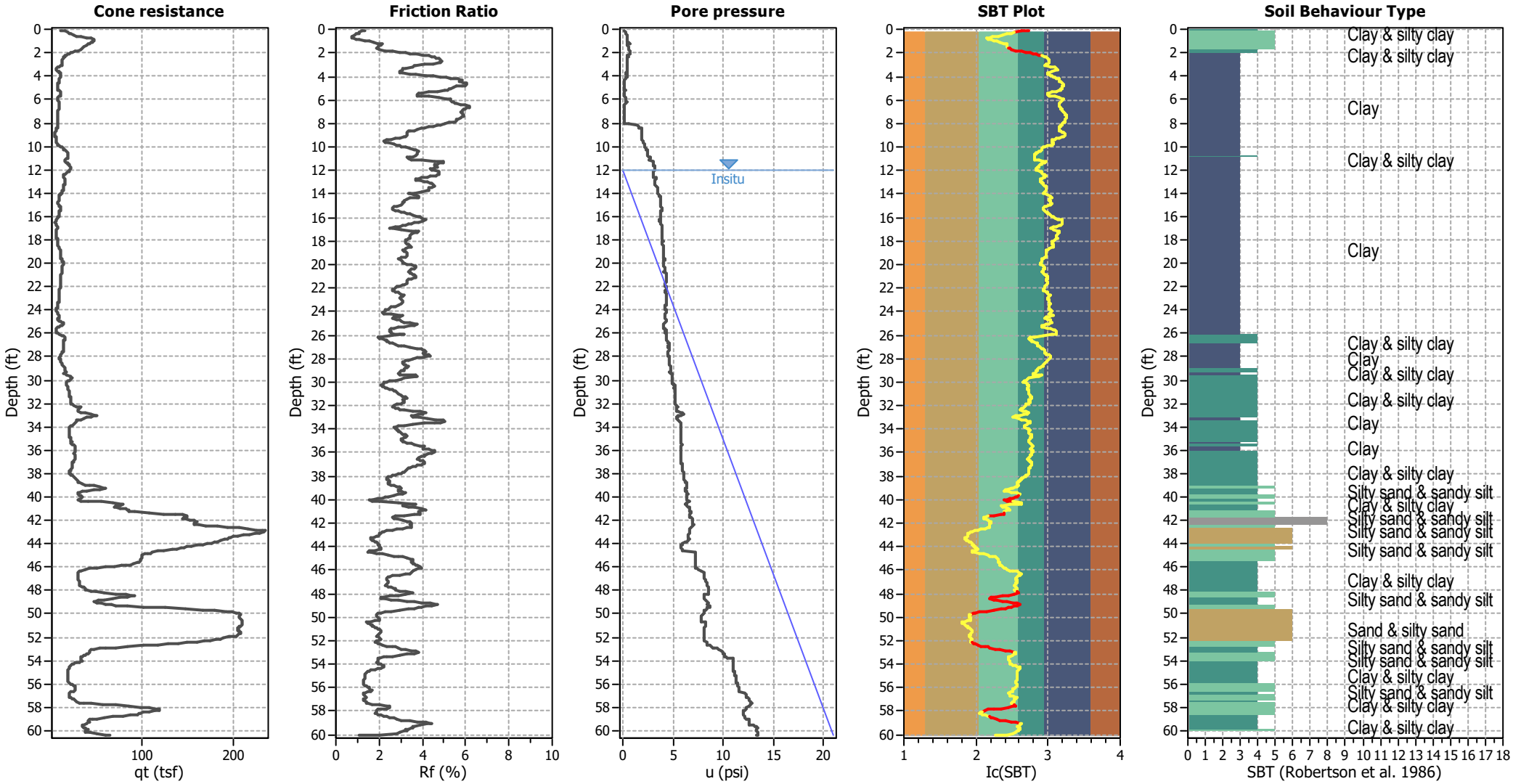



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# CPT basic interpretation plots



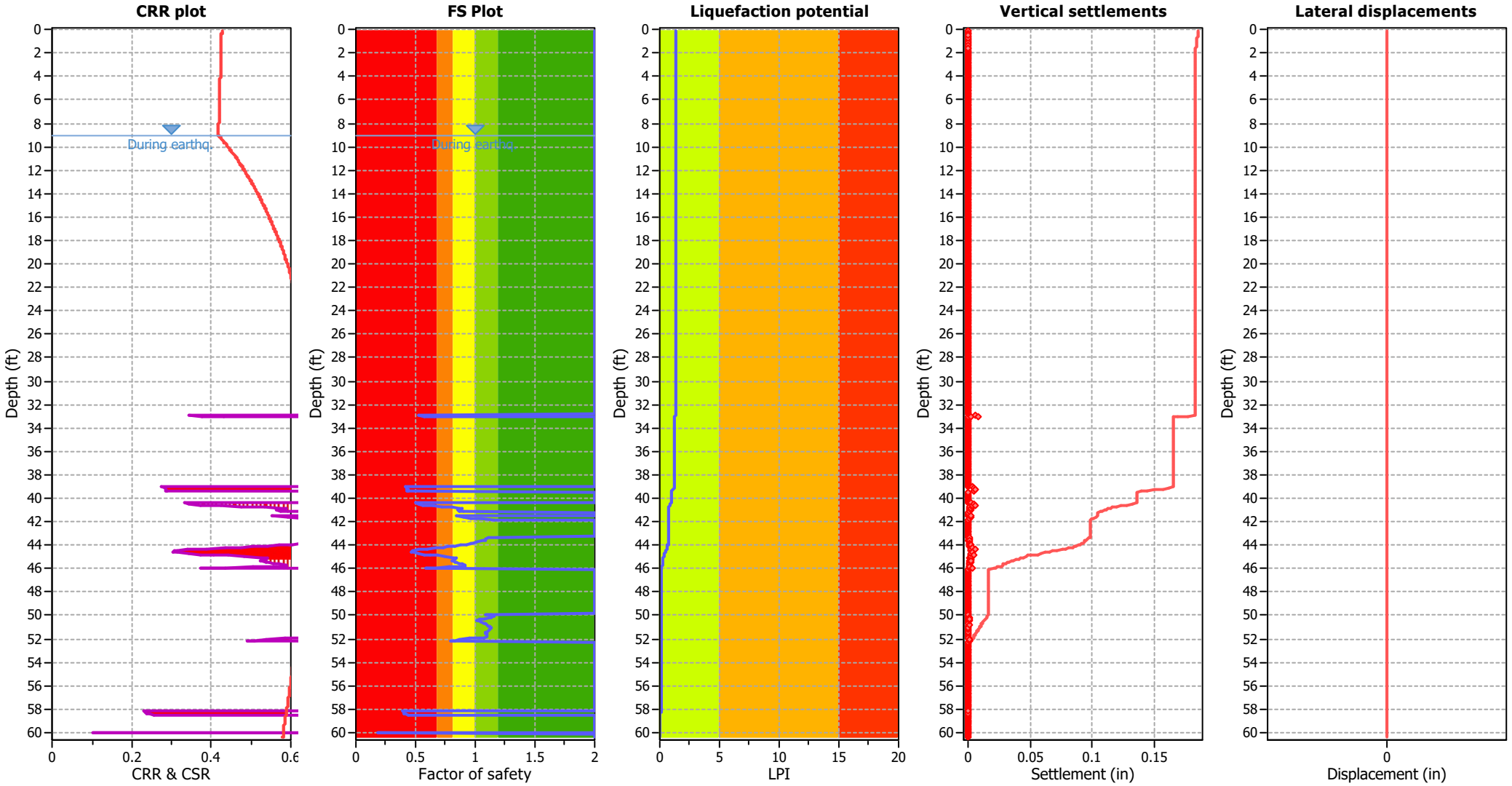

## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

**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

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

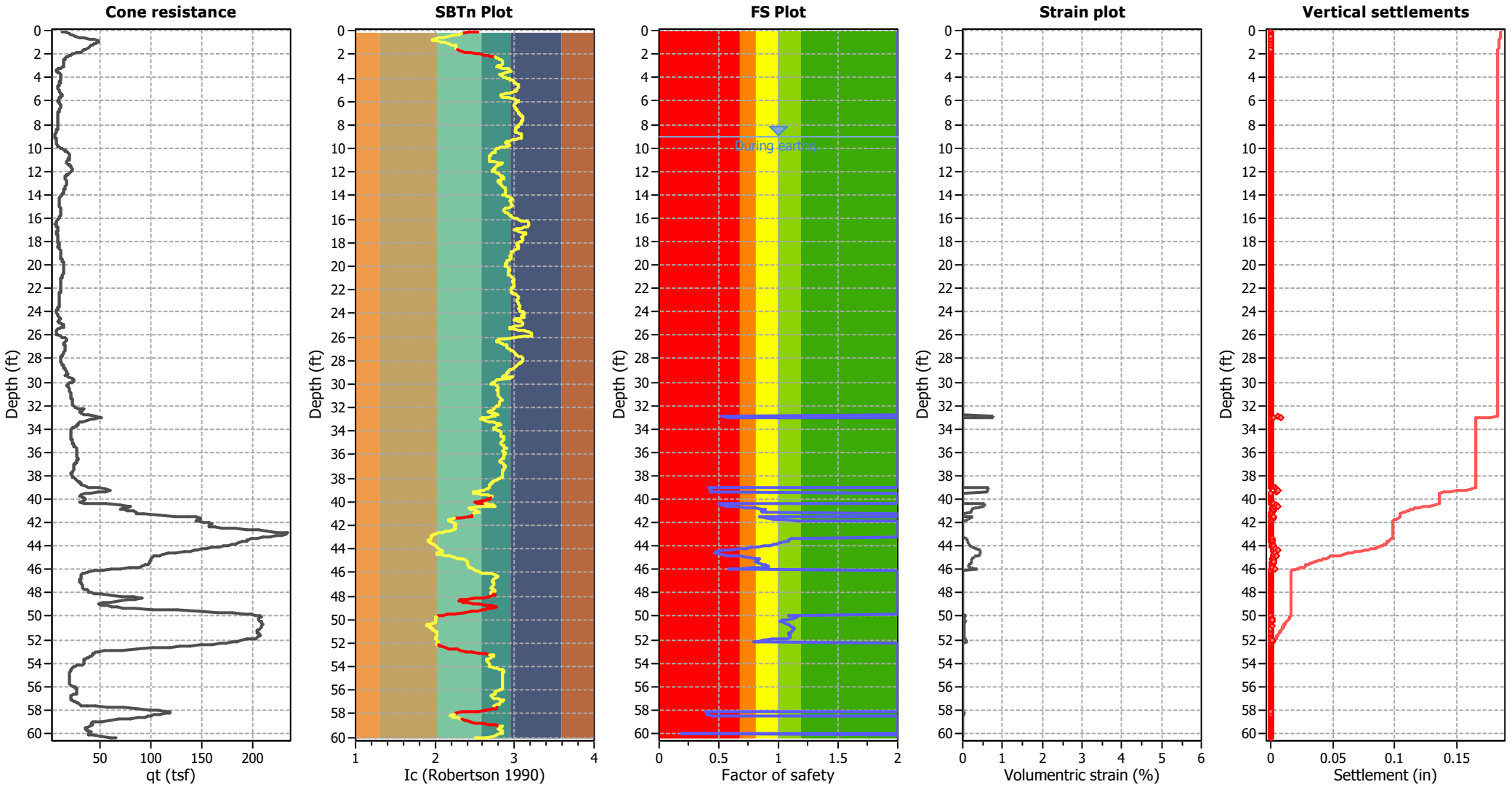
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

## Estimation of post-earthquake settlements




**Abbreviations**

| | |
|---|---|
| $q_t$: | Total cone resistance (cone resistance $q_c$ corrected for pore water effects) |
| $I_c$: | Soil Behaviour Type Index |
| FS: | Calculated Factor of Safety against liquefaction |
| Volumentric strain: | Post-liquefaction volumentric strain |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 2.54 | 20.81 | 3.29 | 68.55 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.16 | 2.43 | 26.08 | 2.53 | 66.02 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.21 | 2.34 | 31.59 | 2.08 | 65.69 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.29 | 2.30 | 34.80 | 1.91 | 66.50 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.36 | 2.28 | 35.89 | 1.85 | 66.32 | 15 | 360 | 0.43 | 0.005 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.40 | 2.24 | 37.52 | 1.73 | 64.73 | 15 | 359 | 0.43 | 0.006 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.51 | 2.17 | 41.87 | 1.55 | 65.07 | 15 | 368 | 0.43 | 0.008 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.57 | 2.11 | 47.81 | 1.43 | 68.19 | 15 | 385 | 0.43 | 0.008 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.61 | 2.04 | 56.15 | 1.34 | 75.23 | 16 | 414 | 0.43 | 0.008 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.69 | 1.99 | 64.82 | 1.30 | 84.03 | 17 | 449 | 0.43 | 0.008 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.76 | 1.96 | 72.20 | 1.28 | 92.36 | 19 | 486 | 0.43 | 0.008 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.81 | 1.97 | 77.09 | 1.29 | 99.17 | 20 | 526 | 0.43 | 0.007 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.87 | 2.02 | 77.75 | 1.33 | 103.15 | 22 | 564 | 0.43 | 0.007 | 0.01 | 9.85 | 0.01 | 0.000 |
| 0.96 | 2.07 | 77.31 | 1.38 | 106.79 | 23 | 597 | 0.43 | 0.007 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.00 | 2.12 | 75.92 | 1.45 | 110.13 | 24 | 623 | 0.43 | 0.007 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.05 | 2.16 | 74.19 | 1.53 | 113.67 | 25 | 644 | 0.43 | 0.007 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.16 | 2.21 | 71.93 | 1.63 | 117.43 | 27 | 659 | 0.43 | 0.008 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.20 | 2.25 | 69.15 | 1.74 | 120.42 | 28 | 666 | 0.43 | 0.008 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.26 | 2.26 | 67.03 | 1.78 | 119.18 | 28 | 655 | 0.43 | 0.009 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.35 | 2.26 | 65.34 | 1.78 | 116.19 | 27 | 639 | 0.43 | 0.011 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.40 | 2.25 | 63.75 | 1.77 | 112.64 | 26 | 620 | 0.43 | 0.012 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.45 | 2.26 | 61.07 | 1.79 | 109.57 | 25 | 601 | 0.43 | 0.013 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.55 | 2.27 | 58.52 | 1.83 | 106.91 | 25 | 583 | 0.43 | 0.016 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.60 | 2.28 | 56.74 | 1.84 | 104.63 | 24 | 569 | 0.43 | 0.018 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.64 | 2.28 | 56.16 | 1.87 | 104.84 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.71 | 2.32 | 53.95 | 1.98 | 106.97 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.79 | 2.37 | 49.72 | 2.24 | 111.53 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.87 | 2.45 | 44.20 | 2.67 | 117.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.95 | 2.52 | 39.45 | 3.15 | 124.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.00 | 2.58 | 36.18 | 3.57 | 129.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.04 | 2.62 | 34.20 | 3.89 | 133.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.11 | 2.66 | 31.85 | 4.32 | 137.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.19 | 2.71 | 29.59 | 4.79 | 141.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.24 | 2.75 | 27.48 | 5.25 | 144.22 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.30 | 2.77 | 26.18 | 5.54 | 145.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.38 | 2.80 | 25.06 | 5.82 | 145.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.44 | 2.82 | 24.14 | 6.07 | 146.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.50 | 2.83 | 23.42 | 6.28 | 147.16 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.58 | 2.85 | 22.84 | 6.46 | 147.43 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.64 | 2.85 | 22.50 | 6.54 | 147.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.69 | 2.85 | 22.40 | 6.57 | 147.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.79 | 2.86 | 22.34 | 6.57 | 146.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.85 | 2.85 | 22.44 | 6.50 | 145.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.90 | 2.83 | 22.67 | 6.20 | 140.49 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.98 | 2.80 | 22.75 | 5.86 | 133.23 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.04 | 2.78 | 22.55 | 5.55 | 125.22 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.09 | 2.80 | 20.45 | 5.85 | 119.61 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.17 | 2.85 | 17.37 | 6.56 | 113.95 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.24 | 2.92 | 14.30 | 7.47 | 106.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.29 | 2.93 | 12.95 | 7.68 | 99.44 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.36 | 2.94 | 12.22 | 7.81 | 95.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.44 | 2.95 | 11.78 | 7.99 | 94.15 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.48 | 2.94 | 12.25 | 7.75 | 94.89 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.56 | 2.88 | 13.97 | 6.93 | 96.86 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.64 | 2.83 | 15.88 | 6.30 | 100.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.69 | 2.82 | 17.42 | 6.04 | 105.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.76 | 2.82 | 18.27 | 6.14 | 112.26 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.84 | 2.84 | 18.84 | 6.34 | 119.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.88 | 2.87 | 18.94 | 6.72 | 127.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.98 | 2.89 | 18.88 | 7.06 | 133.29 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.03 | 2.91 | 18.83 | 7.38 | 138.86 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.08 | 2.93 | 18.63 | 7.65 | 142.59 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.14 | 2.95 | 18.33 | 7.91 | 144.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.23 | 2.98 | 17.37 | 8.49 | 147.46 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.27 | 3.00 | 17.02 | 8.72 | 148.39 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.36 | 3.00 | 16.87 | 8.82 | 148.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.41 | 2.99 | 17.20 | 8.61 | 148.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.46 | 3.00 | 16.72 | 8.85 | 147.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.55 | 3.02 | 16.04 | 9.20 | 147.61 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.61 | 3.04 | 15.36 | 9.55 | 146.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.66 | 3.05 | 14.93 | 9.73 | 145.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.75 | 3.06 | 14.63 | 9.80 | 143.36 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.79 | 3.05 | 14.53 | 9.71 | 141.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.86 | 3.04 | 14.48 | 9.53 | 138.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.96 | 3.03 | 14.51 | 9.34 | 135.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.01 | 3.02 | 14.56 | 9.22 | 134.16 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.06 | 3.02 | 14.80 | 9.08 | 134.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.16 | 3.01 | 15.03 | 8.94 | 134.36 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.21 | 2.99 | 15.60 | 8.56 | 133.53 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.26 | 2.95 | 16.60 | 7.92 | 131.47 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.32 | 2.90 | 17.99 | 7.14 | 128.44 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.41 | 2.85 | 19.22 | 6.52 | 125.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.46 | 2.83 | 19.89 | 6.20 | 123.28 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.52 | 2.82 | 19.88 | 6.13 | 121.95 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.60 | 2.84 | 19.16 | 6.36 | 121.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.66 | 2.87 | 17.91 | 6.84 | 122.48 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.71 | 2.93 | 16.32 | 7.65 | 124.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.80 | 2.99 | 14.78 | 8.62 | 127.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.89 | 3.04 | 13.77 | 9.42 | 129.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.91 | 3.06 | 13.38 | 9.79 | 131.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.00 | 3.05 | 13.75 | 9.60 | 132.09 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.06 | 3.03 | 14.27 | 9.38 | 133.90 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.11 | 3.02 | 14.99 | 9.12 | 136.80 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.20 | 3.01 | 15.61 | 8.95 | 139.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.24 | 3.00 | 16.37 | 8.73 | 143.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.30 | 2.99 | 16.99 | 8.61 | 146.32 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.38 | 2.99 | 17.46 | 8.64 | 150.85 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.46 | 3.00 | 17.64 | 8.77 | 154.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.50 | 3.01 | 17.49 | 8.94 | 156.44 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.60 | 3.02 | 17.20 | 9.08 | 156.13 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.63 | 3.02 | 16.81 | 9.18 | 154.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.71 | 3.03 | 16.47 | 9.22 | 151.86 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.80 | 3.03 | 16.08 | 9.28 | 149.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.84 | 3.03 | 15.65 | 9.38 | 146.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.90 | 3.05 | 15.06 | 9.58 | 144.33 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.00 | 3.06 | 14.52 | 9.79 | 142.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.04 | 3.06 | 14.13 | 9.93 | 140.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.09 | 3.07 | 13.79 | 10.12 | 139.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.20 | 3.08 | 13.54 | 10.26 | 138.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.24 | 3.09 | 13.21 | 10.49 | 138.58 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.30 | 3.10 | 13.01 | 10.60 | 137.90 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.39 | 3.10 | 12.82 | 10.70 | 137.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.43 | 3.10 | 12.72 | 10.71 | 136.15 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.50 | 3.10 | 12.71 | 10.61 | 134.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.59 | 3.10 | 12.70 | 10.52 | 133.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.63 | 3.09 | 12.70 | 10.44 | 132.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.70 | 3.09 | 12.69 | 10.43 | 132.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.79 | 3.09 | 12.69 | 10.42 | 132.22 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.83 | 3.08 | 12.78 | 10.32 | 131.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.90 | 3.08 | 12.87 | 10.20 | 131.32 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.94 | 3.06 | 13.05 | 9.93 | 129.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.03 | 3.06 | 13.05 | 9.76 | 127.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.11 | 3.04 | 13.05 | 9.57 | 124.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.17 | 3.03 | 13.10 | 9.37 | 122.80 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.21 | 3.02 | 13.10 | 9.19 | 120.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.28 | 3.01 | 12.95 | 9.03 | 116.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.37 | 3.01 | 12.62 | 8.98 | 113.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.41 | 3.01 | 12.28 | 8.95 | 109.84 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.48 | 3.01 | 11.84 | 8.99 | 106.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.57 | 3.02 | 11.35 | 9.05 | 102.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.61 | 3.02 | 10.77 | 9.19 | 98.97 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.67 | 3.04 | 10.14 | 9.46 | 95.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.77 | 3.06 | 9.46 | 9.88 | 93.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.81 | 3.08 | 9.03 | 10.19 | 92.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.87 | 3.09 | 8.79 | 10.40 | 91.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.96 | 3.09 | 8.73 | 10.42 | 91.00 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.99 | 3.09 | 8.68 | 10.49 | 91.09 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Total estimated settlement: 0.00**

**Abbreviations**

$Q_{tn}$: Equivalent clean sand normalized cone resistance
$K_c$: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
$G_{max}$: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
$N_c$: Equivalent number of cycles
$e_v$: Volumetric strain
Settle.: Calculated settlement

