SOILS ENGINEERING REPORT
865, 864 & 872 PIONEER STREET
APN's: 115-092-001, 003 & 004
CITY OF GUADALUPE, CALIFORNIA

PROJECT SB00573-1

Prepared for

SKS Portfolio, LLC
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February 5, 2015

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February 5, 2015
Project No. SB00573-1

SKS Portfolio, LLC
Attn: Steve Simoulis
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Subject: **Soils Engineering Report**
856, 864 & 872 Pioneer Street, APN's: 115-092-001, 003 & 004
City of Guadalupe, California

Dear Mr. Simoulis:

This Soils Engineering Report has been prepared for the proposed apartment buildings to be located at 856, 864 & 872 Pioneer Street, APN's: 115-092-001, 003 & 004, in the City of Guadalupe, California. Geotechnically, the site is suitable for the proposed development provided the recommendations in this report for site preparation, earthwork, foundations, slabs, and pavement sections are incorporated into the design.

Due to the extent of loose sandy type subsurface soils and a relatively high ground water table that exist throughout the Site, the potential for static settlements and seismically induced settlements caused from liquefaction appear to be high. To reduce the potential for these settlements to occur, it is anticipated a ribbed post-tension foundation system founded over a geofabric reinforced engineered fill pad will be constructed for the proposed three-story apartment structures. All foundations are to be excavated into uniform material to limit the potential for distress of the foundation systems due to differential settlement.

Thank you for the opportunity to have been of service in preparing this report. If you have any questions or require additional assistance, please feel free to contact the undersigned at (805) 614-6333.

Sincerely,
GeoSolutions, Inc.

Bradley J. Bucher, PE
Project Engineer, C81927

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Site Description 1
1.2 Project Description 1
2.0 PURPOSE AND SCOPE 2
3.0 FIELD AND LABORATORY INVESTIGATION 2
4.0 SEISMIC DESIGN CONSIDERATIONS 5
4.1 Seismic Hazard Analysis 5
4.2 Structural Building Design Parameters 5
4.3 Liquification Potential 6
4.4 Liquefaction Analysis 6
5.0 GENERAL SOIL-FOUNDATION DISCUSSION 7
6.0 CONCLUSIONS AND RECOMMENDATIONS 7
6.1 Preparation of Building Pad 7
6.2 Preparation of Paved Areas 8
6.3 Pavement Design 8
6.4 Ribbed Post-Tensioned Slab Foundation System 9
6.5 Slab-On-Grade Construction 9
6.6 Equivalent Fluid Pressures 11
7.0 INFILTRATION TESTING 11
8.0 ADDITIONAL GEOTECHNICAL SERVICES 12
9.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS 13

REFERENCES

APPENDIX A

Field Investigation
Soil Classification Chart
Boring Logs
CPT Logs
Classification Data with Soil Behavior Types

APPENDIX B

Laboratory Testing
Soil Test Reports

APPENDIX C

USGS Design Map Summary Report
USGS Design Map Detailed Report

APPENDIX D

Preliminary Grading Specifications

APPENDIX E

LiquefyPro CPT-1 Input
LiquefyPro CPT-1 Output
LiquefyPro CPT-2 Input
LiquefyPro CPT-2 Output
NovoCPT CPT-1 Liquefaction Analysis
NovoCPT CPT-2 Liquefaction Analysis

APPENDIX F

Infiltration Boring Logs
Infiltration Field Test Data
Part 630 Hydrology National Engineering Handbook, Chapter 7 Hydrological Soils Groups

LIST OF FIGURES

Figure 1: Site Location Map 1

Figure 2: Site Plan 2

Figure 3: Google Earth Image 3

Figure 4: Regional Geologic Map 4

Figure 5: Sub-Slab Detail 10

LIST OF TABLES

Table 1: Engineering Properties 4

Table 2: Equivalent Fluid Pressures 11

Table 3: Infiltration Test Results 12

Table 4: Required Verification and Inspections of Soils 13

SOILS ENGINEERING REPORT
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APN'S: 115-092-001, 002 & 003
CITY OF GUADALUPE, CALIFORNIA

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1.0 INTRODUCTION

This report presents the results of the geotechnical investigation for the proposed two apartment buildings to be located at 856, 864 & 872 Pioneer Street, APN's: 115-092-001, 002 & 003, in the City of Guadalupe, California. See Figure 1: Site Location Map for the general location of the project area. Figure 1: Site Location Map was obtained from the computer program *Topo USA 8.0* (DeLorme, 2009). The project property will hereafter be referred to as the "Site."

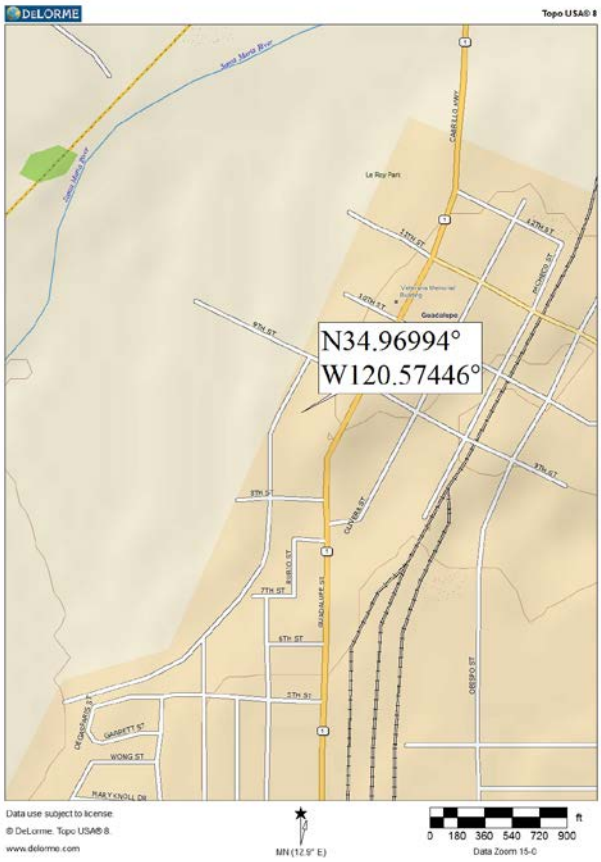

Figure 1: Site Location Map

1.1 Site Description

856, 864 & 872 Pioneer Street are located at about 34.96994 degrees north latitude and 120.57446 degrees west longitude at a general elevation of 73 feet above mean sea level. The combined property area is rectangular in shape and about 200 feet wide by 350 feet long. The nearest intersection is where Pioneer Road intersects 9th Street, approximately 175 feet to the northeast of the Site.

The Site is situated on relatively flat ground with changes in elevation of less than a few feet across the proposed building area. Surface drainage generally follows the topography off site and eventually flows to the Santa Maria River, located approximately 0.4 miles to the northwest. The Site is currently undeveloped and covered with annual grasses and occasional shrubs.

1.2 Project Description

Two apartment buildings are proposed and will be located at the northeast and southwest ends of the Site. The structures are anticipated to each be three stories in height and roughly 170 by 30 feet in size. At the time of preparation for this report, the proposed apartment buildings are to be constructed using light wood framing. No retaining walls are expected to be constructed as part of this project. See Figure 2: Site Plan for the general layout of the Site. Figure 2: Site Plan was provided by Steve Simoulis, SKS Portfolio, LLC.

It is anticipated that the proposed structure(s) will utilize a post-tensioned slab on grade lower floor system. Dead and sustained live loads are unknown, but they are anticipated to be relatively light. Due to the extent of loose sandy type subsurface soils and a relatively high ground water table that exist throughout the Site, the potential for static settlements and seismically induced settlements caused from liquefaction appear to be high. Given these poor subsurface soil conditions it is anticipated that either a soils remediation process consisting of deep compaction methods or a helical pile foundation system will be constructed for the proposed three story apartment structures.

2.0 PURPOSE AND SCOPE

The purpose of this study was to explore and evaluate the surface and sub-surface soil conditions at the Site and to develop geotechnical information and design criteria. The scope of this study includes the following items:

1. A literature review of available published and unpublished geotechnical data pertinent to the project site including geologic maps and available on-line or in-house aerial photographs.

2. A field study consisting of site reconnaissance and subsurface exploration including exploratory borings and CPT soundings in order to formulate a description of the sub-surface conditions at the Site.

3. Laboratory testing performed on representative soil samples that were collected during our field study.

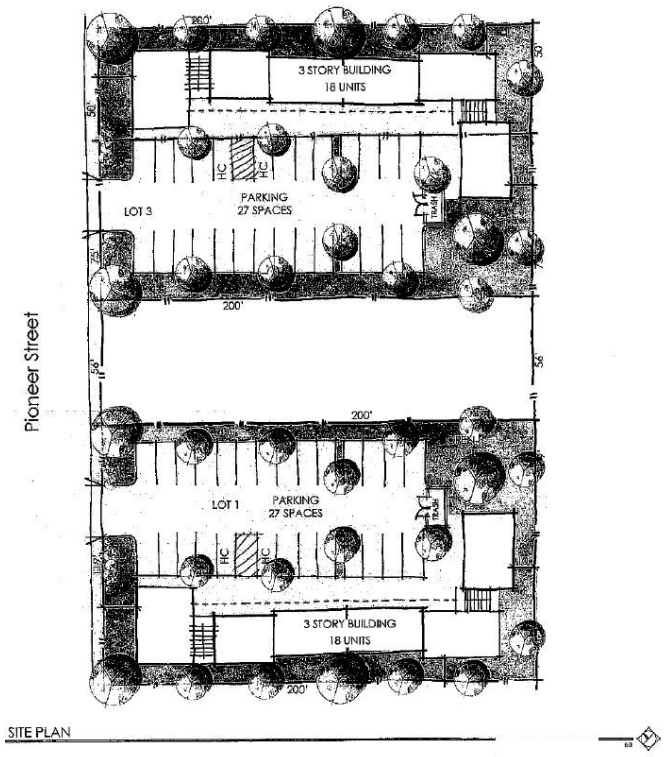

Figure 2: Site Plan

4. Engineering analysis of the data gathered during our literature review, field investigation, and laboratory testing.

5. Development of recommendations for site preparation and grading as well as geotechnical design criteria for building foundations, pavement sections, underground utilities, and drainage facilities.

3.0 FIELD AND LABORATORY INVESTIGATION

A field investigation was conducted on January 19, 2015 using a track-mounted CME 55 drill rig. Three eight-inch diameter exploratory borings were advanced to a maximum depth of 15 feet below ground surface (bgs) at the approximate locations indicated on Figure 3: Google Earth Image. Boring B-1 was placed at the middle of northeast end of the Site, in the proposed area of the north apartment building. Boring B-2 was advanced in approximately the center of the Site between the two proposed parking lots and Boring B-3 was drilled in about the middle of the proposed southern building footprint. All three borings extended to a depth of 15 feet bgs. Sampling methods included the Standard Penetration Test utilizing a standard split-spoon sampler (SPT) without liners. The CME 55 drill rig was equipped with an

automatic hammer, which has an efficiency of approximately 80 percent and was used to obtain test blow counts in the form of N-values.

Data gathered during the boring investigation suggest that the soil materials at the Site consist of interbedded alluvial soil extending to the maximum depth explored (15 feet bgs). The surface materials generally consisted of olive brown poorly graded SAND with clay (SP-SC) encountered in a dry and loose condition to approximately 5 feet bgs. The sub-surface materials consisted of light olive to olive brown clayey sand (SC), poorly-graded sand (SP-SC) with clay and sandy clay (CL) generally encountered in a loose to medium dense and moist condition to depths of about 10 feet bgs. These materials were typically underlain by light olive brown to gray brown poorly-graded sand (SP-SC) with clay encountered in a dense and moist to wet condition, at 15 feet bgs. Flowing sands were encountered in boring B-3 at a depth of 15 feet bgs. Groundwater was measured at the time of the drilling investigation at approximately 13 feet bgs.

Figure 3: Google Earth Image

The CPT field investigation was conducted on January 6, 2015 using a CPT Truck provided by Middle Earth Geo Testing, Inc. Two CPT soundings were advanced to maximum depths of about 65 and 76 feet bgs at the approximate locations indicated on Figure 3: Google Earth Image, corresponding to the middle of the proposed building footprints and near borings B-1 and B-2, respectively.

An electric cone was used during the CPT sounding. The electric cone has a 35.7-mm diameter cone-shaped tip with a 60° apex angle, a 35.7-mm diameter by 133.7-mm long cylindrical sleeve, and a pore pressure transducer.

The CPT data indicates interbedded materials (interpreted as alluvial soils consisting of sand, silt, and clay) with tip resistance values of approximately 10 to 50 tsf (tons per square foot) generally extending to about 55-60 feet bgs. A layer of higher resistance (about 100-200 tsf) was encountered between about 12-15 and 33 feet bgs and at about 58-63 feet bgs, extending to the maximum depth explored.

The CPT soundings were advanced to provide a nearly-continuous soil behavior profile and to better characterize the Site. See **Appendix** A for CPT data and for a description and classification of the soil behavior types.

Regional site geology was obtained by using the *Geologic Map of the Point Sal and Guadalupe Quadrangles, Santa Barbara County, California* (Dibblee, 1989) and the MapView internet application (USGS, 2013); the later application is available from the United States Geological Survey website (USGS, 2013) and compiles existing geologic maps. The near surface and subsurface materials encountered at the Site were interpreted as valley and floodplain alluvium (Qa). See Figure 4: Regional Geologic Map.

Figure 4: Regional Geologic Map

During the boring operations the soils encountered were continuously examined, visually classified, and sampled for general laboratory testing. A project engineer has reviewed a continuous log of the soils encountered at the time of field investigation. See **Appendix A** for the Boring Logs from the field investigation.

Laboratory tests were performed on soil samples that were obtained from the Site during the field investigation. The results of these tests are listed below in Table 1: Engineering Properties. Laboratory data reports and detailed explanations of the laboratory tests performed during this investigation are provided in **Appendix B**.

Table 1: Engineering Properties

Sample Name	Sample Description	USCS Specification	Expansion Index	Expansion Potential	Maximum Dry Density, γ_d (pcf)	Optimum Moisture (%)	Angle of Internal Friction, ϕ (deg.)	Cohesion, c (psf)
A	Olive Brown Poorly Graded SAND with Clay	SP-SC	0	Very Low	115.0	9.7	36.7	0

4.0 SEISMIC DESIGN CONSIDERATIONS

4.1 Seismic Hazard Analysis

1. According to section 1613 of the 2013 CBC (CBSC, 2013), all structures and portions of structures should be designed to resist the effects of seismic loadings caused by earthquake ground motions in accordance with the *Minimum Design Loads for Buildings and Other Structures* (ASCE7) (ASCE, 2010). ASCE7 considers the most severe earthquake ground motion to be the ground motion caused by the Maximum Considered Earthquake (MCE) (ASCE, 2010), which is defined in Section 1613 of the 2013 CBC to be short period S_{MS} and 1-second period S_{M1}, spectral response accelerations.

2. The a_{max} of the Site depends on several factors, which include the distance of the Site from known active faults, the expected magnitude of the MCE, and the Site soil profile characteristics.

3. As per section 1613.3.2 of the 2013 CBC (CBSC, 2013), the Site soil profile classification is determined by the average soil properties in the upper 100 feet of the Site profile (ASCE 7). Based on the $(N_1)_{60}$ and q_c (tip resistance) values calculated for the in-situ tests performed during the field investigation, the Site was defined as Site Class D, Stiff Soil per ASCE 7 Chapter 20.

4. According to section 11.2 of ASCE7 and section 1613 of the 2013 CBC (CBSC, 2013), buildings and structures should be specifically proportioned to resist Design Earthquake Ground Motions (Design a_{max}). ASCE7 defines the Design a_{max} as "the earthquake ground motions that are two-thirds of the corresponding MCE ground motions" (ASCE, 2006, p. 109). Therefore, the **Design a_{max} for the Site is equal to S_{D1}=0.422 and S_{DS}=0.750,** which are 1-second period and short period design spectral response accelerations that are equal to two-thirds of the a_{max} or MCE for the Site.

5. The site specific MCE peak ground acceleration (**PGA_M**) as determined by the USGS computer program (web based) **PGA_M = 0.45** which is present on Sheet 5 of 6 of the USGS Design Maps Detailed Report (ASCE 7-10 Standard). See **Appendix C:** USGS Design Maps Summary and Detailed Report. This **PGA_M** was utilized in our liquefaction analysis.

6. Site coordinates of 34.96994 degrees north latitude and 120.57446 degrees west longitude and a search radius of 100 miles were used in the probabilistic seismic hazard analysis.

4.2 Structural Building Design Parameters

1. Structural building design parameters within chapter 16 of the 2013 CBC (CBSC, 2013) and sections 11.4.3 and 11.4.4 of ASCE7 are dependent upon several factors, which include site soil profile characteristics and the locations and characteristics of faults near the Site. As described in section 4.1 of this report, the Site soil profile classification was determined to be Site Class D. This Site soil profile classification and the latitude and longitude coordinates for the Site were used to determine the structural building design parameters.

2. Spectral Response Accelerations and Site Coefficients were obtained from the Seismic Hazard Curves and Uniform Hazard Response Spectra, U.S. Seismic Design Map

computer application (USGS, 2013); this program is available from the United States Geological Survey website (USGS, 2013). This computer program utilizes the methods developed in the 1997, 2000, 2003, 2008 and 2013 errata editions of the NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures and user-inputted Site latitude and longitude coordinates to calculate seismic design parameters and response spectra (both for period and displacement), for Site Classifications A through E. Analysis of the Design Spectral Response Acceleration Parameters for the Site and of the Occupancy Category for the proposed structure assign to this project a **Seismic Design Category of D** per Tables 1613.3.5(1) and 1613.3.5(2) of the 2013 CBC (CBSC, 2013).

4.3 Liquification Potential

1. Liquefaction occurs when saturated cohesionless soils lose shear strength due to earthquake shaking. Ground motion from an earthquake may induce cyclic reversals of shear stresses of large amplitude. Lateral and vertical movement of the soil mass combined with the loss of bearing strength usually results from this phenomenon. The potential for liquefaction estimated from two CPT soundings is shown in Appendix E. Please see **Appendix E**, Liquefaction Analysis Sheets for complete numerical analysis as well as for the numerical factors of safety against liquefaction.

2. Liquefaction potential of soil deposits during earthquake activity depends on soil type, void ratio, groundwater conditions, the duration of shaking, and confining pressures on the potentially liquefiable soil unit. Fine, poorly graded loose sand, shallow groundwater, high intensity earthquakes, and long duration of ground shaking are the principal factors leading to liquefaction.

3. The determination that Site soils are liquefiable was made following guidelines set forth in, “Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, 1997.” The procedure is termed the “simplified procedure” and is the current standard of care for liquefaction analysis.

4.4 Liquefaction Analysis

1. GeoSolutions, Inc. utilized computer software programs Liquefy Pro Version 5.8f by CivilTech, and NovoCPT by Novo Tech Software Ltd. which were developed using methods recommended in most recent publication, NCEER Workshop and SP117 Implementation to determine the liquefaction and settlement potential of the Site. Seismic load is estimated with Seed’s simplified method (Seed, 1971), which uses a Cyclic Stress Ratio (CSR) this is compared to the Cyclic Resistance Ration (CRR) of the soil.

2. CPT soundings of the Site indicated the presence of saturated SAND type soils encountered in a loose to dense condition at various depths from ground surface (bgs) to termination of CPT sounds at 66 and 76 feet bgs. These values are used to determine Factors of Safety (FOS) for isolated layers below ground surface. Overall seismic vertical settlements on the order of 1.3 to 2.7 inches and lateral displacements on the order of 4 to 7.5 inches where obtained from the program with (FOS) less than 1.3 for the sand soils encountered at various depths below ground surface. The results from this analysis are summarized in **Appendix E** of this report.

3. Based on the presence of sandy soils, the relative density of the in-situ soils, the depth to groundwater, and the expected ground acceleration caused by the Design Base

Earthquake, the potential for seismic liquefaction of Site soils is high. Liquefaction was determined to likely occur in the sand layers between the depths of 13 to 32 feet, and bgs beneath the Site and manifest at the surface as seismically induced settlements and potential sand boils. Seismically induced settlements were estimated to be on the order of 1 to 3 inches.

5.0 GENERAL SOIL-FOUNDATION DISCUSSION

The site is underlain by sandy soils that under static loading conditions were determined to provide adequate bearing for a post-tension foundation system provided loads are kept small. However, under seismic loadings the soils below the groundwater interface may liquefy. The result of liquefaction would be settlements on the order of 1.5 to 3 inches across the Site and the possibility of sand boils manifesting at the surface. The occurrence of sand boils would cause a sudden and complete loss of support under building foundations. The maximum size of the sand boils is difficult to quantify. For design purposes, sand boils could be expected to be 8 feet in diameter. This would be the most critical at building corners.

In Section 8.0 Mitigation of Liquefaction Hazards of the DMG Special Publication 117, March 1999, and the County of Los Angeles Department of Public Works Manual for Preparation of Geotechnical Reports, July 2013, states that structural mitigation for liquefiable sites is acceptable for up to 1 inch of seismically induced differential vertical displacement over a horizontal distance of 30 feet, up to 4 inches of total seismically induced settlement and up to 12 horizontal inches of lateral ground displacement. Based on our analysis of the subsurface soils at the Site (See Appendix E), structural mitigation is acceptable for the design of the proposed two three-story apartment structures.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The Site is suitable for the proposed development provided the recommendations presented in this report are incorporated into the project plans and specifications.

The primary geotechnical concerns at the Site are:

1. The potential of potentially liquefiable soils.

2. The presence of loose surface and subsurface soils.

3. The potential of groundwater seepage.

4. The potential for differential settlement occurring between foundations supported on two soil materials having different settlement characteristics, such as native soil and engineered fill/competent formational material and for sand boils resulting from liquefaction of subsurface soils. Therefore, it is important that all of the foundations are founded in equally competent uniform material in accordance with this report.

6.1 Preparation of Building Pad

1. It is anticipated that a ribbed post-tension foundation system founded over a graded engineered fill pad will be developed for the proposed apartment structure with footings founded in engineered fill.

2. For the development of an engineered fill pad, the native material should be over-excavated at least 60 inches below existing grade, 36 inches below the bottom of the

footings, to competent material, or to one-half the depth of the deepest fill(measured from the bottom of the deepest footing); whichever is greatest. The limits of over-excavation should extend a minimum of 5 feet beyond the perimeter foundation. The exposed surface should be scarified to a depth of 12 inches, moisture conditioned to near optimum moisture content, and compacted to a minimum relative density of 90 percent (ASTM D1557-07). The over-excavated material should then be processed as engineered fill. Onsite soils are suitable as fill material provided it is processed to remove concentrations of organic material, debris, and other particles. Imported fill should meet the requirements of the grading plan. GeoSolutions, Inc. should be notified at least 72 hours prior to delivery to the site to sample and test proposed imported fill materials. Refer to Figure 5: Sub-Slab Detail for under-slab drainage material and **Appendix D** for more details on fill placement.

3. Due to the potential for differential settlements occurring from surface manifestations (sand boils) caused from liquefaction and potential static settlements associated with the loose subsurface soils, a woven Mirafi 600X geofabric or equivalent should be placed at the bottom of the building pad excavation that has been processed per the above sections. The geofabric should extend a minimum of 5 feet beyond the perimeter foundation and should be installed per manufactures specifications.

6.2 Preparation of Paved Areas

1. Pavement areas should be over-excavated 12 inches below existing grade or finished sub-grade; whichever is deeper. The exposed surface should be scarified an additional depth of eight inches, moisture conditioned to near optimum moisture content, and compacted to a minimum relative density of 90 percent (ASTM D1557-07 test method). The over-excavated soil should then be moisture conditioned to produce a water-content of at least one to two percent above optimum value and then compacted to a minimum relative density of 90 percent. The top 12 inches of sub-grade soil under all pavement sections should be compacted to a minimum relative density of 95 percent based on the ASTM D1557-07 test method at slightly above optimum.

2. Sub-grade soils should not be allowed to dry out or have excessive construction traffic between moisture conditioning and compaction, and placement of the pavement structural section.

6.3 Pavement Design

1. All pavement construction and materials used should conform to Sections 25, 26 and 39 of the latest edition of the State of California Department of Transportation Standard Specifications (State of California, 1999).

2. As indicated previously in Section 6.2, the top 12 inches of sub-grade soil under pavement sections should be compacted to a minimum relative density of 95 percent based on the ASTM D1557-07 test method at slightly above optimum moisture content. Aggregate bases and sub-bases should also be compacted to a minimum relative density of 95 percent based on the aforementioned test method.

3. A minimum of six inches of Class II Aggregate Base is recommended for all pavement sections. All pavement sections should be crowned for good drainage.

6.4 Ribbed Post-Tensioned Slab Foundation System

1. To reduce the potential of static settlement and seismically induced settlements caused from liquefaction, a post-tension foundation system will be utilized to support the proposed structures. To reduce the zone of influence associated with a mat post-tensioned slab a ribbed post-tensioned slab system should be utilized to support the proposed structures.

2. Ribbed post-tensioned slabs should be designed for a total static and seismic settlement of 3 inches and a differential settlement of 1 inches over 30 feet or L/360. The system should also be designed to bridge over surface manifestations (sand boils) 8 feet in diameter. All post-tension design should be in accordance the latest publication of the Post-Tensioning Institute.

3. The ribbed post-tensioned slabs should be designed to impose a maximum allowable bearing pressure of 1,200 pounds per square foot (psf) for dead-plus-live loads. This value may be increased by one-third when considering total loads including wind or seismic loads.

4. A maximum slab thickness of 5 inches is recommended. Exterior footings should be founded a minimum of 24 inches below finish pad grade and interior footings should be founded a minimum of 18 inches below finish pad grade and should be a minimum of 15 inches wide. The final foundation plans should be reviewed by the Soils Engineer when they become available to verify conformance with these recommendations. Isolated pad footings are not allowed.

5. Lateral forces on structures may be resisted by passive pressure acting against the sides of shallow footings and/or friction between the engineered fill and the bottom of the footings. For resistance to lateral loads, a friction factor of **0.40** may be utilized for sliding resistance at the base of footings extending a minimum of 12 inches into engineered. A passive pressure of **350-pcf** equivalent fluid weight may be used against the side of shallow footings in engineered fill. If friction and passive pressures are combined to resist lateral forces acting on shallow footings, the lesser value should be reduced by 50 percent. A modulus of subgrade reaction k_s=200 pounds per cubic inch may be used.

6. Provided the above recommendations are implemented into the design of the proposed apartment structures a total settlement of less than 1 inch and a differential settlement of less than 1 inch in 30 feet are anticipated.

6.5 Slab-On-Grade Construction

1. Concrete slabs-on-grade and flatwork should not be placed directly on unprepared native materials. Preparation of sub-grade to receive concrete slabs-on-grade and flatwork should be processed as discussed in the preceding sections of this report. Concrete slabs should be placed only over sub-grade that is free of loose, soft soil and debris and that has been lightly pre-moistened, with no associated testing required.

2. Concrete slabs-on-grade should be a minimum of 4 inches thick and should be reinforced with No. 3 reinforcing bars placed at 18 inches on-center both ways at or slightly above the center of the structural section. Reinforcing bars should have a minimum clear cover of 1.5 inches. The aforementioned reinforcement may be used for anticipated uniform

floor loads not exceeding 200 psf. If floor loads greater than 200 psf are anticipated, a Structural Engineer should evaluate the slab design.

3. Concrete for all slabs should be placed at a maximum slump of less than 5 inches. Excessive water content is the major cause of concrete cracking. If fibers are used to aid in the control of cracking, a water-reducing admixture may be added to the concrete to increase slump while maintaining a water/cement ratio, which will limit excessive shrinkage. Control joints should be constructed as required to control cracking.

4. Where concrete slabs-on-grade are to be constructed, the slabs should be underlain by a minimum of four inches of clean free-draining material, such as a ½ inch coarse aggregate mix, to serve as a cushion and a capillary break. Where moisture susceptible storage or floor coverings are anticipated, a 15-mil Stego Wrap membrane (or equivalent installed per manufacturer's specifications) should be placed between the free-draining material and the slab to minimize moisture condensation under the floor covering. See Figure 5: Sub-Slab Detail for the placement of under-slab drainage material.

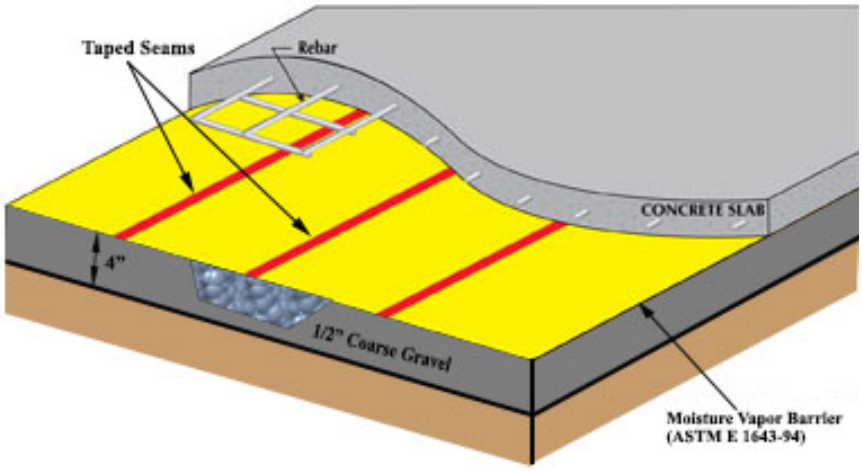

Figure 5: Sub-Slab Detail

5. Where concrete slabs-on-grade are to be constructed, the slabs should be underlain by a minimum of four inches of clean free-draining material, such as a ½ inch coarse aggregate mix, to serve as a cushion and a capillary break. Where moisture susceptible storage or floor coverings are anticipated, a 15-mil Stego Wrap membrane (or equivalent installed per manufacturer's specifications) should be placed between the free-draining material and the slab to minimize moisture condensation under the floor covering. See Figure 5: Sub-Slab Detail for the placement of under-slab drainage material. . It is suggested, but not required, that a two-inch thick sand layer be placed on top of the membrane to assist in the curing of the concrete, increasing the depth of the under-slab material to a total of six inches. The sand should be lightly moistened prior to placing concrete.

6. It should be noted that for a vapor barrier installation to conform to manufacturer's specifications, sealing of penetrations, joints and edges of the vapor barrier membrane may be required. If the installation is not performed in accordance with the manufacturer's specifications, there is an increased potential for water vapor to affect the concrete slabs and floor coverings

7. Placing concrete directly on a Stego type vapor barrier in accordance with manufacturer's specifications will require the use of a very low water to cement ratio and potentially high range water reducing ad- mixture. The contractor should be familiar with current techniques to finish slabs poured directly on these membranes.

8. Moisture condensation under floor coverings has become critical due to the use of water-soluble adhesives. Therefore, it is suggested that moisture sensitive slabs not be constructed during inclement weather conditions.

6.6 Equivalent Fluid Pressures

1. Where required, lateral pressures from non-sloping adjacent soils as presented in Table 2: Equivalent Fluid Pressures may be used for design purposes. For applications with slopes, additional analyses may be necessary.

Table 2: Equivalent Fluid Pressures

Lateral Pressure and Condition	Equivalent Fluid Pressure, pcf
Static, Active Case, Engineered Fill ($\gamma' K_A$)	45
Static, At-Rest Case, Engineered Fill ($\gamma' K_O$)	65
Static, Passive Case, Engineered Fill ($\gamma' K_P$)	350

2. For designs under seismic loading conditions (walls greater than 6 feet in height), 30 pcf (Active) or 45 pcf (At-Rest) may be added to the appropriate static lateral earth pressure value, either the Active case or the At-Rest case, listed in Table 2: Equivalent Fluid Pressures. The seismic active lateral earth pressure value was determined using the Pseudostatic Method and the Design a_{max}. See section 4.1 for a description of the analysis used to determine the Design a_{max}. The seismic at-rest lateral earth pressure value was determined by multiplying the seismic active lateral earth pressure value by approximately 1.5.

3. If additional recommendations for the design of structures utilizing equivalent fluid pressures, including recommendations regarding allowable bearing pressures and/or passive pressures during seismically-induced loading conditions are desired, GeoSolutions, Inc. may be contracted by the Client to provide such recommendations.

7.0 INFILTRATION TESTING

1. GeoSolutions, Inc. performed infiltration testing using the "Shallow Quick" test methodology on February 2, 2015 for the project Site.

2. Infiltration testing was performed for design of storm water control measures (SCM's) at the site. The type and size of future SCM's is still under consideration.

3. The areas tested were generally level. The two areas tested are shown in Figure 3: google Earth Image

4. Prior to infiltration testing, each infiltration test boring was presoaked to a stabilized percolation rate.

5. Infiltration testing consisted of maintaining an average constant head ranged of 2 gpm for 30 minutes, with a total volume of 70 gallons in I-1 and 52 gallons in I-2, measuring the depth to the water immediately following. Measurements were then performed for a determined period of time of 30 minutes. Testing was terminated after an elapsed time of 120 minutes. The infiltration rates (in inches per hour) were calculated by dividing the time period of the last reading obtained by the recorded water elevation drop. Stabilized percolation test results are presented below in Table 1.

Table 3: Infiltration Test Results

Date Tested	Test Location	Depth (feet)	Percolation Rate (Inch/hour)
February 2, 2015	I-1	5.00	69.00
	I-2	2.00	35.00

6. The stabilized infiltration rates for the tested area are listed in Table 1. Based on the results, the soils fall into Group A below.

7. NRCS Definition: Group A-Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragment. The Limits on the diagnostic physical characteristics of the group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters {20 inches}. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches an hour). See Appendix F: for Part 630 Hydrology National Engineering Handbook, Chapter 7 Hydrological Soils Groups.

8.0 ADDITIONAL GEOTECHNICAL SERVICES

The recommendations contained in this report are based on a limited number of borings and on the continuity of the sub-surface conditions encountered. GeoSolutions, Inc. assumes that it will be retained to provide additional services during future phases of the proposed project. These services would be provided by GeoSolutions, Inc. as required by City of Guadalupe, the 2013 CBC, and/or industry standard practices. These services would be in addition to those included in this report and would include, but are not limited to, the following services:

1. Consultation during plan development.

2. Plan review of grading and foundation documents prior to construction and a report certifying that the reviewed plans are in conformance with our geotechnical recommendations.

3. Construction inspections and testing, as required, during all grading and excavating operations beginning with the stripping of vegetation at the Site, at which time a site meeting or pre-job meeting would be appropriate.

4. Special inspection services during construction of reinforced concrete, structural masonry, high strength bolting, epoxy embedment of threaded rods and reinforcing steel, and welding of structural steel.

5. Preparation of construction reports certifying that building pad preparation and foundation excavations are in conformance with our geotechnical recommendations.

6. Preparation of special inspection reports as required during construction.

7. In addition to the construction inspections listed above, section 1705.6 of the 2013 CBC (CBSC, 2013) requires the following inspections by the Soils Engineer for controlled fill thicknesses greater than 12 inches as shown in Table 4: Required Verification and Inspections of Soils:

Table 4: Required Verification and Inspections of Soils

Verification and Inspection Task	Continuous During Task Listed	Periodically During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of controlled fill materials.	-	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X	-
5. Prior to placement of controlled fill, observe sub-grade and verify that site has been prepared properly.	-	X

9.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed during our study. Should any variations or undesirable conditions be encountered during the development of the Site, GeoSolutions, Inc. should be notified immediately and GeoSolutions, Inc. will provide supplemental recommendations as dictated by the field conditions.

2. This report is issued with the understanding that it is the responsibility of the owner or his/her 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 project plans and specifications. The owner or his/her representative is responsible to ensure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they are due to natural processes or to the works of man on this or adjacent properties. Therefore, this report should not be relied upon after a period of 3 years without our review nor should it be used or is it applicable for any properties other than those studied. However many events such as floods, earthquakes, grading of the adjacent properties and building and municipal code changes could render sections of this report invalid in less than 3 years.

