APPENDIX 4.6-B

GEOTECHNICAL INVESTIGATION FOR SALT CREEK SUBSTATION PROPONENT'S ENVIRONMENTAL ASSESSMENT (PEA)

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August 22, 2012

Prepared for:

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GEOTECHNICAL INVESTIGATION
69KV TRANSMISSION LINE TL6965
SALT CREEK SUBSTATION TO
MIGUEL SUBSTATION
CHULA VISTA, CALIFORNIA

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Mr. Tyler Lonsdale
San Diego Gas & Electric Company
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Subject: **Geotechnical Investigation**
69KV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Dear Mr. Lonsdale:

Geosyntec Consultants (Geosyntec) is pleased to provide the San Diego Gas & Electric Company (SDG&E) the accompanying geotechnical investigation report for the proposed 69 kilovolt (kV) Transmission Line TL6965 between the proposed Salt Creek Substation and the existing Miguel Substation in Chula Vista, California. This report presents our conclusions and recommendations pertaining to the project and the results of the field exploration program and laboratory testing.

We appreciate the opportunity to provide geotechnical consulting services to SDG&E on this important project. If you have any questions or require additional information, please contact the undersigned at (858) 674-6559.

Sincerely,

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1. INTRODUCTION

This report presents the results of the geotechnical investigation for the San Diego Gas & Electric Company (SDG&E) proposed 69kV Transmission Line TL6965 in Chula Vista, California (Site). The subject improvements will be located between the proposed Salt Creek Substation and the existing Miguel Substation. This report was prepared by Mr. Jared Warner and Ms. Jennifer Nevius, G.E. and has been reviewed by Mr. Steven Fitzwilliam, G.E., and Mr. Alexander Greene, C.E.G of Geosyntec Consultants (Geosyntec), in accordance with the peer review policies of the firm.

1.1 Project Description

We understand that SDG&E is proposing to construct new poles along Transmission Line TL6965, located in the vicinity of State Route 125 (SR125) and approximately from Hunte Parkway to San Miguel Road (Figure 1). The subject portion of the transmission line alignment is shown on Figure 2. We understand that fourteen of the new pole structures require geotechnical investigation. A summary of information for these proposed pole locations is presented in Table 1.

1.2 Purpose and Scope of Services

The purpose of our geotechnical investigation was to provide geotechnical engineering recommendations for the referenced pole foundations. The scope of the investigation was outlined in our proposal dated 25 April 2012. Geosyntec performed a geotechnical investigation consisting of a site reconnaissance, review of existing geotechnical and geologic information, field explorations, laboratory testing, engineering analyses and evaluations, and the preparation of this geotechnical investigation report. In addition, we reviewed existing geotechnical reports provided by SDG&E for the design and construction of other transmission lines, transmission line improvements, and substation facilities in the area to supplement the current investigation.

This report presents our findings, conclusions, and geotechnical engineering recommendations for the proposed project. Specifically, this report provides discussions, conclusions, and recommendations for the project regarding:

- Geologic and seismic setting;
- Surface conditions;
- Anticipated geologic units;
- Potential geologic hazards;

- Earthwork and grading;
- Parameters for deep foundation design;
- Foundation excavation characteristics; and
- Construction observation recommendations.

Tables, figures, and appendices follow the text of this report.

2. GEOTECHNICAL INVESTIGATION

2.1 Previous Investigations

Several geotechnical investigations have been performed in the vicinity of the proposed pole structures for previous substation and transmission line projects. Summaries of the most pertinent previous investigations are provided below, and references for the available investigation reports are provided in Section 7. Copies of the pertinent boring logs, and/or laboratory test data from the previous investigations are provided in Appendix A. The locations of the applicable subsurface explorations are presented on Figures 2a through 2c.

2.1.1 GEOCON, 2011

Geosyntec was provided with a 2011 report of geotechnical investigation prepared by GEOCON Incorporated (GEOCON) for proposed wood to steel improvements to Transmission Line TL6910 [GEOCON, 2011]. This geotechnical investigation included exploratory borings, seismic refraction surveys, and laboratory testing. Nine of these previous borings and one previous seismic refraction survey are applicable to the current project. This geotechnical report also provided recommendations for foundation design and construction considerations for a wood to steel project.

2.1.2 URS, 2011

Geosyntec was provided with a 2011 report of geotechnical investigation prepared by URS Corporation (URS) for proposed wood to steel improvements to Transmission Line TL6910 [URS, 2011]. This geotechnical investigation included review of previous exploratory borings and previous seismic refraction surveys performed by URS [2005], additional exploratory borings, and laboratory testing. Three of these previous exploratory borings and two of these previous seismic refraction surveys are applicable to the current project. This geotechnical report also provided recommendations for foundation design and construction considerations for a wood to steel project.

2.1.3 Woodward-Clyde Consultants, 1981

Geosyntec was provided with a 1981 report of geotechnical investigation prepared by Woodward-Clyde Consultants (WCC) for a 230kV transmission line from the Miguel Substation to Mexico. This geotechnical investigation included site reconnaissance, exploratory borings, seismic refraction traverses, and laboratory testing. Several of these previous exploration locations are in close proximity to the current improvements, with additional explorations in the general vicinity of the project. This geotechnical

report also provided recommendations for foundation design and construction considerations for this transmission line project.

2.2 Pre-Field Activities

Prior to conducting field explorations, a site-specific health and safety plan was prepared to protect Geosyntec personnel in accordance with Geosyntec and Occupational Safety and Health Administration (OSHA) requirements. Underground Service Alert (USA) was contacted to identify subsurface utilities at each of the boring locations. Boring permits were obtained from the County of San Diego Department of Environmental Health.

2.3 Site Reconnaissance

Site reconnaissance was performed at the proposed pole locations by a geologist from our firm. The reconnaissance consisted of evaluating site access for the field exploration program and a preliminary evaluation of geologic conditions in the vicinity of the proposed pole locations.

2.4 Exploratory Borings

Exploratory borings were performed at nine of the proposed pole locations between 25 June and 3 July 2012 and were designated Borings B-1 through B-9. The borings were advanced by Pacific Drilling of San Diego, California. Borings B-2 and B-4 were advanced using a track-mounted limited-access "Mole" drill rig due to the proximity of the boring to overhead utility lines. The remaining borings advanced for this investigation were advanced using a truck-mounted Unimog drill rig. Both drill rigs were equipped with 7-inch diameter hollow-stem augers. The borings were advanced to depths ranging between 17.0 and 41.5 feet below the existing ground surface (ft bgs). The approximate locations of the borings are shown on Figure 2a and 2b.

Soil samples from the borings were collected using a Standard Penetration Test (SPT) sampler or a 3-inch diameter, split-spoon California sampler driven with an automatic hammer (140-pound hammer falling approximately 30 inches). Bulk samples of the soil cuttings were also collected from exploratory borings. The soil samples from the borings were sealed and transported to the geotechnical laboratory for testing.

Descriptions and visual classifications of the subsurface materials were logged by a geologist from our firm and subsurface descriptions were based on the recovered soil samples and soil cuttings. The subsurface descriptions were developed in general accordance with American Society for Testing and Materials (ASTM) standard D2488.

A key to logs and the individual exploratory boring logs are presented in Appendix B. Sampling information, and other pertinent field data and observations are included on the boring logs.

Due to the developed nature of the site, the soil cuttings from Boring B-6 at Location 24 were drummed and temporarily stored on site. After characterization, the drums were removed from the site by SDG&E for disposal. The soil cuttings from the remainder of the borings were thinly spread in the vicinity of those borings.

2.5 Geotechnical Laboratory Testing

Soil samples from the test borings were tested to verify field classifications and evaluate the physical and engineering properties of the subsurface materials. The geotechnical laboratory testing of soil samples was performed by Excel Geotechnical Testing Inc. of Roswell, Georgia. The laboratory tests were performed in general accordance with the testing procedures of ASTM or other generally accepted test methods.

The laboratory testing performed for this project included:

Laboratory Tests	ASTM Designation
Moisture Content/Dry Density	D2216 / D2937
Grain Size Analysis	D422
Atterberg Limits	D4318

A summary table and individual results of the geotechnical laboratory testing program are presented in Appendix C.

3. SITE AND GEOLOGIC CONDITIONS

Our knowledge of the site conditions has been developed from a review of available geologic literature, previous geologic and geotechnical investigations by others, professional experience, site reconnaissance, and field and laboratory investigations performed for this study. A regional topographic map is presented in Figure 3, and a regional geologic map is presented in Figure 4.

3.1 Geologic and Seismic Setting

The site lies within the coastal margin along the western flanks of the Peninsular Ranges Geomorphic Province of southern California. The general site area extends across a relict terraced surface dissected by numerous incised drainages extending to the west off the topographic highlands east of the alignment down toward the Pacific Ocean. To the east and southeast of the alignment respectively, crystalline granitic rock associated with the Peninsular Range batholith and metavolcanic rock associated with the Santiago Peak Volcanics form the moderately steep slopes of the Peninsular Range foothills. To the northwest of the alignment, the general site area is bounded by the Otay Valley floodplain and to the west by the marine Nestor terrace. The site is situated approximately 11 miles east of the Pacific Ocean at the Silver Strand. The site area is underlain by shallow fills, topsoil, and alluvial, colluvial, and slopewash deposits), the Tertiary-age Otay Formation, and Jurassic to Cretaceous-age Santiago Peak Volcanics at depth. The surficial regional geology is shown on Figure 4.

The Rose Canyon fault zone (RCFZ) is the closest major active fault to the project area, located approximately 9.3 miles to the northwest, and dominates the seismic exposure of San Diego [Lindvall and Rockwell, 1995]. The primary faults comprising the RCFZ extend on land from La Jolla and continue south along the east margin of Mission Bay to the Old Town area; the RCFZ then continues south toward downtown San Diego, through San Diego Bay and south of the border roughly parallel to the coastline. Together with the Newport Inglewood fault zone, the RCFZ is considered a continuous zone comprised of 5 fault segments with a total length of approximately 110 miles (175 kilometers [km]). Studies in the San Diego area indicate an estimated slip rate of 1.5 millimeters/year along the RCFZ [Rockwell, 1991]. The maximum earthquake for this fault zone consists of a three segment rupture and an estimated 7.25 moment magnitude (M_w) event. Other active faults in the vicinity include the Palos Verde fault zone offshore to the west and the Elsinore and San Jacinto fault zones to the northeast. These fault zones and their respective distance from the site and maximum moment magnitudes are presented in the following table.

Fault Name	Distance and Direction from Site [a]	Maximum Moment Magnitude [b]
Rose Canyon	9.3 miles (15 km) to northwest	7.2
Palos Verdes	17.4 miles (28 km) to west	7.1
Elsinore (Julian Segment)	45.9 miles (74 km) to northeast	7.1
San Jacinto (Coyote Creek Segment)	47.8 miles (77 km) to northeast	6.8

Notes:

a. Distances from site noted are the closest distance to the surface trace or inferred projection of the fault as measured from California Division of Mines and Geology [1998].

b. Maximum moment magnitude values reported by California Geological Survey OFR 96-08 Appendix A, revised 2002 [CGS, 2003].

3.2 Surface Conditions

The proposed poles are located within the existing SDG&E easement between the proposed Salt Creek Substation adjacent to Hunte Parkway and the existing Miguel Substation off of San Miguel Road. From south to north, the alignment extends up the margin of terrace and fanglomerate deposits out of Salt Creek (Sites 1, 2, 43 and 44), crests the Otay Valley floodplain (Sites 22 through 29), and extends northward along rolling hills with intervening ridge tops (Sites 38 and 42). The general site areas include residential and commercial development beyond the easement.

The surface conditions along the alignment in the subject pole locations are characterized by sloping terrain varying from relatively flat to gentle slopes. The natural hillsides along the alignment are covered by moderate growth of scrub brush and low grasses. Each of the proposed pole locations are sited in open space adjacent to existing residential development with the exception of Site 24, which is situated within the asphalt parking lot of an existing commercial development. Site 24 is also situated adjacent to a descending slope with an inclination of approximately (2H:1V). Elevations along the alignment range from 487 to 630 feet above Mean Sea Level, and generally drain to the west or southwest toward San Diego Bay, except for Site 1, which drains to the southeast toward Salt Creek and Lower Otay Lake.

3.3 Geologic Units

Our knowledge of the subsurface conditions at the proposed pole locations is based on a review of available published geologic information, site reconnaissance, previous

borings and seismic refraction surveys performed by others for previous projects, and exploratory borings performed for the project by Geosyntec. A regional geologic map is presented in Figure 4. Generalized subsurface profiles at each of the proposed structure locations are provided in Table 2.

3.3.1 Surficial Deposits

Surficial deposits, including topsoil, alluvium, colluvium, slopewash, and residual soils are present in portions of the study area within the natural drainages and mantling the slope areas. The composition and strength of these materials are variable depending on the age, parent sources, and mode of deposition.

3.3.2 Otay Formation

The Tertiary-age Otay Formation underlies the majority of the proposed pole locations along the alignment and outcrops within the pronounced ridges of the western foothills of the Peninsular Range. The Otay Formation is described as predominantly grayish brown, silty fine sandstone to a reddish brown sandy, silty lean claystone (URS, 2011). Additionally, Kennedy and Tan (1977) describe the Otay Formation as light gray and light brown massive sandstone and claystone that is moderately well sorted and poorly indurated.

3.3.3 Santiago Peak Volcanics

The Jurassic- to Cretaceous-age, pre-batholithic metamorphosed volcaniclastic and meta-sedimentary rocks which underlie the Otay Formation at depth are known as the Santiago Peak Volcanics. These volcanic rocks, forming the bulk of the Peninsular Ranges to the east of the alignment, are slightly to intensely weathered forming the local deposits in the Otay Valley floodplain.

3.4 Groundwater

Groundwater was observed within the alluvium in Boring B-5 at a depth of approximately 11 ft bgs. This depth to groundwater represents conditions observed at the time of drilling and may not be indicative of stabilized water levels at this location.

With the exception of Boring B-5 as noted above, regional groundwater was not encountered in the current or previous explorations performed within the project alignment. Based on our review of available information, regional groundwater is expected to be greater than 40 ft bgs. Perched groundwater or localized zones of wet materials were observed in the borings, and based on our experience in the current field

investigation and similar sedimentary bedrock terrain, zones of perched groundwater are anticipated during foundation excavation.

4. GEOLOGIC HAZARDS

4.1 Fault Ground Rupture

The project area, like most of southern California, is considered to be situated in a seismically active area. Based on a review of previous geotechnical reports and available geologic maps, the project alignment is not underlain by known active faults that exhibit evidence of ground displacement during the last 11,000 years, therefore, fault rupture is not considered to be a constraint to the project. The potential for fault surface rupture is generally considered to be significant along "active" faults (defined as exhibiting surface rupture within the past 11,000 years) and to a lesser degree along "potentially active" faults (surface rupture within the past 1.6 million years). A review of published geologic maps did not identify the presence of any active or potentially active faults crossing on or projecting near the project site. The nearest mapped active fault traces are approximately 9.3 miles (15 km) to the northwest of the project area within the Rose Canyon fault zone, and 17.4 miles (28 km) to the west within the Palos Verdes fault zone [Jennings, 1994]. The closest potentially active fault to the site area is the La Nacion fault situated approximately 2.5 miles (4 km) to the west. Therefore it is our opinion that the potential for fault related surface rupture along the proposed project alignment is low.

4.2 Strong Ground Shaking

The RCFZ is the dominant source of potential ground motion at the site. Earthquakes on the Rose Canyon Fault have a maximum magnitude of 7.2 and are considered to be representative of the potential for seismic ground shaking within the property. The "maximum magnitude" is defined as the maximum probable earthquake that appears capable of occurring under the presently known tectonic framework (California Division of Mines and Geology Notes, Number 43). Based on the proximity of the site to the RCFZ and other potential seismic sources on more distant active faults, the project site will likely experience moderate ground shaking in response to a local or regional large magnitude earthquake occurring during the expected life span for the proposed project. The location of regional faults and historic earthquake epicenters are shown on Figure 5.

4.3 Soil Liquefaction

Seismically induced soil liquefaction can be described as a significant loss of strength and stiffness due to cyclic pore water pressure generation from seismic shaking or other large cyclic loading. The material types considered most susceptible to liquefaction are granular soils and low-plasticity fine grained soils which are saturated and loose to

medium dense. Manifestations of soil liquefaction can include the loss of bearing capacity below foundations, surface settlements and tilting in level ground, and instabilities in areas of sloping ground.

For the proposed pole locations, due to the anticipated level of ground shaking for the expected life span for the proposed project, relatively dense nature of the formational soil, and weathered bedrock underlying the proposed pole locations below groundwater and/or the lack of permanent groundwater, the probability of soil liquefaction affecting the project is low. Correspondingly, the potential for damage due to liquefaction-induced seismic settlement and lateral spreading is also considered low.

4.4 Secondary Effects of Seismic Activity

The secondary effects of seismic activity resulting from ground shaking include lateral spreading, tsunamis and seiches. The probability of occurrence of each depends on the severity of earthquake, distance from the epicenter, faulting mechanism, topography, soil and groundwater conditions, and other factors.

Tsunamis are seismically-induced waves generated by sudden movements of the ocean bottom during submarine earthquakes, landslides, or volcanic activity. Seiches are similarly generated, but are waves in lakes or reservoirs. Based on the inland location, site elevation, and the location and direction of the downstream topography below the nearest large lake (Lower Otay Lake at approximately 1.0 miles southeast of the project, and the Sweetwater Reservoir at approximately 2.2 miles northwest of the project), the potential for damage due to a tsunami or seiche is considered very low and does not constitute a significant developmental hazard for the project.

4.5 Landslides and Slope Stability

The sedimentary deposits associated with the Otay Formation that are mapped within the site area are considered to be landslide prone. In addition, portions of the Miguel Substation have previously been identified as being underlain by landslide deposits or possible landslides (URS, 2011). Other nearby landslides have been previously mapped to the west of the proposed alignment (Figure 4), but based on our review of the available geologic maps and aerial photographs, there are no landslides that have been identified beneath the proposed sites. Given this review and our understanding of the proposed construction, the risk of slope movement associated with landslides at the proposed pole locations is considered to be low.

4.5.1 Expansive and Collapsible Soil

Our previous experience in the site area and the soil index testing performed for previous investigations and the current investigation indicates that the majority of the near-surface clayey materials are considered to be expansive and subject to desiccation cracking during cycles of wetting and drying.

Collapsible soils are not anticipated to be present in significant quantities along the proposed alignment and do not constitute a significant hazard during project construction.

4.5.2 Other Geologic Hazards

Other geologic hazards, including volcanic activity, are not considered to be a significant hazard given the geologic setting of the site.

5. DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

The discussions, conclusions, and recommendations presented in this report are intended for the proposed new structures for Transmission Line TL6956 and are based on our understanding of the proposed project and this investigation.

5.1 Earthwork

We anticipate that the earthwork for the proposed project will include site preparation, cuts on the order of 5 feet, placement of engineered fill to achieve final grades, and fine grading for site drainage control. A majority of the material from cut areas will likely be used as fill.

We recommend that a pre-grading conference be held at the site with SDG&E, the contractor, and the geotechnical engineer. We also recommend that the earthwork be performed in accordance with Section 300 of the most recent edition of the "Standard Specifications for Public Works Constriction" (also known as the Greenbook) and "Regional Supplement Amendments" and the recommendations presented below.

5.1.1 Removal of Unsuitable Areas

Prior to grading, any abandoned utilities and improvements, vegetation, or other debris should be removed and properly disposed off-site. Removal of unsuitable topsoil and residual soils to competent material shall be required in areas of fill placement (graded pad areas). Removal depths are expected to range from 1 to 3 feet. Removals should extend beyond the toe of fill slopes a minimum distance equal to a 1:1 projection outward and down to an approved removal bottom. A representative of the geotechnical engineer should determine the actual lateral removal limits in the field during grading.

5.1.2 Fill and Backfill

Except for surficial organic materials (topsoil), the onsite soils are considered suitable for use as engineered fill. It is recommended that any import materials used for the project (if any) be composed of select material. "Select material" may be defined as having at least 40 percent of the material less than ¼ inch in size, an expansion index less than 30, and no perishable, spongy, deleterious, impacted, or otherwise unsuitable material.

All fill and backfill should be compacted to a minimum relative compaction of 90 percent. Relative compaction is defined as the ratio of the in-place dry density to the maximum dry density as determined by ASTM D1557. Fill and backfill materials

should be compacted above the optimum moisture content, as determined by ASTM D1557. Fill soils should be placed in loose lifts no thicker than 8 inches. We recommend that a representative of the geotechnical engineer observe and test the compacted fills.

5.1.3 Fill Slopes

Fill slopes should be formed on an equipment width keyway (10-foot minimum) excavated at least 2 feet into competent material and tilted back at least 2 percent into the slope or as recommended in the field by the geotechnical engineer. Benching will be required after the removal of unsuitable material. Benches should be excavated within competent material as the fill slope formation progresses up slope. Benching shall be in accordance with Section 300-4.4 of the Greenbook unless otherwise directed by the geotechnical engineer.

Fill slopes should be constructed at a maximum inclination of 2H:1V (horizontal:vertical). The face of the slope should be compacted by back rolling with a sheepsfoot roller after each four-foot increase in slope height. When the pad grade is achieved, the slope face should be track walked with a dozer or rolled with a cable-lowered sheepsfoot, and finally grid-rolled.

5.2 Surface Drainage

It is recommended that positive measures be taken to properly finish grade the area of the proposed poles and pad areas so that drainage water from the project area does not pond and is directed away from foundations.

5.3 Foundation Design

We understand that the deep foundations to support the proposed poles will be designed using the Electric Power Research Institute (EPRI) computer program Moment Foundation Analysis and Design (MFAD). The design parameters for use with the MFAD program include:

- Subsurface material layer depths;
- Groundwater depth;
- Total unit weight;
- Internal friction angle;
- Cohesion;
- Elastic pressuremeter modulus; and
- Strength reduction factor.

Estimates of the required parameters were developed based on the results of our site reconnaissance, field exploration program, geotechnical laboratory testing, engineering evaluation and analyses, empirical correlations, literature research, and professional judgment. The design parameters recommended for foundation design using the MFAD computer program are presented in Table 2. These design parameters are intended for use in the MFAD computer program and may not reflect actual strengths. Pressuremeter testing was not performed as part of this project; the elastic pressuremeter modulus values were estimated from published correlations [EPRI, 1990].

Other conditions that influence the design of pole foundations include the presence of groundwater, inclination of adjacent slopes, thickness of residual, disturbed, or otherwise weak soil deposits. The observed groundwater depths, where applicable, are presented in Table 2. It is recommended that a depth of surface material be discounted in the design of the pole foundations. This recommendation is based on the assumption that the loose, weathered, and near surface materials inherently have lower strengths with an associated higher uncertainty. In addition, foundations in sloping terrain have the potential for erosion. The recommended surficial discount depth based on the potential for erosion, surfacing, and depth of weaker surficial deposits at the proposed pole locations is presented in Table 2. We assume that SDG&E will incorporate any additional discount depth or other method for the effects of sloping ground on foundation design, such as at Site 24.

5.4 Foundation Excavation Characteristics

Our evaluation of excavation characteristics is based on drilling characteristics during our exploratory borings, the logs of borings from explorations performed by others during previous investigations, and our local experience.

Based on the observed and reported drilling conditions observed during this and previous investigations, we anticipate that the drilled shaft foundations will be relatively easy to excavate within surficial deposits. However, caving of the drilled holes should be expected in surficial deposits, and will likely be exacerbated by the presence of perched groundwater. We anticipate that the formational materials may be excavated with moderate effort to high effort using conventional heavy-duty foundation drilling equipment. The borings were advanced with a small diameter hollow-stem auger to between 17 and 41.5 ft bgs. Auger and/or sampler refusal was encountered in multiple boring locations, as exhibited where borings were terminated at depths less than 40 feet. Although not encountered in our borings to the depths investigated, concretions may be present in the Otay Formation which may provide localized zones of difficult drilling.

5.5 Construction Observation

Variations in subsurface conditions may be encountered during construction. To permit correlation between the investigation data and the conditions encountered during construction, we recommend that the geotechnical engineer be retained to observe site preparation, grading, and foundation excavation. We further recommend that the geotechnical engineer be retained to test any compacted fills. Additional laboratory testing will be required during construction to evaluate the moisture and density relationships of fill soils at locations where a graded pad is planned.

6. LIMITATIONS

The geotechnical investigation for this project provided for the observation of only a portion of the pertinent subsurface conditions. The information provided herein is based on specific explorations performed under the supervision of Geosyntec personnel and based on the logs of borings performed by others and is of the assumption that soil conditions do not deviate appreciably from those encountered during the current and previous field investigations. This geotechnical investigation report has been performed in accordance with current practices and the standard of care exercised by scientists, geologists, and engineers performing similar tasks in this area. The conclusions contained in this report are based solely on the analysis of the conditions observed by Geosyntec personnel and as reported in the referenced geotechnical investigations for the project site. We cannot make any assurances concerning the accuracy or completeness of the data presented to us.

No warranty, express or implied, is made regarding the professional opinions expressed in this report. Site grading and earthwork, utility trench backfill, and foundation excavations should be observed by a qualified engineer or geologist to verify that the site conditions are as anticipated. If actual conditions are found to differ from those described in the report, or if new information regarding the site is obtained, Geosyntec should be notified and additional recommendations, if required, will be provided. Geosyntec is not liable for any use of the information contained in this report by persons other than SDG&E or their subconsultants, or the use of information in this report for any purposes other than referenced in this report without the expressed, written consent of Geosyntec.

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TABLES

Table 1. Summary of Site Information
69kV Transmission Line TL6965 – Miguel Substation to Salt Creek Substation

PLS Structure #	Structure Longitude [a]	Structure Latitude [a]	Pole Base Elevation [a] (feet)	Proximate Explorations	Reference	Exploration Date
42	116°59'3.994"W	32° 40'42.186"N	312.2	*B-1* *B-19* *SL-00* *B-1*	URS, 2011 URS, 2005 URS, 2005 GEOCON, 2011	01/14/11 12/20/04 10 to 11/04 05/24/11
38	116°58'36.268"W	32° 40'29.275"N	493.0	*B-2* *SL-10* *SL-1* *B-6* *B-2* *B-3* *B-4* *4* *5*	URS, 2011 URS, 2005 GEOCON, 2011 GEOCON, 2011 GEOCON, 2011 GEOCON, 2011 GEOCON, 2011 WCC, 1981 WCC, 1981	01/14/11 10 to 11/04 NA 05/24/11 06/02/11 05/24/11 05/24/11 NA NA
29	116° 58'27.872"W	32° 39'42.261"N	584.8	B-1	Geosyntec, 2012	06/27/12
28	116° 58'26.332"W	32° 39'32.417"N	619.5	B-2	Geosyntec, 2012	06/29/12
27	116° 58'23.581"W	32° 39'14.835"N	630.3	B-3	Geosyntec, 2012	07/03/12
26	116° 58'21.527"W	32° 39'01.700"N	558.7	B-4	Geosyntec, 2012	06/29/12
25	116° 58'19.385"W	32° 38'48.007"N	503.4	B-5 *13*	Geosyntec, 2012 WCC, 1981	06/25/12 NA
24	116° 58'17.514"W	32° 38'36.049"N	544.1	B-6 14	Geosyntec, 2012 WCC, 1981	06/27/12 NA
23	116° 58'15.781"W	32° 38'24.786"N	551.6	B-7	Geosyntec, 2012	06/25/12

Table 1. Summary of Site Information (Continued)
69kV Transmission Line TL6965 – Miguel Substation to Salt Creek Substation

PLS Structure #	Structure Longitude [a]	Structure Latitude [a]	Pole Base Elevation [a] (feet)	Proximate Explorations	Reference	Exploration Date
22	116 º 58'12.466"W	32 º 38'21.456"N	563.5	B-8 *15*	Geosyntec, 2012 WCC, 1981	07/03/12 NA
2	116 º 56'59.058"W	32 º 37'16.031"N	540.5	*B-8*	GEOCON, 2011	05/25/11
1	116 º 56'46.648"W	32 º 37'7.219"N	487.6	*B-9*	GEOCON, 2011	05/25/11
43	116 º 56'55.562"W	32 º 37'12.316"N	486.0	B-9	Geosyntec, 2012	06/27/12
44	116 º 56'55.256"W	32 º 37'12.091"N	483.0	B-9	Geosyntec, 2012	06/27/12

Notes:

a. The longitude, latitude, and pole base elevation from the Structure Record Table provided by SDG&E dated 18 April 2012.
b. NA = Not Available.