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.07 | 90.92 | 2.00 | 0.00 | 0.85 | 0.00 | 9.16 | 90.74 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.21 | 90.22 | 2.00 | 0.00 | 0.84 | 0.00 | 9.27 | 88.51 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.36 | 86.28 | 2.00 | 0.00 | 0.84 | 0.00 | 9.40 | 83.12 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.48 | 81.30 | 2.00 | 0.00 | 0.84 | 0.00 | 9.52 | 80.76 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.61 | 81.79 | 2.00 | 0.00 | 0.84 | 0.00 | 9.65 | 84.63 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.72 | 89.35 | 2.00 | 0.00 | 0.84 | 0.00 | 9.81 | 94.10 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.86 | 98.09 | 2.00 | 0.00 | 0.83 | 0.00 | 9.91 | 102.65 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.00 | 107.24 | 2.00 | 0.00 | 0.83 | 0.00 | 10.05 | 114.83 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.16 | 120.39 | 2.00 | 0.00 | 0.83 | 0.00 | 10.20 | 126.23 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.25 | 130.39 | 2.00 | 0.00 | 0.83 | 0.00 | 10.31 | 134.74 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.40 | 136.69 | 2.00 | 0.00 | 0.82 | 0.00 | 10.44 | 137.05 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.51 | 137.43 | 2.00 | 0.00 | 0.82 | 0.00 | 10.59 | 138.77 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.65 | 139.23 | 2.00 | 0.00 | 0.82 | 0.00 | 10.71 | 137.16 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.79 | 132.74 | 2.00 | 0.00 | 0.82 | 0.00 | 10.85 | 128.41 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.90 | 124.65 | 2.00 | 0.00 | 0.82 | 0.00 | 10.96 | 126.65 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.04 | 130.40 | 2.00 | 0.00 | 0.81 | 0.00 | 11.10 | 139.29 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.18 | 148.31 | 2.00 | 0.00 | 0.81 | 0.00 | 11.24 | 154.68 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.30 | 157.18 | 2.00 | 0.00 | 0.81 | 0.00 | 11.35 | 156.10 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.42 | 155.72 | 2.00 | 0.00 | 0.81 | 0.00 | 11.51 | 154.90 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.55 | 155.90 | 2.00 | 0.00 | 0.80 | 0.00 | 11.62 | 158.76 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.71 | 160.80 | 2.00 | 0.00 | 0.80 | 0.00 | 11.75 | 159.64 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.85 | 156.75 | 2.00 | 0.00 | 0.80 | 0.00 | 11.90 | 154.56 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.94 | 155.07 | 2.00 | 0.00 | 0.80 | 0.00 | 12.02 | 156.61 | 2.00 | 0.00 | 0.80 | 0.00 |
| 12.10 | 157.56 | 2.00 | 0.00 | 0.79 | 0.00 | 12.15 | 156.24 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.24 | 153.54 | 2.00 | 0.00 | 0.79 | 0.00 | 12.30 | 150.31 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.35 | 146.77 | 2.00 | 0.00 | 0.79 | 0.00 | 12.44 | 142.69 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.50 | 137.70 | 2.00 | 0.00 | 0.79 | 0.00 | 12.55 | 133.40 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.63 | 128.93 | 2.00 | 0.00 | 0.79 | 0.00 | 12.70 | 126.18 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.74 | 125.60 | 2.00 | 0.00 | 0.78 | 0.00 | 12.84 | 126.95 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.86 | 130.85 | 2.00 | 0.00 | 0.78 | 0.00 | 12.94 | 134.96 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.01 | 138.89 | 2.00 | 0.00 | 0.78 | 0.00 | 13.09 | 140.67 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.14 | 141.11 | 2.00 | 0.00 | 0.78 | 0.00 | 13.20 | 141.13 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.29 | 141.08 | 2.00 | 0.00 | 0.77 | 0.00 | 13.33 | 139.49 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.39 | 136.94 | 2.00 | 0.00 | 0.77 | 0.00 | 13.49 | 134.11 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.53 | 132.84 | 2.00 | 0.00 | 0.77 | 0.00 | 13.59 | 132.30 | 2.00 | 0.00 | 0.77 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.69 | 131.76 | 2.00 | 0.00 | 0.77 | 0.00 | 13.72 | 131.16 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.79 | 125.53 | 2.00 | 0.00 | 0.77 | 0.00 | 13.89 | 117.72 | 2.00 | 0.00 | 0.76 | 0.00 |
| 13.94 | 111.55 | 2.00 | 0.00 | 0.76 | 0.00 | 13.99 | 111.88 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.08 | 114.22 | 2.00 | 0.00 | 0.76 | 0.00 | 14.13 | 114.22 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.18 | 115.16 | 2.00 | 0.00 | 0.76 | 0.00 | 14.27 | 113.07 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.32 | 110.68 | 2.00 | 0.00 | 0.76 | 0.00 | 14.37 | 105.23 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.48 | 102.53 | 2.00 | 0.00 | 0.75 | 0.00 | 14.52 | 100.31 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.57 | 99.02 | 2.00 | 0.00 | 0.75 | 0.00 | 14.68 | 99.19 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.72 | 98.42 | 2.00 | 0.00 | 0.75 | 0.00 | 14.77 | 97.72 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.83 | 97.66 | 2.00 | 0.00 | 0.75 | 0.00 | 14.92 | 97.14 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.98 | 96.05 | 2.00 | 0.00 | 0.75 | 0.00 | 15.07 | 94.90 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.11 | 93.79 | 2.00 | 0.00 | 0.74 | 0.00 | 15.17 | 92.70 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.27 | 92.22 | 2.00 | 0.00 | 0.74 | 0.00 | 15.31 | 93.00 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.38 | 94.83 | 2.00 | 0.00 | 0.74 | 0.00 | 15.47 | 97.01 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.52 | 99.20 | 2.00 | 0.00 | 0.74 | 0.00 | 15.56 | 101.67 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.64 | 103.94 | 2.00 | 0.00 | 0.73 | 0.00 | 15.71 | 106.24 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.75 | 109.08 | 2.00 | 0.00 | 0.73 | 0.00 | 15.87 | 110.12 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.91 | 110.61 | 2.00 | 0.00 | 0.73 | 0.00 | 15.96 | 110.44 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.01 | 109.69 | 2.00 | 0.00 | 0.73 | 0.00 | 16.11 | 108.68 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.15 | 106.59 | 2.00 | 0.00 | 0.73 | 0.00 | 16.22 | 103.67 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.31 | 100.00 | 2.00 | 0.00 | 0.72 | 0.00 | 16.36 | 96.55 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.41 | 93.22 | 2.00 | 0.00 | 0.72 | 0.00 | 16.51 | 90.50 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.54 | 88.62 | 2.00 | 0.00 | 0.72 | 0.00 | 16.61 | 87.90 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.70 | 87.49 | 2.00 | 0.00 | 0.72 | 0.00 | 16.75 | 87.67 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.81 | 85.89 | 2.00 | 0.00 | 0.72 | 0.00 | 16.91 | 83.09 | 2.00 | 0.00 | 0.71 | 0.00 |
| 16.95 | 85.05 | 2.00 | 0.00 | 0.71 | 0.00 | 17.01 | 90.47 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.11 | 96.82 | 2.00 | 0.00 | 0.71 | 0.00 | 17.13 | 98.88 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.21 | 99.51 | 2.00 | 0.00 | 0.71 | 0.00 | 17.29 | 99.01 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.34 | 97.60 | 2.00 | 0.00 | 0.71 | 0.00 | 17.43 | 96.35 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.48 | 95.70 | 2.00 | 0.00 | 0.70 | 0.00 | 17.54 | 95.55 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.63 | 95.36 | 2.00 | 0.00 | 0.70 | 0.00 | 17.68 | 95.27 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.73 | 95.28 | 2.00 | 0.00 | 0.70 | 0.00 | 17.83 | 95.01 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.85 | 94.69 | 2.00 | 0.00 | 0.70 | 0.00 | 17.93 | 94.51 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.98 | 94.81 | 2.00 | 0.00 | 0.70 | 0.00 | 18.07 | 95.29 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.12 | 95.97 | 2.00 | 0.00 | 0.69 | 0.00 | 18.18 | 96.68 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.24 | 97.65 | 2.00 | 0.00 | 0.69 | 0.00 | 18.33 | 98.63 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.38 | 99.49 | 2.00 | 0.00 | 0.69 | 0.00 | 18.47 | 99.91 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.53 | 100.01 | 2.00 | 0.00 | 0.69 | 0.00 | 18.57 | 99.93 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.67 | 99.72 | 2.00 | 0.00 | 0.68 | 0.00 | 18.72 | 99.73 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.78 | 99.74 | 2.00 | 0.00 | 0.68 | 0.00 | 18.85 | 101.21 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.93 | 102.88 | 2.00 | 0.00 | 0.68 | 0.00 | 18.97 | 103.50 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.08 | 103.58 | 2.00 | 0.00 | 0.68 | 0.00 | 19.12 | 103.41 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.22 | 103.39 | 2.00 | 0.00 | 0.67 | 0.00 | 19.27 | 103.32 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.32 | 103.64 | 2.00 | 0.00 | 0.67 | 0.00 | 19.37 | 101.55 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.43 | 99.45 | 2.00 | 0.00 | 0.67 | 0.00 | 19.52 | 97.95 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.57 | 98.34 | 2.00 | 0.00 | 0.67 | 0.00 | 19.67 | 100.27 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.72 | 102.47 | 2.00 | 0.00 | 0.67 | 0.00 | 19.77 | 104.05 | 2.00 | 0.00 | 0.66 | 0.00 |
| 19.82 | 104.77 | 2.00 | 0.00 | 0.66 | 0.00 | 19.91 | 105.93 | 2.00 | 0.00 | 0.66 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.97 | 108.74 | 2.00 | 0.00 | 0.66 | 0.00 | 20.04 | 112.25 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.08 | 115.22 | 2.00 | 0.00 | 0.66 | 0.00 | 20.16 | 115.47 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.24 | 115.22 | 2.00 | 0.00 | 0.66 | 0.00 | 20.28 | 113.94 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.37 | 112.78 | 2.00 | 0.00 | 0.65 | 0.00 | 20.41 | 110.75 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.50 | 109.32 | 2.00 | 0.00 | 0.65 | 0.00 | 20.57 | 108.60 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.61 | 109.02 | 2.00 | 0.00 | 0.65 | 0.00 | 20.70 | 109.41 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.75 | 109.77 | 2.00 | 0.00 | 0.65 | 0.00 | 20.81 | 110.03 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.89 | 111.03 | 2.00 | 0.00 | 0.65 | 0.00 | 20.95 | 111.35 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.00 | 110.89 | 2.00 | 0.00 | 0.64 | 0.00 | 21.10 | 110.15 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.14 | 108.50 | 2.00 | 0.00 | 0.64 | 0.00 | 21.21 | 106.19 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.30 | 103.83 | 2.00 | 0.00 | 0.64 | 0.00 | 21.34 | 101.90 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.40 | 101.58 | 2.00 | 0.00 | 0.64 | 0.00 | 21.48 | 101.37 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.54 | 101.27 | 2.00 | 0.00 | 0.63 | 0.00 | 21.60 | 100.43 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.68 | 99.05 | 2.00 | 0.00 | 0.63 | 0.00 | 21.75 | 97.45 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.80 | 95.70 | 2.00 | 0.00 | 0.63 | 0.00 | 21.88 | 94.29 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.92 | 93.03 | 2.00 | 0.00 | 0.63 | 0.00 | 21.99 | 91.71 | 2.00 | 0.00 | 0.63 | 0.00 |
| 22.08 | 90.08 | 2.00 | 0.00 | 0.63 | 0.00 | 22.14 | 88.54 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.19 | 88.72 | 2.00 | 0.00 | 0.62 | 0.00 | 22.28 | 89.57 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.34 | 90.38 | 2.00 | 0.00 | 0.62 | 0.00 | 22.39 | 91.36 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.47 | 92.17 | 2.00 | 0.00 | 0.62 | 0.00 | 22.54 | 93.17 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.58 | 93.43 | 2.00 | 0.00 | 0.62 | 0.00 | 22.68 | 92.90 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.74 | 92.30 | 2.00 | 0.00 | 0.61 | 0.00 | 22.79 | 91.97 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.84 | 92.26 | 2.00 | 0.00 | 0.61 | 0.00 | 22.94 | 92.67 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.99 | 93.15 | 2.00 | 0.00 | 0.61 | 0.00 | 23.04 | 93.48 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.11 | 93.60 | 2.00 | 0.00 | 0.61 | 0.00 | 23.18 | 93.48 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.23 | 92.74 | 2.00 | 0.00 | 0.61 | 0.00 | 23.34 | 91.53 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.37 | 90.23 | 2.00 | 0.00 | 0.60 | 0.00 | 23.44 | 88.64 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.54 | 86.68 | 2.00 | 0.00 | 0.60 | 0.00 | 23.60 | 84.70 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.64 | 82.94 | 2.00 | 0.00 | 0.60 | 0.00 | 23.71 | 80.98 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.79 | 78.92 | 2.00 | 0.00 | 0.60 | 0.00 | 23.84 | 77.19 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.89 | 75.13 | 2.00 | 0.00 | 0.60 | 0.00 | 23.98 | 73.55 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.03 | 72.08 | 2.00 | 0.00 | 0.59 | 0.00 | 24.09 | 72.92 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.18 | 75.32 | 2.00 | 0.00 | 0.59 | 0.00 | 24.23 | 80.81 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.31 | 85.94 | 2.00 | 0.00 | 0.59 | 0.00 | 24.36 | 89.48 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.45 | 89.86 | 2.00 | 0.00 | 0.59 | 0.00 | 24.49 | 88.28 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.57 | 86.79 | 2.00 | 0.00 | 0.58 | 0.00 | 24.61 | 86.69 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.69 | 88.11 | 2.00 | 0.00 | 0.58 | 0.00 | 24.74 | 88.79 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.82 | 89.26 | 2.00 | 0.00 | 0.58 | 0.00 | 24.89 | 91.21 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.94 | 96.87 | 2.00 | 0.00 | 0.58 | 0.00 | 25.01 | 104.70 | 2.00 | 0.00 | 0.58 | 0.00 |
| 25.09 | 110.61 | 2.00 | 0.00 | 0.57 | 0.00 | 25.13 | 112.23 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.22 | 108.23 | 2.00 | 0.00 | 0.57 | 0.00 | 25.28 | 101.64 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.34 | 93.26 | 2.00 | 0.00 | 0.57 | 0.00 | 25.44 | 85.74 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.48 | 79.31 | 2.00 | 0.00 | 0.57 | 0.00 | 25.53 | 76.72 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.59 | 74.46 | 2.00 | 0.00 | 0.57 | 0.00 | 25.68 | 74.59 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.73 | 73.34 | 2.00 | 0.00 | 0.56 | 0.00 | 25.79 | 75.13 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.88 | 77.36 | 2.00 | 0.00 | 0.56 | 0.00 | 25.93 | 84.82 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.99 | 86.06 | 2.00 | 0.00 | 0.56 | 0.00 | 26.08 | 84.76 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.14 | 79.87 | 2.00 | 0.00 | 0.56 | 0.00 | 26.19 | 80.50 | 2.00 | 0.00 | 0.56 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26.28 | 83.35 | 2.00 | 0.00 | 0.55 | 0.00 | 26.34 | 87.13 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.39 | 90.01 | 2.00 | 0.00 | 0.55 | 0.00 | 26.45 | 90.61 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.53 | 90.34 | 2.00 | 0.00 | 0.55 | 0.00 | 26.58 | 90.17 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.68 | 91.53 | 2.00 | 0.00 | 0.55 | 0.00 | 26.73 | 92.80 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.78 | 95.24 | 2.00 | 0.00 | 0.55 | 0.00 | 26.88 | 98.20 | 2.00 | 0.00 | 0.54 | 0.00 |
| 26.93 | 101.67 | 2.00 | 0.00 | 0.54 | 0.00 | 26.98 | 105.01 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.04 | 109.65 | 2.00 | 0.00 | 0.54 | 0.00 | 27.13 | 114.16 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.22 | 117.03 | 2.00 | 0.00 | 0.54 | 0.00 | 27.24 | 118.05 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.33 | 118.49 | 2.00 | 0.00 | 0.54 | 0.00 | 27.37 | 118.83 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.43 | 118.15 | 2.00 | 0.00 | 0.54 | 0.00 | 27.52 | 116.74 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.57 | 115.29 | 2.00 | 0.00 | 0.53 | 0.00 | 27.63 | 114.67 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.72 | 114.91 | 2.00 | 0.00 | 0.53 | 0.00 | 27.76 | 114.13 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.84 | 111.04 | 2.00 | 0.00 | 0.53 | 0.00 | 27.93 | 106.57 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.97 | 102.28 | 2.00 | 0.00 | 0.53 | 0.00 | 28.02 | 99.20 | 2.00 | 0.00 | 0.53 | 0.00 |
| 28.12 | 96.87 | 2.00 | 0.00 | 0.52 | 0.00 | 28.17 | 95.48 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.23 | 94.94 | 2.00 | 0.00 | 0.52 | 0.00 | 28.32 | 94.52 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.37 | 94.51 | 2.00 | 0.00 | 0.52 | 0.00 | 28.42 | 95.55 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.48 | 97.71 | 2.00 | 0.00 | 0.52 | 0.00 | 28.57 | 99.81 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.61 | 101.73 | 2.00 | 0.00 | 0.52 | 0.00 | 28.69 | 103.19 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.77 | 104.00 | 2.00 | 0.00 | 0.51 | 0.00 | 28.82 | 104.48 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.88 | 104.19 | 2.00 | 0.00 | 0.51 | 0.00 | 28.97 | 103.99 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.02 | 102.82 | 2.00 | 0.00 | 0.51 | 0.00 | 29.08 | 101.89 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.17 | 101.13 | 2.00 | 0.00 | 0.51 | 0.00 | 29.21 | 101.57 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.28 | 102.62 | 2.00 | 0.00 | 0.50 | 0.00 | 29.36 | 104.26 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.41 | 112.38 | 2.00 | 0.00 | 0.50 | 0.00 | 29.47 | 115.05 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.55 | 117.93 | 2.00 | 0.00 | 0.50 | 0.00 | 29.62 | 114.13 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.68 | 114.62 | 2.00 | 0.00 | 0.50 | 0.00 | 29.76 | 111.17 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.83 | 105.97 | 2.00 | 0.00 | 0.49 | 0.00 | 29.87 | 99.93 | 2.00 | 0.00 | 0.49 | 0.00 |
| 29.96 | 95.72 | 2.00 | 0.00 | 0.49 | 0.00 | 30.01 | 92.55 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.07 | 90.02 | 2.00 | 0.00 | 0.49 | 0.00 | 30.16 | 88.31 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.20 | 85.95 | 2.00 | 0.00 | 0.49 | 0.00 | 30.27 | 85.87 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.34 | 86.72 | 2.00 | 0.00 | 0.49 | 0.00 | 30.42 | 88.90 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.46 | 90.97 | 2.00 | 0.00 | 0.48 | 0.00 | 30.52 | 93.16 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.58 | 95.94 | 2.00 | 0.00 | 0.48 | 0.00 | 30.66 | 98.28 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.71 | 100.49 | 2.00 | 0.00 | 0.48 | 0.00 | 30.81 | 102.04 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.86 | 103.51 | 2.00 | 0.00 | 0.48 | 0.00 | 30.91 | 104.77 | 2.00 | 0.00 | 0.48 | 0.00 |
| 31.01 | 105.86 | 2.00 | 0.00 | 0.47 | 0.00 | 31.06 | 106.68 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.11 | 108.17 | 2.00 | 0.00 | 0.47 | 0.00 | 31.19 | 110.41 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.26 | 112.66 | 2.00 | 0.00 | 0.47 | 0.00 | 31.35 | 113.85 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.37 | 113.49 | 2.00 | 0.00 | 0.47 | 0.00 | 31.46 | 112.68 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.55 | 111.88 | 2.00 | 0.00 | 0.47 | 0.00 | 31.59 | 112.15 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.66 | 112.04 | 2.00 | 0.00 | 0.46 | 0.00 | 31.70 | 112.28 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.79 | 111.29 | 2.00 | 0.00 | 0.46 | 0.00 | 31.86 | 109.44 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.91 | 106.32 | 2.00 | 0.00 | 0.46 | 0.00 | 31.98 | 103.90 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.06 | 102.74 | 2.00 | 0.00 | 0.46 | 0.00 | 32.10 | 103.94 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.20 | 107.59 | 2.00 | 0.00 | 0.45 | 0.00 | 32.26 | 112.81 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.30 | 117.96 | 2.00 | 0.00 | 0.45 | 0.00 | 32.35 | 124.09 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.46 | 132.31 | 2.00 | 0.00 | 0.45 | 0.00 | 32.49 | 138.67 | 2.00 | 0.00 | 0.45 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.58 | 142.60 | 2.00 | 0.00 | 0.45 | 0.00 | 32.62 | 141.01 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.69 | 141.50 | 2.00 | 0.00 | 0.45 | 0.00 | 32.78 | 139.91 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.82 | 139.76 | 2.00 | 0.00 | 0.44 | 0.00 | 32.89 | 141.65 | 0.53 | 0.78 | 0.44 | 0.01 |
| 32.98 | 147.03 | 0.57 | 0.77 | 0.44 | 0.01 | 33.02 | 156.04 | 0.66 | 0.58 | 0.44 | 0.00 |
| 33.08 | 164.95 | 2.00 | 0.00 | 0.44 | 0.00 | 33.18 | 171.87 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.21 | 174.55 | 2.00 | 0.00 | 0.44 | 0.00 | 33.29 | 170.95 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.37 | 164.95 | 2.00 | 0.00 | 0.43 | 0.00 | 33.42 | 156.80 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.47 | 149.30 | 2.00 | 0.00 | 0.43 | 0.00 | 33.53 | 138.17 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.62 | 127.00 | 2.00 | 0.00 | 0.43 | 0.00 | 33.67 | 116.66 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.73 | 110.43 | 2.00 | 0.00 | 0.43 | 0.00 | 33.82 | 105.94 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.87 | 103.53 | 2.00 | 0.00 | 0.43 | 0.00 | 33.93 | 102.82 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.02 | 102.48 | 2.00 | 0.00 | 0.42 | 0.00 | 34.06 | 102.41 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.13 | 102.99 | 2.00 | 0.00 | 0.42 | 0.00 | 34.22 | 104.10 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.26 | 105.54 | 2.00 | 0.00 | 0.42 | 0.00 | 34.32 | 107.20 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.42 | 108.75 | 2.00 | 0.00 | 0.42 | 0.00 | 34.45 | 110.32 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.52 | 111.25 | 2.00 | 0.00 | 0.41 | 0.00 | 34.61 | 111.33 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.70 | 110.23 | 2.00 | 0.00 | 0.41 | 0.00 | 34.76 | 108.70 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.82 | 107.56 | 2.00 | 0.00 | 0.41 | 0.00 | 34.86 | 107.31 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.91 | 108.16 | 2.00 | 0.00 | 0.41 | 0.00 | 35.02 | 109.19 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.06 | 109.39 | 2.00 | 0.00 | 0.41 | 0.00 | 35.11 | 111.02 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.19 | 114.20 | 2.00 | 0.00 | 0.40 | 0.00 | 35.25 | 118.56 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.31 | 121.84 | 2.00 | 0.00 | 0.40 | 0.00 | 35.40 | 125.36 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.45 | 128.26 | 2.00 | 0.00 | 0.40 | 0.00 | 35.50 | 129.73 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.56 | 130.98 | 2.00 | 0.00 | 0.40 | 0.00 | 35.64 | 133.67 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.72 | 138.17 | 2.00 | 0.00 | 0.39 | 0.00 | 35.81 | 141.28 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.85 | 143.34 | 2.00 | 0.00 | 0.39 | 0.00 | 35.90 | 144.03 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.96 | 143.50 | 2.00 | 0.00 | 0.39 | 0.00 | 36.04 | 141.44 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.11 | 138.27 | 2.00 | 0.00 | 0.39 | 0.00 | 36.16 | 135.91 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.25 | 134.33 | 2.00 | 0.00 | 0.39 | 0.00 | 36.31 | 133.51 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.36 | 131.76 | 2.00 | 0.00 | 0.38 | 0.00 | 36.44 | 129.64 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.50 | 128.21 | 2.00 | 0.00 | 0.38 | 0.00 | 36.56 | 129.26 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.65 | 131.31 | 2.00 | 0.00 | 0.38 | 0.00 | 36.68 | 133.43 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.76 | 133.78 | 2.00 | 0.00 | 0.38 | 0.00 | 36.84 | 133.03 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.91 | 131.69 | 2.00 | 0.00 | 0.37 | 0.00 | 36.96 | 129.63 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.04 | 127.08 | 2.00 | 0.00 | 0.37 | 0.00 | 37.10 | 123.75 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.15 | 121.02 | 2.00 | 0.00 | 0.37 | 0.00 | 37.23 | 118.62 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.30 | 116.82 | 2.00 | 0.00 | 0.37 | 0.00 | 37.35 | 115.05 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.45 | 113.69 | 2.00 | 0.00 | 0.37 | 0.00 | 37.51 | 112.67 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.55 | 111.66 | 2.00 | 0.00 | 0.36 | 0.00 | 37.62 | 110.16 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.70 | 108.15 | 2.00 | 0.00 | 0.36 | 0.00 | 37.75 | 105.95 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.80 | 103.33 | 2.00 | 0.00 | 0.36 | 0.00 | 37.90 | 100.67 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.95 | 98.10 | 2.00 | 0.00 | 0.36 | 0.00 | 38.05 | 96.46 | 2.00 | 0.00 | 0.36 | 0.00 |
| 38.06 | 94.69 | 2.00 | 0.00 | 0.35 | 0.00 | 38.15 | 93.41 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.19 | 93.89 | 2.00 | 0.00 | 0.35 | 0.00 | 38.27 | 95.71 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.34 | 98.12 | 2.00 | 0.00 | 0.35 | 0.00 | 38.39 | 99.71 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.46 | 100.64 | 2.00 | 0.00 | 0.35 | 0.00 | 38.55 | 100.79 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.59 | 100.44 | 2.00 | 0.00 | 0.35 | 0.00 | 38.68 | 101.05 | 2.00 | 0.00 | 0.34 | 0.00 |
| 38.75 | 103.19 | 2.00 | 0.00 | 0.34 | 0.00 | 38.80 | 107.92 | 2.00 | 0.00 | 0.34 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.87 | 113.90 | 2.00 | 0.00 | 0.34 | 0.00 | 38.95 | 119.82 | 2.00 | 0.00 | 0.34 | 0.00 |
| 38.99 | 125.23 | 2.00 | 0.00 | 0.34 | 0.00 | 39.04 | 127.93 | 0.41 | 0.65 | 0.34 | 0.00 |
| 39.11 | 129.86 | 0.43 | 0.64 | 0.34 | 0.01 | 39.19 | 130.14 | 0.43 | 0.63 | 0.34 | 0.01 |
| 39.27 | 130.58 | 0.43 | 0.63 | 0.33 | 0.01 | 39.33 | 131.34 | 0.44 | 0.62 | 0.33 | 0.00 |
| 39.39 | 130.16 | 0.43 | 0.63 | 0.33 | 0.00 | 39.45 | 126.68 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.53 | 119.78 | 2.00 | 0.00 | 0.33 | 0.00 | 39.57 | 112.35 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.64 | 105.66 | 2.00 | 0.00 | 0.33 | 0.00 | 39.72 | 100.06 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.79 | 97.32 | 2.00 | 0.00 | 0.33 | 0.00 | 39.84 | 94.38 | 2.00 | 0.00 | 0.32 | 0.00 |
| 39.93 | 89.35 | 2.00 | 0.00 | 0.32 | 0.00 | 39.98 | 82.69 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.05 | 78.83 | 2.00 | 0.00 | 0.32 | 0.00 | 40.09 | 81.78 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.19 | 90.22 | 2.00 | 0.00 | 0.32 | 0.00 | 40.23 | 111.23 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.34 | 128.18 | 2.00 | 0.00 | 0.32 | 0.00 | 40.38 | 139.46 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.43 | 139.62 | 0.50 | 0.56 | 0.31 | 0.00 | 40.50 | 141.68 | 0.52 | 0.55 | 0.31 | 0.00 |
| 40.58 | 146.75 | 0.57 | 0.53 | 0.31 | 0.01 | 40.63 | 154.84 | 0.64 | 0.50 | 0.31 | 0.00 |
| 40.70 | 162.22 | 0.72 | 0.38 | 0.31 | 0.00 | 40.75 | 169.81 | 0.81 | 0.29 | 0.31 | 0.00 |
| 40.84 | 174.40 | 0.87 | 0.21 | 0.31 | 0.00 | 40.88 | 176.21 | 0.89 | 0.21 | 0.31 | 0.00 |
| 40.95 | 175.11 | 0.88 | 0.21 | 0.31 | 0.00 | 41.03 | 173.31 | 0.85 | 0.21 | 0.30 | 0.00 |
| 41.08 | 174.49 | 0.87 | 0.21 | 0.30 | 0.00 | 41.15 | 176.58 | 0.90 | 0.20 | 0.30 | 0.00 |
| 41.23 | 177.09 | 2.00 | 0.00 | 0.30 | 0.00 | 41.28 | 172.88 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.35 | 165.20 | 2.00 | 0.00 | 0.30 | 0.00 | 41.43 | 163.76 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.48 | 166.84 | 2.00 | 0.00 | 0.30 | 0.00 | 41.54 | 172.03 | 0.84 | 0.27 | 0.30 | 0.00 |
| 41.62 | 176.73 | 0.90 | 0.20 | 0.29 | 0.00 | 41.68 | 181.73 | 0.97 | 0.15 | 0.29 | 0.00 |
| 41.77 | 187.61 | 1.05 | 0.11 | 0.29 | 0.00 | 41.82 | 194.68 | 1.16 | 0.07 | 0.29 | 0.00 |
| 41.88 | 201.28 | 2.00 | 0.00 | 0.29 | 0.00 | 41.97 | 205.74 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.01 | 208.96 | 2.00 | 0.00 | 0.29 | 0.00 | 42.10 | 209.62 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.17 | 209.74 | 2.00 | 0.00 | 0.29 | 0.00 | 42.22 | 209.31 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.28 | 208.71 | 2.00 | 0.00 | 0.28 | 0.00 | 42.33 | 207.54 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.41 | 205.68 | 2.00 | 0.00 | 0.28 | 0.00 | 42.48 | 204.51 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.52 | 205.72 | 2.00 | 0.00 | 0.28 | 0.00 | 42.60 | 208.13 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.66 | 212.43 | 2.00 | 0.00 | 0.28 | 0.00 | 42.72 | 216.99 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.80 | 222.84 | 2.00 | 0.00 | 0.27 | 0.00 | 42.87 | 227.69 | 2.00 | 0.00 | 0.27 | 0.00 |
| 42.92 | 229.54 | 2.00 | 0.00 | 0.27 | 0.00 | 43.00 | 228.01 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.06 | 223.55 | 2.00 | 0.00 | 0.27 | 0.00 | 43.11 | 216.59 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.18 | 208.96 | 2.00 | 0.00 | 0.27 | 0.00 | 43.25 | 201.35 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.31 | 195.45 | 1.18 | 0.07 | 0.27 | 0.00 | 43.39 | 190.74 | 1.11 | 0.10 | 0.26 | 0.00 |
| 43.45 | 188.79 | 1.08 | 0.10 | 0.26 | 0.00 | 43.51 | 188.75 | 1.08 | 0.10 | 0.26 | 0.00 |
| 43.61 | 189.01 | 1.08 | 0.10 | 0.26 | 0.00 | 43.65 | 187.22 | 1.06 | 0.10 | 0.26 | 0.00 |
| 43.72 | 184.48 | 1.02 | 0.13 | 0.26 | 0.00 | 43.81 | 181.94 | 0.98 | 0.13 | 0.26 | 0.00 |
| 43.85 | 180.30 | 0.96 | 0.13 | 0.26 | 0.00 | 43.92 | 177.74 | 0.92 | 0.17 | 0.26 | 0.00 |
| 44.01 | 174.21 | 0.88 | 0.18 | 0.25 | 0.00 | 44.05 | 170.39 | 0.83 | 0.24 | 0.25 | 0.00 |
| 44.10 | 165.70 | 0.77 | 0.25 | 0.25 | 0.00 | 44.20 | 161.80 | 0.73 | 0.31 | 0.25 | 0.00 |
| 44.25 | 156.48 | 0.67 | 0.33 | 0.25 | 0.00 | 44.30 | 148.86 | 0.59 | 0.42 | 0.25 | 0.00 |
| 44.40 | 141.18 | 0.53 | 0.44 | 0.25 | 0.01 | 44.45 | 135.91 | 0.48 | 0.45 | 0.25 | 0.00 |
| 44.50 | 134.52 | 0.47 | 0.45 | 0.25 | 0.00 | 44.57 | 134.14 | 0.47 | 0.45 | 0.24 | 0.00 |
| 44.63 | 136.37 | 0.49 | 0.44 | 0.24 | 0.00 | 44.69 | 141.27 | 0.53 | 0.43 | 0.24 | 0.00 |
| 44.79 | 146.34 | 0.57 | 0.41 | 0.24 | 0.01 | 44.84 | 151.73 | 0.62 | 0.40 | 0.24 | 0.00 |
| 44.89 | 157.25 | 0.68 | 0.31 | 0.24 | 0.00 | 44.96 | 163.18 | 0.75 | 0.29 | 0.24 | 0.00 |
| 45.04 | 168.57 | 0.81 | 0.22 | 0.24 | 0.00 | 45.09 | 170.75 | 0.84 | 0.22 | 0.24 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45.17 | 170.13 | 0.83 | 0.22 | 0.23 | 0.00 | 45.24 | 168.79 | 0.81 | 0.22 | 0.23 | 0.00 |
| 45.28 | 168.16 | 0.81 | 0.22 | 0.23 | 0.00 | 45.38 | 168.90 | 0.82 | 0.22 | 0.23 | 0.00 |
| 45.42 | 170.31 | 0.83 | 0.21 | 0.23 | 0.00 | 45.49 | 171.14 | 0.85 | 0.21 | 0.23 | 0.00 |
| 45.57 | 172.26 | 0.86 | 0.16 | 0.23 | 0.00 | 45.63 | 174.24 | 0.89 | 0.16 | 0.23 | 0.00 |
| 45.69 | 176.36 | 0.91 | 0.15 | 0.23 | 0.00 | 45.78 | 176.35 | 0.91 | 0.15 | 0.22 | 0.00 |
| 45.84 | 173.34 | 0.88 | 0.15 | 0.22 | 0.00 | 45.89 | 165.95 | 0.78 | 0.22 | 0.22 | 0.00 |
| 45.93 | 156.35 | 0.68 | 0.29 | 0.22 | 0.00 | 46.02 | 146.88 | 0.58 | 0.37 | 0.22 | 0.00 |
| 46.08 | 140.17 | 2.00 | 0.00 | 0.22 | 0.00 | 46.13 | 134.42 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.22 | 128.14 | 2.00 | 0.00 | 0.22 | 0.00 | 46.28 | 121.74 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.33 | 115.67 | 2.00 | 0.00 | 0.21 | 0.00 | 46.43 | 109.01 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.47 | 102.65 | 2.00 | 0.00 | 0.21 | 0.00 | 46.53 | 99.29 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.63 | 97.28 | 2.00 | 0.00 | 0.21 | 0.00 | 46.67 | 96.45 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.73 | 95.71 | 2.00 | 0.00 | 0.21 | 0.00 | 46.83 | 95.50 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.87 | 95.75 | 2.00 | 0.00 | 0.21 | 0.00 | 46.93 | 96.93 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.02 | 97.76 | 2.00 | 0.00 | 0.20 | 0.00 | 47.08 | 98.14 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.12 | 97.80 | 2.00 | 0.00 | 0.20 | 0.00 | 47.18 | 96.95 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.27 | 95.92 | 2.00 | 0.00 | 0.20 | 0.00 | 47.31 | 96.61 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.39 | 98.55 | 2.00 | 0.00 | 0.20 | 0.00 | 47.48 | 101.10 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.52 | 104.33 | 2.00 | 0.00 | 0.19 | 0.00 | 47.59 | 106.24 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.66 | 108.33 | 2.00 | 0.00 | 0.19 | 0.00 | 47.74 | 109.23 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.79 | 114.23 | 2.00 | 0.00 | 0.19 | 0.00 | 47.86 | 121.87 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.94 | 128.42 | 2.00 | 0.00 | 0.19 | 0.00 | 47.99 | 129.96 | 2.00 | 0.00 | 0.19 | 0.00 |
| 48.05 | 126.15 | 2.00 | 0.00 | 0.19 | 0.00 | 48.13 | 120.82 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.19 | 114.33 | 2.00 | 0.00 | 0.18 | 0.00 | 48.26 | 110.83 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.34 | 111.39 | 2.00 | 0.00 | 0.18 | 0.00 | 48.39 | 115.27 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.43 | 121.62 | 2.00 | 0.00 | 0.18 | 0.00 | 48.51 | 129.59 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.58 | 138.09 | 2.00 | 0.00 | 0.18 | 0.00 | 48.63 | 145.36 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.72 | 150.60 | 2.00 | 0.00 | 0.17 | 0.00 | 48.78 | 155.30 | 2.00 | 0.00 | 0.17 | 0.00 |
| 48.83 | 160.07 | 2.00 | 0.00 | 0.17 | 0.00 | 48.90 | 162.58 | 2.00 | 0.00 | 0.17 | 0.00 |
| 48.98 | 162.95 | 2.00 | 0.00 | 0.17 | 0.00 | 49.03 | 159.47 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.08 | 157.19 | 2.00 | 0.00 | 0.17 | 0.00 | 49.17 | 155.73 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.23 | 155.34 | 2.00 | 0.00 | 0.17 | 0.00 | 49.32 | 153.56 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.35 | 151.36 | 2.00 | 0.00 | 0.16 | 0.00 | 49.43 | 147.91 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.50 | 148.14 | 2.00 | 0.00 | 0.16 | 0.00 | 49.58 | 153.24 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.63 | 161.85 | 2.00 | 0.00 | 0.16 | 0.00 | 49.72 | 169.66 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.78 | 176.91 | 2.00 | 0.00 | 0.16 | 0.00 | 49.83 | 182.48 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.90 | 186.16 | 1.08 | 0.06 | 0.15 | 0.00 | 49.98 | 189.12 | 1.13 | 0.06 | 0.15 | 0.00 |
| 50.02 | 190.49 | 1.15 | 0.04 | 0.15 | 0.00 | 50.08 | 190.40 | 1.15 | 0.04 | 0.15 | 0.00 |
| 50.18 | 189.49 | 1.14 | 0.05 | 0.15 | 0.00 | 50.23 | 188.53 | 1.12 | 0.05 | 0.15 | 0.00 |
| 50.27 | 185.58 | 1.08 | 0.05 | 0.15 | 0.00 | 50.36 | 182.94 | 1.04 | 0.07 | 0.15 | 0.00 |
| 50.40 | 181.01 | 1.01 | 0.07 | 0.15 | 0.00 | 50.47 | 181.99 | 1.03 | 0.07 | 0.14 | 0.00 |
| 50.55 | 183.68 | 1.05 | 0.05 | 0.14 | 0.00 | 50.63 | 184.84 | 1.07 | 0.05 | 0.14 | 0.00 |
| 50.67 | 185.63 | 1.08 | 0.05 | 0.14 | 0.00 | 50.72 | 186.18 | 1.09 | 0.05 | 0.14 | 0.00 |
| 50.83 | 186.75 | 1.10 | 0.05 | 0.14 | 0.00 | 50.88 | 187.38 | 1.11 | 0.05 | 0.14 | 0.00 |
| 50.93 | 188.05 | 1.12 | 0.05 | 0.14 | 0.00 | 51.02 | 188.39 | 1.13 | 0.05 | 0.14 | 0.00 |
| 51.08 | 188.49 | 1.13 | 0.05 | 0.13 | 0.00 | 51.12 | 188.10 | 1.12 | 0.05 | 0.13 | 0.00 |
| 51.21 | 187.59 | 1.12 | 0.05 | 0.13 | 0.00 | 51.27 | 187.19 | 1.11 | 0.05 | 0.13 | 0.00 |
| 51.32 | 186.86 | 1.11 | 0.05 | 0.13 | 0.00 | 51.39 | 186.25 | 1.10 | 0.05 | 0.13 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 51.47 | 185.76 | 1.09 | 0.05 | 0.13 | 0.00 | 51.55 | 185.55 | 1.09 | 0.05 | 0.13 | 0.00 |
| 51.60 | 185.78 | 1.09 | 0.05 | 0.13 | 0.00 | 51.67 | 185.99 | 1.10 | 0.05 | 0.12 | 0.00 |
| 51.72 | 186.12 | 1.10 | 0.05 | 0.12 | 0.00 | 51.79 | 185.62 | 1.09 | 0.05 | 0.12 | 0.00 |
| 51.87 | 184.70 | 1.08 | 0.04 | 0.12 | 0.00 | 51.91 | 181.96 | 1.04 | 0.06 | 0.12 | 0.00 |
| 51.98 | 175.97 | 0.95 | 0.06 | 0.12 | 0.00 | 52.06 | 169.94 | 0.87 | 0.08 | 0.12 | 0.00 |
| 52.12 | 166.30 | 0.82 | 0.11 | 0.12 | 0.00 | 52.17 | 164.23 | 0.80 | 0.11 | 0.12 | 0.00 |
| 52.26 | 161.46 | 2.00 | 0.00 | 0.11 | 0.00 | 52.31 | 157.74 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.38 | 155.33 | 2.00 | 0.00 | 0.11 | 0.00 | 52.47 | 153.29 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.51 | 154.76 | 2.00 | 0.00 | 0.11 | 0.00 | 52.56 | 153.84 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.66 | 150.84 | 2.00 | 0.00 | 0.11 | 0.00 | 52.70 | 147.79 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.77 | 146.59 | 2.00 | 0.00 | 0.11 | 0.00 | 52.87 | 146.55 | 2.00 | 0.00 | 0.10 | 0.00 |
| 52.91 | 146.23 | 2.00 | 0.00 | 0.10 | 0.00 | 52.97 | 145.13 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.02 | 140.06 | 2.00 | 0.00 | 0.10 | 0.00 | 53.10 | 132.61 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.16 | 123.96 | 2.00 | 0.00 | 0.10 | 0.00 | 53.22 | 115.57 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.31 | 107.65 | 2.00 | 0.00 | 0.10 | 0.00 | 53.36 | 100.83 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.42 | 95.52 | 2.00 | 0.00 | 0.09 | 0.00 | 53.51 | 90.96 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.56 | 87.45 | 2.00 | 0.00 | 0.09 | 0.00 | 53.62 | 86.87 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.71 | 86.21 | 2.00 | 0.00 | 0.09 | 0.00 | 53.75 | 85.79 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.83 | 85.30 | 2.00 | 0.00 | 0.09 | 0.00 | 53.91 | 86.00 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.98 | 86.70 | 2.00 | 0.00 | 0.09 | 0.00 | 54.01 | 88.77 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.11 | 89.74 | 2.00 | 0.00 | 0.08 | 0.00 | 54.15 | 90.10 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.21 | 88.80 | 2.00 | 0.00 | 0.08 | 0.00 | 54.27 | 86.89 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.35 | 83.84 | 2.00 | 0.00 | 0.08 | 0.00 | 54.41 | 80.19 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.46 | 75.96 | 2.00 | 0.00 | 0.08 | 0.00 | 54.55 | 72.32 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.60 | 69.42 | 2.00 | 0.00 | 0.07 | 0.00 | 54.66 | 67.72 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.74 | 66.63 | 2.00 | 0.00 | 0.07 | 0.00 | 54.79 | 66.09 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.86 | 65.68 | 2.00 | 0.00 | 0.07 | 0.00 | 54.96 | 65.16 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.03 | 64.73 | 2.00 | 0.00 | 0.07 | 0.00 | 55.06 | 64.56 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.14 | 64.53 | 2.00 | 0.00 | 0.07 | 0.00 | 55.21 | 64.57 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.25 | 64.47 | 2.00 | 0.00 | 0.06 | 0.00 | 55.32 | 64.14 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.41 | 63.73 | 2.00 | 0.00 | 0.06 | 0.00 | 55.45 | 63.33 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.52 | 63.11 | 2.00 | 0.00 | 0.06 | 0.00 | 55.61 | 63.00 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.65 | 63.10 | 2.00 | 0.00 | 0.06 | 0.00 | 55.71 | 63.73 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.80 | 64.63 | 2.00 | 0.00 | 0.05 | 0.00 | 55.86 | 67.19 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.95 | 69.38 | 2.00 | 0.00 | 0.05 | 0.00 | 56.00 | 71.47 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.05 | 71.90 | 2.00 | 0.00 | 0.05 | 0.00 | 56.10 | 72.99 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.20 | 74.10 | 2.00 | 0.00 | 0.05 | 0.00 | 56.24 | 75.89 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.31 | 74.72 | 2.00 | 0.00 | 0.05 | 0.00 | 56.39 | 71.63 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.43 | 67.74 | 2.00 | 0.00 | 0.04 | 0.00 | 56.50 | 66.23 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.60 | 66.68 | 2.00 | 0.00 | 0.04 | 0.00 | 56.66 | 66.97 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.70 | 67.46 | 2.00 | 0.00 | 0.04 | 0.00 | 56.79 | 67.43 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.84 | 66.96 | 2.00 | 0.00 | 0.04 | 0.00 | 56.92 | 65.55 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.99 | 63.95 | 2.00 | 0.00 | 0.03 | 0.00 | 57.03 | 63.61 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.09 | 65.08 | 2.00 | 0.00 | 0.03 | 0.00 | 57.18 | 67.14 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.23 | 68.60 | 2.00 | 0.00 | 0.03 | 0.00 | 57.31 | 69.88 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.38 | 71.91 | 2.00 | 0.00 | 0.03 | 0.00 | 57.43 | 76.80 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.50 | 84.78 | 2.00 | 0.00 | 0.03 | 0.00 | 57.58 | 92.92 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.62 | 99.70 | 2.00 | 0.00 | 0.02 | 0.00 | 57.68 | 104.00 | 2.00 | 0.00 | 0.02 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.78 | 105.20 | 2.00 | 0.00 | 0.02 | 0.00 | 57.82 | 104.31 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.88 | 105.41 | 2.00 | 0.00 | 0.02 | 0.00 | 57.97 | 108.60 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.02 | 112.82 | 2.00 | 0.00 | 0.02 | 0.00 | 58.09 | 115.49 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.17 | 117.52 | 0.39 | 0.03 | 0.01 | 0.00 | 58.23 | 118.23 | 0.40 | 0.03 | 0.01 | 0.00 |
| 58.28 | 118.61 | 0.40 | 0.02 | 0.01 | 0.00 | 58.37 | 119.32 | 0.40 | 0.02 | 0.01 | 0.00 |
| 58.42 | 120.74 | 0.41 | 0.02 | 0.01 | 0.00 | 58.48 | 123.35 | 0.43 | 0.02 | 0.01 | 0.00 |
| 58.57 | 126.86 | 2.00 | 0.00 | 0.01 | 0.00 | 58.62 | 130.34 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.67 | 132.83 | 2.00 | 0.00 | 0.01 | 0.00 | 58.77 | 135.43 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.81 | 140.51 | 2.00 | 0.00 | 0.00 | 0.00 | 58.88 | 144.69 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.97 | 146.91 | 2.00 | 0.00 | 0.00 | 0.00 | 59.01 | 145.81 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.07 | 144.47 | 2.00 | 0.00 | 0.00 | 0.00 | 59.12 | 139.01 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.19 | 133.42 | 2.00 | 0.00 | 0.00 | 0.00 | 59.27 | 127.75 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.32 | 126.38 | 2.00 | 0.00 | 0.00 | 0.00 | 59.42 | 124.56 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.47 | 119.87 | 2.00 | 0.00 | 0.00 | 0.00 | 59.52 | 116.19 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.58 | 114.09 | 2.00 | 0.00 | 0.00 | 0.00 | 59.68 | 114.99 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.74 | 114.29 | 2.00 | 0.00 | 0.00 | 0.00 | 59.78 | 111.20 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.88 | 109.00 | 2.00 | 0.00 | 0.00 | 0.00 | 59.93 | 110.20 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.00 | 89.47 | 2.00 | 0.00 | 0.00 | 0.00 | 60.05 | 63.42 | 0.18 | 0.00 | 0.00 | 0.00 |
| 60.13 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.18 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.25 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.33 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.38 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | | | |

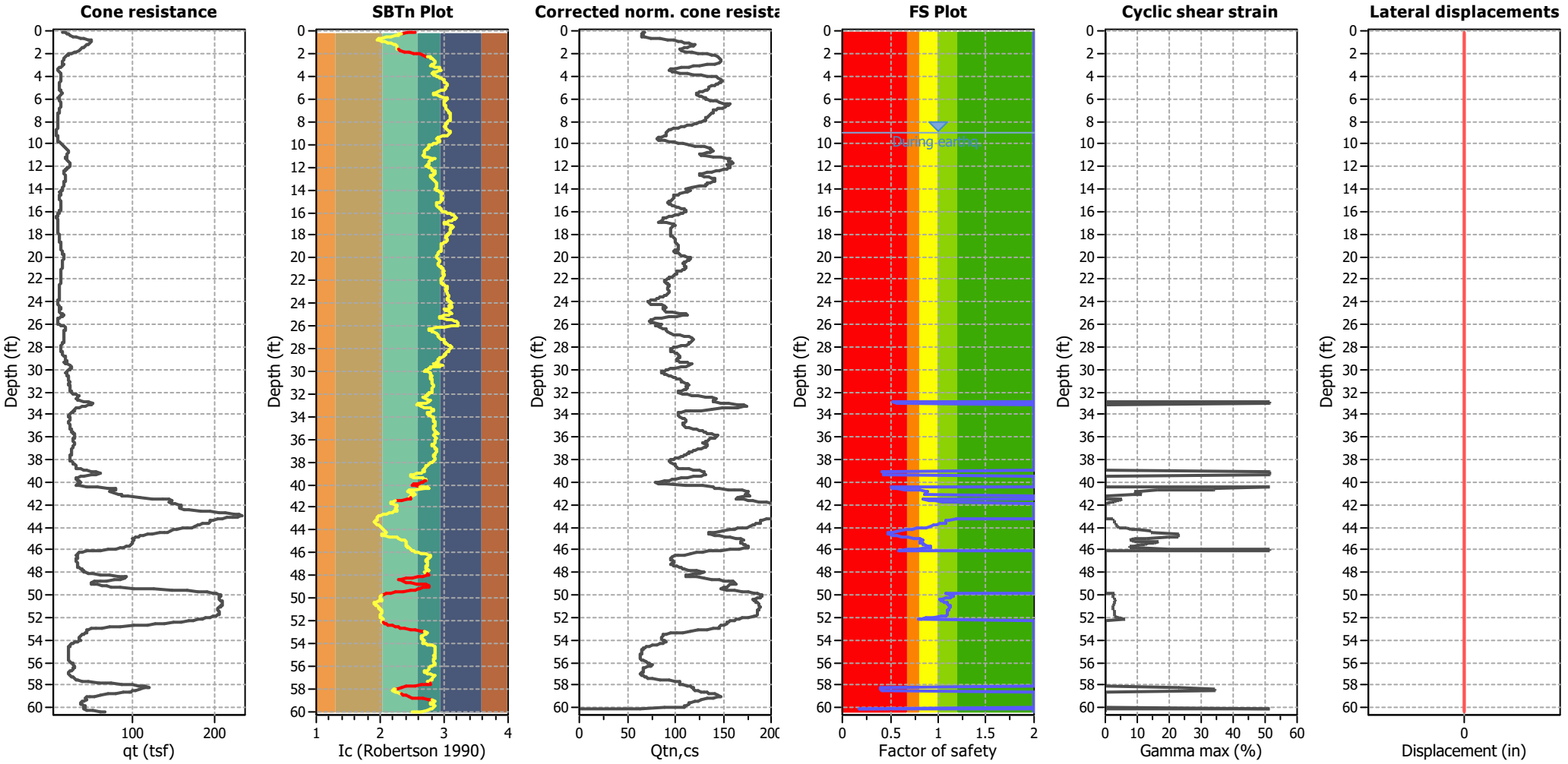
**Total estimated settlement: 0.18**

**Abbreviations**

$Q_{tn,cs}$: 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

# Estimation of post-earthquake lateral Displacements

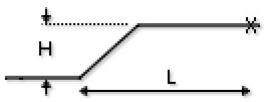
**Geometric parameters: Level ground (or gently sloping) with free face (L: 90.00 ft - H: 12.00 ft)**




**Abbreviations**

$q_t$: Total cone resistance (cone resistance $q_c$ corrected for pore water effects)
$I_c$: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
$\gamma_{max}$: Maximum cyclic shear strain
LDI: Lateral displacement index

**Surface condition**



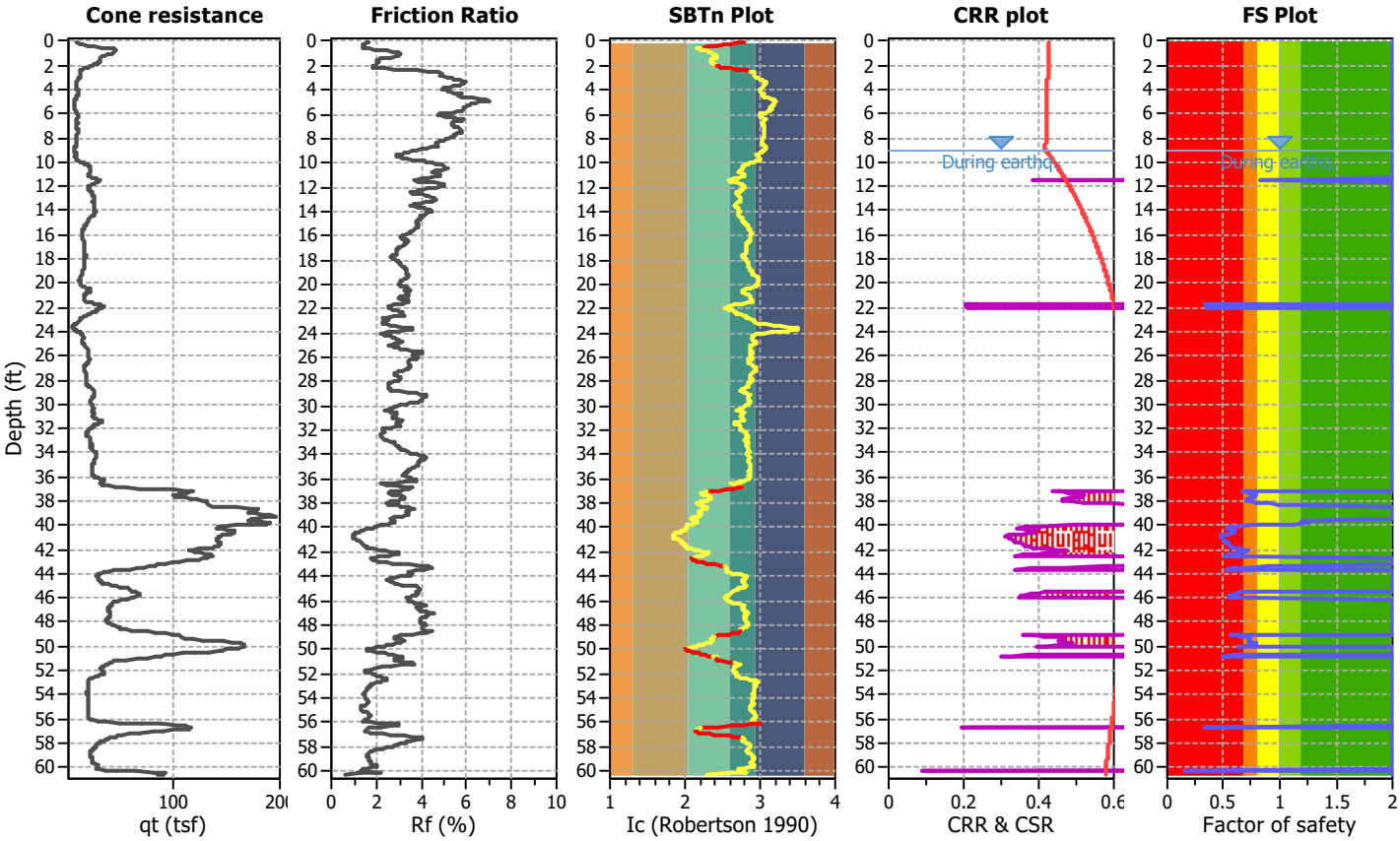
# LIQUEFACTION ANALYSIS REPORT

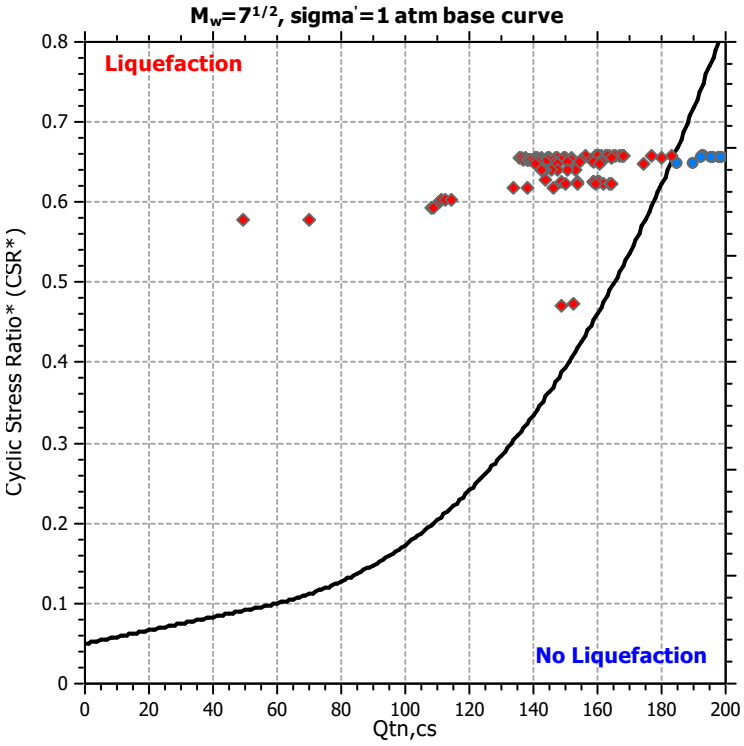
**Project title : Geocon West / 21611 Perry Street** **Location : Carson, CA**

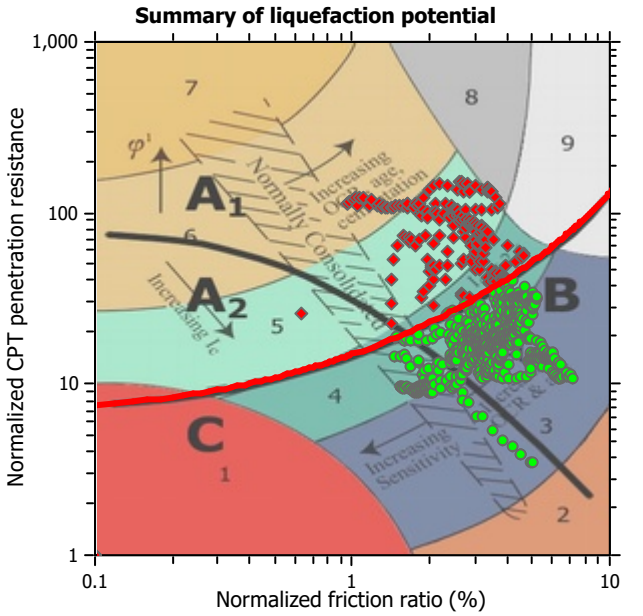
**CPT file : CPT-3**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | G.W.T. (in-situ): | 12.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | NCEER (1998) | G.W.T. (earthq.): | 9.00 ft | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 6.87 | Ic cut-off value: | 2.60 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 0.82 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

