2 November 2022

TUUMATA PLAN CHANGE

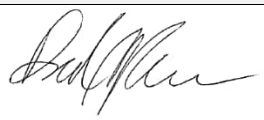
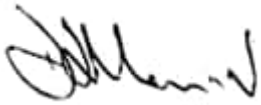
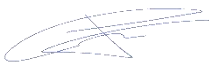
HAMILTON

GEOTECHNICAL INVESTIGATION REPORT

TGH Ruakura Industrial Development Limited

HAM2021-0096AD Rev 3

HAM2021-0096AD		
Date	**Revision**	**Comments**
31 May 2022	0	Issued to client
18 June 2022	1	Incorporating client comments
15 September 2022	2	Updating for typology adjustment
2 November 2022	3	Incorporating client comments

	Name	**Signature**	**Position**
Prepared by	David MacPherson		Project Geotechnical Engineer
Reviewed by	Dave Morton		Principal Geotechnical Engineer CMEngNZ, CPEng
Authorised by	Kostas Lontzetidis		Senior Principal Geotechnical Engineer CMEngNZ, CPEng

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1 INTRODUCTION

1.1 Project Brief

CMW Geosciences (CMW) was engaged by TGH Ruakura Industrial Development Limited to carry out a geotechnical investigation of the Ruakura-Tuumata Structure Plan Area in Hamilton, which is being considered for rezoning from industrial to medium density residential.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal referenced HAM2021-0096AA, Rev 2 dated 8 February 2022.

This report is to support a private plan change application to Hamilton City Council.

1.2 Scope of Work

As detailed in our proposal, the agreed scope of work conducted by CMW was defined as follows:

- Project Management during investigation and reporting, underground services checks, sub-contractor management
- Carry out Seismic Cone Penetrometer Tests across the site
- Evaluate and develop an appropriate geological and geotechnical model, including seasonal groundwater variations.
- Identify any geohazards to the proposed development, including liquefaction, static settlements, and provide strategies to mitigate.
- Compile all of the above detail into a concise geotechnical investigation report, incorporating relevant plans, and field investigation data.

1.3 Existing Information

The following work has previously been completed on this site:

- Opus Ruakura Development Stage 1: Geotechnical Interpretative Report, July 2013. Doc. Ref. G3127.
- T+T Tramway SHA Preliminary Geotechnical and Ground Contamination Assessment, November 2018. Doc. Ref. 1007210.1100.v2
- CMW Ruakura North Development: Integrated Desktop Study Report, 28 August 2019. Doc. Ref. HAM2019-0007AK Rev0

2 SITE DESCRIPTION

2.1 Site Location

The 68ha site is located on Tramway Road as shown on Figure 1 below.

Figure 1: Site Location Plan (OpenStreetMaps)

2.2 Landform

The current general landform, together with associated features located within and adjacent to the site is presented on the attached Landform Plan as ***Drawing 01.***

The site can be split into two general landforms. The first comprises a broad terrace that makes up most of the site and is essentially near level with existing ground levels ranging from RL40m in the west to RL41m in the east with a locally depressed paleochannel (RL38.6m) in the north-eastern corner. The second landform comprises four ridges of Walton Subgroup that rise up to RL45m on the western, southern and south-eastern site boundaries.

The site is bound to the north by residential housing on Northholt Road and the under construction Tuu Mata development. To the east it is bound by farmland, to the west by Wiarere Drive, and to the south by the Ruakura Research Centre.

Historical aerial photographs[1] dating back to 1938 show that between 1953 and 1967 a pit on the northern boundary of the site was backfilled. Since then, the site has been used for agriculture.

[1] Retrolens website, Sourced from http://retrolens.nz and licensed by LINZ CC-BY 3.0

3 PROPOSED DEVELOPMENT

The site is currently zoned industrial, but planning permission is being sought to rezone it to medium density residential, including a 3.5ha suburban centre and adjoining mixed use area.

The preliminary development concept plan was provided by the client and shows a wetland on the western boundary being fed by a series of swales that run parallel to a network of roads throughout the development.

No engineering plans have been provided to date, but we understand the wetland outlet will be at around RL35.7m and that the elevated hills will be lowered to raise the broad terrace by approximately 1m, ie. to between RL41m to RL42m.

4 INVESTIGATION SCOPE

4.1 Field Investigation

Following a dial before you dig search, and onsite service location, the field investigation was carried out between 23 February 2022 and 25 February 2022. All fieldwork was carried out under the direction of CMW in general accordance with the NZGS specification[2]. The scope of fieldwork completed was as follows:

- Undertook a walkover survey of the site to assess the general landform, site conditions and adjacent structures / infrastructure;
- An on-site services search was carried out by a specialist contractor to identify the presence of any underground obstructions or hazards prior to the field investigation program commencing;
- Nine Seismic Cone Penetrometer Tests (sCPT), denoted sCPT22-01 to sCPT22-09, were pushed to depths of up to 29.95m to define the ground model through the proposed excavation depth and through the underlying zone of influence of fill embankments and future building foundations and to provide parameters for retaining wall and foundation design.
- Shear wave velocity measurements were taken using a triaxial geophone on the sCPT at 1m intervals in general accordance with ASTM D 7400-08 (2008). Results of the CPT's, presented as traces of tip resistance (qc), friction resistance (fs) and friction ratio are presented in ***Appendix B***;

The approximate locations of the respective investigation sites referred to above are shown on the Geotechnical Investigation Plan as ***Drawing 02***. Test locations were measured using hand held GPS. Elevations were inferred from the survey plan provided.

5 GROUND MODEL

5.1 Published Geology

The published geological map[3] for the area depicts the regional geology for the area as comprising cross-bedded pumice sand, silt and gravel with interbedded peat of the Hinuera Formation, and the ridges comprising pumiceous mud, silt, sand and gravel with muddy peat beds of the Walton Subgroup overlain by fine grained volcanic ash.

An excerpt from the geological map showing the approximate distribution of those units as illustrated in Figure 2 below.

[2] NZ Geotechnical Society (2021) NZ Ground Investigation Specification, Volume 1 – Master Specification

[3] Edbrooke, S.W. (compiler) 2005: Geology of the Waikato area: scale 1:250,000, Map No4, Institute of Geological & Nuclear Sciences.

Figure 2: Local Geology

Based on the known history of the site and surrounding land levels, some superficial depths of fill could be anticipated as a result of soft landscaping.

5.2 Stratigraphic Units

The ground conditions encountered and inferred from the investigation were considered generally consistent with the published geology. The distribution of the various units encountered is presented on the appended Geological Sections as ***Drawings 03 and 04*** and can be generalised according to the units in Table 2.

Table 1: Summary of Strata Encountered

Geology	Unit Description	Top of Unit (RLm)		Thickness (m)	
		Min	Max	Min	Max
All	Topsoil – black organic silt	39.2	44.5	0.15	0.5
Fill	Fill – northeast and southwest corners, comprises sand, silt, clay, metal, concrete, fencing wire, fence posts, tree stumps, glass and plastic	39.4	43.9	0.3	2.5
Hinuer	Soft to firm organic silt in northeast paleochannel (peak vane shear strength = 28kPa, remoulded shear strength = 4kPa). Also in western site area.	37.5	39.0	0.8	2.9

Table 1: Summary of Strata Encountered					
Geology	Unit Description	Top of Unit (RLm)		Thickness (m)	
		Min	Max	Min	Max
	Layers of firm to stiff silt between 150mm to 2.8m thick interbedded with sand layers described below. CPT cone resistance (Qc) from 0.3MPa to 3.9MPa.	39.0	41.0	1.2	4.2
	Loose to medium dense sand, from 1-2m below terrace surface, CPT Qc from 3MPa to 15MPa.	35.0	40.8	1.0	7.0
Ham Ash	Stiff orange silt is typically draped across the terraces. CPT Qc values ranged from 1MPa to 5MPa*	39.5	43.4	1.1	3.0
	Stiff sandy silt across the terraces. CPT Qc from 0.5MPa to 5MPa*	21.0	41.0	4.3	6.0
Puketoka Formation - soft to stiff silt/clay with CPT Qc from 0.4MPa to 2MPa*		8.5	33.5	3.6	7.6
Walton Subgroup - dense Sand with Interbedded silt/clay CPT Qc 3MPa to 32MPa*		6.3	27.0	-	-
Notes: *Strata only encountered in CPT208, 212, 213, 214, 217, 218, 220, 221, 222, 223, 225, sCPT22-03, 22-06, 22-07, 22-09.					

5.3 Groundwater

T+T completed their site investigation in August 2018 (late winter). The CMW investigation was completed in February 2022 (mid summer). Groundwater was encountered in the CPTs, boreholes, hand augers and test pits at the depths provided in Table 2.

Table 2: Groundwater Data								
Test Location	Groundwater Depth		Test Location	Groundwater Depth		Test Location	Groundwater Depth	
	mBGL	mRL		mBGL	mRL		mBGL	mRL
CPT201	0.3	38.9	CPT220	0.1	41.5	BH201	0.5	39.5
CPT202	1.1	38.5	CPT221	1.0	38.4	BH202	2.2	37.8
CPT203	1.2	39.0	CPT222	0.8	39.6	BH203	1.6	38.2
CPT204	1.6	38.2	CPT223	0.8	38.6	HA203	0.4	39.4
CPT207	1.2	39.0	CPT224	1.5	38.7	HA211	0.5	38.6
CPT208	3.3	35.9	CPT225	1.0	39.8	TP201	0.8	38.3
CPT210	0.8	39.0	CPT227	1.2	38.8	TP202	0.5	39.5
CPT211	0.4	40.4	sCPT22-01	2.2	37.4	TP206	0.8	39.7
CPT212	3.0	39.2	sCPT22-02	2.5	37.1	TP208	1.0	39.0
CPT213	2.1	40.1	sCPT22-03	4.5	34.7	TP210	0.6	39.4
CPT214	0.4	39.2	sCPT22-04	1.7	38.5	TP211	0.9	39.1
CPT215	0.9	38.9	sCPT22-05	2.9	36.6	TP213	1.1	40.3
CPT216	0.5	39.9	sCPT22-06	5.3	38.1	TP217	0.5	39.5
CPT217	0.8	39.8	sCPT22-07	0.1	43.6	TP218	1.2	38.7
CPT218	0.1	39.2	sCPT22-08	2.3	37.1			
CPT219	1.0	38.8	sCPT22-09	5.6	38.2			
Notes: mBGL = Metres below ground level, mRL = meters relative level.								

5.4 Geotechnical Design Parameters

The various geological strata that will be encountered across the site have been rationalised based on geotechnical engineering properties and grouped into broad units to define a representative geotechnical model that has been used in subsequent assessment and analyses.

Parameters are based on the results of the investigations, known correlations from literature, and our experience with these soils in the Hamilton area.

The geotechnical design parameters adopted are presented below in Table 3:

Table 3: Geotechnical Design Parameters

Engineering Soil Unit	γ (kN/m³)	Effective Stress		s_u (kPa)
		c′ (kPa)	ø′ (deg)	
Engineered Clay Fill – refer Section 7.3	17	3	32	120
Hinuera Formation - stiff Silt	16	3	28	80
Hinuera Formation - loose to medium dense Sand	16	0	32	-
Hamilton Ash - stiff Silt/Clay, sandy Silt	16	3	32	100
Puketoka Formation - soft to stiff silt/clay	16	2	28	30
Walton Subgroup - dense Sand with Interbedded silt/clay	16	2	35	-

Note: γ = unit weight; c′ = effective cohesion; ø′ = effective friction angle; s_u = undrained shear strength.

6 GEOHAZARDS ASSESSMENT

6.1 Subsoil Class

Based on the ground conditions encountered on site and published information[4] the seismic site subsoil category is assessed as being Class D (deep soil site) in accordance with NZS1170.5.

6.2 Seismicity

In accordance with NZGS guidance[5], and NZS1170.5 we have adopted the following design Peak Ground Accelerations for various limit states based on Importance Level 2 structures with a 50-year design life.

Table 4: Design Peak Ground Acceleration (PGA) for Various Limit States

Limit State	AEP	PGA(g)	$Magnitude_{eff}$
SLS	1/25	0.06	5.9
ULS	1/500	0.25	5.9

Note: SLS = serviceability limit state; ULS = ultimate limit state; AEP = annual exceedance probability

[4] Cave, A (2020): Site Characterisation of the Hamilton Basin using surface wave methods, Masters Thesis. University of Waikato

[5] Earthquake Geotechnical Engineering Practice, Module 1: Overview of the guidelines, (November 2021)

6.3 Fault Rupture

The site is located 35km from the Kerepehi Fault, which has a recurrence interval of 1:1,000 years. We therefore consider the risk of fault rupture affecting the site to be low.

6.4 Liquefaction

6.4.1 Methodology

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

In accordance with MBIE/NZGS guidance[6] the liquefaction susceptibility of the soils at this site was assessed with respect to geological age and compositional (soil fabric and density) criteria, based on the following assumptions:

- Only saturated soils below an assessed seasonal average groundwater level of RL39m (1.0m depth) were modelled as being susceptible to liquefaction.
- In accordance with MBIE/NZGS guidance[1] a site-specific assessment was carried out using seismic CPT's to account for soil microstructure in accordance with Robertson[7]. Results suggest that no soil microstructure can be justified and therefore no strength gain factor has been applied to the Hinuera Formation. For the Walton Subgroup, soil microstructure is present and justifies the use of an average strength gain factor (K_{DR}) of 1.3.
- Soils are also classified with respect to their grain size and plasticity to assess liquefaction susceptibility. For this project, a cut-off threshold soil behaviour type index value (Ic) of 2.6 was used to distinguish between liquefiable (Ic>2.6) and non-liquefiable (Ic<2.6) soils.
- Specific liquefaction analyses were undertaken for an IL2 structure, using the software package CLiq using the Boulanger and Idriss (2014) method. The cyclic stress ratio (CSR), being a function of the earthquake magnitude for the design return period event, was compared to the cyclic resistance ratio (CRR), being a function of the CPT cone resistance (qc) and friction ratio (Fr).
- Free-field liquefaction induced settlements were determined in accordance with Zhang et al. (2002). With respect to liquefaction response, consideration was given to a 10m cut-off depth to estimate index settlements as per MBIE[8] guidance (foundation technical categories). These were compared to liquefaction settlement estimates over the full depth range of the CPT's with a depth weighting factor (e_v) applied ranging from 1 at the ground surface to 0 at 18m depth.
- Consideration was given to the effect of using different PGAs from nearby Probabilistic Seismic Hazard Assessments (PSHA) around Hamilton to assess the sensitivity of the free-field liquefaction induced settlements to PGA. PGAs of 0.25g, 0.19g and 0.14g have been assessed, and free-field liquefaction induced settlement contour plots for each case are presented in ***Drawings 05 to 08***.

6.4.2 Results

Results are presented in ***Appendix C*** and summarised below in Table 5.

The results show that much of the Hinuera Formation sand and lenses of the Walton Subgroup liquefy during the 0.25g ULS event (***Drawing 05***). The layers of Hinuera Formation sand that liquefy are several metres thick and generally continuous between test locations. The implications of this for lateral spreading are discussed in Section 6.5 and 6.6.

[6] Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (November 2021)

[7] P.K. Robertson (2015). Comparing CPT and Vs Liquefaction Triggering Methods, Journal of Geotechnical and Geoenvironmental Engineering.

[8] Repairing and Rebuilding House affected by the Canterbury Easrthquakes", (December 2012)

Recommendations to mitigate effects of liquefaction settlements on the proposed development are provided below in Section 7.1.

Table 5: Liquefaction Settlements (mm)									
CPT No.	SLS Settlement (mm)	0.25g PGA		0.25g PGA with 1m of Fill		0.19g PGA with 1m of Fill		0.14g PGA with 1m of Fill	
		Total ULS	Index ULS	Total ULS	Index ULS	Total ULS	Index ULS	Total ULS	Index ULS
CPT201	nil	120	155	95	115	75	90	20	75
CPT202	nil	140	130	130	110	80	60	20	30
CPT203	nil	155	130	140	110	105	85	20	40
CPT204	nil	135	160	125	140	90	100	30	65
CPT207	nil	130	135	110	105	90	85	15	45
CPT208	nil	30	45	25	35	0	0	0	0
CPT210	nil	125	105	115	85	80	55	30	45
CPT211	nil	160	150	145	140	130	125	45	105
CPT212	nil	75	85	75	85	45	45	0	0
CPT213	nil	20	25	20	20	5	5	0	0
CPT214	nil	80	100	65	95	50	75	5	30
CPT215	nil	140	120	125	115	80	70	25	30
CPT216	nil	145	140	125	115	100	85	40	80
CPT217	nil	10	10	10	10	5	5	0	0
CPT218	nil	130	125	115	110	80	80	20	75
CPT219	nil	185	180	165	175	115	125	40	50
CPT220	nil	60	60	60	60	50	55	25	30
CPT221	nil	145	165	125	145	95	115	35	75
CPT222	nil	35	40	35	40	15	20	0	0
CPT223	nil	120	110	105	105	50	55	10	30
CPT224	nil	130	120	115	105	75	65	20	75
CPT225	nil	120	175	110	150	80	110	15	0
CPT227	nil	135	125	125	115	80	80	15	20

Table 5: Liquefaction Settlements (mm)									
CPT No.	SLS Settlement (mm)	0.25g PGA		0.25g PGA with 1m of Fill		0.19g PGA with 1m of Fill		0.14g PGA with 1m of Fill	
		Total ULS	Index ULS	Total ULS	Index ULS	Total ULS	Index ULS	Total ULS	Index ULS
sCPT22-01	nil	105	85	90	70	50	30	5	10
sCPT22-02	nil	160	160	140	115	85	85	15	15
sCPT22-03	nil	20	25	10	15	0	0	0	0
sCPT22-04	nil	135	130	125	115	75	65	15	20
sCPT22-05	nil	125	130	115	105	70	75	10	20
sCPT22-06	nil	10	10	5	10	0	0	0	0
sCPT22-07	nil	90	110	90	110	85	105	30	35
sCPT22-08	nil	75	70	75	70	25	25	5	5
sCPT22-09	nil	5	5	5	5	0	0	0	0
sCPT102	nil	50	45	30	25	5	5	0	0
CPT103	nil	115	115	100	95	40	35	5	20

6.5 Lateral Spread

Following the onset of liquefaction, the liquefied soils behave as a very weak undrained material, which can give rise to lateral spreading where a free face is present within the vicinity of the site or where proposed cut and fill batters are proposed over or within liquefied soils.

The potential for and estimated magnitude of lateral spread adjacent to the proposed wetland and stormwater swales has been assessed with respect to liquefied shear strengths ($Su_{(liq)}$) within the liquefied soil units using a Newmark Sliding Block approach as discussed in Section 6.6 below.

6.6 Slope Stability

6.6.1 Design Criteria

The stability of pond and swale cut batters and fill embankments under a range of design conditions is expressed in terms of a factor of safety, which is defined as the ratio of forces resisting failure to the forces causing failure. The following performance standards are recommended for slope stability assessment:

Table 6: Slope Stability Factor of Safety Criteria

Condition	Required Factor of Safety
Static long term conditions (drained soil conditions, normal groundwater)	1.5
Transient short term conditions (elevated groundwater with ru pore pressure condition on the fill)	1.2
Ultimate Limit State (ULS) seismic condition	1.0*
Note*: Factor of safety < 1.0 acceptable where displacement-based approach is adopted.	

6.6.2 Analyses Methodology

The stability of a 3m deep swale and a 5m deep pond with 1V:4H batter gradients was assessed, with a worst case liquefaction profile of all sand below the groundwater table liquefying, and 1m of clay fill placed across the site.

Slope stability analyses were performed using the limit equilibrium software package SLIDE to assess the slope stability factors of safety of this batter configuration. Analyses were carried out for the various conditions stated in Table 6 based on the following:

- For the prevailing case with groundwater levels based on groundwater monitoring results.
- When analysing transient conditions, an elevated pore water pressure was modelled using a porewater pressure ratio (r_u) of 0.3 for the clay fill soils, and an r_u of 0.2 for the silts above the water table.
- A liquefied shear strength ratio of 0.07 was applied to those layers where liquefaction response is predicted based on methods described by Olson and Stark (2002) and Idris and Boulanger (2008), which takes into account overburden pressure above the liquefiable layers.
- Seismic displacements for liquefied soil conditions were estimated using 50th percentile correlations published in Bray and Travasarou (2007), and Martin and Qui (1994).

6.6.3 Slope Stability Analyses

Static and seismic slope stability analyses results for the batter profile described in Section 6.6.2 above are presented in ***Appendix D*** and are summarised on Table 7.

Table 7: Slope Stability Analyses Results					
Location	**Slope Stability Factor of Safety**			**Liquefied ULS Seismic**	
	Prevailing	**Transient**	**Seismic**	**Yield Ac**	**Displacement (mm)**
3m Swale – granular fill	2.0	1.9	1.0	0.01g	800
3m Swale – with 1m clay cap	1.8	2.0	2.0	0.09g	50
5m Pond – with 1m clay cap	2.1	2.0	1.6	0.08g	60

Results show that the requisite factors of safety are achieved when adopting peak soil shear strengths and ULS seismic displacements are limited to 50mm for the swale and 60mm for the pond where a 1m thick engineered cohesive fill cap is provided.

6.7 Load Induced Settlement

6.7.1 Methodology

Static fill induced settlements were estimated based on an applied load of 36kPa from the proposed 1m high fill embankment (unit weight of 16kN/m^3) and a 20kPa building load for CPTs in the Terrace. For CPTs in the Walton Hills, the estimated cut (RL41m) was removed from the CPT and the 20kPa building load applied.

Settlements were estimated using elastic methods and soil modulus correlations from the CPT data.

6.7.2 CPT Correlation

Settlements were assessed using the software CPeT-IT based on the following:

$$S_{CPT} = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

Where S_{CPT} = primary settlement,
$\Delta\sigma$v = change in vertical stress or load applied,
M_{CPT} = constrained modulus calculated from CPT trace, and
Δz = change in depth.

Where $M_{CPT} = a_m \times (q_t - s_{vo})$ where when $I_c > 2.2$, $a_m = Q_t$ when $Q_t < 14$, or $a_m = 14$ when $Q_t > 14$, or when $I_c < 2.2$, $a_m = 0.0188 \times [10^{(0.55 \times Ic + 1.68)}]$

6.7.3 Results

Estimated settlements derived from this methodology are summarised in Table 8 below, and presented in ***Appendix E***.

Table 8: Estimated CPT Based Settlements					
Terrace (Hinuera Formation, 1m Fill)				**Walton Hills (Cut)**	
CPT Number	**Settlement (mm)**	**CPT Number**	**Settlement (mm)**	**CPT Number**	**Settlement (mm)**
CPT201	205	CPT219	24	CPT212	53
CPT202	79	CPT221	38	CPT213	30
CPT203	30	CPT223	35	CPT217	70
CPT204	45	CPT224	66	CPT220	39
CPT207	70	CPT225	37	CPT222	13
CPT208	35	CPT227	34	SCPT22-06	55

Table 8: Estimated CPT Based Settlements					
Terrace (Hinuera Formation, 1m Fill)				Walton Hills (Cut)	
CPT Number	**Settlement (mm)**	**CPT Number**	**Settlement (mm)**	**CPT Number**	**Settlement (mm)**
CPT210	23	sCPT22-01	70	SCPT22-07	15
CPT211	330	sCPT22-02	57	SCPT22-09	19
CPT214	83	sCPT22-03	62		
CPT215	32	sCPT22-04	53		
CPT216	67	sCPT22-05	66		
CPT218	44	sCPT22-08	40		

Most of the settlement is estimated to occur in the Puketoka Formation layer from approximately 10m below ground level. Settlement is also estimated within the organic silt material. Recommendations are discussed in Section 7.3.

6.8 Expansive Soils

Seasonal shrinking and swelling results in vertical surface ground movement which can cause significant cracking of floor slabs and walls. There have been instances of concrete floors and/ or foundations that have been poured on dry, desiccated subgrades in summer months on expansive soils and have undergone heaving and cracking requiring extensive repairs or re-building once the soil moisture contents have returned to higher levels. This hazard is addressed by a combination of careful foundation design and site preparation.

NZS 3604:2011[9] excludes from the definition of 'good ground', soils with a liquid limit of more than 50% and a linear shrinkage of more than 15% due to their potential to shrink and swell as a result of seasonal fluctuations in water content. For soils exceeding these limits, NZS 3604 has historically referenced AS 2870[10]. for foundation design advice. However the November 2019 update of Acceptable Solution B1/AS1[11] provides amendments to NZS 3604 that define a method for testing and classifying the soils and provides foundation designs for specific, simple house configurations across the range of expansive soil conditions.

Nevertheless, there is evidence[12] indicating that the use of the B1/AS1 method of assessment of expansiveness may be inaccurate. Accordingly, our assessments herein have been made in line with our experience, BRANZ Report SR120A[13] and AS2870.

Based on our experience with the local geology, the Walton Subgroup clays can be classified as Class M and Hinuera Formation Silts Class S. Site specific laboratory testing should be undertaken to confirm this at resource consent stage.

[9] Standards New Zealand (2011) Timber-framed buildings, NZS 3604:2011, NZ Standard

[10] Standards Australia Limited (2011) *Residential slabs and footings*, AS 2870-2011, Australian Standard, NSW

[11] Ministry of Business, Innovation and Employment (2019) *Acceptable Solutions and Verification Methods for NZ Building Code Clause B1 Structure,* B1/AS1, Amendment 19

[12] Rogers, N., McDougall, N., Twose, G., Teal, J. & Smith, T. (2020) The Shrink Swell Test: A Critical Analysis, *NZ Geomechanics News,* Issue 99, pages 66-80.

