Appendix D

Cone Penetrometer Testing – Soil Volume Estimates

CPT Listings

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 7.5 feet

CPT NO.: SV-1
DATE : 05-20-2008
TIME : 12:03:30
Groundwater not encountered

LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.53	23.3	37.28	0.73	3.1	12	19	0.06	----	3.10	Clayey SILT to Silty CLAY	120-130
1.04	64.1	102.56	2.33	3.6	32	51	0.13	----	8.54	"	130-140
1.54	108.2	173.12	1.84	1.7	36	58	0.20	41	----	Silty SAND to Sandy SILT	"
2.06	127.3	203.68	5.39	4.2	127	204	0.27	----	16.96	Very Stiff Fine Grained *	>140
2.54	111.1	177.76	3.00	2.7	37	59	0.34	41	----	Silty SAND to Sandy SILT	130-140
3.01	79.2	126.72	1.87	2.4	26	42	0.40	39	----	"	"
3.55	67.5	108.00	1.38	2.0	23	36	0.47	38	----	"	"
4.01	77.6	124.16	1.61	2.1	26	41	0.53	39	----	"	"
4.57	104.0	166.40	1.60	1.5	26	42	0.61	41	----	SAND to Silty SAND	"
5.05	136.4	218.24	1.48	1.1	27	44	0.67	43	----	SAND	120-130
5.58	153.1	244.96	3.00	2.0	51	82	0.74	43	----	Silty SAND to Sandy SILT	130-140
6.04	227.9	363.94	4.34	1.9	46	73	0.80	45	----	SAND	"
6.55	324.0	495.04	6.97	2.2	65	99	0.87	47	----	"	"
7.06	359.5	523.98	10.06	2.8	180	262	0.94	48	----	SAND to Clayey SAND *	>140
7.51	463.1	647.42	10.32	2.2	232	324	1.00	>48	----	"	130-140

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 11.5 feet

CPT NO.: SV-2
DATE : 05-20-2008
TIME : 11:47:35
Groundwater measured at 7.5 feet

LFR, INC.
cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.52	46.0	73.60	1.07	2.3	18	29	0.06	----	6.13	Sandy SILT to Clayey SILT	130-140
1.02	74.8	119.68	2.96	4.0	37	60	0.13	----	9.96	Clayey SILT to Silty CLAY	"
1.51	51.7	82.72	1.27	2.5	21	33	0.19	----	6.88	Sandy SILT to Clayey SILT	"
2.04	45.4	72.64	0.78	1.7	15	24	0.27	36	----	Silty SAND to Sandy SILT	"
2.56	62.1	99.36	0.84	1.4	21	33	0.33	38	----	"	120-130
3.02	33.0	52.80	1.51	4.6	22	35	0.39	----	4.37	Silty CLAY to CLAY	130-140
3.57	84.7	135.52	2.72	3.2	34	54	0.47	----	11.26	Sandy SILT to Clayey SILT	"
4.04	54.0	86.40	3.21	5.9	54	86	0.53	----	7.16	CLAY	"
4.51	83.3	133.28	3.96	4.8	83	133	0.59	----	11.07	Very Stiff Fine Grained *	"
5.07	126.4	202.24	4.20	3.3	51	81	0.67	----	16.81	Sandy SILT to Clayey SILT	"
5.54	128.3	205.28	6.26	4.9	128	205	0.73	----	17.06	Very Stiff Fine Grained *	>140
6.06	209.0	333.33	5.19	2.5	70	111	0.81	45	----	Silty SAND to Sandy SILT	130-140
6.50	195.0	299.38	3.65	1.9	49	75	0.86	44	----	SAND to Silty SAND	"
7.00	156.1	229.05	2.66	1.7	39	57	0.93	43	----	"	"
7.51	100.4	143.66	2.29	2.3	33	48	0.97	40	----	Silty SAND to Sandy SILT	"
8.00	106.2	148.40	2.33	2.2	35	49	1.01	40	----	"	"
8.55	285.2	392.66	4.79	1.7	57	79	1.04	46	----	SAND	"
9.04	269.1	365.48	6.13	2.3	90	122	1.08	45	----	Silty SAND to Sandy SILT	"
9.54	171.5	229.68	4.56	2.7	57	77	1.12	43	----	"	"
10.03	168.5	223.00	1.53	0.9	34	45	1.15	43	----	SAND	120-130
10.52	165.1	215.43	2.30	1.4	33	43	1.18	42	----	"	130-140
11.01	380.2	489.12	5.64	1.5	76	98	1.22	47	----	"	"
11.55	561.1	710.46	10.52	1.9	112	142	1.26	>48	----	"	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 10.0 feet

CPT NO.: SV-3
DATE : 05-20-2008
TIME : 11:47:35
Groundwater measured at 7.0 feet

LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.53	184.3	294.88	2.27	1.2	37	59	0.06	44	----	Clayey SILT to Silty CLAY	130-140
1.02	123.7	197.92	2.74	2.2	41	66	0.13	42	----	Silty SAND to Sandy SILT	"
1.55	78.0	124.80	2.20	2.8	31	50	0.20	----	10.39	Sandy SILT to Clayey SILT	"
2.06	70.0	112.00	1.11	1.6	23	37	0.27	39	----	Silty SAND to Sandy SILT	"
2.57	98.6	157.76	1.14	1.2	25	39	0.33	41	----	SAND to Silty SAND	120-130
3.02	98.9	158.24	0.94	1.0	25	40	0.39	41	----	"	"
3.58	102.8	164.48	0.91	0.9	26	41	0.46	41	----	"	"
4.03	100.8	161.28	0.97	1.0	25	40	0.51	41	----	"	"
4.57	114.3	182.88	1.03	0.9	29	46	0.58	41	----	"	"
5.01	193.6	309.76	1.57	0.8	39	62	0.64	45	----	SAND	"
5.52	217.1	347.36	2.00	0.9	43	69	0.70	45	----	"	"
6.07	244.5	391.20	2.74	1.1	49	78	0.77	46	----	"	"
6.51	219.1	344.29	2.97	1.4	44	69	0.83	45	----	"	130-140
7.01	198.3	304.37	2.56	1.3	40	61	0.87	44	----	"	"
7.52	230.5	345.37	5.60	2.4	77	115	0.90	45	----	Silty SAND to Sandy SILT	"
8.04	655.2	345.37	9.43	2.4	77	115	0.90	45	----	"	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 11.0 feet

CPT NO.: SV-4
DATE : 05-20-2008
TIME : 12:21:05
Groundwater not encountered

LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.56	70.9	113.44	2.65	3.7	35	57	0.07	----	9.45	Clayey SILT to Silty CLAY	130-140
1.07	68.2	109.12	1.75	2.6	27	44	0.13	----	9.08	Sandy SILT to Clayey SILT	"
1.55	64.2	102.72	1.67	2.6	26	41	0.20	----	8.55	"	"
2.04	60.8	97.28	2.30	3.8	30	49	0.27	----	8.09	Clayey SILT to Silty CLAY	"
2.52	34.6	55.36	1.44	4.2	23	37	0.33	----	4.59	Silty CLAY to CLAY	"
3.08	34.9	55.84	1.03	3.0	17	28	0.41	----	4.63	Clayey SILT to Silty CLAY	"
3.55	27.2	43.52	0.98	3.6	14	22	0.47	----	3.60	"	"
4.04	23.9	38.24	0.82	3.4	12	19	0.54	----	3.15	"	"
4.53	32.6	52.16	0.81	2.5	13	21	0.60	----	4.31	Sandy SILT to Clayey SILT	"
5.04	53.3	85.28	2.75	5.2	53	85	0.67	----	7.06	CLAY	"
5.53	24.5	39.20	1.94	7.9	25	39	0.74	----	3.22	"	"
6.04	18.0	28.69	1.33	7.4	18	29	0.81	----	2.35	"	"
6.52	21.6	33.04	1.78	8.2	22	33	0.87	----	2.82	"	"
7.05	109.4	159.52	1.94	1.8	36	53	0.94	41	----	Silty SAND to Sandy SILT	"
7.51	158.6	221.69	2.03	1.3	32	44	1.00	43	----	SAND	"
7.59	150.0	208.83	2.53	1.7	38	52	1.01	42	----	SAND to Silty SAND	"
8.05	203.7	276.98	4.02	2.0	51	69	1.08	44	----	"	"
8.52	278.7	369.92	5.90	2.1	56	74	1.14	46	----	SAND	"
9.04	329.9	425.66	6.97	2.1	66	85	1.21	46	----	"	"
9.53	385.3	484.44	8.38	2.2	77	97	1.28	47	----	"	"
10.04	443.7	543.19	8.48	1.9	89	109	1.35	48	----	"	"
10.51	374.6	447.10	5.13	1.4	75	89	1.41	47	----	"	"
11.03	409.7	475.29	6.56	1.6	82	95	1.48	47	----	"	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 8.5 feet

CPT NO.: SV-5
DATE : 05-20-2008
TIME : 13:50:50
Groundwater not encountered

LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.53	87.5	140.00	2.12	2.4	29	47	0.06	40	----	Silty SAND to Sandy SILT	130-140
1.03	105.8	169.28	4.80	4.5	106	169	0.13	----	14.10	Very Stiff Fine Grained *	"
1.53	50.8	81.28	2.47	4.9	34	54	0.20	----	6.76	Silty CLAY to CLAY	"
2.02	28.6	45.76	0.61	2.1	11	18	0.26	----	3.80	Sandy SILT to Clayey SILT	120-130
2.54	28.8	46.08	0.66	2.3	12	18	0.32	----	3.82	"	"
3.02	11.5	18.40	0.32	2.8	8	12	0.38	----	1.89	Silty CLAY to CLAY	110-120
3.51	89.7	143.52	2.53	2.8	36	57	0.44	----	11.93	Sandy SILT to Clayey SILT	130-140
4.09	114.5	183.20	6.12	5.3	115	183	0.52	----	15.23	Very Stiff Fine Grained *	>140
4.56	151.8	242.88	6.69	4.4	152	243	0.59	----	20.20	"	"
5.03	144.9	231.84	5.14	3.5	58	93	0.65	----	19.28	Sandy SILT to Clayey SILT	130-140
5.55	124.7	199.52	5.09	4.1	125	200	0.73	----	16.58	Very Stiff Fine Grained *	>140
6.04	464.1	742.56	12.68	2.7	232	371	0.80	>48	----	SAND to Clayey SAND *	"
6.52	582.1	894.48	16.61	2.9	291	447	0.86	>48	----	"	"
7.04	456.6	668.35	15.96	3.5	228	334	0.94	>48	----	"	"
7.53	236.8	331.23	5.98	2.5	79	110	1.00	45	----	Silty SAND to Sandy SILT	130-140
8.01	233.2	318.32	2.97	1.3	47	64	1.07	45	----	SAND	"
8.51	388.8	517.16	5.12	1.3	78	103	1.13	47	----	"	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 6.0 feet

