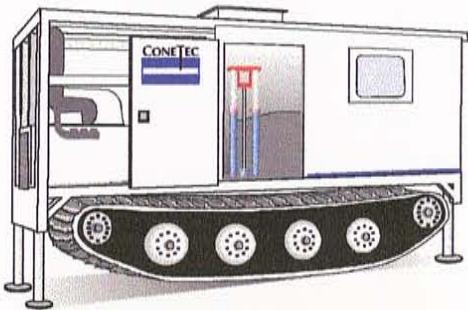


APPENDIX K**WASTEBED 13 CPTU DATA**

(ELECTRONIC COPY OF APPENDICES A THOUGH D PROVIDED ON CD)



Geotechnical and Environmental In Situ Testing Contractors

ConeTec Field Report

**Presentation of CPTU
Test Results for:**

**Honeywell – Wastebed 13
Solvey, New York**

Presented to: Parsons Engineering

Date: October 11, 2006

Presented by: ConeTec, Inc.
436 Commerce Lane, Unit C
West Berlin, NJ
(856) 767-8600

PRESENTATION OF IN SITU TESTING PROGRAM RESULTS

**Honeywell – Wastebed 13
Solvey, New York**

**September 20, 21, 22, 25 – 29, 2006
October 2 – 6, 2006**

Prepared for:

**Parsons Engineering
Liverpool, New York**

Prepared by:

**ConeTec Inc.
West Berlin, NJ**

October 11, 2006

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1.0 INTRODUCTION

This report presents the results of a piezo cone penetrometer testing (CPTU) program carried out at Honeywell's Wastebed 13 located in Sovey, New York. The work was performed under subcontract to Parsons Engineering of Liverpool, New York. The CPTU program took place over a thirteen day period from September 20th, 2006 through October 6th, 2006.

A total of one hundred and thirteen soundings were completed at one hundred and thirteen different sounding locations. The CPT testing was performed to evaluate insitu geotechnical criteria of the proposed wastebed expansion.

CPT sounding locations were selected and numbered under the direction and supervision of Parsons Engineering personnel.

2.0 FIELD EQUIPMENT AND PROCEDURES

2.1 CONE PENETRATION TESTING

The cone penetrometer tests were carried out using an integrated electronic piezo cone manufactured by ConeTec in Vancouver, Canada. The piezo cone used was a compression model cone penetrometer with a 15 cm^2 tip and a 225 cm^2 friction sleeve. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85. The piezo cone dimensions and the operating procedure were in accordance with ASTM Standard D-5778-95. A diagram of the cone penetrometer used for this project is shown as Figure 1.

Pore pressure filter elements, made of porous plastic, were saturated under a vacuum using glycerin as the saturating fluid. The pore pressure element was six millimeters thick and was located immediately behind the tip (the u_2 location) for all soundings.

The cone was advanced using a 20 ton, unitized, track-mounted cone penetration rig. The following data were recorded onto magnetic media every five centimeters (approximately every two inches) as the cone was advanced into the ground:

- Tip Resistance (q_c)
- Sleeve Friction (f_s)
- Dynamic Pore Pressure (u_i)

The field data recorded is included on the attached CD (appendix D).

Before each sounding a complete set of analog baseline readings are taken with a multi-meter and compared with the digitized value on the computer screen. This provides a check on the analog to digital conversion board.

Evaluation of the analog baselines is key to consistent readings. The baseline data should be stable and should not wander excessively during the course of a sounding. Baseline data can be used to apply corrections to the cone data where necessary. For this project, the baseline shift from sounding to sounding was small, typically less than 0.1% of full scale, and no data corrections were applied.

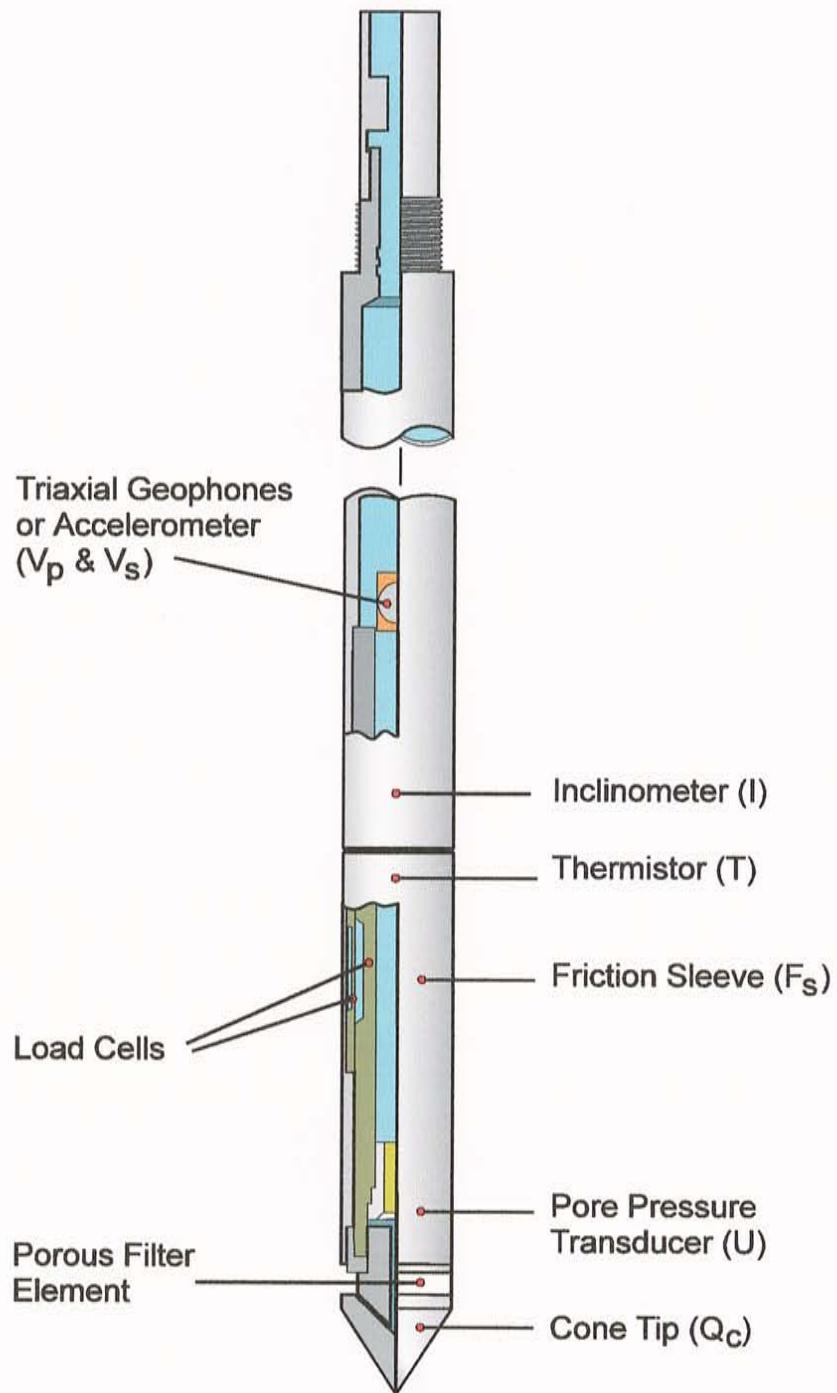


FIGURE 1 - TYPICAL CONE PENETROMETER

2.2 PORE PRESSURE DISSIPATION TESTS

When cone penetration is stopped, the piezo cone essentially becomes a piezometer. While stopped, pore water pressures are automatically recorded at five-second intervals and the readings are stored in a dissipation file (.ppd). Dissipation data can then be plotted onto a dissipation curve consisting of pore water pressure (u) verses time (t). The shapes of dissipation curves are very useful in evaluating soil type, drainage and in situ static water level.

A flat curve that stabilizes quickly (i.e. less than 30 seconds) is typical of a free draining sand. In this case, the final measured pore water pressure is the static in situ water pressure.

Soils that generate excess dynamic pore water pressure during penetration will dissipate this excess pressure when penetration stops. The shape of the dissipation curve and the time of dissipation can be used to estimate C_h , the coefficient of consolidation that can in turn be used to calculate K_h , the horizontal permeability.

Figure 2 shows some idealized shapes of various pore water pressure dissipation curves. The reader is referred Robertson et. al., 1990 to reference dissipation test data analytical techniques.

Estimation of Ground Water Table from CPT Dissipation Tests

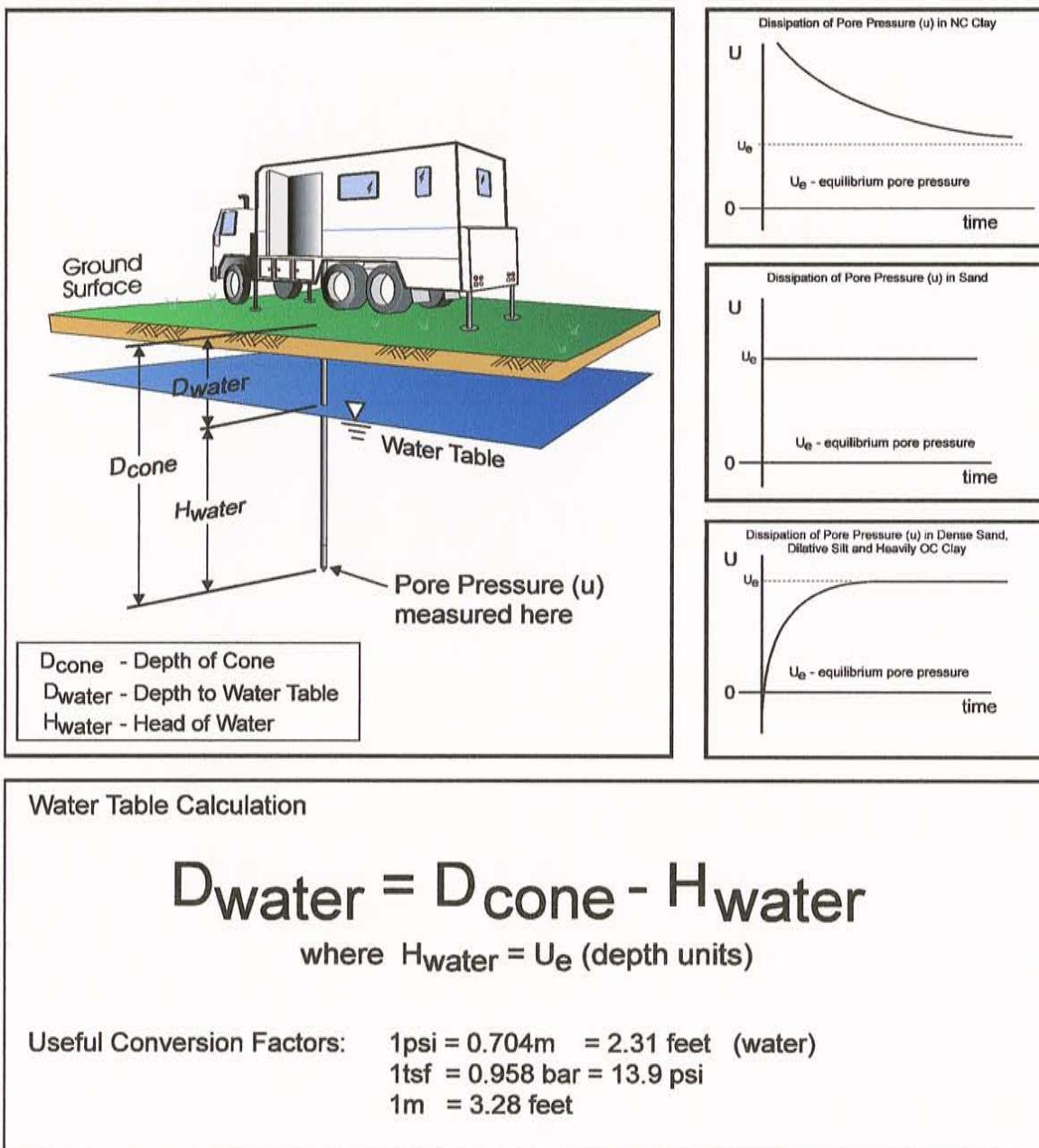


FIGURE 2 - TYPICAL DISSIPATION TESTS

3.0 CONE PENETRATION TEST DATA AND INTERPRETATION

3.1 ANALYSIS OF PIEZOCONE DATA - GENERAL

A total of one hundred & thirteen CPT soundings, involving 4,896.99 feet of testing, were completed.

The interpretation of cone data is based on the relationship between cone bearing, q_c , sleeve friction, f_s , and penetration pore water pressure, u . The friction ratio, R_f , (sleeve friction divided by cone bearing) is a calculated parameter which is used to infer soil behavior type. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

The interpretation of soils encountered on this project was carried out using correlations developed by Robertson et al., 1992. It should be noted that it is not always possible to clearly identify a soil type based on q_c , f_s and u . Occasionally soils will fall within different soil categories on the classification charts. In these situations, experience and judgment and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type. Computer tabulations of the interpreted soil types along with certain other geotechnical parameters for each cone hole is presented in Appendix B.

Each of the parameters measured in the sounding is discussed briefly below. A detailed explanation of CPTU testing and interpretation of the results can be found in Robertson, 1989.

TIP RESISTANCE (q_c): The resistance to penetration, measured at the cone tip, provides an accurate profile of subsurface strata. The recorded tip resistance is a composite of the penetration resistance of the soils located five to ten cone diameters (7 to 14 inches) in front of and behind the tip. The actual resistance "sensed" by the tip depends on the soil properties and on the relative stiffness of the layers encountered. Tip resistance is often corrected for pore pressure effects when testing in soft saturated cohesive soils.

For this project the correction was made and the tip resistance shown, q_t is the corrected tip resistance.

The correction used is: $q_t = q_c + (1-a)u$

Where:

q_t = corrected tip resistance
q_c = measured tip resistance
a = net area ratio for cone (0.85 for this project)
u = dynamic pore water pressure measured behind tip

SLEEVE FRICTION (f_s) The resistance recorded on the friction sleeve, is a measure of the remolded strength of the soil. Values of sleeve friction in very soft soils (such as peat) may fluctuate due to the measured force being small relative to the capacity of the measuring load cell.

FRICTION RATIO (R_f) The ratio of sleeve friction to tip resistance expressed as a percentage, is an indicator of soil type. Cohesive soils generally have friction ratios that are greater than two, while sands and non-plastic silts have friction ratios that are lower than two.

PORE PRESSURE (u) Dynamic pore water pressure is measured during penetration. (dynamic pore water pressure data can be found in the .cor, and .xls files. Static pore water pressure is measured when cone penetration is stopped (static pore water pressure data can be found in the .ppd files). The measured dynamic pore water pressure changes with the location of the porous filter and negative readings are possible when the filter is located behind the tip.

It is important to note that the CPT classifies soil by physical behavior, not by grain size; therefore, the CPT classification should be verified against samples obtained from a conventional drilling program. While the CPT soil classification may not always be accurate in terms of the actual label it applies to a particular soil, it is very accurate in grouping soils with similar mechanical properties.

3.2 CONE PLOTS

The data from each sounding was plotted using the computer program ScreenZ. The plots, plotted with reference to elevation, are included in Appendix A. ScreenZ was developed by ConeTec Inc. and it incorporates soil behavior type (SBT) classification as part of the plot. The soil classification is based on the classification chart reproduced chart in Appendix B.

3.3 PORE PRESSURE DISSIPATION TEST RESULTS

Pore water pressure dissipation data are collected and automatically recorded during pauses in penetration. The pore water pressure data is recorded at five second intervals. Numerous pore water pressure dissipation tests were completed during this phase of the project. Those plots can be found in Appendix C.

Both the dynamic and static pore pressure dissipation data is included on the data CD in the .cor and .ppd files, respectively.

3.4 CPT DATA PROCESSING

The electronic data files were processed using the program CPTSumm. CPTSumm is a program developed by ConeTec to calculate common engineering parameters from CPT data. The processed data file summery sheet is attached in Appendix B. The files (.xls) are also included on the data CD. The calculations used are summarized in the table at the front of the Appendix. Each calculation is derived according to the referenced article.

For this project, the depth to ground water was determined from the dissipation data where available. If none was available, a value of 58.5 feet was used. This value was used on previous projects on this site where no dissipation information was available. The exact depth used is noted in the header of each .xls file.

3.5 DATA CD

One data CD is included in Appendix D. The CD includes all of the CPT, dynamic and static pore water pressure and tabular data.

5.0 REFERENCES

Robertson, P.K., 1989, "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, vol. 27, pages 151-158.

Robertson, P.K., Sully, J., Woeller, D.G., Lunne, T., Powell, J.M., and Gillespie, D.J., 1992, "Estimating Coefficient of Consolidation from Piezocone Tests", Canadian Geotechnical Journal, vol. 29, pages 539-550.



TABLE 1 - SUMMARY OF CPTU SOUNDINGS

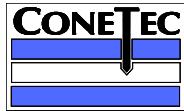
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Location: Honeywell - Wastebed 13 - Solyay, New York
Client: Parsons Engineering
Date: September 20, 21, 22, 25 - 29, October 2 - 6, 2006

Date	CPTU Sounding	File Name	CPT Total Depth (ft)	Comments
------	---------------	-----------	-------------------------------	----------

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02-Oct-06	CPT-8A	789cp08a.cor	9.02	
02-Oct-06	CPT-9	789cp09.cor	17.06	
02-Oct-06	CPT-9A	789cp09a.cor	20.01	
02-Oct-06	CPT-10	789cp10.cor	33.96	
02-Oct-06	CPT-11	789cp11.cor	22.80	
06-Oct-06	CPT-12	789cp12.cor	22.15	
05-Oct-06	CPT-13	789cp13.cor	12.80	
05-Oct-06	CPT-13A	789cp13a.cor	31.33	
05-Oct-06	CPT-13B	789cp13b.cor	45.60	
05-Oct-06	CPT-13C	789cp13c.cor	45.93	
05-Oct-06	CPT-14	789cp14.cor	13.78	
05-Oct-06	CPT-15	789cp15.cor	10.17	
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05-Oct-06	CPT-16	789cp16.cor	38.06	
05-Oct-06	CPT-16A	789cp16a.cor	39.37	
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05-Oct-06	CPT-18	789cp18.cor	15.09	
05-Oct-06	CPT-19	789cp19.cor	16.90	
26-Sep-06	CPT-20	789cp20.cor	21.82	
26-Sep-06	CPT-21	789cp21.cor	70.21	
26-Sep-06	CPT-22	789cp22.cor	54.79	
25-Sep-06	CPT-23	789cp23.cor	14.93	
25-Sep-06	CPT-23A	789cp23a.cor	52.16	
25-Sep-06	CPT-23B	789cp23b.cor	50.36	
25-Sep-06	CPT-24	789cp24.cor	19.68	
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06-Oct-06	CPT-24C	789cp24c.cor	39.37	
06-Oct-06	CPT-24D	789cp24ca.cor	39.70	
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25-Sep-06	CPT-27	789cp27.cor	41.50	
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22-Sep-06	CPT-29	789cp29.cor	2.46	
22-Sep-06	CPT-29A	789cp29a.cor	2.62	
22-Sep-06	CPT-29B	789cp29b.cor	10.01	
27-Sep-06	CPT-29C	789cp29c.cor	15.26	
27-Sep-06	CPT-29D	789cp29d.cor	30.51	
27-Sep-06	CPT-29E	789cp29e.cor	39.70	
21-Sep-06	CPT-30	789cp30.cor	31.99	
06-Oct-06	CPT-30A	789cp30a.cor	32.81	
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Date	CPTU Sounding	File Name	CPT Total Depth (ft)	Comments
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06-Oct-06	CPT-35C	789cp35c.cor	51.18	
21-Sep-06	CPT-36	789cp36.cor	16.08	
21-Sep-06	CPT-37	789cp37.cor	14.93	
27-Sep-06	CPT-38	789cp38.cor	14.44	
27-Sep-06	CPT-38A	789cp38a.cor	21.82	
27-Sep-06	CPT-39	789cp39.cor	30.68	
27-Sep-06	CPT-39A	789cp39a.cor	35.10	
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28-Sep-06	CPT-42	789cp42.cor	13.94	
28-Sep-06	CPT-43	789cp43.cor	15.58	
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28-Sep-06	CPT-45	789cp45.cor	65.29	
28-Sep-06	CPT-46	789cp46.cor	11.65	
28-Sep-06	CPT-47	789cp47.cor	13.12	
28-Sep-06	CPT-48	789cp48.cor	11.81	
28-Sep-06	CPT-49	789cp49.cor	73.98	
02-Oct-06	CPT-50	789cp50.cor	78.25	
05-Oct-06	CPT-51	789cp51.cor	65.62	
02-Oct-06	CPT-52	789cp52.cor	78.25	
02-Oct-06	CPT-53	789cp53.cor	73.82	
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03-Oct-06	CPT-56	789cp56.cor	92.03	
04-Oct-06	CPT-57	789cp57.cor	79.23	
03-Oct-06	CPT-58	789cp58.cor	67.26	
04-Oct-06	CPT-58A	789cp58a.cor	84.32	
03-Oct-06	CPT-59	789cp59.cor	89.73	
04-Oct-06	CPT-59A	789cp59a.cor	93.50	
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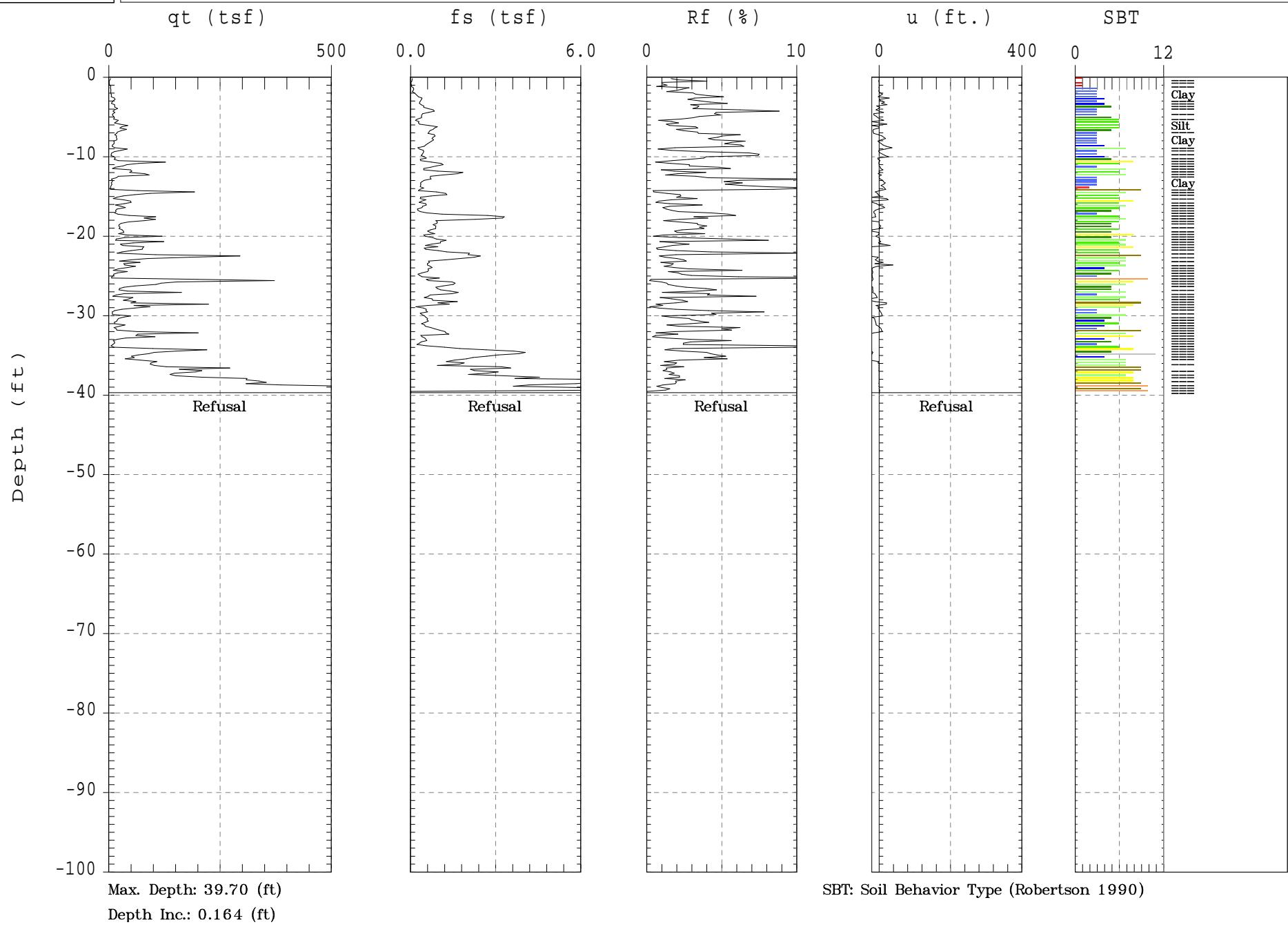
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25-Sep-06	CPT-82	789cp82.cor	62.01	
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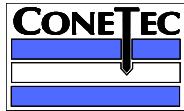


Parsons Engineering

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Date:10:06:06 15:12

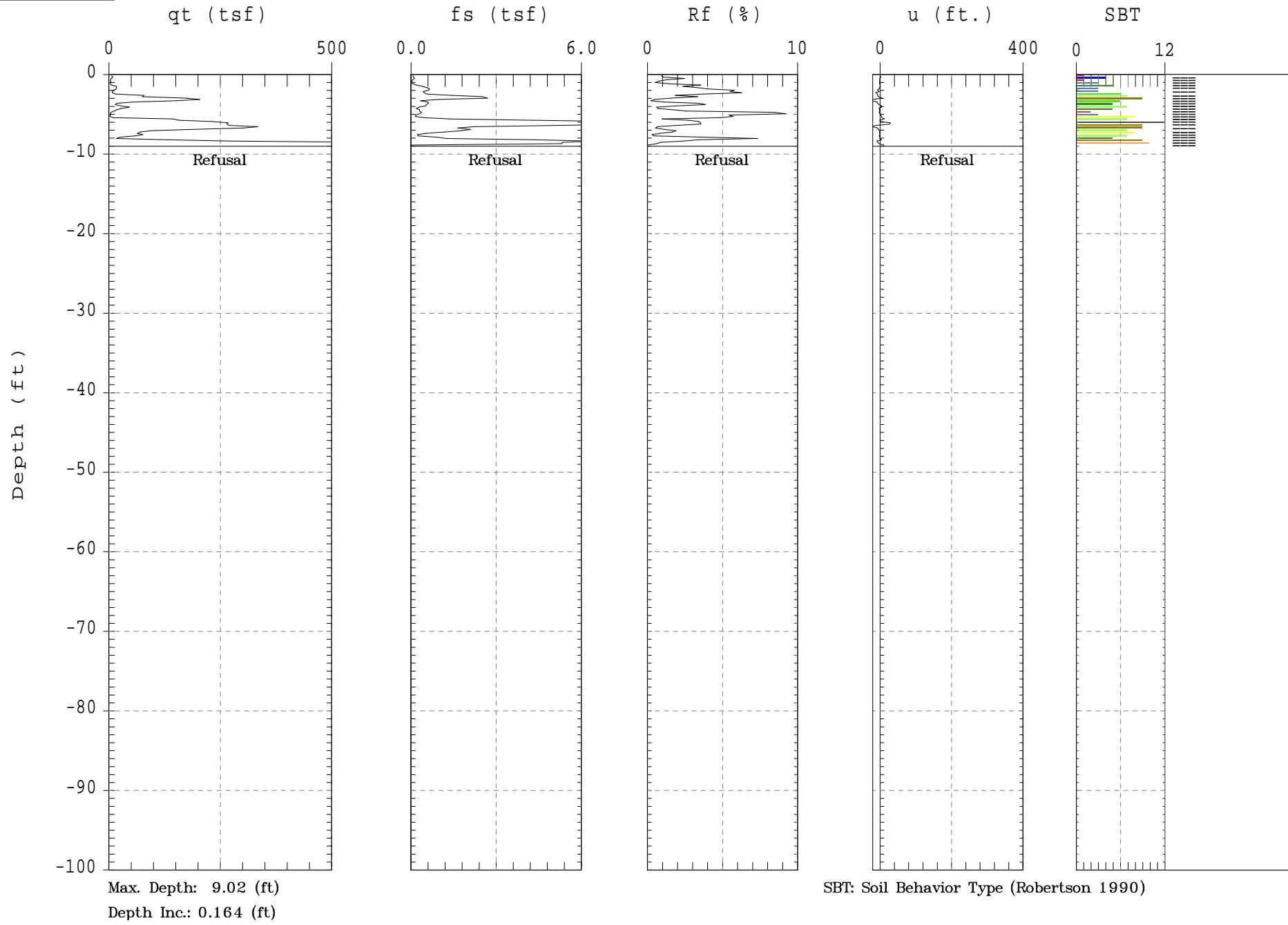


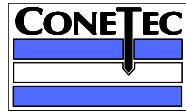


Parsons Engineering

Sounding:CPT-8A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:10:02:06 13:05