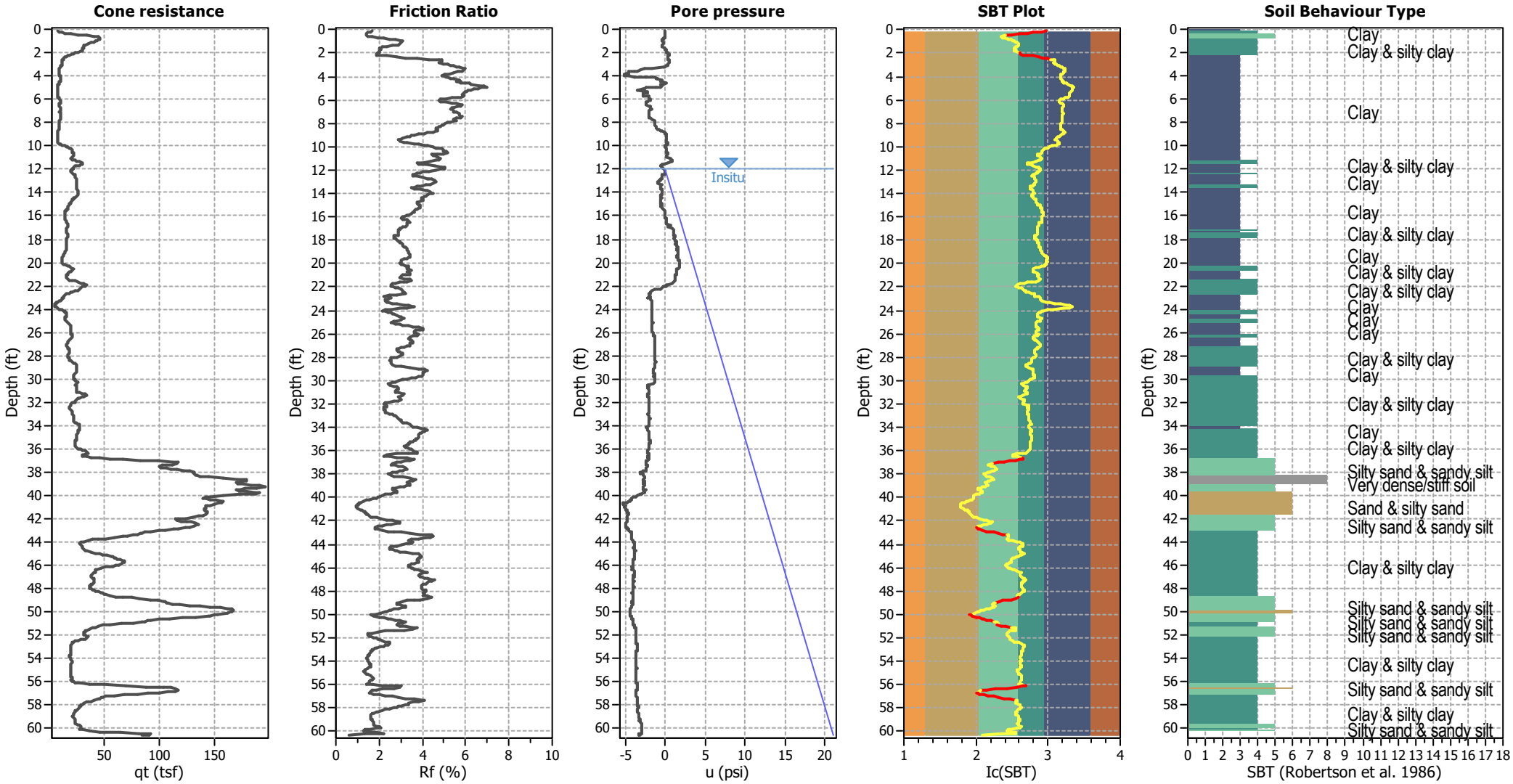



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# CPT basic interpretation plots



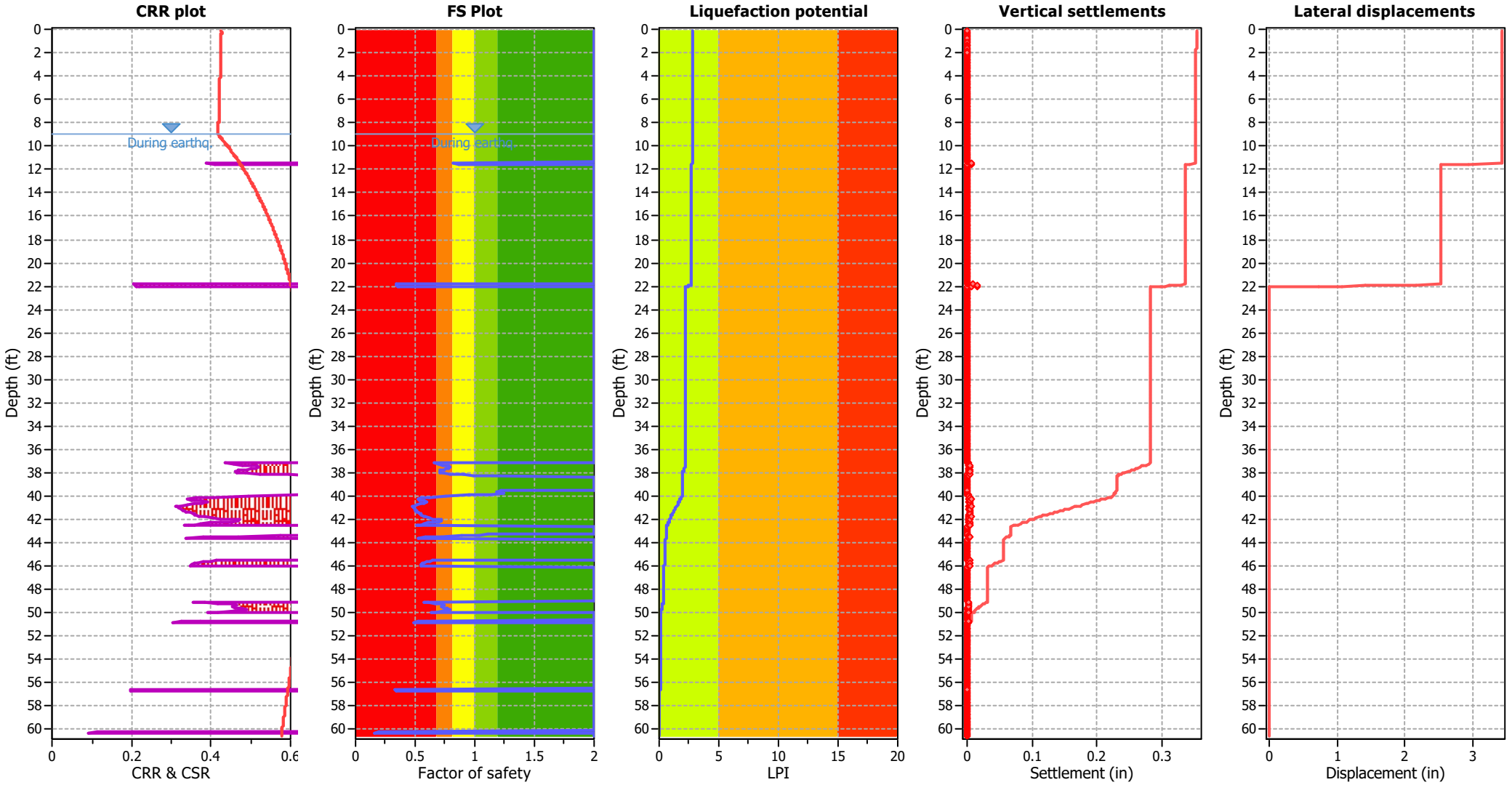

## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

**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

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

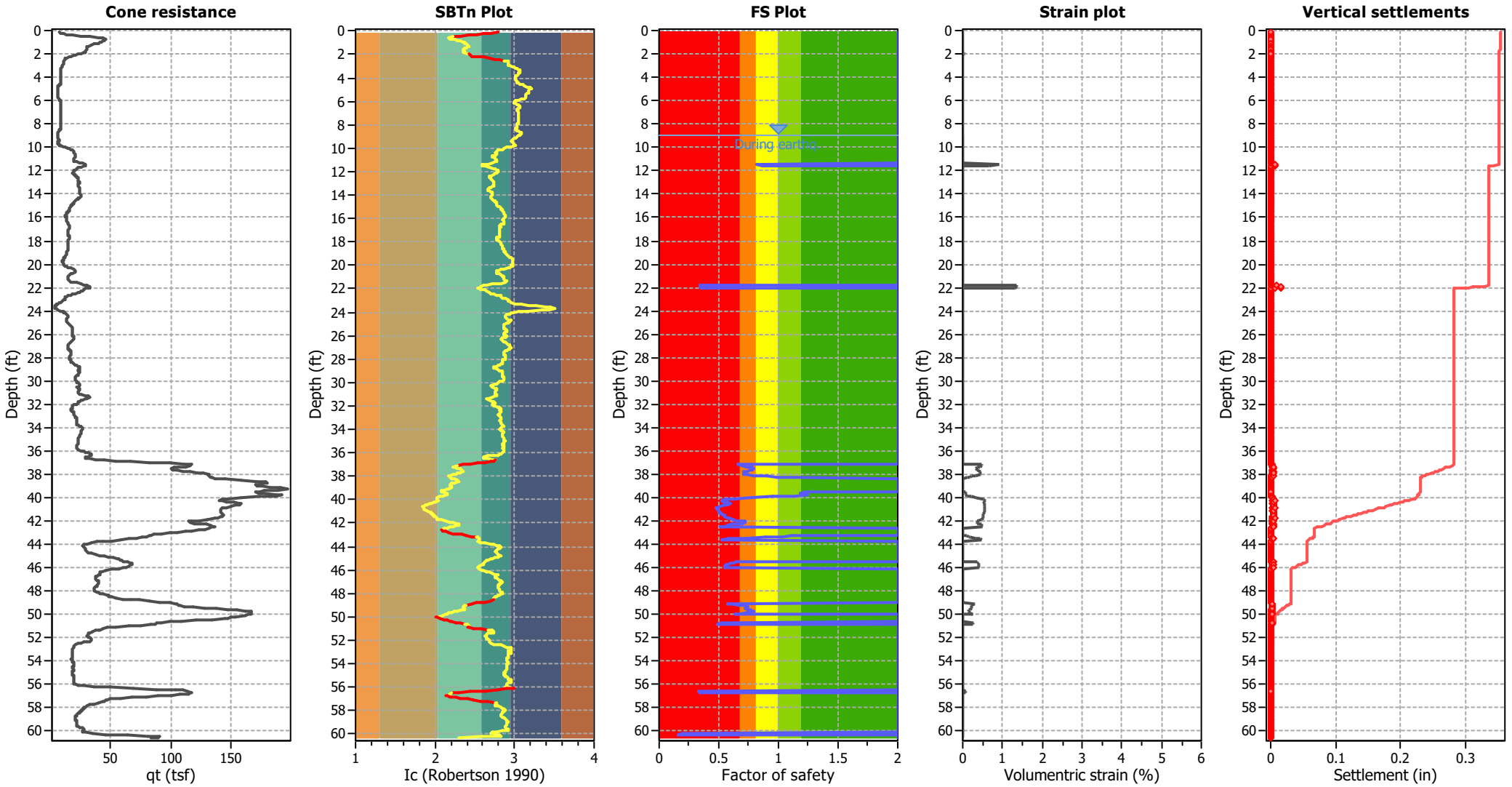
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

## Estimation of post-earthquake settlements




**Abbreviations**

| | |
|---|---|
| $q_t$: | Total cone resistance (cone resistance $q_c$ corrected for pore water effects) |
| $I_c$: | Soil Behaviour Type Index |
| FS: | Calculated Factor of Safety against liquefaction |
| Volumentric strain: | Post-liquefaction volumentric strain |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.08 | 2.78 | 12.35 | 5.66 | 69.90 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.15 | 2.71 | 14.74 | 4.77 | 70.31 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.23 | 2.60 | 18.66 | 3.78 | 70.62 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.30 | 2.52 | 22.68 | 3.13 | 71.08 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.35 | 2.42 | 29.85 | 2.49 | 74.48 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.42 | 2.31 | 41.10 | 1.96 | 80.55 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.50 | 2.22 | 53.73 | 1.66 | 89.43 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.55 | 2.17 | 64.89 | 1.54 | 99.96 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.61 | 2.17 | 70.73 | 1.55 | 109.97 | 25 | 622 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.70 | 2.20 | 73.83 | 1.61 | 118.69 | 27 | 668 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.73 | 2.24 | 73.78 | 1.71 | 126.20 | 29 | 701 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.80 | 2.28 | 72.62 | 1.84 | 133.66 | 31 | 727 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.89 | 2.32 | 71.18 | 1.99 | 141.77 | 34 | 750 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.93 | 2.35 | 69.21 | 2.15 | 148.48 | 36 | 763 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.01 | 2.37 | 66.86 | 2.22 | 148.67 | 36 | 753 | 0.43 | 0.006 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.09 | 2.38 | 64.21 | 2.27 | 146.02 | 36 | 733 | 0.43 | 0.006 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.13 | 2.40 | 60.24 | 2.36 | 141.99 | 35 | 702 | 0.43 | 0.007 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.19 | 2.41 | 56.35 | 2.45 | 138.00 | 34 | 671 | 0.43 | 0.008 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.29 | 2.43 | 52.36 | 2.52 | 132.05 | 33 | 634 | 0.43 | 0.010 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.34 | 2.41 | 50.01 | 2.45 | 122.65 | 30 | 596 | 0.43 | 0.012 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.39 | 2.39 | 49.14 | 2.31 | 113.50 | 28 | 566 | 0.43 | 0.015 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.45 | 2.36 | 48.85 | 2.20 | 107.27 | 26 | 546 | 0.43 | 0.017 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.54 | 2.35 | 48.70 | 2.15 | 104.70 | 25 | 538 | 0.43 | 0.020 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.59 | 2.35 | 48.99 | 2.12 | 103.88 | 25 | 537 | 0.43 | 0.021 | 0.02 | 9.85 | 0.01 | 0.000 |
| 1.67 | 2.37 | 47.31 | 2.21 | 104.70 | 25 | 531 | 0.43 | 0.023 | 0.02 | 9.85 | 0.01 | 0.000 |
| 1.72 | 2.35 | 48.59 | 2.13 | 103.38 | 25 | 533 | 0.43 | 0.024 | 0.02 | 9.85 | 0.01 | 0.000 |
| 1.79 | 2.36 | 47.11 | 2.18 | 102.82 | 25 | 525 | 0.42 | 0.027 | 0.02 | 9.85 | 0.02 | 0.000 |
| 1.85 | 2.36 | 45.86 | 2.19 | 100.31 | 24 | 512 | 0.42 | 0.030 | 0.02 | 9.85 | 0.02 | 0.000 |
| 1.94 | 2.40 | 41.30 | 2.40 | 99.07 | 24 | 486 | 0.42 | 0.038 | 0.03 | 9.85 | 0.02 | 0.000 |
| 1.98 | 2.42 | 37.95 | 2.50 | 95.05 | 24 | 458 | 0.42 | 0.049 | 0.04 | 9.85 | 0.03 | 0.000 |
| 2.04 | 2.44 | 35.12 | 2.59 | 90.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.13 | 2.47 | 31.99 | 2.76 | 88.29 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.17 | 2.53 | 28.45 | 3.21 | 91.30 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.24 | 2.61 | 25.62 | 3.81 | 97.62 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.32 | 2.69 | 23.17 | 4.57 | 105.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.39 | 2.75 | 21.58 | 5.24 | 113.09 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.43 | 2.82 | 20.18 | 6.04 | 122.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.52 | 2.87 | 19.13 | 6.79 | 129.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.58 | 2.91 | 18.40 | 7.40 | 136.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.63 | 2.93 | 18.17 | 7.60 | 138.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.72 | 2.92 | 18.30 | 7.53 | 137.83 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.78 | 2.92 | 18.43 | 7.43 | 136.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.83 | 2.91 | 18.47 | 7.41 | 136.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.89 | 2.93 | 18.18 | 7.62 | 138.52 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.98 | 2.95 | 17.70 | 7.93 | 140.37 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.03 | 2.97 | 17.06 | 8.30 | 141.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.09 | 2.99 | 16.34 | 8.65 | 141.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.18 | 3.01 | 15.71 | 8.96 | 140.69 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.22 | 3.04 | 14.97 | 9.40 | 140.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.32 | 3.05 | 14.47 | 9.74 | 140.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.37 | 3.07 | 14.06 | 10.03 | 140.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.42 | 3.07 | 13.99 | 9.98 | 139.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.52 | 3.06 | 13.97 | 9.91 | 138.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.57 | 3.06 | 13.96 | 9.83 | 137.19 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.61 | 3.05 | 13.95 | 9.75 | 136.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.68 | 3.05 | 13.98 | 9.58 | 133.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.77 | 3.03 | 14.07 | 9.33 | 131.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.83 | 3.01 | 14.25 | 9.04 | 128.88 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.91 | 3.01 | 14.40 | 8.90 | 128.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.95 | 3.01 | 14.59 | 8.88 | 129.49 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.02 | 3.01 | 14.79 | 8.89 | 131.59 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.12 | 3.01 | 15.00 | 8.90 | 133.47 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.14 | 3.01 | 15.11 | 8.97 | 135.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.22 | 3.02 | 15.11 | 9.13 | 138.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.26 | 3.03 | 15.02 | 9.36 | 140.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.37 | 3.04 | 14.87 | 9.52 | 141.49 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.42 | 3.04 | 14.73 | 9.41 | 138.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.46 | 3.05 | 14.39 | 9.60 | 138.14 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.57 | 3.06 | 13.96 | 9.90 | 138.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.61 | 3.10 | 13.28 | 10.58 | 140.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.67 | 3.12 | 12.75 | 10.95 | 139.59 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.76 | 3.16 | 11.68 | 11.95 | 139.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.81 | 3.19 | 11.14 | 12.48 | 139.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.90 | 3.21 | 10.75 | 12.89 | 138.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.96 | 3.19 | 10.96 | 12.46 | 136.67 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.00 | 3.18 | 10.90 | 12.39 | 135.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.05 | 3.18 | 10.84 | 12.28 | 133.04 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.14 | 3.18 | 10.73 | 12.20 | 130.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.20 | 3.17 | 10.64 | 12.15 | 129.26 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.30 | 3.17 | 10.68 | 12.06 | 128.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.35 | 3.16 | 10.97 | 11.80 | 129.46 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.39 | 3.15 | 11.24 | 11.56 | 129.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.48 | 3.14 | 11.33 | 11.46 | 129.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.55 | 3.14 | 11.27 | 11.48 | 129.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.59 | 3.15 | 11.22 | 11.57 | 129.76 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.64 | 3.14 | 11.36 | 11.45 | 130.11 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.74 | 3.13 | 11.65 | 11.18 | 130.29 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.79 | 3.11 | 12.03 | 10.77 | 129.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.84 | 3.08 | 12.60 | 10.21 | 128.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.94 | 3.05 | 13.22 | 9.66 | 127.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.97 | 3.01 | 14.03 | 9.00 | 126.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.05 | 3.00 | 14.60 | 8.71 | 127.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.14 | 2.99 | 15.03 | 8.63 | 129.64 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.19 | 3.00 | 15.07 | 8.86 | 133.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.24 | 3.02 | 14.82 | 9.19 | 136.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.33 | 3.04 | 14.47 | 9.55 | 138.23 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.38 | 3.06 | 14.18 | 9.87 | 139.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.44 | 3.07 | 14.08 | 9.98 | 140.53 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.52 | 3.07 | 14.03 | 9.96 | 139.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.59 | 3.06 | 14.02 | 9.80 | 137.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.64 | 3.05 | 14.12 | 9.60 | 135.48 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.70 | 3.04 | 14.31 | 9.42 | 134.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.78 | 3.03 | 14.44 | 9.35 | 135.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.83 | 3.03 | 14.49 | 9.35 | 135.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.89 | 3.04 | 14.29 | 9.52 | 135.98 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.98 | 3.04 | 14.28 | 9.53 | 136.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.03 | 3.05 | 14.13 | 9.69 | 136.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.09 | 3.05 | 14.27 | 9.68 | 138.08 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.18 | 3.06 | 14.26 | 9.79 | 139.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.23 | 3.05 | 14.59 | 9.63 | 140.49 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.29 | 3.04 | 14.83 | 9.55 | 141.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.38 | 3.04 | 15.01 | 9.52 | 142.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.42 | 3.05 | 15.01 | 9.60 | 144.04 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.48 | 3.05 | 14.81 | 9.63 | 142.56 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.58 | 3.04 | 14.61 | 9.53 | 139.29 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.62 | 3.04 | 14.32 | 9.54 | 136.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.68 | 3.05 | 14.22 | 9.60 | 136.47 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.78 | 3.05 | 14.12 | 9.73 | 137.32 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.81 | 3.05 | 14.12 | 9.66 | 136.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.88 | 3.04 | 14.06 | 9.55 | 134.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.97 | 3.04 | 14.06 | 9.42 | 132.39 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.01 | 3.03 | 14.05 | 9.30 | 130.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.11 | 3.03 | 14.04 | 9.24 | 129.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.14 | 3.02 | 13.99 | 9.17 | 128.37 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.22 | 3.02 | 13.89 | 9.16 | 127.28 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.30 | 3.02 | 13.79 | 9.11 | 125.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.35 | 3.02 | 13.64 | 9.12 | 124.38 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.41 | 3.02 | 13.49 | 9.12 | 122.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.50 | 3.03 | 13.15 | 9.29 | 122.13 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.56 | 3.04 | 12.72 | 9.54 | 121.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.61 | 3.06 | 12.05 | 9.94 | 119.81 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.68 | 3.08 | 11.47 | 10.19 | 116.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.75 | 3.08 | 10.99 | 10.30 | 113.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.80 | 3.08 | 10.79 | 10.18 | 109.84 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.89 | 3.07 | 10.69 | 10.02 | 107.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.94 | 3.05 | 10.69 | 9.71 | 103.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Total estimated settlement: 0.00**

**Abbreviations**

$Q_{tn}$: Equivalent clean sand normalized cone resistance
$K_c$: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
$G_{max}$: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
$N_c$: Equivalent number of cycles
$e_v$: Volumetric strain
Settle.: Calculated settlement

