INITIA

GEOTECHNICAL SPECIALISTS

GREENSTONE LAND DEVELOPMENTS LTD

100 ERIKSEN ROAD DEVELOPMENT, TE AWA, NAPIER

GEOTECHNICAL INVESTIGATION

INITIA REF P-001227 REV A

OCTOBER 2021

Contents

1. Introduction

1.1 Purpose and scope

Initia Ltd (Initia) was engaged by Greenstone Land Developments Ltd to provide preliminary geotechnical services in relation to the proposed residential subdivision at a site at 100 Eriksen Road, Te Awa, Napier. This report presents a summary of the works undertaken and provides relevant geotechnical recommendations for the proposed development. Initia were commissioned to support the Resource Consent Application.

The following works have been undertaken in accordance with our proposal dated 3 September 2021[1]:

- A review of local geology (published geological maps).
- A site inspection by a geotechnical engineer.
- Site specific geotechnical investigations comprising:
    - 1 No. machine drilled boreholes to a depth of 10.0m below ground level (bgl).
    - 8 No. Cone Penetration Tests (CPT) to depths of between 13.0m and 15.5m bgl.
- An assessment of site subsoil class in accordance with NZS 1170.5:2004[2].
- An assessment of seismic hazard using CPT data.
- An assessment of geotechnical considerations associated with the foundation design.
- An assessment of geotechnical considerations associated with the pavement design.
- Preparation of this report.

1.2 Proposed Development

The proposed development comprises a 16-lot subdivision adjacent to Eriksen Road. It is considered that the majority of the site will need to be raised due to the Napier City Council (NCC) flood levels in the area.

Access to the subdivision is proposed to be via two roads off Eriksen Road.

1 Initia Ltd (3 September 2021). Proposal for Geotechnical Consultancy Services – 100 Eriksen Rd, Te Awa, Napier.
2 New Zealand Standard (2004). Structural Design Actions – Earthquake Actions – New Zealand.

2. Site Conditions and Geology

2.1 Site Description and Location

The site of interest (legally named Lot 1 DP 532863) is located off Eriksen Road in Te Awa, Napier. The site is approximately 750m west of the Napier coastline. The site was previously used as a lifestyle farming block and contains well established trees in the central and western parts of the site. The site appears to be on a former flood plain and is therefore typically flat, sitting at an elevation of approximately RL 11-12m. The site is bounded by a new residential subdivision to the east, with Eriksen Road to the west of the site. Refer to Figure 2-1 below:

Figure 2-1 - Site Overview with highlighted boundaries

2.2 Geological setting

The geological Map of the Hawke's Bay Area[3] shows the site to be underlain by Holocene aged Alluvial Deposits comprising gravel, sand and silt and clay, forming the Heretaunga Plains. Refer to Figure 2-2 below:

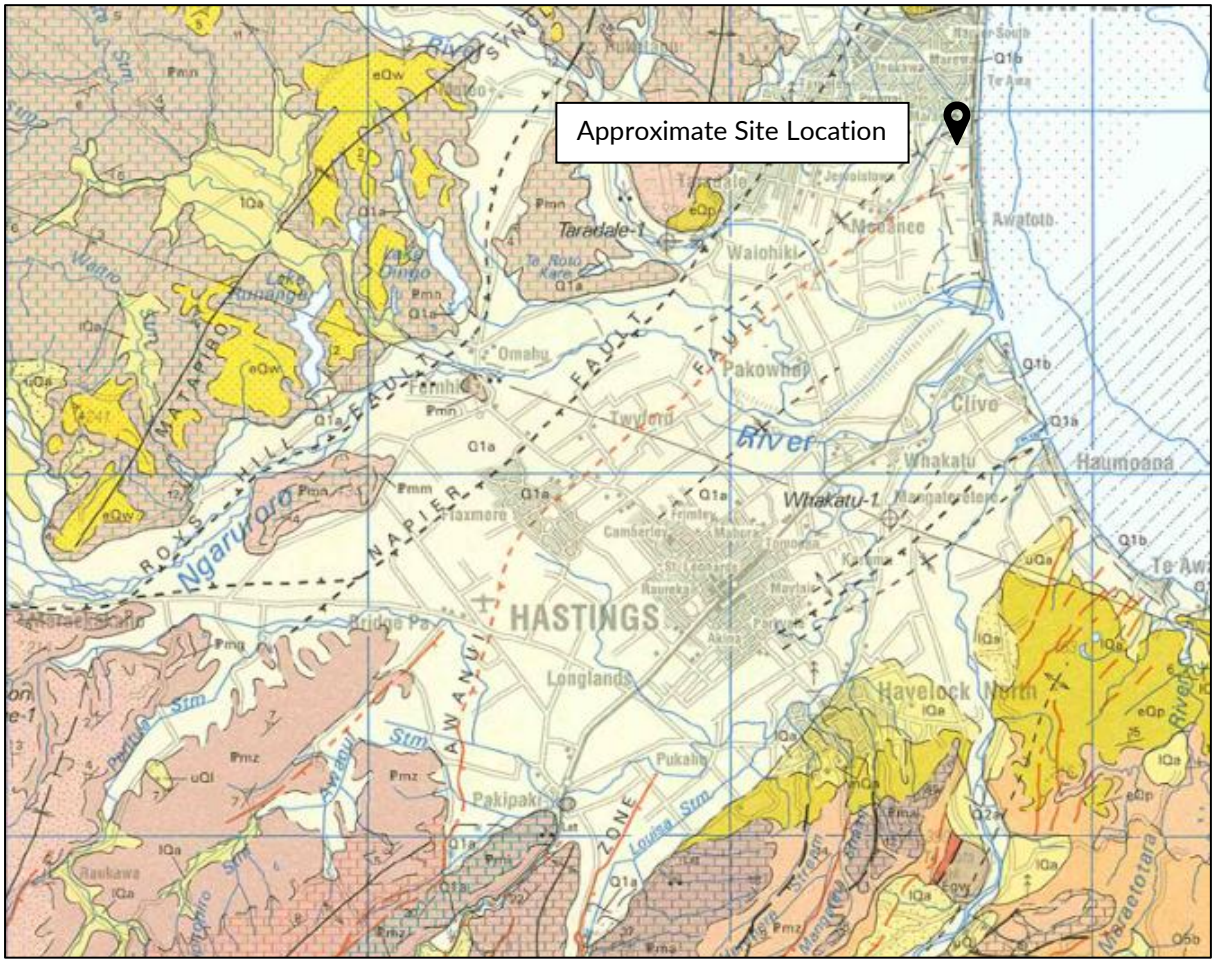

Figure 2-2 - Geological Map of the Hawkes Bay Area showing site area.

[3] Lee, J.M.; Townsend, D.; Bland, K.; Kamp, P.J.J. (compilers) 2011: Geology of the Hawke's Bay area: scale 1:250,000. Lower Hutt: Institute of Geological & Nuclear Sciences Limited. Institute of Geological & Nuclear Sciences 1:250,000 geological map 8. 86 p. + 1 folded map

3. Geotechnical Investigations

3.1 Initia investigations

In September 2021, a site investigation comprising 1 No. Machine Borehole (BH) and 8 No. Cone Penetration Tests (CPTs) was carried out by Geotech Drilling Ltd under the supervision of a Geotechnical Engineer from Initia. The boreholes were logged in accordance with the New Zealand Geotechnical Society (NZGS) 'Field description of Soil and Rock' guidelines. The recent Initia investigation plan and logs are attached in Appendix A and B, respectively.

3.2 Groundwater

Groundwater depths across the site varied from site-specific locations typically ranging from 1.4-2.0m bgl inferred from the CPT testing. This was measured during September 2021 (end of winter).

4. Site stratigraphy

The results of the recent geotechnical investigations carried by Initia (2021) indicates that the site is underlain by interbedded layers of clayey SILT, fine SAND, sandy SILT and river GRAVELS. Some of these layers were described as 'plastic' which is very important from a liquefaction perspective. The CPTs also indicated a highly interbedded soil profile:

This geological sequence is typical of the Heretaunga Plains which comprise alluvial soils of the Holocene age, based on our previous experience. The nature and continuity of the subsoils away from the investigation locations is inferred and it must be appreciated that actual conditions may vary from the assumed model.

Given the variable nature of these layers, it is difficult to define individual soil layers. However, the more cohesive material was observed in the upper 5m of the soil profile across the site.

It is considered that the CPTs refused on a gravel layer between 13.0 and 15.5m bgl. This layer has been identified on the adjacent sites at Te Awa.

5. Geotechnical Considerations

5.1 General

The following geotechnical considerations are relevant to the design and construction of the proposed development and are addressed in the following sections:

- Site seismicity and subsoil class;
- Liquefaction assessment;
- Static Settlement risk;
- Foundation Options

The interpretations, advice and recommendations presented in this report are based on geotechnical investigations completed by Initia and others at point locations. The nature and continuity of the ground conditions away from the investigation locations is inferred and it must be appreciated that actual conditions could vary from the assumed model.

5.2 Site seismicity and subsoil class

Based on the previous and recent geotechnical investigations at the site and in the adjacent area, we consider that the site subsoil class should be classified as Class D – Deep or Soft Soil Site, in accordance with NZS1170.5 (2004)[4].

For determination of the design Peak Ground Acceleration (PGA), we have assumed an Importance Level 2 and a 50-year design life for the future structures likely to be situated across the subdivision development using the GNS Hawkes Bay Seismic Study.

However, it must be noted that recent updates to the NZ Seismic Hazard Model may increase the design PGAs for Hawkes Bay. We have also run our analysis for a PGA of 0.58g and magnitude 7.1 as a sensitivity check to future proof the development.

Table 5-1 Design PGA and average magnitude of an earthquake contributing to PGA

Limit States	Return Period	PGA	Average Magnitude
ULS	500 years	0.42g	6.5
SLS	25 years	0.14g	6.2

Note: The design PGAs have been based on an Importance Level 2 structure and a 50-year design life.

5.3 Liquefaction susceptibility & triggering

The liquefaction susceptibility of the underlying material at the proposed subdivision has been assessed using the results of the Investigations.

A CPT-based liquefaction analysis has been carried out using the computer programme CLiq v.2.3[5] on the recent Initia CPTs (8 No.). The adopted analysis method is based on the study by Boulanger and Idriss (2014).

There is a general agreement that sands, non-plastic silts, and fine gravels mixtures are susceptible to liquefaction.

It is noted that more cohesive (plastic) layers, identified beneath the site, are not considered susceptible to liquefaction. These are generally located in the upper 5m of the soil profile.

[4] New Zealand Standard NZ 1170.5:2004 Structural Design Actions: Part 5: Earthquake actions – New Zealand.
[5] Geologismiki (2020), CPeT-IT – detailed software package for the interpretation of Cone Penetration Test (CPTu) data.

For the soils identified as susceptible to liquefaction, the liquefaction triggering assessment carried out using CLiq indicates the risk of liquefaction under SLS seismic event is low across the site (FoS > 1.0). For the ULS design event, the analysis indicates that liquefaction triggering may occur at various depth and thickness across the site. The liquefaction assessment results based on CPT data are attached in Appendix C and summarised below:

- Liquefaction Severity Number (LSN) 8-13
- Vertical Settlement 45-80mm

The general performance levels for liquefied deposits at the site are estimated in accordance with the MBIE-Module 3 guidelines, based on the review of the liquefaction severity number (LSN) calculated for each CPT. The review of the LSN results indicates that the risk of liquefaction affecting the site is classified as mild to moderate given that there are only thin lenses of liquefiable material in the upper 5m.

According to the MBIE Module 3, liquefaction could result in transient lateral displacements, minor e differential movements and settlements of the ground in the order of 50-100mm. This range is in general accordance with the settlements estimated using the Zhang et al (2002) method. However, these settlements should be treated as proxy for damage only and do not reflect a reliable estimate of actual settlements. The predicted liquefaction induced settlement might lead to damage to the future building foundations and slabs. The Structural Engineer should allow for predicted liquefaction induced settlements in the design and/or for future repairs post-earthquake. The foundation recommendations based on liquefaction results are presented in Section 5.6, but the ground conditions are equivalent to a 'TC2 type' ground performance under the design earthquake loading.

Additionally, earthworks are proposed at the site, to generally raise the overall site level, which will result in an additional non-liquefiable crust thickness (see section 5.4 below).

5.4 Earthworks

We understand that the site has to be raised to meet the NCC minimum flood levels for the Te awa area.

Following the stripping of the topsoil, any imported fill should be placed and compacted in maximum 200mm layers using an appropriate roller. The supplier of the imported material should provide a NZ Heavy Compaction curve for the material which indicates the Maximum Dry Density (MDD).

The following testing should be carried out to ensure adequate compaction is being achieved:

- 95% of MDD
- Air voids less than 10%
- Clegg Impact values (CIV) greater than 20, if granular fill is used
- Shear strengths greater than 140 kPa, if cohesive material is being used

Testing should be carried on a 10m grid on every 2nd lift and on the final surface.

Settlement monitoring plates with pins should be installed at the base of the fill and these should be surveyed on a regular basis during the placement of the fill.

5.5 Static Settlement

The site is underlain by Holocene Alluvium deposits, which are considered susceptible to consolidation settlement. Settlement analyses have been undertaken to estimate primary consolidation settlements induced either a) by the earthworks fill placement or b) by floor slab dead and live loads from future residential buildings.

Settlement analyses have been undertaken to estimate primary consolidation settlements from available CPT data using the geotechnical analysis software CPeT-IT. A Boussinesq load distribution has been considered for the analyses.

5.5.1 Fill – Primary Consolidation Settlement

Primary consolidation settlement induced from earthworks have been estimated assuming 1.0m fill thickness placed across a 100 m by 100 m square area. A unit weight of 20kN/m^3 has conservatively been adopted for the fill material.

The primary consolidation settlements estimated under 1.0m fill across the site range from 30mm-70mm across the site.

The time for consolidation settlements to be completed is dependent on the soil composition, the compressible layer thicknesses and the extent of filling. Settlement monitoring after fill placement has been completed across the site. Installation of services, pavement, and construction of future buildings at the site would only take place after these consolidation settlements have occurred, which should be demonstrated by a stabilisation in readings.

Settlement monitoring results will need to be reviewed by the Geotechnical Designer to confirm the long-term settlements are not expected to be worse than those predicted during the earthworks.

5.5.2 Building – Primary Consolidation Settlement

For the purposes of assessing post-construction settlement induced by future building loads, it has been assumed that any earthworks related consolidation settlements will be completed prior to construction starting.

Primary consolidation settlements induced by future building construction have been estimated for a typical 10kPa floor load across a 15m by 15m square area.

The primary consolidation settlements under future building loads, based on CPT data, are estimated to be less than 25mm. Differential settlements in the order of 1 in 500 are generally expected considering the maximum total settlement value estimated.

The predicted total and differential settlements are understood to be typically tolerable for the proposed type of development, provided adequate foundation system are selected and designed to accommodate the predicted long-term settlements. Recommended foundations at the site are presented in Section 5 of this report.

5.6 Foundations

Given the presence of deep liquefiable soils at site, we consider that this risk to future buildings would be too high for a standard shallow strip footing foundation option on the recently placed engineered fill. We consider that all dwellings to be located on the subdivision utilise a 'TC2' type' raft foundation constructed on the certified engineered fill. These foundation types are very common for residential buildings in the Hawkes Bay due to their ability to withstand differential settlements in the event of an earthquake event.

A 'TC2 type' raft foundation (rib raft or other property system) should be designed with the following bearing capacities:

- Geotechnical ultimate bearing capacity 150kPa
- ULS factored bearing capacity 75kPa
- Allowable bearing capacity 50kPa

A raft foundation also prevents the building from 'pulling apart' in a large earthquake.

6. Further works

We recommend that a full geotechnical completion report (GCR) is provided after the placement of engineered fill and settlement monitoring of the fill.

This GCR should be submitted to NCC to allow for the subsequent Building Consents for each lot to processed easily.

7. Applicability

This report has been prepared for our client, Greenstone Land Developments Ltd, with respect to the brief provided to us. The advice and recommendations presented in this report should not be applied to any other project or used in any other context without prior written approval from Initia Limited.

Report prepared by:

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Senior Geotechnical Engineer

Report reviewed by:

Andy Pomfret
Senior Geotechnical Engineer/ Director

Document control record

Report Title		100 Eriksen Road Development, Te Awa, Napier Geotechnical Investigation			
Initia Project Reference		P-001227			
Client		Greenstone Land Developments Ltd			
Revision	Date	Revision detail	Author	Author	Approved by
A	19/10/21	Final revision	N. Hickman	N. Hickman	A. Pomfret
Current Revision		A			

Appendix A Initia Investigation Plan

NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATE DATUM: NZTM
3. LEVEL DATUM: NEW ZEALAND VERTICAL DATUM 2016 (NZVD2016)
4. AERIAL IMAGE, PROPERTY BOUNDARY AND LIDAR CONTOUR TAKEN FROM LINZ DATA.
5. PROPOSED LAYOUT SUPPLIED BY "CHEAL", REFERENCE "PROPOSED SUBDIVISION OF LOT 1DP 532863_SC0011.pdf", DATED 09 AUG 2021.

SCALE A1 1:250
SCALE A3 1:500
0 5 10 15 20 25m

FOR INFORMATION

Rev	Revision Description	Designed	Drawn	Checked
A	INVESTIGATION LOCATION (19/10/2021)		GG	

NOT FOR CONSTRUCTION
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED
APPROVED:
DATE:
Scale AS SHOWN Original Size A3

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GREENSTONE LAND DEVELOPMENTS LIMITED

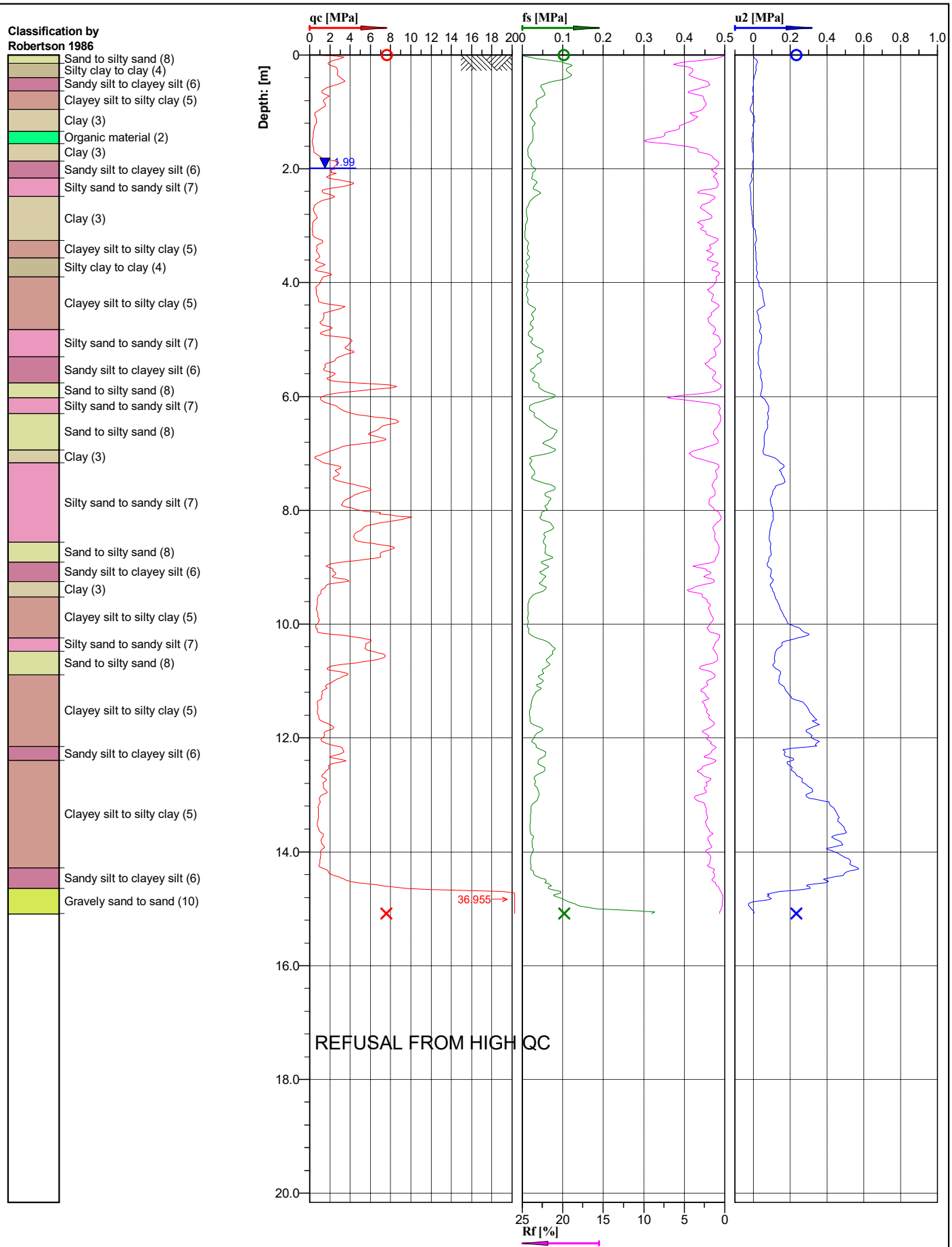
100 ERIKSEN RD, TE AWA, NAPIER

GEOTECHNICAL INVESTIGATION LOCATION PLAN

Initia Project ref: P001227
Figure Number 1227-001
Revision A

D:\INITIA LIMITED\INITIA LIMITED TEAM SITE - 1201_1300\P-001227 - ERIKSEN 100, NAPIER\CAD\2, WORKING FILES\1227-001.DWG, 10/19/2021 9:49 AM