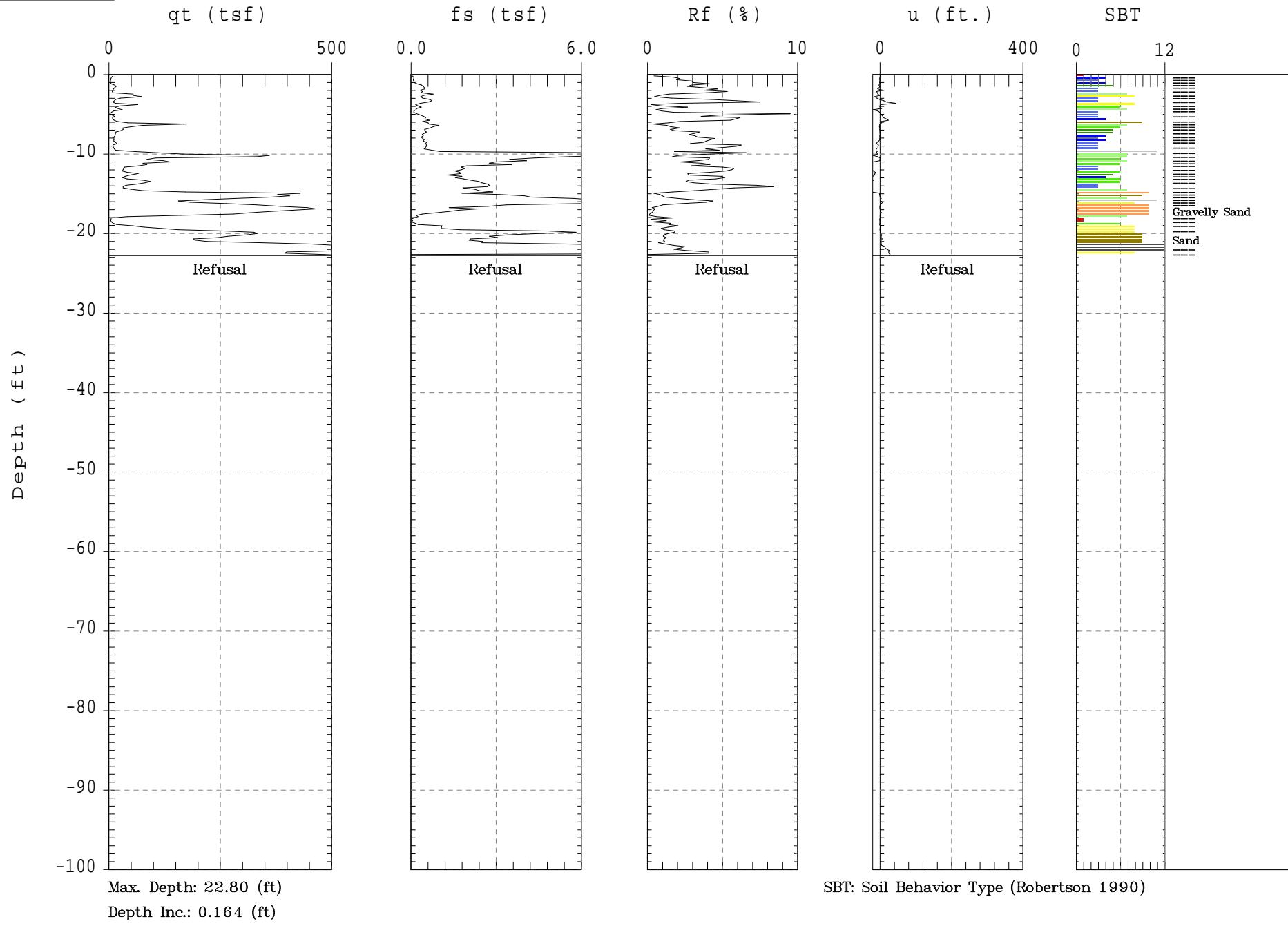


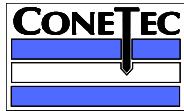


Parsons Engineering

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Site:Wastebed 13

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Date:10:02:06 13:24

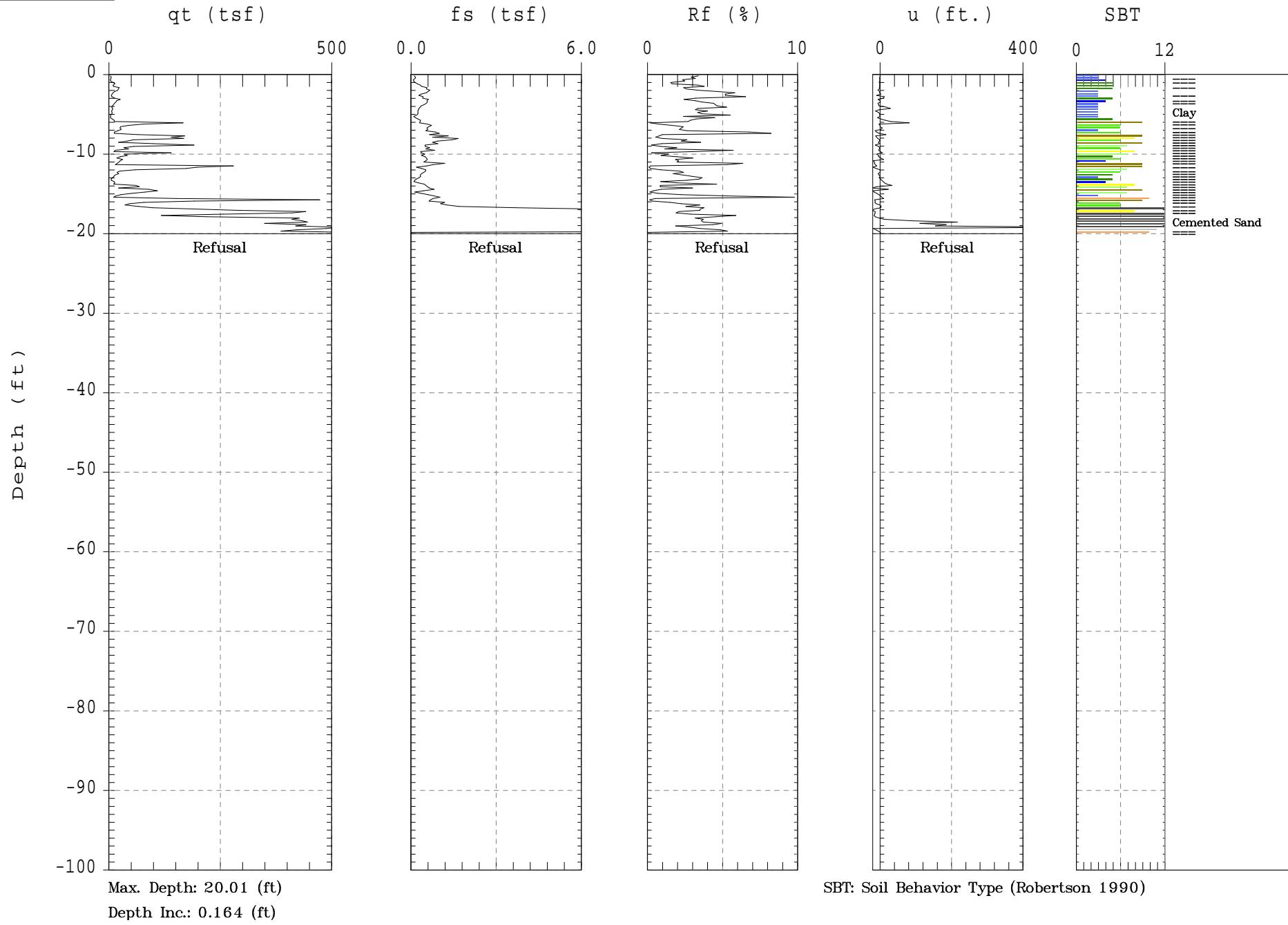


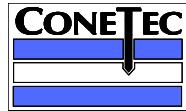


Parsons Engineering

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Site:Wastebed 13

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Date:10:02:06 10:50

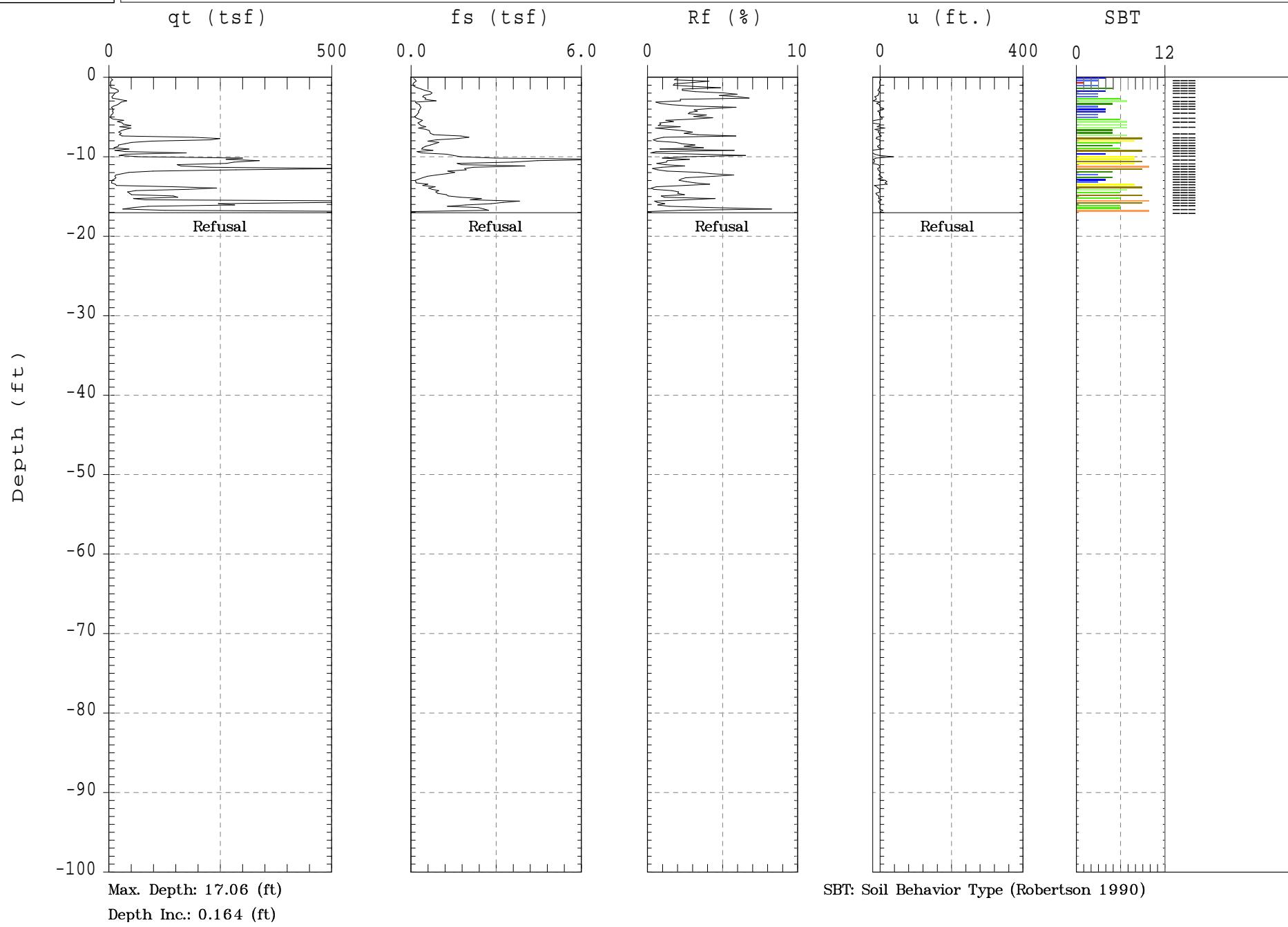


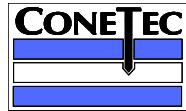


Parsons Engineering

Sounding:CPT-9
Site:Wastebed 13

Piezocene:20 TON AD171
Date:10:02:06 12:39

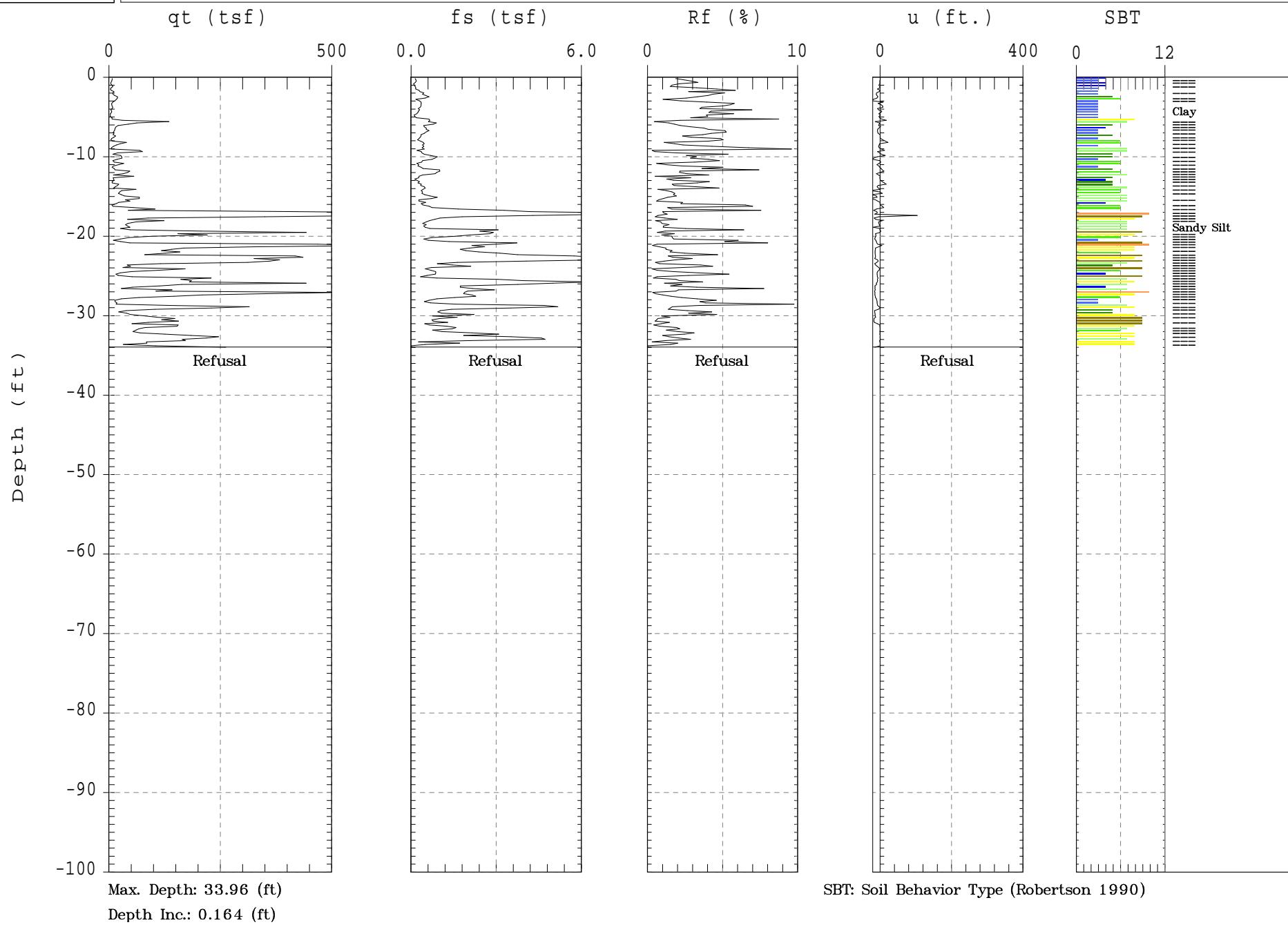


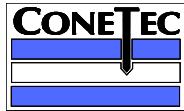


Parsons Engineering

Sounding:CPT-10
Site:Wastebed 13

Piezocene:20 TON AD171
Date:10:02:06 10:16

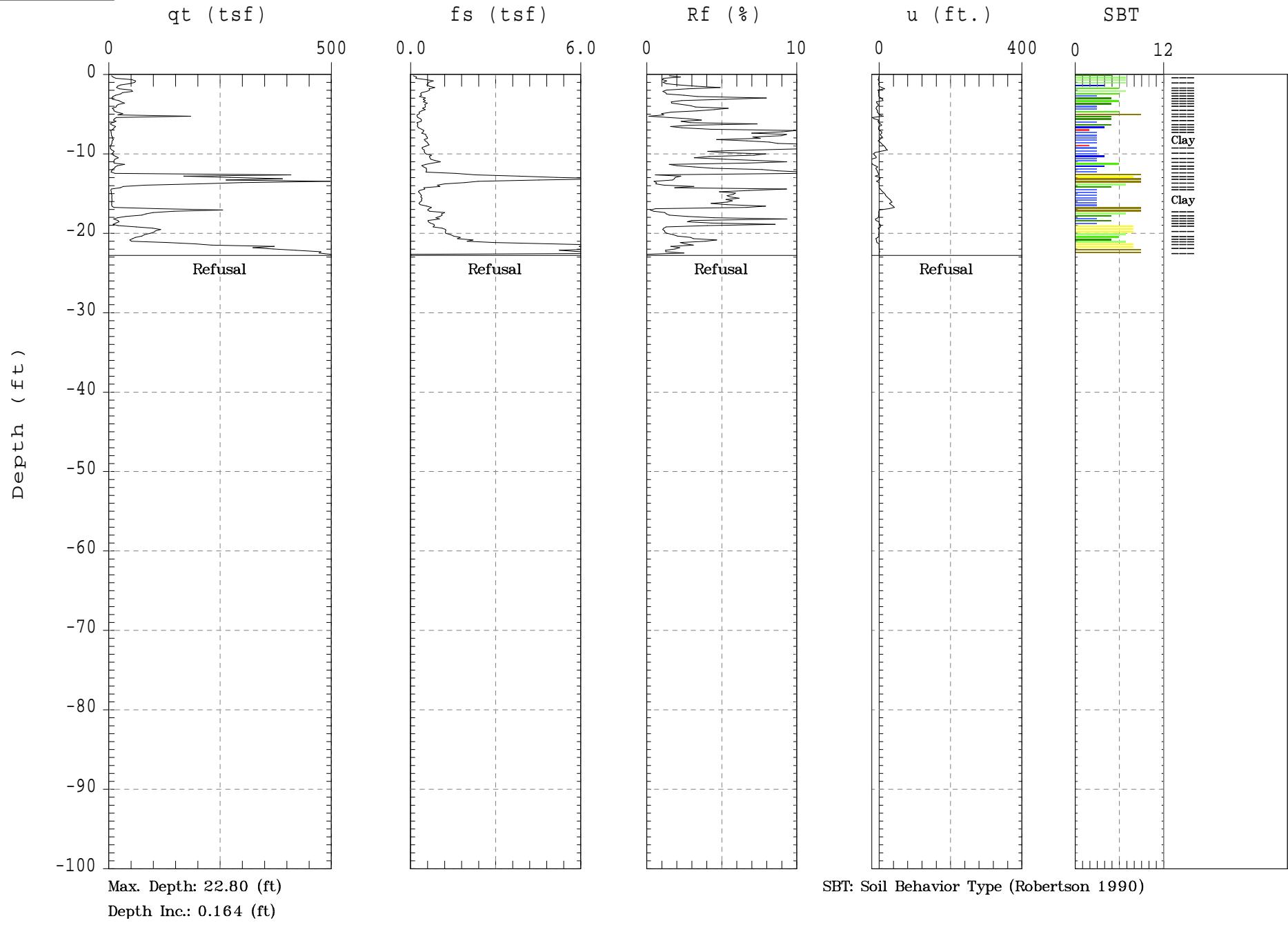


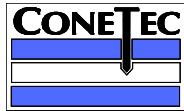


Parsons Engineering

Sounding:CPT-11
Site:Wastebed 13

Piezocene:20 TON AD171
Date:10:02:06 14:04

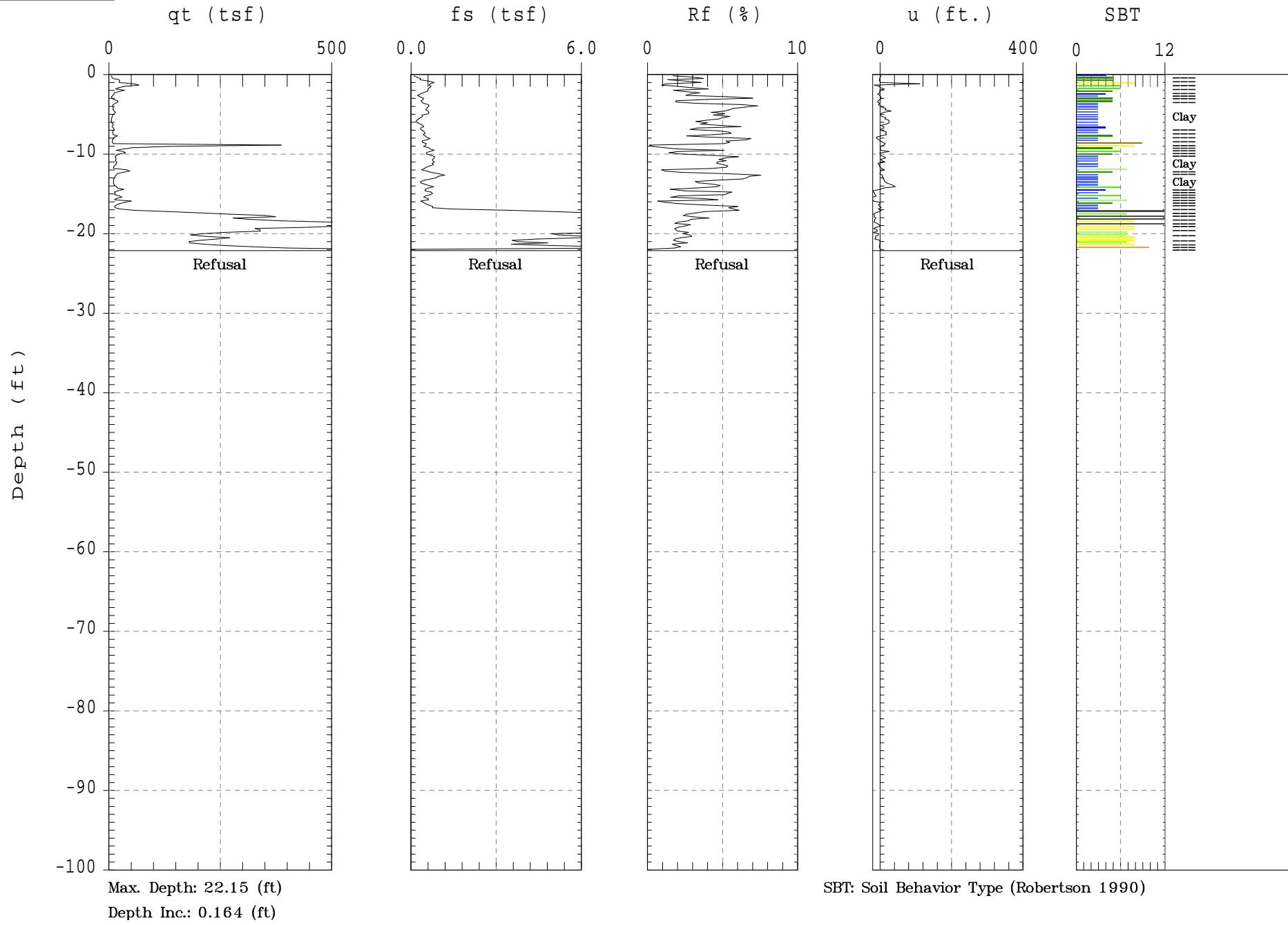


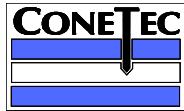


Parsons Engineering

Sounding:CPT-12
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 08:03

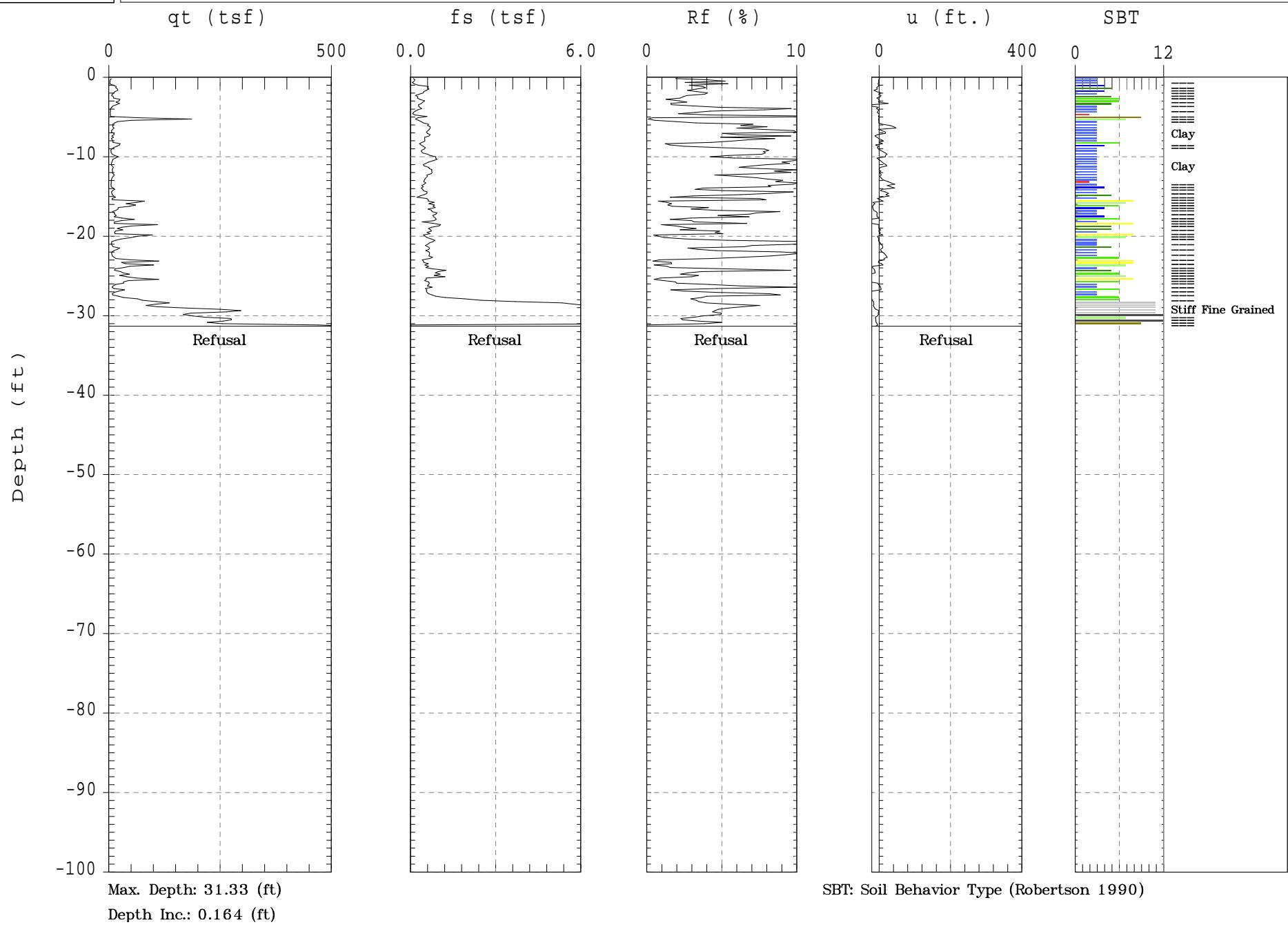


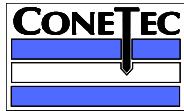


Parsons Engineering

Sounding:CPT-13A
Site:Wastebed 13

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Date:10:05:06 15:55

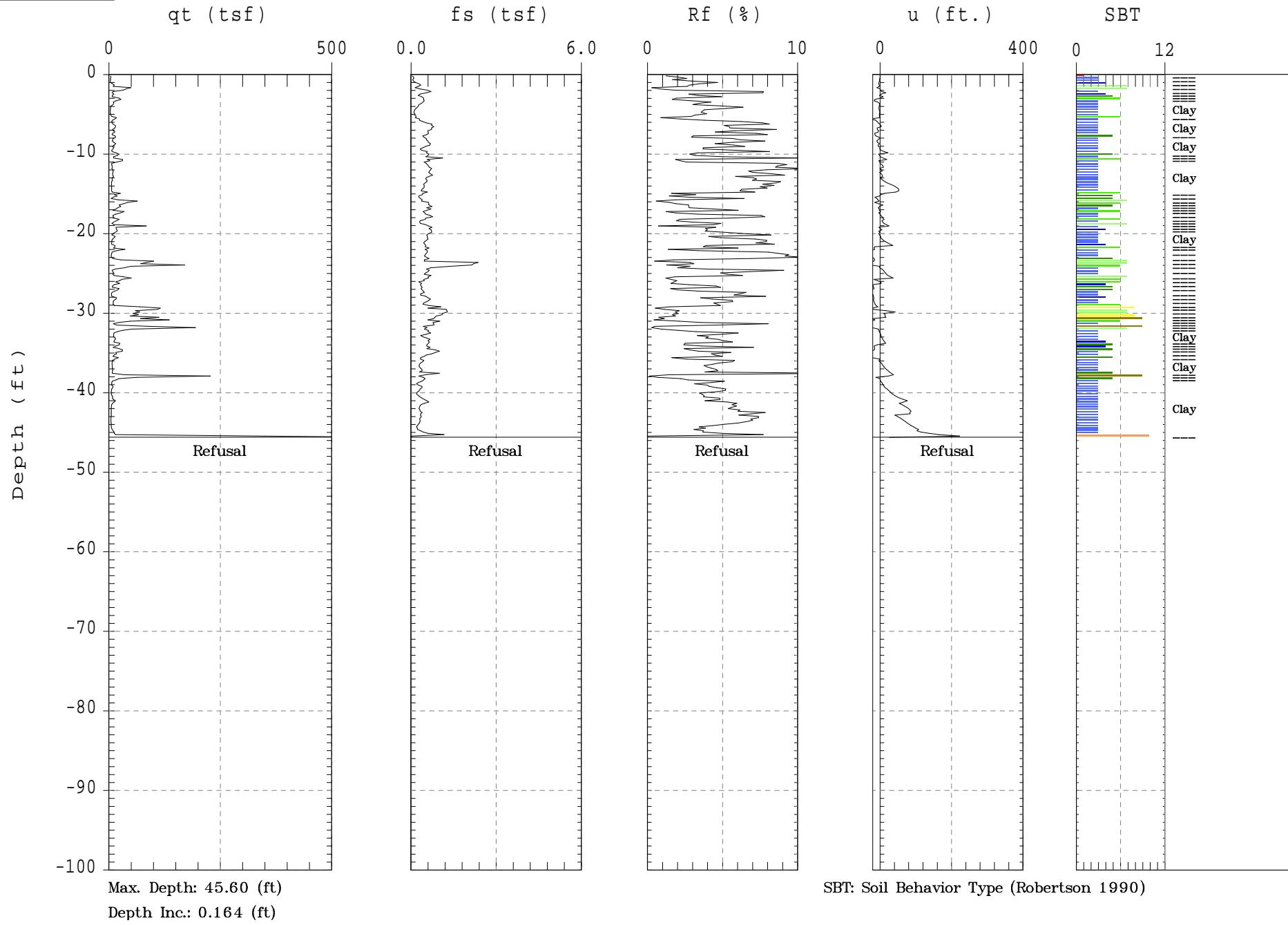


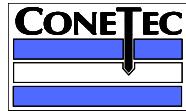


Parsons Engineering

Sounding:CPT-13B
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 15:17

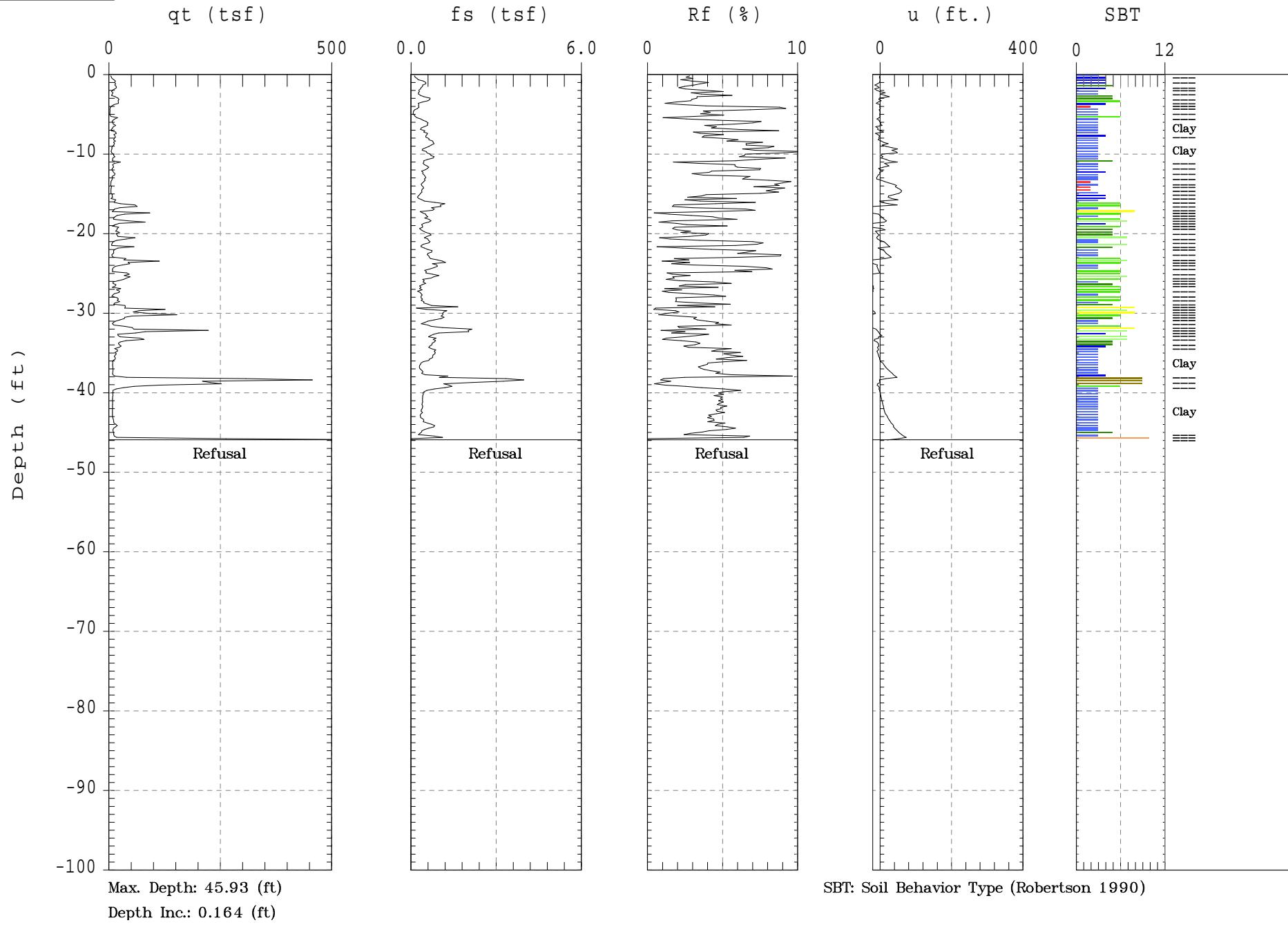


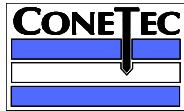


Parsons Engineering

Sounding:CPT-13C
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 14:42

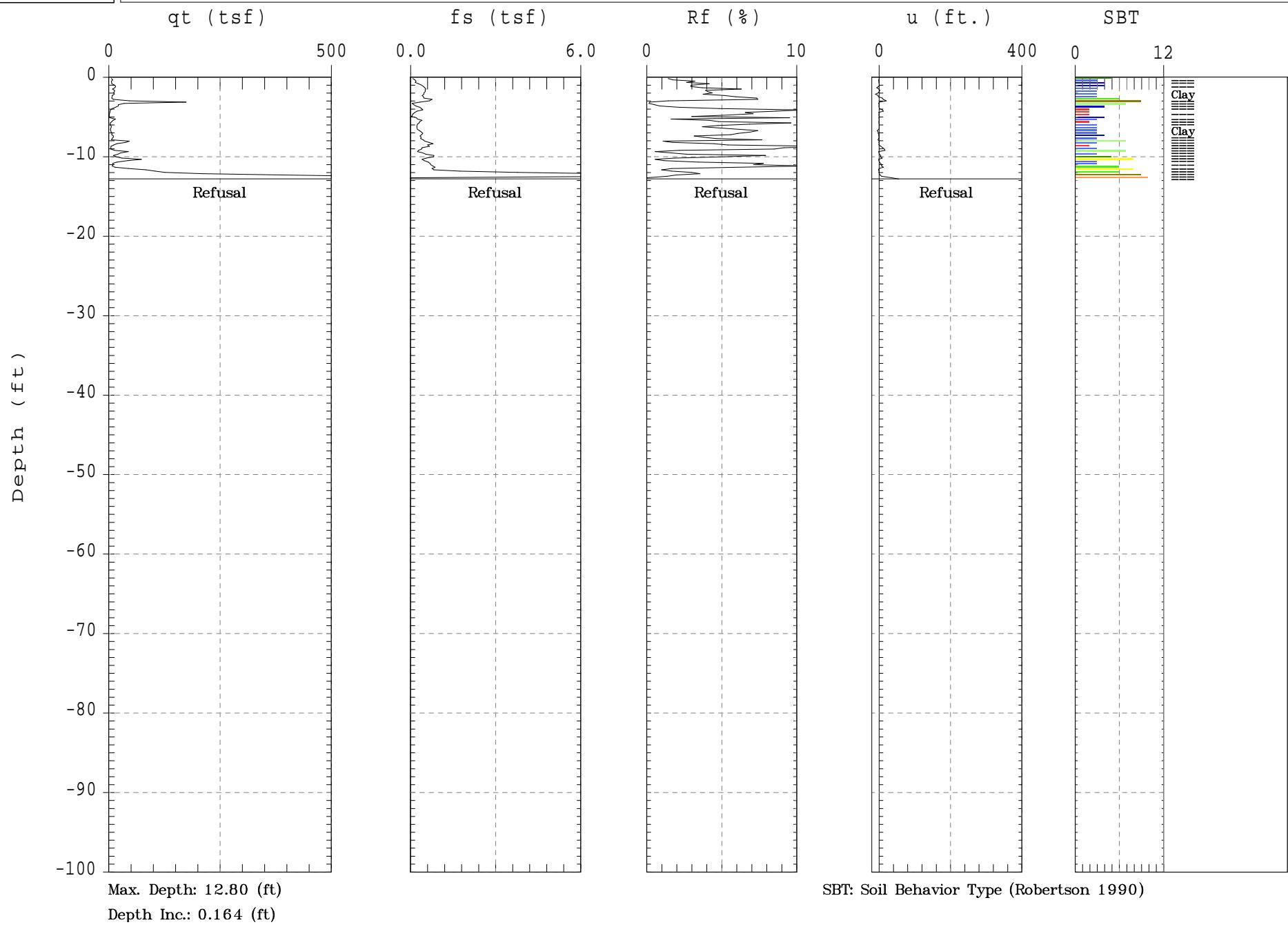


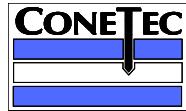


Parsons Engineering

Sounding:CPT-13
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 16:25

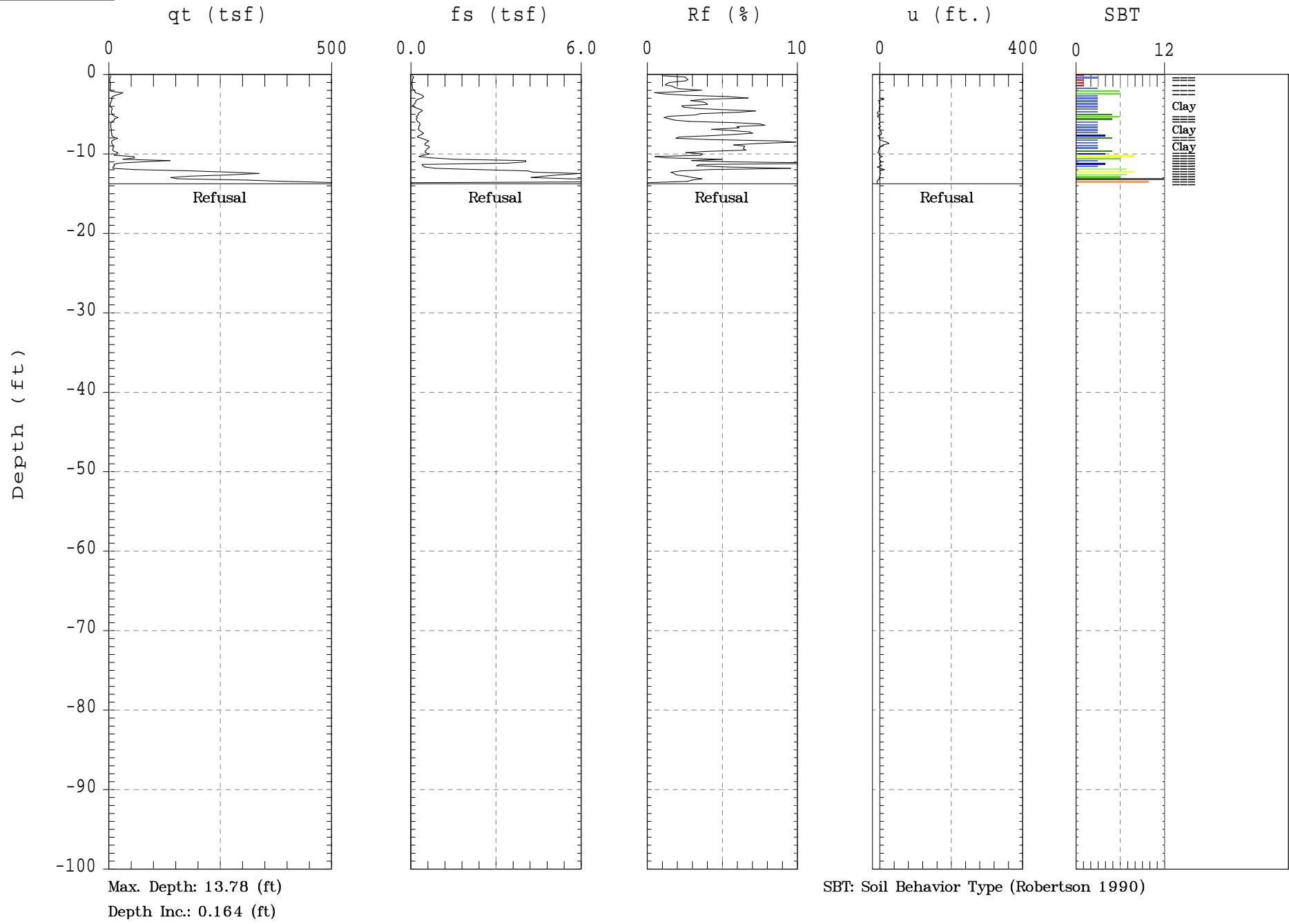


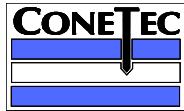


Parsons Engineering

Sounding:CPT-14
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 13:17

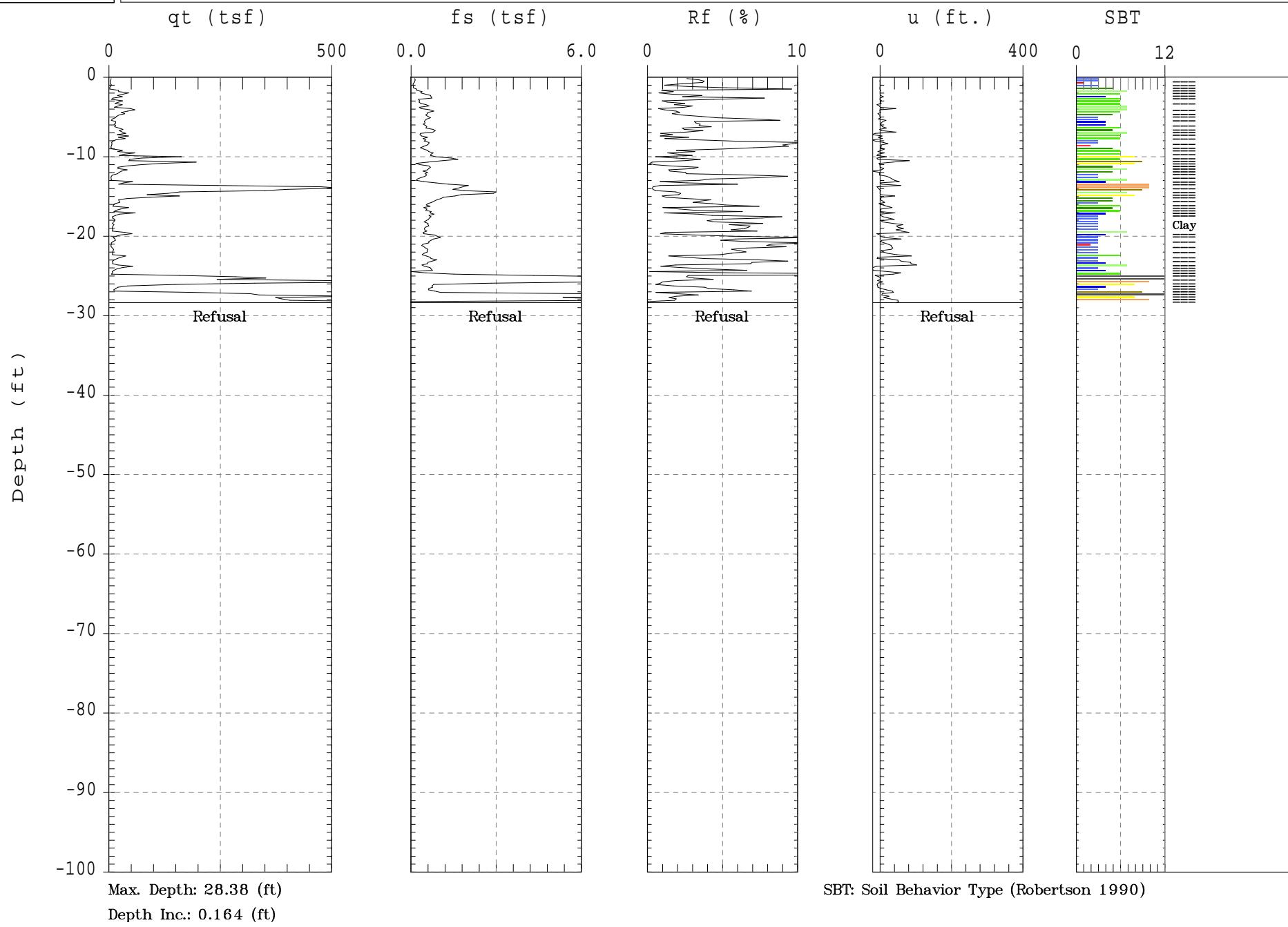


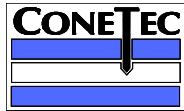


Parsons Engineering

Sounding:CPT-15A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 12:32

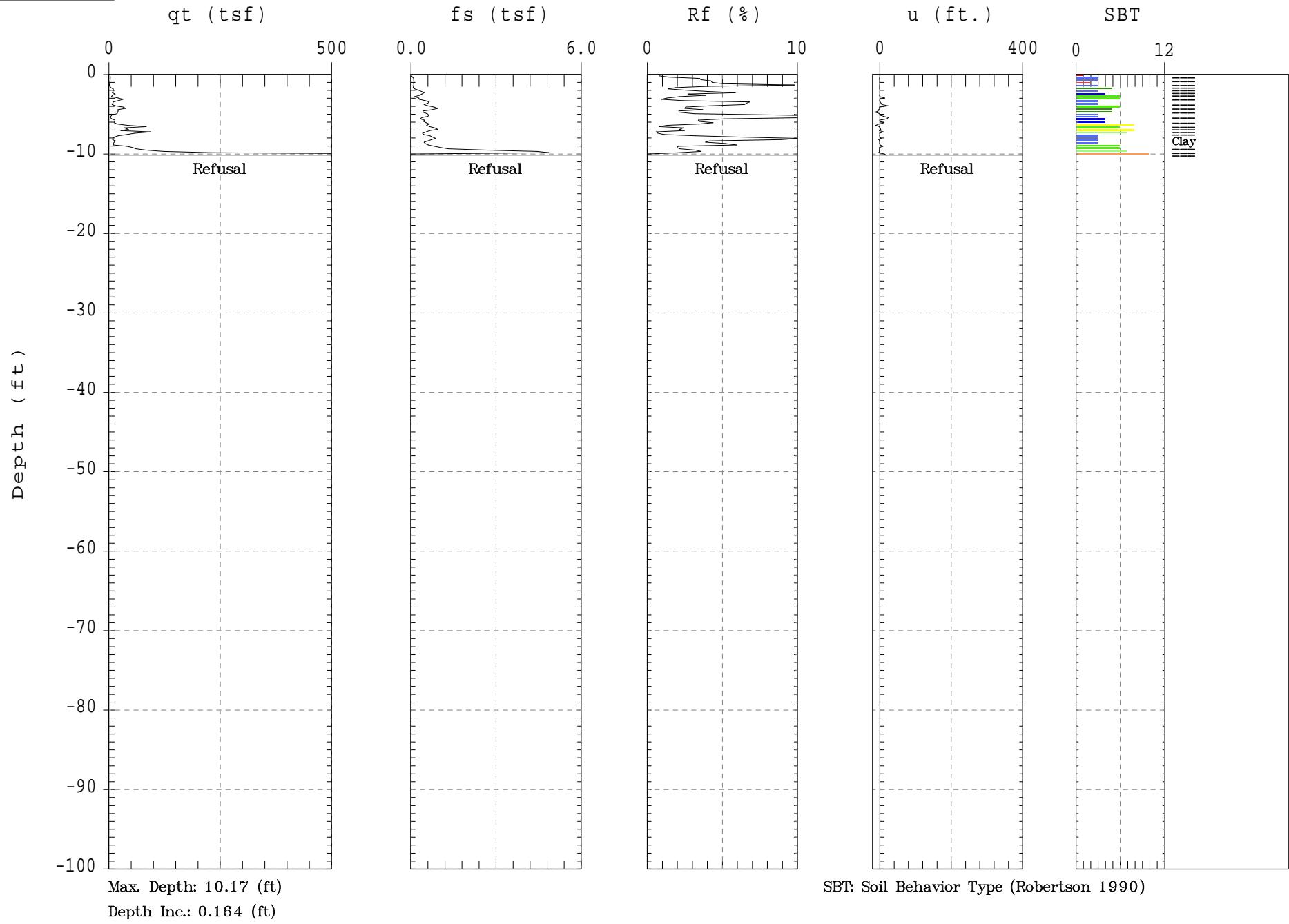


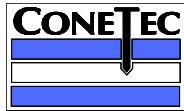


Parsons Engineering

Sounding:CPT-15
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 12:58

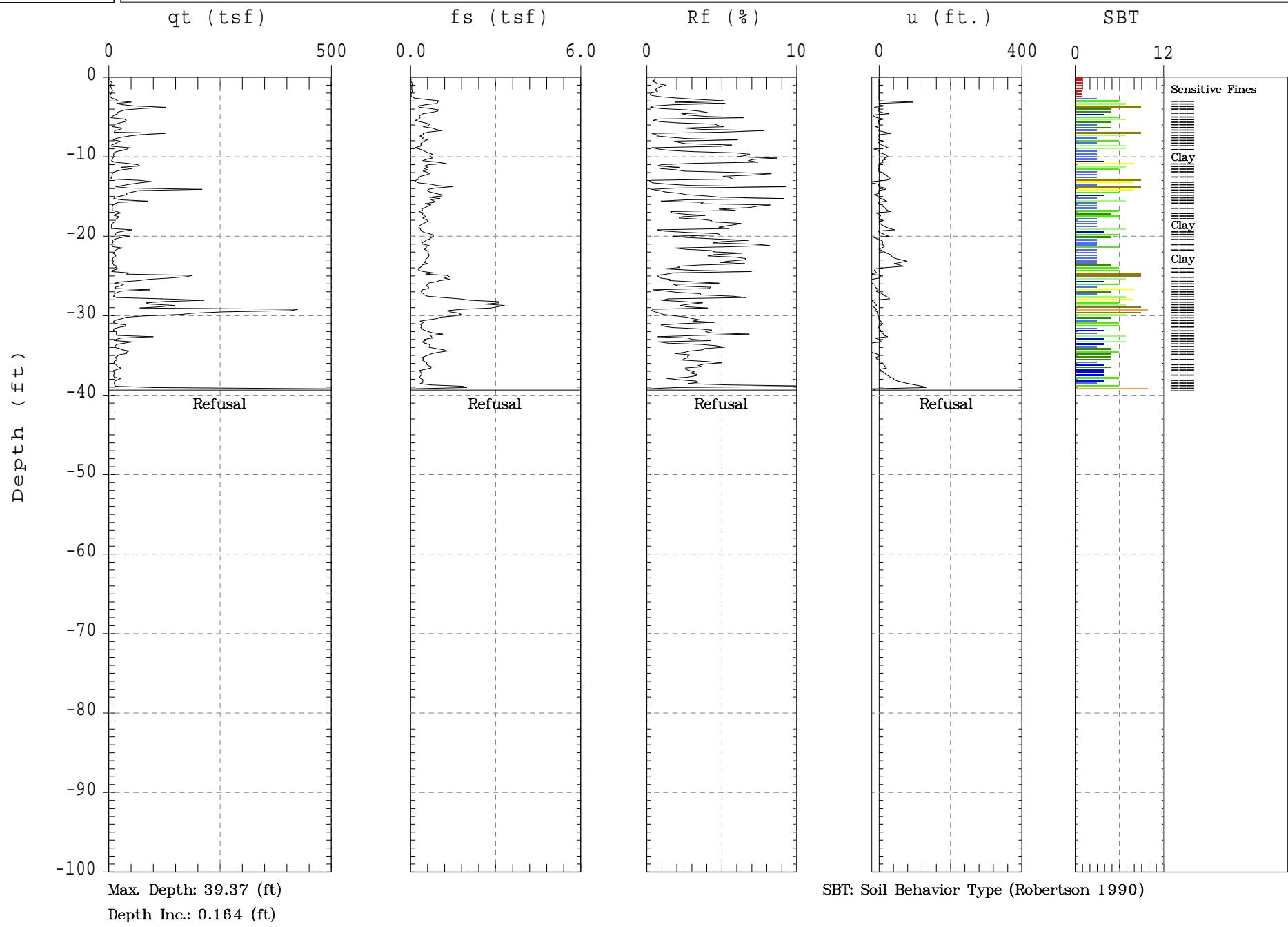


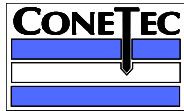


Parsons Engineering

Sounding:CPT-16A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 11:18

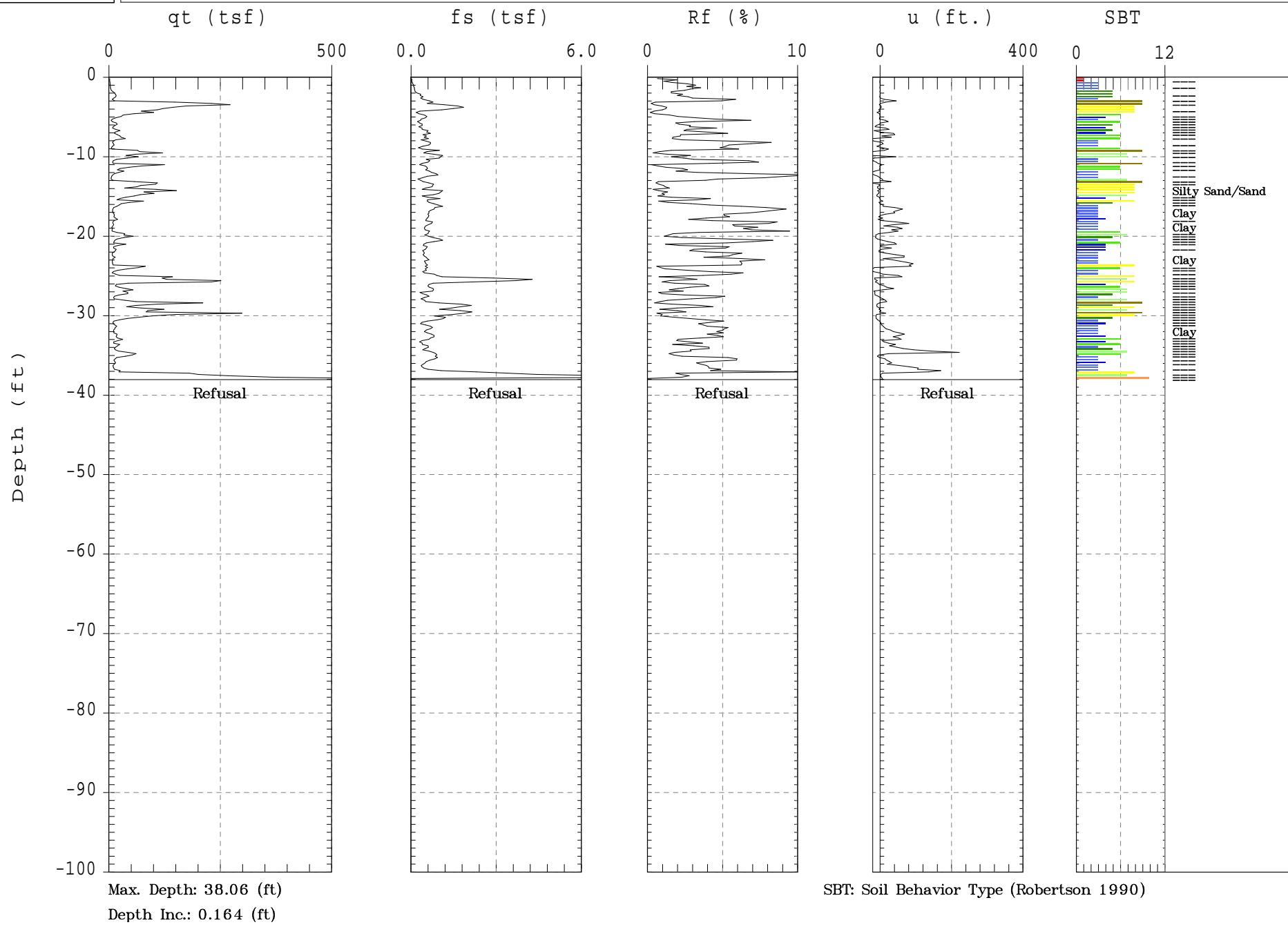


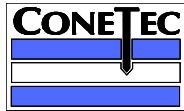


Parsons Engineering

Sounding:CPT-16
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 11:55

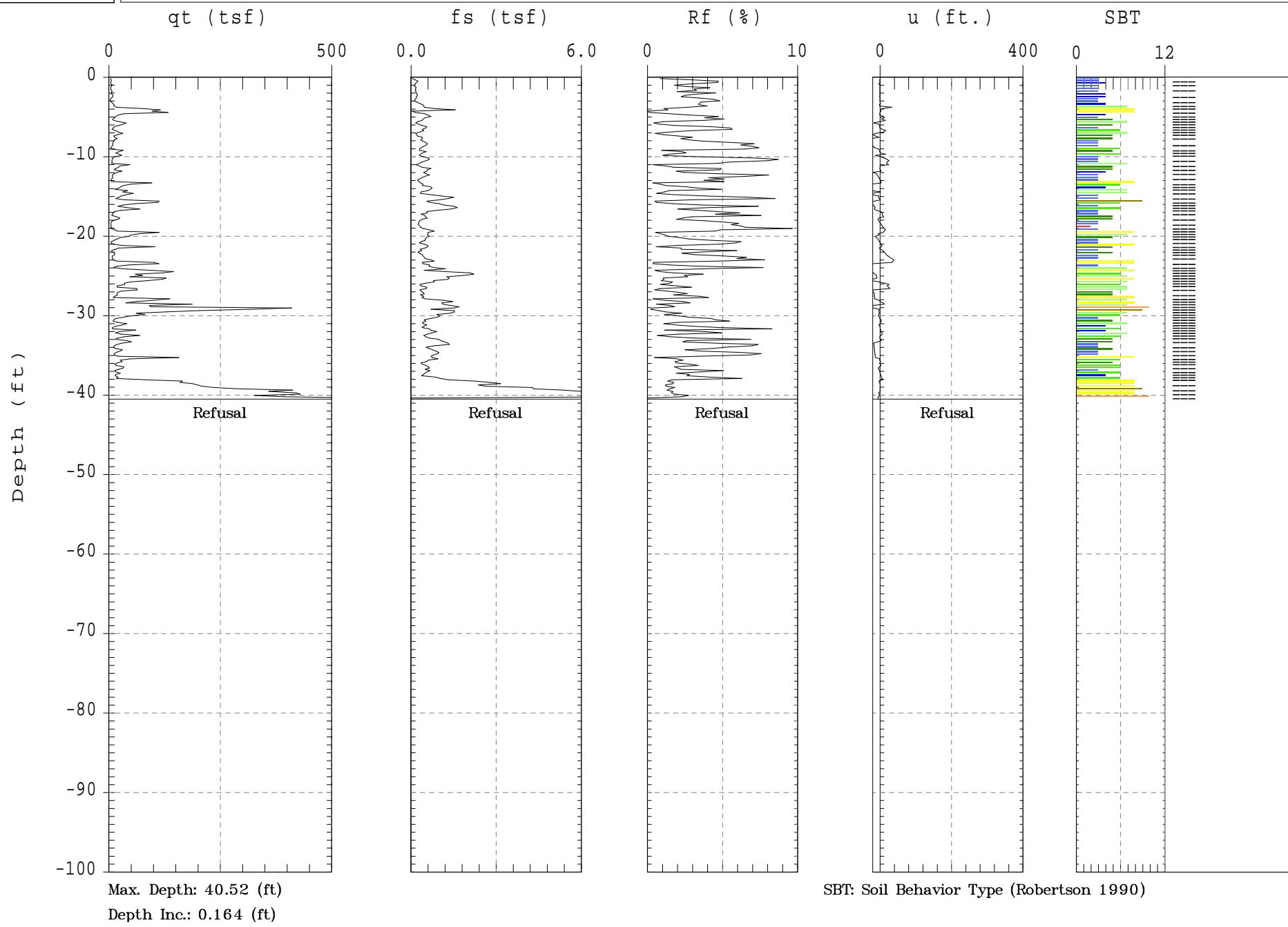


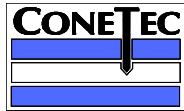


Parsons Engineering

Sounding:CPT-17
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 09:28

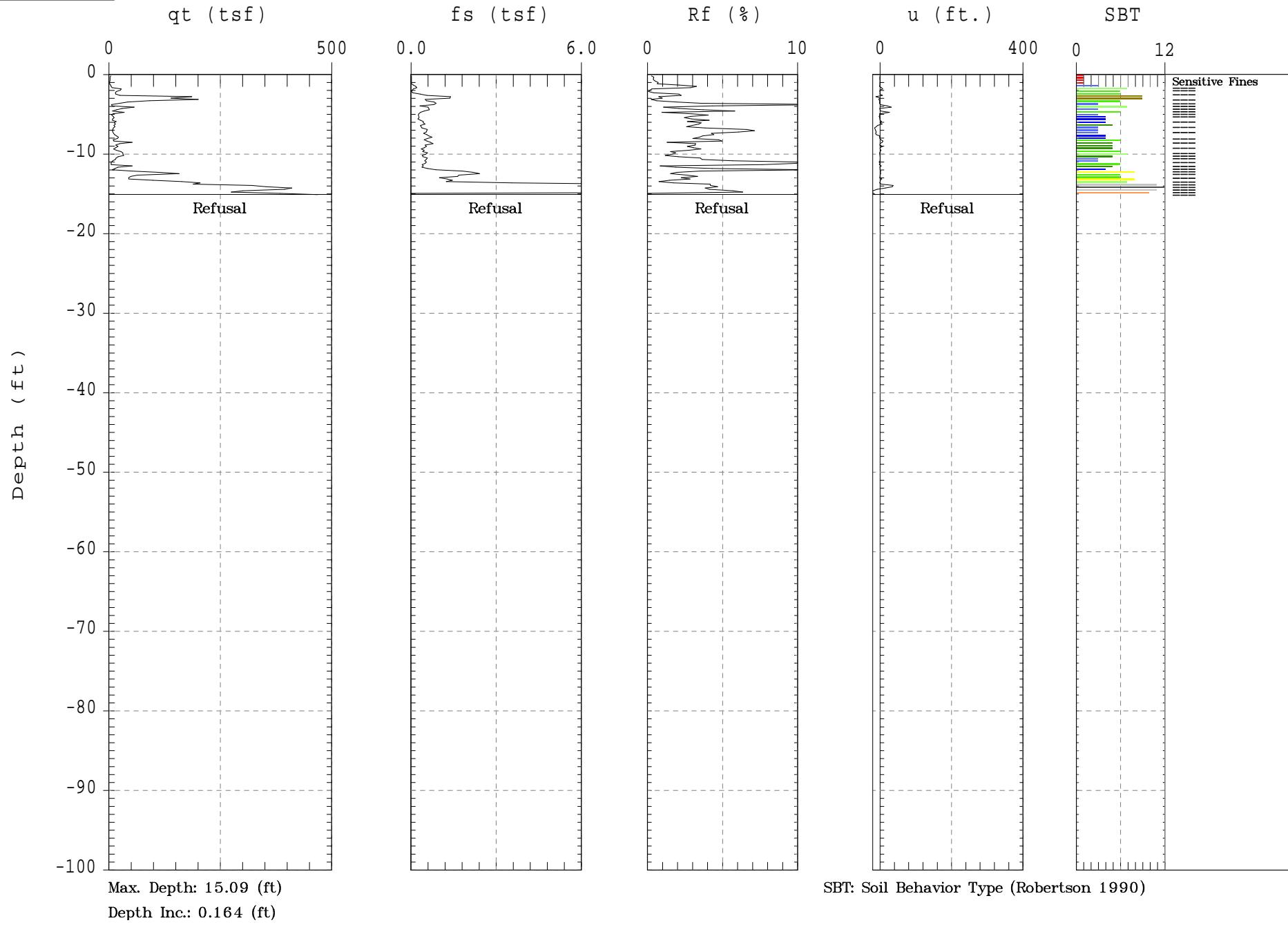


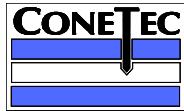


Parsons Engineering

Sounding:CPT-18
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 08:30

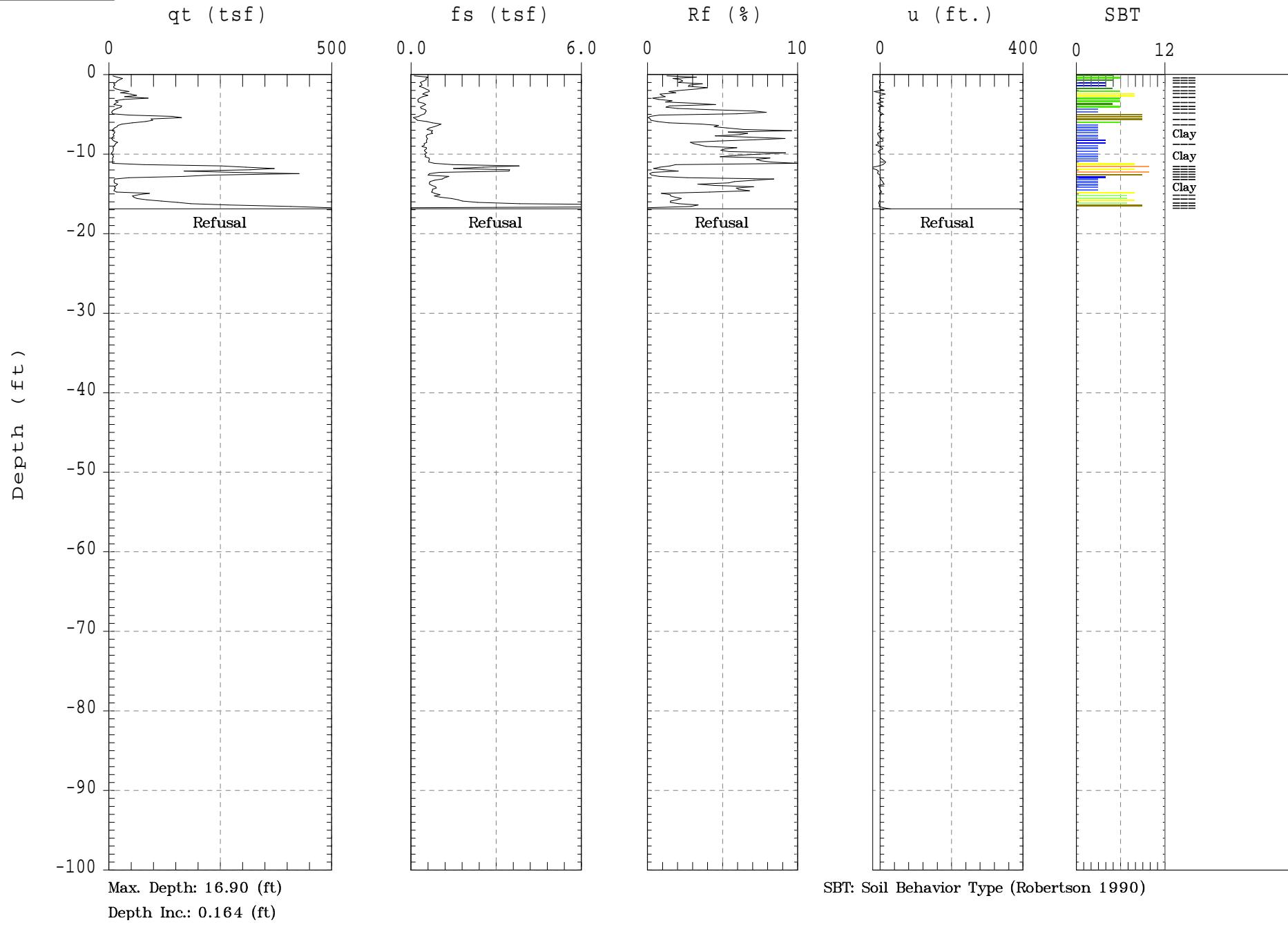


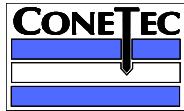


Parsons Engineering

Sounding:CPT-19
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 08:57

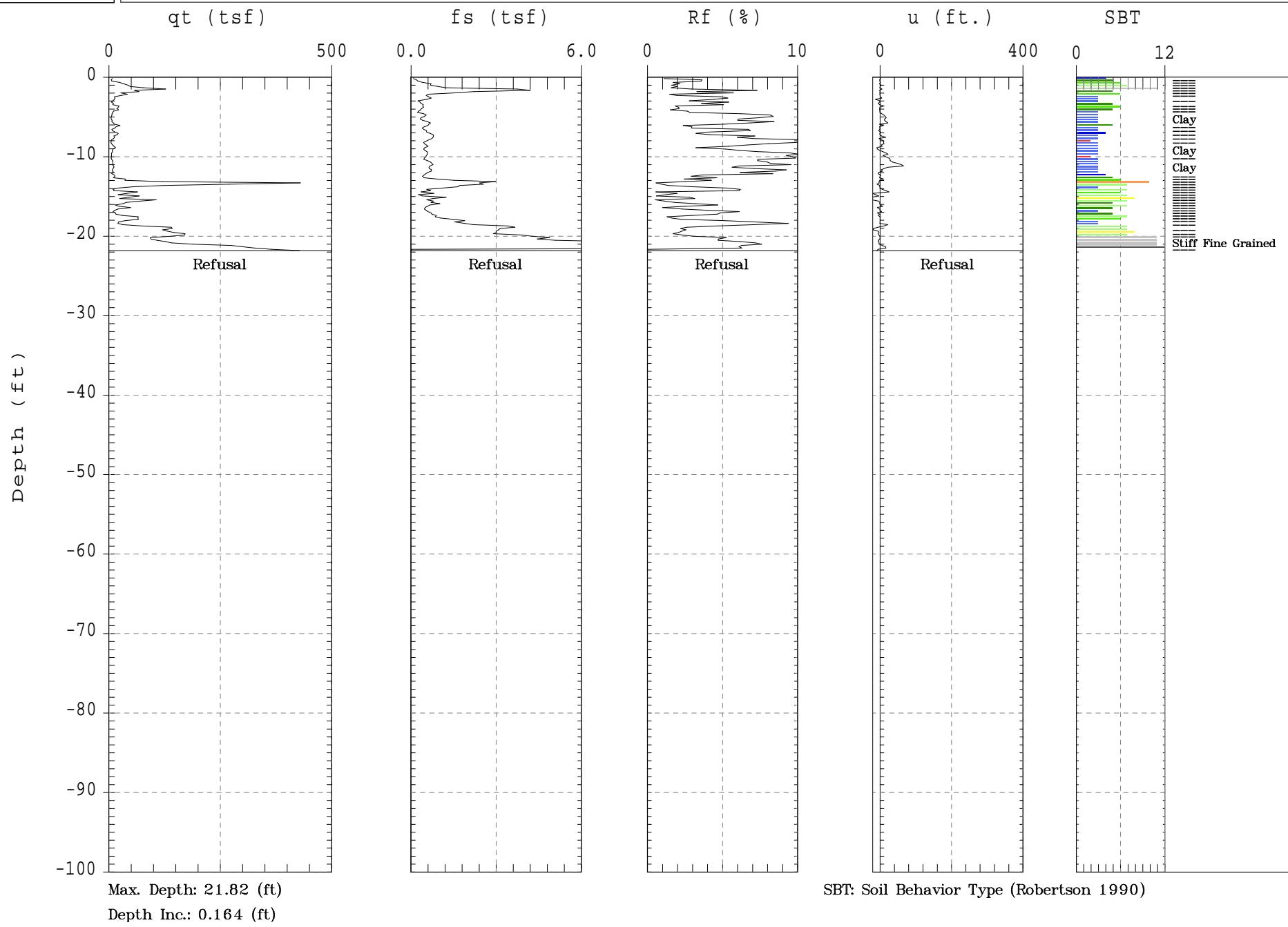


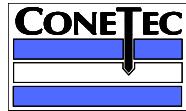


Parsons Engineering

Sounding:CPT-20
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 07:35

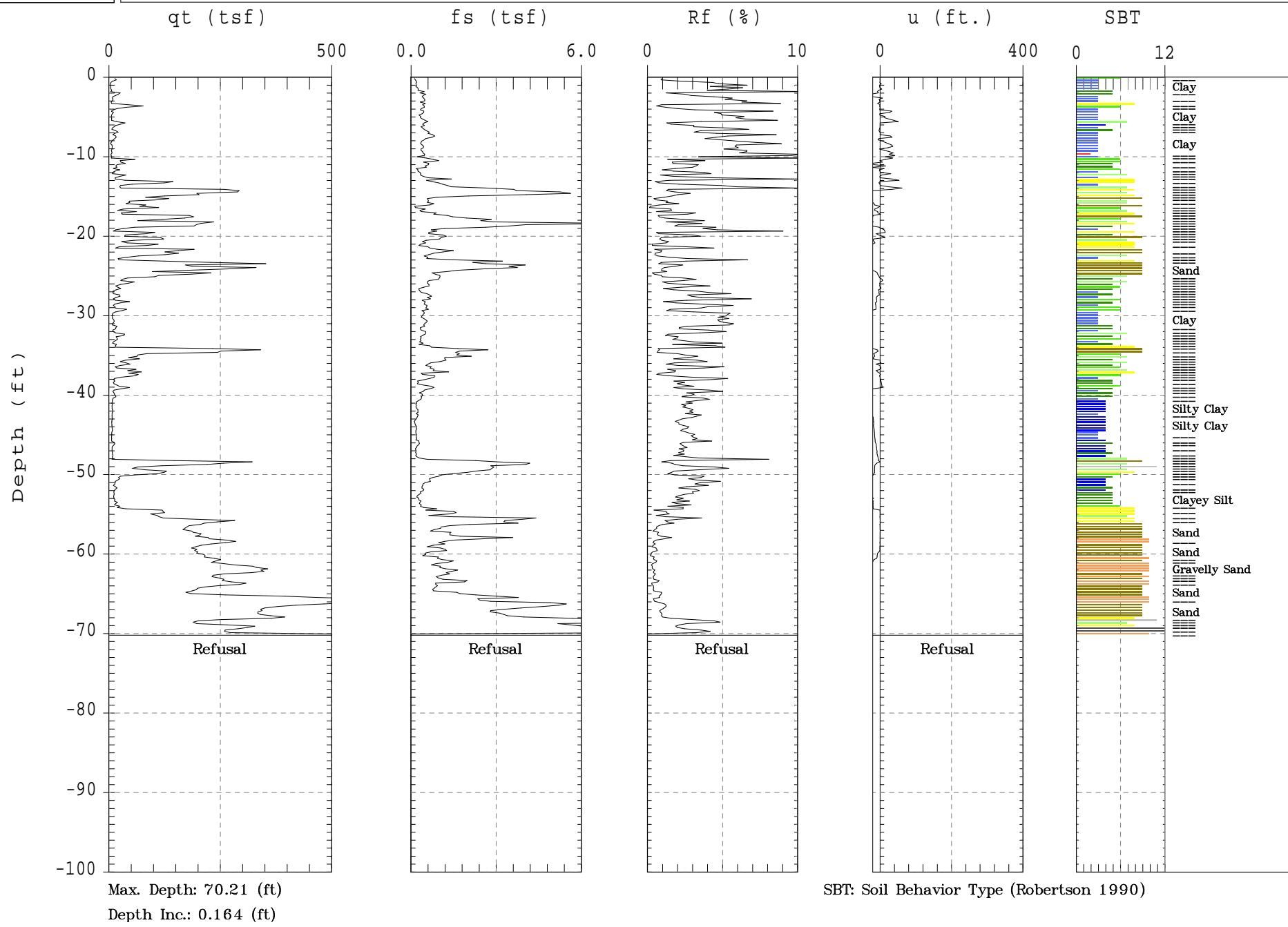


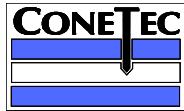


Parsons Engineering

Sounding:CPT-21
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 08:07

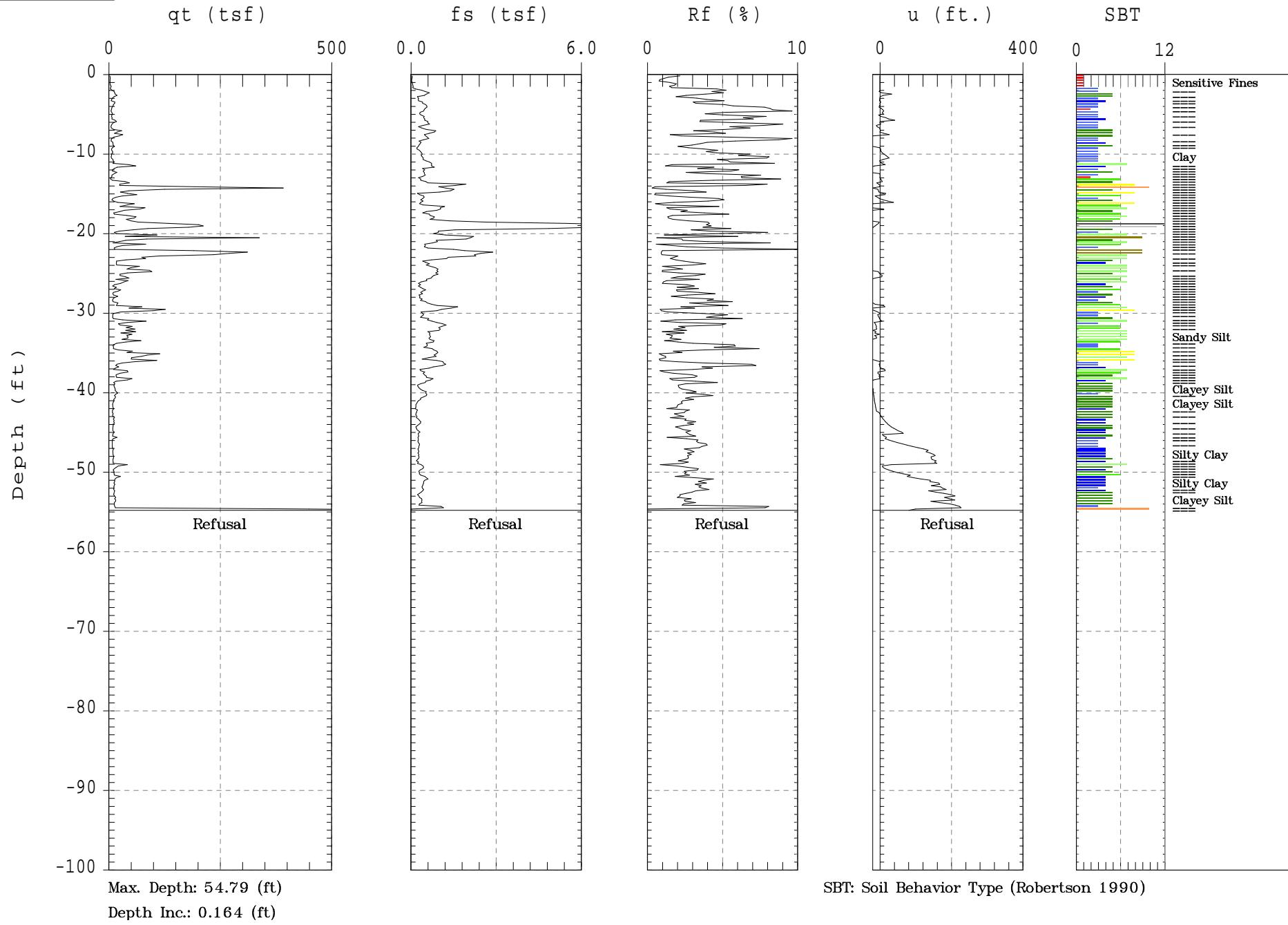


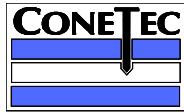


Parsons Engineering

Sounding:CPT-22
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 09:04

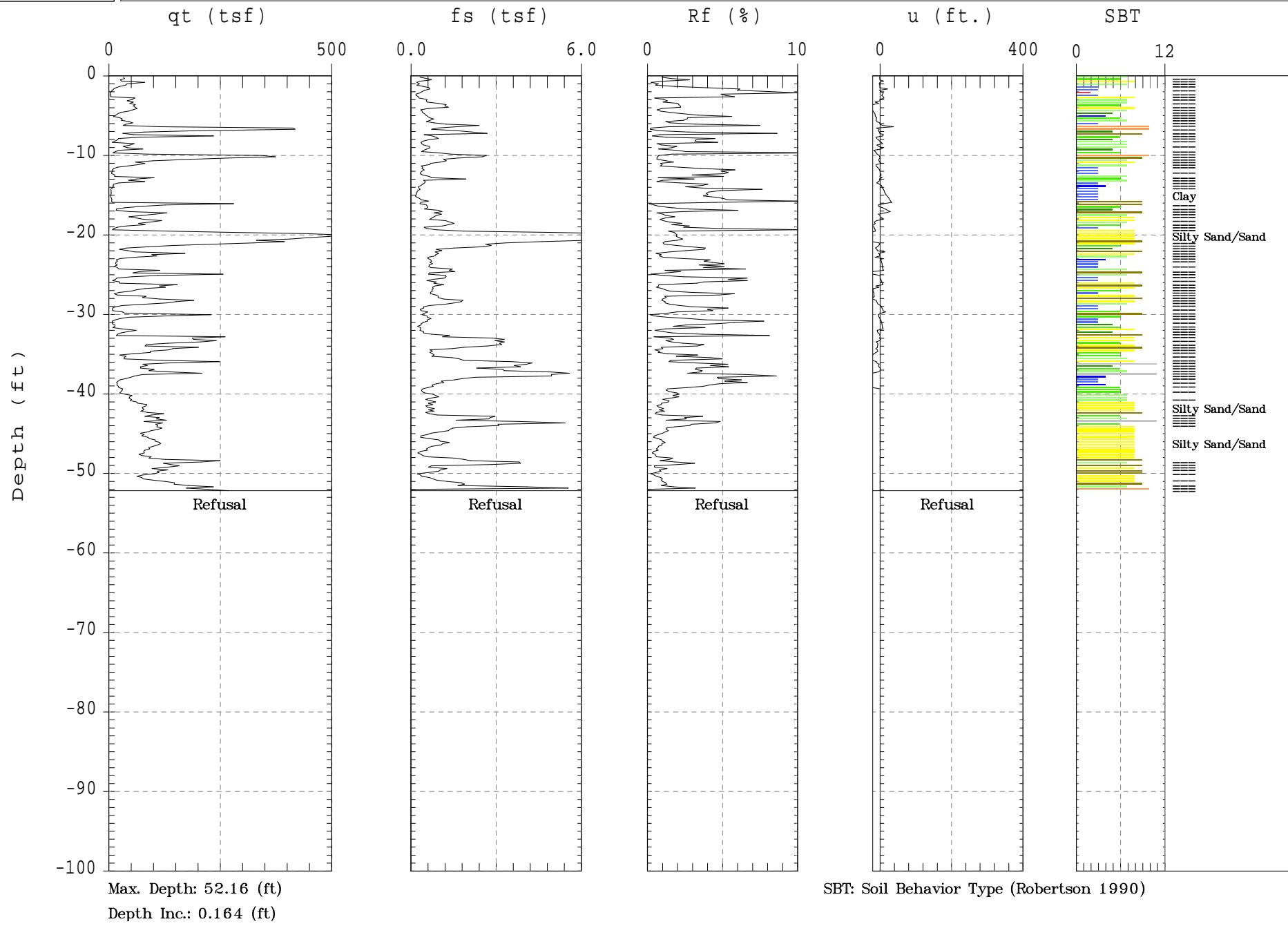


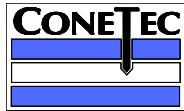


Parsons Engineering

Sounding:CPT-23A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 16:48

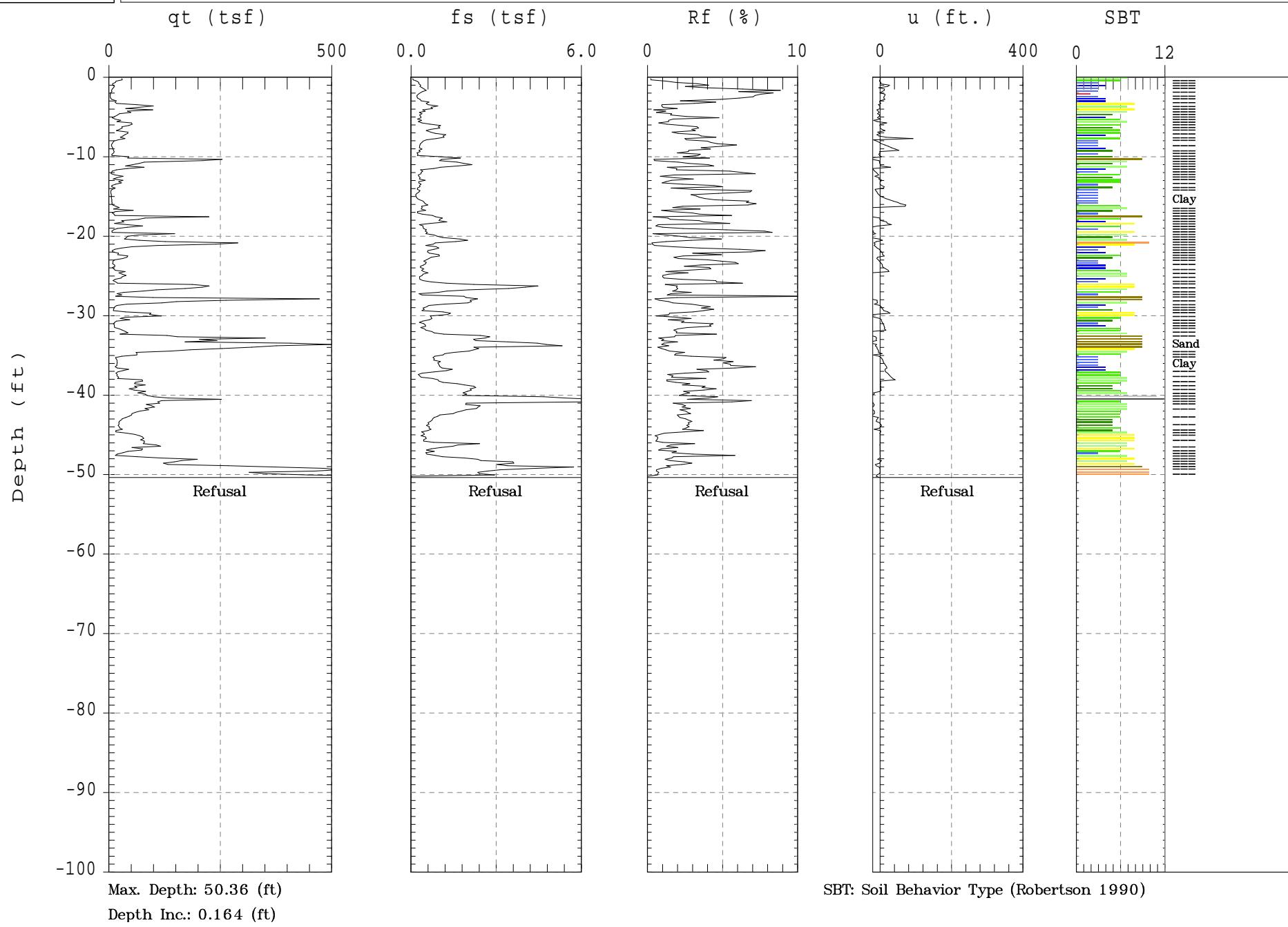


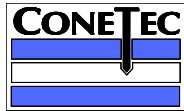


Parsons Engineering

Sounding:CPT-23B
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 17:34

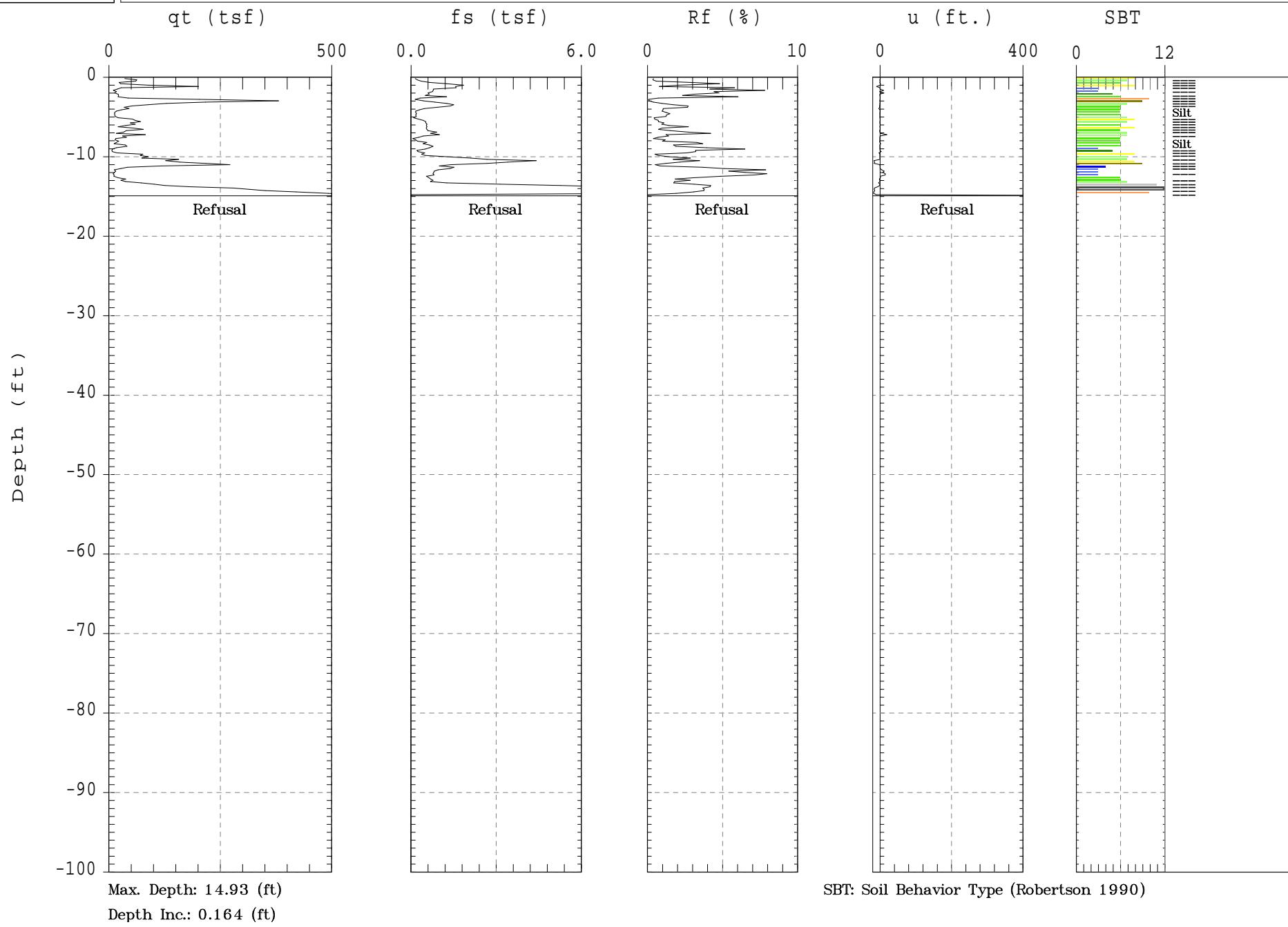


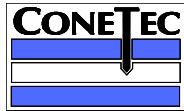


Parsons Engineering

Sounding:CPT-23
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 16:26

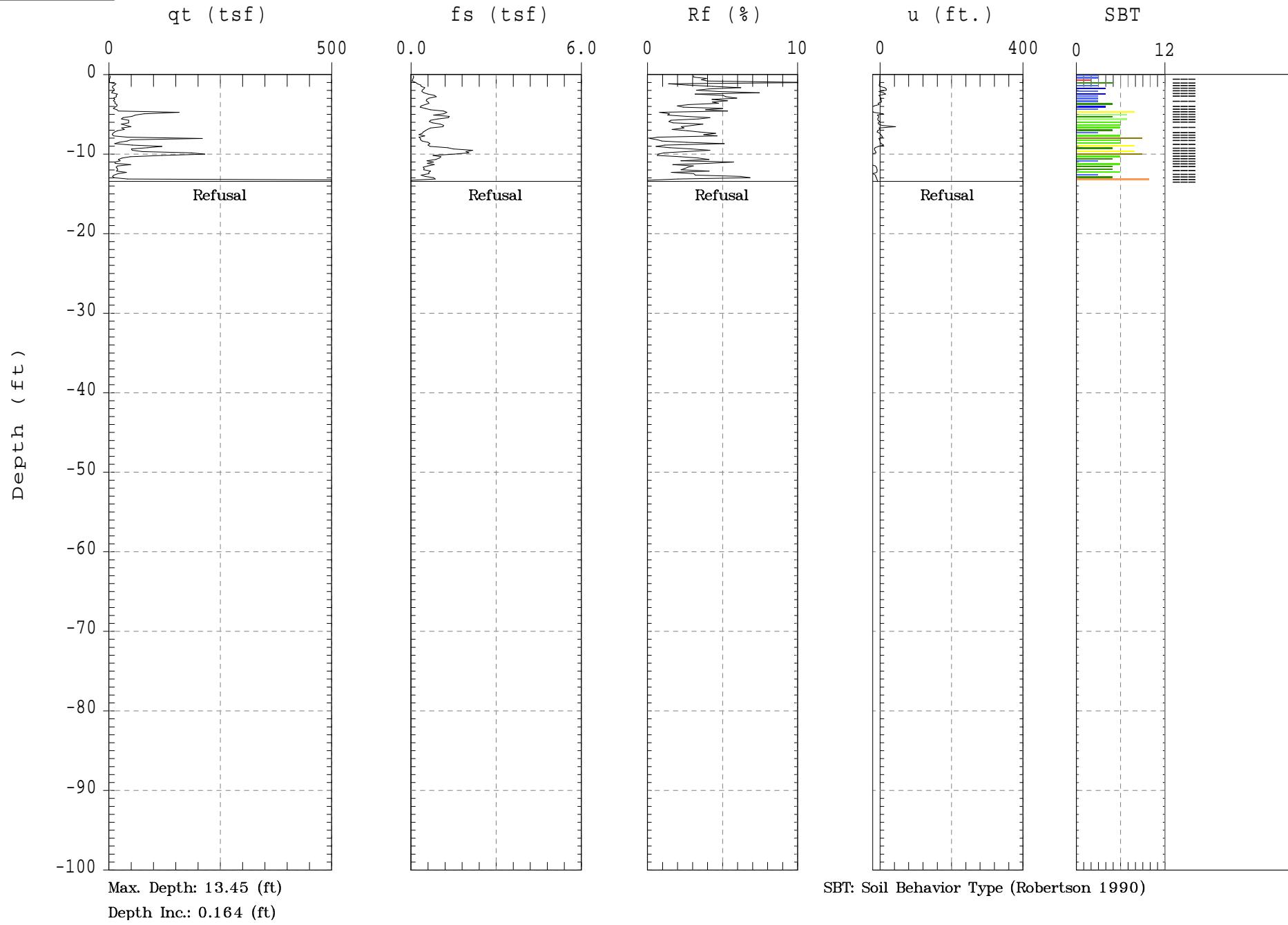


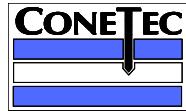


Parsons Engineering

Sounding:CPT-24A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 13:24

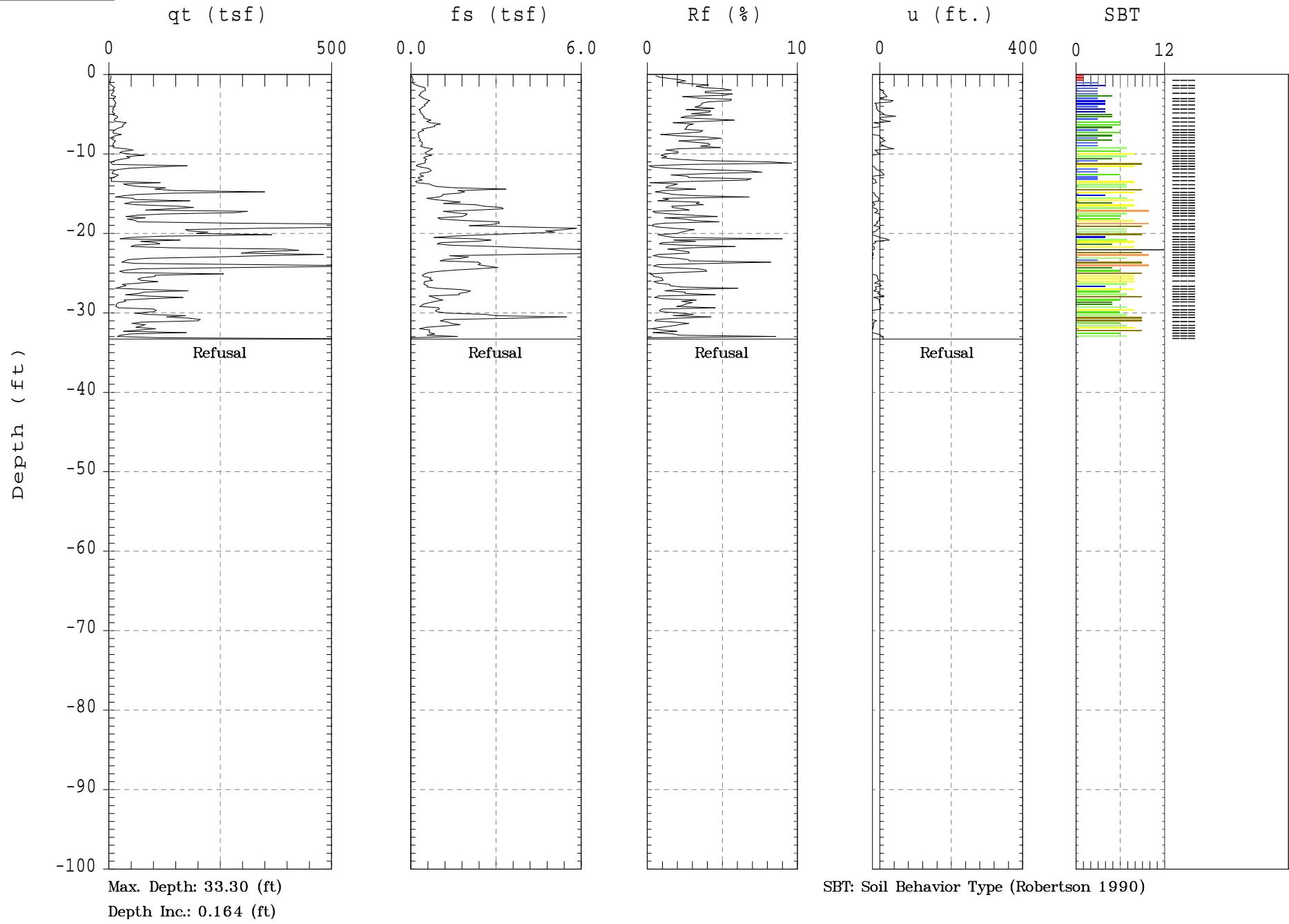


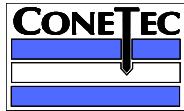


Parsons Engineering

