FILE NO. 04581-03-01

BORING B 1

ELEVATION 572 DATE COMPLETED 9/10/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	B1-10			CH	Very hard, purplish-gray, Bentonitic CLAY conchoidal fracturing (continued)	11/12"	65.5	54.6
62					Hard, pink BENTONITE			
64				ML	Shear zone, soft, highly remolded 1 to 3 inch thick. Attitude near horizontal 62 to 63 feet			
66					Very dense, moist, massive, dark gray fine Silty SANDSTONE			
68					Grades into very hard, light brown siltstone at 63.5 feet			
70								
72	B1-11			SM	Very dense, moist, massive, brownish-gray, very fine, Silty SANDSTONE		126.9	6.6
74								
76				SM	Very hard, moist, purplish-brown, massive Sandy SILTSTONE			
78								
80	B1-12			SM	Very dense, massive, fine SANDSTONE		117.1	13.3
82								
84				SM	Very hard, humid, massive, Sandy SILTSTONE			
86								
88					TRENCH TERMINATED AT 90 FEET		92.5	27.0

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

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 2

ELEVATION 576 DATE COMPLETED 9/11/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Loose, dry, dark gray Silty CLAY			
4				SM	**OTAY FORMATION** Medium dense, humid, fractured, weathered light grayish-brown Silty SANDSTONE			
6	B2-1					3/12"	102.6	17.4
8				CL	Hard, humid, purple, massive CLAYSTONE			
10	B2-2			SM	Grades into very dense massive, Silty SANDSTONE	9/12"	118.2	11.9
12								
14				CL	Hard, humid, purple claystone from 12.5 to 14 feet			
16	B2-3			SM	Grades into very dense massive, Silty SANDSTONE	8/12"	122.2	11.4
18								
20	B2-4			CL	Hard, purple, humid claystone from 19.5 to 20.5 feet	7/12"	108.9	19.0
22				SM	Grades into very dense massive, Silty SANDSTONE			
24								
26	B2-5			CH	Hard pink bentonite bed approximately horizontal from 24.5 to 25.5 feet	6/12"	111.3	11.4
				SM				
28				SP	Grades into very dense massive, Silty SANDSTONE			
				SM				
					Hard, well-cemented sandstone from			

Figure A-4 Log of Test Boring B 2, page 1 of 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 2

ELEVATION 576 DATE COMPLETED 9/11/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B2-6			SM	27 to 28 feet Very dense, massive, Silty SANDSTONE (continued)	14/12"	118.4	10.3
32				CL	Hard, humid, brown Sandy CLAYSTONE			
34				SM	Very dense, humid, massive, light gray, very fine Silty SANDSTONE			
36								
38								
40	B2-7						105.7	9.8
42								
44								
46				CL	Hard, humid, dark gray Silty CLAYSTONE			
48								
50	B2-8			SM	Very dense, humid, massive, light gray, medium cemented, very fine Silty SANDSTONE	9/12"	103.3	13.9
52								
54								
56				CL	Hard, humid, purple, CLAYSTONE Grades into hard, dark gray bentonitic claystone at 56.5 feet			
58				CH	Hard, brittle, pinkish-brown BENTONITE			

Figure A-5 Log of Test Boring B 2, page 2 of 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 2

ELEVATION 576 DATE COMPLETED 9/11/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	B2-9			SP	Very dense, humid, gray, massive fine SANDSTONE		64.4	57.4
62								
64								
66								
68								
					BORING TERMINATED AT 69 FEET			

Figure A-6 Log of Test Boring B 2, page 3 of 3

ECKE

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

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

FILE NO. 04581-03-01

BORING B 3

ELEVATION 606 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Soft, dry, blackish-brown Sandy CLAY			
4				SC	**OTAY FORMATION** Fractured, weathered, dry, whitish-tan Clayey SANDSTONE			
6	B3-1					2/12"	99.2	20.6
8				SM	Very dense, moist, light gray, fine, massive, Silty SANDSTONE			
10				ML	Stiff, humid, light brown SILTSTONE (volcanic tuff)			
12	B3-2			SM	Very dense, moist, light gray, fine, massive, Silty SANDSTONE	6/12"	111.7	11.5
14	B3-3			CL	Hard, humid, purplish-brown CLAYSTONE	8/12"	112.7	15.1
16								
18				SM	Very dense, moist, light gray, fine, massive, Silty SANDSTONE			
20	B3-4					7/12"	113.5	9.9
22				SP	Well cemented SANDSTONE from 21 to 21.5 feet			
				SM				
24				CL	Very dense, moist, light gray, fine, massive, Silty SANDSTONE			
26	B3-5				Hard, humid, purple, massive CLAYSTONE	16/12"	114.4	13.2
				SP	Very dense, humid, light gray, fine SANDSTONE			
28				CL	Hard, humid, light brown, massive CLAYSTONE			

Figure A-7 Log of Test Boring B 3, page 1 of 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 3

ELEVATION 606 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B3-6			SM	Hard, humid, massive, light gray Sandy SILTSTONE	14/12"	119.3	12.4
32								
34								
36				SM	Very dense, moist, light gray, very fine Silty SANDSTONE			
38					Hard, well cemented concretions from 37.5 to 39 feet			
40	B3-7			CL/SM	Hard purplish CLAYSTONE interbedded with very dense, light gray Silty SANDSTONE. Thickness of beds 1 to 2 feet, Contact gradational, general attitude near horizontal.		99.7	13.2
42								
44								
46								
48	B3-10				Shear zone. Bedding plane fault. Thickness approximately 1 inch. Attitude horizontal. Developed along purplish claystone (above) and gray siltstone (below) from 47.5 to 47.75 feet			
50	B3-8			SM-ML	Very dense, humid, light gray, fine Silty SANDSTONE interbedded with gray Shaley SILTSTONE	23/12"	116.6	14.9
52								
54				CL	Very hard, humid, purplish-brown CLAYSTONE, grades into clayey sandstone			
56				SM	Very dense, humid, massive, light gray, fine Silty SANDSTONE. Occasional cemented zones.			
58								

Figure A-8 Log of Test Boring B 3, page 2 of 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 3

ELEVATION 606 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60								
	B3-9				Very dense, humid, massive, light gray, fine Silty SANDSTONE. Occasional cemented zones. (continued)		105.7	13.2
62								
64				SM				
66								
68								
70	B3-11			CL	Hard, humid, purplish-brown CLAYSTONE	20/12"	110.9	18.5
72								
74				SM	Very dense, humid, light gray Silty SANDSTONE with occasional siltstone zones			
76								
				CH	Hard, brittle, pinkish-brown bentonite seam. Thickness approximately 4 inches, poorly developed shear zone. Attitude near horizontal from 76.5 to 77 feet			
78				SM				
80	B3-12				Very dense, humid, light gray Silty SANDSTONE with occasional siltstone zones	50/12"	114.4	11.0
					BORING TERMINATED AT 81 FEET			

Figure A-9 Log of Test Boring B 3, page 3 of 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 4

ELEVATION 559 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
2				CL	**TOPSOIL/ALLUVIUM/COLLUVIUM** Soft, dry, dark gray Sandy CLAY			
4					**OTAY FORMATION** Highly weathered, moist, whitish-tan			
6	B4-1			SM	Sandy SILT	2/12"	107.9	17.6
8				SM	Medium dense, humid, light gray Silty SAND			
10	B4-2			SM	Stiff, moist, fine Sandy SILTSTONE (volcanic tuff) Poorly developed shear zone attitude horizontal at 10 feet	1/12"	91.3	30.5
12				SM-ML	Very dense, moist, light grayish-brown, massive, very fine Silty SANDSTONE/ SILTSTONE			
14								
16	B4-3					4/12"	100.8	23.8
18				CL	Very hard, humid, purple-brown massive CLAYSTONE			
20	B4-4					4/12"	103.0	23.2
22				SM	Very dense, moist, massive, trace Silty SANDSTONE with trace of silt			
24								
					BORING TERMINATED AT 25 FEET			

Figure A-10 Log of Test Boring B 4, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 5

ELEVATION 547 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			MATERIAL DESCRIPTION			
0		CL	**TOPSOIL/ALLUVIUM/COLLUVIUM** Soft, dry, dark gray Sandy CLAY			
2			Becomes moist, blackish-gray clay at 2.5 feet			
4						
6	B5-1	CL/SM	**OTAY FORMATION** Soft, moist to wet, mottled, highly weathered bioturbated CLAY Medium dense, moist, grayish-brown fine Silty SAND CaCO3 concentrations from 8 to 8.5 feet	1/12"	104.2	19.3
8						
10	B5-2	CL	Stiff, moist, purple-brown CLAYSTONE Well cemented concretion from 11 to 11.5 feet	3/12"	94.9	20.8
12						
14		SM	Very stiff, moist, dark gray, Sandy SILTSTONE			
16						
18	B5-3	ML	Hard, humid, gray SILTSTONE		103.2	20.9
20			Light seepage at 20 feet			
22	B5-4				102.5	22.8
24						
			BORING TERMINATED AT 25 FEET			

