

REVISED - PEA Pole
Numbers

GEOTECHNICAL INVESTIGATION

**SDG&E TL695 AND TL6971
WOOD TO STEEL IMPROVEMENTS
BRADY PROJECT NO. SDGEC1.023.000
SDG&E IO NO. 200424511
SAN DIEGO, CALIFORNIA**



GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

**RICHARD BRADY & ASSOCIATES, INC.
SAN DIEGO, CALIFORNIA**

**AUGUST 17, 2015
REVISED SEPTEMBER 10, 2015
PROJECT NO. G1818-32-05A**



Project No. G1818-32-05A
August 17, 2015
Revised September 10, 2015

Richard Brady & Associates, Inc.
3710 Ruffin Road
San Diego, California 92123

Attention: Mr. Brian Montesi

Subject: GEOTECHNICAL INVESTIGATION
SDG&E TL695 AND TL6971
WOOD TO STEEL IMPROVEMENTS
BRADY PROJECT NO. SDGEC1.023.000; SDG&E IO NO. 200424511
SAN DIEGO, CALIFORNIA

Dear Mr. Montesi:

In accordance with your authorization of our Proposal No. LG-15114 dated March 30, 2015, we herein submit the results of our geotechnical investigation for the subject transmission lines. The accompanying report presents the results of our study and conclusions and recommendations pertaining to the geotechnical aspects of constructing foundations for poles along the proposed transmission line. This report has been revised to include general geologic information along the subject alignment. The alignment is considered suitable for development provided the recommendations of this report are followed.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED


Michael E. Embick
GE 2462

MEE:DBE:dmc

(e-mail) Addressee




David B. Evans
CEG 1860

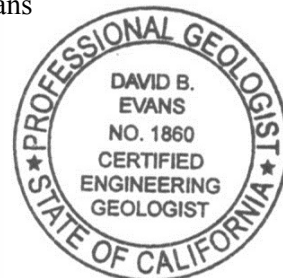


TABLE OF CONTENTS

1.	PURPOSE AND SCOPE	1
2.	PROJECT AND SITE DESCRIPTION	1
3.	FIELD INVESTIGATION.....	8
4.	LABORATORY TESTING RESULTS.....	9
5.	GEOLOGIC HAZARDS	9
5.1	Faulting and Seismicity	9
5.2	Landslides.....	10
5.3	Liquefaction.....	10
5.4	Soil Collapse.....	11
5.5	Subsidence.....	11
5.6	Erosion and Scour.....	12
5.7	Expansive Soil.....	12
6.	GEOLOGIC AND SITE SOIL CONDITIONS	12
6.1	Fill (Unmapped)	13
6.2	Topsoil (Unmapped).....	13
6.3	Alluvium (Qal)	13
6.4	Landslide Deposits (Qls)	14
6.5	Old Alluvial Flood-Plain Deposits (Qoa – includes Qoa2-6, Qoa6, Qoa7).....	14
6.6	Old Paralic Deposits (Qop – includes Qop1-2, Qop2-6, Qop4, Qop7)	14
6.7	Very Old Paralic Deposits (Qvop – includes Qvop 10-13)	15
6.8	San Mateo Formation (Tsm).....	15
6.9	Capistrano Formation (Tcs).....	15
6.10	Monterey Formation (Tm).....	15
6.11	Santiago Formation (Tsa)	15
6.12	Groundwater	16
7.	CORROSION.....	16
8.	RECOMMENDED FOUNDATION DESIGN PARAMETERS	16
9.	CONSTRUCTION CONSIDERATIONS	26

LIMITATIONS AND UNIFORMITY OF CONDITIONS

MAPS AND ILLUSTRATIONS

Figure 1, Vicinity Map
Figure 2, Site Plan Index
Figures 3 to 12, Site Plans
Figure 13, Regional Geologic Map
Figure 14, Geologic Map Index
Figures 15 – 21, Geologic Maps

APPENDIX A

FIELD INVESTIGATION
Figures A-1 – A-14, Logs of Borings

APPENDIX B

LABORATORY TESTING

Table B-I, Summary of Laboratory Direct Shear Test Results

Table B-II, Summary of Laboratory Water-Soluble Sulfate Test Results

APPENDIX C

LOGS OF SELECTED PREVIOUS BORINGS AND LABORATORY TEST RESULTS
from Geocon Incorporated, October 29, 2009

APPENDIX D

LOGS OF SELECTED PREVIOUS BORINGS AND LABORATORY TEST RESULTS
from Geocon Incorporated, September 10, 2012

APPENDIX E

LOGS OF SELECTED PREVIOUS BORINGS AND LABORATORY TEST RESULTS
from URS, May 2, 2012

APPENDIX F

LOGS OF SELECTED PREVIOUS BORINGS AND LABORATORY TEST RESULTS
from Leighton and Associates, June 17, 2011

LIST OF REFERENCES

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation performed for the proposed replacement of existing wood poles with new steel poles along approximately 11 miles of TL695 and TL6971 transmission lines located on Marine Corps Base Camp Pendleton, in San Diego County, California. The purpose of the geotechnical investigation was to evaluate the soil conditions and general site geology in the vicinity of each angle pole location, and to provide geotechnical design parameters required for foundation design of the proposed poles. This report focuses primarily on the angle poles; however, it also includes geologic and seismic hazard information for the non-angled, existing poles and towers along the alignment.

The scope of this geotechnical investigation included a review of readily available published and unpublished geologic literature and performing a field investigation, laboratory testing, engineering analyses, and the preparation of this report. Our geotechnical field investigation included drilling fourteen (14) small-diameter exploratory borings to a maximum depth of approximately 51½ feet.

The boring logs, and other details of the field investigation, are presented in Appendix A. We tested selected soil samples obtained during the field investigation to evaluate pertinent physical properties for engineering analyses and to assist in providing recommendations for foundation design criteria. Details of the laboratory test results are presented in Appendix B. Relevant data from previous geotechnical reports that were prepared for the alignments is included in Appendices C through F.

The recommendations presented in this report are based on an analysis of the data collected during the site investigation and previous investigations, the results of laboratory tests performed on soil samples collected during the site investigation, and our experience with similar soil and geologic conditions.

2. PROJECT AND SITE DESCRIPTION

The project alignment is located along the SDG&E easement in the northern portion of Camp Pendleton near the western boundary, in San Diego County, California. Specifically, the TL695 and TL6971 alignments extend from the Tule Substation (located south of the eastern terminus of Avenida Pico) approximately ⅓ mile westward, then trends south roughly 3 miles toward the coast. The project splits just south of where it crosses Cristianitos Road with a new line to be strung on existing towers that extend to the southeast and the existing 69kV line to be removed that extends to the southwest. From the split, the new line will trend about 2½ miles southeast to near the northern corner of the San Onofre Nuclear Generating Station (SONGS) Mesa. The existing line that will be

removed trends to the southwest from the split about $\frac{1}{3}$ mile to the San Mateo Substation, about $\frac{3}{4}$ mile further southwest to El Camino Real, heading southeast about 1 mile, crossing San Mateo Creek and ending just before the Basilone Substation at Basilone Road. The poles will remain, as they also support 12kV and 138kV components. The line will connect to the Basilone Substation and head west along Basilone Road for about $\frac{1}{2}$ mile, and then southeast for $\frac{3}{4}$ mile towards the SONGS Mesa. It will then head east about $\frac{1}{2}$ mile and connect back with new line at the north end of the Mesa through a short underground section. The final leg extends southeast wrapping in a clockwise manner around the SONGS Mesa, terminating at the Japanese Mesa Substation (see *Vicinity Map*, Figure 1). Topographically, the alignment consists of ridges, canyons and two wide drainages (San Mateo Creek and San Onofre Creek) that are accessed from various public and military roads and gated entrances along the SDG&E and local utility easements.

A list of the poles or towers associated with the alignment is presented in Table 1. A simplified numbering system has been used with many of the figures for clarity. Figure 2, *Site Plan Index*, depicts the alignment and selected poles for reference. Figures 3 through 12, *Site Plans*, depict the actual pole locations, either existing or planned, for the alignment. The PEA pole numbers can be cross-referenced to the simplified numbers using Table 1. The alignment in relation to regional geology is depicted on Figure 13.

We understand that steel poles will be installed to replace the existing wood poles at angle points along the TL695 and TL6971 alignments as a part of the transmission line improvements. Steel poles will also replace the balance of the wood poles along the alignment and some of the existing steel poles and H-Frames. A description of the work to be done at each location is also included in Table 1. The engineered steel angle poles required geotechnical explorations to provide engineering parameters for the design and construction of the new structures. Table 2 lists the proposed new angle poles and their approximate coordinates from the north end of the alignment to the south.

**TABLE 1
SUMMARY OF PROPOSED STRUCTURES**

Simplified Structure No.	PEA Structure No.	Structure Description	Work Being Done
1	14	New Steel Pole at Angle Point	Replace Wood H-frame
2	15	Pole to be retired	Remove Wood Pole
3	16	Pole to be retired	Remove Wood Pole
4	17	New Steel Pole at Angle Point	Replace Wood H-frame
5	18	New Steel Pole	Replace SW H-frame

TABLE 1 (Continued)
SUMMARY OF PROPOSED STRUCTURES

Simplified Structure No.	PEA Structure No.	Structure Description	Work Being Done
6	19	New Steel Pole	Replace Wood H-frame
7	20	Pole to be retired	Remove Wood Pole
8	21	New Steel Pole	Replace Wood H-frame
9	22	New Steel Pole	Replace Wood H-frame
10	23	New Steel Pole	Replace Wood H-frame
11	24	New Steel Pole	Replace Wood H-frame
12	25	Pole to be retired	Remove Wood Pole
13	26	New Steel Pole	Replace SW H-frame
14	27	New Steel Pole	Replace Wood H-frame
15	28	New Steel Pole	Replace Wood H-frame
16	29	Pole to be retired	Remove Wood Pole
17	30	New Steel Pole	Replace SW H-frame
18	31	New Steel Pole	Replace Wood H-frame
19	32	New Steel Pole	Replace Wood H-frame
20	33	New Steel Pole	Replace Wood H-frame
21	34	New Steel Pole	Replace Wood H-frame
22	35	Pole to be retired	Remove Wood Pole
23	36	Pole to be retired	Remove Wood Pole
24	37	New Steel Pole	Replace Wood H-frame
25	38	New Steel Pole	Replace Wood H-frame
26	39	New Steel Pole at Angle Point	Replace Wood 3-Pole
27	ZXXXXXX	New Steel Pole	Install Steel Pole
28	ZXXXXXX-1	New Steel Two-Pole at Angle Point	Install Steel H-frame
29	ZXXXXXX-2	New Steel Two-Pole at Angle Point	Install Steel H-frame
30	43	Existing Tower	String new wire

TABLE 1 (Continued)
SUMMARY OF PROPOSED STRUCTURES

Simplified Structure No.	PEA Structure No.	Structure Description	Work Being Done
31	44	Existing Tower	String new wire
32	45	Existing Tower	String new wire
33	46	Existing Tower	String new wire
34	47	Existing Tower	String new wire
35	48	Existing Tower	String new wire
36	49	Existing Tower	String new wire
37	50	Existing Tower	String new wire
38	51	Existing Tower	String new wire
39	52	Existing Tower	String new wire
40	53	Existing Tower	String new wire
41	ZXXXXXX-3	New Cable Pole (Angle Point)	Install Cable Pole
42	56	New Cable Pole (Angle Point)	Install Cable Pole, Replace Wood Pole
43	3	New Steel Pole at Angle Point	Replace Wood Pole
44	57	New Steel Pole at Angle Point	Replace Wood Pole
45	58	New Steel Pole	Replace Wood Pole
46	59	New Steel Pole	Replace Wood Pole
47	60	New Steel Pole	Replace Wood Pole
48	61	New Steel Pole	Replace Wood Pole
49	62	New Steel Pole at Angle Point	Replace Wood Pole
50	63	New Steel Distribution Pole	Replace Wood Pole
51	64	New Steel Distribution Pole	Replace Wood Pole
52	66	New Steel Pole	Replace Wood Pole
53	65	New Steel Distribution Pole	Replace Wood Pole
54	67	New Steel Pole	Replace Wood Pole
55	68	New Steel Pole	Replace Wood Pole

TABLE 1 (Continued)
SUMMARY OF PROPOSED STRUCTURES

Simplified Structure No.	PEA Structure No.	Structure Description	Work Being Done
56	69	New Steel Pole	Replace Wood Pole
57	70	New Steel Pole	Replace Wood Pole
58	71	New Steel Pole	Replace Wood Pole
59	72	New Steel Pole	Replace Wood Pole
60	73	New Steel Pole	Replace Wood Pole
61	74	New Steel Distribution Pole	Replace Wood Pole
62	75	New Steel Pole at Angle Point	Replace Wood Pole
63	76	New Steel Pole at Angle Point	Replace Wood Pole
64	77	New Steel Pole	Replace Wood Pole
65	78	New Steel Pole at Angle Point	Replace Wood Pole
66	79	New Steel Pole at Angle Point	Replace Wood Pole
67	80	New Steel Distribution Pole	Replace Wood Pole
68	81	New Steel Pole at Angle Point	Replace Wood Pole
69	82	New Steel Pole	Replace Wood Pole
70	83	New Steel Pole at Angle Point	Replace Wood Pole
71	EX. FDN POLE (85)	Existing Steel Pole at Angle Point	TSFR/String new wire
72	ZXXXXXX-4	New Steel Pole at Angle Point	Install FND pole
73	88	New Steel Pole	Replace Wood Pole
74	89	New Steel Pole	Replace Wood Pole
75	90	New Steel Pole	Replace Wood Pole
76	91	New Steel Pole	Replace Wood Pole
77	92	New Steel Pole	Replace Wood Pole
78	93	New Steel Distribution Pole	Replace Wood Pole
79	95	New Steel Pole	Replace Wood Pole
80	96	New Steel Distribution Pole	Replace Wood Pole

TABLE 1 (Concluded)
SUMMARY OF PROPOSED STRUCTURES

Simplified Structure No.	PEA Structure No.	Structure Description	Work Being Done
81	97	New Steel Pole	Replace Wood Pole
82	98	New Steel Pole at Angle Point	Replace Wood Pole
83	99	New Steel Pole	Replace Wood Pole
84	100	New Steel Pole at Angle Point	Replace Wood Pole
85	101	New Steel Pole at Angle Point	Replace SW pole
86	102	New Steel Pole at Angle Point	Replace Wood Pole
87	ZXXXXXX-5	New Steel Pole at Angle Point	Install FDN pole
88	EX. FDN POLE (87)	Existing Steel Pole at Angle Point	Transfer Wire
89	2	New Steel Pole	Replace Wood Pole
90	5	New Steel Pole	Replace Wood Pole
91	6	New Steel Pole at Angle Point	Replace Wood Pole
92	7	New Steel Pole at Angle Point	Replace Wood Pole
93	8	New Steel Pole	Replace Wood Pole
94	9	New Steel Pole	Replace Wood Pole
95	10	New Steel Pole	Replace Wood Pole
96	11	Ex. SW Pole	
97	12	New Steel Pole at Angle Point	Replace Wood Pole
98	13	New Steel Pole	Replace Wood Pole
99	94	Pole to be retired	Remove Wood Pole
100	104	New Steel Distribution Pole	Replace Wood Pole
101	4	New Steel Distribution Pole	Replace Wood Pole

TABLE 2
SUMMARY OF PROPOSED ANGLE POINT STRUCTURES

Simplified Structure No.	PEA Structure No.	Latitude	Longitude
43	3	33.45461	-117.57194
91	6	33.45450	-117.57342
92	7	33.45340	-117.57369
97	12	33.45387	-117.57798
1	14	33.45299	-117.57806
4	17	33.44904	-117.57850
26	39	33.41508	-117.5822
28	ZXXXXXX-1	33.41321	-117.58068
29	ZXXXXXX-2	33.41296	-117.58038
71	EX. FDN POLE (85)	33.38849	-117.58236
87	ZXXXXXX-5	33.38840	-117.58280
88	EX. FDN POLE (87)	33.38771	-117.58280
70	83	33.38794	-117.58145
68	81	33.38651	-117.57938
66	79	33.38603	-117.57826
65	78	33.38598	-117.57678
63	76	33.38645	-117.57405
62	75	33.38574	-117.57292
49	62	33.37944	-117.56284
44	57	33.38163	-117.55809
42	56	33.38218	-117.55682
72	ZXXXXXX-4	33.38188	-117.55648
41	ZXXXXXX-3	33.38225	-117.55551
82	98	33.37727	-117.55236
84	100	33.37542	-117.55328
85	101	33.37469	-117.55392
86	102	33.37453	-117.55502

We understand that the proposed pole foundations at each location will consist of a drilled, cast-in-place reinforced concrete pier (or two for H-Frame) that will vary in diameter and depth depending on the prevailing soil conditions and loading, but are generally on the order of 4 to 10 feet in diameter with depths of up to 40 feet.

The site description and proposed improvements are based on a site reconnaissance, the available topographic maps and plans, and discussions with you. If improvement plans differ from those described herein, Geocon Incorporated should be contacted for review of the plans and possible revisions to this report, especially with regard to changes in final grades of the top of the pole foundations.

3. FIELD INVESTIGATION

We performed our field investigation between June 29, 2015 and July 6, 2015, that consisted of drilling 14 small-diameter borings (B-1 through B-14) to a maximum depth of approximately 51½ feet. We also have information from previous geotechnical investigations done at, or near, some of the angle pole sites. The locations of the proposed angle poles together with the approximate locations of the most recent borings from this investigation, as well as selected borings from previous field exploration are shown on Figures 14 through 21, *Geologic Maps*. Table 3 summarizes the proposed structures, approximate elevations, and associated borings.

**TABLE 3
SUMMARY OF PROPOSED STRUCTURES AND ASSOCIATED BORINGS**

Simplified Structure No.	PEA Structure No.	Approximate Elevation (MSL)	Boring No.
43	3	270	B1 & B1 ¹
91	6	289	B1
92	7	290	B1 & B2 ¹
97	12	373	B6 ¹ & B7 ¹
1	14	375	B8 ¹
4	17	332	B2
26	39	230	B3
28	ZXXXXXX-1	120	B6
29	ZXXXXXX-2	106	B6 & B3 ²
71	EX. FDN POLE	103	B14
87	ZXXXXXX-5	106	B14
88	87	100	B14 & B1 ³
70	83	113	B14 & B4 ⁴
68	81	126	B13
66	79	118	B13
65	78	125	B12
63	76	145	B12 & B14
62	75	65	B11

TABLE 3 (Concluded)
SUMMARY OF PROPOSED STRUCTURES AND ASSOCIATED BORINGS

49	62	92	B5
44	57	94	B4
42	56	107	B10
72	ZXXXXXX-4	98	B10
41	ZXXXXXX-3	113	B10
82	98	149	B9
84	100	139	B8
85	101	128	B8
86	102	102	B7

¹ From Geocon Report dated October 29, 2009

² From Geocon Report dated September 10, 2012

³ From URS Report dated May 2, 2012

⁴ From URS Report dated May 2, 2012, Leighton boring from 2011 referenced in URS report

4. LABORATORY TESTING RESULTS

We performed laboratory tests on a selected sample in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for their *in situ* moisture and dry density, direct shear strength, and water-soluble sulfate content. The results of the laboratory tests are presented in Appendix B.

5. GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

The project site is not within an Alquist-Priolo Earthquake Study Zone as established by the State Geologist. The potentially active Cristianitos Fault traverses the northern portion of the alignment. The “2010 Fault Activity Map of California,” lists this as either a “Pre-Quaternary fault (older than 1.6 million years), or fault without recognized Quaternary displacement.” Due to this classification, it is not anticipated to impact the project. According to the computer program *EZ-FRISK* (Version 7.65), the nearest known active fault is the Newport-Inglewood (offshore) Fault, located between 4 and 7 miles west of the alignment and is the dominant source of potential ground motion. We used the 2008 USGS fault database that provides several models and combinations of fault data to evaluate the fault information. Earthquakes that might occur on this fault zone or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude is 7.5 for the Newport-Inglewood Fault. The estimated deterministic maximum peak ground acceleration is 0.33g at the northern end of the alignment, 0.42g within the central portion of the alignment (at the Basilone Substation, Boring B14), and 0.39g at the south end of the alignment.

5.2 Landslides

Ancient landslides have been mapped over a large portion of the northern end of the alignment in the steeply sloping areas between west of the Talega Substation to where the project splits near Cristianitos Road. Previous Geotechnical borings in the vicinity of poles 1, 97 and 98 did not indicate a landslide at the very northern end; however, immediately south on the alignment, a landslide was encountered in Boring B2. The landslide is part of a larger complex of slides that have occurred in the Capistrano Formation. Although an evaluation of the existing stability of the landslides was beyond the scope of this study, measures to increase the stability, if necessary, would be considered impractical due to their large, deep nature. Since the loads imposed from existing poles or new poles are considered to be relatively insignificant when compared to the overall mass of the slides, the project is anticipated to have a negligible impact on landslide stability.

5.3 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soils are cohesionless or silt/clay with low plasticity, groundwater is encountered within 40 feet of the surface, and soil densities are less than about 70 percent of the maximum dry densities. If the four previous criteria are met, a seismic event could result in a rapid pore water pressure increase from the earthquake-generated ground accelerations. The higher pore pressure can separate particles and cause the soil to act in a manner more like a fluid.

