APPENDIX A

EXPLORATORY EXCAVATIONS

Our subsurface exploration consisted of drilling 17 large diameter borings, 48 excavator trenches, and 71 trackhoe trenches. We performed the field investigation in two phases in 2008 and 2010. We have also included two large diameter borings, 47 backhoe trenches, 10 air-track borings, and 17 seismic surveys from a previous geotechnical report prepared in 2004 by Neblett & Associates in Appendix D. The locations of some of the exploratory borings and trenches were surveyed by the project civil engineer with the remainder located in the field using compass and tape. The large diameter borings were excavated to a maximum depth of 70 feet with a truck-mounted drill rig equipped with a 30-inch diameter bucket-auger. The excavator trenches were extended to a maximum depth of approximately 24 feet using a Komatsu PC 400 excavator equipped with a 36-inch wide bucket. The trackhoe trenches were performed using a John Deere 555 trackhoe equipped with a 24-inch wide bucket and extended to a maximum depth of 13 feet. The approximate boring and trench locations are shown on the Geologic Map (Figures 2 through 5). The logs of the small diameter borings are presented in the geotechnical investigation report for the realignment of Otay Lakes Road dated November 16, 2010 (Project No. G1012-52-01A).

We obtained samples during our subsurface exploration in the borings using a Modified California sampler. The sampler is composed of steel and is driven to obtain ring samples. The Modified California sampler has an inside diameter of 2.5 inches and an outside diameter of 3 inches. Up to 18 rings are placed inside the sampler that is 2.375 inches in diameter and 1 inch in height. We placed the ring samples in moisture-tight containers and transported them to the laboratory for testing. We also obtained bulk samples for laboratory testing.

The large-diameter boring sampler was driven 12 to 18 inches into the bottom of the excavation with the use of a telescoping Kelly bar. The weight of the Kelly bar (4,500 pounds maximum) drives the sampler and varies in weight with depth. The height of drop is usually 18 inches. Blow counts are recorded for every 12 inches the sampler is driven. The penetration resistance values shown on the boring logs are shown in terms of blows per foot. These values are not to be taken as N-values and adjustments have not been applied.

We estimated elevations shown on the boring and trench logs either from a topographic map or by using a benchmark. In addition, some elevations were obtained from surveying stakes provided in the field. 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 Soils (Visual - Manual Procedure D2844). The logs of the exploratory borings and trenches are presented on Figures A-1 through A-136 and included

herein. The logs depict the various soil and rock types encountered and indicate the depths at which samples were obtained.

The County of San Diego Department of Environmental Health issued a Waiver for Geotechnical Borings for the exploratory excavations and is shown after the figures in this appendix.

PROJECT NO. G1012-52-01A

BORING LB 1

ELEV. (MSL.) **563'** DATE COMPLETED **01-07-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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/CH	**TOPSOIL/COLLUVIUM (Qc)** Stiff, moist, dark brown to reddish brown, Silty CLAY with trace gravel			
2					-Becomes grayish brown below 2 feet			
4					-Weathered contact			
				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 5-15% gravel up to 3 inches; no discernible bedding; cemented 3-4 inch thick continuous black reduced bed present at 5 feet			
6	LB1-1					5	128.7	7.1
8					-Random pale green 4-12 inch wide claystone rip-up clasts floating in matrix between 8 and 12½ feet			
10	LB1-2					5/10"	127.8	9.3
12								
				GM/GC	Dense, damp, mottled light brown, green and orange, Gravelly/Clayey SANDSTONE with 20-30% subangular to angular gravel, cobble and boulder size rocks up to 14 inches			
14					-Scoured undulating contact (5-10º, S35W)			
	LB1-3			CL/CH	**OTAY FORMATION (To)** Very stiff to hard, moist, pale green with orange mottling, Silty CLAYSTONE with trace gravel and cobble up to 6 inches; moderately weak, waxy, random polished high angle parting surfaces; manganese staining	6	122.9	12.0
16								
	LB1-4				-Gravel and cobble present, with 10-15% up to 10 inches between 16½ to 18 feet			
18					-Becomes pale gray with orange mottling below 18 feet			
20	LB1-5				**-PROMINENT SHEAR at 20.1 feet; (35º, N10E)**; paper thin to 1/4-inch thick plastic clay gouge; poorly remolded and continuous	4	115.0	17.0
22					-Gravel and cobble size content increase to 10-20% between 21-22 feet			
24								

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 1

ELEV. (MSL.) **563'** DATE COMPLETED **01-07-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
26	LB1-6				**-PROMINENT SHEAR at 24.9 feet; (30-40º, N30W)**; 1/4 to 1/2-inch thick plastic clay gouge; well developed, continuous and moderately remolded	2	101.9	23.4
28	LB1-7				**-PROMINENT SHEAR at 28.9 feet; (35º, N5W)**; 1/2 to 2-inch thick plastic clay gouge; well defined, moderately to well developed and moderately to highly remolded			
30	LB1-8					3	101.5	23.6
32					**-PROMINENT SHEAR at 31.5 feet; (45º, N45E)**; 1/4 to 1/2-inch thick continuous, poorly remolded plastic clay gouge			
34					**-PROMINENT SHEAR at 33.8 feet; (40º, N60W)**; paper thin to 1/4-inch thick continuous plastic clay gouge with poorly remolded clay in random areas			
36	LB1-9				**-SHEAR ZONE present from 35.1 to 39.8 feet** **-PROMINENT SHEAR at 35.1 feet; (35º, N20W)**; paper thin to 1/4-inch thick poorly developed, poorly remolded plastic clay gouge	2	102.2	25.0
38								
40	LB1-10							
42					**-MINOR SHEAR at 42.0 feet; (high angle)**; paper thin to 1/4-inch thick; very poorly developed			
44								
46	LB1-11					3	100.7	25.0
48					-Becomes pale olive green below 48 feet			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
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GEOCON

PROJECT NO. G1012-52-01A

BORING LB 1

ELEV. (MSL.) **563'** DATE COMPLETED **01-07-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
50					**-MULTIPLE SHEARS present between 51 and 52 feet; (avg. 10-15°, S50W)**; 1/2 to 3-inch thick, continuous with variable orientation and thickness highly remolded plastic clay gouge			
52								
54				CL	-Distinct change in competency below 54 feet Hard, moist, pale gray to pale olive green, Silty CLAYSTONE; with little fine to coarse, sandy grit, conchoidal fracturing and manganese staining			
56	LB1-12					10	104.3	23.0
58								
60								
62								
64					-Becomes mottled pale green and reddish brown and waxy with some shining high angle parting surfaces; competent			
66	LB1-13				-18-inch thick clayey sandstone bed present at 65½ feet	10/10"	122.1	13.9
68								
70					BORING TERMINATED AT 70 FEET No groundwater encountered			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

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

PROJECT NO. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 2** ELEV. (MSL.) **611'** DATE COMPLETED **01-08-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM/SC	**TOPSOIL** Loose, damp, dark brown, Silty/Clayey, fine to medium SAND with 10-15% gravel and cobble up to 6 inches			
2				CL/CH	Stiff, moist, reddish brown, Silty CLAY with 10-15% gravel and cobble up to 6 inches			
4				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 10-20% gravel, cobble and boulders up to 24 inches; rippers used; very difficult drilling			
					REFUSAL AT 5 FEET			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
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- ◥ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G1012-52-01A

BORING LB 3

ELEV. (MSL.) **575'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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**			
				SM	Loose, damp, brown, Silty, fine to coarse SAND with 10% gravel; drilled on road			
2					**OTAY FORMATION (To)** Dense, damp, mottled pale green, orange and brown, Silty, fine to coarse SANDSTONE with some clay			
4				CL	Very hard, damp, mottled maroon and dark olive green, Silty, CLAYSTONE			
	LB3-1				-Blocky weathering transitional contact	5	111.0	16.1
6				SC/SM	Very dense, damp, mottled brown, dark olive green with some orange oxidation, Silty/Clayey, fine to coarse SANDSTONE			
8								
10	LB3-2					5/10"	119.1	14.3
12								
				SM	Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 5-15% gravel up to 3 inches			
14								
16								
					-Sharp slightly undulating horizontal contact			
				SC/SM	Very dense, damp, mottled brown, dark olive green with some orange oxidation, Silty/Clayey, fine to coarse SANDSTONE			
18								
20	LB3-3				-Becomes fine to medium below 20 feet	5/10"	118.1	15.5
22								
					-Gradational contact			
24				SM	Very dense, damp, Silty, fine to coarse SANDSTONE; with random 6-inch			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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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PROJECT NO. G1012-52-01A

BORING LB 3

ELEV. (MSL.) **575'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
26					gravel beds			
28								
30	LB3-4					10/10"	122.2	9.6
32								
34								
36					-Becomes much coarser-grained with increase in gravel and cobble 10-15% up to 6 inches			
38								
40	LB3-5					8/8"	125.0	10.3
42								
44								
46				CL	-Slightly scoured contact with 1 to 2-inch black sandstone lense; (15°, S45E) Very hard, damp, mottled brown and dark olive green, Silty/fine, Sandy CLAYSTONE			
48				SM/SC	-Gradational contact Very dense, damp, mottled brown and dark pale green, Silty/Clayey SANDSTONE with trace gravel			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
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PROJECT NO. G1012-52-01A

BORING LB 3

ELEV. (MSL.) **575'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
50	LB3-6				-Becomes pale green with orange oxidation below 50 feet	8/10"	120.9	13.9
52								
				SM	Very dense, damp, light brown to orange, Silty, fine to coarse SANDSTONE with trace gravel			
54								
56								
58								
	LB3-7			CL	Very hard, damp, dark green, Silty CLAYSTONE	10/8"	108.8	18.2
60					BORING TERMINATED AT 60 FEET No groundwater encountered			

Figure A-3,
Log of Boring LB 3, Page 3 of 3

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
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PROJECT NO. G1012-52-01A

BORING LB 4

ELEV. (MSL.) **555'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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	**TOPSOIL** Stiff, moist, dark brown, Sandy CLAY with 10-20% gravel and cobble up to 24 inches			
4				SM/SC	**OTAY FORMATION (To)** Dense to very dense, damp, brown and gray with orange mottling, Silty/Clayey, fine to medium SANDSTONE with random 10-20% gravel beds			
	LB4-1					4	113.5	14.4
12					-Gradational contact			
				SM	Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 5-10% gravel up to 2 inches			
	LB4-2					6/10"	124.4	9.3
					-Becomes much coarser-grained with increase in gravel 10-20% up to 3 inches; also mottled pale green and light brown			
24								

Figure A-4,
Log of Boring LB 4, Page 1 of 3

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

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

PROJECT NO. G1012-52-01A

BORING LB 4

ELEV. (MSL.) **555'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
26	LB4-3					5/8"	129.1	8.7
28								
30								
32								
34					-Sharp contact with 1/2 to 2-inch thick black sandstone bed; slightly undulatory (5-10º, due west)			
36	LB4-4			CL	Very hard, damp, pale green, Silty CLAYSTONE	10/10"	121.6	13.1
38				SM/SC	-Gradational contact Very dense, damp, pale green, Silty/Clayey, fine SANDSTONE -1-foot thick gravelly sandstone bed with 20-30% gravel and cobble up to 5 inches at 37.5 feet -Becomes brown at 38.5 feet			
40								
42				SM	Very dense, damp, reddish brown and gray, Silty, fine to coarse SANDSTONE with abundant gravel			
44				CL	Very hard, damp, pale green, Silty CLAYSTONE with random 1/2 to 1½ inches wide sand filled fractures from 44 to 47 feet; waxy but very competent			
46	LB4-5					5/8"	120.7	13.3
48								

Figure A-4,
Log of Boring LB 4, Page 2 of 3

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
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PROJECT NO. G1012-52-01A

BORING LB 4

ELEV. (MSL.) **555'** DATE COMPLETED **01-08-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
50								
52					-Gradational contact			
				SM	Very dense, moist, mottled pale green, orange and light brown, Silty, fine to coarse SANDSTONE with abundant gravel			
54								
	LB4-6					25/7"	125.8	8.4
56			▽					
					-Slight seepage observed at 57 feet			
58								
60					BORING TERMINATED AT 60 FEET No groundwater encountered			

Figure A-4,
Log of Boring LB 4, Page 3 of 3

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
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- ◪ ... CHUNK SAMPLE
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PROJECT NO. G1012-52-01A

BORING LB 5

ELEV. (MSL.) **719'** DATE COMPLETED **01-11-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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	**TOPSOIL** Very stiff, moist, dark brown, Gravelly CLAY with sand and 20-30% subangular to angular gravel and cobble up to 8 inches			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, light brown to brown, Gravelly, fine to coarse SANDSTONE with 20-40% subangular to angular gravel and cobble up to 12 inches			
4								
6								
8	LB5-1			SM/SC	-Gravel/cobble lag deposit with up to 16-inch boulders at contact; scoured undulating contact (10-30º, N30W)			
10	LB5-2			CL	**OTAY FORMATION (To)** Dense, damp, mottled brown and pale green, Silty/Clayey, fine to coarse SANDSTONE with 10% gravel up to 1/2 to 2 inches; webbed clay filled fractures	3	109.6	17.5
12					Hard, damp, mottled brown and pale green, Silty/fine to coarse Sandy CLAYSTONE			
14				SM/SC	-Fracture (30º, N10W), 1/2-inch thick white caliche along transitional contact Very dense, damp, brown, Silty/Clayey, fine to medium SANDSTONE			
16								
18				SM	Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 10-20% gravel up to 1/2 to 1 inch			
20	LB5-3					10	123.5	11.1
22								
24								

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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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PROJECT NO. G1012-52-01A

BORING LB 5

ELEV. (MSL.) **719'** DATE COMPLETED **01-11-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
26								
28					-Scoured undulating contact			
30	LB5-4			SM/SC and CL	Very dense/hard, damp, mottled brown and pale green, Silty/Clayey, fine SANDSTONE/with interbedded fine, Sandy CLAYSTONE	10	113.4	17.8
32								
34				SM	Very dense, damp, light brown, Silty, fine SANDSTONE			
36								
38								
40	LB5-5				-Becomes fine to coarse and tan below 39.5 feet -Sample disturbed	15/6"	118.9	6.7
42					-Gravel and cobble increase to 10-30% up to 5 inches			
44					-Difficult drilling			
46					BORING TERMINATED AT 46 FEET No groundwater encountered			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
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GEOCON

PROJECT NO. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 6** ELEV. (MSL.) **684'** DATE COMPLETED **01-11-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST** MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Stiff, moist, dark brown, Silty CLAY with sand and gravel			
2								
4				SM	**OTAY FORMATION (To)** Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 5-10% gravel and cobble up to 4 inches			
6								
8				SM	Very dense, damp, light brown, Silty/Gravelly, fine to coarse SANDSTONE with 20-35% gravel, cobble and boulders up to 14 inches that decrease with depth			
10								
12								
14								
16				SM/SC	Very dense, damp, mottled light brown and pale green, Silty/Clayey, fine SANDSTONE			
18				SM	Very dense, damp, light brown, Silty, fine to coarse SANDSTONE with 10-20% gravel			
20								
22								
24								

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 6** ELEV. (MSL.) **684'** DATE COMPLETED **01-11-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26				SM	-From 25 to 28 feet, gravel and cobble increase 10-25% up to 8 inches			
28								
30					-Sampler destroyed			
32								
34	LB6-1				-Very slow and difficult drilling below 34 feet; rippers used			
36					-2-foot thick discontinuous, very hard, mottled maroon and pale green, silty claystone; bed truncated by gravel sandstone bed			
38					-Becomes brown to light brown and more clayey with 10-15% gravel and cobble up to 4 inches below 38½ feet			
40								
42								
					PRACTICAL REFUSAL AT 43 FEET			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 7** ELEV. (MSL.) **615'** DATE COMPLETED **01-11-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Stiff, moist, dark brown, Silty/fine to coarse, Sandy CLAY with 10-15% gravel and cobble up to 8 inches			
2								
4				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, mottled light brown, to brown, Clayey/Silty, fine to coarse SANDSTONE with 10-30% gravel, cobble and boulders up to 16 inches; very difficult drilling with auger and rippers used			
6					-Larger boulders present below 6 feet up to 24 inches; becomes mottled reddish brown, pale green and brown			
8								
10				GM	Very dense, damp, light brown and brown, Gravelly, fine to coarse SANDSTONE with clay and silt within matrix, 20-40% gravel, cobble and boulders up to 3 feet; very slow difficult drilling			
12					REFUSAL AT 12 FEET			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 8** ELEV. (MSL.) **537'** DATE COMPLETED **01-12-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**COLLUVIUM (Qc)** Stiff, moist, dark brown, Sandy CLAY with cobble and boulders up to 24 inches randomly present; slow difficult drilling; auger used			
2								
4					-Boulder REFUSAL ON BOULDER AT 4 FEET			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 9** ELEV. (MSL.) **537'** DATE COMPLETED **01-12-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**COLLUVIUM (Qc)** Stiff, moist, dark brown, Sandy CLAY, with random cobble and boulders up to 24 inches; slow difficult drilling; rippers used			
2								
4					-Cobble and boulder content increase; becomes light brown; possible fanglomerate contact? -Boulder			
6					REFUSAL ON BOULDER AT 6 FEET			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 10

ELEV. (MSL.) **527'** DATE COMPLETED **01-12-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**COLLUVIUM (Qc)** Soft to stiff, moist, dark brown, Sandy CLAY with trace gravel			
2					-Gradational contact			
				CL	**FANGLOMERATE DEPOSITS (Tof)** Very stiff, moist, mottled orange, brown and gray, fine to coarse, Sandy CLAY with 10-25% angular gravel up to 3 inches; no discernible bedding			
4	LB10-1							
6	LB10-2				-Becomes pale green with orange oxidation below 5 feet with random gypsum veins	2	119.5	14.8
8				CL	**OTAY FORMATION (To)** Very dense, damp, mottled orange brown and gray, Gravelly CLAYSTONE with sand, gravel, cobble and boulders up to 8 inches			
10					-1½ thick, stiff, moist, pale green claystone bed with gravel at 10 feet			
12	LB10-3					4/4"	121.6	8.6
14					-Very difficult drilling			
					PRACTICAL REFUSAL AT 15 FEET			

Figure A-10,
Log of Boring LB 10, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 11

ELEV. (MSL.) **529'** DATE COMPLETED **01-13-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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	**TOPSOIL** Stiff, moist, dark brown, fine to coarse, Sandy CLAY with trace gravel			
2				CL/SC	**OTAY FORMATION (To)** Very hard to very dense, damp, mottled light brown, brown and pale green, Sandy, fine to medium CLAYSTONE/Clayey, fine to medium SANDSTONE; clay and sand content vary with depth			
4								
6	LB11-1					5/10"	111.1	15.7
8								
10	LB11-2					5/8"	116.5	16.2
12								
14								
16								
18				SM	Very dense, damp, light gray, Silty, fine to medium SANDSTONE			
20	LB11-3			CL/SC	-Irregular scoured contact with 6 to 8-inch gravel and cobble bed at contact (10-20º, S35W) Very hard to very dense, damp, mottled light brown, brown and pale green, Sandy, fine to medium CLAYSTONE/Clayey, fine to medium SANDSTONE; clay and sand content vary with depth	6	123.1	13.7
22								
24				SM	-Gradational contact Very dense, damp, gray to light brown, Silty, fine to coarse SANDSTONE with 5-10% gravel up to 3 inches			
26								
28								

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 11

ELEV. (MSL.) **529'** DATE COMPLETED **01-13-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30								
32					-Sharp slightly scoured contact with coarse sandstone at base (2-3°, S35W) -1½ foot thick pale green and light brown, sandy claystone/clayey sandstone bed at 35½ feet			
34								
36								
38								
40								
42	LB11-4			CL	-Sharp scoured undulating contact Very hard to hard, pale green, Silty CLAYSTONE, waxy but very competent	8	121.0	14.3
44	LB11-5							
46	LB11-6			SC	-Gradational contact Very dense, damp, orange brown, Clayey, fine to coarse SANDSTONE with 10-30% gravel and cobble up to 10 inches	11/10"	125.7	11.0
48								
50					BORING TERMINATED AT 50 FEET No groundwater encountered			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 12

ELEV. (MSL.) **532'** DATE COMPLETED **01-13-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

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 (Qc)** Loose, damp to moist, brown to reddish brown, Clayey, fine to medium SAND with trace gravel and cobble up to 6 inches			
2					-Gradational contact			
				CL	Stiff, moist, reddish brown, Silty CLAY with some sand, gravel and cobble up to 4 inches			
4								
6	LB12-1			CL	Stiff to very stiff, moist, mottled gray, light brown and green, Sandy CLAYSTONE with trace gravel	1	108.2	17.7
				SC	**OTAY FORMATION (To)** Dense, damp, mottled pale green, light brown, Clayey/Silty SANDSTONE			
8				SM	Very dense, damp, mottled gray, light brown and pale green, Gravelly, fine to coarse SANDSTONE with clay, gravel, cobble and boulders up to 30 inches; very slow difficult drilling			
10								
12					-Heavily scoured contact			
				SM	Very dense, damp, light brown, pale green and light orange, Silty, fine to coarse SANDSTONE			
14					-Becomes silty/clayey sandstone below 14 feet			
16				SM	Very dense, damp, light brown and gray, Gravelly/Silty, fine to coarse SANDSTONE with 20-40% gravel, cobble and boulders up to 24 inches; difficult drilling, rippers and auger used			
18								
20								
					REFUSAL AT 21 FEET ON BOULDER			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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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PROJECT NO. G1012-52-01A

BORING LB 13

ELEV. (MSL.) **542'** DATE COMPLETED **01-13-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**COLLUVIUM (Qc)** Stiff, moist, brown to reddish brown, Silty/fine to coarse Sandy CLAY with trace gravel			
2								
4					-Gradational contact			
				SC	**FANGLOMERATE DEPOSITS (Tof)**			
6	LB13-1				Medium dense to dense, damp to moist, light brown to gray, Clayey, fine to coarse SAND with 10-20% gravel and cobble up to 8 inches; random 12-inch boulder also present; no discernible bedding	4	118.8	12.1
8					-Sharp undulating scoured contact (10-20º, N80W) with increase in cobble and boulders			
				SM	**OTAY FORMATION (To)**			
10					Dense to very dense, damp, pale green, orange and light brown, Silty, fine to coarse SANDSTONE with 5-10% gravel			
12					-1½ foot thick silty/clayey, fine to medium sandstone bed with ocassional cobble and boulder up to 14 inches			
14					-Gravel and cobble lenses present from 13 to 18 feet up to 20 inches; slow difficult drilling; rippers and auger used			
16								
18					REFUSAL AT 18 FEET ON BOULDER			

Figure A-13,
Log of Boring LB 13, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 14** ELEV. (MSL.) **512'** DATE COMPLETED **01-14-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Stiff, moist, dark brown, fine to coarse Sandy/Silty CLAY with 5% gravel and cobble up 8 inches			
2				SC	**FANGLOMERATE DEPOSITS (Tof)** Dense, damp, mottled light brown and orange, Clayey, fine to coarse SANDSTONE with 10-20% gravel, cobble and boulders up to 14 inches; no discernible bedding; difficult drilling			
4								
6								
					-Heavily scoured and undulating contact (10-30º, S10E)			
8				SM	**OTAY FORMATION (To)** Dense, damp, light brown, orange and pale green, Silty, fine to medium SANDSTONE			
				SC/SM	Dense, damp, pale green and orange, Clayey/Silty SANDSTONE			
10								
				SM/SC	Dense, damp, dark gray, Gravelly/Clayey, fine to coarse SANDSTONE with 20-30% gravel, cobble and boulders up to 14 inches; very slow difficult drilling; rippers used			
12								
14					PRACTICAL REFUSAL 1T 14 FEET			

Figure A-14,
Log of Boring LB 14, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 15** ELEV. (MSL.) **507'** DATE COMPLETED **01-14-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**COLLUVIUM/ALLUVIUM (Qc/Qal)** Loose to medium dense, moist, dark brown, Clayey, fine to coarse SAND, 10-20% with gravel, cobble and boulders up to 14 inches; slow difficult drilling; rippers used			
2								
4								
					REFUSAL AT 5 FEET			

Figure A-15,
Log of Boring LB 15, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 16** ELEV. (MSL.) **546'** DATE COMPLETED **01-14-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL/CH	**COLLUVIUM (Qc)** Stiff, moist, brown to dark brown, Silty CLAY with some sand; trace gravel			
2					-Gradational contact			
4				CL	Very stiff, moist, pale olive green to olive brown, Silty CLAY/CLAYSTONE with sand grit, trace gravel and gypsum			
6	LB16-1					1	110.5	17.4
8				SM/SC	**OTAY FORMATION (To)** Dense, damp, orange brown and pale green, Gravelly/Clayey, fine to coarse SAND with 20-40% gravel, cobble and boulders up to 14 inches			
					REFUSAL AT 9 FEET ON BOULDER			

Figure A-16,
Log of Boring LB 16, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

BORING LB 17

ELEV. (MSL.) **509'** DATE COMPLETED **01-14-2010**

EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**COLLUVIUM (Qc)** Stiff, moist, dark brown, Sandy CLAY with 5-10% gravel and cobble up to 6 inches			
2					-Becomes very stiff, pale gray to pale green			
4				CL/SC	**OTAY FORMATION (To)** Dense, damp, light brown to pale green, fine to coarse, Sandy CLAYSTONE/Clayey, fine to coarse SANDSTONE			
6					-Scoured contact			
				CL	Dense, damp, pale green and orange, Gravelly/fine to coarse, Sandy CLAYSTONE with 30% gravel, cobble and boulders up to 12 inches			
8					-Heavily scoured contact			
				CL	Hard, moist, pale green, Silty CLAYSTONE with fine to coarse, sandy grit; waxy but very competent			
10	LB17-1				-Gravel in shoe; blow counts not accurate	5/8"	113.2	15.3
				SM/SC	Very dense, damp, pale green and orange brown, Gravelly/Clayey, fine to coarse SANDSTONE with 20-40% gravel, cobble and boulders up 14 inches with random pale green discontinuous claystone beds			
12								
14								
16								
					-Gradational contact			
				CL	Very stiff to hard, pale gray-green, Silty CLAYSTONE with fine to coarse sandy grit and trace gravel; waxy but competent			
18	LB17-2					2	112.6	18.0
20					-Gravel content increases below 21 feet			
22					-Gradational contact			
				SM/SC	Very dense, damp, pale green and orange brown, Gravelly/Clayey, fine to coarse SANDSTONE with 20-40% gravel, cobble and boulders up 14 inches with random pale green discontinuous claystone beds			
24								

Figure A-17,
Log of Boring LB 17, Page 1 of 2

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING LB 17** ELEV. (MSL.) **509'** DATE COMPLETED **01-14-2010** EQUIPMENT **30" DIAMETER BUCKET RIG** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
26	LB17-3					5/8"	126.8	9.1
28								
30								
					-Gravel, cobble and boulder content increases below 30 feet PRACTICAL REFUSAL AT 31 FEET			

Figure A-17,
Log of Boring LB 17, Page 2 of 2

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 1 ELEV. (MSL.) **652'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, damp, brown, Clayey, fine to coarse SAND			
2					**METAVOLCANIC ROCK (KJmv)** Highly weathered, brown, moderately strong, METAVOLCANIC ROCK -Becomes moderately weathered and very strong; angular fragments up to 12" in maximum dimension			
					REFUSAL AT 3 FEET No groundwater encountered			

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

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 2** ELEV. (MSL.) **700'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Loose, damp, brown, fine to medium Sandy CLAY			
2					**METAVOLCANIC ROCK (KJmv)** Slightly weathered, grayish brown, very strong to extremely strong, METAVOLCANIC ROCK; angular fragments up to 18" in max dimension			
					REFUSAL AT 2½ FEET No groundwater encountered			

Figure A-19,
Log of Trench ET 2, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

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

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GEOCON

PROJECT NO. G1012-52-01A

TRENCH ET 3

ELEV. (MSL.) **674'** DATE COMPLETED **08-18-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**

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	**TOPSOIL** Loose, damp, brown, fine to medium, Sandy CLAY			
2								
4					**METAVOLCANIC ROCK (KJmv)** Soil, brownish- to olive gray, weak METAVOLCANIC ROCK (saprolite)			
6					-Becomes highly weathered			
8					-Becomes moderately weathered and moderately weak			
10					-Becomes moderately strong to strong; some angular fragments to 8" in max dimension			
12					-Very strong			
					REFUSAL AT 13 FEET No groundwater encountered			

Figure A-20,
Log of Trench ET 3, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 4 ELEV. (MSL.) **540'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**COLLUVIUM (Qc)** Loose, damp, brown to dark brown, Clayey, fine to coarse SAND			
2					-Becomes medium dense			
4								
6					**METAVOLCANIC ROCK (KJmv)** Highly weathered, grayish brown, moderately weak, METAVOLCANIC ROCK			
8					-Becomes moderately strong			
10					-Becomes strong to very strong and moderately weathered -Some angular fragments up to 12" in max dimension			
12								
14					REFUSAL AT 14 FEET No groundwater encountered			

Figure A-21,
Log of Trench ET 4, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 5** ELEV. (MSL.) **505'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, damp, brown, Clayey, fine to coarse SAND			
2					**METAVOLCANIC ROCK (KJmv)** Highly weathered, grayish brown, weak, METAVOLCANIC ROCK with red oxidation			
4					-Becomes moderately weathered and moderately weak			
6					-Becomes strong to very strong; angular fragments up to 12" in max dimension			
8					REFUSAL AT 9 FEET No groundwater encountered			

Figure A-22,
Log of Trench ET 5, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 6

ELEV. (MSL.) **506'** DATE COMPLETED **08-18-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	ET6-1			SC	**ALLUVIUM (Qal)** Medium dense, damp to moist, brown to dark brown, Clayey, fine to coarse SAND with trace sub-angular metavolcanic rock up to 6" in maximum dimension			
2								
4				CL/CH	**OTAY FORMATION (To)** Stiff, moist, light olive gray, fine to coarse, Sandy CLAYSTONE; waxy lustre, local polished surfaces			
6								
8								
10	ET6-2				-Becomes stiff to very stiff			
12								
14								
16								
18								
					TRENCH TERMINATED AT 19 FEET No groundwater encountered			

Figure A-23,
Log of Trench ET 6, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 7 ELEV. (MSL.) 550' DATE COMPLETED 08-18-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: J. PAGNILLO MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**TOPSOIL** Loose to medium dense, damp, Clayey, fine to coarse SAND			
2				SM+GW	**FANGLOMERATE DEPOSITS (Tof)** Dense, damp, light brown to tan, Silty, fine to coarse SANDSTONE with 20-30% gravel and cobble up to 10 inches			
4								
6								
8								
10								
12								
14					-Gravel percentage decreases (5-10%)			
16								
18				CL-CH	**OTAY FORMATION (To)** Very stiff, damp, green/brown, Sandy CLAYSTONE			

Figure A-24,
Log of Trench ET 7, Page 1 of 2

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 7** ELEV. (MSL.) **550'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
20								
22								
24					TRENCH TERMINATED AT 24 FEET No groundwater encountered			

Figure A-24,
Log of Trench ET 7, Page 2 of 2

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

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

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GEOCON

PROJECT NO. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 8 ELEV. (MSL.) 646' DATE COMPLETED 08-18-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: J. PAGNILLO	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, damp, reddish brown, Clayey, fine to coarse SAND			
				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, brown and gray, Silty/Gravelly, fine to coarse SANDSTONE with 30-40% gravel and cobble up to 6 inches			
2	ET8-1							
4								
6								
8					-Boulders up to 18 inches present			
10								
12					REFUSAL AT 12 FEET No groundwater encountered			

Figure A-25,
Log of Trench ET 8, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 9 ELEV. (MSL.) 596' DATE COMPLETED 08-18-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: J. PAGNILLO	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET9-1			CL	**TOPSOIL** Medium dense, damp, brown to dark brown, fine to medium Sandy CLAY			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, light brown, Silty, fine- to coarse-grained SANDSTONE with cobbles and some boulders up to 24" in maximum dimension approx. 10% greater than 12-inch minus			
4								
6								
8	ET9-2							
10								
12								
14								
16								
18								
					TRENCH TERMINATED AT 19 FEET No groundwater encountered			

Figure A-26,
Log of Trench ET 9, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 10** ELEV. (MSL.) **504'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**ALLUVIUM (Qal)** Medium dense, dry, brown, Sandy CLAY; some rootlets			
2					-Becomes dense with some nested gravels and boulders up to 2 feet in maximum dimension			
4				SC	**OTAY FORMATION (To)** Dense, moist, light grayish to yellowish brown, Clayey, medium- to coarse-grained SANDSTONE with 20% gravel and occasional cobble			
6								
8								
10								
12					-Massive; becomes very dense and cemented			
14					REFUSAL AT 14 FEET No groundwater encountered			

Figure A-27,
Log of Trench ET 10, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 11** ELEV. (MSL.) **545'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**UNDOCUMENTED FILL (Qudf)** Medium dense, moist, dark brown, fine to medium, Sandy CLAY with trace cobble up to 6" in maximum dimension			
2								
4								
6				SM	**OTAY FORMATION (To)** Dense, moist, light brown, Silty, fine- to coarse-grained SANDSTONE with 10-20% gravel and cobble up to 12-inch minus			
8								
10								
12					-Amount of cobble decreases			
14								
16					TRENCH TERMINATED AT 16 FEET No groundwater encountered			

Figure A-28,
Log of Trench ET 11, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 12 ELEV. (MSL.) **612'** DATE COMPLETED **08-18-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft, damp, brown, fine to medium Sandy CLAY			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, light brown, Silty, fine- to coarse-grained SANDSTONE with 15% gravel, cobble and boulders up to 18 inches			
4								
6					-Amount of cobble and boulder decreases			
8								
10								
12								
14								
16								
18								
					TRENCH TERMINATED AT 19 FEET No groundwater encountered			

Figure A-29,
Log of Trench ET 12, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 13

ELEV. (MSL.) **516'** DATE COMPLETED **08-22-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**TOPSOIL** Loose, dry, grayish brown, Silty to Clayey SAND			
2				CL	Stiff to hard, brown, Sandy CLAY			
4				SM	**OTAY FORMATION (To)** Dense, moist, light yellowish to grayish brown, Silty, fine- to coarse-grained SANDSTONE; few gravels -Becomes very dense with approx. 10-20% gravels and cobbles			
6								
8	ET13-1							
10								
12					-Massive			
14								
16					-Becomes strongly cemented and conglomeratic REFUSAL AT 16 FEET No groundwater encountered			

Figure A-30,
Log of Trench ET 13, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 14 ELEV. (MSL.) 616' DATE COMPLETED 08-22-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Medium dense, moist, grayish brown, Silty SAND; some gravels and cobbles			
2				SC	**FANGLOMERATE DEPOSITS (Tof)** Dense, slightly moist, reddish brown, Clayey/Gravelly, fine to medium SANDSTONE with 20-30% gravel and cobble up to 12-inch minus			
4	ET14-1							
6								
8								
					-Becomes very dense with abundant boulders greater than 2-feet in maximum dimension			
10					REFUSAL AT 10 FEET No groundwater encountered			

Figure A-31,
Log of Trench ET 14, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 15 ELEV. (MSL.) **510'** DATE COMPLETED **08-22-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC-SM	**ALLUVIUM (Qal)** Medium dense, dry, brown, Clayey to Silty SAND			
2				SM	**OTAY FORMATION (To)** Dense, moist, olive gray to light reddish brown, Silty to Clayey, fine- to medium-grained SANDSTONE			
4								
6	ET15-1							
8					-Becomes fine- to coarse-grained with 20-30% cobbles and boulders up to 2-foot minus			
10								
12								
14					-Massive			
16					REFUSAL AT 16 FEET No groundwater encountered			

Figure A-32,
Log of Trench ET 15, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 16 ELEV. (MSL.) **644'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET16-1			SC	**TOPSOIL** Loose, damp, brown, Clayey SAND			
				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, dry, light brown, Silty/Gravelly, fine to medium SANDSTONE; angular gravels			
2								
4								
6	ET16-2				-Becomes dense, moist, light grayish brown and moderately cemented			
8								
10								
12	ET16-3			SM	**OTAY FORMATION (To)** Dense, damp, light brown, Silty, fine to medium SANDSTONE with some gravel			
14								
16								
18					TRENCH TERMINATED AT 18 FEET No groundwater encountered			

Figure A-33,
Log of Trench ET 16, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 17

ELEV. (MSL.) **614'** DATE COMPLETED **08-18-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **J. PAGNILLO**

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	**ALLUVIUM (Qal)** Loose, moist to wet, dark brown, fine to coarse, Sandy CLAY with trace cobble (~10%) up to 6" size			
2								
4								
6				SM	**OTAY FORMATION (To)** Dense, moist to wet, light brown, Silty, fine to coarse SANDSTONE with cobble (~10-15%) sub-rounded, up to 12" in maximum dimension			
8				CL	Hard, moist to wet, yellow, fine to medium, Sandy CLAYSTONE			
10	ET17-1							
12								
14								
16								
18								
20					TRENCH TERMINATED AT 20 FEET No groundwater encountered			

Figure A-34,
Log of Trench ET 17, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 18

ELEV. (MSL.) **585'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**ALLUVIUM (Qal)** Stiff, moist, brown, Sandy CLAY with some gravels			
2	ET18-1							
4								
6				SM	**OTAY FORMATION (To)** Dense, slightly moist, grayish brown, Silty, fine to medium, SANDSTONE; excavates blocky in texture			
8	ET18-2							
10								
12								
14					-Massive			
16					TRENCH TERMINATED AT 16 FEET No groundwater encountered			

Figure A-35,
Log of Trench ET 18, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 19** ELEV. (MSL.) **777'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET19-1				**METAVOLCANIC ROCK (KJmv)** Slightly weathered, gray to reddish brown, strong METAVOLCANIC ROCK; excavates to 2-6" minus			
2								
					REFUSAL AT 3 FEET No groundwater encountered			

Figure A-36,
Log of Trench ET 19, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

SAMPLE SYMBOLS

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

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

GEOCON

PROJECT NO. G1012-52-01A

TRENCH ET 20

ELEV. (MSL.) **638'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	B20-1			SM	**ALLUVIUM (Qal)** Loose, dry, grayish brown, Silty, fine to medium SAND with some clay and gravels			
6	B20-2			CL	**OTAY FORMATION (To)** Hard, light grayish brown, Silty CLAYSTONE			
12					-Massive			
14					**METAVOLCANIC ROCK (KJmv)** Highly weathered, blue-gray, strong METAVOLCANIC ROCK			
16					REFUSAL AT 16 FEET No groundwater encountered			

Figure A-37,
Log of Trench ET 20, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 21

ELEV. (MSL.) **660'** DATE COMPLETED **08-18-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	ET21-1			CL	**TOPSOIL** Loose to medium dense, moist, dark brown, fine to medium Sandy CLAY with cobble (~10%) up to 6" size			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, light brown, Silty, fine to coarse SANDSTONE with 15% gravel, cobble and boulders up to 18 inches			
4								
6								
8					-Amount of cobble decreases (5-10%)			
	ET21-2			SM	**OTAY FORMATION (To)** Dense, damp, light brown, Silty, fine to coarse SANDSTONE with some gravel			
10								
12								
14								
16								
18								
20					TRENCH TERMINATED AT 20 FEET No groundwater encountered			

Figure A-38,
Log of Trench ET 21, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 22 ELEV. (MSL.) 766' DATE COMPLETED 08-21-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, grayish brown, strong METAVOLCANIC ROCK; joint orientations range between N70ºE, 3ºS to horizontal			
2	ET22-1							
4								
6					-Becomes moderately strong and highly weathered			
8								
10								
12					REFUSAL AT 12 FEET No groundwater encountered			

Figure A-39,
Log of Trench ET 22, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 23 ELEV. (MSL.) 766' DATE COMPLETED 08-21-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM (Qal)** Medium dense, dry, reddish brown, Clayey SAND; some gravels and occasional cobbles; approx 10% greater than 6" minus			
2								
4								
6					-30-40% greater than 6" minus			
8								
10					**METAVOLCANIC ROCK (KJmv)** Highly weathered, gray-brown, moderately strong METAVOLCANIC ROCK			
12								
14					REFUSAL AT 14 FEET No groundwater encountered			

Figure A-40,
Log of Trench ET 23, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 24

ELEV. (MSL.) **681'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**TOPSOIL** Stiff, dark olive brown, Sandy CLAY			
2								
4				SM	**OTAY FORMATION (To)** Dense, moist, gray brown to reddish brown, medium-grained, Silty SANDSTONE			
6								
8					-20-30% gravel and cobble present			
10								
12								
14					-Massive			
16								
18					TRENCH TERMINATED AT 18 FEET No groundwater encountered			

Figure A-41,
Log of Trench ET 24, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 25

ELEV. (MSL.) **642'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**TOPSOIL** Loose, dry, light brown, Silty, fine SAND			
2				SC	**OTAY FORMATION (To)** Dense, dry, light reddish brown, Clayey, fine- to coarse-grained SANDSTONE with coarse gravels			
6	ET25-1			SM/SC	Dense, moist, light olive brown, Silty to Clayey, fine-grained SANDSTONE			
12					-Some claystone lenses present			
18					TRENCH TERMINATED AT 18 FEET No groundwater encountered			

Figure A-42,
Log of Trench ET 25, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 26

ELEV. (MSL.) **619'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**TOPSOIL** Loose, dry, dark brown, Silty SAND			
2				SM/SC	**FANGLOMERATE DEPOSITS (Tof)** Very dense, moist, grayish brown, Gravelly/Clayey, medium- to coarse-grained SANDSTONE with 30-40% gravel, cobble and boulders up to 3-feet in diameter			
4								
6	ET26-1							
8								
10								
12					-Becomes yellowish to reddish brown with increase in boulders -Very difficult excavation TRENCH TERMINATED AT 12 FEET No groundwater encountered			

Figure A-43,
Log of Trench ET 26, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 27 ELEV. (MSL.) **576'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, dry, olive brown, Clayey SAND			
2								
4				SM	**OTAY FORMATION (To)** Dense, moist, tan to olive brown, Silty/Gravelly, fine to medium SANDSTONE with 20-30% gravel and cobble			
6								
8					-Gravel and cobble content decreases			
10					TRENCH TERMINATED AT 10 FEET No groundwater encountered			

Figure A-44,
Log of Trench ET 27, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 28** ELEV. (MSL.) **562'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Stiff, moist, dark brown, Sandy CLAY			
2				SM/SC	**OTAY FORMATION (To)** Dense, moist, light grayish brown, Silty/Clayey, fine to coarse SANDSTONE; some angular gravels			
4								
6								
8	ET28-1				-2"-4" thick waxy claystone lense present; competent; not remolded			
10								
12					TRENCH TERMINATED AT 12 FEET No groundwater encountered			

Figure A-45,
Log of Trench ET 28, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 29

ELEV. (MSL.) **564'** DATE COMPLETED **08-21-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**ALLUVIUM (Qal)** Stiff, dry, dark olive brown, Sandy CLAY			
2	ET29-1							
				SM/SC	**OTAY FORMATION (To)** Dense, moist, light grayish brown, Silty/Clayey, fine to coarse SANDSTONE; some gravels; weakly to moderately cemented			
4								
6								
8								
10								
12					-Massive			
14					TRENCH TERMINATED AT 14 FEET No groundwater encountered			

Figure A-46,
Log of Trench ET 29, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 30** ELEV. (MSL.) **680'** DATE COMPLETED **08-21-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Stiff, dry, dark brown, Sandy CLAY			
2				SM	**OTAY FORMATION (To)** Dense, moist, light brown, Silty, fine- to medium-grained SANDSTONE; some gravels and cobble			
20					TRENCH TERMINATED AT 20 FEET No groundwater encountered			

Figure A-47,
Log of Trench ET 30, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 31 ELEV. (MSL.) **514'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**ALLUVIUM (Qal)** Stiff, moist, brown, Clayey SAND; some boulders			
2								
4				SM/SC	**OTAY FORMATION (To)** Dense, moist, light grayish brown, Silty/Clayey, fine- to medium-grained SANDSTONE; occasional gravels			
6								
8								
10								
12								
					TRENCH TERMINATED AT 12½ FEET No groundwater encountered			

Figure A-48,
Log of Trench ET 31, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 32** ELEV. (MSL.) **558'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET32-1			SC	**TOPSOIL** Medium dense, dry, dark reddish brown, Clayey SAND; some gravels and cobbles			
2				SM	**OTAY FORMATION (To)** Dense, moist, light grayish brown, Silty, medium- to coarse-grained SANDSTONE; some gravels			
4								
	ET32-2							
6								
8								
10								
12								
14					TRENCH TERMINATED AT 14 FEET No groundwater encountered			

Figure A-49,
Log of Trench ET 32, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 33** ELEV. (MSL.) **633'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**TOPSOIL** Loose, dry, brown, Clayey SAND			
2	ET33-1			SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, dry, reddish brown, Silty, medium- to coarse-grained SANDSTONE with 20-30% gravel, cobble and boulders up to 24 inches			
4								
					REFUSAL AT 5 FEET No groundwater encountered			

Figure A-50,
Log of Trench ET 33, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 34 ELEV. (MSL.) 535' DATE COMPLETED 08-20-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**TOPSOIL** Loose, dry, light reddish brown, Silty SAND; trace gravels			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, reddish brown, Silty/Gravelly SANDSTONE with 30-40% gravel, cobble and boulders up to 24 inches			
4	ET34-1							
6								
8					-Becomes less cemented and rippable			
10				SC	**OTAY FORMATION (To)** Dense, damp, light reddish to yellowish brown, Clayey, fine to coarse SANDSTONE with some gravel and occasional boulder			
12								
14								
16					TRENCH TERMINATED AT 16 FEET No groundwater encountered			

Figure A-51,
Log of Trench ET 34, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 35

ELEV. (MSL.) **612'** DATE COMPLETED **08-19-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**TOPSOIL** Loose, dry, brown, Sandy CLAY			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, light reddish to light brown, Silty/Gravelly, medium- to coarse-grained SANDSTONE with 30-40% gravel			
	ET35-1							
4								
6								
8								
				SM	**OTAY FORMATION (To)** Dense, damp, light brown, Silty, fine to coarse SANDSTONE with some gravel			
10								
12								
14								
					TRENCH TERMINATED AT 15 FEET No groundwater encountered			

Figure A-52,
Log of Trench ET 35, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

TRENCH ET 36

ELEV. (MSL.) **633'** DATE COMPLETED **08-19-2008**

EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** 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	**FANGLOMERATE DEPOSITS (Tof)** Dense, dry, reddish brown, Silty, medium- to coarse-grained SANDSTONE with 20-30% gravel, cobble and boulders up to 24 inches			
6	ET36-1			SM	**OTAY FORMATION (To)** Very dense, light olive brown, Gravelly, fine to coarse SANDSTONE with approx. 20% gravel and cobble less than 6" minus			
8					-Gravel increases with depth			
16					-Occasional boulders within matrix approx 2' in maximum dimension			
20					TRENCH TERMINATED AT 20 FEET No groundwater encountered			

Figure A-53,
Log of Trench ET 36, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 37 ELEV. (MSL.) **536'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, Silty, fine to medium SAND with abundant gravels and 2' boulders			
2	ET37-1							
4				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, light grayish brown, Silty/Gravelly, medium- to coarse-grained SANDSTONE with 30-40% gravel and cobble			
6								
8								
10					TRENCH TERMINATED AT 10 FEET No groundwater encountered			

Figure A-54,
Log of Trench ET 37, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 38** ELEV. (MSL.) **573'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, dark reddish brown, Silty SAND			
2				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, dry, light reddish brown, Silty/Gravelly medium- to coarse-grained SANDSTONE with 30-40% gravel and cobble less than 12 inches			
4								
6								
8					TRENCH TERMINATED AT 8 FEET No groundwater encountered			

Figure A-55,
Log of Trench ET 38, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 39 ELEV. (MSL.) 508' DATE COMPLETED 08-19-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET39-1			SM/SC	**ALLUVIUM (Qal)** Medium dense, dry, reddish brown, Silty/Clayey SAND with 10-20% gravel, cobble and boulders up to 24 inches			
2								
4				SM/SC	**OTAY FORMATION (To)** Very dense, moist, light grayish brown, Silty/Clayey, medium- to coarse-grained SANDSTONE			
6					**METAVOLCANIC ROCK (KJmv)** Slightly weathered, strong, grayish brown, METAVOLCANIC ROCK REFUSAL AT 6 FEET No groundwater encountered			

Figure A-56,
Log of Trench ET 39, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 40 ELEV. (MSL.) **520'** DATE COMPLETED **08-19-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, dry, dark brown, Silty, fine to medium SAND with 10-20% gravel and cobble up to 6 inches			
2								
4								
6				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, light grayish brown, Silty/Gravelly medium- to coarse-grained SANDSTONE with 30-40% gravel and cobble up to 6 inches			
8								
10								
12								
14					-Difficult excavation			
					REFUSAL AT 15 FEET No groundwater encountered			

Figure A-57,
Log of Trench ET 40, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 41 ELEV. (MSL.) 650' DATE COMPLETED 08-20-2008 EQUIPMENT PC 400LC-EXCAVATOR W/36" BUCKET BY: M. ERTWINE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SC	**COLLUVIUM (Qc)** Loose, dry, brown, Clayey SAND; occasional boulders in excess of 2 feet			
2								
4					**METAVOLCANIC ROCK (KJmv)** Highly weathered, light yellowish brown, medium strong METAVOLCANIC ROCK			
6	ET41-1							
8								
10								
12					-Becomes strong REFUSAL AT 12 FEET No groundwater encountered			

Figure A-58,
Log of Trench ET 41, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 42** ELEV. (MSL.) **622'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, damp, light reddish brown, Silty, fine- to medium-grained SANDSTONE with 15-25% gravel and cobble up to 12-inch minus			
2								
4								
				SM	Dense, moist, light yellowish brown, Silty/Gravelly, medium- to coarse-grained SANDSTONE with 30-40% gravel and cobble up to 12-inch minus			
6								
8								
10								
12								
14								
16								
18					REFUSAL AT 18 FEET No groundwater encountered			

Figure A-59,
Log of Trench ET 42, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH ET 43 ELEV. (MSL.) **586'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET43-1			SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, dry, light reddish brown, Silty/Gravelly SANDSTONE with 20% gravel and cobble less than 12-inch minus			
2								
4				SM	Very dense, moist, light yellowish brown, Silty/Gravelly, medium- to coarse-grained SANDSTONE with 20-30% gravel, cobble and boulders up to 12 inches			
6								
8								
10								
12					REFUSAL AT 12 FEET No groundwater encountered			

Figure A-60,
Log of Trench ET 43, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 44** ELEV. (MSL.) **626'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	ET44-1				**METAVOLCANIC ROCK (KJmv)** Highly weathered, reddish brown, moderately strong, METAVOLCANIC ROCK			
2								
4					-Becomes gray brown and slightly weathered			
					REFUSAL AT 5 FEET No groundwater encountered			

Figure A-61,
Log of Trench ET 44, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 45** ELEV. (MSL.) **679'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Loose, dry, reddish brown, Silty/Sandy CLAY with 10-20% gravel and cobble up to 6 inches			
2								
					METAVOLCANIC ROCK (KJmv) Moderately weathered, gray-brown, strong, METAVOLCANIC ROCK			
4								
					REFUSAL AT 5 FEET No groundwater encountered			

Figure A-62,
Log of Trench ET 45, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 46** ELEV. (MSL.) **621'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Highly weathered, loose, dry, reddish brown, Silty SAND with some gravel and cobble			
2								
4					**METAVOLCANIC ROCK (KJmv)** Soil, mottled reddish brown and gray, weak, METAVOLCANIC ROCK (saprolite); with gypsum crystals throughout			
6	ET46-1							
8								
10					-Becomes moderately weathered, gray-brown and moderately strong			
12					REFUSAL AT 12 FEET No groundwater encountered			

Figure A-63,
Log of Trench ET 46, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 47** ELEV. (MSL.) **593'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM/SC	**FANGLOMERATE DEPOSITS (Tof)** Highly weathered, dense, slightly moist, reddish mottled yellowish brown, Gravelly/Clayey, medium- to coarse-grained SANDSTONE with 30-40% gravel, cobble and boulders up to 14 inches			
2								
4								
6								
8					-Gravel, cobble and boulders increases with depth			
10					-Occasional boulder greater than 1 to 2-foot minus			
12								
14								
16					REFUSAL AT 16 FEET No groundwater encountered			

Figure A-64,
Log of Trench ET 47, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01A

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH ET 48** ELEV. (MSL.) **520'** DATE COMPLETED **08-20-2008** EQUIPMENT **PC 400LC-EXCAVATOR W/36" BUCKET** BY: **M. ERTWINE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, dark brown, Gravelly, fine to coarse SAND			
2								
4				SM	**FANGLOMERATE DEPOSITS (Tof)** Dense, dry, reddish brown, Gravelly/Silty SANDSTONE with gravel, cobble and boulders up to 14 inches			
6								
8					-Becomes grayish brown			
10								
					REFUSAL AT 11 FEET No groundwater encountered			

Figure A-65,
Log of Trench ET 48, Page 1 of 1

G1012-52-01A (OTAY RANCH RESORT VILLAGE).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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 57 ELEV. (MSL.) 555' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose to medium dense, dry to damp, brown, Silty, fine to medium SAND			
2								
4				SM	**FANGLOMERATE DEPOSITS (Tof)** Very dense, damp, light brown, Gravelly, fine to coarse SANDSTONE with 30-40% gravel and cobble up to 12-inches			
					PRACTICAL REFUSAL AT 4.5 FEET No groundwater encountered			

Figure A-122,
Log of Trench T 57, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 58 ELEV. (MSL.) 567' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				GM	**ALLUVIUM (Qal)** Loose, dry, light brown, fine to coarse, Sandy GRAVEL, with gravel and cobble up to 24-inches			
2				CL	**FANGLOMERATE DEPOSITS (Tof)** Dense, moist, pale green, Gravelly CLAY, with sand, and 30-40% gravel, cobble, and boulders up to 18-inch; matrix saprolitic			
4					PRACTICAL REFUSAL AT 4.5 FEET No groundwater encountered			

Figure A-123,
Log of Trench T 58, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 59 ELEV. (MSL.) 603' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				GM	**ALLUVIUM (Qal)** Loose, damp, brown, fine to coarse, Sandy GRAVEL, with gravel, cobble, and boulders up to 18-inch			
2								
4					**METAVOLCANIC ROCK (KJmv)** Soil, pale green, weak METAVOLCANIC ROCK (saprolite); with remnant strong rock fragments floating in matrix			
					PRACTICAL REFUSAL AT 5 FEET No groundwater encountered			

Figure A-124,
Log of Trench T 59, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 60 ELEV. (MSL.) 653' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				GM	**ALLUVIUM (Qal)** Loose, damp, brown, fine to coarse, Sandy GRAVEL; with gravel, cobble, and boulders up to 20-inch			
2					**METAVOLCANIC ROCK (KJmv)** Soil, pale green with maroon oxidation, weak METAVOLCANIC ROCK (saprolite); with remnant rock fragments floating in matrix			
4					TRENCH TERMINATE AT 5 FEET No groundwater encountered			

Figure A-125,
Log of Trench T 60, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 61 ELEV. (MSL.) **680'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 18-inch			
2					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, light brown, strong METAVOLCANIC ROCK			
4					REFUSAL AT 4 FEET No groundwater encountered			

Figure A-126,
Log of Trench T 61, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 62 ELEV. (MSL.) 738' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 14-inch			
2					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, orange brown, strong METAVOLCANIC ROCK			
					REFUSAL AT 2.5 FEET No groundwater encountered			

Figure A-127,
Log of Trench T 62, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 63 ELEV. (MSL.) 738' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 24-inch			
2					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, dark gray, strong METAVOLCANIC ROCK			
					REFUSAL AT 3 FEET No groundwater encountered			

Figure A-128,
Log of Trench T 63, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 64 ELEV. (MSL.) 572' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 18-inch			
2					**METAVOLCANIC ROCK (KJmv)** Slightly weathered, gray, very strong METAVOLCANIC ROCK REFUSAL AT 2 FEET No groundwater encountered			

Figure A-129,
Log of Trench T 64, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 65 ELEV. (MSL.) **530'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 14-inch			
2								
4					**METAVOLCANIC ROCK (KJmv)** Soil, mottled pale green and brown, weak METAVOLCANIC ROCK (saprolite); with relic rock floating in matrix			
6					TRENCH TERMINATE AT 6 FEET No groundwater encountered			

Figure A-130,
Log of Trench T 65, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 66 ELEV. (MSL.) **490'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Silty, fine to coarse SAND			
2					-12-inch gravel lense present below 2 feet			
4								
6					-Minor caving below 6 feet			
8					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, light brown and brown, strong METAVOLCANIC ROCK			
					REFUSAL AT 8 FEET No groundwater encountered			

Figure A-131,
Log of Trench T 66, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 67 ELEV. (MSL.) **580'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 16-inch			
2					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, dark gray, strong METAVOLCANIC ROCK			
					REFUSAL AT 2.5 FEET No groundwater encountered			

Figure A-132,
Log of Trench T 67, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 68** ELEV. (MSL.) **650'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 16-inch			
2					**METAVOLCANIC ROCK (KJmv)** Moderately weathered, dark gray, strong METAVOLCANIC ROCK			
					REFUSAL AT 2.5 FEET No groundwater encountered			

Figure A-133,
Log of Trench T 68, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 69 ELEV. (MSL.) 670' DATE COMPLETED 10-15-2010 EQUIPMENT JD TRACKHOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Loose, dry, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 16-inch			
					METAVOLCANIC ROCK (KJmv) Slightly weathered, dark gray, very strong METAVOLCANIC ROCK			
					REFUSAL AT 1.5 FEET No groundwater encountered			

Figure A-134,
Log of Trench T 69, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 70 ELEV. (MSL.) **496'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Gravelly, fine to coarse SAND, with gravel, cobble, and boulders up to 14-inch			
2								
					METAVOLCANIC ROCK (KJmv) Highly weathered, pale green and light brown, weak and strong METAVOLCANIC ROCK (saprolite); with relic rock fragments floating in matrix			
4					PRACTICAL REFUSAL AT 4 FEET No groundwater encountered			

Figure A-135,
Log of Trench T 70, Page 1 of 1

G1012-52-01D.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. G1012-52-01D

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 71 ELEV. (MSL.) **495'** DATE COMPLETED **10-15-2010** EQUIPMENT **JD TRACKHOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Loose, damp, brown, Silty, fine to coarse SAND, with trace gravel			
2								
4								
6				GM	**FANGLOMERATE DEPOSITS (Tof)** Dense, damp, light brown, fine to coarse, Sandy, GRAVEL with 60-70% gravel, cobble, and boulders up to 16-inches			
					PRACTICAL REFUSAL AT 7 FEET No groundwater encountered			

Figure A-136,
Log of Trench T 71, Page 1 of 1

G1012-52-01D.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

County of San Diego

GARY W. ERBECK
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION
P.O. BOX 129261, SAN DIEGO, CA 92112-9261
619-338-2222/FAX 619-338-2315/1-800-253-9933
www.sdcounty.ca.gov/deh/lwq

JACK MILLER
ASSISTANT DIRECTOR

WAIVER FOR GEOTECHNICAL BORING(S)

August 4, 2008

NATHAN A. ASH
GEOCON ENVIRONMENTAL CON
6960 FLANDERS DRIVE
SAN DIEGO, CA 92121

RE: REQUEST FOR WAIVER # 1210
OTAY RANCH VILLAGE 13

5981300100	NORTH SIDE OF OTAY LAKES RD., CHULA VISTA, CA 91914
5981400100	NORTH SIDE OF OTAY LAKES RD., CHULA VISTA, CA 91914
5980900300	NORTH SIDE OF OTAY LAKES RD., CHULA VISTA, CA 91914

Monitoring Well Program (MWP) staff have reviewed County records currently available regarding County permitted hazardous materials establishments and Site Assessment and Mitigation Program (SAM) sites. **Based on this limited review, and your signed waiver statement, a waiver for a geotechnical-boring permit is granted.**

The following conditions apply:

1. **As specified in the Department of Water Resources Bulletin 74-81 and 74-90**
   a. All borings must be properly destroyed. Borings must be sealed from the bottom of the boring to ground surface with an approved sealing material.
   b. Drill cuttings are not acceptable fill material.

