APPENDIX A

APPENDIX A

EXPLORATORY EXCAVATIONS

We performed our field investigation between July 30, 2012 through August 22, 2012, and consisted of a site reconnaissance and the excavation 56 backhoe trenches, 5 small-diameter borings, 10 air track borings, and conducting 6 seismic refraction traverses. The approximate locations of the trenches, borings and traverses for this study are shown on the Geologic Map, Figures 2 and 3. The soil conditions encountered in the excavations were visually classified and logged in general accordance with American Society for Testing and Materials (ASTM) practice for Description and Identification of Soil (Visual Manual Procedure D 2844).

The exploratory trenches performed by Hillside Excavating were advanced to depths of 2½ to 16 feet using a John Deere 555 trackhoe equipped with a 24-inch-wide bucket. We obtained relatively undisturbed chunk samples and disturbed bulk samples for laboratory testing. The logs of the trenches depicting the soil and geologic conditions encountered and the depth at which samples were obtained are presented on Figures A-1 through A-56.

The small-diameter borings performed by Scott's Drill Service were advanced to a maximum depth of 20 feet below existing grade using a CME-55 rig equipped with 6-inch hollow-stem augers. We obtained samples from our borings 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 that are 2.4 inches in diameter and 1 inch in height are placed inside the sampler. 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 California sampler was driven 12 inches and SPT sampler 18 inches into the bottom of the excavations with the use of an automatic 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 12 inches. If the sampler was not driven for 12 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 estimated elevations shown on the boring and trench logs using the topographic map. We visually examined, classified, and logged the soil conditions encountered in the borings and trenches in general conformance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soil (Visual-Manual Procedure D 2844). The logs of the small diameter exploratory borings are presented on Figures A-57 through A-61 and included herein. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

An Ingersoll-Rand 370 pneumatic percussion rig equipped with 3 ½- inch diameter drill with hydraulic pull-down was used for airtrack holes at selected locations in order to evaluate rippability of characteristics of the underlying bedrock. The rate of penetration was measured and logged. The results are presented as graphs on Figures A-62 through A-71.

Seismic Refraction survey was performed by Southwest Geophysics, Inc. and the results are presented in Appendix C.

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 1 ELEV. (MSL.) 725' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, dark brown, Silty, fine to medium SAND, porous with rootlets			
2	T1-1				**GRANITIC ROCK** Completely weathered, light brown, medium grained, weak TONALITE; abundant pinholes -Becomes highly weathered, light brown, moderately strong tonalite -Becomes moderately weathered, strong - refusal			
4					TRENCH TERMINATED AT 5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

TRENCH T 2

ELEV. (MSL.) **707'** DATE COMPLETED **07-30-2012**

EQUIPMENT **JD 555** BY: **A. SADR**

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-SM	**ALLUVIUM** Loose, dry, brown, Silty to Clayey, fine to coarse SAND with little gravel and rootlets			
2					-Becomes medium dense, damp, dark brown, porous with roots to 6 feet, friable			
4	T2-1						100.4	4.8
6				SM	Becomes moist, brown, Silty, fine to medium SAND with pinholes			
8					-Thin interbeds of light gray, silty clay from 6 to 7 feet			
10	T2-2 T2-3				-Interbeds of coarse sand with subangular cobbles from 10 to 12 feet		120.6	7.7
12								
14					**GRANITIC ROCK** Highly weathered, dark gray, medium grained, weak TONALITE			
					TRENCH TERMINATED AT 15 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 3 ELEV. (MSL.) 730' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SM	**COLLUVIUM** Loose, dry, brown, Silty, fine to medium SAND with rootlets			
2	T3-1				-Becomes lose to medium dense, damp, reddish brown, silty, fine to medium sand, porous		109.8	6.4
4				SM	**TERRACE DEPOSITS** Medium dense, moist, reddish brown, medium to coarse Silty SAND with pinholes -Angular and subangular cobbles at 4 feet, approximately 8 inches thick			
6								
8								
		+ +			**GRANITIC ROCK** Moderately weathered, grayish brown, coarse grained, strong TONALITE -Refusal			
					TRENCH TERMINATED AT 9 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 4 ELEV. (MSL.) 708' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**UNDOCUMENTED FILL** Loose, dry, medium brown, Silty, fine to medium SAND			
2								
4					-Pieces of scrap metal at 3.5 feet			
					GRANITIC ROCK Moderately weathered, grayish brown, coarse, strong TONALITE			
					TRENCH TERMINATED AT 5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 5 ELEV. (MSL.) 695' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, grayish brown, Silty, fine to medium SAND with roots			
2								
4					**GRANITIC ROCK** Highly weathered, grayish brown, coarse grained, moderately strong TONALITE -Becomes moderately weathered, very strong, near refusal			
					TRENCH TERMINATED AT 5.5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 6 ELEV. (MSL.) 684' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM** Loose, dry to damp, dark grayish brown, Silty, fine to coarse SAND with pinholes and rootlets			
2					-Becomes medium dense, damp, dark brown, Silty, fine to medium SAND			
4	T6-1				-Becomes moist		117.6	7.6
6	T6-2						97.4	10.0
8	T6-3							
10					**GRANITIC ROCK** Highly weathered, dark grayish brown, coarse grained, moderately strong TONALITE -Becomes moderately weathered, strong, near refusal TRENCH TERMINATED AT 10 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

TRENCH T 7

ELEV. (MSL.) **677'** DATE COMPLETED **07-30-2012**

EQUIPMENT **JD 555** BY: **A. SADR**

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	**TOPSOIL** Loose, dry, very dark brown, Silty, fine to medium SAND, rootlets			
2				SM	**ALLUVIUM** Medium dense, damp, dark grayish brown, Silty, fine to medium SAND -Becomes moist, very dark brown			
4								
6				CL	Firm, moist, grayish green, Sandy CLAY, shinny parting surfaces			
8	T7-1						111.9	16.6
10					**GRANITIC ROCK** Highly weathered, dark grayish brown, medium green, moderately strong, TONALITE			
					TRENCH TERMINATED AT 10 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 8 ELEV. (MSL.) **678'** DATE COMPLETED **07-30-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL**			
				SM	Loose, dry, dark brown, Silty, fine to coarse SAND, rootlets			
2					**ALLUVIUM** Medium dense, damp, dark brown, Silty fine to coarse SAND with rootlets to 6 feet			
4					-Becomes moist			
6								
8					-Becomes wet			
10			▼		-Heavy seepage at 10.5 feet -Caving from 8 feet			
12								
14								
					TRENCH TERMINATED AT 15 FEET			

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

G1416-52-02.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. G1416-52-02

TRENCH T 9

ELEV. (MSL.) **687'** DATE COMPLETED **07-30-2012**

EQUIPMENT **JD 555** BY: **A. SADR**

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	**TOPSOIL** Loose, dry, dark brown, Silty, fine to coarse SAND, with rootlets			
2				SM	**ALLUVIUM** Loose to medium dense, damp, dark grayish brown, Silty, fine to medium SAND -Becomes medium dense, moist and brown			
4								
6					-Becomes medium dense to dense			
8	T9-1						117.2	16.3
10	T9-2				-Subangular cobbles at 11 to 12 feet			
12								
					GRANITIC TOCK Highly weathered, dark gray, coarse, moderately strong TONALITE TRENCH TERMINATED AT 13.5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 10 ELEV. (MSL.) 798' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**TOPSOIL** Loose, dry, graysih brown, Silty, fine to medium SAND, with rootlets			
2				SC-SM	Becomes medium dense, damp, reddish brown, Clayey, Silty SAND			
4					**GRANITIC ROCK** Highly weathered, light gray, fine, moderately strong TONALITE -Becomes moderately weathered, fractured, near vertical with NEdirection TRENCH TERMINATED AT 5 FEET			

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

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 11 ELEV. (MSL.) 798' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**TOPSOIL** Loose, dry, dark grayish brown, Silty SAND with rootlets			
2				SM	**ALLUVIUM** Medium dense, damp, reddish brown, Silty, fine to medium SAND			
4					**GRANITIC ROCK** Moderately weathered, grayish brown, medium grained, moderately strong TONALITE -Near refusal			
6					TRENCH TERMINATED AT 6 FEET			

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

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 12** ELEV. (MSL.) **728'** DATE COMPLETED **07-30-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Moderately dry, grayish brown, Silty, fine to medium SAND, porous with little subangular gravel			
2					**GRANITIC ROCK** Highly weathered, reddish brown, medium grained, moderately strong TONALITE			
4					-Moderately weathered, strong, near refusal			
					TRENCH TERMINATED AT 5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 13 ELEV. (MSL.) 748' DATE COMPLETED 07-30-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, dark grayish brown, Silty, fine to medium SAND with roots			
2					**GRANITIC ROCK** Highly weathered, light reddish brown, moderately strong TONALITE			
					TRENCH TERMINATED AT 2.5 FEET			

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

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 14 ELEV. (MSL.) 746' DATE COMPLETED 07-31-2012 EQUIPMENT JD 555 BY: A. SADR MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**COLLUVIUM** Loose, dry, dak brown, Silty, fine to medium SAND, porous, roots to 4 feet deep			
2								
4					-Becomes cobbly, subrounded -Stiff, moist, dark brown,sandy clay			
6					**GRANITIC ROCK** Highly weathered, grayish brown, medium grained, moderately strong, TONALITE TRENCH TERMINATED AT 7 FEET			

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

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 15** ELEV. (MSL.) **730'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**COLLUVIUM** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2								
4					**GRANITIC ROCK** Highly weathered, greenish brown, medium grained, moderately strong TONALITE TRENCH TERMINATED AT 4 FEET			

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

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 16 ELEV. (MSL.) 736' DATE COMPLETED 07-31-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					**TOPSOIL** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2					**GRANITIC ROCK** Highly weathered, graysih brown, medium grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 3.5 FEET			

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

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 17 ELEV. (MSL.) **728'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2	T17-1				**GRANITIC ROCK** Highly weathered, grayish brown, coarse grained, moderately strong TONALITE -Becomes moderately weathered, strong -Refusal			
4					TRENCH TERMINATED AT 4 FEET			

Figure A-17,
Log of Trench T 17, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 18 ELEV. (MSL.) **730'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose to medium dense, dry, reddish brown, Silty, fine to medium SAND, porous			
2					**GRANITIC ROCK** Highly weathered, light grayish brown, coarse grained, moderately strong TONALITE -Becomes moderately weathered -Near refusal			
4					TRENCH TERMINATED AT 4.5 FEET			

Figure A-18,
Log of Trench T 18, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 19 ELEV. (MSL.) **700'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**COLLUVIUM** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2	T19-1				-Becomes damp			
4					**GRANITIC ROCK** Highly weathered, grayish brown, coarse grained, moderately strong TONALITE			
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-19,
Log of Trench T 19, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 20 ELEV. (MSL.) 700' DATE COMPLETED 07-31-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2					**GRANITIC ROCK** Highly weathered, grayish brown, coarse grained, moderately strong TONALITE			
4					-Becomes moderately weathered, strong, near refusal			
					TRENCH TERMINATED AT 5 FEET			

Figure A-20,
Log of Trench T 20, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 21 ELEV. (MSL.) **706'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, reddish brown, Silty, fine to medium SAND, porous			
2					**GRANITIC ROCK** Moderately weathered to slightly weathered, dark gray, coarse grained, very strong TONALITE -Refusal			
					TRENCH TERMINATED AT 2 FEET			

Figure A-21,
Log of Trench T 21, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 22 ELEV. (MSL.) **680'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, grayish brown, Silty, fine to medium SAND, little gravel and cobble, rootlets, porous			
				SM				
2					**ALLUVIUM** Medium dense, damp, grayish brown, Silty, fine to coarse SAND, pinholes, little gravel			
				GP	-Becomes laminated with gray, silty fine sand			
4				SM	Angular and subangular COBBLES from 3 to 4 feet with silty sand matrix			
					Medium dense, moist, reddish brown, Silty, medium to coarse SAND			
6					**GRANITIC ROCK** Highly weathered, gray, coarse grained, moderately strong TONALITE -Becomes moderately weathered -Refusal at 6.5 feet TRENCH TERMINATED AT 6.5 FEET			

Figure A-22,
Log of Trench T 22, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 23 ELEV. (MSL.) **702'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**COLLUVIUM** Medium dense, dry, reddish brown, Silty, fine to medium SAND with little gravel and roots to 2 feet			
2					-Few subangular cobbles at 2.5 feet			
4					**GRANITIC ROCK** Highly weathered, grayish brown, coarse GRANIT, moderately strong TONALITE -Becomes moderately weathered and strong - near refusal			
					TRENCH TERMINATED AT 5.5 FEET			

Figure A-23,
Log of Trench T 23, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 24 ELEV. (MSL.) 710' DATE COMPLETED 07-31-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, light reddish brown, Silty, fine to coarse SAND, porous, roots to 3 feet			
2								
4								
6					**GRANITIC ROCK** Highly weathered, yellowish brown, coarse grained, moderately strong, TONALITE -Becomes moderately weathered -Near refusal at 6 feet TRENCH TERMINATED AT 6 FEET			

Figure A-24,
Log of Trench T 24, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 25 ELEV. (MSL.) **760'** DATE COMPLETED **07-31-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, light brown, Silty, fine to medium SAND			
2				SM	**COLLUVIUM** Medium dense, damp, light reddish brown, Silty, fine to coarse SAND			
4								
6					**GRANITIC ROCK** Highly weathered, medium to coarse grained moderately strong TONALITE; excavates blocky			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-25,
Log of Trench T 25, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 26 ELEV. (MSL.) **856'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, reddish brown, Silty SAND			
2					**GRANITIC ROCK** Highly weathered, grayish brown, moderately strong TONALITE - refusal			
					TRENCH TERMINATED AT 3 FEET			

Figure A-26,
Log of Trench T 26, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 27 ELEV. (MSL.) **850'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Medium dense dry, light brown, Silty, fine to medium SAND; some rootlets			
2					**GRANITIC ROCK** Highly weathered, light grayish brown, coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 2 FEET			

Figure A-27,
Log of Trench T 27, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 28 ELEV. (MSL.) 875' DATE COMPLETED 7-30-2012 EQUIPMENT JD 555 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, light brown, Silty, fine to medium SAND; trace boulders up to 2 feet in maximum dimension			
2					-Becomes brown			
4					-Occasional boulder in silty sand matrix			
					GRANITIC ROCK Highly weathered, gray brown, coarse grained, moderately strong, TONALITE			
					REFUSAL AT 5 FEET			

Figure A-28,
Log of Trench T 28, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 29 ELEV. (MSL.) **846'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, light brown, Silty SAND			
2					-Abundant boulders			
4					**GRANITIC ROCK** Highly weathered, light grayish brown, coarse grained, moderately strong, TONALITE			
					TRENCH TERMINATED AT 5 FEET			

Figure A-29,
Log of Trench T 29, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 30 ELEV. (MSL.) **820'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Medium dense, dry, reddish brown, Silty, fine to medium SAND; few boulders up to 3 feet in maximum dimension			
2								
4					**GRANITIC ROCK** Highly weathered, light grayish brown, coarse grained, moderately strong, TONALITE			
6					TRENCH TERMINATED AT 6 FEET No groundwater			

Figure A-30,
Log of Trench T 30, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 31 ELEV. (MSL.) **806'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Medium dense, dry, reddish brown, Silty, fine SAND			
2					**GRANITIC ROCK** Highly weathered, gary to dark reddish brown, coarse grained, moderately strong, TONALITE			
					TRENCH TERMINATED AT 2.5 FEET			

Figure A-31,
Log of Trench T 31, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 32 ELEV. (MSL.) **825'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM** Medium dense, wet, brown, Clayey SAND, trace boulders up to 1 foot in dimension			
2	T32-1				**GRANITIC ROCK** Highly weathered, reddish to grayish brown, coarse grained, moderately strong, TONALITE			
					TRENCH TERMINATED AT 3 FEET			

Figure A-32,
Log of Trench T 32, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 33 ELEV. (MSL.) **916'** DATE COMPLETED **7-30-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, light brown, Silty, fine SAND; few boulders			
2	T33-1				-Becomes medium dense **GRANITIC ROCK** Highly weathered, light reddish to yellowish brown, coarse grained, moderately strong, TONALITE			
4					TRENCH TERMINATED AT 4 FEET			

Figure A-33,
Log of Trench T 33, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 34 ELEV. (MSL.) 770' DATE COMPLETED 7-30-2012 EQUIPMENT JD 555 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, yellowish brown, Silty, fine to coarse SAND, some boulders up to 1' in maximum diameter			
2								
4					**GRANITIC ROCK** Highly weathered, light yellowish to reddish brown, medium to coarse grained, moderately strong TONALITE TRENCH TERMINATED AT 4 FEET			

Figure A-34,
Log of Trench T 34, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 35 ELEV. (MSL.) 740' DATE COMPLETED 08-01-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**COLLUVIUM** Loose, dry, light reddish brown, Silty, fine to medium SAND, porous			
2	T35-1						105.6	3.7
4					-Becomes medium dense, damp			
					GRANITIC ROCK Highly weathered, yellowish brown, medium grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 5 FEET			

