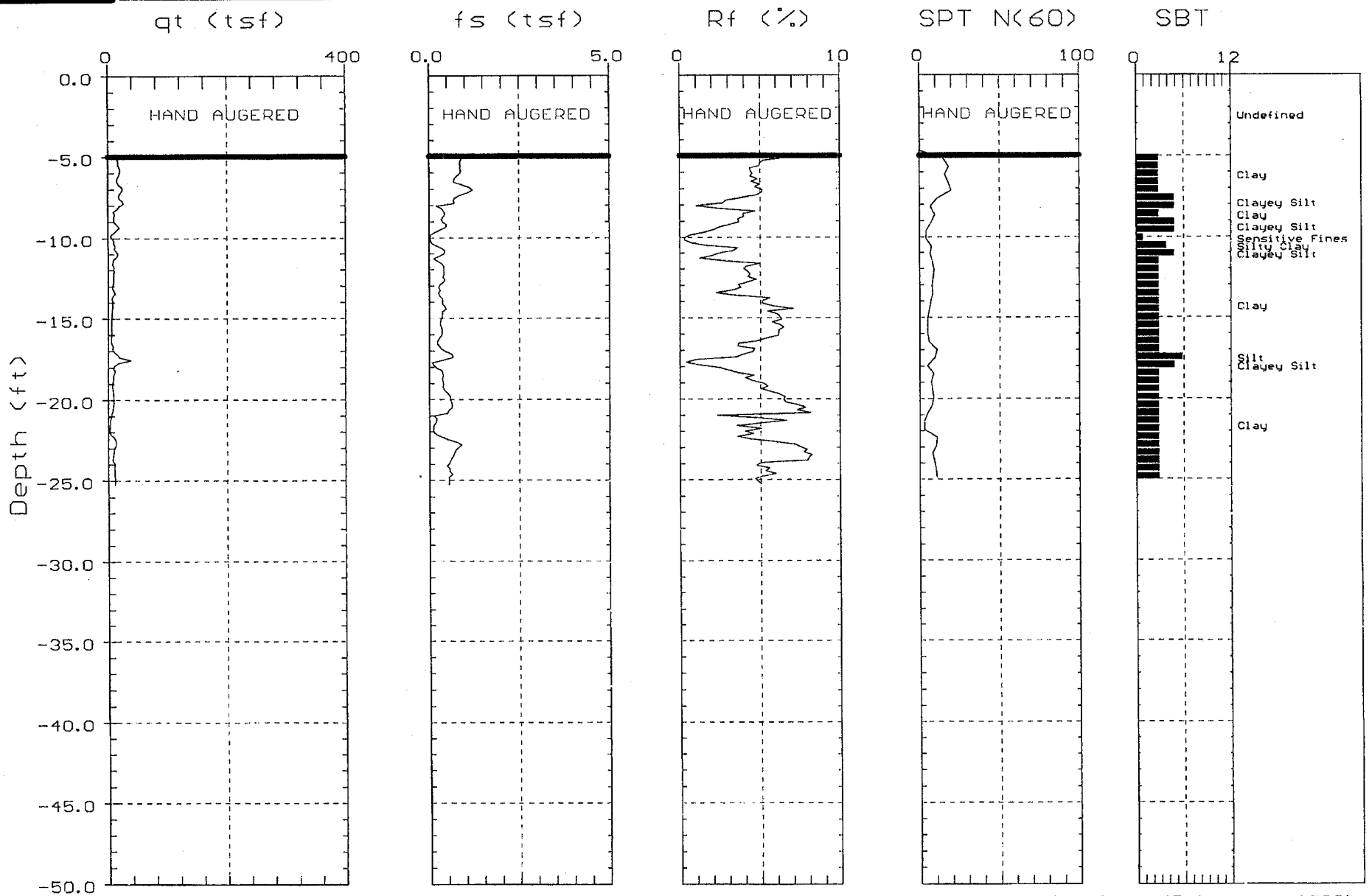
GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-05

Engineer: R. ELLIS
Date: 02:19:05 12:35



Max. Depth: 25.26 (ft)
Depth Inc.: 0.164 (ft)

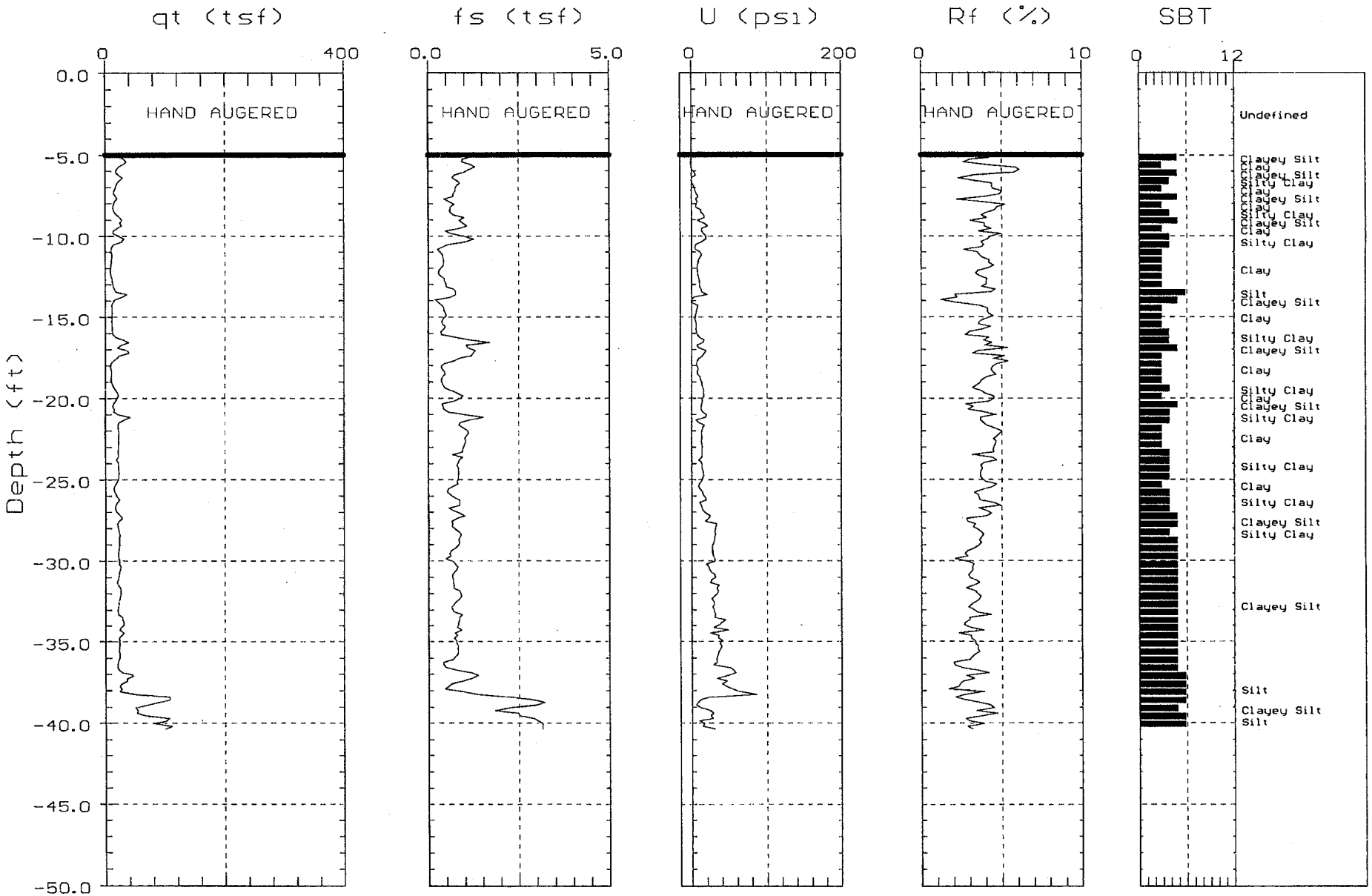
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-06

Engineer: R. ELLIS
Date: 02:19:05 14:03



Max. Depth: 40.35 (ft)
Depth Inc.: 0.164 (ft)

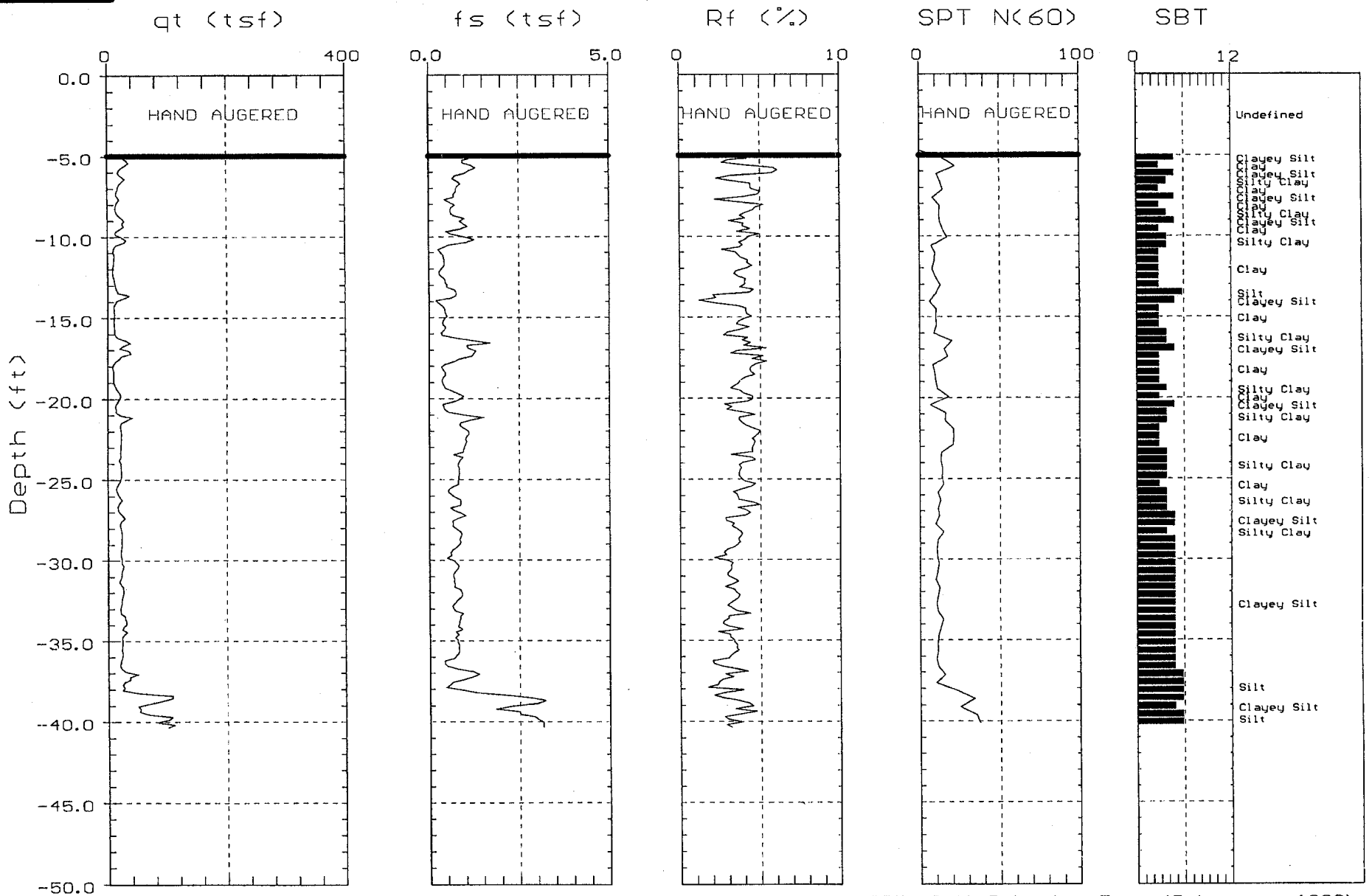
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-06

Engineer: R. ELLIS
Date: 02:19:05 14:03



Max. Depth: 40.35 (ft)
Depth Inc.: 0.164 (ft)

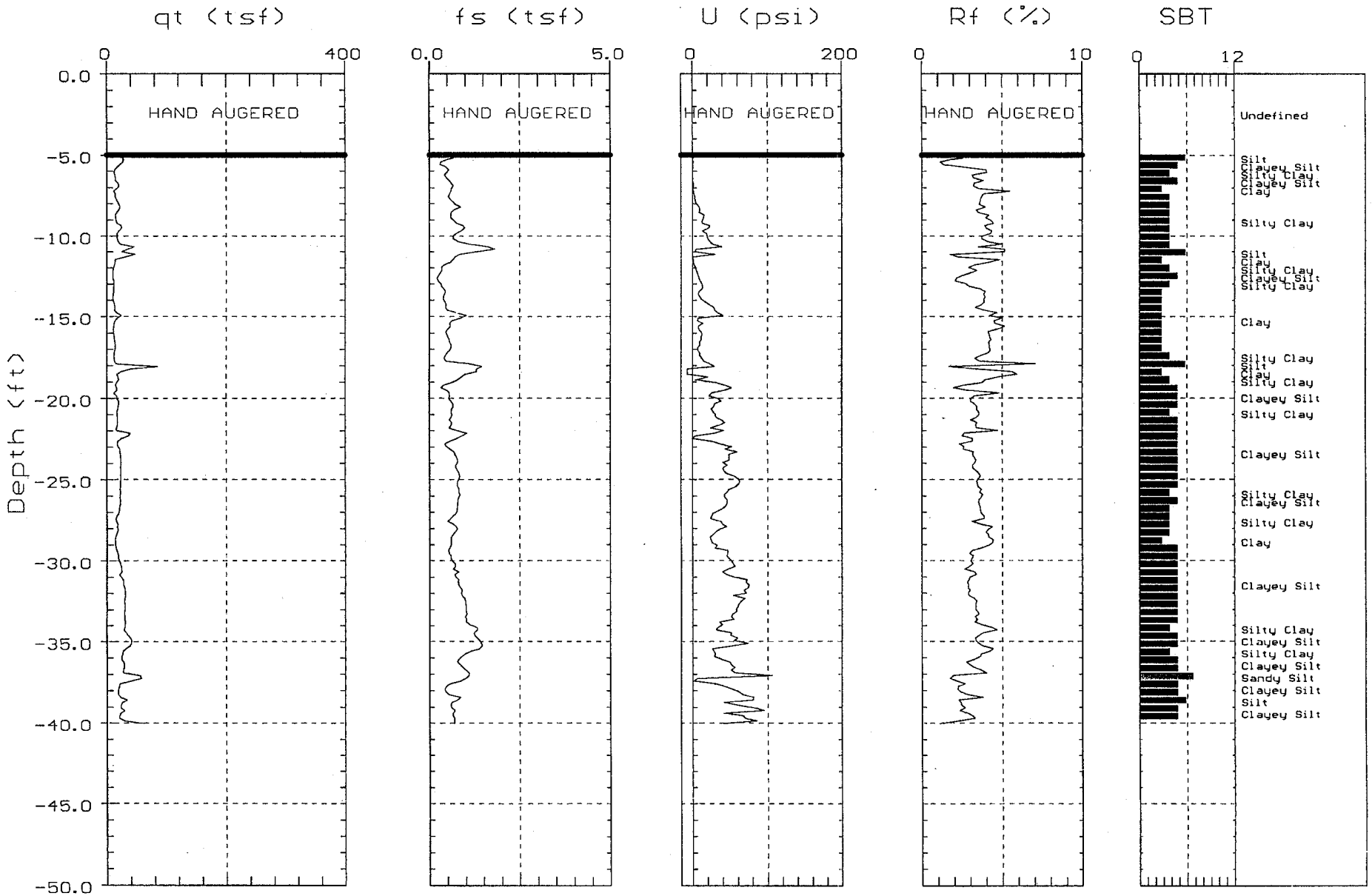
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-07

Engineer: R. ELLIS
Date: 02:19:05 14:51



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

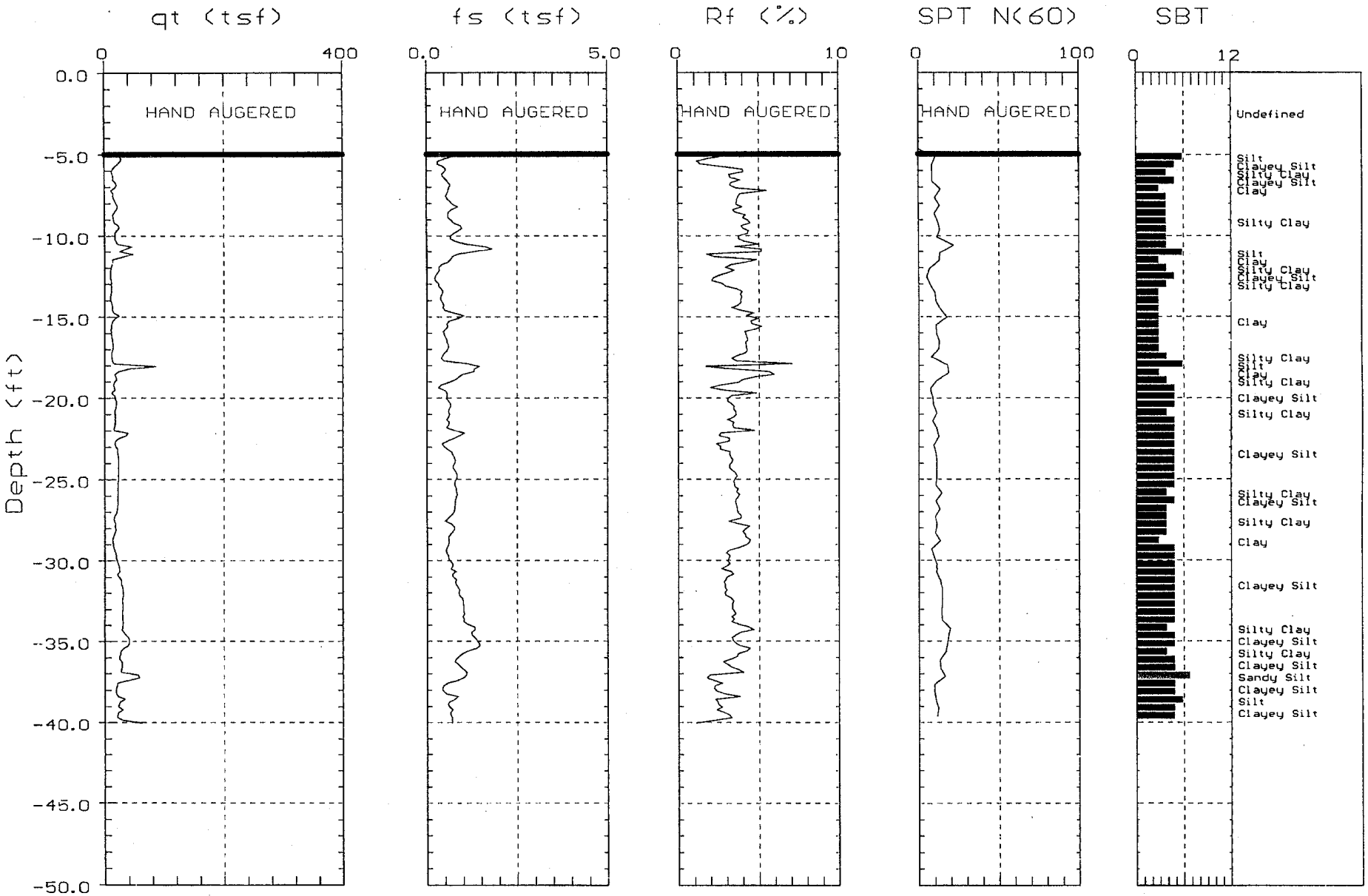
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-07