2. Drill cuttings must be properly handled and disposed to be in compliance with Stormwater Best Management Practices of the local jurisdiction.

Please note that there may be sites with contaminated soil and/or groundwater for which SAM has no information. All responsibilities, obligations and liabilities under state and local laws still apply to the proposed drilling. If new information becomes available indicating that substances have been found or *are planned to be used* at the site, you agree to notify MWP of this change for further evaluation.

Ernesto Profeta, Environmental Health Technician
Monitoring Well Program – Phone: (619) 338-2339, Fax: (619) 338-2315
E Mail: DEH.monitoringwells@sdcounty.ca.gov

Emailed copy 8/4

County of San Diego

GARY W. ERBECK
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION
P.O. BOX 129261, SAN DIEGO, CA 92112-9261
619-338-2222/FAX 619-338-2315/1-800-253-9933
www.sdcounty.ca.gov/deh/lwq

JACK MILLER
ASSISTANT DIRECTOR

WAIVER FOR GEOTECHNICAL BORING(S)

September 25, 2009

Troy K. Reist
GEOCON ENVIRONMENTAL CON
6960 FLANDERS DRIVE
SAN DIEGO, CA 92121

RE: REQUEST FOR WAIVER # 1302
OTAY RANCH PRESERVE AND RESORT (VILLAGE 13)

5981300100	NORTH SIDE OF OTAY LAKES RD, CHULA VISTA CA 91914
5981400100	NORTH SIDE OF OTAY LAKES RD, CHULA VISTA CA 91914
5950900300	NORTH SIDE OF OTAY LAKES RD, CHULA VISTA CA 91914

Monitoring Well Program (MWP) staff have reviewed County records currently available regarding County permitted hazardous materials establishments and Site Assessment and Mitigation Program (SAM) sites. **Based on this limited review, and your signed waiver statement, a waiver for a geotechnical-boring permit is granted.**

The following conditions apply:

1. **As specified in the Department of Water Resources Bulletin 74-81 and 74-90**
   a. All borings must be properly destroyed. Borings must be sealed from the bottom of the boring to ground surface with an approved sealing material.
   b. Drill cuttings are not acceptable fill material except as indicated below.

2. Drill cuttings must be properly handled and disposed to be in compliance with Stormwater Best Management Practices of the local jurisdiction.

3. The 8-inch diameter borings must be completely backfilled with bentonite. The 30-inch diameter borings must be backfilled with a 24-inch bentonite layer at the base of each boring with alternating 12-inch layers of bentonite every 10 feet of depth.

Please note that there may be sites with contaminated soil and/or groundwater for which SAM has no information. All responsibilities, obligations and liabilities under state and local laws still apply to the proposed drilling. If new information becomes available indicating that substances have been found or *are planned to be used* at the site, you agree to notify MWP of this change for further evaluation.

Amelia Cesena

Amelia Cesena, Environmental Health Technician

"Environmental and public health through leadership, partnership and science"

APPENDIX B

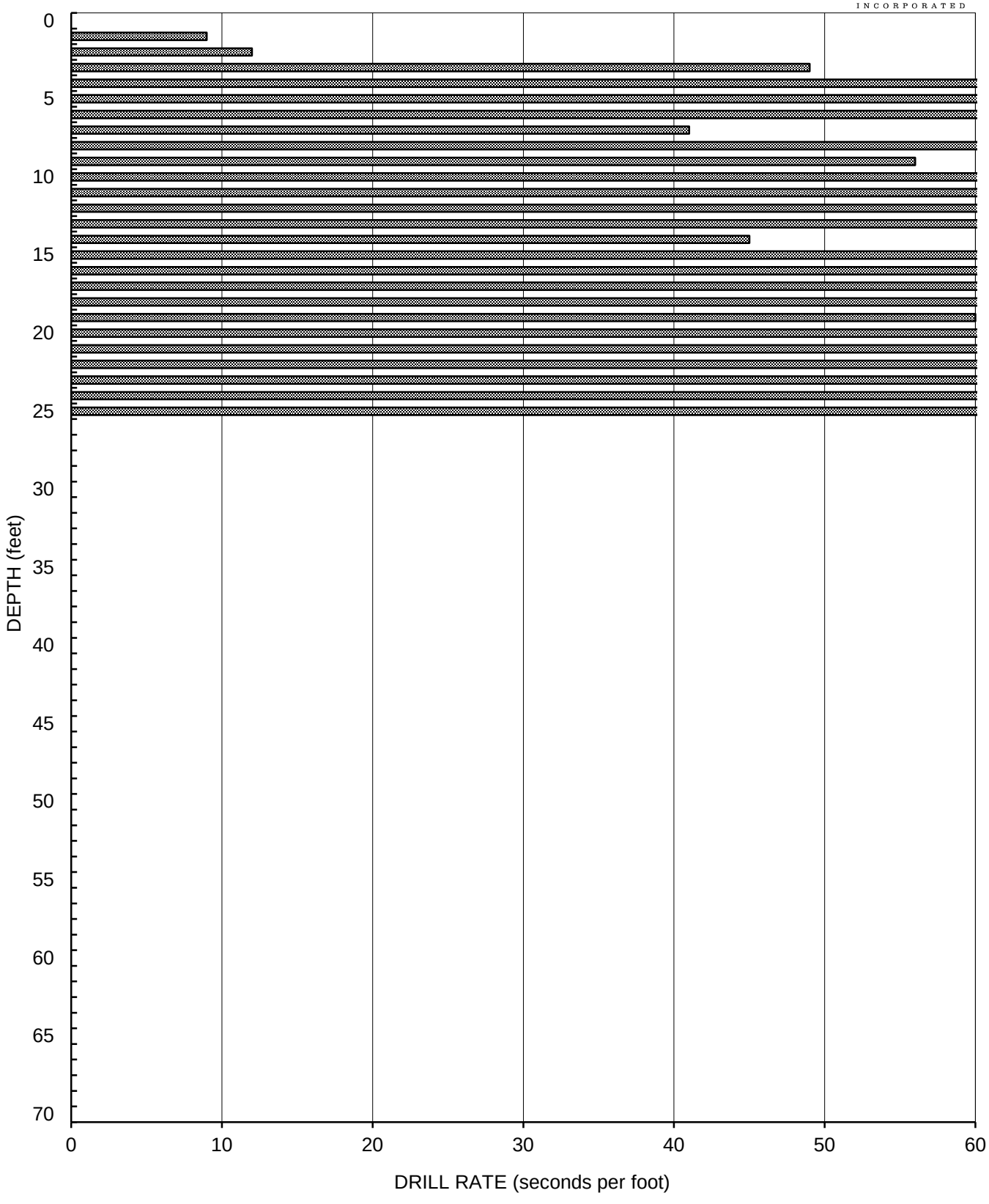
AIR TRACK BORINGS

Our subsurface investigation included excavating 22 air-track borings in the locations of proposed cuts to evaluate bedrock rippability. The air track borings were advanced to a maximum depth of approximately 67 feet using an ECM-370 drill rig equipped with a 4-inch diameter drill bit. The drill bit is advanced with an air percussion hammer and drill rods. As the drilling proceeded, Geocon Incorporated recorded the drill penetration rates in seconds per foot (seconds/foot) based on measured marks on the drill rig tower and a stopwatch. The approximate locations of the air track borings are shown on the Geologic Map, Figures 2 through 5. Logs of the air track borings are presented on Figures B-1 through B-22 in this appendix.

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-1
Elevation - 807 Feet (MSL)

GEOCON
INCORPORATED



AT001.xls

FIGURE B-1

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-2
Elevation - 820 Feet (MSL)

GEOCON
INCORPORATED

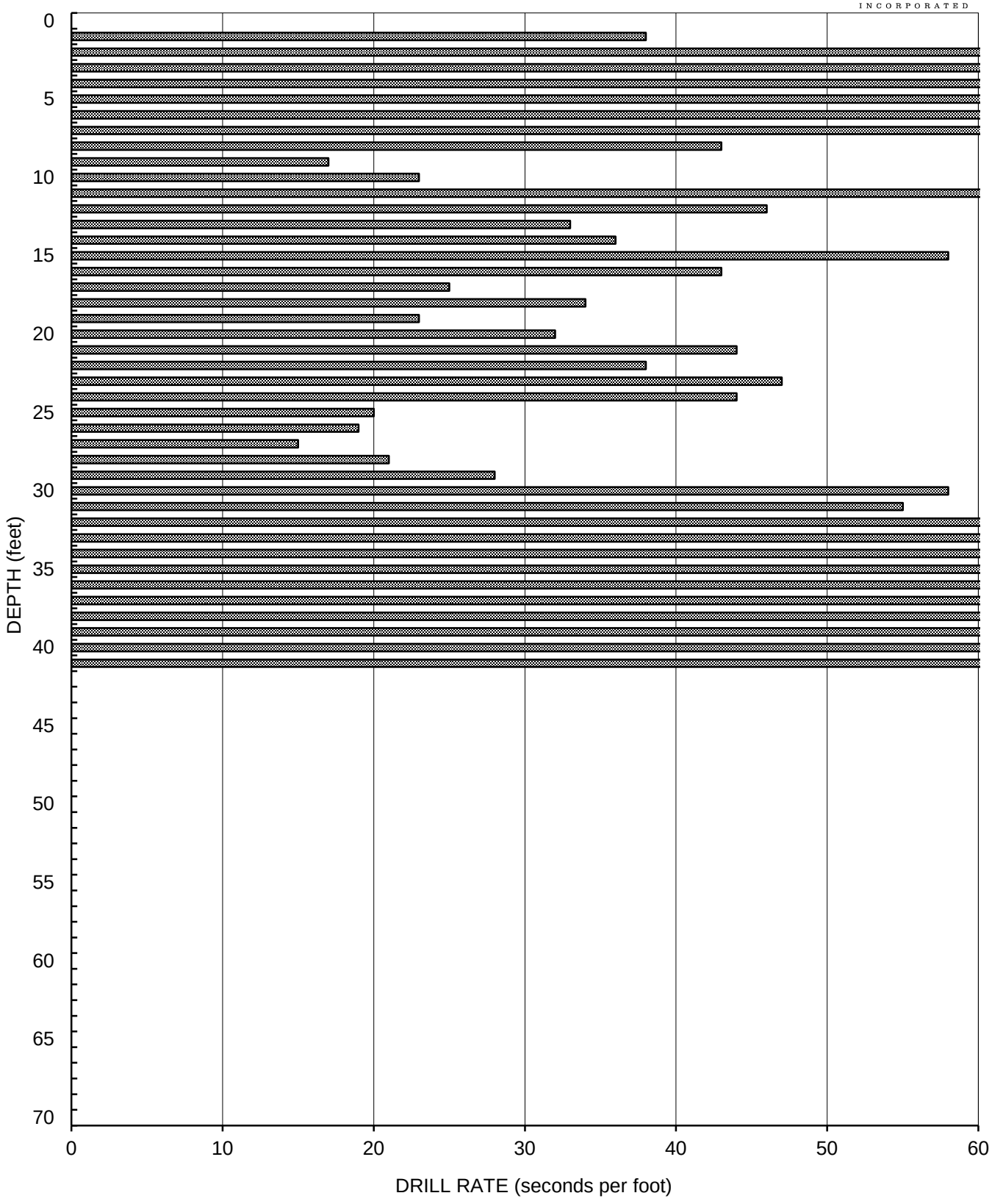


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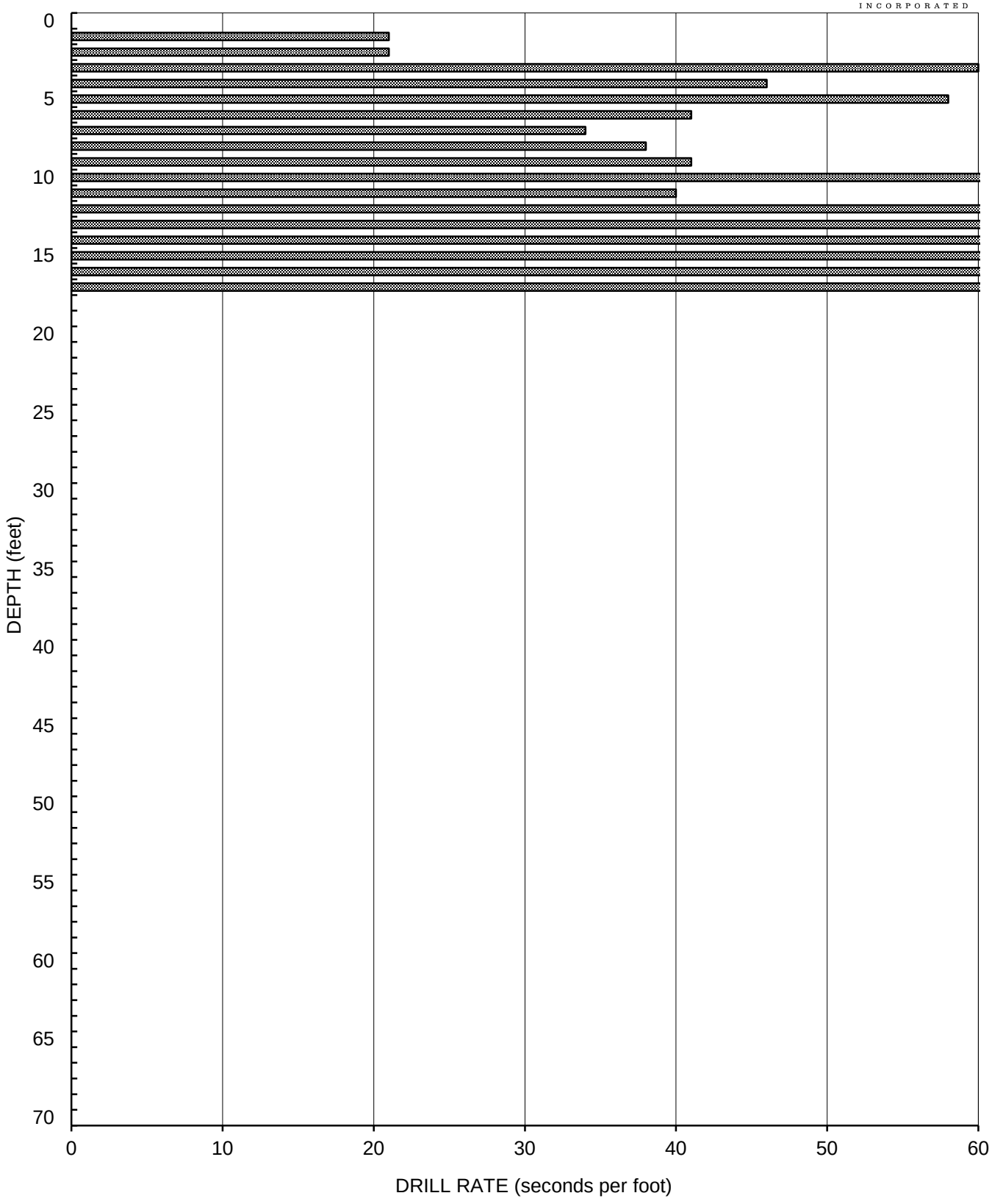
FIGURE B-2

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-3
Elevation - 786 Feet (MSL)

GEOCON
INCORPORATED



AT003.xls

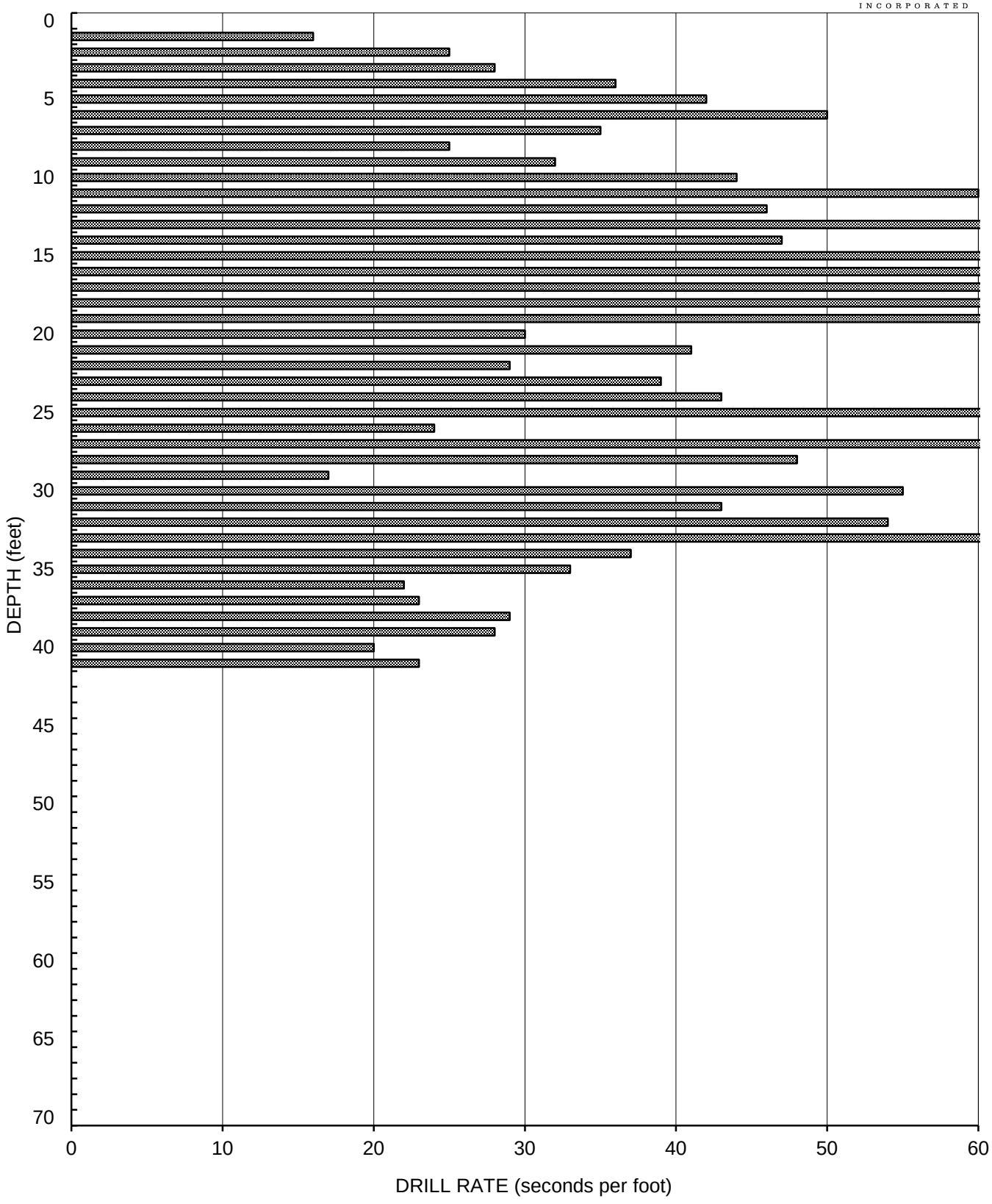
FIGURE B-3

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-4

Elevation - 663 Feet (MSL)

GEOCON INCORPORATED



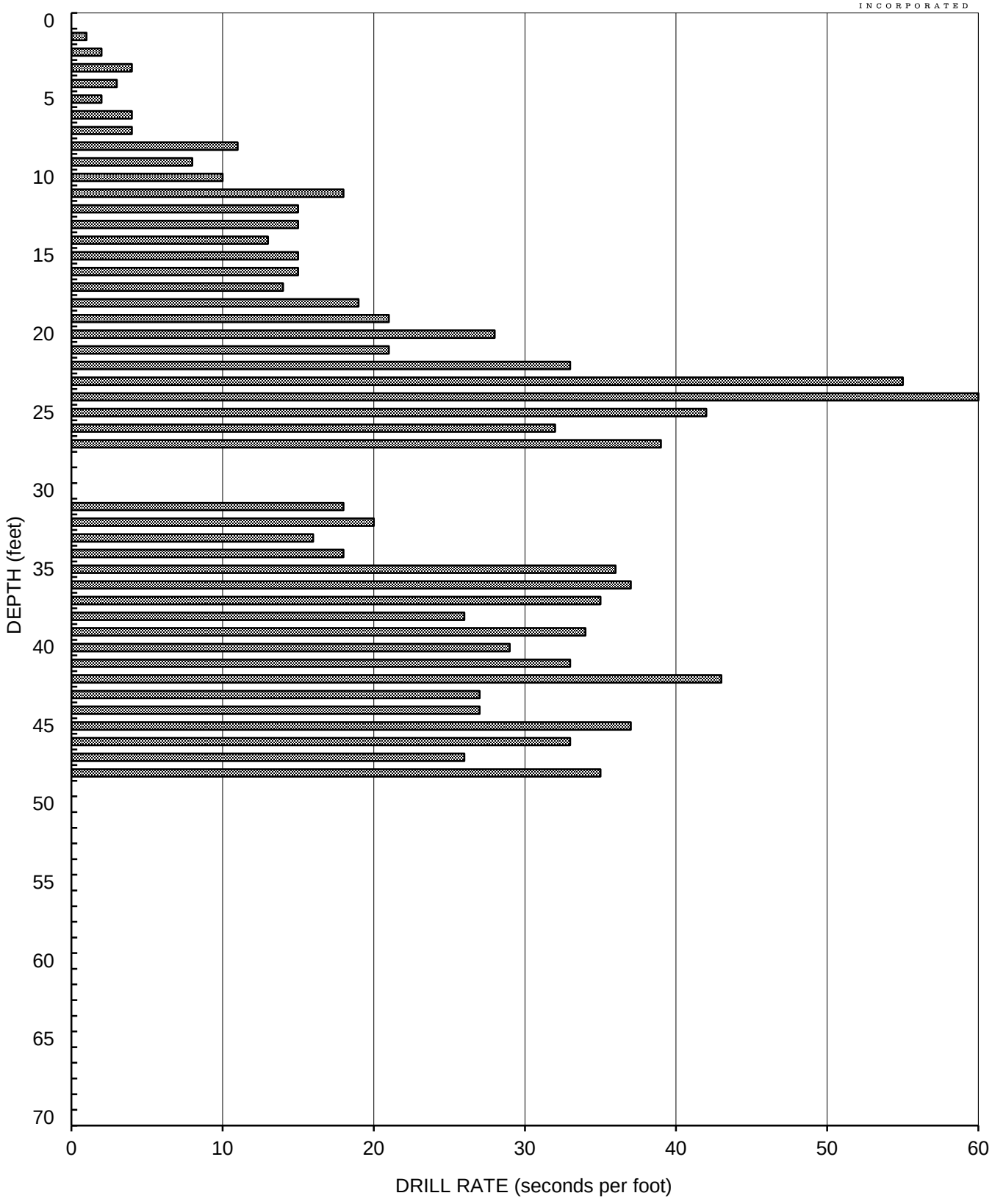
AT004.xls

FIGURE B-4

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-5
Elevation - 684 Feet (MSL)

GEOCON
INCORPORATED



AT005.xls

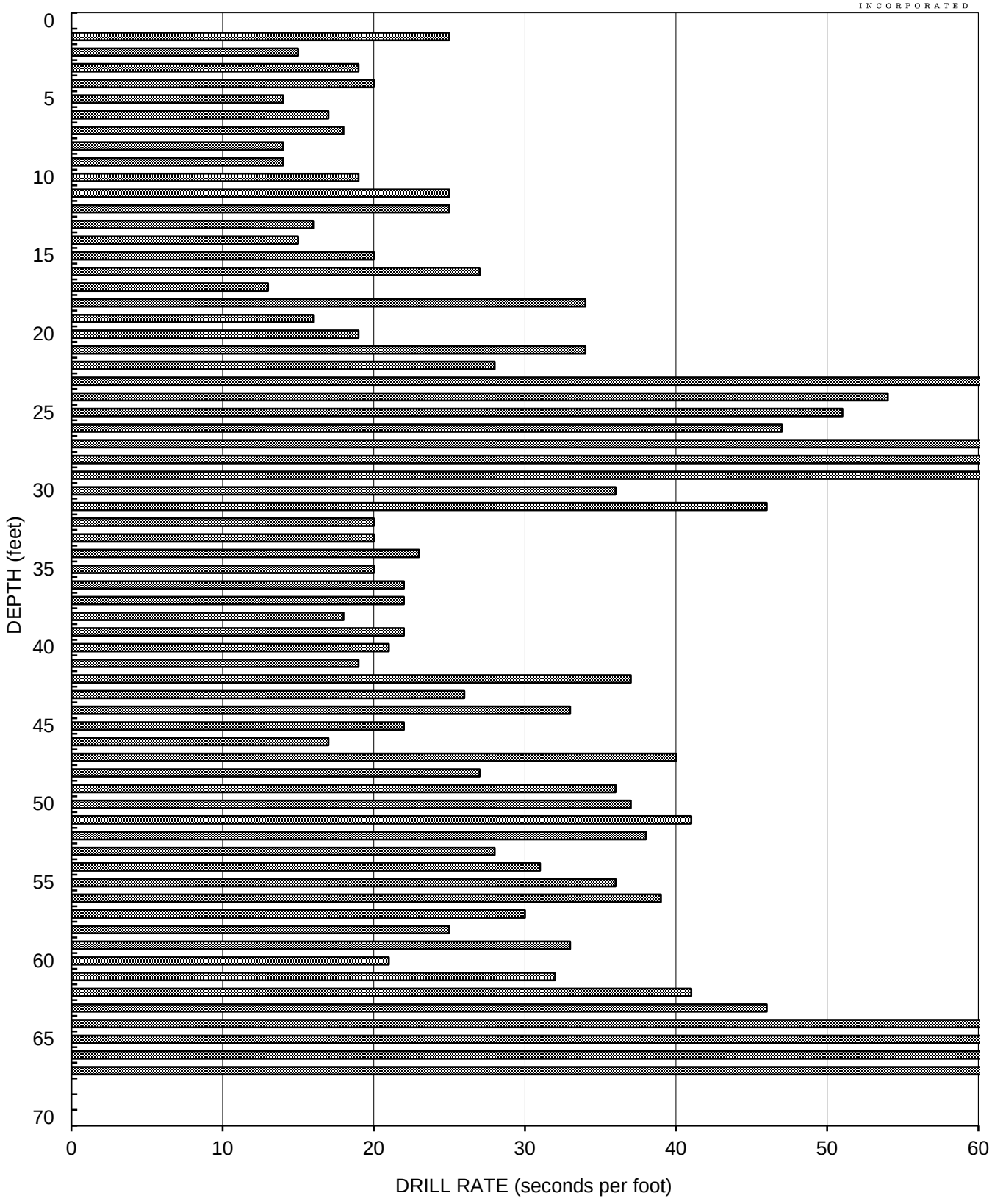
FIGURE B-5

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-6

Elevation - 645 Feet (MSL)

GEOCON INCORPORATED



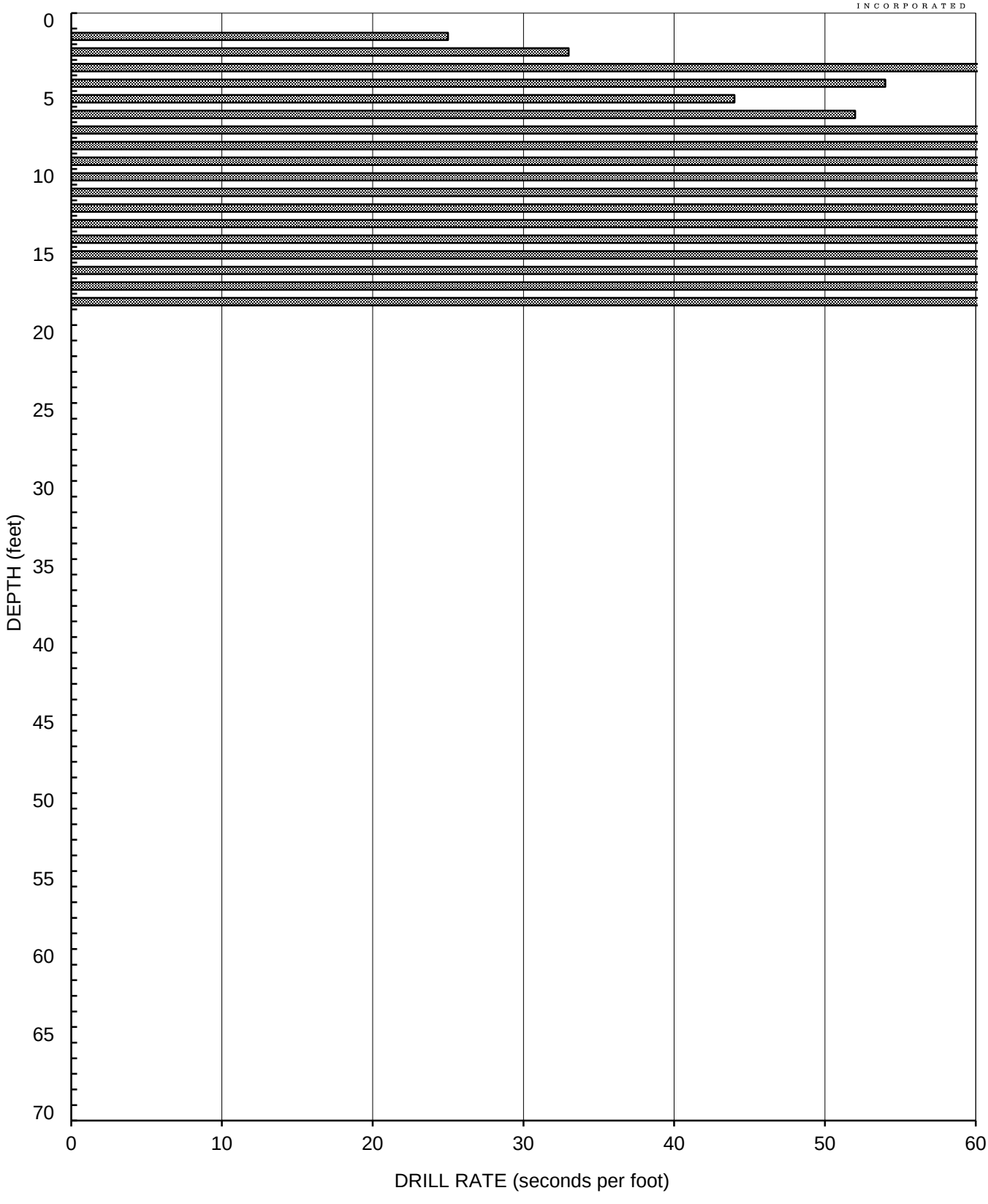
AT006.xls

FIGURE B-6

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-7
Elevation - 693 Feet (MSL)

GEOCON
INCORPORATED



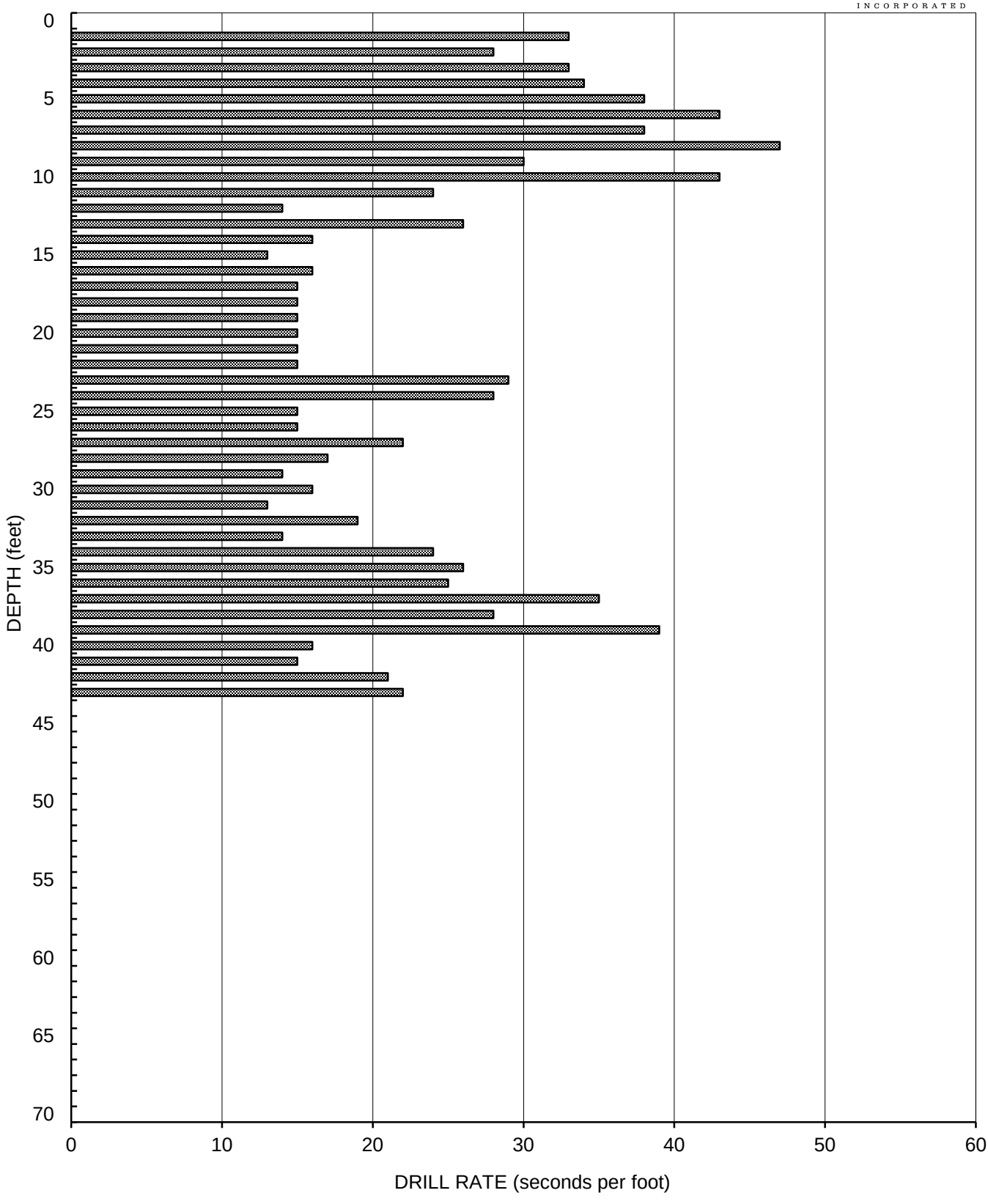
AT007.xls

FIGURE B-7

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-8
Elevation - 611 Feet (MSL)

GEOCON
INCORPORATED



AT008.xls

FIGURE B-8

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-9
Elevation - 702 Feet (MSL)

GEOCON
INCORPORATED

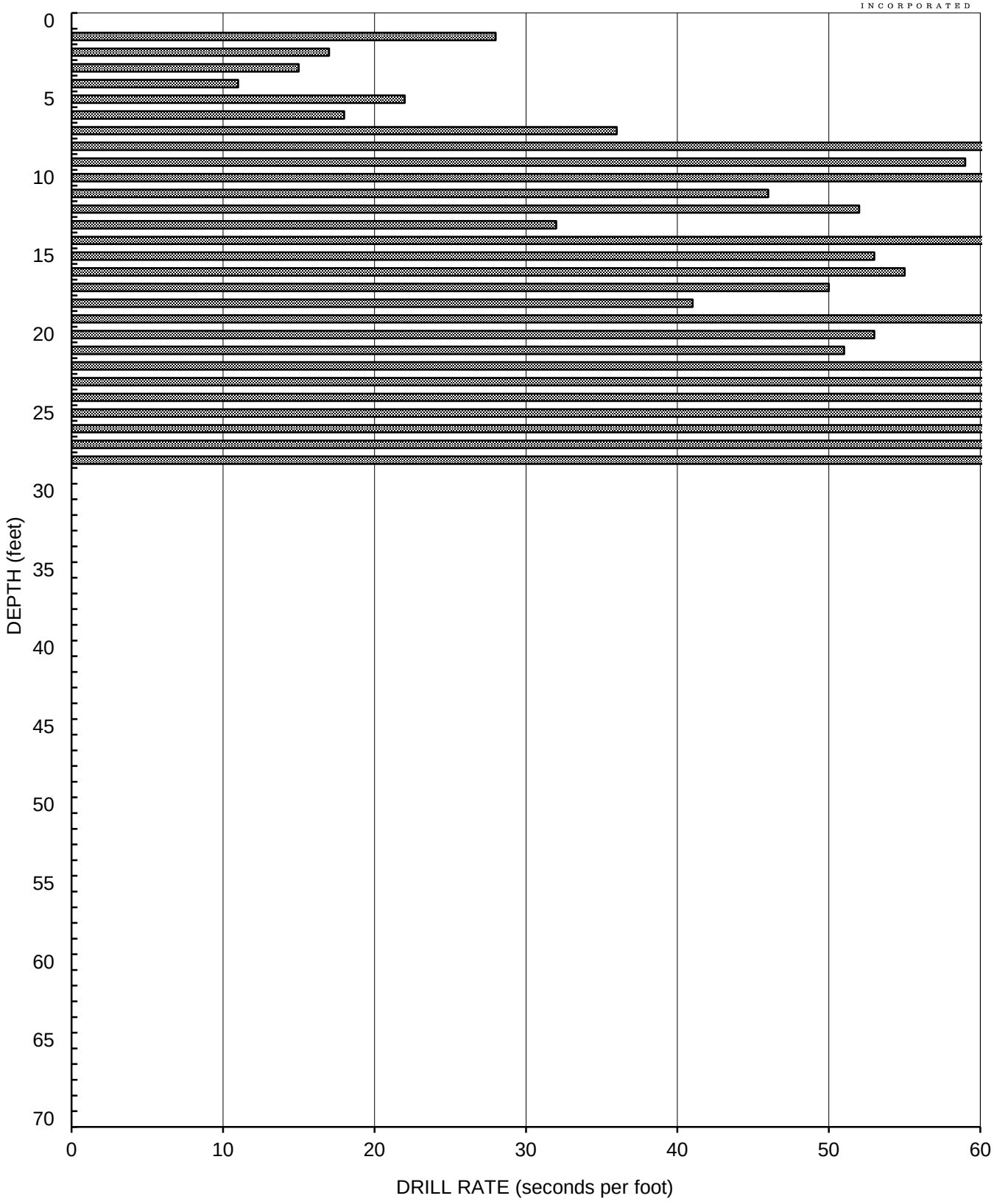


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FIGURE B-9

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-10
Elevation - 800 Feet (MSL)

GEOCON
INCORPORATED

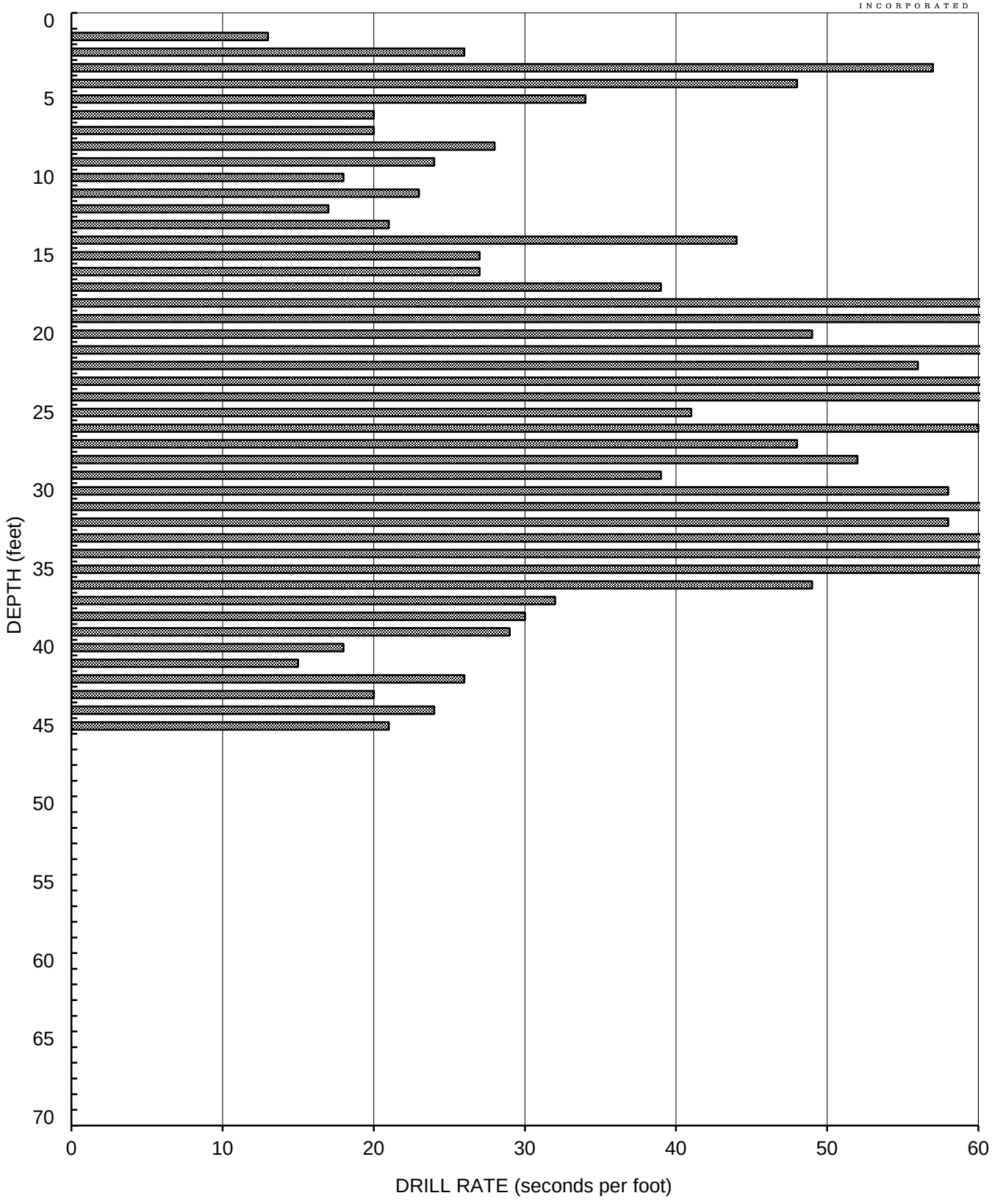

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FIGURE B-10

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-11
Elevation - 756 Feet (MSL)

GEOCON
INCORPORATED

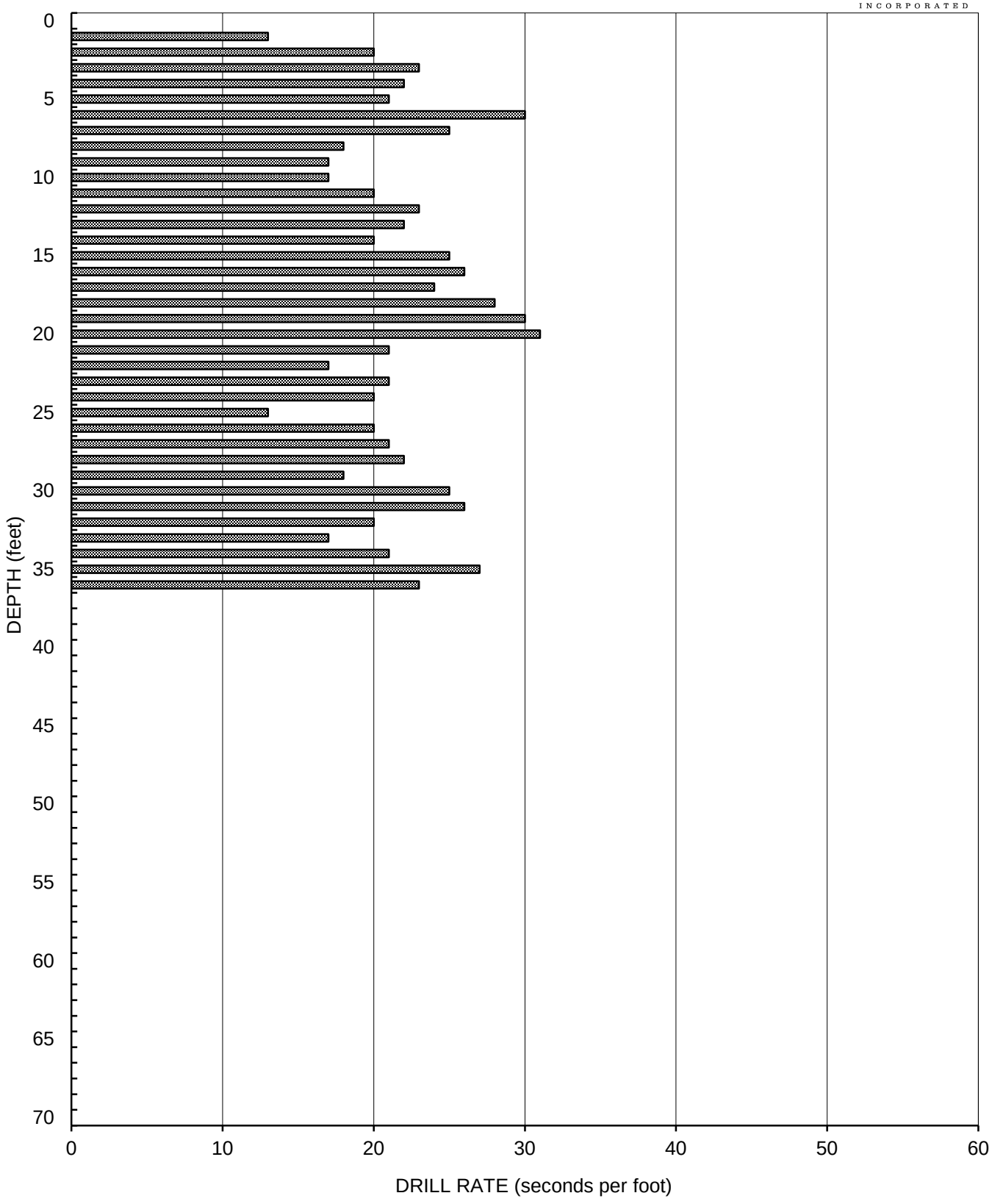

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FIGURE B-11

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-12
Elevation - 811 Feet (MSL)

GEOCON
INCORPORATED

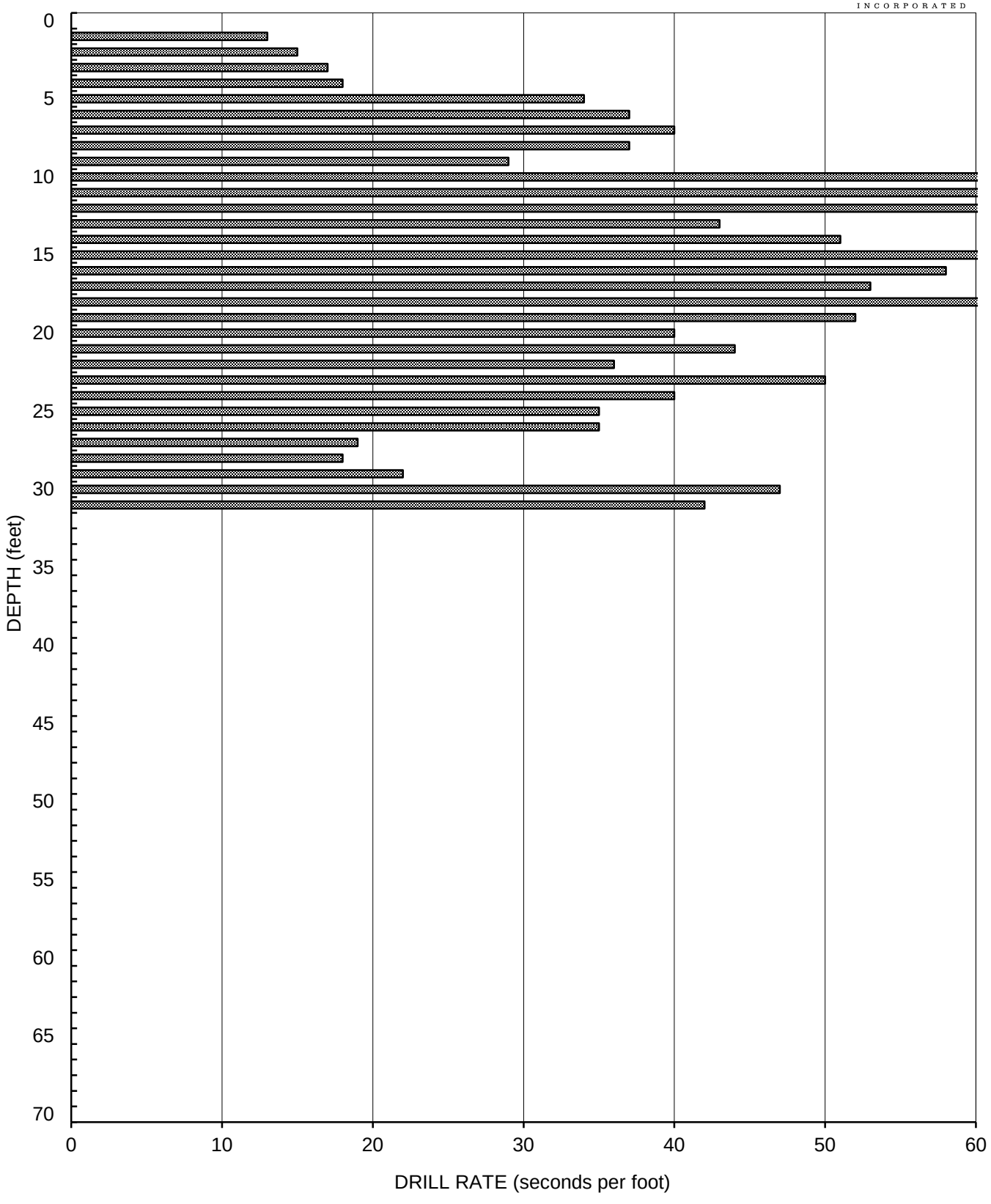

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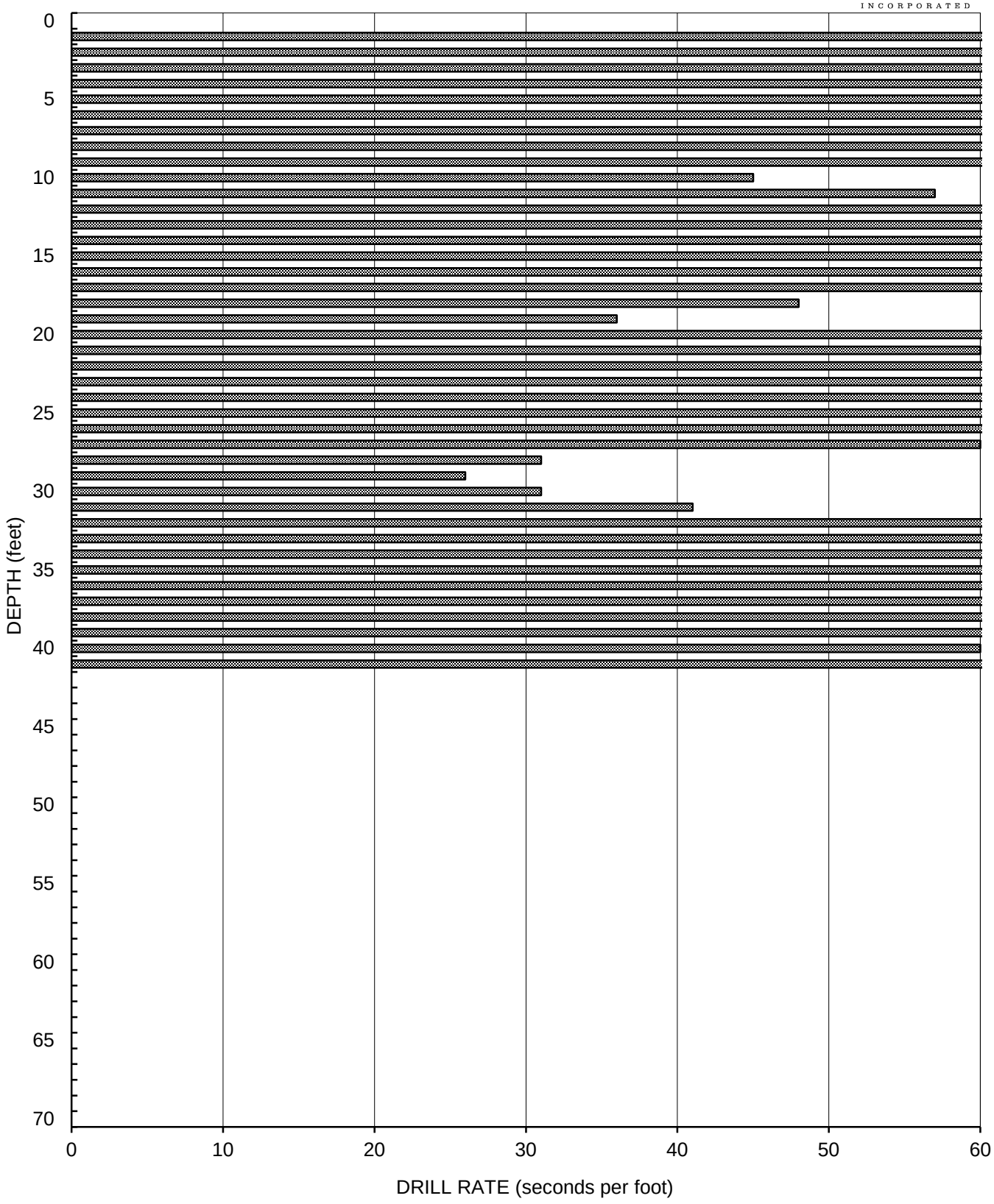
FIGURE B-12