Figure A-35,
Log of Trench T 35, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

TRENCH T 36

ELEV. (MSL.) **730'** DATE COMPLETED **08-01-2012**

EQUIPMENT **JD 555** BY: **A. SADR**

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	**ALLUVIUM** Loose, dry, light brown, Silty, fine to coarse SAND. porous			
2								
4	T36-1				-Becomes damp		102.1	5.0
6				SP	Medium dense, damp, coarse SAND with little silt			
	T36-2			SM	Dense, moist, yellowish brown, Silty SAND, slightly cemented, porous		113.3	11.5
8					-Becomes cobbly with angular/subangular cobbles			
10		+ + +			**GRANITIC ROCK** Highly weathered, yellowish brown, coarse grained, strong TONALITE			
					TRENCH TERMINATED AT 11 FEET			

Figure A-36,
Log of Trench T 36, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 37 ELEV. (MSL.) 834' DATE COMPLETED 08-01-2012 EQUIPMENT JD 555 BY: A. SADR	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose, dry, grayish brown, Silty, fine t medium SAND			
2					-Becomes reddish brown, medium to coarse			
4					-Boulders up to 12 inch diameter			
					GRANITIC ROCK Moderately weathered, graysih brown, coarse grained, strong TONALITE TRENCH TERMINATED AT 5 FEET			

Figure A-37,
Log of Trench T 37, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 38 ELEV. (MSL.) **765'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM** Loose, wet, dark grayish brown, Clayey, fine to coarse SAND with cobbles and boulders up to 4 feet diameter			
2								
4								
6			▼		-Seepage at 6 feet -Extension caving from the top			
		+ +			**GRANITIC ROCK** Highly weathered, yellowish brown, coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 7.5 FEET			

Figure A-38,
Log of Trench T 38, Page 1 of 1

G1416-52-02.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. G1416-52-02

TRENCH T 39

ELEV. (MSL.) **738'** DATE COMPLETED **08-01-2012**

EQUIPMENT **JD 555** BY: **A. SADR**

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	**COLLUVIUM** Loose, dry, yellowish brown, Silty, fine to medium SAND with roots and rootlets, porous			
2								
4				SM	**TERRACE DEPOSITS** Medium dense, moist, brown, Silty, fineto coarse SAND			
6	T39-1			SM-SC	-Becomes dense, moist, thin interbed of dark brown, clayey sand, slightly cemented Becomes dense, wet, yellowish brown, Silty to Clayey, fine to coarse SAND, trace subangular gravel		117.2	5.2
8	T39-2						119.0	11.1
10			▼		-Subangular cobbles weathered -Slight seepage			
12					**GRANITIC ROCK** Highly weathered, dark gray, coarse grained, moderately strong TONALITE TRENCH TERMINATED AT 12 FEET			

Figure A-39,
Log of Trench T 39, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 40 ELEV. (MSL.) **765'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **A. SADR**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**COLLUVIUM** Loose, dry, yellowish brown, Silty, fine to medium SAND, porous			
2					-Becomes very light gray			
				SC	Becomes dense, moist, dark brown, Clayey, fine to coarse SAND			
4				SM	**TERRACE DEPOSITS** Dense to very dense, moist, grayish brown, Silty SAND, little subangular gravel			
6					-Cobble at 6 feet			
					GRANITIC ROCK Moderately weathered, dark gray, coarse grained, strong TONALITE - refusal			
					TRENCH TERMINATED AT 6.5 FEET			

Figure A-40,
Log of Trench T 40, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

TRENCH T 41

ELEV. (MSL.) **732'** DATE COMPLETED **08-01-2012**

EQUIPMENT **JD 555** 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	**COLLUVIUM** Loose, dry, light reddish brown, Silty SAND			
2	T41-1 T41-2			CL	**TERRACE DEPOSITS** Stiff, moist, reddish to grayish brown, Sandy CLAY; trace angular gravels, grades into a residual soil of granitic origin		115.6	12.0
4					**GRANITIC ROCK** Highly weathered, grayish brown, coarse grained, moderately strong TONALITE			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-41,
Log of Trench T 41, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 42 ELEV. (MSL.) 732' DATE COMPLETED 08-01-2012 EQUIPMENT JD 555 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM** Loose, moist, dark brown, Clayey, fine to coarse SAND; abundant boulders			
2					-Becomes medium dense			
					GRANITIC ROCK Highly weathered, dark reddish brown, medium to coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 3 FEET			

Figure A-42,
Log of Trench T 42, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 43 ELEV. (MSL.) 742' DATE COMPLETED 08-01-2012 EQUIPMENT JD 555 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**COLLUVIUM** Loose, dry, light reddish brown, Clayey, fine SAND			
2				CL	Stiff, moist, reddish brown, Sandy CLAY, trace pinhole voids			
4					**GRANITIC ROCK** Highly weathered, reddish to grayish brown, coarse grained, moderately strong TONALITE TRENCH TERMINATED AT 4 FEET			

Figure A-43,
Log of Trench T 43, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 44 ELEV. (MSL.) **752'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**COLLUVIUM** Loose, dry, gray, brown, Clayey SAND, krotovina			
				SC	Dense, damp, reddish brown, Clayey, fine to coarse SAND			
2								
					GRANITIC ROCK Highly weathered, light grayish brown, coarse grained, moderately strong TONALITE			
4								
					TRENCH TERMINATED AT 4.5 FEET			

Figure A-44,
Log of Trench T 44, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 45 ELEV. (MSL.) **742'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**UNDOCUMENTED FILL** Loose, wet, brown, Clayey, fine to coarse SAND; few boulders up to 1 foot in maximum dimension			
2				SC	**ALLUVIUM** Soft, wet, brown, Clayey, fine to coarse SAND			
4								
6					**GRANITIC ROCK** Highly weathered, dark grayish brown, medium grained, moderately strong TONALITE TRENCH TERMINATED AT 6.5 FEET			

Figure A-45,
Log of Trench T 45, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 46 ELEV. (MSL.) **742'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM** Loose, moist, brown, Clayey, fine to coarse SAND; few boulder up to 5 feet in maximum dimension			
2								
4								
6					**GRANITIC ROCK** Highly weathered, grayish brown, medium to coarse grained, moderately strong TONALITE			
					TRENCH TERMINATE AT 7 FEET			

Figure A-46,
Log of Trench T 46, Page 1 of 1

G1416-52-02.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. G1416-52-02

TRENCH T 47

ELEV. (MSL.) **750'** DATE COMPLETED **08-01-2012**

EQUIPMENT **JD 555** BY: **M. ERTWINE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**COLLUVIUM** Loose, dry, dark brown, Clayey, fine-to coarse SAND			
2	T47-1			SC	**TERRACE DEPOSITS** Stiff, damp, olive brown, Sandy CLAY; some pinhole porosity -Gradational contact		121.9	8.7
	T47-2						123.6	7.1
4					**GRANITIC ROCK** Highly weathered, grayish brown, medium to coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED A 4.5 FEET			

Figure A-47,
Log of Trench T 47, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 48 ELEV. (MSL.) **760'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, damp, brown, Clayey, fine to coarse SAND			
2					**GRANITIC ROCK** Highly weathered, grayish to reddish brown, coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 3 FEET			

Figure A-48,
Log of Trench T 48, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 49** ELEV. (MSL.) **724'** DATE COMPLETED **08-01-2012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM** Loose, damp, brown, Clayey, fine to coarse SAND with boulders			
2					-Becomes wet, moderate seepage			
					GRANITIC ROCK Highly weathered, gray, medium to coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 3 FEET			

Figure A-49,
Log of Trench T 49, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 50 ELEV. (MSL.) 732' DATE COMPLETED 08-01-2012 EQUIPMENT JD 555 BY: M. ERTWINE MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**COLLUVIUM** Stiff, wet, brown, Sandy CLAY			
2								
4					-Saturated along contact			
					GRANITIC ROCK Highly weathered, sark grayish brown, coarse grained, moderately strong TONALITE			

Figure A-50,
Log of Trench T 50, Page 1 of 1

G1416-52-02.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. G1416-52-02

TRENCH T 51

ELEV. (MSL.) **762'** DATE COMPLETED **08-02-1012**

EQUIPMENT **JD 555** BY: **M. ERTWINE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**UNDOCUMENTED FILL** Firm, moist, brown, Sandy CLAY			
2	T51-1				-Becomes reddish brown with trace pinhole voids			
4								
	T51-2			CL	Stiff, moist, light grayish brown, Sandy CLAY, trace gravel			
6	T51-3						112.3	15.4
8					**SANTIAGO FORMATION** Hard, moist, light gray, Sandy CLAYSTONE			
10	T51-4				-Becomes very hard, highly fractured, blocky texture			
	T51-5							
12					TRENCH TERMINATED AT 12 FEET			

Figure A-51,
Log of Trench T 51, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 52 ELEV. (MSL.) 788' DATE COMPLETED 08-02-1012 EQUIPMENT JD 555 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Medium dense, moist, light reddish brown, Silty, fine to coarse SAND			
2				SC-SM	**UNDOCUMENTED FILL** Medium dense, moist, light reddish brown, Silty to Clayey SAND			
4								
6								
8	T52-1 T52-2			SC	**SANTIAGO FORMATION** (Ts) Dense, wet, dark grayish brown, Clayey, fine to coarse SAND		111.3	15.4
10								
12								
14					TRENCH TERMINATED AT 14 FEET			

Figure A-52,
Log of Trench T 52, Page 1 of 1

G1416-52-02.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. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 53 ELEV. (MSL.) **800'** DATE COMPLETED **08-02-1012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dense, brown, Silty, fine to coarse SAND			
2	T53-1				**GRANITIC ROCK** Completely weathered, dense, moist, reddish brown, coarse grained, moderately strong TONALITE (excavates into clayey sand)			
4								
					TRENCH TERMINATED AT 5 FEET			

Figure A-53,
Log of Trench T 53, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 54** ELEV. (MSL.) **812'** DATE COMPLETED **08-02-1012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, yellowish brown, Silty, fine to coarse SAND			
2	T54-1				**GRANITIC ROCK** Highly weathered, medium to coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 3 FEET			

Figure A-54,
Log of Trench T 54, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 55 ELEV. (MSL.) **836'** DATE COMPLETED **08-02-1012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, dry, yellowish brown, Silty, fine to coarse SAND			
2					**GRANITIC ROCK** Highly fractured, graysih to reddish brown, coarse grained, moderately strong TONALITE			
					TRENCH TERMINATED AT 2.5 FEET			

Figure A-55,
Log of Trench T 55, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 56** ELEV. (MSL.) **772'** DATE COMPLETED **08-02-1012** EQUIPMENT **JD 555** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**UNDOCUMENTED FILL** Medium dense, moist, light brown to grayish brown, Clayey, fine to medium SAND; trace gravel			
2								
4				SM	**SANTIAGO FORMATION** Dense, damp, whitish, Silty, fine to medium grained SANDSTONE, slightly cemented			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-56,
Log of Trench T 56, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

BORING B 1

ELEV. (MSL.) **689'** DATE COMPLETED **08-17-2012**

EQUIPMENT **CME 55** 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	B1-1			SM	**ALLUVIUM** Medium dense, damp, light reddish brown, Silty fine SAND			
2	B1-2				-Becomes very dense, damp, light grayish brown, Silty, fine-to medium SAND; highly weathered residual soil	70/10"	130.8	6.9
4								
6	B1-3				**GRANITIC ROCK** Highly weathered , olive brown, medium-to coarse-grained, strong TONALITE	50/3"		
8								
10	B1-4				-No recovery Moderately weathered , olive brown, medium-to coarse-grained, strong TONALITE - refusal			
					BORING TERMINATED AT 10.3 FEET No groundwater			

Figure A-57,
Log of Boring B 1, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B 2 ELEV. (MSL.) 698' DATE COMPLETED 08-17-2012 EQUIPMENT CME 55 BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Loose to medium dense, dry to moist, dark reddish brown, Silty, fine-to medium SAND			
2	B2-1					12	107.1	6.9
4								
6	B2-2				-Becomes medium dense, moist, reddish brown, Silty, fine-to coarse SAND; trace clay, trace gravel	16	120.5	10.9
8	B2-3							
10	B2-4				**GRANITIC ROCK** Moderately weathered , olive brown to reddish brown, medium-to coarse-grained TONALITE -Becomes grayish brown, silty, fine-to coarse sand - refusal	50		
					BORING TERMINATED AT 10.3 FEET No groundwater			

Figure A-58,
Log of Boring B 2, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

BORING B 3

ELEV. (MSL.) **677'** DATE COMPLETED **08-17-2012**

EQUIPMENT **CME 55** BY: **M. ERTWINE**

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0		SM	**ALLUVIUM** Medium dense, moist, reddish brown, Silty, fine-to coarse SAND; trace rootlets			
2	B3-1			21	104.9	4.7
4						
6	B3-2			16	109.4	8.9
			-Trace clay			
8						
			-Static groundwater at 9 feet			
10		SC	Loose, saturated, reddish brown, Clayey, fine-to coarse SAND			
	B3-3			4	106.7	21.6
12						
14						
	B3-4		-Becomes medium dense, saturated, reddish brown, Clayey, fine-to coarse SAND; trace gravel	25		
16						
18						
			GRANITIC ROCK Moderately weathered, olive, brown, medium-to coarse-grained, very strong TONALITE; refusal			
20	B3-5			50/2"		

BORING TERMINATED AT 20.2 FEET
Groundwater at 9 feet
Hole collapse to 10.5 feet
Backfilled with bentonite chips

Figure A-59,
Log of Boring B 3, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING B 4** ELEV. (MSL.) **702'** DATE COMPLETED **08-17-2012** EQUIPMENT **CME 55** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Medium dense, reddish brown, Silty, fine-to coarse SAND			
2								
4					**GRANITIC ROCK** Moderately weathered, grayish brown, medium-to coarse, strong TONALITE - refusal			
					BORING TERMINATE AT 5.2 FEET No groundwater			

Figure A-60,
Log of Boring B 4, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

BORING B 5

ELEV. (MSL.) **774'** DATE COMPLETED **08-17-2012**

EQUIPMENT **CME 55** 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	B5-1			SC	**UNDOCUMENTED FILL** Dense, damp, reddish brown, mottled, olive brown, Clayey, fine to coarse SAND			
2	B5-2					50/6"	100.6	12.6
4								
6	B5-3					82/11"	112.3	10.0
8					-Difficult drilling			
10	B5-4			CL	**SANTIAGO FORMATION** Hard, moist, grayish brown, Sandy CLAYSTONE	53	107.3	18.1
12								
14								
16	B5-5 B5-6			SC	Very dense, moist, light gray, Clayey, fine-to medium-grained SANDSTONE	50/6" 70	109.0	17.8
18								
20	B5-7				**GRANITIC ROCK** Highly weathered, gray, medium grained, very strong TONALITE	50/4"	117.3	10.4
					BORING TERMINATED AT 21 FEET			

Figure A-61,
Log of Boring B 5, Page 1 of 1

G1416-52-02.GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1416-52-02

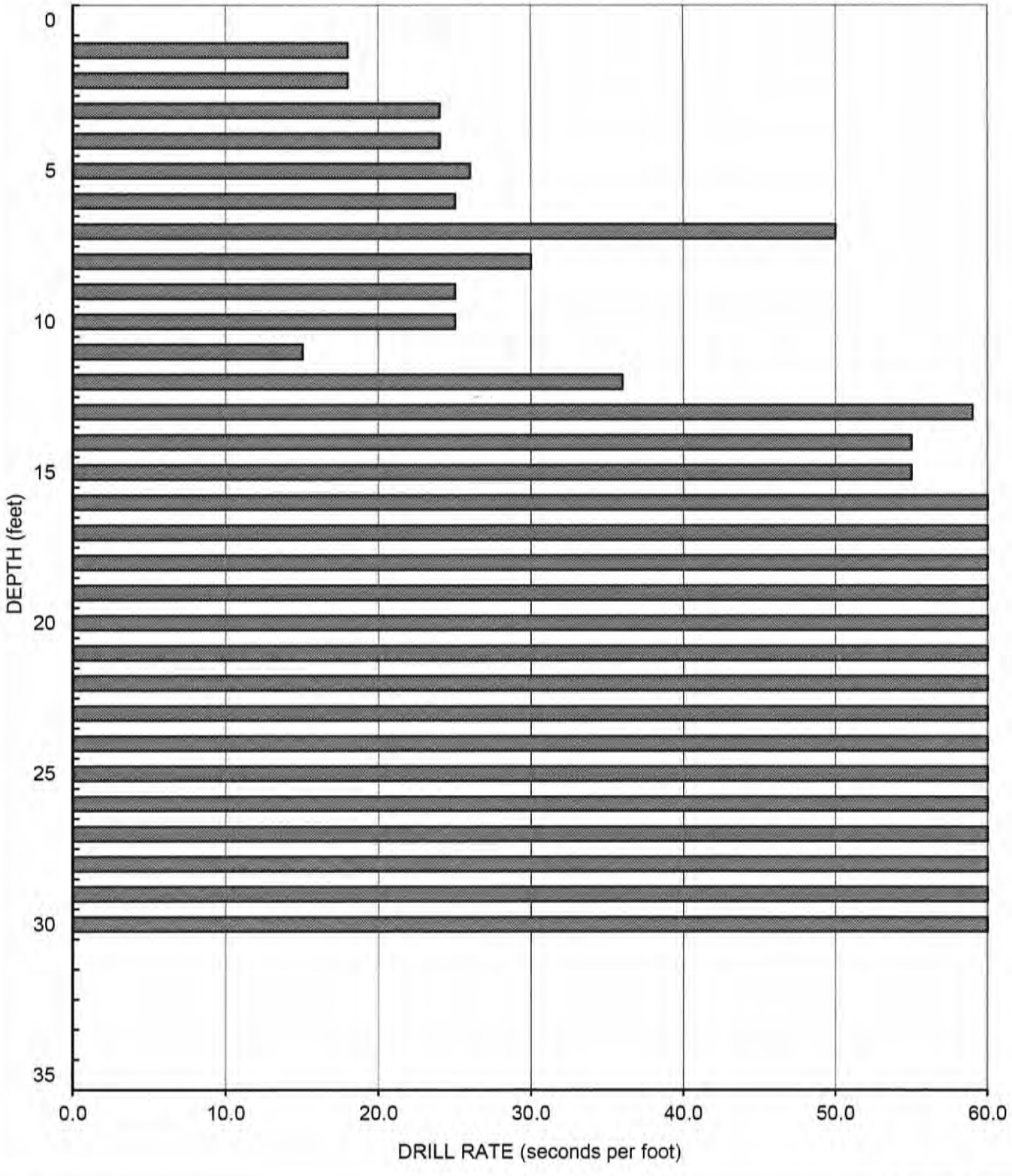
EDEN HILLS

AIR TRACK BORING AT-1

Elevation - 723 Feet (MSL)