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.00 | 101.33 | 2.00 | 0.00 | 0.85 | 0.00 | 9.08 | 99.42 | 2.00 | 0.00 | 0.85 | 0.00 |
| 9.15 | 98.91 | 2.00 | 0.00 | 0.84 | 0.00 | 9.20 | 97.89 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.28 | 96.10 | 2.00 | 0.00 | 0.84 | 0.00 | 9.35 | 94.37 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.40 | 93.35 | 2.00 | 0.00 | 0.84 | 0.00 | 9.45 | 93.03 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.55 | 92.88 | 2.00 | 0.00 | 0.84 | 0.00 | 9.59 | 94.89 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.69 | 98.37 | 2.00 | 0.00 | 0.84 | 0.00 | 9.74 | 104.29 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.79 | 110.06 | 2.00 | 0.00 | 0.83 | 0.00 | 9.84 | 119.23 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.94 | 127.23 | 2.00 | 0.00 | 0.83 | 0.00 | 10.00 | 138.46 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.09 | 146.64 | 2.00 | 0.00 | 0.83 | 0.00 | 10.13 | 155.07 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.18 | 160.01 | 2.00 | 0.00 | 0.83 | 0.00 | 10.24 | 164.76 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.33 | 167.61 | 2.00 | 0.00 | 0.82 | 0.00 | 10.37 | 170.08 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.43 | 171.87 | 2.00 | 0.00 | 0.82 | 0.00 | 10.52 | 172.65 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.59 | 168.22 | 2.00 | 0.00 | 0.82 | 0.00 | 10.64 | 162.62 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.70 | 157.34 | 2.00 | 0.00 | 0.82 | 0.00 | 10.78 | 157.32 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.83 | 158.09 | 2.00 | 0.00 | 0.82 | 0.00 | 10.94 | 160.18 | 2.00 | 0.00 | 0.81 | 0.00 |
| 10.98 | 161.14 | 2.00 | 0.00 | 0.81 | 0.00 | 11.03 | 161.38 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.09 | 160.07 | 2.00 | 0.00 | 0.81 | 0.00 | 11.17 | 158.76 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.24 | 154.72 | 2.00 | 0.00 | 0.81 | 0.00 | 11.33 | 150.11 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.37 | 147.45 | 2.00 | 0.00 | 0.81 | 0.00 | 11.44 | 148.76 | 0.82 | 0.92 | 0.81 | 0.01 |
| 11.52 | 152.64 | 0.87 | 0.67 | 0.80 | 0.01 | 11.57 | 159.75 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.63 | 166.32 | 2.00 | 0.00 | 0.80 | 0.00 | 11.72 | 170.55 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.76 | 170.15 | 2.00 | 0.00 | 0.80 | 0.00 | 11.83 | 167.43 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.92 | 165.17 | 2.00 | 0.00 | 0.80 | 0.00 | 11.94 | 160.98 | 2.00 | 0.00 | 0.80 | 0.00 |
| 12.02 | 153.99 | 2.00 | 0.00 | 0.80 | 0.00 | 12.11 | 145.17 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.16 | 138.77 | 2.00 | 0.00 | 0.79 | 0.00 | 12.22 | 135.92 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.31 | 134.11 | 2.00 | 0.00 | 0.79 | 0.00 | 12.36 | 131.70 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.42 | 131.06 | 2.00 | 0.00 | 0.79 | 0.00 | 12.50 | 132.75 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.56 | 138.76 | 2.00 | 0.00 | 0.79 | 0.00 | 12.62 | 145.14 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.70 | 150.29 | 2.00 | 0.00 | 0.78 | 0.00 | 12.77 | 153.20 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.81 | 156.74 | 2.00 | 0.00 | 0.78 | 0.00 | 12.90 | 159.58 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.96 | 161.77 | 2.00 | 0.00 | 0.78 | 0.00 | 13.01 | 161.79 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.06 | 160.39 | 2.00 | 0.00 | 0.78 | 0.00 | 13.16 | 157.63 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.21 | 154.61 | 2.00 | 0.00 | 0.78 | 0.00 | 13.26 | 149.61 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.36 | 144.46 | 2.00 | 0.00 | 0.77 | 0.00 | 13.40 | 139.31 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.46 | 136.00 | 2.00 | 0.00 | 0.77 | 0.00 | 13.55 | 133.17 | 2.00 | 0.00 | 0.77 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.60 | 136.22 | 2.00 | 0.00 | 0.77 | 0.00 | 13.67 | 142.35 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.75 | 149.51 | 2.00 | 0.00 | 0.77 | 0.00 | 13.80 | 152.39 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.86 | 154.79 | 2.00 | 0.00 | 0.77 | 0.00 | 13.95 | 157.06 | 2.00 | 0.00 | 0.76 | 0.00 |
| 13.99 | 157.62 | 2.00 | 0.00 | 0.76 | 0.00 | 14.06 | 155.79 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.15 | 153.33 | 2.00 | 0.00 | 0.76 | 0.00 | 14.19 | 150.89 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.26 | 147.88 | 2.00 | 0.00 | 0.76 | 0.00 | 14.35 | 144.55 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.39 | 141.84 | 2.00 | 0.00 | 0.76 | 0.00 | 14.45 | 140.52 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.55 | 139.88 | 2.00 | 0.00 | 0.75 | 0.00 | 14.58 | 138.75 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.65 | 136.40 | 2.00 | 0.00 | 0.75 | 0.00 | 14.73 | 133.48 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.77 | 130.91 | 2.00 | 0.00 | 0.75 | 0.00 | 14.84 | 130.08 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.94 | 129.68 | 2.00 | 0.00 | 0.75 | 0.00 | 15.00 | 129.99 | 2.00 | 0.00 | 0.75 | 0.00 |
| 15.03 | 129.38 | 2.00 | 0.00 | 0.75 | 0.00 | 15.11 | 128.38 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.19 | 127.31 | 2.00 | 0.00 | 0.74 | 0.00 | 15.24 | 126.29 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.29 | 124.72 | 2.00 | 0.00 | 0.74 | 0.00 | 15.39 | 122.97 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.42 | 121.34 | 2.00 | 0.00 | 0.74 | 0.00 | 15.49 | 119.55 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.59 | 117.56 | 2.00 | 0.00 | 0.74 | 0.00 | 15.63 | 115.59 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.69 | 113.94 | 2.00 | 0.00 | 0.73 | 0.00 | 15.78 | 112.34 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.84 | 110.36 | 2.00 | 0.00 | 0.73 | 0.00 | 15.89 | 108.32 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.95 | 106.13 | 2.00 | 0.00 | 0.73 | 0.00 | 16.04 | 104.85 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.08 | 104.19 | 2.00 | 0.00 | 0.73 | 0.00 | 16.18 | 105.05 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.24 | 106.76 | 2.00 | 0.00 | 0.72 | 0.00 | 16.28 | 109.29 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.36 | 111.43 | 2.00 | 0.00 | 0.72 | 0.00 | 16.43 | 112.96 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.47 | 113.13 | 2.00 | 0.00 | 0.72 | 0.00 | 16.54 | 112.95 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.63 | 112.85 | 2.00 | 0.00 | 0.72 | 0.00 | 16.68 | 113.79 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.78 | 113.39 | 2.00 | 0.00 | 0.72 | 0.00 | 16.82 | 111.83 | 2.00 | 0.00 | 0.71 | 0.00 |
| 16.87 | 109.28 | 2.00 | 0.00 | 0.71 | 0.00 | 16.93 | 107.22 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.01 | 105.71 | 2.00 | 0.00 | 0.71 | 0.00 | 17.09 | 104.65 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.15 | 103.83 | 2.00 | 0.00 | 0.71 | 0.00 | 17.20 | 103.41 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.27 | 103.10 | 2.00 | 0.00 | 0.71 | 0.00 | 17.35 | 103.42 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.40 | 103.99 | 2.00 | 0.00 | 0.71 | 0.00 | 17.45 | 104.14 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.55 | 103.60 | 2.00 | 0.00 | 0.70 | 0.00 | 17.59 | 102.20 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.65 | 101.34 | 2.00 | 0.00 | 0.70 | 0.00 | 17.75 | 100.78 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.79 | 101.09 | 2.00 | 0.00 | 0.70 | 0.00 | 17.87 | 101.47 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.94 | 101.91 | 2.00 | 0.00 | 0.70 | 0.00 | 17.98 | 102.31 | 2.00 | 0.00 | 0.70 | 0.00 |
| 18.05 | 102.97 | 2.00 | 0.00 | 0.69 | 0.00 | 18.14 | 103.88 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.18 | 104.81 | 2.00 | 0.00 | 0.69 | 0.00 | 18.24 | 105.70 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.34 | 106.38 | 2.00 | 0.00 | 0.69 | 0.00 | 18.39 | 106.90 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.44 | 107.34 | 2.00 | 0.00 | 0.69 | 0.00 | 18.54 | 108.01 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.59 | 108.81 | 2.00 | 0.00 | 0.68 | 0.00 | 18.64 | 109.22 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.74 | 109.44 | 2.00 | 0.00 | 0.68 | 0.00 | 18.79 | 109.64 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.84 | 109.76 | 2.00 | 0.00 | 0.68 | 0.00 | 18.92 | 109.71 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.97 | 109.61 | 2.00 | 0.00 | 0.68 | 0.00 | 19.04 | 109.47 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.14 | 109.27 | 2.00 | 0.00 | 0.68 | 0.00 | 19.17 | 109.02 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.24 | 108.15 | 2.00 | 0.00 | 0.67 | 0.00 | 19.34 | 107.25 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.39 | 106.59 | 2.00 | 0.00 | 0.67 | 0.00 | 19.43 | 105.35 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.52 | 103.77 | 2.00 | 0.00 | 0.67 | 0.00 | 19.56 | 101.21 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.63 | 98.45 | 2.00 | 0.00 | 0.67 | 0.00 | 19.73 | 96.65 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.78 | 96.72 | 2.00 | 0.00 | 0.66 | 0.00 | 19.82 | 96.82 | 2.00 | 0.00 | 0.66 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.90 | 96.84 | 2.00 | 0.00 | 0.66 | 0.00 | 19.96 | 95.72 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.03 | 97.07 | 2.00 | 0.00 | 0.66 | 0.00 | 20.09 | 98.92 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.16 | 102.96 | 2.00 | 0.00 | 0.66 | 0.00 | 20.23 | 108.30 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.31 | 112.01 | 2.00 | 0.00 | 0.66 | 0.00 | 20.35 | 113.84 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.42 | 116.37 | 2.00 | 0.00 | 0.65 | 0.00 | 20.50 | 119.89 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.55 | 122.97 | 2.00 | 0.00 | 0.65 | 0.00 | 20.62 | 121.60 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.70 | 118.37 | 2.00 | 0.00 | 0.65 | 0.00 | 20.75 | 117.36 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.82 | 116.27 | 2.00 | 0.00 | 0.65 | 0.00 | 20.90 | 114.40 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.96 | 109.62 | 2.00 | 0.00 | 0.64 | 0.00 | 21.01 | 105.89 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.11 | 103.41 | 2.00 | 0.00 | 0.64 | 0.00 | 21.15 | 102.00 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.21 | 102.13 | 2.00 | 0.00 | 0.64 | 0.00 | 21.27 | 105.51 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.36 | 109.83 | 2.00 | 0.00 | 0.64 | 0.00 | 21.40 | 113.48 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.51 | 114.13 | 2.00 | 0.00 | 0.64 | 0.00 | 21.55 | 113.81 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.60 | 112.51 | 2.00 | 0.00 | 0.63 | 0.00 | 21.69 | 111.06 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.75 | 110.32 | 2.00 | 0.00 | 0.63 | 0.00 | 21.80 | 110.42 | 0.34 | 1.36 | 0.63 | 0.01 |
| 21.90 | 110.90 | 0.34 | 1.35 | 0.63 | 0.02 | 21.95 | 111.21 | 0.35 | 1.35 | 0.63 | 0.01 |
| 22.00 | 112.62 | 0.35 | 1.33 | 0.63 | 0.01 | 22.09 | 114.60 | 0.36 | 1.31 | 0.63 | 0.02 |
| 22.11 | 118.16 | 2.00 | 0.00 | 0.63 | 0.00 | 22.19 | 120.23 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.26 | 120.71 | 2.00 | 0.00 | 0.62 | 0.00 | 22.35 | 119.30 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.39 | 117.61 | 2.00 | 0.00 | 0.62 | 0.00 | 22.44 | 116.79 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.55 | 115.70 | 2.00 | 0.00 | 0.62 | 0.00 | 22.58 | 112.74 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.65 | 102.26 | 2.00 | 0.00 | 0.62 | 0.00 | 22.74 | 92.86 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.83 | 86.33 | 2.00 | 0.00 | 0.61 | 0.00 | 22.85 | 89.18 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.94 | 89.35 | 2.00 | 0.00 | 0.61 | 0.00 | 23.00 | 88.17 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.05 | 85.79 | 2.00 | 0.00 | 0.61 | 0.00 | 23.10 | 83.06 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.18 | 81.06 | 2.00 | 0.00 | 0.61 | 0.00 | 23.25 | 79.84 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.30 | 78.61 | 2.00 | 0.00 | 0.61 | 0.00 | 23.38 | 77.45 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.45 | 75.87 | 2.00 | 0.00 | 0.60 | 0.00 | 23.50 | 75.02 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.60 | 74.51 | 2.00 | 0.00 | 0.60 | 0.00 | 23.65 | 74.37 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.70 | 74.25 | 2.00 | 0.00 | 0.60 | 0.00 | 23.76 | 74.15 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.84 | 74.75 | 2.00 | 0.00 | 0.60 | 0.00 | 23.89 | 76.18 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.99 | 77.29 | 2.00 | 0.00 | 0.59 | 0.00 | 24.03 | 78.03 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.09 | 81.68 | 2.00 | 0.00 | 0.59 | 0.00 | 24.19 | 85.62 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.24 | 89.96 | 2.00 | 0.00 | 0.59 | 0.00 | 24.30 | 92.24 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.34 | 95.18 | 2.00 | 0.00 | 0.59 | 0.00 | 24.44 | 97.92 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.50 | 100.04 | 2.00 | 0.00 | 0.58 | 0.00 | 24.58 | 101.17 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.65 | 101.74 | 2.00 | 0.00 | 0.58 | 0.00 | 24.69 | 101.62 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.74 | 100.76 | 2.00 | 0.00 | 0.58 | 0.00 | 24.84 | 98.50 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.89 | 95.84 | 2.00 | 0.00 | 0.58 | 0.00 | 24.95 | 93.46 | 2.00 | 0.00 | 0.58 | 0.00 |
| 25.04 | 92.60 | 2.00 | 0.00 | 0.58 | 0.00 | 25.08 | 94.79 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.19 | 98.29 | 2.00 | 0.00 | 0.57 | 0.00 | 25.24 | 102.73 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.28 | 106.34 | 2.00 | 0.00 | 0.57 | 0.00 | 25.35 | 112.13 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.43 | 117.73 | 2.00 | 0.00 | 0.57 | 0.00 | 25.48 | 123.05 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.53 | 126.40 | 2.00 | 0.00 | 0.57 | 0.00 | 25.63 | 126.45 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.68 | 124.05 | 2.00 | 0.00 | 0.56 | 0.00 | 25.73 | 119.66 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.79 | 118.85 | 2.00 | 0.00 | 0.56 | 0.00 | 25.88 | 119.72 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.92 | 121.16 | 2.00 | 0.00 | 0.56 | 0.00 | 25.98 | 122.23 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.05 | 121.91 | 2.00 | 0.00 | 0.56 | 0.00 | 26.13 | 120.76 | 2.00 | 0.00 | 0.56 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26.20 | 118.30 | 2.00 | 0.00 | 0.56 | 0.00 | 26.26 | 116.96 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.31 | 116.33 | 2.00 | 0.00 | 0.55 | 0.00 | 26.40 | 115.74 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.45 | 115.07 | 2.00 | 0.00 | 0.55 | 0.00 | 26.54 | 114.90 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.59 | 114.86 | 2.00 | 0.00 | 0.55 | 0.00 | 26.65 | 114.28 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.74 | 112.86 | 2.00 | 0.00 | 0.55 | 0.00 | 26.78 | 111.17 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.84 | 109.68 | 2.00 | 0.00 | 0.55 | 0.00 | 26.94 | 108.40 | 2.00 | 0.00 | 0.54 | 0.00 |
| 26.99 | 107.33 | 2.00 | 0.00 | 0.54 | 0.00 | 27.04 | 105.11 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.13 | 102.82 | 2.00 | 0.00 | 0.54 | 0.00 | 27.18 | 100.34 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.24 | 99.34 | 2.00 | 0.00 | 0.54 | 0.00 | 27.34 | 98.79 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.40 | 99.03 | 2.00 | 0.00 | 0.54 | 0.00 | 27.44 | 100.46 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.53 | 101.90 | 2.00 | 0.00 | 0.53 | 0.00 | 27.57 | 103.62 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.64 | 104.73 | 2.00 | 0.00 | 0.53 | 0.00 | 27.72 | 105.37 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.79 | 105.16 | 2.00 | 0.00 | 0.53 | 0.00 | 27.83 | 104.08 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.89 | 101.81 | 2.00 | 0.00 | 0.53 | 0.00 | 27.98 | 98.91 | 2.00 | 0.00 | 0.53 | 0.00 |
| 28.03 | 95.98 | 2.00 | 0.00 | 0.52 | 0.00 | 28.09 | 94.13 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.18 | 93.33 | 2.00 | 0.00 | 0.52 | 0.00 | 28.22 | 93.24 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.28 | 93.85 | 2.00 | 0.00 | 0.52 | 0.00 | 28.38 | 94.24 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.43 | 94.75 | 2.00 | 0.00 | 0.52 | 0.00 | 28.48 | 96.11 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.58 | 97.37 | 2.00 | 0.00 | 0.52 | 0.00 | 28.62 | 100.66 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.69 | 101.64 | 2.00 | 0.00 | 0.51 | 0.00 | 28.77 | 105.36 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.82 | 111.97 | 2.00 | 0.00 | 0.51 | 0.00 | 28.88 | 121.51 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.97 | 128.92 | 2.00 | 0.00 | 0.51 | 0.00 | 29.01 | 132.42 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.07 | 134.53 | 2.00 | 0.00 | 0.51 | 0.00 | 29.15 | 136.01 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.21 | 135.86 | 2.00 | 0.00 | 0.50 | 0.00 | 29.30 | 134.69 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.33 | 132.90 | 2.00 | 0.00 | 0.50 | 0.00 | 29.41 | 131.79 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.50 | 130.90 | 2.00 | 0.00 | 0.50 | 0.00 | 29.53 | 129.98 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.61 | 127.53 | 2.00 | 0.00 | 0.50 | 0.00 | 29.70 | 124.49 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.74 | 120.72 | 2.00 | 0.00 | 0.50 | 0.00 | 29.80 | 117.49 | 2.00 | 0.00 | 0.49 | 0.00 |
| 29.90 | 114.00 | 2.00 | 0.00 | 0.49 | 0.00 | 29.93 | 110.44 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.00 | 106.88 | 2.00 | 0.00 | 0.49 | 0.00 | 30.09 | 104.13 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.15 | 103.16 | 2.00 | 0.00 | 0.49 | 0.00 | 30.19 | 102.23 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.30 | 99.81 | 2.00 | 0.00 | 0.49 | 0.00 | 30.33 | 98.56 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.40 | 100.24 | 2.00 | 0.00 | 0.48 | 0.00 | 30.49 | 102.77 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.54 | 105.81 | 2.00 | 0.00 | 0.48 | 0.00 | 30.59 | 107.09 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.64 | 108.58 | 2.00 | 0.00 | 0.48 | 0.00 | 30.72 | 107.92 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.80 | 106.36 | 2.00 | 0.00 | 0.48 | 0.00 | 30.88 | 104.67 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.93 | 104.33 | 2.00 | 0.00 | 0.48 | 0.00 | 31.00 | 104.54 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.04 | 107.78 | 2.00 | 0.00 | 0.47 | 0.00 | 31.13 | 111.93 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.20 | 116.47 | 2.00 | 0.00 | 0.47 | 0.00 | 31.29 | 118.06 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.34 | 117.19 | 2.00 | 0.00 | 0.47 | 0.00 | 31.38 | 116.00 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.43 | 115.19 | 2.00 | 0.00 | 0.47 | 0.00 | 31.51 | 115.35 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.58 | 115.42 | 2.00 | 0.00 | 0.46 | 0.00 | 31.63 | 114.04 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.71 | 109.78 | 2.00 | 0.00 | 0.46 | 0.00 | 31.78 | 103.57 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.83 | 97.47 | 2.00 | 0.00 | 0.46 | 0.00 | 31.90 | 93.66 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.98 | 91.77 | 2.00 | 0.00 | 0.46 | 0.00 | 32.03 | 91.43 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.09 | 91.88 | 2.00 | 0.00 | 0.46 | 0.00 | 32.16 | 91.38 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.22 | 89.96 | 2.00 | 0.00 | 0.45 | 0.00 | 32.30 | 87.65 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.38 | 86.55 | 2.00 | 0.00 | 0.45 | 0.00 | 32.42 | 86.38 | 2.00 | 0.00 | 0.45 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.50 | 87.13 | 2.00 | 0.00 | 0.45 | 0.00 | 32.56 | 87.72 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.62 | 88.85 | 2.00 | 0.00 | 0.45 | 0.00 | 32.72 | 90.01 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.77 | 91.93 | 2.00 | 0.00 | 0.44 | 0.00 | 32.82 | 94.63 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.91 | 97.28 | 2.00 | 0.00 | 0.44 | 0.00 | 32.97 | 99.56 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.02 | 101.24 | 2.00 | 0.00 | 0.44 | 0.00 | 33.11 | 102.44 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.16 | 103.42 | 2.00 | 0.00 | 0.44 | 0.00 | 33.22 | 104.12 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.29 | 105.12 | 2.00 | 0.00 | 0.44 | 0.00 | 33.37 | 106.32 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.41 | 107.11 | 2.00 | 0.00 | 0.43 | 0.00 | 33.47 | 107.85 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.57 | 108.35 | 2.00 | 0.00 | 0.43 | 0.00 | 33.60 | 109.78 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.67 | 112.26 | 2.00 | 0.00 | 0.43 | 0.00 | 33.76 | 115.45 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.80 | 117.65 | 2.00 | 0.00 | 0.43 | 0.00 | 33.86 | 120.58 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.96 | 123.86 | 2.00 | 0.00 | 0.42 | 0.00 | 34.00 | 128.59 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.06 | 132.35 | 2.00 | 0.00 | 0.42 | 0.00 | 34.16 | 134.94 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.20 | 136.06 | 2.00 | 0.00 | 0.42 | 0.00 | 34.26 | 135.32 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.36 | 134.08 | 2.00 | 0.00 | 0.42 | 0.00 | 34.39 | 132.47 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.46 | 130.79 | 2.00 | 0.00 | 0.42 | 0.00 | 34.55 | 128.83 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.60 | 127.43 | 2.00 | 0.00 | 0.41 | 0.00 | 34.65 | 126.49 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.75 | 126.03 | 2.00 | 0.00 | 0.41 | 0.00 | 34.80 | 125.40 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.85 | 124.56 | 2.00 | 0.00 | 0.41 | 0.00 | 34.95 | 123.49 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.99 | 122.16 | 2.00 | 0.00 | 0.41 | 0.00 | 35.06 | 121.12 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.11 | 119.79 | 2.00 | 0.00 | 0.40 | 0.00 | 35.19 | 118.28 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.25 | 116.78 | 2.00 | 0.00 | 0.40 | 0.00 | 35.31 | 115.73 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.39 | 114.75 | 2.00 | 0.00 | 0.40 | 0.00 | 35.49 | 113.76 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.53 | 112.06 | 2.00 | 0.00 | 0.40 | 0.00 | 35.60 | 110.68 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.63 | 109.44 | 2.00 | 0.00 | 0.40 | 0.00 | 35.70 | 110.02 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.78 | 111.61 | 2.00 | 0.00 | 0.39 | 0.00 | 35.84 | 114.65 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.90 | 117.72 | 2.00 | 0.00 | 0.39 | 0.00 | 35.98 | 121.30 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.06 | 124.91 | 2.00 | 0.00 | 0.39 | 0.00 | 36.09 | 128.97 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.18 | 130.36 | 2.00 | 0.00 | 0.39 | 0.00 | 36.23 | 124.49 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.29 | 112.80 | 2.00 | 0.00 | 0.38 | 0.00 | 36.38 | 101.16 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.42 | 97.09 | 2.00 | 0.00 | 0.38 | 0.00 | 36.49 | 101.98 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.58 | 110.03 | 2.00 | 0.00 | 0.38 | 0.00 | 36.62 | 119.88 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.68 | 128.67 | 2.00 | 0.00 | 0.38 | 0.00 | 36.77 | 135.53 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.83 | 136.87 | 2.00 | 0.00 | 0.38 | 0.00 | 36.88 | 138.03 | 2.00 | 0.00 | 0.37 | 0.00 |
| 36.97 | 139.80 | 2.00 | 0.00 | 0.37 | 0.00 | 37.02 | 142.36 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.08 | 146.14 | 2.00 | 0.00 | 0.37 | 0.00 | 37.17 | 151.35 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.22 | 156.40 | 0.66 | 0.48 | 0.37 | 0.00 | 37.27 | 159.68 | 0.70 | 0.47 | 0.37 | 0.00 |
| 37.37 | 162.51 | 0.73 | 0.45 | 0.37 | 0.01 | 37.41 | 165.61 | 0.76 | 0.36 | 0.37 | 0.00 |
| 37.47 | 167.30 | 0.78 | 0.35 | 0.36 | 0.00 | 37.57 | 167.99 | 0.79 | 0.35 | 0.36 | 0.00 |
| 37.61 | 167.08 | 0.78 | 0.35 | 0.36 | 0.00 | 37.67 | 165.23 | 0.76 | 0.35 | 0.36 | 0.00 |
| 37.76 | 163.98 | 0.74 | 0.44 | 0.36 | 0.00 | 37.81 | 160.97 | 0.71 | 0.45 | 0.36 | 0.00 |
| 37.87 | 160.53 | 0.71 | 0.45 | 0.36 | 0.00 | 37.97 | 160.18 | 0.70 | 0.45 | 0.36 | 0.01 |
| 38.02 | 160.31 | 0.70 | 0.45 | 0.36 | 0.00 | 38.07 | 163.31 | 0.74 | 0.43 | 0.35 | 0.00 |
| 38.17 | 168.09 | 0.79 | 0.34 | 0.35 | 0.00 | 38.20 | 176.91 | 0.90 | 0.24 | 0.35 | 0.00 |
| 38.27 | 182.99 | 0.99 | 0.18 | 0.35 | 0.00 | 38.33 | 193.29 | 1.14 | 0.13 | 0.35 | 0.00 |
| 38.42 | 203.16 | 2.00 | 0.00 | 0.35 | 0.00 | 38.46 | 211.87 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.53 | 216.47 | 2.00 | 0.00 | 0.35 | 0.00 | 38.62 | 220.95 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.66 | 223.47 | 2.00 | 0.00 | 0.34 | 0.00 | 38.73 | 223.71 | 2.00 | 0.00 | 0.34 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.81 | 222.89 | 2.00 | 0.00 | 0.34 | 0.00 | 38.86 | 221.48 | 2.00 | 0.00 | 0.34 | 0.00 |
| 38.93 | 218.94 | 2.00 | 0.00 | 0.34 | 0.00 | 39.02 | 216.51 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.05 | 214.69 | 2.00 | 0.00 | 0.34 | 0.00 | 39.12 | 214.55 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.17 | 215.11 | 2.00 | 0.00 | 0.34 | 0.00 | 39.27 | 215.63 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.31 | 213.93 | 2.00 | 0.00 | 0.33 | 0.00 | 39.37 | 209.26 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.44 | 204.33 | 2.00 | 0.00 | 0.33 | 0.00 | 39.50 | 201.51 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.59 | 198.11 | 1.22 | 0.08 | 0.33 | 0.00 | 39.65 | 196.40 | 1.20 | 0.08 | 0.33 | 0.00 |
| 39.71 | 195.79 | 1.19 | 0.08 | 0.33 | 0.00 | 39.77 | 198.67 | 1.23 | 0.08 | 0.33 | 0.00 |
| 39.84 | 199.00 | 1.24 | 0.08 | 0.32 | 0.00 | 39.91 | 192.21 | 1.13 | 0.12 | 0.32 | 0.00 |
| 39.97 | 179.76 | 0.95 | 0.21 | 0.32 | 0.00 | 40.03 | 164.60 | 0.75 | 0.32 | 0.32 | 0.00 |
| 40.10 | 151.90 | 0.62 | 0.53 | 0.32 | 0.00 | 40.17 | 144.83 | 0.55 | 0.55 | 0.32 | 0.00 |
| 40.26 | 140.91 | 0.52 | 0.56 | 0.32 | 0.01 | 40.30 | 141.00 | 0.52 | 0.56 | 0.32 | 0.00 |
| 40.36 | 142.79 | 0.54 | 0.55 | 0.32 | 0.00 | 40.45 | 146.85 | 0.57 | 0.54 | 0.31 | 0.01 |
| 40.49 | 149.74 | 0.60 | 0.53 | 0.31 | 0.00 | 40.56 | 149.25 | 0.59 | 0.53 | 0.31 | 0.00 |
| 40.62 | 147.22 | 0.58 | 0.54 | 0.31 | 0.00 | 40.70 | 144.28 | 0.55 | 0.54 | 0.31 | 0.01 |
| 40.76 | 140.59 | 0.52 | 0.55 | 0.31 | 0.00 | 40.86 | 137.25 | 0.49 | 0.55 | 0.31 | 0.01 |
| 40.89 | 135.59 | 0.48 | 0.56 | 0.31 | 0.00 | 40.95 | 135.98 | 0.48 | 0.56 | 0.31 | 0.00 |
| 41.03 | 137.07 | 0.49 | 0.55 | 0.30 | 0.01 | 41.11 | 138.01 | 0.50 | 0.54 | 0.30 | 0.01 |
| 41.16 | 138.42 | 0.50 | 0.54 | 0.30 | 0.00 | 41.23 | 138.91 | 0.50 | 0.54 | 0.30 | 0.00 |
| 41.29 | 139.30 | 0.51 | 0.53 | 0.30 | 0.00 | 41.35 | 140.54 | 0.52 | 0.53 | 0.30 | 0.00 |
| 41.41 | 142.01 | 0.53 | 0.52 | 0.30 | 0.00 | 41.49 | 143.26 | 0.54 | 0.52 | 0.30 | 0.01 |
| 41.56 | 143.83 | 0.55 | 0.51 | 0.30 | 0.00 | 41.64 | 143.97 | 0.55 | 0.51 | 0.29 | 0.00 |
| 41.69 | 144.53 | 0.55 | 0.51 | 0.29 | 0.00 | 41.73 | 146.32 | 0.57 | 0.50 | 0.29 | 0.00 |
| 41.84 | 148.53 | 0.59 | 0.50 | 0.29 | 0.01 | 41.89 | 151.73 | 0.62 | 0.48 | 0.29 | 0.00 |
| 41.98 | 154.70 | 0.65 | 0.38 | 0.29 | 0.00 | 42.04 | 158.42 | 0.69 | 0.37 | 0.29 | 0.00 |
| 42.09 | 161.42 | 0.72 | 0.36 | 0.29 | 0.00 | 42.16 | 160.97 | 0.72 | 0.36 | 0.29 | 0.00 |
| 42.24 | 158.49 | 0.69 | 0.36 | 0.28 | 0.00 | 42.28 | 154.63 | 0.65 | 0.38 | 0.28 | 0.00 |
| 42.33 | 150.58 | 0.61 | 0.47 | 0.28 | 0.00 | 42.39 | 146.79 | 0.57 | 0.48 | 0.28 | 0.00 |
| 42.47 | 143.88 | 0.55 | 0.49 | 0.28 | 0.00 | 42.53 | 141.53 | 0.53 | 0.49 | 0.28 | 0.00 |
| 42.59 | 139.84 | 0.51 | 0.49 | 0.28 | 0.00 | 42.66 | 138.25 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.73 | 137.82 | 2.00 | 0.00 | 0.28 | 0.00 | 42.83 | 139.88 | 2.00 | 0.00 | 0.27 | 0.00 |
| 42.88 | 144.35 | 2.00 | 0.00 | 0.27 | 0.00 | 42.93 | 150.38 | 2.00 | 0.00 | 0.27 | 0.00 |
| 42.99 | 157.31 | 2.00 | 0.00 | 0.27 | 0.00 | 43.07 | 166.18 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.14 | 177.34 | 2.00 | 0.00 | 0.27 | 0.00 | 43.19 | 186.54 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.25 | 189.94 | 2.00 | 0.00 | 0.27 | 0.00 | 43.34 | 189.77 | 1.10 | 0.10 | 0.27 | 0.00 |
| 43.39 | 184.91 | 1.03 | 0.13 | 0.26 | 0.00 | 43.45 | 174.49 | 0.89 | 0.18 | 0.26 | 0.00 |
| 43.54 | 160.92 | 0.72 | 0.33 | 0.26 | 0.00 | 43.59 | 147.66 | 0.59 | 0.45 | 0.26 | 0.00 |
| 43.64 | 140.41 | 0.52 | 0.46 | 0.26 | 0.00 | 43.73 | 137.17 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.78 | 134.97 | 2.00 | 0.00 | 0.26 | 0.00 | 43.83 | 130.60 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.94 | 123.92 | 2.00 | 0.00 | 0.26 | 0.00 | 43.98 | 116.31 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.04 | 109.34 | 2.00 | 0.00 | 0.25 | 0.00 | 44.14 | 103.95 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.17 | 100.39 | 2.00 | 0.00 | 0.25 | 0.00 | 44.23 | 98.96 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.33 | 98.24 | 2.00 | 0.00 | 0.25 | 0.00 | 44.37 | 98.01 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.44 | 100.53 | 2.00 | 0.00 | 0.25 | 0.00 | 44.53 | 103.40 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.58 | 105.36 | 2.00 | 0.00 | 0.24 | 0.00 | 44.64 | 109.10 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.73 | 115.07 | 2.00 | 0.00 | 0.24 | 0.00 | 44.77 | 123.80 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.82 | 130.20 | 2.00 | 0.00 | 0.24 | 0.00 | 44.90 | 134.97 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.97 | 138.80 | 2.00 | 0.00 | 0.24 | 0.00 | 45.03 | 142.61 | 2.00 | 0.00 | 0.24 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45.09 | 146.40 | 2.00 | 0.00 | 0.24 | 0.00 | 45.17 | 149.00 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.22 | 149.60 | 2.00 | 0.00 | 0.23 | 0.00 | 45.29 | 149.78 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.38 | 150.28 | 2.00 | 0.00 | 0.23 | 0.00 | 45.42 | 152.18 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.50 | 153.20 | 2.00 | 0.00 | 0.23 | 0.00 | 45.57 | 153.10 | 0.65 | 0.37 | 0.23 | 0.00 |
| 45.62 | 150.76 | 0.62 | 0.38 | 0.23 | 0.00 | 45.69 | 147.76 | 0.59 | 0.39 | 0.23 | 0.00 |
| 45.77 | 145.37 | 0.57 | 0.39 | 0.22 | 0.00 | 45.82 | 143.97 | 0.56 | 0.39 | 0.22 | 0.00 |
| 45.88 | 143.19 | 0.55 | 0.39 | 0.22 | 0.00 | 45.97 | 142.46 | 0.55 | 0.39 | 0.22 | 0.00 |
| 46.02 | 142.50 | 0.55 | 0.38 | 0.22 | 0.00 | 46.10 | 142.99 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.17 | 143.20 | 2.00 | 0.00 | 0.22 | 0.00 | 46.21 | 143.22 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.27 | 144.40 | 2.00 | 0.00 | 0.22 | 0.00 | 46.36 | 145.56 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.41 | 145.68 | 2.00 | 0.00 | 0.21 | 0.00 | 46.46 | 142.56 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.56 | 138.89 | 2.00 | 0.00 | 0.21 | 0.00 | 46.61 | 136.14 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.66 | 136.05 | 2.00 | 0.00 | 0.21 | 0.00 | 46.74 | 136.33 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.81 | 136.93 | 2.00 | 0.00 | 0.21 | 0.00 | 46.87 | 138.17 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.94 | 141.36 | 2.00 | 0.00 | 0.20 | 0.00 | 47.01 | 144.83 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.06 | 147.17 | 2.00 | 0.00 | 0.20 | 0.00 | 47.12 | 146.19 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.19 | 144.86 | 2.00 | 0.00 | 0.20 | 0.00 | 47.25 | 144.06 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.34 | 144.09 | 2.00 | 0.00 | 0.20 | 0.00 | 47.39 | 142.18 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.44 | 139.14 | 2.00 | 0.00 | 0.20 | 0.00 | 47.54 | 136.97 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.59 | 136.75 | 2.00 | 0.00 | 0.19 | 0.00 | 47.65 | 136.17 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.74 | 134.55 | 2.00 | 0.00 | 0.19 | 0.00 | 47.81 | 133.83 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.85 | 134.90 | 2.00 | 0.00 | 0.19 | 0.00 | 47.94 | 137.42 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.98 | 138.47 | 2.00 | 0.00 | 0.19 | 0.00 | 48.04 | 138.53 | 2.00 | 0.00 | 0.19 | 0.00 |
| 48.13 | 138.02 | 2.00 | 0.00 | 0.18 | 0.00 | 48.17 | 139.73 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.24 | 141.88 | 2.00 | 0.00 | 0.18 | 0.00 | 48.32 | 144.07 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.37 | 146.21 | 2.00 | 0.00 | 0.18 | 0.00 | 48.44 | 150.67 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.53 | 155.41 | 2.00 | 0.00 | 0.18 | 0.00 | 48.56 | 158.25 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.64 | 157.05 | 2.00 | 0.00 | 0.18 | 0.00 | 48.72 | 153.53 | 2.00 | 0.00 | 0.17 | 0.00 |
| 48.78 | 149.69 | 2.00 | 0.00 | 0.17 | 0.00 | 48.83 | 144.78 | 2.00 | 0.00 | 0.17 | 0.00 |
| 48.90 | 142.00 | 2.00 | 0.00 | 0.17 | 0.00 | 48.97 | 140.23 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.03 | 141.63 | 2.00 | 0.00 | 0.17 | 0.00 | 49.12 | 143.64 | 0.57 | 0.29 | 0.17 | 0.00 |
| 49.16 | 148.47 | 0.61 | 0.29 | 0.17 | 0.00 | 49.23 | 153.56 | 0.67 | 0.22 | 0.17 | 0.00 |
| 49.31 | 158.66 | 0.72 | 0.21 | 0.16 | 0.00 | 49.35 | 160.58 | 0.74 | 0.21 | 0.16 | 0.00 |
| 49.43 | 160.13 | 0.74 | 0.20 | 0.16 | 0.00 | 49.52 | 158.95 | 0.73 | 0.20 | 0.16 | 0.00 |
| 49.58 | 158.76 | 0.72 | 0.20 | 0.16 | 0.00 | 49.62 | 160.13 | 0.74 | 0.20 | 0.16 | 0.00 |
| 49.71 | 162.07 | 0.76 | 0.16 | 0.16 | 0.00 | 49.77 | 163.87 | 0.78 | 0.15 | 0.16 | 0.00 |
| 49.81 | 164.19 | 0.79 | 0.15 | 0.16 | 0.00 | 49.88 | 159.36 | 0.73 | 0.20 | 0.15 | 0.00 |
| 49.97 | 153.77 | 0.67 | 0.20 | 0.15 | 0.00 | 50.00 | 149.75 | 0.63 | 0.26 | 0.15 | 0.00 |
| 50.07 | 149.00 | 2.00 | 0.00 | 0.15 | 0.00 | 50.14 | 149.54 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.22 | 148.64 | 2.00 | 0.00 | 0.15 | 0.00 | 50.27 | 151.51 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.35 | 154.20 | 2.00 | 0.00 | 0.15 | 0.00 | 50.40 | 156.28 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.47 | 155.99 | 2.00 | 0.00 | 0.14 | 0.00 | 50.55 | 156.36 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.59 | 156.56 | 2.00 | 0.00 | 0.14 | 0.00 | 50.66 | 153.04 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.74 | 146.46 | 0.60 | 0.24 | 0.14 | 0.00 | 50.79 | 138.13 | 0.53 | 0.25 | 0.14 | 0.00 |
| 50.86 | 133.63 | 0.49 | 0.25 | 0.14 | 0.00 | 50.94 | 132.11 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.99 | 134.17 | 2.00 | 0.00 | 0.14 | 0.00 | 51.05 | 136.77 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.14 | 139.15 | 2.00 | 0.00 | 0.13 | 0.00 | 51.18 | 137.69 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.25 | 130.60 | 2.00 | 0.00 | 0.13 | 0.00 | 51.34 | 119.24 | 2.00 | 0.00 | 0.13 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 51.41 | 106.80 | 2.00 | 0.00 | 0.13 | 0.00 | 51.44 | 96.27 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.52 | 87.03 | 2.00 | 0.00 | 0.13 | 0.00 | 51.67 | 78.91 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.70 | 74.17 | 2.00 | 0.00 | 0.12 | 0.00 | 51.75 | 73.20 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.78 | 73.20 | 2.00 | 0.00 | 0.12 | 0.00 | 51.88 | 74.59 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.92 | 77.58 | 2.00 | 0.00 | 0.12 | 0.00 | 51.99 | 80.94 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.04 | 84.29 | 2.00 | 0.00 | 0.12 | 0.00 | 52.14 | 86.69 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.19 | 88.79 | 2.00 | 0.00 | 0.12 | 0.00 | 52.26 | 91.35 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.33 | 93.65 | 2.00 | 0.00 | 0.11 | 0.00 | 52.38 | 95.32 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.43 | 94.73 | 2.00 | 0.00 | 0.11 | 0.00 | 52.51 | 92.01 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.58 | 88.39 | 2.00 | 0.00 | 0.11 | 0.00 | 52.63 | 83.60 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.69 | 80.84 | 2.00 | 0.00 | 0.11 | 0.00 | 52.77 | 77.69 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.83 | 74.38 | 2.00 | 0.00 | 0.10 | 0.00 | 52.90 | 73.51 | 2.00 | 0.00 | 0.10 | 0.00 |
| 52.99 | 72.21 | 2.00 | 0.00 | 0.10 | 0.00 | 53.05 | 70.46 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.10 | 69.77 | 2.00 | 0.00 | 0.10 | 0.00 | 53.16 | 70.07 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.25 | 69.20 | 2.00 | 0.00 | 0.10 | 0.00 | 53.29 | 68.88 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.38 | 68.54 | 2.00 | 0.00 | 0.10 | 0.00 | 53.44 | 68.27 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.50 | 67.95 | 2.00 | 0.00 | 0.09 | 0.00 | 53.55 | 67.38 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.64 | 66.68 | 2.00 | 0.00 | 0.09 | 0.00 | 53.72 | 66.00 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.74 | 65.87 | 2.00 | 0.00 | 0.09 | 0.00 | 53.82 | 66.22 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.90 | 66.58 | 2.00 | 0.00 | 0.09 | 0.00 | 53.94 | 66.96 | 2.00 | 0.00 | 0.09 | 0.00 |
| 54.01 | 67.05 | 2.00 | 0.00 | 0.08 | 0.00 | 54.09 | 67.86 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.19 | 68.91 | 2.00 | 0.00 | 0.08 | 0.00 | 54.24 | 70.20 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.29 | 70.76 | 2.00 | 0.00 | 0.08 | 0.00 | 54.35 | 70.73 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.44 | 70.29 | 2.00 | 0.00 | 0.08 | 0.00 | 54.49 | 69.82 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.53 | 68.57 | 2.00 | 0.00 | 0.08 | 0.00 | 54.63 | 66.88 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.68 | 64.96 | 2.00 | 0.00 | 0.07 | 0.00 | 54.74 | 64.11 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.83 | 63.80 | 2.00 | 0.00 | 0.07 | 0.00 | 54.88 | 63.72 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.94 | 64.01 | 2.00 | 0.00 | 0.07 | 0.00 | 55.03 | 64.53 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.07 | 65.71 | 2.00 | 0.00 | 0.07 | 0.00 | 55.13 | 67.48 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.23 | 69.15 | 2.00 | 0.00 | 0.06 | 0.00 | 55.28 | 70.37 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.32 | 71.08 | 2.00 | 0.00 | 0.06 | 0.00 | 55.42 | 70.36 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.50 | 70.66 | 2.00 | 0.00 | 0.06 | 0.00 | 55.53 | 70.58 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.58 | 70.05 | 2.00 | 0.00 | 0.06 | 0.00 | 55.66 | 70.15 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.73 | 68.88 | 2.00 | 0.00 | 0.06 | 0.00 | 55.78 | 68.34 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.86 | 68.14 | 2.00 | 0.00 | 0.05 | 0.00 | 55.92 | 65.34 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.97 | 71.60 | 2.00 | 0.00 | 0.05 | 0.00 | 56.08 | 79.51 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.12 | 91.66 | 2.00 | 0.00 | 0.05 | 0.00 | 56.17 | 103.40 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.27 | 109.94 | 2.00 | 0.00 | 0.05 | 0.00 | 56.32 | 111.54 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.37 | 105.71 | 2.00 | 0.00 | 0.04 | 0.00 | 56.47 | 103.87 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.52 | 105.94 | 2.00 | 0.00 | 0.04 | 0.00 | 56.56 | 107.11 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.67 | 108.00 | 0.33 | 0.09 | 0.04 | 0.00 | 56.72 | 108.67 | 0.34 | 0.08 | 0.04 | 0.00 |
| 56.78 | 110.36 | 2.00 | 0.00 | 0.04 | 0.00 | 56.87 | 112.76 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.91 | 116.71 | 2.00 | 0.00 | 0.04 | 0.00 | 56.97 | 121.24 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.03 | 126.61 | 2.00 | 0.00 | 0.03 | 0.00 | 57.11 | 130.61 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.17 | 135.46 | 2.00 | 0.00 | 0.03 | 0.00 | 57.26 | 139.68 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.32 | 143.78 | 2.00 | 0.00 | 0.03 | 0.00 | 57.35 | 142.51 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.42 | 136.68 | 2.00 | 0.00 | 0.03 | 0.00 | 57.51 | 129.18 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.55 | 123.53 | 2.00 | 0.00 | 0.02 | 0.00 | 57.62 | 120.84 | 2.00 | 0.00 | 0.02 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.71 | 117.54 | 2.00 | 0.00 | 0.02 | 0.00 | 57.78 | 113.46 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.82 | 108.24 | 2.00 | 0.00 | 0.02 | 0.00 | 57.90 | 104.04 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.95 | 100.66 | 2.00 | 0.00 | 0.02 | 0.00 | 58.01 | 97.04 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.11 | 92.93 | 2.00 | 0.00 | 0.02 | 0.00 | 58.15 | 88.14 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.21 | 84.82 | 2.00 | 0.00 | 0.01 | 0.00 | 58.31 | 81.63 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.35 | 78.61 | 2.00 | 0.00 | 0.01 | 0.00 | 58.42 | 75.87 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.50 | 73.65 | 2.00 | 0.00 | 0.01 | 0.00 | 58.55 | 72.34 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.60 | 71.83 | 2.00 | 0.00 | 0.01 | 0.00 | 58.70 | 71.23 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.75 | 70.82 | 2.00 | 0.00 | 0.00 | 0.00 | 58.81 | 70.55 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.89 | 70.56 | 2.00 | 0.00 | 0.00 | 0.00 | 58.95 | 70.67 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.00 | 71.07 | 2.00 | 0.00 | 0.00 | 0.00 | 59.10 | 71.50 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.15 | 72.46 | 2.00 | 0.00 | 0.00 | 0.00 | 59.20 | 73.62 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.28 | 74.24 | 2.00 | 0.00 | 0.00 | 0.00 | 59.35 | 74.22 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.38 | 73.81 | 2.00 | 0.00 | 0.00 | 0.00 | 59.45 | 74.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.52 | 76.20 | 2.00 | 0.00 | 0.00 | 0.00 | 59.59 | 78.85 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.67 | 80.48 | 2.00 | 0.00 | 0.00 | 0.00 | 59.73 | 78.56 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.79 | 73.38 | 2.00 | 0.00 | 0.00 | 0.00 | 59.89 | 69.13 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.94 | 67.39 | 2.00 | 0.00 | 0.00 | 0.00 | 59.98 | 70.28 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.06 | 74.09 | 2.00 | 0.00 | 0.00 | 0.00 | 60.12 | 80.43 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.19 | 87.61 | 2.00 | 0.00 | 0.00 | 0.00 | 60.25 | 69.86 | 0.19 | 0.00 | 0.00 | 0.00 |
| 60.33 | 49.33 | 0.16 | 0.00 | 0.00 | 0.00 | 60.38 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.48 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.53 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.61 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.63 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |

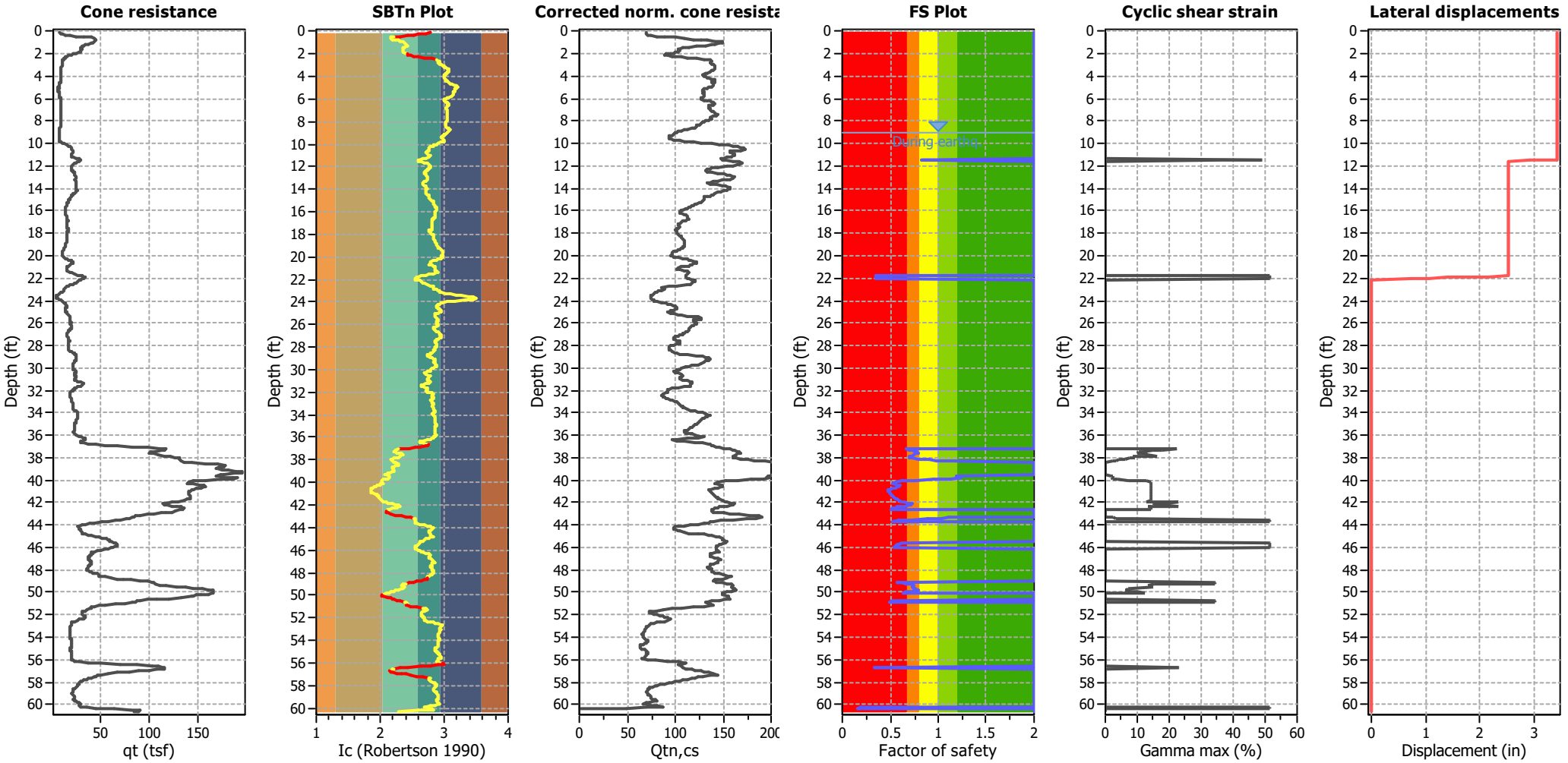
**Total estimated settlement: 0.35**

**Abbreviations**

$Q_{tn,cs}$: 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

# Estimation of post-earthquake lateral Displacements

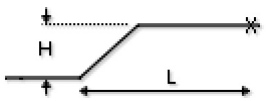
**Geometric parameters: Level ground (or gently sloping) with free face (L: 90.00 ft - H: 12.00 ft)**




**Abbreviations**

$q_t$: Total cone resistance (cone resistance $q_c$ corrected for pore water effects)
$I_c$: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
$\gamma_{max}$: Maximum cyclic shear strain
LDI: Lateral displacement index

**Surface condition**



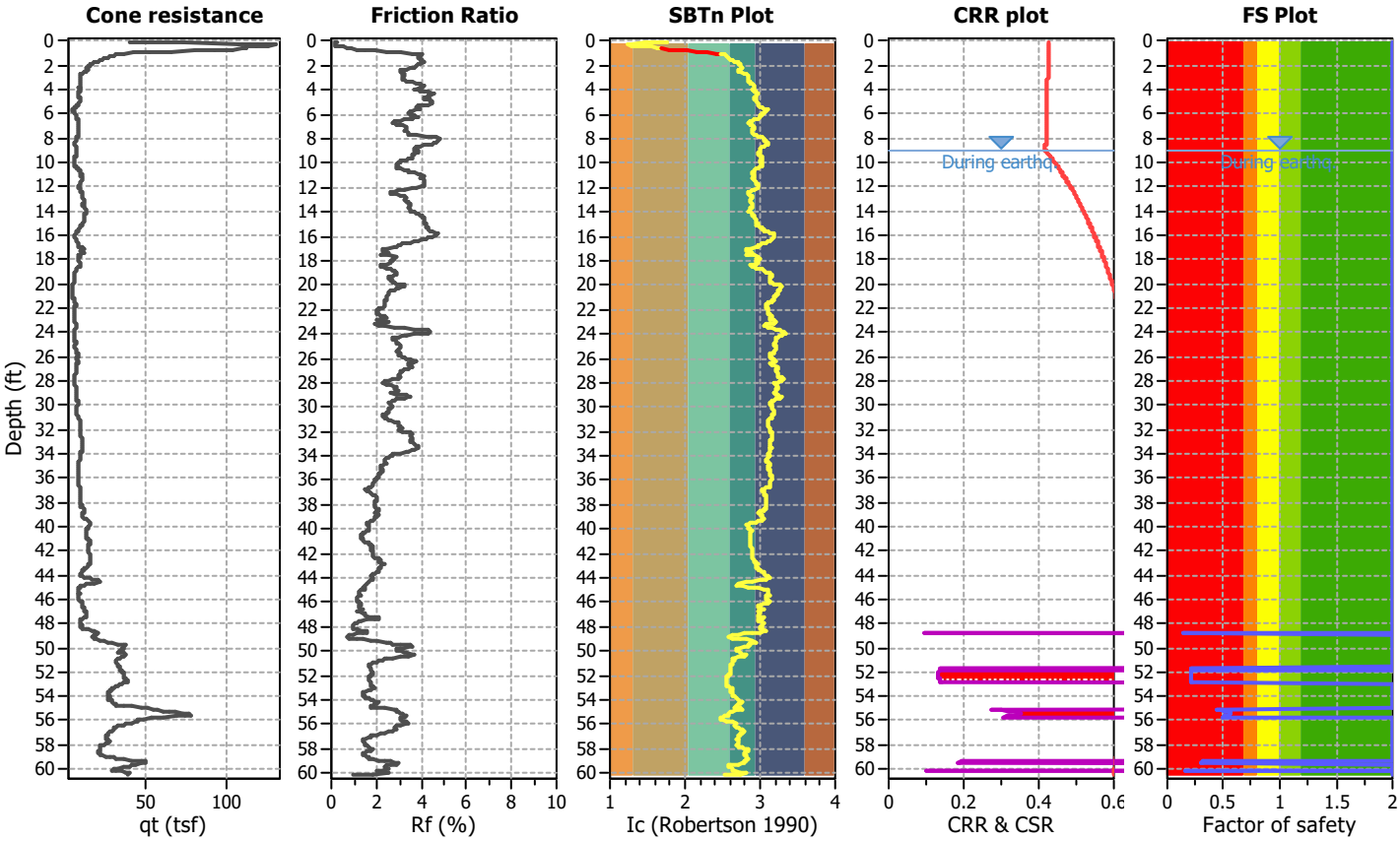
# LIQUEFACTION ANALYSIS REPORT

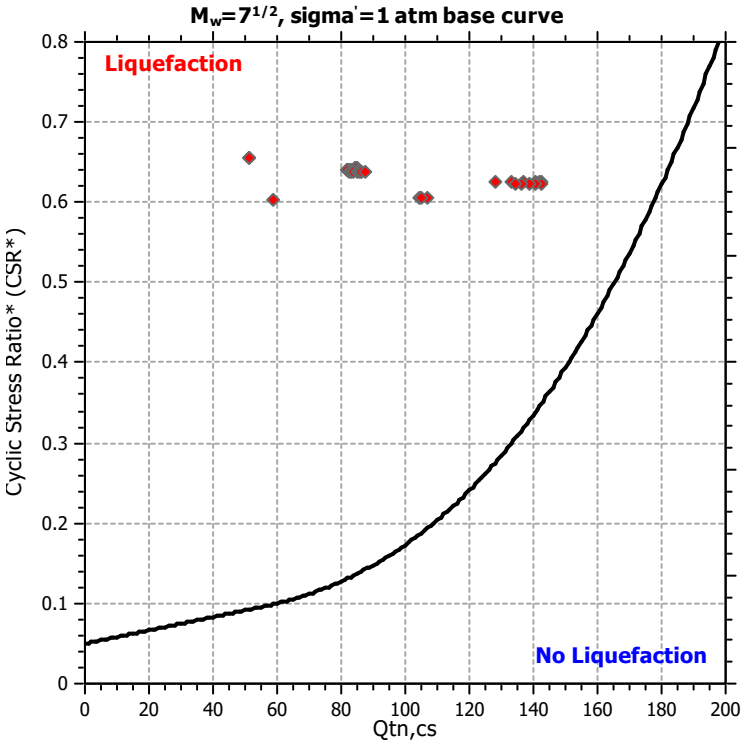
**Project title : Geocon West / 21611 Perry Street** **Location : Carson, CA**

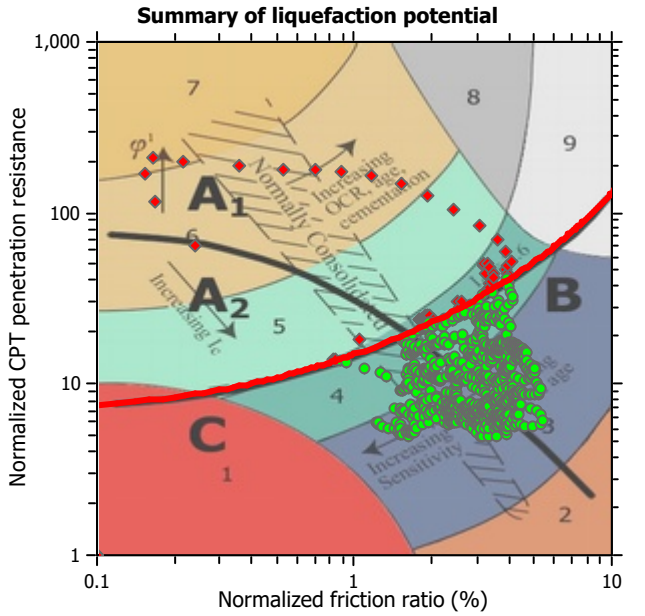
**CPT file : CPT-4**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | G.W.T. (in-situ): | 12.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | NCEER (1998) | G.W.T. (earthq.): | 9.00 ft | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 6.87 | Ic cut-off value: | 2.60 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 0.82 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

