Appendix E

Geologic Reconnaissance Report

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

GEOLOGIC RECONNAISSANCE

THE FARMS AT POWAY
POWAY, CALIFORNIA

PREPARED FOR

COLLIERS INTERNATIONAL
SAN DIEGO, CALIFORNIA

APRIL 10, 2019
PROJECT NO. G2158-32-04

Project No. G2158-32-04
April 10, 2019

Colliers International
4350 La Jolla Village Drive, Suite 500
San Diego, California 92122

Attention: Ms. Erin McKinley

Subject: GEOLOGIC RECONNAISSANCE
THE FARMS AT POWAY
POWAY, CALIFORNIA

Dear Ms. McKinley:

In accordance with your authorization of our Proposal No. LG-18396, dated October 23, 2018, we have performed a geologic reconnaissance for The Farms at Poway project in Poway, California. The accompanying report describes the soil and geologic conditions on the property and provides geotechnical considerations related to future design and construction.

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

Very truly yours,

GEOCON INCORPORATED

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CEG 1860

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GEOLOGIC RECONNAISSANCE

1. PURPOSE AND SCOPE

This report presents the findings of a geologic reconnaissance for The Farms at Poway project located in Poway, California (see *Vicinity Map*, Figure 1). The purpose of this study was to perform reconnaissance-level geologic mapping of the property and identify any known geologic hazards that may adversely impact the proposed development as presently planned.

The scope of our study included a review of readily available published geologic literature, geotechnical reports and plans pertinent to the surrounding area (see *List of References*), performing a limited field reconnaissance, reviewing stereoscopic aerial photographs of property, and preparing this report summarizing our findings.

The exhibit used as a base map to depict the geologic conditions consists of a reproducible copy of a compilation of digital information provided by Hunsaker & Associates (*Geologic Map*, Figures 2 and 3). The plan depicts the proposed development, existing topography and mapped geologic contacts based on published information and our reconnaissance. The conclusions and considerations presented herein are based on an analysis of the data reviewed as part of this study and our experience with similar soil and geologic conditions.

2. SITE AND PROJECT DESCRIPTION

The site consists of approximately 117-acres of the decommissioned Stoneridge Country Club and golf course property located north of Espola Road. The property is surrounded on three sides (west, east and north) by the existing Valle Verde Country Club Estates subdivision. In the northern portion of the project, an existing condominium community (Stoneridge Chateaus) is surrounded by but is not part of the planning area.

Based on a review of the plans provided by Hunsaker and Associates, we understand the property will be developed to create approximately 160 single-family homes with associated underground utilities, a swim and tennis club, multi-purpose barn, community event space and landscaping improvements. Maximum cuts and fills during grading are anticipated to be up to approximately 30 feet and 40 feet, respectively. Maximum 2:1 (horizontal:vertical) cut and fill slopes are planned up to 40 feet and 50 feet, respectively. A backbone roadway will provide ingress and egress to smaller loop roads which will service the subdivision. A number of detention basins are planned throughout the site.

The locations and descriptions of the project are based on review of published geologic literature, in-house geotechnical reports pertinent to the general geographic area of the subject property and our general understanding of the project as presently proposed. If the proposed development details vary significantly from those described, Geocon Incorporated should be retained to update and/or modify this report accordingly.

3. PREVIOUS GEOTECHNICAL STUDIES

A geotechnical investigation was performed by Geocon Incorporated in 2017 as part of a due diligence study for a portion of the site. In addition, two limited geotechnical investigations were performed in 1987 and 1990 for the pro shop and tennis courts (see *List of References*). The subsurface information from these studies, which include exploratory borings, trenches, seismic traverses and as-graded geologic mapping have been reviewed to provide a general understanding of the soil and geologic conditions on the property. This information is included in Appendices A, B, C and D. The exploration locations from these reports has been incorporated onto Figures 2 and 3.

4. SOIL AND GEOLOGIC CONDITIONS

Based on a review of published geologic maps, previous geotechnical reports and observations during our site reconnaissance, the geology underlying the property consists of surficial soil (Artificial Fill, Alluvium and Colluvium) over Cretaceous-age granitic rock. The surficial soils and geologic formation are discussed below in order of increasing age. The estimated extent of these units is shown on the *Geologic Map*, Figures 2 and 3, with the exception of colluvium. The composition, extent and approximate thickness of the surficial deposits will need to be determined during a future geotechnical investigation.

4.1 Artificial Fill (Qaf)

Artificial fill deposits were observed in the form of embankments created during contour grading for the golf course. It appears that artificial fill was also placed in the area of the clubhouse, pro shop, tennis courts and the groundskeeper facilities to create level ground for these structures. The artificial fill deposits will require remedial grading where they are present within the development footprint. In addition, mulch was observed at the surface (unmapped) and the thickness is unknown. This material will require removal and exportation from the site.

4.2 Alluvium (Qal)

Alluvium is present within the existing drainages on the property. These areas generally mimic the drainage locations indicated on the original topography maps. It is assumed remedial grading was not performed for the alluvium during previous grading operations for the golf course. The alluvium will require remedial grading during future development.

4.3 Colluvium (unmapped)

Our experience in the vicinity of the project indicates that the bedrock is mantled with colluvial deposits where relatively gently sloping conditions are present. Remedial grading will be necessary where these soils are present within the development footprint.

4.4 Cretaceous-age Granitic Rock (Kgr)

Cretaceous-age Granitic Rock underlies the property. This formation exhibits a highly variable weathering profile based upon previous studies. Considering heavy duty grading and excavation equipment, it appears that the upper approximately 5 to 15 feet of granitic rock below the ground surface is rippable in the areas studied with the exception of where rock outcroppings are present.

This unit generally exhibits adequate bearing and slope stability characteristics. Cut slopes excavated at an inclination of 2:1 (horizontal:vertical) should be stable to the proposed heights if free of adversely oriented joints, fractures or faults. It should be anticipated that excavations within this unit will generate boulders and oversize materials (rocks greater than 12 inches in length) that will require special handling and placement procedures.

The rippability characteristics of the granitic rock will be a primary consideration during project development. A seismic refraction study was performed in 2017. The results of the study are presented in Appendix B. The study indicates that heavy ripping will be required to achieve the majority of the proposed excavations for the project and blasting may be required if cuts extend deeper than 5 to 15 feet.

5. GROUNDWATER

No groundwater or seepage was observed on the property during our field reconnaissance. However, groundwater levels in the man-made ponds and drainage areas can be expected to fluctuate seasonally and may affect grading if the alluvial areas extend into the development footprint. In this regard, grading may encounter wet soils causing excavation and compaction difficulty, particularly if construction is planned during the winter months. Subdrain systems are not anticipated, however, the need for drains will be evaluated during remedial grading when the bedrock surface can be observed.

6. GEOLOGIC HAZARDS

6.1 Faulting and Seismicity

Based on our observations during mass grading in adjacent areas, previous geotechnical studies, and a review of published geologic maps and reports, the site is not located on any known “active,” “potentially active” or “inactive” fault traces as defined by the California Geological Survey (CGS).

The Newport-Inglewood and Rose Canyon Fault zones, located approximately 16 miles west of the site, are the closest known active faults. The CGS considers a fault seismically active when evidence suggests seismic activity within roughly the last 11,000 years. The CGS has included portions of the Rose Canyon Fault zone within an Alquist-Priolo Earthquake Fault Zone.

We used the computer program *EZ-FRISK* (Version 7.65) to determine the distance of known faults to the site and to estimate ground accelerations at the site for the maximum anticipated seismic event. According to the results, 7 known active faults are located within a search radius of 50 miles from the property. We used acceleration attenuation relationships developed by Boore-Atkinson (2008) NGA USGS2008, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2008) NGA in our analysis. The nearest known active faults are the Newport-Inglewood and Rose Canyon Fault Zones, located approximately 16 miles west of the site, respectively, and are the dominant sources of potential ground motion. Table 6.1.1 lists the estimated maximum earthquake magnitudes and PGA's for the most dominant faults for the site location calculated for Site Class C as defined by Table 1613.3.2 of the 2016 California Building Code (CBC).

TABLE 6.1.1
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	16	7.5	0.19	0.15	0.18
Rose Canyon	16	6.9	0.15	0.13	0.13
Elsinore	21	7.85	0.18	0.13	0.17
Earthquake Valley	29	6.8	0.09	0.07	0.06
Coronado Bank	30	7.4	0.12	0.08	0.09
Palos Verdes	30	7.7	0.13	0.09	0.11
San Jacinto	42	7.88	0.11	0.08	0.09

We performed a site-specific probabilistic seismic hazard analysis using the computer program *EZ-FRISK*. Geologic parameters not addressed in the deterministic analysis are included in this analysis. The program operates under the assumption that the occurrence rate of earthquakes on each mappable Quaternary fault is proportional to the faults slip rate. The program accounts for fault rupture length as a function of earthquake magnitude, 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 (2008) NGA in the analysis. Table 6.1.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 6.1.2
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	0.37	0.36	0.41
5% in a 50 Year Period	0.28	0.27	0.29
10% in a 50 Year Period	0.22	0.21	0.21

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) guidelines currently adopted by the City of Poway.

6.2 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soils are cohesionless, groundwater is encountered within 50 feet of the surface, and soil densities are less than about 70 percent of the relative density. If all four criteria are met, a seismic event could result in a rapid increase in pore water pressure from the earthquake-generated ground accelerations. The potential for liquefaction at the site is considered to be negligible due to the dense formational material encountered, remedial grading recommended, and lack of a shallow groundwater condition.

6.3 Landslides

No evidence of ancient landslide deposits was observed during our site reconnaissance or geologic literature review.

7. CONCLUSIONS AND CONSIDERATIONS

7.1 No soil or geologic conditions were encountered during our reconnaissance or literature review that would preclude development of the site as presently planned.

7.2 A future geotechnical study that includes a subsurface investigation should be performed to evaluate the underlying geologic conditions on the property and to provide specific geotechnical recommendations for the project. This study should include evaluation of surficial deposits, and a rippability analysis of the granitic rock in areas of planned development.

7.3 The site is underlain by surficial units that include artificial fill, alluvial, and colluvial deposits. These deposits are unsuitable in their present condition and will require remedial grading in the form of removal and compaction where improvements are planned.

7.4 The presence of hard rock at or near the existing ground surface will require special consideration during site grading. Based on the seismic refraction survey, it is anticipated that significant portions of the excavations will encounter hard rock conditions and will require special excavation techniques and possible blasting.

7.5 It is anticipated that excavations within the granitic rock will generate oversize materials that will require special handling and placement in fills in accordance with the grading specifications contained in Appendix E. An earthwork analysis should be performed to determine if there is an adequate volume of fill area available to accommodate the anticipated volume of blasted/oversize materials. This study should consider the proposed grading, rippability information contained in this report, rock placement requirements and include proposed undercutting. Crushing may be necessary to meet the project grading specifications with respect to capping and particle size restriction zones.

7.6 Cut slopes should be observed by an engineering geologist during grading to verify that the soil and geologic conditions do not differ significantly from those anticipated. Additional recommendations will be provided in in event that adverse conditions are encountered. Scaling of loose rock fragments from proposed cut slopes may be necessary.