CPT NO.: SV-6
DATE : 05-20-2008
TIME : 12:37:43
Groundwater not encountered

LFR, INC.
cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.56	394.1	630.56	10.26	2.6	197	315	0.07	>48	----	SAND to Clayey SAND *	130-140
1.02	284.3	454.88	10.33	3.6	142	227	0.13	47	----	"	>140
1.53	156.2	249.92	7.55	4.8	156	250	0.20	----	20.81	Very Stiff Fine Grained *	"
2.03	82.7	132.32	2.47	3.0	33	53	0.27	----	11.01	Sandy SILT to Clayey SILT	130-140
2.56	56.7	90.72	1.23	2.2	23	36	0.34	----	7.54	"	"
3.06	61.5	98.40	0.88	1.4	21	33	0.40	38	----	Silty SAND to Sandy SILT	120-130
3.51	87.2	139.52	1.04	1.2	22	35	0.46	40	----	SAND to Silty SAND	"
4.05	80.7	129.12	1.85	2.3	27	43	0.53	39	----	Silty SAND to Sandy SILT	130-140
4.53	82.6	132.16	1.26	1.5	28	44	0.60	40	----	"	"
5.07	291.0	465.60	3.07	1.1	58	93	0.66	47	----	SAND	120-130
5.53	393.4	629.44	7.81	2.0	79	126	0.73	>48	----	"	130-140
6.03	487.9	780.64	10.73	2.2	244	390	0.79	>48	----	SAND to Clayey SAND *	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 10.5 feet

CPT NO.: SV-7
DATE : 05-20-2008
TIME : 12:52:05
Groundwater not encountered

LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.57	254.2	406.72	8.27	3.3	127	203	0.07	46	----	Sandy SILT to Clayey SILT	>140
1.05	214.8	343.68	6.37	3.0	72	115	0.13	45	----	Silty SAND to Sandy SILT	130-140
1.57	306.3	490.08	6.81	2.2	61	98	0.20	47	----	SAND	"
2.06	221.5	354.40	3.82	1.7	44	71	0.27	45	----	"	"
2.56	212.2	339.52	6.25	2.9	71	113	0.34	45	----	Silty SAND to Sandy SILT	"
3.05	169.5	271.20	5.22	3.1	57	90	0.40	44	----	"	"
3.54	117.8	188.48	3.96	3.4	47	75	0.47	----	15.68	Sandy SILT to Clayey SILT	"
4.03	167.9	268.64	3.77	2.2	56	90	0.53	44	----	Silty SAND to Sandy SILT	"
4.55	82.5	132.00	2.11	2.6	33	53	0.60	----	10.96	Sandy SILT to Clayey SILT	"
5.01	39.7	63.52	1.32	3.3	20	32	0.67	----	5.25	Clayey SILT to Silty CLAY	"
5.50	82.2	131.52	3.23	3.9	41	66	0.73	----	10.91	"	"
6.05	28.3	45.08	1.82	6.4	28	45	0.81	----	3.72	CLAY	"
6.53	22.0	33.63	1.44	6.5	22	34	0.87	----	2.88	"	"
7.00	29.5	43.19	1.26	4.3	20	29	0.94	----	3.87	Silty CLAY to CLAY	"
7.57	15.3	21.37	0.75	4.9	15	21	1.01	----	1.97	CLAY	120-130
8.06	17.1	23.34	0.95	5.6	17	23	1.07	----	2.21	"	"
8.53	56.4	75.11	1.83	3.2	23	30	1.13	----	7.44	Sandy SILT to Clayey SILT	130-140
9.08	254.2	328.79	4.43	1.7	51	66	1.20	45	----	SAND	"
9.54	246.9	311.15	7.84	3.2	123	156	1.27	45	----	SAND to Clayey SAND *	>140
10.04	549.4	674.58	11.30	2.1	275	337	1.34	>48	----	"	130-140
10.54	611.7	731.30	13.54	2.2	306	366	1.41	>48	----	"	"

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00(LFR-05)
Terminated at 7.0 feet

CPT NO.: SV-8
DATE : 05-20-2008
TIME : 13:06:55
Groundwater not encountered

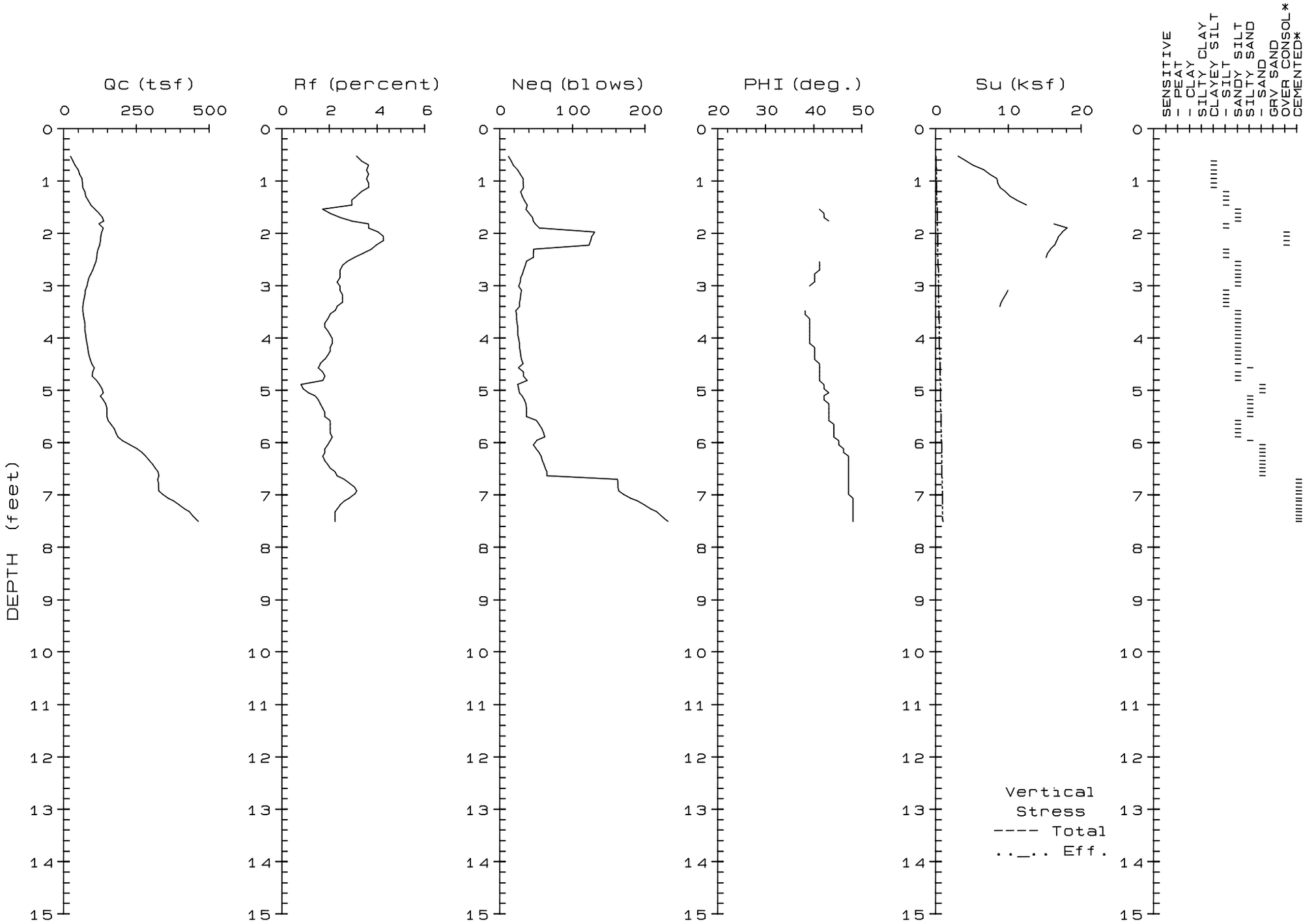
LFR, INC.

cpts by John Sarmiento & Associates

DEPTH (feet)	Qc (tsf)	Qc' (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT' (N')	EffVtStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.57	285.0	456.00	8.97	3.1	143	228	0.07	47	----	Silty CLAY to CLAY	>140
1.04	253.1	404.96	9.64	3.8	127	202	0.13	46	----	"	"
1.57	146.2	233.92	4.04	2.8	49	78	0.20	43	----	Silty SAND to Sandy SILT	130-140
2.01	87.1	139.36	1.20	1.4	22	35	0.26	40	----	SAND to Silty SAND	120-130
2.53	22.1	35.36	0.95	4.3	15	24	0.33	----	2.92	Silty CLAY to CLAY	130-140
3.06	17.2	27.52	0.72	4.2	17	28	0.40	----	2.27	CLAY	120-130
3.53	22.5	36.00	0.82	3.6	15	24	0.46	----	2.97	Silty CLAY to CLAY	130-140
4.02	17.8	28.48	0.96	5.4	18	28	0.53	----	2.34	CLAY	"
4.51	40.3	64.48	1.60	4.0	20	32	0.59	----	5.33	Clayey SILT to Silty CLAY	"
5.00	80.0	128.00	1.85	2.3	27	43	0.66	39	----	Silty SAND to Sandy SILT	"
5.51	37.2	59.52	1.89	5.1	37	60	0.73	----	4.91	CLAY	"
6.02	50.0	80.00	2.27	4.5	33	53	0.80	----	6.61	Silty CLAY to CLAY	"
6.52	146.5	225.18	4.12	2.8	49	75	0.86	43	----	Silty SAND to Sandy SILT	"
7.01	703.6	1038.2	5.87	0.8	117	173	0.92	>48	----	Gravelly SAND to SAND	120-130

DEPTH = Sampling interval (.1 feet)
Qc = Tip bearing resistance TotStr = Total Stress using est. density**
Fs = Sleeve friction resistance Phi = Soil friction angle*
Rf = Tip/Sleeve ratio Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf)
SPT = Equivalent Standard Penetration Test* (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)
References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