Table 2. Recommended Foundation Design Parameters
69kV Transmission Line TL6965 – Miguel Substation to Salt Creek Substation

PLS Structure #	Layer Depth [a] (feet)	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	E_{pmt} (ksi)	Shear Strength Reduction Factor, α	Surficial Discount Depth (feet)	Reginal Groundwater Depth (feet)
42	0 to 10	115	30	50	1.5	0.8	3	Not Encountered
	10 to 25	120	30	200	5.0	0.8		
	>25	125	30	400	5.0	0.8		
38	0 to 5	115	30	50	1.5	0.8	3	Not Encountered
	5 to 15	120	30	200	2.0	0.8		
	>15	125	30	400	5.0	0.8		
29	0 to 5	115	30	50	1.5	1.0	3	Not Encountered
	5 to 20	120	35	200	3.0	1.0		
	20 to 25	125	30	200	1.5	0.8		
	>25	130	37	500	5.0	1.0		
28	0 to 5	115	30	50	1.5	1.0	3	Not Encountered
	5 to 15	120	35	200	3.0	1.0		
	>15	125	37	500	5.0	1.0		
27	0 to 5	115	30	50	1.5	0.8	3	Not Encountered
	5 to 7	120	32	200	3.0	0.9		
	>7	125	37	500	5.0	1.0		

Table 2. Recommended Foundation Design Parameters (Continued)
69kV Transmission Line TL6965 – Miguel Substation to Salt Creek Substation

PLS Structure #	Layer Depth [a] (feet)	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	E_{pmt} (ksi)	Shear Strength Reduction Factor, α	Surficial Discount Depth (feet)	Regional Groundwater Depth (feet)
26	0 to 6	115	30	50	1.5	0.8	3	Not Encountered
	6 to 11	120	30	200	1.5	1.0		
	>11	125	37	500	5.0	1.0		
25	0 to 9	115	30	50	1.5	1.0	3	11
	9 to 20	125	30	200	1.5	0.8		
	20 to 25	125	35	200	2.0	1.0		
	>25	130	37	500	5.0	1.0		
24	0 to 5	115	30	50	1.5	0.8	1	Not Encountered
	5 to 15	125	30	200	1.5	0.8		
	>15	130	37	500	5.0	1.0		
23	0 to 5	115	30	50	1.5	1.0	3	Not Encountered
	5 to 10	125	30	200	1.5	0.8		
	10 to 25	130	37	500	5.0	1.0		
	>25	130	33	500	5.0	0.8		
22	0 to 5	115	30	50	1.5	1.0	3	Not Encountered
	5 to 10	125	30	200	1.5	0.8		
	10 to 25	130	37	500	5.0	1.0		
	>25	130	33	500	5.0	0.8		

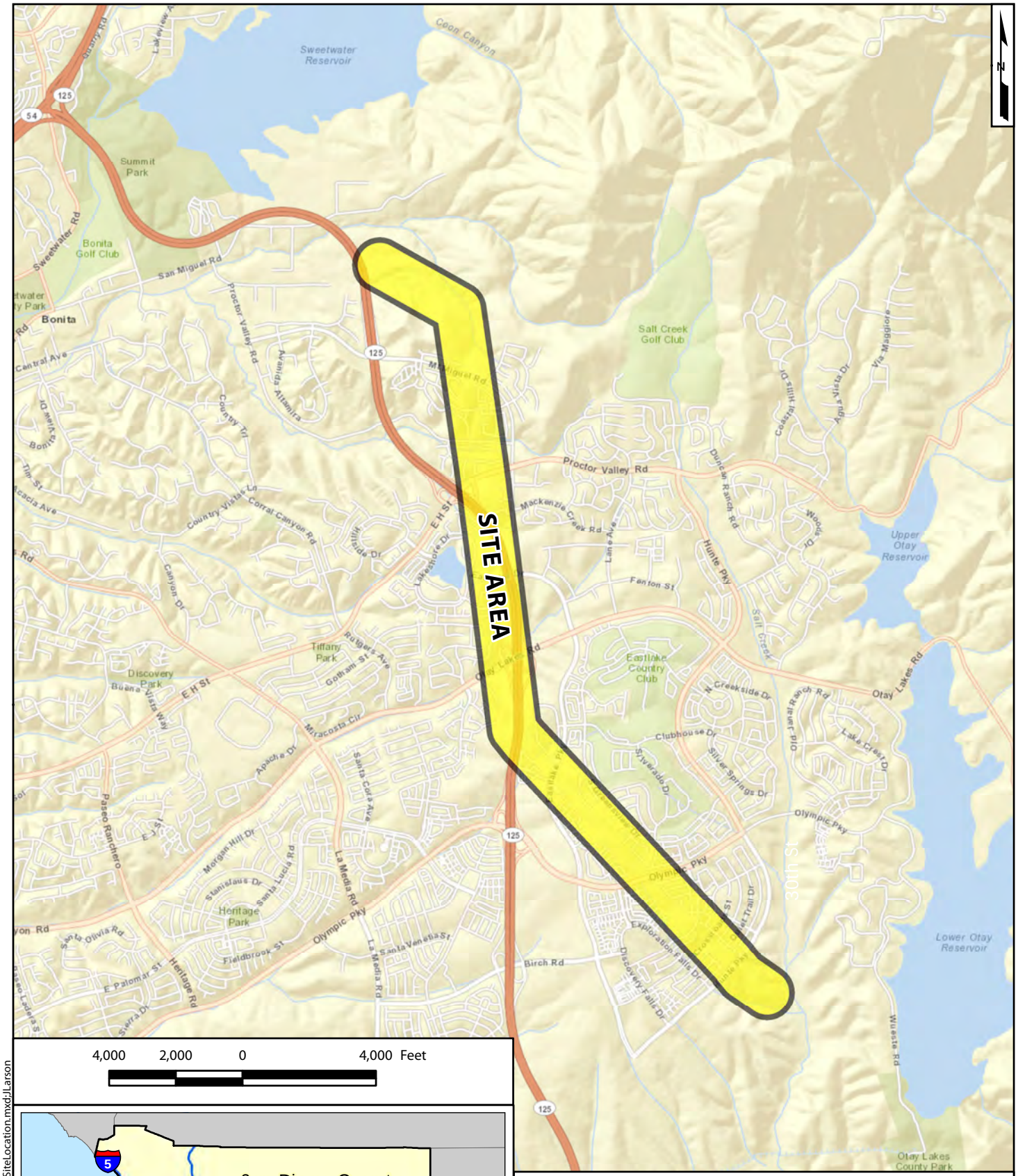
Table 2. Recommended Foundation Design Parameters (Continued)
69kV Transmission Line TL6965 – Miguel Substation to Salt Creek Substation

PLS Structure #	Layer Depth [b] (feet)	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	E_{pmt} (ksi)	Shear Strength Reduction Factor, α	Surficial Discount Depth (feet)	Regional Groundwater Depth (feet)
2	0 to 3	115	30	50	1.5	0.8	3	Not Encountered
	3 to 10	120	35	200	3.0	0.9		
	>10	125	37	500	5.0	1.0		
1	0 to 4	115	30	50	1.5	0.8	3	Not Encountered
	>4	120	37	500	5.0	1.0		
43	0 to 5	115	30	50	1.5	0.8	3	Not Encountered
	5 to 10	120	32	200	1.5	1.0		
	>10	130	37	500	5.0	1.0		
44	0 to 5	115	30	50	1.5	0.8	3	Not Encountered
	5 to 10	120	32	200	1.5	1.0		
	>10	130	37	500	5.0	1.0		

Notes:

a. Depth below existing grade.
b. pcf = pounds per cubic foot, psf = pounds per square foot, ksi = kips per square inch.

FIGURES



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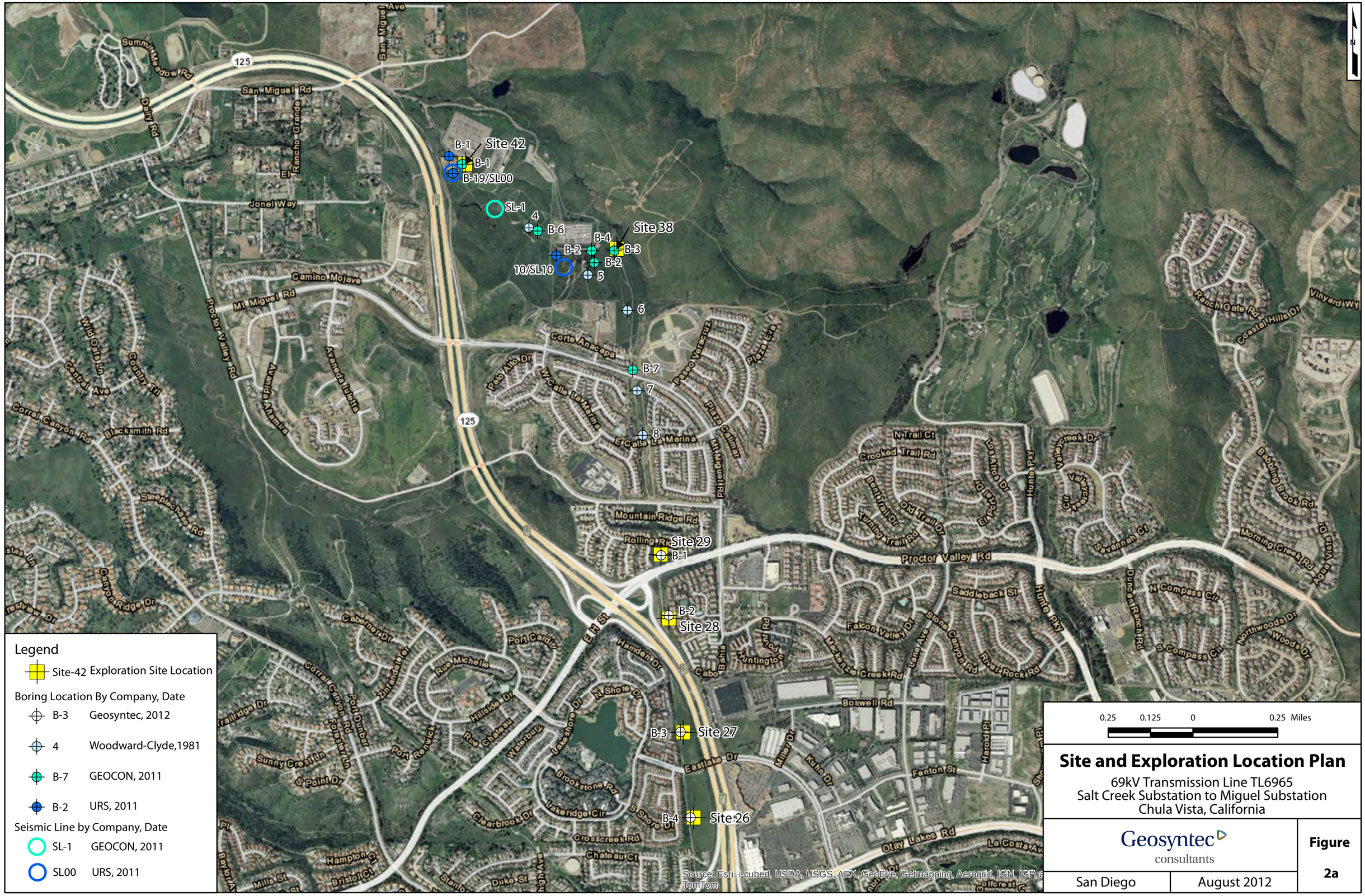
Site Location and Vicinity Map

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego | August 2012

Figure 1



Site and Exploration Location Plan

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego | August 2012

Figure 2a

Site 26 B-4
Site 25 B-5
13
Site 24 B-6
14
Site 23 B-7
15
Site 22 B-8
16
Site 2
B-8
Site 43
B-9
Site 44
Site 1
B-9

Legend

Site-1 Exploration Site Location

Boring Location By Company, Date

B-4 Geosyntec, 2012

14 Woodward-Clyde,1981

B-9 GEOCON, 2011

0.25 0.125 0 0.25 Miles

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, a TomTom

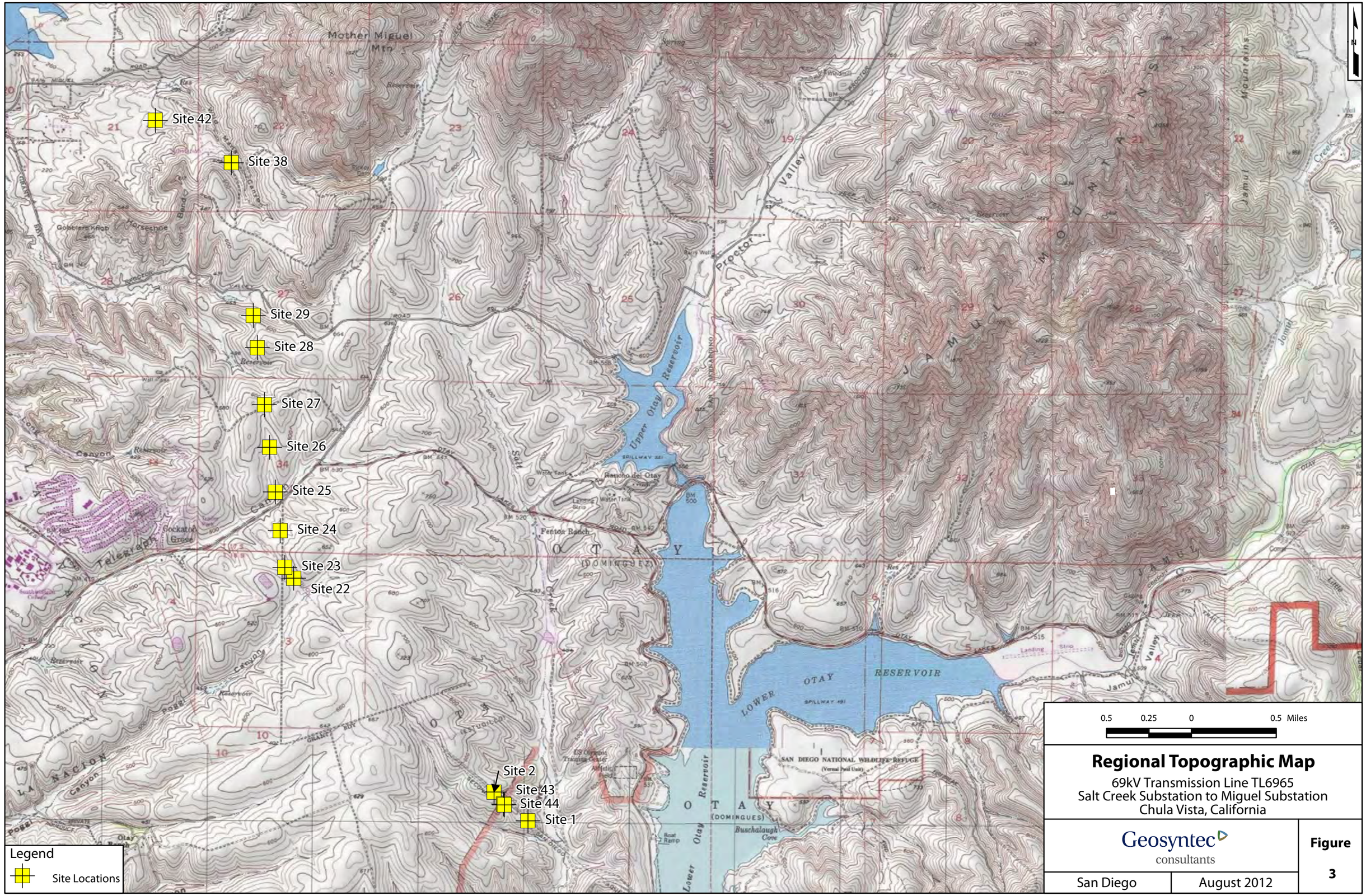
Site and Exploration Location Plan

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego | August 2012

Figure 2b



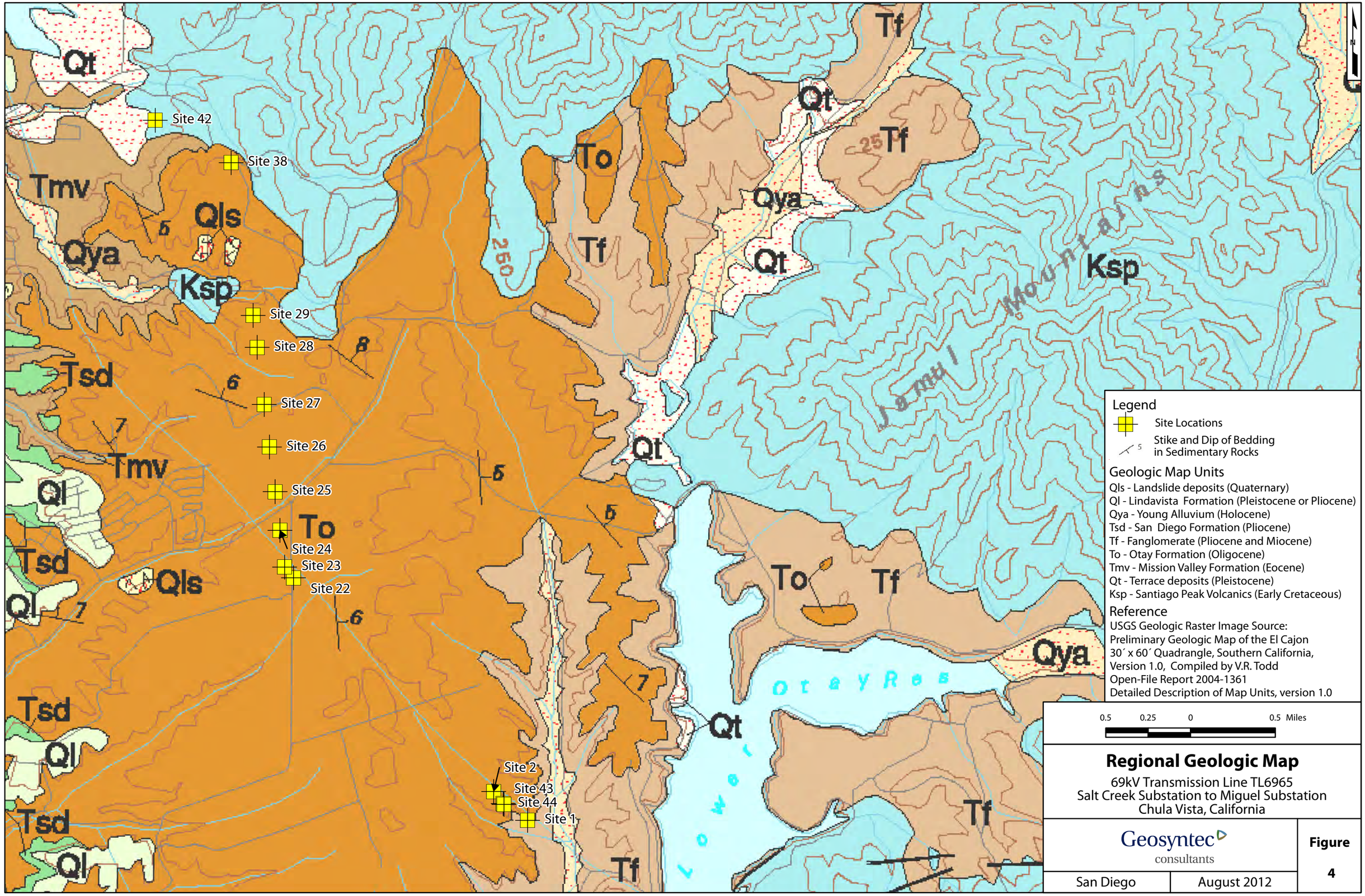
Regional Topographic Map

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego | August 2012

Figure 3



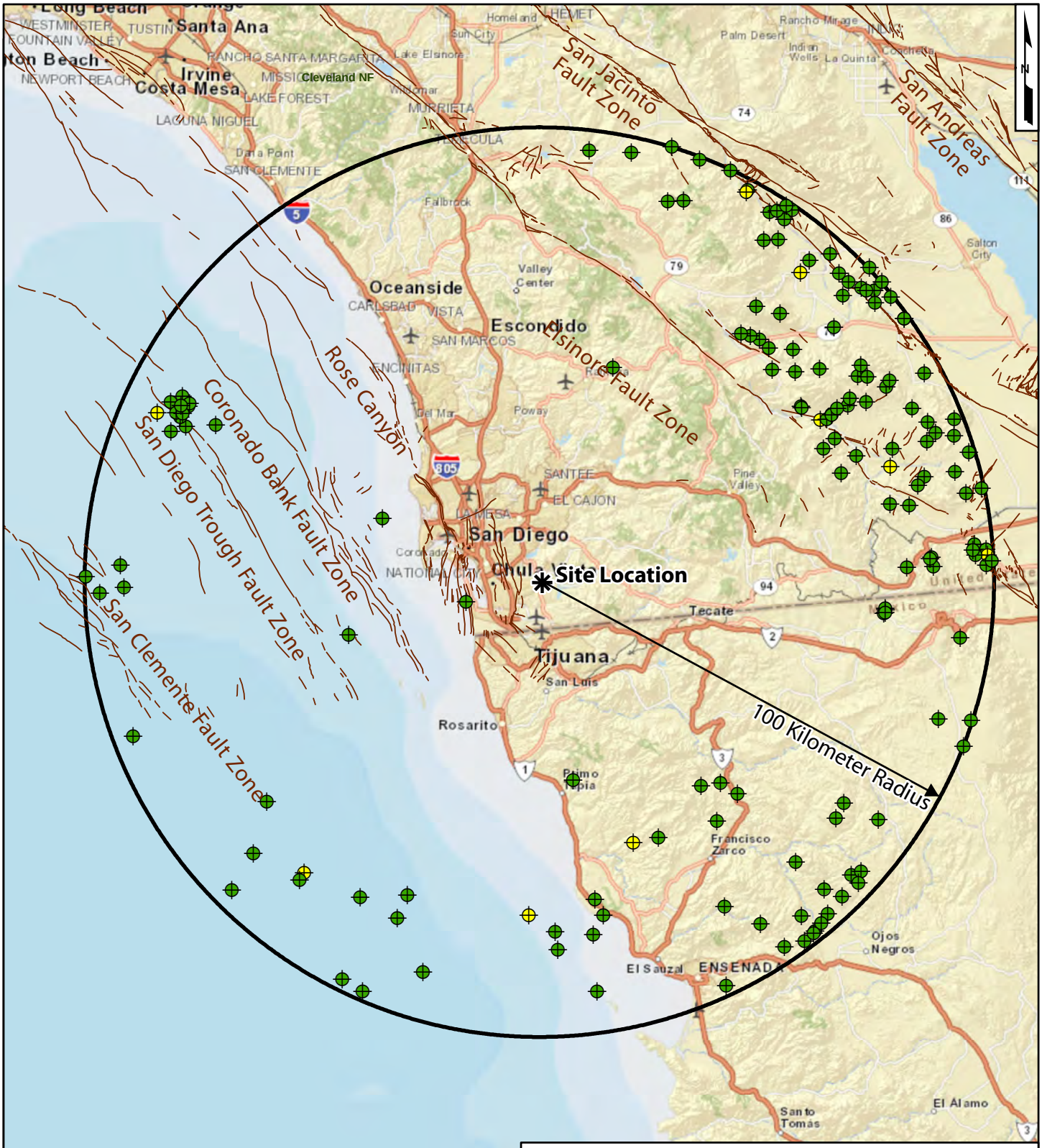
Regional Geologic Map

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego | August 2012

Figure 4



Legend

Reported Earthquake Magnitudes 1932 - 2012

- 4.0 - 4.99
- 5.0 - 5.99
- 6.0 - 6.6
- Fault

Data Source: Southern California Earthquake Data Center

Image Source: ArcOnline NGS_Topo_US_2D

Regional Fault and Epicenter Map

69kV Transmission Line TL6965
Salt Creek Substation to Miguel Substation
Chula Vista, California

Geosyntec consultants

San Diego	August 2012	Figure 5

APPENDIX A

PREVIOUS INVESTIGATIONS

Geosyntec
consultants

GEOCON, 2011

PROJECT NO. G1115-52-29

BORING B 1

ELEV. (MSL.) 309' DATE COMPLETED 05-24-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**COLLUVIUM (Qcol)** Medium dense, moist, grayish brown, Clayey SAND; some gravel			
2								
4								
6	B1-1			CL	Hard, moist, gray to brown, Sandy CLAY	23	99.8	23.0
8	B1-2			SM	**MISSION VALLEY FORMATION (Tmv)** Dense, moist, yellowish to gray brown, Silty, fine- to coarse-grained SANDSTONE	43		
10	B1-3			CL	Hard, gray mottled yellowish brown, Silty CLAYSTONE; some fine subrounded gravels	86/9"	120.3	11.8
12	B1-4							
14								
16	B1-5				-Some black carbon staining within matrix	72		
18					-Highly weathered			
	B1-6					50/5"	115.9	16.2
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-1,
Log of Boring B 1, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 2

ELEV. (MSL.) 511' DATE COMPLETED 06-02-2011

EQUIPMENT MARL 5 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B2-1			SM	**OTAY FORMATION (To)** Medium dense, moist, grayish brown, Silty, fine- to medium-grained SANDSTONE			
2								
4								
6	B2-2			ML	Hard, moist, grayish brown, Sandy SILTSTONE	43	93.5	25.3
8								
10	B2-3			SC	Medium dense, moist, brown, Clayey SANDSTONE; some gravels	14		
12								
14	B2-4			SM	Dense, moist, yellowish brown, Silty, medium- to coarse-grained SANDSTONE	48	111.1	10.4
16								
18	B2-5					23		
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered			

Figure A-2,
Log of Boring B 2, Page 1 of 1

G1115-52-29.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 3

ELEV. (MSL.) 491' DATE COMPLETED 05-24-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B3-1			SC	**COLLUVIUM (Qcol)** Medium dense, moist, grayish brown, Clayey, fine to medium SAND; some gravel to about 4 feet			
2								
4								
	B3-2			CL	-Becomes reddish brown **OTAY FORMATION (To)** Very stiff, moist, light reddish brown mottled gray, Sandy CLAYSTONE; some gravel and laminations of sand	42	112.0	12.5
6								
8	B3-3					45		
10	B3-4			SC	Very dense, moist, reddish brown, Clayey, fine-grained SANDSTONE; moderately cemented	53		
12								
14								
	B3-5			CL	Hard, moist, gray mottled reddish brown, Sandy CLAYSTONE	41		
16								
18								
	B3-6				-Becomes very hard and highly weathered	50/5"	108.7	16.5
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered			

Figure A-3,
Log of Boring B 3, Page 1 of 1

G1115-52-29.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 4

ELEV. (MSL.) 502' DATE COMPLETED 05-24-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**UNDOCUMENTED FILL (Qudf)** Soft, moist, brown, Sandy CLAY; some gravel			
2								
4								
	B4-1			ML	**OTAY FORMATION (To)** Hard, moist, brown, Sandy SILTSTONE	59	99.7	19.9
6	B4-2							
8								
10	B4-3			CL	Very stiff, moist, reddish brown, Sandy CLAYSTONE	22		
12								
14								
	B4-4				-Becomes hard and highly weathered	72	107.2	21.2
16								
18	B4-5				-Some sand and black staining	50/5"		
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-4,
Log of Boring B 4, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 6

ELEV. (MSL.) 447' DATE COMPLETED 05-24-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**COLLUVIUM (Qcol)** Stiff, moist, dark brown, Sandy CLAY			
2								
4								
6	B6-1			SM	**OTAY FORMATION (To)** Very dense, moist, grayish brown, Silty, fine-grained SANDSTONE; moderately cemented	80/9"	117.9	14.7
	B6-2							
8								
10	B6-3			CL	Hard, moist, gray brown, Sandy CLAYSTONE	79		
12								
14								
	B6-4					50/5"		
16								
18	B6-5					62		
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-6,
Log of Boring B 6, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 7

ELEV. (MSL.) 378' DATE COMPLETED 05-25-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				GP	**UNDOCUMENTED (Qudf)** Dense, dry, light brown, Sandy GRAVEL			
2								
4								
6	B7-1			CL	**OTAY FORMATION (To)** Very stiff, moist, light grayish brown, Sandy CLAY; trace fine gravel, highly weathered	42	101.7	22.0
8	B7-2				-Becomes hard, reddish brown, moist, light gray to reddish brown, Silty to Sandy CLAYSTONE; some small subrounded gravel	54		
10	B7-3							
12	B7-4				-Large gravel in sampler, Poor Recovery, erroneous blow counts	50/3"		
14					-Excavates to a Sandy CLAY with rounded gravel to about 14 feet			
16	B7-5			SM	Very dense, damp, Silty, fine- to medium SANDSTONE; some gravels	90/9"		
18	B7-6					50/3"		
					BORING TERMINATED AT 18.3 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-7,
Log of Boring B 7, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

BORING B 8

ELEV. (MSL.) 528' DATE COMPLETED 05-25-2011

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				SC	**TOPSOIL / COLLUVIUM (Qcol)** Stiff, moist, brown, Sandy CLAY			
4	B8-1			SM	**OTAY FORMATION (To)** Dense to hard, dry, whitish gray, Silty, medium- to coarse-grained SANDSTONE with interlayers of fine Sandy SILTSTONE	73	95.9	6.7
6	B8-2			ML	Hard, dry, whitish gray Sandy SILTSTONE; some angular gravel	38		
8	B8-3							
10	B8-4			SM	Very dense, moist, dark gray, Silty, fine-grained SANDSTONE	75/10"	106.6	17.6
12								
14								
16	B8-5					78		
18	B8-6				-Poor recovery	50/3"		
					BORING TERMINATED AT 18.3 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-8,
Log of Boring B 8, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1115-52-29

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING B 9** ELEV. (MSL.) **472'** DATE COMPLETED **05-25-2011** EQUIPMENT **CME 75** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**OTAY FORMATION FANGLOMERATE (Tof)** Dense, dry, olive to reddish brown, Silty, fine-coarse SANDSTONE; some gravel			
2	B9-1					50/6"		
4								
6	B9-2 B9-3				-Becomes very dense, moist, reddish to whitish brown	73		
8								
10					-Poor recovery			
12	B9-5				-Becomes whitish gray	56		
14								
16								
18	B9-6				-Becomes gravelly SAND	80/6"		
					BORING TERMINATED AT 19.0 FEET Groundwater not encountered			

G1115-52-29.GPJ

Figure A-9,
Log of Boring B 9, Page 1 of 1

SAMPLE SYMBOLS

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

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

GEOCON

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with the generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected bulk, chunk, and ring samples were tested for their dry density moisture content and shear strength, The results of our laboratory tests are presented in tabular forms hereinafter The results of in-place density and moisture content tests are depicted on the boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080-03

Sample No.	Dry Density (pcf)	Moisture Content %)		Ultimate Unit Cohesion (psf)	Ultimate Angle of Shear Resistance (degrees)
		Before Test	After Test		
B1-1	99.8	23	33.5	340	10
B1-3	120.3	11.8	18.8	420	30
B2-2	93.5	25.3	36.9	600	25
B2-4	111.1	10.4	16.9	290	36
B3-2	112.0	12.5	19.1	780	36
B3-6	108.7	16.5	21.8	1080	35
B4-1	99.7	19.9	29.9	230	31
B4-4	107.2	21.2	27.8	610	29
B6-1	117.9	14.7	21.6	190	41
B7-1	101.7	22.0	26.6	770	21
B8-1	95.9	6.7	25.2	450	40
B8-4	106.6	17.6	23.5	570	34
B11-1	118.3	8.1	13.3	600	38
B11-4	114.9	16.8	22.5	740	26
B15-1	111.1	7.2	17.6	780	35
B15-4	105.3	9.7	18.9	60	37

SEISMIC LINE LOCATION MAP

N

SDG&E TL-6910
San Diego County, California

Project No.: 111204 | Date: 06/11

SOUTHWEST GEOPHYSICS INC.