Sounding:CPT-24B
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 14:00

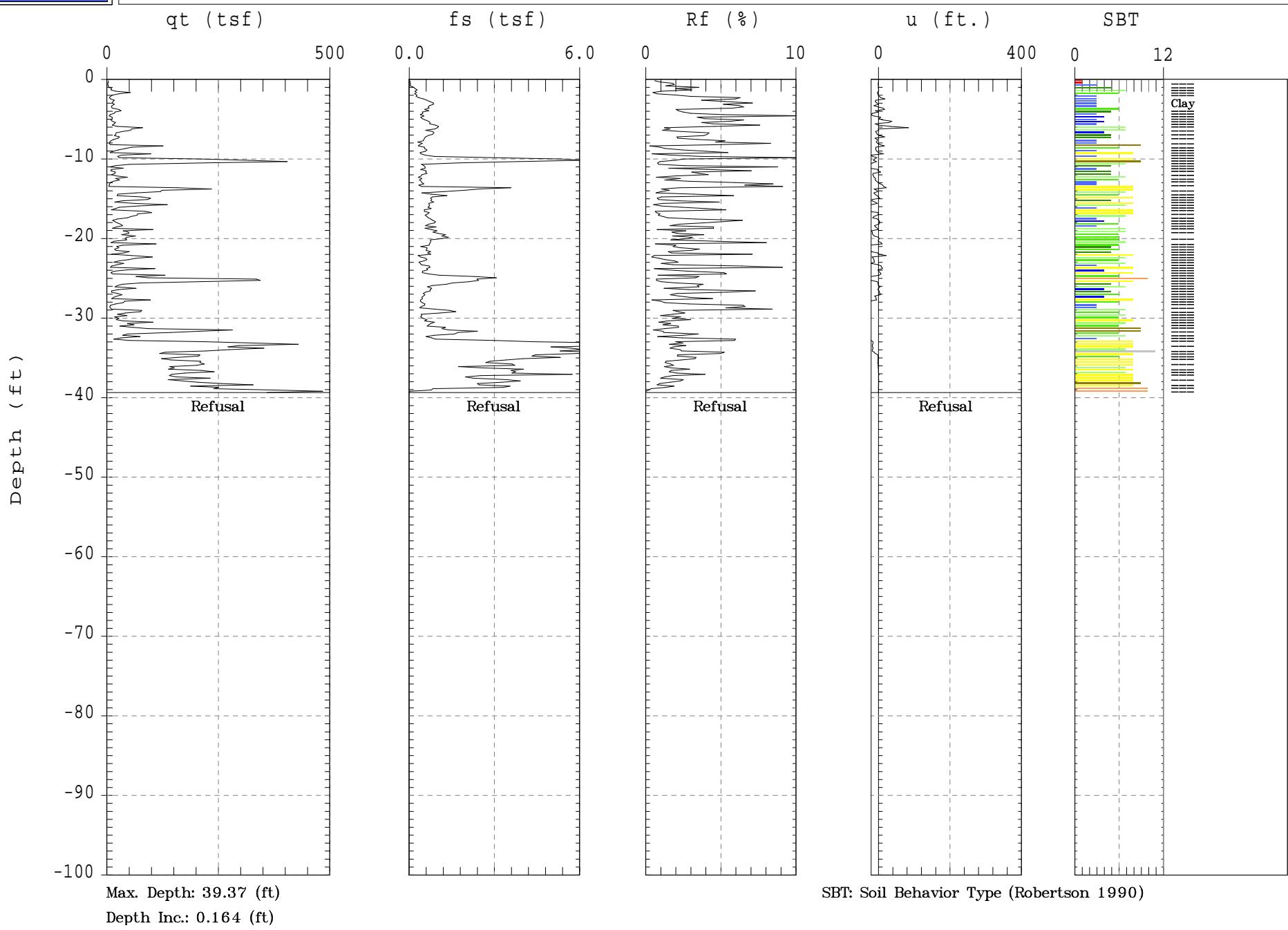


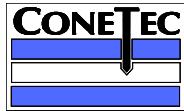


Parsons Engineering

Sounding:CPT-24C
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 14:34

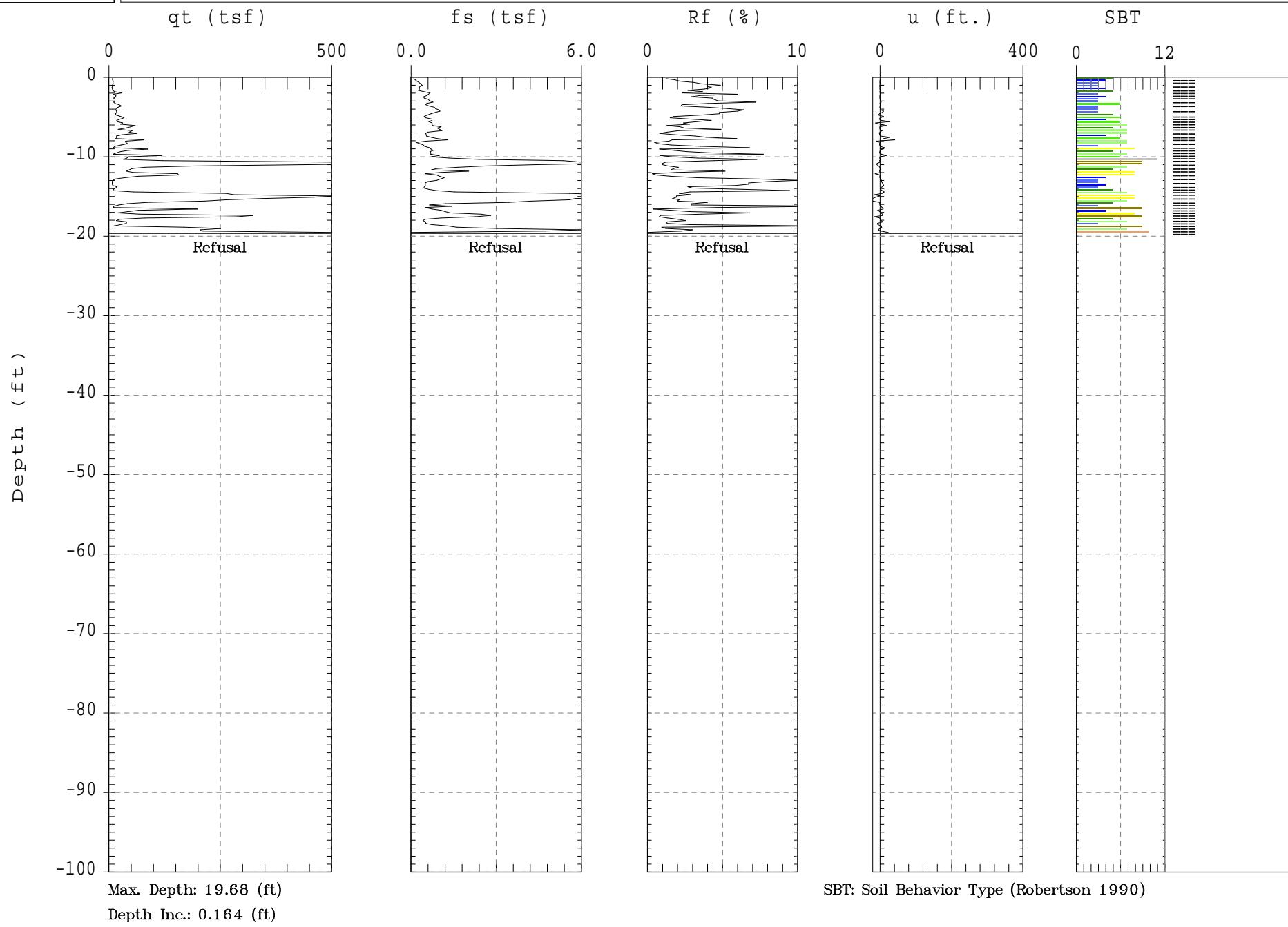


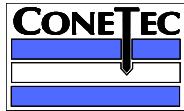


Parsons Engineering

Sounding:CPT-24
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 15:56

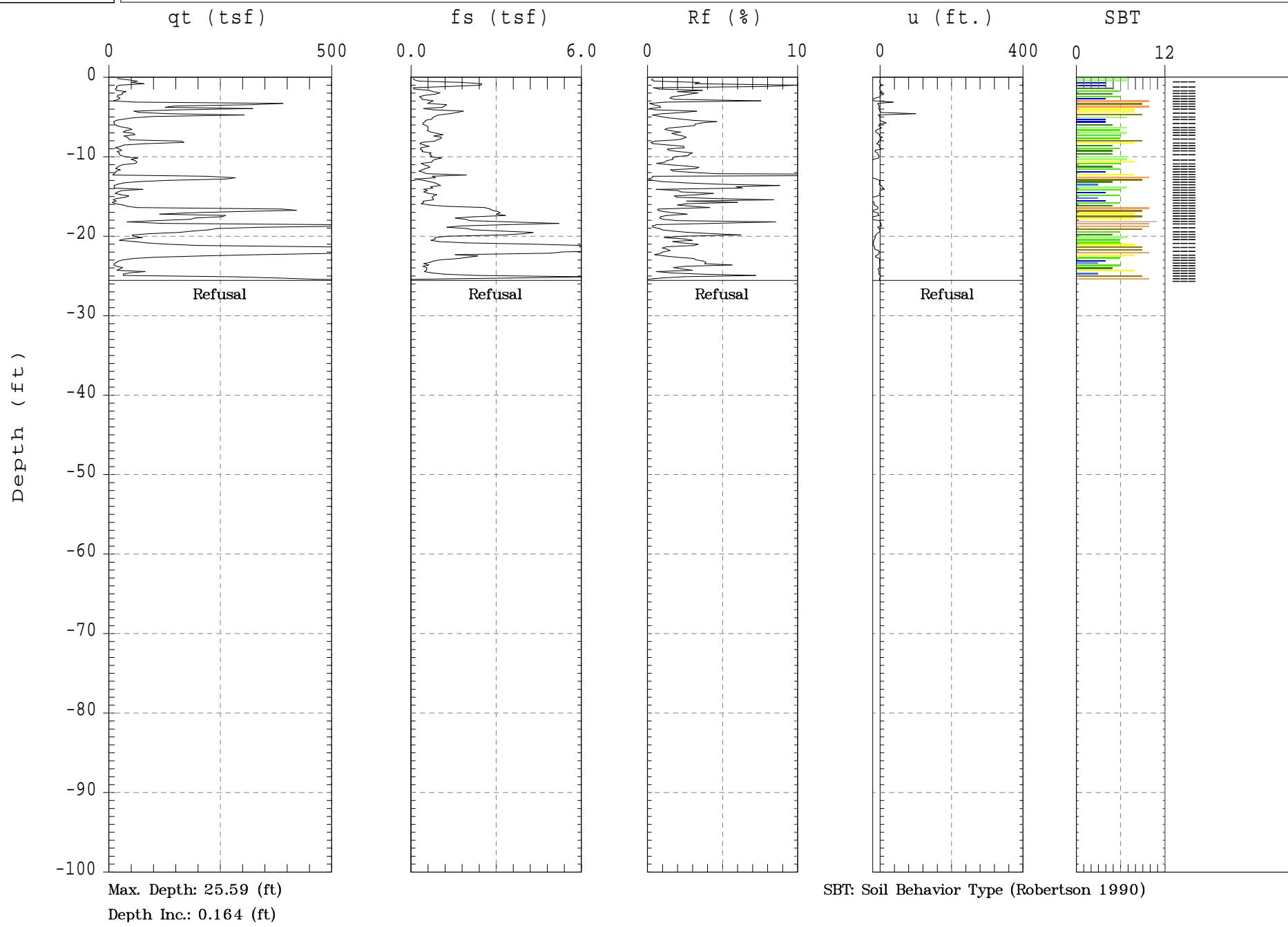


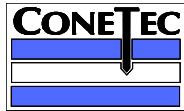


Parsons Engineering

Sounding:CPT-25
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 09:03

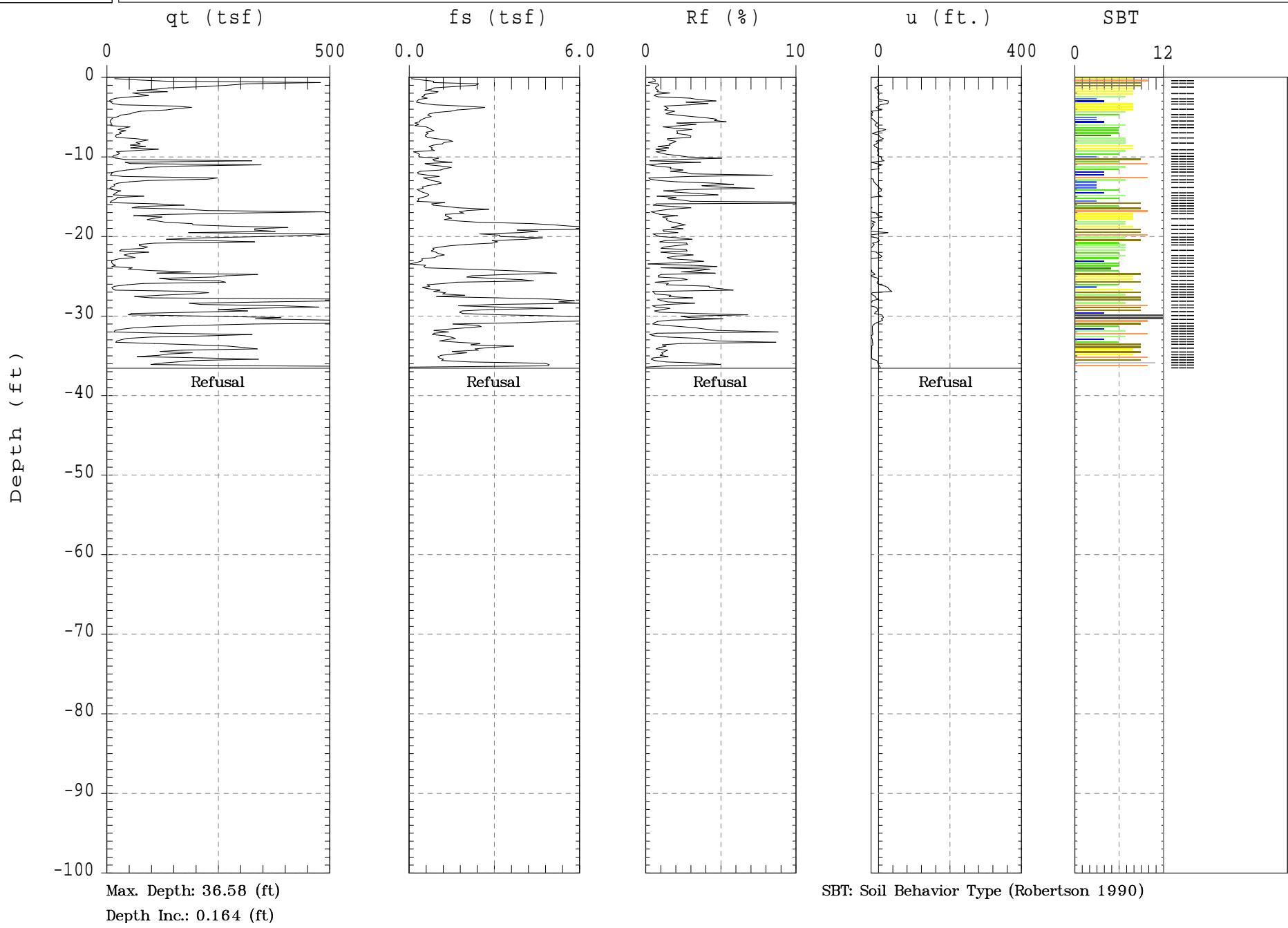


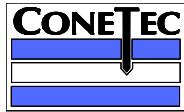


Parsons Engineering

Sounding:CPT-26
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 09:34

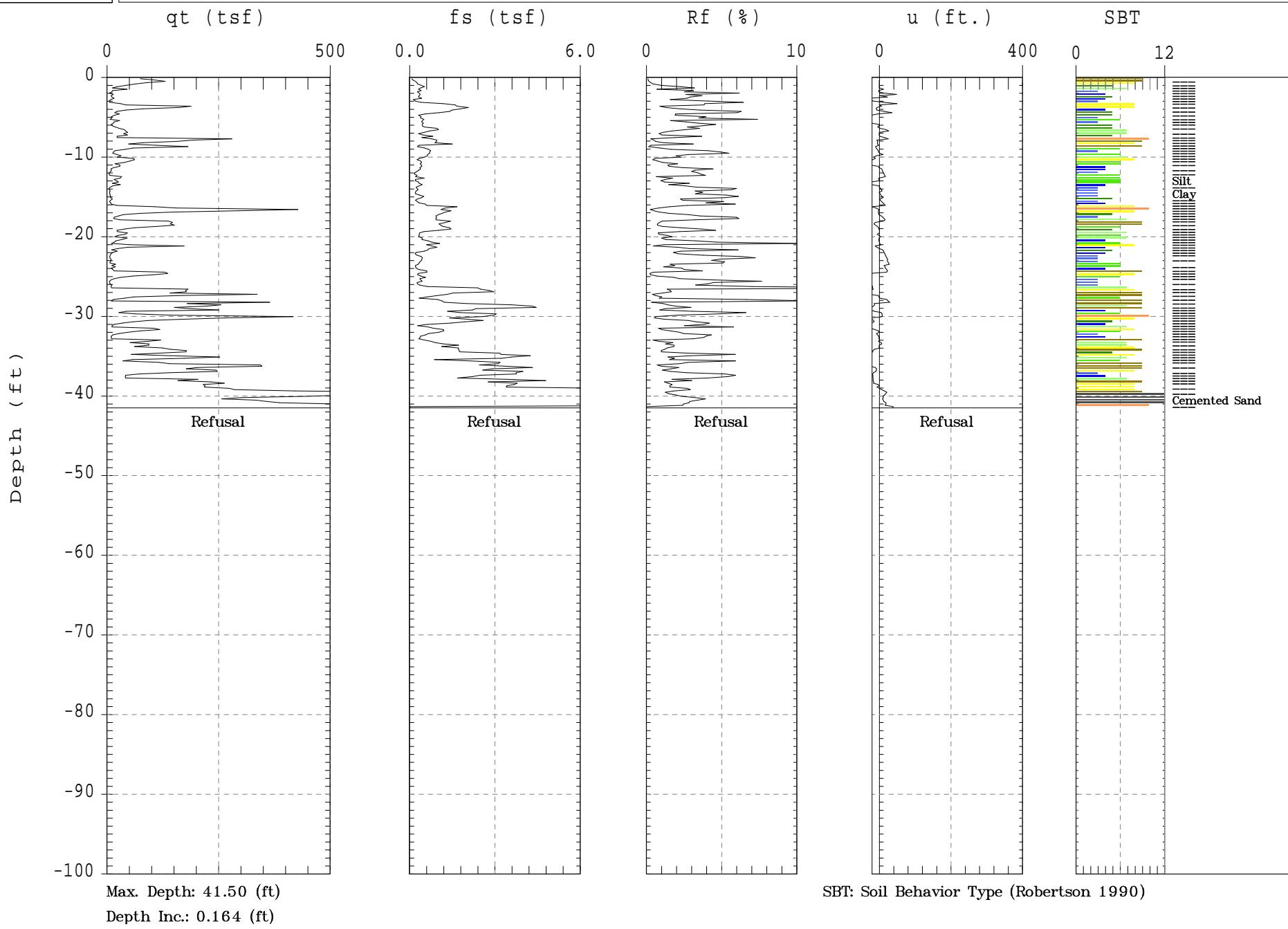


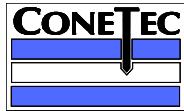


Parsons Engineering

Sounding:CPT-27
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 10:08

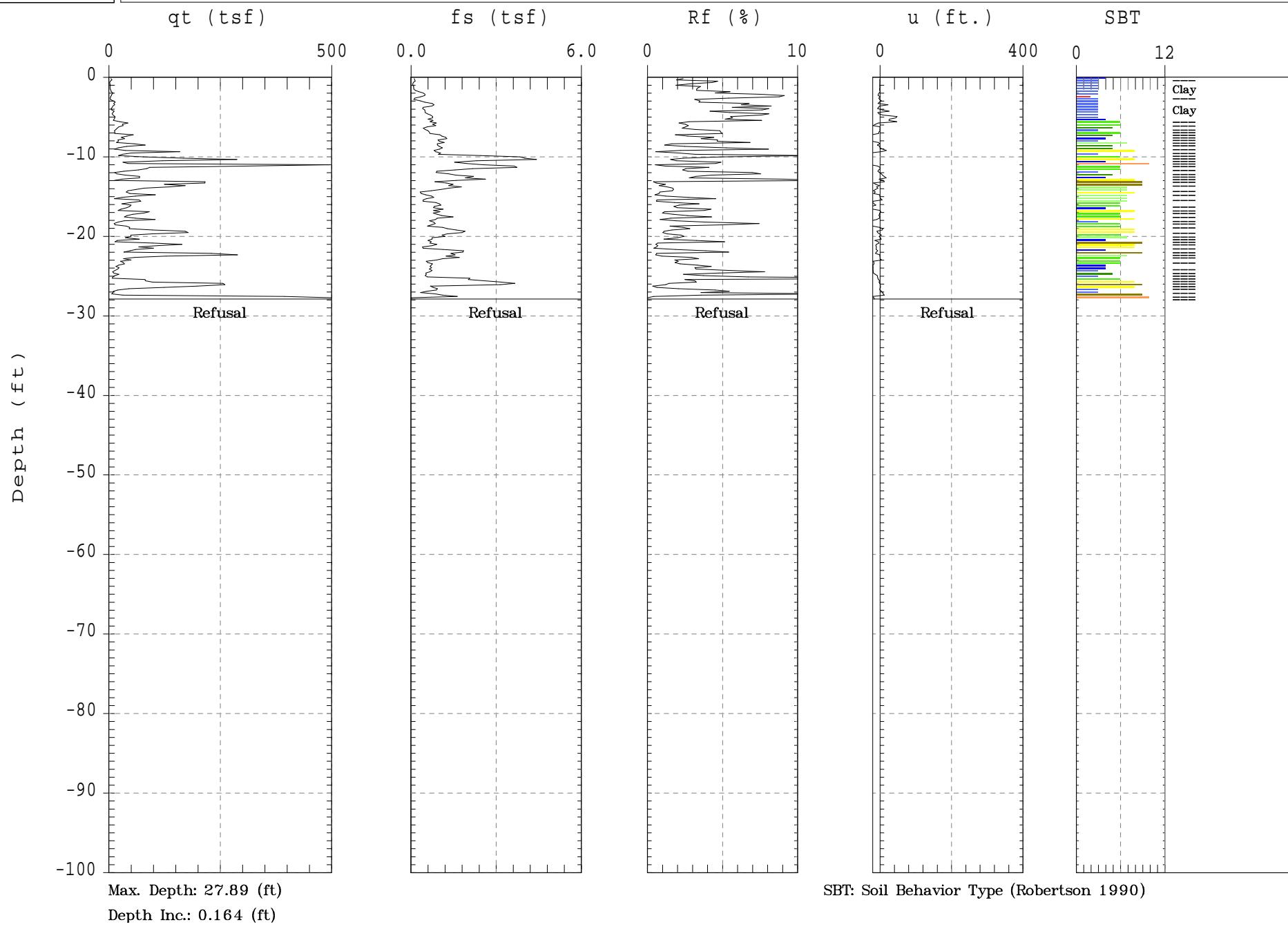


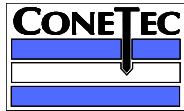


Parsons Engineering

Sounding:CPT-28
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 14:38

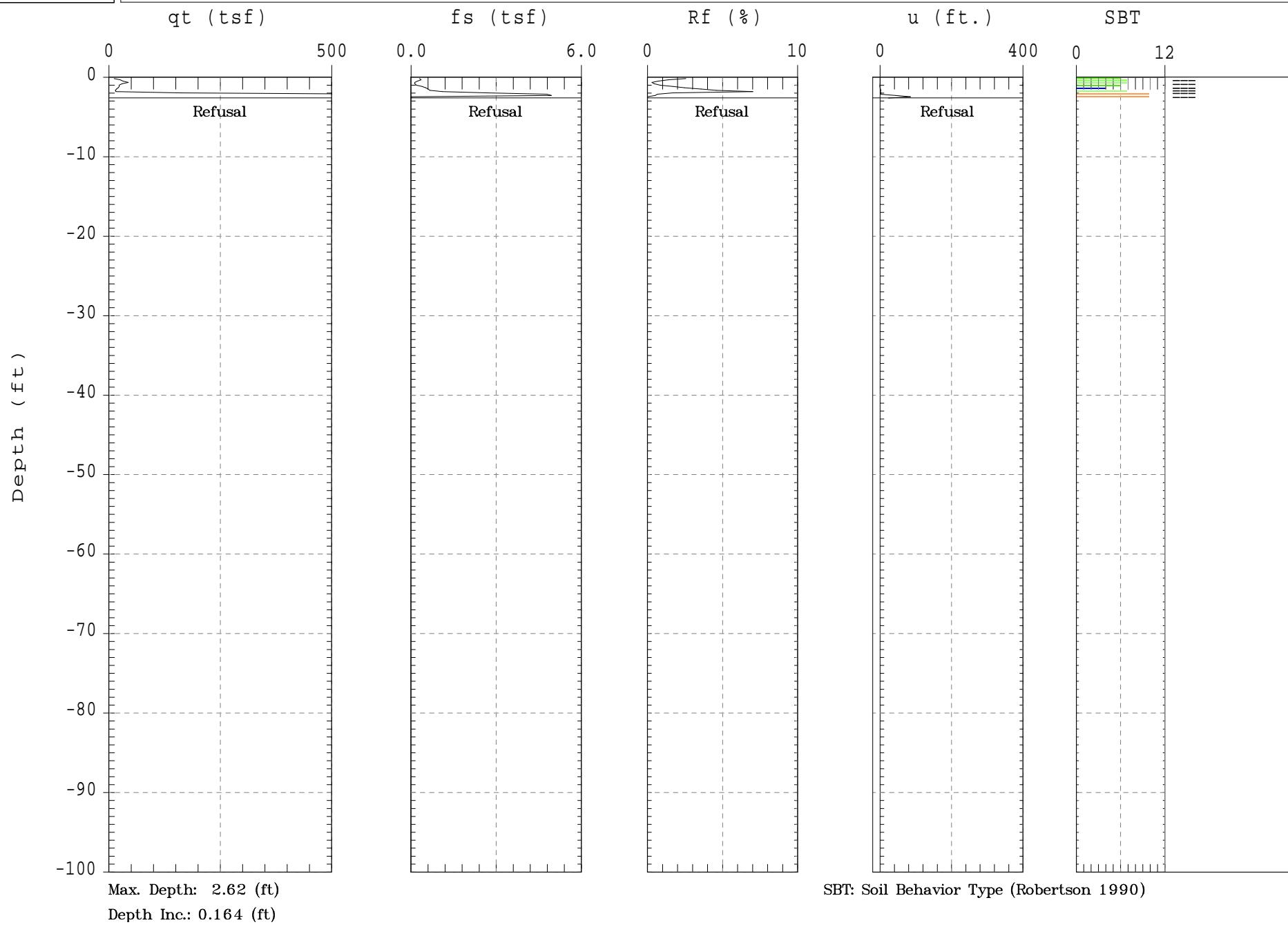


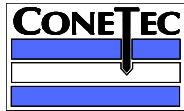


Parsons Engineering

Sounding:CPT-29A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 14:02

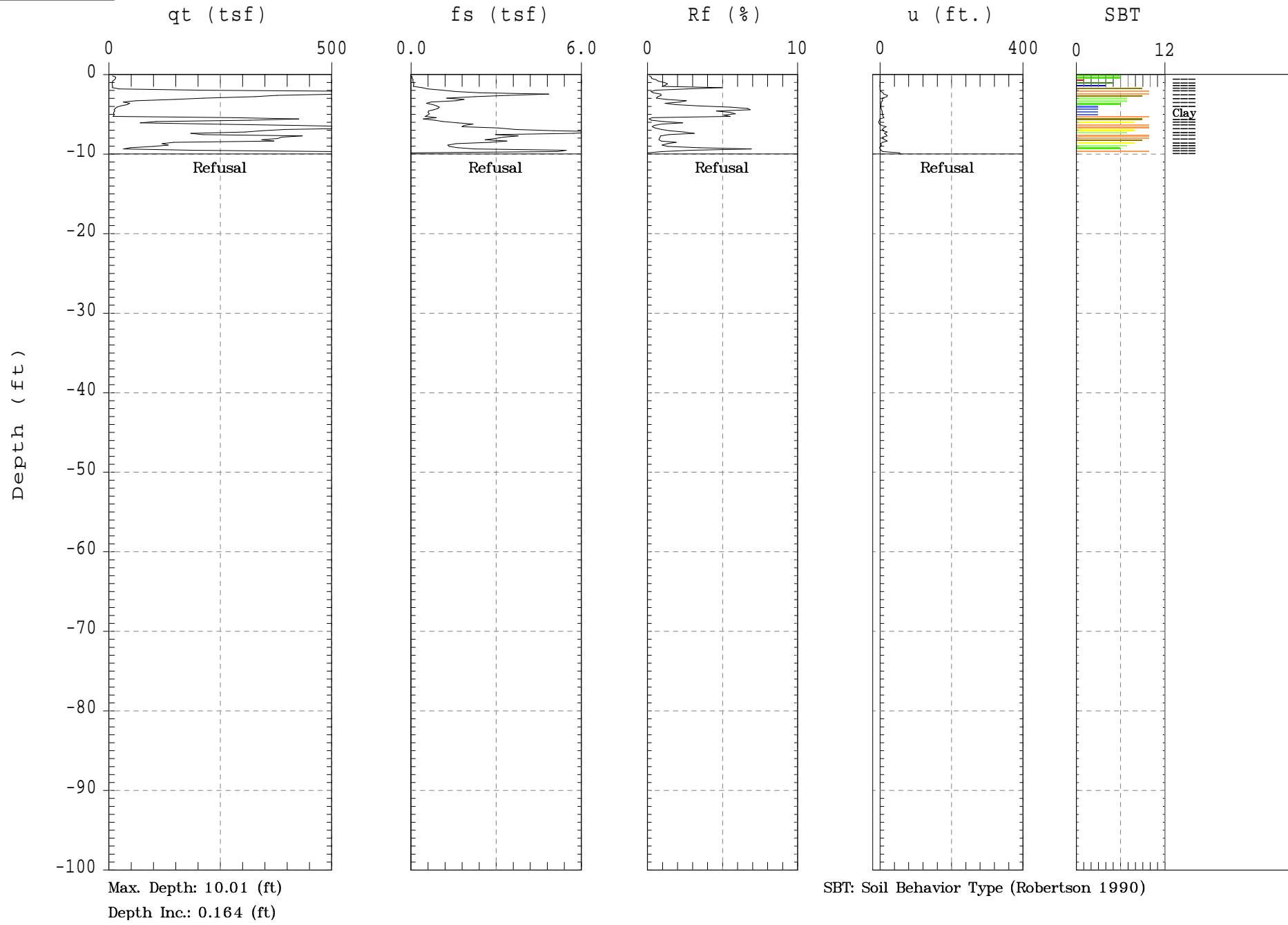


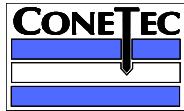


Parsons Engineering

Sounding:CPT-29B
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 14:11

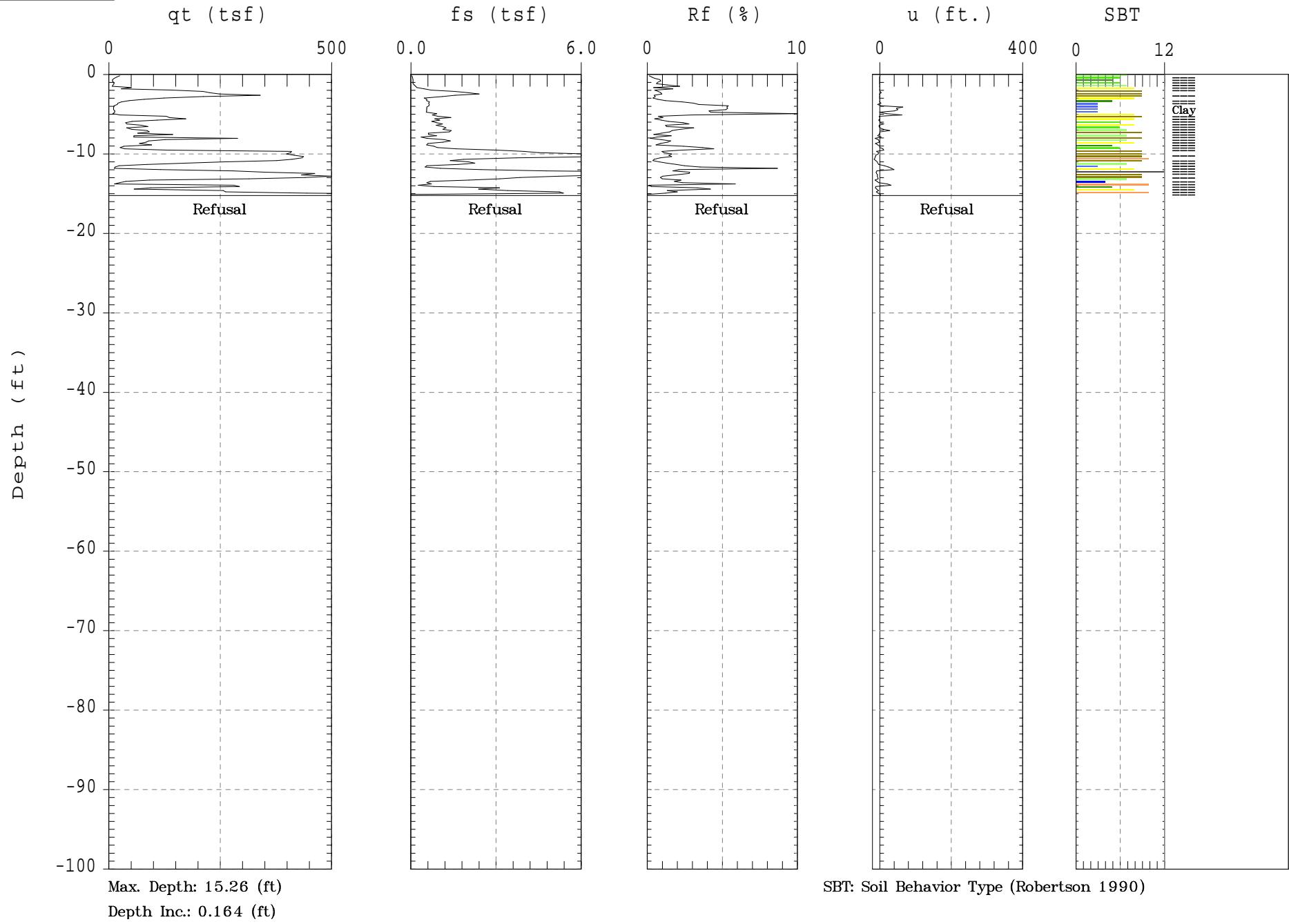


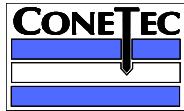


Parsons Engineering

Sounding:CPT-29C
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 12:18

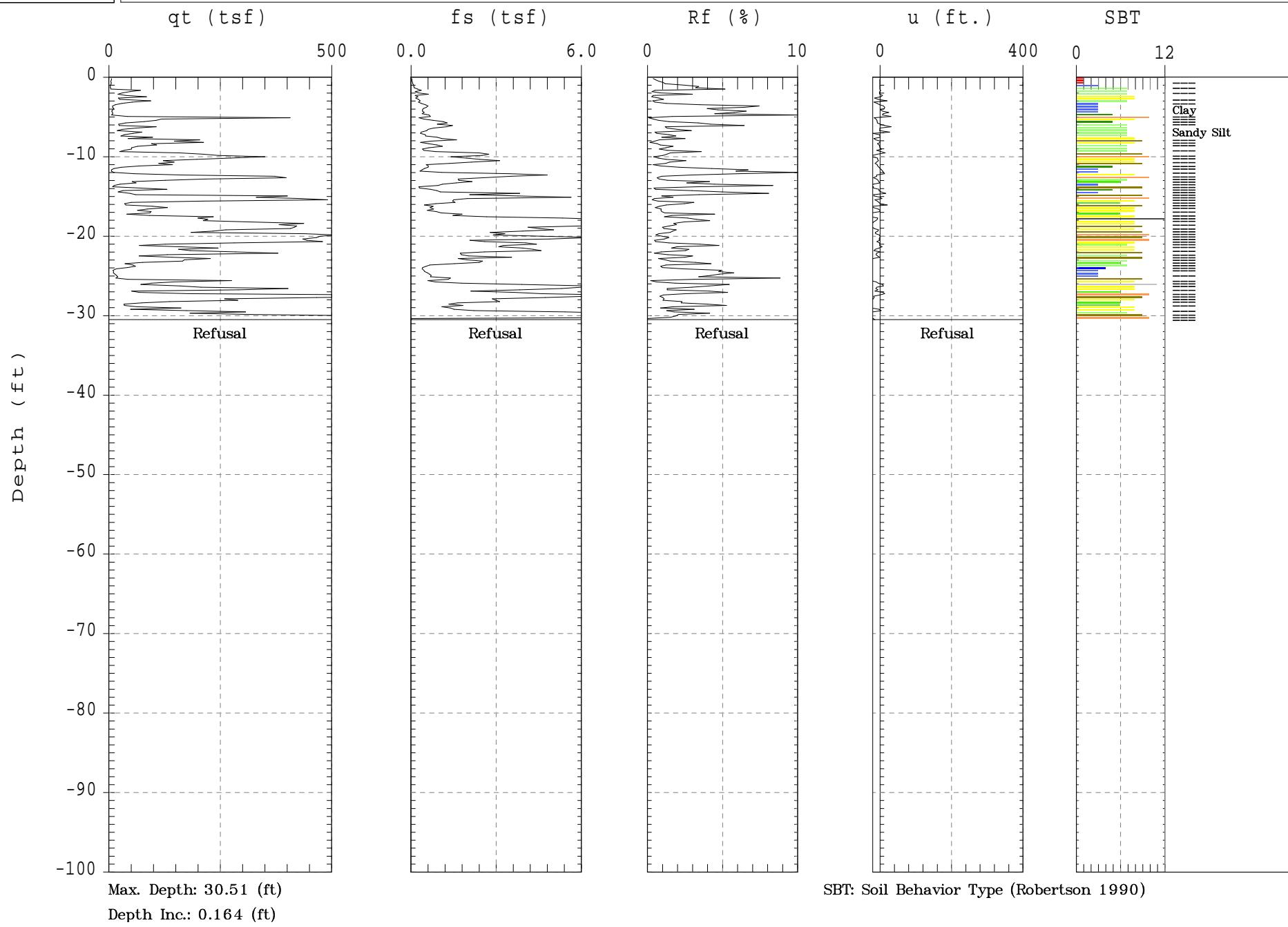


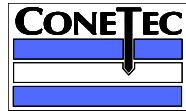


Parsons Engineering

Sounding:CPT-29D
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 12:40

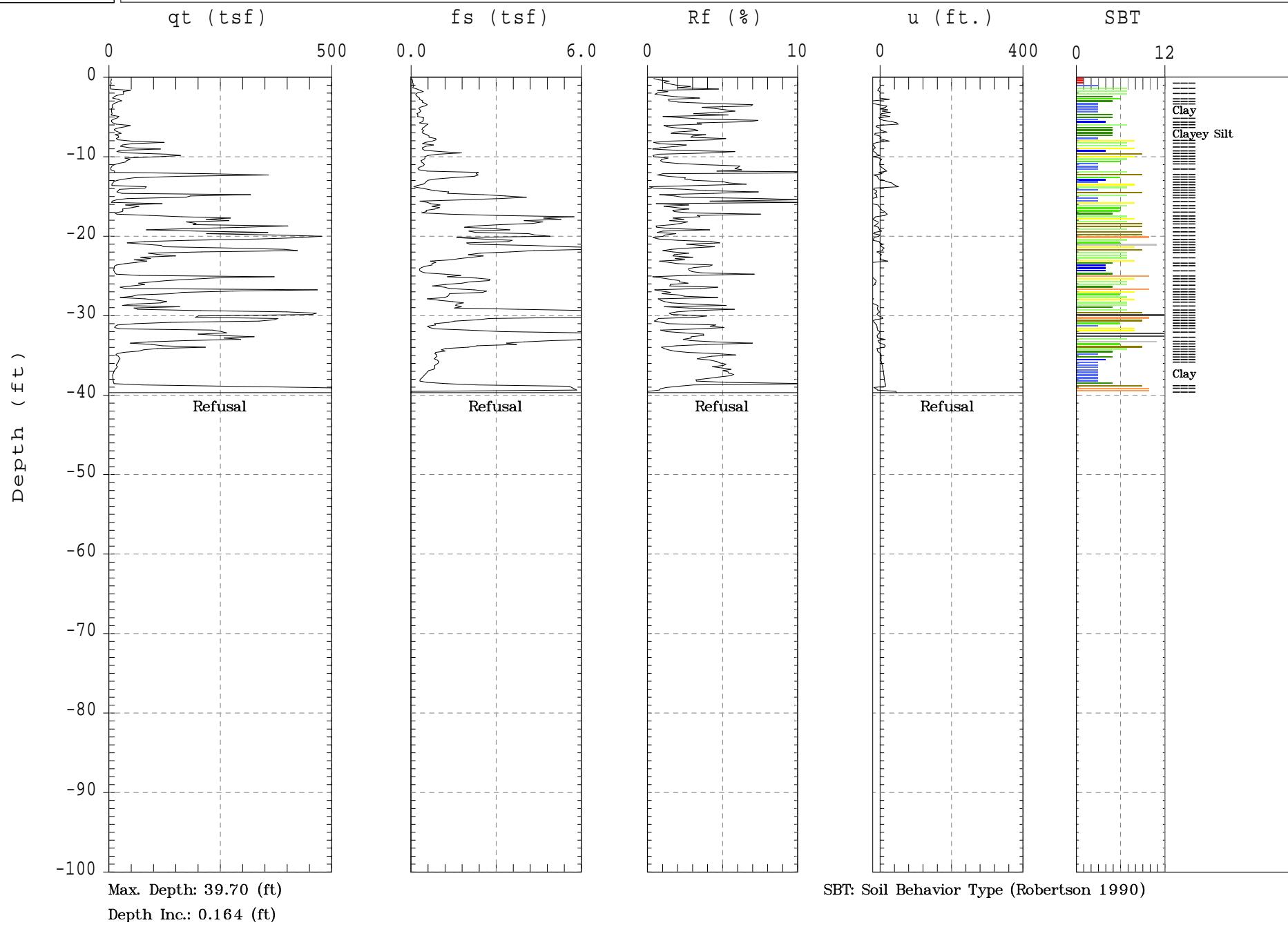


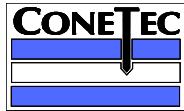


Parsons Engineering

Sounding:CPT-29E
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 13:12

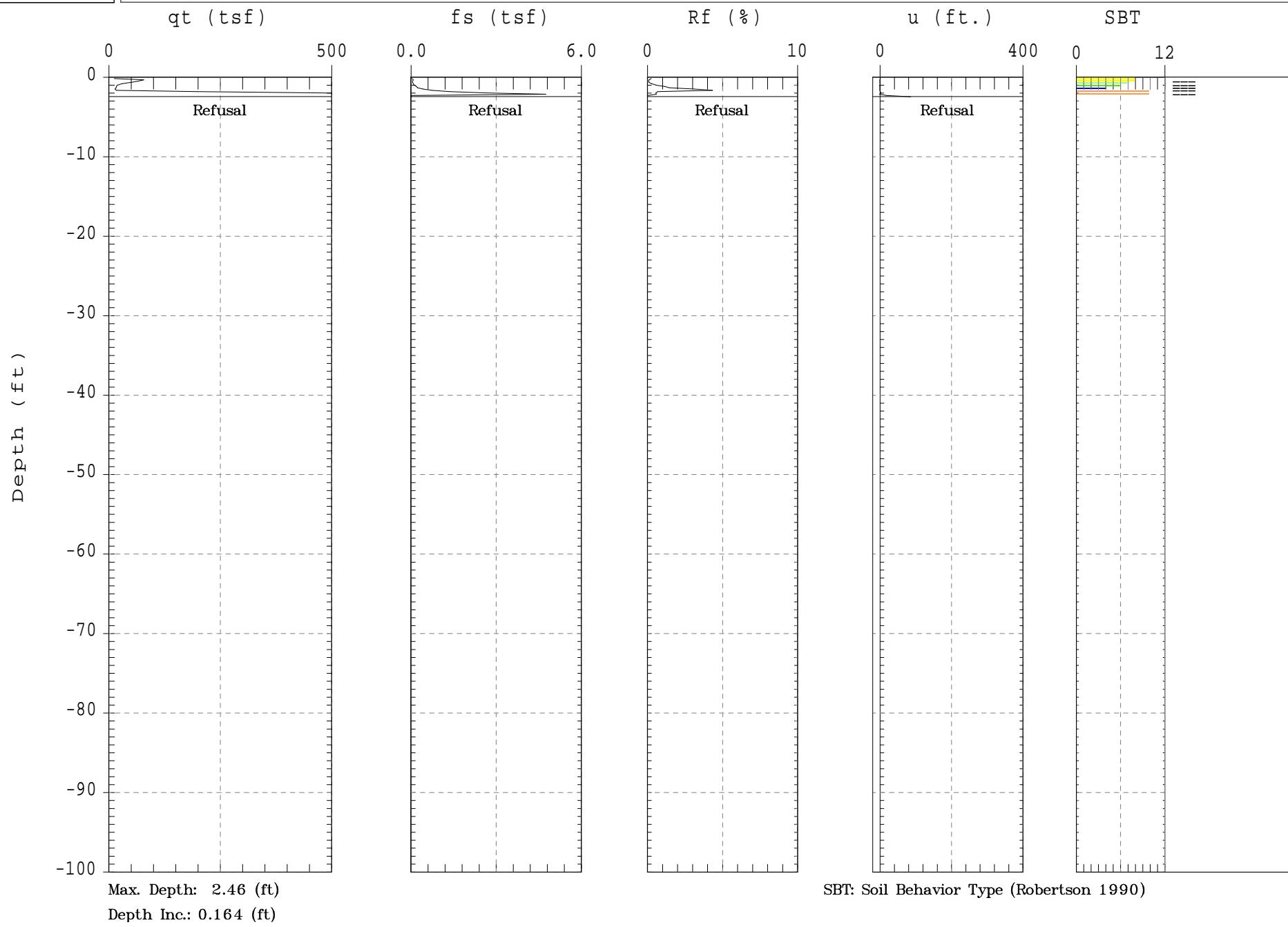


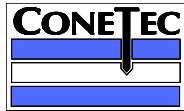


Parsons Engineering

Sounding:CPT-29
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 13:54

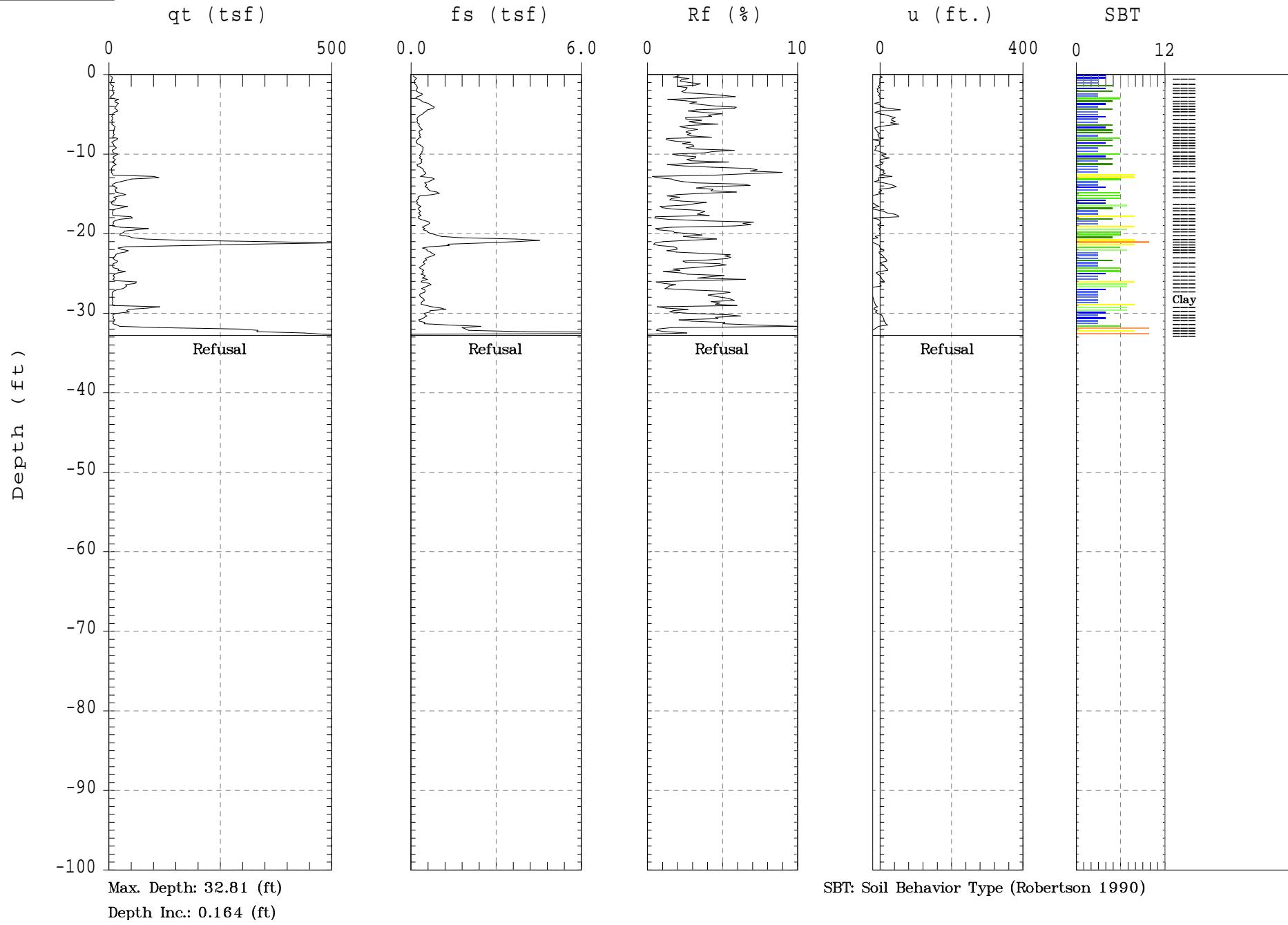


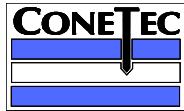


Parsons Engineering

Sounding:CPT-30A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 10:56

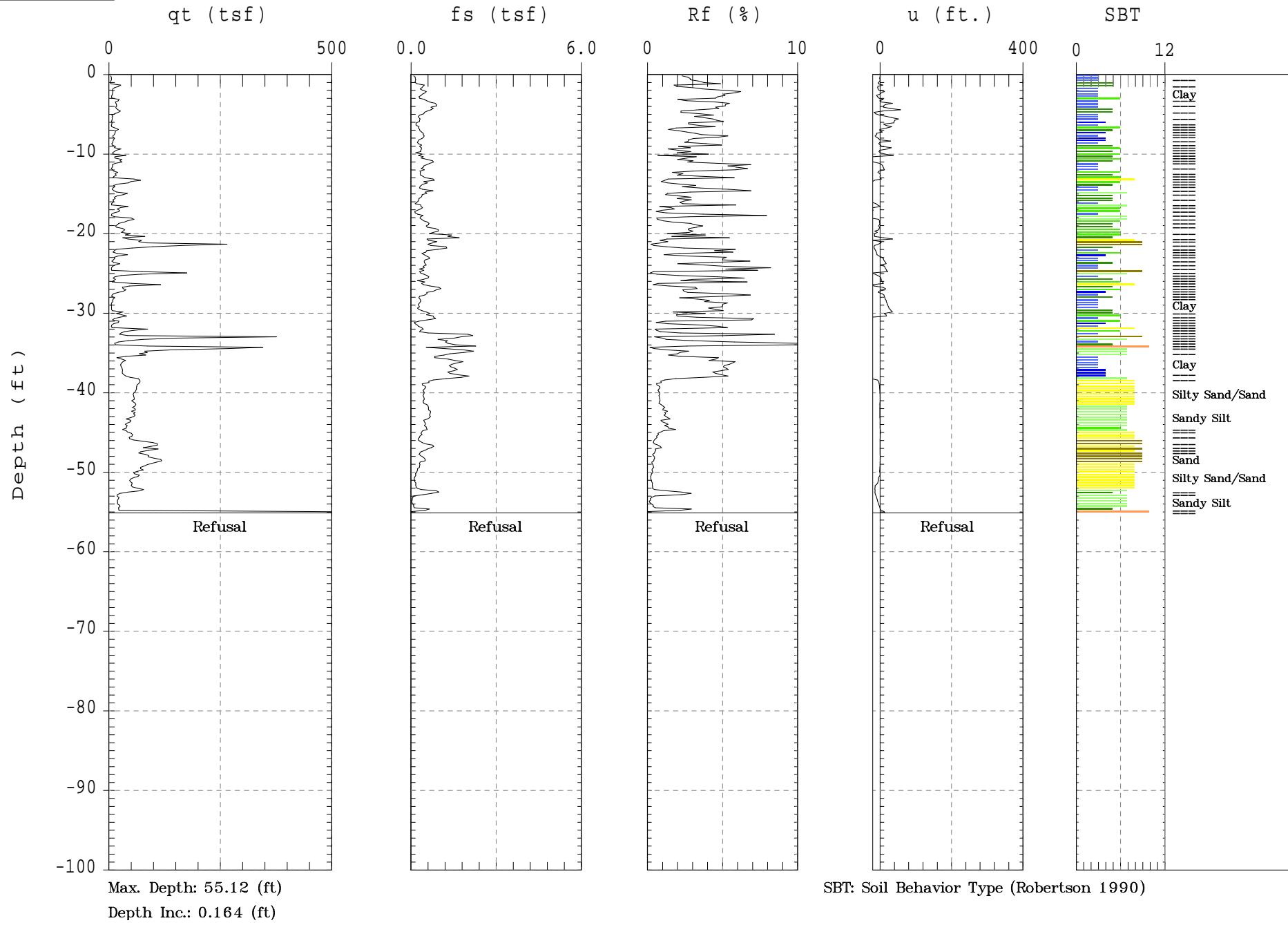


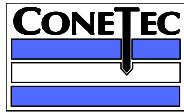


Parsons Engineering

Sounding:CPT-30B
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 11:32

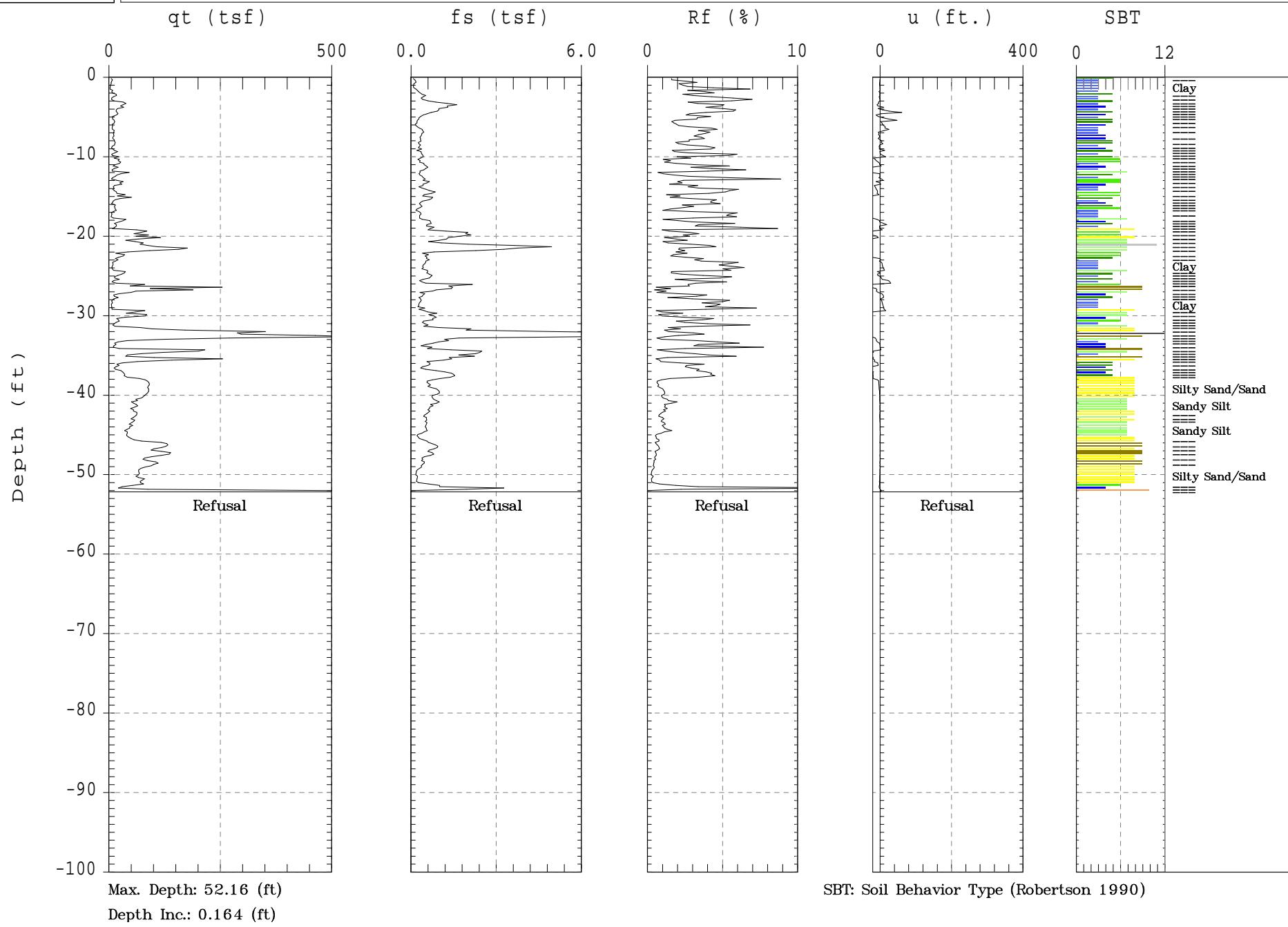


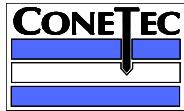


Parsons Engineering

Sounding:CPT-30C
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 12:16

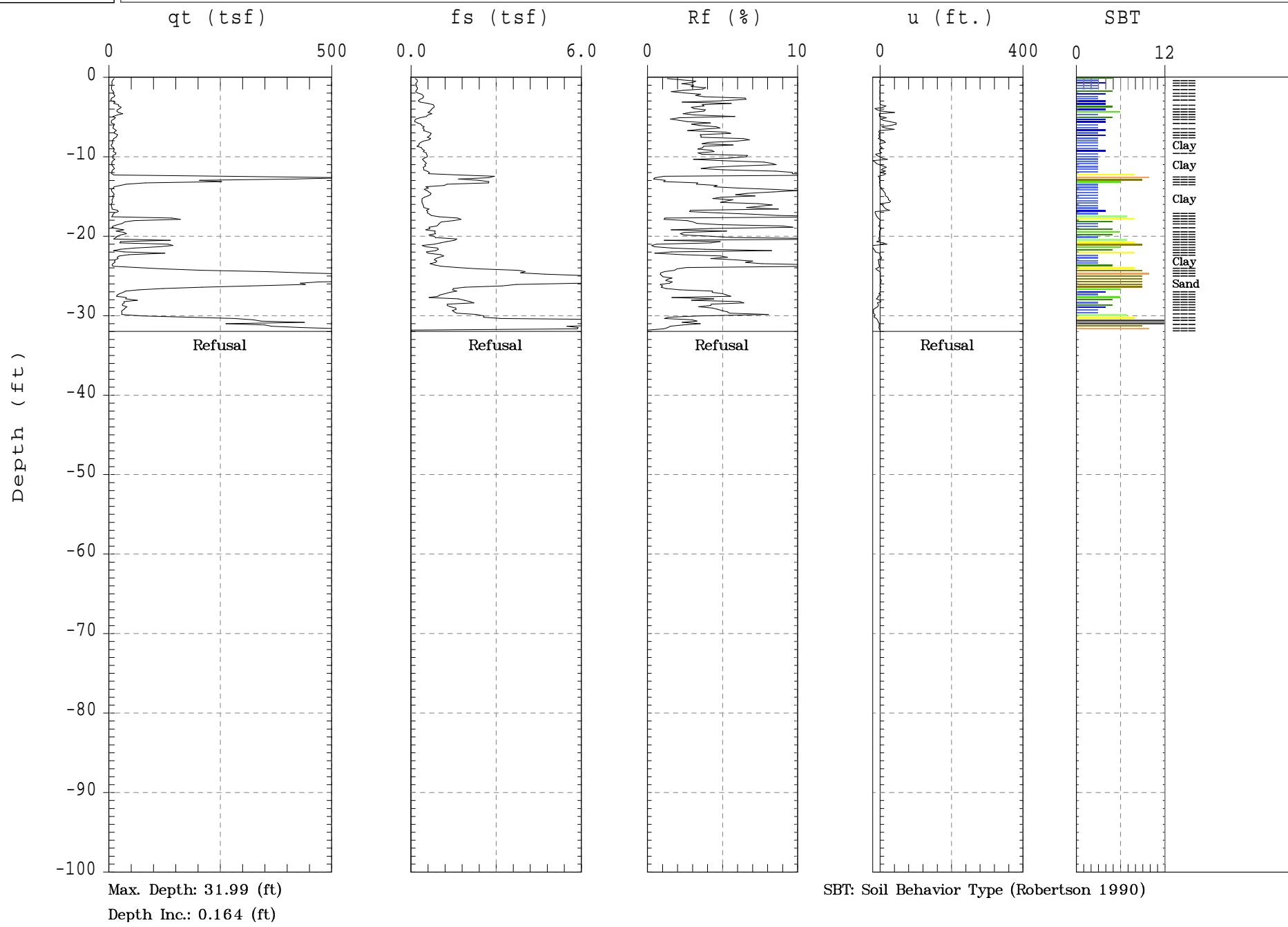


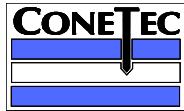


Parsons Engineering

Sounding:CPT-30
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 11:52

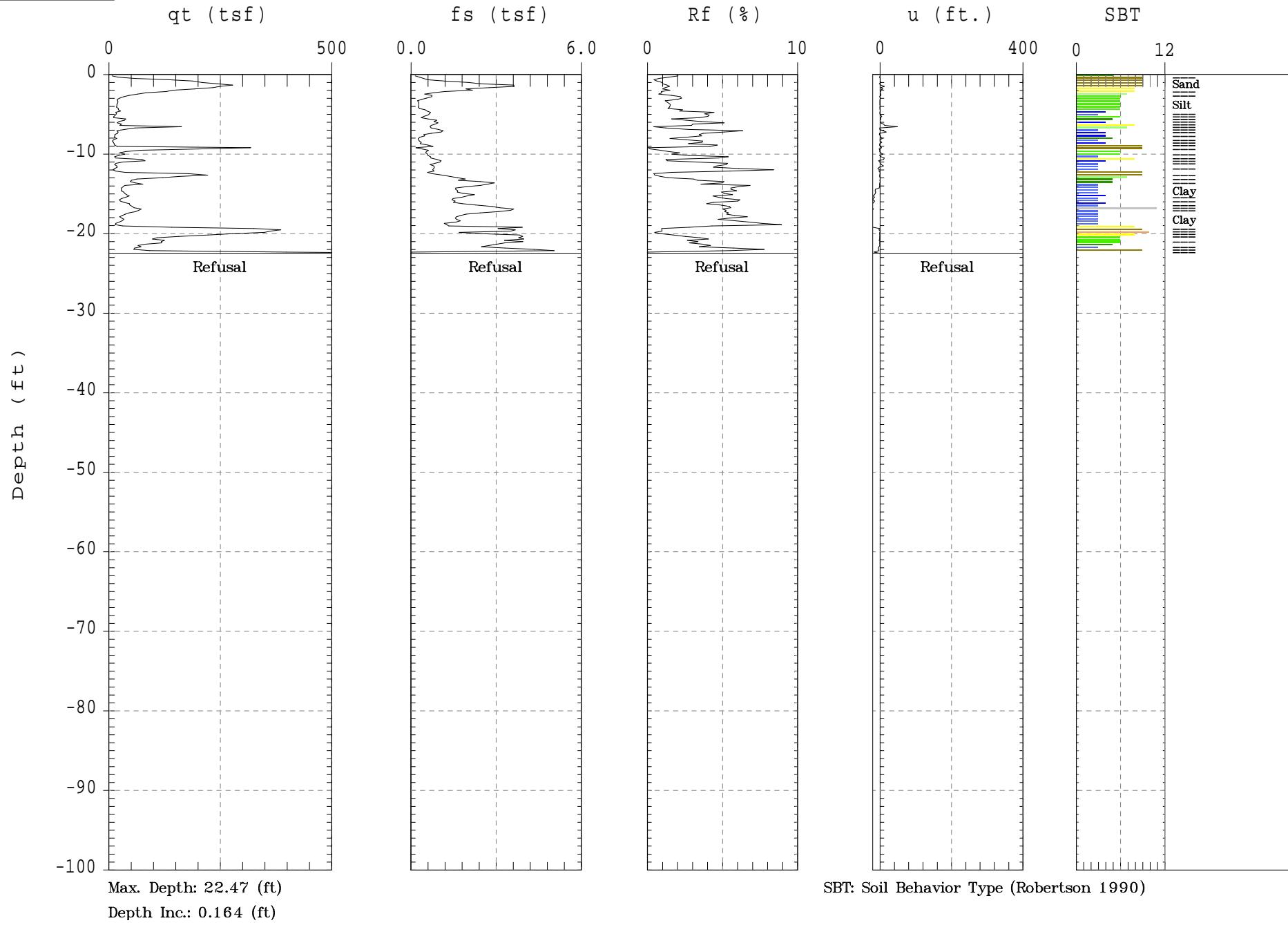


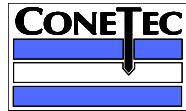


Parsons Engineering

Sounding:CPT-31
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:20:06 16:13

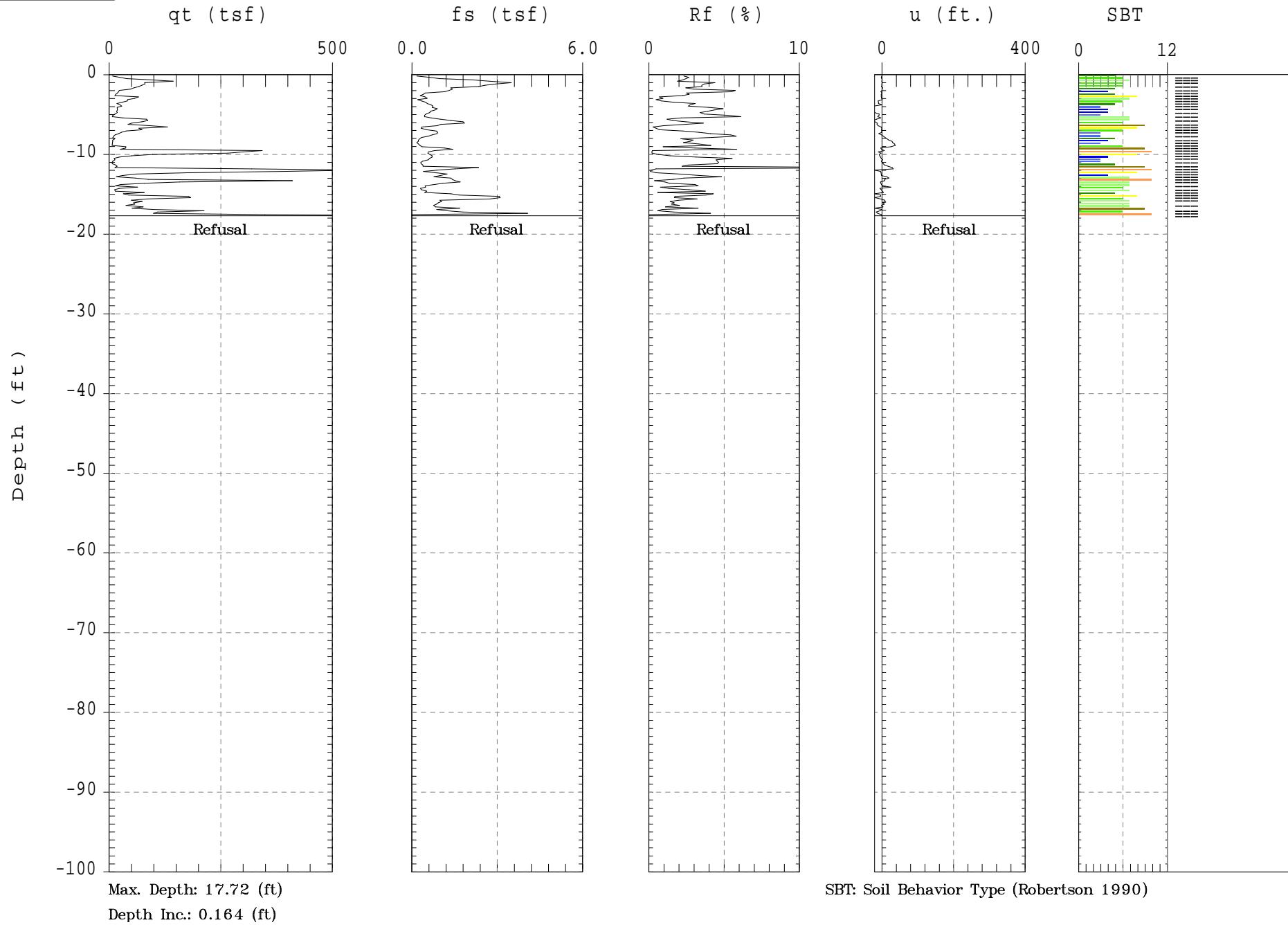


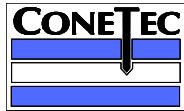


Parsons Engineering

Sounding:CPT-32A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 07:16

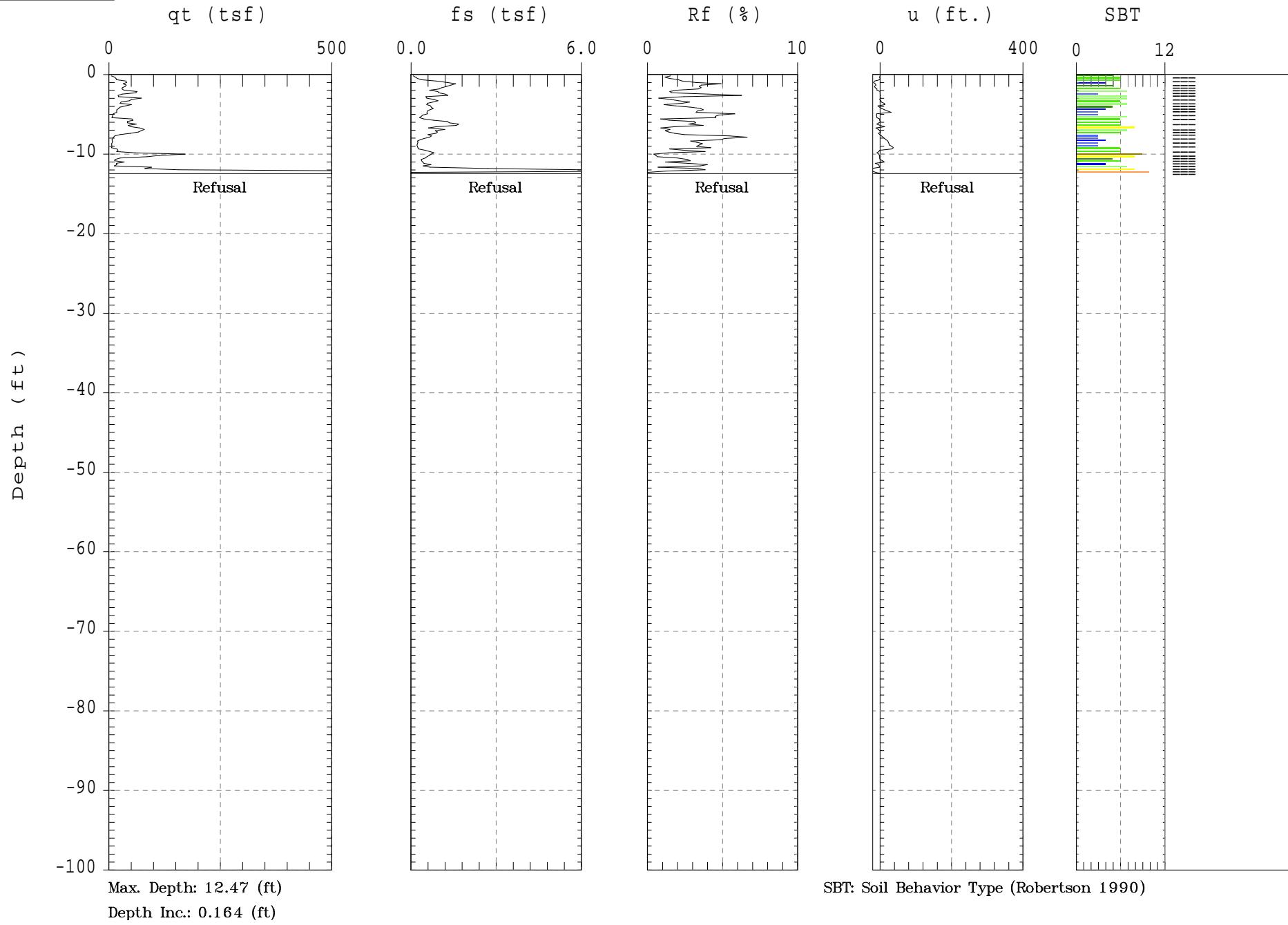


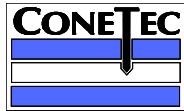


Parsons Engineering

Sounding:CPT-32
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:20:06 16:49

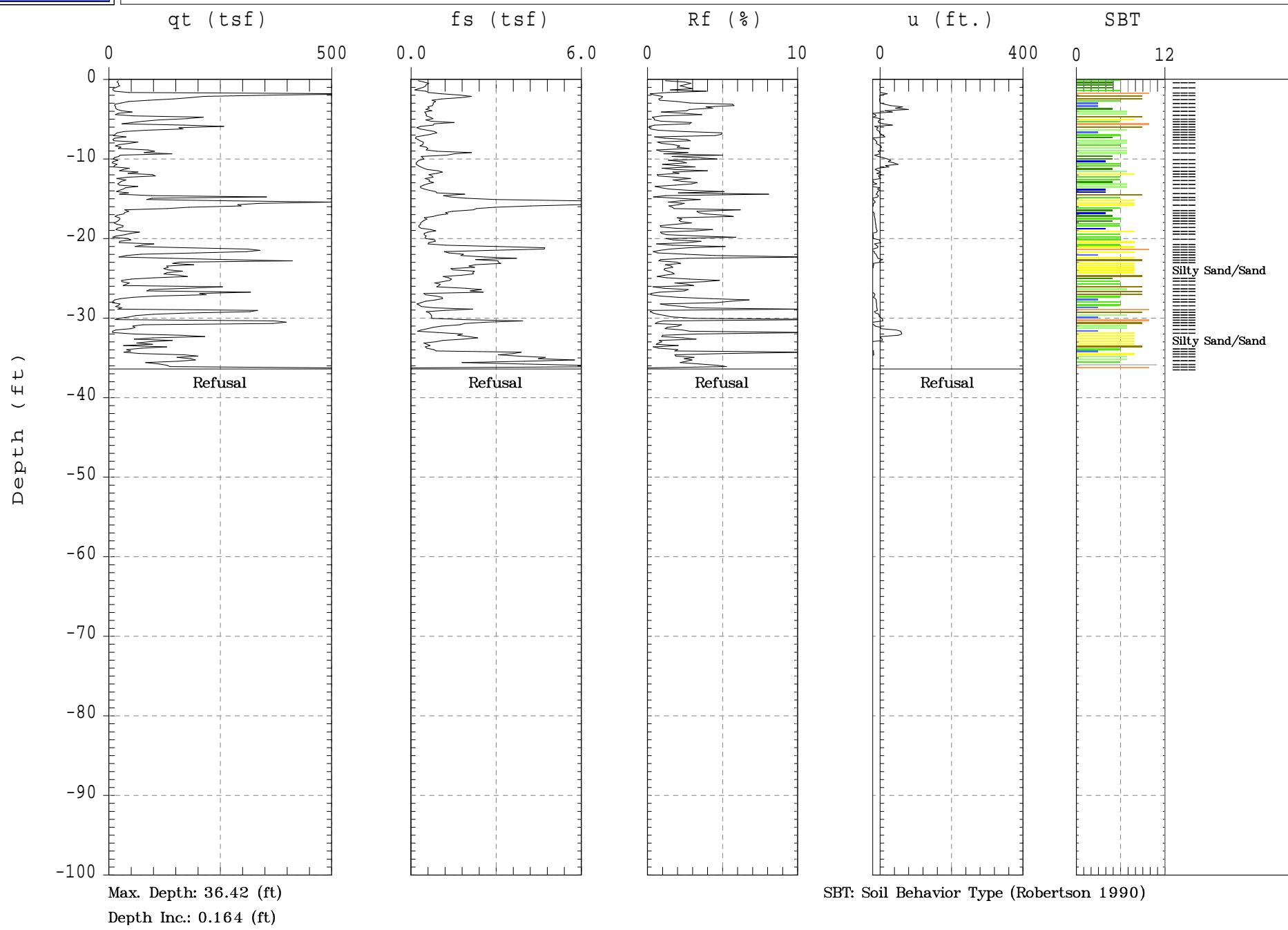


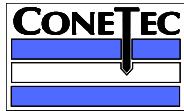


Parsons Engineering

Sounding:CPT-33A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 10:20

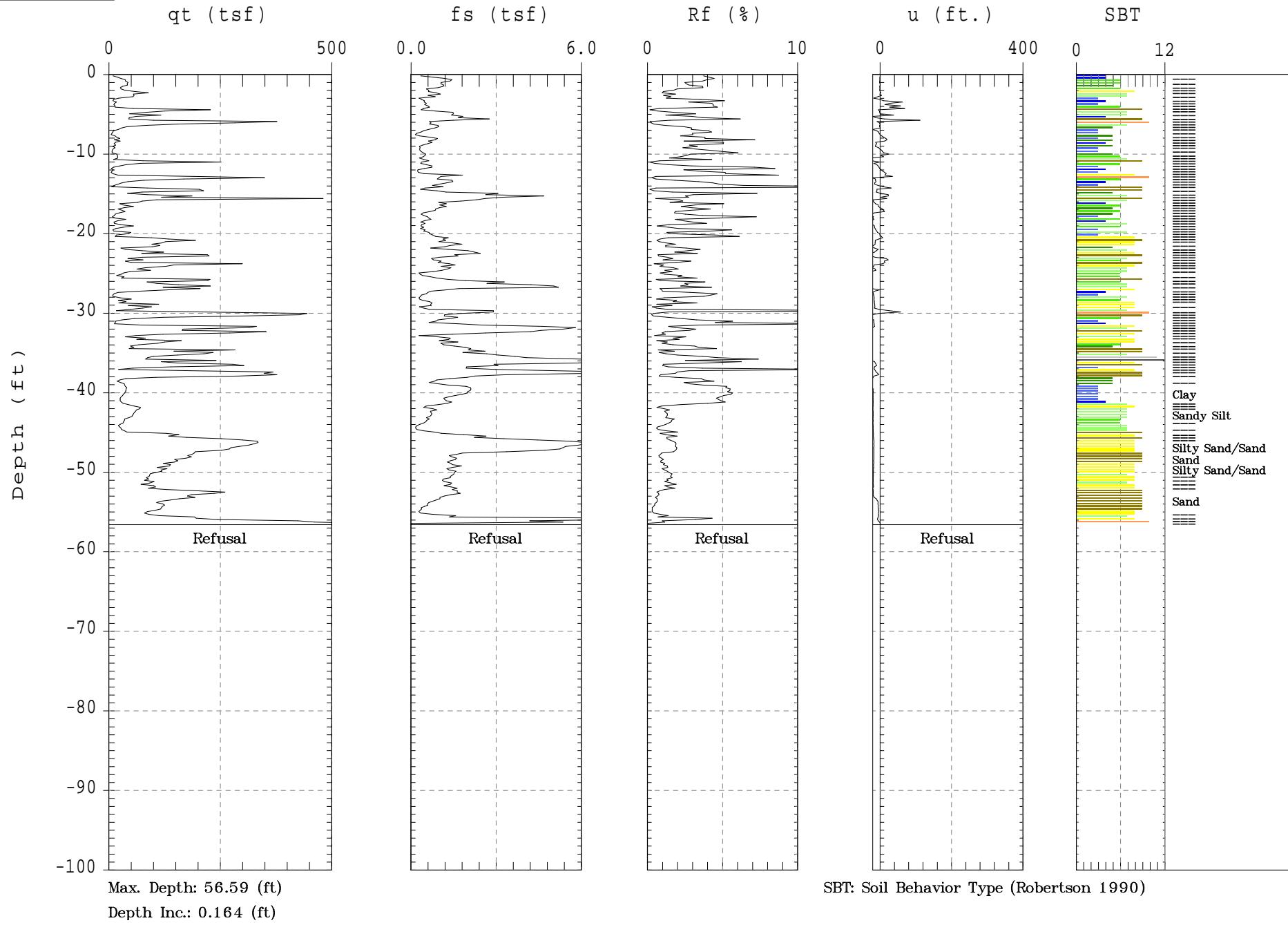


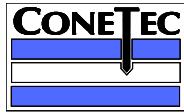


Parsons Engineering

Sounding:CPT-33B
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 11:02

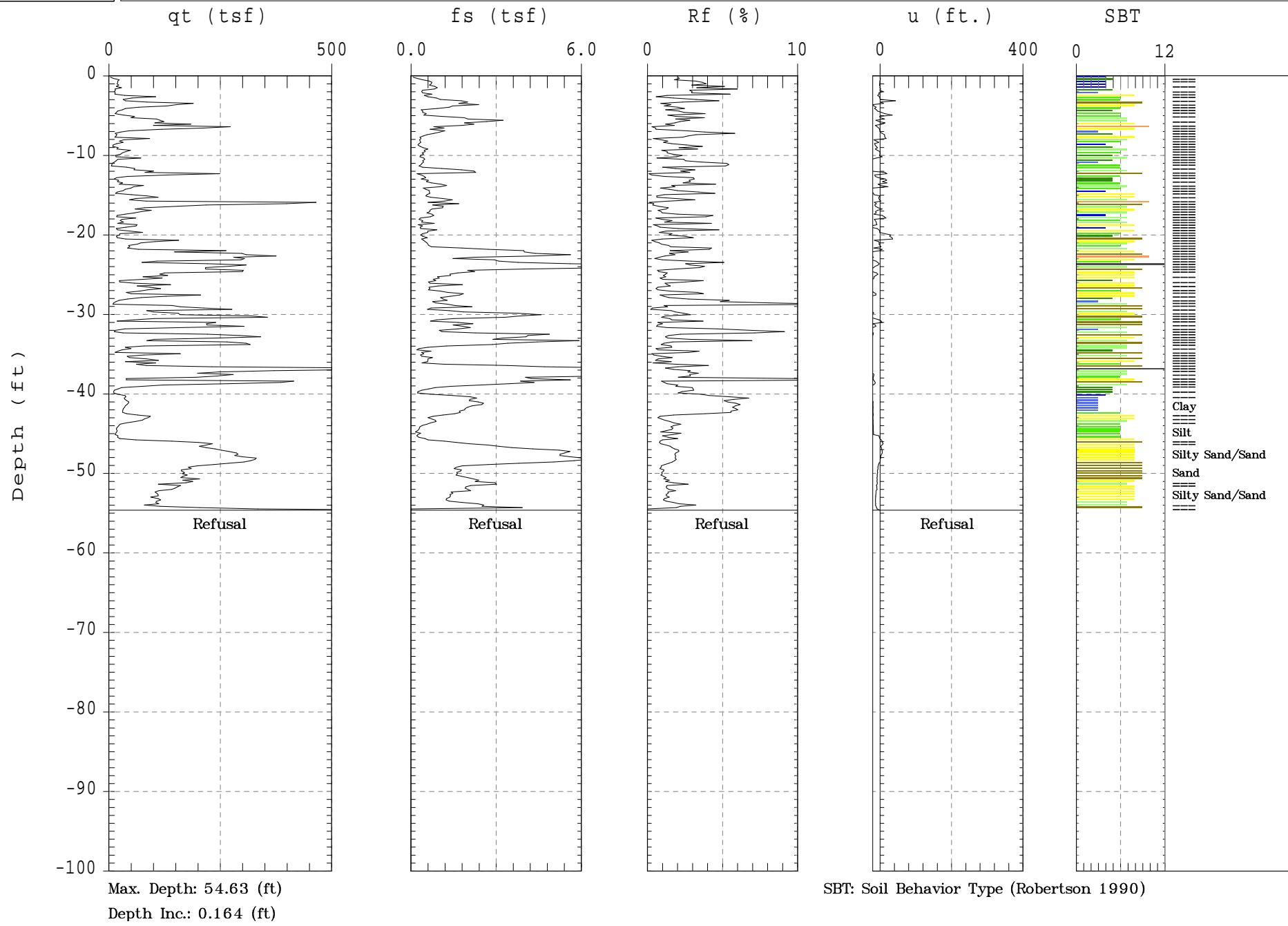


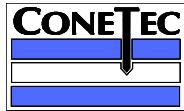


Parsons Engineering

Sounding:CPT-33
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 07:46

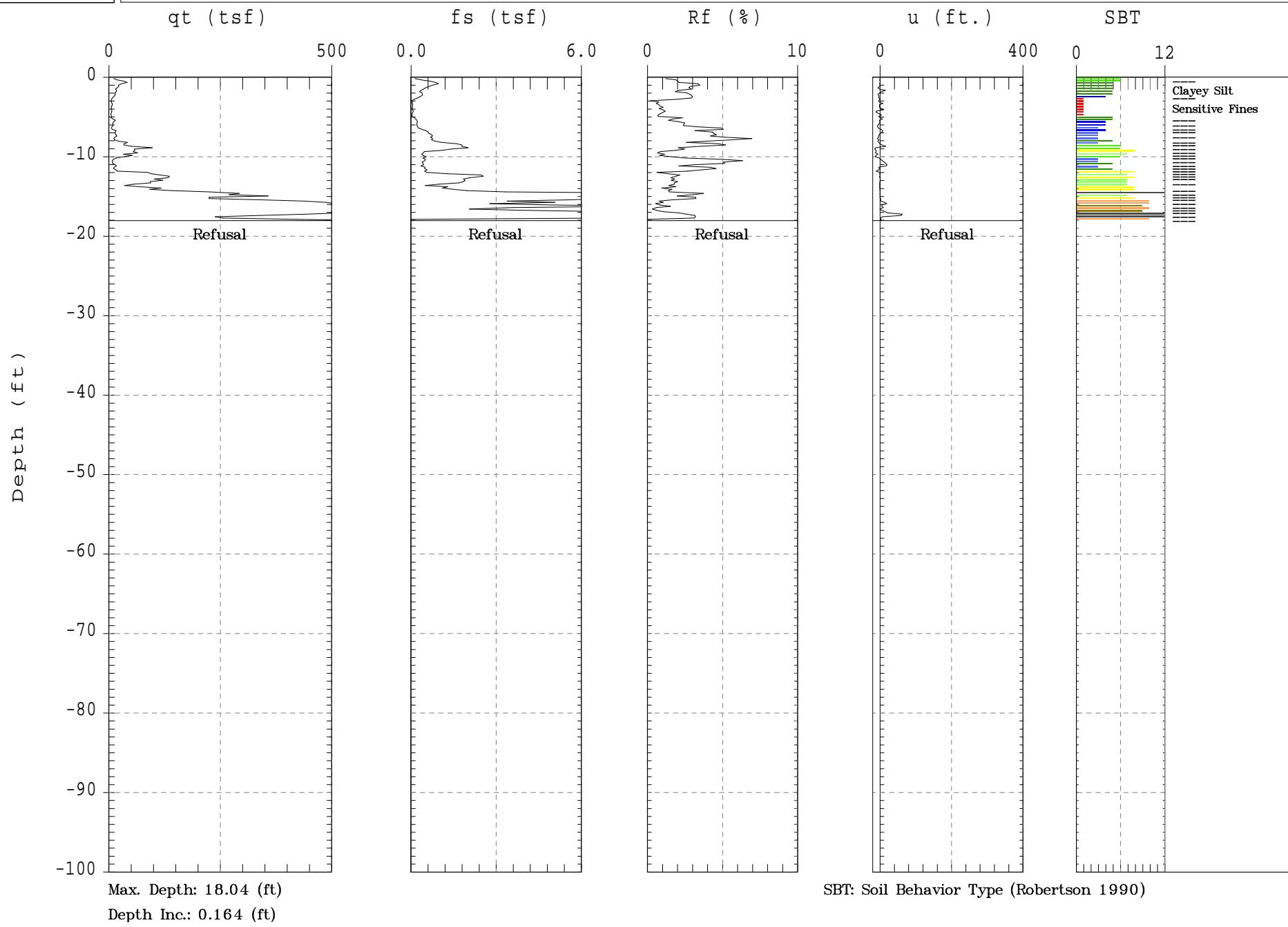


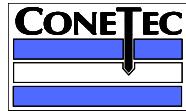


Parsons Engineering

Sounding:CPT-34
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 13:26

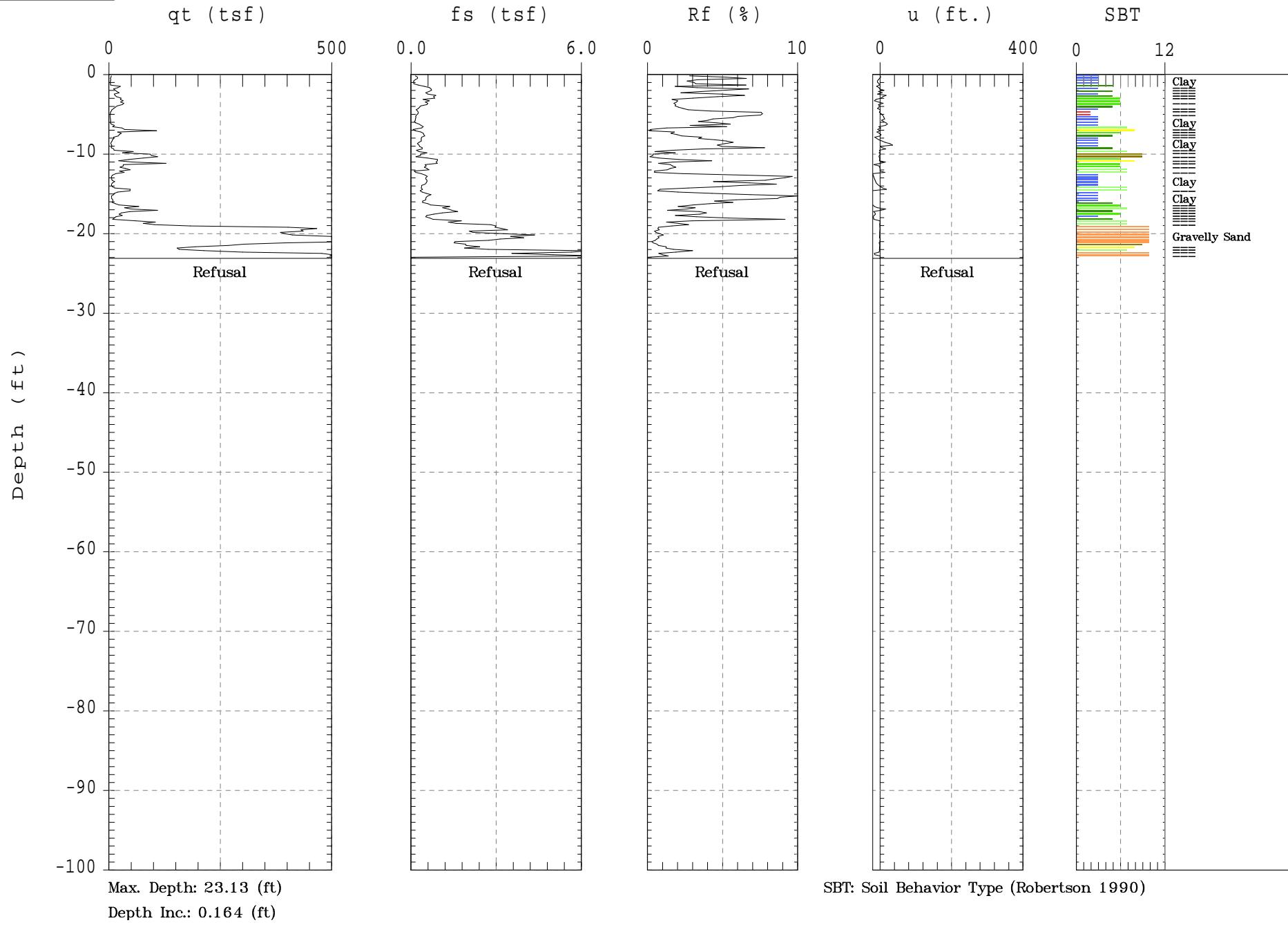


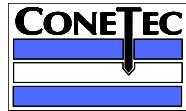


Parsons Engineering

Sounding:CPT-35A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 10:04

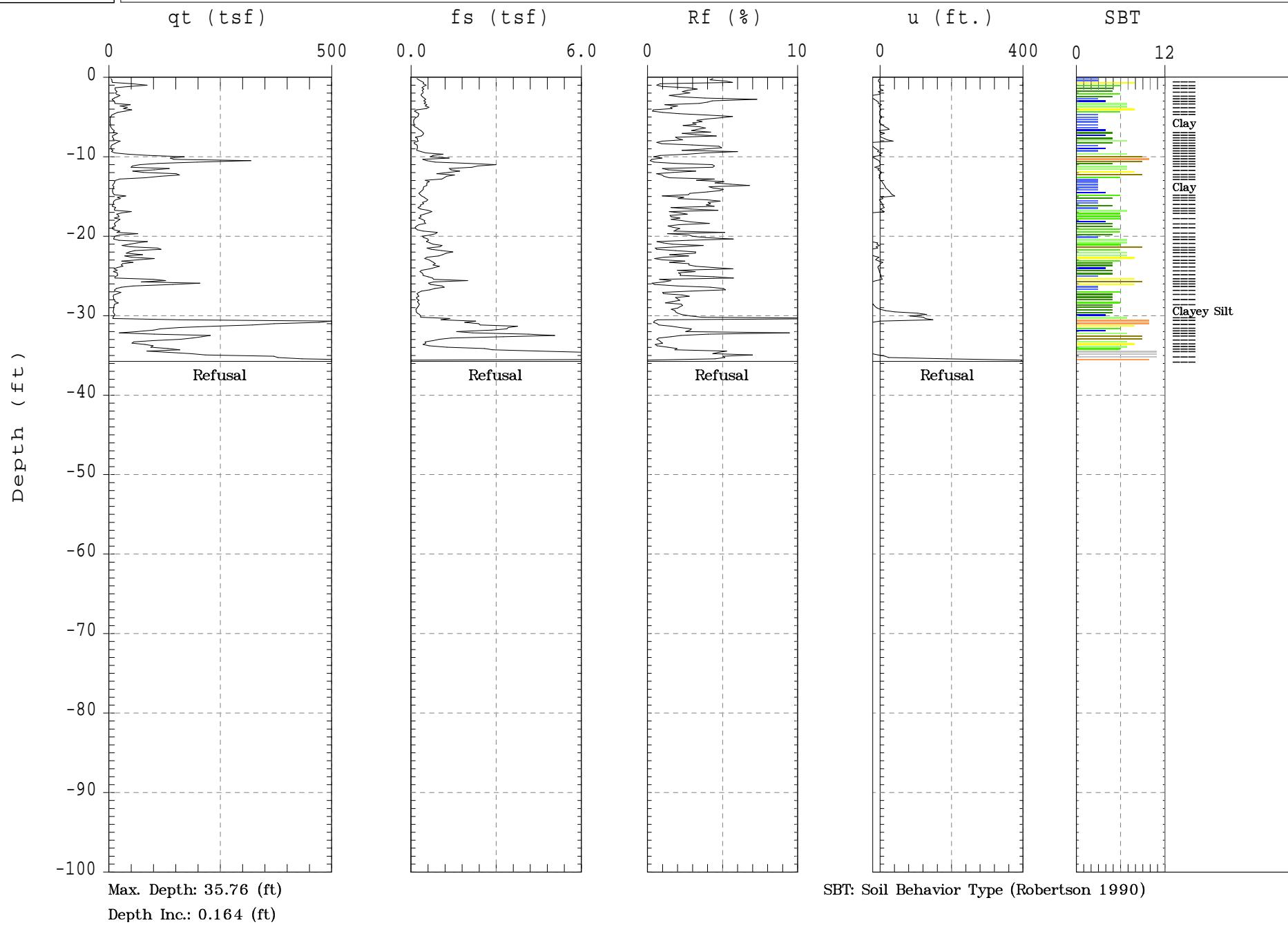


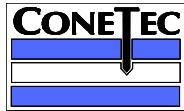


Parsons Engineering

Sounding:CPT-35B
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 09:28

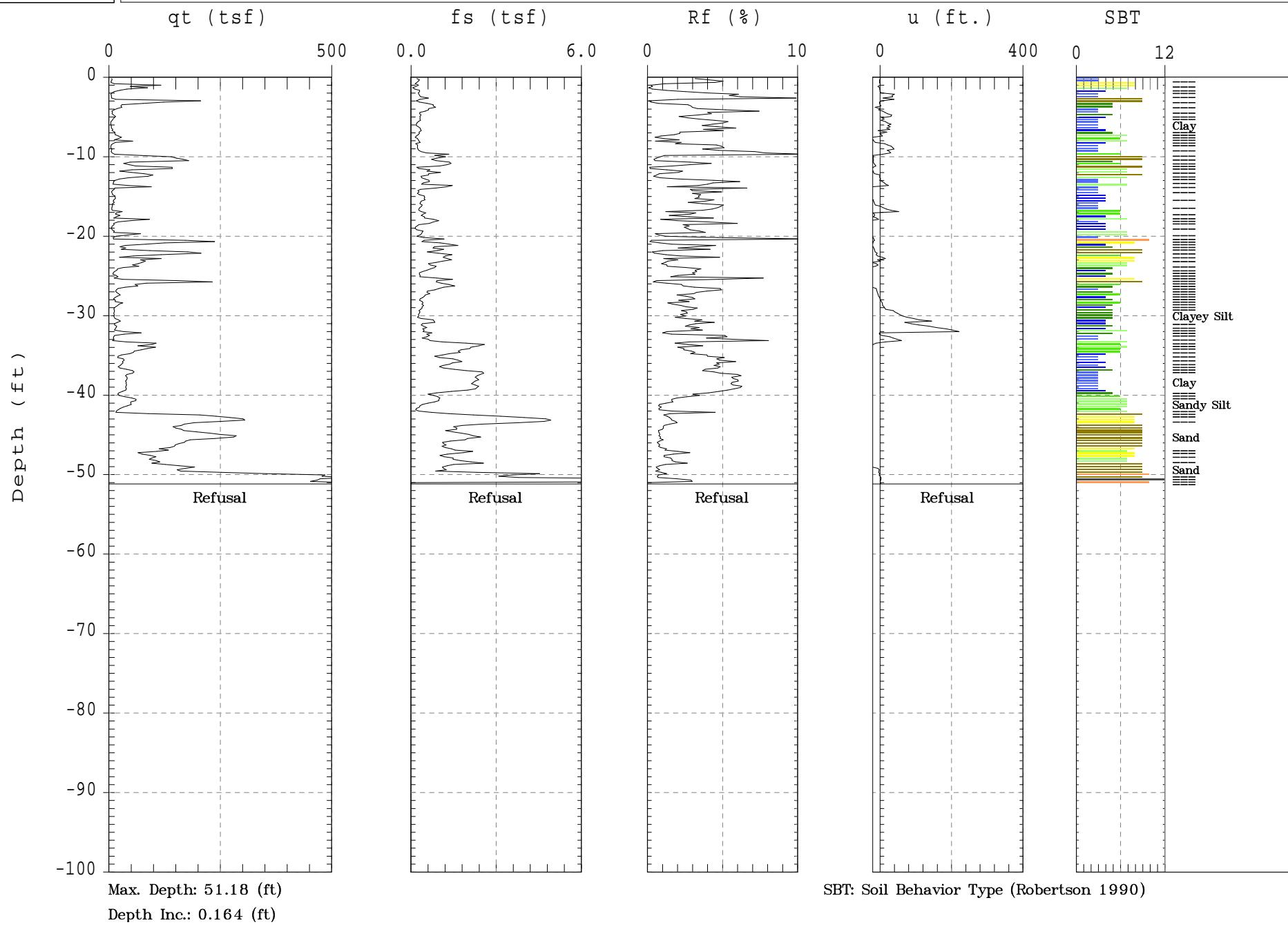


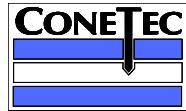


Parsons Engineering

Sounding:CPT-35C
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:06:06 08:51