CPT Plots



Terminated at 7.5 feet

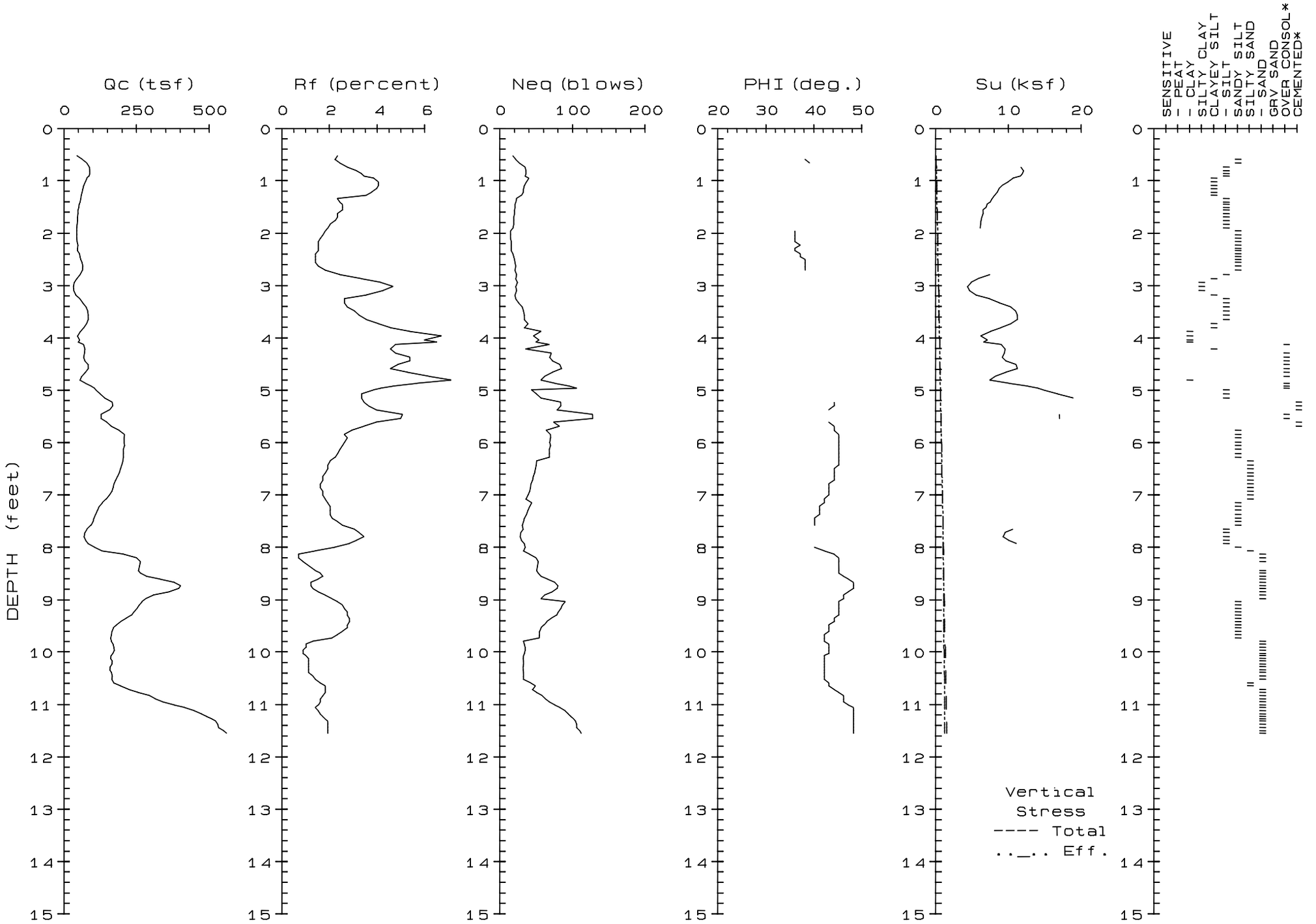
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-1
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 11.5 feet

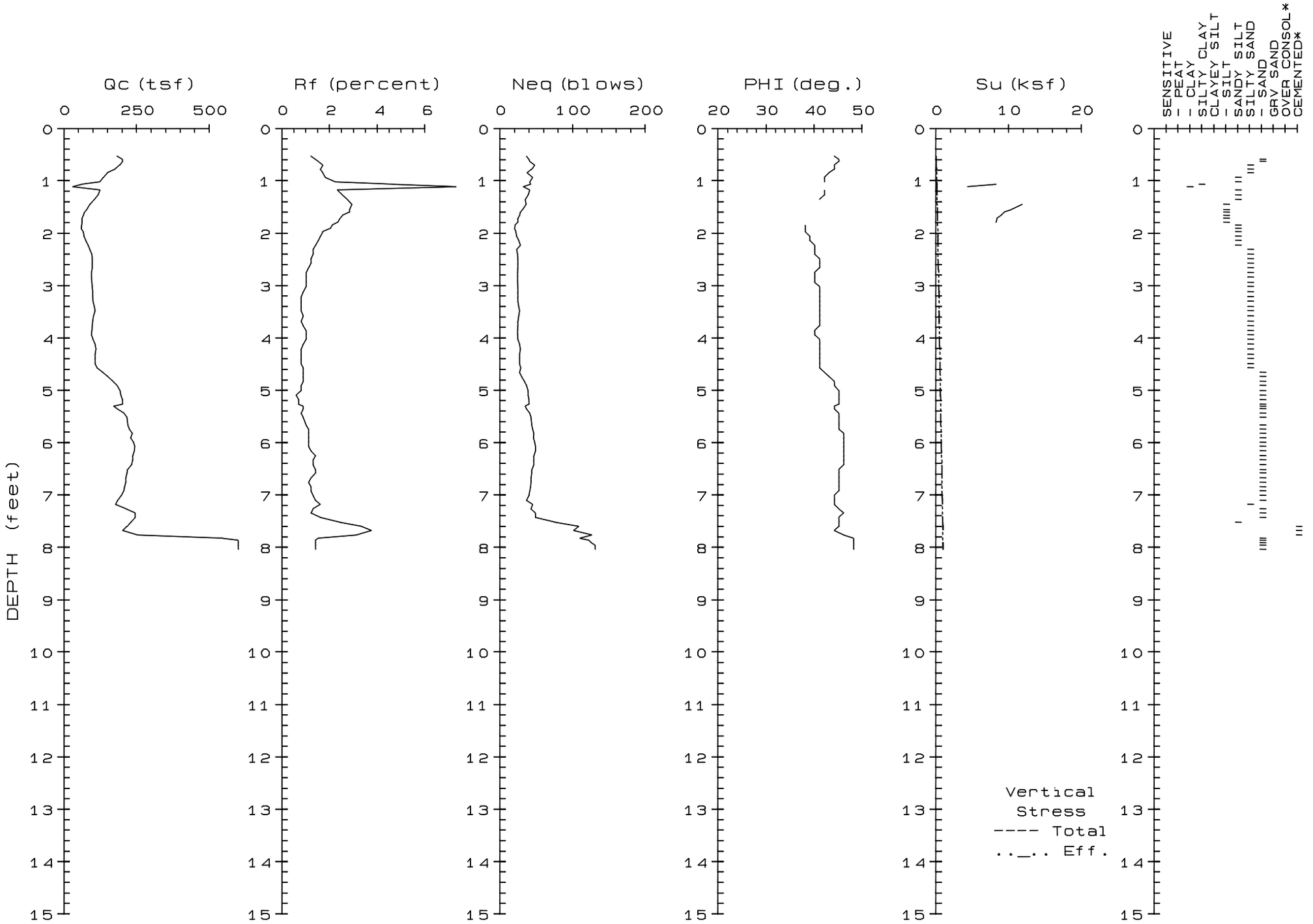
Groundwater measured at 7.5 feet

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-2
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 10.0 feet

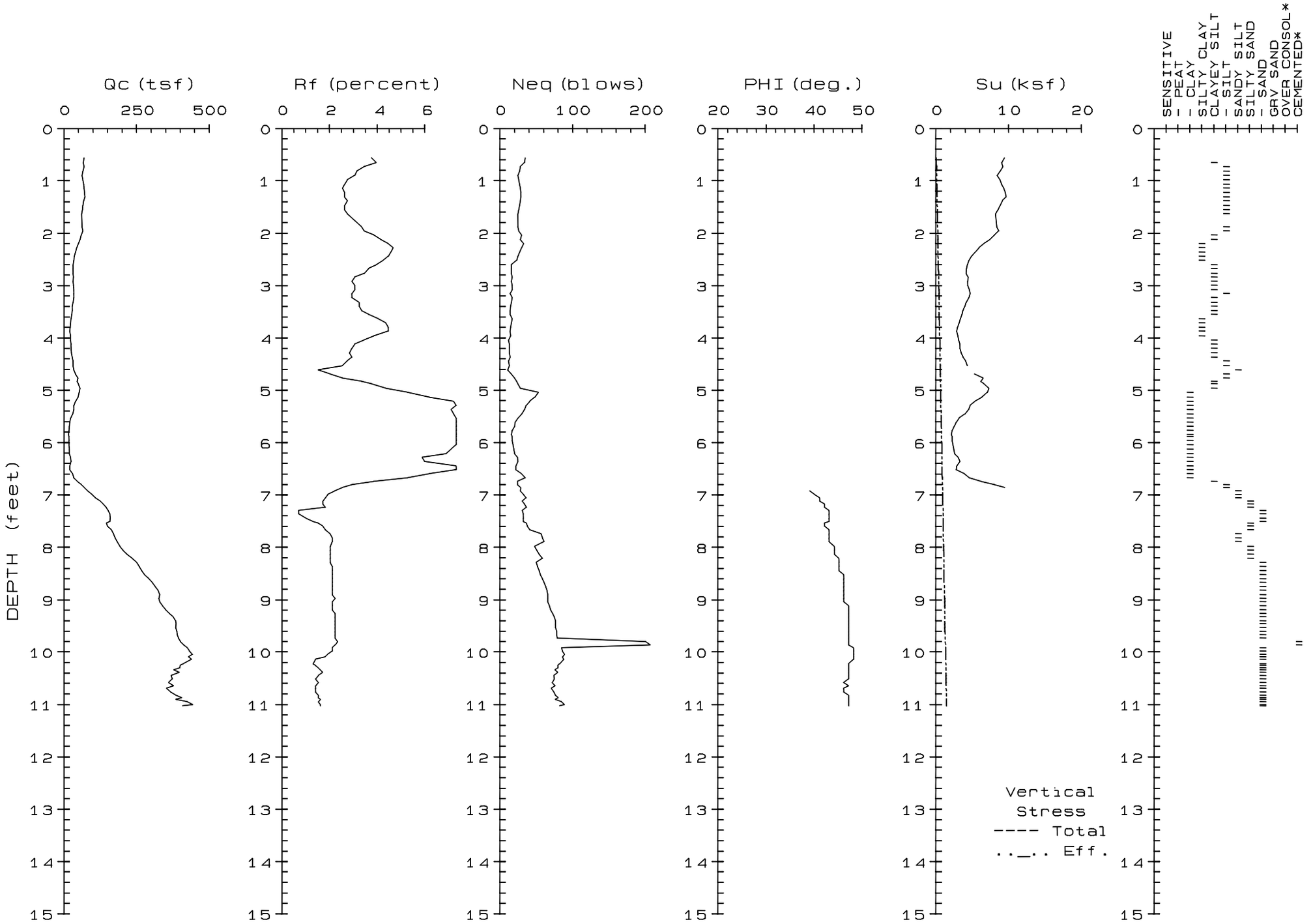
Groundwater measured at 7.0 feet

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-3
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 11.0 feet