Figure 2a

0 100 200

approximate scale in feet

SITE PHOTOGRAPHS

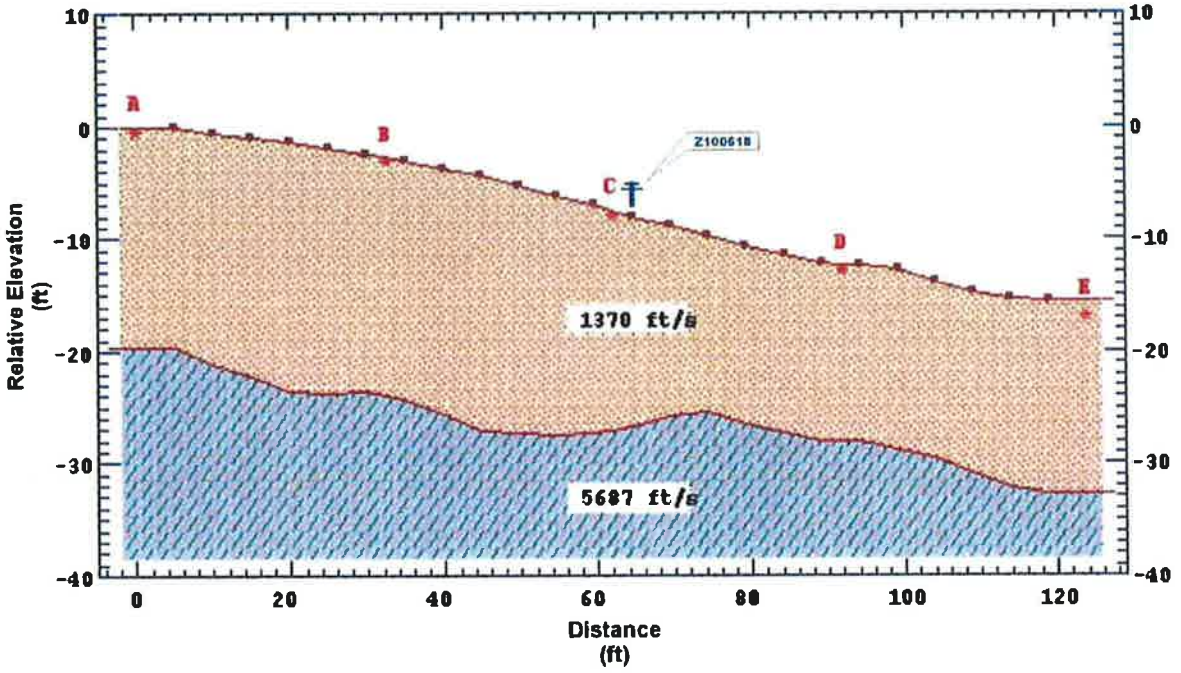
SDG&E TL-6910
San Diego County, California

Project No.: 111204 | Date: 06/11

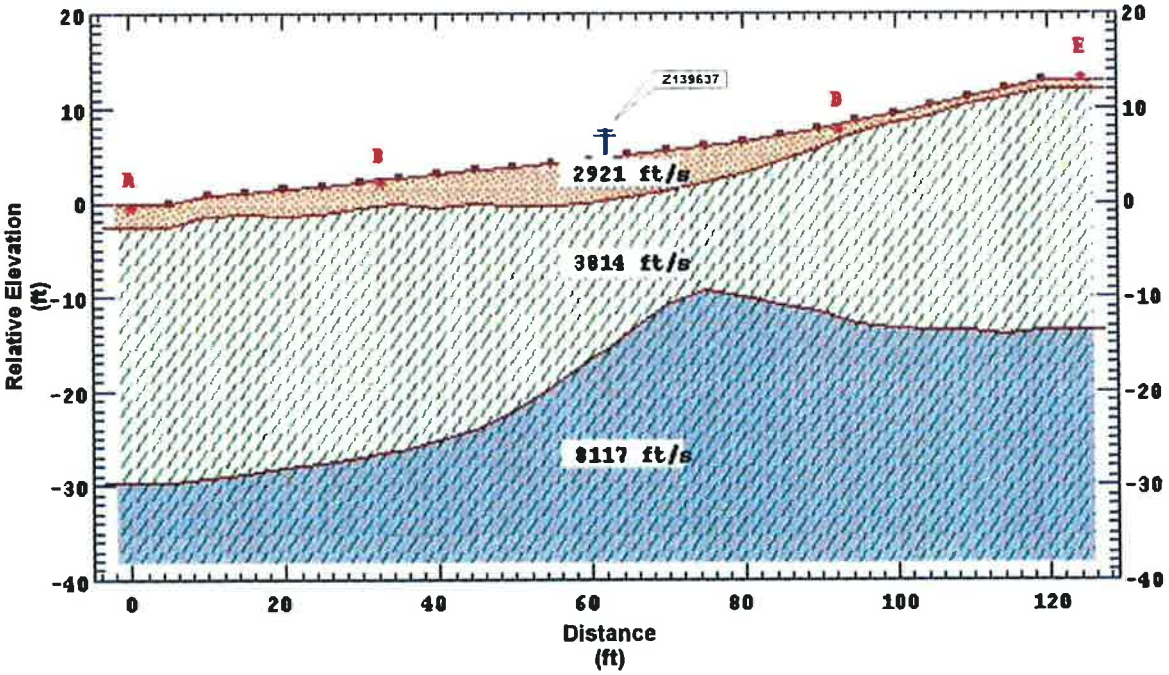
SOUTHWEST GEOPHYSICS INC.

Figure 3

SL-1



SL-2



SEISMIC PROFILES SL-1 AND SL-2	SDG&E TL-6910 San Diego County, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 111204 / Date: 05/11	Figure 4a

Geosyntec
consultants

URS, 2011

Project: TL 13826 Miguel to Proctor Valley
Project Location: San Diego, CA
Project Number: 27661044.10000

Key to Logs

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Blows per foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Density, pcf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number. Unnumbered sample indicates no sample recovery.

5 **Blows per foot:** Number of blows required to advance driven sampler 12 inches beyond first 6-inch interval, or distance noted, using a 140-lb hammer with a 30-inch drop.

6 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

7 **Material Description:** Description of material encountered; may include relative density/consistency, moisture, color, particle size; texture, weathering, and strength of formation material.

8 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

9 **Dry Unit Weight:** Dry density of soil sample measured in laboratory, expressed in pounds per cubic feer (pcf).

10 **Remarks and Other Tests:** Comments and observations regarding drilling or sampling made by driller or field personnel.

SA	Sieve Analysis, %<#200 sieve
WA	Wash Analysis, %<#200 sieve
LL	Liquid Limit, from Atterberg limits test, %
PI	Plasticity Index (LL-PL), %
UC	Unconfined Compression test
CORR	Corrosivity test

TYPICAL MATERIAL GRAPHIC SYMBOLS


Clayey SAND to sandy CLAY (SC/CL)


Silty, clayey SAND (SC-SM)


Lean CLAY (CL)


Fat CLAY (CH)


Sandy silty CLAY (CH-CL)


CLAYSTONE

TYPICAL SAMPLER GRAPHIC SYMBOLS

2.5" ID sampler

Standard Penetration sample

OTHER GRAPHIC SYMBOLS


First water encountered at time of drilling and sampling (ATD)


Static water level measured in boring or well at specified time after drilling


Change in material properties within a lithologic stratum

Inferred contact between strata or gradational change in lithology

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure B-1

Project: TL 13826 Miguel to Proctor Valley
Project Location: San Diego, CA
Project Number: 27661044.10000

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled	**01/14/11**	Logged By	**K. Shaner**	Checked By	**M. Hatch**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**7 inches**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**ATC**	Drilling Contractor	**Tri-County Drilling, Inc.**	Approximate Surface Elevation	**277 feet**
Water Level Depth (Feet)	**Not encountered**	Sampling Method(s)	**SPT/2.5" ID**	Hammer Data	**140 lbs/30-inch drop**
Borehole Backfill	**Soil cuttings**	Location	**See Site Plan**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Density, pcf	REMARKS AND OTHER TESTS
	0					ALLUVIUM Medium stiff to stiff, moist, dark yellowish brown, sandy lean CLAY (CL)			
			1-1	9					
	5		1-2	21		RESIDUAL SOIL Medium stiff, moist, yellowish brown, silty fat CLAY (CH), low plasticity, trace caliche, blocky structure	30		WA(83), LL(64), PI(41)
270									
	10		1-3	40		SWEETWATER FORMATION Dense, moist, yellowish brown, sandy CLAY (CL) with oxidized staining, cemented seams, some gypsum lenses	16		SA(67)
	15		1-4	80		Becomes very dense, sandy cemented claystone, yellowish brown with gray seams, manganese staining	17		
260									
	20		1-5	49					
	25		1-6	65			20		
250									
	30		1-7	48		Very dense, yellowish brown, cemented CLAYSTONE with manganese staining, blocky structure			SA(84)
	35		1-8	85		Increase silt content	17		
240									
	40		1-9	71					
						Bottom of boring at 41.5 feet			
	45								

Report: GEO_10_SNA; File: 27661044.GPJ; 3/17/2011 B-1

URS

Figure B-2

Project: TL 13826 Miguel to Proctor Valley
Project Location: San Diego, CA
Project Number: 27661044.10000

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled	**01/14/11**	Logged By	**K. Shaner**	Checked By	**M. Hatch**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**7 inches**	Total Depth of Borehole	**31.5 feet**
Drill Rig Type	**ATC**	Drilling Contractor	**Tri-County Drilling, Inc.**	Approximate Surface Elevation	**481 feet**
Water Level Depth (Feet)	**Not encountered**	Sampling Method(s)	**SPT/2.5" ID**	Hammer Data	**140 lbs/30-inch drop**
Borehole Backfill	**Soil cuttings**	Location	**See Site Plan**		

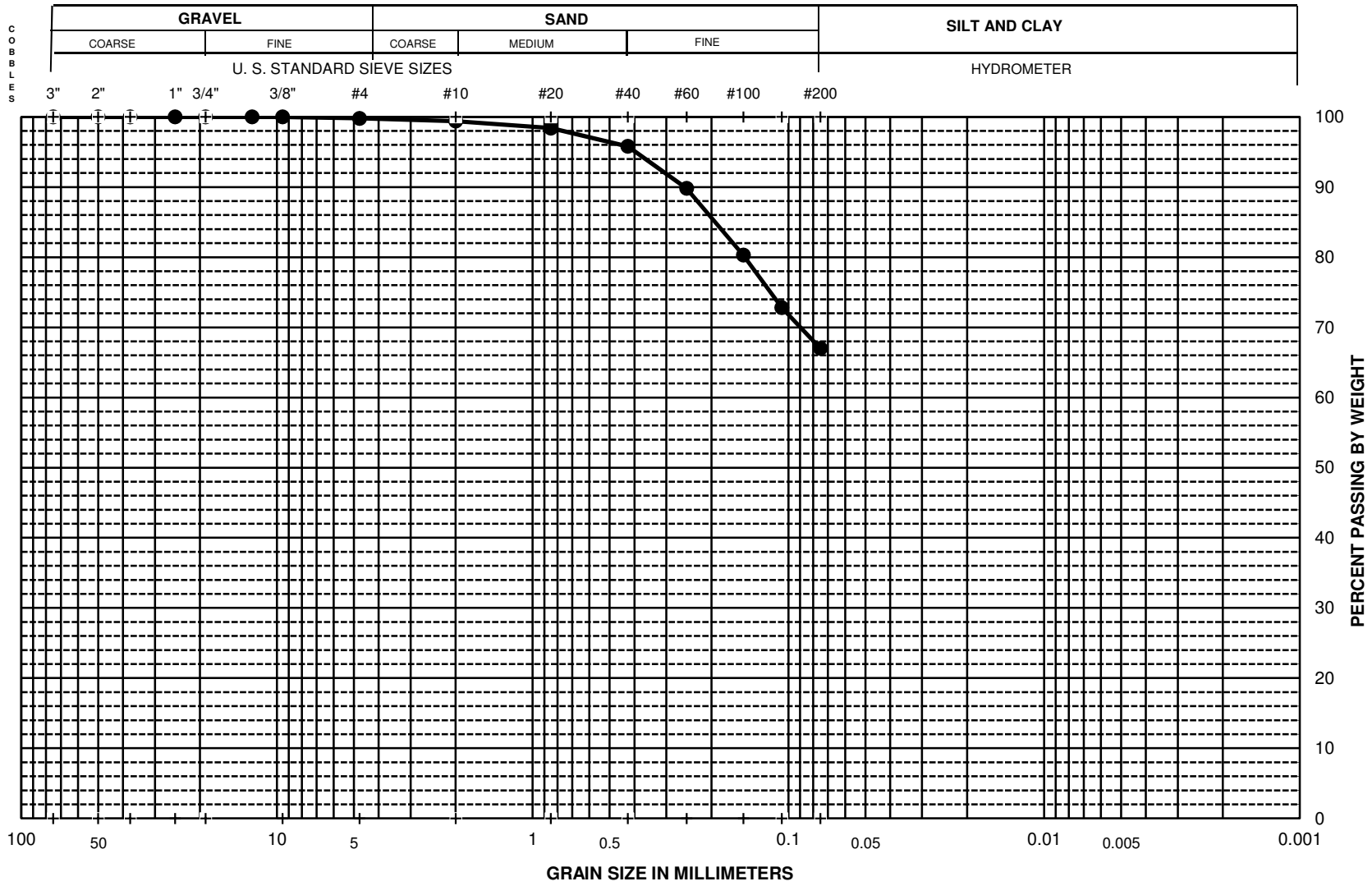
Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Density, pcf	REMARKS AND OTHER TESTS
480	0					TOPSOIL Dense, moist, dark brown, clayey SAND to sandy CLAY (SC/CL), trace sand			
			2-1	15		COLLUVIUM Medium dense, moist, yellowish to reddish brown, silty, clayey SAND (SM-SC), some caliche	19		
	5		2-2	27		Stiff, moist, reddish brown, sandy, silty CLAY (CH-CL)			SA(76), CORR
470	10		1-3	25			20		WA(63)
						SWEETWATER FORMATION Hard, moist, grayish brown, sandy, silty CLAYSTONE with manganese staining			
	15		1-4	27					LL(46), PI(23)
460	20		1-5	57		Becomes very hard			UC
	25		1-6	13		Becomes very stoff, increased silt and sand content	30		
450	30		1-7	50/6"		Becomes very hard			
						Bottom of boring at 31.5 feet			
440	35								
	40								
	45								

Report: GEO_10_SNA; File: 27661044.GPJ; 3/17/2011 B-2

URS

Figure B-3

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	99.8
#10	2.00	99.4
#20	0.850	98.4
#40	0.425	95.8
#60	0.250	89.8
#100	0.150	80.3
#140	0.106	72.8
#200	0.075	67.0

Hydrometer Analysis

% Cobbles	XX
% Gravel	0.2
% Sand	32.8
% Fines	67.0

D_{85}	0.193
D_{60}	#N/A
D_{50}	#N/A
D_{30}	#N/A
D_{15}	#N/A
D_{10}	#N/A
C_u	XXX
C_c	XXX

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
B1	3	10.0	●	16.1	NA	NA	NA	**Very pale brown sandy Clay (CL)**

PROJECT NAME: **TL 13826 Miguel to Proctor Valley**

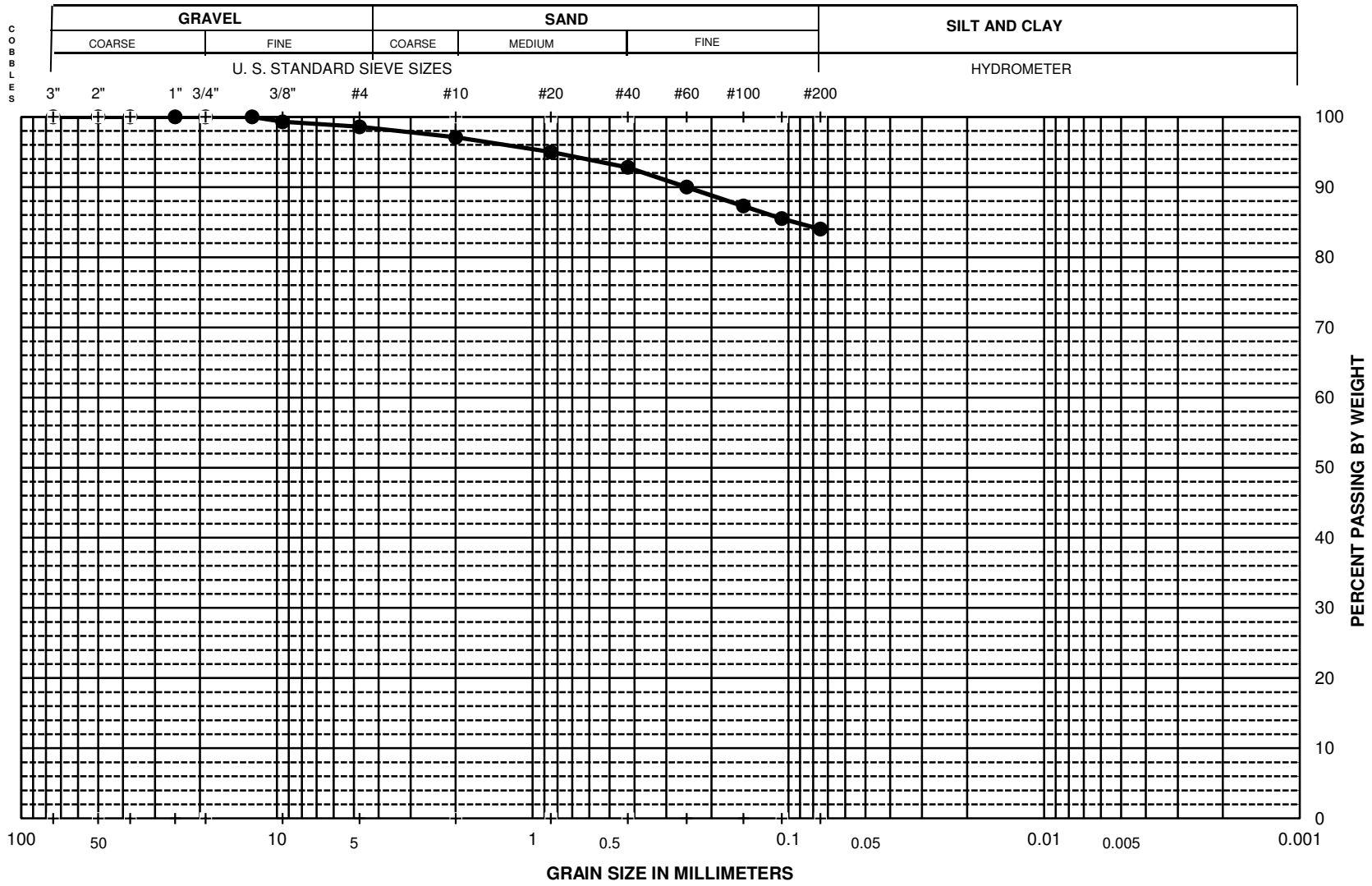
PROJECT NUMBER: **27661044.10000**

PARTICLE-SIZE DISTRIBUTION CURVES **Figure C-1**

Sieve Miguel B01 010

URS

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	99.3
#4	4.75	98.6
#10	2.00	97.1
#20	0.850	95.0
#40	0.425	92.8
#60	0.250	90.0
#100	0.150	87.3
#140	0.106	85.5
#200	0.075	84.0

Hydrometer Analysis

% Cobbles	XX
% Gravel	1.4
% Sand	14.6
% Fines	84.0

D_{85}	0.094
D_{60}	#N/A
D_{50}	#N/A
D_{30}	#N/A
D_{15}	#N/A
D_{10}	#N/A
C_u	XXX
C_c	XXX

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
B1	7	30.0	●	NA	NA	NA	NA	**Light yellowish brown Clay with sand (CH)**

PROJECT NAME: **TL 13826 Miguel to Proctor Valley**

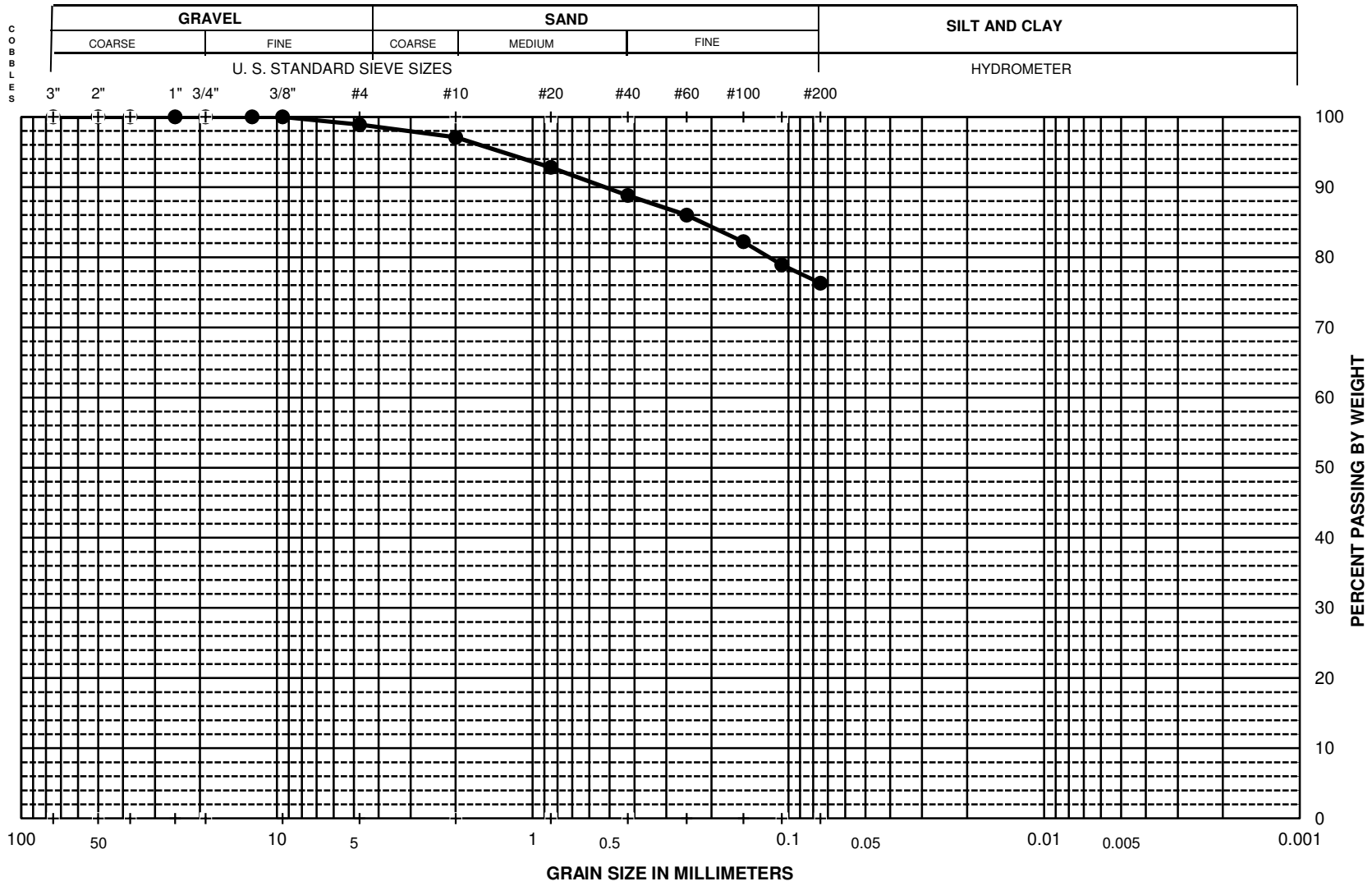
PROJECT NUMBER: **27661044.10000**

PARTICLE-SIZE DISTRIBUTION CURVES **Figure C-2**

URS

Sieve Miguel B01 030

UNIFIED SOIL CLASSIFICATION



Sieve No.	Dia. mm	% Finer
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.00	100.0
1/2"	12.50	100.0
3/8"	9.50	100.0
#4	4.75	98.9
#10	2.00	97.1
#20	0.850	92.8
#40	0.425	88.8
#60	0.250	86.0
#100	0.150	82.2
#140	0.106	78.9
#200	0.075	76.3

Hydrometer Analysis

% Cobbles	XX
% Gravel	1.1
% Sand	22.6
% Fines	76.3

D_{85}	0.219
D_{60}	#N/A
D_{50}	#N/A
D_{30}	#N/A
D_{15}	#N/A
D_{10}	#N/A
C_u	XXX
C_c	XXX

Boring No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% 2 μm	Description and Classification
B2	2	5.0	●	NA	NA	NA	NA	**Pale brown Clay with sand (CH)**

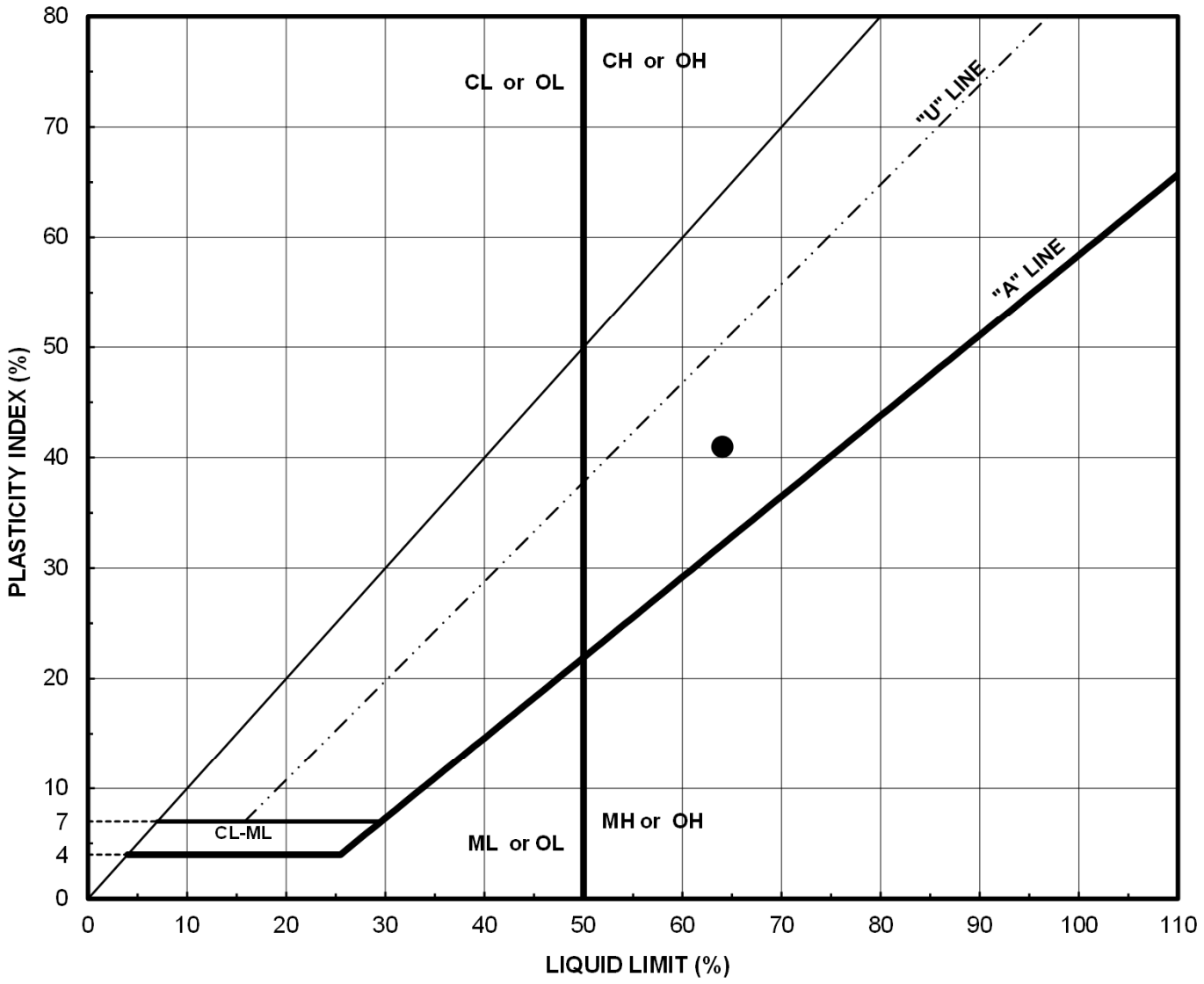
PROJECT NAME: **TL 13826 Miguel to Proctor Valley**

PROJECT NUMBER: **27661044.10000**

PARTICLE-SIZE DISTRIBUTION CURVES **Figure C-3**

Sieve Miguel B02 005

URS



BORING No.	SAMPLE No.	DEPTH (ft.)	WATER CONTENT (%)	LL	PI	DESCRIPTION / CLASSIFICATION
B1	2	5.0	29.6	64	41	Yellowish brown Clay with sand (CH)