Portions of the alignment are located within a County of San Diego-designated liquefaction hazard zone. These areas are designated on Figure 13, *Regional Geologic Map* and are within the San Mateo Creek and the San Onofre Creek drainages. Three of the angle poles for which this study was initially performed (Nos. 28, 29 and 62) are located within potentially liquefiable areas; however, based on the elevation, boring information and laboratory test results, will not be subject to liquefaction. Additionally, the liquefaction maps were created on a very large scale and, therefore, their limits should be considered approximate. Portions of the limits extend into areas mapped within Tertiary Formations. In general, young alluvial deposits should be considered susceptible to liquefaction. In our opinion, actual structures (poles or towers) that may be prone to liquefaction include Nos. 31 to 33, 39, and 55 to 58. The effects of liquefaction could include loss of bearing capacity within portions of the foundations and corresponding settlement; as well as sand boils, however, the poles or towers where liquefaction may occur are currently existing. Changing to steel poles from wooden poles or leaving the existing towers in-place will not change the liquefaction potential at these locations.

Lateral spreading occurs when liquefiable soil is in the immediate vicinity of a free face, such as a slope. Factors controlling lateral displacement included earthquake magnitude, distance from earthquake epicenter, thickness of the liquefiable soil layer, grain size characteristics, fines content of the soil and SPT blow counts. The pole and tower locations prone to liquefaction (Nos. 31 to 33, 39,

and 55 to 58) are located on relatively level ground and, therefore, the effects of lateral displacement at these sites, were they to liquefy, would not be expected to have an adverse impact on the structures.

5.4 Soil Collapse

The potential for soil collapse (aka hydrocollapse) typically occurs where the structure of the soil is in a relatively low density, unconsolidated matrix. This is often a result of clayey soils that have dried in mudflows. The addition of water adds weight and allows the bonds between the soil particles to be broken and rearrange into a more consolidated state. Additionally, grading that adds loading from fill can also be a contributing factor to soil collapse. Along the subject alignment, soil collapse might be expected within the alluvial and flood plain deposits. The two borings that we extended into the old alluvial deposits indicated stiff clays, except near the surface, and sandy soils, both of which are less prone to soil collapse.

Soil collapse can be problematic with structures on shallow foundations where settlement near the surface can cause concomitant settlement of the structure. Soil collapse in the vicinity of deep foundations as will be constructed for the new poles is not anticipated to have near the same effect as on shallow foundations. Because no significant fill will be placed and the new poles will be constructed on deep foundations, the potential for soil collapse to impact the proposed new poles is considered to be low.

5.5 Subsidence

Subsidence is typically caused by the extraction of groundwater (or petroleum) from large alluvial areas that are composed of relatively unconsolidated soil or organic soil. The extraction of the liquid, lowers the water table (or oil table), decreasing the buoyant forces. This loads the unconsolidated layers, causing aerial compression or consolidation. The project crosses two alluvial basins (San Mateo Creek and San Onofre Creek) where active pumping of groundwater from wells is currently occurring or has previously occurred. The potential for subsidence crossing these areas does exist; however, the poles and towers that cross these areas have been in-place for more than 10 years and some of the wells have been in operation prior to 1994. We opine that although the potential for subsidence exists, a large portion of the compression has likely already taken place. Additionally, subsidence would likely occur as a relatively uniform phenomenon, decreasing the likelihood of differential settlement beneath any particular tower. Therefore, we do not expect subsidence to pose a significant adverse impact to the project.

5.6 Erosion and Scour

Soil on sloping terrain, and in particular, where clean sandy soil is present at the ground surface, has the potential to erode. However, this erosion is much more prevalent where water is directed into a concentrated channel such as within a rivulet or small drainage. Based on our review, it does not appear that the subject poles will be located at such locations. Additionally, we understand that Best Management Practices (BMP's) will be implemented during design and construction to reduce or eliminate erosion at each construction site; therefore, we do not believe that erosion will pose a significant adverse impact to the project.

Scour is similar to erosion except that it is by transport of soil beneath water in rivers or creeks during period of heavy flow. We did not perform a scour analysis; however, Towers 31, 32, 33 and 39 and Poles 55 to 58 are located within the alluvial drainages of the San Mateo and San Onofre Creeks. Based on Federal Emergency Management Agency (FEMA) maps, these drainages have been classified as Flood Zone D, indicating there are possible but undetermined flood hazards, and, therefore, an assessment of the impact of flooding within the basin has not been conducted by FEMA. During flooding, if water conditions rose to the elevations of the towers or poles, it is conceivable that scour could occur. Therefore, we consider that the potential exists for scour at these locations. If desired, analysis by a hydrologist should be pursued to further evaluate the scour potential.

5.7 Expansive Soil

Expansive soil (typically clay) can be found along the subject alignment. Expansive soil is problematic when the soil is subject to cyclical wetting and drying resulting in swelling and shrinking. This generally occurs where the moisture content varies seasonally over time and has low confining pressures, typically within the upper 4 feet of the ground surface. This is generally more of a concern where structures bear on shallow foundations or slabs on grade. Because the structures for the alignment will have deep foundations, where the moisture content is relatively consistent and the confining pressures are greater, the potential for expansive soil to impact the project is considered low.

6. GEOLOGIC AND SITE SOIL CONDITIONS

Marine and river sedimentary units make up the geologic units encountered along the alignment and consist of Pleistocene age Old Alluvial Flood Plain Deposits, Old Paralic Deposits (formerly known as Terrace Deposits), and Very Old Paralic Deposits (also formerly known as Terrace Deposits). Tertiary age units along the alignment also consist of the Capistrano Formation, San Mateo Formation, Monterey Formation, and the Santiago Formation. One angle pole (Pole 4, [PEA 17]) on the northern portion of the alignment is located on a large landslide complex. During the investigation, we experienced very difficult drilling conditions for several of the borings. The four Tertiary age formations encountered generally consisted of claystone/siltstone and sandstone. Identification of

regional geology is based on the California Geologic Survey document *Geologic Map of the Oceanside 30' x 60' Quadrangle, California*, prepared by Kennedy, M. P., and S. S. Tan, 2007.

The project alignment is generally underlain by four surficial soil types and the aforementioned seven geologic formations. The surficial units consist of fill, topsoil, alluvium, and landslide deposits. The formational materials consist of Old Alluvial Flood Plain Deposits, Old Paralic Deposits, Very Old Paralic Deposits, Capistrano Formation, San Mateo Formation, Monterey Formation, and the Santiago Formation. The regional geology for the alignment is depicted on Figure 13, *Regional Geologic Map*. The boring locations and the angle pole locations are shown on the geologic maps, Figures 14 through 21. The soil and geologic units encountered during the investigation are presented in the boring logs in Appendix A. The surficial soil types and geologic units are described below in order of increasing age.

6.1 Fill (Unmapped)

We encountered undocumented fill in 6 of the 14 borings to a maximum depth of 8 feet, which was likely placed during the construction of access roads, or grading for parking lots. Because the borings were offset from specific pole locations, a number of the poles will be placed in relatively undisturbed areas and are not expected to be impacted significantly by fill soil, although some topsoil may be expected. The exception to this is Pole 49 (PEA 62), at Boring B5, where 8 ½ feet of fill was encountered. The fill in this boring consisted of medium dense, silty and sandy gravel and cobble. We recommend the foundation of the proposed poles extend into the formational units below the fill.

6.2 Topsoil (Unmapped)

We encountered topsoil in 7 of the 14 borings to a maximum thickness of approximately 5 feet. The topsoil consists primarily of soft to stiff, silty and sandy clay and loose, silty sand. The top few inches of this material typically has a high organic content due to vegetative growth. We recommend the foundation of the poles extend below topsoil into underlying geologic units. Additionally, a number of borings were located in areas where no topsoil was present because they were advanced in areas where grading had occurred or where the ground had been disturbed; however, the related poles are located within native, relatively undisturbed soil. At these locations, we made assumptions that some topsoil was present. Our recommended foundation design parameters that follow reflect these assumptions.

6.3 Alluvium (Qal)

We did not encounter alluvium in borings this investigation, nor in previous investigations; however, alluvium has been mapped near the alignment and along the alignment within the major drainages (San Mateo Creek and San Onofre Creek). Alluvium generally occurs in canyon bottoms and

drainages and is generally loose or soft. Poles that have been mapped in alluvium include Nos. 31 to 33, 39, and 55 to 58.

6.4 Landslide Deposits (Qls)

We encountered Quaternary-age Landslide Deposits, as mapped by Kennedy and Tan (2007), in Boring B2 (Pole 4, [PEA 17]) to the maximum depth explored of approximately 41½ feet. The Landslide Deposits encountered in B2 generally consists of stiff, silty clay and clayey silt. The landslide complex in this area is very large and stabilization measures are not considered practical nor warranted. In this regard, the modification of the poles from wood to steel in this area is anticipated to have no impact on landslide stability. Pole locations that have been mapped in landslide deposits include Pole Nos. 2 to 12 and 19 to 22.

6.5 Old Alluvial Flood-Plain Deposits (Qoa – includes Qoa2-6, Qoa6, Qoa7)

Pleistocene-age Old Alluvial Flood Plain Deposits were encountered in two borings, Boring B6 (Poles 28, ZXXXXXX-1 and 29, ZXXXXXX-2) and B11 (Pole 62, [PEA 75]) and are likely associated with ancient flooding of San Mateo Creek and San Onofre Creek, respectively, as the borings and poles are located on the northern margins of these drainages. Boring B3 (in the vicinity of Boring B6) from a previous Geocon report (See Appendix D) also indicated Old Alluvium in this area. This deposit is also mapped at other locations along the alignment and includes Pole 27, and 59 to 61. This deposit generally consisted of loose to very dense, clean sand and silty sand. This deposit exhibits adequate shear strength and “low” expansive potential.

6.6 Old Paralic Deposits (Qop – includes Qop1-2, Qop2-6, Qop4, Qop7)

Old Paralic Deposits were encountered in 9 of the 14 borings for the angle poles and are mapped at other locations along the alignment. Poles associated with these units include Nos. 40 to 42, 44 to 52, 54, 64 to 88, 99, and 100. This formation encountered in our borings generally consisted of medium dense to very dense silty and clayey, gravel and cobble conglomerate, medium dense to dense, clean sand and clayey sand, and stiff to very stiff sandy clay and sandy silt. The most difficult drilling conditions generally were found to be related to northern side of the SONGS Mesa (Borings B4, B5, and B10) and along Basilone Road (Borings B12 and B13). The more clayey deposits appeared to be along the southern portion of the SONGS Mesa; however, even there, some cobble zones requiring difficult drilling conditions should be expected. In general, these deposits may be very difficult to drill and require specialized heavy-duty equipment. Clean sand lenses were observed within Borings B4 and B5. These lenses may be subject to caving and instability during foundation excavation operations and casing or grouting and re-drilling may be necessary. The granular portions of the Terrace Deposits typically exhibit adequate shear strength and “low” expansive potential. The clayey portions exhibit adequate strength with higher expansion potential.

6.7 Very Old Paralic Deposits (Qvop – includes Qvop 10-13)

Similar to the Old Paralic Deposits, Very Old Paralic Deposits have been mapped at Towers 34 and 35 and are older than the Old Paralic Deposits, but considered similar in composition. These deposits have been classified as poorly sorted, beach, estuarine and colluvial deposits composed of siltstone, sandstone, and conglomerate. These deposits have been mapped where existing towers will remain and, therefore, no construction issues are expected from these deposits.

6.8 San Mateo Formation (Tsm)

The San Mateo Formation was encountered underlying the Old Paralic Deposits in Boring B14 and, based on a review of the geologic map by Kennedy and Tan, 2007, and our observations of the cut slope below Pole 63 (PEA 76), composes the ridge where Pole PEA 76 is located. This unit has also been mapped at Poles 36, 37 and 53. The material typically consists of interbedded sandstone and siltstone with varying degrees of cementation. The San Mateo Formation in this area exhibits adequate shear strength.

6.9 Capistrano Formation (Tcs)

The Capistrano Formation was encountered in Boring B3 underlying fill and topsoil to the maximum depth explored (51½ feet). The Capistrano Formation encountered was the siltstone facies of this unit and consisted of very stiff, sandy and clayey siltstone and silty claystone, with some interbedding of medium dense, clean sand. This unit has been mapped at Poles 13 to 18, 23 to 26, and 30 and typically exhibits adequate strength.

6.10 Monterey Formation (Tm)

The Monterey Formation was encountered in Borings B6 to B8 from the referenced report dated October 29, 2009 (see Appendix C), and was found overlying the Santiago Formation in Boring B7 from that report. This unit is expected at Poles 1 and 95 to 98. The Monterey Formation consisted of moderately cemented sandy siltstone, claystone, and silty sandstone. The Monterey Formation typically exhibits adequate strength.

6.11 Santiago Formation (Tsa)

We encountered the Santiago Formation in Boring B1 (Poles 43, [PEA 3] and 91, [PEA 6]) and it was observed in previous borings by Geocon at the northern end of the alignment. Poles where the Santiago Formation is expected to be exposed are Nos. 43, 89 to 94 and 101. The Santiago Formation generally consists of medium dense to dense, silty sandstone and stiff to hard, sandy siltstone and claystone with varying degrees of cementation. The Santiago Formation in this area exhibits adequate shear strength.

6.12 Groundwater

We did not encounter groundwater within the borings during our field investigation. In two borings, B2 located within the landslide and B11 located on the northern side of San Onofre Creek, we encountered very moist soil toward the bottoms of the borings. We do not expect groundwater to significantly impact proposed construction with the exception of poles located in alluvium (Nos. 55 to 58). The on-site geologic units have permeability characteristics and/or fracture systems that are conducive to water transmission, natural or otherwise (i.e., landscape), and may result in future seepage conditions. In particular, due to multiple years of drought conditions, groundwater and seepage is expected to be at low levels. If construction proceeds following a period of significant precipitation, groundwater or seepage conditions could be encountered that were not previously observed. Groundwater may be expected within the aforementioned pole areas that are in alluvium and casing, drilling mud and wet drilling techniques may be necessary for the construction of pole foundations if placed below groundwater or seepage.

7. CORROSION

Laboratory tests were performed on limited samples of the on-site materials to determine the percentage of water-soluble sulfate. Results from the laboratory water-soluble sulfate tests are presented in Table B-II and indicate that the on-site materials at the locations tested possess a *not applicable* Severity and an S0 Class sulfate exposure to concrete structures as defined by 2013 CBC Section 1904.2 and ACI 318-11 Sections 4.2 and 4.3. It should be noted that the presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, if improvements that could be susceptible to corrosion are planned, it is recommended that further evaluation by a corrosion engineer be performed.

8. RECOMMENDED FOUNDATION DESIGN PARAMETERS

A generalized subsurface soil profile has been developed for the area surrounding each angle pole foundation based on the data obtained from our investigation. Soil layers have been categorized by depth below the existing grade and assigned soil parameters that may be utilized with the *MFAD* computer program used by SDG&E for pier foundation design.

Tables 8.1 through 8.27 summarize the average total unit weight, cohesive strength, angle of internal friction, and deformation modulus assigned to the soil layers beneath the proposed angle pole sites. The parameters presented herein are based on current and past experience and/or testing of similar materials. We have assumed that the existing grade will not be changed significantly. If the finalized improvements are different from those currently proposed, Geocon Incorporated should be contacted for further evaluation.

TABLE 8.1
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 3)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	110	10	124	0.5	1.0
3 to 25	Santiago Formation	400	28	120	18	130	3.5	1.0
25 to 40+	Santiago Formation	800	23	120	16	130	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B1 from report dated October 29, 2009 and Boring B1.

TABLE 8.2
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 6)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	110	10	124	0.5	1.0
3 to 25	Santiago Formation	400	29	107	5	125	2.4	1.0
25 to 30+	Santiago Formation	300	28	125	16	130	3.0	1.0

Note: Based on the subsurface conditions encountered in Boring B1.

TABLE 8.3
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 7)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	110	10	124	0.5	1.0
3 to 15	Santiago Formation	400	28	115	8	130	2.4	1.0
15 to 30+	Santiago Formation	300	28	125	16	130	3.0	1.0

Note: Based on the subsurface conditions encountered in Boring B2 from report dated October 29, 2009 and Boring B1.

TABLE 8.4
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 12)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	110	10	124	0.5	1.0
3 to 10	Monterey Formation	200	32	125	16	130	1.4	1.0
10 to 20	Monterey Formation	600	15	114	32	116	1.2	1.0
20 to 30+	Monterey Formation	400	33	125	22	130	2.7	1.0

Note: Based on the subsurface conditions encountered in Borings B6 and B7 from report dated October 29, 2009.

TABLE 8.5
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 14)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 5	Monterey Formation	300	35	118	30	119	1.2	1.0
5 to 14	Monterey Formation	500	33	128	20	130	1.8	1.0
14 to 26+	Monterey Formation	900	28	120	30	120	2.0	1.0

Note: Based on the subsurface conditions encountered in Boring B8 from report dated October 29, 2009.

TABLE 8.6
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 17)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 6	Topsoil/Landslide	400	25	120	15	130	0.5	1.0
6 to 41+	Landslide Debris	500	22	120	25	125	0.9	1.0

Note: Based on the subsurface conditions encountered in Boring B2.

TABLE 8.7
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 39)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Topsoil	300	25	115	10	125	0.5	1.0
4 to 18	Capistrano Formation	600	35	125	15	130	1.7	1.0
18 to 40+	Capistrano Formation	800	24	120	15	130	1.6	1.0

Note: Based on the subsurface conditions encountered in Boring B3.

TABLE 8.8
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (ZXXXXXX-1)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 5	Topsoil	300	24	115	5	125	0.8	1.0
5 to 12	Old Alluvium	480	36	115	9	128	1.4	1.0
12 to 18	Old Alluvium	330	29	113	4	130	3.0	1.0
18 to 35+	Old Alluvium	1000	31	135	10	140	2.5	1.0

Note: Based on the subsurface conditions encountered in Boring B6.

TABLE 8.9
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (ZXXXXXX-2)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 2	Topsoil	150	28	115	10	128	0.8	1.0
2 to 13	Old Alluvium	250	32	123	12	132	2.8	1.0
13 to 20+	Old Alluvium	150	36	132	10	138	3.5	1.0

Note: Based on the subsurface conditions encountered in Boring B3 from report dated September 10, 2012 and Boring B6.

TABLE 8.10
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN
(EXISTING FDN – PEA pole 85)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Old Paralac Deposits	100	32	120	8	132	2.2	1.0
3 to 12	Old Paralac Deposits	300	32	130	12	135	4.0	1.0
12 to 37+	San Mateo Formation	500	25	122	11	131	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B14.

TABLE 8.11
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (ZXXXXXX-5)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 7	Old Paralac Deposits	100	32	120	8	132	2.2	1.0
7 to 16	Old Paralac Deposits	300	32	130	12	135	4.0	1.0
16 to 41+	San Mateo Formation	500	25	122	11	131	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B14.

TABLE 8.12
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 87)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 5	Old Paralac Deposits	300	32	130	12	135	4.0	1.0
5 to 20+	Old Paralac Deposits	500	30	120	25	125	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B1 from referenced report dated May 2, 2102 and Boring B14.

TABLE 8.13
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 83)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Old Paralac Deposits	100	32	120	8	132	2.2	1.0
4 to 14	Old Paralac Deposits	300	32	130	12	135	4.0	
14 to 20+	San Mateo Formation	500	25	122	11	131	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B 4 from Leighton and Associates as referenced in report dated May 2, 2102 and Boring B14.

TABLE 8.14
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 81)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Topsoil	200	26	115	5	125	0.5	1.0
4 to 7	Old Paralac Deposits	260	34	107	3	125	1.3	1.0
7 to 10	Old Paralac Deposits	120	29	104	3	125	4.0	1.0
10 to 12+	Old Paralac Deposits	500	35	130	10	140	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B13.

TABLE 8.15
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 79)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Topsoil	200	26	115	5	125	0.5	1.0
4 to 7	Old Paralac Deposits	260	34	107	3	125	1.3	1.0
7 to 10	Old Paralac Deposits	120	29	104	3	125	4.0	1.0
10 to 12+	Old Paralac Deposits	500	35	130	10	140	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B13.

TABLE 8.16
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 78)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	115	10	125	0.5	1.0
3 to 8	Old Paralac Deposits	260	34	107	3	125	1.3	1.0
8 to 19+	Old Paralac Deposits	340	32	123	6	135	3.5	1.0

Note: Based on the subsurface conditions encountered in Boring B12.

TABLE 8.17
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 76)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 5	San Mateo Formation	300	25	122	11	131	1.2	1.0
5 to 30+	San Mateo Formation	500	25	122	11	131	4.0	1.0

Note: Based on the subsurface conditions encountered in Borings B14 and B12. These parameters assume the new pole will be located north and east of the existing pole. Revised parameters may be necessary if the pole is located elsewhere.

TABLE 8.18
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 75)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 15	Old Alluvium	0	36	114	4	130	0.9	1.0
15 to 35+	Old Alluvium	200	30	120	4	135	2.0	1.0

Note: Based on the subsurface conditions encountered in Boring B11.

TABLE 8.19
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 62)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Loose Fill	100	20	115	15	125	0.2	1.0
3 to 9	Fill	300	35	130	15	140	2.0	1.0
9 to 12	Old Paralac Deposits	800	20	125	18	130	1.5	1.0
12 to 20	Old Paralac Deposits	0	38	105	3	120	1.5	1.0
20 to 31+	Old Paralac Deposits	100	30	110	5	125	2.5	1.0

Note: Based on the subsurface conditions encountered at Boring B5.