Figure A-11 Log of Test Boring B 5, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 6

ELEVATION 539 DATE COMPLETED 9/12/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			MATERIAL DESCRIPTION			
2		CL	**ALLUVIUM\COLLUVIUM** Medium stiff, dry-slightly damp, red-brown to gray-brown Sandy CLAY Very gravelly at 2.5 feet			
4		CL	**OTAY FORMATION** Medium stiff, moist, mottled red-brown and light tan Silty CLAY with CaCO3 seams; some interbedded medium dense, moist, gray-brown Silty fine SAND; highly weathered Becomes stiff at 5 feet			
6	B6-1			1/12"	102.3	21.1
8			Stiff moist-wet, light tan SILTSTONE			
10	B6-2	ML	Becomes wet from 11 to 11.5 feet	4/12"	108.5	20.5
12			Very dense, moist-wet, gray micaceous SANDSTONE, some interbedded hardened red-brown oxidized layers			
14		SM	Becomes saturated at 14 feet			
16	B6-3			3/12"	109.1	18.3
18			Highly cemented sandstone at 18.5 feet			
20	B6-4	CL	Stiff, saturated, light red-brown CLAYSTONE	5/12"	106.4	21.1
22		SM	Dense, saturated dark gray SANDSTONE			
24						
			BORING TERMINATED AT 25 FEET			

Figure A-12 Log of Test Boring B 6, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ▨ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 7

ELEVATION 615 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			MATERIAL DESCRIPTION			
0		CL	**TOPSOIL** Soft, dry, dark gray Sandy CLAY			
2			Cobbles at 2.5 feet			
4		ML	**OTAY FORMATION** Highly weathered, dry, whitish-tan, fractured calichified SILTSTONE. Numerous krotovinas along the topsoil contact			
6	B7-1			4/12"	91.7	15.5
8		SM	Stiff, humid, dark gray, fractured Sandy SILTSTONE			
10	B7-2	SM	Very dense, humid, light gray, massive weakly cemented fine Silty SANDSTONE	5/12"	109.7	12.0
12						
14		ML	Hard, humid, dark gray Sandy SILTSTONE. Bedding near horizontal.			
16	B7-3	SM	Very dense, humid, light gray, massive weakly cemented fine Silty SANDSTONE	10/12"	126.6	11.3
18						
20	B7-4			10/12"	118.6	11.8
22		SM				
24		SM-CL	Volcanic tuff bed. Attitude horizontal from 22.5 to 23 feet			
26	B7-5		Very stiff to hard, humid, purplish-brown Sandy SILTSTONE/CLAYSTONE	14/12"	124.8	10.6
28		SM	Very dense, humid, light gray, fine Silty SANDSTONE Bentonitic tuff seam. from 27.5 to 28 feet, Attitude horizontal Purple, hard, claystone from 28 to 28.5 feet			

Figure A-13 Log of Test Boring B 7, page 1 of 2

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 7

ELEVATION 615 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B7-6			SM	Very dense, humid, light gray, fine Silty SANDSTONE (continued)	10/12"	109.3	22.2
32				CL	Hard, humid, purplish-brown, Silty CLAYSTONE			
				SP				
34				ML	Very dense, humid, gray massive SANDSTONE			
36				SP	Hard, purplish-brown siltstone from 34 to 35 feet			
38					Very dense, gray, massive SANDSTONE			
40					BORING TERMINATED AT 40 FEET			

Figure A-14 Log of Test Boring B 7, page 2 of 2

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 8

ELEVATION 539 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0		CL	**TOPSOIL** Loose, slightly damp to damp, yellow-brown CLAY with minor caliche, abundant grass and root matter			
2		CL				
4	B8-1		**ALLUVIUM/COLLUVIUM** Stiff, damp, brown, Sandy CLAY with Becomes dark brown CaCO3, from 3 to 4 feet	1/12"	110.9	12.1
6	B8-4	CL				
	B8-2			PUSH	87.8	31.7
8		SM	Dense, damp, gray-brown, Clayey fine to medium SAND with CaCo3			
		SM	Stiff, moist, brown Sandy CLAY			
10	B8-3		**OTAY FORMATION** Highly weathered, dense, moist, gray-brown Silty SAND with sub-horizontal layers of highly weathered white volcanic tuff Stiff, hard, moist, light gray-pinkish gray volcanic tuff at 8 feet	2/12"	97.1	26.6
12		SM				
14			Dense to hard, damp to moist, gray-brown Silty fine SAND with few interbedded layers of volcanic tuff			
16	B8-5			4/12"	105.9	20.1
18			Standing water at 19 feet			
20			BORING TERMINATED AT 20 FEET			

Figure A-15 Log of Test Boring B 8, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 9

ELEVATION 553 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0		SC	**TOPSOIL** Loose, dry, dark brown, Clayey SAND with trace gravel			
2		CL	**COLLUVIUM** Stiff, damp, dark brown Sandy CLAY			
4			Stiff mottled dark red-brown and light tan sandy clay at 4 feet			
6	B9-1	SM	**OTAY FORMATION** Highly weathered, interbedded dense, damp gray SANDSTONE Krotovina at 5.5 feet	2/12"	104.8	11.5
8						
10	B9-2	SP	Very dense, damp, light brownish-gray SANDSTONE	3/12"	107.0	13.6
12						
14						
16	B9-3	SM-ML	Very dense to hard, damp, light pinkish-gray, tuffaceous SANDSTONE	5/12"	111.9	10.7
18		SP	Stiff, hard, damp, purplish-gray to white volcanic tuff SILTSTONE			
			Very dense, damp, light gray-brown interlayered with pinkish-brown SANDSTONE			
20	B9-4	CL	Medium stiff, damp to moist, light slightly pinkish-tan CLAYSTONE/BENTONITE	7/12"	110.9	18.3
22		SP	Hard, damp, medium gray-brown SANDSTONE			
24						
			BORING TERMINATED AT 25 FEET			

Figure A-16 Log of Test Boring B 9, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 10

ELEVATION 518 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0		CL	**TOPSOIL** Loose, fractured, stiff, damp dark brown Sandy CLAY with little gravel			
2		CL				
4			**ALLUVIUM/COLLUVIUM** Stiff, damp, dark brown, Sandy CLAY with gravel, subangular clasts to 3 inches.			
6	B10-1 B10-2	CL	Base of gravels at 2.5 feet	PUSH	89.6	27.4
8		SP	**OTAY FORMATION** Stiff, mottled gray-brown to dark brown, Silty CLAY, highly weathered			
10	B10-3	ML	Dense, moist, interbedded gray-brown SANDSTONE with brown siltstone/claystone Becomes very dense to hard, damp, gray-brown sandstone, finely bedded Highly cemented layer 4 to 6 inch thick at 9 feet	2/12"	94.1	29.9
12						
14		SM	Stiff, moist, light purplish-tan SILTSTONE Becomes medium stiff, finely bedded at 11.5 feet			
16	B10-4		Very dense to hard, moist, medium gray-brown SANDSTONE 6 inch thick siltstone layer at 13 feet Highly cemented layer 1 to 2 inch thick at 17.5 feet	2/12"	99.1	25.5
18						
20	B10-5		Siltstone layer 2 to 3 inch thick at 20 feet	6/12"	105.3	20.4
22			Siltstone layer 2 to 3 inch thick at 22 feet			
24						
26			Siltstone layer 2 to 3 inch thick, very hard at 25 feet			
28						
			BORING TERMINATED AT 28.5 FEET			

Figure A-17 Log of Test Boring B 10, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

BORING B 11

ELEVATION 558 DATE COMPLETED 9/13/90

EQUIPMENT E-100 BUCKET DRILL

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** Highly fractured, stiff, slightly damp, dark brown, slightly gravelly, Sandy CLAY			
2				CL				
4				CL	**ALLUVIUM/COLLUVIUM** Stiff, damp, moist, dark brown, fine Sandy CLAY with little gravel			
6	B11-1			SM	Stiff, damp, grayish brown, CLAY, gravelly in lower 6 inches to 1 foot (subangular clasts to 5 inches)	2/12"	100.0	11.6
8				SM-CL				
10	B11-2			SP	**OTAY FORMATION** Very dense, damp, gray brown Silty SANDSTONE			
12				ML-CL	Medium stiff, damp, mottled purplish brown and light tan, SILTSTONE/ CLAYSTONE -Becomes stiff, at 7 feet	1/12"	96.4	23.2
14					Very dense, slightly damp, gray brown SANDSTONE			
16	B11-3			SM	Stiff to very stiff, damp, grayish tan and dark purplish brown SILTSTONE/ CLAYSTONE with interbedded, discontinuous seams of white volcanic tuff siltstone	8/12"	123.2	12.7
18				CL	Very dense to hard, damp, gray brown SANDSTONE			
20				ML	Very stiff, damp, light reddish brown CLAYSTONE with pressure faces			
					Hard, slightly damp, dark gray brown SILTSTONE			
					BORING TERMINATED AT 20 FEET			