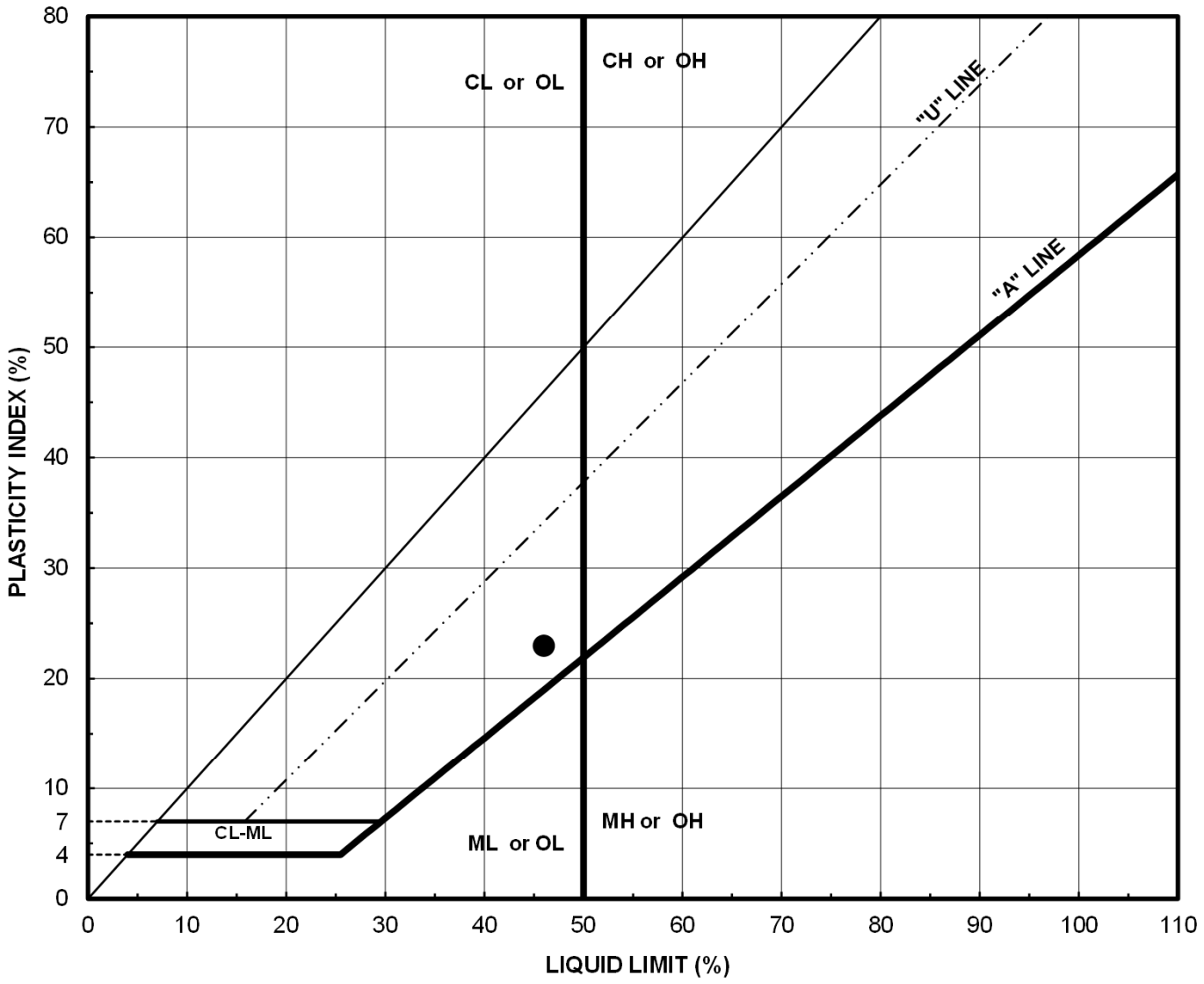
Project Name: TL 13826 Miguel to Proctor Valley

Project Number: 27661044.10000

PLASTICITY CHART

Figure C-4

URS



BORING No.	SAMPLE No.	DEPTH (ft.)	WATER CONTENT (%)	LL (%)	PI (%)	DESCRIPTION / CLASSIFICATION
B2	4	15.0	NA	46	23	Yellowish red Clay (CL)

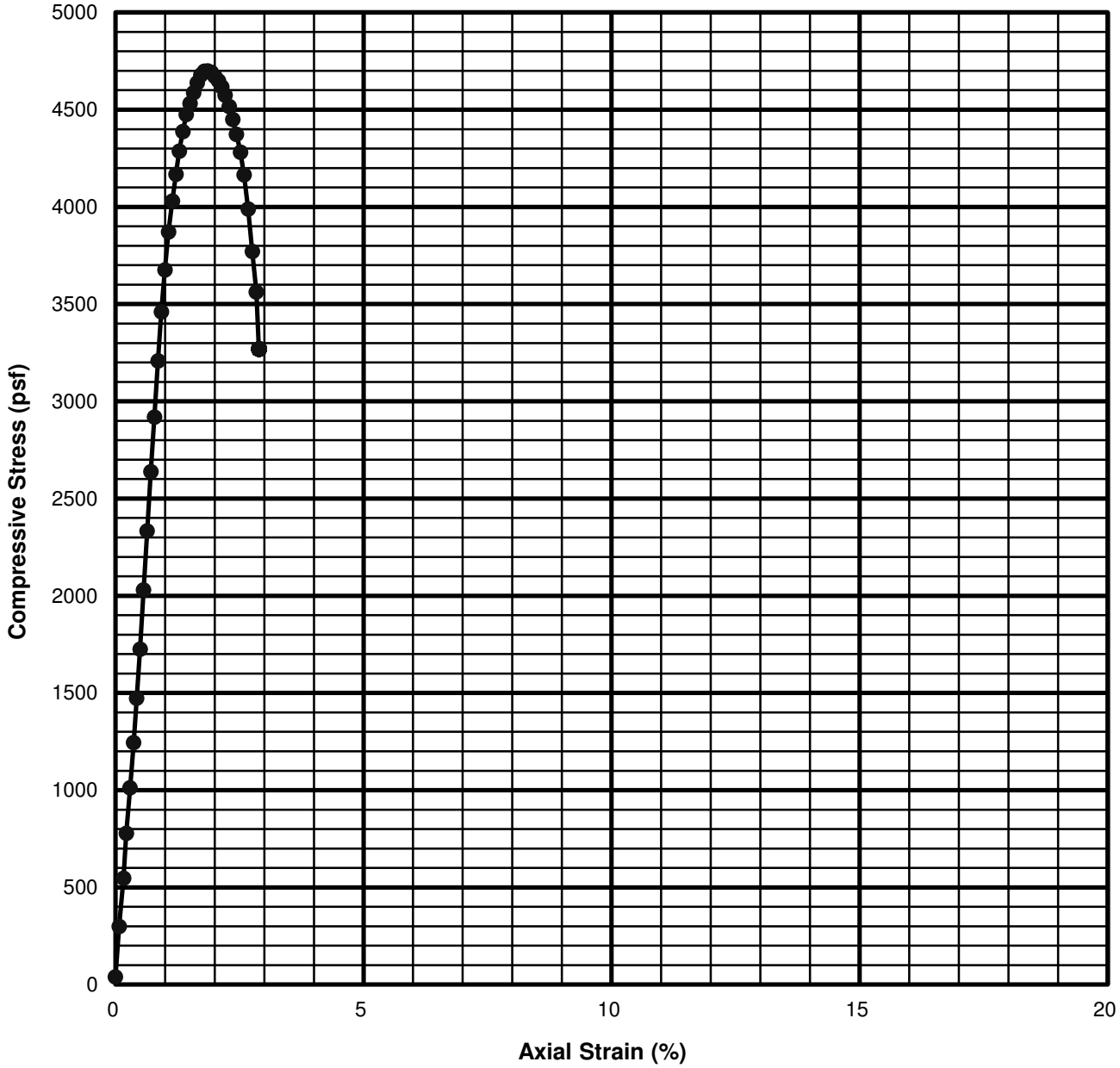
Project Name: TL 13826 Miguel to Proctor Valley

Project Number: 27661044.10000

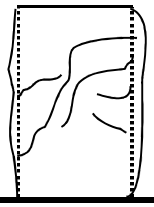
PLASTICITY CHART

Figure C-5

URS



Failure Sketch



Water Content (%)	Length (in)	Diameter (in)	Wet Density (pcf)	Degree of Saturation (%)	Peak Stress (psf)
21.5	6.018	2.403	121.8	80.0	4699.6

Project Name:	**TL 13826 Miguel to Proctor Valley**				
Project Number:	**27661044.10000**				
Boring Number:	**B2**	**Sample No.:**	**5**	**Depth (ft):**	**20**
Description and/or Classification:	**Reddish brown Clay (CH)**				

UNCONFINED COMPRESSION TEST
ASTM D2166

Figure C-6

CORROSIVITY TEST ANALYSIS

Project Number: 27661044
Project Name: TL 13826 Miguel to Proctor
Project Engineer: KAS

Boring No.: B2
Sample No.: 2
Depth (ft): 5.0

Initial Visual Classification Symbol: CH

State of Specimen before Processing

X	Passing soil through #8 sieve
X	Moist State
	Air Dried
	Oven Dried at 60 C

Set-Up Water Content	Minus No. 8 or ( )
Container No.	s25
Mass Container + Wet Soil (g), M1	117.74
Mass Container + Dry Soil (g), M2	114.49
Mass Container (g), M3	99
Water Content, w (%)	20.98

Resistivity Test: California Test Method 643

Mininum Resistence value: 360 ohm-cm

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Weight of Soil in bowl (g):	318.93	318.15	325.32	331.25	
Weight of mixing bowl (g):	151.04	151.04	151.04	151.04	
Wet weight of Soil (g):	167.89	167.11	174.28	180.21	
Amount of water added (ml):	0	10	10	10	
Soil Box + Wet Soil (g), M5	239.99	262.47	270.64	272.56	
Weight of Soil Box (g), M6	130.40	130.40	130.40	130.40	
Wt. of Wet Soil for test (g), M7	109.59	132.07	140.24	142.16	
Volume of Soil Box (cm^3)	79.2	79.2	79.2	79.2	79.2
Est. Saturation (%)	41.8	70.2	86.7	94.6	
Resistivity Reading (ohm)	1,200	480	370	360	
Resistence (ohm-cm)	1,200	480	370	360	

Resistence = Soil Box Constant x Reading

pH Test :

50g wet weight of soil mixed with 50 mL of de-ionized water.

pH of slurry: 8.10
Temperature : 21.8 Celsius

Sulfate Content:

100g of soil mixed with 300 mL of de-ionized water.

SO_4 (ppm) : 42

recorded mg of SO_4 in sample, x, = 14 mg

soil / water ratio, r, = 3

number of dilutions to obtain above value, d, = _____ = _____ mg/ L = ppm

Dilution Equation, d > 0; $SO_4 = ((x / 80)* (r\ 80 * 2^{d} - r\ 80 * 2^{(d-1)})) + r\ 80 * 2^{(d-1)}$

Chloride Content:

100g of soil mixed with 300 mL of de-ionized water.

Cl^- (ppm) : 345

mg/L of Cl^- = ((A-B) x N x 35453) x 3

A = mL of $AgNO_3$ A= 23

B = 23 mL of the blank

N = 0.0493 N, normality of the titrant

Cl^- (mg/L) = A * 5 * 3

Tested By: TJO Date: 1/28/2011 Checked By: TJO

Figure C-7

URS, 2005

Table A-1
Summary of Seismic Refraction and Augerability
Otay Mesa Power Purchasing Agreement

Structure No.	Apparent Compression Wave Velocity (feet/second)	Apparent Depth (feet)	Corresponding Boring	Geologic Unit [a]	Augerability [a,b]
00	1200	0 to 10		RS/Qsw	e-m
	4550	10 to 25		Wx Tsw	e-m
	6300+	25+		Tsw	r
01	1175	0 to 8		RS/Qsw	e-m
	4600	8 to 19		Wx Tsw	e-m
	6000+	19+		Tsw	r
02	1200	0 to 9		RS/Qsw	e-m
	4050	9 to 24		Wx Tsw	e-m
	6000	24+		Tsw	r
10	1200	0 to 12.5		Wx To	e-m
	2700	12.5 to 26		To	e-m
	3650	26+		Tsw	e-m
20	1250	0 to 3.5	B-14	RS	e-m
	2400	3.5 to 10		Wx To	e-m
	3150	10+		To	e-m
40	1600	0 to 3		RS	e-m
	2800	3 to 20		Wx To	e-m
	4000	20+		To	e-m
60	1200	0 to 10	B-13	RS/Hwx Tsw	e-m
	5100	10+		Wx Tsw	d
80	1500	0 to 5		RS	e-m
	2400	5 to 17		Wx To	e-m
	3500	17+		To	e-m
100	1200	0 to 12		RS/Hwx To	e-m
	3500	12 to 25		Wx To	e-m
	5400	25+		To	d
120	1500	0 to 5.5		RS	e-m
	3400	5.5 to 15		Wx To	e-m
	4700	15+		To	e-m
150	1350	0 to 17		RS/HwxTsd	e-m
	3000	17+		Tsd	e-m

Table A-1 (continued)
Summary of Seismic Refraction and Augerability
Otay Mesa Power Purchasing Agreement

Structure No.	Apparent Compression Wave Velocity (feet/second)	Apparent Depth (feet)	Corresponding Boring	Geologic Unit	Augerability [a,b]
170	1500	0 to 4	B-12	RS	e-m
	3300	4 to 14		Wx Ql	e-m
	4600	14+		Ql	e-m
180	1200	0 to 7		RS	e-m
	1700	7 to 20		Wx Tsd	e-m
	3300	20+		Tsd	e-m
210	2500	0 to 4		RS	e-m
	4650	4 to 18		Wx Ql	e-m
	7100	18+		Ql	d
230	1600	0 to 4		Qsw	e-m
	3300	4 to 15		Wx Tsd	e-m
	5350	15+		Tsd	d
250	1200	0 to 3		Fill	e-m
	3200	3 to 23		Wx Ql	e-m
	6300	23+		Ql	d
260	2200	0 to 5	B-11	Fill	e-m
	4800	5+		Ql	e-m
270	1850	0 to 4	B-10	RS	e-m
	3450	4 to 15		Wx Ql	e-m
	4700	15+		Ql	e-m
300	1200	0 to 3	B-9	Qsw	e-m
	2050	3 to 10		Wx Tsd	e-m
	3100	10+		Tsd	e-m
310	1300	0 to 5	B-8	Qsw	e-m
	3000	5 to 16		Wx Tsd	e-m
	6000	16+		Tsd	d
340	1400	0 to 3		Fill	e-m
	3600	3 to 24		Wx Qbp	e-m
	7400	24+		Qbp	d

Table A-1 (continued)
Summary of Seismic Refraction and Augerability
Otay Mesa Power Purchasing Agreement

Structure No.	Apparent Compression Wave Velocity (feet/second)	Apparent Depth (feet)	Corresponding Boring	Geologic Unit	Augerability [a,b]
360	1300	0 to 6	B-6	RS	e-m
	2700	6 to 31		Wx Qbp	e-m
	5400	31+		Qbp	d
370	1200	0 to 6	B-5	RS/Wx Qbp	e-m
	2300	6 to 14		Wx Qbp	e-m
	3800	14+		Qbp	e-m
390	1650	0 to 8	B-7	Qal / Qbp	e-m
	4950	8+		Qbp	e-m
410	1150	0 to 15		RS/Qbp	e-m
	2600	15 to 23		Wx Qbp	e-m
	3900	23+		Qbp	e-m
430	1300	0 to 30	B-3	Fill/Qbp	e-m
	3600	30+		Qbp	e-m
440	1800	0 to 22		Qal / Qbp	e-m
	3750	22+		Qbp	e-m
450	1125	0 to 4	B-15	Qal	e-m
	1650	4 to 30		Qbp	e-m
	3400	30+		Qbp	e-m
460	1175	0 to 19		Qal / Qbp	e-m
	2600	19 to 29		Qbp	e-m
	4600	29+		Qbp	e-m
470	1200	0 to 9	B-1	Fill / Wx Qbp	e-m
	2050	9 to 20		Wx Qbp	e-m
	4300	20+		Qbp	e-m
480	1450	0 to 7	B-2	RS/Qbp	e-m
	2500	7+		Qbp	e-m

Note:

a. RS = residual soil Hwx = highly weathered To = Otay Formation Qbp = Bay Point Formation Qsw = Slopewash
Wx = weathered Tsw = Sweetwater Formation Tsd = San Diego Formation Qal = Alluvium Ql = Lindavista Formation

b. Augerability Classifications:
e-m: Easy to moderate
d: Difficult
r: Refusal

c. See Section 5.2 for further discussion on augerability.

Project: OMPPA
Project Location: San Diego County, CA
Project Number: 27664035.00010

Log of Boring B-19

Sheet 1 of 1

Date(s) Drilled	**12-20-04**	Logged By	**A. Greene**	Checked By	**J. Nevius**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8"**	Total Depth of Borehole	**19.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**F&C Drilling**	Approximate Surface Elevation	**308' MSL**
Water Level Depth (Feet)	**None encountered**	Sampling Method(s)	**ModCal/SPT**	Hammer Data	**140 lbs/30" drop**
Borehole Backfill	**Soil cuttings**	Location	**STR 00**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Density, pcf	REMARKS AND OTHER TESTS
	0					RESIDUAL SOIL/SLOPEWASH Very stiff to hard, moist, grayish brown, fat CLAY with trace fine sand and gravel (CH)			
305			19-1	30			22		LL(73), PI(45)
	5		19-2	25		Becomes light brown with localized carbonate concretion. Scattered gravels 5'-7'			
300			19-3	37			19		LL(66), PI(40)
	10		19-4	59		SWEETWATER FORMATION Hard, moist, light brown to pale brown mottled, lean CLAY with trace fine sand (CL), slight fractured texture	22	101	
295									
	15		19-5	49					CORR
290			19-6	55					
	20					Bottom of boring at 19.5 feet			
285									
	25								
280									
	30								

Report: GEO_10_SNA; File: 27664035.GPJ; 2/22/2011 B-19

URS

Figure A-5

WCC, 1981

TABLE 2.3

SUMMARY OF LABORATORY TESTING RESULTS

Sample No.	Tower Site	Depth (ft.)	Moisture Content(%)	Dry Density (lb/ft^3)	Liquid Limit(%)	Plasticity Index(%)	% Passing #200 Sieve	USCS Symbol	Geologic* Formation	Direct Shear Test Results $\phi°$	Direct Shear Test Results c(psf)	Blow Count/ft
6-1-4	6	4.0- 4.5	22	100	64	46	60	CH	Tsw	5	1,080	34
6-2-3	6	8.5- 9.0	16	101				CH	Tsw	22	670	26
6-2-4	6	9.0- 9.5	14	109	35	18	45	GC-SC	Tsw			26
6-3-3	6	15.5-16.0	19	104				CH	Tsw	17	620	63
6-3-4	6	16.0-16.5	14	112	52	34	65	CH	Tsw			63
15-1-4	15	3.0- 3.5	22	103	62	46	75	CH	Residual clay/Tot			23
15-2-4	15	9.0- 9.5	16	107				CH	Residual clay/Tot			41
15-3-3	15	14.0-14.5	12	102	non-plastic		25	SM	Tot			50/4"
15-3-4	15	14.5-15.0	10	106				SM	Tot	51	0	50/4"
22-1-3	22	5.5- 6.0	16	85	47	18	58	ML-CL	Tot			72
22-1-4	22	6.0- 6.5	24	94				ML-CL	Tot	36	1,280	72
22-2-3	22	10.0-10.5	13	97			28	SM	Tot			50/4"
22-2-4	22	10.5-11.0	14	107	non-plastic			SM	Tot	45	500	50/4"
25-1	25	11.0-15.0	6				11	SC	Tsw			
31-1	31	8.0-10.0	3				5	SM-SP	Qal			
32-1	32	4.0- 7.0	5				27	GC-SC	Qt			
33-2	33	13.0-15.0	16		54	38	83	CH	Tsw/Qls			
33-3	33	38.0-40.0	37		96	66	92	CH	Tsw			
37-1	37	3.0- 6.0	8				37	GC-SC	Tsw_c			
48-2	48	12.0-15.0	13				45	GC-SC	Tsw_c			

* See Section 3.1

TABLE 3.1

SUMMARY OF TOWER SITE
SOIL AND ROCK MATERIAL
AND ANTICIPATED FOUNDATION TYPE

Tower Site No.	Subsurface Material Category	Expected Foundation Type	Notes
4	Tsw	DP	(a) (b) (h) (i)
5	Tot	DP	
6(A)	Tsw	DP	(a) (b) (h)
7	Tsw	DP	(a)
8	Tsw	DP	(a)
9	Tot	DP	(a)
10	Tot	DP	(a) (b)
11	Tot	DP	(a)
12	Tot	DP	(a)
13	Tot	DP	(a) (b) (d)
14	Tot	DP	(a) (b)
15(A)	Tot	DP	(a) (b)
16	Tot	DP	(b)
17	Tot	DP	
18	Tot	DP	(a)
19	Tot	DP	
20	Tot	DP	(a)
21	Tot	DP	(a)
22(A)	Tot	DP	(a) (b)
23	Tot	DP	(a) (h)

TABLE 3.1 (cont'd)

SUMMARY OF TOWER SITE
SOIL AND ROCK MATERIAL
AND ANTICIPATED FOUNDATION TYPE

Tower Site No.	Subsurface Material Category	Expected Foundation Type	Notes
24	Tot	DP	(a)
25(A)	Tsw	DP	(b) (h)
26	Tsw	DP	(a) (b) (h) (i)
27	Tsw	DP	(a) (b) (h) (i)
28	Tsw	DP	(a) (b)
29	Tsw	DP	(b) (h) (i)
30(A)	Qt	DP	(b) (e)
31	Qal	DP	(a) (b) (c) (d) (e)
32	Qt	DP	(b) (d) (e)
33	Tsw/Qls	DP	(b) (g) (h) (i)
34	Tsw_c	DP	(a) (b) (e)
35	Tsw_c	DP	(b) (e)
36	Tsw_c	DP	(b) (e) (i)
37	Tsw_c	DP	(e)
38	Tsw_c	DP	(a) (b) (e)
39	Tsw_c	DP	(a) (b) (e)
40(A)	Jsp	RA	(a) (b) (h) (i)
41	Jsp	RA	(a) (b) (f)
42	Jsp	RA	(a) (b) (h)
43	Jsp	RA	(a) (b) (h)

TABLE 3.1 (cont'd)

SUMMARY OF TOWER SITE
SOIL AND ROCK MATERIAL
AND ANTICIPATED FOUNDATION TYPE

Tower Site No.	Subsurface Material Category	Expected Foundation Type	Notes
44	Jsp	RA	(a) (b) (h) (i)
45	Jsp	RA	(a) (b) (h) (i)
46	Jsp	RA	(a) (b) (f)
47	Tsw_c	DP	(a) (b) (e)
48	Tsw_c	DP	(a) (b) (e)

NOTES FOR TABLE 3.1

(a) Colluvium, topsoils, loose plowed soils or loose boulders, generally less than 3 feet thick, present over formation soil/rock.

(b) Potential for erosion.

(c) In alluvial fan or valley, next to a drainage channel; potential for flooding.

(d) Potential for seasonal perched or high water tables.

(e) Subsurface soils contain cobbles and/or boulder-size material.

(f) Some drilling may be possible; if so, use Jsp (soil) parameters.

(g) Site located on landslide.

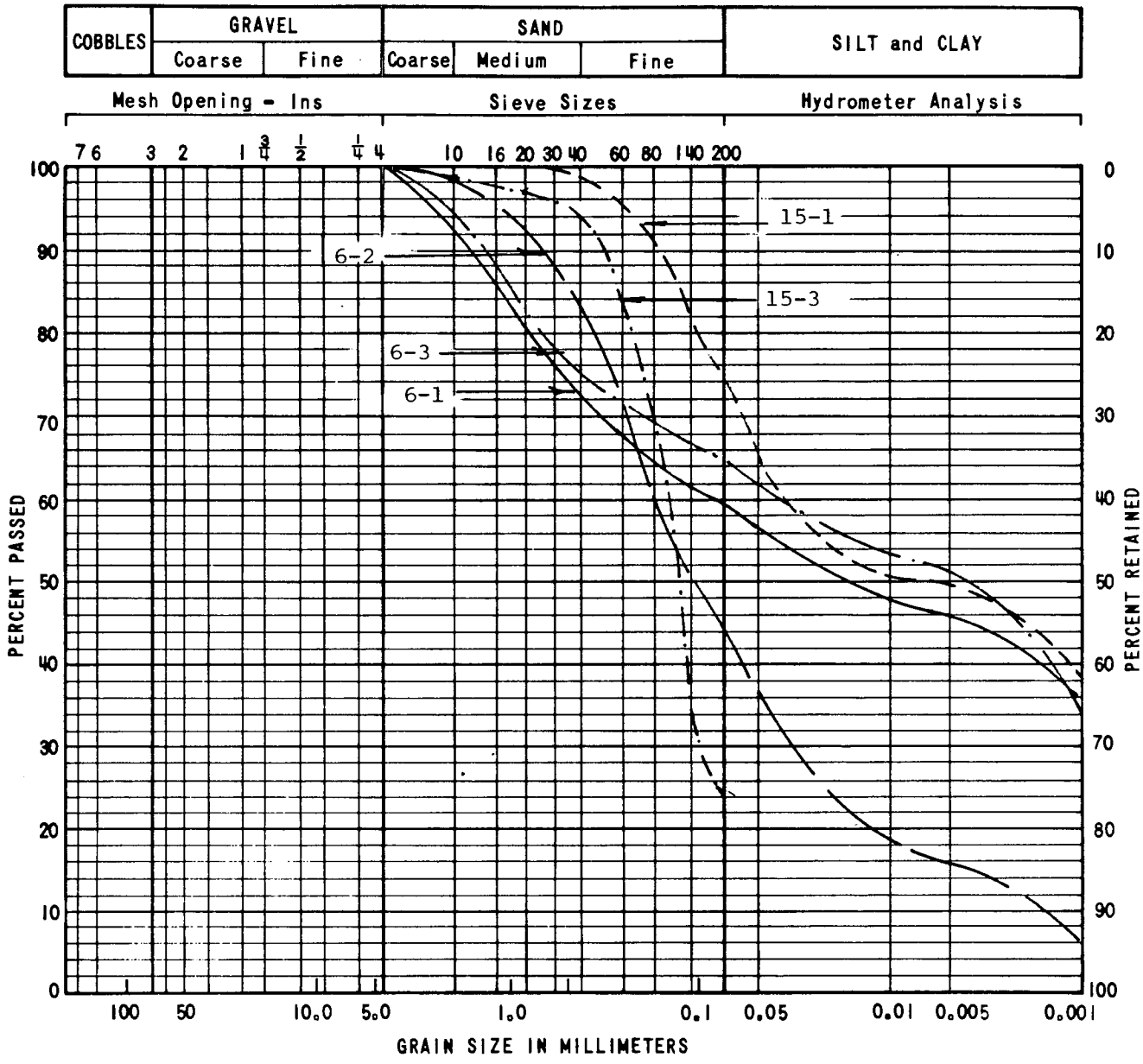
(h) Steep slopes (generally in excess of 15 degrees).

(i) Poor access.

(A) Angle Tower.

DP Drilled Pier.

RA Rock Anchor.