Appendix B Borehole log and CPT Plots



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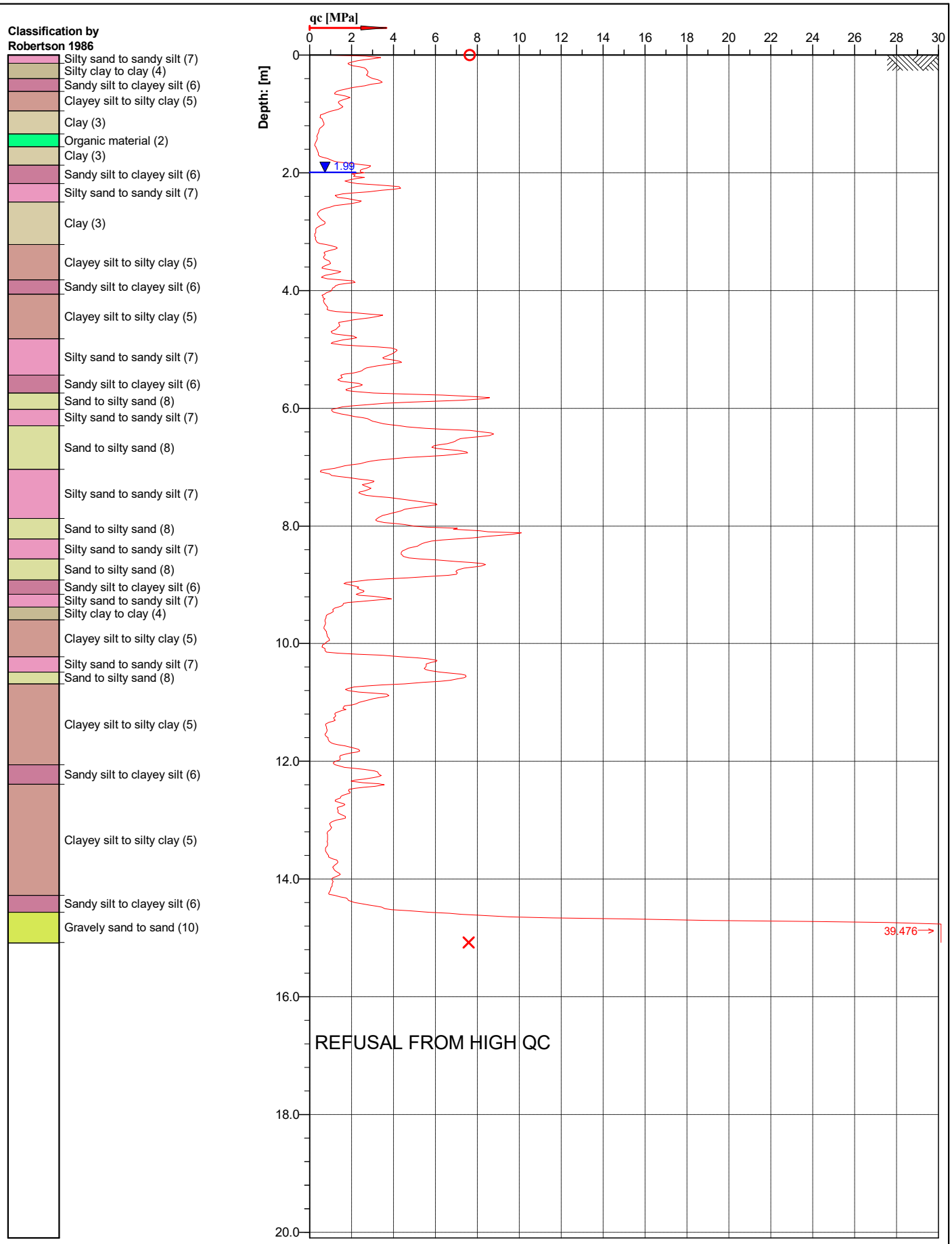

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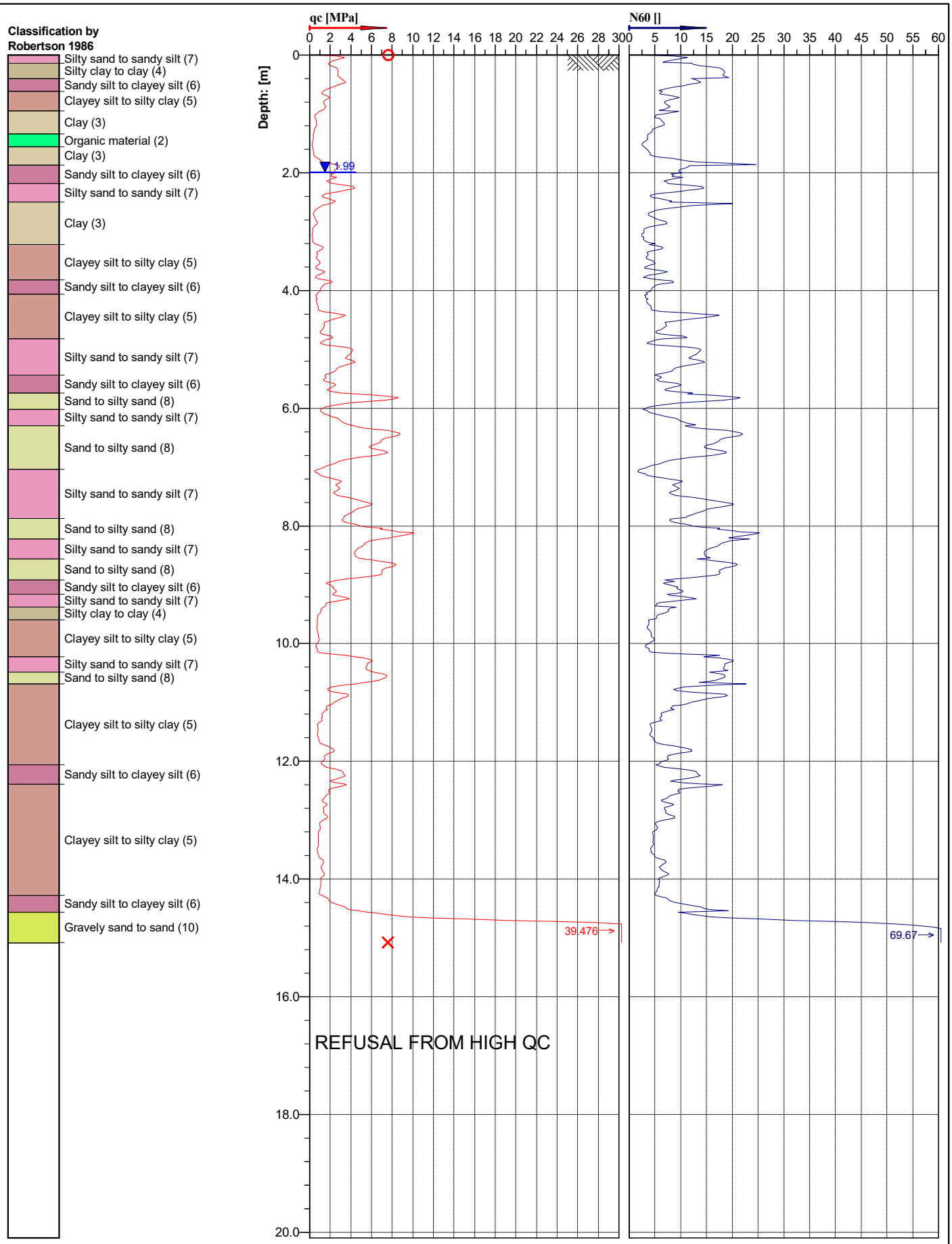

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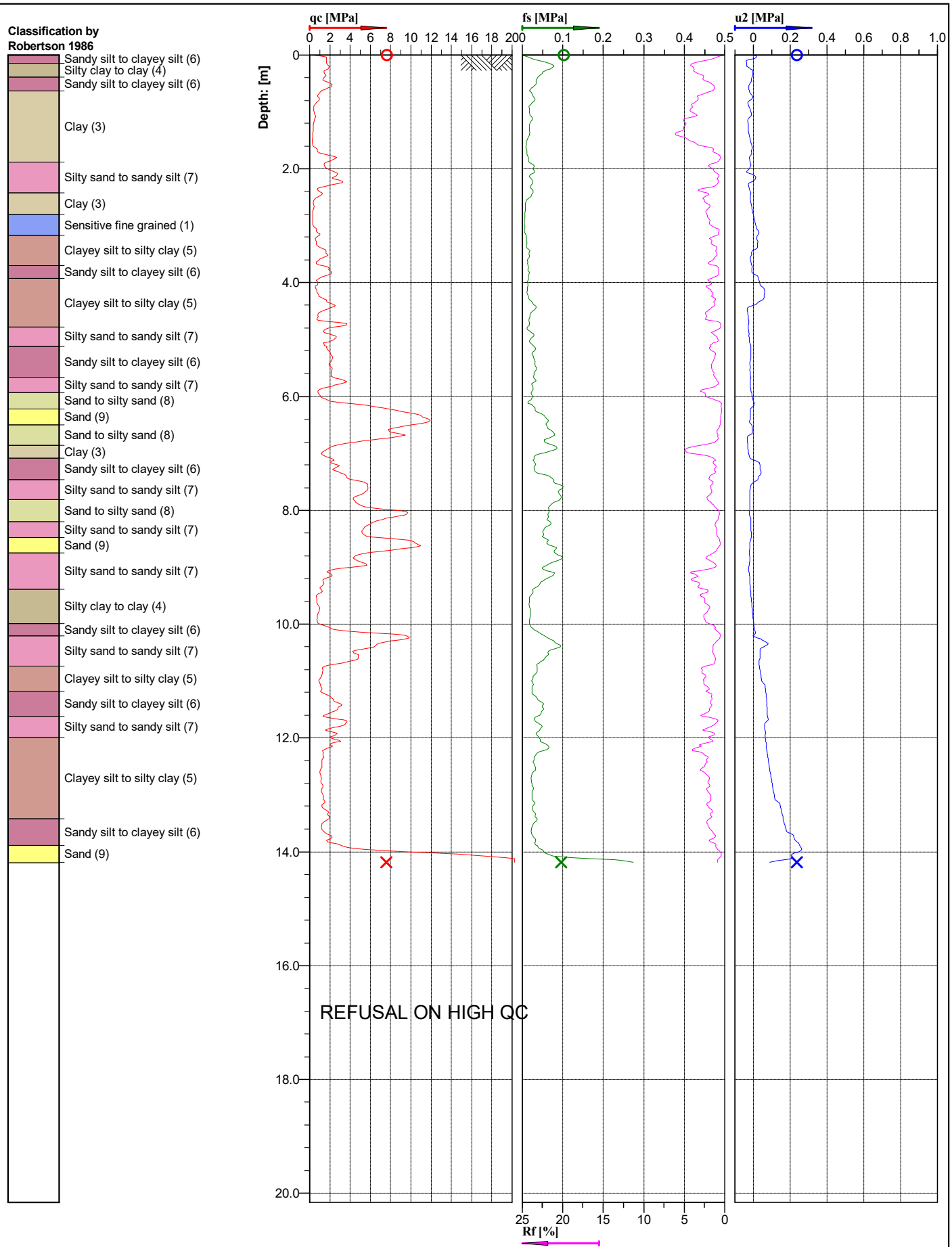

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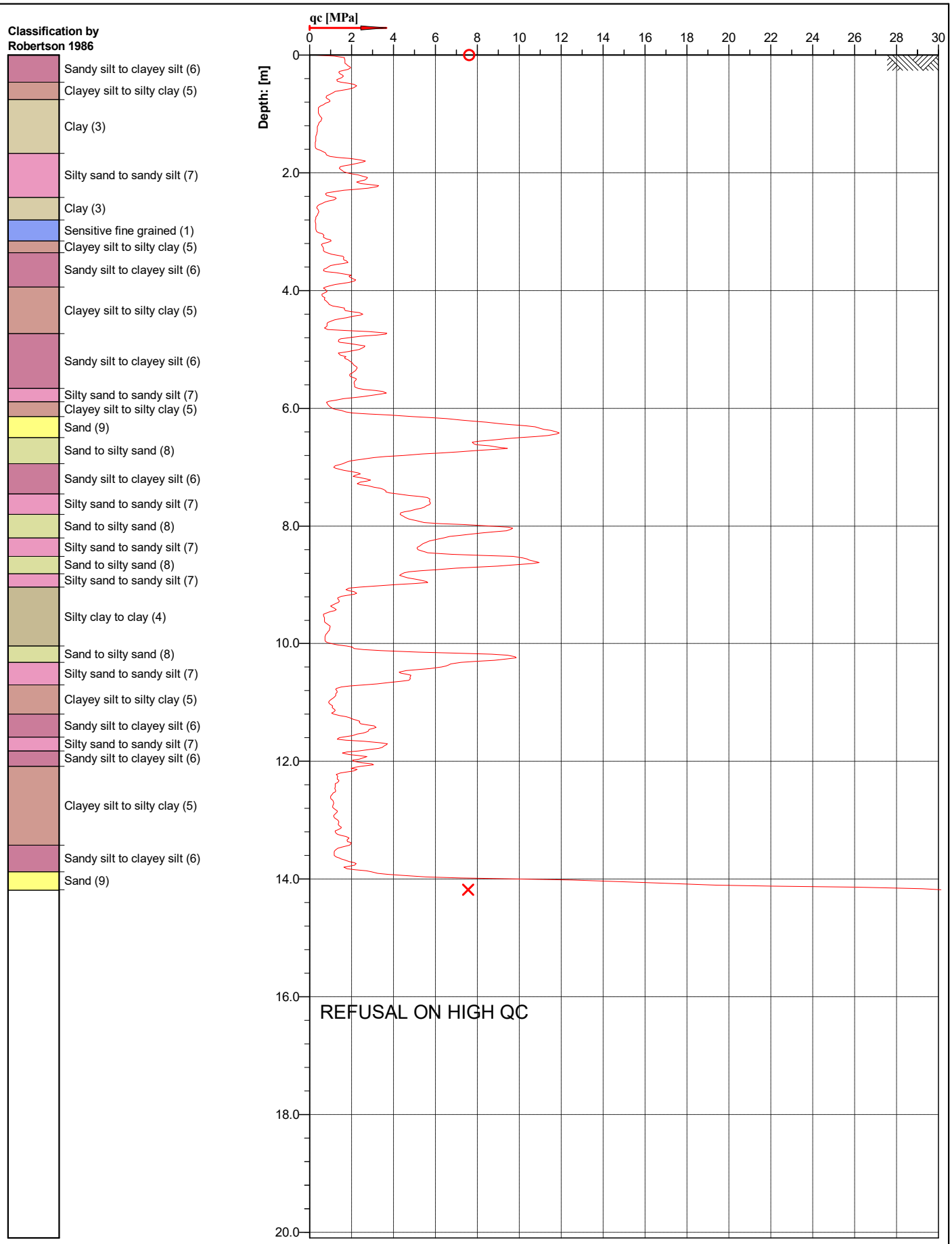

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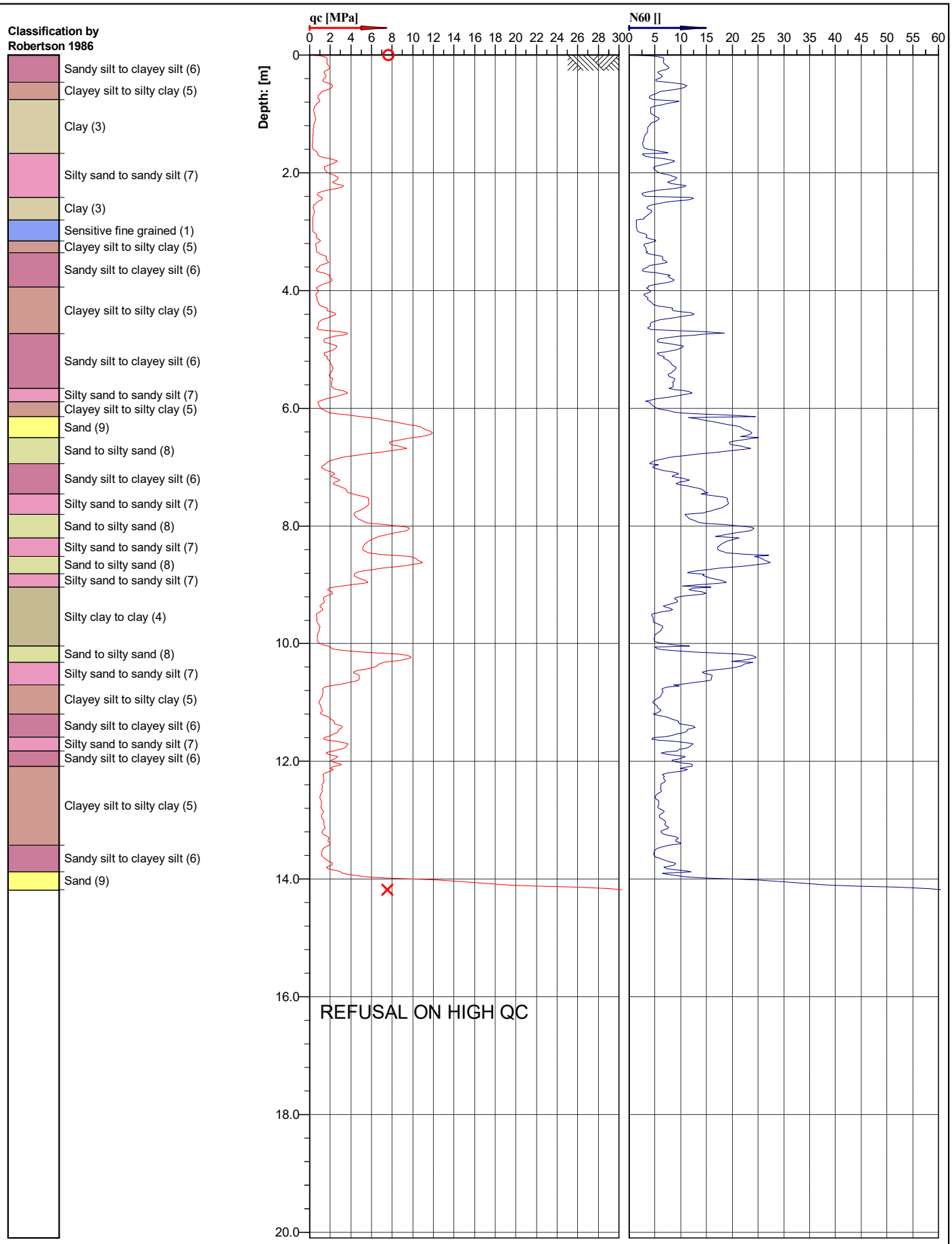

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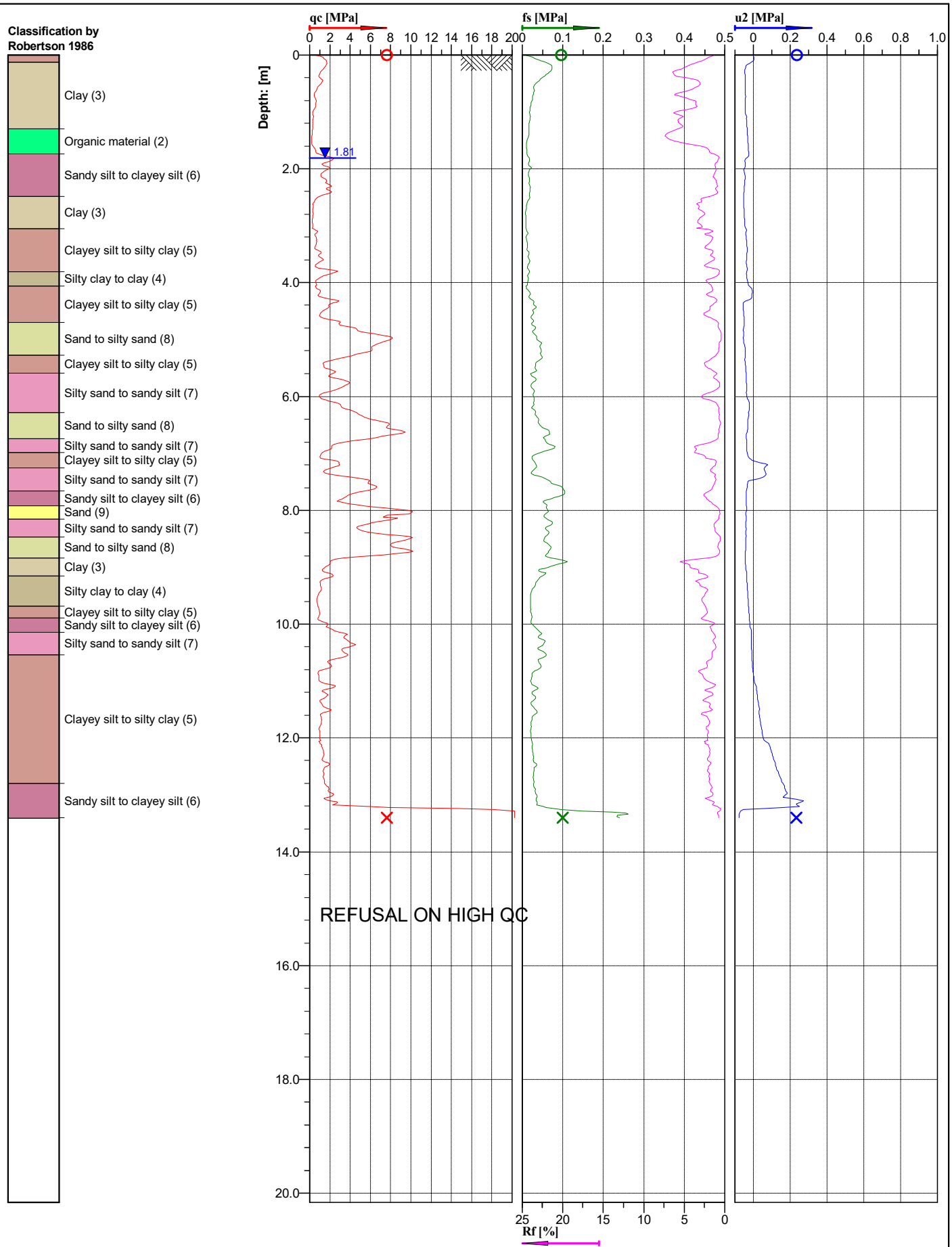