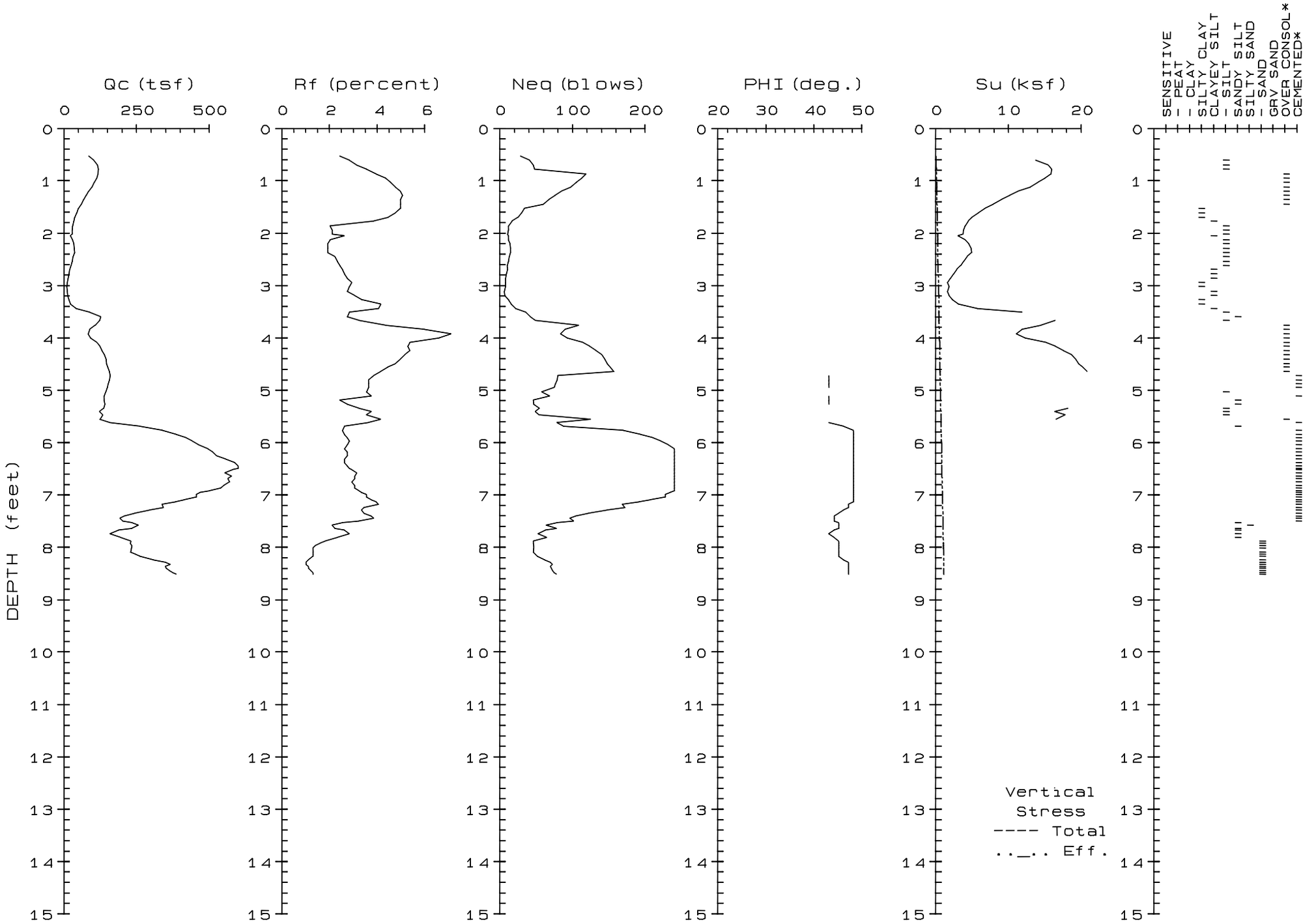
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-4
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 8.5 feet

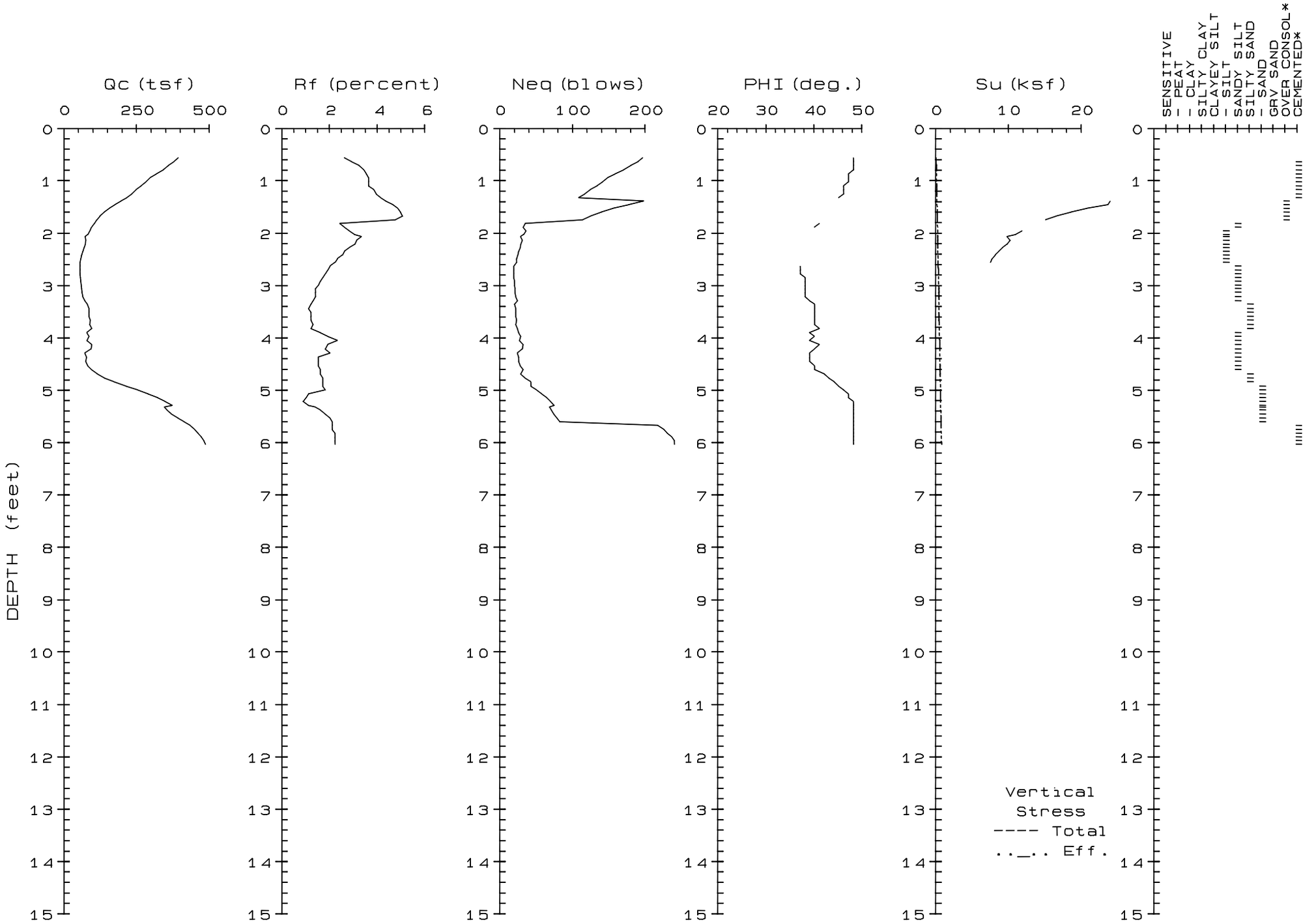
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-5
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 6.0 feet

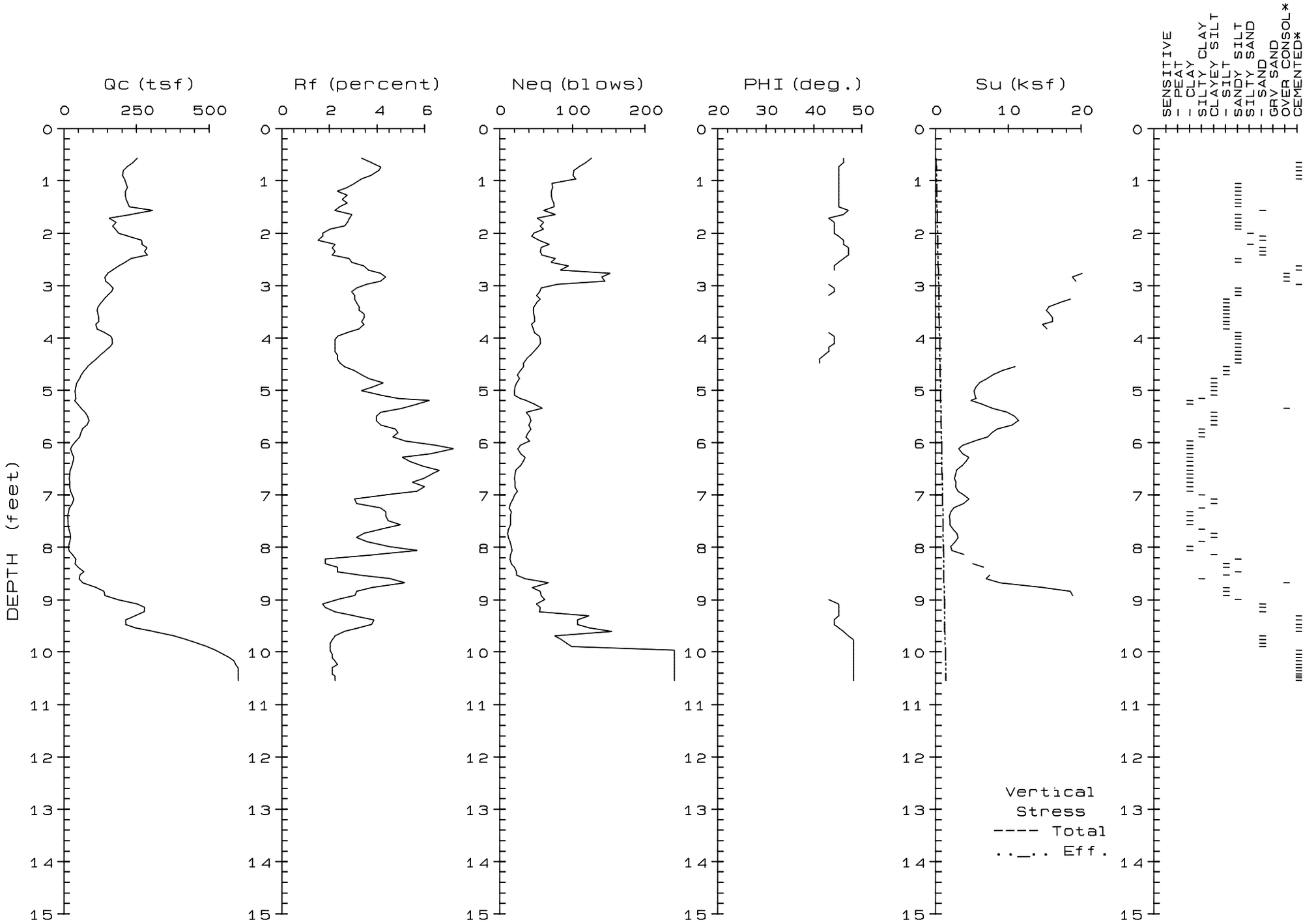
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-6
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 10.5 feet