Engineer: R. ELLIS
Date: 02:19:05 14:51



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

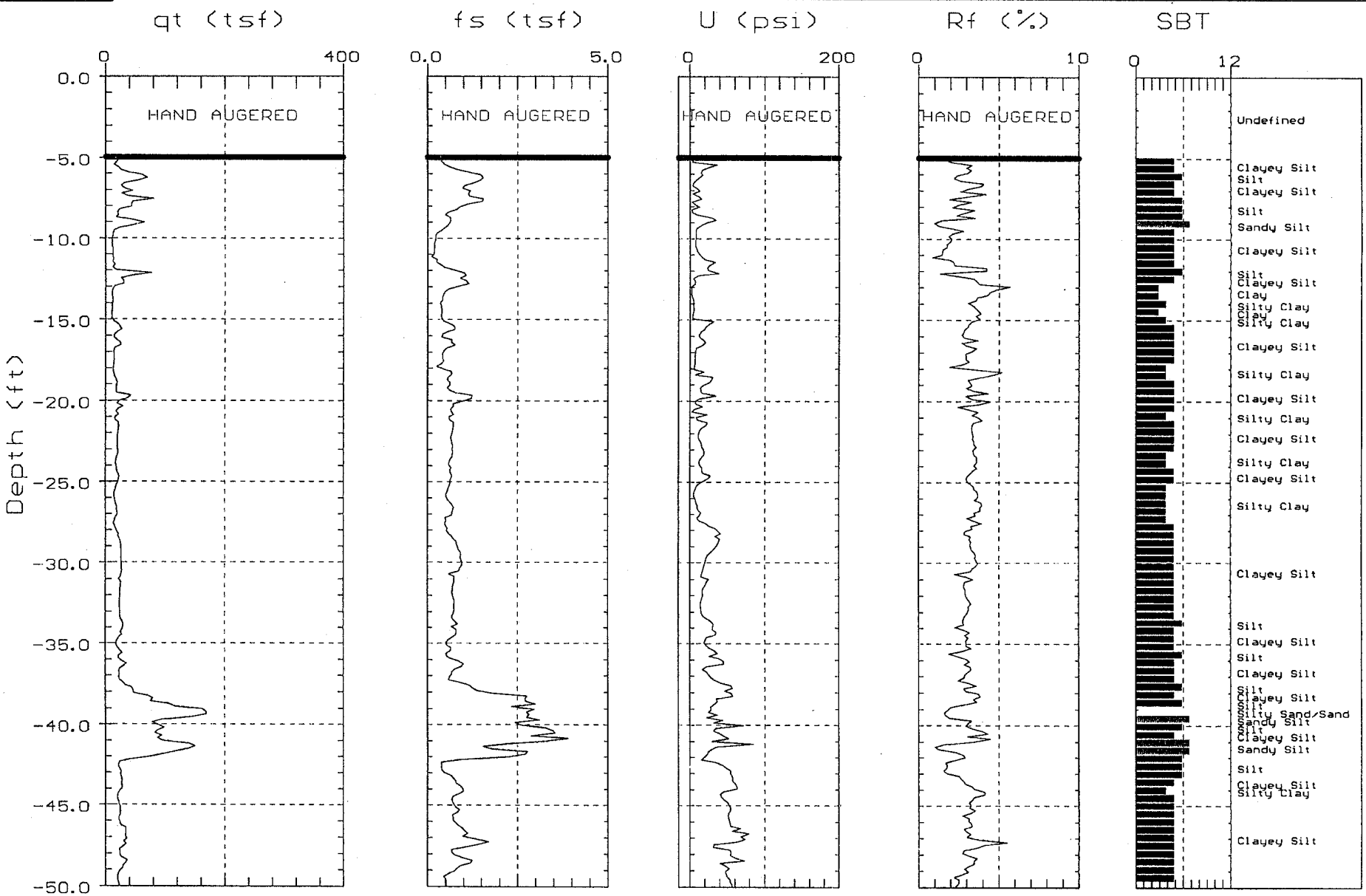
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-08

Engineer: R. ELLIS
Date: 02:19:05 17:29



Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

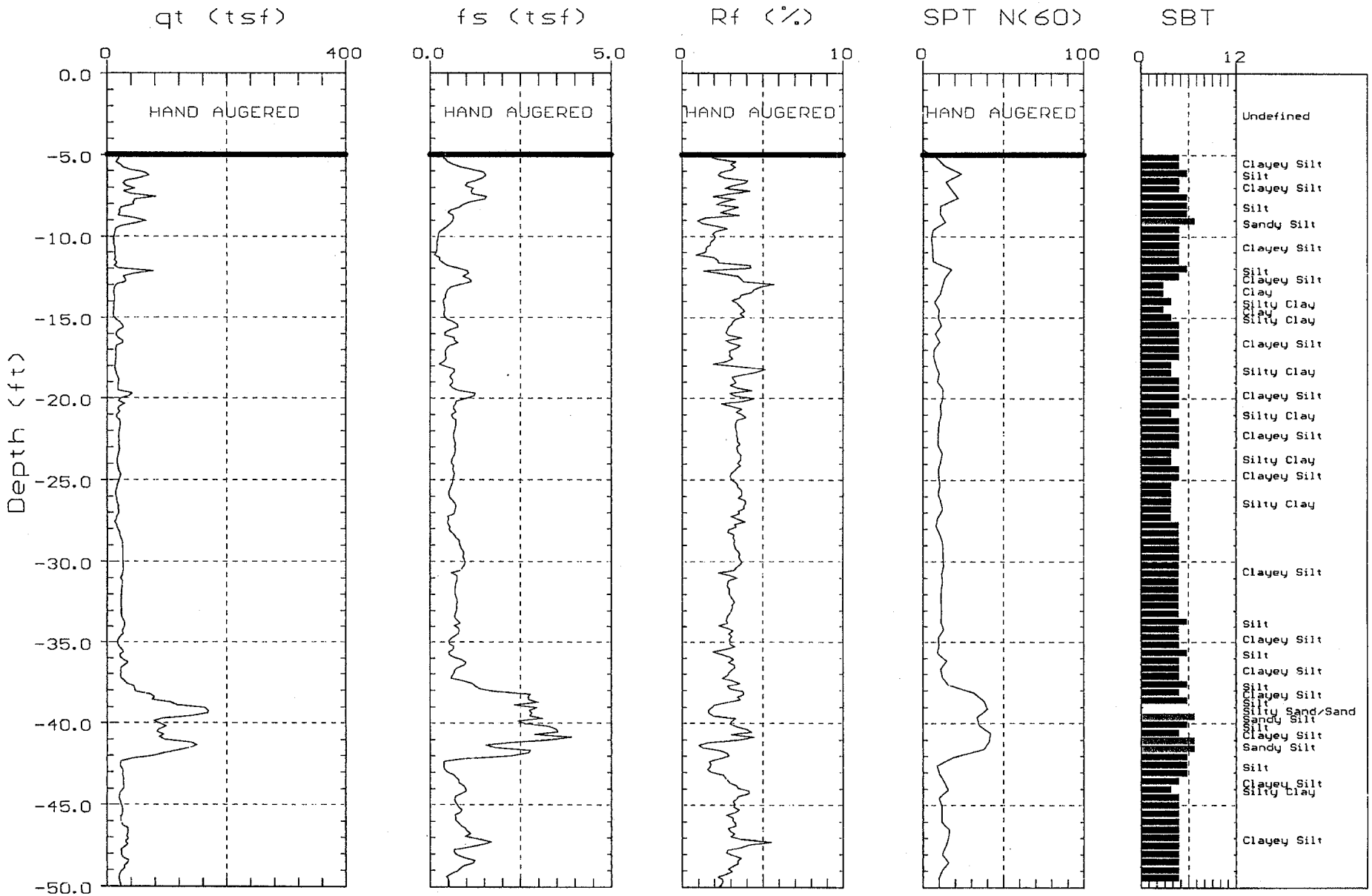
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-08

Engineer: R. ELLIS
Date: 02:19:05 17:29



Max. Depth: 50.03 (ft)
Depth Inc.: 0.164 (ft)

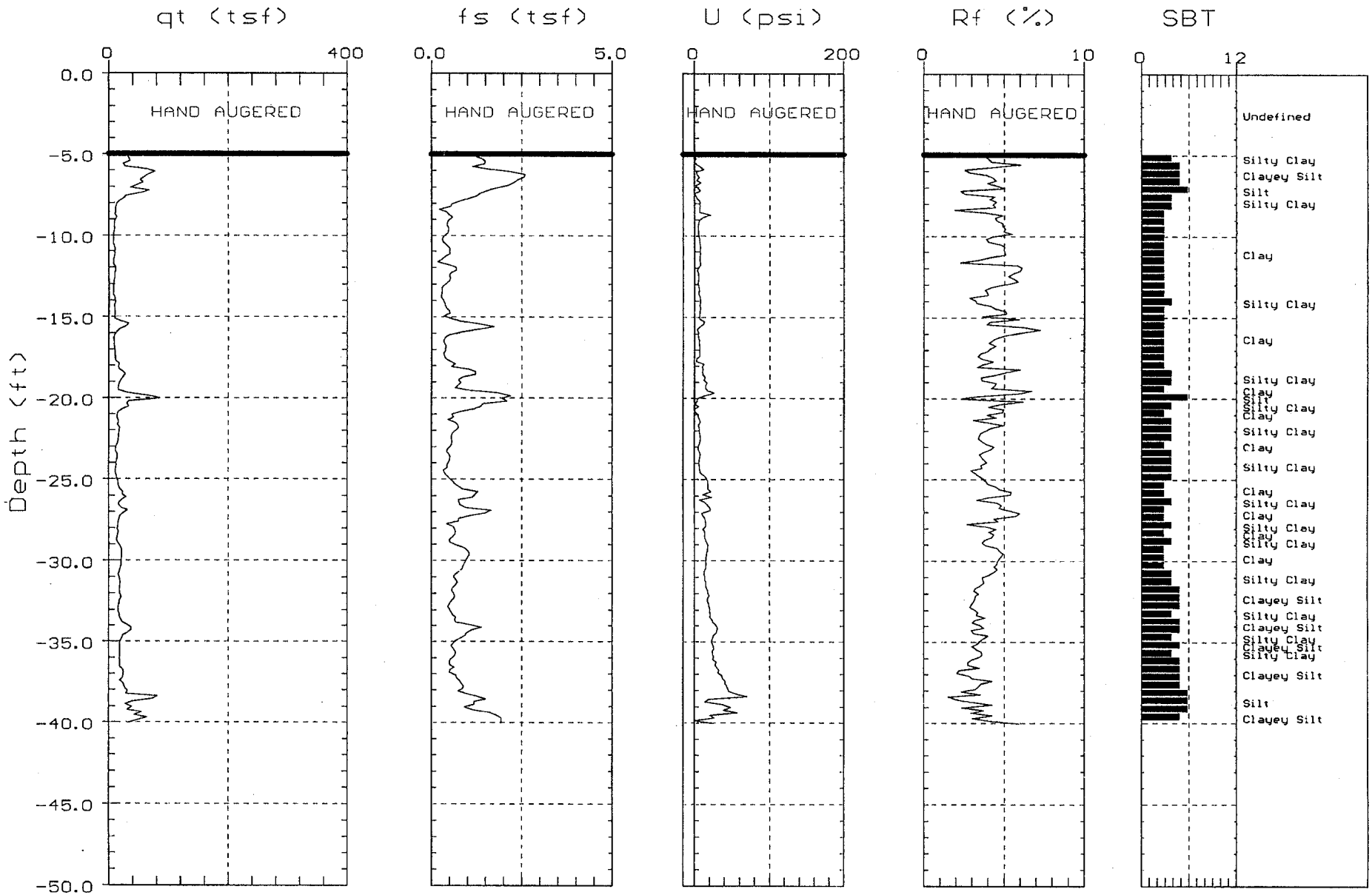
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-09

Engineer: R. ELLIS
Date: 02:19:05 18:15



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

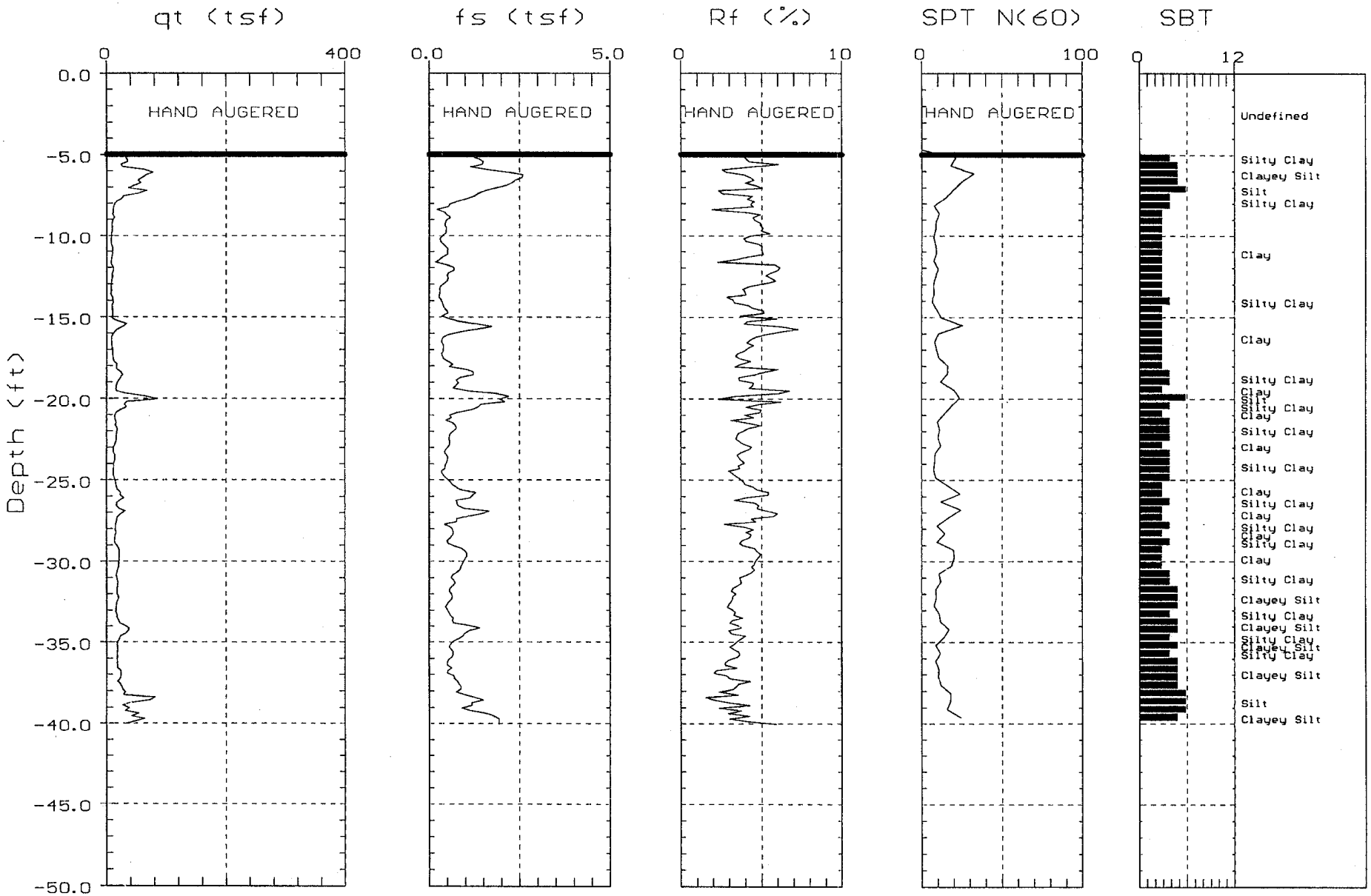
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-09

Engineer: R. ELLIS
Date: 02:19:05 18:15



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

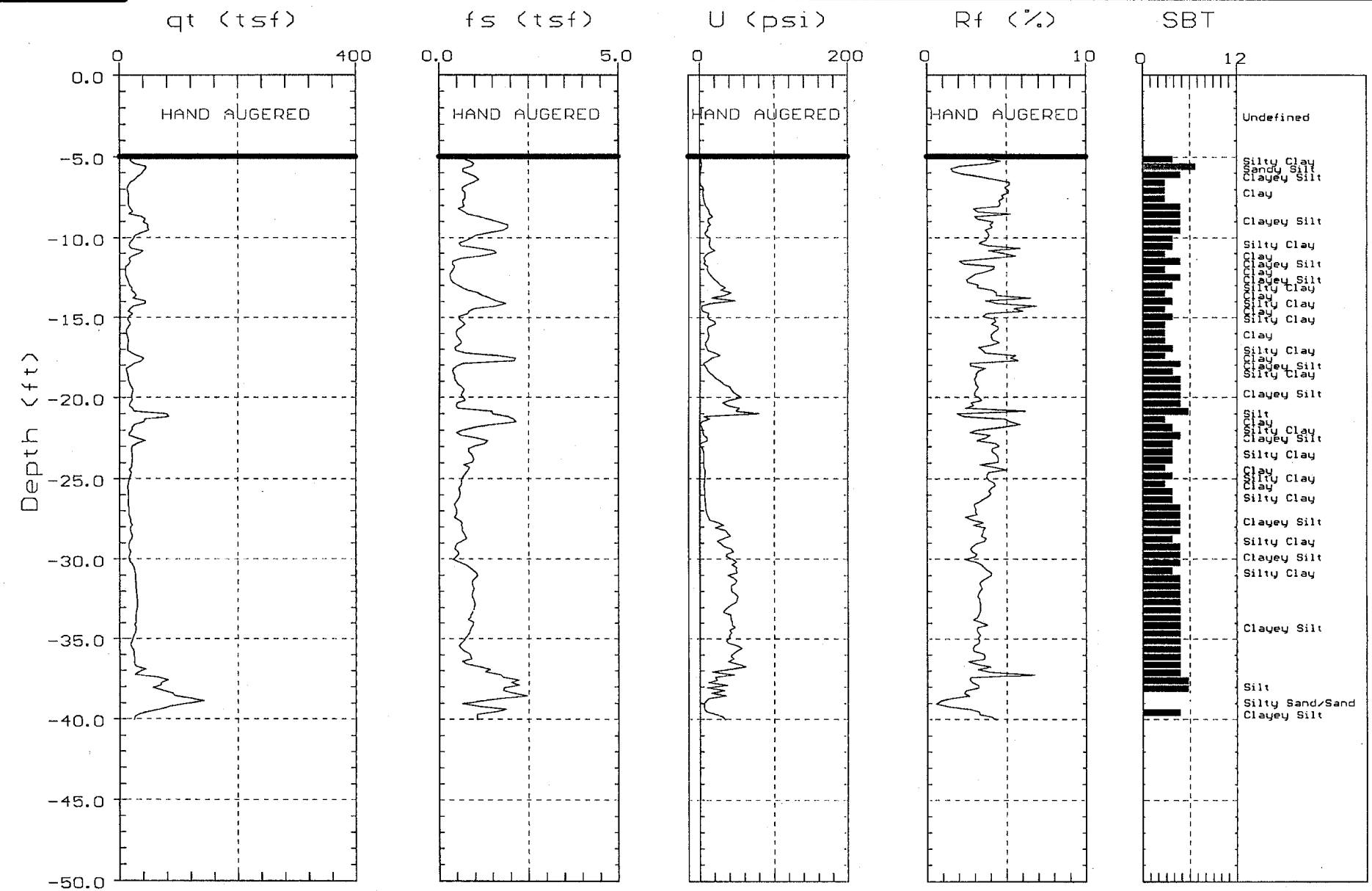
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-10