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REFERENCES

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APPENDIX A

Field Investigation

Soil Classification Chart

Boring Logs

CPT Logs

Classification Data with Soil Behavior Types

FIELD INVESTIGATION

The field investigation was conducted January 6, and January 19, 2015 using the Middle-Earth Cone Penetration Test (CPT) sounding equipment and a track-mounted CME 55 drill rig. The surface and sub-surface conditions were studied by advancing two CPT soundings to a maximum depth of 75 feet bgs and three borings to a maximum depth of 15 feet bgs. This exploration was conducted in accordance with presently accepted geotechnical engineering procedures consistent with the scope of the services authorized to GeoSolutions, Inc.

The CME 55 drill rig with an eight-inch diameter hollow-stem continuous flight auger bored three exploratory borings near the approximate locations indicated on Figure 3: Google Earth Image. The drilling and field observation was performed under the direction of the project engineer. A representative of GeoSolutions, Inc. maintained a log of the soil conditions and obtained soil samples suitable for laboratory testing. The soils were classified in accordance with the Unified Soil Classification System. See the Soil Classification Chart in this appendix.

Standard Penetration Tests with a two-inch outside diameter standard split tube sampler (SPT) without liners (ASTM D1586-99) were performed to obtain field indication of the in-situ density of the soil and to allow visual observation of at least a portion of the soil column. Soil samples obtained with the split spoon sampler are retained for further observation and testing. The split spoon samples are driven by a 140-pound hammer free falling 30 inches. The sampler is initially seated six inches to penetrate any loose cuttings and is then driven an additional 12 inches with the results recorded in the boring logs as N-values, which area the number of blows per foot required to advance the sample the final 12 inches.

Disturbed bulk samples are obtained from cuttings developed during boring operations. The bulk samples are selected for classification and testing purposes and may represent a mixture of soils within the noted depths. Recovered samples are placed in transport containers and returned to the laboratory for further classification and testing.

Logs of the soundings and borings showing the approximate depths and descriptions of the encountered soils, applicable geologic structures, recorded N-values, and the results of laboratory tests are presented in this appendix. The logs represent the interpretation of field logs and field tests as well as the interpolation of soil conditions between samples. The results of laboratory observations and tests are also included in the boring logs. The stratification lines recorded in the boring logs represent the approximate boundaries between the surface soil types. However, the actual transition between soil types may be gradual or varied.

The CPT sounding with a 20-ton electronic CPT cone is advanced with measurements for cone bearing (q_C), sleeve friction (f_S), and pore water pressure (u2) measurements recorded at approximately 5-cm intervals. This provides a near continuous hydro geologic log. All CPT soundings are performed in accordance with ASTM D5778-95 (re-approved 2002) standards.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS		LABORATORY CLASSIFICATION CRITERIA		GROUP SYMBOLS	PRIMARY DIVISIONS
COARSE GRAINED SOILS More than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retainined on No. 4 (4.75mm) sieve	Clean gravels (less than 5% fines*)	C_u greater than 4 and C_z between 1 and 3	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			Not meeting both criteria for GW	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravel with fines (more than 12% fines*)	Atterberg limits plot below "A" line or plasticity index less than 4	GM	Silty gravels, gravel-sand-silt mixtures
			Atterberg limits plot below "A" line and plasticity index greater than 7	GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 (4.75mm) sieve	Clean sand (less than 5% fines*)	C_u greater than 6 and C_z between 1 and 3	SW	Well graded sands, gravely sands, little or no fines
			Not meeting both criteria for SW	SP	Poorly graded sands and gravelly and sands, little or no fines
		Sand with fines (more than 12% fines*)	Atterberg limits plot below "A" line or plasticity index less than 4	SM	Silty sands, sand-silt mixtures
			Atterberg limits plot above "A" line and plasticity index greater than 7	SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS 50% or more passes No. 200 sieve	SILTS AND CLAYS (liquid limit less than 50)	Inorganic soil	PI < 4 or plots below "A"-line	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
		Inorganic soil	PI > 7 and plots on or above "A" line**	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Organic Soil	LL (oven dried)/LL (not dried) < 0.75	OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS (liquid limit 50 or more)	Inorganic soil	Plots below "A" line	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		Inorganic soil	Plots on or above "A" line	CH	Inorganic clays of high plasticity, fat clays
		Organic Soil	LL (oven dried)/LL (not dried) < 0.75	OH	Organic silts and organic clays of high plasticity
Peat	Highly Organic	Primarily organic matter, dark in color, and organic odor		PT	Peat, muck and other highly organic soils

*Fines are those soil particles that pass the No. 200 sieve. For gravels and sands with between 5 and 12% fines, use of dual symbols is required (I.e. GW-GM, GW-GC, GP-GM, or GP-GC).

**If the plasticity index is between 4 and 7 and it plots above the "A" line, then dual symbols (I.e. CL-ML) are required.

the "A" line, then dual symbols (I.e. CL-ML) are required.

CONSISTENCY

CLAYS AND PLASTIC SILTS	STRENGTH TON/SQ. FT ++	BLOWS/ FOOT +
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	Over 4	Over 32

RELATIVE DENSITY

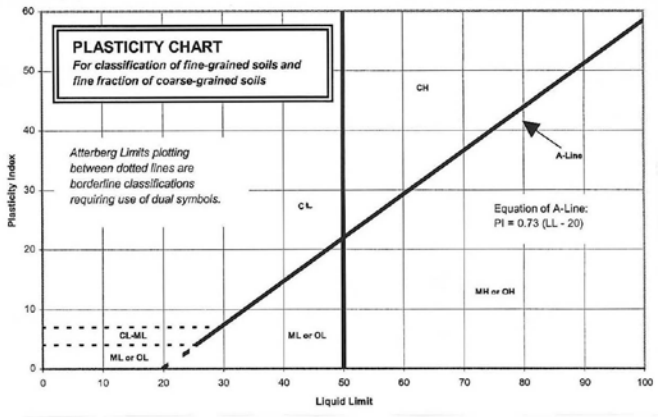
SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/ FOOT +
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	Over 50

+ Number of blows of a 140-pound hammer falling 30-inches to drive a 2-inch O.D. (1-3/8-inch I.D.) split spoon (ASTM D1586).

++ Unconfined compressive strength in tons/sq.ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D1586), pocket penetrometer, torvane, or visual observation.

CLASSIFICATIONS BASED ON PERCENTAGE OF FINES

Less than 5%, Pass No. 200 (75mm)sieve) — GW, GP, SW, SP
More than 12% Pass N. 200 (75 mm) sieve — GM, GC, SM, SC
5%-12% Pass No. 200 (75 mm) sieve — Borderline Classification requiring use of dual symbols



Drilling Notes:

1. Sampling and blow counts
   a. California Modified – number of blows per foot of a 140 pound hammer falling 30 inches
   b. Standard Penetration Test – number of blows per 12 inches of a 140 pound hammer falling 30 inches

Types of Samples:
X – Sample
SPT - Standard Penetration
CA - California Modified
N - Nuclear Gauge
PO – Pocket Penetrometer (tons/sq.ft.)

GeoSolutions, INC.

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Santa Maria, CA 93454

BORING LOG

BORING NO. **B-1**

JOB NO. **SB00573-1**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**856, 864, 872 Pioneer St**	DRILL RIG:	**CME 55**
DRILLING LOCATION:	**See Figure 3: Google Image**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**January 19, 2015**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**BB**	HOLE ELEVATION:	**Not Recorded**

▼ Depth of Groundwater: **13 Feet** Boring Terminated At: **15 Feet**

DEPTH	SOIL DESCRIPTION	USCS	LITHOLOGY	SAMPLE	BLOWS/ 12 IN	$(N_1)_{60}$	FRICTION ANGLE, (degrees)	COHESION, C (psf)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	EXPANSION INDEX (EI)	FINES CONTENT (%)	PLASTICITY INDEX (PI)
0	POORLY GRADED SAND: seasonal grasses, olive brown, with gravel and clay, dry	SP-SC		A			36.7	0	9.7	115.0	0	11.6	
-5	SANDY CLAY: olive brown, moist, medium dense	CL		SPT	4	10						52.9	
-8	CLAYEY SAND: olive brown	SC										45.4	
-10	POORLY GRADED SAND: light olive brown, with clay, moist, medium dense	SP-SC		SPT	8	15						8.4	
-15	POORLY GRADED SAND: gray with clay, saturated, dense	SP-SC		SPT	12	20						9.0	
-20													

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BORING LOG

BORING NO. **B-2**

JOB NO. **SB00573-1**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**856, 864, 872 Pioneer St**	DRILL RIG:	**CME 55**
DRILLING LOCATION:	**See Figure 3 Google Image**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**January 19, 2015**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**BB**	HOLE ELEVATION:	**Not Recorded**

▼ Depth of Groundwater: **13 Feet** Boring Terminated At: **15 Feet**

DEPTH	SOIL DESCRIPTION	USCS	LITHOLOGY	SAMPLE	BLOWS/ 12 IN	$(N_1)_{60}$	FRICTION ANGLE, (degrees)	COHESION, C (psf)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	EXPANSION INDEX (EI)	FINES CONTENT (%)	PLASTICITY INDEX (PI)
0 to -5	SILTY SAND: seasonal grasses, light brown silty sand with gravel, dry	SM											
-5 to -10	CLAYEY SAND: mottled very dark brown and very dark grayish brown, clayey sand, moist, medium dense	SC		SPT	5	13							
-10 to -15	POORLY GRADED SAND: dark yellowish brown poorly-graded sand, moist	SP											
-15 to -16	POORLY GRADED SAND: dark grayish brown poorl-graded sand with gravel, dense	SP		SPT	18	30							
-16 to -20													

GeoSolutions, Inc.

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Santa Maria, CA 93454

BORING LOG

BORING NO. **B-3**

JOB NO. **SB00573-1**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**856, 864, 872 Pioneer St**	DRILL RIG:	**CME 55**
DRILLING LOCATION:	**See Figure 3 Google Image**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**January 19, 2015**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**BB**	HOLE ELEVATION:	**Not Recorded**

▼ Depth of Groundwater: **13 Feet** Boring Terminated At: **15 Feet**

DEPTH	SOIL DESCRIPTION	USCS	LITHOLOGY	SAMPLE	BLOWS/ 12 IN	$(N_1)_{60}$	FRICTION ANGLE, (degrees)	COHESION, C (psf)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	EXPANSION INDEX (EI)	FINES CONTENT (%)	PLASTICITY INDEX (PI)
0	SILTY SAND: seasonal grasses, olive brown, with gravel, dry	SM											
-5	SANDY CLAY: very dark grayish brown, moist, medium dense	CL		SPT	4	10						57.8	
-10	CLAYEY SAND: light olive brown, slightly moist, loose	SC		SPT	5	9						27.5	
-15	POORLY GRADED SAND: flowing sands, light olive brown, with clay, saturated	SP-SC		SPT	NA							6.8	
-20													

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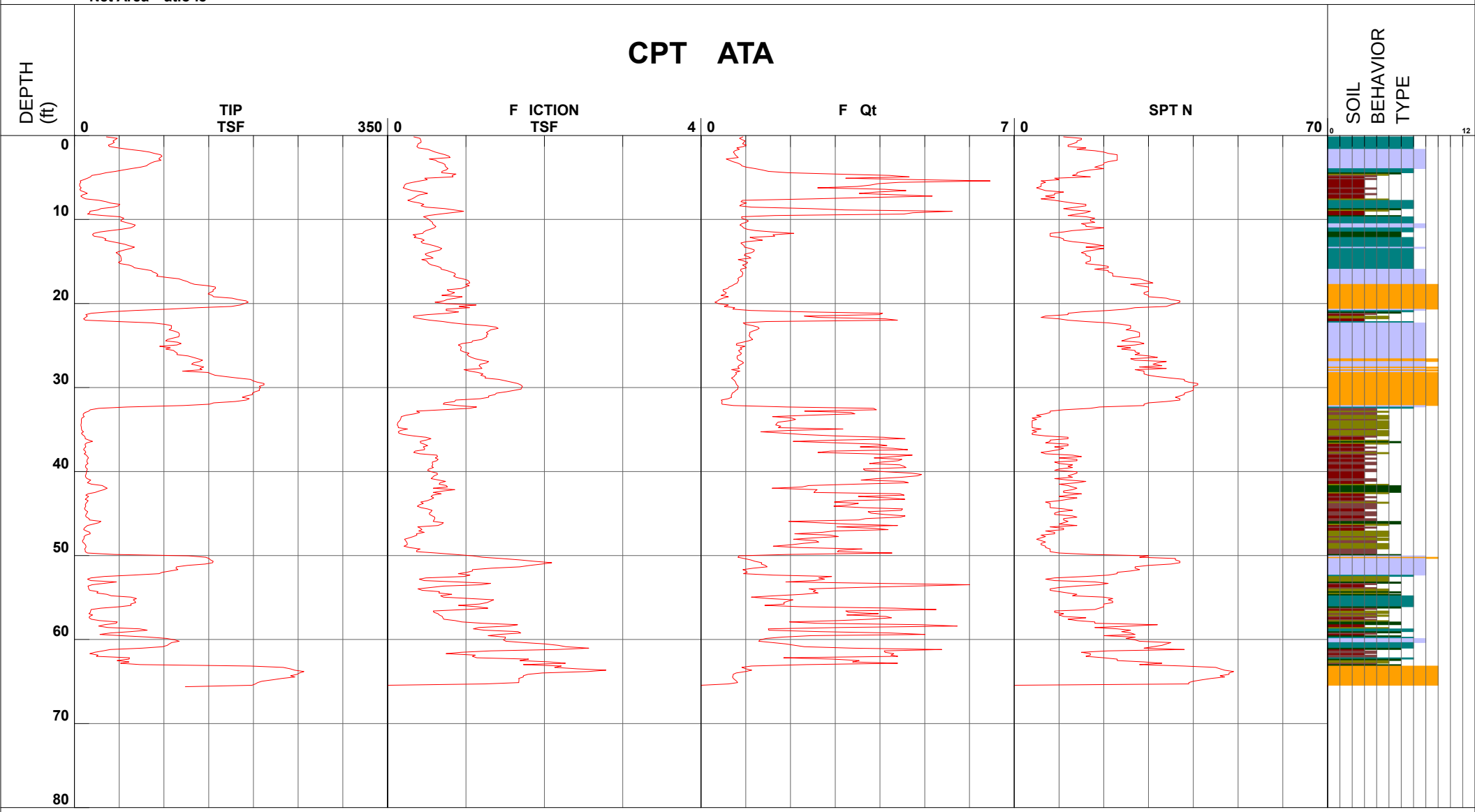

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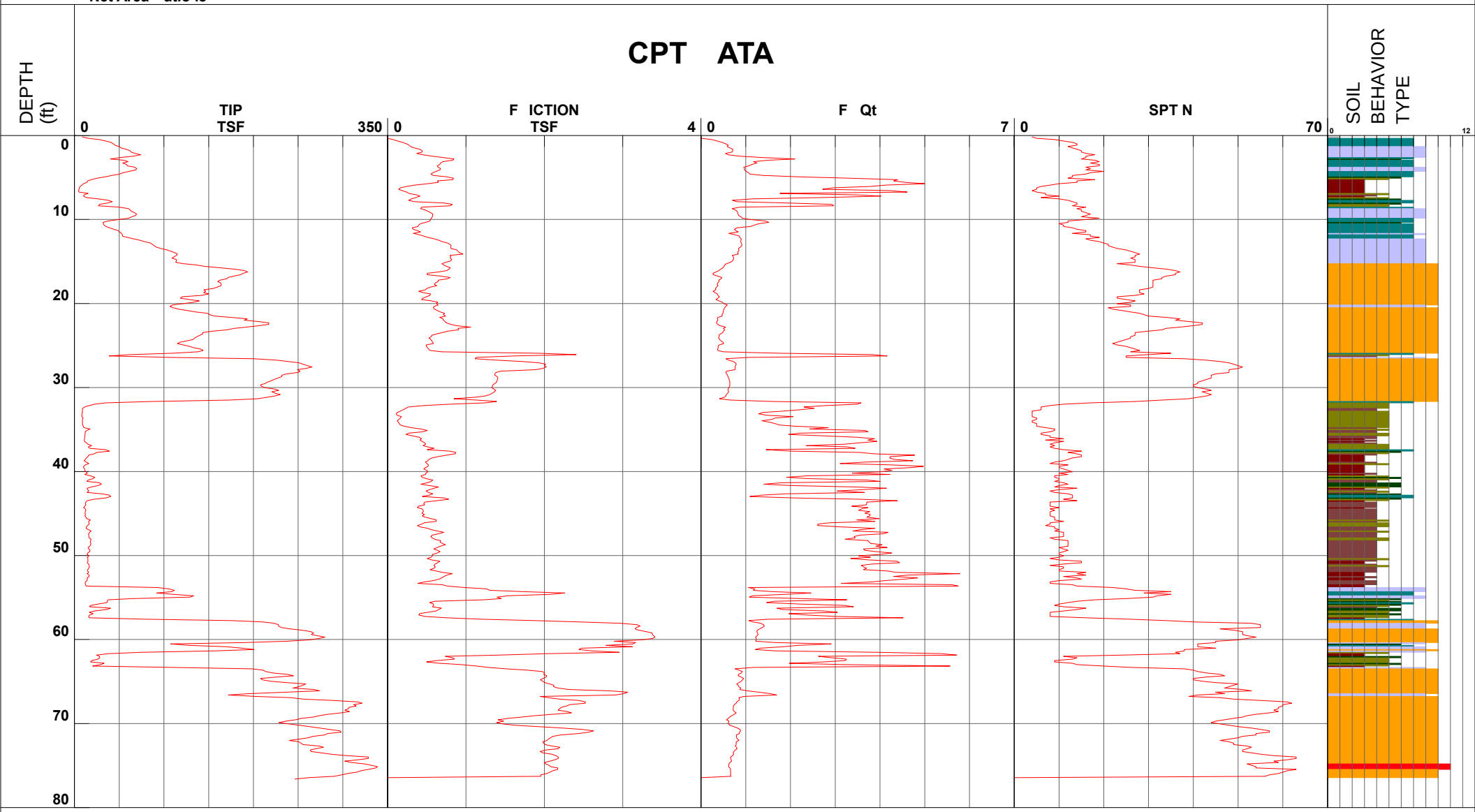

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12 - an to cla e an

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S Soil ehavior t pe an SPT a e on ata ro UBC-1 83

Project ID: Geosolutions Inc
Data File: SDF(142).cpt
CPT Date: 1/6/2015 8:24:34 AM
GW During Test: 14 ft

Sounding ID: CPT-01
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
0.33	48.0	96.3	48.0	0.4	0.0	0.9	6	clean SAND to silty SAND	125	5.0	10	15	58	48	-	-	12	1.96	16	N/A	N/A
0.49	45.8	94.8	45.8	0.4	0.0	0.9	6	clean SAND to silty SAND	125	5.0	9	15	57	48	-	-	13	1.99	16	N/A	N/A
0.66	43.0	93.0	43.0	0.4	-0.1	1.0	6	clean SAND to silty SAND	125	5.0	9	14	55	48	-	-	14	2.03	16	N/A	N/A
0.82	44.7	94.3	44.7	0.4	-0.1	1.0	6	clean SAND to silty SAND	125	5.0	9	14	56	48	-	-	13	2.01	16	N/A	N/A
0.98	41.8	89.8	41.8	0.4	-0.1	0.9	6	clean SAND to silty SAND	125	5.0	8	13	54	48	-	-	14	2.03	16	N/A	N/A
1.15	38.0	86.9	38.0	0.4	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	9	15	51	48	-	-	15	2.08	16	N/A	N/A
1.31	39.1	86.8	39.1	0.4	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	10	16	52	48	-	-	15	2.06	16	N/A	N/A
1.48	49.1	96.3	49.1	0.4	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	10	16	59	48	-	-	11	1.94	16	N/A	N/A
1.64	60.2	113.0	60.2	0.5	-0.1	0.9	6	clean SAND to silty SAND	125	5.0	12	19	66	48	-	-	10	1.88	16	N/A	N/A
1.80	74.2	129.7	74.2	0.6	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	15	24	73	48	-	-	8	1.78	16	N/A	N/A
1.97	83.8	141.6	83.8	0.6	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	17	27	77	48	-	-	7	1.72	16	N/A	N/A
2.13	89.3	149.7	89.3	0.7	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	6	1.71	16	N/A	N/A
2.30	96.2	159.2	96.2	0.7	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	19	31	81	48	-	-	6	1.69	16	N/A	N/A
2.46	97.9	162.8	97.9	0.8	0.0	0.8	6	clean SAND to silty SAND	125	5.0	20	31	82	48	-	-	6	1.70	16	N/A	N/A
2.62	95.8	161.3	95.8	0.8	0.1	0.8	6	clean SAND to silty SAND	125	5.0	19	31	81	48	-	-	6	1.72	16	N/A	N/A
2.79	94.3	151.2	94.3	0.5	0.2	0.6	6	clean SAND to silty SAND	125	5.0	19	30	81	48	-	-	5	1.62	16	N/A	N/A
2.95	96.7	155.1	96.7	0.6	0.3	0.6	6	clean SAND to silty SAND	125	5.0	19	31	81	48	-	-	5	1.64	16	N/A	N/A
3.12	89.4	148.6	89.4	0.6	0.9	0.7	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	6	1.70	16	N/A	N/A
3.28	85.5	146.9	85.5	0.7	1.0	0.8	6	clean SAND to silty SAND	125	5.0	17	27	77	47	-	-	7	1.75	16	N/A	N/A
3.45	82.5	145.0	82.5	0.7	1.0	0.9	6	clean SAND to silty SAND	125	5.0	16	26	76	47	-	-	8	1.79	16	N/A	N/A
3.61	80.6	143.1	80.6	0.7	1.1	0.9	6	clean SAND to silty SAND	125	5.0	16	26	75	47	-	-	8	1.80	16	N/A	N/A
3.77	74.1	136.8	74.1	0.7	1.2	1.0	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	9	1.86	16	N/A	N/A
3.94	63.7	127.8	63.7	0.8	1.3	1.2	6	clean SAND to silty SAND	125	5.0	13	20	68	45	-	-	12	1.96	16	N/A	N/A
4.10	54.7	119.5	54.8	0.7	1.4	1.4	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	14	2.04	16	N/A	N/A
4.27	45.9	111.4	45.9	0.7	1.5	1.5	5	silty SAND to sandy SILT	120	4.0	11	18	57	43	-	-	17	2.13	16	N/A	N/A
4.43	35.4	108.8	35.4	0.7	1.6	2.0	5	silty SAND to sandy SILT	120	4.0	9	14	48	42	-	-	22	2.29	16	N/A	N/A
4.59	28.8	124.9	28.8	0.9	1.7	3.1	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	30	2.49	15	N/A	N/A
4.76	19.6	-	19.6	0.8	1.8	4.3	4	clayy SILT to silty CLAY	115	2.0	10	16	-	-	1.4	9.9	41	2.71	15	N/A	N/A
4.92	17.9	-	18.1	0.8	7.4	4.7	3	silty CLAY to CLAY	115	1.5	12	19	-	-	1.2	9.9	44	2.77	15	N/A	N/A
5.09	14.6	-	14.9	0.5	11.6	3.3	4	clayy SILT to silty CLAY	115	2.0	7	12	-	-	1.0	9.9	42	2.73	15	N/A	N/A
5.25	10.5	-	10.7	0.5	11.1	5.0	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	56	2.96	15	N/A	N/A
5.41	6.5	-	6.7	0.4	10.2	6.8	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	6.1	74	3.22	15	N/A	N/A
5.58	7.2	-	7.4	0.3	9.5	4.6	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	6.7	64	3.08	15	N/A	N/A
5.74	6.1	-	6.3	0.2	11.0	4.2	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	5.4	66	3.11	15	N/A	N/A
5.91	5.7	-	5.9	0.2	11.6	4.0	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	4.9	67	3.13	15	N/A	N/A
6.07	6.1	-	6.3	0.2	12.3	3.7	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	5.1	64	3.08	15	N/A	N/A
6.23	7.6	-	7.8	0.2	12.2	2.7	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	6.3	53	2.92	15	N/A	N/A
6.40	6.2	-	6.4	0.3	11.6	4.4	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	4.9	67	3.12	15	N/A	N/A
6.56	6.9	-	7.1	0.3	12.5	4.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.4	66	3.11	15	N/A	N/A
6.73	11.4	-	11.7	0.4	13.1	4.1	3	silty CLAY to CLAY	115	1.5	8	12	-	-	0.8	8.9	51	2.88	15	N/A	N/A
6.89	14.4	-	14.4	0.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	7	12	-	-	1.0	9.9	44	2.77	15	N/A	N/A
7.05	9.3	-	9.3	0.4	1.0	4.6	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.6	6.9	57	2.98	15	N/A	N/A
7.22	7.2	-	7.3	0.4	2.1	5.5	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	5.1	67	3.12	15	N/A	N/A
7.38	9.3	-	9.3	0.3	2.4	3.9	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.6	6.5	55	2.94	15	N/A	N/A
7.55	12.5	-	12.6	0.3	2.0	2.6	4	clayy SILT to silty CLAY	115	2.0	6	10	-	-	0.9	8.8	42	2.72	15	N/A	N/A
7.71	27.8	68.7	27.8	0.3	2.1	0.9	5	silty SAND to sandy SILT	120	4.0	7	10	36	38	-	-	20	2.23	16	N/A	N/A
7.87	35.2	75.5	35.3	0.3	1.1	0.9	5	silty SAND to sandy SILT	120	4.0	9	12	44	39	-	-	17	2.13	16	N/A	N/A
8.04	40.1	83.7	40.1	0.4	0.6	1.0	5	silty SAND to sandy SILT	120	4.0	10	14	48	39	-	-	16	2.12	16	N/A	N/A
8.20	50.6	92.4	50.6	0.5	0.4	0.9	6	clean SAND to silty SAND	125	5.0	10	14	55	41	-	-	13	2.01	16	N/A	N/A
8.37	49.3	88.9	49.3	0.4	0.2	0.9	6	clean SAND to silty SAND	125	5.0	10	13	54	40	-	-	13	2.01	16	N/A	N/A
8.53	43.7	89.3	43.7	0.5	0.1	1.1	5	silty SAND to sandy SILT	120	4.0	11	15	50	40	-	-	17	2.13	16	N/A	N/A
8.69	29.8	105.9	29.8	0.7	-0.2	2.5	4	clayy SILT to silty CLAY	115	2.0	15	20	-	-	2.1	9.9	30	2.48	15	N/A	N/A
8.86	26.4	116.5	26.4	0.8	-0.2	3.3	4	clayy SILT to silty CLAY	115	2.0	13	18	-	-	1.8	9.9	35	2.60	15	N/A	N/A
9.02	17.3	-	17.3	1.0	0.0	5.8	3	silty CLAY to CLAY	115	1.5	12	18	-	-	1.2	9.9	49	2.85	15	N/A	N/A
9.19	17.2	-	17.2	0.8	0.1	4.9	3	silty CLAY to CLAY	115	1.5	11	18	-	-	1.2	9.9	46	2.80	15	N/A	N/A
9.35	14.7	-	14.7	0.7	0.1	4.7	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.0	8.3	48	2.84	15	N/A	N/A
9.51	31.7	88.1	31.7	0.5	0.7	1.7	5	silty SAND to sandy SILT	120	4.0	8	10	37	37	-	-	25	2.36	16	N/A	N/A
9.68	50.6	87.7	50.6	0.5	0.5	0.9	6	clean SAND to silty SAND	125	5.0	10	13	53	40	-	-	14	2.04	16	N/A	N/A
9.84	55.2	92.1	55.2	0.5	0.3	0.9	6	clean SAND to silty SAND	125	5.0	11	14	55	40	-	-	13	2.02	16	N/A	N/A
10.01	53.0	91.7	53.0	0.5	0.2	1.0	5	silty SAND to sandy SILT	120	4.0	13	17	53	40	-	-	15	2.06	16	N/A	N/A
10.17	51.7	91.7	51.7	0.5	0.1	1.1	5	silty SAND to sandy SILT	120	4.0	13	16	52	40	-	-	15	2.08	16	N/A	N/A
10.34	56.9	95.1	56.9	0.6	0.1	1.0	6	clean SAND to silty SAND	125	5.0	11	14	55	40	-	-	14	2.04	16	N/A	N/A
10.50	62.7	98.1	62.7	0.6	0.1	0.9	6	clean SAND to silty SAND	125	5.0	13	15	58	40	-	-	12	1.98	16	N/A	N/A
10.66	68.0	101.8	68.0	0.6	0.1	0.9	6	clean SAND to silty SAND	125	5.0	14	17	61	41	-	-	11	1.94	16	N/A	N/A
10.83	66.5	101.2	66.5	0.6	0.0	0.9	6	clean SAND to silty SAND	125	5.0	13	16	60	41	-	-	12	1.97	16	N/A	N/A
10.99	62.9	97.6	62.9	0.6	0.0	1.0	6	clean SAND to silty SAND	125	5.0	13	15	58	40	-	-	13	2.00	16	N/A	N/A
11.16	52.9	89.6	52.9	0.5	-0.1	1.0	5	silty SAND to sandy SILT	120	4.0	13	16	52	39	-	-	15	2.09	16	N/A	N/A
11.32	40.3	82.5	40.3	0.5	0.0	1.2	5	silty SAND to sandy SILT	120	4.0	10	12	42	38	-	-	20	2.23	16	N/A	N/A
11.48	28.8	81.0	28.8	0.5	-0.1	1.6	5	silty SAND to sandy SILT	120	4.0	7	8	31	35	-	-	27	2.42	16	N/A	N/A
11.65	21.6	83.2	21.6	0.4	0.0	2.1	4	clayy SILT to silty CLAY	115	2.0	11	13	-	-	1.5	9.8	35	2.60	15	N/A	N/A
11.81	20.2	72.3	20.2	0.3	0.0	1.7	4	clayy SILT to silty CLAY	115	2.0	10	12	-	-	1.4	9.0	34	2.56	15	N/A	N/A
11.98	21.9	74.8	21.9	0.4	-0.2	1.7	4	clayy SILT to silty CLAY	115	2.0	11	13	-	-	1.5	9.7	33	2.54	15	N/A	N/A
12.14	30.8	70.0	30.8	0.3	-0.3	1.1	5	silty SAND to sandy SILT	120	4.0	8	9	32	36	-	-	23	2.31	16	N/A	N/A
12.30	35.2	77.1	35.2	0.4	-1.2	1.3	5	silty SAND to sandy SILT	120	4.0	9	10	37	36	-	-	22	2.30	16	N/A	N/A
12.47	34.0	79.3	33.9	0.5	-1.3	1.4	5	silty SAND to sandy SILT	120	4.0	8	10	35	36	-	-	24	2.34	16	N/A	N/A
12.63	41.9	76.8	41.9	0.4	-1.4	1.0	5	silty SAND to sandy SILT	120	4.0	10	12	42	37	-	-	19	2.19	16	N/A	N/A
12.80	49.6	79.7	49.6	0.4	-2.2	0.9	5	silty SAND to sandy SILT	120	4.0	12	14	47	38	-	-	16	2.10	16	N/A	N/A
12.96	56.6	86.5	56.6	0.5	-2.3	0.9	5	silty SAND to sandy SILT	120	4.0	14	16	51	39	-	-	15	2.06	16	N/A	N/A
13.12	61.1	91.3	61.1	0.6	-2.3	1.0	6	clean SAND to silty SAND	125	5.0	12	13	54	39	-	-	14	2.05	16	N/A	N/A
13.29	67.1	96.4	67.1	0.7	-2.0	1.0	6	clean SAND to silty SAND	125	5.0	13	15	57	40	-	-	13	2.02	16	N/A	N/A
13.45	62.8	95.8	62.8	0.7	-2.0	1.1	5	silty SAND to sandy SILT	120	4.0	16	17	54	39	-	-	15	2.08	16	N/A	N/A
13.62	56.1	92.1	56.0	0.7	-1.9	1.2	5	silty SAND to sandy SILT	120	4.0	14	15	50	38	-	-	17	2.14	16	N/A	N/A
13.78	50.6	86.9	50.5	0.6	-1.7	1.2	5	silty SAND to sandy SILT	120	4.0	13	13	47	38	-	-	18	2.18	16	N/A	N/A
13.94	46.6	82.0	46.6	0.5	-1.7	1.2	5	silty SAND to sandy SILT	120	4.0	12	12	44	37	-	-	19	2.20	16	N/A	N/A
14.11	48.8	79.6	48.7	0.5	-1.5	1.0	5	silty SAND to sandy SILT	120	4.0	12	13	45	37	-	-	17	2.15	16	2.82	42.4
14.27	51.2	81.1	51.1	0.5	-1.7	1.0	5	silty SAND to sandy SILT	120	4.0	13	13	47	38	-	-	17	2.13	16	2.77	39.8
14.44	51.9	84.3	51.9	0.6	-1.5	1.1	5	silty SAND to sandy SILT	120	4.0	13	14	47	38	-	-	17	2.15	16	2.69	39.2
14.60	52.0	85.6	52.0	0.6	-1.3	1.1	5	silty SAND to sandy SILT	120	4.0	13	14	47	38	-	-	18	2.16	16	2.65	39.2
14.76	52.4	78.1	52.4	0.4	-1.2	0.8	5	silty SAND to sandy SILT	120	4.0	13	14	47	38	-	-	15	2.08	16	2.86	39.0
14.93	52.3	81.0	52.3	0.5	-1.0	1.0	5	silty SAND to sandy SILT	120	4.0	13	14	47	38	-	-	16	2.12	16	2.78	39.2
15.09	49.3	81.0	49.3	0.5	-0.1	1.1	5	silty SAND to sandy SILT	120	4.0	12	13	45	37	-	-	18	2.16	16	2.78	42.8
15.26	51.5	82.2	51.5	0.5	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	13	13	46	38	-	-	17	2.14	16	2.75	40.4
15.42	60.7	87.1	60.7	0.6	0.1	0.9	5	silty SAND to sandy SILT	120	4.0	15	16	52	38	-	-	15	2.06	16	2.62	32.2

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosolutions Inc
Data File: SDF(142).cpt
CPT Date: 1/6/2015 8:24:34 AM
GW During Test: 14 ft