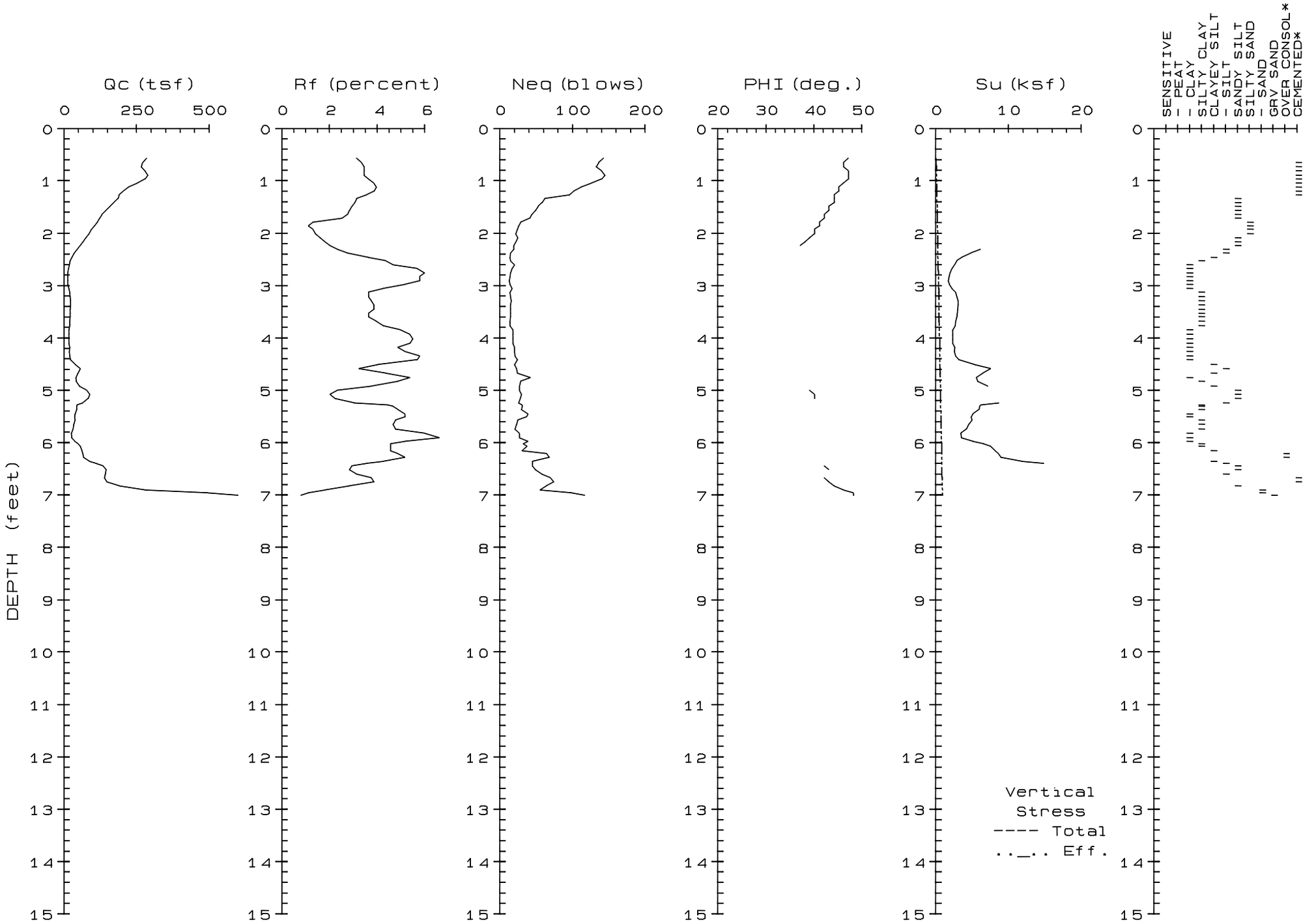
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-7
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 7.0 feet

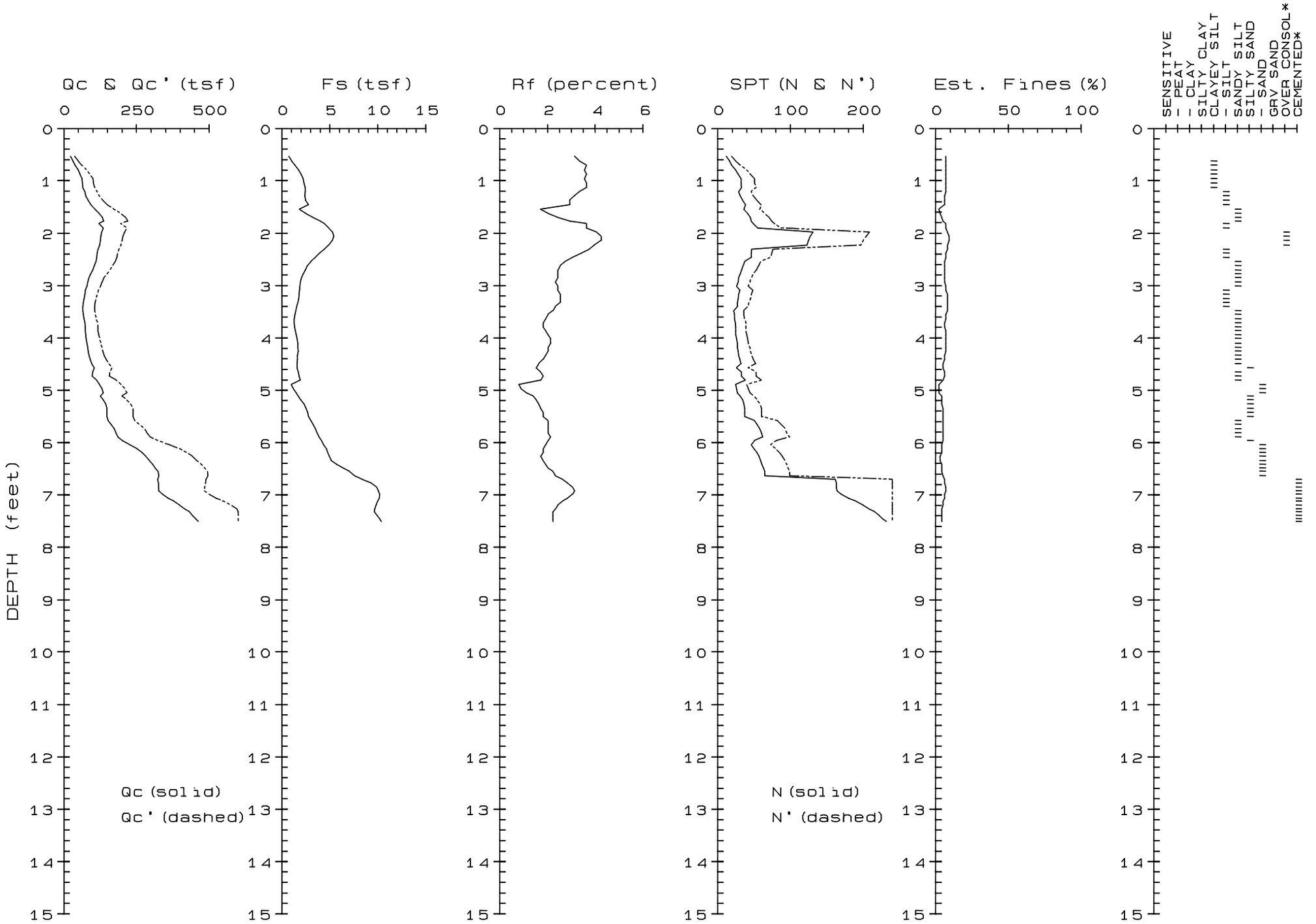
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-8
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 7.5 feet

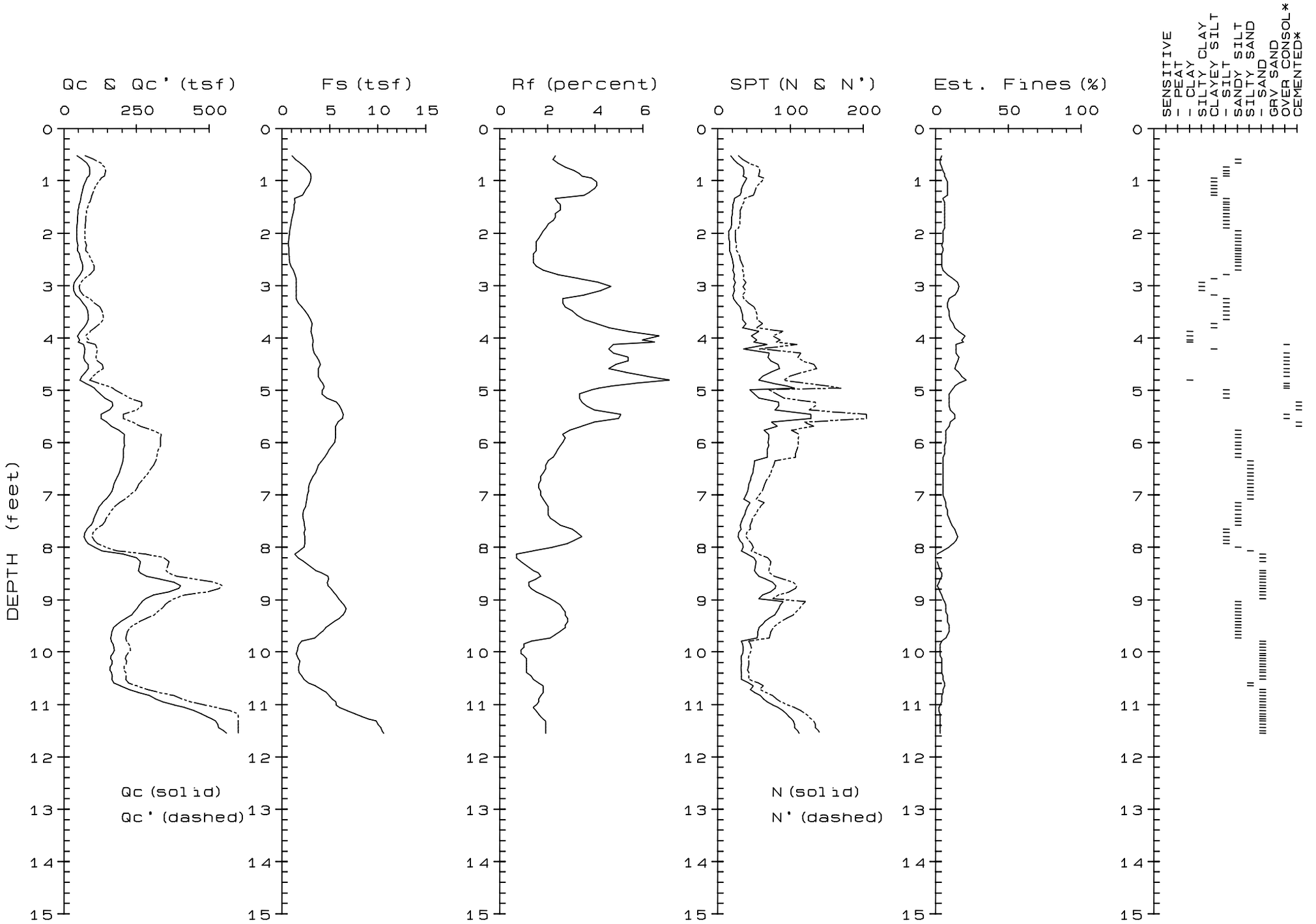
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-1
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 11.5 feet