Engineer: R. ELLIS
Date: 02:19:05 15:49



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

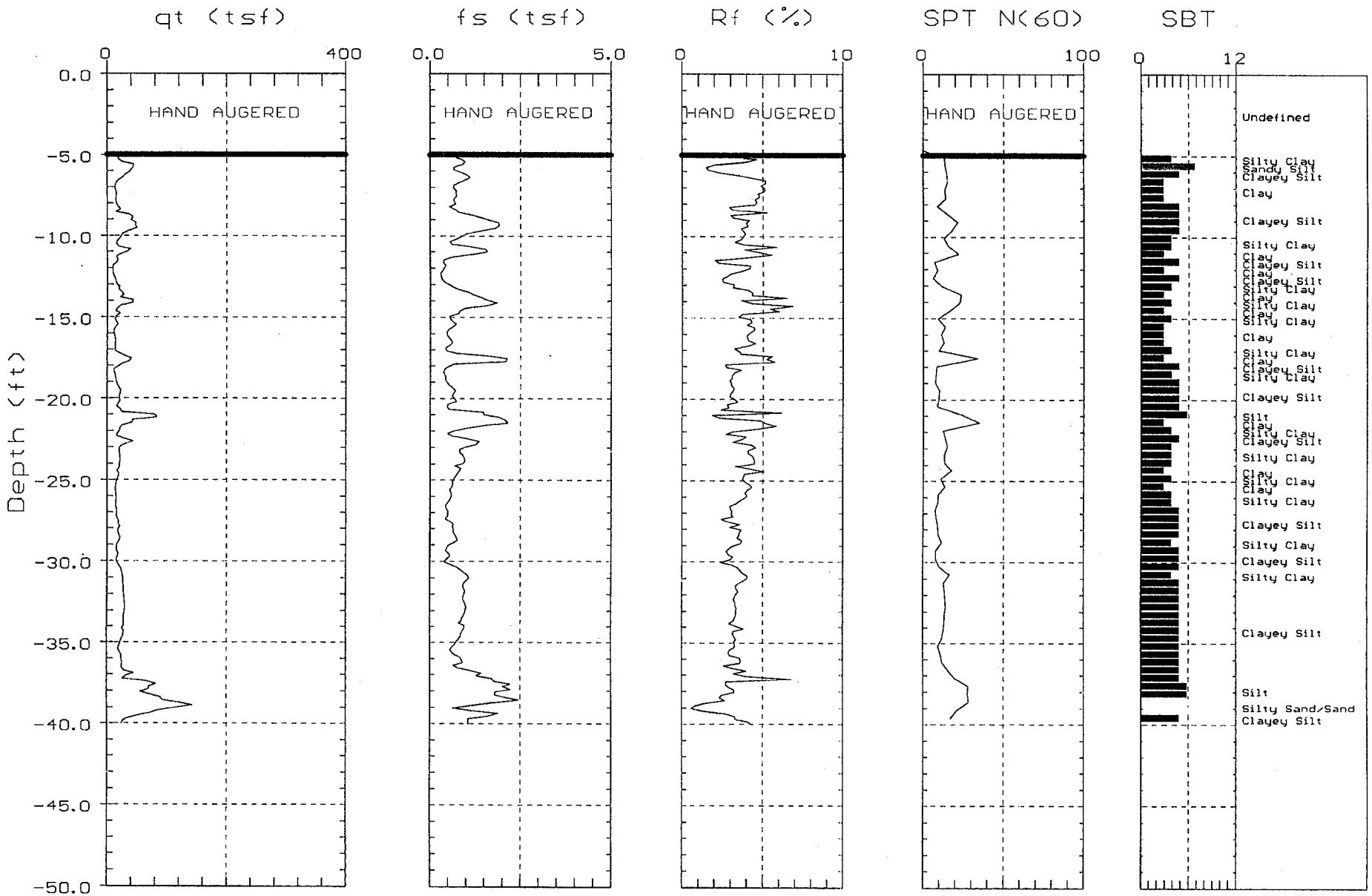
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-10

Engineer: R. ELLIS
Date: 02:19:05 15:49



Max. Depth: 40.03 (ft)
Depth Inc.: 0.164 (ft)

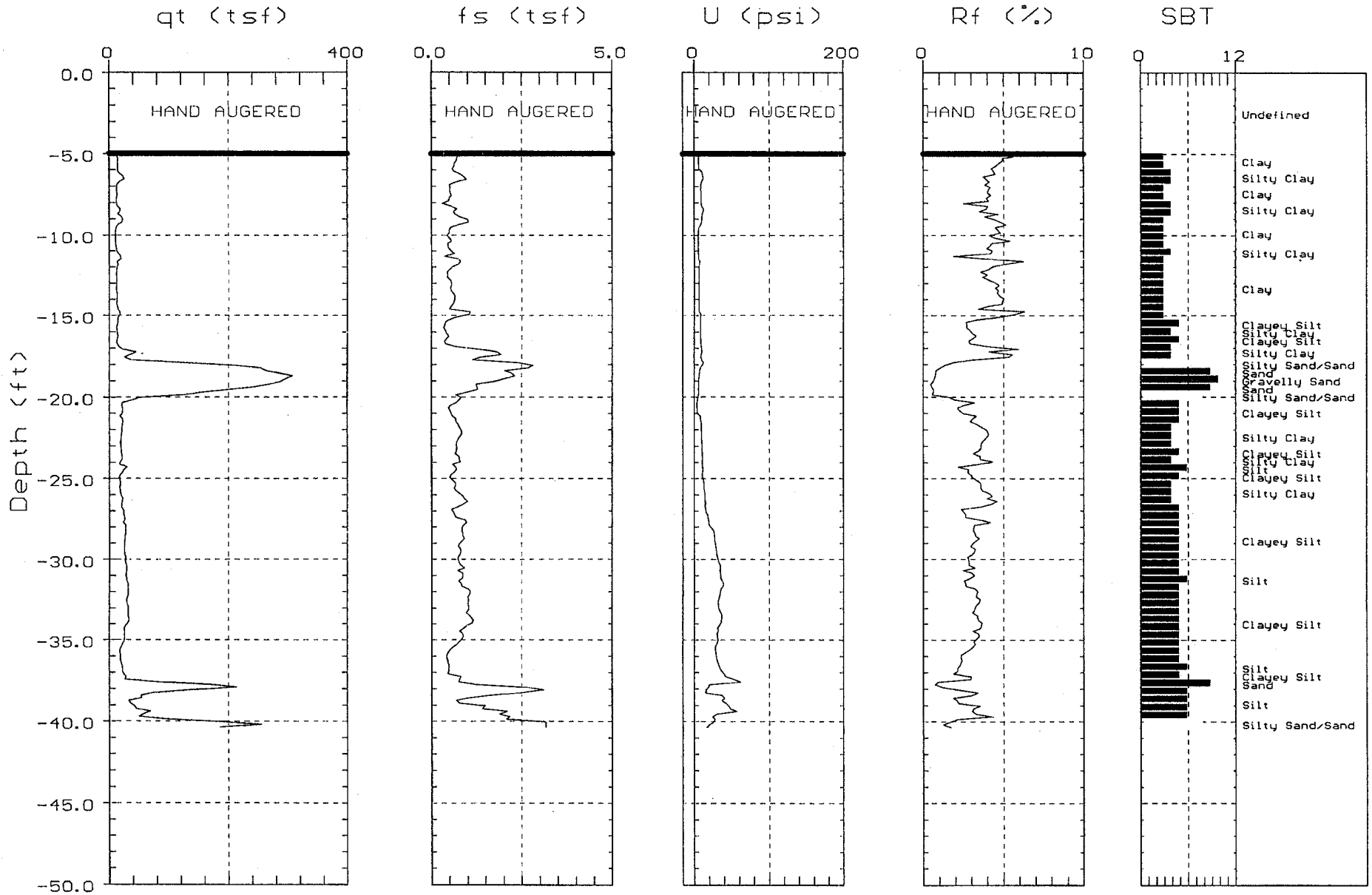
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-11

Engineer: R. ELLIS
Date: 02:19:05 16:33



Max. Depth: 40.35 (ft)
Depth Inc.: 0.164 (ft)

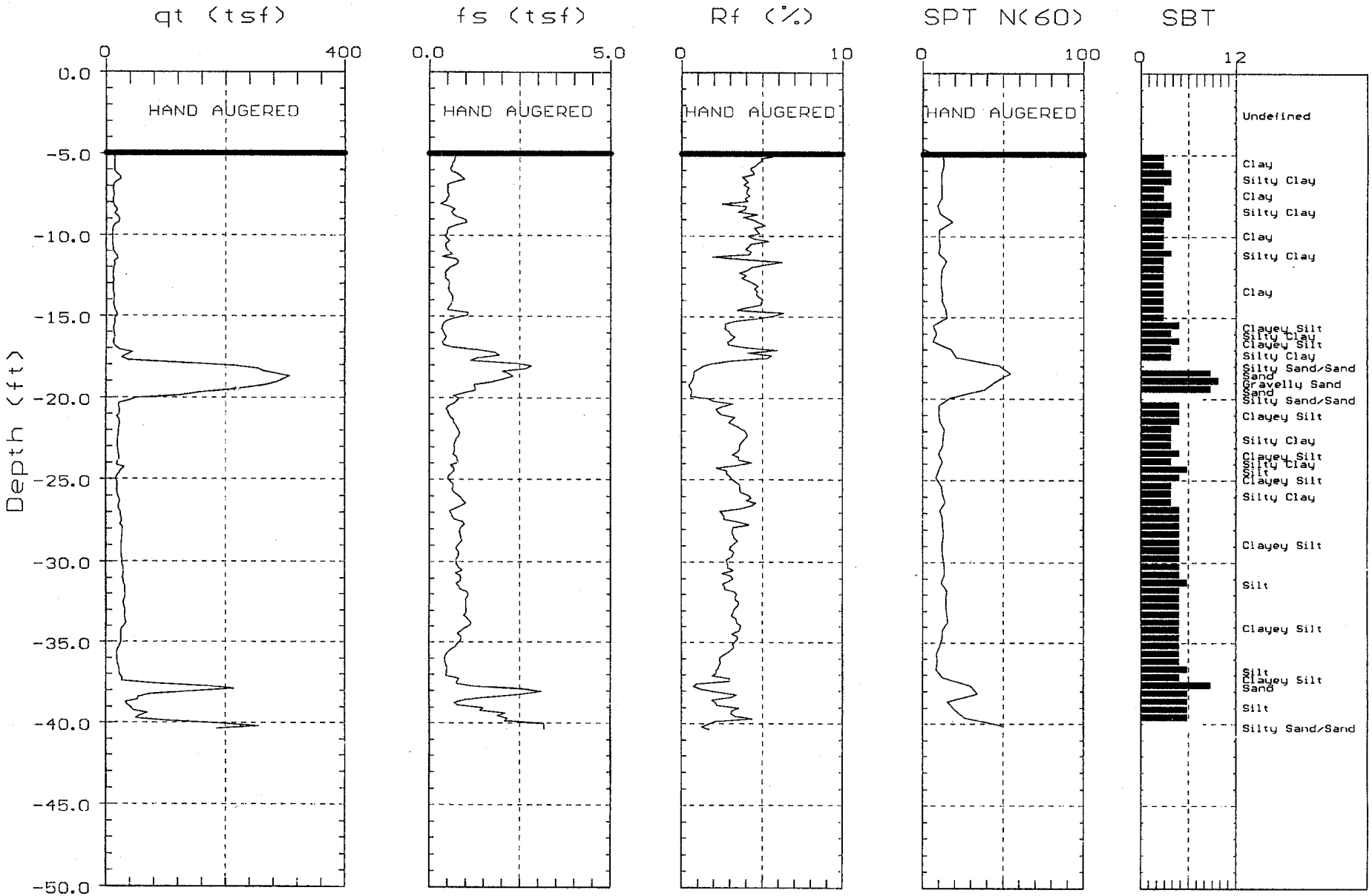
SBT: Soil Behavior Type (Robertson 1990)

GREGG

KLEINFELDER

Site: CHEVRON
Location: CPT-11

Engineer: R. ELLIS
Date: 02:19:05 16:33



Max. Depth: 40.35 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Preliminary Geotechnical Exploration, San Ramon City Center, San Ramon, California, prepared for City of San Ramon, California, prepared by ENGEO Incorporated, ENGEO Project 5172.001.01, dated March 29, 2001

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. 441 feet (134 meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0				SILTY CLAY with sand (CL), black, very stiff, moist, with trace pebbles, and metallic debris. (Fill?)				
	1	1-1			34	2.0*		
5				With trace wood debris.				
	2	1-2		SILTY CLAY (CL), black, stiff to very stiff, moist. (Fill?)	30	1.9	98.8	25.6
				SILTY CLAY (CL/CH), light olive with white mottling, very stiff, moist.				
10	3	1-3			43	3.0*	100.2	24.3
	4							
15								
	5	1-4		SILTY to CLAYEY SAND (SM), brown, medium dense, moist.	25			
20	6			SILTY CLAY with sand (CL), yellowish brown, very stiff, wet.				
		1-5			18			
	7							
25				SILTY CLAY (CH), dark olive grey, very stiff, very moist to wet.				
	8	1-6			18	2.5*		
30	9							
		1-7		SILTY CLAY with sand (CL), dark greyish brown, trace carbonates, very stiff, very moist.	35	2.8	103.0	24.4
	10							
35				SILTY CLAY with sand (CL), grey with black mottling, very stiff, wet, trace medium sand and organics.				
	11	1-8			23			
40	12			SANDY CLAY (CL), grey, very stiff, very moist.				
		1-9			19			
	13							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-1

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY MT

FIGURE NO. 6

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. 441 feet (134 meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
45	14	1-10		SILTY CLAY (CH), brown and olive, very stiff, very moist, with very thin layers of clayey sand.	48	4.5*	105.8	22.9
50	15	1-11		SANDY CLAY (CL), light olive, very stiff, moist to wet, trace charcoal.	32	2.0* / 3.0*		
	16			SILTY CLAY (CH), olive and white mottled, very stiff, moist to wet.				
55	17	1-12		CLAYEY SAND (SC), greyish brown, medium dense, medium grained, local lenses of gravelly sand.	15			19.4
60	18	1-13		GRAVELLY SAND (SP), greyish brown, very dense, wet, pebbles up to 3/4 inch in diameter, with clayey pockets.	54/6"			12.7
65	19							
	20							
70	21			SILTY CLAY (CL), light olive, very stiff, wet.				
	22			Bottom of boring at approximately at 70 feet. Ground water encountered at 20 feet during drilling.				
75	23							
	24							
80	25							
85	26							

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-1

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY mr

FIGURE NO. 6

MET 5172.GPJ 3/30/01

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. 438 feet (134 meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0				SILTY CLAY (CH), black, hard, dry to moist, trace pebbles, and fine roots. (Fill?)				
	1	2-1			43	+4.5*	113.5	13.2
5								
	2	2-2			41	+4.5*		
				SILTY CLAY (CH), olive, hard, moist.				
				SANDY CLAY (CL), olive brown with white mottling, stiff, very moist.				
10	3							
		2-3			15	2.0*	98.9	24.3
	4							
				SILTY CLAY (CL), olive brown, stiff, very moist, trace fine sand and pebbles.				
15								
	5	2-4			22	1.5*		
				▽				
20	6							
		2-5		SILTY CLAY (CL), olive, very stiff, wet, trace carbonates.	14			25.8
	7							
				SILTY CLAY (CH), olive grey, very stiff, wet.				
25								
	8	2-6			16			
				Bottom of boring at approximately 26½ feet. Ground water encountered at 20 feet during drilling.				
30	9							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-2

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY: MT

FIGURE NO. 7

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. 442 feet (135 meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0				SILTY CLAY (CH), black, hard, dry to moist.				
	1	3-1			53	+4.5*		
5								
	2	3-2		SILTY CLAY (CH), black, moist, very stiff.	31	3.0*	103.1	21.7
				SILTY CLAY (CL), light olive brown with white mottling, very stiff, moist.				
10	3							
		3-3			29	4.0*		
	4			Increased silt, grades to stiff.				
15								
	5	3-4		SILTY CLAY (CL), light olive brown, medium stiff, very moist, some carbonates, with very fine sand.	18	0.7	96.2	26.5
				▽				
20	6							
		3-5		SILTY CLAY (CL), light olive brown, stiff, moist.	14			
	7							
25				SANDY CLAY/CLAYEY SAND (CL/SC), light olive brown, very stiff, very moist.				
		3-6			14			28.4
	8			SILTY CLAY (CH), dark grey, very stiff, very moist.				
				Bottom of boring at approximately 26 1/2 feet. Ground water encountered at 18 feet during drilling.				
30	9							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-3

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY: MT

FIGURE NO. 8

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. feet (meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0								
	1	4-1		SILTY CLAY (CH), black, damp, hard, with sand and some wood debris. (Fill)	39	+4.5*	106.8	15.8
5				SILTY CLAY (CL), greyish brown, abundant carbonates, hard, damp.				
	2	4-2			26	4.5*	99.0	11.4
				SILTY SAND (SM), light olive, medium dense, damp.				
				SANDY CLAY (CL), olive, very stiff, moist.				
10	3							
		4-3			27	3.5*		
	4							
15				▽				
	5	4-4		SILTY CLAY (CL), olive brown, stiff, very moist to wet, trace carbonates.	15	1.5*	90.4	31.3
				SILTY CLAY (CH), dark grey, very stiff, wet.				
20	6							
		4-5			18			
				SANDY CLAY (CL), olive brown, stiff, wet.				
	7							
				SILTY CLAY (CH), light olive brown, very stiff, wet, trace carbonates.				
25								
		4-6			12			28.8
	8							
				Bottom of boring at approximately $26^1/_2$ feet. Ground water encountered at 15 feet during drilling.				
30	9							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-4