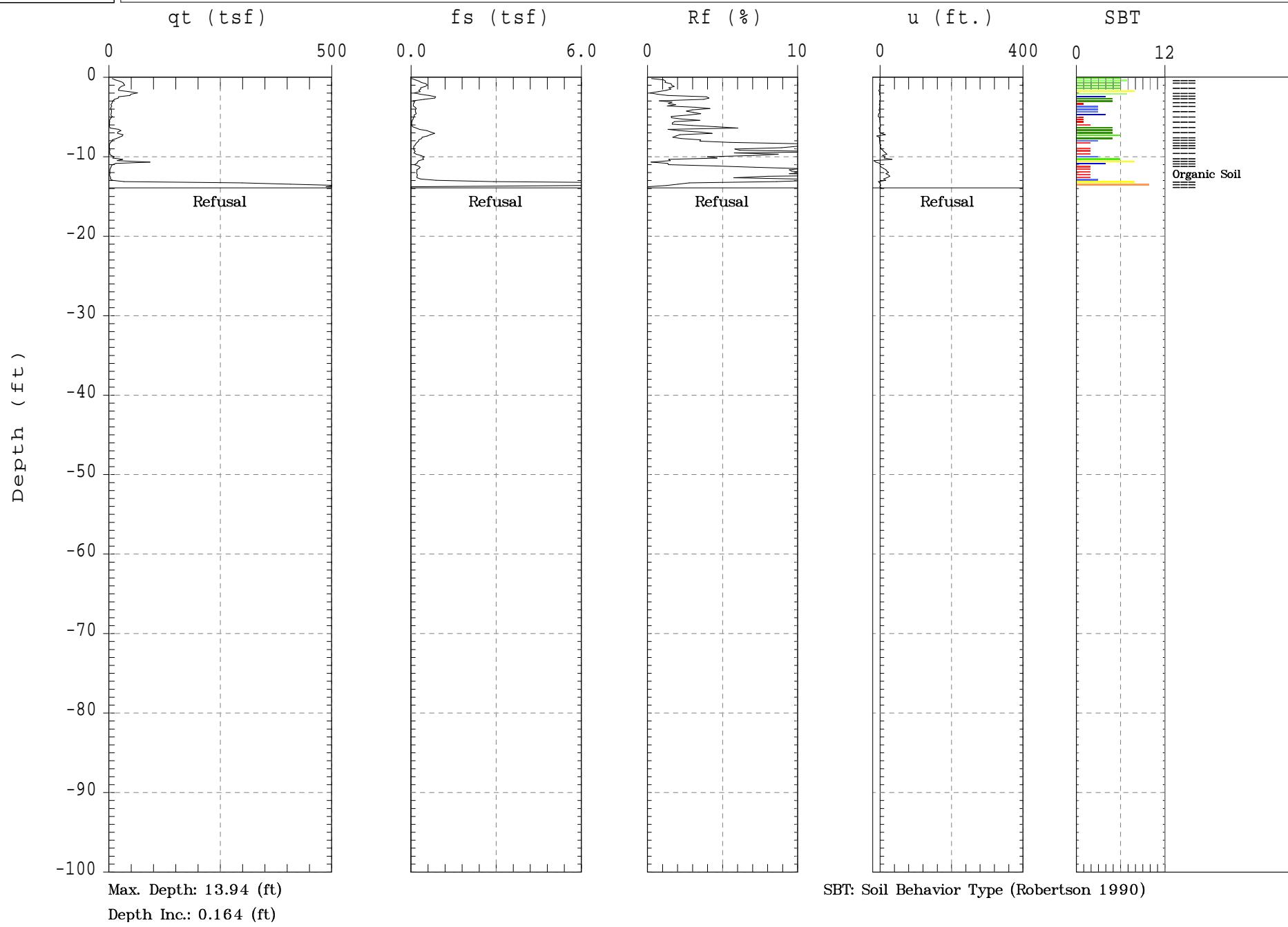


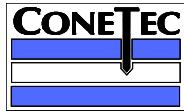


Parsons Engineering

Sounding:CPT-35
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 13:55

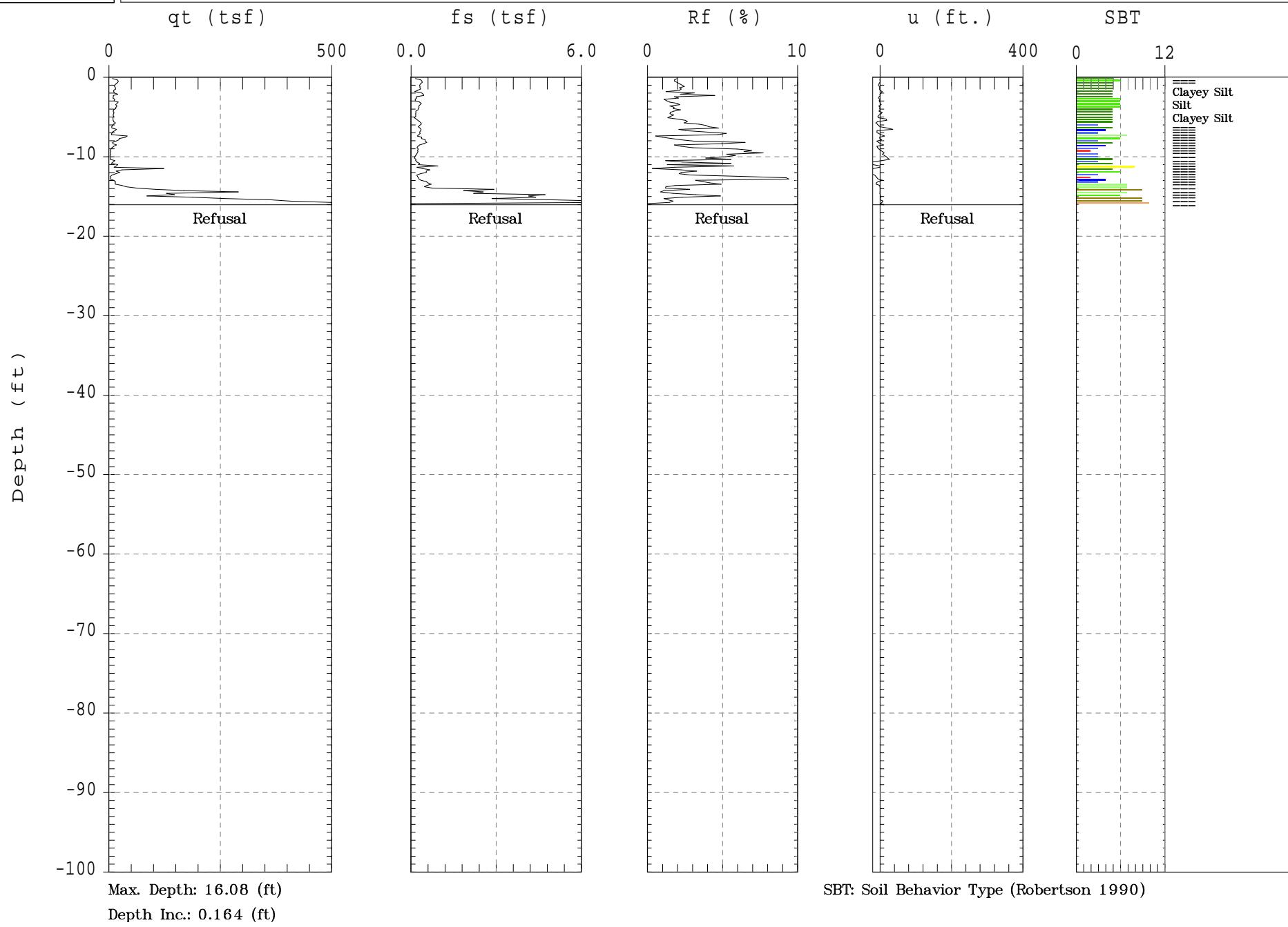


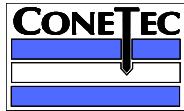


Parsons Engineering

Sounding:CPT-36
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 14:20

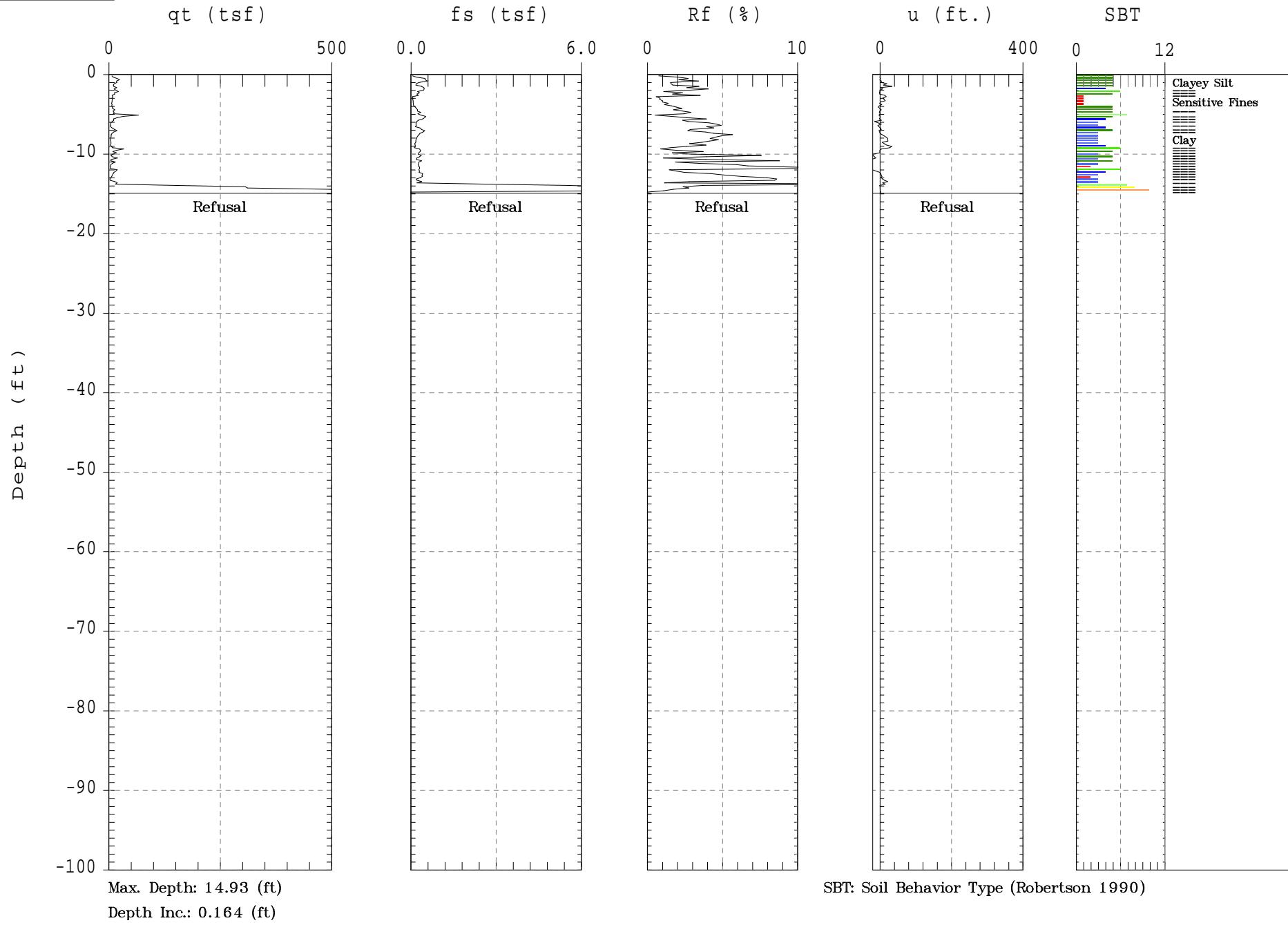


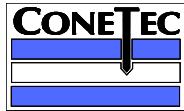


Parsons Engineering

Sounding:CPT-37
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 14:47

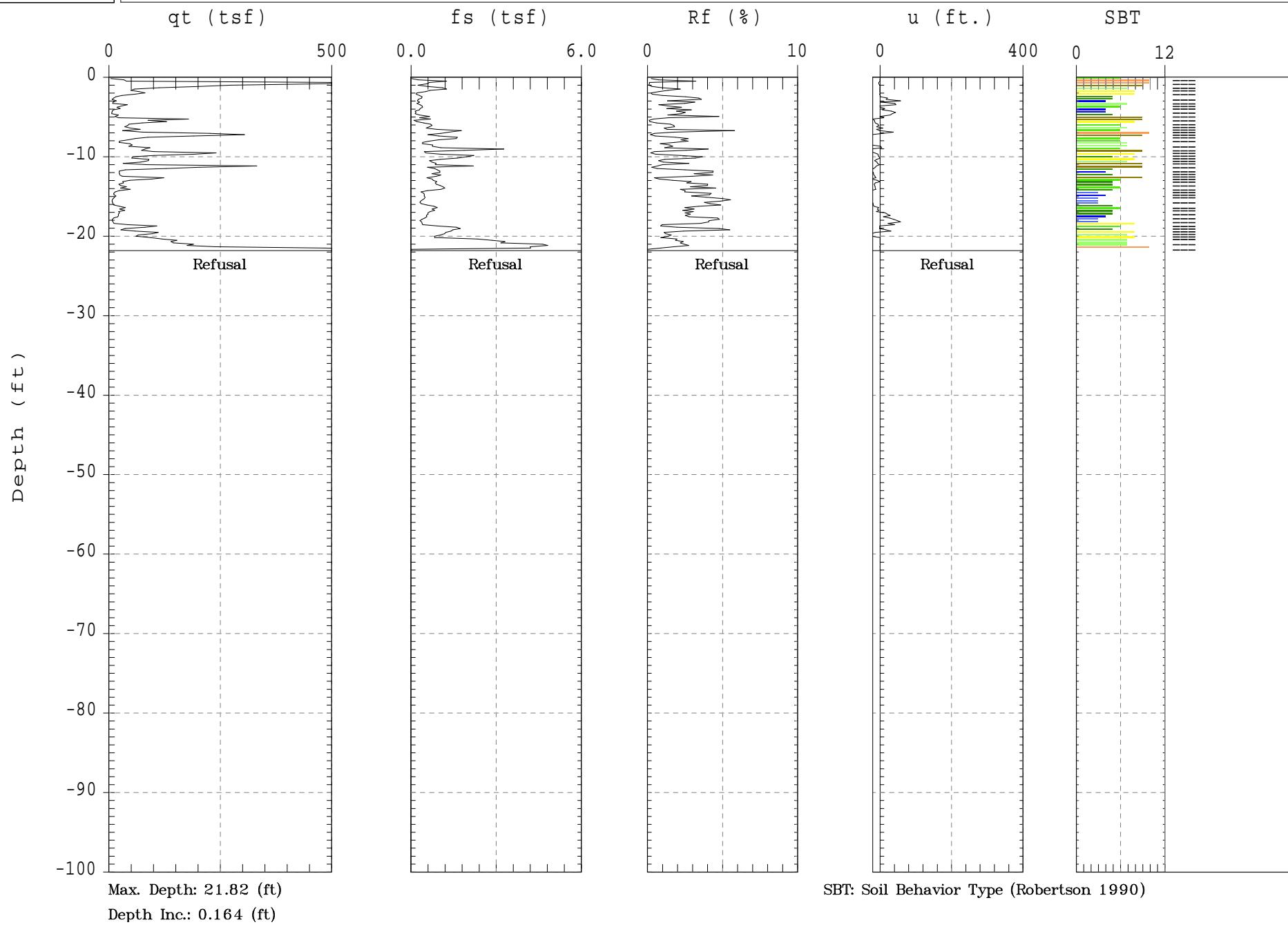


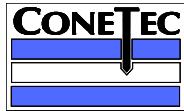


Parsons Engineering

Sounding:CPT-38A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 15:39

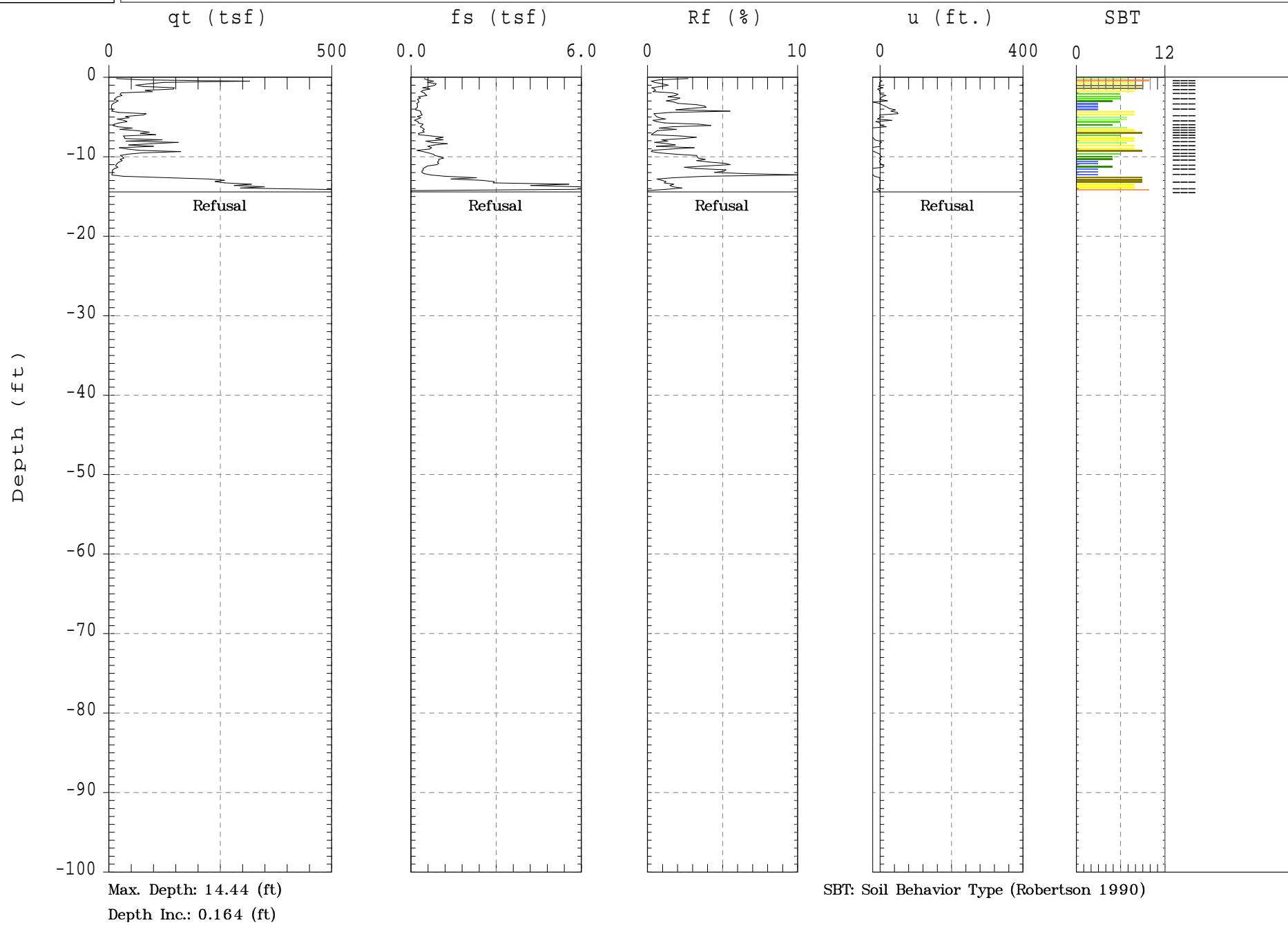


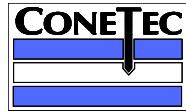


Parsons Engineering

Sounding:CPT-38
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 15:16

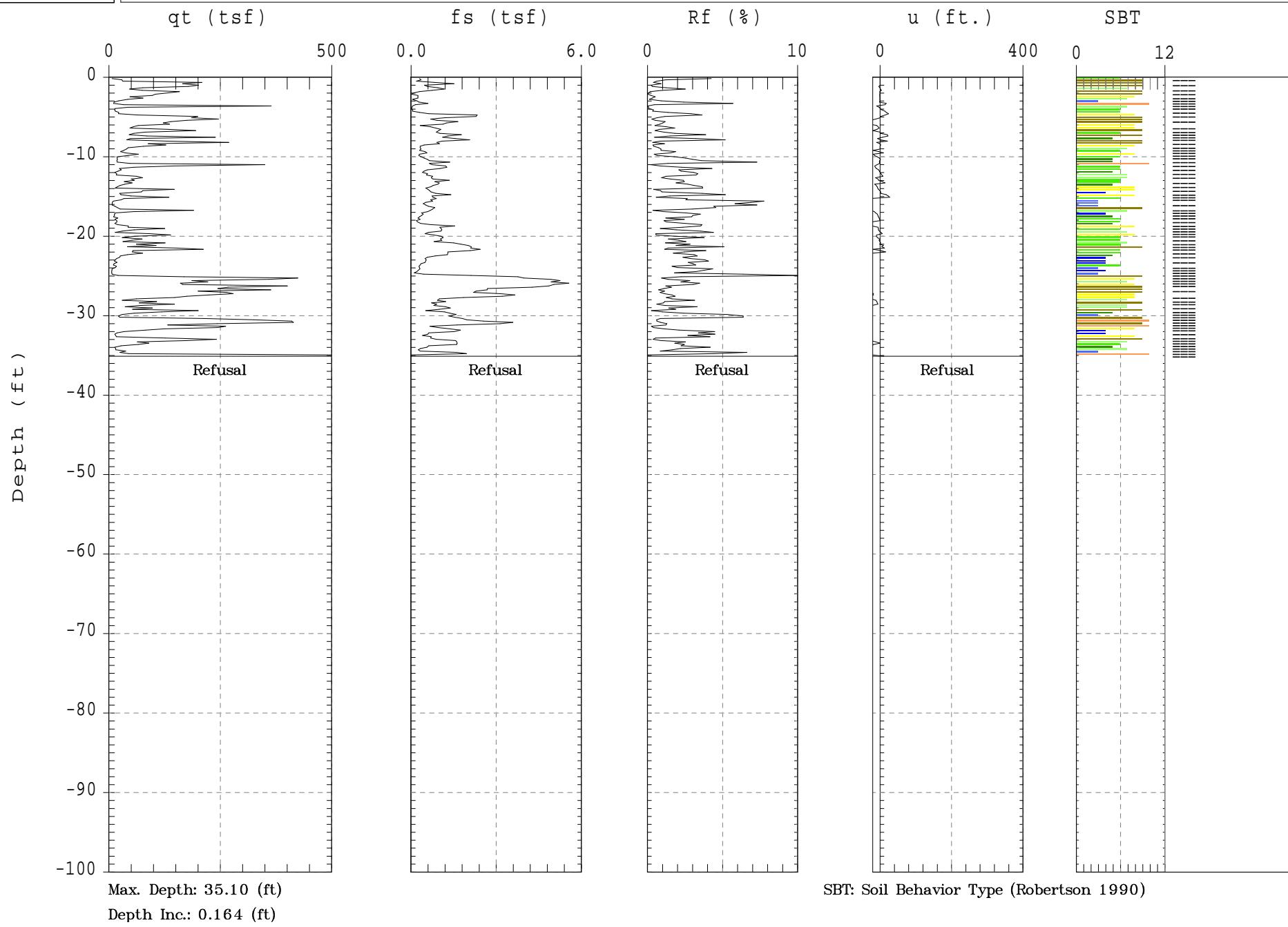


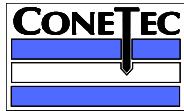


Parsons Engineering

Sounding:CPT-39A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 16:33

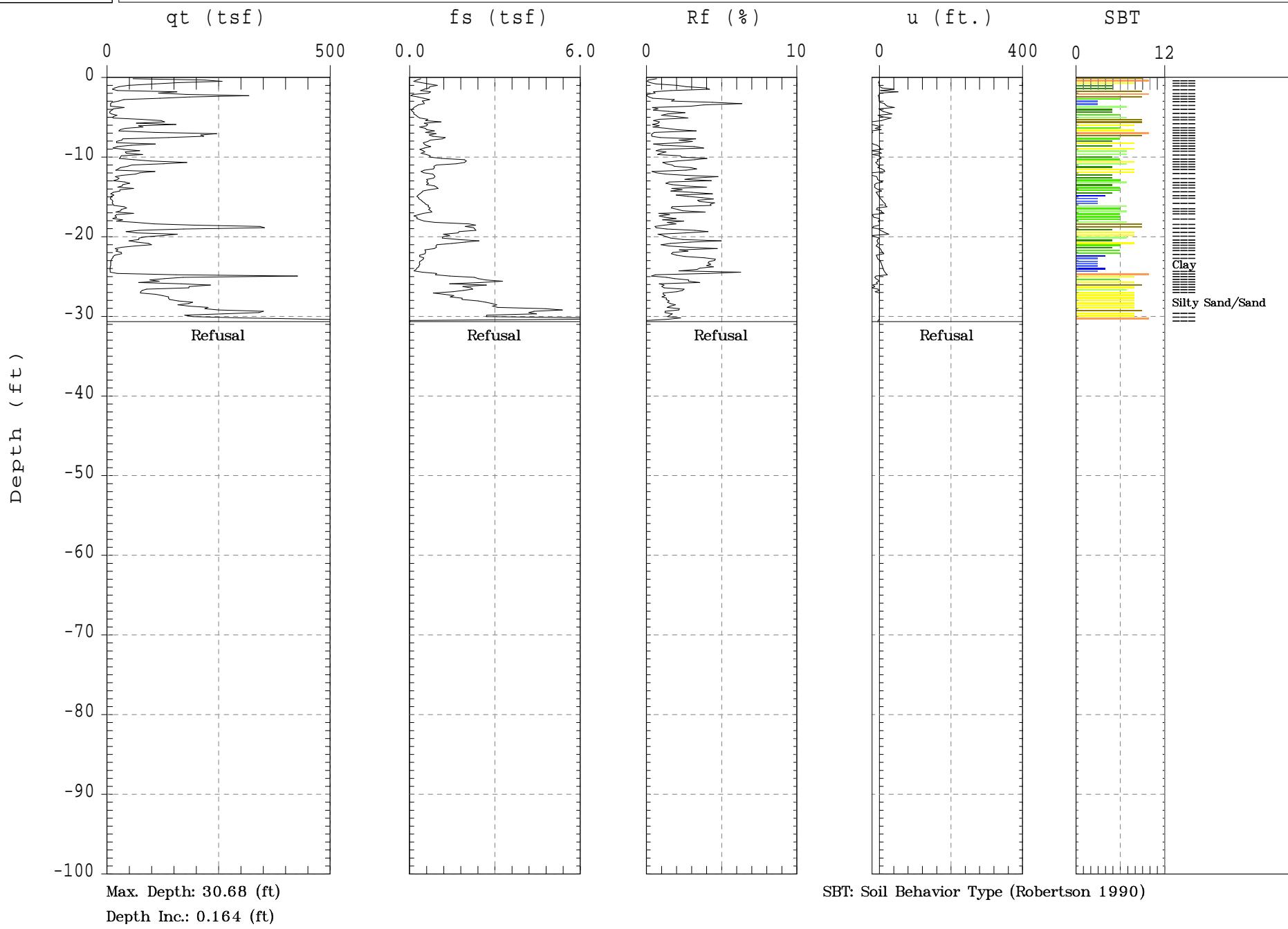


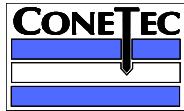


Parsons Engineering

Sounding:CPT-39
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 16:04

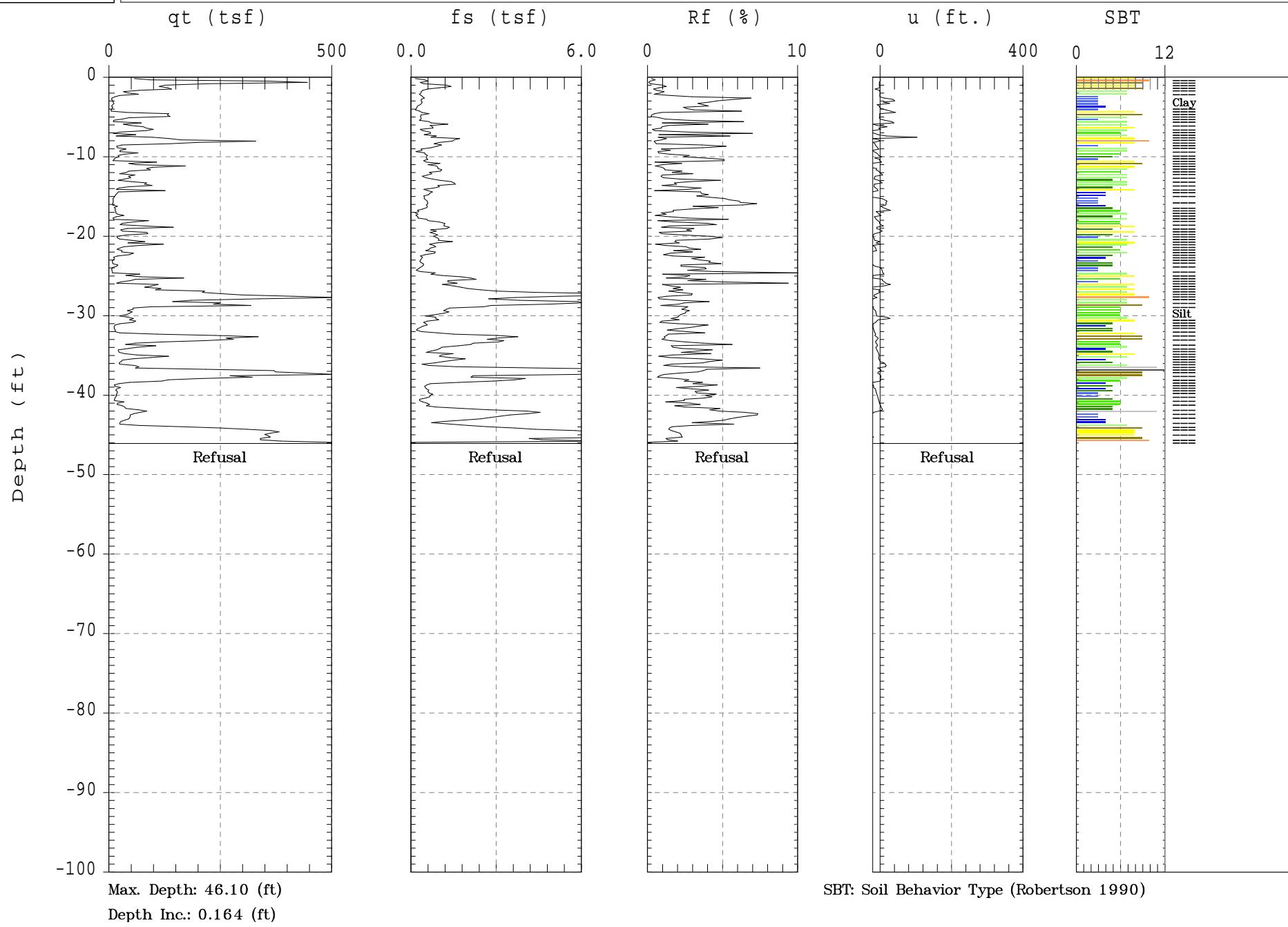


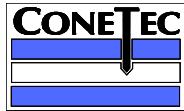


Parsons Engineering

Sounding:CPT-40
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 17:04

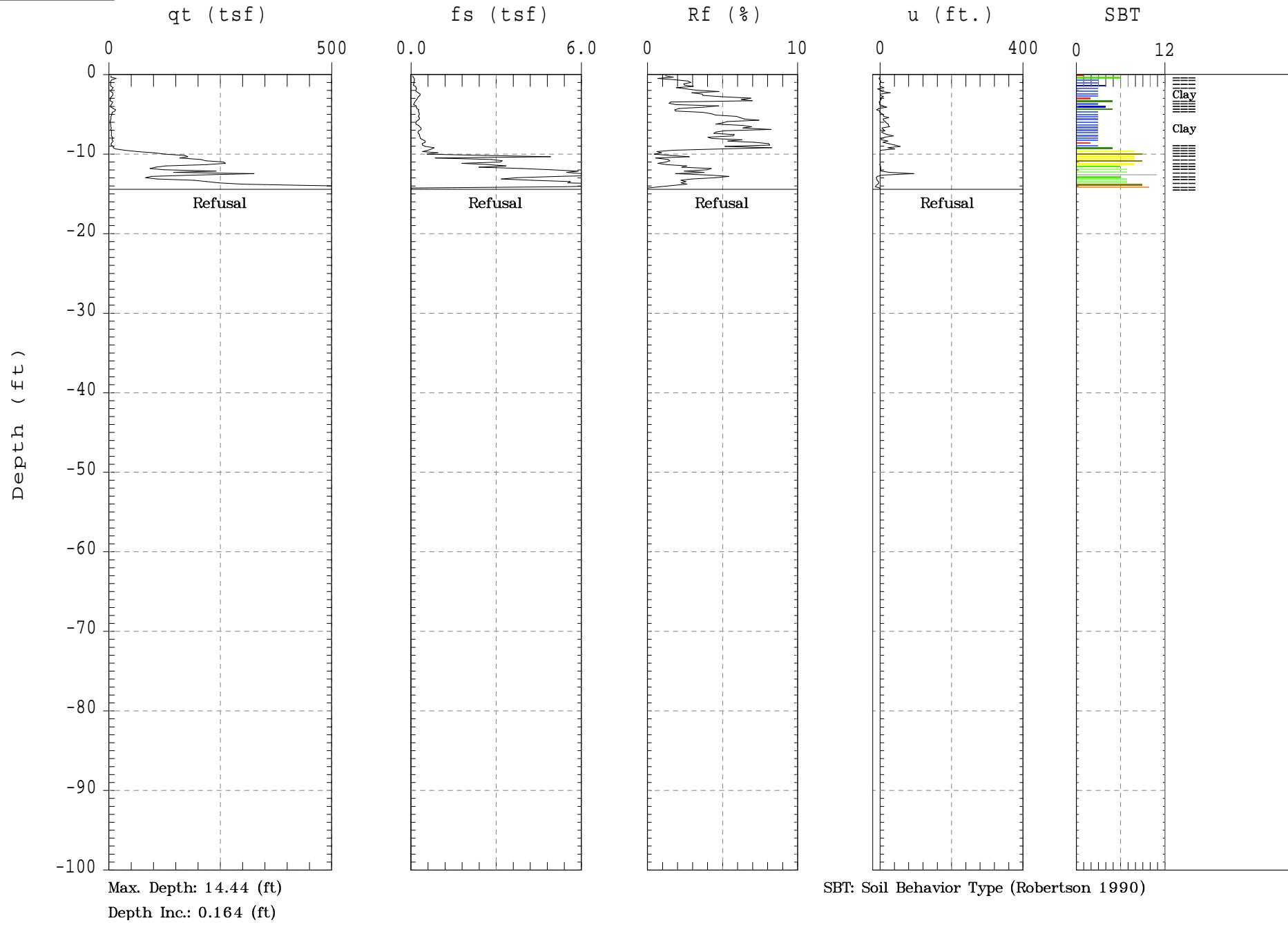


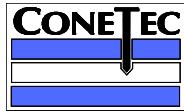


Parsons Engineering

Sounding:CPT-41
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 07:25

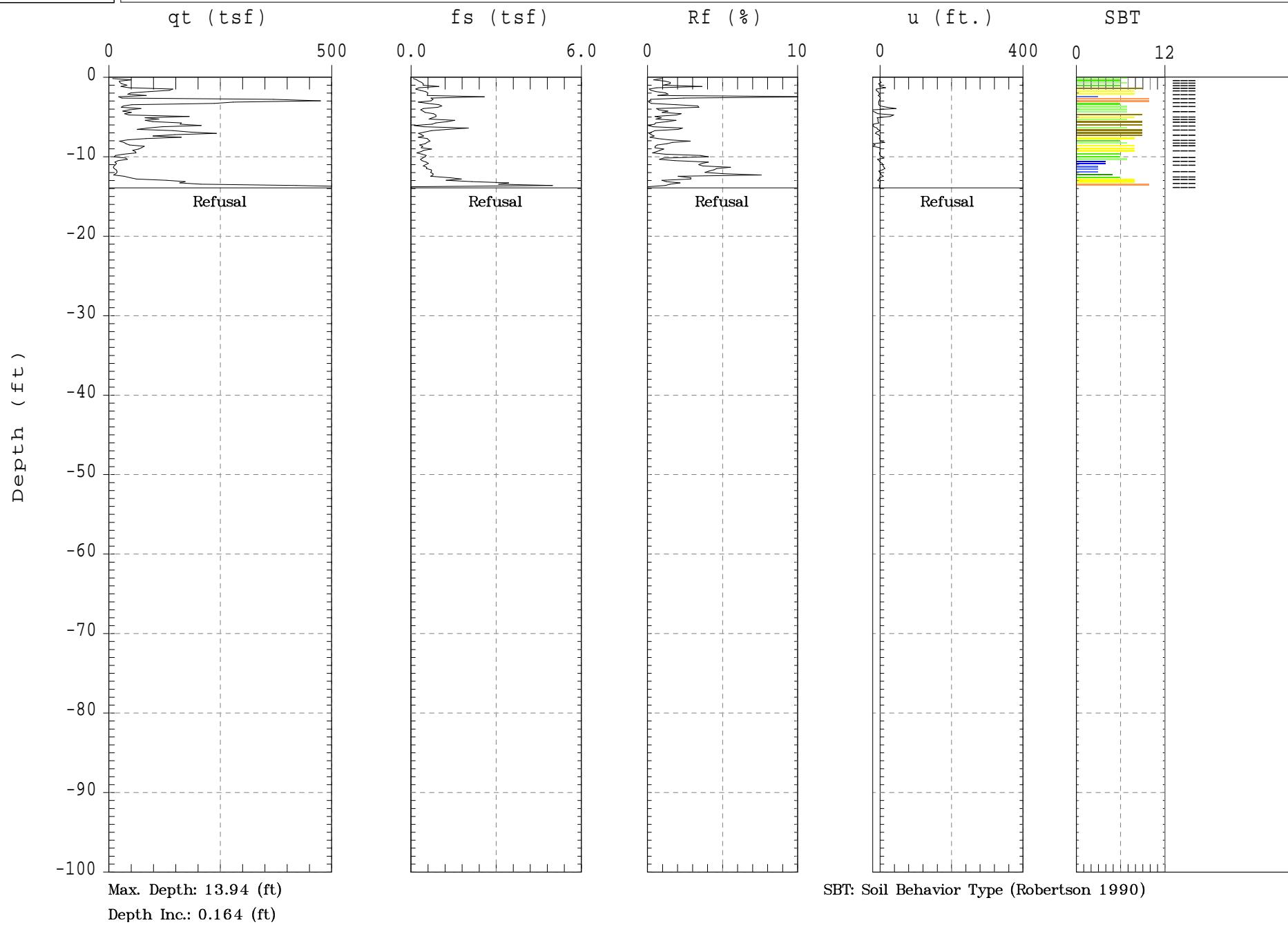


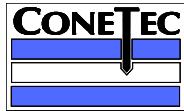


Parsons Engineering

Sounding:CPT-42
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 07:52

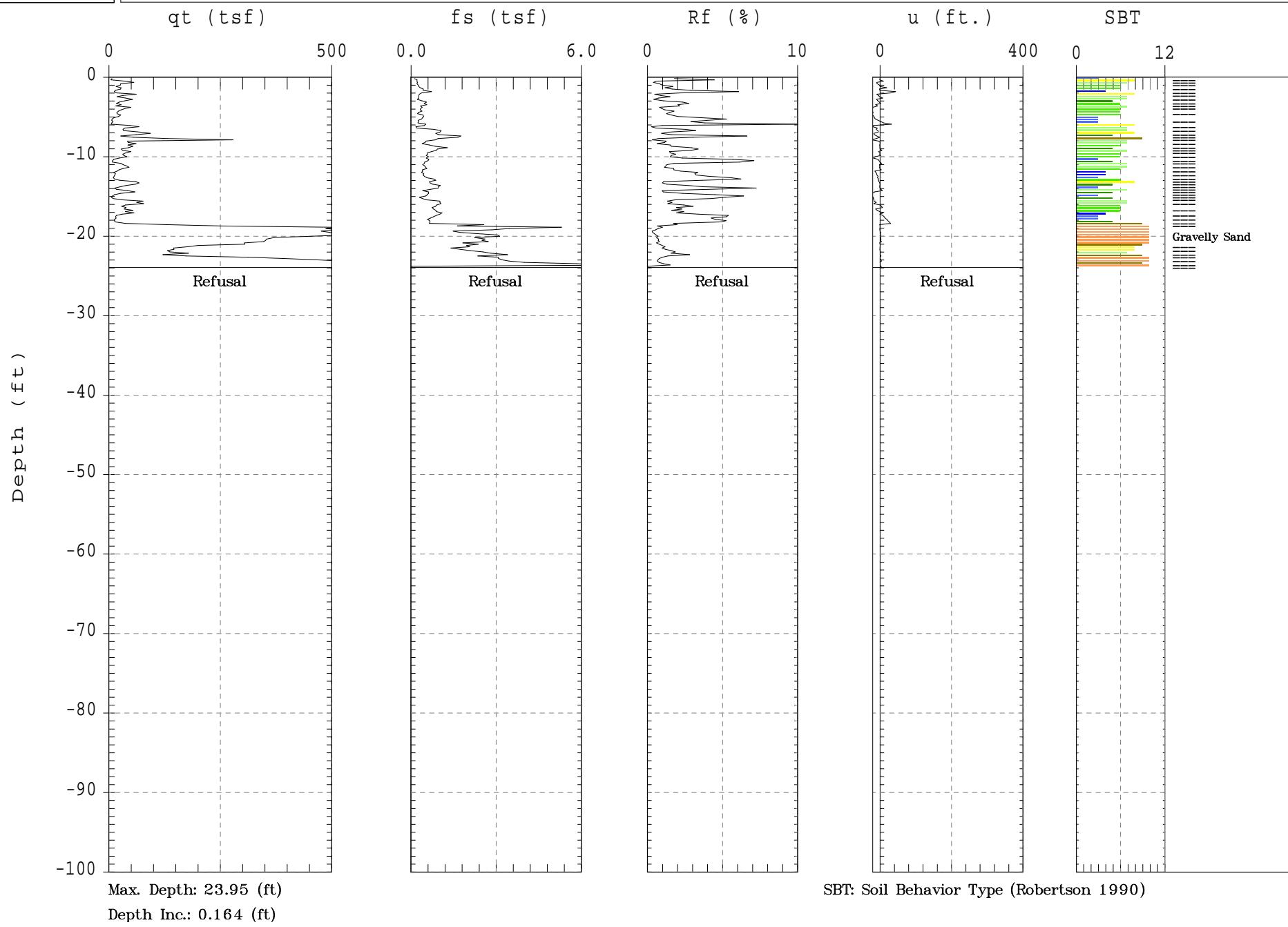


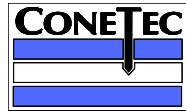


Parsons Engineering

Sounding:CPT-43A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 08:33

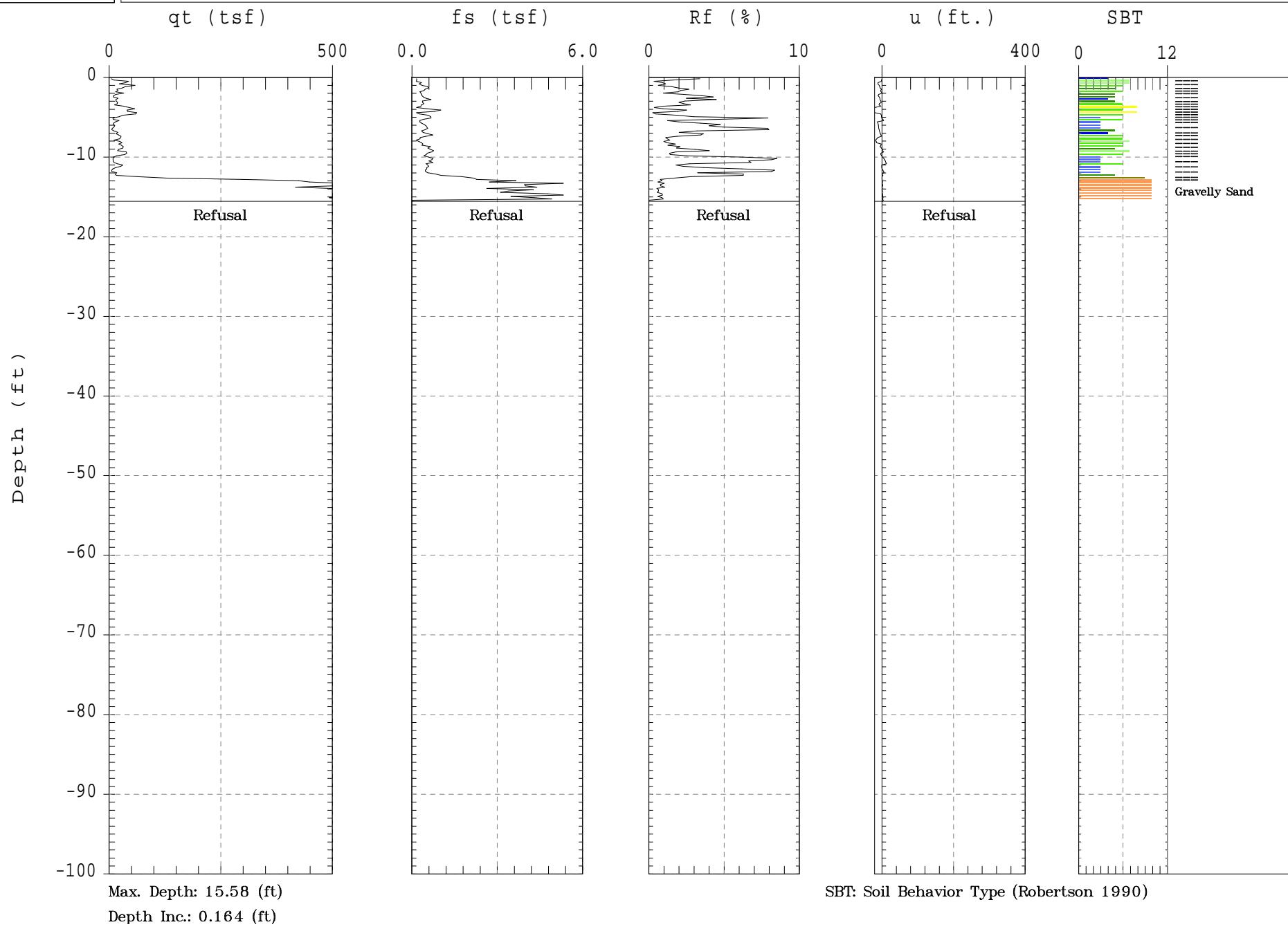


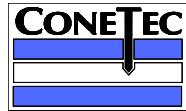


Parsons Engineering

Sounding:CPT-43
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 08:12

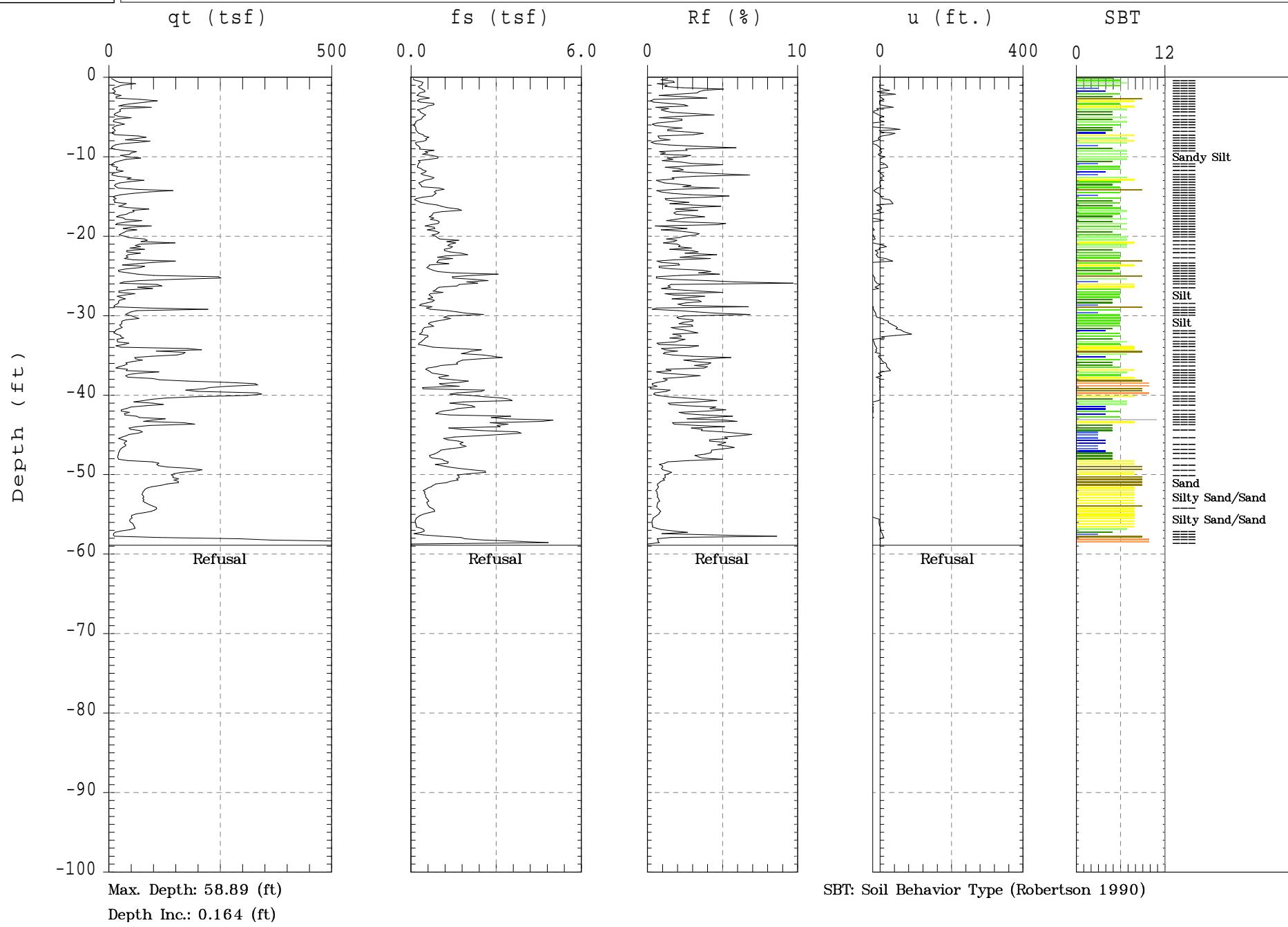


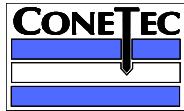


Parsons Engineering

Sounding:CPT-44A
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 09:29

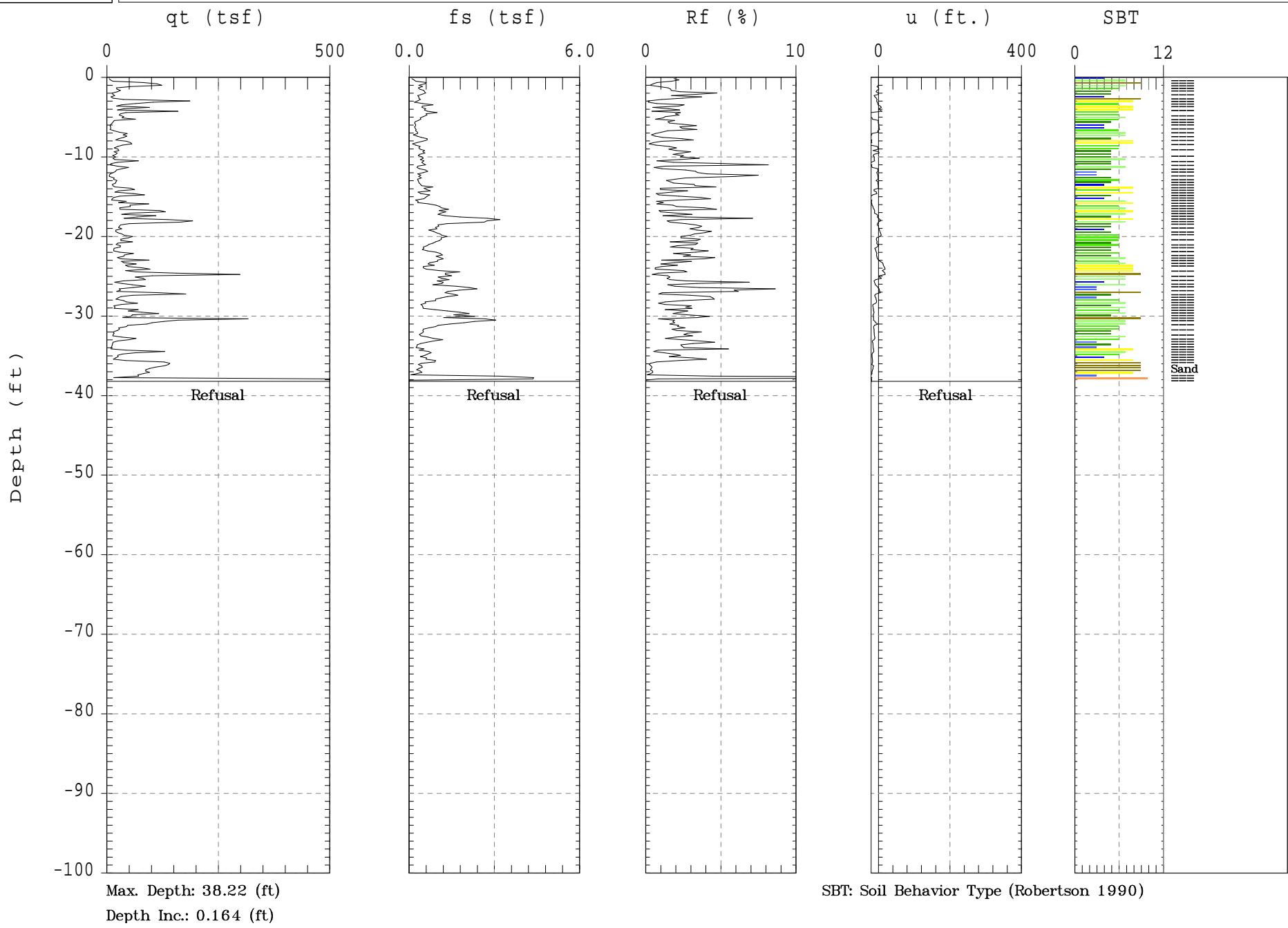


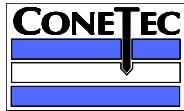


Parsons Engineering

Sounding:CPT-44
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 08:54

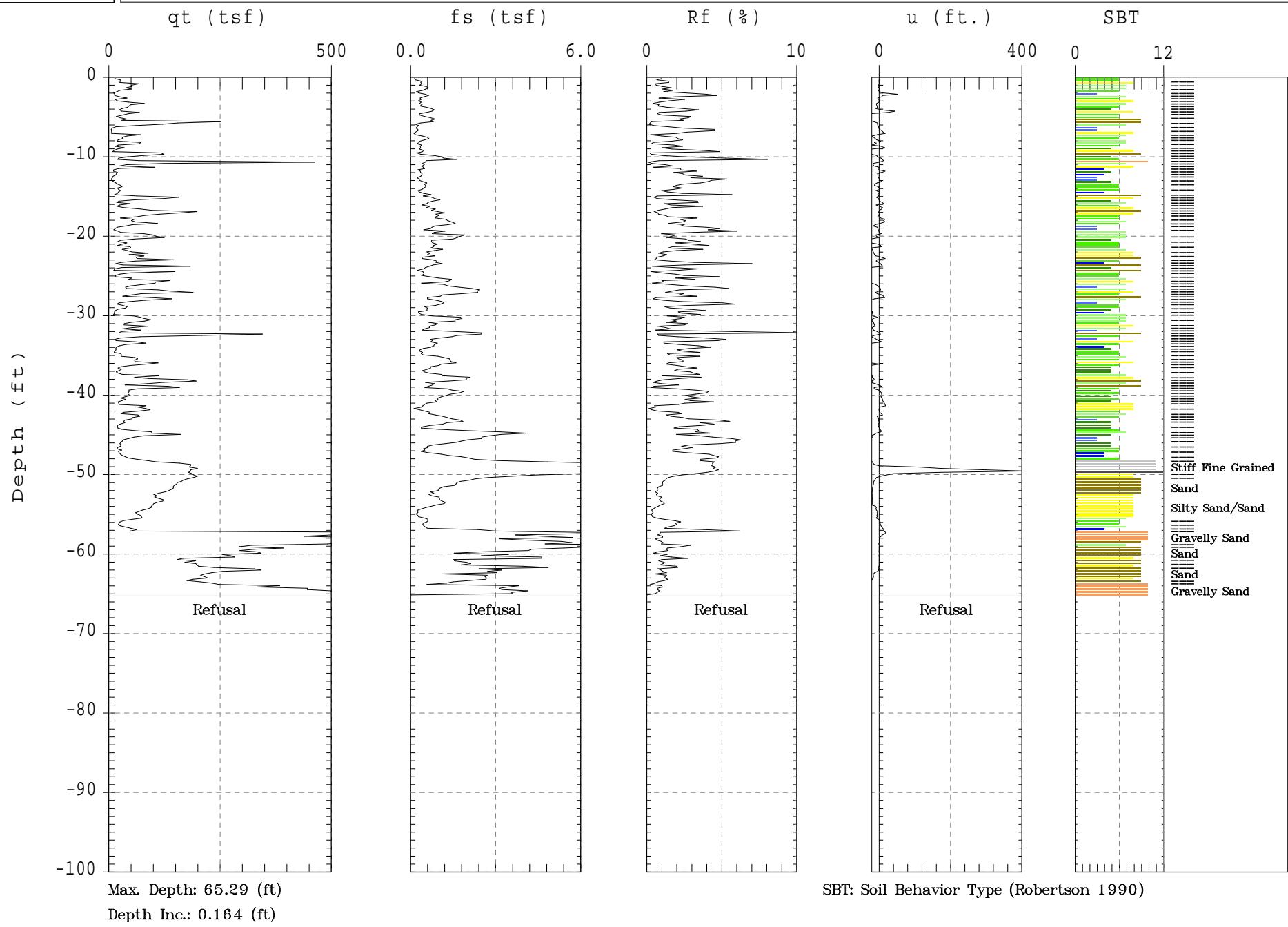


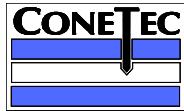


Parsons Engineering

Sounding:CPT-45
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 10:14

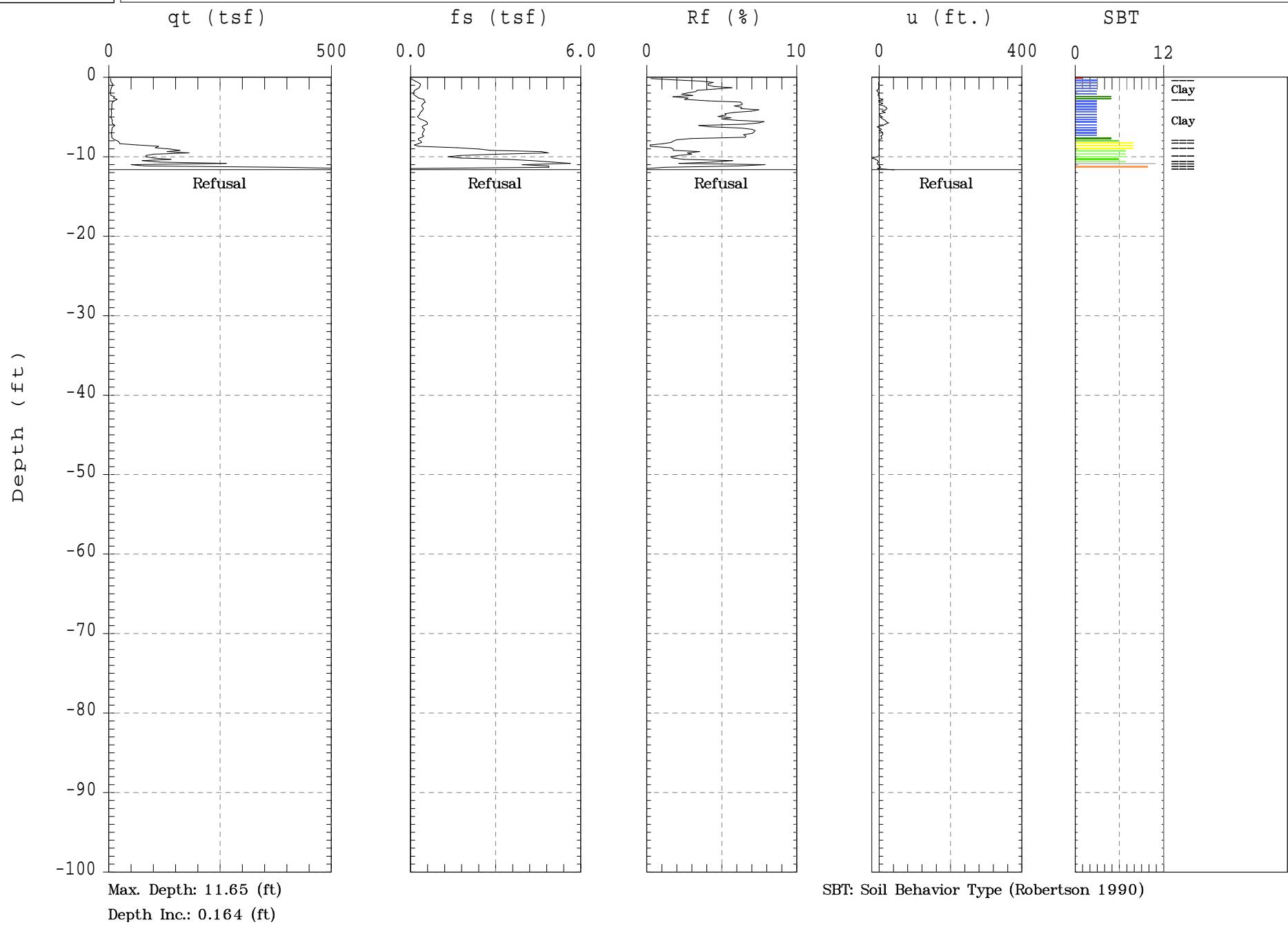


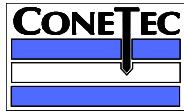


Parsons Engineering

Sounding:CPT-46
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 14:13

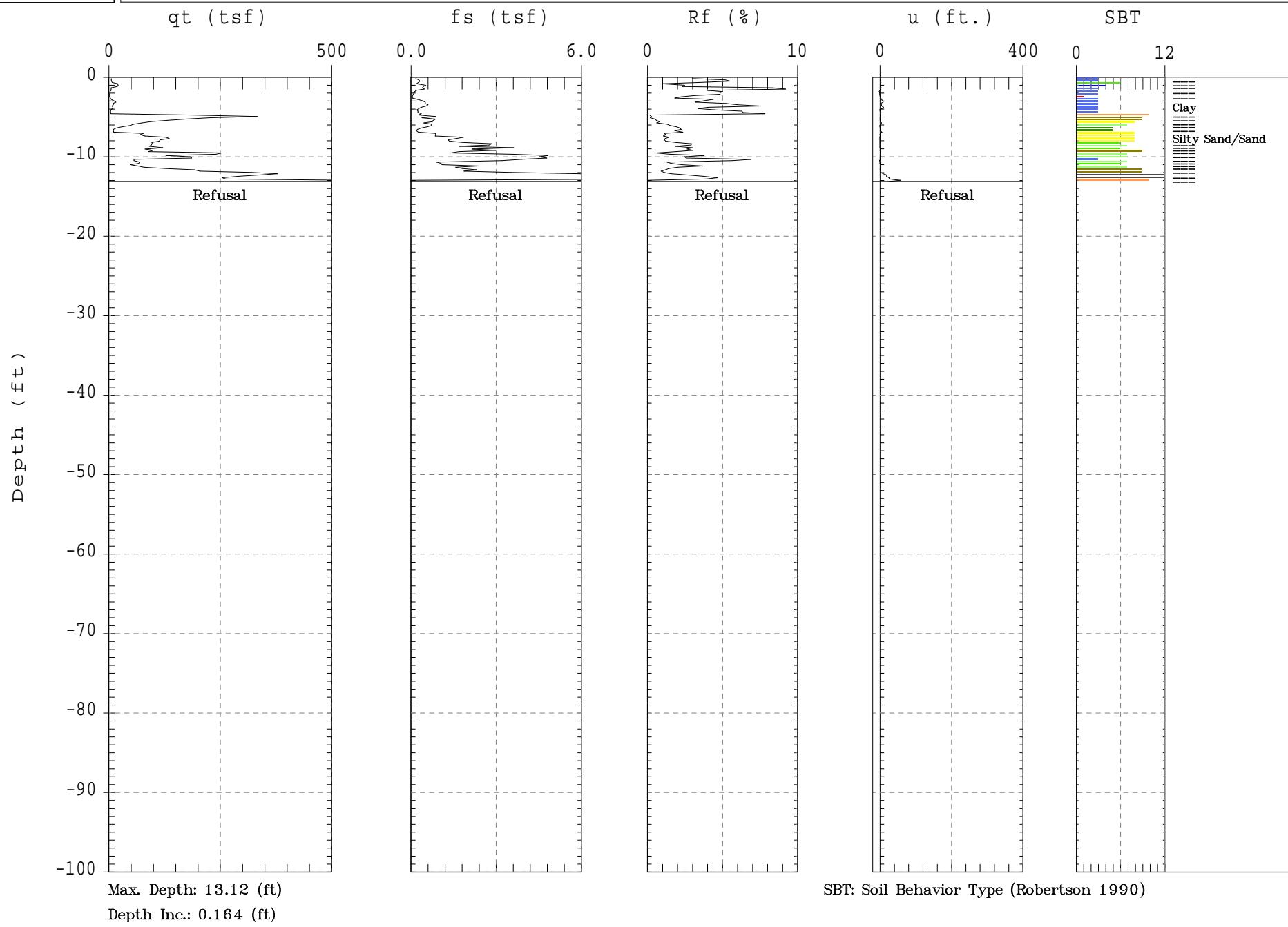


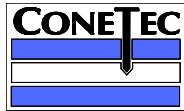


Parsons Engineering

Sounding:CPT-47
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 14:33

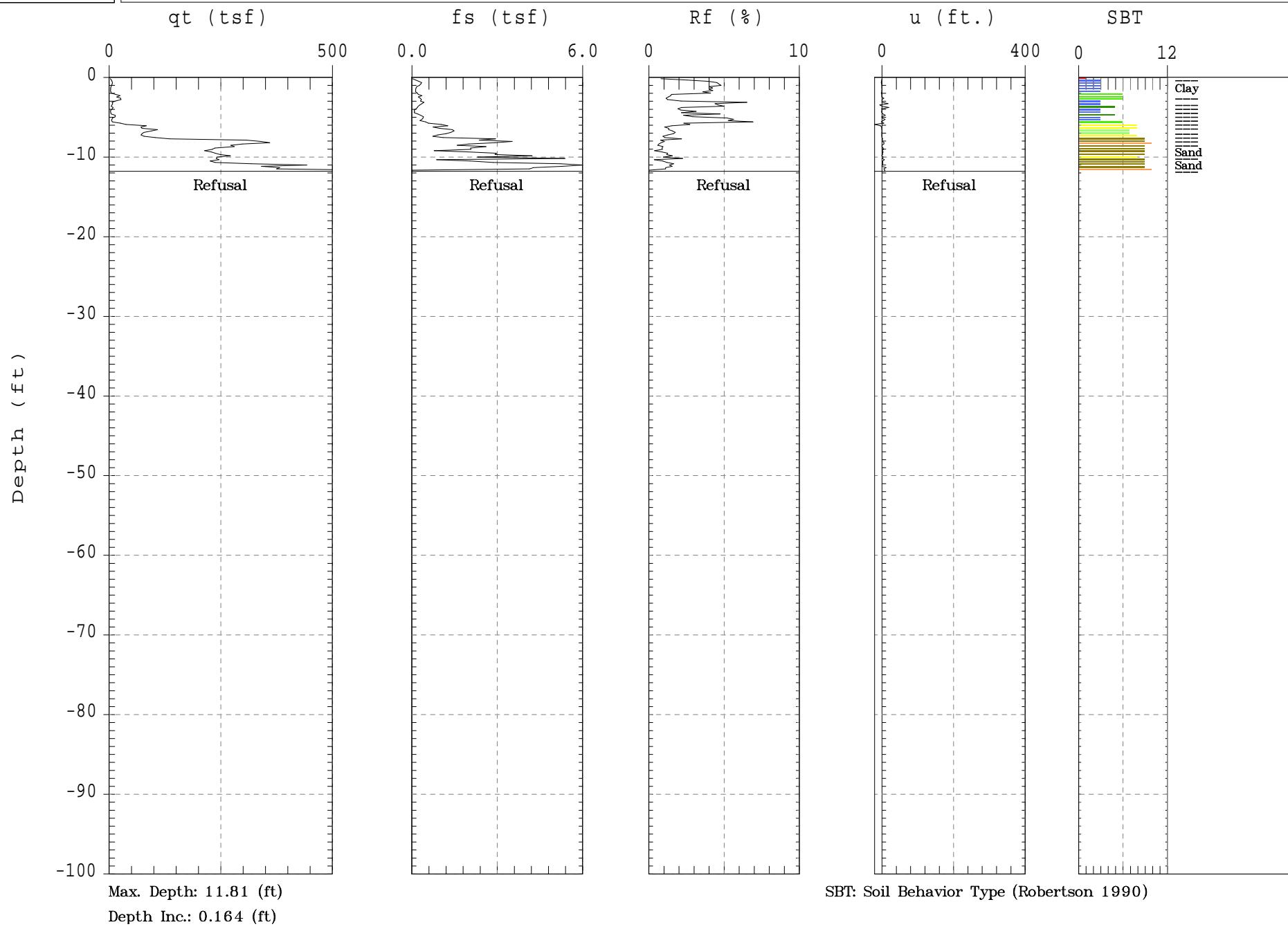


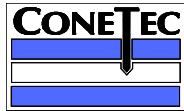


Parsons Engineering

Sounding:CPT-48
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 14:56

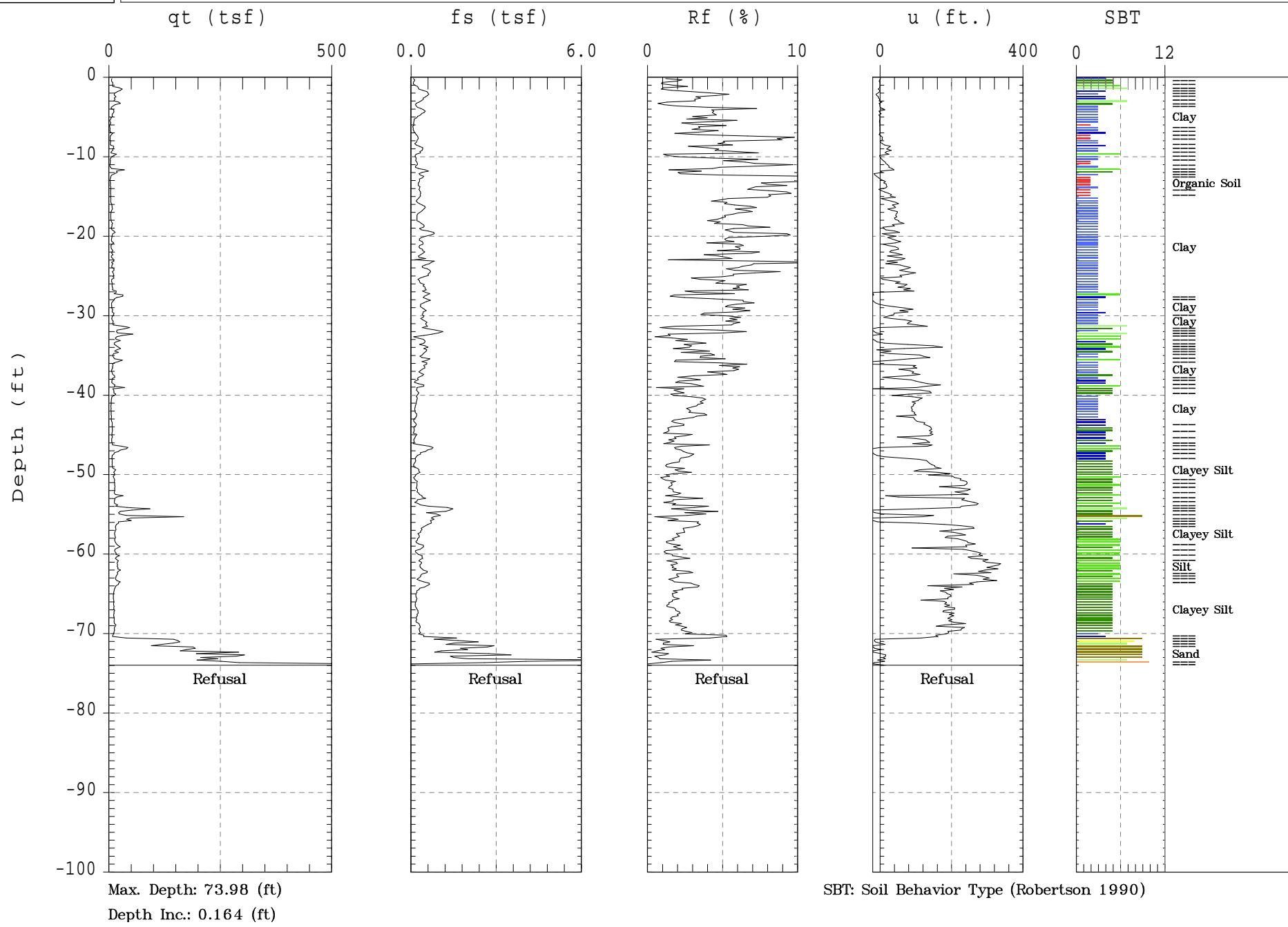


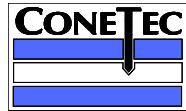


Parsons Engineering

Sounding:CPT-49
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 15:20

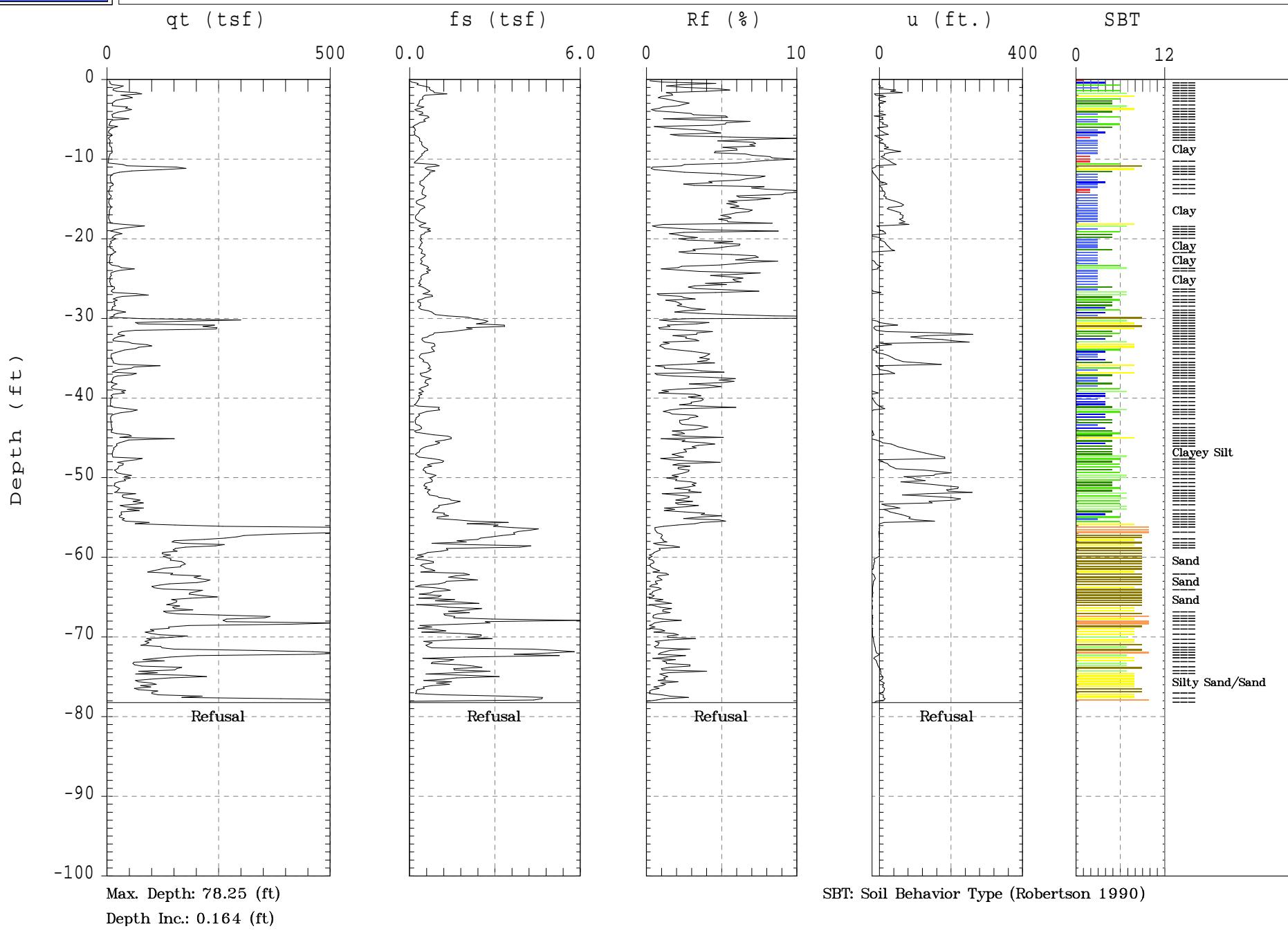


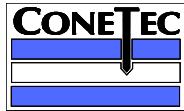


Parsons Engineering

Sounding:CPT-50
Site:Wastebed 13

Piezocone:20 TON AD171
Date:10:02:06 14:33

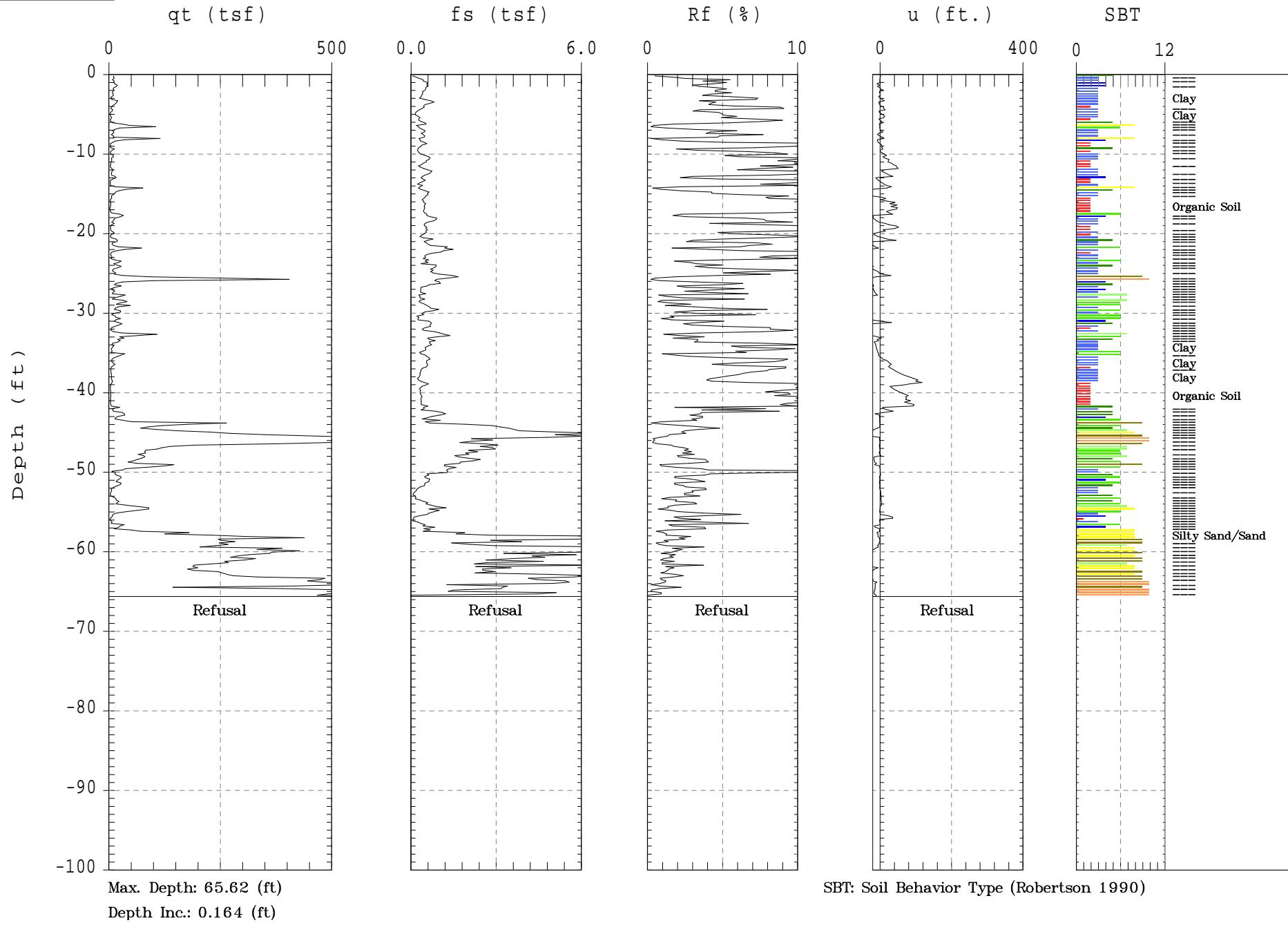


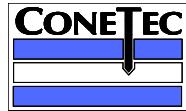


Parsons Engineering

Sounding:CPT-51
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 16:50

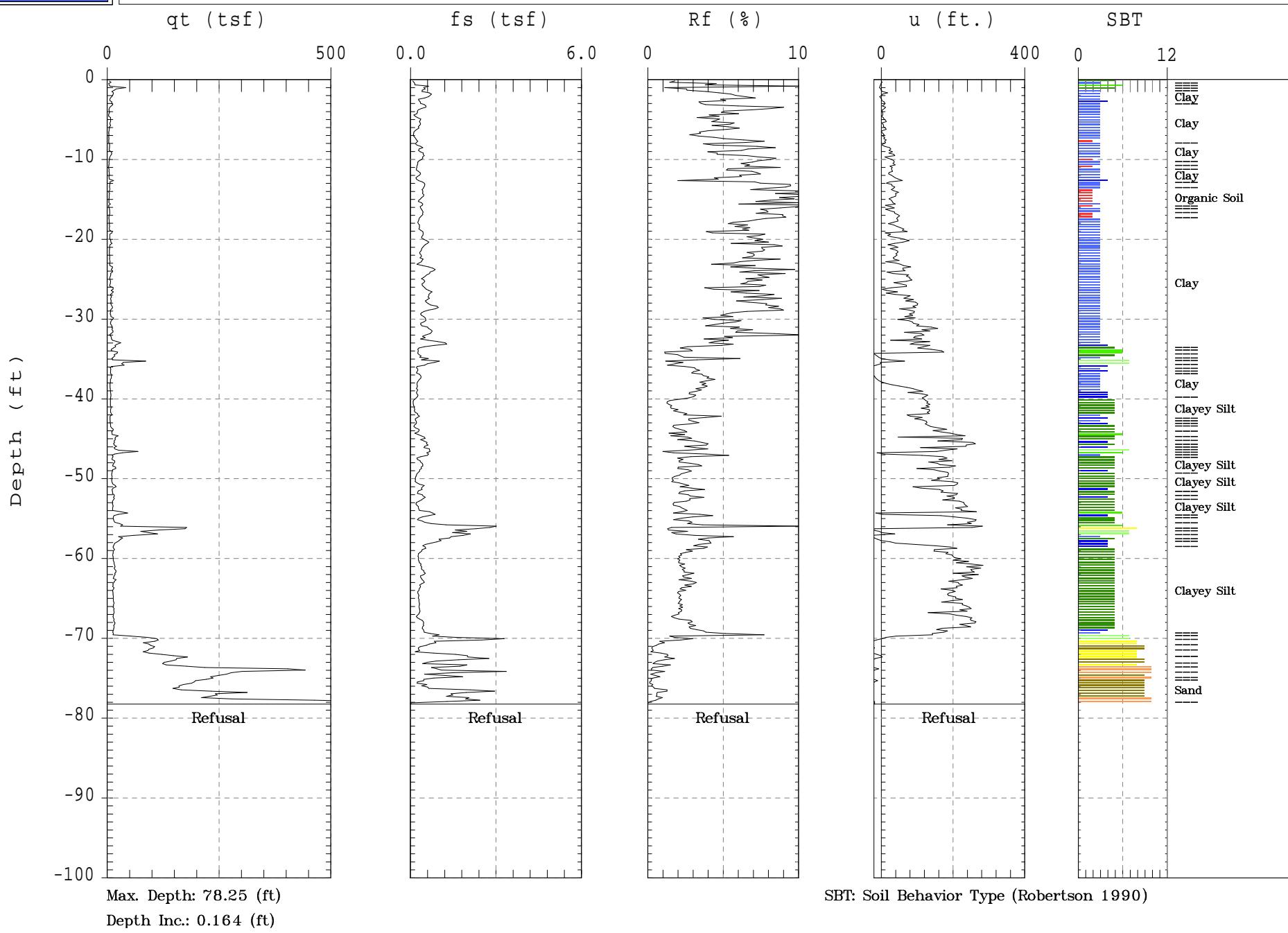


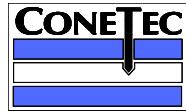


Parsons Engineering

Sounding:CPT-52
Site:Wastebed 13

Piezocone:20 TON AD171
Date:10:02:06 15:42

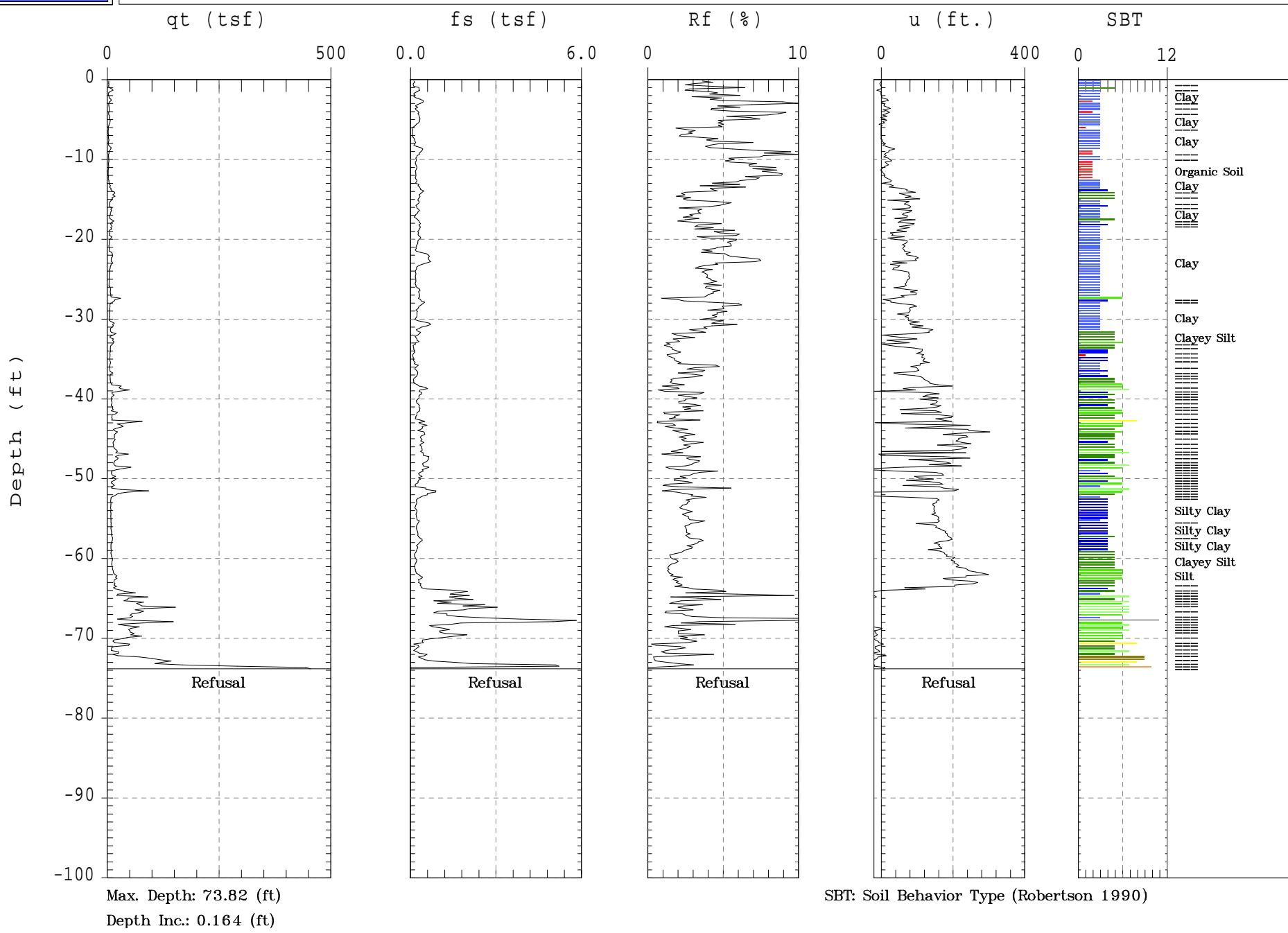


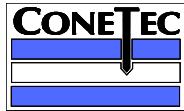


Parsons Engineering

Sounding:CPT-53
Site:Wastebed 13

Piezocone:20 TON AD171
Date:10:02:06 09:03

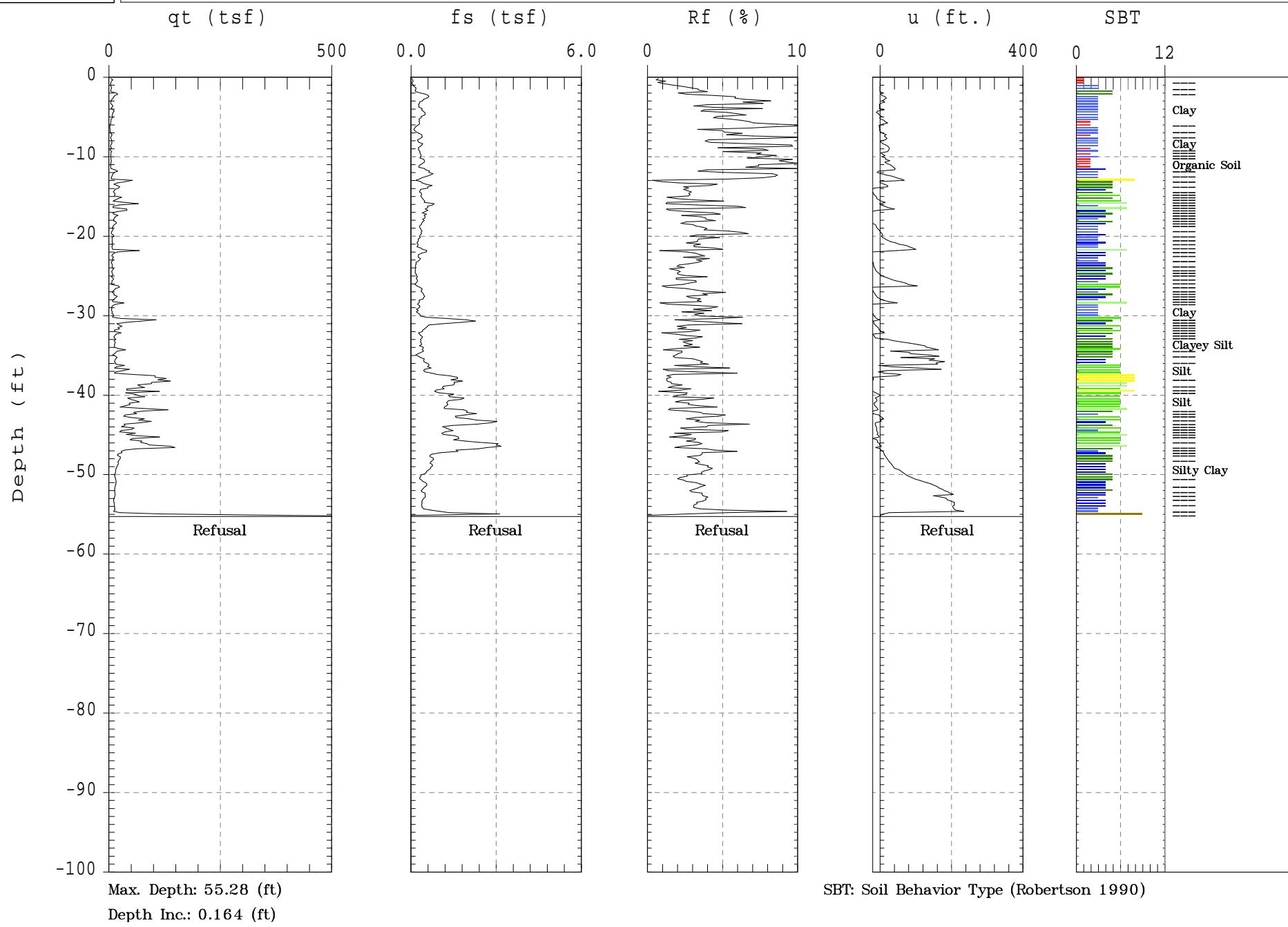


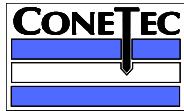


Parsons Engineering

Sounding:CPT-54
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 13:26

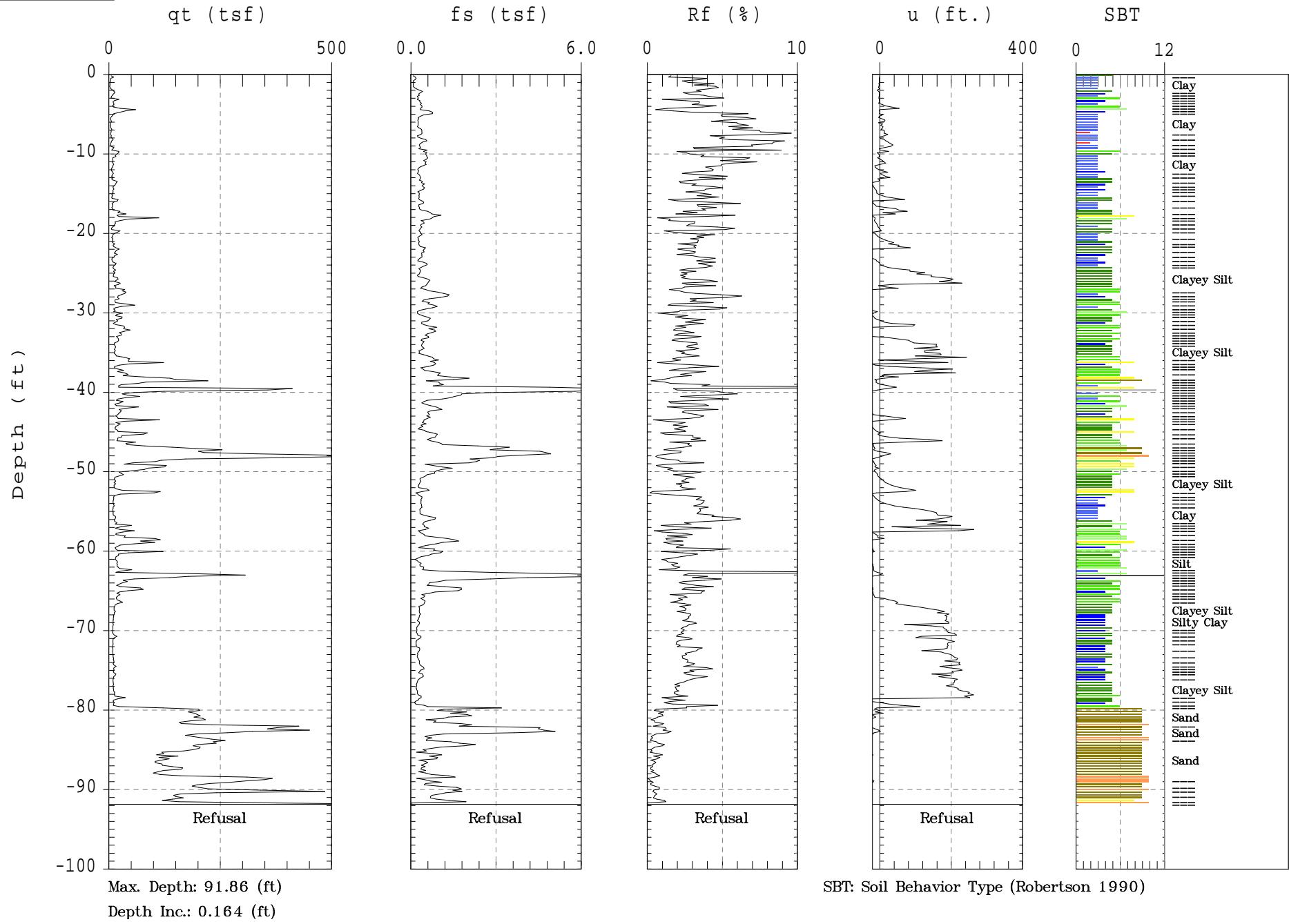


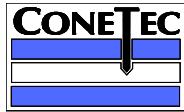


Parsons Engineering

Sounding:CPT-55
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:28:06 12:11