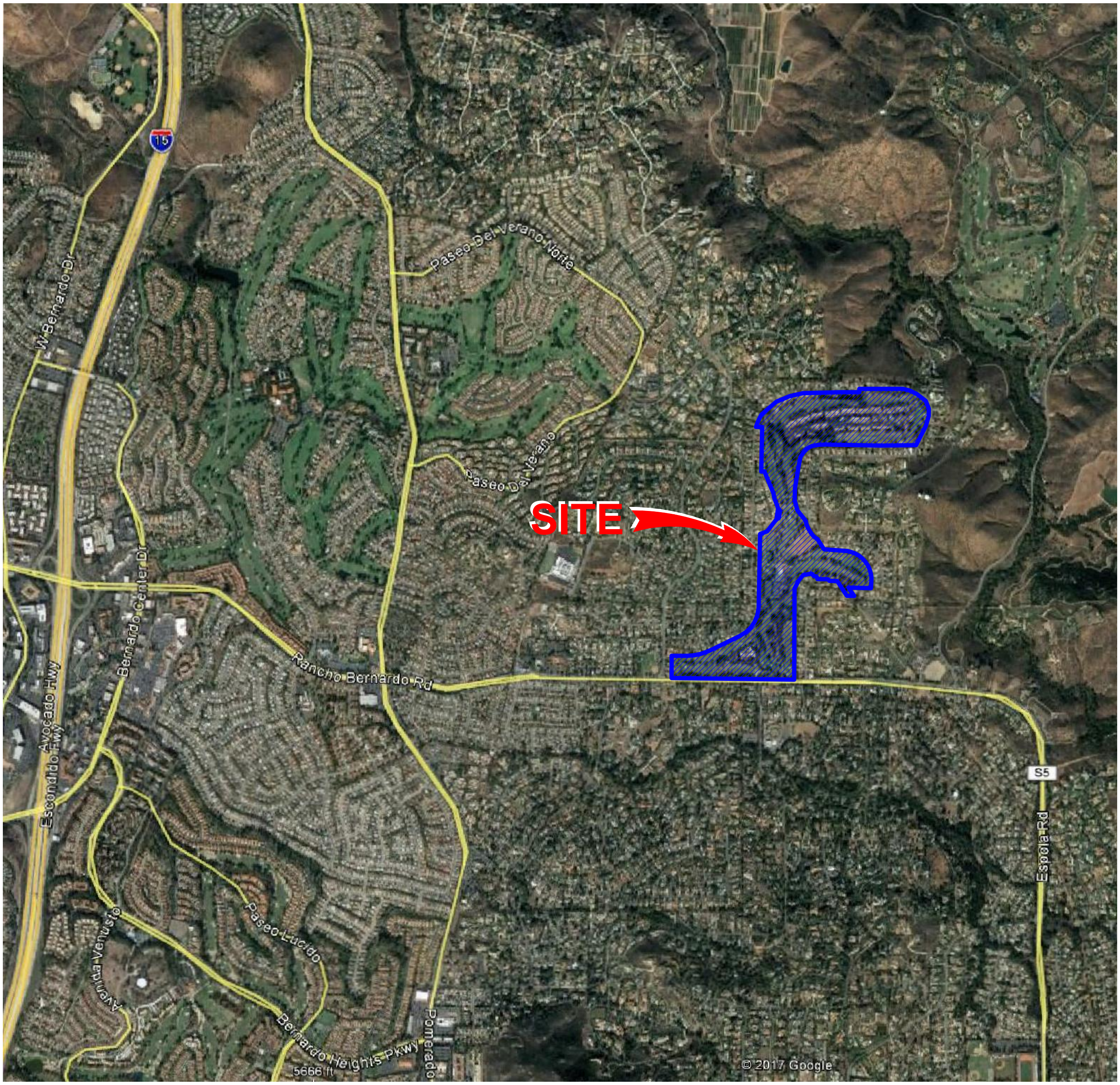
LIMITATIONS AND UNIFORMITY OF CONDITIONS

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

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

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

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



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NO SCALE

VICINITY MAP

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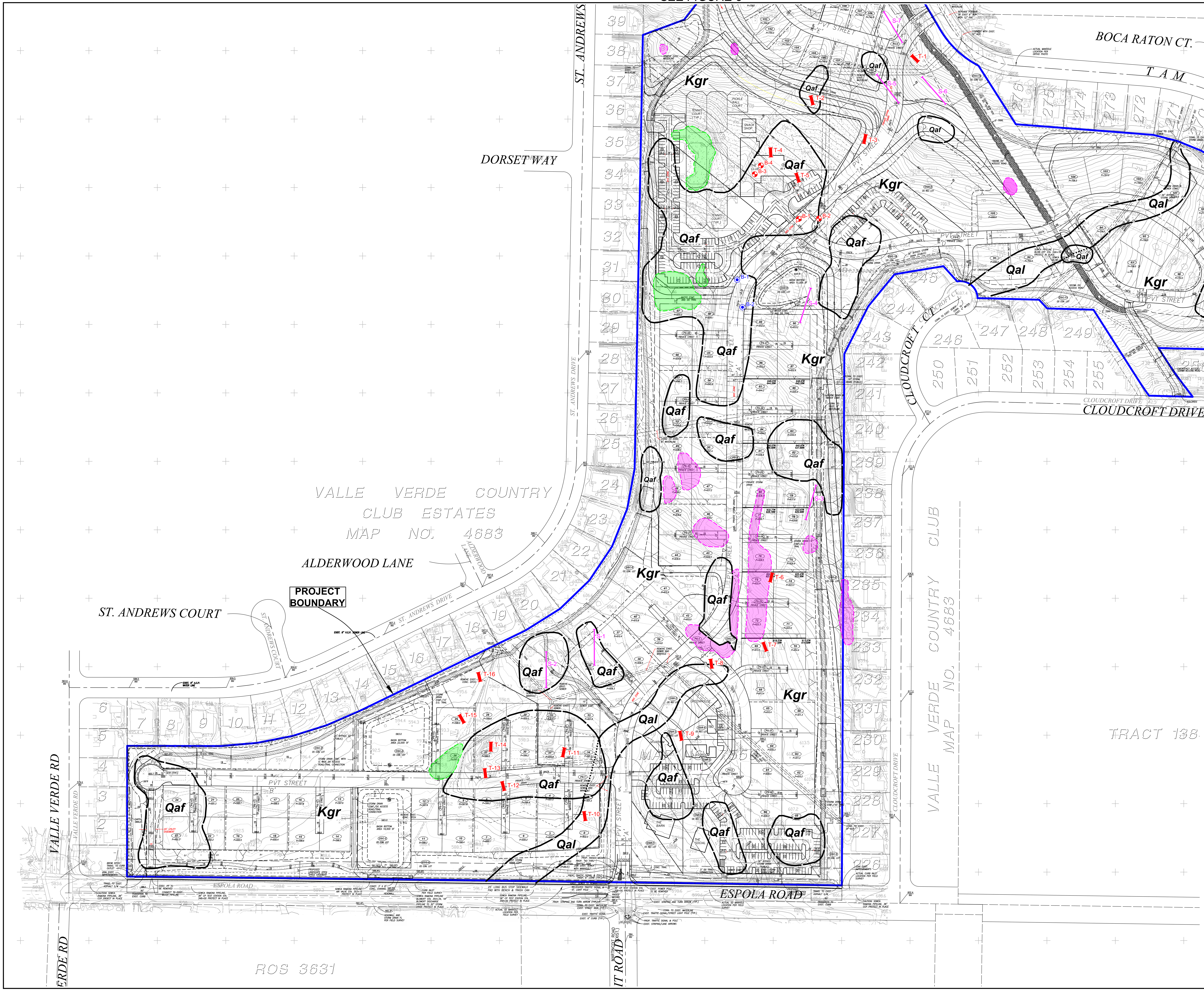
PHONE 858 558-6900 - FAX 858 558-6159

THE FARMS AT POWAY
POWAY, CALIFORNIA

JP / RA		DSK/GTYPD	DATE 04 - 10 - 2019	PROJECT NO. G2158 - 32 - 04	FIG. 1

Plotted:04/09/2019 9:48AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G2158-32-04 The Farm\DETAILS\G2158-32-04 VicinityMap.dwg

SEE FIGURE 3



GEOLOGIC MAP

THE FARMS AT POWAY
POWAY, CALIFORNIA

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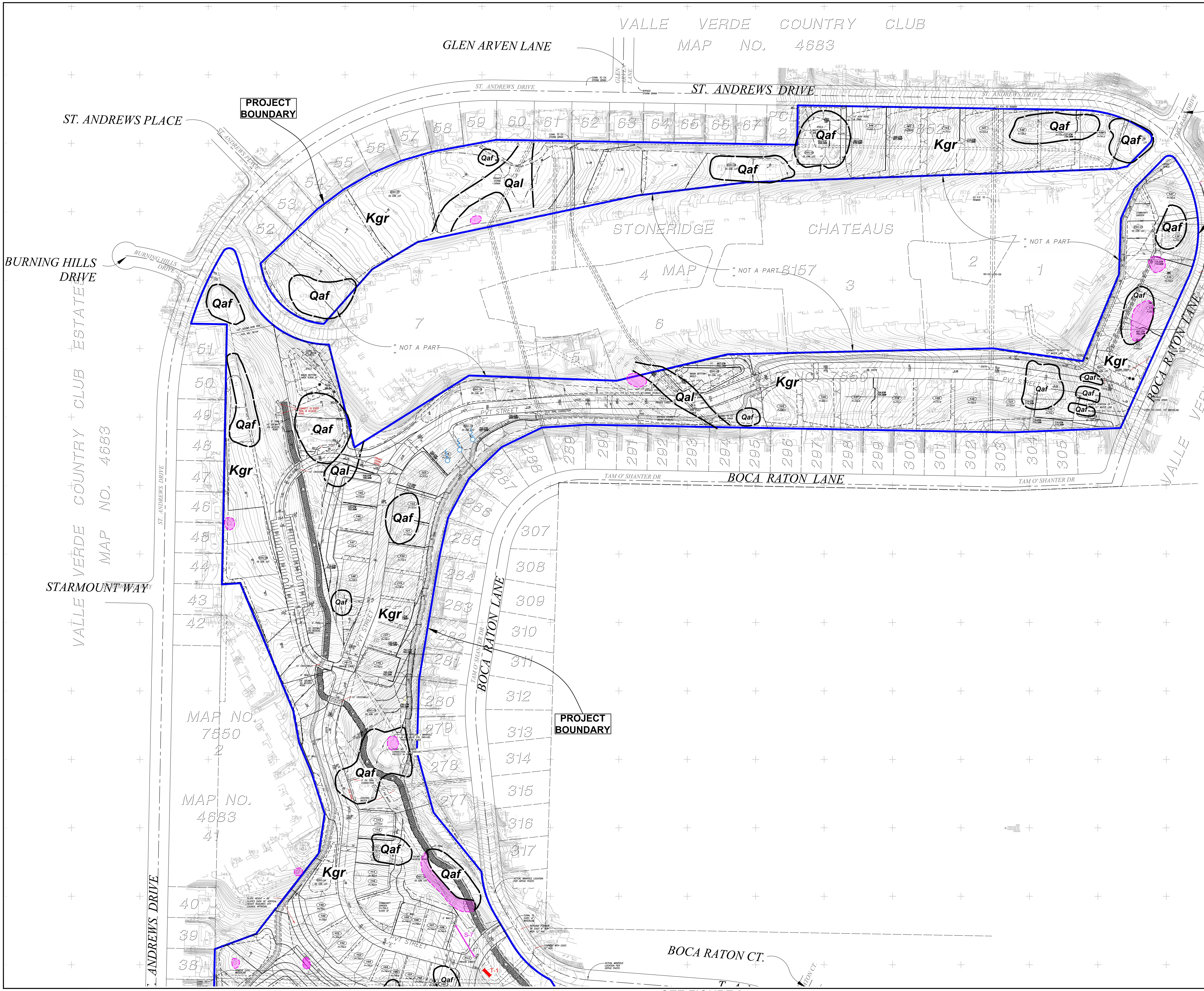
SCALE 1" = 100'	DATE 04 - 10 - 2019		
PROJECT NO. G2158 - 32 - 04		FIGURE 2	
SHEET 1 OF 2			



GEOLOGIC MAP

THE FARMS AT POWAY
POWAY, CALIFORNIA

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SCALE 1" = 100'	DATE 04 - 10 - 2019
PROJECT NO. G2158 - 32 - 04	FIGURE 3
SHEET 2 OF 2	

SEE FIGURE 2

APPENDIX A

APPENDIX A

TRENCH LOGS

PREPARED BY GEOCON INCORPORATED,
DATED AUGUST 10, 2017; PROJECT NO. G2158-32-01

FOR

THE FARMS AT POWAY
POWAY, CALIFORNIA

PROJECT NO. G2158-32-04

TRENCH T 1

ELEV. (MSL.) **741'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 5				SM/SC	**COLLUVIUM** Medium dense to dense, dry, reddish brown, Silty/Clayey, fine to medium SAND; pinhole porosity -Some fresh boulders 24-inch in size or greater, exposed in side wall and bottom of trench			
5 – 6					**GRANITIC ROCK** Moderately weak to moderately strong, moderately weathered, yellow, orange, and gray GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

REFUSAL AT 6 FEET
Groundwater not encountered

Figure A-1,
Log of Trench T 1, Page 1 of 1

G2158-32-01.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.