SAMPLE	CLASSIFICATION AND SYMBOL	*LL	*PI
6-1	Sandy clay (CH)	64	46
6-2	Clayey fine to coarse sand (SC)	35	18
6-3	Sandy clay (CH)	52	34
15-1	Sandy clay (CH)	62	46
15-3	Silty fine to medium sand (SM)	non	plastic

*LL - Liquid Limit
*PI - Plasticity Index

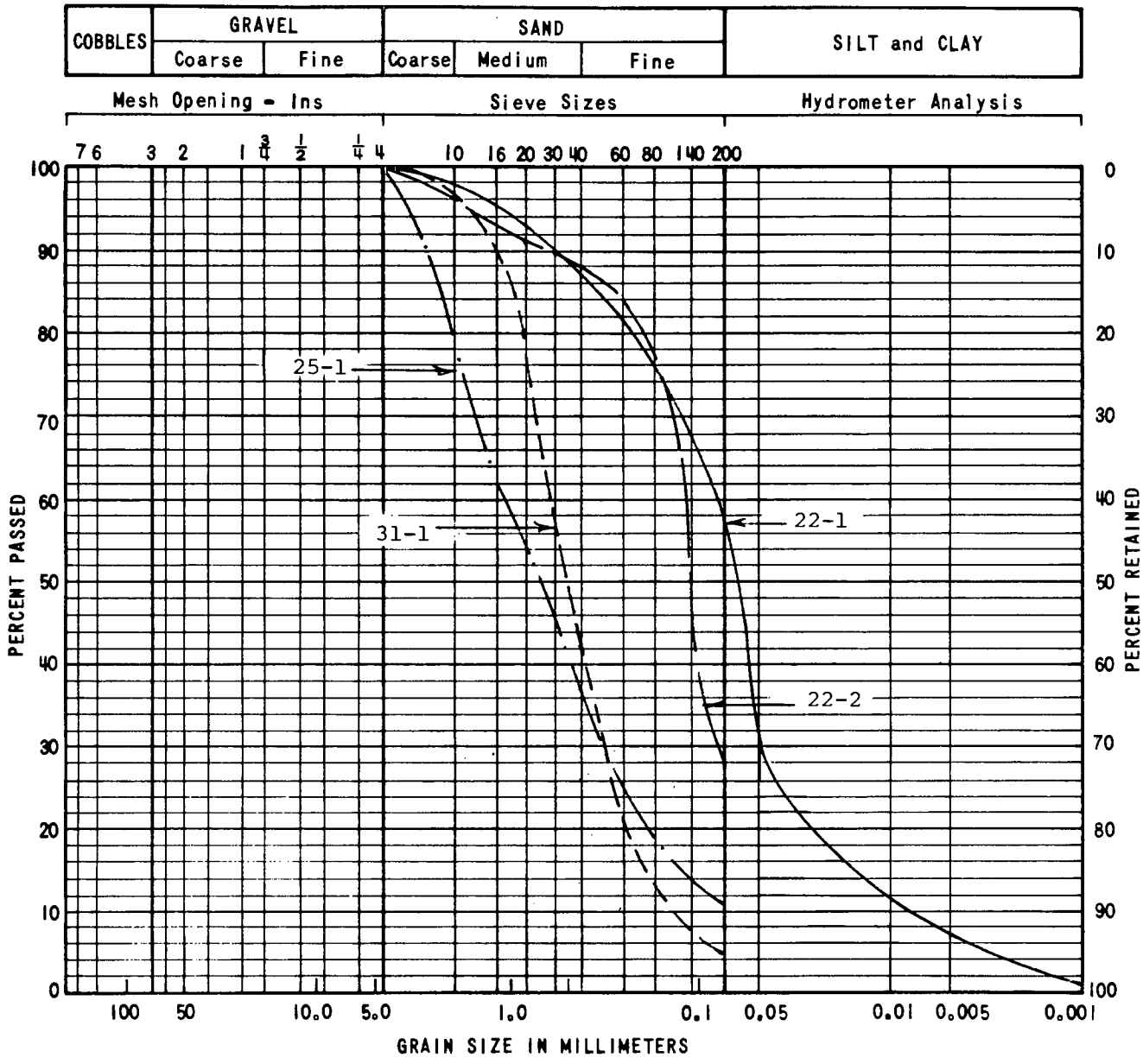
GRAIN SIZE DISTRIBUTION CURVES

MIGUEL - MEXICO 230 KV TRANSMISSION LINE

DRAWN BY: ch	CHECKED BY:	PROJECT NO: 51157S-SI03	DATE: 10-16-81	FIGURE NO: A-1

WOODWARD-CLYDE CONSULTANTS

WCC-GS-76



SAMPLE	CLASSIFICATION AND SYMBOL	*LL	*PI
22-1	Sandy silt to sandy clay (ML-CL)	47	18
22-2	Silty sand (SM)	non	plastic
25-1	Clayey sand (SC)	-	-
31-1	Silty fine to medium sand (SM-SP)	-	-

*LL - Liquid Limit
*PI - Plasticity Index

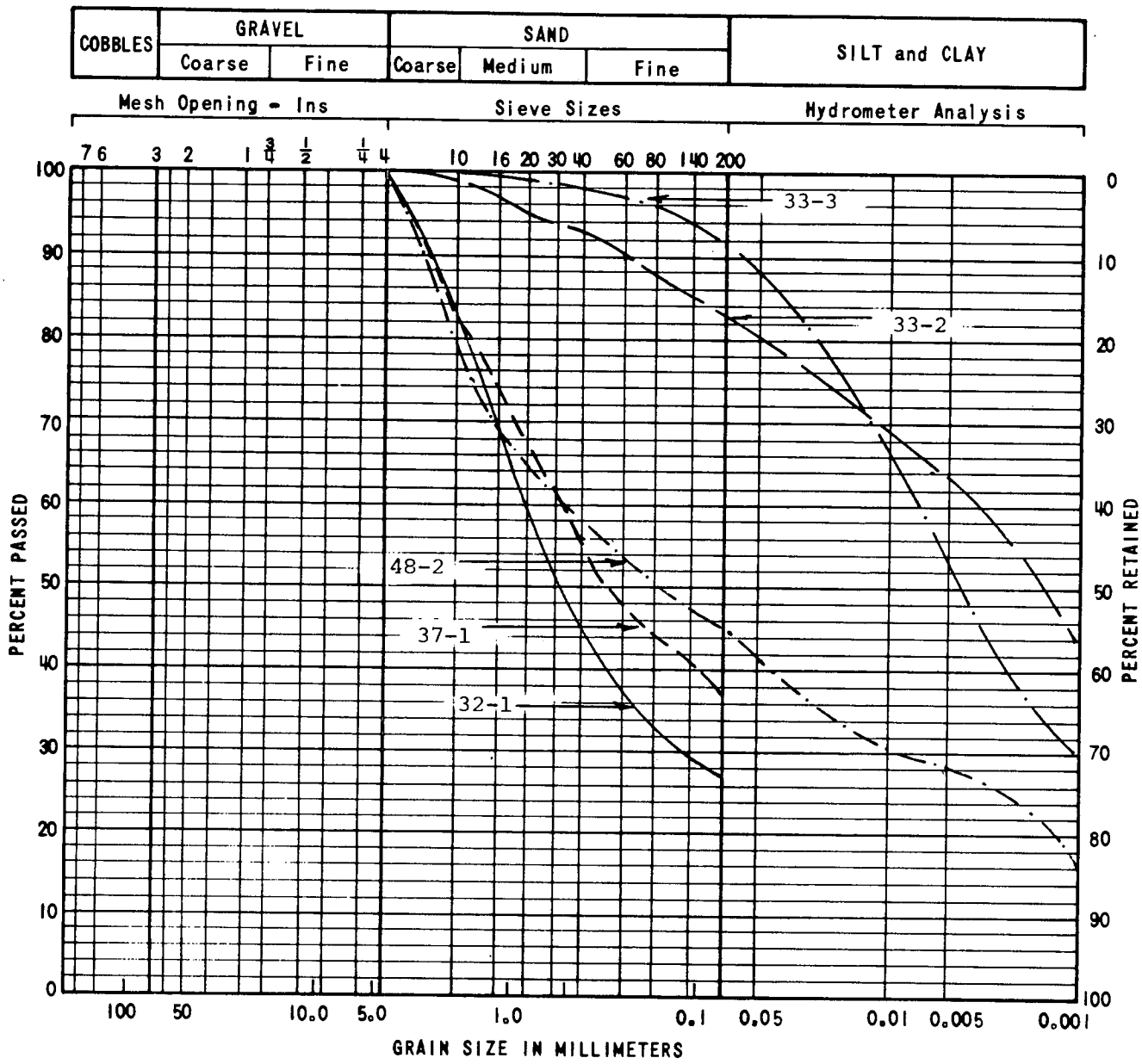
GRAIN SIZE DISTRIBUTION CURVES

MIGUEL - MEXICO 230 KV TRANSMISSION LINE

DRAWN BY: ch	CHECKED BY:	PROJECT NO: 51157S-SIO3	DATE: 10-16-81	FIGURE NO: A-2

WOODWARD-CLYDE CONSULTANTS

WCC-GS-76



SAMPLE	CLASSIFICATION AND SYMBOL	*LL	*PI
32-1	Clayey fine to coarse sand (SC)	-	-
33-2	Silty clay (CH)	54	38
33-3	Silty clay (CH) - Slip plane	96	66
37-1	Clayey fine to coarse sand (SC)	-	-
48-2	Clayey fine to coarse sand (SC)	-	-

*LL - Liquid Limit
*PI - Plasticity Index

GRAIN SIZE DISTRIBUTION CURVES

MIGUEL - MEXICO 230 KV TRANSMISSION LINE

DRAWN BY: ch	CHECKED BY:	PROJECT NO: 51157S-SIO3	DATE: 10-16-81	FIGURE NO: A-3

WOODWARD-CLYDE CONSULTANTS

WCC-GS-76

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 4 Station: 34+10.00

Tower Type: CPT Geophysical Survey: Yes ✓ No ____

Soil Description of Surface and Anticipated Subsurface Conditions: 1-3' silty clay (CH) topsoil overlying on Sweetwater Fm (claystone part of section). Dessication cracks -

Anticipated Groundwater Conditions: none within sensor limit of 5ft from surface

Site Slope Conditions: steep hillside, 30% northerly slope

Erosion Potential and Possible Erosion Control Techniques: low potential for gullying across site

Geologic Hazards: none

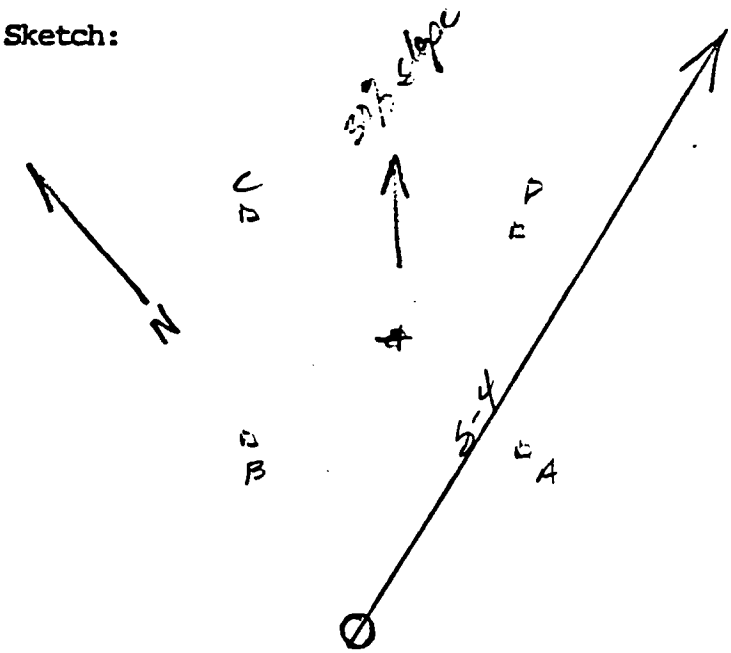
Boring Recommendation: none - site too steep

Access: walk from substation access road

Pictures: ____

Notes: ____

Sketch:

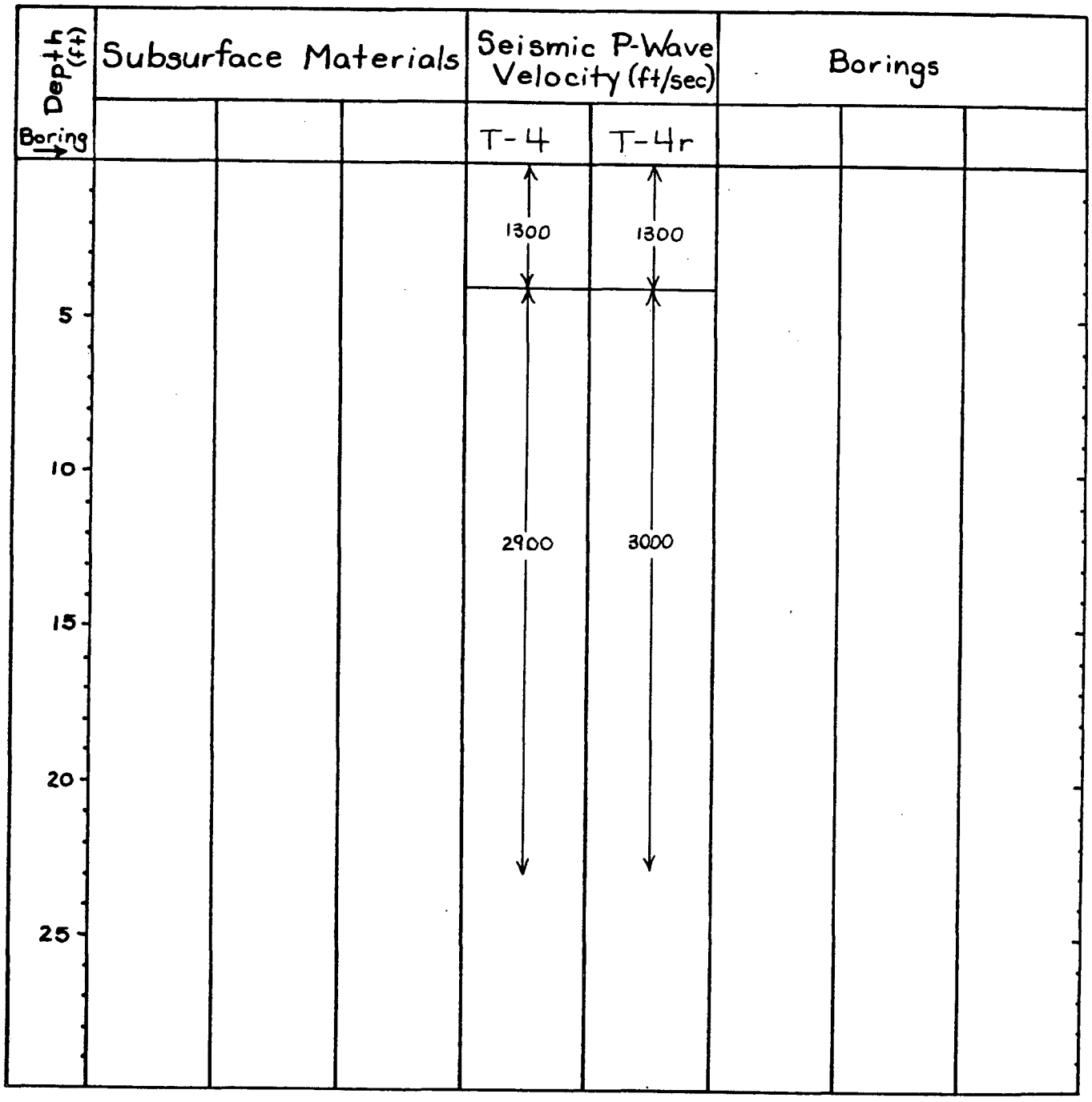


Inspection Team: DLS, PE

Date: 7/15/61

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 4



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC,
511575

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 5 Station: 46 + 34.90

Tower Type: CTH Geophysical Survey: Yes ✓ No ____

Soil Description of Surface and Anticipated Subsurface Conditions:

silty to sandy clay (CL-SC) developed on Olds Fm.

Anticipated Groundwater Conditions: none within several hundred feet

Site Slope Conditions: flat site area on top of knoll above substation

Erosion Potential and Possible Erosion Control Techniques: none

Geologic Hazards: none

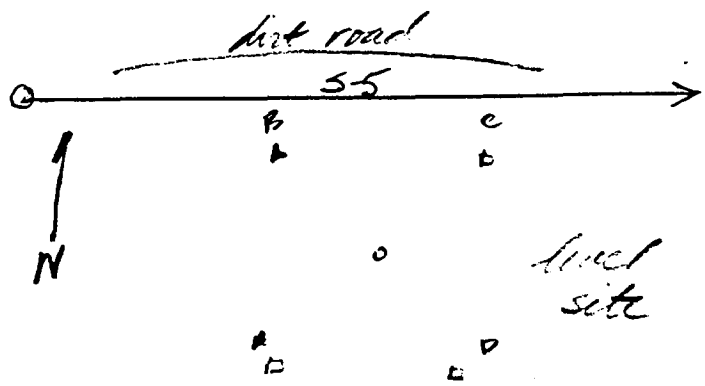
Boring Recommendation: could use UCC rig

Access: dirt road from substation, good access and level site.

Pictures:

Notes: nearby overhead high tension lines

Sketch:

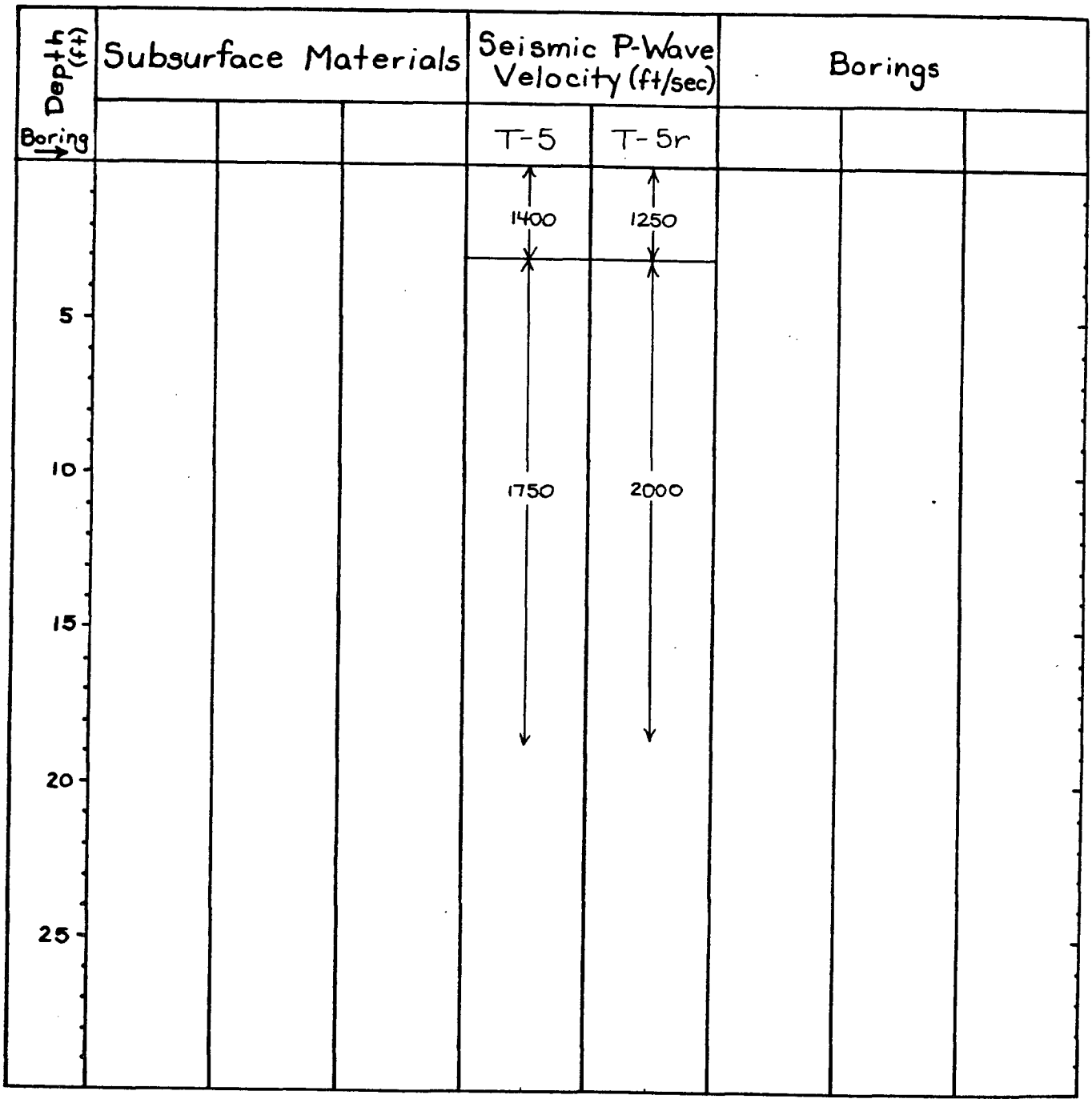


Inspection Team: DLS, BB

Date: 7/15/81

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 5



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC, 511575

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 6 Station: 54 + 84.90

Tower Type: CRS (PI) Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions: generally clay residual on Sweetwater Fm, claystone pert, possibly 3-5' colluvial deposits.

Anticipated Groundwater Conditions: none within 100 feet

Site Slope Conditions: moderately steep, uneven hillside slope, 15% westerly slope

Erosion Potential and Possible Erosion Control Techniques: potential for gullying and undercutting leg C

Geologic Hazards: none

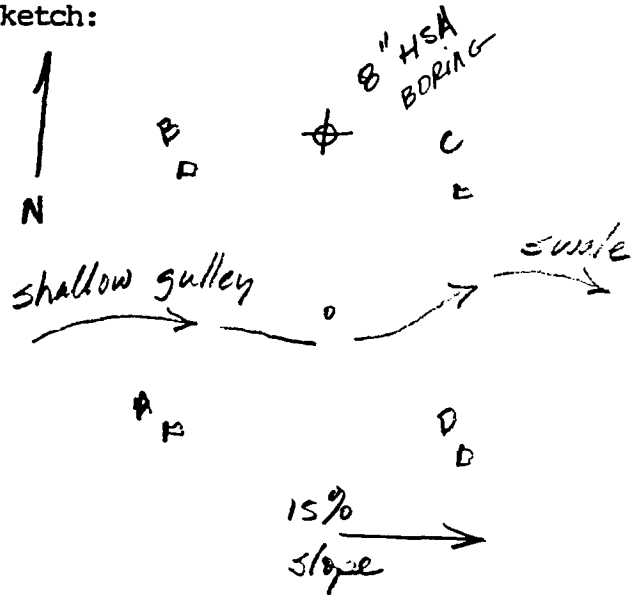
Boring Recommendation: loading difficult - auger rig?

Access: dirt road from substation, steep hillside trail

Pictures:

Notes:

Sketch:

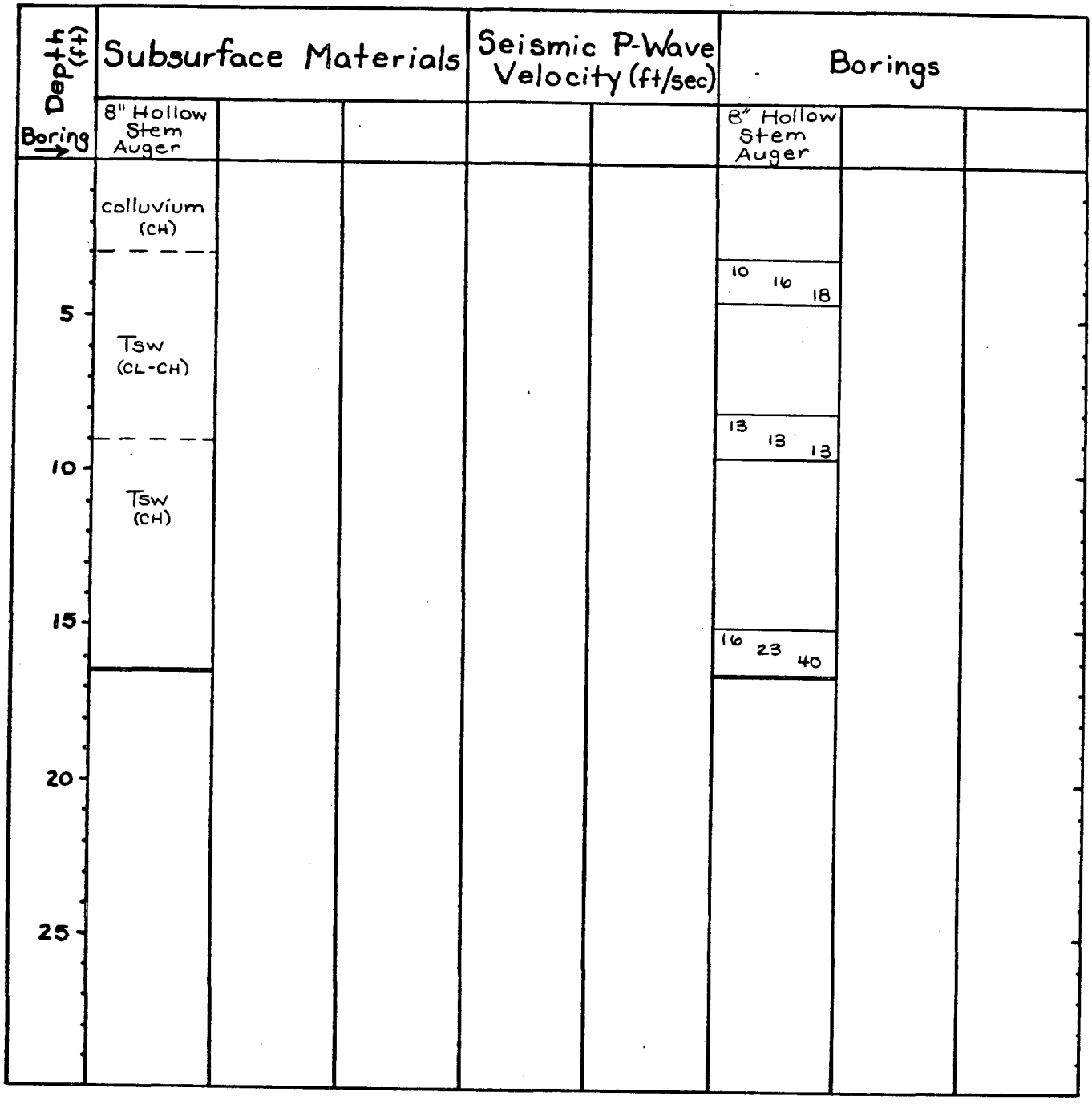


Inspection Team: DLS, BB

Date: 7/15/81

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 6



LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC,
511575

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 7 Station: 66+90.00

Tower Type: CPT Geophysical Survey: Yes ✓ No ____

Soil Description of Surface and Anticipated Subsurface Conditions: 1-2 ft. soil cover consists of silty clay to clayey sand (CL-SC) overlies Sweetwater Fm.

Anticipated Groundwater Conditions: water table deeper than several hundred feet

Site Slope Conditions: top of mesa, near flat surface, less than 1% slope

Erosion Potential and Possible Erosion Control Techniques: none

Geologic Hazards: none

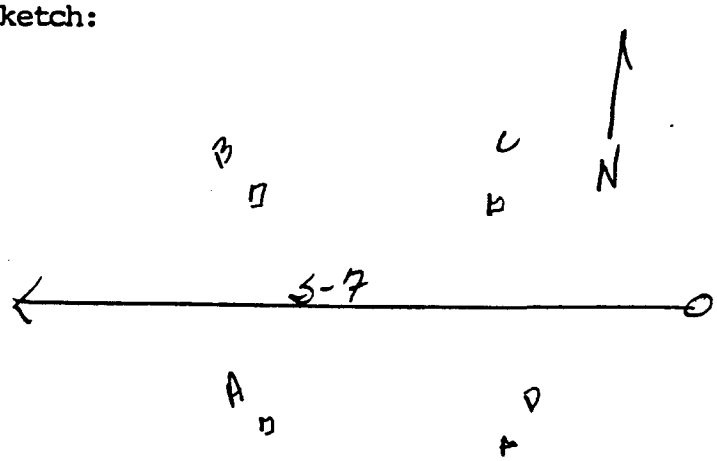
Boring Recommendation:

Access: good road, level site

Pictures:

Notes: good drill site in TSW conglomerate if Tower 6 is impossible to drill.

Sketch:

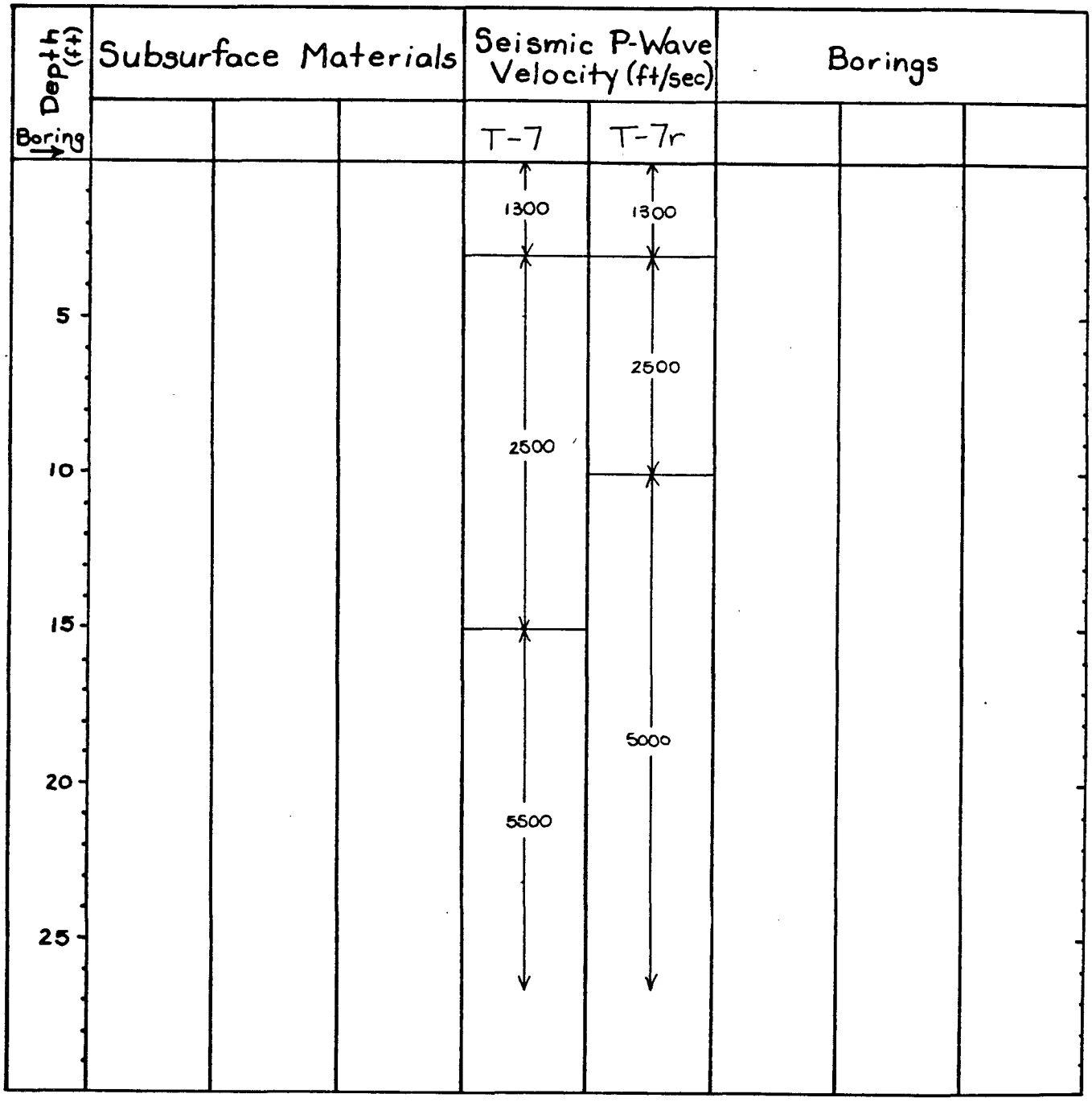


Inspection Team: DLS BB

Date: 7/15/81

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 7



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC, 511575

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 8 Station: 73+87.50

Tower Type: CPT Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions:

coarse sandy clay, scattered boulder sized metabasic float, thin soil cover (<2') on Tsw claystone part.

Anticipated Groundwater Conditions: none within several hundred feet

Site Slope Conditions: edge of mesa surface, 1 on 10% slope

Erosion Potential and Possible Erosion Control Techniques: none

Geologic Hazards: none

Boring Recommendation: none - auger if necessary

Access:

Pictures:

Notes: Sketch:

Inspection Team: DLS, BB

Date: 7/15/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 9 Station: 94+20.00

Tower Type: CPT Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions:

silty clay (CH), 2-3' thick, developed on Otay Fm. desiccation cracks

Anticipated Groundwater Conditions: none within several hundred feet

Site Slope Conditions: near edge of broad ridge, 5% northerly slope

Erosion Potential and Possible Erosion Control Techniques: none

Geologic Hazards: none

Boring Recommendation: none

Access: locked gate on Proctor Valley Rd, several fences

Pictures:

Notes: Sketch:

Inspection Team: KLS, BB

Date: 7/15/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 10 Station: 104 + 11.00

Tower Type: CPT Geophysical Survey: Yes ____ No V

Soil Description of Surface and Anticipated Subsurface Conditions:

2-3' of silty clay (CH) topsoil developed on fine-grained sandstone of Otay Fm.