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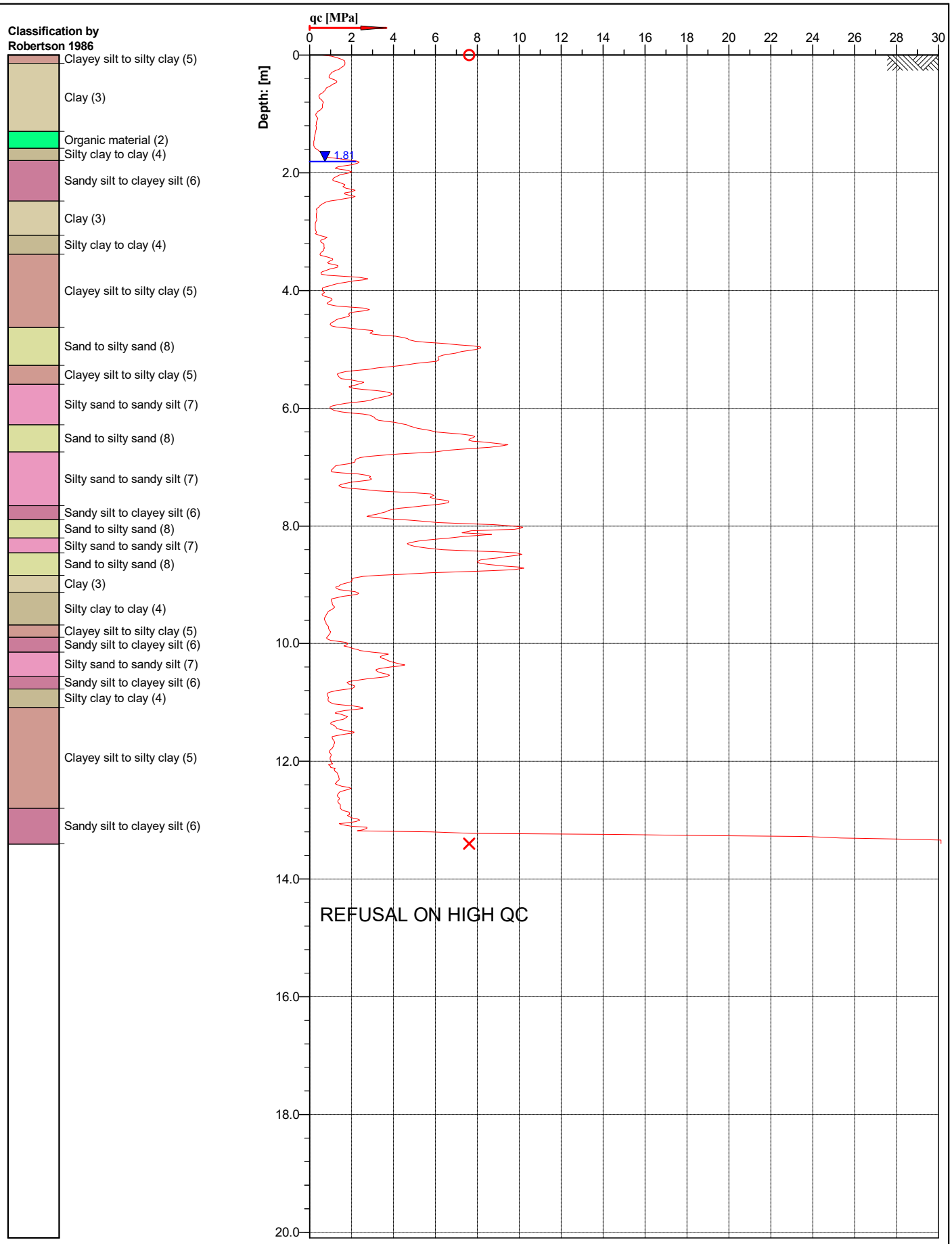

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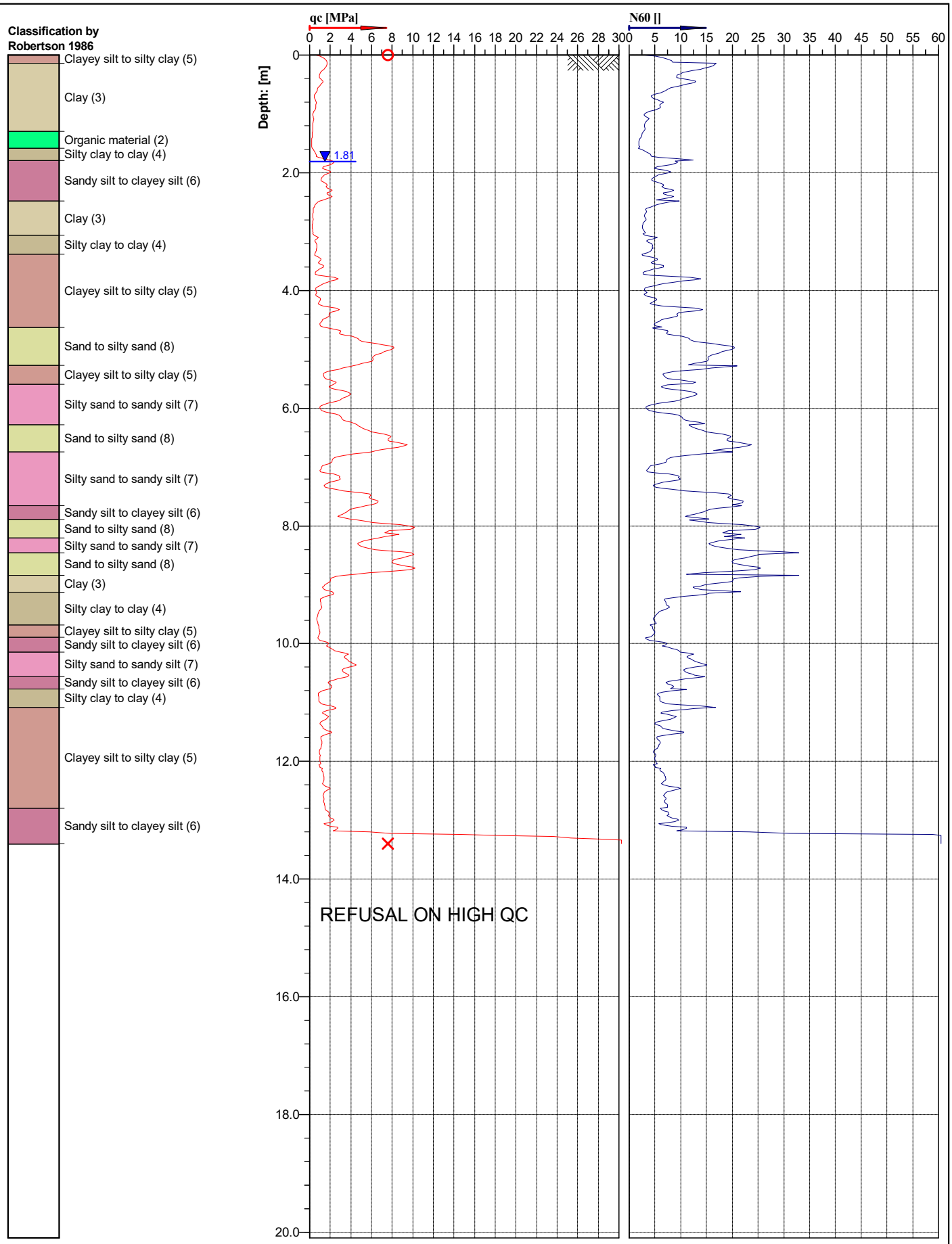

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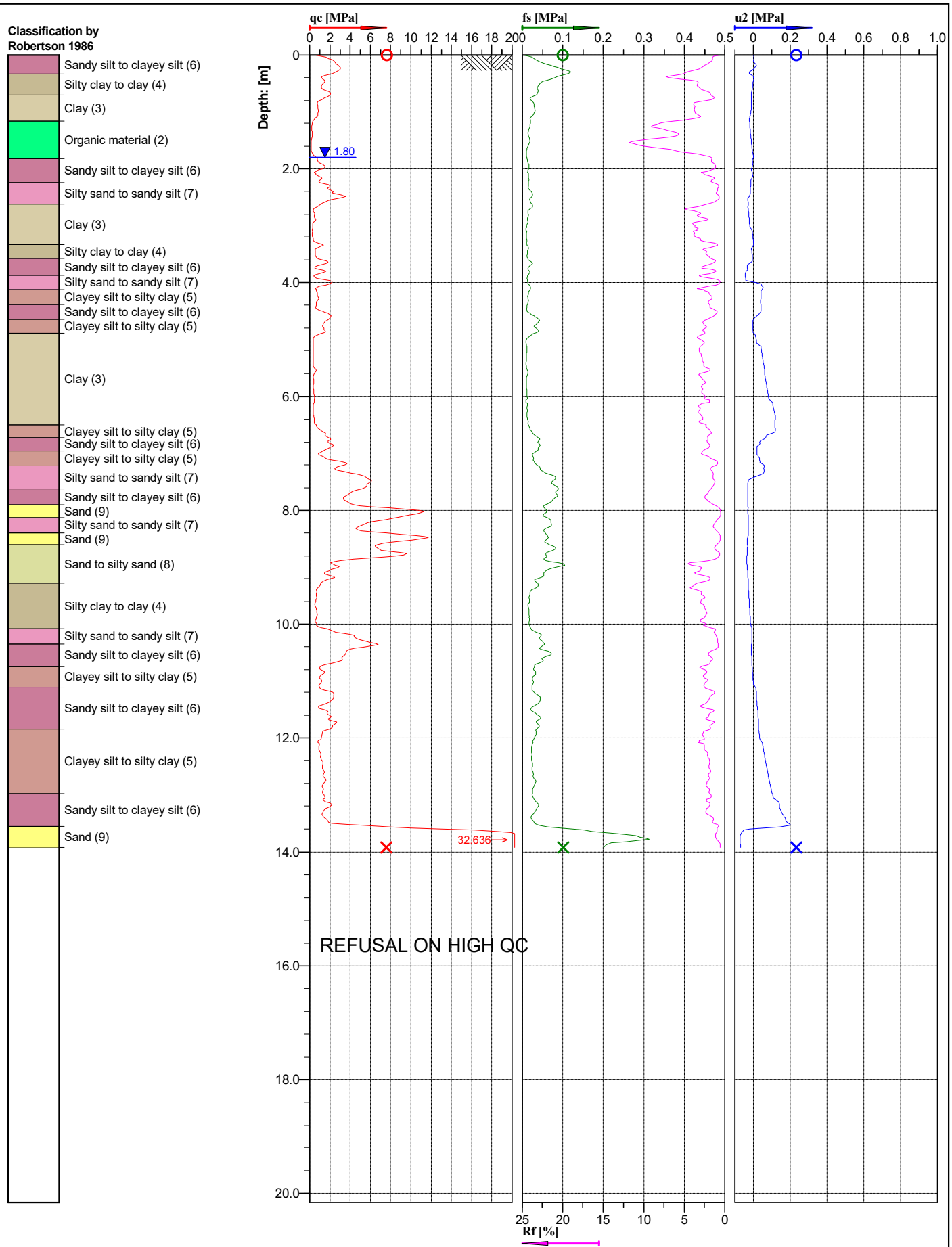

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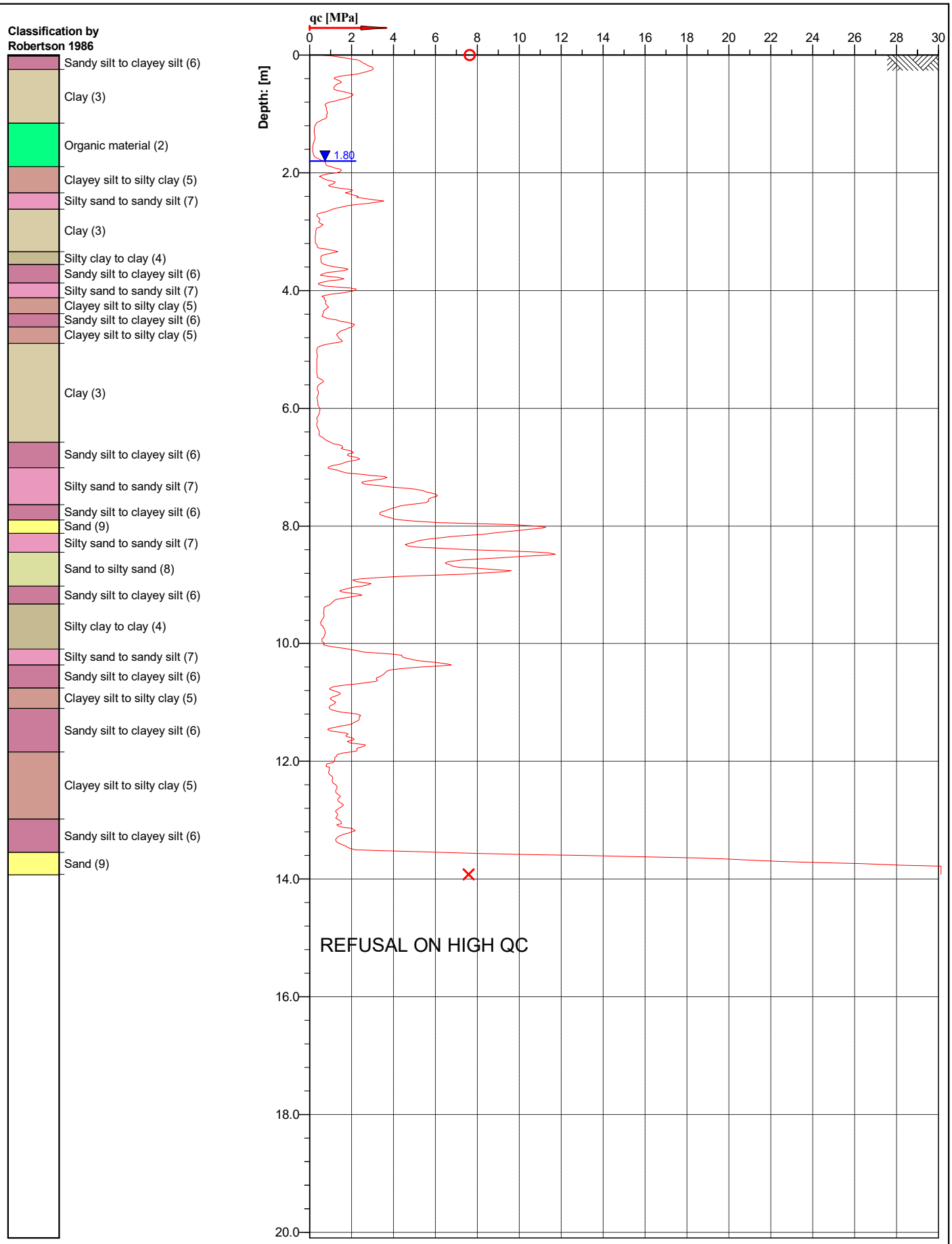

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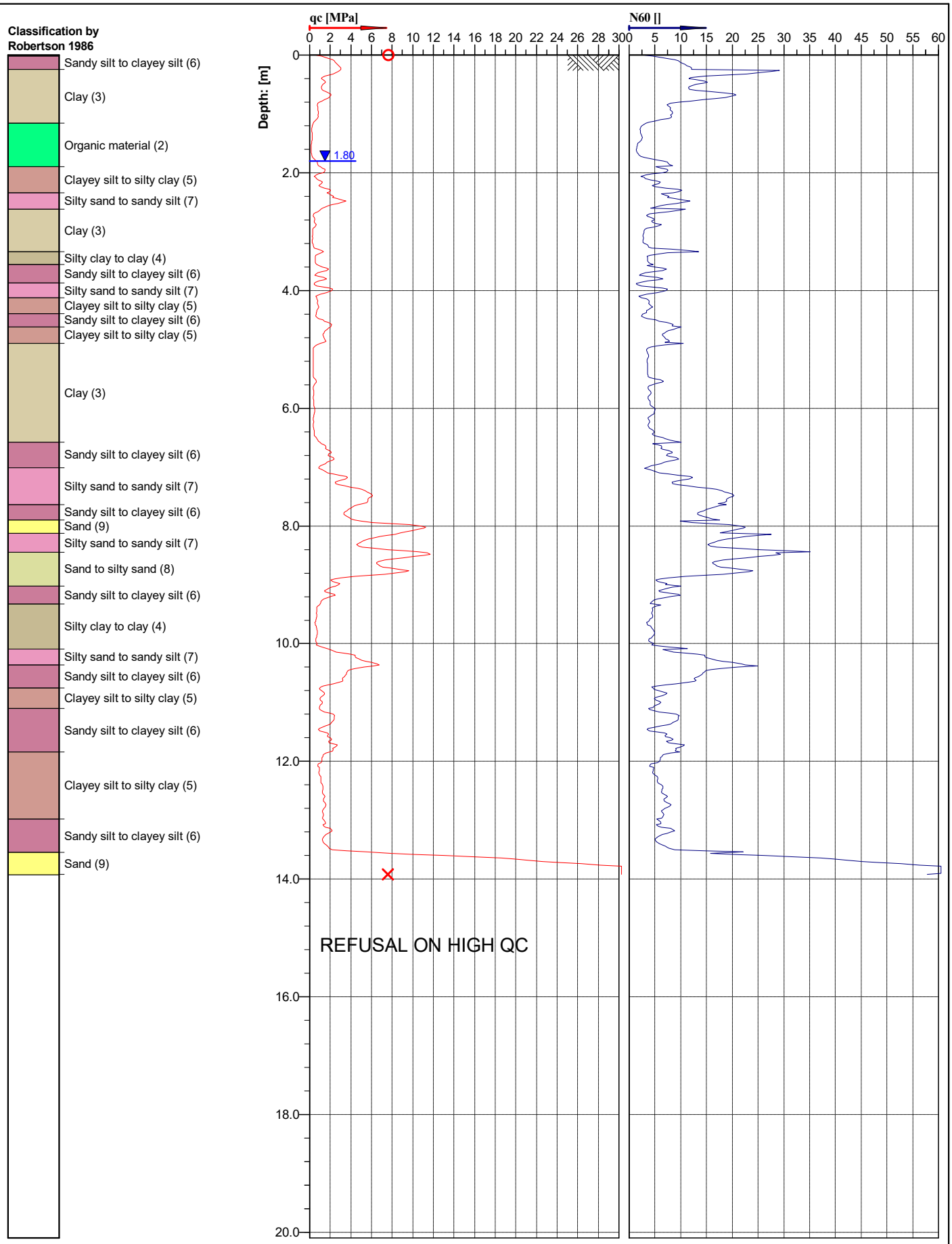

