GEOTECHNICAL INVESTIGATION

TL6975 – SAN MARCOS – ESCONDIDO
BRADY PROJECT: SDGEC1.078.000
SAN DIEGO COUNTY, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

RICHARD BRADY & ASSOCIATES, INC.
SAN DIEGO, CALIFORNIA

SEPTEMBER 12, 2017
PROJECT NO. G1818-52-24

GEOCON
INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G1818-52-24
September 12, 2017

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

Attention: Mr. Brian Montesi

Subject: GEOTECHNICAL INVESTIGATION
TL6975 – SAN MARCOS – ESCONDIDO
BRADY PROJECT: SDGEC1.078.000
SAN DIEGO COUNTY, CALIFORNIA

Dear Mr. Montesi:

In accordance with your request and the task order dated March 8, 2016, we herein submit the results of our geotechnical investigation for the subject TL6975 – San Marcos – Escondido project. The accompanying report presents the results of our study and conclusions and recommendations pertaining to the geotechnical aspects of the proposed transmission line improvements. Based on the results of our investigation, it is our opinion that the alignment is suitable for the proposed improvements 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

Yong Wang
GE 2775

REGISTERED PROFESSIONAL ENGINEER
YONG WANG
No.2775
GEOTECHNICAL
STATE OF CALIFORNIA

Joseph J. Vettel
GE 2401

REGISTERED PROFESSIONAL ENGINEER
JOSEPH J. VETTEL
No. 2401
GEOTECHNICAL
STATE OF CALIFORNIA

YW:JJV:ejc

(e-mail) Addressee
(e-mail) San Diego Gas and Electric
Attention: Mr. Stanislav Dekic

6960 Flanders Drive ■ San Diego, California 92121-2974 ■ Telephone 858.558.6900 ■ Fax 858.558.6159

TABLE OF CONTENTS

1. PURPOSE AND SCOPE 1

2. SITE AND PROJECT DESCRIPTION 1

3. CURRENT AND PREVIOUS INVESTIGATIONS 5

4. FAULTING AND SEISMICITY AND OTHER HAZARDS 9

5. SOIL AND GEOLOGIC CONDITIONS 11
   5.1 Undocumented Fill (Qudf) 11
   5.2 Topsoil 12
   5.3 Young Alluvium (Qya) 12
   5.4 Santiago Formation (Tsa) 12
   5.5 Granodiorite (Kgr) 12

6. GROUNDWATER 12

7. RECOMMENDATIONS FOR FOUNDATION POLES 13

8. RECOMMENDATIONS FOR TRENCHED UNDERGROUND 25
   8.1 Excavation and Soil Characteristics 25
   8.2 Temporary Slope and Excavation Support 25
   8.3 Ground Control and Improvement 27
   8.4 Bearing Capacity for Underground Vault 27
   8.5 Dewatering 27

9. RECOMMENDATIONS FOR TRENCHLESS UNDERGROUND 28

10. RECOMMENDATIONS FOR RETAINING WALLS 29

11. PLAN REVIEW 32

LIMITATIONS AND UNIFORMITY OF CONDITIONS

MAPS AND ILLUSTRATIONS
   Figure 1, Vicinity Map
   Figures 2-13, Site Plans/Geologic Maps

APPENDIX A
   FIELD INVESTIGATION
   Figures A-1 through A-8, Logs of Borings

APPENDIX B
   LABORATORY TESTING
   Table B-I, Summary of Laboratory Direct Shear Test Results
   Table B-II, Summary of Laboratory Plasticity Index Test Results
   Table B-III, Summary of Laboratory Grain Size Distribution Test Results
   Table B-IV, Summary of Laboratory Soil Corrosion Test Results
   Table B-V, Summary of Laboratory Maximum Dry Density and Optimum Moisture Content Test Results
   Table B-VI, Summary of Laboratory Expansion Index Test Results
   Figure B-1, Gradation Curves

APPENDIX C

SELECTED PREVIOUS EXPLORATION LOGS BY GEOCON AND OTHERS

APPENDIX D

CURRENT PROJECT PLANS AND AS-GRADED GEOLOGIC MAPS OF PREVIOUSLY GRADED PADS

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation performed for the proposed TL6975 – San Marcos – Escondido transmission line project in San Diego County, California (see Vicinity Map, Figure 1). The purpose of the geotechnical investigation is to evaluate the surface and subsurface geologic conditions, construction conditions along the project alignment, and to provide recommendations regarding the geotechnical aspects of constructing the proposed improvements.

The scope of our geotechnical consulting included reviewing readily available published and unpublished geologic literature, reviewing the previously performed geotechnical investigation, field exploration, laboratory testing, engineering analyses, and preparing this report. The review also included previous geotechnical explorations along the project alignment by Geocon and/or others to aid in evaluating geotechnical conditions.

We performed a field investigation on June 26, 27, and 28, 2017 that included drilling 8 small diameter exploratory borings to a maximum depth of approximately 54 feet. The boring logs and other details of the field investigation are presented in Appendix A. The approximate locations of the current borings and applicable previous explorations are depicted on the *Site Plans/Geologic Maps*, Figures 2 through 13. We tested selected soil samples obtained during the field investigation to evaluate pertinent physical and chemical properties for engineering analyses and to assist in providing recommendations for the proposed overhead and underground improvements. Details of the laboratory tests and a summary of the test results are presented in Appendix B.

Selected previous exploration logs by Geocon and other consultants are included in Appendix C. The current project plans and *As-Graded Geologic Maps* of the previously graded pads are included in Appendix D.

The recommendations presented in this report are based on an analysis of the data collected during the current and previous investigation of nearby site, and our experience with similar soil and geologic conditions.

2. SITE AND PROJECT DESCRIPTION

The final project plans regarding the proposed TL6975 improvements are being prepared therefore are not available to Geocon Incorporated at this time. In general, the project consists of three segments in San Diego County, California (see Vicinity Map, Figure 1). For the purposes of this report, these three segments may be referred to as the west, north, and the east.

The west segment is located along approximately 3.1 miles of transmission line easement of San Diego Gas and Electric (SDG&E) in the City of San Marcos. This segment runs parallel to the existing TL13825/13811 where geotechnical investigations and engineering services during the wood to steel replacement were performed by Geocon Incorporated several years ago. Specifically, this segment begins at Palomar Airport Road and trends approximately 3.1 miles to the southeast and terminates just north of San Elijo Road. Topographically, this alignment consists of ridges and valleys that are accessed from various gated entrances along the SDG&E and local utility easements. The surrounding terrain is rugged and covered by dense chaparral. We understand that approximately 19 poles will be installed along the project alignment.

The north segment consists of supplemental overhead and underground improvements. The total supplemental overhead and underground alignment extends approximately 3.3 miles in the City of San Marcos. The proposed overhead improvements are generally located within the transmission line easement of San Diego Gas and Electric (SDG&E) and consist of 12 foundation poles that may include drilled, cast-in-place reinforced concrete piers, which will vary from 4 to 10 feet in diameter and 20 to 50 feet in depth. The proposed underground improvements generally consist of 69 kV vaults that are to be constructed along West San Marcos Boulevard and Discovery Street. The majority of the proposed vaults will be installed within 10 feet of existing grade using cut-and-cover trenching methods, and a segment of the vaults beneath San Marcos Creek channel will be installed using trenchless construction method with horizontal directional drilling.

The east segment is located at the northern terminus of the existing transmission lines to the Palomar Power Plant in Escondido, where two new poles will be installed in the southern portion of the existing Palomar Power Plant. Geocon Incorporated previously performed geotechnical investigation for the transmission lines of Palomar Power Plant.

We understand that the proposed monopole foundations may include drilled, cast-in-place reinforced concrete piers, which will vary in diameter and depth depending on the prevailing rock and soil conditions but are generally on the order of 4 to 10 feet in diameter and 20 to 50 feet in depth. In addition, new pads with retaining walls will also be constructed for three of the pole foundations.

Tables 2.1 through 2.5 list the proposed poles, pads and associated retaining walls, and the supplemental overhead and underground improvements. The locations of proposed improvements are shown on Figures 2 through 13, *Site Plans/Geologic Maps*. The preliminary plans for the pads of proposed Poles Z100268, Z100273, and Z100274 are also included in Appendix D of this the report.

TABLE 2.1
SUMMARY OF PROPOSED POLES – WEST SEGMENT

Pole No.	Latitude	Longitude	Approx. El. (ft)
Z100267	33.1305393	-117.2305889	494.4
Z100268	33.12730476	-117.228504	420.5
Z100269	33.12487651	-117.2269082	528.6
Z100270	33.12311502	-117.2257499	717.1
Z100271	33.12227056	-117.2251951	727.1
Z100272	33.1214068	-117.2246291	691.9
Z100273	33.11509428	-117.2204825	716
Z100274	33.1131924	-117.2192398	769.1
Z100275	33.11200336	-117.2184652	807.7
Z100276	33.11060528	-117.2175433	696.4
Z100277	33.10683497	-117.2150703	482.8
Z100278	33.10266668	-117.2123461	532.7
Z100279	33.10165278	-117.211678	571.2
Z100280	33.09995827	-117.2105642	568.4
Z100281	33.09840371	-117.2095428	570.7
Z100282	33.09722056	-117.2087525	572
Z100283	33.09492527	-117.2070219	481.3
Z100284	33.09488748	-117.204039	537.4
P254291	33.09483995	-117.2038099	535.7

TABLE 2.2
SUMMARY OF PROPOSED PADS AND RETAINING WALLS – WEST SEGMENT

Pad No.	Latitude	Longitude	Approx. Pad El. (ft)	Max. Wall Height and Length (ft)
Z100268, #2	33.127305	-117.228504	424	14 and 148
Z100273, #8	33.115094	-117.220483	728	18 and 156
Z100274, #9	33.113192	-117.219240	772	17 and 158

TABLE 2.3
SUMMARY OF PROPOSED SUPPLEMENTAL OVERHEAD – NORTH SEGMENT

Item	Structure	Latitude	Longitude
1	Z114456	33.1308	-117.2306
2	Z114455	33.1311	-117.2296
3	Z114448	33.1314	-117.2208
4	Z114441	33.1313	-117.2126
5	Z815952	33.1313	-117.2111
6	Z815956	33.1320	-117.2102
7	Z815955	33.1314	-117.2089
8	Z815945	33.1312	-117.2079
9	Z817834	33.1312	-117.2009
10	Z10567	33.1306	-117.2007
11	Z114429	33.1290	-117.1987
12	Z519522	33.1285	-117.1978

TABLE 2.4
SUMMARY OF PROPOSED UNDERGROUND – NORTH SEGMENT

Item	Structure	From Station	To Station
1	Vault (cut-and-cover trenching)	11+84	105+34
2	Vault (horizontal directional drilling)	105+34	115+10
3	Vault (cut-and-cover trenching)	115+10	118+90

TABLE 2.5
SUMMARY OF PROPOSED POLES – EAST SEGMENT

Pole No.	Latitude	Longitude	Approx. El. (ft)
Z257431	33.12495294	-117.1169552	691.2
Z257432	33.12497716	-117.1165838	683

The site description and proposed improvements are based on a site reconnaissance, and the available topographic maps and project plans. If final 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 grade of the top of the pole foundation.

3. CURRENT AND PREVIOUS INVESTIGATIONS

In general, the geotechnical data for the subject project is based on a combination of the previous explorations along the project alignment and the current exploration where previous explorations are not applicable.

The geotechnical data along the north segment was documented by our report titled: *Geotechnical Investigation, TL6975–San Marcos–Escondido, Supplemental Overhead and Underground, BRADY Project: SDGEC1.078.000, San Marcos, California*, prepared by Geocon Incorporated, dated: August 9, 2017 (Project No. G1818-52-24).

Tables 3.1 and 3.2 list the proposed improvements along the north segment and their adjacent geotechnical explorations for overhead and underground, respectively. The approximate locations are shown on Figures 9 through 13, *Site Plans/Geologic Maps*. The logs of current explorations and associated results of laboratory testing are included in Appendices A and B, respectively. Selected logs of previous explorations by others are included in Appendix C. The current project plans for the underground improvements are included in Appendix D.

TABLE 3.1
PROPOSED OVERHEAD AND ADJACENT EXPLORATIONS – NORTH SEGMENT

Item	Structure	Longitude	Longitude	Adjacent Exploration
1	Z114456	33.1308	-117.2306	B1
2	Z114455	33.1311	-117.2296	B1
3	Z114448	33.1314	-117.2208	B10
4	Z114441	33.1313	-117.2126	B9
5	Z815952	33.1313	-117.2111	B2
6	Z815956	33.1320	-117.2102	B3
7	Z815955	33.1314	-117.2089	SDCWA (2015) B-1
8	Z815945	33.1312	-117.2079	SDCWA (2015) B-1
9	Z817834	33.1312	-117.2009	B5
10	Z10567	33.1306	-117.2007	B5
11	Z114429	33.1290	-117.1987	B7
12	Z519522	33.1285	-117.1978	Substation (2008) B-1, B-2, B-3

SDCWA = San Diego County Water Authority, Carlsbad 6 FAF

TABLE 3.2
PROPOSED UNDERGROUND AND ADJACENT EXPLORATIONS – NORTH SEGMENT

Item	Structure	From Station	To Station	Adjacent Exploration*
1	Vault (cut-and-cover trenching)	11+84	105+34	B1, B10, B3, B5 07349-42-10; 07590-22-17; G1734-52-01; 07528-22-01; 03342-01-01; SDCWA (2015); 03299-02-03; 03726-01-01; 07732-42-01 to 06; G1000-32-01A; G1331-01-01; G3658-01-01; 04868-31-01; 03747-01-01; 07523-22-01
2	Vault (horizontal directional drilling)	105+34	115+10	B5, B6, B7
3	Vault (cut-and-cover trenching)	115+10	118+90	B6, B7, Substation (2008)

*Current and previous by Geocon and by others.

The geotechnical data along the west and east segments was documented in our report titled: *Geotechnical Investigation, TL6975–San Marcos–Escondido, San Diego County, California*, prepared by Geocon Incorporated, dated April 18, 2016 (Revised May 6, 2016, Project No. G1818-52-24), and *Geotechnical Consultation – Addendum No.1, TL6975-San Marcos-Escondido, San Diego County, California*, prepared by Geocon incorporated, dated August 15, 2016 (Project No. G1818-52-24). We further reviewed the following documents that include the previous geotechnical investigations and engineering services performed for the adjacent TL13825/13811 Shadowridge to Meadowlark Junction project and the Palomar Transmission Lines project:

1. *Geotechnical Investigation, TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated January 7, 2008 (Project No. 07590-22-25).
2. *Geotechnical Design Criteria for Segmental (Geosynthetic Reinforced) Retaining Walls, TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated July 25, 2008 (Project No. 07590-22-25).
3. *Retaining Wall Plan Review, TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated October 15, 2008 (Project No. 07590-22-25).
4. *Consultation, TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated July 7, 2009 (Project No. 07590-22-25).
5. *Final Report of Testing and Observation Services Performed during Site Grading, TL 13825/ 13811 Shadowridge Substation to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated November 18, 2009 (Project No. 07590-22-25A).
6. *Update: MFAD Parameters, TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated November 19, 2009 (Project No. 07590-22-25A).

7. *Addendum, Geotechnical Investigation: Design Parameter for New Pole Location (SP-860), TL 13825/13811 Shadowridge to Meadowlark Junction, Vista and San Marcos, California,* prepared by Geocon Incorporated, dated March 2, 2010 (Project No. 07590-22-25A).

8. *Foundation Design Parameters, Palomar Power Transmission Line, S.S.A. 56600009769, Escondido, California,* prepared by Geocon Incorporated, dated September 20, 2004 (Project No. 07050-22-15B).

9. *Supplemental Foundation Design Parameters for SP-627, Palomar Power Transmission Line, S.S.A. 56600009769, Escondido, California,* prepared by Geocon Incorporated, dated October 21, 2004 (Project No. 07050-22-15B).

Tables 3.3, 3.4 and 3.5 list the summary of the proposed improvements together with the adjacent explorations and engineering services we performed previously along the west and east segments. In general, there are four (4) geotechnical hollow-stem auger borings (B-1, B-5 through B-7); ten (10) air-track borings (AT-1 through AT-3, AT-5, AT-6, AT-8, AT-9, and AT-11 through AT-13); and two (2) rock coring borings (C-1 and C-3). In addition, we performed geotechnical engineering services during the grading of eleven (11) pads and the construction of three (3) associated retaining walls. The approximate locations of previous explorations are depicted on Figures 2 through 8, *Site Plans/Geologic Maps*. The logs of selected previous explorations and the *As-Graded Maps* of the pads and retaining walls are included in Appendices C and D of this report, respectively.

TABLE 3.3
PROPOSED POLES AND ADJACENT PREVIOUS EXPLORATIONS AND GRADED PADS - WEST SEGMENT

Pole No.	Adjacent Previous Exploration	Adjacent Graded Pad
Z100267	B-5	119756
Z100268	B-5, B-6	
Z100269	B-6	
Z100270	AT-9	119759
Z100271	AT-8/C-1	119760
Z100272	AT-8/C-1	
Z100273	AT-13	119762
Z100274	AT-12	119763
Z100275	AT-12	
Z100276	AT-11	119765
Z100277	AT-6	119766
Z100278	AT-1/C-2	
Z100279	AT-1/C-2	
Z100280	AT-2	119769
Z100281	AT-2	119770
Z100282	AT-3	119771
Z100283	AT-5/B-7	119773
Z100284	AT-5/B-7	
P254291	AT-5/B-7	

TABLE 3.4
PROPOSED PADS AND ADJACENT PREVIOUS EXPLORATIONS AND GRADED PADS – WEST SEGMENT

Pole No.	Adjacent Previous Exploration	Adjacent Graded Pad
Z100268, #2	B-5, B-6	
Z100273, #8	AT-13	119762
Z100274, #9	AT-12	119763

TABLE 3.5
PROPOSED POLES AND ADJACENT PREVIOUS EXPLORATIONS – EAST SEGMENT

Pole No.	Adjacent Previous Exploration
Z257431	B-1
Z257432	B-1

We previously performed laboratory tests on selected soil samples in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. We tested selected samples for the in-place moisture, dry density, direct shear strength, and compaction characteristics. In addition, selected rock samples were tested for their unconfined compressive strengths. The results of the in-place moisture and dry density tests are shown on the previous boring logs in Appendix C. Other results of the previous laboratory tests are summarized in Tables 3.6, 3.7, and 3.8 below.

TABLE 3.6
SUMMARY OF PREVIOUS LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-02

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
B6-6a	Yellowish brown, Clayey, fine SAND	125.9	10.1

TABLE 3.7
SUMMARY OF PREVIOUS LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080-03

Sample No.	Dry Density (pcf)	Moisture Content %)		Ultimate Unit Cohesion (psf)	Ultimate Angle of Shear Resistance (degrees)
		Before Test	After Test		
B5-3	110.9	13.7	18.2	1200	26
B6-7	109.2	11.1	20.9	450	15
B7-6	118.5	14.8	21.2	1050	20

TABLE 3.8
SUMMARY OF PREVIOUS UNCONFINED COMPRESSION TEST RESULTS
ASTM D 2166 (2938)

Sample No.	Description	Unconfined Compression Strength (psi)	Density (pcf)
C1-1	Moderately Weathered Granodiorite	23,010	163.0
C3-1	Slightly Weathered Granodiorite	37,860	162.9
C4-1	Weathered Granodiorite	14,810	163.0
C5-1	Slightly Weathered Granodiorite	34,970	165.5

Sample C1-1 was obtained from Boring C-1 at 5½ feet.
Sample C3-1 was obtained from rocks exposed at the vicinity of AT-3.
Sample C4-1 was obtained from rocks exposed at the vicinity of AT-1.
Sample C5-1 was obtained from rocks exposed at the vicinity of AT-11.

4. FAULTING AND SEISMICITY AND OTHER HAZARDS

According to the computer program *EZ-FRISK* (Version 7.65), 9 known active faults are located within a search radius of 50 miles from the project site. We used the 2008 USGS fault database that provides several models and combinations of fault data to evaluate the fault information. Based on this database, the nearest known active fault is the Newport-Inglewood/Rose Canyon Faults, located approximately 9 miles west of the site and is the dominant source of potential ground motion. Earthquakes that might occur on the Newport-Inglewood/Rose Canyon Faults 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 and peak ground acceleration for the Newport-Inglewood/Rose Canyon Faults are 7.5 and 0.28g, respectively. Table 4.1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We calculated peak ground acceleration (PGA) using Boore-Atkinson (2008) NGA USGS2008, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2007) NGA USGS2008 acceleration-attenuation relationships.

TABLE 4.1
DETERMINISTIC SEISMIC SITE PARAMETERS

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Peak Ground Acceleration		
			Boore-Atkinson 2008 (g)	Campbell-Bozorgnia 2008 (g)	Chiou-Youngs 2008 (g)
Newport-Inglewood	9	7.5	0.25	0.22	0.28
Rose Canyon	9	6.9	0.21	0.20	0.22
Elsinore	20	7.9	0.19	0.14	0.18
Coronado Bank	24	7.4	0.14	0.10	0.11
Palos Verdes Connected	24	7.7	0.16	0.11	0.14
Earthquake Valley	37	6.8	0.07	0.06	0.05
Palos Verdes	41	7.3	0.08	0.06	0.06
San Joaquin Hills	41	7.1	0.08	0.09	0.08
San Jacinto	45	7.9	0.10	0.07	0.09

We used the computer program *EZ-FRISK* to perform a probabilistic seismic hazard analysis. The computer program *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mapped Quaternary fault is proportional to the faults slip rate. The program accounts for earthquake magnitude as a function of fault rupture length, and site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore-Atkinson (2008) NGA USGS 2008, Campbell-Bozorgnia (2008) NGA USGS 2008, and Chiou-Youngs (2007) USGS2008 in the analysis. Table 4.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 4.2
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson, 2008 (g)	Campbell-Bozorgnia, 2008 (g)	Chiou-Youngs, 2008 (g)
2% in a 50 Year Period	0.41	0.39	0.44
5% in a 50 Year Period	0.30	0.29	0.31
10% in a 50 Year Period	0.23	0.22	0.23

While listing peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site. Seismic design of the structures should be evaluated in accordance with the California Building Code (CBC) and other currently adopted City of San Diego codes.

Except for the potential liquefaction in loose saturated alluvium and/or flooding associated with San Marcos Creek, other geologic and geotechnical hazards such as landslide, erosion, debris flows, rock falls, subsidence, and seismic related conditions such as fault rupture, lateral spreading, seiches, and tsunamis are considered non-applicable for the proposed improvements.

5. SOIL AND GEOLOGIC CONDITIONS

Along the west segment in the City of San Marcos, the proposed poles are underlain by topsoil (residual soil), Santiago Formation, and Granodiorite. The topsoil (residual soil) consists primarily of silty, fine- to coarse-grained sand with up to 15 percent gravel and occasional cobble-size rock fragments. The top few inches has typically high organic contents due to vegetative growth. The Eocene-age Santiago Formation, consists of dense, massive, yellowish brown to gray, silty, fine to coarse sandstones with interbeds of hard, greenish-gray to brown claystones and siltstones. Gravel, cobble and boulders are common in this unit. The Cretaceous-age granodiorite is at various stages of weathering and possesses a medium- to coarse-grained phaneritic texture with corestones interspersed within the formational unit. Granitic rock generally excavates to silty, fine- to coarse-grained sand with rock fragments and the generated soil typically exhibits low expansion potential and adequate shear strength when compacted.

The proposed pole sites along the east segment in the City of Escondido are underlain by topsoil and granitic rock. Alluvium was also encountered in the previous Boring B-7 that is located near the proposed Pole Z100283 but outside the project alignment. However, alluvium is not likely to be encountered at the proposed Pole Z100283 where granitic rock was encountered in the adjacent air-track boring AT-5.

The north segment is generally underlain by undocumented fill, topsoil, young alluvium, and Santiago Formation. The occurrence and distribution of the units are presented on the boring logs in Appendix A. The surficial soil types and geologic units are described below in order of increasing age.

5.1 Undocumented Fill (Qudf)

We encountered undocumented fill within 6 of 8 boring drilled during the current investigation. The undocumented fill generally consists of loose to dense silty sand and clayey sand. The fill was likely placed during original roadway construction and improvements. Since we have not been able to review engineering reports pertaining to fill placement, the fill is considered undocumented.

5.2 Topsoil

We encountered topsoil within Borings B5 and B6 with a thickness of approximately 3 to 4 feet. The topsoil is composed of soft sandy clay and loose clayey sand. Silty sand with gravel and occasional cobbles were also encountered in topsoil within our previous explorations along the project alignment.

5.3 Young Alluvium (Qya)

Young alluvium was observed beneath the topsoil or undocumented fill within Borings B5, B6, and B7. The young alluvium generally consists of loose to dense, silty sand.

5.4 Santiago Formation (Tsa)

The Santiago Formation encountered in our borings generally consists of dense to very dense, massive, silty sandstone and clayey sandstone. Gravel, cobbles, and boulders are common in this unit.

5.5 Granodiorite (Kgr)

The Cretaceous-age granodiorite encountered within our previous explorations along the project alignment is at various stages of weathering and possesses a medium- to coarse-grained phaneritic texture with corestones interspersed within the formational unit. Granitic rock generally excavates to silty, fine- to coarse-grained sand with rock fragments and the generated soil typically exhibits low expansion potential and adequate shear strength when compacted.

6. GROUNDWATER

We encountered groundwater during our previous investigation within air-track boring AT-7 at approximately 20 feet below the existing ground surface. We further encountered groundwater in current Borings B5, B6, and B7 at depths of 4 to 8 feet below existing grade, or approximate elevations of 510 feet above Mean Sea Level (MSL). Cut-and-cover trenching above this elevation are generally not expected to encounter groundwater if constructed during the dry season; however, it is not uncommon for groundwater or seepage conditions to develop where none previously existed.

Groundwater elevations are dependent on seasonal precipitation; irrigation, land use, among other factors, and vary as a result. If groundwater accumulates in the excavation it should be pumped out prior to the installation of the underground vaults and piers.

7. RECOMMENDATIONS FOR FOUNDATION POLES

For foundations with drilled pier, a generalized subsurface soil profile has been developed for the area surrounding pole foundation based on the data obtained from our current and previous explorations. 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 7.1 through 7.12 summarize the average total unit weight, cohesive strength, angle of internal friction, deformation modulus, and strength reduction factors assigned to the soil layers beneath the proposed pole sites along the north segment. Similar parameters for the proposed poles along the west and east segments are summarized in Tables 7.13 through 7.33. The parameters presented herein are based on nearby explorations and experience and testing of similar materials. We have assumed that except for the three proposed pads, 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 7.1
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z114456)

Depth (feet)	Soil 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	Undocumented Fill	250	31	110	16	122	2.5	1.0
8 to 20+	Santiago Formation	550	30	121	7	133	4.0	1.0

Note: Data based on Boring B1.

TABLE 7.2
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z114455)

Depth (feet)	Soil 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	Undocumented Fill	250	31	110	16	122	2.5	1.0
8 to 20+	Santiago Formation	550	30	121	7	133	4.0	1.0

Note: Data based on Boring B1.

TABLE 7.3
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z114448)

Depth (feet)	Soil 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	Undocumented Fill	250	31	110	16	122	2.5	1.0
2 to 20+	Santiago Formation	650	26	130	17	133	4.0	1.0

Note: Data based on Boring B10.

TABLE 7.4
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z114441)

Depth (feet)	Soil 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	Undocumented Fill	250	31	110	16	122	2.5	1.0
6 to 20+	Santiago Formation	850	27	130	15	133	4.0	1.0

Note: Data based on Boring B9.

TABLE 7.5
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z815952)

Depth (feet)	Soil 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 14	Undocumented Fill	350	32	115	11	128	2.5	1.0
14 to 20+	Santiago Formation	1,100	28	130	19	132	4.0	1.0

Note: Data based on Boring B2.

TABLE 7.6
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z815956)

Depth (feet)	Soil 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	Undocumented Fill	250	31	110	16	122	2.5	1.0
6 to 20+	Santiago Formation	670	35	130	14	135	4.0	1.0

Note: Data based on Boring B3.

TABLE 7.7
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z815955)

Depth (feet)	Soil 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	Fill	250	31	123	18	128	2.5	1.0
6 to 30+	Santiago Formation	670	35	127	14	133	4.0	1.0

Note: Data based on SDCWA Boring B-1 (2015).

TABLE 7.8
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z815945)

Depth (feet)	Soil 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	Fill	250	31	123	18	128	2.5	1.0
6 to 30+	Santiago Formation	670	35	127	14	133	4.0	1.0

Note: Data based on SDCWA Boring B-1 (2015).

TABLE 7.9
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z817834)

Depth (feet)	Soil 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	150	25	116	16	125	0.5	1.0
4 to 14	Young Alluvium	1,000	17	127	16	131	1.2	0.8
14 to 42+	Santiago Formation	700	33	133	16	134	4.0	1.0

Note: Data based on Boring B5.

TABLE 7.10
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z10567)

Depth (feet)	Soil 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	150	25	116	16	125	0.5	1.0
4 to 14	Young Alluvium	1,000	17	127	16	131	1.2	0.8
14 to 42+	Santiago Formation	700	33	133	16	134	4.0	1.0

Note: Data based on Boring B5.

TABLE 7.11
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z114429)

Depth (feet)	Soil 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 20	Undocumented Fill	300	26	124	22	127	1.0	1.0
20 to 29	Undocumented Fill	390	39	123	20	127	2.0	0.9
29 to 41+	Young Alluvium	800	26	125	20	128	3.5	1.0

Note: Data based on Boring B7.

TABLE 7.12
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z519522)

Depth (feet)	Soil 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	Artificial Fill	200	38	131	6	140	1.5	0.9
8 to 17+	Alluvium	720	20	129	23	131	0.4	1.0

Note: Data based on Substation Borings B-1, B-2 (2008) and B3 (1991).

TABLE 7.13
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100267)

Depth (feet)	Soil 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 20+	Santiago Formation	1,200	25	126	14	132	4.0	1.0

Note: Data based on previous Borings B-5 and the as-built pad for Pole 119756.

TABLE 7.14
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100268)

Depth (feet)	Soil 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	Compacted Fill	200	30	125	14	131	2.0	1.0
5 to 25+	Santiago Formation	1,200	25	126	14	132	4.0	1.0

Note: Data based on previous Borings B-5, B-6, and the proposed new pad.

TABLE 7.15
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100269)

Depth (feet)	Soil 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 20+	Santiago Formation	1,200	25	127	20	129	6.0	1.0

Note: Data based on previous Borings B-6.

TABLE 7.16
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100270)

Depth (feet)	Soil 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	Weathered Granodiorite	70,000	0	150	2	155	20.0	0.5
4 to 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-9 and the as-built pad for Pole 119759.

TABLE 7.17
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100271)

Depth (feet)	Soil 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	Residual Silty Sand Soil	300	35	130	8	138	2.0	1.0
4 to 20+	Hard Granodiorite Rock	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-8, Rock Coring C-1, and the as-built pad for Pole 119760.

TABLE 7.18
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100272)

Depth (feet)	Soil 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	Residual Silty Sand Soil	300	35	130	8	138	2.0	1.0
4 to 20+	Hard Granodiorite Rock	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-8 and the Rock Coring C-1.

TABLE 7.19
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100273)

Depth (feet)	Soil 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	Compacted Fill	200	32	130	8	138	2.0	0.0
6 to 12	Compacted Fill	200	32	130	8	138	2.0	1.0
12 to 16	Residual Silty Sand Soil	300	35	150	8	138	2.0	1.0
16 to 32+	Hard Granodiorite	70,000	0	163	2	155	20.0	0.5

Note: Data based on previous Air-Track AT-13, as-built pad for Pole 119762, and the proposed new pad. Strength within the upper 6 feet of fill is deducted due to close distance of proposed slope.

TABLE 7.20
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100274)

Depth (feet)	Soil 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	Compacted Fill	200	30	126	9	135	2.0	1.0
3 to 23+	Hard Granodiorite	130,000	0	127	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-12, as-built pad for Pole 119763, and the proposed new pad.

TABLE 7.21
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100275)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	127	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-12.

TABLE 7.22
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100276)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	123	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-11 and the as-built pad for Pole 119765.

TABLE 7.23
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100277)

Depth (feet)	Soil 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	Weathered Granodiorite	70,000	0	121	2	155	20.0	0.5
6 to 20+	Hard Granodiorite	130,000	0	126	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-6 and the as-built pad for Pole 119766.

TABLE 7.24
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100278)

Depth (feet)	Soil 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 12	Weathered Granodiorite	70,000	0	126	2	155	20.0	0.5
12 to 20+	Hard Granodiorite	130,000	0	127	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-1 and the Rock Coring C-2.

TABLE 7.25
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100279)

Depth (feet)	Soil 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 12	Weathered Granodiorite	70,000	0	126	2	155	20.0	0.5
12 to 20+	Hard Granodiorite	130,000	0	127	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-1 and the Rock Coring C-2.

TABLE 7.26
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100280)

Depth (feet)	Soil 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	Weathered Granodiorite	70,000	0	150	2	155	20.0	0.5
5 to 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-2 and the as-built pad for Pole 119769.

TABLE 7.27
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100281)

Depth (feet)	Soil 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	Weathered Granodiorite	70,000	0	150	2	155	20.0	0.5
5 to 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-2 and the as-built pad for Pole 119770.

TABLE 7.28
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100282)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	120	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-3 and the as-built pad for Pole 119771.

TABLE 7.29
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100283)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-5, Boring B-7, and the as-built pad for Pole 119773.

TABLE 7.30
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z100284)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-5 and Boring B-7.

TABLE 7.31
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (P254291)

Depth (feet)	Soil 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 20+	Hard Granodiorite	130,000	0	163	1	163	50.0	0.5

Note: Data based on previous Air-Track AT-5 and Boring B-7.

TABLE 7.32
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z257431)

Depth (feet)	Soil 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 – 4	Topsoil – Very Dense Clayey Sand	500	35	126	9.6	135	3.0	1.0
4+	Decomposed Granitic Rock	600	39	133	9.6	139	8.0	0.9

Note: Data based on previous Boring B-1.

TABLE 7.33
RECOMMENDED SOIL PARAMETERS FOR PIER FOUNDATION DESIGN (Z257432)

Depth (feet)	Soil 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 – 4	Topsoil – Very Dense Clayey Sand	500	35	126	9.6	135	3.0	1.0
4+	Decomposed Granitic Rock	600	39	133	9.6	139	8.0	0.9

Note: Data based on previous Boring B-1.

We expect that the surficial soil deposits can be excavated with light to moderate effort using conventional heavy-duty drilling/grading equipment. A moderate to very heavy effort is anticipated for excavations within the Santiago Formation and weathered Granodiorite (rippable). Blasting, rock breaking or rock coring will be required if excavations are to extend into the less weathered, fresh Granodiorite rock (marginal to non-rippable). The pier contractor should have auger, core barrels, and excavating tools suitable for penetrating dense and hard layers, boulders, concretions, and cemented zones on-site during the pier construction.

Table 7.34 summarizes the excavation characteristics at each power pole location based on the results of the field investigations. Rock rippability is a function of natural weathering processes that can be variable and change vertically and horizontally over short distances depending on jointing, fracturing, and/or mineralogic discontinuities within the bedrock. With this in mind and the fact that the boreholes were often shifted away from the proposed pole locations due to accessibility constraints, the interpretation prescribed herein may not accurately represent the actual subsurface conditions for the foundations of the individual poles. In addition, rippable materials often contain a substantial amount of "oversize" corestone boulders that would likely require special handling.

The rock rippability in Table 7.34 was estimated based on the difficulty of coring using the CME 75 hollow-stem drill rig. If the hollow-stem auger could be advanced, the soil/rock is considered rippable. Where coring was performed and the RQD values are less than 50 percent, the rock has been considered rippable to marginally rippable. If the RQD values are greater than 50 percent, the rock has been considered non-rippable. For air-track boring, a frequently used guideline to equate rock rippability to drill penetration rate is as follows; a penetration rate of approximately 0 to 20 seconds per foot (spf) generally indicates rippable material, 20 to 30 spf marginally to nonrippable material, and greater than 30 spf nonrippable rock. These general guidelines are typically based on drill rates using a rotary percussion drill rig similar to that used for our investigation.

TABLE 7.34
EXCAVATION CHARACTERISTICS

Pole No.	Depth (feet)	Boring No.	Soil Type	Rippability	Reference
Z114456	0 – 20	B1	Undocumented Fill (8'±) over Santiago Formation	Rippable	Hollow Stem
Z114455	0 – 20	B1	Undocumented Fill (8'±) over Santiago Formation	Rippable	Hollow Stem
Z114448	0 – 20	B10	Undocumented Fill (2'±) over Santiago Formation	Rippable	Hollow Stem
Z114441	0 – 20	B9	Undocumented Fill (6'±) over Santiago Formation	Rippable	Hollow Stem

TABLE 7.34 (CONTINUED)
EXCAVATION CHARACTERISTICS

Pole No.	Depth (feet)	Boring No.	Soil Type	Rippability	Reference
Z815952	0 – 20	B2	Undocumented Fill (14'±) over Santiago Formation	Rippable	Hollow Stem
Z815956	0 – 20	B3	Undocumented Fill (6'±) over Santiago Formation	Rippable	Hollow Stem
Z815955	0 – 30	SDCWA B-1	Fill (6'±) over Santiago Formation	Rippable	Hollow Stem
Z815945	0 – 30	SDCWA B-1	Fill (6'±) over Santiago Formation	Rippable	Hollow Stem
Z817834	0 – 42	B5	Topsoil (4'±) and Young Alluvium (10'±) over Santiago Formation	Rippable	Hollow Stem
Z10567	0 – 42	B5	Topsoil (4'±) and Young Alluvium (10'±) over Santiago Formation	Rippable	Hollow Stem
Z114429	0 – 41	B7	Undocumented Fill (29'±) over Young Alluvium	Rippable	Hollow Stem
Z519522	0 – 17	Substation B-1, B-2 and B-3	Artificial Fill (8'±) over Alluvium	Rippable	Hollow Stem
Z100267	0 – 20	Previous B-5	Santiago Formation	Rippable	Hollow Stem
Z100268	0 – 25	Previous B-5, B-6	New Fill (5'±) over Santiago Formation	Rippable	Hollow Stem
Z100269	0 – 20	Previous B-6	Santiago Formation	Rippable	Hollow Stem
Z100270	0 – 4	Previous AT-9	Weathered Granodiorite	Rippable	Air Track
	2 – 20	Previous AT-9	Hard Granodiorite	Non-rippable	Air Track
Z100271	0 – 4	Previous AT-8, C-1	Residual Silty Sand Soil	Rippable	Air Track
	4 - 20	Previous AT-8, C-1	Hard Granodiorite Rock	Non-rippable	Air Track – Rock Coring
Z100272	0 – 4	Previous AT-8, C-1	Residual Silty Sand Soil	Rippable	Air Track
	4 - 20	Previous AT-8, C-1	Hard Granodiorite Rock	Non-rippable	Air Track – Rock Coring
Z100273	0 – 16	Previous AT-13	New Fill (12'±) over Residual Silty Sand Soil	Rippable	Air Track
	16 – 32	Previous AT-13	Hard Granodiorite	Non-Rippable	Air Track

TABLE 7.34 (CONCLUDED)
EXCAVATION CHARACTERISTICS

Pole No.	Depth (feet)	Boring No.	Soil Type	Rippability	Reference
Z100274	0 – 23	Previous AT-12	New Fill (3'±) over Hard Granodiorite	Non-Rippable	Air Track
Z100275	0 – 20	Previous AT-12	Hard Granodiorite	Non-Rippable	Air Track
Z100276	0 – 20	Previous AT-11	Hard Granodiorite	Non-Rippable	Air Track
Z100277	0 – 6	Previous AT-6	Weathered Granodiorite	Rippable	Air Track
	6 – 20	Previous AT-6	Hard Granodiorite	Non-Rippable	Air Track
Z100278	0 – 12	Previous AT-1, C-2	Weathered Granodiorite	Rippable	Air Track – Rock Coring
	12 - 20	Previous AT-1, C-2	Hard Granodiorite	Non-Rippable	Air Track – Rock Coring
Z100279	0 – 12	Previous AT-1, C-2	Weathered Granodiorite	Rippable	Air Track – Rock Coring
	12 - 20	Previous AT-1, C-2	Hard Granodiorite	Non-Rippable	Air Track – Rock Coring
Z100280	0 – 5	Previous AT-2	Weathered Granodiorite	Rippable	Air Track
	5 – 20	Previous AT-2	Hard Granodiorite	Non-Rippable	Air Track
Z100281	0 – 5	Previous AT-2	Weathered Granodiorite	Rippable	Air Track
	5 – 20	Previous AT-2	Hard Granodiorite	Non-Rippable	Air Track
Z100282	0 - 20	Previous AT-3	Hard Granodiorite	Non-Rippable	Air Track
Z100283	0 - 20	Previous AT-5	Hard Granodiorite	Non-Rippable	Air Track
Z100284	0 - 20	Previous AT-5	Hard Granodiorite	Non-Rippable	Air Track
P254291	0 - 20	Previous AT-5	Hard Granodiorite	Non-Rippable	Air Track
Z257431	0 - 20	Previous B-1	Topsoil over Decomposed Granitic Rock	Rippable	Hollow Stem
Z257432	0 - 20	Previous B-1	Topsoil over Decomposed Granitic Rock	Rippable	Hollow Stem

Groundwater was encountered within the previous air-track boring AT-7 at approximately 20 feet below the existing ground surface, and in the current Borings B5, B6, and B7 at the approximately elevation of 510 feet MSL. It is not uncommon for groundwater or seepage conditions to develop where none previously existed. Groundwater and/or seepage accumulating in drilled pier borings should be pumped out prior to placement of concrete. Sloughing or reveling could occur where relatively clean sands are encountered below the groundwater level or where loose soils are encountered. Therefore, casing and/or wet methods may be necessary to facilitate construction of proposed pier foundation extending below the groundwater table or into loose soil.