Anticipated Groundwater Conditions: none within several hundred feet

Site Slope Conditions: mesa hillside slope below edge of mesa, 10% westerly slope

Erosion Potential and Possible Erosion Control Techniques: very low

Geologic Hazards: none

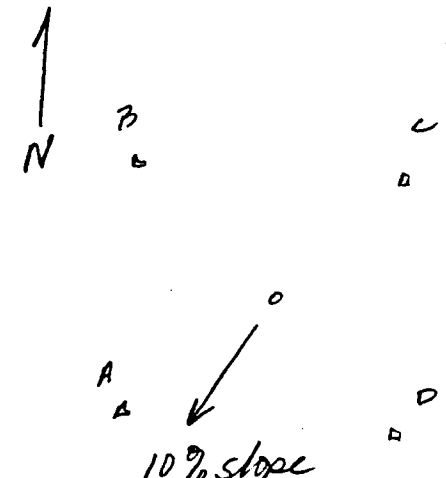
Boring Recommendation: none

Access: walk from Town II, fences to cross

Pictures:

Notes:

Sketch:



Inspection Team: DLS, BB

Date: 7/15/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 11 Station: 122 + 50.00

Tower Type: CTA Geophysical Survey: Yes ✓ No ____

Soil Description of Surface and Anticipated Subsurface Conditions:

plowed field, 2-3 feet of silty clay (CH) on clay Fm. sandstone

Anticipated Groundwater Conditions: none within 100 feet

Site Slope Conditions:

edge of broad ridge, even 5-7% slope

Erosion Potential and Possible Erosion Control Techniques: none

Geologic Hazards: none

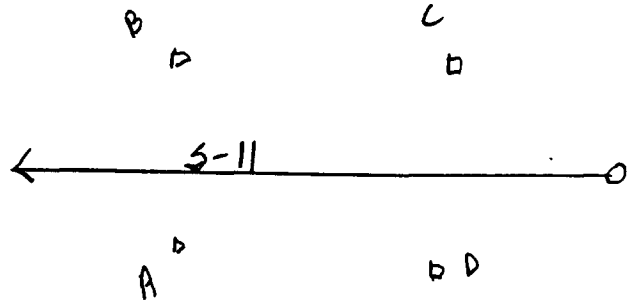
Boring Recommendation: Can use WCC rig

Access: easy access from Rancho Tanal Rd. good leveling

Pictures:

Notes: estimated site location from orthophoto, all stakes and center pole are missing

Sketch:

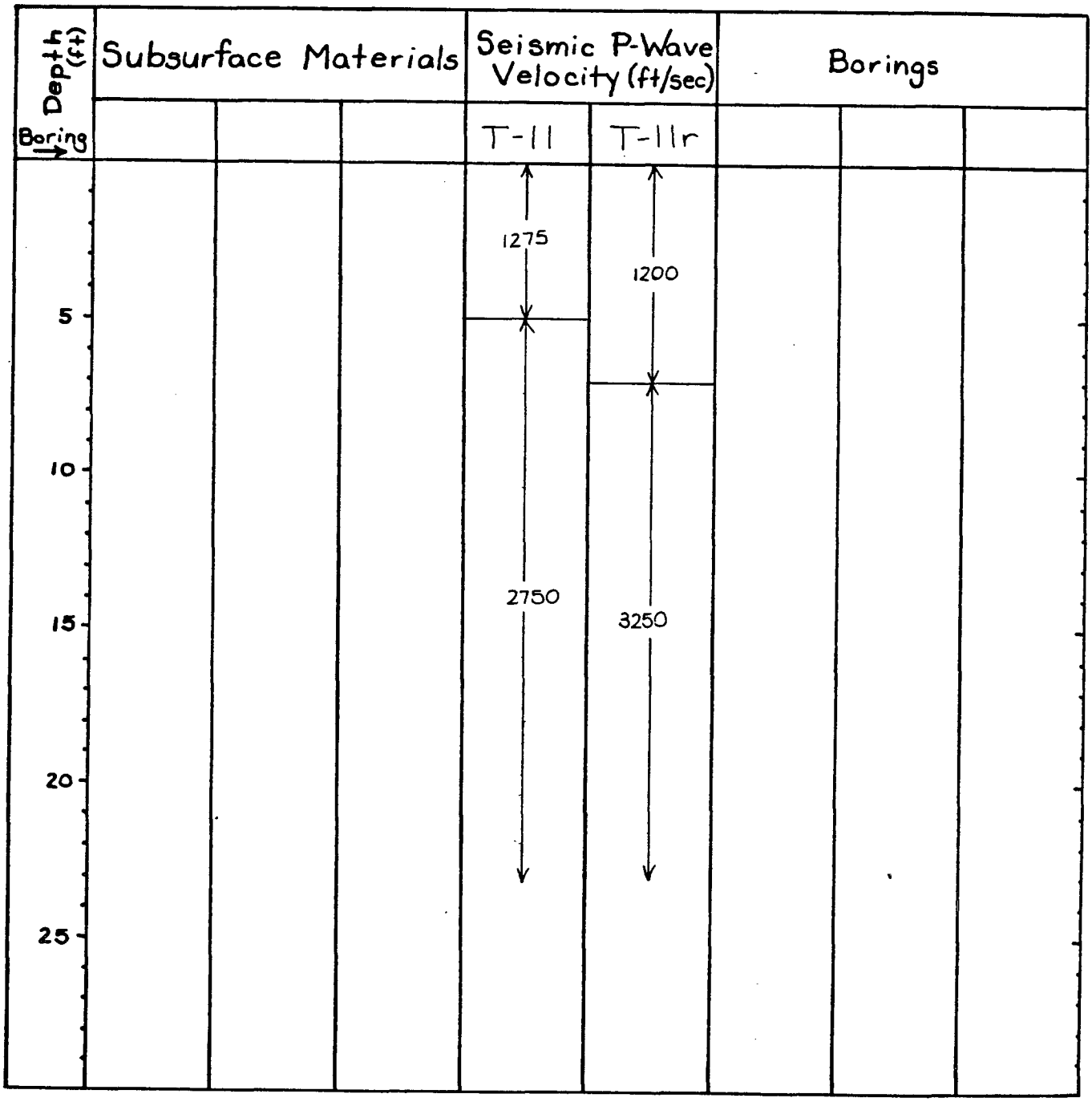


Inspection Team: DLS, BB

Date: 7/15/81

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 11



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 12 Station: 136 + 00.00

Tower Type: CPT Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions:

plowed field, silty clay (CH), 2-3' thick, developed on Otty Fm sandstone

Anticipated Groundwater Conditions: none within 50 feet

Site Slope Conditions:

lower slope of broad, even hillside, 10% easterly slope

Erosion Potential and Possible Erosion Control Techniques:

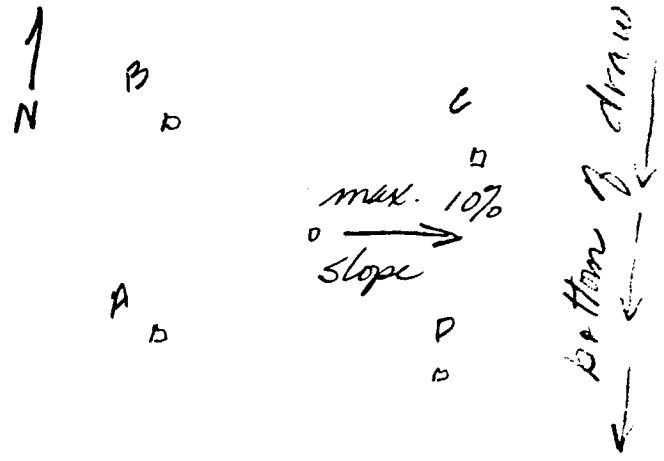
Geologic Hazards: none

Boring Recommendation: none

Access: dirt road from Otty Lakes Rd, must cross plowed field

Pictures:

Notes: all leg stakes down Sketch:



Inspection Team: DLE, BB

Date: 7/15/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 13 Station: 149 + 71.60

Tower Type: CPT Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions:

silty clay (CH), as much as 3-5 feet of topsoil and colluvium overlying Otay Fm. sandstone

Anticipated Groundwater Conditions: shallow seasonal w.t., 10-15' below surface

Site Slope Conditions: near flat base of hillside, slightly higher than base of shallow drain. 1-3% easterly slope

Erosion Potential and Possible Erosion Control Techniques: low potential for gullying during heavy rains

Geologic Hazards: none

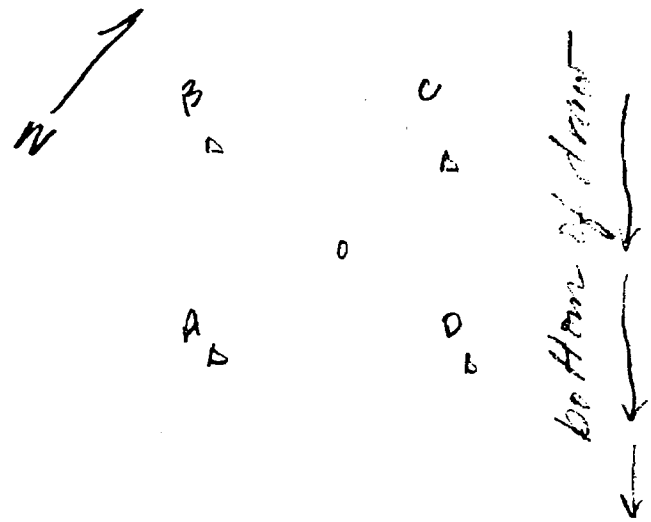
Boring Recommendation: use ucc rig

Access: fences, no gate off Otay Lakes Rd. on United Enterprises property

Pictures:

Notes: need to define colluvial thickness. possibly compressible organic rich soils

Sketch:



Inspection Team: DLS, BB

Date: 7/16/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 14 Station: 162 + 15.00

Tower Type: CPT Geophysical Survey: Yes ____ No ✓

Soil Description of Surface and Anticipated Subsurface Conditions:

plowed field, silty clay topsoil (CH), 2-3' thick developed on Otty Fm sandstone

Anticipated Groundwater Conditions: none within 50 feet

Site Slope Conditions: gentle, even slope at broad hillside, slope less than 5%

Erosion Potential and Possible Erosion Control Techniques: very low

Geologic Hazards: none

Boring Recommendation: none

Access: fences - U.E. property

Pictures:

Notes: Sketch:

Inspection Team: DLS, BB

Date: 7/15/81

TABLE I

TOWER SITE INSPECTION SUMMARY

Tower No: 15 Station: 172 + 83.17

Tower Type: CRS (PI) Geophysical Survey: Yes ✓ No ____

Soil Description of Surface and Anticipated Subsurface Conditions: plowed field, silty clay (CH), 2-3' + brick dumped on Otay Fm. sandstone

Anticipated Groundwater Conditions: none within 100' +

Site Slope Conditions: near level site, bottom of broad draw

Erosion Potential and Possible Erosion Control Techniques: low potential for gullying during heavy rains

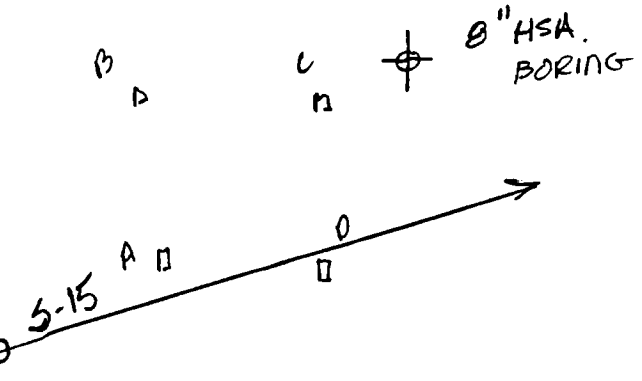
Geologic Hazards: none

Boring Recommendation: use WCC rig

Access: Otay Water District aqueduct road

Pictures: ____

Notes: good drill site Sketch:

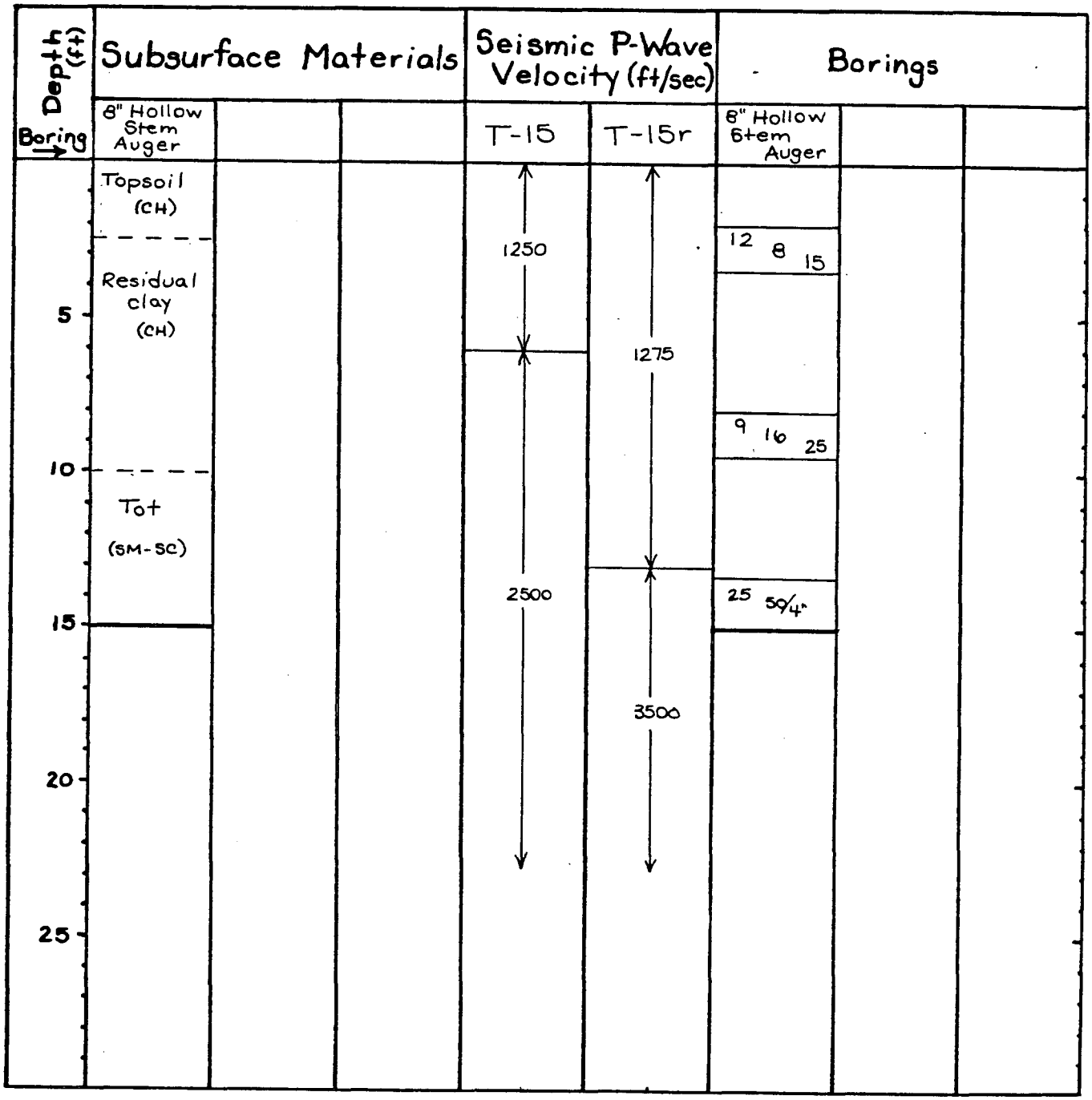


Inspection Team: DLS, BB

Date: 7/15/81

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 15



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC, 511575

APPENDIX B

LOGS OF FIELD EXPLORATIONS

Geosyntec consultants
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San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

PROJECT Miguel to Salt Creek
PROJECT LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

KEY SHEET - CLASSIFICATIONS AND SYMBOLS

GS FORM: KEY 09/99

EMPIRICAL CORRELATIONS WITH STANDARD PENETRATION RESISTANCE N VALUES *

	N VALUE * (BLOWS/FT)	CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT)
FINE GRAINED SOILS	0 - 2	VERY SOFT	<0.25
	3 - 4	SOFT	0.25 - 0.50
	5 - 8	FIRM	0.50 - 1.00
	9 - 15	STIFF	1.00 - 2.00
	16 - 30	VERY STIFF	2.00 - 4.00
	31 - 50	HARD	>4.00
	>50	VERY HARD	

	N VALUE * (BLOWS/FT)	RELATIVE DENSITY
COARSE GRAINED SOILS	0 - 4	VERY LOOSE
	5 - 10	LOOSE
	11 - 30	MEDIUM DENSE
	31 - 50	DENSE
	>50	VERY DENSE

* ASTM D 1586; NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 IN. O.D., 1.4 IN. I.D. SAMPLER ONE FOOT.

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

MAJOR DIVISIONS			SYMBOLS	DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL COARSER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	CLEAN GRAVELS — LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES — APPRECIABLE AMOUNT OF FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE	CLEAN SANDS — LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES — APPRECIABLE AMOUNT OF FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL FINER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS USED FOR BORDERLINE CLASSIFICATIONS

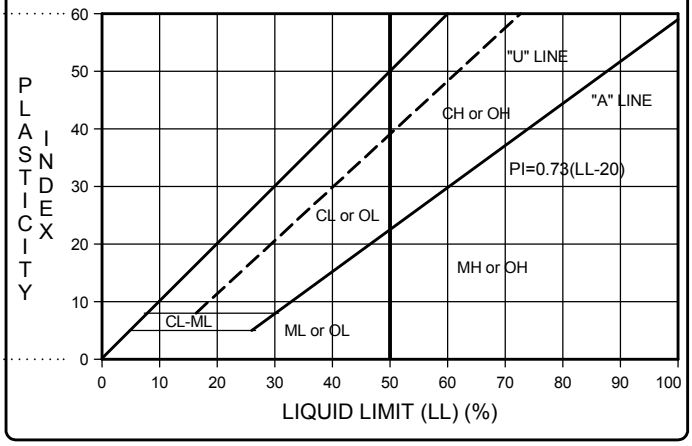
PARTICLE SIZE IDENTIFICATION

BOULDERS	>300 mm
COBBLES	75 - 300 mm
GRAVEL: COARSE	19.0 - 75 mm
GRAVEL: FINE	4.75 - 19 mm
SAND: COARSE	2.00 - 4.75 mm
SAND: MEDIUM	0.425 - 2.00 mm
SAND: FINE	0.075 - 0.425 mm
SILT	0.075 - 0.002 mm
CLAY	<0.002 mm

WELL GRADED - HAVING WIDE RANGE OF GRAIN SIZES AND APPRECIABLE AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES

POORLY GRADED - PREDOMINANTLY ONE GRAIN SIZE, OR HAVING A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING

PLASTICITY CHART



OTHER MATERIAL SYMBOLS

- Siltstone
- Sandstone
- Siltstone/Claystone
- Claystone
- Shale
- Siltstone/Sandstone
- Conglomerate
- Granitic
- Sand
- Silt
- Silty Sand
- Alluvium
- Artificial Fill
- Debris Fill
- Asphalt
- Cement

WELL SYMBOLS

- HYDRATED GRANULAR BENTONITE
- BENTONITE CEMENT GROUT
- FILTER PACK
- CONCRETE
- NATIVE/ SLOUGH
- CENTRAL-IZER

SAMPLER AND OTHER SYMBOLS

- GRAB SAMPLE
- SPLIT SPOON
- STANDARD PENETRATION TEST (SPT)
- SHELBY TUBE
- CALIFORNIA SAMPLER

- Water Level at Time Drilling, or as Shown
- Static Water Level
- MSL: Mean Sea Level
- MC: Moisture Content
- DD: Dry Density
- SA: Sieve Analysis
- PI: Plasticity Index
- LL: Liquid Limit
- c: Cohesion
- K: Hydraulic Conductivity
- Phi: Friction Angle

KEY-GEOTECH SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-1 **SHEET** 1 OF 2
START DATE 6/27/2012 **ELEVATION** 584.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	BLOW COUNTS	% RECOVERY	N-VALUE	TIME	COMMENTS
	Otay Formation: Moist, very pale brown [10YR 7/3], clayey fine to very fine sand (SC)			B-1-1						Hand auger to 5 feet
5	At 5 ft, contains trace angular gravels		579	B-1-2		14/17/29		56		MC, DD
10	Moist, very pale brown [10YR 7/3], sandy lean clay (CL)		574	B-1-3		13/20/24		44		MC, SA, LL, PI
15	Moist, very pale brown [10YR 8/3], very dense, poorly graded, fine sand with interbedded clay lenses (SP/SC)		569	B-1-4		15/31/50		81		MC, DD
20	Moist, very pale brown [10YR 7/4], medium dense silty fine sand (SM)		564	B-1-5		10/10/14		24		MC, SA
	Moist, pale brown [10YR 6/3], hard, fine sandy silt (ML)									MC, DD
25			559	B-1-6		24/37/50		87		
	Moist, pale brown [10YR 6/3], fine to very fine silty sand (SM)									
30			554							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5 Rig
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene

LATITUDE 32.6617060
LONGITUDE 116.9743900
ANGLE Vertical
BEARING ------
PRINTED August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 29.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
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Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-1 **SHEET** 2 OF 2
START DATE 6/27/2012 **ELEVATION** 584.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
				B-1-7		20/23/24		47		
35	Moist, brownish yellow to pink [10YR 8/3], hard clayey silt with bentonite lenses with sand and trace fine angular gravel (ML)		549	B-1-8		14/29/50 for 5"				MC, DD
	At 40 ft, decrease in gravel and increase in sand									
40	Bottom of boring at 41.5 feet. Boring backfilled with approximately 7.4 cubic feet of bentonite grout.		544	B-1-9		27/39/44		83		
			539							
			534							
			529							
			524							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5 Rig
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene **PRINTED** August 7, 2012

LATITUDE 32.6617060
LONGITUDE 116.9743900
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 29.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-2 **SHEET** 1 OF 1
START DATE 6/27/2012 **ELEVATION** 620.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Otay Formation: Moist, white [10YR 8/1], very dense, fine silty sand (SM) At 4 feet, increase in very fine sands			B-2-1						Hand auger to 5 feet
				B-2-2		50 for 5"				MC, DD, SA
5			615							
	Moist, light gray [10YR 7/2], very dense, poorly graded, fine grained sand with silt (SP/SM)			B-2-3		40/50 for 5"				
10			610							
	Moist, light gray [10YR 7/2], very dense fine silty sand (SM)			B-2-4		50 for 5"				MC, DD, SA
15			605							
				B-2-5		50 for 1"				
	Encountered auger refusal at 17 feet. Boring backfilled with approximately 4.5 cubic feet of bentonite grout.									
20			600							
25			595							
30			590							

CONTRACTOR Pacific Drilling
EQUIPMENT Limited Access Rig
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene

LATITUDE 32.6591420
LONGITUDE 116.9739800
ANGLE Vertical
BEARING ------
PRINTED August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 28.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-3 **SHEET** 1 OF 2
START DATE 7/3/2012 **ELEVATION** 630.0 FT MSL
FINISH DATE 7/3/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Fill: Moist, very pale brown [10YR 8/2], silty sand with trace clay and trace angular to sub rounded gravels			B-3-1						Hand auger to 5 feet
5	Otay Formation: Moist, very pale brown [10YR 7/2], very dense, clayey silt (ML)		625	B-3-2		18/50 for 3"		50		MC, DD
	Moist, pale brown [10YR 6/3], very dense, fine silty sand (SM)									
10			620	B-3-3		10/21/34		55		
15	At 15 ft, trace clay		615	B-3-4		24/50 for 3.5"				MC, DD, SA
20			610	B-3-5		26/50 for 5.5"				
	At 24 ft, becomes very pale brown [10YR 8/2], increase in moisture noted above clayey silt Lense of brown [10YR 4/3], hard, clayey silt									
25			605	B-3-6		50 for 5"				MC, DD Perched water observed
	Moist, light gray [10YR 7/1], very dense, fine to medium, poorly graded sand (SP)									
30			600							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A.Greene **PRINTED** August 7, 2012

LATITUDE 32.6541160
LONGITUDE 116.9732000
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 27.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-3 **SHEET** 2 OF 2
START DATE 7/3/2012 **ELEVATION** 630.0 FT MSL
FINISH DATE 7/3/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
				B-3-7		50 for 6"				
35			595	B-3-8		50 for 5.5"				MC, DD
	Moist, brown [10YR 4/3], very dense, fine to medium grained silty sand, with interbedded claystone lenses (SM)									
40	Moist, light gray [10YR 7/1], very dense, fine to medium grained, poorly graded silty sand, sand-silt (SM/SP)		590	B-3-9		23/50 for 6"				
	Bottom of boring at 41.0 feet. Boring backfilled with approximately 9.4 cubic feet of bentonite grout topped with soil cuttings.									
			585							
			580							
			575							
			570							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A.Greene **PRINTED** August 7, 2012
LATITUDE 32.6541160
LONGITUDE 116.9732000
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 27.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-4 **SHEET** 1 OF 1
START DATE 6/29/2012 **ELEVATION** 567.0 FT MSL
FINISH DATE 6/29/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Otay Formation: Moist, light brown [7.5YR 6/3], low plasticity sandy clay (CL)		B-4-1						Hand auger to 5 feet
	Moist, very pale brown [10YR 8/2], very dense, fine to medium clayey to silty sand (SC/SM)		B-4-2		50 for 5"				
5		562							
	Moist, white [7.5YR 8/1], very dense, very fine silty sand (SM)		B-4-3		10/40/50 for 5"				MC, SA
10		557							
	Interbedded clay lenses		B-4-4		50 for 5"				MC, DD
15		552							
	Moist, pale brown [10YR 6/3], very hard, lean clayey sand (SC)		B-4-5		50 for 6"				MC, LL, PI
20		547							
	Moist, very pale brown [10YR 7/3], very dense, silty fine sand (SM)		B-4-6		50 for 2"				MC, DD
	Moist, very pale brown [10YR 7/4], very dense, poorly graded fine sand with trace coarse sand (SP)		B-4-7		50 for 5"				
25		542							
	At 27 ft, becomes fine to very fine sand with trace gravel								
	Encountered auger refusal at 27.2 feet. Boring backfilled with approximately 6.1 cubic feet of bentonite grout.		B-4-8		50 for 2"				MC, DD
		537							

CONTRACTOR Pacific Drilling **LATITUDE** 32.6504910
EQUIPMENT Limited Access Rig **LONGITUDE** 116.9728070
DRILL MTHD HSA **ANGLE** Vertical
DIAMETER 7 inches **BEARING** ------
LOGGER N.Godinez **REVIEWER** A.Greene **PRINTED** August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 26.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-5 **SHEET** 1 OF 2
START DATE 6/25/2012 **ELEVATION** 504.0 FT MSL
FINISH DATE 6/25/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Alluvium (Qal): Moist, dark brown [10YR 2/3], clayey fine sand with some plant debris (SC)			B-5-1						Hand auger to 5 feet
5	Moist, brown [10YR 4/3], medium dense clayey, fine to coarse sand to fine sand with trace clay (SC)		499	B-5-2		8/12/17		29		MC, DD
	Moist, pale brown [10YR 6/3], stiff sandy lean clay with some sub rounded gravels (CL)									
10			494	B-5-3		5/5/6		11		▽
15	At 15 feet, becomes moist, pale yellow [2.5Y 8/2], to light gray [10YR 7/2], sandy lean clay with angular gravels (CL)		489	B-5-4		9/10/11		21		MC, DD, SA
20	Moist, grayish brown [10YR 4/2], medium dense fine to medium clayey sand with sub-rounded to angular gravels (SC)		484	B-5-5		9/14/15		29		
25	Otay Formation: Moist, brown [7.5YR 3/4], to very pale brown [10YR 8/5], very dense, interbedded well sorted siltstone and sandy claystone with sub rounded to angular breccia (SC)		479	B-5-6		23 for 5"				MC, DD
30			474							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A.Greene

LATITUDE 32.6466660
LONGITUDE 116.9205000
ANGLE Vertical
BEARING ------
PRINTED August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 25.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-5 **SHEET** 2 OF 2
START DATE 6/25/2012 **ELEVATION** 504.0 FT MSL
FINISH DATE 6/25/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
				B-5-7		36 for 4"				
35			469	B-5-8		50 for 6"				MC, DD
	Moist, yellowish brown [10YR 5/4], to light yellowish brown [2.5YR 6/3], very dense, poorly graded, fine to medium sand (SP) and clayey sand (SC)									
40			464	B-5-9		19/21/35		56		
	Bottom of boring at 41.5 feet. Boring backfilled with approximately 8.7 cubic feet of bentonite grout topped with soil cuttings.									
			459							
			454							
			449							
			444							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A.Greene **PRINTED** August 7, 2012
LATITUDE 32.6466660
LONGITUDE 116.9205000
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 25.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-6 **SHEET** 1 OF 2
START DATE 6/27/2012 **ELEVATION** 544.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Fill: 3" asphalt over 2" aggregate base over moist, grayish brown [10YR 5/2], clayey silt with trace fine to medium gravel			B-6-1						Hand auger to 5 feet
	Otay Formation: Moist, very pale brown [10YR 7/4], very dense fine sandy silt (ML)									
5			539	B-6-2		50 for 5"				MC, DD
10			534	B-6-3		15/25/36		61		MC, SA
15	Moist, white [10YR 8/1], very dense poorly graded fine sand (SP)		529	B-6-4		50 for 5"				MC, DD
20	Moist, pale brown [10YR 6/3], very dense, very fine to fine clayey sand (SC)		524	B-6-5		12/23/29		52		MC, LL, PI
25	At 25 ft, slight decrease in fines		519	B-6-6		27/50 for 2"				MC, DD
30			514							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene **PRINTED** August 7, 2012

LATITUDE 32.6433630
LONGITUDE 116.9715860
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-6 **SHEET** 2 OF 2
START DATE 6/27/2012 **ELEVATION** 544.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Moist, reddish brown [10YR 7/2], hard lean clay with trace sand (CL)			B-6-7		15/23/50 for 6"				
35	Moist, pale brown [10YR 6/3], to light brownish gray [10YR 6/2], very dense, very fine to fine clayey sand (SC)		509	B-6-8		19/50 for 4"				MC, DD, LL, PI
40	Bottom of boring at 40.5 feet. Boring backfilled with approximately 7.4 cubic feet of bentonite gravel and 0.8 cubic feet of concrete.		504	B-6-9		50 for 6"				
			499							
			494							
			489							
			484							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene

LATITUDE 32.6433630
LONGITUDE 116.9715860
ANGLE Vertical
BEARING ------
PRINTED August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