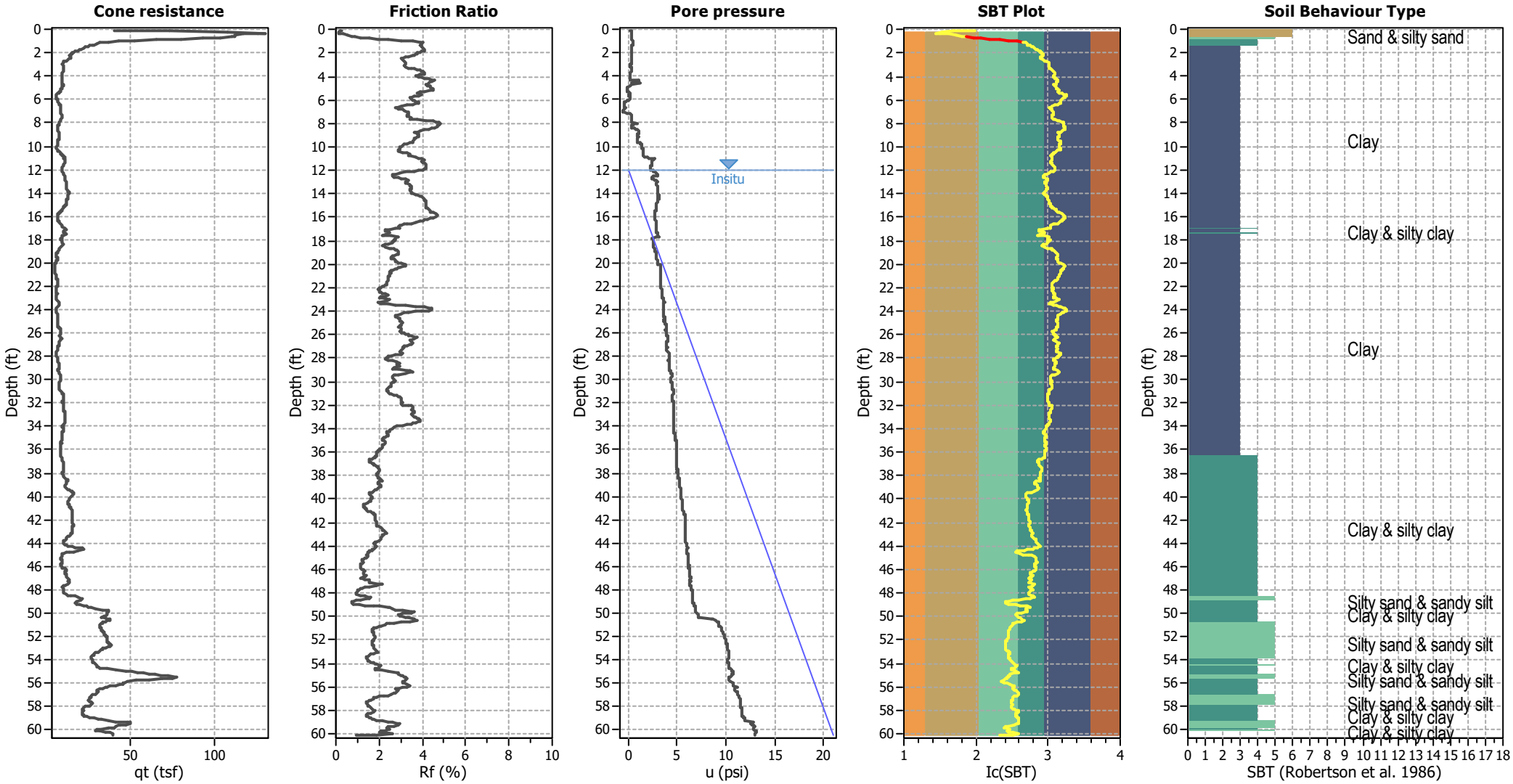



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# CPT basic interpretation plots



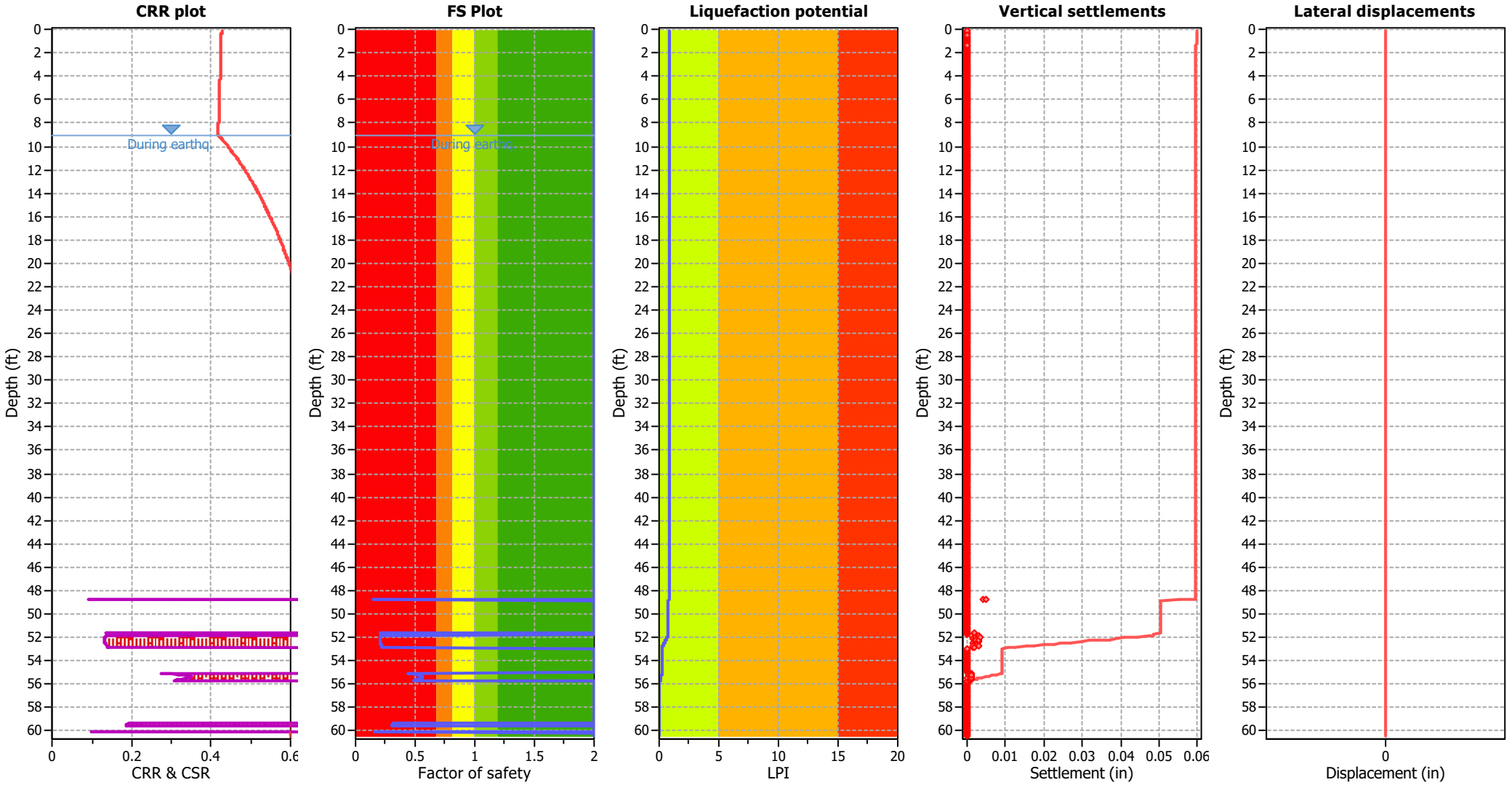

## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

**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

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

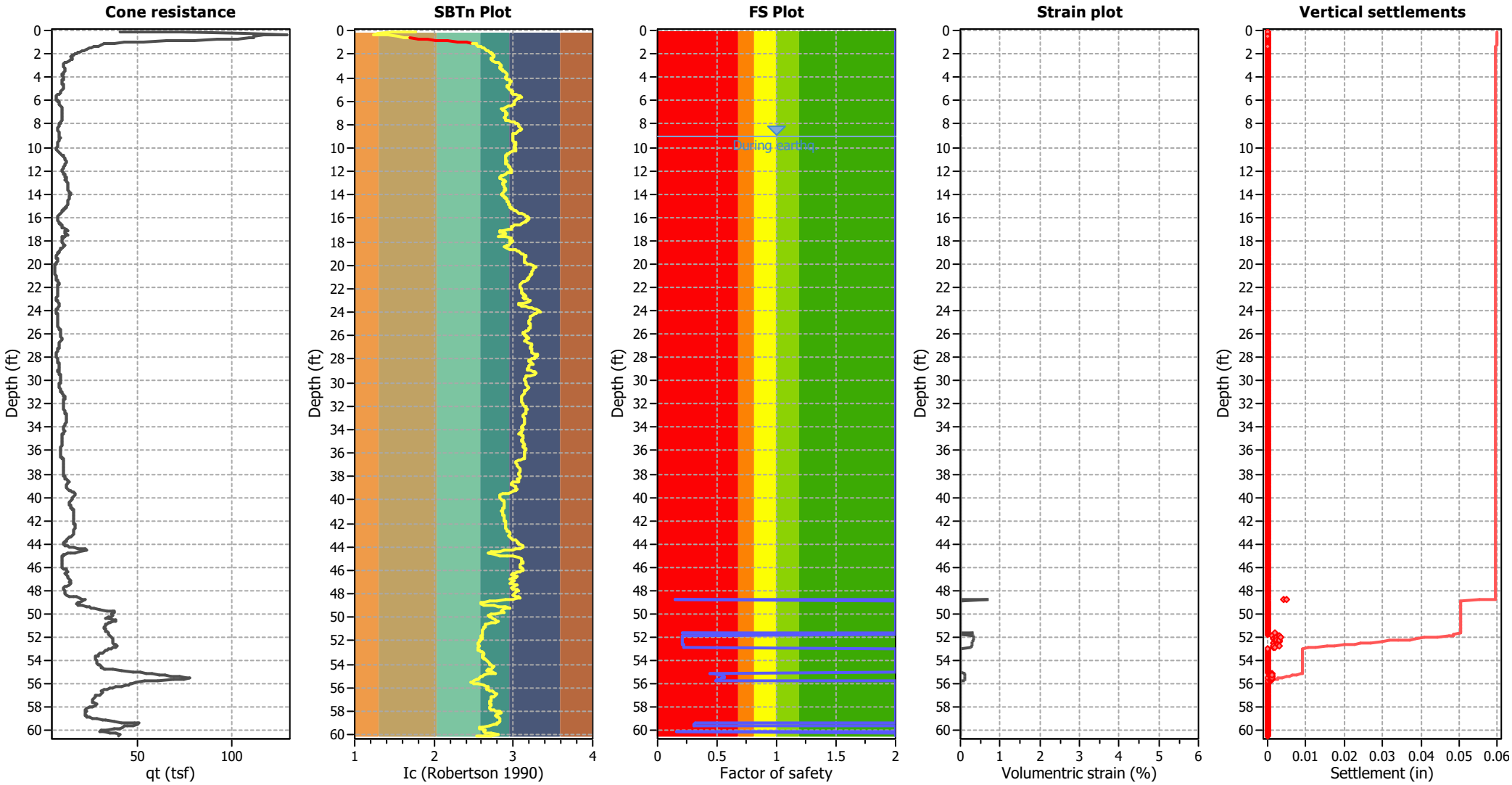
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

## Estimation of post-earthquake settlements




**Abbreviations**

| | |
|---|---|
| $q_t$: | Total cone resistance (cone resistance $q_c$ corrected for pore water effects) |
| $I_c$: | Soil Behaviour Type Index |
| FS: | Calculated Factor of Safety against liquefaction |
| Volumentric strain: | Post-liquefaction volumentric strain |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 1.76 | 64.66 | 1.00 | 64.66 | 12 | 338 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.15 | 1.47 | 116.95 | 1.00 | 116.95 | 20 | 422 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.23 | 1.30 | 171.88 | 1.00 | 171.88 | 28 | 500 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.30 | 1.23 | 208.04 | 1.00 | 208.04 | 33 | 554 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.34 | 1.29 | 200.93 | 1.00 | 200.93 | 33 | 579 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.40 | 1.42 | 187.83 | 1.00 | 187.83 | 32 | 638 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.50 | 1.54 | 179.00 | 1.00 | 179.00 | 32 | 705 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.54 | 1.62 | 179.76 | 1.00 | 179.76 | 33 | 782 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.60 | 1.70 | 176.06 | 1.00 | 176.06 | 33 | 844 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.68 | 1.80 | 165.55 | 1.15 | 190.25 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.73 | 1.91 | 148.37 | 1.25 | 184.78 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.80 | 2.03 | 127.88 | 1.34 | 170.81 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.86 | 2.16 | 105.03 | 1.53 | 160.59 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.94 | 2.30 | 84.40 | 1.92 | 162.20 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 0.99 | 2.41 | 69.00 | 2.42 | 167.25 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.09 | 2.48 | 59.40 | 2.84 | 168.76 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.14 | 2.54 | 51.62 | 3.23 | 166.72 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.22 | 2.54 | 48.92 | 3.30 | 161.34 | 42 | 687 | 0.43 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.29 | 2.55 | 46.52 | 3.38 | 157.25 | 42 | 662 | 0.43 | 0.010 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.33 | 2.57 | 44.31 | 3.51 | 155.51 | 41 | 644 | 0.43 | 0.011 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.39 | 2.59 | 42.24 | 3.65 | 154.24 | 41 | 627 | 0.43 | 0.012 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.48 | 2.60 | 40.31 | 3.79 | 152.96 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.52 | 2.62 | 38.38 | 3.94 | 151.41 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.59 | 2.64 | 36.41 | 4.12 | 149.91 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.66 | 2.67 | 34.01 | 4.37 | 148.74 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.73 | 2.69 | 32.08 | 4.59 | 147.27 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.78 | 2.71 | 30.16 | 4.79 | 144.34 | 0 | 0 | 0.43 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.84 | 2.72 | 28.62 | 4.88 | 139.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.93 | 2.73 | 27.07 | 4.98 | 134.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 1.98 | 2.73 | 25.97 | 5.06 | 131.43 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.04 | 2.74 | 24.95 | 5.16 | 128.86 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.13 | 2.76 | 23.79 | 5.34 | 126.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.18 | 2.75 | 23.40 | 5.30 | 124.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.25 | 2.75 | 23.06 | 5.29 | 122.07 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.30 | 2.73 | 23.49 | 5.03 | 118.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.38 | 2.72 | 23.34 | 4.96 | 115.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.44 | 2.71 | 23.28 | 4.83 | 112.46 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.50 | 2.72 | 22.37 | 4.95 | 110.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.57 | 2.75 | 20.97 | 5.22 | 109.36 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.66 | 2.78 | 19.33 | 5.62 | 108.56 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.72 | 2.80 | 18.18 | 5.90 | 107.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.76 | 2.83 | 17.21 | 6.20 | 106.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.84 | 2.84 | 16.68 | 6.34 | 105.70 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.92 | 2.85 | 16.28 | 6.47 | 105.28 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.95 | 2.85 | 16.28 | 6.45 | 104.98 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.07 | 2.84 | 16.41 | 6.40 | 105.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.11 | 2.84 | 16.60 | 6.34 | 105.32 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.16 | 2.84 | 16.84 | 6.34 | 106.83 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.26 | 2.85 | 16.93 | 6.44 | 109.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.30 | 2.86 | 17.02 | 6.57 | 111.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.36 | 2.86 | 17.07 | 6.70 | 114.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.44 | 2.87 | 17.11 | 6.82 | 116.64 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.50 | 2.88 | 17.00 | 6.97 | 118.52 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.56 | 2.90 | 16.71 | 7.15 | 119.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.62 | 2.91 | 16.27 | 7.36 | 119.71 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.71 | 2.92 | 15.78 | 7.56 | 119.37 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.76 | 2.93 | 15.49 | 7.64 | 118.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.82 | 2.92 | 15.43 | 7.50 | 115.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.90 | 2.91 | 15.52 | 7.32 | 113.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.95 | 2.90 | 15.76 | 7.16 | 112.85 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.00 | 2.90 | 15.90 | 7.27 | 115.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.09 | 2.92 | 15.89 | 7.43 | 118.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.16 | 2.93 | 15.64 | 7.65 | 119.61 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.20 | 2.95 | 15.35 | 7.95 | 122.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.27 | 2.96 | 15.25 | 8.13 | 124.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.33 | 2.97 | 15.16 | 8.26 | 125.26 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.44 | 2.96 | 15.21 | 8.12 | 123.42 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.48 | 2.96 | 15.11 | 8.07 | 121.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.58 | 2.95 | 15.14 | 8.00 | 121.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.63 | 2.94 | 15.52 | 7.78 | 120.82 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.68 | 2.92 | 15.99 | 7.57 | 121.13 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.73 | 2.92 | 16.37 | 7.46 | 122.05 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.80 | 2.93 | 16.26 | 7.60 | 123.52 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.86 | 2.94 | 16.06 | 7.75 | 124.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.92 | 2.94 | 15.91 | 7.85 | 124.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.00 | 2.96 | 15.52 | 8.07 | 125.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.07 | 2.97 | 15.08 | 8.26 | 124.60 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.12 | 2.98 | 14.41 | 8.51 | 122.69 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.20 | 2.99 | 13.92 | 8.54 | 118.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.27 | 2.98 | 13.53 | 8.44 | 114.17 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.33 | 2.98 | 13.05 | 8.41 | 109.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.41 | 2.99 | 12.41 | 8.60 | 106.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.45 | 3.02 | 11.40 | 9.21 | 105.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.52 | 3.07 | 10.39 | 9.95 | 103.36 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.60 | 3.09 | 9.62 | 10.47 | 100.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.67 | 3.10 | 9.28 | 10.54 | 97.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.71 | 3.08 | 9.27 | 10.29 | 95.38 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.80 | 3.07 | 9.41 | 10.03 | 94.38 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.85 | 3.05 | 9.70 | 9.75 | 94.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.91 | 3.04 | 10.32 | 9.40 | 96.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.01 | 3.02 | 10.98 | 9.09 | 99.80 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.06 | 3.01 | 11.55 | 8.88 | 102.49 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.11 | 3.01 | 11.77 | 8.87 | 104.47 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.18 | 3.01 | 11.86 | 8.93 | 105.87 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.26 | 3.01 | 11.90 | 8.96 | 106.60 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.30 | 2.99 | 12.19 | 8.68 | 105.72 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.37 | 2.97 | 12.52 | 8.33 | 104.30 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.45 | 2.93 | 13.23 | 7.68 | 101.69 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.50 | 2.89 | 13.86 | 7.13 | 98.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.60 | 2.86 | 14.38 | 6.68 | 96.08 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.64 | 2.85 | 14.52 | 6.53 | 94.89 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.70 | 2.86 | 14.47 | 6.63 | 95.89 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.80 | 2.87 | 14.36 | 6.79 | 97.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.83 | 2.89 | 14.21 | 7.03 | 99.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.90 | 2.90 | 14.11 | 7.22 | 101.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.98 | 2.91 | 14.05 | 7.38 | 103.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.04 | 2.91 | 14.10 | 7.42 | 104.59 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.09 | 2.91 | 14.14 | 7.41 | 104.86 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.16 | 2.91 | 14.24 | 7.37 | 104.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.24 | 2.91 | 14.38 | 7.30 | 104.91 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.29 | 2.90 | 14.71 | 7.14 | 105.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.39 | 2.89 | 14.99 | 7.04 | 105.53 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.43 | 2.89 | 15.12 | 7.10 | 107.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.50 | 2.90 | 14.98 | 7.24 | 108.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.59 | 2.91 | 14.78 | 7.31 | 107.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.63 | 2.91 | 14.54 | 7.40 | 107.56 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.70 | 2.94 | 14.25 | 7.86 | 111.95 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.78 | 2.98 | 13.90 | 8.45 | 117.47 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.83 | 3.01 | 13.61 | 8.92 | 121.46 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.89 | 3.03 | 12.98 | 9.38 | 121.77 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.95 | 3.06 | 12.45 | 9.78 | 121.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.02 | 3.06 | 12.20 | 9.94 | 121.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.11 | 3.06 | 12.20 | 9.88 | 120.46 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.16 | 3.06 | 12.09 | 9.89 | 119.64 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.21 | 3.08 | 11.61 | 10.19 | 118.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.30 | 3.09 | 11.17 | 10.40 | 116.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.36 | 3.10 | 10.79 | 10.53 | 113.61 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.41 | 3.10 | 10.54 | 10.55 | 111.24 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.47 | 3.09 | 10.49 | 10.40 | 109.13 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.56 | 3.08 | 10.58 | 10.14 | 107.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.61 | 3.05 | 10.96 | 9.67 | 105.96 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.70 | 3.02 | 11.43 | 9.18 | 104.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.75 | 3.00 | 11.91 | 8.79 | 104.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.81 | 2.99 | 12.14 | 8.70 | 105.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.89 | 3.00 | 12.28 | 8.71 | 106.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.94 | 3.00 | 12.32 | 8.78 | 108.21 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Total estimated settlement: 0.00**

**Abbreviations**

$Q_{tn}$: Equivalent clean sand normalized cone resistance
$K_c$: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
$G_{max}$: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
$N_c$: Equivalent number of cycles
$e_v$: Volumetric strain
Settle.: Calculated settlement