TABLE 8.20
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 57)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Topsoil	200	26	115	10	125	0.5	1.0
4 to 8	Old Paralac Deposits	500	35	135	10	145	5.0	1.0
8 to 18	Old Paralac Deposits	0	37	113	8	128	2.0	1.0
18 to 30+	Old Paralac Deposits	500	35	135	10	145	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B4.

TABLE 8.21
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 56)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 4	Topsoil	200	26	115	10	125	0.5	1.0
4 to 9	Old Paralac Deposits	500	35	135	10	145	5.0	1.0
9 to 24	Old Paralac Deposits	500	29	125	23	130	1.4	1.0
24 to 35+	Old Paralac Deposits	500	35	135	10	145	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B10.

TABLE 8.22
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (ZXXXXXX-4)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 5	Topsoil	200	26	115	10	125	0.5	1.0
5 to 20	Old Parallic Deposits	500	29	125	23	130	1.4	1.0
20 to 30+	Old Parallic Deposits	500	35	135	10	145	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B10.

TABLE 8.23
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (ZXXXXXX-3)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 2	Topsoil	200	26	110	10	124	0.5	1.0
2 to 4	Old Parallic Deposits	500	30	135	11	140	2.5	1.0
4 to 19	Old Parallic Deposits	500	35	135	10	145	5.0	1.0
19 to 34	Old Parallic Deposits	500	29	125	23	130	1.4	1.0
34 to 45+	Old Parallic Deposits	500	35	135	10	145	5.0	1.0

Note: Based on the subsurface conditions encountered at B10.

TABLE 8.24
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 98)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	115	10	125	0.5	1.0
3 to 12	Old Parallic Deposits	500	35	137	8	142	2.0	1.0
12 to 35+	Old Parallic Deposits	700	35	142	16	145	3.0	1.0

Note: Based on the subsurface conditions encountered in Boring B9.

TABLE 8.25
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 100)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	115	10	125	0.5	1.0
3 to 14	Old Parallic Deposits	500	35	135	12	138	1.4	1.0
14 to 34	Old Parallic Deposits	1000	30	135	11	141	2.5	1.0
34 to 39+	Old Parallic Deposits	300	32	130	10	140	2.5	1.0

Note: Based on the subsurface conditions encountered in Boring B8 and B9.

TABLE 8.26
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 101)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 3	Topsoil	200	26	115	10	125	0.5	1.0
3 to 7	Old Parallic Deposits	500	35	135	12	138	1.4	1.0
7 to 27	Old Parallic Deposits	1000	30	135	11	141	2.5	1.0
27 to 32+	Old Parallic Deposits	300	32	130	10	140	2.5	1.0

Note: Based on the subsurface conditions encountered in Boring B8.

TABLE 8.27
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (PEA pole 102)

Depth (feet)	Soil/Rock Type	Unit Cohesion c (psf)	Friction Angle ϕ (degrees)	Total Moist Unit Weight γ (pcf)	Moisture Content (%)	Total Saturated Unit Weight γ (pcf)	Deformation Modulus E_p (ksi)	Strength Reduction Factor
0 to 8	Old Parallic Deposits	800	29	130	12	138	1.3	1.0
8 to 24+	Old Parallic Deposits	1000	25	135	16	140	5.0	1.0

Note: Based on the subsurface conditions encountered in Boring B7.

As noted in Table 8.17, pole foundation design parameters for PEA Pole 76 are provided with the understanding that the new pole will be located north and west of the existing pole. If the new pole will not be located north and west of the existing pole, additional evaluation and possible revision of the design parameters may be necessary due the proximity to an existing slope.

9. CONSTRUCTION CONSIDERATIONS

We expect very dense to hard formational materials with varying amounts of cementation, gravel, cobbles, and boulders will be encountered during some pole installations at the site. The contractor should have auger, core barrels, and excavating tools suitable for penetrating dense layers, concretions, and cemented zones on-site during the pole construction.

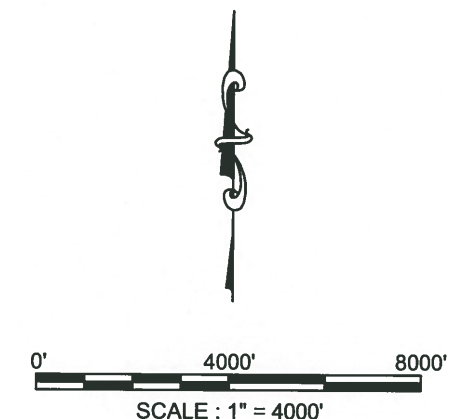
Very moist conditions were encountered at the bottom of Borings B2 and B11. Groundwater or perched groundwater could be encountered during construction following heavy rainfall, runoff, and/or irrigation. Sloughing or raveling could occur where relatively clean sands are encountered both above and below the groundwater level. Casing and/or wet methods may be necessary for the installation of pole foundations below groundwater, if any. In particular, these conditions may be expected for Poles 55 to 58, but may be anticipated elsewhere, as well.

The drilling equipment should allow maneuverability on difficult and sloped terrain, penetration and support of weak and unconsolidated soils, and/or rotary percussive drilling in obstructions including cobbles and hard formational materials.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.
2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.
3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.
4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



Data SIO, NOAA, U.S. Navy, NGA, GEBCO

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED



GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818-32-05A

FIGURE 1
DATE 09-10-2015

VICINITY MAP

SDG&E W

CA

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

FIG. 9

FIG. 10

FIG. 11

FIG. 12

Avenida Vera Cruz

Avenida Pico

Avenida del Mar

Esplanade

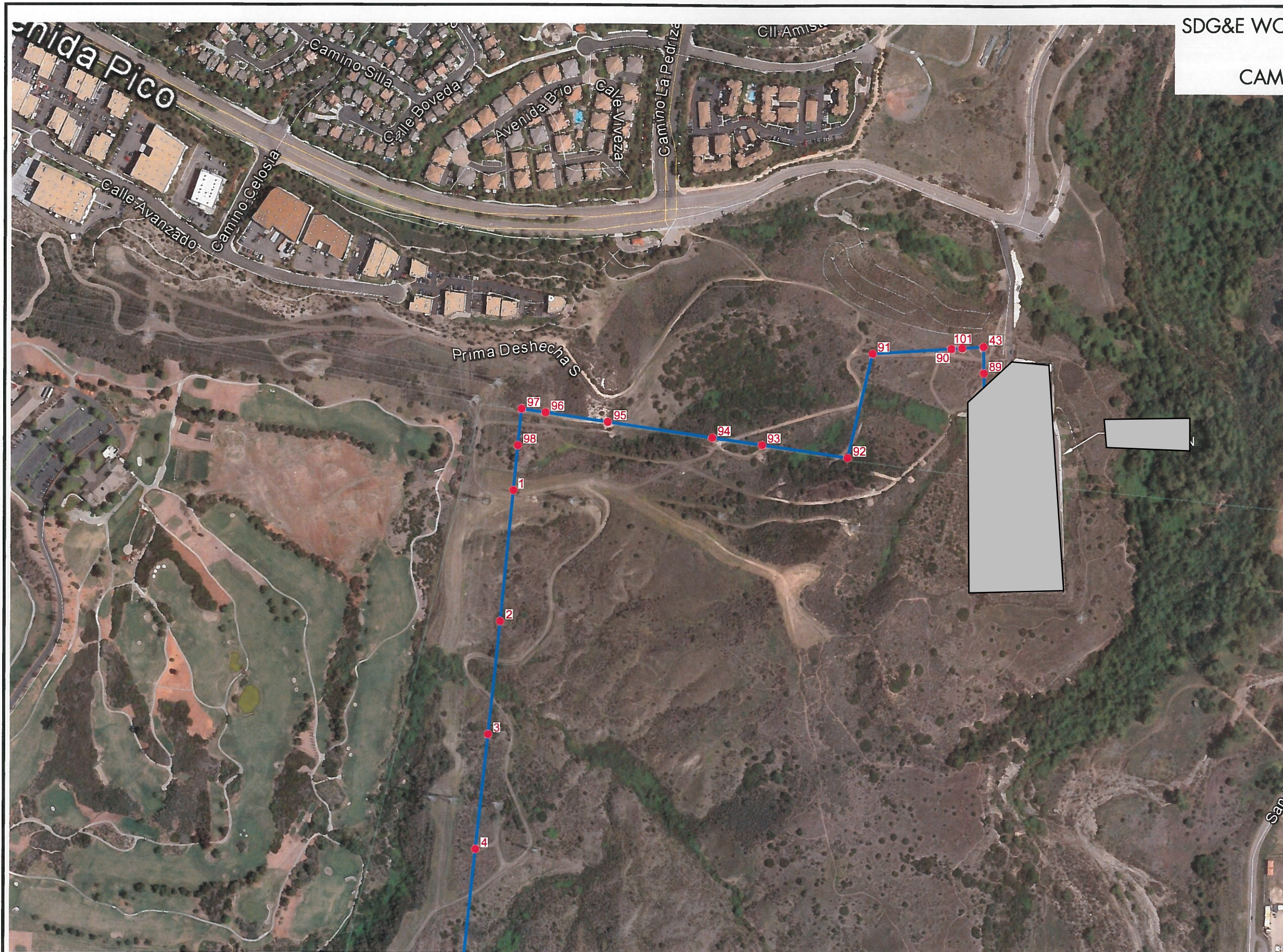
San Mateo Dr

Highway 101

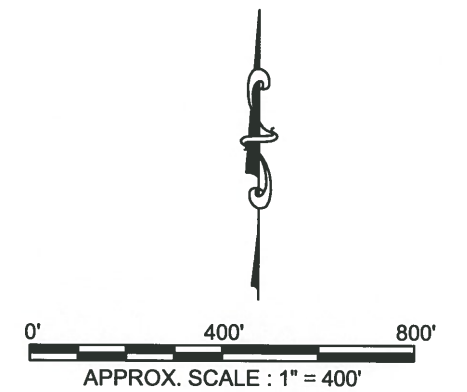
Data SIO NOAA U.S. Navy NGA GEBCO



SITE PLAN INDEX



SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

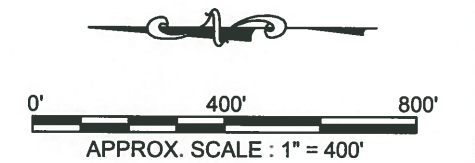
PROJECT NO. G1818 - 32 - 05A

FIGURE 3

SITE PLAN DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH. SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED



GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

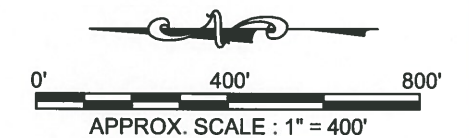
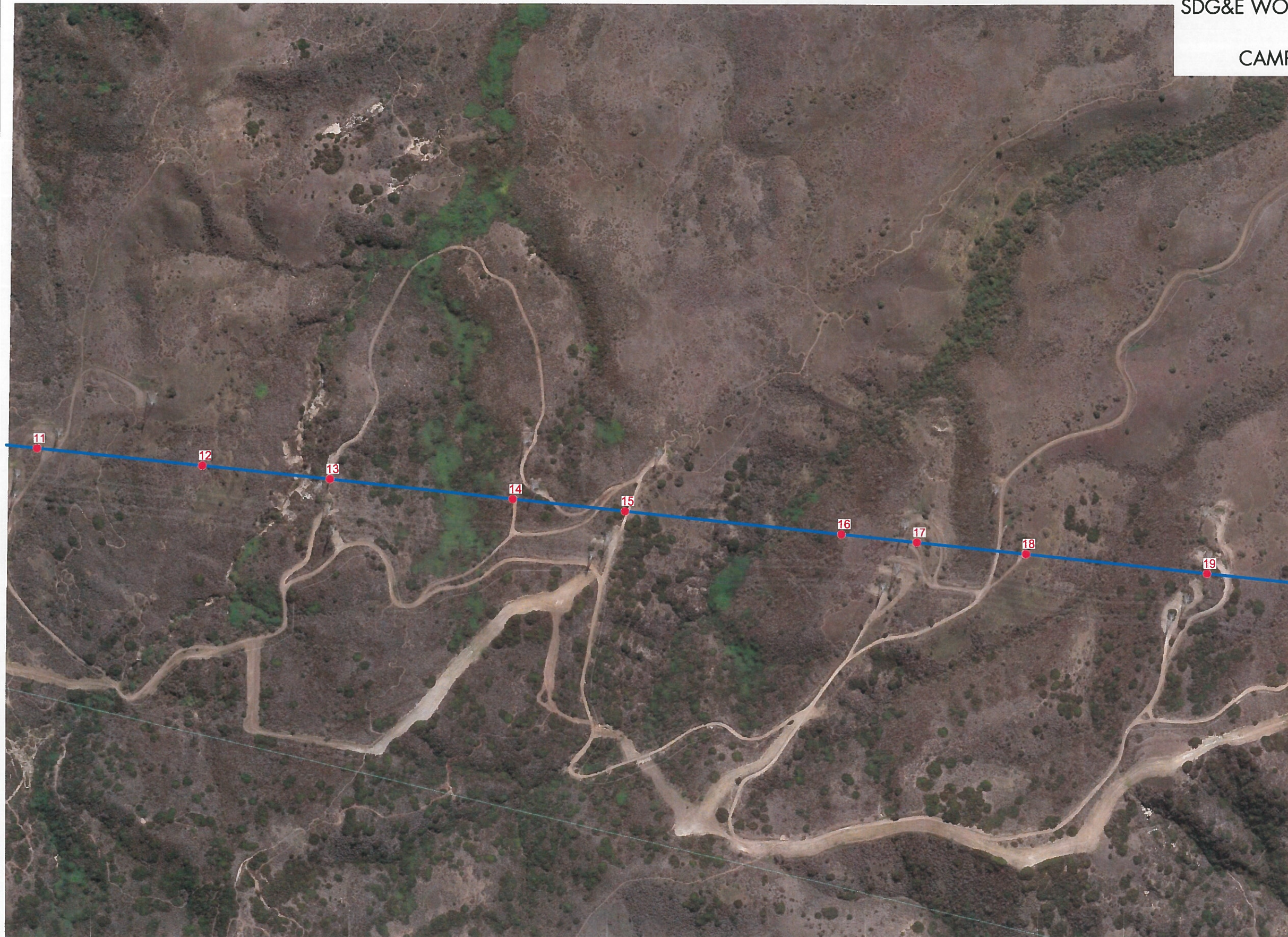
PROJECT NO. G1818 - 32 - 05A

FIGURE 4

SITE PLAN DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A

SITE PLAN FIGURE 5
DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH. SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A

FIGURE 6
DATE 09 - 10 - 2015

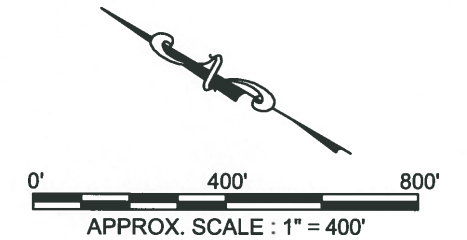
SITE PLAN

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH. SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



69 kV LINE TO BE REMOVED
FROM THESE POLES. 12 kV
AND 38 kV LINES TO REMAIN



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED



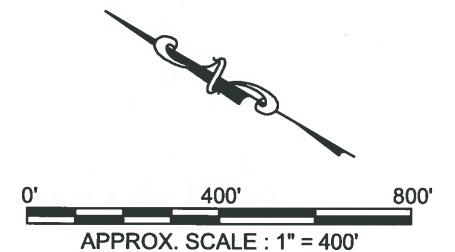
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A

FIGURE 7

SITE PLAN DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED

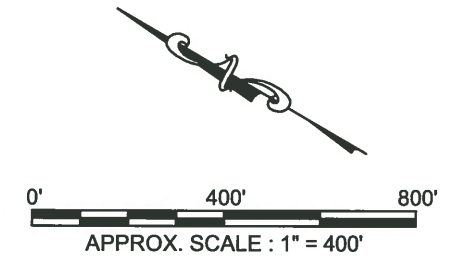
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A

FIGURE 8

SITE PLAN DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

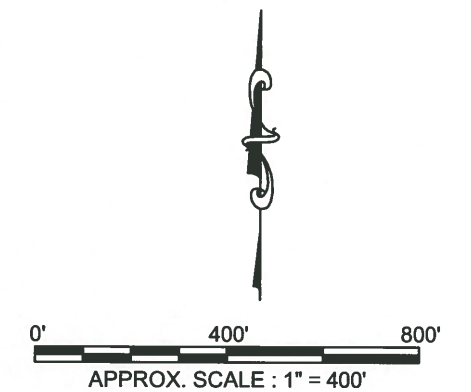
- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 9
DATE 09 - 10 - 2015

SITE PLAN

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

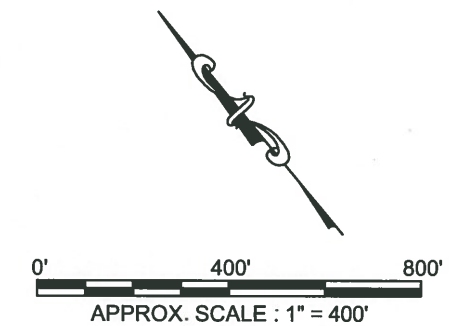
- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 10
DATE 09 - 10 - 2015

SITE PLAN

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH. SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

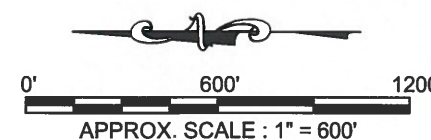
- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 11

SITE PLAN DATE 09 - 10 - 2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



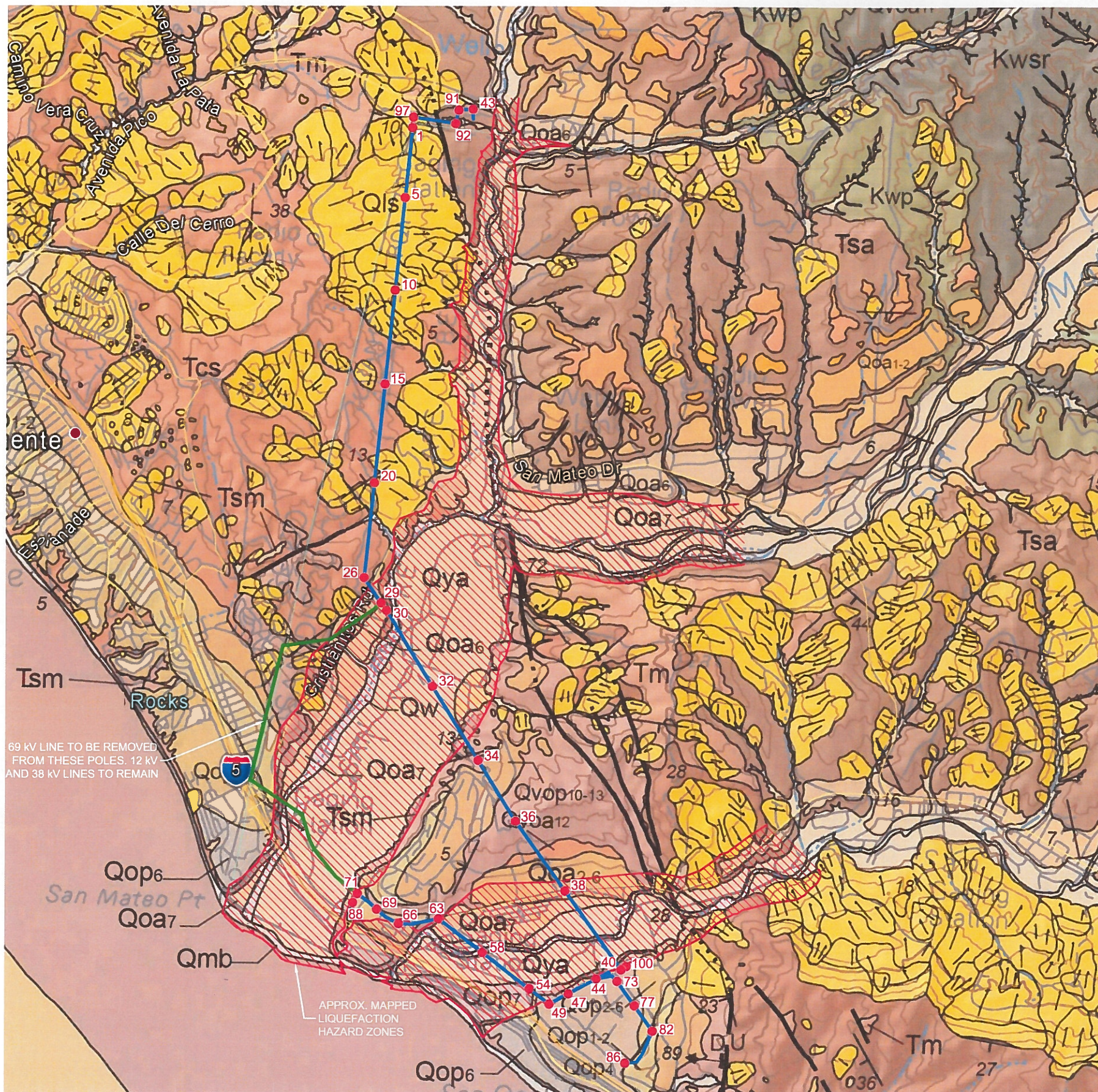
LEGEND

- 101SDG&E POLE LOCATION AND NUMBER
-APPROX. LOCATION OF ALIGNMENT/PROJECT LOCATION

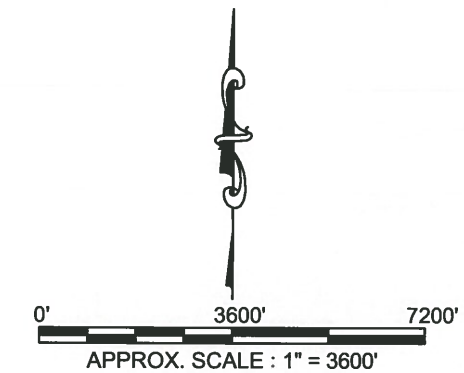
THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 12
DATE 09 - 10 - 2015

