

# **SUMMARY OF CONE PENETRATION TEST DATA**

Project:

**ESEC Englekirk Structural Engineering Center North Soil Pit  
10201 Pomerado Road  
San Diego, CA  
April 16, 2024**

Prepared for:

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# SUMMARY OF CONE PENETRATION TEST DATA

## 1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the ESEC Englekirk Structural Engineering Center North Soil Pit project located at 10201 Pomerado Road in San Diego, California. The work was performed by Kehoe Testing & Engineering (KTE) on April 16, 2024. The scope of work was performed as directed by University of California, San Diego (UCSD) personnel.

## 2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at six locations to determine the soil lithology. A summary is provided in **TABLE 2.1**.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
SCPT-1	25	
SCPT-2	25	
CPT-3	25	
CPT-4	25	
CPT-5	25	
CPT-6	25	

**TABLE 2.1 - Summary of CPT Soundings**

## 3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm<sup>2</sup> cone with a cone net area ratio of 0.83. The following parameters were recorded at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed

At locations SCPT-1 & SCPT-2, shear wave measurements were obtained at various depths. The shear wave is generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer.

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for up to 2 years for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

#### **4. CONE PENETRATION TEST DATA & INTERPRETATION**

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil behavior type on the CPT plots is derived from the attached CPT SBT plot (Robertson, "Interpretation of Cone Penetration Test...", 2009) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance ( $q_c$ ), sleeve friction ( $f_s$ ), and penetration pore pressure ( $u$ ). The friction ratio ( $R_f$ ), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

The CPT data files have also been provided. These files can be imported in CPeT-IT (software by GeoLogismiki) and other programs to calculate various geotechnical parameters.

It should be noted that it is not always possible to clearly identify a soil type based on  $q_c$ ,  $f_s$  and  $u$ . In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