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.01 | 108.77 | 2.00 | 0.00 | 0.85 | 0.00 | 9.09 | 108.89 | 2.00 | 0.00 | 0.85 | 0.00 |
| 9.13 | 108.38 | 2.00 | 0.00 | 0.85 | 0.00 | 9.20 | 107.59 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.27 | 106.62 | 2.00 | 0.00 | 0.84 | 0.00 | 9.35 | 105.70 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.39 | 104.41 | 2.00 | 0.00 | 0.84 | 0.00 | 9.45 | 103.20 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.54 | 101.99 | 2.00 | 0.00 | 0.84 | 0.00 | 9.59 | 100.49 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.65 | 98.50 | 2.00 | 0.00 | 0.84 | 0.00 | 9.73 | 96.09 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.81 | 94.50 | 2.00 | 0.00 | 0.83 | 0.00 | 9.85 | 93.19 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.94 | 91.95 | 2.00 | 0.00 | 0.83 | 0.00 | 10.00 | 90.24 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.04 | 89.13 | 2.00 | 0.00 | 0.83 | 0.00 | 10.12 | 88.89 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.19 | 89.07 | 2.00 | 0.00 | 0.83 | 0.00 | 10.24 | 88.72 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.31 | 89.70 | 2.00 | 0.00 | 0.83 | 0.00 | 10.39 | 92.82 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.48 | 97.76 | 2.00 | 0.00 | 0.82 | 0.00 | 10.53 | 103.47 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.63 | 107.29 | 2.00 | 0.00 | 0.82 | 0.00 | 10.67 | 108.57 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.71 | 108.25 | 2.00 | 0.00 | 0.82 | 0.00 | 10.79 | 110.20 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.83 | 114.73 | 2.00 | 0.00 | 0.82 | 0.00 | 10.93 | 118.48 | 2.00 | 0.00 | 0.81 | 0.00 |
| 10.98 | 121.02 | 2.00 | 0.00 | 0.81 | 0.00 | 11.06 | 122.82 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.11 | 123.35 | 2.00 | 0.00 | 0.81 | 0.00 | 11.16 | 123.21 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.23 | 122.70 | 2.00 | 0.00 | 0.81 | 0.00 | 11.31 | 123.39 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.36 | 123.70 | 2.00 | 0.00 | 0.81 | 0.00 | 11.42 | 123.17 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.51 | 122.29 | 2.00 | 0.00 | 0.80 | 0.00 | 11.56 | 121.30 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.64 | 120.25 | 2.00 | 0.00 | 0.80 | 0.00 | 11.71 | 121.77 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.75 | 121.00 | 2.00 | 0.00 | 0.80 | 0.00 | 11.84 | 119.61 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.89 | 117.61 | 2.00 | 0.00 | 0.80 | 0.00 | 11.96 | 115.86 | 2.00 | 0.00 | 0.80 | 0.00 |
| 12.03 | 112.89 | 2.00 | 0.00 | 0.80 | 0.00 | 12.11 | 107.82 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.16 | 103.05 | 2.00 | 0.00 | 0.79 | 0.00 | 12.21 | 98.89 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.30 | 95.62 | 2.00 | 0.00 | 0.79 | 0.00 | 12.35 | 94.03 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.41 | 94.06 | 2.00 | 0.00 | 0.79 | 0.00 | 12.49 | 94.92 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.56 | 96.59 | 2.00 | 0.00 | 0.79 | 0.00 | 12.60 | 99.33 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.67 | 102.72 | 2.00 | 0.00 | 0.79 | 0.00 | 12.75 | 105.89 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.80 | 107.66 | 2.00 | 0.00 | 0.78 | 0.00 | 12.90 | 108.00 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.95 | 107.76 | 2.00 | 0.00 | 0.78 | 0.00 | 13.02 | 107.50 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.06 | 108.23 | 2.00 | 0.00 | 0.78 | 0.00 | 13.14 | 109.37 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.19 | 110.81 | 2.00 | 0.00 | 0.78 | 0.00 | 13.29 | 111.39 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.33 | 111.87 | 2.00 | 0.00 | 0.77 | 0.00 | 13.39 | 112.07 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.48 | 112.18 | 2.00 | 0.00 | 0.77 | 0.00 | 13.54 | 112.10 | 2.00 | 0.00 | 0.77 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.59 | 111.35 | 2.00 | 0.00 | 0.77 | 0.00 | 13.67 | 110.42 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.71 | 111.28 | 2.00 | 0.00 | 0.77 | 0.00 | 13.78 | 113.30 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.86 | 115.20 | 2.00 | 0.00 | 0.77 | 0.00 | 13.93 | 116.13 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.01 | 117.09 | 2.00 | 0.00 | 0.76 | 0.00 | 14.05 | 118.90 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.14 | 120.35 | 2.00 | 0.00 | 0.76 | 0.00 | 14.21 | 121.51 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.24 | 122.25 | 2.00 | 0.00 | 0.76 | 0.00 | 14.31 | 122.64 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.39 | 122.74 | 2.00 | 0.00 | 0.76 | 0.00 | 14.44 | 123.19 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.54 | 123.65 | 2.00 | 0.00 | 0.75 | 0.00 | 14.59 | 123.93 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.64 | 123.53 | 2.00 | 0.00 | 0.75 | 0.00 | 14.70 | 122.97 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.79 | 122.59 | 2.00 | 0.00 | 0.75 | 0.00 | 14.83 | 122.35 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.93 | 122.12 | 2.00 | 0.00 | 0.75 | 0.00 | 14.98 | 121.78 | 2.00 | 0.00 | 0.75 | 0.00 |
| 15.03 | 122.70 | 2.00 | 0.00 | 0.75 | 0.00 | 15.10 | 121.37 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.18 | 120.09 | 2.00 | 0.00 | 0.74 | 0.00 | 15.23 | 119.16 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.33 | 118.49 | 2.00 | 0.00 | 0.74 | 0.00 | 15.37 | 117.78 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.44 | 116.86 | 2.00 | 0.00 | 0.74 | 0.00 | 15.52 | 115.96 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.56 | 115.50 | 2.00 | 0.00 | 0.74 | 0.00 | 15.63 | 115.08 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.71 | 114.38 | 2.00 | 0.00 | 0.73 | 0.00 | 15.77 | 112.98 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.82 | 111.52 | 2.00 | 0.00 | 0.73 | 0.00 | 15.88 | 109.70 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.97 | 108.06 | 2.00 | 0.00 | 0.73 | 0.00 | 16.02 | 106.21 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.10 | 104.65 | 2.00 | 0.00 | 0.73 | 0.00 | 16.17 | 103.25 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.22 | 102.20 | 2.00 | 0.00 | 0.73 | 0.00 | 16.27 | 101.46 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.37 | 100.44 | 2.00 | 0.00 | 0.72 | 0.00 | 16.42 | 99.11 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.52 | 97.58 | 2.00 | 0.00 | 0.72 | 0.00 | 16.55 | 96.53 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.62 | 95.95 | 2.00 | 0.00 | 0.72 | 0.00 | 16.70 | 95.27 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.74 | 94.43 | 2.00 | 0.00 | 0.72 | 0.00 | 16.82 | 93.99 | 2.00 | 0.00 | 0.71 | 0.00 |
| 16.91 | 94.09 | 2.00 | 0.00 | 0.71 | 0.00 | 16.94 | 92.37 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.01 | 89.67 | 2.00 | 0.00 | 0.71 | 0.00 | 17.10 | 87.49 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.15 | 86.72 | 2.00 | 0.00 | 0.71 | 0.00 | 17.21 | 87.87 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.30 | 88.42 | 2.00 | 0.00 | 0.71 | 0.00 | 17.34 | 88.73 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.41 | 86.85 | 2.00 | 0.00 | 0.70 | 0.00 | 17.49 | 84.86 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.53 | 85.38 | 2.00 | 0.00 | 0.70 | 0.00 | 17.59 | 88.84 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.67 | 92.69 | 2.00 | 0.00 | 0.70 | 0.00 | 17.73 | 92.45 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.79 | 90.23 | 2.00 | 0.00 | 0.70 | 0.00 | 17.87 | 90.20 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.92 | 89.90 | 2.00 | 0.00 | 0.70 | 0.00 | 17.99 | 89.25 | 2.00 | 0.00 | 0.70 | 0.00 |
| 18.07 | 88.30 | 2.00 | 0.00 | 0.69 | 0.00 | 18.14 | 88.06 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.19 | 87.63 | 2.00 | 0.00 | 0.69 | 0.00 | 18.26 | 85.31 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.34 | 83.64 | 2.00 | 0.00 | 0.69 | 0.00 | 18.38 | 82.38 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.45 | 82.79 | 2.00 | 0.00 | 0.69 | 0.00 | 18.53 | 83.45 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.60 | 84.80 | 2.00 | 0.00 | 0.68 | 0.00 | 18.68 | 85.10 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.72 | 85.66 | 2.00 | 0.00 | 0.68 | 0.00 | 18.79 | 86.46 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.84 | 87.12 | 2.00 | 0.00 | 0.68 | 0.00 | 18.92 | 86.96 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.98 | 86.02 | 2.00 | 0.00 | 0.68 | 0.00 | 19.06 | 84.56 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.11 | 83.08 | 2.00 | 0.00 | 0.68 | 0.00 | 19.18 | 81.40 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.25 | 79.77 | 2.00 | 0.00 | 0.67 | 0.00 | 19.33 | 78.21 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.37 | 77.58 | 2.00 | 0.00 | 0.67 | 0.00 | 19.47 | 77.75 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.52 | 78.52 | 2.00 | 0.00 | 0.67 | 0.00 | 19.57 | 79.80 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.62 | 80.74 | 2.00 | 0.00 | 0.67 | 0.00 | 19.71 | 81.05 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.77 | 80.97 | 2.00 | 0.00 | 0.67 | 0.00 | 19.82 | 81.03 | 2.00 | 0.00 | 0.66 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.91 | 81.44 | 2.00 | 0.00 | 0.66 | 0.00 | 19.96 | 82.04 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.02 | 82.03 | 2.00 | 0.00 | 0.66 | 0.00 | 20.11 | 81.00 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.18 | 79.51 | 2.00 | 0.00 | 0.66 | 0.00 | 20.23 | 78.32 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.28 | 77.58 | 2.00 | 0.00 | 0.66 | 0.00 | 20.37 | 76.64 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.42 | 75.20 | 2.00 | 0.00 | 0.65 | 0.00 | 20.48 | 73.77 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.56 | 72.83 | 2.00 | 0.00 | 0.65 | 0.00 | 20.63 | 72.58 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.67 | 72.78 | 2.00 | 0.00 | 0.65 | 0.00 | 20.74 | 72.87 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.82 | 73.00 | 2.00 | 0.00 | 0.65 | 0.00 | 20.90 | 73.09 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.97 | 73.30 | 2.00 | 0.00 | 0.64 | 0.00 | 21.02 | 73.43 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.10 | 73.47 | 2.00 | 0.00 | 0.64 | 0.00 | 21.17 | 73.44 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.22 | 73.37 | 2.00 | 0.00 | 0.64 | 0.00 | 21.27 | 73.82 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.37 | 74.53 | 2.00 | 0.00 | 0.64 | 0.00 | 21.43 | 75.39 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.46 | 75.93 | 2.00 | 0.00 | 0.64 | 0.00 | 21.55 | 76.26 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.62 | 76.50 | 2.00 | 0.00 | 0.63 | 0.00 | 21.66 | 76.60 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.74 | 76.38 | 2.00 | 0.00 | 0.63 | 0.00 | 21.81 | 75.62 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.85 | 74.17 | 2.00 | 0.00 | 0.63 | 0.00 | 21.93 | 72.45 | 2.00 | 0.00 | 0.63 | 0.00 |
| 22.00 | 70.92 | 2.00 | 0.00 | 0.63 | 0.00 | 22.07 | 69.84 | 2.00 | 0.00 | 0.63 | 0.00 |
| 22.16 | 69.16 | 2.00 | 0.00 | 0.62 | 0.00 | 22.19 | 68.84 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.26 | 69.11 | 2.00 | 0.00 | 0.62 | 0.00 | 22.33 | 69.78 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.40 | 70.66 | 2.00 | 0.00 | 0.62 | 0.00 | 22.45 | 71.70 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.53 | 73.04 | 2.00 | 0.00 | 0.62 | 0.00 | 22.60 | 74.53 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.64 | 74.92 | 2.00 | 0.00 | 0.62 | 0.00 | 22.70 | 72.69 | 2.00 | 0.00 | 0.62 | 0.00 |
| 22.80 | 70.03 | 2.00 | 0.00 | 0.61 | 0.00 | 22.84 | 68.44 | 2.00 | 0.00 | 0.61 | 0.00 |
| 22.90 | 70.73 | 2.00 | 0.00 | 0.61 | 0.00 | 23.00 | 72.88 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.05 | 73.62 | 2.00 | 0.00 | 0.61 | 0.00 | 23.14 | 71.83 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.18 | 69.34 | 2.00 | 0.00 | 0.61 | 0.00 | 23.24 | 69.83 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.32 | 73.10 | 2.00 | 0.00 | 0.60 | 0.00 | 23.39 | 77.87 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.44 | 83.58 | 2.00 | 0.00 | 0.60 | 0.00 | 23.53 | 89.30 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.59 | 94.49 | 2.00 | 0.00 | 0.60 | 0.00 | 23.63 | 97.40 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.69 | 98.66 | 2.00 | 0.00 | 0.60 | 0.00 | 23.77 | 98.49 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.82 | 96.26 | 2.00 | 0.00 | 0.60 | 0.00 | 23.93 | 93.28 | 2.00 | 0.00 | 0.59 | 0.00 |
| 23.95 | 89.23 | 2.00 | 0.00 | 0.59 | 0.00 | 24.03 | 86.15 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.12 | 83.09 | 2.00 | 0.00 | 0.59 | 0.00 | 24.16 | 81.40 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.22 | 80.14 | 2.00 | 0.00 | 0.59 | 0.00 | 24.30 | 78.94 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.37 | 78.38 | 2.00 | 0.00 | 0.59 | 0.00 | 24.43 | 78.34 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.50 | 79.02 | 2.00 | 0.00 | 0.58 | 0.00 | 24.57 | 79.97 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.62 | 80.77 | 2.00 | 0.00 | 0.58 | 0.00 | 24.69 | 81.29 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.77 | 81.95 | 2.00 | 0.00 | 0.58 | 0.00 | 24.83 | 82.63 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.88 | 83.52 | 2.00 | 0.00 | 0.58 | 0.00 | 24.97 | 83.83 | 2.00 | 0.00 | 0.58 | 0.00 |
| 25.02 | 83.63 | 2.00 | 0.00 | 0.58 | 0.00 | 25.11 | 83.10 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.17 | 82.64 | 2.00 | 0.00 | 0.57 | 0.00 | 25.21 | 82.11 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.29 | 81.58 | 2.00 | 0.00 | 0.57 | 0.00 | 25.36 | 81.18 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.40 | 81.80 | 2.00 | 0.00 | 0.57 | 0.00 | 25.46 | 83.18 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.54 | 84.74 | 2.00 | 0.00 | 0.57 | 0.00 | 25.61 | 85.56 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.66 | 86.27 | 2.00 | 0.00 | 0.57 | 0.00 | 25.75 | 86.87 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.80 | 87.79 | 2.00 | 0.00 | 0.56 | 0.00 | 25.85 | 89.00 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.96 | 90.30 | 2.00 | 0.00 | 0.56 | 0.00 | 26.01 | 91.59 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.05 | 92.01 | 2.00 | 0.00 | 0.56 | 0.00 | 26.12 | 92.67 | 2.00 | 0.00 | 0.56 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26.19 | 93.68 | 2.00 | 0.00 | 0.56 | 0.00 | 26.25 | 95.03 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.33 | 95.43 | 2.00 | 0.00 | 0.55 | 0.00 | 26.42 | 95.21 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.46 | 94.14 | 2.00 | 0.00 | 0.55 | 0.00 | 26.52 | 93.08 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.61 | 91.90 | 2.00 | 0.00 | 0.55 | 0.00 | 26.67 | 90.94 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.71 | 90.13 | 2.00 | 0.00 | 0.55 | 0.00 | 26.79 | 89.23 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.87 | 88.27 | 2.00 | 0.00 | 0.54 | 0.00 | 26.91 | 86.60 | 2.00 | 0.00 | 0.54 | 0.00 |
| 26.98 | 85.30 | 2.00 | 0.00 | 0.54 | 0.00 | 27.06 | 84.21 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.11 | 83.95 | 2.00 | 0.00 | 0.54 | 0.00 | 27.21 | 83.42 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.26 | 82.50 | 2.00 | 0.00 | 0.54 | 0.00 | 27.32 | 81.58 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.40 | 80.98 | 2.00 | 0.00 | 0.54 | 0.00 | 27.45 | 80.64 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.52 | 80.06 | 2.00 | 0.00 | 0.53 | 0.00 | 27.60 | 79.08 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.65 | 77.14 | 2.00 | 0.00 | 0.53 | 0.00 | 27.71 | 74.28 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.80 | 71.63 | 2.00 | 0.00 | 0.53 | 0.00 | 27.84 | 70.11 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.90 | 70.15 | 2.00 | 0.00 | 0.53 | 0.00 | 27.99 | 70.37 | 2.00 | 0.00 | 0.53 | 0.00 |
| 28.05 | 70.68 | 2.00 | 0.00 | 0.52 | 0.00 | 28.09 | 71.52 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.17 | 73.33 | 2.00 | 0.00 | 0.52 | 0.00 | 28.25 | 75.88 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.30 | 78.37 | 2.00 | 0.00 | 0.52 | 0.00 | 28.39 | 79.73 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.44 | 80.17 | 2.00 | 0.00 | 0.52 | 0.00 | 28.49 | 79.97 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.54 | 80.56 | 2.00 | 0.00 | 0.52 | 0.00 | 28.62 | 81.23 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.68 | 82.36 | 2.00 | 0.00 | 0.51 | 0.00 | 28.74 | 81.37 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.83 | 78.59 | 2.00 | 0.00 | 0.51 | 0.00 | 28.89 | 77.72 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.98 | 80.89 | 2.00 | 0.00 | 0.51 | 0.00 | 29.03 | 85.46 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.09 | 87.01 | 2.00 | 0.00 | 0.51 | 0.00 | 29.14 | 86.44 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.22 | 85.06 | 2.00 | 0.00 | 0.50 | 0.00 | 29.27 | 83.64 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.38 | 81.71 | 2.00 | 0.00 | 0.50 | 0.00 | 29.43 | 80.51 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.48 | 79.94 | 2.00 | 0.00 | 0.50 | 0.00 | 29.57 | 79.55 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.62 | 79.45 | 2.00 | 0.00 | 0.50 | 0.00 | 29.68 | 79.61 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.73 | 79.88 | 2.00 | 0.00 | 0.50 | 0.00 | 29.82 | 80.28 | 2.00 | 0.00 | 0.49 | 0.00 |
| 29.87 | 80.63 | 2.00 | 0.00 | 0.49 | 0.00 | 29.94 | 80.77 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.02 | 80.38 | 2.00 | 0.00 | 0.49 | 0.00 | 30.07 | 79.42 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.16 | 78.43 | 2.00 | 0.00 | 0.49 | 0.00 | 30.19 | 77.60 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.26 | 77.26 | 2.00 | 0.00 | 0.49 | 0.00 | 30.36 | 76.86 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.41 | 76.56 | 2.00 | 0.00 | 0.48 | 0.00 | 30.46 | 75.65 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.53 | 74.96 | 2.00 | 0.00 | 0.48 | 0.00 | 30.61 | 74.40 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.65 | 74.16 | 2.00 | 0.00 | 0.48 | 0.00 | 30.71 | 74.42 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.81 | 74.84 | 2.00 | 0.00 | 0.48 | 0.00 | 30.84 | 75.89 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.91 | 76.95 | 2.00 | 0.00 | 0.48 | 0.00 | 30.99 | 78.41 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.04 | 80.46 | 2.00 | 0.00 | 0.47 | 0.00 | 31.11 | 82.70 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.18 | 85.50 | 2.00 | 0.00 | 0.47 | 0.00 | 31.25 | 87.33 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.30 | 88.88 | 2.00 | 0.00 | 0.47 | 0.00 | 31.39 | 89.49 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.45 | 90.04 | 2.00 | 0.00 | 0.47 | 0.00 | 31.50 | 89.86 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.60 | 89.50 | 2.00 | 0.00 | 0.46 | 0.00 | 31.64 | 89.47 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.73 | 89.66 | 2.00 | 0.00 | 0.46 | 0.00 | 31.80 | 89.75 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.84 | 88.32 | 2.00 | 0.00 | 0.46 | 0.00 | 31.91 | 88.03 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.99 | 89.60 | 2.00 | 0.00 | 0.46 | 0.00 | 32.03 | 92.67 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.09 | 94.81 | 2.00 | 0.00 | 0.46 | 0.00 | 32.19 | 95.17 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.25 | 95.29 | 2.00 | 0.00 | 0.45 | 0.00 | 32.29 | 95.06 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.38 | 94.99 | 2.00 | 0.00 | 0.45 | 0.00 | 32.43 | 95.32 | 2.00 | 0.00 | 0.45 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.48 | 96.21 | 2.00 | 0.00 | 0.45 | 0.00 | 32.58 | 96.96 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.63 | 97.21 | 2.00 | 0.00 | 0.45 | 0.00 | 32.69 | 96.97 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.74 | 96.84 | 2.00 | 0.00 | 0.45 | 0.00 | 32.83 | 97.18 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.88 | 98.21 | 2.00 | 0.00 | 0.44 | 0.00 | 32.97 | 99.19 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.01 | 99.93 | 2.00 | 0.00 | 0.44 | 0.00 | 33.07 | 100.25 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.16 | 100.88 | 2.00 | 0.00 | 0.44 | 0.00 | 33.20 | 101.96 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.27 | 102.61 | 2.00 | 0.00 | 0.44 | 0.00 | 33.36 | 102.55 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.41 | 101.56 | 2.00 | 0.00 | 0.43 | 0.00 | 33.51 | 100.01 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.56 | 98.16 | 2.00 | 0.00 | 0.43 | 0.00 | 33.61 | 96.33 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.67 | 93.73 | 2.00 | 0.00 | 0.43 | 0.00 | 33.76 | 90.54 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.81 | 86.77 | 2.00 | 0.00 | 0.43 | 0.00 | 33.86 | 84.42 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.94 | 82.88 | 2.00 | 0.00 | 0.42 | 0.00 | 34.02 | 81.90 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.06 | 81.31 | 2.00 | 0.00 | 0.42 | 0.00 | 34.14 | 80.18 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.21 | 79.55 | 2.00 | 0.00 | 0.42 | 0.00 | 34.25 | 78.60 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.33 | 78.67 | 2.00 | 0.00 | 0.42 | 0.00 | 34.41 | 78.62 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.49 | 78.44 | 2.00 | 0.00 | 0.42 | 0.00 | 34.56 | 77.99 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.59 | 77.32 | 2.00 | 0.00 | 0.41 | 0.00 | 34.67 | 76.25 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.76 | 74.98 | 2.00 | 0.00 | 0.41 | 0.00 | 34.80 | 73.98 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.85 | 73.61 | 2.00 | 0.00 | 0.41 | 0.00 | 34.93 | 73.55 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.98 | 73.75 | 2.00 | 0.00 | 0.41 | 0.00 | 35.05 | 74.33 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.13 | 74.82 | 2.00 | 0.00 | 0.40 | 0.00 | 35.18 | 74.95 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.24 | 74.57 | 2.00 | 0.00 | 0.40 | 0.00 | 35.31 | 73.78 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.41 | 72.99 | 2.00 | 0.00 | 0.40 | 0.00 | 35.46 | 72.22 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.51 | 71.90 | 2.00 | 0.00 | 0.40 | 0.00 | 35.58 | 71.61 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.66 | 71.23 | 2.00 | 0.00 | 0.40 | 0.00 | 35.71 | 70.46 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.76 | 69.60 | 2.00 | 0.00 | 0.39 | 0.00 | 35.86 | 68.80 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.91 | 68.18 | 2.00 | 0.00 | 0.39 | 0.00 | 36.01 | 67.77 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.05 | 67.47 | 2.00 | 0.00 | 0.39 | 0.00 | 36.12 | 67.34 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.20 | 67.21 | 2.00 | 0.00 | 0.39 | 0.00 | 36.23 | 66.95 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.31 | 66.60 | 2.00 | 0.00 | 0.38 | 0.00 | 36.35 | 66.14 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.45 | 65.88 | 2.00 | 0.00 | 0.38 | 0.00 | 36.51 | 65.57 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.58 | 64.85 | 2.00 | 0.00 | 0.38 | 0.00 | 36.66 | 63.88 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.70 | 63.34 | 2.00 | 0.00 | 0.38 | 0.00 | 36.80 | 63.51 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.84 | 64.14 | 2.00 | 0.00 | 0.38 | 0.00 | 36.89 | 65.13 | 2.00 | 0.00 | 0.37 | 0.00 |
| 36.96 | 66.24 | 2.00 | 0.00 | 0.37 | 0.00 | 37.03 | 67.43 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.09 | 68.35 | 2.00 | 0.00 | 0.37 | 0.00 | 37.15 | 69.18 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.23 | 69.82 | 2.00 | 0.00 | 0.37 | 0.00 | 37.27 | 70.63 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.34 | 71.39 | 2.00 | 0.00 | 0.37 | 0.00 | 37.43 | 72.06 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.49 | 72.24 | 2.00 | 0.00 | 0.36 | 0.00 | 37.54 | 72.17 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.62 | 71.81 | 2.00 | 0.00 | 0.36 | 0.00 | 37.69 | 71.50 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.74 | 71.01 | 2.00 | 0.00 | 0.36 | 0.00 | 37.82 | 70.57 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.88 | 70.00 | 2.00 | 0.00 | 0.36 | 0.00 | 37.93 | 69.77 | 2.00 | 0.00 | 0.36 | 0.00 |
| 38.02 | 69.74 | 2.00 | 0.00 | 0.36 | 0.00 | 38.08 | 69.96 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.13 | 70.58 | 2.00 | 0.00 | 0.35 | 0.00 | 38.23 | 71.42 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.28 | 72.59 | 2.00 | 0.00 | 0.35 | 0.00 | 38.34 | 73.98 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.41 | 74.84 | 2.00 | 0.00 | 0.35 | 0.00 | 38.47 | 75.23 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.52 | 74.88 | 2.00 | 0.00 | 0.35 | 0.00 | 38.61 | 74.78 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.66 | 74.76 | 2.00 | 0.00 | 0.34 | 0.00 | 38.72 | 75.39 | 2.00 | 0.00 | 0.34 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.82 | 76.09 | 2.00 | 0.00 | 0.34 | 0.00 | 38.86 | 76.02 | 2.00 | 0.00 | 0.34 | 0.00 |
| 38.96 | 75.07 | 2.00 | 0.00 | 0.34 | 0.00 | 39.01 | 73.85 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.05 | 72.93 | 2.00 | 0.00 | 0.34 | 0.00 | 39.13 | 72.03 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.21 | 71.27 | 2.00 | 0.00 | 0.34 | 0.00 | 39.24 | 70.76 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.31 | 70.31 | 2.00 | 0.00 | 0.33 | 0.00 | 39.40 | 70.04 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.44 | 69.55 | 2.00 | 0.00 | 0.33 | 0.00 | 39.51 | 69.48 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.59 | 70.19 | 2.00 | 0.00 | 0.33 | 0.00 | 39.66 | 71.42 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.70 | 72.68 | 2.00 | 0.00 | 0.33 | 0.00 | 39.80 | 73.40 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.85 | 73.56 | 2.00 | 0.00 | 0.32 | 0.00 | 39.90 | 72.80 | 2.00 | 0.00 | 0.32 | 0.00 |
| 39.98 | 71.87 | 2.00 | 0.00 | 0.32 | 0.00 | 40.05 | 71.21 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.10 | 70.72 | 2.00 | 0.00 | 0.32 | 0.00 | 40.20 | 69.84 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.25 | 68.24 | 2.00 | 0.00 | 0.32 | 0.00 | 40.30 | 66.44 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.40 | 64.63 | 2.00 | 0.00 | 0.32 | 0.00 | 40.45 | 63.40 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.49 | 62.87 | 2.00 | 0.00 | 0.31 | 0.00 | 40.59 | 62.77 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.64 | 62.88 | 2.00 | 0.00 | 0.31 | 0.00 | 40.69 | 63.65 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.79 | 64.67 | 2.00 | 0.00 | 0.31 | 0.00 | 40.83 | 65.52 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.92 | 65.36 | 2.00 | 0.00 | 0.31 | 0.00 | 40.98 | 65.96 | 2.00 | 0.00 | 0.31 | 0.00 |
| 41.03 | 68.30 | 2.00 | 0.00 | 0.30 | 0.00 | 41.08 | 71.31 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.18 | 73.34 | 2.00 | 0.00 | 0.30 | 0.00 | 41.22 | 74.28 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.31 | 74.96 | 2.00 | 0.00 | 0.30 | 0.00 | 41.36 | 75.37 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.41 | 75.17 | 2.00 | 0.00 | 0.30 | 0.00 | 41.50 | 74.86 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.54 | 74.80 | 2.00 | 0.00 | 0.30 | 0.00 | 41.61 | 74.84 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.70 | 74.76 | 2.00 | 0.00 | 0.29 | 0.00 | 41.75 | 74.97 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.80 | 75.16 | 2.00 | 0.00 | 0.29 | 0.00 | 41.87 | 75.51 | 2.00 | 0.00 | 0.29 | 0.00 |
| 41.95 | 75.80 | 2.00 | 0.00 | 0.29 | 0.00 | 42.01 | 75.99 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.10 | 76.02 | 2.00 | 0.00 | 0.29 | 0.00 | 42.14 | 75.66 | 2.00 | 0.00 | 0.29 | 0.00 |
| 42.20 | 75.95 | 2.00 | 0.00 | 0.28 | 0.00 | 42.27 | 76.74 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.34 | 78.60 | 2.00 | 0.00 | 0.28 | 0.00 | 42.39 | 80.82 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.49 | 82.25 | 2.00 | 0.00 | 0.28 | 0.00 | 42.54 | 82.32 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.59 | 81.52 | 2.00 | 0.00 | 0.28 | 0.00 | 42.69 | 81.18 | 2.00 | 0.00 | 0.28 | 0.00 |
| 42.74 | 82.20 | 2.00 | 0.00 | 0.28 | 0.00 | 42.80 | 83.06 | 2.00 | 0.00 | 0.27 | 0.00 |
| 42.89 | 84.26 | 2.00 | 0.00 | 0.27 | 0.00 | 42.93 | 83.71 | 2.00 | 0.00 | 0.27 | 0.00 |
| 42.99 | 83.10 | 2.00 | 0.00 | 0.27 | 0.00 | 43.08 | 81.83 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.11 | 80.66 | 2.00 | 0.00 | 0.27 | 0.00 | 43.18 | 79.87 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.28 | 78.86 | 2.00 | 0.00 | 0.27 | 0.00 | 43.35 | 78.03 | 2.00 | 0.00 | 0.27 | 0.00 |
| 43.38 | 77.33 | 2.00 | 0.00 | 0.26 | 0.00 | 43.45 | 76.17 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.53 | 74.65 | 2.00 | 0.00 | 0.26 | 0.00 | 43.58 | 73.14 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.64 | 71.25 | 2.00 | 0.00 | 0.26 | 0.00 | 43.73 | 69.46 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.78 | 67.76 | 2.00 | 0.00 | 0.26 | 0.00 | 43.84 | 67.36 | 2.00 | 0.00 | 0.26 | 0.00 |
| 43.92 | 67.24 | 2.00 | 0.00 | 0.26 | 0.00 | 43.98 | 67.24 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.07 | 67.93 | 2.00 | 0.00 | 0.25 | 0.00 | 44.12 | 68.79 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.17 | 69.37 | 2.00 | 0.00 | 0.25 | 0.00 | 44.23 | 70.06 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.29 | 71.87 | 2.00 | 0.00 | 0.25 | 0.00 | 44.39 | 73.68 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.43 | 73.33 | 2.00 | 0.00 | 0.25 | 0.00 | 44.49 | 74.36 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.57 | 71.85 | 2.00 | 0.00 | 0.24 | 0.00 | 44.67 | 70.80 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.73 | 66.63 | 2.00 | 0.00 | 0.24 | 0.00 | 44.77 | 66.38 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.82 | 64.10 | 2.00 | 0.00 | 0.24 | 0.00 | 44.93 | 62.33 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.97 | 59.85 | 2.00 | 0.00 | 0.24 | 0.00 | 45.02 | 58.28 | 2.00 | 0.00 | 0.24 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45.09 | 56.68 | 2.00 | 0.00 | 0.24 | 0.00 | 45.17 | 55.59 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.22 | 55.27 | 2.00 | 0.00 | 0.23 | 0.00 | 45.30 | 55.78 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.37 | 56.40 | 2.00 | 0.00 | 0.23 | 0.00 | 45.42 | 56.35 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.50 | 55.69 | 2.00 | 0.00 | 0.23 | 0.00 | 45.57 | 54.84 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.61 | 54.23 | 2.00 | 0.00 | 0.23 | 0.00 | 45.72 | 53.81 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.77 | 53.57 | 2.00 | 0.00 | 0.22 | 0.00 | 45.80 | 53.58 | 2.00 | 0.00 | 0.22 | 0.00 |
| 45.88 | 53.99 | 2.00 | 0.00 | 0.22 | 0.00 | 45.96 | 54.76 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.01 | 56.55 | 2.00 | 0.00 | 0.22 | 0.00 | 46.11 | 58.12 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.14 | 59.48 | 2.00 | 0.00 | 0.22 | 0.00 | 46.21 | 59.78 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.26 | 59.67 | 2.00 | 0.00 | 0.22 | 0.00 | 46.35 | 59.26 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.41 | 59.17 | 2.00 | 0.00 | 0.21 | 0.00 | 46.49 | 59.98 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.55 | 60.98 | 2.00 | 0.00 | 0.21 | 0.00 | 46.59 | 60.62 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.68 | 59.13 | 2.00 | 0.00 | 0.21 | 0.00 | 46.74 | 57.76 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.80 | 58.63 | 2.00 | 0.00 | 0.21 | 0.00 | 46.85 | 61.74 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.93 | 65.10 | 2.00 | 0.00 | 0.20 | 0.00 | 47.00 | 65.51 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.10 | 66.22 | 2.00 | 0.00 | 0.20 | 0.00 | 47.15 | 68.22 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.20 | 73.25 | 2.00 | 0.00 | 0.20 | 0.00 | 47.25 | 76.10 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.31 | 75.69 | 2.00 | 0.00 | 0.20 | 0.00 | 47.40 | 72.54 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.44 | 67.02 | 2.00 | 0.00 | 0.20 | 0.00 | 47.52 | 61.96 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.58 | 57.84 | 2.00 | 0.00 | 0.19 | 0.00 | 47.67 | 55.68 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.73 | 54.03 | 2.00 | 0.00 | 0.19 | 0.00 | 47.78 | 52.68 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.86 | 52.11 | 2.00 | 0.00 | 0.19 | 0.00 | 47.92 | 52.02 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.98 | 51.86 | 2.00 | 0.00 | 0.19 | 0.00 | 48.05 | 51.68 | 2.00 | 0.00 | 0.19 | 0.00 |
| 48.12 | 52.36 | 2.00 | 0.00 | 0.18 | 0.00 | 48.19 | 55.24 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.27 | 58.76 | 2.00 | 0.00 | 0.18 | 0.00 | 48.32 | 62.00 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.38 | 64.84 | 2.00 | 0.00 | 0.18 | 0.00 | 48.47 | 65.90 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.52 | 65.86 | 2.00 | 0.00 | 0.18 | 0.00 | 48.56 | 61.36 | 2.00 | 0.00 | 0.18 | 0.00 |
| 48.66 | 56.82 | 2.00 | 0.00 | 0.18 | 0.00 | 48.71 | 52.62 | 2.00 | 0.00 | 0.17 | 0.00 |
| 48.76 | 51.26 | 0.14 | 0.70 | 0.17 | 0.00 | 48.82 | 51.48 | 0.14 | 0.69 | 0.17 | 0.00 |
| 48.93 | 53.85 | 2.00 | 0.00 | 0.17 | 0.00 | 48.97 | 60.71 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.05 | 66.77 | 2.00 | 0.00 | 0.17 | 0.00 | 49.08 | 74.71 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.16 | 80.83 | 2.00 | 0.00 | 0.17 | 0.00 | 49.25 | 86.82 | 2.00 | 0.00 | 0.17 | 0.00 |
| 49.29 | 91.88 | 2.00 | 0.00 | 0.16 | 0.00 | 49.36 | 95.92 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.43 | 100.81 | 2.00 | 0.00 | 0.16 | 0.00 | 49.48 | 108.45 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.55 | 118.04 | 2.00 | 0.00 | 0.16 | 0.00 | 49.64 | 123.78 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.70 | 124.69 | 2.00 | 0.00 | 0.16 | 0.00 | 49.75 | 119.83 | 2.00 | 0.00 | 0.16 | 0.00 |
| 49.81 | 115.91 | 2.00 | 0.00 | 0.16 | 0.00 | 49.90 | 114.35 | 2.00 | 0.00 | 0.15 | 0.00 |
| 49.94 | 116.03 | 2.00 | 0.00 | 0.15 | 0.00 | 50.01 | 117.53 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.08 | 121.19 | 2.00 | 0.00 | 0.15 | 0.00 | 50.15 | 125.06 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.24 | 129.50 | 2.00 | 0.00 | 0.15 | 0.00 | 50.30 | 130.62 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.34 | 129.24 | 2.00 | 0.00 | 0.15 | 0.00 | 50.41 | 124.60 | 2.00 | 0.00 | 0.15 | 0.00 |
| 50.47 | 117.41 | 2.00 | 0.00 | 0.14 | 0.00 | 50.54 | 110.05 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.62 | 105.13 | 2.00 | 0.00 | 0.14 | 0.00 | 50.66 | 100.85 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.77 | 97.17 | 2.00 | 0.00 | 0.14 | 0.00 | 50.81 | 92.98 | 2.00 | 0.00 | 0.14 | 0.00 |
| 50.87 | 89.74 | 2.00 | 0.00 | 0.14 | 0.00 | 50.92 | 86.21 | 2.00 | 0.00 | 0.14 | 0.00 |
| 51.01 | 83.42 | 2.00 | 0.00 | 0.14 | 0.00 | 51.07 | 81.79 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.15 | 81.32 | 2.00 | 0.00 | 0.13 | 0.00 | 51.21 | 80.93 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.26 | 80.94 | 2.00 | 0.00 | 0.13 | 0.00 | 51.32 | 81.19 | 2.00 | 0.00 | 0.13 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 51.39 | 82.02 | 2.00 | 0.00 | 0.13 | 0.00 | 51.46 | 82.86 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.53 | 83.39 | 2.00 | 0.00 | 0.13 | 0.00 | 51.61 | 83.64 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.65 | 84.22 | 0.21 | 0.34 | 0.12 | 0.00 | 51.72 | 84.86 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.81 | 85.17 | 2.00 | 0.00 | 0.12 | 0.00 | 51.84 | 84.93 | 0.21 | 0.32 | 0.12 | 0.00 |
| 51.92 | 84.23 | 0.21 | 0.32 | 0.12 | 0.00 | 52.01 | 83.53 | 0.21 | 0.32 | 0.12 | 0.00 |
| 52.06 | 83.04 | 0.21 | 0.32 | 0.12 | 0.00 | 52.11 | 82.53 | 0.21 | 0.32 | 0.12 | 0.00 |
| 52.19 | 82.07 | 0.21 | 0.32 | 0.12 | 0.00 | 52.25 | 81.67 | 0.20 | 0.32 | 0.11 | 0.00 |
| 52.30 | 81.70 | 0.20 | 0.31 | 0.11 | 0.00 | 52.38 | 82.14 | 0.21 | 0.31 | 0.11 | 0.00 |
| 52.45 | 82.60 | 0.21 | 0.30 | 0.11 | 0.00 | 52.49 | 83.26 | 0.21 | 0.30 | 0.11 | 0.00 |
| 52.57 | 83.98 | 0.21 | 0.29 | 0.11 | 0.00 | 52.65 | 84.83 | 0.21 | 0.29 | 0.11 | 0.00 |
| 52.70 | 85.50 | 0.22 | 0.28 | 0.11 | 0.00 | 52.79 | 86.02 | 0.22 | 0.28 | 0.11 | 0.00 |
| 52.85 | 86.54 | 0.22 | 0.27 | 0.10 | 0.00 | 52.89 | 87.45 | 0.22 | 0.27 | 0.10 | 0.00 |
| 52.99 | 87.92 | 2.00 | 0.00 | 0.10 | 0.00 | 53.04 | 87.65 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.08 | 85.53 | 2.00 | 0.00 | 0.10 | 0.00 | 53.17 | 82.64 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.24 | 78.83 | 2.00 | 0.00 | 0.10 | 0.00 | 53.33 | 76.03 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.39 | 73.86 | 2.00 | 0.00 | 0.10 | 0.00 | 53.42 | 72.72 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.49 | 71.87 | 2.00 | 0.00 | 0.09 | 0.00 | 53.58 | 71.34 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.63 | 71.78 | 2.00 | 0.00 | 0.09 | 0.00 | 53.68 | 72.58 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.77 | 73.76 | 2.00 | 0.00 | 0.09 | 0.00 | 53.83 | 75.15 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.88 | 77.25 | 2.00 | 0.00 | 0.09 | 0.00 | 53.97 | 79.53 | 2.00 | 0.00 | 0.09 | 0.00 |
| 54.03 | 81.79 | 2.00 | 0.00 | 0.08 | 0.00 | 54.08 | 84.13 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.18 | 86.31 | 2.00 | 0.00 | 0.08 | 0.00 | 54.22 | 88.09 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.27 | 87.53 | 2.00 | 0.00 | 0.08 | 0.00 | 54.38 | 85.74 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.42 | 83.36 | 2.00 | 0.00 | 0.08 | 0.00 | 54.47 | 82.37 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.57 | 82.50 | 2.00 | 0.00 | 0.08 | 0.00 | 54.61 | 89.32 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.68 | 98.07 | 2.00 | 0.00 | 0.07 | 0.00 | 54.75 | 107.68 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.79 | 110.93 | 2.00 | 0.00 | 0.07 | 0.00 | 54.86 | 115.41 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.95 | 119.16 | 2.00 | 0.00 | 0.07 | 0.00 | 55.01 | 124.44 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.06 | 127.99 | 0.44 | 0.13 | 0.07 | 0.00 | 55.12 | 133.02 | 0.48 | 0.12 | 0.07 | 0.00 |
| 55.21 | 137.02 | 0.51 | 0.12 | 0.06 | 0.00 | 55.25 | 140.52 | 0.54 | 0.11 | 0.06 | 0.00 |
| 55.32 | 142.18 | 0.56 | 0.11 | 0.06 | 0.00 | 55.40 | 142.70 | 0.56 | 0.11 | 0.06 | 0.00 |
| 55.50 | 142.19 | 0.56 | 0.10 | 0.06 | 0.00 | 55.52 | 140.35 | 0.54 | 0.10 | 0.06 | 0.00 |
| 55.60 | 138.56 | 0.53 | 0.10 | 0.06 | 0.00 | 55.66 | 136.06 | 0.50 | 0.10 | 0.06 | 0.00 |
| 55.72 | 134.50 | 0.49 | 0.10 | 0.06 | 0.00 | 55.79 | 133.81 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.86 | 133.74 | 2.00 | 0.00 | 0.05 | 0.00 | 55.95 | 132.12 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.00 | 128.26 | 2.00 | 0.00 | 0.05 | 0.00 | 56.05 | 122.94 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.10 | 116.38 | 2.00 | 0.00 | 0.05 | 0.00 | 56.19 | 112.55 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.24 | 110.69 | 2.00 | 0.00 | 0.05 | 0.00 | 56.34 | 111.05 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.37 | 109.63 | 2.00 | 0.00 | 0.04 | 0.00 | 56.43 | 107.45 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.54 | 105.07 | 2.00 | 0.00 | 0.04 | 0.00 | 56.59 | 102.95 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.64 | 99.69 | 2.00 | 0.00 | 0.04 | 0.00 | 56.73 | 96.28 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.79 | 92.21 | 2.00 | 0.00 | 0.04 | 0.00 | 56.84 | 87.54 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.93 | 83.36 | 2.00 | 0.00 | 0.04 | 0.00 | 56.96 | 80.38 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.03 | 78.85 | 2.00 | 0.00 | 0.03 | 0.00 | 57.13 | 76.81 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.16 | 73.97 | 2.00 | 0.00 | 0.03 | 0.00 | 57.23 | 71.83 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.29 | 70.54 | 2.00 | 0.00 | 0.03 | 0.00 | 57.38 | 70.36 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.42 | 70.64 | 2.00 | 0.00 | 0.03 | 0.00 | 57.49 | 71.65 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.57 | 72.15 | 2.00 | 0.00 | 0.02 | 0.00 | 57.62 | 72.95 | 2.00 | 0.00 | 0.02 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.68 | 74.15 | 2.00 | 0.00 | 0.02 | 0.00 | 57.77 | 75.92 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.85 | 77.35 | 2.00 | 0.00 | 0.02 | 0.00 | 57.92 | 77.38 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.97 | 77.72 | 2.00 | 0.00 | 0.02 | 0.00 | 58.02 | 78.32 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.07 | 78.39 | 2.00 | 0.00 | 0.02 | 0.00 | 58.16 | 76.74 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.23 | 73.38 | 2.00 | 0.00 | 0.01 | 0.00 | 58.31 | 70.21 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.37 | 68.30 | 2.00 | 0.00 | 0.01 | 0.00 | 58.42 | 68.33 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.50 | 69.13 | 2.00 | 0.00 | 0.01 | 0.00 | 58.57 | 70.24 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.61 | 71.64 | 2.00 | 0.00 | 0.01 | 0.00 | 58.68 | 73.20 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.76 | 74.66 | 2.00 | 0.00 | 0.00 | 0.00 | 58.80 | 75.92 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.87 | 80.07 | 2.00 | 0.00 | 0.00 | 0.00 | 58.95 | 86.88 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.01 | 94.25 | 2.00 | 0.00 | 0.00 | 0.00 | 59.06 | 100.88 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.16 | 106.78 | 2.00 | 0.00 | 0.00 | 0.00 | 59.19 | 112.75 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.29 | 114.94 | 2.00 | 0.00 | 0.00 | 0.00 | 59.33 | 112.14 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.39 | 106.98 | 0.32 | 0.00 | 0.00 | 0.00 | 59.47 | 104.21 | 0.31 | 0.00 | 0.00 | 0.00 |
| 59.54 | 104.81 | 0.31 | 0.00 | 0.00 | 0.00 | 59.58 | 106.04 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.65 | 103.54 | 2.00 | 0.00 | 0.00 | 0.00 | 59.73 | 98.28 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.81 | 93.48 | 2.00 | 0.00 | 0.00 | 0.00 | 59.85 | 90.67 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.92 | 93.15 | 2.00 | 0.00 | 0.00 | 0.00 | 59.99 | 99.18 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.08 | 82.68 | 2.00 | 0.00 | 0.00 | 0.00 | 60.13 | 58.90 | 0.16 | 0.00 | 0.00 | 0.00 |
| 60.18 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.27 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.33 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.38 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.47 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | | | |

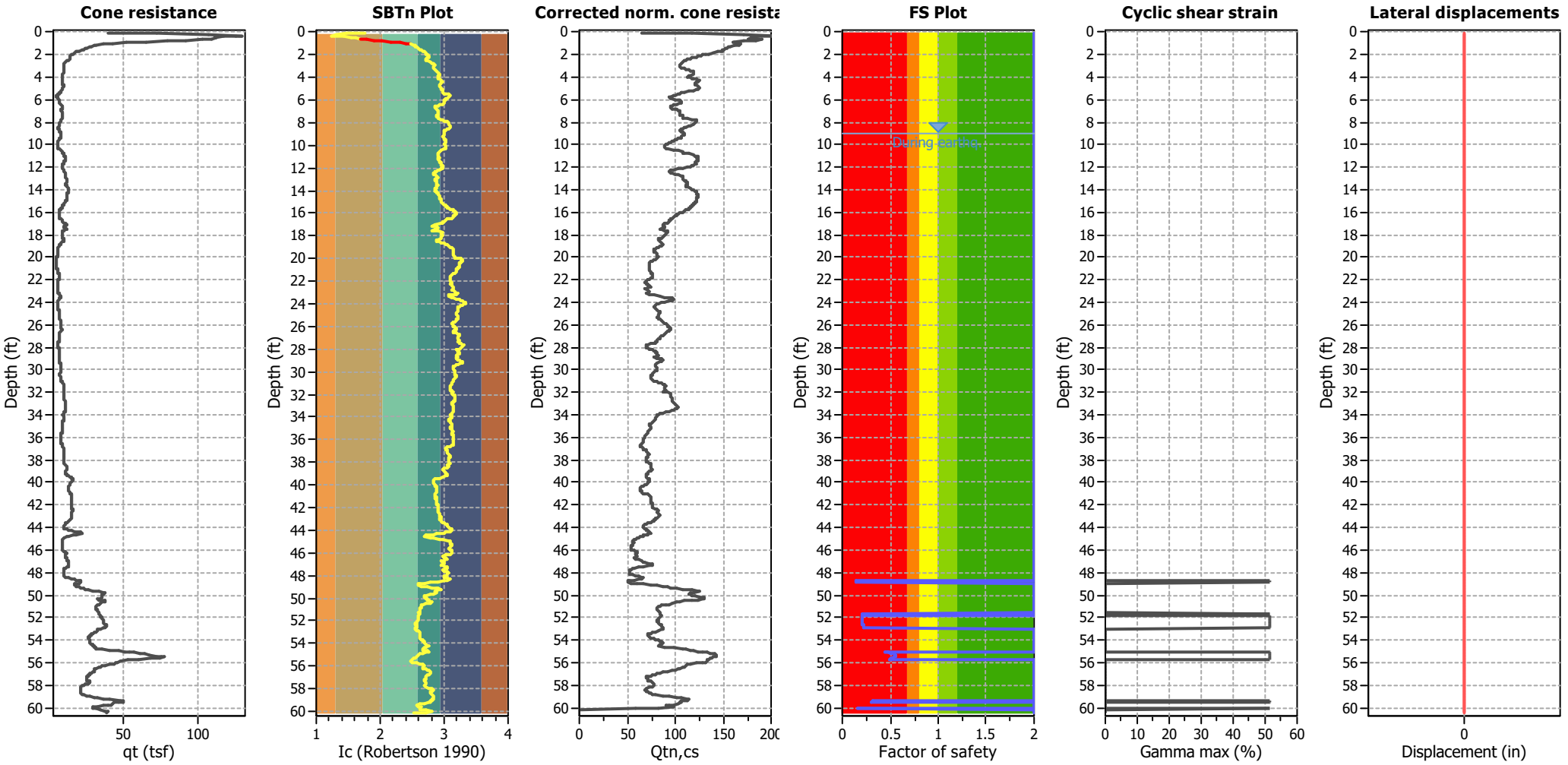
**Total estimated settlement: 0.06**

**Abbreviations**

| | |
|---|---|
| $Q_{tn,cs}$: | 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 |

# Estimation of post-earthquake lateral Displacements

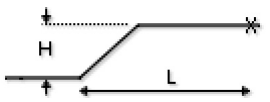
**Geometric parameters: Level ground (or gently sloping) with free face (L: 90.00 ft - H: 12.00 ft)**




**Abbreviations**

$q_t$: Total cone resistance (cone resistance $q_c$ corrected for pore water effects)
$I_c$: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
$\gamma_{max}$: Maximum cyclic shear strain
LDI: Lateral displacement index

**Surface condition**



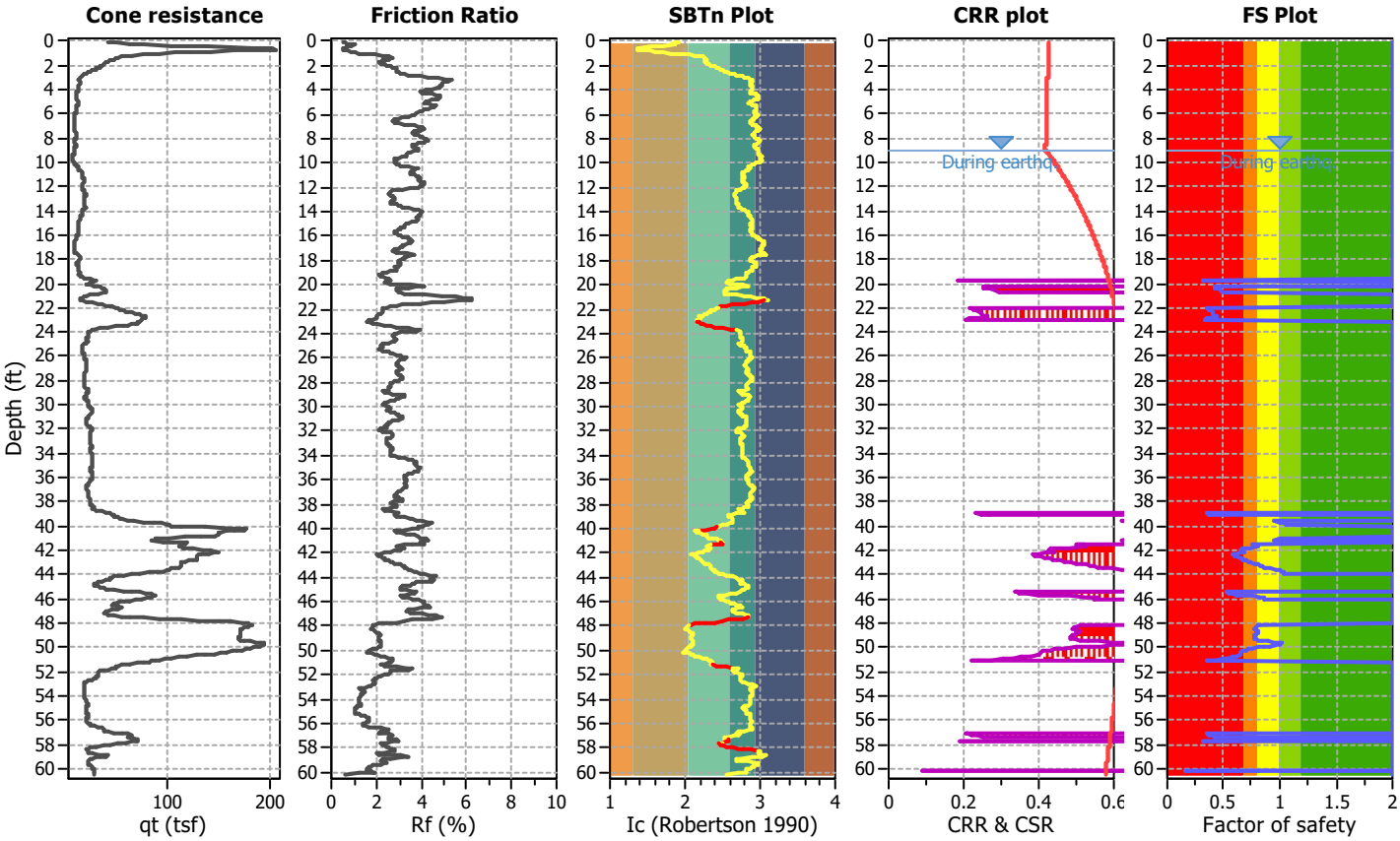
# LIQUEFACTION ANALYSIS REPORT

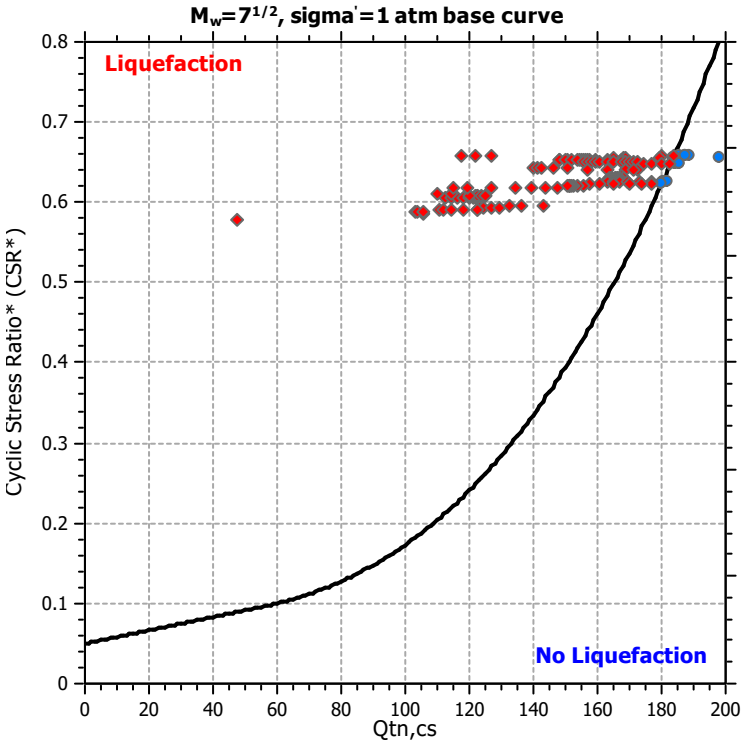
**Project title : Geocon West / 21611 Perry Street** **Location : Carson, CA**

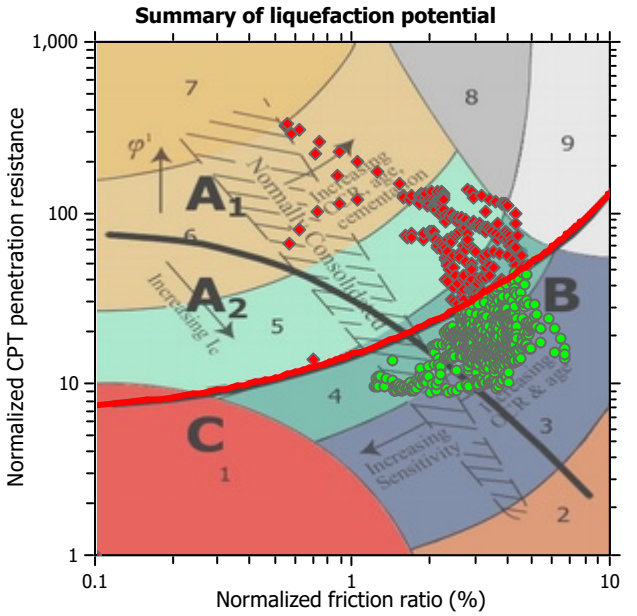
**CPT file : CPT-5**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | G.W.T. (in-situ): | 12.00 ft | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | NCEER (1998) | G.W.T. (earthq.): | 9.00 ft | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 6.87 | Ic cut-off value: | 2.60 | Trans. detect. applied: | Yes | MSF method: | Method based |
| Peak ground acceleration: | 0.82 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

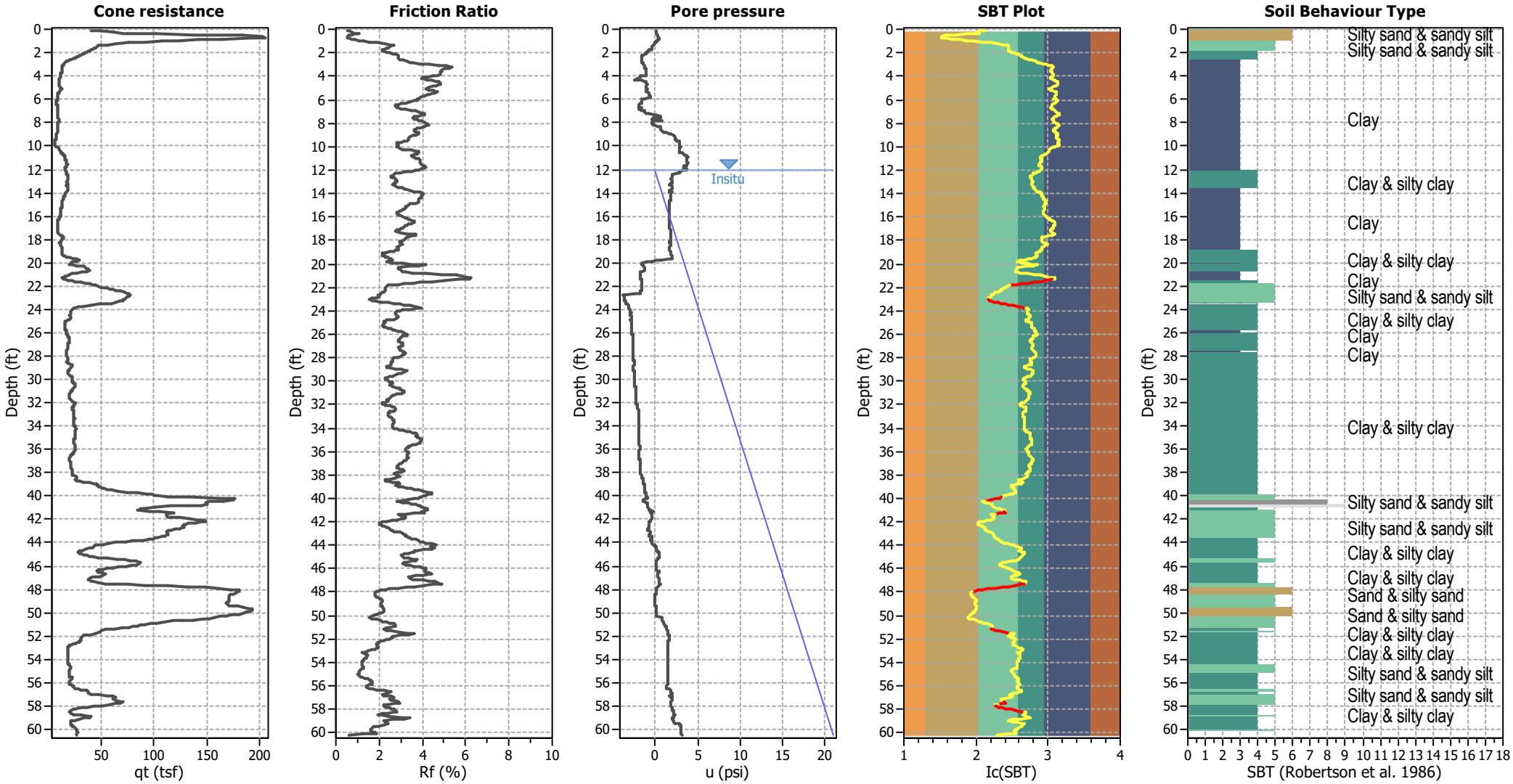



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# CPT basic interpretation plots