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Tel: (858) 674-6559
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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-7 **SHEET** 1 OF 2
START DATE 6/25/2012 **ELEVATION** 552.0 FT MSL
FINISH DATE 6/25/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	BLOW COUNTS	% RECOVERY	N-VALUE	TIME	COMMENTS
	Fill: Moist, dark grayish brown [10YR 4/2], fine to medium clayey sand, with sub-rounded gravels			B-7-1						Hand auger to 5 feet
5	Colluvium: Moist, very dark brown [10YR 2/2], to grayish brown [10YR 5/2], very stiff sandy lean clay, with sub-rounded gravels and some plant debris (CL)		547	B-7-2		7/10/15		25		MC, DD, SA
10	Otay Formation: Moist, very pale brown [10YR 7/4], medium dense, poorly graded fine to medium sand with silt (SP/SM)		542	B-7-3		8/8/7		15		
15	At 15 ft, becomes light gray [2.5YR 7/2], and very dense		537	B-7-4		15/36 for 3"				MC, DD
	Moist, pale brown [10YR 6/3], medium dense, fine to medium sand with trace clay (SP/SC)									
20			532	B-7-5		10/13/17		30		
25	Moist, light gray [2.5 YR 7/2], hard sandy lean clay (CL)		527	B-7-6		29 for 3"				MC, DD, SA
	Moist, yellowish brown [10YR 5/4], medium dense, fine to medium silty sand (SM)									
30			522							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A Greene **PRINTED** August 7, 2012
LATITUDE 32.6403000
LONGITUDE 116.9711170
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 23.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-7 **SHEET** 2 OF 2
START DATE 6/25/2012 **ELEVATION** 552.0 FT MSL
FINISH DATE 6/25/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
				B-7-7		9/12/14		26		
	Moist, pale yellow [2.5YR 8/2], to light gray [2.5YR 7/2], very dense, poorly graded, fine to medium sand (SP)									MC, DD
35			517	B-7-8		26 for 4"				
40			512	B-7-9		28/38/40		78		
	Bottom of boring at 41.5 feet. Boring backfilled with approximately 10.0 cubic feet of bentonite grout/chips.									
			507							
			502							
			497							
			492							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A Greene **PRINTED** August 7, 2012

LATITUDE 32.6403000
LONGITUDE 116.9711170
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 23.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
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San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-8 **SHEET** 1 OF 2
START DATE 7/3/2012 **ELEVATION** 564.0 FT MSL
FINISH DATE 7/3/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	BLOW COUNTS	% RECOVERY	N-VALUE	TIME	COMMENTS
	Fill: Moist, dark yellowish brown [10YR 3/4] to dark grayish brown [10YR 4/2], silty sand with trace clay		B-8-1						Hand auger to 5 feet
5	Colluvium: Moist, very dark brown [10YR 2/2], hard fat clay (CH)	559	B-8-2		9/13/18		31		MC, DD, LL, PI
10	Otay Formation: Moist, white [10YR 8/1] to yellowish brown [10YR 5/4], medium dense, clayey sand with carbonate nodules (SC)	554	B-8-3		5/9/11		20		
15	Moist, light brownish gray [10YR 6/2] very dense, fine clayey sand (SC)	549	B-8-4		22/50 for 5.5"				MC, DD, SA
20	Moist, pale brown [10YR 6/3], fine sand with silt (SP/SM) At 20.3 feet, light gray 2" to 3" sandstone layer	544	B-8-5		21/21/24		45		
25	At 26 ft, becomes brown [10YR 5/3], and increase in fine to medium sand	539	B-8-6		50 for 5"				MC, DD
30		534							

CONTRACTOR Pacific Drilling **LATITUDE** 32.6392980
EQUIPMENT Unimog MARL M5 **LONGITUDE** 116.9701210
DRILL MTHD HSA **ANGLE** Vertical
DIAMETER 7 inches **BEARING** ------
LOGGER J.Warner **REVIEWER** A.Greene **PRINTED** August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 22.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-8 **SHEET** 2 OF 2
START DATE 7/3/2012 **ELEVATION** 564.0 FT MSL
FINISH DATE 7/3/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Becomes pale brown [10YR 6/3]			B-8-7		19/28/41		69		
	Moist, yellowish brown [10YR 3/4], very dense clayey fine sand with trace silt (SC/SM)									MC, DD
35	At 35.5 ft, becomes pale brown [10YR 6/3], very dense, poorly graded fine sand with trace silt		529	B-8-8		37/50 for 2"				
	Moist, light gray [10YR 7/2], very dense, fine to medium poorly graded sand with silt (SP-SM)									
40	Bottom of boring at 40.8 feet. Boring backfilled with approximately 7.9 cubic feet of bentonite grout topped with soil cuttings.		524	B-8-9		30/50 for 3"				
			519							
			514							
			509							
			504							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER J.Warner **REVIEWER** A.Greene **PRINTED** August 7, 2012

LATITUDE 32.6392980
LONGITUDE 116.9701210
ANGLE Vertical
BEARING ------

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site No. 22.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-9 **SHEET** 1 OF 1
START DATE 6/27/2012 **ELEVATION** 480.0 FT MSL
FINISH DATE 6/27/2012
PROJECT Miguel to Salt Creek
LOCATION Chula Vista, California
PROJECT NUMBER SC0368-26

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES N-VALUE	TIME	COMMENTS
	Colluvium: Moist, very dark brown [10YR 2/2], medium dense, lean clay with trace fine sand and fine gravel (CL)			B-9-1						Hand auger to 5 feet
5	Moist, brown [7.5YR 5/2], medium dense, clayey fine to medium sand with coarse sand and gravels (SC)		475	B-9-2		8/8/17		25		
10	Otay Formation: Moist, light yellowish brown 2.5YR 6/4], very dense, fine to medium sand with angular coarse sand (SC) gritstone		470	B-9-3		21/50 for 5"				MC, DD, SA
	Trace fine gravel, becomes cemented			B-9-4		25/50 for 3"				Difficult drilling, added approx. 5 gallons of water to assist drilling
15	Auger refusal encountered at 15.2 feet. Boring backfilled with approximately 2.0 cubic feet of bentonite grout.		465	B-9-5		50 for 2"				
			460							
			455							
			450							

CONTRACTOR Pacific Drilling
EQUIPMENT Unimog MARL M5
DRILL MTHD HSA
DIAMETER 7 inches
LOGGER N.Godinez **REVIEWER** A.Greene

LATITUDE 32.6201590
LONGITUDE 116.9490720
ANGLE Vertical
BEARING ------
PRINTED August 7, 2012

REMARKS: Approximate lat/long estimated from Google Earth. Approximate elevation estimated from Google Earth/Pole Survey Data. Site Nos. 43 and 44.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BORING LOG GEOTECH (KEATON) SC0368-26.GPJ GEOSNTEC.GDT 8/7/12

APPENDIX C

GEOTECHNICAL LABORATORY TESTING

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Test Results Summary

Project Name: Miguel To Salt Creek TL6956

Project No.: 558

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422			Atterberg Limits ASTM D 4318			Dry Unit Weight[1] Modified ASTM D 2937		Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	LL	PL	PI	Dry Unit Weight	Moisture Content		
(-)	(-)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(-)	
B-1-2	12G014								112.6	15.3		
B-1-3	12G015	13.0	2.8	45.7	51.5	46	20	26				
B-1-4	12G016								111.6	15.2		
B-1-5	12G017	4.0	0.8	68.9	30.3							
B-1-6	12G018								118.8	13.0		
B-1-8	12G019								87.8	33.7		
B-2-2	12G020		0.0	68.4	31.6				105.0	13.0		
B-2-4	12G021		0.1	84.7	15.2				101.3	8.7		
B-3-2	12G022								94.5	20.7		
B-3-4	12G023		0.8	67.3	31.9				116.2	12.2		
B-3-6	12G024								110.6	11.0		
B-3-8	12G025								111.6	10.3		
B-4-3	12G026	16.4	2.4	60.5	37.1							
B-4-4	12G027								105.0	16.0		
B-4-5	12G028	14.8				47	24	23				
B-4-6	12G029								104.3	13.3		
B-4-8	12G030								101.0	11.1		
B-5-2	12G031								112.7	9.5		
B-5-4	12G032		2.4	43.2	54.4				95.3	23.7		
B-5-6	12G033								114.8	15.9		
B-5-8	12G034								111.2	11.9		
B-6-2	12G035								111.4	12.8		
B-6-3	12G036	15.5	0.0	45.5	54.5							
B-6-4	12G037								104.7	7.2		
B-6-5	12G038	16.2				48	25	23				
B-6-6	12G039								114.2	10.8		
B-6-8	12G040	17.5				56	23	33	107.7	17.5		
B-7-2	12G041		1.2	38.8	60.0				106.7	19.9		
B-7-4	12G042								111.2	18.2		
B-7-6	12G043		0.1	28.5	71.4				105.1	14.0		
B-7-8	12G044								106.5	15.2		
B-8-2	12G045					65	26	39	102.6	22.5		
B-8-4	12G046		0.0	73.4	26.6				105.0	21.4		

Notes:
1 - Some of the samples may be disturbed and thus the values obtained may not be accurate.

7-30-12
SRS

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Test Results Summary

Project Name: Miguel To Salt Creek TL6956

Project No.: 558

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422			Atterberg Limits ASTM D 4318			Dry Unit Weight[1] Modified ASTM D 2937		Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	LL	PL	PI	Dry Unit Weight	Moisture Content		
(-)	(-)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(-)	
B-8-6	12G047								96.2	18.8		
B-8-8	12G048								100.6	23.4		
B-9-3	12G049		6.7	66.1	27.2				118.0	10.3		

Notes:
1 - Some of the samples may be disturbed and thus the values obtained may not be accurate.

7-30-12
SRS

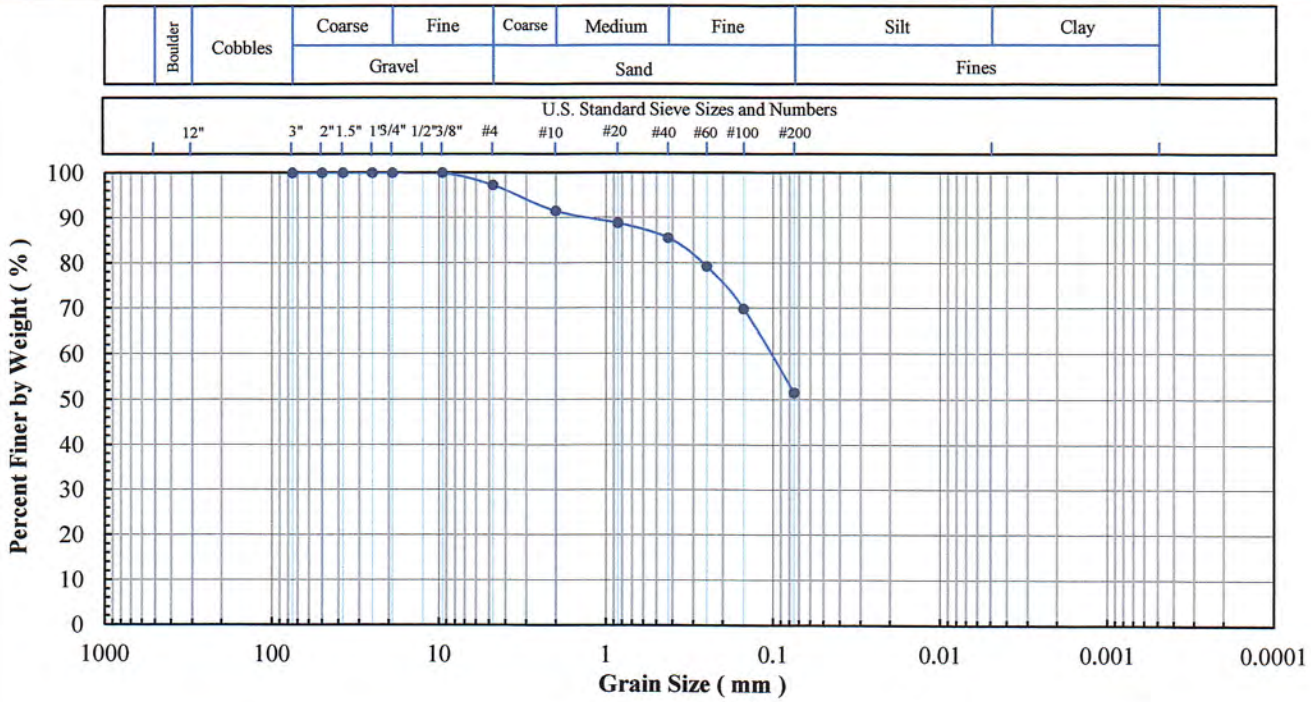
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-1-3
Lab Sample No:	12G015

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



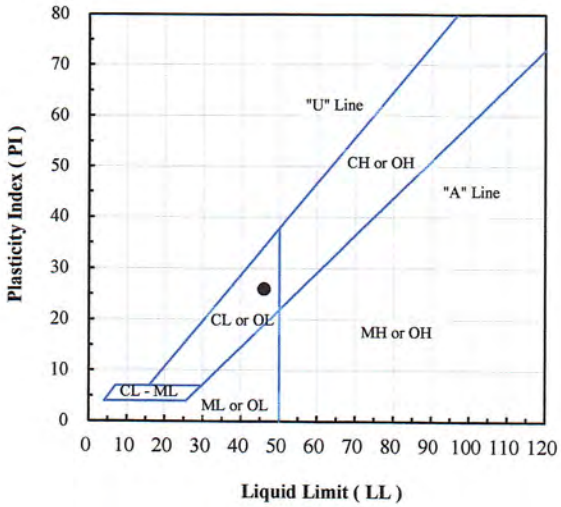
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.2
#10	2.00	91.5
#20	0.850	88.8
#40	0.425	85.5
#60	0.250	79.2
#100	0.150	69.8
#200	0.075	51.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.8
Sand (%):	45.7
Fines (%):	51.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-1-3	12G015	13.0	51.5	46	20	26	

Note(s):

7-30-12
SPC

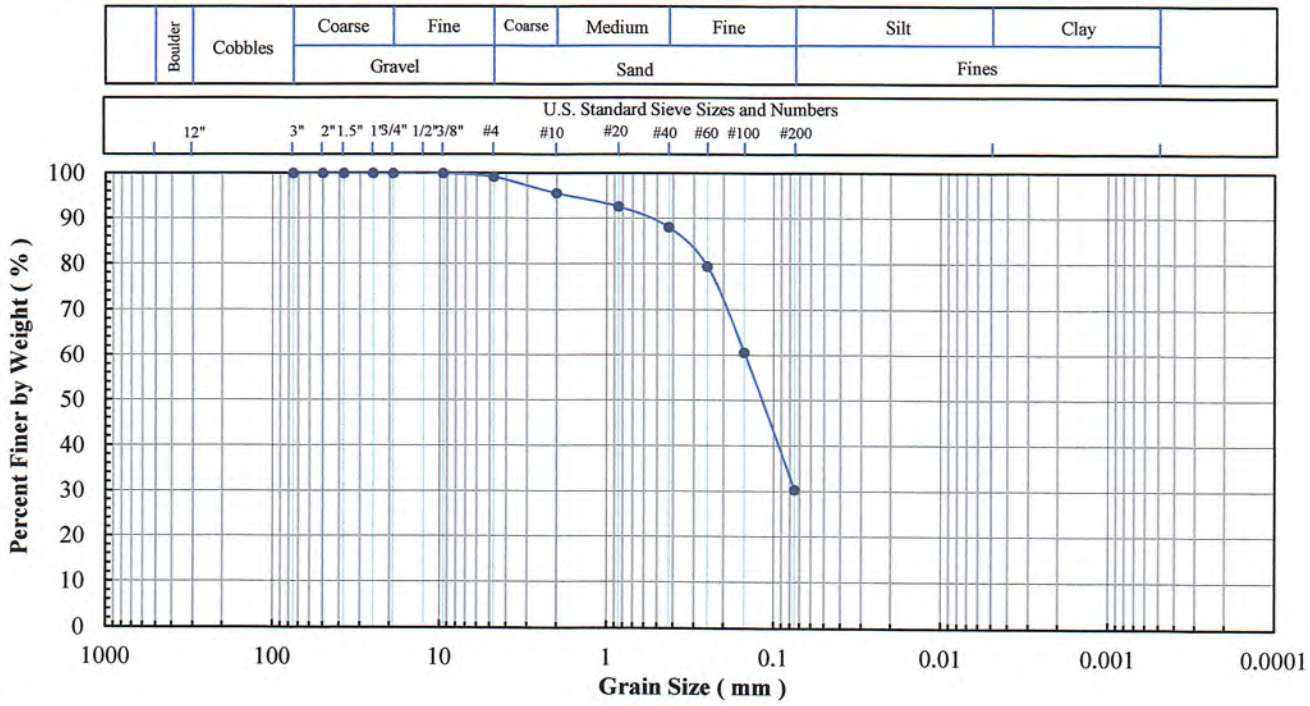
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-1-5
Lab Sample No:	12G017

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



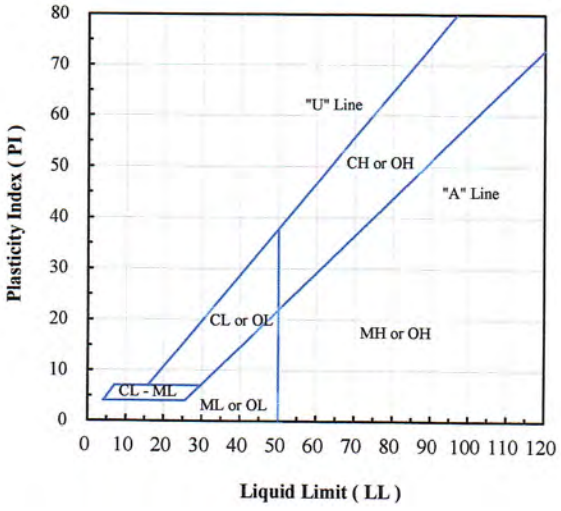
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	95.6
#20	0.850	92.6
#40	0.425	88.0
#60	0.250	79.4
#100	0.150	60.6
#200	0.075	30.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	68.9
Fines (%):	30.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-1-5	12G017	11.0	30.3				

Note(s):

7-30-12
JRS

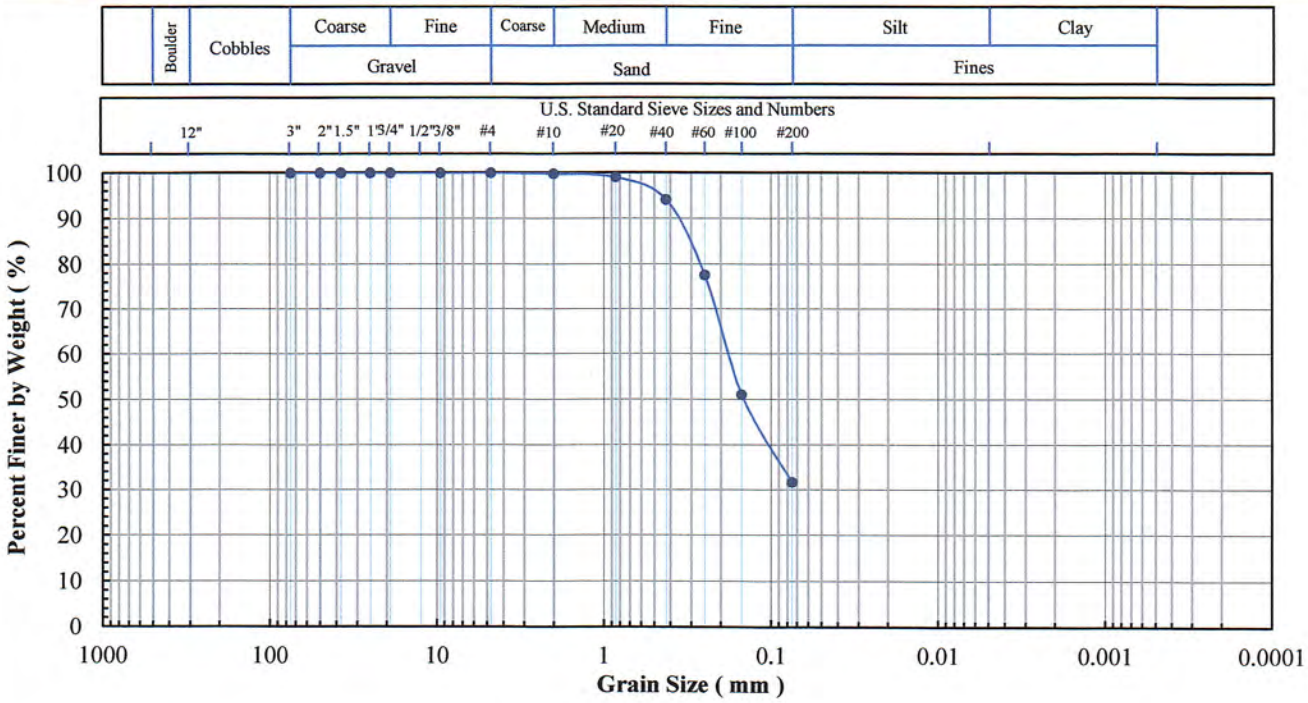
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-2-2
Lab Sample No:	12G020

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



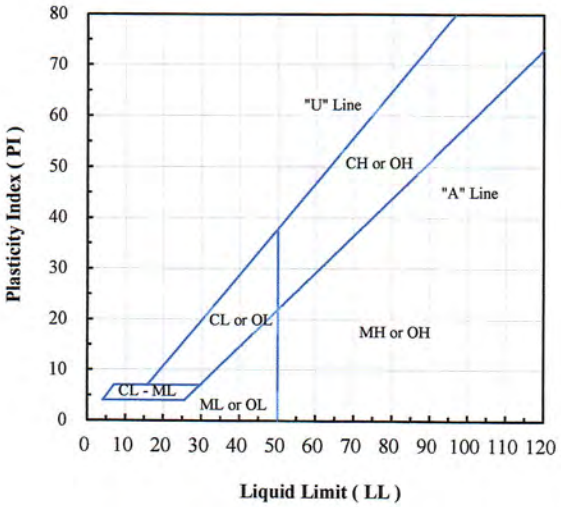
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.0
#40	0.425	94.1
#60	0.250	77.6
#100	0.150	51.0
#200	0.075	31.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	68.4
Fines (%):	31.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-2-2	12G020	13.0	31.6				

Note(s):

7-30-12
SRS

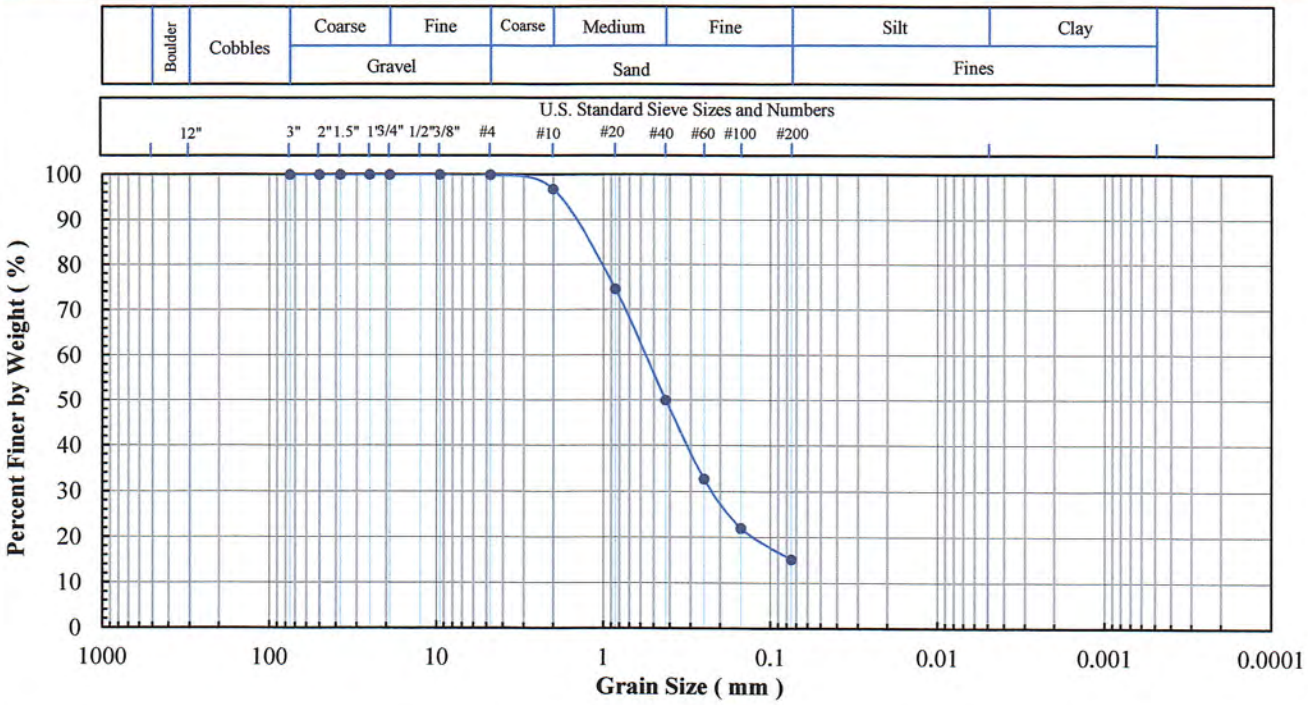
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-2-4
Lab Sample No:	12G021

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



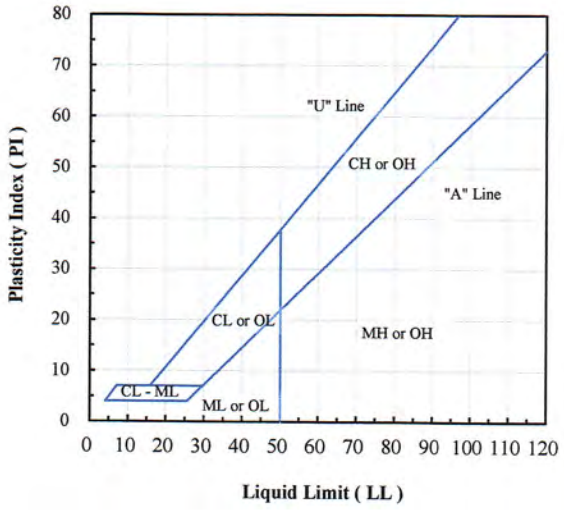
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	96.8
#20	0.850	74.6
#40	0.425	50.0
#60	0.250	32.7
#100	0.150	22.0
#200	0.075	15.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	84.7
Fines (%):	15.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-2-4	12G021	8.7	15.2				

Note(s):

7-30-12
SRS

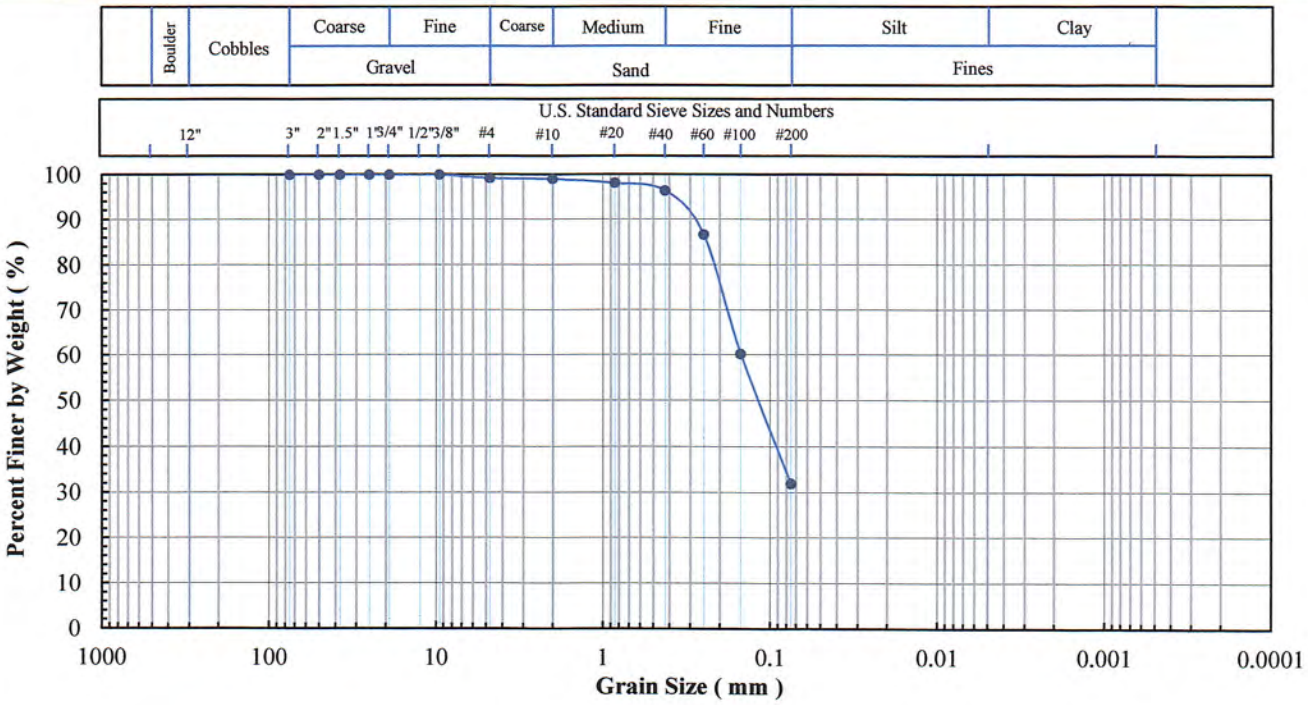
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-3-4
Lab Sample No:	12G023

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



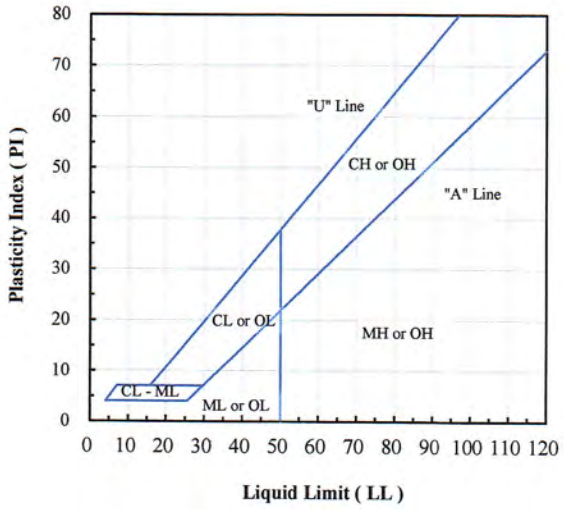
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	96.4
#60	0.250	86.6
#100	0.150	60.2
#200	0.075	31.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	67.3
Fines (%):	31.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-3-4	12G023	12.2	31.9				