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PROJECT NO. G2158-32-01

TRENCH T 2

ELEV. (MSL.) **707'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2.5				SM	**UNDOCUMENTED FILL** Loose, damp, grayish-brown, Silty, fine to medium SAND			
2.5 – 14				SM/SC	**COLLUVIUM** Medium dense, moist, reddish brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
14 – 14.5					**GRANITIC ROCK** Weak, completely weathered, yellow and brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND with trace clay			

TRENCH TERMINATED AT 14.5 FEET
Groundwater not encountered

Figure A-2,
Log of Trench T 2, Page 1 of 1

G2158-32-01.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.

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TRENCH T 3

ELEV. (MSL.) **704'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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/SC	**COLLUVIUM** Medium dense, damp, reddish brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
2	T3-1							
4								
					GRANITIC ROCK Weak, completely weathered, yellow and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND			
6								

TRENCH TERMINATED AT 6 FEET
Groundwater not encountered

Figure A-3,
Log of Trench T 3, Page 1 of 1

G2158-32-01.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

TRENCH T 4

ELEV. (MSL.) 693' DATE COMPLETED 07-19-2017

EQUIPMENT JD 410G Backhoe BY: T. MYERS

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2				SM	**UNDOCUMENTED FILL** Loose, damp, brown, Silty, fine to medium SAND -Becomes light brown, Silty/Clayey, fine to medium SAND			
2 – 8				SM/SC	**COLLUVIUM** Medium dense, moist, reddish brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
8 – 8.5					**GRANITIC ROCK** Weak, completely weathered, orange, brown, and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 8.5 FEET
Groundwater not encountered

Figure A-4,
Log of Trench T 4, Page 1 of 1

G2158-32-01.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.

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TRENCH T 5

ELEV. (MSL.) **693'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, damp, grayish brown, Silty, fine to medium SAND			
2				CL	Soft, very moist, light brown, fine to coarse, Sandy CLAY			
4				SM/SC	Loose, moist, grayish-brown, Silty/Clayey, fine to medium SAND			
6, 8, 10				SM/SC	**COLLUVIUM** Medium dense, moist, reddish brown, Silty/Clayey fine to medium SAND; pinhole porosity			
					GRANITIC ROCK Weak, completely weathered, gray, yellow, and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 11.5 FEET
Groundwater not encountered

Figure A-5,
Log of Trench T 5, Page 1 of 1

G2158-32-01.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. G2158-32-01

TRENCH T 6

ELEV. (MSL.) **633'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, damp, dark brown, Silty, fine to medium SAND; heavy roots			
2				SM/SC	**COLLUVIUM** Loose, damp to slightly moist, light brown, Silty/Clayey , fine to medium SAND; porous, roots			
4				SM/SC	Medium dense to dense, damp to slightly moist, brown, Silty/Clayey, fine to medium SAND			
6								
8					**GRANITIC ROCK** Moderately weak, highly weathered, yellow and gray GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 9 FEET
Groundwater not encountered

Figure A-6,
Log of Trench T 6, Page 1 of 1

G2158-32-01.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

TRENCH T 7

ELEV. (MSL.) **618'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, dry, brown, Silty, fine to medium SAND; heavy roots, porous			
2				SM/SC	**COLLUVIUM** Medium dense, damp, orange brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
4					**GRANITIC ROCK** weak, completely weathered, yellowish brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND			
					REFUSAL AT 5 FEET Groundwater not encountered			

Figure A-7,
Log of Trench T 7, Page 1 of 1

G2158-32-01.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. G2158-32-01

TRENCH T 8

ELEV. (MSL.) **606'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, dry, light brown, Silty, fine to medium SAND			
2				SM/SC	**COLLUVIUM** Medium dense, damp, orange brown, Clayey/Silty SAND; pinhole porosity			
4								
6								
8								
					GRANITIC ROCK Weak, completely weathered, grayish brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND			
10					TRENCH TERMINATED AT 10 FEET Groundwater not encountered			

Figure A-8,
Log of Trench T 8, Page 1 of 1

G2158-32-01.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. G2158-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 9 ELEV. (MSL.) 605' DATE COMPLETED 07-19-2017 EQUIPMENT JD 410G Backhoe BY: T. MYERS	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL** Loose, damp, light brown, Silty, fine to medium SAND with some rootlets			
2					**GRANITIC ROCK** Moderately weak, highly weathered, orangish-brown, gray and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND			
					TRENCH TERMINATED AT 2.5 FEET Groundwater not encountered			

Figure A-9,
Log of Trench T 9, Page 1 of 1

G2158-32-01.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

TRENCH T 10

ELEV. (MSL.) **594'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 3				SM	**UNDOCUMENTED FILL** Loose, damp, brown, Silty, fine to medium SAND with rootlets			
3 – 12				SM/SC	**COLLUVIUM** Loose to medium dense, moist to very moist, dark brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
12 – 13					**GRANITIC ROCK** Weak, completely weathered, orange, yellow and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND with trace clay			

TRENCH TERMINATED AT 13 FEET
Groundwater not encountered

Figure A-10,
Log of Trench T 10, Page 1 of 1

G2158-32-01.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. G2158-32-01

TRENCH T 11

ELEV. (MSL.) **595'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					3" **ASPHALT CONCRETE**			
				SM	**UNDOCUMENTED FILL** Loose, damp, gray, Silty, fine to medium SAND			
2				SM/SC	**COLLUVIUM** Loose to medium dense, moist, brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
4								
6					**GRANITIC ROCK** Weak, completely weathered, yellow, orange, and grayish brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 7 FEET
Groundwater not encountered

Figure A-11,
Log of Trench T 11, Page 1 of 1

G2158-32-01.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. G2158-32-01

TRENCH T 12

ELEV. (MSL.) 595' DATE COMPLETED 07-19-2017

EQUIPMENT JD 410G Backhoe BY: T. MYERS

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 8				SM	**UNDOCUMENTED FILL** Loose, dry, light brown, Silty, fine to medium SAND with abundant cobble and boulders, generally 3-inch to 18-inch in size, and some debris (plastic, AC, roots)			
8 – 19				SM/SC	**COLLUVIUM** Loose to medium dense, damp to moist, brown, Silty/Clayey, fine to medium SAND; porous			
19 – 19.5					**GRANITIC ROCK** Weak, completely weathered, orange, black and white GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 19.5 FEET
Groundwater not encountered

Figure A-12,
Log of Trench T 12, Page 1 of 1

G2158-32-01.GPJ

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

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GEOCON

PROJECT NO. G2158-32-01

TRENCH T 13

ELEV. (MSL.) **598'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					Mulch/organics, tree trunks/branches			
2				SM/SC	**UNDOCUMENTED FILL** Loose, dry, light brown, Silty/Clayey, fine to medium SAND; some debris (asphalt concrete, plastic, roots)			
8				SM/SC	**COLLUVIUM** Loose to medium dense, moist, brown, Silty/Clayey, fine to medium SAND; porous			
14	T15-1							
18					**GRANITIC ROCK** Weak, completely weathered, brown, orange, gray, and yellow GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 18.5 FEET
Groundwater not encountered

Figure A-13,
Log of Trench T 13, Page 1 of 1

G2158-32-01.GPJ

SAMPLE SYMBOLS

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

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GEOCON

PROJECT NO. G2158-32-01

TRENCH T 14

ELEV. (MSL.) **600'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					Mulch/organics			
2				SM	**UNDOCUMENTED FILL** Loose, dry, brown gray, Silty, fine to medium SAND with some debris (plastic, rope, metal, etc)			
4								
6								
8								
10								
				SM/SC	**COLLUVIUM** Loose to medium dense, damp, brown, Silty/Clayey, fine to medium SAND			
12								
14								
16					**GRANITIC ROCK** Weak, completely weathered, orangish-brown, gray and black GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 17 FEET
Groundwater not encountered

Figure A-14,
Log of Trench T 14, Page 1 of 1

G2158-32-01.GPJ

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

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GEOCON

PROJECT NO. G2158-32-01

TRENCH T 15

ELEV. (MSL.) **594'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, damp, orangish-brown, Silty, fine to coarse SAND			
2								
4				SM/SC	**COLLUVIUM** Loose to medium dense, moist to very moist, dark grayish brown, Silty/Clayey, fine to medium SAND; pinhole porosity			
6								
8								
10								
12								
14					**GRANITIC ROCK** Moderately weak, highly weathered, grayish brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 14 FEET
Groundwater not encountered

Figure A-15,
Log of Trench T 15, Page 1 of 1

G2158-32-01.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

TRENCH T 16

ELEV. (MSL.) **596'** DATE COMPLETED **07-19-2017**

EQUIPMENT **JD 410G Backhoe** BY: **T. MYERS**

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** Loose, damp, brown, Silty, fine to medium SAND			
2 4 6				SC	**COLLUVIUM** Medium dense, damp, orangish brown, Clayey, fine to medium SAND; pinhole porosity			
8					**GRANITIC ROCK** Moderately weak, highly weathered, grayish brown GRANITIC ROCK; excavates as Silty, fine to coarse SAND			

TRENCH TERMINATED AT 8 FEET
Groundwater not encountered

Figure A-16,
Log of Trench T 16, Page 1 of 1

G2158-32-01.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

SEISMIC REFRACTION SURVEY
PREPARED BY SOUTHWEST GEOPHYSICS,
DATED AUGUST 10, 2017; PROJECT NO. 117388

FOR

THE FARMS AT POWAY
POWAY, CALIFORNIA

PROJECT NO. G2158-32-04

SEISMIC REFRACTION SURVEY
STONERIDGE GOLF COURSE
SAN DIEGO, CALIFORNIA

PREPARED FOR:
Geocon Incorporated
6960 Flanders Drive
San Diego, CA 92121

PREPARED BY:
Southwest Geophysics, Inc.
8057 Raytheon Road, Suite 9
San Diego, CA 92111

August 10, 2017
Project No. 117388

SOUTHWEST
GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

August 10, 2017
Project No. 117388

Mr. David Evans
Geocon Incorporated
6960 Flanders Drive
San Diego, CA 92121

Subject: Seismic Refraction Survey
Stoneridge Golf Course
San Diego, California

Dear Mr. Evans:

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the Stoneridge Golf Course project located in San Diego, California. Specifically, our survey consisted of performing seven seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles of the areas surveyed, and to assess the apparent rippability of the subsurface materials. This data report presents our survey methodology, equipment used, analysis, and results.