[13] Fraser Thomas Limited (2008) - Addendum Study Report (BRANZ SR120A), Soil Expansivity in the Auckland Region – Final Report

7 GEOTECHNICAL RECOMMENDATIONS

7.1 Liquefaction Mitigation

Liquefaction analysis results show that stiffened raft type foundations, with or without geogrid reinforced ravel rafts (refer ***Drawings 06 to 08***), will be required to comply with the following MBIE Guidelines:

Table 9: MBIE Foundation Recommendations

Foundation Technical Category	ULS Liquefaction Index Settlement	Foundation Recommendation
TC1	0 – 25mm	• As per NZS 3604
TC2	0 – 100mm	• Raft Foundations OR • Light construction with timber floors and shallow piles as per NZS 3604 OR • Enhanced perimeter foundation wall and shallow piles as per NZS 3604 OR • Specific foundation design
TC2/3 Hybrid	>100mm	• Geogrid reinforced granular raft with enhanced foundation slab OR • Timber floor with NZS 3604 piles with 2/140x45 bold laminated bearers with ply shutters around exterior OR • Short piles on a grid of ground beams OR • Specific foundation design

Drawing 06 shows that for the MBIE PGA=0.25g, the level of Index Settlements mean that most of the site is defined as TC2/3 Hybrid requiring a geogrid reinforced granular raft beneath raft foundation slabs. ***Drawing 07*** shows that for a reduced PGA=0.19g, the TC2/3 design area across the site is considerably reduced and ***Drawing 08*** shows that for PGA=0.14g, the TC2/3 design area is eliminated.

Reducing or eliminating the TC2/3 Hybrid category has significant cost advantages to the project and therefore a Site Specific Seismic Hazard Assessment (SSSHA) has been commissioned to determine the design PGA and final building preparation works. Further investigation and analysis will also be required to refine liquefaction hazard zones across the site.

Liquefaction is a risk across the Hamilton Basin and is being mitigated at the Ruakura Project to the south and the Tuumata Development to the north.

7.2 Lateral Spread Mitigation

With respect to the MBIE guidelines presented in Table 9, up to 100mm of lateral spread is permitted for the TC2 Foundation Technical Category and TC2/3 Hybrid Category.

To mitigate lateral spread magnitudes to less than 100mm, slope stability analyses results show that a 1m thick cohesive fill cap, constructed to achieve an undrained shear strength of at least 120kPa, is required within 100m of the wetland and swales.

7.3 Load Induced Settlement

Much of the predicted load induced settlement is within the Puketoka Formation located 10m below ground level. Based on experience, settlement estimates are expected to be over-stated and are also expected to be largely elastic such that the fill load component will be mostly built out prior to building construction. A trial embankment and laboratory testing is recommended to improve the level of uncertainty around predicting load induced static settlements.

Further specific investigation and design will be required for larger or heavier buildings within the suburban zone.

Across the organic silt and Uncontrolled Fill areas, further investigation and design is required to define the extent of those areas and develop specific mitigation measures, including undercuts and/or surcharging.

7.4 Earthworks

7.4.1 General

All earthwork activities must be carried out in general accordance with the requirements of NZS 4431[14] and the requirements of the Waikato Regional Infrastructure Specifications (RITS) under the guidance of a Chartered Professional Geotechnical Engineer.

7.4.2 Subgrade Preparation

Preparation of the natural soil subgrade beneath proposed fill areas should comprise stripping of all vegetation, topsoil, any pre-existing fill materials or weak surface alluvium. The subgrade should then be scarified and moisture conditioned where necessary and then proof rolled to verify the subgrade stiffness and consistency.

Where any particularly weak materials are encountered that weave excessively during the proof rolling process, they should be undercut and removed prior to placing engineered fill.

Within the paleochannel, allowance should be made for excavating out all organic materials, cleaning out of all accumulated sediment, placement of drainage materials and bulk engineered fill above.

7.4.3 Compaction

Earthfill must be placed, spread and compacted in controlled lifts under the direction of a geotechnical engineer. All on-site fill borrow material is expected to comprise cohesive silt / clay, which must be compacted to achieve a minimum undrained shear strength of 120kPa.

All earthfill must be placed to ensure adequate knitting of successive fill lifts by conditioning of any natural subgrade or fill surfaces that have become dry / wet prior to placing the following fill lift.

7.4.4 Quality Control

The source and / or type of material used for engineered fill will dictate the type of quality control testing undertaken.

For cohesive (clay/silt) materials test criteria using vane shear strength and air voids should be used. A representative suite of compaction curves with solid density and moisture content tests are recommended to confirm a project specific compaction specification.

For any granular (sand and gravel) fill materials, testing following compaction should be principally in terms of the maximum dry density within the appropriate water content range, which may be calibrated with a dynamic cone (Scala) penetrometer test that is then used as the primary testing measure. Where the source or quality of fill changes, re-calibration will be required.

The source of the fill should be discussed with and approved by the project geotechnical engineer to verify its appropriateness and quality control testing requirements.

7.5 Civil Works

7.5.1 Road Subgrades

The development masterplan indicates subdivision roading which will be constructed in cut areas or where around 1m of structural earthfill has been placed.

[14] Standards New Zealand (1989) Code of practice for earth fill for residential development, incorporating Amendment No. 1, NZS 4431:1989, NZ Standard

Hinuera silts are sensitive to disturbance and degrade rapidly with trafficking. Where traffic can be left off these materials, they are moisture conditioned, recompacted at optimum moisture contents and located at least 1m above the peak winter water table, there could be some opportunity to use them as a pavement subgrade material for minor roads. However, this is not considered practical for main collector-type roads and allowance should therefore be made to undercut these materials and replace with a subgrade improvement layer (SIL).

Silt / clay fill is likely to have a CBR of between 1% and 3% and will require a subgrade improvement layer (SIL). The thickness of the SIL should be determined by the pavement designer although a nominal thickness of 1m is envisaged to adequately dissipate traffic loads. From our experience a 1m thick sand SIL overlying high strength geotextile and geogrid may be appropriate. Specific consideration to construction methodologies, such as the use of long reach excavators, progressive excavation and SIL placement, along with use of geotextiles, etc, will also be required to avoid trafficking over sensitive silt subgrades.

It is envisioned that well-graded clean sand excavated during proposed stormwater basin construction would be suitable for use as SIL material.

Medium dense to dense Hinuera Formation sandy soils are generally suitable as road subgrade materials. Where loose Hinuera Formation sands are present at subgrade levels these may be conditioned by proof rolling to achieve suitable subgrade strengths.

7.5.2 Service Trenches

All of the materials to be exposed during the excavation of service trenches should be readily removed using an excavator.

Trench collapse is expected to pose problems in areas where groundwater is encountered, particular over winter months.

Potential for dewatering induced settlements should be considered during detailed subdivision design and impact on adjacent roading and existing structures assessed.

It is anticipated that all trench backfill will be placed and compacted in accordance with RITS requirements.

8 FOUNDATIONS

At the completion of earthworks, a Geotechnical Completion Report (GCR) will be prepared. The GCR will advise on anticipated foundation design parameters and any restrictions that require further engineering investigation and/ or design to address any remaining natural hazards as described in Section 71(3) of the Building Act i.e., erosion, falling debris, subsidence, slippage, and inundation.

Restrictions that are expected to be applied in the GCR to protect the future buildings from natural hazards associated with static settlement and liquefaction, batters and drainage are outlined in the respective sections in this report.

On this site, our provisional expectation is that, provided earthworks are completed in accordance with the standards and recommendations described herein, the following will apply:

- A preliminary geotechnical ultimate bearing pressure of 300kPa should be available for shallow strip and pad foundations constructed within both the natural cut ground and engineered fill areas, subject to the short axis of those footings measuring no greater than 1.5m in plan.
- A geotechnical ultimate bearing capacity of 300kPa may also be assumed for the design of raft foundation beams subject to the short axis plan dimension of those beams measuring no more than 0.5m. A uniformly distributed raft load of up to 10kPa is permitted.
- There may be areas where localised variations in shear strength/ density within the natural cut ground occur. Further confirmation of available bearing pressures will be addressed at the time of post earthworks soil testing.
- On the basis of soil descriptions and our experience, we have assessed the preliminary AS2870 Site Class for building platforms within the Walton Subgroup soils to be M (moderately reactive). These

recommendations should be subject to laboratory testing and review by a suitably qualified geotechnical engineer for specific building foundations.

- As required by section B1/VM4[15] of the New Zealand Building Code Handbook, a strength reduction factor of 0.5 and 0.8 must be applied to all recommended geotechnical ultimate soil capacities in conjunction with their use in factored design load cases for static and earthquake overload conditions respectively.

9 STATEMENT OF PROFESSIONAL OPINION

Based on the results of previous geotechnical investigations at the site and subject to the preliminary recommendations stated above, we consider that the site is suitable for the proposed level of development. The proposed Private Plan Change to enable residential subdivision, with associated roading infrastructure and stormwater soakage/detention basin, is considered to be appropriate from a geotechnical perspective. This statement is dependent on further work as detailed in Section 10 below.

10 FURTHER WORK

Further geotechnical field investigation and design will be required to suitably mitigate the geotechnical risks identified in *Section 7* above.

Our recommendations for further work are as follows:

- Update liquefaction recommendations on completion of the SSSHA
- Complete further site investigations to monitor seasonal groundwater variation, laboratory testing of liquefaction susceptible materials in the Walton Subgroup, constrain zones of high liquefaction susceptibility, and to better understand the strength and extents of the Organic Silt material.
- Further site investigation and slope stability analyses should be undertaken at the time of detailed design of the wetland and swales including assessment of soil types, variation of water levels, potential for scour/erosion and any surcharge loading. A building restriction setback from the basins should be confirmed at this time.
- Detailed settlement assessment should be undertaken at the time of detailed design once cut and fill levels are known. A trial embankment and laboratory testing is recommended to better understand the sites settlement risk.
- Section 106 of the Resource Management Act16 (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land or structures (consequence). This is a requirement at Resource Consent application stage.
- Earthworks material suitability assessment including sampling of proposed fill materials, laboratory testing and preparation of a project specific earthworks compaction control specification.
- Presentation of the above work in a Geotechnical Design Report suitable to support a Resource Consent application and / or detailed design as appropriate.

[15] Ministry of Business, Innovation and Employment (2019) *Acceptable Solutions and Verification Methods for NZ Building Code Clause B1 Structure,* B1/VM4, Amendment 19

[16] Resource Management Act (1991), as at 29 October 2019

USE OF THIS REPORT

Site subsurface conditions cause more construction problems than any other factor and therefore are generally the largest technical risk to a project. These notes have been prepared to help you understand the limitations of your geotechnical report.

Your geotechnical report is based on project specific criteria

Your geotechnical report has been developed on the basis of our understanding of your project specific requirements and applies only to the site area investigated. Project requirements could include the general nature of the project; its size and configuration; the location of any structures on or around the site; and the presence of underground utilities. If there are any subsequent changes to your project you should seek geotechnical advice as to how such changes affect your report's recommendations. Your geotechnical report should not be applied to a different project given the inherent differences between projects and sites.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface investigation, the conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation of factual data

Site investigations identify actual subsurface conditions at points where samples are taken. Additional geotechnical information (e.g., literature and external data source review, laboratory testing on samples, etc) are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can exactly predict what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

Your report's recommendations require confirmation during construction

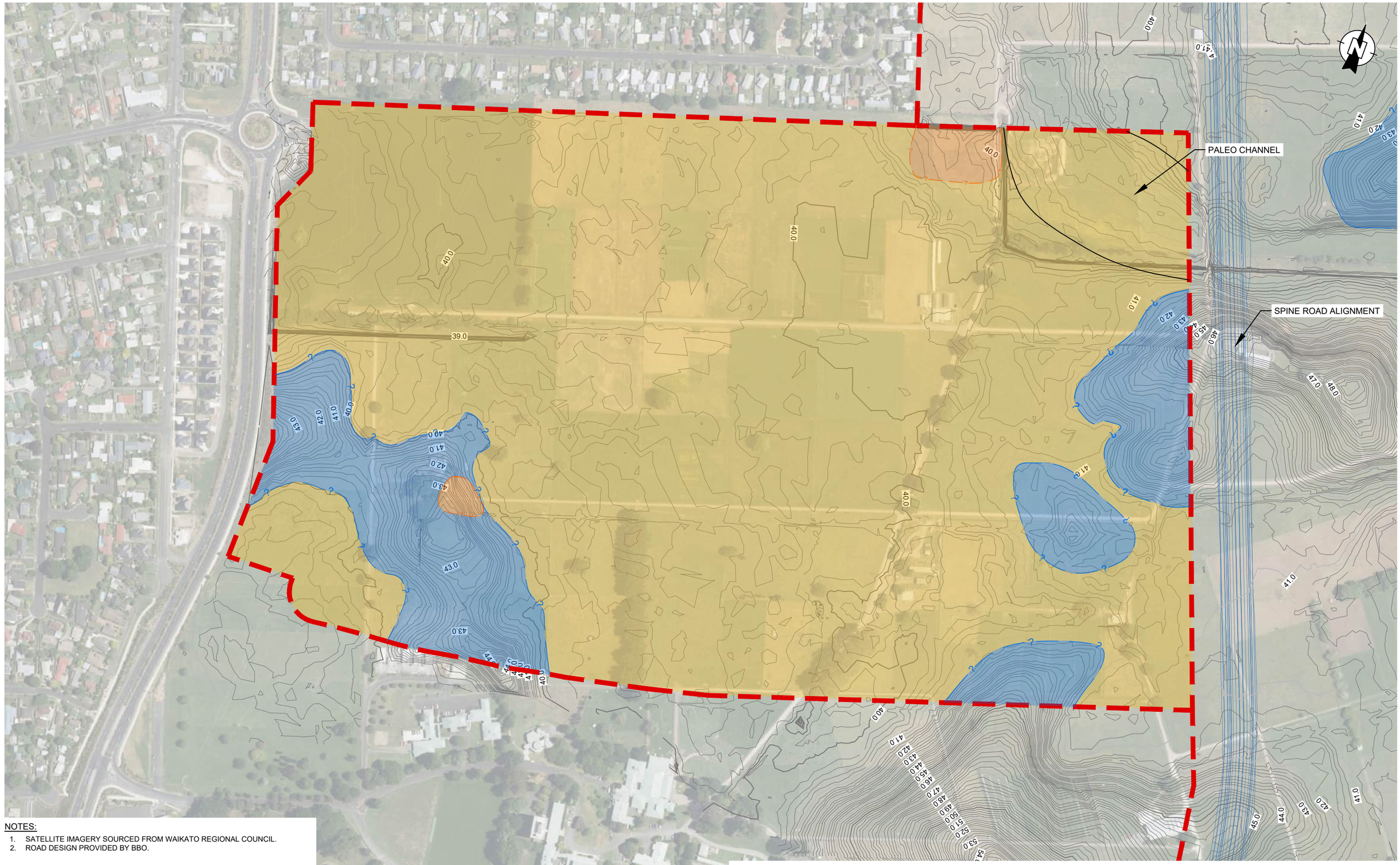
Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site. A geotechnical designer, who is fully familiar with the background information, is able to assess whether the report's recommendations are valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. Read all geotechnical documents closely and do not hesitate to ask any questions you may have. To help avoid misinterpretations, retain the assistance of geotechnical professionals familiar with the contents of the geotechnical report to work with other project design professionals who need to take account of the contents of the report. Have the report implications explained to design professionals who need to take account of them, and then have the design plans and specifications produced reviewed by a competent Geotechnical Engineer.

Appendix A: Drawings

Title	Reference No.	Date	Revision
Landform Plan	HAM2021-0096AD 01	20/05/2022	0
Geotechnical Investigation Plan	HAM2021-0096AD 02	19/05/2022	0
Section A	HAM2021-0096AD 03	18/05/2022	0
Section B	HAM2021-0096AD 04	18/05/2022	0
PGA 0.25 Liquefaction Settlement Plan (No Fill)	HAM2021-0096AD 05	18/05/2022	0
PGA 0.25 Liquefaction Settlement Plan (1m Fill)	HAM2021-0096AD 06	18/05/2022	0
PGA 0.19 Liquefaction Settlement Plan (1m Fill)	HAM2021-0096AD 07	18/05/2022	0
PGA 0.14 Liquefaction Settlement Plan (1m Fill)	HAM2021-0096AD 08	18/05/2022	0



NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.

LEGEND:

- SITE BOUNDARY
- WALTON SUBGROUP
- HINUERA FORMATION
- UNCONTROLLED FILL

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CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**		DRAWN: HV	PROJECT No: HAM2021-0096
PROJECT: **TUUMATA PLAN CHANGE**		CHECKED: DM	DRAWING: 01
		REVISION: 0	SCALE: 1:4000
TITLE: **LANDFORM PLAN**		DATE: 27/05/2022	SHEET: A3

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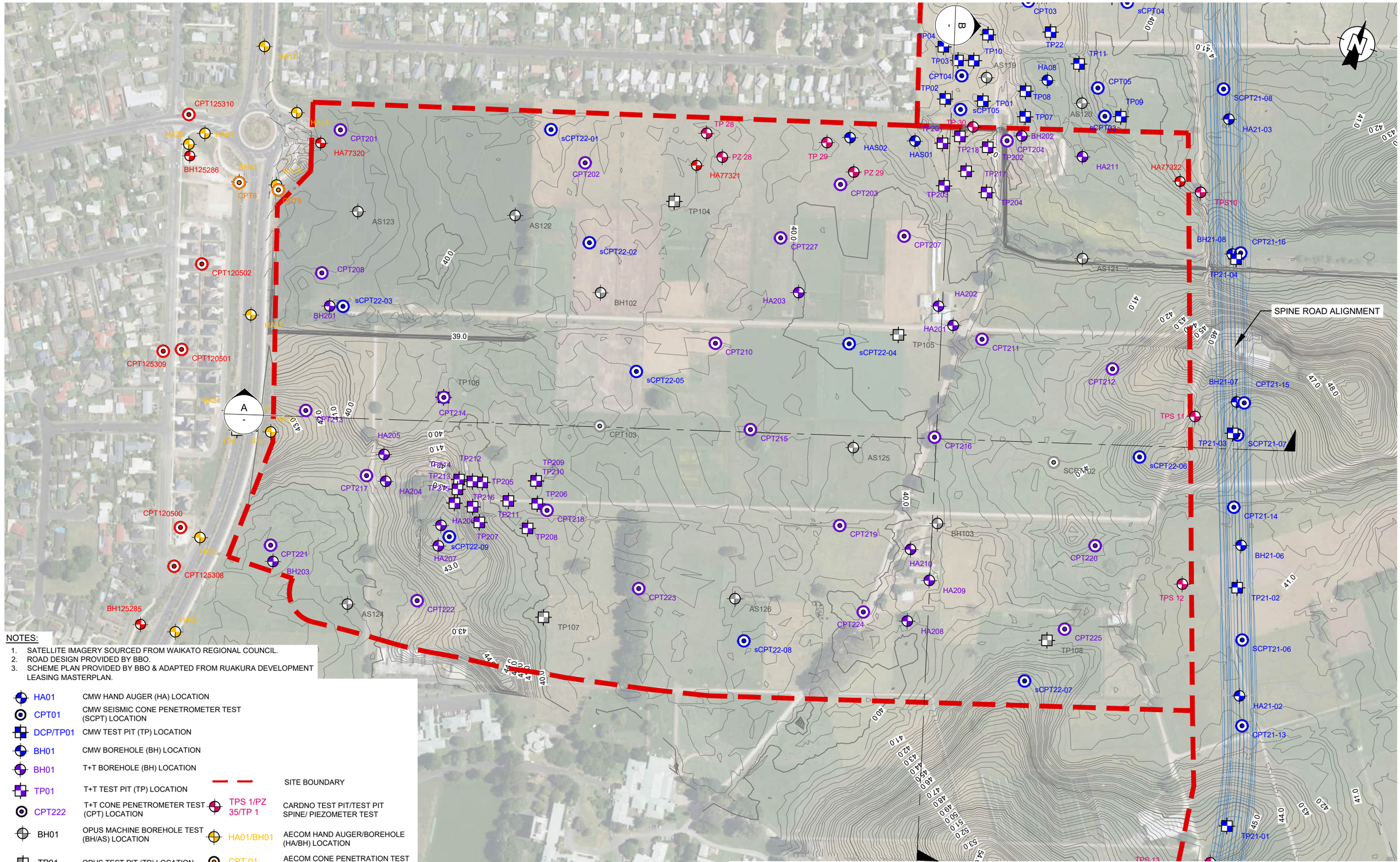

NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.
3. SCHEME PLAN PROVIDED BY BBO & ADAPTED FROM RUAKURA DEVELOPMENT LEASING MASTERPLAN.

HA01	CMW HAND AUGER (HA) LOCATION		
CPT01	CMW SEISMIC CONE PENETROMETER TEST (SCPT) LOCATION		
DCP/TP01	CMW TEST PIT (TP) LOCATION		
BH01	CMW BOREHOLE (BH) LOCATION		
BH01	T+T BOREHOLE (BH) LOCATION		
TP01	T+T TEST PIT (TP) LOCATION		SITE BOUNDARY
CPT222	T+T CONE PENETROMETER TEST (CPT) LOCATION	TPS 1/PZ 35/TP 1	CARDNO TEST PIT/TEST PIT SPINE/ PIEZOMETER TEST
BH01	OPUS MACHINE BOREHOLE TEST (BH/AS) LOCATION	HA01/BH01	AECOM HAND AUGER/BOREHOLE (HA/BH) LOCATION
TP01	OPUS TEST PIT (TP) LOCATION	CPT 01	AECOM CONE PENETRATION TEST (CPT) LOCATION
CPT222	OPUS CONE PENETROMETER TEST (CPT) LOCATION	TP6	AECOM TEST PIT (TP) LOCATION
BH125285	NZGD HAND AUGER TEST (HA) APPROX. LOCATION	SDMT 9257	NZGD SDMT APPROX. LOCATION
TP77215	NZGD TEST PIT (TP) APPROX. LOCATION		
CPT125308	NZGD CONE PENETRATION TEST (CPT) APPROX LOCATION		

1:4000 0 40 80 120 160 200 m

CMW Geosciences

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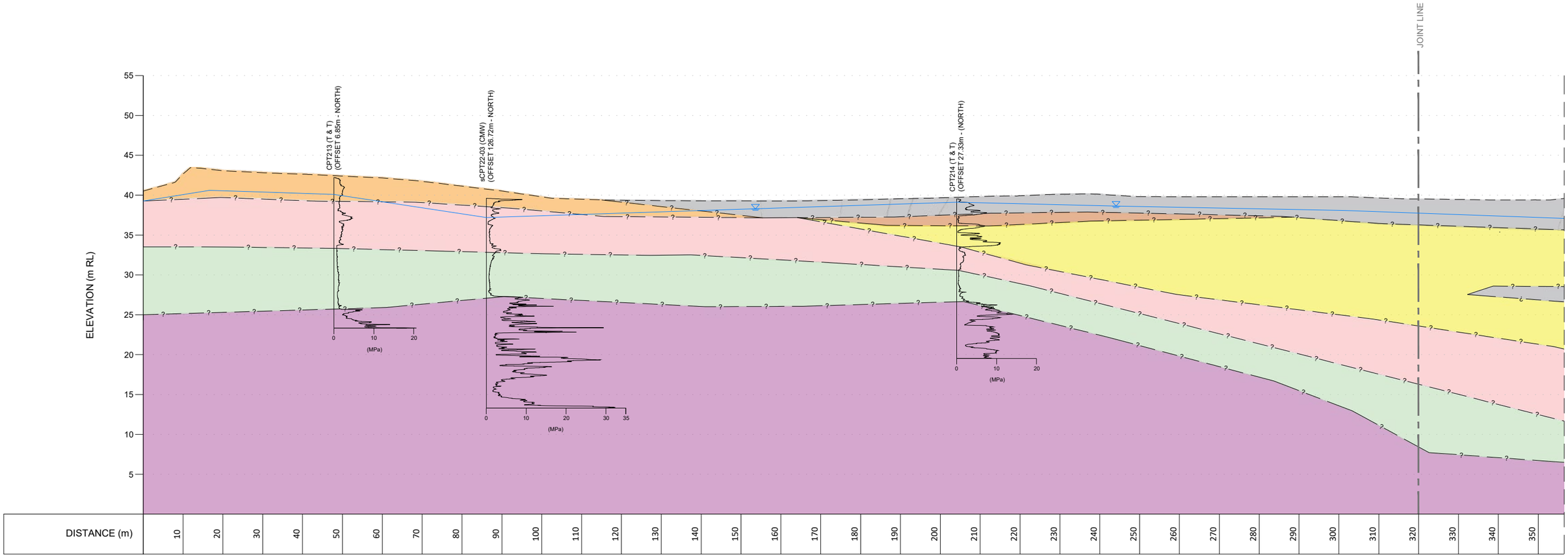

SECTION A

LEGEND:

EXISTING PROFILE

INFERRED STRATA

STIFF SILT (HAMILTON ASH)

STIFF-SANDY SILT (HAMILTON ASH)

SOFT-STIFF SILT/CLAY (PUKETOKA FORMATION)

DENSE SAND WITH INTERBEDDED SILT/CLAY LAYERS (WALTON SUBGROUP)

ORGANIC SILT (HINUERA FORMATION)

STIFF SILT (HINUERA FORMATION)

LOOSE-MEDIUM DENSE SAND (HINUERA FORMATION)

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1:1000 HORIZONTAL 0 10 20 30 40 50 m