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY MT

FIGURE NO. 9

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. feet (meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0				SILTY CLAY (CL), black, very stiff, dry to moist, with trace hay and other debris. (Fill)				
	1	5-1			28	+4.5*	101.2	16.2
5		5-2-1						
	2	5-2-2		SANDY CLAY with gravel (CL), light brown, moist, hard, poorly sorted. (Fill?)	30			
10	3			SILTY CLAY (CL), light brown, very stiff, moist.				
		5-3		SILTY SAND (SM), olive brown, medium dense, moist.	43	2.0*	112.0	15.5
	4							
15				SILTY CLAY (CH), greyish brown with black mottling, stiff, wet, trace charcoal.				
	5	5-4			16	2.0*	93.0	30.8
20	6			▽				
		5-5		Mottling changes to white.	23	3.0*		
	7			SILTY CLAY (CH), olive grey, very stiff, very moist.				
25								
	8	5-6			26	2.0	94.0	29.9
30	9							
		5-7			29	3.0*		
	10							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-5

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY: MT

FIGURE NO. 10

DATE OF BORING: January 22, 2001

SURFACE ELEVATION: Approx. feet (meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
35	11	5-8		SANDY CLAY (CL), olive brown, hard, moist, some rust stains.	56	4.0*	114.2	17.9
40	12	5-9		Trace charcoal.	50	4.0*		
	13							
45	14	5-10		SILTY CLAY (CL), olive brown, very stiff, very moist, with trace carbonates, fine sand.	26	2.5*	100.7	25.6
				Bottom of boring at approximately 46½ feet. Ground water encountered at 20 feet during drilling.				
50	15							
	16							
55	17							
	18							
60	19							
65	20							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-5

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY: MT

FIGURE NO. 10

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DATE OF BORING: January 29, 2001 SURFACE ELEVATION: Approx. feet (meters) DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
0				SILTY CLAY (CL), black, very stiff, dry to moist, with trace hay and other debris. (Fill)				
	1							
5								
	2			SANDY CLAY with gravel (CL), light brown, hard, moist, poorly sorted. (Fill?)				
10	3			SILTY CLAY (CL), light brown, stiff, moist.				
				SILTY SAND (SM), olive brown, medium dense, moist.				
	4							
15				SILTY CLAY (CH), greyish brown with black mottling, stiff, wet, trace charcoal.				
	5							
20	6			▽				
	7							
25				SILTY CLAY (CH), olive grey, very stiff, very moist.				
	8							
				Grades to very stiff.				
30	9							
	10							
35				SANDY CLAY (CL), olive brown, hard, moist.				
	11							
40	12							
	13							
45				SILTY CLAY (CL), olive brown, very stiff, very moist, with trace carbonate.				
	14			SILTY SAND (SM), olive brown, dense, wet, medium grained.				
				SILTY CLAY (CL), light olive brown, very stiff, wet.				
	15							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-6

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY: MF

FIGURE NO. 11

DATE OF BORING: January 29, 2001

SURFACE ELEVATION: Approx. feet (meters)

DEPTH (FEET)	DEPTH (METERS)	SAMPLE NUMBER	LOG, LOCATION AND TYPE OF SAMPLE	DESCRIPTION	BLOWS/FT.	qu UNCON STRENGTH (TSF) *FIELD PENET. APPROX.	IN PLACE DRY UNIT WEIGHT (PCF)	IN PLACE MOIST. CONTENT % DRY WEIGHT
50				SILTY CLAY with sand (CL), light olive brown, very stiff, wet, some chunks of carbonates, minor rust stains.				
	16	6-1			27	3.0*	99.5	26.4
55								
	17	6-2		CLAYEY SAND with gravel (SC), brown, very dense, wet.	50/6"		126.1	12.6
	18							
60				GRAVELLY SAND (SP), greyish brown, very dense, wet.				
	19							
65	20							
	21							
70				Bottom of boring at approximately 70 feet. Ground water encountered at 20 feet during drilling.				
	22							
75	23							
	24							
80								
	25							
85	26							
	27							
90								
	28							
95	29							
	30							

MET 5172.GPJ 3/30/01

ENGEO INCORPORATED

SAN RAMON CITY CENTER

SAN RAMON, CALIFORNIA

BORING NO.: B-6

DATE: March 2001

PROJ. NO.: 5172.5.001.01

CHECKED BY mr

FIGURE NO. 11

Geotechnical Investigation, Bishop Ranch 1 Development, San Ramon, California, prepared for Sunset Development Company, prepared by Harding Lawson Associates (HLA), HLA Project 50044.1, dated May 15, 2000

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS

April 21, 2000

RECEIVED
APR 24 2000
HARDING LAWSON

Mr. Ryan Shafer
Harding, Lawson and Associates, Inc.
383 Fourth St
Suite 300
Oakland, CA 94607

PROJECT NAME: CPT Testing at Bishop Ranch 1
PROJECT NO.: 50044.1

Dear Mr. Shafer:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

ENVIRONMENTAL: SCIENTISTS • GEOLOGISTS • ENGINEERS
Contaminated Site Assessments • Phase I Audits • Site Remediation • Hazardous Waste Management

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The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

> "Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

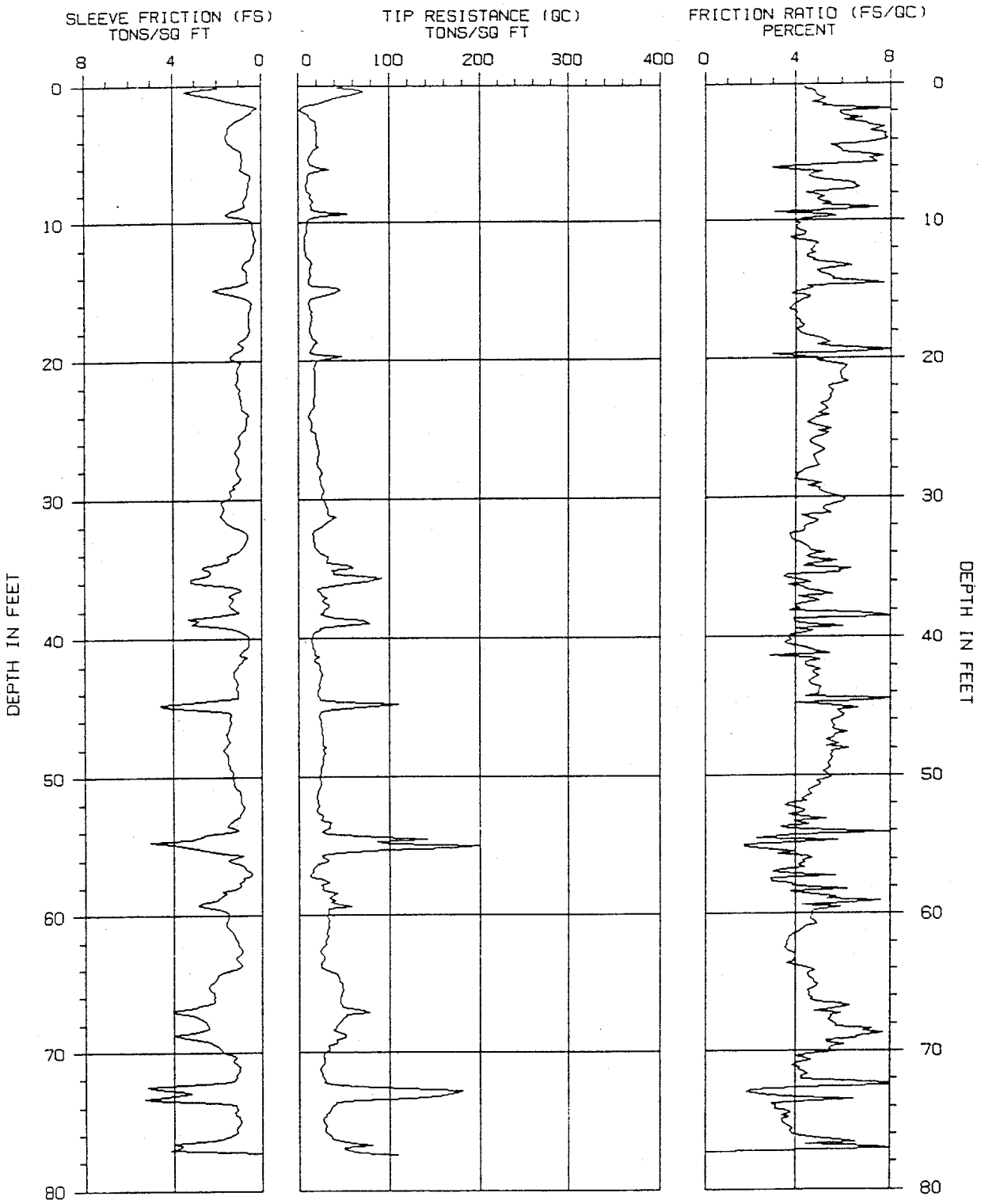
Please feel free to call if you have any questions.

Respectfully submitted,

Dick Carlton

Dick Carlton
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:DC\Enclosures



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-1

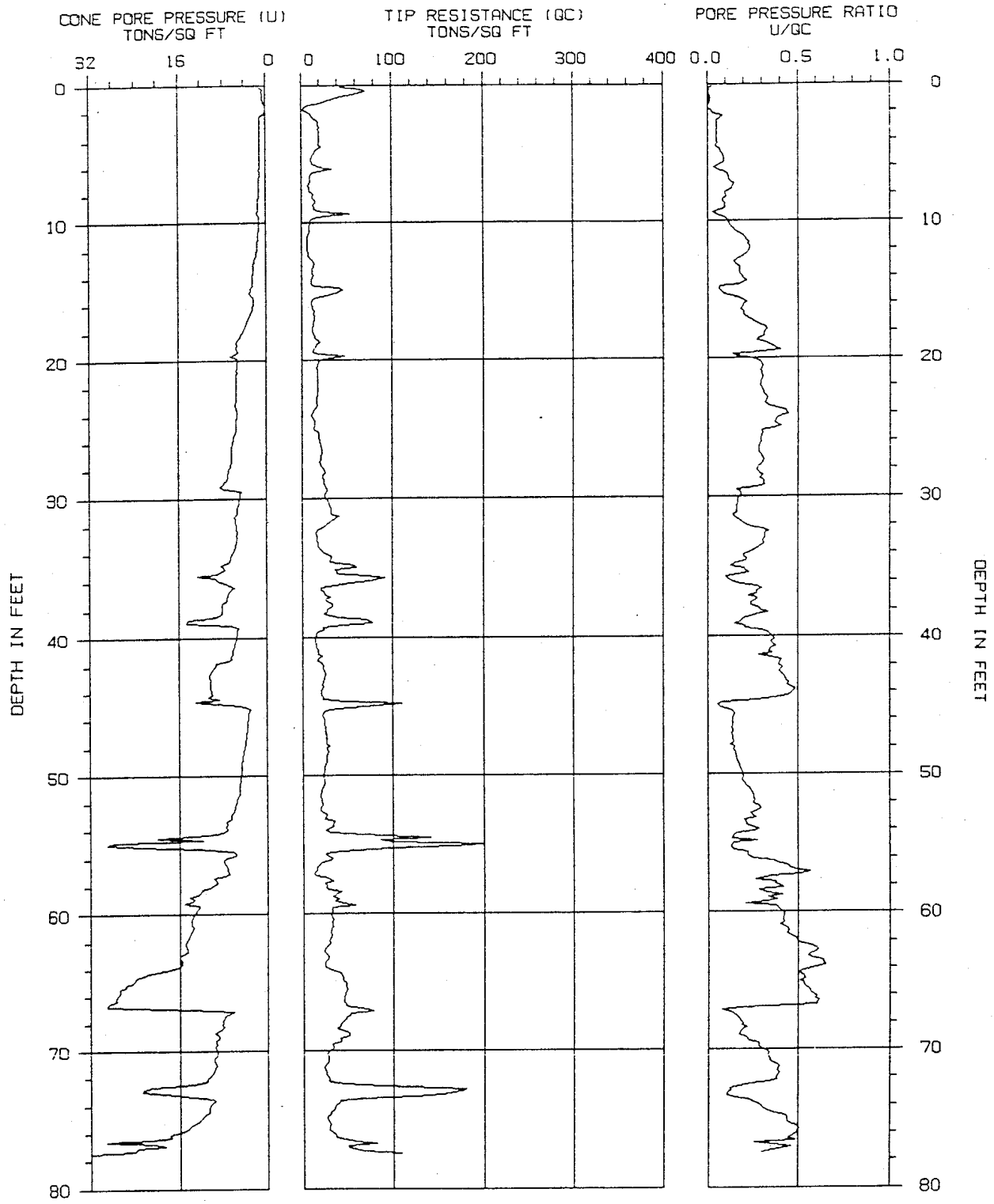
PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/R#4

DATE/TIME: 04-13-00 07:51

HFA



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-1

PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/R#4

DATE/TIME: 04-13-00 07:51

HFA

CPT INTERPRETATIONS

SOUNDING : HLA-1
PROJECT : HLA/BISHOP RH 1
DATE/TIME: 04-13-00 07:51

PROJECT No.: 50044.1
CONE/RIG : 491/BH,VO/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	71.51	4.83	*VERY STIFF FINE GRAINED	72	100			
.300	.98	35.48	5.29	CLAY	35	57		2.1	
.450	1.48	9.71	5.33	CLAY	10	16		.6	
.600	1.97	7.22	5.93	CLAY	7	12		.5	
.750	2.46	14.49	6.82	CLAY	14	23		1.0	
.900	2.95	20.46	7.10	CLAY	20	33		1.4	
1.050	3.44	20.78	7.18	CLAY	21	33		1.4	
1.200	3.94	19.89	7.86	CLAY	20	32		1.3	
1.350	4.43	22.88	5.53	CLAY	23	37		1.3	
1.500	4.92	14.36	6.02	CLAY	14	23		.9	
1.650	5.41	11.96	7.12	CLAY	12	19		.8	
1.800	5.91	21.54	4.12	CLAY to SILTY CLAY	14	23		1.4	
1.950	6.40	11.75	5.15	CLAY	12	19		.8	
2.100	6.89	10.37	5.03	CLAY	10	17		.7	
2.250	7.38	9.09	6.47	CLAY	9	14		.6	
2.400	7.87	14.04	4.45	CLAY	14	22		.9	
2.550	8.37	15.70	4.95	CLAY	16	24		1.0	
2.700	8.86	14.74	5.16	CLAY	15	22		1.0	
2.850	9.35	53.47	3.02	SANDY SILT to CLAYEY SILT	21	32		3.5	
3.000	9.84	10.75	4.39	CLAY	11	16		.7	
3.150	10.33	9.79	4.09	CLAY	10	14		.6	
3.300	10.83	8.37	4.44	CLAY	8	12		.5	
3.450	11.32	7.10	3.98	CLAY	7	10		.4	
3.600	11.81	6.99	4.86	CLAY	7	10		.4	
3.750	12.30	8.35	4.84	CLAY	8	12		.5	
3.900	12.80	13.43	4.86	CLAY	13	18		.8	
4.050	13.29	12.96	6.37	CLAY	13	17		.8	
4.200	13.78	13.24	5.04	CLAY	13	18		.8	
4.350	14.27	11.13	5.60	CLAY	11	15		.7	
4.500	14.76	40.94	4.51	CLAY to SILTY CLAY	27	36		2.4	
4.650	15.26	28.66	3.82	CLAY to SILTY CLAY	19	25		1.9	
4.800	15.75	11.60	4.28	CLAY	12	15		.7	
4.950	16.24	12.87	3.82	CLAY	13	16		.8	
5.100	16.73	14.68	4.03	CLAY	15	18		.9	
5.250	17.22	13.94	4.16	CLAY	14	17		.9	
5.400	17.72	12.30	4.33	CLAY	12	15		.8	
5.550	18.21	15.15	4.34	CLAY	15	19		.9	
5.700	18.70	20.14	5.27	CLAY	20	24		1.1	
5.850	19.19	15.11	5.65	CLAY	15	18		.9	
6.000	19.69	47.97	2.95	SANDY SILT to CLAYEY SILT	19	23		3.1	
6.150	20.18	19.25	4.88	CLAY	19	23		1.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-1

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	17.95	6.12	CLAY	18	21		1.1	
6.450	21.16	17.97	5.91	CLAY	18	21		1.1	
6.600	21.65	18.65	6.22	CLAY	19	22		1.0	
6.750	22.15	18.06	5.40	CLAY	18	21		1.1	
6.900	22.64	17.46	5.47	CLAY	17	20		1.1	
7.050	23.13	17.17	5.40	CLAY	17	19		1.1	
7.200	23.62	14.00	5.38	CLAY	14	16		.8	
7.350	24.11	11.92	5.43	CLAY	12	13		.7	
7.500	24.61	14.98	4.51	CLAY	15	17		.9	
7.650	25.10	15.02	5.50	CLAY	15	16		.9	
7.800	25.59	19.76	5.13	CLAY	20	22		1.2	
7.950	26.08	21.05	4.61	CLAY	21	23		1.3	
8.100	26.57	22.50	5.24	CLAY	23	24		1.2	
8.250	27.07	21.20	4.76	CLAY	21	23		1.3	
8.400	27.56	21.33	4.95	CLAY	21	23		1.3	
8.550	28.05	25.79	4.37	CLAY to SILTY CLAY	17	18		1.4	
8.700	28.54	23.24	4.09	CLAY to SILTY CLAY	15	16		1.4	
8.850	29.04	25.43	5.12	CLAY	25	26		1.4	
9.000	29.53	28.00	5.01	CLAY	28	29		1.6	
9.150	30.02	27.36	5.89	CLAY	27	28		1.5	
9.300	30.51	30.32	5.68	CLAY	30	31		1.7	
9.450	31.00	33.10	5.38	CLAY	33	34		1.8	
9.600	31.50	36.84	4.55	CLAY to SILTY CLAY	25	25		2.1	
9.750	31.99	26.30	4.48	CLAY to SILTY CLAY	18	18		1.4	
9.900	32.48	15.70	4.35	CLAY	16	16		.9	
10.050	32.97	17.38	3.84	CLAY to SILTY CLAY	12	11		1.0	
10.200	33.46	18.44	4.46	CLAY	18	18		1.1	
10.350	33.96	26.94	5.25	CLAY	27	26		1.5	
10.500	34.45	31.00	4.80	CLAY	31	30		1.7	
10.650	34.94	60.78	4.35	CLAYEY SILT to SILTY CLAY	30	29		3.5	
10.800	35.43	39.37	5.93	CLAY	39	38		2.2	
10.950	35.93	75.48	4.24	CLAYEY SILT to SILTY CLAY	38	36		4.3	
11.100	36.42	21.92	4.35	CLAY to SILTY CLAY	15	14		1.3	
11.250	36.91	26.02	5.62	CLAY	26	25		1.4	
11.400	37.40	27.62	5.02	CLAY	28	26		1.5	
11.550	37.89	27.83	4.18	CLAY to SILTY CLAY	19	17		1.5	
11.700	38.39	31.65	7.55	CLAY	32	30		1.7	
11.850	38.88	78.14	4.01	CLAYEY SILT to SILTY CLAY	39	36		4.5	
12.000	39.37	24.98	4.01	CLAY to SILTY CLAY	17	15		1.5	
12.150	39.86	15.81	3.78	CLAY to SILTY CLAY	11	10		.9	
12.300	40.35	16.49	3.52	CLAY to SILTY CLAY	11	10		1.0	
12.450	40.85	17.65	4.56	CLAY	18	16		1.0	
12.600	41.34	22.77	2.87	CLAYEY SILT to SILTY CLAY	11	10		1.4	
12.750	41.83	23.03	4.46	CLAY	23	21		1.4	
12.900	42.32	24.75	5.05	CLAY	25	22		1.3	
13.050	42.81	25.05	5.00	CLAY	25	22		1.3	
13.200	43.31	22.90	4.63	CLAY	23	20		1.4	
13.350	43.80	20.97	5.07	CLAY	21	19		1.1	
13.500	44.29	23.79	4.47	CLAY	24	21		1.4	
13.650	44.78	110.47	4.12	CLAYEY SILT to SILTY CLAY	55	48		6.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-1