SITE PLAN



SDG&E WOOD TO STEEL POLE REPLACEMENT TL695 AND TL6971 CAMP PENDLETON, CALIFORNIA



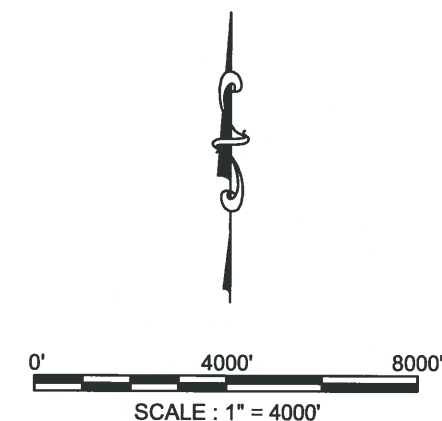
GEOCON LEGEND

- 101APPROX. POLE LOCATION (Only select poles have been shown for reference. See subsequent figures for more detailed maps depicting pole locations.)
-APPROX. ALIGNMENT/PROJECT LOCATION
- Qya**YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS
- Qls**LANDSLIDE DEPOSITS
- Qoa**OLD ALLUVIAL FLOOD PLAIN DEPOSITS (Includes Qoa2-6, Qoa6, Qoa7)
- Qop**OLD PARALIC DEPOSITS (Includes Qop1-2, Qop2-6, Qop4, Qop7)
- Qvop**VERY OLD PARALIC DEPOSITS (Includes Qvop10-13)
- Tcs**CAPISTRANO FORMATION
- Tsm**SAN MATEO FORMATION
- Tm**MONTEREY FORMATION
- Tsa**SANTIAGO FORMATION
-APPROX. LOCATION OF GEOLOGIC CONTACT
-APPROX. LOCATION OF POTENTIALLY ACTIVE CRISTIANITOS FAULT (Dotted Where Buried)

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 13
DATE 09 - 10 - 2015

REGIONAL GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

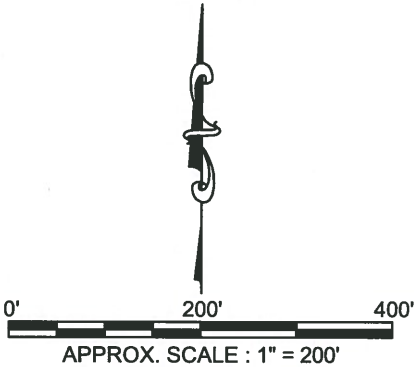
GEOCON
INCORPORATED



GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 14
DATE 09 - 10 - 2015

GEOLOGIC MAP INDEX

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- QalALLUVIUM
- QlsLANDSLIDE DEPOSITS
- QoaOLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- QopOLD PARALIC DEPOSITS
- TcsCAPISTRANO FORMATION
- TsmSAN MATEO FORMATION
- TmMONTEREY FORMATION
- TsaSANTIAGO FORMATION
-APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
-APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

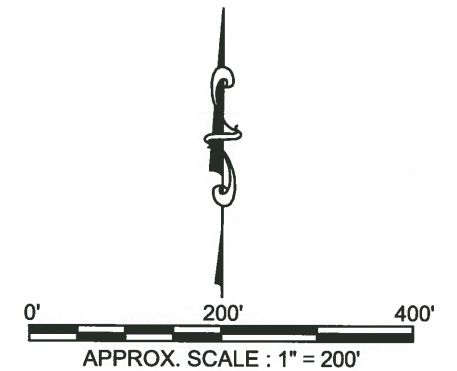


THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 15
DATE 09 - 10 - 2015

GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- ⊕ B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- ⊕ B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- ⊕ B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- Qal**ALLUVIUM
- Qls**LANDSLIDE DEPOSITS
- Qoa**OLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- Qop**OLD PARALIC DEPOSITS
- Tcs**CAPISTRANO FORMATION
- Tsm**SAN MATEO FORMATION
- Tm**MONTEREY FORMATION
- Tsa**SANTIAGO FORMATION
- ~?APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- ?APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

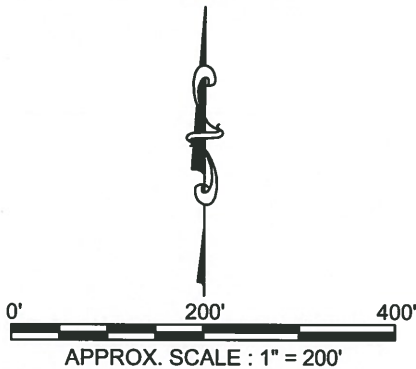


THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818-32-05A
FIGURE 16
DATE 09-10-2015

GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



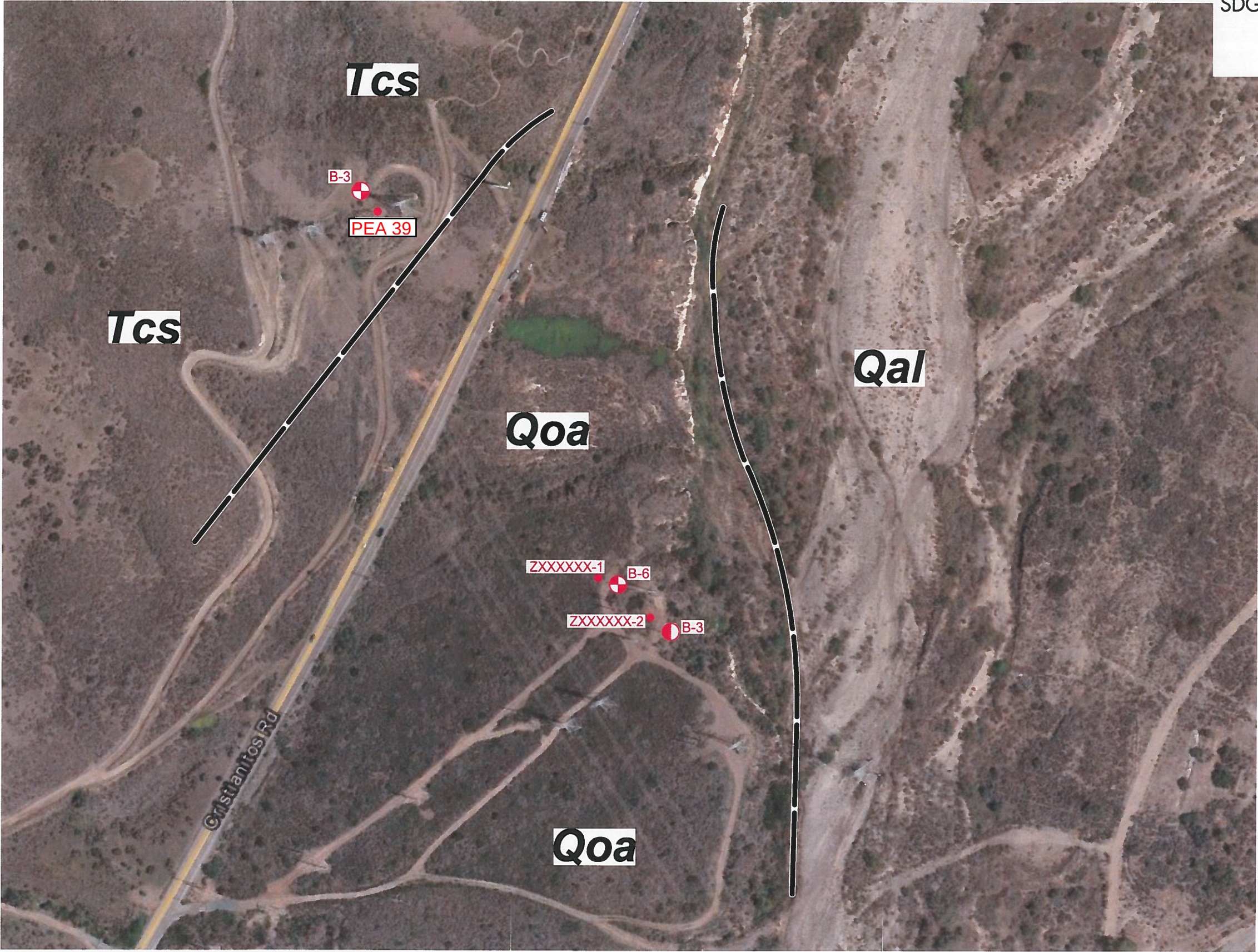
LEGEND

- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- Qal**ALLUVIUM
- Qls**LANDSLIDE DEPOSITS
- Qoa**OLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- Qop**OLD PARALIC DEPOSITS
- Tcs**CAPISTRANO FORMATION
- Tsm**SAN MATEO FORMATION
- Tm**MONTEREY FORMATION
- Tsa**SANTIAGO FORMATION
-APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
-APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

GEOCON
INCORPORATED

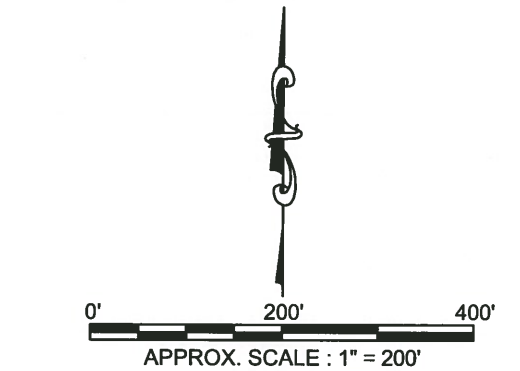
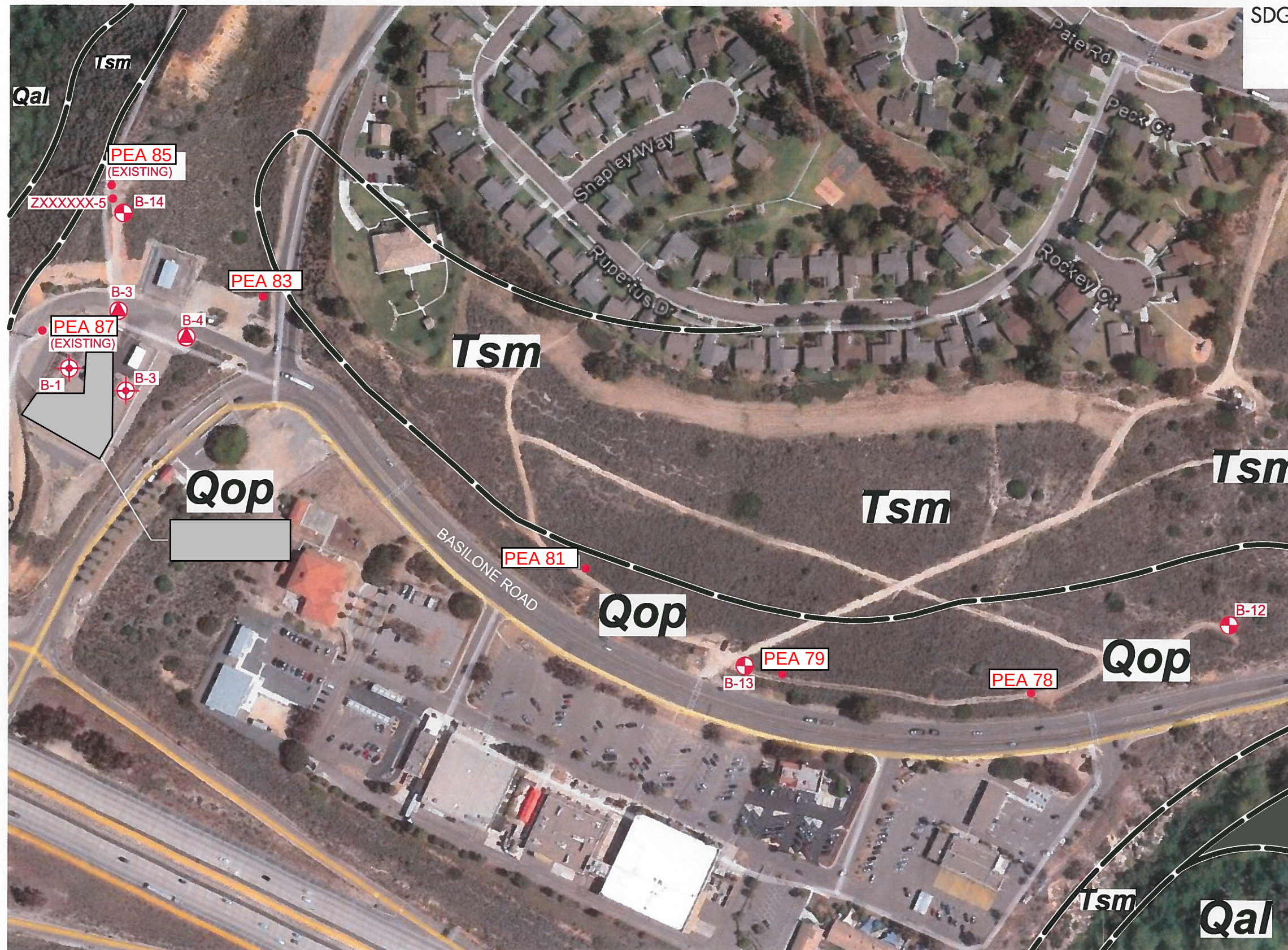
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 17
DATE 09 - 10 - 2015

GEOLOGIC MAP



THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

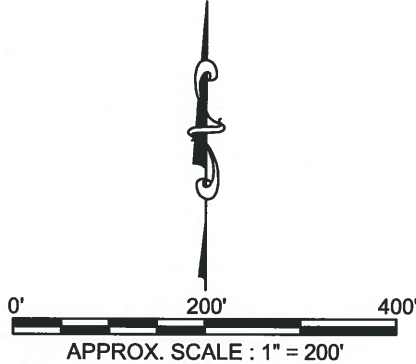
- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- QalALLUVIUM
- QlsLANDSLIDE DEPOSITS
- QoaOLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- QopOLD PARALIC DEPOSITS
- TcsCAPISTRANO FORMATION
- TsmSAN MATEO FORMATION
- TmMONTEREY FORMATION
- TsaSANTIAGO FORMATION
-APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
-APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 18
DATE 09 - 10 - 2015

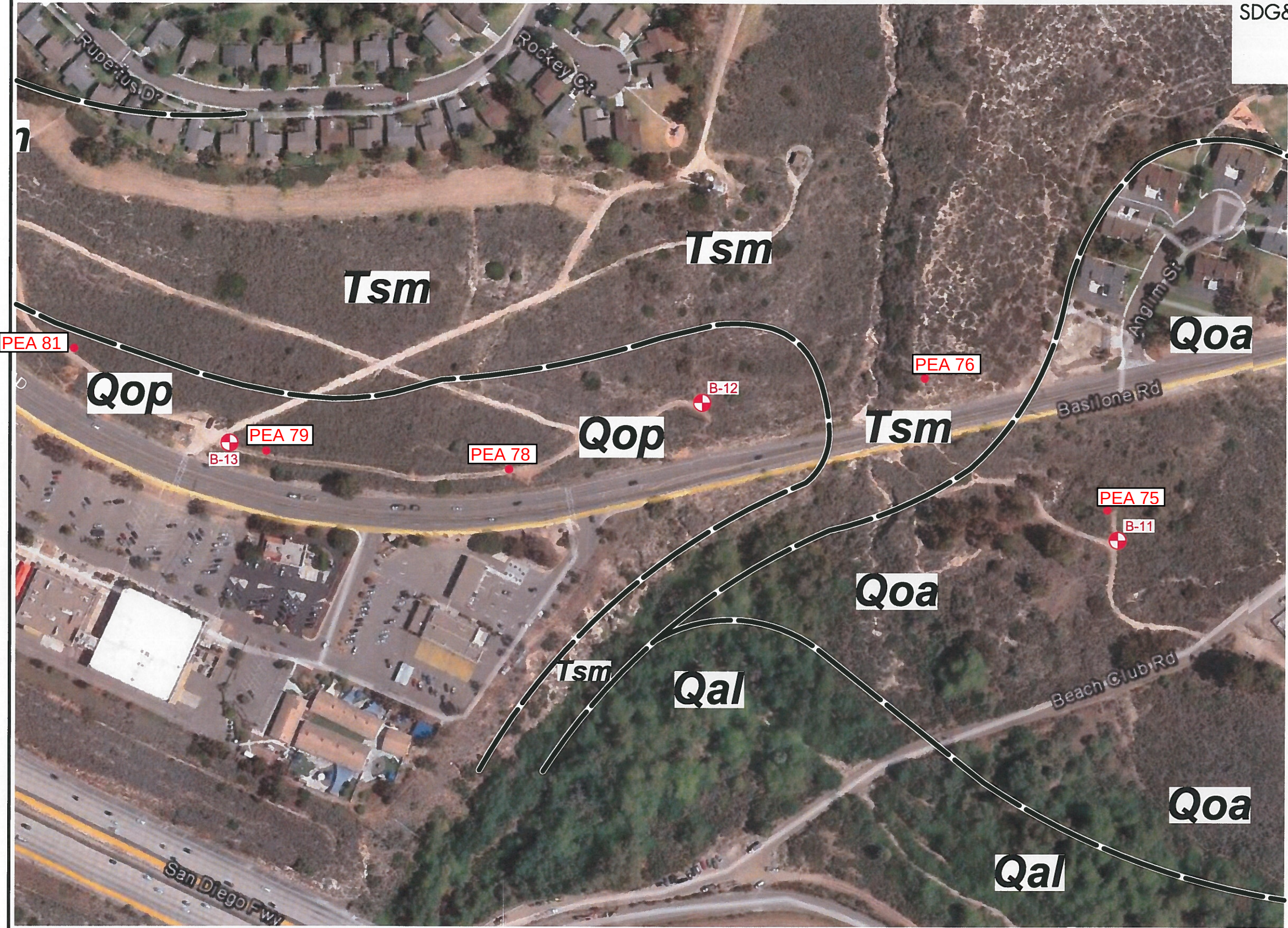
GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- Qal**.....ALLUVIUM
- Qls**.....LANDSLIDE DEPOSITS
- Qoa**.....OLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- Qop**.....OLD PARALIC DEPOSITS
- Tcs**.....CAPISTRANO FORMATION
- Tsm**.....SAN MATEO FORMATION
- Tm**.....MONTEREY FORMATION
- Tsa**.....SANTIAGO FORMATION
-APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
-APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

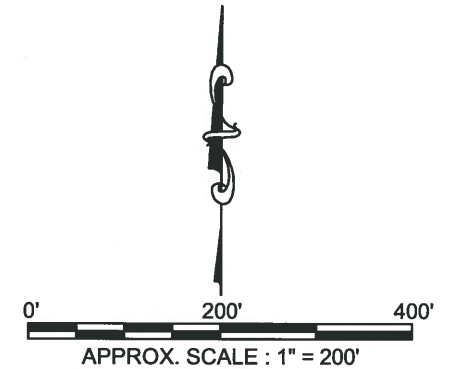


THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818 - 32 - 05A
FIGURE 19
DATE 09 - 10 - 2015

GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

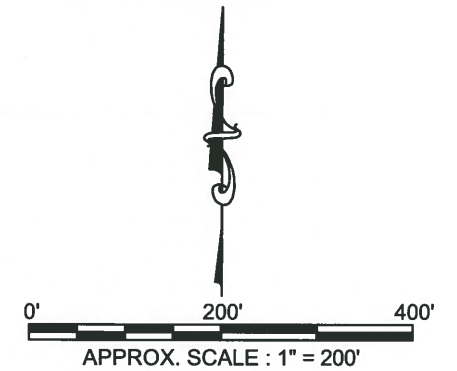
- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- ⊕ B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- ⊕ B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- ⊕ B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- Qal**ALLUVIUM
- Qls**LANDSLIDE DEPOSITS
- Qoa**OLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- Qop**OLD PARALIC DEPOSITS
- Tcs**CAPISTRANO FORMATION
- Tsm**SAN MATEO FORMATION
- Tm**MONTEREY FORMATION
- Tsa**SANTIAGO FORMATION
- ~?APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- ?APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH. SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818-32-05A
FIGURE 20
DATE 09-10-2015

GEOLOGIC MAP

SDG&E WOOD TO STEEL POLE REPLACEMENT
TL695 AND TL6971
CAMP PENDLETON, CALIFORNIA



LEGEND

- Z171179SDG&E ANGLE POLE LOCATION AND NUMBER
- ⊕ B-14APPROX. LOCATION OF EXPLORATORY BORING (THIS INVESTIGATION)
- ⊕ B-8APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 10-29-2009)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (Geocon Inc. 09-10-2012)
- ⊕ B-3APPROX. LOCATION OF EXPLORATORY BORING (URS 05-02-2012)
- ⊕ B-4APPROX. LOCATION OF EXPLORATORY BORING (Leighton & Assoc. 06-17-2011)
- Qal**ALLUVIUM
- Qls**LANDSLIDE DEPOSITS
- Qoa**OLD ALLUVIAL FLOOD-PLAIN DEPOSITS
- Qop**OLD PARALIC DEPOSITS
- Tcs**CAPISTRANO FORMATION
- Tsm**SAN MATEO FORMATION
- Tm**MONTEREY FORMATION
- Tsa**SANTIAGO FORMATION
- ~?APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- ?APPROX. LOCATION OF INACTIVE FAULT (Dotted Where Buried; Queried Where Uncertain)

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159
PROJECT NO. G1818-32-05A
FIGURE 21
DATE 09-10-2015

THE GEOGRAPHICAL INFORMATION MADE AVAILABLE FOR DISPLAY WAS PROVIDED BY GOOGLE EARTH, SUBJECT TO A LICENSING AGREEMENT. THE INFORMATION IS FOR ILLUSTRATIVE PURPOSES ONLY; IT IS NOT INTENDED FOR CLIENT'S USE OR RELIANCE AND SHALL NOT BE REPRODUCED BY CLIENT. CLIENT SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS GEOCON FROM ANY LIABILITY INCURRED AS A RESULT OF SUCH USE OR RELIANCE BY CLIENT.