Date 08-21-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT001.xls

FIGURE A62

PROJECT NO. G1416-52-02

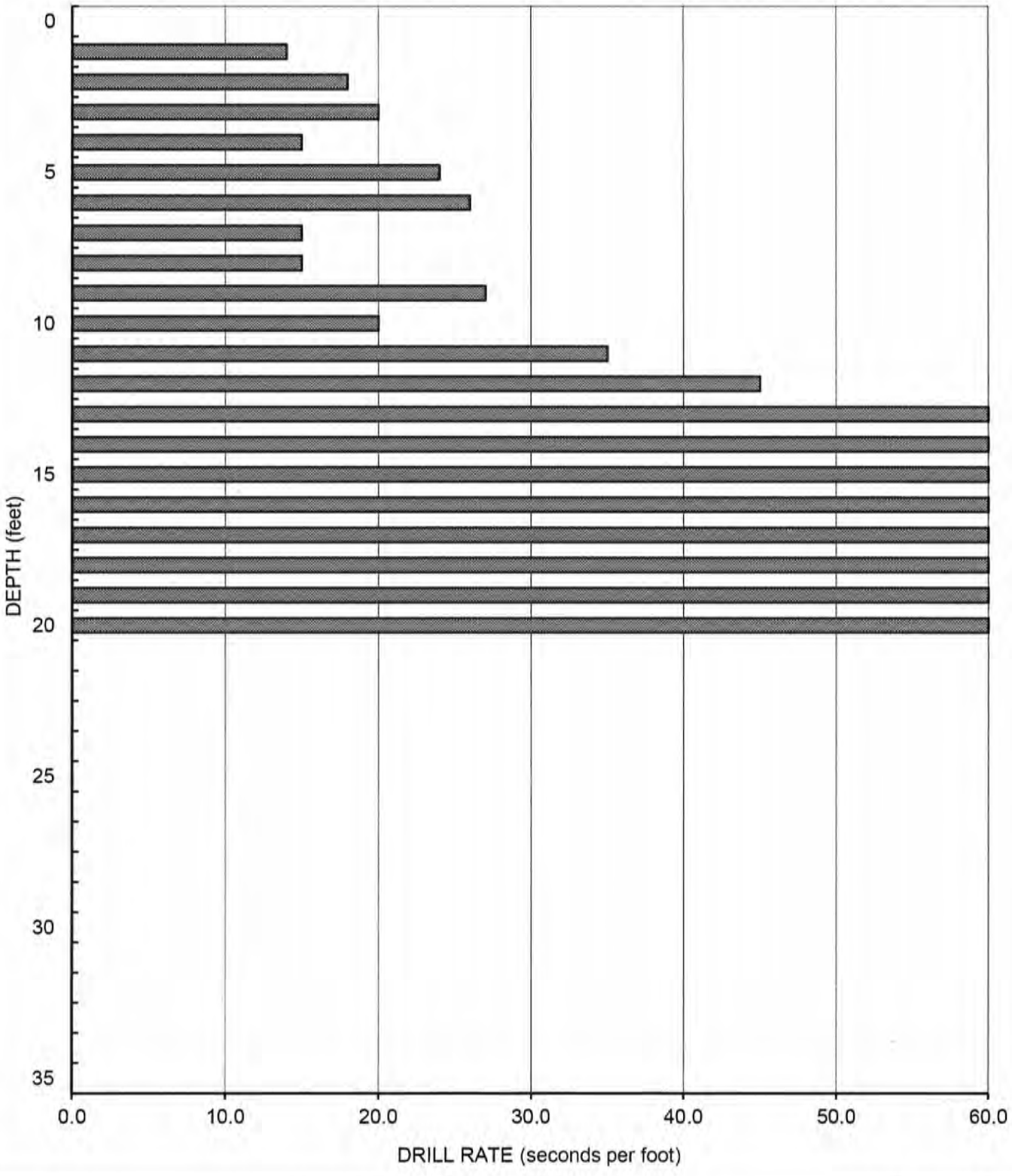
EDEN HILLS

AIR TRACK BORING AT-2

Elevation - 766 Feet (MSL)

Date 08-21-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT002.xls

FIGURE A63

PROJECT NO. G1416-52-02

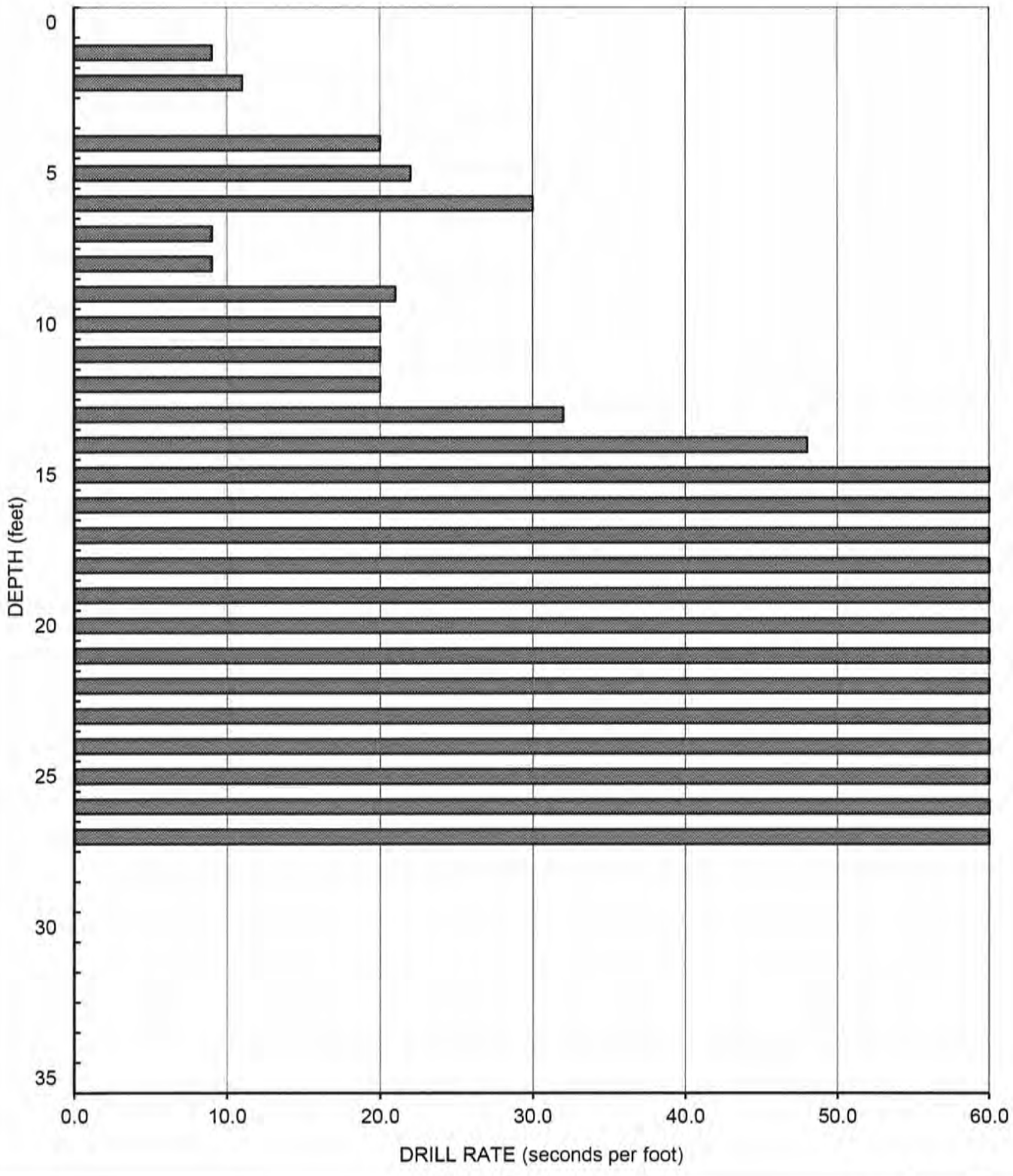
EDEN HILLS

AIR TRACK BORING AT-3

Elevation - 890 Feet (MSL)

Date 08-21-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT003.xls

FIGURE A64

PROJECT NO. G1416-52-02

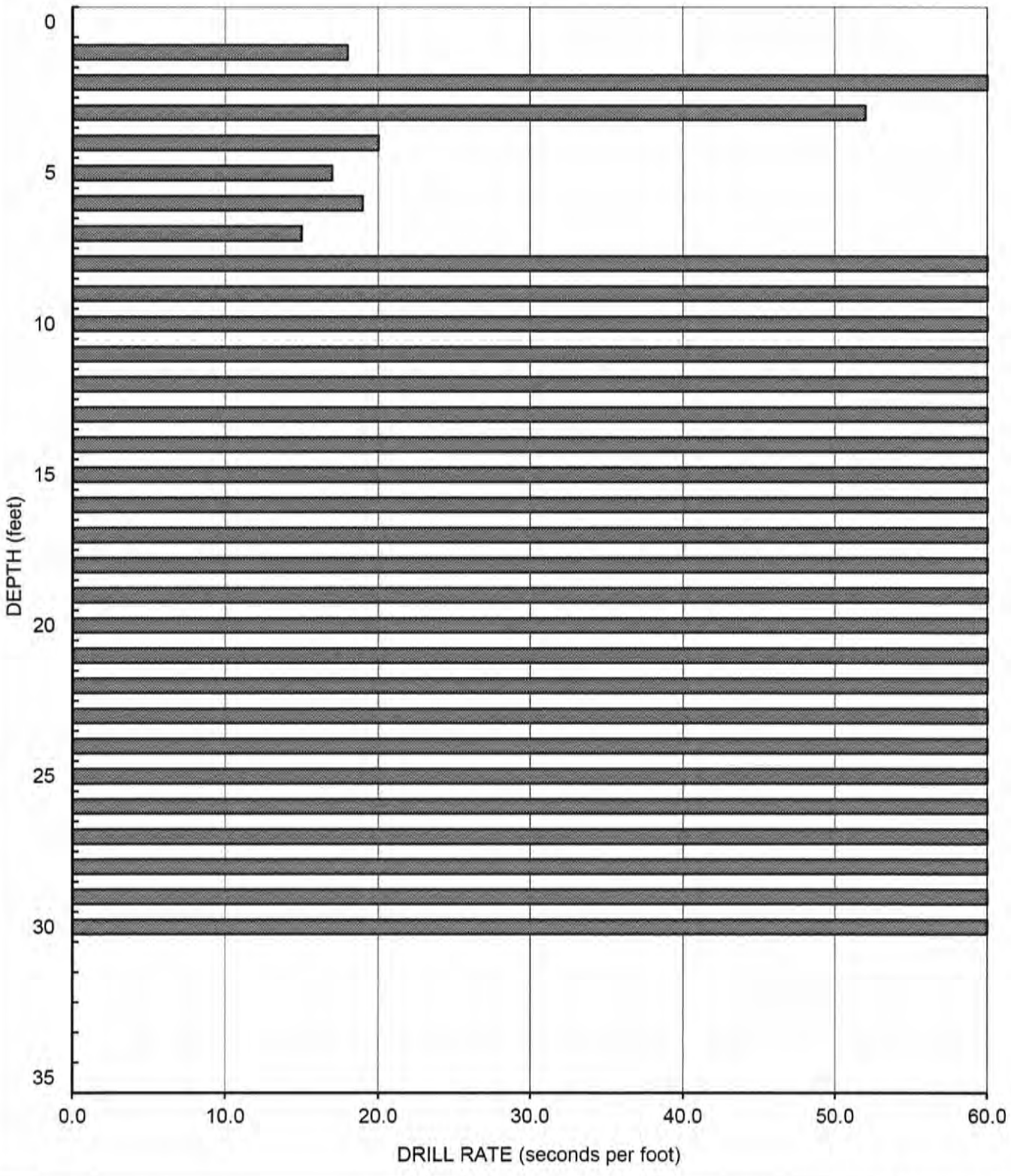
EDEN HILLS

AIR TRACK BORING AT-4

Elevation - 887 Feet (MSL)

Date 08-21-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT004.xls

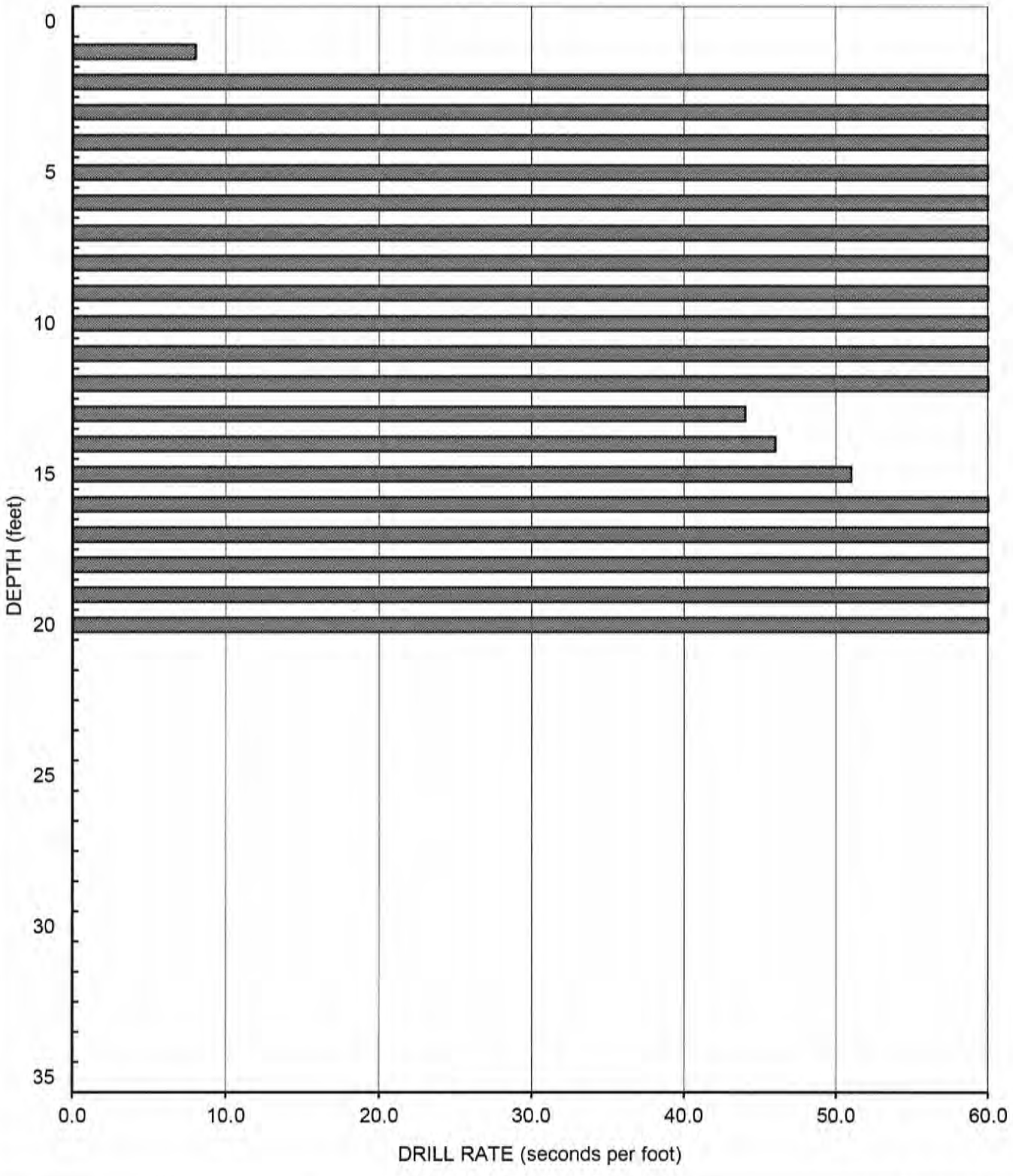
FIGURE A65

EDEN HILLS

AIR TRACK BORING AT-5

Elevation - 887 Feet (MSL)
Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT005.xls