CMW Geosciences

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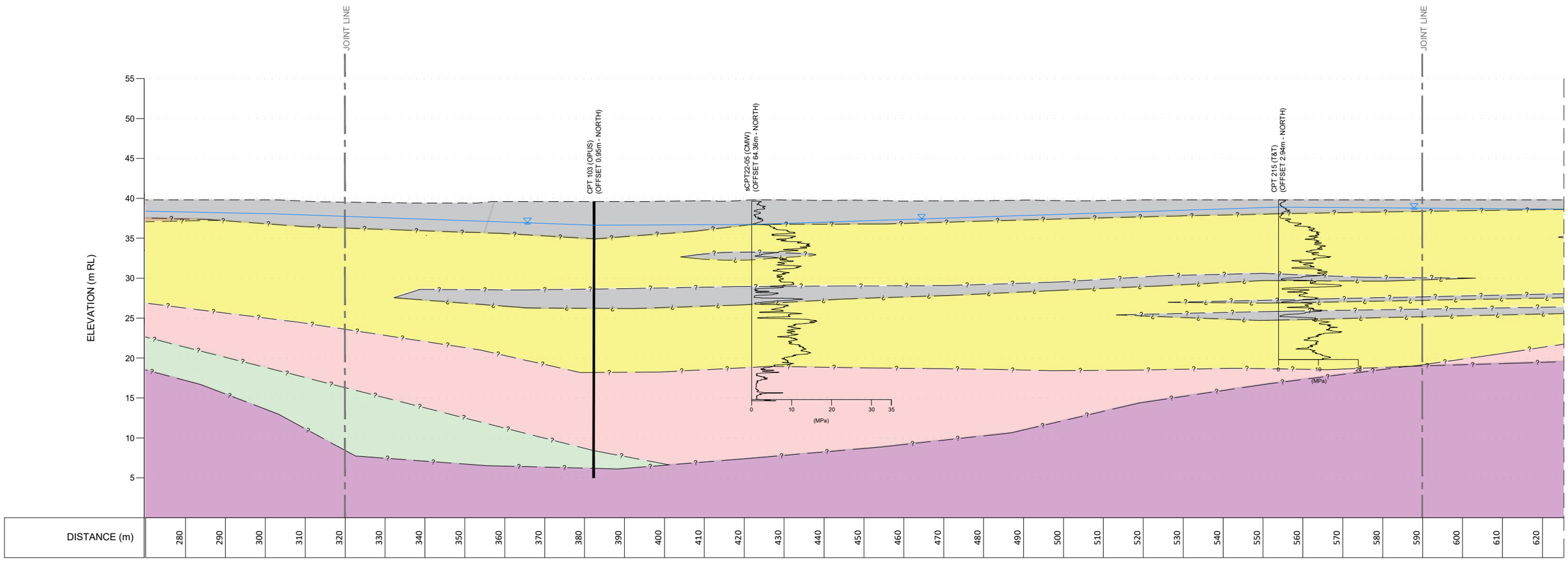

SECTION A

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- STIFF SILT (HAMILTON ASH)
- STIFF-SANDY SILT (HAMILTON ASH)
- SOFT-STIFF SILT/CLAY (PUKETOKA FORMATION)
- DENSE SAND WITH INTERBEDDED SILT/CLAY LAYERS (WALTON SUBGROUP)
- ORGANIC SILT (HINUERA FORMATION)
- STIFF SILT (HINUERA FORMATION)
- LOOSE-MEDIUM DENSE SAND (HINUERA FORMATION)

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CMW Geosciences

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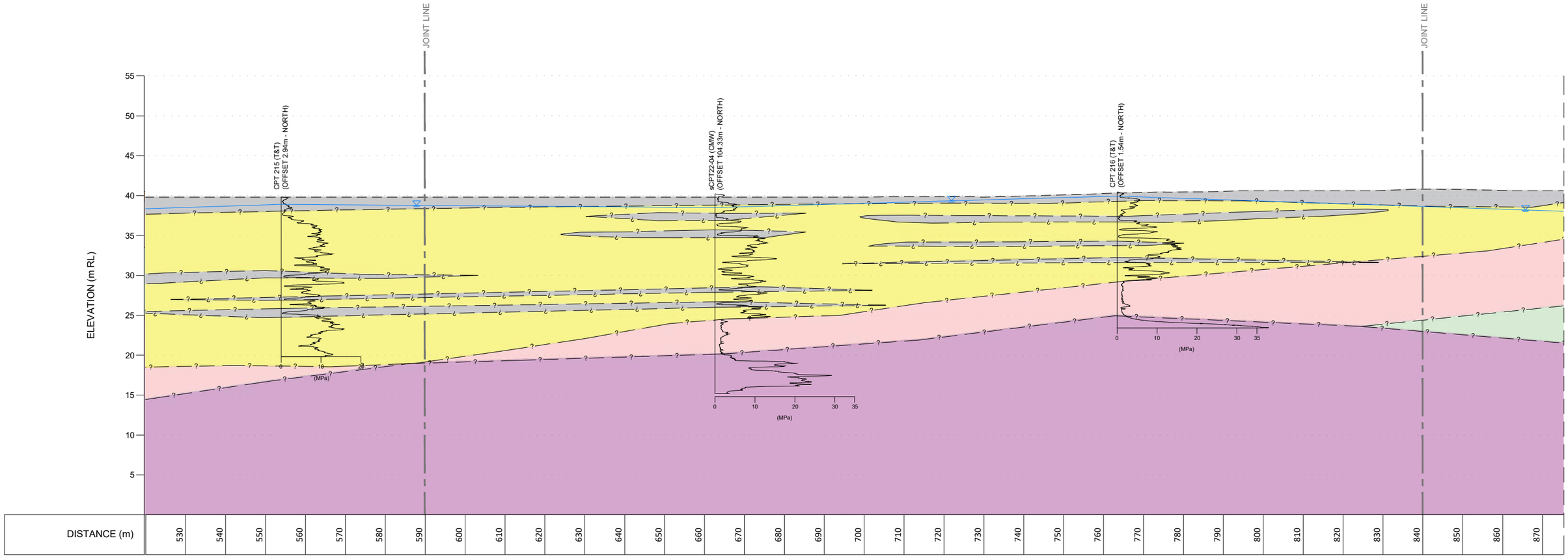

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LOOSE-MEDIUM DENSE SAND (HINUERA FORMATION)

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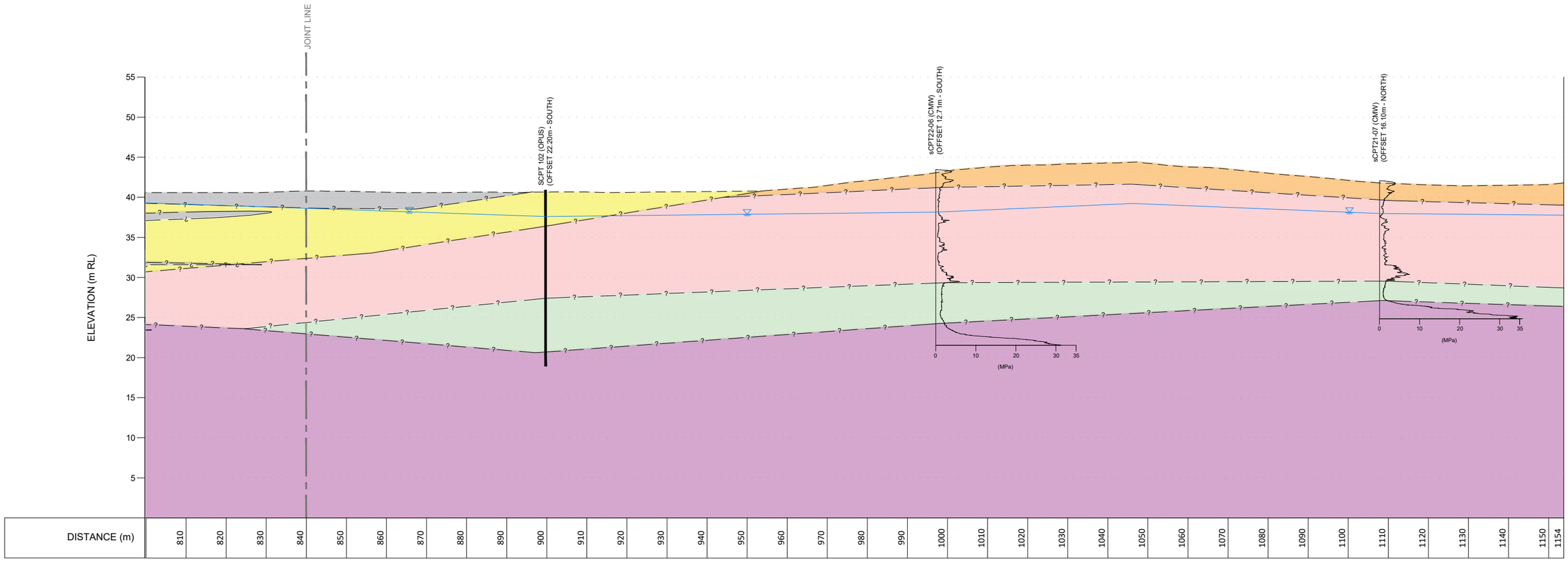

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STIFF SILT (HAMILTON ASH)

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CMW Geosciences

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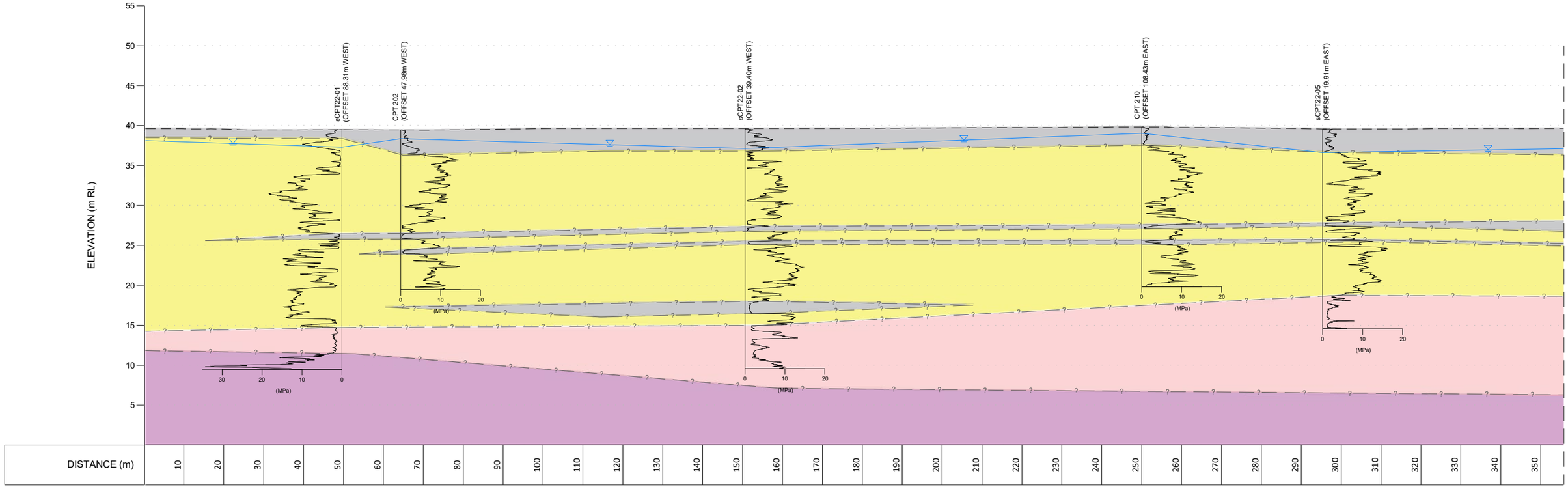

SECTION B

LEGEND:

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INFERRED STRATA

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STIFF-SANDY SILT (HAMILTON ASH)

SOFT-STIFF SILT/CLAY (PUKETOKA FORMATION)

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CMW Geosciences

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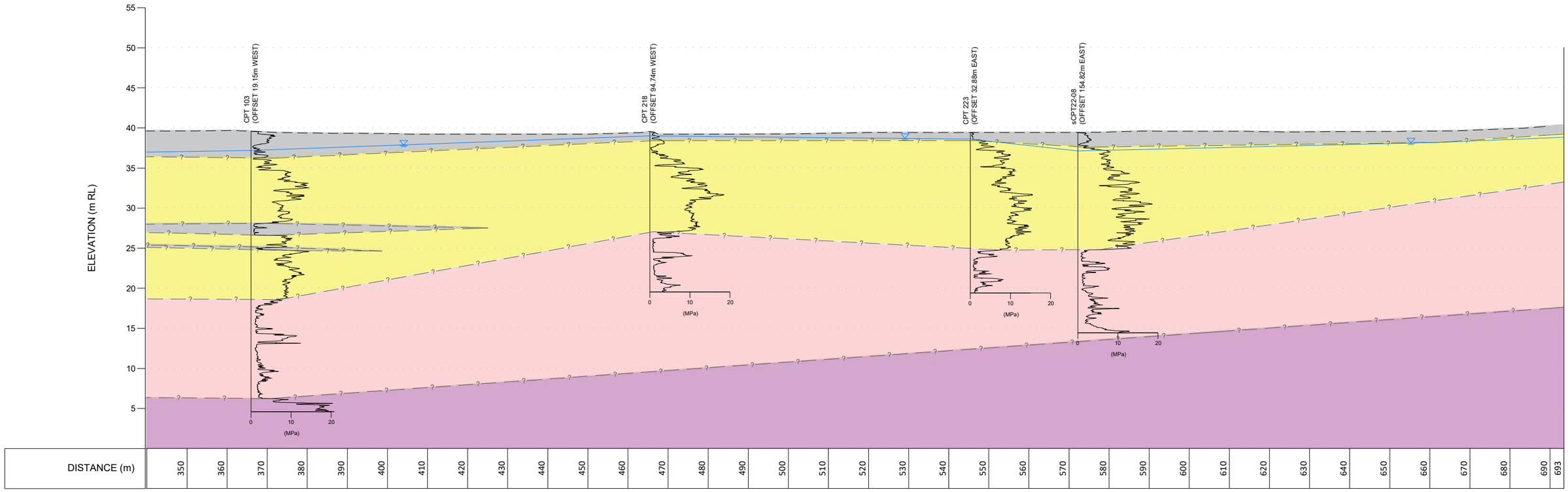

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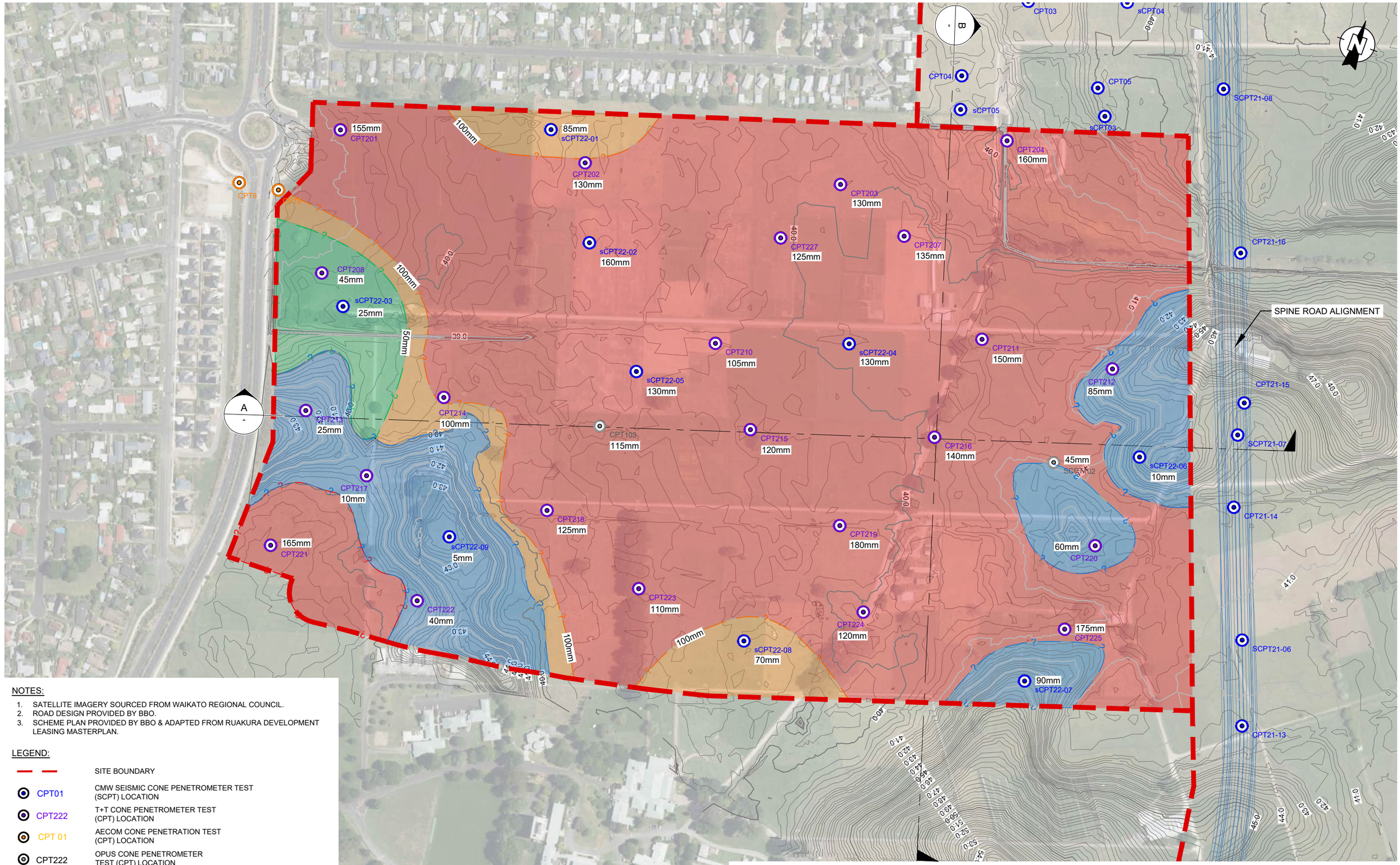
CMW Geosciences

CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**		DRAWN: HV	PROJECT No: HAM2019-0007
PROJECT: **TUUMATA PLAN CHANGE**		CHECKED: DM	DRAWING: 04(2)
		REVISION: 0	SCALE: AS SHOWN
TITLE: **SECTION B -2**		DATE: 18/05/2022	SHEET: A3

\\CMWGEOSCIENCES.SHAREPOINT.COM@SSL\DAVWWWROOT\SITES\CMWHAMILTONOFFICE\SHARED DOCUMENTS\HAMILTON PROJECT DOCUMENTS\2021\HAM2021-0096 TGH TRAMWAY\DRAWINGS\HAM2021-0096 SECTIONS-RUAKURA NORTH.DWG



NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.
3. SCHEME PLAN PROVIDED BY BBO & ADAPTED FROM RUAKURA DEVELOPMENT LEASING MASTERPLAN.

LEGEND:

	SITE BOUNDARY
CPT01	CMW SEISMIC CONE PENETROMETER TEST (SCPT) LOCATION
CPT222	T+T CONE PENETROMETER TEST (CPT) LOCATION
CPT 01	AECOM CONE PENETRATION TEST (CPT) LOCATION
CPT222	OPUS CONE PENETROMETER TEST (CPT) LOCATION
CPT125308	NZGD CONE PENETRATION TEST (CPT) APPROX LOCATION
	WALTON SUBGROUP
	SETTLEMENT <50mm
	SETTLEMENT >50mm BUT <100mm
	SETTLEMENT >100mm

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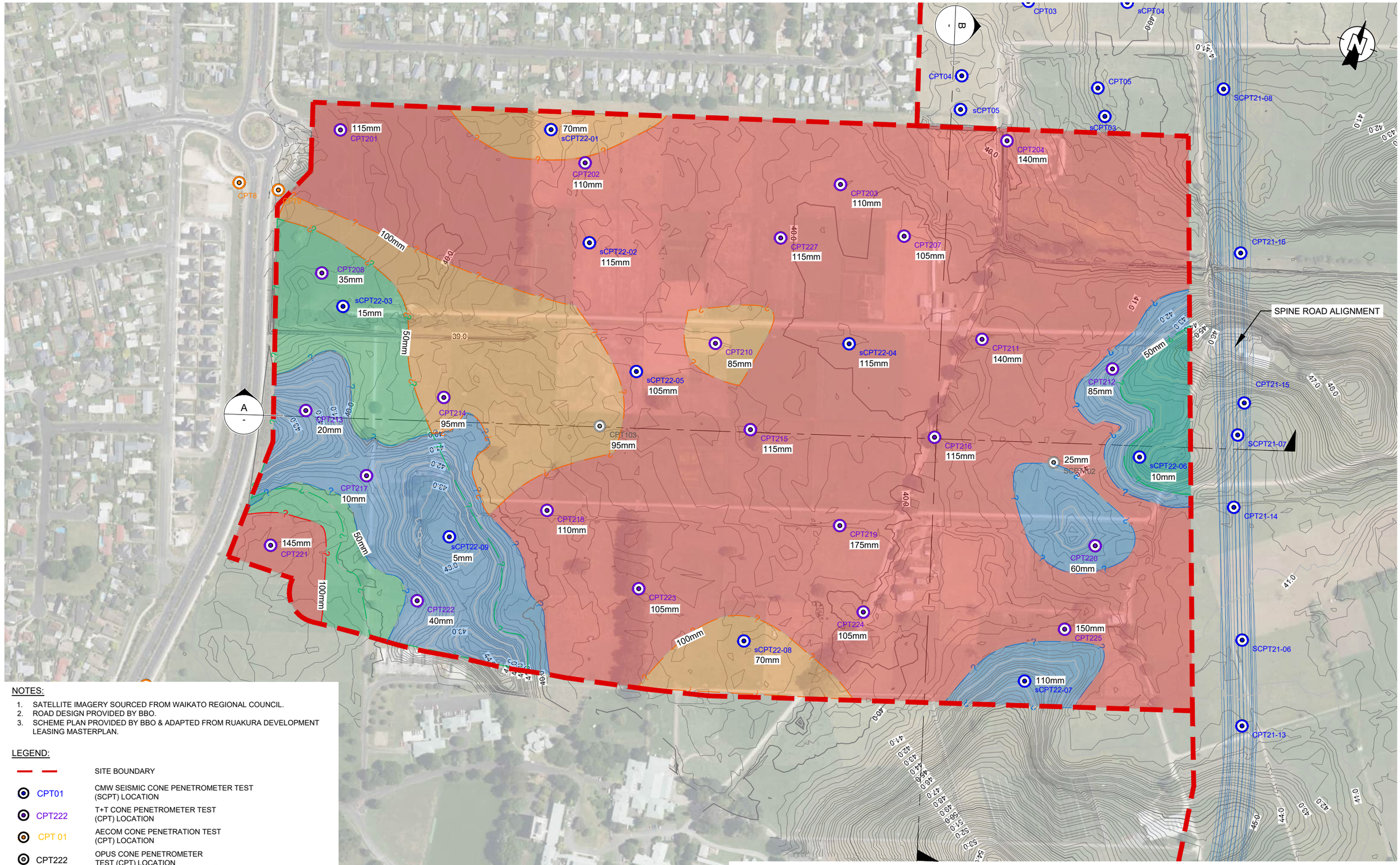
CMW Geosciences

CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**		DRAWN: HV	PROJECT No: HAM2021-0096
PROJECT: **TUUMATA PLAN CHANGE**		CHECKED: DM	DRAWING: 05
		REVISION: 0	SCALE: 1 :4000
TITLE: **PGA 0.25 LIQUEFACTION SETTLEMENT PLAN (NO FILL)**		DATE: 23/05/2022	SHEET: A3

\\CMWGEOSCIENCES.SHAREPOINT.COM@SSL\DAVWWWROOT\SITES\CMWHAMILTONOFFICE\SHARED DOCUMENTS\HAMILTON PROJECT DOCUMENTS\2021\HAM2021-0096 TGH TRAMWAY\DRAWINGS\HAM2021-0096 SETTLEMENT PLANS.DWG



NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.
3. SCHEME PLAN PROVIDED BY BBO & ADAPTED FROM RUAKURA DEVELOPMENT LEASING MASTERPLAN.

LEGEND:

	SITE BOUNDARY
CPT01	CMW SEISMIC CONE PENETROMETER TEST (SCPT) LOCATION
CPT222	T+T CONE PENETROMETER TEST (CPT) LOCATION
CPT 01	AECOM CONE PENETRATION TEST (CPT) LOCATION
CPT222	OPUS CONE PENETROMETER TEST (CPT) LOCATION
CPT125308	NZGD CONE PENETRATION TEST (CPT) APPROX LOCATION
	WALTON SUBGROUP
	SETTLEMENT <50mm
	SETTLEMENT >50mm BUT <100mm
	SETTLEMENT >100mm

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CMW Geosciences

CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**	DRAWN: HV	PROJECT No: HAM2021-0096	
PROJECT: **TUUMATA PLAN CHANGE**	CHECKED: DM	DRAWING: 06	
	REVISION: 0	SCALE: 1 :4000	
TITLE: **PGA 0.25 LIQUEFACTION SETTLEMENT PLAN (+1m FILL)**	DATE: 23/05/2022	SHEET: A3	

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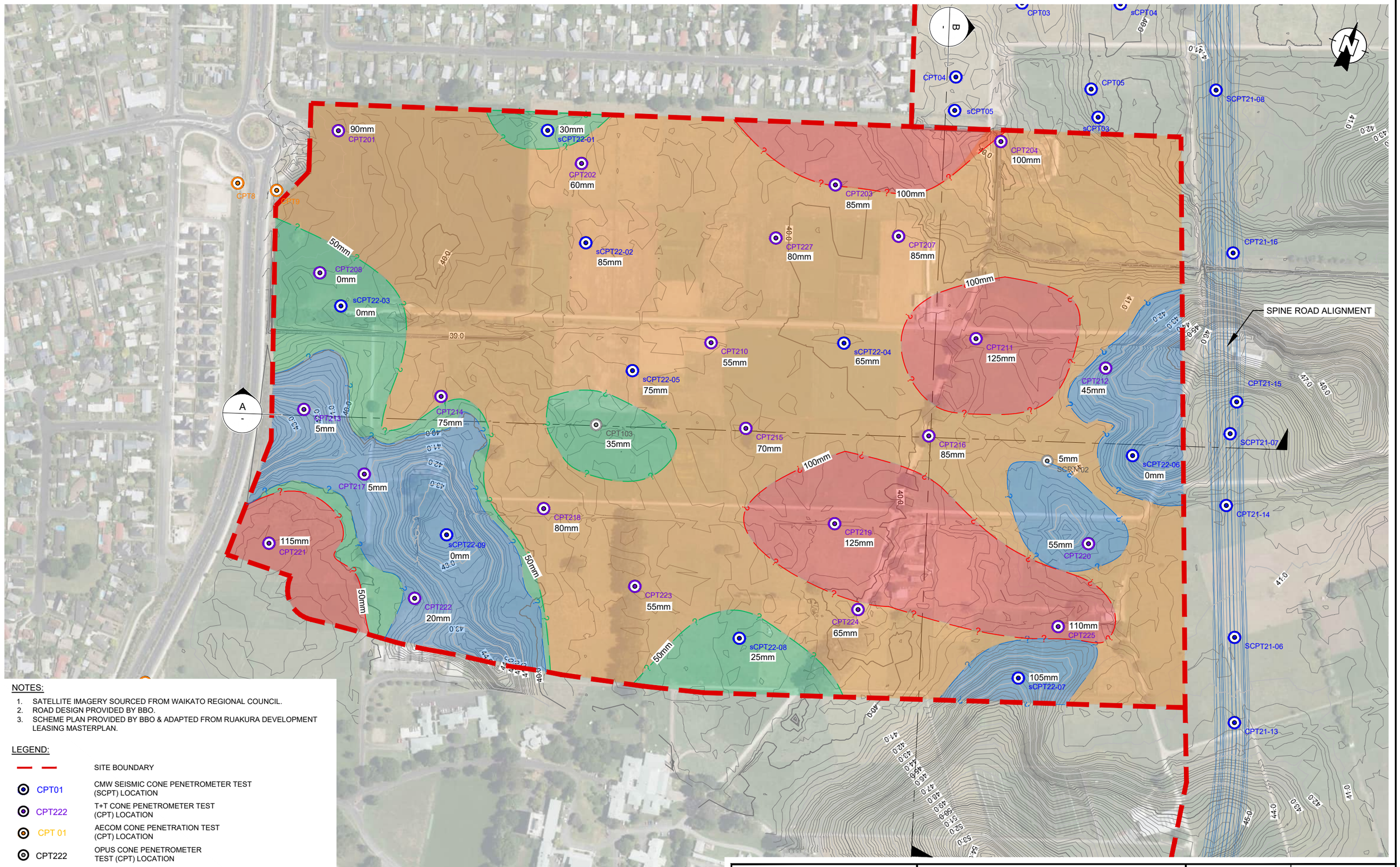


NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.
3. SCHEME PLAN PROVIDED BY BBO & ADAPTED FROM RUAKURA DEVELOPMENT LEASING MASTERPLAN.