GEOLOGIC MAP

APPENDIX

A

APPENDIX A

FIELD INVESTIGATION

We performed the current field investigation (14 borings) from June 29, 2015 through July 6, 2015. The locations of the exploratory borings from this investigation, as well as previous investigations, are shown on *Geologic Maps*, Figures 14 through 21. Boring logs and an explanation of the geologic units encountered are presented in figures following the text in this appendix.

We advanced the borings near the proposed new steel poles to a maximum depth of 51½ feet below grade using a small-terrain truck-mounted drill rig equipped with 6-inch-diameter, hollow-stem augers. We obtained relatively undisturbed samples at various depths by driving a 3-inch O.D. split-tube sampler (California Sampler) into the soil mass with a 140-pound hammer falling 30 inches. The sampler was equipped with 1-inch-high by 2⅜-inch-diameter brass sampler rings to facilitate removal and laboratory testing of the soil recovered. We also performed Standard Penetration Tests (SPTs) at selected depths in accordance with ASTM D 1586. We collected disturbed samples from the SPT sampler and drill cuttings. The type of sample is noted on the exploratory boring logs.

We visually examined soil conditions encountered in the borings, classified, and logged in general conformance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). The logs of the exploratory borings are presented on Figures A-1 through A-14 in Appendix A.

The laboratory tests are presented in Appendix B.

Boring logs and laboratory test data from previous investigations along the alignment are presented in Appendices C through F.

G1818-32-05A.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 1 ELEV. (MSL.) <u>294'</u> DATE COMPLETED <u>06-29-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B1-8				-Becomes olive gray at 25 feet	58		
28				SM	Very dense, moist, gray, Silty, fine SANDSTONE; with trace clay			
30	B1-9					77/10"		
					BORING TERMINATED AT 30.8 FEET No groundwater encountered Backfilled with soil cuttings			

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

G1818-32-05A.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.

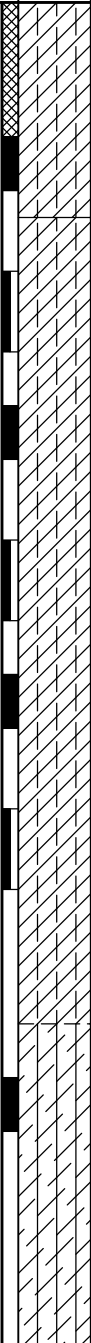
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 2 ELEV. (MSL.) <u>335'</u> DATE COMPLETED <u>06-29-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B2-1			CH	TOPSOIL Soft to stiff, dry, dark gray, Silty CLAY; trace fine sand			
2	B2-2					21	107.5	15.3
4	B2-3			CL	LANDSLIDE DEBRIS Stiff, moist, mottled, olive tan and black, Silty CLAY; trace fine sand with tan sandstone chunks and calcium carbonate staining	9		
6								
8	B2-4					24	95.2	24.8
10	B2-5					11		
12	B2-6					18	98.1	23.7
14								
16	B2-7					13		
18								
20	B2-8			ML	Stiff, moist, olive, Clayey SILT; trace fine sand	24	93.6	28.4
22								
24								

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

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 2 ELEV. (MSL.) <u>335'</u> DATE COMPLETED <u>06-29-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B2-8			ML	Stiff, moist, olive, Clayey SILT; trace fine sand	13		
28								
30	B2-10				-Apparently near vertical bedding at 30 feet	21		
32								
34				CL/ML	Stiff, moist to very moist, olive, Silty CLAY/Clayey SILT			
36	B2-11					12		
38								
40	B2-12				-Becomes very moist at 40 feet	13		
					BORING TERMINATED AT 41.5 FEET No groundwater encountered Backfilled with soil cuttings			

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

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 3 ELEV. (MSL.) <u>242'</u> DATE COMPLETED <u>06-29-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2				CL	UNDOCUMENTED FILL (small slope for pad) Soft, dry, very dark gray, Silty CLAY -Becomes damp to moist at 2 feet			
4	B3-1			CL	TOPSOIL Stiff, damp to moist, dark gray, mottled with tan, Silty CLAY; trace fine sand	9		
6								
8	B3-2			ML	CAPISTRANO FORMATION Very stiff, moist, mottled olive, tan and brown, fine Sandy SILTSTONE; trace clay, some orange rip-up clasts	32	106.3	15.6
10	B3-3					17		
12	B3-4					34	106.7	15.3
14	B3-5					18		
16								
18								
20	B3-6				-Interbeds of silty, fine sandstone at 20 feet	44	110.8	16.9
22								
24	B3-7			ML	Very stiff, moist, olive, fine Sandy SILTSTONE; trace clay			
26					-6" thick lense of tan, fine sand at 25 feet	22		
28				SP-SM	Medium dense, damp, tan, fine SAND, with little silt (based on cuttings)			

Figure A-3,
Log of Boring B 3, Page 1 of 2

G1818-32-05A.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.

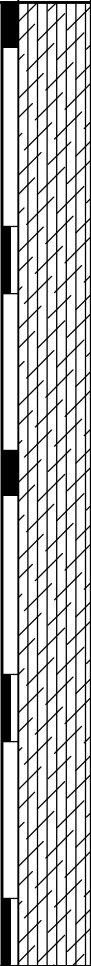
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 3 ELEV. (MSL.) <u>242'</u> DATE COMPLETED <u>06-29-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
30	B3-8			ML/CL	Very stiff, moist, olive, Clayey SILTSTONE and Silty CLAYSTONE; with fine sand interbeds	34		
32								
34								
36	B3-9					27		
38								
40	B3-10					43		
42								
44								
46	B3-11					23		
48								
50	B3-12					27		
					BORING TERMINATED AT 51.5 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-3,
Log of Boring B 3, Page 2 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 4 ELEV. (MSL.) <u>111'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
					4" ASPHALT CONCRETE over 2" BASE			
2				GM	FILL Loose, moist, brown, Silty, fine to coarse GRAVEL and COBBLE; with some fine to medium sand and fine to medium and lenses. Very difficult drilling.	7		
4	B4-1							
6				GM	OLD PARALIC DEPOSITS Dense, moist, brown, Silty Gravel and Cobble CONGLOMERATE; with some fine to medium sand. Very difficult drilling.			
8	B4-2							
10	B4-3				-No recovery at 10 feet	50/1"		
12	B4-4							
14								
16	B4-5				-Little clay at 15 feet	53		
18								
20	B4-6					50/6"		
22								
24				SP-SM	Medium dense, moist, strong brown, fine to medium SAND; with trace to little silt			

Figure A-4,
Log of Boring B 4, Page 1 of 2

G1818-32-05A.GPJ

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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 4 ELEV. (MSL.) <u>111'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B4-7					36	101.6	10.5
28								
30	B4-8			SP-SM	-Isolated clayey interbeds between 30 and 35 feet	55	108.3	4.7
32								
34								
36	B4-9			GC	Very dense, moist, dark brown, Clayey, Gravel and Cobble CONGLOMERATE; with some fine to medium sand	50/5"		
38								
40	B4-10				-No recovery	50/1"		
42								
44				GM	Very dense, moist, tan and brown, Silty, Gravel and Cobble CONGLOMERATE; with some fine to medium sand			
46	B4-11					69		
					BORING TERMINATED AT 46.5 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-4,
Log of Boring B 4, Page 2 of 2

G1818-32-05A.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.

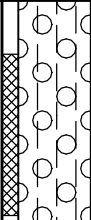
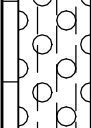
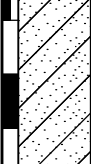
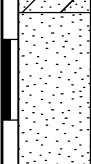
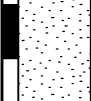
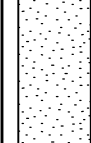
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 5 ELEV. (MSL.) <u>96'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
0	B5-1			GM	FILL Medium dense, damp to moist, brown, Silty, Gravel and Cobble CONGLOMERATE; with some fine to medium sand			
2								
4								
6	B5-2				-No recovery at 5 feet	18		
8	B5-3					16		
10	B5-4			CL	OLD PARALIC DEPOSITS Stiff to very stiff, moist, olive brown, fine to medium Sandy CLAY; with trace gravel	27	107.1	18.4
12	B5-5			SP-SM	Medium dense, damp to moist, orange-tan, fine to medium SAND; with trace to little silt	25		
14								
16	B5-6					23	101.0	3.2
18					-Gravel and cobble from 17 to 20 feet			
20	B5-7			ML	Very stiff, moist, olive, fine Sandy SILT	25		
22								
24								

Figure A-5,
Log of Boring B 5, Page 1 of 2

G1818-32-05A.GPJ

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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 5 ELEV. (MSL.) <u>96'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B5-8			SP-SM	-No recovery - sampler on cobble? Dense to very dense, damp, off-white, fine to medium SAND; with trace to little silt	50/7"		
28								
30	B5-9					51		
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-5,
Log of Boring B 5, Page 2 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 6 ELEV. (MSL.) <u>124'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B6-1			CH	TOPSOIL Soft, dry, dark gray, Silty CLAY			
2	B6-2				-Becomes stiff, damp to moist at 3 feet	11		
4								
6	B6-3			CL	OLD ALLUVIAL FLOOD-PLAIN DEPOSITS Stiff to very stiff, damp to moist, light olive, Silty CLAYSTONE; with calcium carbonate veins, trace fine sand	37	106.0	8.9
8	B6-4					14		
10	B6-5				-Becomes mottled with dark olive brown, pinhole voids	42		
12	B6-6			SC/SM	Medium dense, damp, olive brown, Clayey, fine SAND interbedded with Silty, fine to coarse SAND	25		
14								
16	B6-7					57	109.2	3.9
18								
20	B6-8			CL	Hard, damp to moist, dark olive, fine Sandy CLAY	34		
22								
24								

Figure A-6,
Log of Boring B 6, Page 1 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 6 ELEV. (MSL.) <u>124'</u> DATE COMPLETED <u>06-30-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B6-9					55	126.3	9.8
28								
30	B6-10				-Some interbeds of silty fine sand at 30 feet	15		
32								
34					-Large cobble at 35.5 feet			
					REFUSAL AT 35.5 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-6,
Log of Boring B 6, Page 2 of 2

G1818-32-05A.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.

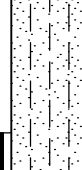
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 7 ELEV. (MSL.) <u>110'</u> DATE COMPLETED <u>07-01-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2	B7-1			SM	FILL Dense, damp, orange brown, Silty, fine to medium SAND	39		
4	B7-2			SM	OLD PARALIC DEPOSITS Medium dense, damp, brown, Silty, fine to medium SAND; with trace clay			
6	B7-3			CL	Very stiff, damp, brown, fine to medium Sandy CLAY; pinhole voids	27	121.2	11.6
8	B7-4				-Increasing sand content at 10 feet	16		
10	B7-5				-Increasing sand content at 10 feet	55		
12	B7-6			GC	Very dense, damp, brown, Clayey, Gravel and Cobble CONGLOMERATE; with some fine to coarse sand	58		
14								
16	B7-7				-1' lense of sandy clay at 15 feet	25	111.6	16.4
18								
20								
22								
24	B7-8				-No recovery on cobble/gravel at 23 feet	50/1"		

Figure A-7,
Log of Boring B 7, Page 1 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 7 ELEV. (MSL.) <u>110'</u> DATE COMPLETED <u>07-01-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B7-9				-Clayey, fine to coarse sandy lens at 25 feet	66		
28								
30	B7-10			SC	Medium dense to very dense, moist, reddish brown, Clayey, fine to coarse SAND; with trace gravel and cobble	50/4"		
32								
34								
36	B7-11				-Interbeds of silty, fine to medium sand at 35 feet	29		
					BORING TERMINATED AT 36.5 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-7,
Log of Boring B 7, Page 2 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 8 ELEV. (MSL.) <u>132'</u> DATE COMPLETED <u>07-01-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2	B8-1			SC	FILL Medium dense, moist, strong brown, Clayey, fine to medium SAND	15		
4	B8-2			CL	OLD PARALIC DEPOSITS Stiff to very stiff, damp to moist, mottled gray and reddish brown, fine to coarse Sandy CLAY	39	121.0	12.3
6	B8-3							
8	B8-4					19		
10	B8-5			CL	Very stiff to hard, damp, mottled gray and brown, fine to coarse Sandy CLAY; with trace gravel	75		
12	B8-6					19		
14								
16	B8-7				-Becomes dark brown at 15 feet	53	126.4	10.5
18								
20	B8-8					63		
22								
24					-With little gravel and cobble between 23 feet and 25 feet			

Figure A-8,
Log of Boring B 8, Page 1 of 2

G1818-32-05A.GPJ

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.

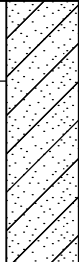
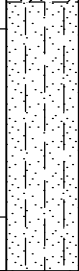
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 8 ELEV. (MSL.) 132' DATE COMPLETED 07-01-2015 EQUIPMENT UNIMOG - MARL M5 BY: M. EMBICK	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B8-9					21		
28								
30	B8-10					27		
32				SM	Medium dense to dense, damp, tan, Silty, fine to medium SAND			
34					-Gravel and cobble from 33 to 36 feet			
36	B8-11					50/6"		
					BORING TERMINATED AT 36 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-8,
Log of Boring B 8, Page 2 of 2

G1818-32-05A.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.

G1818-32-05A.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.

G1818-32-05A.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 10		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) 115'	DATE COMPLETED 07-02-2015			
					EQUIPMENT UNIMOG - MARL M5		BY: M. EMBICK		
					MATERIAL DESCRIPTION				
0				CL	TOPSOIL Soft, dry, brown, Silty CLAY				
2	B10-1			CL	OLD PARALIC DEPOSITS Very dense, damp, brown, fine to coarse Sandy CLAY		53	124.2	11.5
4	B10-2			GC	Very dense, damp, tan, Clayey, Gravel and Cobble CONGLOMERATE; with some fine to coarse SAND. Very difficult drilling. No drive sample attempted.				
6									
8									
10	B10-3			GM	Dense, damp, tan, Clayey, Gravel and Cobble CONGLOMERATE; with some fine to coarse sand.		33		
12									
14	B10-4			GC	Dense, damp, tan brown, Clayey, Gravel and Cobble CONGLOMERATE; with some fine to coarse sand.		50/1"		
16	B10-5				-No Recovery at 15 feet				
18									
20	B10-6			SC	Medium dense, moist, tan, Clayey, fine to coarse SAND		23		
22				SM	Medium dense, moist, tan, Silty, fine to coarse SAND				
24				ML/SM	Very stiff, moist, mottled olive and tan, fine Sandy SILT interbedded with medium dense, Silty, fine SAND				

Figure A-10,
Log of Boring B 10, Page 1 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 10 ELEV. (MSL.) <u>115'</u> DATE COMPLETED <u>07-02-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	B10-7					30	101.5	23.7
28								
30	B10-8				-No recovery at 30 feet	32		
32								
34								
36	B10-9			GM	Dense, moist, olive, Silty Gravel and Cobble CONGLOMERATE with some fine sand, little clay -Very difficult drilling	50/4"		
38								
40	B10-10					50/5"		
42								
44	B10-11					50/1"		
					-No recovery at 45 feet PRACTICAL REFUSAL AT 45.1 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-10,
Log of Boring B 10, Page 2 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 11 ELEV. (MSL.) <u>63'</u> DATE COMPLETED <u>07-02-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
				SM	OLD ALLUVIAL FLOOD-PLAIN DEPOSITS Loose, damp, light brown, Silty, fine to medium SAND			
2								
4	B11-1					15	114.3	3.6
6	B11-2					9		
					-Becomes fine to coarse at 6 feet			
8	B11-3							
	B11-4					13	108.4	3.5
10								
	B11-5				-Becomes tan at 10 feet	9		
12								
	B11-6					23	108.4	3.1
14								
16	B11-7			SM	Medium dense to dense, damp to moist, brown, Silty, fine to coarse SAND	35		
18	B11-8					31	115.5	4.2
20	B11-9					21		
22								
24								

Figure A-11,
Log of Boring B 11, Page 1 of 2

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 11 ELEV. (MSL.) <u>63'</u> DATE COMPLETED <u>07-02-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u>
---------------------	---------------	-----------	-------------	-------------------------	--

Figure A-11,
Log of Boring B 11, Page 2 of 2

G1818-32-05A.GPJ

SAMPLE SYMBOLS					
	... SAMPLING UNSUCCESSFUL			... STANDARD PENETRATION TEST	
	... 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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 12 ELEV. (MSL.) <u>129'</u> DATE COMPLETED <u>07-06-2015</u> EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
	B12-1			SM	TOPSOIL Loose, very dry, tan-brown, Silty, fine to medium SAND			
2	B12-2			SM	OLD PARALIC DEPOSITS Loose to medium dense, damp, tan, Silty, fine to coarse SAND; trace fine gravel	11		
4	B12-3					15	104.1	2.9
6	B12-4					24		
8	B12-5				-Increasing gravel content at 7.5 feet			
10	B12-6				-Becomes very dense, moist, yellow-tan, a trace of cobble at 10 feet (cobble in sample)	87/11"		
12	B12-7					35		
14	B12-8					83	116.5	5.7
16				GM	Very dense, moist, tan-brown, Silty gravel and Cobble CONGLOMERATE, with some fine to coarse sand -Very difficult drilling			
18					PRACTICAL REFUSAL AT 19 FEET No groundwater encountered Backfilled with soil cuttings			

Figure A-12,
Log of Boring B 12, Page 1 of 1

G1818-32-05A.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.

G1818-32-05A.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

G1818-32-05A.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 14		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) <u>108'</u>	DATE COMPLETED <u>07-06-2015</u>			
					EQUIPMENT <u>UNIMOG - MARL M5</u> BY: <u>M. EMBICK</u>				
					MATERIAL DESCRIPTION				
26	B14-11						50/6"		
28									
30	B14-12		SM/ML	Very dense, moist, olive tan, Silty, fine SANDSTONE interbedded with hard, moist, very dark gray, Clayey SILTSTONE with little fine sand			50/5"		
32									
34									
36	B14-13		-Mottled olive gray with orange staining at 35 feet		50/6"				
38	B14-14								
40	B14-15					50/7"			
					BORING TERMINATED AT 41.1 FEET No groundwater encountered Backfilled with soil cuttings				

Figure A-14,
Log of Boring B 14, Page 2 of 2

G1818-32-05A.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.