Figure A-18 Log of Test Boring B 11, page 1 of 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 1

ELEVATION 607 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

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, slightly damp gray-brown, slightly Clayey fine to coarse SAND			
2				SC				
4				SM	**FLUVIAL TERRACE DEPOSITS** Soft-medium, stiff, damp-moist, dark gray-brown, Clayey fine to medium SAND with abundant subangular cobbles			
6				SM	**OTAY FORMATION** Medium dense, damp, mottled white and light yellow-brown SANDSTONE with CaCO3			
8				SM	Medium dense, dense, damp light gray Silty fine to coarse SAND			
					Very dense, damp, white - to light tan Silty SANDSTONE			
					TRENCH TERMINATED AT 9.5 FEET			

Figure A-19, Log of Test Trench T 1

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 2

ELEVATION 620 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Dark blackish-gray, soft, dry Sandy CLAY			
4				SW	**FLUVIAL TERRACE DEPOSITS** Dense, dry, whitish-gray, weathered SAND/COBBLES			
6				SW	Very dense, humid, light brown, cohesionless SAND/COBBLE (subrounded metavolcanic rock fragments)			
8								
10				SC	**OTAY FORMATION** Very dense, moist, light gray medium-cemented Clayey SANDSTONE			
12	T2-1							
					TRENCH TERMINATED AT 12.5 FEET			

Figure A-20, Log of Test Trench T 2

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 3

ELEVATION 611 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				SC	**TOPSOIL** Loose, slightly-damp, gray-brown, Clayey SAND Becomes dark-brown at 1 foot			
4				SW	**FLUVIAL TERRACE DEPOSITS** Dense, damp-moist, yellow-brown, slightly clayey, Gravelly SAND with some cobble to 10 inches Becomes gravelly sand with cobble, no clay at 6 feet			
6	T3-1							
8								
10								
12	T3-2			SM	**OTAY FORMATION** Dense, damp, light gray, Silty SANDSTONE			
					TRENCH TERMINATED AT 12 FEET			

Figure A-21, Log of Test Trench T 3

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 4

ELEVATION 611 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				SC-SM	**TOPSOIL/COLLUVIUM** Loose,to medium-dense, damp-dry, gray-brown Clayey, Silty SAND			
4	T4-1			CL	**FLUVIAL TERRACE DEPOSITS** Medium stiff,to stiff, moist, dark reddish-brown Sandy CLAY Becomes cobbly (metavolcanic rock fragments) at 4 feet			
6	T4-2			SM/SW	Dense, damp, light reddish-brown Silty, Gravelly SAND with cobbles Cobble size increases with depth			
8								
10					Boulders to 3 feet at 10 feet			
					TRENCH TERMINATED AT 11 FEET REFUSAL			

Figure A-22, Log of Test Trench T 4

ECKE

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

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

FILE NO. 04581-03-01

TRENCH T 5

ELEVATION 627 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SM-SC	**TOPSOIL** Loose, dryish damp, gray-brown Silty SAND			
2				SW	Becomes dark brown, clayey with abundant cobbles			
4					**TERRACE DEPOSITS** Dense, damp, light yellowish, reddish-brown, SAND/COBBLE to greater than 12 inches, Subangular Boulders to 2 feet, at 4.5 feet			
6								
8	T5-1			SM-SW	**OTAY FORMATION** Very dense, damp, light gray-brown, weakly cemented SANDSTONE			
10								
					TRENCH TERMINATED AT 10.5 FEET			

Figure A-23, Log of Test Trench T 5

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 8

ELEVATION 607 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

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 to medium dense, damp, dark gray-brown clayey SAND with trace gravel			
2				SC-CL				
4				CL	**FLUVIAL TERRACE DEPOSITS** Medium dense, damp, gray-brown, Clayey SAND/Sandy CLAY with cobbles (meta-volcanic rock fragments)			
				SM				
6				SC-CL	Medium stiff, damp-moist dark red-brown Sandy CLAY			
				SM				
8					**OTAY FORMATION** Very dense, slightly damp, light greenish-gray Silty SANDSTONE			
					Medium dense, medium stiff, damp-moist, reddish brown, Clayey SAND/Sandy CLAY			
					Medium dense to dense, damp, white light gray-brown mottled CaCO3 cemented SANDSTONE			
					TRENCH TERMINATED AT 8.5 FEET			

Figure A-27, Log of Test Trench T 8

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 9

ELEVATION 610 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				SC	**TOPSOIL** Loose-medium dense, damp dark brown, Clayey SAND with cobbles, few boulders			
4				CL	**TERRACE DEPOSITS** Medium stiff, damp, yellow brown, Sandy CLAY			
6	T9-1			CL	**OTAY FORMATION** Stiff, damp, pale yellow-brown Sandy CLAY with clay films on ped faces			
8				SP	Very dense, damp, light brown SANDSTONE			
10					TRENCH TERMINATED AT 10 FEET			

Figure A-28, Log of Test Trench T 9

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 10

ELEVATION 600 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				SC-CL	**TOPSOIL** Loose, damp, dark gray-brown, Clayey SAND/Sandy CLAY			
4				CL	**OTAY FORMATION** Medium dense, weathered, damp white-light tan, Sandy CLAY			
6				CL-SM CL/ML	Dense, damp, light gray-tan, Sandy CLAYSTONE/SILTSTONE			

TRENCH TERMINATED AT 7 FEET

Figure A-29, Log of Test Trench T 10

ECKE

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

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

FILE NO. 04581-03-01

TRENCH T 11

ELEVATION 612 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

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-CL	**TOPSOIL** Loose to medium dense, dry-damp, dark brown Clayey SAND with subangular to subrounded cobbles Becomes stiff sandy clay at 1.5 feet			
2								
				SC				
4				SM	**OTAY FORMATION** Weathered, medium dense, damp, yellow-brown Clayey SAND			
6								
				CL-ML	Dense, damp, yellowish gray-brown SANDSTONE			
8					Dense, slightly damp, tan SILTSTONE/ CLAYSTONE			
					TRENCH TERMINATED AT 9 FEET			

Figure A-30, Log of Test Trench T 11

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 12

ELEVATION 605 DATE COMPLETED 9/7/90

EQUIPMENT JD 710 BACKHOE

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-CL	**TOPSOIL** Loose to medium dense, damp, dark brown, Clayey SAND Becomes stiff sandy clay at 1.5 feet			
2								
4				SW-SM	**OTAY FORMATION** Dense, damp, yellow-brown, Silty fine to coarse SAND			
6				SM	Very dense, damp, gray-brown SANDSTONE			
				CL-ML	Medium dense, damp-moist, yellow-brown SILTSTONE/CLAYSTONE			
8								
10					TRENCH TERMINATED AT 10 FEET			

Figure A-31, Log of Test Trench T 12

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 13

ELEVATION 560 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACK HOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2	T13-1			CL	**TOPSOIL** Loose, damp, dark brown Sandy CLAY			
4				CL	**OTAY FORMATION** Medium stiff, damp, mottled white to medium tan Sandy CLAY			
6				CL-ML	Dense, dry to slightly damp, light tan SILTSTONE/CLAYSTONE			
					TRENCH TERMINATED AT 7.5 FEET			

Figure A-32, Log of Test Trench T 13

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 14

ELEVATION 553 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**ALLUVIUM/COLLUVIUM** Soft to medium stiff, humid, blackish-gray Sandy CLAY			
4				CL	Stiff, moist, dark brown Sandy CLAY/ COBBLES			
6				CL				
				SC	Stiff, blackish-brown Sandy CLAY			
8				SC	**OTAY FORMATION** Dense, moist, whitish-brown, weathered Clayey SANDSTONE			
10					Very dense, moist, grayish-light brown medium to weakly cemented, poorly graded fine Clayey SANDSTONE			
12								
					TRENCH TERMINATED AT 13 FEET			

Figure A-33, Log of Test Trench T 14

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 15

ELEVATION 544 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

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/COLLUVIUM** Soft, dry to humid, blackish-gray Sandy CLAY Numerous $CaCO_3$ concentrations from 2 to 3 feet			
4				SC	Medium dense, moist, dark brown Clayey SAND/COBBLES			
6				CL	Stiff moist, black CLAY			
8				SC	**OTAY FORMATION** Dense, moist, weathered, light brown Clayey SANDSTONE			
10				SM	Very dense, moist, grayish-brown, poorly graded weakly cemented Silty SANDSTONE			
					TRENCH TERMINATED AT 10 FEET			

Figure A-34, Log of Test Trench T 15

ECKE

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

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

FILE NO. 04581-03-01

TRENCH T 16

ELEVATION 532 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

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/COLLUVIUM** Soft, dry, dark-gray, Sandy CLAY			
2				SC	Medium dense, moist, reddish-brown, Clayey SAND, some cobbles			
4				SC	**OTAY FORMATION** Medium dense, moist, light-brown Clayey SANDSTONE			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-35, Log of Test Trench T 16