#### **KEHOE TESTING & ENGINEERING**



Steven P. Kehoe  
President

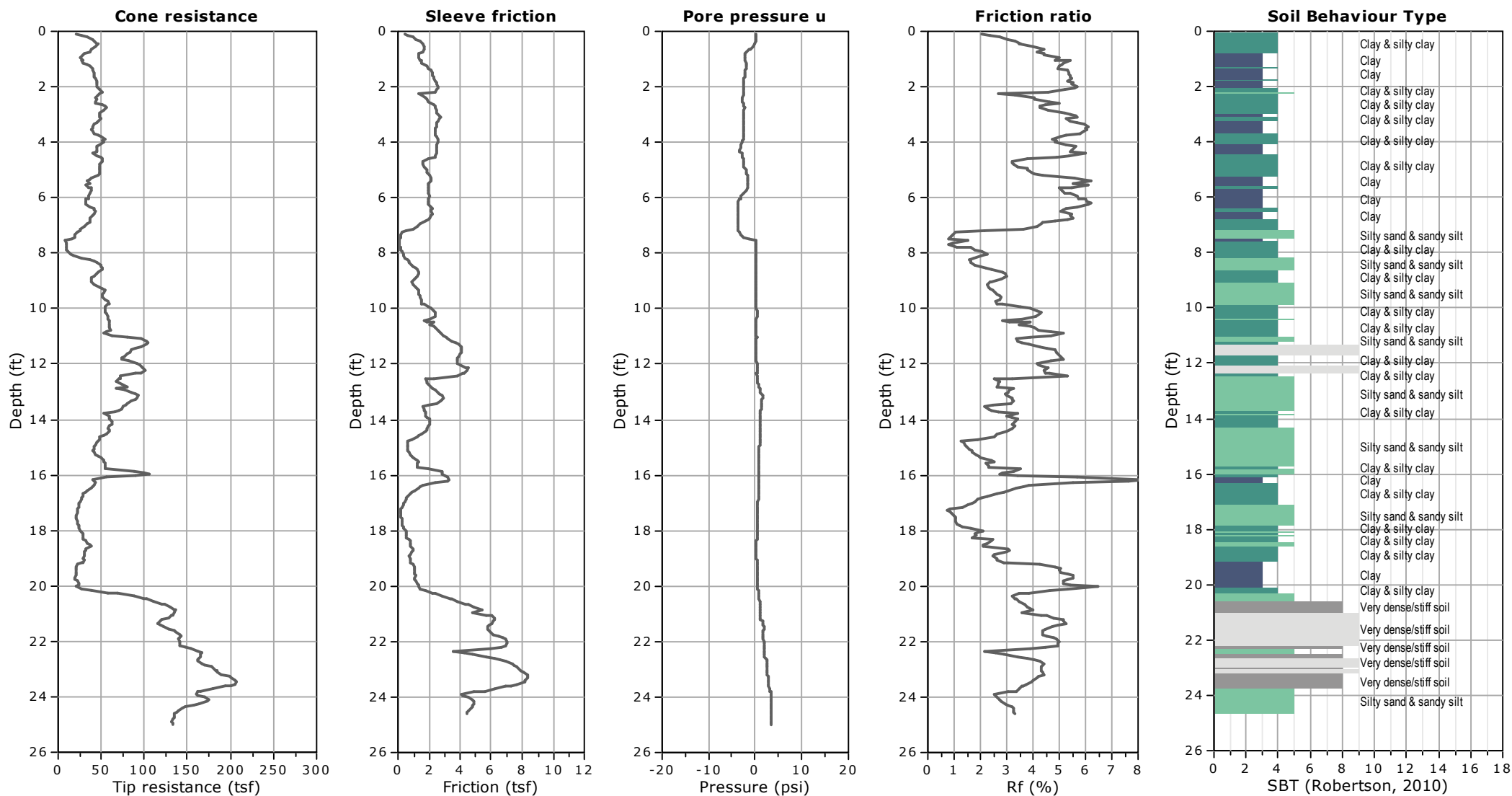
## APPENDIX



Project: UCSD . ESEC Englekirk Structural Engineering Center North Soil Pit  
Location: 10201 Pomerado Rd, San Diego, CA