APPENDIX

B

APPENDIX B

LABORATORY TESTING

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

**TABLE B-1
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080**

Sample No.	Depth of Sample, feet (Geologic Unit)	PEA Pole Structure	Dry Density (pcf)	Moisture Content (%)		Unit Peak [Ultimate*] Cohesion (psf)	Angle of Peak [Ultimate*] Shear Resistance (degrees)
				Initial	Final		
B1-3	5 (Tsa)	3	101.6	6.7	21.7	300 [130]	30 [32]
B1-5	10 (Tsa)	3	102.3	3.9	19.7	530 [310]	26 [28]
B1-7	20 (Tsa)	3	110.8	16.2	24.5	320 [310]	27 [27]
B2-2	2.5 (Topsoil)	17	107.5	15.3	25.5	500 [420]	27 [29]
B2-4	7.5 (Qls)	17	95.2	24.8	38.1	250 [190]	28 [26]
B2-6	12.5 (Qls)	17	98.1	23.7	33.6	440 [420]	22 [22]
B2-8	20 (Qls)	17	93.6	28.4	36.2	860 [760]	22 [20]
B3-2	7.5 (Tcs)	39	106.3	15.6	22.0	1500 [780]	14 [21]
B3-4	12.5 (Tcs)	39	106.7	15.3	21.1	990 [430]	24 [28]
B3-6	20 (Tcs)	39	110.8	16.9	20.6	650 [590]	40 [30]
B4-7	25 (Qop)	57	101.6	10.5	19.0	50 [0]	37 [33]
B4-8	30 (Qop)	57	108.3	4.7	15.9	300 [0]	38 [36]
B5-4	10 (Qop)	62	107.1	18.4	22.8	1060 [800]	18 [20]
B5-6	15 (Qop)	62	101.0	3.2	20.4	0 [0]	39 [38]
B6-3	5 (Qoa)	ZXXXXXX-1	106.0	8.9	24.8	640 [480]	36 [37]
B6-7	15 (Qoa)	ZXXXXXX-1	109.2	3.9	17.3	330 [280]	29 [26]
B6-9	25 (Qoa)	ZXXXXXX-1	126.3	9.8	17.0	1150 [1150]	32 [31]
B7-3	5 (Qop)	102	121.2	11.6	15.7	1250 [1000]	28 [30]
B7-7	15 (Qop)	102	111.6	16.4	19.0	2200 [2500]	11 [19]
B8-3	5 (Qop)	101	121.0	12.3	19.9	600 [500]	35 [37]
B8-7	15 (Qop)	101	126.4	10.5	17.3	1100 [1000]	30 [29]
B9-2	5 (Qop)	98	128.7	7.7	13.8	1200 [1100]	36 [36]

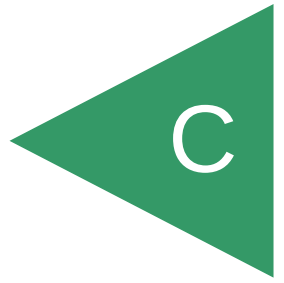
TABLE B-I (Concluded)
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

Sample No.	Depth of Sample, feet (Geologic Unit)	PEA Pole Structure	Dry Density (pcf)	Moisture Content (%)		Unit Peak [Ultimate*] Cohesion (psf)	Angle of Peak [Ultimate*] Shear Resistance (degrees)
				Initial	Final		
B9-5	10 (Qop)	98	126.4	8.5	14.1	450 [180]	37 [36]
B9-7	15 (Qop)	98	124.3	12.7	16.5	2000 [900]	34 [36]
B10-1	2.5 (Qop)	56	124.5	11.5	20.8	600 [590]	33 [33]
B10-7	25 (Qop)	56	101.5	23.7	24.6	840 [290]	27 [32]
B11-1	2.5 (Qoa)	75	114.3	3.6	14.0	0 [50]	39 [36]
B11-4	7.5 (Qoa)	75	108.4	3.5	16.4	110 [0]	36 [37]
B11-6	12.5 (Qoa)	75	108.4	3.1	16.2	80 [130]	36 [33]
B11-8	17.5 (Qoa)	75	115.5	4.2	15.1	340 [200]	29 [30]
B12-3	5 (Qop)	78	104.1	2.9	16.7	260 [330]	34 [31]
B12-7	15 (Qop)	78	116.5	5.7	13.5	340 [200]	32 [27]
B13-3	7.5 (Qop)	79	100.7	3.2	20.1	120 [120]	29 [28]
B14-2	2.5 (Qop)	ZXXXXXX-5	111.6	7.5	19.9	90 [170]	32 [28]
B14-4	7.5 (Qop)	ZXXXXXX-5	117.5	12.1	17.9	270 [570]	37 [26]
B14-9	17.5 (Tsm)	ZXXXXXX-5	110.3	11.1	18.1	1090 [450]	20 [24]

TABLE B-II
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Sulfate Severity	Sulfate Class
B1-1	0.005	Not Applicable	S0
B2-1	0.001	Not Applicable	S0
B6-1	0.0003	Not Applicable	S0
B9-4	0.015	Not Applicable	S0
B10-2	0.050	Not Applicable	S0
B14-5	0.034	Not Applicable	S0

APPENDIX



APPENDIX C

**LOGS OF SELECTED PREVIOUS BORINGS
AND
LABORATORY TEST RESULTS**

FROM

***GEOTECHNICAL INVESTIGATION
TALEGA TAP, M.S.A. 6160015454
SAN DIEGO COUNTY, CALIFORNIA,***

**PREPARED BY *GEOCON INCORPORATED*
OCTOBER 29, 2009
*(PROJECT NO. G1115-22-02)***

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 1 ELEV. (MSL.) <u>205'</u> DATE COMPLETED <u>09-10-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
	B1-1			SM	UNDOCUMENTED FILL (Qudf) Medium dense, damp, yellow brown, Silty, fine to medium SAND; some clay; trace coarse sand; upper 4 feet hand excavated			
2				ML	SANTIAGO FORMATION (Tsa) Well indurated, moist, green, SILTSTONE; some purple mottling; some carbonates			
4	B1-2					75	107.8	20.4
6	B1-3			ML	Mottled purple and green, fine-grained Sandy SILTSTONE	65		
8	B1-4					86	106.5	20.1
	B1-5					42		
10	B1-6			CL	Well indurated, moist, olive, CLAYSTONE; carbonates	50/6"	107.1	16.0
12								
14				ML	Well indurated, moist, mottled purple and green, fine-grained, Sandy SILTSTONE			
16	B1-7				-Becomes green at 16 feet	50/4"	104.7	19.7
18								
20	B1-8				-Orange staining; increase in fine-grained sand	50/5"		
22								
24				SP	Well indurated, moist, pale yellow, Silty, fine-grained SANDSTONE			
26	B1-9					50/5"		
					BORING TERMINATED AT 26½ FEET No groundwater encountered No caving Backfilled 09-10-2009			

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

G1115-22-02.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 2 ELEV. (MSL.) <u>320'</u> DATE COMPLETED <u>09-09-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
				SM	SANTIAGO FORMATION (Tsa) Moderately cemented, damp, pale yellow, Silty, fine-grained SANDSTONE; some mica	31		
2	B2-1 B2-2					19		
	B2-3				-Becomes moist at 2½ feet			
4	B2-4					44	106.4	6.5
6	B2-5				-Some medium-grained sand	15		
8	B2-6					44	109.4	6.9
	B2-7					20		
10	B2-8					51	106.5	8.4
12								
	B2-9				-Some brown staining	79		
14								
	B2-10				-Some coarse-grained sand; some light gray clay chunks	87/11"	106.5	20.5
16				CL	Well indurated, moist, reddish yellow, CLAYSTONE -Becomes light gray claystone at 16½ feet	25		
	B2-11							
18				SM	Moderately cemented, moist, yellowish light brown, Silty, fine- to medium-grained SANDSTONE			
20	B2-12					56	111.5	7.3
					-Increase in silt			
22	B2-13					42		
					-Pale yellow			
24								
	B2-14					61	97.8	6.5
26								
28	B2-15				-Whitish light brown	33		

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

G1115-22-02.GPJ

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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 2 ELEV. (MSL.) <u>320'</u> DATE COMPLETED <u>09-09-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B2-16			SM	MATERIAL DESCRIPTION -Pale yellow	84/5"		
32	B2-17					84/11"		
34								
36	B2-18					50/5"		
					BORING TERMINATED AT 36½ FEET No groundwater encountered No caving Backfilled 09-09-2009			

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

G1115-22-02.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 6 ELEV. (MSL.) <u>368'</u> DATE COMPLETED <u>09-11-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2	B6-1 B6-2 B6-3			SM	MONTEREY FORMATION (Tm) Moderately cemented, damp to moist, whitish light brown, Silty, fine SANDSTONE; some joints; micaceous; weathered -Olive, moist	24 11	108.8	16.6
4	B6-4			ML	Well indurated, moist, olive with orange staining, fine Sandy SILTSTONE with clay	29	99.3	24.3
6	B6-5					14		
8	B6-6 B6-7				-Interbedded siltstone/claystone/sandstone	50 16	85.2	32.7
10	B6-8			CL	Well indurated, moist, olive, CLAYSTONE; trace fine sand	39	86.1	32.7
12								
14								
16	B6-9			ML	Well indurated, moist, olive, fine Sandy SILTSTONE; some orange staining carbonates	92	106.7	19.2
18								
20	B6-10				-Very well indurated	80/10"	98.5	25.6
22								
24								
26	B6-11			CL	Well indurated, moist, olive, CLAYSTONE	58		
					BORING TERMINATED AT 26½ FEET No groundwater encountered No caving Backfilled 09-11-2009			

Figure A-7,
Log of Boring B 6, Page 1 of 1

G1115-22-02.GPJ

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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 7 ELEV. (MSL.) <u>354'</u> DATE COMPLETED <u>09-11-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2	B7-1 B7-2			CL	MONTEREY FORMATION (Tm) Very stiff, moist, dark brown, CLAY, some sandstone chunks (up to 1/2"); carbonate stringers	33	105.9	19.6
4	B7-3 B7-4			ML	SANTIAGO FORMATION (Tsa) Well indurated, moist, olive, fine Sandy SILTSTONE; laminated; orange staining along bedding planes; carbonate nodules up to 1/8"); gypsum	17		
6	B7-5					33	90.2	29.0
8	B7-6				-Increase in sand	19		
10	B7-7					39	94.0	27.3
12	B7-8					22		
14						42	86.4	29.3
16	B7-9				-Interbedded claystone, siltstone, sandstone			
18						46	94.0	24.9
20	B7-10			ML	Well indurated, moist, olive, fine Sandy SILTSTONE; gypsum filled joints	50/6"	93.8	27.2
22								
24	B7-11				-Gray brown, decrease in jointing	50/5 1/2"		
26					BORING TERMINATED AT 26 1/2 FEET No groundwater encountered No caving Backfilled 09-11-2009			

Figure A-8,
Log of Boring B 7, Page 1 of 1

G1115-22-02.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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 8 ELEV. (MSL.) <u>372'</u> DATE COMPLETED <u>09-11-2009</u> EQUIPMENT <u>MARL 5-6" HOLLOW STEM AUGER</u> BY: <u>P. THERIAULT</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
				SM	MONTEREY FORMATION (Tm)			
	B8-1			ML	Damp, light brown, Silty, fine grained SANDSTONE, some medium sand; trace coarse; micaceous; surface joints	26	91.4	28.5
2	B8-2							
	B8-3				Moderately indurated, moist, gray with orange staining, fine Sandy SILTSTONE; some sandstone interbeds; micaceous	14		
4	B8-4					36	88.8	32.8
					-Gray with orange mottling; some calcium carbonate filled fractures; micaceous, some clay	18		
6	B8-5					41	105.1	20.7
8	B8-6					25		
	B8-7							
10	B8-8				-Increase in clay; decrease in sand	87/11½"	107.9	19.7
12								
14				CL	Well indurated, moist, olive, CLAYSTONE; some silt; some jointing; micaceous			
	B8-9				-Some silt; some jointing; micaceous	39	95.3	26.7
16								
18								
20	B8-10					54	87.5	34.5
22					-Interbeds of fine-grained sandstone			
24								
	B8-11			ML	Well indurated, moist, olive, SILTSTONE	50/6"		
26								
					BORING TERMINATED AT 26½ FEET No groundwater encountered No caving Backfilled 09-11-2009			

Figure A-9,
Log of Boring B 8, Page 1 of 1

G1115-22-02.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.

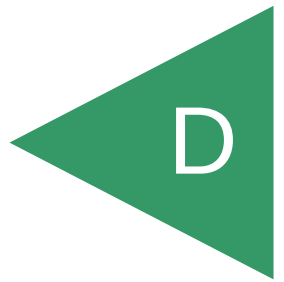
**TABLE III
SUMMARY OF LABORATORY TEST RESULTS**

Sample No.	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion C (psf)	Angle of Shear Resistance (degrees)
B1-2	107.8	20.4	560	33
B1-4	106.5	20.1	--	--
B1-6	107.1	16.0	900	23
B1-7	104.7	19.7	--	--
B2-4	106.4	6.5	--	--
B2-6	109.4	6.9	0	43
B2-8	106.5	8.4	--	--
B2-10	106.5	20.5	400	37
B2-12	111.5	7.3	--	--
B2-14	97.3	6.5	300	40
B3-2	108.4	6.1	--	--
B3-4	109.2	17.3	380	34
B3-6	107.1	17.9	--	--
B3-8	106.7	21.5	800	31
B3-9	120.7	12.6	--	--
B3-10	113.4	13.8	240	41
B4-6	111.7	17.0	840	20
B4-8	111.8	15.1	760	21
B5-4	91.2	25.0	210	31
B5-6	107.5	13.7	--	--
B5-8	105.0	19.0	--	--
B5-10	89.4	28.2	900	25
B5-12	102.5	12.1	0	41
B5-13	99.6	12.8	--	--
B6-2	108.8	16.6	--	--
B6-4	99.3	24.3	870	23
B6-6	85.2	32.7	--	--
B6-8	86.1	32.7	730	15
B6-9	106.7	19.2	--	--
B6-10	98.5	25.6	400	35
B7-2	105.9	19.6	--	--
B7-4	90.2	29.0	400	31
B7-6	94.0	27.3	--	--
B7-8	86.4	29.3	1500	13

TABLE III (Continued)
SUMMARY OF LABORATORY TEST RESULTS

Sample No.	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion C (psf)	Angle of Shear Resistance (degrees)
B7-9	94.0	24.9	--	--
B7-10	93.8	27.2	580	39
B8-2	91.4	28.5	--	--
B8-4	88.8	32.8	400	35
B8-6	105.1	20.7	--	--
B8-8	107.9	19.7	530	33
B8-9	95.3	26.7	--	--
B8-10	87.5	34.5	980	27

APPENDIX



APPENDIX D

**LOGS OF SELECTED PREVIOUS BORINGS
AND
LABORATORY TEST RESULTS**

FROM

***GEO TECHNICAL INVESTIGATION
SDG&E TL 13812: SAN MATEO TO TALEGA
WOOD TO STEEL, NEW STEEL POLE FOUNDATIONS
M.S.A. 6160015454
SAN DIEGO, CALIFORNIA***

**PREPARED BY GEOCON INCORPORATED
SEPTEMBER 10, 2012
(PROJECT NO. G1115-52-40)**

G1115-52-40.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.

APPENDIX B
LABORATORY TESTING

We performed laboratory tests in accordance with the generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. We selected ring samples for laboratory testing for 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)
B1-1	110.2	3.8	180	31
B1-3	113.1	5.0	320	33
B1-5	105.4	4.9	130	34
B1-7	111.8	6.4	490	30
B2-2	116.8	6.4	130	33
B2-5	123.8	10.0	200	35
B2-7	118.6	9.5	0	31
B2-9	129.3	10.3	570	29
B3-1	104.2	10.0	280	26
B3-3	116.0	10.7	200	32
B3-6	108.6	12.1	170	35
B3-8	122.4	10.7	0	36

APPENDIX

E

APPENDIX E

**LOGS OF SELECTED PREVIOUS BORINGS
AND
LABORATORY TEST RESULTS**

FROM

***GEOTECHNICAL INVESTIGATION
PROPOSED SDG&E SUBSTATION
P1048 ELECTRICAL UPGRADES
MARINE CORPS BASE CAMP PENDLETON
SAN DIEGO COUNTY, CALIFORNIA***

**PREPARED BY URS
MAY 2, 2012
(PROJECT NO. 27651084.01000)**

Project: MCBCP - P1048 Electrical Upgrades
 Project Location: Camp Pendleton, California
 Project Number: 27651084.01000

Key to Logs

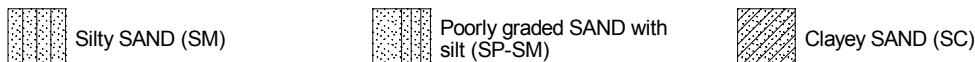
Sheet 1 of 1

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

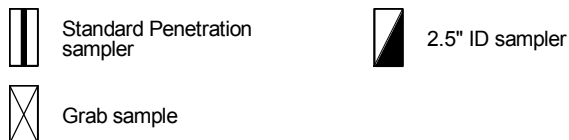
COLUMN DESCRIPTIONS

- | | |
|--|--|
| <p>1 Elevation: Elevation in feet referenced to mean sea level (MSL) or site datum.</p> <p>2 Depth: Depth in feet below the ground surface.</p> <p>3 Sample Type: Type of soil sample collected at depth interval shown; sampler symbols are explained below.</p> <p>4 Sample Number: Sample identification number. Unnumbered sample indicates no sample recovery.</p> <p>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.</p> <p>6 Graphic Log: Graphic depiction of subsurface material encountered; typical symbols are explained below.</p> <p>7 Material Description: Description of material encountered; may include relative density/consistency, moisture, color, particle size; texture, weathering, and strength of formation material.</p> | <p>8 Water Content: Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.</p> <p>9 Dry Unit Weight: Dry density of soil sample measured in laboratory, in pounds per cubic foot.</p> <p>10 Remarks and Other Tests: Comments and observations regarding drilling or sampling made by driller or field personnel.</p> <p>SA Sieve analysis, %<#200 sieve
 WA Three-point wash sieve, %<#200 sieve
 LL Liquid limit (from Atterberg limits test), %
 PI Plasticity Index [LL - PL], %; NP=nonplastic
 DS Direct Shear test
 CORR Corrosivity test</p> |
|--|--|

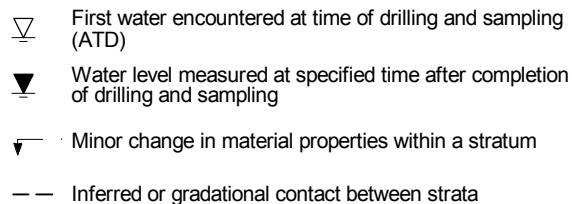
TYPICAL MATERIAL GRAPHIC SYMBOLS



TYPICAL SAMPLER GRAPHIC SYMBOLS



OTHER GRAPHIC SYMBOLS



GENERAL NOTES

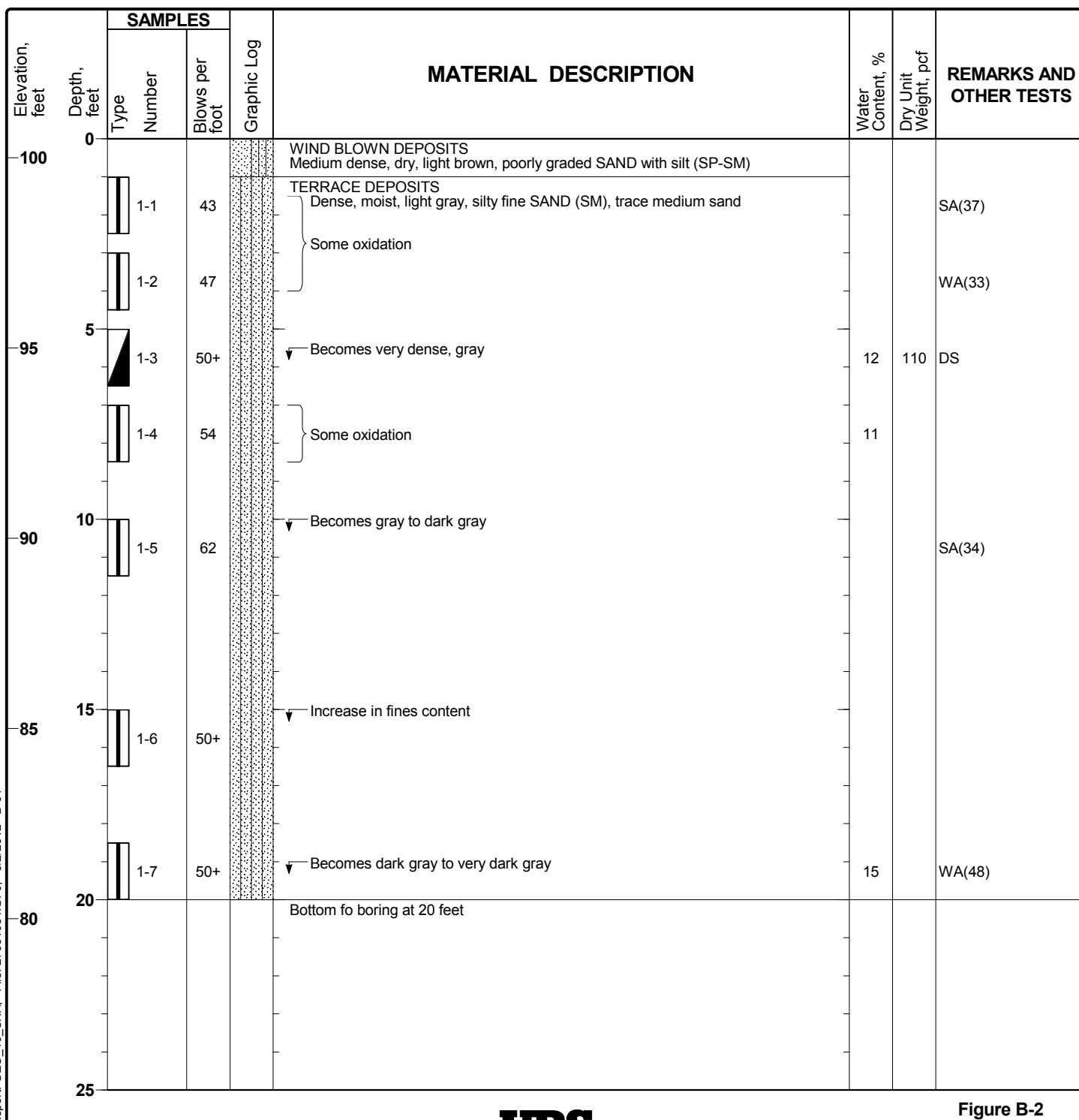
- Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
- Descriptions on these logs apply only at the specific boring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