FIGURE A66

PROJECT NO. G1416-52-02

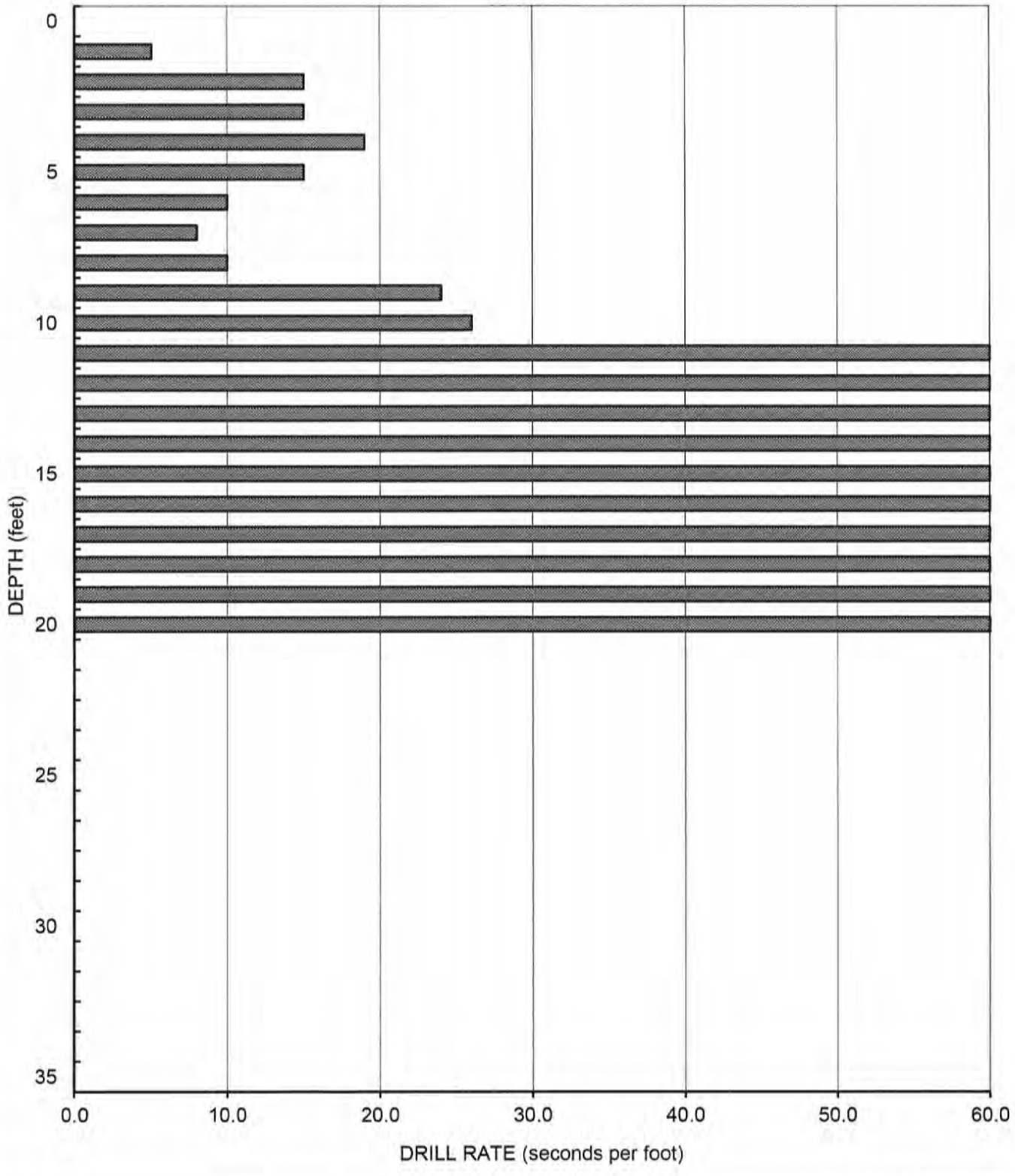
EDEN HILLS

AIR TRACK BORING AT-6

Elevation - 912 Feet (MSL)

Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT006.xls

FIGURE A67

PROJECT NO. G1416-52-02

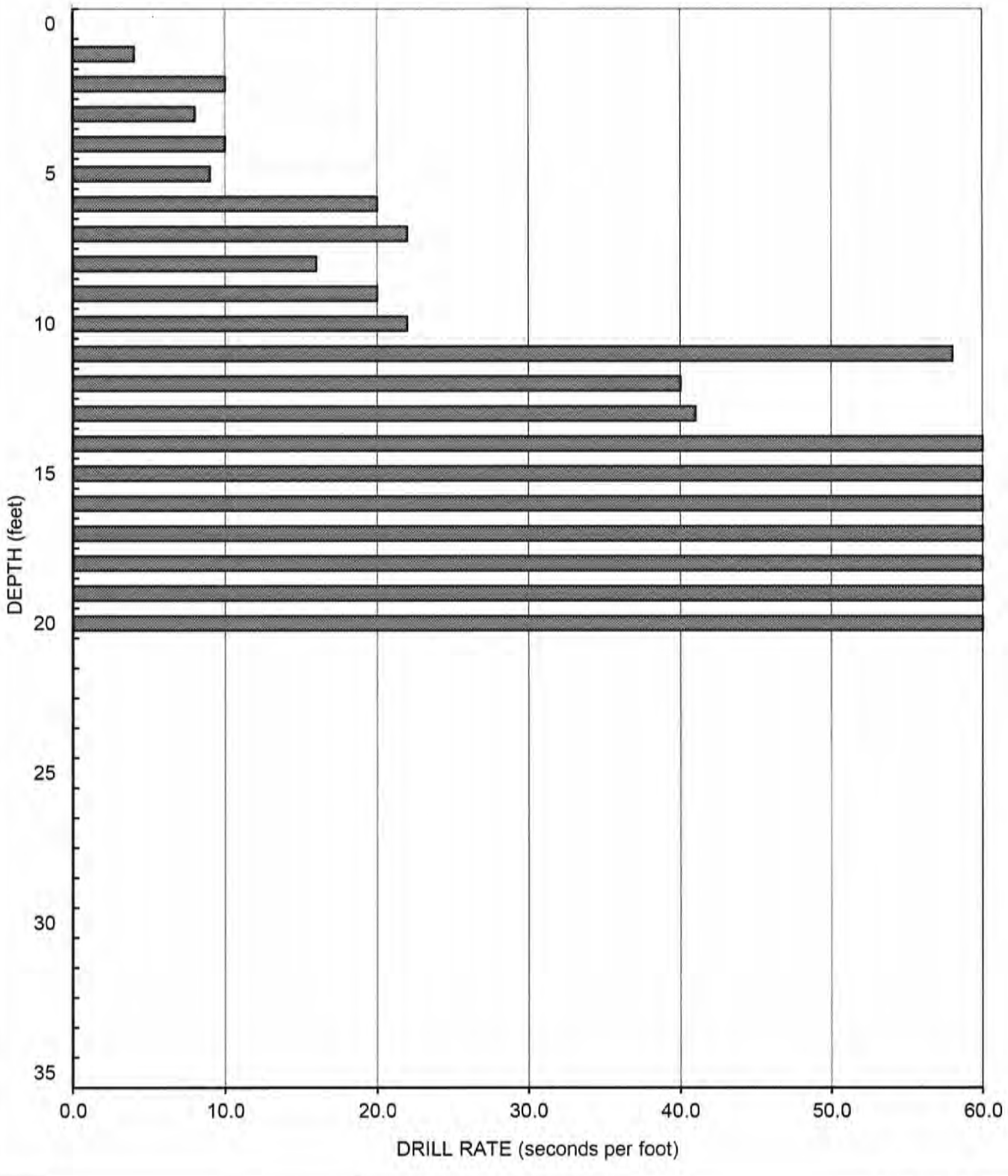
EDEN HILLS

AIR TRACK BORING AT-7

Elevation - 902 Feet (MSL)

Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT007.xls

FIGURE A68

PROJECT NO. G1416-52-02

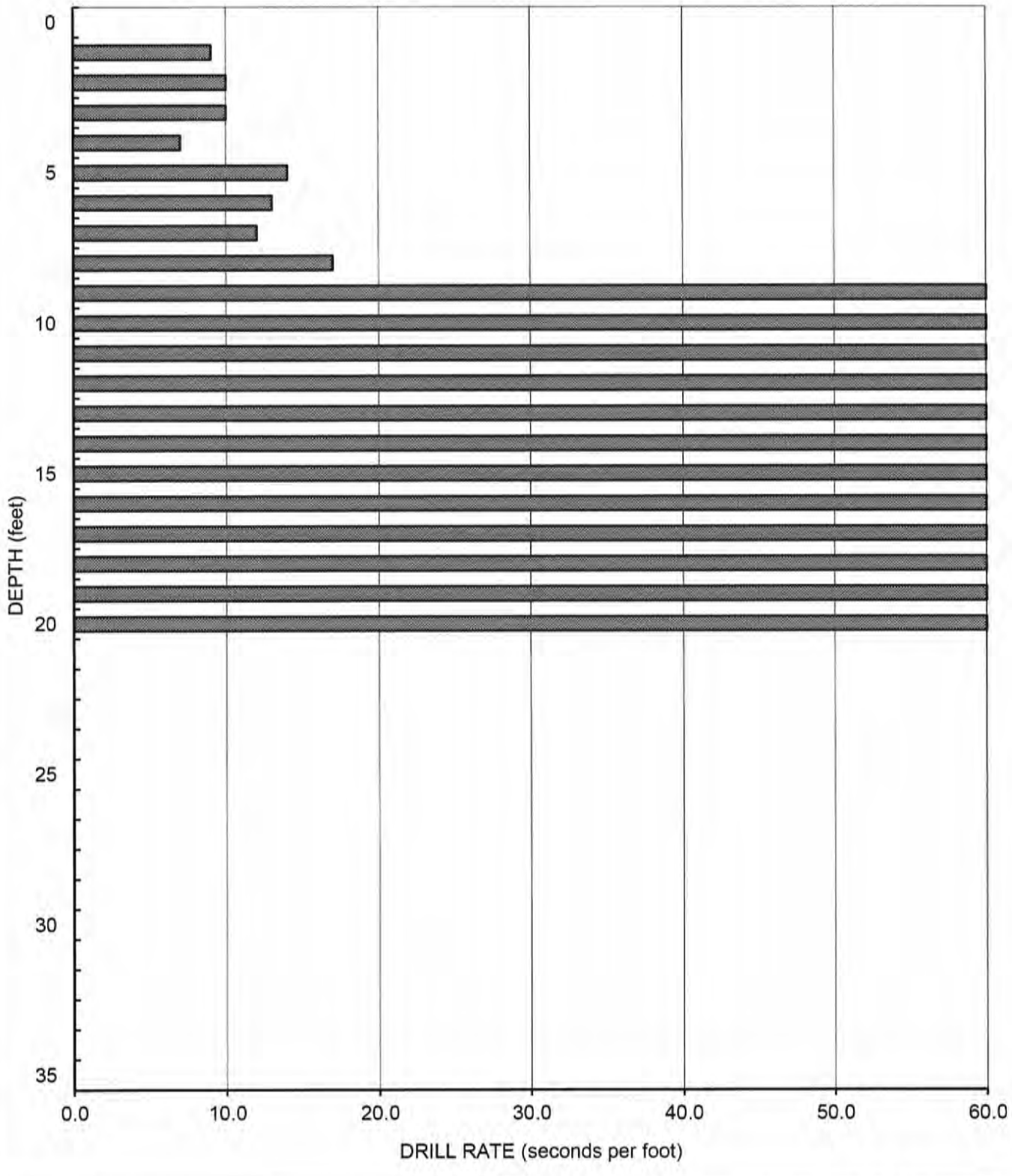
EDEN HILLS

AIR TRACK BORING AT-8

Elevation - 800 Feet (MSL)

Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT008.xls

FIGURE A69

PROJECT NO. G1416-52-02

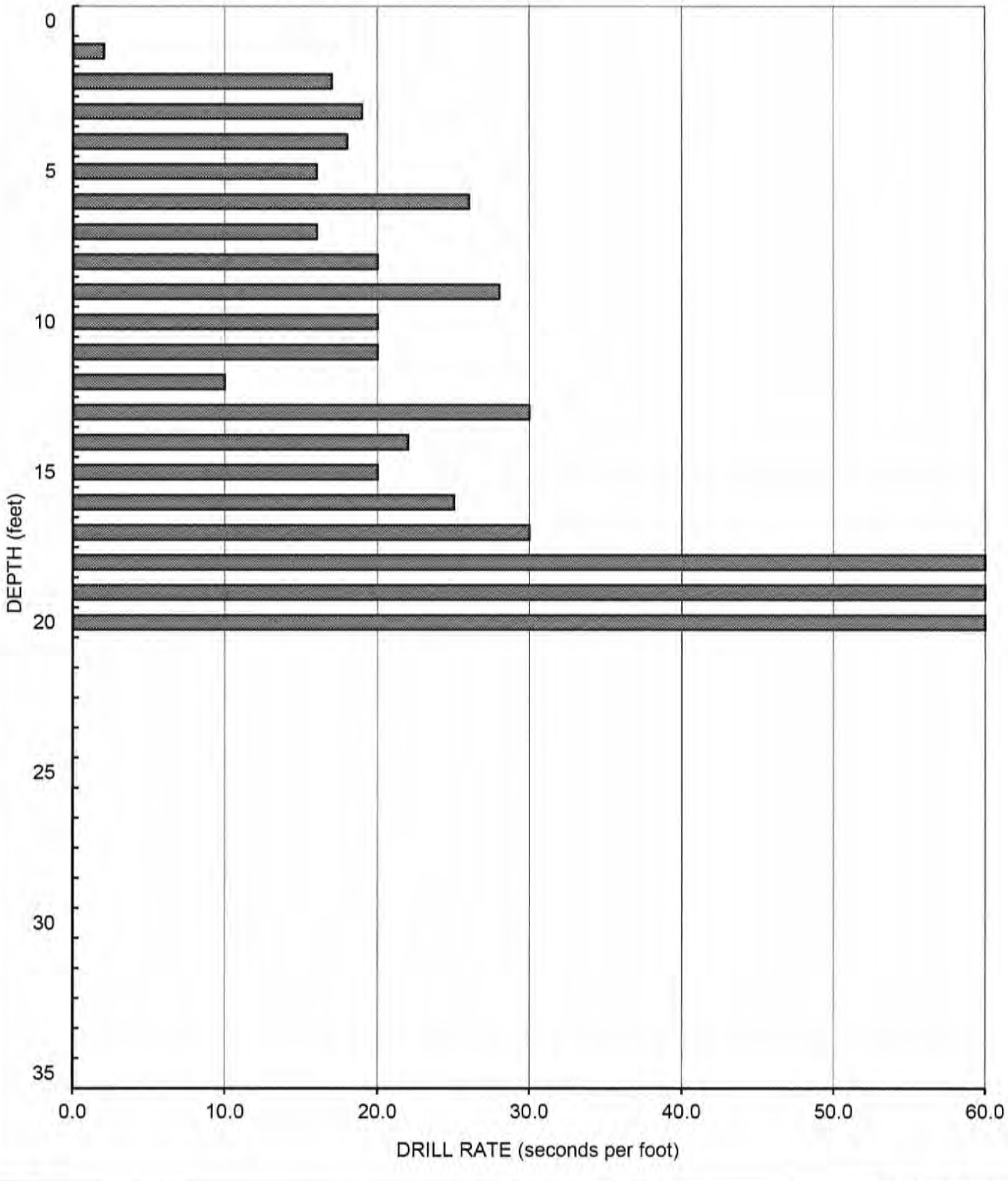
EDEN HILLS

AIR TRACK BORING AT-9

Elevation - 788 Feet (MSL)

Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT009.xls

FIGURE A70

PROJECT NO. G1416-52-02

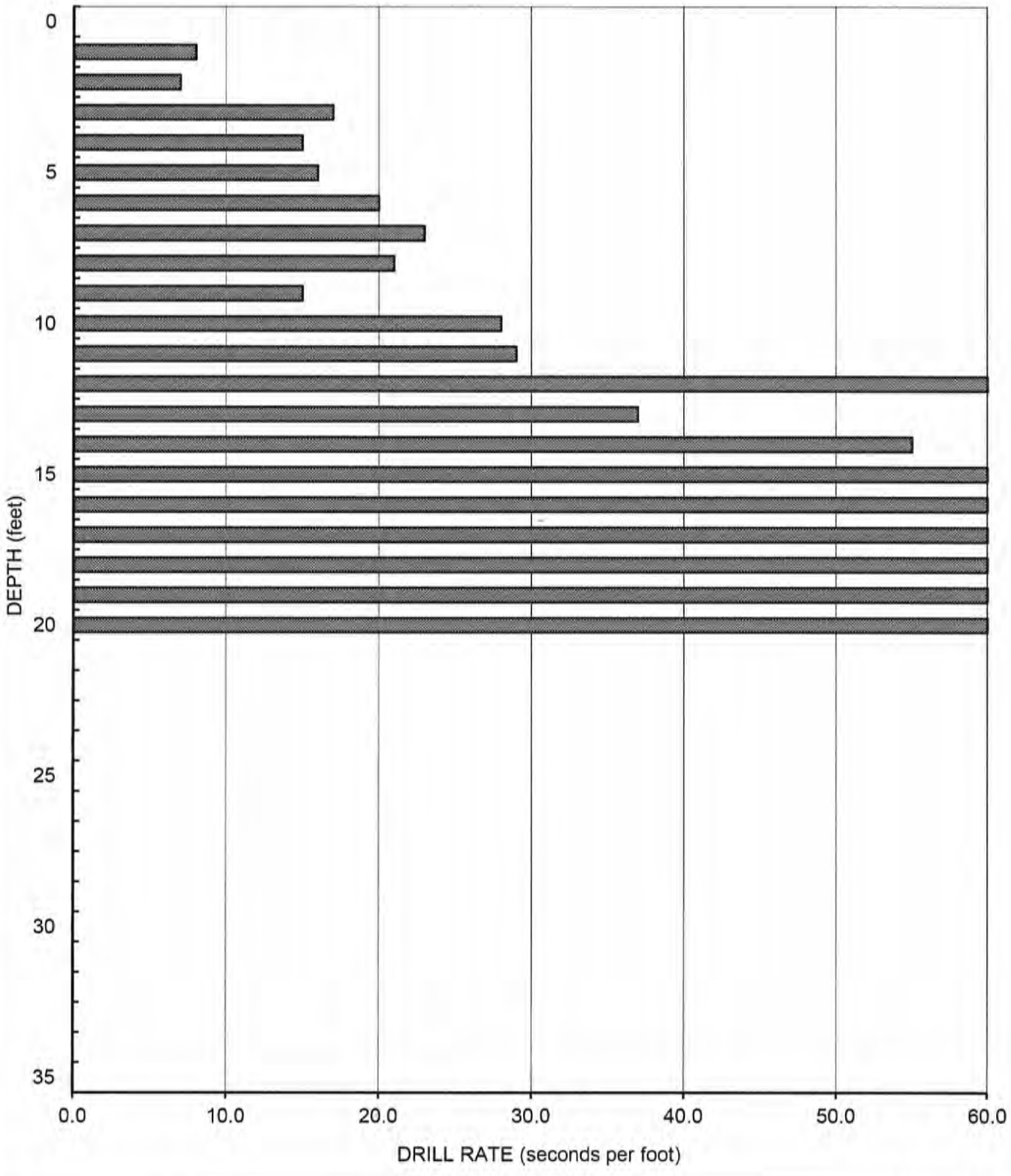
EDEN HILLS

AIR TRACK BORING AT-10

Elevation - 796 Feet (MSL)

Date 08-22-2012 - Equipment: ECM 375

GEOCON
INCORPORATED



AT0010.xls

FIGURE A71

APPENDIX B

APPENDIX B

LABORATORY TESTING

We performed laboratory tests in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected soil samples were analyzed for in-situ dry density and moisture content, maximum dry density and optimum moisture content, direct shear strength, expansion potential, water-soluble sulfate, gradation, and consolidation. The results of the laboratory tests are presented on Tables B-I through B-IV and Figures B-1 and B-2. The in-place dry density and moisture content of the samples tested are presented on the boring logs in Appendix A.

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

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
B1-1	Brown, Clayey, fine to medium SAND	126.5	11.2
T2-3	Dark grayish brown, Silty, fine to coarse SAND	130.3	8.8
T17-1	Dark grayish brown, Silty, fine to medium SAND	133.1	8.6
T19-1	Dark brown, Clayey, fine to medium SAND	127.9	9.4
T41-2	Dark brown, Silty, fine to medium SAND	118.9	12.9

TABLE B-II
SUMMARY OF LABORATORY DIRECT SHEAR STRENGTH TEST RESULTS
ASTM D 3080

Sample No.	Dry Density (pcf)	Moisture Content (%)		Peak [Ultimate] Cohesion (psf)	Peak [Ultimate] Angle of Shear Resistance (degrees)
		Initial	After Test		
T2-3	117.9	8.3	12.9	415	35
T17-1	119.1	9.3	12.7	430	36

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

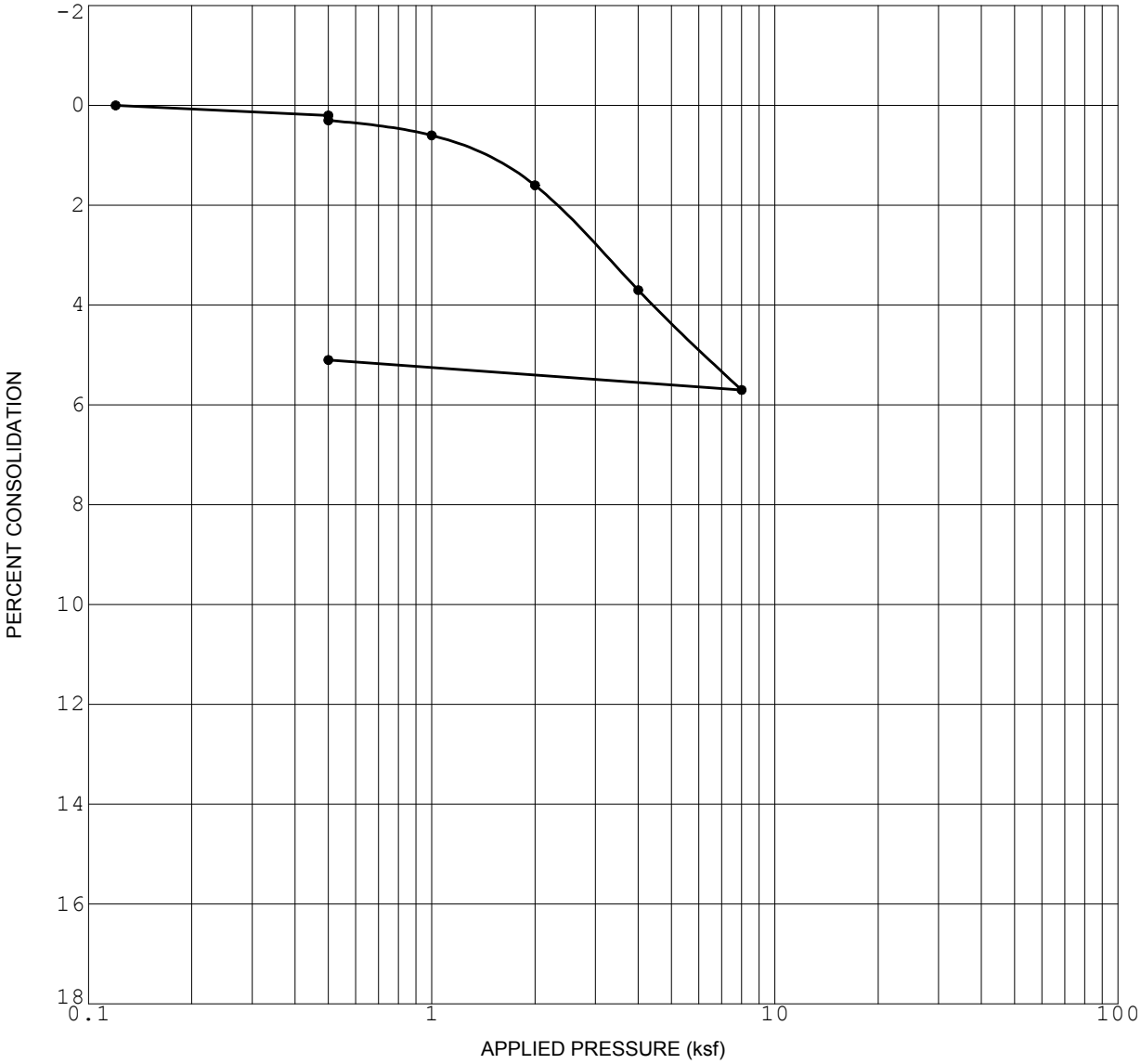
Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	Expansion Classification	2013 Expansion Classification
	Before Test	After Test				
T17-1	7.4	13.7	119.2	0	Very Low	Expansive
T41-2	10.4	19.8	109.7	17	Very Low	Expansive
B1-1	10.8	20.1	108.3	23	Low	Non-Expansive

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

Sample No.	Water-Soluble Sulfate (%)	Water-Soluble Sulfate (ppm)	Sulfate Severity
T2-3	0.012	120	Not Applicable (S0)
T17-1	0.002	20	Not Applicable (S0)
T41-2	0.037	367	Not Applicable (S0)

PROJECT NO. G1416-52-02

SAMPLE NO. B3-2



Initial Dry Density (pcf)	105.4	**Initial Saturation (%)**	45.8
Initial Water Content (%)	8.9	**Sample Saturated at (ksf)**	0.5

CONSOLIDATION CURVE

EDEN HILLS

SAN DIEGO COUNTY, CALIFORNIA

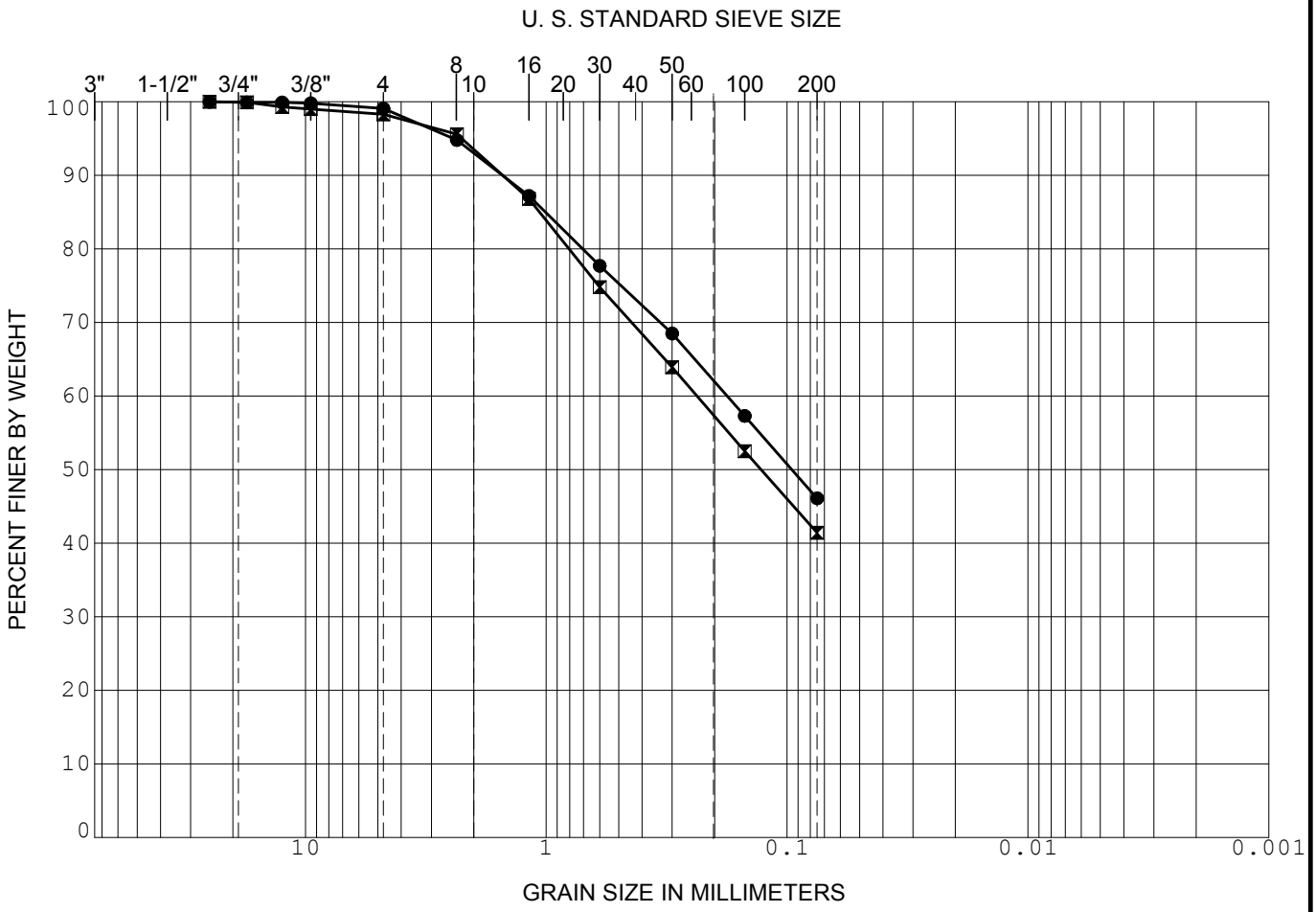
G1416-52-02.GPJ

Figure B-1

GEOCON

PROJECT NO. G1416-52-02

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	NAT WC	LL	PL	PI
●	T6-3	7.0	(SC) Clayey SAND				
⊠	T19-1	2.0	(SC) Clayey SAND				
▲							

GRADATION CURVE

EDEN HILLS

SAN DIEGO COUNTY, CALIFORNIA

G1416-52-02.GPJ

Figure B-2

GEOCON

APPENDIX C

APPENDIX C

SEISMIC REFRACTION SURVEY

FOR

VALIANO (EDEN HILLS)
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1416-52-02

SEISMIC REFRACTION SURVEY
EDEN HILLS RESIDENTIAL DEVELOPMENT
SAN MARCOS, 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

September 5, 2012
Project No. 112312

SOUTHWEST GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

September 5, 2012
Project No. 112312

Mr. Ali Sadr
Geocon Incorporated
6960 Flanders Drive
San Diego, CA 92121

Subject: Seismic Refraction Survey
Eden Hills Residential Development
San Marcos, California

Dear Mr. Sadr:

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the proposed Eden Hills Residential Development project located in San Marcos, California. Specifically, our survey consisted of performing six seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles and to assess the apparent rippability of the subsurface materials in the project area. 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 related to this report, please contact the undersigned at your convenience.

Sincerely,
SOUTHWEST GEOPHYSICS, INC.

Aaron Puente
Staff Geologist/Geophysicist

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

HV/ATP/hv

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Figures

1. INTRODUCTION

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the proposed Eden Hills Residential Development project located in San Marcos, California (Figure 1). Specifically, our survey consisted of performing six seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles and to assess the apparent rippability of the subsurface materials in the project area. This data report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of six seismic refraction lines at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results, conclusions and recommendations.

3. SITE DESCRIPTION AND PROJECT DESCRIPTION

The project site is located south of La Moree Road, just west of the Hill Valley Road termination in San Marcos (Figures 1 and 2). The subject property consists of an avocado grove with moderately steep terrain. Dirt roads provide access across much of the site. Scattered outcrops of granitic rock were observed at and near the project site. Figures 2 and 3 depict the general site conditions.

Based on our discussions with you it is our understanding that the proposed project includes the construction of single family homes. Grading of the site reportedly will include cuts and fills with cuts up to 50 feet deep.

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 geophones and recorded with a 24-channel Geometrics StrataView 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.

Six seismic lines (SL-1 through SL-6) 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, seismic wave velocities can be correlated to material density and/or rock hardness. The relationship between rippability and seismic velocity is empirical and assumes a homogenous mass. Localized areas of differing composition, texture, and/or structure may affect both the measured data and the actual rippability of the mass. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

The rippability values presented in Table 1 are based on 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 rippability. These characteristics may also vary with location and depth. For trenching operations**,** the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may in-

dicate 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, 2011). 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. RESULTS

As previously indicated, six seismic traverses were conducted as part of our study. The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using both SIPwin and SeisOpt Pro (Optim, 2008). Both programs use first arrival picks and elevation data to produce subsurface velocity models. SIPwin uses layer-based modeling techniques to produce a layered velocity model, where changes in velocities are depicted as discrete contacts. SeisOpt Pro uses 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.

Table 2 lists the approximate P-wave velocities and depths calculated from the seismic refraction traverse using the layered modeling method. The approximate locations of the seismic refraction traverses are shown on the Line Location Map (Figure 2). The velocity models are included in

Figures 4a through 4f. In general, the effective depth of evaluation for a seismic refraction traverse is approximately one-third to one-fifth the length of the traverse.