8. RECOMMENDATIONS FOR TRENCHED UNDERGROUND

8.1 Excavation and Soil Characteristics

We expect that the undocumented fill, topsoil, and young alluvium along the proposed cut-and-cover trenching alignment within the north segment can be excavated with light to moderate effort using conventional heavy-duty excavation equipment. Moderate to very heavy effort should be expected within the Santiago Formation.

We tested 3 on-site soil samples for expansion characteristics. The results indicate “very low” to “medium” expansion potential (Expansion Index of 90 or less) as defined by 2013 California Building Code (CBC) Section 1803.5.3. Table 8.1 presents soil classifications based on the expansion index.

TABLE 8.1
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification	2013 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

8.2 Temporary Slope and Excavation Support

Temporary excavations should be made in conformance with OSHA requirements. On-site undocumented fill, topsoil, and young alluvium should be considered a Type B (Type C soil if seepage or groundwater is encountered) soil and Santiago Formation should be considered a Type A soil (Type B soil if seepage or groundwater is encountered) in accordance with OSHA requirements. In general, special shoring requirements will not be necessary if temporary excavations will be less than 5 feet in height. Temporary excavations greater than 5 feet in height, however, should be sloped back at an appropriate inclination according to OSHA requirements. These excavations should not be allowed to become saturated or to dry out. Surcharge loads should not be permitted to a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 15 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 15 feet from an existing surface improvement should be shored in accordance with applicable OSHA codes and regulations.

Temporary, unsupported cuts in undocumented fill, topsoil, and young alluvium should not be steeper than 1:1 (horizontal:vertical) up to 20 feet in height. Excavations in Santiago Formation can be made with slopes of ¾:1. Excavation slopes should be checked by an engineering geologist or geotechnical engineer to evaluate the existence of zones of weakness, groundwater seepage, or adversely oriented cracks that could form local areas of slope instability. Flatter slopes, shoring or safety shields will be needed in areas where sloughing, raveling or running is encountered. The contractor should be made aware of this potential and have the equipment available on site to flatten slopes or install shoring if necessary. Loose or easily erodible soils may be present locally and should be removed from the faces of excavation side slopes before personnel begin work below the slopes.

Where a portable safety shield is used to protect workers, the side wall of the trench is not directly supported. Therefore, use of a shield generally should be limited to open areas to minimize the effects on adjacent improvements or settlement of the ground surface behind the shield. Shields should be sized to minimize clearance between trench and shield walls. Unsupported trenches should be backfilled immediately after removal of the shield.

Temporary cantilevered shoring can be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 25 pcf. Temporary multi-braced shoring should be designed using a lateral pressure envelope acting uniformly on the back of the shoring and applying a pressure equal to 16H, where H is the height of the shoring in feet (resulting pressure in pounds per square foot). Also, lateral earth pressure due to the surcharging effects of adjacent structures or traffic loads should be considered where appropriate during design of the shoring system.

Passive soil pressure resistance for embedded portions of soldier piles can be estimated based on an equivalent fluid weight of 300 pounds per cubic foot (pcf).

Lateral movement of shoring is associated with vertical ground settlement outside of the excavation. It is important that the shoring system allow limited amounts of lateral displacement. We recommend that horizontal movements of the shoring wall be accurately monitored and recorded during excavation if adjacent settlement sensitive improvements are present.

Lagging should keep pace with excavation. We recommend that the excavation not be advanced deeper than 3 feet below the bottom of lagging at any time. These unlagged gaps of up to 3 feet should only be allowed to stand for short periods of time in order to decrease the probability of soil sloughing and caving. Backfilling should be conducted when necessary between the back of lagging and excavation sidewalls to reduce sloughing in this zone.

The condition of existing streets and other structures (if any) around the perimeter of the planned excavation should be documented prior to the start of shoring and excavation work. Special attention should be given to documenting existing cracks or other indications of differential settlement within these adjacent pavements and other improvements.

8.3 Ground Control and Improvement

It is important that the contractor be provided with complete soil, underground utility, and groundwater information so that appropriate equipment can be mobilized. In addition, providing adequate information before the project starts will be vital if claims for changed conditions are filed during construction.

The contractor should monitor existing pavement areas and adjacent improvements for surface deflection (settlement or heave) during construction so that appropriate modification to the excavation and shoring system are implemented to minimize the surface deflection in a timely manner.

In addition to existing surface improvements, other underground utilities may exist near and above the proposed vault. The actual depths and locations of some of these pipes may not be known accurately. The bedding for these pipes may also carry significant quantities of water. To reduce the settlement potential and avoid damaging adjacent pipelines (by undermining the pipe if the bedding material is encountered in the heading), the bedding material supporting the overlying pipe can be stabilized locally using cement grout from the ground surface.

8.4 Bearing Capacity for Underground Vault

Our test boring indicated that on-site soils generally have adequate bearing capacity for support of the proposed underground vault. We do not expect a significant increase in load over the present overburden. Consequently, vault settlement under static loading should be negligible.

8.5 Dewatering

Along the alignment of the proposed underground vault near and crossing San Marcos Creek, we encountered groundwater within the adjacent Borings B5, B6 and B7 at depths of approximately 4 to 8 feet below the existing grade, or at the approximate elevation of 510 feet MSL. We understand that this segment of vault will be installed via horizontal directional drilling. Groundwater may not be encountered if trenching is performed during the dry season and above the static groundwater level. However, if significant amounts of seepage are encountered during excavation, water should be pumped away to facilitate the installation of underground vaults.

9. RECOMMENDATIONS FOR TRENCHLESS UNDERGROUND

Based on the currently available project plans, approximately 976 lineal feet of the proposed underground conduit between approximately Stations 105+34 and 115+10 within the north segment will be installed using horizontal directional drilling (HDD). The invert elevations of the proposed HDD are at or above 481 feet MSL. Our recommendations regarding HDD are provided below:

- The anticipated subsurface materials near the depth of the proposed HDD generally consist of undocumented fill (Qudf), young alluvium (Qya), and Santiago Formation (Tsa). Groundwater encountered in our borings is at approximately depths of 4 to 8 feet below the existing grade, or at approximate elevation of 510 feet MSL.

- The undocumented fill generally consists of loose to medium dense clayey sand. The young alluvium generally consists of loose to dense silty sand. The Santiago Formation generally consists of dense to very dense, silty and clayey sandstone and sandy siltstone. The drilling equipment and drill fluid should be selected based on the anticipated subsurface conditions. Potential hazardous materials were not encountered in our borings.

- The on-site young alluvial deposits below the groundwater level are susceptible to liquefaction, and a liquefaction induced settlement on the order of 4 inches may occur.

- We did not observe any sinkholes on site during our field exploration. However, the potential for sinkhole exists if working within alluvium at shallow depth. The proper depth of HDD should be designed by the project engineer. For the minimum depth of cover, the scour potential as well as a minimum ratio of 10-to-1 for depth of cover to borehole diameter should be considered.

- The installation methods and/or procedures should be selected by the drilling contractor. The drag force on pipe can be estimated based on the typical coefficients of friction of 0.5 for empty pipe and 0.3 for buoyant pipe.

- Corrosion testing performed on one soil sample (B7-1) along the HDD alignment yields a resistivity of 1,500 ohm-cm, a pH of 7.2, a chloride content of 90 ppm, and a sulfate content of 30 ppm. The soil sample tested is not considered corrosive based on Caltrans criteria. Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements susceptible to corrosion are planned.

- The updated plans show several existing underground utilities. The proposed HDD should be planned to avoid any conflicts with the existing improvements, underground utilities, and/or other man-made obstructions.

10. RECOMMENDATIONS FOR RETAINING WALLS

We understand that three individual pads with retaining walls up to 18 feet in height will be constructed for the proposed Poles Z100268, Z100273, and Z100274. Each of these sites will require import fill soils to achieve the proposed grads. The source of imported soil in not known at this point. The foundation material for these sites consists of Santiago Formation (Pole Z100268) or weathered/fractured granitic rock (Poles Z100273 and Z100274) that possesses relatively high shear strength in its natural state or when used as fill. We assume that the additional fill would come from similar materials. We further assume that the proposed retaining walls consist of segmental (geosynthetic reinforced) retaining walls similar to those retaining walls built along the TL13825/13811 alignment. Table 10.1 lists the recommended geotechnical parameters for the geosynthetic reinforced walls.

TABLE 10.1
GEOTECHNICAL PARAMETERS FOR GEOSYNTHETIC REINFORCED WALLS

Parameter	Reinforced Zone	Retained Zone	Foundation Zone
Angle of Internal Friction	30 degrees	30 degrees	30 degrees
Cohesion	0 psf	0 psf	0 psf
Wet Unit Weight	125 pcf	125 pcf	125 pcf

The imported soil should possess less than 35 percent passing sieve #200 and a maximum Plasticity Index (PI) of 20. Import materials should be subjected to laboratory testing to verify conformance with specified wall design parameters. Materials not meeting the minimum design parameters specified by the wall engineer should not be utilized.

The above parameters assume that walls will be founded on native formational soils or properly compacted fill and a temporary backcut will be performed against the formational material or compacted fill. The foundation zone is the area where the footing is embedded; the reinforced zone is the area of the backfill that possesses the reinforcing fabric; and the retained zone is the area behind the reinforced zone.

An allowable soil bearing pressure of 2,000 psf (pounds per square foot) should be used for foundation design. This bearing pressure assumes a minimum foundation width and depth of 12 inches.

Backfill materials within the reinforced zone should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density at or slightly above optimum moisture content in accordance with ASTM D 1557. This is applicable to the entire embedment width of the geogrid reinforcement.

Geosynthetic reinforcement must elongate to develop full tensile resistance. This elongation generally results in movement at the top of the wall. The amount of movement is dependent upon the height of the wall (e.g., higher walls rotate more) and the type of geogrid reinforcing used. In addition, over time geogrid has been known to exhibit creep (sometimes as much as 5 percent) and can undergo additional movement. Given this condition, the owner should be aware that structures and pavement placed within the reinforced and retained zones of the wall may undergo movement.

We used the computer program *U.S. Seismic Design Maps*, provided by the USGS to evaluate the seismic design criteria. Tables 10.2, 10.3, and 10.4 summarize site-specific design criteria for each wall obtained from the 2013 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class C. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2013 CBC and Table 20.3-1 of ASCE 7-10. The values presented in Tables 10.2, 10.3, and 10.4 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 10.2
2013 CBC SEISMIC DESIGN PARAMETERS (Z100268 RW)

Parameter	Value	2013 CBC Reference
Site Class	C	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.022g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.398g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.000	Table 1613.3.3(1)
Site Coefficient, F_V	1.402	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.022g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.558g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.681g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.372g	Section 1613.3.4 (Eqn 16-40)

TABLE 10.3
2013 CBC SEISMIC DESIGN PARAMETERS (Z100273 RW)

Parameter	Value	2013 CBC Reference
Site Class	C	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.015g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.396g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.000	Table 1613.3.3(1)
Site Coefficient, F_V	1.404	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.015g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.556g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.677g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.370g	Section 1613.3.4 (Eqn 16-40)

TABLE 10.4
2013 CBC SEISMIC DESIGN PARAMETERS (Z100274 RW)

Parameter	Value	2013 CBC Reference
Site Class	C	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.014g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.395g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.000	Table 1613.3.3(1)
Site Coefficient, F_V	1.405	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.014g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.555g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.676g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.370g	Section 1613.3.4 (Eqn 16-40)

Tables 10.5, 10.6, and 10.7 present additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 10.5
2013 CBC SITE ACCELERATION DESIGN PARAMETERS (Z100268 RW)

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.387g	Figure 22-7
Site Coefficient, F_{PGA}	1.013	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.392g	Section 11.8.3 (Eqn 11.8-1)

TABLE 10.6
2013 CBC SITE ACCELERATION DESIGN PARAMETERS (Z100273 RW)

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.385g	Figure 22-7
Site Coefficient, F_{PGA}	1.015	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.391g	Section 11.8.3 (Eqn 11.8-1)

TABLE 10.7
2013 CBC SITE ACCELERATION DESIGN PARAMETERS (Z100274 RW)

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.384g	Figure 22-7
Site Coefficient, F_{PGA}	1.016	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.390g	Section 11.8.3 (Eqn 11.8-1)

Conformance to the criteria in Tables 10.2 through 10.7 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

11. PLAN REVIEW

We recommend that the final plans and specifications be reviewed by Geocon Incorporated to evaluate if the plans and details have been prepared in substantial conformance with the recommendations contained within this report.

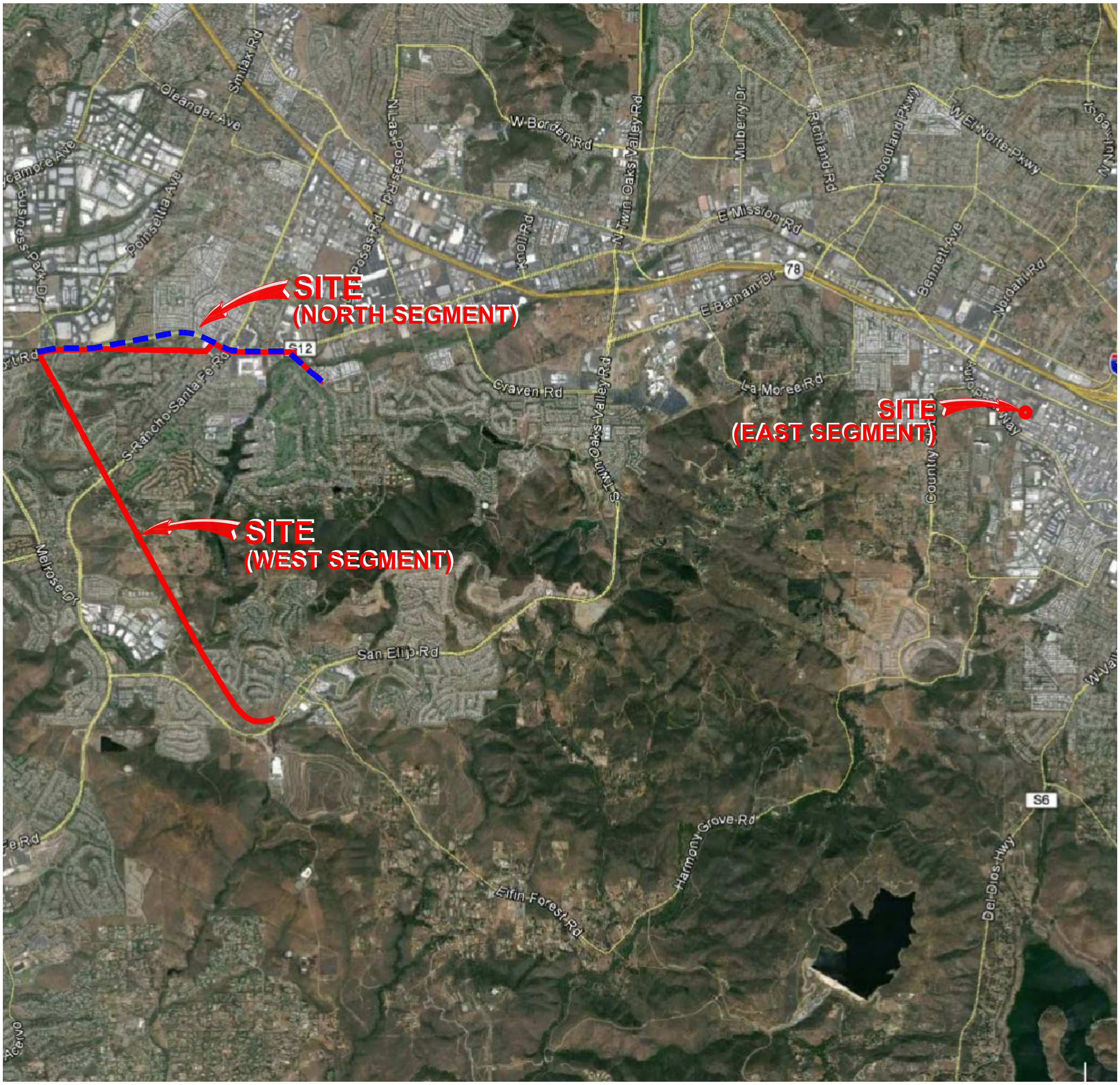
LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. 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.

2. 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 that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. 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 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.

4. 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.



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.

N

NO SCALE

VICINITY MAP

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

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA

YW / CW		DSK/GTYPD	REVISED 09 - 12 - 2017	PROJECT NO. G1818 - 52 - 24	FIG. 1

Plotted:09/12/2017 9:03AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\DETAILS\G1818-52-24_Vicinity Map.dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA

0' 250' 500'

SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM

Ts ....SANTIAGO FORMATION

Kgr ....GRANITIC ROCK

Z257432 ....APPROX. LOCATION OF PROPOSED POLE

AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING

B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING

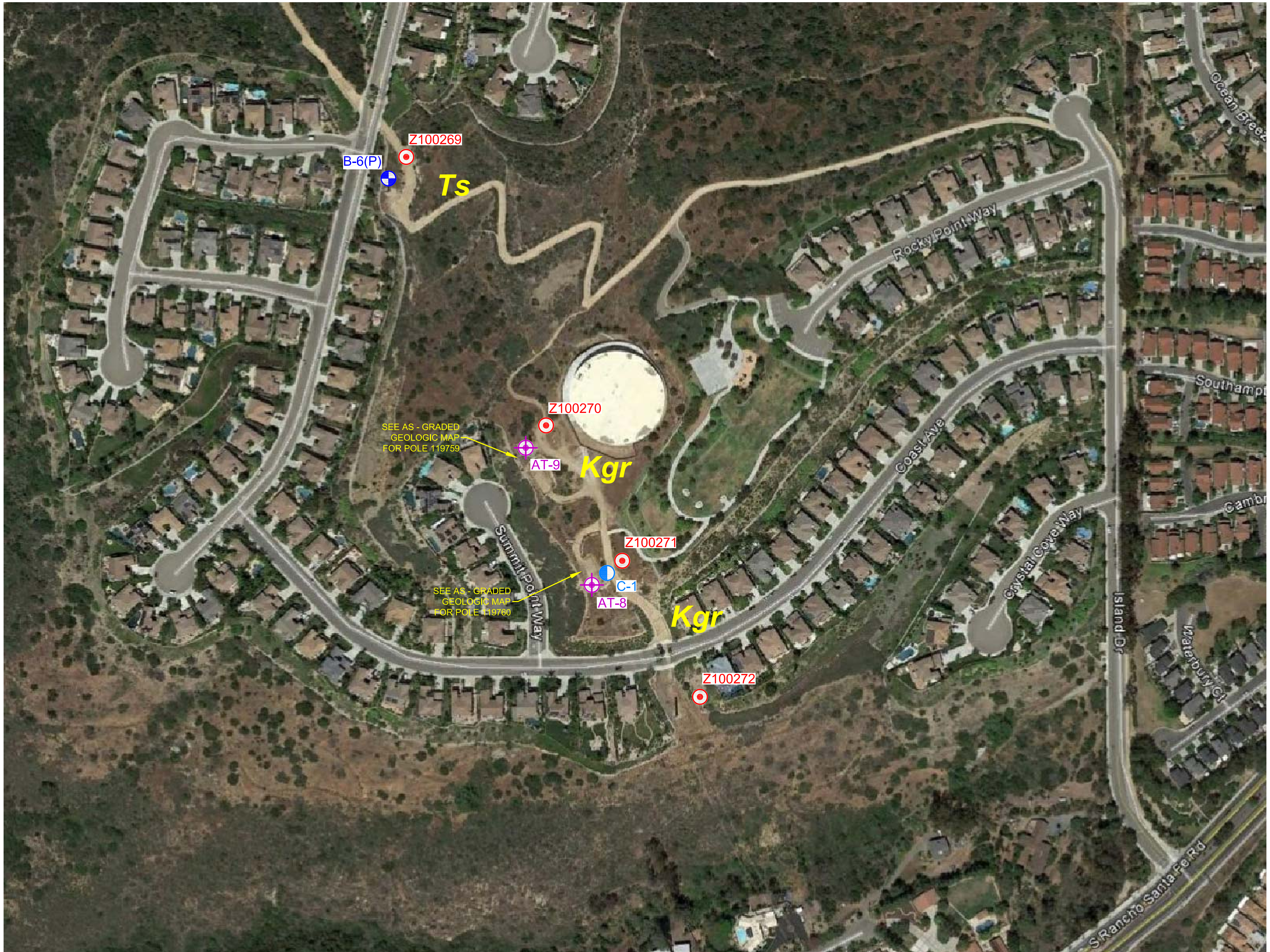
C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

SITE PLAN / GEOLOGIC MAP

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

PROJECT NO. G1818 - 52 - 24
FIGURE 2
DATE 09 - 12 - 2017

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA



0' 250' 500'

SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM

Ts ....SANTIAGO FORMATION

Kgr ....GRANITIC ROCK

Z257432 ....APPROX. LOCATION OF PROPOSED POLE

AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING

B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING

C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

GEOCON
INCORPORATED

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

PROJECT NO. G1818 - 52 - 24

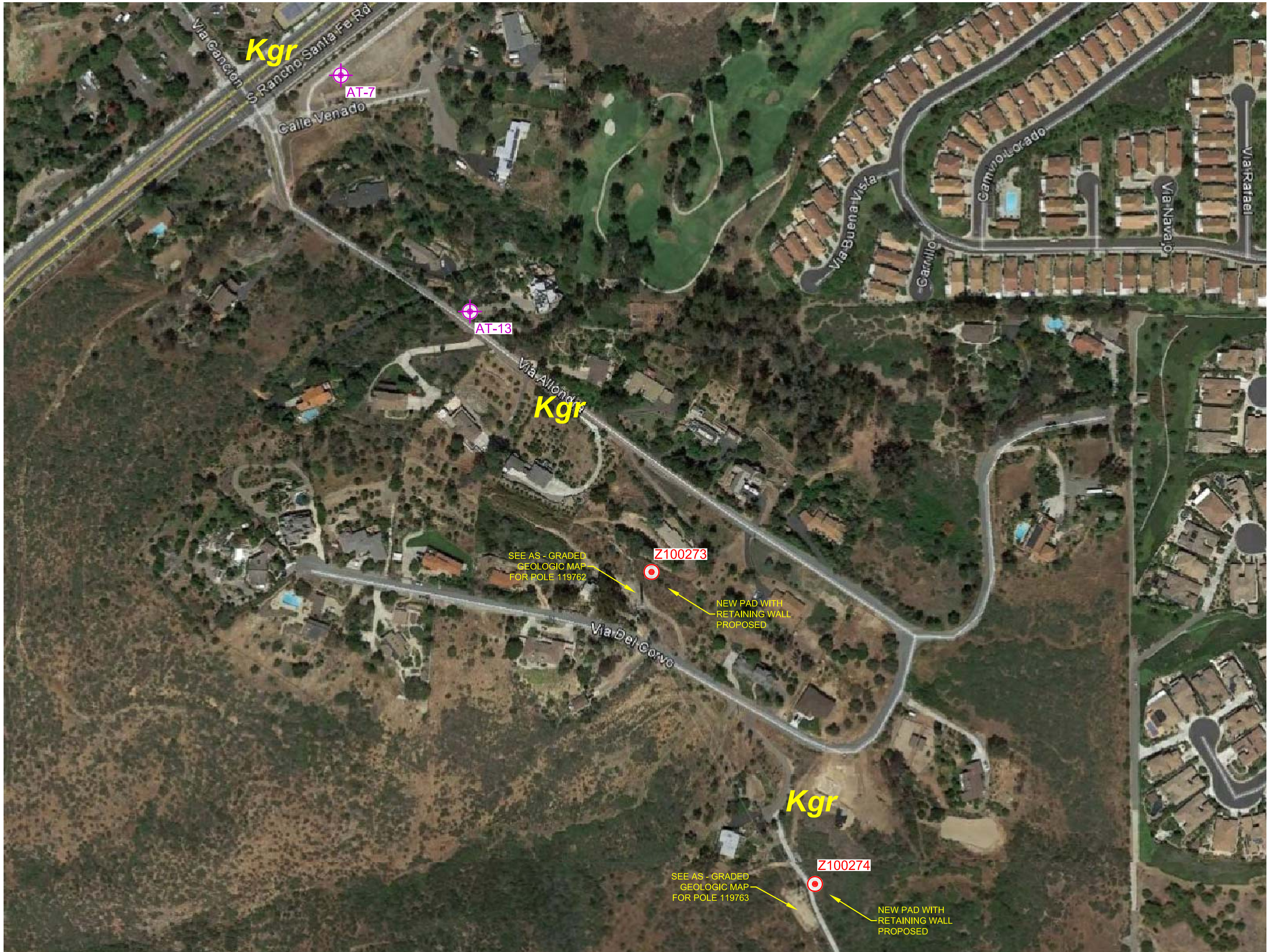
SITE PLAN / GEOLOGIC MAP

FIGURE 3

DATE 09 - 12 - 2017

Plotted:09/12/2017 9:09AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\SHEETS\G1818-52-24_GEO-MAP.dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA



0' 250' 500'
SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM
Ts ....SANTIAGO FORMATION
Kgr ....GRANITIC ROCK
Z257432 ....APPROX. LOCATION OF PROPOSED POLE
AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING
B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING
C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

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

PROJECT NO. G1818 - 52 - 24
FIGURE 4
DATE 09 - 12 - 2017

SITE PLAN / GEOLOGIC MAP

Plotted:09/12/2017 9:07AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\SHEETS\G1818-52-24_GEO-MAP.dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA

0' 250' 500'
SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM
Ts ....SANTIAGO FORMATION
Kgr ....GRANITIC ROCK
Z257432 ....APPROX. LOCATION OF PROPOSED POLE
AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING
B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING
C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

SITE PLAN / GEOLOGIC MAP

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

PROJECT NO. G1818 - 52 - 24
FIGURE 5
DATE 09 - 12 - 2017

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA

0' 250' 500'

SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM

Ts ....SANTIAGO FORMATION

Kgr ....GRANITIC ROCK

Z257432 ....APPROX. LOCATION OF PROPOSED POLE

AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING

B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING

C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

SITE PLAN / GEOLOGIC MAP

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

PROJECT NO. G1818 - 52 - 24
FIGURE 6
DATE 09 - 12 - 2017

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA

0' 250' 500'

SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal	........ALLUVIUM
Ts	........SANTIAGO FORMATION
Kgr	........GRANITIC ROCK
Z257432	........APPROX. LOCATION OF PROPOSED POLE
AT-13	........APPROX. LOCATION OF PREVIOUS AIR TRACK BORING
B-7(P)	........APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING
C-2	........APPROX. LOCATION OF PREVIOUS ROCK CORING

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

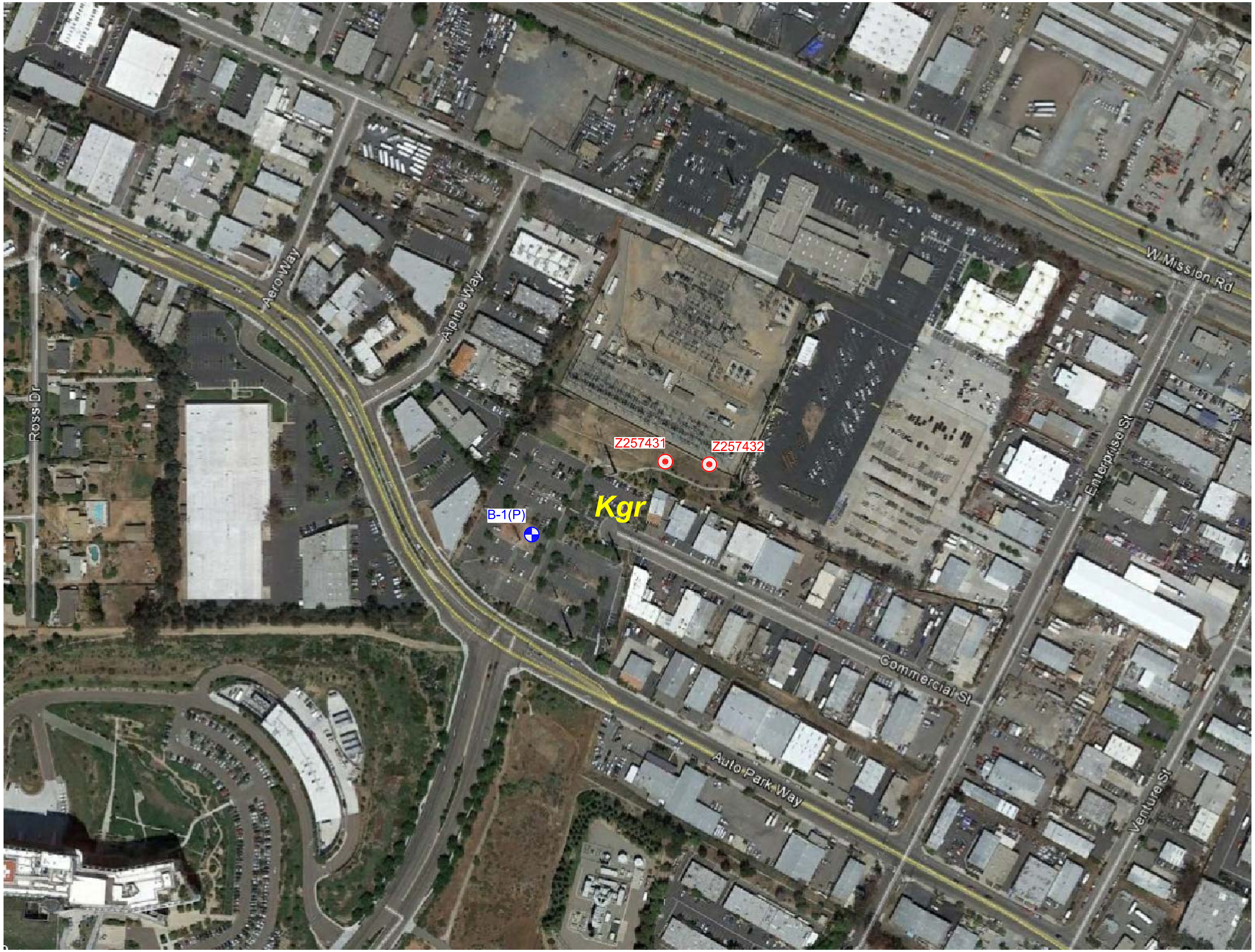
PROJECT NO. G1818 - 52 - 24

FIGURE 7

DATE 09 - 12 - 2017

SITE PLAN / GEOLOGIC MAP

TL6975 - SAN MARCOS - ESCONDIDO
SAN DIEGO COUNTY, CALIFORNIA



0' 250' 500'
SCALE 1"= 250' (On 11x17)

GEOCON LEGEND

Qal ....ALLUVIUM
Ts ....SANTIAGO FORMATION
Kgr ....GRANITIC ROCK
Z257432 ....APPROX. LOCATION OF PROPOSED POLE
AT-13 ....APPROX. LOCATION OF PREVIOUS AIR TRACK BORING
B-7(P) ....APPROX. LOCATION OF PREVIOUS HOLLOW-STEM BORING
C-2 ....APPROX. LOCATION OF PREVIOUS ROCK CORING

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

SITE PLAN / GEOLOGIC MAP

PROJECT NO. G1818 - 52 - 24
FIGURE 8
DATE 09 - 12 - 2017

Plotted:09/12/2017 9:04AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\SHEETS\G1818-52-24_GEO-MAP.dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN MARCOS, CALIFORNIA

0' 125' 250' 375' 500'

SCALE 1"=250'(on 11x17)

GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL

Qya ....YOUNG ALLUVIUM

B-1 ....APPROX. LOCATION OF CURRENT BORING

Z114456 ....APPROX. LOCATION OF PROPOSED POLE

Ref: 07349-42-10 ....APPROX. LOCATION OF PREVIOUS PROJECT

SITE PLAN / GEOLOGIC MAP

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

PROJECT NO. G1818 - 52 - 24
FIGURE 9
DATE 09 - 12 - 2017

Plotted:09/12/2017 9:18AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\SHEETS\G1818-52-24 Geo Map (Suplemental).dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN MARCOS, CALIFORNIA

0' 125' 250' 375' 500'

SCALE 1"=250'(on 11x17)

GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL

Qya ....YOUNG ALLUVIUM

B-1 ....APPROX. LOCATION OF CURRENT BORING

Z114456 ....APPROX. LOCATION OF PROPOSED POLE

Ref: 07349-42-10 ....APPROX. LOCATION OF PREVIOUS PROJECT

SITE PLAN / GEOLOGIC MAP

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

PROJECT NO. G1818 - 52 - 24
FIGURE 10
DATE 09 - 12 - 2017

Plotted:09/12/2017 9:16AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1818-52-24 TL6975\SHEETS\G1818-52-24 Geo Map (Suplemental).dwg

TL6975 - SAN MARCOS - ESCONDIDO
SAN MARCOS, CALIFORNIA

0' 125' 250' 375' 500'

SCALE 1"=250'(on 11x17)

GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL

Qya ....YOUNG ALLUVIUM

B-1 ....APPROX. LOCATION OF CURRENT BORING

Z114456 ....APPROX. LOCATION OF PROPOSED POLE

Ref: 07349-42-10 ....APPROX. LOCATION OF PREVIOUS PROJECT

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.

SITE PLAN / GEOLOGIC MAP

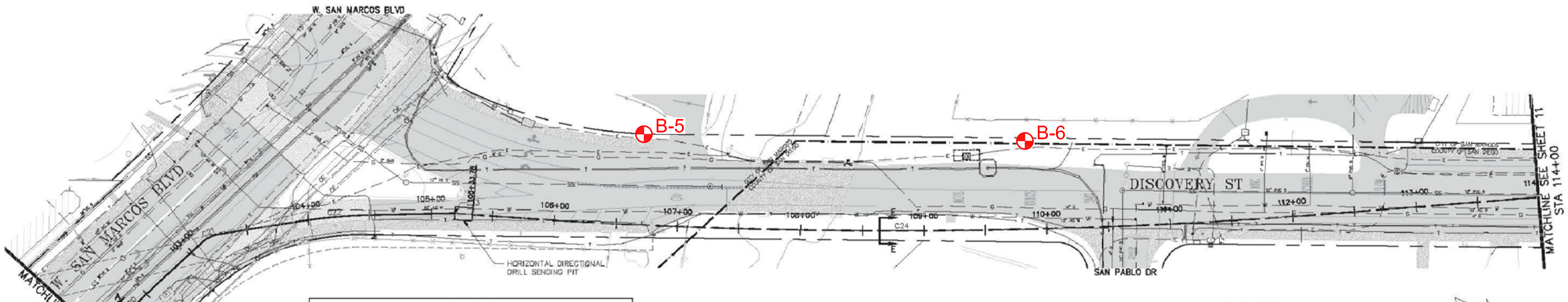
GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

PROJECT NO. G1818 - 52 - 24

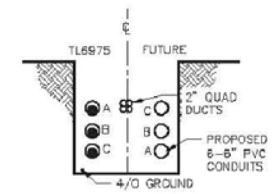
FIGURE 11

DATE 09 - 12 - 2017

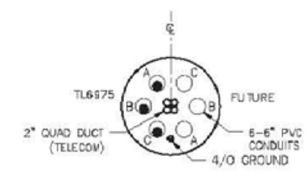
TL6975 - SAN MARCOS - ESCONDIDO
SAN MARCOS, CALIFORNIA



CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C20	BC 102+20.37 EC 102+50.92	005°00'00"	350.00'	30.54'	1992729.0, 6270231.4	1992730.2, 6270261.9
C21	BC 103+11.87 EC 103+26.59	033°45'00"	25.00'	14.73'	1992729.9, 6270322.9	1992725.6, 6270336.7
C22	BC 103+88.11 EC 104+55.90	007°46'07"	500.00'	67.79'	1992691.2, 6270387.7	1992649.7, 6270441.2
C23	BC 105+17.65 EC 105+20.18	005°47'09"	25.00'	2.52'	1992608.5, 6270487.3	1992606.8, 6270489.1
C24	BC 105+33.78 EC 112+30.95	008°49'31"	4526.18'	697.17'	1992596.7, 6270498.3	1992122.6, 6271008.4



SECTION "A-A"
(REF. DETAIL 1 SHEET 12)

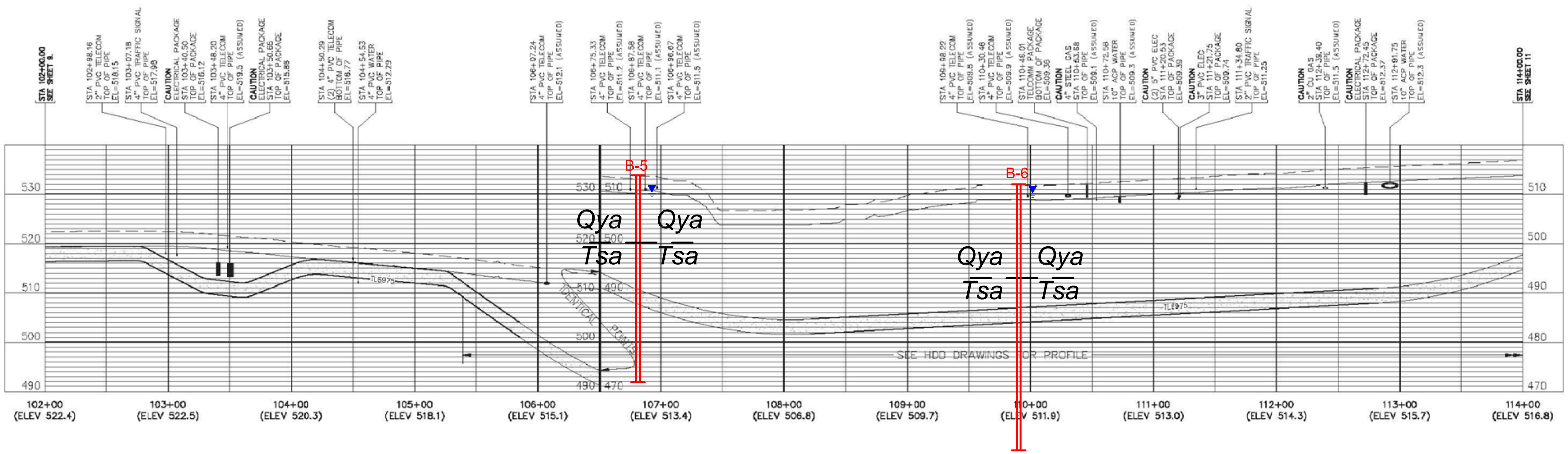


(REF. DETAIL X SHEET XX)
SECTION "E-E"
NOT TO SCALE

GRAPHIC SCALE
SCALE 1" = 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

TRENCH NOTES
STA. 102+00.00 TO 105+33.78, SECTION A-A
STA. 105+33.78 TO 114+00.00, SECTION E-E



GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL
Qya ....YOUNG ALLUVIUM
Tsa ....SANTIAGO FORMATION
B-7 ....APPROX. LOCATION OF BORING
........APPROX. LOCATION OF GROUNDWATER

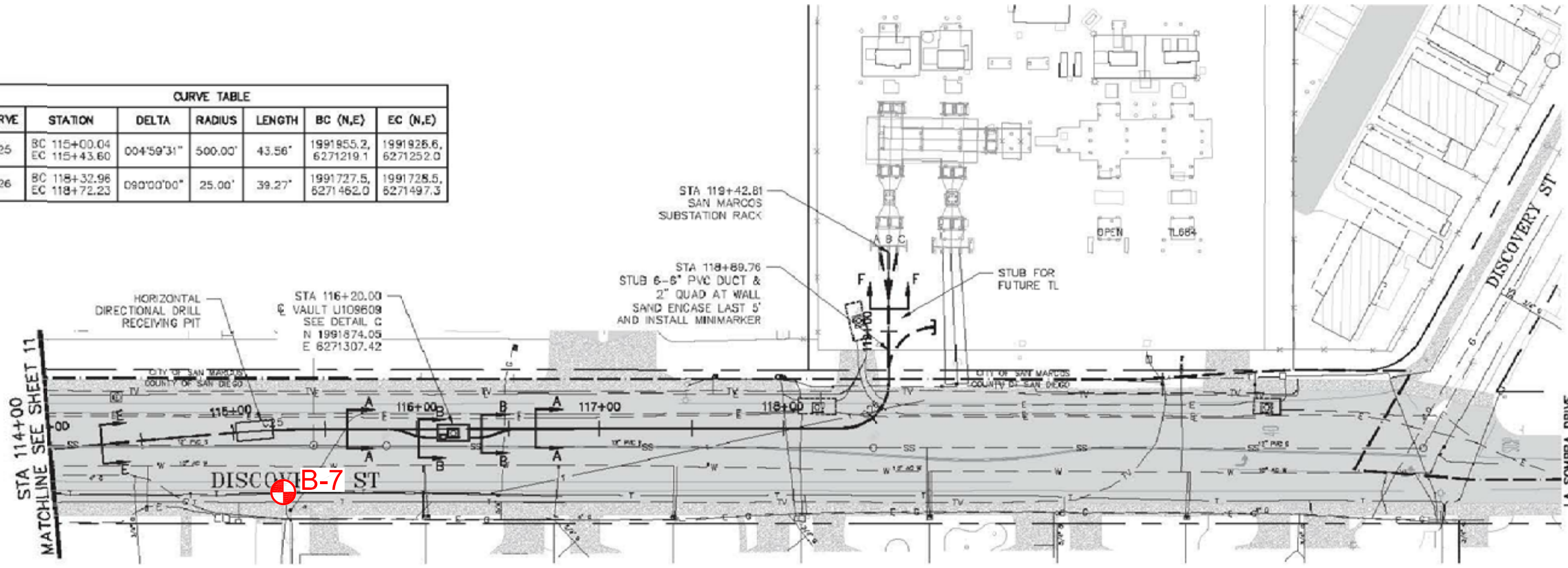
SITE PLAN / GEOLOGIC MAP (HDD)

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

PROJECT NO. G1818 - 52 - 24
FIGURE 12
DATE 09 - 12 - 2017

TL6975 - SAN MARCOS - ESCONDIDO
SAN MARCOS, CALIFORNIA

CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C25	BC 115+00.04 EC 115+43.60	004°59'31"	500.00'	43.56'	1991855.2, 6271219.1	1991926.6, 6271252.0
C26	BC 118+32.96 EC 118+72.23	090°00'00"	25.00'	39.27'	1991727.5, 6271462.0	1991728.5, 6271497.3



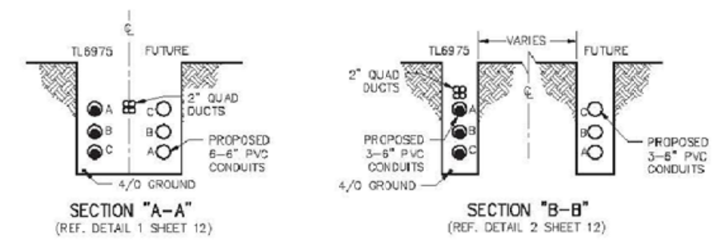
GRAPHIC SCALE

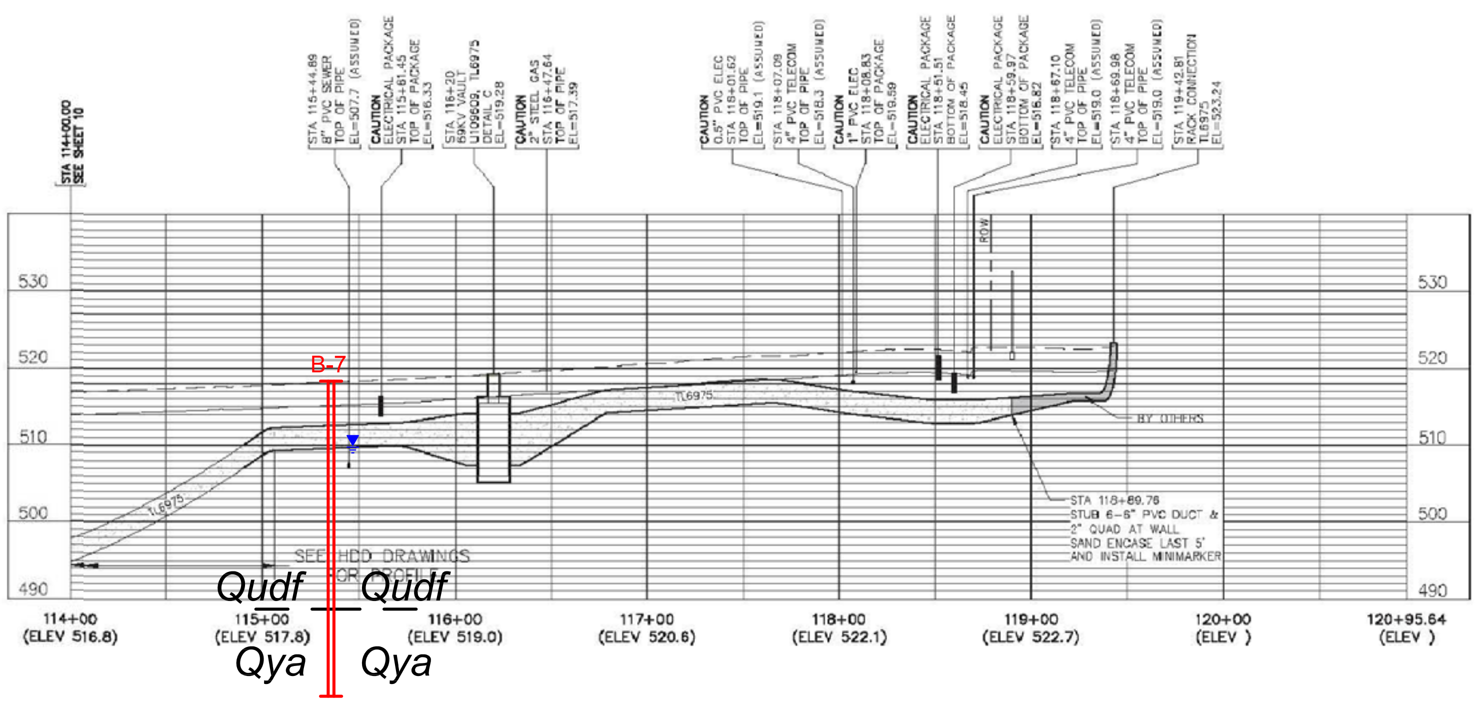
SCALE 1" = 40'

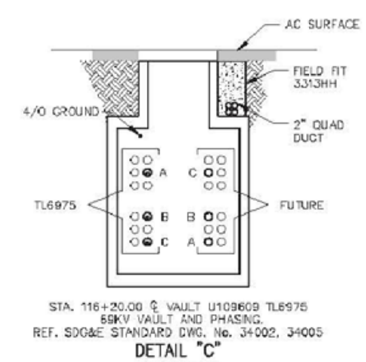
SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

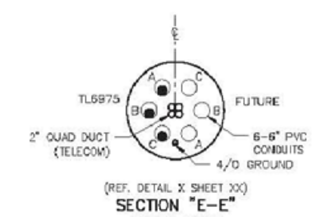
TRENCH NOTES

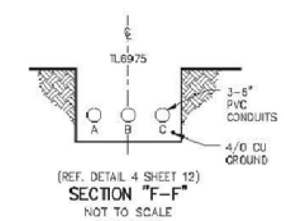
STA. 114+00.00 TO 115+01.99, SECTION E-E
STA. 115+01.99 TO 115+84.79, SECTION A-A
STA. 115+84.79 TO 116+11.40, SECTION B-B
STA. 116+11.40 TO 116+28.60, DETAIL C
STA. 116+28.60 TO 116+55.21, SECTION B-B
STA. 116+55.21 TO 118+79.02, SECTION A-A
STA. 118+79.02 TO 119+42.81, SECTION F-F











GEOCON LEGEND

Qudf........UNDOCUMENTED FILL

Qya........YOUNG ALLUVIUM

Tsa........SANTIAGO FORMATION

B-7 ....APPROX. LOCATION OF BORING

........APPROX. LOCATION OF GROUNDWATER

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.