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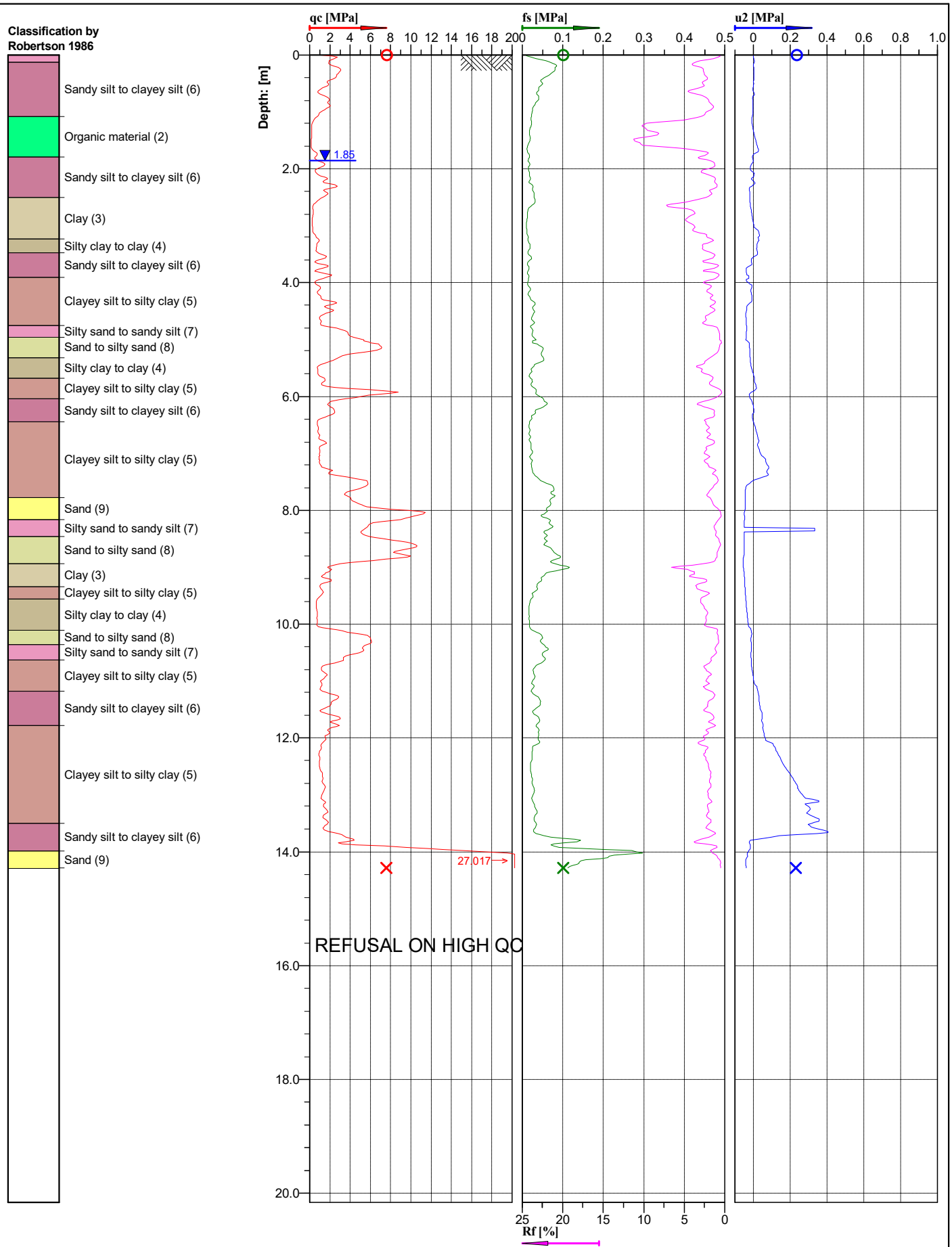

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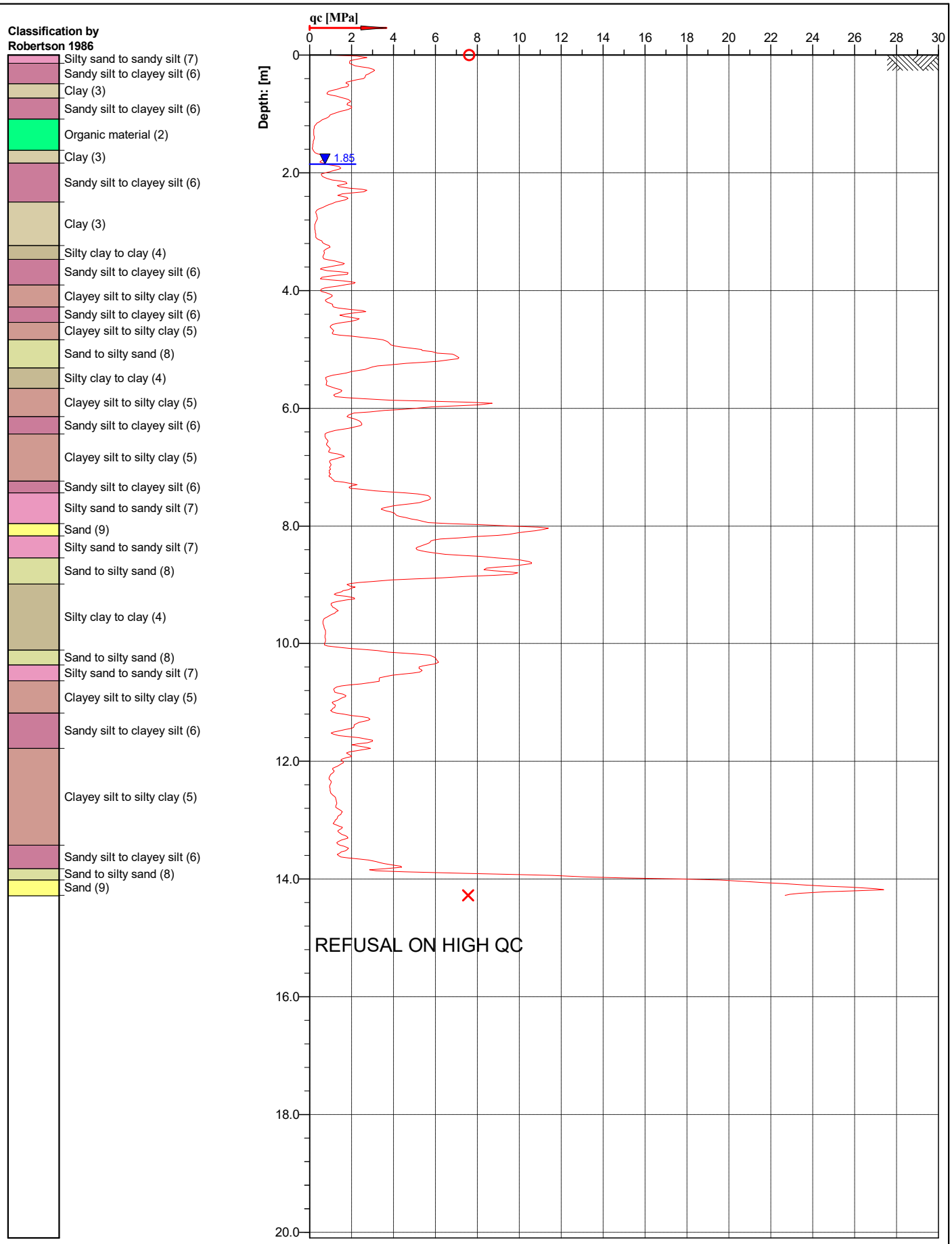

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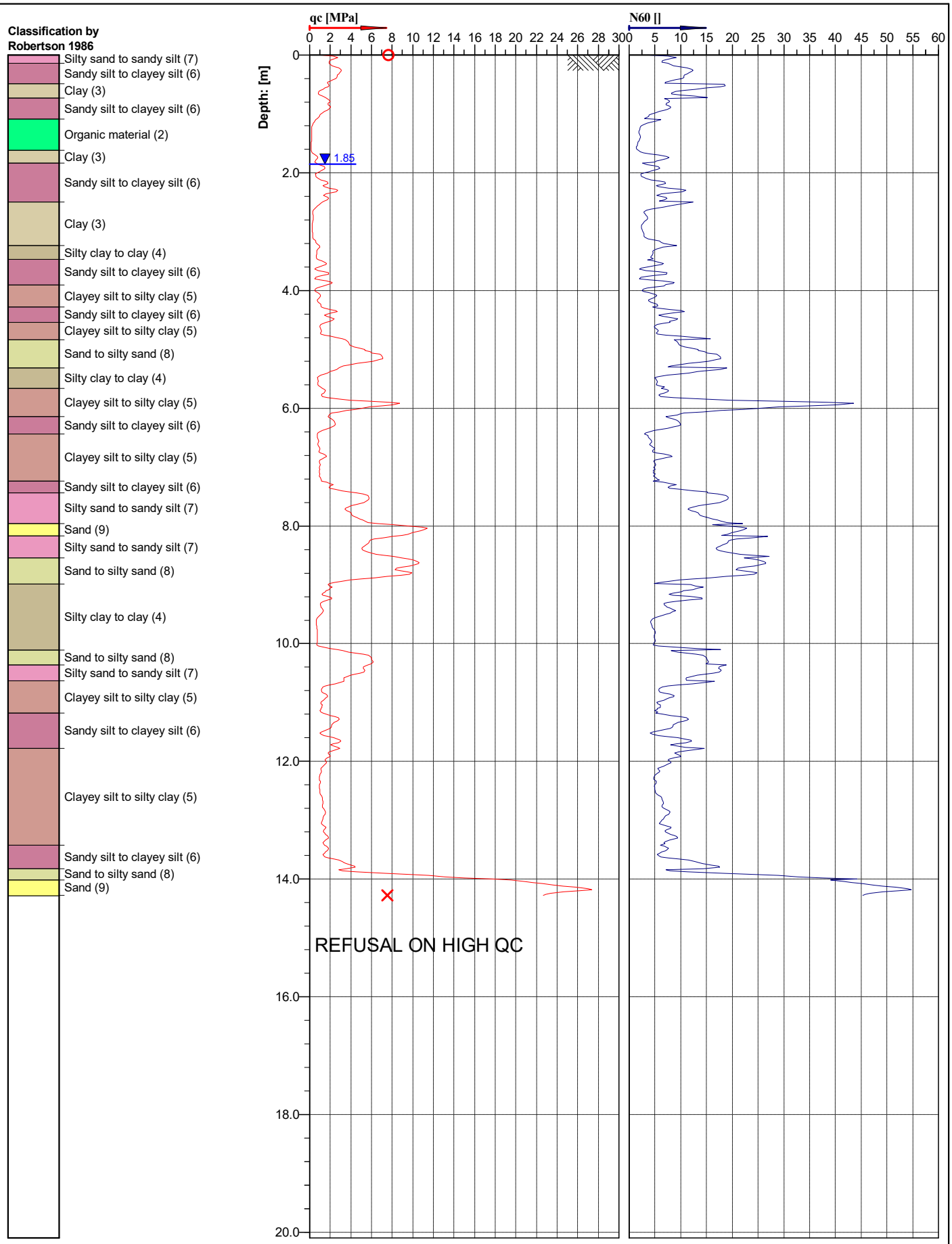
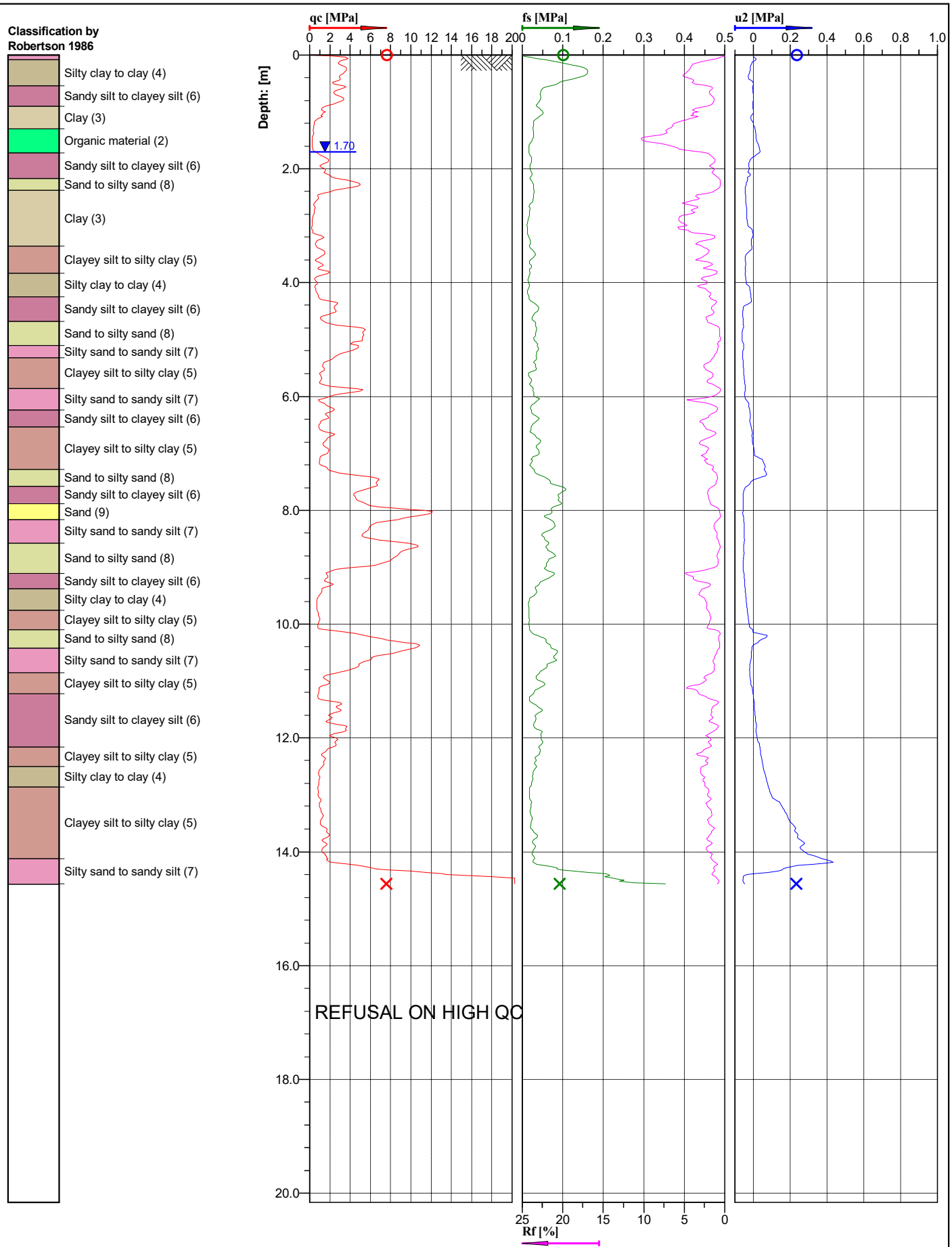


Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT04
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52632, E 176.91135		File: CPT04.cpt	

GEOTECH DRILLING

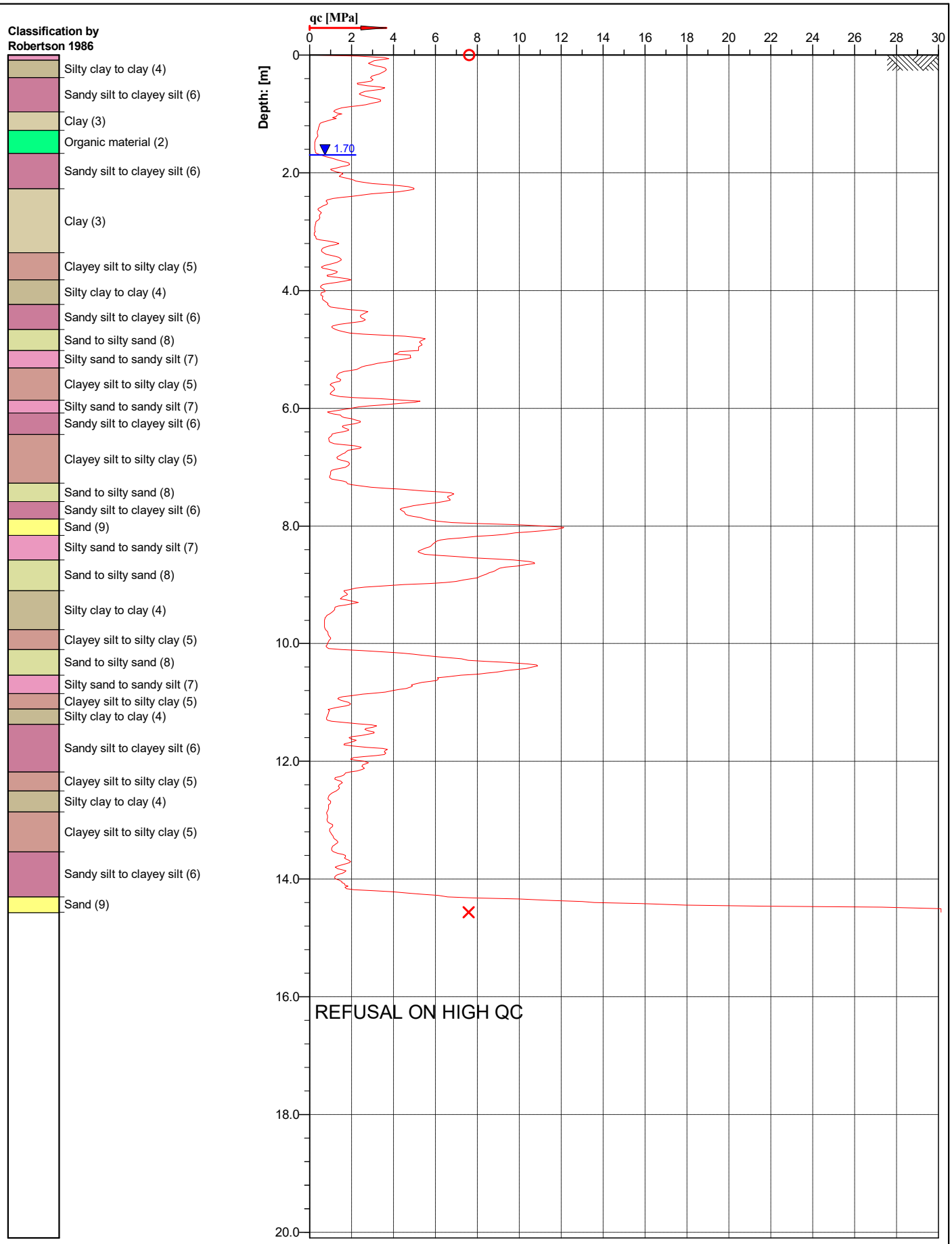
u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150



Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

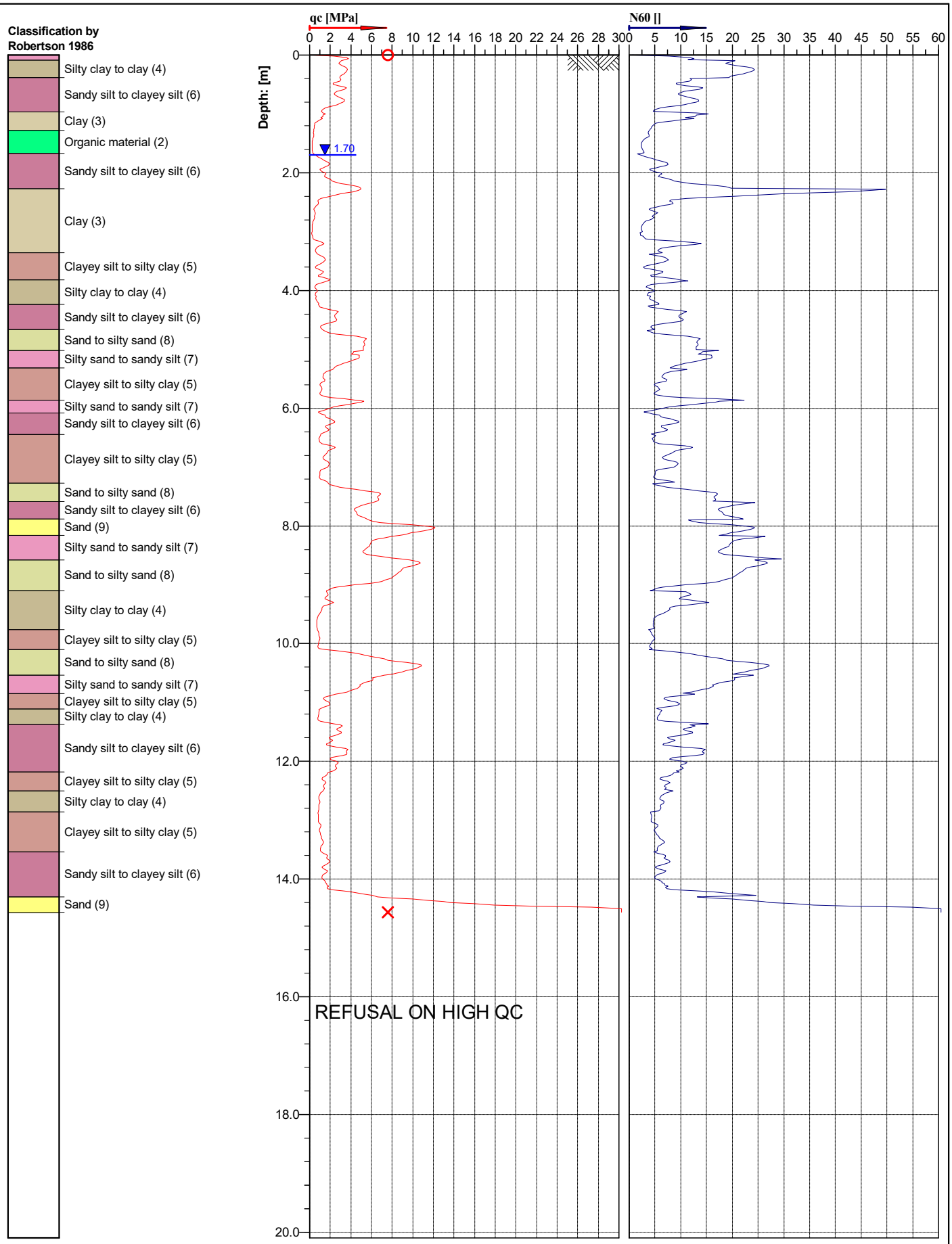
Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT05
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 90
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52658, E 176.91129		File: CPT05.cpt	



u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT05
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52658, E 176.91129		File: CPT05.cpt	