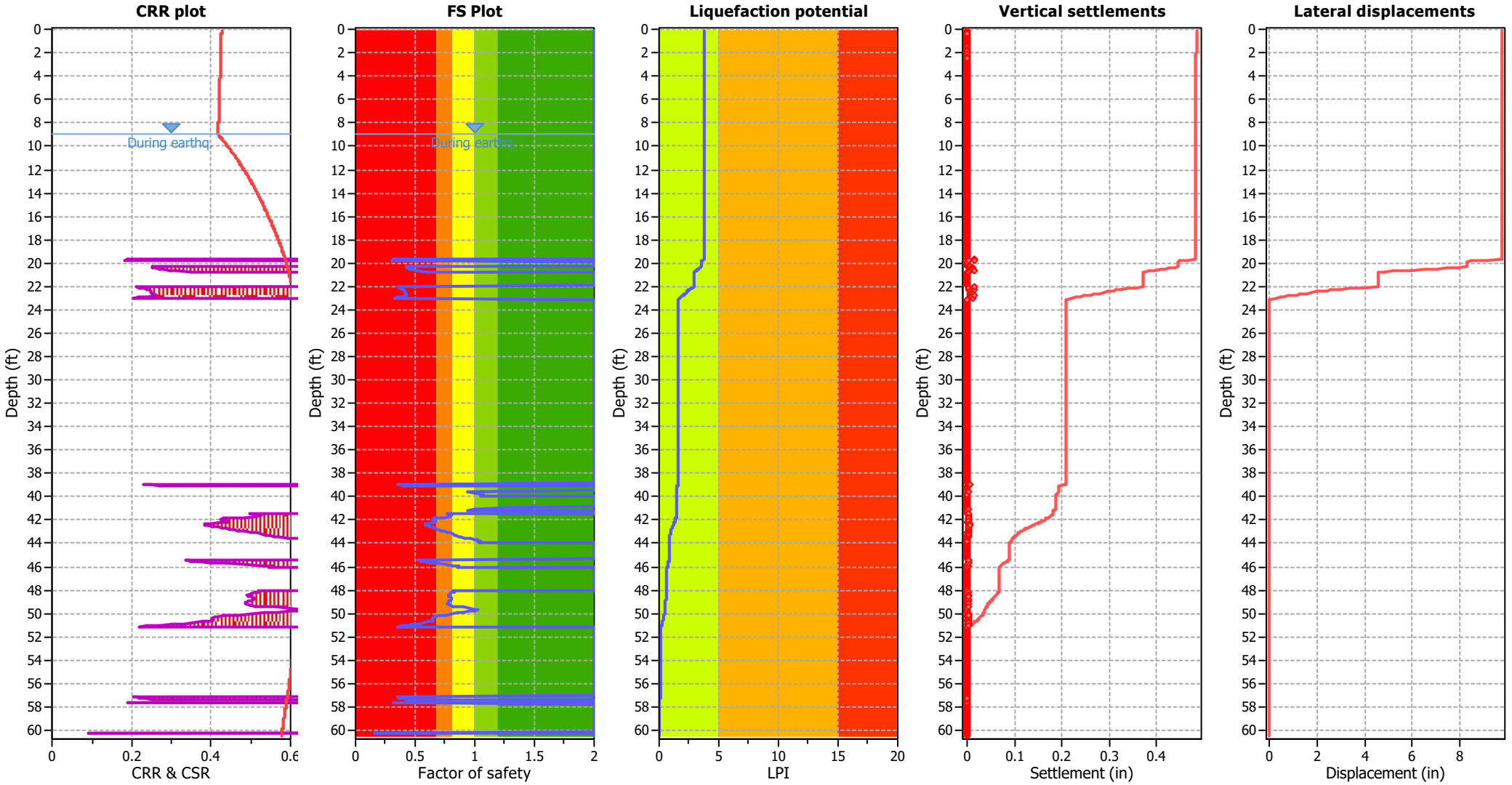

## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

**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

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | NCEER (1998) | Depth to water table (erthq.): | 9.00 ft | Fill weight: | N/A |
| Fines correction method: | NCEER (1998) | Average results interval: | 3 | Transition detect. applied: | Yes |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 6.87 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.82 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 12.00 ft | Fill height: | N/A | Limit depth: | N/A |

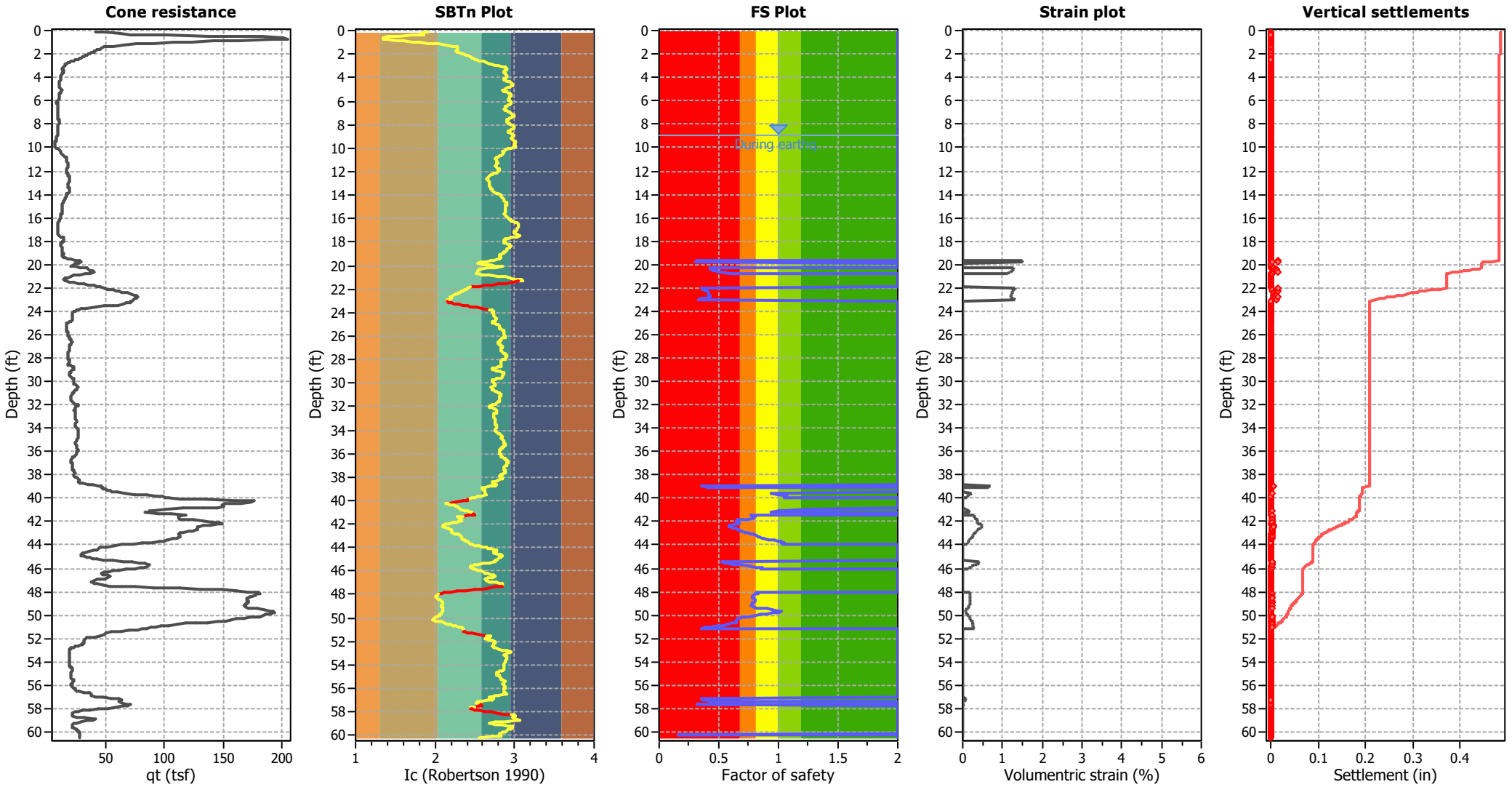
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

## Estimation of post-earthquake settlements




**Abbreviations**

| | |
|---|---|
| $q_t$: | Total cone resistance (cone resistance $q_c$ corrected for pore water effects) |
| $I_c$: | Soil Behaviour Type Index |
| FS: | Calculated Factor of Safety against liquefaction |
| Volumentric strain: | Post-liquefaction volumentric strain |

**:: Post-earthquake settlement of dry sands ::**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 1.92 | 65.55 | 1.25 | 81.92 | 17 | 417 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.15 | 1.87 | 79.78 | 1.21 | 96.85 | 19 | 475 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.23 | 1.82 | 100.87 | 1.18 | 118.84 | 23 | 569 | 0.43 | 0.001 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.30 | 1.83 | 114.61 | 1.18 | 135.77 | 27 | 653 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.34 | 1.86 | 120.84 | 1.21 | 146.09 | 29 | 714 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.39 | 1.71 | 164.88 | 1.01 | 166.01 | 31 | 805 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.50 | 1.56 | 222.48 | 1.00 | 222.48 | 40 | 894 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.53 | 1.40 | 293.84 | 1.00 | 293.84 | 50 | 975 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.60 | 1.36 | 324.18 | 1.00 | 324.18 | 54 | 1012 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.69 | 1.36 | 329.49 | 1.00 | 329.49 | 55 | 1028 | 0.43 | 0.002 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.72 | 1.41 | 307.68 | 1.00 | 307.68 | 52 | 1027 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.80 | 1.51 | 264.05 | 1.00 | 264.05 | 46 | 1005 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.87 | 1.61 | 227.48 | 1.00 | 227.48 | 41 | 982 | 0.43 | 0.003 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.92 | 1.71 | 197.32 | 1.00 | 197.82 | 37 | 961 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 0.99 | 1.80 | 172.20 | 1.16 | 199.18 | 39 | 946 | 0.43 | 0.004 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.08 | 1.91 | 146.84 | 1.25 | 183.04 | 37 | 929 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.12 | 2.04 | 121.81 | 1.35 | 163.92 | 35 | 905 | 0.43 | 0.005 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.20 | 2.14 | 103.59 | 1.49 | 154.31 | 34 | 875 | 0.43 | 0.006 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.30 | 2.23 | 89.25 | 1.69 | 150.67 | 34 | 840 | 0.43 | 0.007 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.34 | 2.27 | 80.72 | 1.82 | 147.30 | 34 | 803 | 0.43 | 0.008 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.40 | 2.28 | 77.26 | 1.84 | 141.94 | 33 | 772 | 0.43 | 0.009 | 0.00 | 9.85 | 0.00 | 0.000 |
| 1.49 | 2.28 | 74.04 | 1.84 | 136.31 | 32 | 741 | 0.43 | 0.010 | 0.01 | 9.85 | 0.00 | 0.000 |
| 1.54 | 2.28 | 71.35 | 1.84 | 131.22 | 31 | 714 | 0.43 | 0.011 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.59 | 2.28 | 69.04 | 1.84 | 126.76 | 30 | 690 | 0.43 | 0.013 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.68 | 2.27 | 67.02 | 1.83 | 122.52 | 28 | 668 | 0.43 | 0.015 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.74 | 2.27 | 65.09 | 1.82 | 118.60 | 28 | 647 | 0.43 | 0.017 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.79 | 2.28 | 63.21 | 1.85 | 116.95 | 27 | 635 | 0.42 | 0.018 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.87 | 2.30 | 61.10 | 1.92 | 117.51 | 28 | 630 | 0.42 | 0.020 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.94 | 2.33 | 58.89 | 2.03 | 119.78 | 29 | 629 | 0.42 | 0.021 | 0.01 | 9.85 | 0.01 | 0.000 |
| 1.98 | 2.35 | 56.92 | 2.15 | 122.40 | 29 | 629 | 0.42 | 0.021 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.04 | 2.39 | 54.56 | 2.30 | 125.36 | 31 | 627 | 0.42 | 0.023 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.13 | 2.41 | 52.34 | 2.45 | 128.34 | 32 | 624 | 0.42 | 0.025 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.17 | 2.44 | 50.23 | 2.60 | 130.47 | 33 | 618 | 0.42 | 0.026 | 0.01 | 9.85 | 0.01 | 0.000 |
| 2.24 | 2.45 | 48.50 | 2.68 | 129.89 | 33 | 607 | 0.42 | 0.028 | 0.02 | 9.85 | 0.01 | 0.000 |
| 2.33 | 2.47 | 46.38 | 2.77 | 128.59 | 33 | 592 | 0.42 | 0.032 | 0.02 | 9.85 | 0.01 | 0.000 |
| 2.36 | 2.48 | 44.27 | 2.84 | 125.93 | 32 | 573 | 0.42 | 0.036 | 0.02 | 9.85 | 0.02 | 0.000 |
| 2.43 | 2.50 | 41.24 | 3.01 | 124.09 | 32 | 551 | 0.42 | 0.043 | 0.02 | 9.85 | 0.02 | 0.000 |
| 2.52 | 2.52 | 38.93 | 3.12 | 121.36 | 32 | 530 | 0.42 | 0.052 | 0.03 | 9.85 | 0.02 | 0.000 |
| 2.56 | 2.56 | 35.34 | 3.44 | 121.52 | 32 | 508 | 0.42 | 0.062 | 0.04 | 9.85 | 0.03 | 0.000 |
| 2.64 | 2.60 | 32.45 | 3.76 | 121.98 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.74 | 2.65 | 29.42 | 4.22 | 124.30 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.78 | 2.68 | 27.88 | 4.52 | 126.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.83 | 2.71 | 26.73 | 4.80 | 128.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.90 | 2.75 | 25.19 | 5.29 | 133.26 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 2.98 | 2.80 | 23.70 | 5.87 | 139.09 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.03 | 2.85 | 22.55 | 6.46 | 145.76 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.10 | 2.88 | 21.68 | 6.92 | 149.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.18 | 2.90 | 21.05 | 7.23 | 152.19 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.23 | 2.91 | 20.85 | 7.30 | 152.19 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.29 | 2.89 | 21.13 | 7.12 | 150.57 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.38 | 2.88 | 21.55 | 6.89 | 148.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.42 | 2.87 | 21.84 | 6.72 | 146.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.51 | 2.87 | 21.69 | 6.73 | 145.93 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.58 | 2.87 | 21.30 | 6.82 | 145.21 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.62 | 2.88 | 20.72 | 6.93 | 143.58 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.69 | 2.89 | 20.14 | 7.05 | 142.00 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.77 | 2.90 | 19.56 | 7.18 | 140.51 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.82 | 2.91 | 19.07 | 7.31 | 139.40 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.89 | 2.91 | 18.73 | 7.29 | 136.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 3.97 | 2.90 | 18.38 | 7.20 | 132.39 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.03 | 2.88 | 18.28 | 6.97 | 127.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.10 | 2.87 | 18.36 | 6.75 | 123.92 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.15 | 2.87 | 18.17 | 6.73 | 122.27 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.24 | 2.88 | 17.73 | 6.92 | 122.71 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.29 | 2.91 | 16.91 | 7.37 | 124.67 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.35 | 2.93 | 16.48 | 7.72 | 127.18 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.44 | 2.95 | 16.19 | 8.01 | 129.68 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.48 | 2.96 | 16.14 | 8.14 | 131.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.54 | 2.97 | 16.04 | 8.24 | 132.12 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.61 | 2.97 | 15.98 | 8.26 | 132.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.69 | 2.97 | 15.93 | 8.25 | 131.45 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.74 | 2.96 | 16.07 | 8.14 | 130.88 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.82 | 2.95 | 16.40 | 7.93 | 130.13 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.86 | 2.93 | 17.07 | 7.61 | 129.78 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 4.94 | 2.89 | 18.26 | 7.07 | 129.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.02 | 2.86 | 19.35 | 6.68 | 129.38 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.09 | 2.85 | 19.98 | 6.51 | 130.12 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.13 | 2.87 | 19.44 | 6.77 | 131.65 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.23 | 2.90 | 18.42 | 7.20 | 132.72 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.28 | 2.93 | 17.41 | 7.63 | 132.80 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.33 | 2.95 | 16.69 | 7.89 | 131.67 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.39 | 2.95 | 16.21 | 7.96 | 128.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.48 | 2.95 | 15.77 | 8.01 | 126.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.52 | 2.95 | 15.48 | 7.95 | 123.10 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.58 | 2.95 | 15.33 | 7.91 | 121.21 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.67 | 2.94 | 15.27 | 7.82 | 119.35 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.73 | 2.94 | 15.27 | 7.75 | 118.26 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.78 | 2.93 | 15.36 | 7.58 | 116.41 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.88 | 2.92 | 15.25 | 7.51 | 114.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.92 | 2.92 | 14.91 | 7.56 | 112.73 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 5.97 | 2.94 | 14.08 | 7.85 | 110.58 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.08 | 2.96 | 13.31 | 8.16 | 108.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.11 | 2.96 | 12.89 | 8.19 | 105.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.18 | 2.95 | 12.84 | 8.01 | 102.88 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.26 | 2.93 | 12.98 | 7.67 | 99.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.33 | 2.92 | 12.99 | 7.43 | 96.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.38 | 2.90 | 13.13 | 7.18 | 94.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.44 | 2.89 | 13.22 | 7.04 | 93.06 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.50 | 2.88 | 13.41 | 6.95 | 93.17 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.57 | 2.88 | 13.59 | 6.93 | 94.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.67 | 2.88 | 13.88 | 6.87 | 95.39 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.72 | 2.87 | 14.11 | 6.84 | 96.59 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.76 | 2.88 | 14.21 | 6.97 | 99.02 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.83 | 2.90 | 14.15 | 7.26 | 102.74 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.92 | 2.93 | 14.05 | 7.58 | 106.54 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 6.97 | 2.94 | 13.96 | 7.86 | 109.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.04 | 2.96 | 13.81 | 8.11 | 111.99 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.12 | 2.98 | 13.56 | 8.41 | 114.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.16 | 2.99 | 13.32 | 8.62 | 114.83 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.25 | 2.99 | 13.27 | 8.62 | 114.36 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.32 | 2.98 | 13.42 | 8.44 | 113.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.37 | 2.96 | 13.81 | 8.08 | 111.60 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.43 | 2.94 | 14.24 | 7.73 | 110.14 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.52 | 2.92 | 14.62 | 7.50 | 109.55 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.56 | 2.91 | 14.99 | 7.37 | 110.50 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.63 | 2.91 | 15.35 | 7.34 | 112.71 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.71 | 2.91 | 15.73 | 7.30 | 114.85 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.75 | 2.91 | 15.95 | 7.36 | 117.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.83 | 2.92 | 16.04 | 7.44 | 119.31 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.88 | 2.93 | 15.89 | 7.60 | 120.80 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 7.97 | 2.94 | 15.61 | 7.75 | 121.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.01 | 2.95 | 15.03 | 8.02 | 120.63 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.08 | 2.97 | 14.41 | 8.33 | 120.01 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.18 | 2.99 | 13.78 | 8.64 | 119.03 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.22 | 3.00 | 13.44 | 8.72 | 117.20 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.28 | 2.99 | 13.49 | 8.55 | 115.34 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.35 | 2.97 | 13.78 | 8.22 | 113.27 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.43 | 2.95 | 14.11 | 7.95 | 112.23 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.48 | 2.93 | 14.49 | 7.67 | 111.15 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.55 | 2.92 | 14.67 | 7.55 | 110.79 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.63 | 2.92 | 14.71 | 7.52 | 110.66 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.68 | 2.93 | 14.38 | 7.71 | 110.83 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.76 | 2.95 | 13.94 | 7.96 | 111.00 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.80 | 2.97 | 13.46 | 8.26 | 111.17 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.88 | 2.98 | 13.12 | 8.45 | 110.94 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.94 | 2.99 | 12.88 | 8.56 | 110.25 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |
| 8.99 | 2.98 | 12.79 | 8.44 | 107.90 | 0 | 0 | 0.42 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 |

**:: Post-earthquake settlement of dry sands :: (continued)**

| Depth (ft) | Ic | $Q_{tn}$ | Kc | $Q_{tn,cs}$ | $N_{1,60}$ (blows) | $G_{max}$ (tsf) | CSR | Shear, γ (%) | $e_{vol(15)}$ (%) | $N_c$ | $e_v$ (%) | Settle. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Total estimated settlement: 0.00**

**Abbreviations**

$Q_{tn}$: Equivalent clean sand normalized cone resistance
$K_c$: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
$G_{max}$: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
$N_c$: Equivalent number of cycles
$e_v$: Volumetric strain
Settle.: Calculated settlement