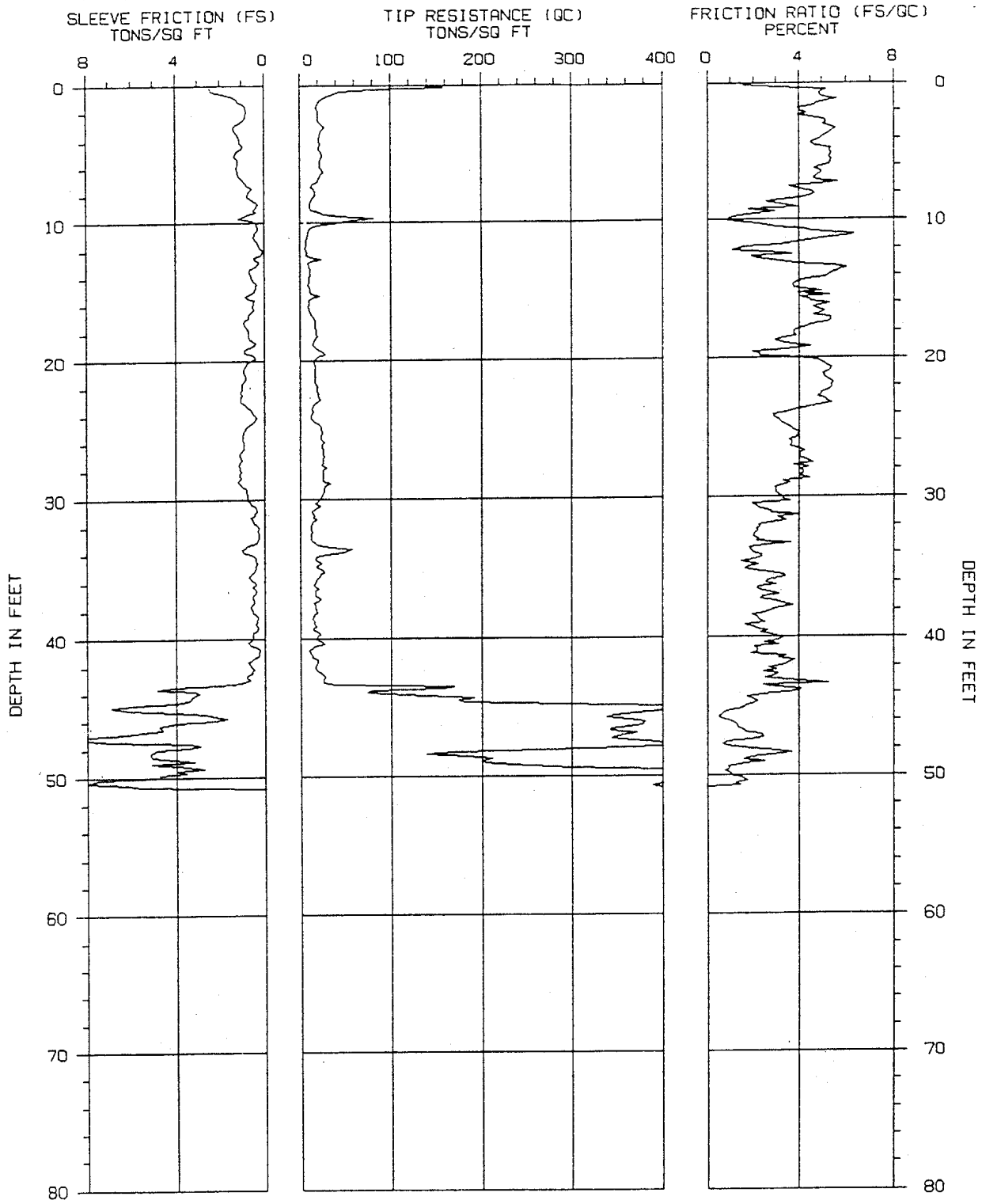
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	25.64	5.83	CLAY	26	22		1.4	
13.950	45.77	23.62	6.03	CLAY	24	21		1.2	
14.100	46.26	25.26	5.58	CLAY	25	22		1.3	
14.250	46.75	26.05	5.78	CLAY	26	22		1.4	
14.400	47.24	26.77	5.62	CLAY	27	23		1.4	
14.550	47.74	26.68	5.87	CLAY	27	23		1.4	
14.700	48.23	29.06	5.55	CLAY	29	25		1.6	
14.850	48.72	27.17	5.59	CLAY	27	23		1.4	
15.000	49.21	26.36	5.42	CLAY	26	22		1.4	
15.150	49.70	24.47	5.18	CLAY	24	21		1.3	
15.300	50.20	23.56	5.55	CLAY	24	20		1.2	
15.450	50.69	23.28	5.07	CLAY	23	19		1.2	
15.600	51.18	21.07	4.57	CLAY	21	17		1.2	
15.750	51.67	21.29	4.29	CLAY to SILTY CLAY	14	12		1.2	
15.900	52.17	22.56	3.50	CLAYEY SILT to SILTY CLAY	11	9		1.3	
16.050	52.66	22.73	4.33	CLAY to SILTY CLAY	15	12		1.3	
16.200	53.15	24.43	5.36	CLAY	24	20		1.3	
16.350	53.64	35.20	3.35	CLAYEY SILT to SILTY CLAY	18	14		2.1	
16.500	54.13	31.82	7.94	CLAY	32	26		1.7	
16.650	54.63	87.12	5.81	*VERY STIFF FINE GRAINED	87	70			
16.800	55.12	167.90	1.75	SAND to SILTY SAND	42	34	76		40.5
16.950	55.61	25.94	3.21	CLAYEY SILT to SILTY CLAY	13	10		1.5	
17.100	56.10	31.23	4.32	CLAY to SILTY CLAY	21	17		1.7	
17.250	56.59	16.02	4.41	CLAY	16	13		.9	
17.400	57.09	12.32	3.98	CLAY	12	10		.6	
17.550	57.58	34.16	2.93	CLAYEY SILT to SILTY CLAY	17	13		2.1	
17.700	58.07	25.62	4.77	CLAY	26	20		1.3	
17.850	58.56	37.43	4.86	CLAY	37	29		2.0	
18.000	59.06	35.56	7.57	CLAY	36	28		1.9	
18.150	59.55	32.67	5.98	CLAY	33	25		1.7	
18.300	60.04	31.85	4.75	CLAY	32	25		1.7	
18.450	60.53	33.08	4.86	CLAY	33	26		1.8	
18.600	61.02	32.04	4.38	CLAY to SILTY CLAY	21	16		1.7	
18.750	61.52	32.12	3.88	CLAYEY SILT to SILTY CLAY	16	12		1.7	
18.900	62.01	30.00	3.60	CLAYEY SILT to SILTY CLAY	15	11		1.8	
19.050	62.50	24.64	3.51	CLAYEY SILT to SILTY CLAY	12	9		1.4	
19.200	62.99	28.19	4.01	CLAY to SILTY CLAY	19	14		1.6	
19.350	63.48	24.54	3.91	CLAY to SILTY CLAY	16	12		1.4	
19.500	63.98	29.42	4.63	CLAY to SILTY CLAY	20	15		1.5	
19.650	64.47	43.57	4.55	CLAY to SILTY CLAY	29	22		2.4	
19.800	64.96	47.95	4.82	CLAY to SILTY CLAY	32	24		2.6	
19.950	65.45	49.10	4.80	CLAY to SILTY CLAY	33	24		2.7	
20.100	65.94	46.29	4.57	CLAY to SILTY CLAY	31	23		2.5	
20.250	66.44	45.83	4.95	CLAY to SILTY CLAY	31	23		2.5	
20.400	66.93	71.89	5.60	*VERY STIFF FINE GRAINED	72	53			
20.550	67.42	52.13	5.51	CLAY	52	38		2.8	
20.700	67.91	43.89	5.67	CLAY	44	32		2.4	
20.850	68.41	37.88	7.26	CLAY	38	28		2.0	
21.000	68.90	51.75	6.61	CLAY	52	38		2.8	
21.150	69.39	41.00	5.38	CLAY	41	30		2.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-1

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
21.300	69.88	33.38	5.47	CLAY	33	24		1.7	
21.450	70.37	28.40	3.98	CLAY to SILTY CLAY	19	14		1.6	
21.600	70.87	27.64	4.20	CLAY to SILTY CLAY	18	13		1.4	
21.750	71.36	24.88	4.15	CLAY to SILTY CLAY	17	12		1.4	
21.900	71.85	26.79	4.26	CLAY to SILTY CLAY	18	13		1.3	
22.050	72.34	35.97	9.56	CLAY	36	26		1.9	
22.200	72.83	179.86	2.01	SILTY SAND to SANDY SILT	60	43	74		39.5
22.350	73.33	124.77	4.26	*VERY STIFF FINE GRAINED	100	89			
22.500	73.82	40.77	2.96	CLAYEY SILT to SILTY CLAY	20	14		2.4	
22.650	74.31	33.95	3.70	CLAYEY SILT to SILTY CLAY	17	12		2.0	
22.800	74.80	27.21	3.68	CLAYEY SILT to SILTY CLAY	14	10		1.5	
22.950	75.30	29.89	3.57	CLAYEY SILT to SILTY CLAY	15	10		1.7	
23.100	75.79	29.32	3.73	CLAYEY SILT to SILTY CLAY	15	10		1.7	
23.250	76.28	37.28	4.94	CLAY	37	26		1.9	
23.400	76.77	80.88	4.45	CLAYEY SILT to SILTY CLAY	40	28		4.5	
23.550	77.26	67.98	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-2

PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/R#4

DATE/TIME: 04-12-00 07:36

HFA

CPT INTERPRETATIONS

SOUNDING : HLA-2
PROJECT : HLA/BISHOP RH 1
DATE/TIME: 04-12-00 07:36

PROJECT No.: 50044.1
CONE/RIG : 491/BH,VO/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	45.08	5.18	CLAY	45	72		2.7	
.300	.98	24.81	5.08	CLAY	25	40		1.5	
.450	1.48	18.84	4.76	CLAY	19	30		1.3	
.600	1.97	20.40	4.01	CLAY to SILTY CLAY	14	22		1.4	
.750	2.46	20.73	4.52	CLAY	21	33		1.4	
.900	2.95	27.43	5.02	CLAY	27	44		1.6	
1.050	3.44	22.90	5.41	CLAY	23	37		1.3	
1.200	3.94	22.05	4.94	CLAY	22	35		1.3	
1.350	4.43	21.52	4.53	CLAY	22	34		1.4	
1.500	4.92	24.79	5.27	CLAY	25	40		1.4	
1.650	5.41	22.99	5.30	CLAY	23	37		1.3	
1.800	5.91	23.01	5.30	CLAY	23	37		1.3	
1.950	6.40	24.28	4.95	CLAY	24	39		1.4	
2.100	6.89	20.10	4.61	CLAY	20	32		1.3	
2.250	7.38	12.83	4.84	CLAY	13	20		.8	
2.400	7.87	16.85	4.60	CLAY	17	26		1.1	
2.550	8.37	12.58	4.03	CLAY	13	19		.8	
2.700	8.86	12.00	3.06	CLAY to SILTY CLAY	8	12		.8	
2.850	9.35	25.85	2.93	CLAYEY SILT to SILTY CLAY	13	19		1.7	
3.000	9.84	58.27	.93	SILTY SAND to SANDY SILT	19	28	61		41.5
3.150	10.33	12.47	2.48	CLAYEY SILT to SILTY CLAY	6	9		1.0	
3.300	10.83	9.65	4.63	CLAY	10	14		.6	
3.450	11.32	6.95	4.99	CLAY	7	10		.4	
3.600	11.81	6.48	3.16	CLAY	6	9		.4	
3.750	12.30	7.24	2.68	CLAY to SILTY CLAY	5	7		.5	
3.900	12.80	13.00	2.17	CLAYEY SILT to SILTY CLAY	7	9		1.0	
4.050	13.29	10.96	5.47	CLAY	11	15		.7	
4.200	13.78	11.11	5.51	CLAY	11	15		.7	
4.350	14.27	10.16	4.33	CLAY	10	13		.6	
4.500	14.76	10.96	3.74	CLAY	11	14		.7	
4.650	15.26	21.16	3.97	CLAY to SILTY CLAY	14	18		1.4	
4.800	15.75	10.47	4.46	CLAY	10	13		.6	
4.950	16.24	10.92	4.60	CLAY	11	14		.7	
5.100	16.73	14.30	4.94	CLAY	14	18		.9	
5.250	17.22	17.51	5.33	CLAY	18	22		1.1	
5.400	17.72	17.80	4.33	CLAY	18	22		1.1	
5.550	18.21	18.76	3.80	CLAY to SILTY CLAY	13	15		1.2	
5.700	18.70	14.34	2.93	CLAY to SILTY CLAY	10	12		.9	
5.850	19.19	19.33	4.51	CLAY	19	23		1.2	
6.000	19.69	20.08	2.27	CLAYEY SILT to SILTY CLAY	10	12		1.5	
6.150	20.18	15.83	4.80	CLAY	16	19		1.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-2

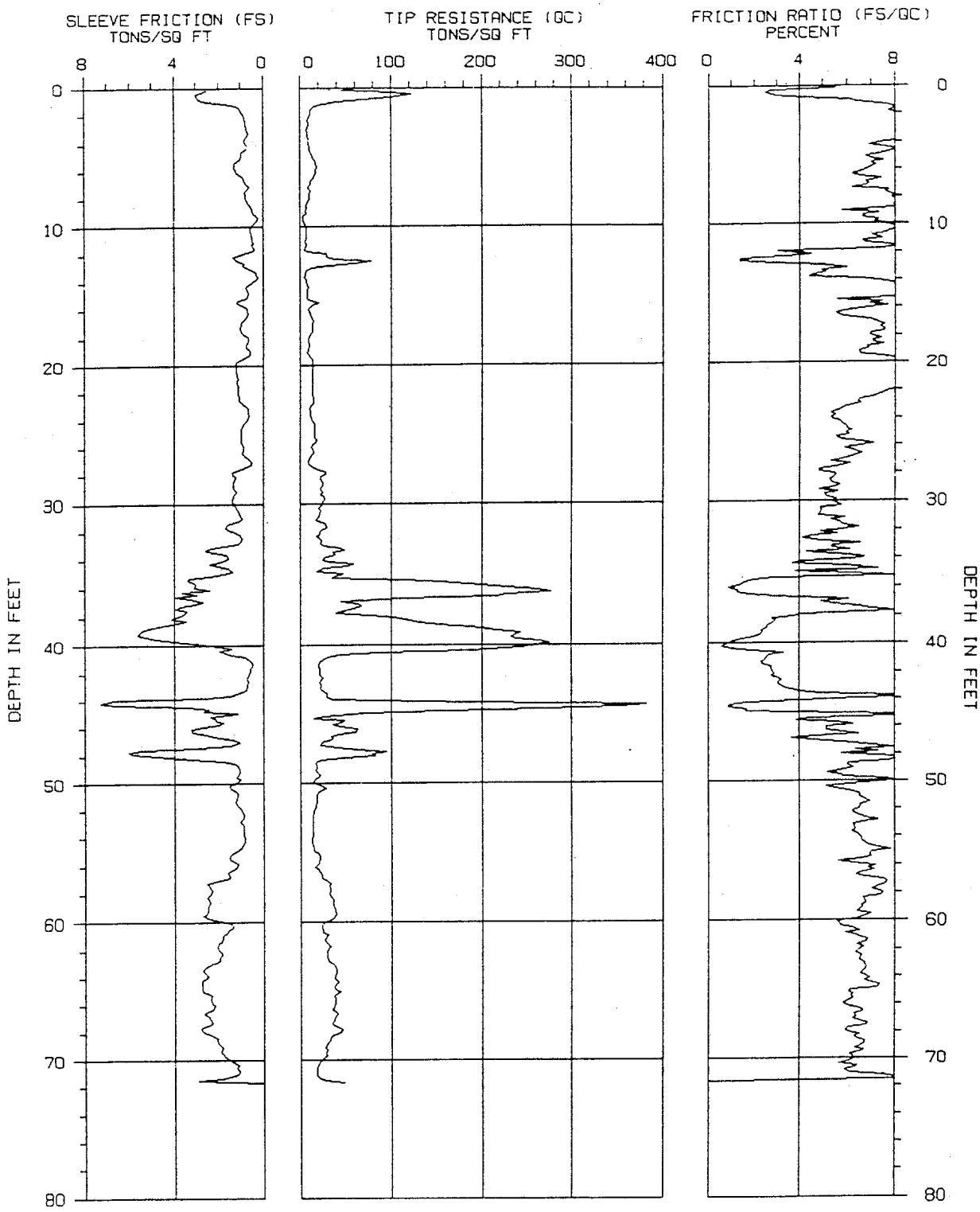
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	17.06	5.36	CLAY	17	20		1.1	
6.450	21.16	17.02	5.02	CLAY	17	20		1.1	
6.600	21.65	18.50	5.40	CLAY	19	21		1.2	
6.750	22.15	19.31	5.36	CLAY	19	22		1.2	
6.900	22.64	21.27	4.93	CLAY	21	24		1.3	
7.050	23.13	17.14	5.15	CLAY	17	19		1.1	
7.200	23.62	14.34	4.16	CLAY	14	16		.9	
7.350	24.11	12.47	2.87	CLAY to SILTY CLAY	8	9		.7	
7.500	24.61	21.24	3.19	CLAYEY SILT to SILTY CLAY	11	12		1.3	
7.650	25.10	25.05	3.70	CLAY to SILTY CLAY	17	18		1.6	
7.800	25.59	24.22	3.97	CLAY to SILTY CLAY	16	18		1.5	
7.950	26.08	24.96	3.69	CLAY to SILTY CLAY	17	18		1.6	
8.100	26.57	25.71	4.10	CLAY to SILTY CLAY	17	18		1.6	
8.250	27.07	25.94	4.06	CLAY to SILTY CLAY	17	18		1.6	
8.400	27.56	24.88	4.60	CLAY	25	26		1.4	
8.550	28.05	26.15	4.05	CLAY to SILTY CLAY	17	18		1.6	
8.700	28.54	26.32	4.02	CLAY to SILTY CLAY	18	18		1.7	
8.850	29.04	28.66	3.61	CLAYEY SILT to SILTY CLAY	14	15		1.8	
9.000	29.53	26.51	3.00	CLAYEY SILT to SILTY CLAY	13	14		1.7	
9.150	30.02	22.50	3.29	CLAYEY SILT to SILTY CLAY	11	12		1.4	
9.300	30.51	22.26	1.96	SANDY SILT to CLAYEY SILT	9	9		1.6	
9.450	31.00	15.23	2.78	CLAYEY SILT to SILTY CLAY	8	8		.9	
9.600	31.50	17.91	3.07	CLAYEY SILT to SILTY CLAY	9	9		1.1	
9.750	31.99	12.11	2.25	CLAYEY SILT to SILTY CLAY	6	6		.8	
9.900	32.48	13.11	2.17	CLAYEY SILT to SILTY CLAY	7	7		.9	
10.050	32.97	14.11	2.21	CLAYEY SILT to SILTY CLAY	7	7		1.0	
10.200	33.46	33.27	2.51	SANDY SILT to CLAYEY SILT	13	13		2.1	
10.350	33.96	29.15	2.02	SANDY SILT to CLAYEY SILT	12	11		2.2	
10.500	34.45	18.74	2.03	CLAYEY SILT to SILTY CLAY	9	9		1.3	
10.650	34.94	21.92	1.80	SANDY SILT to CLAYEY SILT	9	8		1.6	
10.800	35.43	22.35	2.79	CLAYEY SILT to SILTY CLAY	11	11		1.4	
10.950	35.93	17.59	2.63	CLAYEY SILT to SILTY CLAY	9	8		1.0	
11.100	36.42	19.86	2.25	CLAYEY SILT to SILTY CLAY	10	9		1.4	
11.250	36.91	16.72	3.11	CLAYEY SILT to SILTY CLAY	8	8		1.0	
11.400	37.40	16.42	2.96	CLAYEY SILT to SILTY CLAY	8	8		1.0	
11.550	37.89	18.67	2.92	CLAYEY SILT to SILTY CLAY	9	9		1.1	
11.700	38.39	15.06	1.97	CLAYEY SILT to SILTY CLAY	8	7		1.0	
11.850	38.88	16.42	2.48	CLAYEY SILT to SILTY CLAY	8	8		1.0	
12.000	39.37	15.87	2.16	CLAYEY SILT to SILTY CLAY	8	7		1.1	
12.150	39.86	19.63	2.79	CLAYEY SILT to SILTY CLAY	10	9		1.2	
12.300	40.35	26.96	2.51	CLAYEY SILT to SILTY CLAY	13	12		1.6	
12.450	40.85	10.86	2.17	CLAYEY SILT to SILTY CLAY	5	5		.7	
12.600	41.34	13.53	3.41	CLAY to SILTY CLAY	9	8		.8	
12.750	41.83	17.91	3.60	CLAY to SILTY CLAY	12	11		1.0	
12.900	42.32	19.08	3.04	CLAYEY SILT to SILTY CLAY	10	9		1.1	
13.050	42.81	27.62	2.89	CLAYEY SILT to SILTY CLAY	14	12		1.7	
13.200	43.31	38.81	5.26	CLAY	39	35		2.1	
13.350	43.80	77.90	4.10	CLAYEY SILT to SILTY CLAY	39	34		4.4	
13.500	44.29	190.78	1.73	SAND to SILTY SAND	48	42	82		42.5
13.650	44.78	289.55	2.04	SAND to SILTY SAND	72	63	94		44.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-2