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-13

Elevation - 884 Feet (MSL)

GEOCON
INCORPORATED



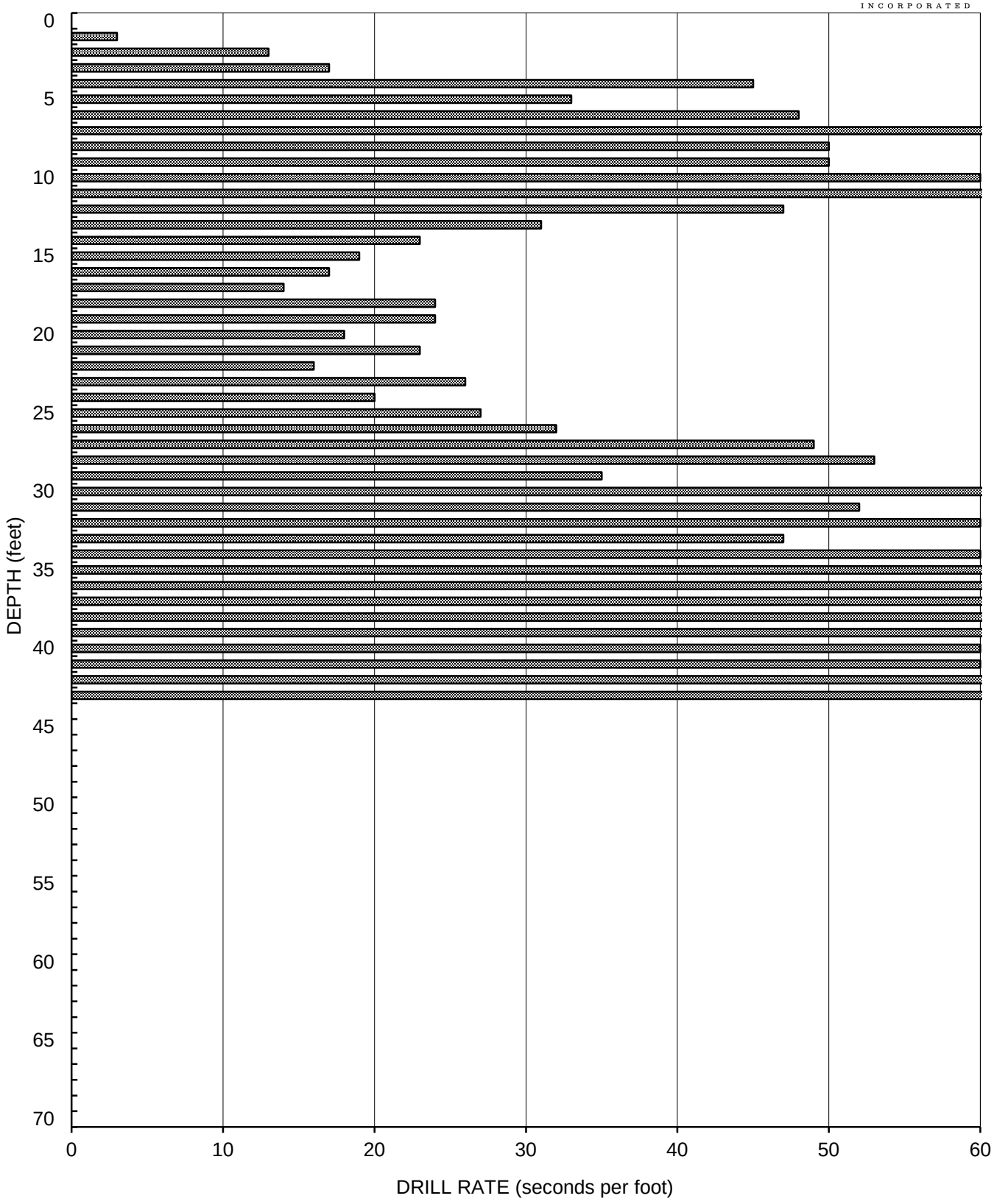
AT013.xls

FIGURE B-13

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-14
Elevation - 832 Feet (MSL)

GEOCON
INCORPORATED



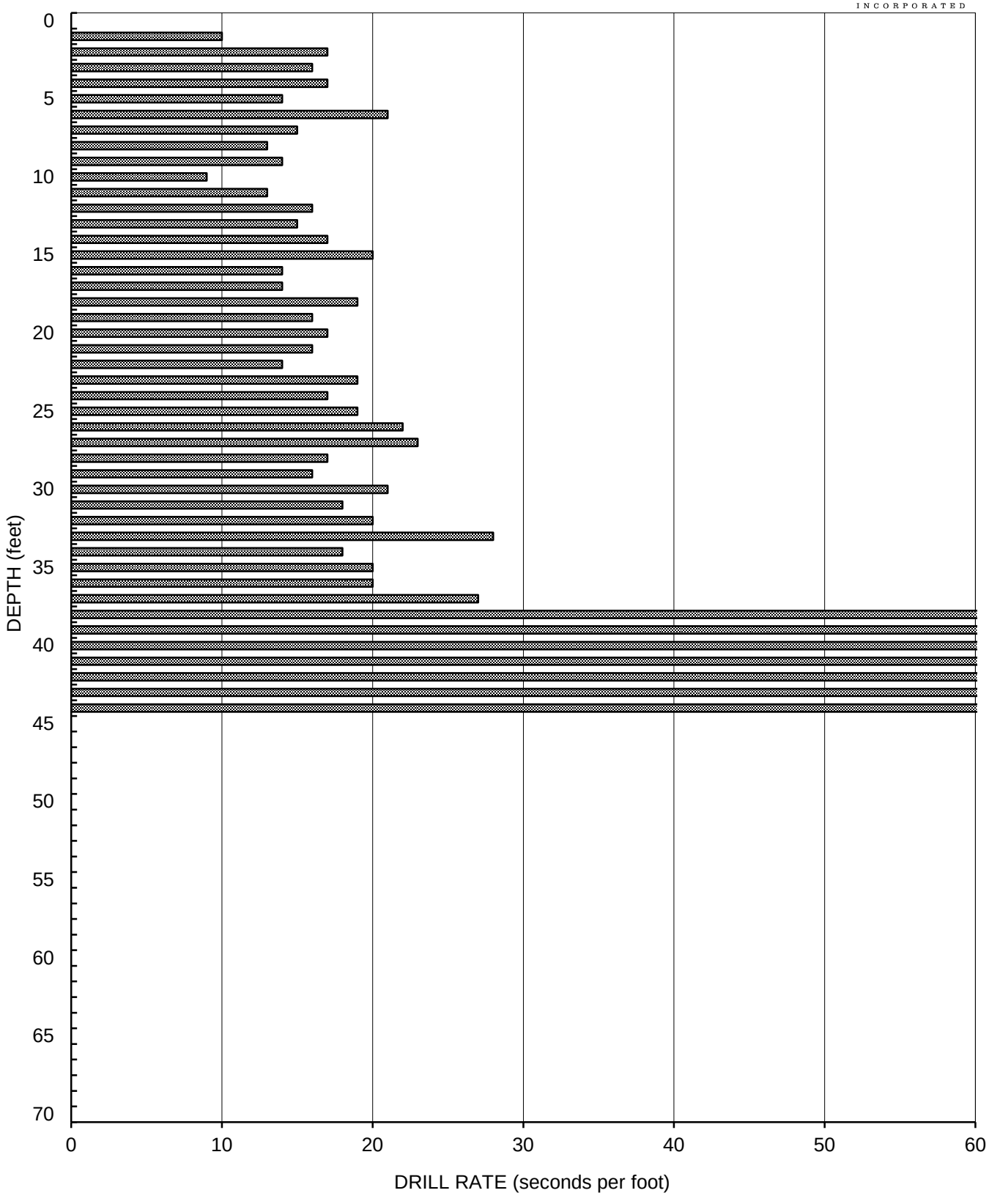
AT014.xls

FIGURE B-14

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-15
Elevation - 815 Feet (MSL)

GEOCON
INCORPORATED



AT015.xls

FIGURE B-15

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-16
Elevation - 698 Feet (MSL)

GEOCON
INCORPORATED

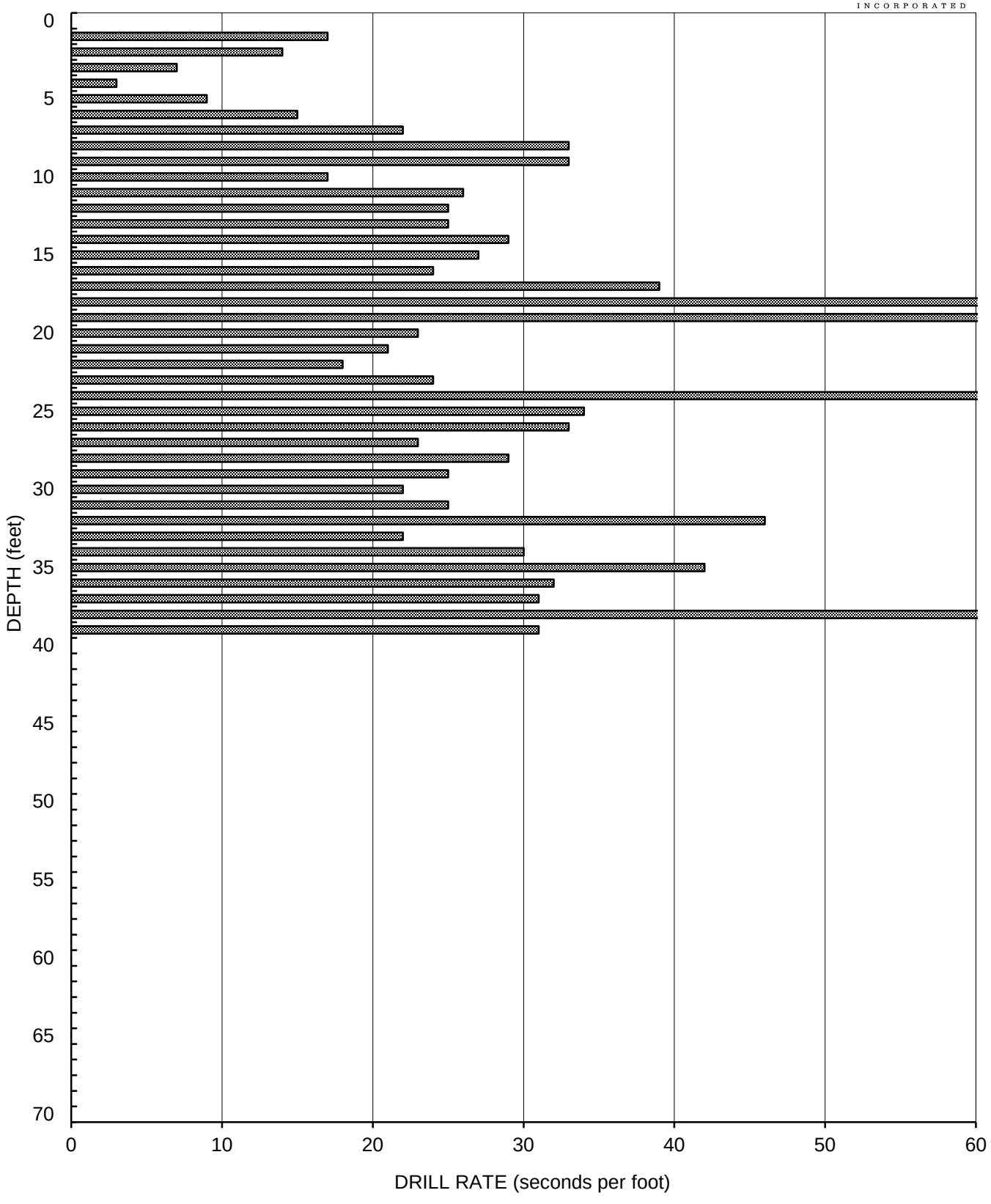


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FIGURE B-16

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-17
Elevation - 598 Feet (MSL)

GEOCON
INCORPORATED

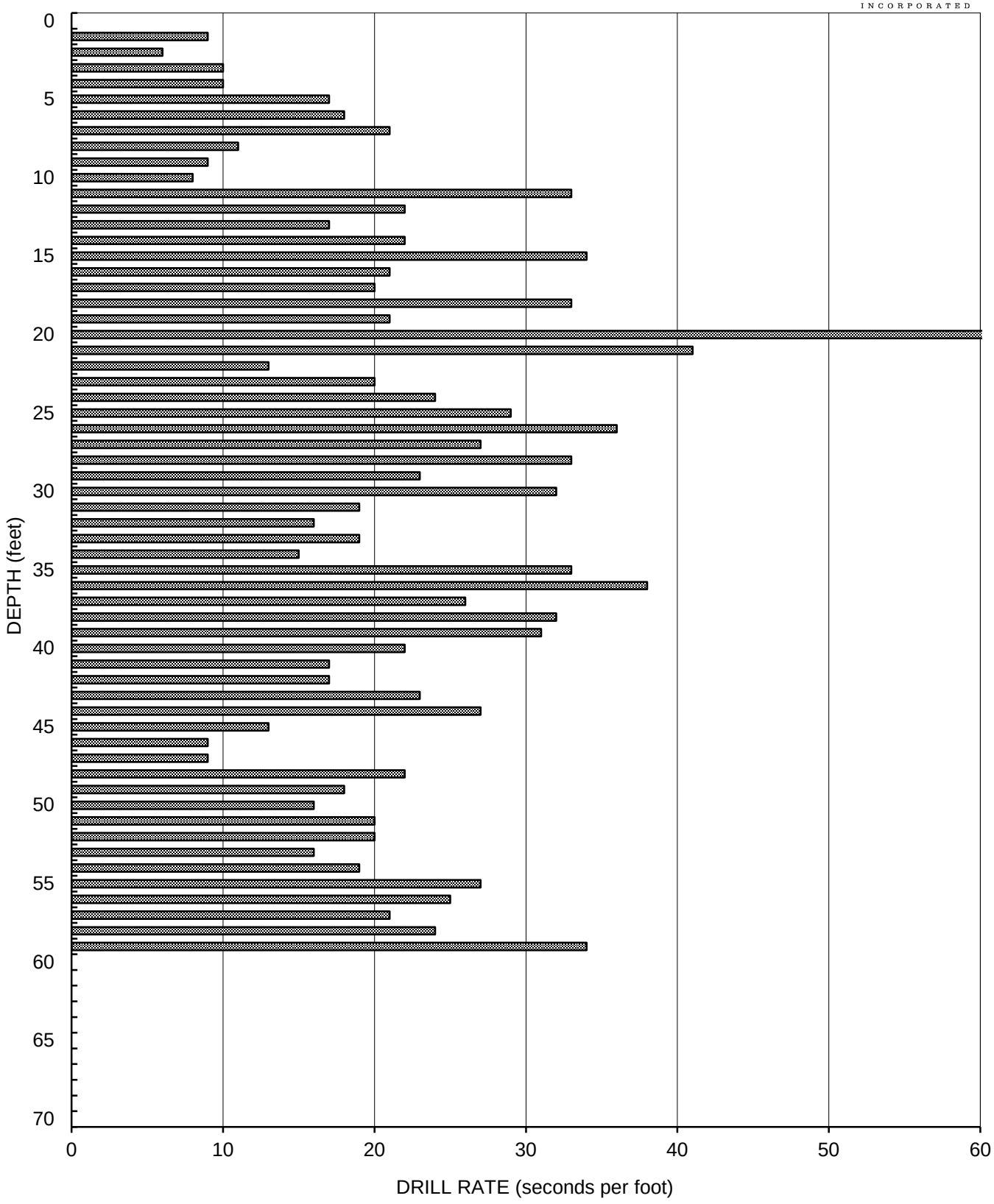

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FIGURE B-17

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-18

Elevation - 596 Feet (MSL)

GEOCON INCORPORATED

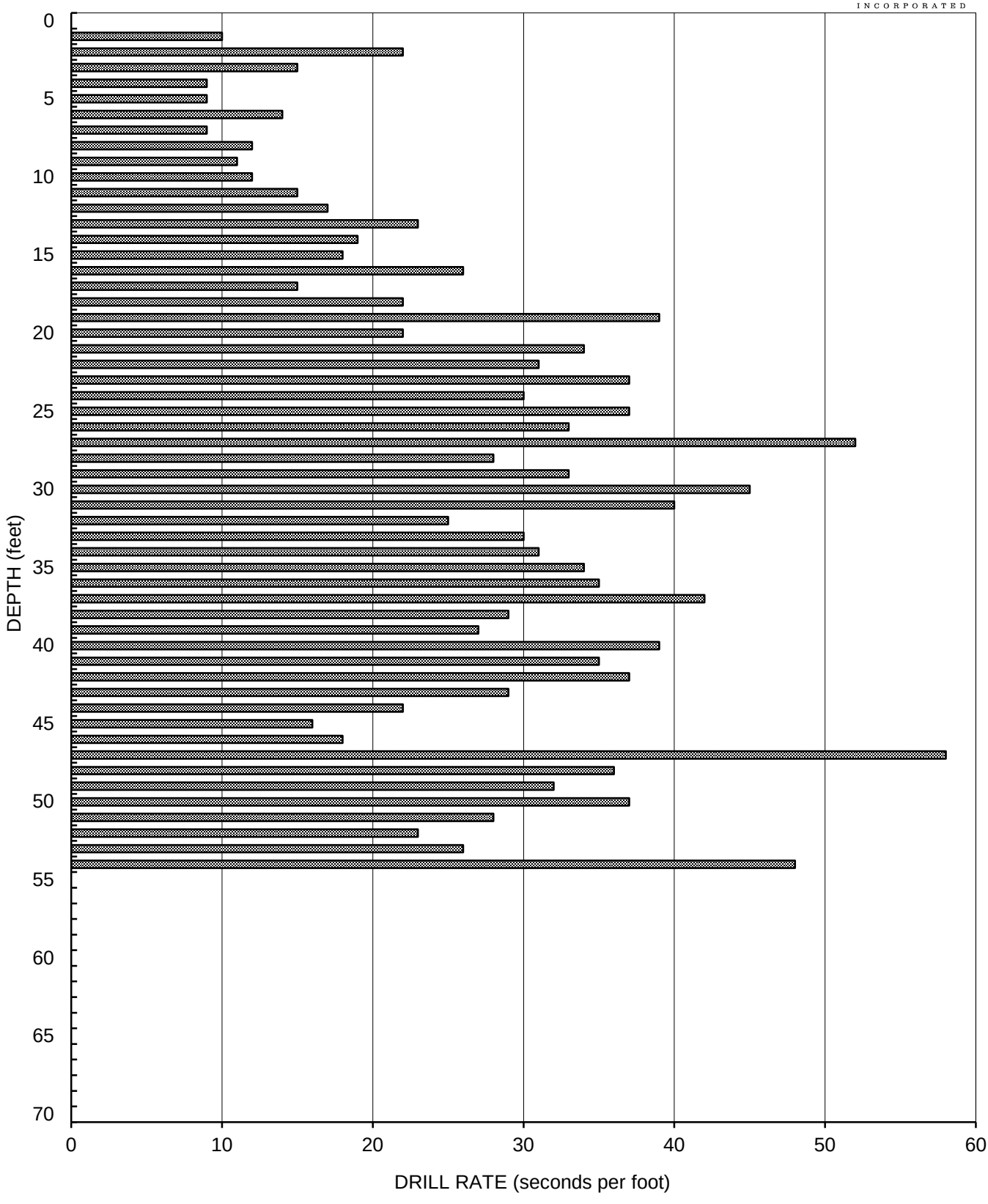

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FIGURE B-18

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-19
Elevation - 563 Feet (MSL)

GEOCON
INCORPORATED

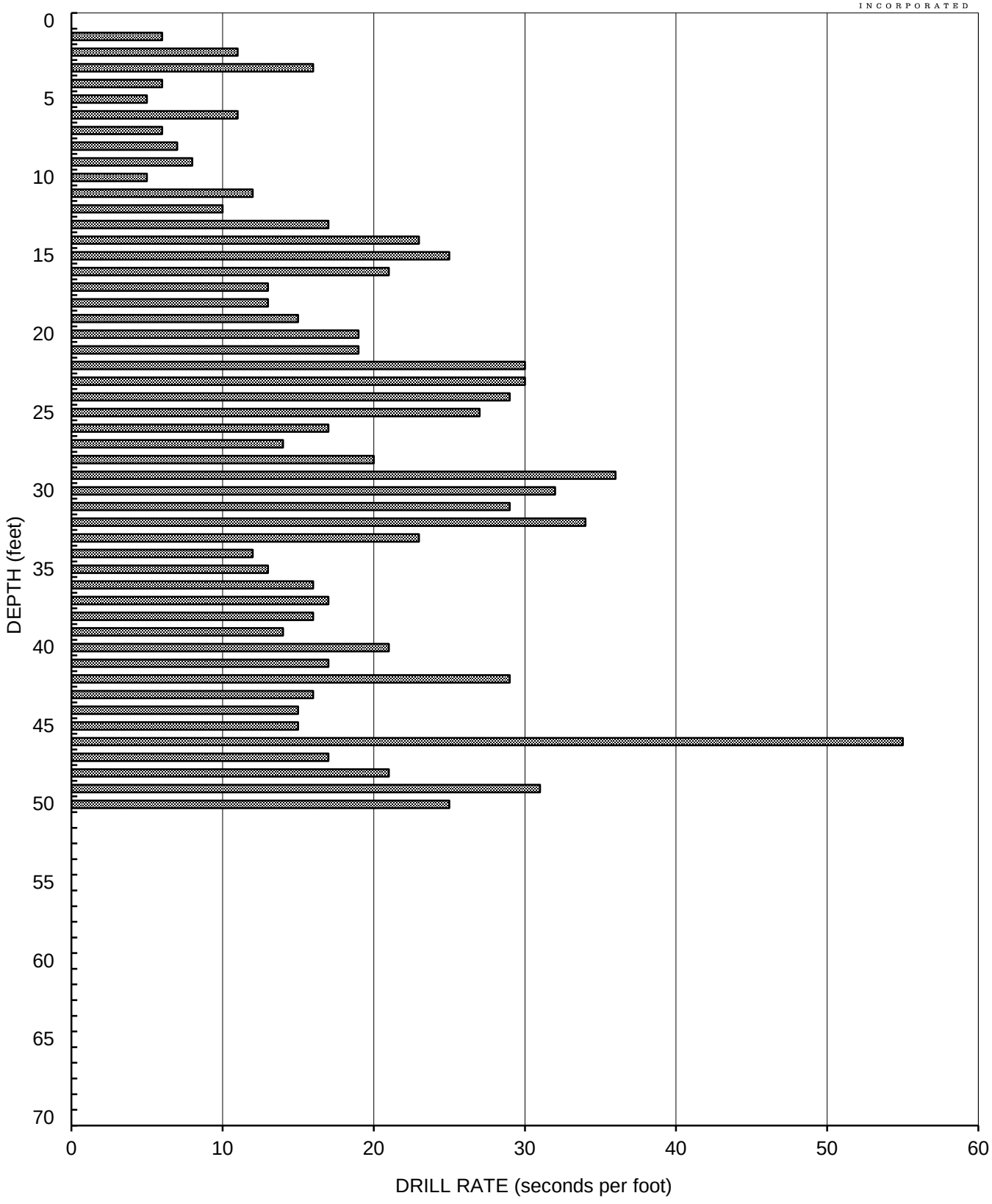

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FIGURE B-19

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-20
Elevation - 696 Feet (MSL)

GEOCON
INCORPORATED

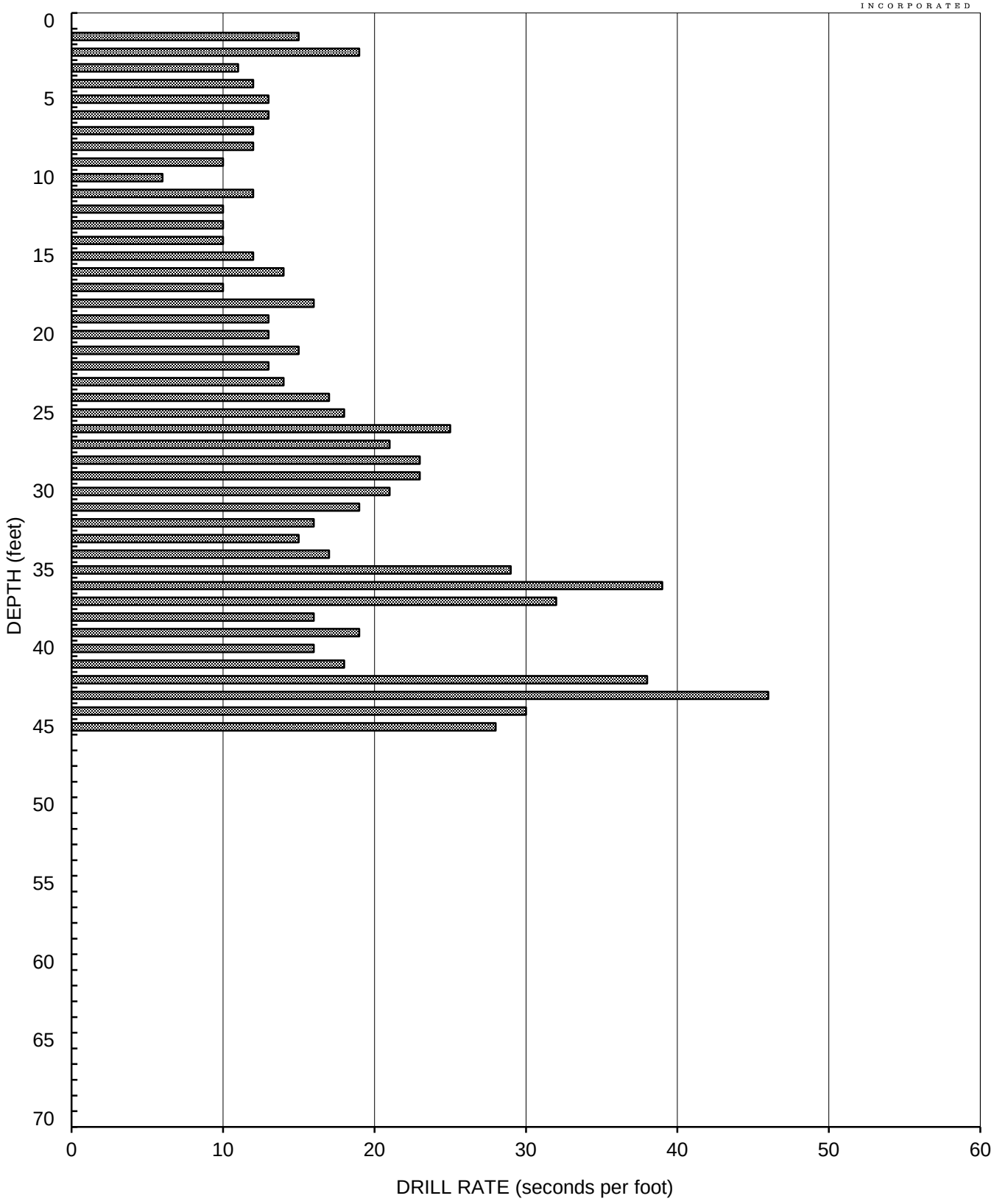

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FIGURE B-20

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-21
Elevation - 537 Feet (MSL)

GEOCON
INCORPORATED

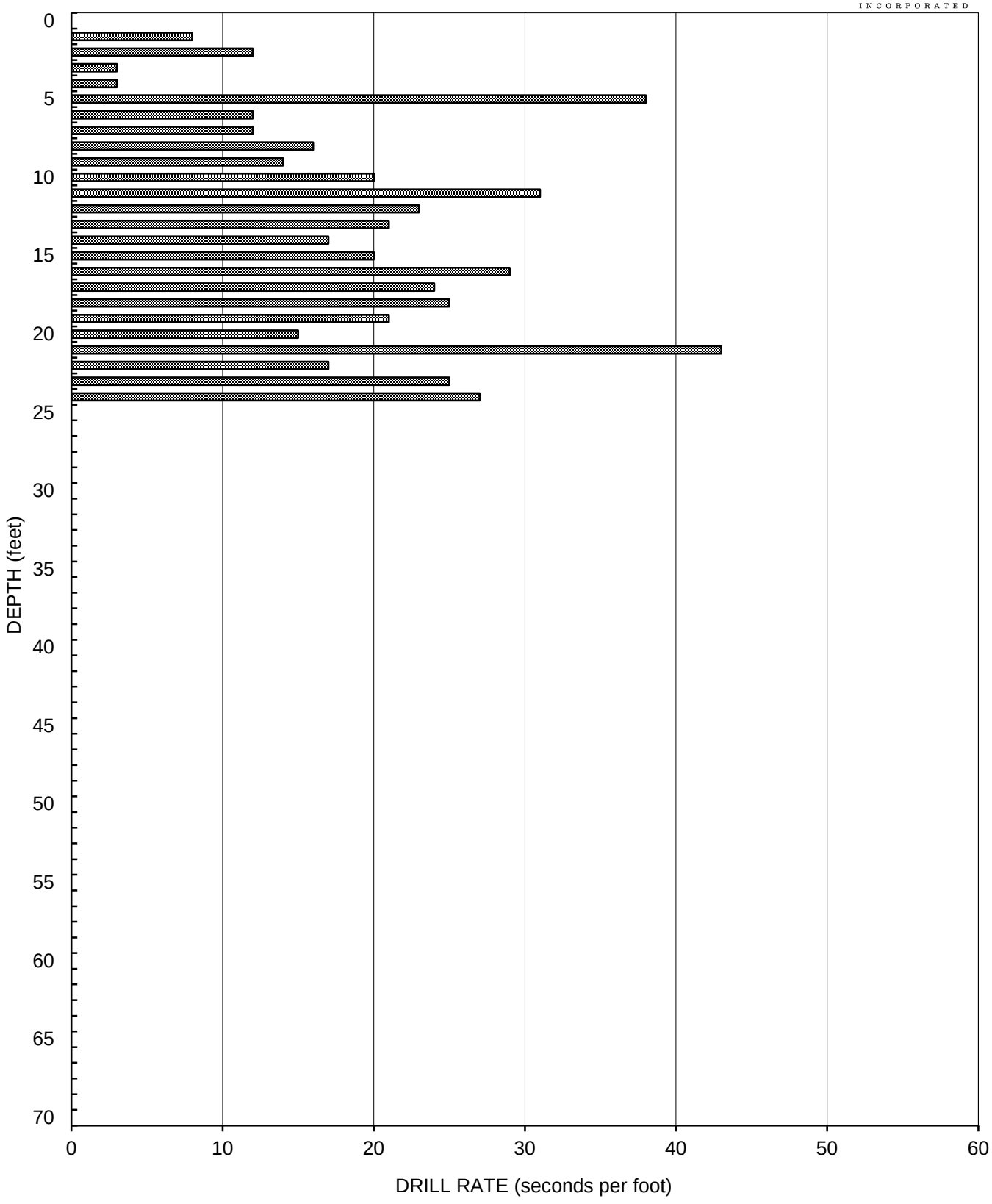

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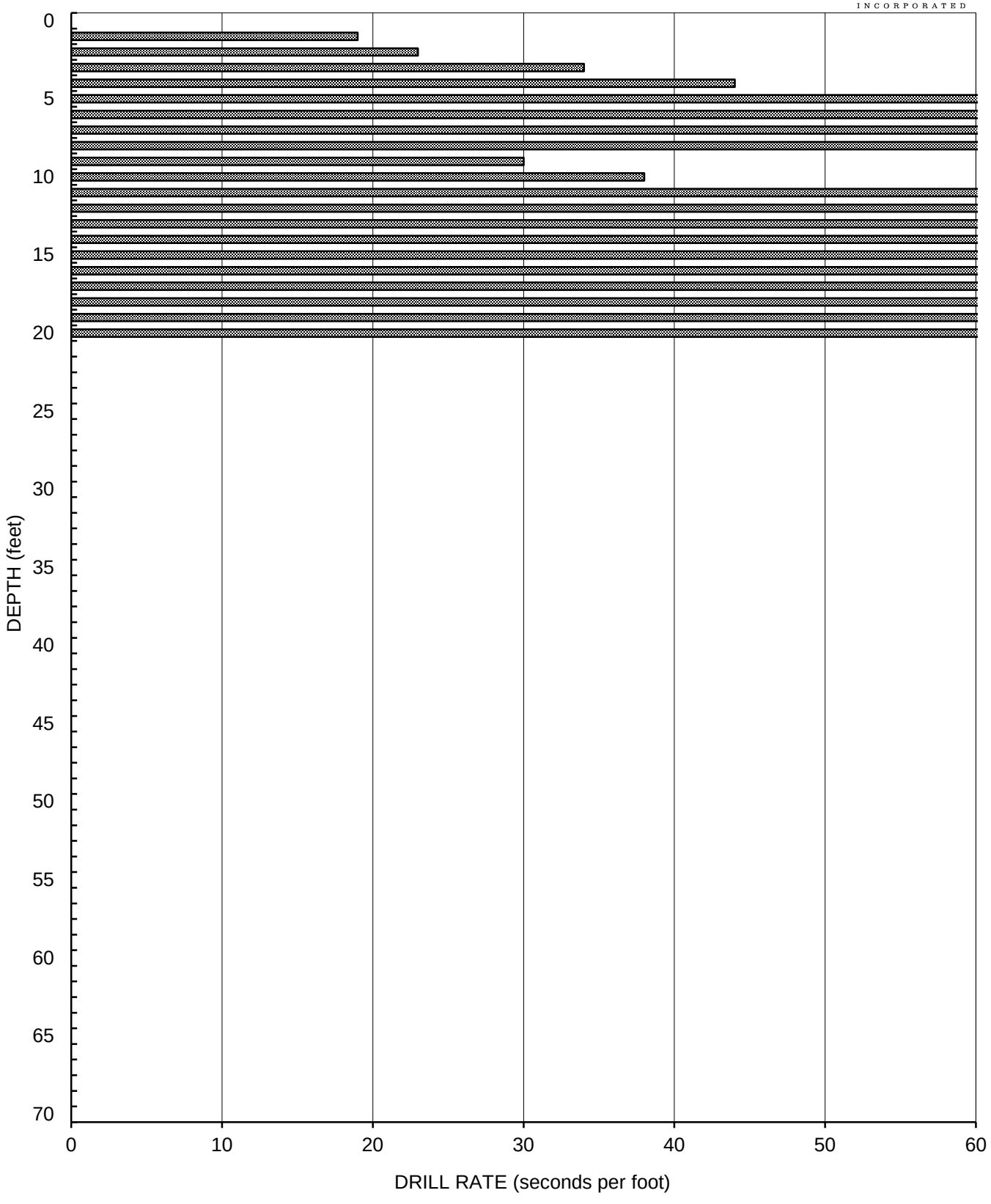
FIGURE B-21

OTAY RANCH RESORT VILLAGE

AIR TRACK BORING AT-22
Elevation - 728 Feet (MSL)

GEOCON
INCORPORATED



AT022.xls

FIGURE B-22

APPENDIX C

SEISMIC REFRACTION SURVEY REPORT

PREPARED BY SOUTHWEST GEOPHYSICS, INC.
DATED OCTOBER 10, 2008 (PROJECT NO. 108226)

FOR

OTAY RANCH RESORT VILLAGE
AREA B TENTATIVE MAP
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1012-52-01C

SEISMIC REFRACTION SURVEY
OTAY RANCH RESIDENTIAL DEVELOPMENT
SAN DIEGO, CALIFORNIA

PREPARED FOR:
Geocon Consultants, Inc.
6970 Flanders Drive
San Diego, CA 92121

PREPARED BY:
Southwest Geophysics, Inc.
7438 Trade Street
San Diego, CA 92121

October 10, 2008
Project No. 108226

SOUTHWEST
GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

October 10, 2008
Project No. 108226

Mr. Nathan Ash
Geocon Consultants, Inc.
6970 Flanders Drive
San Diego, CA 92121

Subject: Seismic Refraction Survey
Otay Ranch Residential Development
San Diego, California

Dear Mr. Ash:

In accordance with your authorization, we have performed a seismic refraction survey for the proposed Otay Ranch Residential Development to be located in an area of generally undeveloped land along the north side of Otay Lakes Road in San Diego, California. Specifically, our survey consisted of performing 18 seismic refraction lines at the subject site. The purpose of our study was to develop a subsurface velocity profile of the areas surveyed, and to assess the apparent rippability of near surface materials. This data report presents our survey methodology, equipment used, analysis, and results.

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

Sincerely,
SOUTHWEST GEOPHYSICS, INC.

Patrick Lehrmann

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

Hans van de Vrugt

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

REGISTERED GEOPHYSICIST
Hans van de Vrugt
No 1012
Exp. 4/24/10
STATE OF CALIFORNIA

HV/PFL/hv

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TABLE OF CONTENTS

1. INTRODUCTION

In accordance with your authorization, we have performed a seismic refraction survey for the proposed Otay Ranch Residential Development to be located in an area of generally undeveloped land along the north side of Otay Lakes Road in San Diego, California (Figure 1). Specifically, our survey consisted of performing 18 seismic refraction lines at the subject site. The purpose of our study was to develop a subsurface velocity profile of the areas surveyed, and to assess the apparent rippability of near surface materials. This data report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of 18 seismic refraction lines at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site generally includes south facing slopes and low-lying terrain along the north side of Otay Lakes Road (Figure 1). The project area is situated just to the north of Lower Otay Reservoir. Figures 2a and 2b illustrate the study area and general site conditions. Terrain at the site varies from gentle to very steep slopes, flat low-lying areas, and relatively small drainages. Numerous crystalline rock outcrops and remnant boulders were observed in the study areas. Vegetation generally consists of dry grass and brush. Figure 3 provides a general view of the site conditions in the project area and along some seismic lines.

Based on our discussions with you, we understand that the study area is under consideration for grading and construction of new single family homes and associated roadways. Cuts up to roughly 125 feet deep are proposed.

4. SURVEY METHODOLOGY

A seismic P-wave (compression wave) refraction survey was conducted at the site to evaluate the depth to bedrock and apparent rippability characteristics of the subsurface materials, and to develop a subsurface velocity profile 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.

Eighteen seismic lines/profiles (SL-1 through SL-18) were conducted as part of our study. The general locations of the lines were selected by your office, and are depicted on Figures 2a and 2b. Shot points were conducted at the ends and midpoint of each line and in areas where relatively deep cuts were proposed 50-foot offend shots were performed in order to increase the exploration depth.

The refraction method requires that subsurface velocities increase with depth. A layer having a velocity lower than that of the layer above will not 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 or intrusions 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 indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in a narrow trench, should be anticipated.

Table 1 – Rippability Classification

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

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

5. RESULTS

As previously indicated, 18 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 layered based modeling techniques to produce layered velocity models, where changes in velocities are depicted as

discrete contacts. SeisOpt Pro uses a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity models provide a tomographic image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the models. 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 traverses conducted during the evaluation. The approximate locations of the seismic refraction traverses are shown on the Seismic Line Location Maps (Figures 2a and 2b). The layer velocity profiles are included in Figures 4a through 4r. It should also be noted that, as a general rule, the effective depth of evaluation for a seismic refraction traverse is approximately one-third to one-fifth the length of the refraction line.

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[3]
SL-1 240 feet[2]	V1 = 1,900 V2 > 10,000	2 – 7 ---	Easy Blasting Generally Required
SL-2 480 feet	V1 = 2,500 V2 = 8,450	1 – 8 ---	Moderate Blasting Generally Required
SL-3 240 feet[2]	V1 = 1,675 V2 = 7,550	2 – 10 ---	Easy Blasting Generally Required
SL-4 240 feet	V1 = 1,650 V2 = 8,725 V3 > 10,000	3 – 8 20 – 36 ---	Easy Blasting Generally Required Blasting Generally Required
SL-5 240 feet	V1 = 1,475 V2 = 9,175	2 – 5 ---	Easy Blasting Generally Required
SL-6 480 feet	V1 = 2,450 V2 > 10,000	3 – 8 ---	Moderate Blasting Generally Required
SL-7 240 feet	V1 = 3,025 V2 > 10,000	4 – 8 ---	Moderate Blasting Generally Required
SL-8 240 feet	V1 = 1,625 V2 = 5,575	4 – 9 ---	Easy Very Difficult, Probable Blasting
SL-9 240 feet[2]	V1 = 2,150 V2 > 10,000	4 – 11 ---	Moderate Blasting Generally Required
SL-10 240 feet	V1 = 1,600 V2 = 7,300	4 – 11 ---	Easy Blasting Generally Required
SL-11 240 feet	V1 = 1,575 V2 > 10,000	2 – 7 ---	Easy Blasting Generally Required

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[3]**
SL-12 240 feet	V1 = 1,525 V2 = 9,050	3 – 6 ---	Easy Blasting Generally Required
SL-13 310 feet	V1 = 1,850 V2 = 9,425	2 – 6 ---	Easy Blasting Generally Required
SL-14 240 feet	V1 = 1,400 V2 > 10,000	1 – 6 ---	Easy Blasting Generally Required
SL-15 240 feet[2]	V1 = 1,925 V2 = 5,600 V3 > 10,000	3 – 6 21 – 49 ---	Easy Very Difficult, Probable Blasting Blasting Generally Required
SL-16 240 feet	V1 = 1,775 V2 = 7,250 V3 > 10,000	6 – 8 58 – 77 ---	Easy Blasting Generally Required Blasting Generally Required
SL-17 240 feet	V1 = 1,450 V2 = 4,850 V3 = 8,475	3 – 6 26 – 44 ---	Easy Difficult, Possible Local Blasting Blasting Generally Required
SL-18 240 feet[2]	V1 = 2,075 V2 = 3,975 V3 > 10,000	2 – 6 56 – 66 ---	Moderate Moderate Blasting Generally Required

1 Results based on models generated using SIP, 2003
2 50-foot offend shots were also conducted at the ends of the line
3 Rippability criteria based on the use of a Caterpillar D-9 dozer ripping with a single shank

6. CONCLUSIONS

The results from our seismic survey revealed two to three distinct layers at the locations surveyed. Based on our site observations and discussions with you, the layers detected have been interpreted to be surficial soil (colluvium or topsoil) overlying crystalline bedrock with varying degrees of weathering along profiles SL-1 through SL-17, and topsoil overlying fanglomerate deposits and crystalline bedrock along profile SL-18. Figures 4a through 4r provide the velocity models for the areas calculated from both SIPwin and SeisOpt Pro. In general the two results agree well, with distinct lateral velocity variations evident in the tomographic profiles for some areas. Based on the results of our survey, significant variations in the subsurface materials are present in the study area. Accordingly, variability in the excavatability (including excavation depth) of the subsurface materials should be expected across the project area.

Based on our results, very difficult conditions where blasting may be required to obtain proposed excavation depths may be encountered depending on the location, excavation depth, and desired

rate of production. A contractor with excavation experience in similar difficult conditions should be consulted for expert advice on excavation methodology, equipment, production rate, and possibly oversized materials.

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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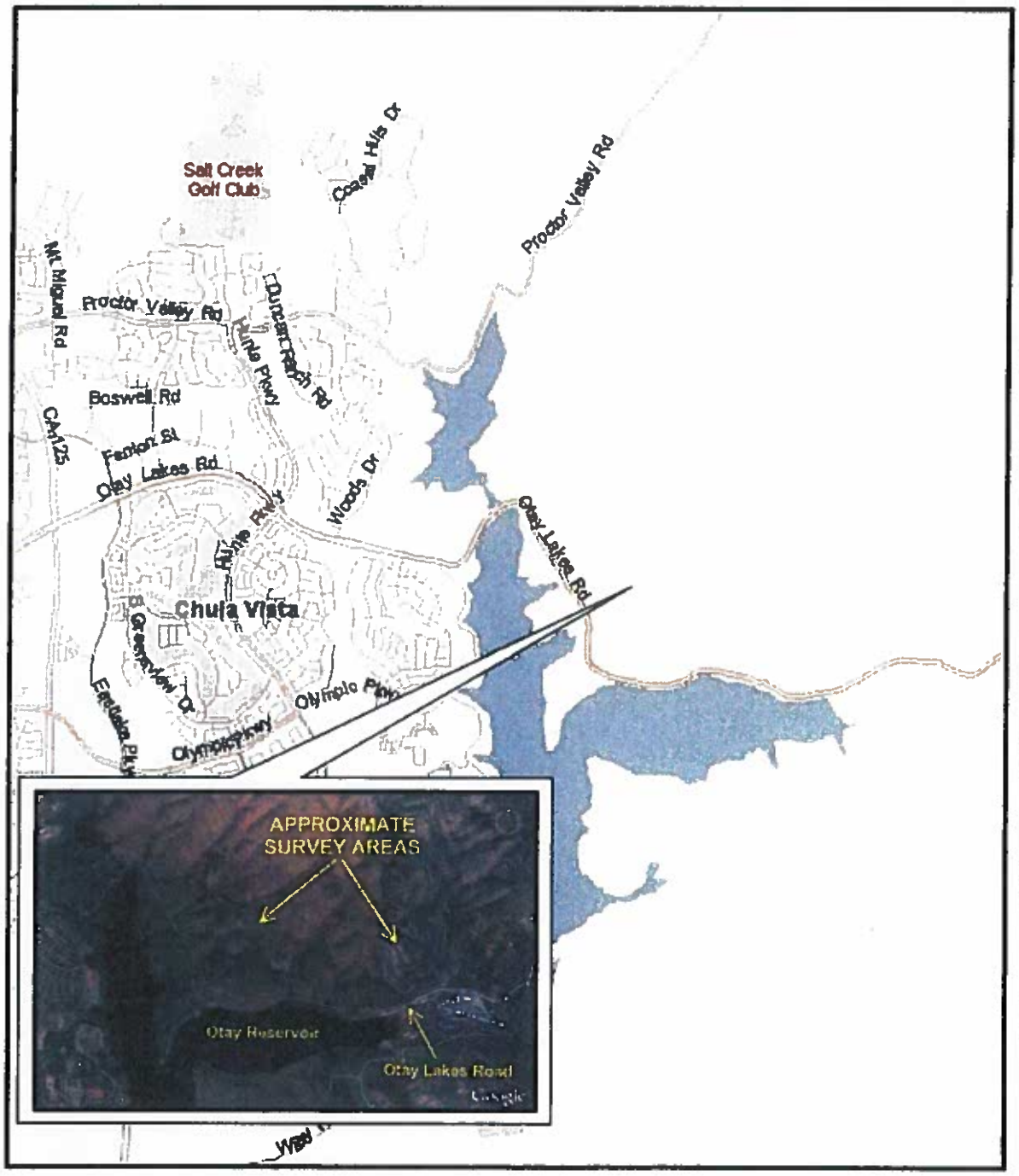
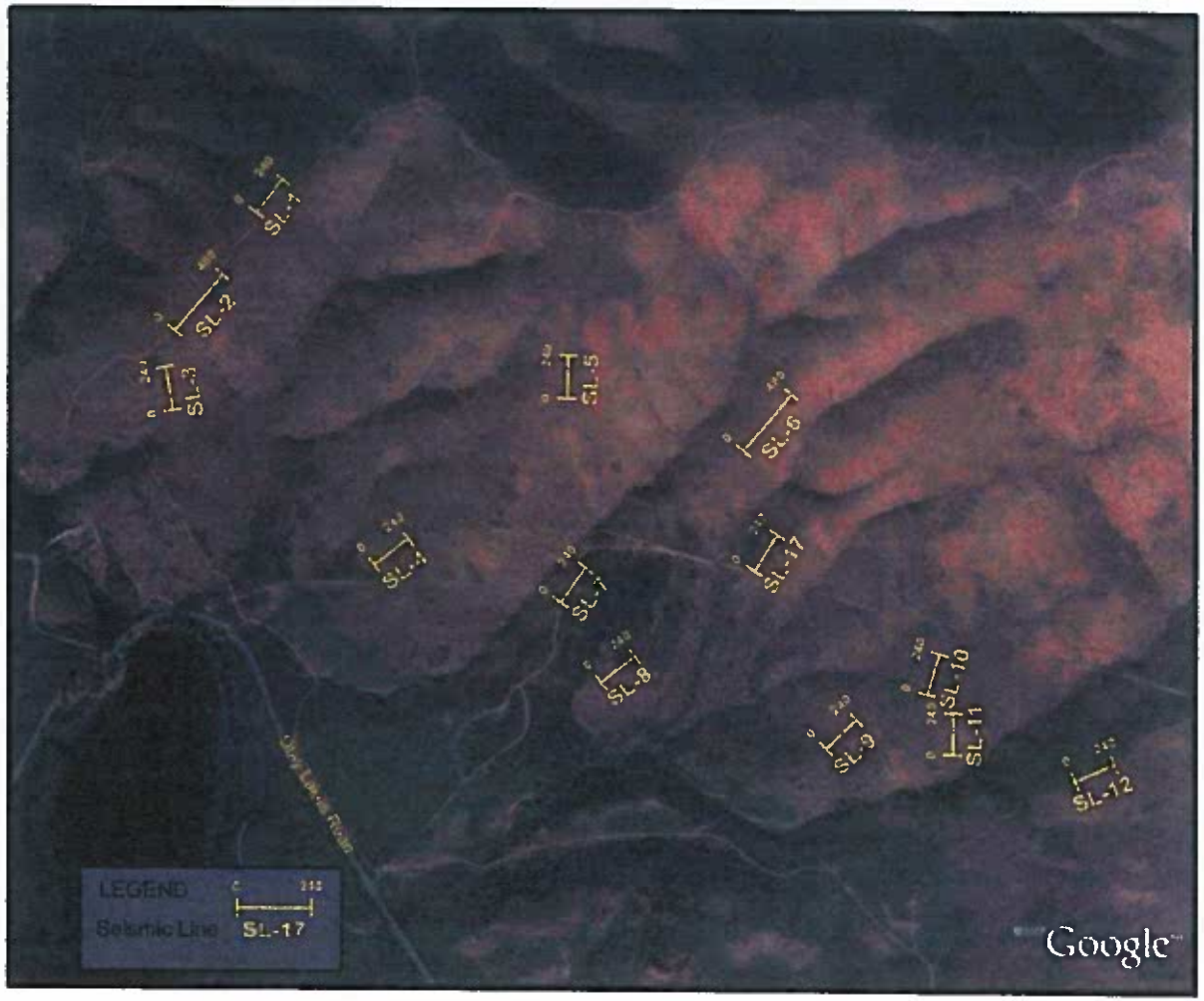


SITE LOCATION MAP	N	Otay Ranch Residential Development Chula Vista, California	SOUTHWEST GEOPHYSICS INC
		Project No.. 108226 | Date: 10/08	Figure 1



SEISMIC LINE LOCATION MAP

N

Otay Ranch Residential Development
San Diego, California

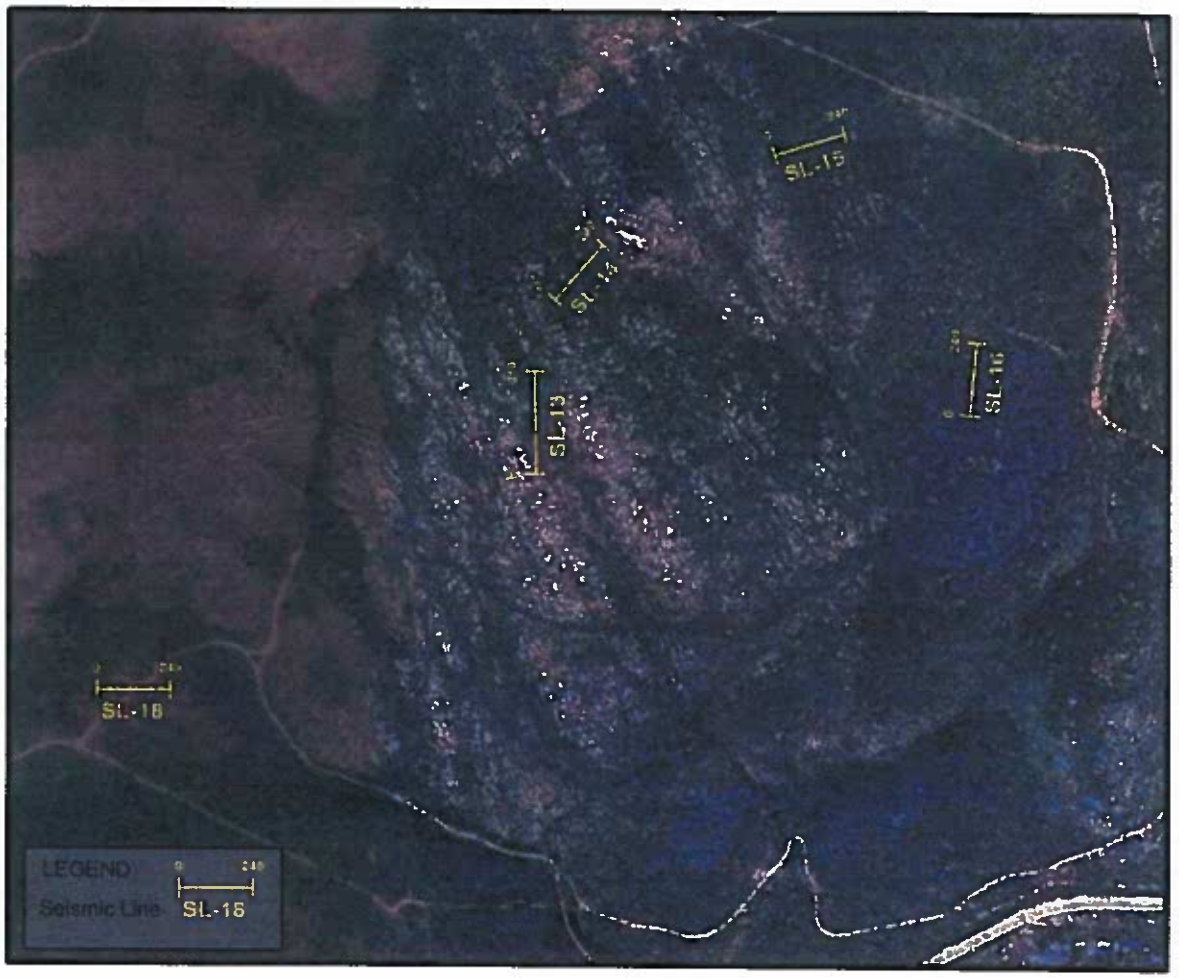
Project No.: 108226 | Date: 10/08

SOUTHWEST GEOPHYSICS INC

Figure 2a

0 960 1920

approximate scale in feet



SEISMIC LINE LOCATION MAP

N

Otay Ranch Residential Development
San Diego, California

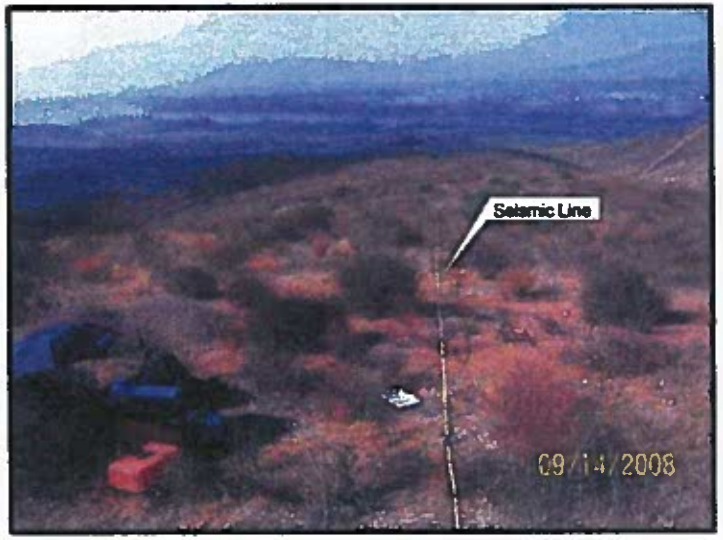
Project No.. 108228 | Date: 10/06

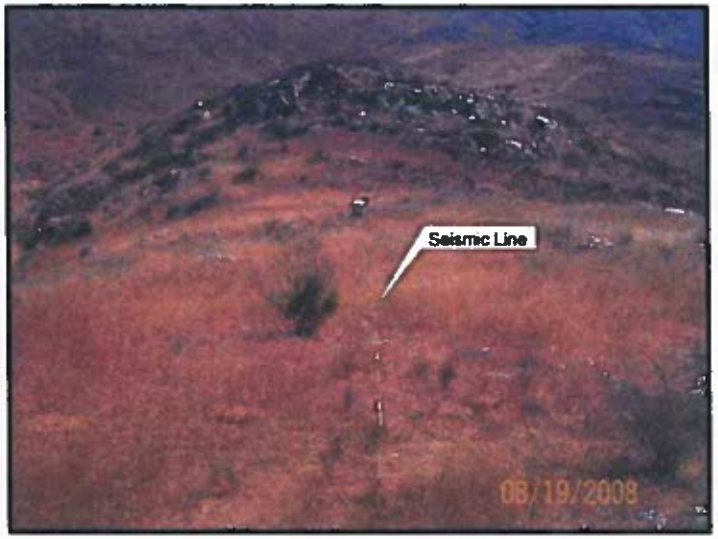
SOUTHWEST GEOPHYSICS INC.