Table 2 – Seismic Traverse Results[1]

Traverse No. And Length	P-wave Velocity feet/second	Approximate Depth to Bottom of Layer in feet	Apparent Rippability[2]
SL-1 150 feet	V1 = 1565 V2 = 7,315	6 – 9 ---	Easy Blasting Generally Required
SL-2 150 feet	V1 = 2,205 V2 >10,000	11 – 18 ---	Moderate Blasting Generally Required
SL-3 230 feet	V1 = 1,655 V2 = 5,250 V3 > 10,000	3 – 9 11 – 47 ---	Easy Difficult, Possible Blasting Blasting Generally Required
SL-4 150 feet	V1 = 1,605 V2 = 4,700 V3 > 10,000	1 – 8 33 – 57 ---	Easy Difficult, Possible Blasting Blasting Generally Required
SL-5 150 feet	V1 = 1,475 V2 = 3,645 V3 > 10,000	1 – 5 13 – 32 ---	Easy Moderate Blasting Generally Required
SL-6 150 feet	V1 = 1,415 V2 = 5,280 V3 > 10,000	1 – 7 19 – 33 ---	Easy Difficult, Possible Blasting Blasting Generally Required

1 Results based on the model generated using SIPwin, 2003
2 Rippability criteria based on the use of a Caterpillar D-9 dozer ripping with a single shank

6. CONCLUSIONS AND RECOMMENDATIONS

The results from our seismic survey revealed distinct layers/zones in the near surface that likely represent soil (colluvium and topsoil) overlying granitic bedrock with varying degrees of weathering. Figures 4a through 4f provide the velocity models calculated from both SIPwin and SeisOpt Pro. Distinct vertical and lateral variations between the two models are evident. In general, the tomography results better characterize the onsite conditions than the layer models.

Significant scatter was observed in the seismic data, especially for SL-4 and SL-6, suggesting the presence of inhomogeneous conditions in the subsurface likely related to remnant boulders, intrusions and differential weathering of the bedrock materials. In addition, the tomography models revealed pockets/zones of very high material within a matrix of slower material. Therefore, vari-

ability in the excavatability (including depth of rippability) of the subsurface materials should be expected across the project area.

Based on our results very difficult conditions, where blasting may be required, will likely be encountered depending on the excavation depth, location, 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, expressed 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

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

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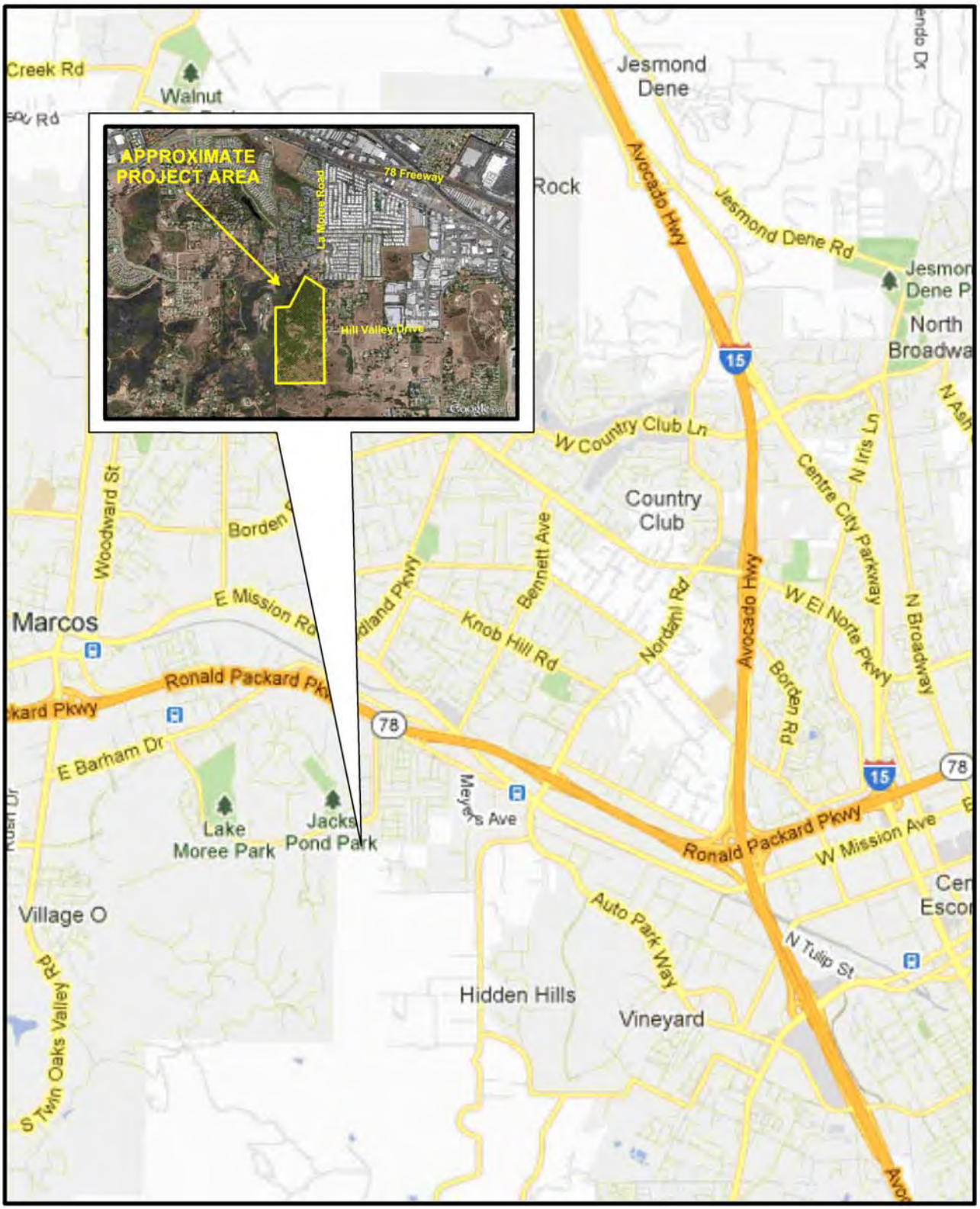
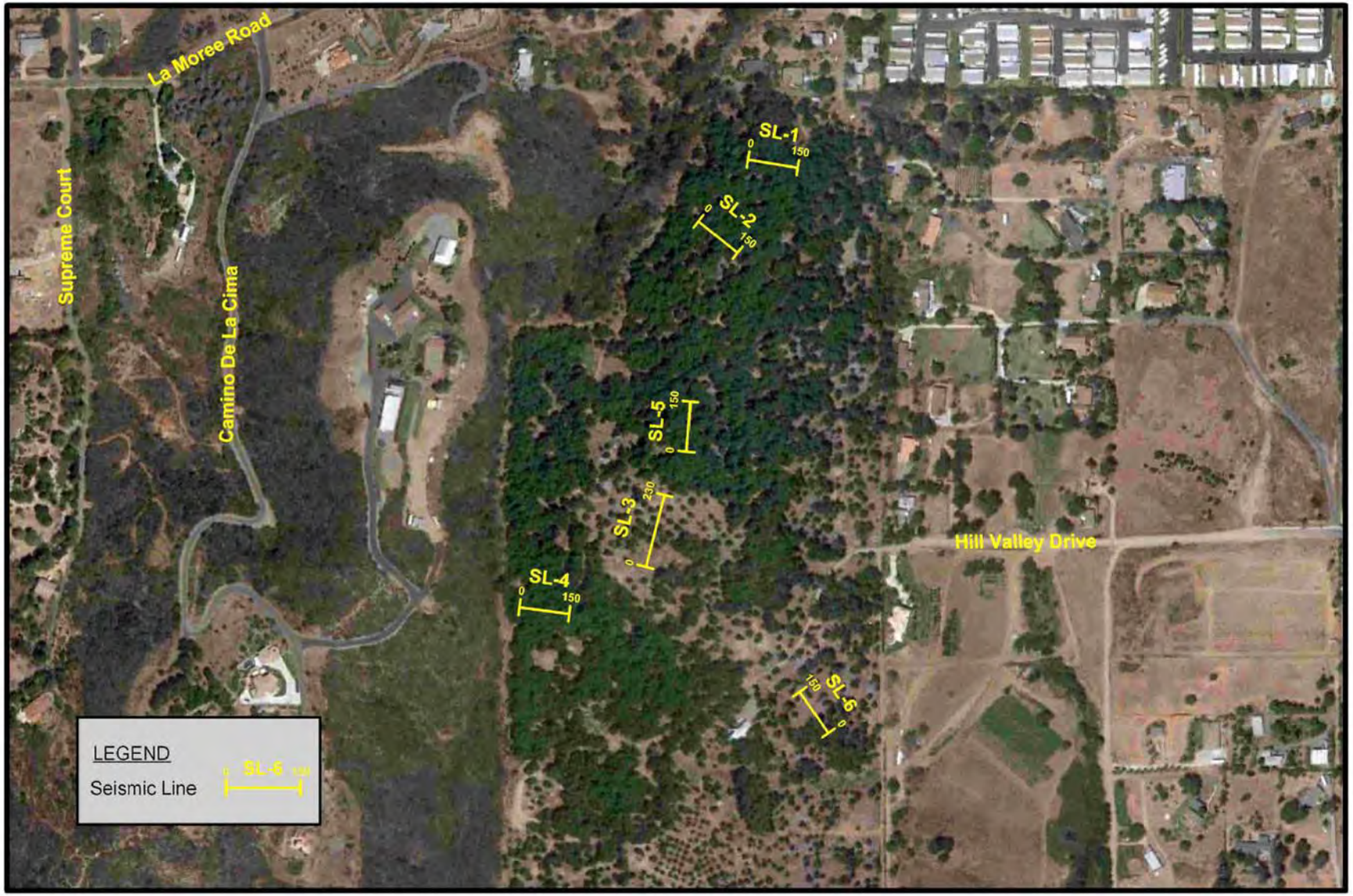
Telford, W.M., Geldart, L.P., Sheriff, R.E., and Keys, D.A., 1976, Applied Geophysics, Cambridge University Press.



SITE LOCATION MAP	N	Eden Hills Residential Development San Marcos, California	SOUTHWEST GEOPHYSICS INC.
		Project No.: 112312 | Date: 09/12	Figure 1



LINE LOCATION MAP
(SL-1 through SL-6)

N

Eden Hills Residential Development
San Marcos, California

Project No.: 112312 | Date: 09/12

SOUTHWEST GEOPHYSICS INC.

Figure 2

0 400 800

approximate scale in feet

SITE PHOTOGRAPHS

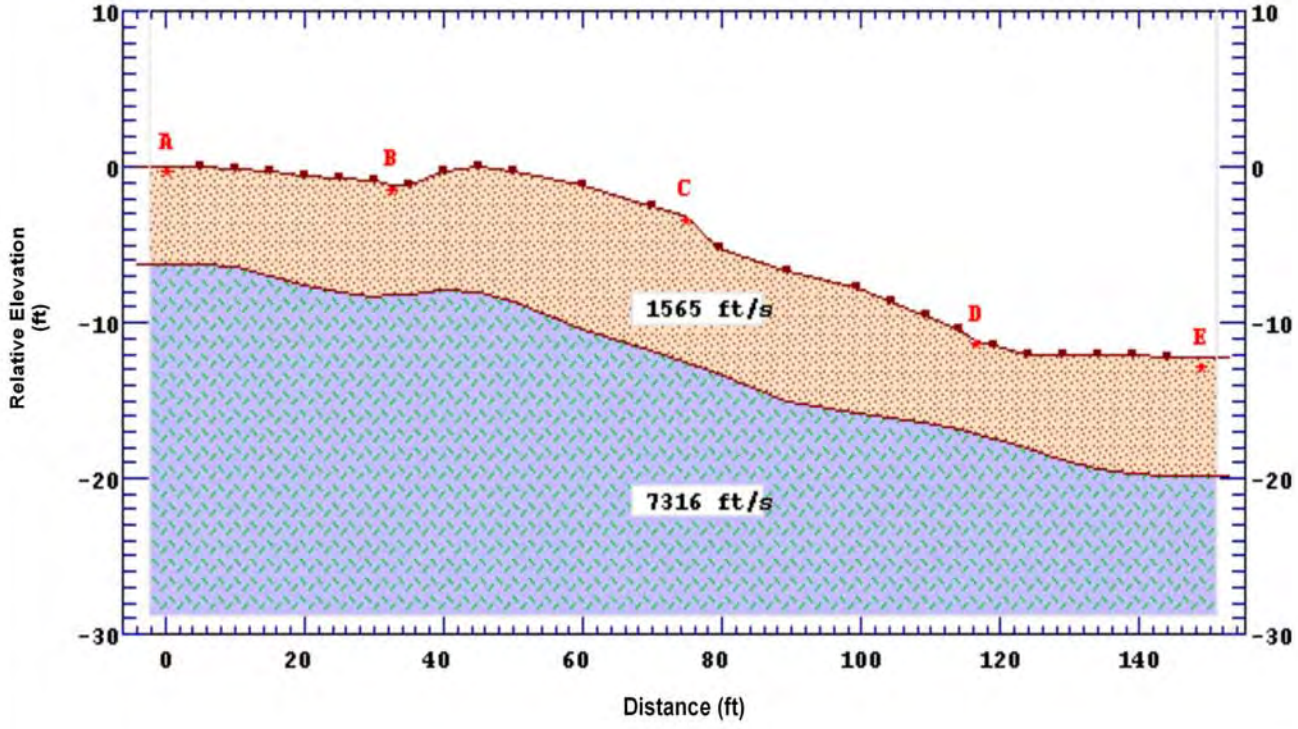
Eden Hills Residential Development
San Marcos, California

Project No.: 112312 | Date: 09/12

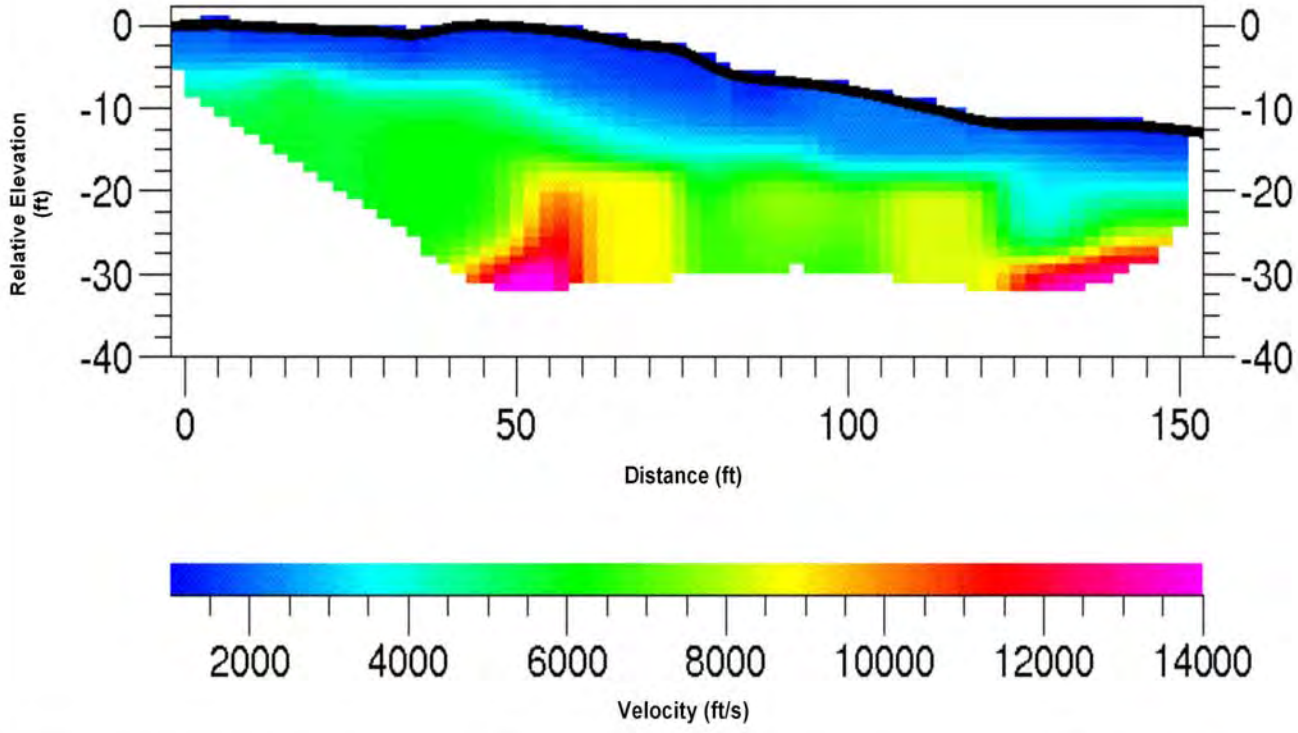
SOUTHWEST GEOPHYSICS INC.