SCPT-1

Total depth: 25.00 ft, Date: 4/16/2024

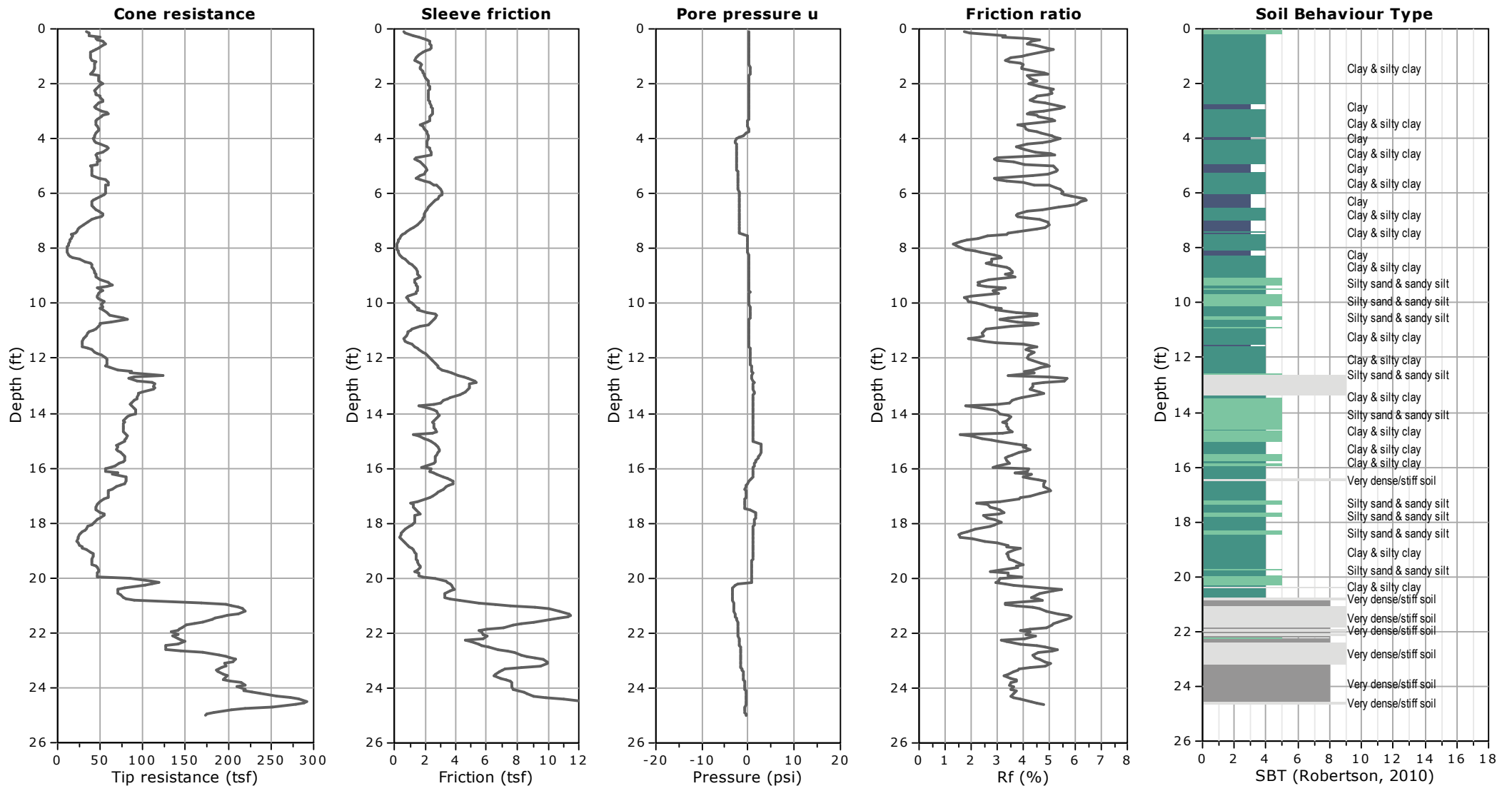


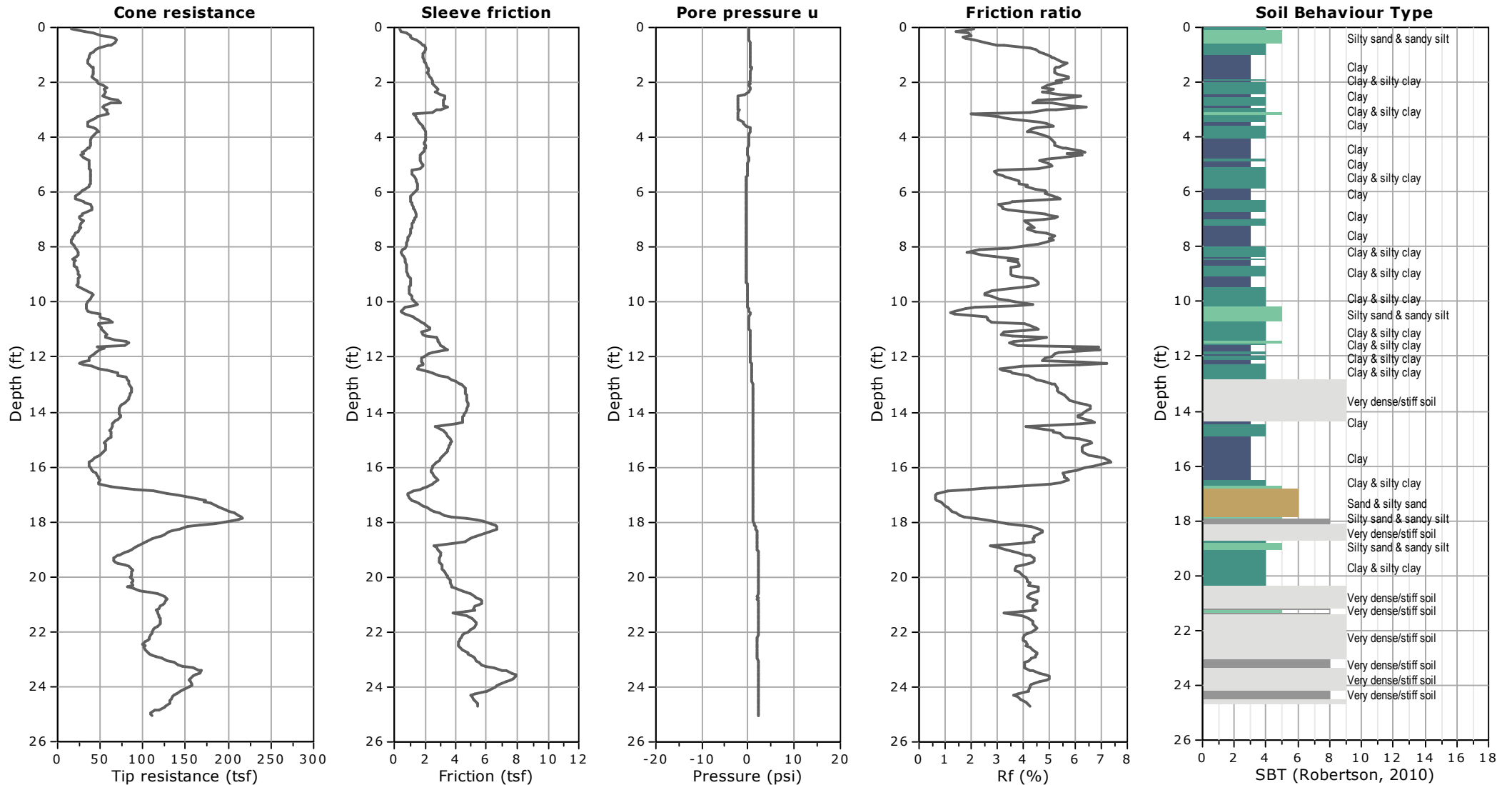