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	398.77	1.01	SAND	80	70	100		45.5
13.950	45.77	338.71	.51	GRAVELLY SAND to SAND	56	49	98		44.5
14.100	46.26	378.77	1.25	SAND	76	66	100		45.0
14.250	46.75	342.68	1.61	SAND to SILTY SAND	86	74	98		44.5
14.400	47.24	344.46	2.47	SILTY SAND to SANDY SILT	100	99	98		44.5
14.550	47.74	440.45	.66	GRAVELLY SAND to SAND	73	63	100		46.0
14.700	48.23	169.62	3.02	SANDY SILT to CLAYEY SILT	68	58		9.8	
14.850	48.72	211.45	1.93	SAND to SILTY SAND	53	45	84		42.5
15.000	49.21	233.10	1.67	SAND to SILTY SAND	58	49	86		43.0
15.150	49.70	467.87	.76	GRAVELLY SAND to SAND	78	66	100		46.0
15.300	50.20	494.86	1.51	SAND	99	83	100		46.0
15.450	50.69	389.23	1.43	SAND	78	65	100		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-3

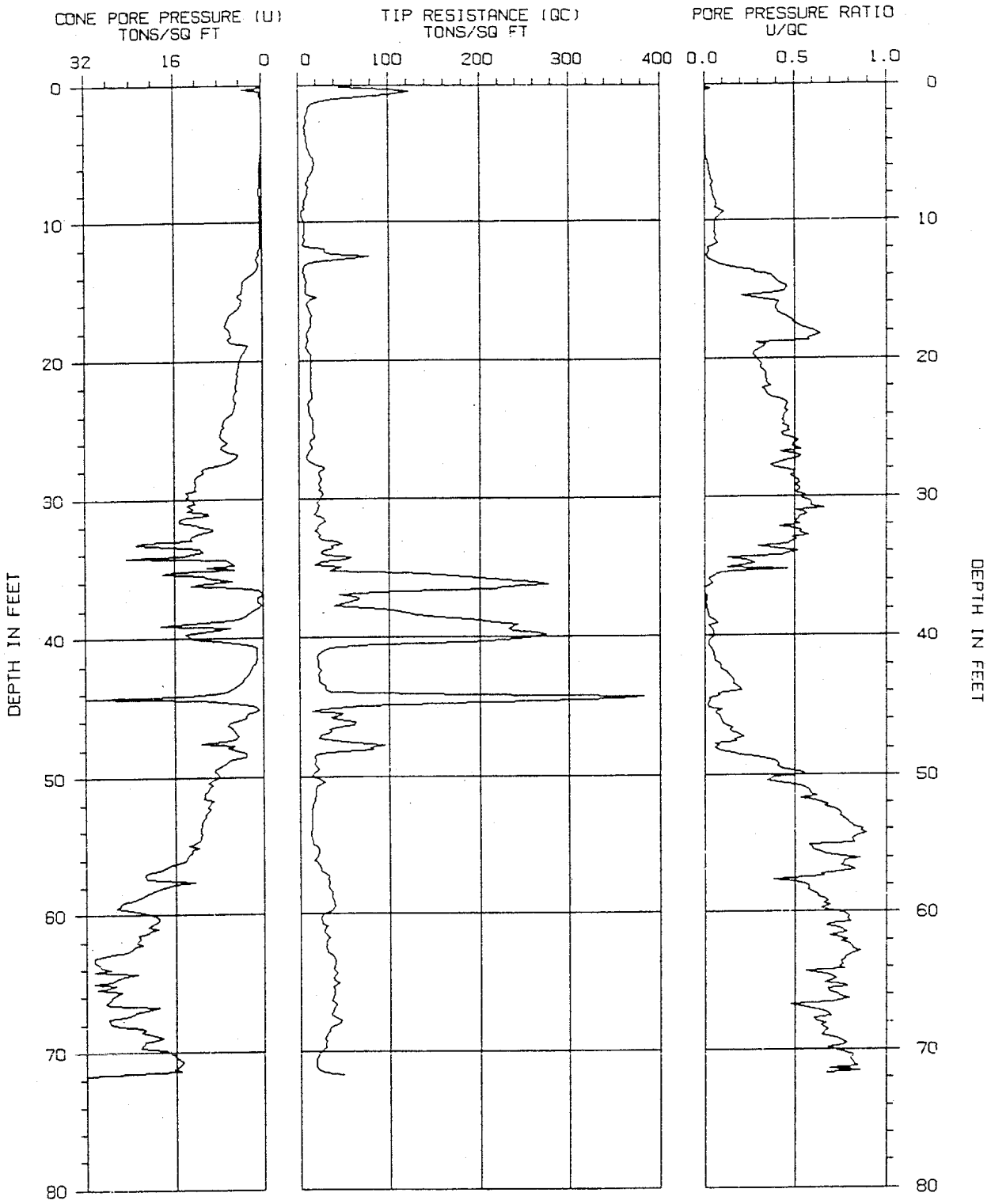
PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/R#4

DATE/TIME: 04-13-00 09:26

HFA



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-3

PROJECT NAME : HLA/BISHOP RH 1

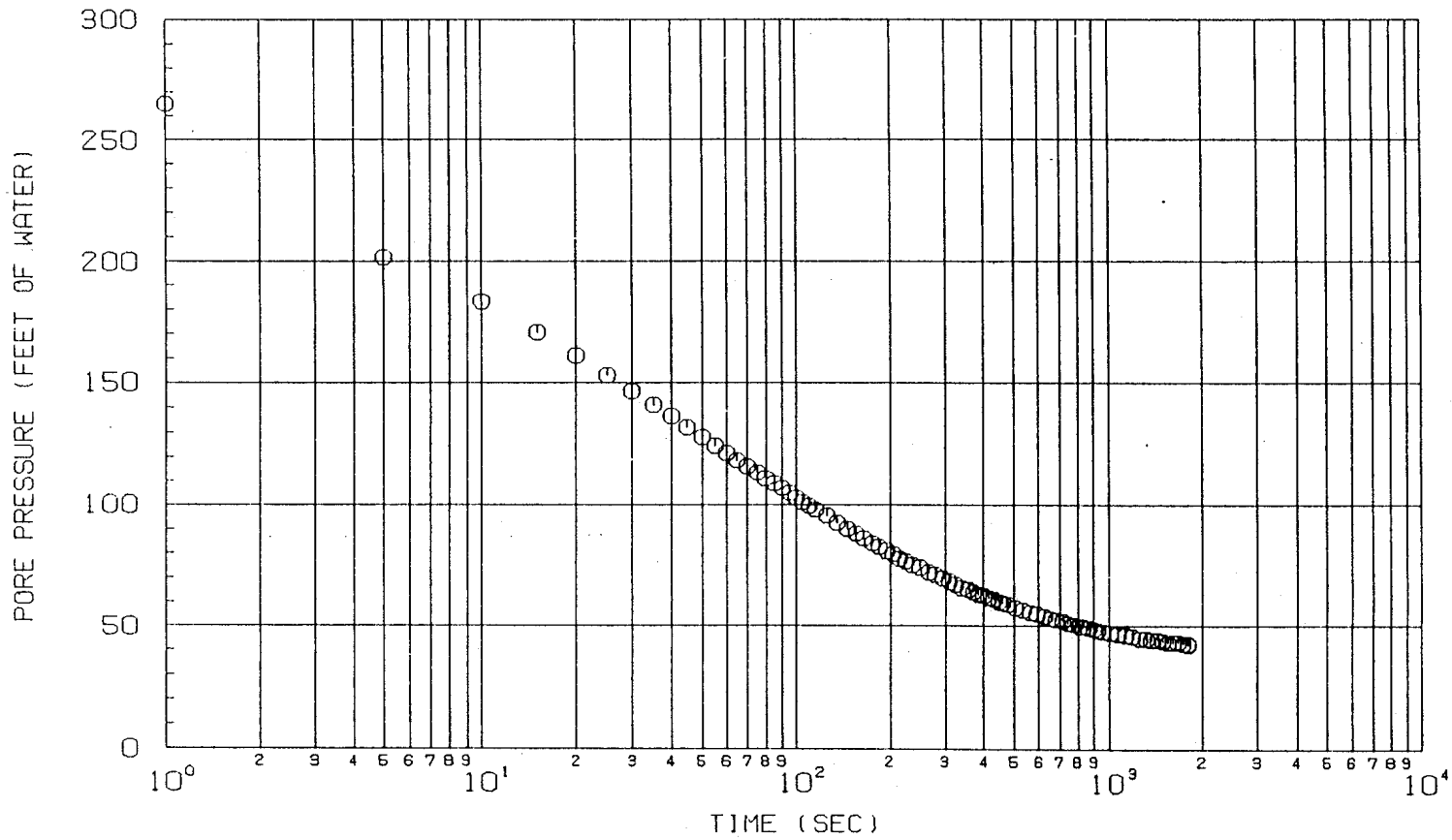
CONE/RIG : 491/BH.V0/R#4

PROJECT NUMBER : 50044.1

DATE/TIME: 04-13-00 09:26

HFA

PORE PRESSURE DISSIPATION CURVES



DEPTH: ⏀ 36.3 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: HLA-3

PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/Rn4

DATE/TIME: 04-13-00 09:26

HFA

CPT INTERPRETATIONS

SOUNDING : HLA-3
PROJECT : HLA/BISHOP RH 1
DATE/TIME: 04-13-00 09:26

PROJECT No.: 50044.1
CONE/RIG : 491/BH,VO/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	122.22	2.48	SILTY SAND to SANDY SILT	41	65	82		
.300	.98	40.17	6.15	CLAY	40	64		2.4	
.450	1.48	13.62	7.86	CLAY	14	22		.9	
.600	1.97	10.64	8.27	CLAY	11	17		.7	
.750	2.46	9.24	8.48	CLAY	9	15		.6	
.900	2.95	7.48	9.83	CLAY	7	12		.5	
1.050	3.44	8.52	8.29	CLAY	9	14		.6	
1.200	3.94	9.82	8.01	CLAY	10	16		.6	
1.350	4.43	10.56	7.54	CLAY	11	17		.7	
1.500	4.92	13.34	7.33	CLAY	13	21		.9	
1.650	5.41	17.36	7.52	CLAY	17	28		1.1	
1.800	5.91	17.59	6.94	CLAY	18	28		1.2	
1.950	6.40	14.89	6.24	CLAY	15	24		1.0	
2.100	6.89	11.17	6.79	CLAY	11	18		.7	
2.250	7.38	11.92	6.24	CLAY	12	19		.8	
2.400	7.87	10.13	7.97	CLAY	10	16		.6	
2.550	8.37	7.54	8.27	CLAY	8	11		.5	
2.700	8.86	5.99	8.31	CLAY	6	9		.4	
2.850	9.35	3.36	6.65	ORGANIC MATERIAL	3	5		.3	
3.000	9.84	6.08	7.13	CLAY	6	9		.4	
3.150	10.33	6.56	8.59	CLAY	7	9		.4	
3.300	10.83	7.03	7.08	CLAY	7	10		.4	
3.450	11.32	6.88	6.79	CLAY	7	10		.4	
3.600	11.81	7.84	7.52	CLAY	8	11		.5	
3.750	12.30	36.73	3.38	CLAYEY SILT to SILTY CLAY	18	25		2.4	
3.900	12.80	31.27	2.88	CLAYEY SILT to SILTY CLAY	16	21		2.0	
4.050	13.29	6.42	4.94	CLAY	6	9		.4	
4.200	13.78	6.84	4.40	CLAY	7	9		.4	
4.350	14.27	8.82	8.45	CLAY	9	12		.5	
4.500	14.76	7.73	8.51	CLAY	8	10		.5	
4.650	15.26	12.02	9.11	CLAY	12	16		.7	
4.800	15.75	11.43	6.93	CLAY	11	15		.7	
4.950	16.24	11.28	5.87	CLAY	11	14		.7	
5.100	16.73	14.36	6.21	CLAY	14	18		.9	
5.250	17.22	13.45	7.57	CLAY	13	17		.8	
5.400	17.72	11.54	7.56	CLAY	12	14		.7	
5.550	18.21	8.80	7.41	CLAY	9	11		.5	
5.700	18.70	9.88	7.49	CLAY	10	12		.6	
5.850	19.19	9.20	6.49	CLAY	9	11		.5	
6.000	19.69	14.21	8.09	CLAY	14	17		.9	
6.150	20.18	13.79	8.80	CLAY	14	16		.8	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-3

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	14.19	8.11	CLAY	14	17		.9	
6.450	21.16	13.45	8.42	CLAY	13	16		.8	
6.600	21.65	13.83	8.03	CLAY	14	16		.8	
6.750	22.15	14.30	7.59	CLAY	14	16		.9	
6.900	22.64	14.70	6.54	CLAY	15	17		.9	
7.050	23.13	10.83	6.18	CLAY	11	12		.6	
7.200	23.62	12.00	5.32	CLAY	12	13		.7	
7.350	24.11	14.83	5.39	CLAY	15	16		.9	
7.500	24.61	16.29	5.94	CLAY	16	18		1.0	
7.650	25.10	16.02	5.97	CLAY	16	18		1.0	
7.800	25.59	17.19	5.73	CLAY	17	19		1.1	
7.950	26.08	13.38	6.56	CLAY	13	14		.8	
8.100	26.57	11.83	6.60	CLAY	12	13		.7	
8.250	27.07	9.07	5.77	CLAY	9	10		.5	
8.400	27.56	20.16	5.53	CLAY	20	21		1.1	
8.550	28.05	22.88	5.49	CLAY	23	24		1.3	
8.700	28.54	25.37	5.28	CLAY	25	27		1.4	
8.850	29.04	23.07	5.46	CLAY	23	24		1.3	
9.000	29.53	26.28	5.08	CLAY	26	27		1.5	
9.150	30.02	24.47	5.40	CLAY	24	25		1.3	
9.300	30.51	22.97	4.91	CLAY	23	23		1.3	
9.450	31.00	19.33	4.79	CLAY	19	20		1.2	
9.600	31.50	28.47	5.68	CLAY	28	29		1.6	
9.750	31.99	21.29	5.86	CLAY	21	21		1.1	
9.900	32.48	20.97	4.53	CLAY	21	21		1.3	
10.050	32.97	26.34	6.58	CLAY	26	26		1.4	
10.200	33.46	36.35	6.14	CLAY	36	36		2.0	
10.350	33.96	24.58	6.76	CLAY	25	24		1.3	
10.500	34.45	53.75	3.70	CLAYEY SILT to SILTY CLAY	27	26		3.1	
10.650	34.94	47.12	3.81	CLAYEY SILT to SILTY CLAY	24	23		2.7	
10.800	35.43	117.19	2.88	SANDY SILT to CLAYEY SILT	47	45		6.8	
10.950	35.93	228.06	1.36	SAND to SILTY SAND	57	55	89		44.0
11.100	36.42	226.68	1.32	SAND to SILTY SAND	57	54	89		44.0
11.250	36.91	44.49	6.09	CLAY	44	42		2.5	
11.400	37.40	59.57	6.53	CLAY	60	56		3.4	
11.550	37.89	93.75	4.11	CLAYEY SILT to SILTY CLAY	47	44		5.4	
11.700	38.39	131.34	2.92	SANDY SILT to CLAYEY SILT	53	49		7.6	
11.850	38.88	216.78	2.52	SILTY SAND to SANDY SILT	72	67	87		43.5
12.000	39.37	231.91	2.26	SILTY SAND to SANDY SILT	77	71	89		43.5
12.150	39.86	273.82	1.14	SAND	55	50	93		44.5
12.300	40.35	187.83	1.05	SAND	38	34	82		42.5
12.450	40.85	30.04	2.68	CLAYEY SILT to SILTY CLAY	15	14		1.9	
12.600	41.34	20.76	2.32	CLAYEY SILT to SILTY CLAY	10	9		1.2	
12.750	41.83	21.31	2.75	CLAYEY SILT to SILTY CLAY	11	10		1.3	
12.900	42.32	25.03	2.75	CLAYEY SILT to SILTY CLAY	13	11		1.5	
13.050	42.81	22.43	3.09	CLAYEY SILT to SILTY CLAY	11	10		1.3	
13.200	43.31	25.83	3.64	CLAYEY SILT to SILTY CLAY	13	11		1.6	
13.350	43.80	30.66	8.39	CLAY	31	27		1.7	
13.500	44.29	383.11	1.71	SAND to SILTY SAND	96	84	100		45.5
13.650	44.78	157.57	1.69	SAND to SILTY SAND	39	35	76		41.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-3