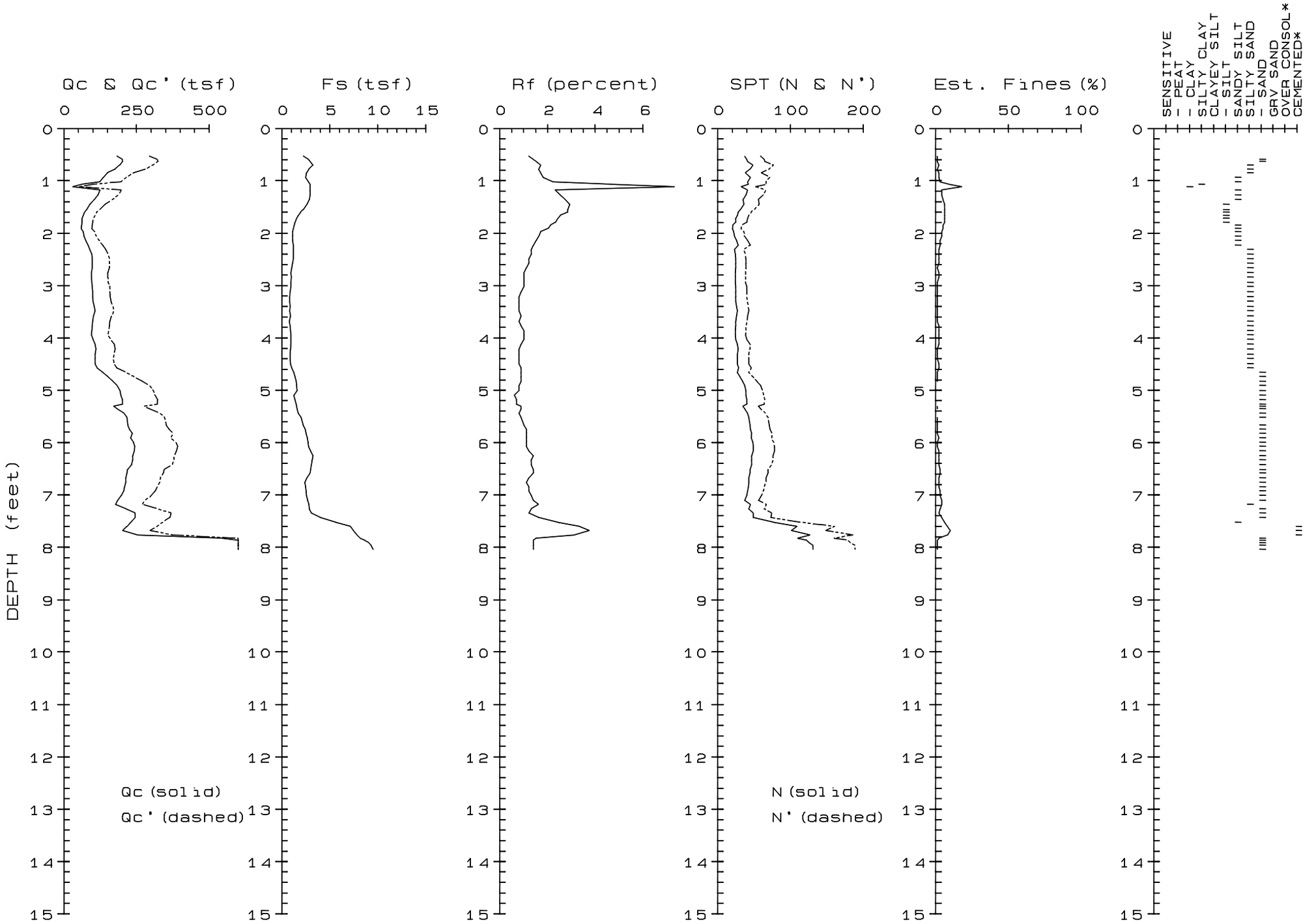
Groundwater measured at 7.5 feet

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-2
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 10.0 feet

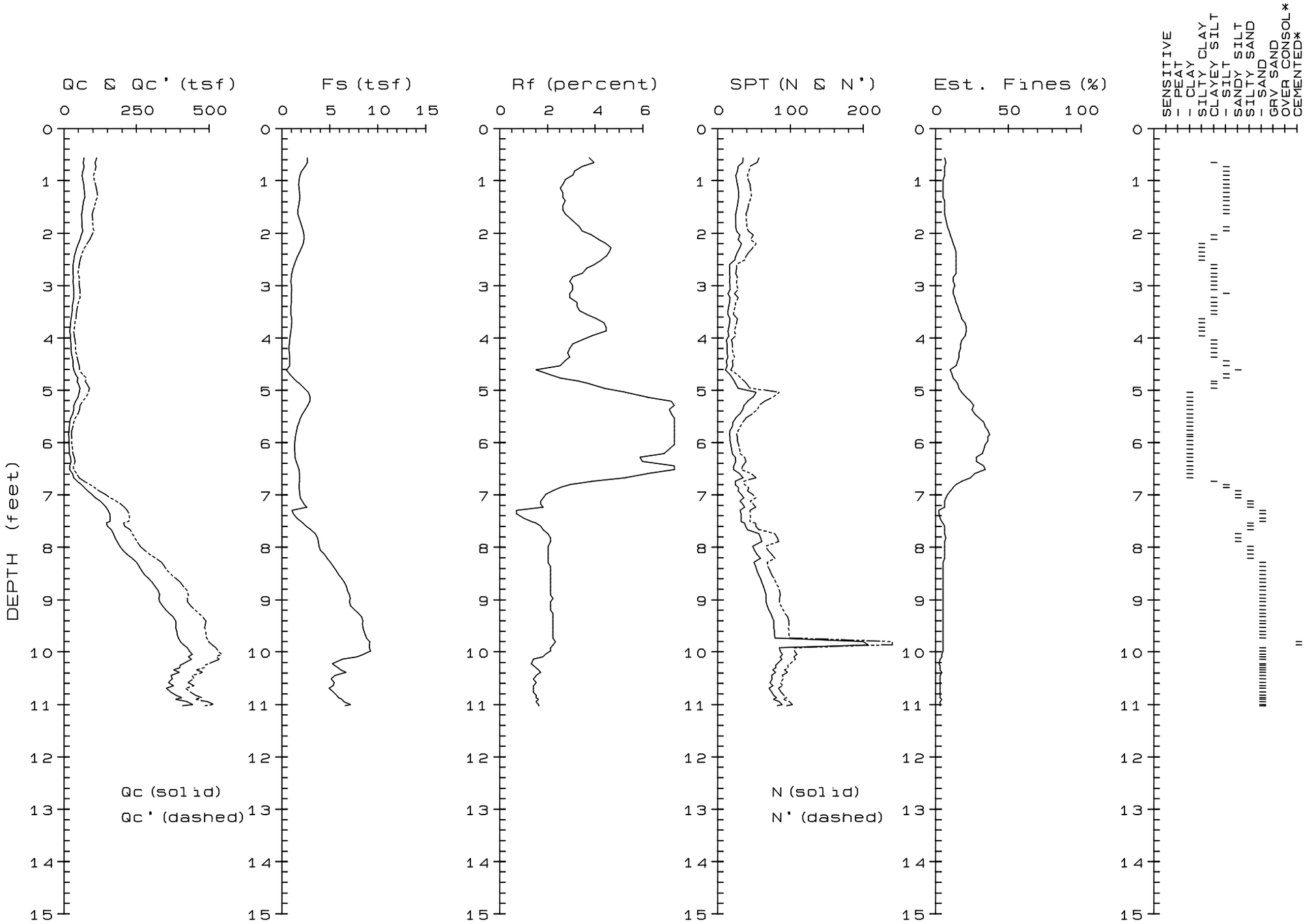
Groundwater measured at 7.0 feet

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-3
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 11.0 feet

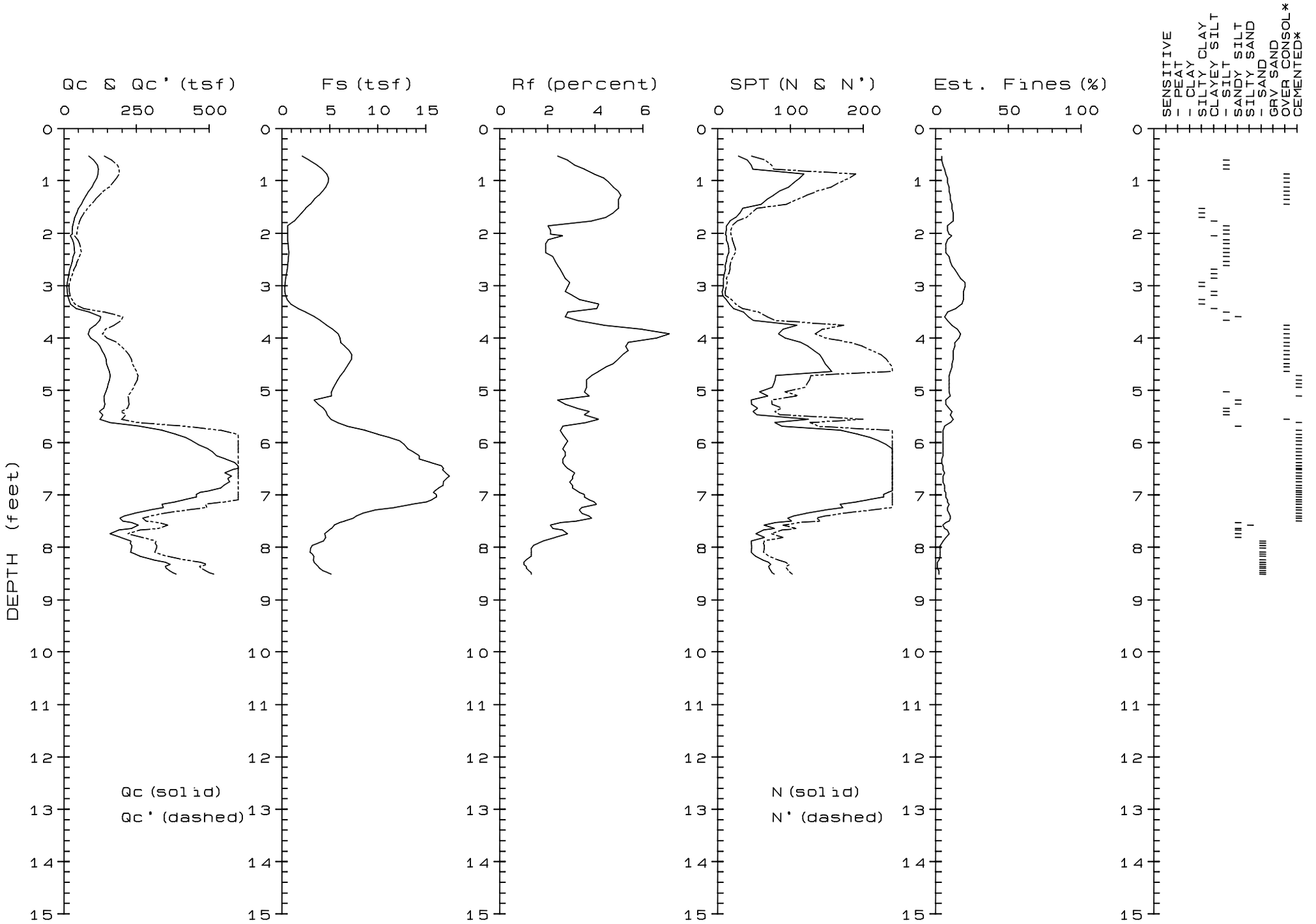
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-4
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 8.5 feet