LEGEND:

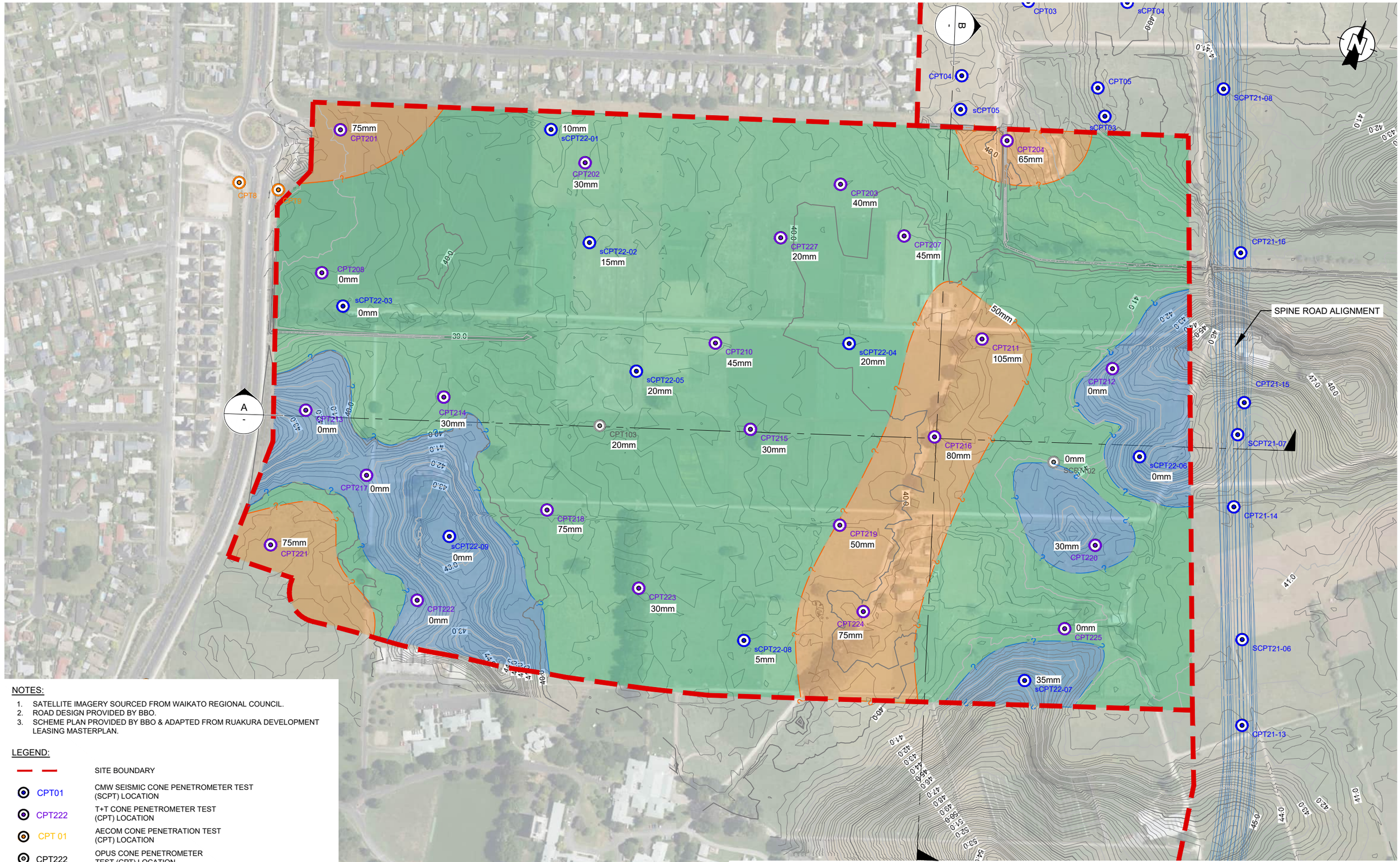
	SITE BOUNDARY
CPT01	CMW SEISMIC CONE PENETROMETER TEST (SCPT) LOCATION
CPT222	T+T CONE PENETROMETER TEST (CPT) LOCATION
CPT 01	AECOM CONE PENETRATION TEST (CPT) LOCATION
CPT222	OPUS CONE PENETROMETER TEST (CPT) LOCATION
CPT125308	NZGD CONE PENETRATION TEST (CPT) APPROX LOCATION
	WALTON SUBGROUP
	SETTLEMENT <50mm
	SETTLEMENT >50mm BUT <100mm
	SETTLEMENT >100mm

1:4000 0 40 80 120 160 200 m

CMW Geosciences

CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**	DRAWN: HV	PROJECT No: HAM2021-0096	
PROJECT: **TUUMATA PLAN CHANGE**	CHECKED: DM	DRAWING: 07	
	REVISION: 0	SCALE: 1 :4000	
TITLE: **PGA 0.19 LIQUEFACTION SETTLEMENT PLAN (1m FILL)**	DATE: 23/05/2022	SHEET: A3	

\\CMWGEOSCIENCES.SHAREPOINT.COM@SSL\DAVWWWROOT\SITES\CMWHAMILTONOFFICE\SHARED DOCUMENTS\HAMILTON PROJECT DOCUMENTS\2021\HAM2021-0096 TGH TRAMWAY\DRAWINGS\HAM2021-0096 SETTLEMENT PLANS.DWG



NOTES:

1. SATELLITE IMAGERY SOURCED FROM WAIKATO REGIONAL COUNCIL.
2. ROAD DESIGN PROVIDED BY BBO.
3. SCHEME PLAN PROVIDED BY BBO & ADAPTED FROM RUAKURA DEVELOPMENT LEASING MASTERPLAN.

LEGEND:

	SITE BOUNDARY
CPT01	CMW SEISMIC CONE PENETROMETER TEST (SCPT) LOCATION
CPT222	T+T CONE PENETROMETER TEST (CPT) LOCATION
CPT 01	AECOM CONE PENETRATION TEST (CPT) LOCATION
CPT222	OPUS CONE PENETROMETER TEST (CPT) LOCATION
CPT125308	NZGD CONE PENETRATION TEST (CPT) APPROX LOCATION
	WALTON SUBGROUP
	SETTLEMENT <50mm
	SETTLEMENT >50mm BUT <100mm
	SETTLEMENT >100mm

1:4000 0 40 80 120 160 200 m

CMW Geosciences

CLIENT: **RUAKURA INDUSTRIAL DEVELOPMENT LIMITED**		DRAWN: HV	PROJECT No: HAM2021-0096
PROJECT: **TUUMATA PLAN CHANGE**		CHECKED: DM	DRAWING: 08
		REVISION: 0	SCALE: 1 :4000
TITLE: **PGA 0.14 LIQUEFACTION SETTLEMENT PLAN (1m FILL)**		DATE: 23/05/2022	SHEET: A3

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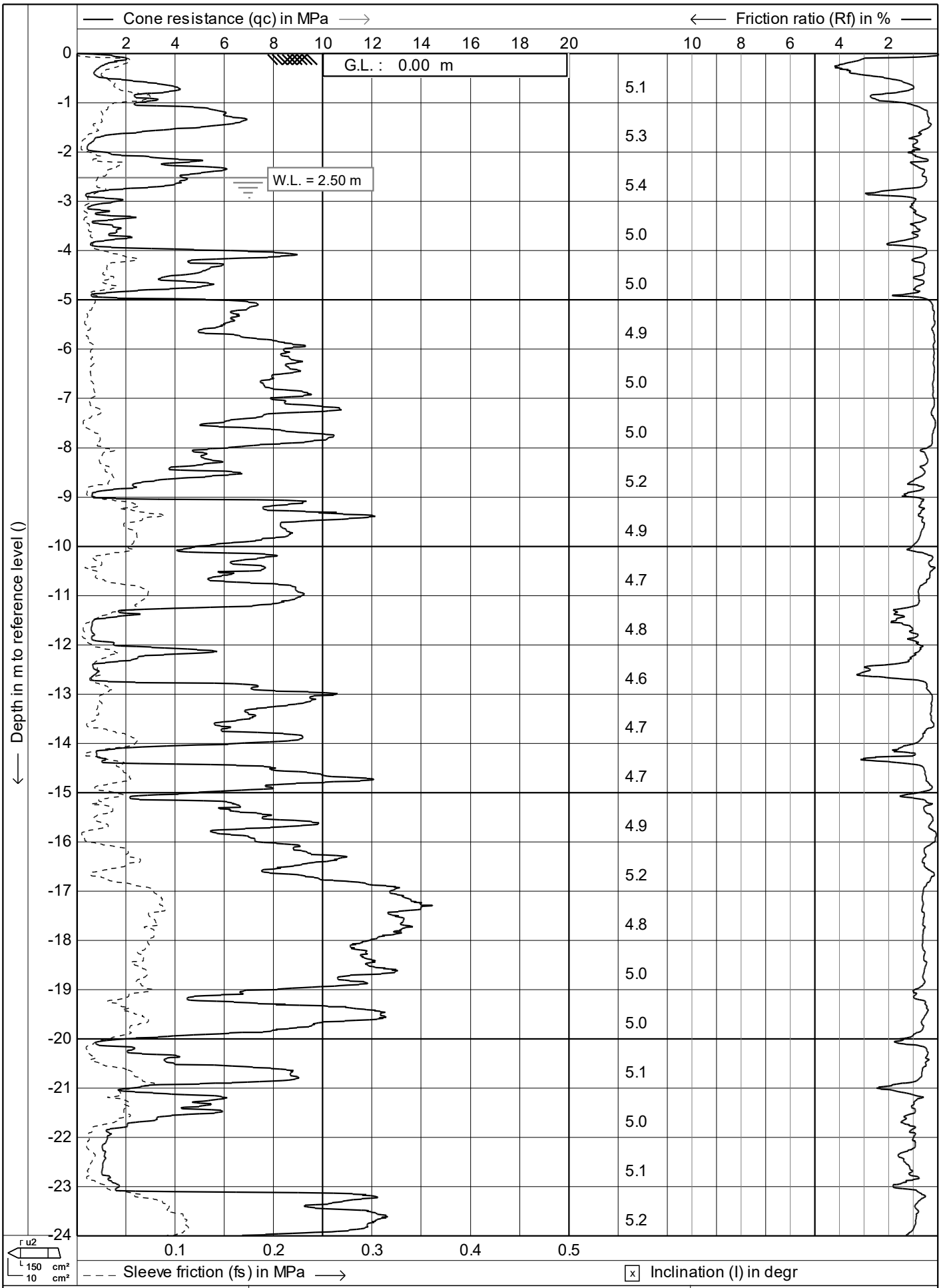
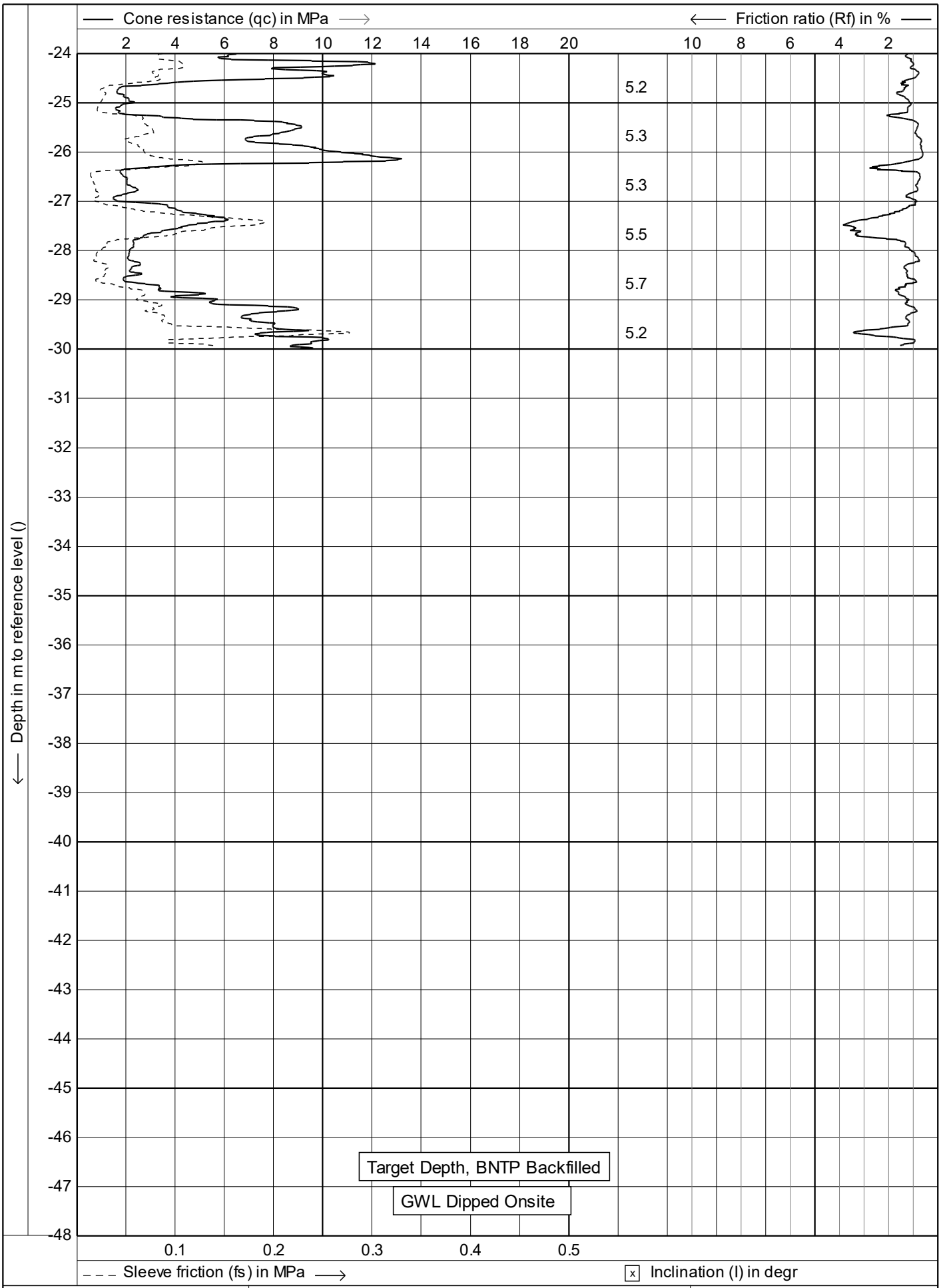
Appendix B: Cone Penetrometer Tests



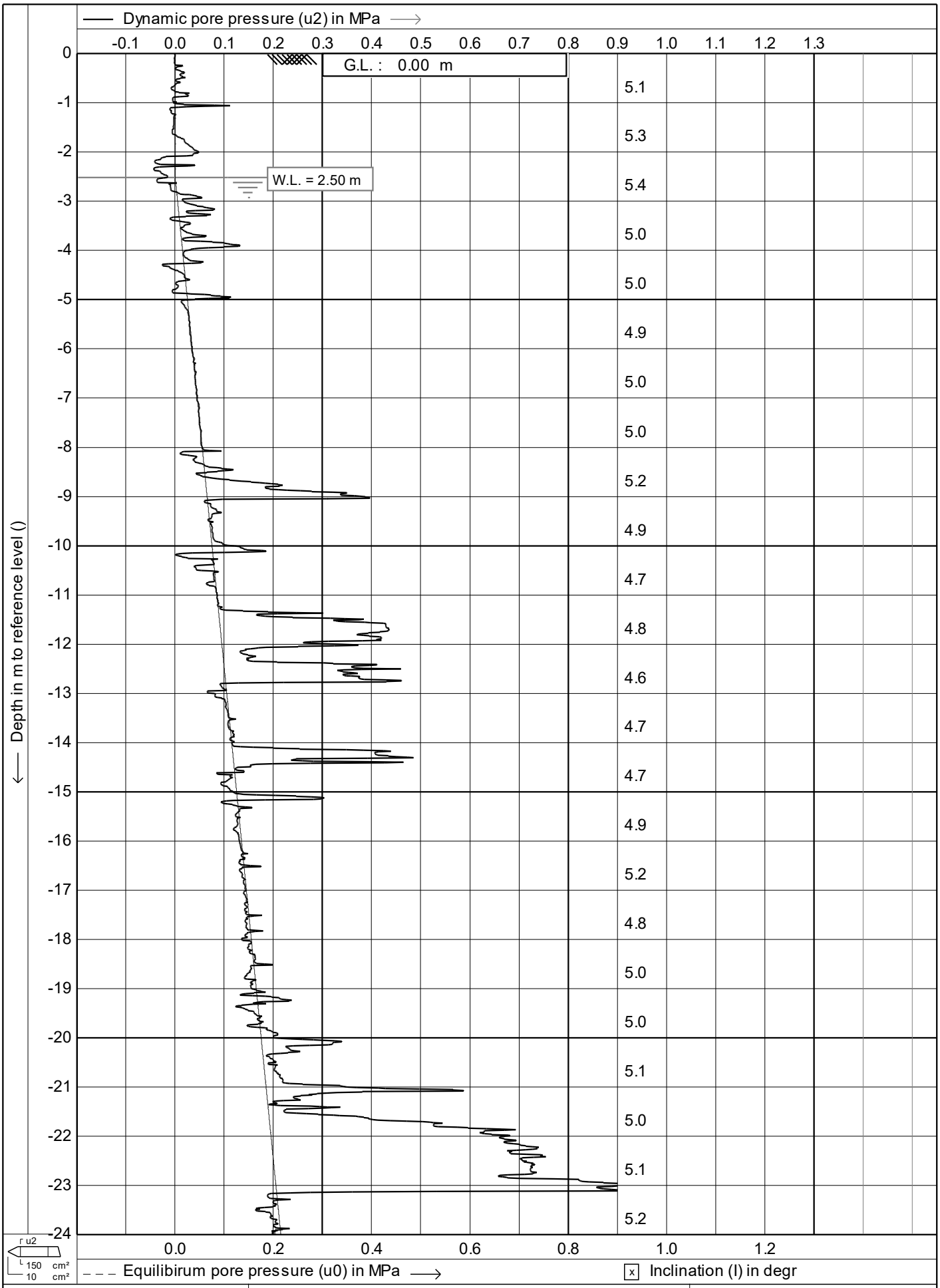
PERRY GEOTECH	A.S.T.M D5778-12	Date : **23/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **sCPT02** 1/28

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **23/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **sCPT02** 2/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

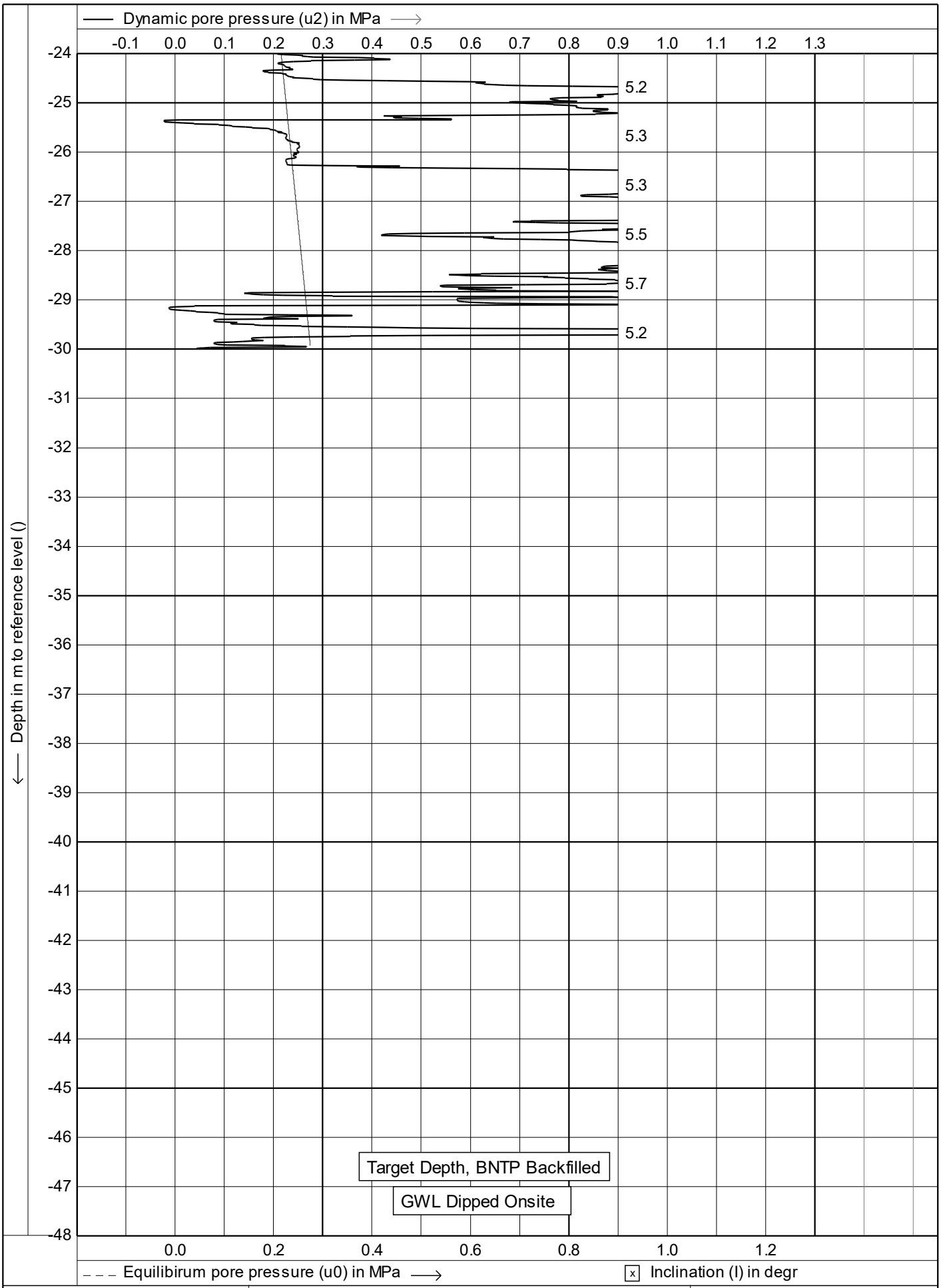
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **sCPT02** **3/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

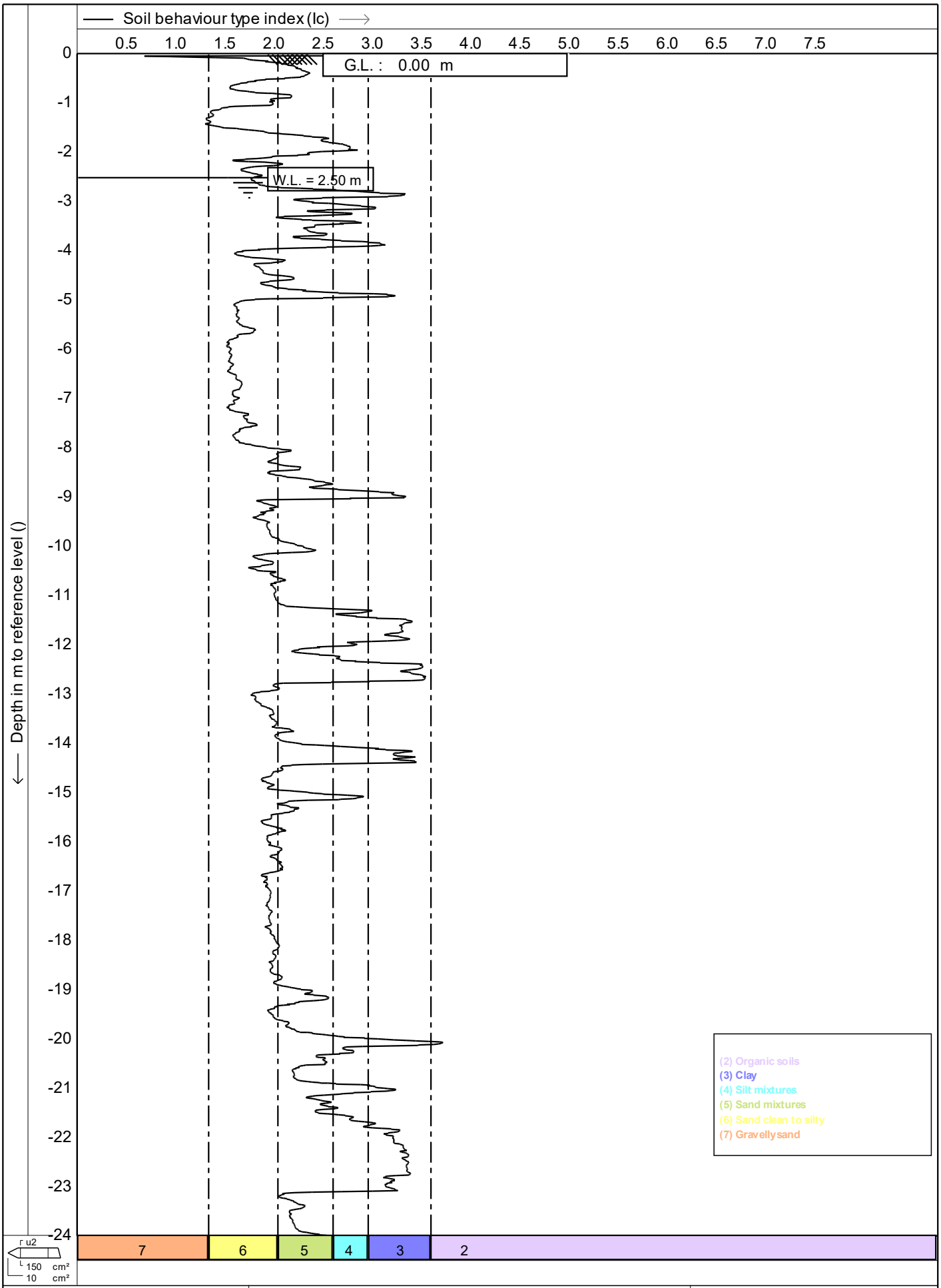
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **sCPT02** **4/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