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**SCPT-2**

Total depth: 25.00 ft, Date: 4/16/2024





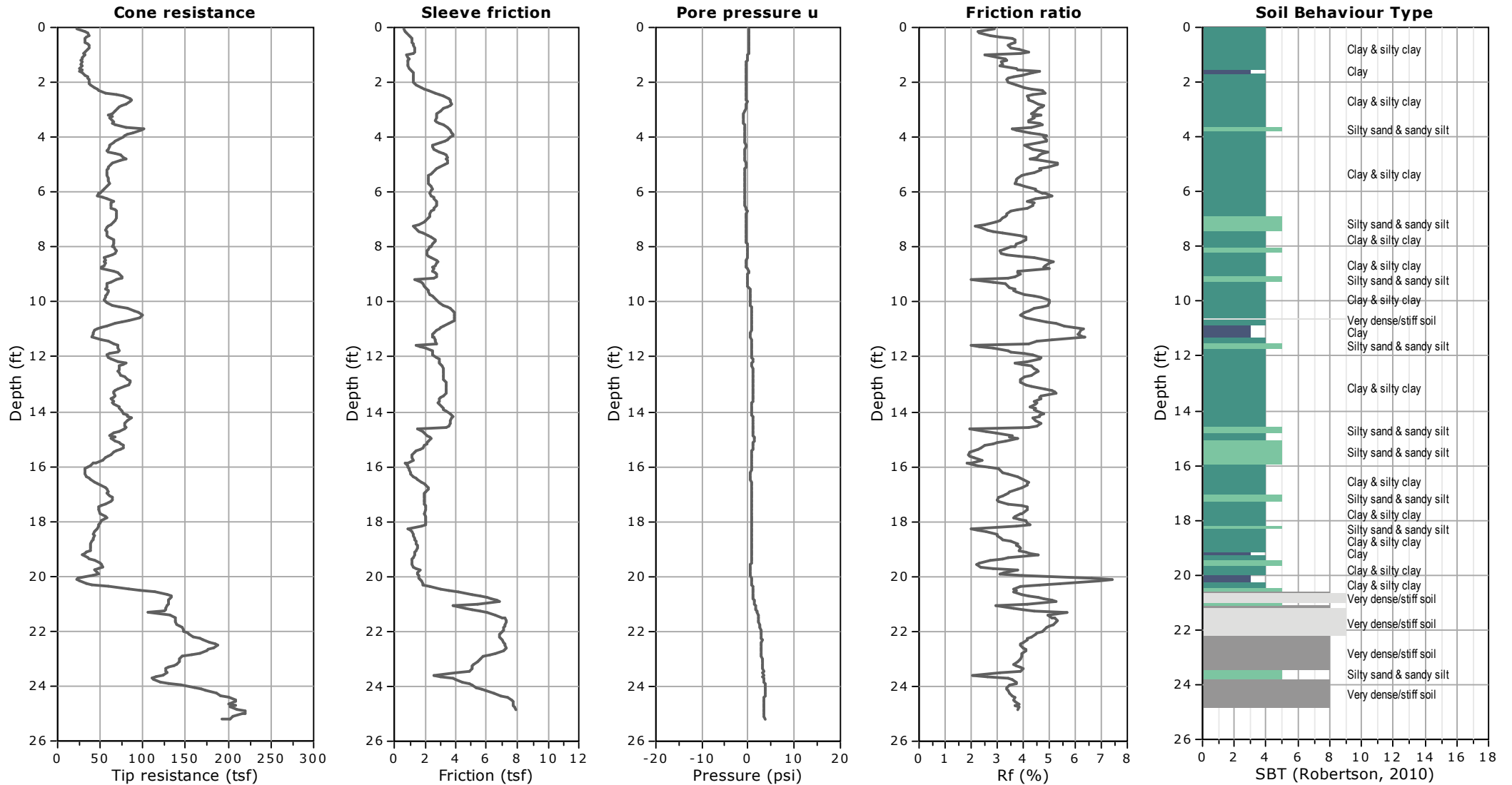




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**CPT-4**

Total depth: 25.20 