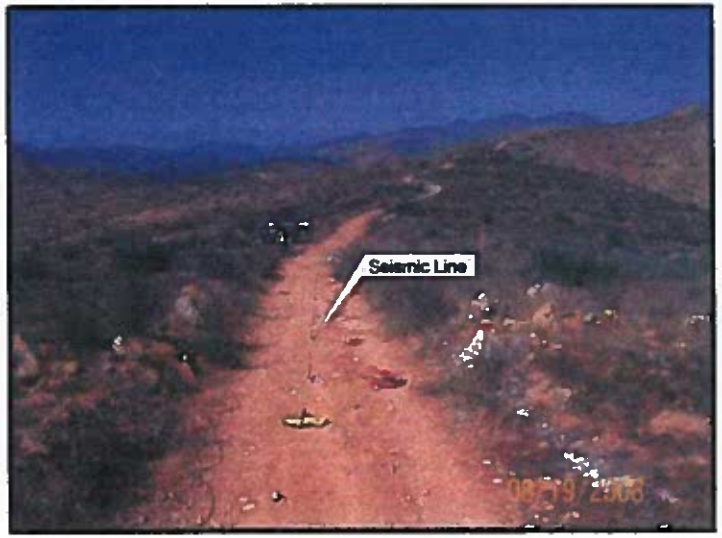
Figure 2b

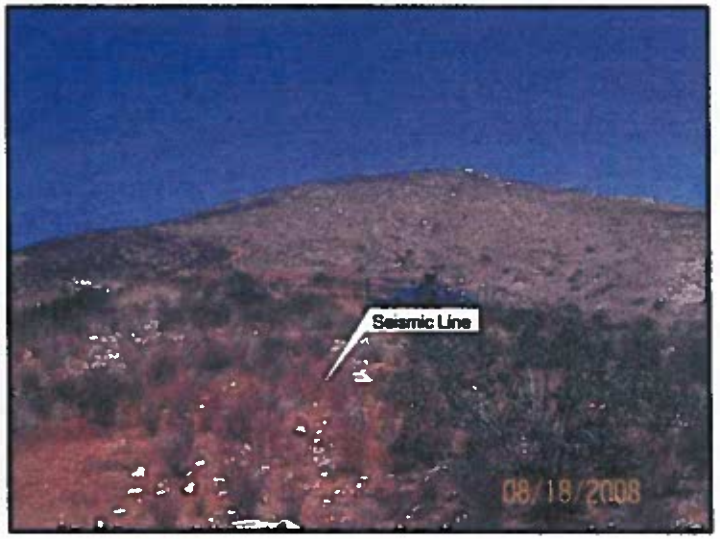
0 480 960

approximate scale in feet









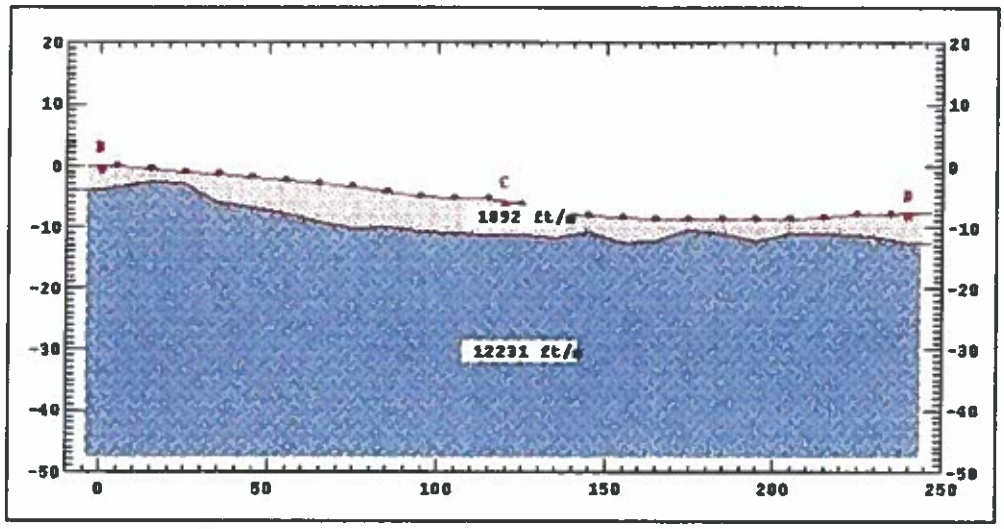
SITE PHOTOGRAPHS

Otay Ranch Residential Development
Chula Vista, California

Project No.. 108226 | Date: 10/06

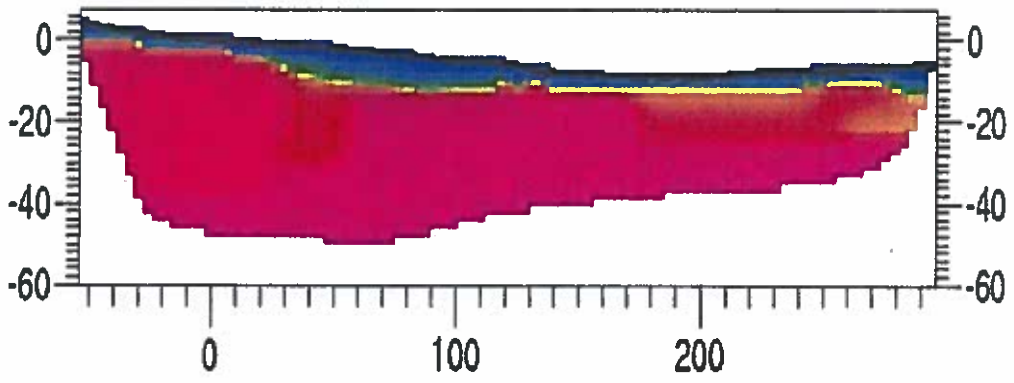
SOUTHWEST GEOPHYSICS INC

Figure 3



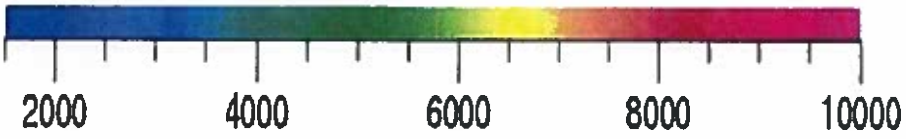
DEPTH IN FEET

DISTANCE IN FEET



DEPTH IN FEET

DISTANCE IN FEET



VELOCITY

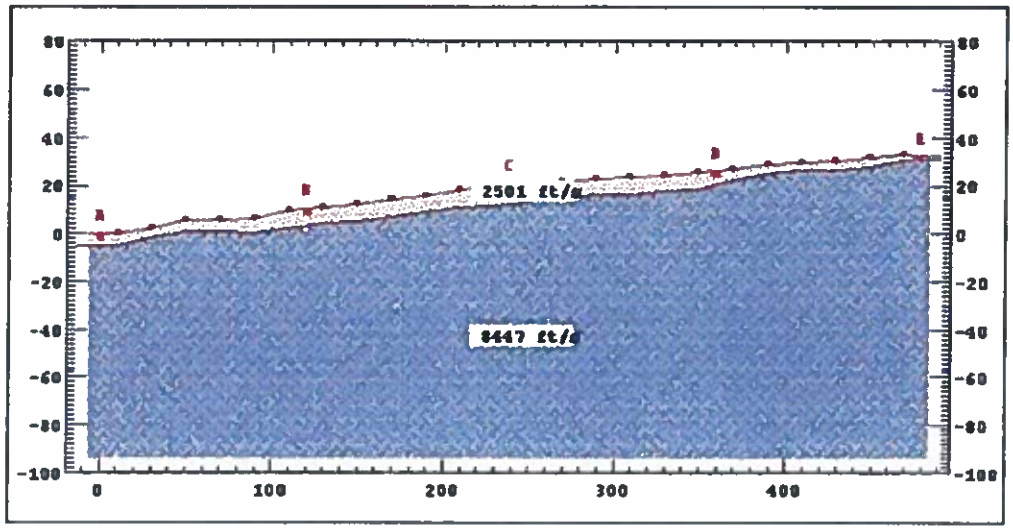
SEISMIC PROFILE
SL-1

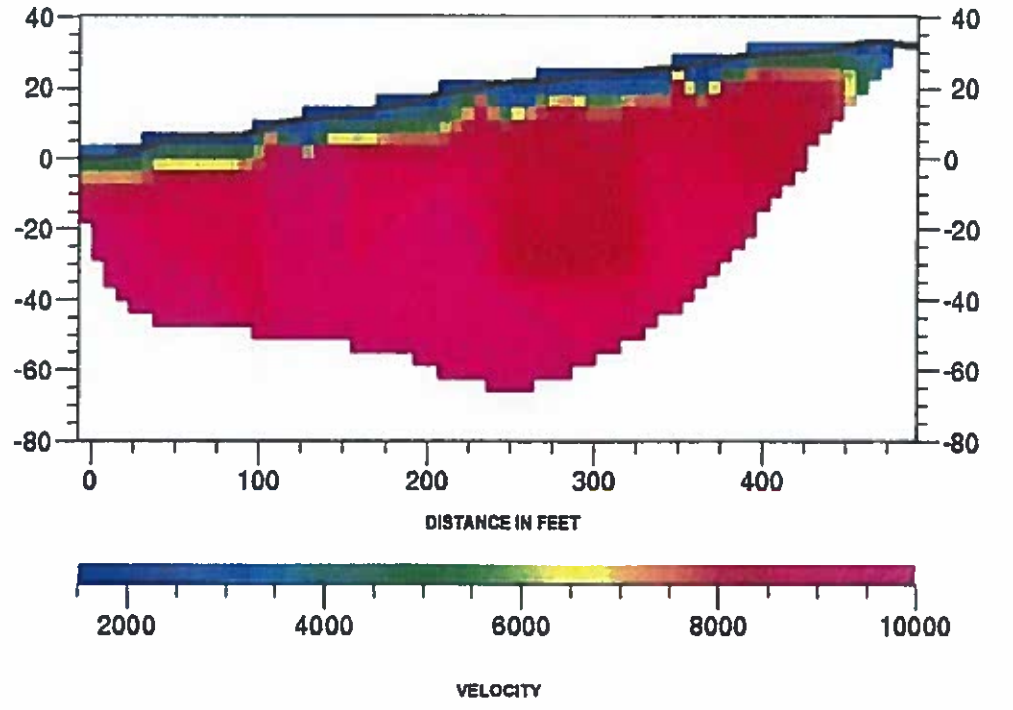
Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

SOUTHWEST GEOPHYSICS INC

Figure 4a





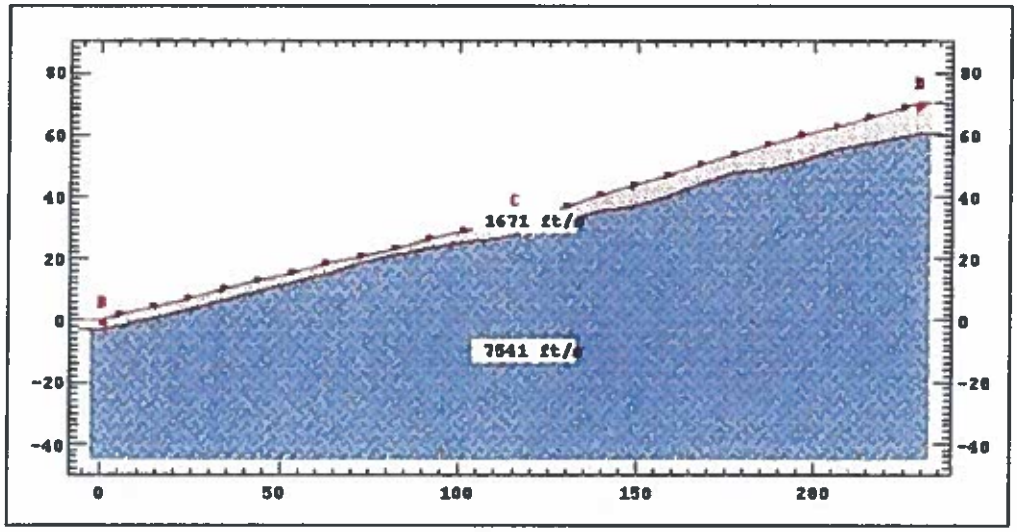
SEISMIC PROFILE SL-2

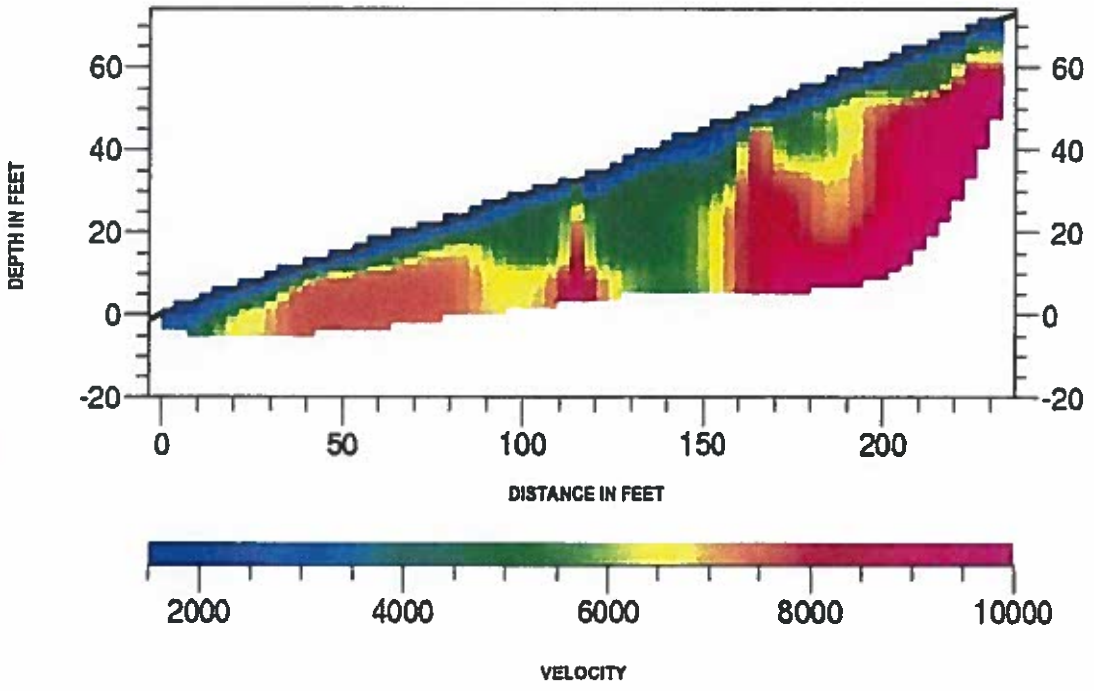
Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

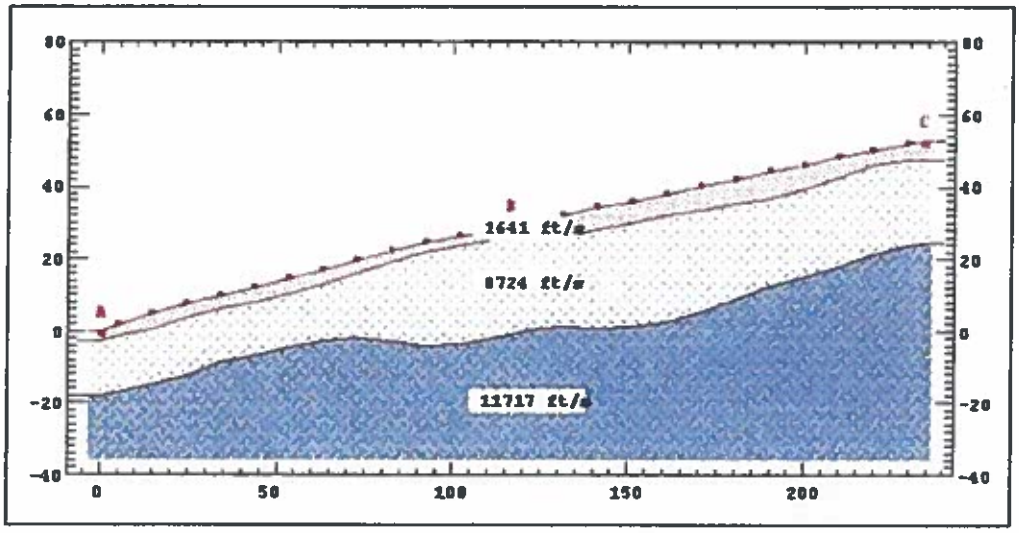
SOUTHWEST GEOPHYSICS INC

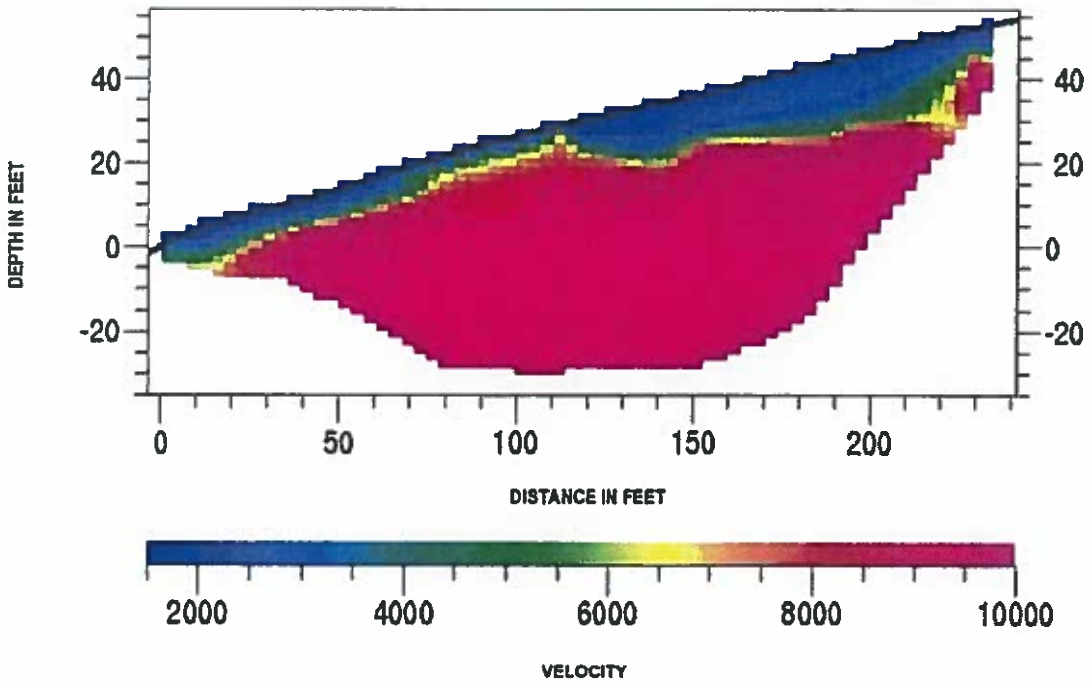
Figure 4b





SEISMIC PROFILE SL-3	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC.
	Project No.: 108226 Date: 10/08	Figure 4c





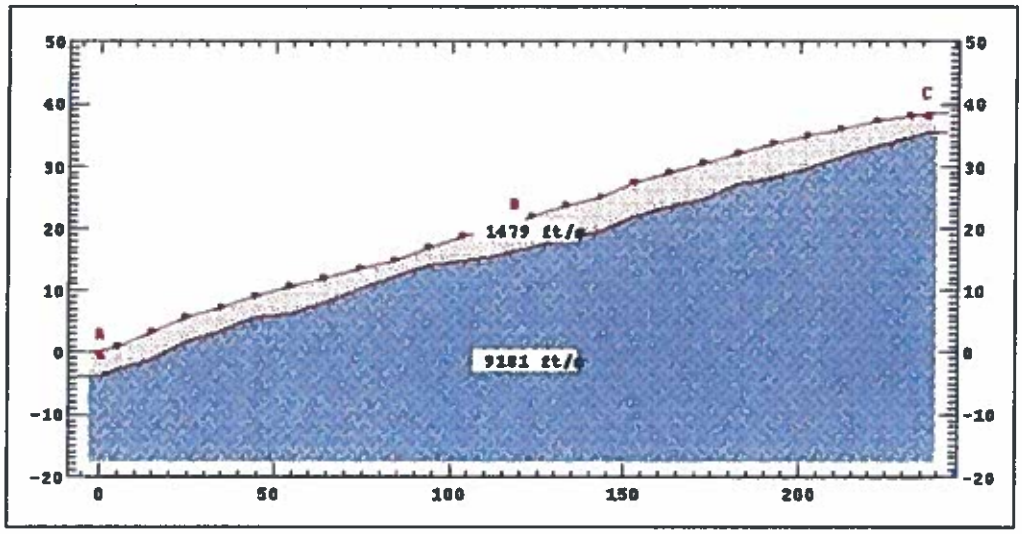
SEISMIC PROFILE
SL-4

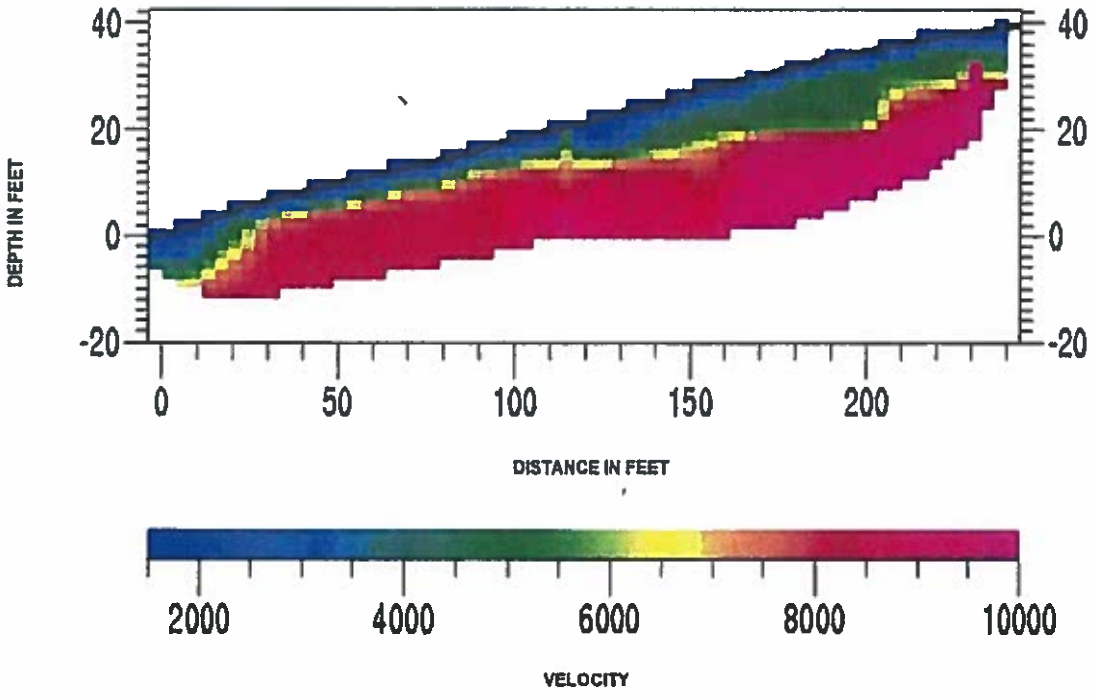
Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/06

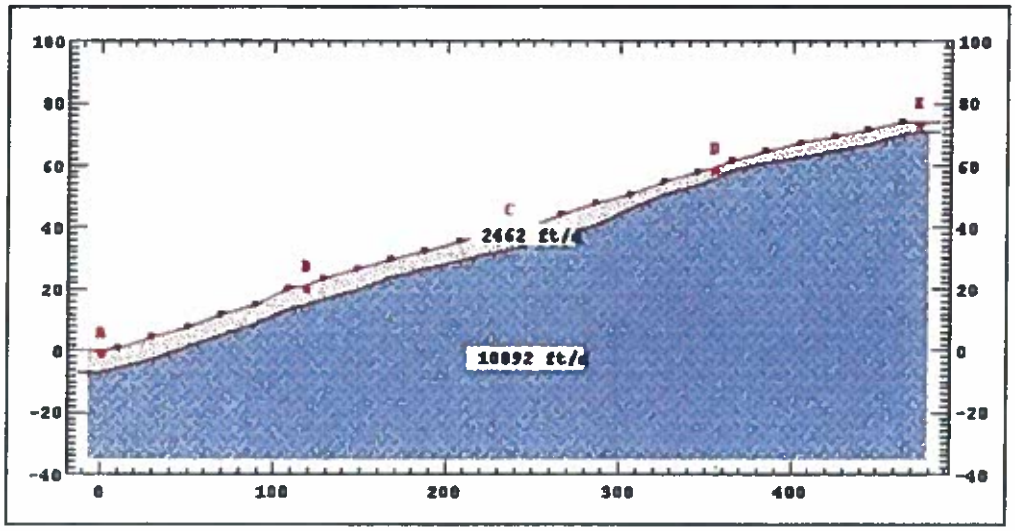
SOUTHWEST GEOPHYSICS INC

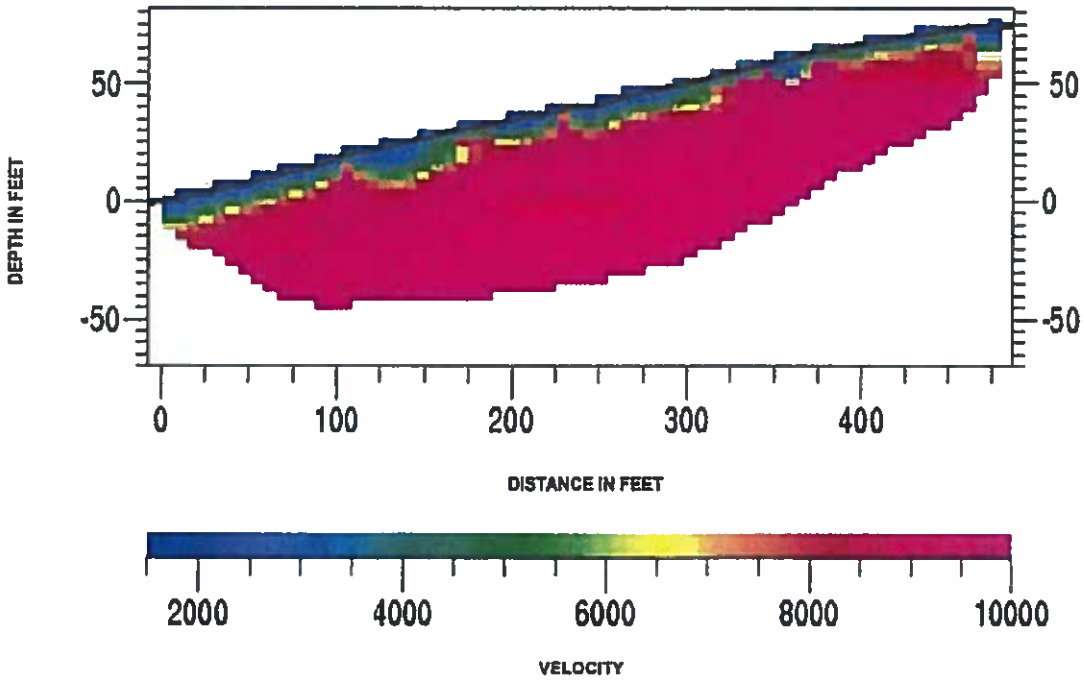
Figure 4d



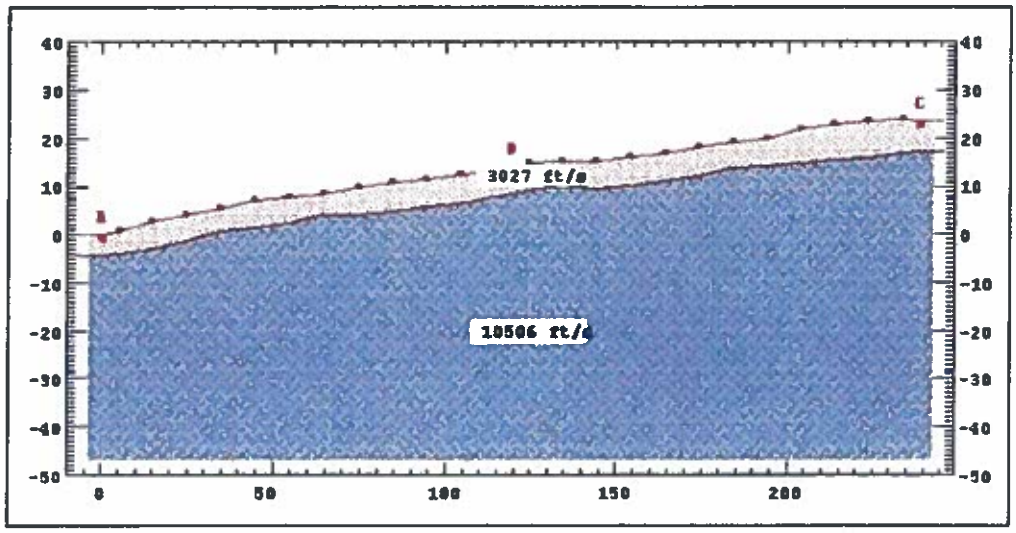


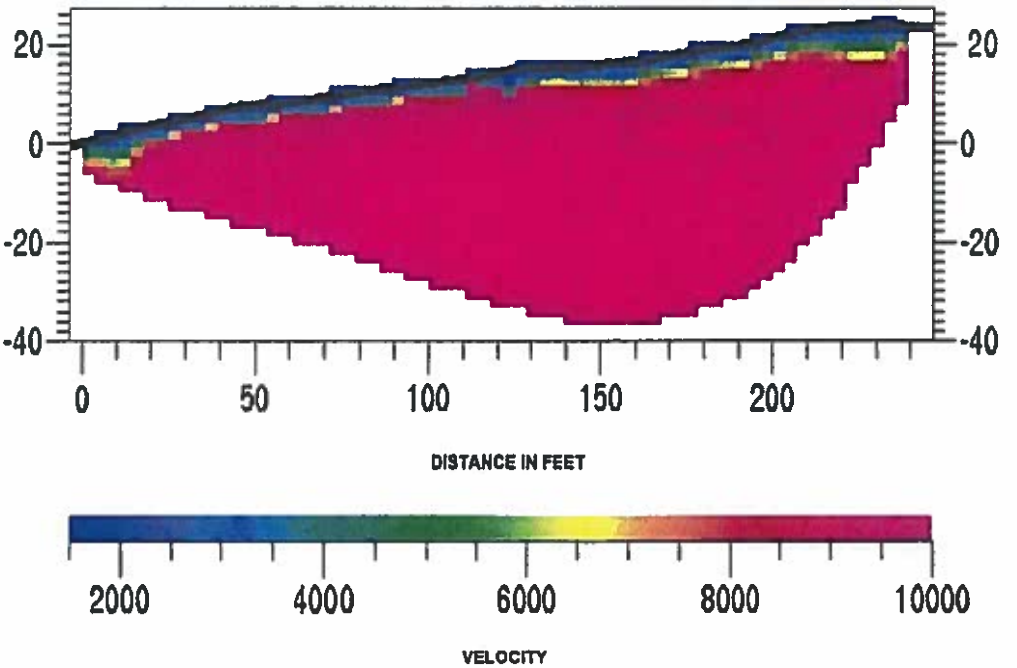
SEISMIC PROFILE SL-5	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 106226 / Date: 10/08	Figure 4e





SEISMIC PROFILE SL-6	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 108226 / Date: 10/08	Figure 4f





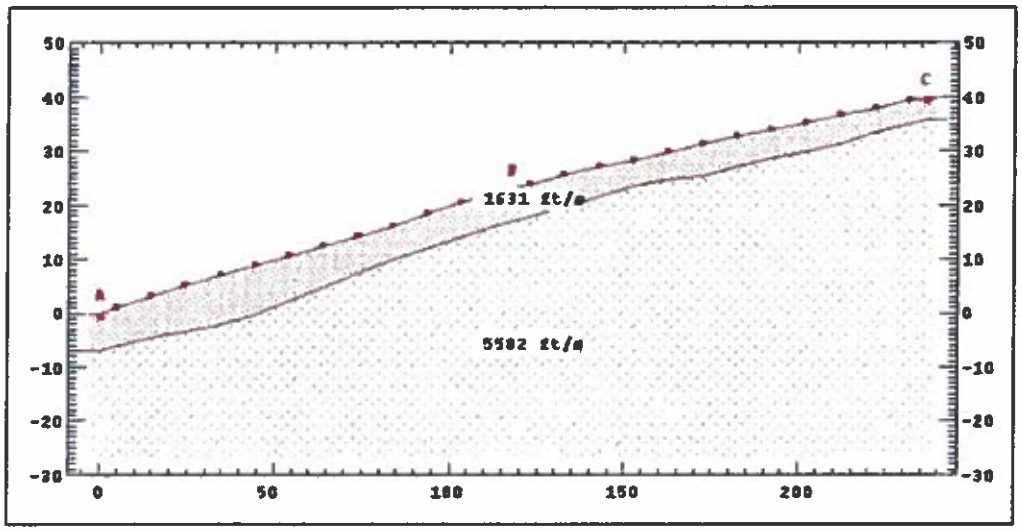
SEISMIC PROFILE
SL-7

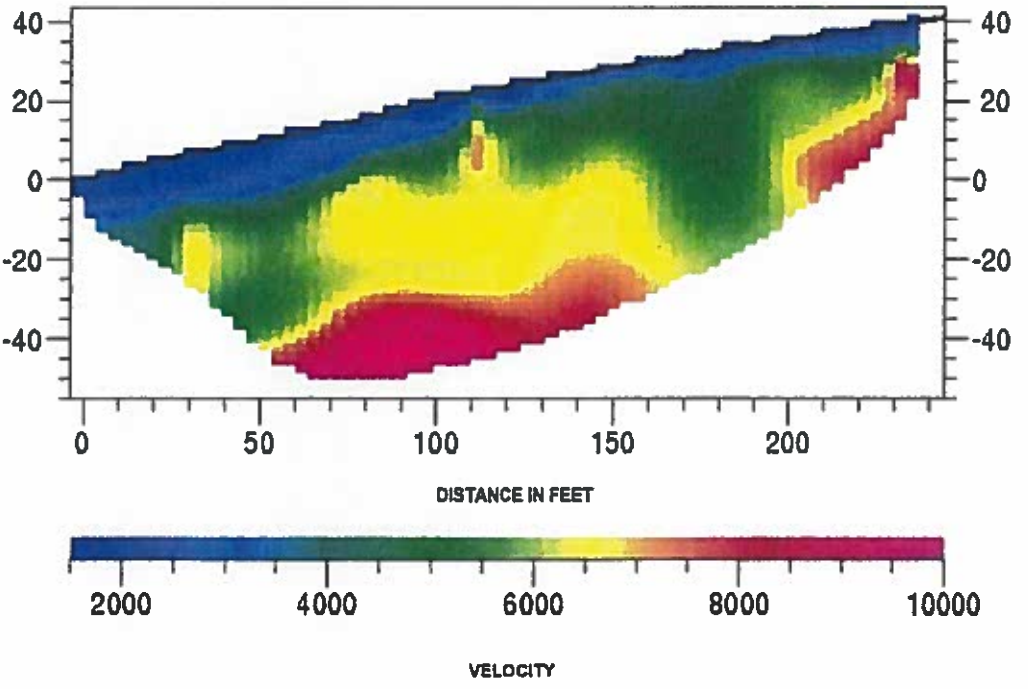
Otay Ranch Residential Development
San Diego, California

Project No.. 108226 | Date: 10/08

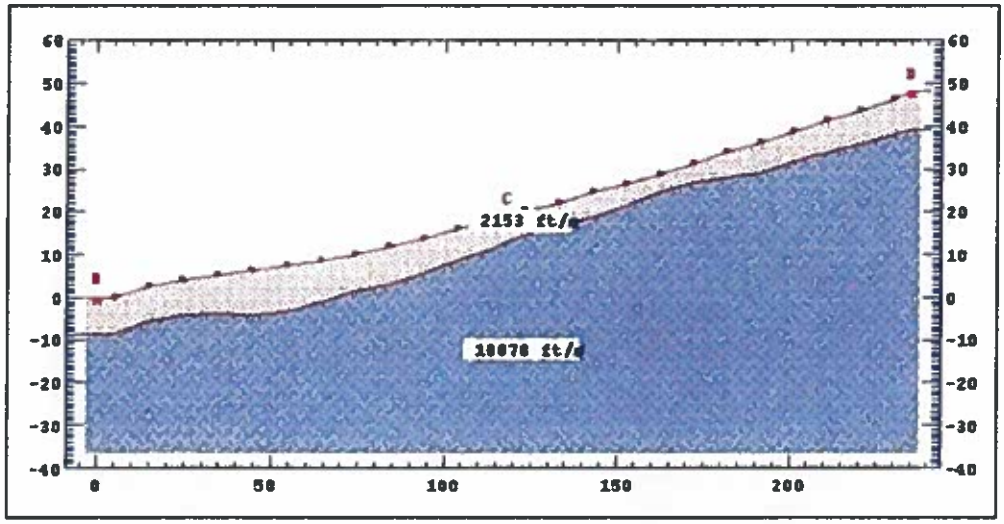
SOUTHWEST GEOPHYSICS INC

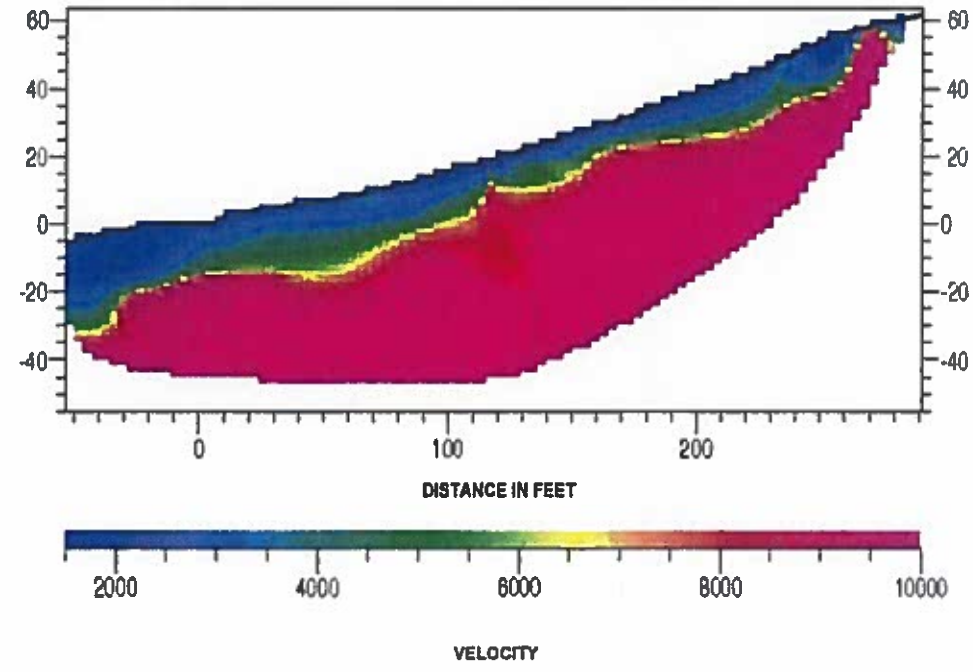
Figure 4g





SEISMIC PROFILE SL-8	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 108226 / Date: 10/08	Figure 4h





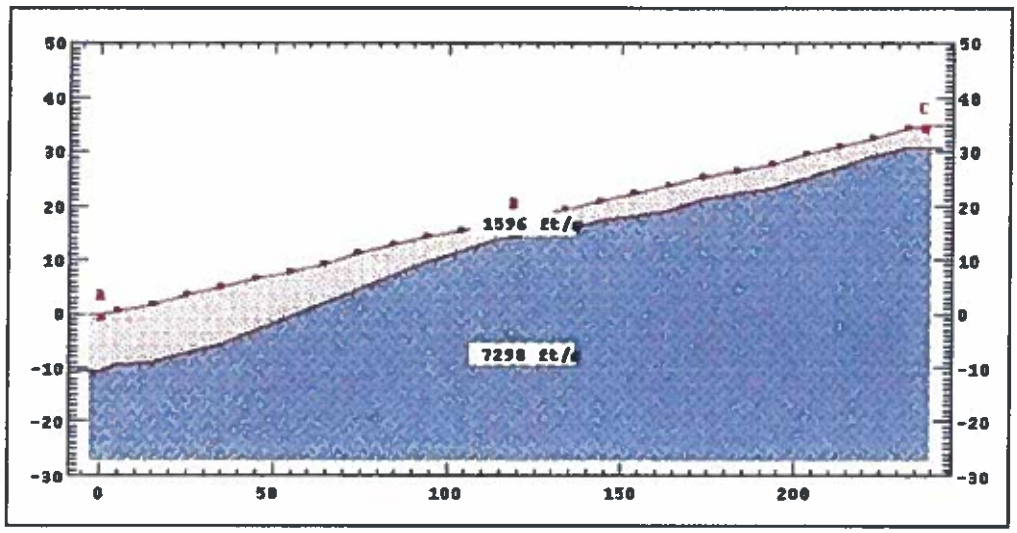
SEISMIC PROFILE
SL-9

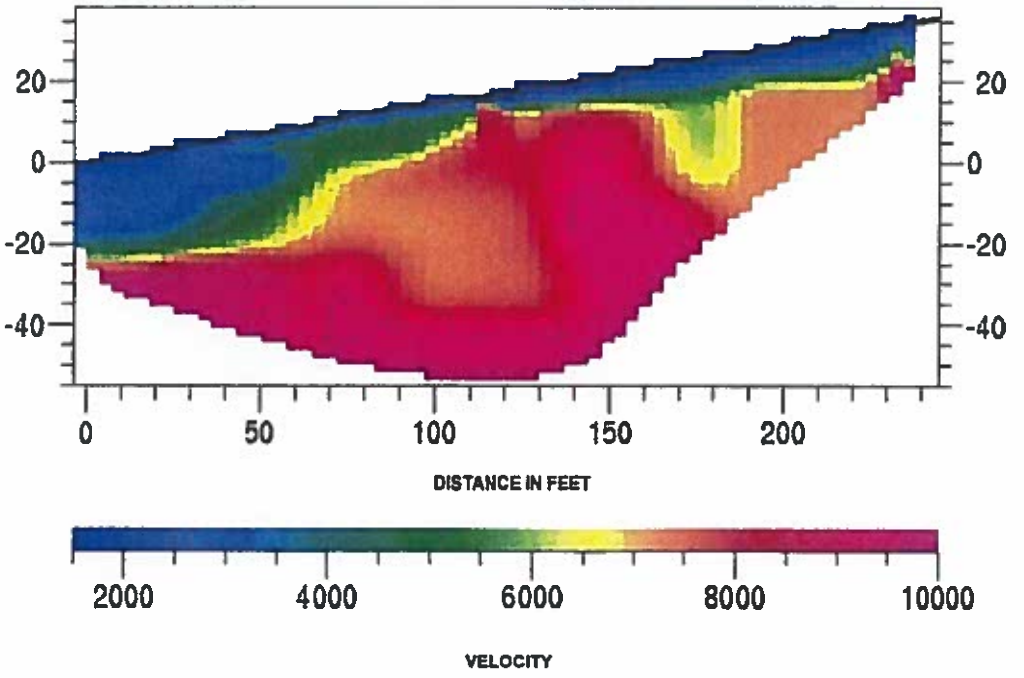
Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

SOUTHWEST GEOPHYSICS INC

Figure 4i





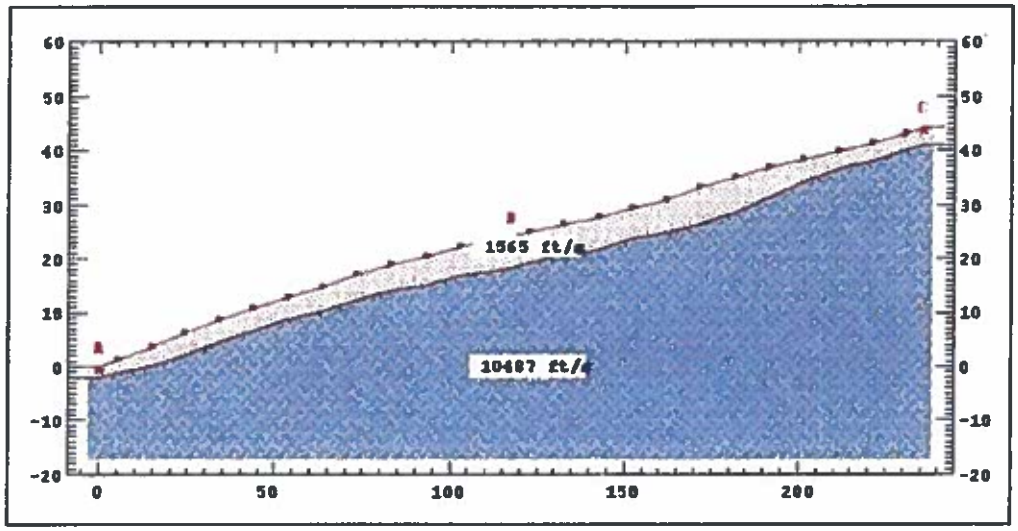
SEISMIC PROFILE
SL-10

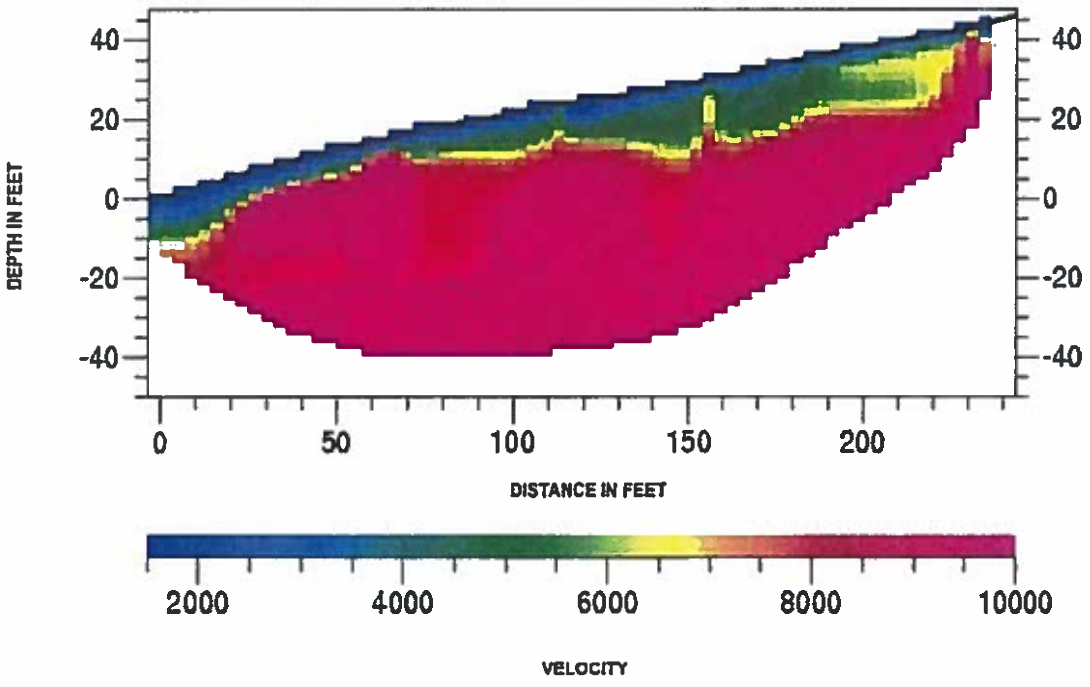
Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

SOUTHWEST GEOPHYSICS INC

Figure 4j





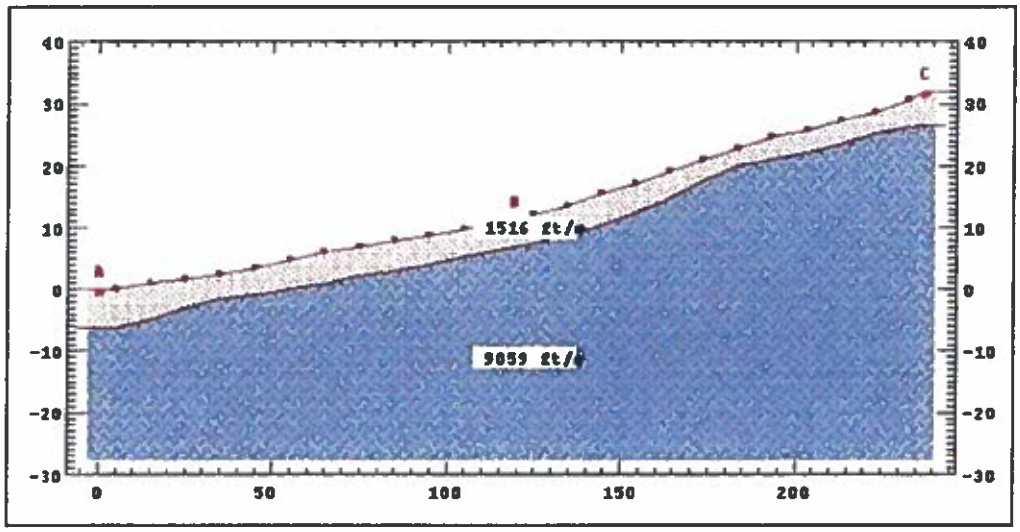
SEISMIC PROFILE
SL-11

Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

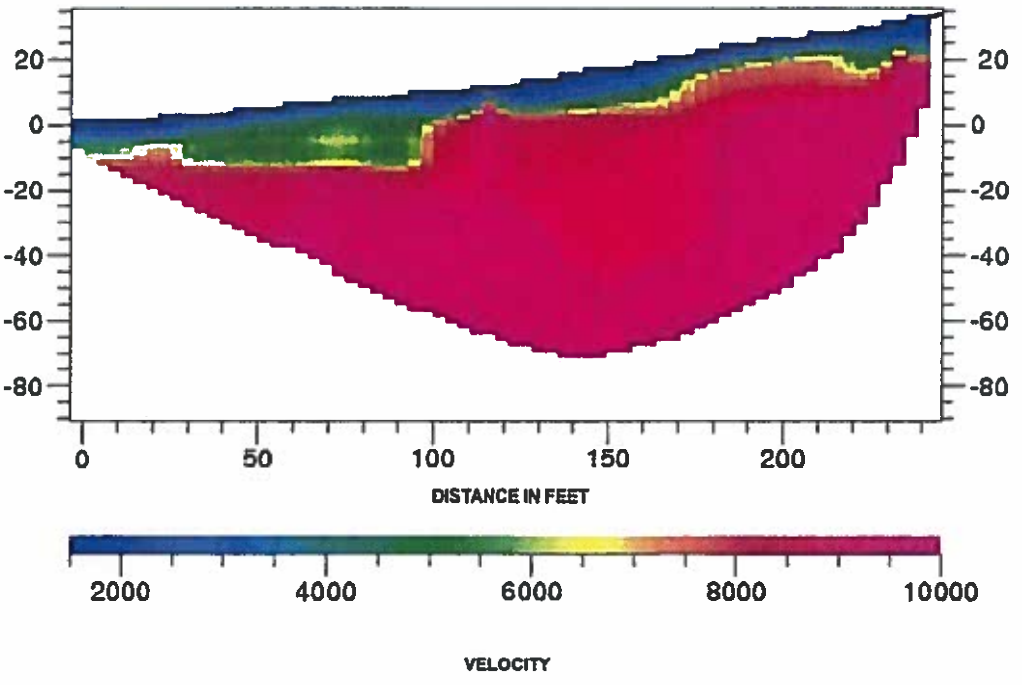
SOUTHWEST GEOPHYSICS INC

Figure 4k



DEPTH IN FEET

DISTANCE IN FEET

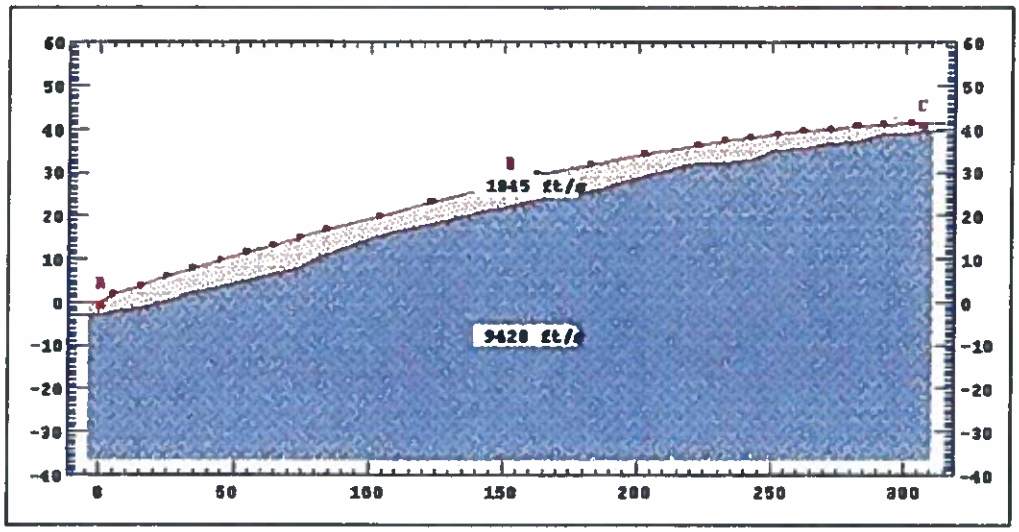


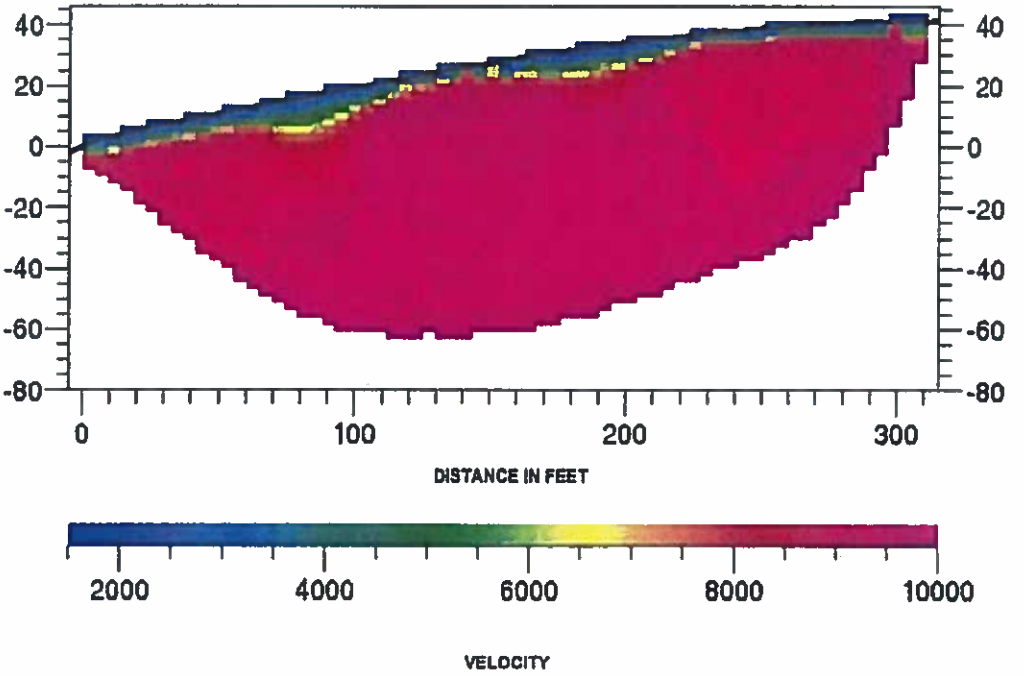
DEPTH IN FEET

DISTANCE IN FEET

VELOCITY

SEISMIC PROFILE SL-12	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 108226 | Date: 10/08	Figure 4l