We appreciate the opportunity to be of service on this project. Should you have any questions please contact the undersigned at your convenience.

Sincerely,
SOUTHWEST GEOPHYSICS, INC.

Patrick Lehrmann, P.G., P.Gp.
Principal Geologist/Geophysicist

Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist

PFL/HV/hv

Distribution: Addressee (electronic)

REGISTERED GEOPHYSICIST
PATRICK F. LEHRMANN
No. 1043
Exp. 1/31/18
STATE OF CALIFORNIA

8057 Raytheon Road, Suite 9 • San Diego • California 92111 • Telephone 858-527-0849 • Fax 858-225-0114

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1. INTRODUCTION

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the Stoneridge Golf Course project located in San Diego, California (Figure 1). Specifically, our survey consisted of performing seven seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles of the areas surveyed, and to assess the apparent rippability of the subsurface materials. This data report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of seven seismic P-wave refraction lines at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results and conclusions.

3. SITE DESCRIPTION

The project site is generally located north of Espola Road between Saint Andrews Drive and Cloudcroft Drive in San Diego, California (Figure 1). The site is an active golf course and country club. Vegetation at the site consists of trees, scattered brush and grass. Several granitic bedrock outcrops are visible at the site. Figures 2, 3a, and 3b depict the site conditions in the area of the seismic traverses.

4. SURVEY METHODOLOGY

A seismic P-wave (compression wave) refraction survey was conducted at the site to evaluate the rippability characteristics of the subsurface materials and to develop subsurface velocity profiles of the areas surveyed. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

Seven seismic lines (SL-1 through SL-7) were conducted in the study area. The general locations and lengths of the lines were selected by your office. Shot points (signal generation locations) were conducted along the lines at the ends, midpoint, and intermediate points between the ends and the midpoint.

The seismic refraction theory requires that subsurface velocities increase with depth. A layer having a velocity lower than that of the layer above will not generally be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity, such as those caused by core stones, intrusions or boulders can also result in the misinterpretation of the subsurface conditions. In general, the effective depth of evaluation for a seismic refraction traverse is approximately one-third to one-fifth the length of the spread.

In general, the seismic P-wave velocity of a material can be correlated to rippability (see Table 1 below), or to some degree "hardness." Table 1 is based on published information from the Caterpillar Performance Handbook (Caterpillar, 2011) as well as our experience with similar materials, and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristics, such as fracture spacing and orientation, play a significant role in determining rock quality or rippability. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

For trenching operations**,** the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in a narrow trench, should be anticipated.

Table 1 – Rippability Classification	
Seismic P-wave Velocity	**Rippability**
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook (Caterpillar, 2004). Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

5. DATA ANALYSIS

The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

6. RESULTS AND CONCLUSIONS

As previously indicated, seven seismic traverses were conducted as part of our study. Figures 4a through 4g present the velocity models generated from our analysis. Based on the results it appears that the study area is underlain by low velocity materials (e.g., topsoil) in the near surface and granitic bedrock at depth. Distinct vertical and lateral velocity variations are evident in the models. Moreover, the degree of bedrock weathering and the depth to bedrock appears to be highly variable across the study areas. In addition, remnant boulders appear to be present in the subsurface in some areas.

Based on the refraction results, variability in the excavatability (including depth of rippability) of the subsurface materials should be expected across the project area. Furthermore, blasting may be required depending on the excavation depth, location, equipment used, and desired rate of production. In addition, oversized materials should be expected. A contractor with excavation experience in similar difficult conditions should be consulted for expert advice on excavation methodology, equipment and production rate.

7. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, Inc. should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. SELECTED REFERENCES

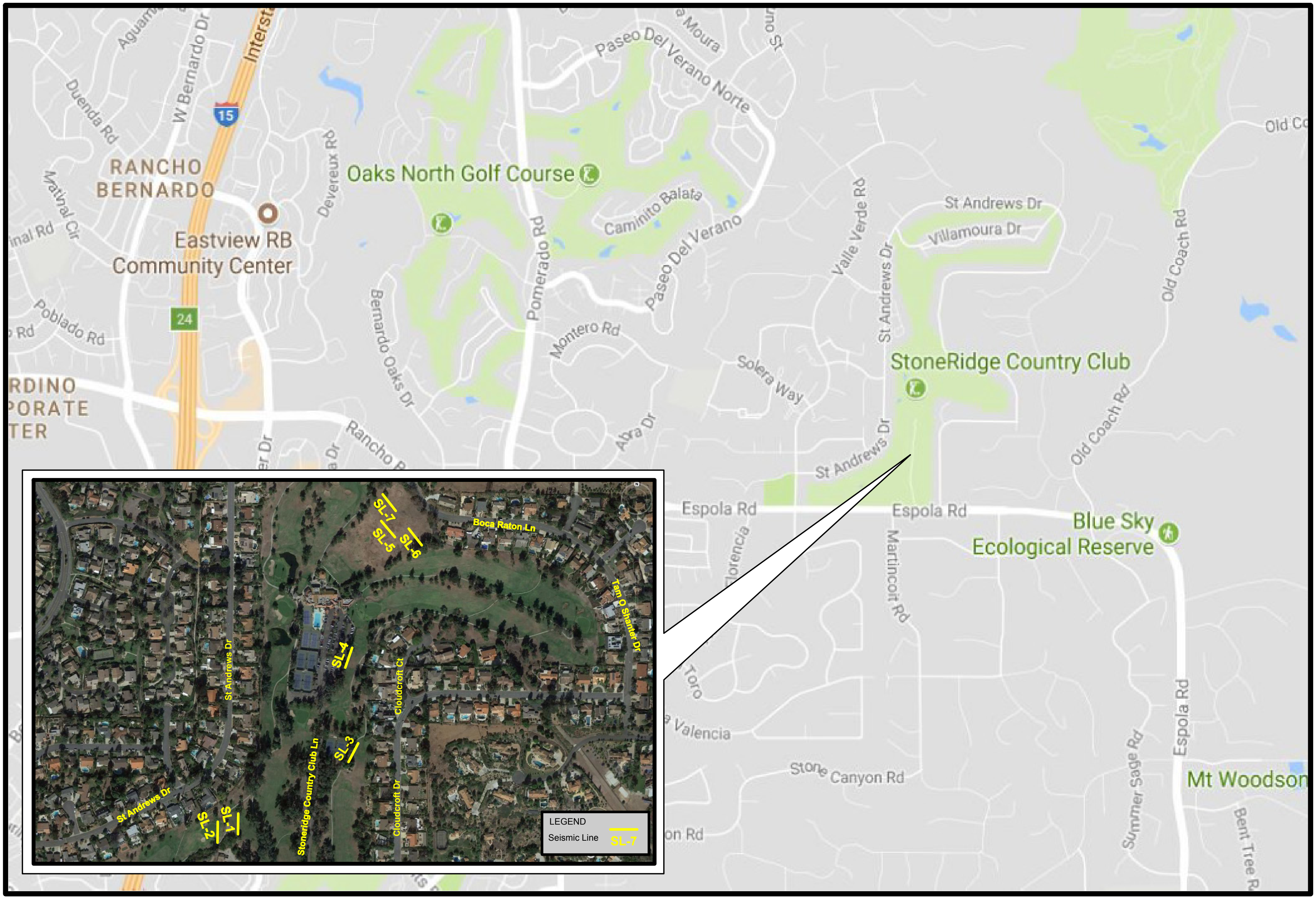
Caterpillar, Inc., 2011, Caterpillar Performance Handbook, Edition 41, Caterpillar, Inc., Peoria, Illinois.

Mooney, H.M., 1976, Handbook of Engineering Geophysics, dated February.

Optim, Inc., 2008, SeisOpt Pro, V-5.0.

Rimrock Geophysics, 2003, Seismic Refraction Interpretation Program (SIPwin), V-2.76.

Telford, W.M., Geldart, L.P., Sheriff, R.E., and Keys, D.A., 1976, Applied Geophysics, Cambridge University Press.



SITE LOCATION MAP	N	Stoneridge Golf Course San Diego, California Project No.: 117338 — Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 1

SEISMIC LINE LOCATION MAP

N

Stoneridge Golf Course
San Diego, California

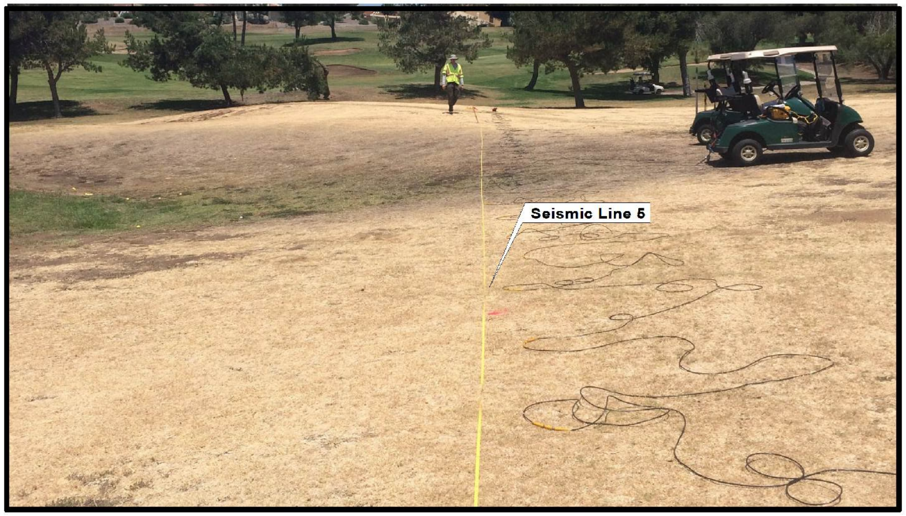
Project No.: 117338 | Date: 08/17

SOUTHWEST GEOPHYSICS INC.