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 17

ELEVATION 548 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Medium stiff to stiff, humid, blackish gray, Sandy CLAY, with some cobbles			
4				SC	**OTAY FORMATION** Dense, moist, light brown, poorly graded, Clayey SANDSTONE			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-36, Log of Test Trench T 17

ECKE

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ▨ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 18

ELEVATION 575 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**TOPSOIL** Soft, dry, dark gray, Sandy CLAY with cobbles			
2				CL				
4					**FLUVIAL TERRACE DEPOSITS** Very dense, moist reddish-brown, well graded cohesionless SAND/COBBLES, occasional boulders Becomes moderately cemented, very slow trenching at 6.5 feet			
6								
8				SW				
10								
12								
14								
16								
18				SM	**OTAY FORMATION** Dense, moist, light gray, massive, fine SANDSTONE			
					TRENCH TERMINATED AT 19 FEET			

Figure A-37, Log of Test Trench T 18

ECKE

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ◧ ... STANDARD PENETRATION TEST; ■ ... DRIVE SAMPLE (UNDISTURBED); ⊠ ... DISTURBED OR BAG SAMPLE; ▨ ... CHUNK SAMPLE; ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 19 ELEVATION 564 DATE COMPLETED 9/10/90 EQUIPMENT JD 555 TRACKHOE	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft, dry, dark grayish-brown Sandy CLAY			
2				SM	**OTAY FORMATION** Dense, light brown, dry, highly weathered SANDSTONE			
4								
6				SM	Dense, humid, grayish-brown, massive Silty SANDSTONE			
					TRENCH TERMINATED AT 6 FEET			

Figure A-38, Log of Test Trench T 19

ECKE

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

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

FILE NO. 04581-03-01

TRENCH T 20

ELEVATION 562 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

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** Soft, humid, blackish-gray Sandy CLAY			
2								
4				SM	**OTAY FORMATION** Medium dense, dry, whitish, light brown, highly weathered, Silty SANDSTONE			
6				SP	Very dense, humid, grayish-brown, massive SANDSTONE			
					TRENCH TERMINATED AT 7 FEET			

Figure A-39, Log of Test Trench T 20

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 21

ELEVATION 563 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Soft, humid, dark gray, Sandy CLAY			
4				ML	**OTAY FORMATION** Medium dense, dry, whitish-tan, highly weathered SILTSTONE			
6				SM	Dense, humid, whitish-gray Silty SANDSTONE			
					TRENCH TERMINATED AT 7 FEET			

Figure A-40, Log of Test Trench T 21

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 22

ELEVATION 537 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**ALLUVIUM/COLLUVIUM** Soft, moist, blackish-brown Sandy CLAY			
4								
6				SC	**OTAY FORMATION** Highly weathered, moist, mottled whitish-tan, brown Clayey SAND, highly bioturbated			
8								
10				SM	Dense, moist to wet, gray, weakly cemented, fine Silty SANDSTONE			
					TRENCH TERMINATED AT 11 FEET			

Figure A-41, Log of Test Trench T 22

ECKE

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ▨ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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

FILE NO. 04581-03-01

TRENCH T 23

ELEVATION 544 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**ALLUVIUM/COLLUVIUM** Soft, moist, blackish-brown Sandy CLAY			
4								
6				SW	Medium dense, moist, reddish-brown fine to coarse SAND with cobbles			
8				SM	**OTAY FORMATION** Medium dense, wet, grayish-brown weathered, Silty SANDSTONE			
					TRENCH TERMINATED AT 9 FEET			

Figure A-42, Log of Test Trench T 23

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 24

ELEVATION 550 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**ALLUVIUM/COLLUVIUM** Soft, dry, dark grayish-black Silty CLAY			
4				SC	**OTAY FORMATION** Medium dense, moist, highly weathered, grayish-brown, Clayey SANDSTONE			
6				SM	Dense, moist, gray, fine, Silty SANDSTONE			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-43, Log of Test Trench T 24

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 25

ELEVATION 442 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Soft, dry, black Sandy CLAY, rare cobbles Becomes moist at 2 feet			
4				SM	**OTAY FORMATION** Highly weathered, humid, whitish, Silty SANDSTONE			
6								
8				CH	Thin bentonite layer from 7 to 7.5 feet			
					SANTIAGO PEAK VOLCANICS Hard metavolcanic ROCK			
					TRENCH TERMINATED AT 9 FEET			

Figure A-44, Log of Test Trench T 25

ECKE

SAMPLE SYMBOLS

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

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

FILE NO. 04581-03-01

TRENCH T 26

ELEVATION 445 DATE COMPLETED 9/10/90

EQUIPMENT JD 555 TRACKHOE

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	**TOPSOIL** Soft, dry, grayish-black Sandy CLAY, with angular boulders			
4				SM	**OTAY FORMATION** Highly weathered, dry, whitish-brown Sandy SILTSTONE			
6				SM	Very dense, hard, moist, massive light gray Silty SANDSTONE			
8								
10				CH	Hard, pinkish-brown bentonite from 10.5 to 11 feet			
12					**SANTIAGO PEAK VOLCANICS** Very hard, metavolcanic ROCK			
					TRENCH TERMINATED AT 12 FEET			

Figure A-45, Log of Test Trench T 26

ECKE

SAMPLE SYMBOLS

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

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

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM). The maximum dry density and optimum moisture content of samples were determined in accordance with Test Procedure D1557-78, Method A. In addition, relatively undisturbed ring samples were tested for in-place moisture and density, shear strength and consolidation characteristics. Expansion Index tests were also performed on six samples collected from the exploratory excavations. The results of the tests are presented in tabular and graphical form herein. Moisture-density relationships are presented on the boring logs.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY
AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-91

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T2-1	Light gray, Clayey SAND	113.7	15.5
T3-1	Yellowish-brown, well graded SAND	131.1	7.3
T9-1	Light brown CLAY	112.2	16.0
T13-1	Dark brown, Sandy CLAY	114.5	14.9
B1-4	Purplish, Sandy SILT	108.7	15.3
B8-4	Dark brown, Sandy CLAY	117.1	15.1

TABLE B-II
SUMMARY OF IN-PLACE MOISTURE DENSITY
AND DIRECT SHEAR TEST RESULTS

Sample No.	Depth (feet)	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
T2-1*	12	102.7	15.2	150	35
T3-1*	6	117.7	7.6	120	38
T9-1*	6	101.3	15.7	590	15
B1-10	60	65.5	54.6	2315	6
B2-2	10	118.2	11.9	530	35
B3-5	25	114.4	13.2	1460	11

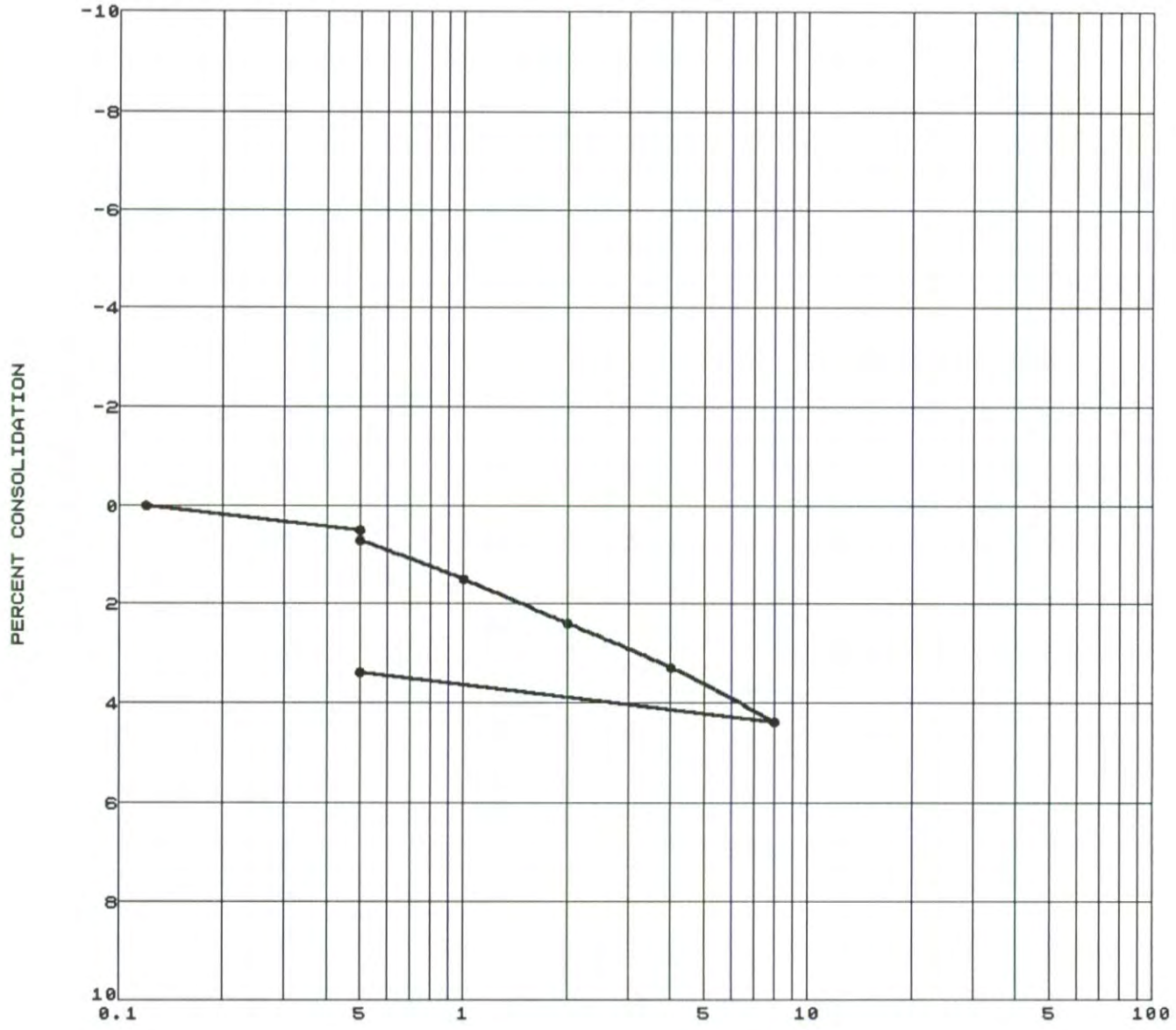
*Soil sample remolded approximately to 90 percent relative density at near optimum moisture content.