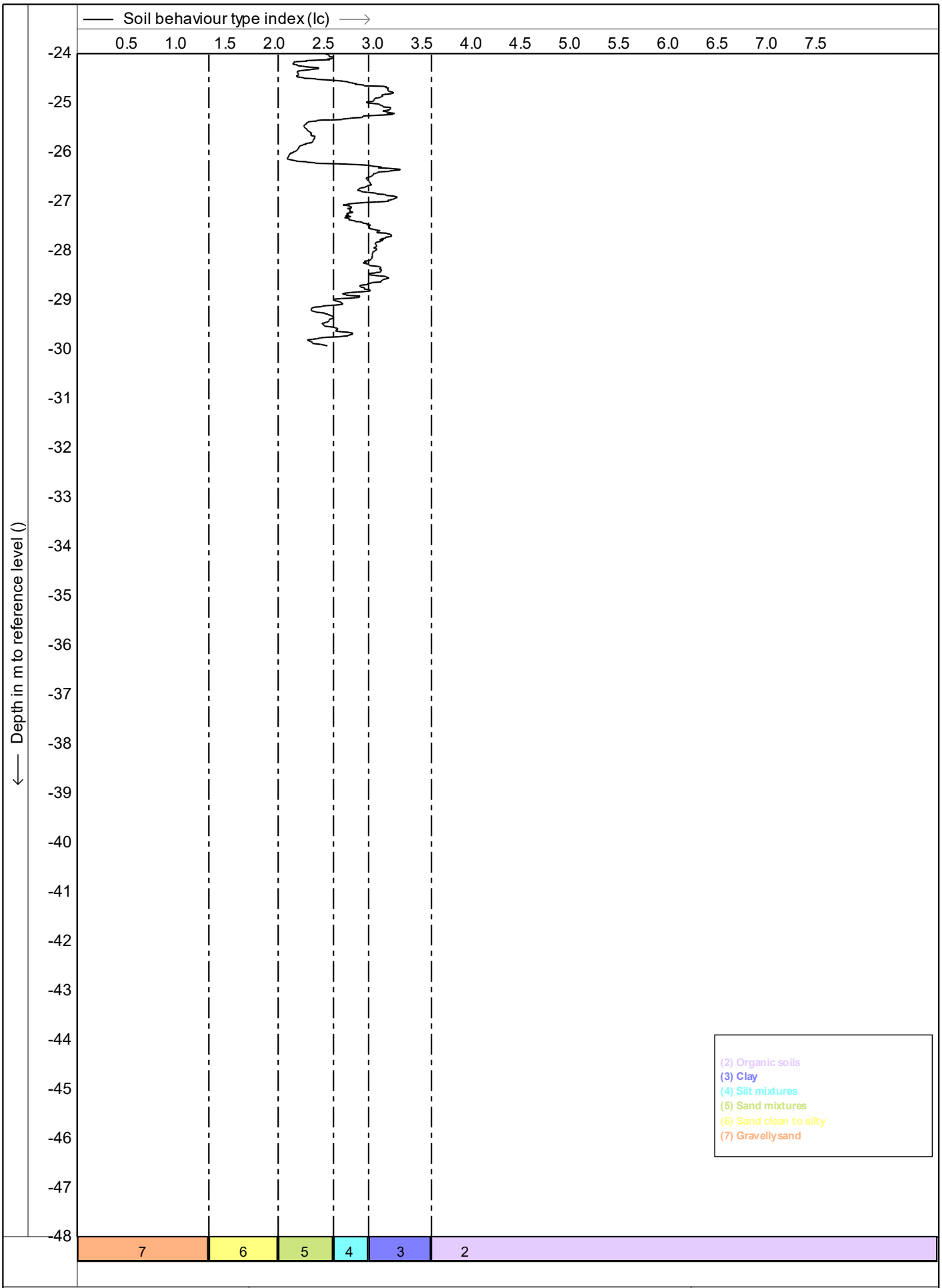
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **sCPT02** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

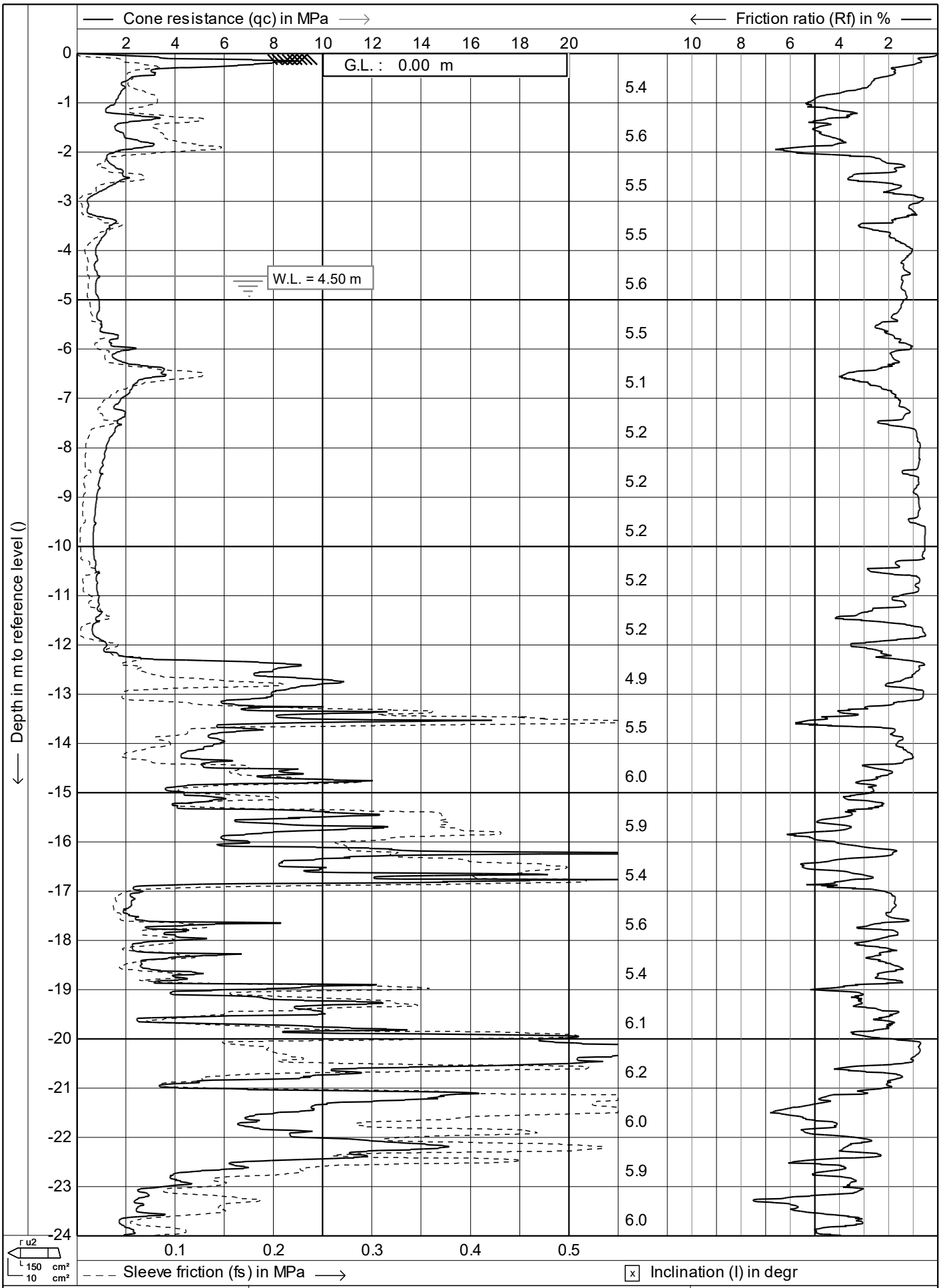
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

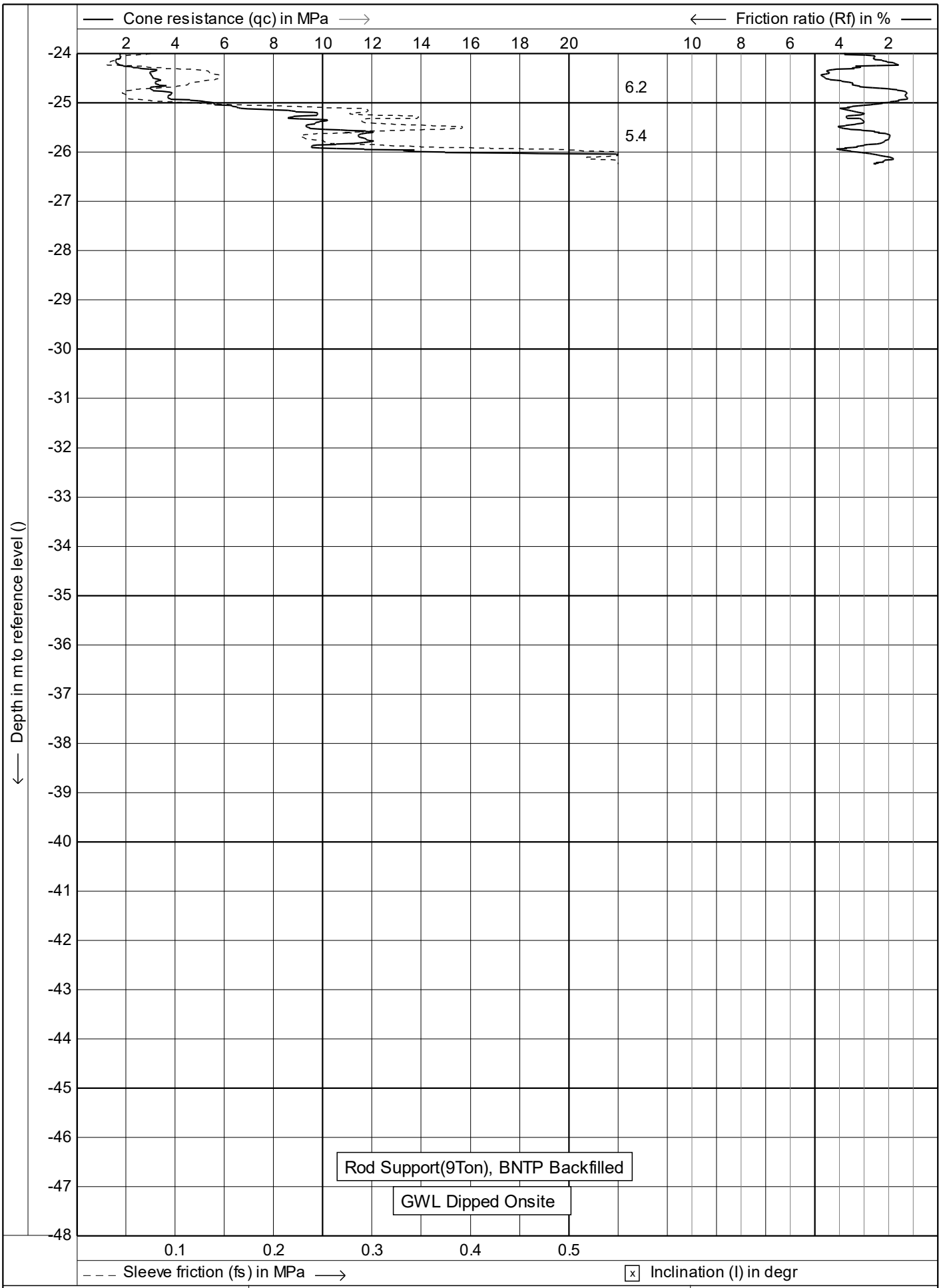
Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **sCPT02** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **23/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT03** 1/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

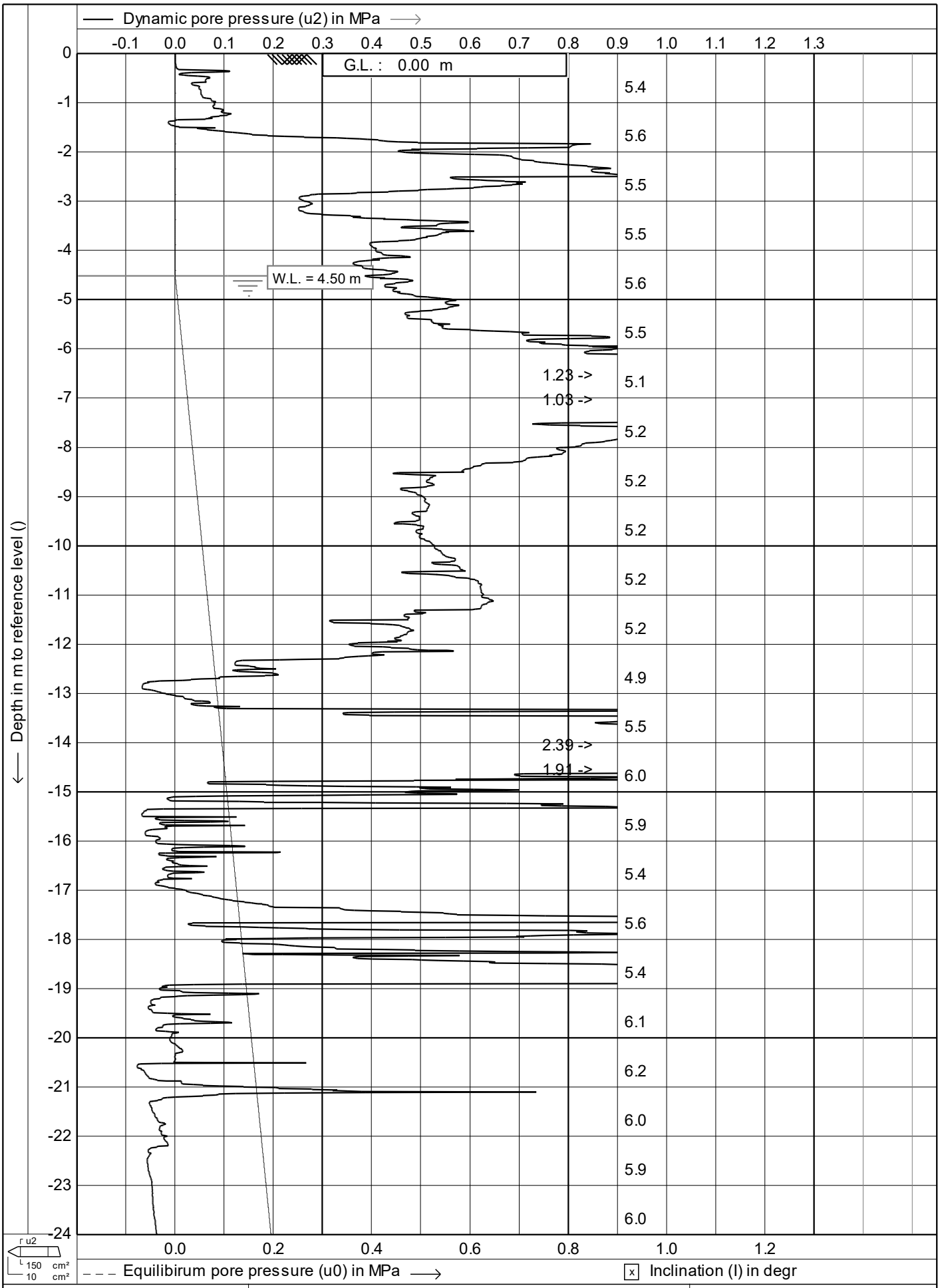
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT03** **2/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT03** **3/28**

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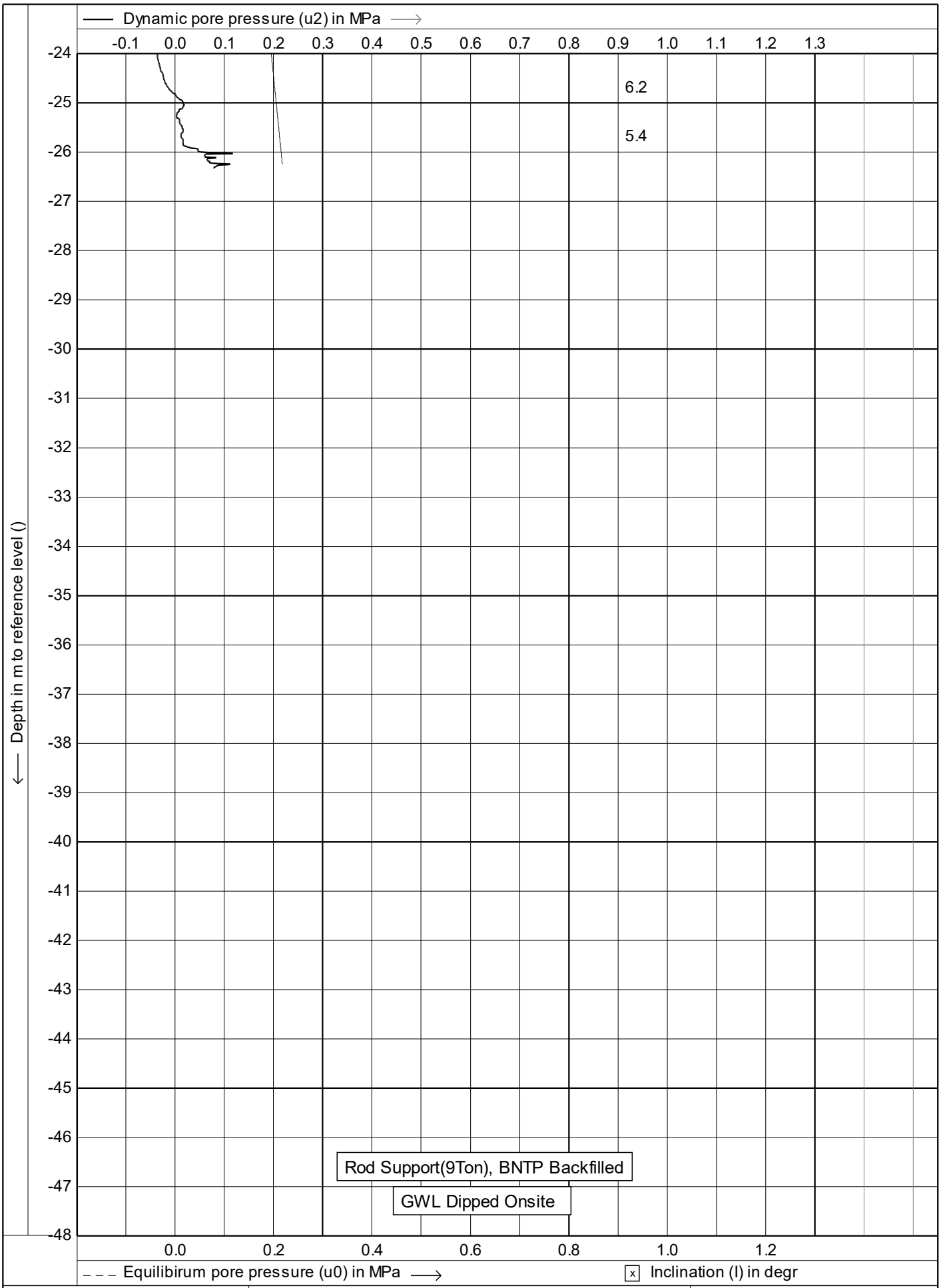


PERRY GEOTECH

A.S.T.M D5778-12

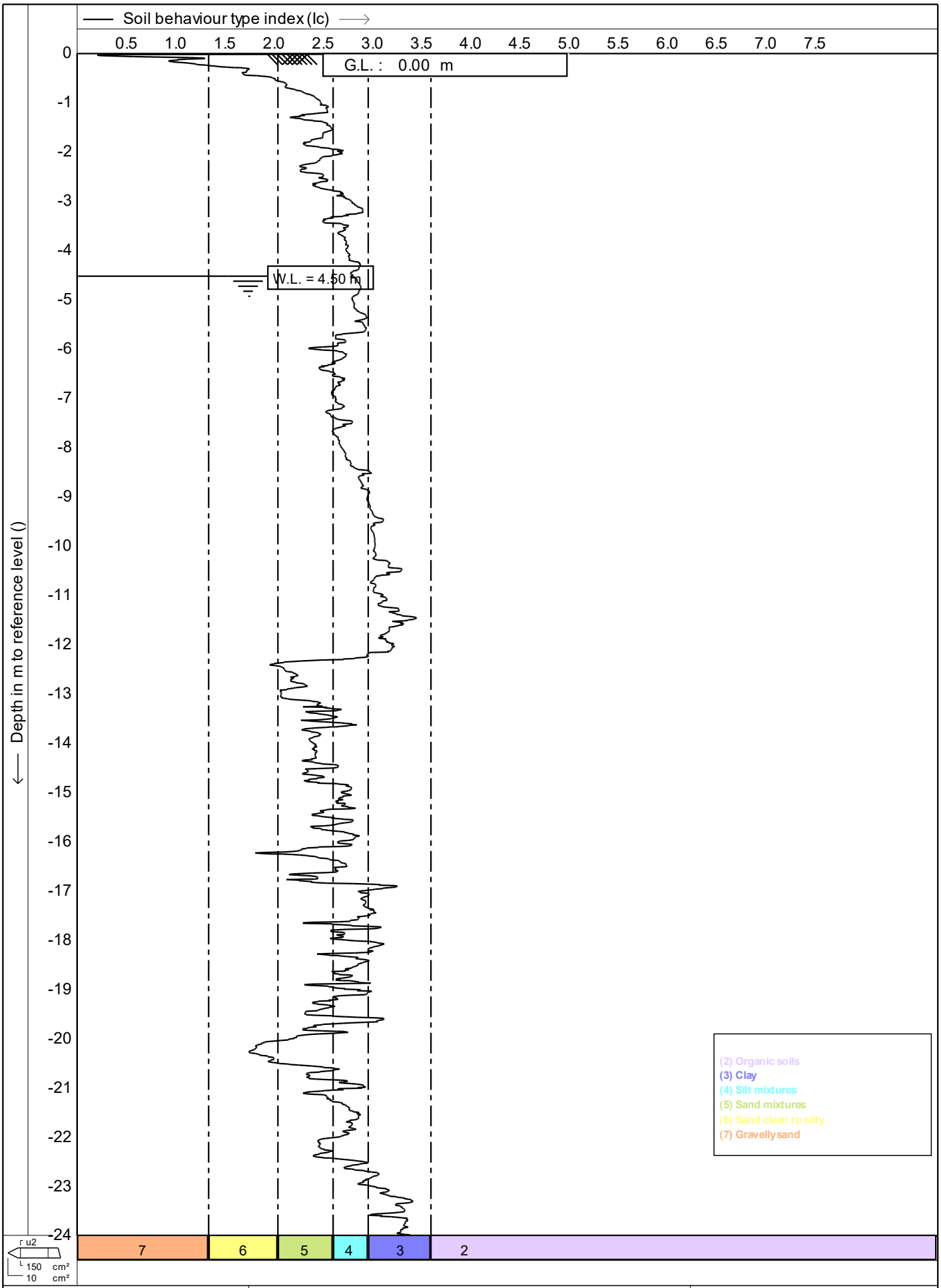
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT03** **4/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
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Project no.	: **02CMW008**
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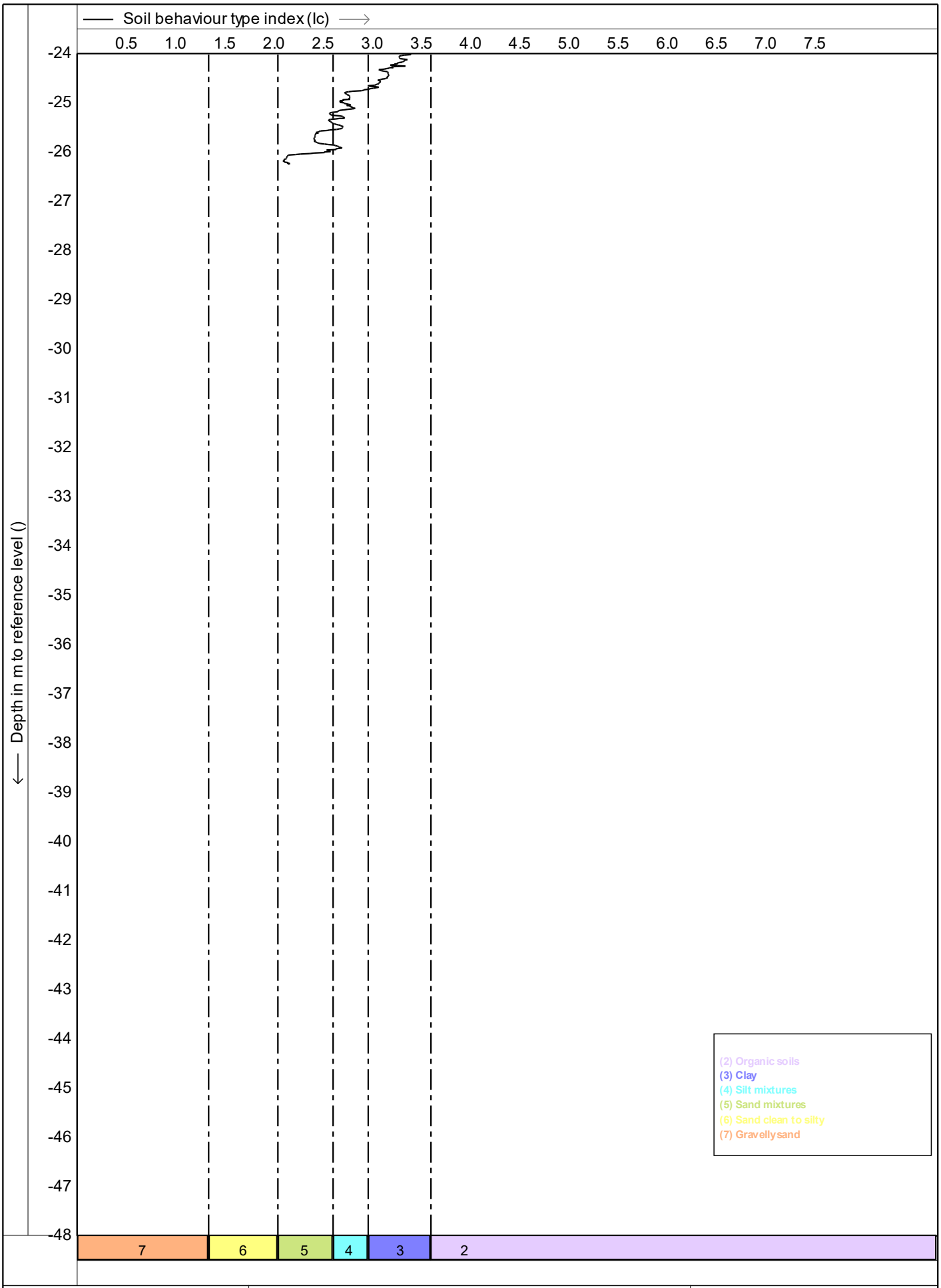
1.49