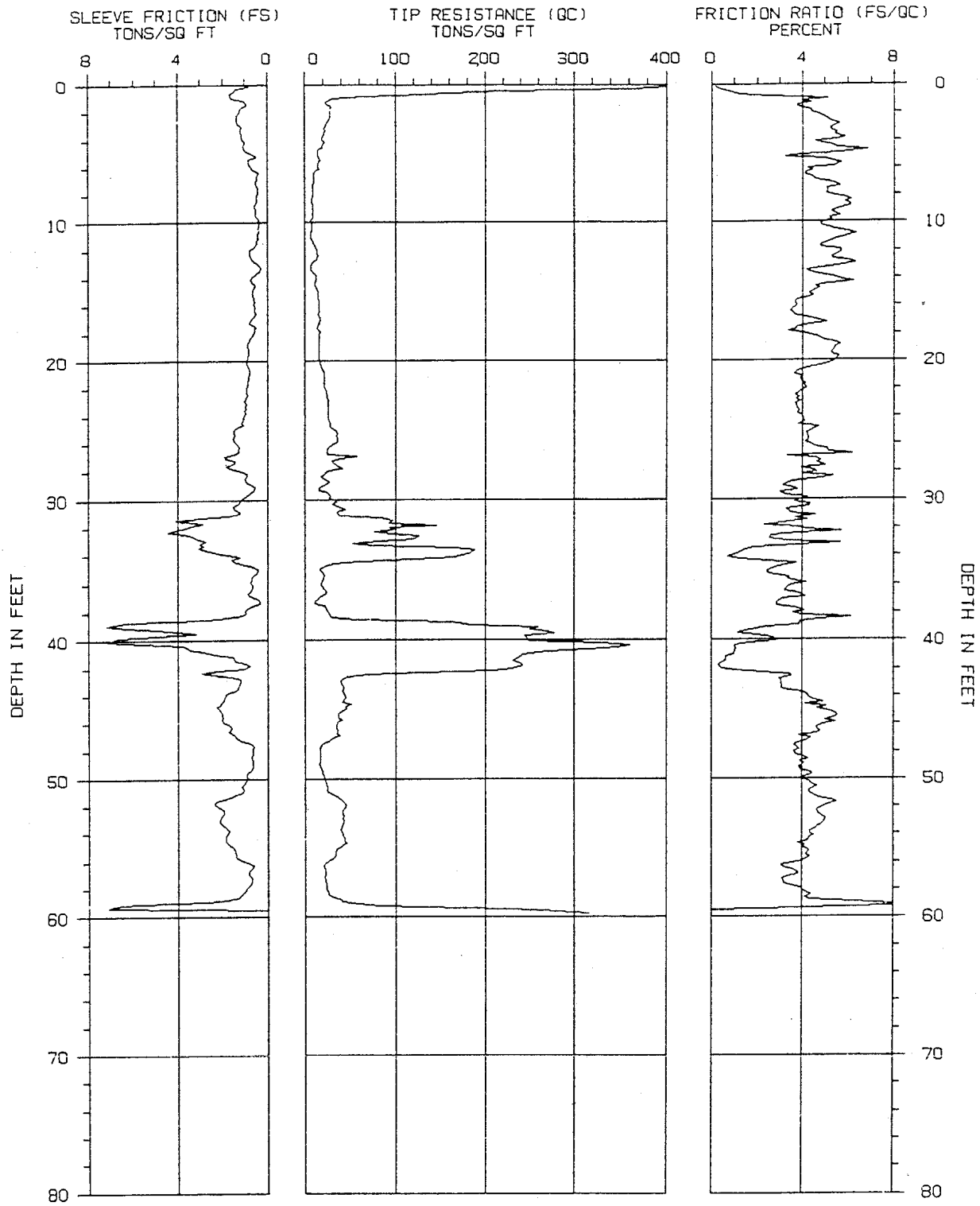
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	15.28	13.92	CLAY	15	13		.9	
13.950	45.77	35.48	5.61	CLAY	35	31		1.9	
14.100	46.26	60.99	5.14	CLAY to SILTY CLAY	41	35		3.4	
14.250	46.75	35.39	4.67	CLAY to SILTY CLAY	24	20		1.9	
14.400	47.24	23.11	6.31	CLAY	23	20		1.2	
14.550	47.74	94.31	6.37	*VERY STIFF FINE GRAINED	94	81			
14.700	48.23	32.91	9.74	CLAY	33	28		1.8	
14.850	48.72	18.70	6.08	CLAY	19	16		.9	
15.000	49.21	18.23	5.93	CLAY	18	15		1.0	
15.150	49.70	17.06	5.86	CLAY	17	14		1.0	
15.300	50.20	22.97	6.65	CLAY	23	19		1.2	
15.450	50.69	19.01	6.02	CLAY	19	16		1.0	
15.600	51.18	18.21	6.54	CLAY	18	15		1.0	
15.750	51.67	17.00	6.55	CLAY	17	14		.9	
15.900	52.17	14.64	6.27	CLAY	15	12		.8	
16.050	52.66	14.17	6.78	CLAY	14	12		.8	
16.200	53.15	14.26	6.26	CLAY	14	12		.8	
16.350	53.64	13.94	6.23	CLAY	14	11		.7	
16.500	54.13	13.04	6.61	CLAY	13	11		.7	
16.650	54.63	14.34	6.93	CLAY	14	12		.8	
16.800	55.12	20.16	7.07	CLAY	20	16		1.1	
16.950	55.61	20.88	6.60	CLAY	21	17		1.0	
17.100	56.10	16.51	7.22	CLAY	17	13		.9	
17.250	56.59	23.65	6.53	CLAY	24	19		1.2	
17.400	57.09	28.70	7.55	CLAY	29	23		1.5	
17.550	57.58	32.53	7.25	CLAY	33	26		1.7	
17.700	58.07	32.48	7.52	CLAY	32	26		1.7	
17.850	58.56	35.54	6.74	CLAY	36	28		1.9	
18.000	59.06	37.60	6.65	CLAY	38	29		2.0	
18.150	59.55	38.16	7.03	CLAY	38	30		2.1	
18.300	60.04	25.92	5.58	CLAY	26	20		1.3	
18.450	60.53	24.39	6.28	CLAY	24	19		1.2	
18.600	61.02	28.45	6.33	CLAY	28	22		1.5	
18.750	61.52	28.98	6.86	CLAY	29	22		1.5	
18.900	62.01	29.36	6.58	CLAY	29	22		1.5	
19.050	62.50	29.23	6.62	CLAY	29	22		1.5	
19.200	62.99	35.37	6.75	CLAY	35	27		1.9	
19.350	63.48	39.52	6.81	CLAY	40	30		2.1	
19.500	63.98	37.11	6.85	CLAY	37	28		2.0	
19.650	64.47	39.30	6.99	CLAY	39	30		2.1	
19.800	64.96	43.57	6.17	CLAY	44	33		2.4	
19.950	65.45	37.94	6.19	CLAY	38	28		2.0	
20.100	65.94	37.09	5.88	CLAY	37	28		2.0	
20.250	66.44	38.03	6.65	CLAY	38	28		2.0	
20.400	66.93	37.56	6.40	CLAY	38	28		2.0	
20.550	67.42	36.22	6.87	CLAY	36	27		1.9	
20.700	67.91	44.64	5.94	CLAY	45	33		2.4	
20.850	68.41	32.48	6.31	CLAY	32	24		1.7	
21.000	68.90	28.21	6.74	CLAY	28	21		1.4	
21.150	69.39	28.36	6.72	CLAY	28	21		1.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-3

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
21.300	69.88	26.26	6.27	CLAY	26	19		1.3	
21.450	70.37	19.38	5.69	CLAY	19	14		.9	
21.600	70.87	18.31	5.90	CLAY	18	13		1.0	
21.750	71.36	21.63	8.53	CLAY	22	16		1.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 7.5 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-4

PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.VO/R#4

DATE/TIME: 04-12-00 17:19

HFA

CPT INTERPRETATIONS

SOUNDING : HLA-4
PROJECT : HLA/BISHOP RH 1
DATE/TIME: 04-12-00 17:19

PROJECT No.: 50044.1
CONE/RIG : 491/BH,VO/R#4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	218.69	.68	SAND	44	70	99		
.300	.98	30.72	5.12	CLAY	31	49		1.8	
.450	1.48	25.15	3.78	CLAY to SILTY CLAY	17	27		1.7	
.600	1.97	28.47	4.40	CLAY to SILTY CLAY	19	30		1.7	
.750	2.46	27.34	5.09	CLAY	27	44		1.6	
.900	2.95	22.43	5.41	CLAY	22	36		1.3	
1.050	3.44	21.75	5.51	CLAY	22	35		1.3	
1.200	3.94	19.74	5.56	CLAY	20	32		1.1	
1.350	4.43	19.82	5.38	CLAY	20	32		1.2	
1.500	4.92	14.34	5.63	CLAY	14	23		.9	
1.650	5.41	16.76	5.01	CLAY	17	27		1.1	
1.800	5.91	14.32	5.39	CLAY	14	23		.9	
1.950	6.40	9.92	4.13	CLAY	10	16		.6	
2.100	6.89	10.62	4.59	CLAY	11	17		.7	
2.250	7.38	8.77	5.64	CLAY	9	14		.6	
2.400	7.87	9.09	5.07	CLAY	9	14		.6	
2.550	8.37	7.90	6.13	CLAY	8	12		.5	
2.700	8.86	9.16	6.11	CLAY	9	13		.6	
2.850	9.35	9.56	5.46	CLAY	10	14		.6	
3.000	9.84	7.58	5.30	CLAY	8	11		.5	
3.150	10.33	7.99	5.14	CLAY	8	11		.5	
3.300	10.83	6.95	6.34	CLAY	7	10		.4	
3.450	11.32	9.07	5.31	CLAY	9	12		.6	
3.600	11.81	12.79	4.79	CLAY	13	17		.8	
3.750	12.30	14.55	5.49	CLAY	15	20		.9	
3.900	12.80	10.35	6.03	CLAY	10	14		.6	
4.050	13.29	6.69	4.80	CLAY	7	9		.4	
4.200	13.78	12.47	4.79	CLAY	12	16		.8	
4.350	14.27	11.11	6.22	CLAY	11	14		.7	
4.500	14.76	13.21	4.76	CLAY	13	17		.8	
4.650	15.26	15.00	4.49	CLAY	15	19		.9	
4.800	15.75	16.10	3.69	CLAY to SILTY CLAY	11	13		1.0	
4.950	16.24	16.10	3.55	CLAY to SILTY CLAY	11	13		1.0	
5.100	16.73	15.72	3.65	CLAY to SILTY CLAY	10	13		1.0	
5.250	17.22	15.66	5.07	CLAY	16	19		1.0	
5.400	17.72	15.08	3.76	CLAY to SILTY CLAY	10	12		.9	
5.550	18.21	15.93	4.56	CLAY	16	19		1.0	
5.700	18.70	16.15	5.49	CLAY	16	19		1.0	
5.850	19.19	15.78	5.44	CLAY	16	19		1.0	
6.000	19.69	15.70	5.60	CLAY	16	18		1.0	
6.150	20.18	17.38	5.32	CLAY	17	20		1.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.3 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-4

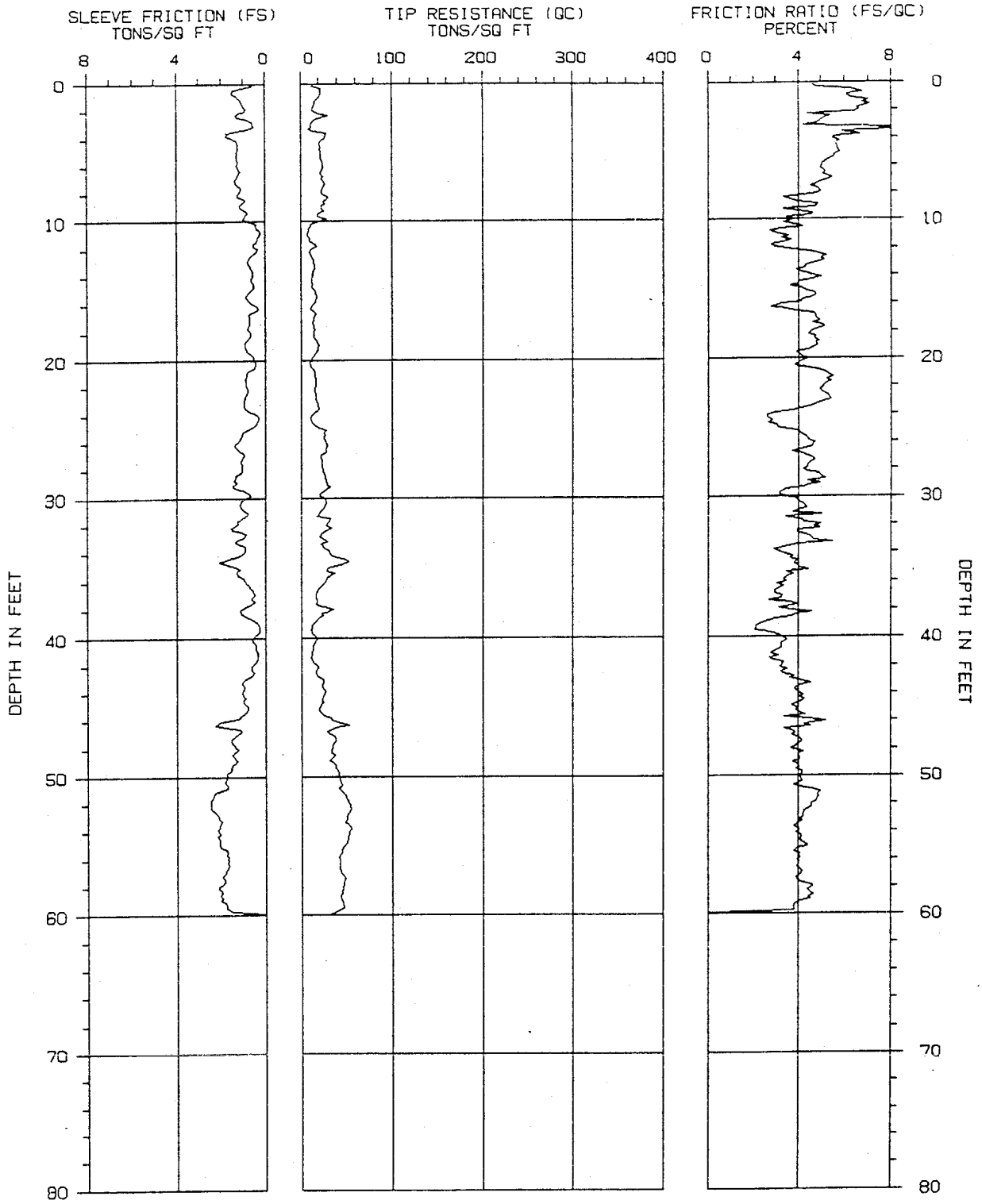
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	20.88	3.87	CLAY to SILTY CLAY	14	16		1.3	
6.450	21.16	21.27	3.95	CLAY to SILTY CLAY	14	16		1.3	
6.600	21.65	21.37	4.16	CLAY to SILTY CLAY	14	16		1.3	
6.750	22.15	23.39	4.01	CLAY to SILTY CLAY	16	18		1.5	
6.900	22.64	25.15	3.88	CLAY to SILTY CLAY	17	19		1.6	
7.050	23.13	25.75	3.68	CLAY to SILTY CLAY	17	19		1.6	
7.200	23.62	25.85	3.87	CLAY to SILTY CLAY	17	19		1.6	
7.350	24.11	26.07	4.00	CLAY to SILTY CLAY	17	19		1.6	
7.500	24.61	27.96	3.83	CLAY to SILTY CLAY	19	20		1.8	
7.650	25.10	34.74	4.36	CLAY to SILTY CLAY	23	25		2.0	
7.800	25.59	36.16	4.26	CLAY to SILTY CLAY	24	26		2.0	
7.950	26.08	29.87	4.45	CLAY to SILTY CLAY	20	21		1.7	
8.100	26.57	24.88	5.15	CLAY	25	26		1.4	
8.250	27.07	40.24	4.61	CLAY to SILTY CLAY	27	28		2.3	
8.400	27.56	35.76	5.03	CLAY	36	37		2.0	
8.550	28.05	22.54	4.61	CLAY	23	23		1.4	
8.700	28.54	20.69	4.84	CLAY	21	21		1.3	
8.850	29.04	18.59	3.17	CLAYEY SILT to SILTY CLAY	9	10		1.1	
9.000	29.53	24.69	3.05	CLAYEY SILT to SILTY CLAY	12	13		1.5	
9.150	30.02	30.74	3.92	CLAY to SILTY CLAY	20	21		1.9	
9.300	30.51	35.73	4.30	CLAY to SILTY CLAY	24	24		2.0	
9.450	31.00	36.03	3.46	CLAYEY SILT to SILTY CLAY	18	18		2.3	
9.600	31.50	96.56	4.21	CLAYEY SILT to SILTY CLAY	48	48		5.6	
9.750	31.99	93.12	3.89	CLAYEY SILT to SILTY CLAY	47	46		5.4	
9.900	32.48	96.15	3.84	CLAYEY SILT to SILTY CLAY	48	47		5.6	
10.050	32.97	82.30	3.35	SANDY SILT to CLAYEY SILT	33	32		4.7	
10.200	33.46	166.60	1.85	SILTY SAND to SANDY SILT	56	54	81		42.5
10.350	33.96	175.93	1.00	SAND	35	34	82		43.0
10.500	34.45	60.00	2.50	SANDY SILT to CLAYEY SILT	24	23		3.9	
10.650	34.94	17.00	2.67	CLAYEY SILT to SILTY CLAY	9	8		1.0	
10.800	35.43	21.48	2.80	CLAYEY SILT to SILTY CLAY	11	10		1.3	
10.950	35.93	18.25	4.19	CLAY	18	17		1.1	
11.100	36.42	21.41	3.30	CLAYEY SILT to SILTY CLAY	11	10		1.3	
11.250	36.91	16.93	4.14	CLAY	17	16		1.0	
11.400	37.40	11.81	2.84	CLAY to SILTY CLAY	8	7		.7	
11.550	37.89	24.56	4.08	CLAY to SILTY CLAY	16	15		1.5	
11.700	38.39	29.70	6.13	CLAY	30	27		1.6	
11.850	38.88	184.24	3.89	*SAND to CLAYEY SAND	92	85			
12.000	39.37	269.75	1.47	SAND to SILTY SAND	67	62	93		44.0
12.150	39.86	246.55	2.72	SILTY SAND to SANDY SILT	82	75	90		44.0
12.300	40.35	360.61	1.04	SAND	72	65	100		45.5
12.450	40.85	270.11	1.06	SAND	54	49	92		44.0
12.600	41.34	234.99	.63	SAND	47	42	88		43.5
12.750	41.83	241.98	.33	SAND	48	43	89		43.5
12.900	42.32	128.25	2.27	SILTY SAND to SANDY SILT	43	38	71		40.0
13.050	42.81	41.07	2.97	CLAYEY SILT to SILTY CLAY	21	18		2.6	
13.200	43.31	42.13	3.10	CLAYEY SILT to SILTY CLAY	21	19		2.6	
13.350	43.80	42.98	4.07	CLAYEY SILT to SILTY CLAY	21	19		2.4	
13.500	44.29	42.85	4.54	CLAY to SILTY CLAY	29	25		2.4	
13.650	44.78	44.83	5.05	CLAY	45	39		2.5	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.3 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-4