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index
	Before Test	After Test		
T2-1	11.0	23.2	106.1	6
T3-1	6.4	13.2	125.1	0
T9-1	11.9	36.4	102.4	160
T13-1	11.7	34.9	103.8	115
B1-4	10.5	32.3	106.7	63
B8-4	9.2	31.4	111.8	88

File No. 04581-03-01

SAMPLE NO. B6-1



Initial Dry Density (pcf)	102.3
Initial Water Content (%)	21.1

Initial Saturation (%)	87.2
Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

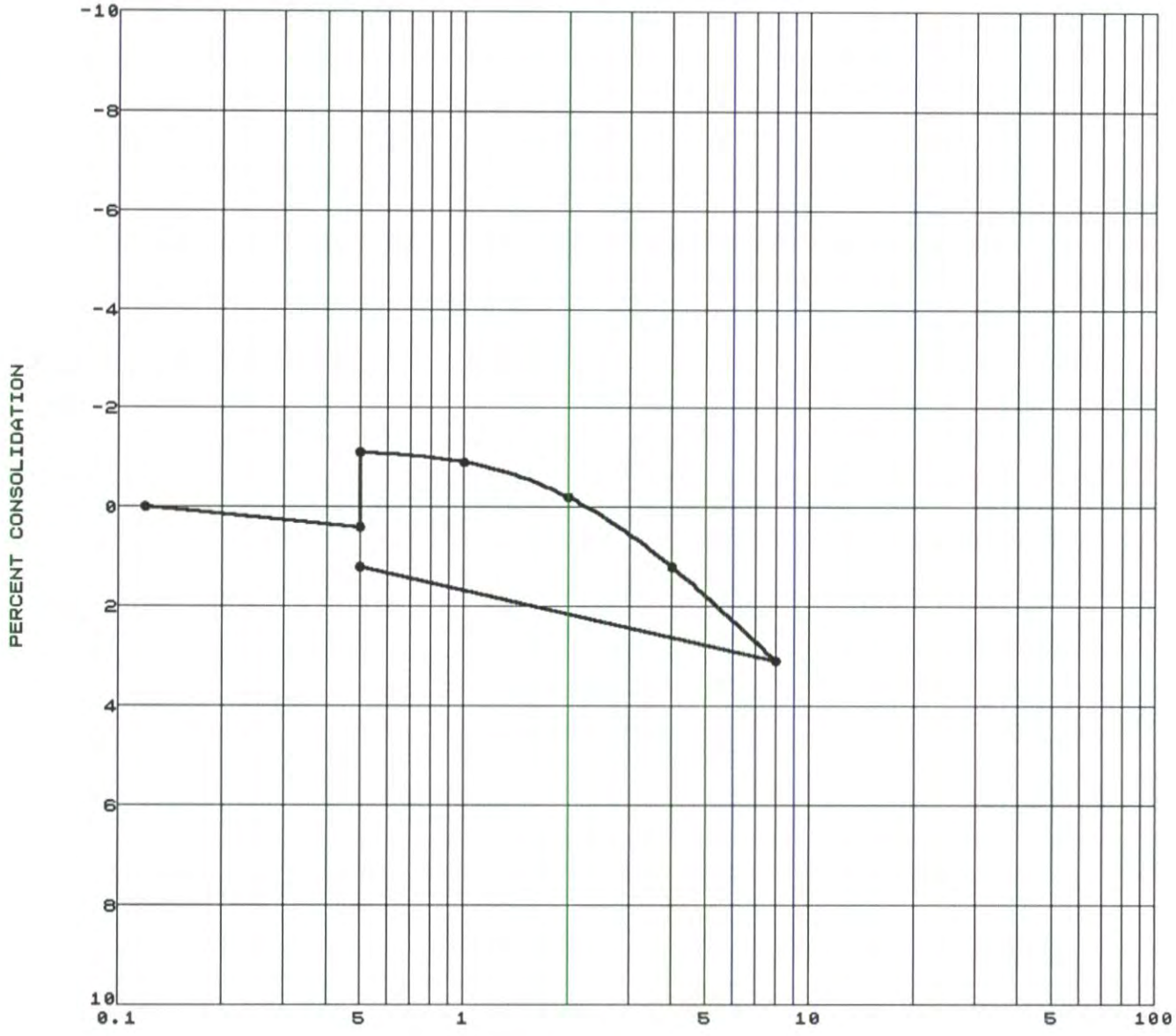
SAN DIEGO COUNTY, CALIFORNIA

ECKE

Figure B-1

File No. 04581-03-01

SAMPLE NO. B8-1



Initial Dry Density (pcf)	110.9	Initial Saturation (%)	67.2
Initial Water Content (%)	12.1	Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

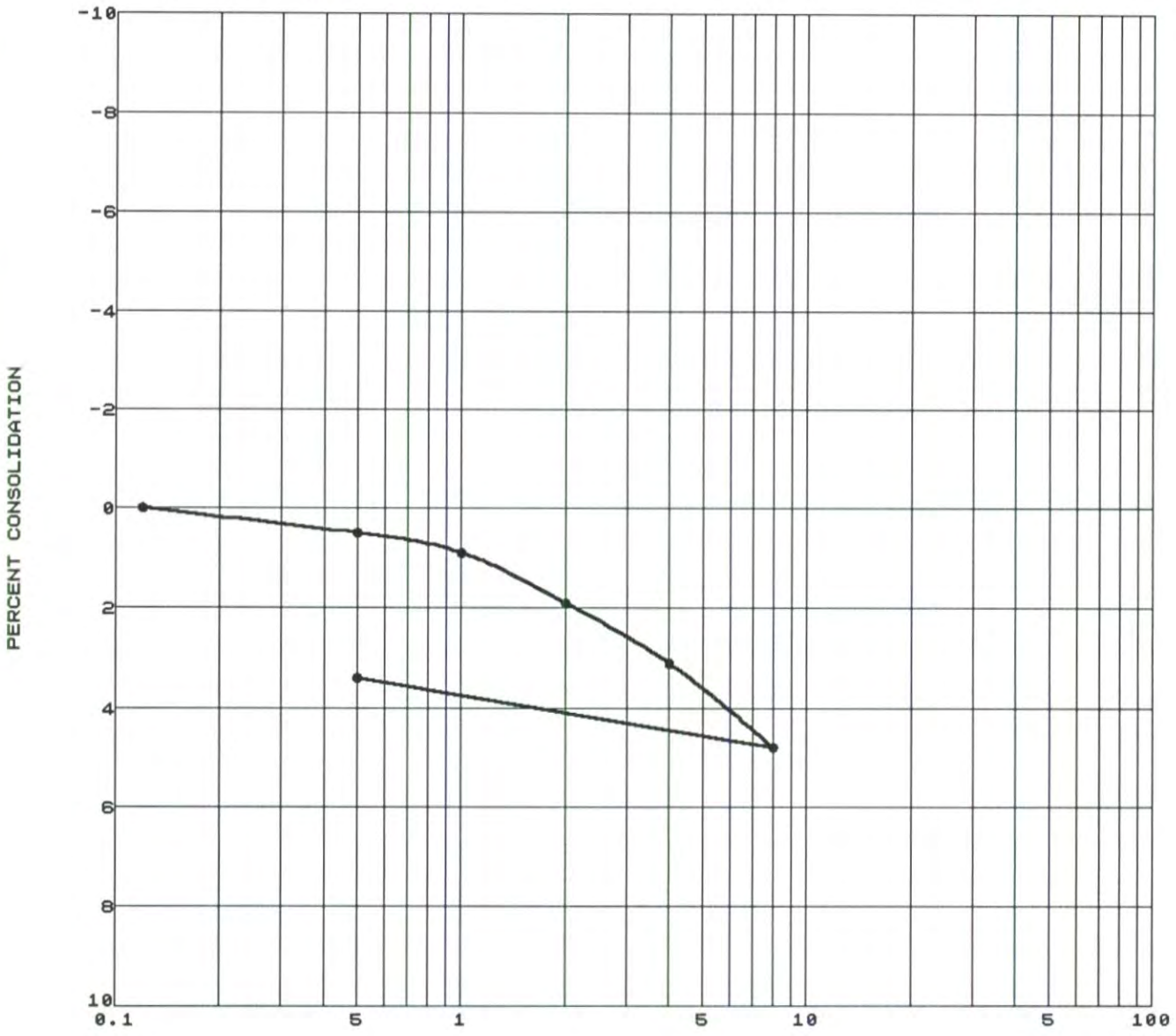
SAN DIEGO COUNTY, CALIFORNIA

ECKE

Figure B-2

File No. 04581-03-01

SAMPLE NO. B8-2



Initial Dry Density (pcf)	87.8	Initial Saturation (%)	92.9
Initial Water Content (%)	31.7	Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