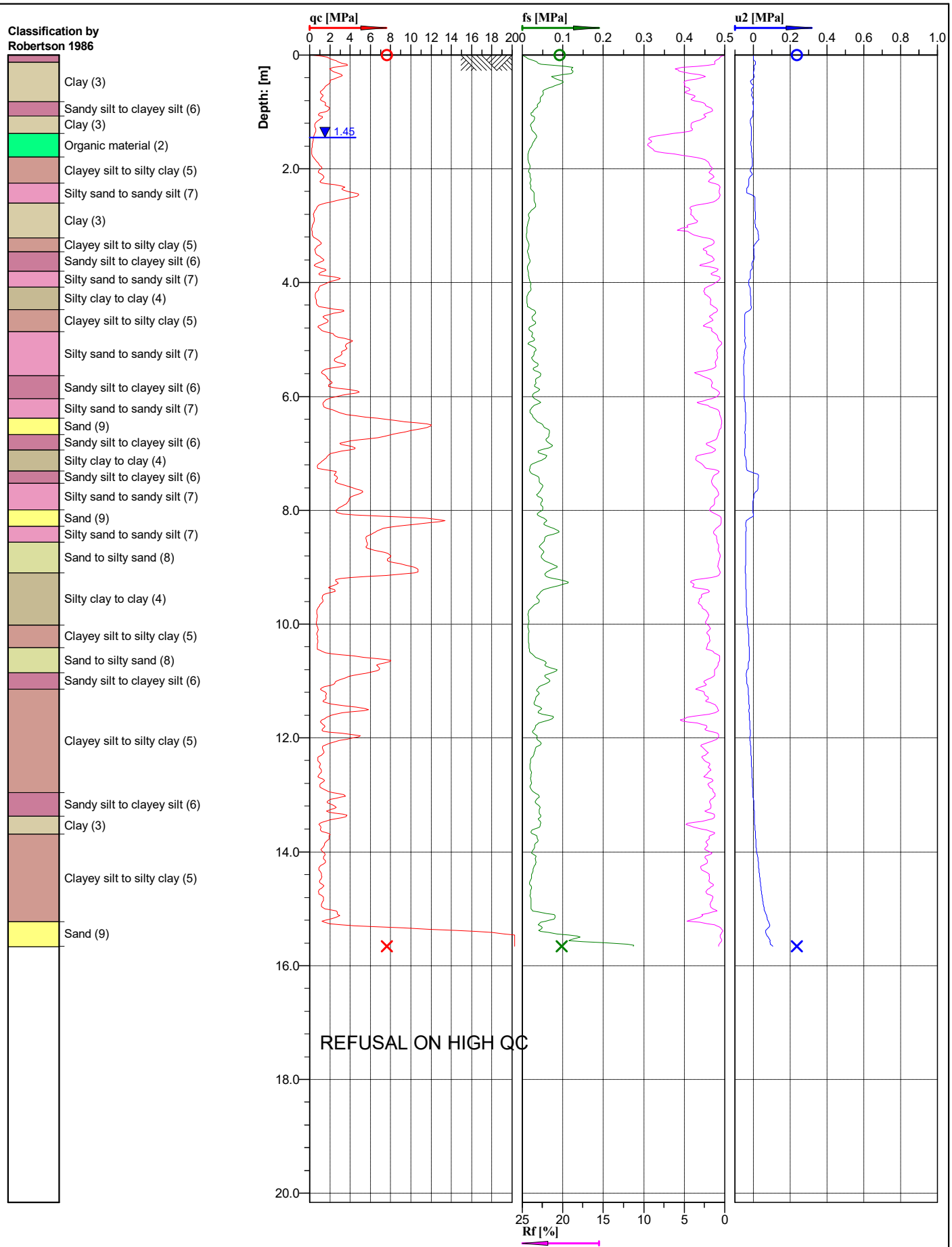


GEOTECH DRILLING

u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT05
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52658, E 176.91129		File: CPT05.cpt	

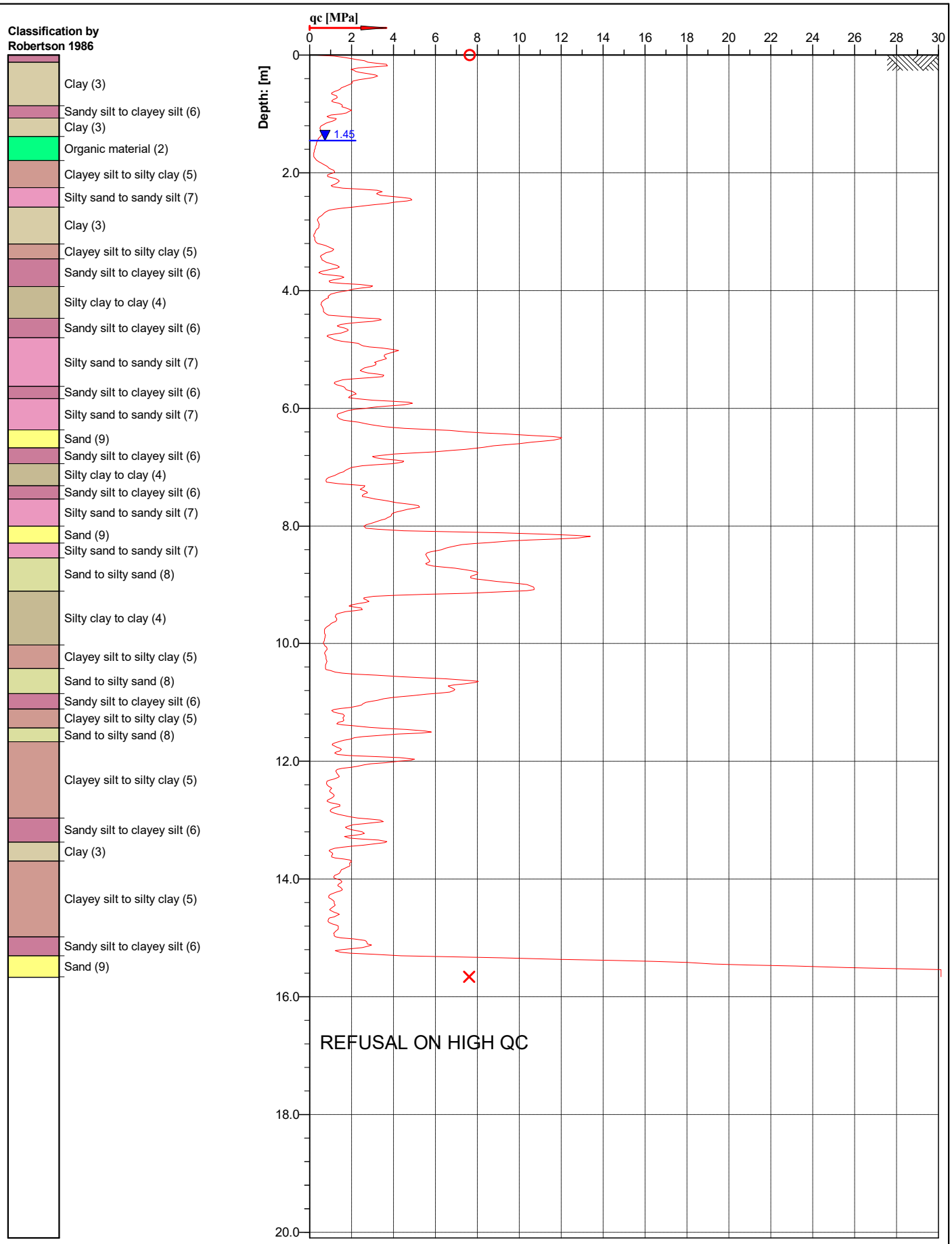


Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT06
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 90
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52670, E 176.91061		File: CPT06.cpt	

GEOTECH DRILLING

u2

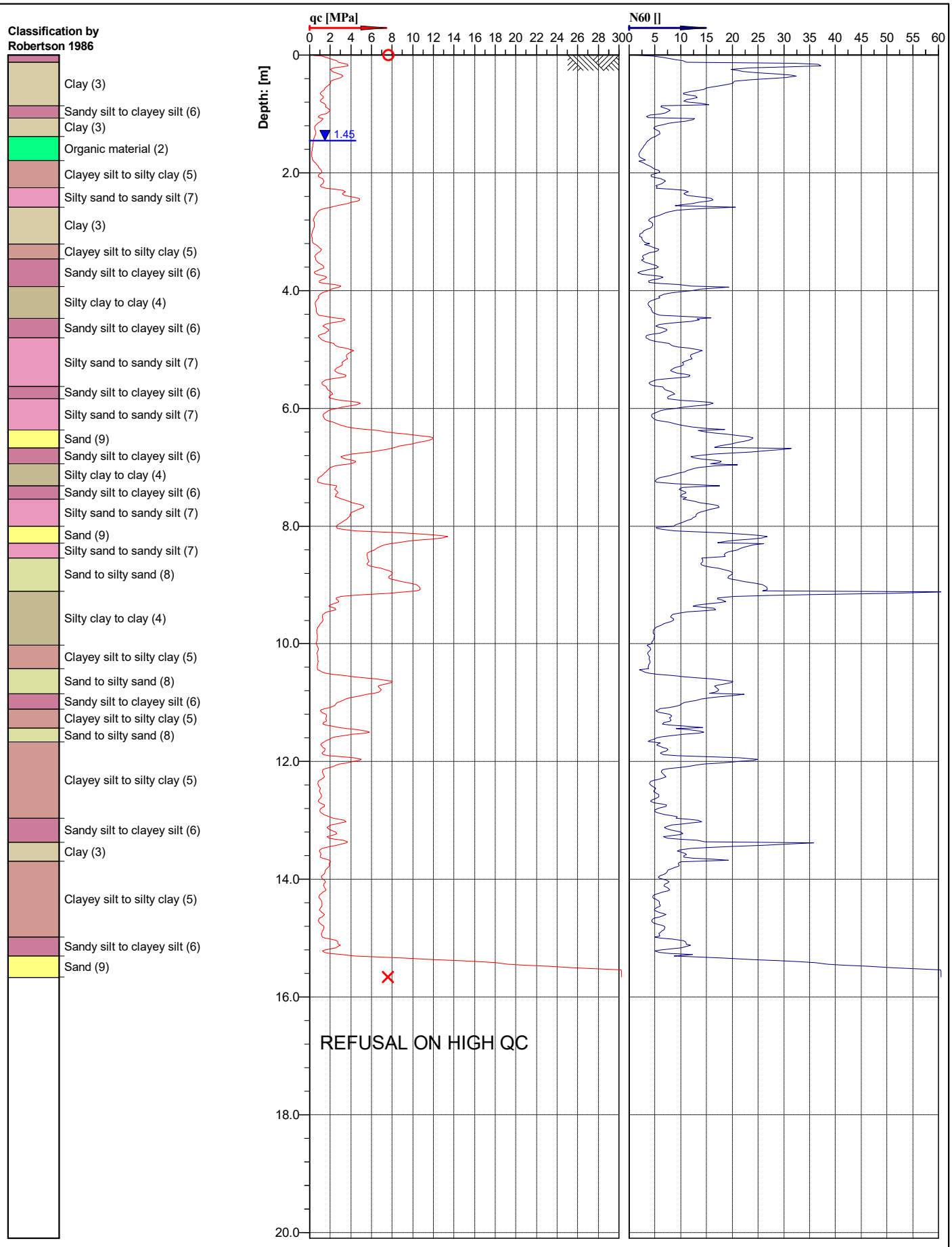
Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150



u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT06
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52670, E 176.91061		File: CPT06.cpt	

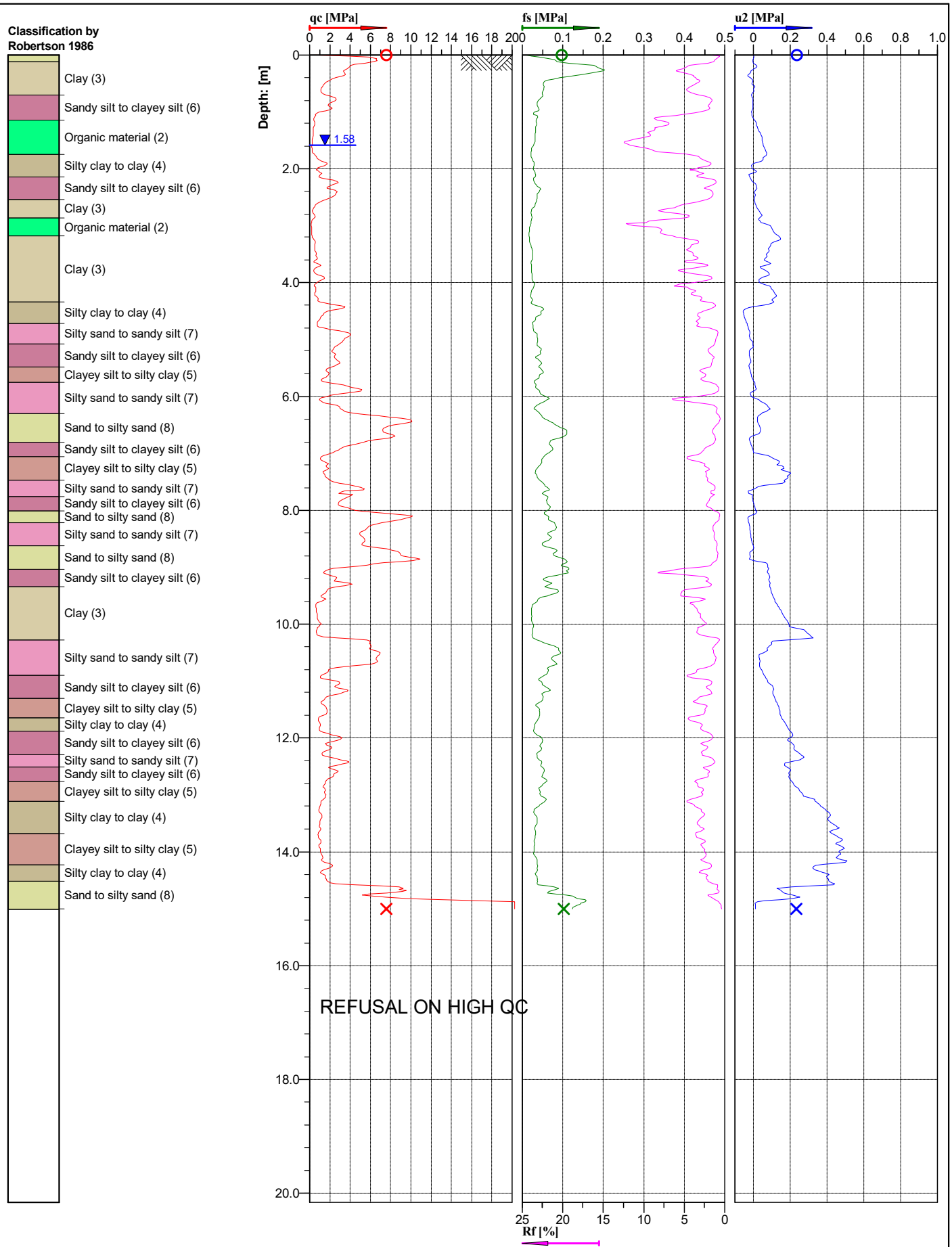


Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT06
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52670, E 176.91061		File: CPT06.cpt	

GEOTECH DRILLING

u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

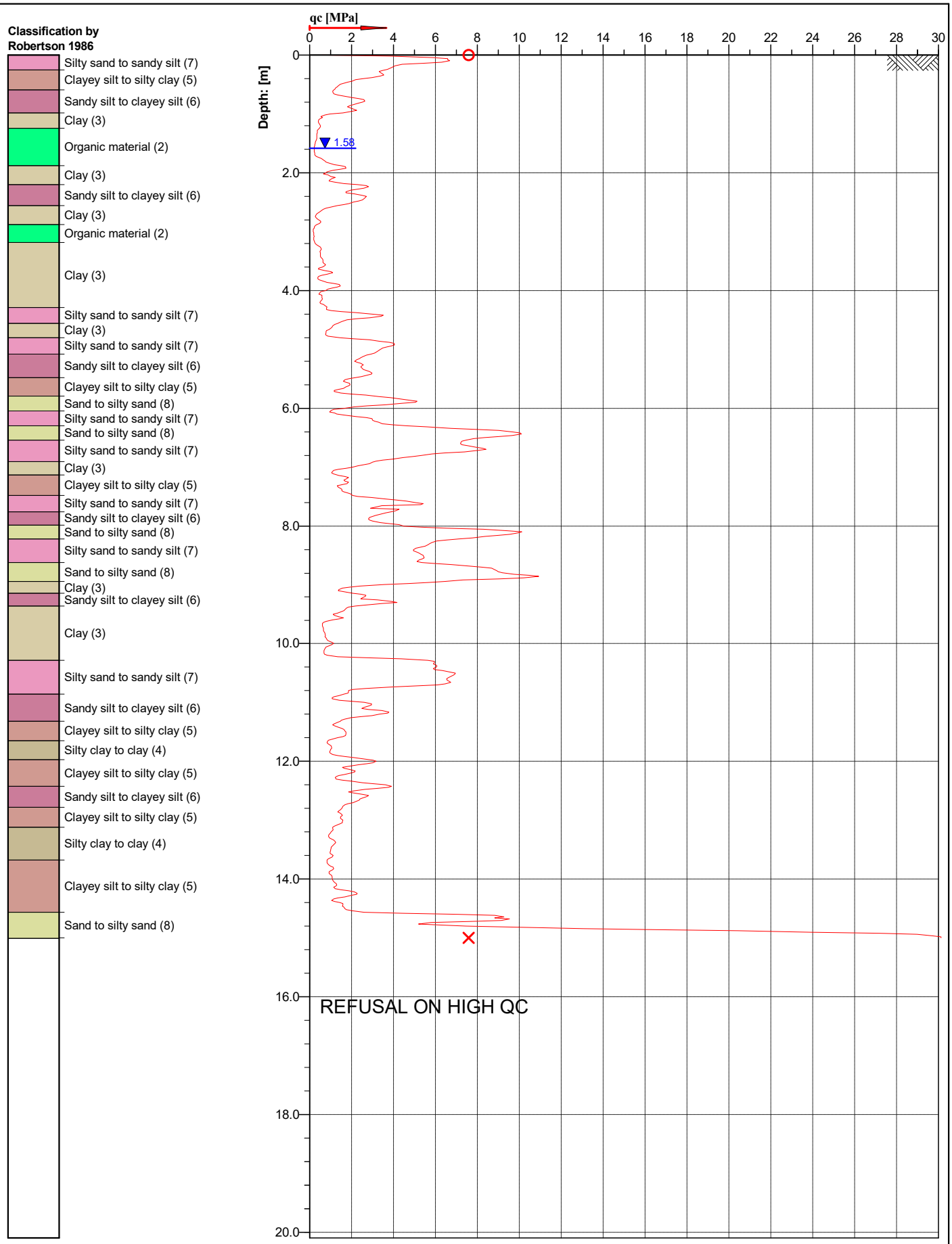


GEOTECH DRILLING

u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

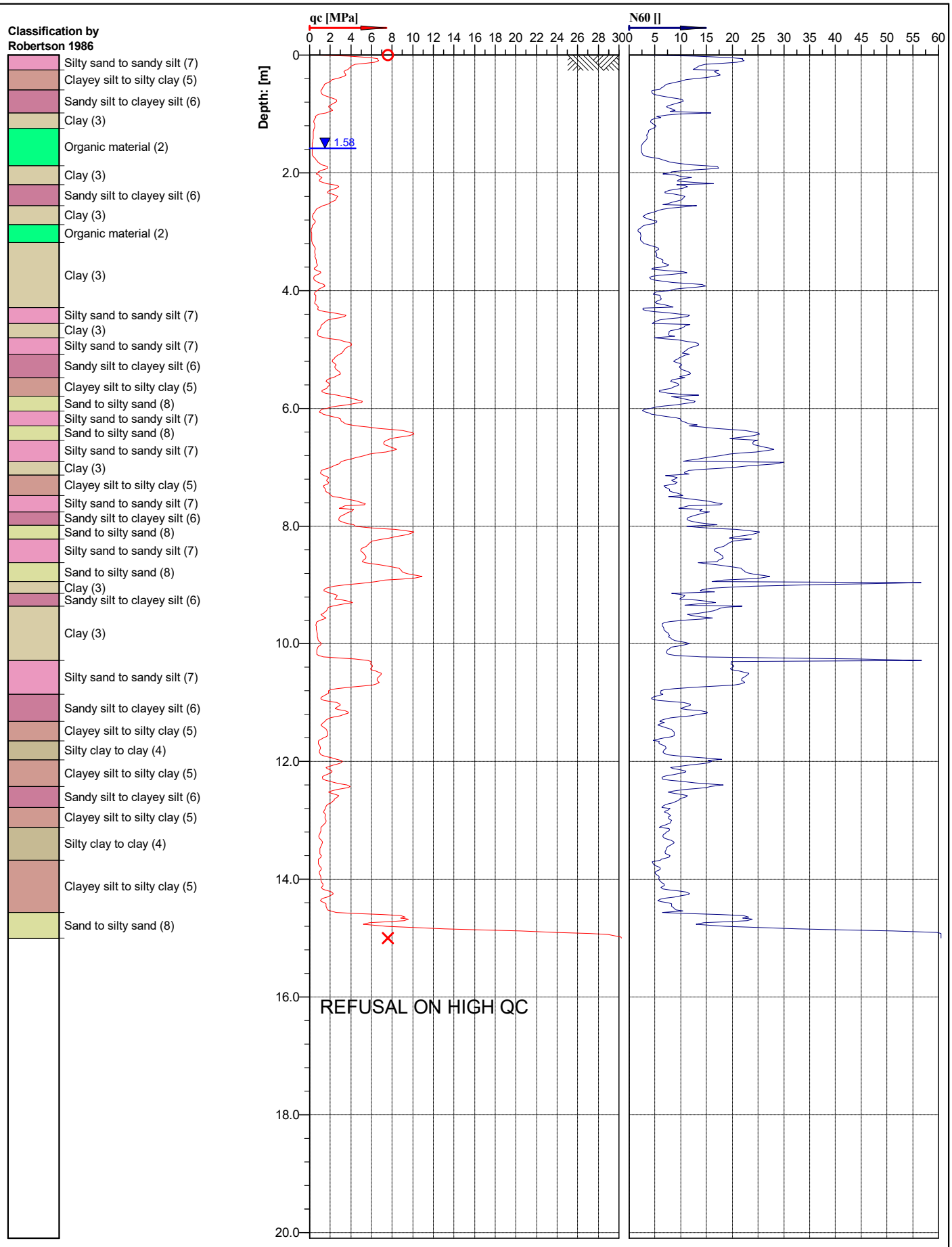
Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT07
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 90
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52636, E 176.91078		File: CPT07.cpt	