SITE PLAN / GEOLOGIC MAP (HDD)

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

PROJECT NO. G1818 - 52 - 24
FIGURE 13
DATE 09 - 12 - 2017

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

We performed our field investigation on June 26, 27 and 28, 2017, which consisted of a site reconnaissance, and drilling 8 exploratory borings to a maximum depth of approximately 54 feet below the existing ground surface using a high-torque drill rig equipped with 8-inch-diameter, hollow-stem-auger. The locations of the exploratory borings are shown on the *Site Plan/Geologic Map*, Figures 9, 10, and 11. Boring logs are presented on Figures A-1 through A-8 following the text in this appendix. We located the borings in the field using a measuring tape and existing reference points provided by the project civil engineer. Therefore, actual boring locations may deviate slightly. Elevations shown on the boring logs were estimated from a topographic map.

We obtained samples during our boring excavations using a California split-spoon sampler or a Standard Penetration Test (SPT) sampler. Both samplers are composed of steel and are driven to obtain the soil samples. The California sampler has an inside diameter of 2.5 inches and an outside diameter of 2.875 inches. Up to 18 rings are placed inside the sampler that is 2.4 inches in diameter and 1 inch in height. The SPT sampler has an inside diameter of 1.5 inches and an outside diameter of 2 inches. Ring samples at appropriate intervals were retained in moisture-tight containers and transported to the laboratory for testing. We also retained bulk samples from the borings for laboratory testing. The type of sample is noted on the exploratory boring logs. The samplers were driven 12 and 18 inches using the California and SPT samplers, respectively, into the bottom of the excavations with the use of a Cathead hammer and the use of A rods. The sampler is connected to the A rods and driven into the bottom of the excavation using a 140-pound hammer with a 30-inch drop. Blow counts are recorded for every 6 inches the sampler is driven. The penetration resistances shown on the boring logs are shown in terms of blows per foot. The values indicated on the boring logs are the sum of the last 12 inches of the sampler if driven 18 inches. If the sampler was not driven for 18 inches, an approximate value is calculated in term of blows per foot or the final 6-inch interval is reported. These values are not to be taken as N-values, adjustments have not been applied.

We visually examined, classified, and logged the soil encountered in the borings in general accordance with American Society for Testing and Materials (ASTM) practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). The logs depict the soil and geologic conditions observed and the depth where we obtained samples.

PROJECT NO. G1818-52-24

BORING B 1

ELEV. (MSL.)________ DATE COMPLETED 06-26-2017

EQUIPMENT Diedrich D-50 with 8" HSA BY: K. JAMES

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B1-1			SM	**UNDOCUMENTED FILL (Qudf)** Medium dense, damp, yellowish brown, Silty, fine to medium SAND			
5	B1-2				-Moist	30	93.1	15.7
8				SM	**SANTIAGO FORMATION (Tsa)** Dense, damp, light gray, Silty, fine to medium SANDSTONE			
10	B1-3				-Moist	56	116.9	10.9
15	B1-4				-Becomes medium dense, fine to coarse	39	111.1	5.6
19	B1-5					40	110.2	4.1
					BORING TERMINATED AT 19.5 FEET Groundwater not encountered Backfilled with soil cuttings			

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

G1818-52-24.GPJ

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

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

GEOCON

PROJECT NO. G1818-52-24

BORING B 2

ELEV. (MSL.)________ DATE COMPLETED **06-28-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**UNDOCUMENTED FILL (Qudf)** Medium dense, moist, yellowish brown, Silty, fine to medium SAND with some clay			
	B2-1							
2								
4								
	B2-2				-Becomes very dense, pale yellow; high blow counts due to rock in shoe	64/10"	103.9	11.1
6								
8								
10	B2-3				-Becomes medium dense, yellowish brown, fine grained	21		
12								
14				SM	**SANTIAGO FORMATION (Tsa)** Dense, moist, olive, Silty, fine grained SANDSTONE			
	B2-4					65	109.7	18.9
16								
18								
	B2-5				-Becomes very dense, moist, yellowish brown	50/5"		

BORING TERMINATED AT 19.5 FEET
Groundwater not encountered

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

G1818-52-24.GPJ

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

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

GEOCON

PROJECT NO. G1818-52-24

BORING B 3

ELEV. (MSL.)________ DATE COMPLETED **06-26-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. JAMES**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B3-1			SC	3.5" **ASPHALT CONCRETE**			
					UNDOCUMENTED FILL (Qudf) Mediuim dense, moist, brown, Clayey, fine to coarse SAND			
2								
4								
	B3-2					66/11"	116.7	17.3
6				SC	**SANTIAGO FORMATION (Tsa)** Very dense, damp to moist, light grayish brown, Clayey, fine to medium SANDSTONE			
8								
10	B3-3					86/8"	107.5	12.6
12					-Very difficult drilling			
14								
	B3-4				-Becomes fine to coarse	95/10"	121.4	7.8
16								
18								
	B3-5				-Becomes dense, moist, light grayish brown to reddish brown	57	113.4	16.8

BORING TERMINATED AT 19.5 FEET
Groundwater not encountered
Backfilled with soil cuttings

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

G1818-52-24.GPJ

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

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

GEOCON

BORING B 5

ELEV. (MSL.)________ DATE COMPLETED 06-27-2017

EQUIPMENT Diedrich D-50 with 8" HSA BY: K. HAASE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B5-1			CL	**TOPSOIL** Soft, moist, dark brown, fine Sandy CLAY			
4	B5-2		▼	SM	**YOUNG ALLUVIUM (Qya)** Medium dense, moist, light brown to light reddish brown, Silty, fine to medium SAND	26	116.8	15.6
10	B5-3				-Becomes wet, light brown, coarse grained	15		
14	B5-4			SM	**SANTIAGO FORMATION (Tsa)** Dense, moist, yellowish brown to pale yellow, Silty, fine- to medium-grained SANDSTONE	51	114.3	16.9
20	B5-5				-Becomes very dense, damp, coarse grained	64		
24	B5-6				-Becomes dense, finer grained	61	112.0	15.7

Figure A-4,
Log of Boring B 5, Page 1 of 2

G1818-52-24.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.

BORING B 5

ELEV. (MSL.)________ DATE COMPLETED **06-27-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B5-7				-Becomes very dense, moist, light reddish brown, coarser grained	67/6"		
32								
34								
	B5-8				-Becomes yellowish brown	81/9"	116.2	15.5
36								
38								
40	B5-9				-Becomes olive, finer grained	50		
42					BORING TERMINATED AT 42 FEET Groundwater encountered at 4.5 feet Backfilled with 14.6 ft³ of bentonite grout			

Figure A-4,
Log of Boring B 5, Page 2 of 2

G1818-52-24.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.

BORING B 6

ELEV. (MSL.)________ DATE COMPLETED **06-27-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B6-1			SC	**TOPSOIL** Loose, moist, dark brown, Clayey, fine SAND; trace roots			
2								
4			▼	SM	**YOUNG ALLUVIUM (Qya)** Loose, saturated, gray, Silty, fine to medium SAND			
6	B6-2					5		
8								
10	B6-3				-No recovery	3		
12								
14	B6-4				-No recovery	7		
16	B6-5				-Loose, saturated, light bluish gray, fine to coarse SAND	9		
18								
20	B6-6			SM	**SANTIAGO FORMATION (Tsa)** Very dense, moist, light olive to olive brown, Silty, fine- to coarse-grained SANDSTONE	78		
22								
24								
26	B6-7				-Becomes dense, light olive gray, finer grained	55	113.0	17.8
28								

Figure A-5,
Log of Boring B 6, Page 1 of 2

G1818-52-24.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

BORING B 6

ELEV. (MSL.)________ DATE COMPLETED **06-27-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B6-8				-Becomes very dense, wet, light olive brown, coarser grained	50/6"	114.4	16.6
32								
34								
36	B6-9				-Becomes moist, pale yellow	58		
38				SC	Dense, damp, dark bluish gray, fine Sandy SILTSTONE			
40	B6-10					32		
42								
44				SM	Dense, damp, bluish gray, Silty, fine SANDSTONE			
46	B6-11					31		
48								
50	B6-12				-Becomes very dense	57		
52								
54					BORING TERMINATED AT 54 FEET Groundwater encountered at 4 feet Backfilled with 18.8 ft³ of bentonite grout			

Figure A-5,
Log of Boring B 6, Page 2 of 2

G1818-52-24.GPJ

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

GEOCON

BORING B 7

ELEV. (MSL.)________ DATE COMPLETED **06-28-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					9" **ASPHALT AND BASE**			
				SC	**UNDOCUMENTED FILL (Qudf)** Loose, moist, dark brown, Clayey, fine to medium SAND			
2	B7-1					2		
4								
6	B7-2				-Becomes wet	5	102.0	27.7
8			▼					
10	B7-3				-Becomes saturated, brown, sandy clay pocket	5		
12								
14								
16	B7-4				-No recovery	11		
18								
20	B7-5				-Becomes medium dense, silty	22	111.2	22.6
22								
24								
26	B7-6				-Becomes wet, dark gray, finer grained	27		
28								
				SM	**YOUNG ALLUVIUM (Qya)**			

Figure A-6,
Log of Boring B 7, Page 1 of 2

G1818-52-24.GPJ

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

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

GEOCON

BORING B 7

ELEV. (MSL.)_______ DATE COMPLETED **06-28-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B7-7				Dense, moist, light to medium gray, Silty, fine to medium SAND	70	104.1	20.4
32								
34								
	B7-8				-Becomes very dense, light gray, finer grained	60		
36								
38								
40	B7-9				-No recovery	50/2"		
					BORING TERMINATED AT 41 FEET Groundwater encountered at 8 feet Backfilled with 14.3 ft³ of bentonite grout			

Figure A-6,
Log of Boring B 7, Page 2 of 2

G1818-52-24.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.

PROJECT NO. G1818-52-24

BORING B 9

ELEV. (MSL.)________ DATE COMPLETED **06-26-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. JAMES**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B9-1			SC	**UNDOCUMENTED FILL (Qudf)** Medium dense, moist, dark brown to light brown, Clayey, fine to medium SAND			
2								
4								
	B9-2					71/11"	118.1	13.0
6				SC	**SANTIAGO FORMATION (Tsa)** Very dense, moist, light grayish brown to reddish brown, Clayey, fine to medium SANDSTONE			
8								
10	B9-3					48	109.7	13.7
				SM	Dense, moist, light gray, Silty, fine to SANDSTONE			
12								
14								
	B9-4					65/10"	108.9	18.1
16								
18								
	B9-5					66/10.5"	114.0	16.1

BORING TERMINATED AT 19.5 FEET
Groundwater not encountered
Backfilled with soil cuttings

Figure A-7,
Log of Boring B 9, Page 1 of 1

G1818-52-24.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.

GEOCON

BORING B 10

ELEV. (MSL.)________ DATE COMPLETED **06-26-2017**

EQUIPMENT **Diedrich D-50 with 8" HSA** BY: **K. JAMES**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**UNDOCUMENTED FILL (Qudf)** Medium dense, moist, yellowish brown, Silty, fine to medium SAND			
2				SM	**SANTIAGO FORMATION (Tsa)** Medium dense, moist, yellowish brown and light gray, mottle, Silty, fine to medium SANDSTONE			
4								
	B10-1					46	108.0	16.7
6								
8				SC	Medium dense, moist, reddish brown and light gray mottled, Clayey, fine to medium SANDSTONE			
10	B10-2					28	105.3	20.9
12								
14								
	B10-3			SM	Dense, moist, light gray, Silty, fine to coarse SANDSTONE	68	122.1	10.5
16								
18								
	B10-4					64	109.0	18.9

BORING TERMINATED AT 19.5 FEET
Groundwater not encountered
Backfilled with soil cuttings

Figure A-8,
Log of Boring B 10, Page 1 of 1

G1818-52-24.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 testing to evaluate the physical and mechanical properties of the soil and formational materials encountered at the site. We performed the laboratory tests in accordance with the current versions of the generally accepted *American Society for Testing Materials* (ASTM) procedures or other suggested procedures. We tested selected soil samples for their in-situ dry density and moisture content, shear strength, plasticity index, gradation, expansion index, maximum dry density and optimum moisture content, and corrosion potential. The results of our laboratory tests are presented in Tables B-I through B-VI and on Figure B-1. In addition, the in-situ dry density and moisture content are presented on the exploratory boring logs in Appendix A.

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

Sample No.	Depth (feet)	Geologic Unit	Dry Density (pcf)	Moisture Content (%)		Peak [Ultimate[1]] Cohesion (psf)	Peak [Ultimate[1]] Angle of Shear Resistance (degrees)
				Initial	Final		
B1-2	5	Qudf	93.1	15.7	26.5	740 [680]	31 [31]
B1-3	10	Tsa	116.9	10.9	15.6	570 [580]	43 [30]
B1-4	15	Tsa	111.1	5.6	15.7	1120 [570]	30 [33]
B1-5	18.5	Tsa	110.2	4.1	17.2	520 [440]	38 [36]
B2-2	5	Qudf	103.9	11.1	19.5	380 [440]	36 [32]
B2-4	15	Tsa	109.7	18.9	21.3	1080 [1240]	44 [28]
B3-2	5	Tsa	116.7	17.3	20.9	1470 [980]	28 [31]
B3-3	10	Tsa	107.5	12.6	20.0	670 [530]	35 [30]
B3-4	15	Tsa	121.4	7.8	12.8	260 [520]	43 [35]
B3-5	18.5	Tsa	113.4	16.8	18.5	690 [490]	41 [32]
B5-2	5	Qya	116.8	15.6	18.1	1320 [1310]	17 [17]
B5-4	15	Tsa	114.3	16.9	17.9	760 [290]	33 [34]
B5-6	25	Tsa	112.0	15.7	18.2	1280 [530]	36 [32]
B5-8	35	Tsa	116.2	15.5	16.7	830 [600]	43 [37]
B6-7	25	Tsa	113.0	17.8	19.1	370 [270]	34 [34]
B6-8	30	Tsa	114.4	16.6	16.5	700 [290]	41 [40]
B7-2	5	Qudf	102.0	27.7	25.9	300 [300]	26 [26]
B7-5	20	Qudf	111.2	22.6	20.9	390 [70]	41 [43]
B7-7	30	Qudf	104.1	20.4	22.5	850 [770]	26 [25]
B9-2	5	Tsa	118.1	13.0	15.1	840 [0]	39 [39]
B9-3	10	Tsa	109.7	13.7	18.1	820 [900]	39 [26]
B9-4	15	Tsa	108.9	18.1	19.7	950 [740]	32 [31]

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

Sample No.	Depth (feet)	Geologic Unit	Dry Density (pcf)	Moisture Content (%)		Peak [Ultimate[1]] Cohesion (psf)	Peak [Ultimate[1]] Angle of Shear Resistance (degrees)
				Initial	Final		
B9-5	18.5	Tsa	114.0	16.1	18.3	1600 [1200]	27 [24]
B10-1	5	Tsa	108.0	16.7	25.1	90 [680]	49 [28]
B10-2	10	Tsa	105.3	20.9	24.4	1530 [620]	21 [28]
B10-3	15	Tsa	122.1	10.5	13.8	1140 [630]	29 [26]
B10-4	18.5	Tsa	109.0	18.9	20.8	730 [650]	32 [25]

[1] Ultimate at end of test at 0.2-inch deflection.

TABLE B-II
SUMMARY OF LABORATORY PLASTICITY INDEX TEST RESULTS
(ASTM D 4318)

Sample No.	Depth (feet)	Geologic Unit	Liquid Limit	Plastic Limit	Plasticity Index	USCS Classification
B5-3	10	Qya	NP	NP	NP	NP
B6-5	15	Qya	26	19	7	CL
B7-3	10	Qudf	30	21	9	CL

NP = Non-Plastic

TABLE B-III
SUMMARY OF LABORATORY GRAIN SIZE DISTRIBUTION TEST RESULTS
(ASTM D 422)

Sample No.	Depth (feet)	% Gravel	% Sand	% Fines	USCS Classification
B5-3	10	0.0	72.0	28.0	SM
B6-5	15	0.0	62.0	38.0	SC-SM
B7-3	10	0.0	31.1	68.9	CL

TABLE B-IV
SUMMARY OF LABORATORY SOIL CORROSION TEST RESULTS
(CALIFORNIA TEST NOS. 643, 417, AND 422)

Sample No.	Sample Depth	Resistivity (ohm centimeters)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
B7-1	2	1,500	7.2	90	30
B9-1	0	480	7.6	430	1190

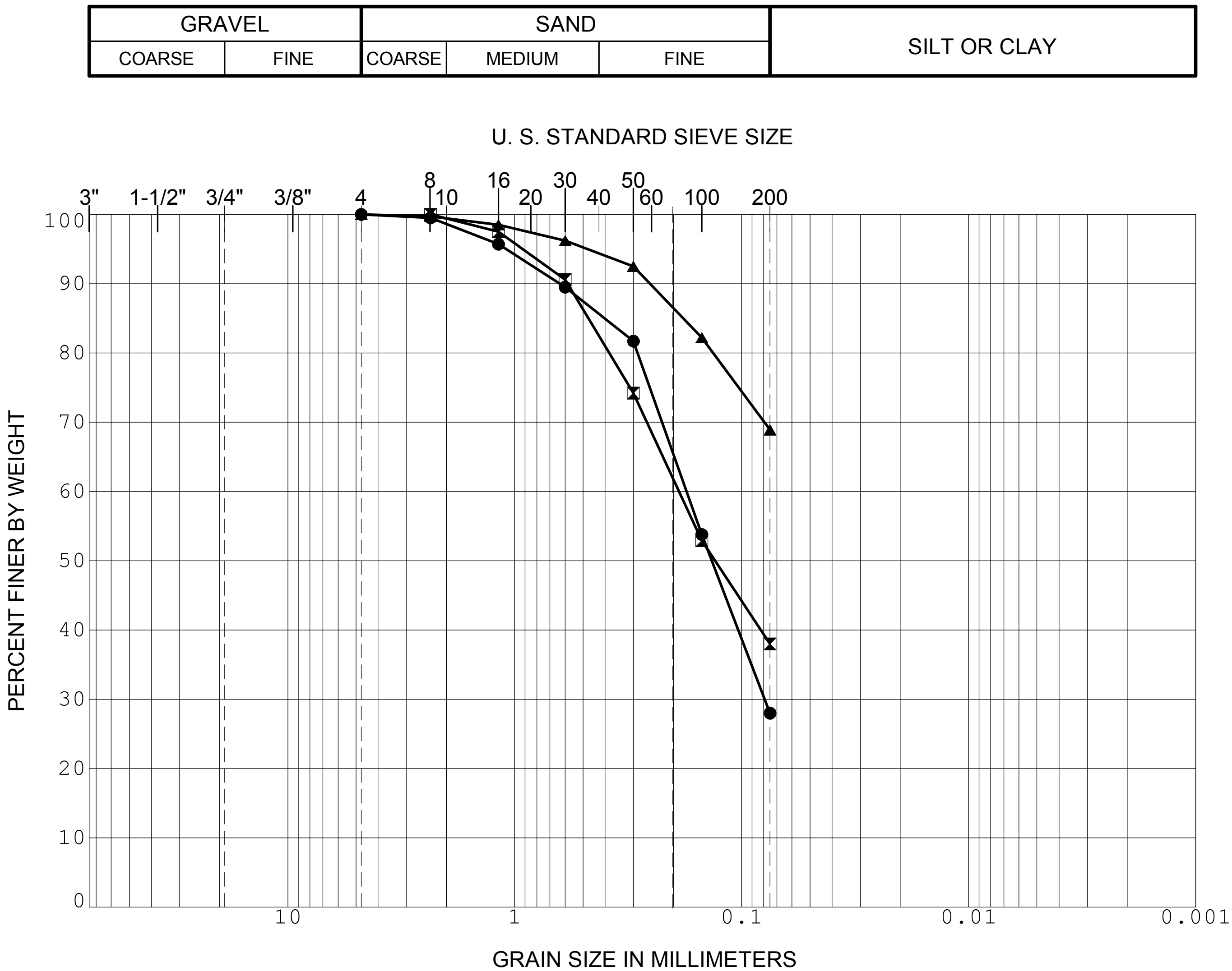
TABLE B-V
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
(ASTM D 1557)

Sample No.	Sample Depth (feet)	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
B1-1	0	Yellowish brown, Silty SAND	123.0	11.7
B3-1	0	Brown, Clayey SAND	130.6	8.4
B5-1	1	Dark brown, Sandy CLAY	126.0	10.7
B6-1	1	Dark brown, Clayey SAND	122.6	11.4

TABLE B-VI
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
(ASTM D 4829)

Sample No.	Sample Depth (feet)	Expansion Index
B3-1	0	3
B5-1	1	68
B6-1	1	18

PROJECT NO. G1818-52-24



	SAMPLE	DEPTH (ft)	CLASSIFICATION	NAT WC	LL	PL	PI
●	B5-3	10.0	(SM) Silty SAND				
⧗	B6-5	15.0	(SC-SM) Silty, Clayey SAND				
▲	B7-3	10.0	(CL) Sandy, lean CLAY				

GRADATION CURVE

TL6975-SAN MARCOS-ESCONDIDO

SAN DIEGO COUNTY, CALIFORNIA

APPENDIX C

APPENDIX C

SELECTED PREVIOUS EXPLORATION LOGS BY GEOCON AND OTHERS

FOR

TL6975 – SAN MARCOS – ENCONDIDO
BRADY PROJECT: SDGEC1.078.000
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1818-52-24

PROJECT NO. 07050-22-15

BORING B 1

ELEV. (MSL.) DATE COMPLETED 12-19-2003

EQUIPMENT IR A-300

DEPTH IN FEET	SAMPLE NO	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**TOPSOIL** Very dense, moist, orange, Clayey, fine to coarse SAND			
2	B1-1			SC		50/4-1/2"		
	B1-2					50		
4					**DECOMPOSED GRANITIC ROCK** Damp, light orange, highly weathered to decomposed, moderately hard, excavates as Silty, fine to very coarse SAND, some clay	50/1"		
6	B1-3					50/2"		
8								
10	B1-4				-Becomes tan, moist with no clay	50/3"		
12								
14								
16	B1-5					50/1"		
18								
					BORING TERMINATED AT 19.5 FEET BACKFILLED WITH SOIL CUTTINGS MIXED WITH 1 X 94 lb SACK OF CEMENT (APPROX. 7 cuft)			

07050-22-15.GPJ

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

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

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

PROJECT NO. 07590-22-25

BORING B 5

ELEV. (MSL.) 468' DATE COMPLETED 11-20-2007

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**SANTIAGO FORMATION** Very dense, moist, brown, Silty, fine grained SANDSTONE			
2	B5-1					83	112.0	12.5
4	B5-2			ML/SM	Very stiff to medium dense, moist, olive brown, interbedded Sandy SILTSTONE and Silty SANDSTONE	26		
	B5-3			SM	Very dense, moist, whitish gray, Silty, fine-to medium-grained SANDSTONE	80	110.6	13.7
6	B5-4			ML	Hard, moist, gray mottled reddish brown, Sandy SILTSTONE; fining downward	48		
8								
10	B5-5				-Massive and homogeneous	95	102.6	20.8
12	B5-6					43		
14								
	B5-7			SC/ML	Hard, moist, dark gray mottled reddish brown, Sandy CLAYSTONE to Sandy SILTSTONE; trace rip-up clasts of fine-grained metavolcanic rock	72	108.1	23.9
16								
	B5-8					41		
18					-Becomes siltstone			

BORING TERMINATED AT 18.5 FEET
No groundwater encountered
Backfilled with cuttings

Figure A-18,
Log of Boring B 5, Page 1 of 1

07590-22-25.GPJ

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

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

GEOCON

PROJECT NO. 07590-22-25

BORING B 6

ELEV. (MSL.) 537' DATE COMPLETED 11-20-2007

EQUIPMENT CME 75 BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**TOPSOIL** Dark brown, Clayey SAND			
				SC/ML	**SANTIAGO FORMATION** Stiff, moist, brown mottled yellowish brown, Sandy CLAYSTONE interbedded with Sandy SILTSTONE			
2	B6-1					64	99.0	24.0
4	B6-2				-Becomes very dense, interbedded fine grained sandstone and hard sandy silt	78		
	B6-3			SM/ML	Very dense to hard, moist, yellowish brown mottled gray, interbedded Silty, fine grained SANDSTONE and Sandy SILTSTONE	50/5"	99.9	17.4
6	B6-4					31		
8					-Becomes hard, predominately siltstone, excavates to sandy clay			
10	B6-5			SM	Very dense, moist, gray mottled with reddish brown stringers, Silty, fine-to medium-grained SANDSTONE; fining upward	97	111.2	16.5
	B6-6					48		
12				SC/CL	Hard, moist, gray, Sandy CLAYSTONE to lean CLAYSTONE			
14								
	B6-7			SC/SM	Very dense, gray mottled reddish brown, Silty to slightly Clayey, fine-to medium-grained SANDSTONE	68	109.0	16.1
16								
	B6-8			SM	Very dense, whitish gray, Silty, fine grained SANDSTONE	50		
18								

BORING TERMINATED AT 18.5 FEET
No groundwater encountered
Backfilled with cuttings

Figure A-19,
Log of Boring B 6, Page 1 of 1

07590-22-25.GPJ

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

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

GEOCON

PROJECT NO. 07590-22-25A

BORING B 7

ELEV. (MSL.) 463' DATE COMPLETED 02-22-2010

EQUIPMENT UNIMOG-MARL 4 WITH 6" HSA BY: M. ERTWINE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B7-0			CL	**PREVIOUSLY PLACED FILL** Stiff, moist, yellowish to olive brown, Sandy CLAY; trace organic rootlets, trace gravel			
2	B7-1					13		
4	B7-2			SM-SC	**SANTIAGO FORMATION** Dense, moist, yellowish mottled reddish brown, Silty to Clayey, fine to coarse SANDSTONE; trace of angular gravels	36	123.4	12.5
6								
8	B7-3				-Becomes mottled grayish brown with trace black carbon staining	32		
10	B7-4			SM	Very dense, moist, yellowish brown to whitish gray, Silty, fine to medium-grained SANDSTONE; trace gravels	50/6"	119.9	9.8
12	B7-5				-Excavates to a silty sand	57		
14								
	B7-6			SM	Very dense, moist, yellowish brown, mottled grayish and reddish brown, Silty, fine-grained SANDSTONE, interbedded with very stiff, moist, grayish green, Clayey SILTSTONE; moderately cemented	61		
16	B7-7							
18	B7-8			SM	**ESCONDIDO CREEK GRANODIORITE (Kgr)** Highly weathered, moderately strong, yellowish brown to reddish brown, fine-to-coarse grained, GRANITIC ROCK	50/6"	113.1	14.2
					-Becomes moderately weathered, refusal	50/6"		

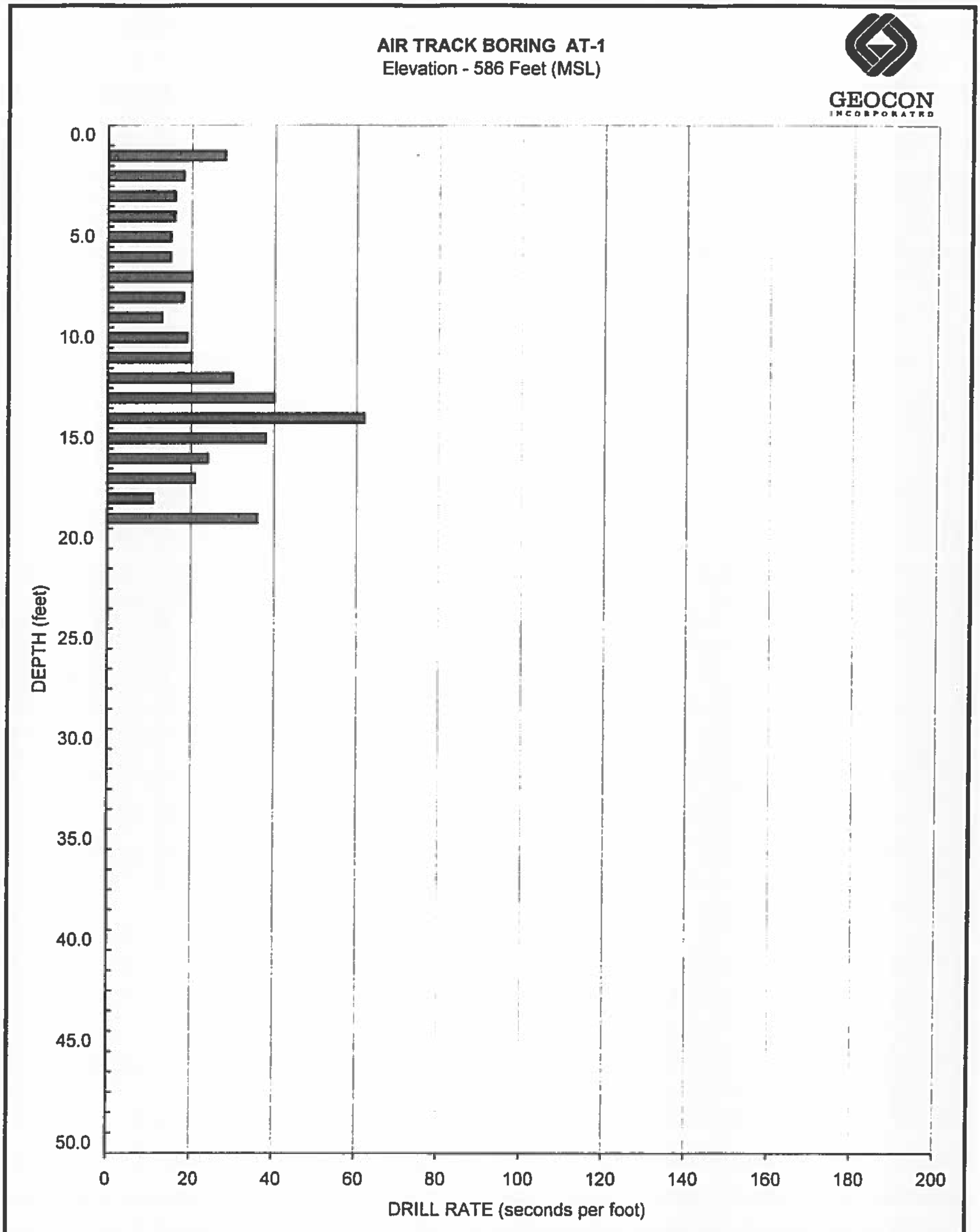
REFUSAL AT 19.5 FEET
Backfilled with cuttings and 1 bag of bentonite chips
Groundwater was not encountered

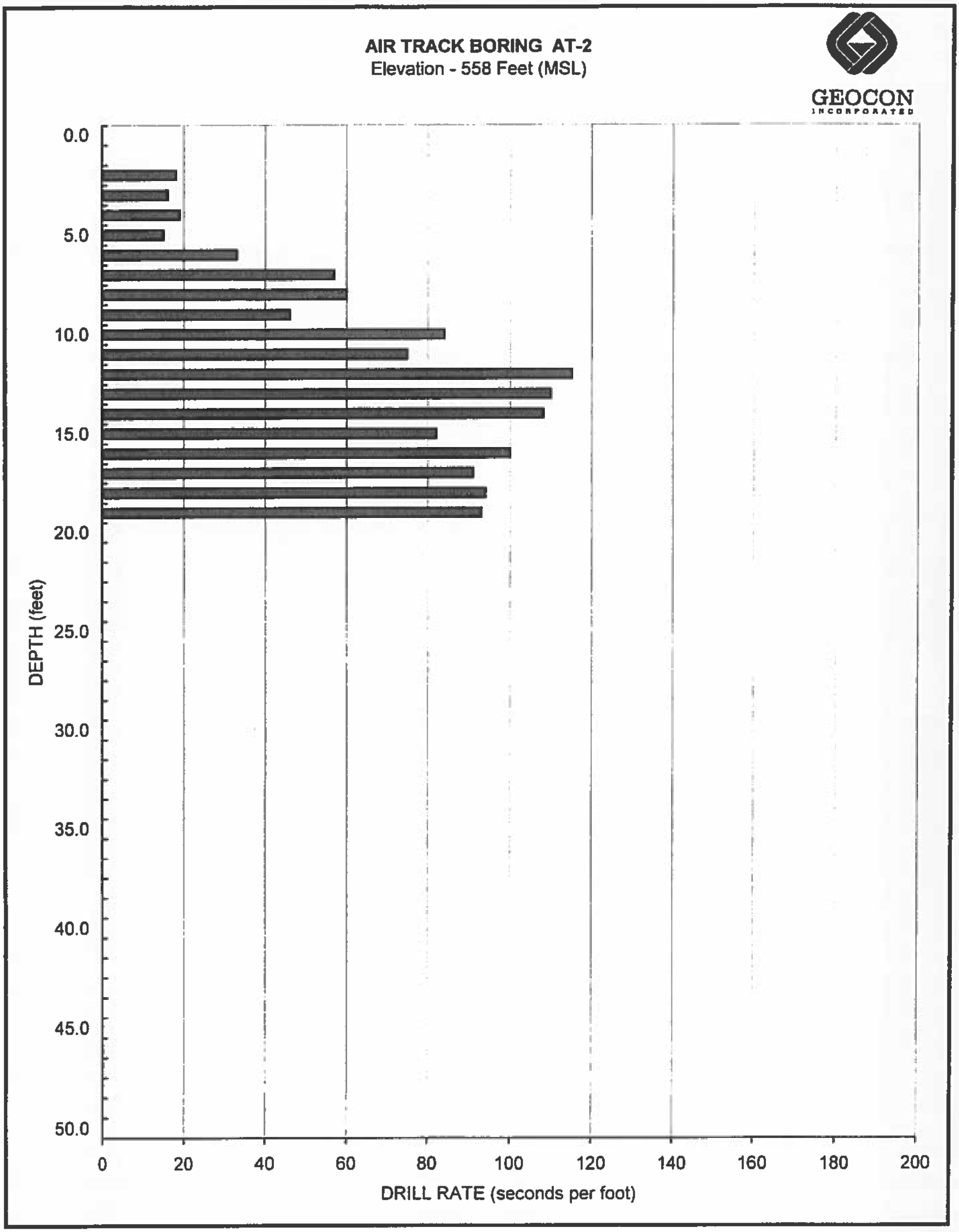
Figure A-1,
Log of Boring B 7, Page 1 of 1

07590-22-25A.GPJ

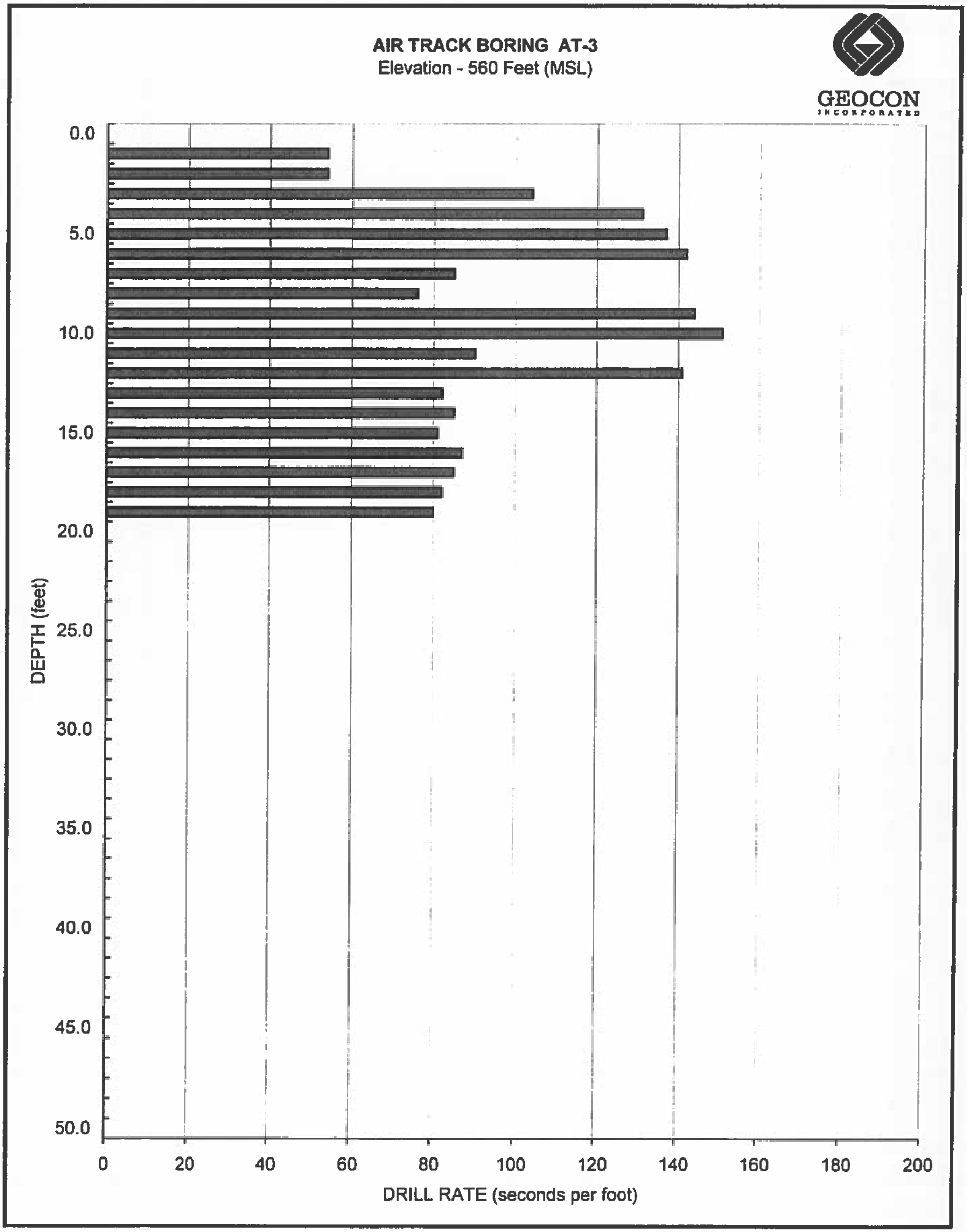
SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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.