Figure 2

0 300 600
approximate scale in feet

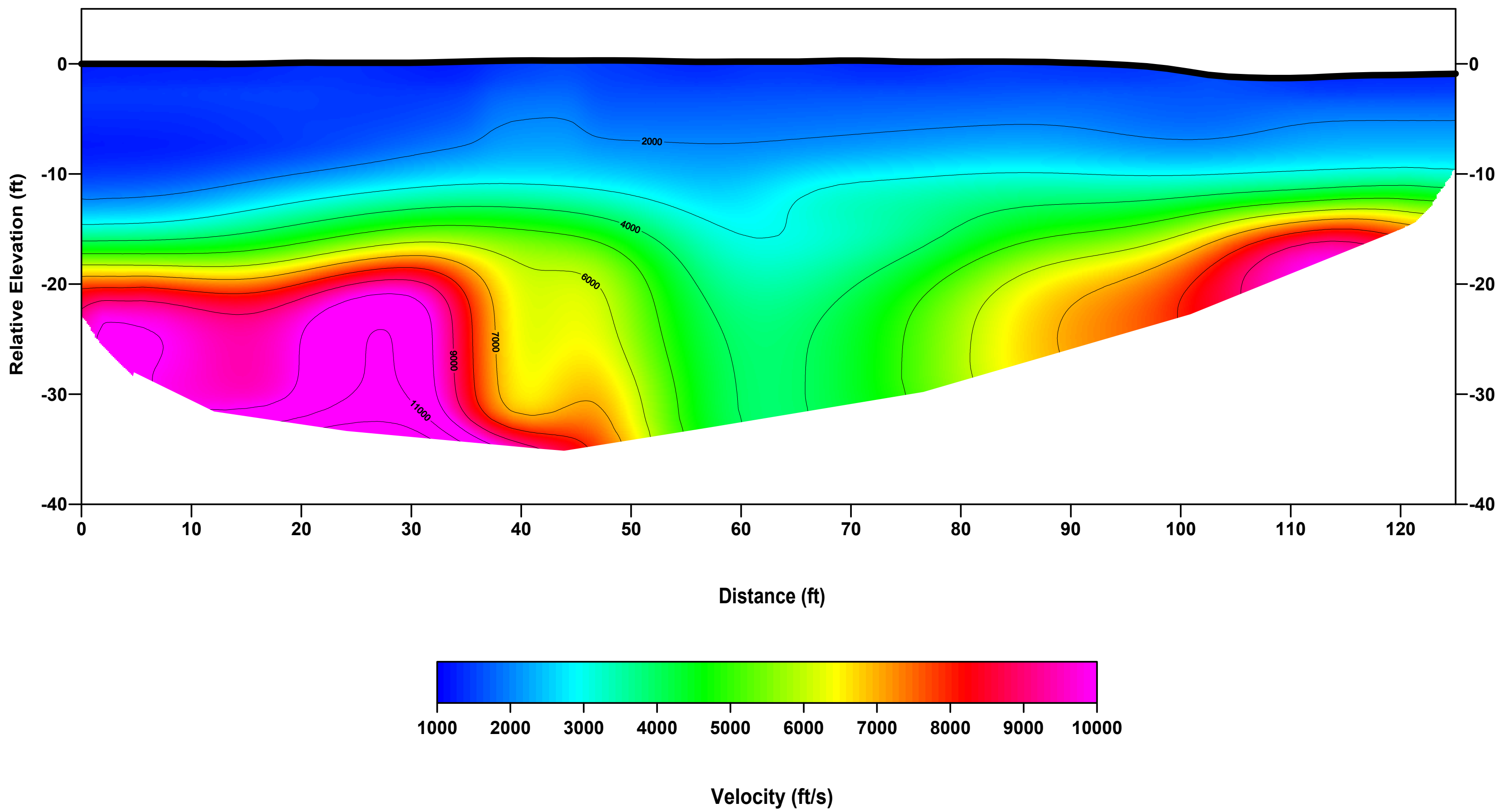
SITE PHOTOGRAPHS	Stoneridge Golf Course San Diego, California Project No.: 117338 Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 3a



SITE PHOTOGRAPHS	Stoneridge Golf Course San Diego, California		SOUTHWEST GEOPHYSICS INC. Figure 3b
	Project No.: 117338	Date: 08/17	

TOMOGRAPHY MODEL

SL-1

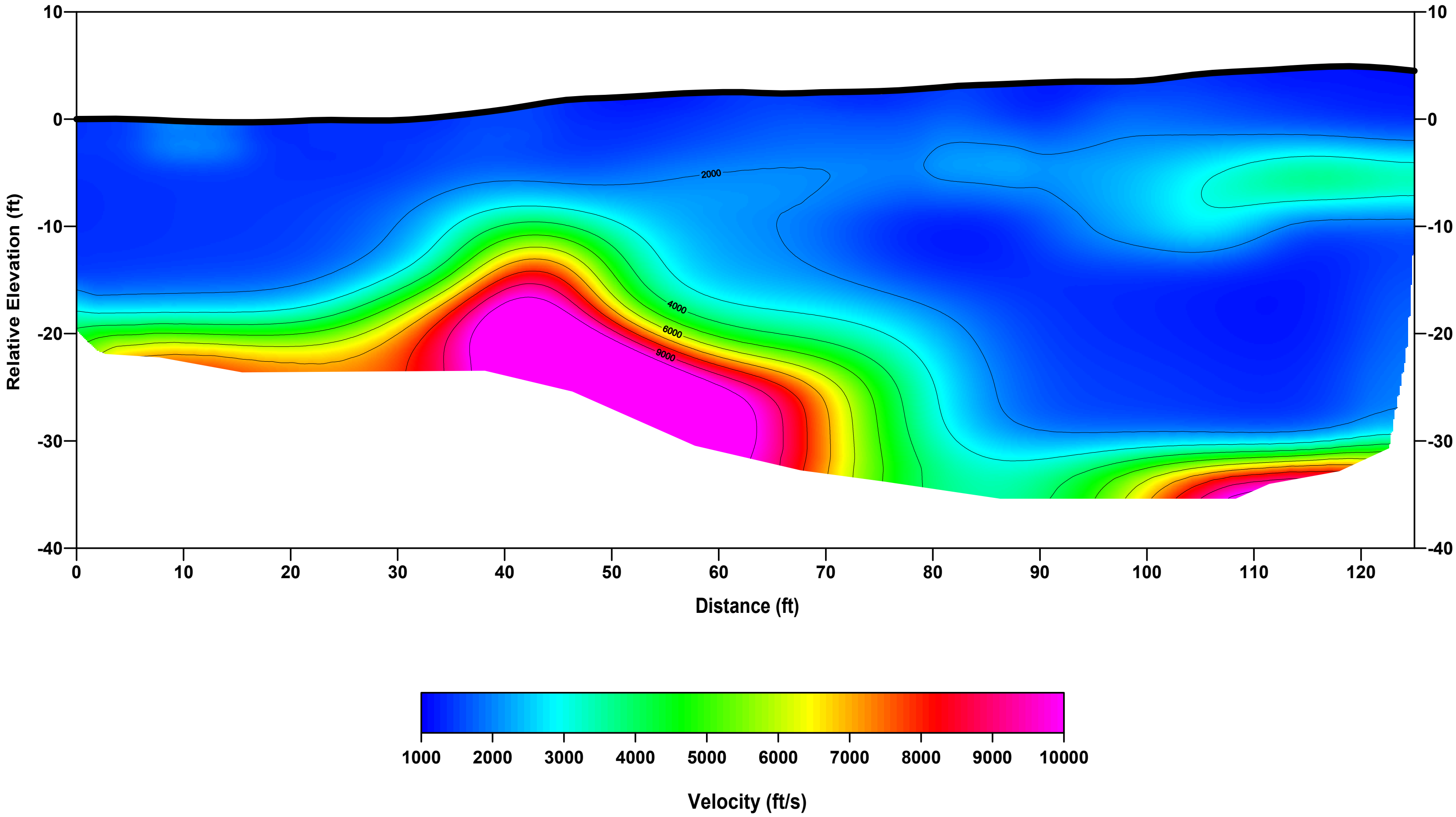


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California		SOUTHWEST GEOPHYSICS INC. Figure 4a
	Project No.: 117338	Date: 08/17	

TOMOGRAPHY MODEL

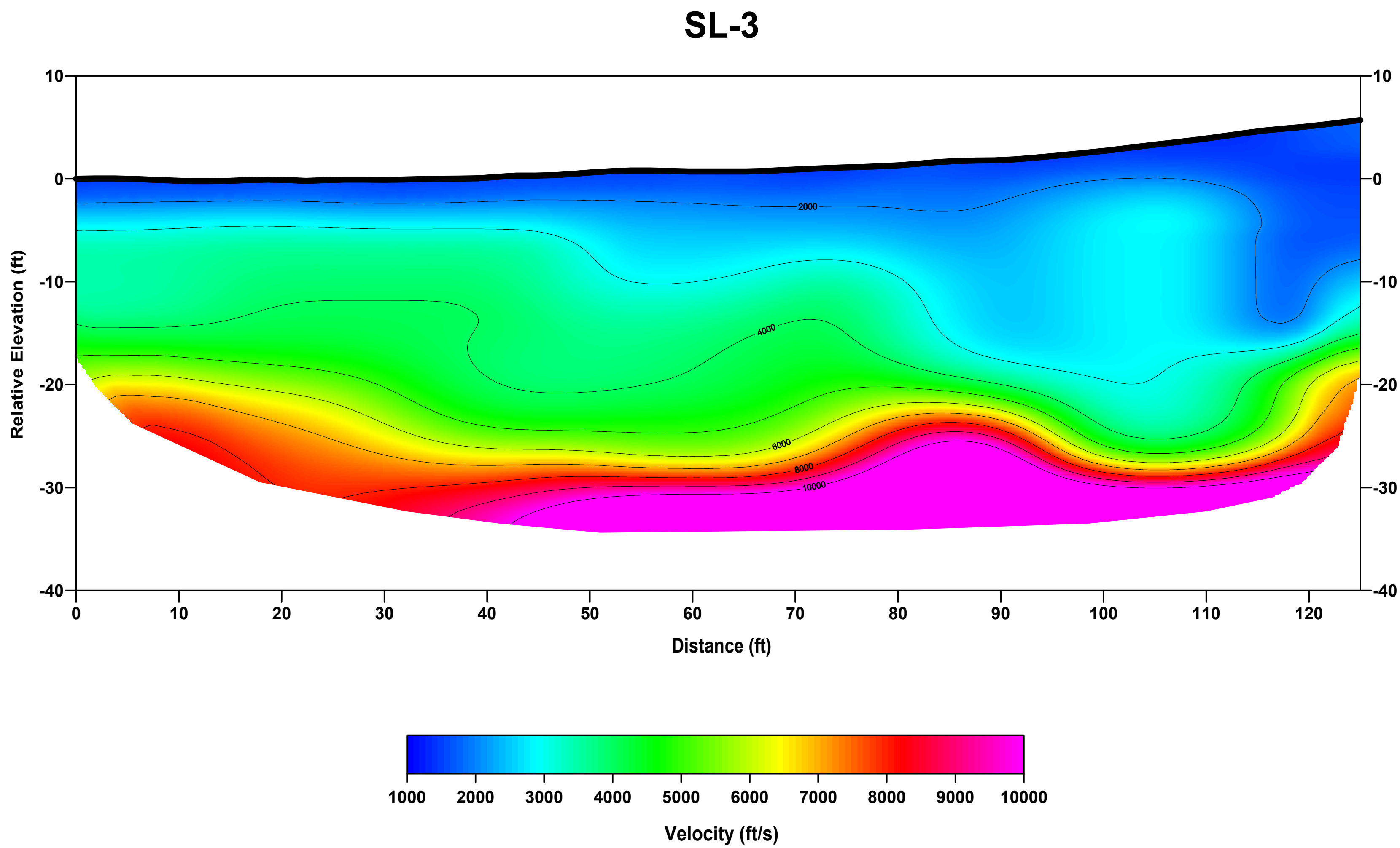
SL-2



Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California		SOUTHWEST GEOPHYSICS INC. Figure 4b
	Project No.: 117338	Date: 08/17	