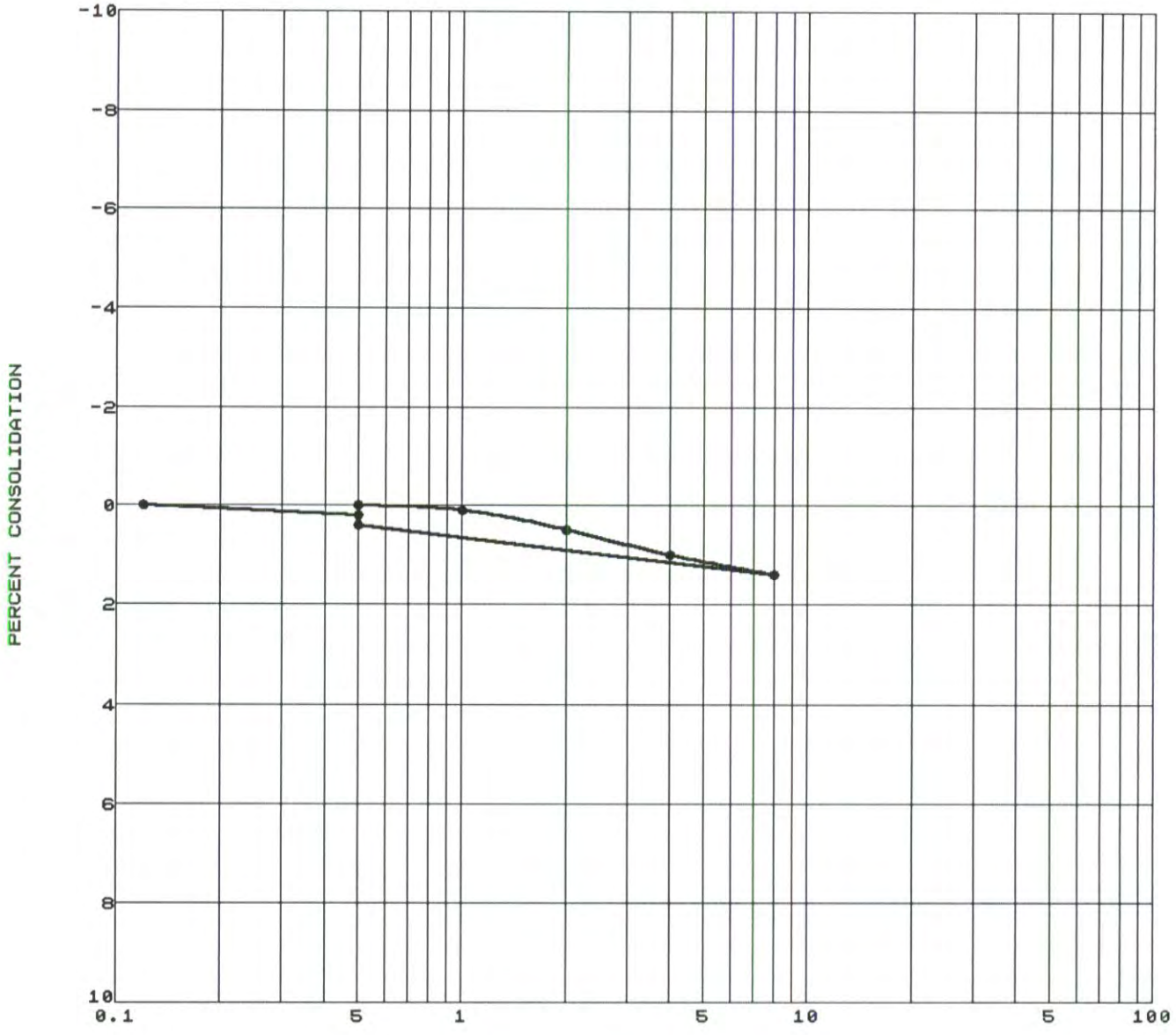
SAN DIEGO COUNTY, CALIFORNIA

ECKE

Figure B-3

File No. 04581-03-01

SAMPLE NO. B9-1



Initial Dry Density (pcf)	104.8	Initial Saturation (%)	57.7
Initial Water Content (%)	11.5	Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

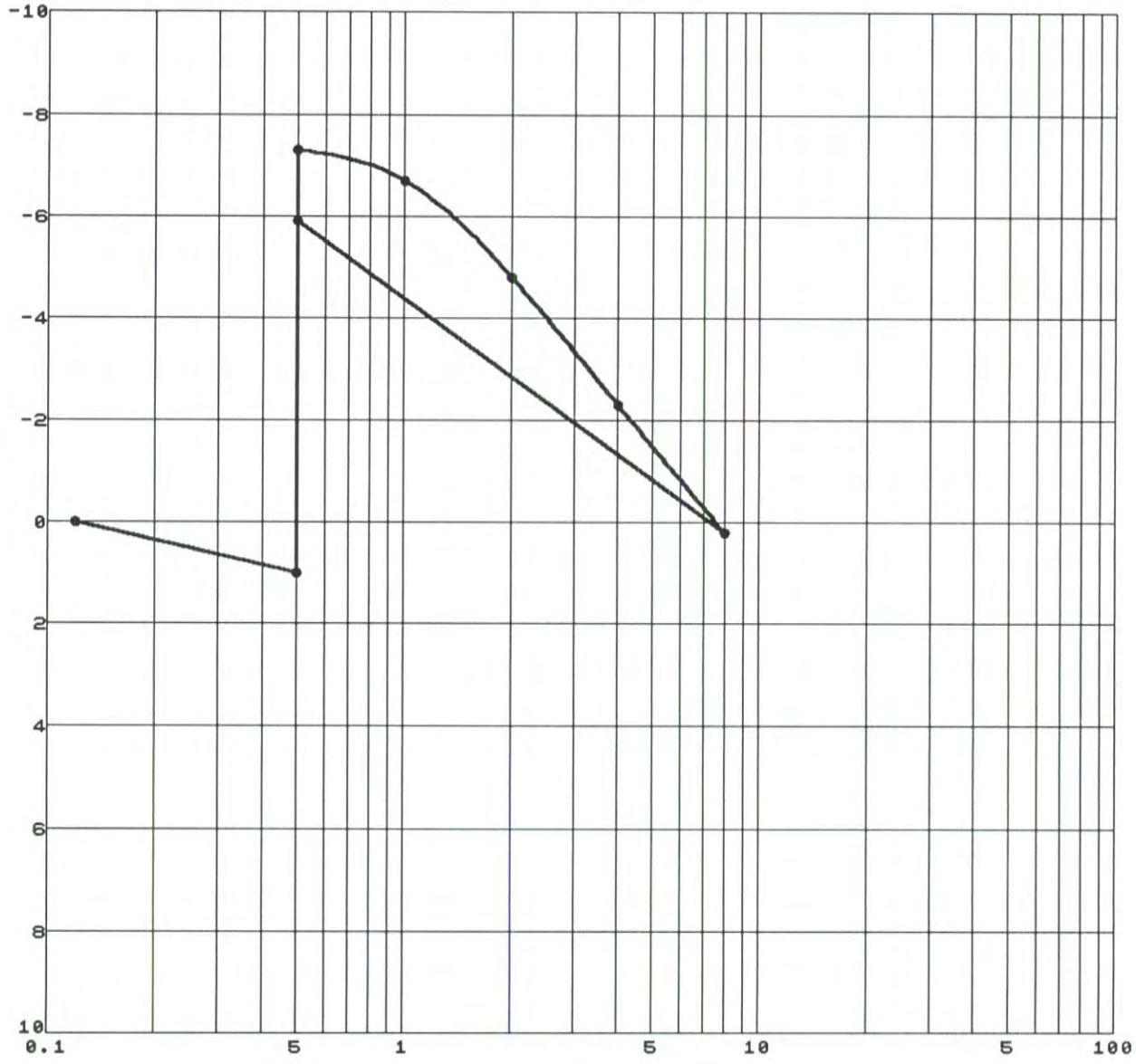
SAN DIEGO COUNTY, CALIFORNIA

ECKE

Figure B-4

File No. 04581-03-01

SAMPLE NO. B10-1



Initial Dry Density (pcf)	89.6	Initial Saturation (%)	85.0
Initial Water Content (%)	27.4	Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