GEOTECH DRILLING

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT07
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52636, E 176.91078		File: CPT07.cpt	



Location: NAPIER	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT07
Project ID:	Client: INITIA	Date: 10/09/2021	Scale: 1 : 87
Project: 100 ERIKSEN ROAD		Page: 1/1	Fig.:
S 39.52636, E 176.91078		File: CPT07.cpt	

GEOTECH DRILLING

u2

Cone No: 5545
Tip area [cm2]: 10
Sleeve area [cm2]: 150

BOREHOLE LOG

				Borehole No:	BH01
				Driller:	Drew
				Sheet No.	1 of 1
PROJECT:	100 Ericksen rd	LOCATION:	Napier	JOB No:	
CO-ORDINATES:	39.52643	DRILL TYPE:	CRS-T	HOLE STARTED:	20/09/2021
	176.91083	DRILL METHOD:	SONIC	HOLE FINISHED:	20/09/2021
CLIENT:	Initia	DRILL FLUID:	WATER		

ENGINEERING DESCRIPTION

Soil Description : Soil Type, Minor Components
Plasticity or Particle Size, colour

Rock Description
Substance: Rock type, particle size ,
colour, minor mcomponents
Defects: Type, inclination, thickness
roughness, filling

Fluid Loss	Water	Core recovery (%)	Method	Casing	SPT Tests	Piezo Install
					75	Bentonite
					75	Backfill
					75	Sand
					75	Collapsed
					75	

Brown soft silty clay, some gravels, saturated in places.		1.1 m	100%	SONIC		No SPT's done as per Geos request.	1
Colour changing to a bark grey very wet, mostly clay with sand.	1.5		200%	SONIC			2
Sandy clay with shells, strong smell.	3.0		300%	SONIC			3
Very wet sand ,some shell, strong smell.	4.5		400%	SONIC			4
Very wet sand ,some shell, strong smell.	6.0		500%	SONIC			5
Very wet sand ,some shell, strong smell.	7.5		600%	SONIC			6
Very wet sand ,some shell, strong smell.	9.0		100%	Sonic			7
	10.0						8
							9
							10