AIR TRACK BORING AT-1
Elevation - 586 Feet (MSL)
GEOCON INCORPORATED
DEPTH (feet)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
0
20
40
60
80
100
120
140
160
180
200
DRILL RATE (seconds per foot)



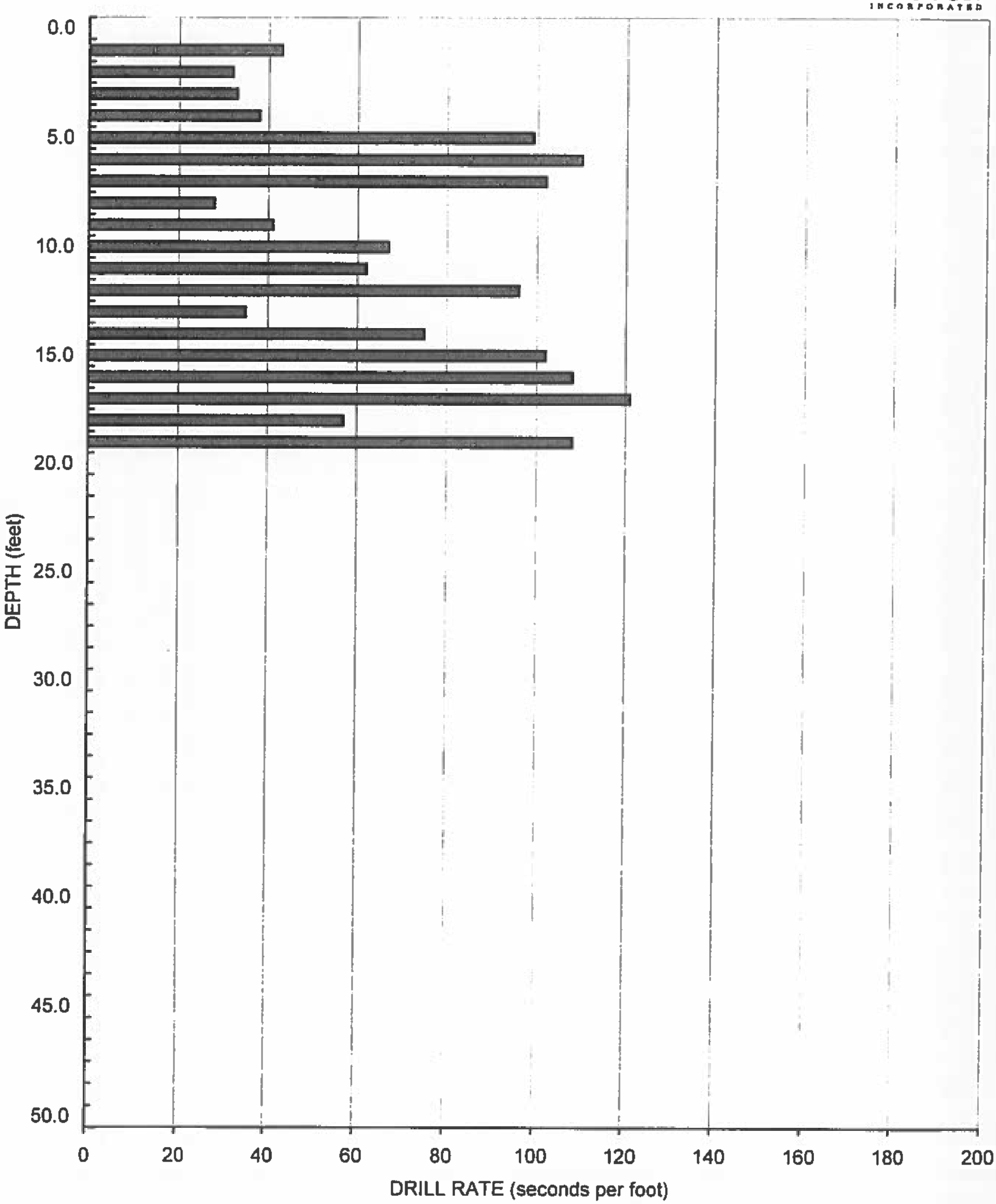
AIR TRACK BORING AT-2
Elevation - 558 Feet (MSL)
GEOCON INCORPORATED
DEPTH (feet)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
0
20
40
60
80
100
120
140
160
180
200
DRILL RATE (seconds per foot)


AIR TRACK BORING AT-3
Elevation - 560 Feet (MSL)
GEOCON
INCORPORATED
DEPTH (feet)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
0
20
40
60
80
100
120
140
160
180
200
DRILL RATE (seconds per foot)

GEOCON INCORPORATED

AIR TRACK BORING AT-5

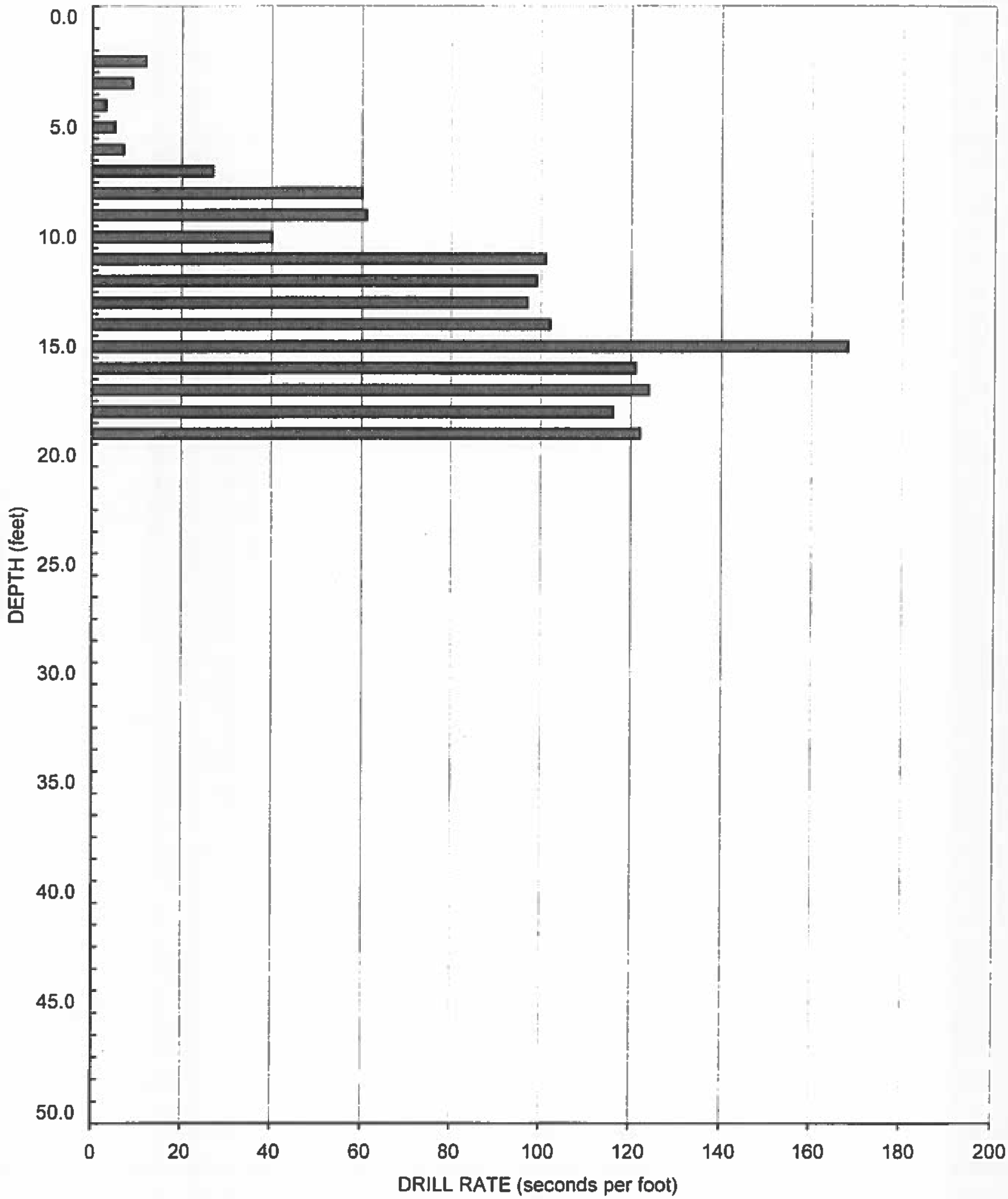
Elevation - 470 Feet (MSL)

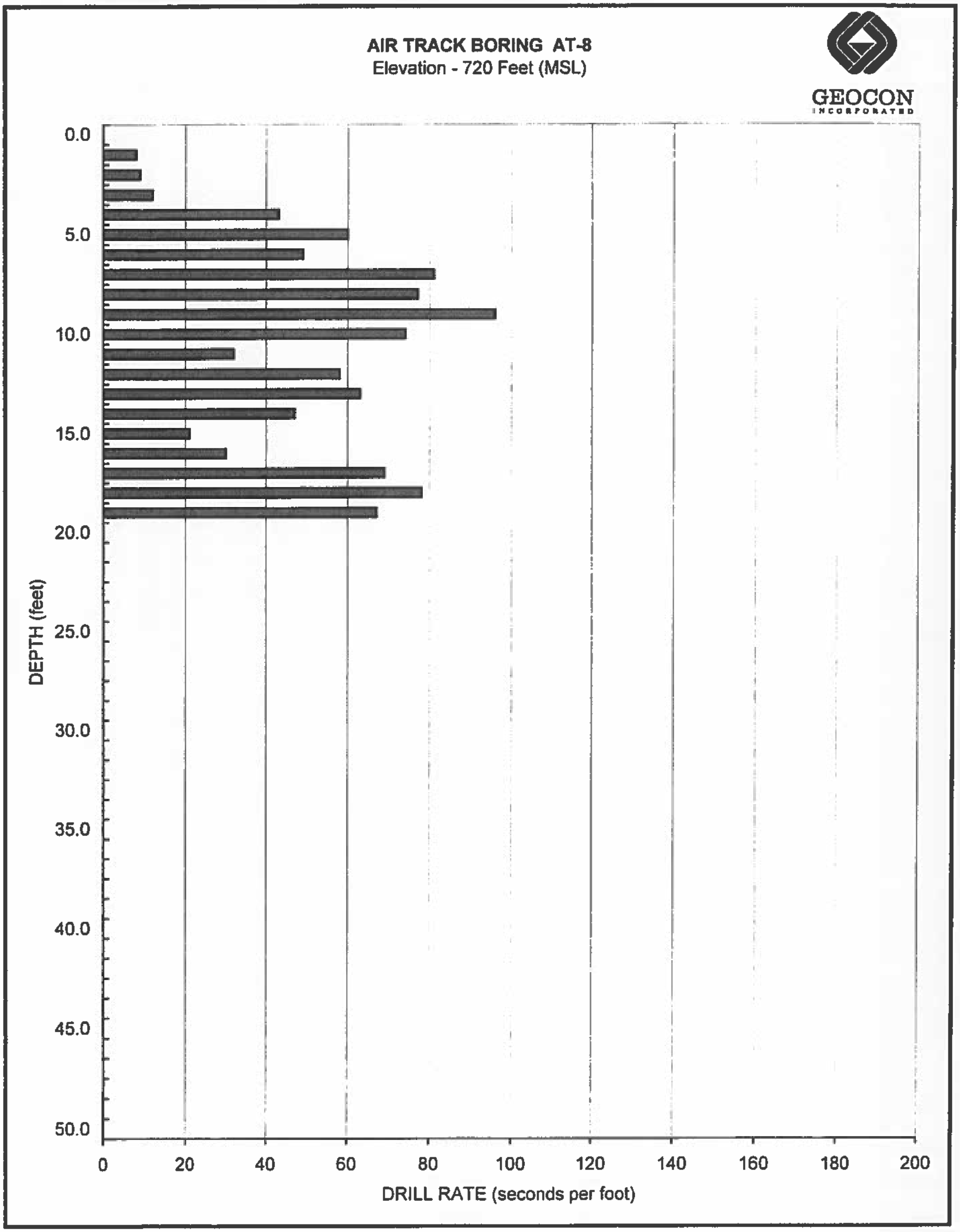


AIR TRACK BORING AT-6

Elevation - 443 Feet (MSL)

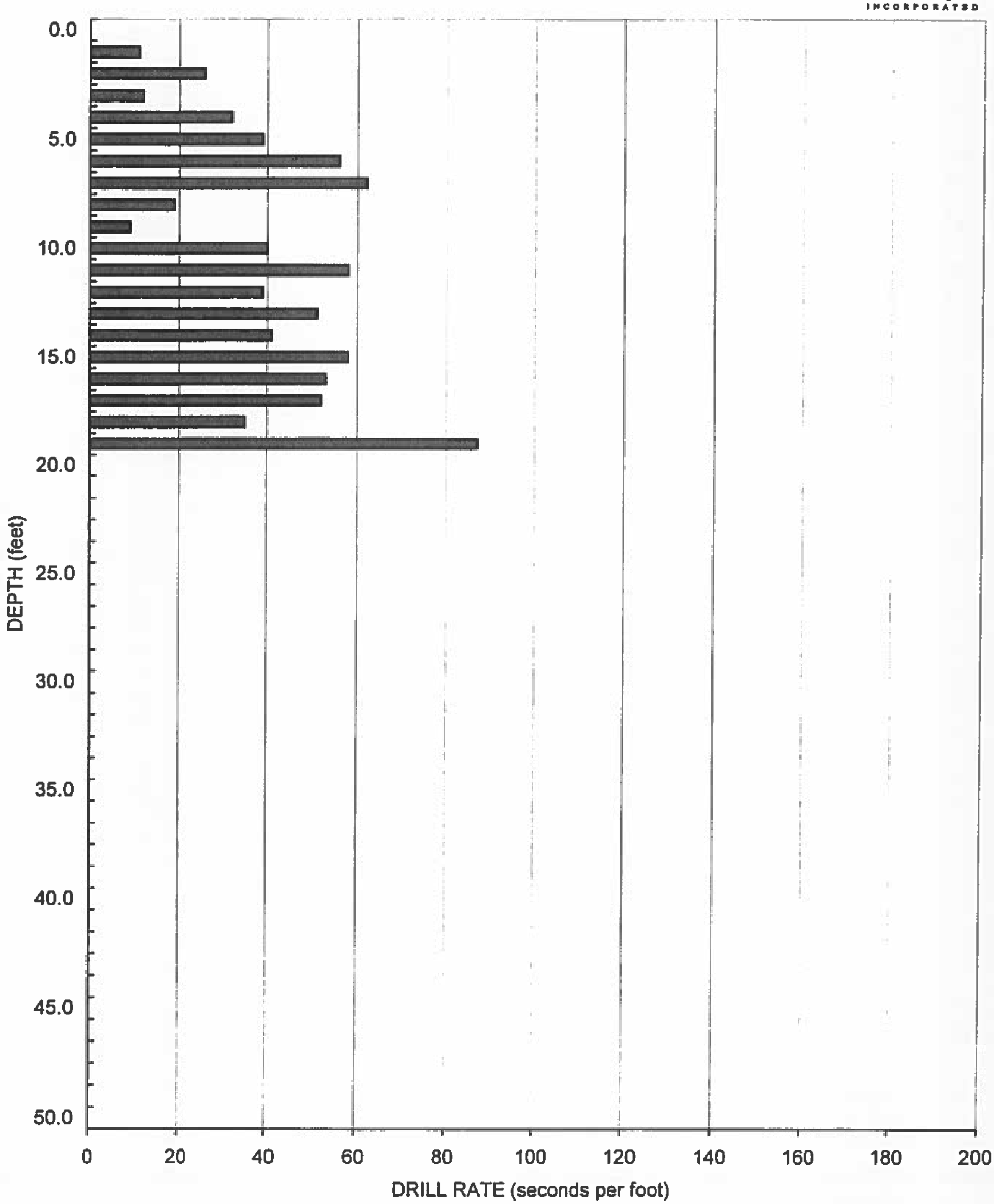
GEOCON INCORPORATED

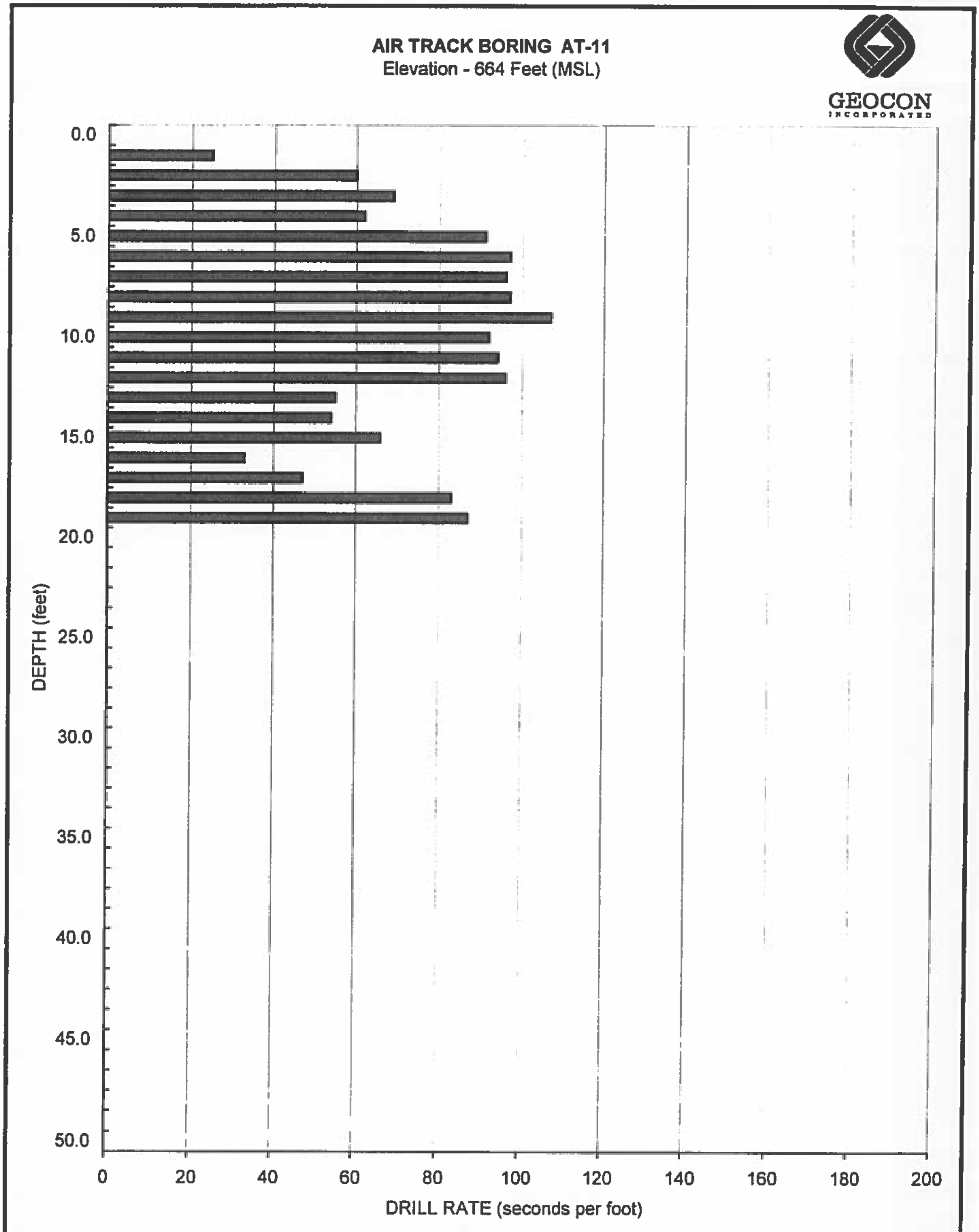



AIR TRACK BORING AT-8
Elevation - 720 Feet (MSL)
GEOCON
INCORPORATED
DEPTH (feet)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
0
20
40
60
80
100
120
140
160
180
200
DRILL RATE (seconds per foot)

AIR TRACK BORING AT-9
Elevation - 710 Feet (MSL)

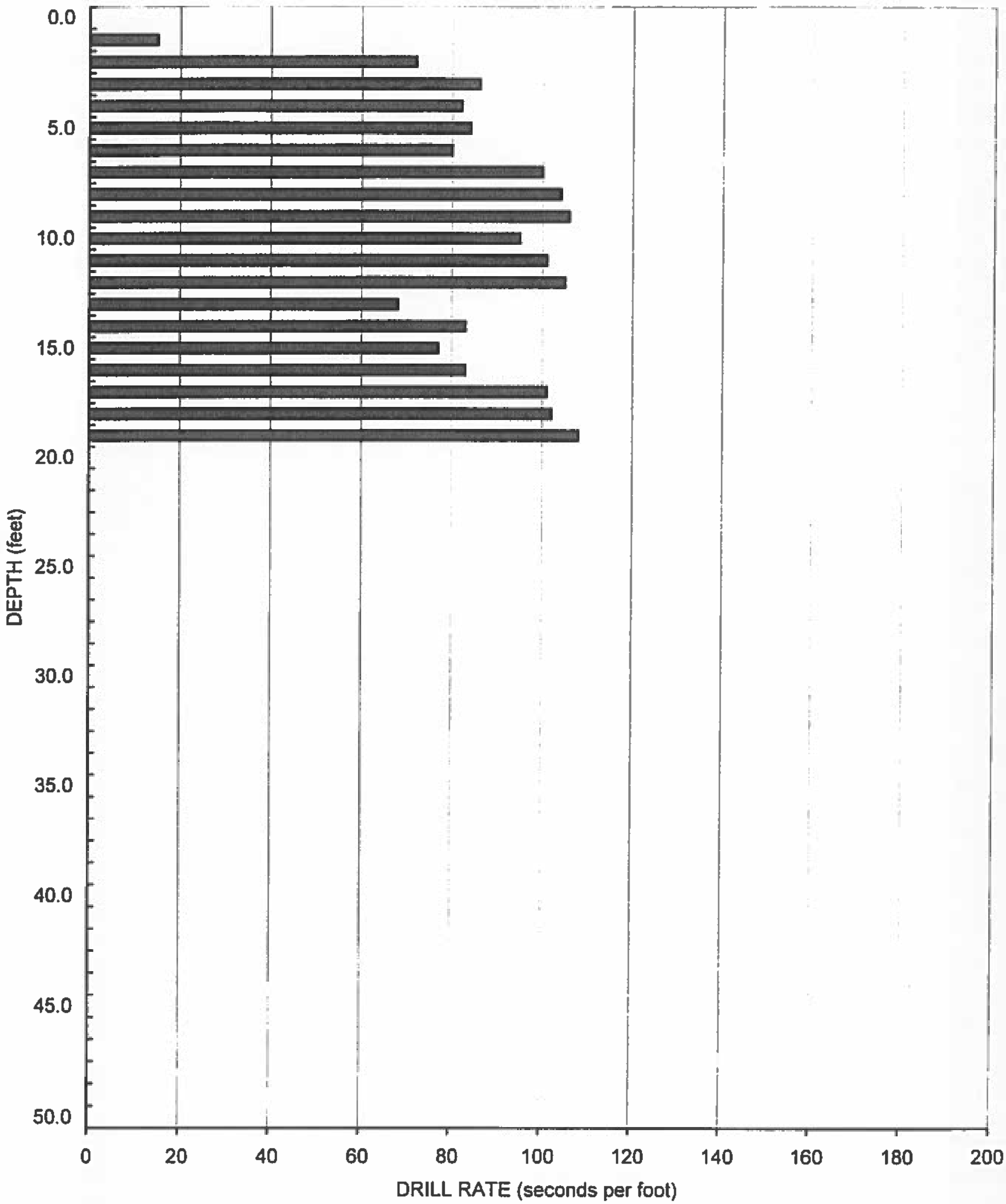
GEOCON INCORPORATED

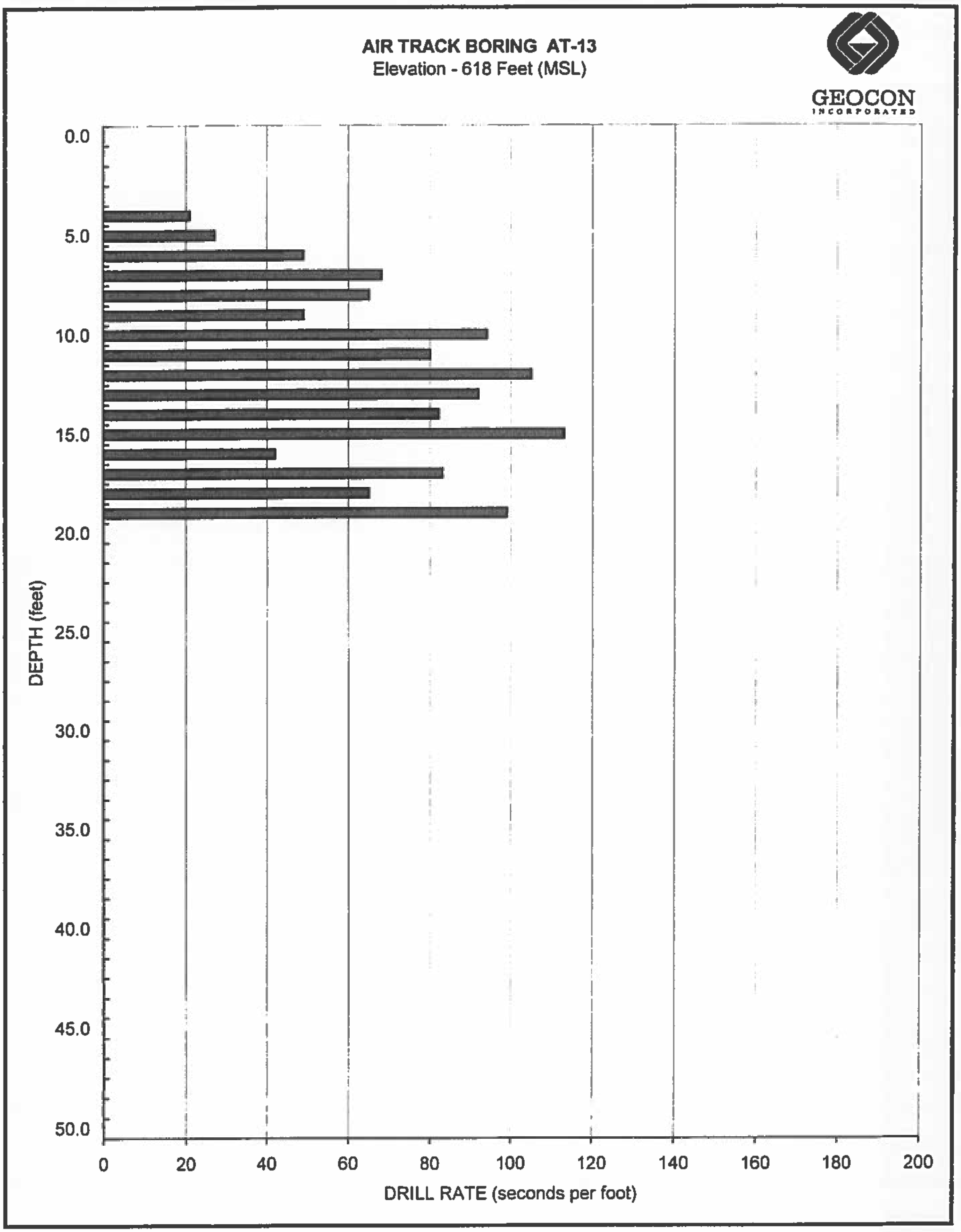



AIR TRACK BORING AT-11
Elevation - 664 Feet (MSL)
GEOCON
INCORPORATED
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
DEPTH (feet)
0
20
40
60
80
100
120
140
160
180
200
DRILL RATE (seconds per foot)

GEOCON INCORPORATED

AIR TRACK BORING AT-12
Elevation - 758 Feet (MSL)





AT0013.xls

FIGURE A-13

PROJECT NO. 07590-22-25

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING C 1 ELEV. (MSL.) 722' DATE COMPLETED 11-20-2007 EQUIPMENT CME 75 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0 – 2				SM	**TOPSOIL** Loose to medium dense, damp, light brown, Silty SAND			
				SC	**RESIDUAL SOIL** Dense, moist, brown, Clayey SAND; hollow stem to 3½ feet; caving started at 3½ feet			
4 – 18	C1-1				**GRANITIC ROCK** Moderately weathered, strong, light grayish brown, medium-grained GRANODIORITE; well defined fractures, with heavy staining 40 to 60 degrees -Run=3 feet, recovery=100%, RQD=25% -Becomes very fractured at various directions (e.g. near horizontal, vertical to 50 degrees) -7 to 12 feet, run=5 feet, recovery=95%, RQD=10% -12 to 13 feet, run=1 foot, recovery=90%, RQD=0% -Relatively uniform granodiorite -13 to 15 feet, run=2 feet, recovery=100%, RQD=10% -Becomes highly fractured from 15 to 17 feet -Becomes moderately fractured from 17 to 19 feet -15 to 19 feet, run=4 feet, recovery=75%, RQD=0%			
					BORING TERMINATED AT 19 FEET No groundwater encountered Backfilled with cuttings			

Figure A-20,
Log of Boring C 1, Page 1 of 1

07590-22-25.GPJ

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

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

GEOCON

PROJECT NO. 07590-22-25

DEPTH IN FEET	SAMPLE NO	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING C 2 ELEV. (MSL.) 577' DATE COMPLETED 11-20-2007 EQUIPMENT CME 75 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, moist, reddish brown, Clayey SAND; residual soil			
2					**GRANITIC ROCK** Highly to completely weathered, weak, fine to medium grained, dark reddish brown, GRANITIC ROCK -No recovery, hollow stem augered to 5 feet			
4								
6					Moderately weathered, moderately strong, moderately fractured, reddish brown, fine-grained aphanitic GRANITIC ROCK; fractures typically 70 degrees to near horizontal			
8					-Intrusion from 7 to 9 feet, slightly weathered, strong, light yellowish brown, fine-grained			
10					-Becomes intensely fractured at 9.8 to 10 feet -Run=5 feet, recovery=40%, RQD=0%			
12	C2-1				Highly weathered, strong, moderately fractured, dark grayish brown, fine-grained crystalline GRANITIC ROCK; fractures typically 70 degrees to near horizontal, intensely fractured from 10 to 10½ to 10.8 feet; infilled with clay			
14	C2-2				-Run=5 feet, recovery=56%, RQD=20%			
16					-Becomes highly fractured -No recovery from 15 to 19 feet			
18					-Hollow stem drilling to 5 feet, rock coring from 5 to 19 feet			
					BORING TERMINATED AT 19 FEET No groundwater encountered Backfilled with cuttings			

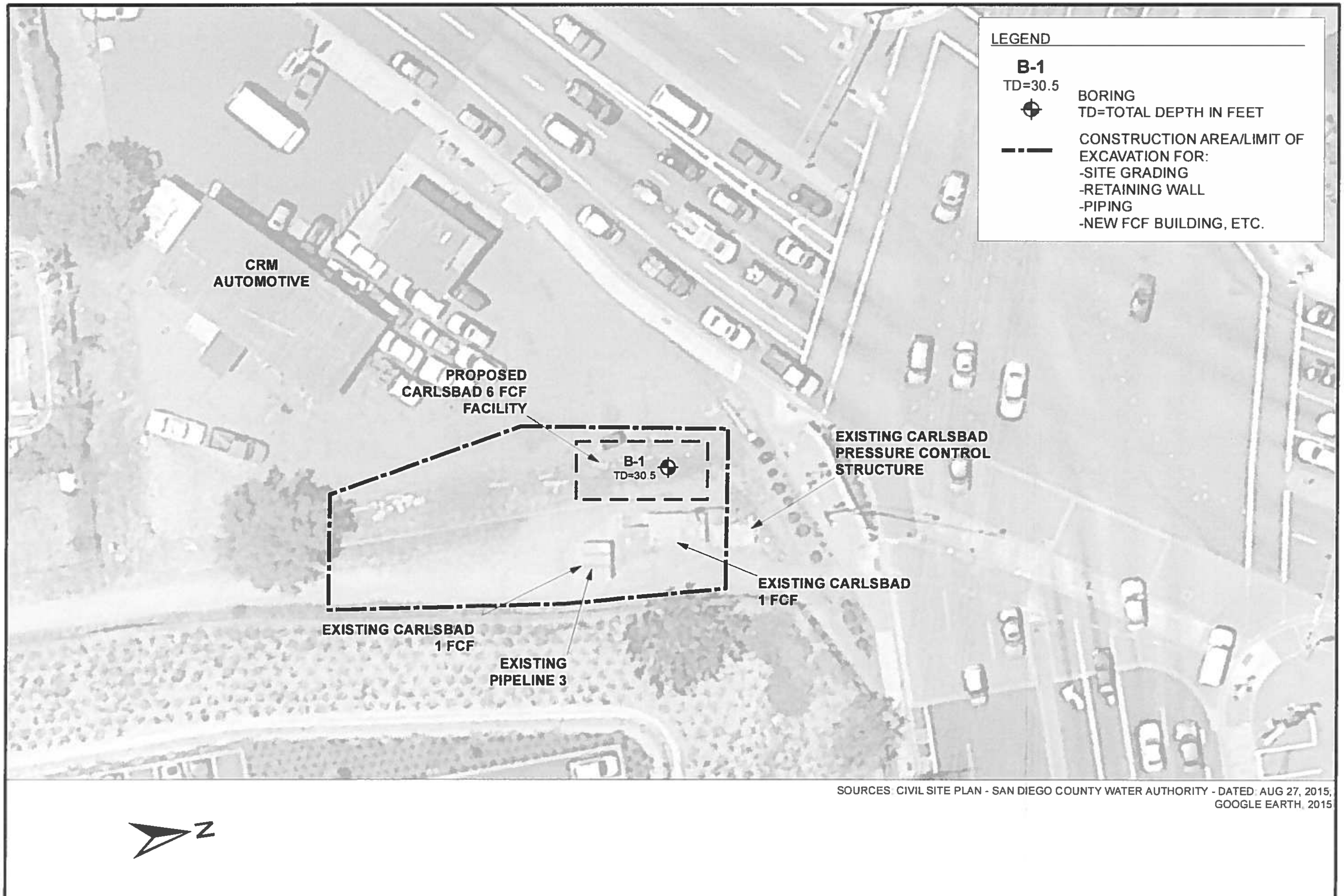
Figure A-21,
Log of Boring C 2, Page 1 of 1

07590-22-25 GPJ

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

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

GEOCON



SOURCES: CIVIL SITE PLAN - SAN DIEGO COUNTY WATER AUTHORITY - DATED: AUG 27, 2015; GOOGLE EARTH, 2015

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore		BORING LOCATION	FIGURE
PROJECT NO.	DATE	SAN DIEGO COUNTY WATER AUTHORITY CARLSBAD 6 FCF SAN MARCOS, CALIFORNIA	2
108003001	12/15		

2_108003001_BL.mxd 12/9/2015 JDL

DATE DRILLED 8/18/15 BORING NO. B-1

GROUND ELEVATION 568' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (A-300) (Ingersoll)

DRIVE WEIGHT 140 lbs. DROP 30"

SAMPLED BY LLB LOGGED BY LLB REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	FILL: Dark brown, moist, medium dense, silty SAND; few clay.
							CL	Yellow brown to medium brown, moist, firm, sandy CLAY; few to little silt; trace gravel; scattered organic debris.
							SM	Medium brown, moist, loose, silty SAND.
			21	17.6	104.5		CL	Olive brown, moist, very stiff, sandy CLAY.
							SM	Medium brown, moist, medium dense, silty SAND; trace to few clay.
			50/5"					
10			50/6"	13.3	110.6			SANTIAGO FORMATION: Yellowish to grayish brown, moist, weakly to moderately cemented clayey SILTSTONE. Light grayish brown, moist, weakly to moderately cemented, fine to medium clayey SANDSTONE.
			86/4"					
			50/ 5-1/2"	14.0	113.4			Light gray to yellowish brown.
20			50/6"					Yellowish brown; moderately cemented; medium to coarse.
			50/6"					Light gray to olive; wet.
30			50/6"					
								Total Depth = 30.5 feet. Groundwater encountered at approximately 22 feet during drilling. Backfilled with approximately 10.6 cubic feet of bentonite grout shortly after drilling on 8/18/15.
40								

Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

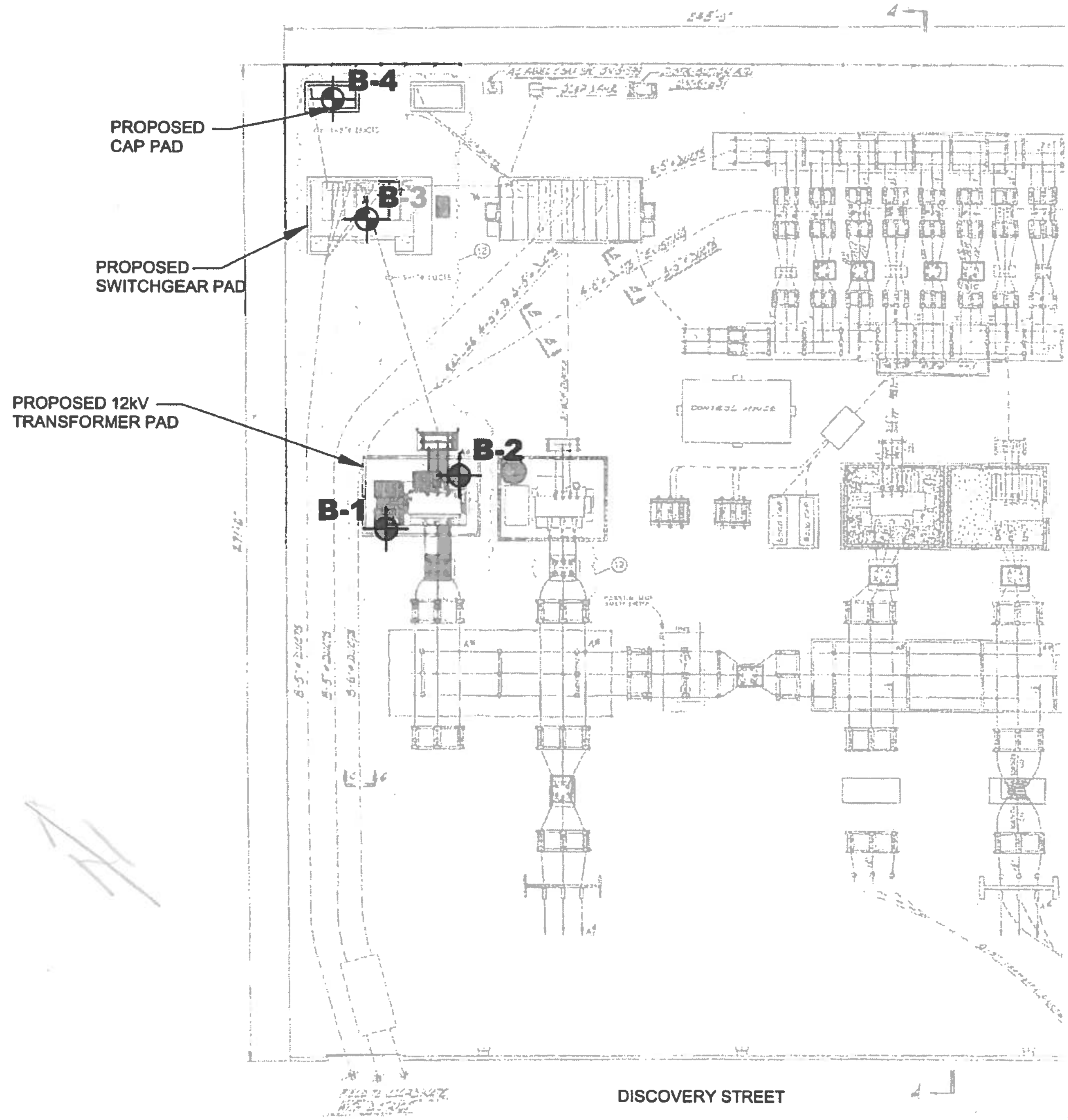
The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

Ninyo & Moore

BORING LOG

SAN DIEGO COUNTY WATER AUTHORITY
CARLSBAD 6 FCF, SAN MARCOS, CALIFORNIA

PROJECT NO.	DATE	FIGURE
108003001	12/15	A-1



40 0 40

APPROXIMATE SCALE (feet)

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

LEGEND

APPROXIMATE LOCATION OF PROPOSED BORING

ATTACHED IMAGES: Images: San_Marcos_site.jpg
ATTACHED XREFS: CAD FILE: G:\2008\99582 - SDGE San Marcos\ LAYOUT: Layout1

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	99582
DRAWN:	12/4/08
DRAWN BY:	JP
CHECKED BY:	TG
FILE NAME:	99582SITE.dwg

BORING LOCATION MAP

SDG&E SAN MARCOS
SUBSTATION EXPANSION
SAN MARCOS, CALIFORNIA

FIGURE
2

DATE DRILLED:	11/21/08	WATER DEPTH:	11.0 ft
DRILLING COMPANY:	PACIFIC DRILLING	DATE OBSERVED:	11/21/08
DRILLING METHOD:	UNIMOG, Auto Hammer, 140lb, 30" drop, Hollow Stem Auger (HSA)	GROUND ELEVATION:	TBD
		LOGGED BY:	TG
HOLE DIAMETER:	7 inches	REVIEWED BY:	SHR

ELEVATION (feet)	DEPTH (feet)	SAMPLES BULK / DRIVEN	BLOW COUNTS (blows/foot)	SAMPLE NUMBER	GRAPHIC LOG	SOIL DESCRIPTION AND CLASSIFICATION	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	COMMENTS/ ADDITIONAL TESTS
						ARTIFICIAL FILL (Qaf):			
						Silty SAND (SM), brown, dry to moist, medium dense, fine to medium grained sand			
			25	1		Becomes dark brown, fine to coarse grained sand, some fine grained gravel			
	5			2			123.0	6	SA (20%)
			34	3		Increase in coarse grained sand and fine grained gravel			
						Alluvium (Qal):			
	10					CLAY (CL), dark brown, moist, very soft to soft, trace fine grained sand			
∇			5	4		Becomes wet, medium to high plasticity		23	WA (78%) PI 29 LL 47
				5					
	15		5	6					CONSOL
						-Total boring depth 16.5 feet bgs -Groundwater encountered at 11 feet bgs at the time of drilling -Boring backfilled with soil cuttings and bentonite			
	20								

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO. 99582

SDG&E SAN MARCOS
SUBSTATION EXPANSION
SAN MARCOS, CALIFORNIA

LOG OF BORING B-1

FIGURE
A3

DATE DRILLED:	11/21/08	WATER DEPTH:	NONE
DRILLING COMPANY:	PACIFIC DRILLING	DATE OBSERVED:	11/21/08
DRILLING METHOD:	UNIMOG, Auto Hammer, 140lb, 30" drop, Hollow Stem Auger (HSA)	GROUND ELEVATION:	TBD
		LOGGED BY:	TG
HOLE DIAMETER:	7 inches	REVIEWED BY:	SHR

ELEVATION (feet)	DEPTH (feet)	SAMPLES: BULK	SAMPLES: DRIVEN	BLOW COUNTS (blows/foot)	SAMPLE NUMBER	GRAPHIC LOG	SOIL DESCRIPTION AND CLASSIFICATION	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	COMMENTS/ ADDITIONAL TESTS
							ARTIFICIAL FILL (Qaf): Silty SAND (SM) with some Gravel, brown, dry to moist, medium dense to dense, fine to coarse grained sand, fine grained gravel			
		X	X	30	1 2		Becomes dark brown			
	5		X	27	3A 3B		Becomes medium dense, gray brown	125.0	6	DS
	10		X	5	4		**Alluvium (Qal):** CLAY (CL), dark brown, moist, very soft to soft, trace fine grained sand, medium to high plasticity			PI 29 LL 45
							-Total boring depth 11.5 feet bgs -Groundwater not encountered -Boring backfilled with soil cuttings and bentonite			
	15									
	20									

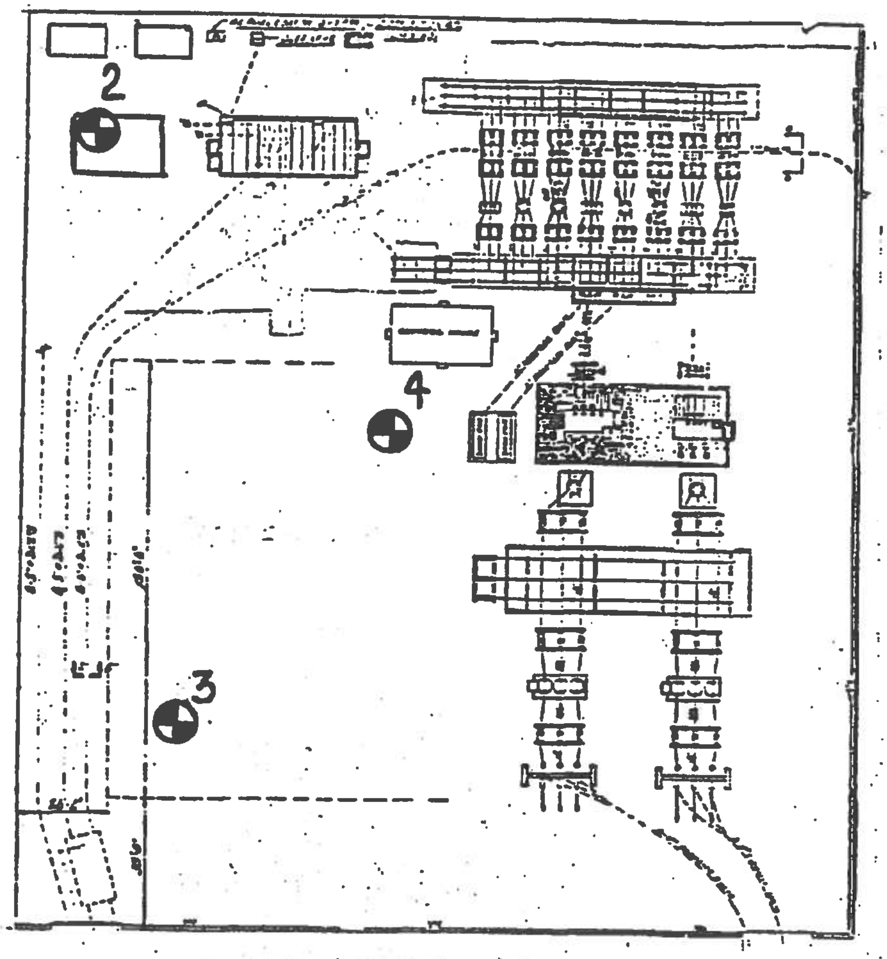
KLEINFELDER
Bright People. Right Solutions.