Note(s):

7-30-12
GRS

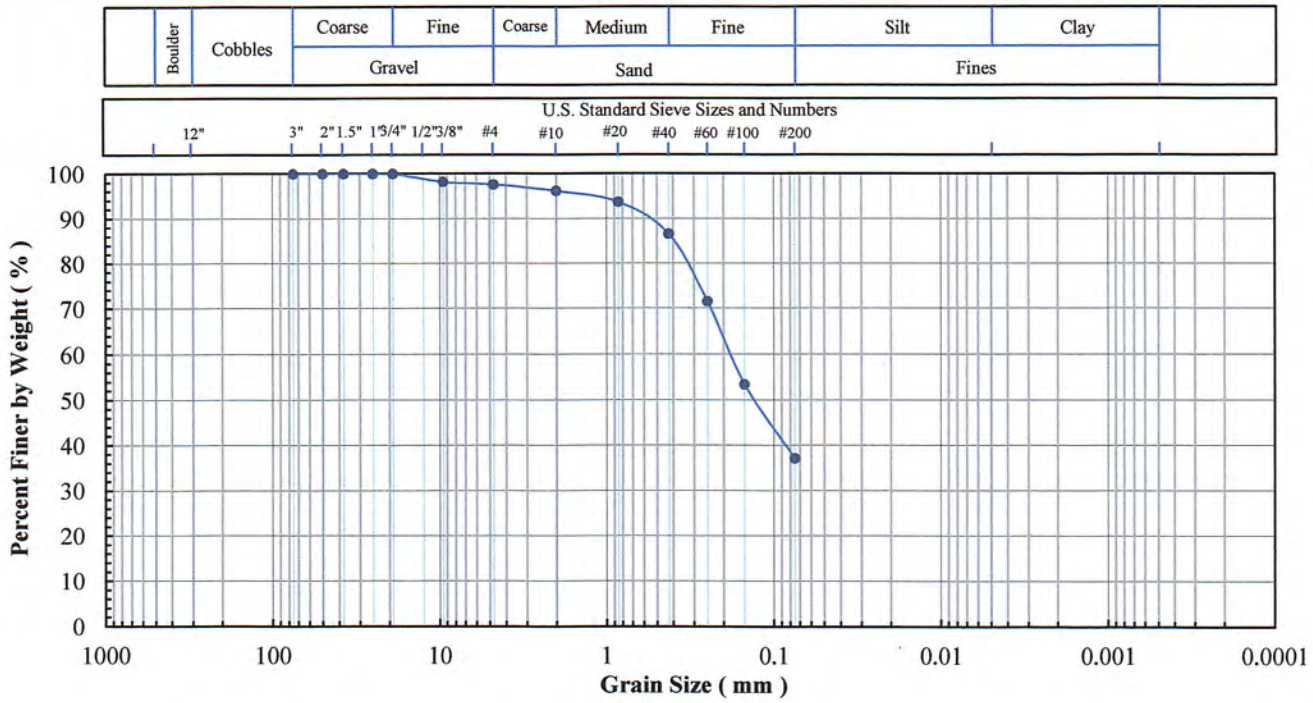
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-4-3
Lab Sample No:	12G026

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



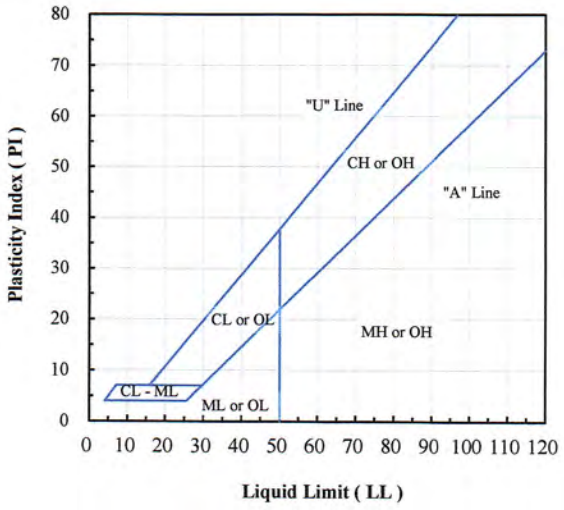
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.2
#4	4.75	97.6
#10	2.00	96.2
#20	0.850	93.7
#40	0.425	86.6
#60	0.250	71.5
#100	0.150	53.4
#200	0.075	37.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.4
Sand (%):	60.5
Fines (%):	37.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-4-3	12G026	16.4	37.1				

Note(s):

7-30-12
SRS

Excel Geotechnical Testing, Inc.
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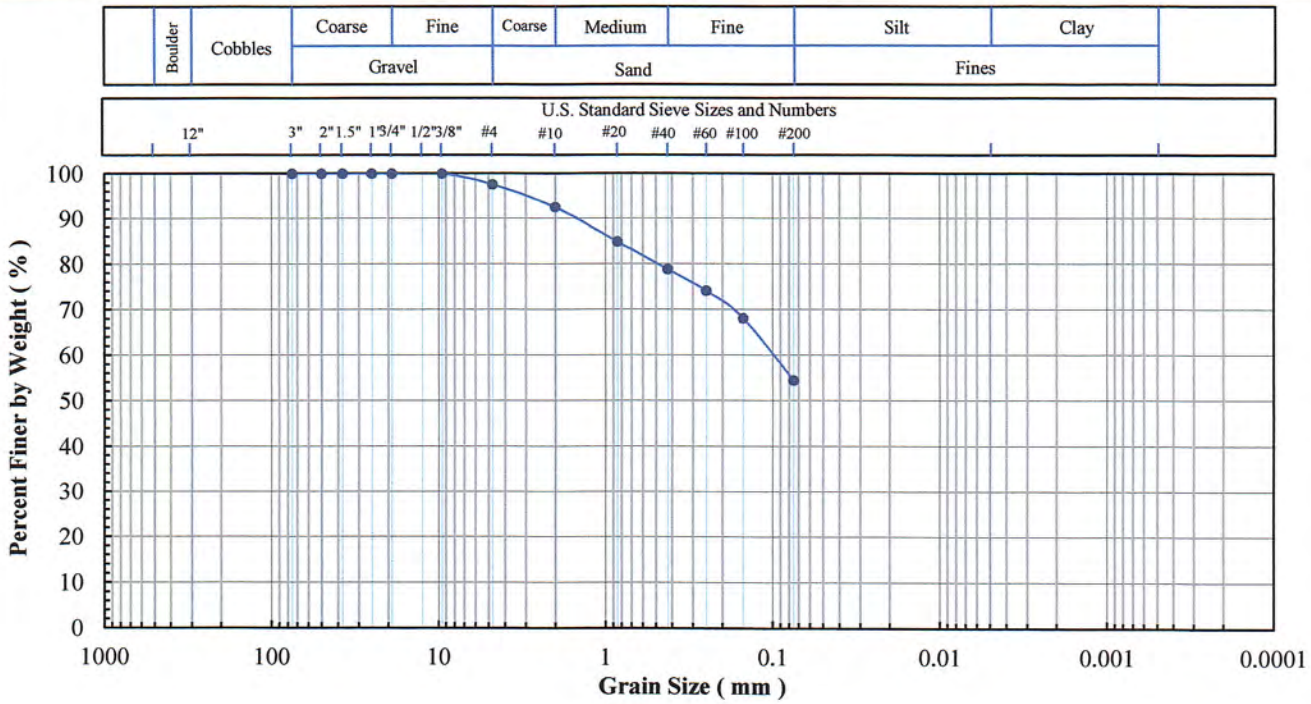
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-5-4
Lab Sample No:	12G032

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



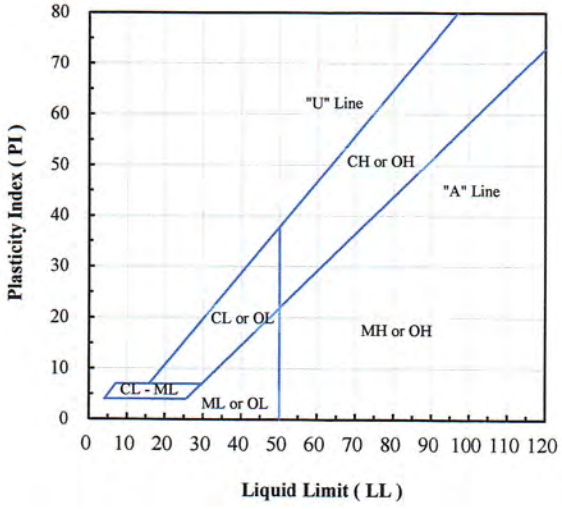
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.6
#10	2.00	92.5
#20	0.850	84.8
#40	0.425	78.8
#60	0.250	74.1
#100	0.150	68.1
#200	0.075	54.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.4
Sand (%):	43.2
Fines (%):	54.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-5-4	12G032	23.7	54.4				

Note(s):

7-31-12
SAS

Excel Geotechnical Testing, Inc.
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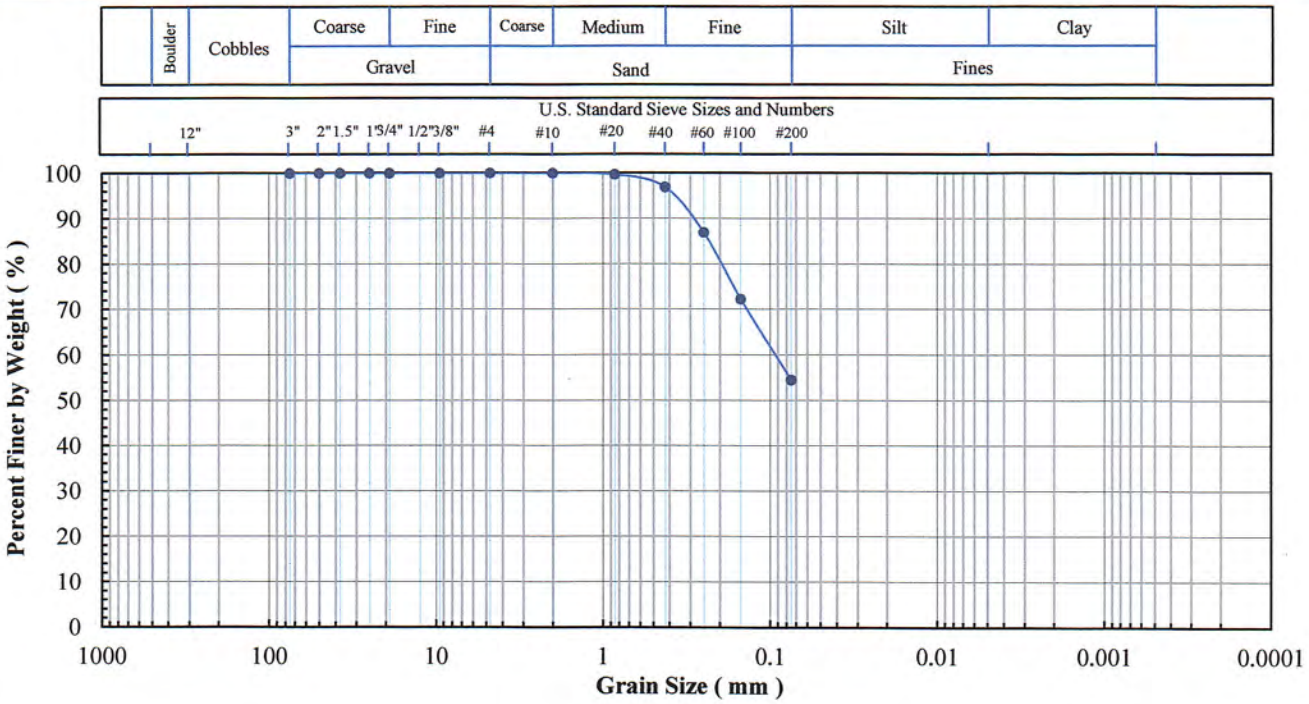
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-6-3
Lab Sample No:	12G036

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



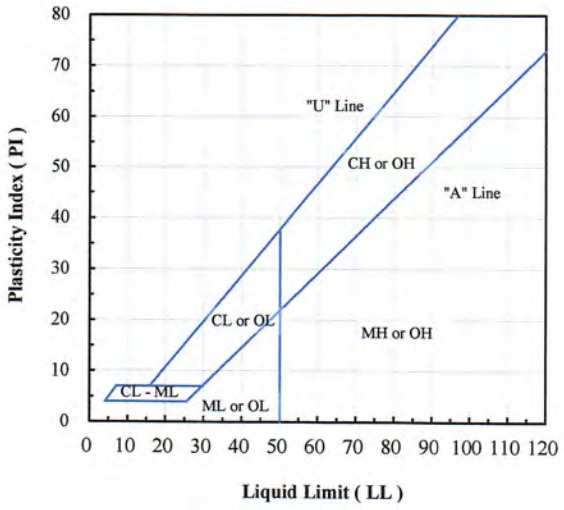
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.7
#40	0.425	96.9
#60	0.250	86.9
#100	0.150	72.2
#200	0.075	54.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	45.5
Fines (%):	54.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-6-3	12G036	15.5	54.5				

Note(s):

7-30-12
SRS

Excel Geotechnical Testing, Inc.
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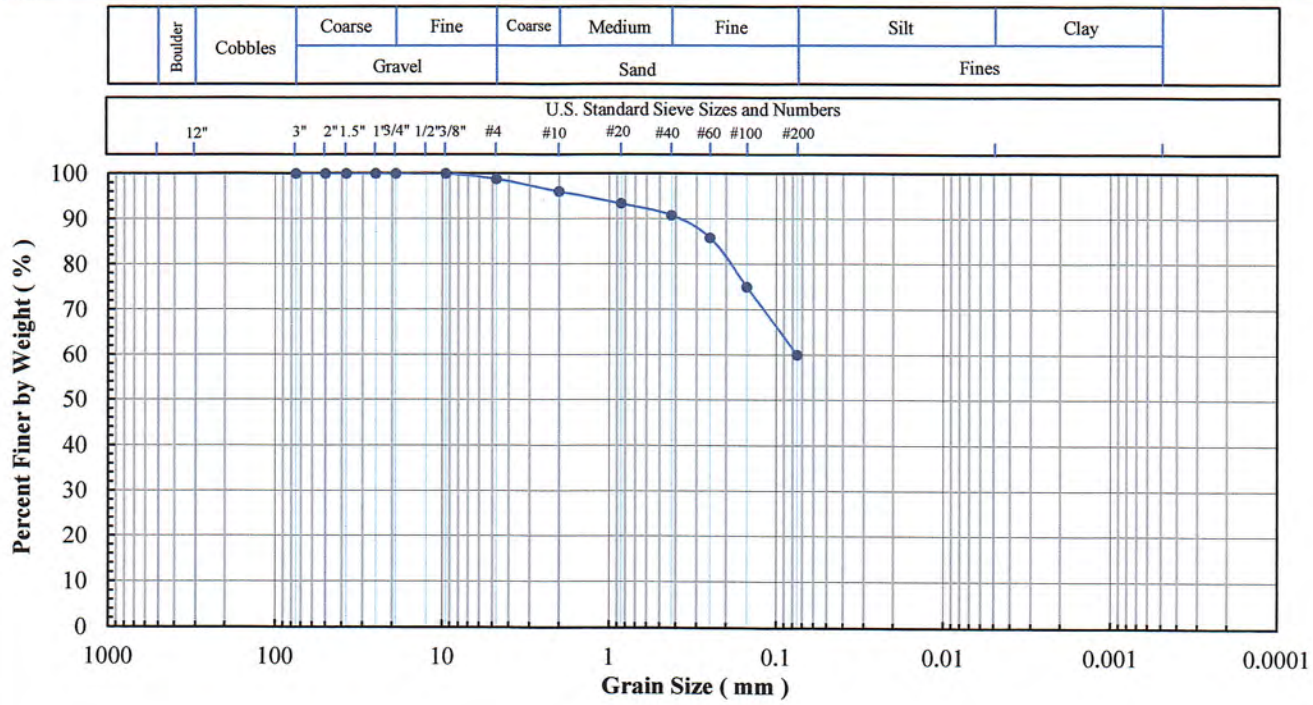
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-7-2
Lab Sample No:	12G041

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



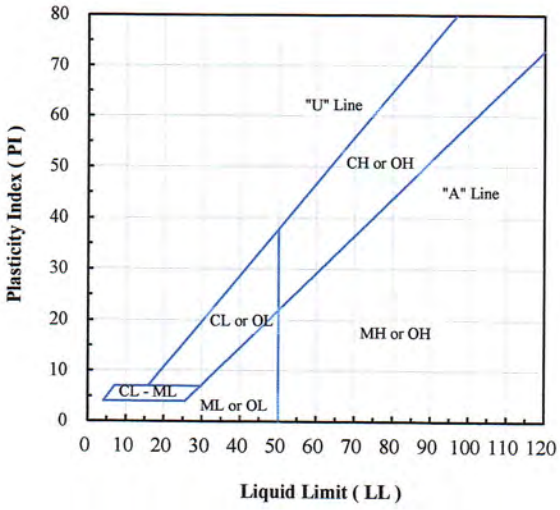
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	96.1
#20	0.850	93.4
#40	0.425	90.8
#60	0.250	85.8
#100	0.150	75.0
#200	0.075	60.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	38.8
Fines (%):	60.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-7-2	12G041		60.0				

Note(s):

7-30-12
STS

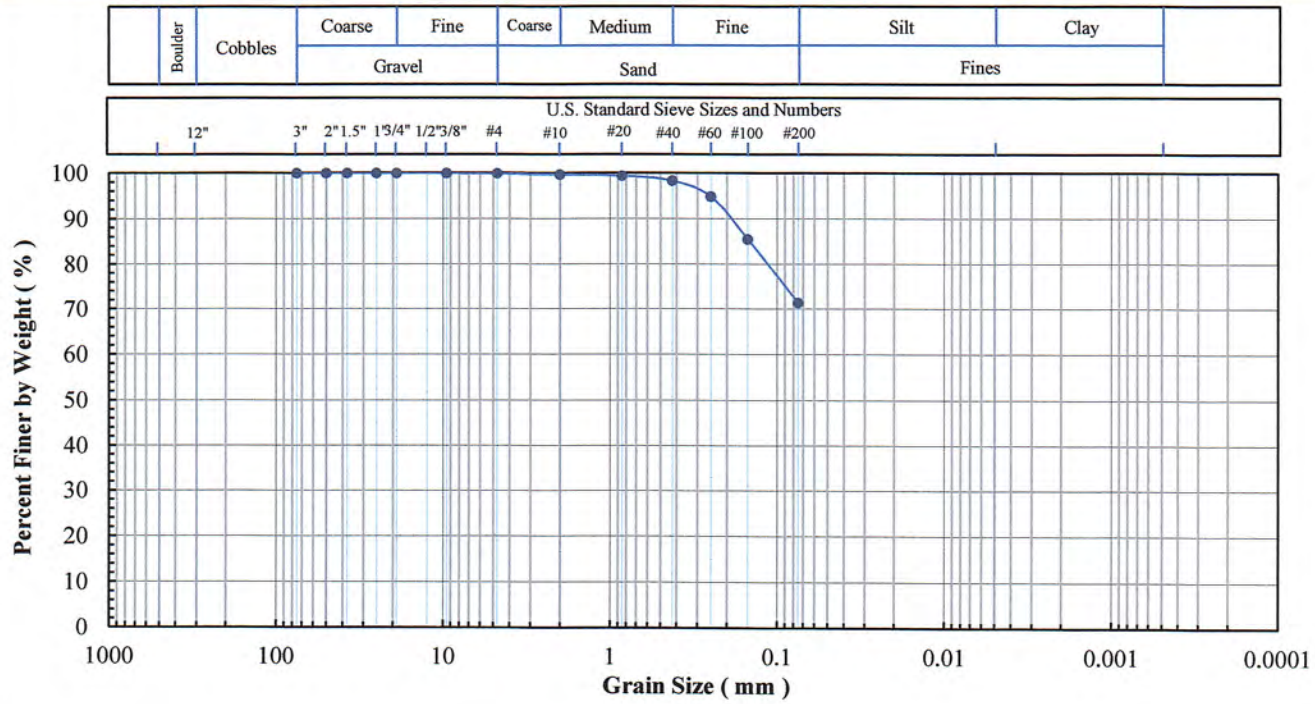
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-7-6
Lab Sample No:	12G043

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



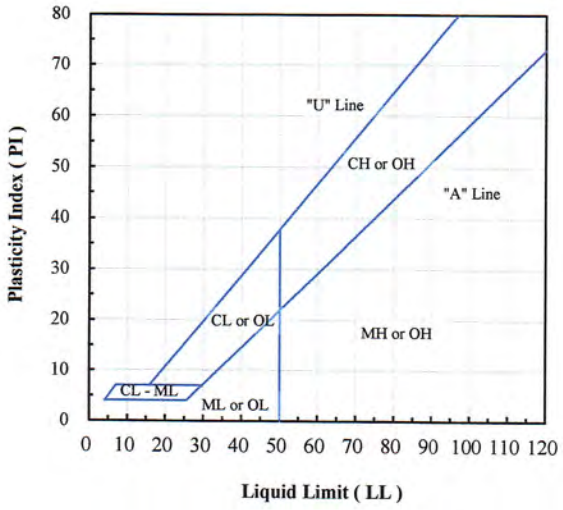
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	99.7
#20	0.850	99.4
#40	0.425	98.3
#60	0.250	94.8
#100	0.150	85.5
#200	0.075	71.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	28.5
Fines (%):	71.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-7-6	12G043		71.4				

Note(s):

7-30-13
SRS

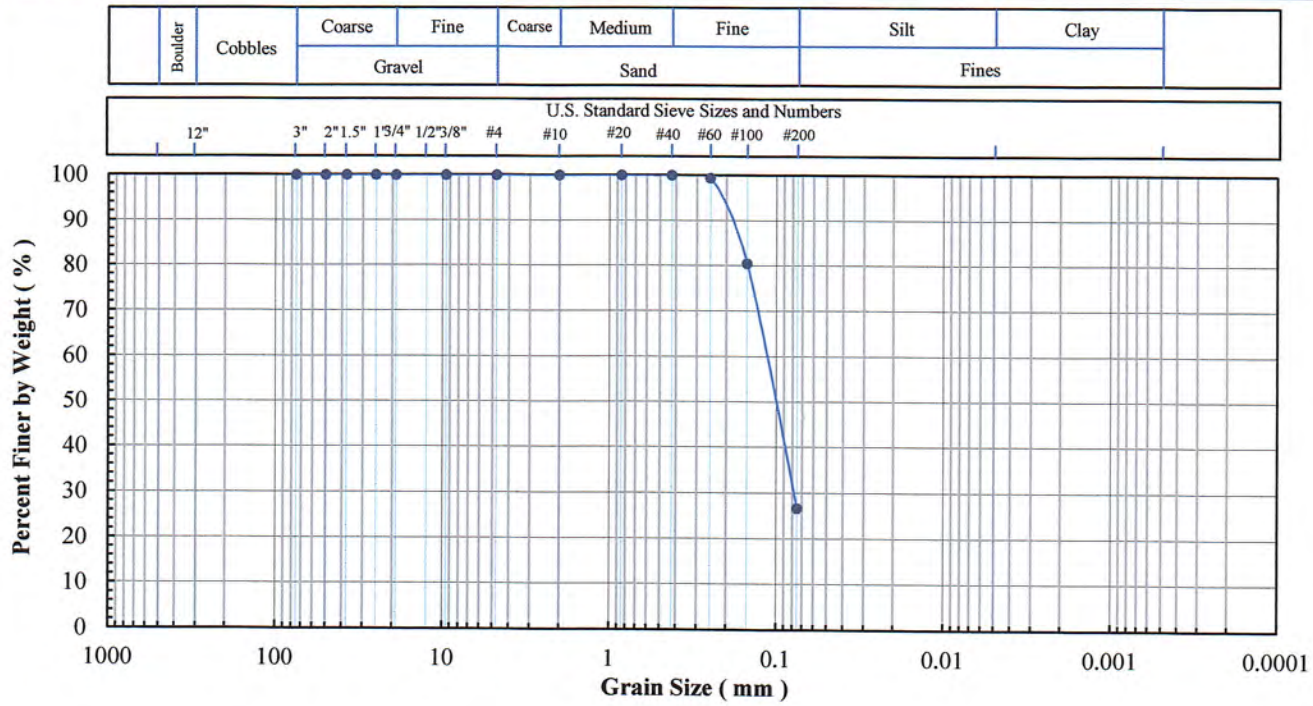
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-8-4
Lab Sample No:	12G046

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



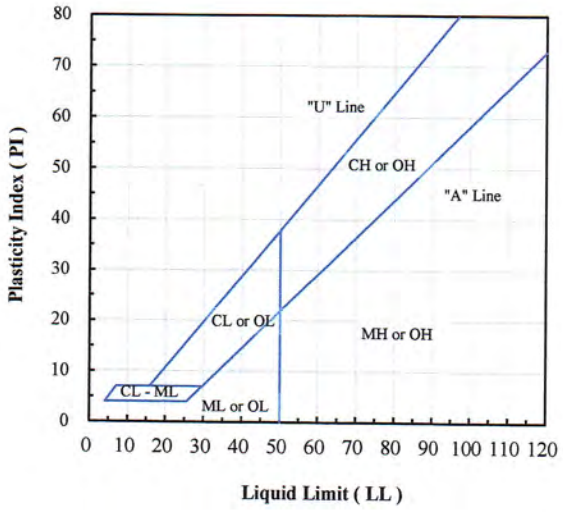
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	99.4
#100	0.150	80.4
#200	0.075	26.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	73.4
Fines (%):	26.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B-8-4	12G046		26.6				

Note(s):

7-30-12
SRS

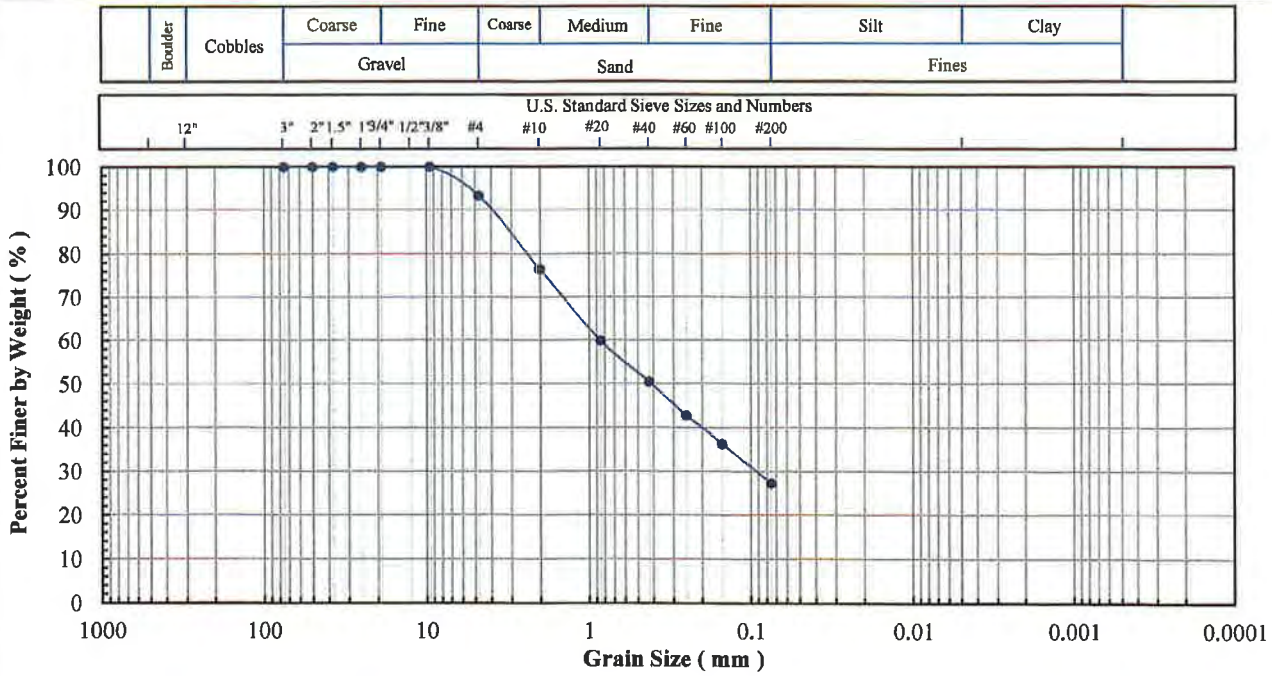
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Miguel To Salt Creek TL6956
Project No:	558
Client Sample ID:	B-9-3
Lab Sample No:	12G049

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



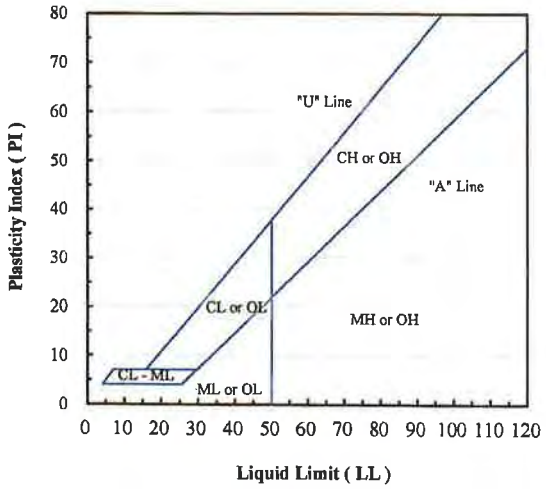
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	93.3
#10	2.00	76.5
#20	0.850	59.9
#40	0.425	50.4
#60	0.250	42.8
#100	0.150	36.4
#200	0.075	27.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6.7
Sand (%):	66.1
Fines (%):	27.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B-9-3	12G049		27.2				

Note(s):

7-30-12
SRS