Appendix C Liquefaction Analysis

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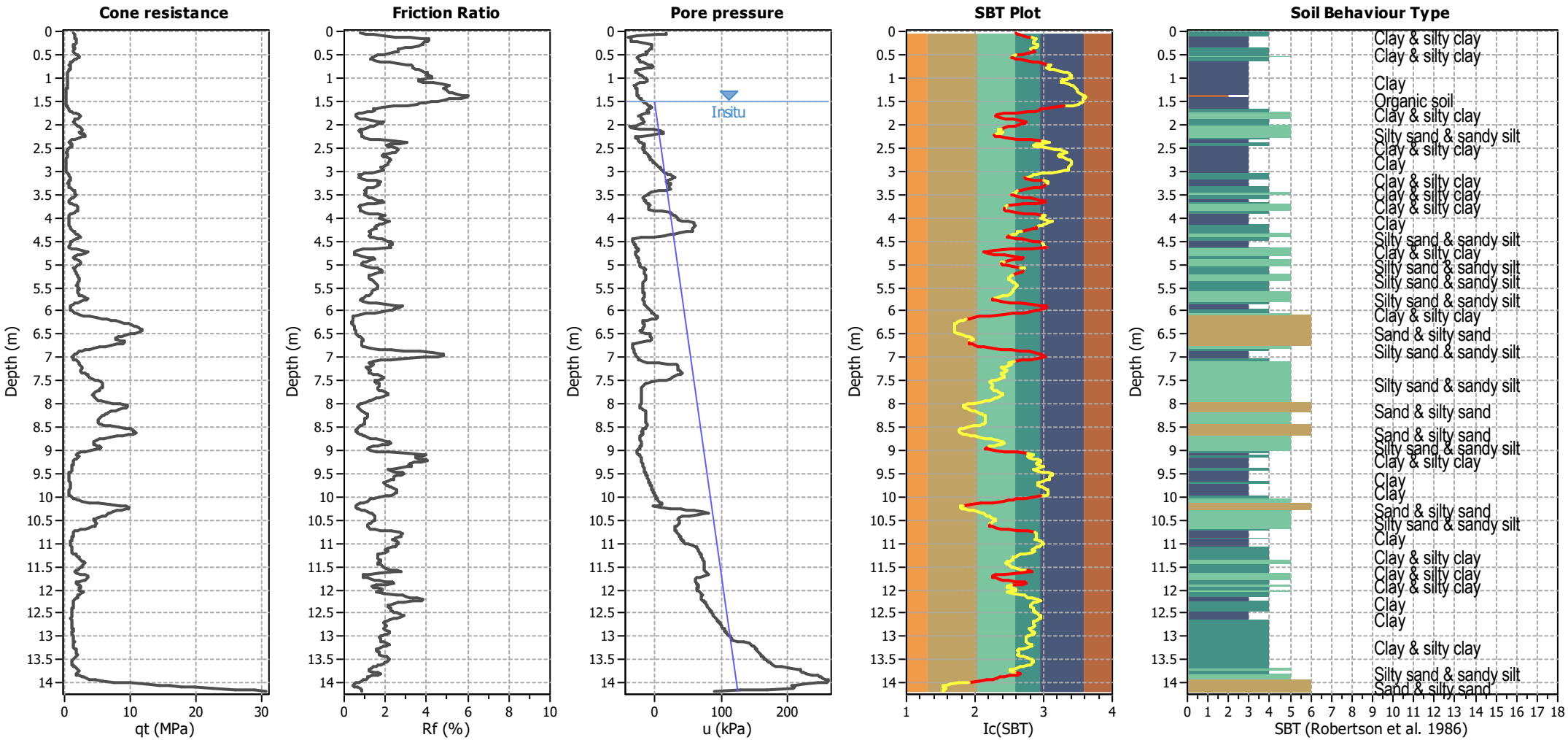
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT01
Total depth: 14.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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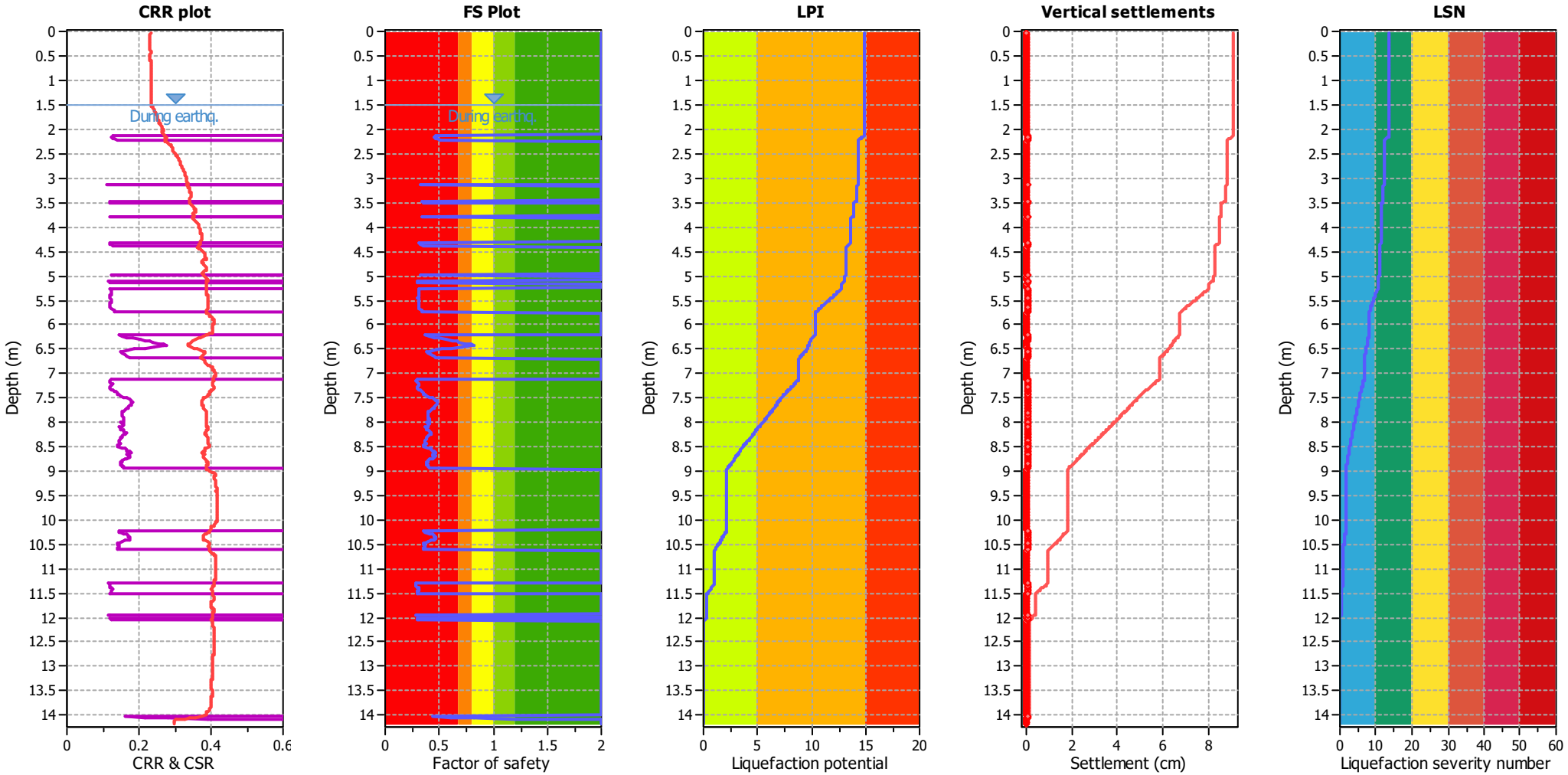
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT01
Total depth: 14.18 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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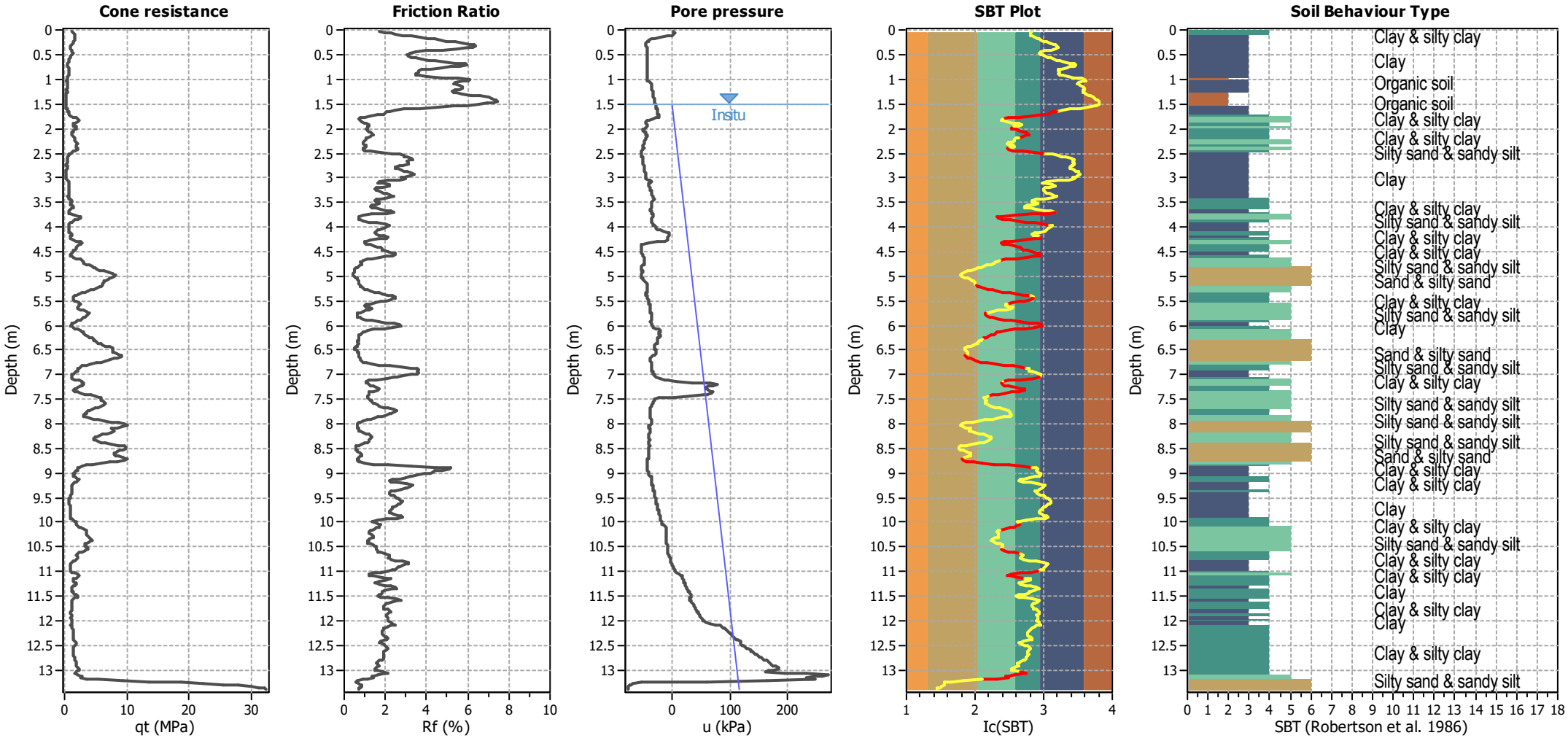
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT02
Total depth: 13.40 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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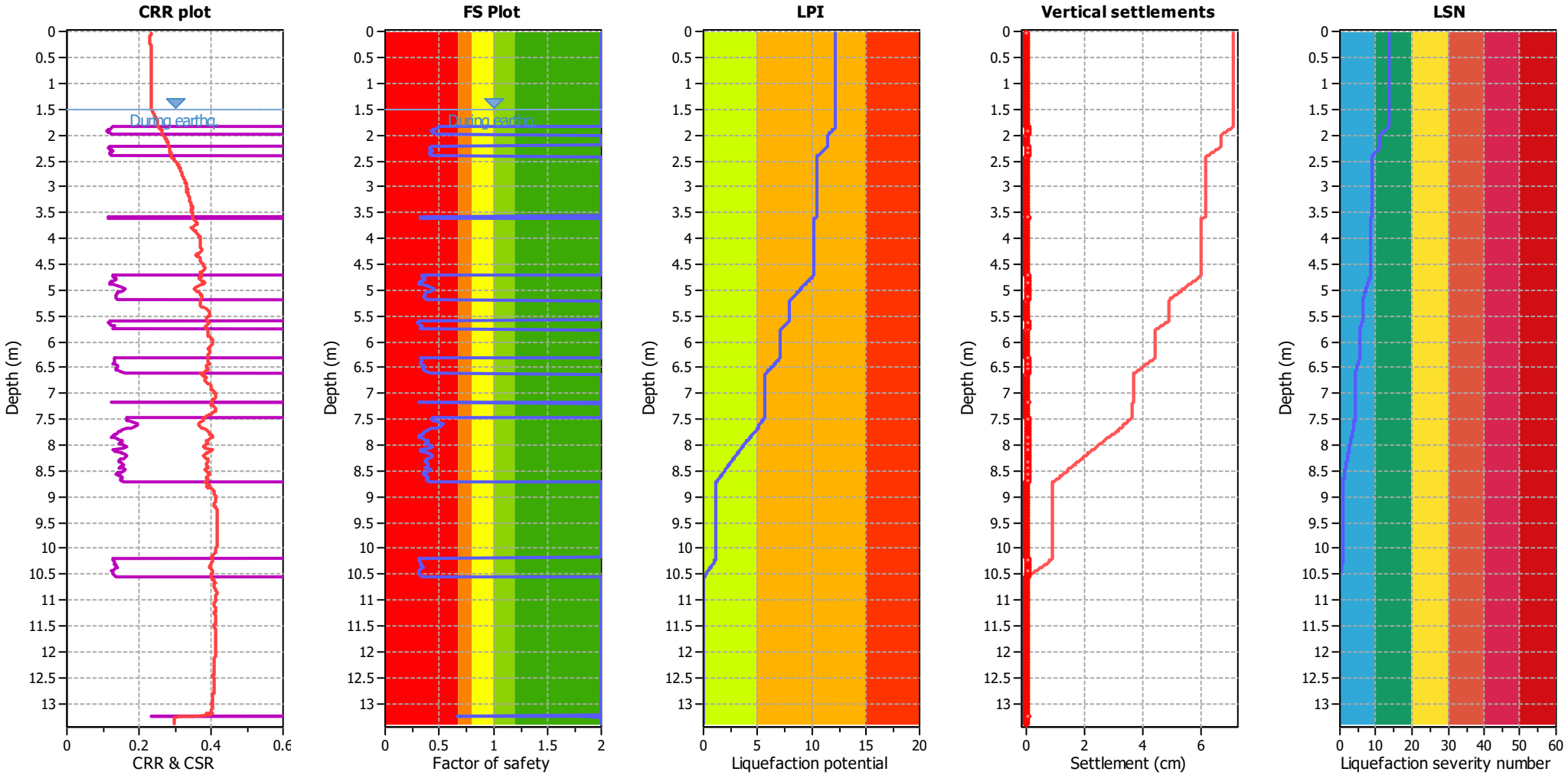
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT02
Total depth: 13.40 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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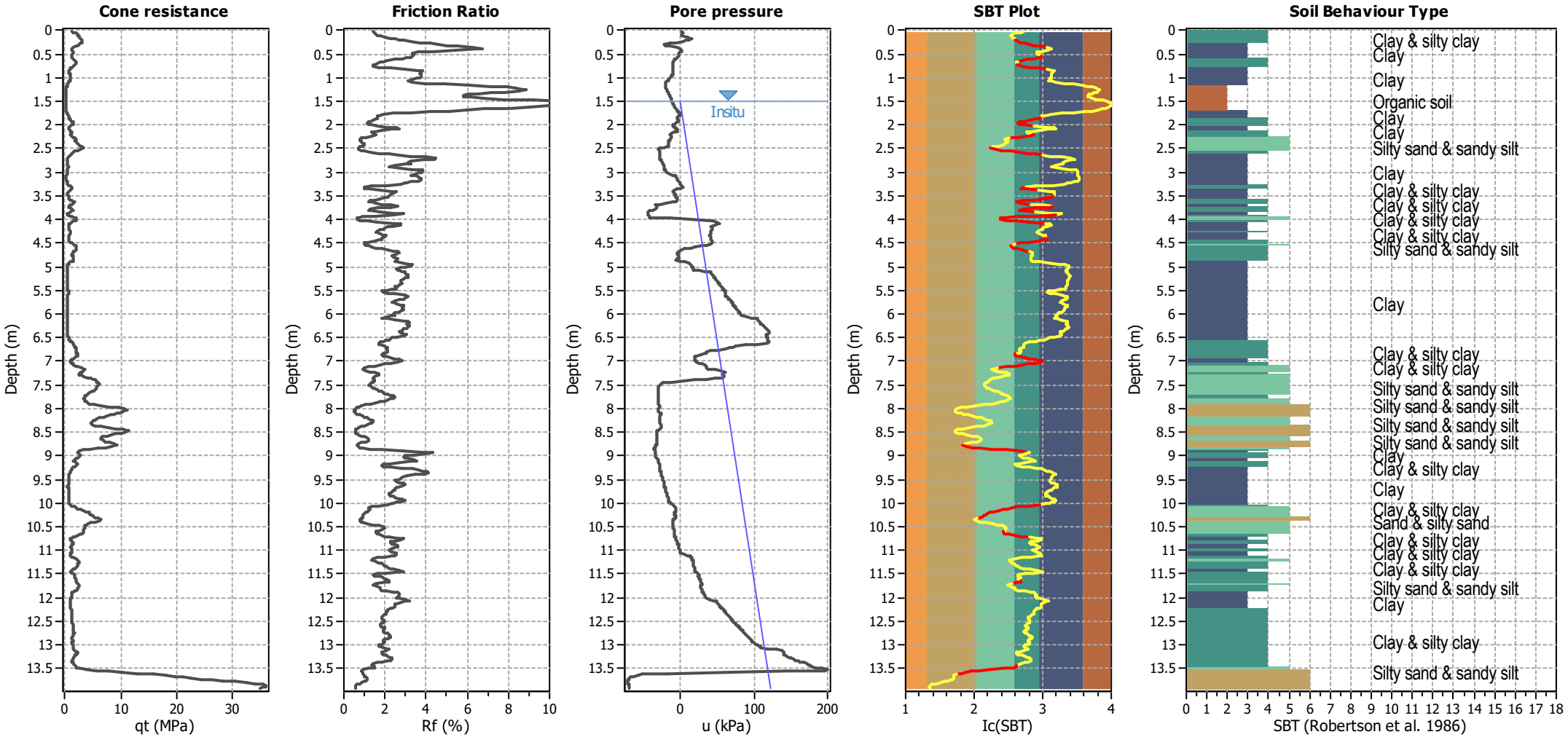
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT03
Total depth: 13.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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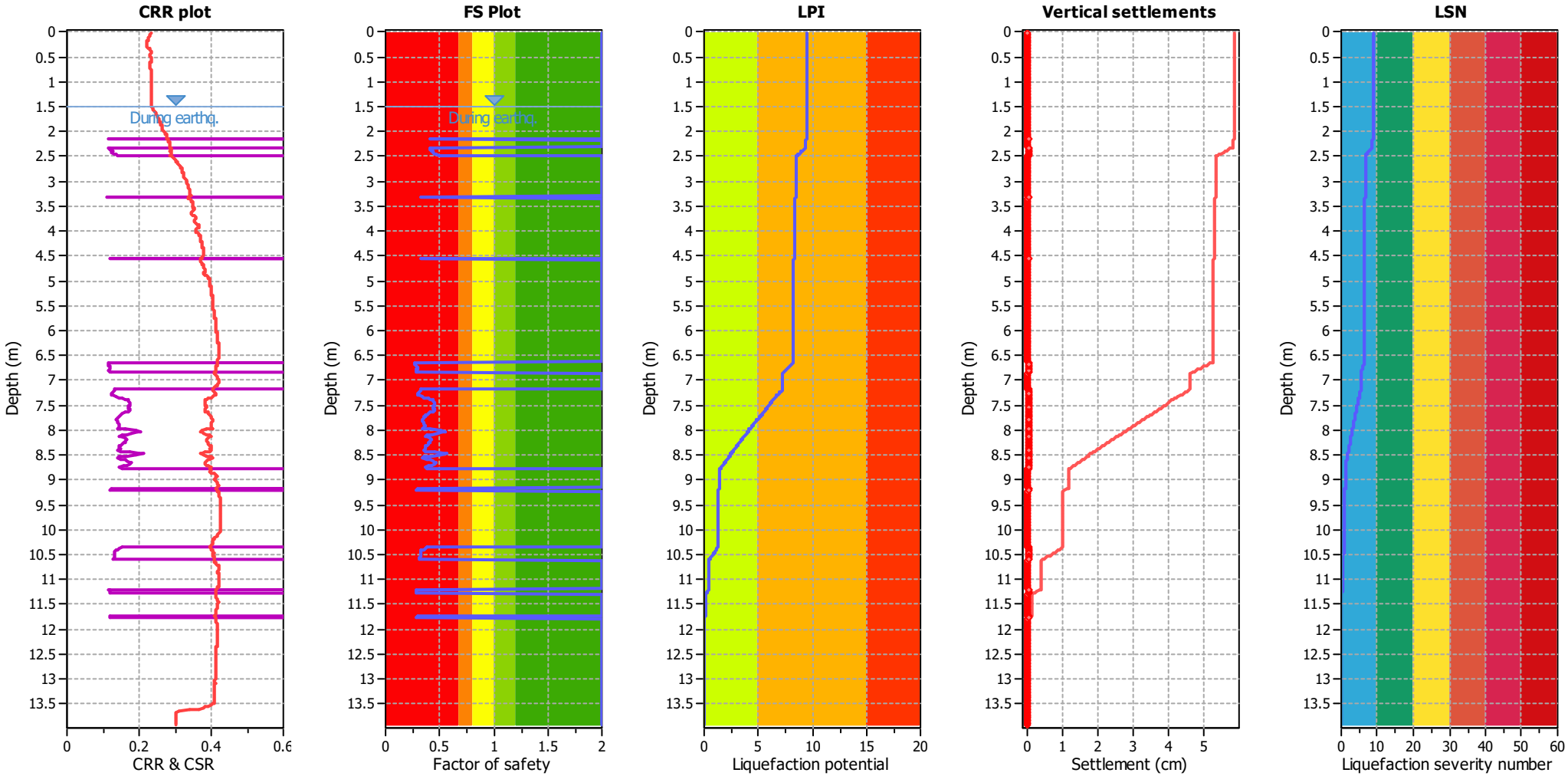
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT03
Total depth: 13.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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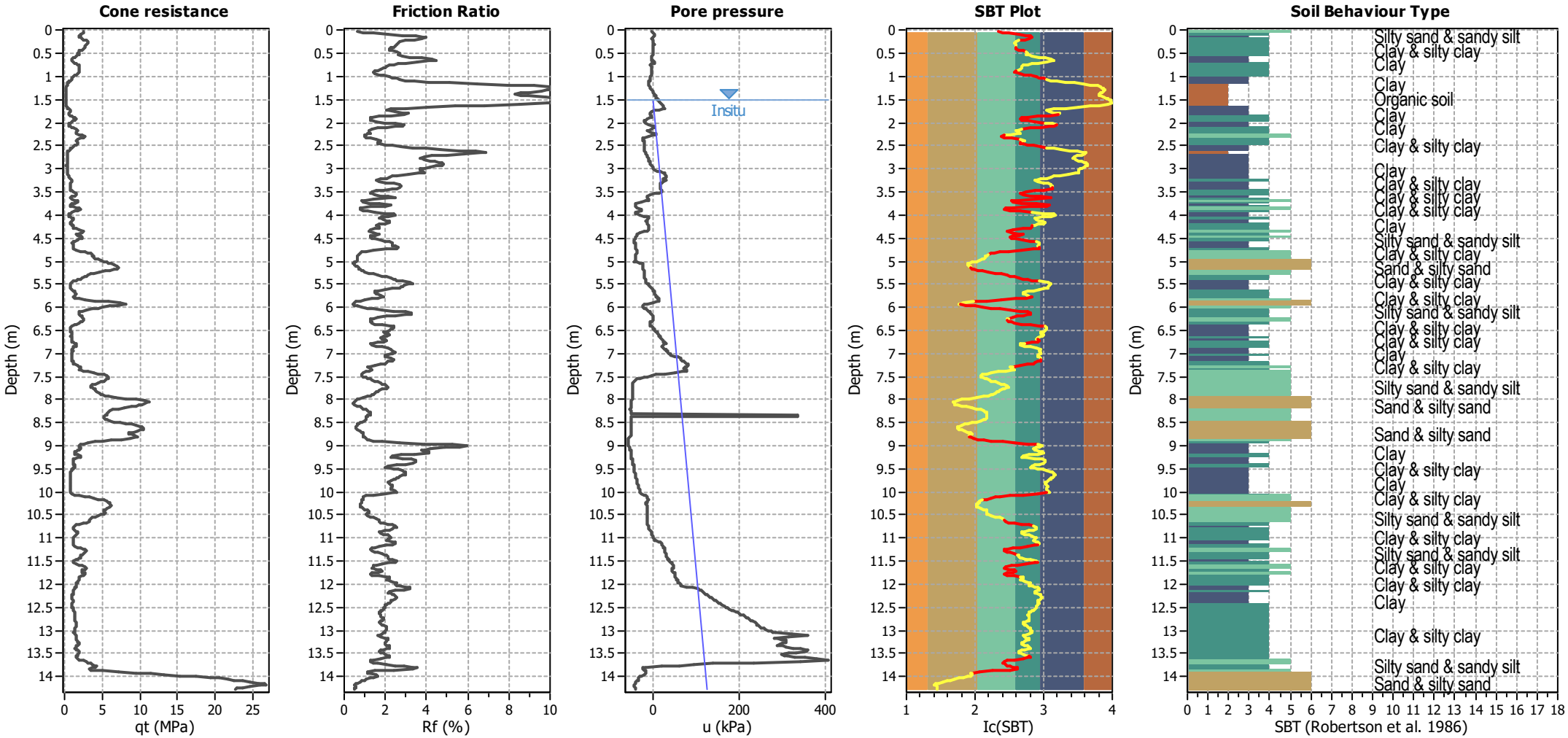
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT04
Total depth: 14.28 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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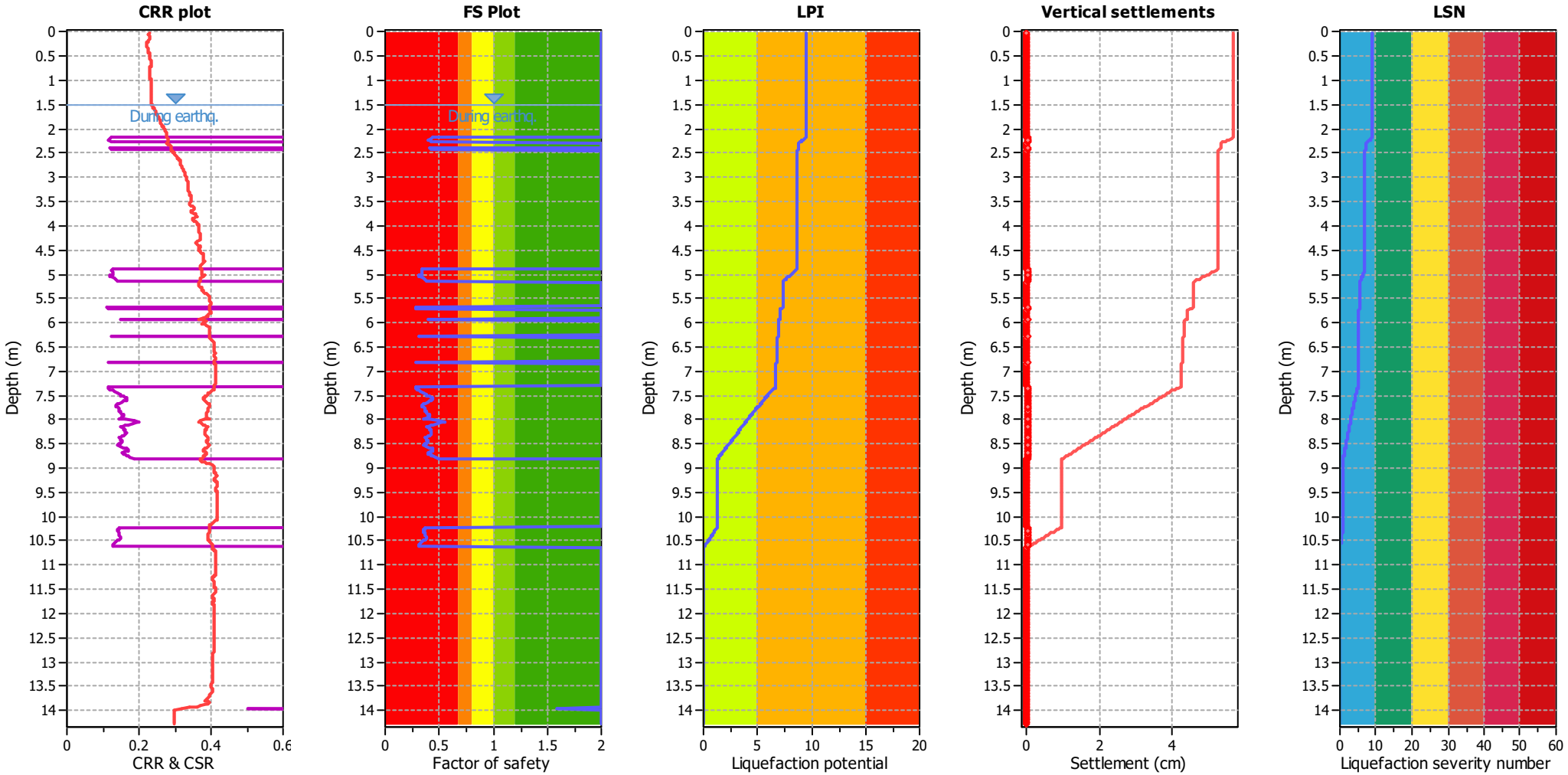
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT04
Total depth: 14.28 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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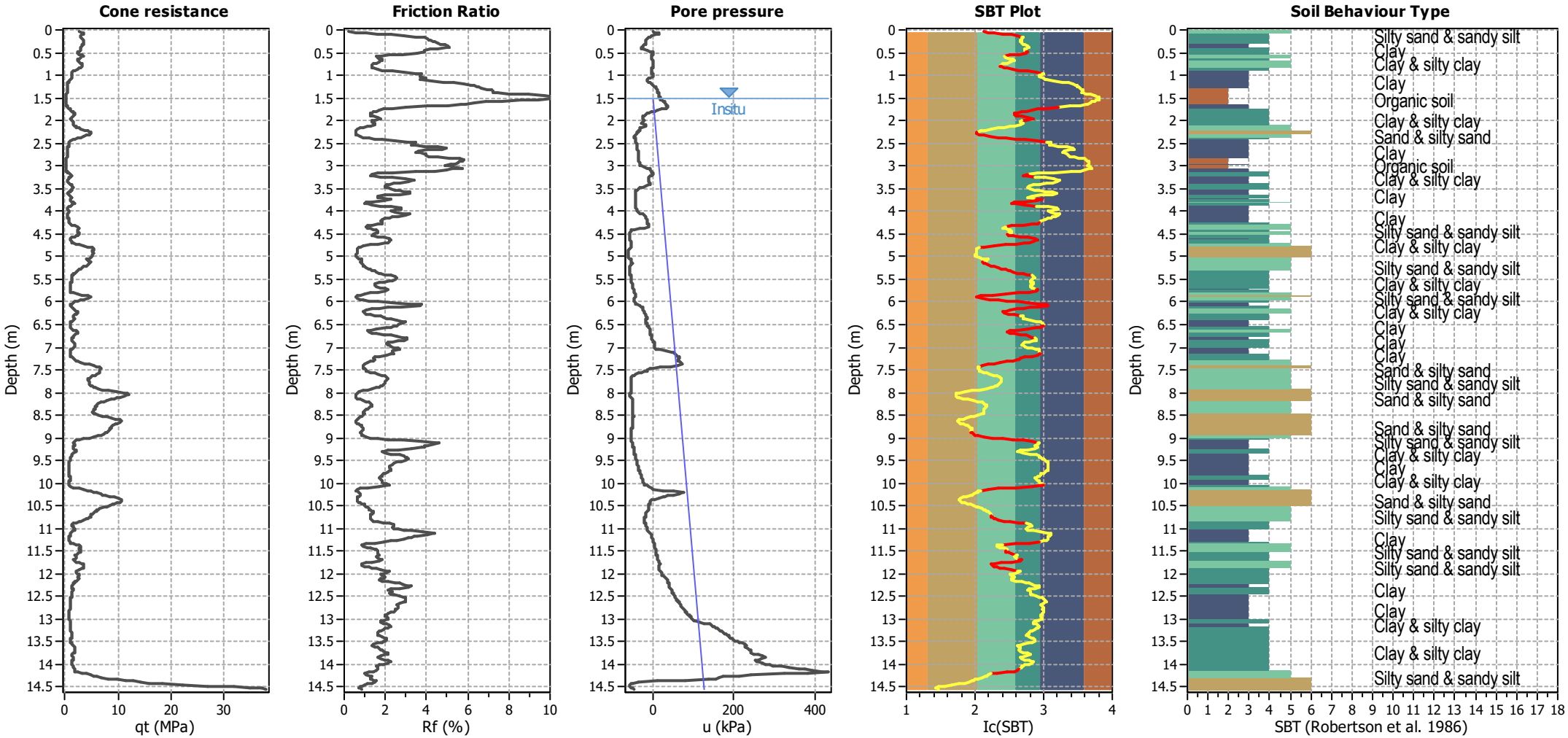