PROJECT NO. 99582

SDG&E SAN MARCOS
SUBSTATION EXPANSION
SAN MARCOS, CALIFORNIA

LOG OF BORING B-2

FIGURE
A4



LEGEND

INDICATES APPROXIMATE LOCATION OF TEST BORING

NOTE: BORING 2 WAS DONE ON PREVIOUS REPORT

DATE: 10-10-1991 DRAWN: M JACKSON AND CLIENT NOT TO SCALE

LOCATION OF TEST BORINGS

SAN DIEGO GAS AND ELECTRIC COMPANY

SAN MARCOS 69/12KV SUBSTATION

DISCOVERY STREET

SAN MARCOS, CALIFORNIA

PROJECT NO.		DRAWING NO.
91-10-5A	BENTON ENGINEERING, INC.	1

JOB NAME San Diego Gas & Electric, San Marcos Substation

SUMMARY SHEET

BORING NO. 3

DEPTH/FEET	SAMPLE NUMBER	SOIL CLASSIFICATION SYMBOL	DESCRIPTION	CLASSIFICATION		DRIVE ENERGY FT. KIPS/FT.	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS/CU. FT.	SHEAR RESISTANCE KIPS/SQ. FT.
0			Dark Brown, Dry, Loose, Few Gravel to 3/4"	SILTY FINE TO MEDIUM SAND					
1	[1]		Slightly Moist to Moist						
2	(1)				3	1.1	11.8	95.7	0.13
4	(2)				7	1.1	13.0	109.9	0.72
5	(3)		Brown, Occasional Lenses, 20% Gravel to 2", Few Gravel Continued		7	1.1	7.5	97.7	0.50
6			Moist						
7	(4)		Brown, Slightly Moist, Medium Firm, 20-30% Gravel to 3", Slight Caving	GRAVELLY SILTY FINE TO MEDIUM SAND	6	2.2	7.3	106.4	1.06
10	(5)		Brown, Moist, Medium Firm	FINE TO MEDIUM SANDY CLAY	3	1.1	19.3	108.6	1.17
14			Merges						
15	(6)		Gray Brown, Moist to Very Moist, Medium Firm to Firm	CLAYEY FINE TO MEDIUM SAND	4	2.2	21.6	106.6	1.38

Stop at 15'

"No Free Water"

○ Indicates Undisturbed Drive Sample

□ Indicates Loose Bulk Sample

PROJECT NO.		DRAWING NO.
91-10-5A	BENTON ENGINEERING, INC.	2

121013

APPENDIX D

APPENDIX D

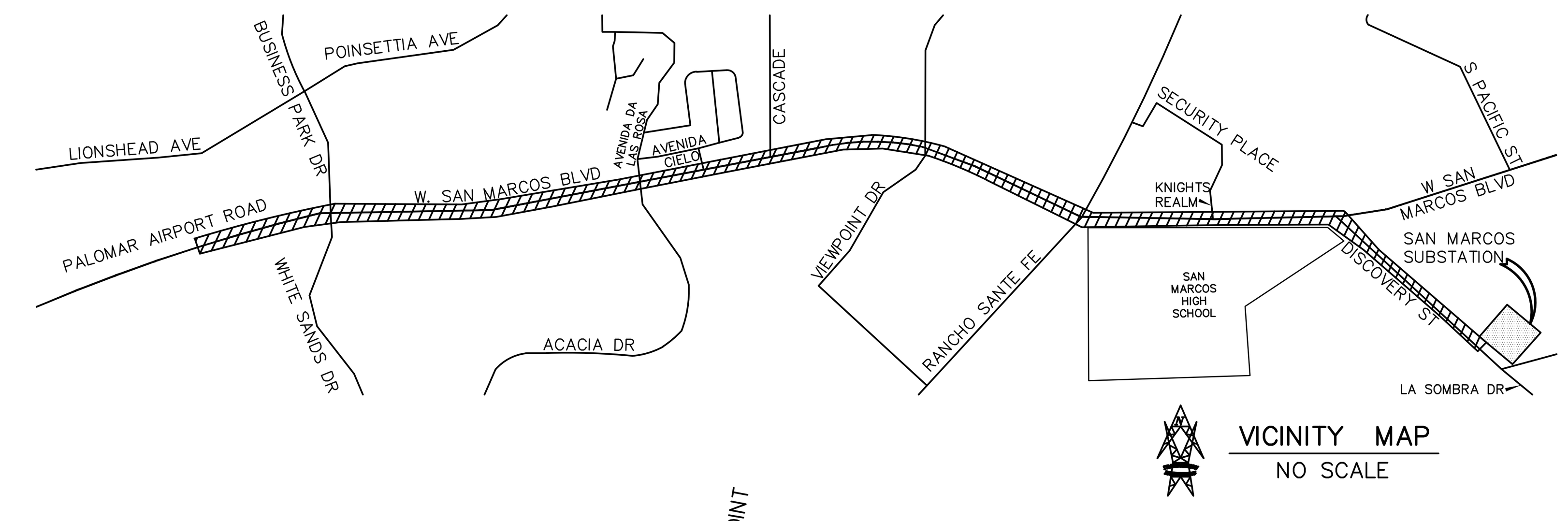
CURRENT PROJECT PLANS AND AS-GRADED GEOLOGIC MAPS OF PREVIOUSLY GRADED PADS

FOR

TL6975 – SAN MARCOS – ENCONDIDO
BRADY PROJECT: SDGEC1.078.000
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1818-52-24

SAN MARCOS TO ESCONDIDO
TL6975 UNDERGROUND

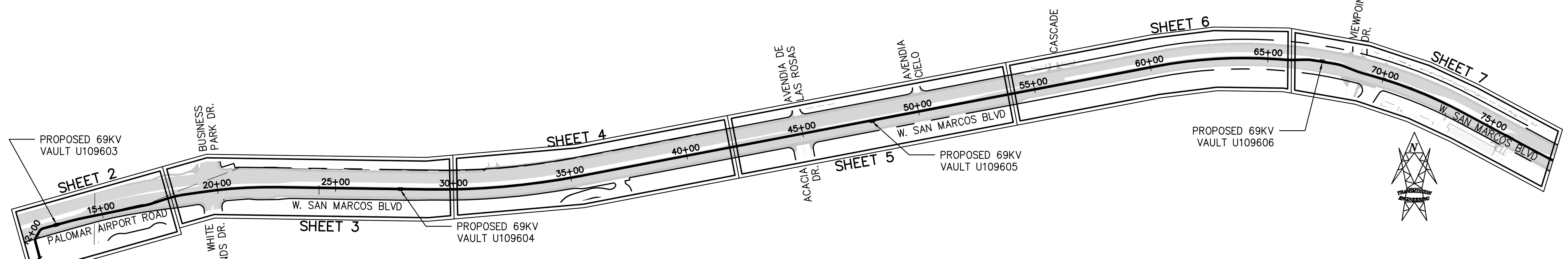


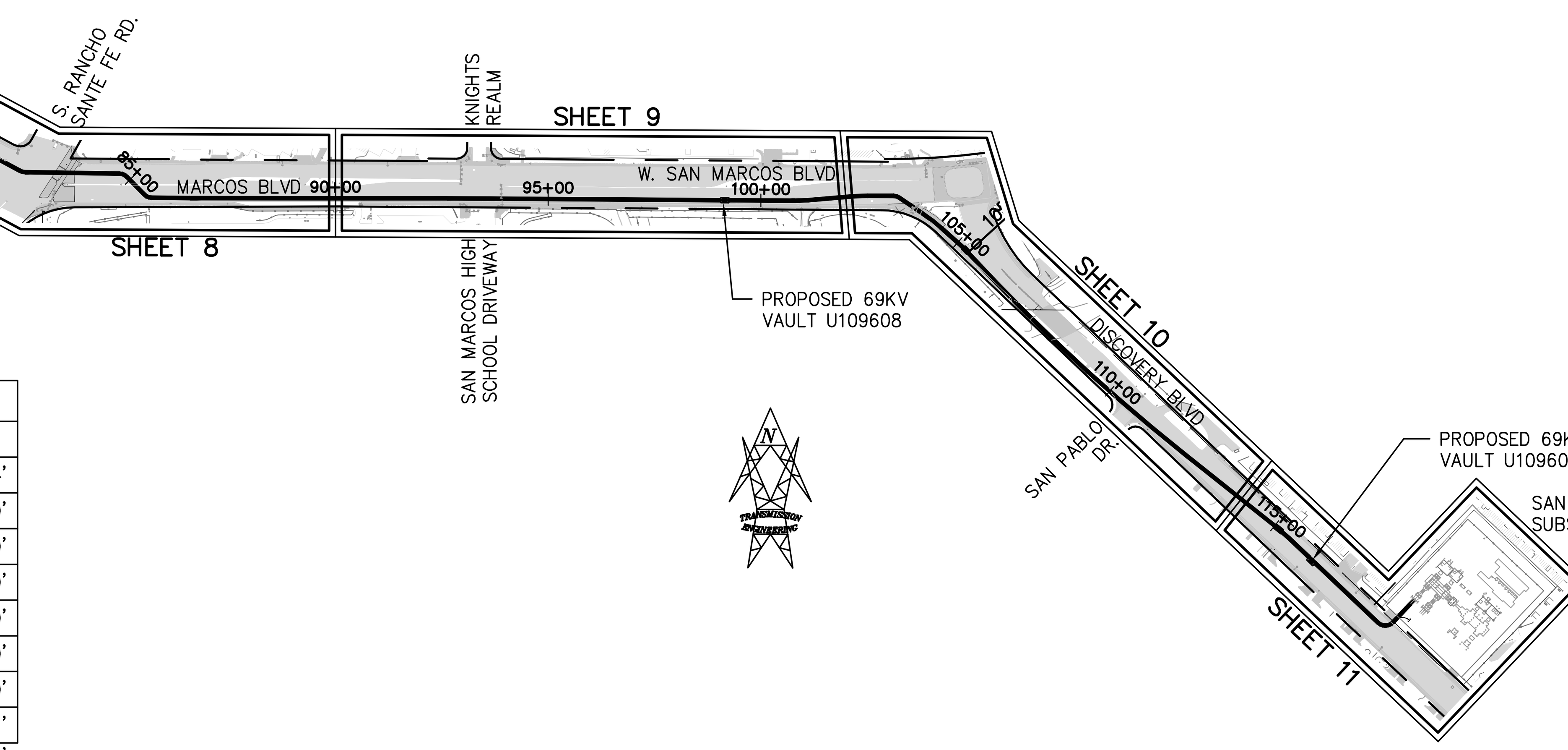
SHEET INDEX

1	TITLE SHEET
2–11	TL6975 PLAN & PROFILE
12	DETAILS & NOTES
##-##	HORIZONTAL DIRECTIONAL DRILL PLANS

GENERAL NOTES

1. LOCATIONS OF ALL UNDERGROUND FACILITIES ARE TAKEN FROM AVAILABLE MAPS AND RECORDS. ACTUAL FIELD LOCATIONS OF ALL UTILITIES MUST BE VERIFIED BY CONTRACTOR PRIOR TO TRENCHING. CONTACT USA DIG ALERT, 1–800–227–2600, PRIOR TO DIGGING. UNDERGROUND FACILITY ELEVATIONS & LOCATIONS SHOWN ON THE DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION LOCATED DURING DESIGN. NOTE THAT THE DEPTH OF UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UNDERGROUND FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO SURFACE OR UNDERGROUND FACILITIES RESULTING FROM THEIR WORK WHETHER SHOWN OR NOT SHOWN ON THE DRAWINGS.
2. ALL WORK SHALL COMPLY WITH THESE ENGINEERING DRAWINGS, SPECIFICATION NO. TE–0100 & TE–0107, CONTRACT DOCUMENTS AND ALL APPLICABLE PROVISIONS OF THE SDG&E UNDERGROUND STANDARDS, LATEST REVISION.
3. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF G.O. 128.
4. ALL WORK SHALL COMPLY WITH ALL STATE AND LOCAL TRAFFIC CONTROL REGULATIONS. CONTRACTOR SHALL FOLLOW ALL PROVISIONS OF PERMITS, WHETHER FROM CITY, COUNTY, STATE, OR OTHER DISTRICTS OR AGENCIES.
5. ANY DEVIATION FROM ENGINEERING DRAWINGS MUST BE APPROVED BY SDG&E PRIOR TO CONSTRUCTION. MAINTAIN AND UPDATE THE AS–BUILT RECORDS TO DOCUMENT ALL FIELD CHANGES.
6. PROFILE SECTIONS ON THE PLAN AND PROFILE DRAWINGS ARE ALONG CENTER LINE OF TRENCH.
7. PROVIDE NECESSARY ANCHORING TO PREVENT CONDUITS FROM FLOATING WHILE THEY ARE BEING ENCASED IN CONCRETE.
8. USE ONLY PLASTIC STRAPS TO SECURE CONDUITS UNLESS OTHERWISE APPROVED. NO FERROUS METAL SHALL ENCIRCLE ANY INDIVIDUAL DUCT OR GROUP OF DUCTS.
9. CLEARANCE BETWEEN EXISTING UTILITIES AND DUCT BANKS SHALL BE A MINIMUM OF 1' UNLESS OTHERWISE NOTED.
10. CONTRACTOR TO MAINTAIN ACCESS TO ALL DRIVEWAYS DURING CONSTRUCTION.
11. CONTRACTOR TO REPAIR AND REPLACE PAVEMENT STRIPING TO PRIOR CONDITIONS.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORATION OF ALL GROUND SURFACES DISTURBED DURING CONSTRUCTION. REPLACEMENT OF LANDSCAPING & IRRIGATION SHALL BE COMPARABLE TO THAT REMOVED AND BE FINISHED WITHIN 30 DAYS OF COMPLETION OF CONSTRUCTION.
13. IN MAKING OPEN CUT ROAD CROSSINGS, THE CONTRACTOR SHALL NOT BLOCK MORE THAN ONE HALF OF THE ROAD AT A TIME. ONE LANE OF TRAFFIC IN EACH DIRECTION MUST BE MAINTAINED AT ALL TIMES.
14. THE MINIMUM RADIUS OF CONDUITS SHALL BE 25 FEET FOR HORIZONTAL BENDS, EXCEPT AS NOTED ON DRAWINGS, OR APPROVED BY ENGINEER.
15. SOME EXISTING TRAFFIC LOOP DETECTORS WILL BE DAMAGED DURING CONSTRUCTION AND MUST BE REPLACED BY CONTRACTOR.
16. CONTRACTOR TO FIELD FIT ALL 3313 HANDHOLDS AT EVERY 69KV VAULT LOCATION.
17. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING A PERMIT FOR TEMPORARY CONSTRUCTION DEWATERING. A PERMIT IS REQUIRED FROM THE REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) FOR ANY DISCHARGE OF GROUNDWATER TO THE ENVIRONMENT. THE CONTRACTOR SHALL COMPLY WITH (RWQCB) WASTE DISCHARGE PERMIT REQUIREMENTS BEFORE DEWATERING. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION AS REQUIRED FOR GROUNDWATER DISPOSAL. THE CONTRACTOR SHALL COMPLY WITH ALL SAMPLING, TESTING, MONITORING, AND REPORTING REQUIREMENTS.
18. AT ALL LOCATIONS WHERE PROPOSED TRENCH IS BELOW AN EXISTING VCP SEWER LINE, CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY SUPPORT AS NECESSARY, OR REPLACE IN KIND IF DAMAGED





PROPOSED 69KV VAULT U109607

TRENCH DISTANCES TL6975

FROM	TO	LENGTH
STA. 11+02.06 C.P ZXXXXXX	STA. 13+00.00 VAULT U109603	197.94'
STA. 13+00.00 VAULT U109603	STA. 27+75.00 VAULT U109604	1,475.00'
STA. 27+75.00 VAULT U109604	STA. 48+00.00 VAULT U109605	2,025.00'
STA. 48+00.00 VAULT U109605	STA. 67+31.00 VAULT U109606	1,931.00'
STA. 67+31.00 VAULT U109606	STA. 81+50.00 VAULT U109607	1,419.00'
STA. 81+50.00 VAULT U109607	STA. 99+15.00 VAULT U109608	1,765.00'
STA. 99+15.00 VAULT U109608	STA. 116+20.00 VAULT U109609	1,705.00'
STA. 116+20.00 VAULT U109609	STA. 119+42.81 RACK CONNECTION	322.81'
	TOTAL CP TO RACK =	10,840.75'

ABBREVIATIONS

AC	ASPHALT CONCRETE
ACP	ASBESTOS CEMENT PIPE
BC	BEGIN CURVE
CU	COPPER
CIPP	CURED IN PLACE PIPE
CIR	CIRCUIT
CCMLS	CEMENT COATED MORTAR LINED STEEL PIPE
CNTR	CENTER
CML	CEMENT MORTAR LINING
CML&C	CEMENT MORTAR LINED & COATED STEEL
CONC	CONCRETE
DIA	DIAMETER
DWG	DRAWING
EC	END CURVE
EL	ELEVATION
ELEC	ELECTRICAL
EP	EDGE OF PAVEMENT
HH	HAND HOLE
OH	OVERHEAD
MH	MORRO HILL
PC	POINT OF CURVE
PEHP	POLYETHYLENE HIGH PRESSURE GAS
PCC	PORTLAND CEMENT CONC
PL	PROPERTY LINE
PVC	POLYVINYL CHLORIDE
REF	REFERENCE
R/W	RIGHT OF WAY
REQ	REQUIRED
SA	SAN LUIS REY
SD	STORM DRAIN
SL	STREET LIGHT
STA	STATION
SWR	SEWER
VCP	VITRIFIED CLAY PIPE

LEGEND

CATV——CATV——CATV	EXISTING CABLE/TV UTILITIES
E——E——E	EXISTING ELECTRICAL LINE
G——G——G	EXISTING GAS LINE
IR——IR——IR	EXISTING IRRIGATION LINE
OH——OH——OH	EXISTING OVERHEAD UTILITIES
SS——SS——SS	EXISTING SEWER LINE
FM——FM——FM	EXISTING SEWER FORCE MAIN
SD——SD——SD	EXISTING STORM DRAIN LINE
SL——SL——SL	EXISTING STREET LIGHT LINE
T——T——T	EXISTING TELEPHONE LINE
TV——TV——TV	EXISTING TV/CABLE LINE
TS——TS——TS	EXISTING TRAFFIC SIGNAL
W——W——W	EXISTING WATER LINE
X——X	EXISTING FENCE
	CURB & GUTTER
	PROPOSED TRENCH
	RIGHT OF WAY
	EXIST EASEMENT

LEGEND

D	SD DRAIN MANHOLE
GV	GAS VALVE
SC	IRRIGATION METER
TL	TELEPHONE BOX
GM	GAS METER
GRI	GAS RISER
CATV	CABLE TV BOX
EPB	ELECTRICAL PULL BOX
	WATER BLOW OFF
E	ELECTRICAL MH
IR	IRRIGATION VALVE
ASSUMED	ASSUMED UTILITY ELEVATION FROM STANDARD TRENCH SECTIONS
CALC'D	CALCULATED UTILITY ELEVATION INTERPOLATED FROM AS–BUILTS ELEVATIONS OR MANHOLE INVERT ELEVATIONS
E	ELECTRICAL BOX
S	SEWER MANHOLE
P	POWER POLE
	POLE ANCHOR GUY
GP	GUY POLE
TE	BOX
	STREET LIGHT
WV	WATER VALVE
TPB	TELEPHONE PULL BOX
TE	TELEPHONE RISER
	EXIST PCC SURFACE
ERI	ELECTRICAL RISER
T	TELEPHONE MH
C/O	SWR CLEAN OUT
	PROPOSED 69 KV VAULT
	36" JACK & BORE
	EXIST ASPHALT SURFACE
	FIRE HYDRANT
	TELCO HANDHOLE
	RAILROAD TRACKS
	ADJACENT UNDERGROUND TRENCHES
	TRAFFIC SIGNAL LOOPS

BASIS OF BEARINGS:

BEARINGS ARE REFERENCED TO GRID NORTH AS DEFINED BY THE CALIFORNIA COORDINATE SYSTEM 1983, ZONE VI AND ARE BASED ON OBSERVATIONS BETWEEN NGS POINTS PID AD9374 (CRQ AP STA A) AND POINT PID DX3916 (LOMAX) SAID BEARING BEING S 80°16'45"E.

BASIS OF ELEVATION:

ELEVATIONS ARE BASED ON NGS PID AD9374 (CRQ AP STA A). ELEVATION 33.37 NAVD88 (GEOID09)

BENCH MARK:

POINT IS A TOPOGRAPHIC STATION DISK LOCATED NEAR THE WEST END OF THE MCCLENNAM–PALOMAR AIRPORT ON A SLIGHT HILL NORHT OF RUNWAY 6 IN CARLSBAD, CALIFORNIA. NAVD88 ELEVATION=333.365SFT.

BASIS OF COORDINATES:

THE BASIS OF HORIZONTAL COORDINATES FOR THIS SURVEY IS THE NORTH

AMERICAN DATUM OF 1983, CCS ZONE 6 (EPOCH 2007.00) UTILIZING GROUND RELATIONSHIPS, HOLDING NGS POINT PID AD9374 PER TOWILL CONTROL. THE VALUE FOR PID AD9374=(N–1991682.719, E–6243858.440)

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2–D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: N/A
VERTICAL: N/A

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

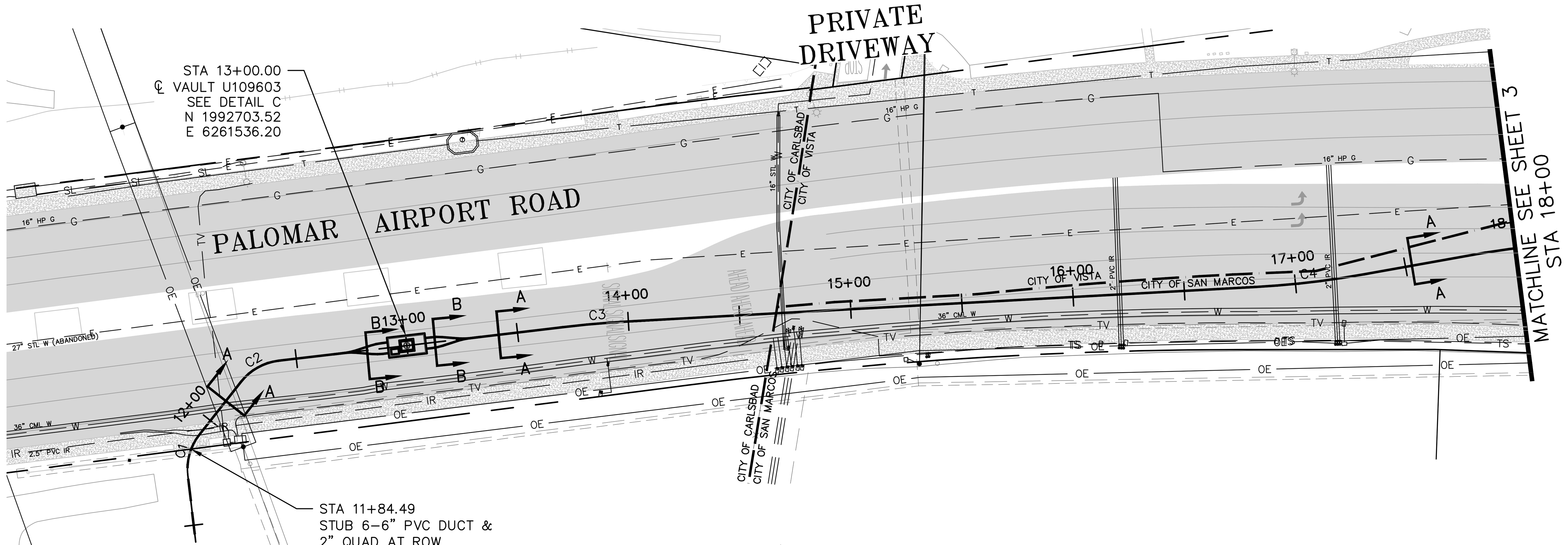
TL6975

TL6975
SAN MARCOS TO ESCONDIDO

SCALE N/A *SHEET* 1 OF 12

DRAWING NUMBER 63783–1

N:\SDG002053\CADD\POWER\TL6975.DWG



GRAPHIC SCALE

0' 20' 40' 60' 80' 120' 160'

SCALE 1"= 40'

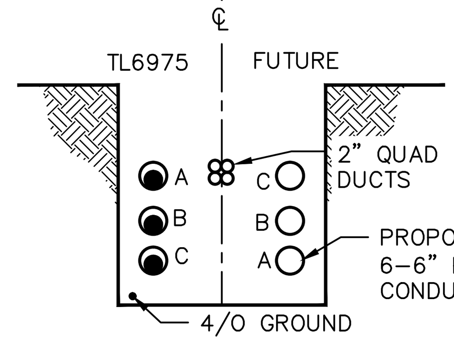
SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

TRANSMISSION ENGINEERING

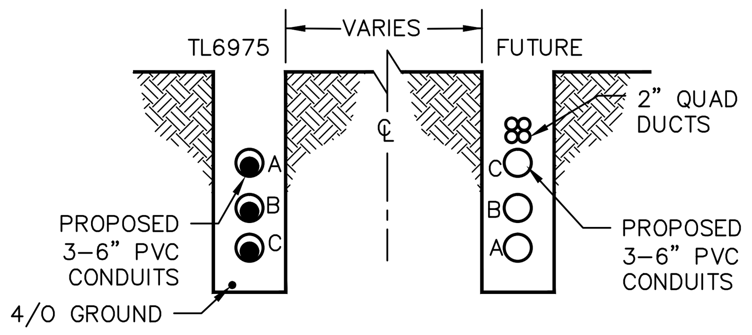
TRENCH NOTES

STA. 11+00.00 TO 12+71.72, SECTION A-A
STA. 12+71.72 TO 12+91.40, SECTION B-B
STA. 12+91.40 TO 13+08.60, DETAIL C
STA. 13+08.60 TO 13+28.22, SECTION B-B
STA. 13+28.22 TO 18+00.00, SECTION A-A

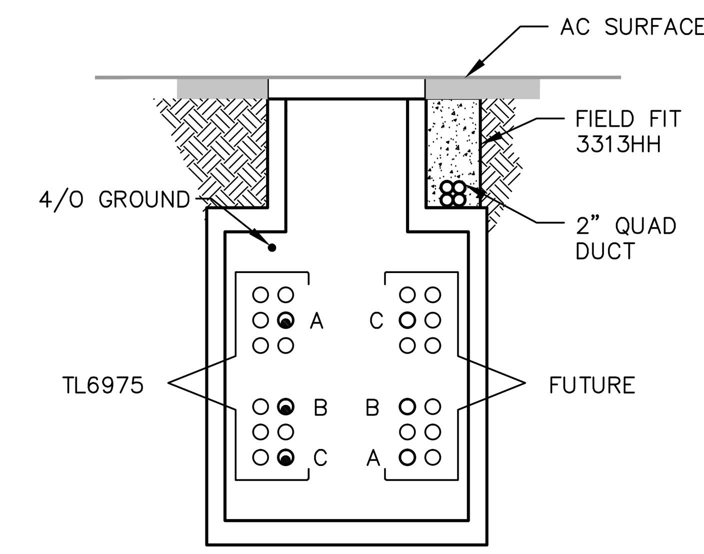
CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C1	BC 11+72.37 EC 11+92.00	045°00'00"	25.00'	19.63'	1992631.4, 6261447.5	1992650.3, 6261449.9
C2	BC 12+22.26 EC 12+41.90	045°00'00"	25.00'	19.63'	1992676.6, 6261465.0	1992688.3, 6261480.1
C3	BC 13+70.74 EC 14+02.08	003°35'31"	500.00'	31.35'	1992722.1, 6261604.5	1992729.3, 6261635.0
C4	BC 16+82.06 EC 17+30.93	007°00'00"	400.00'	48.87'	1992785.6, 6261909.2	1992798.3, 6261956.4



SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



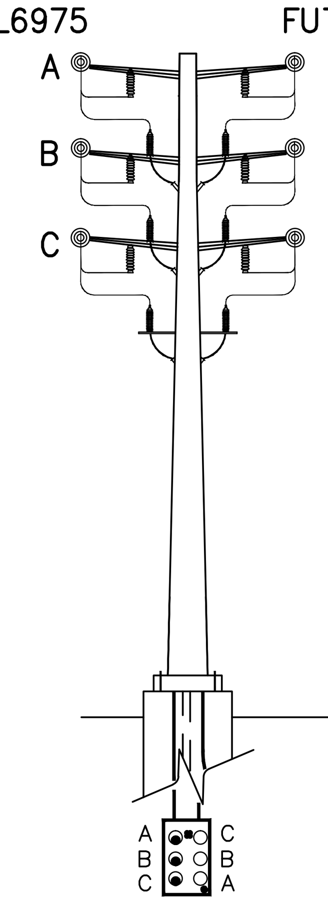
SECTION "B-B"
(REF. DETAIL 2 SHEET 12)



STA. 13+00.00 ℄ VAULT U109603 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005

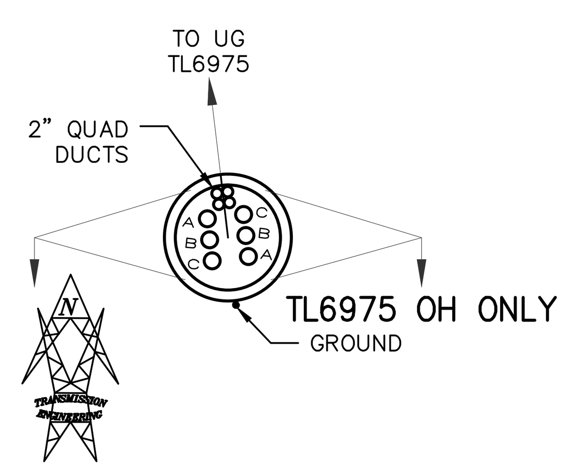
DETAIL "C"
NOT TO SCALE

PHASING TO BE FIELD VERIFIED

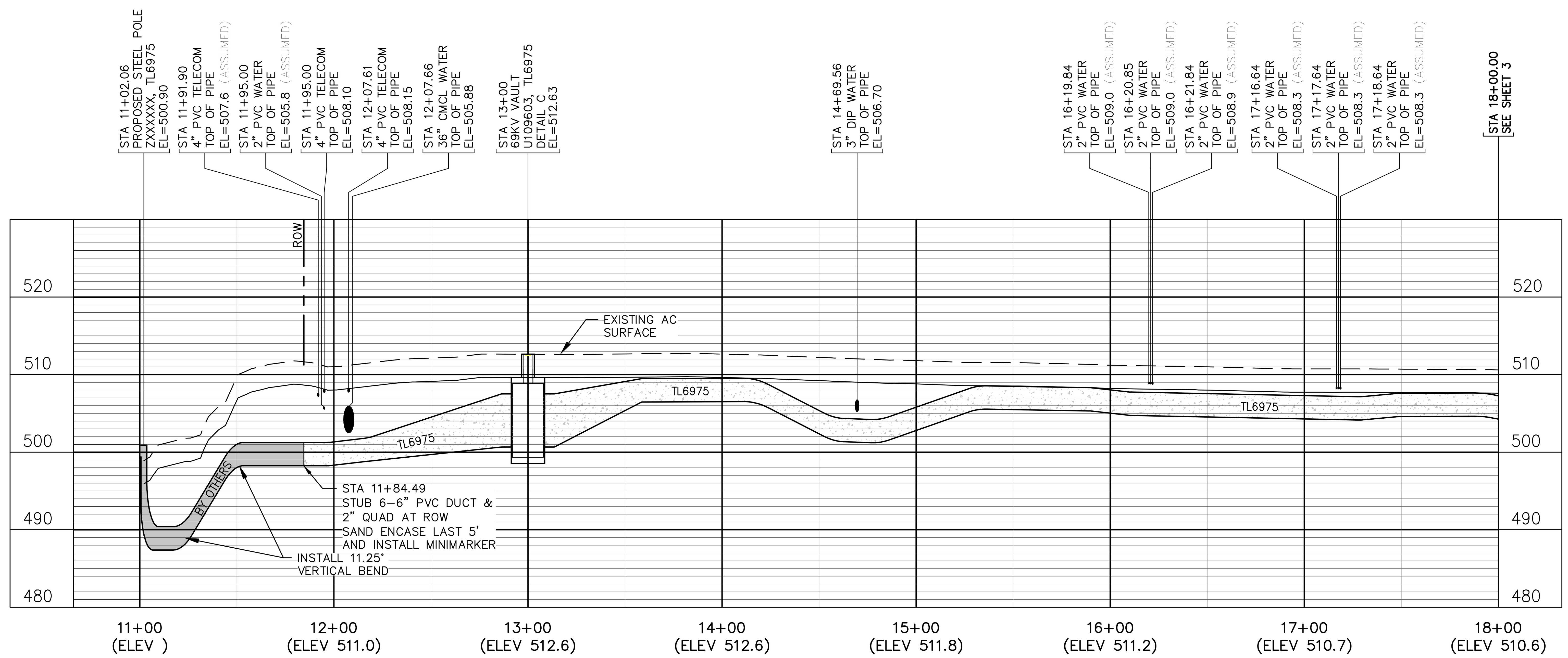


STEEL CABLE POLE
#ZXXXXX SP-XXXX & PHASING DETAIL
LOOKING NORTH

DETAIL L



DETAIL M
CABLE POLE
RISER AND PHASING
LOOKING NORTH



PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5

15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT

Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

SDGE

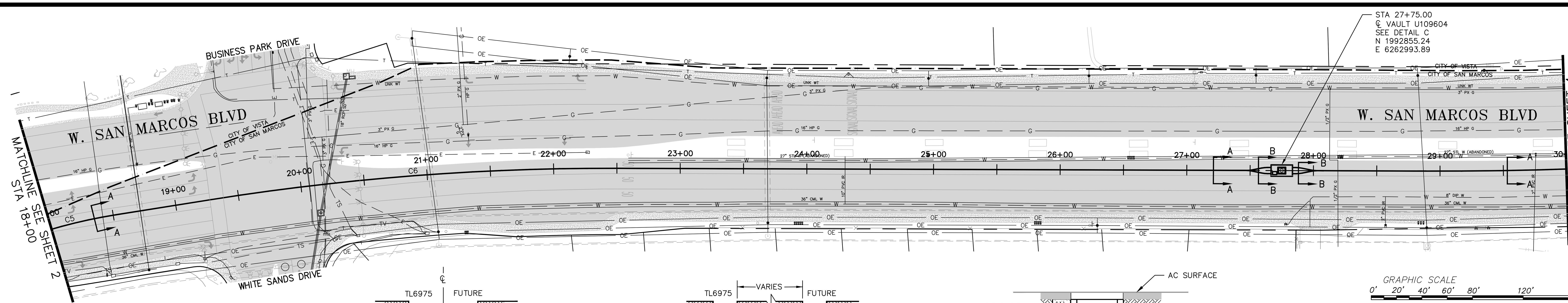
TL6975

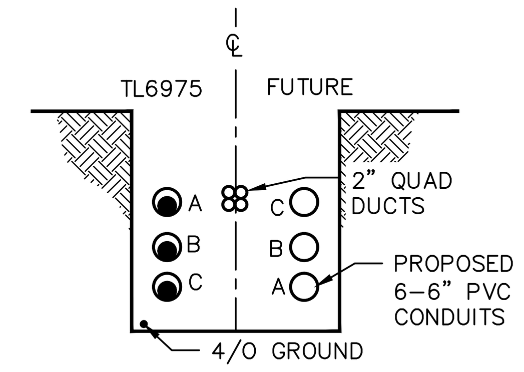
TL6975
SAN MARCOS TO ESCONDIDO

SCALE 1"=40'   SHEET 2 OF 12

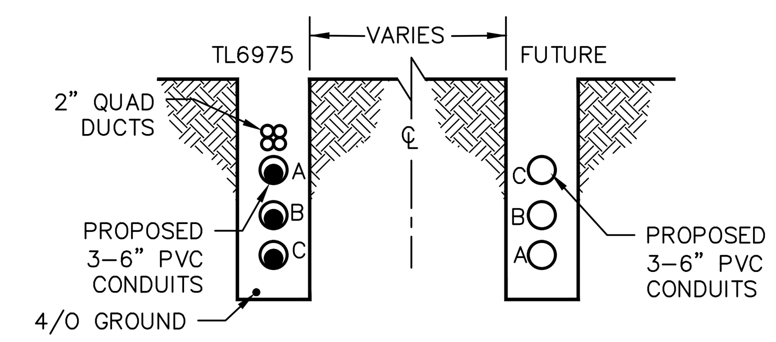
DRAWING NUMBER
63783-2

N:\SDG002053\CADD\POWER\TL6975.DWG

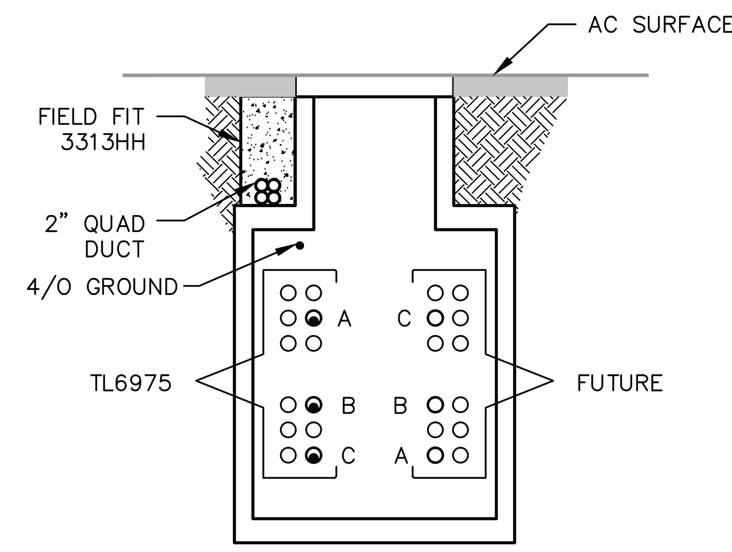




SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



SECTION "B-B"
(REF. DETAIL 2 SHEET 12)