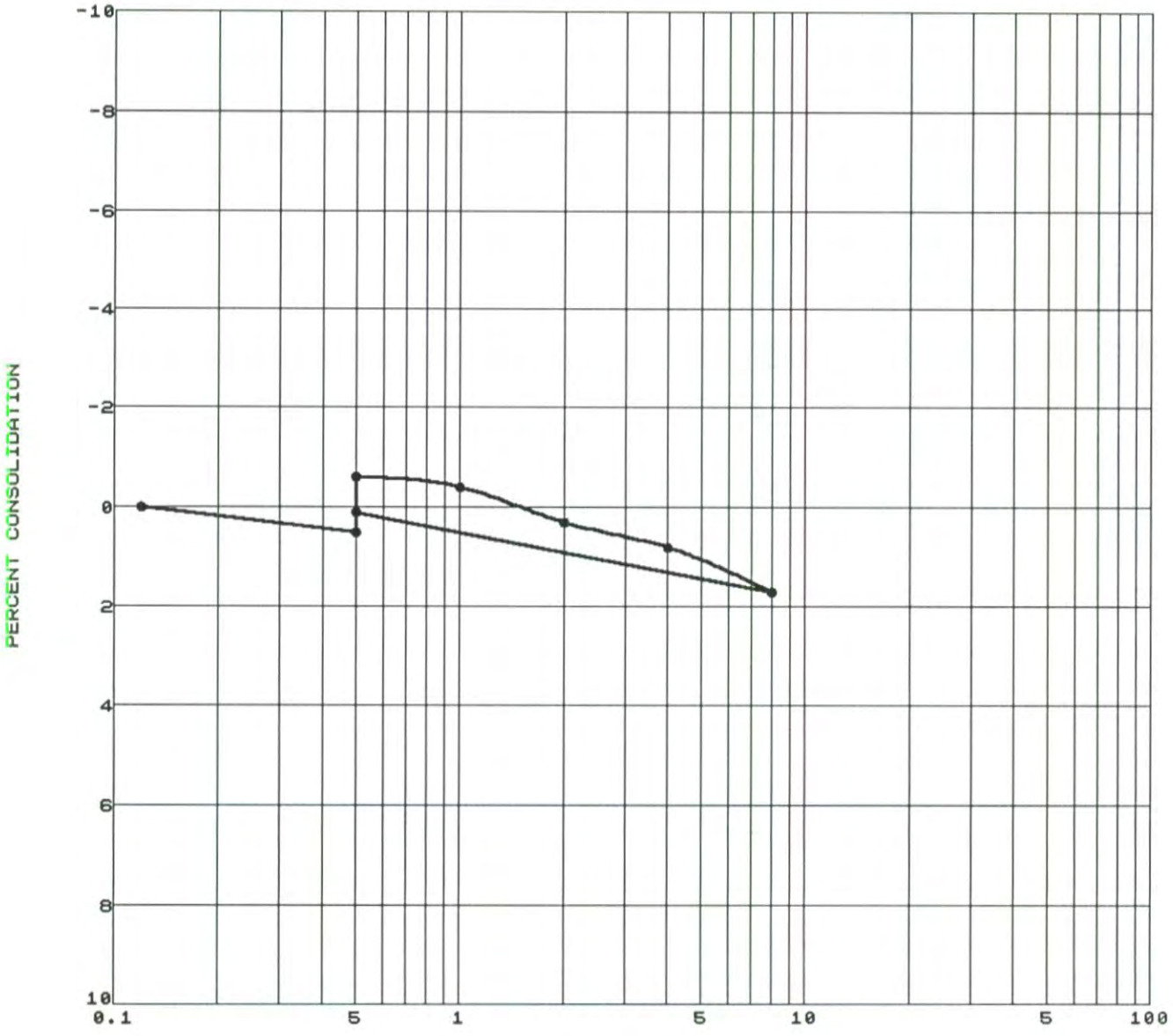
SAN DIEGO COUNTY, CALIFORNIA

ECKE

Figure B-5

File No. 04581-03-01

SAMPLE NO. B11-1



Initial Dry Density (pcf)	100.0
Initial Water Content (%)	11.6

Initial Saturation (%)	56.6
Sample Saturated at (ksf)	0.5

CONSOLIDATION CURVE

RANCON OTAY MESA

SAN DIEGO COUNTY, CALIFORNIA

APPENDIX C

APPENDIX C

RECOMMENDED GRADING SPECIFICATIONS

FOR

EAST OTAY MESA CENTER MIXED-USE
OTAY MESA AND HARVEST ROADS
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. 06263-42-03

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

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

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

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

2. DEFINITIONS

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

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

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

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

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

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

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

3. MATERIALS

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

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

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

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

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

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9

and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

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

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

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

4. CLEARING AND PREPARING AREAS TO BE FILLED

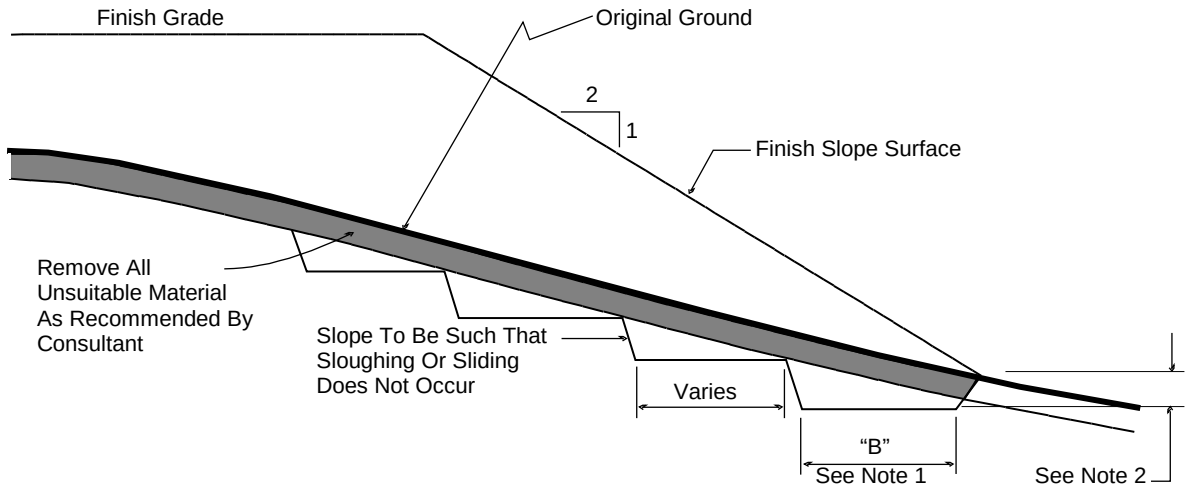
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material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

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

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

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

TYPICAL BENCHING DETAIL



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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection

variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

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

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

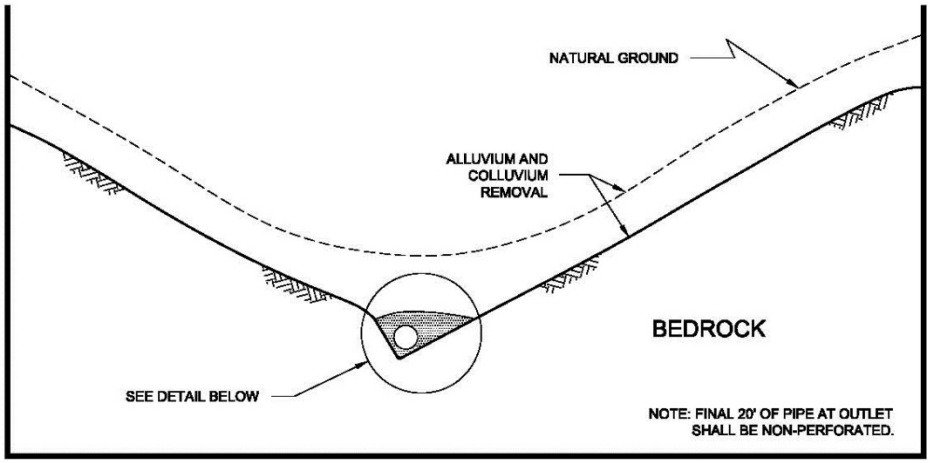
6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant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