TOMOGRAPHY MODEL

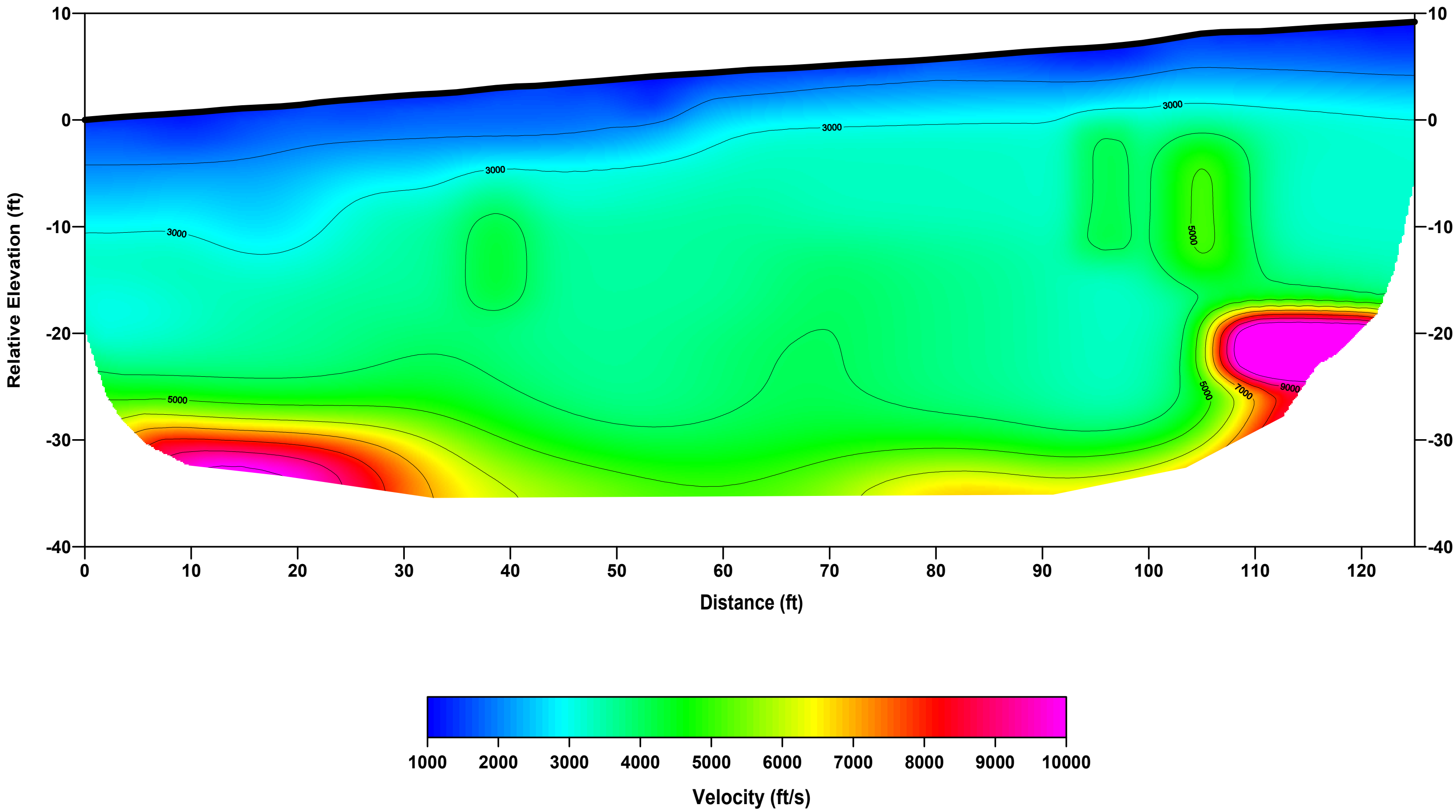


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California Project No.: 117338 Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 4c

TOMOGRAPHY MODEL

SL-4

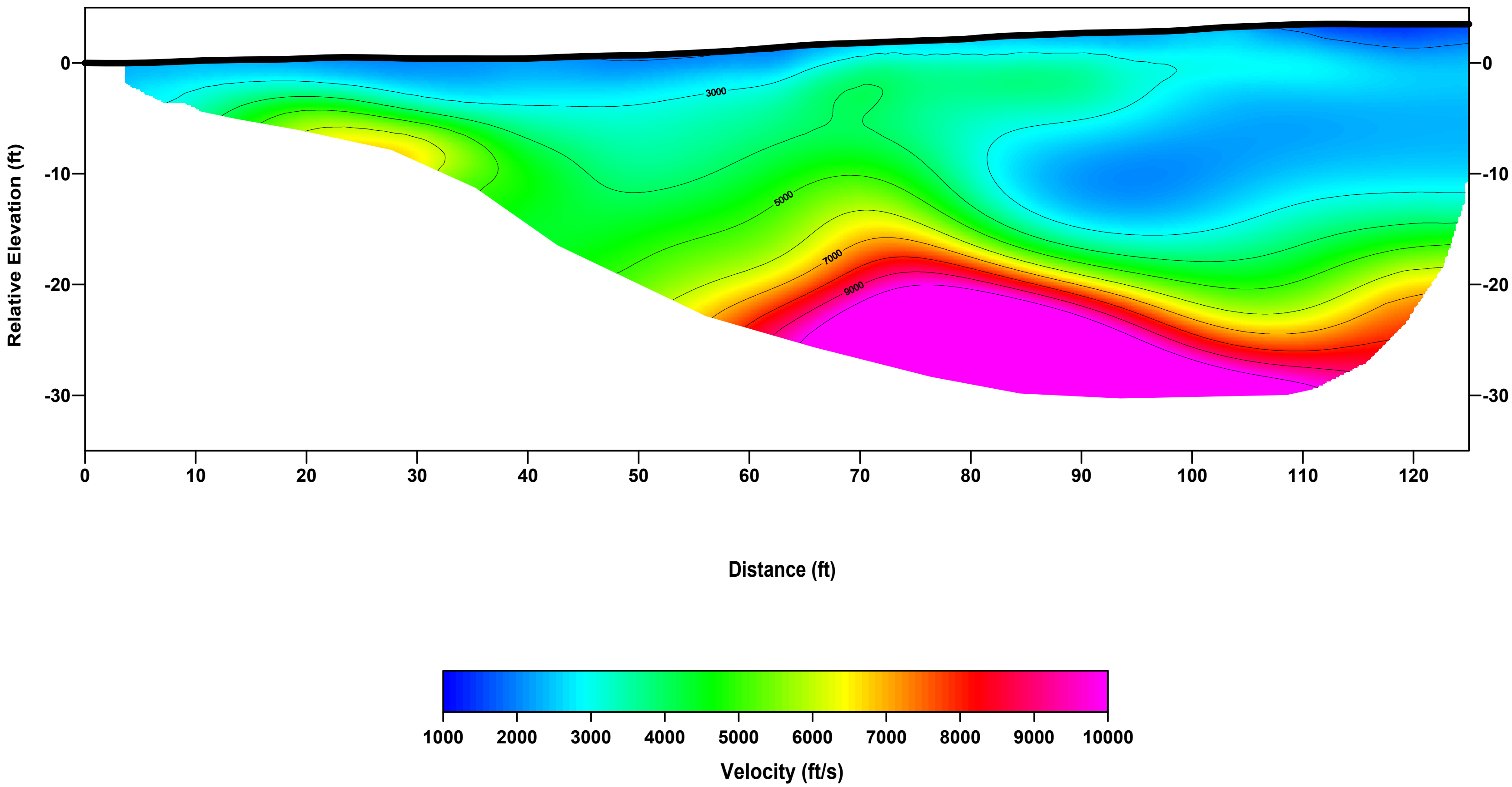


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California Project No.: 117338 — Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 4d

TOMOGRAPHY MODEL

SL-5

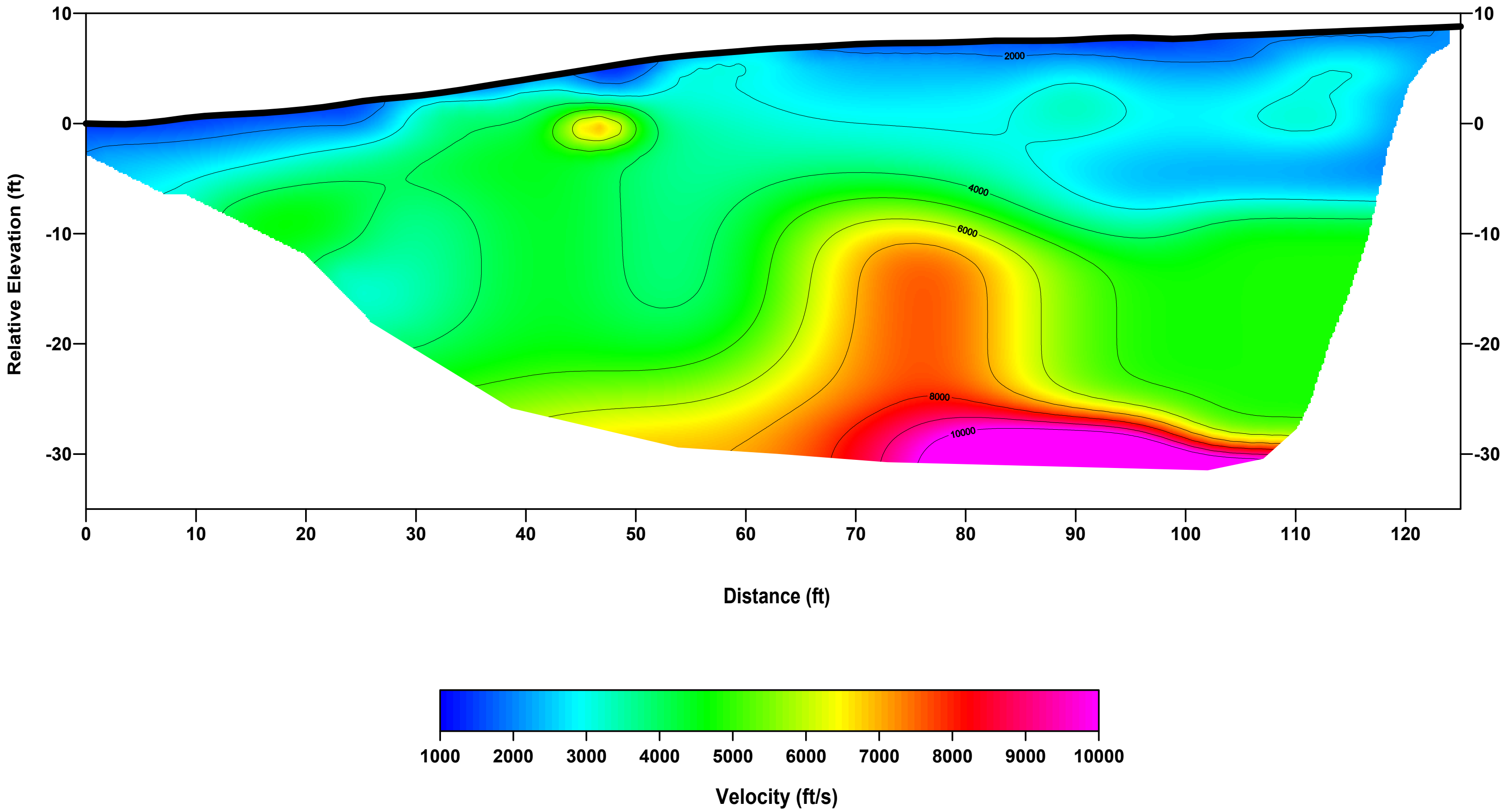


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California Project No.: 117338 Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 4e