Project: MCBCP - P1048 Electrical Upgrades
Project Location: Camp Pendleton, California
Project Number: 27651084.01000

Log of Boring B-01

Sheet 1 of 1

Date(s) Drilled	04/04/12	Logged By	J. Faker	Checked By	P. Balasubramanyam
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	6 inches	Total Depth of Borehole	20.0 feet
Drill Rig Type	Wolverine rig	Drilling Contractor	Pacific Drilling	Approximate Surface Elevation	100.5 feet NAVD88
Water Level Depth	None encountered	Sampling Method(s)	SPT/2.5" ID	Hammer Data	140 lbs/30" drop
Borehole Completion	Soil cuttings	Location	N33.38756°/W117.58256°		

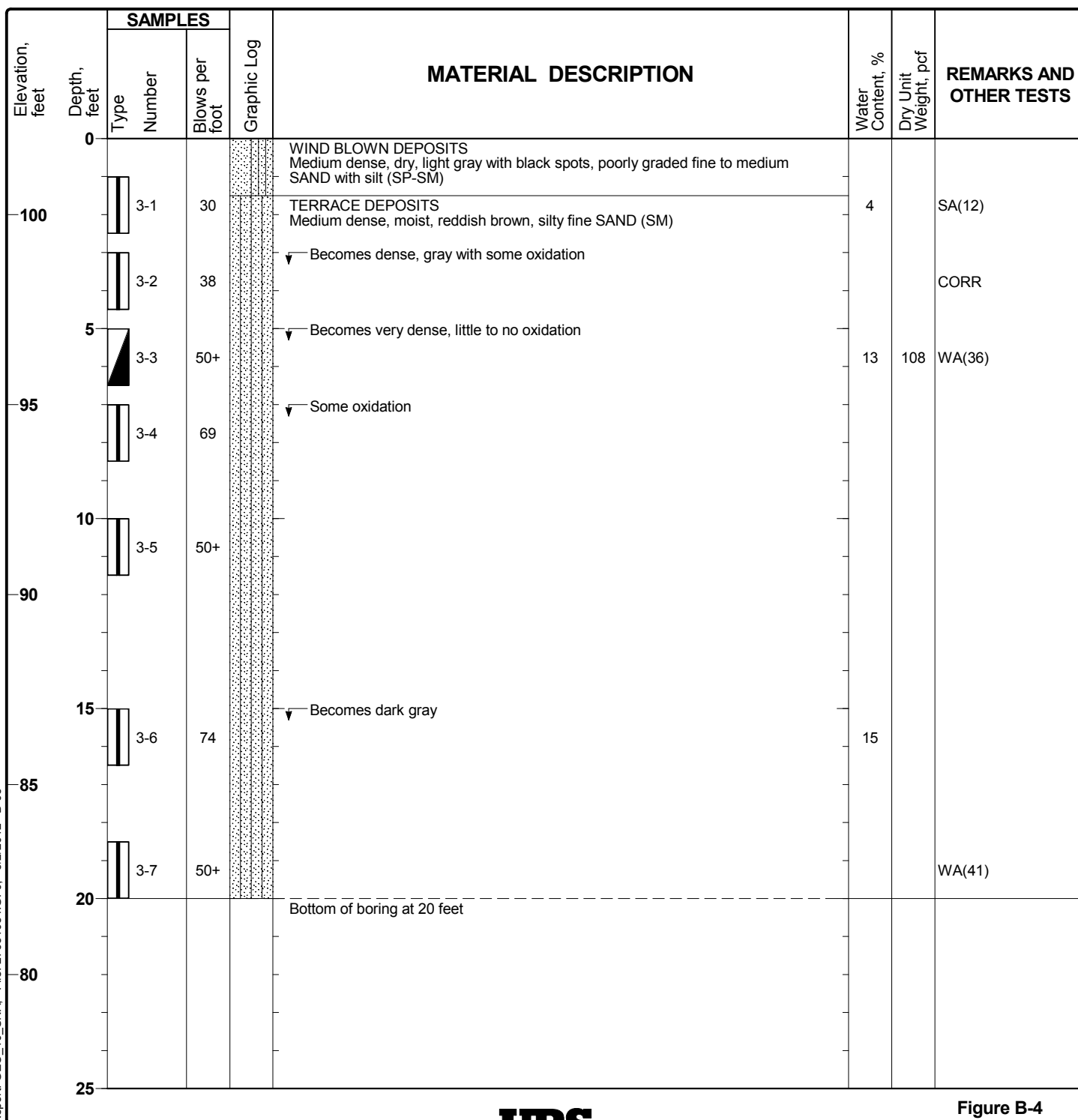


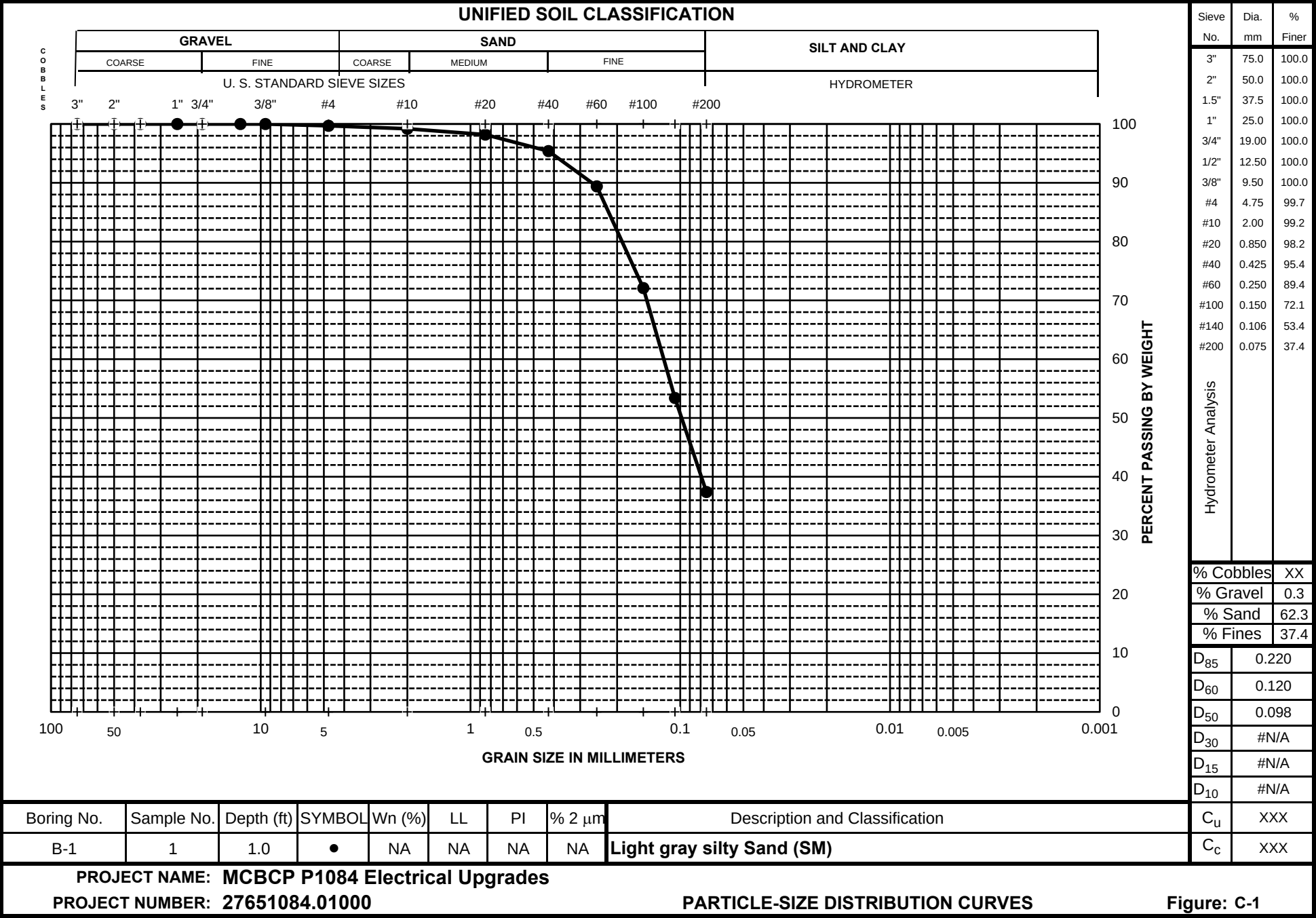
Project: MCBCP - P1048 Electrical Upgrades
Project Location: Camp Pendleton, California
Project Number: 27651084.01000

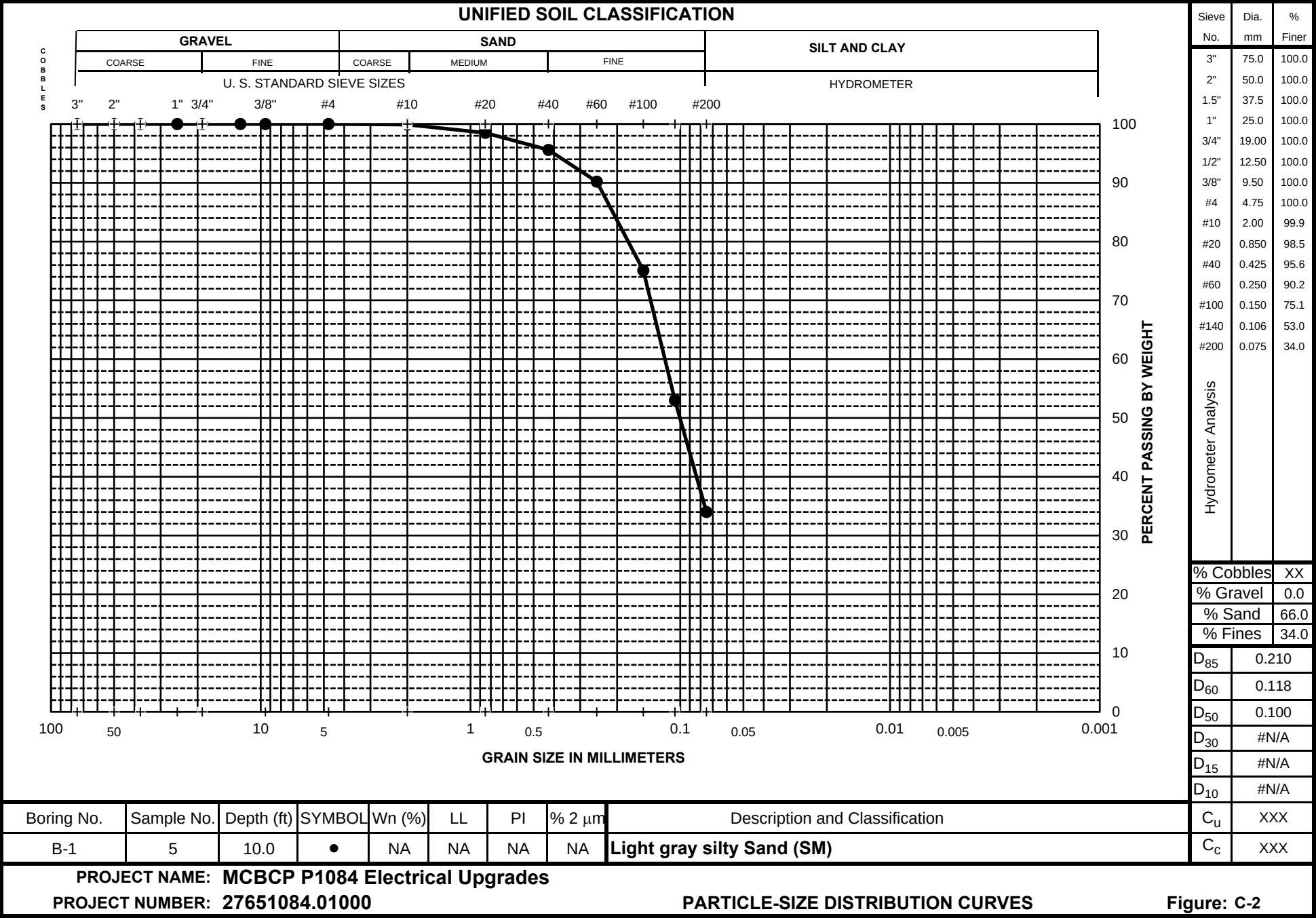
Log of Boring B-03

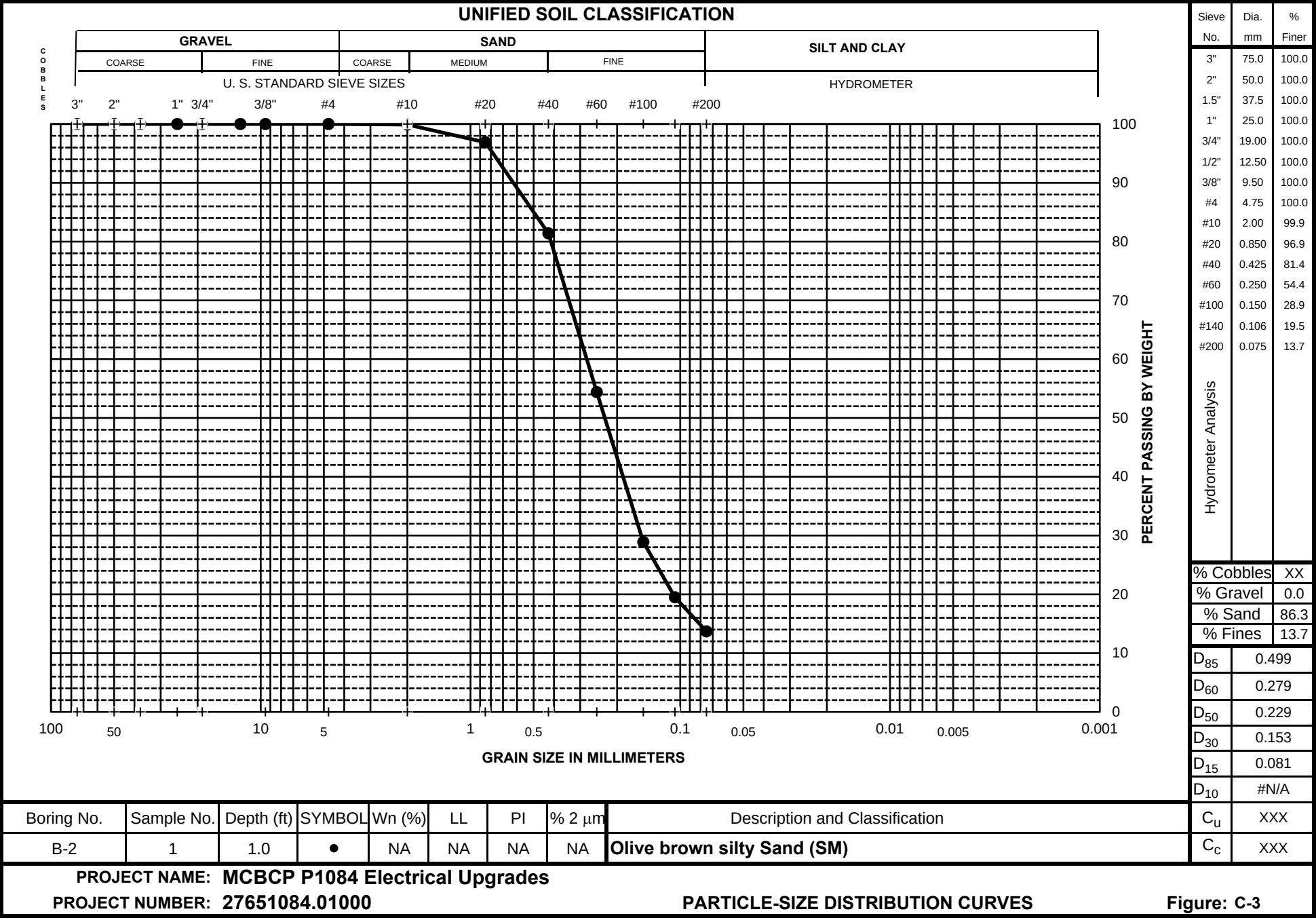
Sheet 1 of 1

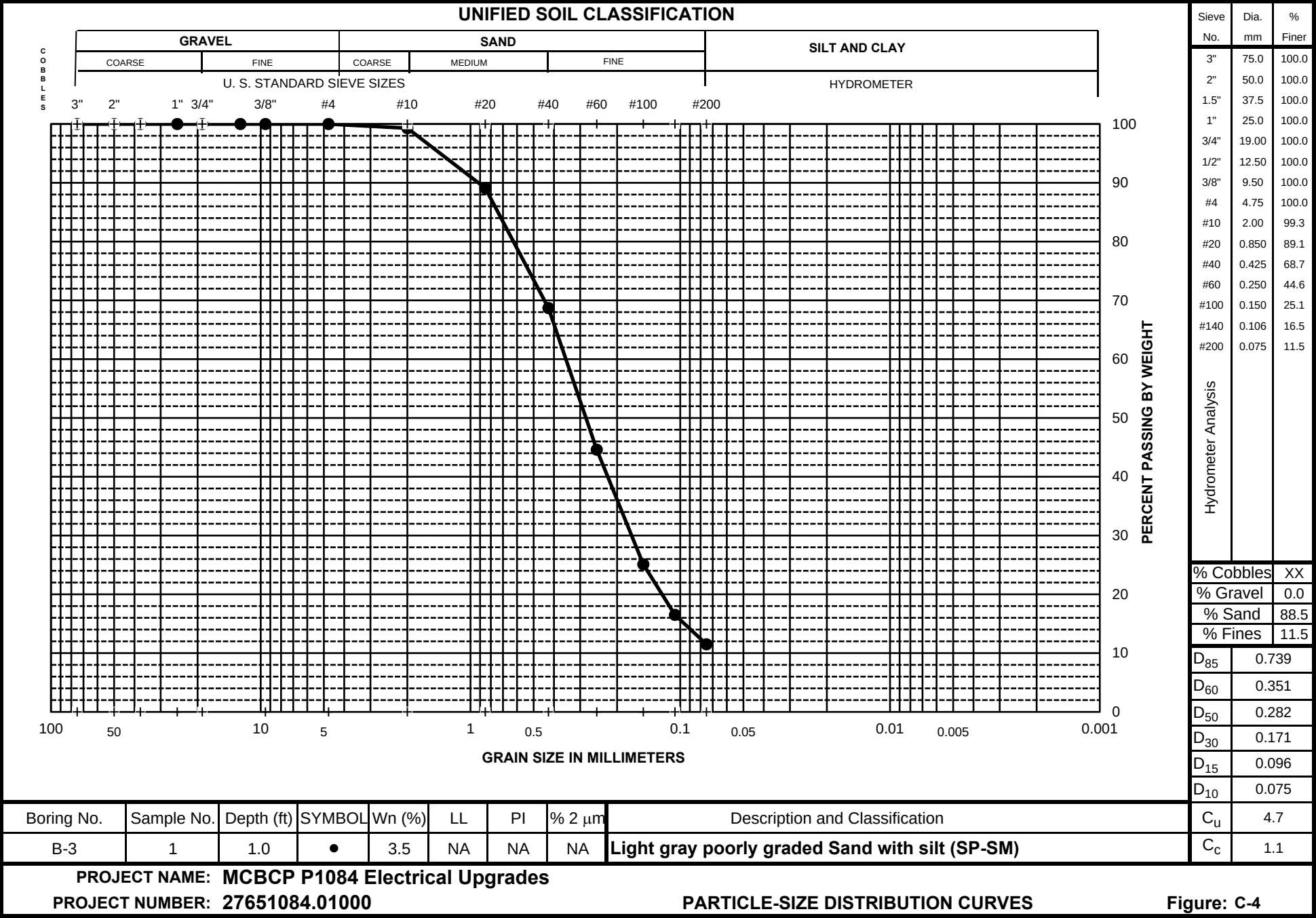
Date(s) Drilled	04/04/12	Logged By	J. Faker	Checked By	P. Balasubramanyam
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	6 inches	Total Depth of Borehole	20.0 feet
Drill Rig Type	Wolverine rig	Drilling Contractor	Pacific Drilling	Approximate Surface Elevation	102 feet NAVD88
Water Level Depth	None encountered	Sampling Method(s)	SPT/2.5" ID	Hammer Data	140 lbs/30" drop
Borehole Completion	Soil cuttings	Location	N33.38736°/W117.58234°		