ft, Date: 4/16/2024

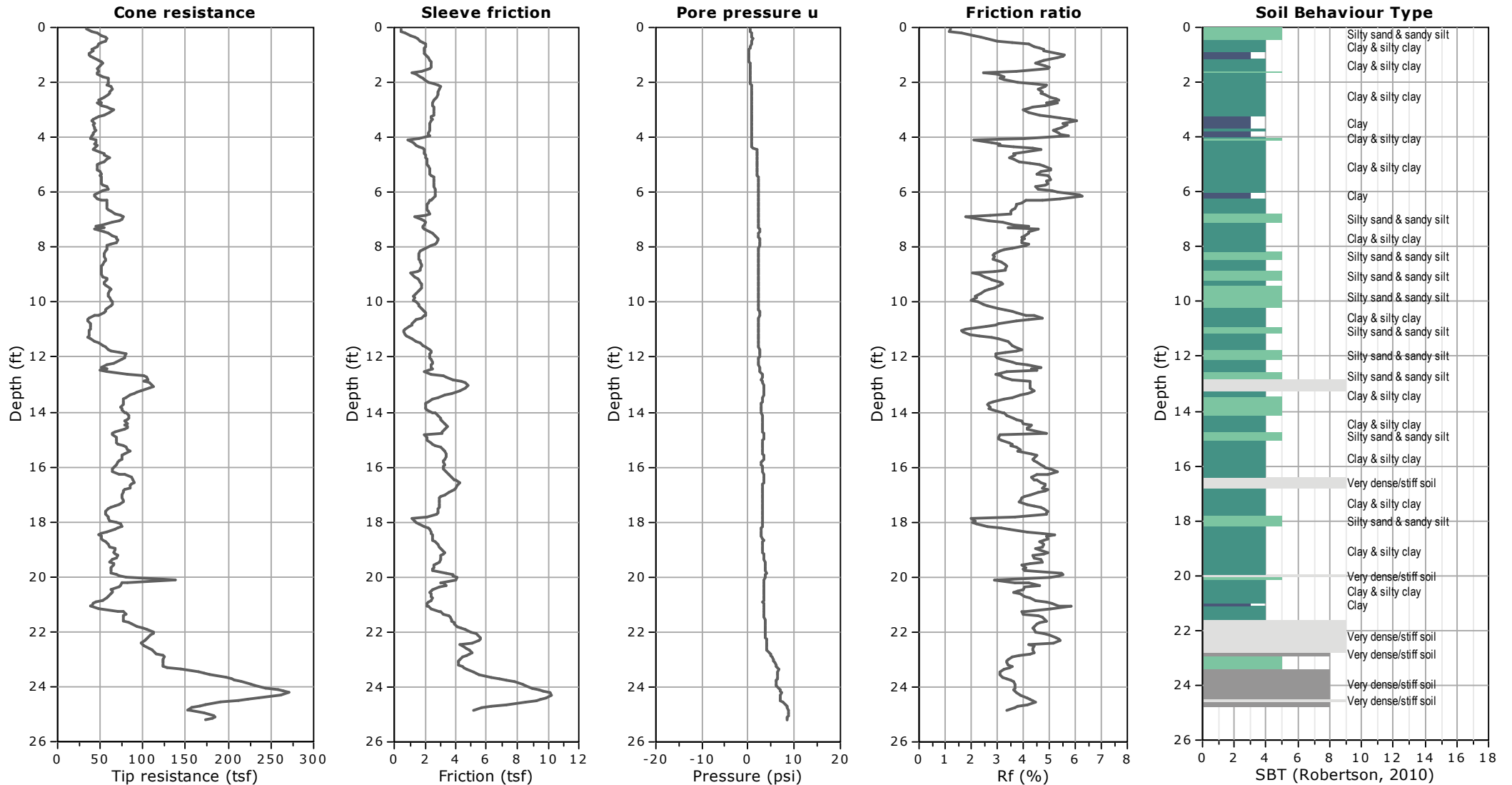


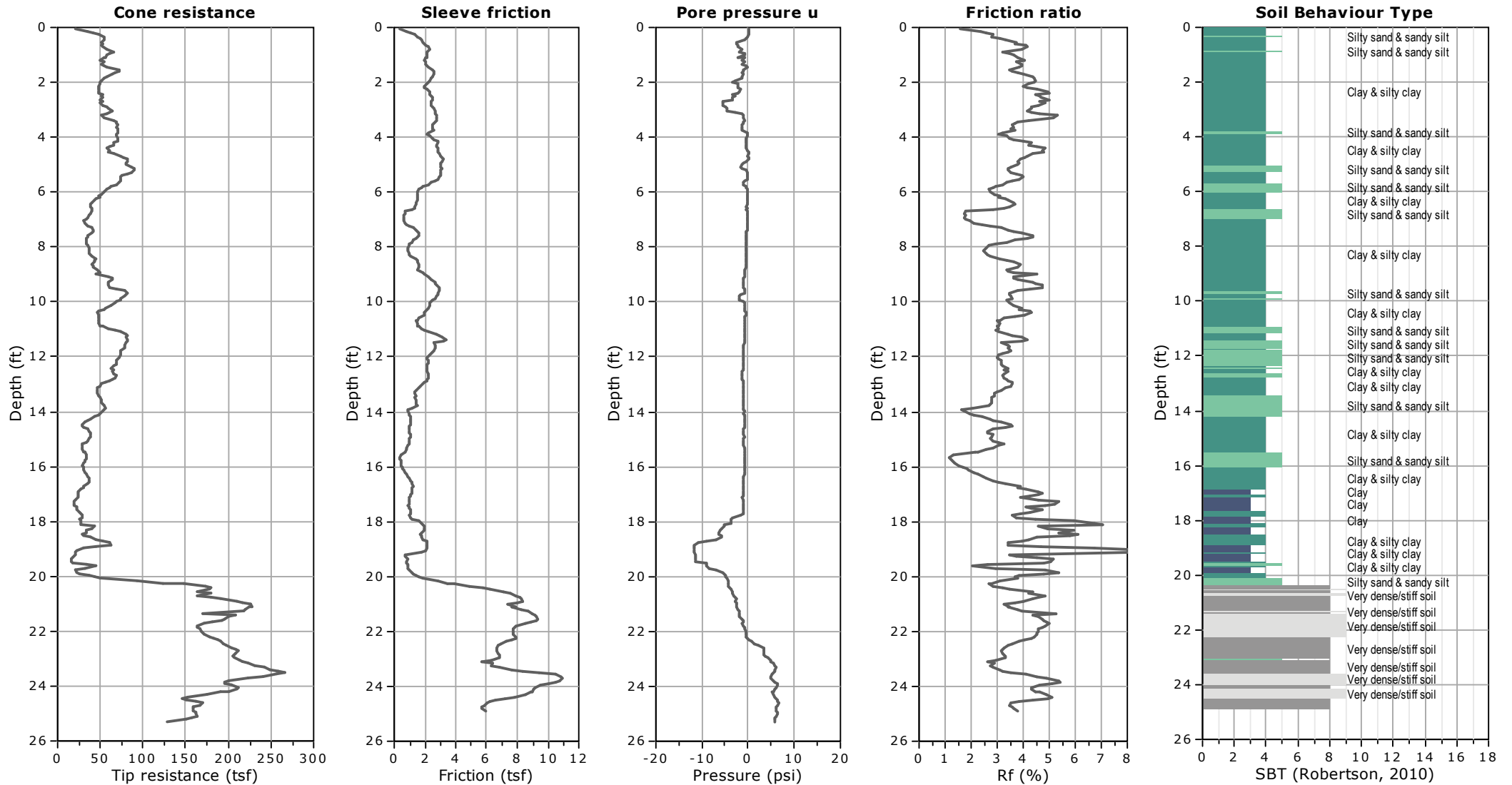