STA. 27+75.00 ℄ VAULT U109604 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005

DETAIL "C"
NOT TO SCALE

TRENCH NOTES

STA. 18+00.00 TO 27+46.78, SECTION A-A
STA. 27+46.78 TO 27+66.40, SECTION B-B
STA. 27+66.40 TO 27+83.60, DETAIL C
STA. 27+83.60 TO 28+03.22, SECTION B-B
STA. 28+03.22 TO 30+00.00, SECTION A-A

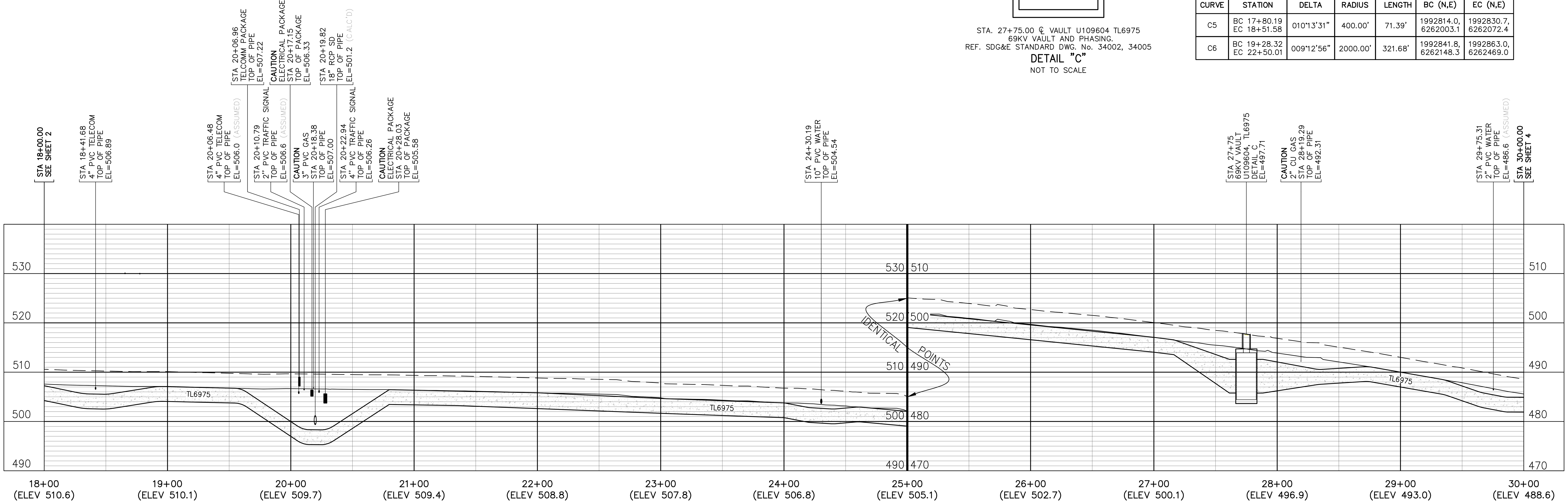
GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

N
TRANSMISSION ENGINEERING

CURVE TABLE

CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C5	BC 17+80.19 EC 18+51.58	010°13'31"	400.00'	71.39'	1992814.0, 6262003.1	1992830.7, 6262072.4
C6	BC 19+28.32 EC 22+50.01	009°12'56"	2000.00'	321.68'	1992841.8, 6262148.3	1992863.0, 6262469.0



NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING
SDG&E

TL6975

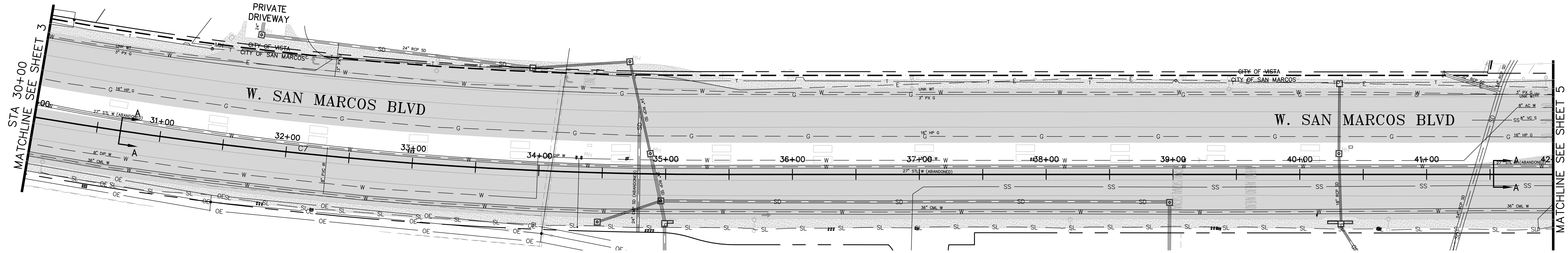
SCALE 1"=40' SHEET 3 OF 12

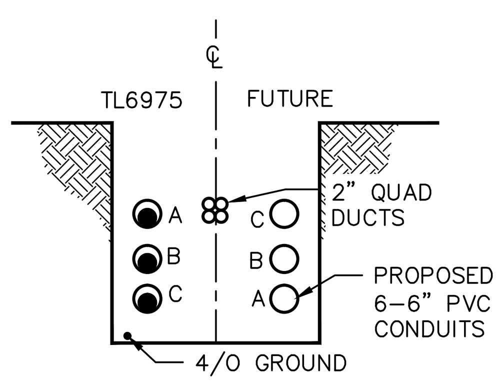
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783-3

PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

N:\SDG002053\CADD\POWER\TL6975.DWG





SECTION "A–A"
(REF. DETAIL 1 SHEET 12)

TRENCH NOTES

STA. 30+00.00 TO 42+00.00, SECTION A–A

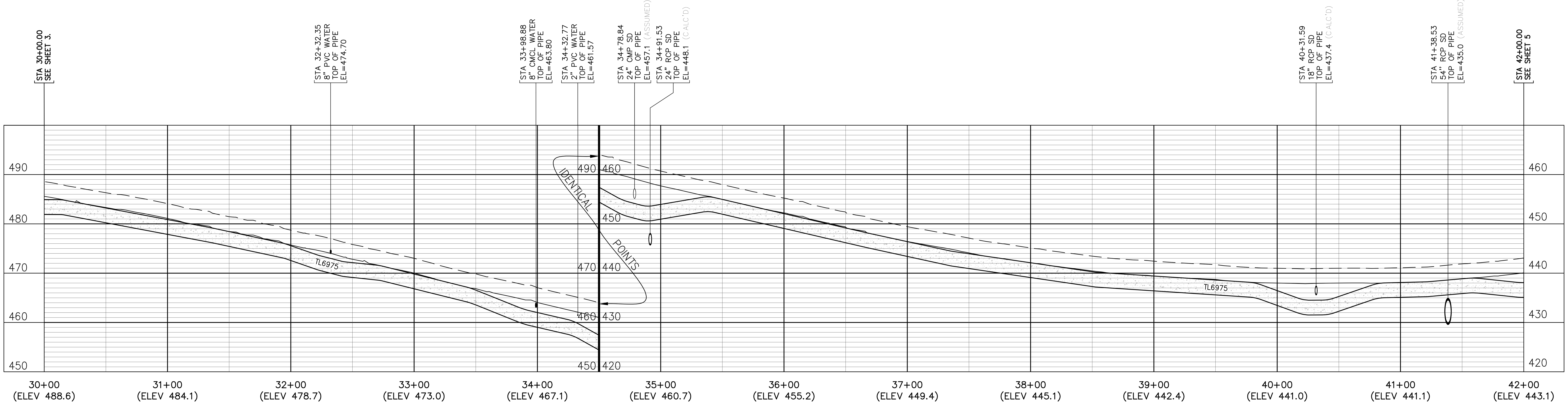
GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

TRANSMISSION ENGINEERING

CURVE TABLE

CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C7	BC 28+87.93 EC 35+38.25	011°38'38"	3200.00'	650.32'	1992853.6, 6263106.8	1992909.9, 6263753.6



NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2–D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

TL6975

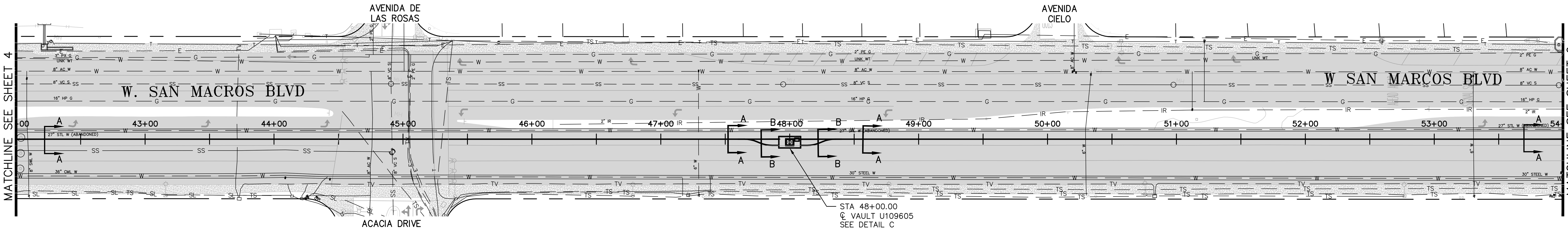
SCALE 1"=40' SHEET 4 OF 12

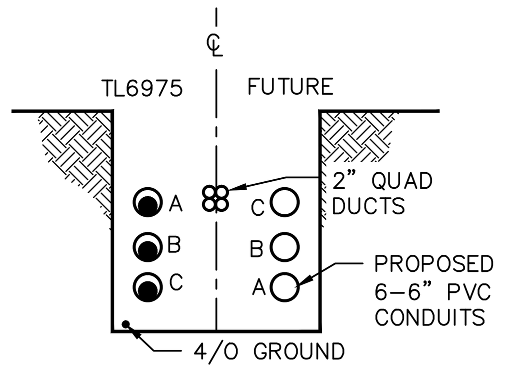
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783–4

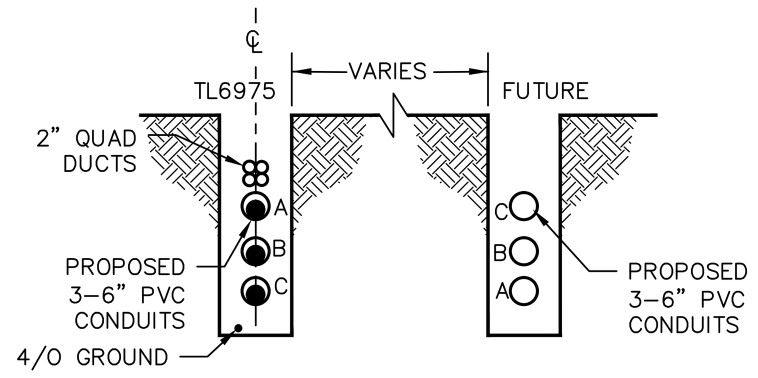
PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

N:\SDG002053\CADD\POWER\TL6975.DWG

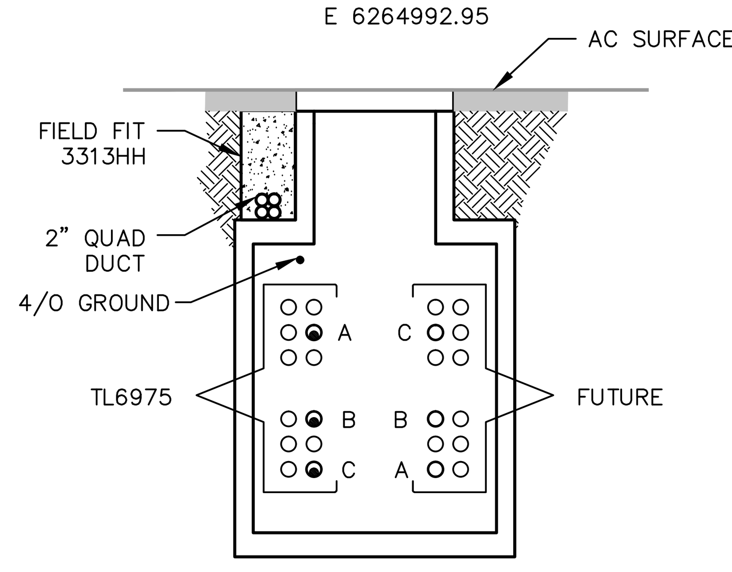




SECTION "A–A"
(REF. DETAIL 1 SHEET 12)



SECTION "B–B"
(REF. DETAIL 2 SHEET 12)



STA. 48+00.00 ℄ VAULT U109605 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005

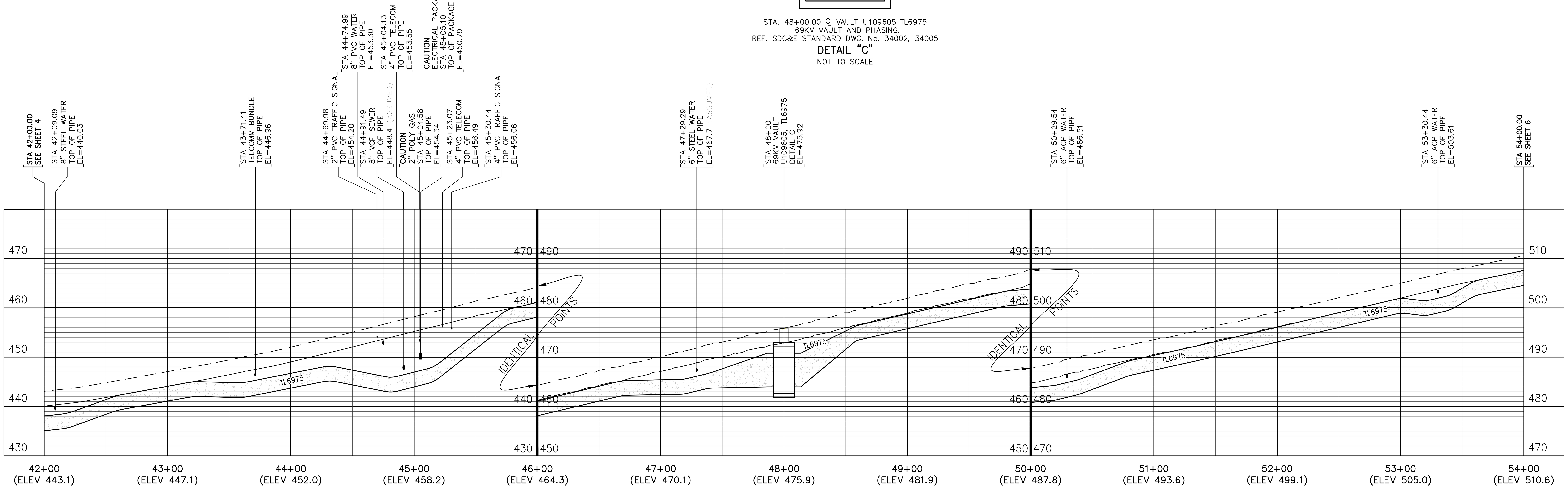
DETAIL "C"
NOT TO SCALE

TRENCH NOTES

STA. 42+00.00 TO 47+64.80, SECTION A–A
STA. 47+64.80 TO 47+91.40, SECTION B–B
STA. 47+91.40 TO 48+08.60, DETAIL C–C
STA. 48+08.60 TO 48+35.20, SECTION B–B
STA. 48+35.20 TO 54+00.00, SECTION A–A

GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.



NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2–D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

TL6975

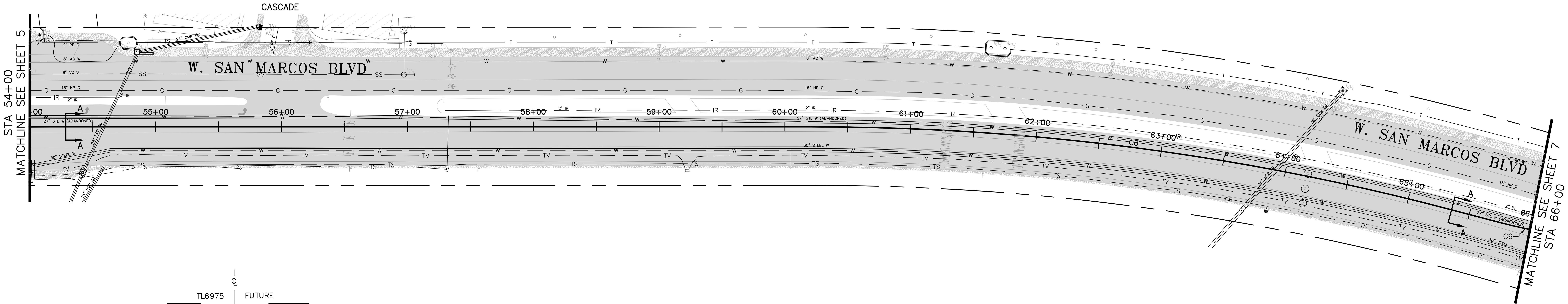
SCALE 1"=40' SHEET 5 OF 12

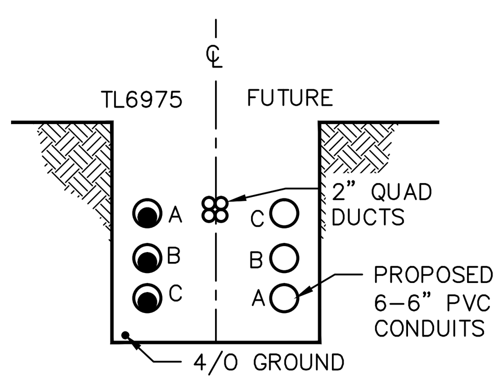
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783–5

PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

N:\SDG002053\CADD\POWER\TL6975.DWG





SECTION "A–A"
(REF. DETAIL 1 SHEET 12)

CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C8	BC 60+20.11 EC 65+34.68	014°44'28"	2000.00'	514.57'	1993375.1, 6266191.4	1993405.8, 6266703.7
C9	BC 65+75.40 EC 66+16.60	005°54'04"	400.00'	41.20'	1993403.0, 6266744.3	1993402.3, 6266785.5

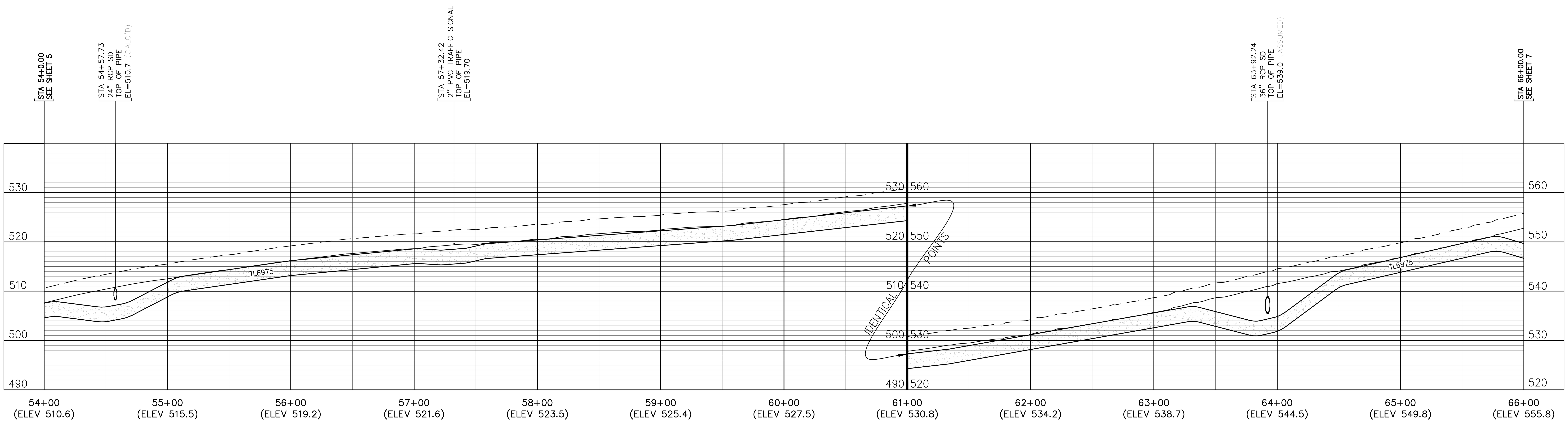
TRENCH NOTES

STA. 54+00 TO 66+00, SECTION A–A

GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

N
TRANSMISSION ENGINEERING



N|V|5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2–D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING
SDGE

TL6975

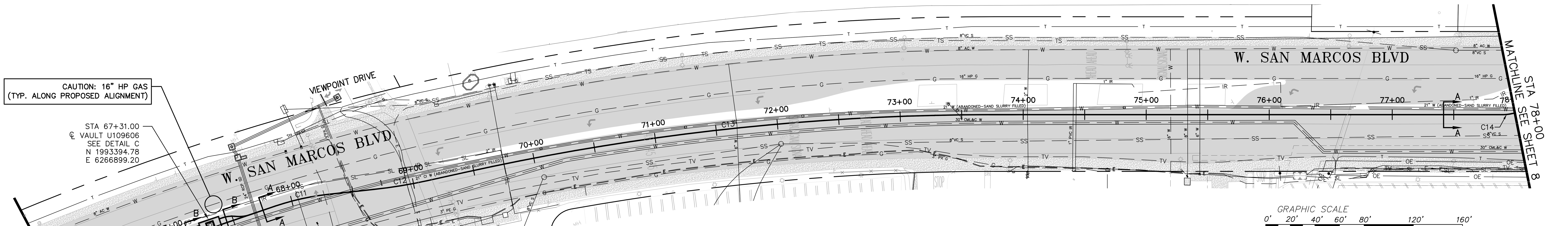
SCALE 1"=40' SHEET 6 OF 12

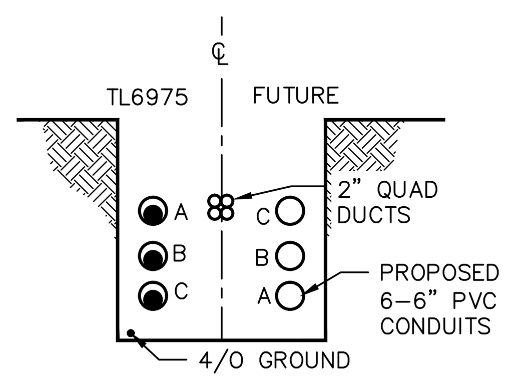
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783–6

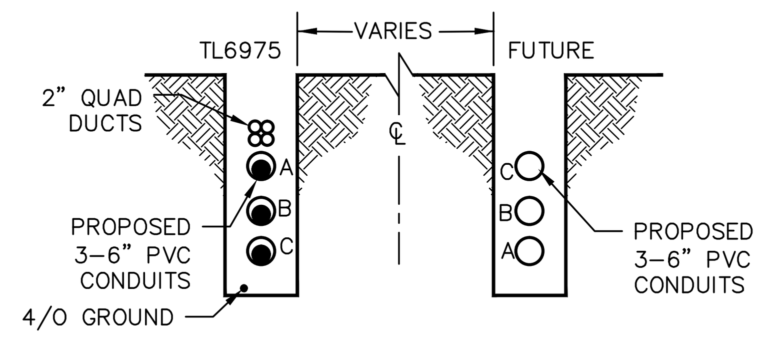
PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

N:\SDG002053\CADD\POWER\TL6975.DWG

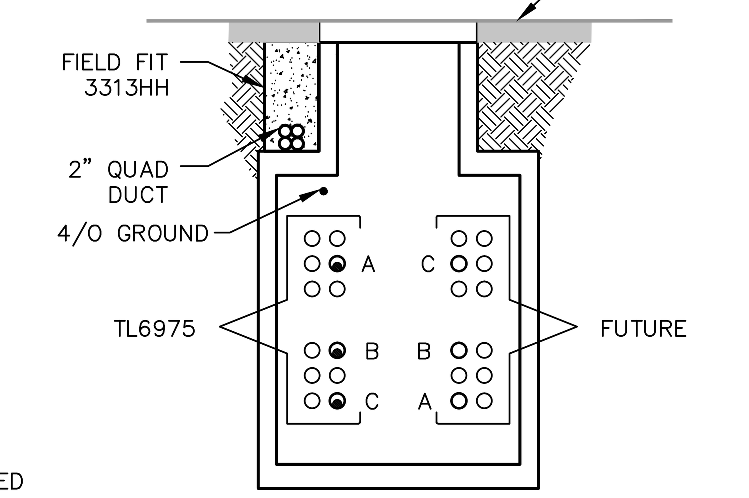




SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



SECTION "B-B"
(REF. DETAIL 2 SHEET 12)



STA. 67+31.00 ℄ VAULT U109606 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005
DETAIL "C"
NOT TO SCALE

TRENCH NOTES

STA. 66+00.00 TO 66+98.25, SECTION A-A
STA. 66+98.25 TO 67+22.40, SECTION B-B
STA. 67+22.40 TO 67+39.60, DETAIL C
STA. 67+39.60 TO 67+63.75, SECTION B-B
STA. 67+63.75 TO 78+00.00, SECTION A-A

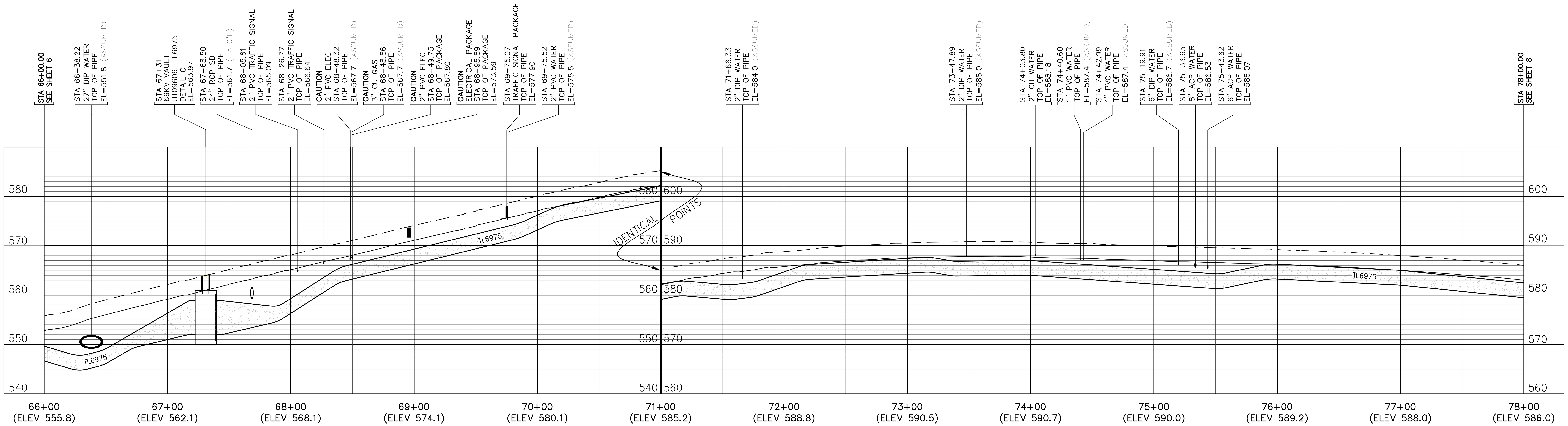
GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

CURVE TABLE

CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C10	BC 66+53.19 EC 66+92.70	011°19'14"	200.00'	39.52'	1993403.5, 6266822.0	1993401.0, 6266861.4
C11	BC 67+86.18 EC 68+30.19	012°36'30"	200.00'	44.01'	1993385.8, 6266953.6	1993373.9, 6266995.9
C12	BC 68+67.77 EC 69+11.40	006°15'00"	400.00'	43.63'	1993359.9, 6267030.8	1993345.8, 6267072.1
C13	BC 69+42.86 EC 73+77.36	012°26'51"	2000.00'	434.50'	1993337.3, 6267102.3	1993175.3, 6267504.6
C14	BC 77+90.47 EC 77+95.38	011°15'00"	25.00'	4.91'	1992980.3, 6267868.8	1992978.4, 6267873.3

TRANSMISSION ENGINEERING



PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

TL6975

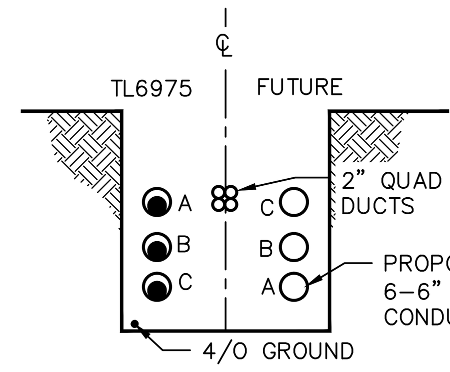
TL6975
SAN MARCOS TO ESCONDIDO

SCALE 1"=40' SHEET 7 OF 12

DRAWING NUMBER
63783-7

N:\SDG002053\CADD\POWER\TL6975.DWG

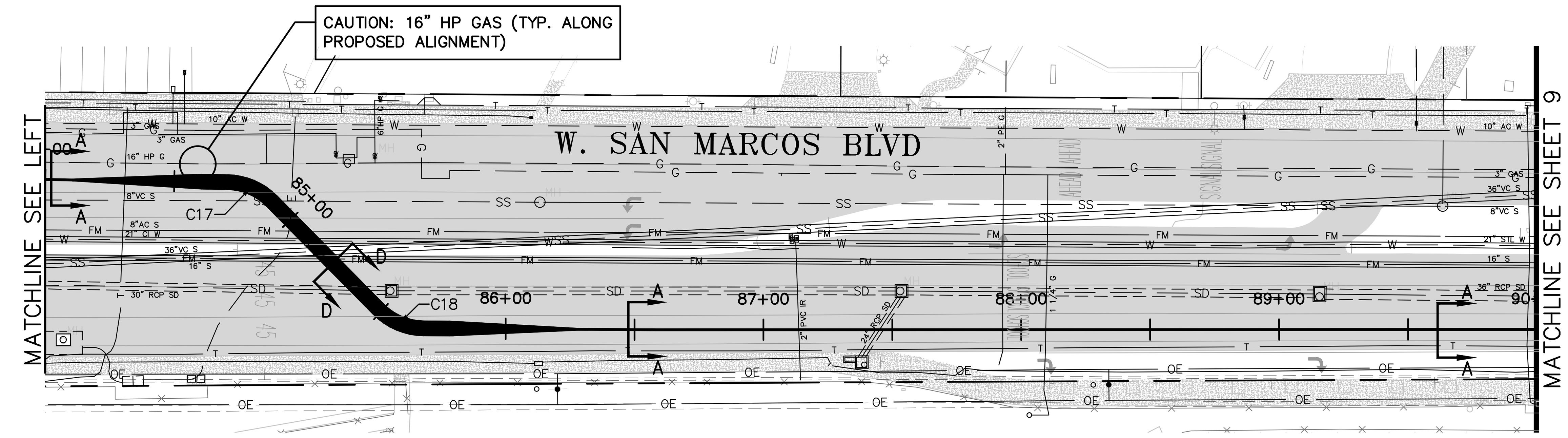
CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C15	BC 78+62.37 EC 79+41.86	011°23'10"	400.00'	79.49'	1992958.9, 6267937.4	1992928.4, 6268010.7
C16	BC 82+36.60 EC 82+48.57	027°25'15"	25.00'	11.96'	1992788.7, 6268270.2	1992785.7, 6268281.6
C17	BC 84+70.45 EC 84+89.90	044°34'48"	25.00'	19.45'	1992782.3, 6268503.5	1992774.8, 6268520.9
C18	BC 85+48.65 EC 85+68.30	045°01'02"	25.00'	19.64'	1992732.9, 6268562.1	1992725.5, 6268579.8

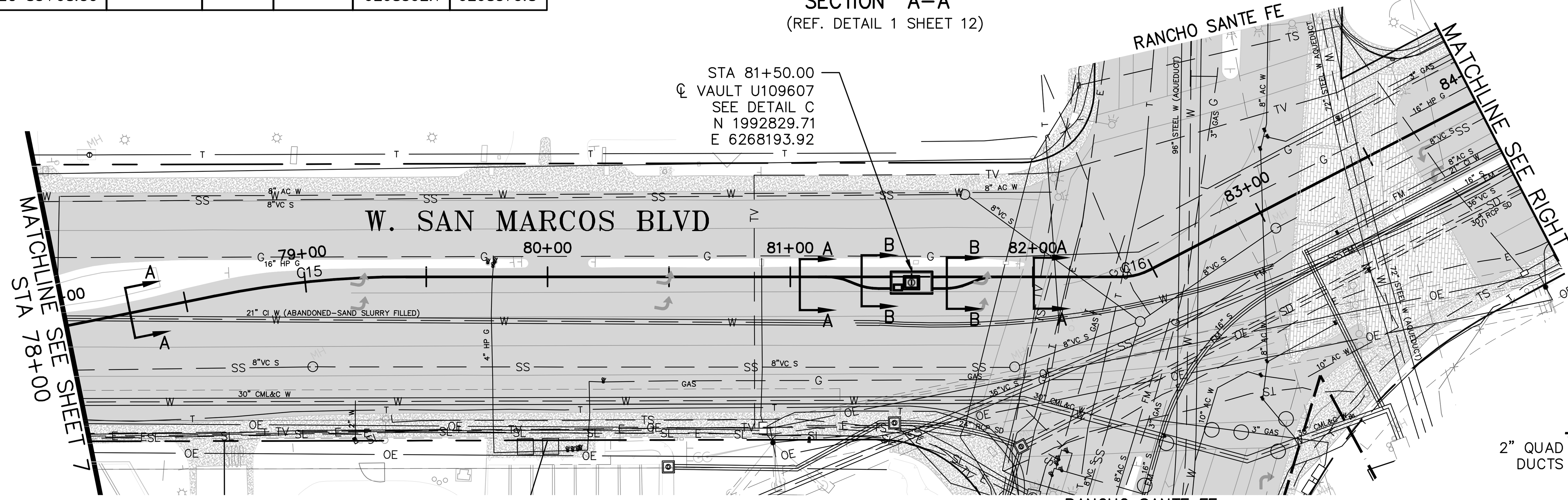


SECTION "A–A"
(REF. DETAIL 1 SHEET 12)

TRENCH NOTES

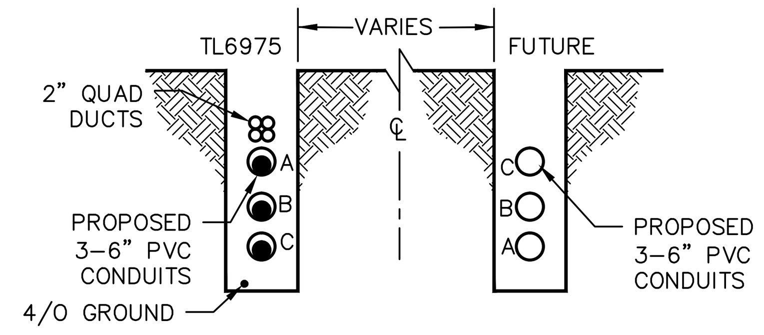
STA. 78+00.00 TO 81+14.78, SECTION A–A
STA. 81+14.78 TO 81+41.40, SECTION B–B
STA. 81+41.40 TO 81+58.60 DETAIL C
STA. 81+58.60 TO 81+85.22 DETAIL B–B
STA. 81+85.22 TO 84+10.45, SECTION A–A
STA. 84+10.45 TO 86+28.30, SECTION D–D
STA. 86+28.30 TO 90+00.00, SECTION A–A



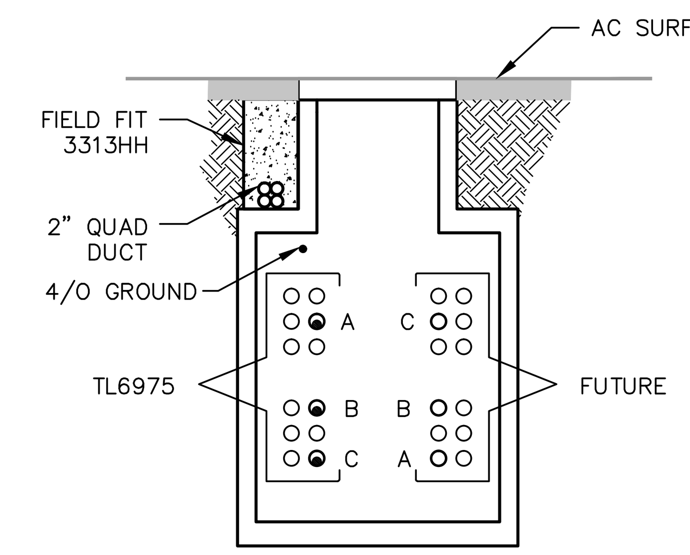


GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

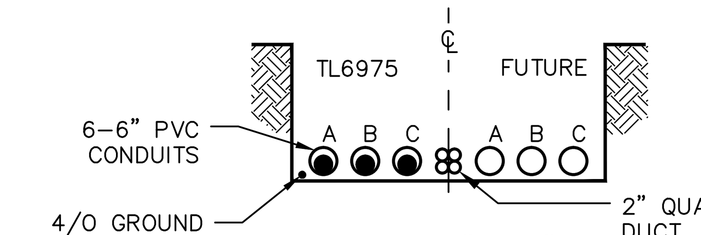
SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.