Figure 3

Layer Model



Tomography Model



SEISMIC PROFILE
SL-1

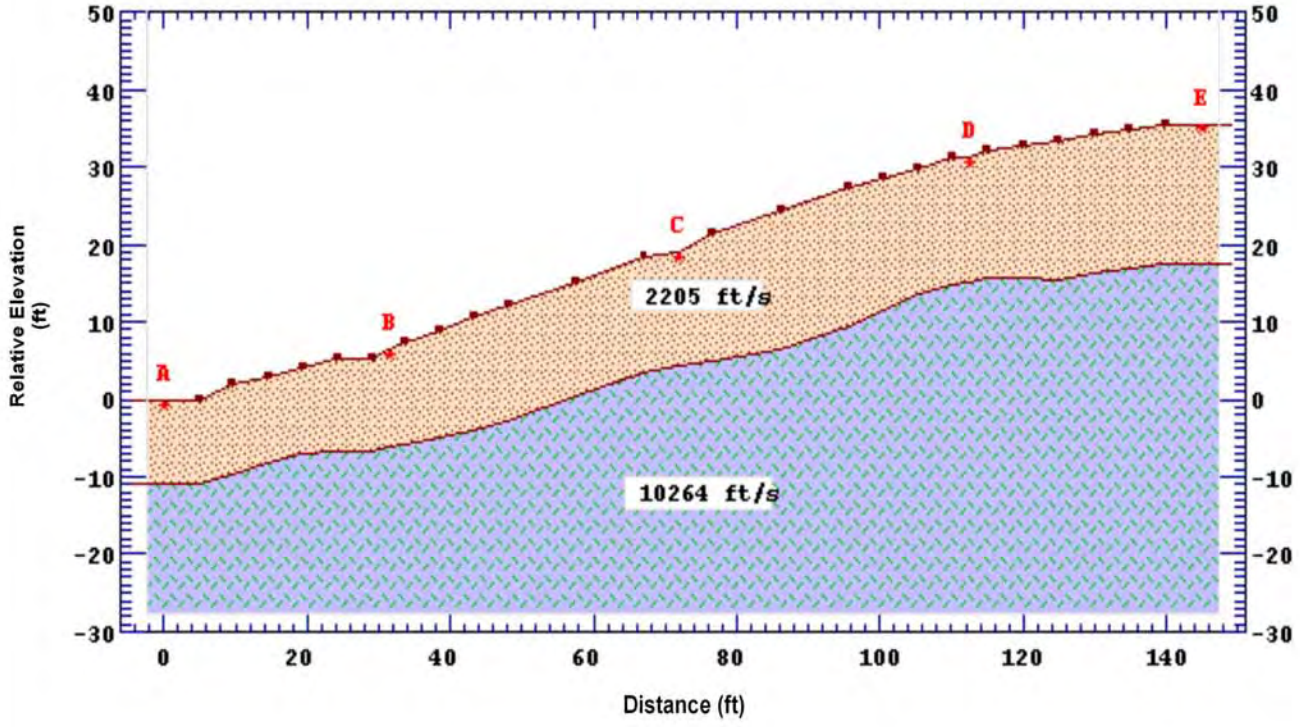
Eden Hills Residential Development
San Marcos, California

Project No.: 112312 | Date: 09/12

SOUTHWEST GEOPHYSICS INC.

Figure 4a

Layer Model



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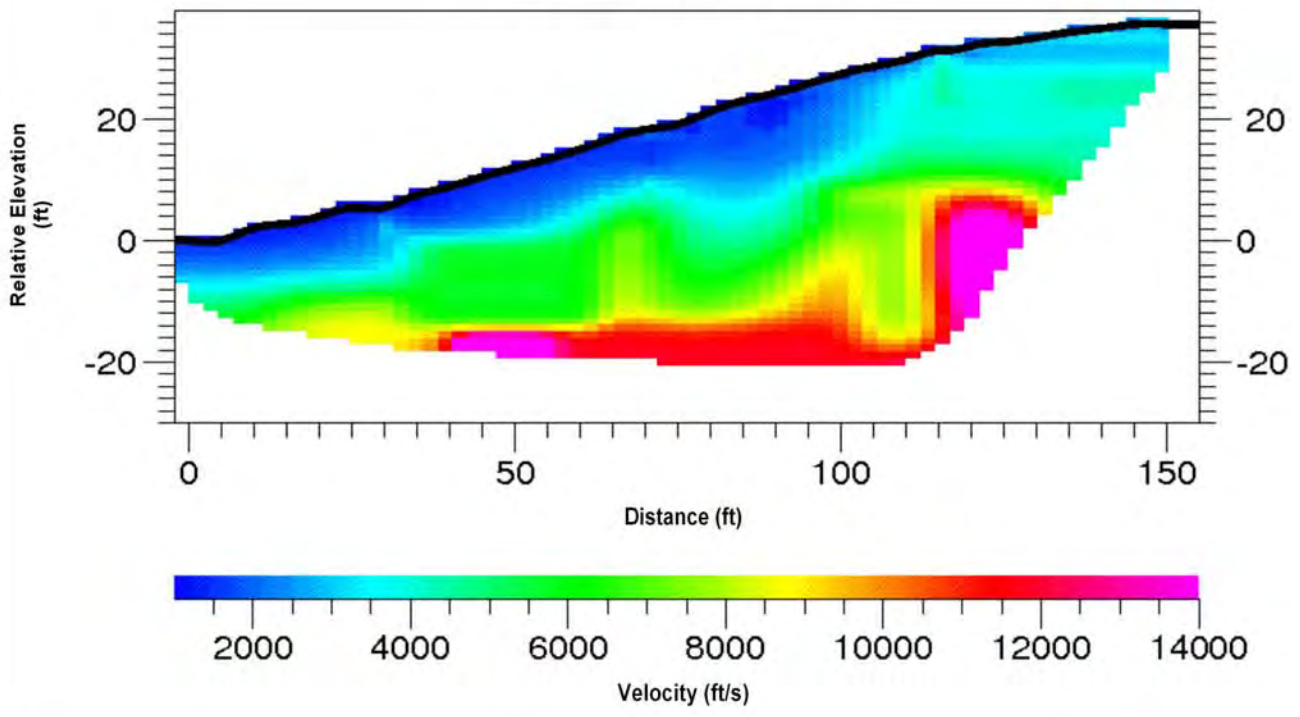
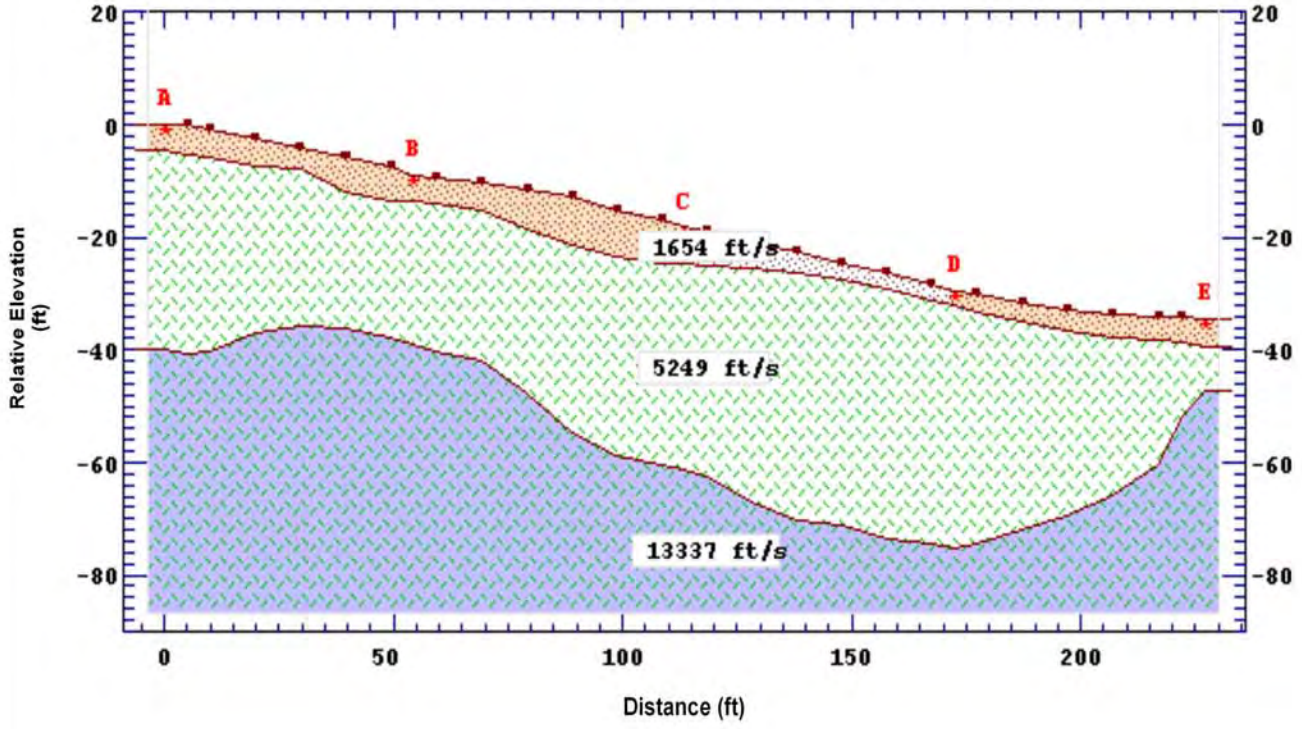


SEISMIC PROFILE SL-2	Eden Hills Residential Development San Marcos, California	SOUTHWEST GEOPHYSICS INC.
	Project No.: 112312 / Date: 09/12	Figure 4b

Layer Model



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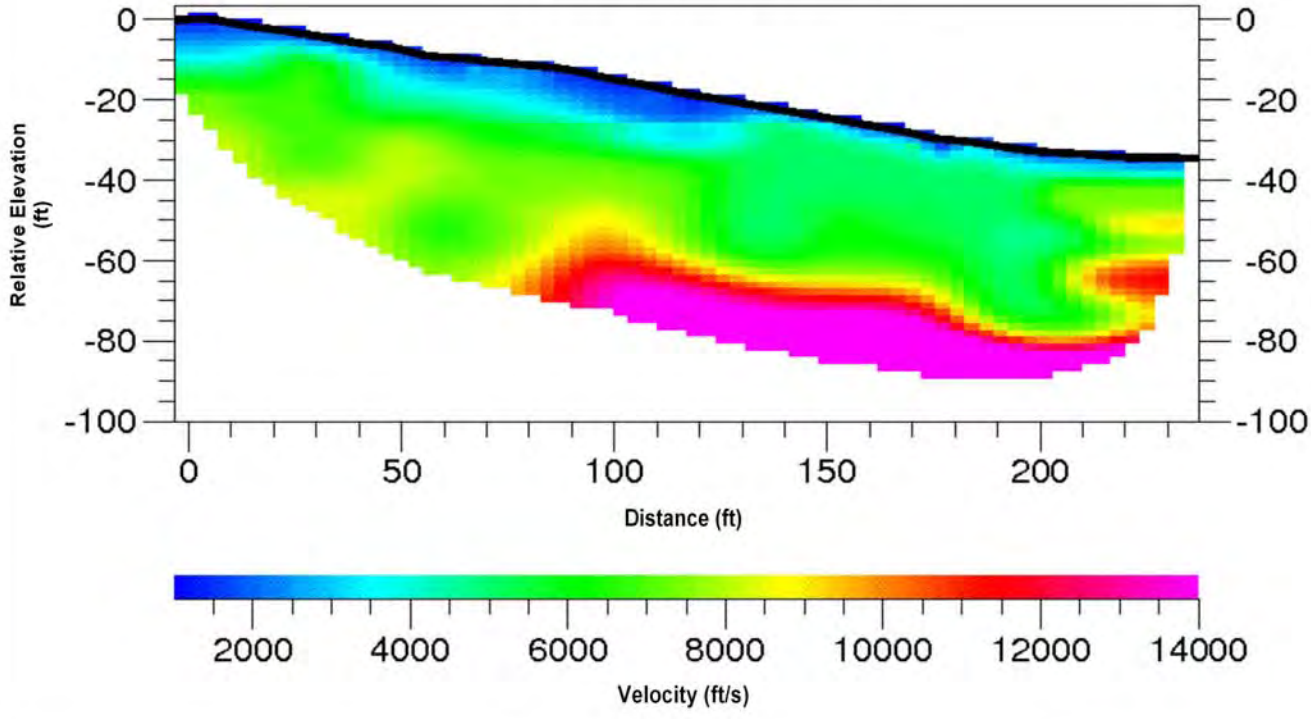
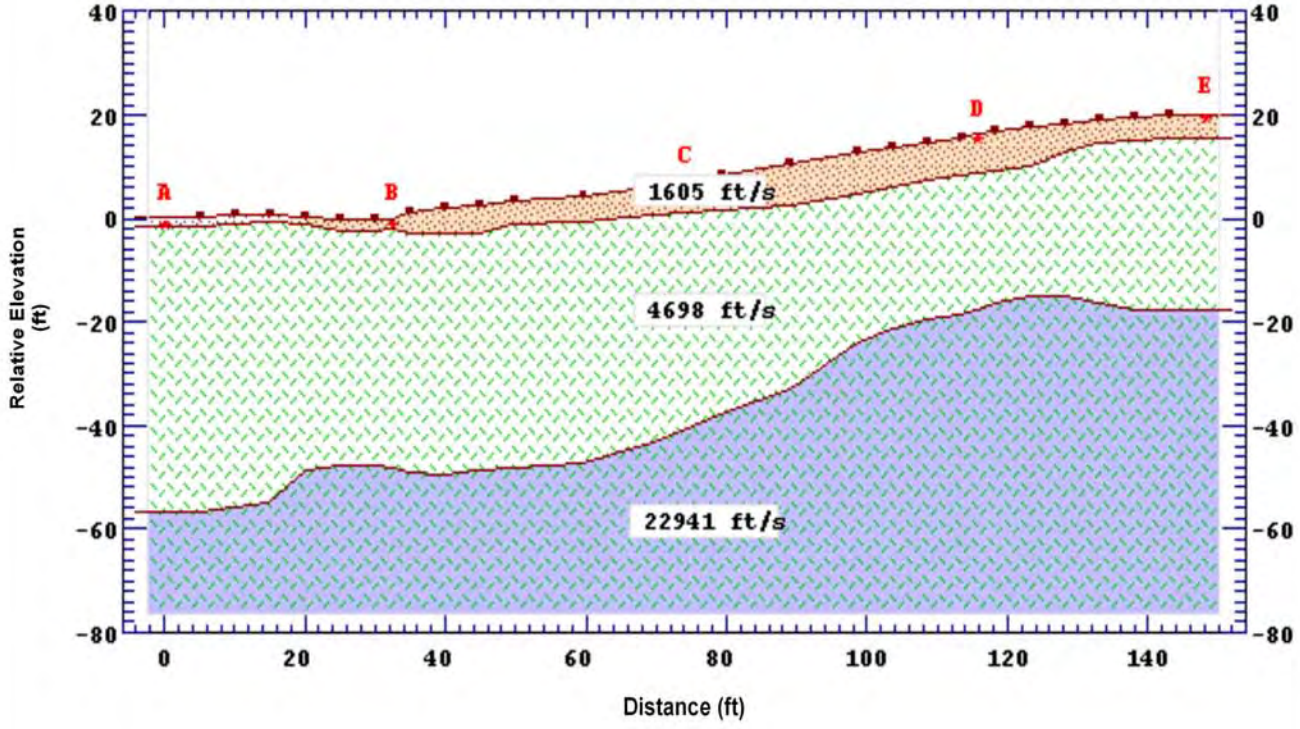


SEISMIC PROFILE SL-3	Eden Hills Residential Development San Marcos, California	SOUTHWEST GEOPHYSICS INC.
	Project No.: 112312 / Date: 09/12	Figure 4c