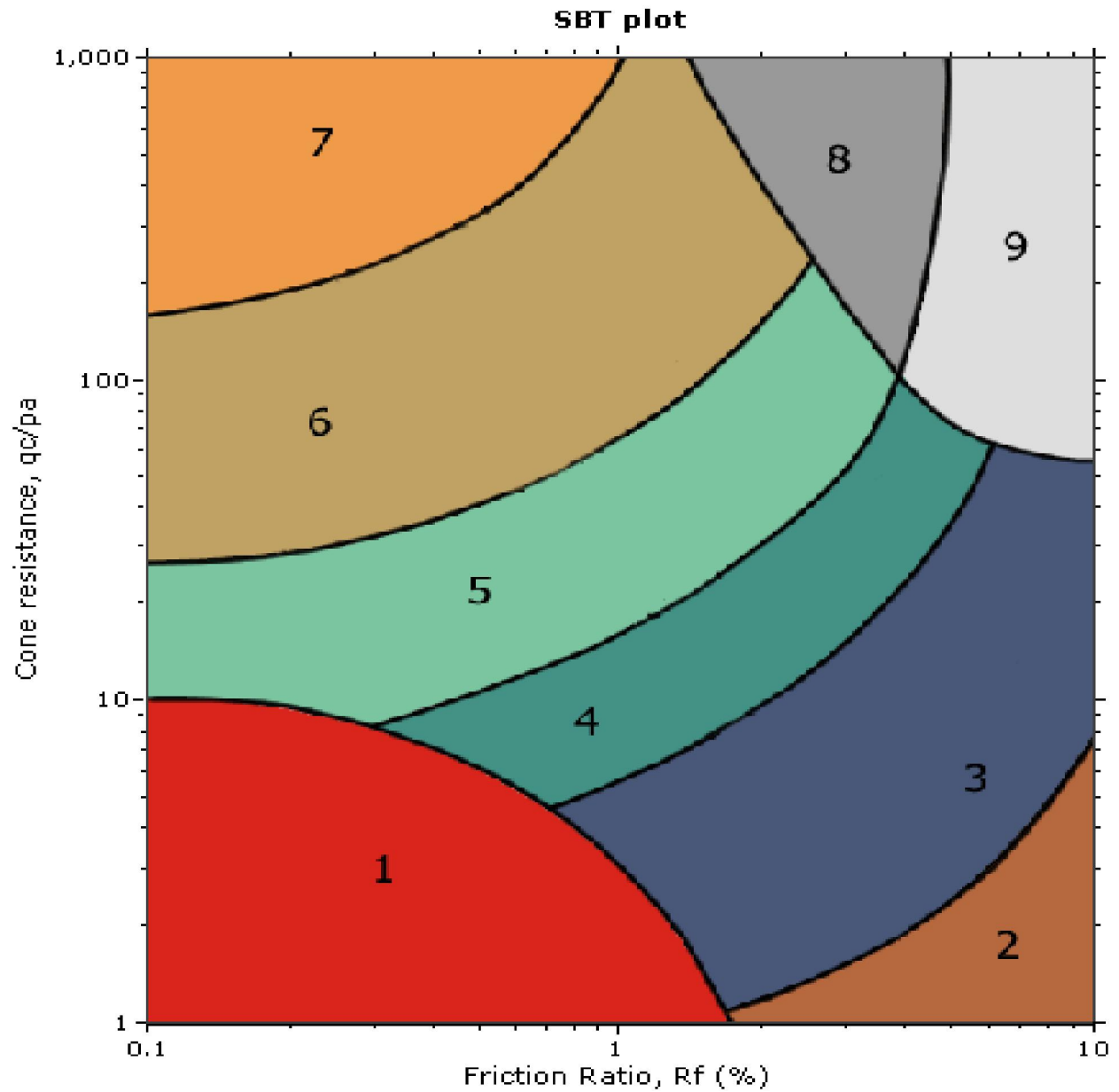
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**Location:** 10201 Pomerado Rd, San Diego, CA