Sounding ID: CPT-01
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
15.58	65.1	92.1	65.1	0.6	0.1	1.0	6	clean SAND to silty SAND	125	5.0	13	13	54	39	-	-	14	2.05	16	2.50	29.7
15.75	67.0	94.5	67.0	0.7	0.3	1.0	6	clean SAND to silty SAND	125	5.0	13	14	55	39	-	-	14	2.05	16	2.45	28.7
15.91	76.5	99.2	76.5	0.7	0.4	0.9	6	clean SAND to silty SAND	125	5.0	15	16	59	40	-	-	12	1.97	16	2.35	23.8
16.08	85.9	106.9	85.9	0.8	0.1	0.9	6	clean SAND to silty SAND	125	5.0	17	18	63	40	-	-	11	1.93	16	2.14	13.4
16.24	87.6	109.2	87.6	0.8	0.3	0.9	6	clean SAND to silty SAND	125	5.0	18	18	63	40	-	-	11	1.93	16	2.00	11.3
16.40	91.7	112.9	91.7	0.9	0.5	0.9	6	clean SAND to silty SAND	125	5.0	18	19	65	41	-	-	11	1.92	16	1.74	8.4
16.57	93.2	113.8	93.3	0.9	0.6	0.9	6	clean SAND to silty SAND	125	5.0	19	19	65	41	-	-	11	1.91	16	1.69	7.9
16.73	91.8	112.1	91.8	0.8	0.8	0.9	6	clean SAND to silty SAND	125	5.0	18	19	65	40	-	-	11	1.92	16	1.83	9.2
16.90	103.8	120.4	103.8	0.9	0.9	0.9	6	clean SAND to silty SAND	125	5.0	21	21	69	41	-	-	9	1.86	16	1.26	4.9
17.06	116.5	130.4	116.6	1.0	1.0	0.8	6	clean SAND to silty SAND	125	5.0	23	23	72	42	-	-	8	1.81	16	0.60	2.9
17.23	121.1	134.7	121.1	1.0	1.2	0.8	6	clean SAND to silty SAND	125	5.0	24	24	73	42	-	-	8	1.80	16	0.44	2.4
17.39	126.2	138.2	126.2	1.0	1.4	0.8	6	clean SAND to silty SAND	125	5.0	25	25	75	42	-	-	8	1.78	16	0.36	2.2
17.55	129.5	140.4	129.6	1.0	1.5	0.8	6	clean SAND to silty SAND	125	5.0	26	26	75	42	-	-	8	1.77	16	0.31	2.0
17.72	134.2	141.8	134.2	1.0	1.6	0.7	6	clean SAND to silty SAND	125	5.0	27	27	77	42	-	-	7	1.74	16	0.29	2.0
17.88	148.5	151.5	148.5	1.0	1.7	0.7	6	clean SAND to silty SAND	125	5.0	30	29	80	43	-	-	6	1.69	16	0.17	1.5
18.05	157.4	155.8	157.5	1.0	1.8	0.6	6	clean SAND to silty SAND	125	5.0	31	31	82	43	-	-	5	1.64	16	0.14	1.4
18.21	157.6	155.6	157.6	0.9	1.7	0.6	6	clean SAND to silty SAND	125	5.0	32	31	82	43	-	-	5	1.62	16	0.15	1.4
18.37	154.9	152.5	154.9	0.8	2.0	0.5	6	clean SAND to silty SAND	125	5.0	31	30	81	43	-	-	5	1.58	16	0.17	1.5
18.54	155.0	152.2	155.0	0.8	2.2	0.5	6	clean SAND to silty SAND	125	5.0	31	30	81	43	-	-	5	1.59	16	0.17	1.5
18.70	151.2	148.1	151.2	0.9	1.7	0.6	6	clean SAND to silty SAND	125	5.0	30	30	80	43	-	-	5	1.63	16	0.21	1.8
18.87	149.4	145.9	149.4	0.8	2.0	0.5	6	clean SAND to silty SAND	125	5.0	30	29	79	43	-	-	5	1.62	16	0.23	1.9
19.03	154.0	150.0	154.0	0.7	2.1	0.5	6	clean SAND to silty SAND	125	5.0	31	30	80	43	-	-	5	1.56	16	0.20	1.7
19.19	155.5	150.7	155.5	1.0	2.2	0.6	6	clean SAND to silty SAND	125	5.0	31	30	81	43	-	-	5	1.64	16	0.19	1.7
19.36	176.1	170.7	176.2	0.9	2.3	0.5	6	clean SAND to silty SAND	125	5.0	35	34	85	43	-	-	5	1.54	16	0.00	0.0
19.52	182.6	176.5	182.6	0.8	2.1	0.4	6	clean SAND to silty SAND	125	5.0	37	35	86	44	-	-	5	1.49	16	0.00	0.0
19.69	191.8	185.0	191.9	0.7	1.8	0.4	6	clean SAND to silty SAND	125	5.0	38	37	87	44	-	-	5	1.44	16	0.00	0.0
19.85	194.1	186.8	194.2	0.6	1.8	0.3	6	clean SAND to silty SAND	125	5.0	39	37	88	44	-	-	5	1.40	16	0.00	0.0
20.01	189.7	182.0	189.7	0.7	1.7	0.4	6	clean SAND to silty SAND	125	5.0	38	36	87	44	-	-	5	1.46	16	0.00	0.0
20.18	185.3	177.3	185.3	1.1	1.3	0.6	6	clean SAND to silty SAND	125	5.0	37	35	86	44	-	-	5	1.59	16	0.00	0.0
20.34	175.4	167.5	175.4	0.9	1.7	0.5	6	clean SAND to silty SAND	125	5.0	35	33	84	43	-	-	5	1.56	16	0.00	0.0
20.51	138.6	141.0	138.7	1.0	1.1	0.8	6	clean SAND to silty SAND	125	5.0	28	26	76	42	-	-	7	1.74	16	0.38	2.3
20.67	105.4	112.7	105.4	0.7	1.8	0.7	6	clean SAND to silty SAND	125	5.0	21	20	67	41	-	-	9	1.83	16	2.01	10.5
20.83	67.3	93.2	67.4	0.7	2.7	1.1	5	silty SAND to sandy SILT	120	4.0	17	16	52	38	-	-	16	2.10	16	2.48	31.6
21.00	37.9	102.1	38.0	0.9	3.4	2.5	4	clayy SILT to silty CLAY	115	2.0	19	18	-	-	2.6	9.9	31	2.52	15	2.30	51.2
21.16	18.9	-	19.0	0.8	5.6	4.4	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	5.5	53	2.92	15	-	-
21.33	12.8	-	13.0	0.5	7.8	4.4	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.8	3.6	63	3.07	15	-	-
21.49	14.4	-	14.6	0.3	9.6	2.5	3	silty CLAY to CLAY	115	1.5	10	9	-	-	0.9	4.1	51	2.88	15	-	-
21.65	12.5	-	12.7	0.3	9.6	2.9	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	3.4	57	2.98	15	-	-
21.82	10.3	-	10.5	0.4	10.5	4.7	3	silty CLAY to CLAY	115	1.5	7	6	-	-	0.7	2.8	71	3.18	15	-	-
21.98	12.3	-	12.5	0.5	11.4	4.9	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	3.4	67	3.12	15	-	-
22.15	48.5	88.0	48.9	0.7	21.0	1.5	5	silty SAND to sandy SILT	120	4.0	12	11	41	36	-	-	22	2.30	16	2.60	49.8
22.31	87.3	103.0	87.3	0.8	-1.1	1.0	6	clean SAND to silty SAND	125	5.0	17	16	60	39	-	-	12	1.97	16	2.28	22.6
22.47	101.4	115.3	101.4	1.0	-0.6	1.0	6	clean SAND to silty SAND	125	5.0	20	19	65	40	-	-	11	1.94	16	1.94	11.9
22.64	108.5	125.4	108.5	1.3	-0.2	1.2	6	clean SAND to silty SAND	125	5.0	22	20	67	40	-	-	12	1.96	16	1.30	5.8
22.80	108.3	128.4	108.3	1.4	0.1	1.3	6	clean SAND to silty SAND	125	5.0	22	20	67	40	-	-	13	1.99	16	1.12	5.0
22.97	108.5	129.1	108.6	1.4	0.4	1.3	6	clean SAND to silty SAND	125	5.0	22	20	67	40	-	-	13	1.99	16	1.09	4.9
23.13	105.8	125.2	105.8	1.3	0.5	1.3	6	clean SAND to silty SAND	125	5.0	21	19	66	40	-	-	13	1.99	16	1.35	6.4
23.30	111.8	127.1	111.8	1.3	0.5	1.2	6	clean SAND to silty SAND	125	5.0	22	21	68	40	-	-	12	1.95	16	1.24	5.4
23.46	116.2	128.6	116.2	1.3	0.5	1.1	6	clean SAND to silty SAND	125	5.0	23	21	69	41	-	-	11	1.92	16	1.16	4.9
23.62	117.3	129.4	117.3	1.3	0.8	1.1	6	clean SAND to silty SAND	125	5.0	23	21	69	41	-	-	11	1.92	16	1.12	4.7
23.79	117.1	128.6	117.1	1.3	1.1	1.1	6	clean SAND to silty SAND	125	5.0	23	21	69	41	-	-	11	1.92	16	1.18	5.0
23.95	116.6	128.4	116.7	1.3	1.3	1.1	6	clean SAND to silty SAND	125	5.0	23	21	69	41	-	-	11	1.92	16	1.21	5.1
24.12	110.4	124.1	110.4	1.2	1.6	1.1	6	clean SAND to silty SAND	125	5.0	22	20	67	40	-	-	12	1.95	16	1.48	7.1
24.28	103.9	119.8	103.9	1.2	1.8	1.2	6	clean SAND to silty SAND	125	5.0	21	19	65	40	-	-	12	1.98	16	1.75	10.4
24.44	102.1	115.7	102.1	1.1	2.2	1.1	6	clean SAND to silty SAND	125	5.0	20	18	64	40	-	-	12	1.96	16	2.01	14.4
24.61	115.1	122.1	115.2	1.1	2.4	0.9	6	clean SAND to silty SAND	125	5.0	23	21	68	40	-	-	10	1.89	16	1.63	7.7
24.77	119.2	121.2	119.3	0.9	2.6	0.8	6	clean SAND to silty SAND	125	5.0	24	21	69	41	-	-	9	1.83	16	1.69	7.7
24.94	114.3	117.1	114.4	0.9	2.8	0.8	6	clean SAND to silty SAND	125	5.0	23	21	68	40	-	-	9	1.85	16	1.97	10.8
25.10	95.3	107.6	95.3	0.9	2.9	1.0	6	clean SAND to silty SAND	125	5.0	19	17	62	39	-	-	12	1.97	16	2.20	21.2
25.26	107.1	113.6	107.2	0.9	3.3	0.9	6	clean SAND to silty SAND	125	5.0	21	19	66	40	-	-	10	1.90	16	2.07	16.1
25.43	102.2	110.6	102.2	0.9	3.7	0.9	6	clean SAND to silty SAND	125	5.0	20	18	64	40	-	-	11	1.93	16	2.15	18.7
25.59	110.7	115.0	110.8	0.9	3.8	0.9	6	clean SAND to silty SAND	125	5.0	22	20	66	40	-	-	10	1.88	16	2.04	14.2
25.76	112.6	116.8	112.7	1.0	3.9	0.9	6	clean SAND to silty SAND	125	5.0	23	20	67	40	-	-	10	1.88	16	1.98	12.4
25.92	114.9	119.6	115.0	1.0	4.1	0.9	6	clean SAND to silty SAND	125	5.0	23	20	68	40	-	-	10	1.88	16	1.86	10.2
26.08	114.6	118.6	114.7	1.0	4.3	0.9	6	clean SAND to silty SAND	125	5.0	23	20	67	40	-	-	10	1.88	16	1.92	11.0
26.25	127.1	125.9	127.2	1.0	4.2	0.8	6	clean SAND to silty SAND	125	5.0	25	22	71	41	-	-	9	1.82	16	1.49	6.3
26.41	132.8	129.9	132.9	1.1	3.6	0.8	6	clean SAND to silty SAND	125	5.0	27	23	72	41	-	-	8	1.81	16	1.27	5.2
26.58	138.0	133.6	138.0	1.1	3.7	0.8	6	clean SAND to silty SAND	125	5.0	28	24	73	41	-	-	8	1.80	16	1.06	4.4
26.74	143.1	138.2	143.2	1.2	3.8	0.9	6	clean SAND to silty SAND	125	5.0	29	25	74	41	-	-	8	1.79	16	0.80	3.6
26.90	139.9	137.9	139.9	1.3	4.0	0.9	6	clean SAND to silty SAND	125	5.0	28	24	74	41	-	-	9	1.83	16	0.83	3.7
27.07	132.9	133.3	133.0	1.3	4.1	1.0	6	clean SAND to silty SAND	125	5.0	27	23	72	41	-	-	9	1.85	16	1.10	4.6
27.23	131.0	130.2	131.1	1.2	4.3	0.9	6	clean SAND to silty SAND	125	5.0	26	23	71	41	-	-	9	1.85	16	1.29	5.4
27.40	138.2	133.7	138.2	1.2	4.5	0.9	6	clean SAND to silty SAND	125	5.0	28	24	73	41	-	-	8	1.81	16	1.10	4.6
27.56	144.5	137.6	144.6	1.2	4.6	0.8	6	clean SAND to silty SAND	125	5.0	29	25	74	41	-	-	8	1.79	16	0.89	3.9
27.72	140.2	135.3	140.3	1.2	4.7	0.9	6	clean SAND to silty SAND	125	5.0	28	24	73	41	-	-	8	1.81	16	1.03	4.3
27.89	142.6	131.5	142.7	1.0	4.8	0.7	6	clean SAND to silty SAND	125	5.0	29	25	74	41	-	-	7	1.74	16	1.25	5.1
28.05	121.0	120.8	121.1	1.0	4.2	0.9	6	clean SAND to silty SAND	125	5.0	24	21	68	40	-	-	10	1.87	16	1.88	10.3
28.22	149.3	138.7	149.4	1.2	4.6	0.8	6	clean SAND to silty SAND	125	5.0	30	26	75	41	-	-	7	1.76	16	0.86	3.8
28.38	152.9	141.8	153.0	1.2	4.7	0.8	6	clean SAND to silty SAND	125	5.0	31	26	76	41	-	-	7	1.76	16	0.70	3.4
28.54	157.1	143.4	157.1	1.2	4.6	0.8	6	clean SAND to silty SAND	125	5.0	31	27	77	42	-	-	7	1.74	16	0.63	3.2
28.71	168.9	150.9	169.0	1.2	4.6	0.7	6	clean SAND to silty SAND	125	5.0	34	29	79	42	-	-	6	1.71	16	0.40	2.5
28.87	182.6	157.6	182.7	1.2	4.6	0.7	6	clean SAND to silty SAND	125	5.0	37	31	82	42	-	-	5	1.66	16	0.26	2.1
29.04	196.9	168.6	197.0	1.4	4.7	0.7	6	clean SAND to silty SAND	125	5.0	39	34	84	43	-	-	5	1.65	16	0.00	0.0
29.20	199.7	171.7	199.8	1.5	5.3	0.8	6	clean SAND to silty SAND	125	5.0	40	34	84	43	-	-	5	1.66	16	0.00	0.0
29.36	204.3	175.5	204.4	1.6	4.6	0.8	6	clean SAND to silty SAND	125	5.0	41	35	85	43	-	-	5	1.66	16	0.00	0.0
29.53	211.9	180.6	212.0	1.7	4.2	0.8	6	clean SAND to silty SAND	125	5.0	42	36	86	43	-	-	5	1.65	16	0.00	0.0
29.69	212.0	181.2	212.0	1.7	4.2	0.8	6	clean SAND to silty SAND	125	5.0	42	36	86	43	-	-	5	1.66	16	0.00	0.0
29.86	206.7	178.7	206.8	1.7	4.2	0.8	6	clean SAND to silty SAND	125	5.0	41	35	85	43	-	-	6	1.68	16	0.00	0.0
30.02	208.0	179.0	208.1	1.7	4.2	0.8	6	clean SAND to silty SAND	125	5.0	42	35	85	43	-	-	6	1.68	16	0.00	0.0
30.19	206.5	177.7	206.5	1.7	4.1	0.8	6	clean SAND to silty SAND	125	5.0	41	35	85	43	-	-	6	1.68	16	0.00	0.0
30.35	206.8	175.8	206.9	1.6	4.2	0.8	6	clean SAND to silty SAND	125	5.0	41	35	85	43	-	-	5	1.66	16	0.00	0.0
30.51	201.7	170.8	201.8	1.5	4.3	0.8	6	clean SAND to silty SAND	125	5.0	40	34	84	43	-	-	5	1.66	16	0.00	0.0
30.68	199.0	166.4	199.0	1.4	4.4	0.7	6	clean SAND to silty SAND	125	5.0	40	33	84	43	-	-	5	1.65	16	0.00	0.0
30.84	198.9	165.7	199.0	1.4	4.5	0.7	6	clean SAND to silty SAND	125	5.0	40	33	84	43	-	-	5	1.64	16	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(142).cpt
CPT Date: 1/6/2015 8:24:34 AM
GW During Test: 14 ft

Sounding ID: CPT-01
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
31.01	192.2	160.3	192.3	1.3	4.7	0.7	6	clean SAND to silty SAND	125	5.0	38	32	82	42	-	-	5	1.65	16	0.00	0.0
31.17	187.7	158.0	187.8	1.3	5.0	0.7	6	clean SAND to silty SAND	125	5.0	38	31	82	42	-	-	5	1.66	16	0.29	2.2
31.33	195.2	161.9	195.3	1.2	5.2	0.6	6	clean SAND to silty SAND	125	5.0	39	32	83	42	-	-	5	1.62	16	0.00	0.0
31.50	191.8	158.7	191.9	0.9	5.7	0.5	6	clean SAND to silty SAND	125	5.0	38	32	82	42	-	-	5	1.55	16	0.28	2.2
31.66	179.7	148.4	179.8	0.9	6.0	0.5	6	clean SAND to silty SAND	125	5.0	36	30	80	42	-	-	5	1.58	16	0.55	3.0
31.83	155.7	128.4	155.8	0.7	6.1	0.5	6	clean SAND to silty SAND	125	5.0	31	26	75	41	-	-	5	1.63	16	1.57	6.6
31.99	150.8	124.4	151.0	0.7	6.5	0.5	6	clean SAND to silty SAND	125	5.0	30	25	74	41	-	-	5	1.65	16	1.80	8.0
32.15	121.6	113.2	121.8	0.9	6.6	0.7	6	clean SAND to silty SAND	125	5.0	24	20	67	40	-	-	9	1.84	16	2.11	17.0
32.32	59.0	103.5	59.1	1.1	6.7	2.0	5	silty SAND to sandy SILT	120	4.0	15	12	43	36	-	-	25	2.36	16	2.27	46.0
32.48	27.2	-	27.4	1.0	7.2	4.2	3	silty CLAY to CLAY	115	1.5	18	13	-	-	1.8	5.9	51	2.88	15	-	-
32.65	17.8	-	17.9	0.7	8.3	4.4	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	3.7	62	3.06	15	-	-
32.81	16.0	-	16.2	0.4	11.7	2.6	3	silty CLAY to CLAY	115	1.5	11	8	-	-	1.0	3.3	56	2.97	15	-	-
32.97	12.2	-	12.8	0.4	31.6	4.0	3	silty CLAY to CLAY	115	1.5	8	6	-	-	0.8	2.4	72	3.19	15	-	-
33.14	10.0	-	10.7	0.3	35.9	4.3	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.6	1.8	81	3.29	15	-	-
33.30	9.8	-	10.5	0.2	38.0	3.0	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.6	1.8	75	3.22	15	-	-
33.47	11.0	-	11.7	0.2	36.1	2.0	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	2.1	64	3.07	15	-	-
33.63	8.3	-	9.0	0.2	37.4	2.7	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.4	79	3.28	15	-	-
33.79	7.8	-	8.6	0.2	40.7	2.9	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.4	1.3	83	3.33	15	-	-
33.96	7.7	-	8.6	0.2	43.5	2.7	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.4	1.3	83	3.32	15	-	-
34.12	7.8	-	8.7	0.1	45.6	2.3	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.4	1.3	80	3.29	15	-	-
34.29	7.6	-	8.5	0.1	47.5	2.3	3	silty CLAY to CLAY	115	1.5	5	3	-	-	0.4	1.2	81	3.30	15	-	-
34.45	7.3	-	8.3	0.1	49.3	2.3	3	silty CLAY to CLAY	115	1.5	5	3	-	-	0.4	1.2	83	3.32	15	-	-
34.61	7.5	-	8.5	0.1	51.1	2.5	3	silty CLAY to CLAY	115	1.5	5	3	-	-	0.4	1.2	83	3.32	15	-	-
34.78	7.9	-	9.0	0.1	52.2	2.4	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.5	1.3	80	3.28	15	-	-
34.94	7.9	-	8.9	0.3	51.5	4.3	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.5	1.3	92	3.42	15	-	-
35.11	8.4	-	9.5	0.2	53.5	2.6	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.4	80	3.28	15	-	-
35.27	10.1	-	10.7	0.1	29.3	1.7	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.6	1.8	65	3.10	15	-	-
35.43	7.9	-	8.5	0.1	34.3	2.5	3	silty CLAY to CLAY	115	1.5	5	4	-	-	0.5	1.3	82	3.31	15	-	-
35.60	8.8	-	9.6	0.2	41.4	3.0	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.5	81	3.29	15	-	-
35.76	11.0	-	11.9	0.3	47.7	3.7	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	2.0	76	3.24	15	-	-
35.93	12.0	-	12.9	0.5	48.7	5.0	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.2	79	3.28	15	-	-
36.09	12.1	-	12.9	0.6	41.1	5.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.2	81	3.30	15	-	-
36.26	16.0	-	16.8	0.5	42.3	3.6	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.0	3.0	63	3.07	15	-	-
36.42	20.2	-	20.9	0.4	32.8	2.3	4	clayy SILT to silty CLAY	115	2.0	10	7	-	-	1.3	3.9	50	2.87	15	-	-
36.58	13.8	-	14.5	0.4	34.7	3.6	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.5	68	3.14	15	-	-
36.75	11.9	-	12.7	0.5	40.4	4.9	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.1	79	3.28	15	-	-
36.91	12.3	-	13.1	0.5	41.6	5.1	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.2	79	3.28	15	-	-
37.08	12.8	-	13.6	0.5	40.7	4.3	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.3	75	3.22	15	-	-
37.24	11.0	-	11.8	0.5	43.0	5.4	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	1.9	85	3.34	15	-	-
37.40	10.2	-	11.0	0.5	42.3	5.9	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.7	90	3.40	15	-	-
37.57	12.1	-	13.0	0.4	43.1	3.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.1	73	3.20	15	-	-
37.73	12.8	-	13.5	0.3	36.8	3.2	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.2	69	3.15	15	-	-
37.90	11.0	-	11.8	0.4	40.8	4.7	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	1.9	82	3.32	15	-	-
38.06	13.3	-	14.1	0.6	42.8	5.7	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.3	80	3.28	15	-	-
38.22	14.7	-	15.6	0.6	43.9	5.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.6	74	3.21	15	-	-
38.39	15.7	-	16.4	0.6	36.3	4.5	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	2.8	70	3.16	15	-	-
38.55	14.3	-	15.1	0.6	36.9	5.4	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.5	76	3.24	15	-	-
38.72	14.2	-	14.9	0.6	37.0	5.3	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.5	76	3.24	15	-	-
38.88	14.1	-	14.9	0.6	39.8	4.9	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.5	75	3.22	15	-	-
39.04	15.1	-	16.0	0.6	42.7	4.5	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.7	71	3.17	15	-	-
39.21	13.0	-	13.8	0.6	42.1	5.4	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.2	80	3.29	15	-	-
39.37	12.4	-	13.3	0.6	43.1	5.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.1	83	3.32	15	-	-
39.54	12.7	-	13.6	0.6	45.6	5.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.1	82	3.31	15	-	-
39.70	14.5	-	15.4	0.5	43.3	4.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.5	72	3.19	15	-	-
39.86	13.9	-	14.7	0.5	41.8	4.4	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.4	74	3.21	15	-	-
40.03	13.5	-	14.4	0.6	45.9	5.0	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.3	78	3.26	15	-	-
40.19	13.4	-	14.4	0.6	47.1	5.7	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.3	81	3.30	15	-	-
40.36	12.9	-	13.7	0.6	40.8	6.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	84	3.33	15	-	-
40.52	12.3	-	13.1	0.6	43.5	6.0	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.0	85	3.35	15	-	-
40.68	12.8	-	13.7	0.6	43.6	5.5	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	82	3.31	15	-	-
40.85	14.1	-	15.0	0.6	45.6	4.8	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.4	75	3.23	15	-	-
41.01	18.2	-	19.0	0.7	40.3	4.1	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	3.2	65	3.09	15	-	-
41.18	16.3	-	17.2	0.7	45.5	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.0	2.8	73	3.20	15	-	-
41.34	14.4	-	15.4	0.7	48.3	5.6	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.4	78	3.27	15	-	-
41.50	19.2	-	20.2	0.7	52.1	3.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.2	3.3	63	3.06	15	-	-
41.67	31.1	-	31.6	0.7	28.6	2.6	4	clayy SILT to silty CLAY	115	2.0	16	9	-	-	2.1	5.7	44	2.77	15	-	-
41.83	33.8	-	34.1	0.8	17.0	2.4	4	clayy SILT to silty CLAY	115	2.0	17	10	-	-	2.3	6.2	42	2.72	15	-	-
42.00	36.6	-	36.8	0.6	11.7	1.7	4	clayy SILT to silty CLAY	115	2.0	18	11	-	-	2.5	6.8	35	2.60	15	-	-
42.16	33.0	-	33.2	0.9	8.8	2.8	4	clayy SILT to silty CLAY	115	2.0	17	10	-	-	2.2	6.1	44	2.77	15	-	-
42.32	27.7	-	27.9	0.7	9.2	2.8	4	clayy SILT to silty CLAY	115	2.0	14	8	-	-	1.8	5.0	48	2.83	15	-	-
42.49	23.0	-	23.2	0.6	9.7	2.8	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	4.0	53	2.91	15	-	-
42.65	15.4	-	15.6	0.7	10.8	5.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.5	76	3.24	15	-	-
42.82	12.7	-	13.0	0.6	13.0	5.7	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.0	84	3.34	15	-	-
42.98	15.8	-	16.1	0.6	15.3	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.6	70	3.17	15	-	-
43.15	14.0	-	14.3	0.6	16.2	5.2	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.2	79	3.27	15	-	-
43.31	12.1	-	12.5	0.6	18.5	5.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.9	87	3.37	15	-	-
43.47	15.4	-	15.8	0.5	20.9	4.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.5	70	3.17	15	-	-
43.64	14.2	-	14.6	0.4	21.4	3.7	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.2	72	3.18	15	-	-
43.80	12.9	-	13.4	0.5	23.9	4.4	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	79	3.27	15	-	-
43.97	12.2	-	12.7	0.4	26.5	4.2	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.8	80	3.29	15	-	-
44.13	12.8	-	13.4	0.4	28.8	3.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	76	3.24	15	-	-
44.29	11.7	-	12.4	0.4	32.1	4.7	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.7	84	3.34	15	-	-
44.46	11.3	-	12.0	0.5	35.7	5.9	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.6	91	3.41	15	-	-
44.62	12.6	-	13.4	0.6	38.9	5.7	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.9	86	3.35	15	-	-
44.79	14.9	-	15.9	0.6	53.9	4.6	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.3	75	3.23	15	-	-
44.95	14.0	-	15.0	0.5	51.6	4.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.1	78	3.26	15	-	-
45.11	13.0	-	14.1	0.5	55.9	5.2	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	83	3.32	15	-	-
45.28	12.5	-	13.6	0.6	57.9	5.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.8	87	3.37	15	-	-
45.44	13.5	-	14.6	0.6	58.8	5.6	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	83	3.33	15	-	-
45.61	16.4	-	17.5	0.6	56.7	4.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.6	72	3.18	15	-	-
45.77	16.8	-	17.9	0.6	54.2	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.6	70	3.16	15	-	-
45.93	29.7	-	30.5	0.6	43.7	2.2	4	clayy SILT to silty CLAY	115	2.0	15	8	-	-	2.0	5.0	44	2.76	15	-	-
46.10	27.2	-	27.7	0.7	25.5	2.9	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.8	4.6	50	2.87	15	-	-
46.26	21.2	-	21.7	0.7	27.3	3.7	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	3.4	61	3.04	15	-	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(142).cpt
CPT Date: 1/6/2015 8:24:34 AM
GW During Test: 14 ft

Sounding ID: CPT-01
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
46.43	14.6	-	15.2	0.6	29.9	5.4	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.2	80	3.29	15	-	-
46.59	12.6	-	13.3	0.4	34.6	3.9	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.8	79	3.27	15	-	-
46.75	10.8	-	11.6	0.4	38.6	5.2	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.5	91	3.42	15	-	-
46.92	10.5	-	11.5	0.4	54.9	5.7	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.4	95	3.46	15	-	-
47.08	13.4	-	14.5	0.4	56.8	3.8	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	76	3.24	15	-	-
47.25	17.2	-	18.3	0.5	56.3	3.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.6	65	3.10	15	-	-
47.41	17.6	-	18.5	0.4	43.6	2.5	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	2.7	60	3.02	15	-	-
47.57	12.9	-	13.7	0.4	40.9	3.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.8	78	3.26	15	-	-
47.74	10.7	-	11.6	0.3	46.7	4.2	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.4	88	3.38	15	-	-
47.90	10.9	-	12.0	0.3	53.9	3.4	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.5	83	3.33	15	-	-
48.07	10.4	-	11.6	0.2	63.5	2.9	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.4	82	3.31	15	-	-
48.23	9.0	-	10.3	0.2	67.2	3.8	3	silty CLAY to CLAY	115	1.5	6	3	-	-	0.5	1.1	95	3.45	15	-	-
48.39	9.2	-	10.6	0.2	70.3	3.8	3	silty CLAY to CLAY	115	1.5	6	3	-	-	0.5	1.1	93	3.44	15	-	-
48.56	11.0	-	12.4	0.3	69.6	3.1	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.5	81	3.30	15	-	-
48.72	12.3	-	13.6	0.2	64.9	2.7	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.7	74	3.21	15	-	-
48.89	13.0	-	14.2	0.2	63.0	2.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.8	68	3.14	15	-	-
49.05	12.7	-	14.0	0.3	64.1	2.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.8	74	3.21	15	-	-
49.22	11.5	-	12.9	0.4	70.3	4.8	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.5	89	3.39	15	-	-
49.38	12.1	-	13.3	0.4	60.2	4.1	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.6	83	3.33	15	-	-
49.54	12.1	-	13.4	0.4	63.6	4.0	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.6	83	3.32	15	-	-
49.71	14.5	-	15.9	0.6	70.9	5.4	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	82	3.31	15	-	-
49.87	44.4	-	45.5	0.9	58.2	2.1	4	clayy SILT to silty CLAY	115	2.0	22	12	-	-	3.0	7.3	36	2.62	15	-	-
50.04	126.9	108.7	126.9	1.1	-0.6	0.9	6	clean SAND to silty SAND	125	5.0	25	18	64	38	-	-	11	1.92	16	2.18	19.8
50.20	146.5	119.7	146.5	1.2	-3.5	0.8	6	clean SAND to silty SAND	125	5.0	29	21	68	39	-	-	9	1.86	16	2.00	14.6
50.36	150.5	125.8	150.4	1.4	-2.7	1.0	6	clean SAND to silty SAND	125	5.0	30	21	69	39	-	-	10	1.89	16	1.80	10.6
50.53	152.1	130.9	152.1	1.7	-2.1	1.1	6	clean SAND to silty SAND	125	5.0	30	22	69	39	-	-	11	1.93	16	1.55	7.9
50.69	155.1	135.3	155.1	1.9	-1.5	1.2	6	clean SAND to silty SAND	125	5.0	31	22	70	39	-	-	12	1.95	16	1.32	6.2
50.86	154.5	139.2	154.5	2.1	-0.9	1.4	6	clean SAND to silty SAND	125	5.0	31	22	70	39	-	-	12	1.98	16	1.11	5.1
51.02	146.0	133.7	146.0	2.0	-0.3	1.4	6	clean SAND to silty SAND	125	5.0	29	21	68	39	-	-	13	2.00	16	1.39	7.4
51.18	126.3	124.3	126.4	1.8	6.6	1.5	5	silty SAND to sandy SILT	120	4.0	32	22	63	38	-	-	15	2.07	16	1.84	16.8
51.35	114.1	118.1	114.2	1.7	6.9	1.5	5	silty SAND to sandy SILT	120	4.0	29	20	60	38	-	-	16	2.11	16	2.02	23.0
51.51	113.4	108.7	113.6	1.3	6.5	1.2	5	silty SAND to sandy SILT	120	4.0	28	20	59	38	-	-	14	2.05	16	2.18	23.3
51.68	115.6	103.4	115.6	1.1	0.5	1.0	6	clean SAND to silty SAND	125	5.0	23	16	60	38	-	-	12	1.98	16	2.27	22.6
51.84	107.0	100.4	107.0	1.1	-0.7	1.0	6	clean SAND to silty SAND	125	5.0	21	15	57	37	-	-	14	2.03	16	2.33	25.6
52.00	98.1	95.9	98.1	1.0	-0.1	1.1	5	silty SAND to sandy SILT	120	4.0	25	17	55	37	-	-	15	2.07	16	2.42	28.9
52.17	94.7	91.6	94.6	0.9	-0.9	1.0	5	silty SAND to sandy SILT	120	4.0	24	17	53	36	-	-	15	2.06	16	2.51	30.3
52.33	65.3	94.2	65.3	1.1	-4.4	1.7	5	silty SAND to sandy SILT	120	4.0	16	11	41	34	-	-	24	2.34	16	2.45	49.4
52.50	33.5	-	33.5	1.0	-3.7	3.2	3	silty CLAY to CLAY	115	1.5	22	11	-	-	2.2	5.2	49	2.86	15	-	-
52.66	18.6	-	18.5	0.5	-2.7	3.2	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	2.6	65	3.09	15	-	-
52.82	14.6	-	14.6	0.4	-1.4	3.5	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	1.9	75	3.23	15	-	-
52.99	18.4	-	18.4	0.5	-0.2	3.1	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	2.6	65	3.09	15	-	-
53.15	46.9	-	46.9	0.9	0.2	2.0	4	clayy SILT to silty CLAY	115	2.0	23	12	-	-	3.2	7.4	36	2.61	15	-	-
53.32	32.8	-	32.8	1.3	0.2	4.4	3	silty CLAY to CLAY	115	1.5	22	11	-	-	2.2	5.0	56	2.96	15	-	-
53.48	19.9	-	19.9	1.2	0.8	7.2	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	2.8	80	3.28	15	-	-
53.64	15.0	-	15.1	0.7	1.9	6.0	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	86	3.35	15	-	-
53.81	15.7	-	15.8	0.5	3.2	4.4	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	2.1	77	3.25	15	-	-
53.97	16.1	-	16.1	0.4	4.1	3.0	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	70	3.16	15	-	-
54.14	17.2	-	17.3	0.4	5.1	3.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.3	68	3.14	15	-	-
54.30	26.4	-	26.6	0.7	14.8	2.9	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.7	3.8	54	2.93	15	-	-
54.46	25.0	-	25.3	0.7	16.1	3.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.6	3.6	56	2.97	15	-	-
54.63	36.3	-	36.6	0.8	16.5	2.5	4	clayy SILT to silty CLAY	115	2.0	18	9	-	-	2.4	5.4	44	2.77	15	-	-
54.79	41.1	-	41.4	0.7	16.5	1.8	4	clayy SILT to silty CLAY	115	2.0	21	10	-	-	2.8	6.2	37	2.64	15	-	-
54.96	63.2	79.5	63.4	0.7	12.9	1.2	5	silty SAND to sandy SILT	120	4.0	16	11	39	34	-	-	21	2.26	16	2.82	51.2
55.12	69.3	93.7	69.5	1.1	9.5	1.6	5	silty SAND to sandy SILT	120	4.0	17	12	42	34	-	-	23	2.31	16	2.47	47.1
55.28	65.8	105.6	66.0	1.4	10.3	2.2	5	silty SAND to sandy SILT	120	4.0	16	11	41	34	-	-	27	2.41	16	2.23	50.1
55.45	67.6	103.5	67.8	1.3	11.0	2.0	5	silty SAND to sandy SILT	120	4.0	17	12	41	34	-	-	26	2.38	16	2.27	48.7
55.61	68.5	101.7	68.7	1.3	10.6	1.9	5	silty SAND to sandy SILT	120	4.0	17	12	42	34	-	-	25	2.37	16	2.30	48.0
55.78	62.9	99.0	63.1	1.2	10.7	2.0	5	silty SAND to sandy SILT	120	4.0	16	11	39	34	-	-	26	2.40	16	2.36	51.2
55.94	63.5	87.8	63.7	0.9	11.1	1.5	5	silty SAND to sandy SILT	120	4.0	16	11	39	34	-	-	23	2.32	16	2.60	51.2
56.11	50.9	-	51.1	1.1	7.3	2.4	4	clayy SILT to silty CLAY	115	2.0	25	12	-	-	3.5	7.7	37	2.64	15	-	-
56.27	29.5	-	29.7	1.3	8.6	4.9	3	silty CLAY to CLAY	115	1.5	20	10	-	-	1.9	4.2	61	3.04	15	-	-
56.43	18.8	-	19.0	1.0	10.3	6.4	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.2	2.5	80	3.29	15	-	-
56.60	18.1	-	18.3	0.6	13.6	4.0	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.1	2.4	72	3.19	15	-	-
56.76	17.9	-	18.2	0.6	17.2	4.1	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.1	2.3	73	3.20	15	-	-
56.93	16.2	-	16.6	0.6	20.0	5.0	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.0	81	3.30	15	-	-
57.09	20.2	-	20.7	0.7	22.6	3.9	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	2.7	68	3.14	15	-	-
57.25	16.9	-	17.3	0.7	23.9	5.2	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	80	3.29	15	-	-
57.42	16.5	-	17.0	0.7	26.7	5.4	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	82	3.31	15	-	-
57.58	19.0	-	19.6	0.7	27.9	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.2	2.5	74	3.21	15	-	-
57.75	27.9	-	28.5	0.9	28.5	3.5	3	silty CLAY to CLAY	115	1.5	19	9	-	-	1.8	3.9	57	2.98	15	-	-
57.91	47.9	-	48.4	0.9	26.6	2.1	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.2	7.0	38	2.64	15	-	-
58.07	46.6	-	46.8	1.2	13.3	2.8	4	clayy SILT to silty CLAY	115	2.0	23	11	-	-	3.1	6.8	42	2.73	15	-	-
58.24	33.7	-	34.0	1.7	14.8	5.5	3	silty CLAY to CLAY	115	1.5	22	11	-	-	2.2	4.8	61	3.03	15	-	-
58.40	27.0	-	27.4	1.5	16.2	6.6	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.8	3.7	70	3.16	15	-	-
58.57	37.3	-	37.7	1.2	18.8	3.4	3	silty CLAY to CLAY	115	1.5	25	12	-	-	2.5	5.3	50	2.87	15	-	-
58.73	72.7	94.1	73.0	1.1	15.5	1.6	5	silty SAND to sandy SILT	120	4.0	18	12	43	34	-	-	22	2.30	16	2.46	45.8
58.89	81.3	98.7	81.6	1.2	11.8	1.6	5	silty SAND to sandy SILT	120	4.0	20	14	47	35	-	-	21	2.26	16	2.36	39.5
59.06	62.8	-	63.0	1.7	11.5	2.8	4	clayy SILT to silty CLAY	115	2.0	31	15	-	-	4.3	9.2	36	2.62	15	-	-
59.22	40.2	-	40.4	1.7	12.3	4.6	3	silty CLAY to CLAY	115	1.5	27	13	-	-	2.7	5.7	53	2.92	15	-	-
59.39	28.5	-	28.8	1.4	14.5	5.7	3	silty CLAY to CLAY	115	1.5	19	9	-	-	1.9	3.9	66	3.11	15	-	-
59.55	52.1	-	52.4	1.3	18.1	2.6	4	clayy SILT to silty CLAY	115	2.0	26	12	-	-	3.5	7.5	39	2.68	15	-	-
59.71	83.3	107.7	83.5	1.5	12.4	1.9	5	silty SAND to sandy SILT	120	4.0	21	14	47	35	-	-	22	2.30	16	2.20	38.4
59.88	103.2	108.1	103.3	1.5	8.4	1.5	5	silty SAND to sandy SILT	120	4.0	26	17	54	36	-	-	18	2.16	16	2.19	29.0
60.04	112.3	109.0	112.4	1.5	5.2	1.4	5	silty SAND to sandy SILT	120	4.0	28	19	57	37	-	-	16	2.11	16	2.18	25.8
60.21	116.9	110.7	117.0	1.5	0.7	1.3	5	silty SAND to sandy SILT	120	4.0	29	19	59	37	-	-	15	2.09	16	2.15	24.3
60.37	108.6	115.2	108.7	1.7	0.6	1.7	5	silty SAND to sandy SILT	120	4.0	27	18	56	37	-	-	18	2.17	16	2.07	27.2
60.53	106.0	122.3	106.0	2.0	0.8	2.0	5	silty SAND to sandy SILT	120	4.0	26	18	55	36	-	-	20	2.23	16	1.86	25.7
60.70	103.7	127.0	103.7	2.2	1.4	2.2	5	silty SAND to sandy SILT	120	4.0	26	17	54	36	-	-	21	2.27	16	1.59	20.0
60.86	98.5	129.8	98.5	2.3	1.8	2.4	5	silty SAND to sandy SILT	120	4.0	25	16	53	36	-	-	23	2.32	16	1.41	16.1
61.03	75.5	-	75.5	2.6	2.2	3.6	4	clayy SILT to silty CLAY	115	2.0	38	17	-	-	5.2	9.9	37	2.64	15	-	-
61.19	40.1	-	40.2	2.2	5.4	5.9	3	silty CLAY to CLAY	115	1.5	27	12	-	-	2.7	5.5	59	3.00	15	-	-
61.35	32.2	-	32.3	1.3	6.3	4.6	3	silty CLAY to CLAY	115	1.5	21	10	-	-	2.1	4.3	60	3.02	15	-	-
61.52	22.8	-	22.9	0.9	7.6	4.9	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	2.9	71	3.17	15	-	-
61.68	17.3	-	17.5	0.7	9.3	5.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.0	83	3.32	15	-	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(142).cpt
CPT Date: 1/6/2015 8:24:34 AM
GW During Test: 14 ft