PERRY GEOTECH

A.S.T.M D5778-12

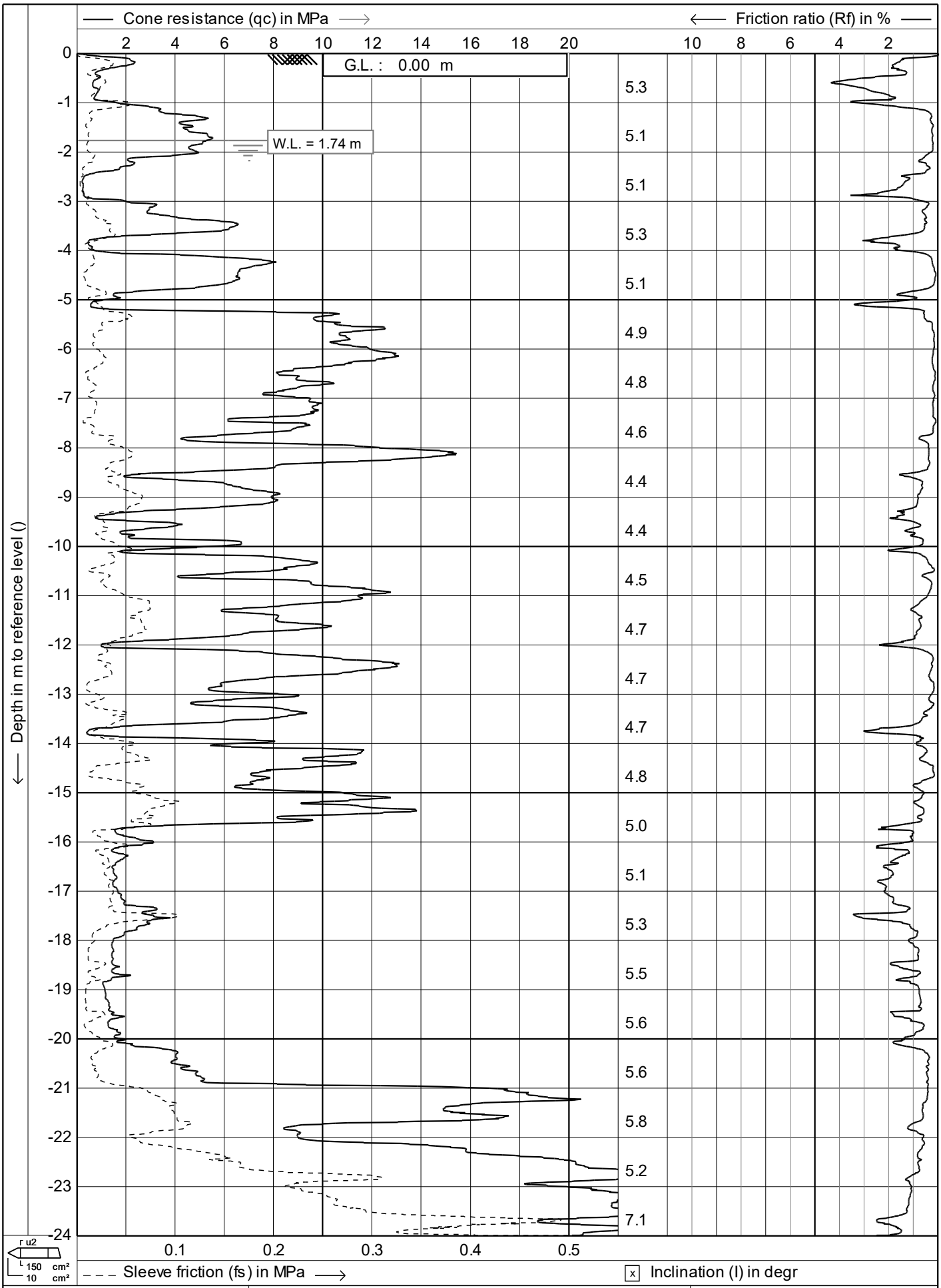
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

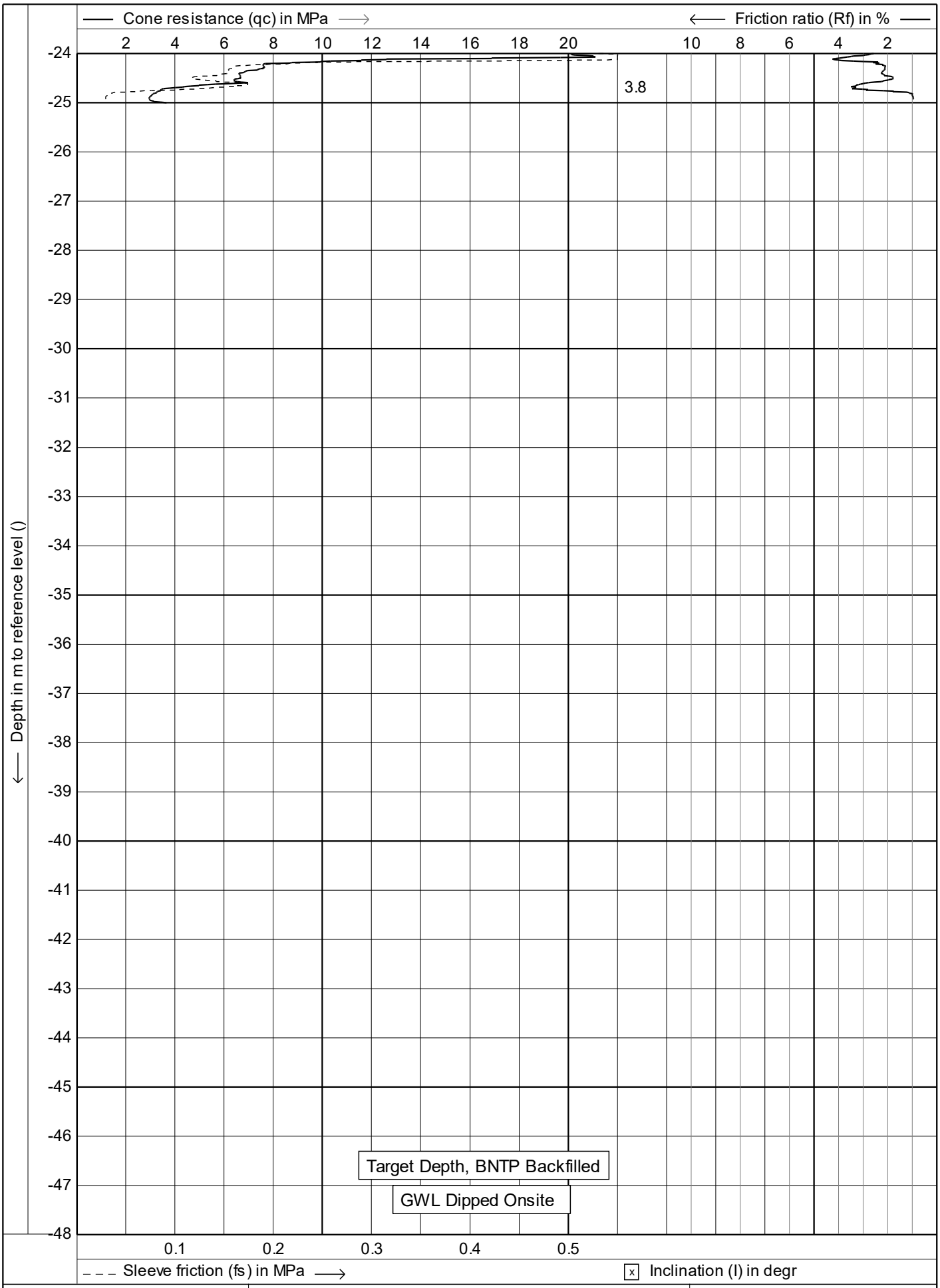
Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT03** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT04** 1/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

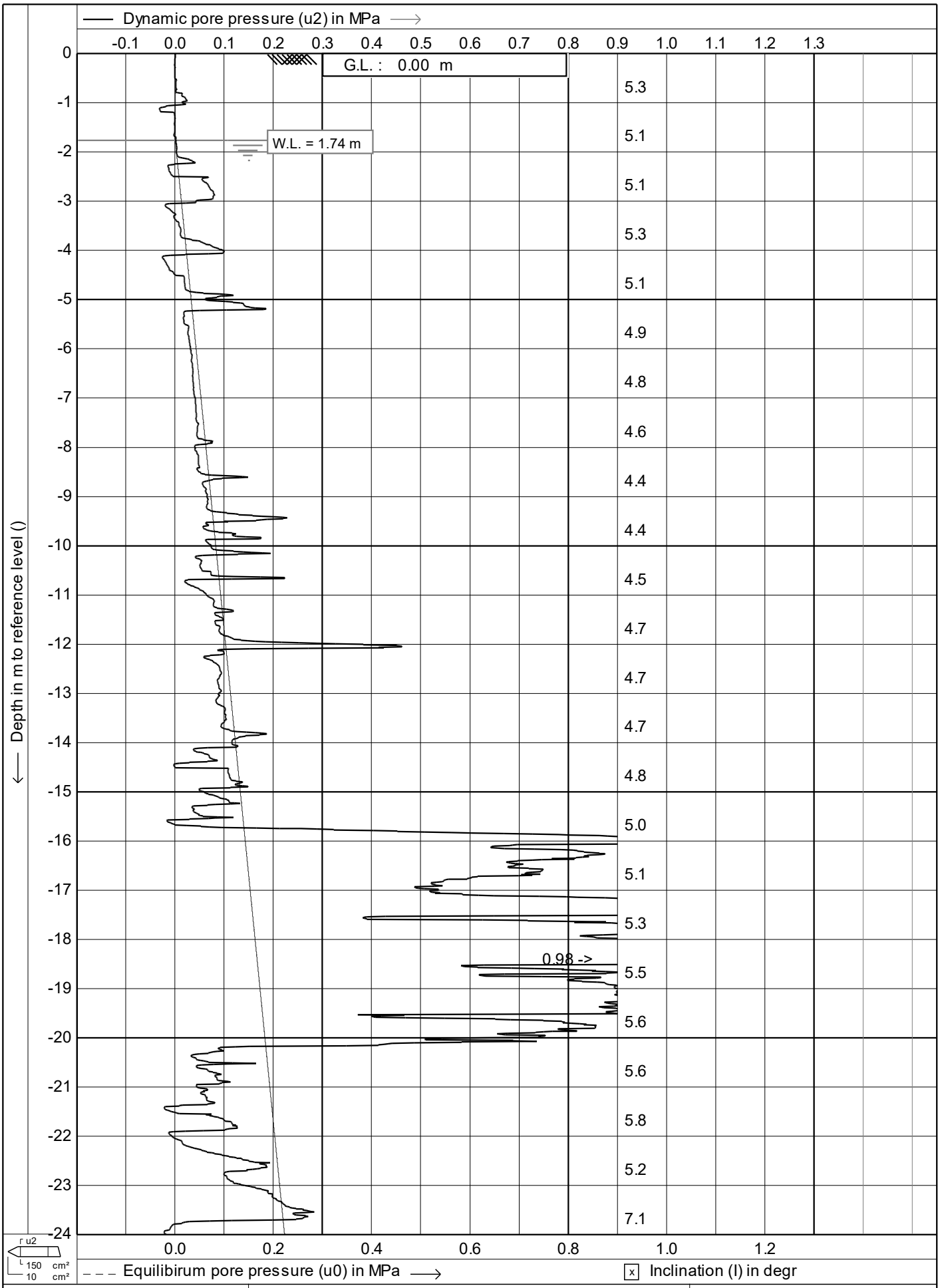
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

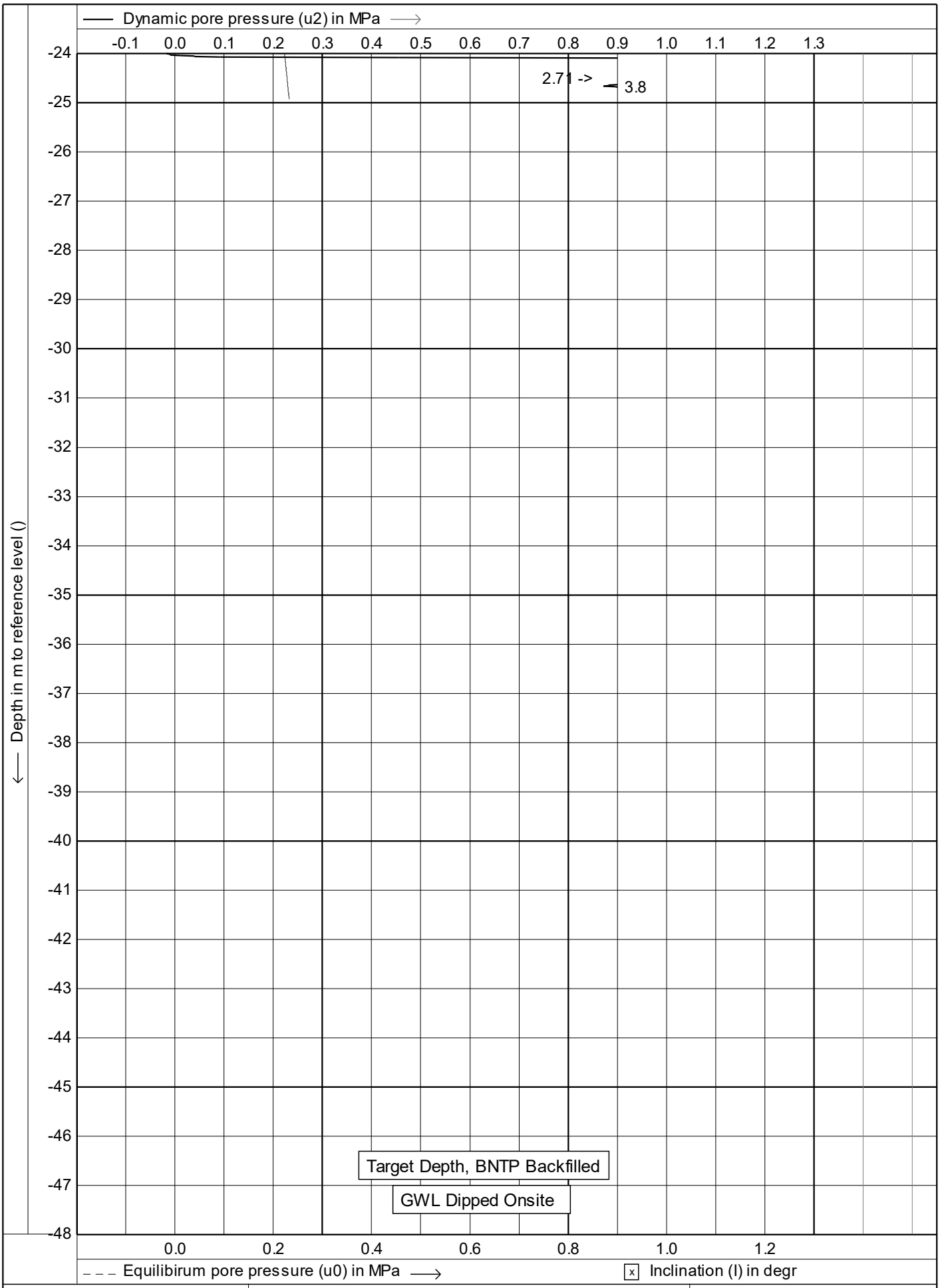
Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT04** **2/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT04** 3/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

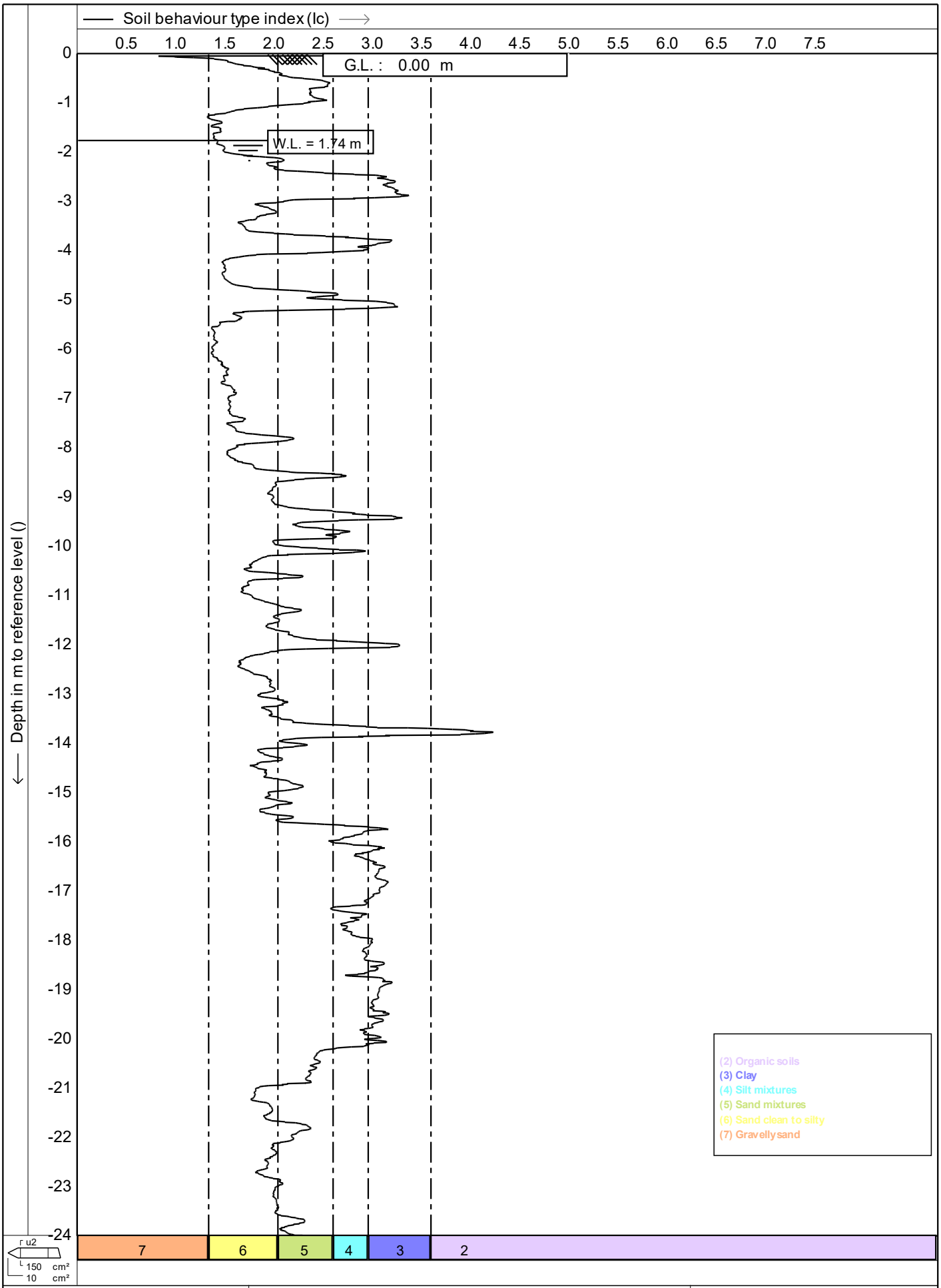
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT04** **4/28**

1.49



A.S.T.M D5778-12

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT04** **17/28**

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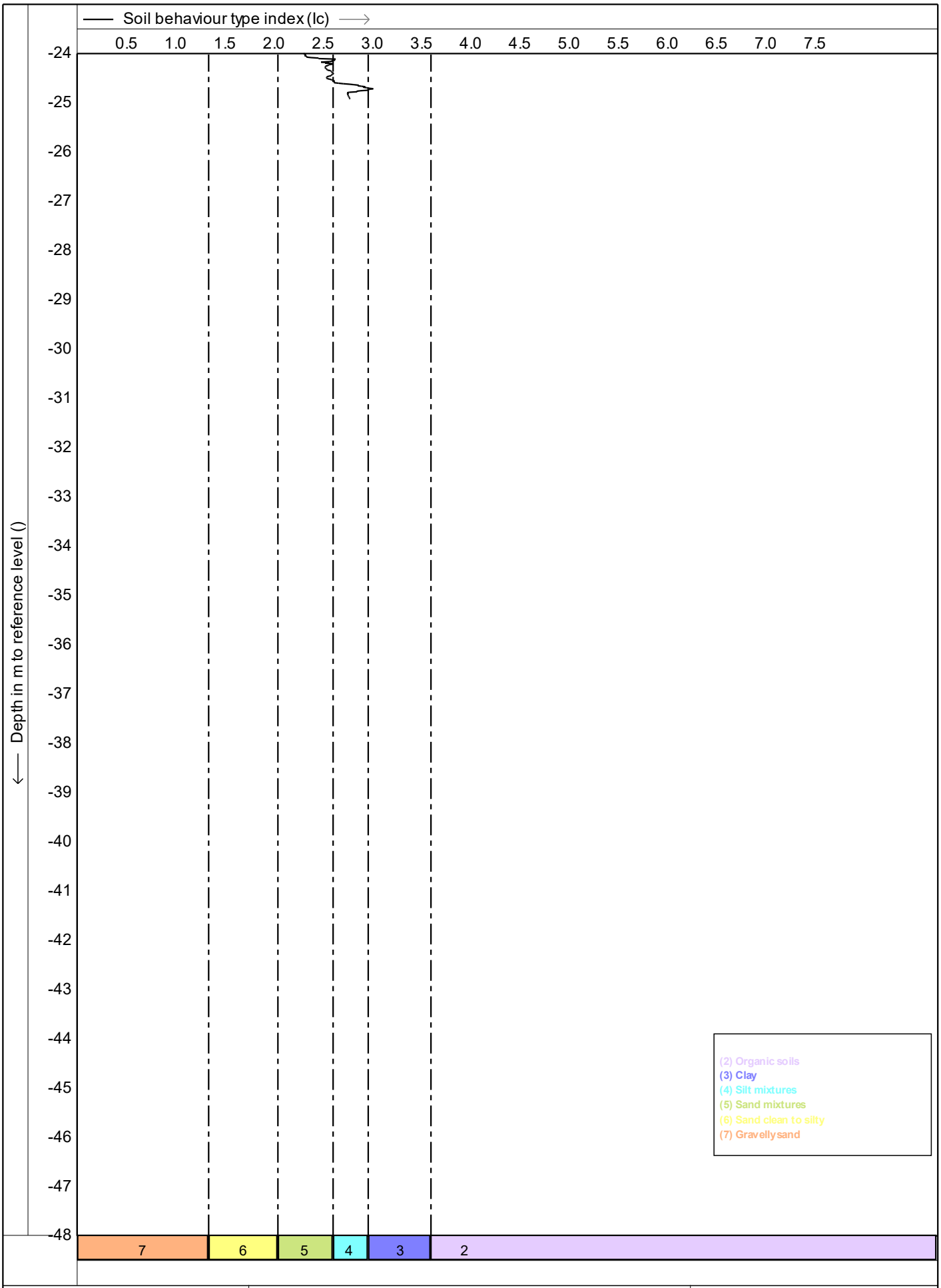