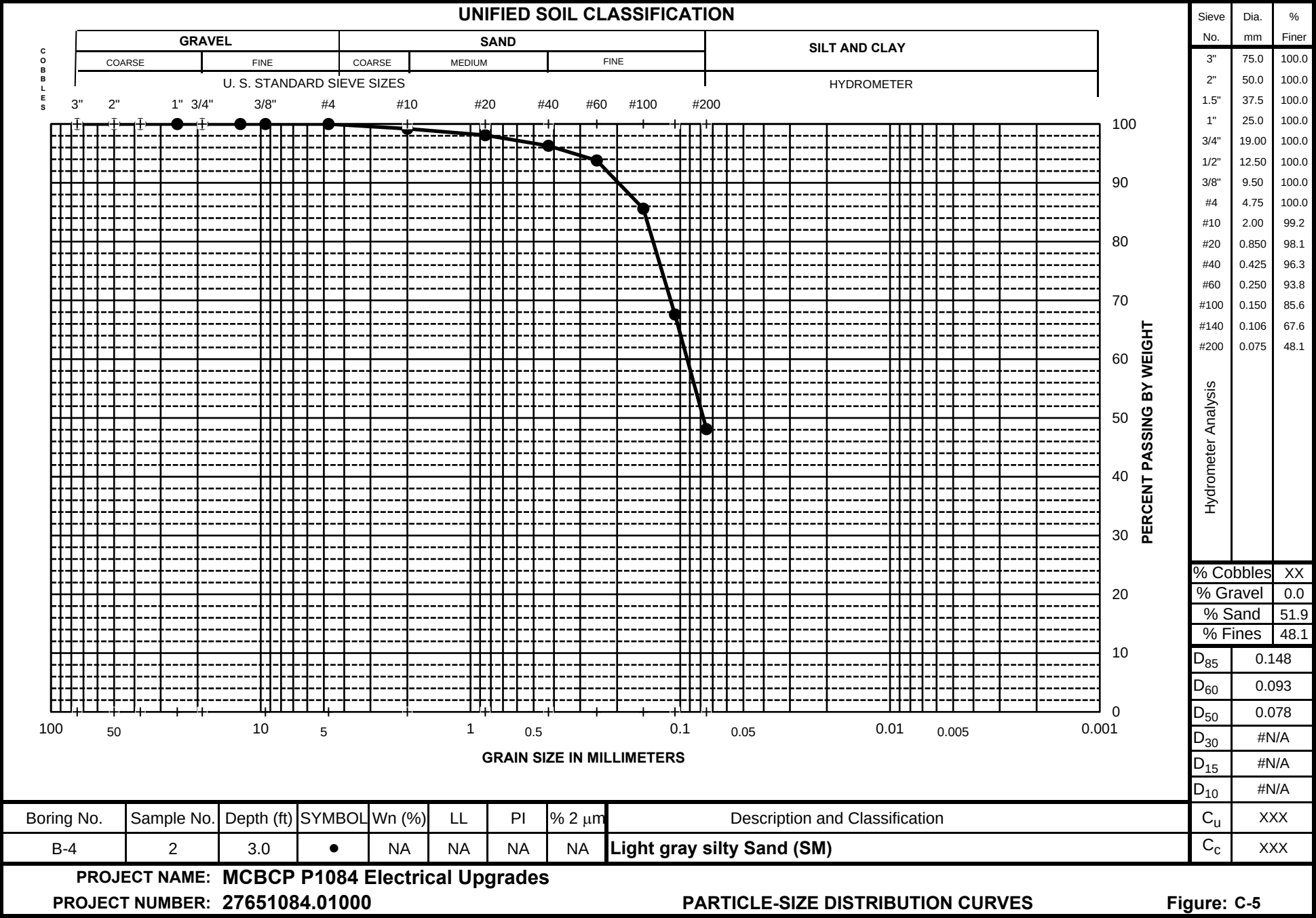


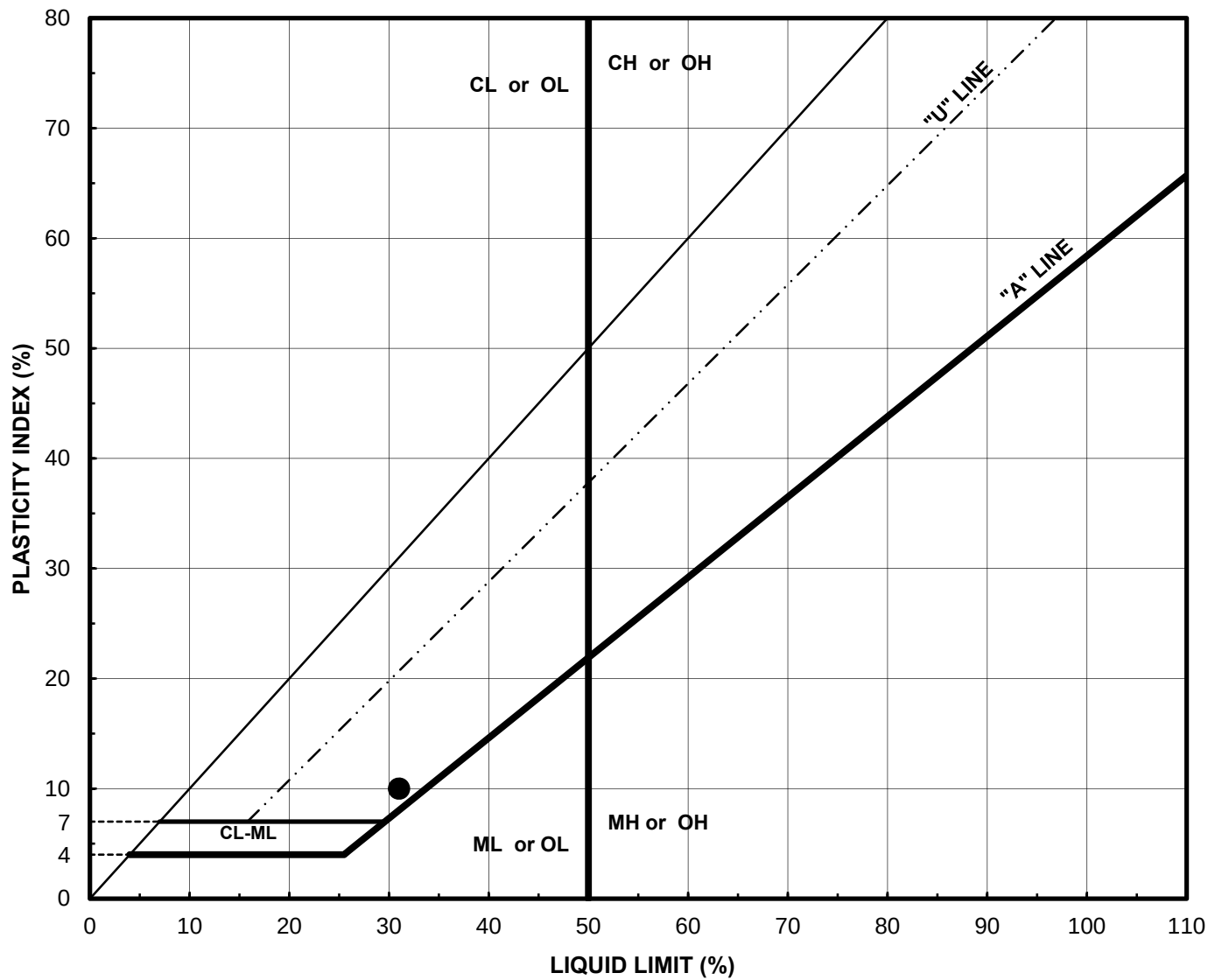








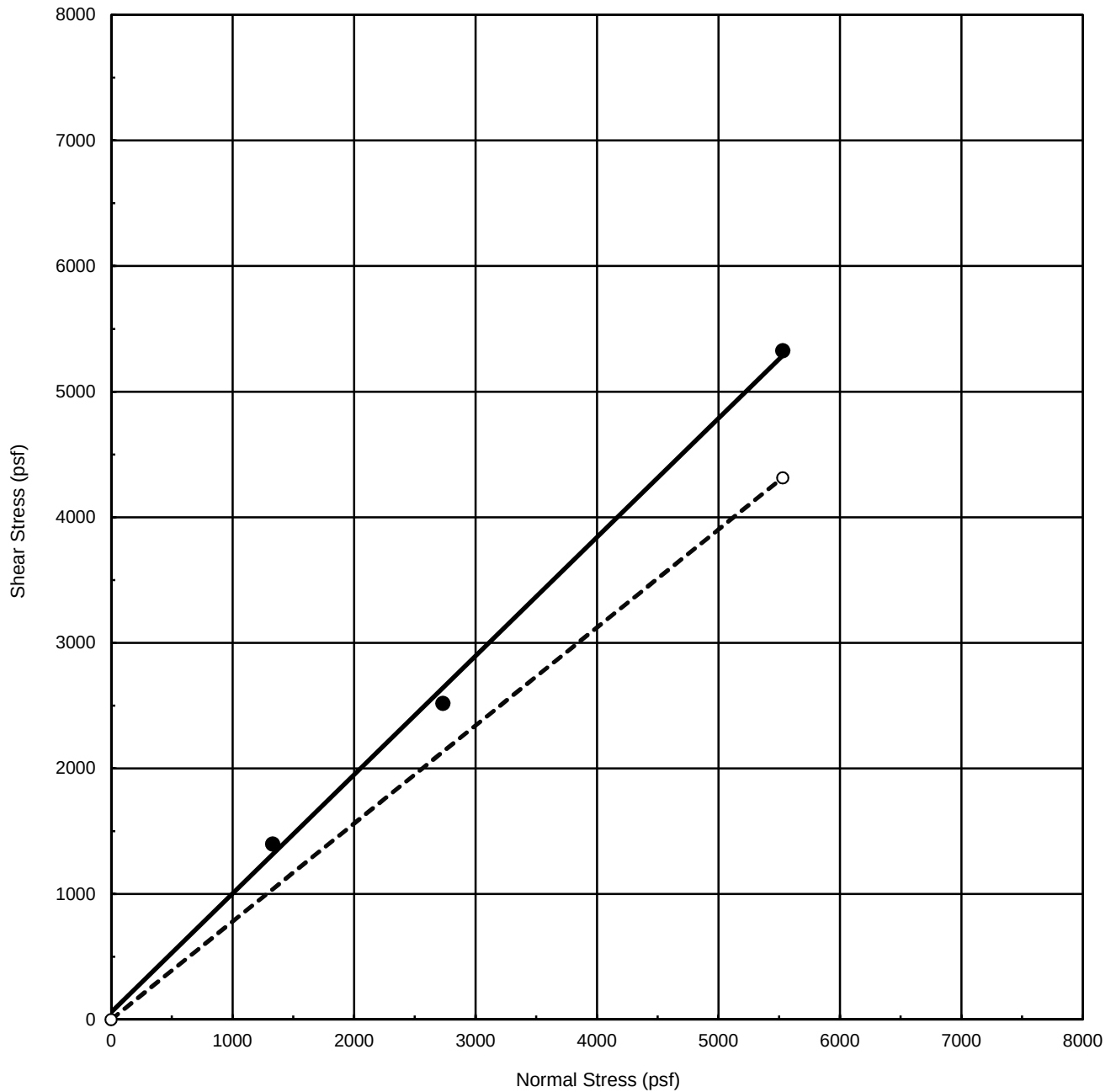




Boring Number	Sample Number	Depth (ft)	Water Content (%)	LL	PI	DESCRIPTION / CLASSIFICATION
B-2	3B	5.0	13.8	31	10	Dark gray clayey Sand (SC)

Project Name: **MCBCP Electrical Upgrades**
Project Number: **27651084.01000**

PLASTICITY CHART
Figure: C-6



Peak Values are :  ,solid trend line												Ultimate Values are:  ,dashed trend line			
Exploration No.:		B1		Strength Intercept (C) :				58.1	psf	Peak	0.0	psf	Ultimate		
Sample No.:		3A						2.8	kPa		0.0	kPa			
Depth (ft m)		5.0	1.5	Friction Angle (ϕ) :				43	degree		38	degree			
Description:		Gray silty Sand (SM)						Shear rate :		0.0040 (in/min) ,		0.0102 (cm/min)			
SYMBOL		% Water	Total Unit Weight		Dry Unit Weight		Normal Stress		Peak Stress		Ultimate Stress				
		Content	(pcf)	(kN/m³)	(pcf)	(kN/m³)	(psf)	(kPa)	(psf)	(kPa)	(psf)	(kPa)			
Initial / Set up		11.9	123.5	19.4	110.3	17.3	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX			
pre-shear	spec. 1	22.1	131.6	20.7	107.8	16.9	1330	64	1398	67	1245	60			
	spec. 2	21.2	134.1	21.1	110.6	17.4	2731	131	2517	121	1629	78			
	spec. 3	20.7	133.6	21.0	110.7	17.4	5529	265	5327	255	4380	210			
URS		MCBCP P1084 Electrical Upgrades							DIRECT SHEAR TEST						
		Project Number: 27651048.01000							ASTM D 3080						
		Test Date: 4/12/2012							Figure: c-7						

CORROSIVITY TEST ANALYSIS

Project Number: 27651084
 Project Name: MCBCP P1084 Electrical Upgrades
 Project Engineer: CRS

Boring No.: B-3
 Sample No.: 2
 Depth (ft): 3.0

Initial Visual Classification Symbol: SM

State of Specimen before Processing

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

Set-Up Water Content	Minus No. 8 or ()
Container No.	s6
Mass Container + Wet Soil (g), M1	161.1
Mass Container + Dry Soil (g), M2	152.42
Mass Container (g), M3	79.84
Water Content, w (%)	11.96

Resistivity Test: California Test Method 643

Minimum Resistance value: 5,150 ohm-cm

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Weight of Soil in bowl (g):	533.7	552	566.23	584.84	
Weight of mixing bowl (g):	130	130	130	130	
Wet weight of Soil (g):	403.7	422	436.23	454.84	
Amount of water added (ml):	0	20	15	20	
Soil Box + Wet Soil (g), M5	227.73	237.35	253.03	255.65	
Weight of Soil Box (g), M6	125.02	125.02	125.02	125.02	
Wt. of Wet Soil for test (g), M7	102.71	112.33	128.01	130.63	
Volume of Soil Box (cm ³)	79.2	79.2	79.2	79.2	79.2
Est. Saturation (%)	24.3	45.9	62.5	74.3	
Resistivity Reading (ohm)	10,000	7,550	5,150	5,750	
Resistance (ohm-cm)	10,000	7,550	5,150	5,750	

Resistance = Soil Box Constant x Reading

pH Test : California Test Method 532

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

pH of slurry: 8.20

Temperature : 19.9 Celsius

Sulfate Content:

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

recorded mg of SO₄ in sample, x, = 20 mg

soil / water ratio, r, = 3

number of dilutions to obtain above value, d, = 3 = 3 mg/ L = ppm

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

SO₄ (ppm) : 60

Chloride Content:

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

mg/L of Cl⁻ = ((A-B) x N x 35453) x 3

A = mL of AgNO₃ A= 3

B = 23 mL of the blank

N = 0.0493 N, normality of the titrant

Cl⁻ (mg/L) = A * 5 * 3

Cl⁻ (ppm) : 45

Tested By: YS

Date: 4/9/2012

Checked By: TJO

URS

APPENDIX



APPENDIX F

**LOGS OF SELECTED PREVIOUS BORINGS
AND
LABORATORY TEST RESULTS**

FROM

***PRELIMINARY GEOTECHNICAL REPORT
P-1048 ELECTRICAL UPGRADES
MARINE CORPS BASE CAMP PENDLETON
SAN DIEGO COUNTY, CALIFORNIA
PREPARED BY LEIGHTON AND ASSOCIATES
JUNE 17, 2011***

AS PRESENTED IN

***GEOTECHNICAL INVESTIGATION
PROPOSED SDG&E SUBSTATION
P1048 ELECTRICAL UPGRADES
MARINE CORPS BASE CAMP PENDLETON
SAN DIEGO COUNTY, CALIFORNIA
PREPARED BY URS
MAY 2, 2012
(PROJECT NO. 27651084.01000)***

GEOTECHNICAL BORING LOG B-3

Project No.	603133-001	Date Drilled	2-24-11
Project	RBF/MCB Camp Pendleton Substations	Logged By	RCS
Drilling Co.	Baja Exploration	Hole Diameter	8"
Drilling Method	CME-75 - 140lb - Autohammer - 30" Drop	Ground Elevation	103'
Location	Basilone (North)	Sampled By	RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							<i>This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.</i>	
	0			B-1				SM	OLDER TERRACE DEPOSITS (Qt) @ 0': SILTY SANDSTONE, Olive brown, moist, dense, friable, fine-grained, slight micaceous, mottled with red-brown	EI, CR
100	5			R-1	26 50	112	14		@ 5': SILTY SANDSTONE, Olive brown, moist, dense, friable, fine-grained, slight micaceous, mottled with red-brown	
95	10			S-1	13 24 30				@ 10': SILTY SANDSTONE, Olive brown, moist, dense, friable, fine-grained, slight micaceous, mottled with red-brown	
90	15			R-2	50/6"	108	12		@ 15': SILTY SANDSTONE, Olive brown, moist, dense, friable, fine-grained, slight micaceous, mottled with red-brown	
85	20			S-2	20 50			SM	SAN MATEO FORMATION (Tsm) @ 20': Dark olive-brown to dark gray, SILTY SANDSTONE, moist to very moist, dense to very dense	
80	25								Total Depth = 21 Feet No ground water encountered at time of drilling Backfilled with soil cuttings on 2/24/11	
75	30									

SAMPLE TYPES:

B BULK SAMPLE
C CORE SAMPLE
G GRAB SAMPLE
R RING SAMPLE
S SPLIT SPOON SAMPLE
T TUBE SAMPLE

TYPE OF TESTS:

-200 % FINES PASSING
AL ATTERBERG LIMITS
CN CONSOLIDATION
CO COLLAPSE
CR CORROSION
CU UNDRAINED TRIAXIAL

DS DIRECT SHEAR
EI EXPANSION INDEX
H HYDROMETER
MD MAXIMUM DENSITY
PP POCKET PENETROMETER
RV R VALUE

SA SIEVE ANALYSIS
SE SAND EQUIVALENT
SG SPECIFIC GRAVITY
UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG B-4

Project No.	603133-001	Date Drilled	2-24-11
Project	RBF/MCB Camp Pendleton Substations	Logged By	RCS
Drilling Co.	Baja Exploration	Hole Diameter	8"
Drilling Method	CME-75 - 140lb - Autohammer - 30" Drop	Ground Elevation	105'
Location	Basilone (South)	Sampled By	RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
<i>This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.</i>										
105	0	N S						SM	<u>OLDER TERRACE DEPOSITS (Qt)</u> @ 0': SILTY SANDSTONE, Olive-brown, moist, dense, friable, fine-grained slightly micaceous, mottled with red-brown	
100	5			R-1 5'-6'	22 50	107	12			
95	10			S-1	10 20 22				@ 10': SILTY SANDSTONE, Olive-brown, moist, dense, friable, fine-grained slightly micaceous, mottled with red-brown	
90	15			R-2	38 50/2"	112	16	SM	<u>SAN MATEO FORMATION (Tsm)</u> @ 15': Dark olive-brown to dark gray, SILTY SANDSTONE, moist to very moist, dense to very dense	
85	20			S-2	27 50					
80	25								Total Depth = 21 Feet No ground water encountered at time of drilling Backfilled with soil cuttings on 2/24/11	
75	30									

SAMPLE TYPES:
B BULK SAMPLE
C CORE SAMPLE
G GRAB SAMPLE
R RING SAMPLE
S SPLIT SPOON SAMPLE
T TUBE SAMPLE

TYPE OF TESTS:
-200 % FINES PASSING
AL ATTERBERG LIMITS
CN CONSOLIDATION
CO COLLAPSE
CR CORROSION
CU UNDRAINED TRIAXIAL

DS DIRECT SHEAR
EI EXPANSION INDEX
H HYDROMETER
MD MAXIMUM DENSITY
PP POCKET PENETROMETER
RV R VALUE

SA SIEVE ANALYSIS
SE SAND EQUIVALENT
SG SPECIFIC GRAVITY
UC UNCONFINED COMPRESSIVE STRENGTH



LIST OF REFERENCES

1. ACI 318-11, Building Code Requirements for Structural Concrete and Commentary, prepared by the American Concrete Institute, dated August, 2011.
2. Boore, D. M., and G. M Atkinson (2006), *Boore-Atkinson NGA Ground Motion Relations for the Geometric Mean Horizontal Component of Peak and Spectral Ground Motion Parameters*, Report Number PEER 2007/01, May 2007.
3. Campbell, K. W., Y. Bozorgnia, *NGA Ground Motion Model for the Geometric Mean Horizontal Component of PGA, PGV, PGD and 5% Damped Linear Elastic Response Spectra for Periods Ranging from 0.01 to 10 s*, Preprint of version submitted for publication in the NGA Special Volume of Earthquake Spectra, Volume 24, Issue 1, pages 139-171, February 2008.
4. Chiou, Brian S. J., and Robert R. Youngs, *A NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra*, preprint for article to be published in NGA Special Edition for Earthquake Spectra, Spring 2008.
5. *Fault Activity Map of California*, California Geological Survey, compiled by C. W. Jennings and W. A. Bryant, 2010 interactive map, www.quake.ca.gov/gmaps/FAM/faultactivitymap.html.
6. Kennedy, M. P., and S. S. Tan, *Geologic Map of the Oceanside 30'x60' Quadrangle, California*, USGS Regional Map Series Map No. 2, Scale 1:100,000, 2007.
7. Risk Engineering, EZ-FRISK (version 7.65), 2015.
8. United States Geological Survey, *7.5 minute Quadrangle Series*, San Clemente, 1968, photorevised 1975.
9. United States Geological Survey, *7.5 minute Quadrangle Series*, San Onofre Bluff Quadrangle, 1968, photoinspected 1975.
10. Unpublished reports, aerial photographs, and maps on file with Geocon Incorporated.
11. Weber, F. H., Jr., *Geology and Mineral Resources of San Diego County, California*, California Division of Mines and Geology, No. 3, 1963.
12. Wesnousky, S. G., *Earthquakes, Quaternary Faults, and Seismic Hazard in California*, Journal of Geophysical Research, Vol. 91, No. B12, 1986, pp. 12, 587, 631.