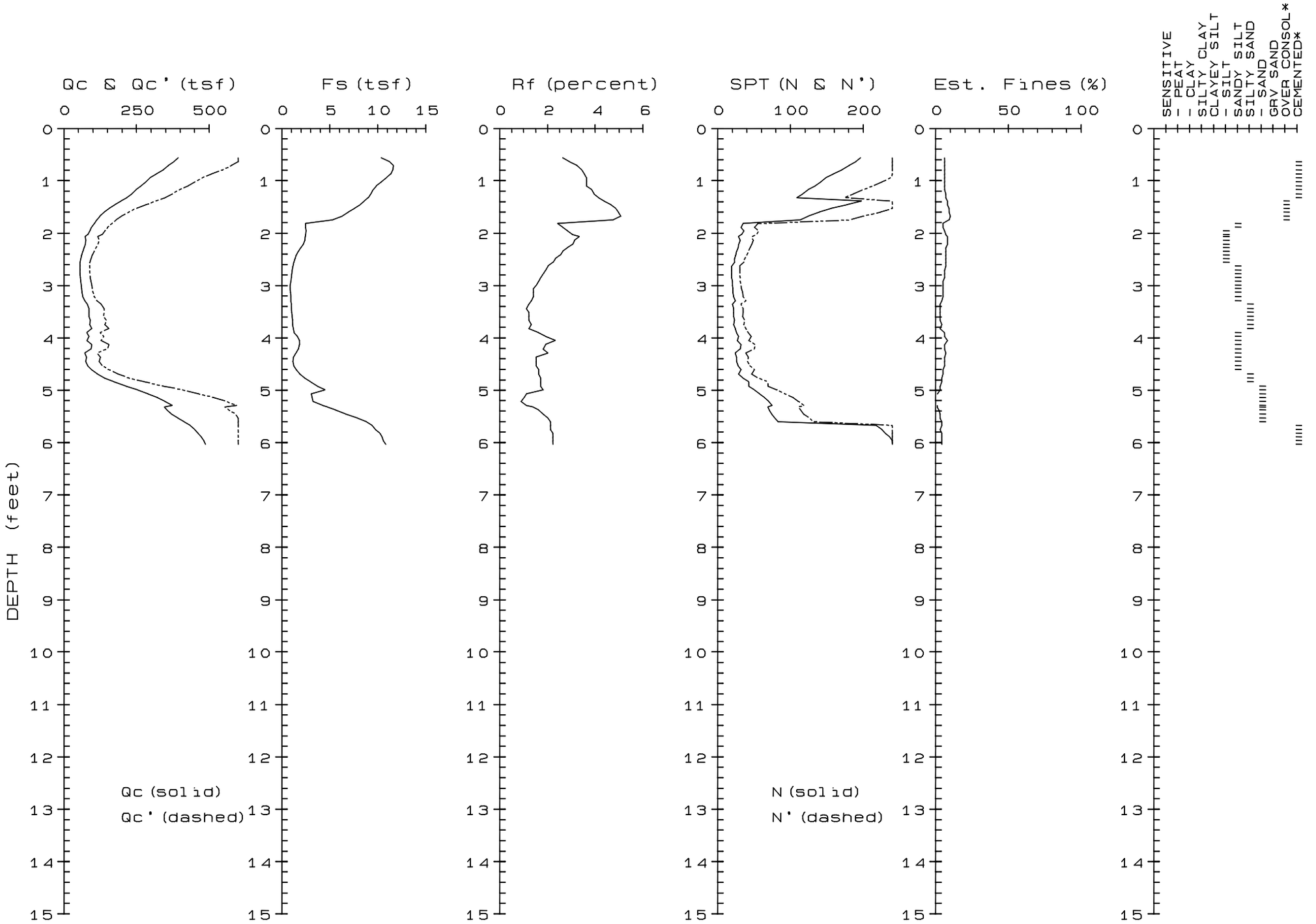
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-5
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 6.0 feet

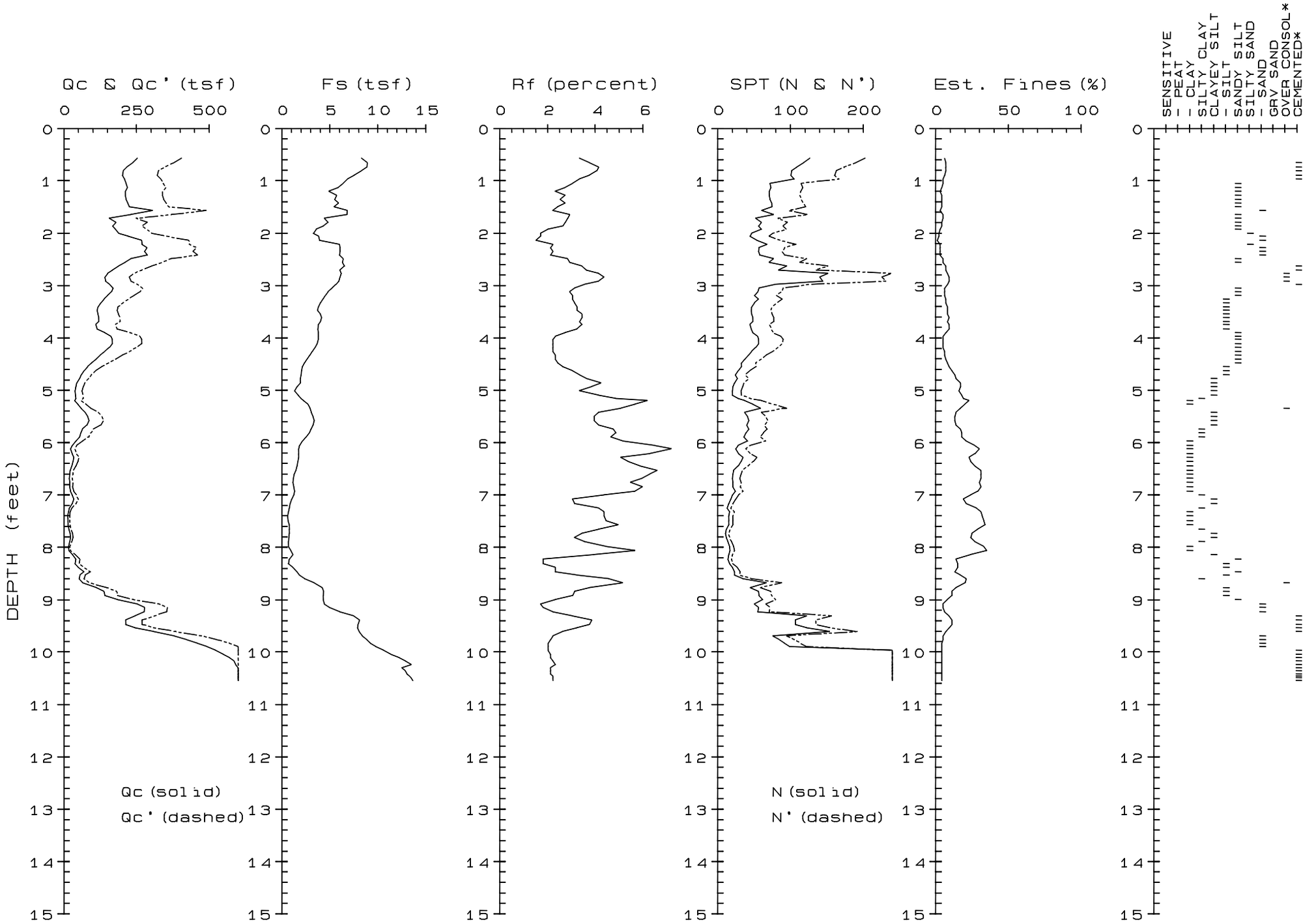
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-6
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 10.5 feet

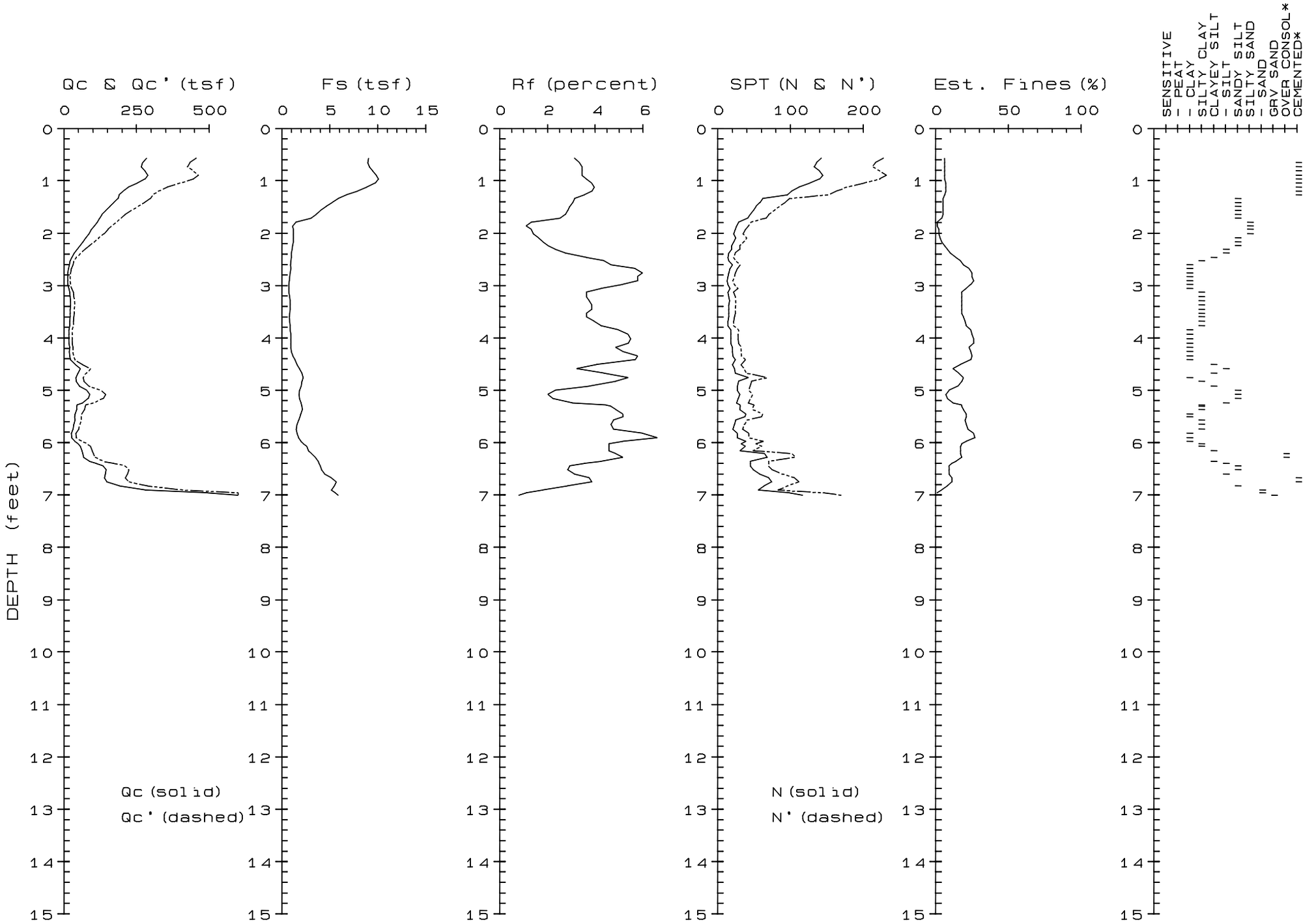
Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-7
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates