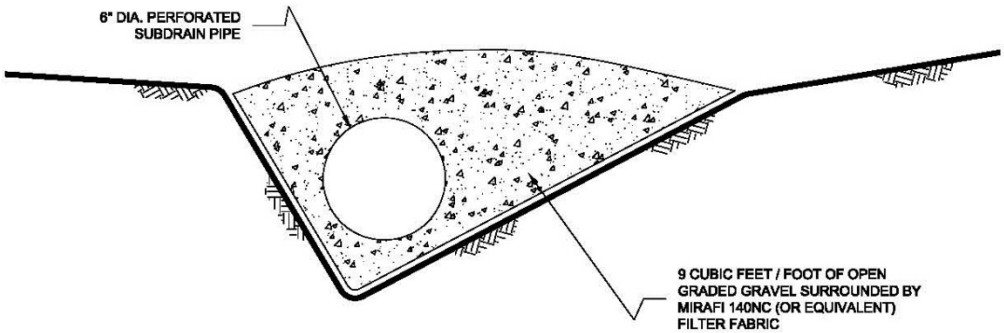
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

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

TYPICAL CANYON DRAIN DETAIL





NOTES:

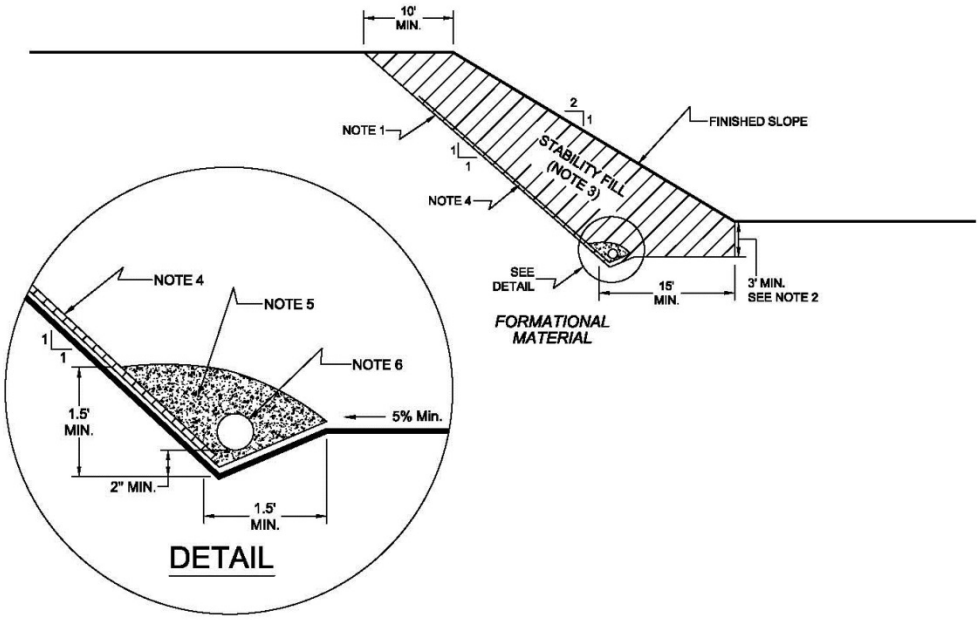
1.....6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS
IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

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

NO SCALE

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

TYPICAL STABILITY FILL DETAIL



NOTES:

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

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

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

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

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

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

NO SCALE

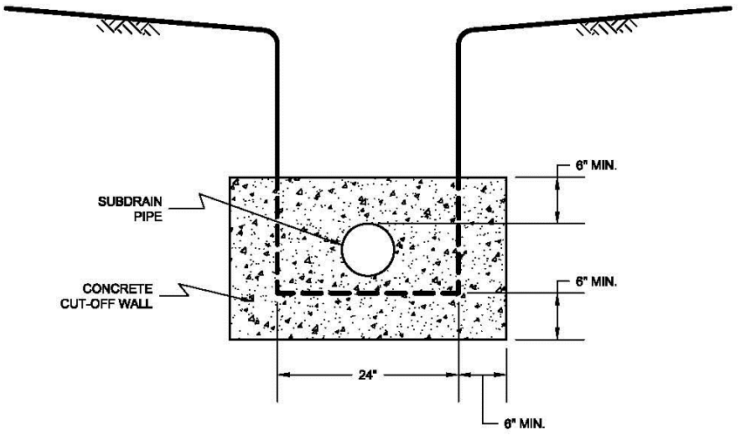
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing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

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

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

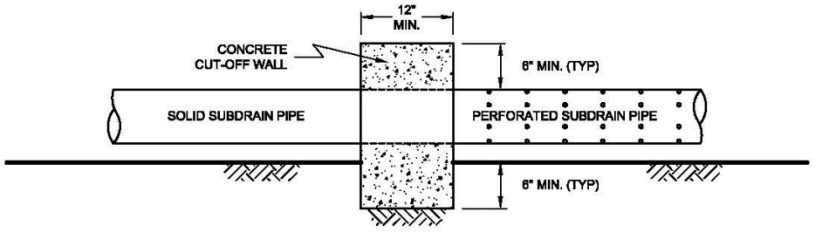
TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW

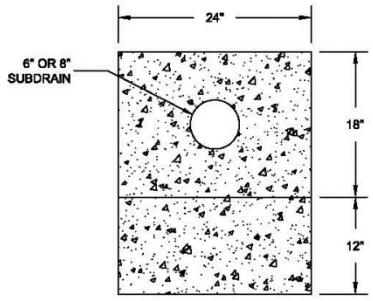


NO SCALE

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

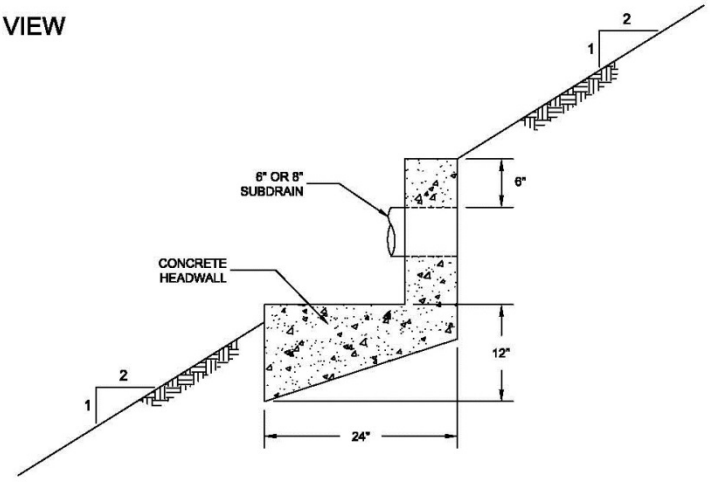
TYPICAL HEADWALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW



NOTE: HEADWALL SHOULD OUTLET AT TOE OF FILL SLOPE OR INTO CONTROLLED SURFACE DRAINAGE

NO SCALE

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

8. OBSERVATION AND TESTING

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

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

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

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

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

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

8.6.1 Soil and Soil-Rock Fills:

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

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

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

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

9. PROTECTION OF WORK

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

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

10. CERTIFICATIONS AND FINAL REPORTS

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

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

LIST OF REFERENCES

Anderson, J. G. (1984), *Synthesis of Seismicity and Geological Data in California,* U.S. Geological Survey Open-file Report 84-424, pp. 1-186;

Boore, D. M., and Atkinson, G. M (2007), *Boore-Atkinson NGA Ground Motion Relations for the Geometric Mean Horizontal Component of Peak and Spectral Ground Motion Parameters*, Report Number PEER 2007/01;

California Division of Mines and Geology (1996), *Probabilistic Seismic Hazard Assessment for the State of California,* Open File Report 96-08;

California Geological Survey (2013), *Probabilistic Seismic Hazards Mapping Ground Motion Page*, www.conservation.ca.gov/cgs/rghm/pshamap/pshamap.asp;

Chiou, B. S. -J., and Youngs, R. R. (2008), *A NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra,* Earthquake Spectra, 24(1);

Geocon Incorporated (1999), *Updated Geotechnical Investigation for Sunroad Centrum (Rancon Otay Mesa,* Project No. 06263-22-01;

Geocon Incorporated (1990), *Soil and Geologic Investigation for Rancon Otay Mesa, San Diego County, California,* Project No. 04581-03-01;

Geocon Incorporated (1989), *Geotechnical Investigation for Planning Purposes, Ecke Ranch, Otay Mesa, San Diego County, California;*

Hart, M. W. (2000), *Bedding-Parallel Shear Zones as Landslide Mechanisms in Horizontal Sedimentary Rocks*, Environmental & Engineering Geoscience, Vol. VI, No. 2, pp195-113;

Jennings, C. W. (1994), *Fault Activity Map of California ad Adjacent Areas,* California Division of Mines and Geology;

Kennedy, M. P., and Tan, S. S. (2008), *Geologic Map of the San Diego 30' x 60' Quadrangle, California*, USGS Regional Geologic Map Series, 1:100,000 Scale, Map No. 3;

Risk Engineering (2015), *EZ-FRISK, Version 7.65*;

Wesnousky, S. G. (1986), *Earthquakes, Quaternary Faults, and Seismic Hazard in California*, Journal of Geophysical Research, Vol. 91, No. B12, pp. 12, 587, 631.