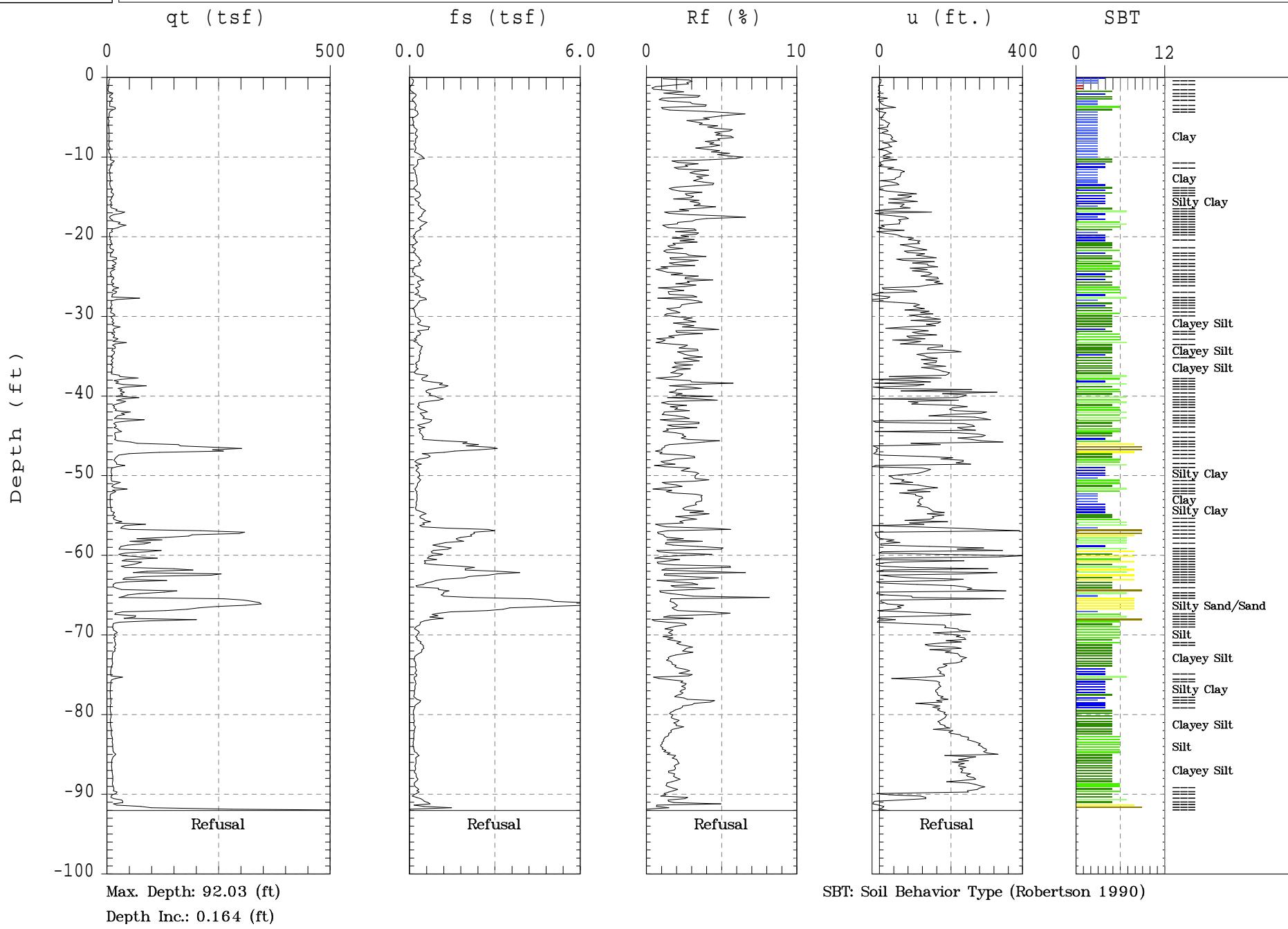


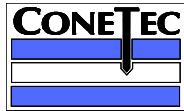


Parsons Engineering

Sounding:CPT-56
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:03:06 14:39

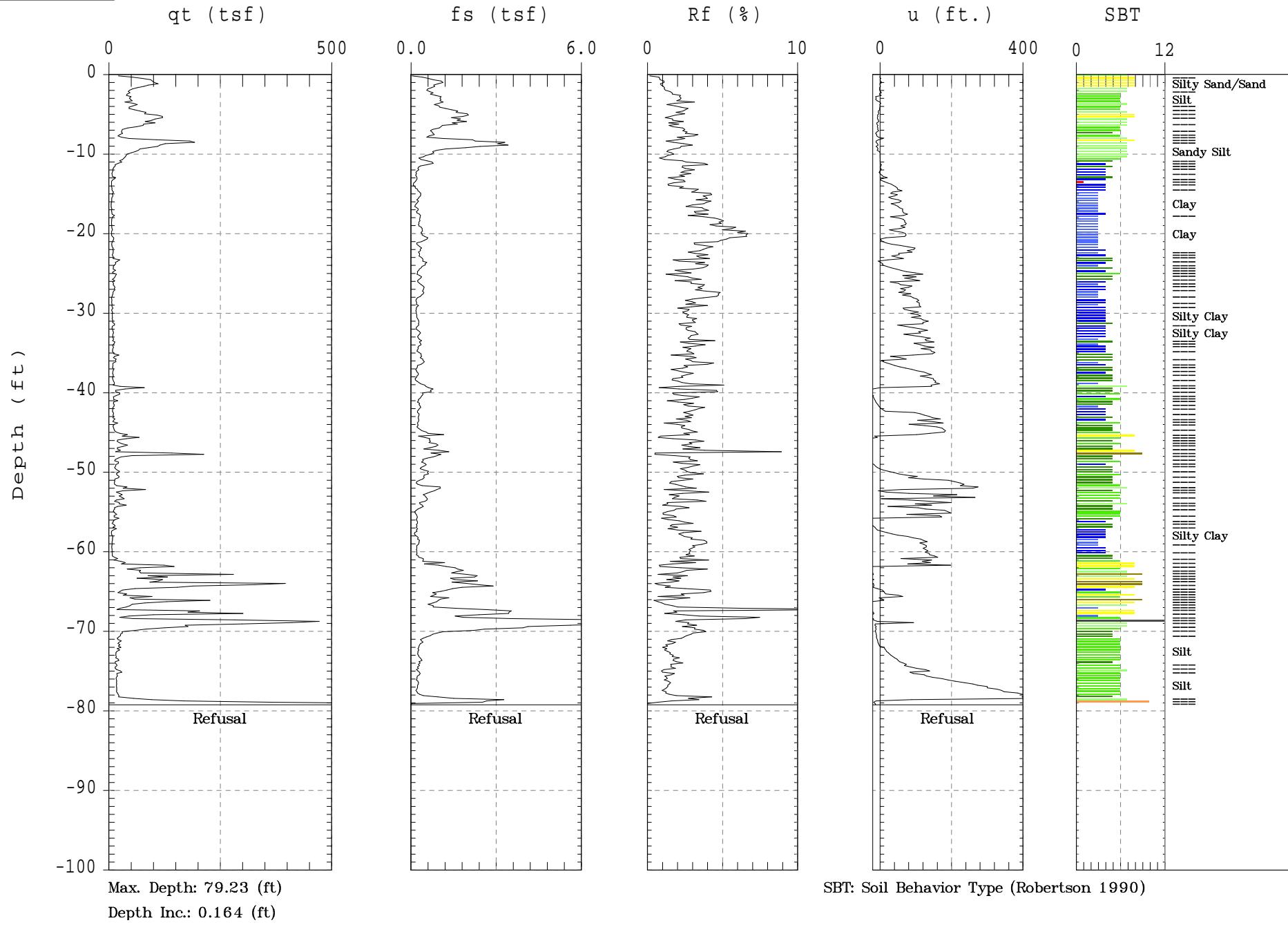


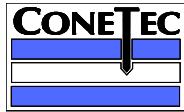


Parsons Engineering

Sounding:CPT-57
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 08:42

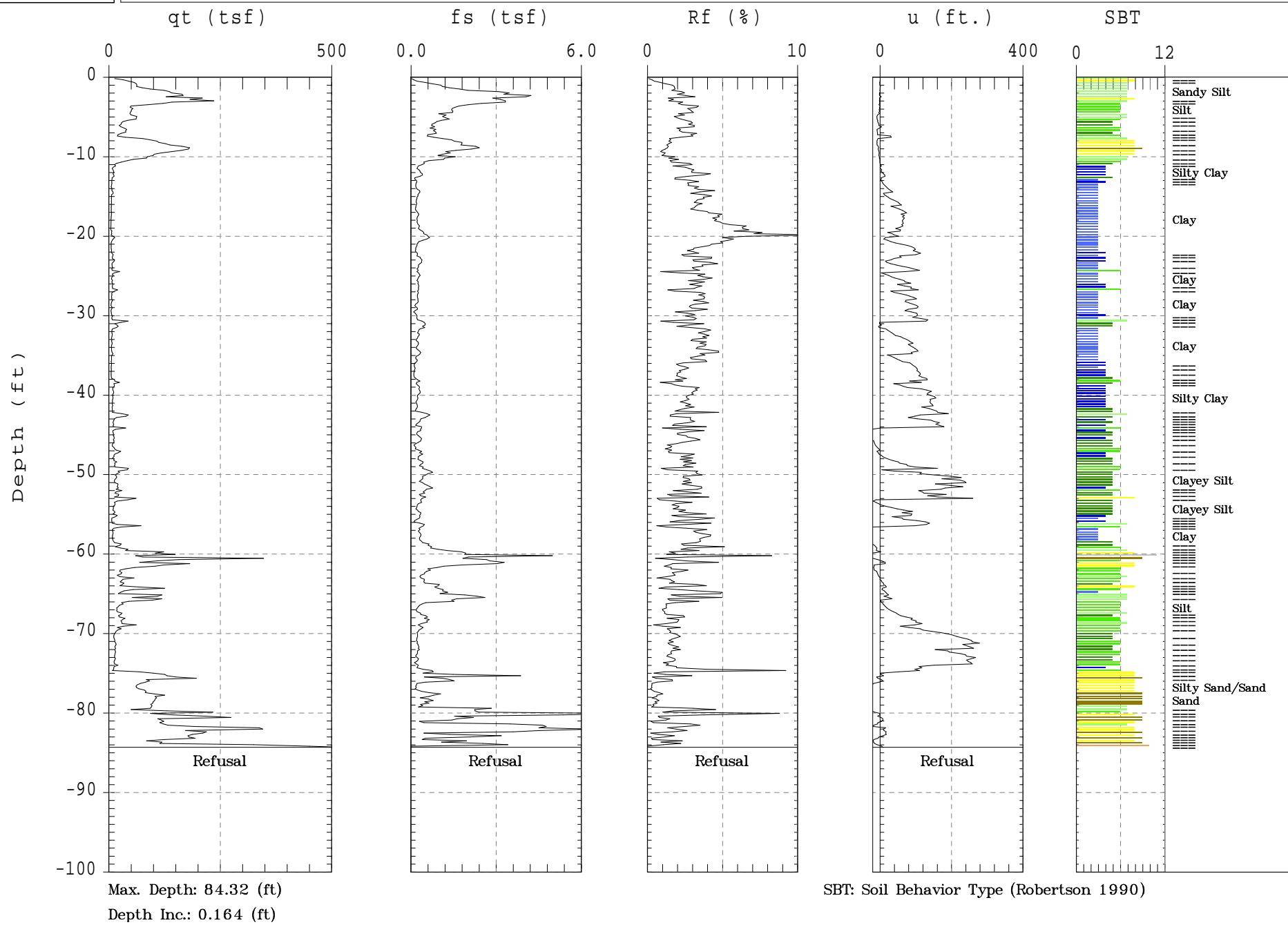


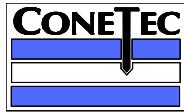


Parsons Engineering

Sounding:CPT-58A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 09:39

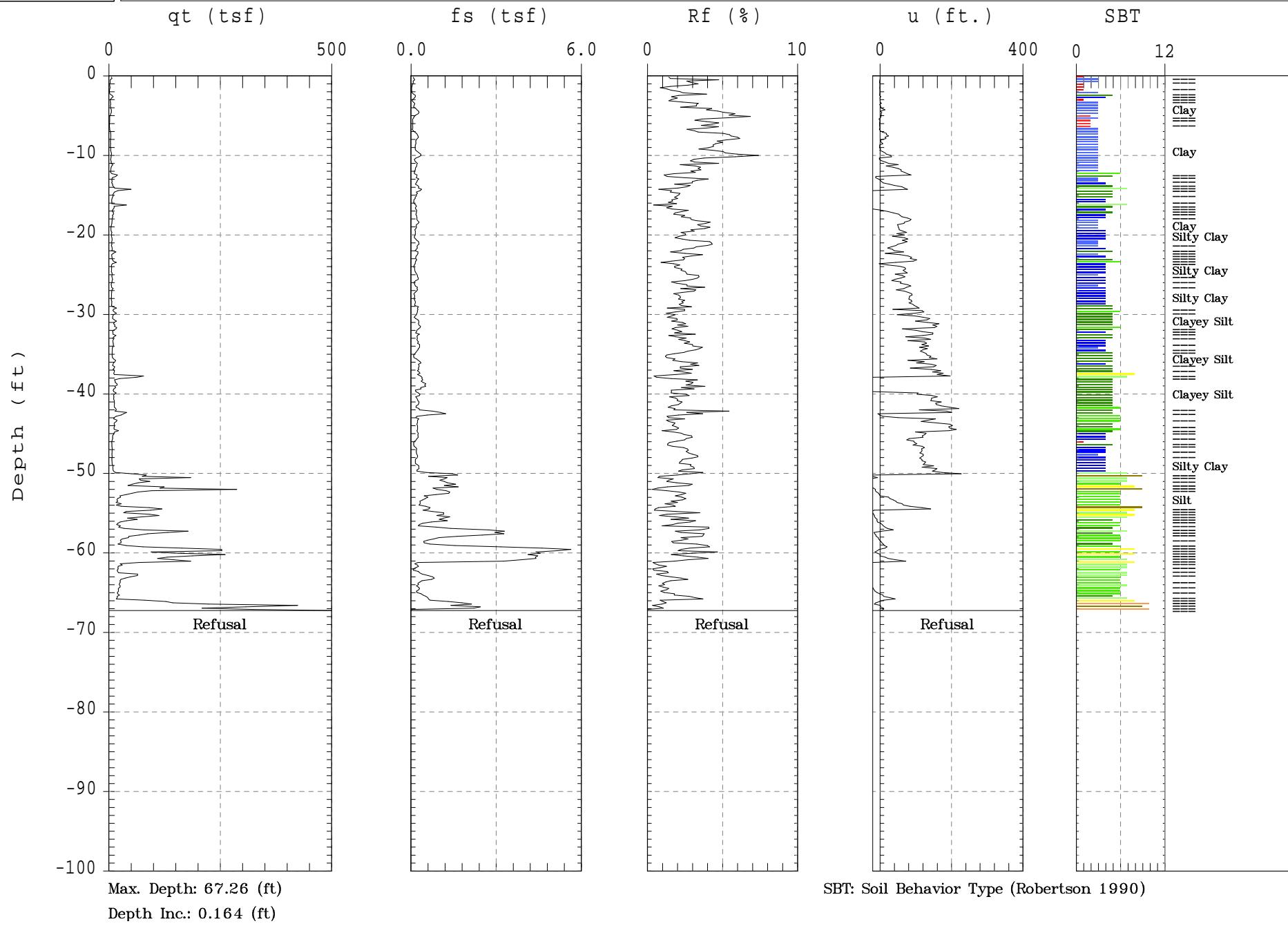


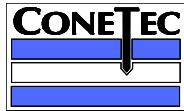


Parsons Engineering

Sounding:CPT-58
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:03:06 13:39

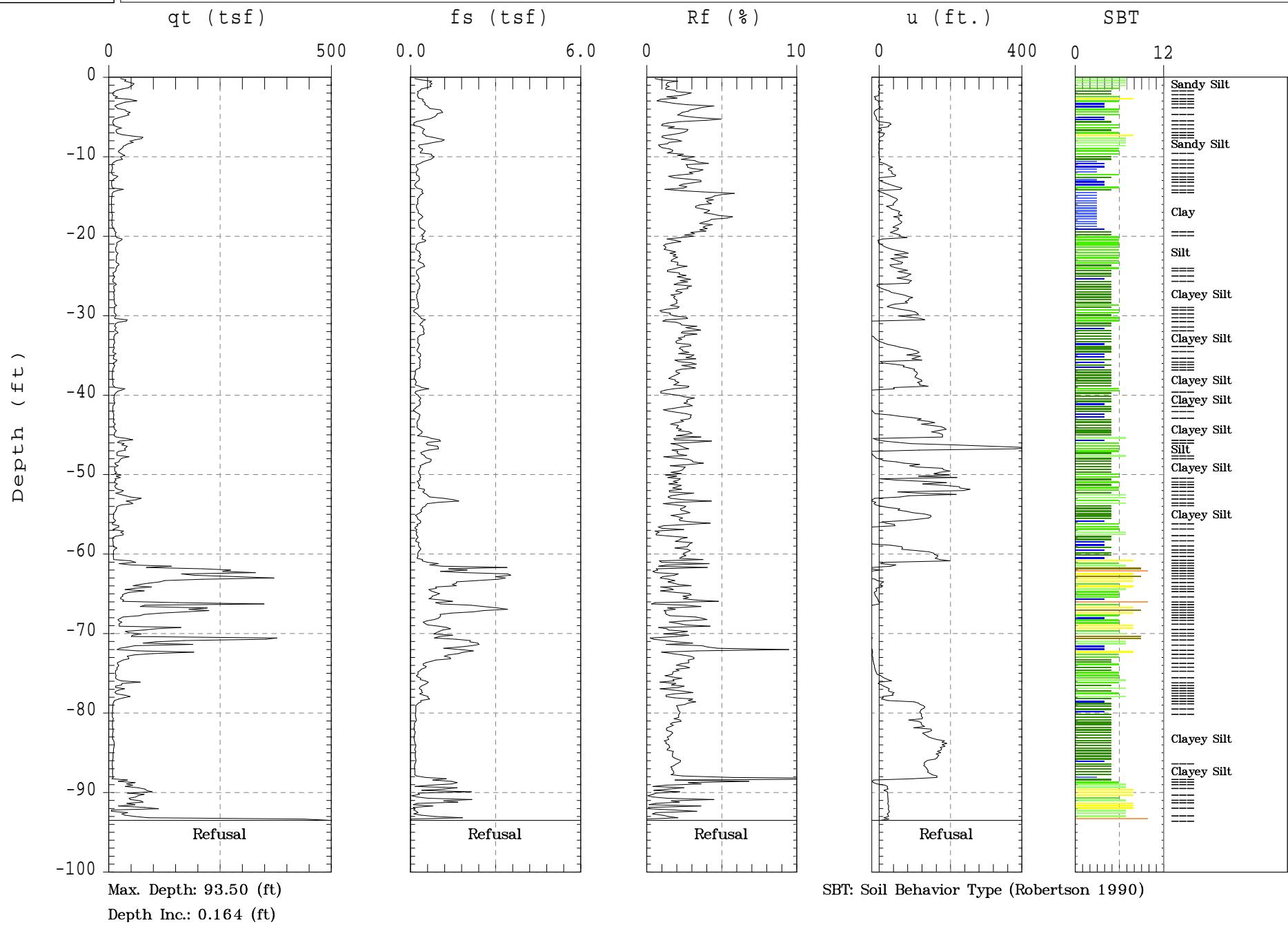


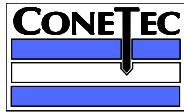


Parsons Engineering

Sounding:CPT-59A
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 07:28

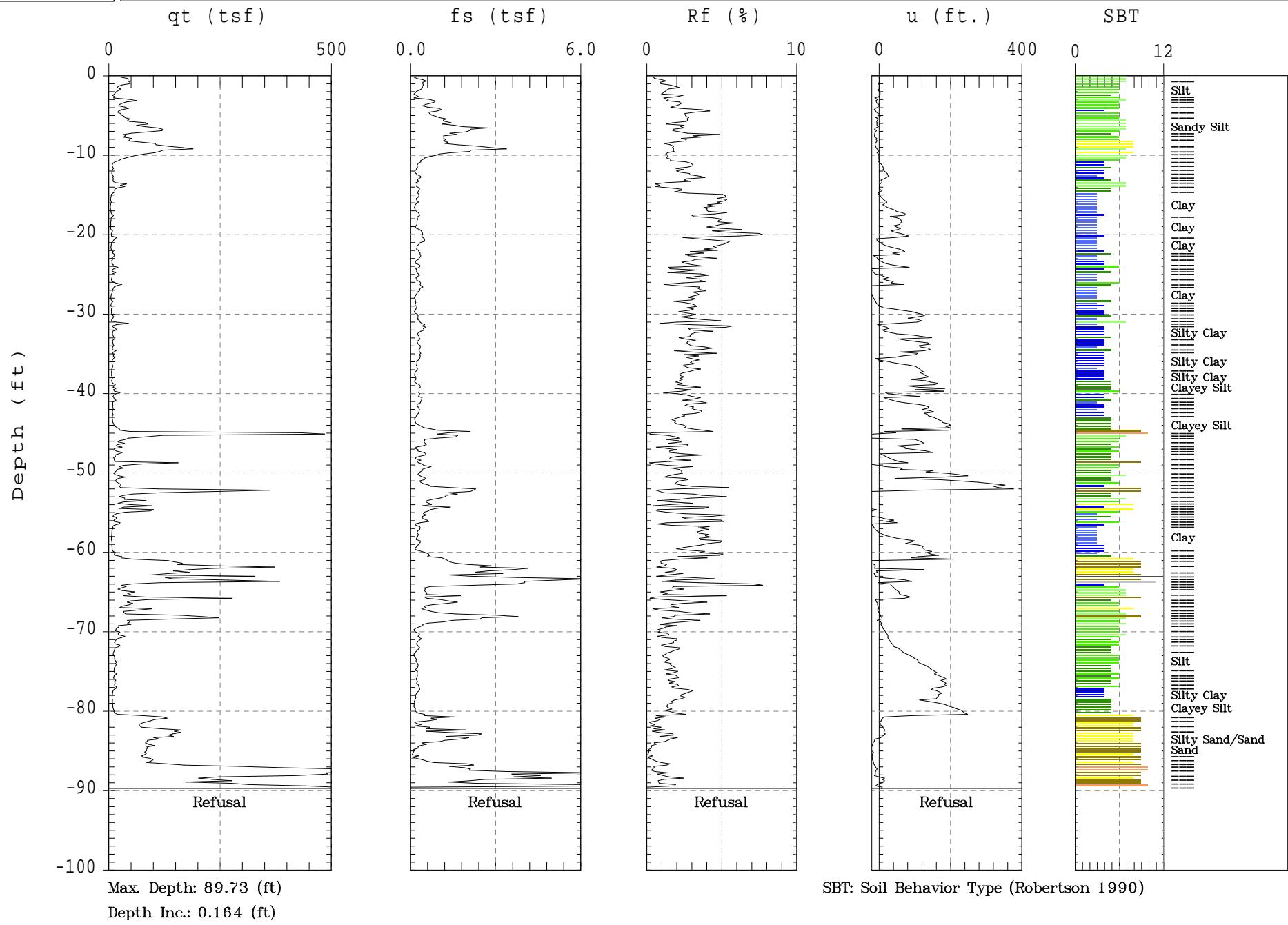


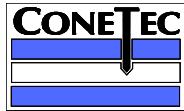


Parsons Engineering

Sounding:CPT-59
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:03:06 15:50

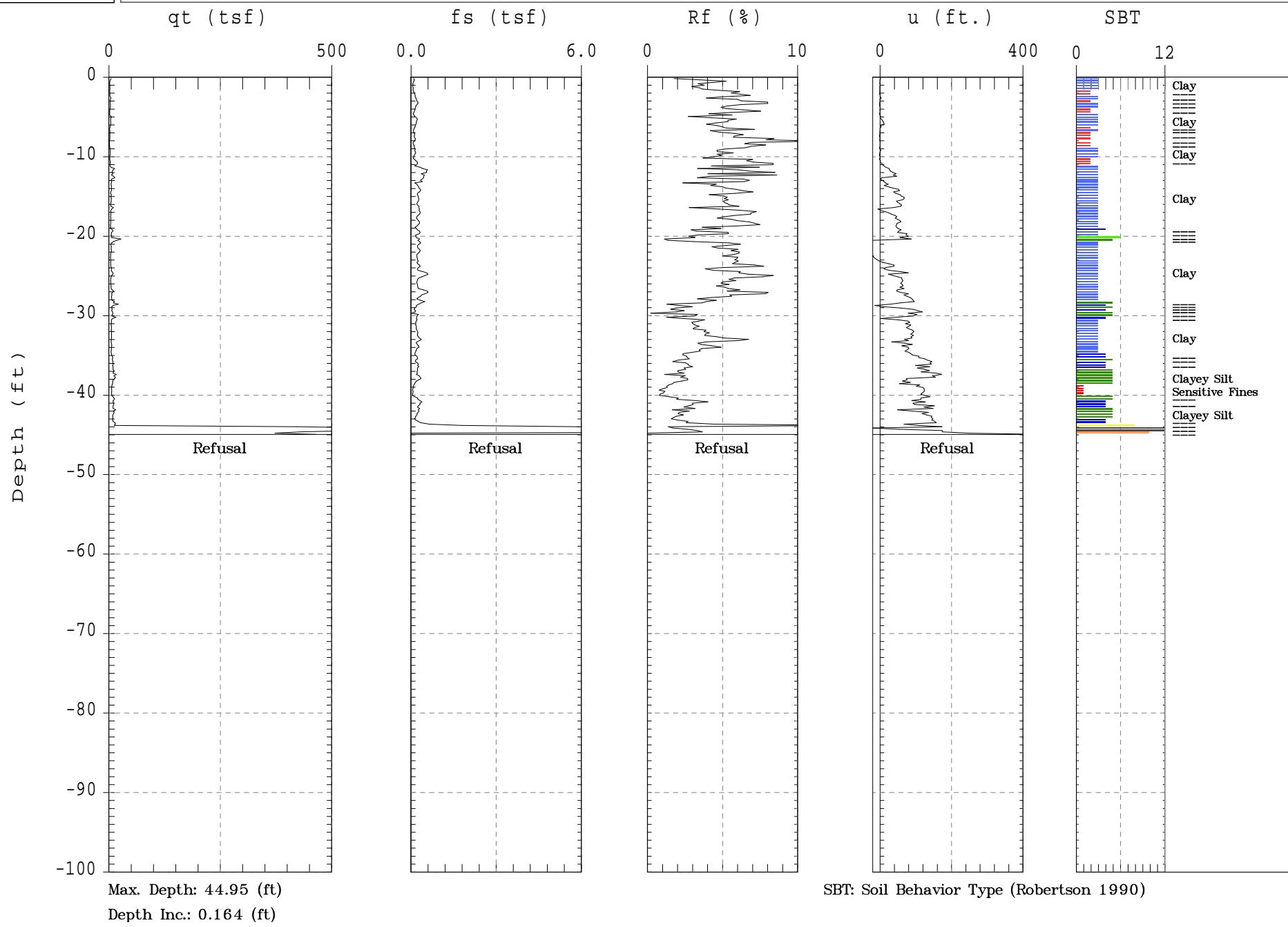


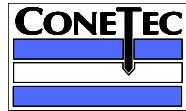


Parsons Engineering

Sounding:CPT-60
Site:Wastebed 13

Piezocene:20 TON AD171
Date:10:02:06 16:40

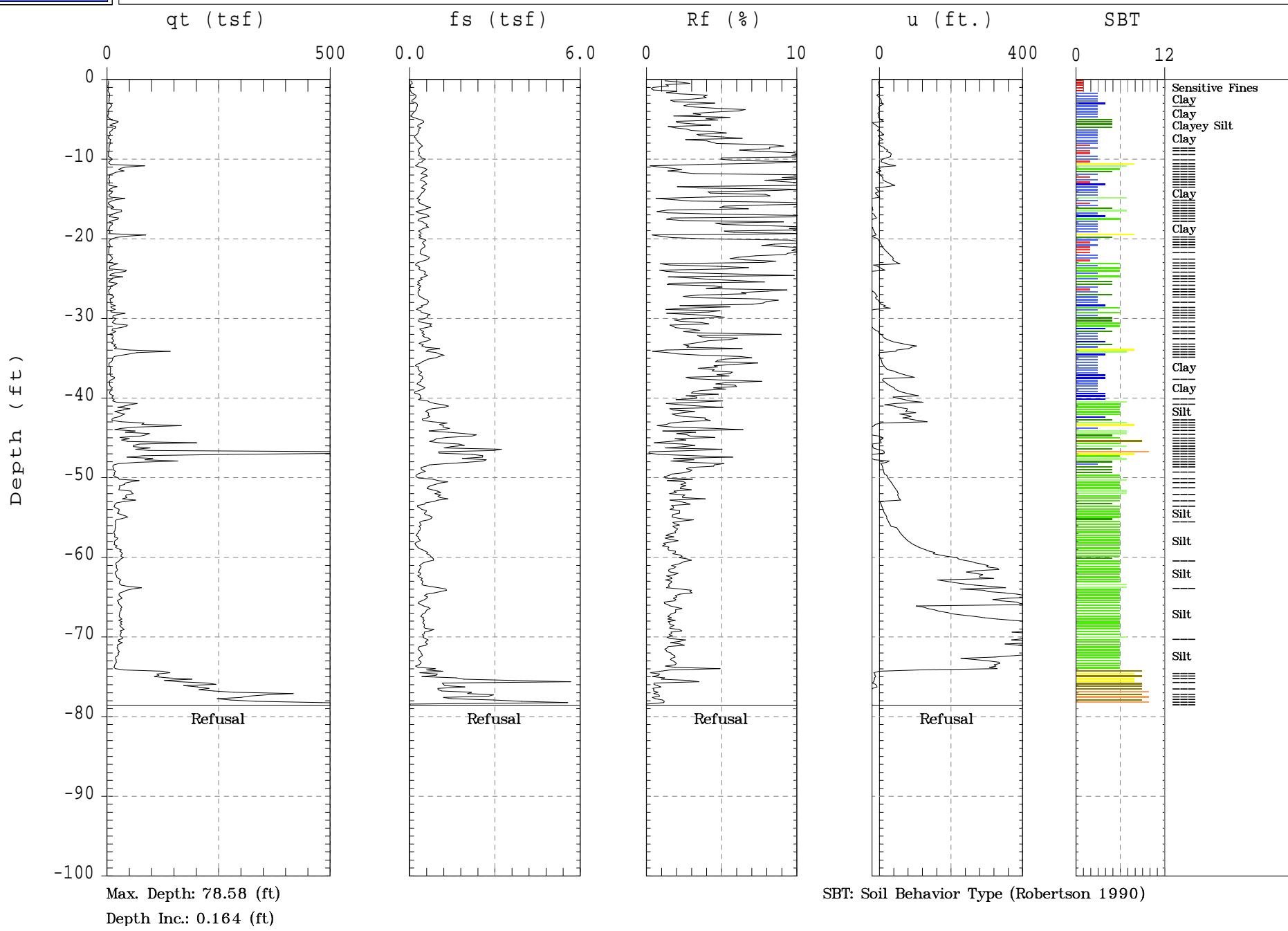


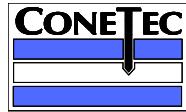


Parsons Engineering

Sounding:CPT-61
Site:Wastebed 13

Piezocone:20 TON AD179
Date:10:05:06 13:34

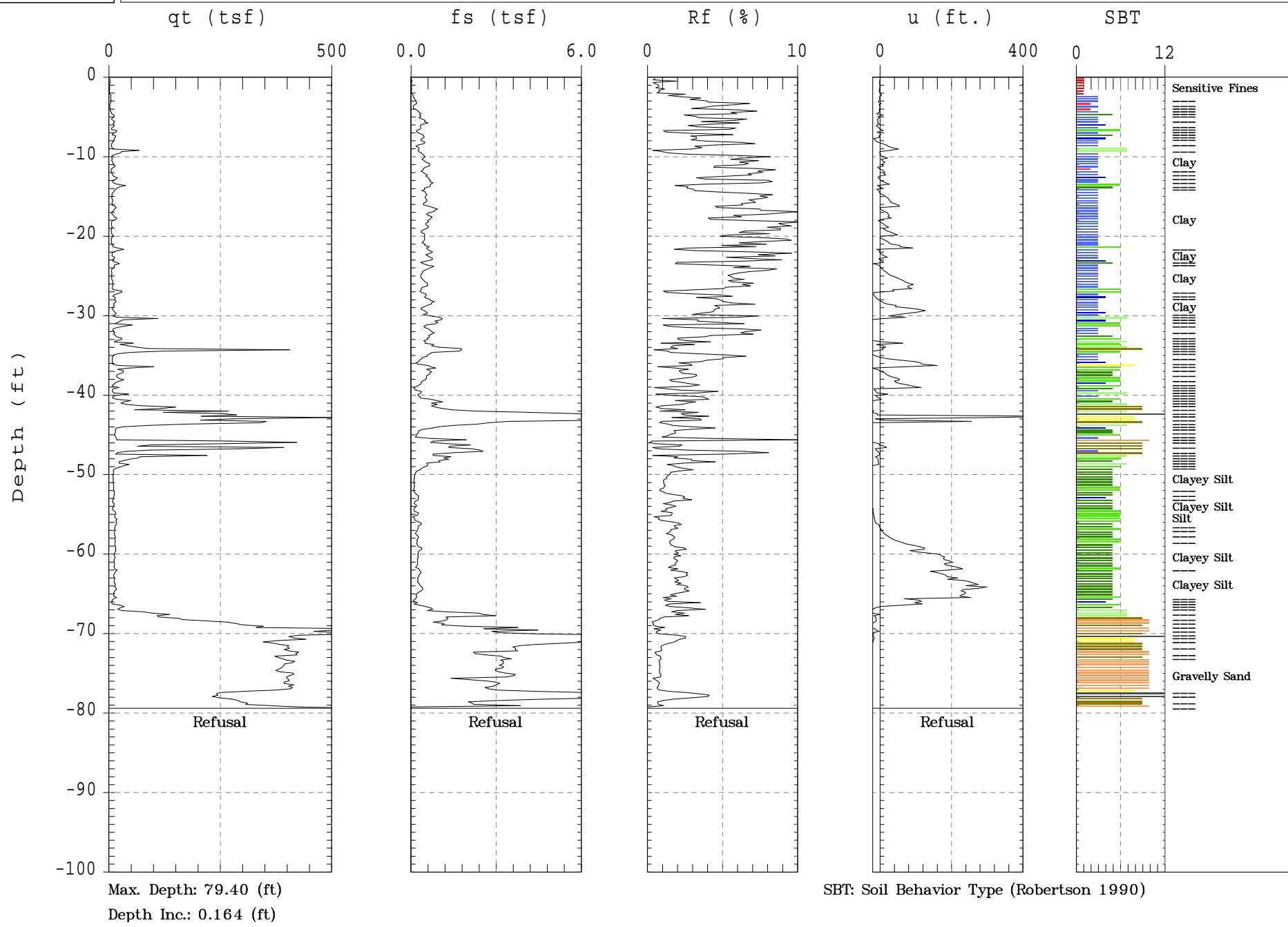


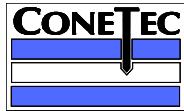


Parsons Engineering

Sounding:CPT-62
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:05:06 07:32

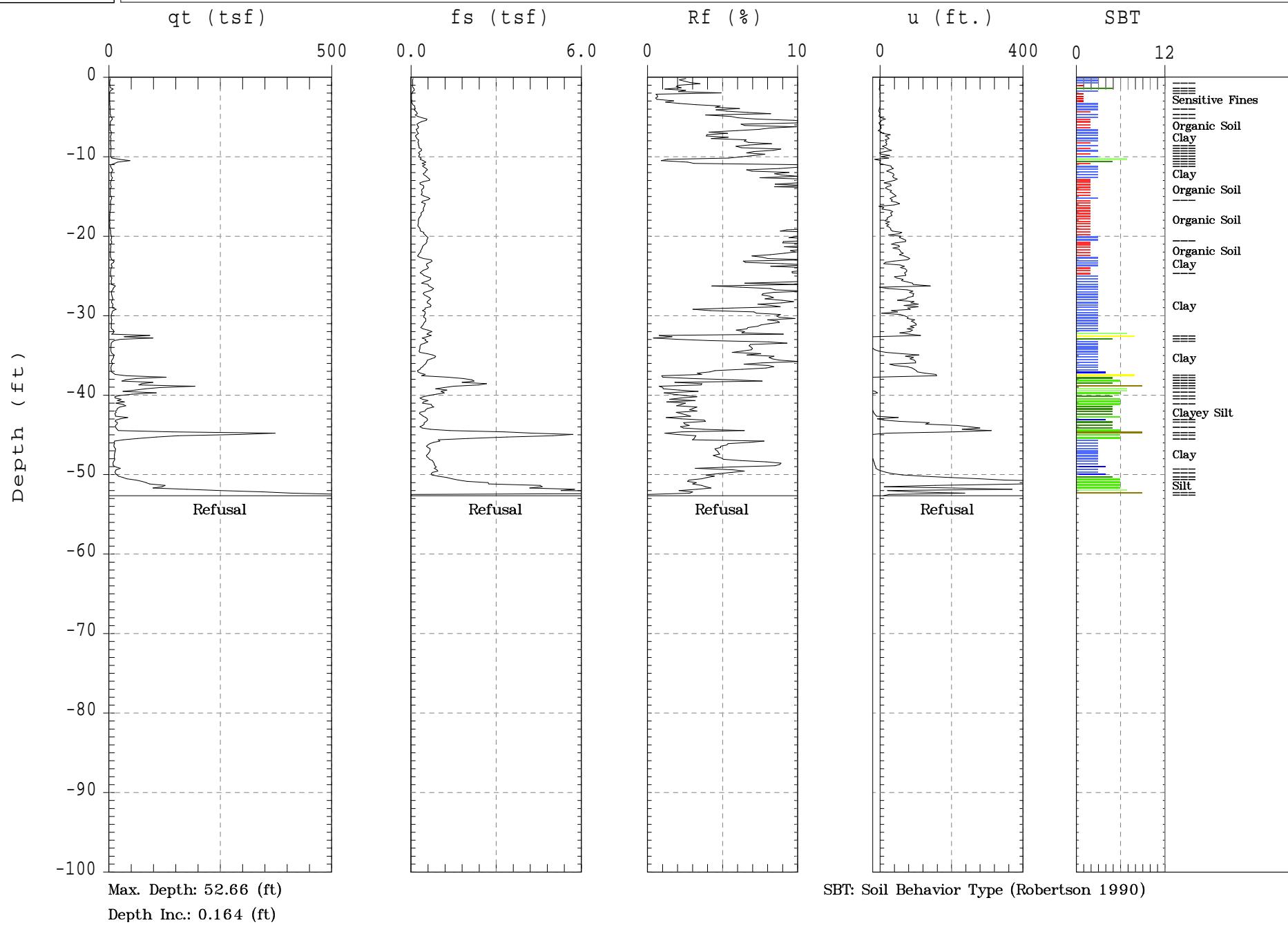


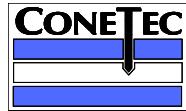


Parsons Engineering

Sounding:CPT-63
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 17:30

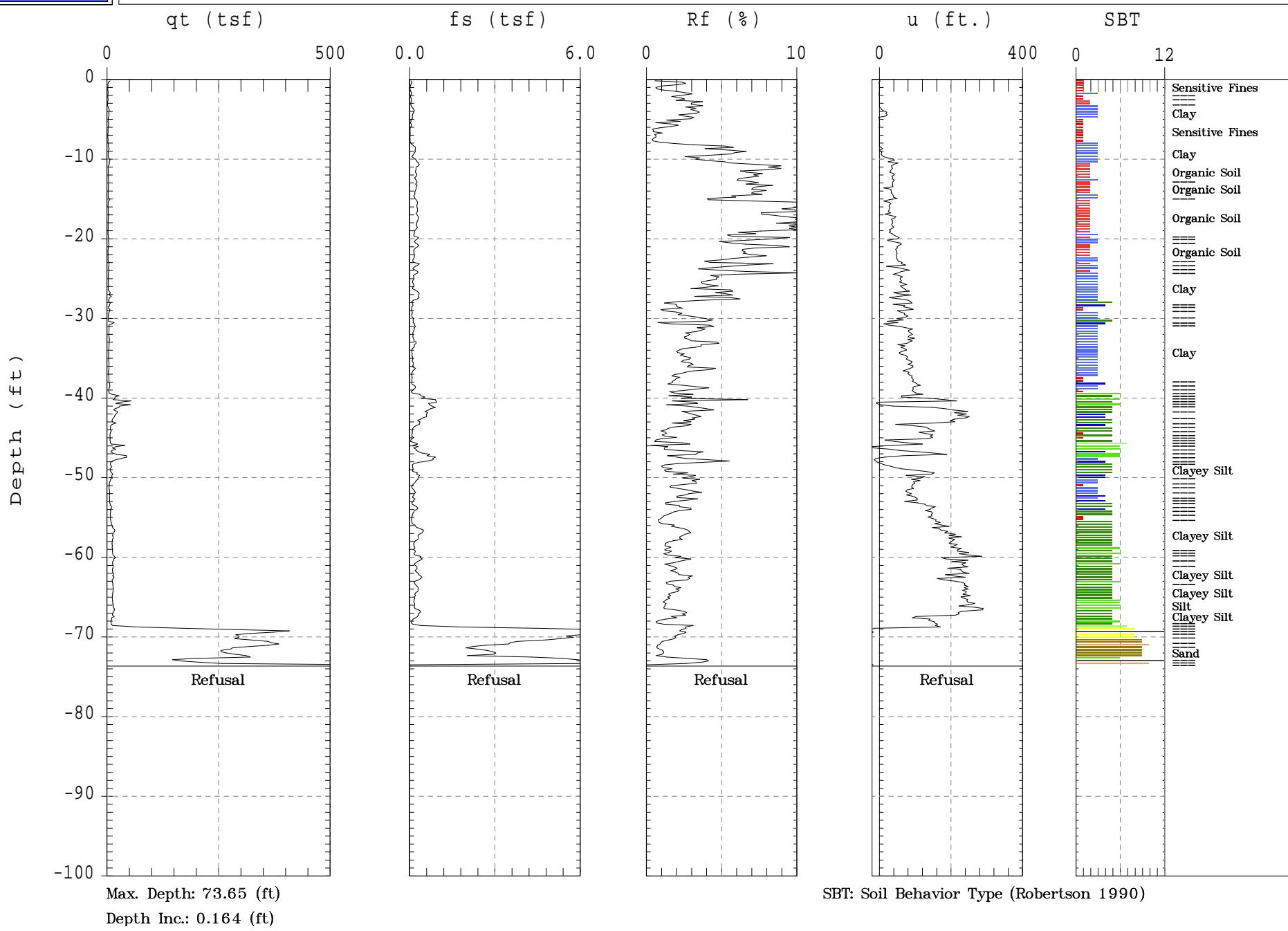


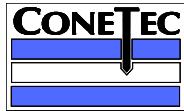


Parsons Engineering

Sounding:CPT-64
Site:Wastebed 13

Piezocone:20 TON AD179
Date:10:04:06 10:55

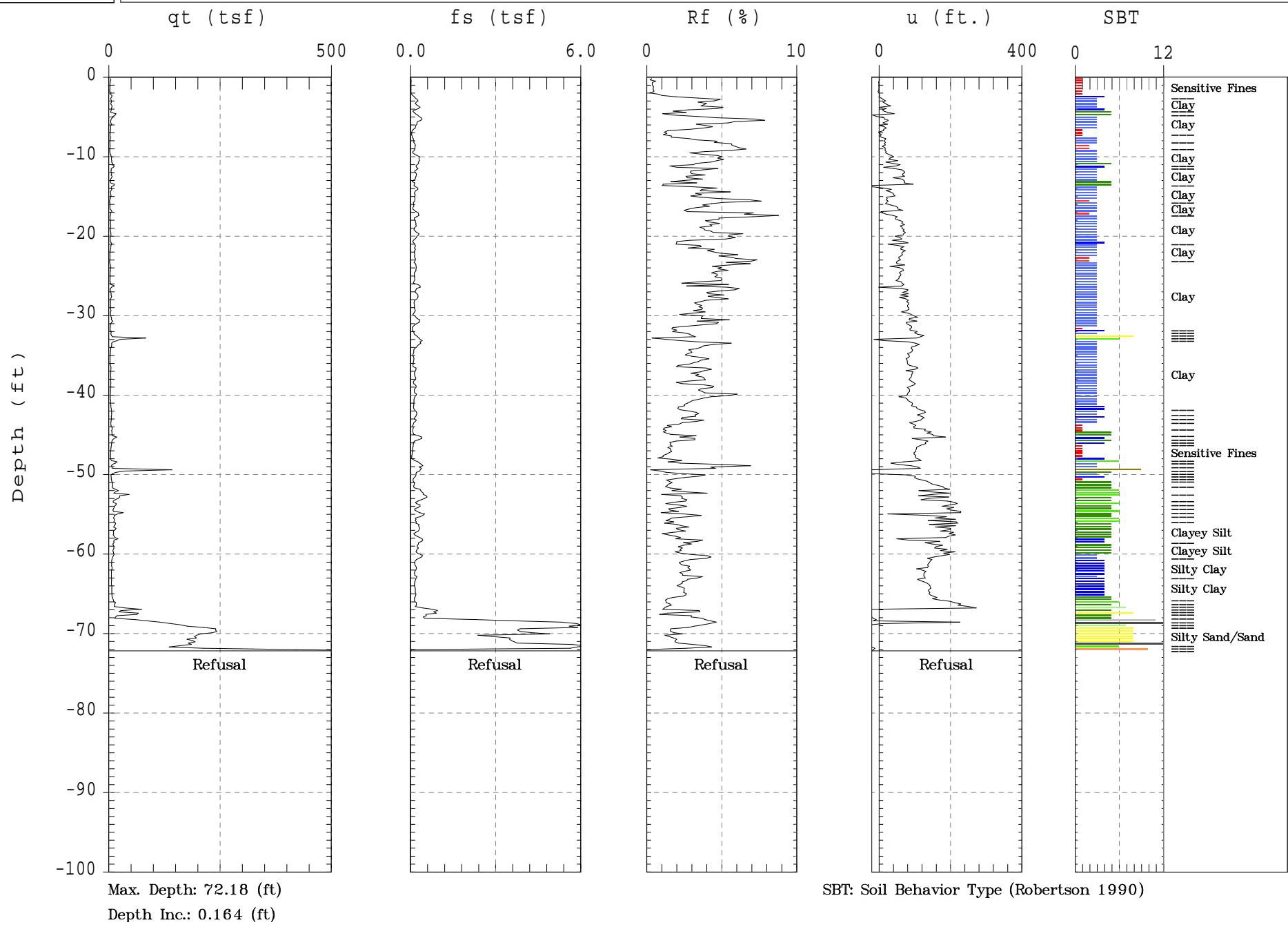


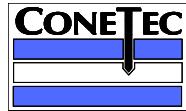


Parsons Engineering

Sounding:CPT-65
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 14:15

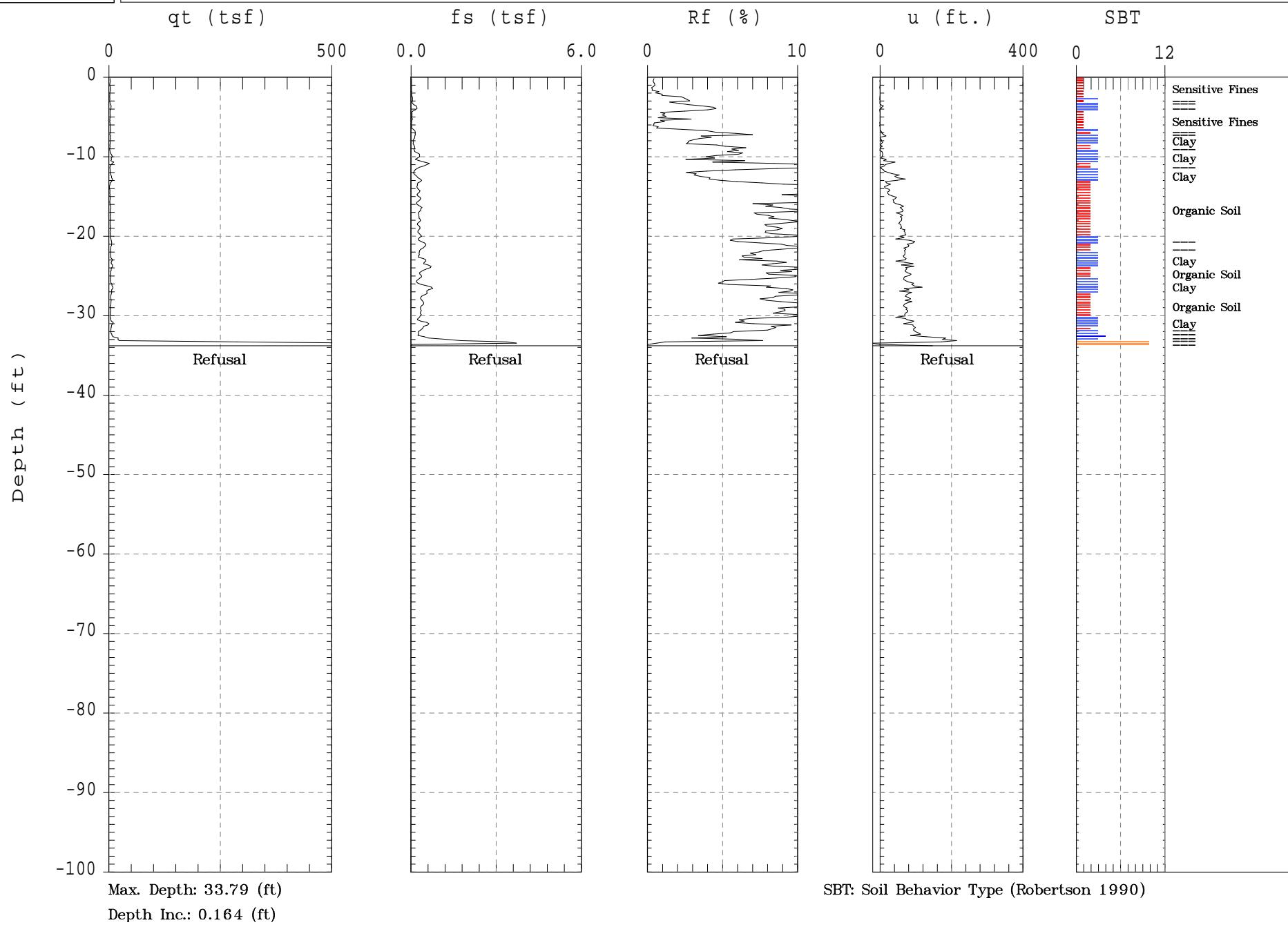


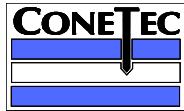


Parsons Engineering

Sounding:CPT-66
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 15:09

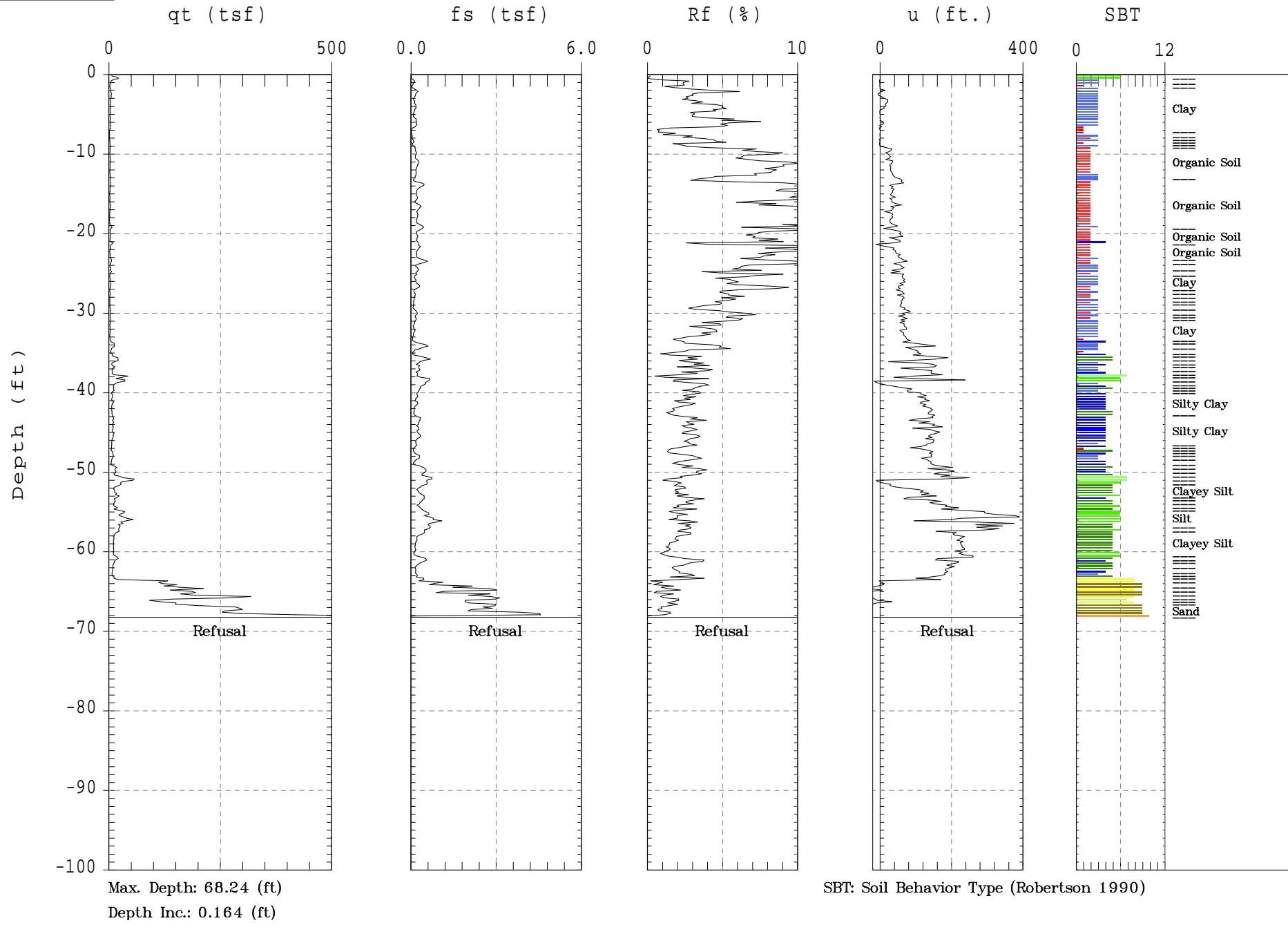


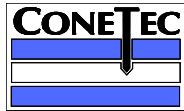


Parsons Engineering

Sounding:CPT-67
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 15:43

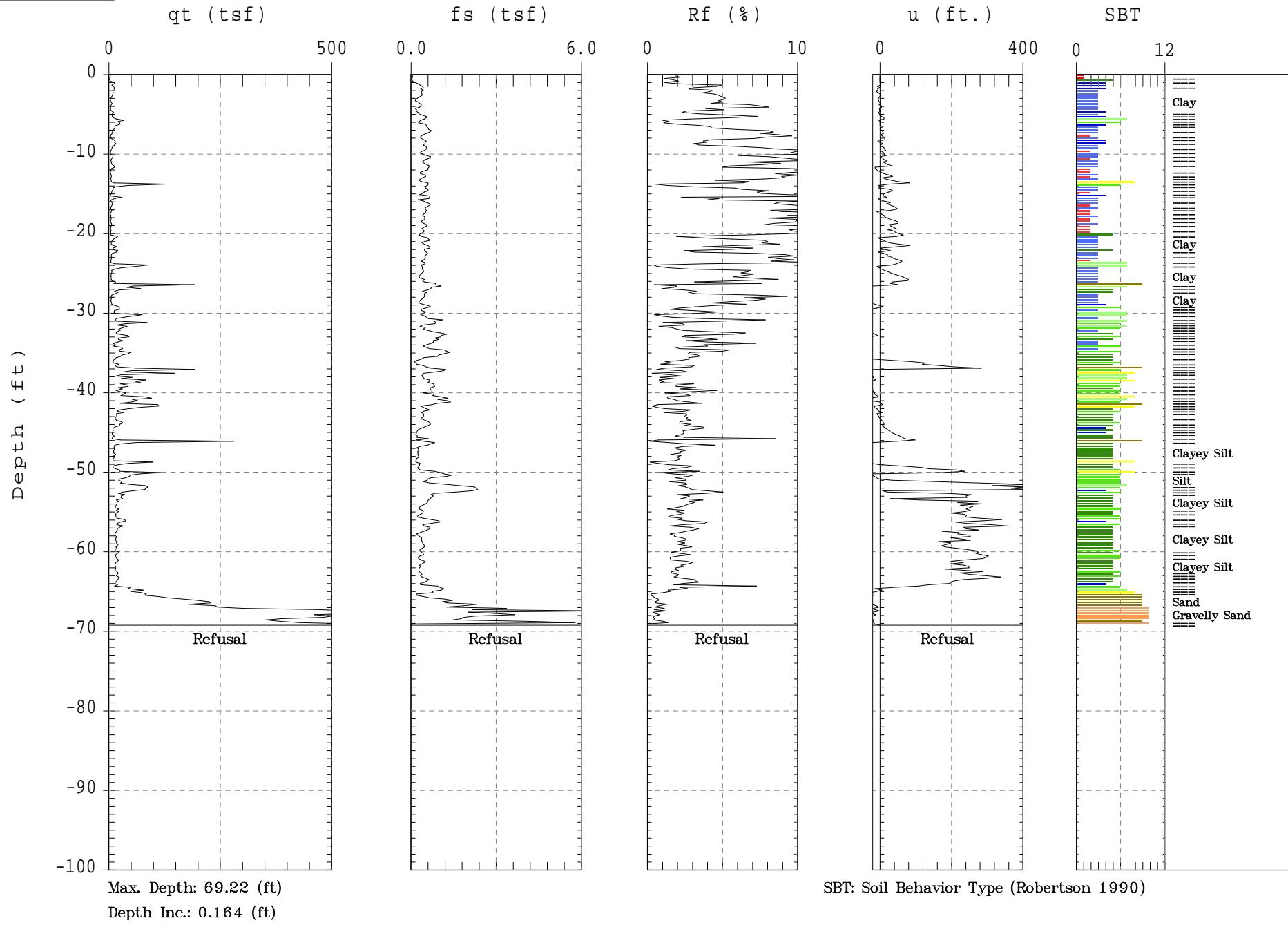


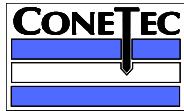


Parsons Engineering

Sounding:CPT-68
Site:Wastebed 13

Piezocene:20 TON AD179
Date:10:04:06 16:39

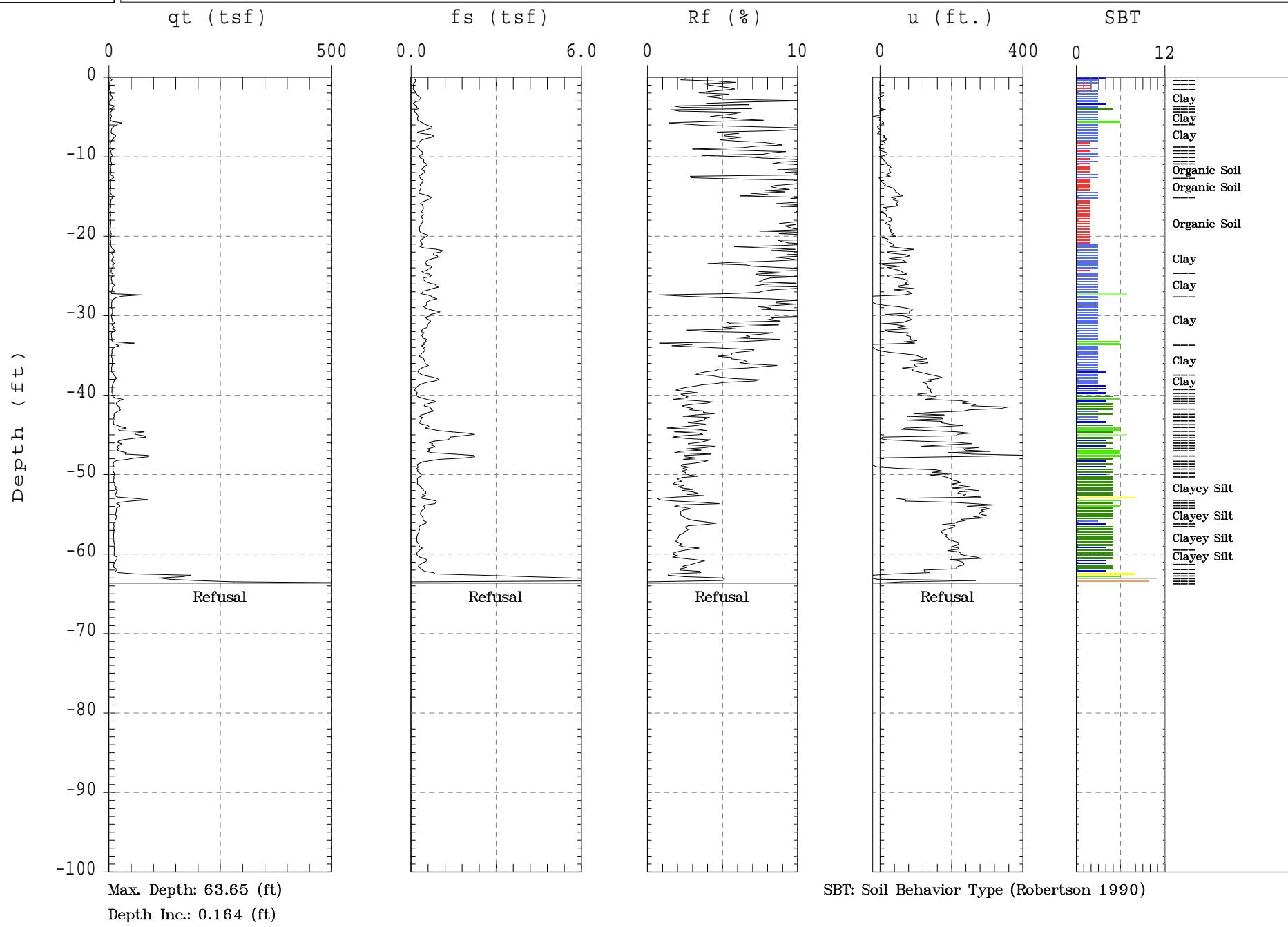


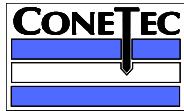


Parsons Engineering

Sounding:CPT-69
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 12:25

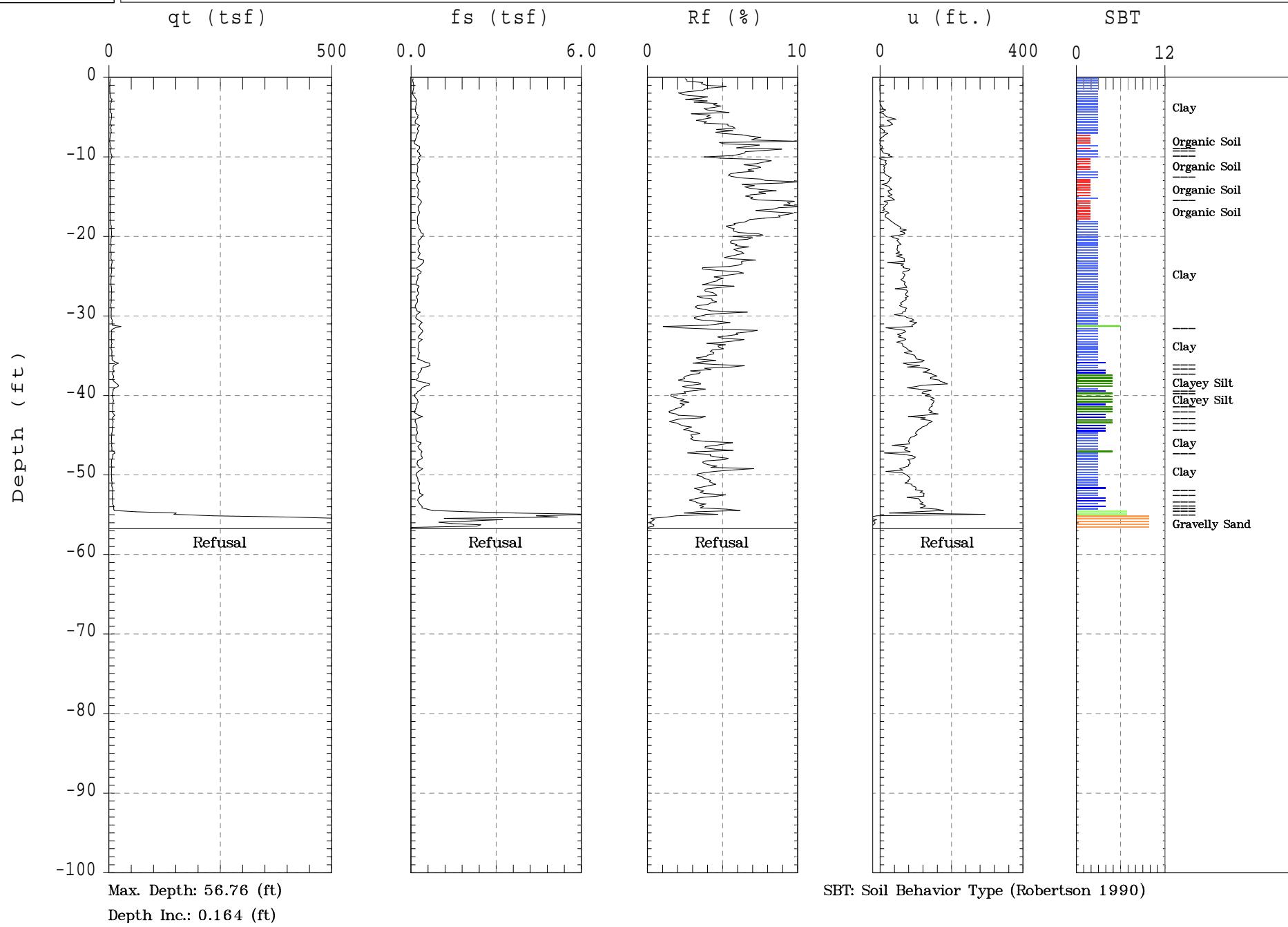


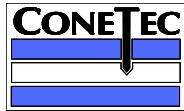


Parsons Engineering

Sounding:CPT-70
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 16:54

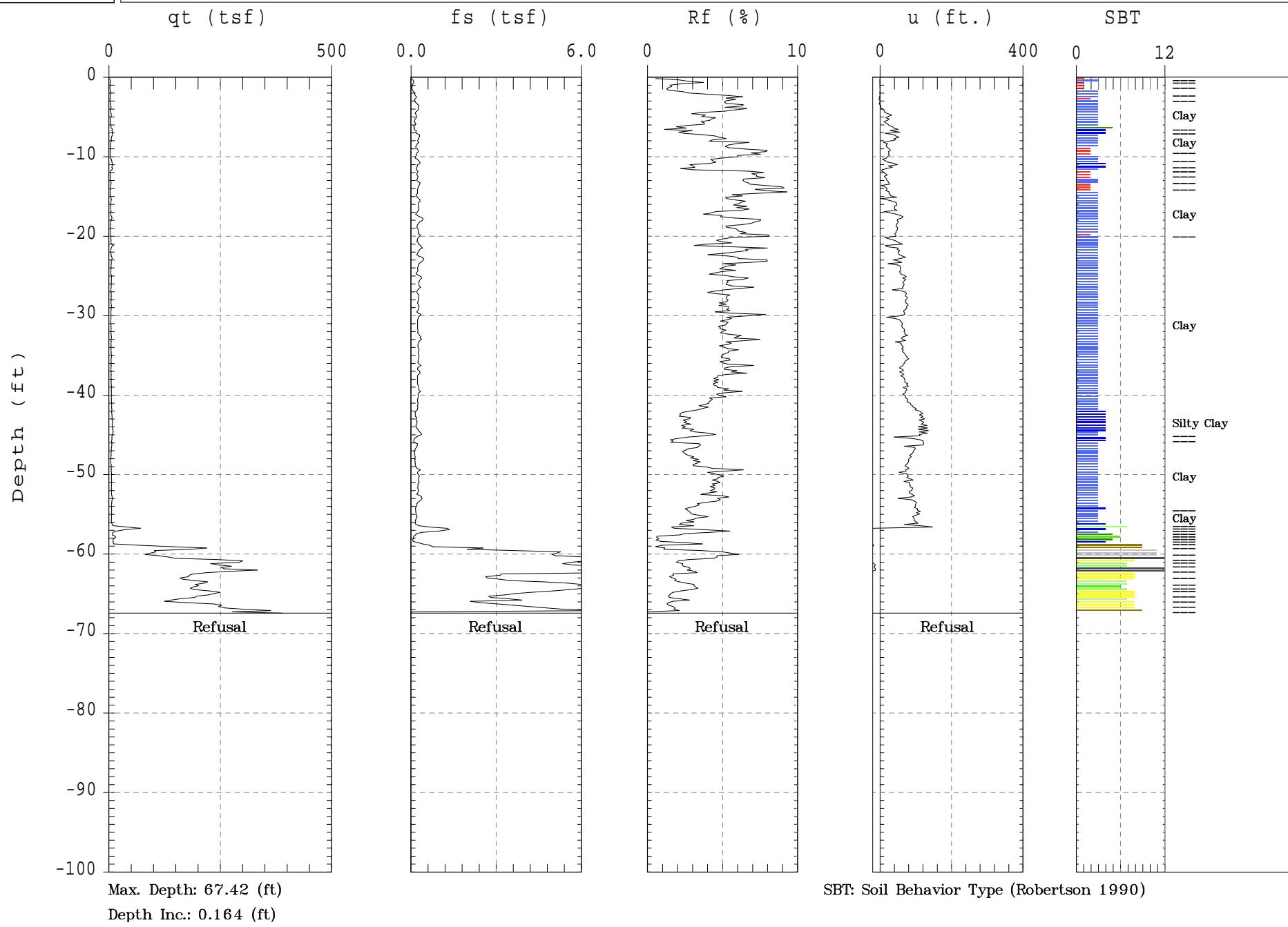


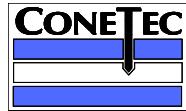


Parsons Engineering

Sounding:CPT-71
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:26:06 13:21