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT05
Total depth: 14.56 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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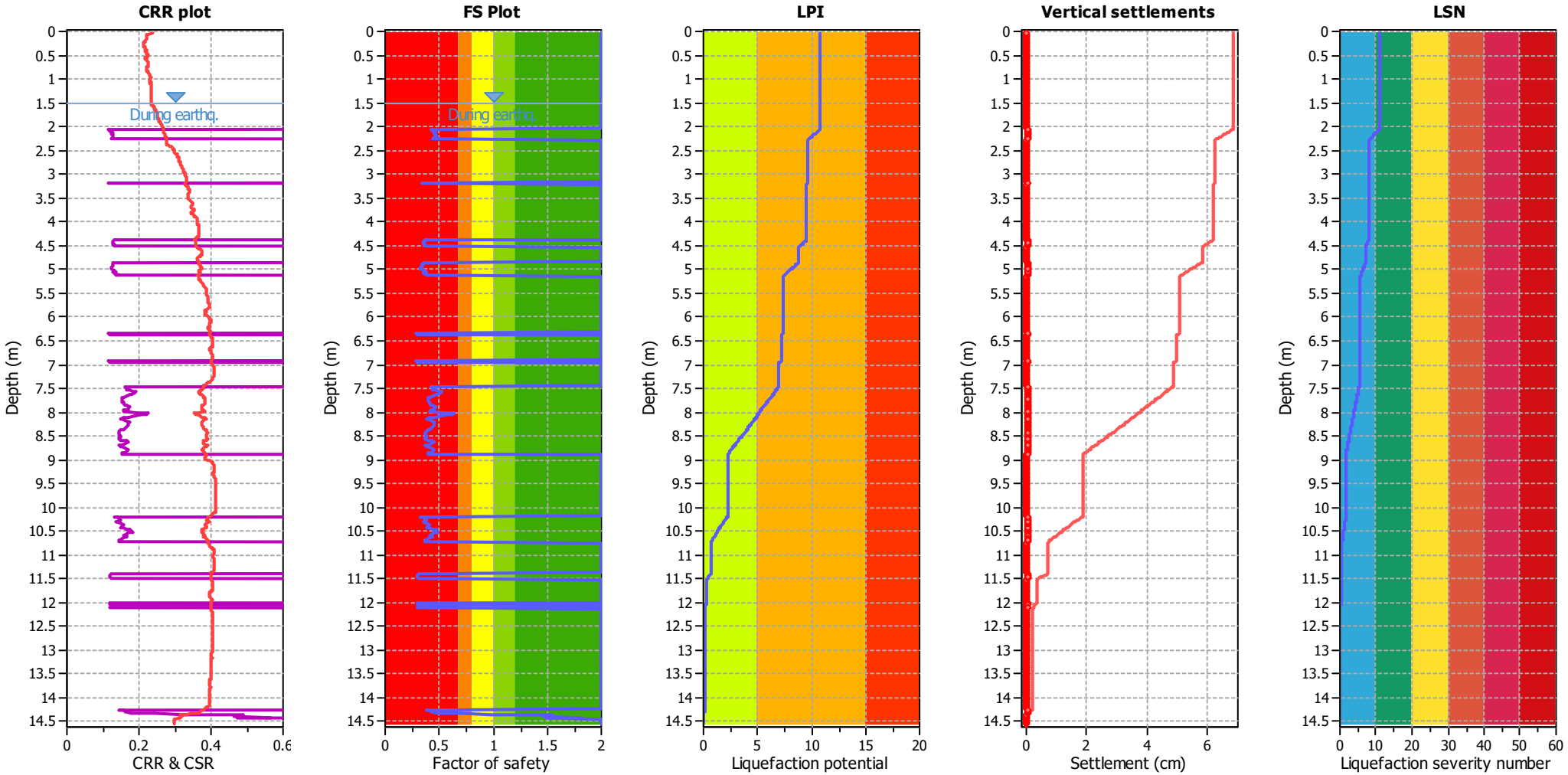
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT05
Total depth: 14.56 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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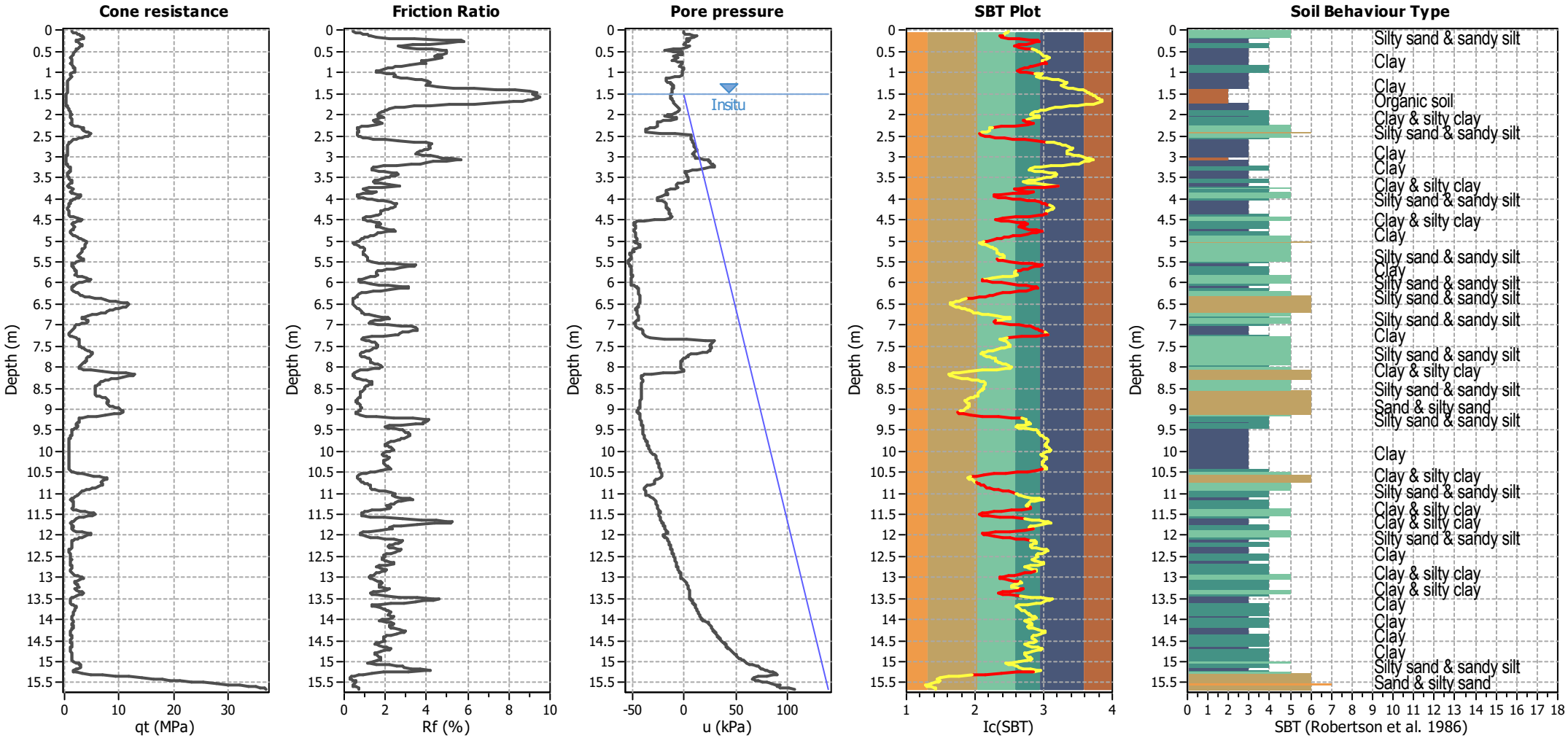
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT06
Total depth: 15.66 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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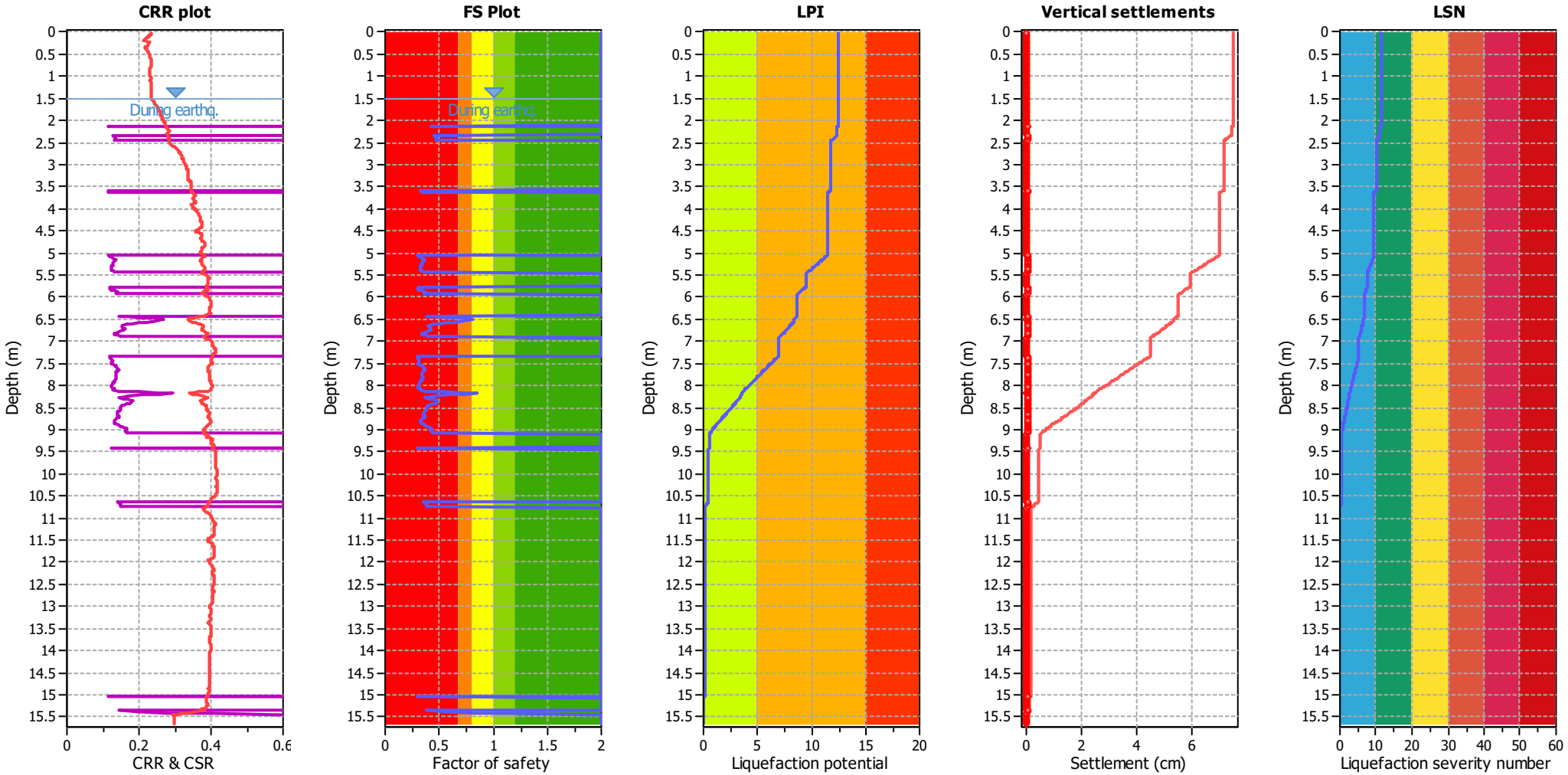
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT06
Total depth: 15.66 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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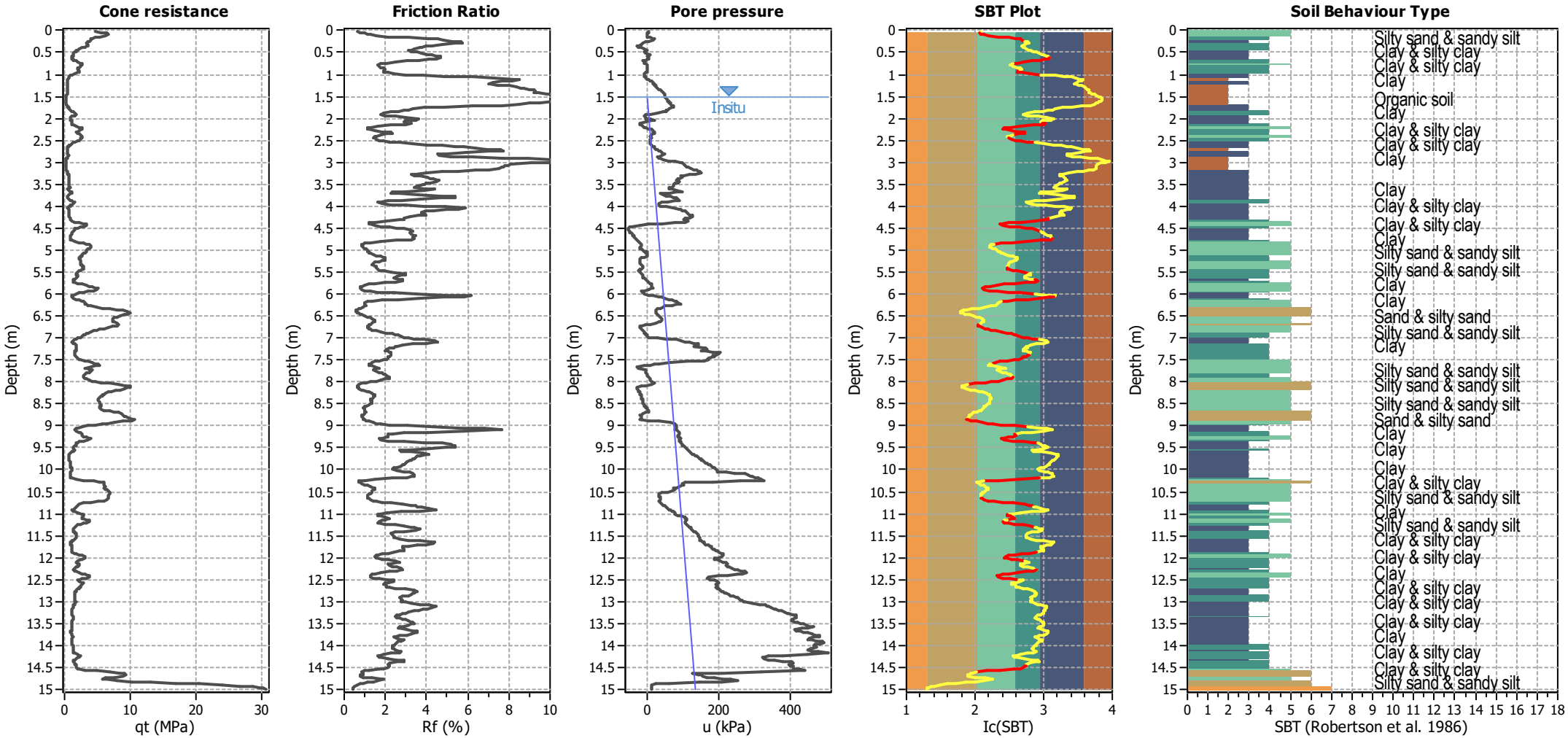
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT07
Total depth: 15.00 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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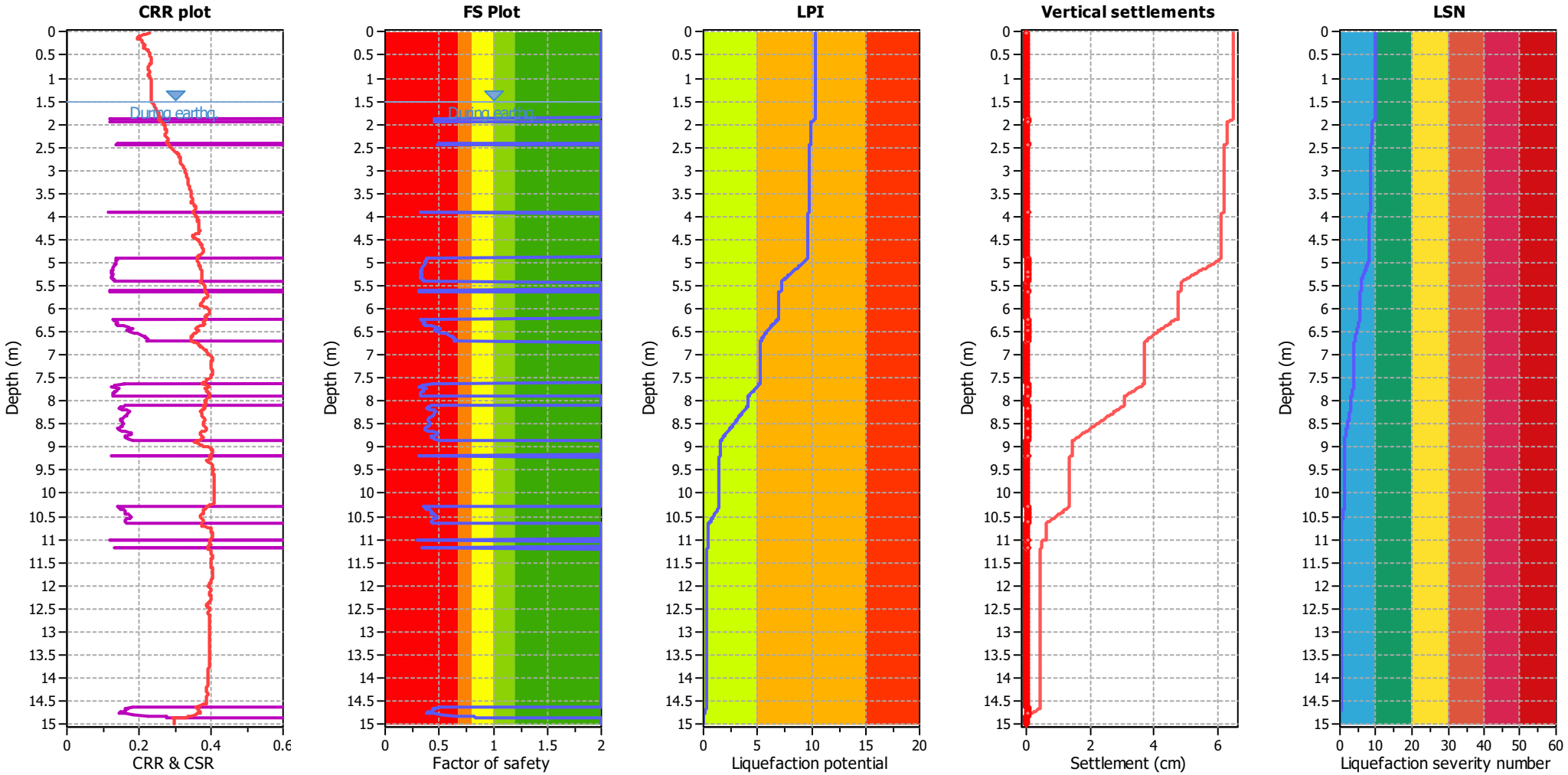
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT07
Total depth: 15.00 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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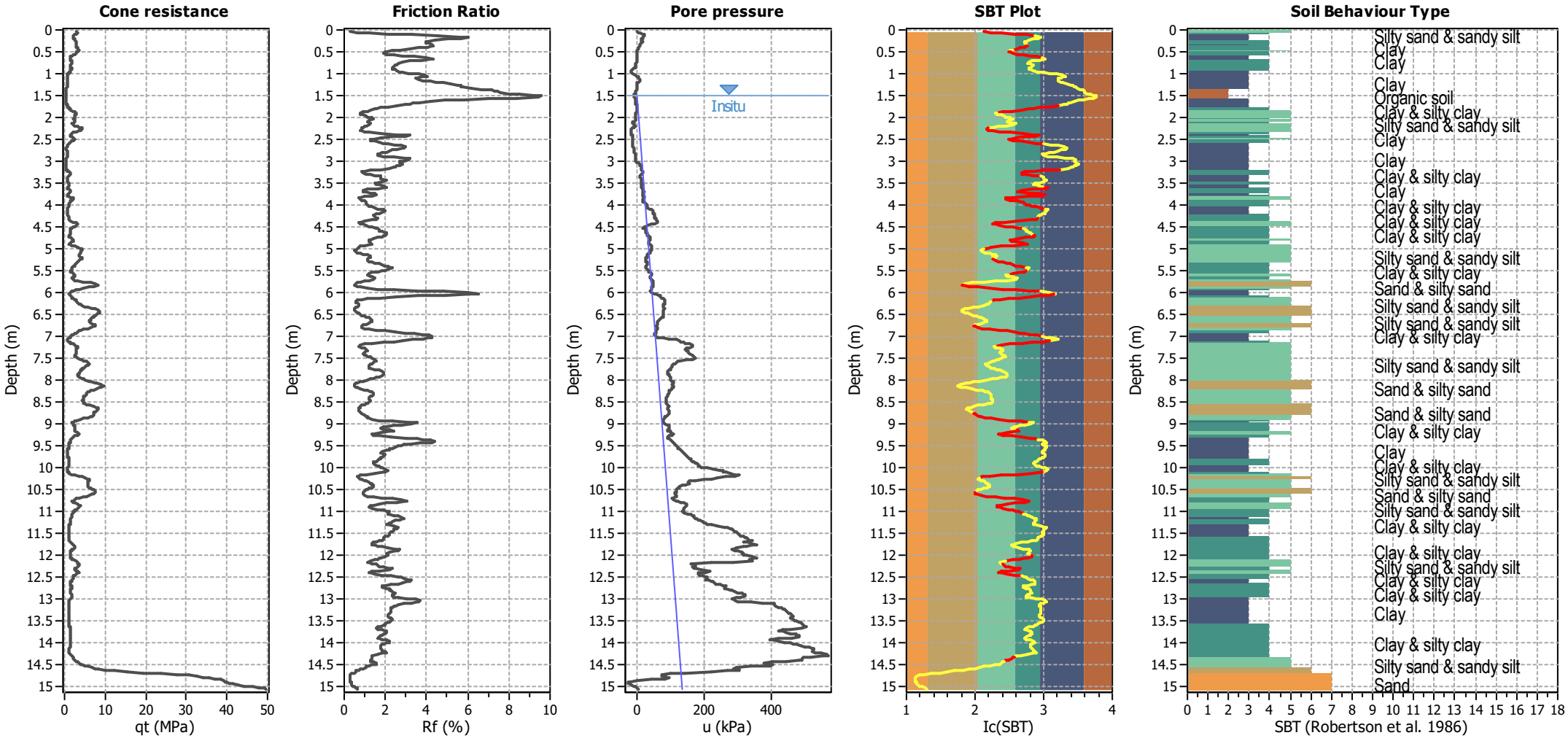
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT08
Total depth: 15.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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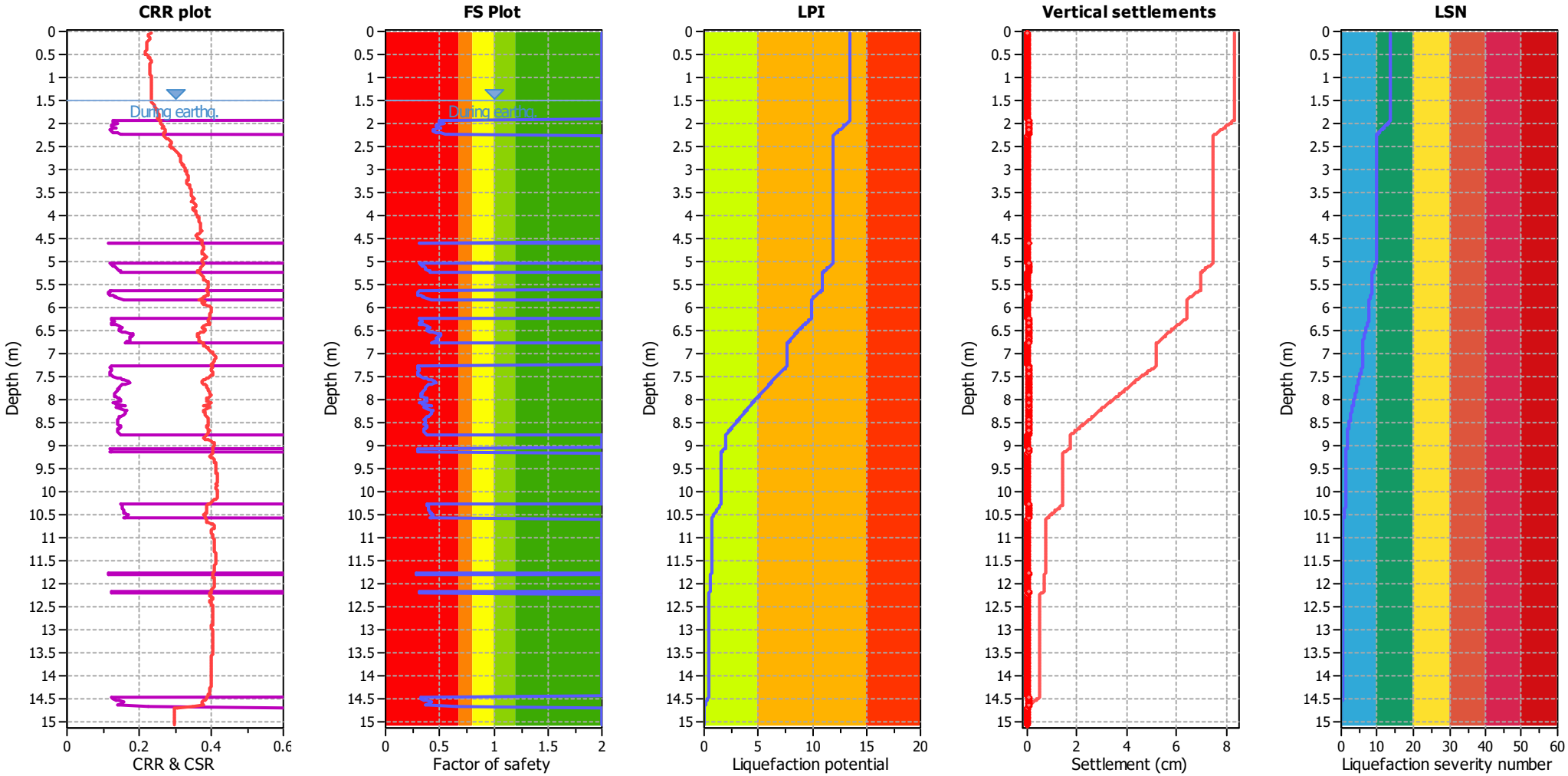
Project: **100 Eriksen Rd - ULS Liquefaction Analysis (0.42g, 6.5M)**
Location: **Te Awa, Napier**

CPT: CPT08
Total depth: 15.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		