Terminated at 7.0 feet

Groundwater not encountered

PROJECT: GATEWAY SOUTH DEVELOPMENT
LOCATION: Scotts Valley CA
PROJ. NO.: 001-09650-00 (LFR-05)

CPT NO.: SV-8
DATE : 05-20-2008

LFR, Inc.

cpts by John Sarmiento & Associates

RESULTS OF THE ANALYSIS OF THE SANDY MATERIALS

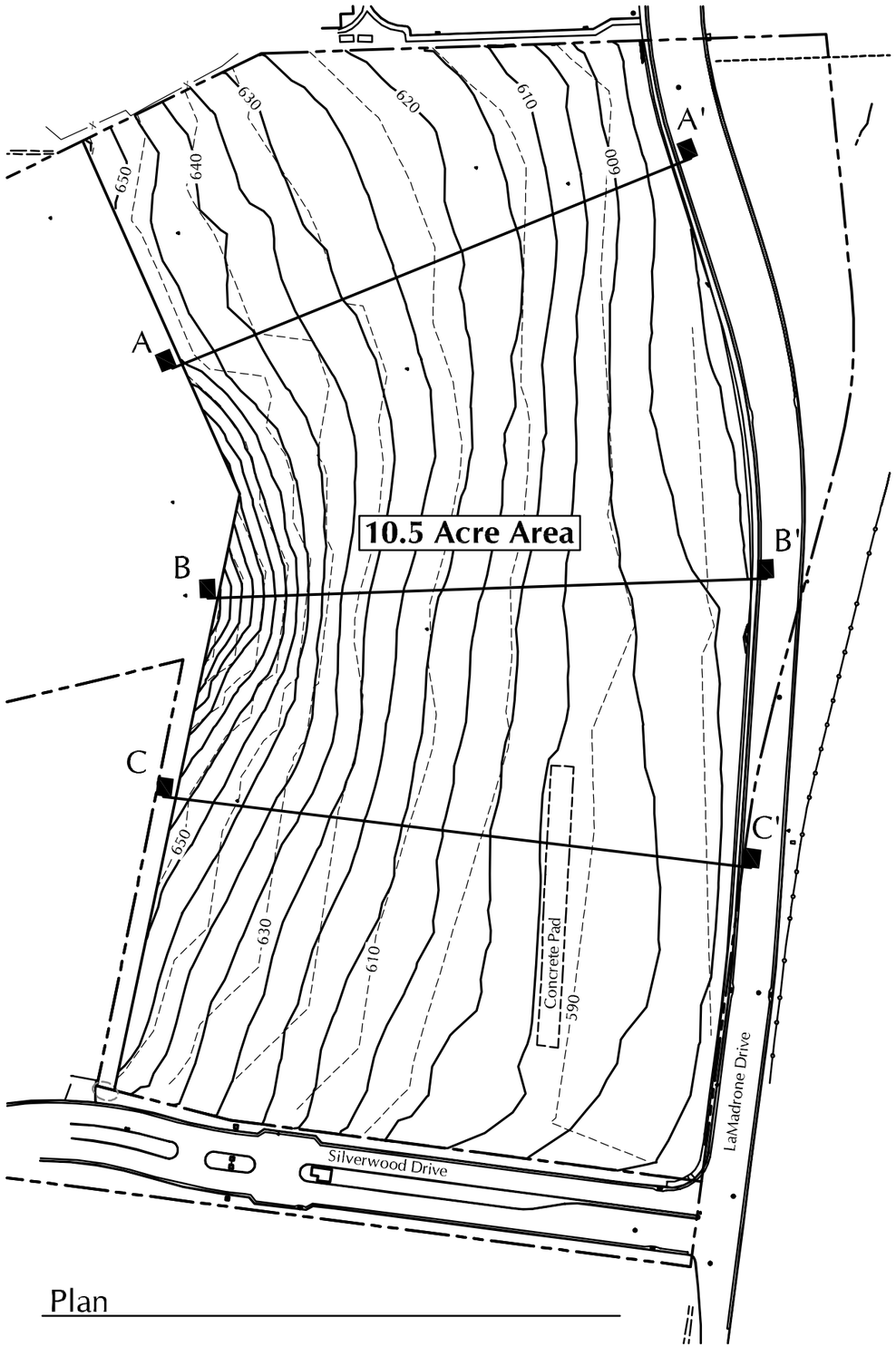
Proposed Target Development Site

Scotts Valley, California

Depth (ft)	k (cm/s)		Depth (ft)	k (cm/s)
6.64	2.00E-03		9.36	5.20E-03
6.72	2.30E-03		9.42	7.20E-03
6.79	2.40E-03		9.48	1.10E-02
6.86	2.60E-03		9.54	1.30E-02
6.93	2.90E-03		9.6	1.40E-02
7	3.30E-03		9.67	1.20E-02
7.08	3.80E-03		9.73	1.80E-02
7.15	4.20E-03		9.79	1.80E-02
7.22	4.50E-03		9.85	1.80E-02
7.29	4.70E-03		9.91	1.80E-02
7.37	5.10E-03		9.97	2.00E-02
7.44	5.60E-03		10.03	2.40E-02
7.51	5.60E-03		10.07	3.30E-02
7.58	5.30E-03		10.12	2.40E-02
7.65	5.90E-03		10.17	2.50E-02
7.72	6.20E-03		10.23	2.50E-02
7.79	5.40E-03		10.28	2.60E-02
7.86	5.60E-03		10.34	5.10E-02
7.93	6.90E-03		10.39	3.80E-02
8	7.30E-03		10.46	2.80E-02
8.07	6.60E-03		10.52	3.10E-02
8.13	5.20E-03		10.59	3.10E-02
8.2	7.80E-02		10.65	2.50E-02
8.27	6.10E-02		10.71	2.40E-02
8.44	7.90E-02		10.77	1.70E-02
8.49	5.30E-02		10.83	1.10E-02
8.55	4.40E-02		10.89	1.10E-02
8.61	2.80E-02		10.95	9.00E-03
8.67	2.10E-02		11.01	7.10E-03
8.73	1.10E-02		11.06	3.50E-03
8.79	1.60E-02		11.12	1.80E-03
8.85	6.50E-03		11.18	2.10E-03
8.91	8.40E-03		11.23	1.60E-03
8.98	7.90E-03		11.28	1.60E-03
9.04	7.40E-03		11.32	1.70E-03
9.1	5.60E-03		11.38	1.30E-03
9.17	4.90E-03		11.44	1.20E-03
9.23	3.60E-03		11.5	1.00E-03
9.29	4.10E-03		11.55	1.00E-03

Based on Elsworth, D and Lee, D.S. 2007. "Limits in determining permeability from on-the-fly uCPT sounding". Geotechnique. Vol 57 No. 8. pp 679 – 685. Elsworth's method uses a correlation between material properties, the resistance to the advancement of the cone, and the excess pore pressures generated during the advancement of the cone to the material hydraulic conductivity.

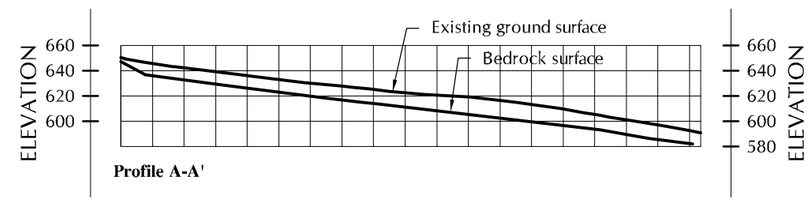
The values derived using Elsworth's method compare favorably with the number derived from the Hazen formula for hydraulic conductivity of sands (k = 100 * D_{10}^2 D_{10} in cm and K in cm/s) using the sieve analysis from the Treadwell and Rollo report = 100 * 0.018 cm^2 = .03 cm/s and the values provided by the Natural Resources Conservation Service (0.003 cm/s). The Natural Resources Conservation Service values are for the upper strata of soils which are more clayey than the deeper soils and which hence would be expected to have a lower hydraulic conductivity. The silty-clayey sands in the upper vadose zone at the site likely have hydraulic conductivities in the 0.0001 to 0.00001 cm/s range (10^{-4} to 10^{-5} cm/s).



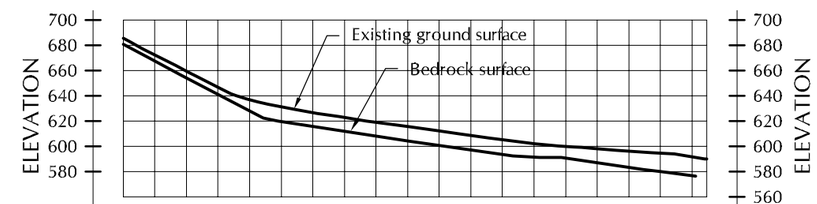
Plan

EXPLANATION:

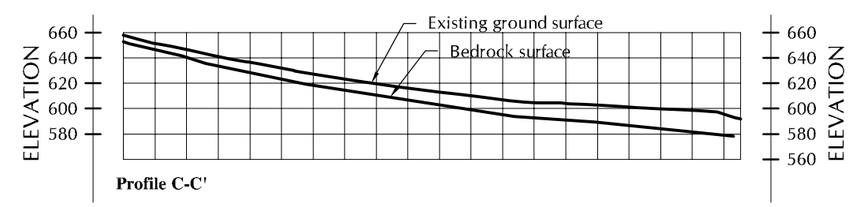
- Property boundary
- Existing grade elevation contours
- Bedrock layer elevation contours (approximate)



Profile A-A'

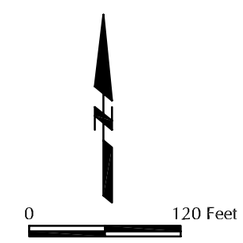


Profile B-B'



Profile C-C'

4,615,110 Cu Ft of soil over bedrock



Proposed Target Site
Soil Volume Estimate

Scotts Valley, California

LFR

I:\Design\001\09650\CaStPlain NAD 83 Zone 3 Deveolopement.dwg Jun 26,2008-3:55pm