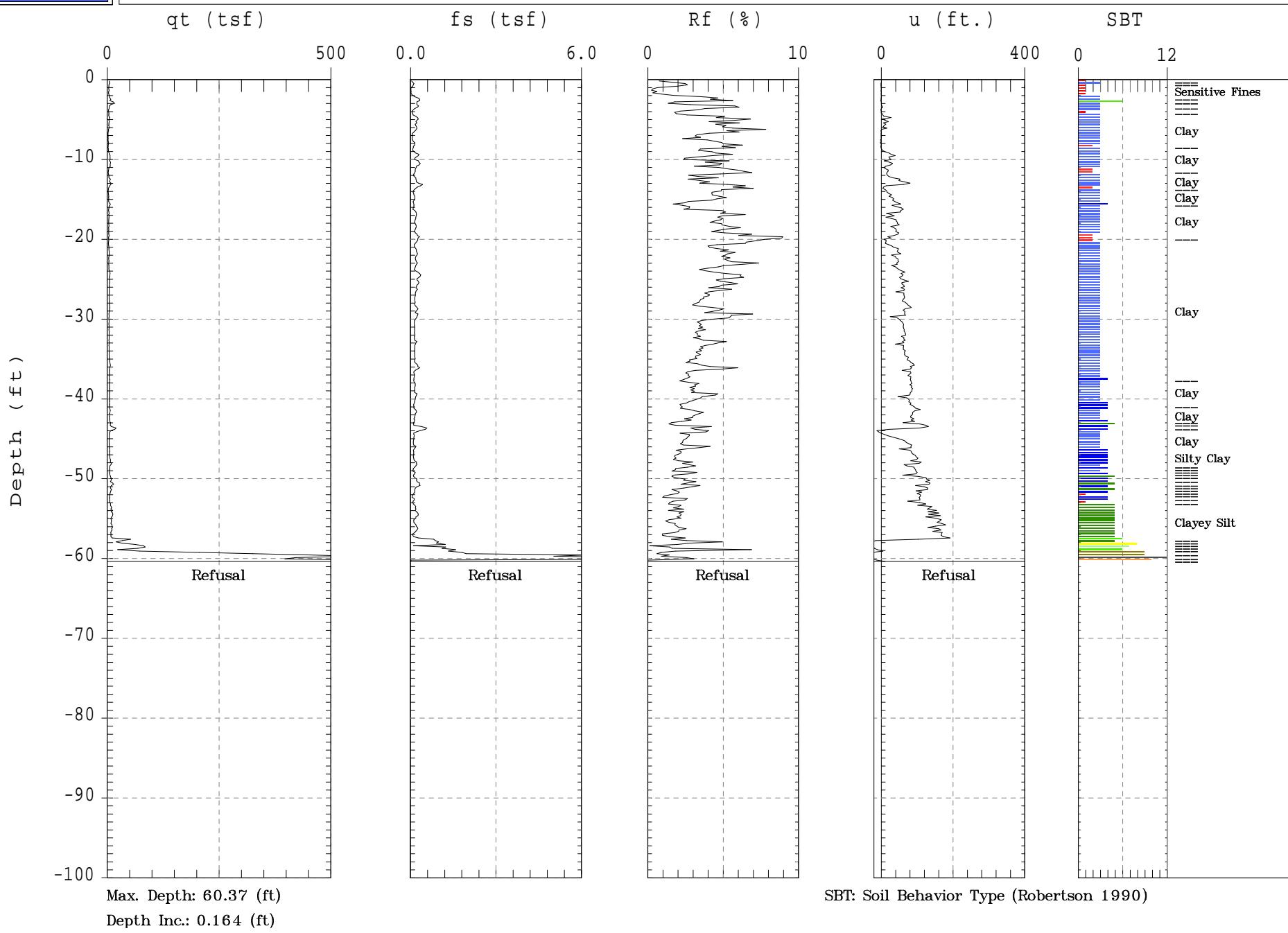


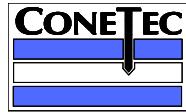


Parsons Engineering

Sounding:CPT-72
Site:Wastebed 13

Piezocone:20 TON AD171
Date:09:26:06 16:04

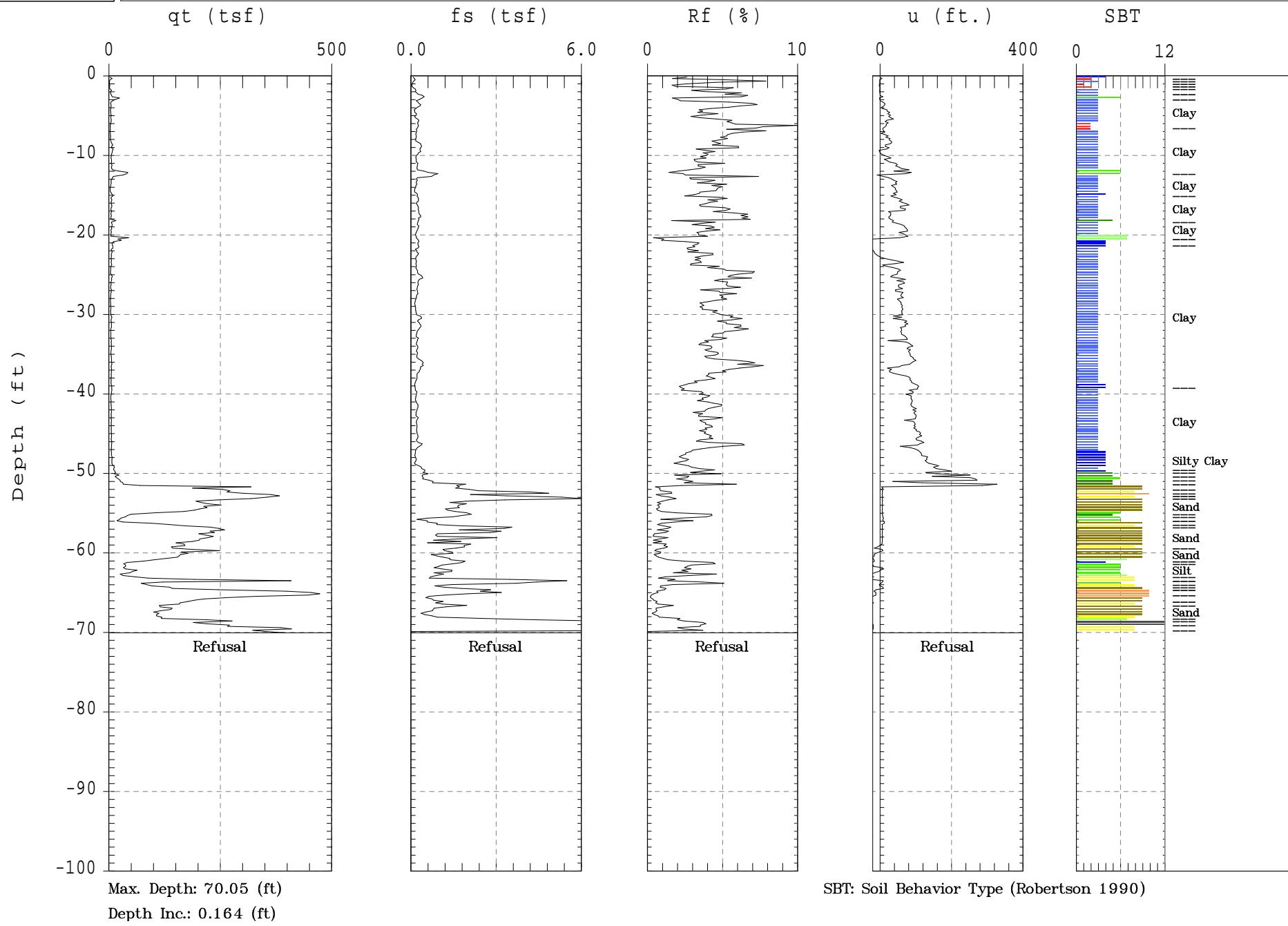


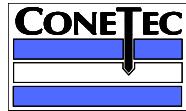


Parsons Engineering

Sounding:CPT-73
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 08:49

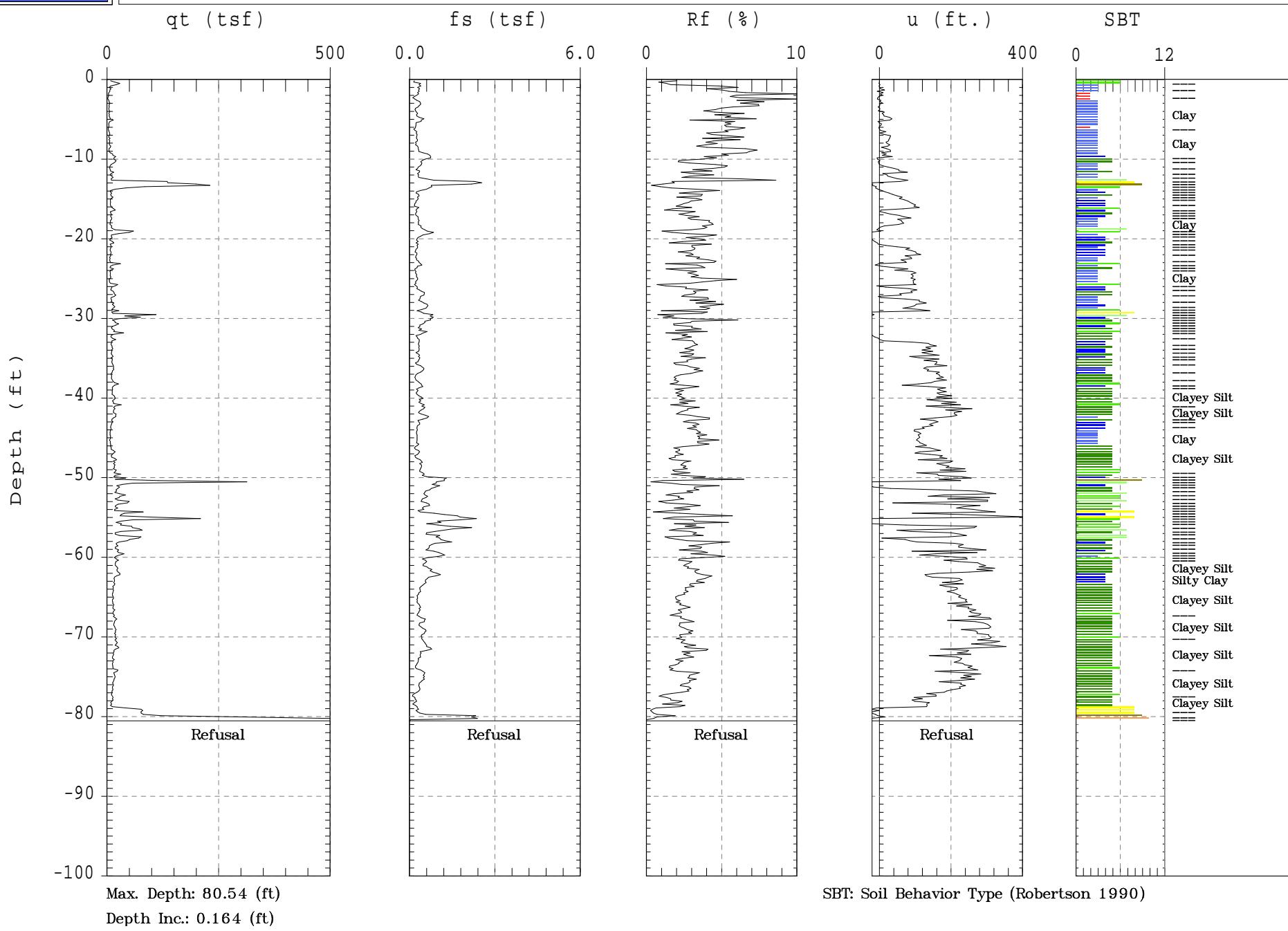


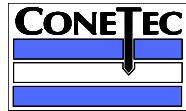


Parsons Engineering

Sounding:CPT-74
Site:Wastebed 13

Piezocone:20 TON AD171
Date:09:22:06 07:40

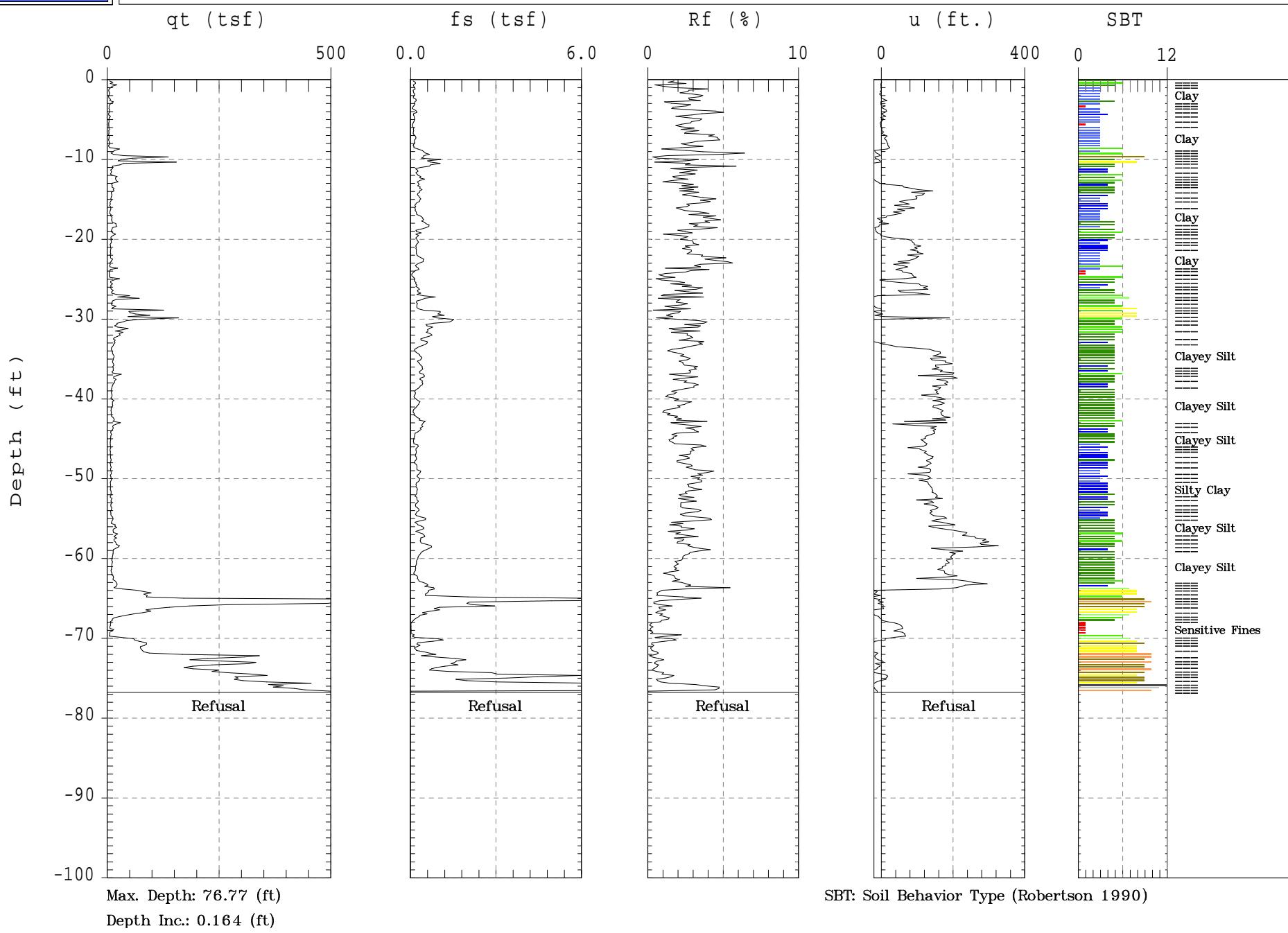


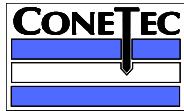


Parsons Engineering

Sounding:CPT-75
Site:Wastebed 13

Piezocone:20 TON AD171
Date:09:21:06 16:04

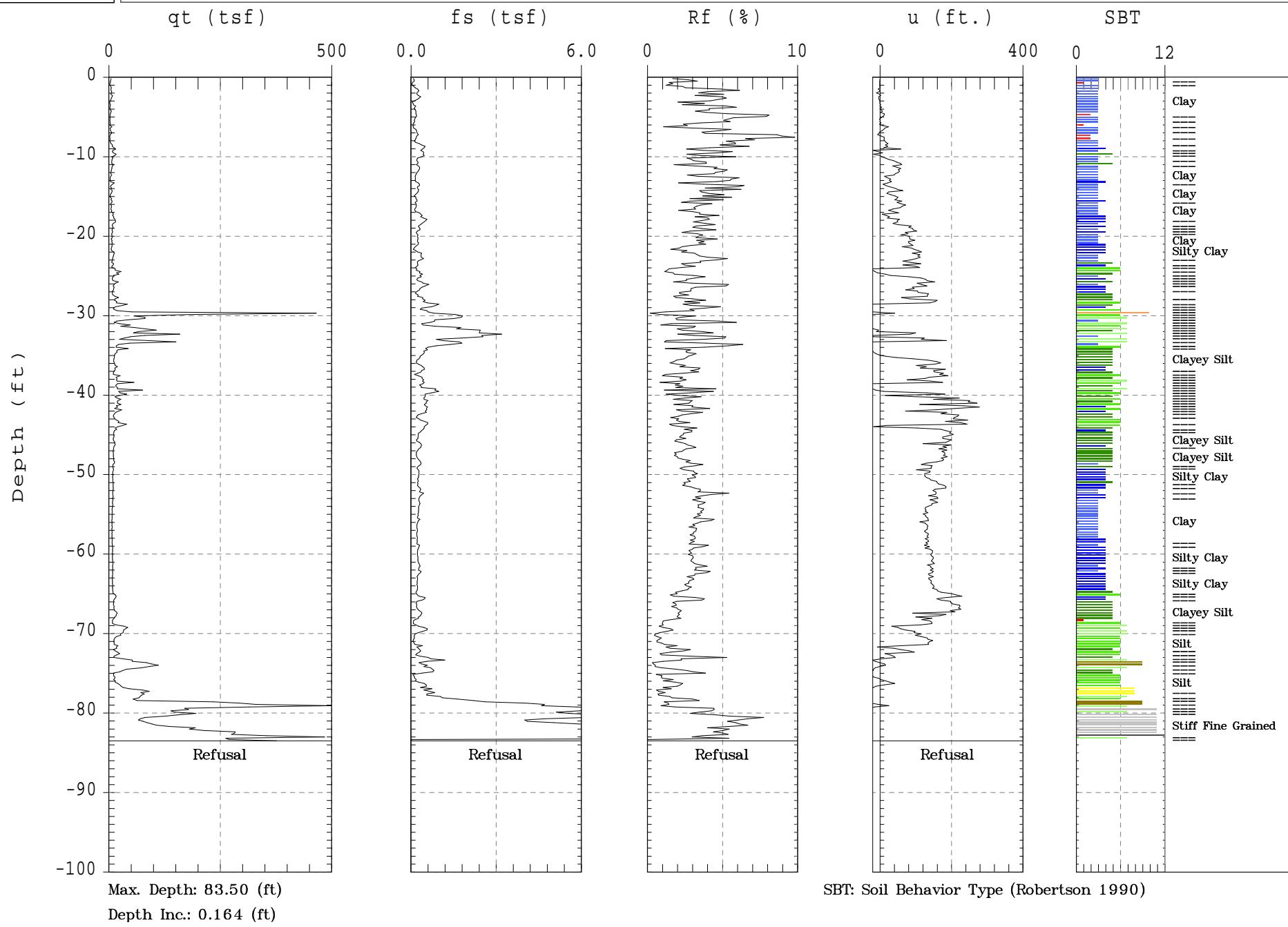


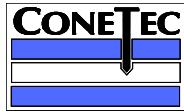


Parsons Engineering

Sounding:CPT-76
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 13:58

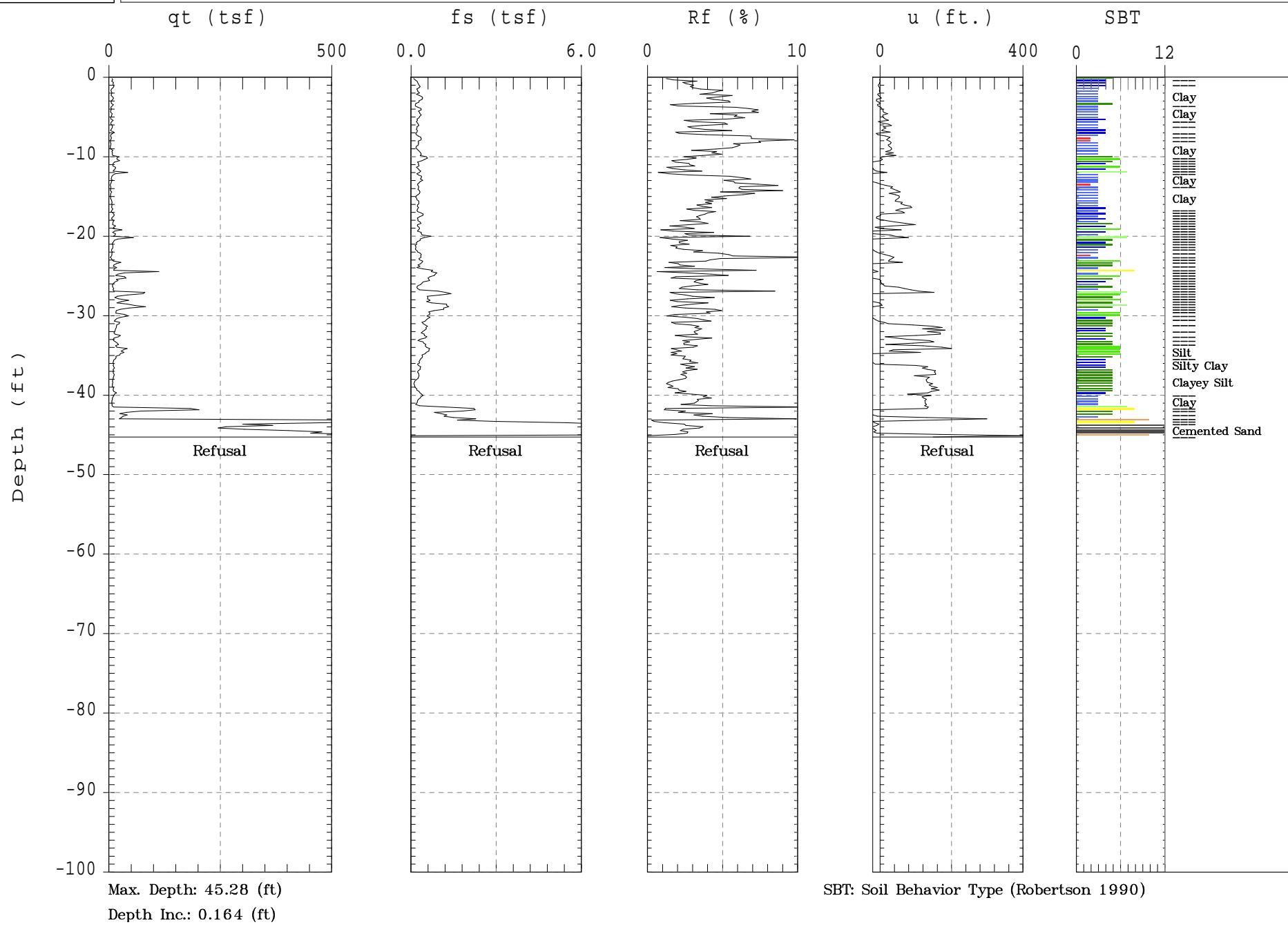


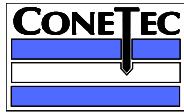


Parsons Engineering

Sounding:CPT-77
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 15:16

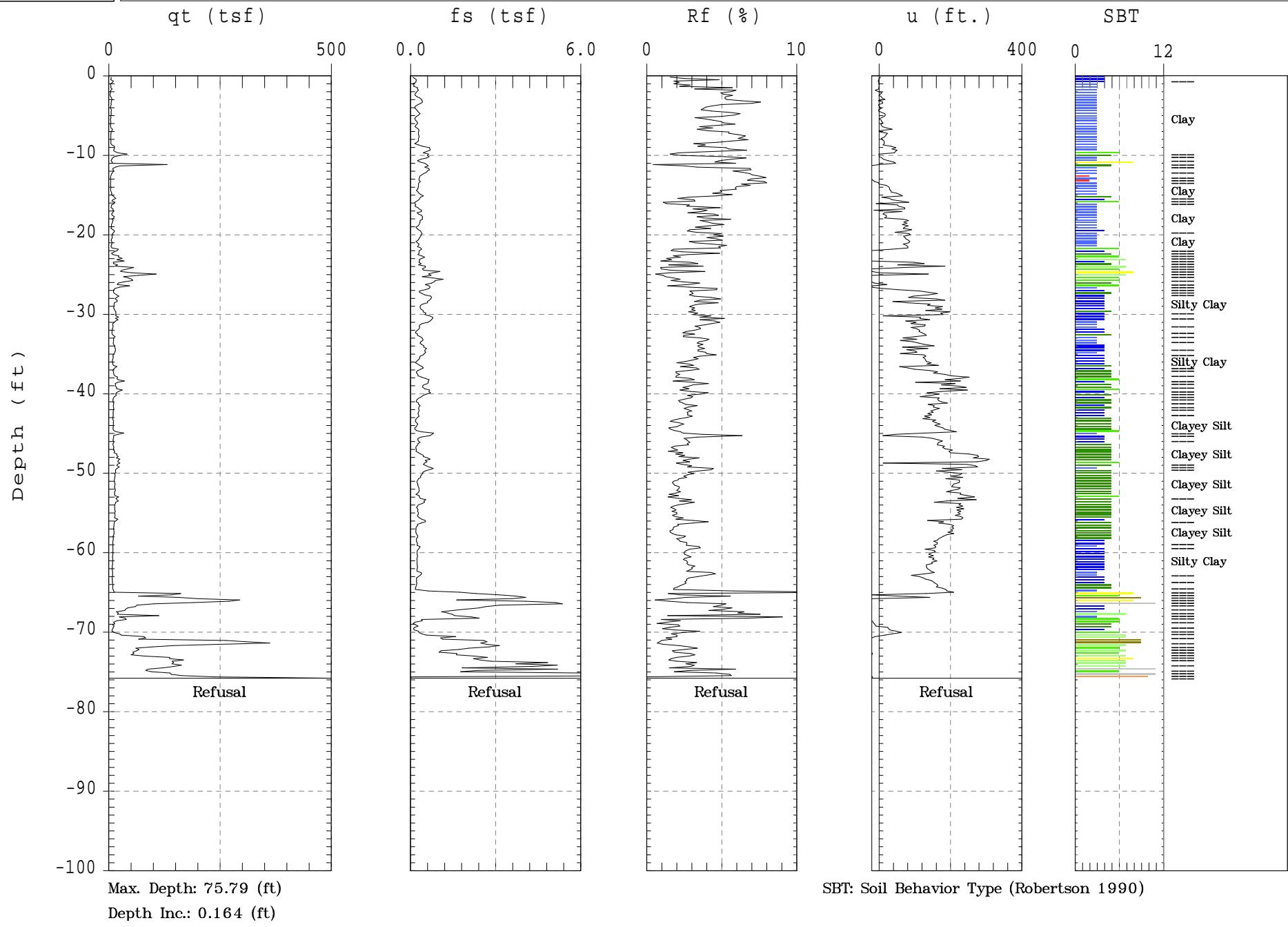


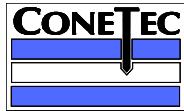


Parsons Engineering

Sounding:CPT-78
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 08:05

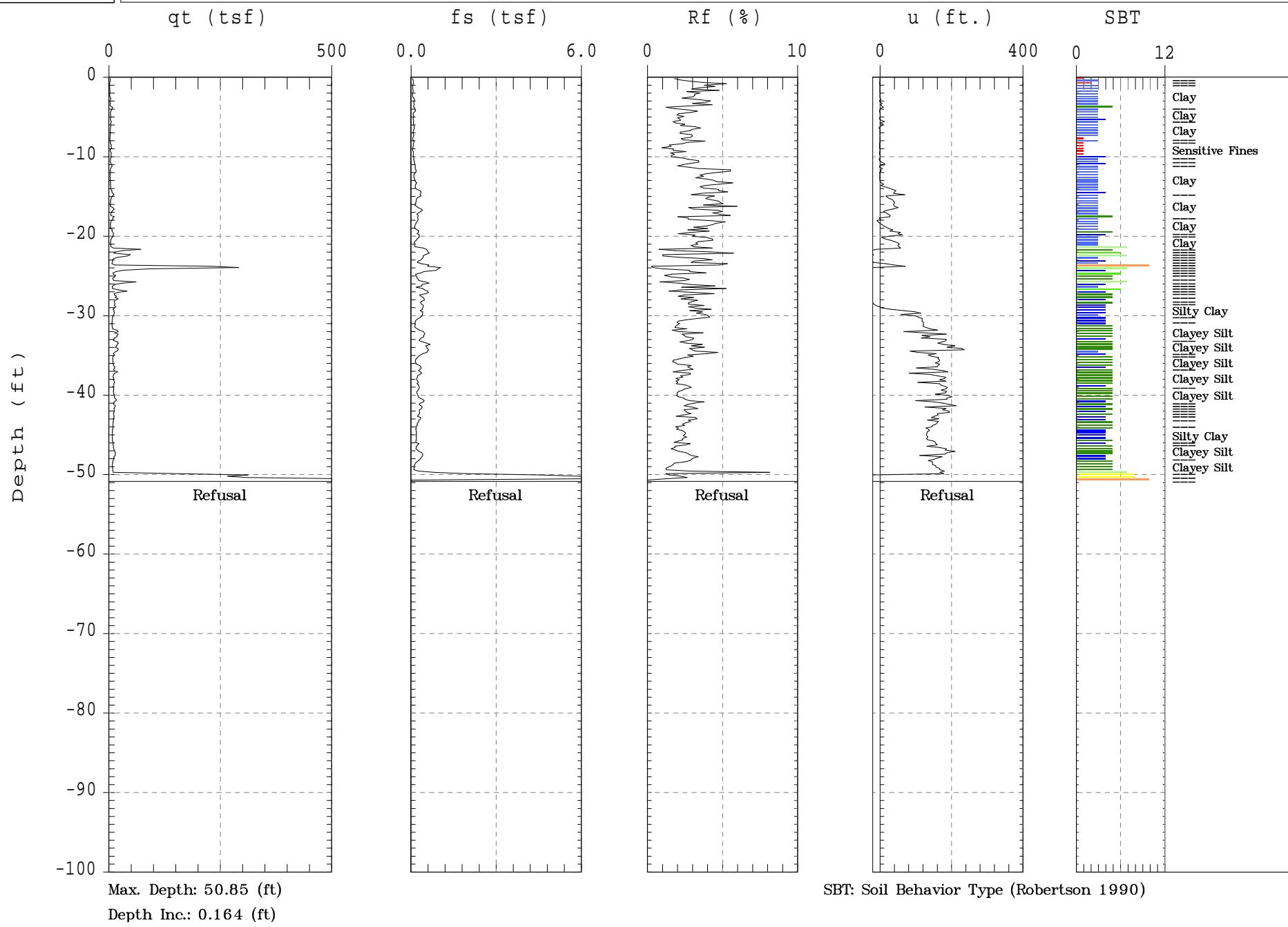


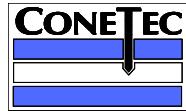


Parsons Engineering

Sounding:CPT-79
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 07:21

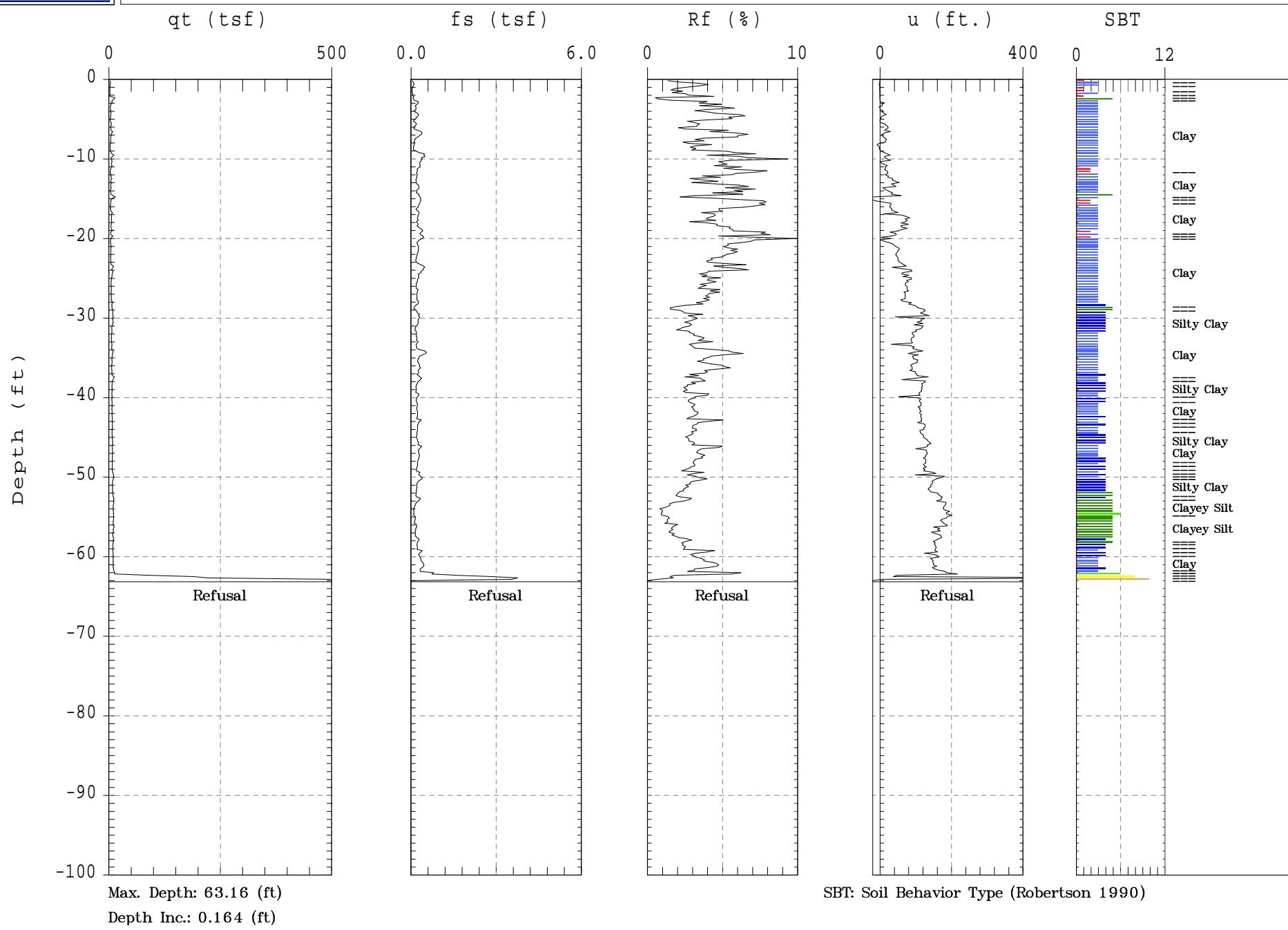


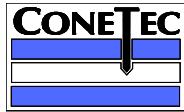


Parsons Engineering

Sounding:CPT-80
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 10:01

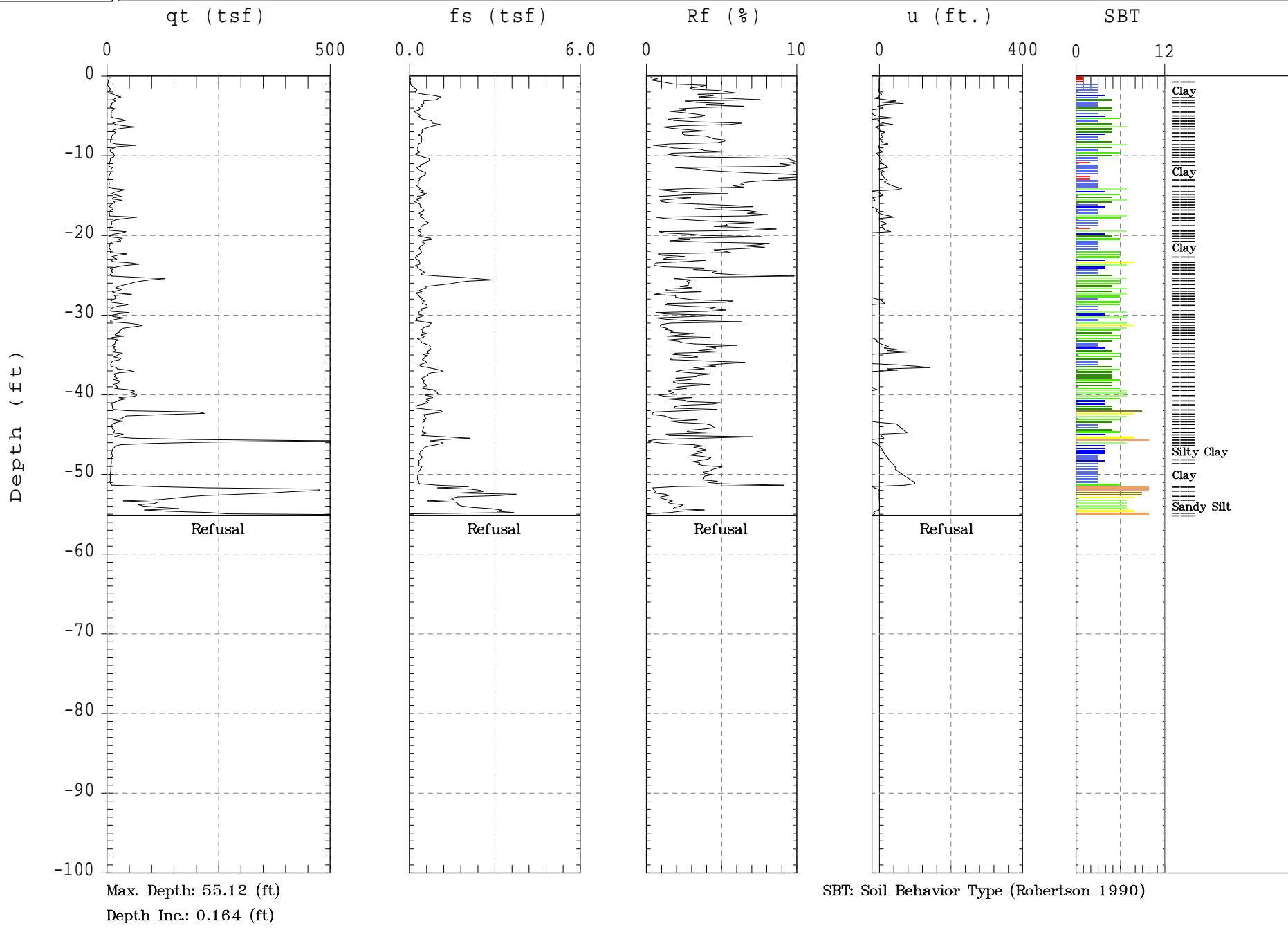


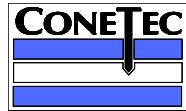


Parsons Engineering

Sounding:CPT-81
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:25:06 15:06

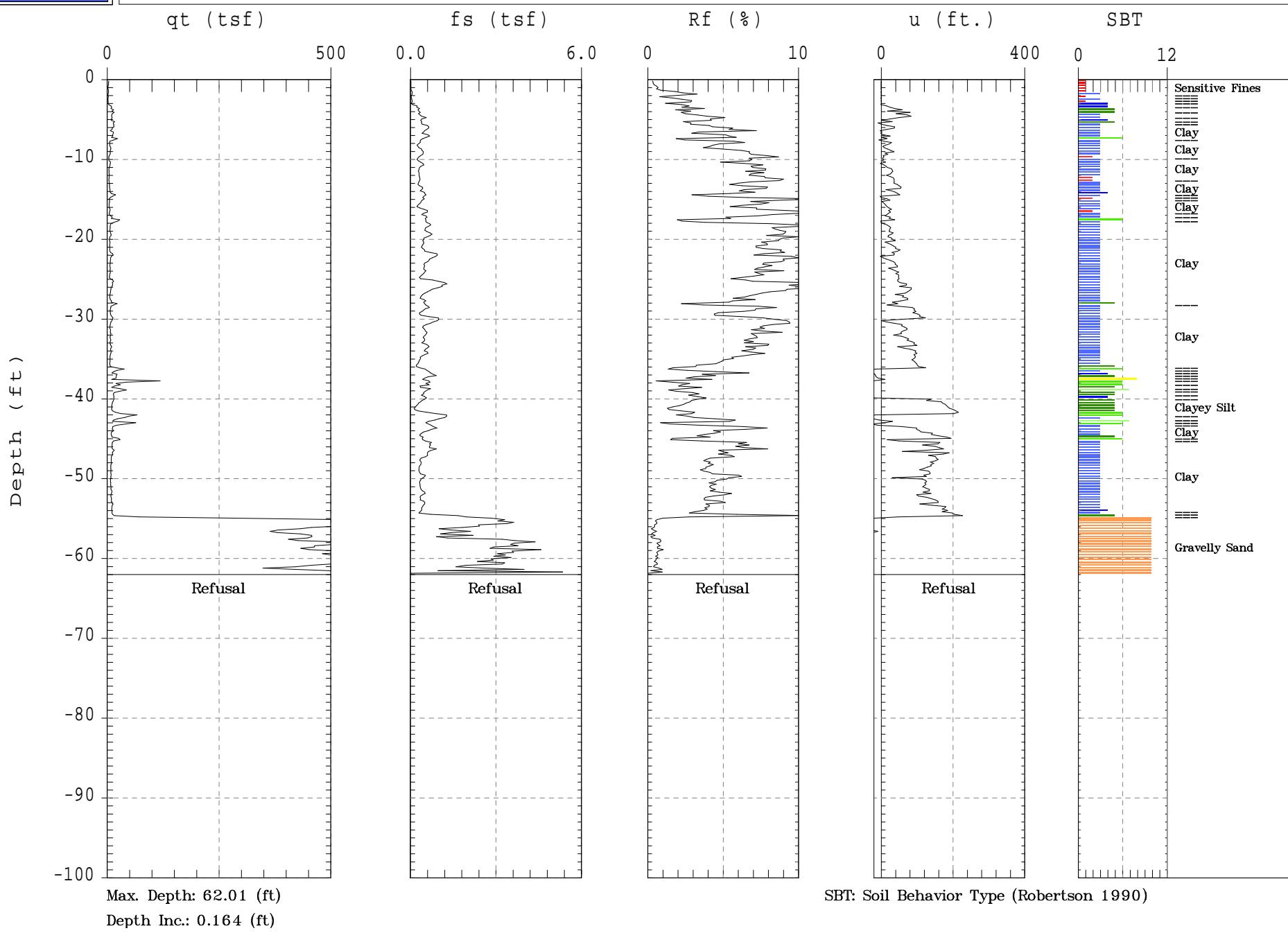


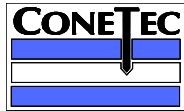


Parsons Engineering

Sounding:CPT-82
Site:Wastebed 13

Piezocone:20 TON AD171
Date:09:25:06 13:09

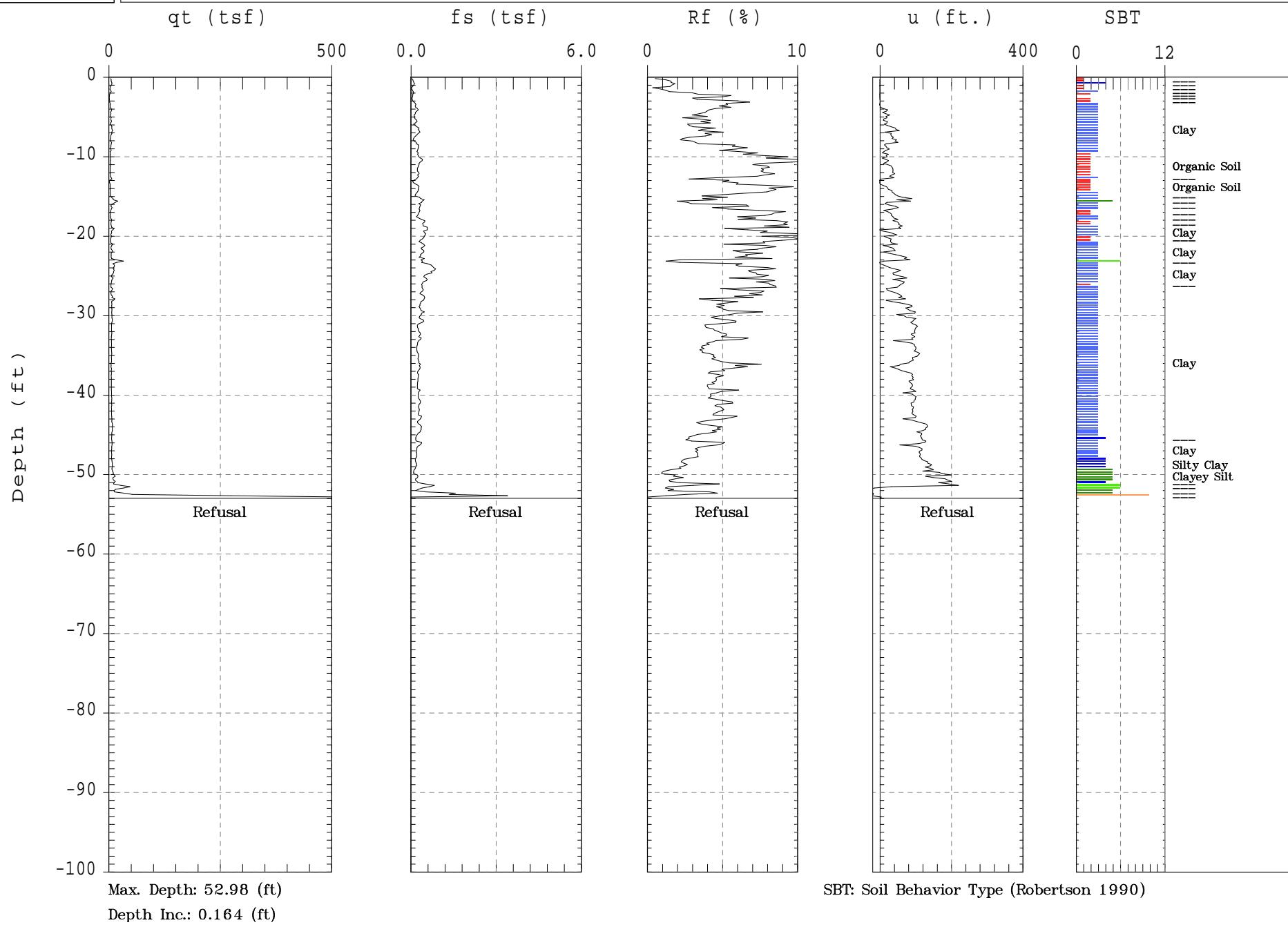


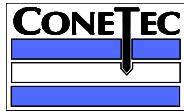


Parsons Engineering

Sounding:CPT-83
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 11:02

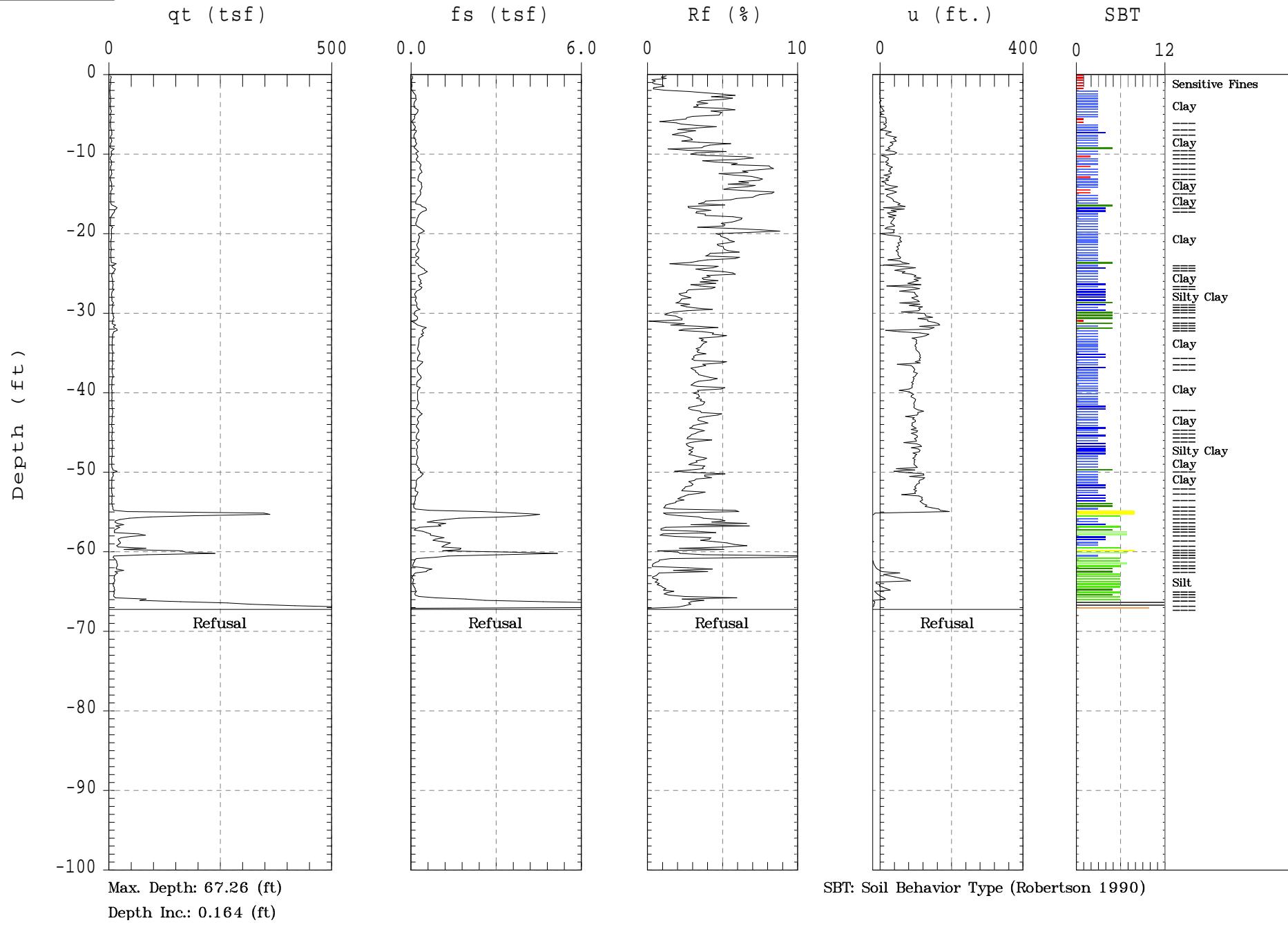


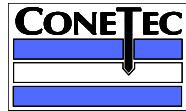


Parsons Engineering

Sounding:CPT-84
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:22:06 12:10

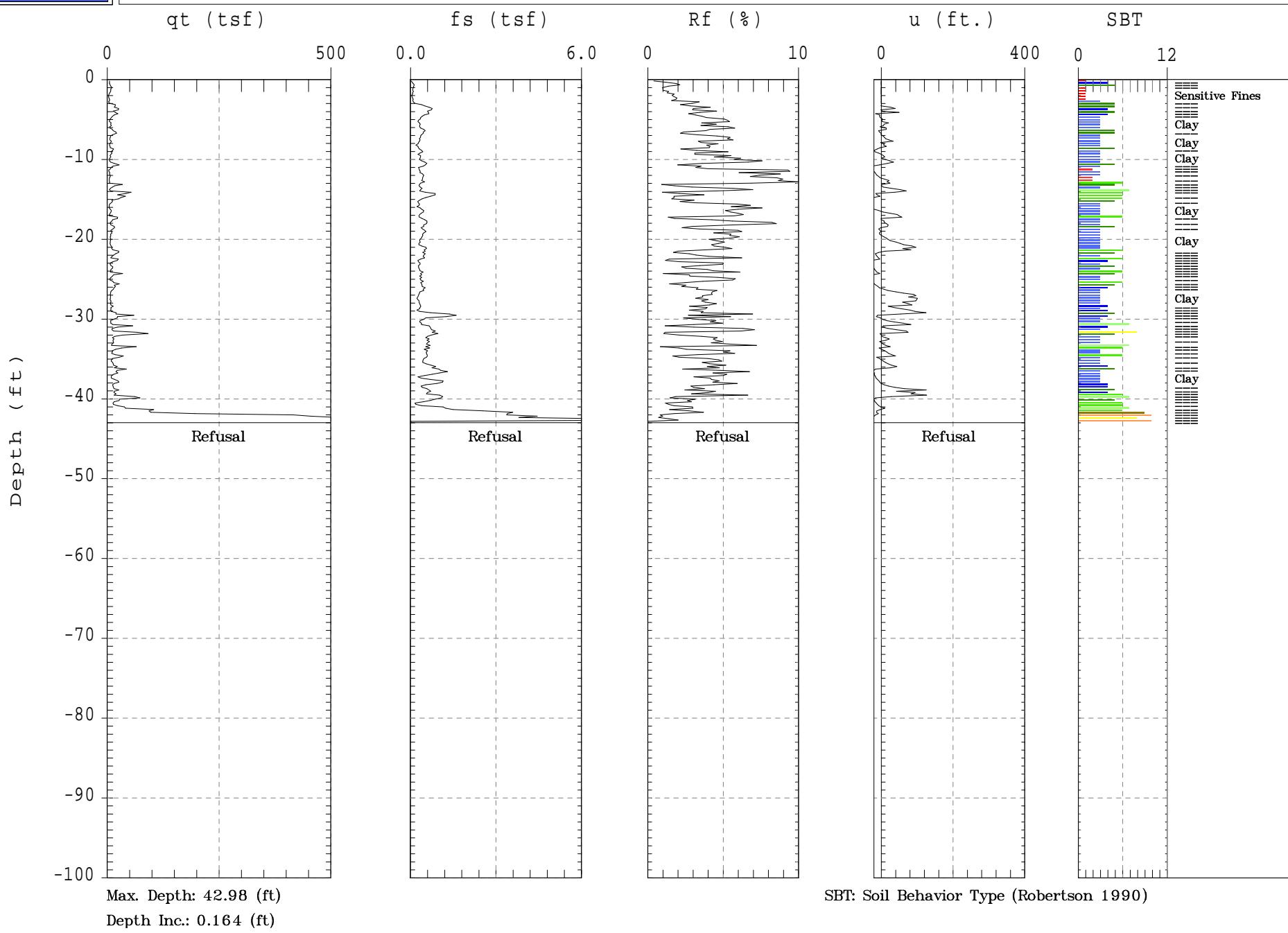


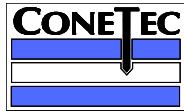


Parsons Engineering

Sounding:CPT-85
Site:Wastebed 13

Piezocone:20 TON AD171
Date:09:22:06 13:16

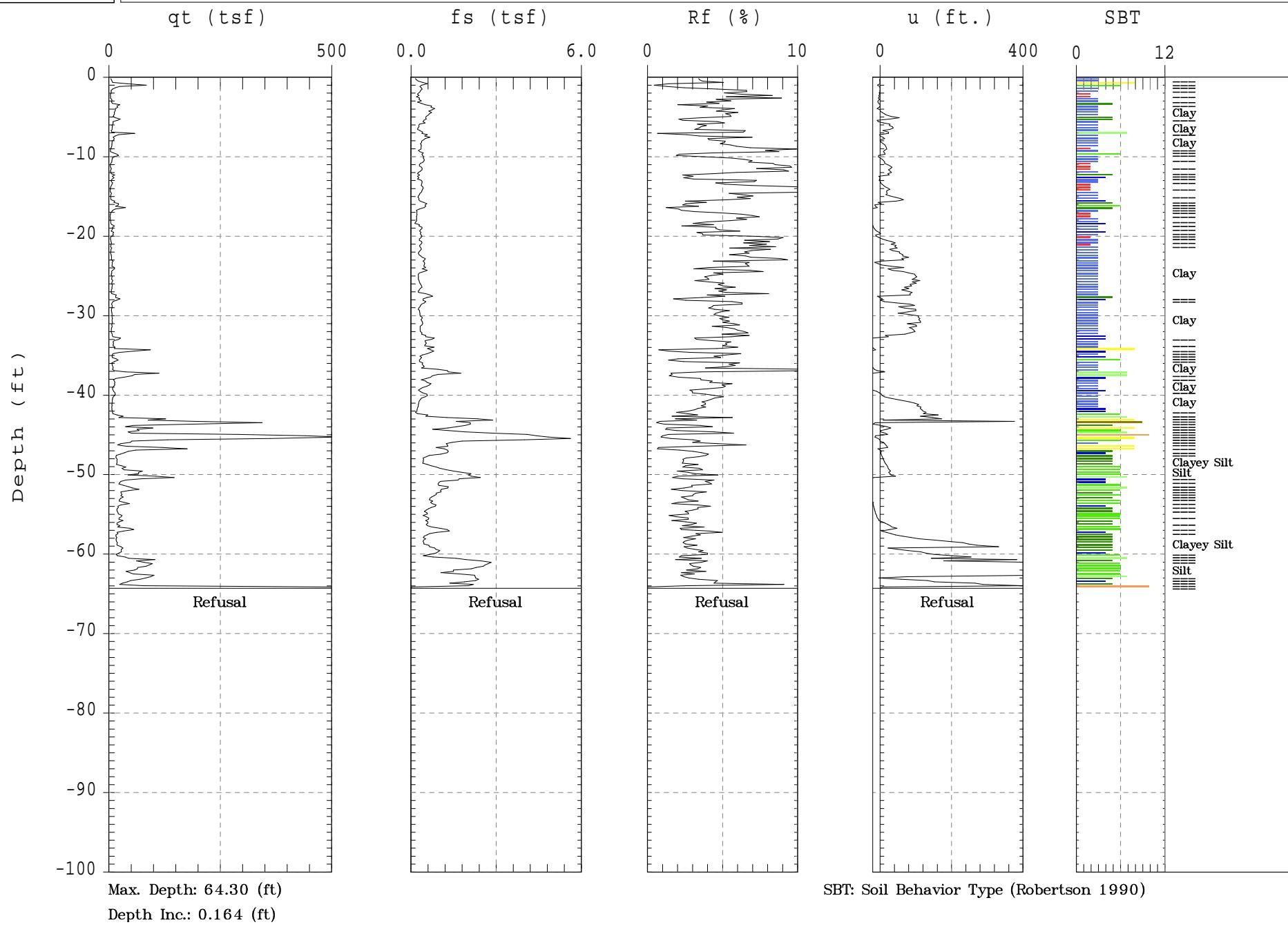


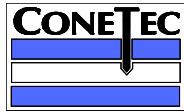


Parsons Engineering

Sounding:CPT-86
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:21:06 12:26

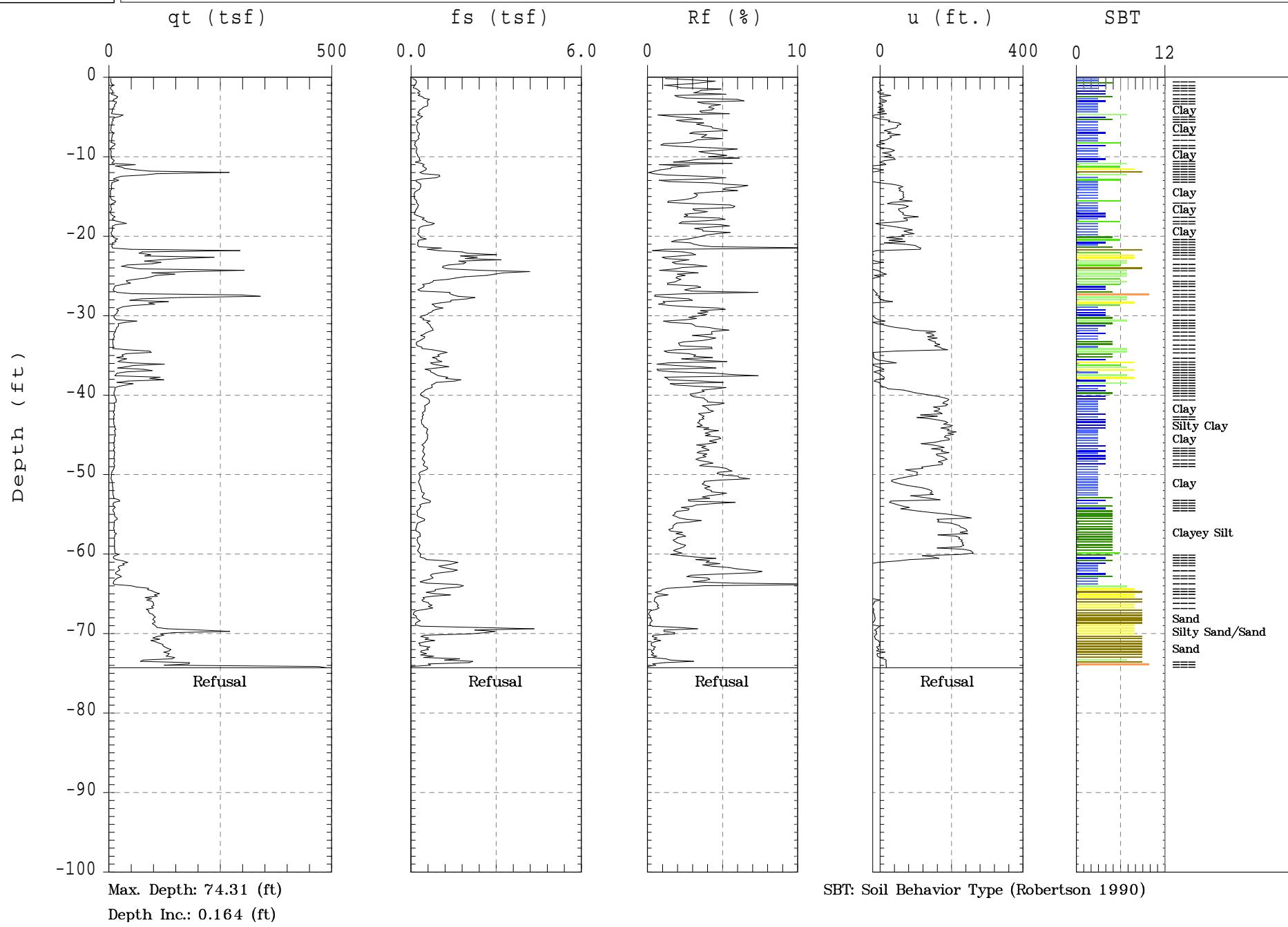




Parsons Engineering

Sounding:CPT-87
Site:Wastebed 13

Piezocene:20 TON AD171
Date:09:27:06 11:11





ConeTec

Environmental and Geotechnical Site Investigation Contractors

ConeTec Interpretations as of June 30, 2004 (Release 1.22A)

ConeTec's interpretation routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the program and does not assume liability for any use of the results in any design or review. Representative hand calculations should be made for any parameter that is critical for design purposes. The end user of the interpreted output should also be fully aware of the techniques and the limitations of any method used in this program. The purpose of this document is to inform the user as to which methods were used and what the appropriate papers and/or publications are for further reference.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (e.g. 0.20m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. Since all ConeTec cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, f_s , are not required.

The tip correction is: $q_t = q_c + (1-a) \cdot u_2$

where: q_t is the corrected tip resistance

q_c is the recorded tip resistance

u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)

a is the Net Area Ratio for the cone (typically 0.85 for ConeTec cones)

The total stress calculations are based on soil unit weights that have been assigned to the Soil Behavior Type zones, from a user defined unit weight profile or by using a single value throughout the profile. Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). For over water projects the effects of the column of water have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at mud line).

Details regarding the interpretation methods for all of the interpreted parameters are provided in Table 1. The appropriate references cited in Table 1 are listed in Table 2. Where methods are based on charts or techniques that are too complex to describe in this summary the user should refer to the cited material.

The estimated Soil Behavior Types (normalized and non-normalized) are based on the charts developed by Robertson and Campanella shown in Figures 1 and 2. The Bq classification charts are not reproduced in this document but can be reviewed in Lunne, Robertson and Powell (1997) or Robertson (1990).

Where the results of a calculation/interpretation are declared '*invalid*' the value will be represented by the text strings "-9999" or "-9999.0". In some cases the value 0 will be used. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).
2. Where the interpretation method is inappropriate, for example, drained parameters in an undrained material (and vice versa).
3. Where interpretation input values are beyond the range of the referenced charts or specified limitations of the interpretation method.
4. Where pre-requisite or intermediate interpretation calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the interpreted parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are often delivered in one (or more) of the following three formats:

File Type	Typical Extensions	Description
Printable	IFP, NLP	ASCII files formatted for direct printing either by copying to a printer port, through a text editor or through a dedicated printing routine (such as ConeTec's CTPRINT). Typically formatted for 132 columns wide and 70 lines per page. Any printer would need to be set to have a compressed font (16cpi) as its default.
Importable	IFI, NLI	Tab delimited ASCII files (not for use with text editors) meant for importing into spreadsheet and database applications (e.g. Excel, Lotus, Quattro, Access). Some column and cell formatting maybe required depending on the quality of the application's import utility.
Spreadsheet	XLS	IFI, NLI files exported directly to Excel format. Column and cell formatting has been done. Header information is exported to start in Column C allowing the depth columns A and/or B to be duplicated on each printed page without repetition of part of the header information.

Table 1
CPT Interpretation Methods

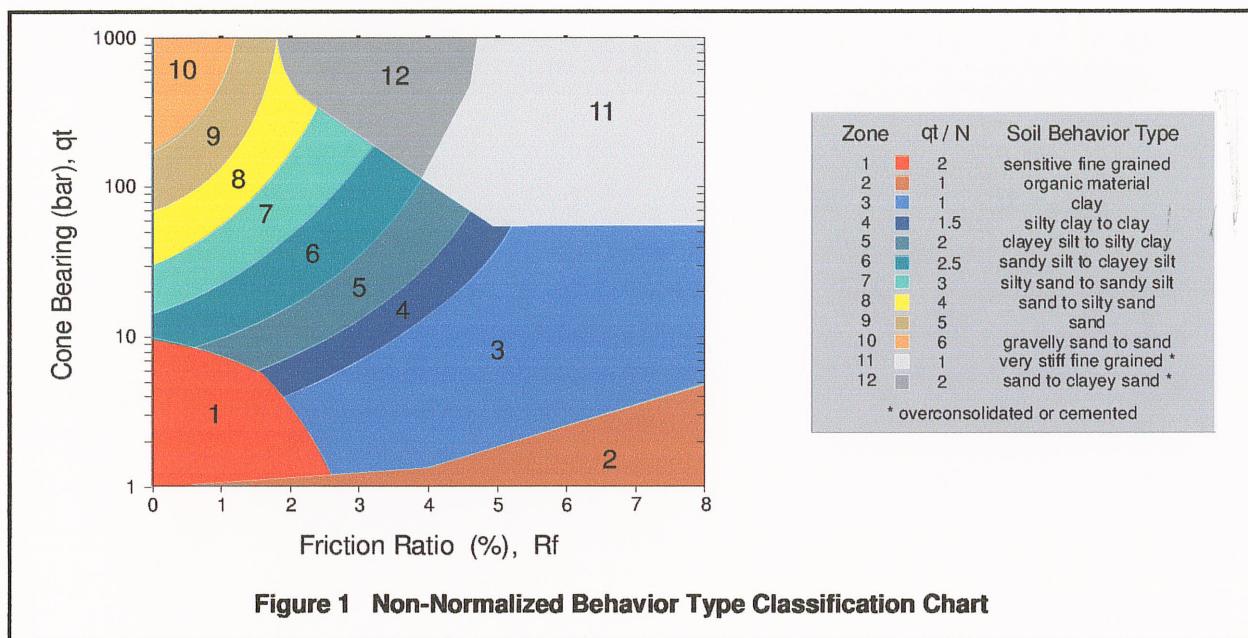
Interpreted Parameter	Description	Equation	Ref
Depth	Mid Layer Depth <i>(where interpretations are done at each point then Mid Layer Depth = Recorded Depth)</i>	$Depth \text{ (Layer Top)} + Depth \text{ (Layer Bottom)} / 2.0$	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client	Elevation = Collar Elevation - Depth	
Avgqc	Averaged recorded tip value (q_c)	$\text{Avgqc} = \frac{1}{n} \sum_{i=1}^n q_c$ <i>n=1 when interpretations are done at each point</i>	
Avgqt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a) \cdot u$	$\text{Avgqt} = \frac{1}{n} \sum_{i=1}^n q_t$ <i>n=1 when interpretations are done at each point</i>	
Avgfs	Averaged sleeve friction (f_s)	$\text{Avgfs} = \frac{1}{n} \sum_{i=1}^n f_s$ <i>n=1 when interpretations are done at each point</i>	
AvgRf	Averaged friction ratio (Rf) where friction ratio is defined as: $Rf = 100\% \cdot \frac{f_s}{q_t}$	$\text{AvgRf} = 100\% \cdot \frac{\text{Avgfs}}{\text{Avgqt}}$ <i>n=1 when interpretations are done at each point</i>	
Avgu	Averaged dynamic pore pressure (u)	$\text{Avgu} = \frac{1}{n} \sum_{i=1}^n u_i$ <i>n=1 when interpretations are done at each point</i>	
AvgRes	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$\text{Avgu} = \frac{1}{n} \sum_{i=1}^n \text{RESISTIVITY}_i$ <i>n=1 when interpretations are done at each point</i>	

Interpreted Parameter	Description	Equation	Ref
AvgUVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$\text{Avgu} = \frac{1}{n} \sum_{i=1}^n \text{UVIF}_i$ <i>n=1 when interpretations are done at each point</i>	
AvgTemp	Averaged Temperature (this data is not always available since it is a specialized test)	$\text{Avgu} = \frac{1}{n} \sum_{i=1}^n \text{TEMPERATURE}_i$ <i>n=1 when interpretations are done at each point</i>	
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$\text{Avgu} = \frac{1}{n} \sum_{i=1}^n \text{GAMMA}_i$ <i>n=1 when interpretations are done at each point</i>	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	2, 5
U.Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile	See references	5
T. Stress	Total vertical overburden stress at Mid Layer Depth.	$T\text{Stress} = \sum_{i=1}^n \gamma_i h_i$	
σ_v'	<i>A layer is defined as the averaging interval specified by the user. For data interpreted at each point the Mid Layer Depth is the same as the recorded depth.</i>	where γ_i is layer unit weight h_i is layer thickness	
E. Stress			
σ_v'	Effective vertical overburden stress at Mid Layer Depth	$E\text{stress} = T\text{stress} - u_{eq}$	
Ueq	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic from water table depth 2) user supplied profile	For hydrostatic option: $u_{eq} = \gamma_w \cdot (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
Cn	SPT N ₆₀ overburden correction factor	$Cn = (\sigma_v')^{-0.5}$ where σ_v' is in tsf $0.5 < C_n < 2.0$	
N ₆₀	SPT N value at 60% energy calculated from qt/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	See Figure 1	4, 5
(N ₁) ₆₀	SPT N ₆₀ value corrected for overburden pressure	$(N_1)_{60} = Cn \cdot N_{60}$	4
N _{60lc}	SPT N ₆₀ values based on the lc parameter	$(qt/\text{pa})/N_{60} = 8.5 (1 - lc/4.6)$	5
(N ₁) _{60lc}	SPT N ₆₀ value corrected for overburden pressure (using N ₆₀ lc). User has 2 options.	1) $(N_1)_{60lc} = Cn \cdot (N_{60} lc)$ 2) $q_{c1ncs}/(N_1)_{60lc} = 8.5 (1 - lc/4.6)$	4 5
(N ₁) _{60cslc}	Clean sand equivalent SPT (N ₁) _{60lc} . User has 3 options.	1) $(N_1)_{60cslc} = \alpha + \beta((N_1)_{60lc})$ 2) $(N_1)_{60cslc} = K_{SPT} * ((N_1)_{60lc})$ 3) $q_{c1ncs}/(N_1)_{60cslc} = 8.5 (1 - lc/4.6)$ FC ≤ 5%: $\alpha = 0, \beta = 1.0$ FC ≥ 35%: $\alpha = 5.0, \beta = 1.2$ 5% < FC < 35%: $\alpha = \exp[1.76 - (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
S _u	Undrained shear strength - N _{kt} is user selectable	$S_u = \frac{q_t - \sigma_v'}{N_k}$	1, 5
k	Coefficient of permeability (assigned to each SBT zone)		5

Interpreted Parameter	Description	Equation	Ref
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ where: $\Delta u = u - u_{eq}$ and u = dynamic pore pressure u_{eq} = equilibrium pore pressure	1, 5
Qt	Normalized q_t for Soil Behavior Type classification as defined by Robertson, 1990	$Qt = \frac{qt - \sigma_v}{\sigma_v}$	2, 5
Fr	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson, 1990	$Fr = 100\% \cdot \frac{fs}{qt - \sigma_v}$	2, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson and Campanella	See Figure 2	2, 5
SBT-BQ	Non-normalized soil behavior type based on the Bq parameter	See Figure 5.7 (reference 5)	2, 5
SBT-BQn	Normalized Soil Behavior base on the Bq parameter	See Figure 5.8 (reference 5) or Figure 3 (reference 2)	2, 5
Ic	Soil index for estimating grain characteristics	$Ic = [(3.47 - \log_{10} Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ Where: $Q = \left(\frac{qt - \sigma_v}{P_{a2}} \right) \left(\frac{P_a}{\sigma_v} \right)^n$ And Fr is in percent P_a = atmospheric pressure P_{a2} = atmospheric pressure n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting Ic	3, 8
FC	Apparent fines content (%)	$FC = 1.75(Ic^{3.25}) - 3.7$ $FC = 100$ for $Ic > 3.5$ $FC = 0$ for $Ic < 1.26$ $FC = 5\%$ if $1.64 < Ic < 2.6$ AND $Fr < 0.5$	3
Ic Zone	This parameter is the Soil Behavior Type zone based on the Ic parameter (valid for zones 2 through 7 on SBTn chart)	$Ic < 1.31$ Zone = 7 $1.31 < Ic < 2.05$ Zone = 6 $2.05 < Ic < 2.60$ Zone = 5 $2.60 < Ic < 2.95$ Zone = 4 $2.95 < Ic < 3.60$ Zone = 3 $Ic > 3.60$ Zone = 2	3
PHI ϕ	Friction Angle determined from one of the following user selectable options: a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu	See reference	5
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann 1976 d) Jamiolkowski - All Sands	See reference	5

Interpreted Parameter	Description	Equation	Ref
OCR	Over Consolidation Ratio	a) Based on Schmertmann's method involving a plot of S_u/σ'_v / (S_u/σ'_v) _{NC} and OCR where the S_u/σ'_v ratio for NC clay is user selectable	9
State Parameter	The state parameter is used to describe whether a soil is contractive (SP is positive) or dilative (SP is negative) at large strains based on the work by Been and Jefferies	See reference	8, 6, 5
Es/qt	Intermediate parameter for calculating Youngs Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5
Youngs Modulus E	Youngs Modulus based on the work by Baldi. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in Baldi's chart.	Mean normal stress is evaluated from: $\sigma_m = \frac{1}{3} * (\sigma_v' + \sigma_h' + \sigma_n')$ where σ_v' = vertical effective stress σ_h' = horizontal effective stress and $\sigma_h = K_0 * \sigma_v'$ with K_0 assumed to be 0.5	5
q _{c1}	q _t normalized for overburden stress used for seismic analysis	$q_{c1} = q_t * (Pa/\sigma'_v)^{0.5}$ where: Pa = atm. Pressure q _t is in Mpa	3
q _{c1n}	q _{c1} in dimensionless form used for seismic analysis	$q_{c1n} = (q_{c1} / Pa)(Pa/\sigma'_v)$ where: Pa = atm. Pressure and n ranges from 0.5 to 0.75 based on I _c .	3
K _{SPT}	Equivalent clean sand factor for (N ₁) ₆₀	$K_{SPT} = 1 + ((0.75/30) * (FC - 5))$	10
K _{CPT}	Equivalent clean sand correction for q _{c1n}	$K_{cpt} = 1.0 \text{ for } I_c \leq 1.64$ $K_{cpt} = f(I_c) \text{ for } I_c > 1.64 \text{ (see reference)}$	10
q _{c1ncs}	Clean sand equivalent q _{c1n}	$q_{c1ncs} = q_{c1n} * K_{cpt}$	3
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50:$ $CRR_{7.5} = 0.833 [(q_{c1ncs}/1000) + 0.05]$ $50 \leq q_{c1ncs} < 160:$ $CRR_{7.5} = 93 [(q_{c1ncs}/1000)^3 + 0.08]$	10
CSR	Cyclic Stress Ratio	$CSR = (T_{av}/\sigma'_v) = 0.65 (a_{max} / g) (\sigma_v / \sigma'_v) r_d$ $r_d = 1.0 - 0.00765 z \quad z \leq 9.15m$ $r_d = 1.174 - 0.0267 z \quad 9.15 < z \leq 23m$ $r_d = 0.744 - 0.008 z \quad 23 < z \leq 30m$ $r_d = 0.50 \quad z > 30m$	10

Interpreted Parameter	Description	Equation	Ref
MSF	Magnitude Scaling Factor	See Reference	10
FoS	Factor of Safety against Liquefaction	$FS = (CRR_{7.5} / CSR) MSF$	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account FoS and limitations based I_c and q_{c1ncs} .	10



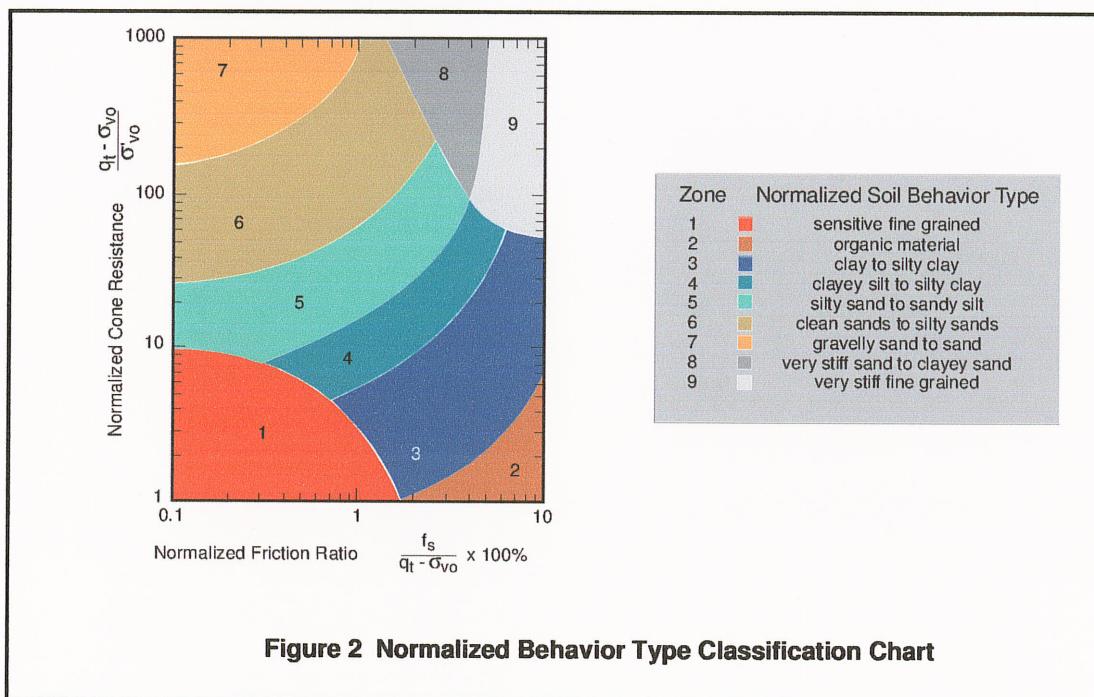


Figure 2 Normalized Behavior Type Classification Chart

Table 2 References

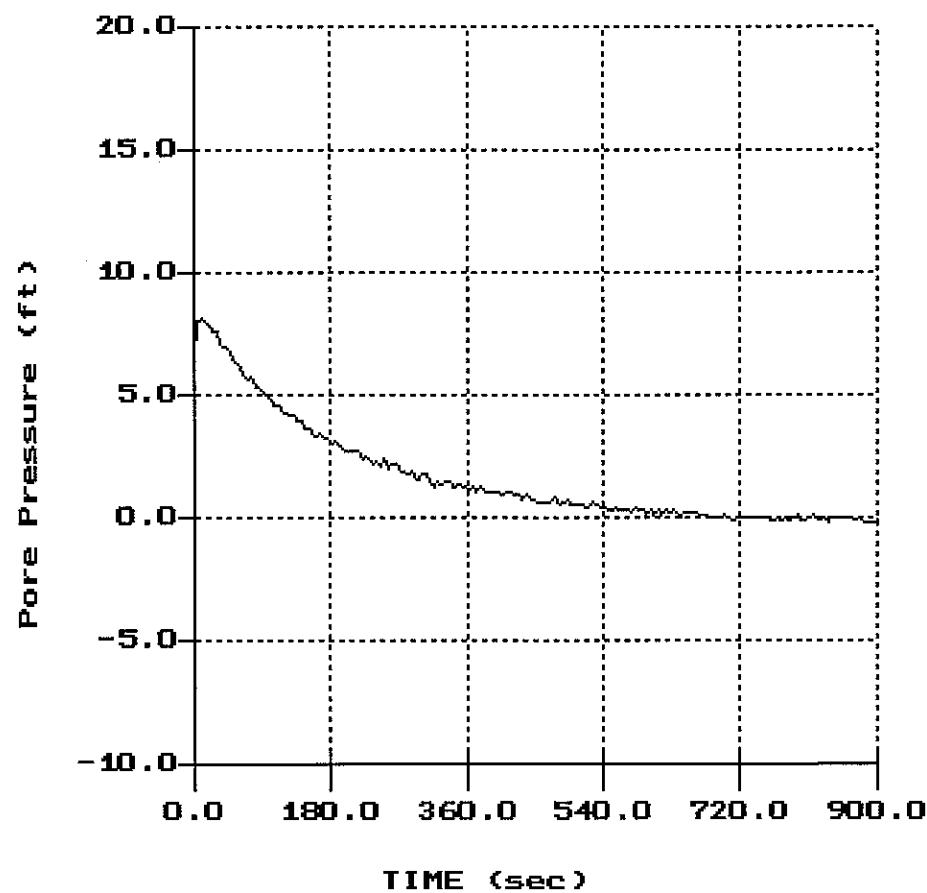
No.	References
1	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
2	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
3	Robertson, P.K. and Fear, C.E., 1998, "Evaluating cyclic liquefaction potential using the cone penetration test", Canadian Geotechnical Journal, 35: 442-459.
4	Robertson, P.K. and Wride, C.E., 1998, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
5	Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, "Cone Penetration Testing in Geotechnical Practice," Blackie Academic and Professional.
6	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.
7	Jefferies, M.G. and Davies, M.P., 1993. "Use of CPTu to Estimate equivalent N_{60} ", Geotechnical Testing Journal, 16(4): 458-467.
8	Been, K. and Jefferies, M.P., 1985, "A state parameter for sands", Geotechnique, 35(2), 99-112.
9	Schmertmann, 1977, "Guidelines for Cone Penetration Test Performance and Design", Federal Highway Administration Report FHWA-TS-78-209, U.S. Department of Transportation
10	Proceedings of theNCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Salt LakeCity, 1996. Chaired by Leslie Youd.