TOMOGRAPHY MODEL

SL-6

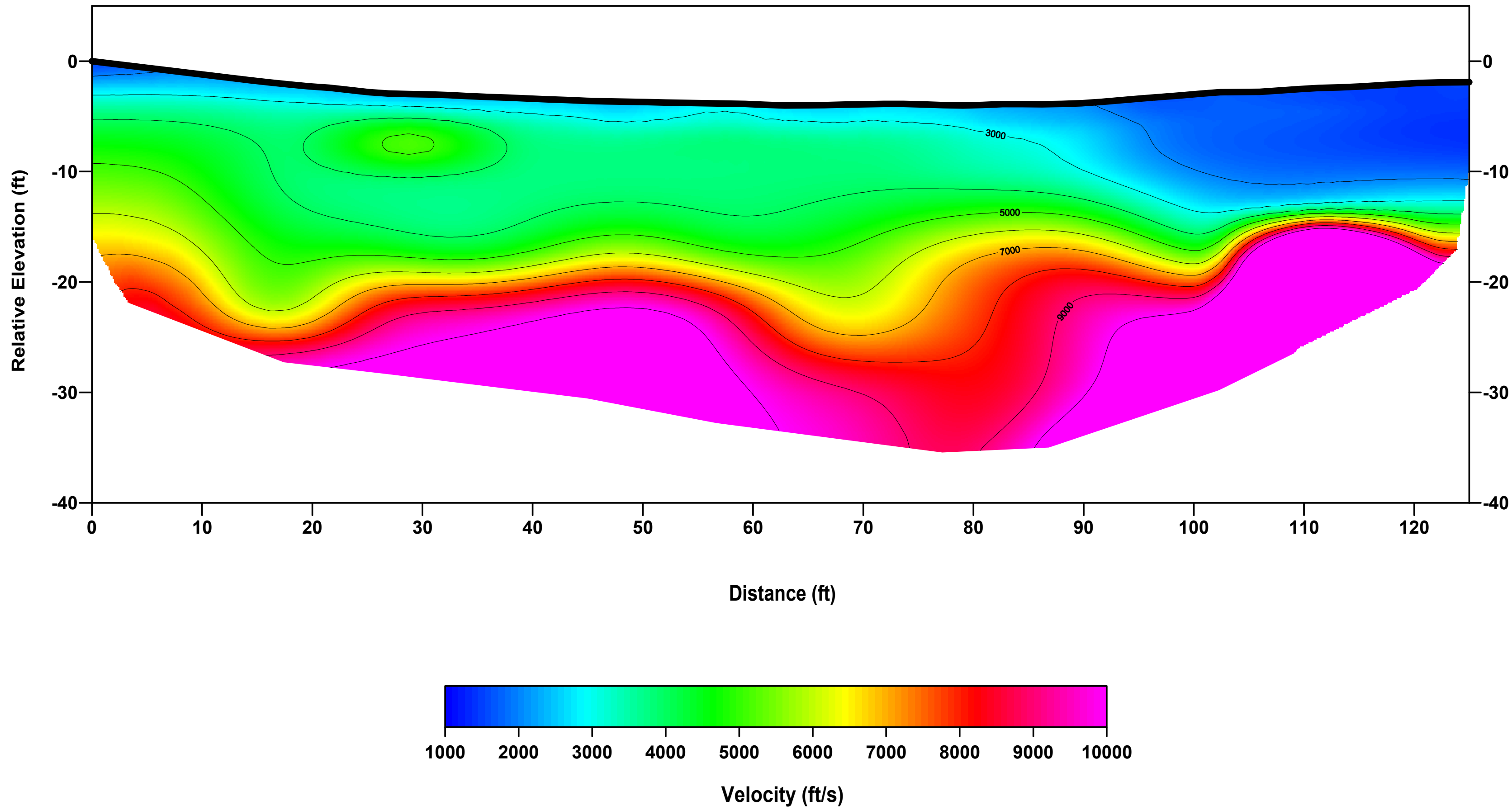


Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California		SOUTHWEST GEOPHYSICS INC. Figure 4f
	Project No.: 117338	Date: 08/17	

TOMOGRAPHY MODEL

SL-7



Note: Contour Interval = 1,000 feet per second

SEISMIC PROFILE	Stoneridge Golf Course San Diego, California Project No.: 117338 Date: 08/17	SOUTHWEST GEOPHYSICS INC. Figure 4g

APPENDIX C

APPENDIX C

BORING LOGS

PREPARED BY GEOCON INCORPORATED,
DATED JANUARY 12, 1990; PROJECT NO. D-3543-504

FOR

THE FARMS AT POWAY
POWAY, CALIFORNIA

PROJECT NO. G2158-32-04

File No. D-3543-504
January 12, 1990

BORING B 1

ELEVATION 686 DATE COMPLETED 1/8/90

EQUIPMENT BEAVER POWER AUGER

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2	B1-1				**FILL SOIL** Moderately dense, moist to very moist, brown to dark brown, fine to medium Silty SAND with a trace of clay	16	116.2	11.3
	B1-4							
4								
	B1-2				Moderately dense, moist, black, fine to medium Silty SAND with a little clay	23	124.6	11.0
6								
8					**DECOMPOSED GRANITIC ROCK** Very dense, moist, dark brown, fine to coarse SAND			
10	B1-3					50/1.5"		
					BORING TERMINATED AT 10.2 FEET			

Figure A-1 Log of Test Boring B 1, page 1 of 1

STNCC

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.

File No. D-3543-504
January 12, 1990

BORING B 2

ELEVATION 686 DATE COMPLETED 1/8/90

EQUIPMENT BEAVER POWER AUGER

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 4					**FILL SOIL** Moderately dense, moist, brown, fine to coarse SAND with a little clay			
4 – 6	B2-1				Moderately dense, moist, black, fine to medium Silty SAND with a trace of clay	44	123.9	12.9
6 – 10					**DECOMPOSED GRANITIC ROCK** Very dense, moist, tan to brown, fine to coarse SAND (too dense to sample)			
10					BORING TERMINATED AT 10 FEET			

Figure A-2 Log of Test Boring B 2, page 1 of 1

STNCC

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.

File No. D-3543-504
January 12, 1990

BORING B 3

ELEVATION 690 DATE COMPLETED 1/8/90

EQUIPMENT BEAVER POWER AUGER

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**FILL SOIL** Moderately dense, very moist, brown, fine to coarse Silty <u>SAND</u> with a trace of clay (sampler on a rock)			
2	B3-1					13/6"	118.8	11.0
4								
6	B3-2				**WEATHERED GRANITIC ROCK** Moderately dense, very moist, reddish-brown, fine to coarse <u>SAND</u> with a little clay	23	122.2	12.9
					DECOMPOSED GRANITIC ROCK Very dense, moist, reddish-brown, fine to coarse <u>SAND</u>			

BORING TERMINATED AT 7 FEET
REFUSAL

Figure A-3 **Log of Test Boring B 3, page 1 of 1**

STNCC

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.

File No. D-3543-504
January 12, 1990

BORING B 4

ELEVATION 690 DATE COMPLETED 1/8/90

EQUIPMENT BEAVER POWER AUGER

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0–4	B4-1				**FILL SOIL** Dense, damp to moist, brown, fine to medium Silty SAND with a trace of clay	41	127.3	9.4
4–6	B4-2				Dense, damp, dark brown, fine to coarse SAND	23	110.0	3.4
6–9					**DECOMPOSED GRANITIC ROCK** Very dense, moist, reddish-brown, fine to coarse SAND			

BORING TERMINATED AT 9 FEET
REFUSAL

Figure A-4 Log of Test Boring B 4, page 1 of 1

STNCC

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 D

APPENDIX D

BORING LOGS
PREPARED BY GEOCON INCORPORATED,
DATED OCTOBER 19, 1987; PROJECT NO. D-3543-W02

FOR

THE FARMS AT POWAY
POWAY, CALIFORNIA

PROJECT NO. G2158-32-04

File No. D-3543-W02
October 19, 1987

BORING 1

ELEVATION 663 DATE DRILLED 10/8/87

EQUIPMENT Mobile B-50 Drill Rig

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (U.S.C.S.)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT, %
0					FILL SOILS			
	B1-1				Medium dense, moist, brown, fine to medium Silty SAND with little clay		BULK SAMPLE	
2	B1-2					24	119.7	11.7
					color changes to dark reddish-brown			
4								
6	B1-3					48		
					Medium dense, moist, dark reddish-brown, Clayey SAND with trace of silt			
8								
					DECOMPOSED GRANITE			
10	B1-4				Medium dense, moist, grayish-green, fine to medium Silty SAND with little clay; weathered decomposed granitics	50/ 3.5"	126.0	8.9
12					Dense, moist, olive-green, fine to medium, Silty SAND (D.G.)			
					BORING TERMINATED AT 10.5 FEET			

Figure A-1, Log of Test Boring 1

SAMPLE SYMBOLS
- ☐ — SAMPLING UNSUCCESSFUL
- ☒ — DISTURBED OR BAG SAMPLE
- STANDARD PENETRATION TEST
- CHUNK SAMPLE
- ■ — DRIVE SAMPLE (UNDISTURBED)
- WATER TABLE OR SEEPAGE

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

File No. D-3543-W02
October 19, 1987

BORING 2

ELEVATION 662 DATE DRILLED 10/8/87

EQUIPMENT Mobile B-50 Drill Rig

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (U.S.C.S)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT, %
0					FILL SOILS Medium dense, dry to slightly moist, tan, fine to medium, Silty SAND			
2	B2-1					50/ 8"	126.0	5.2
4					little more moist			
6	B2-2				Dense, moist, reddish-brown, Silty SAND with trace clay	48	126.7	7.4
	B2-3						BULK SAMPLE	
8					increasing sand content			
10	B2-4				DECOMPOSED GRANITE Dense to very dense, orange to brown, Silty SAND	50/ 3"	127.2	9.6
12					BORING TERMINATED AT 10.5 FEET			

Figure A-2, Log of Test Boring 2

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.

APPENDIX E

APPENDIX E

RECOMMENDED GRADING SPECIFICATIONS

FOR

THE FARMS AT POWAY
POWAY, CALIFORNIA

PROJECT NO. G2158-32-04

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

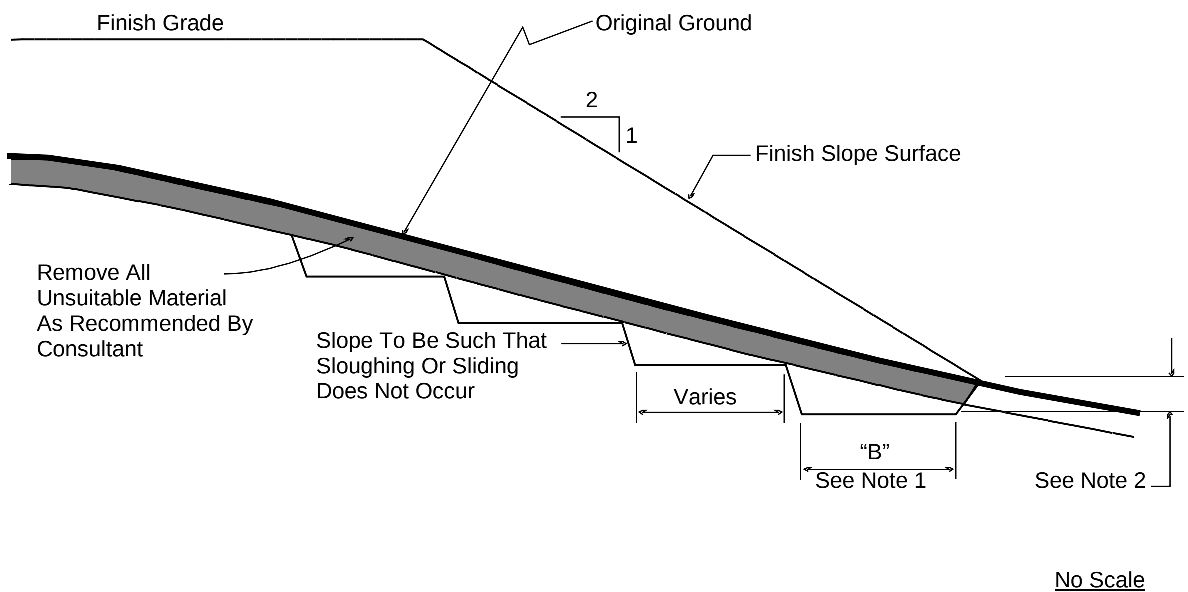
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



DETAIL NOTES: (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of “passes” have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