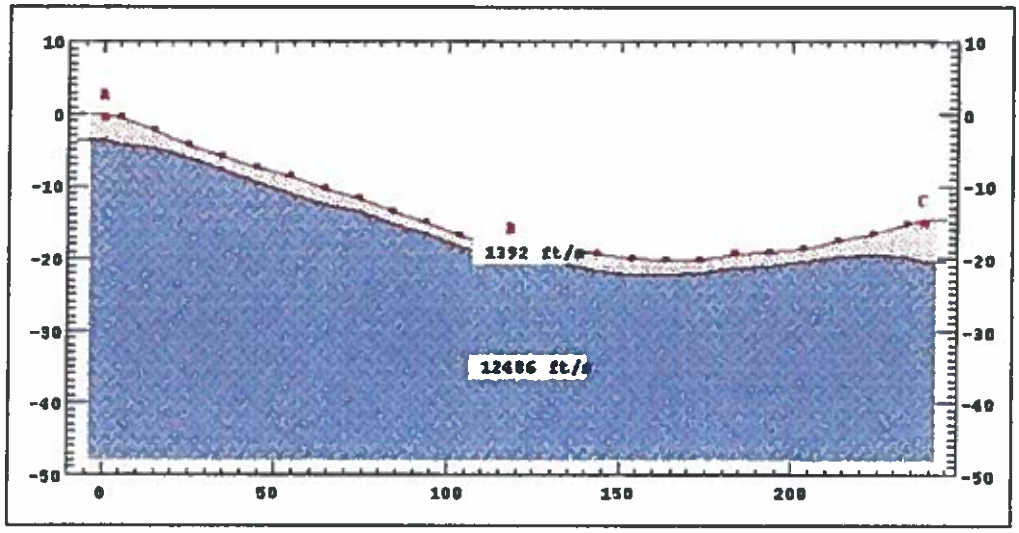
SEISMIC PROFILE
SL-13

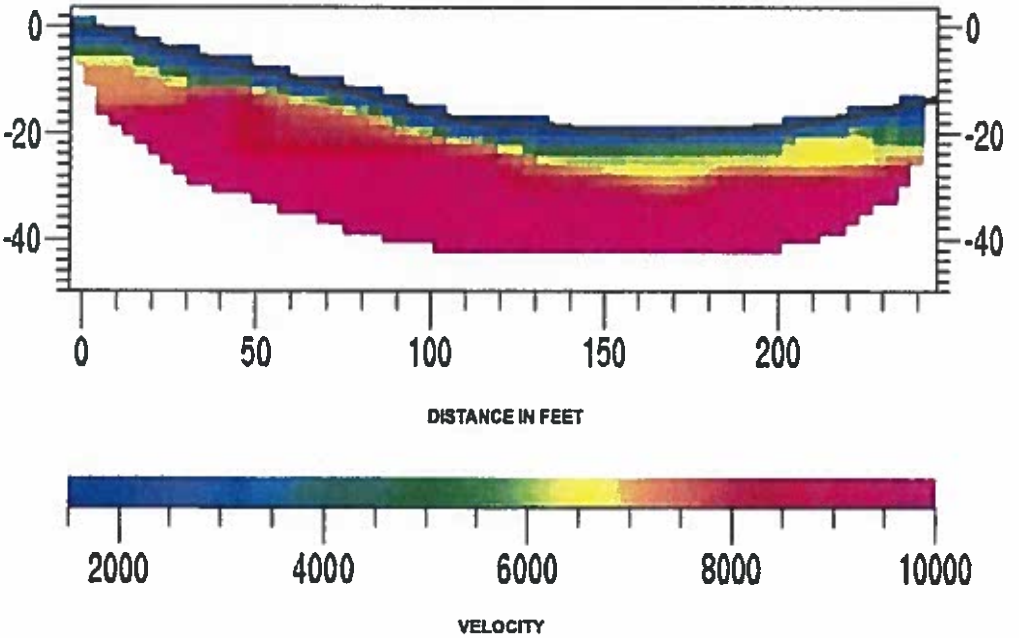
Otay Ranch Residential Development
San Diego, California

Project No.. 108226 | Date: 10/08

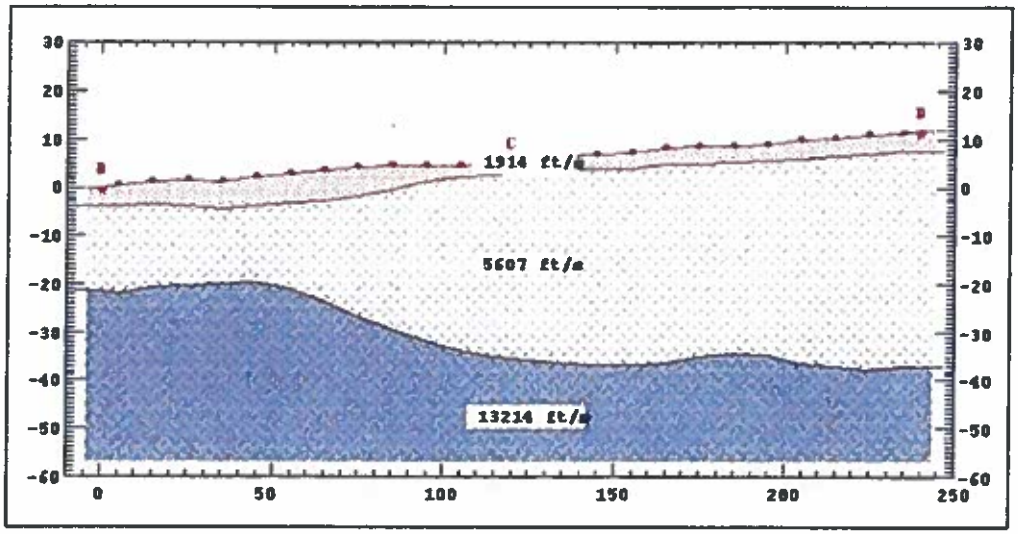
SOUTHWEST GEOPHYSICS INC

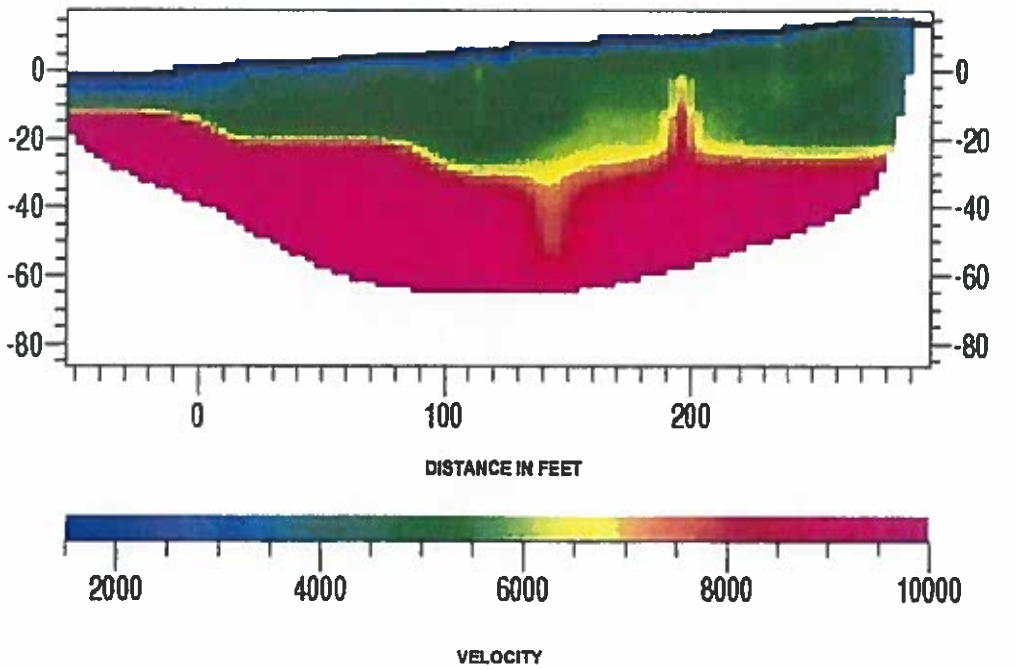
Figure 4m



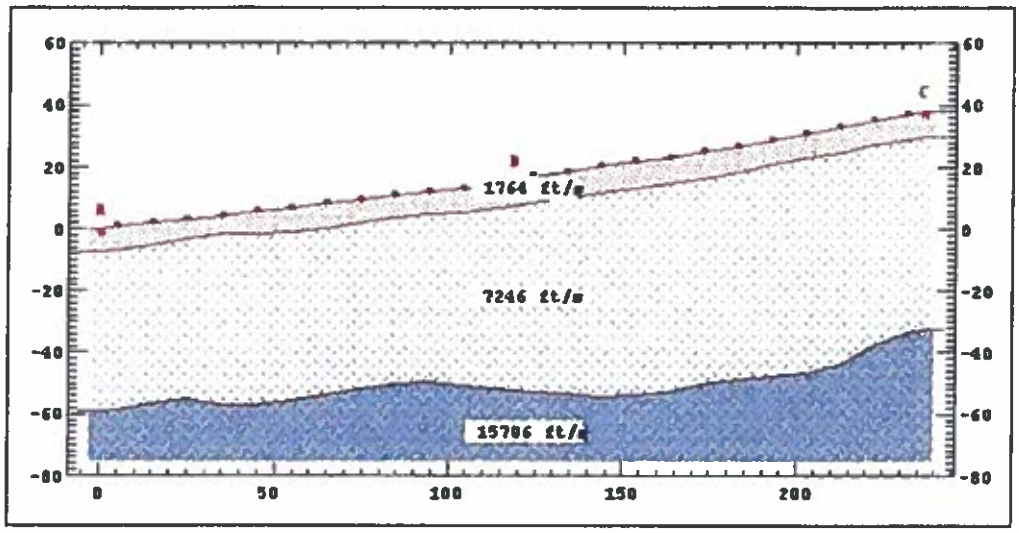


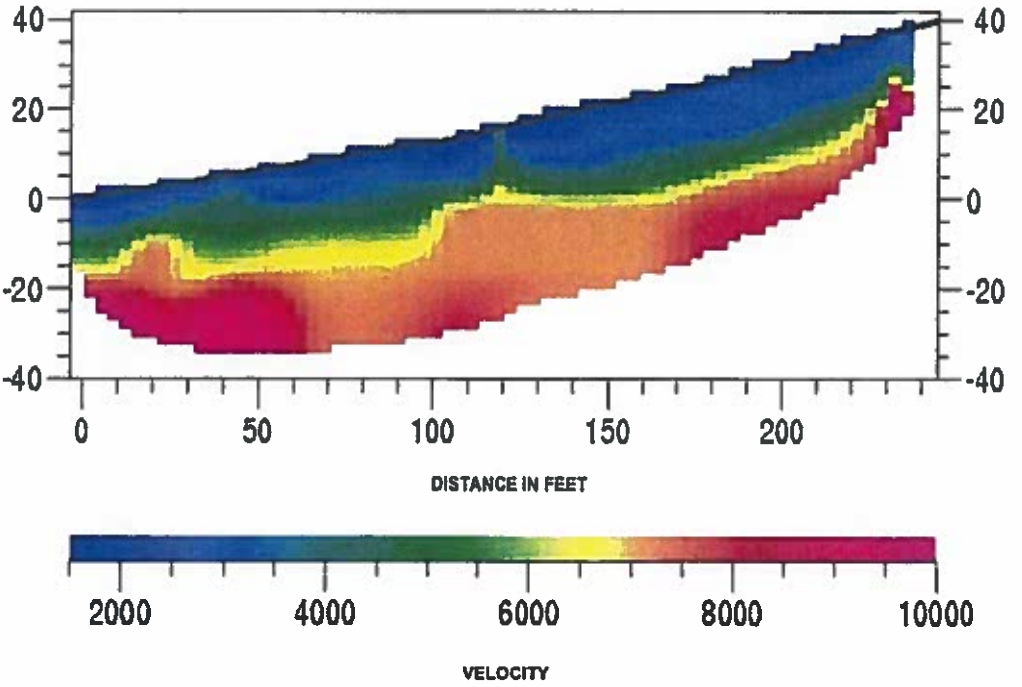
SEISMIC PROFILE SL-14	Otay Ranch Residential Development San Diego, California Project No.: 108226 Date: 10/08	SOUTHWEST GEOPHYSICS INC Figure 4n



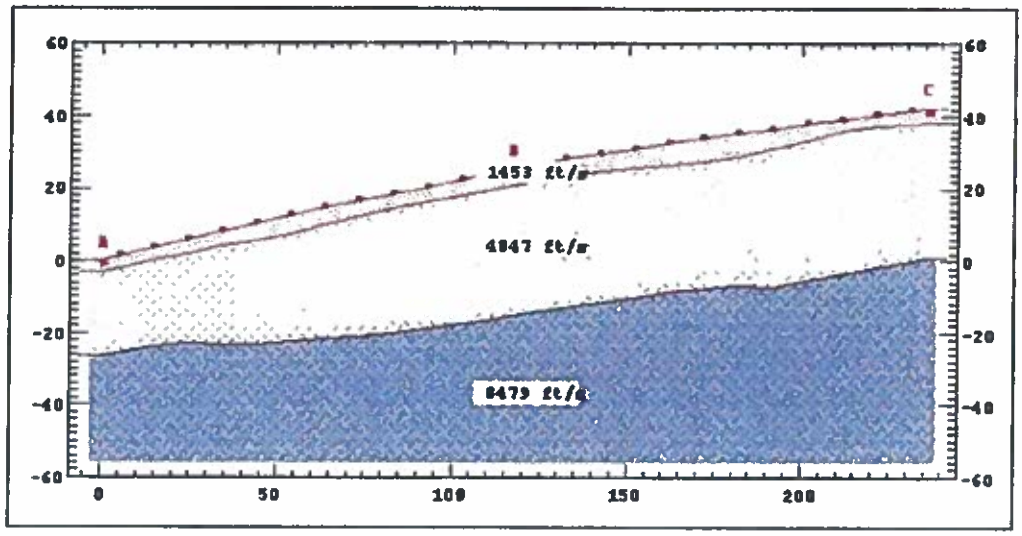


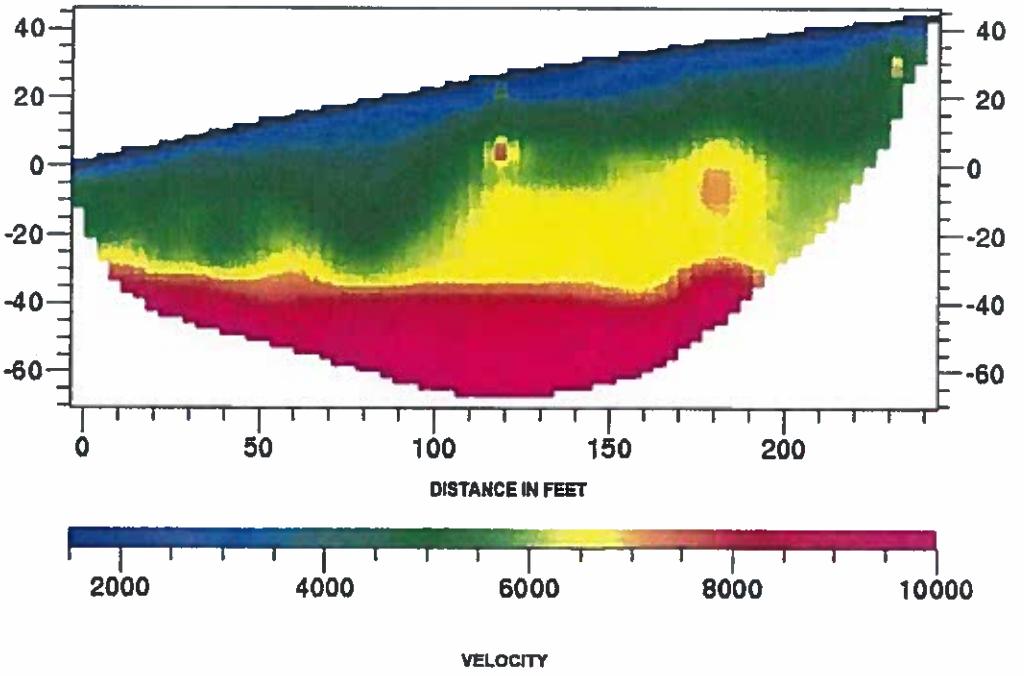
SEISMIC PROFILE SL-15	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 108226 | Date: 10/08	Figure 4o



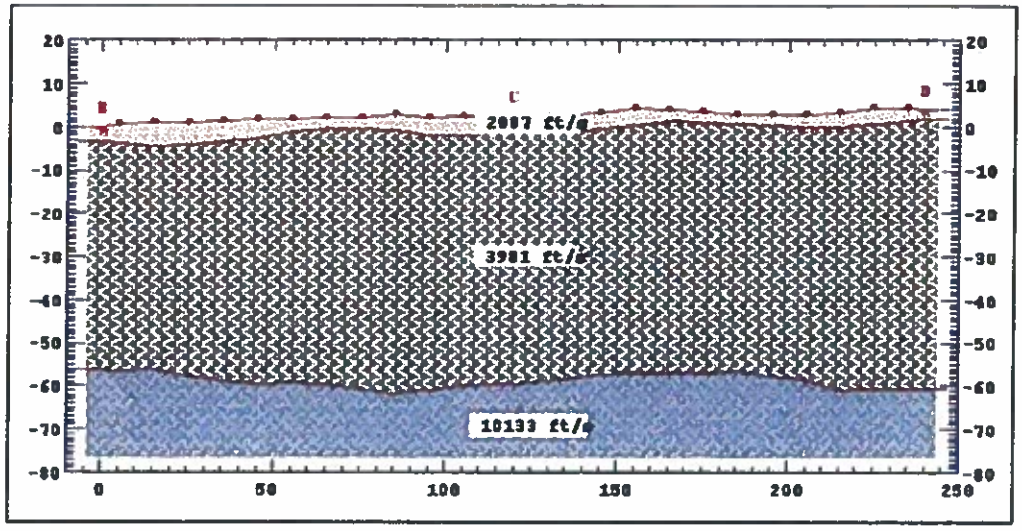


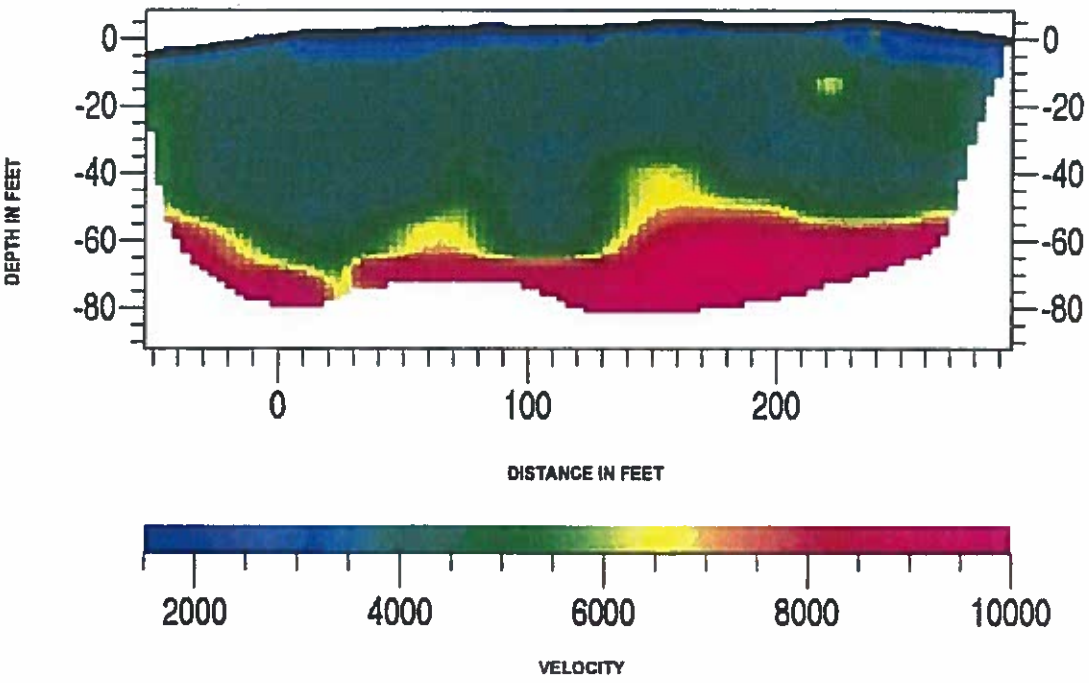
SEISMIC PROFILE SL-16	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC Figure 4p
	Project No.: 108226 | Date: 10/08	





SEISMIC PROFILE SL-17	Otay Ranch Residential Development San Diego, California	SOUTHWEST GEOPHYSICS INC
	Project No.: 108226 / Date: 10/08	Figure 4q





SEISMIC PROFILE
SL-18

Otay Ranch Residential Development
San Diego, California

Project No.: 108226 | Date: 10/08

SOUTHWEST GEOPHYSICS INC

Figure 4r

APPENDIX D

BORING LOGS AND SEISMIC REFRACTION SURVEYS

FROM ***PRELIMINARY GEOLOGIC/GEOTECHNICAL FEASIBILITY FOR ENVIRONMENTAL IMPACT REPORT, OTAY RANCH VILLAGE 13, CITY OF CHULA VISTA, COUNTY OF SAN DIEGO, CALIFORNIA***,

PREPARED BY **NEBLETT & ASSOCIATES,**
DATED **JANUARY 16, 2004 (PROJECT NO. 362-000-02)**

FOR

OTAY RANCH RESORT VILLAGE
AREA B TENTATIVE MAP
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1012-52-01C

GEOTECHNICAL BORING LOG

PROJECT NO. 362 000
DATE STARTED 6/18/01
DATE FINISHED 6/18/01
DRILLER
TYPE OF DRILL RIG Bucket Auger

PROJECT NAME OTAY RANCH
GROUND ELEV
GW DEPTH (FT)
DRIVE WT.
DROP

BORING DESIG. NB-1
LOGGED BY JSC
NOTE

DEPTH (feet)	ELEV.	SAMPLE TYPE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT. (%)	DRY (pcf) DENSITY	SAT-URATION (%)	Other Tests
						Alluvium (Qal): Silty sand with cobbles and boulders, brown, slightly moist, dense, subrounded clasts. @ 2' Difficult drilling - ripper utilized.				
5						@ 4' **Unnamed Fanglomerate Deposits (Tfg):** Cobble - boulder conglomerate in clayey sand matrix, pale greenish brown, moist, dense, subrounded clasts, difficult to excavate. @ 7' Refusal Total depth 7.0 feet. No groundwater, no caving.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ Water Seepage
MAX - Max. Density/Opt. Moist.
DS - Direct Shear
GS - Grain Size Analysis
EI - Expansion Index
CONS - Consolidation

NEBLETT & ASSOCIATES, INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA 92649 714-840-8286

PLATE A-1

GEOTECHNICAL BORING LOG

PROJECT NO. 362 000
DATE STARTED 6/18/01
DATE FINISHED 6/18/01
DRILLER
TYPE OF DRILL RIG Bucket Auger

PROJECT NAME OTAY RANCH
GROUND ELEV.
GW DEPTH (FT)
DRIVE WT.
DROP

BORING DESIG NB-2
LOGGED BY JSC
NOTE

DEPTH (feet)	ELEV.	SAMPLE TYPE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT. (%)	DRY (pcf) DENSITY	SAT-URATION (%)	Other Tests
0						**Alluvium (Qal):** Sandy to gravelly clay, dark brown, slightly moist, stiff, coarse-grained, porous, rooted, sharp lower contact.				
5		B R	5			@ 5' **Unnamed Fanglomerate Deposits (Tfg):** Gravel/cobble conglomerate in clayey sand matrix, mottled, reddish brown and brown, moist, moderately hard, very clayey. @7' Sandstone with gravel, mottled, brown and reddish brown, moist, moderately hard, coarse-grained, some cobbles, gypsum crystals throughout.				
10						@ 10' No sample taken due to cobbles. @ 10' Sharp contact. Gravel/cobble conglomerate with clayey sand matrix, reddish brown, moist, moderately hard, coarse-grained sand.				
15						@ 15' No sample taken due to cobbles.				
20						@ 20' No sample taken due to cobbles.				
25						@ 25' No sample taken due to cobbles - difficult drilling @ 25' Cobble/boulder conglomerate with clayey sand matrix, reddish brown, moist, dense, coarse-grained sand.				
						@ 28' Difficult drilling - ripper utilized. @ 28' Refusal on boulder. Total depth 28.0 feet. No groundwater, no caving.				

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

► Water Seepage
MAX - Max. Density/Opt. Moist.
DS - Direct Shear
GS - Grain Size Analysis
EI - Expansion Index
CONS - Consolidation

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PLATE A-2

NT - 1

Date Excavated: 6-19-01
Logged by: JSC

Depth	Description
0.0' – 3.0'	**Alluvium (Qal):** silty sand with gravel, cobbles, and boulders, brown, slightly moist, moderately dense, rooted, clayey, porous, difficult to excavate, sharp lower contact.
3.0' – 6.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey sand matrix, mottled orangish brown and grayish brown, slightly moist, moderately dense, locally decomposed clay (bentonite) within matrix, difficult to excavate.

Total Depth 6.5'; no groundwater, no caving.

NT - 2

Date Excavated: 6-19-01
Logged by: JSC

Depth	Description
0.0' – 4.5'	**Colluvium (Qcol):** silty sand, brown, slightly moist, moderately dense, fine to coarse grained, porous, rooted, some gravel and cobbles, some boulders at 3 feet, sharp lower contact.
4.5' – 7.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel-cobble conglomerate with coarse sand and clay matrix (bentonitic), mottled orangish brown, pale greenish brown and yellowish brown, slightly moist, massive, cobble amount increases with depth, few boulders.

Total Depth 7.5'; no groundwater, no caving.

NT - 3

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 3.5'	**Alluvium (Qal):** silty sand, brown, slightly moist, moderately dense, fine to coarse grained, boulders and cobbles, porous, sharp lower contact.
	BULK SAMPLE at 1.0'to 2.0'.
3.5' – 7.5'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone (bentonitic), pale yellowish to greenish gray, moist, soft to moderately hard, massive, weathered.
	BULK SAMPLE at 6'.
	Total Depth 7.5'; no groundwater, no caving.

NT - 4

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' - 2.0'	**Colluvium (Qcol):** gravelly sand, brown, fine- to coarse-grained, moist, moderately dense, weakly bedded, heavily rooted in upper 1-2 feet.
2.0' – 6.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey coarse sand matrix, mottled brown and pale brown, moist, moderately hard, massive.
	Total Depth 6.0'; no groundwater, no caving.

NT - 5

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 5.0'	**Alluvium (Qcol):** clayey sand and silty sand; dark brown; fine to medium grained; slightly moist; moderately dense; some gravel; weak angular blocky structure; sharp lower contact.
5.0' – 7.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey coarse sand matrix, mottled brown and pale brown, moist, moderately hard, massive.
	Total Depth 7.5'; no groundwater, no caving.

NT – 6

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 6.0'	**Alluvium (Qal):** silty sand and clayey sand, dark brown to very dark brown, moist, moderately dense, rooted, decomposed organics, sharp lower contact.
6.0' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, mottled brown and pale greenish gray, slightly moist, soft to moderately hard, fine to coarse grained.

Total Depth 8.0'; no groundwater, no caving.

NT – 7

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 3.5'	**Alluvium (Qal):** silty to clayey sand, brown, slightly moist, moderately dense, fine to coarse grained with gravel and cobbles, porous, rooted, sharp lower contact.
3.5' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey coarse sand matrix, medium brown to light brown and orangish brown, slightly moist, moderately hard, massive.

Total Depth 5.5'; no groundwater, no caving.

NT – 8

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 3.5'	**Alluvium (Qal):** silty to clayey sand, brown, slightly moist, moderately dense, fine to coarse grained with gravel and cobble, some boulders, porous, sharp lower contact.
3.5' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey coarse sand matrix, medium brown to light brown and orangish brown, slightly moist, moderately hard, massive.

Total Depth 5.5'; no groundwater, no caving.

NT – 9

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** clayey sand and silty sand with gravel and cobble, brown, moist, moderately dense, porous, rooted.
2.0' – 3.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone with clay, brown, slightly moist, soft to moderately hard coarse-grained sand.
	Total Depth 3.0'; no groundwater, no caving.

NT – 10

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** silty sand with gravel, cobble, and boulder, dark brown, slightly moist, moderately dense; porous, rooted, sharp lower contact.
4.0' – 7.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey sand matrix, slightly moist, moderately hard, massive.
	Total Depth 7.0', no groundwater, no caving.

NT – 11

Date excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** silty sand with gravel, cobble and boulders, brown, slightly moist, moderately dense, rooted, very difficult to excavate, sharp lower contact.
4.0' – 6.0'	**Unnamed Fanglomerate Deposits (Tfg):** sandstone with gravel and cobbles, pale brown and grayish brown, slightly moist, moderately hard, fine to coarse grained.
	Total Depth 6.0'; no groundwater, no caving.

NT – 12

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 3.5'	**Alluvium (Qal):** clayey sand with gravel and cobble, dark brown, slightly moist, dense, porous, sharp lower contact.
3.5' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, pale brown and orangish brown, slightly moist, moderately hard, fine to coarse grained, massive.

Total Depth 5.5'; no groundwater, no caving

NT – 13

Date Excavated: 6-19-2001
Logged by: JSC

Depth	Description
0.0' – 1.5'	**Alluvium (Qal):** silty sand with gravel and cobble, grayish brown, slightly moist, moderately dense, porous.
1.5' – 3.0'	Cobbly to sandy clay, dark brown to reddish brown, moist, stiff, sharp lower contact.
3.0' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** sandy to gravelly claystone, moist, soft to moderately hard.

Total Depth 5.5'; no groundwater, no caving.

NT – 14

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 3.0'	**Alluvium (Qal):** sandy clay, light grayish brown, slightly moist, stiff, some coarse sand, fine gravel (40%), trace cobble, small boulder (<5%).
3.0' – 9.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, pale greenish yellow, moist, moderately hard, fine to coarse grained, moderately graded, subangular to angular, occasional small subrounded cobbles, cobble/boulder bed from 7' to 8'.

Total Depth 9.0'; no groundwater, no caving.

NT – 15

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Alluvium (Qal):** sandy clay, medium brown, moist, stiff, porous, fine to coarse sand (15%), subangular to subrounded cobble/boulder (30%).
2.0' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, pale greenish yellow, moist, dense, moderately well to well graded, angular, fine to coarse sand, gravel (15%), some oxidation mottling.
	Total Depth 8.0'; no groundwater, no caving.

NT – 16

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** sandy clay, dark brown, moist, stiff, porous.
2.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, pale greenish yellow, moist, moderately dense, angular, fine to coarse sand, gravel (15%), some oxidation mottling.
	Total Depth 5.0'; no groundwater, no caving

NT – 17

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** sandy silt, gray brown, moist, stiff, fine to coarse grained, porous, roots, cobble/boulder layer from 2' to 3', orangish brown.
5.0' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, pale yellowish green, moist, moderately hard, plastic, bentonitic, coarse grained sand
	BULK SAMPLE at 7'.
	Total Depth 8.0'; no groundwater, no caving.

NT – 18

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Alluvium (Qal):** sandy clay, pale reddish brown, moist, stiff, porous, fine to coarse grained, trace gravel, roots.
2.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone with gravel and cobbles, pale yellowish brown, moist, moderately hard, fine to coarse sand, gravel/cobbles (30-40%).

Total Depth 5.0'; no groundwater, no caving.

NT – 19

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** clayey sand, gray brown, moist, soft, fine to coarse sand, abundant cobbles at surface, angular.
2.0' – 6.0'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, pale olive gray, moist, soft, some medium to coarse sand.

Total Depth 6.0'; no groundwater, no caving.

NT – 20

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** silty clay, gray brown, moist, hard, abundant boulders in clayey silt matrix, angular. Refusal on cobble/boulder bed.

Total Depth 4.0'; no groundwater, no caving.

NT – 21

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.5'	**Colluvium (Qcol):** sandy clay, pale reddish brown, slightly moist, stiff, fine to coarse sand (<15%), gravel (5%), subangular, cobble/boulder layer from 2' to 2.5'.
2.5' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone with gravel and cobbles, pale yellowish brown, moist, moderately hard, fine to coarse sand, gravel/cobbles (30-40%), angular boulder to 12" from 7' to 8'.

Total Depth 8.0'; no groundwater, no caving.

NT – 22

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 5.0'	**Alluvium (Qal):** gravelly clay, gray brown, moist, stiff.
5.0' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone with gravel and cobbles, pale yellowish brown, moist, moderately hard, fine to coarse sand, gravel/cobbles (30-40%), angular to subangular boulders from 5' to 7'.

Total Depth 8.0'; no groundwater, no caving.

NT – 23

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** sandy clay with cobbles and boulders, gray brown, moist, stiff, porous.
2.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** silty claystone, pale yellowish green, moist, soft, scarce coarse sand.

Total Depth 5.0'; no groundwater, no caving

NT – 24

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' - 3.0'	**Alluvium (Qal):** clayey sand, reddish brown, moist, stiff, poorly sorted, fine to coarse grained, some fine angular gravel, small cobbles.
3.0' – 6.0'	**Unnamed Fanglomerate Deposits (Tfg):** silty claystone, pale yellowish green, moist, soft, some coarse sand, cobble/boulder bed at contact.
	Total Depth 6.0'; no groundwater, no caving.

NT – 25

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** sandy clay, reddish brown, moist, stiff, some fine to coarse sand, gravel/small cobbles (10–15%).
2.0' – 4.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, yellowish gray, slightly moist, dense, fine to coarse grained.
	Total Depth 4.5'; no groundwater, no caving.

NT – 26

Date Excavated: 3-20-2001
Logged by: SMR

Depth	Description
0.0' – 2.0'	**Alluvium (Qal):** sandy clay, reddish brown, moist, stiff, some fine to coarse sand, gravel/small cobbles (10–15%).
2.0' – 6.0'	**Unnamed Fanglomerate Deposits (Tfg):** silty claystone, light gray brown, moist, soft, trace coarse sand.
	BULK SAMPLE at 6 feet.
	Total Depth 6.0'; no groundwater, no caving.

NT – 27

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 3.0'	**Alluvium (Qal):** sandy clay, reddish brown, moist, stiff, some fine to coarse sand, gravel/small cobbles (10–15%).
3.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, yellowish gray, slightly moist, moderately hard, fine to coarse grained, abundant cobbles.
	Total Depth 5.0', no groundwater, no caving.

NT – 28

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 1.5'	**Colluvium (Qcol):** sandy clay, reddish brown, moist, stiff, some fine to coarse sand, very few cobbles.
1.5' – 4.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, pale yellowish green, moist, moderately hard, fine to coarse sand, abundant cobbles (30-40%), few small boulders (<5%).
	Total Depth 4.0'; no groundwater, no caving.

NT – 29

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 3.0'	**Alluvium (Qal):** sandy clay, reddish brown, moist, hard, roots,
3.0' – 7.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, pale yellowish green, moist, moderately hard, fine to coarse sand, few cobbles.
	Total Depth 7.0'; no groundwater, no caving

NT – 30

Date Excavated: 6-20-2001
Logged by: SMR

Depth	Description
0.0' – 3.0'	**Alluvium (Qal):** clayey sand with cobbles, reddish brown, moist, dense, boulder/cobble at base, difficult to excavate, sharp lower contact.
3.0' – 7.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, pale yellowish green, moist, moderately hard, fine to coarse sand, weathered.
5.0' – 7.0'	Gravelly sandstone, pale yellowish green, slightly moist, moderately hard, fine to coarse grained, abundant cobbles.
	Total Depth 7.0'; no groundwater, no caving.

NT – 31

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 3.5'	**Alluvium (Qal):** clayey sand with cobbles, reddish brown, moist, dense, fine to coarse sand, gravel/cobble (30-40%), few small boulders, porous, roots
3.5' – 7.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, pale yellowish green, moist, moderately hard, fine to coarse sand, moderately graded, few cobbles.
	Total Depth 7.0'; no groundwater, no caving.

NT – 32

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 5.0'	**Alluvium (Qal):** gravel, cobble, and boulder in silty sand matrix, brown, slightly moist, moderately dense, fine to coarse grained, porous, difficult to excavate at 3', dense, sharp lower contact.
5.0' – 7.0'	**Unnamed Fanglomerate Deposits (Tfg):** coarse sandstone with gravel, clayey matrix, mottled greenish brown and orangish brown, moist, soft to moderately hard.
	Total Depth 7.0'; no groundwater, no caving.

NT – 33

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** coarse-grained sand with gravel and cobbles, brown, moist, loose, interbedded with dark brown clayey sand.
	BULK SAMPLE at 2'.
4.0' – 4.5'	Cobble and boulders, pale yellowish green, very moist, dense. Groundwater at 4.0', Refusal due to caving. Total Depth 4.5'; groundwater at 4', caving to 4'.

NT – 34

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** gravel, cobble, and boulders in silty sand matrix, brown, slightly moist to moist, dense, porous, roots, difficult to excavate, sharp lower contact.
4.0' – 8.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone with cobbles, mottled orangish brown, greenish brown, and gray, moist, soft to moderately hard, weathered to 7'.
	Total Depth 8.0'; no groundwater, no caving.

NT – 35

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 2.5'	**Colluvium (Qcol):** gravelly to cobbly sand with clay, brown, slightly moist, moderately dense, fine to coarse grained, porous, rooted, sharp lower contact.
2.5' – 4.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone with cobbles, pale brown, greenish brown, and orangish brown, slightly moist, moderately hard, massive.
	BULK SAMPLE at 3 feet.
	Total Depth 4.0'; no groundwater, no caving

NT – 36

Date Excavated: 3-20-2001
Logged by: JSC

Depth	Description
0.0' – 2.0'	**Alluvium (Qal):** silty sand with gravel, cobble, and boulder, brown, slightly moist, moderately dense, porous, rooted, sharp lower contact.
0.0' – 4.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey sand matrix, mottled medium brown and orangish brown, slightly moist, moderately hard, some boulder.
	Total Depth 4.0'; no groundwater, no caving

NT – 37

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 2.0'	**Colluvium (Qcol):** silty sand with gravel, cobble, and boulder, brown, slightly moist, moderately dense, porous, rooted, sharp lower contact.
2.0' – 3.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone with clay, mottled brown, orange and greenish brown, slightly moist, moderately hard, difficult to excavate.
	Total Depth 3.5'; no groundwater, no caving.

NT – 38

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' - 4.0'	**Alluvium (Qal):** silty sand with gravel and cobble, medium to dark brown, slightly moist, loose to moderately dense, rooted.
2.0' - 4.0'	Silty sand with gravel, dark brown, moist, moderately dense.
4.0' 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate with clayey sand matrix, mottled greenish gray, orangish brown, and brown, moist, moderately hard to soft.

Total Depth 5.0'; no groundwater, no caving.

NT - 39

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 2.5'	**Alluvium (Qal):** silty to clayey sand with gravel, cobble, and boulder, brown, slightly moist, loose to moderately dense, sharp lower contact.
2.5' – 4.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravelly sandstone, clayey (bentonitic), coarse-grained sand matrix, mottled pale brown and brown, greenish brown, moist, moderately hard, increase in cobble with depth.

Total Depth 4.5'; no groundwater, no caving.

NT – 40

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 2.5'	**Colluvium (Qcol):** clayey sand and gravel with cobble, brown to reddish brown, slightly moist, moderately dense to dense, porous, rooted, sharp lower contact.
2.5' - 4.0'	**Unnamed Fanglomerate Deposits (Tfg):** clayey sandstone, mottled greenish brown and brown, moist, moderately hard, fine to coarse grained.

Total Depth 4.0'; no groundwater, no caving.

NT – 41

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** clayey sand and gravel with cobble, brown to reddish brown, slightly moist, moderately dense to dense, porous, rooted, sharp lower contact.
4.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, mottled greenish brown and brown, moist, moderately hard, massive.

Total Depth 5.0'; no groundwater, no caving.

NT – 42

Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** gravel, cobble, and boulder in silty sand matrix, brown, slightly moist, moderately dense, rooted, difficult to excavate, sharp lower contact.
4.0' – 5.0'	**Unnamed Fanglomerate Deposits (Tfg):** coarse-grained sandstone, clayey , pale greenish brown, moist, moderately hard, massive, cobbly at 5'.

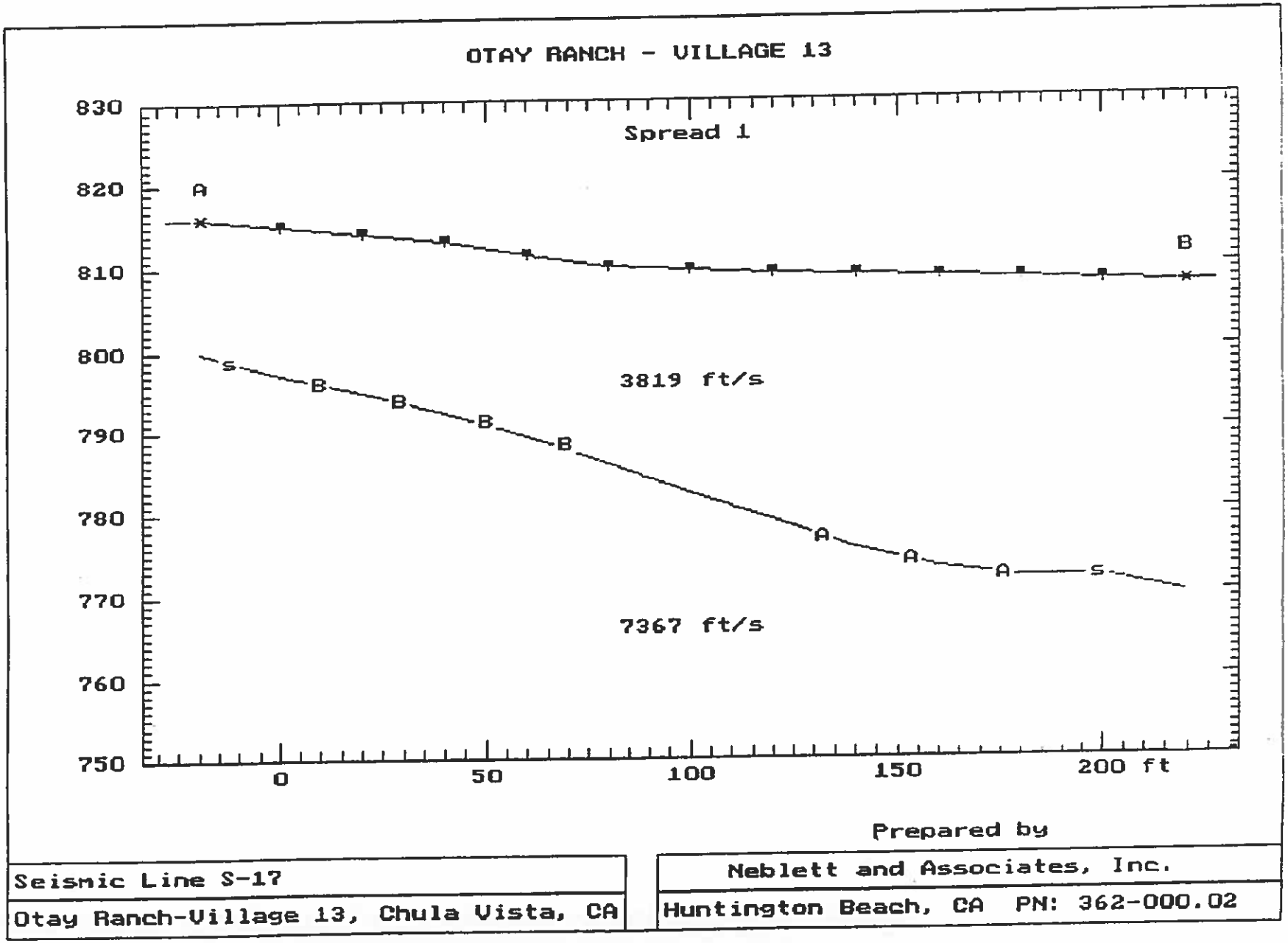
Total Depth 5.0'; no groundwater, no caving.

NT – 43

Date Excavated: 3-20-2001
Logged by: JSC

Depth	Description
0.0' – 3.0'	**Colluvium (Qcol):** clayey sand, dark reddish brown, moist, dense, fine to coarse grained, porous, rooted, sharp lower contact.
0.0' – 4.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate, brown, slightly moist, moderately hard, difficult to excavate, deep reddish brown with depth.

Total Depth 4.5'; no groundwater, no caving


OTAY RANCH - VILLAGE 13
Spread 1
830
820
810
800
790
780
770
760
750
A
B
S
B
B
B
B
A
A
A
S
3819 ft/s
7367 ft/s
0
50
100
150
200 ft
Prepared by
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02
Seismic Line S-17
Otay Ranch-Village 13, Chula Vista, CA

NT – 44 **Date Excavated: 6-20-2001**
Logged by: JSC

Depth	Description
0.0' – 3.0'	**Alluvium (Qol):** clayey sand, dark reddish brown, moist, dense, fine to coarse grained, porous, rooted, sharp lower contact.
3.0' – 3.5'	**Unnamed Fanglomerate Deposits (Tfg):** gravel and cobble conglomerate, brown, slightly moist, moderately hard, difficult to excavate.
	Total Depth 3.5'; no groundwater, no caving.

NT – 45 **Date Excavated: 6-20-2001**
Logged by: JSC

Depth	Description
0.0' – 4.0'	**Alluvium (Qal):** cobble and boulder in silty sand matrix, brown, slightly moist, fine to coarse grained, porous, rooted.
4.0	REFUSAL at 4' at contact with Bedrock – Santiago Peak Volcanics (KJsp) Total Depth 4.0'; no groundwater, no caving.

NT – 46 **Date Excavated: 6-20-2001**

Depth	Description
0.0' – 4.0'	**Colluvium (Qcol):** clayey sand with gravel and cobble, slightly moist, moderately dense, porous, cobble and boulder near lower contact.
4.0' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, greenish brown, moist, moderately hard, some gravel.
	REFUSAL on large boulder at 5.5 feet.
	Total Depth 5.5'; no groundwater, no caving .

NT – 47

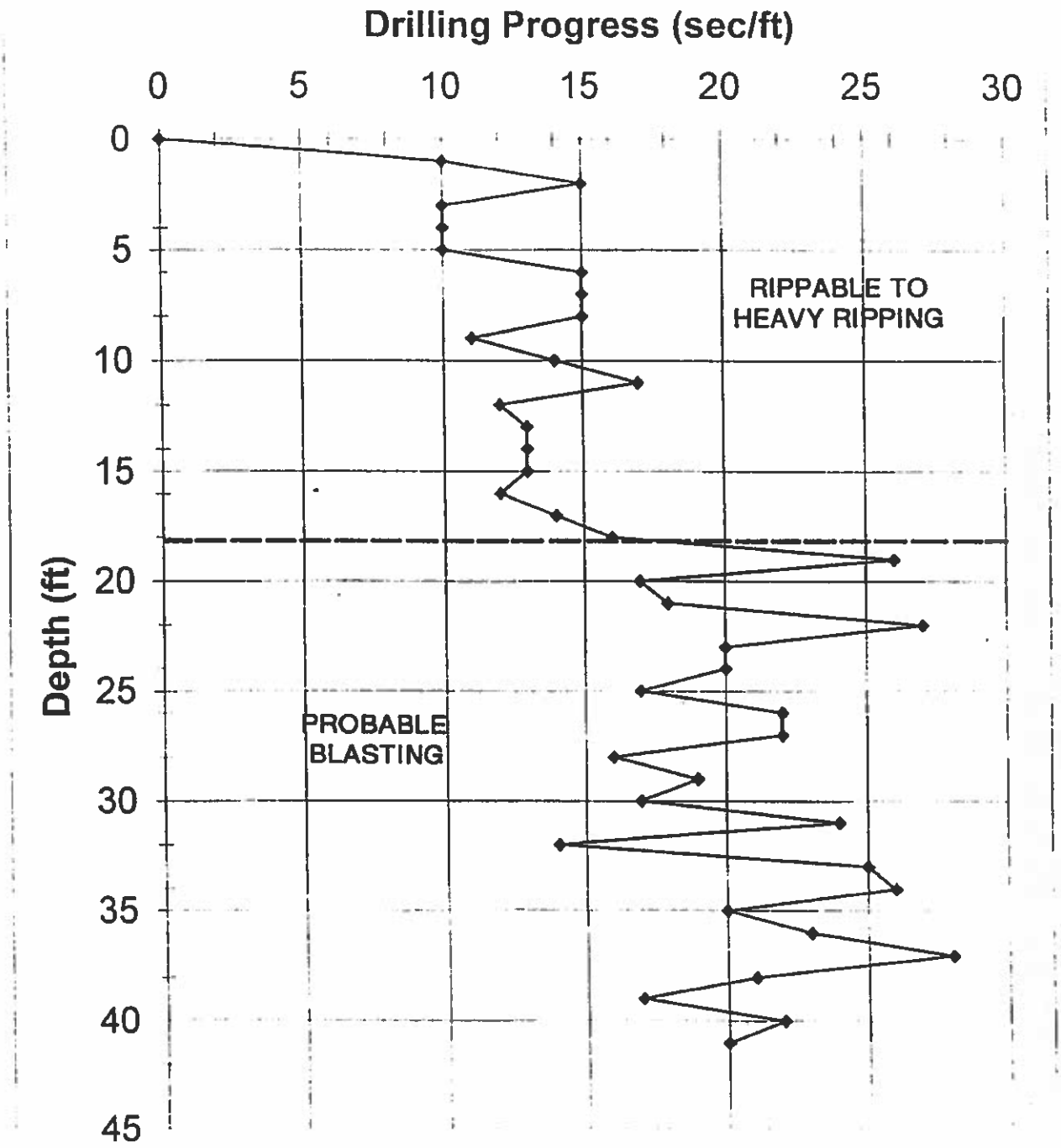
Date Excavated: 6-20-2001
Logged by: JSC

Depth	Description
0.0' – 3.0'	**Colluvium (Qcol):** gravelly to sandy clay, dark brown, moist, dense, some silty sand, moist, dense, sharp lower contact.
3.0' – 5.5'	**Unnamed Fanglomerate Deposits (Tfg):** sandy claystone, brown, slightly moist, moderately hard, greenish brown at 4.5'.
	Total Depth 5.5'; no groundwater, no caving.