Parsons

Hole:CPT-17
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 09:28

PORE PRESSURE DISSIPATION RECORD



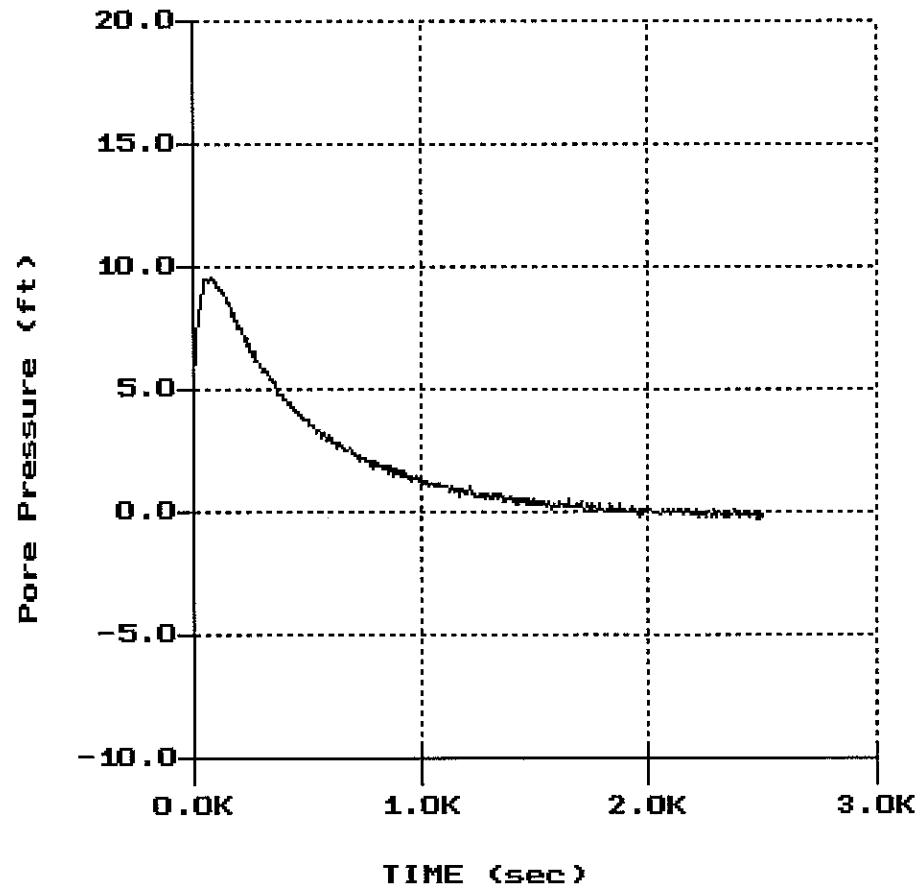
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Parsons

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Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 09:28

PORE PRESSURE DISSIPATION RECORD



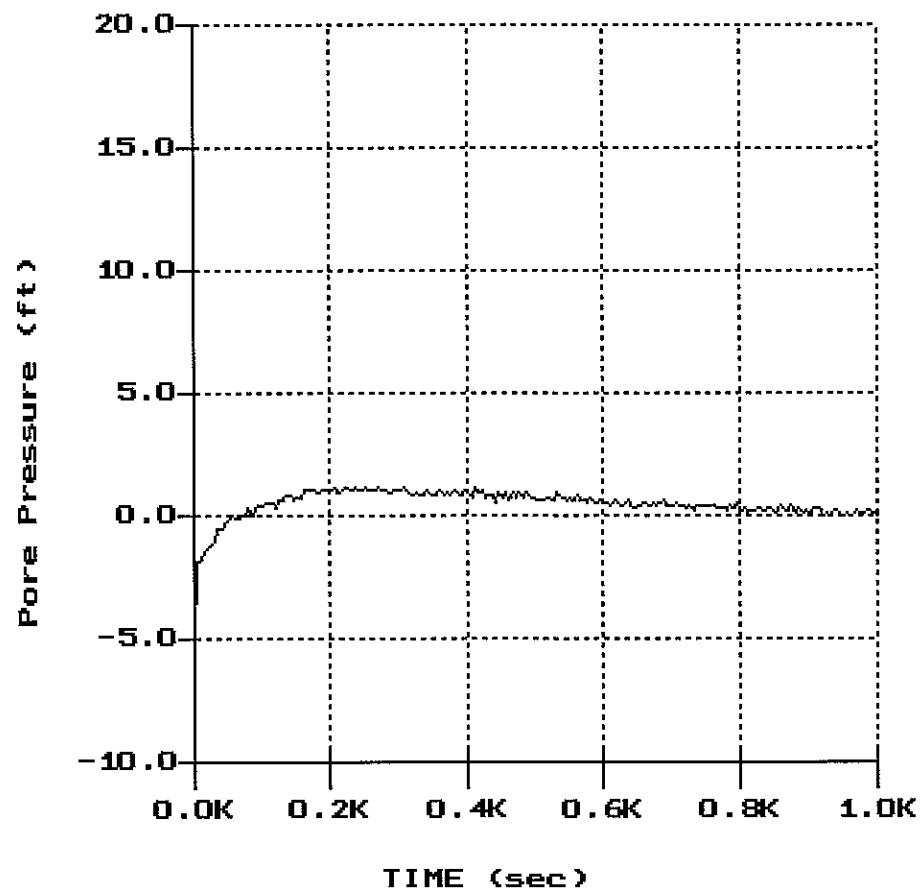
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Parsons

Hole:CPT-17
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 09:28

PORE PRESSURE DISSIPATION RECORD



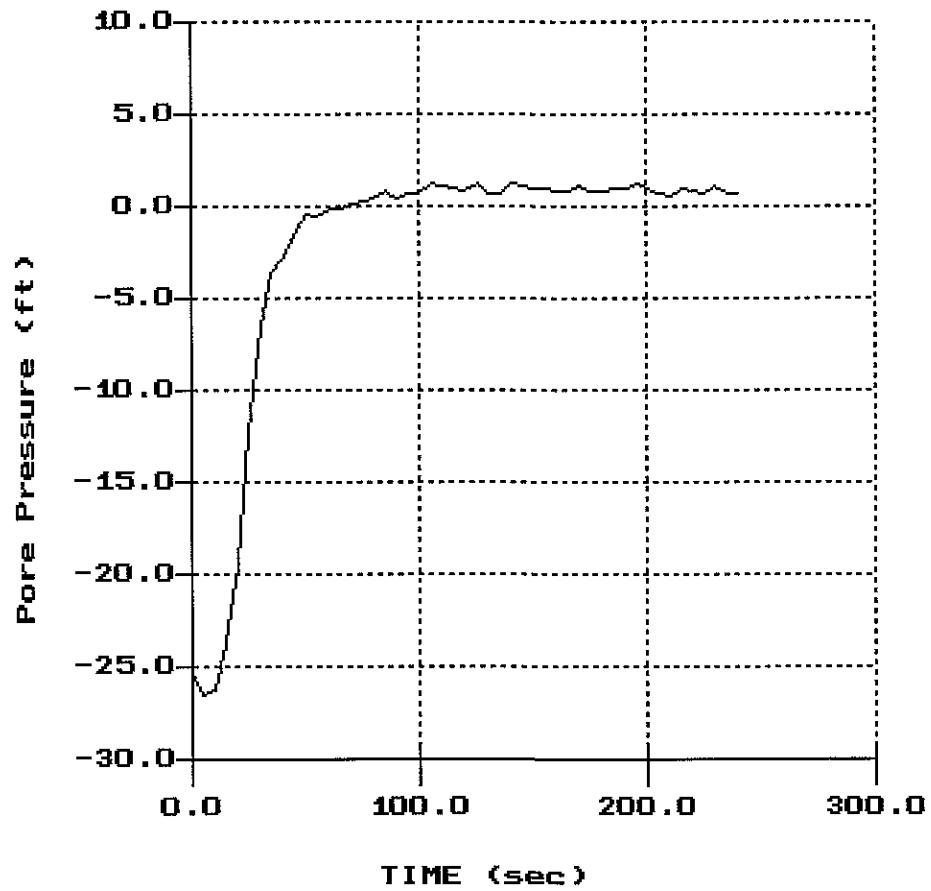
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Parsons

Hole:CPT-22
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 09:04

PORE PRESSURE DISSIPATION RECORD



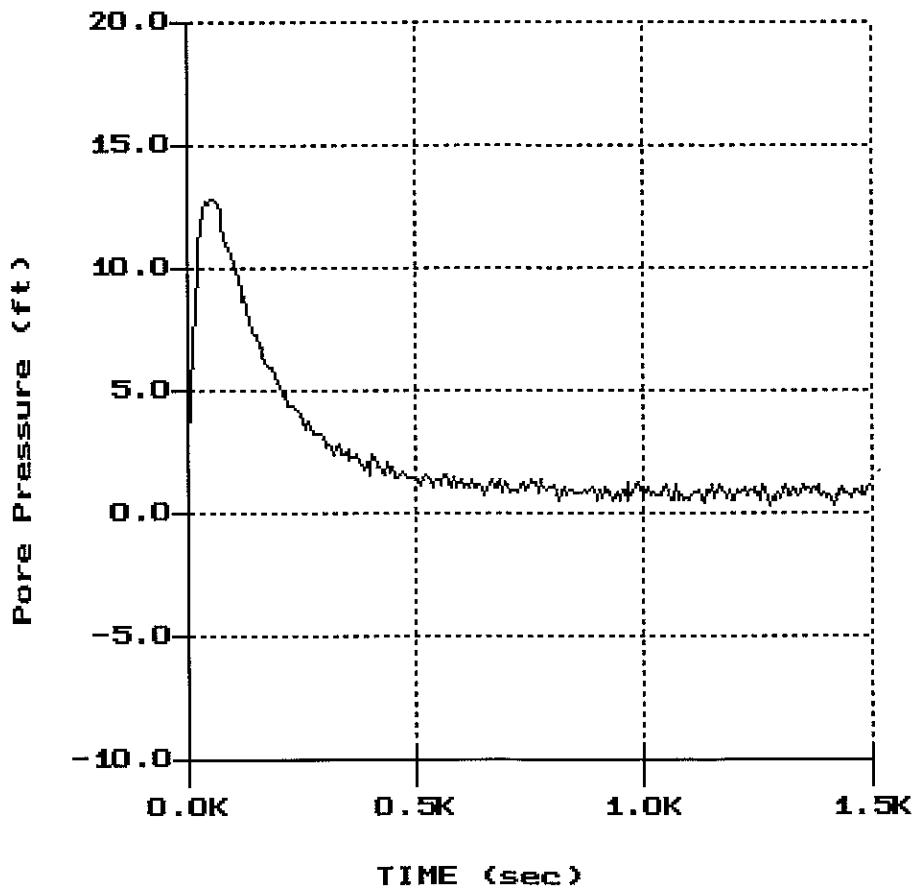
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(ft): 15.09
Duration : 240.0s
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U-max: 1.31 105.0s

Parsons

Hole:CPT-22
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 09:04

PORE PRESSURE DISSIPATION RECORD



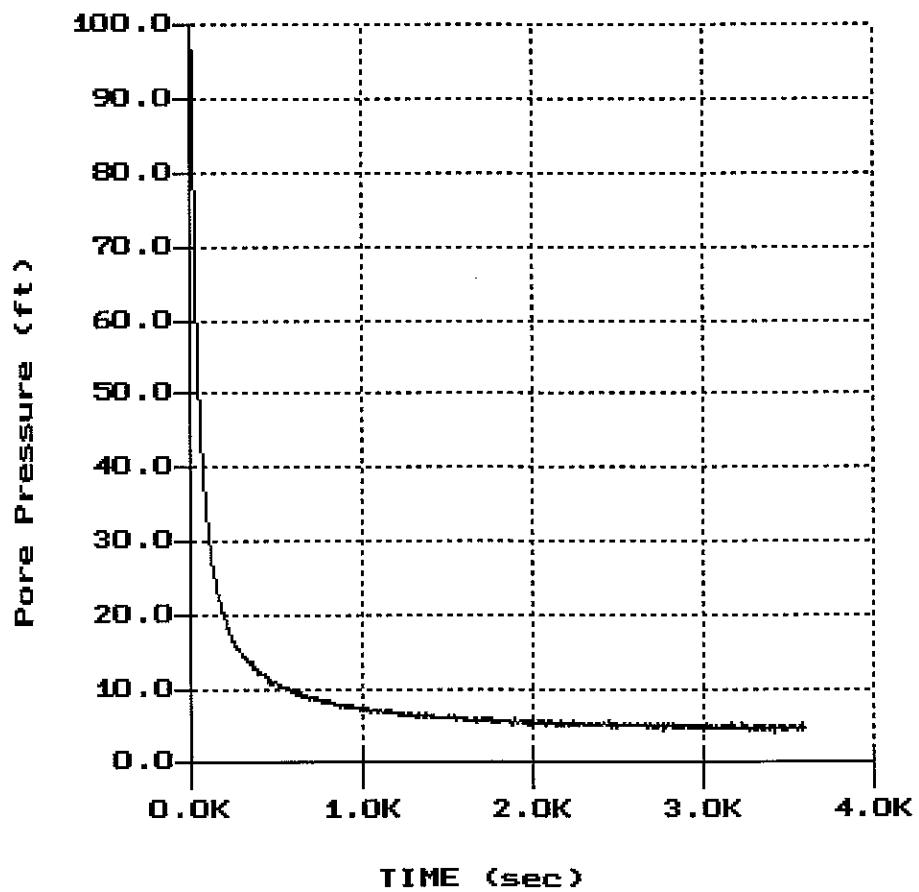
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Parsons

Hole:CPT-22
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 09:04

PORE PRESSURE DISSIPATION RECORD



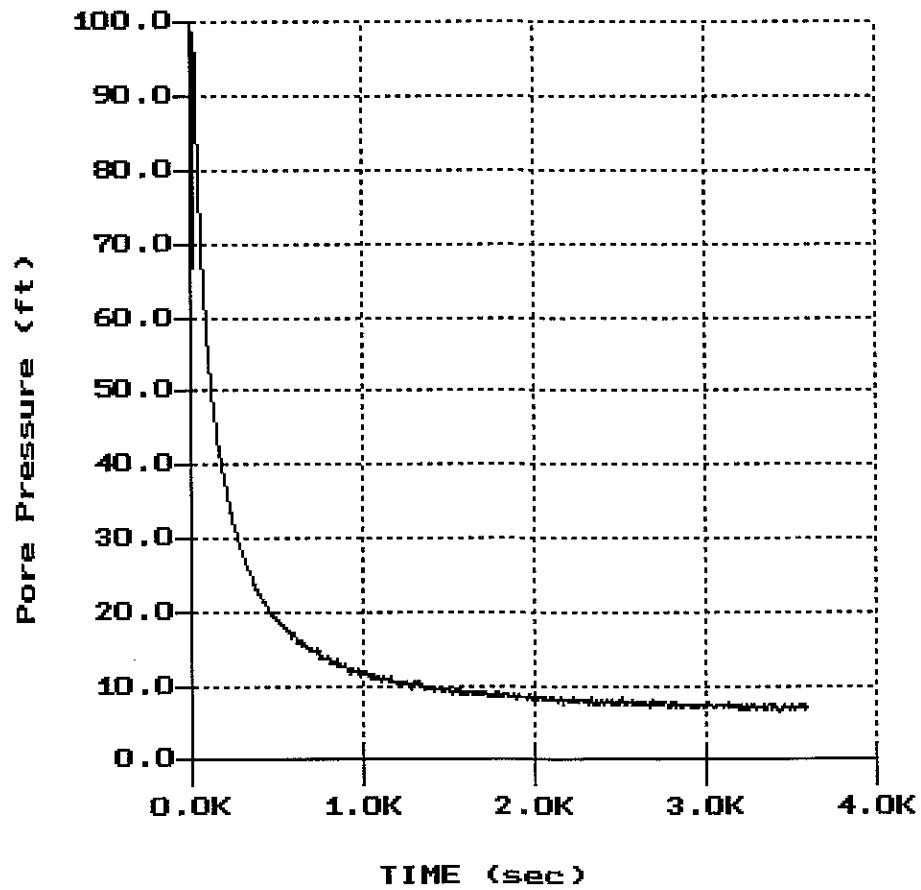
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Parsons

Hole:CPT-22
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 09:04

PORE PRESSURE DISSIPATION RECORD



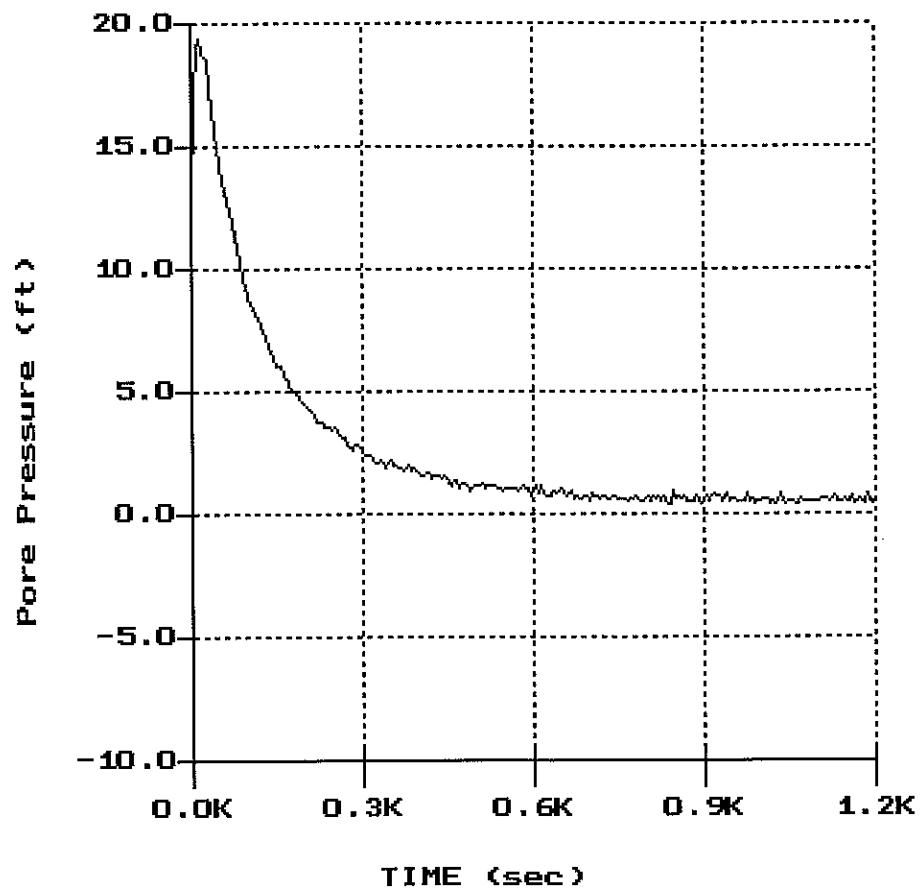
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Parsons

Hole:CPT-27
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 10:08

PORE PRESSURE DISSIPATION RECORD



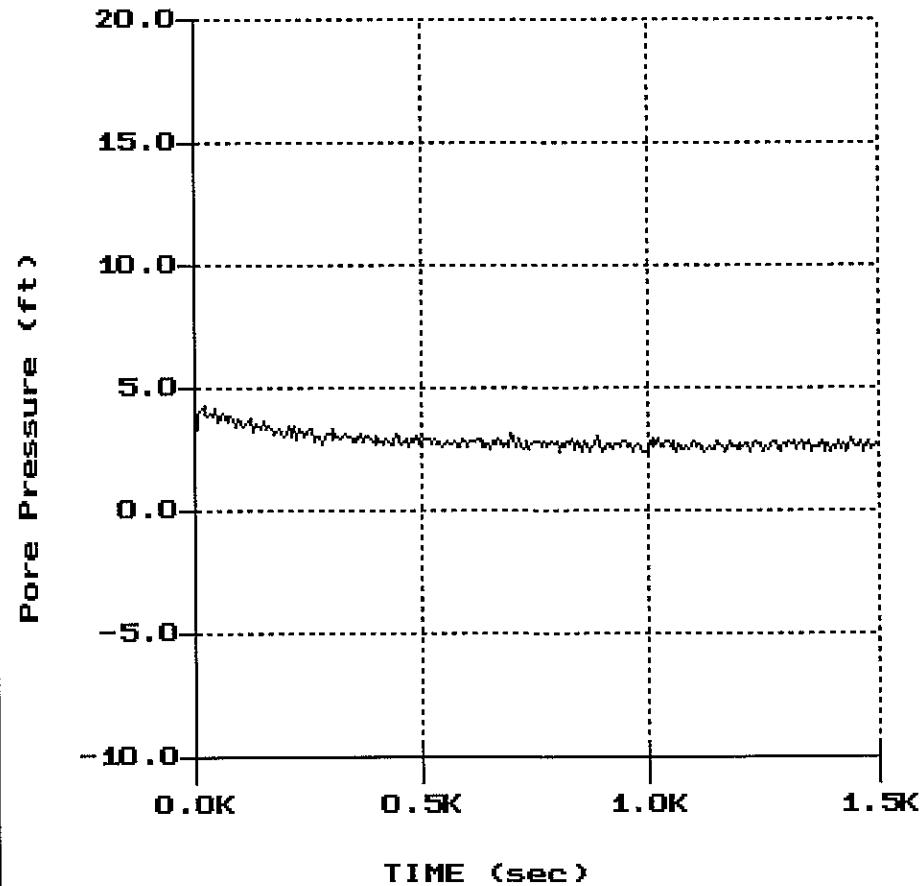
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Depth (m): 4.60
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Duration : 1200.0s
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U-Max: 19.33 15.0s

Parsons

Hole:CPT-27
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 10:08

PORE PRESSURE DISSIPATION RECORD

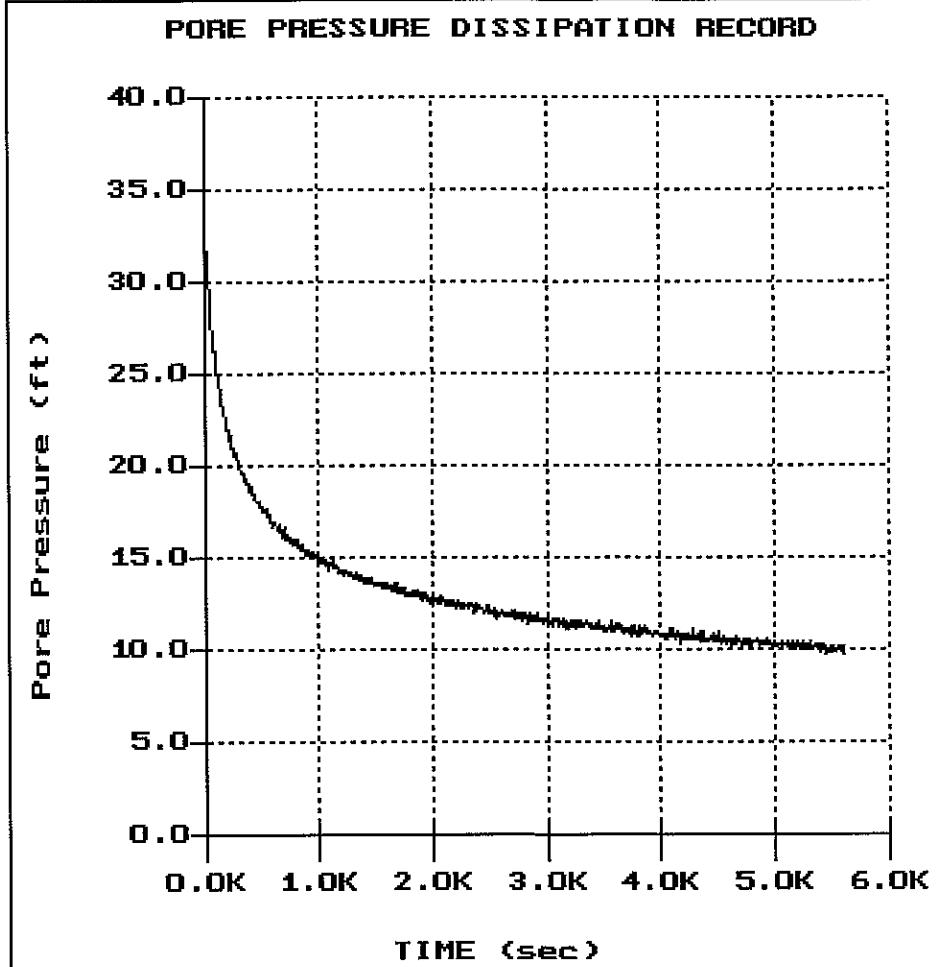


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Parsons

Hole:CPT-27
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 10:08



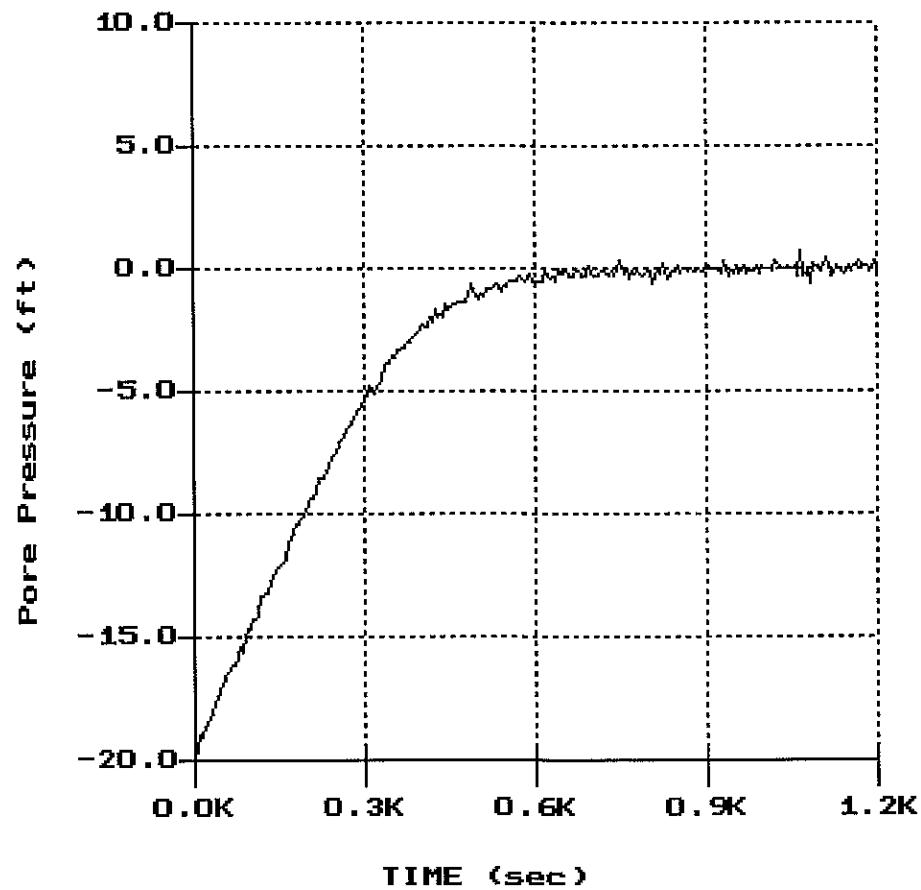
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U-Max: 38.15 0.0s

Parsons

Hole:CPT-28
Location:Wastebed 13

Cone:20 TON AD171
Date:09:22:06 14:38

PORE PRESSURE DISSIPATION RECORD



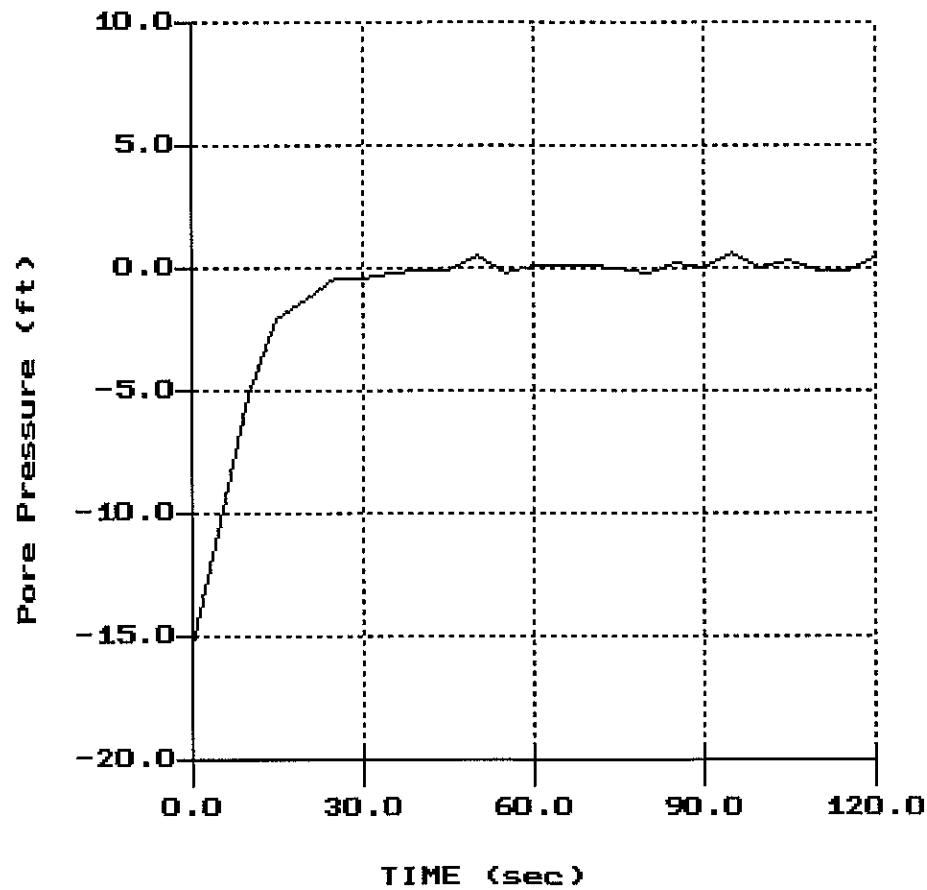
File: 789CP28.PPD
Depth (m): 5.05
(ft): 16.57
Duration : 1200.0s
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U-max: 0.70 1065.0s

Parsons

Hole:CPT-28
Location:Wastebed 13

Cone:20 TON AD171
Date:09:22:06 14:38

PORE PRESSURE DISSIPATION RECORD



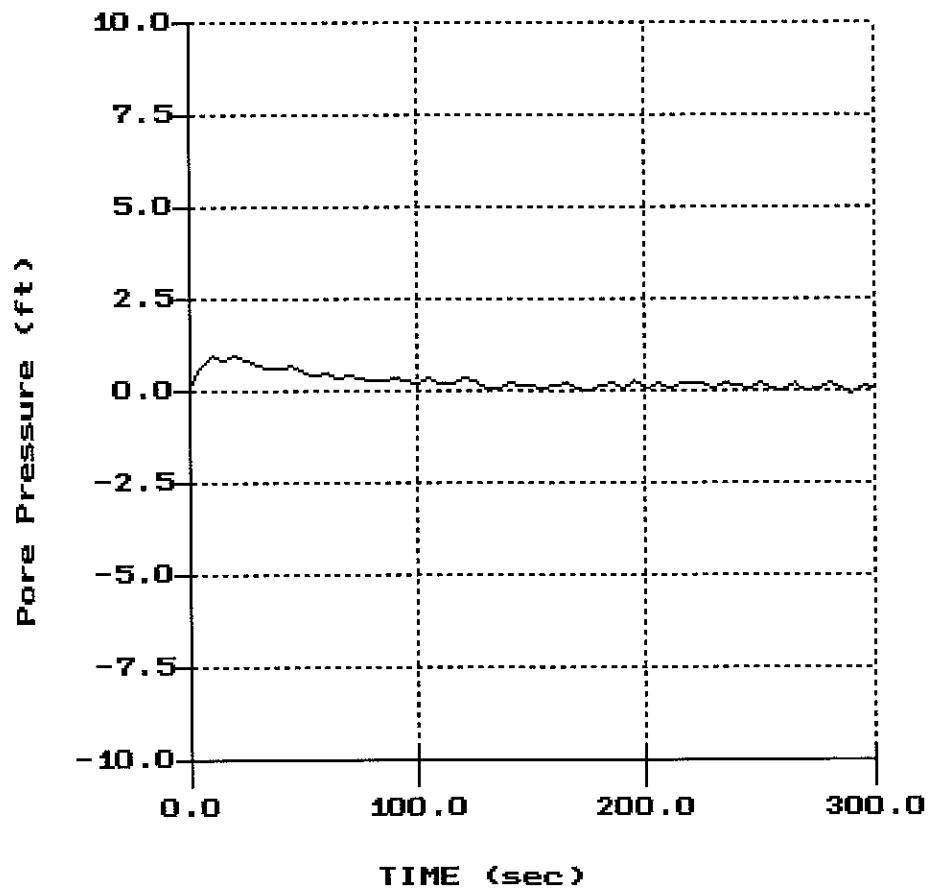
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Depth (m): 8.50
(ft): 27.89
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U-max: 0.61 95.0s

Parsons

Hole:CPT-33
Location:Wastebed 13

Cone:20 TON AD171
Date:09:21:06 07:46

PORE PRESSURE DISSIPATION RECORD



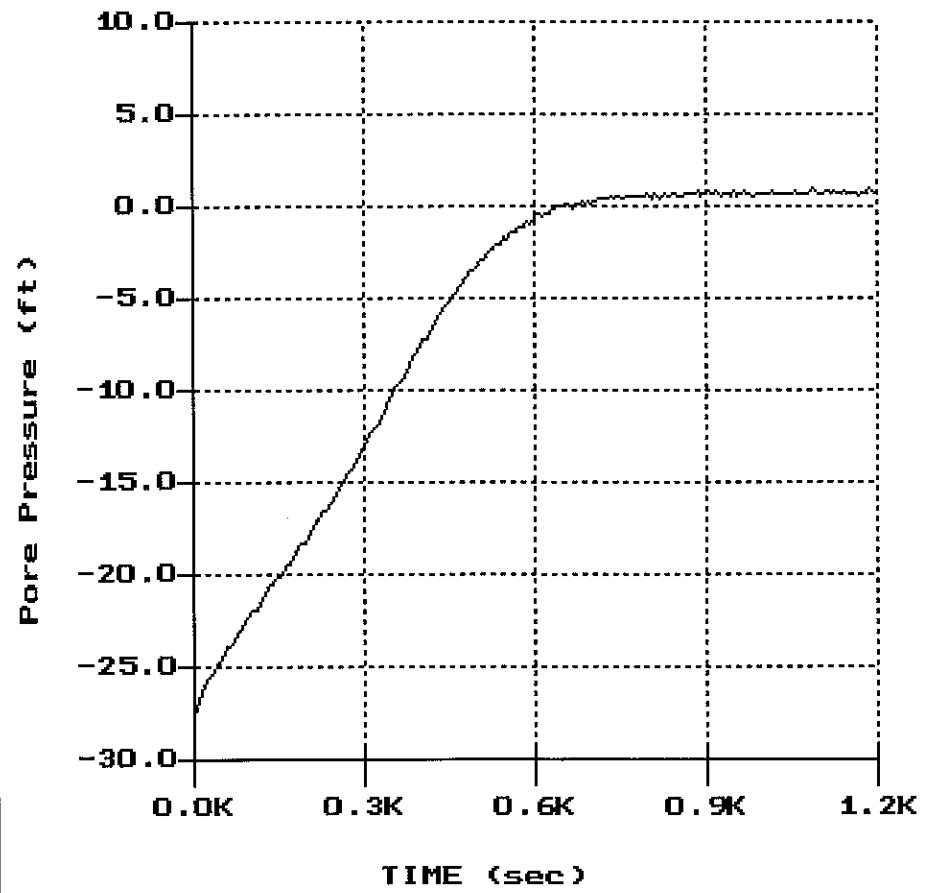
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Depth (m): 4.60
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Duration : 300.0s
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U-max: 0.99 10.0s

Parsons

Hole:CPT-33
Location:Wastebed 13

Cone:20 TON AD171
Date:09:21:06 07:46

PORE PRESSURE DISSIPATION RECORD



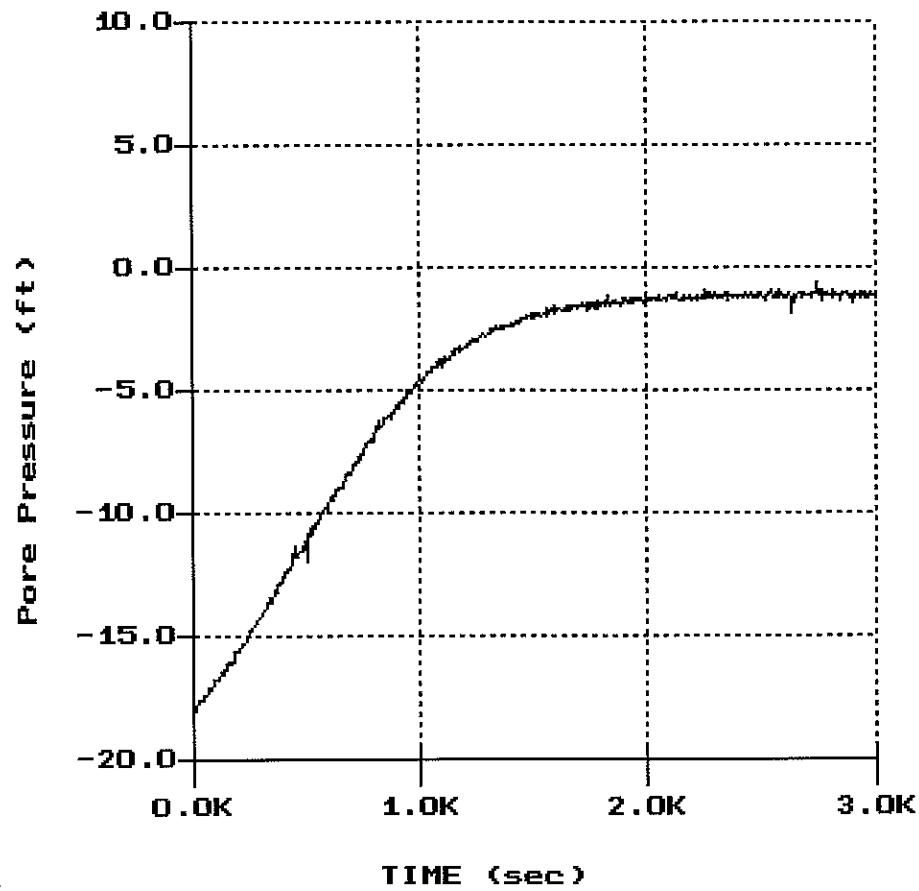
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Parsons

Hole:CPT-33
Location:Wastebed 13

Cone:20 TON AD171
Date:09:21:06 07:46

PORE PRESSURE DISSIPATION RECORD



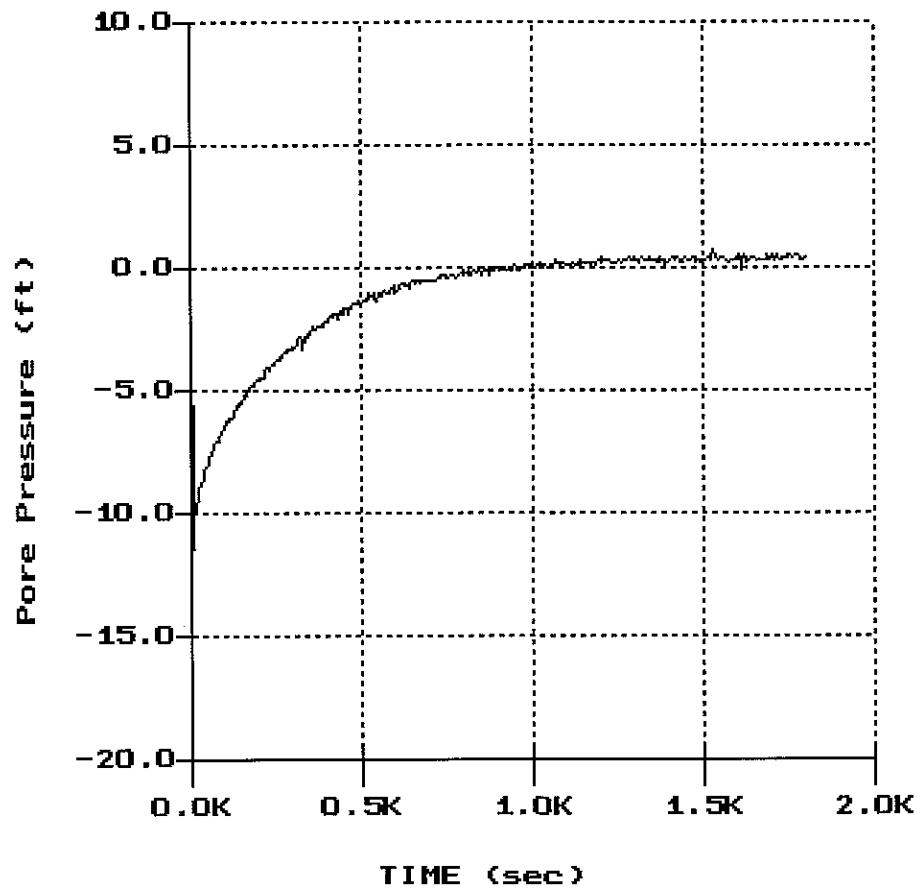
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Parsons

Hole:CPT-33
Location:Wastebed 13

Cone:20 TON AD171
Date:09:21:06 07:46

PORE PRESSURE DISSIPATION RECORD

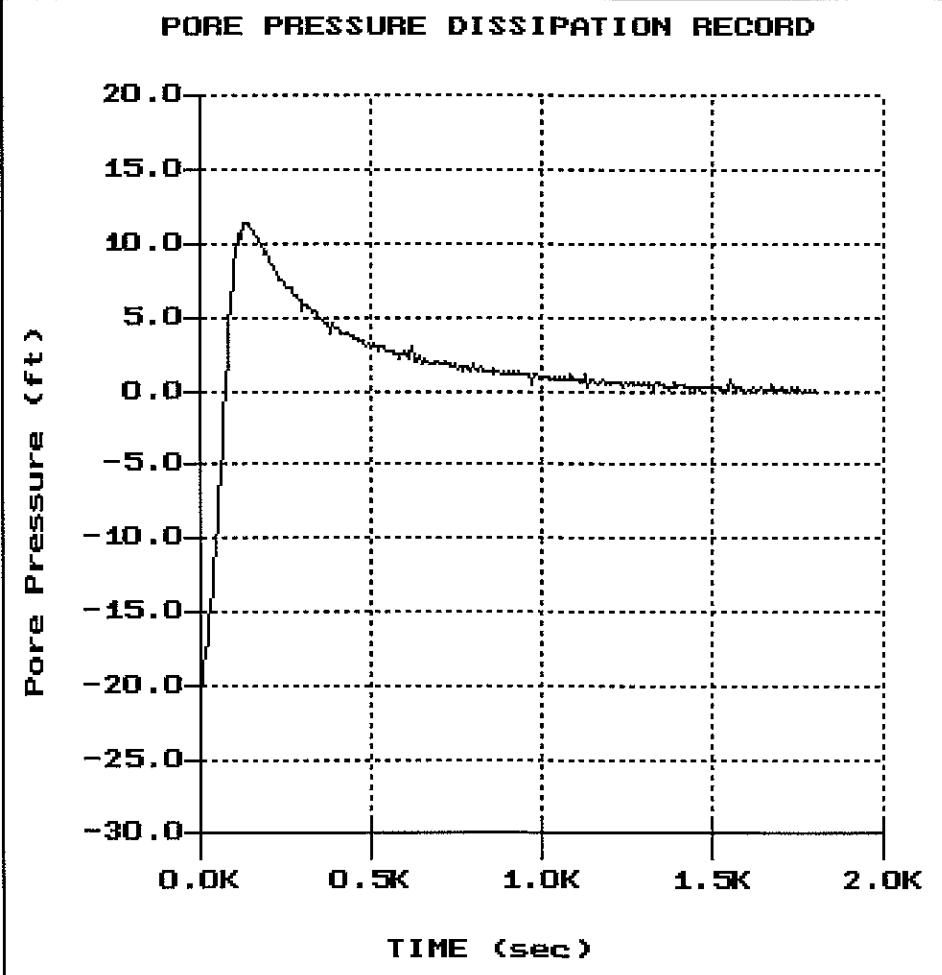


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Depth (m): 16.65
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Duration : 1800.0s
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U-max: 0.70 1530.0s

Parsons

Hole:CPT-40
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 17:04



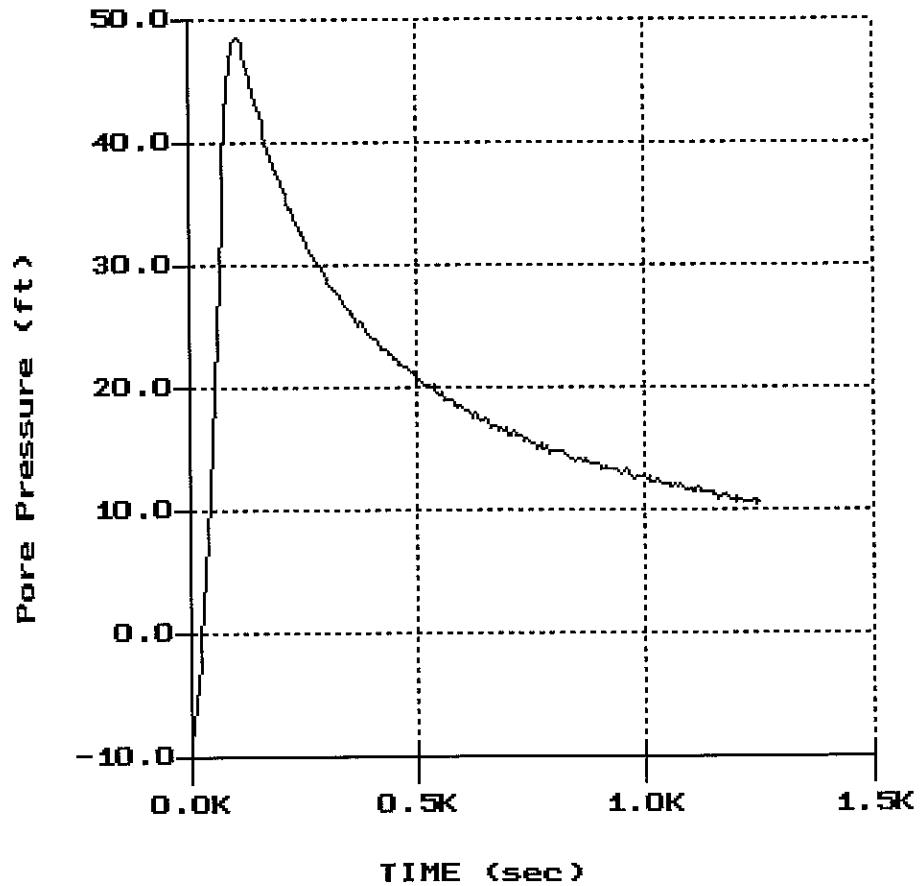
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(ft): 15.09
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U-Max: 11.40 135.0s

Parsons

Hole:CPT-40
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 17:04

PORE PRESSURE DISSIPATION RECORD



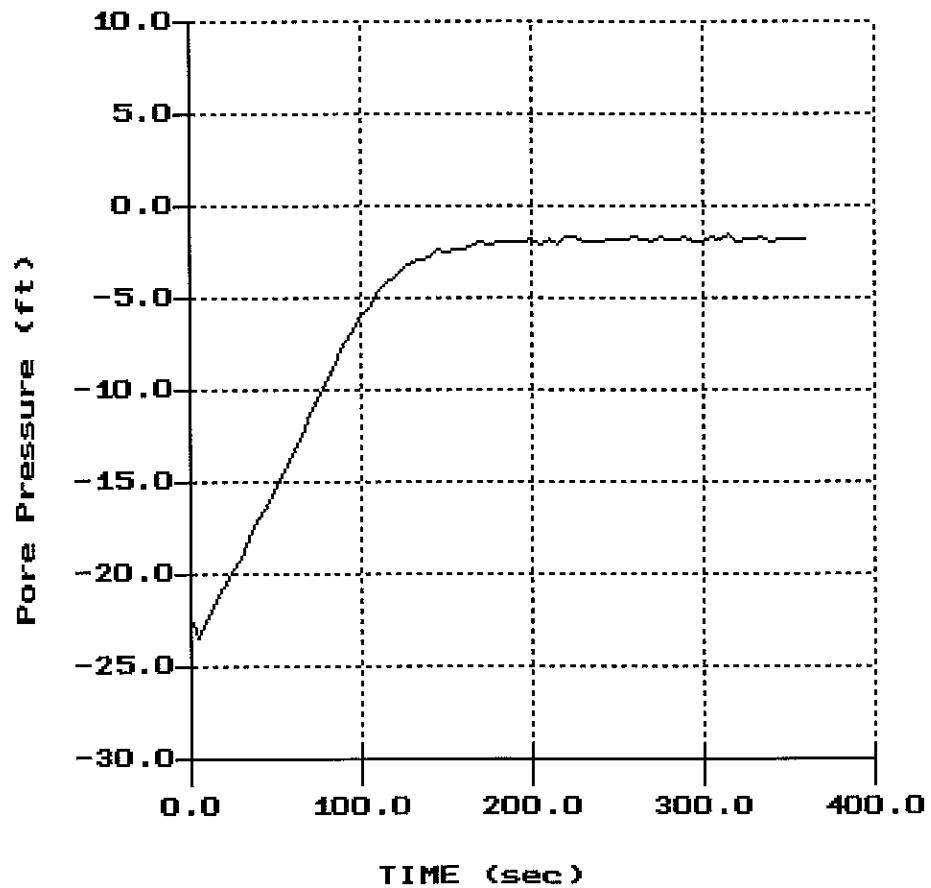
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Parsons

Hole:CPT-40
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 17:04

PORE PRESSURE DISSIPATION RECORD



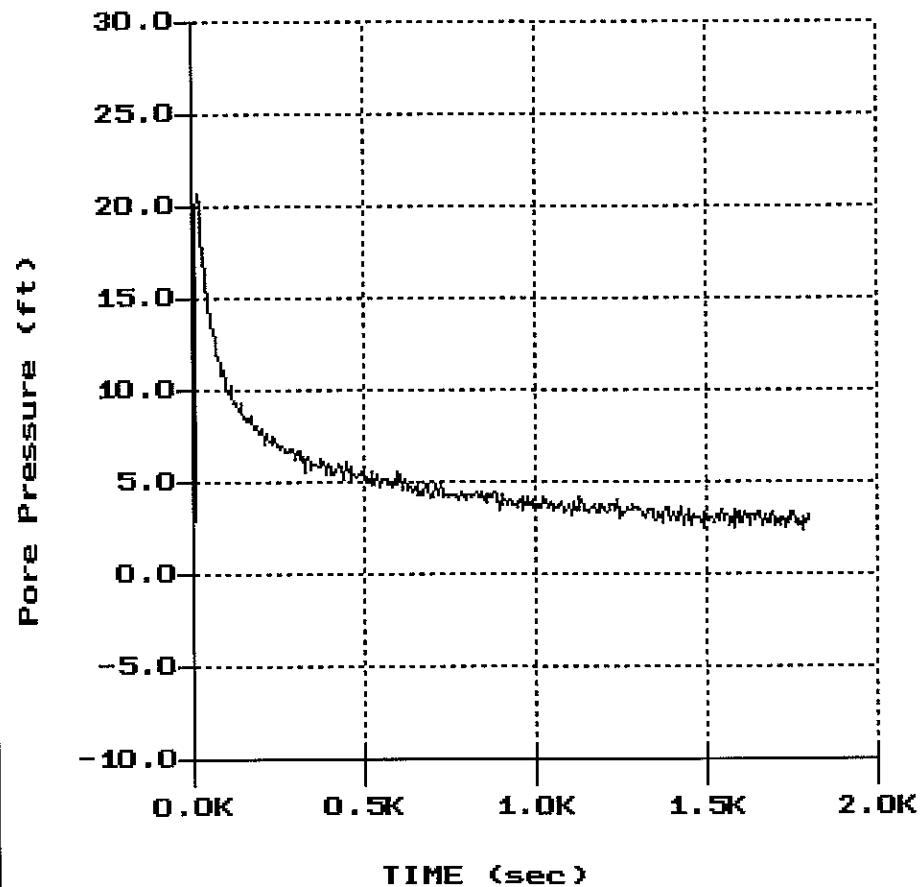
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(ft): 46.10
Duration : 360.0s
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U-max: -1.55 315.0s

Parsons

Hole:CPT-45
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 10:14

PORE PRESSURE DISSIPATION RECORD



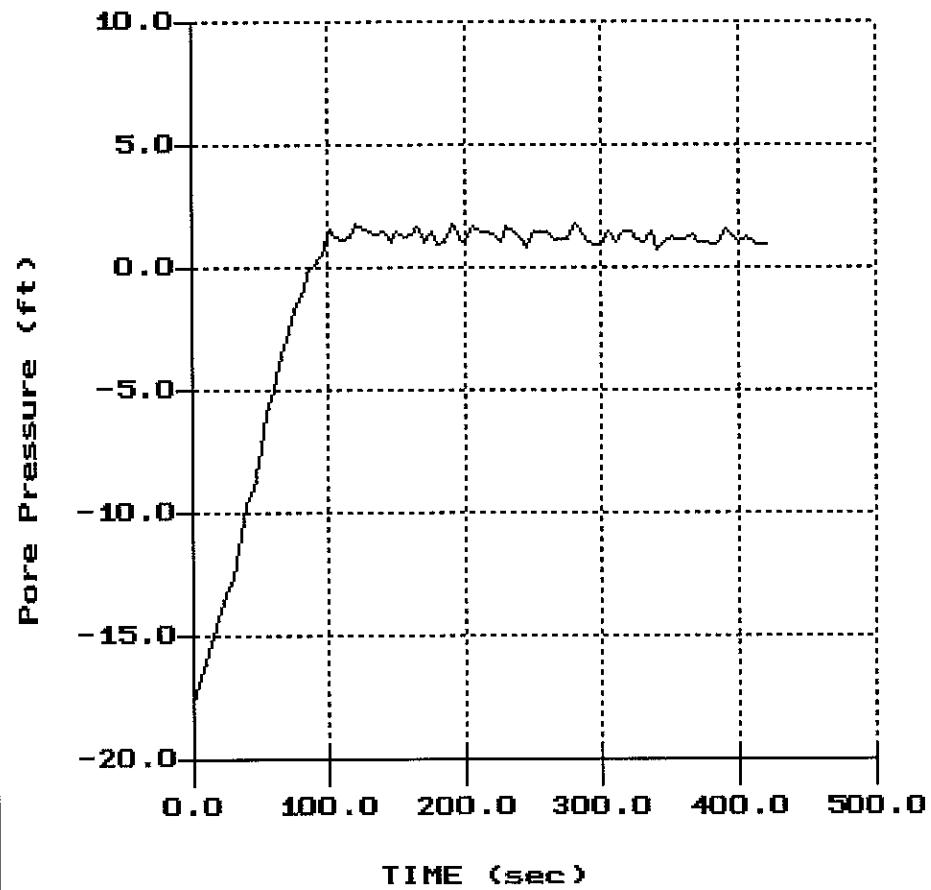
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Depth (m): 4.60
(ft): 15.09
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U-Min: -6.57 0.0s
U-max: 20.74 15.0s

Parsons

Hole:CPT-45
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 10:14

PORE PRESSURE DISSIPATION RECORD



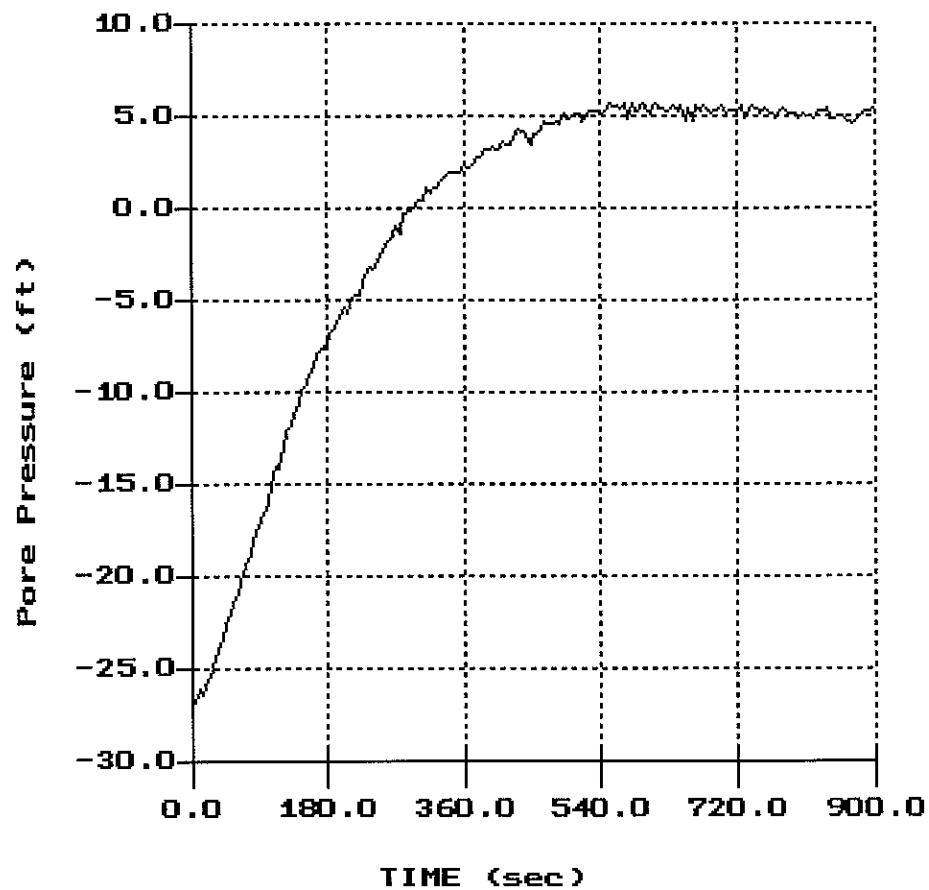
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U-max: 1.78 120.0s

Parsons

Hole:CPT-45
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 10:14

PORE PRESSURE DISSIPATION RECORD



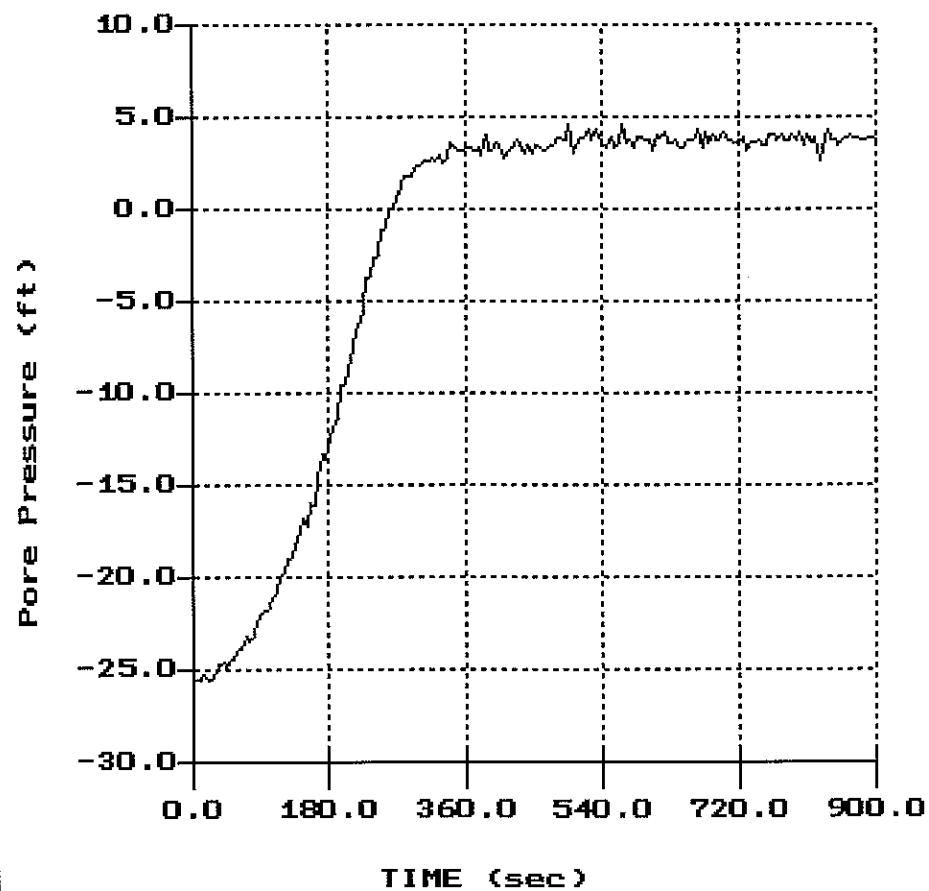
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U-Max: 5.68 610.0s

Parsons

Hole:CPT-45
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 10:14

PORE PRESSURE DISSIPATION RECORD



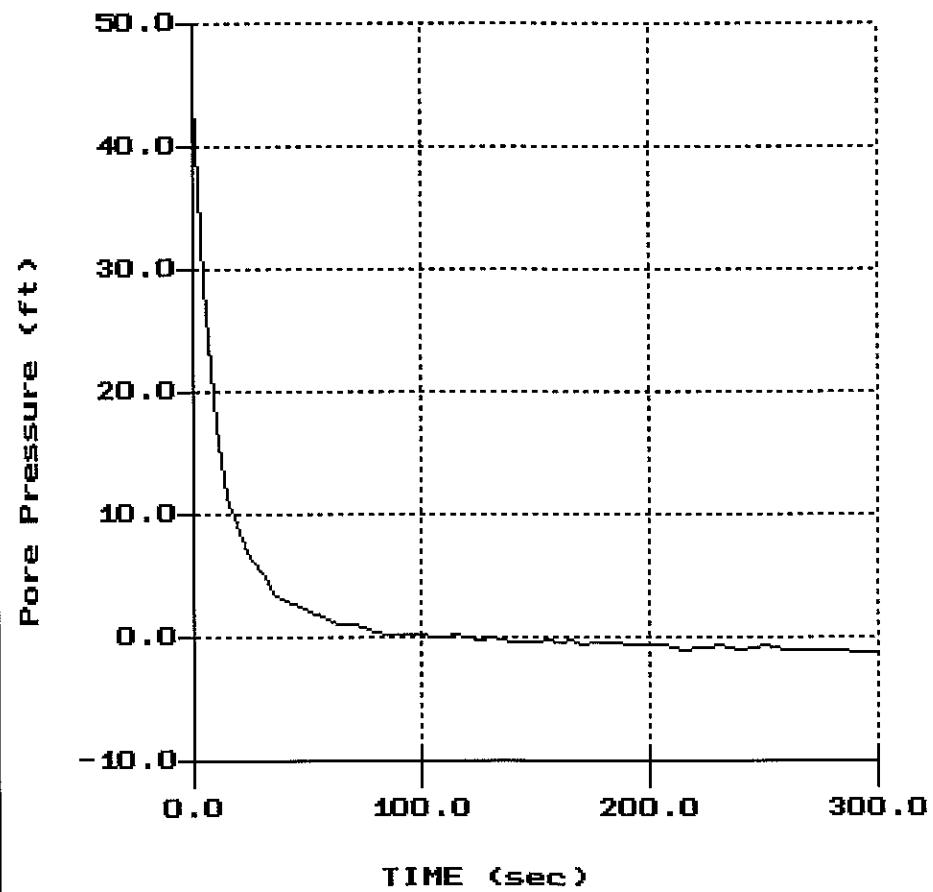
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(ft): 65.29
Duration : 900.0s
U-Min: -25.90 0.0s
U-max: 4.65 565.0s

Parsons

Hole:CPT-49
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 15:20

PORE PRESSURE DISSIPATION RECORD



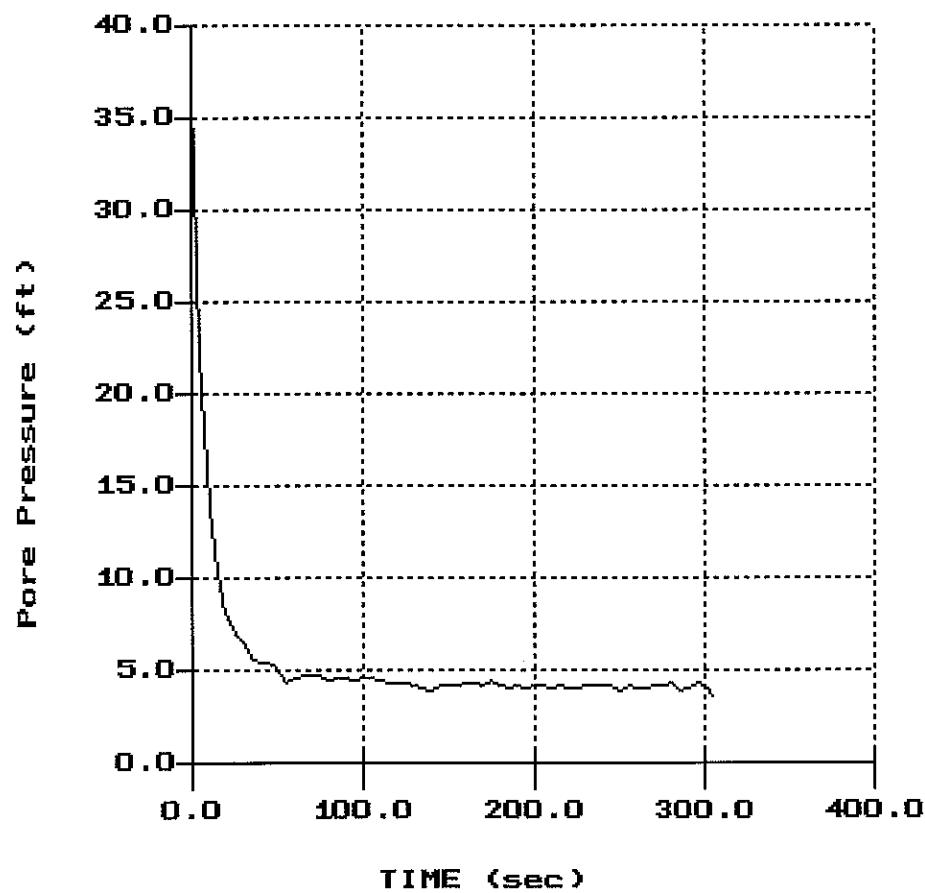
File: 789CP49.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 300.0s
U-Min: -1.31 295.0s
U-Max: 44.39 0.0s

Parsons

Hole:CPT-49
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 15:20

PORE PRESSURE DISSIPATION RECORD



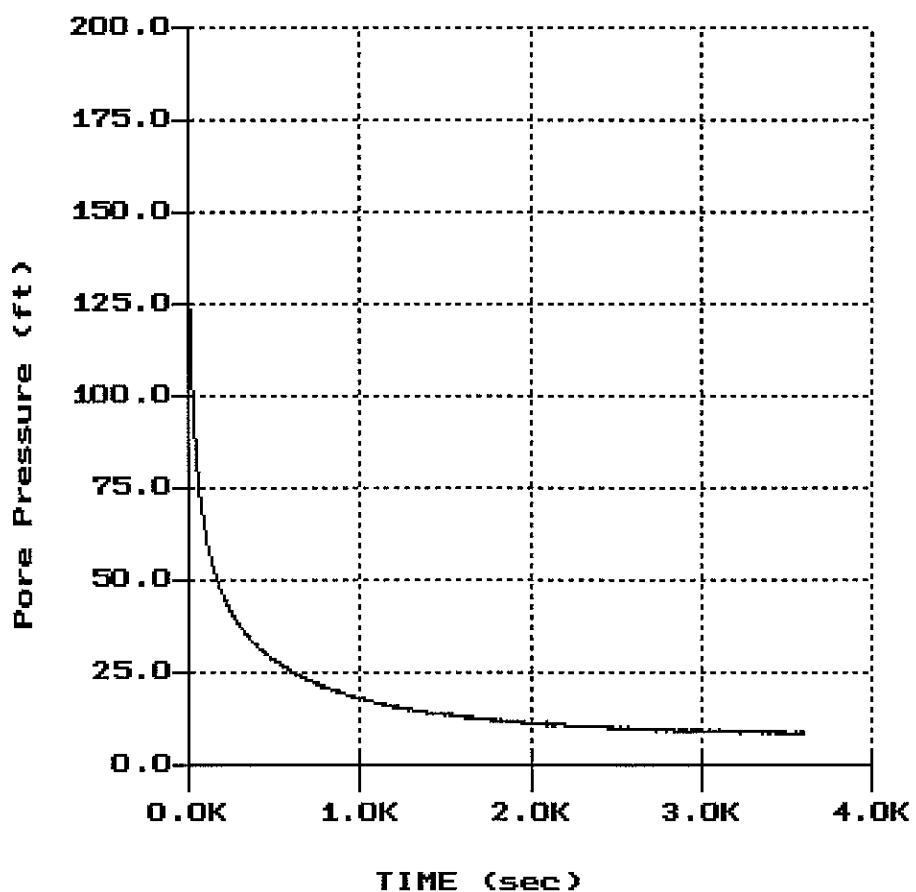
File: 789CP49.PPD
Depth (m): 9.15
(ft): 30.02
Duration : 305.0s
U-min: 3.61 305.0s
U-max: 36.93 0.0s

Parsons

Hole:CPT-49
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 15:20

PORE PRESSURE DISSIPATION RECORD



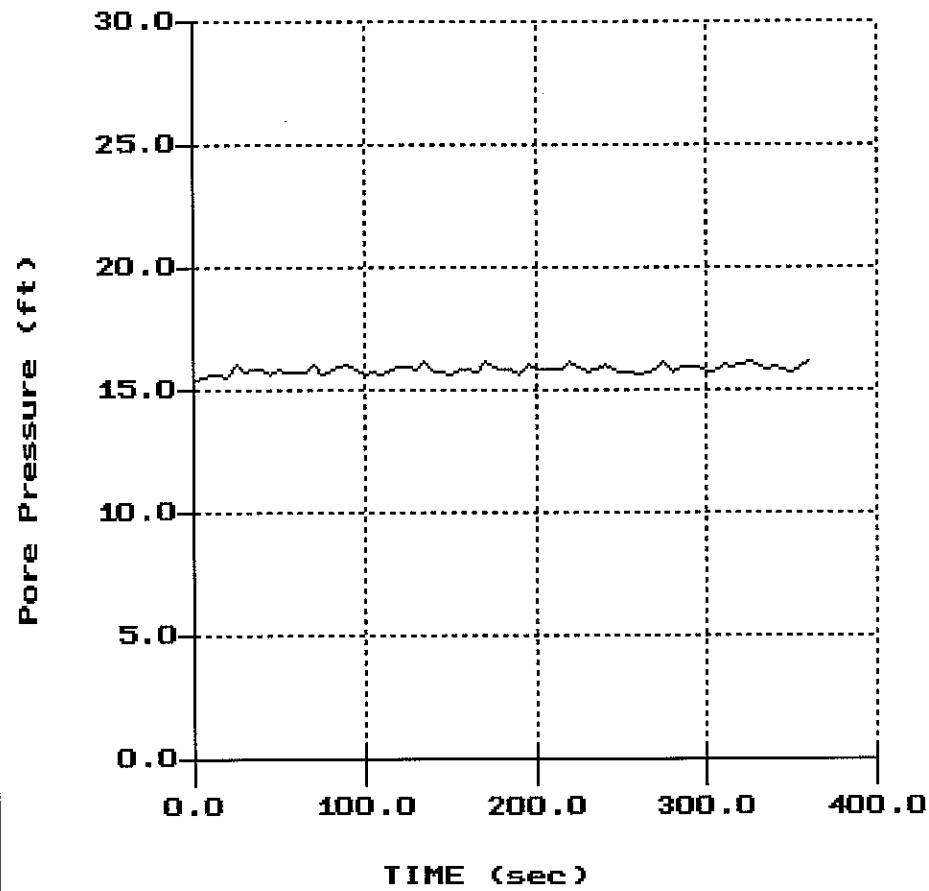
File: 789CP49.PPD
Depth (m): 13.75
(ft): 45.11
Duration : 3600.0s
U-Min: 8.12 3575.0s
U-max: 138.44 0.0s

Parsons

Hole:CPT-49
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 15:20

PORE PRESSURE DISSIPATION RECORD



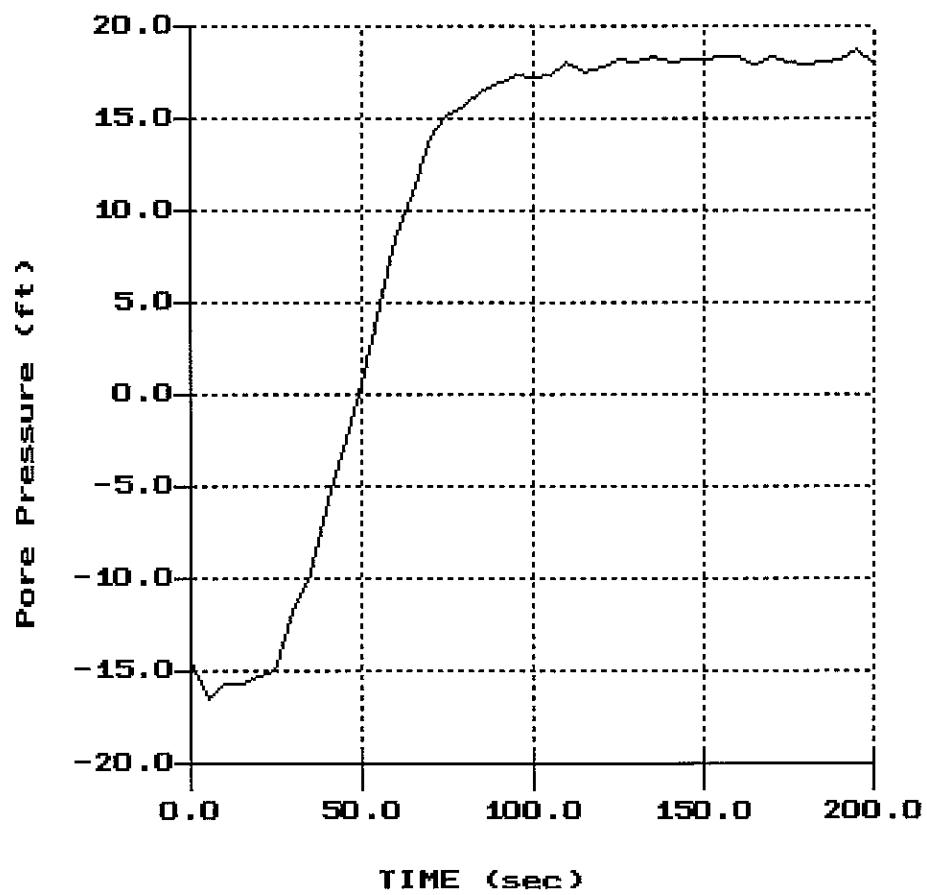
File: 789CP49.PPD
Depth (m): 22.55
(ft): 73.98
Duration : 360.0s
U-min: 15.35 0.0s
U-max: 16.14 220.0s

Parsons

Hole:CPT-50
Location:Wastebed 13

Cone:20 TON AD171
Date:10:02:06 14:33

PORE PRESSURE DISSIPATION RECORD



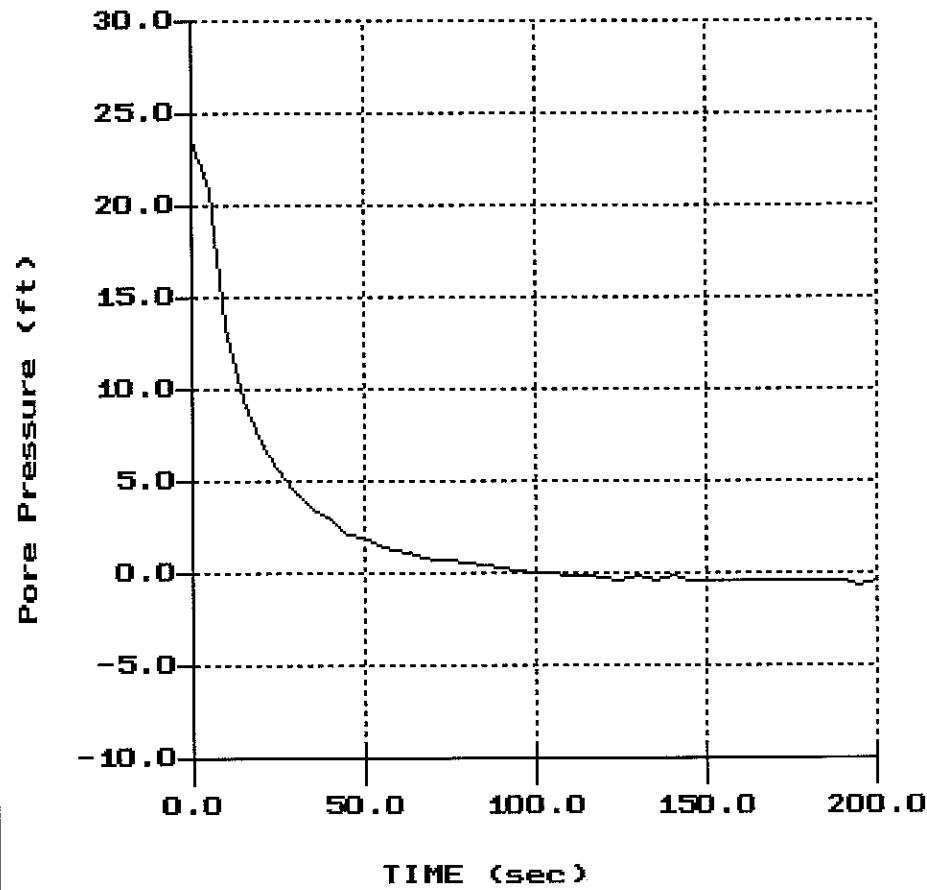
File: 789CP50.PPD
Depth (m): 23.85
(ft): 78.25
Duration : 200.0s
U-Min: -16.57 5.0s
U-max: 18.72 195.0s

Parsons

Hole:CPT-51
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 16:50

PORE PRESSURE DISSIPATION RECORD



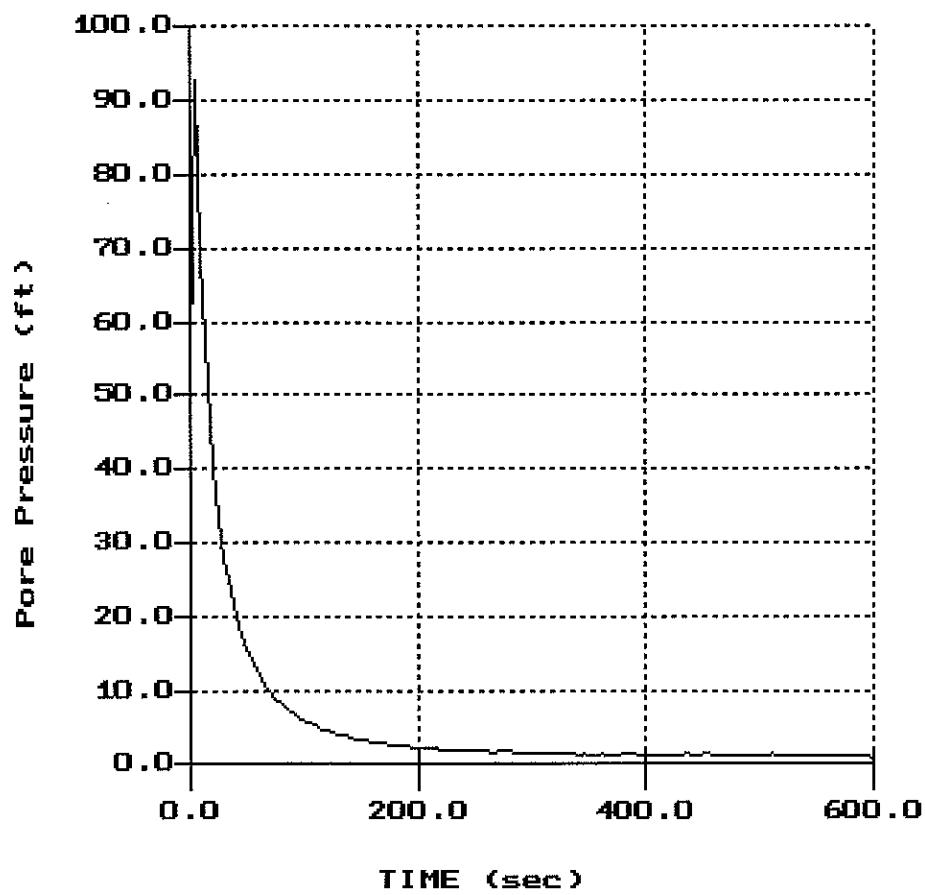
File: 789CP51.PPD
Depth (m): 4.75
(ft): 15.58
Duration : 200.0s
U-min: -0.66 195.0s
U-max: 23.56 0.0s

Parsons

Hole:CPT-51
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 16:50

PORE PRESSURE DISSIPATION RECORD



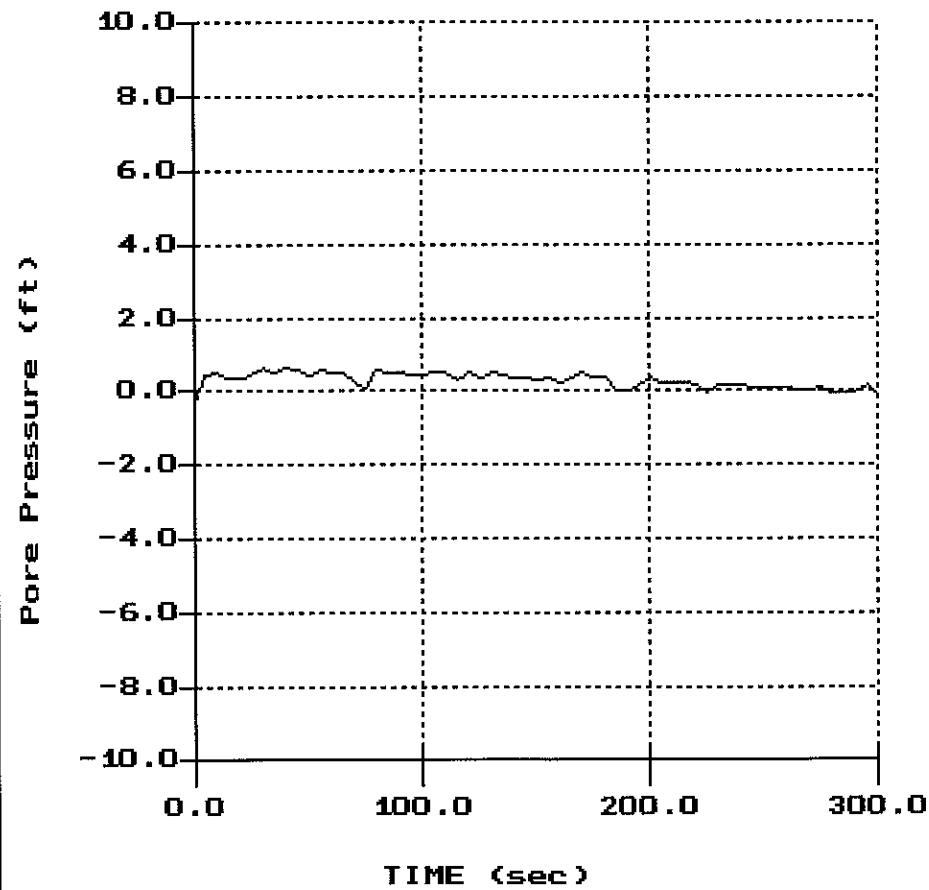
File: 789CP51.PPD
Depth (m): 9.50
(ft): 31.17
Duration : 600.0s
U-Min: 0.75 600.0s
U-Max: 92.64 5.0s

Parsons

Hole:CPT-51
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 16:50

PORE PRESSURE DISSIPATION RECORD



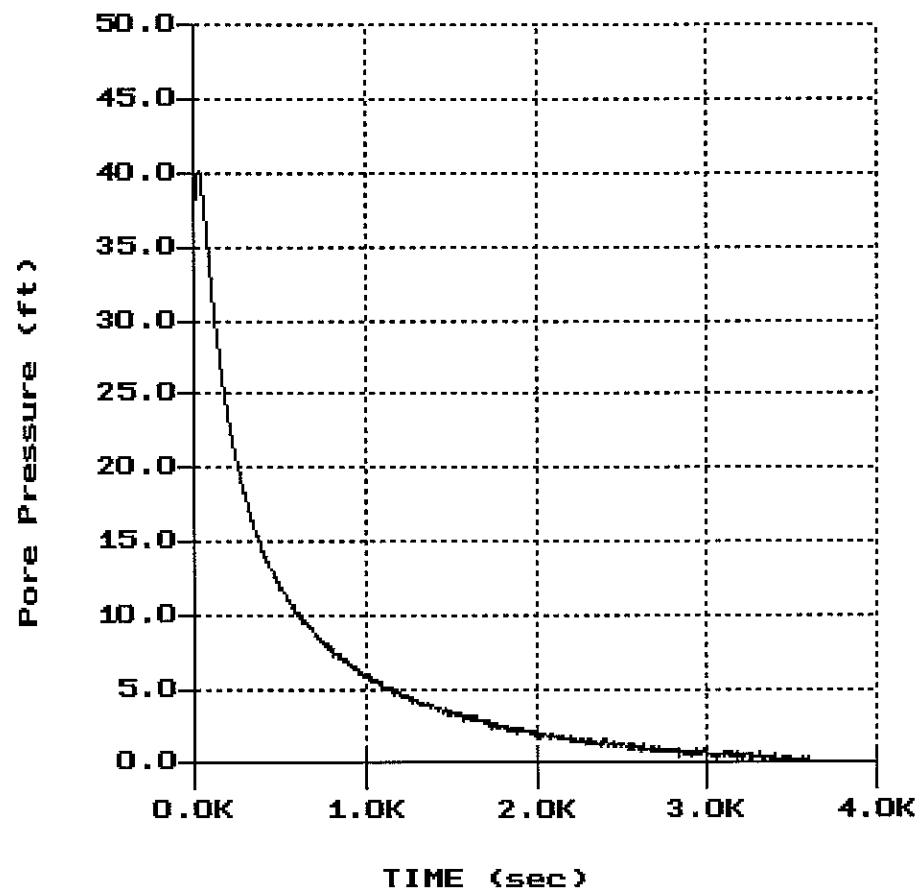
File: 789CP51.PPD
Depth (m): 15.00
(ft): 49.21
Duration : 300.0s
U-min: -0.38 0.0s
U-max: 0.61 40.0s

Parsons

Hole:CPT-51
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 16:50

PORE PRESSURE DISSIPATION RECORD

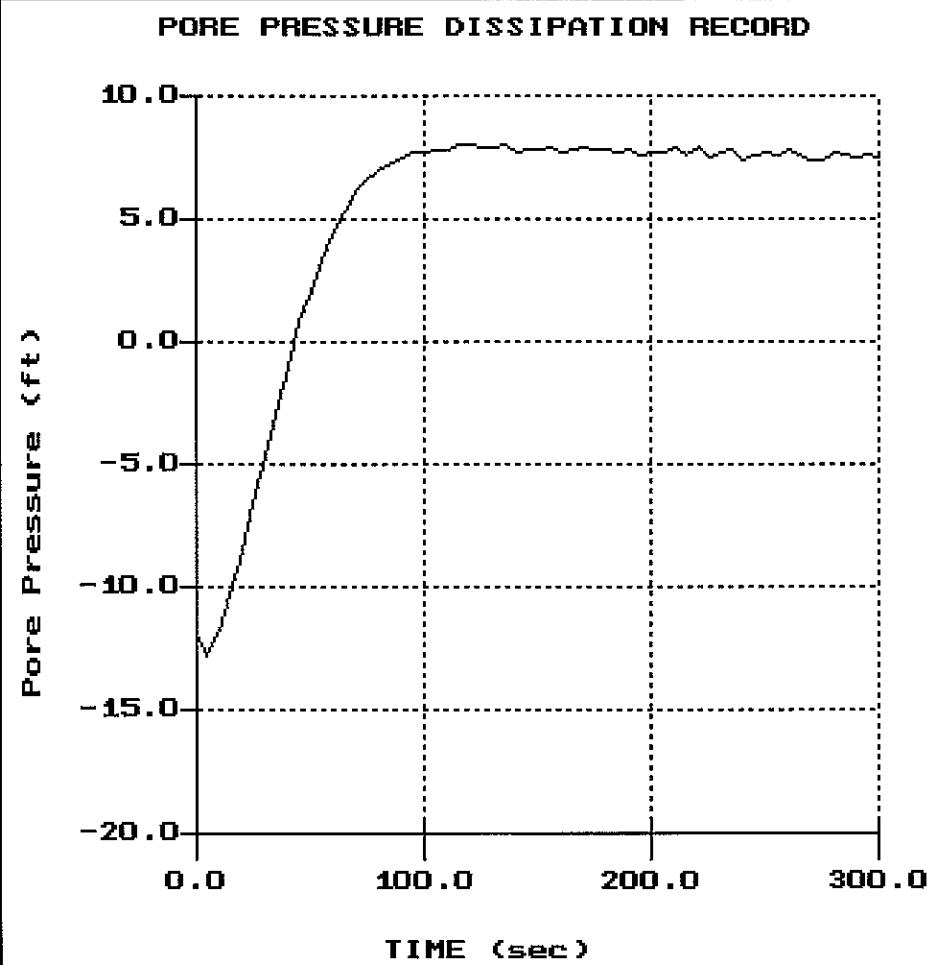


File: 789CP51.PPD
Depth (m): 17.00
(ft): 55.77
Duration : 3600.0s
U-Min: 0.05 3600.0s
U-Max: 40.12 30.0s

Parsons

Hole:CPT-51
Location:Wastebed 13

Cone:20 TON AD179
Date:10:05:06 16:50



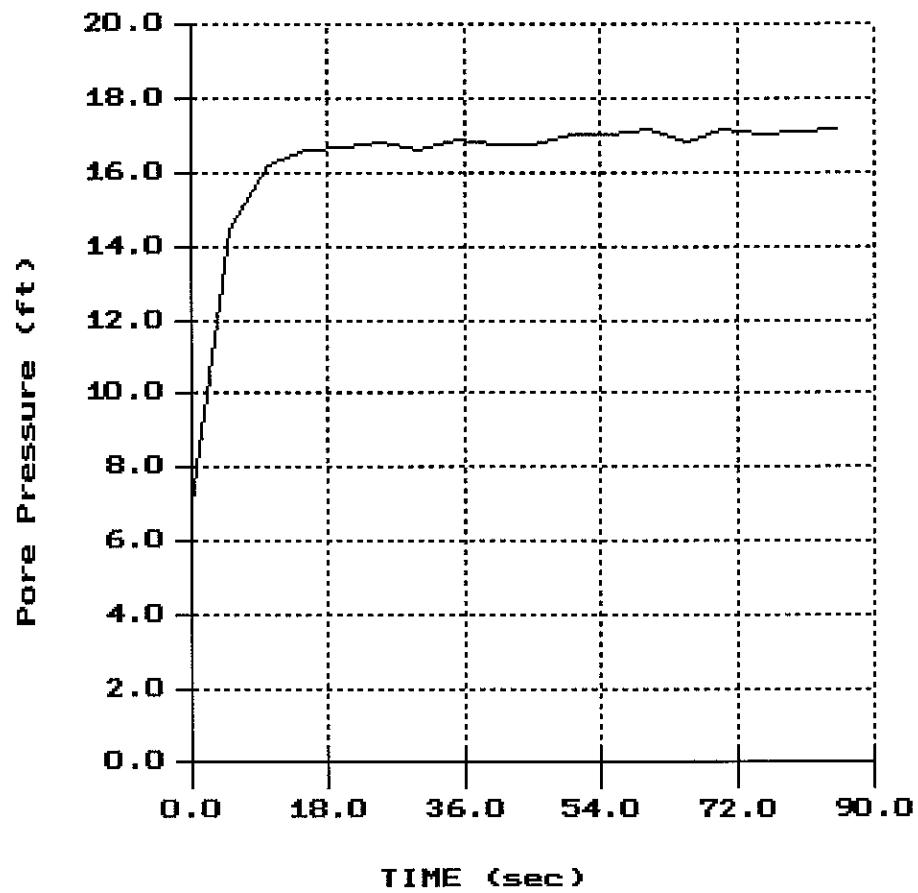
File: 789CP51.PPD
Depth (m): 20.00
(ft): 65.62
Duration : 300.0s
U-min: -12.81 5.0s
U-max: 8.02 120.0s

Parsons

Hole:CPT-53
Location:Wastebed 13

Cone:20 TON AD171
Date:10:02:06 09:03

PORE PRESSURE DISSIPATION RECORD



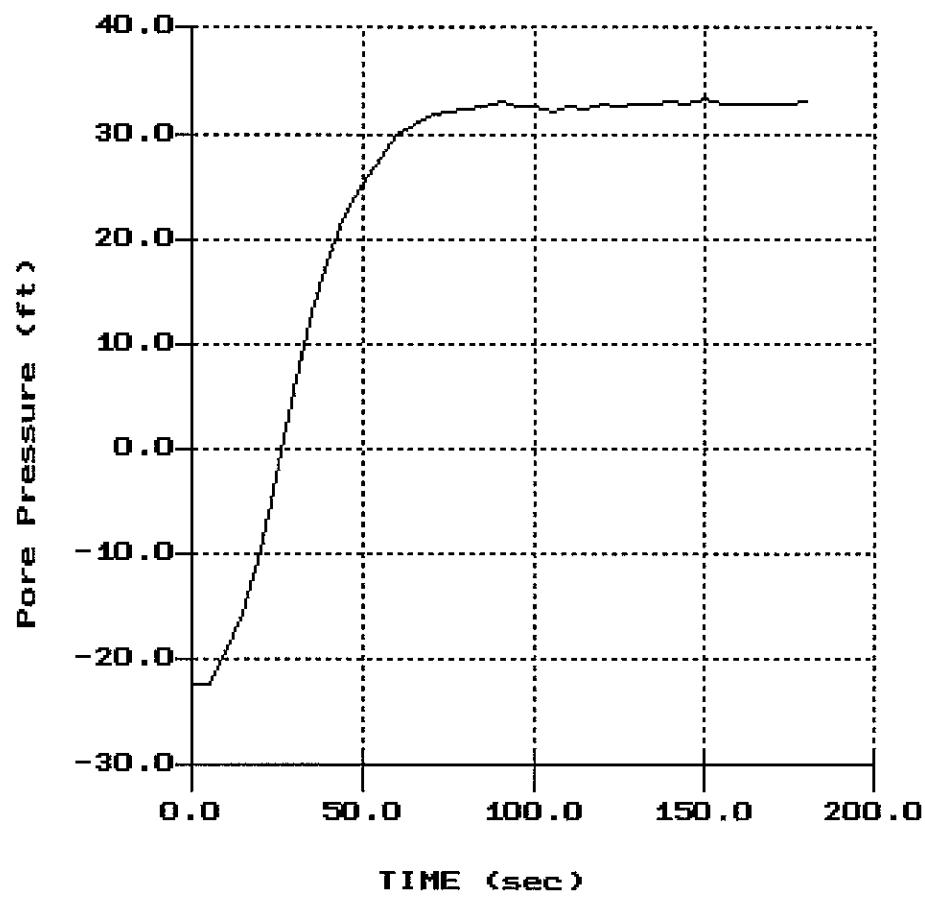
File: 789CP53.PPD
Depth (m): 22.50
(ft): 73.82
Duration : 85.0s
U-Min: 6.95 0.0s
U-Max: 17.13 85.0s