Sounding ID: CPT-01
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
61.85	26.3	-	26.6	1.1	11.6	4.9	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.7	3.4	67	3.11	15	-	-
62.01	24.6	-	24.9	1.1	12.3	5.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	3.1	69	3.15	15	-	-
62.17	61.6	97.0	61.9	1.1	14.9	2.0	5	silty SAND to sandy SILT	120	4.0	15	10	37	33	-	-	27	2.42	16	2.40	51.2
62.34	61.0	-	61.3	1.8	13.9	3.1	4	clayy SILT to silty CLAY	115	2.0	31	14	-	-	4.2	8.6	39	2.68	15	-	-
62.50	47.8	-	48.1	1.7	14.5	3.8	3	silty CLAY to CLAY	115	1.5	32	14	-	-	3.2	6.6	47	2.82	15	-	-
62.67	61.0	-	61.3	2.1	16.8	3.6	4	clayy SILT to silty CLAY	115	2.0	30	14	-	-	4.2	8.5	42	2.72	15	-	-
62.83	51.6	-	52.0	2.3	16.9	4.7	3	silty CLAY to CLAY	115	1.5	34	15	-	-	3.5	7.1	49	2.86	15	-	-
63.00	73.4	116.3	73.8	1.7	18.8	2.5	5	silty SAND to sandy SILT	120	4.0	18	12	43	34	-	-	28	2.43	16	2.01	46.7
63.16	197.0	149.4	197.3	2.2	15.2	1.1	6	clean SAND to silty SAND	125	5.0	39	26	75	40	-	-	10	1.88	16	0.58	3.1
63.32	233.3	163.2	233.5	2.1	12.5	0.9	6	clean SAND to silty SAND	125	5.0	47	30	81	41	-	-	7	1.76	16	0.00	0.0
63.49	241.2	170.5	241.4	2.4	10.2	1.0	6	clean SAND to silty SAND	125	5.0	48	31	82	41	-	-	8	1.78	16	0.00	0.0
63.65	246.2	177.2	246.3	2.8	3.0	1.1	6	clean SAND to silty SAND	125	5.0	49	32	82	41	-	-	8	1.81	16	0.00	0.0
63.82	256.5	178.4	256.4	2.6	-2.7	1.0	6	clean SAND to silty SAND	125	5.0	51	33	84	41	-	-	7	1.75	16	0.00	0.0
63.98	251.5	167.7	251.4	2.0	-5.1	0.8	6	clean SAND to silty SAND	125	5.0	50	33	83	41	-	-	6	1.69	16	0.00	0.0
64.14	248.8	163.5	248.7	1.8	-6.2	0.7	6	clean SAND to silty SAND	125	5.0	50	32	83	41	-	-	6	1.67	16	0.00	0.0
64.31	241.5	159.5	241.4	1.7	-5.7	0.7	6	clean SAND to silty SAND	125	5.0	48	31	82	41	-	-	6	1.68	16	0.32	2.3
64.47	246.3	161.2	246.2	1.7	-5.2	0.7	6	clean SAND to silty SAND	125	5.0	49	32	82	41	-	-	6	1.67	16	0.00	0.0
64.64	231.7	154.4	231.6	1.7	-1.5	0.7	6	clean SAND to silty SAND	125	5.0	46	30	80	41	-	-	6	1.70	16	0.43	2.7
64.80	221.6	150.3	221.6	1.7	-1.1	0.8	6	clean SAND to silty SAND	125	5.0	44	28	79	40	-	-	7	1.73	16	0.56	3.0
64.96	209.6	145.1	209.6	1.7	-0.6	0.8	6	clean SAND to silty SAND	125	5.0	42	27	77	40	-	-	7	1.76	16	0.76	3.6
65.13	204.7	143.0	204.7	1.7	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	41	26	76	40	-	-	8	1.78	16	0.85	3.9
65.29	202.3	134.7	202.3	1.2	0.2	0.6	6	clean SAND to silty SAND	125	5.0	40	26	76	40	-	-	6	1.70	16	1.29	5.4

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

856,864 and 872 Pioneer St

Project ID: Geosolutions Inc
Data File: SDF(143).cpt
CPT Date: 1/6/2015 9:20:23 AM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
0.33	15.4	35.7	15.4	0.0	0.0	0.1	5	silty SAND to sandy SILT	120	4.0	4	6	21	48	-	-	16	2.09	16	N/A	N/A
0.49	27.7	53.8	27.7	0.1	0.0	0.2	6	clean SAND to silty SAND	125	5.0	6	9	40	48	-	-	11	1.92	16	N/A	N/A
0.66	35.1	66.3	35.1	0.1	-0.1	0.4	6	clean SAND to silty SAND	125	5.0	7	11	48	48	-	-	10	1.89	16	N/A	N/A
0.82	40.6	76.3	40.6	0.2	-0.2	0.5	6	clean SAND to silty SAND	125	5.0	8	13	53	48	-	-	10	1.88	16	N/A	N/A
0.98	43.6	82.4	43.6	0.2	-0.3	0.6	6	clean SAND to silty SAND	125	5.0	9	14	55	48	-	-	10	1.89	16	N/A	N/A
1.15	45.0	85.8	45.0	0.3	-0.3	0.6	6	clean SAND to silty SAND	125	5.0	9	14	56	48	-	-	10	1.90	16	N/A	N/A
1.31	49.6	91.3	49.5	0.3	-0.4	0.6	6	clean SAND to silty SAND	125	5.0	10	16	59	48	-	-	9	1.85	16	N/A	N/A
1.48	52.4	96.9	52.4	0.3	-0.5	0.7	6	clean SAND to silty SAND	125	5.0	10	17	61	48	-	-	9	1.86	16	N/A	N/A
1.64	57.9	106.1	57.9	0.4	-0.4	0.7	6	clean SAND to silty SAND	125	5.0	12	19	65	48	-	-	9	1.85	16	N/A	N/A
1.80	62.3	112.0	62.3	0.4	-0.4	0.7	6	clean SAND to silty SAND	125	5.0	12	20	67	48	-	-	9	1.82	16	N/A	N/A
1.97	63.3	113.0	63.3	0.4	-0.2	0.7	6	clean SAND to silty SAND	125	5.0	13	20	68	48	-	-	8	1.81	16	N/A	N/A
2.13	67.6	114.5	67.6	0.4	-0.3	0.6	6	clean SAND to silty SAND	125	5.0	14	22	70	48	-	-	7	1.73	16	N/A	N/A
2.30	74.1	124.8	74.1	0.4	-0.4	0.6	6	clean SAND to silty SAND	125	5.0	15	24	73	48	-	-	6	1.72	16	N/A	N/A
2.46	65.5	120.8	65.5	0.6	0.2	0.9	6	clean SAND to silty SAND	125	5.0	13	21	69	47	-	-	9	1.86	16	N/A	N/A
2.62	51.4	115.2	51.4	0.7	0.1	1.4	5	silty SAND to sandy SILT	120	4.0	13	21	61	46	-	-	15	2.07	16	N/A	N/A
2.79	40.3	119.6	40.3	0.8	0.1	2.1	5	silty SAND to sandy SILT	120	4.0	10	16	53	45	-	-	21	2.27	16	N/A	N/A
2.95	55.3	124.1	55.3	0.8	0.3	1.5	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	15	2.07	16	N/A	N/A
3.12	59.9	121.4	59.9	0.7	0.4	1.2	6	clean SAND to silty SAND	125	5.0	12	19	66	46	-	-	12	1.97	16	N/A	N/A
3.28	54.0	115.2	54.0	0.7	0.4	1.3	6	clean SAND to silty SAND	125	5.0	11	17	62	45	-	-	14	2.02	16	N/A	N/A
3.45	58.4	118.3	58.4	0.7	0.4	1.1	6	clean SAND to silty SAND	125	5.0	12	19	65	46	-	-	12	1.97	16	N/A	N/A
3.61	59.1	117.6	59.1	0.6	0.4	1.1	6	clean SAND to silty SAND	125	5.0	12	19	65	45	-	-	12	1.95	16	N/A	N/A
3.77	67.2	125.7	67.2	0.6	0.3	1.0	6	clean SAND to silty SAND	125	5.0	13	22	69	46	-	-	10	1.88	16	N/A	N/A
3.94	69.7	129.5	69.7	0.7	0.3	1.0	6	clean SAND to silty SAND	125	5.0	14	22	71	46	-	-	10	1.87	16	N/A	N/A
4.10	68.5	128.0	68.5	0.7	0.3	1.0	6	clean SAND to silty SAND	125	5.0	14	22	70	45	-	-	10	1.87	16	N/A	N/A
4.27	61.2	118.8	61.2	0.6	0.4	1.0	6	clean SAND to silty SAND	125	5.0	12	20	66	45	-	-	11	1.92	16	N/A	N/A
4.43	54.3	110.6	54.3	0.6	0.4	1.1	6	clean SAND to silty SAND	125	5.0	11	17	62	44	-	-	12	1.98	16	N/A	N/A
4.59	50.5	106.3	50.5	0.6	0.3	1.1	6	clean SAND to silty SAND	125	5.0	10	16	60	43	-	-	13	2.01	16	N/A	N/A
4.76	42.1	102.8	42.1	0.6	0.3	1.4	5	silty SAND to sandy SILT	120	4.0	11	17	54	42	-	-	17	2.14	16	N/A	N/A
4.92	34.3	114.1	34.3	0.8	0.3	2.2	5	silty SAND to sandy SILT	120	4.0	9	14	47	41	-	-	24	2.34	16	N/A	N/A
5.09	25.2	124.8	25.2	0.8	0.3	3.4	4	clayy SILT to silty CLAY	115	2.0	13	20	-	-	1.8	9.9	33	2.56	15	N/A	N/A
5.25	18.9	-	18.9	0.8	0.4	4.5	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	42	2.74	15	N/A	N/A
5.41	14.8	-	14.8	0.6	0.6	4.4	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.0	9.9	47	2.81	15	N/A	N/A
5.58	14.2	-	14.2	0.6	0.8	4.7	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	48	2.84	15	N/A	N/A
5.74	10.3	-	10.3	0.5	1.7	5.2	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.3	57	2.98	15	N/A	N/A
5.91	8.3	-	8.4	0.3	2.2	4.3	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	7.3	59	3.00	15	N/A	N/A
6.07	6.3	-	6.4	0.2	2.1	4.0	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	5.3	65	3.09	15	N/A	N/A
6.23	5.5	-	5.6	0.2	2.2	3.2	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	4.5	64	3.08	15	N/A	N/A
6.40	5.2	-	5.2	0.1	2.3	2.9	3	silty CLAY to CLAY	115	1.5	3	6	-	-	0.3	4.1	64	3.09	15	N/A	N/A
6.56	4.4	-	4.4	0.2	2.4	4.7	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	3.3	78	3.26	15	N/A	N/A
6.73	5.3	-	5.3	0.2	2.6	5.0	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.3	3.9	74	3.21	15	N/A	N/A
6.89	15.3	74.4	15.3	0.3	2.7	1.8	4	clayy SILT to silty CLAY	115	2.0	8	11	-	-	1.0	9.9	35	2.59	15	N/A	N/A
7.05	10.7	-	10.7	0.4	2.7	3.6	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	7.9	50	2.87	15	N/A	N/A
7.22	10.2	-	10.3	0.4	3.1	4.2	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	7.4	54	2.93	15	N/A	N/A
7.38	13.2	-	13.3	0.4	3.3	2.8	4	clayy SILT to silty CLAY	115	2.0	7	11	-	-	0.9	9.4	42	2.73	15	N/A	N/A
7.55	26.5	73.3	26.5	0.3	3.0	1.2	5	silty SAND to sandy SILT	120	4.0	7	10	35	37	-	-	22	2.29	16	N/A	N/A
7.71	37.9	73.8	38.0	0.3	2.6	0.7	6	clean SAND to silty SAND	125	5.0	8	11	47	39	-	-	14	2.05	16	N/A	N/A
7.87	42.2	80.7	42.3	0.3	1.4	0.8	6	clean SAND to silty SAND	125	5.0	8	12	50	40	-	-	14	2.04	16	N/A	N/A
8.04	37.1	104.7	37.1	0.7	0.8	2.0	5	silty SAND to sandy SILT	120	4.0	9	13	45	39	-	-	23	2.32	16	N/A	N/A
8.20	28.2	115.1	28.2	0.8	0.8	3.0	4	clayy SILT to silty CLAY	115	2.0	14	19	-	-	2.0	9.9	32	2.54	15	N/A	N/A
8.37	26.9	113.4	26.9	0.8	0.8	3.0	4	clayy SILT to silty CLAY	115	2.0	13	18	-	-	1.9	9.9	33	2.56	15	N/A	N/A
8.53	50.2	89.5	50.2	0.4	0.8	0.9	6	clean SAND to silty SAND	125	5.0	10	14	54	40	-	-	13	2.01	16	N/A	N/A
8.69	60.3	95.8	60.3	0.4	0.8	0.7	6	clean SAND to silty SAND	125	5.0	12	16	60	41	-	-	10	1.90	16	N/A	N/A
8.86	62.3	99.1	62.3	0.5	0.4	0.8	6	clean SAND to silty SAND	125	5.0	12	17	61	41	-	-	11	1.91	16	N/A	N/A
9.02	63.6	101.1	63.6	0.5	0.4	0.8	6	clean SAND to silty SAND	125	5.0	13	17	61	41	-	-	11	1.92	16	N/A	N/A
9.19	67.3	104.8	67.3	0.5	0.3	0.8	6	clean SAND to silty SAND	125	5.0	13	18	63	42	-	-	11	1.91	16	N/A	N/A
9.35	69.4	106.7	69.4	0.6	0.3	0.8	6	clean SAND to silty SAND	125	5.0	14	18	63	42	-	-	10	1.90	16	N/A	N/A
9.51	68.2	105.1	68.2	0.6	0.3	0.8	6	clean SAND to silty SAND	125	5.0	14	17	63	41	-	-	11	1.92	16	N/A	N/A
9.68	64.1	101.3	64.1	0.6	0.3	0.9	6	clean SAND to silty SAND	125	5.0	13	16	60	41	-	-	12	1.96	16	N/A	N/A
9.84	60.6	97.8	60.6	0.6	0.3	0.9	6	clean SAND to silty SAND	125	5.0	12	15	58	41	-	-	13	1.99	16	N/A	N/A
10.01	49.3	90.7	49.3	0.5	0.4	1.1	5	silty SAND to sandy SILT	120	4.0	12	15	51	39	-	-	16	2.11	16	N/A	N/A
10.17	37.7	87.6	37.7	0.5	0.4	1.5	5	silty SAND to sandy SILT	120	4.0	9	12	42	38	-	-	22	2.28	16	N/A	N/A
10.34	32.1	83.8	32.1	0.5	0.5	1.5	5	silty SAND to sandy SILT	120	4.0	8	10	36	37	-	-	25	2.35	16	N/A	N/A
10.50	32.4	78.4	32.3	0.4	-1.8	1.3	5	silty SAND to sandy SILT	120	4.0	8	10	36	37	-	-	23	2.31	16	N/A	N/A
10.66	33.0	76.2	33.0	0.4	-2.5	1.2	5	silty SAND to sandy SILT	120	4.0	8	10	37	37	-	-	22	2.29	16	N/A	N/A
10.83	35.2	75.6	35.1	0.4	-2.5	1.1	5	silty SAND to sandy SILT	120	4.0	9	11	39	37	-	-	21	2.25	16	N/A	N/A
10.99	39.3	70.8	39.2	0.3	-2.9	0.8	5	silty SAND to sandy SILT	120	4.0	10	12	42	38	-	-	17	2.13	16	N/A	N/A
11.16	43.9	73.4	43.8	0.3	-3.9	0.8	5	silty SAND to sandy SILT	120	4.0	11	13	45	38	-	-	15	2.08	16	N/A	N/A
11.32	48.8	78.4	48.7	0.4	-3.8	0.8	6	clean SAND to silty SAND	125	5.0	10	11	49	39	-	-	14	2.05	16	N/A	N/A
11.48	50.4	81.0	50.4	0.4	-3.8	0.8	6	clean SAND to silty SAND	125	5.0	10	12	49	39	-	-	15	2.06	16	N/A	N/A
11.65	52.7	77.3	52.7	0.3	-3.7	0.6	6	clean SAND to silty SAND	125	5.0	11	12	51	39	-	-	12	1.97	16	N/A	N/A
11.81	53.6	81.3	53.5	0.4	-3.7	0.8	6	clean SAND to silty SAND	125	5.0	11	12	51	39	-	-	13	2.02	16	N/A	N/A
11.98	53.8	84.0	53.7	0.5	-3.1	0.9	6	clean SAND to silty SAND	125	5.0	11	12	51	39	-	-	14	2.05	16	N/A	N/A
12.14	59.3	88.8	59.2	0.5	-3.1	0.9	6	clean SAND to silty SAND	125	5.0	12	13	54	39	-	-	13	2.02	16	N/A	N/A
12.30	66.2	95.8	66.1	0.6	-3.0	0.9	6	clean SAND to silty SAND	125	5.0	13	15	57	40	-	-	13	1.99	16	N/A	N/A
12.47	73.0	101.5	72.9	0.7	-3.0	0.9	6	clean SAND to silty SAND	125	5.0	15	16	60	40	-	-	12	1.96	16	N/A	N/A
12.63	78.6	106.2	78.5	0.7	-2.9	0.9	6	clean SAND to silty SAND	125	5.0	16	17	62	41	-	-	11	1.93	16	N/A	N/A
12.80	84.9	112.0	84.9	0.8	-2.8	0.9	6	clean SAND to silty SAND	125	5.0	17	19	65	41	-	-	11	1.91	16	N/A	N/A
12.96	87.2	114.0	87.1	0.8	-2.7	0.9	6	clean SAND to silty SAND	125	5.0	17	19	65	41	-	-	11	1.91	16	N/A	N/A
13.12	89.1	115.2	89.1	0.8	-2.7	0.9	6	clean SAND to silty SAND	125	5.0	18	19	66	41	-	-	10	1.90	16	N/A	N/A
13.29	91.6	116.2	91.6	0.8	-2.5	0.9	6	clean SAND to silty SAND	125	5.0	18	20	67	41	-	-	10	1.88	16	N/A	N/A
13.45	96.6	119.1	96.5	0.8	-2.5	0.8	6	clean SAND to silty SAND	125	5.0	19	21	68	41	-	-	9	1.85	16	N/A	N/A
13.62	103.6	125.4	103.6	0.9	-2.4	0.9	6	clean SAND to silty SAND	125	5.0	21	22	70	42	-	-	9	1.84	16	N/A	N/A
13.78	107.8	128.1	107.7	0.9	-2.3	0.8	6	clean SAND to silty SAND	125	5.0	22	23	71	42	-	-	9	1.82	16	N/A	N/A
13.94	112.0	131.0	112.0	0.9	-2.2	0.8	6	clean SAND to silty SAND	125	5.0	22	24	72	42	-	-	8	1.80	16	N/A	N/A
14.11	115.2	134.0	115.1	1.0	-2.1	0.8	6	clean SAND to silty SAND	125	5.0	23	24	73	42	-	-	8	1.80	16	0.33	2.0
14.27	114.1	128.6	114.0	0.8	-2.0	0.7	6	clean SAND to silty SAND	125	5.0	23	24	73	42	-	-	7	1.76	16	0.49	2.5
14.44	111.5	126.8	111.4	0.8	-1.8	0.7	6	clean SAND to silty SAND	125	5.0	22	23	72	42	-	-	8	1.78	16	0.58	2.8
14.60	109.0	124.7	109.0	0.8	-1.3	0.7	6	clean SAND to silty SAND	125	5.0	22	23	71	42	-	-	8	1.79	16	0.69	3.1
14.76	113.9	128.3	113.9	0.8	-1.3	0.7	6	clean SAND to silty SAND	125	5.0	23	24	73	42	-	-	7	1.77	16	0.54	2.7
14.93	113.9	127.6	113.9	0.8	-1.2	0.7	6	clean SAND to silty SAND	125	5.0	23	24	72	42	-	-	7	1.76	16	0.59	2.8
15.09	113.3	125.2	113.3	0.7	-1.1	0.7	6	clean SAND to silty SAND	125	5.0	23	23	72	42	-	-	7	1.75	16	0.70	3.2
15.26	121.6	128.9	121.6	0.7	-1.0	0.6	6	clean SAND to silty SAND	125	5.0	24	25	74	42	-	-	6	1.69	16	0.55	2.7
15.42	136.4	140.0	136.4	0.7	-0.9	0.5	6	clean SAND to silty SAND	125	5.0	27	28	78	43	-	-	5	1.63	16	0.25	1.9