**CPT-5**

Total depth: 25.20 ft, Date: 4/16/2024







**SBT legend**

- |   |   |   |
|---|---|---|
| <span style="color: red;">■</span> 1. Sensitive fine grained  | <span style="color: teal;">■</span> 4. Clayey silt to silty clay      | <span style="color: orange;">■</span> 7. Gravely sand to sand         |
| <span style="color: brown;">■</span> 2. Organic material      | <span style="color: lightgreen;">■</span> 5. Silty sand to sandy silt | <span style="color: grey;">■</span> 8. Very stiff sand to clayey sand |
| <span style="color: darkblue;">■</span> 3. Clay to silty clay | <span style="color: tan;">■</span> 6. Clean sand to silty sand        | <span style="color: lightgrey;">■</span> 9. Very stiff fine grained   |

UCSD  
ESEC Englekirk Structural Engr. Center North Soil Pit  
San Diego, CA

CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
SCPT-1	2.49	1.49	2.49	2.76	904	
	4.99	3.99	4.46	5.56	803	703
	7.51	6.51	6.81	8.24	826	876
	10.04	9.04	9.26	12.08	766	638
	12.50	11.50	11.67	15.72	743	663
	15.03	14.03	14.17	18.30	774	969
	17.52	16.52	16.64	20.96	794	928
	20.01	19.01	19.11	23.56	811	952
	22.51	21.51	21.60	25.16	859	1555
	25.03	24.03	24.11	26.62	906	1719
SCPT-2	2.53	1.53	2.52	2.88	874	
	4.99	3.99	4.46	5.78	772	671
	7.51	6.51	6.81	8.56	796	844
	10.01	9.01	9.23	11.96	772	711
	12.50	11.50	11.67	15.60	748	671
	15.03	14.03	14.17	18.20	779	961
	17.49	16.49	16.61	21.18	784	818
	20.01	19.01	19.11	24.20	790	829
	22.51	21.51	21.60	26.44	817	1111
	25.00	24.00	24.08	27.92	863	1676

Shear Wave Source Offset - 2 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival  
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)