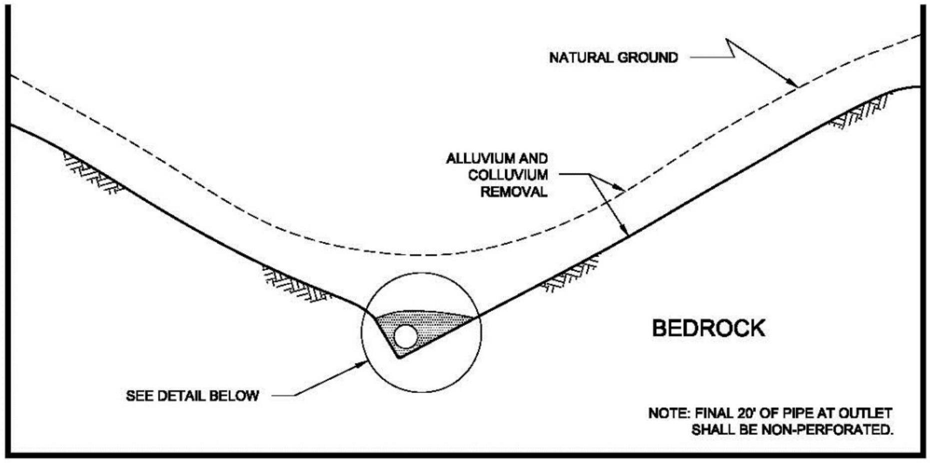
6.3.6 To reduce the potential for “piping” of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

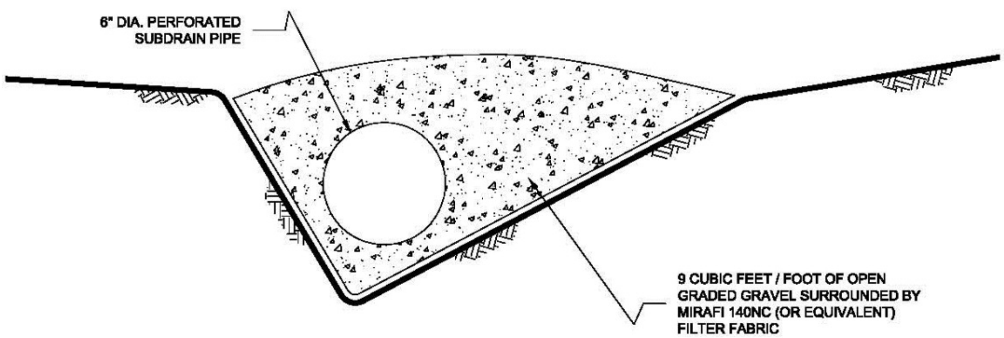
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL





NOTES:

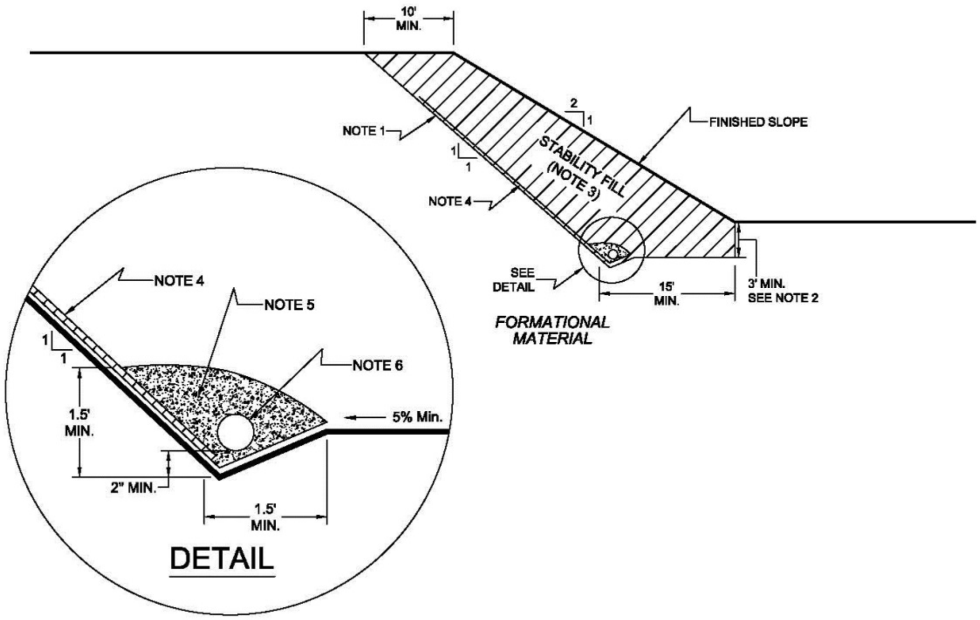
1......6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

2......6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

NO SCALE

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or lager) pipes.

TYPICAL STABILITY FILL DETAIL



NOTES:

1.....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).

2.....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.

3.....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.

4.....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.

5.....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).

6.....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

NO SCALE

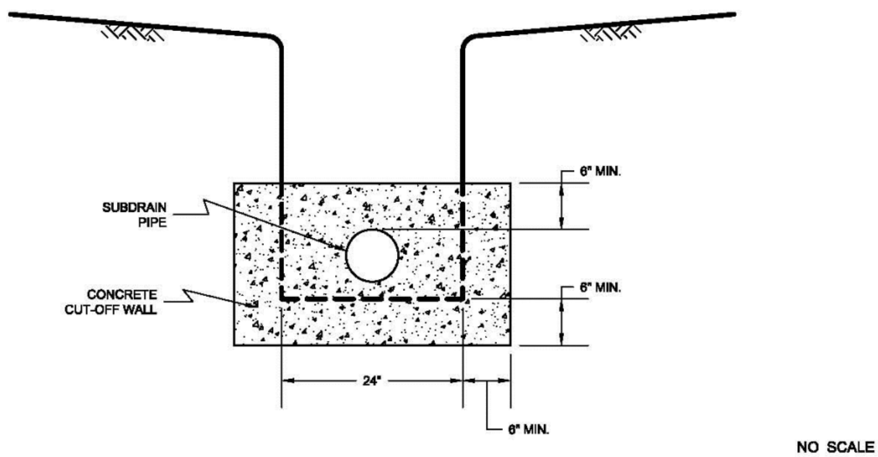
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.

7.4 *Rock* fill or *soil-rock* fill areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock* fill drains should be constructed using the same requirements as canyon subdrains.

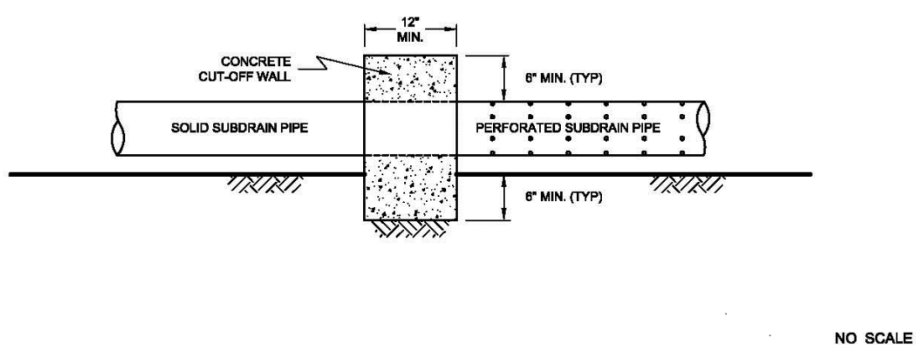
7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

TYPICAL CUT OFF WALL DETAIL

FRONT VIEW

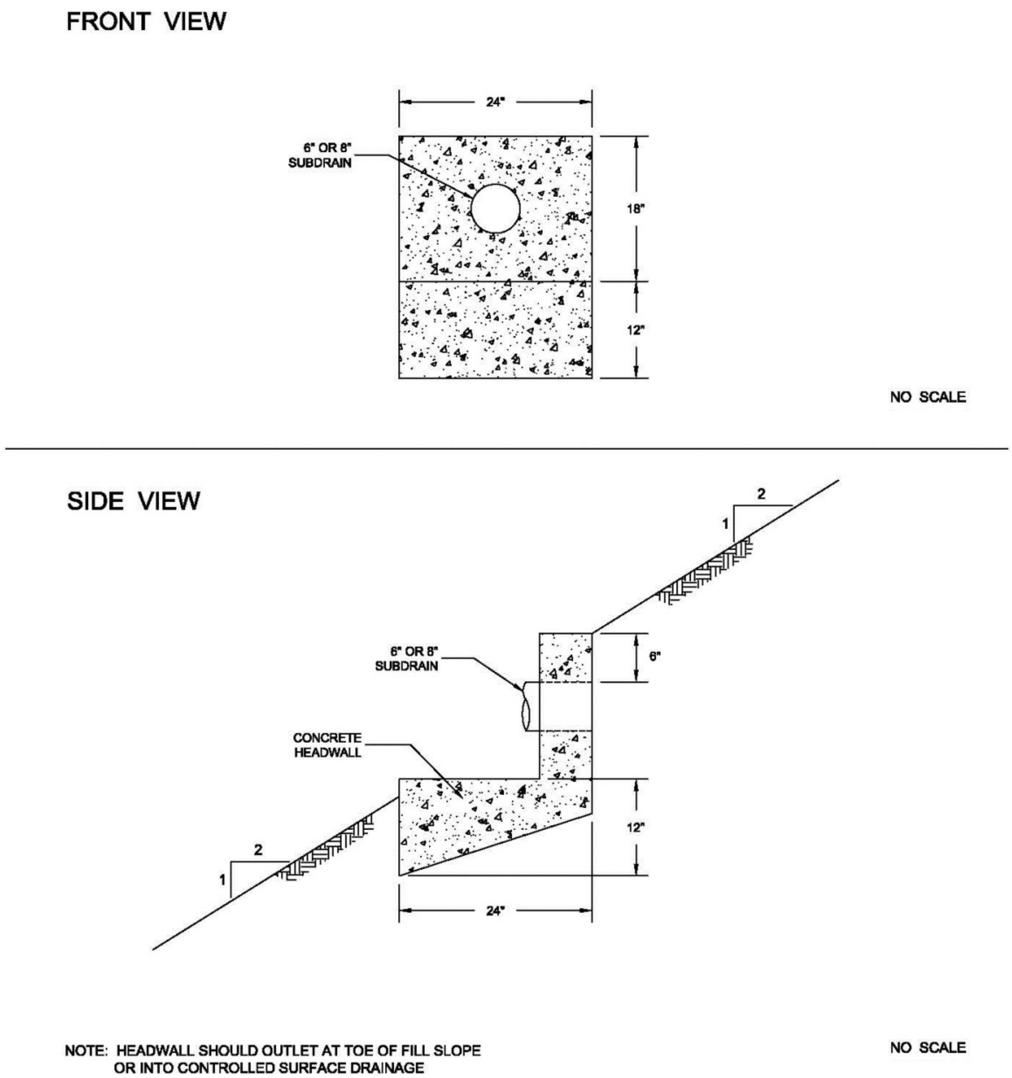


SIDE VIEW



7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

TYPICAL HEADWALL DETAIL



7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an "as-built" map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

8. OBSERVATION AND TESTING

8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.

8.6 Testing procedures shall conform to the following Standards as appropriate:

8.6.1 Soil and Soil-Rock Fills:

8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method.*

8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

8.6.1.4. Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

9. PROTECTION OF WORK

9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

10. CERTIFICATIONS AND FINAL REPORTS

10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

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2. California Department of Conservation, Division of Mines and Geology, *Probabilistic Seismic Hazard Assessment for the State of California*, Open File Report 96-08, 1996.

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12. United States Department of Agriculture, *1953 Stereoscopic Aerial Photographs, Flight AXN-10M*, Photos Nos. 93 and 94 (scale 1:20,000).

13. United States Geological Survey, *Topographic Map of the Escondido Quadrangle, San Diego County, California, 7.5' Series*, Scale 1:24,000, 1968.