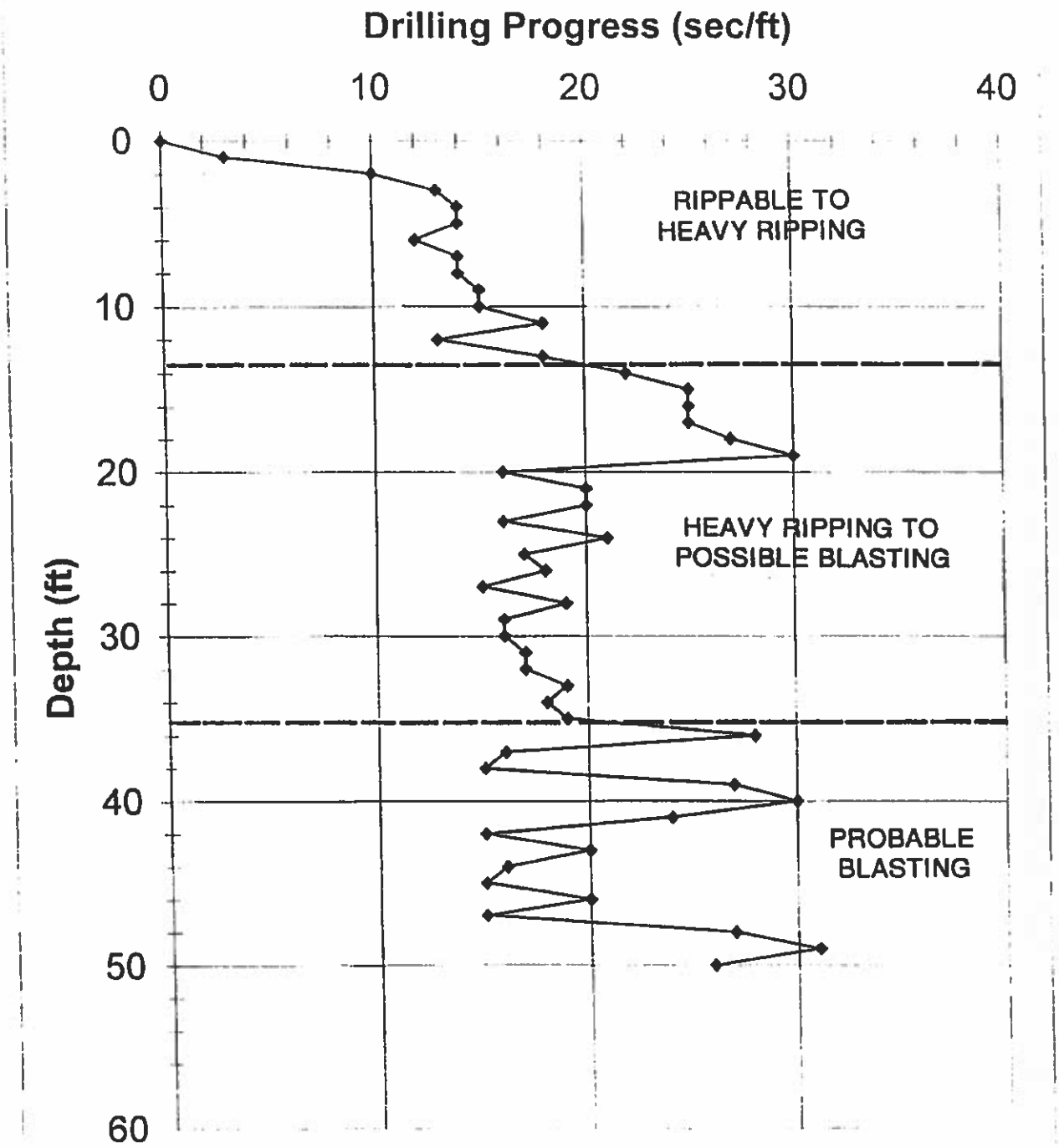
APPENDIX B

AIR HAMMER AND SEISMIC REFRACTION DATA

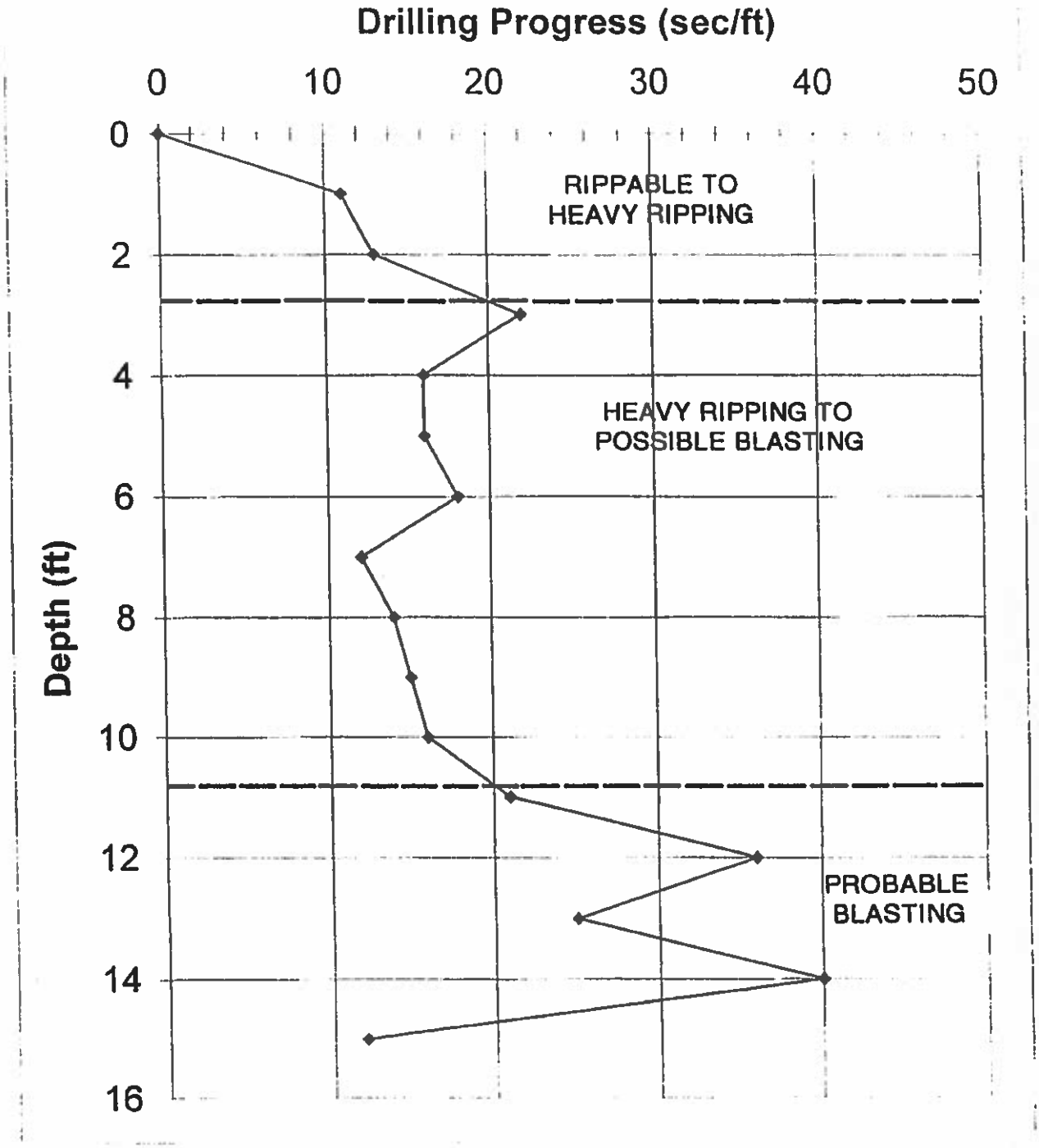
AH-1


Drilling Progress (sec/ft)
0
5
10
15
20
25
30
Depth (ft)
0
5
10
15
20
25
30
35
40
45
RIPPABLE TO
HEAVY RIPPING
PROBABLE
BLASTING

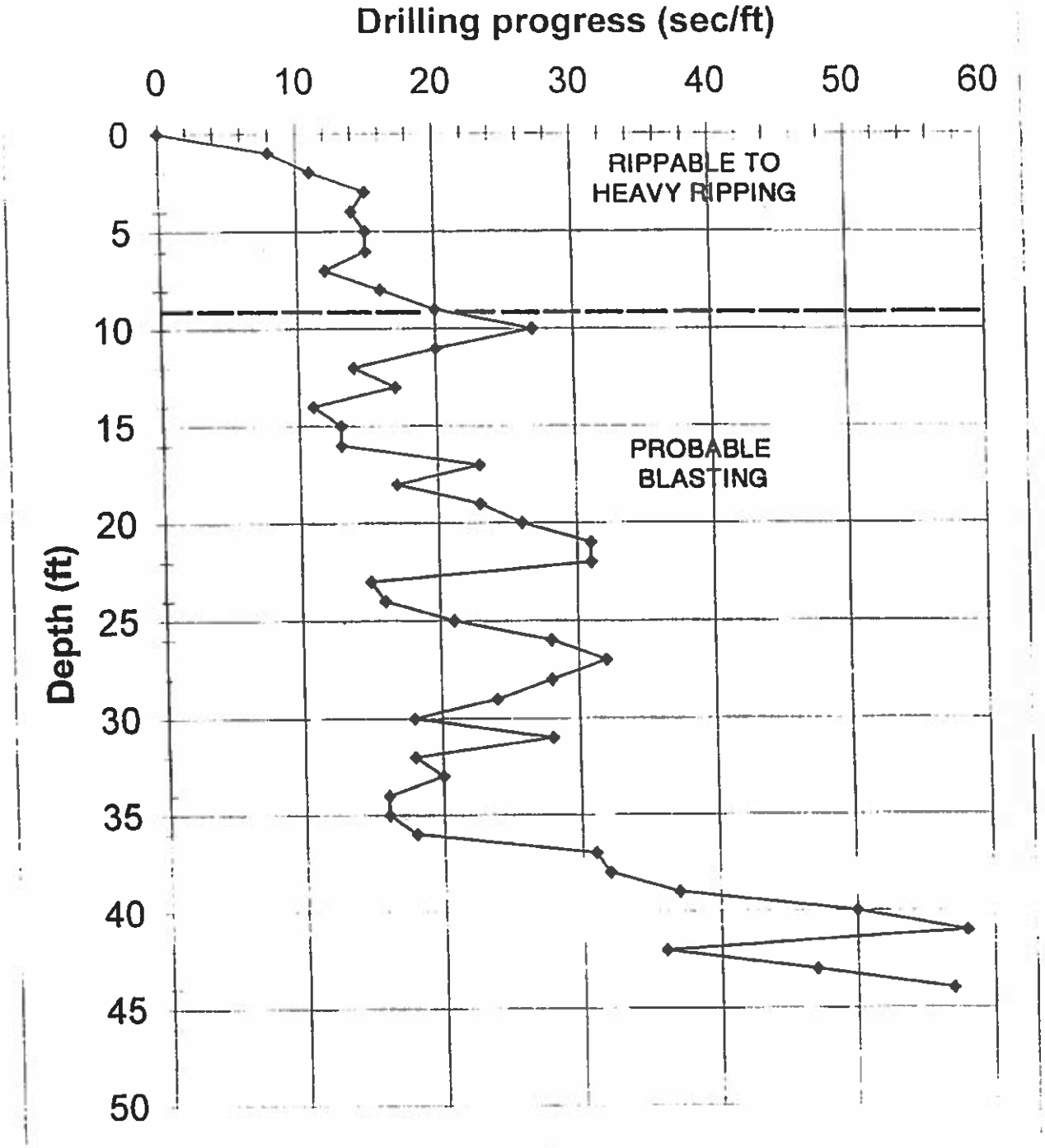
AH-2


Drilling Progress (sec/ft)
0
10
20
30
40
Depth (ft)
0
10
20
30
40
50
60
RIPPABLE TO
HEAVY RIPPING
HEAVY RIPPING TO
POSSIBLE BLASTING
PROBABLE
BLASTING

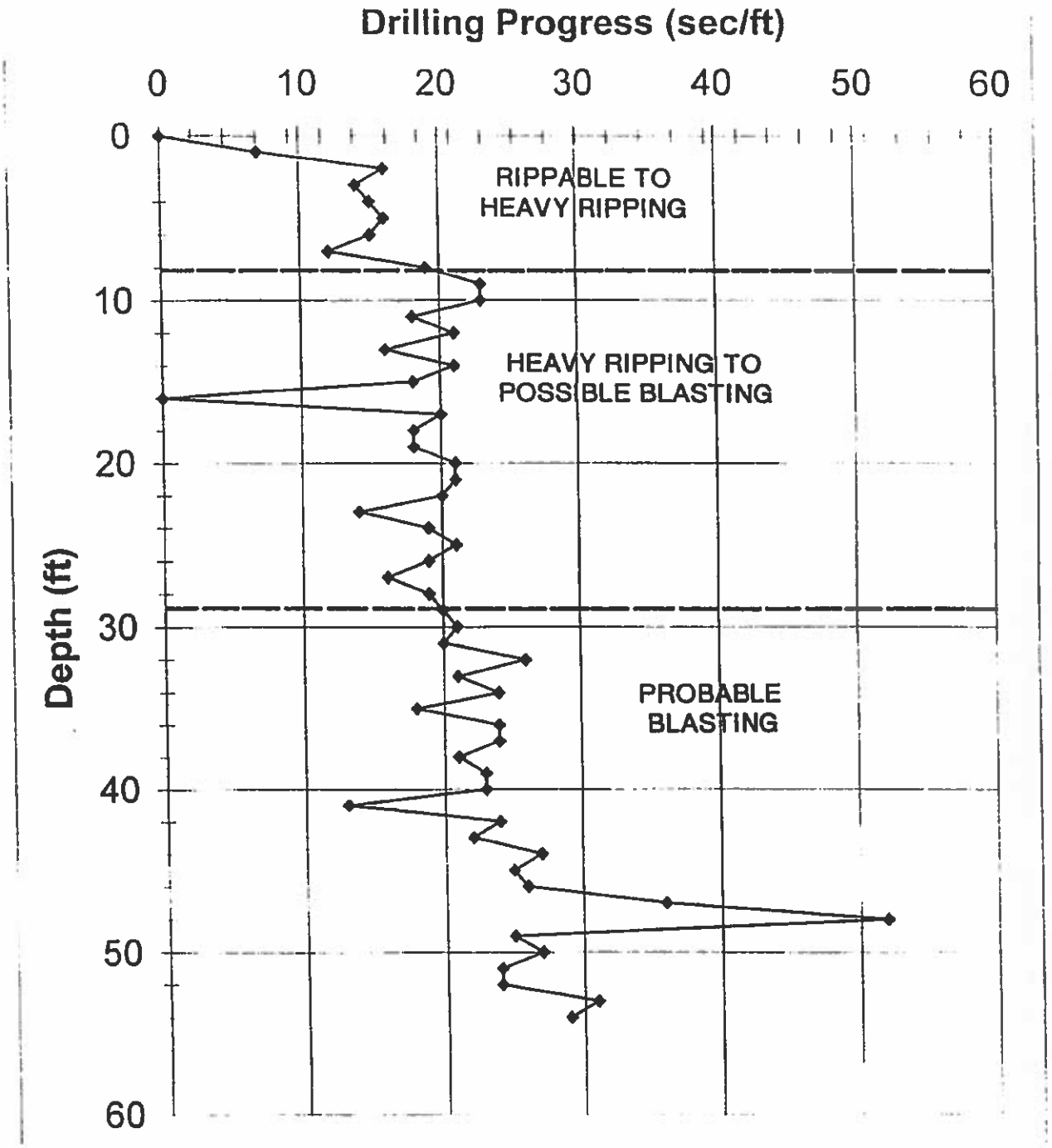
AH-3


Drilling Progress (sec/ft)
0
10
20
30
40
50
Depth (ft)
0
2
4
6
8
10
12
14
16
RIPPABLE TO
HEAVY RIPPING
HEAVY RIPPING TO
POSSIBLE BLASTING
PROBABLE
BLASTING

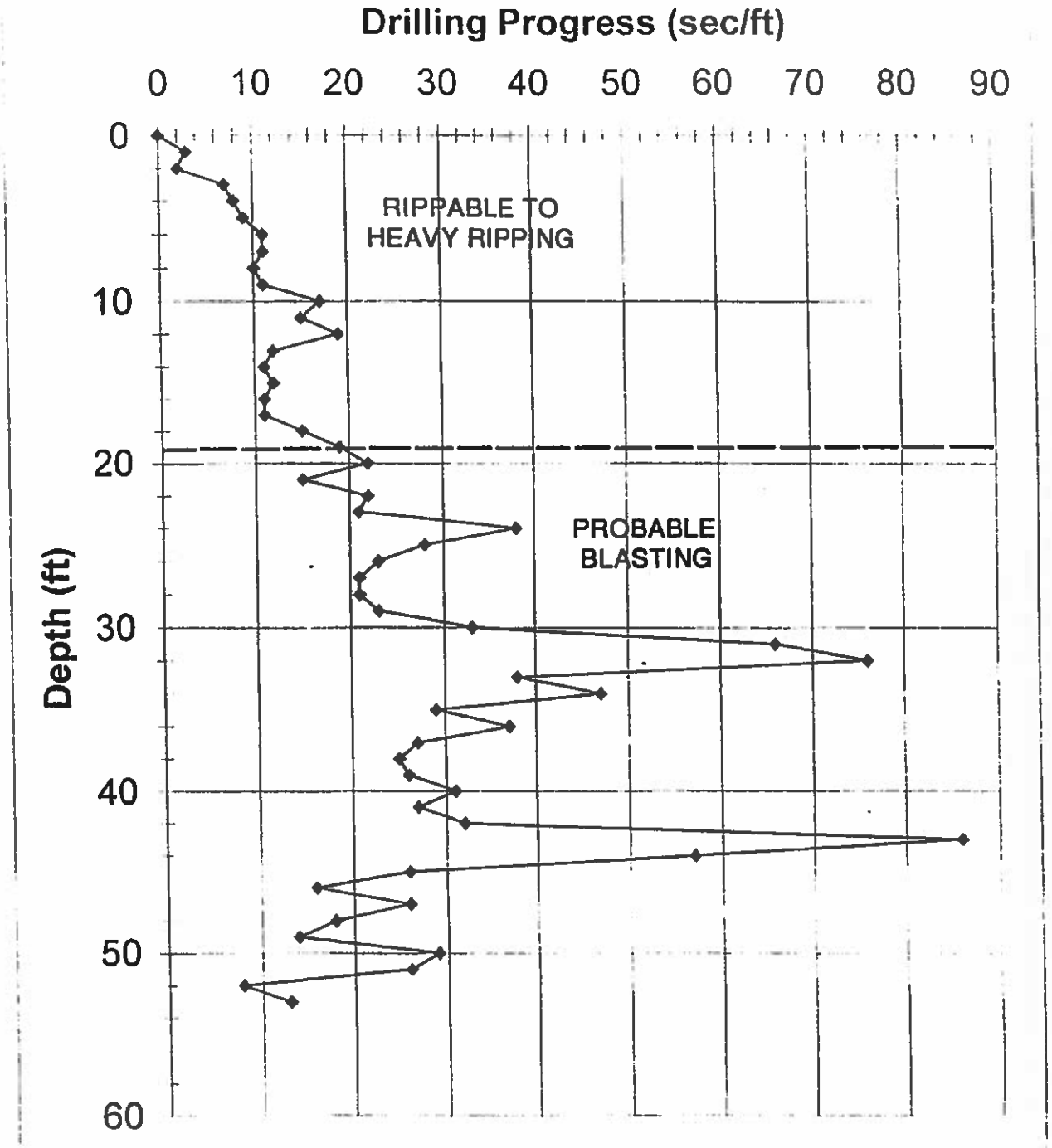
AH-4


Drilling progress (sec/ft)
0
10
20
30
40
50
60
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
RIPPABLE TO
HEAVY RIPPING
PROBABLE
BLASTING

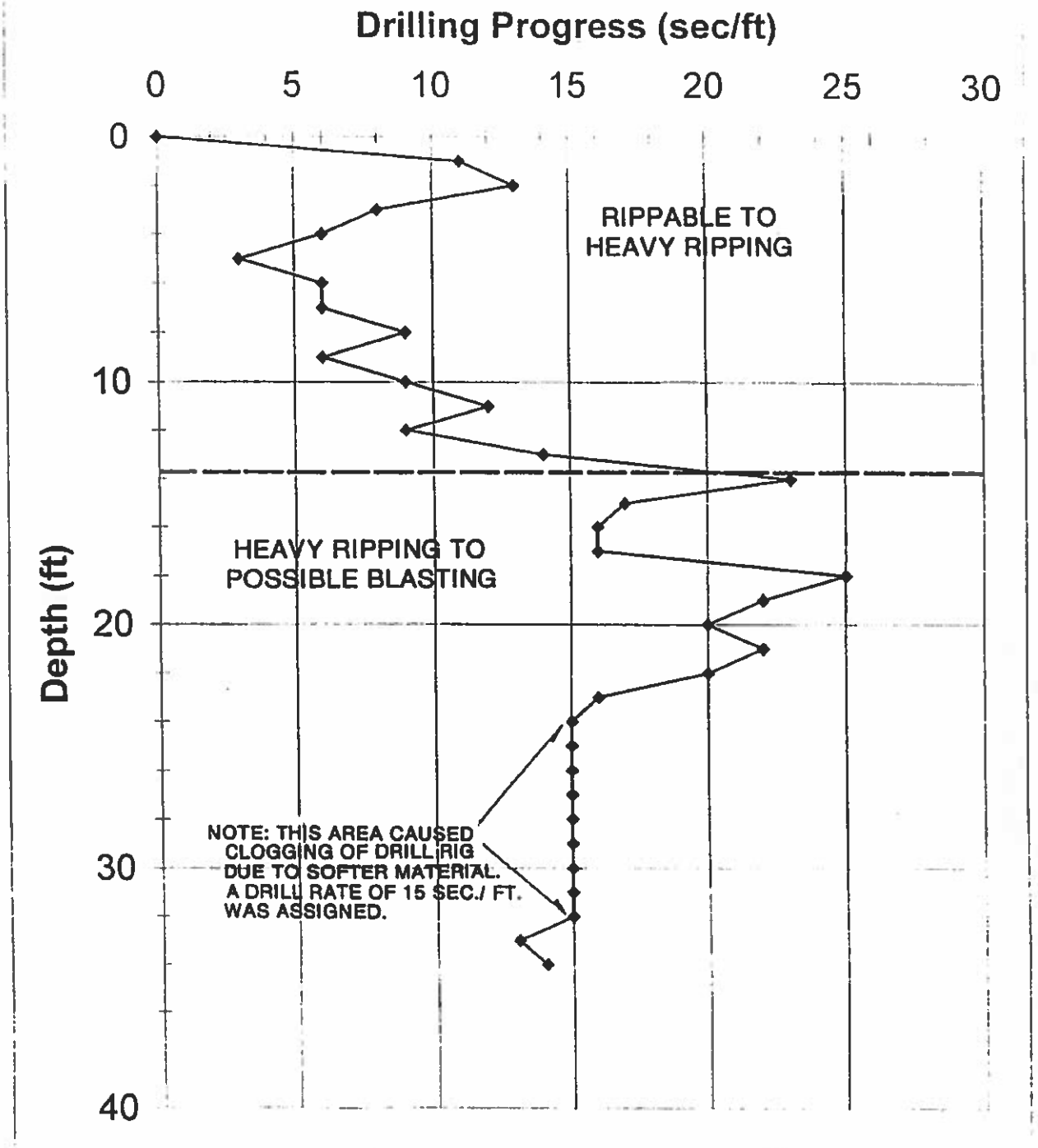
AH-5


Drilling Progress (sec/ft)
0
10
20
30
40
50
60
Depth (ft)
0
10
20
30
40
50
60
RIPPABLE TO
HEAVY RIPPING
HEAVY RIPPING TO
POSSIBLE BLASTING
PROBABLE
BLASTING

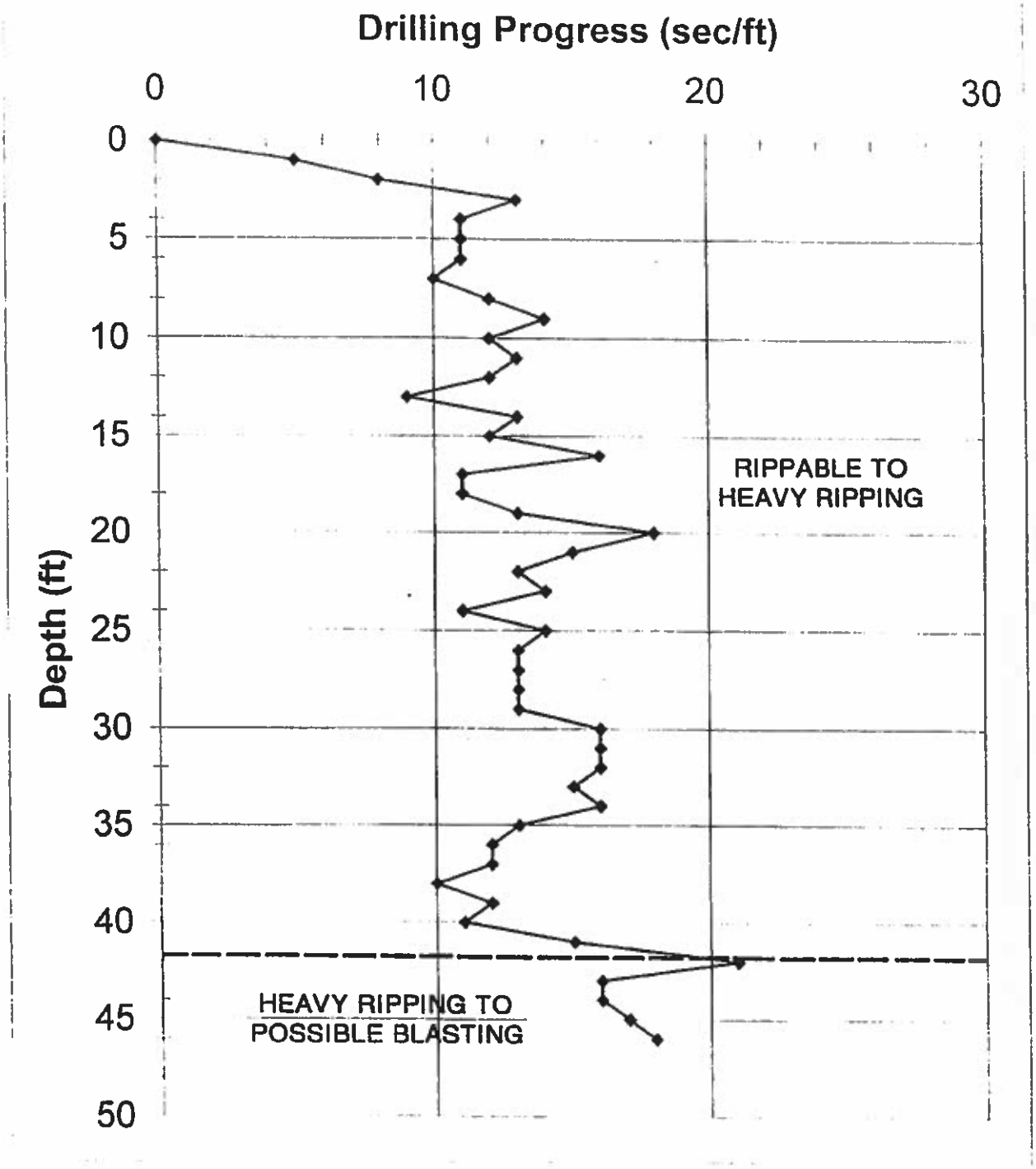
AH-6


Drilling Progress (sec/ft)
0
10
20
30
40
50
60
70
80
90
Depth (ft)
0
10
20
30
40
50
60
RIPPABLE TO
HEAVY RIPPING
PROBABLE
BLASTING

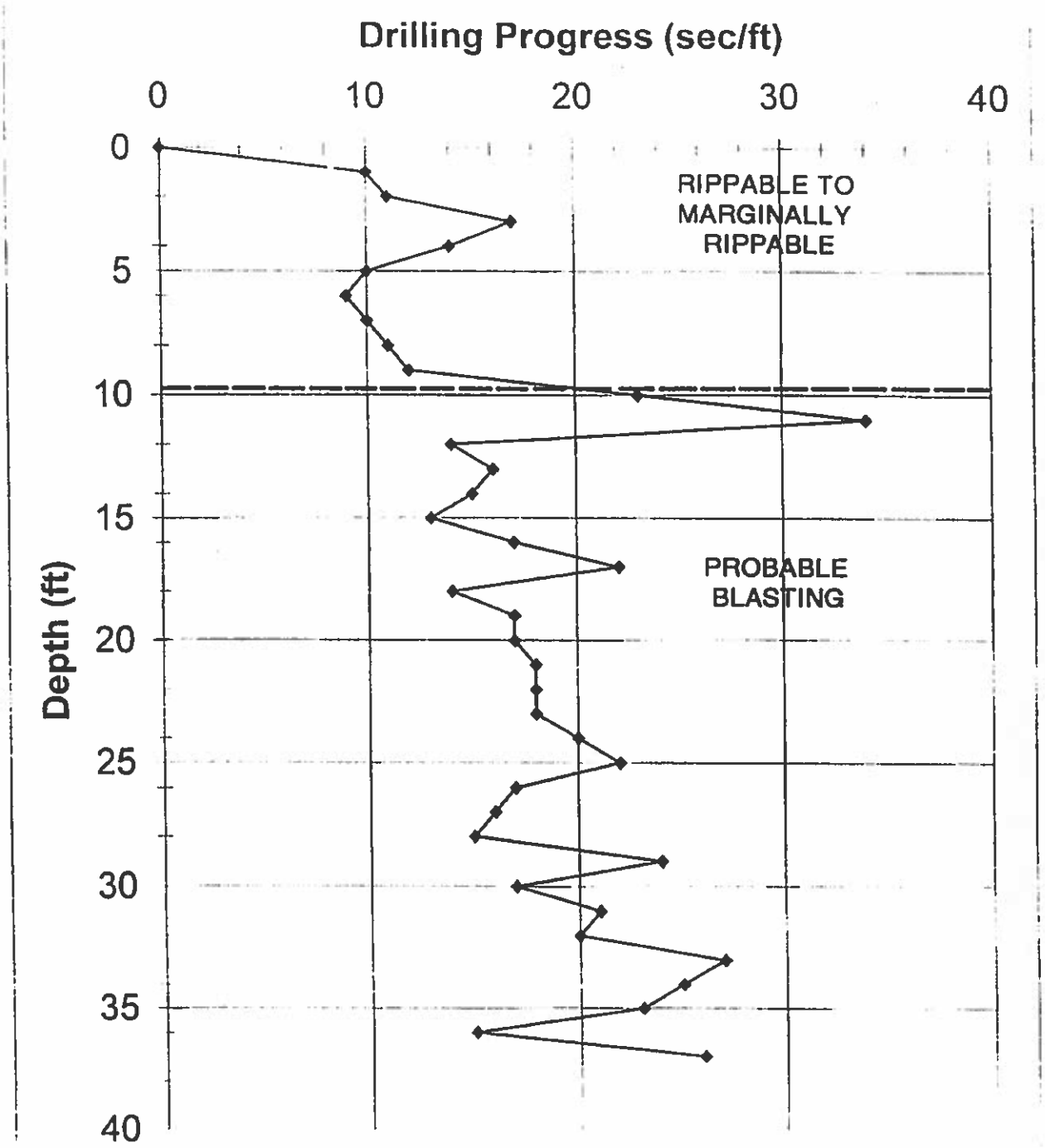
AH-7


Drilling Progress (sec/ft)
0
5
10
15
20
25
30
Depth (ft)
0
10
20
30
40
RIPPABLE TO
HEAVY RIPPING
HEAVY RIPPING TO
POSSIBLE BLASTING
NOTE: THIS AREA CAUSED
CLOGGING OF DRILL RIG
DUE TO SOFTER MATERIAL.
A DRILL RATE OF 15 SEC./ FT.
WAS ASSIGNED.

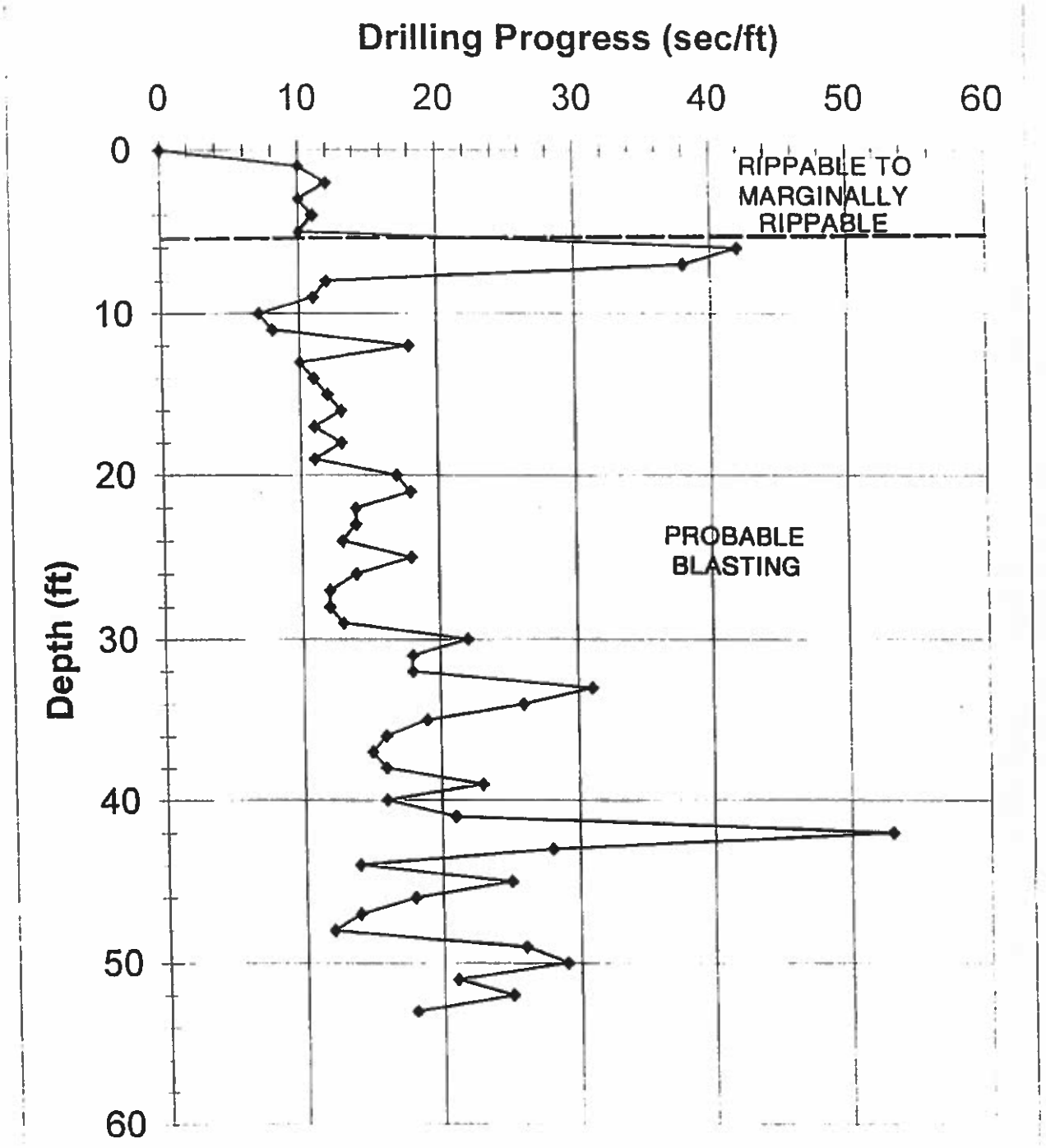
AH-8

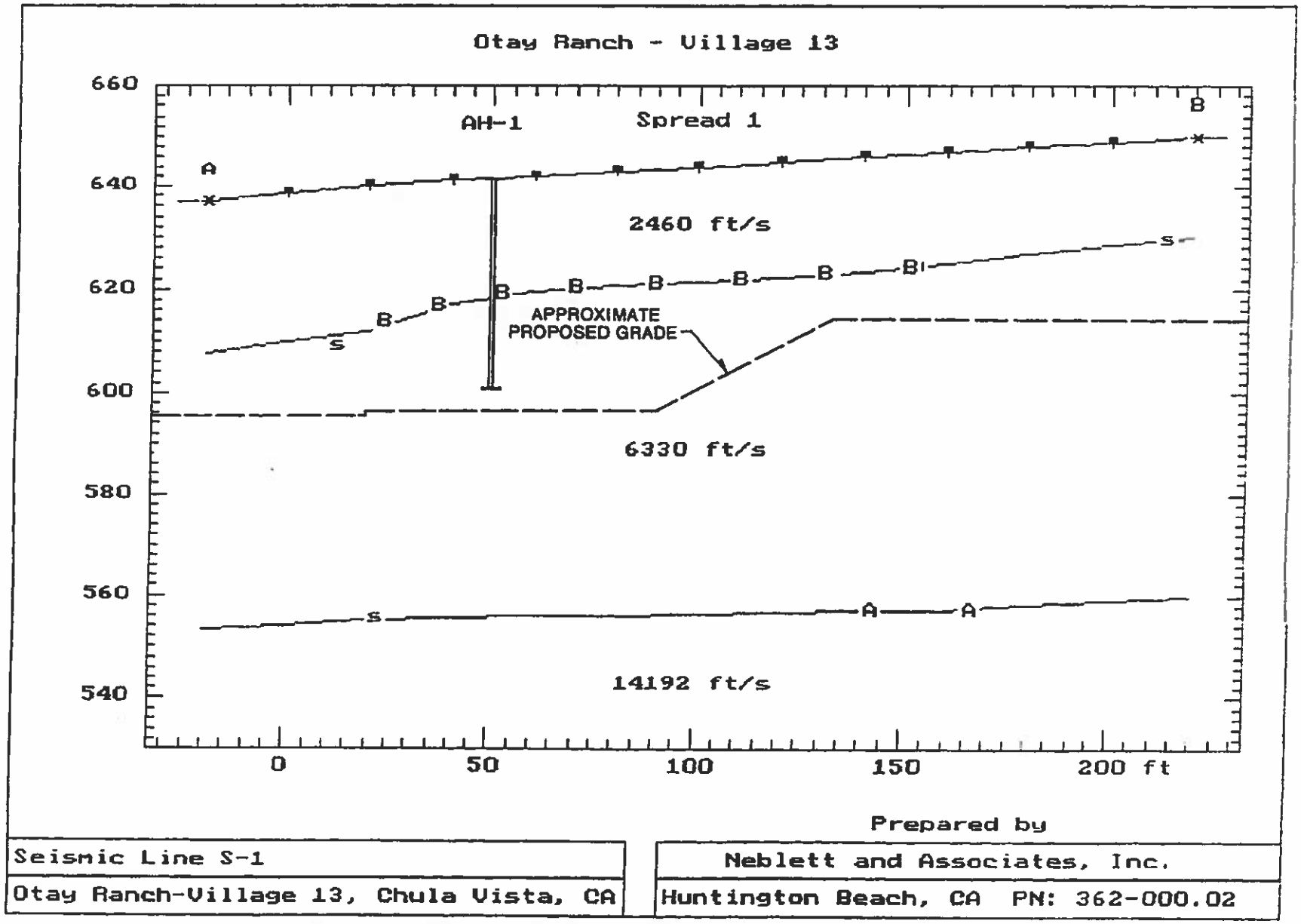

Drilling Progress (sec/ft)
0
10
20
30
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
RIPPABLE TO
HEAVY RIPPING
HEAVY RIPPING TO
POSSIBLE BLASTING

AH-9


Drilling Progress (sec/ft)
0
10
20
30
40
Depth (ft)
0
5
10
15
20
25
30
35
40
RIPPABLE TO MARGINALLY RIPPABLE
PROBABLE BLASTING

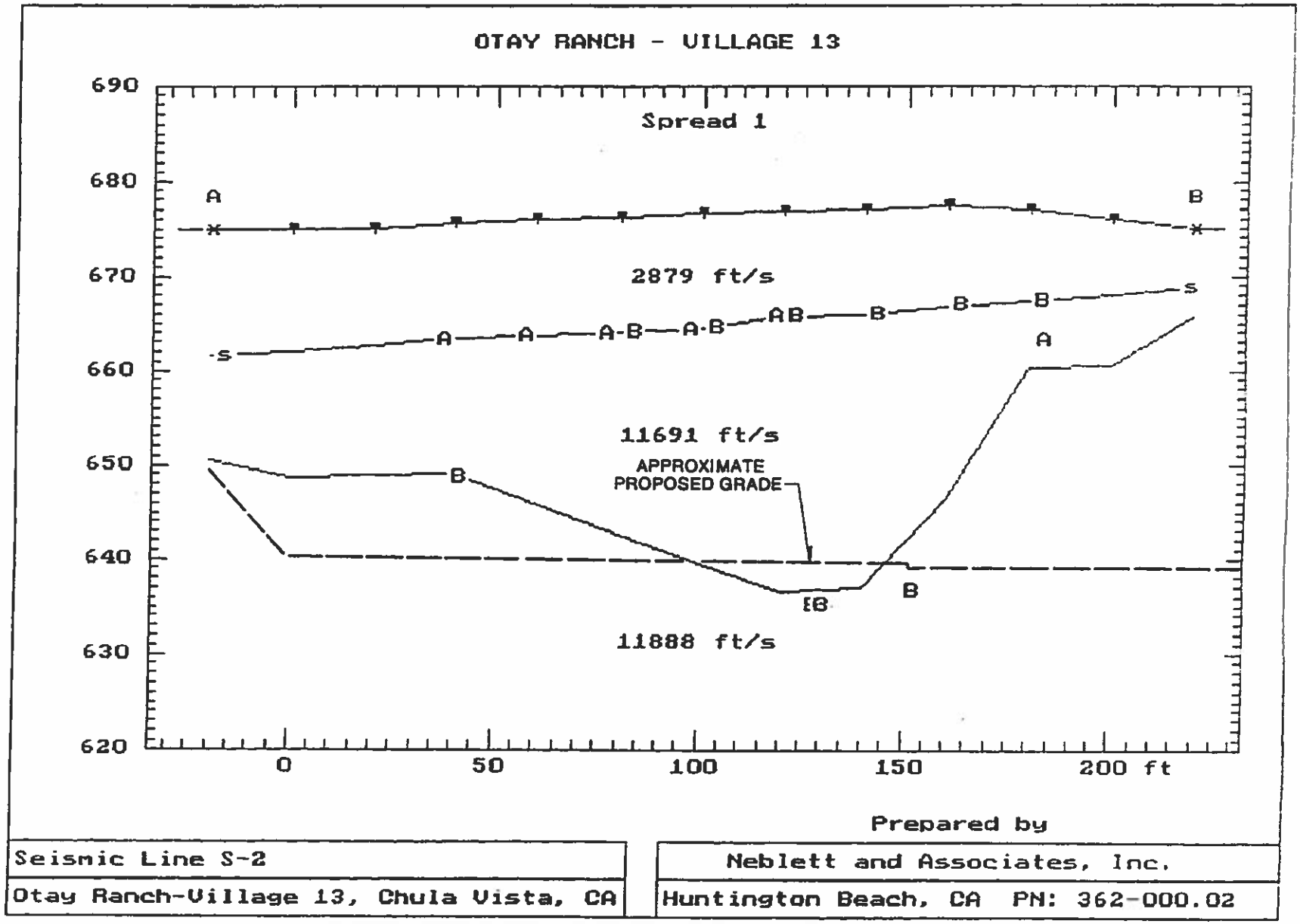
AH-10


Drilling Progress (sec/ft)
0
10
20
30
40
50
60
Depth (ft)
0
10
20
30
40
50
60
RIPPABLE TO MARGINALLY RIPPABLE
PROBABLE BLASTING



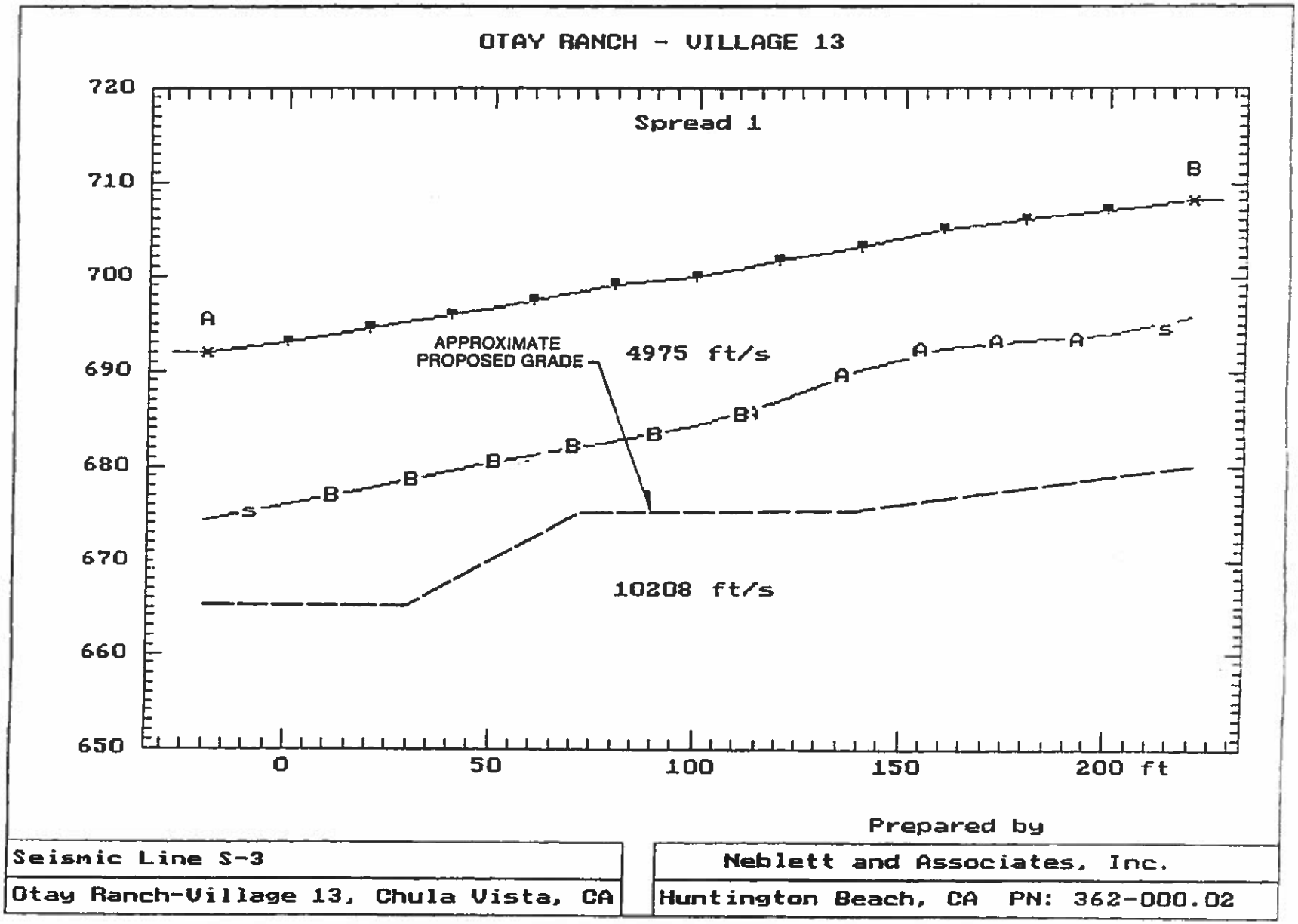
Prepared by

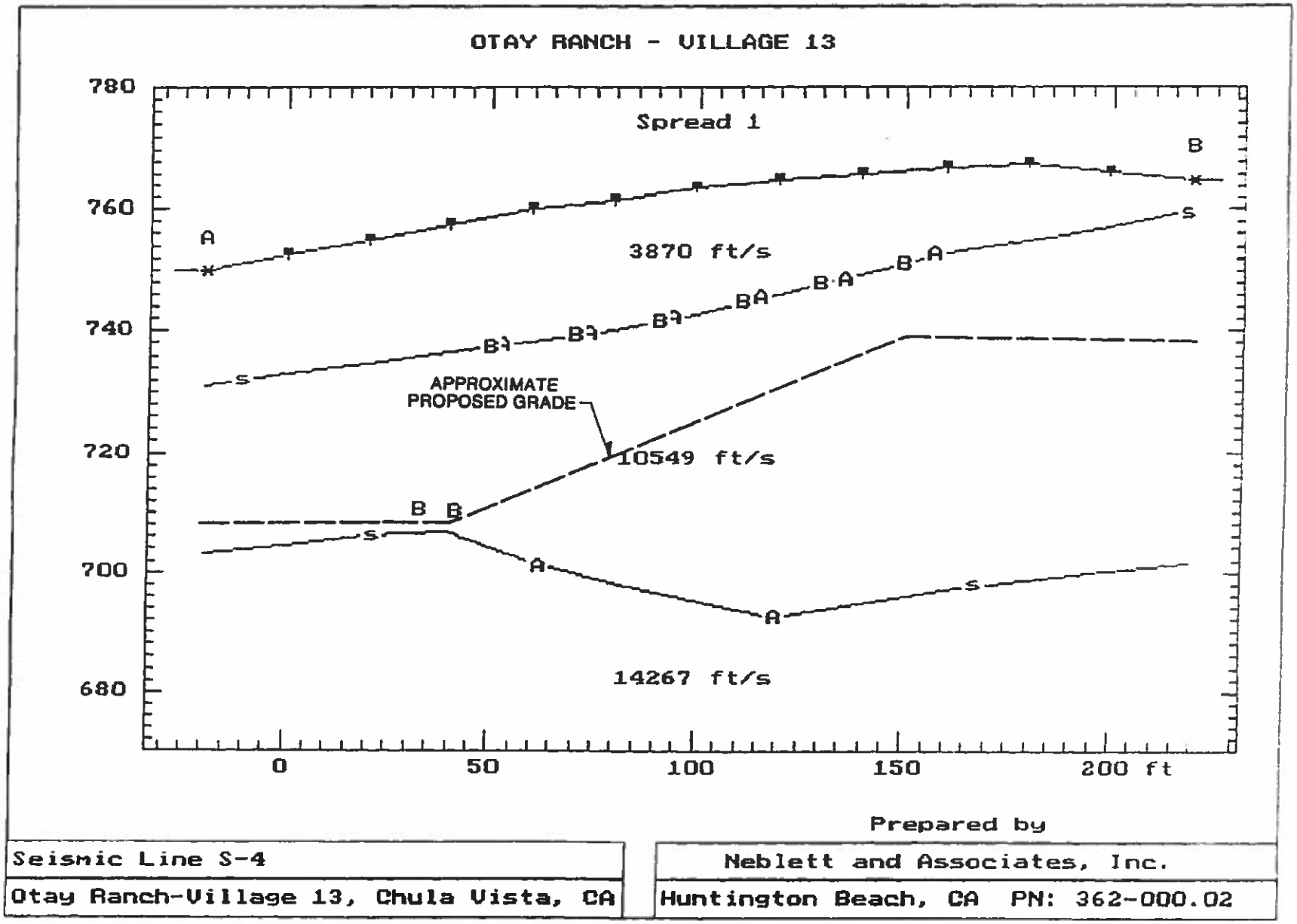
Seismic Line S-1	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02

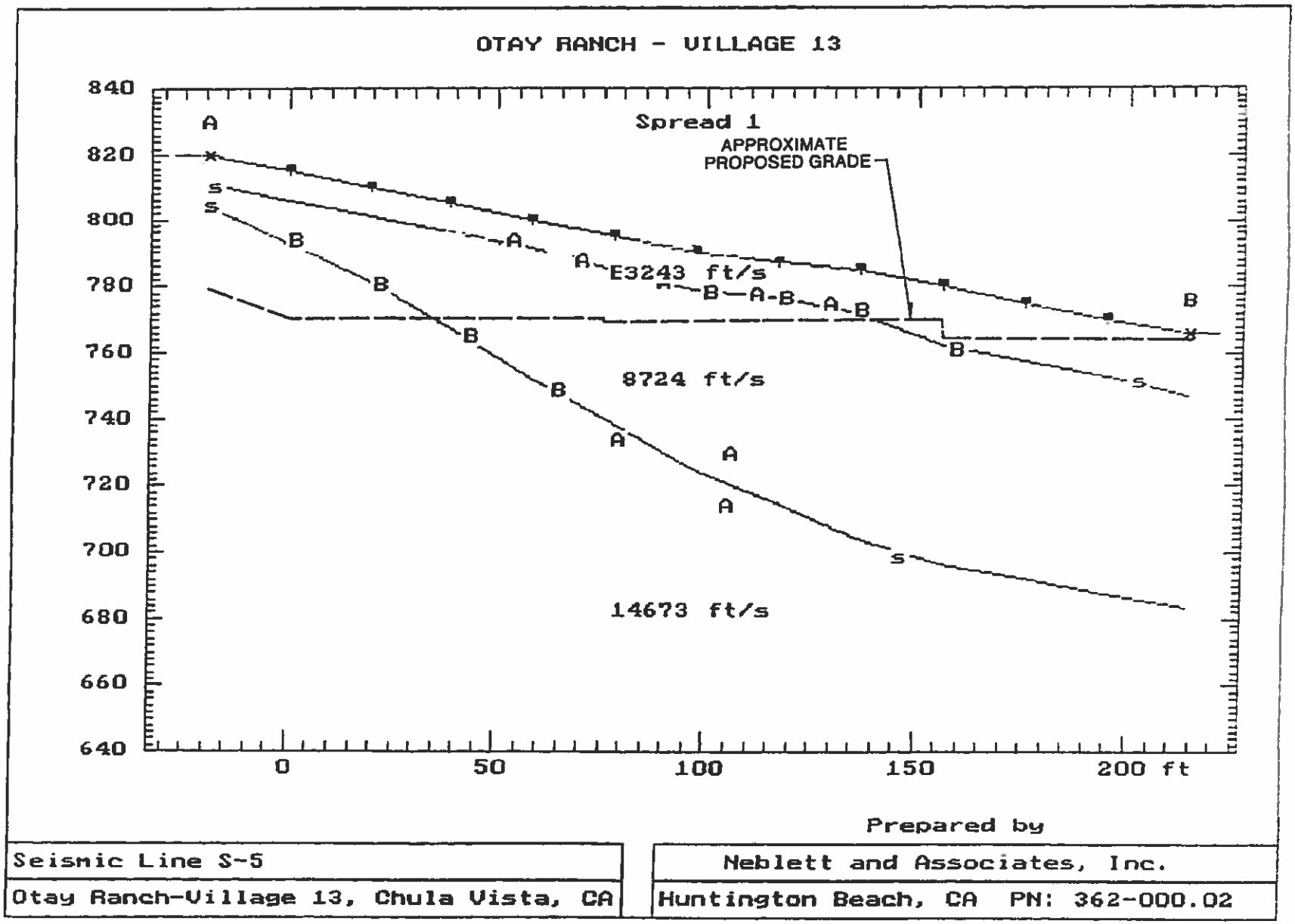


Prepared by

Seismic Line S-2	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02

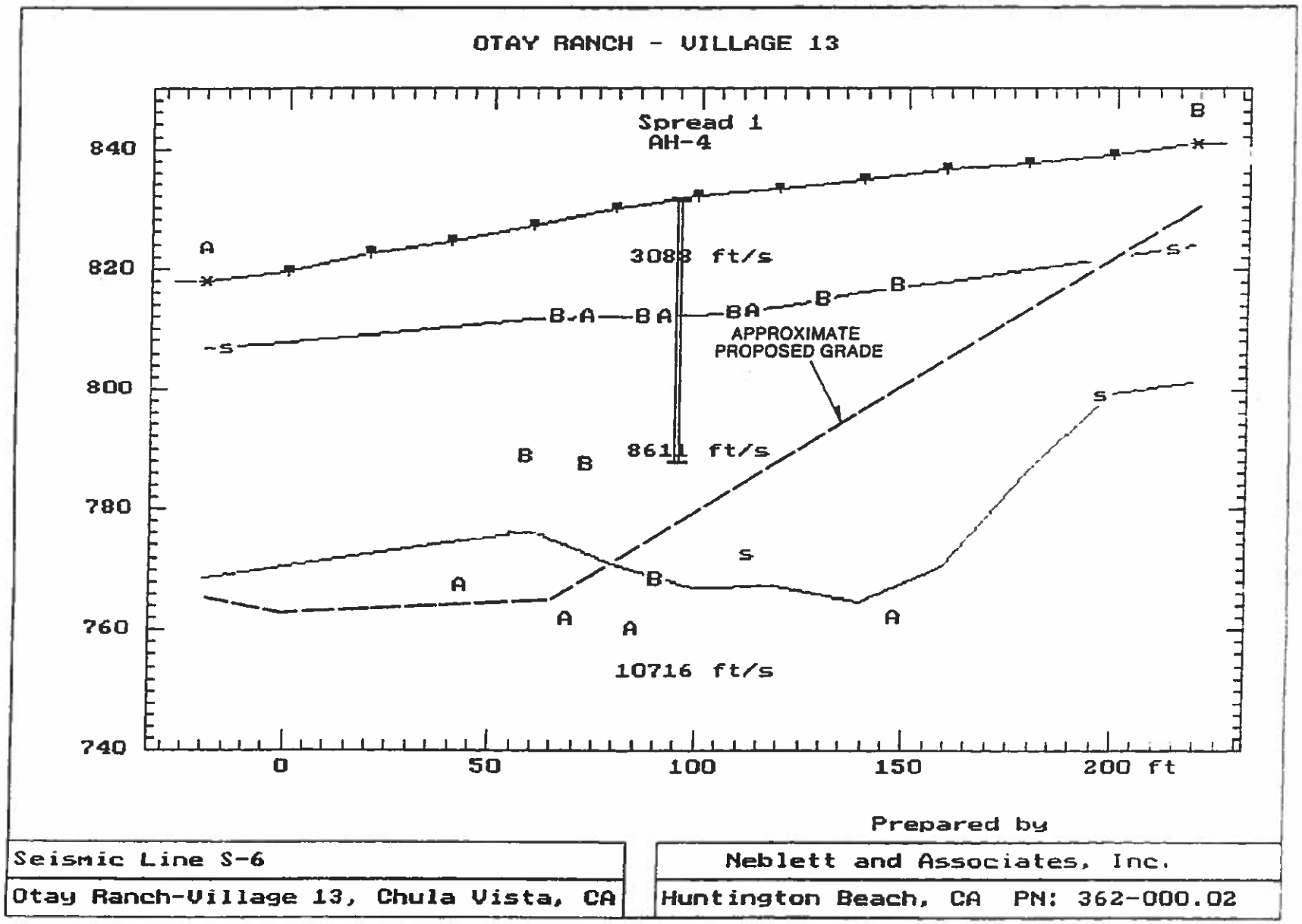

OTAY RANCH - VILLAGE 13
Spread 1
720
710
700
690
680
670
660
650
0
50
100
150
200 ft
A
B
APPROXIMATE
PROPOSED GRADE
4975 ft/s
10208 ft/s
Prepared by
Seismic Line S-3
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02

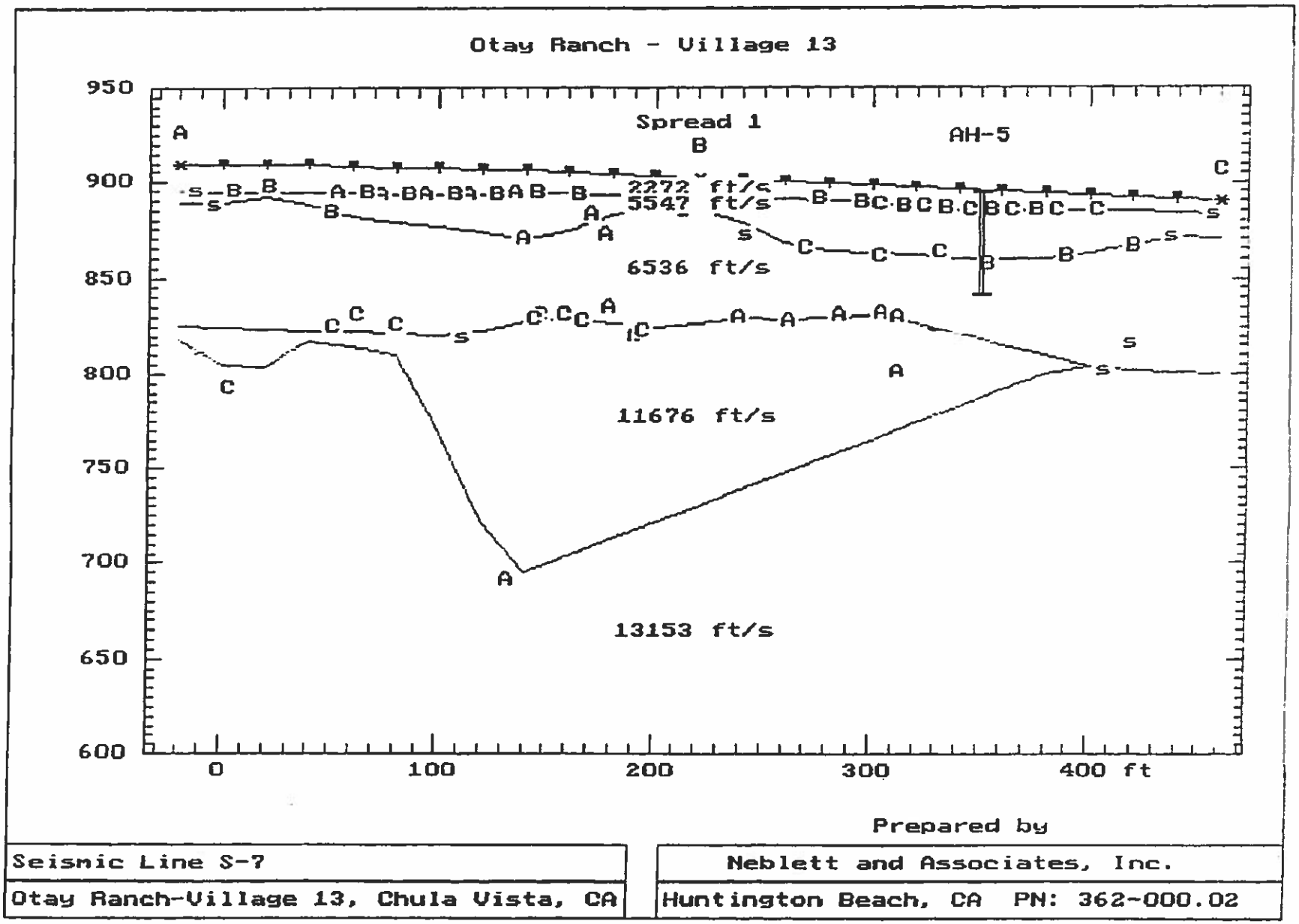

OTAY RANCH - VILLAGE 13
Spread 1
780
760
740
720
700
680
3870 ft/s
10549 ft/s
14267 ft/s
APPROXIMATE
PROPOSED GRADE
0
50
100
150
200 ft
Prepared by
Seismic Line S-4
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02