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosolutions Inc
Data File: SDF(143).cpt
CPT Date: 1/6/2015 9:20:23 AM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	Nk -	* Vol Strn %	* Cycl SStn %
15.58	145.4	148.8	145.4	0.8	-0.8	0.5	6	clean SAND to silty SAND	125	5.0	29	30	80	43	-	-	5	1.60	16	0.17	1.5
15.75	162.8	166.1	162.8	0.8	-0.7	0.5	6	clean SAND to silty SAND	125	5.0	33	33	84	44	-	-	5	1.55	16	0.00	0.0
15.91	178.9	182.0	178.9	0.8	-0.5	0.4	6	clean SAND to silty SAND	125	5.0	36	36	87	44	-	-	5	1.49	16	0.00	0.0
16.08	189.9	192.7	189.9	0.8	-0.4	0.4	6	clean SAND to silty SAND	125	5.0	38	39	89	44	-	-	5	1.44	16	0.00	0.0
16.24	193.6	195.9	193.6	0.7	-0.3	0.3	6	clean SAND to silty SAND	125	5.0	39	39	89	44	-	-	5	1.40	16	0.00	0.0
16.40	188.8	190.5	188.8	0.5	-0.1	0.3	6	clean SAND to silty SAND	125	5.0	38	38	88	44	-	-	5	1.36	16	0.00	0.0
16.57	185.5	186.6	185.5	0.5	0.1	0.3	6	clean SAND to silty SAND	125	5.0	37	37	88	44	-	-	5	1.37	16	0.00	0.0
16.73	178.4	179.0	178.4	0.7	0.2	0.4	6	clean SAND to silty SAND	125	5.0	36	36	86	44	-	-	5	1.46	16	0.00	0.0
16.90	171.6	171.7	171.6	0.8	0.5	0.5	6	clean SAND to silty SAND	125	5.0	34	34	85	44	-	-	5	1.52	16	0.00	0.0
17.06	170.4	170.0	170.4	0.8	1.9	0.5	6	clean SAND to silty SAND	125	5.0	34	34	85	44	-	-	5	1.52	16	0.00	0.0
17.23	162.4	161.6	162.4	0.6	1.8	0.4	6	clean SAND to silty SAND	125	5.0	32	32	83	43	-	-	5	1.51	16	0.00	0.0
17.39	160.0	158.8	160.0	0.6	1.9	0.4	6	clean SAND to silty SAND	125	5.0	32	32	82	43	-	-	5	1.52	16	0.11	1.2
17.55	163.6	161.9	163.6	0.6	2.1	0.4	6	clean SAND to silty SAND	125	5.0	33	32	83	43	-	-	5	1.49	16	0.00	0.0
17.72	164.0	161.9	164.1	0.6	2.5	0.4	6	clean SAND to silty SAND	125	5.0	33	32	83	43	-	-	5	1.49	16	0.00	0.0
17.88	163.9	161.4	164.0	0.6	2.7	0.4	6	clean SAND to silty SAND	125	5.0	33	32	83	43	-	-	5	1.50	16	0.00	0.0
18.05	159.8	156.9	159.9	0.6	2.8	0.3	6	clean SAND to silty SAND	125	5.0	32	31	82	43	-	-	5	1.49	16	0.13	1.3
18.21	155.0	151.8	155.1	0.5	2.8	0.3	6	clean SAND to silty SAND	125	5.0	31	30	81	43	-	-	5	1.48	16	0.17	1.5
18.37	144.6	141.3	144.7	0.5	2.5	0.3	6	clean SAND to silty SAND	125	5.0	29	28	78	42	-	-	5	1.52	16	0.31	2.1
18.54	146.7	142.9	146.7	0.4	2.6	0.3	6	clean SAND to silty SAND	125	5.0	29	29	79	43	-	-	5	1.47	16	0.28	2.0
18.70	144.5	140.5	144.6	0.4	2.7	0.3	6	clean SAND to silty SAND	125	5.0	29	28	78	42	-	-	5	1.51	16	0.34	2.2
18.87	149.9	145.3	149.9	0.5	2.7	0.4	6	clean SAND to silty SAND	125	5.0	30	29	79	43	-	-	5	1.53	16	0.24	1.9
19.03	141.9	137.2	141.9	0.5	2.4	0.4	6	clean SAND to silty SAND	125	5.0	28	27	77	42	-	-	5	1.56	16	0.43	2.5
19.19	120.5	115.7	120.5	0.5	2.6	0.4	6	clean SAND to silty SAND	125	5.0	24	23	72	41	-	-	5	1.64	16	1.72	6.4
19.36	118.5	114.1	118.6	0.4	2.7	0.4	6	clean SAND to silty SAND	125	5.0	24	23	71	41	-	-	5	1.63	16	1.85	7.1
19.52	128.0	122.8	128.0	0.4	2.8	0.3	6	clean SAND to silty SAND	125	5.0	26	25	74	42	-	-	5	1.58	16	1.27	4.6
19.69	139.5	133.5	139.5	0.6	2.8	0.4	6	clean SAND to silty SAND	125	5.0	28	27	77	42	-	-	5	1.58	16	0.60	3.0
19.85	133.4	127.0	133.4	0.6	2.9	0.5	6	clean SAND to silty SAND	125	5.0	27	25	75	42	-	-	5	1.64	16	1.00	3.9
20.01	121.3	119.4	121.3	0.6	3.0	0.5	6	clean SAND to silty SAND	125	5.0	24	23	72	41	-	-	6	1.69	16	1.52	5.7
20.18	109.4	112.5	109.5	0.6	3.1	0.6	6	clean SAND to silty SAND	125	5.0	22	21	68	41	-	-	7	1.76	16	2.00	9.4
20.34	106.8	109.2	106.8	0.6	3.2	0.6	6	clean SAND to silty SAND	125	5.0	21	20	67	41	-	-	7	1.76	16	2.17	12.2
20.51	110.2	110.8	110.2	0.6	3.3	0.5	6	clean SAND to silty SAND	125	5.0	22	21	68	41	-	-	7	1.74	16	2.12	10.4
20.67	116.3	114.8	116.4	0.6	3.3	0.5	6	clean SAND to silty SAND	125	5.0	23	22	70	41	-	-	6	1.71	16	1.86	7.5
20.83	125.9	121.3	126.0	0.6	3.4	0.5	6	clean SAND to silty SAND	125	5.0	25	24	73	41	-	-	6	1.68	16	1.44	5.4
21.00	135.1	127.4	135.2	0.7	3.5	0.5	6	clean SAND to silty SAND	125	5.0	27	25	75	42	-	-	5	1.65	16	1.06	4.1
21.16	148.5	139.0	148.5	0.7	3.5	0.5	6	clean SAND to silty SAND	125	5.0	30	28	78	42	-	-	5	1.61	16	0.45	2.6
21.33	151.0	141.1	151.1	0.7	3.6	0.5	6	clean SAND to silty SAND	125	5.0	30	28	78	42	-	-	5	1.60	16	0.41	2.5
21.49	156.5	145.9	156.6	0.7	3.6	0.5	6	clean SAND to silty SAND	125	5.0	31	29	79	42	-	-	5	1.59	16	0.30	2.1
21.65	175.3	163.0	175.3	0.7	3.7	0.4	6	clean SAND to silty SAND	125	5.0	35	33	83	43	-	-	5	1.49	16	0.00	0.0
21.82	193.2	179.2	193.2	0.7	3.8	0.4	6	clean SAND to silty SAND	125	5.0	39	36	86	43	-	-	5	1.45	16	0.00	0.0
21.98	189.8	175.7	189.9	0.7	3.7	0.4	6	clean SAND to silty SAND	125	5.0	38	35	86	43	-	-	5	1.47	16	0.00	0.0
22.15	205.5	189.7	205.6	0.7	3.6	0.4	6	clean SAND to silty SAND	125	5.0	41	38	88	44	-	-	5	1.42	16	0.00	0.0
22.31	217.2	200.1	217.3	0.7	3.5	0.3	6	clean SAND to silty SAND	125	5.0	43	40	90	44	-	-	5	1.40	16	0.00	0.0
22.47	217.1	199.6	217.2	0.8	3.7	0.4	6	clean SAND to silty SAND	125	5.0	43	40	90	44	-	-	5	1.42	16	0.00	0.0
22.64	206.5	189.4	206.6	0.9	3.7	0.4	6	clean SAND to silty SAND	125	5.0	41	38	88	44	-	-	5	1.47	16	0.00	0.0
22.80	191.8	175.5	191.9	1.1	3.8	0.6	6	clean SAND to silty SAND	125	5.0	38	35	86	43	-	-	5	1.56	16	0.00	0.0
22.97	178.7	163.1	178.7	0.9	3.9	0.5	6	clean SAND to silty SAND	125	5.0	36	33	83	43	-	-	5	1.56	16	0.00	0.0
23.13	170.8	155.6	170.9	0.9	3.8	0.5	6	clean SAND to silty SAND	125	5.0	34	31	82	43	-	-	5	1.59	16	0.19	1.7
23.30	154.7	140.6	154.8	0.8	4.0	0.5	6	clean SAND to silty SAND	125	5.0	31	28	78	42	-	-	5	1.62	16	0.51	2.8
23.46	143.3	129.9	143.4	0.7	4.1	0.5	6	clean SAND to silty SAND	125	5.0	29	26	76	42	-	-	5	1.64	16	1.09	4.3
23.62	143.2	129.5	143.3	0.6	4.2	0.4	6	clean SAND to silty SAND	125	5.0	29	26	76	42	-	-	5	1.61	16	1.13	4.4
23.79	140.3	126.6	140.3	0.6	4.4	0.4	6	clean SAND to silty SAND	125	5.0	28	25	75	42	-	-	5	1.60	16	1.32	5.0
23.95	136.7	123.2	136.8	0.6	4.5	0.4	6	clean SAND to silty SAND	125	5.0	27	25	74	41	-	-	5	1.62	16	1.54	6.0
24.12	134.3	120.7	134.4	0.5	4.6	0.4	6	clean SAND to silty SAND	125	5.0	27	24	73	41	-	-	5	1.62	16	1.70	6.8
24.28	132.5	118.8	132.6	0.6	4.7	0.4	6	clean SAND to silty SAND	125	5.0	27	24	73	41	-	-	5	1.63	16	1.83	7.5
24.44	125.5	114.5	125.6	0.6	4.9	0.5	6	clean SAND to silty SAND	125	5.0	25	22	71	41	-	-	6	1.67	16	2.05	9.8
24.61	118.0	110.6	118.1	0.6	4.9	0.5	6	clean SAND to silty SAND	125	5.0	24	21	69	40	-	-	6	1.72	16	2.15	13.5
24.77	115.2	108.9	115.3	0.6	5.0	0.5	6	clean SAND to silty SAND	125	5.0	23	21	68	40	-	-	7	1.73	16	2.18	15.3
24.94	121.8	109.7	121.9	0.5	5.1	0.4	6	clean SAND to silty SAND	125	5.0	24	22	70	41	-	-	5	1.66	16	2.17	13.3
25.10	128.5	114.0	128.6	0.5	5.2	0.4	6	clean SAND to silty SAND	125	5.0	26	23	71	41	-	-	5	1.63	16	2.06	10.3
25.26	133.5	118.2	133.6	0.5	5.1	0.4	6	clean SAND to silty SAND	125	5.0	27	24	73	41	-	-	5	1.62	16	1.92	8.3
25.43	141.1	124.6	141.2	0.5	5.2	0.4	6	clean SAND to silty SAND	125	5.0	28	25	74	41	-	-	5	1.59	16	1.54	6.1
25.59	143.6	126.6	143.7	0.5	5.2	0.4	6	clean SAND to silty SAND	125	5.0	29	25	75	41	-	-	5	1.59	16	1.43	5.6
25.76	137.9	123.4	138.0	0.7	5.3	0.5	6	clean SAND to silty SAND	125	5.0	28	24	73	41	-	-	6	1.67	16	1.62	6.6
25.92	108.8	139.3	108.9	1.9	5.4	1.8	5	silty SAND to sandy SILT	120	4.0	27	24	65	40	-	-	16	2.10	16	0.68	3.5
26.08	63.0	156.4	63.1	2.4	5.5	3.9	4	clayy SILT to silty CLAY	115	2.0	31	28	-	-	4.4	9.9	31	2.51	15	0.21	0.6
26.25	39.1	-	39.2	1.6	6.0	4.3	3	silty CLAY to CLAY	115	1.5	26	21	-	-	2.7	9.9	42	2.72	15	-	-
26.41	106.4	116.4	106.5	1.1	7.8	1.1	6	clean SAND to silty SAND	125	5.0	21	19	65	40	-	-	12	1.96	16	2.01	15.9
26.58	199.9	174.1	200.0	1.1	6.4	0.6	6	clean SAND to silty SAND	125	5.0	40	35	85	43	-	-	5	1.57	16	0.00	0.0
26.74	226.5	196.9	226.7	1.4	6.2	0.6	6	clean SAND to silty SAND	125	5.0	45	39	89	44	-	-	5	1.56	16	0.00	0.0
26.90	238.7	207.1	238.8	1.7	5.9	0.7	6	clean SAND to silty SAND	125	5.0	48	41	91	44	-	-	5	1.58	16	0.00	0.0
27.07	251.4	217.7	251.5	1.9	5.4	0.8	6	clean SAND to silty SAND	125	5.0	50	44	93	44	-	-	5	1.59	16	0.00	0.0
27.23	255.4	220.7	255.5	2.0	5.0	0.8	6	clean SAND to silty SAND	125	5.0	51	44	93	44	-	-	5	1.59	16	0.00	0.0
27.40	260.4	224.5	260.4	2.0	4.7	0.8	6	clean SAND to silty SAND	125	5.0	52	45	94	44	-	-	5	1.58	16	0.00	0.0
27.56	265.5	228.5	265.6	2.0	4.5	0.8	6	clean SAND to silty SAND	125	5.0	53	46	94	44	-	-	5	1.57	16	0.00	0.0
27.72	258.3	221.9	258.4	2.0	4.5	0.8	6	clean SAND to silty SAND	125	5.0	52	44	93	44	-	-	5	1.58	16	0.00	0.0
27.89	249.1	213.5	249.2	1.9	4.6	0.8	6	clean SAND to silty SAND	125	5.0	50	43	92	44	-	-	5	1.59	16	0.00	0.0
28.05	252.1	215.6	252.2	1.4	4.6	0.6	6	clean SAND to silty SAND	125	5.0	50	43	92	44	-	-	5	1.50	16	0.00	0.0
28.22	249.7	213.1	249.8	1.4	4.7	0.6	6	clean SAND to silty SAND	125	5.0	50	43	92	44	-	-	5	1.50	16	0.00	0.0
28.38	237.1	202.0	237.2	1.4	4.9	0.6	6	clean SAND to silty SAND	125	5.0	47	40	90	44	-	-	5	1.53	16	0.00	0.0
28.54	231.6	196.9	231.7	1.4	5.0	0.6	6	clean SAND to silty SAND	125	5.0	46	39	89	43	-	-	5	1.54	16	0.00	0.0
28.71	231.7	196.6	231.8	1.4	5.0	0.6	6	clean SAND to silty SAND	125	5.0	46	39	89	43	-	-	5	1.55	16	0.00	0.0
28.87	227.3	192.5	227.4	1.4	5.1	0.6	6	clean SAND to silty SAND	125	5.0	45	39	89	43	-	-	5	1.56	16	0.00	0.0
29.04	223.4	188.8	223.5	1.4	5.0	0.6	6	clean SAND to silty SAND	125	5.0	45	38	88	43	-	-	5	1.57	16	0.00	0.0
29.20	219.7	185.4	219.8	1.4	5.1	0.6	6	clean SAND to silty SAND	125	5.0	44	37	87	43	-	-	5	1.58	16	0.00	0.0
29.36	215.5	181.5	215.6	1.4	5.2	0.7	6	clean SAND to silty SAND	125	5.0	43	36	87	43	-	-	5	1.59	16	0.00	0.0
29.53	213.2	179.1	213.3	1.4	5.4	0.6	6	clean SAND to silty SAND	125	5.0	43	36	86	43	-	-	5	1.60	16	0.00	0.0
29.69	207.9	174.4	208.0	1.3	5.5	0.7	6	clean SAND to silty SAND	125	5.0	42	35	85	43	-	-	5	1.61	16	0.00	0.0
29.86	209.1	175.1	209.2	1.3	5.7	0.6	6	clean SAND to silty SAND	125	5.0	42	35	85	43	-	-	5	1.60	16	0.00	0.0
30.02	212.9	177.9	213.0	1.3	5.8	0.6	6	clean SAND to silty SAND	125	5.0	43	36	86	43	-	-	5	1.59	16	0.00	0.0
30.19	224.0	186.9	224.1	1.4	5.9	0.6	6	clean SAND to silty SAND	125	5.0	45	37	88	43	-	-	5	1.57	16	0.00	0.0
30.35	228.1	189.9	228.2	1.4	6.0	0.6	6	clean SAND to silty SAND	125	5.0	46	38	88	43	-	-	5	1.56	16	0.00	0.0
30.51	220.7	183.4	220.8	1.4	6.0	0.6	6	clean SAND to silty SAND	125	5.0	44	37	87	43	-	-	5	1.58	16	0.00	0.0
30.68	224.1	185.8	224.2	1.3	6.0	0.6	6	clean SAND to silty SAND	125	5.0	45	37	87	43	-	-	5	1.56	16	0.00	0.0
30.84	230.0	190.4	230.1	1.3	6.1	0.6	6	clean SAND to silty SAND	125	5.0	46	38	88	43	-	-	5	1.54	16	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(143).cpt
CPT Date: 1/6/2015 9:20:23 AM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR - -	* Fin Ic %	* Ic SBT Indx	Nk -	* Vol Strn %	* Cycl SStn %
31.01	224.2	185.3	224.4	1.2	6.2	0.6	6	clean SAND to silty SAND	125	5.0	45	37	87	43	-	-	5	1.55	16	0.00	0.0
31.17	215.1	177.4	215.2	1.1	6.3	0.5	6	clean SAND to silty SAND	125	5.0	43	35	86	43	-	-	5	1.54	16	0.00	0.0
31.33	205.2	168.9	205.3	0.8	6.3	0.4	6	clean SAND to silty SAND	125	5.0	41	34	84	43	-	-	5	1.50	16	0.00	0.0
31.50	173.3	146.1	173.4	1.1	6.4	0.7	6	clean SAND to silty SAND	125	5.0	35	28	79	42	-	-	6	1.68	16	0.62	3.2
31.66	85.5	113.4	85.6	1.4	6.1	1.7	5	silty SAND to sandy SILT	120	4.0	21	18	55	38	-	-	18	2.18	16	2.11	28.1
31.83	34.9	-	35.0	1.2	6.6	3.8	4	clayy SILT to silty CLAY	115	2.0	17	12	-	-	2.4	7.7	44	2.77	15	-	-
31.99	22.7	-	22.8	0.8	7.0	3.8	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	4.8	54	2.92	15	-	-
32.15	16.7	-	16.8	0.5	8.1	3.2	3	silty CLAY to CLAY	115	1.5	11	8	-	-	1.1	3.4	58	3.00	15	-	-
32.32	11.5	-	11.7	0.3	11.1	2.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.2	67	3.13	15	-	-
32.48	9.2	-	9.4	0.2	13.2	3.2	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.7	78	3.26	15	-	-
32.65	8.9	-	9.2	0.2	14.7	2.8	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	77	3.25	15	-	-
32.81	8.8	-	9.1	0.2	16.1	2.4	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	75	3.22	15	-	-
32.97	8.9	-	9.3	0.1	17.6	1.8	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	69	3.15	15	-	-
33.14	8.4	-	8.8	0.1	19.1	1.7	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.5	71	3.18	15	-	-
33.30	8.3	-	8.7	0.1	20.7	1.9	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.4	74	3.21	15	-	-
33.47	8.5	-	8.9	0.2	22.5	2.7	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.5	79	3.27	15	-	-
33.63	9.8	-	10.2	0.2	24.4	2.1	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.7	69	3.15	15	-	-
33.79	9.1	-	9.6	0.1	25.7	2.0	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	72	3.18	15	-	-
33.96	9.0	-	9.5	0.1	27.4	1.8	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	70	3.16	15	-	-
34.12	9.0	-	9.5	0.1	29.1	2.0	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.5	72	3.19	15	-	-
34.29	9.0	-	9.6	0.1	30.9	2.2	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.5	73	3.20	15	-	-
34.45	9.3	-	9.9	0.2	32.7	2.3	3	silty CLAY to CLAY	115	1.5	6	4	-	-	0.5	1.6	73	3.20	15	-	-
34.61	10.0	-	10.7	0.2	34.5	2.7	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.6	1.8	73	3.20	15	-	-
34.78	10.7	-	11.4	0.3	36.5	3.6	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.6	1.9	76	3.24	15	-	-
34.94	17.5	-	18.0	0.4	26.6	2.8	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.1	3.4	56	2.97	15	-	-
35.11	13.8	-	14.4	0.5	26.8	4.3	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.6	71	3.18	15	-	-
35.27	11.9	-	12.5	0.4	28.3	4.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.2	77	3.25	15	-	-
35.43	12.1	-	12.7	0.3	30.2	2.7	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.2	67	3.12	15	-	-
35.60	11.9	-	12.5	0.2	31.9	2.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.1	66	3.11	15	-	-
35.76	11.6	-	12.3	0.3	35.0	3.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.1	73	3.20	15	-	-
35.93	11.5	-	12.2	0.4	37.9	4.3	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.0	78	3.26	15	-	-
36.09	11.2	-	12.0	0.4	40.1	4.8	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	2.0	81	3.30	15	-	-
36.26	11.0	-	11.8	0.4	41.5	4.7	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	1.9	81	3.30	15	-	-
36.42	11.2	-	12.1	0.4	42.9	4.9	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	1.9	82	3.31	15	-	-
36.58	13.4	-	14.2	0.5	44.2	4.2	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.4	73	3.20	15	-	-
36.75	15.1	-	15.9	0.5	41.7	3.8	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	2.8	67	3.12	15	-	-
36.91	19.2	-	20.0	0.5	40.6	2.7	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.2	3.6	54	2.93	15	-	-
37.08	15.6	-	16.4	0.5	38.7	3.8	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	2.9	66	3.11	15	-	-
37.24	17.2	-	18.0	0.6	42.4	4.0	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	3.2	64	3.08	15	-	-
37.40	34.7	75.4	35.4	0.5	33.0	1.6	5	silty SAND to sandy SILT	120	4.0	9	7	24	31	-	-	31	2.50	16	2.94	51.2
37.57	39.2	-	39.6	0.8	20.0	2.1	4	clayy SILT to silty CLAY	115	2.0	20	13	-	-	2.7	7.8	36	2.61	15	-	-
37.73	24.5	-	24.8	0.9	16.0	3.9	3	silty CLAY to CLAY	115	1.5	16	10	-	-	1.6	4.7	55	2.94	15	-	-
37.90	22.3	-	22.8	0.9	23.1	4.3	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	4.2	59	3.00	15	-	-
38.06	15.8	-	16.2	0.8	20.9	5.6	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.0	2.8	74	3.21	15	-	-
38.22	15.2	-	15.7	0.6	22.7	5.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.7	73	3.20	15	-	-
38.39	13.5	-	13.9	0.6	23.9	5.1	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.3	77	3.26	15	-	-
38.55	12.2	-	12.7	0.5	25.3	5.3	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.1	82	3.31	15	-	-
38.72	10.8	-	11.3	0.5	26.5	6.1	3	silty CLAY to CLAY	115	1.5	7	5	-	-	0.7	1.8	89	3.40	15	-	-
38.88	13.1	-	13.7	0.5	28.6	4.5	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.2	76	3.24	15	-	-
39.04	16.1	-	16.7	0.5	29.2	3.7	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.0	2.8	66	3.10	15	-	-
39.21	12.3	-	12.9	0.5	29.5	5.2	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.0	82	3.31	15	-	-
39.37	10.4	-	11.0	0.5	31.1	6.5	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.6	93	3.44	15	-	-
39.54	10.3	-	10.9	0.5	32.5	6.2	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.6	93	3.43	15	-	-
39.70	11.3	-	12.0	0.5	34.5	5.2	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.8	85	3.35	15	-	-
39.86	11.6	-	12.3	0.5	36.2	5.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.9	85	3.34	15	-	-
40.03	12.8	-	13.5	0.5	37.5	5.0	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	80	3.28	15	-	-
40.19	14.4	-	15.2	0.5	38.0	4.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.4	72	3.18	15	-	-
40.36	11.5	-	12.3	0.5	38.6	5.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.8	85	3.35	15	-	-
40.52	17.9	-	18.9	0.4	51.5	2.8	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	3.1	58	3.00	15	-	-
40.68	22.9	-	23.5	0.4	30.9	2.1	4	clayy SILT to silty CLAY	115	2.0	11	7	-	-	1.5	4.1	48	2.84	15	-	-
40.85	20.7	-	21.3	0.5	27.8	2.7	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.3	3.7	54	2.93	15	-	-
41.01	15.5	-	16.1	0.6	28.7	4.4	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.6	71	3.18	15	-	-
41.18	13.9	-	14.5	0.6	31.1	4.9	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.3	77	3.25	15	-	-
41.34	27.9	-	28.6	0.5	34.1	2.0	4	clayy SILT to silty CLAY	115	2.0	14	8	-	-	1.9	5.1	43	2.74	15	-	-
41.50	30.2	-	30.7	0.4	25.9	1.5	4	clayy SILT to silty CLAY	115	2.0	15	9	-	-	2.0	5.5	38	2.65	15	-	-
41.67	26.5	-	26.9	0.5	20.4	2.2	4	clayy SILT to silty CLAY	115	2.0	13	8	-	-	1.8	4.8	45	2.79	15	-	-
41.83	18.8	-	19.2	0.7	20.5	4.0	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.2	3.2	64	3.08	15	-	-
42.00	14.3	-	14.8	0.6	22.8	5.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.3	77	3.25	15	-	-
42.16	14.8	-	15.3	0.5	25.3	4.4	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.4	73	3.20	15	-	-
42.32	16.1	-	16.7	0.5	27.5	3.6	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.7	67	3.12	15	-	-
42.49	14.2	-	14.8	0.5	28.2	4.5	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.3	75	3.23	15	-	-
42.65	30.3	-	30.9	0.6	30.9	2.1	4	clayy SILT to silty CLAY	115	2.0	15	9	-	-	2.0	5.4	42	2.73	15	-	-
42.82	39.1	75.2	39.5	0.5	19.0	1.5	5	silty SAND to sandy SILT	120	4.0	10	7	26	32	-	-	29	2.46	16	2.95	51.2
42.98	40.6	69.2	40.8	0.4	14.2	1.2	5	silty SAND to sandy SILT	120	4.0	10	8	27	32	-	-	26	2.39	16	3.16	51.2
43.15	35.0	-	35.2	0.7	11.3	2.2	4	clayy SILT to silty CLAY	115	2.0	18	10	-	-	2.4	6.3	40	2.69	15	-	-
43.31	21.8	-	22.0	0.8	11.3	4.1	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.4	3.7	61	3.03	15	-	-
43.47	14.2	-	14.5	0.6	12.7	5.4	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.2	80	3.28	15	-	-
43.64	12.8	-	13.1	0.5	15.2	4.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	80	3.29	15	-	-
43.80	12.4	-	12.8	0.5	16.9	4.7	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.9	82	3.31	15	-	-
43.97	12.8	-	13.1	0.5	18.1	4.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	81	3.30	15	-	-
44.13	11.7	-	12.1	0.4	19.2	4.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.7	83	3.32	15	-	-
44.29	10.2	-	10.6	0.4	20.2	5.1	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.4	92	3.43	15	-	-
44.46	12.2	-	12.8	0.4	30.9	4.6	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.8	82	3.32	15	-	-
44.62	12.9	-	13.5	0.5	32.4	4.5	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	80	3.29	15	-	-
44.79	12.1	-	12.8	0.5	33.6	4.9	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.8	84	3.34	15	-	-
44.95	11.9	-	12.6	0.4	35.7	4.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.7	85	3.34	15	-	-
45.11	12.4	-	13.1	0.5	37.1	4.8	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.8	83	3.33	15	-	-
45.28	11.7	-	12.5	0.4	38.9	4.9	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.7	86	3.36	15	-	-
45.44	12.9	-	13.7	0.5	40.7	4.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	82	3.31	15	-	-
45.61	13.9	-	14.7	0.6	43.1	5.0	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.1	80	3.29	15	-	-
45.77	17.8	-	18.7	0.6	44.7	4.1	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	2.8	68	3.13	15	-	-
45.93	15.9	-	16.7	0.6	40.4	4.7	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.4	74	3.22	15	-	-
46.10	16.3	-	17.1	0.5	41.8	3.5	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.5	68	3.13	15	-	-
46.26	16.6	-	17.5	0.4	43.4	3.1	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.6	66	3.10	15	-	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(143).cpt
CPT Date: 1/6/2015 9:20:23 AM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
46.43	14.6	-	15.5	0.4	46.2	3.2	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.2	70	3.16	15	-	-
46.59	13.3	-	14.2	0.4	49.1	3.9	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	78	3.26	15	-	-
46.75	13.1	-	14.2	0.5	54.5	4.9	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	83	3.32	15	-	-
46.92	15.5	-	16.6	0.6	57.0	4.4	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.3	74	3.22	15	-	-
47.08	18.6	-	19.6	0.6	50.0	4.0	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	2.9	67	3.12	15	-	-
47.25	17.1	-	18.1	0.7	51.1	5.0	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.6	74	3.21	15	-	-
47.41	15.9	-	16.7	0.6	39.8	5.0	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.4	76	3.24	15	-	-
47.57	16.0	-	16.9	0.6	45.3	4.3	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.4	73	3.20	15	-	-
47.74	16.1	-	17.1	0.6	50.9	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.4	73	3.19	15	-	-
47.90	16.5	-	17.6	0.6	54.7	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.5	72	3.19	15	-	-
48.07	18.6	-	19.8	0.6	59.8	3.8	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	2.8	66	3.11	15	-	-
48.23	18.1	-	19.3	0.7	60.8	4.4	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	2.7	70	3.16	15	-	-
48.39	17.8	-	19.0	0.7	60.9	4.5	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.1	2.7	71	3.18	15	-	-
48.56	18.4	-	19.7	0.7	62.3	4.5	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	2.8	70	3.16	15	-	-
48.72	18.2	-	19.4	0.7	62.4	4.8	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	2.7	72	3.19	15	-	-
48.89	17.2	-	18.4	0.7	62.5	4.7	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.5	73	3.21	15	-	-
49.05	15.2	-	16.4	0.6	63.0	5.2	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.2	80	3.28	15	-	-
49.22	16.2	-	17.5	0.6	65.5	4.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.3	74	3.22	15	-	-
49.38	17.4	-	18.7	0.6	67.8	4.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.1	2.5	72	3.19	15	-	-
49.54	17.0	-	18.4	0.7	67.6	4.8	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	2.5	74	3.21	15	-	-
49.71	14.9	-	16.2	0.6	67.5	5.3	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	81	3.30	15	-	-
49.87	14.3	-	15.6	0.6	68.5	5.1	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	82	3.31	15	-	-
50.04	16.3	-	17.7	0.6	71.6	4.3	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.3	74	3.21	15	-	-
50.20	14.7	-	16.1	0.6	70.4	4.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	80	3.28	15	-	-
50.36	15.1	-	16.5	0.5	68.5	4.2	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	76	3.24	15	-	-
50.53	15.0	-	16.4	0.6	70.9	4.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	79	3.27	15	-	-
50.69	15.2	-	16.5	0.7	70.7	5.5	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	82	3.31	15	-	-
50.86	14.4	-	15.7	0.6	68.3	5.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	84	3.34	15	-	-
51.02	15.9	-	17.5	0.6	78.9	4.7	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.2	77	3.25	15	-	-
51.18	16.5	-	18.1	0.6	84.5	4.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.3	75	3.22	15	-	-
51.35	16.7	-	18.4	0.6	82.4	4.5	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.3	74	3.22	15	-	-
51.51	16.1	-	17.7	0.6	84.4	4.6	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.2	76	3.24	15	-	-
51.68	14.9	-	16.6	0.5	84.2	4.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	79	3.28	15	-	-
51.84	14.8	-	16.4	0.6	84.0	5.3	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.0	83	3.32	15	-	-
52.00	16.1	-	17.4	0.7	66.3	5.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.2	80	3.29	15	-	-
52.17	14.2	-	15.4	0.8	59.6	7.4	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	1.9	92	3.43	15	-	-
52.33	16.4	-	17.5	0.8	55.7	5.7	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.2	81	3.30	15	-	-
52.50	16.7	-	17.8	0.7	55.7	5.3	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.3	79	3.27	15	-	-
52.66	14.2	-	15.3	0.7	56.1	6.2	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	1.9	88	3.38	15	-	-
52.82	14.5	-	15.6	0.7	58.8	5.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	1.9	86	3.36	15	-	-
52.99	14.2	-	15.3	0.6	59.9	5.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	1.8	85	3.35	15	-	-
53.15	12.3	-	13.5	0.5	60.2	5.2	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.5	90	3.41	15	-	-
53.32	12.2	-	13.5	0.4	66.2	4.2	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.5	86	3.36	15	-	-
53.48	12.4	-	13.8	0.7	72.3	7.6	2	Organic SOILS - Peats	100	1.0	12	6	-	-	1.1	1.5	95	3.50	10	-	-
53.64	13.3	-	14.8	0.8	77.1	7.6	3	silty CLAY to CLAY	115	1.5	9	4	-	-	0.8	1.7	95	3.47	15	-	-
53.81	92.6	92.9	92.8	1.0	11.5	1.1	5	silty SAND to sandy SILT	120	4.0	23	16	52	36	-	-	16	2.10	16	2.48	31.6
53.97	105.2	103.8	105.4	1.3	10.7	1.2	5	silty SAND to sandy SILT	120	4.0	26	18	56	37	-	-	15	2.09	16	2.27	26.8
54.14	111.7	106.5	111.9	1.3	11.6	1.2	5	silty SAND to sandy SILT	120	4.0	28	19	58	37	-	-	15	2.06	16	2.22	24.7
54.30	108.8	117.2	109.0	1.7	11.6	1.6	5	silty SAND to sandy SILT	120	4.0	27	19	57	37	-	-	18	2.16	16	2.04	25.7
54.46	91.9	132.0	92.2	2.3	12.0	2.6	5	silty SAND to sandy SILT	120	4.0	23	16	52	36	-	-	24	2.34	16	1.34	15.6
54.63	110.2	126.3	110.5	2.1	12.3	1.9	5	silty SAND to sandy SILT	120	4.0	28	19	58	37	-	-	19	2.20	16	1.70	19.6
54.79	133.2	118.0	133.2	1.5	3.3	1.2	6	clean SAND to silty SAND	125	5.0	27	18	64	38	-	-	13	2.00	16	2.03	18.9
54.96	129.2	113.6	129.2	1.4	0.1	1.1	6	clean SAND to silty SAND	125	5.0	26	18	63	38	-	-	13	1.99	16	2.10	20.3
55.12	65.1	109.5	65.1	1.4	0.1	2.3	5	silty SAND to sandy SILT	120	4.0	16	11	40	34	-	-	28	2.44	16	2.17	50.8
55.28	37.6	-	37.6	1.2	0.9	3.6	3	silty CLAY to CLAY	115	1.5	25	12	-	-	2.5	5.6	49	2.86	15	-	-
55.45	36.7	-	36.8	0.6	1.6	1.8	4	clayy SILT to silty CLAY	115	2.0	18	9	-	-	2.5	5.4	40	2.70	15	-	-
55.61	36.6	-	36.6	0.5	2.0	1.6	4	clayy SILT to silty CLAY	115	2.0	18	9	-	-	2.4	5.4	39	2.67	15	-	-
55.78	26.4	-	26.4	0.6	2.4	2.5	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.7	3.7	53	2.91	15	-	-
55.94	18.3	-	18.4	0.6	3.1	3.9	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	2.4	71	3.17	15	-	-
56.11	16.8	-	16.9	0.6	4.2	4.3	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.2	76	3.23	15	-	-
56.27	40.4	-	40.5	0.7	5.2	1.9	4	clayy SILT to silty CLAY	115	2.0	20	10	-	-	2.7	6.0	39	2.67	15	-	-
56.43	35.9	-	36.0	0.7	5.1	2.0	4	clayy SILT to silty CLAY	115	2.0	18	9	-	-	2.4	5.2	42	2.73	15	-	-
56.60	22.5	-	22.6	0.6	5.7	3.2	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.4	3.1	61	3.04	15	-	-
56.76	16.7	-	16.9	0.5	6.5	3.8	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	74	3.21	15	-	-
56.93	20.8	-	20.9	0.4	7.3	2.4	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.3	2.8	59	3.00	15	-	-
57.09	16.9	-	17.1	0.4	8.0	2.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	69	3.15	15	-	-
57.25	15.8	-	16.0	0.5	8.8	3.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.0	77	3.25	15	-	-
57.42	16.7	-	17.1	0.8	18.8	5.7	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	83	3.32	15	-	-
57.58	81.4	98.2	81.8	1.2	20.8	1.6	5	silty SAND to sandy SILT	120	4.0	20	14	47	35	-	-	21	2.25	16	2.37	39.1
57.75	175.6	138.8	175.8	1.9	10.7	1.1	6	clean SAND to silty SAND	125	5.0	35	24	72	40	-	-	10	1.89	16	1.12	5.0
57.91	210.4	161.8	210.6	2.4	11.1	1.2	6	clean SAND to silty SAND	125	5.0	42	28	78	41	-	-	9	1.85	16	0.00	0.0
58.07	223.1	174.5	223.3	3.0	11.0	1.4	6	clean SAND to silty SAND	125	5.0	45	30	80	41	-	-	10	1.88	16	0.00	0.0
58.24	227.9	179.2	228.1	3.2	10.5	1.4	6	clean SAND to silty SAND	125	5.0	46	30	81	41	-	-	10	1.89	16	0.00	0.0
58.40	227.9	179.5	228.1	3.2	9.9	1.4	6	clean SAND to silty SAND	125	5.0	46	30	81	41	-	-	10	1.89	16	0.00	0.0
58.57	231.2	180.1	231.4	3.2	9.4	1.4	6	clean SAND to silty SAND	125	5.0	46	31	81	41	-	-	10	1.88	16	0.00	0.0
58.73	240.6	183.7	240.8	3.2	9.2	1.3	6	clean SAND to silty SAND	125	5.0	48	32	83	41	-	-	9	1.85	16	0.00	0.0
58.89	254.2	189.9	254.4	3.2	9.1	1.3	6	clean SAND to silty SAND	125	5.0	51	34	84	41	-	-	9	1.82	16	0.00	0.0
59.06	264.2	195.3	264.4	3.3	9.1	1.3	6	clean SAND to silty SAND	125	5.0	53	35	86	42	-	-	8	1.81	16	0.00	0.0
59.22	267.3	197.4	267.5	3.4	9.0	1.3	6	clean SAND to silty SAND	125	5.0	53	35	86	42	-	-	8	1.81	16	0.00	0.0
59.39	264.7	196.1	264.8	3.4	8.9	1.3	6	clean SAND to silty SAND	125	5.0	53	35	86	42	-	-	8	1.81	16	0.00	0.0
59.55	270.9	198.8	271.1	3.4	8.7	1.3	6	clean SAND to silty SAND	125	5.0	54	36	86	42	-	-	8	1.80	16	0.00	0.0
59.71	280.0	202.7	280.2	3.4	8.8	1.2	6	clean SAND to silty SAND	125	5.0	56	37	87	42	-	-	8	1.78	16	0.00	0.0
59.88	273.5	199.4	273.6	3.4	8.7	1.3	6	clean SAND to silty SAND	125	5.0	55	36	87	42	-	-	8	1.80	16	0.00	0.0
60.04	262.3	192.5	262.5	3.2	8.7	1.2	6	clean SAND to silty SAND	125	5.0	52	35	85	42	-	-	8	1.81	16	0.00	0.0
60.21	236.7	177.0	236.9	2.9	9.0	1.2	6	clean SAND to silty SAND	125	5.0	47	31	82	41	-	-	9	1.84	16	0.00	0.0
60.37	189.2	162.8	189.4	3.2	9.3	1.7	6	clean SAND to silty SAND	125	5.0	38	25	74	40	-	-	13	2.01	16	0.00	0.0
60.53	107.5	152.0	107.7	3.1	11.0	3.0	5	silty SAND to sandy SILT	120	4.0	27	18	56	36	-	-	25	2.36	16	0.39	2.0
60.70	129.2	142.8	129.4	2.8	11.5	2.2	5	silty SAND to sandy SILT	120	4.0	32	21	62	38	-	-	19	2.21	16	0.78	4.3
60.86	169.2	156.2	169.4	3.1	8.1	1.9	5	silty SAND to sandy SILT	120	4.0	42	28	70	39	-	-	15	2.07	16	0.36	2.2
61.03	187.5	150.6	187.6	2.5	5.6	1.3	6	clean SAND to silty SAND	125	5.0	38	25	74	40	-	-	11	1.94	16	0.54	2.9
61.19	200.8	155.1	200.9	2.4	5.1	1.2	6	clean SAND to silty SAND	125	5.0	40	26	76	40	-	-	10	1.89	16	0.41	2.6
61.35	157.7	143.2	157.8	2.6	4.9	1.7	5	silty SAND to sandy SILT	120	4.0	39	26	68	39	-	-	15	2.06	16	0.81	4.0
61.52	74.8	-	74.9	3.0	5.2	4.2	4	clayy SILT to silty CLAY	115	2.0	37	17	-	-	5.1	9.9	40	2.69	15	-	-
61.68	38.1	-	38.2	2.0	5.5	6.0	3	silty CLAY to CLAY	115	1.5	25	11	-	-	2.5	5.1	60	3.03	15	-	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosolutions Inc
Data File: SDF(143).cpt
CPT Date: 1/6/2015 9:20:23 AM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: SB00573-1
Cone/Rig: DDG1281

Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
61.85	24.7	-	24.8	1.4	6.3	6.7	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	3.1	75	3.23	15	-	-
62.01	28.1	-	28.2	0.7	8.0	3.0	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.8	3.6	56	2.97	15	-	-
62.17	28.4	-	28.6	0.8	9.9	3.4	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.8	3.7	58	2.99	15	-	-
62.34	26.2	-	26.4	0.9	11.2	3.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	3.3	62	3.05	15	-	-
62.50	19.4	-	19.6	0.6	11.9	4.0	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.2	2.3	73	3.19	15	-	-
62.67	18.1	-	18.4	0.5	12.9	3.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.1	72	3.19	15	-	-
62.83	33.2	-	33.5	0.7	14.3	2.2	4	clayy SILT to silty CLAY	115	2.0	17	7	-	-	2.2	4.3	48	2.83	15	-	-
63.00	29.3	-	29.6	0.9	14.3	3.7	3	silty CLAY to CLAY	115	1.5	20	9	-	-	1.9	3.7	59	3.00	15	-	-
63.16	20.5	-	20.8	1.1	15.5	6.8	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.3	2.4	82	3.31	15	-	-
63.32	108.1	101.6	108.5	1.3	17.8	1.2	5	silty SAND to sandy SILT	120	4.0	27	17	55	36	-	-	16	2.10	16	2.31	28.2
63.49	198.8	138.7	199.0	1.5	8.4	0.8	6	clean SAND to silty SAND	125	5.0	40	26	75	40	-	-	7	1.76	16	1.09	4.7
63.65	210.9	148.0	211.0	1.8	5.8	0.9	6	clean SAND to silty SAND	125	5.0	42	27	77	40	-	-	8	1.77	16	0.64	3.3
63.82	213.8	151.8	213.9	2.0	6.0	0.9	6	clean SAND to silty SAND	125	5.0	43	28	78	40	-	-	8	1.79	16	0.51	2.9
63.98	221.9	155.5	222.1	2.0	9.9	0.9	6	clean SAND to silty SAND	125	5.0	44	29	79	40	-	-	8	1.78	16	0.40	2.6
64.14	237.6	161.7	237.8	2.0	10.1	0.9	6	clean SAND to silty SAND	125	5.0	48	31	81	41	-	-	7	1.73	16	0.00	0.0
64.31	244.8	165.1	245.1	2.0	10.4	0.8	6	clean SAND to silty SAND	125	5.0	49	31	82	41	-	-	6	1.72	16	0.00	0.0
64.47	226.6	157.3	226.8	2.0	10.8	0.9	6	clean SAND to silty SAND	125	5.0	45	29	79	40	-	-	7	1.77	16	0.36	2.4
64.64	208.1	148.9	208.3	2.0	11.2	1.0	6	clean SAND to silty SAND	125	5.0	42	27	76	40	-	-	8	1.81	16	0.59	3.1
64.80	210.0	149.0	210.2	1.9	11.6	0.9	6	clean SAND to silty SAND	125	5.0	42	27	77	40	-	-	8	1.80	16	0.58	3.1
64.96	219.2	153.2	219.4	2.0	12.1	0.9	6	clean SAND to silty SAND	125	5.0	44	28	78	40	-	-	8	1.78	16	0.46	2.7
65.13	236.5	160.6	236.8	2.0	12.6	0.9	6	clean SAND to silty SAND	125	5.0	47	30	81	41	-	-	7	1.74	16	0.00	0.0
65.29	258.4	170.2	258.7	2.1	13.1	0.8	6	clean SAND to silty SAND	125	5.0	52	33	83	41	-	-	6	1.69	16	0.00	0.0
65.46	255.2	169.6	255.5	2.1	13.3	0.8	6	clean SAND to silty SAND	125	5.0	51	33	83	41	-	-	6	1.71	16	0.00	0.0
65.62	250.6	167.6	250.9	2.1	13.5	0.9	6	clean SAND to silty SAND	125	5.0	50	32	82	41	-	-	6	1.72	16	0.00	0.0
65.78	244.1	165.6	244.4	2.2	13.7	0.9	6	clean SAND to silty SAND	125	5.0	49	31	82	41	-	-	7	1.74	16	0.00	0.0
65.95	267.8	177.0	268.0	2.3	13.9	0.9	6	clean SAND to silty SAND	125	5.0	54	34	85	41	-	-	6	1.70	16	0.00	0.0
66.11	274.1	186.6	274.4	2.8	14.2	1.1	6	clean SAND to silty SAND	125	5.0	55	35	85	41	-	-	7	1.75	16	0.00	0.0
66.28	236.3	173.8	236.6	3.1	13.6	1.3	6	clean SAND to silty SAND	125	5.0	47	30	80	41	-	-	10	1.87	16	0.00	0.0
66.44	195.3	158.0	195.6	3.0	13.0	1.6	6	clean SAND to silty SAND	125	5.0	39	25	74	39	-	-	12	1.98	16	0.31	2.1
66.60	172.1	149.6	172.4	2.9	12.6	1.7	5	silty SAND to sandy SILT	120	4.0	43	27	70	39	-	-	14	2.05	16	0.50	2.7
66.77	202.8	144.6	203.0	1.9	12.6	1.0	6	clean SAND to silty SAND	125	5.0	41	26	75	40	-	-	9	1.83	16	0.74	3.6
66.93	242.0	161.9	242.1	2.0	3.9	0.9	6	clean SAND to silty SAND	125	5.0	48	31	81	41	-	-	7	1.73	16	0.00	0.0
67.10	255.7	169.4	255.8	2.2	4.1	0.9	6	clean SAND to silty SAND	125	5.0	51	32	83	41	-	-	7	1.72	16	0.00	0.0
67.26	289.0	185.8	289.1	2.4	4.5	0.9	6	clean SAND to silty SAND	125	5.0	58	36	87	42	-	-	6	1.68	16	0.00	0.0
67.42	316.6	199.1	316.8	2.5	5.2	0.8	6	clean SAND to silty SAND	125	5.0	63	40	90	42	-	-	5	1.63	16	0.00	0.0
67.59	321.3	201.9	321.5	2.5	5.7	0.8	6	clean SAND to silty SAND	125	5.0	64	40	90	42	-	-	5	1.62	16	0.00	0.0
67.75	312.1	195.9	312.2	2.3	6.0	0.8	6	clean SAND to silty SAND	125	5.0	62	39	89	42	-	-	5	1.61	16	0.00	0.0
67.92	314.9	197.4	315.1	2.3	6.5	0.7	6	clean SAND to silty SAND	125	5.0	63	39	89	42	-	-	5	1.60	16	0.00	0.0
68.08	306.9	192.2	307.0	2.2	7.2	0.7	6	clean SAND to silty SAND	125	5.0	61	38	89	42	-	-	5	1.61	16	0.00	0.0
68.24	306.2	191.5	306.3	2.2	7.8	0.7	6	clean SAND to silty SAND	125	5.0	61	38	88	42	-	-	5	1.61	16	0.00	0.0
68.41	302.2	188.9	302.4	2.2	8.7	0.7	6	clean SAND to silty SAND	125	5.0	60	38	88	42	-	-	5	1.62	16	0.00	0.0
68.57	307.2	191.8	307.4	2.3	9.2	0.8	6	clean SAND to silty SAND	125	5.0	61	38	88	42	-	-	5	1.62	16	0.00	0.0
68.74	298.2	186.3	298.4	2.3	9.7	0.8	6	clean SAND to silty SAND	125	5.0	60	37	87	42	-	-	5	1.65	16	0.00	0.0
68.90	283.0	176.7	283.2	2.1	10.0	0.8	6	clean SAND to silty SAND	125	5.0	57	35	86	41	-	-	5	1.65	16	0.00	0.0
69.07	273.7	170.3	273.9	1.9	10.4	0.7	6	clean SAND to silty SAND	125	5.0	55	34	85	41	-	-	5	1.64	16	0.00	0.0
69.23	266.7	165.8	266.9	1.7	10.8	0.6	6	clean SAND to silty SAND	125	5.0	53	33	84	41	-	-	5	1.63	16	0.00	0.0
69.39	254.0	157.7	254.2	1.5	11.2	0.6	6	clean SAND to silty SAND	125	5.0	51	32	82	41	-	-	5	1.63	16	0.32	2.3
69.56	247.1	153.2	247.3	1.4	11.6	0.6	6	clean SAND to silty SAND	125	5.0	49	31	81	41	-	-	5	1.62	16	0.42	2.7
69.72	236.6	148.6	236.9	1.5	12.1	0.6	6	clean SAND to silty SAND	125	5.0	47	29	80	40	-	-	5	1.66	16	0.57	3.1
69.89	228.5	143.9	228.7	1.4	12.5	0.6	6	clean SAND to silty SAND	125	5.0	46	28	78	40	-	-	6	1.67	16	0.76	3.6
70.05	239.3	149.0	239.5	1.5	13.0	0.6	6	clean SAND to silty SAND	125	5.0	48	30	80	40	-	-	5	1.66	16	0.55	3.0
70.21	251.2	156.0	251.6	1.6	17.0	0.7	6	clean SAND to silty SAND	125	5.0	50	31	82	41	-	-	5	1.65	16	0.35	2.4
70.38	262.5	165.0	262.8	1.9	16.6	0.7	6	clean SAND to silty SAND	125	5.0	53	32	83	41	-	-	6	1.67	16	0.00	0.0
70.54	274.1	174.1	274.4	2.2	15.8	0.8	6	clean SAND to silty SAND	125	5.0	55	34	84	41	-	-	6	1.69	16	0.00	0.0
70.71	284.5	181.6	284.8	2.5	15.1	0.9	6	clean SAND to silty SAND	125	5.0	57	35	86	41	-	-	6	1.70	16	0.00	0.0
70.87	296.5	188.0	296.8	2.6	14.6	0.9	6	clean SAND to silty SAND	125	5.0	59	36	87	41	-	-	6	1.69	16	0.00	0.0
71.03	298.0	187.5	298.3	2.6	14.1	0.9	6	clean SAND to silty SAND	125	5.0	60	37	87	41	-	-	6	1.68	16	0.00	0.0
71.20	283.1	180.0	283.4	2.4	13.8	0.9	6	clean SAND to silty SAND	125	5.0	57	35	85	41	-	-	6	1.70	16	0.00	0.0
71.36	279.3	175.0	279.6	2.2	13.8	0.8	6	clean SAND to silty SAND	125	5.0	56	34	85	41	-	-	6	1.68	16	0.00	0.0
71.53	266.9	168.8	267.2	2.1	14.7	0.8	6	clean SAND to silty SAND	125	5.0	53	33	83	41	-	-	6	1.69	16	0.00	0.0
71.69	261.2	166.1	261.5	2.1	14.7	0.8	6	clean SAND to silty SAND	125	5.0	52	32	82	41	-	-	6	1.70	16	0.00	0.0
71.85	251.1	161.7	251.4	2.1	14.9	0.8	6	clean SAND to silty SAND	125	5.0	50	31	81	40	-	-	7	1.72	16	0.00	0.0
72.02	240.1	157.0	240.4	2.0	15.0	0.9	6	clean SAND to silty SAND	125	5.0	48	29	80	40	-	-	7	1.75	16	0.31	2.3
72.18	250.7	160.2	251.0	2.0	15.3	0.8	6	clean SAND to silty SAND	125	5.0	50	31	81	40	-	-	6	1.71	16	0.00	0.0
72.35	253.2	161.2	253.5	2.0	15.8	0.8	6	clean SAND to silty SAND	125	5.0	51	31	81	40	-	-	6	1.71	16	0.00	0.0
72.51	255.6	162.3	255.9	2.0	16.1	0.8	6	clean SAND to silty SAND	125	5.0	51	31	82	41	-	-	6	1.71	16	0.00	0.0
72.67	273.6	170.1	274.0	2.1	16.4	0.8	6	clean SAND to silty SAND	125	5.0	55	33	84	41	-	-	6	1.68	16	0.00	0.0
72.84	278.3	173.3	278.6	2.2	16.6	0.8	6	clean SAND to silty SAND	125	5.0	56	34	84	41	-	-	6	1.68	16	0.00	0.0
73.00	269.7	169.6	270.0	2.2	16.5	0.8	6	clean SAND to silty SAND	125	5.0	54	33	83	41	-	-	6	1.70	16	0.00	0.0
73.17	263.5	164.8	263.9	2.0	17.1	0.8	6	clean SAND to silty SAND	125	5.0	53	32	82	41	-	-	6	1.69	16	0.00	0.0
73.33	264.6	164.0	264.9	1.9	16.9	0.7	6	clean SAND to silty SAND	125	5.0	53	32	83	41	-	-	6	1.68	16	0.00	0.0
73.49	275.7	168.4	276.1	2.0	17.8	0.7	6	clean SAND to silty SAND	125	5.0	55	33	84	41	-	-	5	1.66	16	0.00	0.0
73.66	286.7	173.9	287.0	2.1	17.1	0.7	6	clean SAND to silty SAND	125	5.0	57	35	85	41	-	-	5	1.65	16	0.00	0.0
73.82	304.2	183.7	304.5	2.1	16.8	0.7	6	clean SAND to silty SAND	125	5.0	61	37	87	41	-	-	5	1.62	16	0.00	0.0
73.99	328.4	198.2	328.8	2.2	16.5	0.7	6	clean SAND to silty SAND	125	5.0	66	40	90	42	-	-	5	1.58	16	0.00	0.0
74.15	328.5	198.0	328.8	2.2	16.2	0.7	6	clean SAND to silty SAND	125	5.0	66	40	90	42	-	-	5	1.58	16	0.00	0.0
74.31	317.1	191.0	317.4	2.1	16.3	0.7	6	clean SAND to silty SAND	125	5.0	63	38	88	42	-	-	5	1.59	16	0.00	0.0
74.48	302.0	181.7	302.3	2.1	16.1	0.7	6	clean SAND to silty SAND	125	5.0	60	36	87	41	-	-	5	1.62	16	0.00	0.0
74.64	309.4	186.0	309.7	2.0	16.1	0.7	6	clean SAND to silty SAND	125	5.0	62	37	87	41	-	-	5	1.59	16	0.00	0.0
74.81	324.1	194.6	324.4	2.0	16.3	0.6	6	clean SAND to silty SAND	125	5.0	65	39	89	42	-	-	5	1.57	16	0.00	0.0
74.97	331.5	198.9	331.8	2.1	16.4	0.6	6	clean SAND to silty SAND	125	5.0	66	40	90	42	-	-	5	1.56	16	0.00	0.0
75.13	338.7	203.0	339.0	2.1	16.4	0.6	6	clean SAND to silty SAND	125	5.0	68	41	90	42	-	-	5	1.55	16	0.00	0.0
75.30	336.9	201.7	337.2	2.2	16.5	0.7	6	clean SAND to silty SAND	125	5.0	67	40	90	42	-	-	5	1.56	16	0.00	0.0
75.46	328.5	196.5	328.8	2.2	16.5	0.7	6	clean SAND to silty SAND	125	5.0	66	39	89	42	-	-	5	1.58	16	0.00	0.0
75.63	320.4	191.4	320.7	2.1	16.3	0.7	6	clean SAND to silty SAND	125	5.0	64	38	88	42	-	-	5	1.59	16	0.00	0.0
75.79	315.4	188.3	315.7	2.1	16.2	0.7	6	clean SAND to silty SAND	125	5.0	63	38	88	41	-	-	5	1.59	16	0.00	0.0
75.96	305.3	182.1	305.6	2.0	16.2	0.7	6	clean SAND to silty SAND	125	5.0	61	36	87	41	-	-	5	1.61	16	0.00	0.0
76.12	298.5	177.9	298.8	2.0	16.3	0.7	6	clean SAND to silty SAND	125	5.0	60	36	86	41	-	-	5	1.61	16	0.00	0.0
76.28	290.6	173.0	290.9	2.0	16.4	0.7	6	clean SAND to silty SAND	125	5.0	58	35	85	41	-	-	5	1.63	16	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

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Location	856,864, an 872 Pioneer St	Operator	-B		
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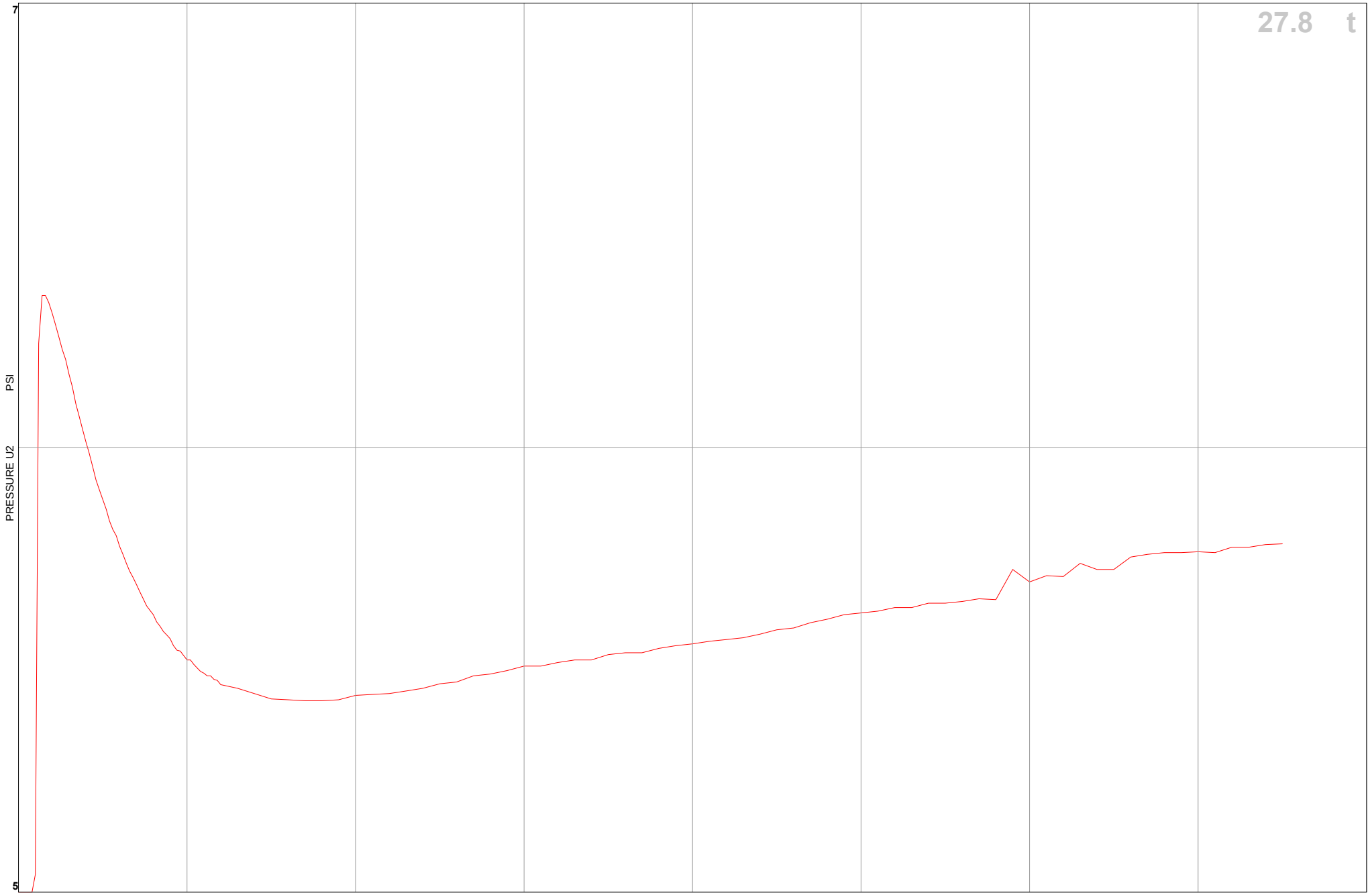
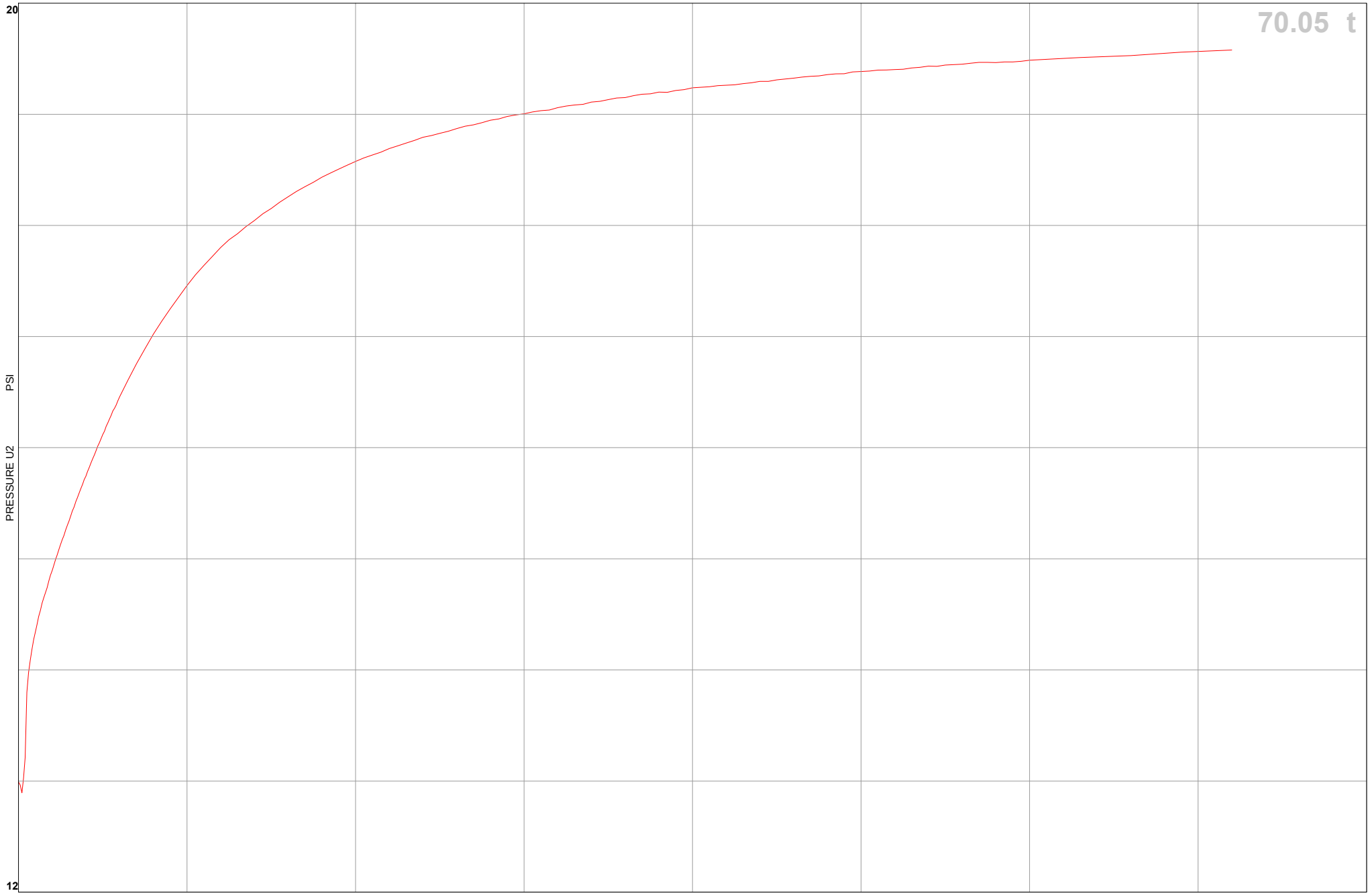


eo ol tion Inc

Location	856,864 an 872 Pioneer St	Operator	-B		
o N er	SB00573-1	Cone N er	1281	PS	
ole N er	CPT-02	ate an Ti e	1 6 2015 20 23 A		
E ili e Pre re	1 .5	EST epth rin Te t	24.7		



APPENDIX B

Laboratory Testing

Soil Test Reports

LABORATORY TESTING

This appendix includes a discussion of the test procedures and the laboratory test results performed as part of this investigation. The purpose of the laboratory testing is to assess the engineering properties of the soil materials at the Site. The laboratory tests are performed using the currently accepted test methods, when applicable, of the American Society for Testing and Materials (ASTM).

Undisturbed and disturbed bulk samples used in the laboratory tests are obtained from various locations during the course of the field exploration, as discussed in **Appendix A** of this report. Each sample is identified by sample letter and depth. The Unified Soils Classification System is used to classify soils according to their engineering properties. The various laboratory tests performed are described below:

Expansion Index of Soils (ASTM D4829-03) is conducted in accordance with the ASTM test method and the California Building Code Standard, and are performed on representative bulk and undisturbed soil samples. The purpose of this test is to evaluate expansion potential of the site soils due to fluctuations in moisture content. The sample specimens are placed in a consolidometer, surcharged under a 144-psf vertical confining pressure, and then inundated with water. The amount of expansion is recorded over a 24-hour period with a dial indicator. The expansion index is calculated by determining the difference between final and initial height of the specimen divided by the initial height.

Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557-07) is performed to determine the relationship between the moisture content and density of soils and soil-aggregate mixtures when compacted in a standard size mold with a 10-lbf hammer from a height of 18 inches. The test is performed on a representative bulk sample of bearing soil near the estimated footing depth. The procedure is repeated on the same soil sample at various moisture contents sufficient to establish a relationship between the maximum dry unit weight and the optimum water content for the soil. The data, when plotted, represents a curvilinear relationship known as the moisture density relations curve. The values of optimum water content and modified maximum dry unit weight can be determined from the plotted curve.

Direct Shear Tests of Soils Under Consolidated Drained Conditions (ASTM D3080-04) is performed on undisturbed and remolded samples representative of the foundation material. The samples are loaded with a predetermined normal stress and submerged in water until saturation is achieved. The samples are then sheared horizontally at a controlled strain rate allowing partial drainage. The shear stress on the sample is recorded at regular strain intervals. This test determines the resistance to deformation, which is shear strength, inter-particle attraction or cohesion c, and resistance to interparticle slip called the angle of internal friction ϕ.

Particle Size Analysis of Soils (ASTM D422-63R02) is used to determine the particle-size distribution of fine and coarse aggregates. In the test method the sample is separated through a series of sieves of progressively smaller openings for determination of particle size distribution. The total percentage passing each sieve is reported and used to determine the distribution of fine and coarse aggregates in the sample.

GeoSolutions, Inc.	SOILS REPORT	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street			Date Tested:	January 21, 2015
Client:				Project #:	SB00573-1
Sample:	A	Depth:	2.0 Feet	Lab #:	462
Location:	B-1			Sample Date:	January 20, 2015
				Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Result:	Olive Brown Poorly Graded SAND with Clay
Specification:	SP-SC

Sieve Analysis
ASTM D422-63R02

Sieve Size	Percent Passing	Project Specifications
3"		
2"		
1 1/2"		
1"		
3/4"		
No. 4	91	
No. 8	90	
No. 16	87	
No. 30	76	
No. 50	48	
No. 100	20	
No. 200	11.6	

Sand Equivalent Cal 217 (06/2011)

1		SE
2		
3		
4		

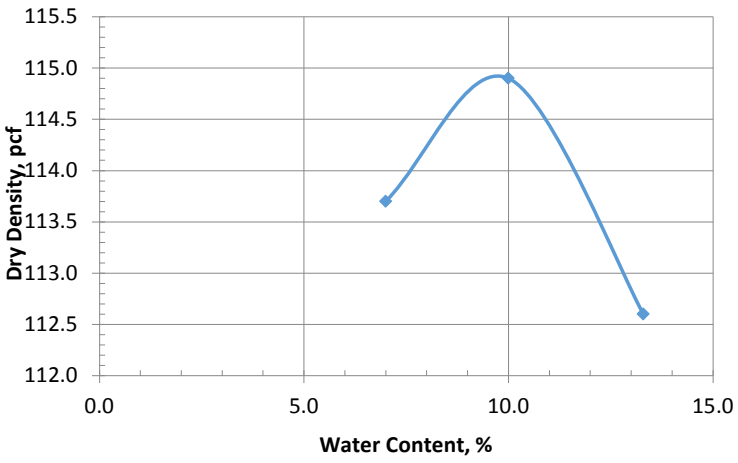
Plasticity Index
ASTM D4318-05

Liquid Limit:	
Plastic Limit:	
Plasticity Index:	

Expansion Index
ASTM D4829-08

Expansion Index:	**0**
Expansion Potential:	Very Low
Initial Saturation, %:	50

Laboratory Maximum Density
ASTM D1557-07



Mold ID	n/a	Mold Diameter, ins.	4.00
No. of Layers	5	Weight of Rammer, lbs.	10.00
No. of Blows	25		

Estimated Specific Gravity for 100% Saturation Curve = 2.4

Trial #	1	2	3	4
Water Content:	7.0	10.0	13.3	
Dry Density:	113.7	114.9	112.6	

Maximum Dry Density, pcf:	**115.0**
Optimum Water Content, %:	**9.7**

Moisture-Density ASTM D2937-04, **Moisture Content** ASTM D2216-05

Sample	Depth (ft)	Water Content (%)	Dry Density (pcf)	Relative Density	Sample Description

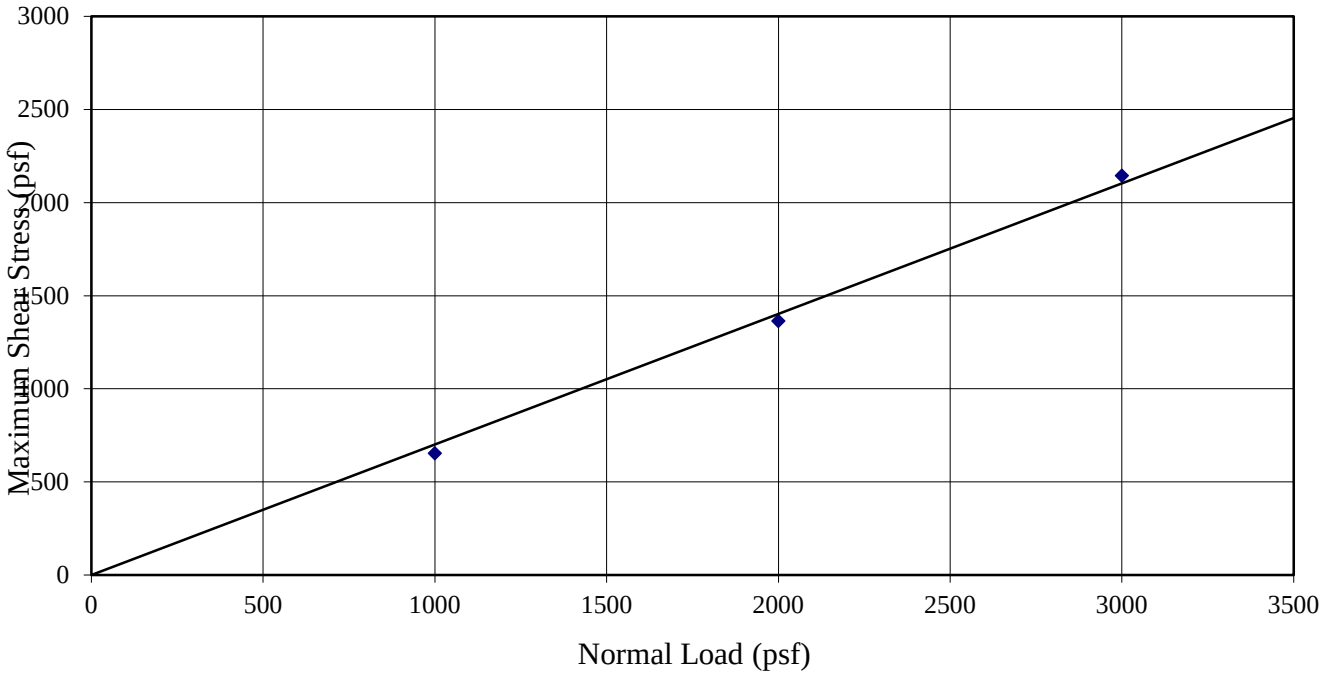
Report By: Aaron Eichman

GeoSolutions, Inc.	DIRECT SHEAR TEST REPORT D3080-04	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street			Date Tested:	January 23, 2015
Client:				Project #:	SB00573-1
Sample #:	A	Depth:	2.0 Feet	Lab #:	462
Location:	B-1			Sample Date:	January 20, 2015
Material:	Olive Brown Poorly Graded SAND with Clay			Sampled By:	BB

Test Data

Specimen Number	Void Ratio	Saturation, %	Normal Load, psf	Max Shear Stress, psf	Water Content, %	Dry Density, pcf	Relative Density*,%
1	-	-	1000	654	18.4	101.8	90
2	-	-	2000	1364	17.7	101.8	90
3	-	-	3000	2144	17.4	101.8	90
4							
5							



*The test specimens were initially remolded at 90% of the maximum dry density (ASTM D1557) and at 2% above the optimum moisture content of the material.

Maximum Dry Density, pcf:	115.0	Optimum Moisture, %:	9.7

Angle of Internal Friction @ 90% Rel. Compaction, Phi:	36.7 °
Cohesion @ 90% Relative Compaction, C:	0 psf

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 26, 2015
Client:		Project #:	SB00573-1
Sample #:	B-1 @ 5' Depth: 5.0 Feet	Lab #:	462
Location:	B-1	Sample Date:	January 20, 2015
Material:	Olive Brown Sandy CLAY	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Olive Brown Sandy CLAY**
Specification:	**CL**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	100		
No. 8	100		
No. 16	99		
No. 30	97		
No. 50	98		
No. 100	62		
No. 200	52.9		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 26, 2015
Client:		Project #:	SB00573-1
Sample #:	B-1 @ 8' Depth: 8.0 Feet	Lab #:	462
Location:	B-1	Sample Date:	January 20, 2015
Material:	Olive Brown Clayey SAND	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Olive Brown Clayey SAND**
Specification:	**SC**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	98		
No. 8	97		
No. 16	96		
No. 30	89		
No. 50	72		
No. 100	53		
No. 200	45.4		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 23, 2015
Client:		Project #:	SB00573-1
Sample #:	B-1 @ 10' Depth: 10.0 Feet	Lab #:	462
Location:	B-1	Sample Date:	January 20, 2015
Material:	Light Olive Brown Poorly Graded SAND with Clay	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Light Olive Brown Poorly Graded SAND with Clay**
Specification:	**SP-SC**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	100		
No. 8	99		
No. 16	99		
No. 30	94		
No. 50	40		
No. 100	14		
No. 200	8.4		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street		Date Tested:	January 26, 2015
Client:			Project #:	SB00573-1
Sample #:	B-1 @ 15'	Depth: 15.0 Feet	Lab #:	462
Location:	B-1		Sample Date:	January 20, 2015
Material:	Gray Poorly Graded SAND with Clay		Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Gray Poorly Graded SAND with Clay**
Specification:	**SP-SC**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	100		
No. 8	100		
No. 16	100		
No. 30	100		
No. 50	69		
No. 100	18		
No. 200	9.0		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 26, 2015
Client:		Project #:	SB00573-1
Sample #:	B-3 @ 5' Depth: 5.0 Feet	Lab #:	462
Location:	B-3	Sample Date:	January 20, 2015
Material:	Very Dark Grayish Brown Sandy CLAY	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Very Dark Grayish Brown Sandy CLAY**
Specification:	**CL**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	99		
No. 8	98		
No. 16	96		
No. 30	89		
No. 50	72		
No. 100	64		
No. 200	57.8		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 23, 2015
Client:		Project #:	SB00573-1
Sample #:	B-3 @ 10' Depth: 10.0 Feet	Lab #:	462
Location:	B-3	Sample Date:	January 20, 2015
Material:	Light Olive Brown Clayey SAND	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Light Olive Brown Clayey SAND**
Specification:	**SC**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	99		
No. 8	98		
No. 16	98		
No. 30	97		
No. 50	84		
No. 100	43		
No. 200	27.8		

Comments:

Report By: Aaron Eichman

GeoSolutions, Inc.	SIEVE ANALYSIS REPORT ASTM D422-63R07	(805) 543-8539

Project:	856, 864, and 872 Pioneer Street	Date Tested:	January 23, 2015
Client:		Project #:	SB00573-1
Sample #:	B-3 @ 15' Depth: 15.0 Feet	Lab #:	462
Location:	B-3	Sample Date:	January 20, 2015
Material:	Light Olive Brown Poorly Graded SAND with Clay	Sampled By:	BB

Soil Classification
ASTM D2487-06, D2488-06

Soil Description:	**Light Olive Brown Poorly Graded SAND with Clay**
Specification:	**SP-SC**

Sieve Analysis

U.S. Standard Sieve	Percent Passing TOTAL	Project Specifications	Remarks
3"			
2"			
1 1/2"			
1"			
3/4"			
3/8"			
No. 4	98		
No. 8	96		
No. 16	91		
No. 30	56		
No. 50	20		
No. 100	10		
No. 200	6.8		

Comments:

Report By: Aaron Eichman

APPENDIX C

USGS Design Map Summary Report

USGS Design Map Detailed Report

USGS Design Maps Summary Report

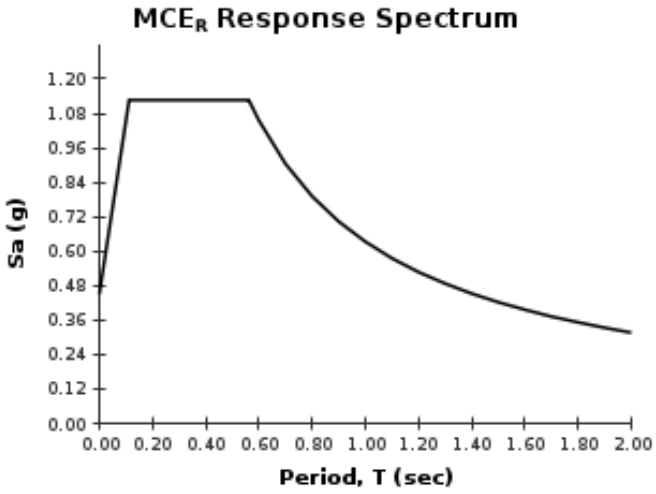
User–Specified Input

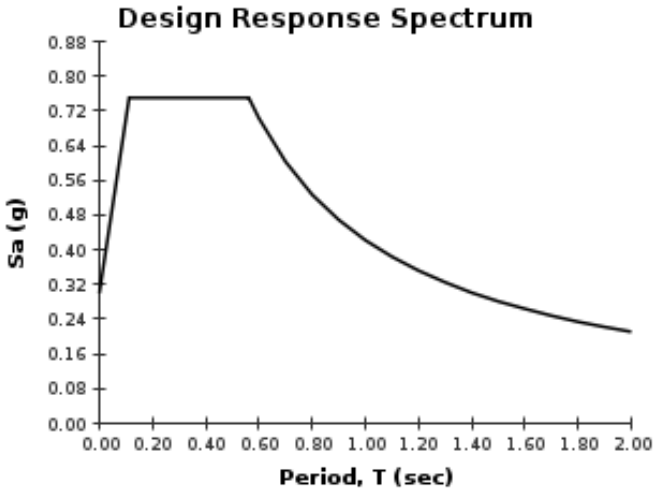
Report Title	856, 864, & 872 Pioneer St. Wed January 7, 2015 19:11:29 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.9697°N, 120.5745°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.037 g	S_{MS} =	1.126 g	S_{DS} =	0.750 g
S_1 =	0.391 g	S_{M1} =	0.633 g	S_{D1} =	0.422 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (34.9697°N, 120.5745°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 1.037 g
From Figure 22-2 [2]	S_1 = 0.391 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\overline{v}_s$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.037 g, F_a = 1.085

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.391 g, F_v = 1.617

Equation (11.4–1): $S_{MS} = F_a S_S = 1.085 \times 1.037 = 1.126$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.617 \times 0.391 = 0.633$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

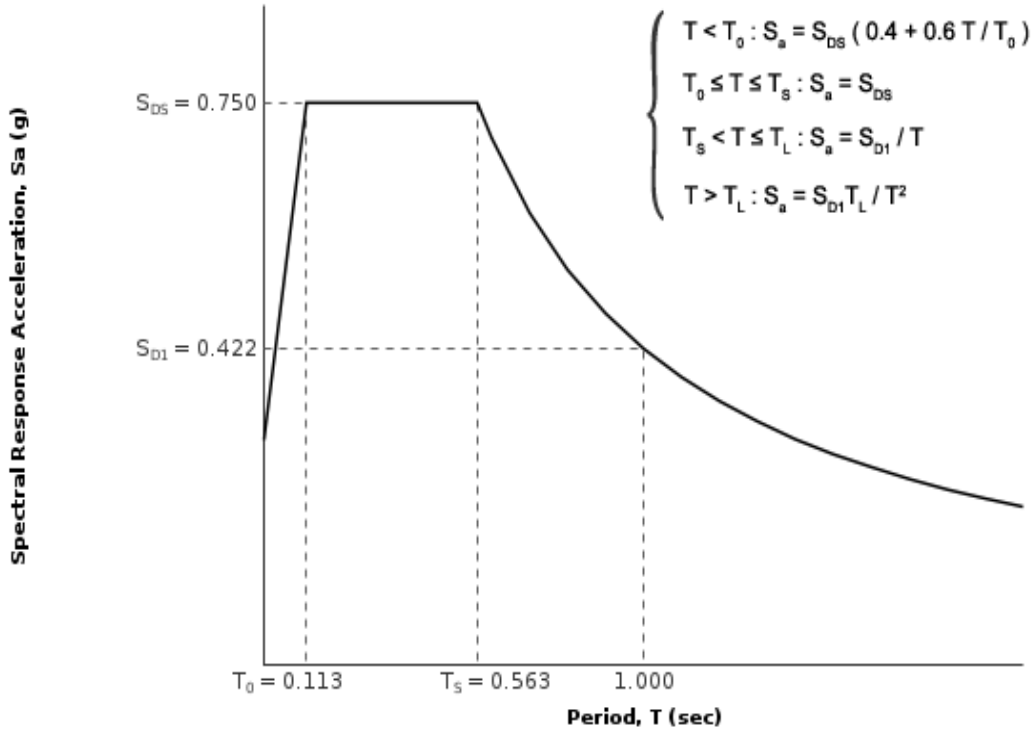
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.126 = 0.750$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.633 = 0.422$ g

Section 11.4.5 — Design Response Spectrum

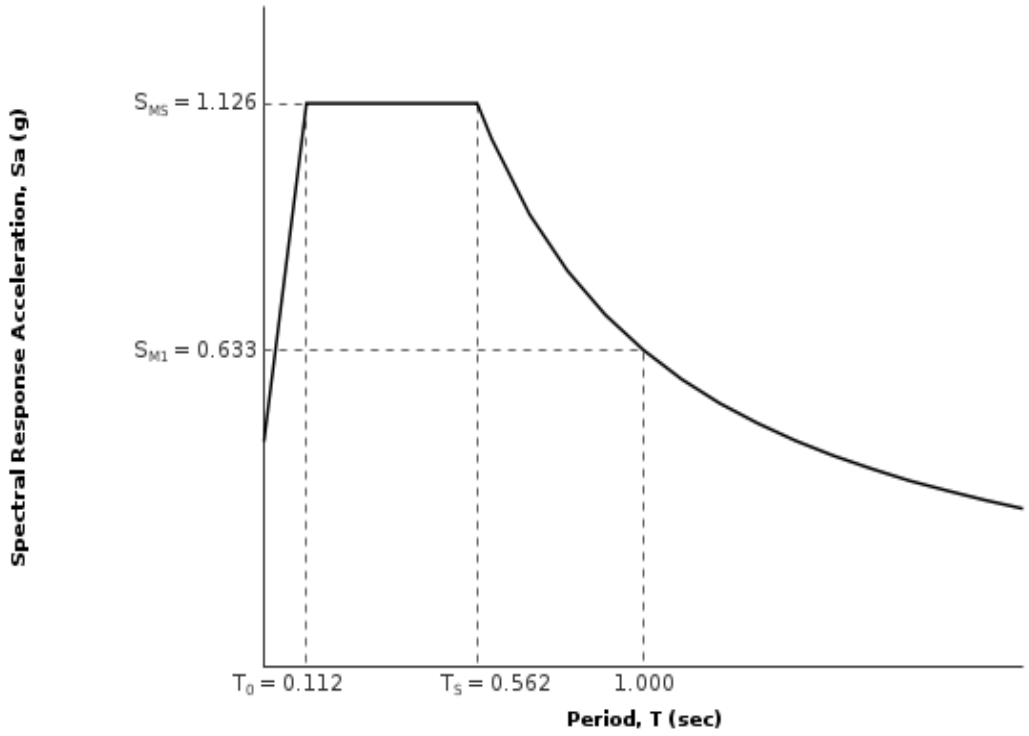
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.415

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.085 \times 0.415 = 0.45$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.415 g, F_{PGA} = 1.085

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.938

From Figure 22-18 [6] C_{R1} = 0.987

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.750 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.422 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX D

Preliminary Grading Specifications

PRELIMINARY GRADING SPECIFICATIONS

A. General

1. These preliminary specifications have been prepared for the subject site; GeoSolutions, Inc. should be consulted prior to the commencement of site work associated with site development to ensure compliance with these specifications.