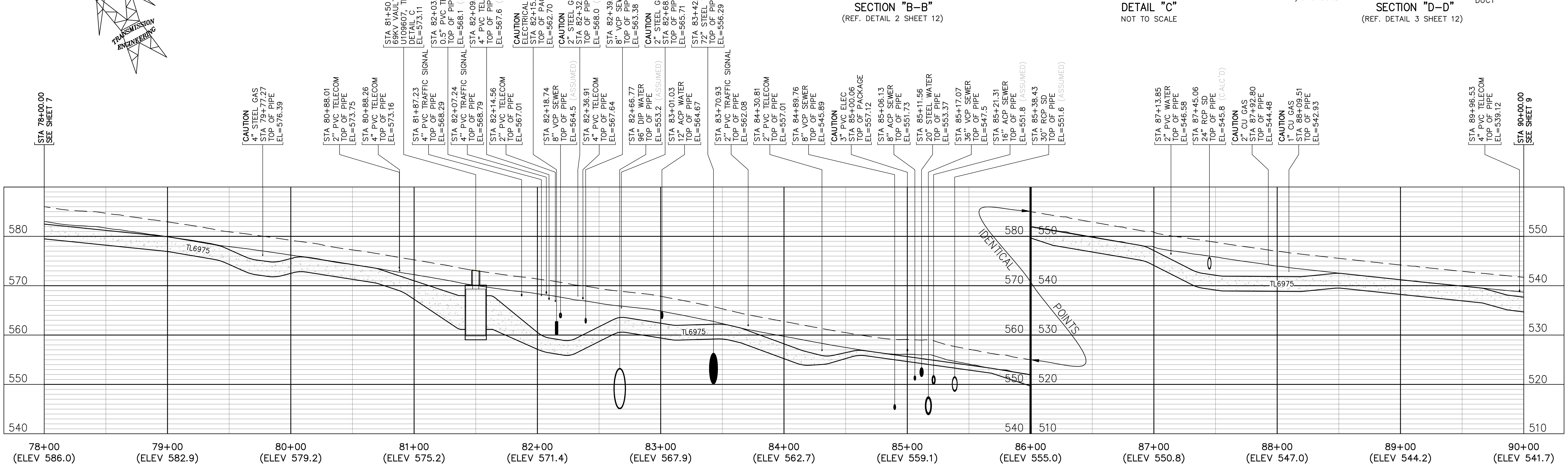
SECTION "B–B"
(REF. DETAIL 2 SHEET 12)



STA. 81+50.00 ℄ VAULT U109607 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005
DETAIL "C"
NOT TO SCALE



SECTION "D–D"
(REF. DETAIL 3 SHEET 12)



PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2–D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

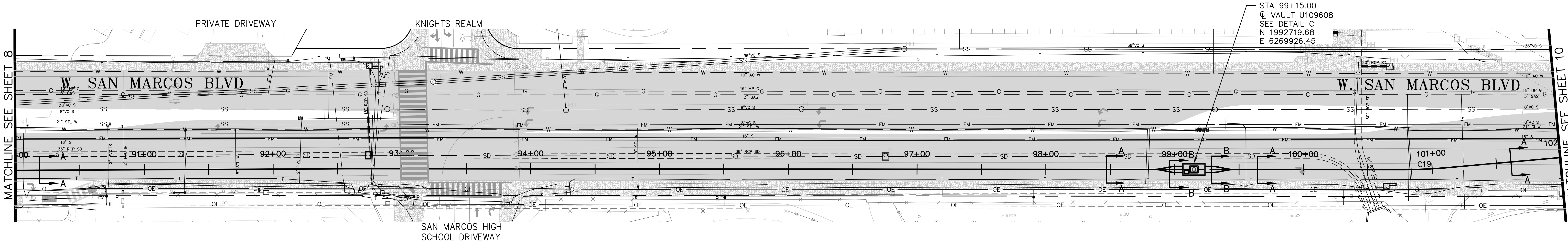
TL6975

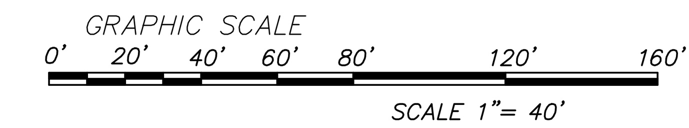
SCALE 1"=40' SHEET 8 OF 12

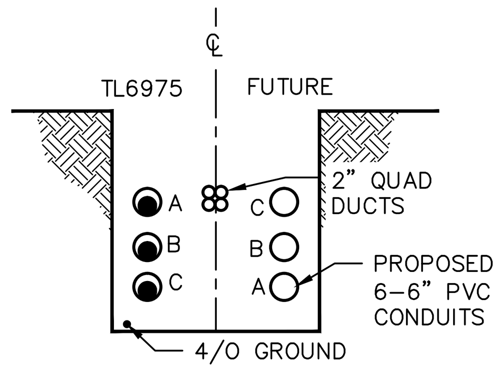
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783–8

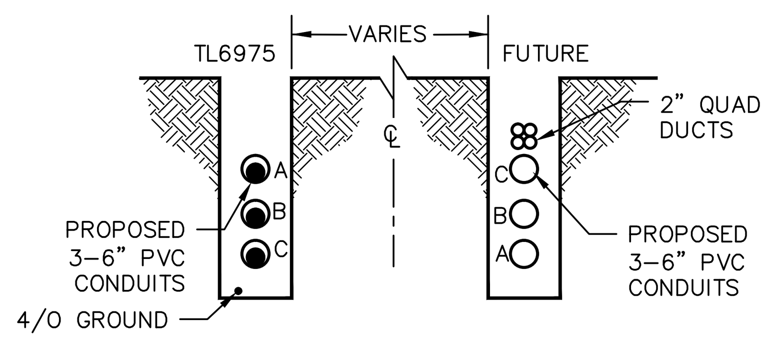
N:\SDG0002053\CADD\POWER\TL6975.DWG



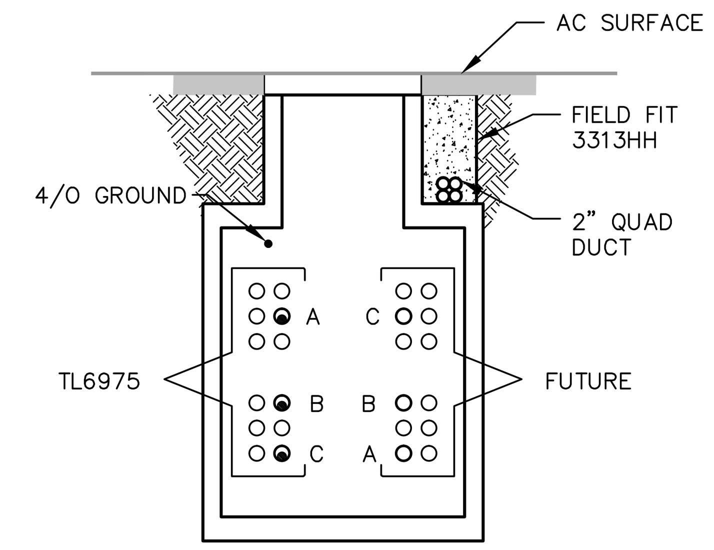




SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



SECTION "B-B"
(REF. DETAIL 2 SHEET 12)



STA. 99+15.00 ℄ VAULT U109608 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005

DETAIL "C"
NOT TO SCALE

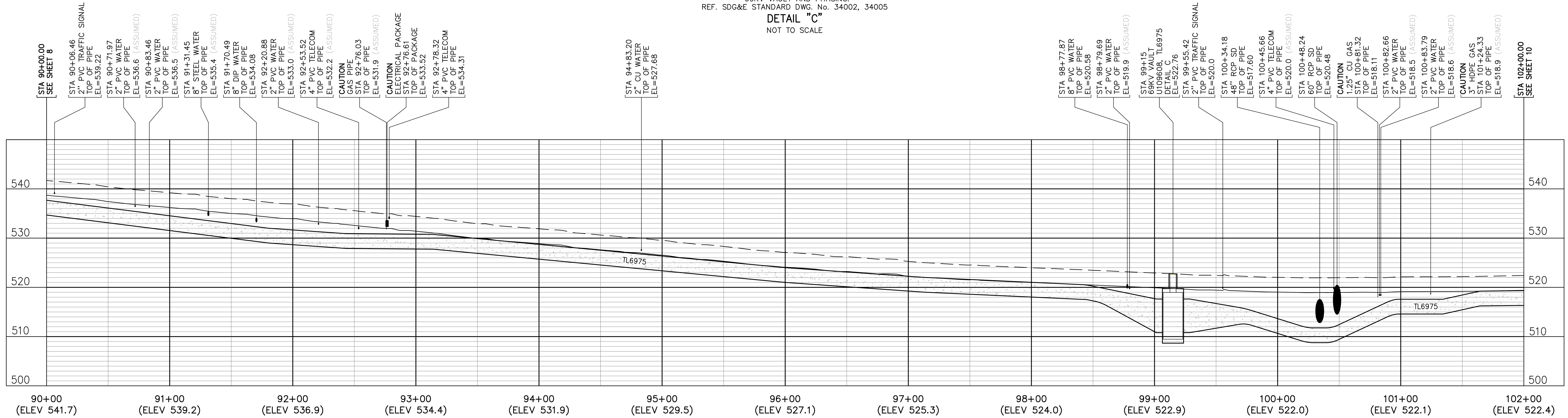
TRENCH NOTES

STA. 90+00.00 TO 98+84.28, SECTION A-A
STA. 98+84.28 TO 99+06.40, SECTION B-B
STA. 99+06.40 TO 99+23.60, DETAIL C
STA. 99+23.60 TO 99+45.72, SECTION B-B
STA. 99+45.72 TO 102+00.00, SECTION A-A

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

CURVE TABLE

CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C19	BC 100+78.32 EC 101+09.74	005°08'35"	350.00'	31.42'	1992718.6, 6270089.8	1992719.8, 6270121.1



PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

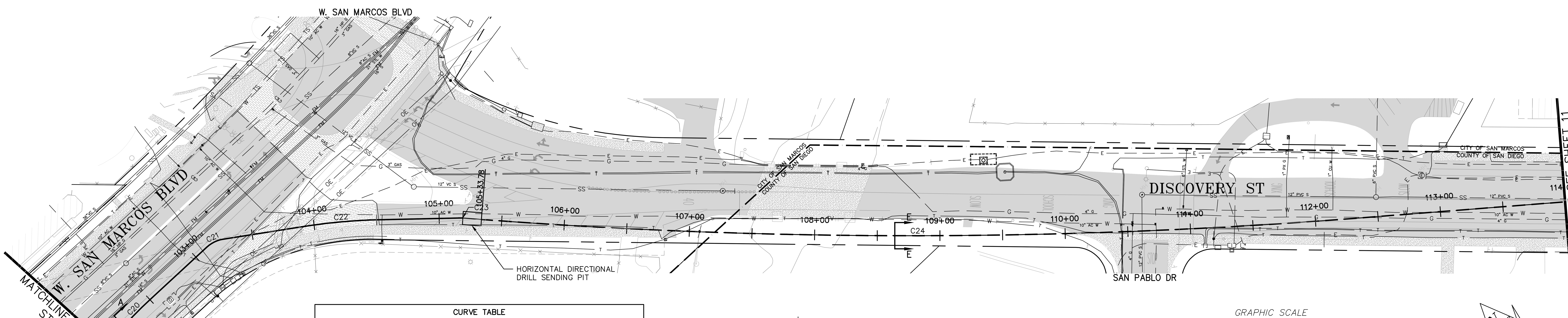
TL6975

SCALE 1"=40' SHEET 9 OF 12

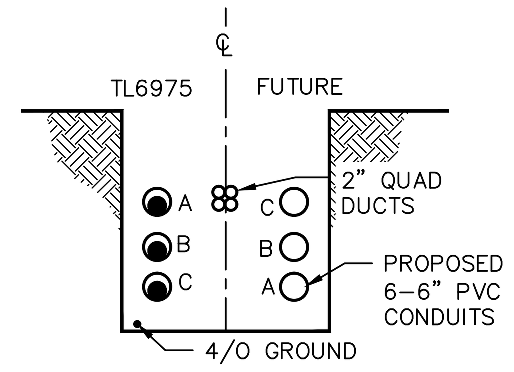
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783-9

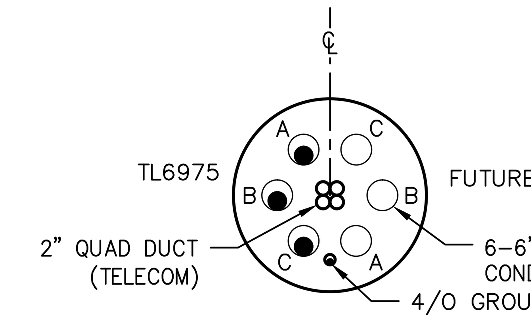
N:\SDG0002053\CADD\POWER\TL6975.DWG



CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C20	BC 102+20.37 EC 102+50.92	005°00'00"	350.00'	30.54'	1992729.0, 6270231.4	1992730.2, 6270261.9
C21	BC 103+11.87 EC 103+26.59	033°45'00"	25.00'	14.73'	1992729.9, 6270322.9	1992725.6, 6270336.7
C22	BC 103+88.11 EC 104+55.90	007°46'07"	500.00'	67.79'	1992691.2, 6270387.7	1992649.7, 6270441.2
C23	BC 105+17.65 EC 105+20.18	005°47'09"	25.00'	2.52'	1992608.5, 6270487.3	1992606.8, 6270489.1
C24	BC 105+33.78 EC 112+30.95	008°49'31"	4526.18'	697.17'	1992596.7, 6270498.3	1992122.6, 6271008.4



SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



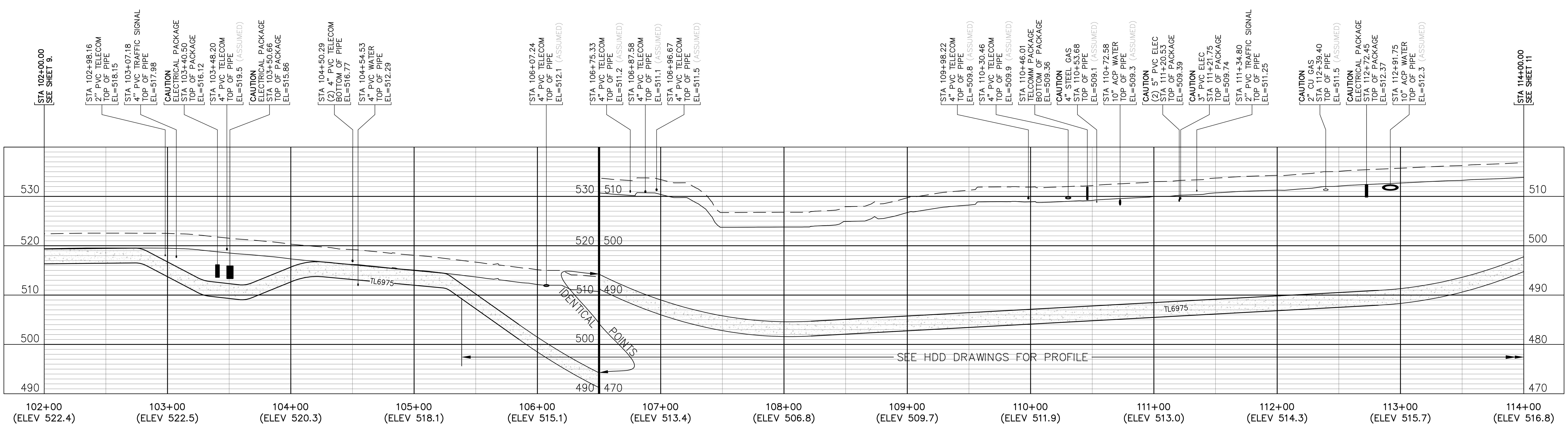
(REF. DETAIL X SHEET XX)
SECTION "E-E"
NOT TO SCALE

GRAPHIC SCALE
0' 20' 40' 60' 80' 120' 160'
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

TRANSMISSION ENGINEERING

TRENCH NOTES
STA. 102+00.00 TO 105+33.78, SECTION A-A
STA. 105+33.78 TO 114+00.00, SECTION E-E



PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

TL6975

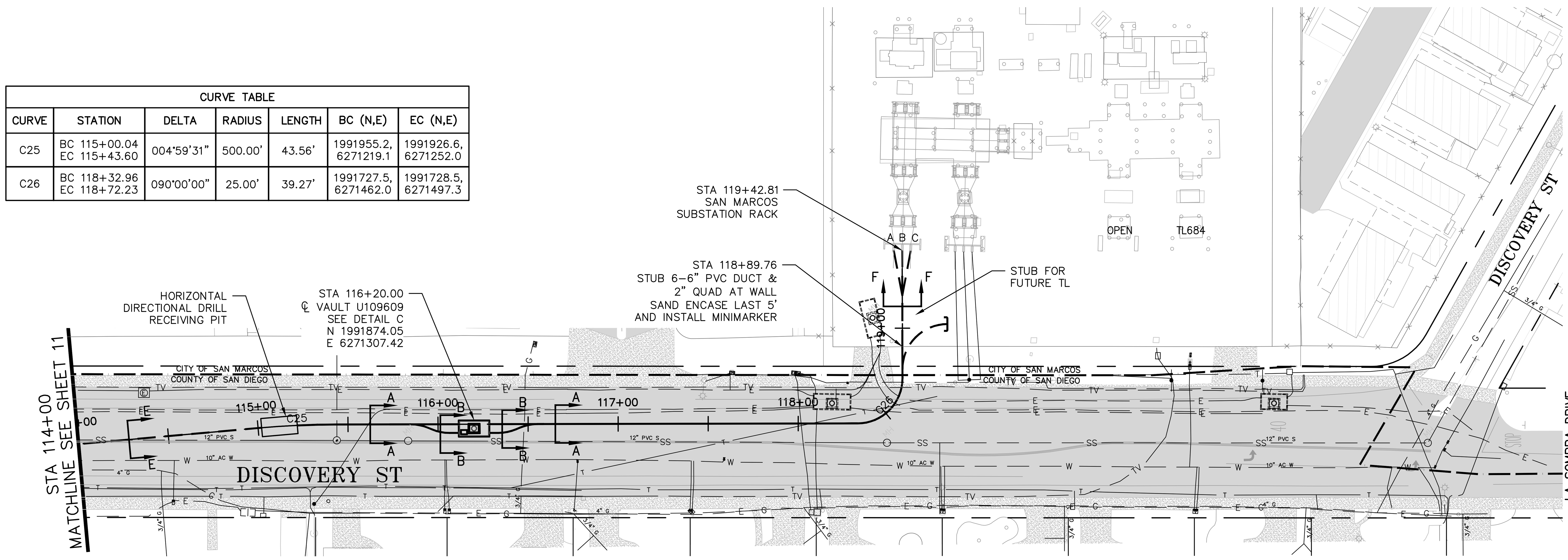
TL6975
SAN MARCOS TO ESCONDIDO

SCALE 1"=40' SHEET 10 OF 12

DRAWING NUMBER
63783-10

N:\SDG002053\CADD\POWER\TL6975.DWG

CURVE TABLE						
CURVE	STATION	DELTA	RADIUS	LENGTH	BC (N,E)	EC (N,E)
C25	BC 115+00.04 EC 115+43.60	004°59'31"	500.00'	43.56'	1991955.2, 6271219.1	1991926.6, 6271252.0
C26	BC 118+32.96 EC 118+72.23	090°00'00"	25.00'	39.27'	1991727.5, 6271462.0	1991728.5, 6271497.3



GRAPHIC SCALE

0' 20' 40' 60' 80' 120' 160'

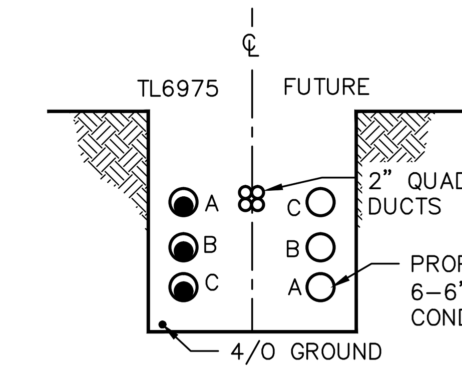
SCALE 1"= 40'

SCALE IS ACCURATE FOR 24"X36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

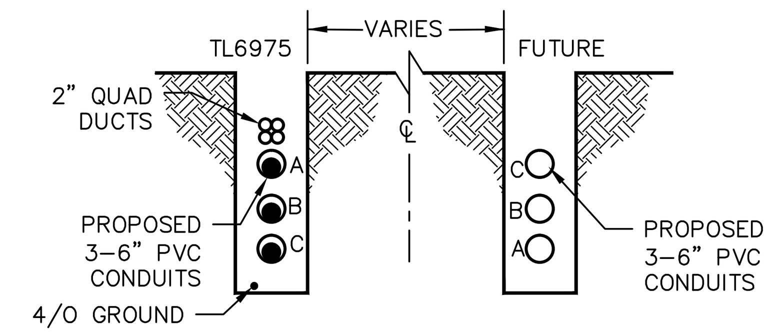
TRANSMISSION ENGINEERING

TRENCH NOTES

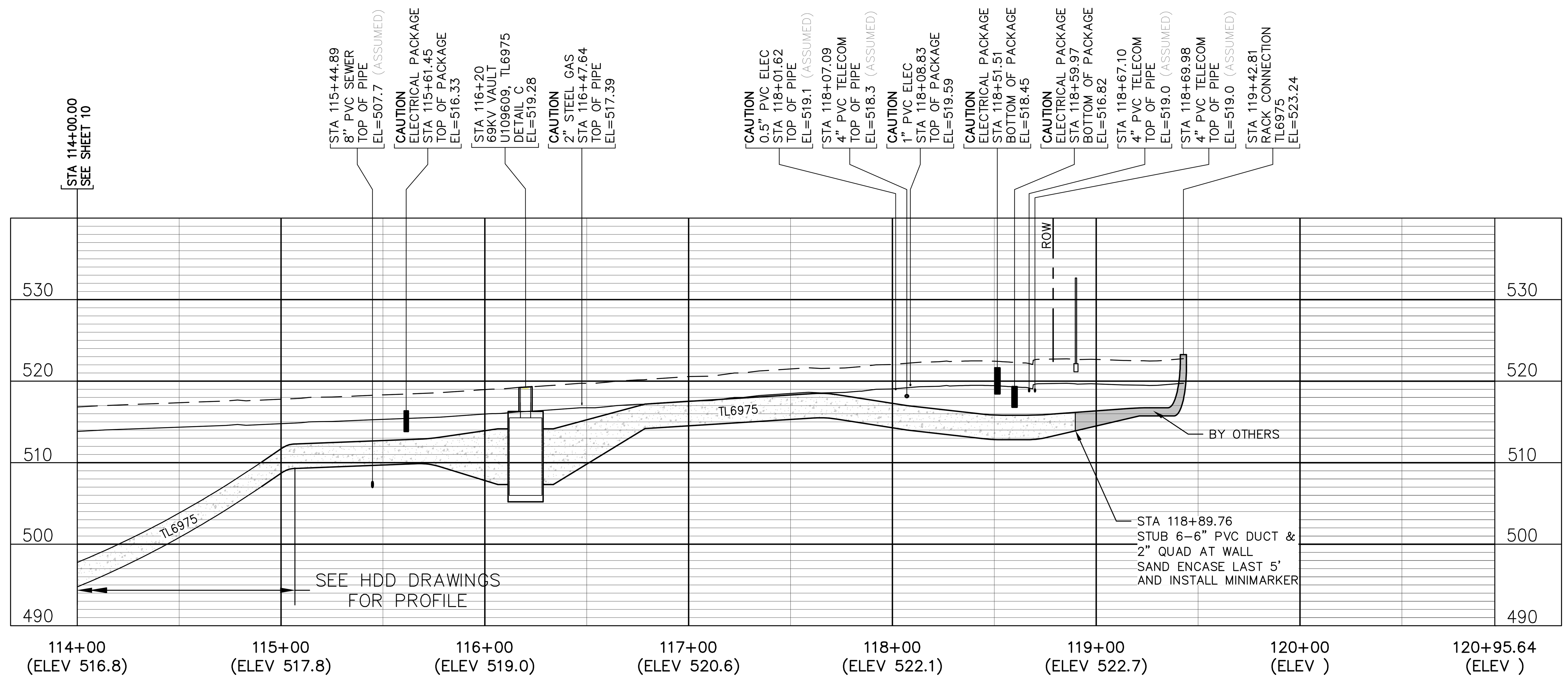
STA. 114+00.00 TO 115+01.99, SECTION E-E
STA. 115+01.99 TO 115+84.79, SECTION A-A
STA. 115+84.79 TO 116+11.40, SECTION B-B
STA. 116+11.40 TO 116+28.60, DETAIL C
STA. 116+28.60 TO 116+55.21, SECTION B-B
STA. 116+55.21 TO 118+79.02, SECTION A-A
STA. 118+79.02 TO 119+42.81, SECTION F-F

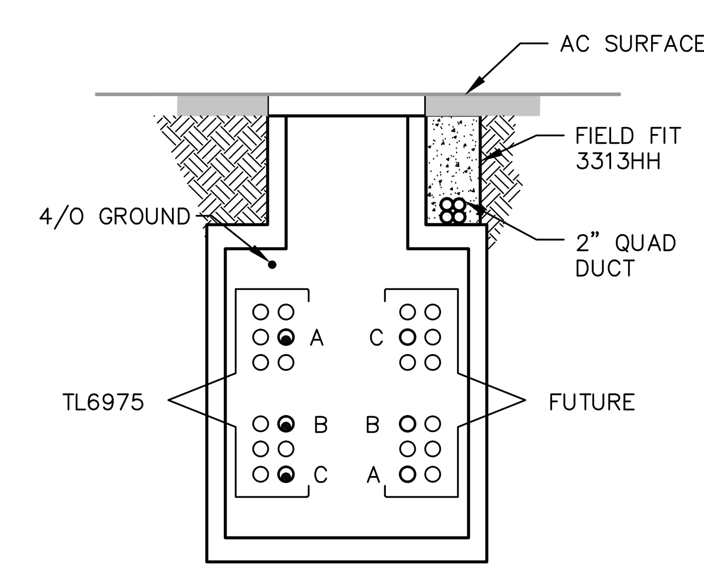


SECTION "A-A"
(REF. DETAIL 1 SHEET 12)



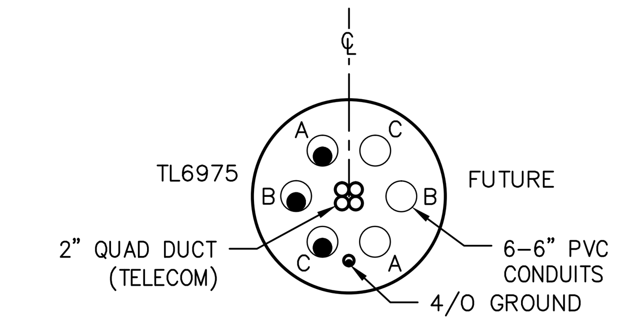
SECTION "B-B"
(REF. DETAIL 2 SHEET 12)





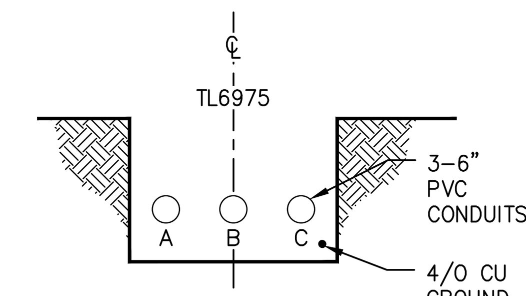
STA. 116+20.00 ℄ VAULT U109609 TL6975
69KV VAULT AND PHASING.
REF. SDG&E STANDARD DWG. No. 34002, 34005

DETAIL "C"
NOT TO SCALE



(REF. DETAIL X SHEET XX)

SECTION "E-E"
NOT TO SCALE



(REF. DETAIL 4 SHEET 12)

SECTION "F-F"
NOT TO SCALE
(BY OTHERS)

PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

NV5

15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL: 1"=40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5/PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

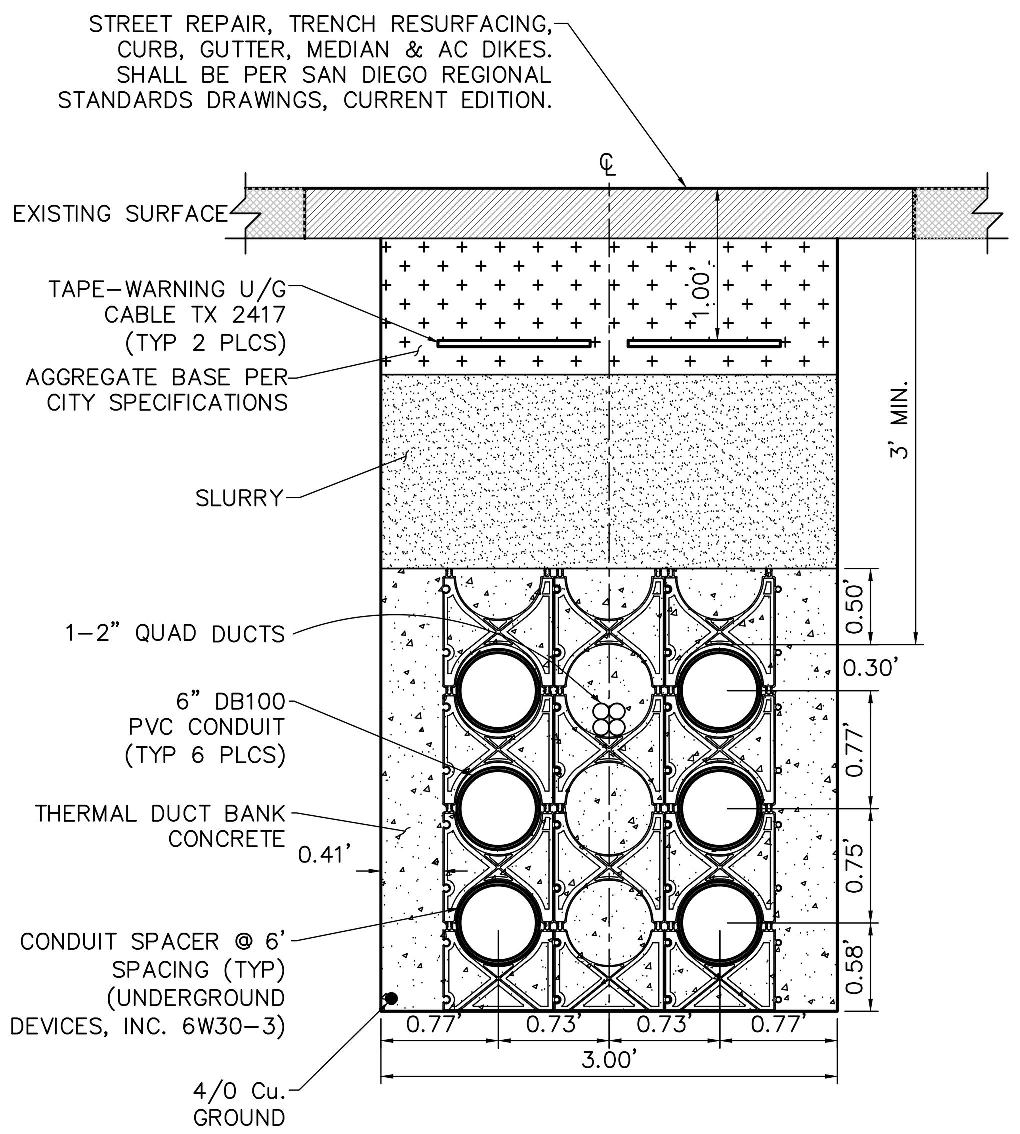
TL6975

SCALE 1"=40' SHEET 11 OF 12

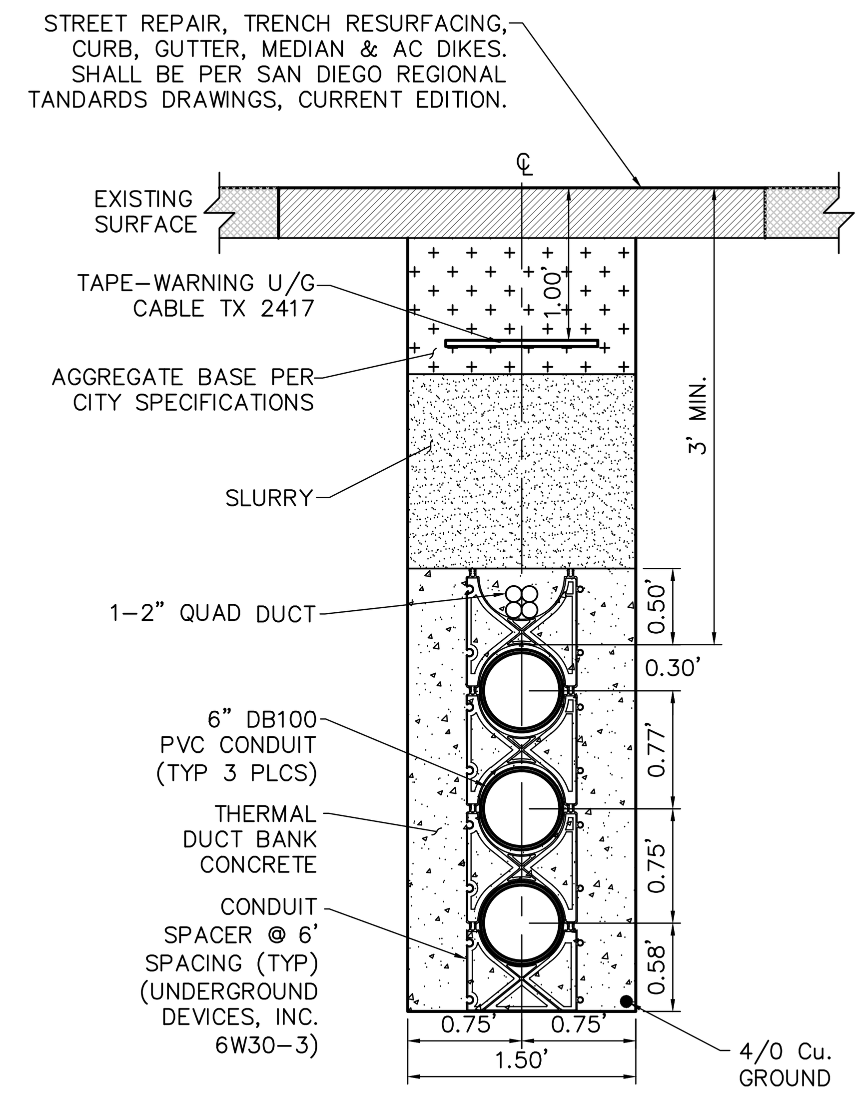
TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783-11

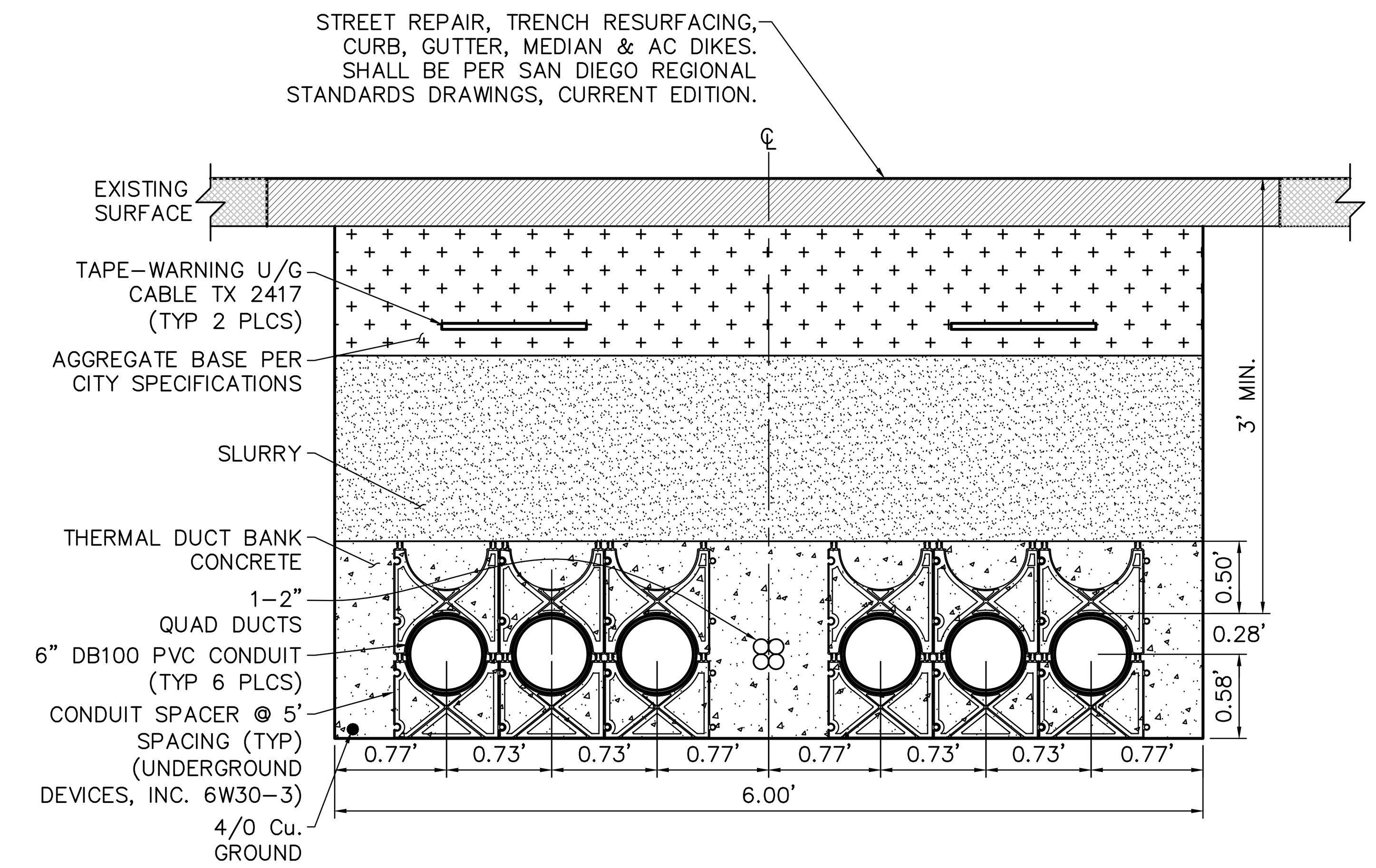
N:\SDG0002053\CADD\POWER\TL6975.DWG



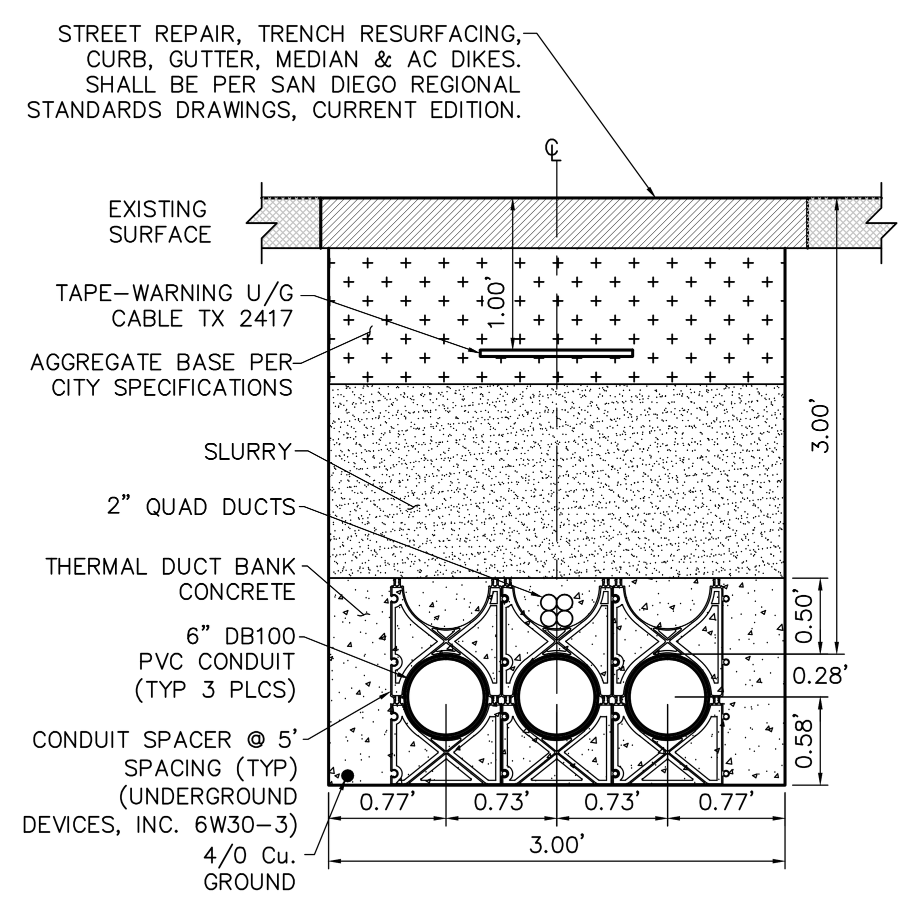
DETAIL 1
SIX CONDUITS–SIX INCH DIAM.
NOT TO SCALE



DETAIL 2
THREE CONDUITS–SIX INCH DIAM.
NOT TO SCALE



DETAIL 3
SIX CONDUITS–SIX INCH DIAM. FLAT
NOT TO SCALE



DETAIL 4
THREE CONDUITS–SIX INCH DIAM. FLAT
NOT TO SCALE

N|V|5
15092 AVENUE OF SCIENCE, SUITE 200 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NV5.COM

DIGALERT
Call 2 Working Days Before You Dig!
811

DRAWN BY:	NV5
DATE:	14/02/2017
THO. BROS.	1128, A2-D2
PROJ. NO.	XXXXXXXX
CONST. NO.	2986471

PLAN & PROFILE
HORIZONTAL:1" = 40'
VERTICAL: 1"=10'

REV	BUDGET	CONST ORDER	CHANGE	DWN	CHKD	APPV	DATE
	----	2986471	90% TRENCH & SUBSTRUCTURES	NV5 / PB			

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

TL6975

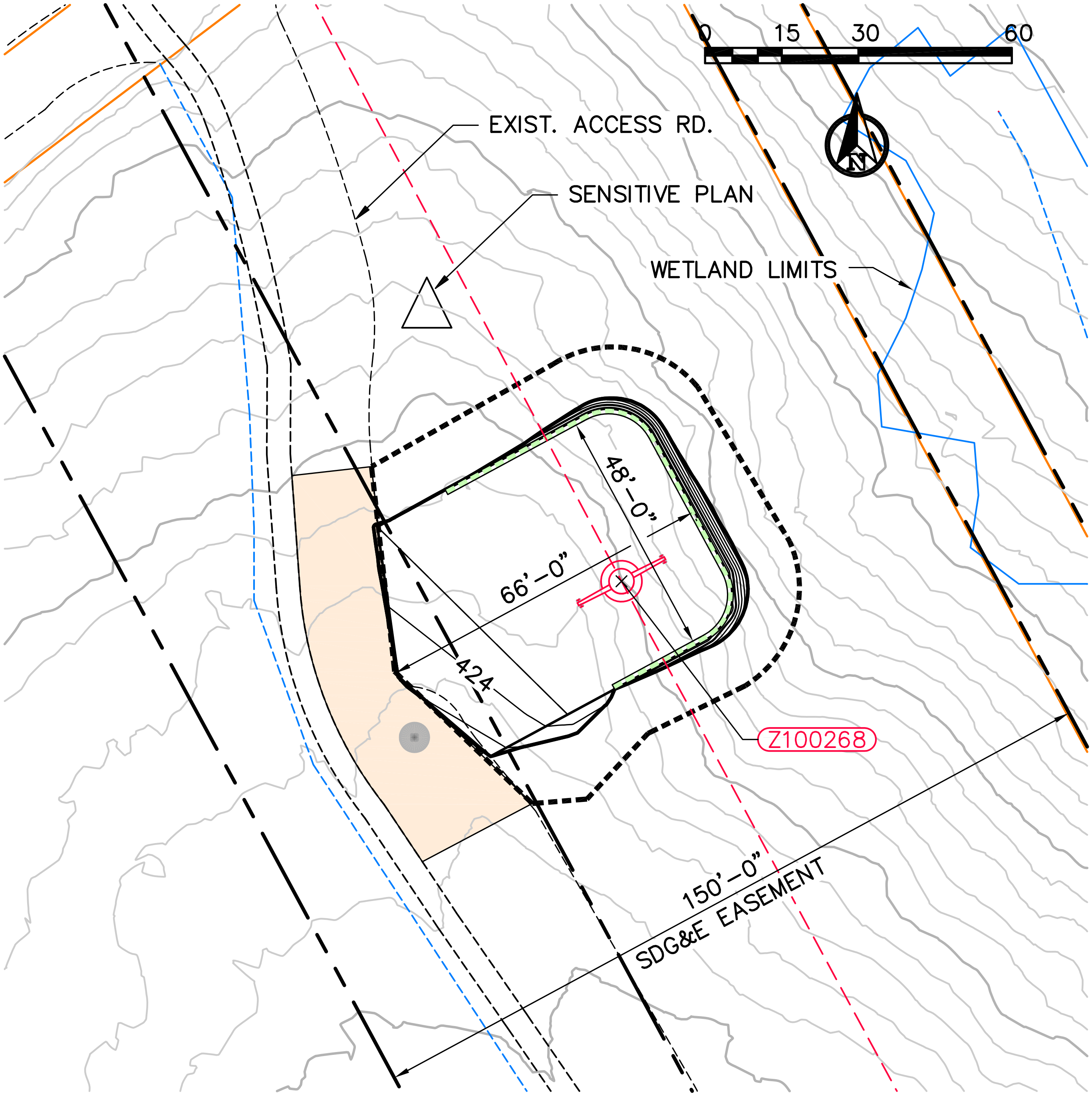
SCALE AS SHOWN
SHEET 12 OF 12

TL6975
SAN MARCOS TO ESCONDIDO

DRAWING NUMBER
63783-12

PRELIMINARY DESIGN ONLY NOT FOR CONSTRUCTION

N:\SDG002053\CADD\POWER\TL6975.DWG



Z100268 #2

SCALE: 1" = 30'
N1991352.45
E6262100.81

EARTH QUANTITIES

CUT:	48 C.Y.
FILL:	290 C.Y.
NET FILL:	242 C.Y.
DIST. AREA:	3,335 S.F. (PERM.)
DIST. AREA:	1,819 S.F. (TEMP.)
DIST. AREA:	5,154 S.F. (TOTAL)