Prepared by

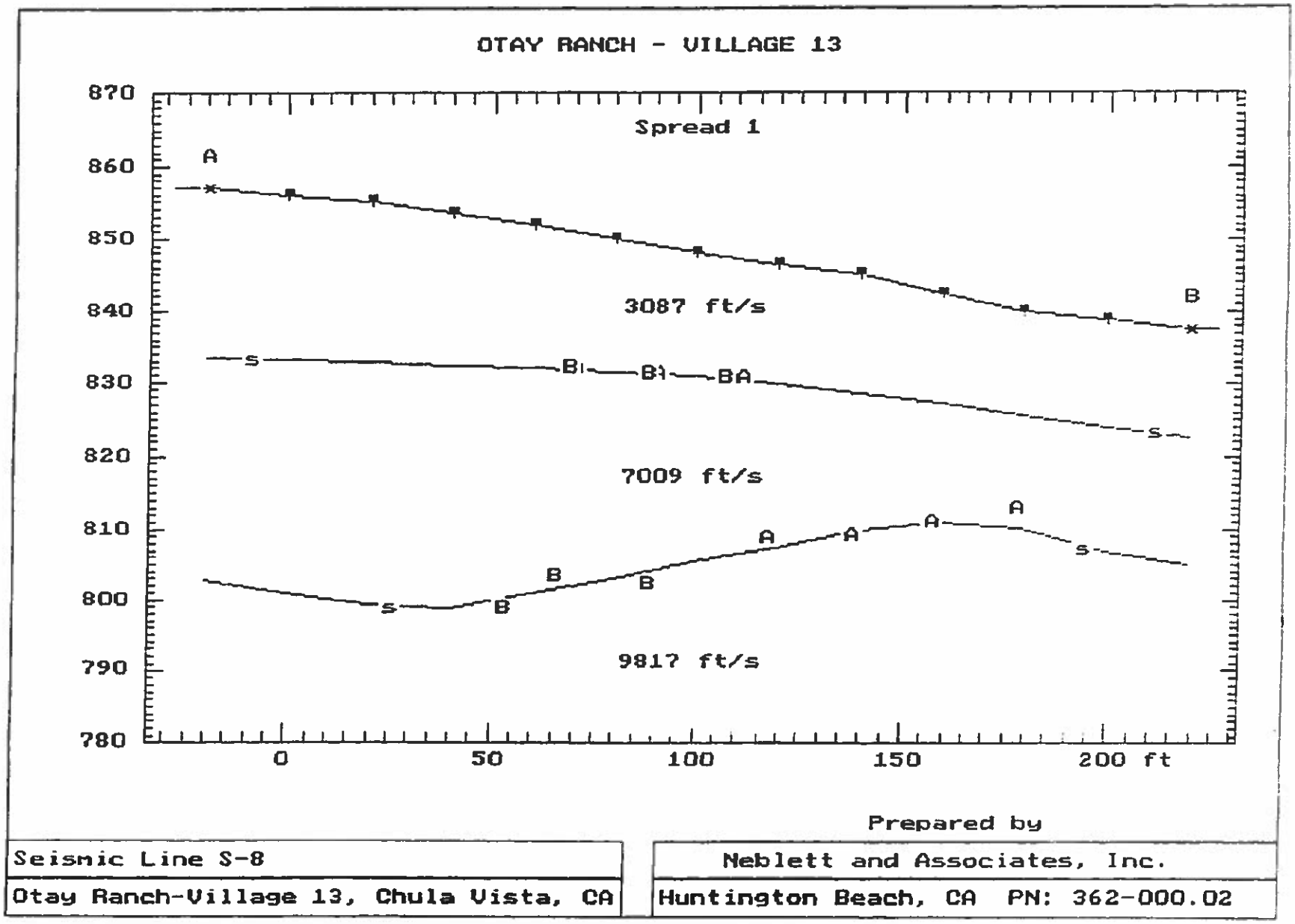
Seismic Line S-5	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02

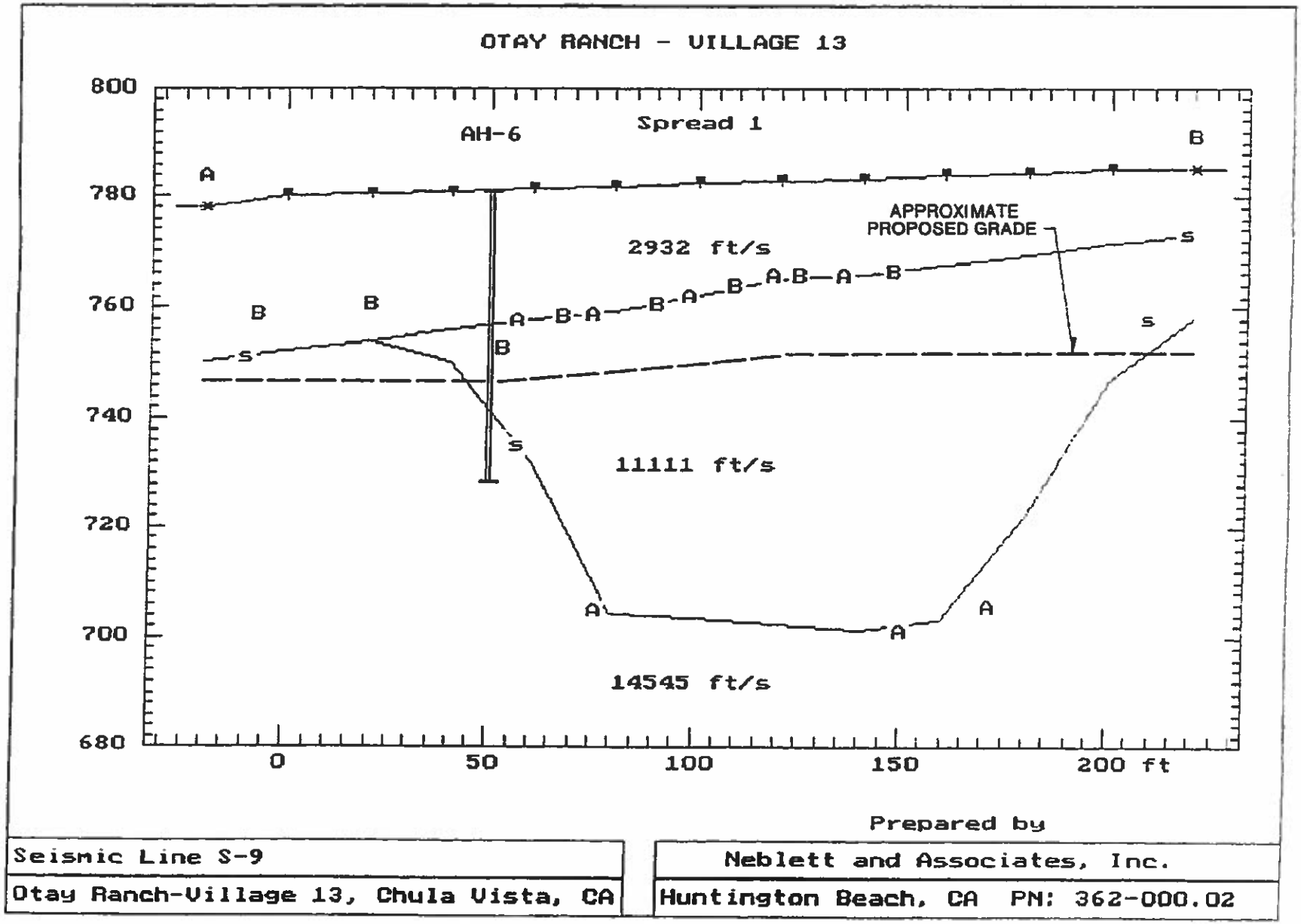

OTAY RANCH - VILLAGE 13
Spread 1
AH-4
840
820
800
780
760
740
0
50
100
150
200 ft
3088 ft/s
8611 ft/s
10716 ft/s
APPROXIMATE
PROPOSED GRADE
Prepared by
Seismic Line S-6
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02

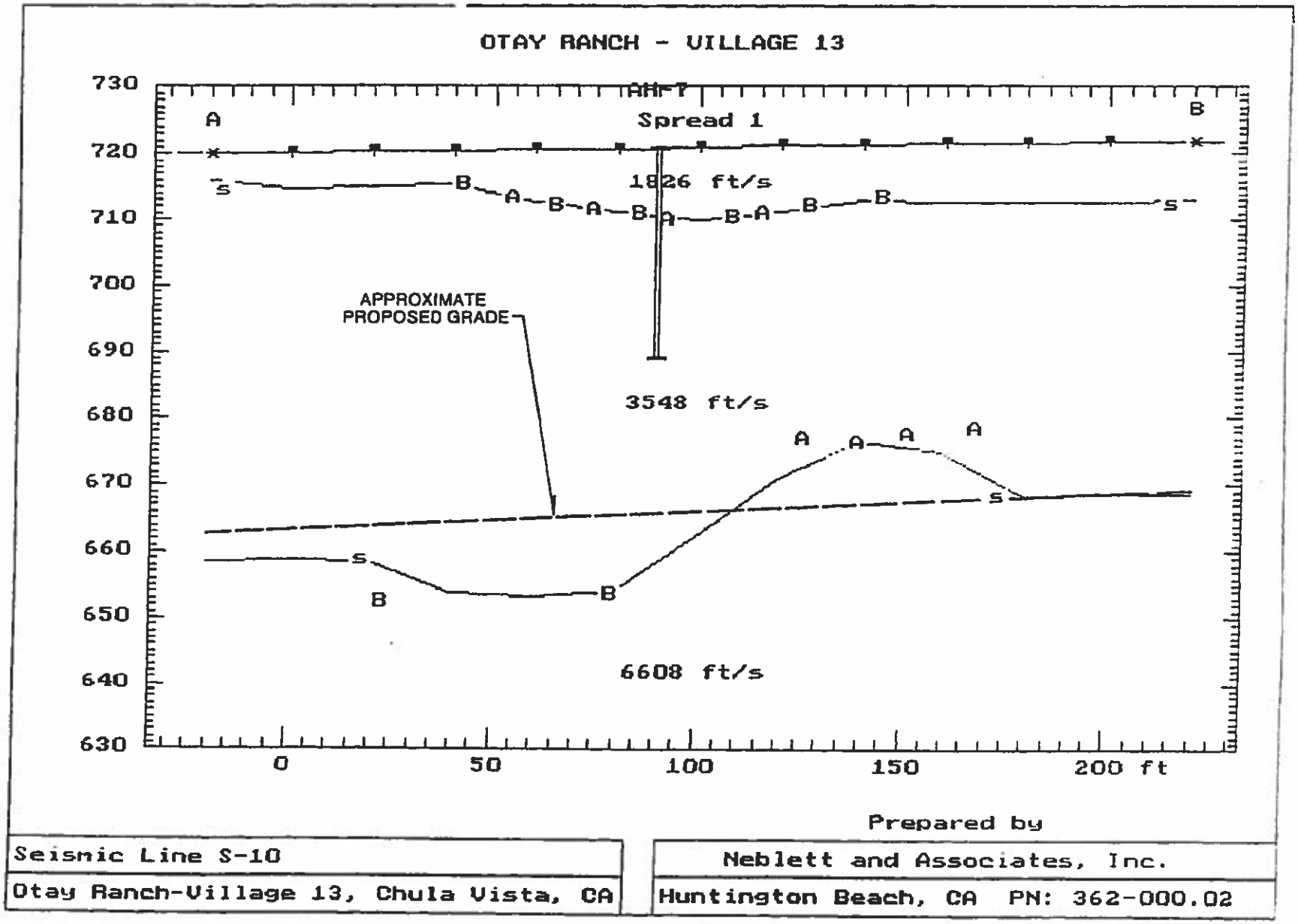


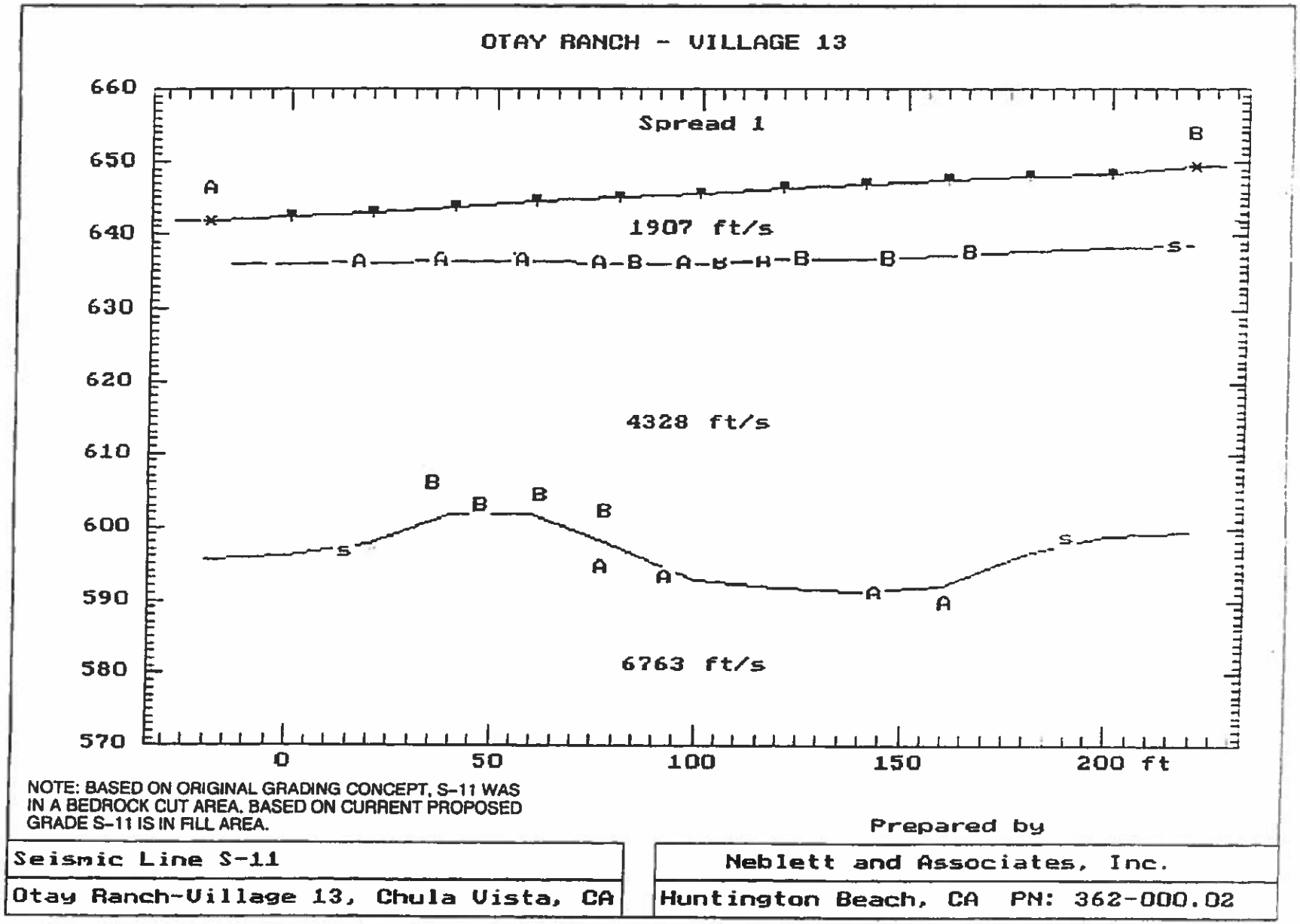
Prepared by

Seismic Line S-7	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02


OTAY RANCH - VILLAGE 13
Spread 1
870
860
850
840
830
820
810
800
790
780
0
50
100
150
200 ft
3087 ft/s
7009 ft/s
9817 ft/s
Prepared by
Seismic Line S-8
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02


OTAY RANCH - VILLAGE 13
800
780
760
740
720
700
680
AH-6
Spread 1
A
B
APPROXIMATE
PROPOSED GRADE
2932 ft/s
11111 ft/s
14545 ft/s
0
50
100
150
200 ft
Prepared by
Seismic Line S-9
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02

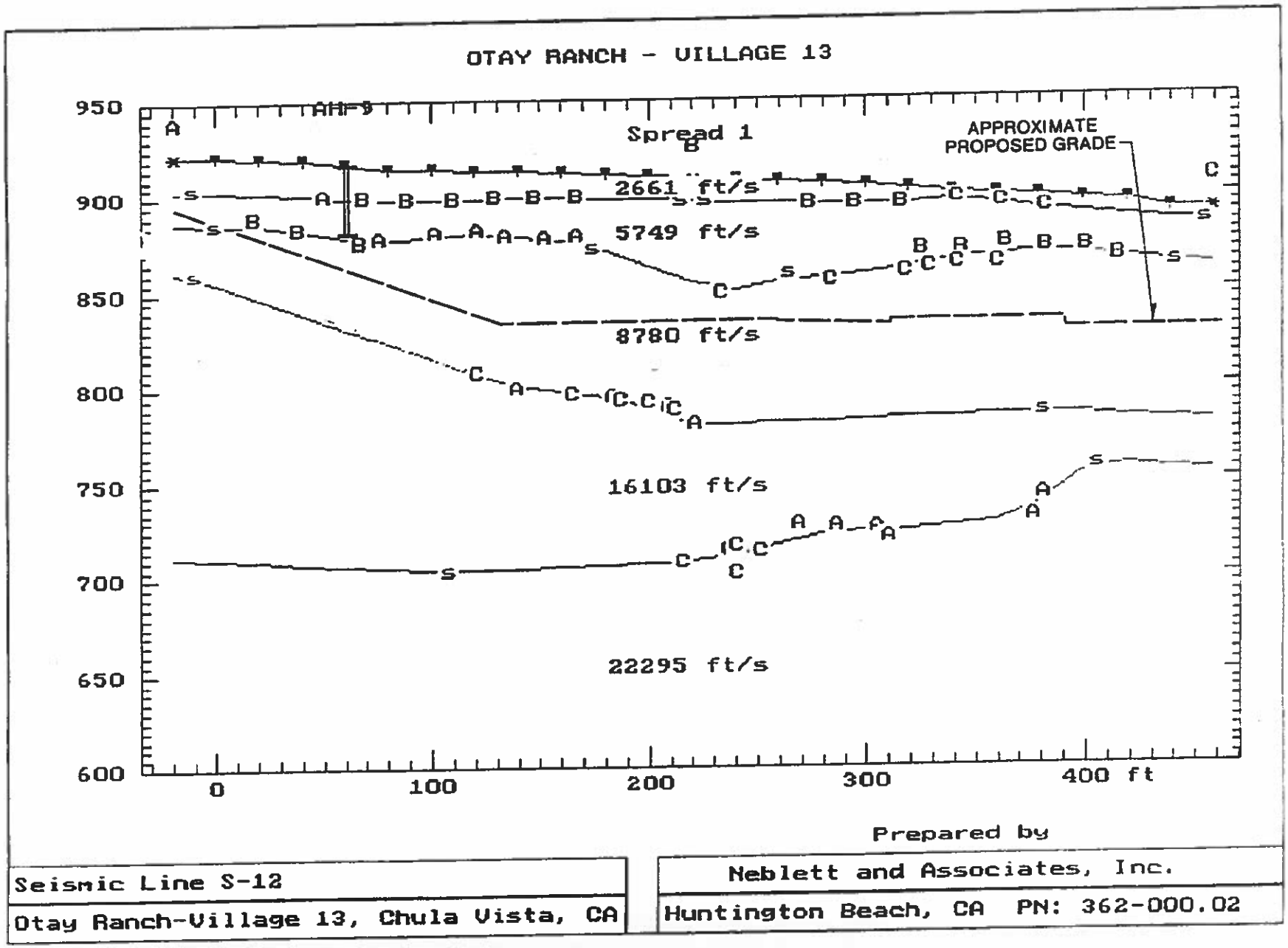

OTAY RANCH - VILLAGE 13
730
720
710
700
690
680
670
660
650
640
630
A
Spread 1
B
1826 ft/s
APPROXIMATE
PROPOSED GRADE
3548 ft/s
6608 ft/s
0
50
100
150
200 ft
Prepared by
Seismic Line S-10
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02

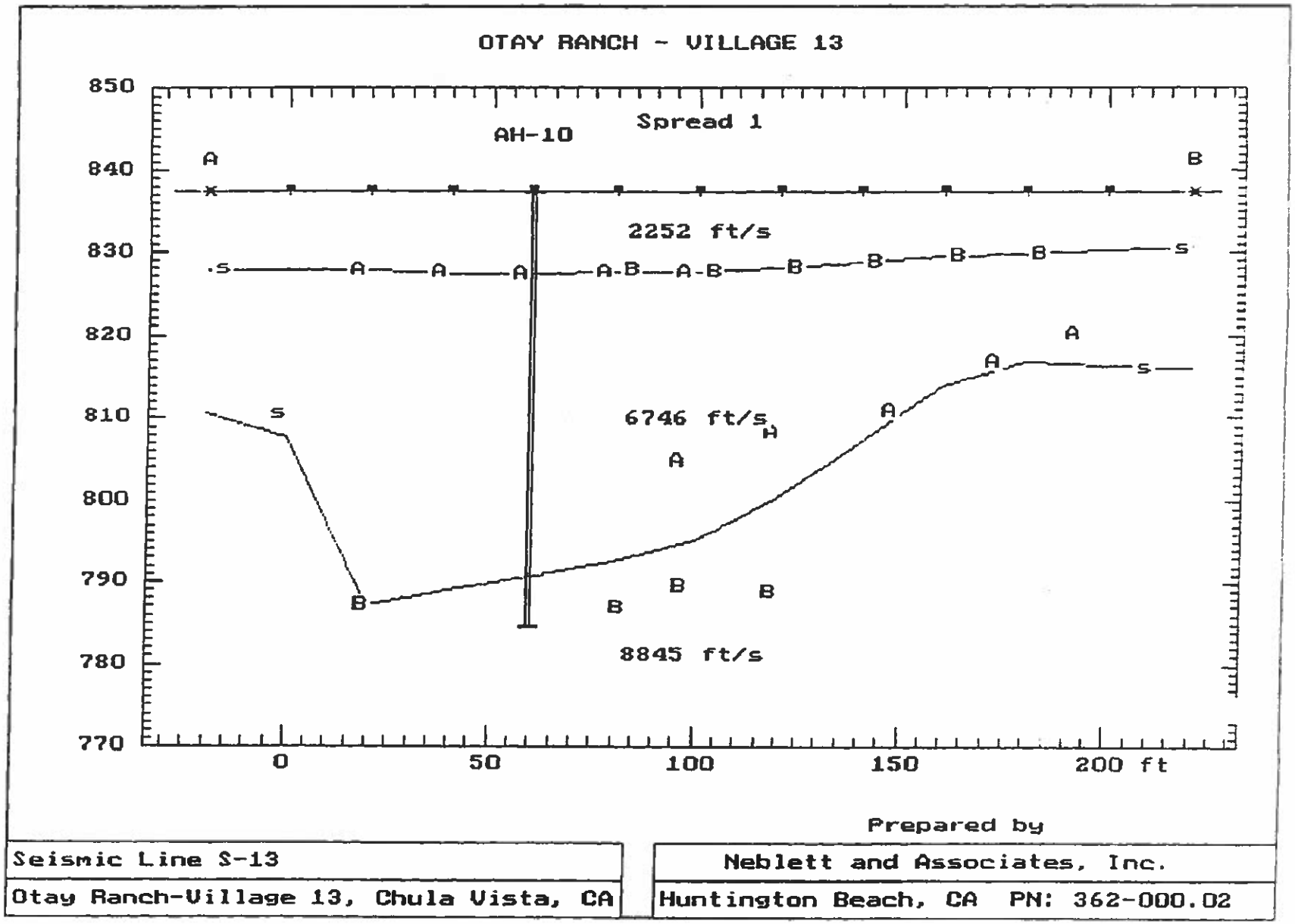


NOTE: BASED ON ORIGINAL GRADING CONCEPT, S-11 WAS IN A BEDROCK CUT AREA. BASED ON CURRENT PROPOSED GRADE S-11 IS IN FILL AREA.

Prepared by

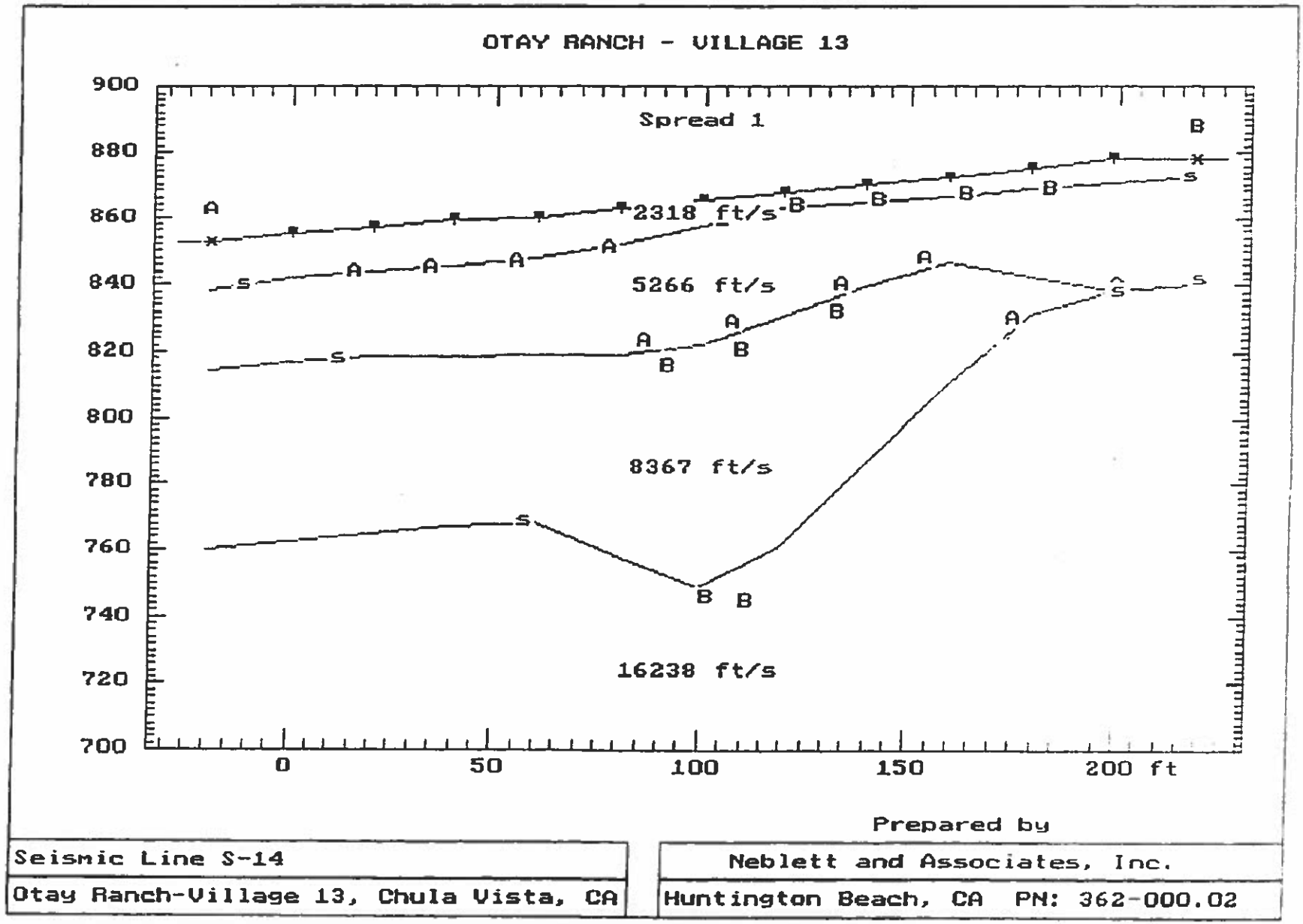
Seismic Line S-11	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02


OTAY RANCH - VILLAGE 13
Spread 1
APPROXIMATE
PROPOSED GRADE
2661 ft/s
5749 ft/s
8780 ft/s
16103 ft/s
22295 ft/s
950
900
850
800
750
700
650
600
0
100
200
300
400 ft
Prepared by
Seismic Line S-12
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02



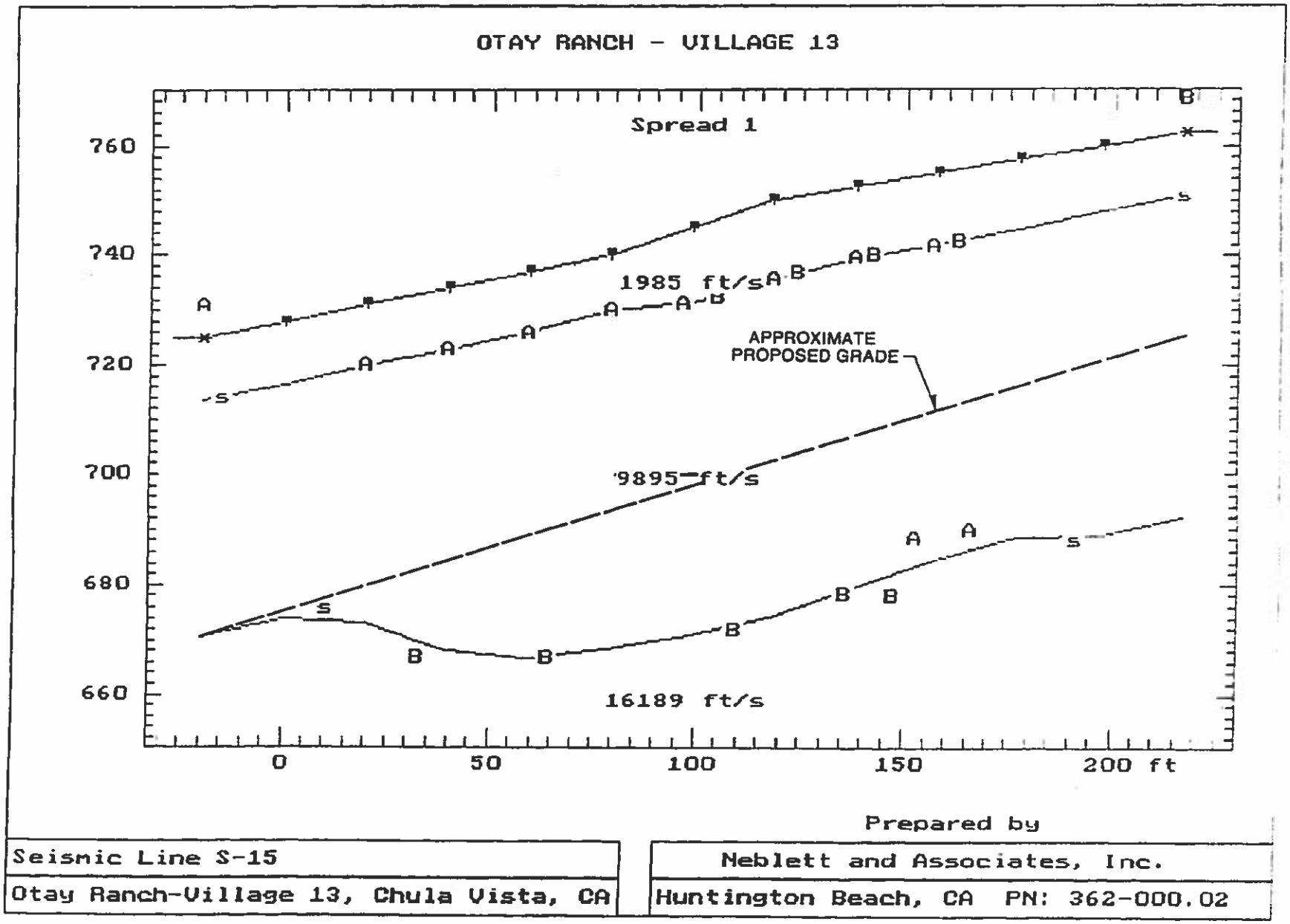
Prepared by

Seismic Line S-13	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02



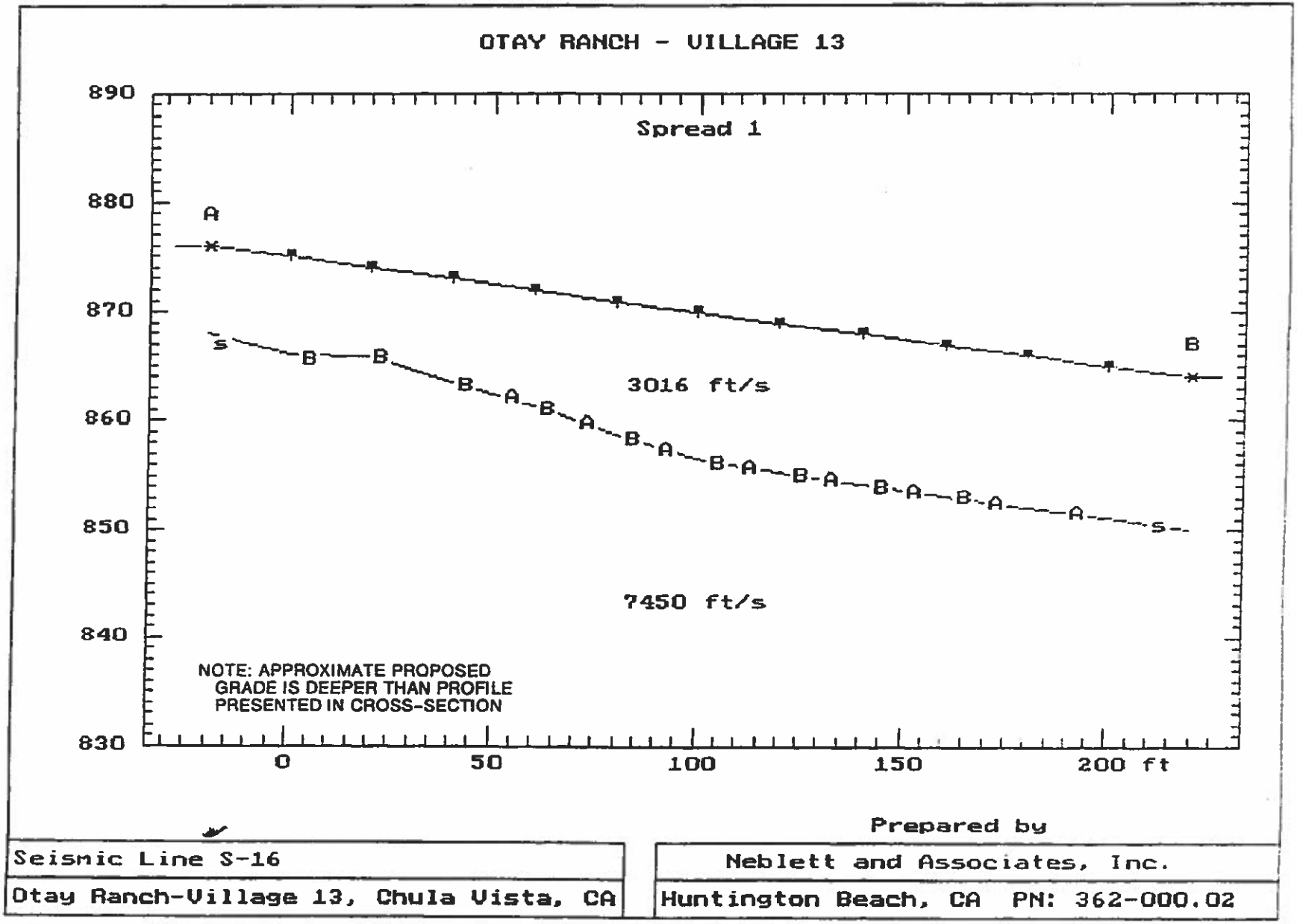
Prepared by

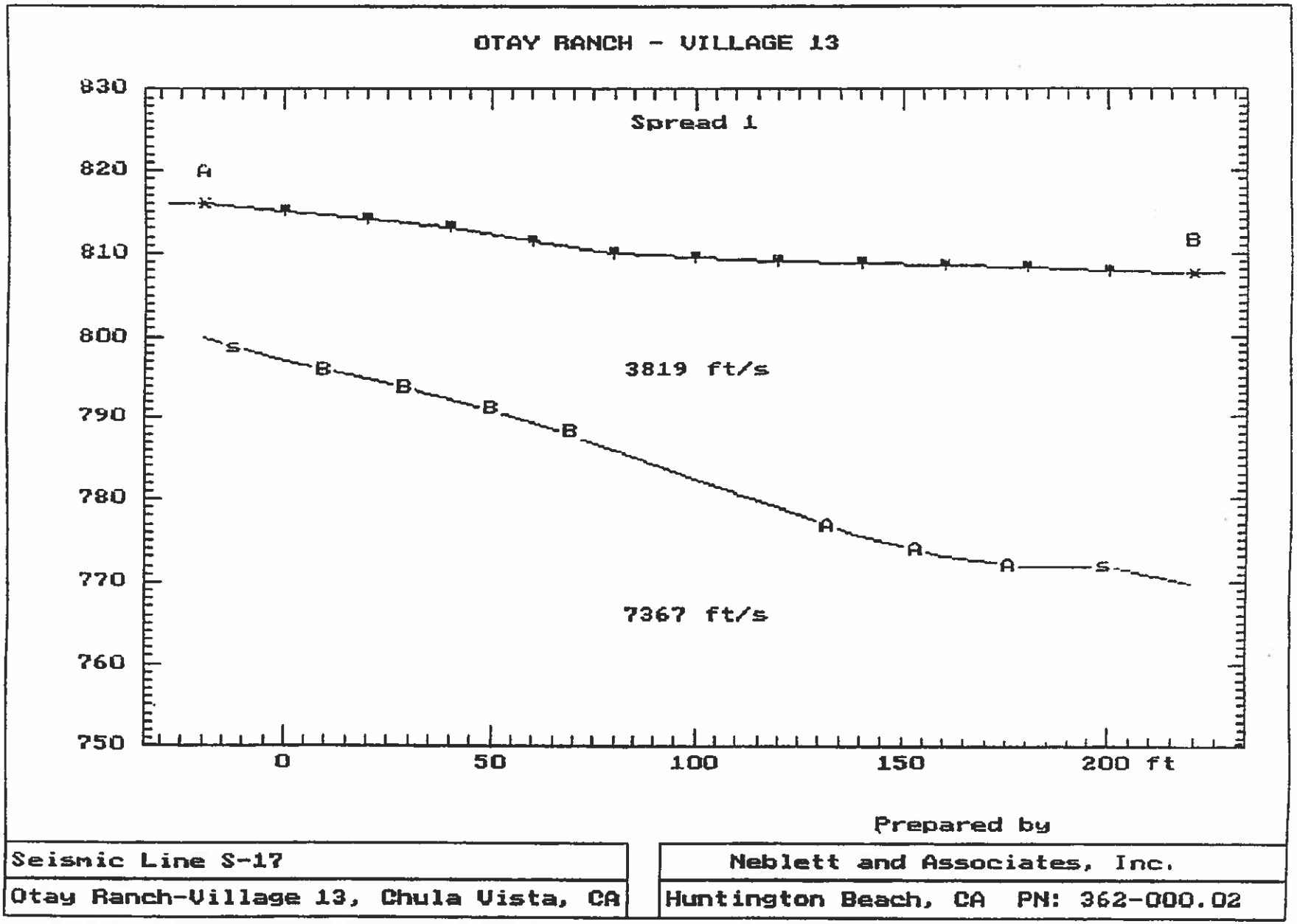
Seismic Line S-14	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02



Prepared by

Seismic Line S-15	Neblett and Associates, Inc.
Otay Ranch-Village 13, Chula Vista, CA	Huntington Beach, CA PN: 362-000.02


OTAY RANCH - VILLAGE 13
Spread 1
890
880
870
860
850
840
830
A
B
3016 ft/s
7450 ft/s
NOTE: APPROXIMATE PROPOSED GRADE IS DEEPER THAN PROFILE PRESENTED IN CROSS-SECTION
0
50
100
150
200 ft
Prepared by
Seismic Line S-16
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02


OTAY RANCH - VILLAGE 13
Spread 1
830
820
810
800
790
780
770
760
750
A
B
S
B
B
B
B
A
A
A
S
3819 ft/s
7367 ft/s
0
50
100
150
200 ft
Prepared by
Seismic Line S-17
Otay Ranch-Village 13, Chula Vista, CA
Neblett and Associates, Inc.
Huntington Beach, CA PN: 362-000.02

APPENDIX E

METAVOLCANIC ROCK RIPPABILITY SUMMARY

Our subsurface investigation included excavating 22 air-track borings, 18 seismic-refraction surveys, and 14 excavator trenches within the Metavolcanic Rock. We have also included subsurface exploration information consisting 7 air-track borings, 2 backhoe trenches, and 14 seismic-refraction surveys within the Metavolcanic Rock from a previous geotechnical report by Neblett & Associates (2004) in our analysis. We used information from our subsurface exploration and the previous exploration to estimate the approximate thickness of capping material and the depth to non-rippable rock summarized in Table E-I for each excavation location (if located within Metavolcanic Rock). The rippability information is also presented on the Geologic Map, Figures 2 through 5, at each excavation location within the rock unit. We provided an average value for the data on the geologic map when 2 or more methods were used in the same proximity.

TABLE E-I
METAVOLCANIC ROCK RIPPABILITY SUMMARY

Excavation No.	Geologic Formation	Estimated Thickness of Capping Material after Screening (feet)	Estimated Rippable Depth (feet)
AT-1	Metavolcanic Rock (KJmv)	2	3
AT-2	Metavolcanic Rock (KJmv)	1	1
AT-3	Metavolcanic Rock (KJmv)	0	1
AT-4	Metavolcanic Rock (KJmv)	1	2
AT-6	Fanglomerate Deposits (Tof)/Metavolcanic Rock (KJmv)	23	23
AT-7	Metavolcanic Rock (KJmv)	0	1
AT-8	Fanglomerate Deposits (Tof)/Metavocanic Rock (KJmv)	34	34
AT-9	Metavolcanic Rock (KJmv)	1	5
AT-10	Metavolcanic Rock (KJmv)	0	2
AT-11	Metavolcanic Rock (KJmv)	0	2
AT-12	Metavolcanic Rock (KJmv))	0	5
AT-13	Metavolcanic Rock (KJmv)	0	0
AT-14	Metavolcanic Rock (KJmv))	1	3
AT-15	Metavolcanic Rock (KJmv)	1	26
AT-16	Metavolcanic Rock (KJmv)	4	7
AT-21	Metavolcanic Rock (KJmv)	5	16
AT-22	Metavolcanic Rock (KJmv)	0	2
AH-2	Metavolcanic Rock (KJmv)	1	13½
AH-3	Metavolcanic Rock (KJmv)	1	10½

TABLE E-I (Continued)
METAVOLCANIC ROCK RIPPABILITY SUMMARY

Excavation No.	Geologic Formation	Estimated Thickness of Capping Material after Screening (feet)	Estimated Rippable Depth (feet)
AH-4	Metavolcanic Rock (KJmv)	2	9
AH-5	Metavolcanic Rock (KJmv)	1	8
AH-6	Metavolcanic Rock (KJmv)	6	19
AH-9	Metavolcanic Rock (KJmv)	1	10
AH-10	Metavolcanic Rock (KJmv)	1	5½
SL-1	Metavolcanic Rock (KJmv)	2	4½
SL-2	Metavolcanic Rock (KJmv)	1	4½
SL-3	Metavolcanic Rock (KJmv)	2	6
SL-4	Metavolcanic Rock (KJmv)	3	5½
SL-5	Metavolcanic Rock (KJmv)	2	3½
SL-6	Metavolcanic Rock (KJmv)	3	5½
SL-7	Metavolcanic Rock (KJmv)	4	12
SL-8	Metavolcanic Rock (KJmv)	4	6½
SL-9	Metavolcanic Rock (KJmv)	4	7½
SL-10	Metavolcanic Rock (KJmv)	4	7½
SL-11	Metavolcanic Rock (KJmv)	2	3½
SL-12	Metavolcanic Rock (KJmv)	3	4½
SL-13	Metavolcanic Rock (KJmv)	2	4
SL-14	Metavolcanic Rock (KJmv)	1	3½
SL-15	Metavolcanic Rock (KJmv)	3	21
SL-16	Metavolcanic Rock (KJmv)	5	7
SL-17	Metavolcanic Rock (KJmv)	3	26
SL-18	Metavolcanic Rock (KJmv)	61	61
S-2	Metavolcanic Rock (KJmv)	1	22
S-3	Metavolcanic Rock (KJmv)	0	12
S-4	Metavolcanic Rock (KJmv)	1	17
S-5	Metavolcanic Rock (KJmv)	1	5
S-6	Metavolcanic Rock (KJmv)	0	18
S-7	Metavolcanic Rock (KJmv)	1	10
S-8	Metavolcanic Rock (KJmv)	1	17
S-9	Metavolcanic Rock (KJmv)	0	16
S-12	Metavolcanic Rock (KJmv)	1	10
S-13	Metavolcanic Rock (KJmv)	0	9
S-14	Metavolcanic Rock (KJmv)	0	7
S-15	Metavolcanic Rock (KJmv)	0	8

TABLE E-I (Concluded)
METAVOLCANIC ROCK RIPPABILITY SUMMARY

Excavation No.	Geologic Formation	Estimated Thickness of Capping Material after Screening (feet)	Estimated Rippable Depth (feet)
S-16	Metavolcanic Rock (KJmv)	1	10
S-17	Fanglomerate Deposits (Tof)/Metavolcanic Rock (KJmv)	20	20
ET-1	Metavolcanic Rock (KJmv)	1	>3
ET-2	Metavolcanic Rock (KJmv)	½	2½
ET-3	Metavolcanic Rock (KJmv)	3	>13
ET-4	Metavolcanic Rock (KJmv)	5	>14
ET-5	Metavolcanic Rock (KJmv)	2	>9
ET-8	Metavolcanic Rock (KJmv)	½	>12
ET-19	Metavolcanic Rock (KJmv)	0	>3
ET-22	Metavolcanic Rock (KJmv)	0	>12
ET-23	Alluvium (Qal)/ Metavolcanic Rock (KJmv)	10	>14
ET-39	Alluvium (Qal)/Otay Formation (To) Metavolcanic Rock (KJmv)	5½	>6
ET-41	Metavolcanic Rock (KJmv)	4	>12
ET-44	Metavolcanic Rock (KJmv)	0	>5
ET-45	Metavolcanic Rock (KJmv)	3	>5
ET-46	Metavolcanic Rock (KJmv)	4	>12
NT-45	Alluvium (Qal)/Metavolcanic Rock (KJmv)	>4	--
NT-46	Metavolcanic Rock (KJmv)	>5½	--

APPENDIX F

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, Atterberg limits, water-soluble sulfate, water-soluble chloride ion, pH and resistivity, R-Value, aggregate quality, and gradation,. The results of the laboratory tests are presented on Tables F-I through F-IX and Figures F-1 through F-4. The in-place dry density and moisture content of the samples tested are presented on the boring logs in Appendix A.

TABLE F-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.)
ET6-1	Dark brown, Clayey SAND	128.9	8.6
ET6-2	Light olive brown, Silty CLAY	117.7	14.2
ET8-1	Reddish brown, Clayey SAND	126.3	10.3
ET14-1	Reddish brown, Clayey SAND	131.9	7.7
ET16-2	Yellowish brown, Clayey SAND	117.8	14.3
ET21-2	Yellowish brown, Silty SAND	124.2	10.9
ET35-1	Light yellowish brown, Clayey SAND	125.5	11.0
ET41-1	Brown, Clayey SAND (Weathered KJmv)	117.6	13.9

TABLE F-II
SUMMARY OF LABORATORY DIRECT SHEAR 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		
LB1-5	115.0	17.0	22.9	525[475]	29[25]
LB1-6	101.9	23.4	29.1	525[375]	21[19]
LB1-7**	n/a	n/a	n/a	430	22
LB1-9	102.2	25.0	31.9	350[600]	20[20]
LB1-12	104.1	23.0	29.8	450[425]	32[16]
LB3-3	118.1	15.5	21.7	750[125]	32[29]
LB3-4	122.2	9.6	14.0	700[225]	40[40]
LB3-7	108.8	18.2	26.8	525[300]	31[30]
LB4-4	121.6	13.1	18.9	700[500]	33[29]
LB4-5	120.7	13.3	18.5	775[850]	34[30]
LB10-3	121.6	8.6	14.5	625[725]	45[43]
LB11-1	111.1	15.7	21.6	875[1000]	32[27]
LB12-1	108.2	17.7	21.8	300[500]	26[26]
LB17-1	113.2	15.3	20.5	500[725]	31[19]
LB17-2	112.6	18.0	23.4	300[375]	30[20]
ET6-1*	115.5	8.9	20.5	190 [140]	32 [32]
ET6-2*	107.1	12.8	22.9	380 [295]	16 [15]
ET8-1*	112.9	10.9	20.4	235	35
ET16-2*	104.7	15.5	24.7	390	24
ET35-1*	112.0	11.3	21.6	255 [215]	33 [33]
ET41-1*	105.5	14.1	21.0	240 [120]	32 [35]

*Sample remolded to a dry density of approximately 90 percent of the laboratory maximum dry density near optimum moisture content.
**Fully softened remolded sample.