2. GeoSolutions, Inc. should be notified at least 72 hours prior to site clearing or grading operations on the property in order to observe the stripping of surface materials and to coordinate the work with the grading contractor in the field.

3. These grading specifications may be modified and/or superseded by recommendations contained in the text of this report and/or subsequent reports.

4. If disputes arise out of the interpretation of these grading specifications, the Soils Engineer shall provide the governing interpretation.

B. Obligation of Parties

1. The Soils Engineer should provide observation and testing services and should make evaluations to advise the client on geotechnical matters. The Soils Engineer should report the findings and recommendations to the client or the authorized representative.

2. The client should be chiefly responsible for all aspects of the project. The client or authorized representative has the responsibility of reviewing the findings and recommendations of the Soils Engineer. During grading the client or the authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

3. The contractor is responsible for the safety of the project and satisfactory completion of all grading and other operations on construction projects, including, but not limited to, earthwork in accordance with project plans, specifications, and controlling agency requirements.

C. Site Preparation

1. The client, prior to any site preparation or grading, should arrange and attend a meeting which includes the grading contractor, the design Structural Engineer, the Soils Engineer, representatives of the local building department, as well as any other concerned parties. All parties should be given at least 72 hours notice.

2. All surface and sub-surface deleterious materials should be removed from the proposed building and pavement areas and disposed of off-site or as approved by the Soils Engineer. This includes, but is not limited to, any debris, organic materials, construction spoils, buried utility line, septic systems, building materials, and any other surface and subsurface structures within the proposed building areas. Trees designated for removal on the construction plans should be removed and their primary root systems grubbed under the observations of a representative of GeoSolutions, Inc. Voids left from site clearing should be cleaned and backfilled as recommended for structural fill.

3. Once the Site has been cleared, the exposed ground surface should be stripped to remove surface vegetation and organic soil. A representative of GeoSolutions, Inc. should determine the required depth of stripping at the time of work being completed. Strippings may either be disposed of off-site or stockpiled for future use in landscape areas, if approved by the landscape architect.

D. Site Protection

1. Protection of the Site during the period of grading and construction should be the responsibility of the contractor.

2. The contractor should be responsible for the stability of all temporary excavations.

3. During periods of rainfall, plastic sheeting should be kept reasonably accessible to prevent unprotected slopes from becoming saturated. Where necessary during periods of rainfall, the contractor should install check-dams, de-silting basins, sand bags, or other devices or methods necessary to control erosion and provide safe conditions.

E. Excavations

1. Materials that are unsuitable should be excavated under the observation and recommendations of the Soils Engineer. Unsuitable materials include, but may not be limited to: 1) dry, loose, soft, wet, organic, or compressible natural soils; 2) fractured, weathered, or soft bedrock; 3) non-engineered fill; 4) other deleterious materials; and 5) materials identified by the Soils Engineer or Engineering Geologist.

2. Unless otherwise recommended by the Soils Engineer and approved by the local building official, permanent cut slopes should not be steeper than 2:1 (horizontal to vertical). Final slope configurations should conform to section 1804 of the 2013 California Building Code unless specifically modified by the Soil Engineer/Engineering Geologist.

3. The Soil Engineer/Engineer Geologist should review cut slopes during excavations. The contractor should notify the Soils Engineer/Engineer Geologist prior to beginning slope excavations.

F. Structural Fill

1. Structural fill should not contain rocks larger than 3 inches in greatest dimension, and should have no more than 15 percent larger than 2.5 inches in greatest dimension.

2. Imported fill should be free of organic and other deleterious material and should have very low expansion potential, with a plasticity index of 12 or less. Before delivery to the Site, a sample of the proposed import should be tested in our laboratory to determine its suitability for use as structural fill.

G. Compacted Fill

1. Structural fill using approved import or native should be placed in horizontal layers, each approximately 8 inches in thickness before compaction. On-site inorganic soil or approved imported fill should be conditioned with water to produce a soil water content near optimum moisture and compacted to a minimum relative density of 90 percent based on ASTM D1557-07.

2. Fill slopes should not be constructed at gradients greater than 2-to-1 (horizontal to vertical). The contractor should notify the Soils Engineer/Engineer Geologist prior to beginning slope excavations.

3. If fill areas are constructed on slopes greater than 10-to-1 (horizontal to vertical), we recommend that benches be cut every 4 feet as fill is placed. Each bench shall be a minimum of 10 feet wide with a minimum of 2 percent gradient into the slope.

4. If fill areas are constructed on slopes greater than 5-to-1, we recommend that the toe of all areas to receive fill be keyed a minimum of 24 inches into underlying dense material. Key depths are to be observed and approved by a representative of GeoSolutions, Inc. Sub-drains shall be placed in the keyway and benches as required.

H. Drainage

1. During grading, a representative of GeoSolutions, Inc. should evaluate the need for a sub-drain or back-drain system. Areas of observed seepage should be provided with sub-surface drains to release the hydrostatic pressures. Sub-surface drainage facilities may include gravel blankets, rock filled trenches or Multi-Flow systems or equal. The drain system should discharge in a non-erosive manner into an approved drainage area.

2. All final grades should be provided with a positive drainage gradient away from foundations. Final grades should provide for rapid removal of surface water runoff. Ponding of water should not be allowed on building pads or adjacent to foundations. Final grading should be the responsibility of the contractor, general Civil Engineer, or architect.

3. Concentrated surface water runoff within or immediately adjacent to the Site should be conveyed in pipes or in lined channels to discharge areas that are relatively level or that are adequately protected against erosion.

4. Water from roof downspouts should be conveyed in solid pipes that discharge in controlled drainage localities. Surface drainage gradients should be planned to prevent ponding and promote drainage of surface water away from building foundations, edges of pavements and sidewalks. For soil areas we recommend that a minimum of 2 percent gradient be maintained.

5. Attention should be paid by the contractor to erosion protection of soil surfaces adjacent to the edges of roads, curbs and sidewalks, and in other areas where hard edges of structures may cause concentrated flow of surface water runoff. Erosion resistant matting such as Miramat, or other similar products, may be considered for lining drainage channels.

6. Sub-drains should be placed in established drainage courses and potential seepage areas. The location of sub-drains should be determined after a review of the grading plan. The sub-drain outlets should extend into suitable facilities or connect to the proposed storm drain system or existing drainage control facilities. The outlet pipe should consist of a non-perforated pipe the same diameter as the perforated pipe.

I. Maintenance

1. Maintenance of slopes is important to their long-term performance. Precautions that can be taken include planting with appropriate drought-resistant vegetation as recommended by a landscape architect, and not over-irrigating, a primary source of surficial failures.

2. Property owners should be made aware that over-watering of slopes is detrimental to long term stability of slopes.

J. Underground Facilities Construction

1. The attention of contractors, particularly the underground contractors, should be drawn to the State of California Construction Safety Orders for "Excavations, Trenches, Earthwork." Trenches or excavations greater than 5 feet in depth should be shored or sloped back in accordance with OSHA Regulations prior to entry.

2. Bedding is defined as material placed in a trench up to 1 foot above a utility pipe and backfill is all material placed in the trench above the bedding. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand to be used as bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical means to achieve at least 90 percent relative density based on ASTM D1557-07.

3. On-site inorganic soils, or approved import, may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs, and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry), to produce a soil water content of about 2 to 3 percent above the optimum value and placed in horizontal layers, each not exceeding 8 inches in thickness before compaction. Each layer should be compacted to at least 90 percent relative density based on ASTM D1557-07. The top lift of trench backfill under vehicle pavements should be compacted to the requirements given in report under Preparation of Paved Areas for vehicle pavement sub-grades. Trench walls must be kept moist prior to and during backfill placement.

K. Completion of Work

1. After the completion of work, a report should be prepared by the Soils Engineer retained to provide such services. The report should including locations and elevations of field density tests, summaries of field and laboratory tests, other substantiating data, and comments on any changes made during grading and their effect on the recommendations made in the approved Soils Engineering Report.

2. Soils Engineers shall submit a statement that, to the best of their knowledge, the work within their area of responsibilities is in accordance with the approved soils engineering report and applicable provisions within Chapter 18 of the 2013 CBC.

APPENDIX E

LiquefyPro CPT-1 Input Graph

LiquefyPro CPT-1 Output Graph

LiquefyPro CPT-2 Input Graph

LiquefyPro CPT-2 Output Graph

NovoCPT CPT-1 Liquefaction Analysis

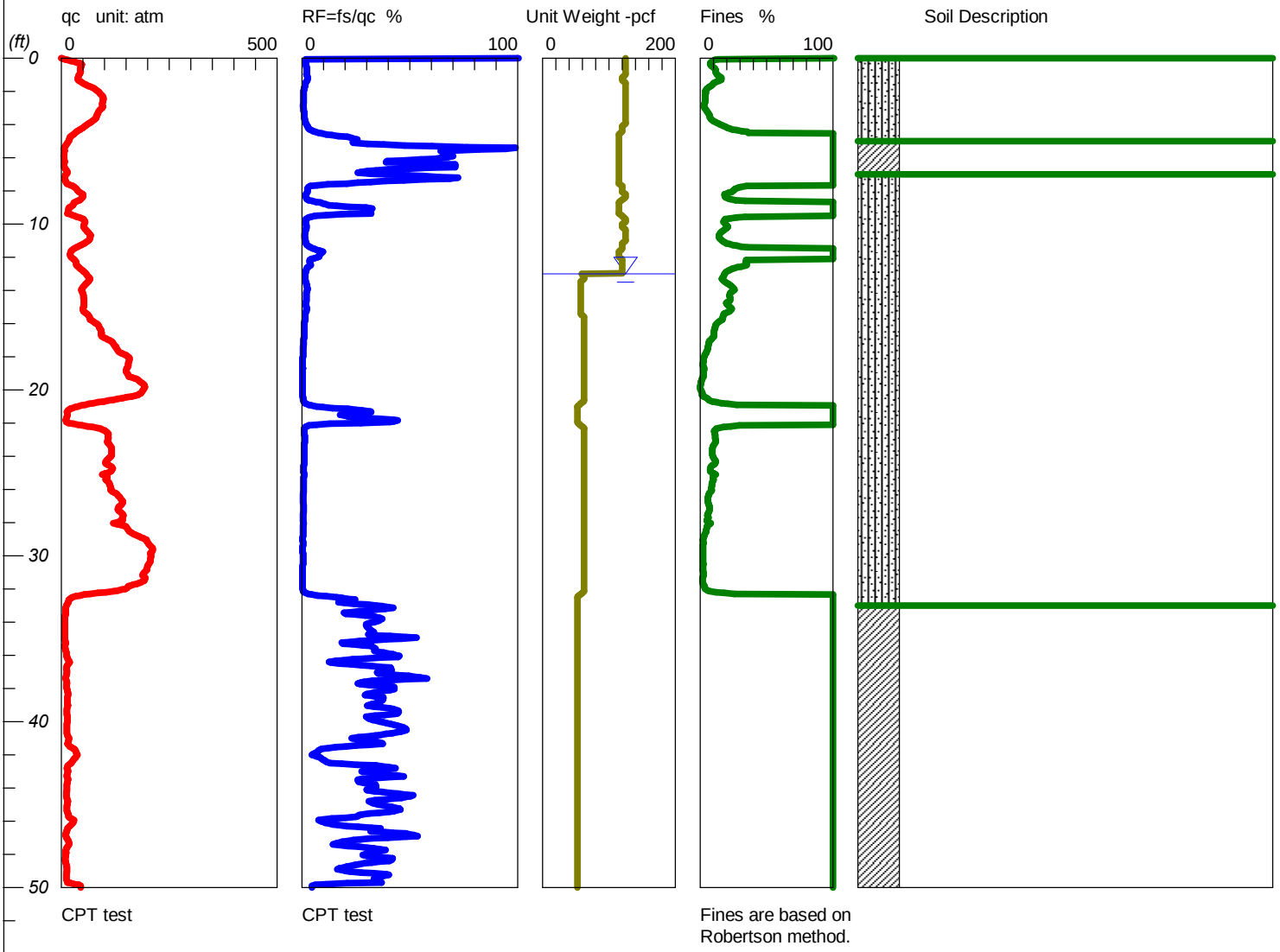
NovoCPT CPT-2 Liquefaction Analysis

LIQUEFACTION ANALYSIS

856, 864, & 872 Pioneer St.

Hole No.=CPT-1 Water Depth=13 ft Surface Elev.=72

Magnitude=7
Acceleration=0.45g

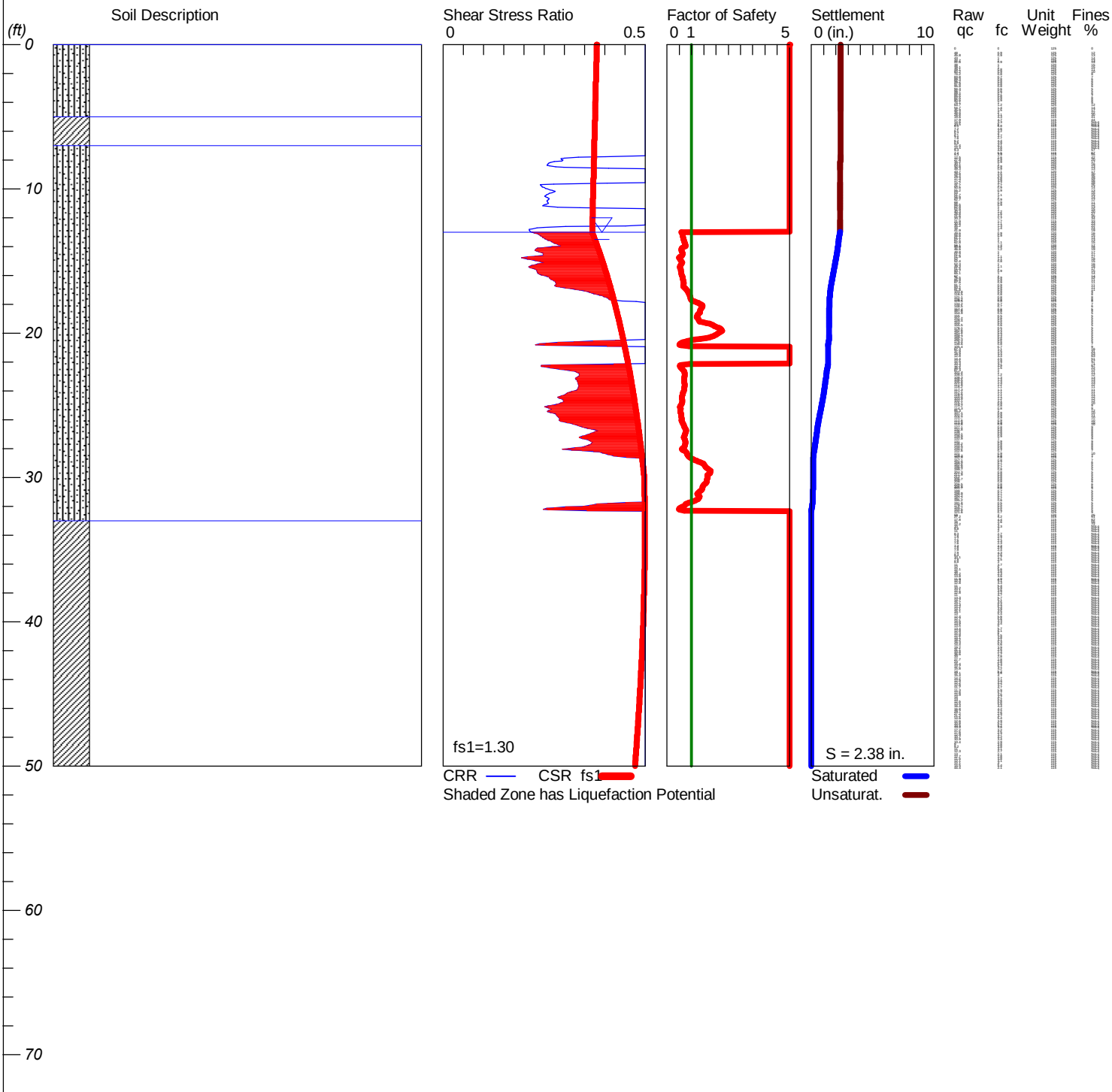


LIQUEFACTION ANALYSIS

856, 864, & 872 Pioneer St.

Hole No.=CPT-1 Water Depth=13 ft Surface Elev.=72

Magnitude=7
Acceleration=0.45g



LIQUEFACTION ANALYSIS

856, 864, & 872 Pioneer St.

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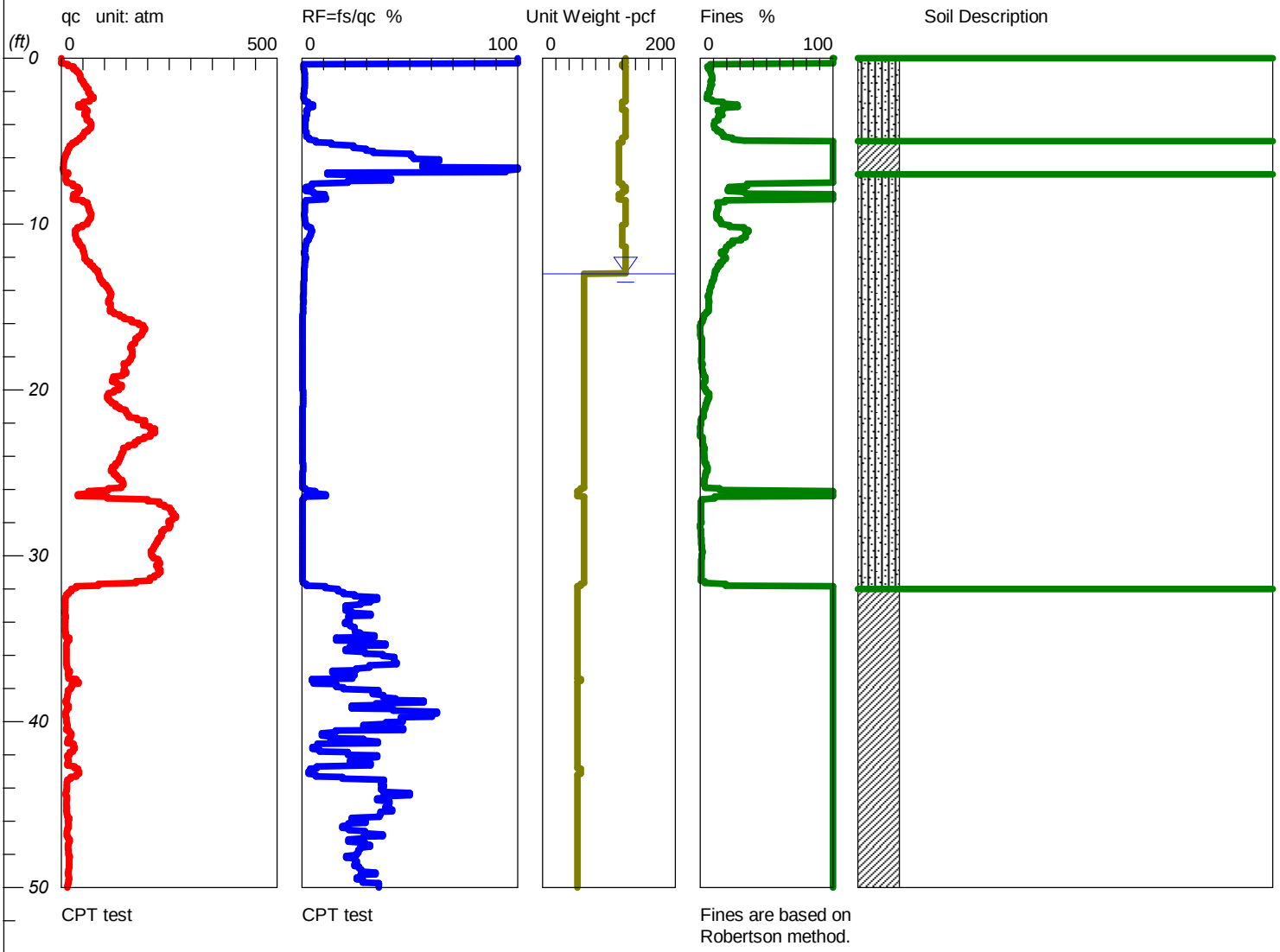
Magnitude=7
Acceleration=0.45g

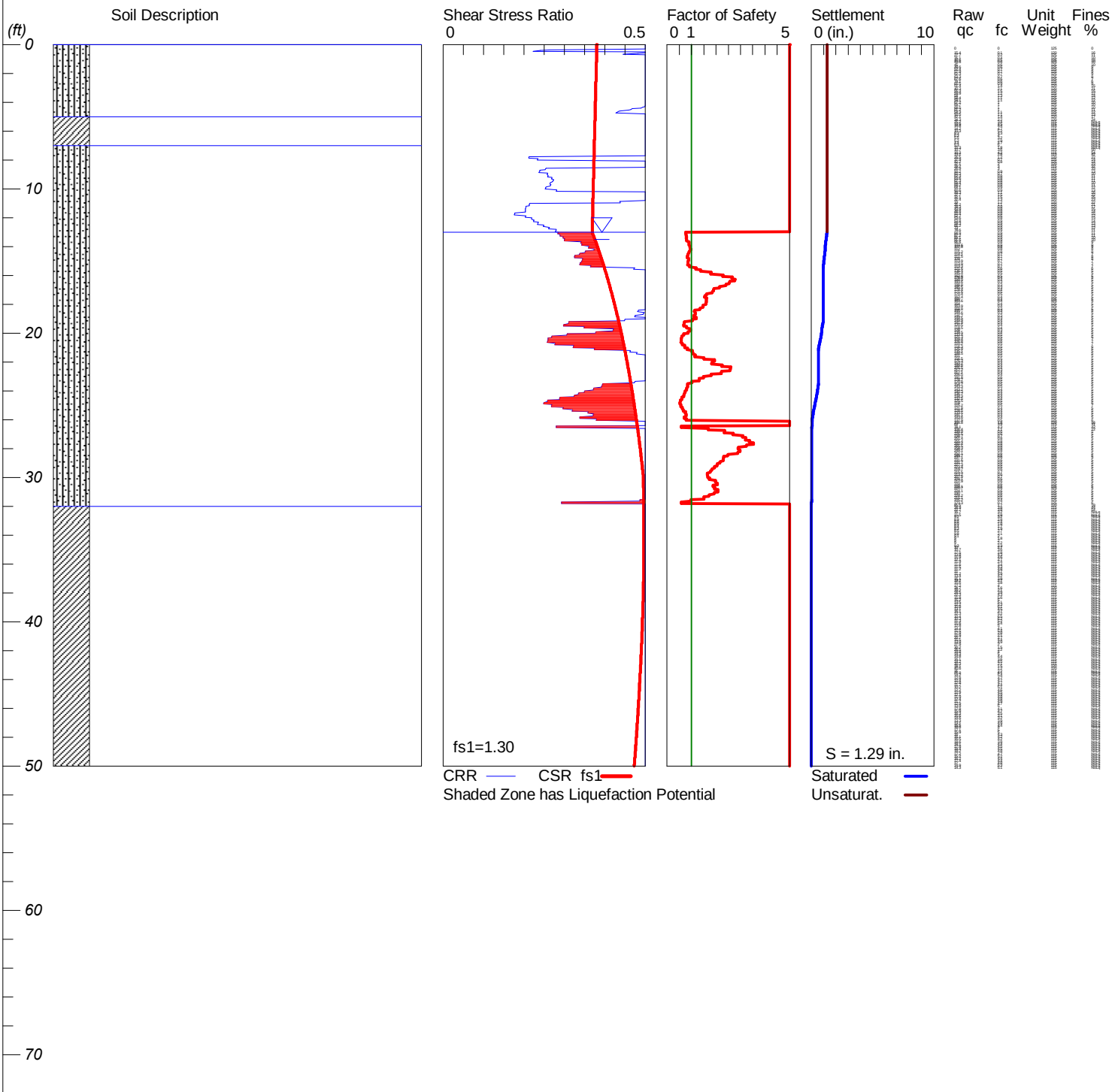


LIQUEFACTION ANALYSIS

856, 864, & 872 Pioneer St.

Hole No.=CPT-2 Water Depth=13 ft Surface Elev.=72

Magnitude=7
Acceleration=0.45g



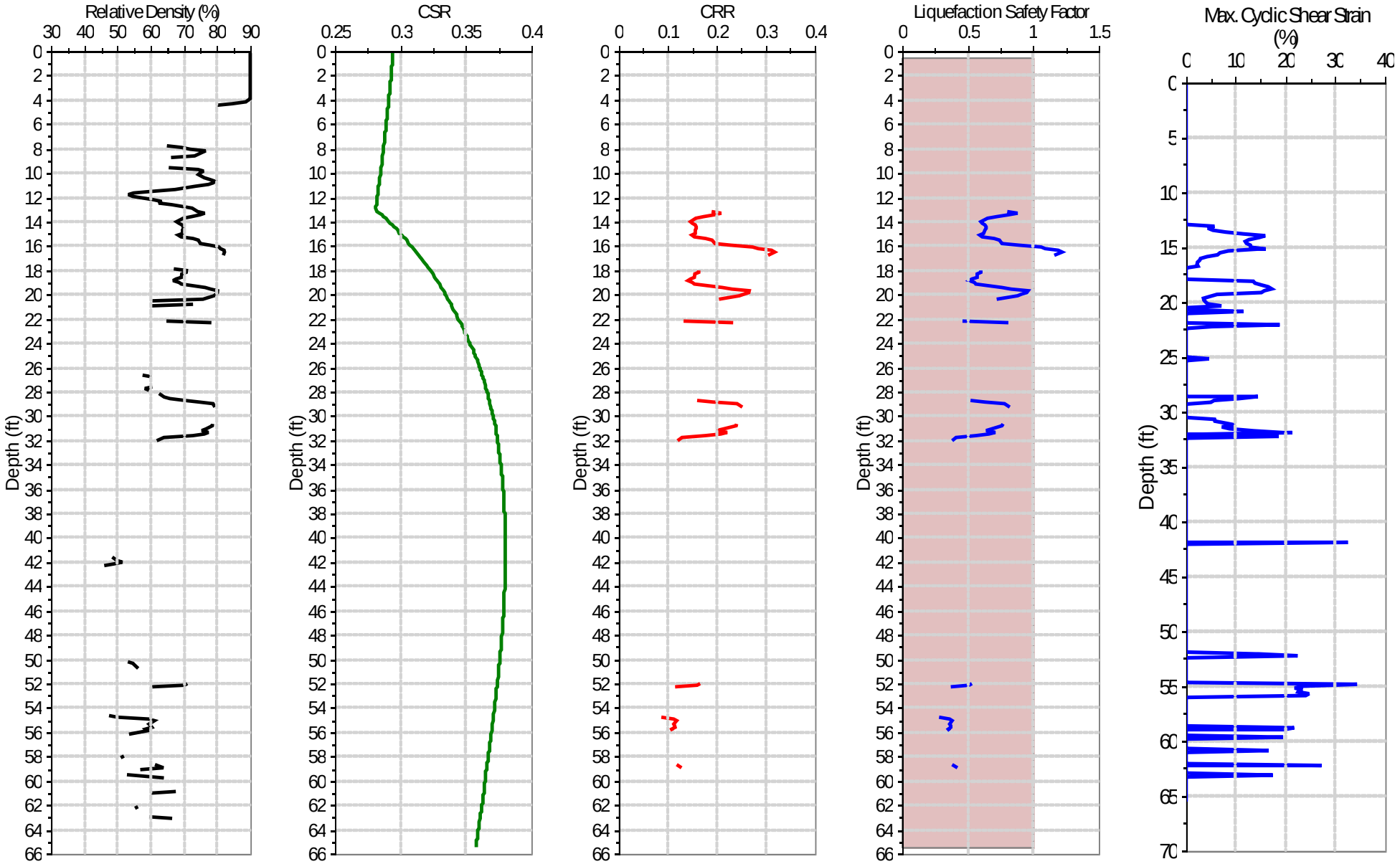
LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadalupe
Notes :

Borehole : CPT-1
Ground Water Level : 3.9624 ft
Co-ordinates : n.a.
Calculated By : BB
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 65.6 ft



LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadalupe
Notes :

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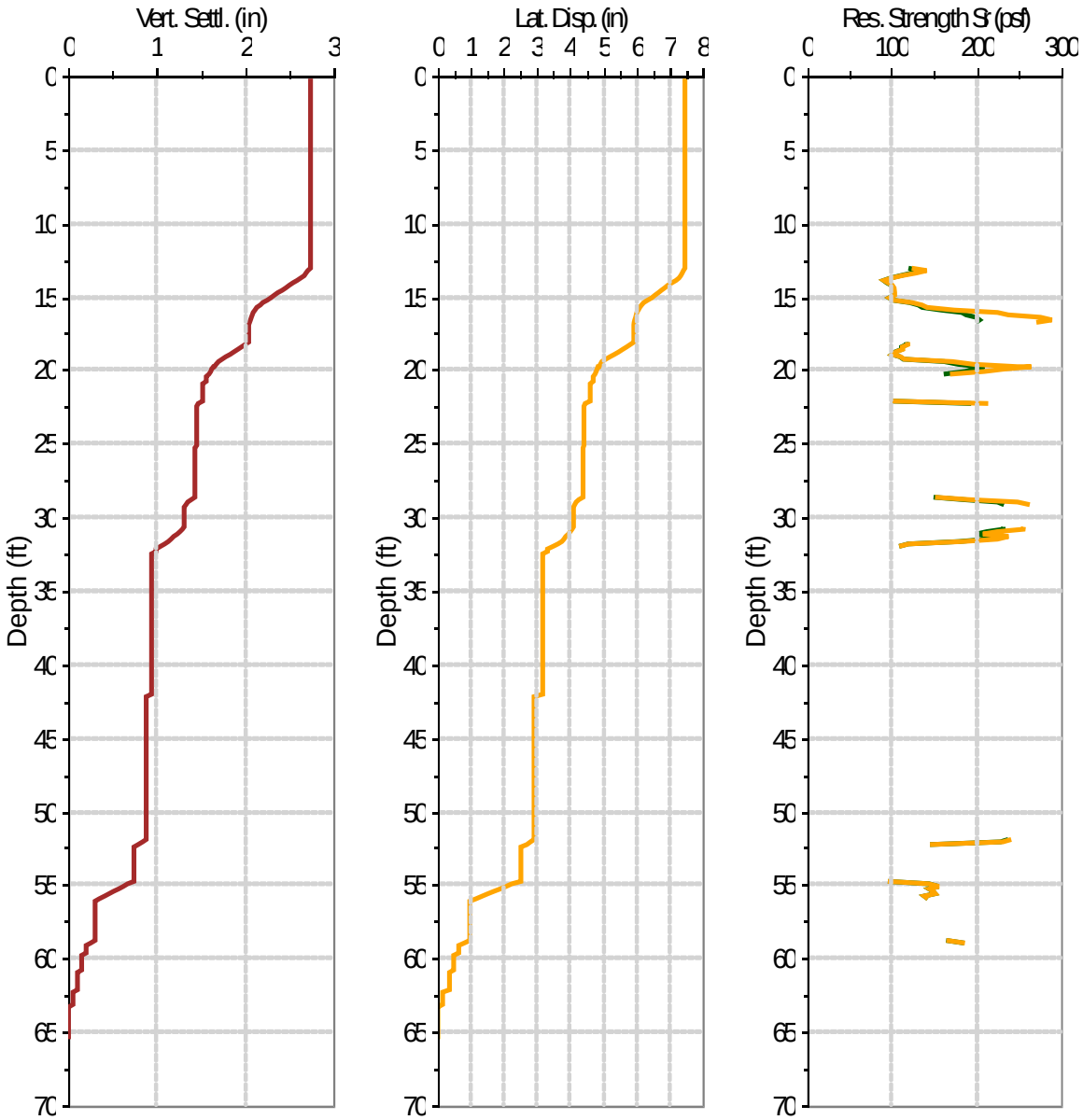
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 65.6 ft



LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadalupe
Notes :

Borehole : CPT-1
Ground Water Level : 3.9624 ft
Co-ordinates : n.a.
Calculated By : BB
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 65.6 ft

:: Current Analysis Settings and Correlations

Apply 2009 Robertson Normalization n :
Yes

N60 :
Jefferies & Davis 1993

Hydraulic Conductivity K :
Robertson et al. 1986 (SBT)

Unit Weight From Rf and qt :
No

Shear Wave Velocity Vs :
Mayne 2006c (all soils)

Undrained Shear Strength Su :
use Nk=12.5

Clay Overconsolidation Ratio OCR :
Powell et al. 1998

Sand Overconsolidation Ratio OCR :
Mayne 2005

Clay Friction Angle :
Sunneset et al., 1988 and 1989 (NTH solution)