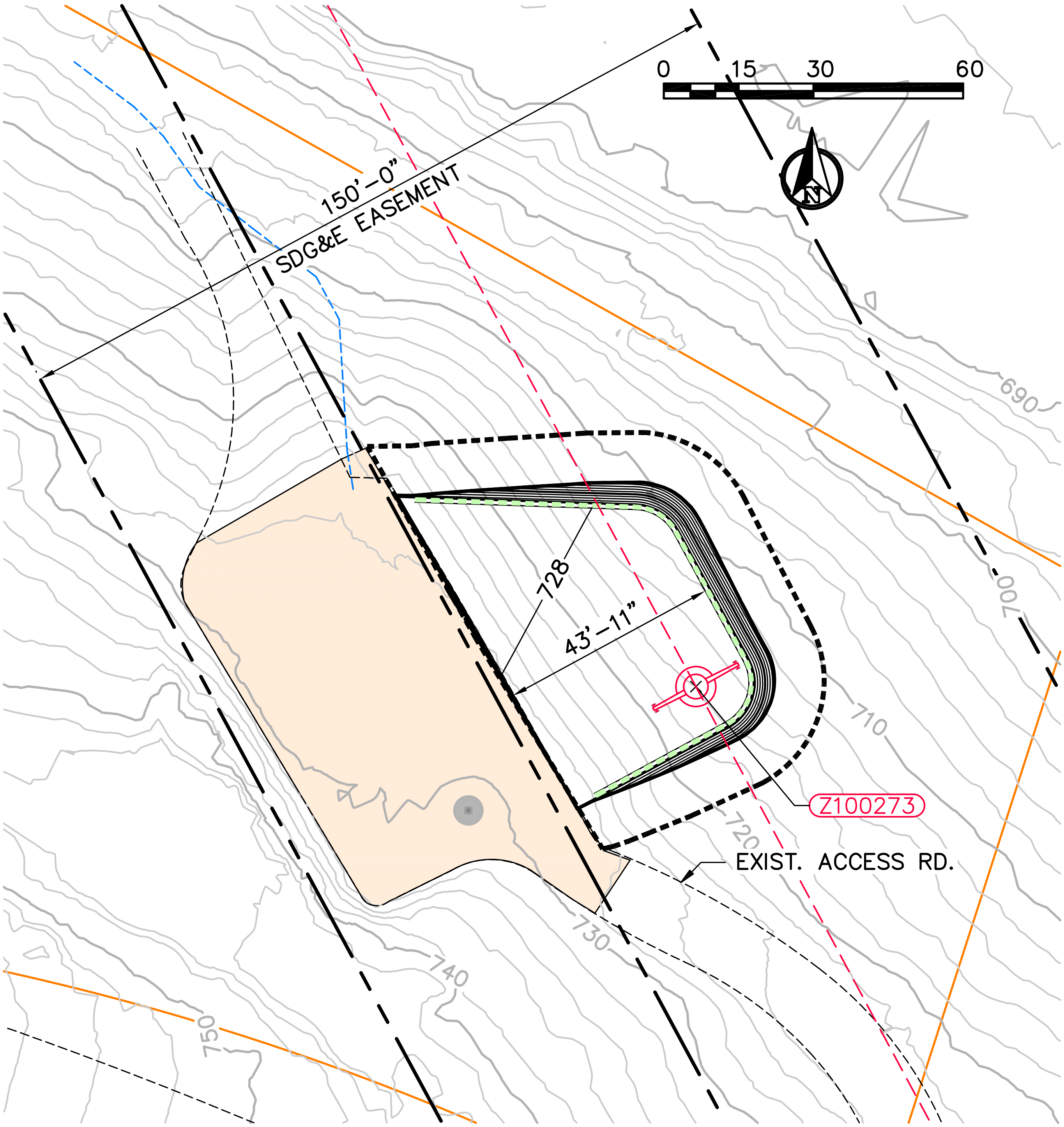
RETAINING WALL

12' MAX. HEIGHT
111' LENGTH

EXIST. AREA TO BE USED (1,408 S.F. PERM. NOT INCLUDED IN TOTAL)

GROUND. DISTURBANCE LIMITS ---------

PRELIMINARY NOT FOR CONSTRUCTION



Z100273 #8

SCALE: 1" = 30'
N1986886.88
6264515.14

EARTH QUANTITIES

CUT: 0 C.Y.
FILL: 945 C.Y.
NET FILL: 945 C.Y.
DIST. AREA: 3,064 S.F. (PERM.)
DIST. AREA: 1,661 S.F. (TEMP.)
DIST. AREA: 4,725 S.F. (TOTAL)

GROUND. DISTURBANCE LIMITS ---------

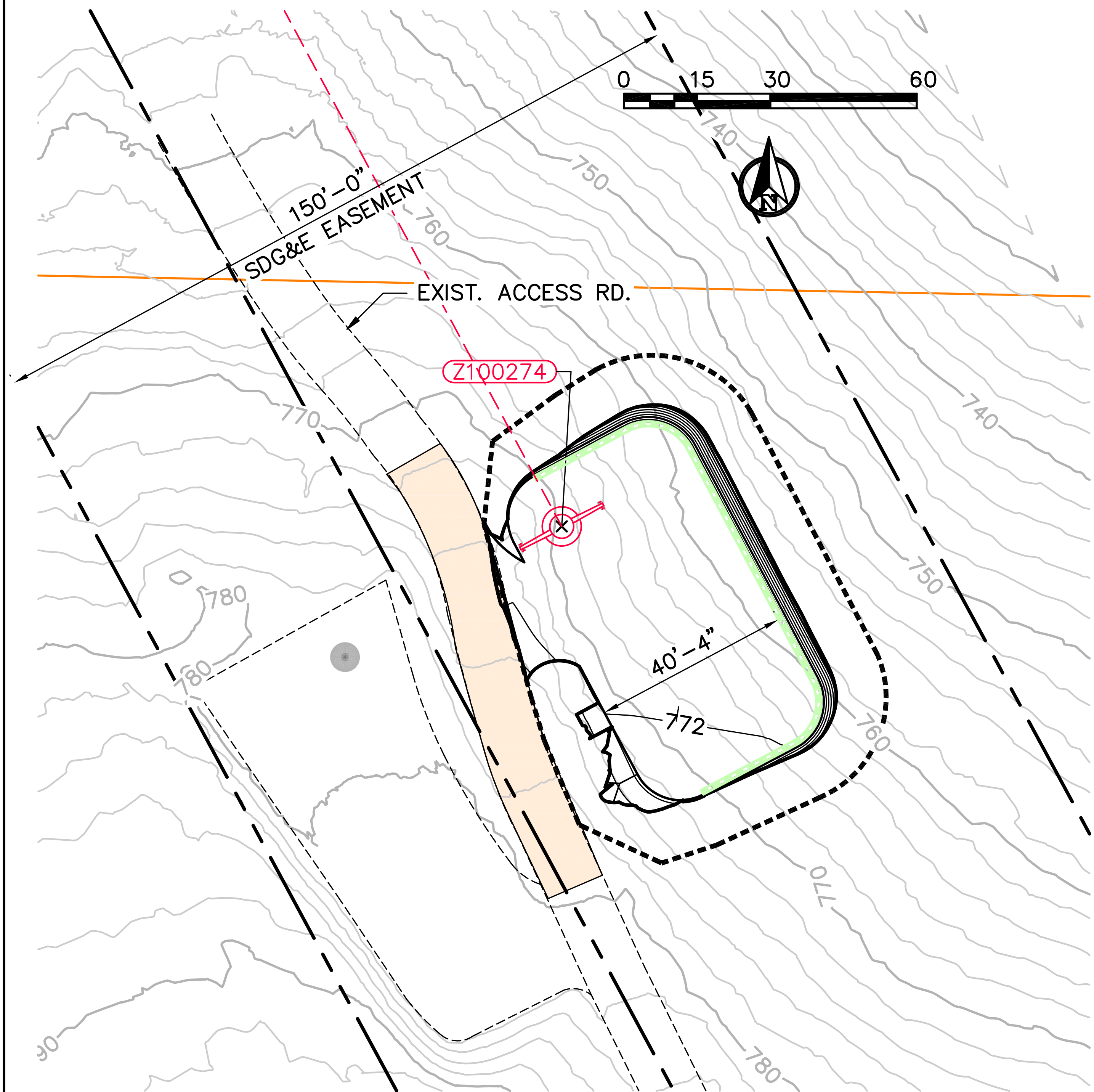
RETAINING WALL

18' MAX. HEIGHT
130' LENGTH

EXIST. AREA TO BE USED
(4,107 S.F. PERM.
NOT INCLUDED IN TOTAL)

PRELIMINARY NOT FOR CONSTRUCTION

S:\Civil\Data_TRANSMISSION\TL6975 San Marcos - Escondido\DWG\TL6975-SM-ESC-1.dwg, 2/4/2016 3:16:31 PM



Z100274 #9

SCALE: 1" = 30'
N1986191.37
E6264889.19

EARTH QUANTITIES

CUT: 5 C.Y.
FILL: 854 C.Y.
NET FILL: 849 C.Y.
DIST. AREA: 3,719 S.F. (PERM.)
DIST. AREA: 2,236 S.F. (TEMP.)
DIST. AREA: 5,955 S.F. (TOTAL)

GROUND. DISTURBANCE LIMITS ---------

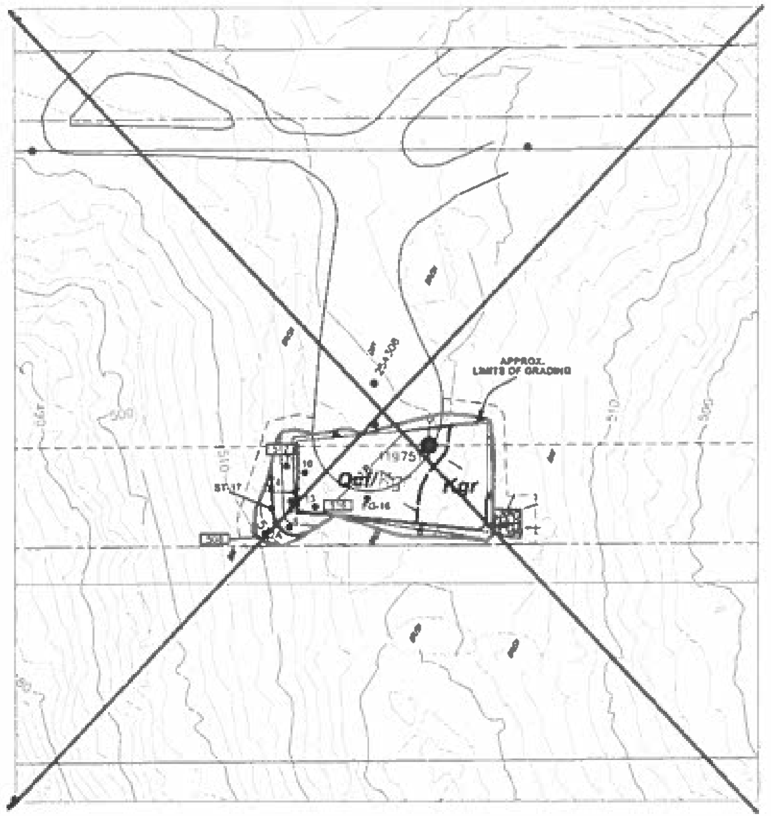
RETAINING WALL

15' MAX. HEIGHT
127' LENGTH

EXIST. AREA TO BE USED (1,159 S.F. PERM. NOT INCLUDED IN TOTAL)

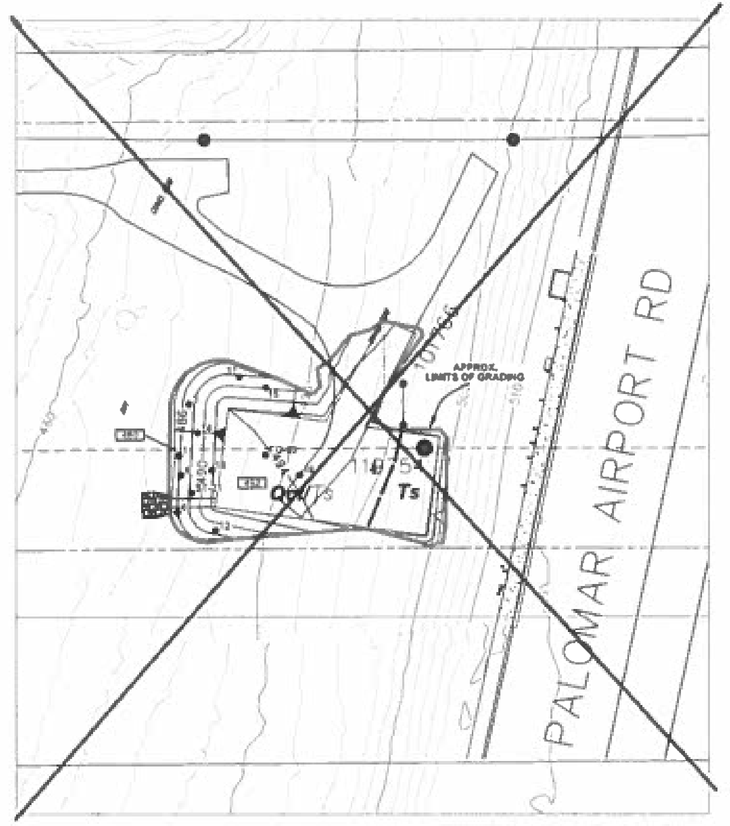
PRELIMINARY NOT FOR CONSTRUCTION

S:\Civil\Data_TRANSMISSION\TL6975\TL6975 San Marcos - Escondido\DWG\TL6975-SM-ESC-1.dwg, 2/4/2016 3:17:24 PM



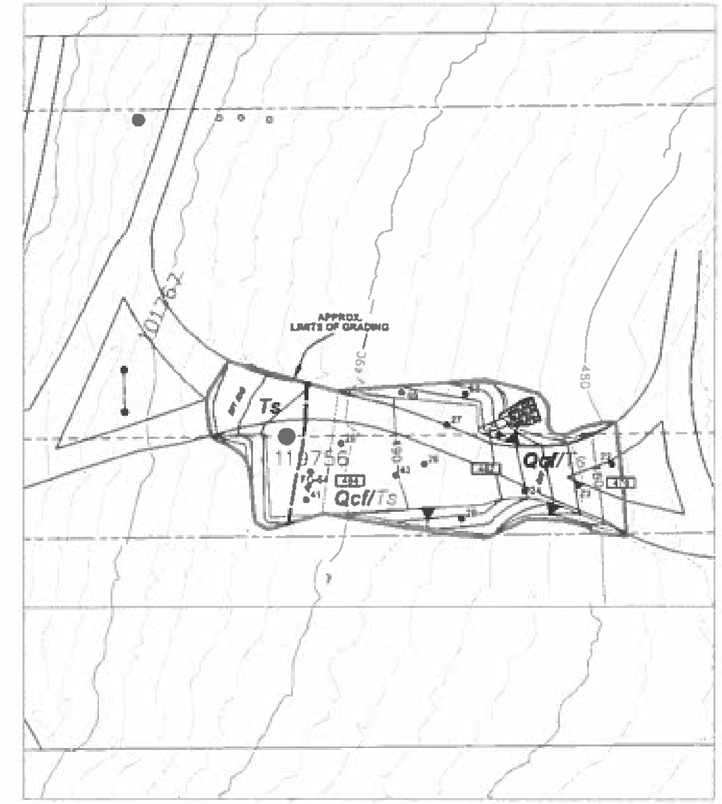
POLE 119751 PLAN (City of Vista)

SCALE: 1" = 30'



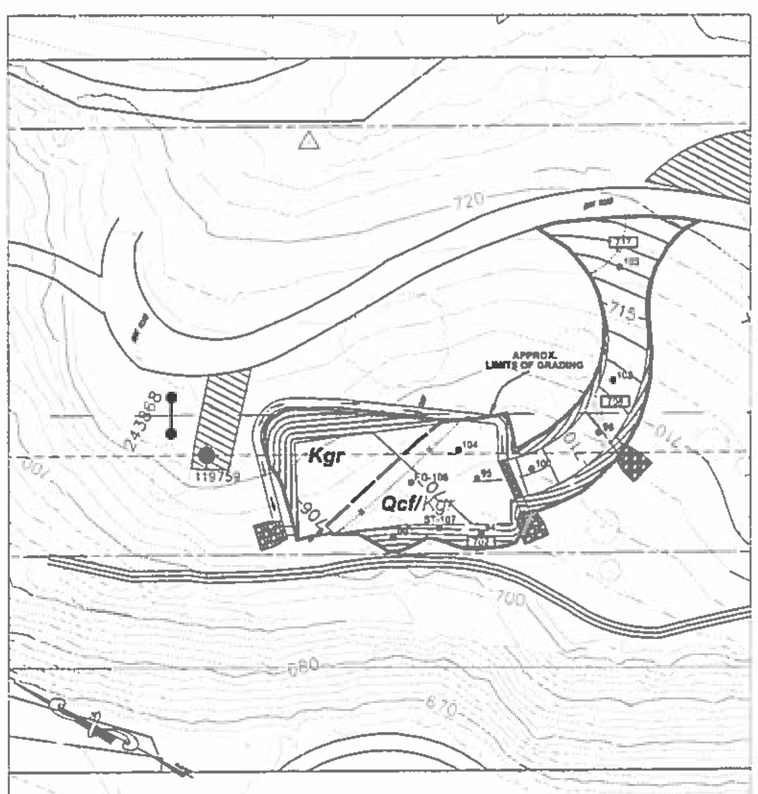
POLE 119754 PLAN (City of Carlsbad)

SCALE: 1" = 30'



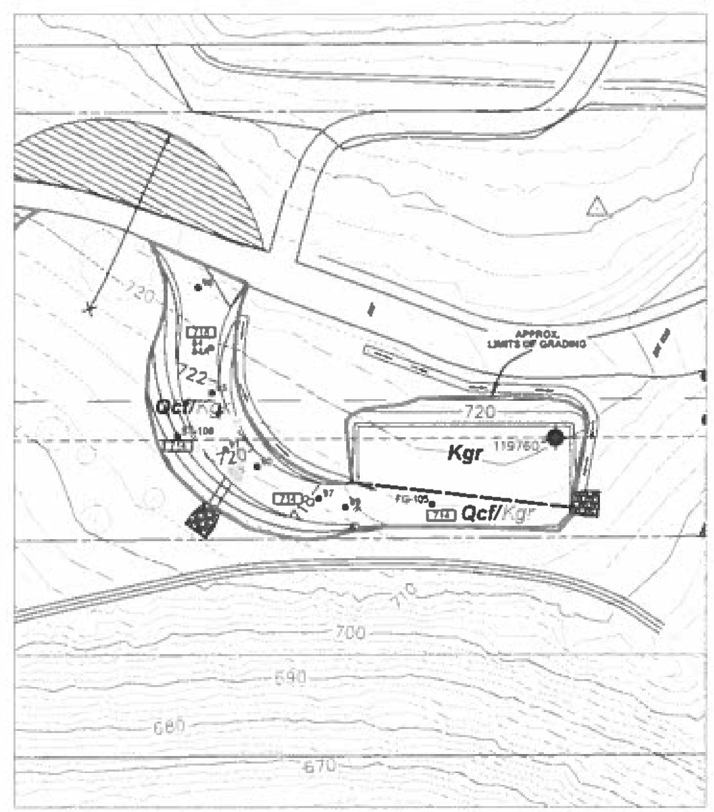
POLE 119756 PLAN (City of Carlsbad)

SCALE: 1" = 30'



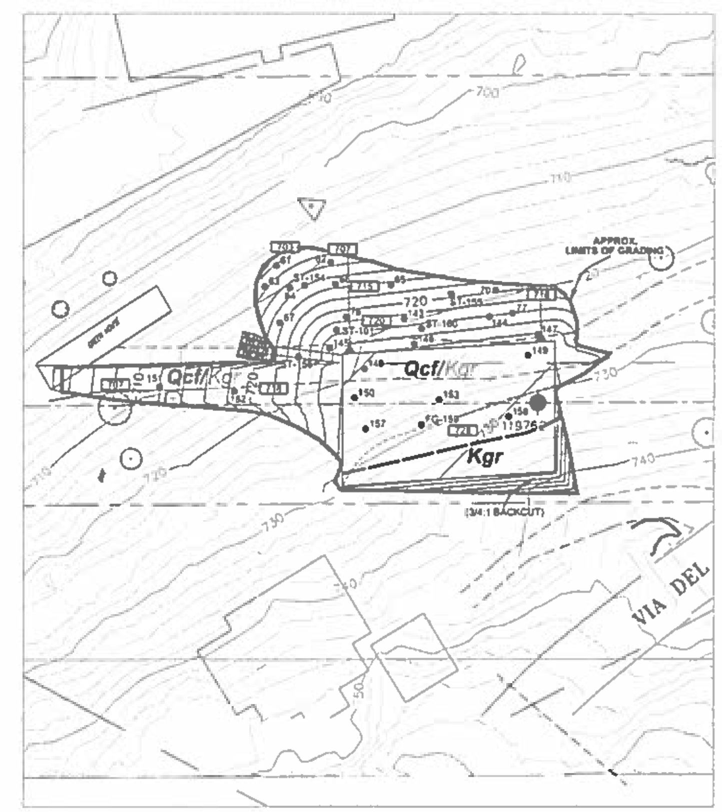
POLE 119759 PLAN (City of San Marcos)

SCALE: 1" = 30'



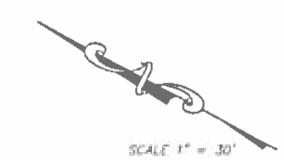
POLE 119760 PLAN (City of San Marcos)

SCALE: 1" = 30'



POLE 119762 PLAN (County of San Diego)

SCALE: 1" = 30'



GEOCON LEGEND

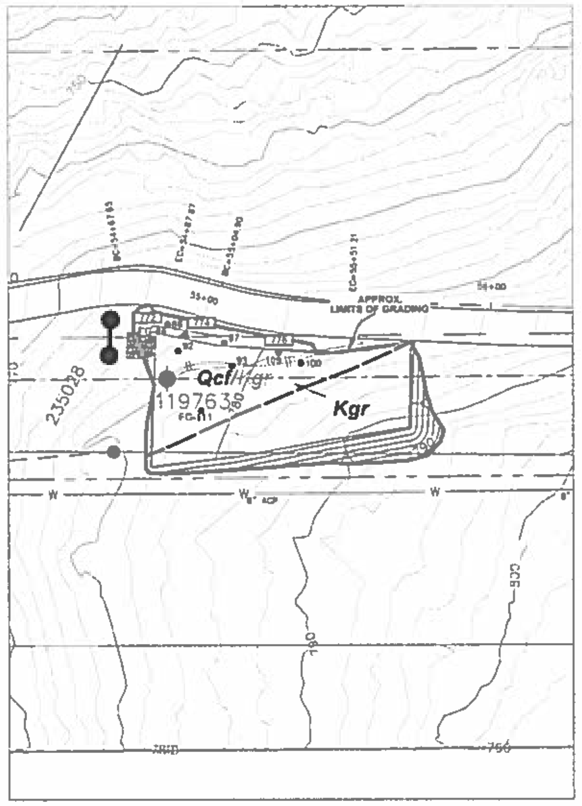
- **Qcf** ......COMPACTED FILL
- **Ts** ......SANTIAGO FORMATION (Dotted Where Buried)
- **Kgr** ......GRANITIC ROCK (Dotted Where Buried)
- ST-208 ● ......APPROX. LOCATION OF IN-PLACE DENSITY TEST
  - FG....Finish Grade
  - ST....Slope Test
- [475] ......APPROX. ELEVATION AT BASE OF FILL
- ......APPROX. LOCATION OF GEOLOGIC CONTACT

AS - GRADED GEOLOGIC MAP

TL 13825/13811 SHADOWRIDGE SUBSTATION
TO MEADOWLARK JUNCTION
VISTA TO SAN MARCOS, CALIFORNIA

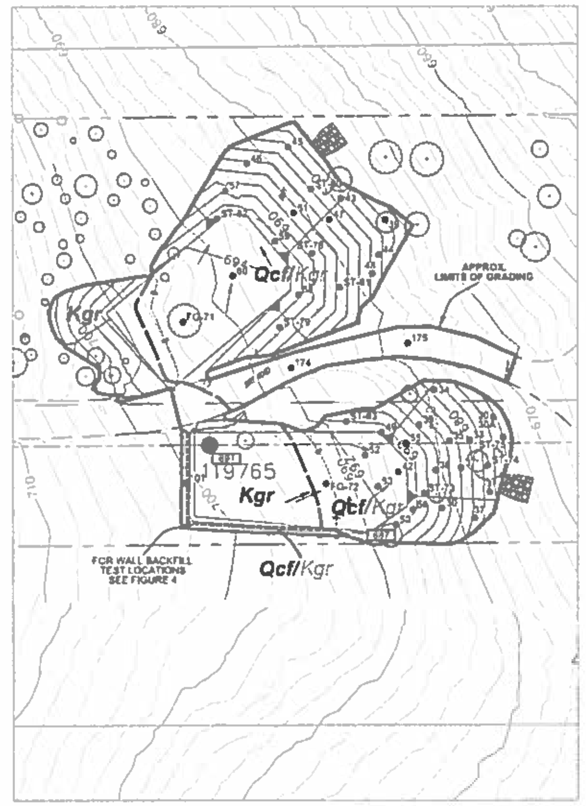
GEOCON
INCORPORATED
GEOTECHNICAL CONSULTANTS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE 1" = 30'	DATE 11 - 18 - 2009
PROJECT NO. 07590 - 22 - 25A	FIGURE 2
SHEET 1 OF 1	



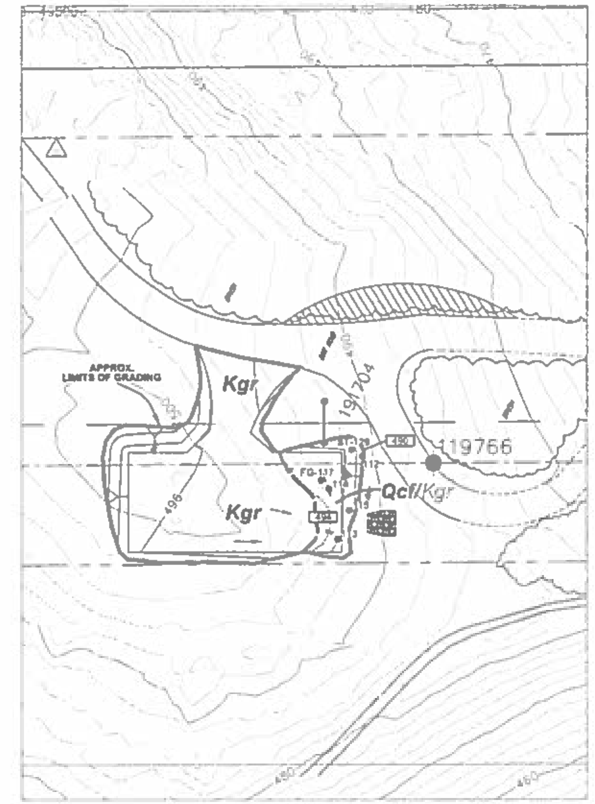
POLE 119763 PLAN (City of San Marcos)

SCALE: 1" = 30'



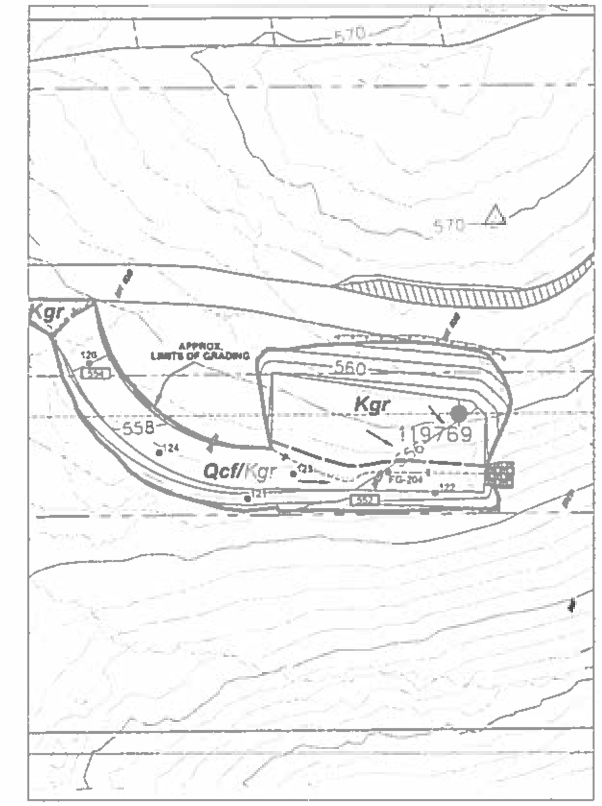
POLE 119765 PLAN (City of San Marcos)

SCALE: 1" = 30'



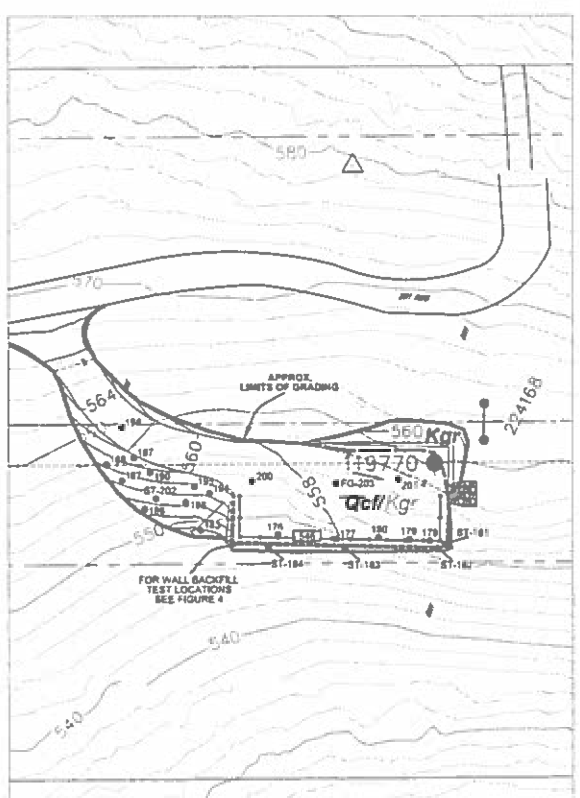
POLE 119766 PLAN (City of San Marcos)

SCALE: 1" = 30'



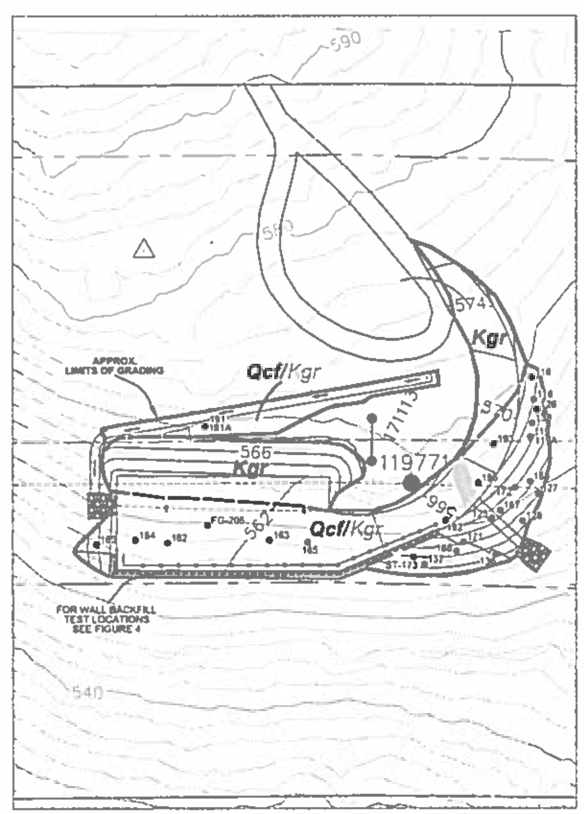
POLE 119769 PLAN (City of San Marcos)

SCALE: 1" = 30'



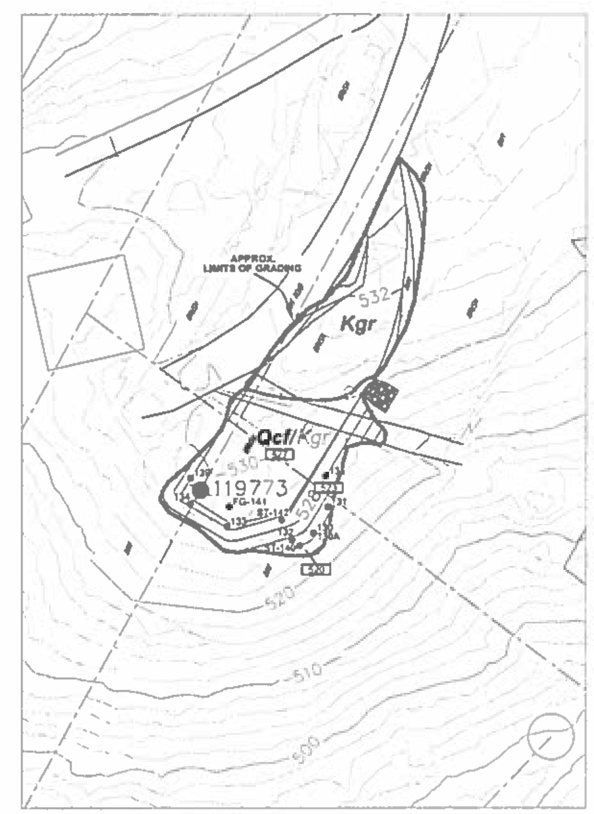
POLE 119770 PLAN (City of San Marcos)

SCALE: 1" = 30'



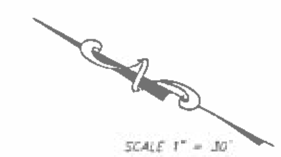
POLE 119771 PLAN (City of San Marcos)

SCALE: 1" = 30'



POLE 119773 PLAN (City of San Marcos)

SCALE: 1" = 30'



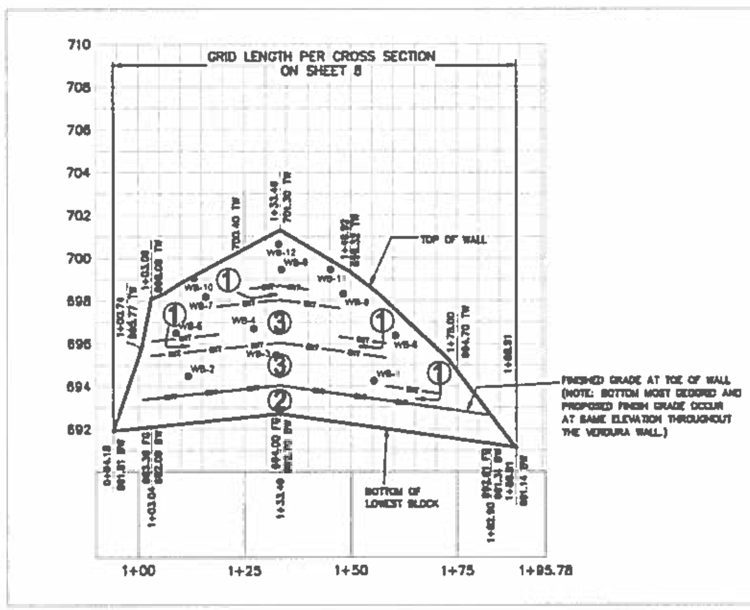
GEOCON LEGEND

- **Qcf** ....COMPACTED FILL
- **Ts** ....SANTIAGO FORMATION (Dotted Where Buried)
- **Kgr** ....GRANITIC ROCK (Dotted Where Buried)
- ST-206 ....APPROX. LOCATION OF IN-PLACE DENSITY TEST
  FG...Finish Grade
  ST...Slope Test
- [478] ....APPROX. ELEVATION AT BASE OF FILL
- ....APPROX. LOCATION OF GEOLOGIC CONTACT

AS - GRADED GEOLOGIC MAP

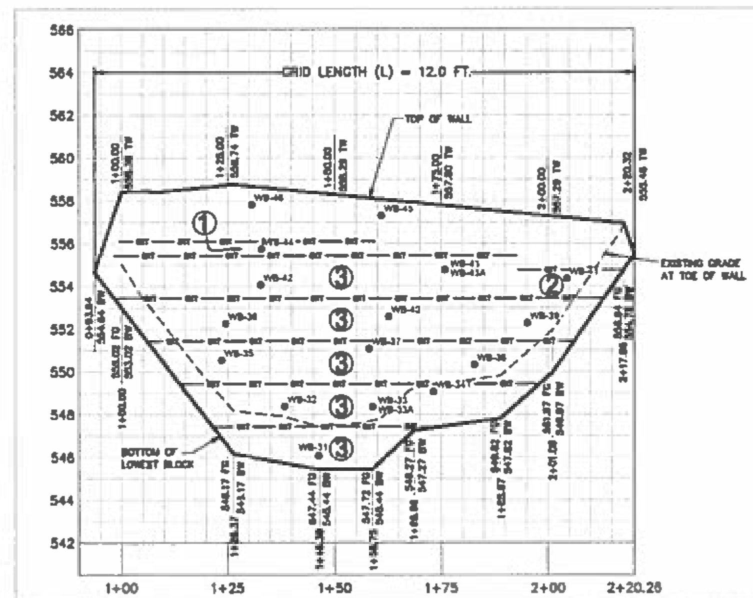
TL 13825/13811 SHADOWRIDGE SUBSTATION
TO MEADOWLARK JUNCTION
VISTA TO SAN MARCOS, CALIFORNIA

GEOCON INCORPORATED GEOTECHNICAL CONSULTANTS 6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974 PHONE 858 558-6900 - FAX 858 558-6159	SCALE 1" = 30'	DATE 11 - 18 - 2009	
	PROJECT NO. 07590 - 22 - 25A		FIGURE 3
	SHEET 1 OF 1		



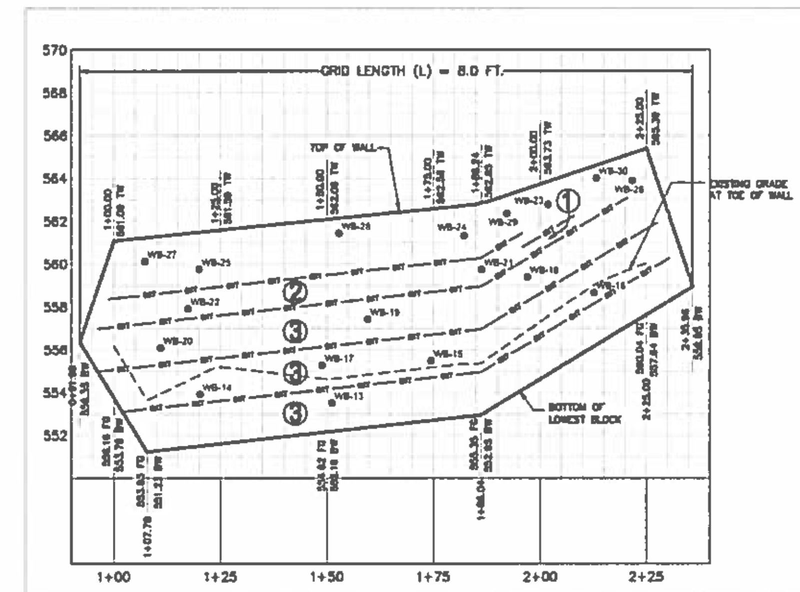
P119765 WALL PROFILE (City of San Marcos)

SCALE: HORIZ: 1" = 20'
VERT: 1" = 4'



P119770 WALL PROFILE (City of San Marcos)

SCALE: HORIZ: 1" = 20'
VERT: 1" = 4'



P119771 WALL PROFILE (City of San Marcos)

SCALE: HORIZ: 1" = 20'
VERT: 1" = 4'

GEOCON LEGEND

WB-48 • ......APPROX. LOCATION OF IN-PLACE DENSITY TEST
WB....Wall Backfill

AS - GRADED GEOLOGIC MAP

TL 13825/13811 SHADOWRIDGE SUBSTATION
TO MEADOWLARK JUNCTION
VISTA TO SAN MARCOS, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL CONSULTANTS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE HORIZ: 1" = 20' VERT: 1" = 4'	DATE 11 - 18 - 2009
PROJECT NO. 07590 - 22 - 25A	FIGURE 4
SHEET 1 OF 1	