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

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	Expansion Classification
	Before Test	After Test			
ET6-2	12.5	29.5	98.5	63	Medium
ET9-1	9.3	19.1	112.4	40	Low
ET16-2	11.7	27.2	104.6	95	High
ET18-1	11.6	28.4	103.0	103	High
ET18-2	8.6	18.9	113.1	33	Low
ET37-1	10.9	25.3	105.2	66	Medium
ET41-1	11.3	26.6	102.2	57	Medium
ET46-1	13.9	34.8	93.0	90	Medium

TABLE F-IV
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
LB1-9	72	29	43
LB1-10	74	28	46
ET6-2	61	18	43

TABLE F-V
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Water-Soluble Sulfate (ppm)	Sulfate Exposure
ET6-2	0.050	500	Not Applicable (S0)
ET9-1	0.002	20	Not Applicable (S0)
ET16-2	0.201	2,010	Severe (S2)
ET18-1	0.118	1,180	Moderate (S1)
ET18-2	0.008	80	Not Applicable (S0)
ET37-1	0.172	1,720	Moderate (S1)
ET46-1	0.975	9,750	Severe (S2)

TABLE F-VI
SUMMARY OF LABORATORY WATER-SOLUBLE CHLORIDE ION CONTENT TEST RESULTS
AASHTO TEST NO. T 291

Sample No.	Chloride Ion Content (%)	Chloride Ion Content (ppm)
ET17-1	0.188	1,882

TABLE F-VII
SUMMARY OF LABORATORY POTENTIAL OF HYDROGEN (PH) AND RESISTIVITY TEST RESULTS
CALIFORNIA TEST METHOD 643

Sample No.	pH	Minimum Resistivity (ohm-centimeters)
ET17-1	7.8	180

TABLE F-VIII
SUMMARY OF LABORATORY RESISTANCE VALUE (R-VALUE) TEST RESULTS
ASTM D 2844

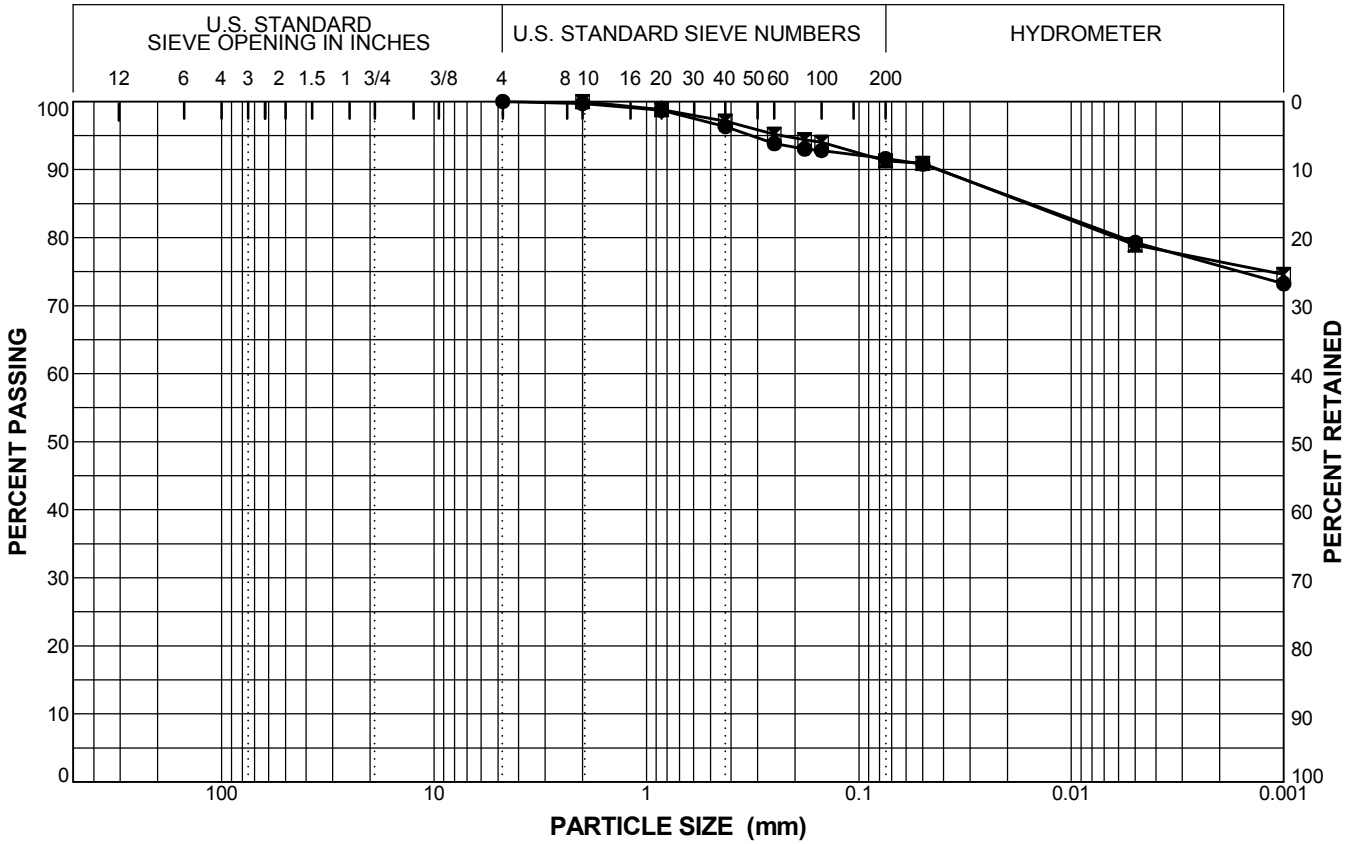
Sample No.	R-Value
ET28-1	23

TABLE F-IX
SUMMARY OF LABORATORY AGGREGATE QUALITY TEST RESULTS

Test Type	Sample Number				Specified Value
	ET19-1	ET22-1	ET26-1	ET44-1	
Apparent Specific Gravity ASTM C128	2.6	2.6	2.7	2.7	2.5 Minimum (Greenbook)
Absorption ASTM C128 (%)	0.5	0.1	1.0	1.5	4.2 Maximum (Greenbook)
Density ASTM C128 (pcf)	162.3	164.4	164.6	159.2	--
Durability Index California Test 229	87	93	82	73	35 Minimum (Caltrans)
L.A. Abrasion ASTM C131 (%Wear, 200 Revolutions)	6	6	10	10	15 Maximum (Greenbook)
L.A. Abrasion ASTM C131 (% Wear, 500 Revolutions)	14	13	18	20	52 Maximum (Greenbook)
Geologic Unit	Metavolcanic Rock (KJmv)	Metavolcanic Rock (KJmv)	Fanglomerate Deposits Cobble (Tof)	Metavolcanic Rock (KJmv)	--

PROJECT NO. G1012-52-01A

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	% Gravel	% Sand	% Fines
●	LB1-9	35.0	(CH) Silty CLAY	0	8	92
⊠	LB1-10	39.5	(CH) Silty CLAY	0	9	91
▲						

GRADATION CURVE

OTAY RANCH RESORT VILLAGE

SAN DIEGO COUNTY, CALIFORNIA

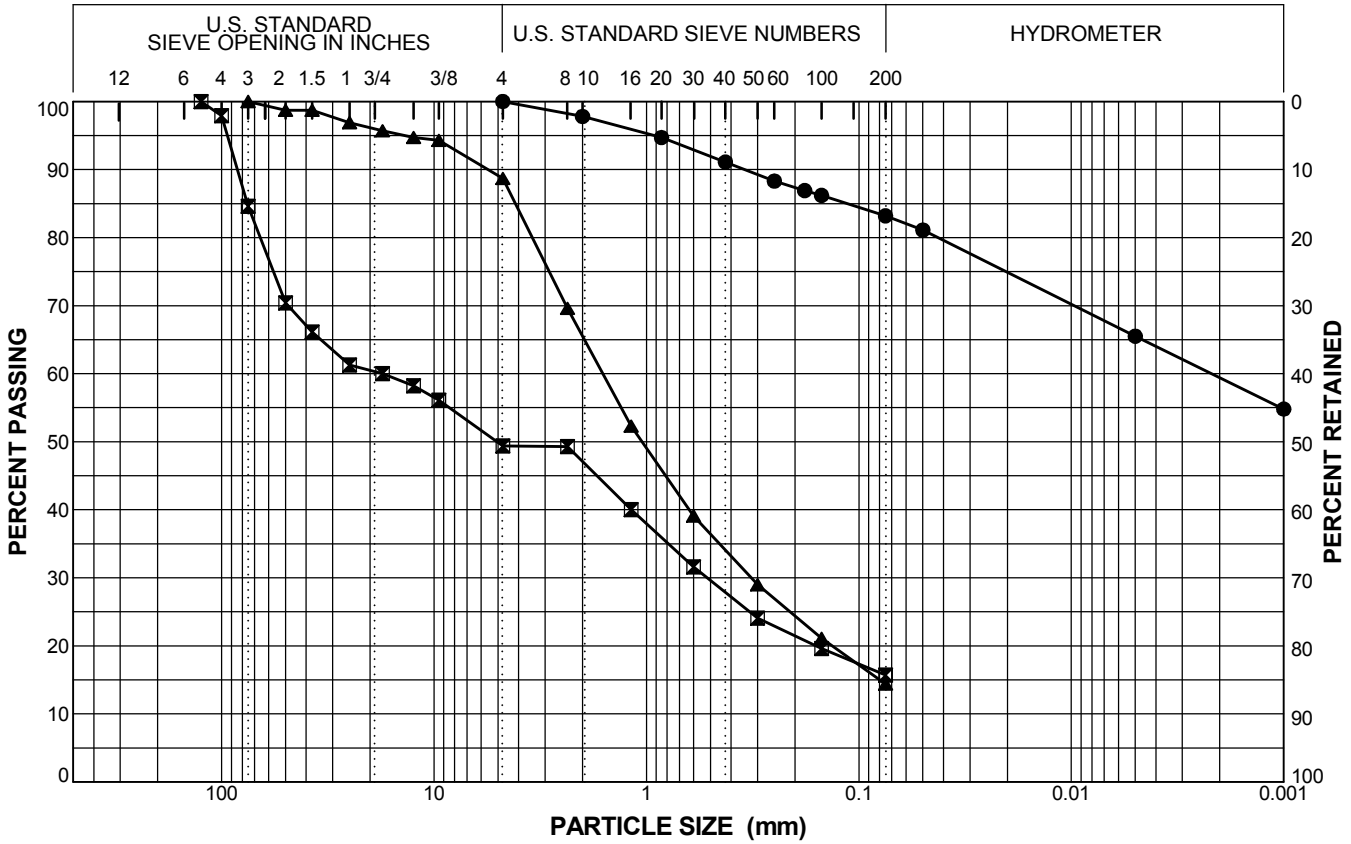
G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

Figure F-1

GEOCON

PROJECT NO. G1012-52-01A

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	% Gravel	% Sand	% Fines
●	ET6-2	10.5	(CH) CLAY with sand	0	17	83
⊠	ET9-2	8.5	(GC) Clayey GRAVEL with sand	35	34	16
▲	ET13-1	7.0	(SC) Clayey SAND	11	74	14

GRADATION CURVE

OTAY RANCH RESORT VILLAGE

SAN DIEGO COUNTY, CALIFORNIA

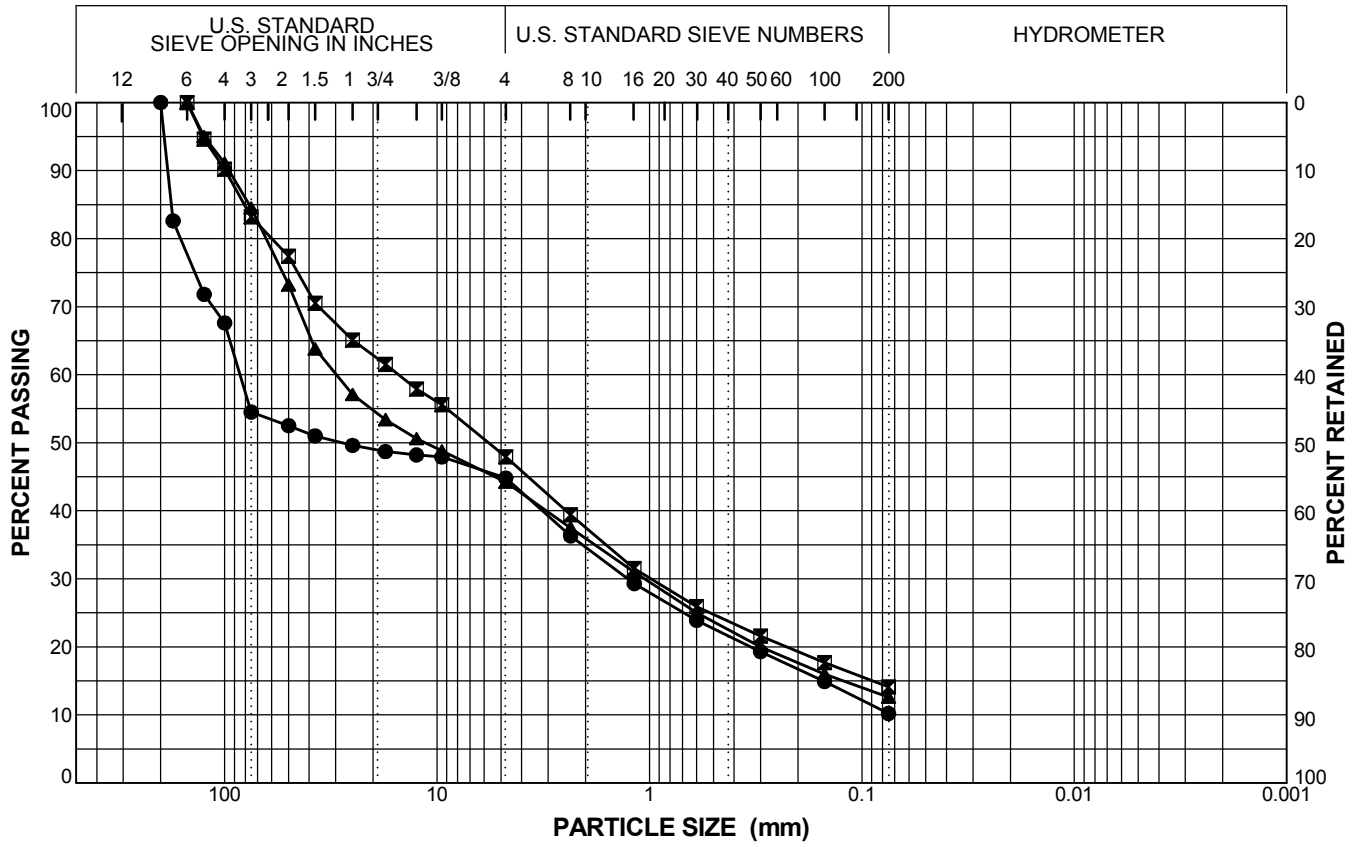
G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

Figure F-2

GEOCON

PROJECT NO. G1012-52-01A

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	% Gravel	% Sand	% Fines
●	ET15-1	6.0	(GP-GM) GRAVEL with silt or clay and sand	10	35	10
⊠	ET33-1	1.0	(GM) Silty GRAVEL with sand	35	34	14
▲	ET36-1	5.0	(GM) Silty GRAVEL with sand	40	32	13

GRADATION CURVE

OTAY RANCH RESORT VILLAGE

SAN DIEGO COUNTY, CALIFORNIA

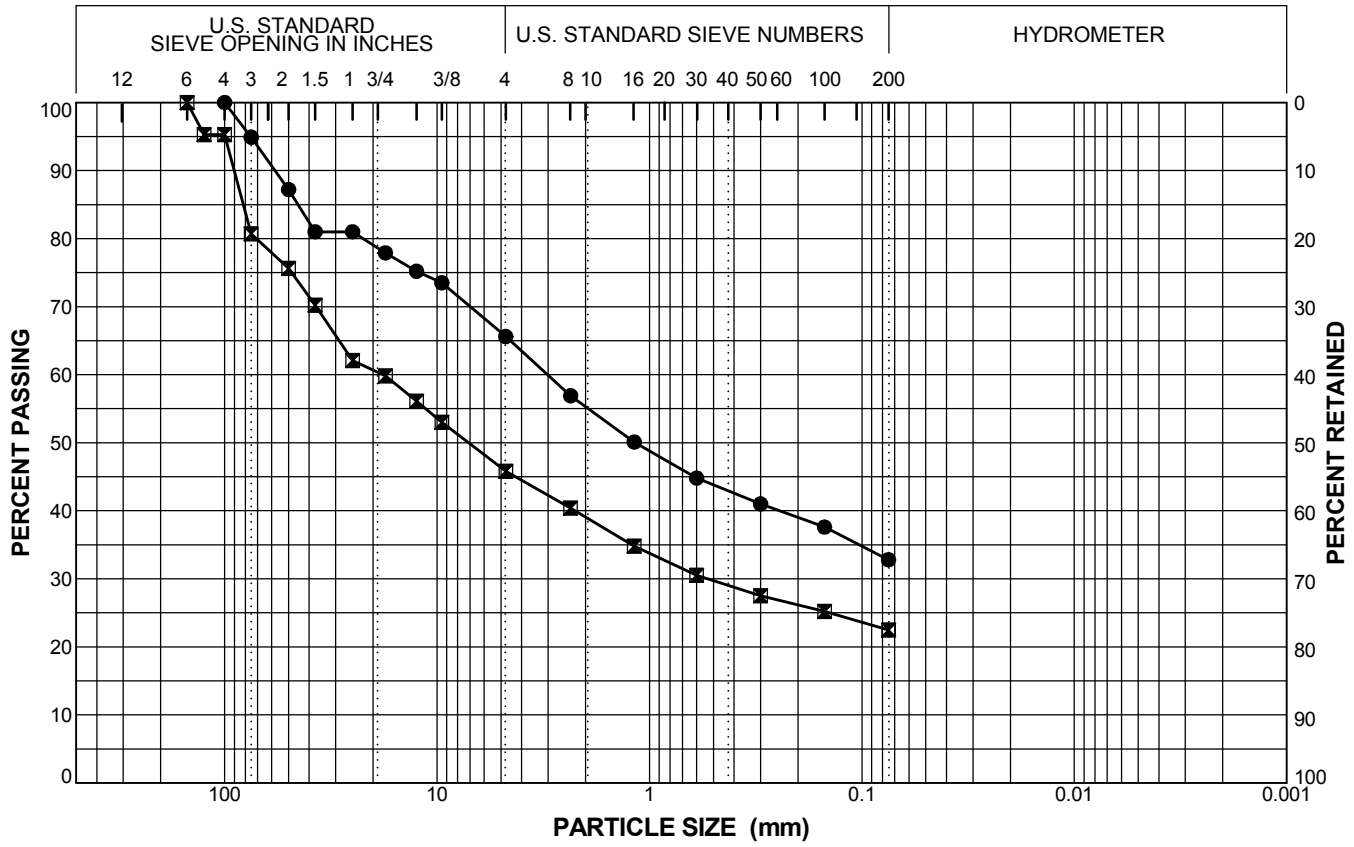
G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

Figure F-3

GEOCON

PROJECT NO. G1012-52-01A

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	% Gravel	% Sand	% Fines
●	ET41-1	6.0	(GC) Clayey GRAVEL with sand	29	33	33
⊠	ET43-1	1.0	(GC) Clayey GRAVEL with sand	35	23	23
▲						

GRADATION CURVE

OTAY RANCH RESORT VILLAGE

SAN DIEGO COUNTY, CALIFORNIA

G1012-52-01A (OTAY RANCH RESORT VILLAGE).GPJ

Figure F-4

GEOCON

APPENDIX G

SLOPE STABILITY ANALYSIS

We performed slope stability analyses using a two-dimensional computer software *GeoStudio2004* developed by Geo-Slope International Ltd. We analyzed the critical modes of potential slip surfaces including rotational-mode and block-mode based on Spencer's method. The soil parameters used, case conditions, and the calculated factors of safety were presented herein. Plots of analyses' results, including the soil stratigraphy, potential failure surfaces, and calculated Factors of Safety, are included in this appendix.

Shear strength characters of the existing geologic units were estimated based on laboratory direct shear tests on samples obtained during our field investigation in accordance with ASTM D 3080 (see Appendix F), and based on empirical data obtained from the referenced geotechnical literature. The soil parameters used for the stability analyses are presented on Table G-I.

TABLE G-I
SUMMARY OF SOIL PROPERTIES USED FOR SLOPE STABILITY ANALYSES

Geologic Unit/Material	Density (pcf)	Cohesion (psf)	Friction Angle (degrees)
Compacted Fill (Qcf)	125	250	30
Surficial Deposits	120	300	16
Fanglomerate Deposits (Tof)	130	200	31
Otay Formation (To) - Sandstone	130	700	34
Otay Formation (To) – Sandstone (Clayey)	130	700	30
Otay Formation (To) – Claystone	130	300	22
Otay Formation (To) – Claystone (WEAK)	130	300	20
Metavolcanic Rock (KJmv)	130	1,000	35

We selected Cross Sections G-G′, I-I′, K-K′, L-L′, M-M′ and O-O' to perform the slope stability analyses. Table G-II provides a summary of cases analyzed and calculated Factors of Safety. A minimum Factor of Safety of 1.5 under static conditions is currently required by the County of San Diego for slope stability. Results of slope stability analyses are plotted on Figures G-1 through G-9. As discussed herein, we encountered discontinuous claystone layers in several of the exploratory borings and trenches within the Otay Formation (To) and Fanglomerate Deposits (Tof). The claystone possesses relatively low shear strengths and may be prone to slope instability if exposed in cut slopes. This geologic claystone layer was mainly found in cross sections G-G′, K-K′, and L-L′. Surficial slope stability calculations are presented on Figure G-10.

TABLE G-II
SUMMARY OF SLOPE STABILITY ANALYSES

Cross Section	Condition of Slope Stability Analyses	Calculated Factor of Safety	Figure Number
G-G′	Minimum Rotational-Mode Factor of Safety – Cut Slope at inclination of 2:1	1.66	G-1
G-G′	Minimum Block-Mode Factor of Safety – Cut Slope at inclination of 2:1	1.61	G-2
I-I′	Minimum Rotational-Mode Factor of Safety – Fill Slope at inclination of 2:1	1.58	G-3
K-K′	Minimum Rotational-Mode Factor of Safety – Fill Slope Over Weak Claystone at inclination of 2:1	1.66	G-4
K-K′	Minimum Block-Mode Factor of Safety – Fill Slope Over Weak Claystone at inclination of 2:1	1.65	G-5
L-L′	Minimum Rotational-Mode Factor of Safety – Fill Slope at inclination of 2:1	1.85	G-6
L-L′	Minimum Block-Mode Factor of Safety – Fill Slope Over Formational Claystone Layer at inclination of 2:1	2.17	G-7
M-M′	Minimum Rotational-Mode Factor of Safety – Fill Slope at inclination of 2:1	1.70	G-8
O-O′	Minimum Rotational-Mode Factor of Safety – Cut Slope in Metavolcanic Rock at inclination of 1.5:1	2.30	G-9
N/A	Surficial Slope Stability Analysis	2.2	G-10

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section G-G'
Name: G-1_cir.gsz
Date: 3/3/2010 Time: 2:05:25 PM
Description: Qcf C: 0psf Phi: 30deg. Wt: 125pcf
Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Ql C: 0psf Phi: 31deg. Wt: 130pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: To-Sandstone C: 0psf Phi: 34deg. Wt: 130pcf

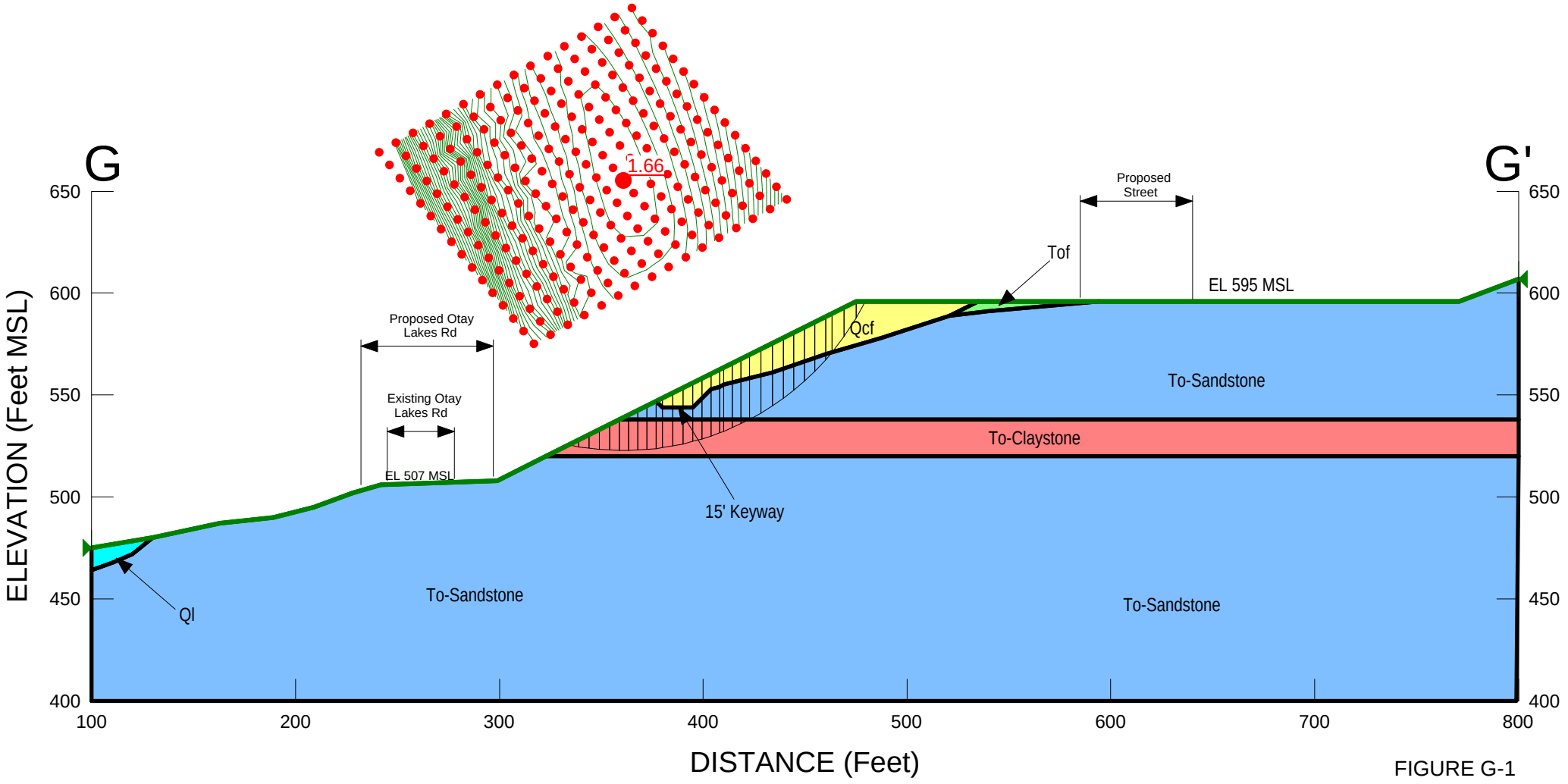


FIGURE G-1

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section G-G'
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Date: 3/3/2010 Time: 2:06:26 PM
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Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Ql C: 0psf Phi: 31deg. Wt: 130pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: To-Sandstone C: 0psf Phi: 34deg. Wt: 130pcf

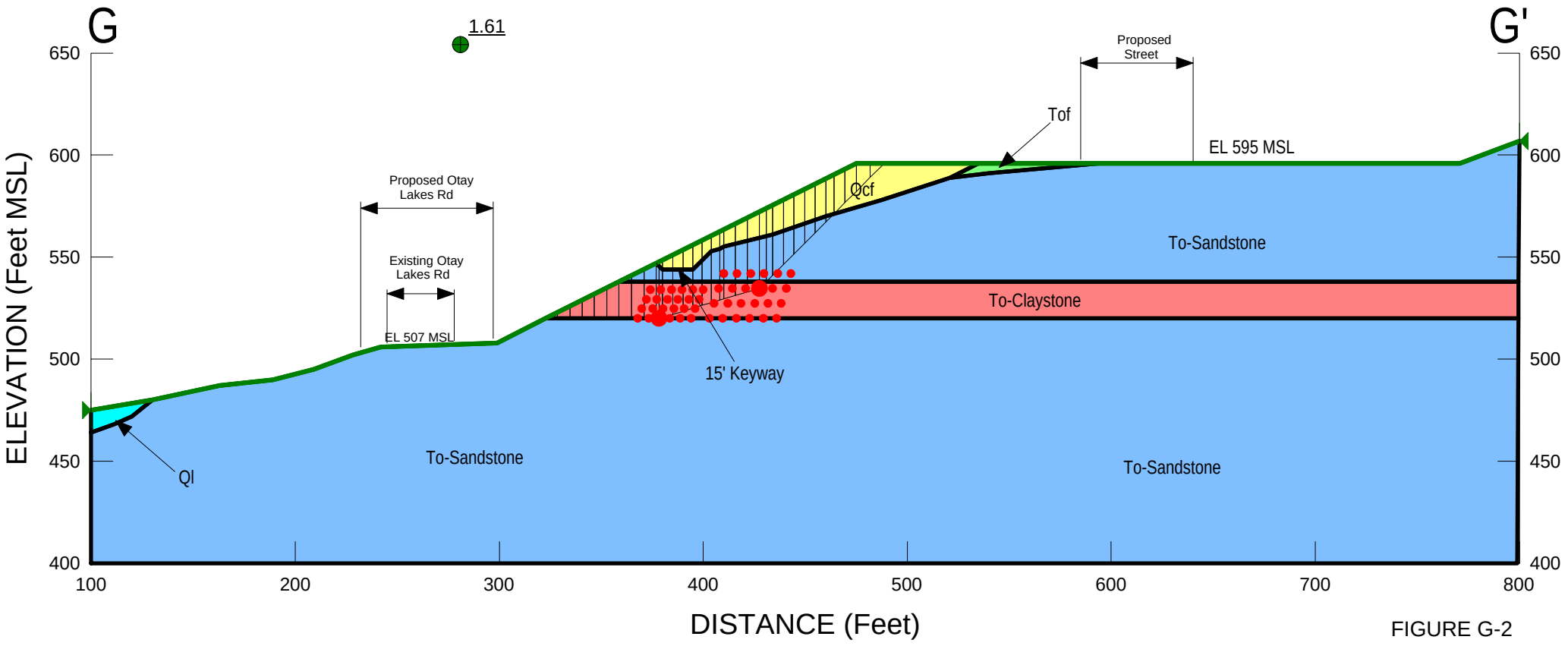

FIGURE G-2

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section I-I'
Name: I-1_cir.gsz
Date: 10/7/2010 Time: 2:32:27 PM
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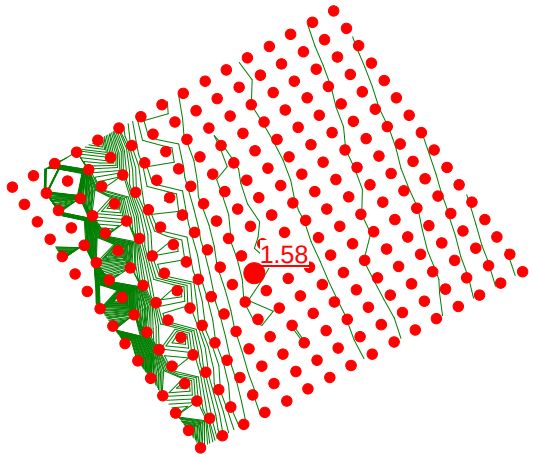
Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To - Sandstone C: 0psf Phi: 34deg. Wt: 130pcf
Description: Kjmv C: 0psf Phi: 35deg. Wt: 130pcf



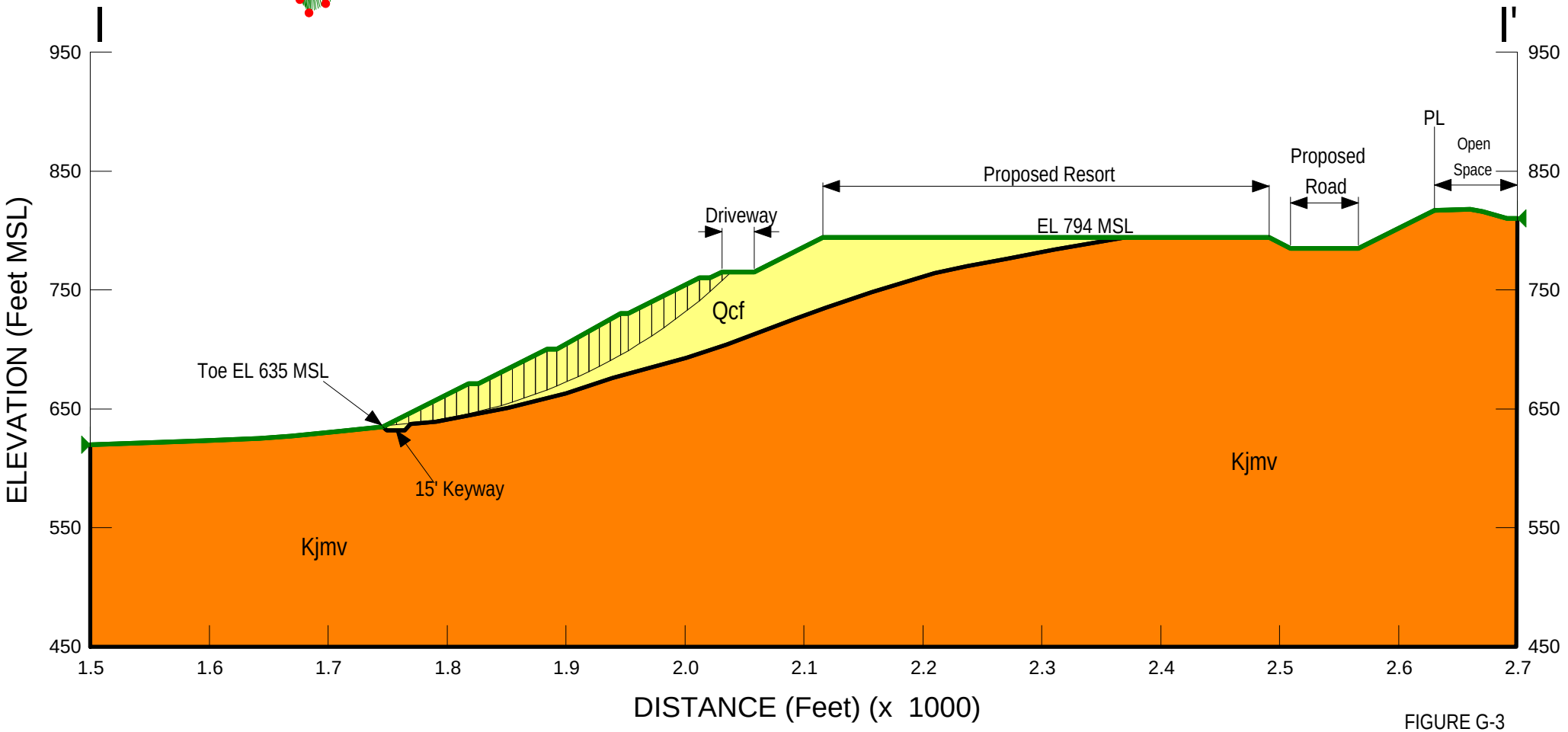


FIGURE G-3

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section K-K'
Name: K-1_cir.gsz
Date: 10/7/2010 Time: 2:34:10 PM
Description: Qcf C: 0psf Phi: 30deg. Wt: 125pcf
Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone (WEAK) C: 0psf Phi: 20deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: Kjmv C: 0psf Phi: 35deg. Wt: 130pcf

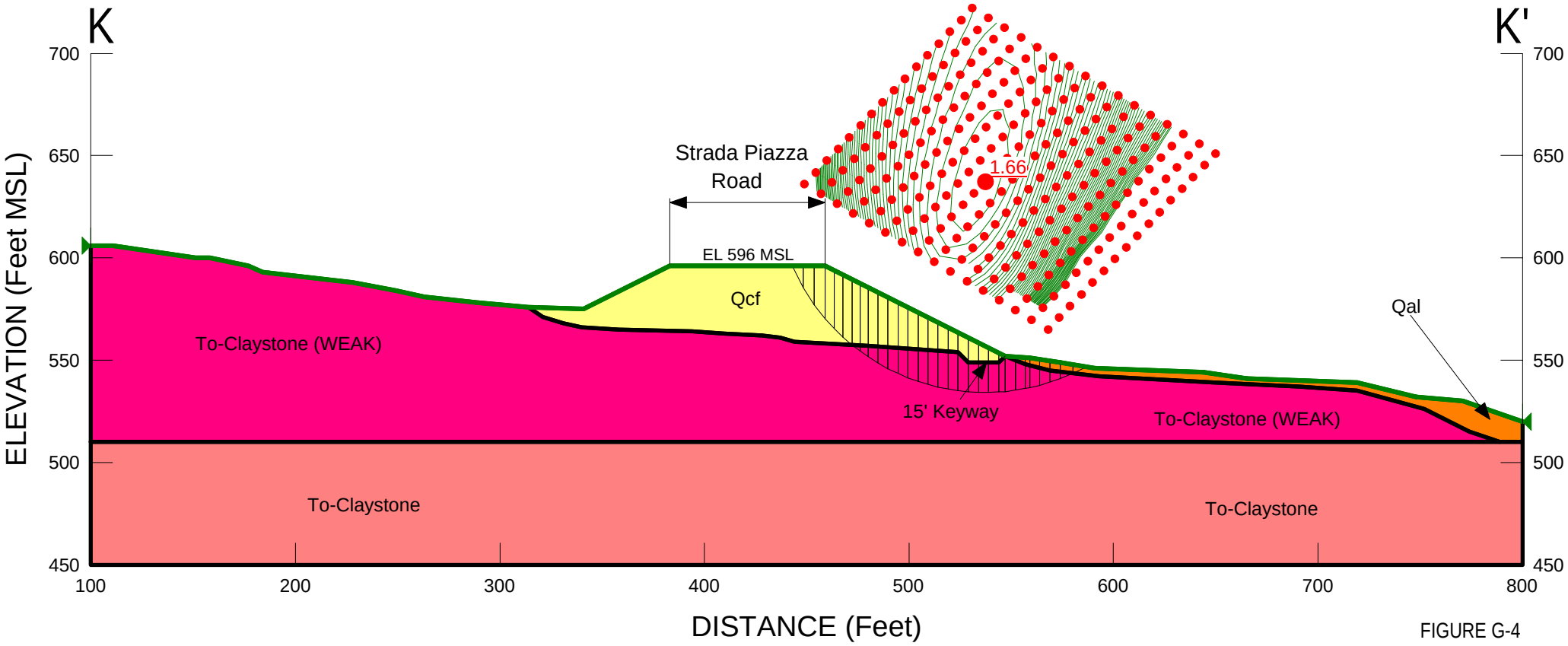


FIGURE G-4

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section K-K'
Name: K-2_blk.gsz
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Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone (WEAK) C: 0psf Phi: 20deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: Kjmv C: 0psf Phi: 35deg. Wt: 130pcf

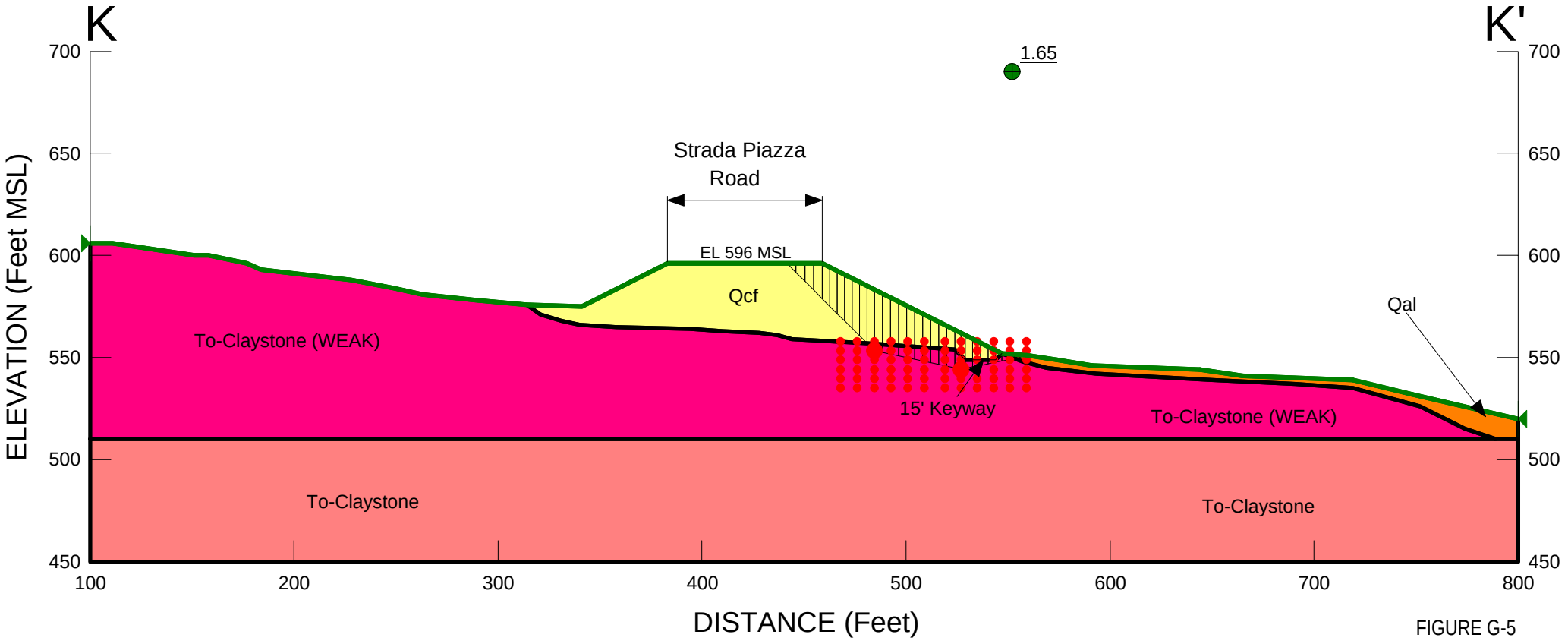

FIGURE G-5

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section L-L'
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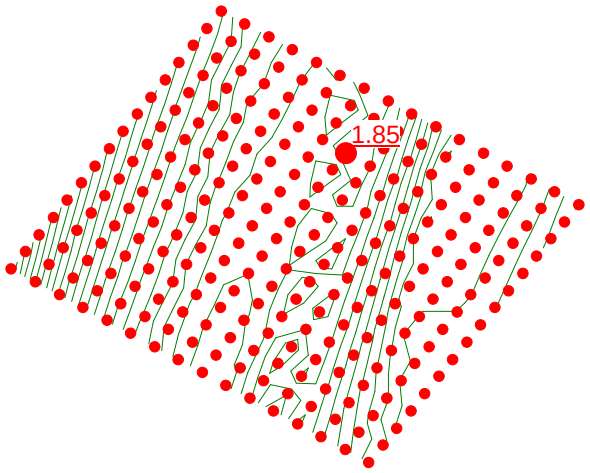
Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: To-Sandstone C: 0psf Phi: 34deg. Wt: 130pcf



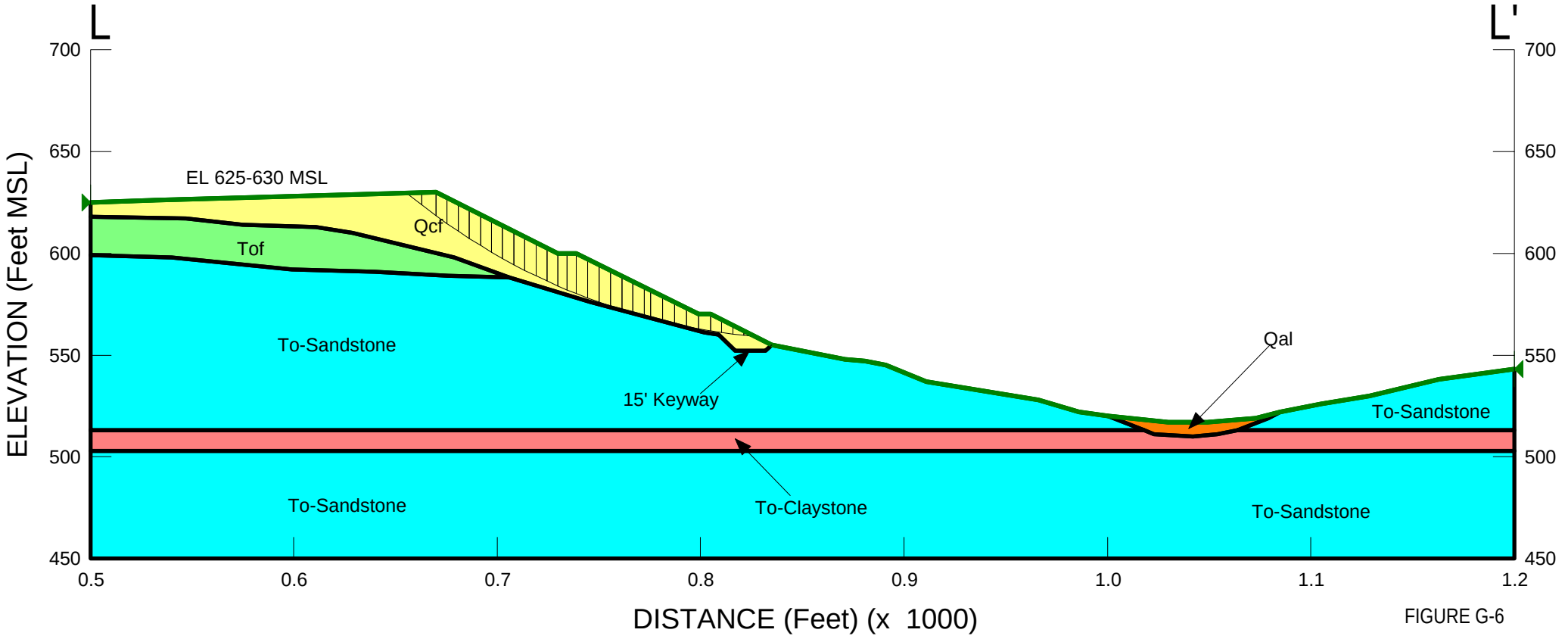


FIGURE G-6

Otay Ranch Village 13 - Area B Tentative Map
Project No. G1012-52-01C
Cross Section L-L'
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Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To-Claystone C: 0psf Phi: 22deg. Wt: 130pcf
Description: To-Sandstone C: 0psf Phi: 34deg. Wt: 130pcf

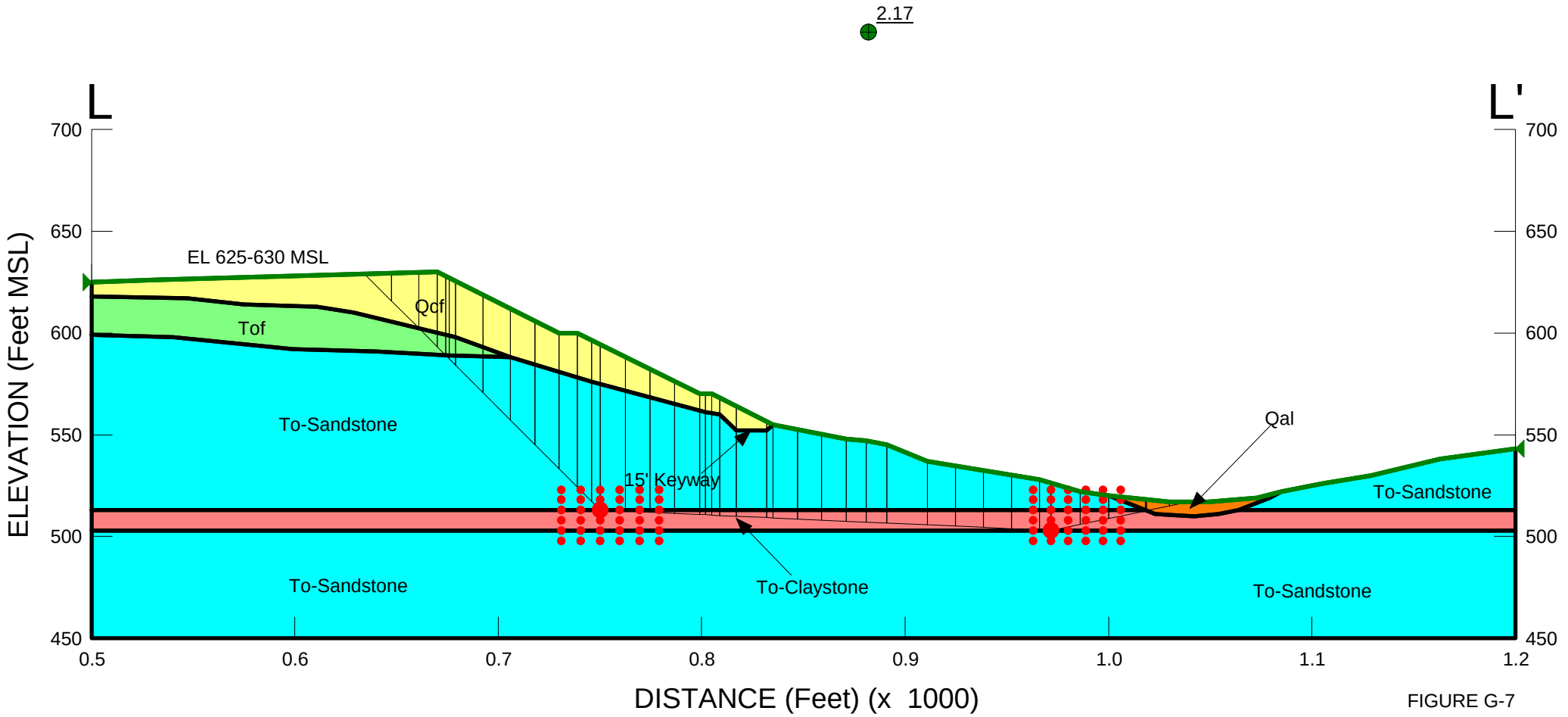

FIGURE G-7

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section M-M'
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Date: 10/7/2010 Time: 2:38:27 PM
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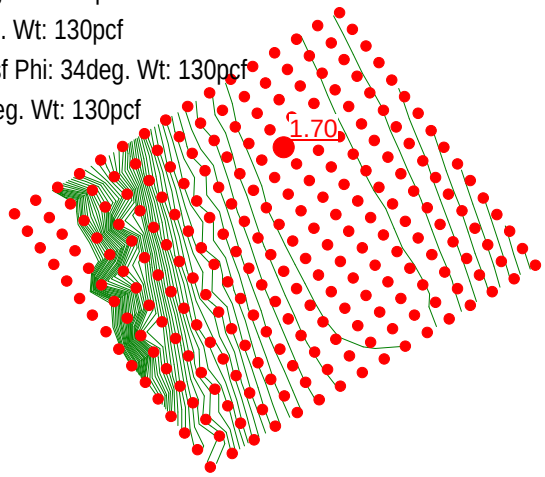
Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To - Sandstone C: 0psf Phi: 34deg. Wt: 130pcf
Description: Kjmv C: 0psf Phi: 35deg. Wt: 130pcf



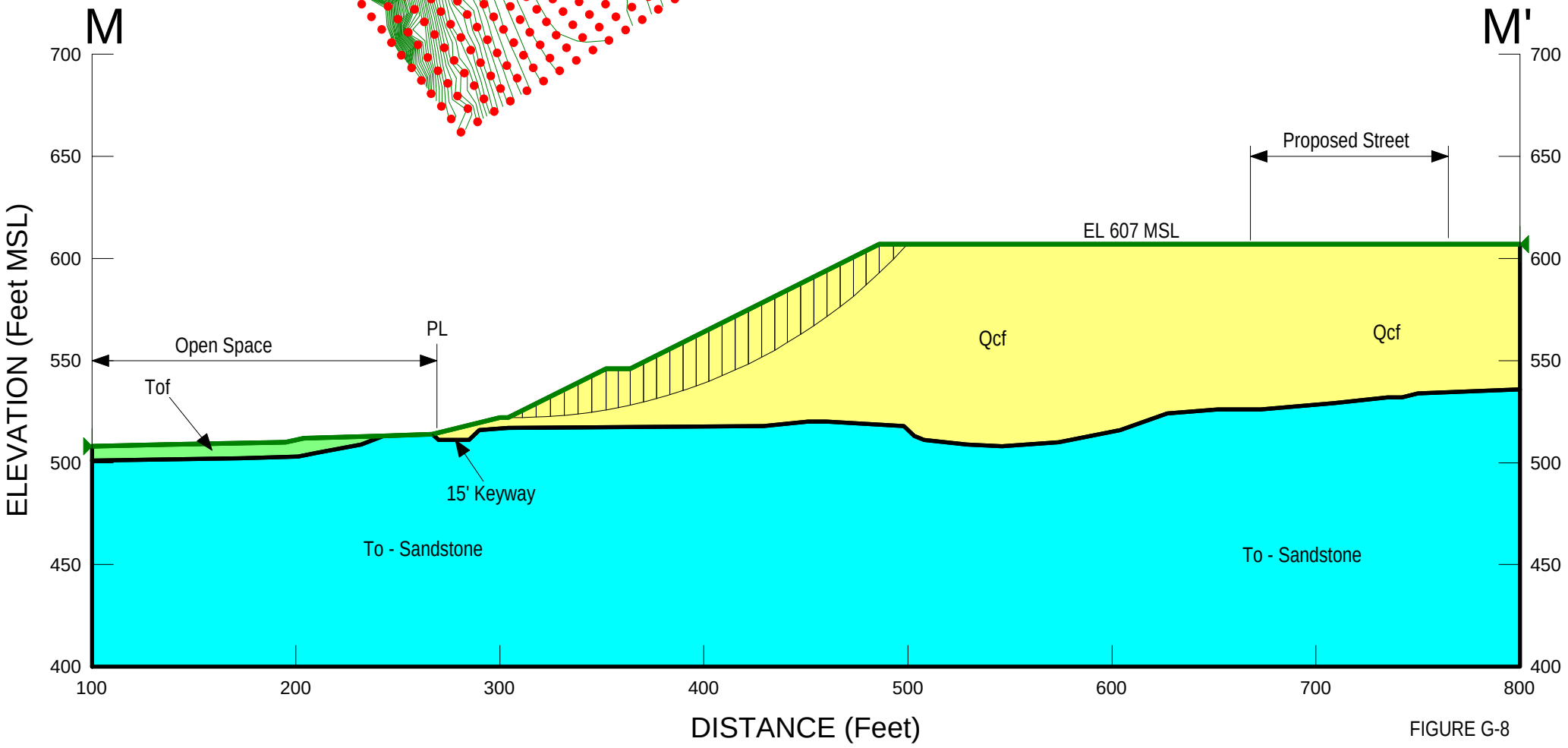


FIGURE G-8

Otay Ranch Resort Village - Area B Tentative Map
Project No. G1012-52-01C
Cross Section O-O'
Name: O-1_cir.gsz
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Description: Qal C: 0psf Phi: 16deg. Wt: 120pcf
Description: Tof C: 0psf Phi: 31deg. Wt: 130pcf
Description: To - Sandstone C: 0psf Phi: 34deg. Wt: 130pcf
Description: Kjmv C: 0psf Phi: 35deg. Wt: 130pcf

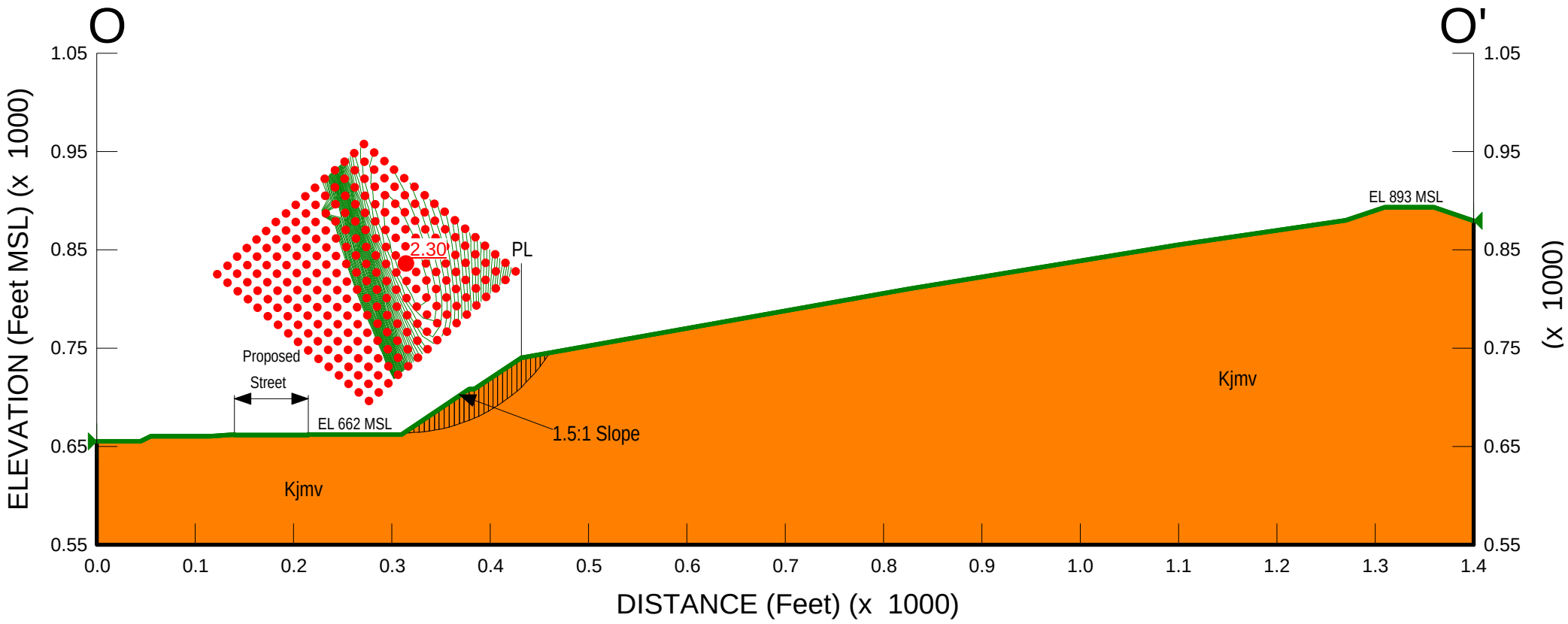


FIGURE G-9

Proposed Fill Slopes

ASSUMED CONDITIONS:

Slope Height	H	=	Infinite	
Depth of Saturation	Z	=	3	feet
Slope Inclination	2:1	(Horizontal:Vertical)		
Slope Angle	I	=	26.6	degrees
Unit Weight of Water	γ_w	=	62.4	pounds per cubic foot
Total Unit Weight of Soil	γ_t	=	130	pounds per cubic foot
Angle of Internal Friction	ϕ	=	30	degrees
Apparent Cohesion	C	=	250	pounds per square foot

Slope saturated to vertical depth Z below slope face.
Seepage forces parallel to slope face

ANALYSIS:

$$FS = \frac{C + (\gamma_t - \gamma_w) Z \cos^2 i \tan \phi}{\gamma_t Z \sin i \cos i} = 2.2$$

REFERENCES:

(1) Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage,* Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62.

(2) Skempton, A. W., and F. A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81.

SURFICIAL SLOPE STABILITY ANALYSIS

OTAY RANCH RESORT VILLAGE
AREA B TENTATIVE MAP
SAN DIEGO COUNTY, CALIFORNIA

FIGURE G-10

APPENDIX H

RECOMMENDED GRADING SPECIFICATIONS

FOR

OTAY RANCH RESORT VILLAGE
AREA B TENTATIVE MAP
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. G1012-52-01C

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

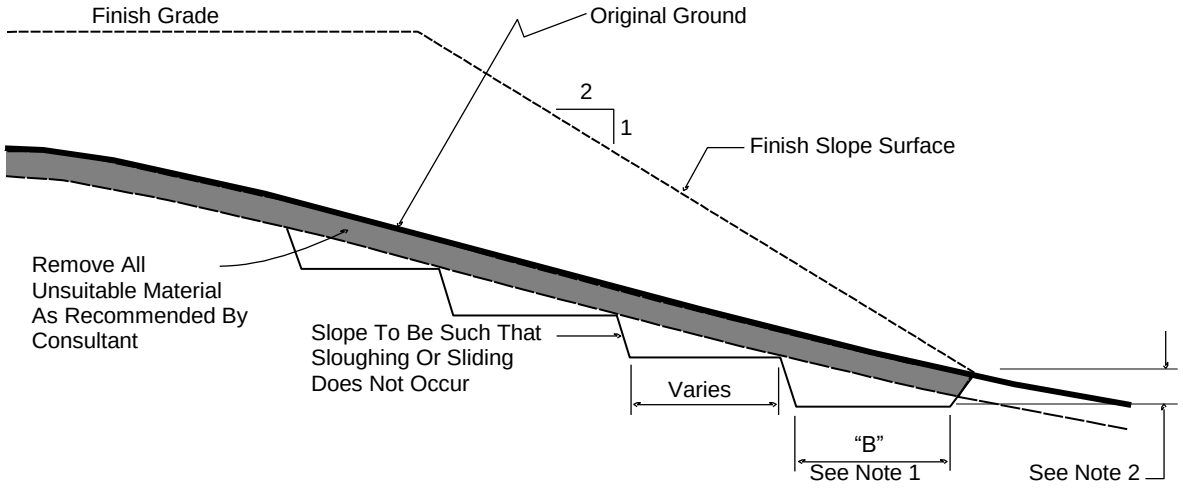
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material 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.