Layer Model



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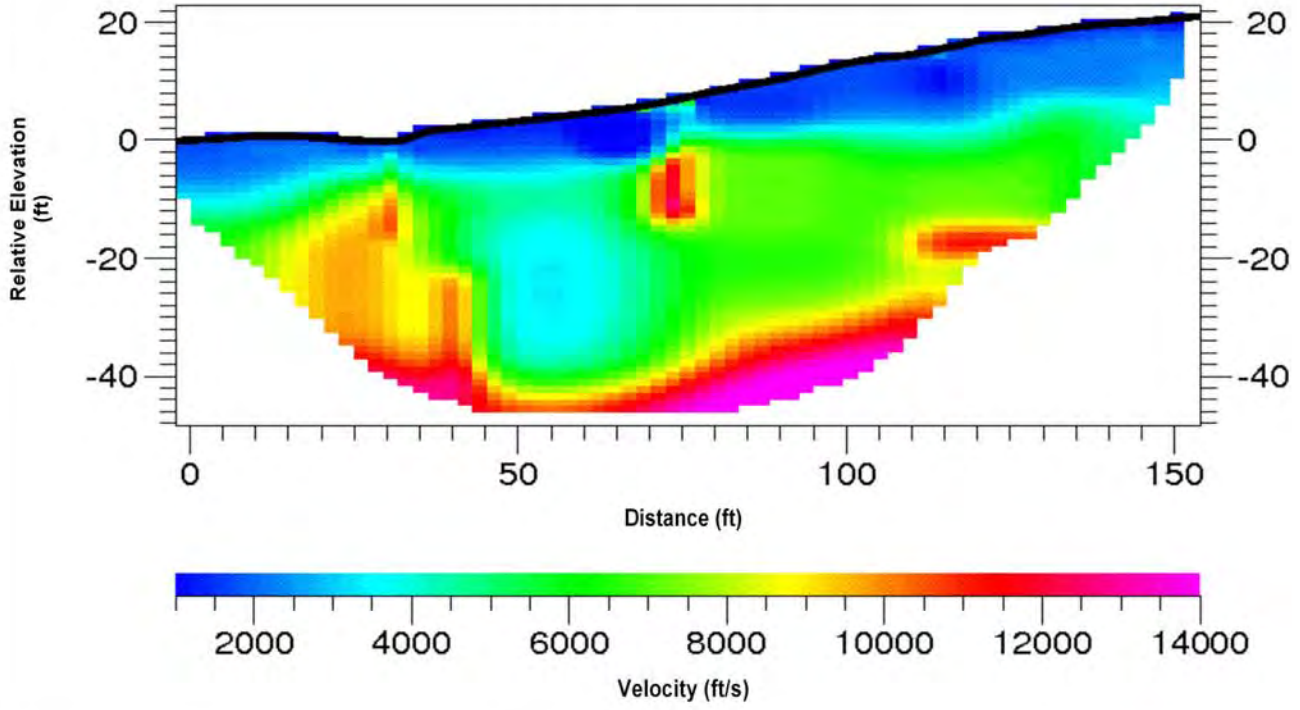
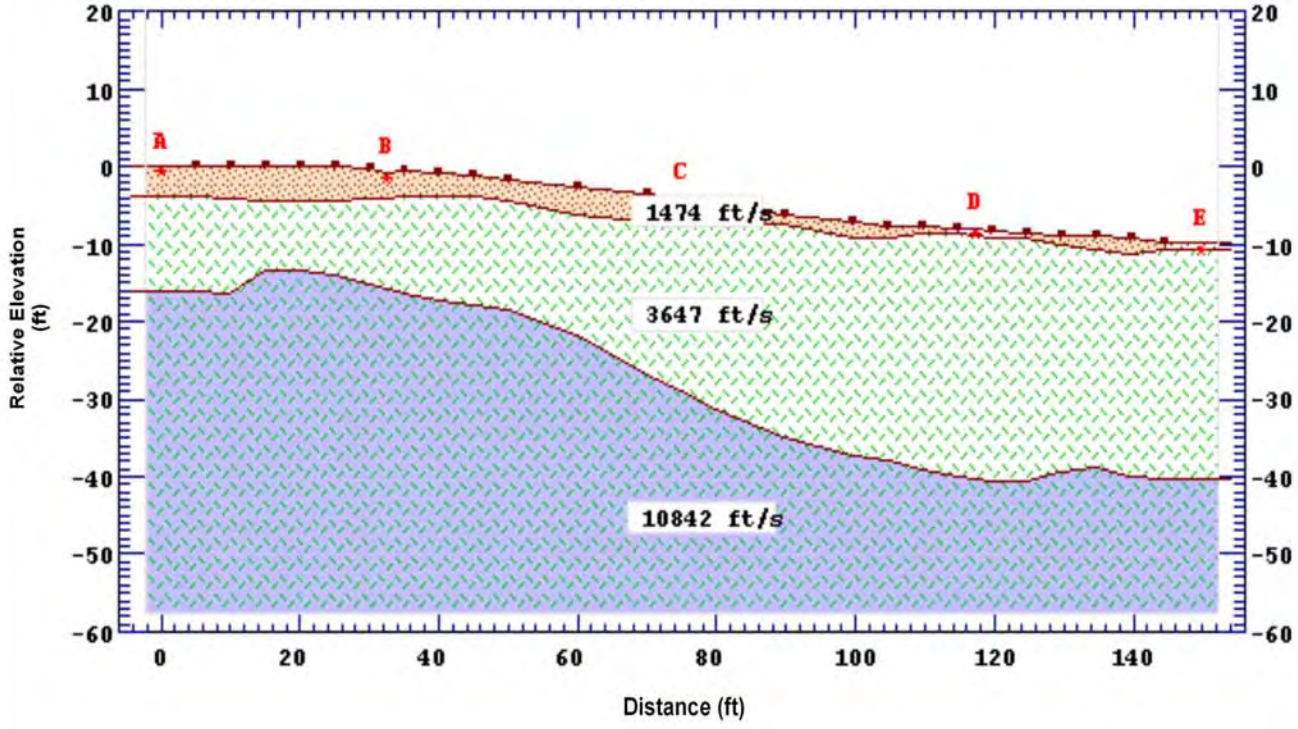


SEISMIC PROFILE SL-4	Eden Hills Residential Development San Marcos, California	SOUTHWEST GEOPHYSICS INC. Figure 4d
	Project No.: 112312 | Date: 09/12	

Layer Model



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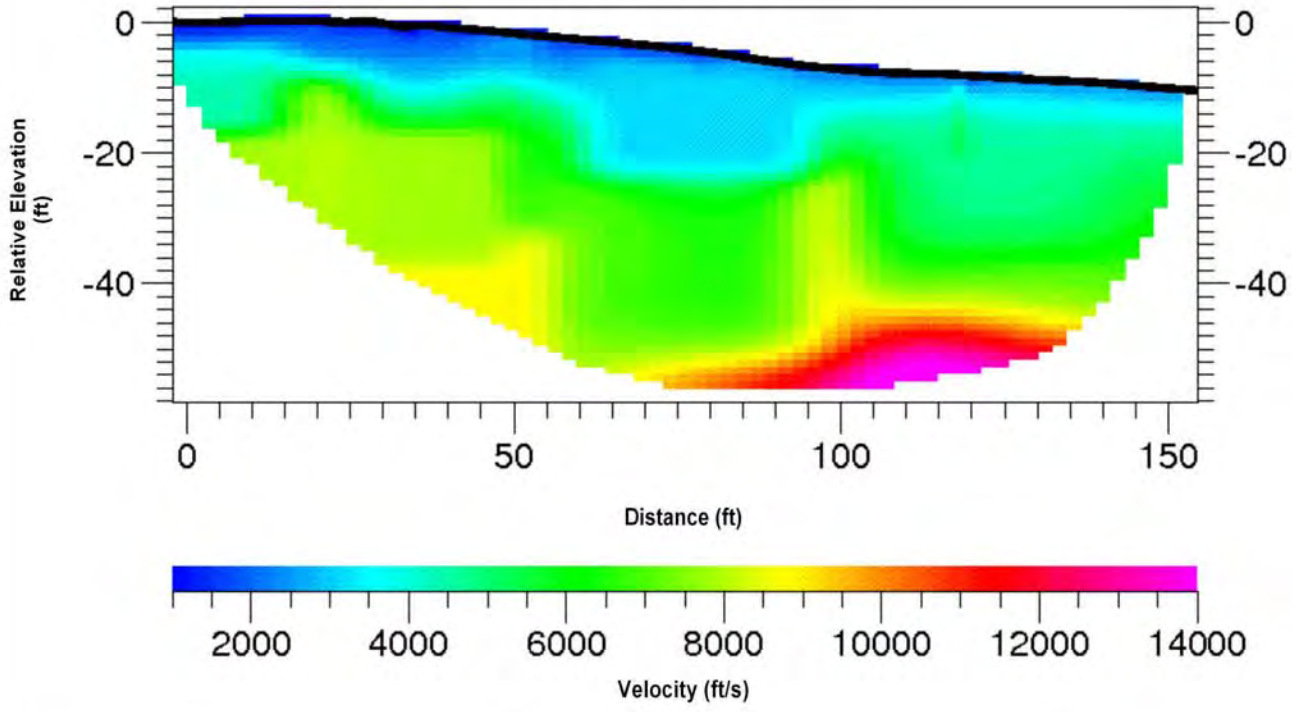


SEISMIC PROFILE
SL-5

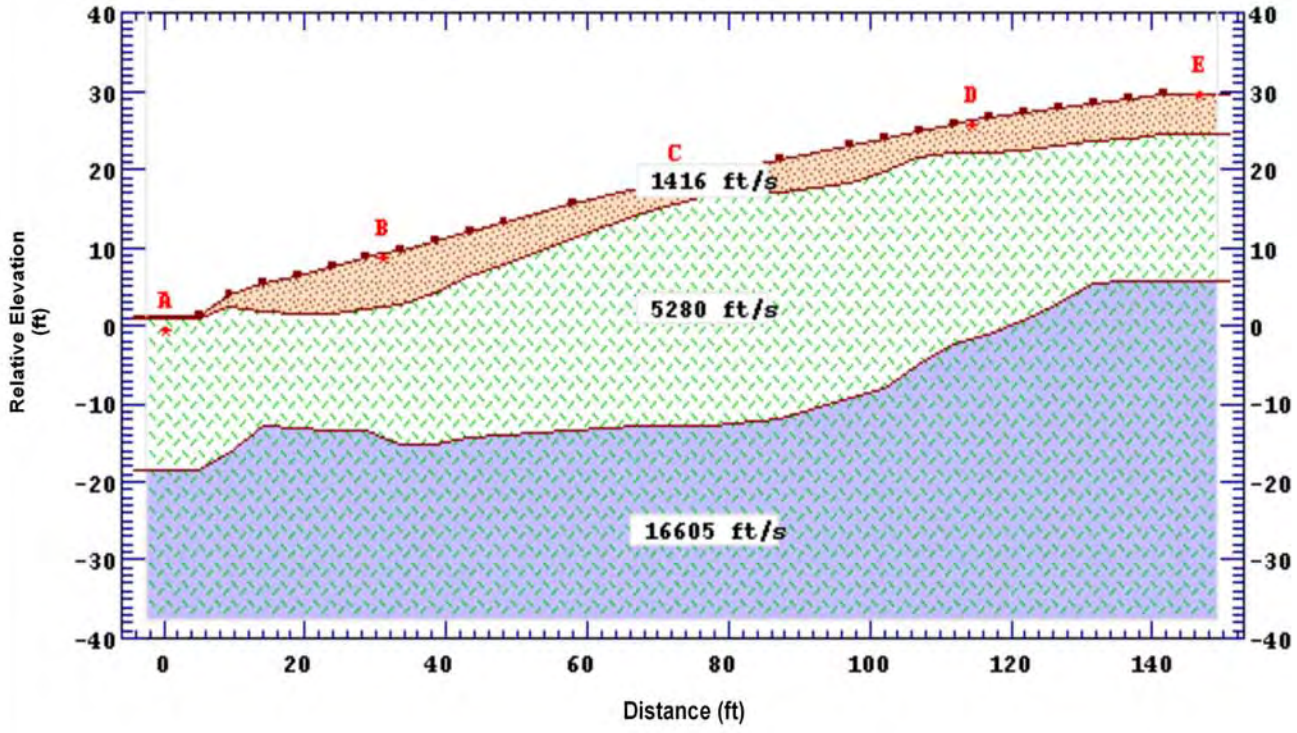
Eden Hills Residential Development
San Marcos, California

Project No.: 112312 | Date: 09/12

SOUTHWEST GEOPHYSICS INC.

Figure 4e

Layer Model



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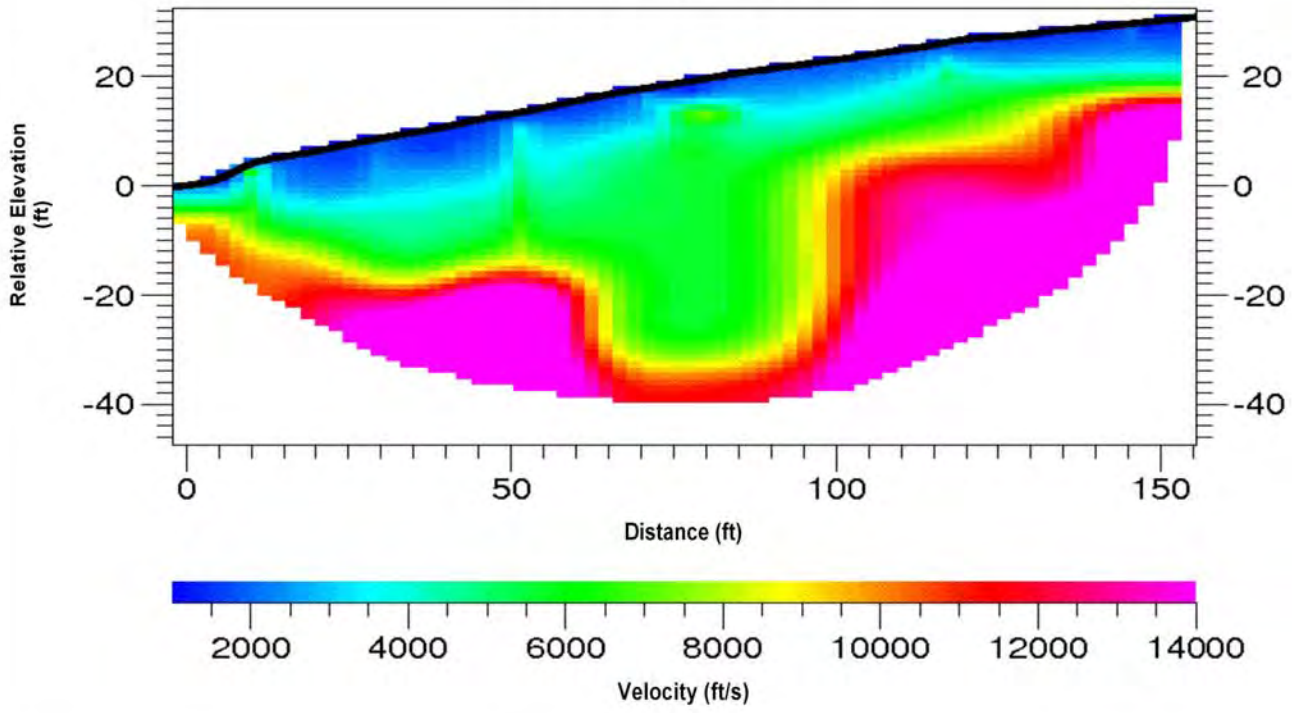


SEISMIC PROFILE SL-6	Eden Hills Residential Development San Marcos, California	SOUTHWEST GEOPHYSICS INC. Figure 4f
	Project No.: 112312 | Date: 09/12	

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

VALIANO (EDEN HILLS)
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1416-52-02

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 Incorporated. 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, 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

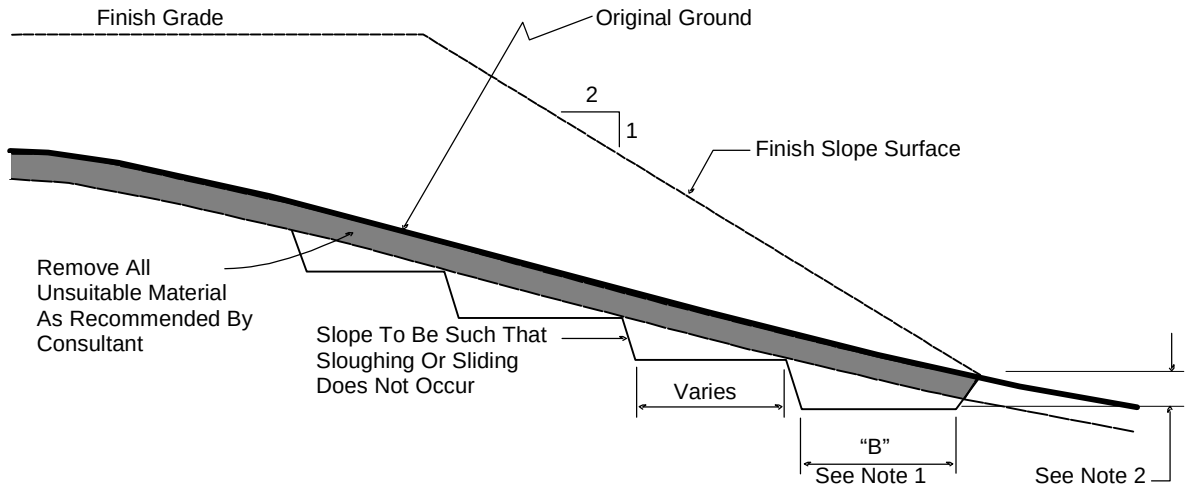
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material 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 Any asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility. 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



No Scale

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 1557-09.

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 1557-09. 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 1196-09, 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. OBSERVATION AND TESTING

7.1 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.

7.2 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.

7.3 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.

7.4 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.

7.5 The Consultant should observe the placement of subdrains, to verify that the drainage devices have been placed and constructed in substantial conformance with project specifications.

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

7.6.1 Soil and Soil-Rock Fills:

7.6.1.1 Field Density Test, ASTM D 1556-07, *Density of Soil In-Place By the Sand-Cone Method*.

7.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938-08A, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

7.6.1.3 Laboratory Compaction Test, ASTM D 1557-09, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

7.6.1.4. Expansion Index Test, ASTM D 4829-08A, *Expansion Index Test*.

7.6.2 Rock Fills

7.6.2.1 Field Plate Bearing Test, ASTM D 1196-09 (Reapproved 1997) *Standard Method for Nonreparative Static Plate Load Tests of Soils and Flexible Pavement Components, For Use in Evaluation and Design of Airport and Highway Pavements.*

8. PROTECTION OF WORK

8.1 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.

8.2 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.

9. CERTIFICATIONS AND FINAL REPORTS

9.1 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.

9.2 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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