**:: Post-earthquake settlement due to soil liquefaction ::**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.07 | 105.49 | 2.00 | 0.00 | 0.85 | 0.00 | 9.14 | 103.04 | 2.00 | 0.00 | 0.85 | 0.00 |
| 9.22 | 101.97 | 2.00 | 0.00 | 0.84 | 0.00 | 9.27 | 100.73 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.37 | 99.63 | 2.00 | 0.00 | 0.84 | 0.00 | 9.42 | 98.24 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.47 | 96.96 | 2.00 | 0.00 | 0.84 | 0.00 | 9.52 | 94.72 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.62 | 92.20 | 2.00 | 0.00 | 0.84 | 0.00 | 9.67 | 89.68 | 2.00 | 0.00 | 0.84 | 0.00 |
| 9.73 | 88.54 | 2.00 | 0.00 | 0.84 | 0.00 | 9.82 | 88.41 | 2.00 | 0.00 | 0.83 | 0.00 |
| 9.86 | 88.11 | 2.00 | 0.00 | 0.83 | 0.00 | 9.92 | 89.69 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.02 | 92.05 | 2.00 | 0.00 | 0.83 | 0.00 | 10.06 | 95.40 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.12 | 99.27 | 2.00 | 0.00 | 0.83 | 0.00 | 10.21 | 103.17 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.25 | 108.28 | 2.00 | 0.00 | 0.83 | 0.00 | 10.31 | 113.67 | 2.00 | 0.00 | 0.83 | 0.00 |
| 10.41 | 118.44 | 2.00 | 0.00 | 0.82 | 0.00 | 10.45 | 122.03 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.52 | 123.00 | 2.00 | 0.00 | 0.82 | 0.00 | 10.61 | 122.86 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.64 | 122.08 | 2.00 | 0.00 | 0.82 | 0.00 | 10.71 | 122.19 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.81 | 122.75 | 2.00 | 0.00 | 0.82 | 0.00 | 10.85 | 124.58 | 2.00 | 0.00 | 0.82 | 0.00 |
| 10.91 | 126.48 | 2.00 | 0.00 | 0.82 | 0.00 | 10.96 | 128.91 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.03 | 130.97 | 2.00 | 0.00 | 0.81 | 0.00 | 11.10 | 132.61 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.20 | 133.18 | 2.00 | 0.00 | 0.81 | 0.00 | 11.24 | 133.33 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.30 | 133.53 | 2.00 | 0.00 | 0.81 | 0.00 | 11.36 | 134.23 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.43 | 135.02 | 2.00 | 0.00 | 0.81 | 0.00 | 11.50 | 135.99 | 2.00 | 0.00 | 0.81 | 0.00 |
| 11.58 | 137.24 | 2.00 | 0.00 | 0.80 | 0.00 | 11.63 | 138.56 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.70 | 138.82 | 2.00 | 0.00 | 0.80 | 0.00 | 11.79 | 137.16 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.84 | 134.71 | 2.00 | 0.00 | 0.80 | 0.00 | 11.90 | 132.31 | 2.00 | 0.00 | 0.80 | 0.00 |
| 11.98 | 129.74 | 2.00 | 0.00 | 0.80 | 0.00 | 12.02 | 126.01 | 2.00 | 0.00 | 0.80 | 0.00 |
| 12.09 | 121.52 | 2.00 | 0.00 | 0.80 | 0.00 | 12.14 | 115.95 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.21 | 111.27 | 2.00 | 0.00 | 0.79 | 0.00 | 12.29 | 107.00 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.34 | 104.91 | 2.00 | 0.00 | 0.79 | 0.00 | 12.44 | 103.74 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.49 | 102.92 | 2.00 | 0.00 | 0.79 | 0.00 | 12.57 | 103.44 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.64 | 104.70 | 2.00 | 0.00 | 0.79 | 0.00 | 12.68 | 106.44 | 2.00 | 0.00 | 0.79 | 0.00 |
| 12.73 | 107.69 | 2.00 | 0.00 | 0.78 | 0.00 | 12.84 | 108.75 | 2.00 | 0.00 | 0.78 | 0.00 |
| 12.88 | 108.99 | 2.00 | 0.00 | 0.78 | 0.00 | 12.98 | 108.62 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.00 | 107.38 | 2.00 | 0.00 | 0.78 | 0.00 | 13.08 | 106.22 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.14 | 105.00 | 2.00 | 0.00 | 0.78 | 0.00 | 13.23 | 104.59 | 2.00 | 0.00 | 0.78 | 0.00 |
| 13.27 | 104.88 | 2.00 | 0.00 | 0.78 | 0.00 | 13.34 | 107.22 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.43 | 109.92 | 2.00 | 0.00 | 0.77 | 0.00 | 13.46 | 113.31 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.54 | 115.49 | 2.00 | 0.00 | 0.77 | 0.00 | 13.63 | 117.68 | 2.00 | 0.00 | 0.77 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.67 | 119.63 | 2.00 | 0.00 | 0.77 | 0.00 | 13.71 | 122.93 | 2.00 | 0.00 | 0.77 | 0.00 |
| 13.83 | 127.00 | 2.00 | 0.00 | 0.77 | 0.00 | 13.88 | 130.91 | 2.00 | 0.00 | 0.76 | 0.00 |
| 13.94 | 132.86 | 2.00 | 0.00 | 0.76 | 0.00 | 13.98 | 132.62 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.06 | 131.22 | 2.00 | 0.00 | 0.76 | 0.00 | 14.14 | 129.24 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.18 | 128.01 | 2.00 | 0.00 | 0.76 | 0.00 | 14.26 | 127.23 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.33 | 126.32 | 2.00 | 0.00 | 0.76 | 0.00 | 14.37 | 124.49 | 2.00 | 0.00 | 0.76 | 0.00 |
| 14.45 | 122.94 | 2.00 | 0.00 | 0.76 | 0.00 | 14.54 | 121.40 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.61 | 120.61 | 2.00 | 0.00 | 0.75 | 0.00 | 14.65 | 119.75 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.74 | 118.40 | 2.00 | 0.00 | 0.75 | 0.00 | 14.80 | 116.40 | 2.00 | 0.00 | 0.75 | 0.00 |
| 14.85 | 113.76 | 2.00 | 0.00 | 0.75 | 0.00 | 14.90 | 111.27 | 2.00 | 0.00 | 0.75 | 0.00 |
| 15.00 | 109.29 | 2.00 | 0.00 | 0.75 | 0.00 | 15.05 | 108.02 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.10 | 107.52 | 2.00 | 0.00 | 0.74 | 0.00 | 15.17 | 106.81 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.25 | 106.05 | 2.00 | 0.00 | 0.74 | 0.00 | 15.30 | 104.91 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.36 | 103.58 | 2.00 | 0.00 | 0.74 | 0.00 | 15.45 | 101.95 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.49 | 100.36 | 2.00 | 0.00 | 0.74 | 0.00 | 15.56 | 99.09 | 2.00 | 0.00 | 0.74 | 0.00 |
| 15.64 | 97.83 | 2.00 | 0.00 | 0.73 | 0.00 | 15.69 | 97.14 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.77 | 97.08 | 2.00 | 0.00 | 0.73 | 0.00 | 15.85 | 97.89 | 2.00 | 0.00 | 0.73 | 0.00 |
| 15.89 | 99.04 | 2.00 | 0.00 | 0.73 | 0.00 | 15.99 | 100.37 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.05 | 101.86 | 2.00 | 0.00 | 0.73 | 0.00 | 16.09 | 102.61 | 2.00 | 0.00 | 0.73 | 0.00 |
| 16.16 | 104.20 | 2.00 | 0.00 | 0.73 | 0.00 | 16.23 | 104.27 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.30 | 104.52 | 2.00 | 0.00 | 0.72 | 0.00 | 16.34 | 104.14 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.44 | 103.21 | 2.00 | 0.00 | 0.72 | 0.00 | 16.48 | 101.81 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.54 | 100.01 | 2.00 | 0.00 | 0.72 | 0.00 | 16.63 | 97.93 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.68 | 96.09 | 2.00 | 0.00 | 0.72 | 0.00 | 16.74 | 94.88 | 2.00 | 0.00 | 0.72 | 0.00 |
| 16.82 | 94.37 | 2.00 | 0.00 | 0.71 | 0.00 | 16.89 | 93.93 | 2.00 | 0.00 | 0.71 | 0.00 |
| 16.94 | 93.04 | 2.00 | 0.00 | 0.71 | 0.00 | 17.03 | 91.80 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.07 | 90.46 | 2.00 | 0.00 | 0.71 | 0.00 | 17.13 | 89.37 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.21 | 88.88 | 2.00 | 0.00 | 0.71 | 0.00 | 17.26 | 88.41 | 2.00 | 0.00 | 0.71 | 0.00 |
| 17.33 | 90.95 | 2.00 | 0.00 | 0.71 | 0.00 | 17.41 | 95.53 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.48 | 102.07 | 2.00 | 0.00 | 0.70 | 0.00 | 17.53 | 106.65 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.61 | 108.80 | 2.00 | 0.00 | 0.70 | 0.00 | 17.67 | 108.02 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.72 | 108.39 | 2.00 | 0.00 | 0.70 | 0.00 | 17.82 | 108.33 | 2.00 | 0.00 | 0.70 | 0.00 |
| 17.88 | 108.12 | 2.00 | 0.00 | 0.70 | 0.00 | 17.92 | 105.50 | 2.00 | 0.00 | 0.70 | 0.00 |
| 18.02 | 102.65 | 2.00 | 0.00 | 0.69 | 0.00 | 18.07 | 100.11 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.14 | 99.16 | 2.00 | 0.00 | 0.69 | 0.00 | 18.20 | 98.68 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.27 | 97.86 | 2.00 | 0.00 | 0.69 | 0.00 | 18.32 | 98.95 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.38 | 97.55 | 2.00 | 0.00 | 0.69 | 0.00 | 18.47 | 97.34 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.51 | 96.56 | 2.00 | 0.00 | 0.69 | 0.00 | 18.57 | 97.38 | 2.00 | 0.00 | 0.69 | 0.00 |
| 18.67 | 98.61 | 2.00 | 0.00 | 0.68 | 0.00 | 18.71 | 98.96 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.81 | 98.26 | 2.00 | 0.00 | 0.68 | 0.00 | 18.86 | 96.48 | 2.00 | 0.00 | 0.68 | 0.00 |
| 18.91 | 94.56 | 2.00 | 0.00 | 0.68 | 0.00 | 18.97 | 91.39 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.06 | 88.18 | 2.00 | 0.00 | 0.68 | 0.00 | 19.11 | 85.07 | 2.00 | 0.00 | 0.68 | 0.00 |
| 19.21 | 84.21 | 2.00 | 0.00 | 0.67 | 0.00 | 19.27 | 84.54 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.31 | 86.93 | 2.00 | 0.00 | 0.67 | 0.00 | 19.41 | 88.98 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.46 | 93.00 | 2.00 | 0.00 | 0.67 | 0.00 | 19.51 | 97.16 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.56 | 102.57 | 2.00 | 0.00 | 0.67 | 0.00 | 19.63 | 106.00 | 2.00 | 0.00 | 0.67 | 0.00 |
| 19.71 | 105.39 | 0.32 | 1.49 | 0.67 | 0.02 | 19.80 | 103.36 | 0.31 | 1.51 | 0.66 | 0.02 |
| 19.82 | 103.78 | 0.31 | 1.51 | 0.66 | 0.00 | 19.91 | 108.71 | 2.00 | 0.00 | 0.66 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.95 | 117.22 | 2.00 | 0.00 | 0.66 | 0.00 | 20.02 | 125.24 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.11 | 135.25 | 2.00 | 0.00 | 0.66 | 0.00 | 20.15 | 133.93 | 2.00 | 0.00 | 0.66 | 0.00 |
| 20.24 | 129.76 | 2.00 | 0.00 | 0.66 | 0.00 | 20.29 | 122.56 | 0.42 | 1.30 | 0.66 | 0.01 |
| 20.36 | 122.88 | 0.43 | 1.29 | 0.65 | 0.01 | 20.41 | 124.45 | 0.44 | 1.28 | 0.65 | 0.01 |
| 20.48 | 126.74 | 0.45 | 1.26 | 0.65 | 0.01 | 20.56 | 129.59 | 0.48 | 1.23 | 0.65 | 0.01 |
| 20.66 | 132.43 | 0.50 | 1.21 | 0.65 | 0.01 | 20.71 | 136.04 | 0.53 | 1.18 | 0.65 | 0.01 |
| 20.74 | 143.17 | 0.59 | 1.13 | 0.65 | 0.00 | 20.82 | 153.36 | 2.00 | 0.00 | 0.65 | 0.00 |
| 20.91 | 163.25 | 2.00 | 0.00 | 0.65 | 0.00 | 20.95 | 167.43 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.03 | 164.92 | 2.00 | 0.00 | 0.64 | 0.00 | 21.11 | 161.43 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.15 | 155.73 | 2.00 | 0.00 | 0.64 | 0.00 | 21.22 | 151.53 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.26 | 148.19 | 2.00 | 0.00 | 0.64 | 0.00 | 21.34 | 145.23 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.41 | 142.03 | 2.00 | 0.00 | 0.64 | 0.00 | 21.48 | 137.36 | 2.00 | 0.00 | 0.64 | 0.00 |
| 21.52 | 133.91 | 2.00 | 0.00 | 0.64 | 0.00 | 21.61 | 131.31 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.66 | 126.69 | 2.00 | 0.00 | 0.63 | 0.00 | 21.76 | 121.94 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.81 | 117.22 | 2.00 | 0.00 | 0.63 | 0.00 | 21.85 | 113.70 | 2.00 | 0.00 | 0.63 | 0.00 |
| 21.92 | 112.34 | 2.00 | 0.00 | 0.63 | 0.00 | 22.01 | 112.78 | 0.35 | 1.33 | 0.63 | 0.01 |
| 22.09 | 114.24 | 0.36 | 1.31 | 0.63 | 0.01 | 22.12 | 115.95 | 0.37 | 1.29 | 0.63 | 0.00 |
| 22.20 | 117.91 | 0.38 | 1.27 | 0.62 | 0.01 | 22.29 | 119.72 | 0.40 | 1.25 | 0.62 | 0.01 |
| 22.31 | 121.36 | 0.41 | 1.24 | 0.62 | 0.00 | 22.40 | 121.92 | 0.41 | 1.23 | 0.62 | 0.01 |
| 22.45 | 122.24 | 0.41 | 1.23 | 0.62 | 0.01 | 22.51 | 122.11 | 0.41 | 1.23 | 0.62 | 0.01 |
| 22.60 | 122.44 | 0.41 | 1.22 | 0.62 | 0.01 | 22.64 | 123.77 | 0.42 | 1.21 | 0.62 | 0.01 |
| 22.75 | 125.30 | 0.43 | 1.19 | 0.61 | 0.02 | 22.80 | 125.15 | 0.43 | 1.19 | 0.61 | 0.01 |
| 22.85 | 119.88 | 0.39 | 1.23 | 0.61 | 0.01 | 22.91 | 114.07 | 0.36 | 1.28 | 0.61 | 0.01 |
| 22.99 | 109.78 | 0.33 | 1.32 | 0.61 | 0.01 | 23.08 | 109.70 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.10 | 110.41 | 2.00 | 0.00 | 0.61 | 0.00 | 23.18 | 114.71 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.26 | 120.54 | 2.00 | 0.00 | 0.61 | 0.00 | 23.30 | 128.94 | 2.00 | 0.00 | 0.61 | 0.00 |
| 23.37 | 134.92 | 2.00 | 0.00 | 0.60 | 0.00 | 23.46 | 140.61 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.51 | 144.23 | 2.00 | 0.00 | 0.60 | 0.00 | 23.56 | 147.76 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.63 | 149.13 | 2.00 | 0.00 | 0.60 | 0.00 | 23.71 | 146.50 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.79 | 136.95 | 2.00 | 0.00 | 0.60 | 0.00 | 23.87 | 126.62 | 2.00 | 0.00 | 0.60 | 0.00 |
| 23.91 | 116.58 | 2.00 | 0.00 | 0.59 | 0.00 | 23.96 | 111.35 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.02 | 107.59 | 2.00 | 0.00 | 0.59 | 0.00 | 24.11 | 105.44 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.20 | 104.79 | 2.00 | 0.00 | 0.59 | 0.00 | 24.22 | 104.73 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.31 | 105.41 | 2.00 | 0.00 | 0.59 | 0.00 | 24.39 | 105.65 | 2.00 | 0.00 | 0.59 | 0.00 |
| 24.42 | 106.31 | 2.00 | 0.00 | 0.59 | 0.00 | 24.51 | 106.31 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.55 | 106.48 | 2.00 | 0.00 | 0.58 | 0.00 | 24.63 | 105.28 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.71 | 103.23 | 2.00 | 0.00 | 0.58 | 0.00 | 24.75 | 99.21 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.81 | 95.35 | 2.00 | 0.00 | 0.58 | 0.00 | 24.90 | 92.34 | 2.00 | 0.00 | 0.58 | 0.00 |
| 24.94 | 90.33 | 2.00 | 0.00 | 0.58 | 0.00 | 25.00 | 89.64 | 2.00 | 0.00 | 0.58 | 0.00 |
| 25.07 | 88.38 | 2.00 | 0.00 | 0.58 | 0.00 | 25.15 | 87.14 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.20 | 86.01 | 2.00 | 0.00 | 0.57 | 0.00 | 25.28 | 85.50 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.35 | 86.50 | 2.00 | 0.00 | 0.57 | 0.00 | 25.40 | 88.25 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.48 | 91.11 | 2.00 | 0.00 | 0.57 | 0.00 | 25.55 | 93.38 | 2.00 | 0.00 | 0.57 | 0.00 |
| 25.60 | 94.75 | 2.00 | 0.00 | 0.57 | 0.00 | 25.67 | 96.90 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.75 | 100.52 | 2.00 | 0.00 | 0.56 | 0.00 | 25.79 | 104.61 | 2.00 | 0.00 | 0.56 | 0.00 |
| 25.90 | 107.18 | 2.00 | 0.00 | 0.56 | 0.00 | 25.95 | 108.53 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.01 | 109.55 | 2.00 | 0.00 | 0.56 | 0.00 | 26.09 | 109.42 | 2.00 | 0.00 | 0.56 | 0.00 |
| 26.13 | 108.57 | 2.00 | 0.00 | 0.56 | 0.00 | 26.19 | 107.31 | 2.00 | 0.00 | 0.56 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26.27 | 106.73 | 2.00 | 0.00 | 0.55 | 0.00 | 26.34 | 106.13 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.39 | 105.70 | 2.00 | 0.00 | 0.55 | 0.00 | 26.47 | 105.55 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.54 | 106.11 | 2.00 | 0.00 | 0.55 | 0.00 | 26.58 | 106.72 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.66 | 107.66 | 2.00 | 0.00 | 0.55 | 0.00 | 26.73 | 108.39 | 2.00 | 0.00 | 0.55 | 0.00 |
| 26.78 | 109.11 | 2.00 | 0.00 | 0.55 | 0.00 | 26.85 | 109.18 | 2.00 | 0.00 | 0.54 | 0.00 |
| 26.93 | 108.76 | 2.00 | 0.00 | 0.54 | 0.00 | 26.98 | 107.66 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.03 | 106.07 | 2.00 | 0.00 | 0.54 | 0.00 | 27.13 | 104.52 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.17 | 104.10 | 2.00 | 0.00 | 0.54 | 0.00 | 27.24 | 104.50 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.33 | 105.18 | 2.00 | 0.00 | 0.54 | 0.00 | 27.36 | 105.80 | 2.00 | 0.00 | 0.54 | 0.00 |
| 27.43 | 106.12 | 2.00 | 0.00 | 0.54 | 0.00 | 27.52 | 106.48 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.60 | 106.49 | 2.00 | 0.00 | 0.53 | 0.00 | 27.63 | 106.26 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.72 | 105.65 | 2.00 | 0.00 | 0.53 | 0.00 | 27.77 | 104.32 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.84 | 102.53 | 2.00 | 0.00 | 0.53 | 0.00 | 27.93 | 100.42 | 2.00 | 0.00 | 0.53 | 0.00 |
| 27.97 | 98.84 | 2.00 | 0.00 | 0.53 | 0.00 | 28.02 | 97.74 | 2.00 | 0.00 | 0.53 | 0.00 |
| 28.12 | 97.09 | 2.00 | 0.00 | 0.52 | 0.00 | 28.17 | 96.67 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.22 | 96.64 | 2.00 | 0.00 | 0.52 | 0.00 | 28.32 | 96.64 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.36 | 95.80 | 2.00 | 0.00 | 0.52 | 0.00 | 28.42 | 94.87 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.48 | 94.99 | 2.00 | 0.00 | 0.52 | 0.00 | 28.57 | 95.60 | 2.00 | 0.00 | 0.52 | 0.00 |
| 28.62 | 96.11 | 2.00 | 0.00 | 0.51 | 0.00 | 28.72 | 95.03 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.75 | 94.35 | 2.00 | 0.00 | 0.51 | 0.00 | 28.82 | 95.94 | 2.00 | 0.00 | 0.51 | 0.00 |
| 28.87 | 99.01 | 2.00 | 0.00 | 0.51 | 0.00 | 28.95 | 103.82 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.02 | 107.78 | 2.00 | 0.00 | 0.51 | 0.00 | 29.07 | 110.42 | 2.00 | 0.00 | 0.51 | 0.00 |
| 29.16 | 110.54 | 2.00 | 0.00 | 0.51 | 0.00 | 29.21 | 108.01 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.29 | 105.06 | 2.00 | 0.00 | 0.50 | 0.00 | 29.36 | 102.71 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.40 | 101.59 | 2.00 | 0.00 | 0.50 | 0.00 | 29.47 | 100.03 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.55 | 98.00 | 2.00 | 0.00 | 0.50 | 0.00 | 29.60 | 95.31 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.71 | 93.88 | 2.00 | 0.00 | 0.50 | 0.00 | 29.75 | 93.16 | 2.00 | 0.00 | 0.50 | 0.00 |
| 29.79 | 93.68 | 2.00 | 0.00 | 0.50 | 0.00 | 29.86 | 94.98 | 2.00 | 0.00 | 0.49 | 0.00 |
| 29.95 | 96.77 | 2.00 | 0.00 | 0.49 | 0.00 | 30.04 | 98.45 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.06 | 99.94 | 2.00 | 0.00 | 0.49 | 0.00 | 30.15 | 100.92 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.20 | 101.06 | 2.00 | 0.00 | 0.49 | 0.00 | 30.28 | 100.42 | 2.00 | 0.00 | 0.49 | 0.00 |
| 30.34 | 100.04 | 2.00 | 0.00 | 0.49 | 0.00 | 30.39 | 101.24 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.45 | 104.51 | 2.00 | 0.00 | 0.48 | 0.00 | 30.54 | 108.00 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.59 | 110.42 | 2.00 | 0.00 | 0.48 | 0.00 | 30.67 | 111.10 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.74 | 111.26 | 2.00 | 0.00 | 0.48 | 0.00 | 30.79 | 112.21 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.86 | 112.43 | 2.00 | 0.00 | 0.48 | 0.00 | 30.95 | 111.90 | 2.00 | 0.00 | 0.48 | 0.00 |
| 30.99 | 110.66 | 2.00 | 0.00 | 0.47 | 0.00 | 31.05 | 107.16 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.14 | 103.56 | 2.00 | 0.00 | 0.47 | 0.00 | 31.19 | 99.53 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.26 | 97.93 | 2.00 | 0.00 | 0.47 | 0.00 | 31.34 | 96.22 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.39 | 95.26 | 2.00 | 0.00 | 0.47 | 0.00 | 31.45 | 94.21 | 2.00 | 0.00 | 0.47 | 0.00 |
| 31.54 | 93.56 | 2.00 | 0.00 | 0.47 | 0.00 | 31.57 | 92.77 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.63 | 93.91 | 2.00 | 0.00 | 0.46 | 0.00 | 31.73 | 94.19 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.77 | 92.42 | 2.00 | 0.00 | 0.46 | 0.00 | 31.84 | 90.46 | 2.00 | 0.00 | 0.46 | 0.00 |
| 31.93 | 90.68 | 2.00 | 0.00 | 0.46 | 0.00 | 31.98 | 93.75 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.05 | 96.26 | 2.00 | 0.00 | 0.46 | 0.00 | 32.09 | 99.63 | 2.00 | 0.00 | 0.46 | 0.00 |
| 32.17 | 102.07 | 2.00 | 0.00 | 0.45 | 0.00 | 32.22 | 103.52 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.32 | 103.27 | 2.00 | 0.00 | 0.45 | 0.00 | 32.35 | 103.02 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.43 | 102.87 | 2.00 | 0.00 | 0.45 | 0.00 | 32.52 | 101.64 | 2.00 | 0.00 | 0.45 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.57 | 100.07 | 2.00 | 0.00 | 0.45 | 0.00 | 32.62 | 98.38 | 2.00 | 0.00 | 0.45 | 0.00 |
| 32.71 | 97.57 | 2.00 | 0.00 | 0.45 | 0.00 | 32.76 | 97.12 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.81 | 96.88 | 2.00 | 0.00 | 0.44 | 0.00 | 32.90 | 96.57 | 2.00 | 0.00 | 0.44 | 0.00 |
| 32.96 | 96.55 | 2.00 | 0.00 | 0.44 | 0.00 | 33.02 | 97.60 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.11 | 98.88 | 2.00 | 0.00 | 0.44 | 0.00 | 33.17 | 100.27 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.22 | 101.21 | 2.00 | 0.00 | 0.44 | 0.00 | 33.31 | 102.13 | 2.00 | 0.00 | 0.44 | 0.00 |
| 33.34 | 103.07 | 2.00 | 0.00 | 0.43 | 0.00 | 33.41 | 103.42 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.49 | 103.30 | 2.00 | 0.00 | 0.43 | 0.00 | 33.57 | 102.58 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.61 | 101.67 | 2.00 | 0.00 | 0.43 | 0.00 | 33.68 | 101.32 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.76 | 101.27 | 2.00 | 0.00 | 0.43 | 0.00 | 33.81 | 101.26 | 2.00 | 0.00 | 0.43 | 0.00 |
| 33.88 | 101.12 | 2.00 | 0.00 | 0.43 | 0.00 | 33.95 | 101.56 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.01 | 103.38 | 2.00 | 0.00 | 0.42 | 0.00 | 34.06 | 106.24 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.13 | 110.04 | 2.00 | 0.00 | 0.42 | 0.00 | 34.21 | 113.58 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.25 | 116.87 | 2.00 | 0.00 | 0.42 | 0.00 | 34.35 | 119.37 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.40 | 122.57 | 2.00 | 0.00 | 0.42 | 0.00 | 34.49 | 124.73 | 2.00 | 0.00 | 0.42 | 0.00 |
| 34.53 | 126.12 | 2.00 | 0.00 | 0.41 | 0.00 | 34.60 | 125.90 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.65 | 125.61 | 2.00 | 0.00 | 0.41 | 0.00 | 34.74 | 125.47 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.80 | 125.56 | 2.00 | 0.00 | 0.41 | 0.00 | 34.85 | 126.58 | 2.00 | 0.00 | 0.41 | 0.00 |
| 34.93 | 128.04 | 2.00 | 0.00 | 0.41 | 0.00 | 34.98 | 128.88 | 2.00 | 0.00 | 0.41 | 0.00 |
| 35.05 | 127.80 | 2.00 | 0.00 | 0.41 | 0.00 | 35.15 | 126.17 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.20 | 125.37 | 2.00 | 0.00 | 0.40 | 0.00 | 35.25 | 124.93 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.33 | 123.91 | 2.00 | 0.00 | 0.40 | 0.00 | 35.40 | 122.11 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.44 | 119.99 | 2.00 | 0.00 | 0.40 | 0.00 | 35.50 | 117.88 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.59 | 116.45 | 2.00 | 0.00 | 0.40 | 0.00 | 35.63 | 116.01 | 2.00 | 0.00 | 0.40 | 0.00 |
| 35.70 | 115.62 | 2.00 | 0.00 | 0.39 | 0.00 | 35.79 | 114.77 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.83 | 114.39 | 2.00 | 0.00 | 0.39 | 0.00 | 35.94 | 114.71 | 2.00 | 0.00 | 0.39 | 0.00 |
| 35.98 | 115.69 | 2.00 | 0.00 | 0.39 | 0.00 | 36.03 | 116.70 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.09 | 116.58 | 2.00 | 0.00 | 0.39 | 0.00 | 36.17 | 115.49 | 2.00 | 0.00 | 0.39 | 0.00 |
| 36.23 | 114.00 | 2.00 | 0.00 | 0.39 | 0.00 | 36.29 | 113.09 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.38 | 112.63 | 2.00 | 0.00 | 0.38 | 0.00 | 36.44 | 112.05 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.49 | 111.15 | 2.00 | 0.00 | 0.38 | 0.00 | 36.59 | 109.97 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.63 | 108.85 | 2.00 | 0.00 | 0.38 | 0.00 | 36.69 | 107.75 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.78 | 106.46 | 2.00 | 0.00 | 0.38 | 0.00 | 36.82 | 105.29 | 2.00 | 0.00 | 0.38 | 0.00 |
| 36.88 | 104.46 | 2.00 | 0.00 | 0.37 | 0.00 | 36.98 | 103.87 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.02 | 102.96 | 2.00 | 0.00 | 0.37 | 0.00 | 37.10 | 102.04 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.18 | 101.36 | 2.00 | 0.00 | 0.37 | 0.00 | 37.22 | 101.05 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.28 | 100.81 | 2.00 | 0.00 | 0.37 | 0.00 | 37.38 | 100.58 | 2.00 | 0.00 | 0.37 | 0.00 |
| 37.42 | 101.02 | 2.00 | 0.00 | 0.37 | 0.00 | 37.48 | 102.97 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.57 | 105.41 | 2.00 | 0.00 | 0.36 | 0.00 | 37.62 | 107.42 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.68 | 107.95 | 2.00 | 0.00 | 0.36 | 0.00 | 37.77 | 106.20 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.82 | 102.49 | 2.00 | 0.00 | 0.36 | 0.00 | 37.88 | 99.35 | 2.00 | 0.00 | 0.36 | 0.00 |
| 37.96 | 99.43 | 2.00 | 0.00 | 0.36 | 0.00 | 38.00 | 101.66 | 2.00 | 0.00 | 0.36 | 0.00 |
| 38.08 | 103.26 | 2.00 | 0.00 | 0.35 | 0.00 | 38.12 | 104.09 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.20 | 103.97 | 2.00 | 0.00 | 0.35 | 0.00 | 38.27 | 102.06 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.36 | 98.71 | 2.00 | 0.00 | 0.35 | 0.00 | 38.40 | 94.91 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.46 | 94.28 | 2.00 | 0.00 | 0.35 | 0.00 | 38.56 | 95.66 | 2.00 | 0.00 | 0.35 | 0.00 |
| 38.59 | 100.70 | 2.00 | 0.00 | 0.35 | 0.00 | 38.66 | 107.26 | 2.00 | 0.00 | 0.34 | 0.00 |
| 38.76 | 111.79 | 2.00 | 0.00 | 0.34 | 0.00 | 38.79 | 113.89 | 2.00 | 0.00 | 0.34 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.87 | 114.34 | 2.00 | 0.00 | 0.34 | 0.00 | 38.91 | 117.43 | 0.35 | 0.70 | 0.34 | 0.00 |
| 39.00 | 121.63 | 0.38 | 0.67 | 0.34 | 0.01 | 39.04 | 126.71 | 0.41 | 0.65 | 0.34 | 0.00 |
| 39.11 | 133.05 | 2.00 | 0.00 | 0.34 | 0.00 | 39.20 | 138.70 | 2.00 | 0.00 | 0.34 | 0.00 |
| 39.24 | 143.92 | 2.00 | 0.00 | 0.33 | 0.00 | 39.31 | 150.02 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.38 | 158.39 | 2.00 | 0.00 | 0.33 | 0.00 | 39.46 | 166.23 | 2.00 | 0.00 | 0.33 | 0.00 |
| 39.51 | 174.07 | 2.00 | 0.00 | 0.33 | 0.00 | 39.60 | 179.88 | 0.94 | 0.22 | 0.33 | 0.00 |
| 39.66 | 183.49 | 0.99 | 0.16 | 0.33 | 0.00 | 39.71 | 185.76 | 1.03 | 0.16 | 0.33 | 0.00 |
| 39.79 | 187.56 | 1.05 | 0.12 | 0.33 | 0.00 | 39.85 | 188.48 | 1.07 | 0.12 | 0.32 | 0.00 |
| 39.91 | 187.38 | 1.05 | 0.12 | 0.32 | 0.00 | 39.99 | 186.65 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.05 | 185.70 | 2.00 | 0.00 | 0.32 | 0.00 | 40.11 | 187.17 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.20 | 193.96 | 2.00 | 0.00 | 0.32 | 0.00 | 40.24 | 202.25 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.30 | 203.67 | 2.00 | 0.00 | 0.32 | 0.00 | 40.40 | 203.35 | 2.00 | 0.00 | 0.32 | 0.00 |
| 40.43 | 204.57 | 2.00 | 0.00 | 0.31 | 0.00 | 40.49 | 207.32 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.55 | 212.50 | 2.00 | 0.00 | 0.31 | 0.00 | 40.64 | 217.54 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.69 | 219.21 | 2.00 | 0.00 | 0.31 | 0.00 | 40.80 | 218.36 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.84 | 218.47 | 2.00 | 0.00 | 0.31 | 0.00 | 40.89 | 207.82 | 2.00 | 0.00 | 0.31 | 0.00 |
| 40.95 | 198.23 | 1.23 | 0.08 | 0.31 | 0.00 | 41.04 | 184.28 | 1.01 | 0.15 | 0.30 | 0.00 |
| 41.10 | 183.92 | 1.00 | 0.15 | 0.30 | 0.00 | 41.15 | 179.67 | 0.95 | 0.20 | 0.30 | 0.00 |
| 41.24 | 180.70 | 2.00 | 0.00 | 0.30 | 0.00 | 41.27 | 171.62 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.38 | 165.78 | 2.00 | 0.00 | 0.30 | 0.00 | 41.41 | 162.91 | 2.00 | 0.00 | 0.30 | 0.00 |
| 41.49 | 165.20 | 0.76 | 0.29 | 0.30 | 0.00 | 41.54 | 167.91 | 0.79 | 0.28 | 0.30 | 0.00 |
| 41.61 | 168.54 | 0.80 | 0.28 | 0.29 | 0.00 | 41.69 | 167.22 | 0.79 | 0.28 | 0.29 | 0.00 |
| 41.77 | 163.27 | 0.74 | 0.36 | 0.29 | 0.00 | 41.84 | 159.26 | 0.70 | 0.37 | 0.29 | 0.00 |
| 41.88 | 156.07 | 0.66 | 0.38 | 0.29 | 0.00 | 41.94 | 154.97 | 0.65 | 0.38 | 0.29 | 0.00 |
| 42.04 | 155.83 | 0.66 | 0.38 | 0.29 | 0.00 | 42.08 | 157.17 | 0.68 | 0.37 | 0.29 | 0.00 |
| 42.17 | 157.20 | 0.68 | 0.37 | 0.29 | 0.00 | 42.19 | 154.48 | 0.65 | 0.46 | 0.28 | 0.00 |
| 42.28 | 150.86 | 0.61 | 0.47 | 0.28 | 0.01 | 42.33 | 148.18 | 0.59 | 0.48 | 0.28 | 0.00 |
| 42.39 | 148.41 | 0.59 | 0.48 | 0.28 | 0.00 | 42.48 | 149.69 | 0.60 | 0.47 | 0.28 | 0.01 |
| 42.53 | 151.63 | 0.62 | 0.46 | 0.28 | 0.00 | 42.59 | 153.74 | 0.64 | 0.45 | 0.28 | 0.00 |
| 42.67 | 155.46 | 0.66 | 0.36 | 0.28 | 0.00 | 42.73 | 156.86 | 0.67 | 0.36 | 0.28 | 0.00 |
| 42.81 | 157.92 | 0.69 | 0.35 | 0.27 | 0.00 | 42.88 | 159.24 | 0.70 | 0.35 | 0.27 | 0.00 |
| 42.92 | 160.90 | 0.72 | 0.34 | 0.27 | 0.00 | 43.00 | 162.97 | 0.74 | 0.33 | 0.27 | 0.00 |
| 43.08 | 165.24 | 0.77 | 0.26 | 0.27 | 0.00 | 43.12 | 167.44 | 0.79 | 0.26 | 0.27 | 0.00 |
| 43.21 | 168.89 | 0.81 | 0.25 | 0.27 | 0.00 | 43.27 | 170.17 | 0.83 | 0.25 | 0.27 | 0.00 |
| 43.32 | 171.28 | 0.84 | 0.25 | 0.27 | 0.00 | 43.39 | 172.62 | 0.86 | 0.18 | 0.26 | 0.00 |
| 43.47 | 174.23 | 0.88 | 0.18 | 0.26 | 0.00 | 43.52 | 176.84 | 0.92 | 0.18 | 0.26 | 0.00 |
| 43.59 | 179.94 | 0.96 | 0.13 | 0.26 | 0.00 | 43.67 | 182.79 | 1.00 | 0.13 | 0.26 | 0.00 |
| 43.72 | 184.14 | 1.02 | 0.13 | 0.26 | 0.00 | 43.80 | 184.43 | 1.02 | 0.13 | 0.26 | 0.00 |
| 43.85 | 185.75 | 1.04 | 0.13 | 0.26 | 0.00 | 43.91 | 185.41 | 1.04 | 0.13 | 0.26 | 0.00 |
| 43.97 | 178.40 | 2.00 | 0.00 | 0.25 | 0.00 | 44.04 | 168.39 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.13 | 159.98 | 2.00 | 0.00 | 0.25 | 0.00 | 44.16 | 159.84 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.24 | 158.69 | 2.00 | 0.00 | 0.25 | 0.00 | 44.31 | 154.26 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.37 | 145.63 | 2.00 | 0.00 | 0.25 | 0.00 | 44.45 | 138.31 | 2.00 | 0.00 | 0.25 | 0.00 |
| 44.50 | 132.54 | 2.00 | 0.00 | 0.25 | 0.00 | 44.56 | 128.28 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.65 | 122.69 | 2.00 | 0.00 | 0.24 | 0.00 | 44.71 | 116.42 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.76 | 111.67 | 2.00 | 0.00 | 0.24 | 0.00 | 44.85 | 109.31 | 2.00 | 0.00 | 0.24 | 0.00 |
| 44.88 | 109.76 | 2.00 | 0.00 | 0.24 | 0.00 | 44.95 | 112.70 | 2.00 | 0.00 | 0.24 | 0.00 |
| 45.05 | 116.66 | 2.00 | 0.00 | 0.24 | 0.00 | 45.10 | 122.85 | 2.00 | 0.00 | 0.24 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45.17 | 129.99 | 2.00 | 0.00 | 0.23 | 0.00 | 45.25 | 136.97 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.30 | 139.53 | 2.00 | 0.00 | 0.23 | 0.00 | 45.37 | 140.64 | 2.00 | 0.00 | 0.23 | 0.00 |
| 45.45 | 140.08 | 0.52 | 0.41 | 0.23 | 0.00 | 45.49 | 141.40 | 0.53 | 0.40 | 0.23 | 0.00 |
| 45.54 | 142.55 | 0.54 | 0.40 | 0.23 | 0.00 | 45.60 | 146.20 | 0.58 | 0.39 | 0.23 | 0.00 |
| 45.68 | 150.85 | 0.62 | 0.38 | 0.23 | 0.00 | 45.75 | 156.96 | 0.69 | 0.29 | 0.22 | 0.00 |
| 45.80 | 163.32 | 0.76 | 0.22 | 0.22 | 0.00 | 45.89 | 168.82 | 0.82 | 0.21 | 0.22 | 0.00 |
| 45.93 | 172.37 | 0.87 | 0.16 | 0.22 | 0.00 | 46.01 | 171.02 | 0.85 | 0.16 | 0.22 | 0.00 |
| 46.08 | 166.94 | 2.00 | 0.00 | 0.22 | 0.00 | 46.15 | 160.45 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.20 | 155.97 | 2.00 | 0.00 | 0.22 | 0.00 | 46.29 | 154.19 | 2.00 | 0.00 | 0.22 | 0.00 |
| 46.34 | 154.81 | 2.00 | 0.00 | 0.21 | 0.00 | 46.41 | 154.77 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.49 | 152.78 | 2.00 | 0.00 | 0.21 | 0.00 | 46.53 | 147.33 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.60 | 141.66 | 2.00 | 0.00 | 0.21 | 0.00 | 46.69 | 137.09 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.73 | 135.64 | 2.00 | 0.00 | 0.21 | 0.00 | 46.79 | 135.37 | 2.00 | 0.00 | 0.21 | 0.00 |
| 46.89 | 136.25 | 2.00 | 0.00 | 0.21 | 0.00 | 46.94 | 138.10 | 2.00 | 0.00 | 0.20 | 0.00 |
| 46.99 | 141.99 | 2.00 | 0.00 | 0.20 | 0.00 | 47.09 | 144.63 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.13 | 147.52 | 2.00 | 0.00 | 0.20 | 0.00 | 47.19 | 151.58 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.28 | 156.22 | 2.00 | 0.00 | 0.20 | 0.00 | 47.34 | 160.06 | 2.00 | 0.00 | 0.20 | 0.00 |
| 47.38 | 157.24 | 2.00 | 0.00 | 0.20 | 0.00 | 47.50 | 153.15 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.51 | 148.50 | 2.00 | 0.00 | 0.19 | 0.00 | 47.60 | 144.73 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.69 | 140.86 | 2.00 | 0.00 | 0.19 | 0.00 | 47.70 | 139.69 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.80 | 142.94 | 2.00 | 0.00 | 0.19 | 0.00 | 47.84 | 150.17 | 2.00 | 0.00 | 0.19 | 0.00 |
| 47.91 | 156.78 | 2.00 | 0.00 | 0.19 | 0.00 | 48.00 | 162.81 | 2.00 | 0.00 | 0.19 | 0.00 |
| 48.04 | 166.60 | 2.00 | 0.00 | 0.19 | 0.00 | 48.11 | 167.78 | 0.82 | 0.18 | 0.18 | 0.00 |
| 48.19 | 167.89 | 0.82 | 0.17 | 0.18 | 0.00 | 48.23 | 166.85 | 0.81 | 0.18 | 0.18 | 0.00 |
| 48.30 | 165.57 | 0.80 | 0.18 | 0.18 | 0.00 | 48.40 | 164.34 | 0.78 | 0.18 | 0.18 | 0.00 |
| 48.45 | 164.01 | 0.78 | 0.18 | 0.18 | 0.00 | 48.50 | 164.51 | 0.78 | 0.17 | 0.18 | 0.00 |
| 48.59 | 165.37 | 0.79 | 0.17 | 0.18 | 0.00 | 48.66 | 166.06 | 0.80 | 0.17 | 0.18 | 0.00 |
| 48.69 | 166.34 | 0.81 | 0.17 | 0.17 | 0.00 | 48.78 | 166.23 | 0.81 | 0.17 | 0.17 | 0.00 |
| 48.85 | 165.89 | 0.80 | 0.17 | 0.17 | 0.00 | 48.89 | 165.27 | 0.80 | 0.17 | 0.17 | 0.00 |
| 48.98 | 164.42 | 0.79 | 0.17 | 0.17 | 0.00 | 49.03 | 163.96 | 0.78 | 0.17 | 0.17 | 0.00 |
| 49.09 | 163.63 | 0.78 | 0.17 | 0.17 | 0.00 | 49.19 | 163.35 | 0.77 | 0.17 | 0.17 | 0.00 |
| 49.23 | 163.32 | 0.77 | 0.16 | 0.17 | 0.00 | 49.28 | 164.80 | 0.79 | 0.16 | 0.16 | 0.00 |
| 49.39 | 166.67 | 0.82 | 0.16 | 0.16 | 0.00 | 49.42 | 169.33 | 0.85 | 0.15 | 0.16 | 0.00 |
| 49.48 | 173.02 | 0.90 | 0.11 | 0.16 | 0.00 | 49.59 | 176.79 | 0.95 | 0.08 | 0.16 | 0.00 |
| 49.62 | 180.52 | 1.00 | 0.08 | 0.16 | 0.00 | 49.69 | 181.66 | 1.02 | 0.08 | 0.16 | 0.00 |
| 49.74 | 180.26 | 1.00 | 0.08 | 0.16 | 0.00 | 49.83 | 177.11 | 0.96 | 0.08 | 0.16 | 0.00 |
| 49.88 | 173.53 | 0.91 | 0.11 | 0.15 | 0.00 | 49.93 | 169.72 | 0.86 | 0.11 | 0.15 | 0.00 |
| 50.03 | 165.22 | 0.80 | 0.15 | 0.15 | 0.00 | 50.13 | 160.80 | 0.75 | 0.15 | 0.15 | 0.00 |
| 50.14 | 157.68 | 0.71 | 0.19 | 0.15 | 0.00 | 50.23 | 155.80 | 0.69 | 0.19 | 0.15 | 0.00 |
| 50.27 | 153.88 | 0.67 | 0.20 | 0.15 | 0.00 | 50.34 | 152.42 | 0.66 | 0.20 | 0.15 | 0.00 |
| 50.43 | 151.59 | 0.65 | 0.20 | 0.15 | 0.00 | 50.49 | 151.43 | 0.65 | 0.24 | 0.14 | 0.00 |
| 50.53 | 151.29 | 0.65 | 0.24 | 0.14 | 0.00 | 50.62 | 151.13 | 0.65 | 0.24 | 0.14 | 0.00 |
| 50.68 | 150.93 | 0.65 | 0.24 | 0.14 | 0.00 | 50.73 | 147.78 | 0.61 | 0.24 | 0.14 | 0.00 |
| 50.82 | 143.57 | 0.57 | 0.24 | 0.14 | 0.00 | 50.88 | 139.31 | 0.54 | 0.24 | 0.14 | 0.00 |
| 50.93 | 134.19 | 0.49 | 0.25 | 0.14 | 0.00 | 51.02 | 127.18 | 0.44 | 0.26 | 0.14 | 0.00 |
| 51.09 | 119.48 | 0.39 | 0.27 | 0.13 | 0.00 | 51.12 | 114.89 | 0.36 | 0.28 | 0.13 | 0.00 |
| 51.19 | 113.65 | 2.00 | 0.00 | 0.13 | 0.00 | 51.27 | 115.33 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.32 | 119.29 | 2.00 | 0.00 | 0.13 | 0.00 | 51.39 | 125.47 | 2.00 | 0.00 | 0.13 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 51.48 | 133.65 | 2.00 | 0.00 | 0.13 | 0.00 | 51.53 | 136.49 | 2.00 | 0.00 | 0.13 | 0.00 |
| 51.62 | 130.07 | 2.00 | 0.00 | 0.13 | 0.00 | 51.68 | 118.63 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.73 | 111.36 | 2.00 | 0.00 | 0.12 | 0.00 | 51.82 | 108.36 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.87 | 105.77 | 2.00 | 0.00 | 0.12 | 0.00 | 51.92 | 101.93 | 2.00 | 0.00 | 0.12 | 0.00 |
| 51.97 | 98.61 | 2.00 | 0.00 | 0.12 | 0.00 | 52.04 | 94.25 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.12 | 90.77 | 2.00 | 0.00 | 0.12 | 0.00 | 52.17 | 88.15 | 2.00 | 0.00 | 0.12 | 0.00 |
| 52.23 | 86.84 | 2.00 | 0.00 | 0.11 | 0.00 | 52.31 | 85.30 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.37 | 84.25 | 2.00 | 0.00 | 0.11 | 0.00 | 52.44 | 83.17 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.53 | 82.25 | 2.00 | 0.00 | 0.11 | 0.00 | 52.57 | 81.88 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.64 | 81.27 | 2.00 | 0.00 | 0.11 | 0.00 | 52.72 | 79.91 | 2.00 | 0.00 | 0.11 | 0.00 |
| 52.78 | 77.99 | 2.00 | 0.00 | 0.11 | 0.00 | 52.83 | 75.66 | 2.00 | 0.00 | 0.10 | 0.00 |
| 52.92 | 72.48 | 2.00 | 0.00 | 0.10 | 0.00 | 52.96 | 70.16 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.04 | 67.23 | 2.00 | 0.00 | 0.10 | 0.00 | 53.12 | 63.60 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.17 | 61.59 | 2.00 | 0.00 | 0.10 | 0.00 | 53.22 | 63.65 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.29 | 65.48 | 2.00 | 0.00 | 0.10 | 0.00 | 53.37 | 66.33 | 2.00 | 0.00 | 0.10 | 0.00 |
| 53.42 | 66.44 | 2.00 | 0.00 | 0.09 | 0.00 | 53.49 | 65.92 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.58 | 65.23 | 2.00 | 0.00 | 0.09 | 0.00 | 53.63 | 64.52 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.68 | 63.77 | 2.00 | 0.00 | 0.09 | 0.00 | 53.78 | 62.89 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.84 | 62.03 | 2.00 | 0.00 | 0.09 | 0.00 | 53.88 | 61.68 | 2.00 | 0.00 | 0.09 | 0.00 |
| 53.94 | 61.54 | 2.00 | 0.00 | 0.09 | 0.00 | 54.03 | 61.41 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.08 | 61.42 | 2.00 | 0.00 | 0.08 | 0.00 | 54.16 | 61.52 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.20 | 61.71 | 2.00 | 0.00 | 0.08 | 0.00 | 54.28 | 62.04 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.35 | 62.73 | 2.00 | 0.00 | 0.08 | 0.00 | 54.43 | 63.41 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.48 | 63.42 | 2.00 | 0.00 | 0.08 | 0.00 | 54.55 | 62.63 | 2.00 | 0.00 | 0.08 | 0.00 |
| 54.63 | 61.54 | 2.00 | 0.00 | 0.07 | 0.00 | 54.67 | 60.54 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.74 | 59.69 | 2.00 | 0.00 | 0.07 | 0.00 | 54.82 | 58.97 | 2.00 | 0.00 | 0.07 | 0.00 |
| 54.87 | 58.80 | 2.00 | 0.00 | 0.07 | 0.00 | 54.92 | 58.37 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.02 | 57.95 | 2.00 | 0.00 | 0.07 | 0.00 | 55.06 | 57.48 | 2.00 | 0.00 | 0.07 | 0.00 |
| 55.14 | 58.25 | 2.00 | 0.00 | 0.07 | 0.00 | 55.22 | 59.57 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.27 | 62.13 | 2.00 | 0.00 | 0.06 | 0.00 | 55.37 | 64.60 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.42 | 67.22 | 2.00 | 0.00 | 0.06 | 0.00 | 55.47 | 69.35 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.53 | 71.10 | 2.00 | 0.00 | 0.06 | 0.00 | 55.58 | 72.38 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.66 | 72.79 | 2.00 | 0.00 | 0.06 | 0.00 | 55.72 | 72.69 | 2.00 | 0.00 | 0.06 | 0.00 |
| 55.81 | 72.12 | 2.00 | 0.00 | 0.05 | 0.00 | 55.85 | 71.03 | 2.00 | 0.00 | 0.05 | 0.00 |
| 55.92 | 69.42 | 2.00 | 0.00 | 0.05 | 0.00 | 56.01 | 67.83 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.05 | 66.01 | 2.00 | 0.00 | 0.05 | 0.00 | 56.11 | 66.77 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.21 | 69.20 | 2.00 | 0.00 | 0.05 | 0.00 | 56.26 | 73.46 | 2.00 | 0.00 | 0.05 | 0.00 |
| 56.32 | 78.60 | 2.00 | 0.00 | 0.05 | 0.00 | 56.41 | 85.09 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.46 | 90.89 | 2.00 | 0.00 | 0.04 | 0.00 | 56.50 | 94.70 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.59 | 95.31 | 2.00 | 0.00 | 0.04 | 0.00 | 56.65 | 94.75 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.70 | 92.50 | 2.00 | 0.00 | 0.04 | 0.00 | 56.78 | 92.10 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.85 | 93.82 | 2.00 | 0.00 | 0.04 | 0.00 | 56.89 | 101.45 | 2.00 | 0.00 | 0.04 | 0.00 |
| 56.98 | 107.06 | 2.00 | 0.00 | 0.03 | 0.00 | 57.04 | 110.92 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.09 | 110.81 | 0.35 | 0.07 | 0.03 | 0.00 | 57.16 | 111.98 | 0.36 | 0.07 | 0.03 | 0.00 |
| 57.24 | 114.31 | 0.37 | 0.06 | 0.03 | 0.00 | 57.29 | 118.36 | 0.40 | 0.06 | 0.03 | 0.00 |
| 57.37 | 122.59 | 0.43 | 0.05 | 0.03 | 0.00 | 57.42 | 124.48 | 2.00 | 0.00 | 0.03 | 0.00 |
| 57.49 | 119.74 | 2.00 | 0.00 | 0.03 | 0.00 | 57.59 | 112.69 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.64 | 106.83 | 2.00 | 0.00 | 0.02 | 0.00 | 57.69 | 105.87 | 0.32 | 0.05 | 0.02 | 0.00 |

**:: Post-earthquake settlement due to soil liquefaction :: (continued)**

| Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) | Depth (ft) | $Q_{tn,cs}$ | FS | $e_v$ (%) | DF | Settlement (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 57.77 | 106.92 | 2.00 | 0.00 | 0.02 | 0.00 | 57.82 | 108.59 | 2.00 | 0.00 | 0.02 | 0.00 |
| 57.89 | 109.56 | 2.00 | 0.00 | 0.02 | 0.00 | 57.97 | 108.58 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.03 | 107.12 | 2.00 | 0.00 | 0.02 | 0.00 | 58.09 | 104.19 | 2.00 | 0.00 | 0.02 | 0.00 |
| 58.17 | 101.86 | 2.00 | 0.00 | 0.01 | 0.00 | 58.21 | 95.50 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.28 | 89.89 | 2.00 | 0.00 | 0.01 | 0.00 | 58.37 | 83.77 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.40 | 78.43 | 2.00 | 0.00 | 0.01 | 0.00 | 58.48 | 75.49 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.53 | 77.16 | 2.00 | 0.00 | 0.01 | 0.00 | 58.63 | 82.84 | 2.00 | 0.00 | 0.01 | 0.00 |
| 58.67 | 93.89 | 2.00 | 0.00 | 0.01 | 0.00 | 58.73 | 103.10 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.82 | 107.59 | 2.00 | 0.00 | 0.00 | 0.00 | 58.89 | 102.91 | 2.00 | 0.00 | 0.00 | 0.00 |
| 58.93 | 96.38 | 2.00 | 0.00 | 0.00 | 0.00 | 59.00 | 94.14 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.06 | 93.07 | 2.00 | 0.00 | 0.00 | 0.00 | 59.13 | 91.37 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.22 | 89.13 | 2.00 | 0.00 | 0.00 | 0.00 | 59.28 | 84.58 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.33 | 80.82 | 2.00 | 0.00 | 0.00 | 0.00 | 59.41 | 76.24 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.47 | 74.37 | 2.00 | 0.00 | 0.00 | 0.00 | 59.52 | 72.86 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.61 | 71.78 | 2.00 | 0.00 | 0.00 | 0.00 | 59.67 | 71.20 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.72 | 71.23 | 2.00 | 0.00 | 0.00 | 0.00 | 59.78 | 71.91 | 2.00 | 0.00 | 0.00 | 0.00 |
| 59.87 | 73.11 | 2.00 | 0.00 | 0.00 | 0.00 | 59.92 | 75.63 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.00 | 78.56 | 2.00 | 0.00 | 0.00 | 0.00 | 60.05 | 80.28 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.11 | 66.10 | 2.00 | 0.00 | 0.00 | 0.00 | 60.21 | 47.80 | 0.16 | 0.00 | 0.00 | 0.00 |
| 60.25 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.31 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.40 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | 60.43 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| 60.51 | -1.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | | | |

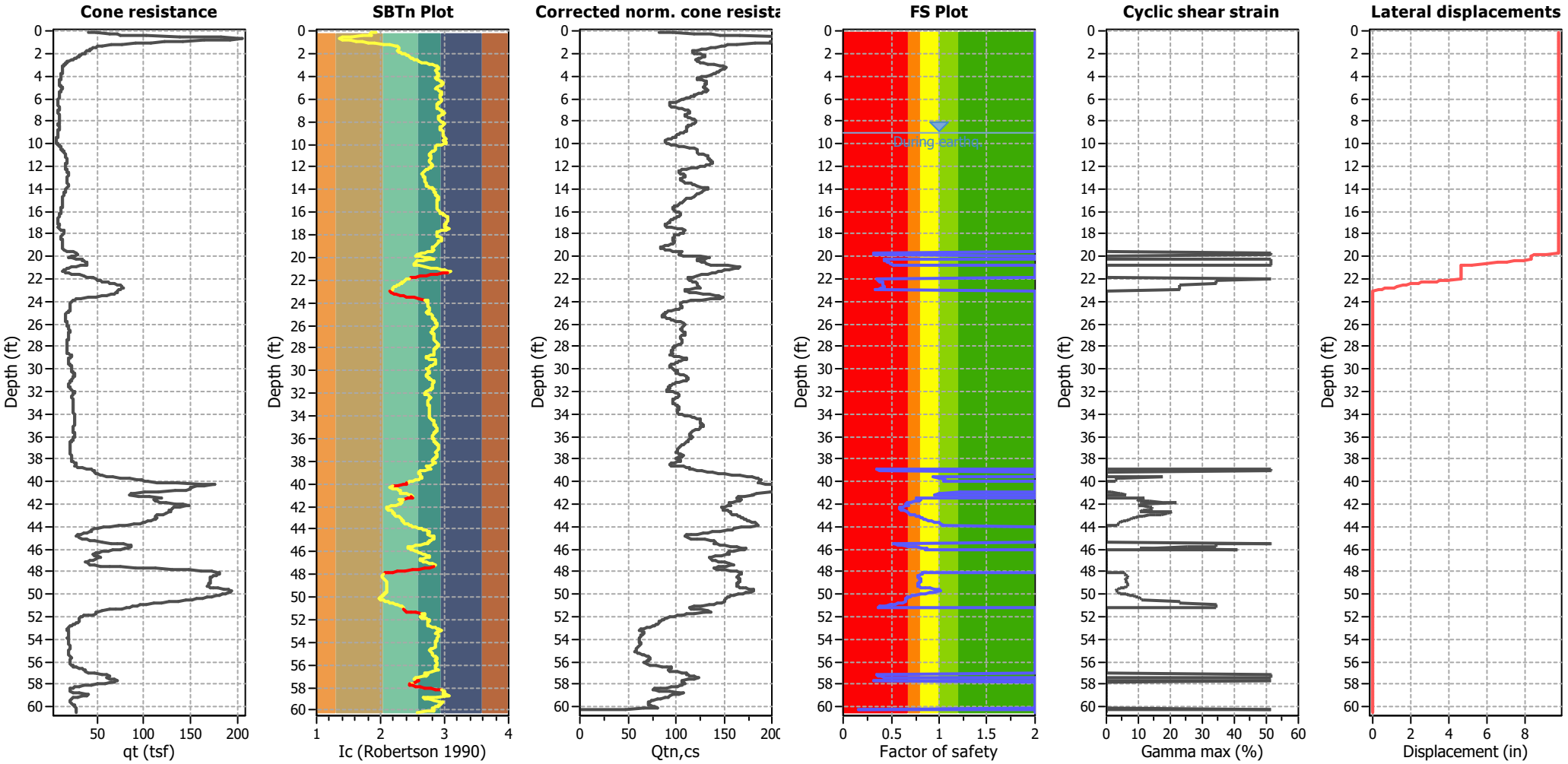
**Total estimated settlement: 0.48**

**Abbreviations**

| | |
|---|---|
| $Q_{tn,cs}$: | 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 |

# Estimation of post-earthquake lateral Displacements

**Geometric parameters: Level ground (or gently sloping) with free face (L: 90.00 ft - H: 12.00 ft)**




**Abbreviations**

$q_t$: Total cone resistance (cone resistance $q_c$ corrected for pore water effects)
$I_c$: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
$\gamma_{max}$: Maximum cyclic shear strain
LDI: Lateral displacement index

**Surface condition**