PERRY GEOTECH

A.S.T.M D5778-12

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT04** **18/28**

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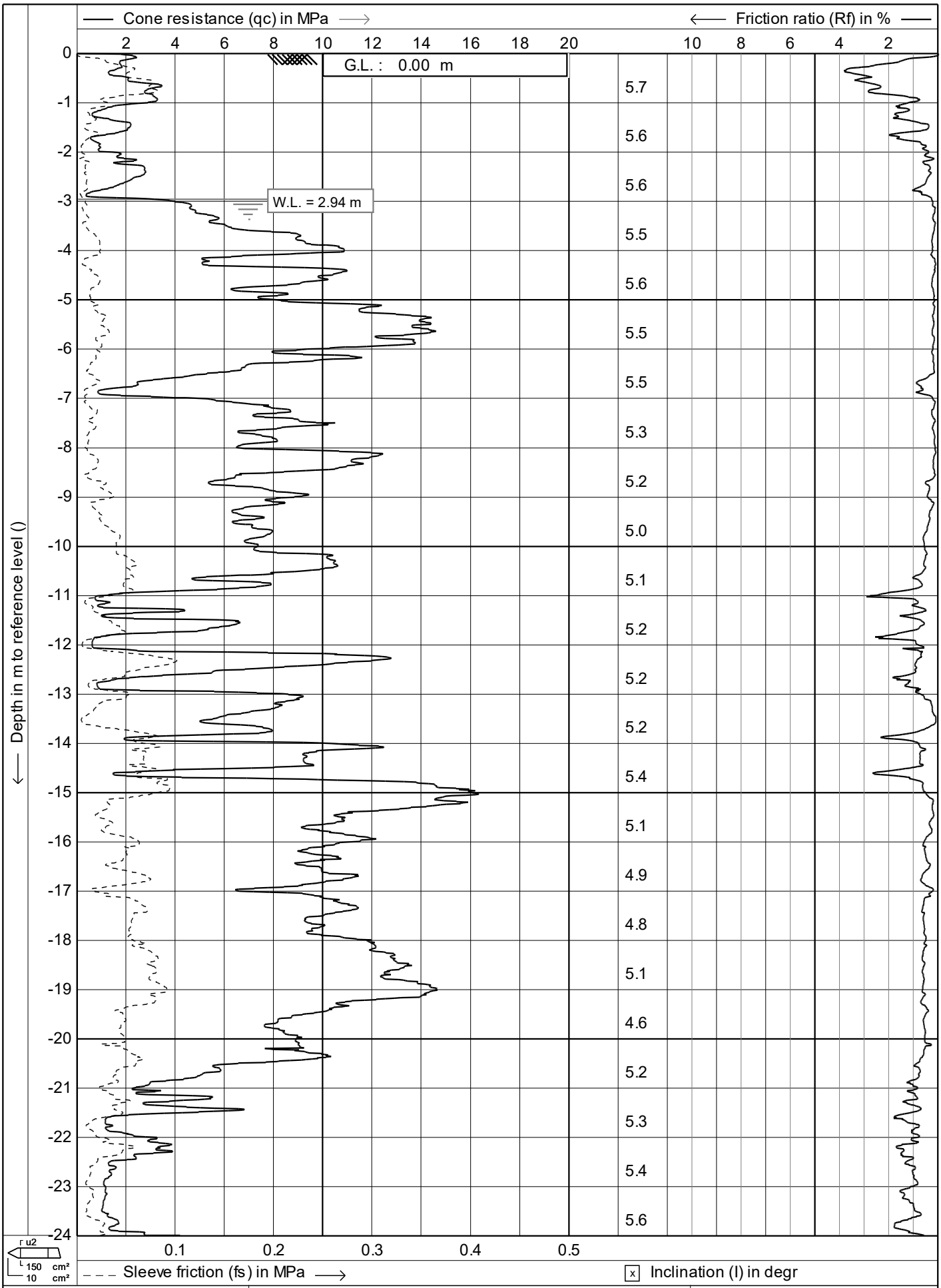

PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
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	Position: **0, 0**	CPT no. : **SCPT05** 1/28

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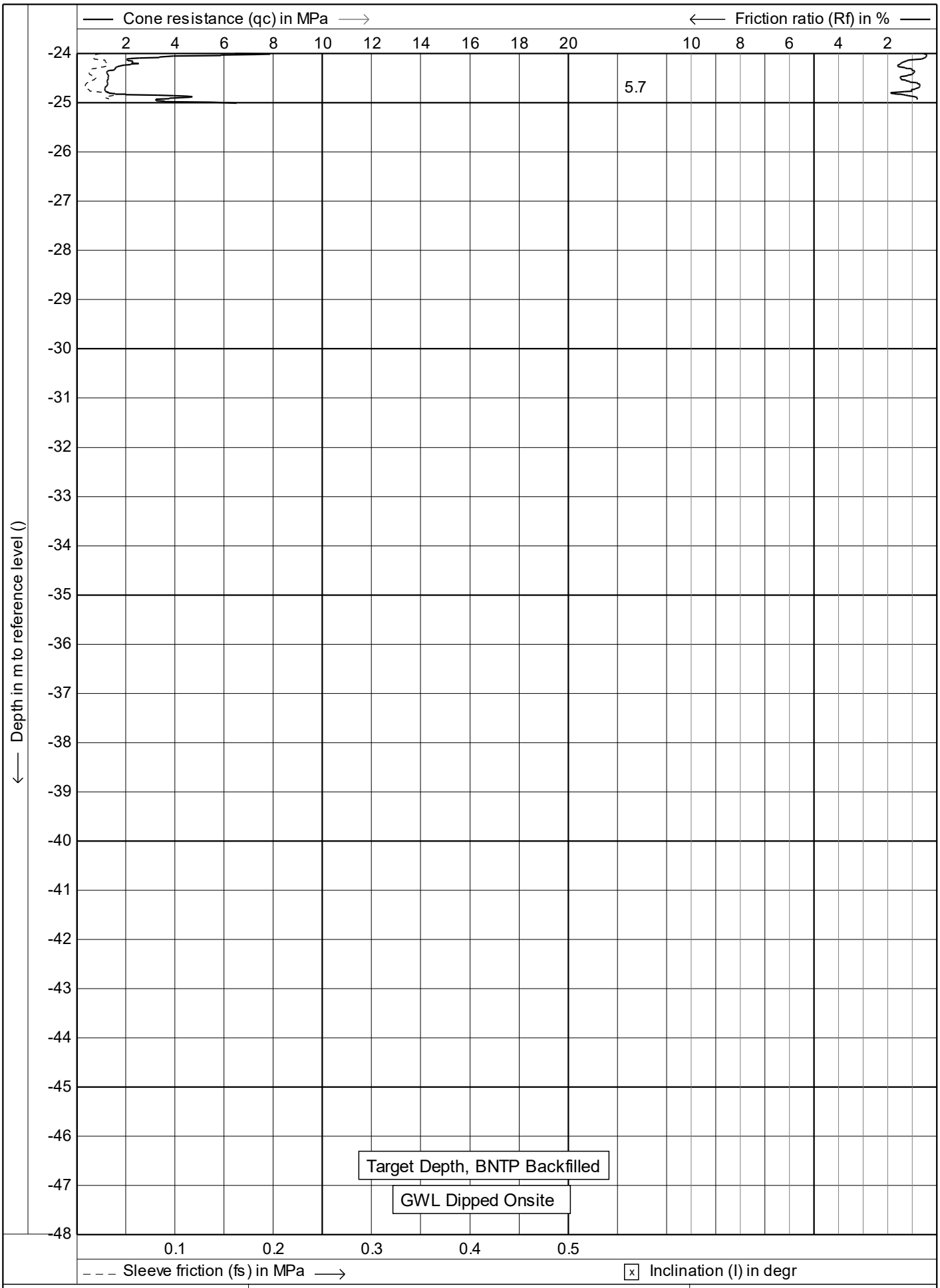
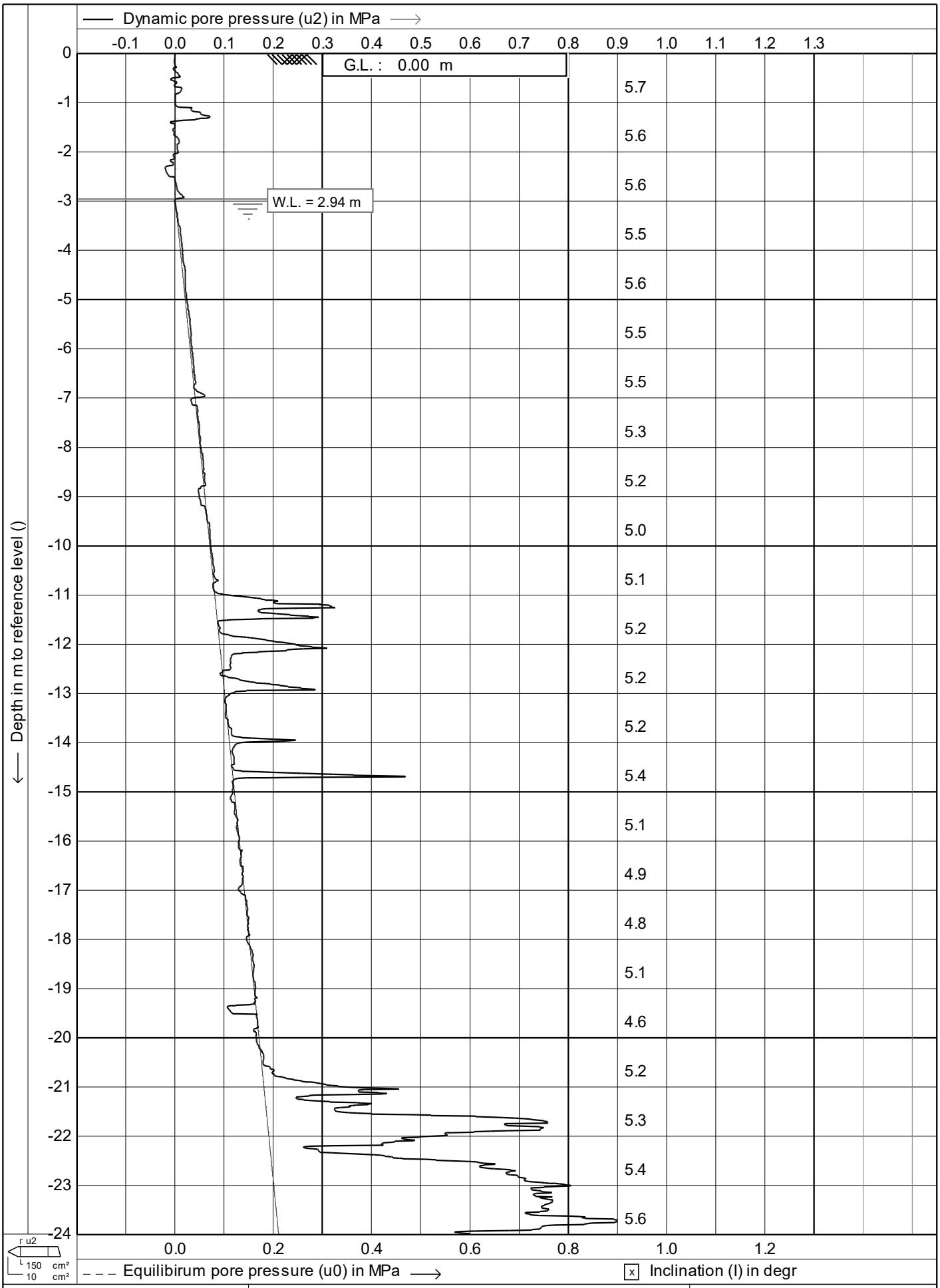


PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT05** 2/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

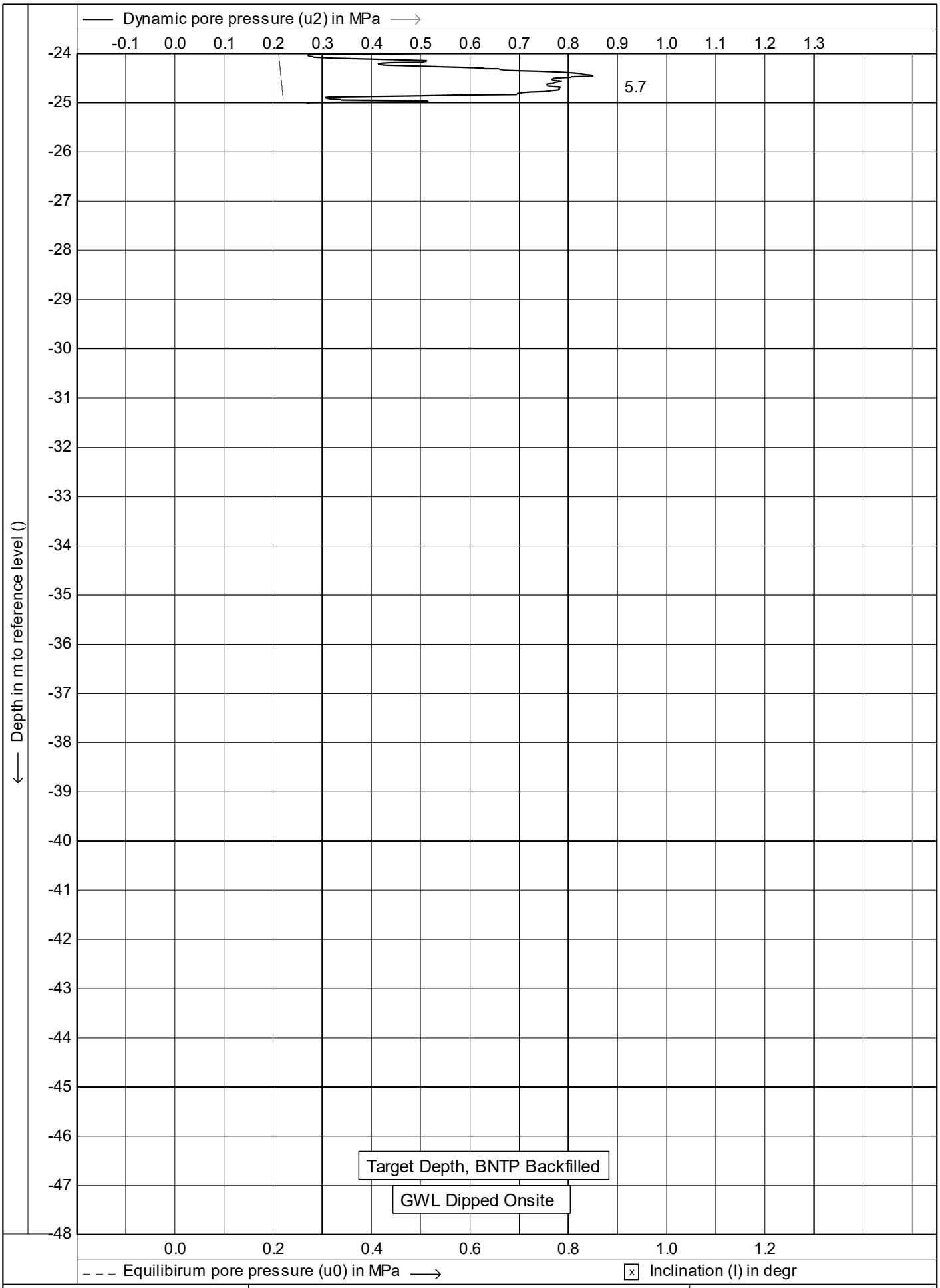
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT05** **3/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

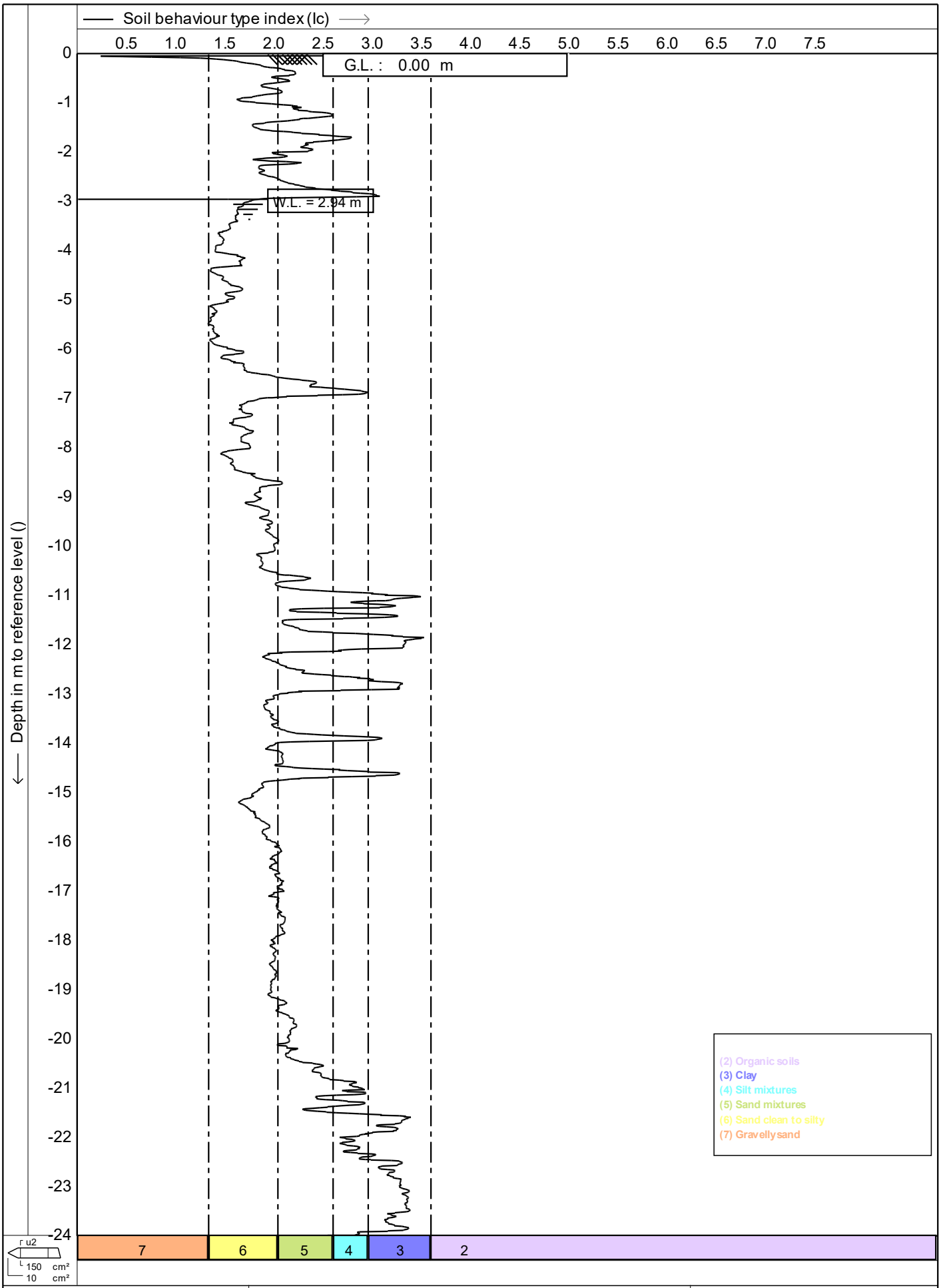
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT05** **4/28**

1.49



A.S.T.M D5778-12

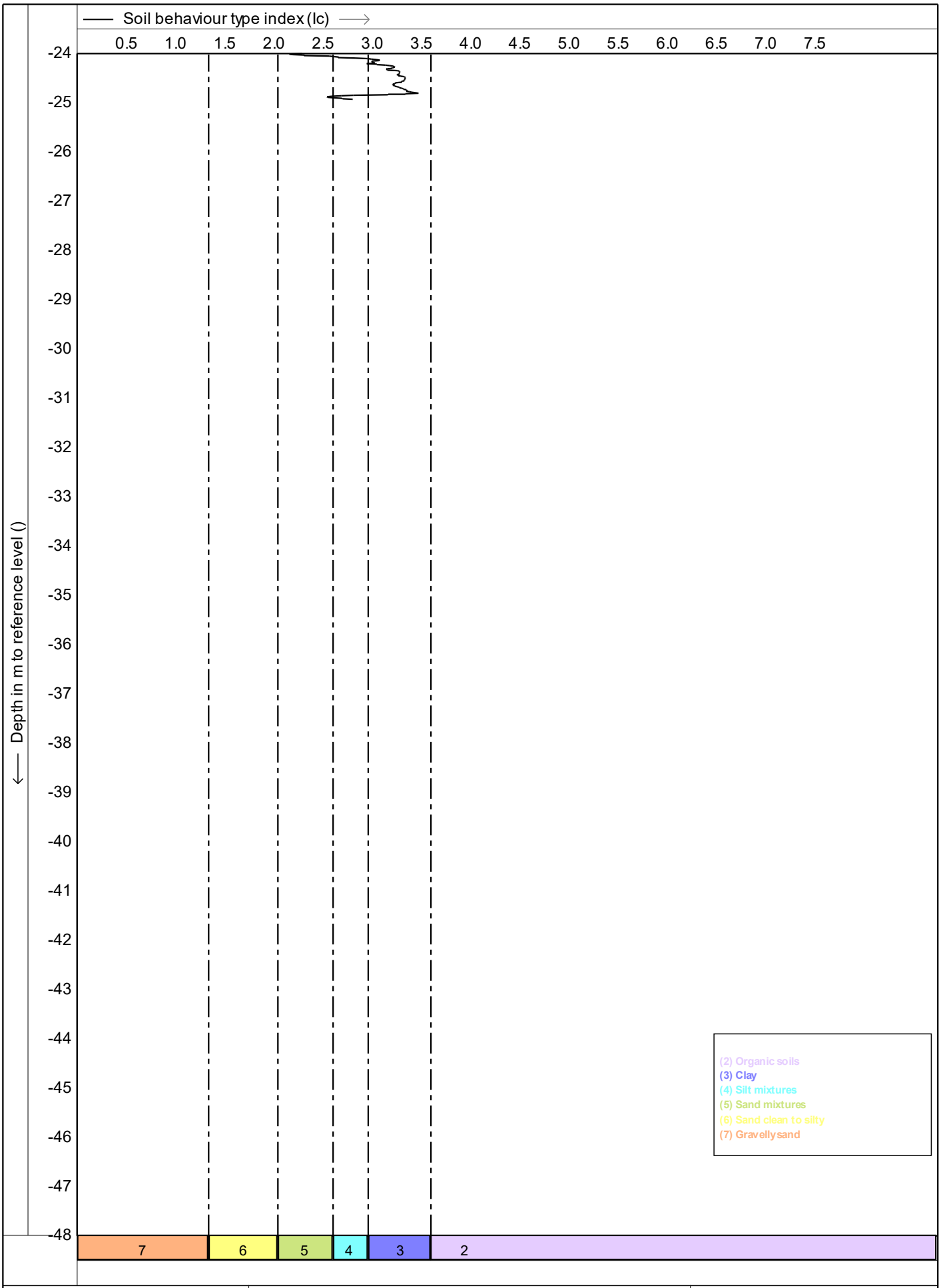
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT05** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

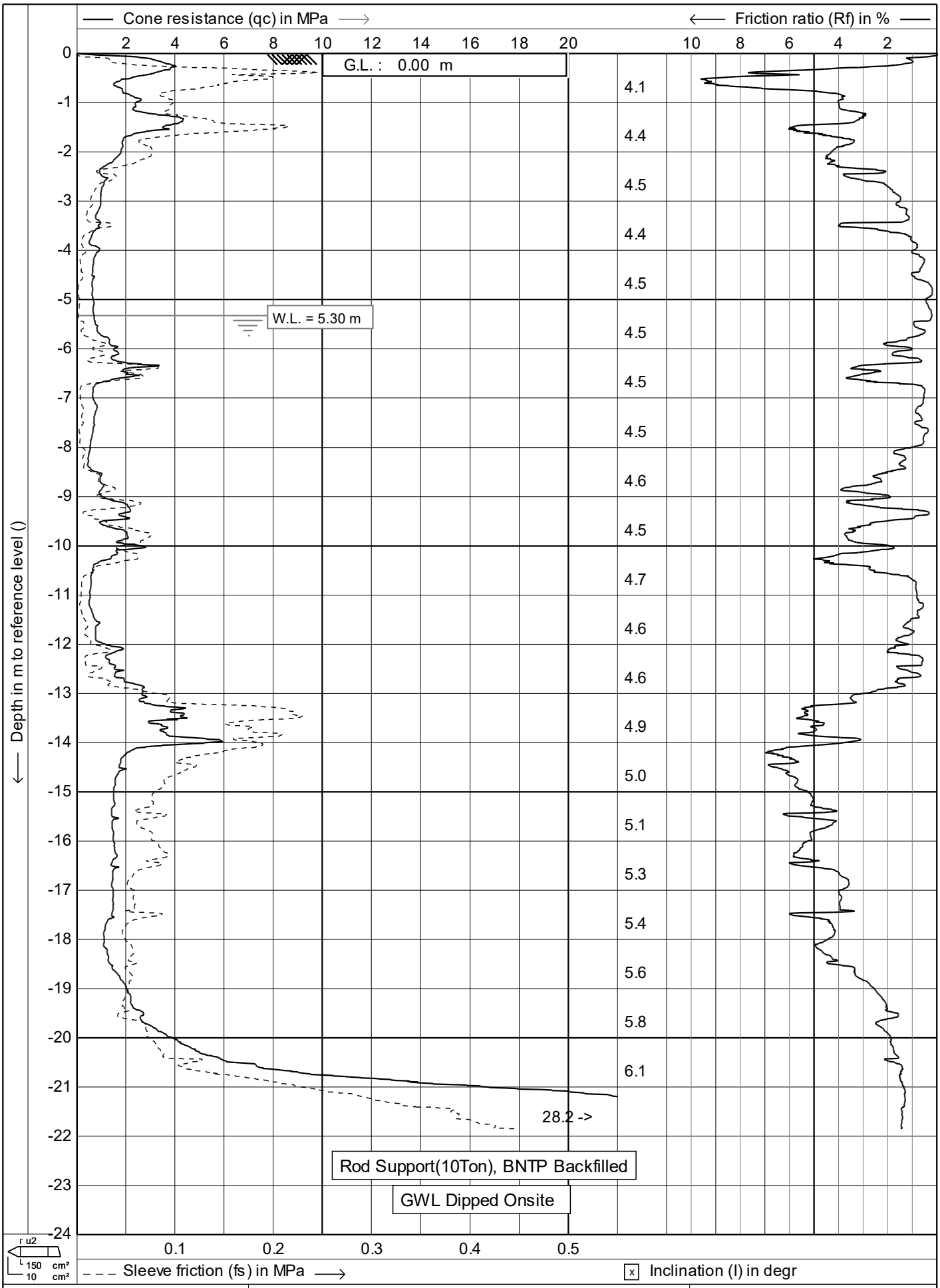
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