Sand Friction Angle :
Robertson & Campanella 1983

Clay Young's Modulus Es :
Duncan & Buchihmami 1976

Sand Young's Modulus Es :
Bellotti et al. 1989

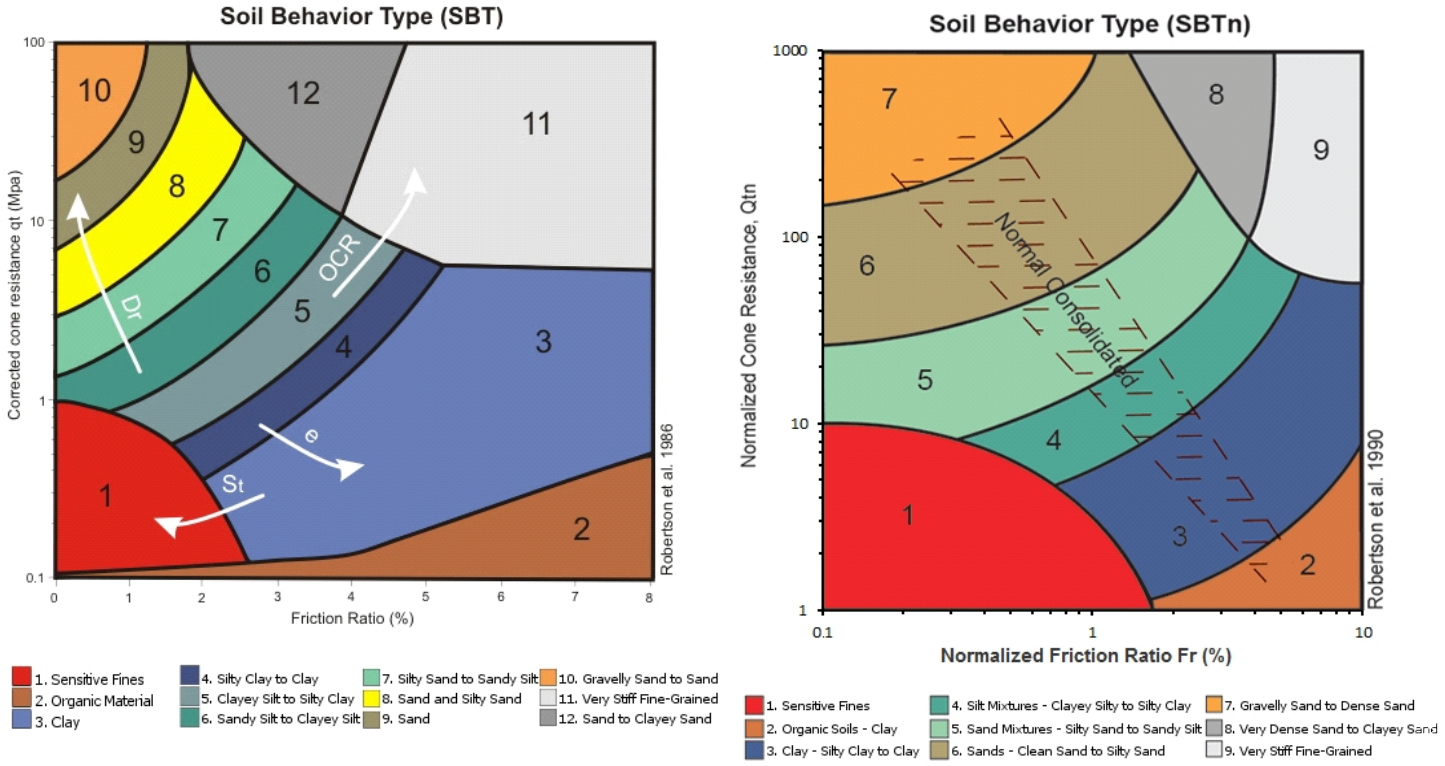
Sand Relative Density Dr :
Jamiolkowski et al. 2001

Clay Sensitivity St :
Robertson & Campanella 1988 Ns=6

Liquefaction MSF :
Youd et al. 2001 (NCEER 1997)

Stress Reduction Factor Rd :
Idriss & Boulanger, 2008 (Idriss 1999)

Liquefaction Assessed For Following SBT:
7 8 9 10 12



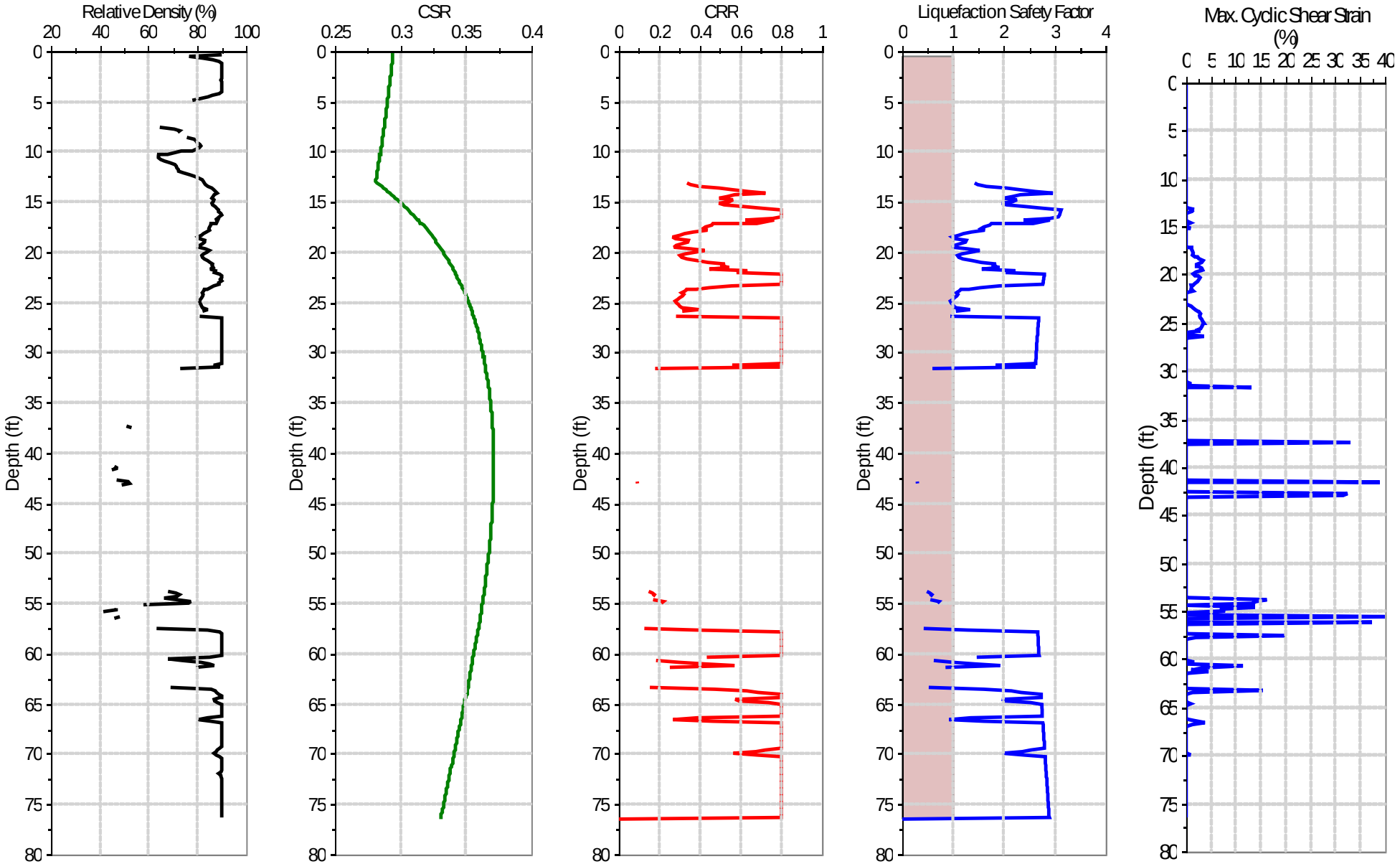
LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St.
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadlupe
Notes :

Borehole : CPT-2
Ground Water Level : 3.9624 ft
Co-ordinates : n.a.
Calculated By : BB
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 76.59 ft



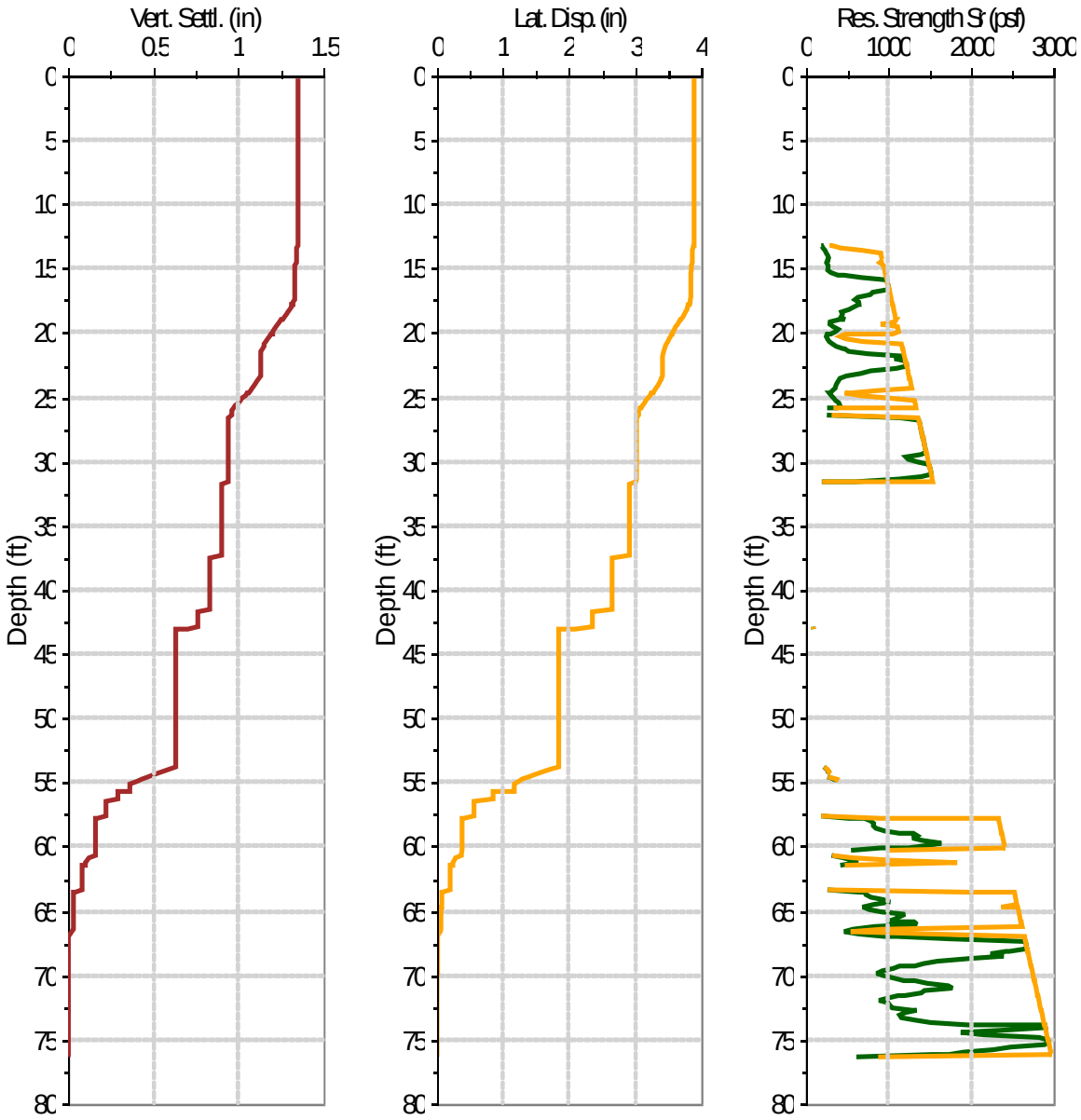
LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St.
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadlupe
Notes :

Borehole : CPT-2
Ground Water Level : 3.9624 ft
Co-ordinates : n.a.
Calculated By : BB
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 76.59 ft



LIQUEFACTION CPT ANALYSIS REPORT

GeoSolutions, inc.

Project : 865, 864, & 872 Pioneer St.
Project No. : SB00573-1
Client : SKS Portfolio, LLC
Location : Guadlupe
Notes :

Borehole : CPT-2
Ground Water Level : 3.9624 ft
Co-ordinates : n.a.
Calculated By : BB
Checked By : BB

Ground Slope : Gently Sloped 0.2%
PGA = 0.45 gEq. Magnitude M = 7
Cone Area Ratio = 0.8
CPT Max. Depth = 76.59 ft

:: Current Analysis Settings and Correlations

Apply 2009 Robertson Normalization n :
Yes

N60 :
Jefferies & Davis 1993

Hydraulic Conductivity K :
Robertson et al. 1986 (SBT)

Unit Weight From Rf and qt :
No

Shear Wave Velocity Vs :
Mayne 2006c (all soils)

Undrained Shear Strength Su :
use Nk=12.5

Clay Overconsolidation Ratio OCR :
Powell et al. 1998

Sand Overconsolidation Ratio OCR :
Mayne 2005

Clay Friction Angle :
Sunneset et al., 1988 and 1989 (NTH solution)

Sand Friction Angle :
Robertson & Campanella 1983

Clay Young's Modulus Es :
Duncan & Buchihmami 1976

Sand Young's Modulus Es :
Bellotti et al. 1989

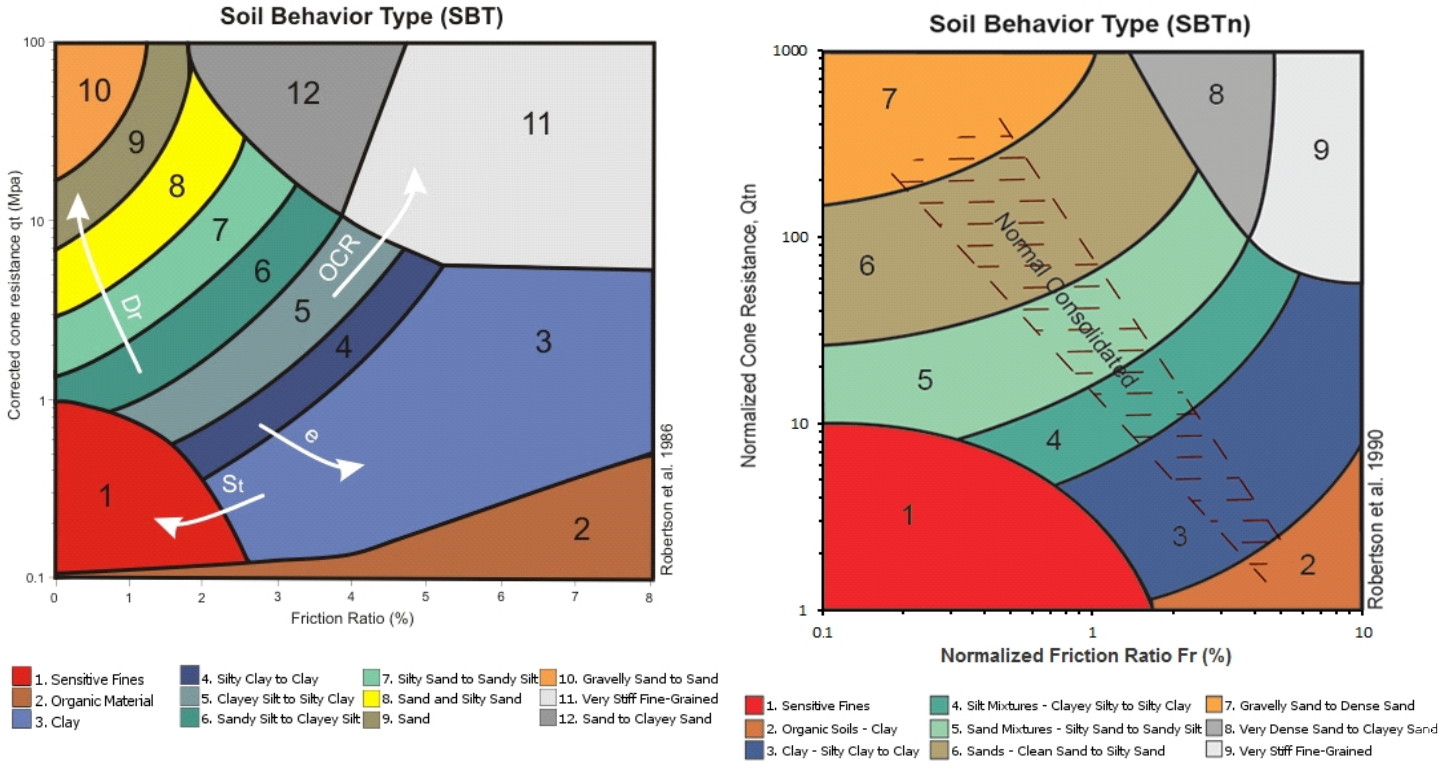
Sand Relative Density Dr :
Jamiolkowski et al. 2001

Clay Sensitivity St :
Robertson & Campanella 1988 Ns=6

Liquefaction MSF :
Youd et al. 2001 (NCEER 1997)

Stress Reduction Factor Rd :
Idriss & Boulanger, 2008 (Idriss 1999)

Liquefaction Assessed For Following SBT:
7 8 9 10 12



APPENDIX F

Infiltration Boring Logs

Infiltration Field Test Data

Part 630 Hydrology National Engineering Handbook, Chapter 7 Hydrological Soils Groups

GeoSolutions, Inc.

1021 West Tama Lane, Suite 105

Santa Maria, CA 93454

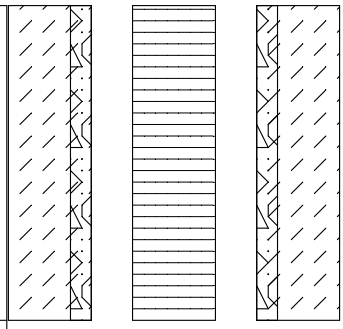
INFILTRATION LOG

BORING NO. **I-1**

JOB NO. **SB00573-1**

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: **856, 864 872 Pioneer Street**	DRILL RIG: **CME 55**
DRILLING LOCATION: **See Figure 3: Google Image**	HOLE DIAMETER **6 inches**
DATE DRILLED: **January 19, 2015**	SAMPLING METHOD **n/a**
LOGGED BY: **BB**	HOLE ELEVATION: **Not Recorded**

▼ Depth of Groundwater: **Not Encountered** Boring Terminated At: **5 feet**

DEPTH	SOIL DESCRIPTION	USCS	LITHOLOGY	ANNULAR MATERIAL DESCRIPTION	WELL CASING MATERIAL DESCRIPTION	WELL CROSS-SECTION
0	POORLY GRADED SAND: seasonal grasses, olive brown, with gravel and clay, dry	SP-SC		PEA GRAVEL	PVC SCREEN	

0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -12 -13 -14 -15 -16 -17 -18 -19 -20

GeoSolutions, Inc.

1021 West Tama Lane, Suite 105

Santa Maria, CA 93454

INFILTRATION LOG

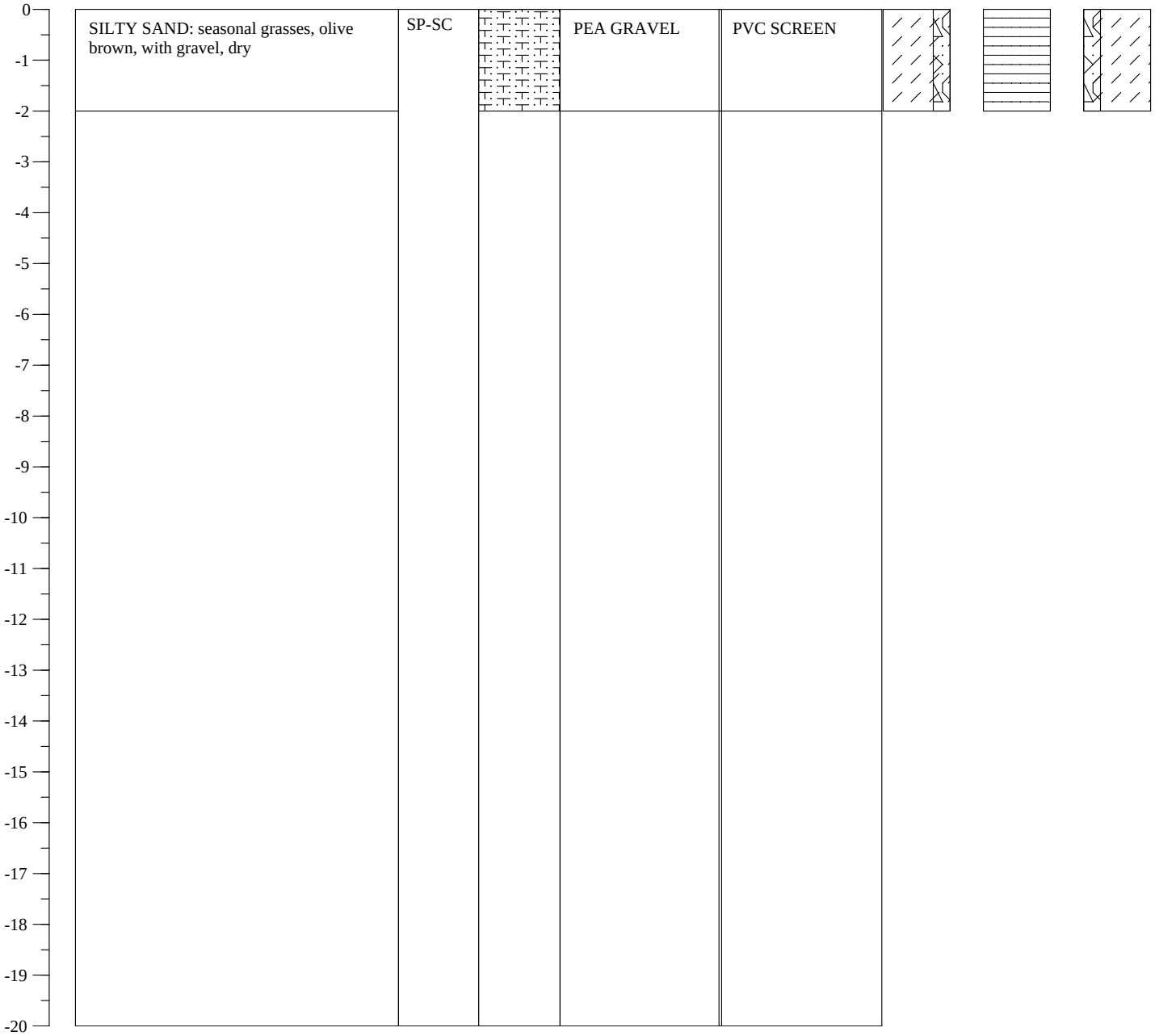
BORING NO. **I-2**

JOB NO. **SB00573-1**

PROJECT INFORMATION	DRILLING INFORMATION
PROJECT: **856, 864 872 Pioneer Street**	DRILL RIG: **CME 55**
DRILLING LOCATION: **See Figure 3: Google Image**	HOLE DIAMETER **6 inches**
DATE DRILLED: **January 19, 2015**	SAMPLING METHOD **n/a**
LOGGED BY: **BB**	HOLE ELEVATION: **Not Recorded**

▼ Depth of Groundwater: **Not Encountered** Boring Terminated At: **2 feet**

DEPTH	SOIL DESCRIPTION	USCS	LITHOLOGY	ANNULAR MATERIAL DESCRIPTION	WELL CASING MATERIAL DESCRIPTION	WELL CROSS-SECTION
0	SILTY SAND: seasonal grasses, olive brown, with gravel, dry	SP-SC		PEA GRAVEL	PVC SCREEN	



INFILITRATION FIELD TEST DATA

Job Name: 856, 864, & 872 Pioneer Street
Job #: SB00573-1
Date: 2/5/2015
Technician: SP

Type of Test Hole: **(x) Standard 2" PVC** **( ) Backhoe Pit**

Size Of Test Hole: **(x) 8 inch boring** **( ) 12 inch boring**

If the backhoe pit has been utilized please provide dimensions of the actual perc test hole including the depth of water tested.
Pit Hole Size: _____ **Water Depth:** _____

Unit of Measure: **Decimal Feet**

Constant Head (volume)
I-1
I-2
I-3

Test Methodology (x) Shallow quick infiltration

	WATER DEPTH FROM TOP OF CASING		
Time (hours), Rates	**I-1**	**I-2**	**I-3**
0.0	4.65	3.80	
H at 30 min	6.68	6.02	
ΔH	2.03	2.22	
Rate (in/hour)	48.72	53.28	
0.5	4.90	4.96	
H at 60 min	7.29	6.34	
ΔH	2.39	1.38	
Rate (in/hour)	57.36	33.12	
1.0	4.99	3.75	
H at 90 min	7.59	6.02	
ΔH	2.60	2.27	
Rate (in/hour)	62.40	54.48	
1.5	5.06	4.88	
H at 120 min	7.95	6.34	
ΔH	2.89	1.46	
Rate (in/hour)	69.36	35.04	
2.0			
H at 120 min			
ΔH			
Rate (in/hour)			

Hole Depth (ft)	**5.00**	**2.00**	
No. of Measurements	**4**	**4**	

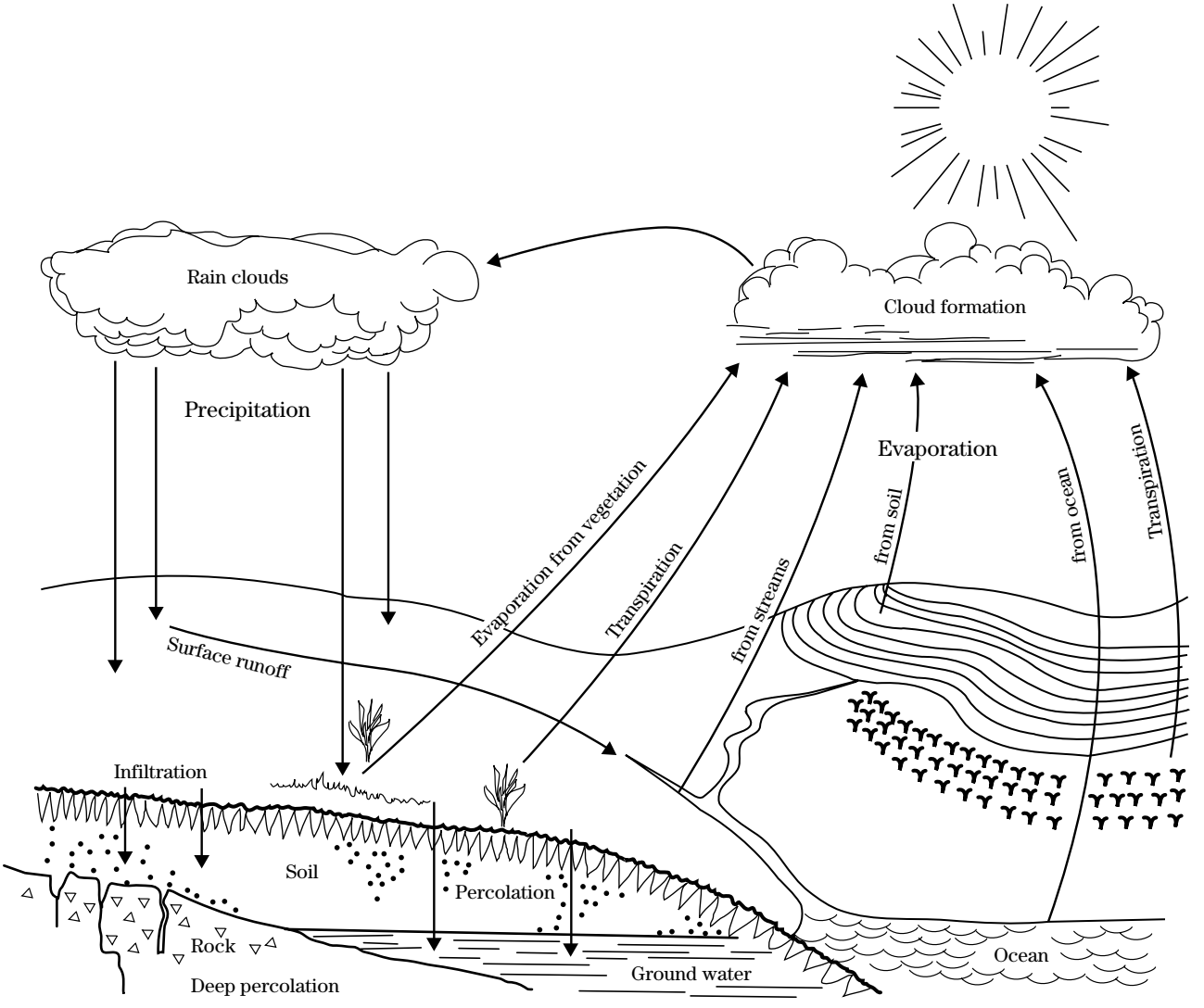
Infil Rate (in/hour)	**69.00**	**35.00**	

United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

Part 630 Hydrology
National Engineering Handbook

Chapter 7 Hydrologic Soil Groups



Chapter 7 Hydrologic Soil Groups

Contents:

630.0700	**Introduction**	**7–1**
630.0701	**Hydrologic soil groups**	**7–1**
630.0702	**Disturbed soils**	**7–5**
630.0703	**References**	**7–5**

Tables

Table 7–1	Criteria for assignment of hydrologic soil groups when a water impermeable layer exists at a depth between 50 and 100 centimeters [20 and 40 inches]	7–4
Table 7–2	Criteria for assignment of hydrologic soil groups when any water impermeable layer exists at a depth greater than 100 centimeters [40 inches]	7–4

Chapter 7 Hydrologic Soil Groups

630.0700 Introduction

This chapter defines four hydrologic soil groups, or HSGs, that, along with land use, management practices, and hydrologic conditions, determine a soil's associated runoff curve number (NEH630.09). Runoff curve numbers are used to estimate direct runoff from rainfall (NEH630.10).

A map unit is a collection of areas defined and named the same in terms of their soil components or miscellaneous areas or both (NSSH 627.03). Soil scientists assign map unit components to hydrologic soil groups. Map unit components assigned to a specific hydrologic soil group have similar physical and runoff characteristics. Soils in the United States, its territories, and Puerto Rico have been assigned to hydrologic soil groups. The assigned groups can be found by consulting the Natural Resources Conservation Service's (NRCS) Field Office Technical Guide; published soil survey data bases; the NRCS Soil Data Mart Web site (*http://soildatamart.nrcs.usda.gov/*); and/or the Web Soil Survey Web site (*http://websoilsurvey.nrcs.usda.gov/*).

The state soil scientist should be contacted if a soil survey does not exist for a given area or where the soils within a watershed have not been assigned to hydrologic groups.

630.0701 Hydrologic soil groups

Soils were originally assigned to hydrologic soil groups based on measured rainfall, runoff, and infiltrometer data (Musgrave 1955). Since the initial work was done to establish these groupings, assignment of soils to hydrologic soil groups has been based on the judgment of soil scientists. Assignments are made based on comparison of the characteristics of unclassified soil profiles with profiles of soils already placed into hydrologic soil groups. Most of the groupings are based on the premise that soils found within a climatic region that are similar in depth to a restrictive layer or water table, transmission rate of water, texture, structure, and degree of swelling when saturated, will have similar runoff responses. The classes are based on the following factors:

- intake and transmission of water under the conditions of maximum yearly wetness (thoroughly wet)
- soil not frozen
- bare soil surface
- maximum swelling of expansive clays

The slope of the soil surface is not considered when assigning hydrologic soil groups.

In its simplest form, hydrologic soil group is determined by the water transmitting soil layer with the lowest saturated hydraulic conductivity and depth to any layer that is more or less water impermeable (such as a fragipan or duripan) or depth to a water table (if present). The least transmissive layer can be any soil horizon that transmits water at a slower rate relative to those horizons above or below it. For example, a layer having a saturated hydraulic conductivity of 9.0 micrometers per second (1.3 inches per hour) is the least transmissive layer in a soil if the layers above and below it have a saturated hydraulic conductivity of 23 micrometers per second (3.3 inches per hour).

Water impermeable soil layers are among those types of layers recorded in the component restriction table of the National Soil Information System (NASIS) database. The saturated hydraulic conductivity of an impermeable or nearly impermeable layer may range

from essentially 0 micrometers per second (0 inches per hour) to 0.9 micrometers per second (0.1 inches per hour). For simplicity, either case is considered impermeable for hydrologic soil group purposes. In some cases, saturated hydraulic conductivity (a quantitatively measured characteristic) data are not always readily available or obtainable. In these situations, other soil properties such as texture, compaction (bulk density), strength of soil structure, clay mineralogy, and organic matter are used to estimate water movement. Tables 7–1 and 7–2 relate saturated hydraulic conductivity to hydrologic soil group.

The four hydrologic soil groups (HSGs) are described as:

Group A—Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.

The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B—Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.

The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C—Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.

The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour).

Group D—Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table

within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained.

The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

Dual hydrologic soil groups—Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups (A/D, B/D, and C/D) based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

Matrix of hydrologic soil group assignment criteria—The decision matrix in tables 7–1 and 7–2 can be used to determine a soil's hydrologic soil group. Check both tables before making a final decision. If saturated hydraulic conductivity data are available and deemed to be reliable, then these data, along with water table depth information, should be used to place the soil into the appropriate hydrologic soil group. If these data are not available, the hydrologic soil group is determined by observing the properties of the soil in the field. Factors such as texture, compaction (bulk density), strength of soil structure, clay mineralogy, and organic matter are considered in estimating the hydraulic conductivity of each layer in the soil profile. The depth and hydraulic conductivity of any water impermeable layer and the depth to any high water table are used to determine correct hydrologic soil group for the soil. The property that is most limiting to water movement generally determines the soil's hydrologic group. In anomalous situations, when adjustments to hydrologic soil group become necessary, they shall be made by the NRCS state soil scientist in consultation with the state conservation engineer.

Table 7–1 Criteria for assignment of hydrologic soil groups when a water impermeable layer exists at a depth between 50 and 100 centimeters [20 and 40 inches]

Soil property	Hydrologic soil group A	Hydrologic soil group B	Hydrologic soil group C	Hydrologic soil group D
Saturated hydraulic conductivity of the least transmissive layer	>40.0 µm/s (>5.67 in/h)	≤40.0 to >10.0 µm/s (≤5.67 to >1.42 in/h)	≤10.0 to >1.0 µm/s (≤1.42 to >0.14 in/h)	≤1.0 µm/s (≤0.14 in/h)
	and	and	and	and/or
Depth to water impermeable layer	50 to 100 cm [20 to 40 in]	50 to 100 cm [20 to 40 in]	50 to 100 cm [20 to 40 in]	<50 cm [<20 in]
	and	and	and	and/or
Depth to high water table	60 to 100 cm [24 to 40 in]	60 to 100 cm [24 to 40 in]	60 to 100 cm [24 to 40 in]	<60 cm [<24 in]

Table 7–2 Criteria for assignment of hydrologic soil groups when any water impermeable layer exists at a depth greater than 100 centimeters [40 inches]

Soil property	Hydrologic soil group A	Hydrologic soil group B	Hydrologic soil group C	Hydrologic soil group D
Saturated hydraulic conductivity of the least transmissive layer	>10 µm/s (>1.42 in/h)	≤10.0 to >4.0 µm/s (≤1.42 to >57 in/h)	≤4.0 to >0.40 µm/s (≤0.57 to >0.06 in/h)	≤0.40 µm/s (≤0.06 in/h)
	and	and	and	and/or
Depth to water impermeable layer	>100 cm [>40 in]	>100 cm [>40 in]	>100 cm [>40 in]	>100 cm [>40 in]
	and	and	and	and/or
Depth to high water table	>100 cm [>40 in]	>100 cm [>40 in]	>100 cm [>40 in]	>100 cm [>40 in]

630.0702 Disturbed soils

As a result of construction and other disturbances, the soil profile can be altered from its natural state and the listed group assignments generally no longer apply, nor can any supposition based on the natural soil be made that will accurately describe the hydrologic properties of the disturbed soil. In these circumstances, an onsite investigation should be made to determine the hydrologic soil group. A general set of guidelines for estimating saturated hydraulic conductivity from field observable characteristics is presented in the Soil Survey Manual (Soil Survey Staff 1993).

630.0703 References

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