Parsons

Hole:CPT-55
Location:Wastebed 13

Cone:20 TON AD171
Date:09:28:06 12:11

PORE PRESSURE DISSIPATION RECORD



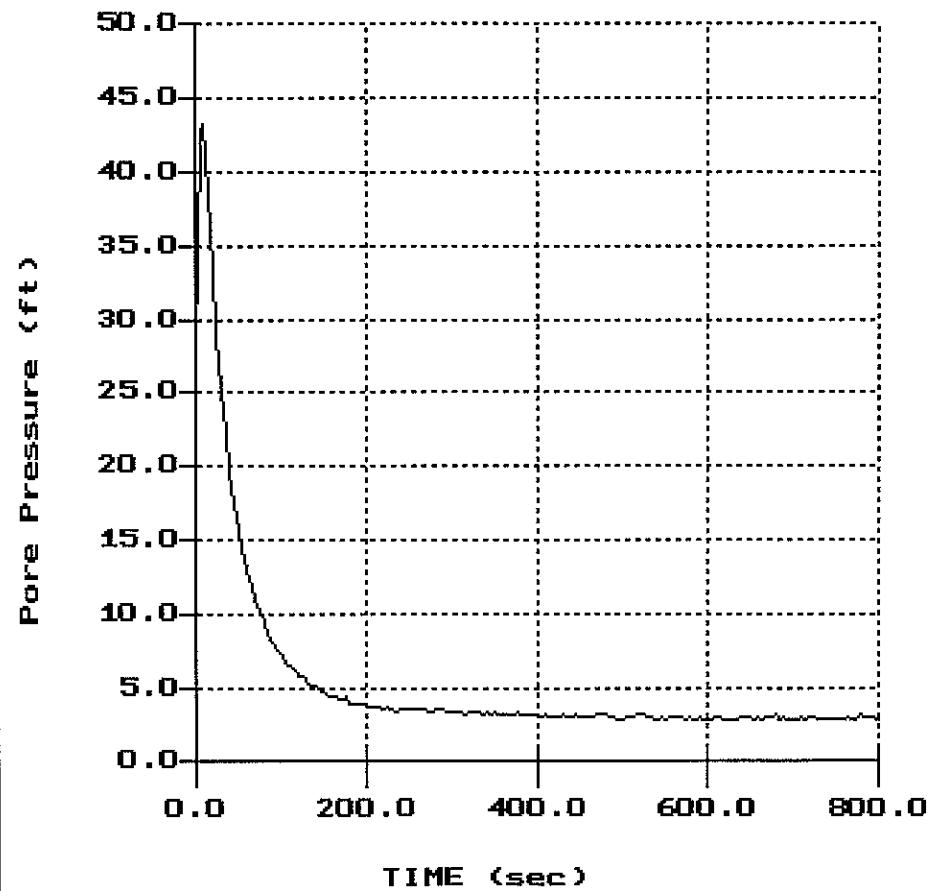
File: 789CP55.PPD
Depth (m): 28.00
(ft): 91.86
Duration : 180.0s
U-Min: -22.53 0.0s
U-Max: 33.13 150.0s

Parsons

Hole:CPT-59
Location:Wastebed 13

Cone:20 TON AD179
Date:10:03:06 15:50

PORE PRESSURE DISSIPATION RECORD

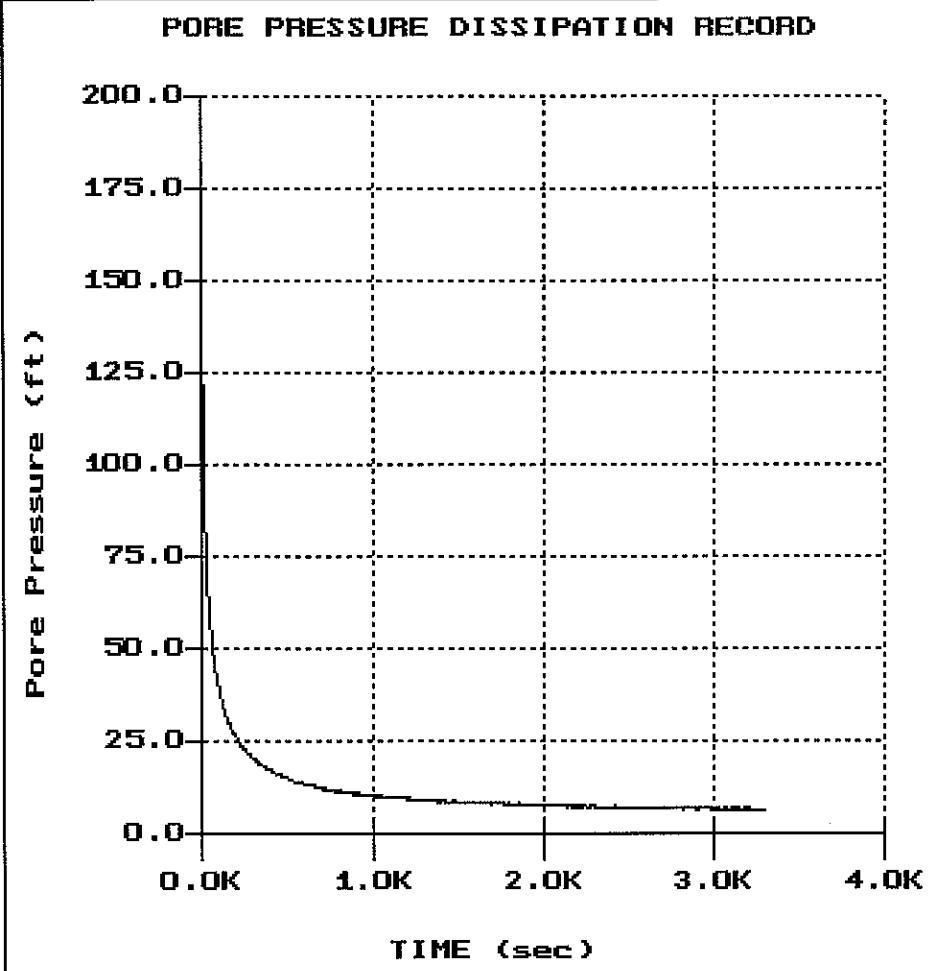


File: 789CP59.PPD
Depth (m): 7.75
(ft): 25.43
Duration : 800.0s
U-min: 2.72 750.0s
U-max: 43.27 10.0s

Parsons

Hole:CPT-59
Location:Wastebed 13

Cone:20 TON AD179
Date:10:03:06 15:50



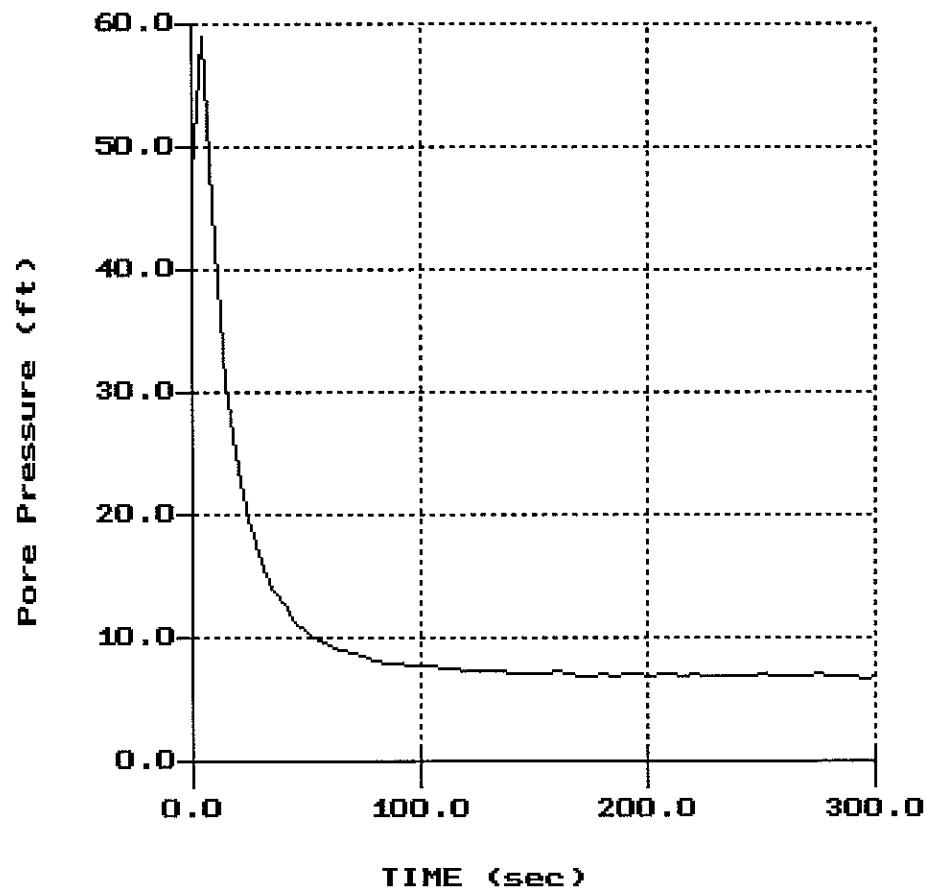
File: 789CP59.PPD
Depth (m): 12.30
(ft): 40.35
Duration : 3300.0s
U-Min: 6.34 3245.0s
U-Max: 131.73 5.0s

Parsons

Hole:CPT-59
Location:Wastebed 13

Cone:20 TON AD179
Date:10:03:06 15:50

PORE PRESSURE DISSIPATION RECORD

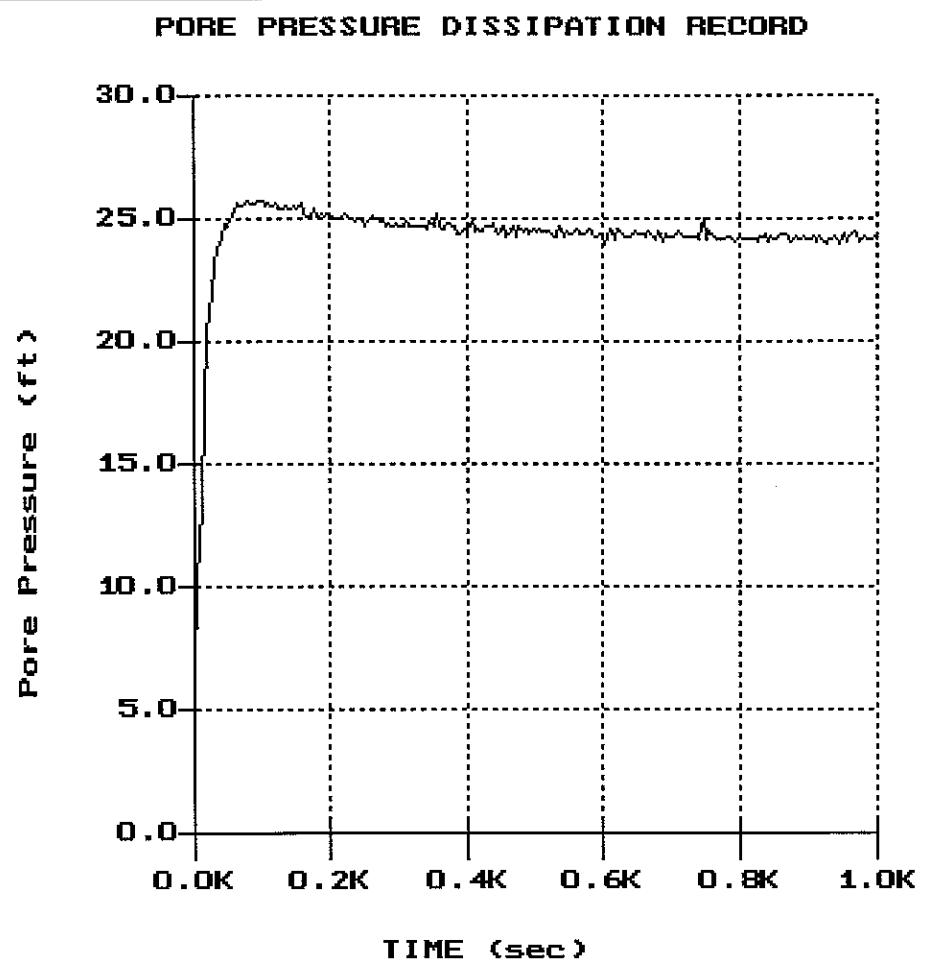


File: 789CP59.PPD
Depth (m): 17.05
(ft): 55.94
Duration : 300.0s
U-Min: 6.76 295.0s
U-Max: 59.04 5.0s

Parsons

Hole:CPT-59
Location:Wastebed 13

Cone:20 TON AD179
Date:10:03:06 15:50



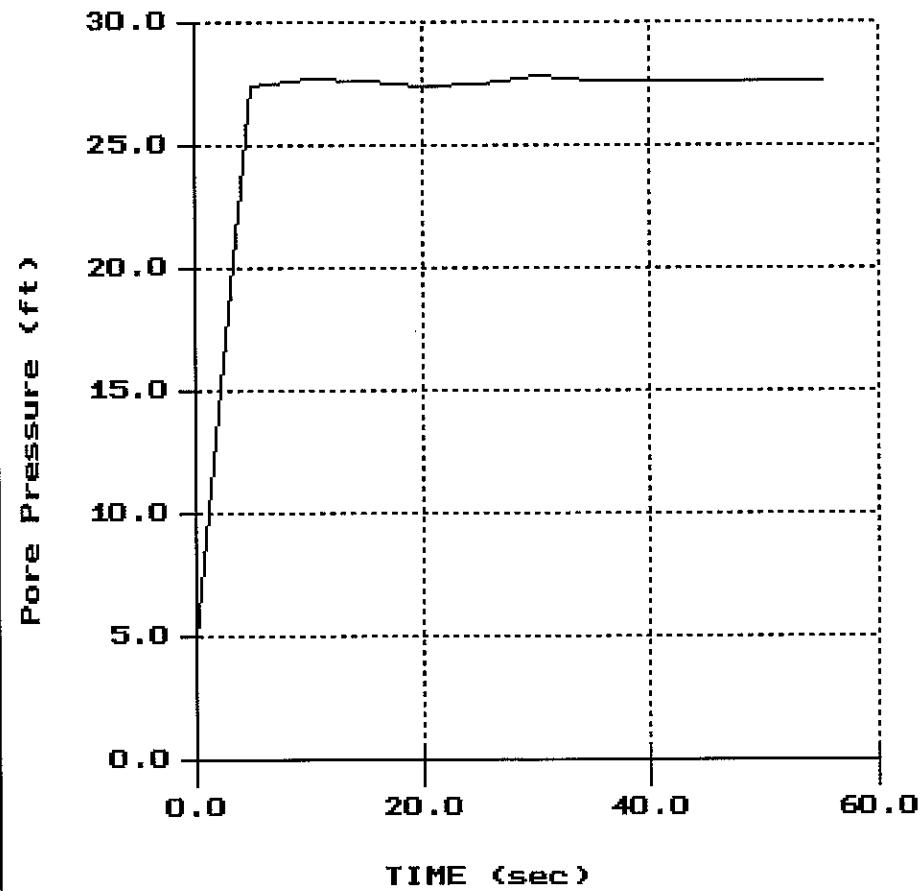
File: 789CP59.PPD
Depth (m): 27.35
(ft): 89.73
Duration : 1000.0s
U-Min: 6.24 0.0s
U-Max: 25.72 100.0s

Parsons

Hole:CPT-59A
Location:Wastebed 13

Cone:20 TON AD179
Date:10:04:06 07:28

PORE PRESSURE DISSIPATION RECORD

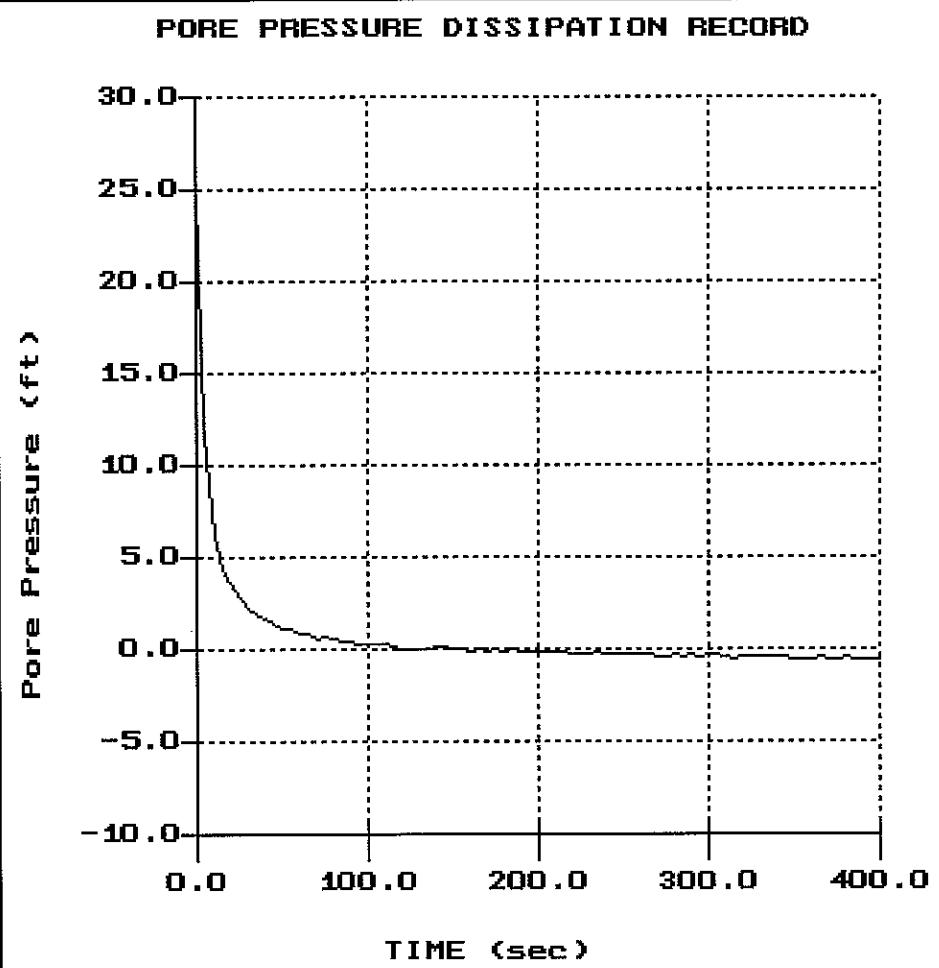


File: 789CP59A.PPD
Depth (m): 28.50
(ft): 93.50
Duration : 55.0s
U-Min: 4.93 0.0s
U-Max: 27.78 30.0s

Parsons

Hole:CPT-64
Location:Wastebed 13

Cone:20 TON AD179
Date:10:04:06 10:55



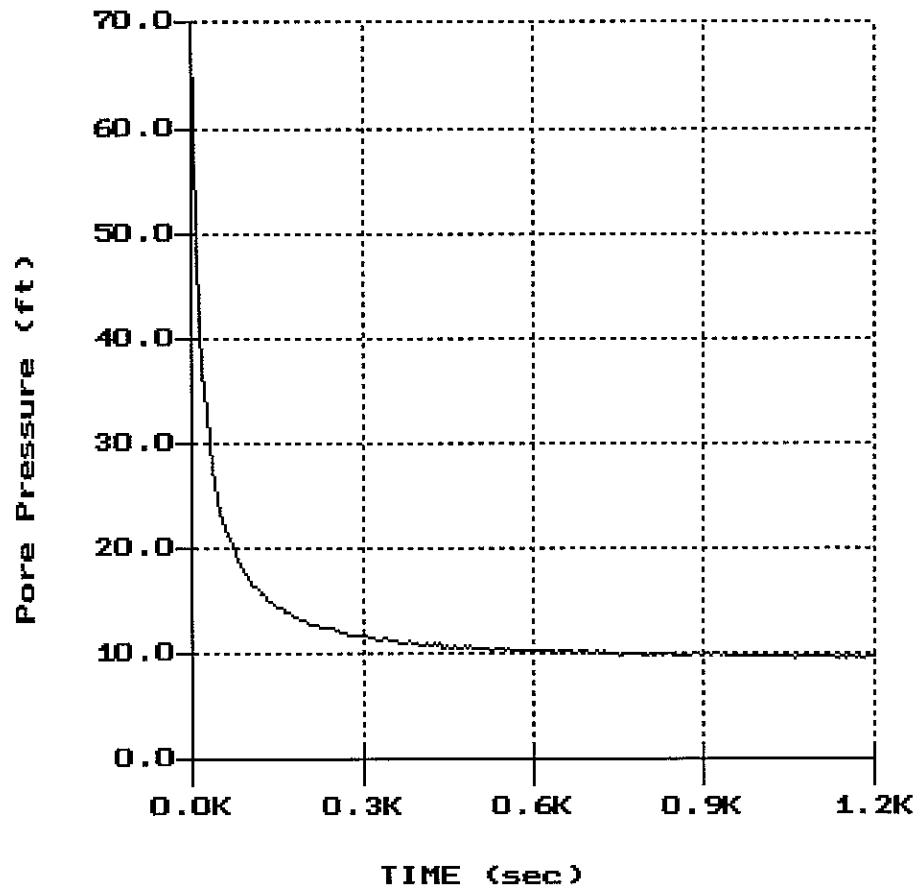
File: 789CP64.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 400.0s
U-Min: -0.61 390.0s
U-Max: 25.39 0.0s

Parsons

Hole:CPT-64
Location:Wastebed 13

Cone:20 TON AD179
Date:10:04:06 10:55

PORE PRESSURE DISSIPATION RECORD

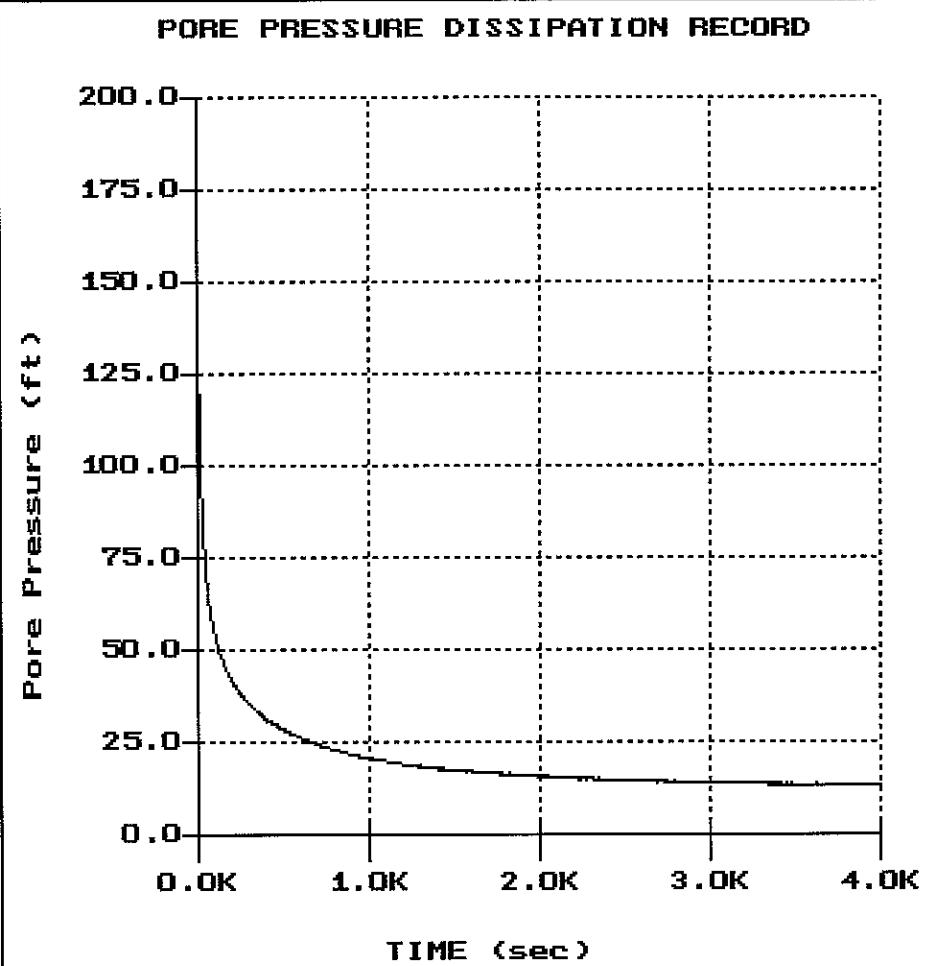


File: 789CP64.PPD
Depth (m): 9.20
(ft): 30.18
Duration : 1200.0s
U-Min: 9.53 1135.0s
U-Max: 69.92 0.0s

Parsons

Hole:CPT-64
Location:Wastebed 13

Cone:20 TON AD179
Date:10:04:06 10:55



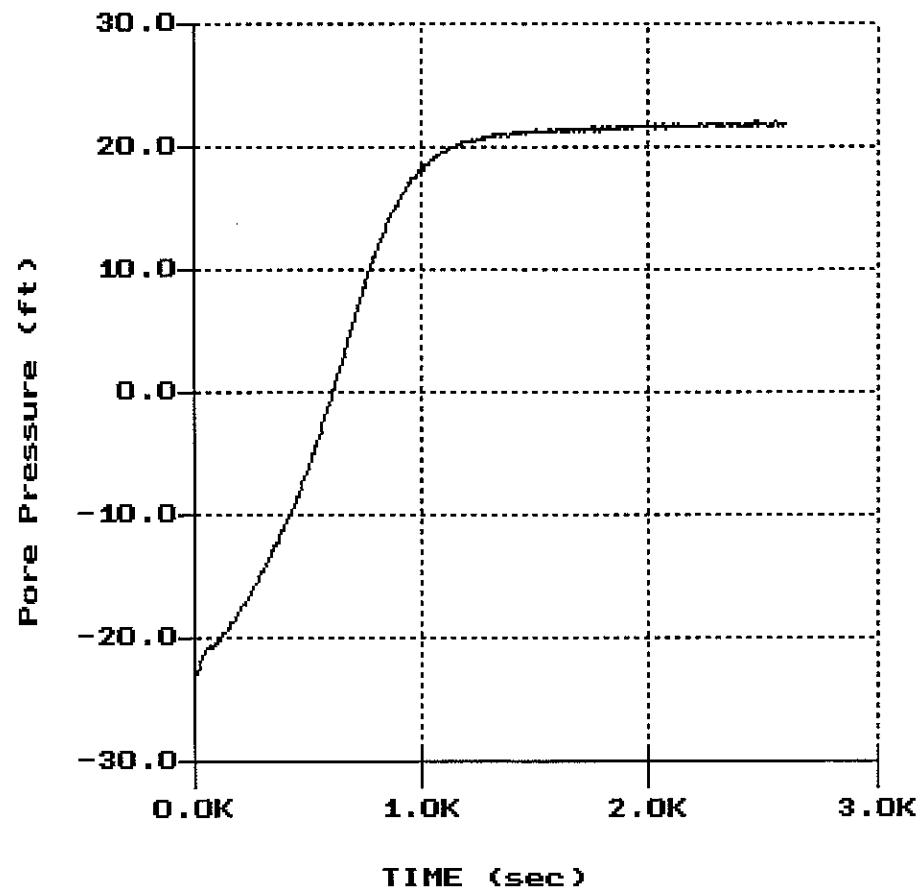
File: 789CP64.PPD
Depth (m): 13.75
(ft): 45.11
Duration : 4000.0s
U-min: 13.00 3960.0s
U-max: 140.08 0.0s

Parsons

Hole:CPT-64
Location:Wastebed 13

Cone:20 TON AD179
Date:10:04:06 10:55

PORE PRESSURE DISSIPATION RECORD



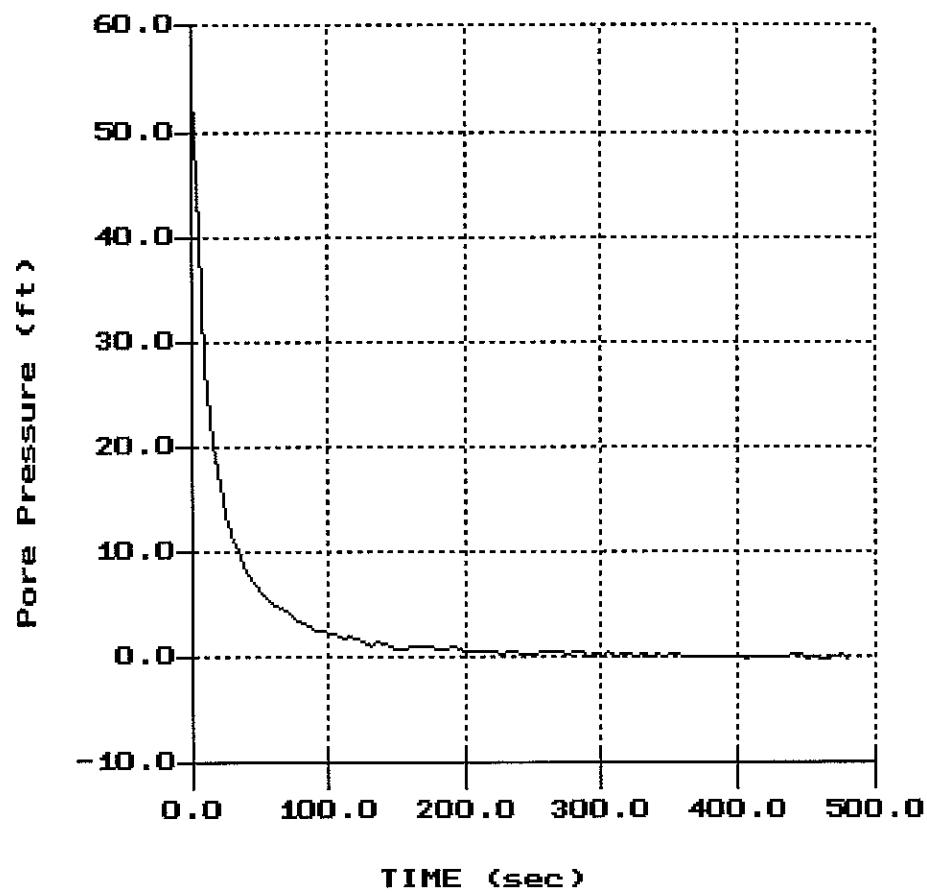
File: 789CP64.PPD
Depth (m): 22.45
(ft): 73.65
Duration : 2600.0s
U-min: -22.95 10.0s
U-max: 22.06 2550.0s

Parsons

Hole:CPT-71
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 13:21

PORE PRESSURE DISSIPATION RECORD



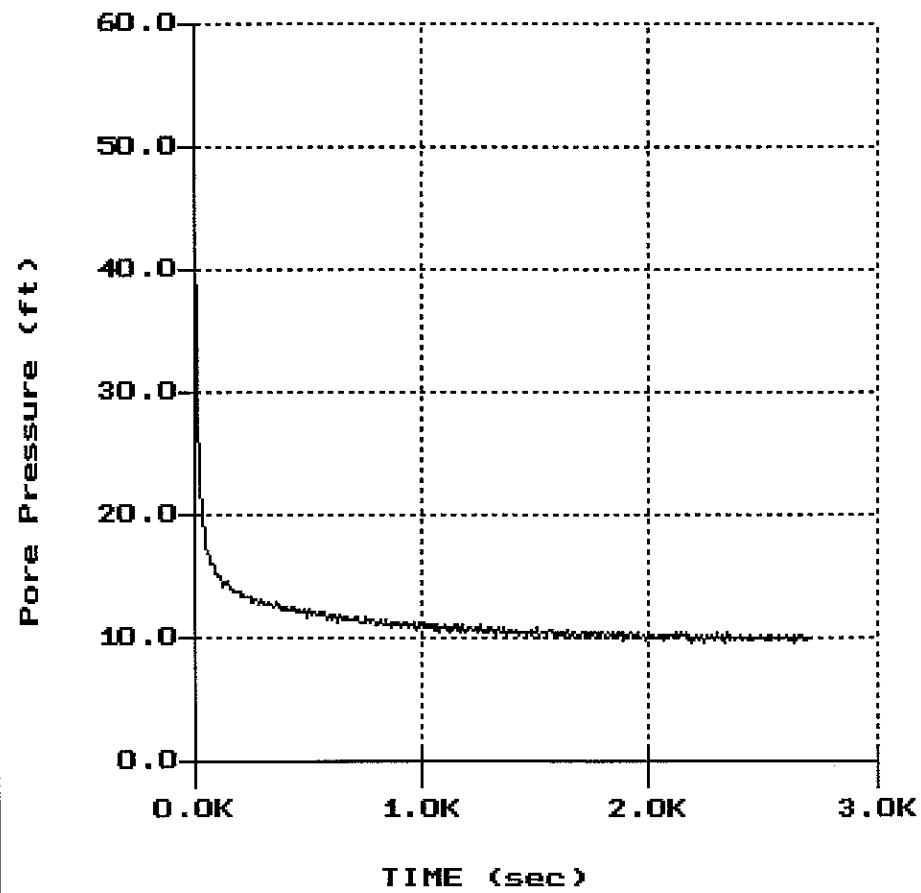
File: 789CP71.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 480.0s
U-Min: -0.33 450.0s
U-max: 54.11 0.0s

Parsons

Hole:CPT-71
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 13:21

PORE PRESSURE DISSIPATION RECORD



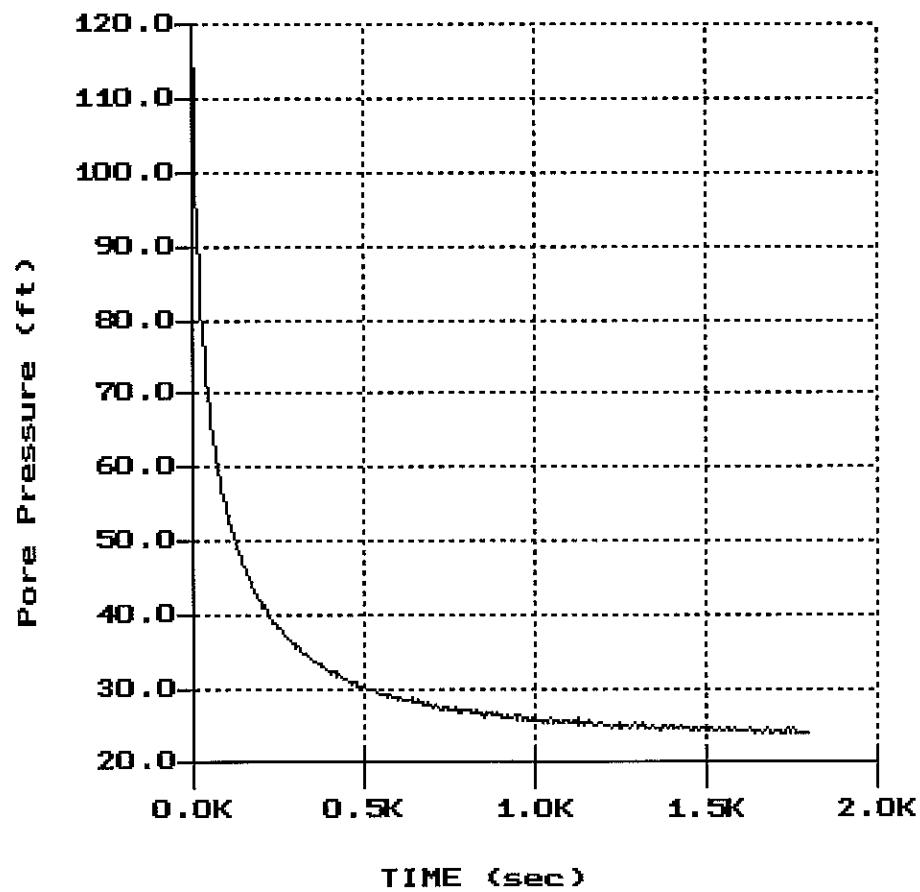
File: 789CP71.PPD
Depth (m): 9.15
(ft): 30.02
Duration : 2700.0s
U-min: 9.48 2630.0s
U-max: 59.13 0.0s

Parsons

Hole:CPT-71
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 13:21

PORE PRESSURE DISSIPATION RECORD

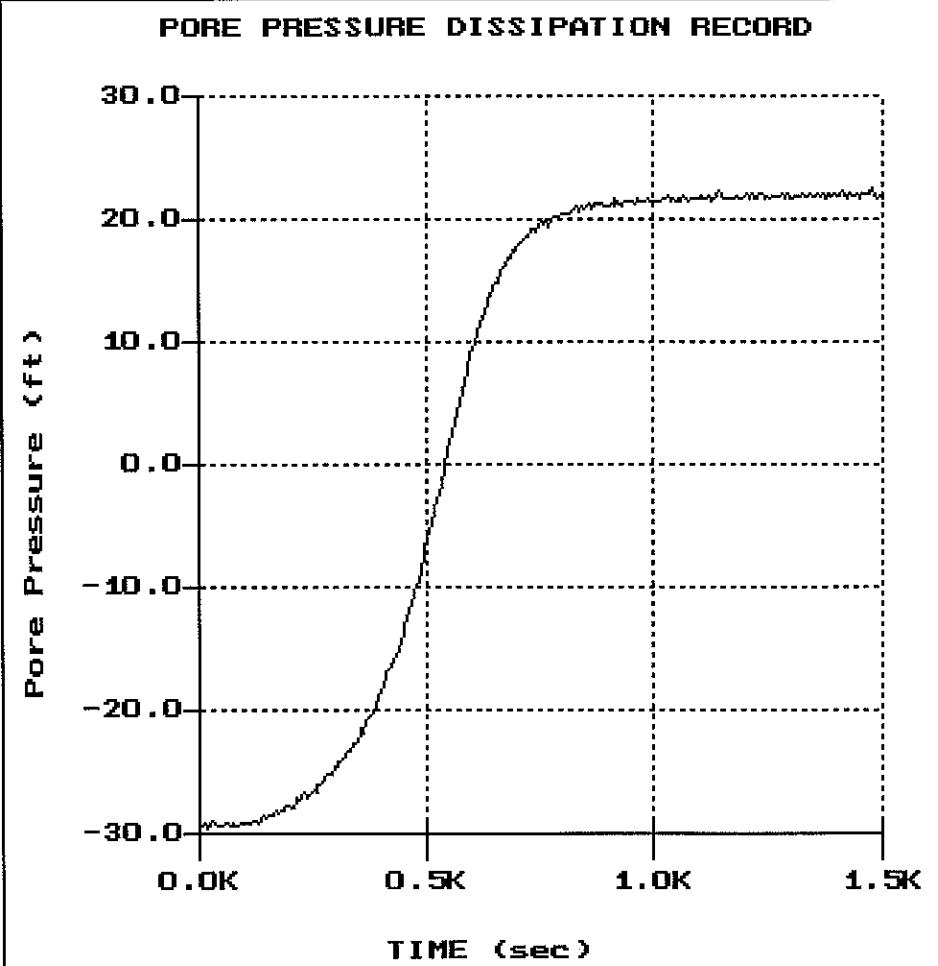


File: 789CP71.PPD
Depth (m): 13.75
(ft): 45.11
Duration : 1800.0s
U-Min: 23.70 1760.0s
U-Max: 118.12 0.0s

Parsons

Hole:CPT-71
Location:Wastebed 13

Cone:20 TON AD171
Date:09:26:06 13:21



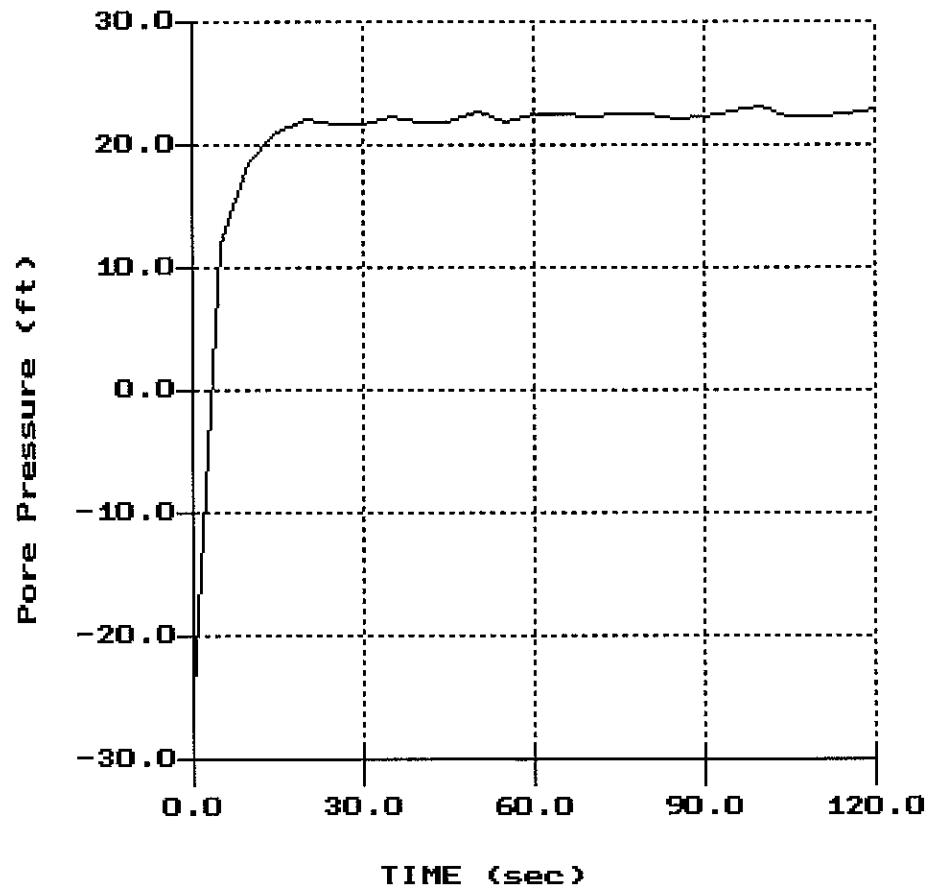
File: 789CP71.PPD
Depth (m): 20.55
(ft): 67.42
Duration : 1500.0s
U-Min: -29.66 15.0s
U-Max: 22.43 1475.0s

Parsons

Hole:CPT-74
Location:Wastebed 13

Cone:20 TON AD171
Date:09:22:06 07:40

PORE PRESSURE DISSIPATION RECORD



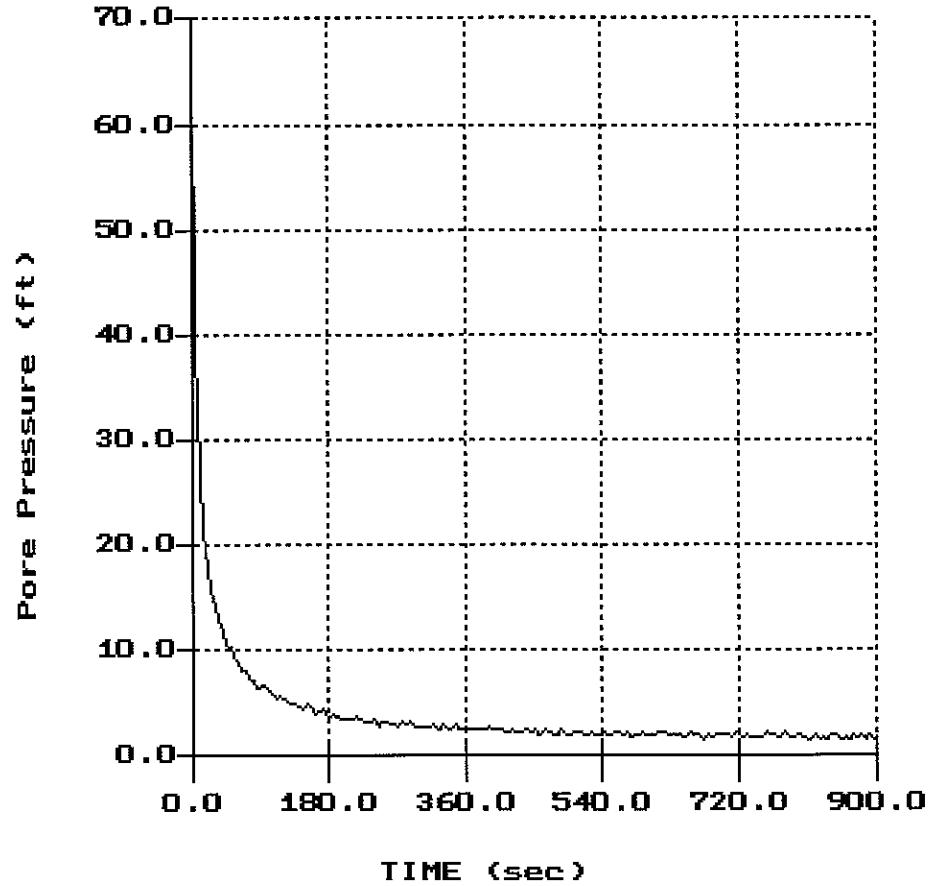
File: 789CP74.PPD
Depth (m): 24.55
(ft): 80.54
Duration : 120.0s
U-Min: -24.97 0.0s
U-Max: 23.09 100.0s

Parsons

Hole:CPT-78
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 08:05

PORE PRESSURE DISSIPATION RECORD



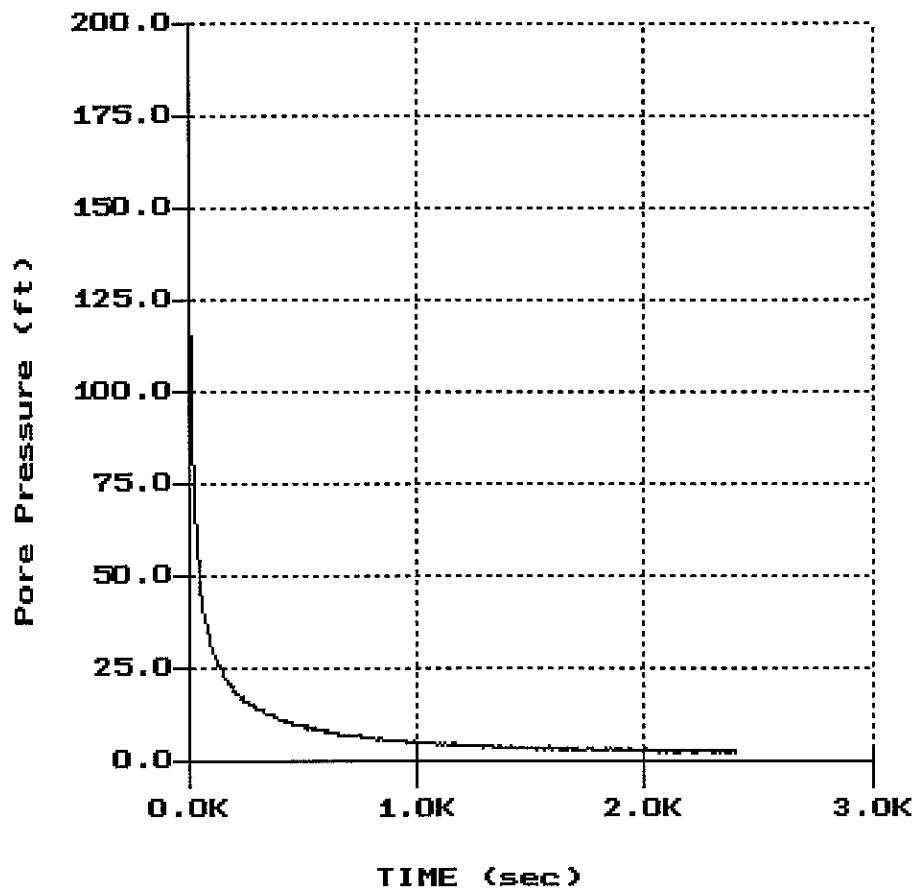
File: 789CP78.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 900.0s
U-min: 1.41 835.0s
U-max: 68.99 0.0s

Parsons

Hole:CPT-78
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 08:05

PORE PRESSURE DISSIPATION RECORD



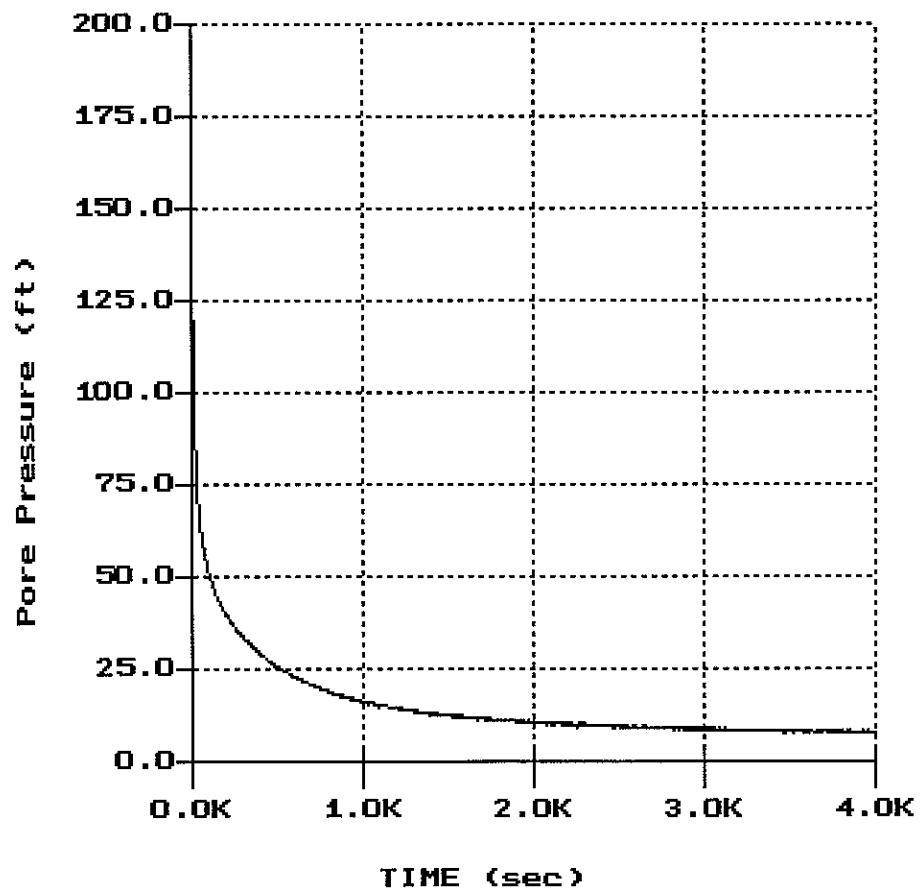
File: 789CPT78.PPD
Depth (m): 9.15
(ft): 30.02
Duration : 2400.0s
U-min: 2.02 2375.0s
U-max: 171.29 0.0s

Parsons

Hole:CPT-78
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 08:05

PORE PRESSURE DISSIPATION RECORD

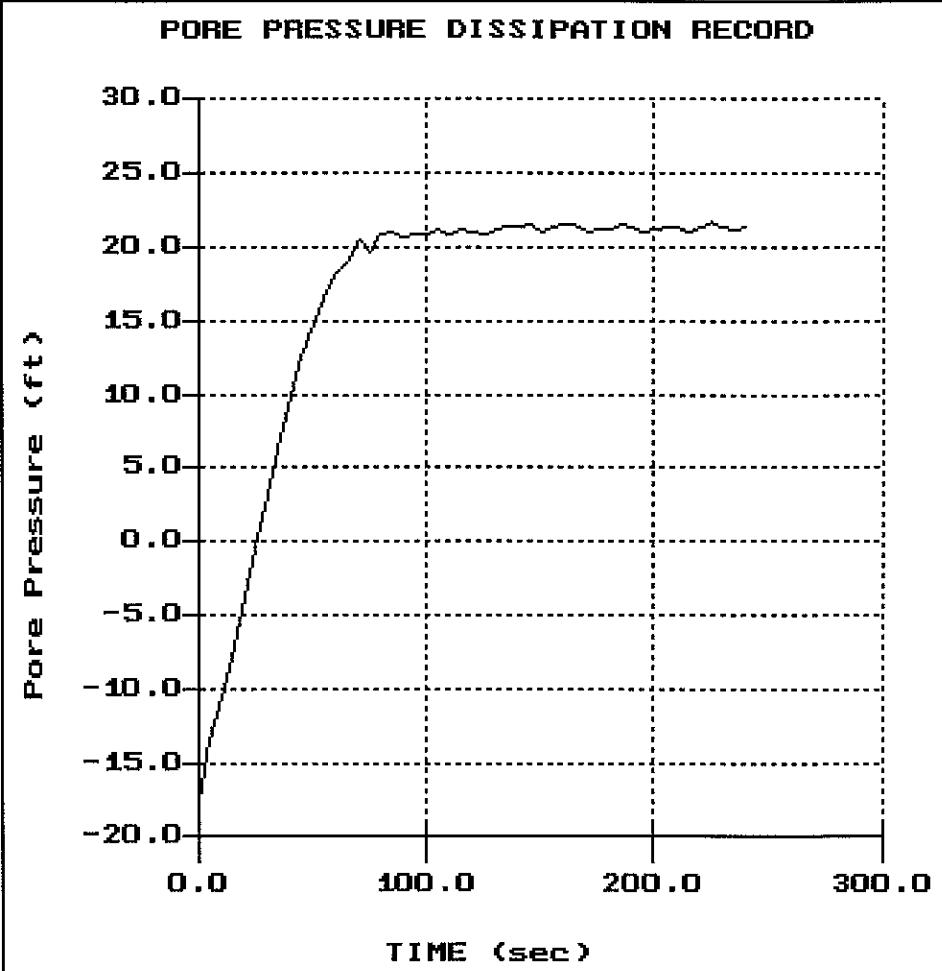


File: 789CP78.PPD
Depth (m): 13.75
(ft): 45.11
Duration : 4000.0s
U-Min: 7.60 3970.0s
U-Max: 130.09 5.0s

Parsons

Hole:CPT-78
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 08:05

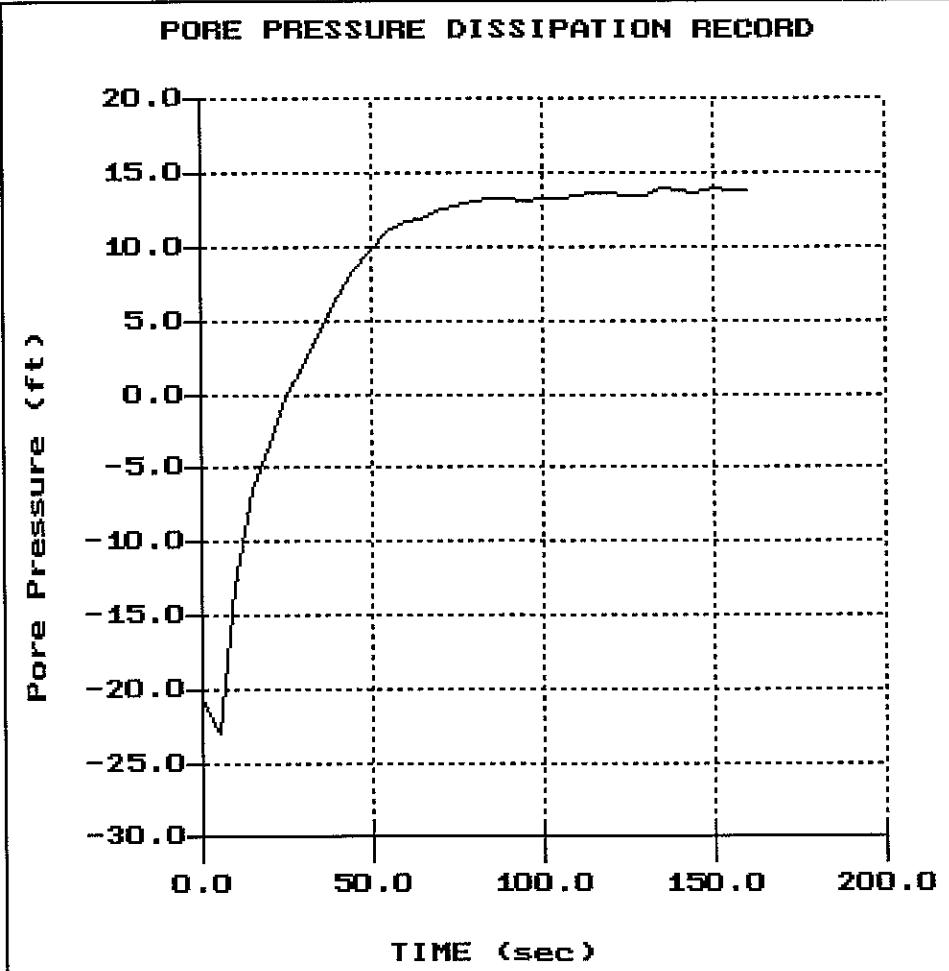


File: 789CP78.PPD
Depth (m): 23.10
(ft): 75.79
Duration : 240.0s
U-Min: -17.69 0.0s
U-Max: 21.59 225.0s

Parsons

Hole:CPT-80
Location:Wastebed 13

Cone:20 TON AD171
Date:09:22:06 10:01



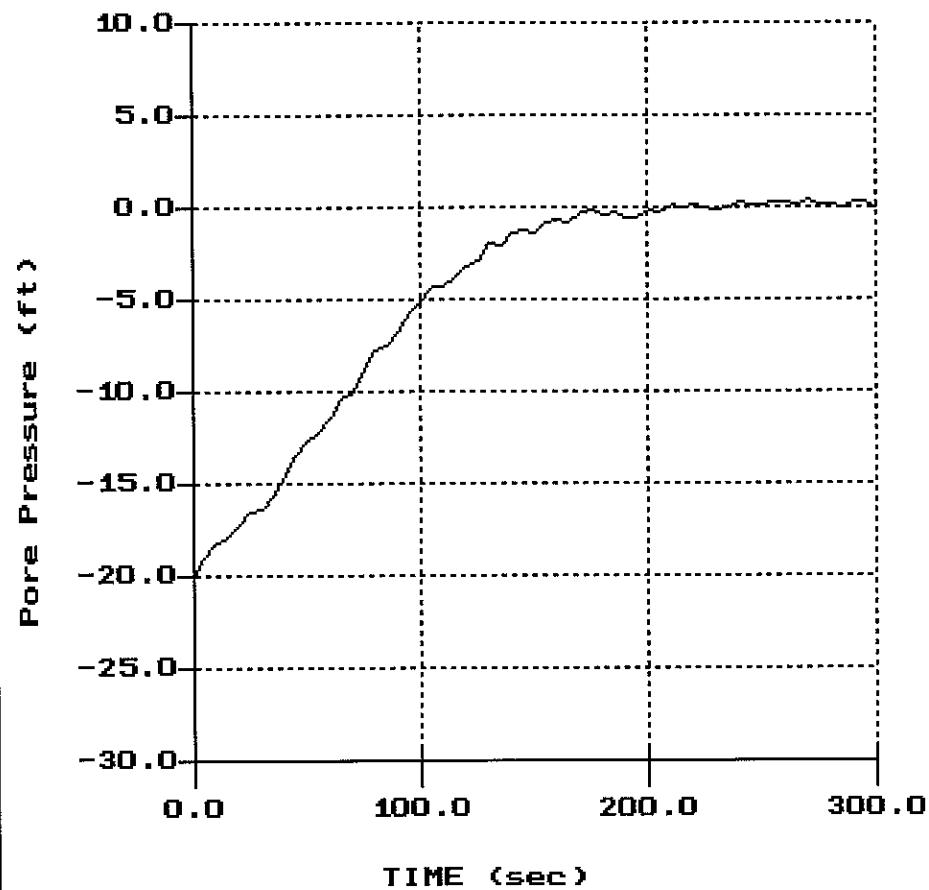
File: 789CP80.PPD
Depth (m): 19.25
(ft): 63.16
Duration : 160.0s
U-Min: -23.00 5.0s
U-max: 13.98 135.0s

Parsons

Hole:CPT-81
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 15:06

PORE PRESSURE DISSIPATION RECORD



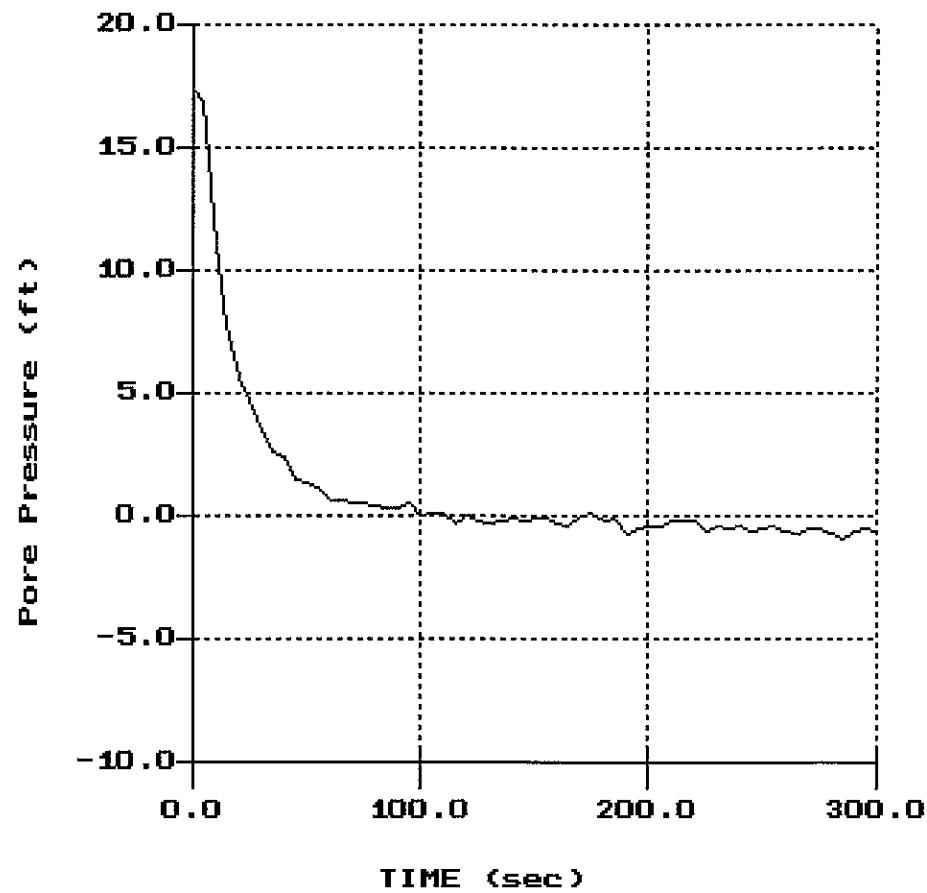
File: 789CP81.PPD
Depth (m): 16.80
(ft): 55.12
Duration : 300.0s
U-Min: -20.04 0.0s
U-Max: 0.42 270.0s

Parsons

Hole:CPT-82
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 13:09

PORE PRESSURE DISSIPATION RECORD



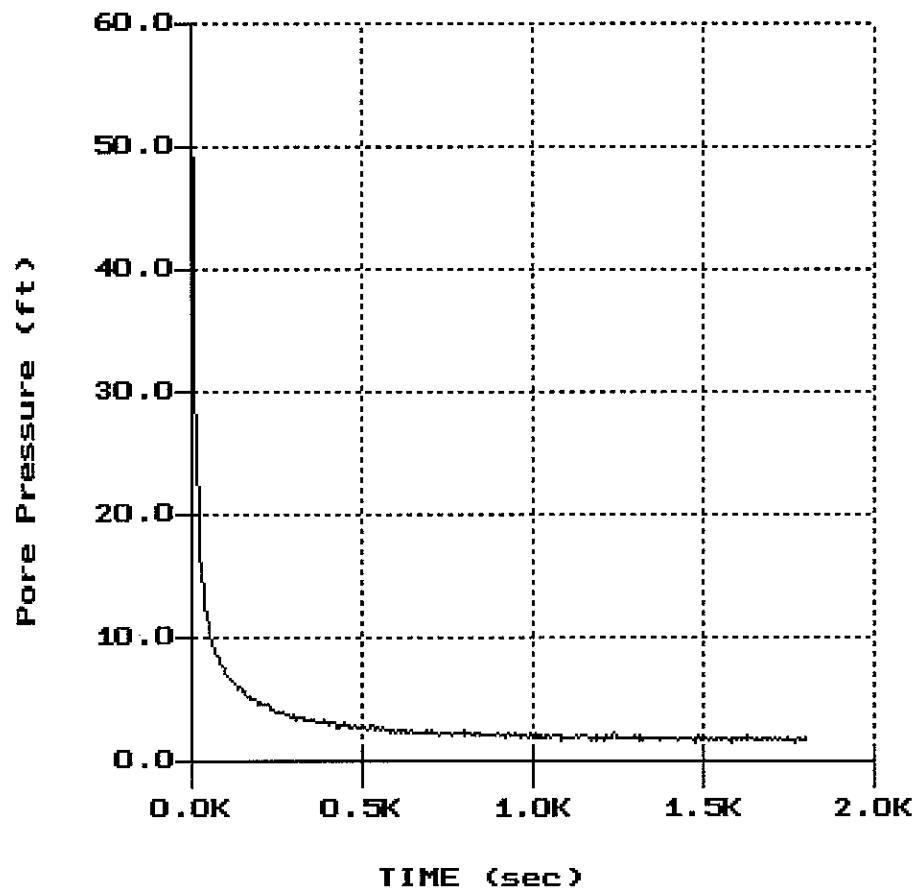
File: 789CP82.PPD
Depth (m): 4.60
(ft): 15.09
Duration : 300.0s
U-min: -0.89 285.0s
U-max: 17.41 0.0s

Parsons

Hole:CPT-82
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 13:09

PORE PRESSURE DISSIPATION RECORD

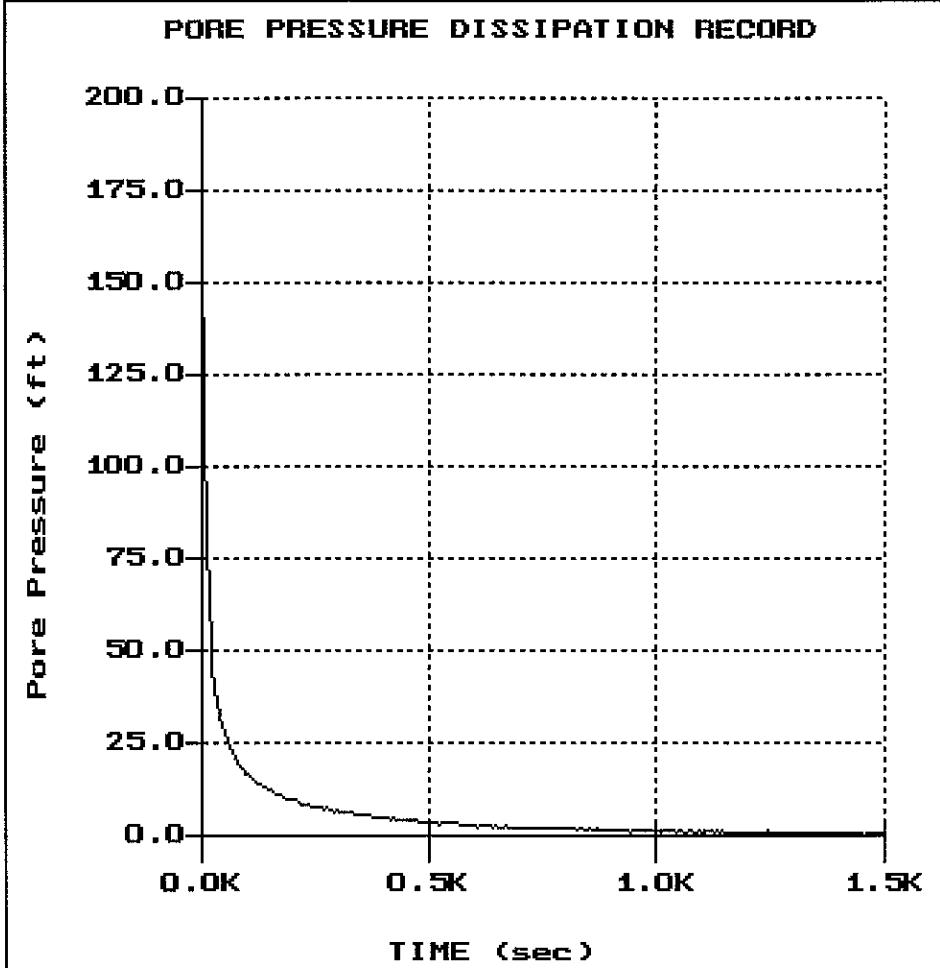


File: 789CP82.PPD
Depth (m): 9.15
(ft): 30.02
Duration : 1800.0s
U-Min: 1.45 1480.0s
U-Max: 51.34 0.0s

Parsons

Hole:CPT-82
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 13:09



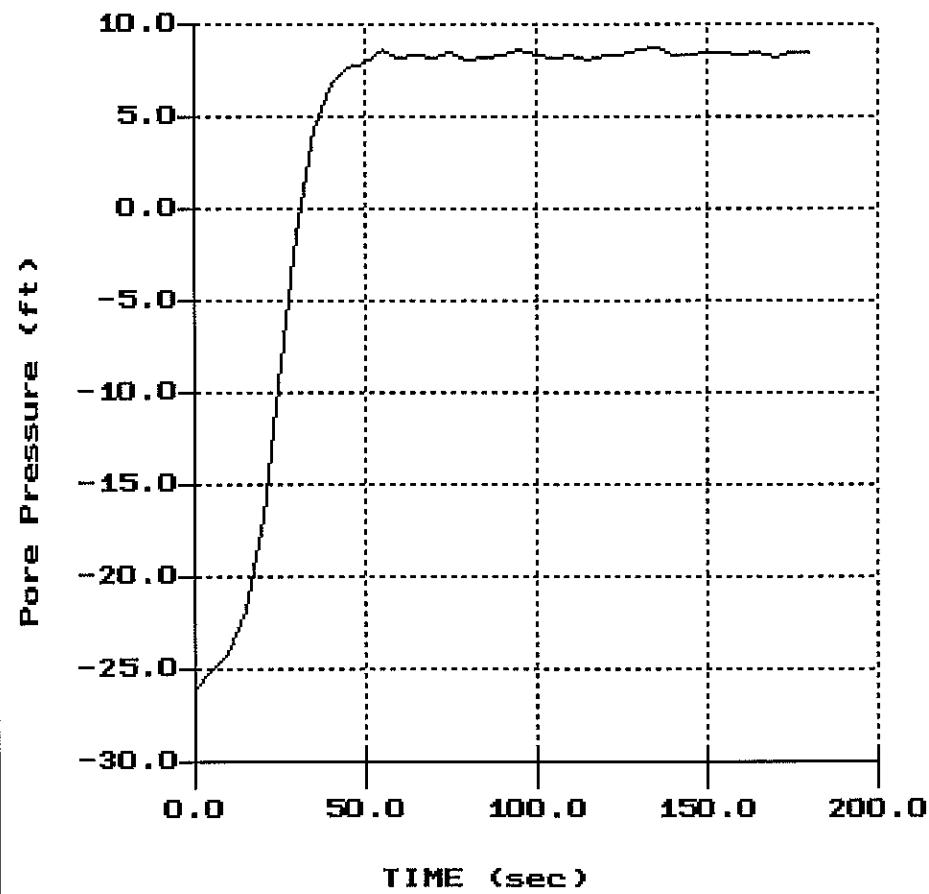
File: 789CP82.PPD
Depth (m): 13.90
(ft): 45.60
Duration : 1500.0s
U-min: 0.33 1455.0s
U-max: 168.76 0.0s

Parsons

Hole:CPT-82
Location:Wastebed 13

Cone:20 TON AD171
Date:09:25:06 13:09

PORE PRESSURE DISSIPATION RECORD



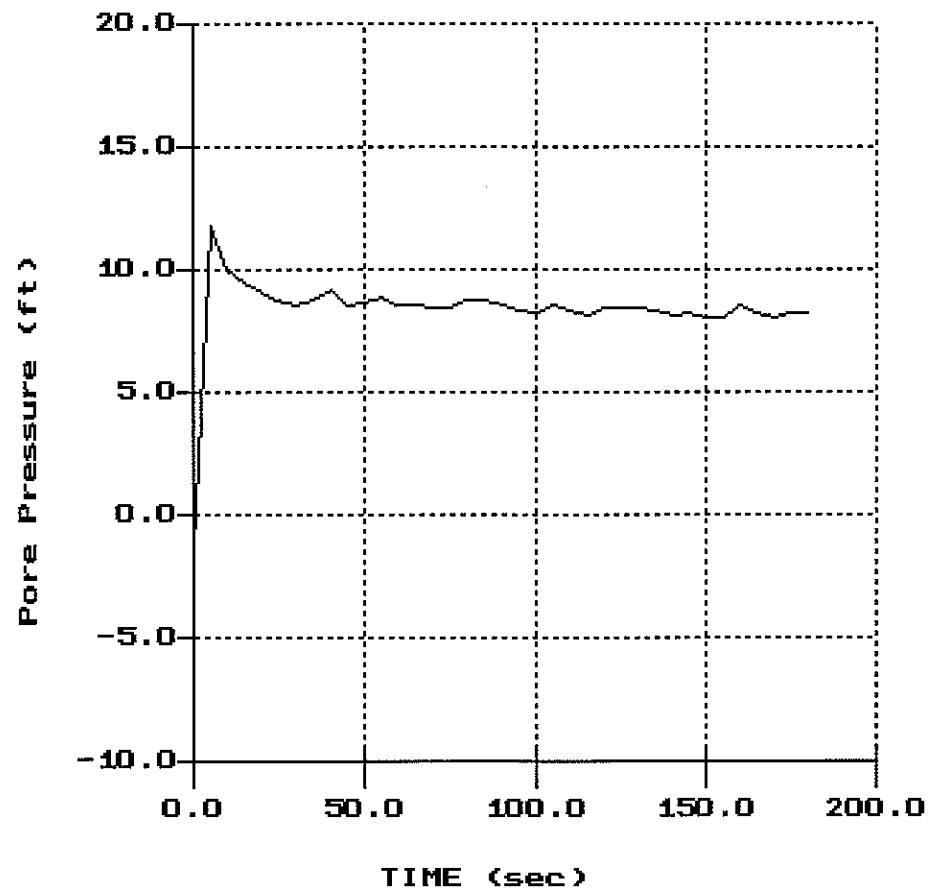
File: 789CP82.PPD
Depth (m): 18.90
(ft): 62.01
Duration : 180.0s
U-Min: -26.05 0.0s
U-Max: 8.73 135.0s

Parsons

Hole:CPT-86
Location:Wastebed 13

Cone:20 TON AD171
Date:09:21:06 12:26

PORE PRESSURE DISSIPATION RECORD



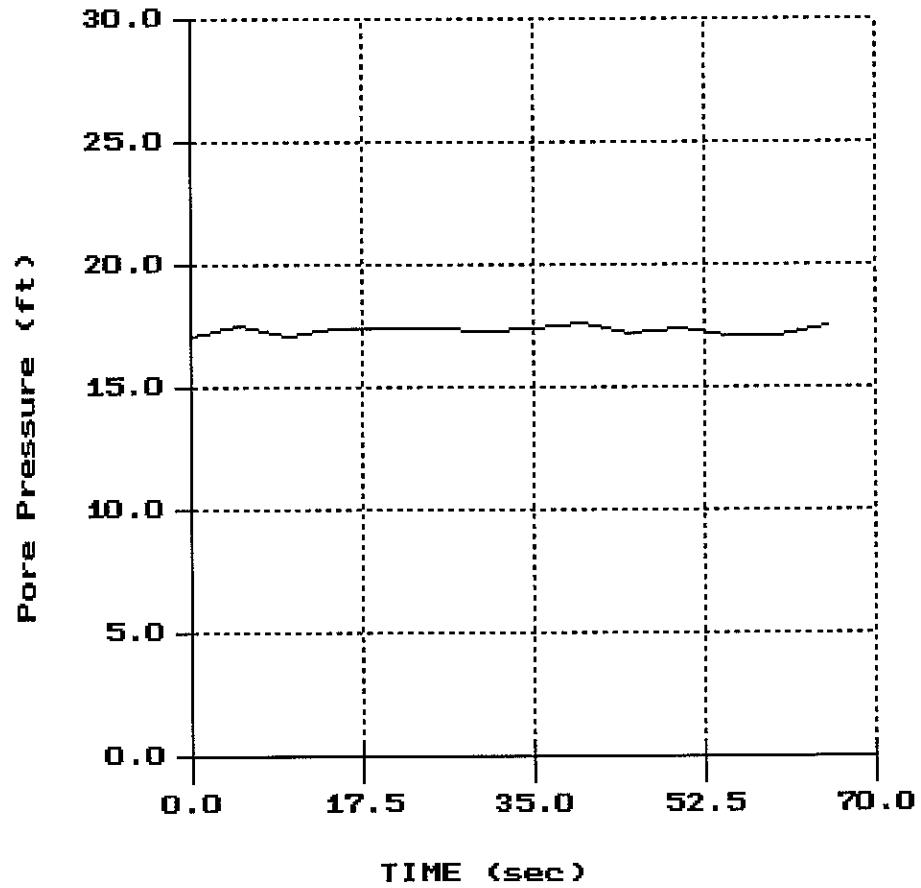
File: 789CP86.PPD
Depth (m): 19.60
(ft): 64.30
Duration : 180.0s
U-Min: -1.60 0.0s
U-max: 11.73 5.0s

Parsons

Hole:CPT-87
Location:Wastebed 13

Cone:20 TON AD171
Date:09:27:06 11:11

PORE PRESSURE DISSIPATION RECORD



File: 789CP87.PPD
Depth (m): 22.65
(ft): 74.31
Duration : 65.0s
U-min: 17.04 0.0s
U-max: 17.65 40.0s

ConeTec Digital File Formats

CPT Data Files (COR Extension)

ConeTec CPT data files are named such that the first 3 characters contain the job number, the next two characters are CP followed by two characters indicating the sounding number. The last DOS character position is reserved for the letters a, b, c, d etc to uniquely identify multiple soundings at the same location. The CPT sounding file has the extensions COR, and pore pressure dissipation files have the extension PPD. As an example, for job number 99-127 the first sounding will have file names 127CP01.COR and 127CP01.PPD.

The CPT (COR) file consists of the following components:

1. Two lines of header information
2. Data records
3. End of data marker
4. Units information

Header Lines

Line 1: Columns 1-6 are blank (future use)
 Columns 7-21 contain the sounding Date and Time
 Columns 22-36 contain the sounding Operator

Line 2: Columns 1-16 contain the Job Location
 Columns 17-31 contain the Cone ID
 Columns 32-47 contain the sounding number

Data Records

The data records contain 4 or more columns of data in floating point format. A comma (and spaces) separates each data item:

Column 1: Sounding Depth (meters)
 Column 2: Tip (q_c) data uncorrected for pore pressure effects. Recorded in units selected by the operator.
 Column 3: Sleeve (f_s) data. Recorded in units selected by the operator
 Column 4: Dynamic pore pressure readings. Recorded in units selected by the operator
 Column 5: UVIF Data. See UVIF section.

End of Data Marker

After the last line of data a line containing ASCII 26 (CTL-Z) and a newline (carriage return/ line feed) character. This is used to mark the end of data.

Units Information

The last section of the file contains information about the units that were selected for the sounding. A separator bar makes up the first line. The second line contains the type of units used for depth, q_c , f_s and u . The third line contains the conversion values required for ConeTec's software to convert the recorded data to an internal set of base units (bar for q_c , bar for f_s and meters for u).

CPT Dissipation Files (PPD Extension)

CPT Dissipation files have the same naming convention as the CPT sounding files and have the extension PPD. PPD files consist of the following components:

1. Two lines of header information
2. Data records

Header Lines (same as COR file):

- Line 1: Columns 1-6 are blank (future use)
Columns 7-21 contain the sounding Date and Time
Columns 22-36 contain the sounding Operator
- Line 2: Columns 1-16 contain the Job Location
Columns 17-31 contain the Cone ID
Columns 32-47 contain the sounding number

Data Records

The data records immediately follow the header lines. Each data record can occupy several lines in the file and is a complete record of a dissipation test at a particular depth. Each data record starts with a line containing two values separated by spaces; the first value being an index number (not currently used by the Software) and the second being the dissipation test depth in meters. Following this line are the dissipation pore pressure values stored at 5 second intervals with a maximum of 12 entries per line. The last line of the dissipation record may not contain a full 12 entries. The data record is terminated with an ASCII 30 character (appears as a triangle in some editors).

This sequence is repeated for every dissipation test in the sounding. No marker is used to indicate end of file. Units information is not stored in this file. Users would have to check the CPT file for the units that were used.

CPT Basic Interpretations (TBL Extension)

ConeTec's basic CPT interpretation output files are generally delivered in text files with a TBL extension. The root file name is the same as the COR files. A number of calculated geotechnical parameters are presented in these files. The files are stored as ASCII text files that can be viewed using any text editor such as Notepad or Wordpad. The files do not contain any page formatting. These files are not distributed if the enhanced interpretation files are provided.

CPT Enhanced Interpretations (NLI, NLP, XLS Extension)

ConeTec's enhanced CPT interpretation output files are delivered in several formats, each file type containing the exact same information but formatted slightly differently. The files typically have any of the following file extensions:

1. NLI an importable TAB delimited ASCII text file containing approximately 36 data columns of geotechnical interpretations. The file is designed for easy import to Excel. A companion document describes the techniques used for the interpretations (usually reproduced at the beginning of the Interpretation Appendix). Text editors can be used to view the file contents, however, they may remove the tabs or replace the tabs with spaces upon saving the file destroying the feature that makes them easy to import into Excel.
2. NLP a printable ASCII text file containing the same 36 columns of geotechnical interpretations as the NLI file. This file type has been formatted as a multi-page document with up to 132 characters per line and up to 68 lines per page. Each page has been separated into multiple sections to accommodate all the data fields. Each physical page has a header section and a page/section number. The file is designed for direct printing to laser printers set into compressed font mode. This output is typically provided in the Interpretation Appendix.
3. XLS an Excel format file that has been generated directly from the corresponding NLI file.

In each case root file name is the same as the COR files.