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	37.48	5.47	CLAY	37	32		2.1	
13.950	45.77	40.51	5.03	CLAY	41	35		2.2	
14.100	46.26	34.67	4.61	CLAY to SILTY CLAY	23	20		1.9	
14.250	46.75	34.31	4.67	CLAY to SILTY CLAY	23	20		1.9	
14.400	47.24	26.62	4.12	CLAY to SILTY CLAY	18	15		1.6	
14.550	47.74	16.70	3.80	CLAY to SILTY CLAY	11	9		.9	
14.700	48.23	17.46	3.73	CLAY to SILTY CLAY	12	10		1.0	
14.850	48.72	17.48	3.92	CLAY to SILTY CLAY	12	10		1.0	
15.000	49.21	17.23	3.85	CLAY to SILTY CLAY	11	10		1.0	
15.150	49.70	20.88	4.45	CLAY	21	17		1.2	
15.300	50.20	22.56	4.32	CLAY to SILTY CLAY	15	12		1.3	
15.450	50.69	24.28	4.53	CLAY	24	20		1.3	
15.600	51.18	31.76	4.45	CLAY to SILTY CLAY	21	17		1.7	
15.750	51.67	42.45	5.49	CLAY	42	35		2.3	
15.900	52.17	44.00	4.78	CLAY to SILTY CLAY	29	24		2.4	
16.050	52.66	42.09	4.87	CLAY to SILTY CLAY	28	23		2.3	
16.200	53.15	42.81	4.99	CLAY	43	35		2.3	
16.350	53.64	39.05	4.59	CLAY to SILTY CLAY	26	21		2.1	
16.500	54.13	41.47	4.53	CLAY to SILTY CLAY	28	22		2.3	
16.650	54.63	45.93	3.85	CLAYEY SILT to SILTY CLAY	23	18		2.5	
16.800	55.12	35.10	4.23	CLAY to SILTY CLAY	23	19		1.9	
16.950	55.61	32.38	4.36	CLAY to SILTY CLAY	22	17		1.7	
17.100	56.10	22.73	3.57	CLAY to SILTY CLAY	15	12		1.3	
17.250	56.59	22.39	3.65	CLAY to SILTY CLAY	15	12		1.3	
17.400	57.09	21.69	3.40	CLAYEY SILT to SILTY CLAY	11	9		1.2	
17.550	57.58	23.67	3.27	CLAYEY SILT to SILTY CLAY	12	9		1.4	
17.700	58.07	24.96	3.99	CLAY to SILTY CLAY	17	13		1.5	
17.850	58.56	31.14	4.15	CLAY to SILTY CLAY	21	16		1.6	
18.000	59.06	59.17	9.80	CLAY	59	46		3.3	
18.150	59.55	262.82	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.3 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-5

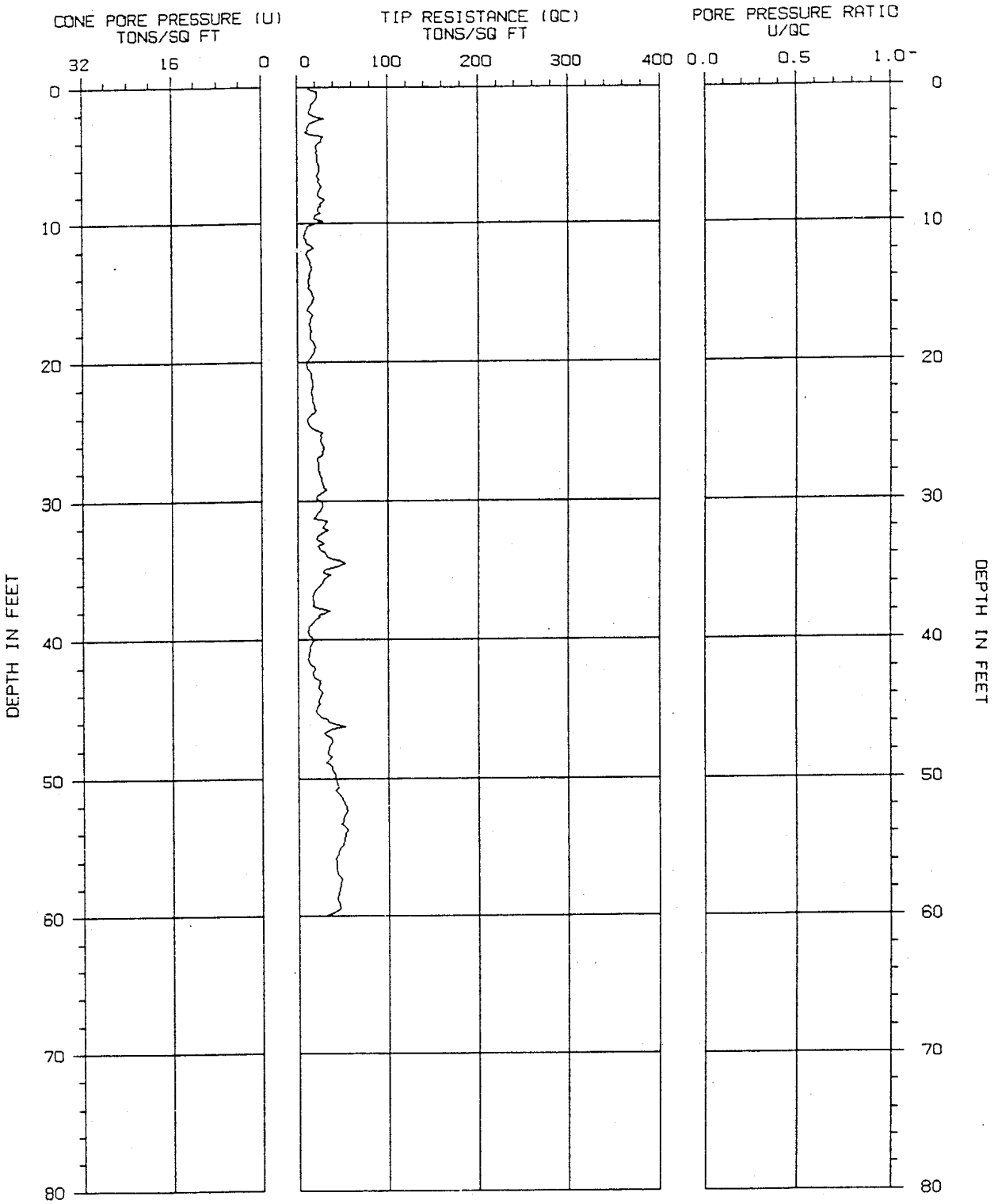
PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.VO/R#4

DATE/TIME: 04-13-90 13:56

HFA



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: HLA-5

PROJECT NAME : HLA/BISHOP RH 1

PROJECT NUMBER : 50044.1

CONE/RIG : 491/BH.V0/R#4

DATE/TIME: 04-13-90 13:56

HFA

CPT INTERPRETATIONS

SOUNDING : HLA-5 PROJECT No.: 50044.1
PROJECT : HLA/BISHOP RH 1 CONE/RIG : 491/BH,VO/R#4
DATE/TIME: 04-13-90 13:56

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	22.99	6.27	CLAY	23	37		1.4	
.300	.98	20.48	6.13	CLAY	20	33		1.2	
.450	1.48	15.47	6.76	CLAY	15	25		1.0	
.600	1.97	14.43	6.60	CLAY	14	23		1.0	
.750	2.46	23.11	5.40	CLAY	23	37		1.4	
.900	2.95	11.66	4.76	CLAY	12	19		.8	
1.050	3.44	15.30	8.44	CLAY	15	24		1.0	
1.200	3.94	26.94	5.55	CLAY	27	43		1.6	
1.350	4.43	22.03	5.60	CLAY	22	35		1.3	
1.500	4.92	22.20	5.74	CLAY	22	36		1.3	
1.650	5.41	23.11	5.56	CLAY	23	37		1.3	
1.800	5.91	25.30	5.05	CLAY	25	40		1.5	
1.950	6.40	22.99	5.10	CLAY	23	37		1.3	
2.100	6.89	23.92	5.48	CLAY	24	38		1.4	
2.250	7.38	25.39	4.80	CLAY	25	40		1.5	
2.400	7.87	23.71	5.00	CLAY	24	36		1.4	
2.550	8.37	29.40	3.34	CLAYEY SILT to SILTY CLAY	15	22		1.9	
2.700	8.86	24.03	4.83	CLAY	24	35		1.4	
2.850	9.35	20.01	4.03	CLAY to SILTY CLAY	13	19		1.3	
3.000	9.84	28.83	3.48	CLAYEY SILT to SILTY CLAY	14	20		1.9	
3.150	10.33	11.24	3.87	CLAY	11	16		.7	
3.300	10.83	8.54	2.75	CLAY to SILTY CLAY	6	8		.6	
3.450	11.32	10.37	3.25	CLAY to SILTY CLAY	7	9		.6	
3.600	11.81	18.57	2.82	CLAYEY SILT to SILTY CLAY	9	12		1.2	
3.750	12.30	11.51	4.60	CLAY	12	15		.7	
3.900	12.80	15.00	4.98	CLAY	15	20		1.0	
4.050	13.29	15.68	4.30	CLAY	16	20		1.0	
4.200	13.78	13.60	4.12	CLAY	14	18		.9	
4.350	14.27	13.13	4.60	CLAY	13	17		.8	
4.500	14.76	14.28	3.67	CLAY to SILTY CLAY	10	12		.9	
4.650	15.26	17.97	4.72	CLAY	18	23		1.1	
4.800	15.75	16.87	4.17	CLAY	17	21		1.1	
4.950	16.24	11.51	2.82	CLAY to SILTY CLAY	8	9		.7	
5.100	16.73	15.61	4.68	CLAY	16	19		1.0	
5.250	17.22	14.28	4.92	CLAY	14	17		.9	
5.400	17.72	15.49	5.10	CLAY	15	19		1.0	
5.550	18.21	14.47	4.45	CLAY	14	17		.9	
5.700	18.70	19.25	4.88	CLAY	19	23		1.2	
5.850	19.19	18.74	4.70	CLAY	19	22		1.2	
6.000	19.69	14.32	4.06	CLAY	14	17		.9	
6.150	20.18	10.88	4.23	CLAY	11	13		.7	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.8 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-5

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	15.11	4.46	CLAY	15	17		.9	
6.450	21.16	16.29	5.30	CLAY	16	18		1.0	
6.600	21.65	16.55	5.41	CLAY	17	19		1.0	
6.750	22.15	15.83	5.07	CLAY	16	18		1.0	
6.900	22.64	17.29	5.29	CLAY	17	19		1.1	
7.050	23.13	18.89	5.10	CLAY	19	21		1.2	
7.200	23.62	19.67	4.11	CLAY to SILTY CLAY	13	14		1.2	
7.350	24.11	11.71	2.64	CLAY to SILTY CLAY	8	8		.8	
7.500	24.61	14.74	2.65	CLAYEY SILT to SILTY CLAY	7	8		.9	
7.650	25.10	27.75	3.23	CLAYEY SILT to SILTY CLAY	14	15		1.8	
7.800	25.59	25.83	4.32	CLAY to SILTY CLAY	17	18		1.4	
7.950	26.08	29.64	4.71	CLAY	30	31		1.7	
8.100	26.57	28.53	4.11	CLAY to SILTY CLAY	19	20		1.6	
8.250	27.07	22.84	4.40	CLAY	23	24		1.4	
8.400	27.56	24.11	4.48	CLAY	24	25		1.5	
8.550	28.05	24.96	4.23	CLAY to SILTY CLAY	17	17		1.6	
8.700	28.54	27.13	4.97	CLAY	27	28		1.5	
8.850	29.04	29.66	4.92	CLAY	30	30		1.7	
9.000	29.53	26.49	3.43	CLAYEY SILT to SILTY CLAY	13	13		1.7	
9.150	30.02	26.64	3.47	CLAYEY SILT to SILTY CLAY	13	13		1.7	
9.300	30.51	27.26	4.17	CLAY to SILTY CLAY	18	18		1.5	
9.450	31.00	21.54	3.96	CLAY to SILTY CLAY	14	14		1.3	
9.600	31.50	32.14	3.44	CLAYEY SILT to SILTY CLAY	16	16		2.0	
9.750	31.99	27.62	4.99	CLAY	28	27		1.5	
9.900	32.48	26.24	3.98	CLAY to SILTY CLAY	17	17		1.6	
10.050	32.97	27.07	4.57	CLAY	27	26		1.5	
10.200	33.46	25.09	3.97	CLAY to SILTY CLAY	17	16		1.5	
10.350	33.96	32.57	3.15	CLAYEY SILT to SILTY CLAY	16	16		2.0	
10.500	34.45	48.97	3.64	CLAYEY SILT to SILTY CLAY	24	23		2.8	
10.650	34.94	33.57	3.96	CLAY to SILTY CLAY	22	21		1.9	
10.800	35.43	36.92	3.48	CLAYEY SILT to SILTY CLAY	18	17		2.3	
10.950	35.93	27.62	3.33	CLAYEY SILT to SILTY CLAY	14	13		1.7	
11.100	36.42	21.20	3.33	CLAYEY SILT to SILTY CLAY	11	10		1.3	
11.250	36.91	17.00	2.97	CLAYEY SILT to SILTY CLAY	9	8		1.0	
11.400	37.40	18.08	2.74	CLAYEY SILT to SILTY CLAY	9	8		1.1	
11.550	37.89	35.59	3.16	CLAYEY SILT to SILTY CLAY	18	16		2.2	
11.700	38.39	25.13	3.88	CLAY to SILTY CLAY	17	15		1.5	
11.850	38.88	14.64	2.55	CLAYEY SILT to SILTY CLAY	7	7		.8	
12.000	39.37	11.96	2.13	CLAYEY SILT to SILTY CLAY	6	5		.8	
12.150	39.86	16.36	3.10	CLAY to SILTY CLAY	11	10		.9	
12.300	40.35	14.89	3.29	CLAY to SILTY CLAY	10	9		.8	
12.450	40.85	13.28	3.23	CLAY to SILTY CLAY	9	8		.7	
12.600	41.34	11.96	3.11	CLAY to SILTY CLAY	8	7		.6	
12.750	41.83	14.74	3.33	CLAY to SILTY CLAY	10	9		.8	
12.900	42.32	17.53	3.51	CLAY to SILTY CLAY	12	10		1.0	
13.050	42.81	19.35	3.83	CLAY to SILTY CLAY	13	11		1.1	
13.200	43.31	23.65	4.52	CLAY	24	21		1.4	
13.350	43.80	26.51	3.88	CLAY to SILTY CLAY	18	15		1.6	
13.500	44.29	23.39	4.03	CLAY to SILTY CLAY	16	14		1.4	
13.650	44.78	22.94	3.96	CLAY to SILTY CLAY	15	13		1.4	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.8 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : HLA-5

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	21.54	3.91	CLAY to SILTY CLAY	14	12		1.3	
13.950	45.77	33.93	3.37	CLAYEY SILT to SILTY CLAY	17	15		2.1	
14.100	46.26	52.77	4.27	CLAYEY SILT to SILTY CLAY	26	23		3.0	
14.250	46.75	29.57	3.76	CLAYEY SILT to SILTY CLAY	15	13		1.8	
14.400	47.24	38.64	4.03	CLAYEY SILT to SILTY CLAY	19	16		2.1	
14.550	47.74	35.18	3.98	CLAYEY SILT to SILTY CLAY	18	15		1.9	
14.700	48.23	33.29	4.22	CLAY to SILTY CLAY	22	19		1.8	
14.850	48.72	33.46	4.04	CLAY to SILTY CLAY	22	19		1.8	
15.000	49.21	38.24	3.92	CLAYEY SILT to SILTY CLAY	19	16		2.1	
15.150	49.70	41.17	4.20	CLAY to SILTY CLAY	27	23		2.3	
15.300	50.20	43.11	4.08	CLAYEY SILT to SILTY CLAY	22	18		2.4	
15.450	50.69	44.36	3.85	CLAYEY SILT to SILTY CLAY	22	18		2.4	
15.600	51.18	46.06	4.98	CLAY	46	38		2.5	
15.750	51.67	51.58	4.83	CLAY to SILTY CLAY	34	28		2.9	
15.900	52.17	53.94	4.58	CLAY to SILTY CLAY	36	29		3.0	
16.050	52.66	51.67	4.29	CLAYEY SILT to SILTY CLAY	26	21		2.9	
16.200	53.15	49.82	4.07	CLAYEY SILT to SILTY CLAY	25	20		2.8	
16.350	53.64	54.98	3.81	CLAYEY SILT to SILTY CLAY	27	22		3.1	
16.500	54.13	52.20	3.92	CLAYEY SILT to SILTY CLAY	26	21		2.9	
16.650	54.63	50.41	4.10	CLAYEY SILT to SILTY CLAY	25	20		2.8	
16.800	55.12	46.16	4.41	CLAY to SILTY CLAY	31	24		2.5	
16.950	55.61	42.60	4.11	CLAYEY SILT to SILTY CLAY	21	17		2.3	
17.100	56.10	42.87	3.95	CLAYEY SILT to SILTY CLAY	21	17		2.3	
17.250	56.59	43.11	3.97	CLAYEY SILT to SILTY CLAY	22	17		2.4	
17.400	57.09	45.63	4.14	CLAYEY SILT to SILTY CLAY	23	18		2.5	
17.550	57.58	46.61	3.99	CLAYEY SILT to SILTY CLAY	23	18		2.6	
17.700	58.07	46.40	4.61	CLAY to SILTY CLAY	31	24		2.5	
17.850	58.56	43.42	4.65	CLAY to SILTY CLAY	29	22		2.4	
18.000	59.06	45.40	4.12	CLAYEY SILT to SILTY CLAY	23	18		2.5	
18.150	59.55	45.87	3.84	CLAYEY SILT to SILTY CLAY	23	18		2.5	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 110 pcf
ASSUMED DEPTH OF WATER TABLE = 8.8 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
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Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
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