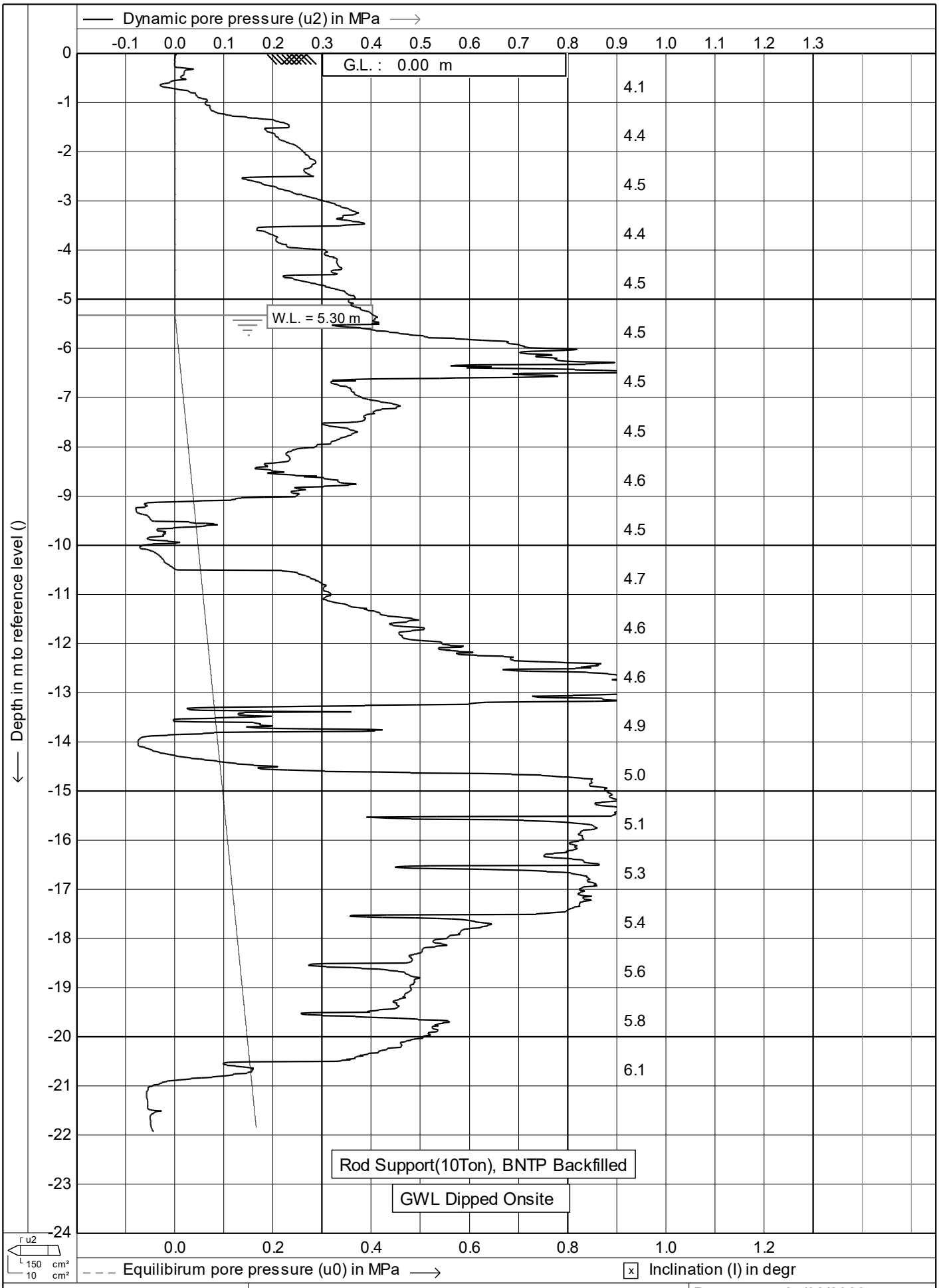
Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT05** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT06** 1/14

1.49



PERRY GEOTECH

A.S.T.M D5778-12

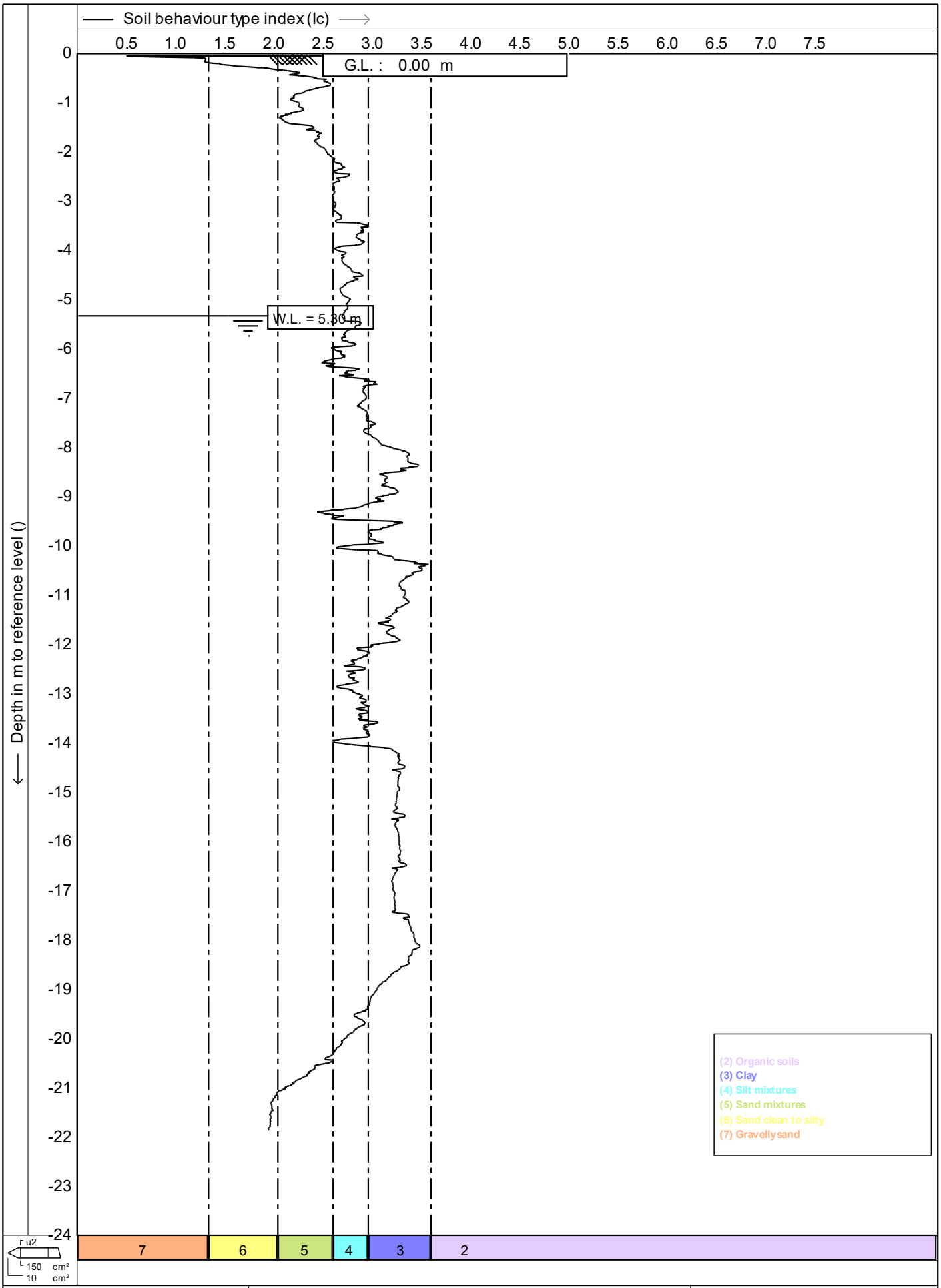
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT06** **2/14**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

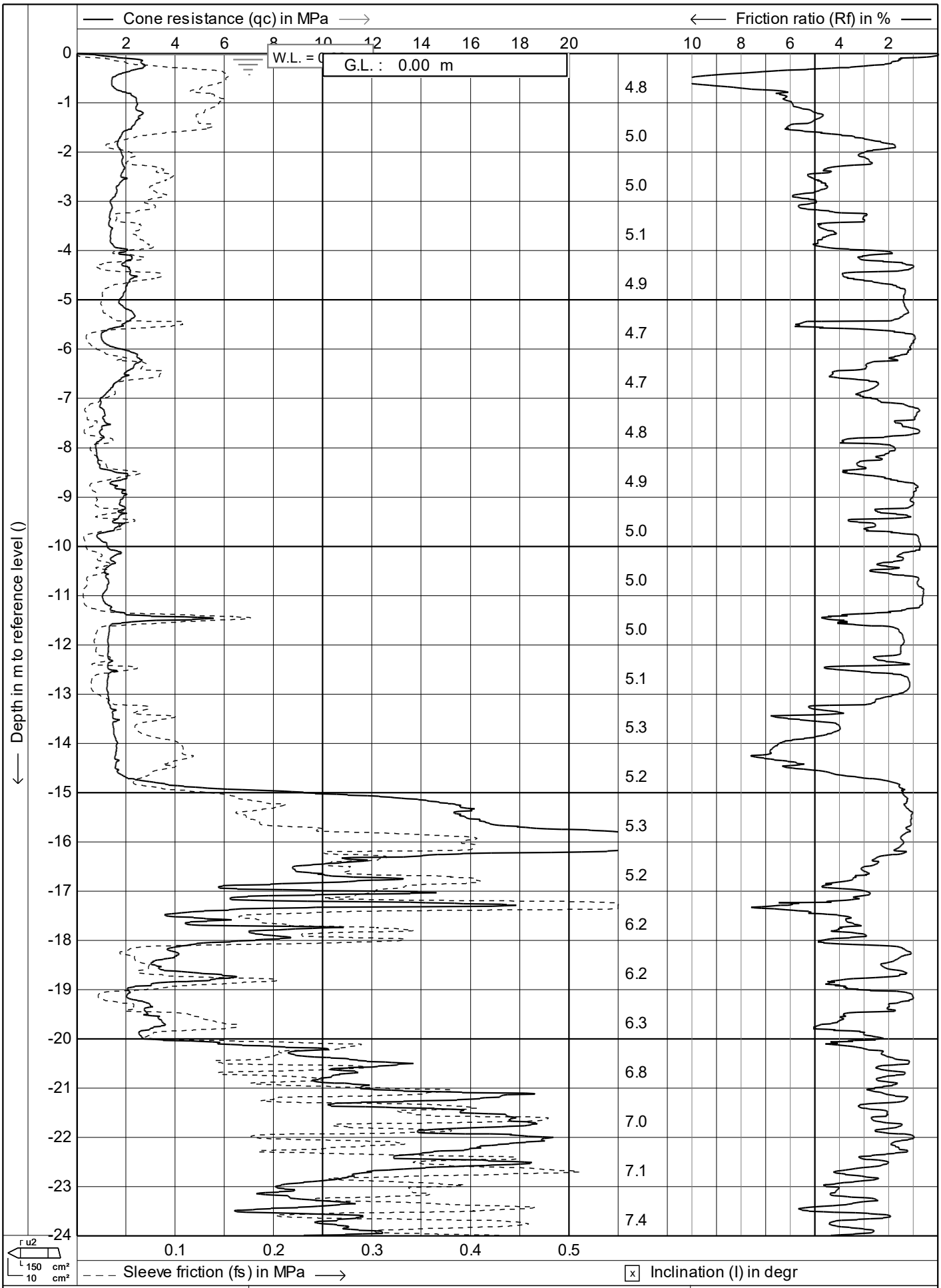
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT06** **9/14**

1.49



A.S.T.M D5778-12

PERRY GEOTECH

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

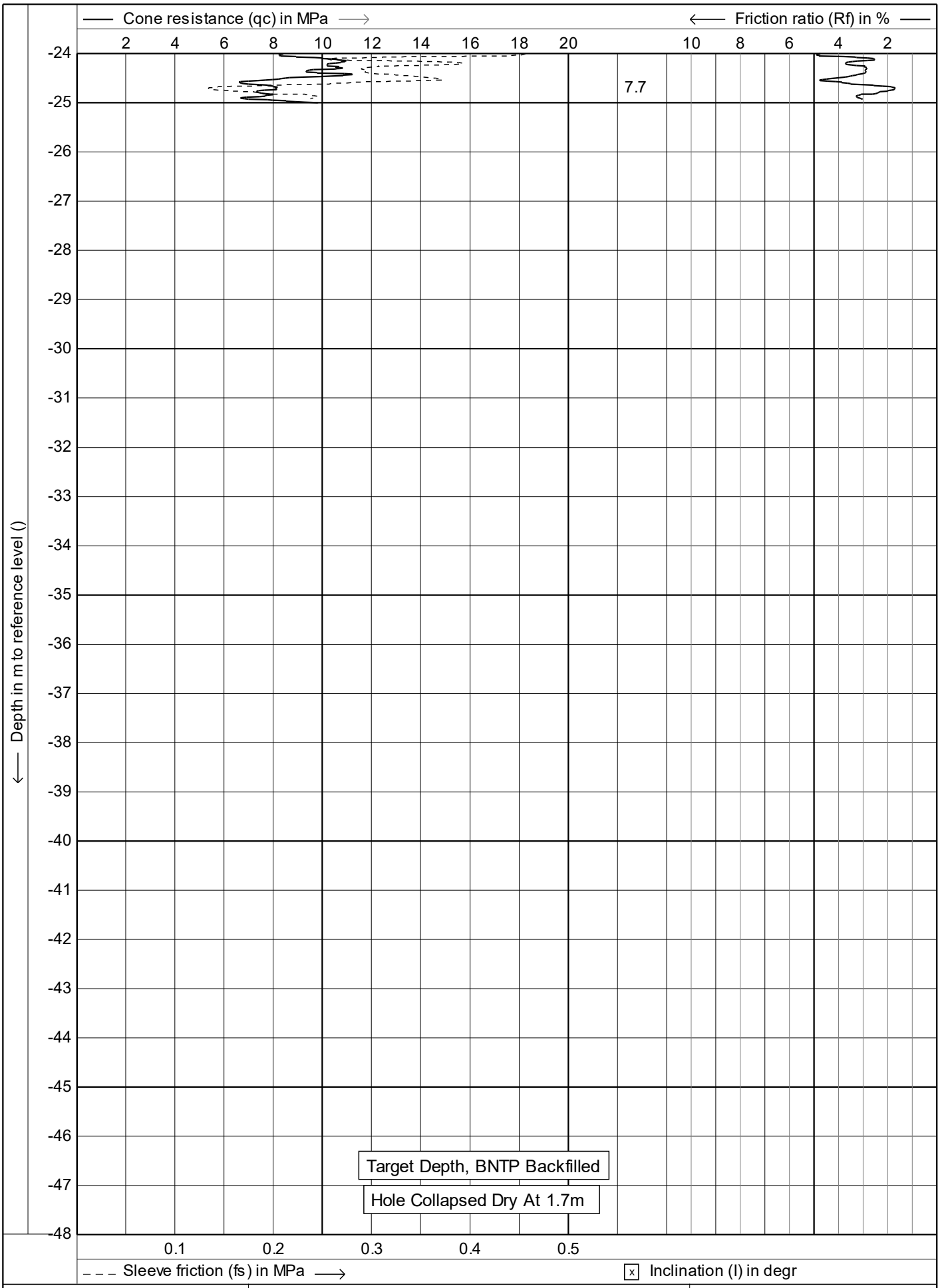
Date : **25/02/2022**

Cone no. : **C10CFIIP.C15212**

Project no. : **02CMW008**

CPT no. : **SCPT07** **1/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

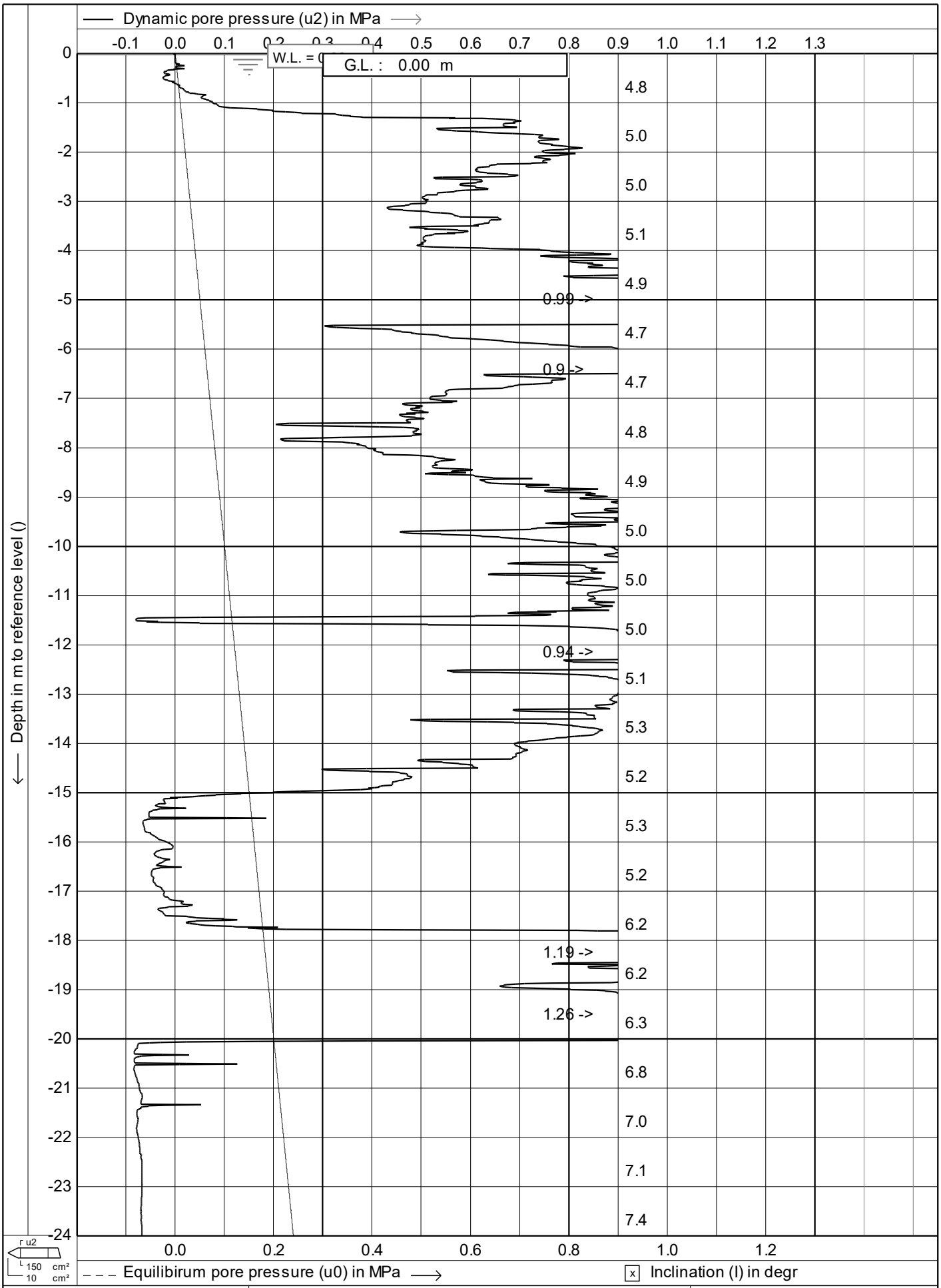
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT07** **2/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

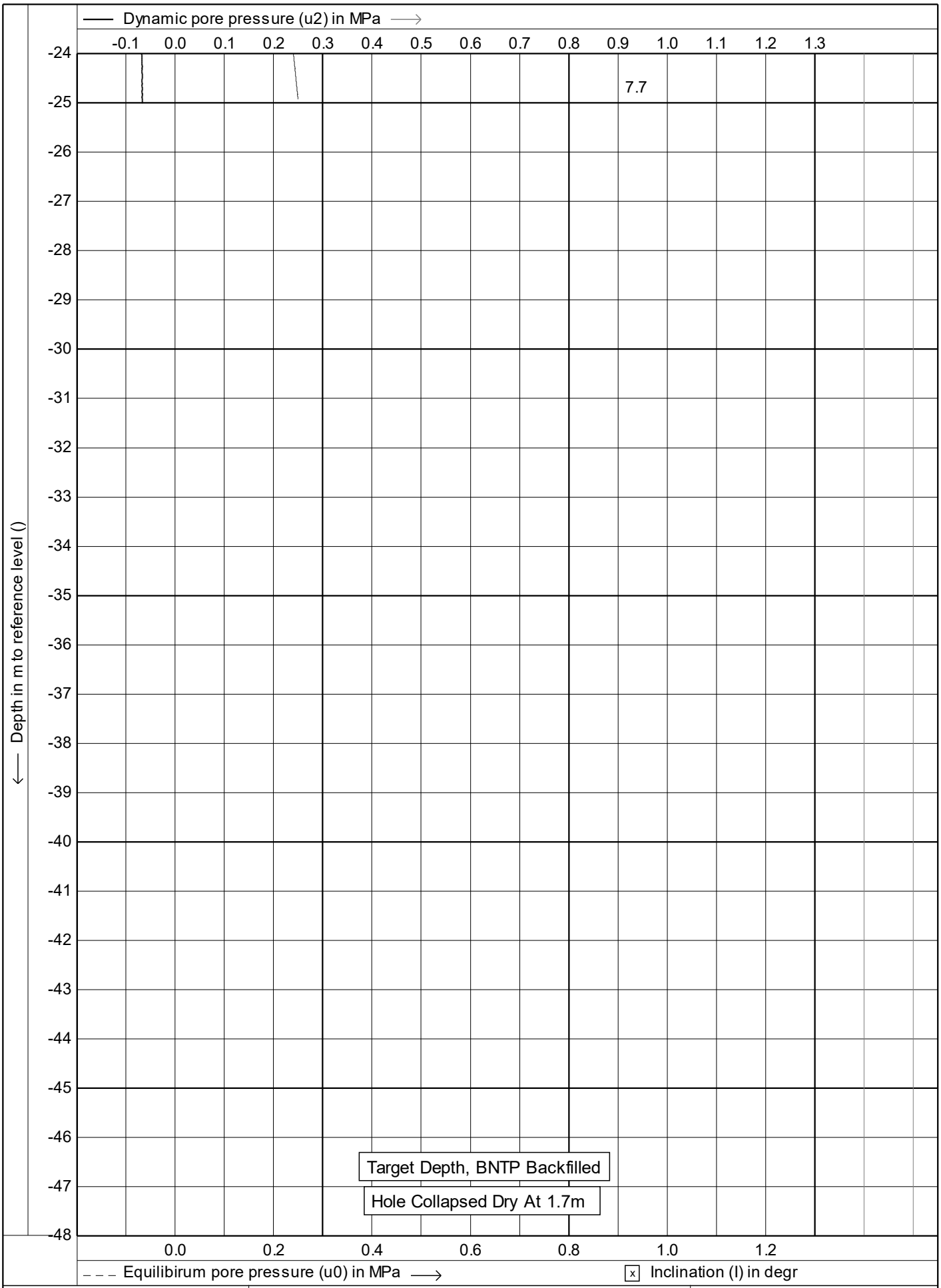
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT07** **3/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

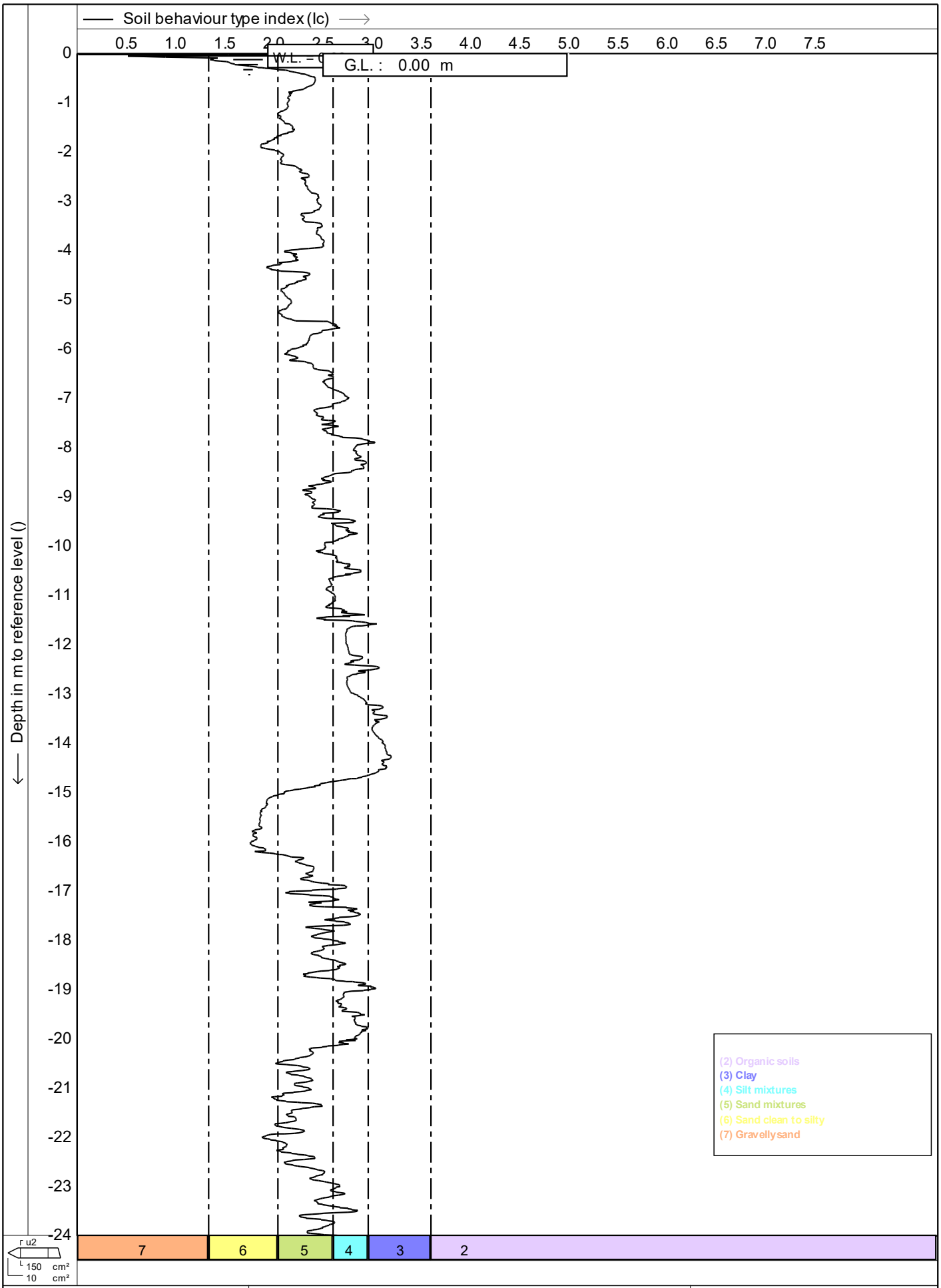
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT07** **4/28**

1.49



A.S.T.M D5778-12

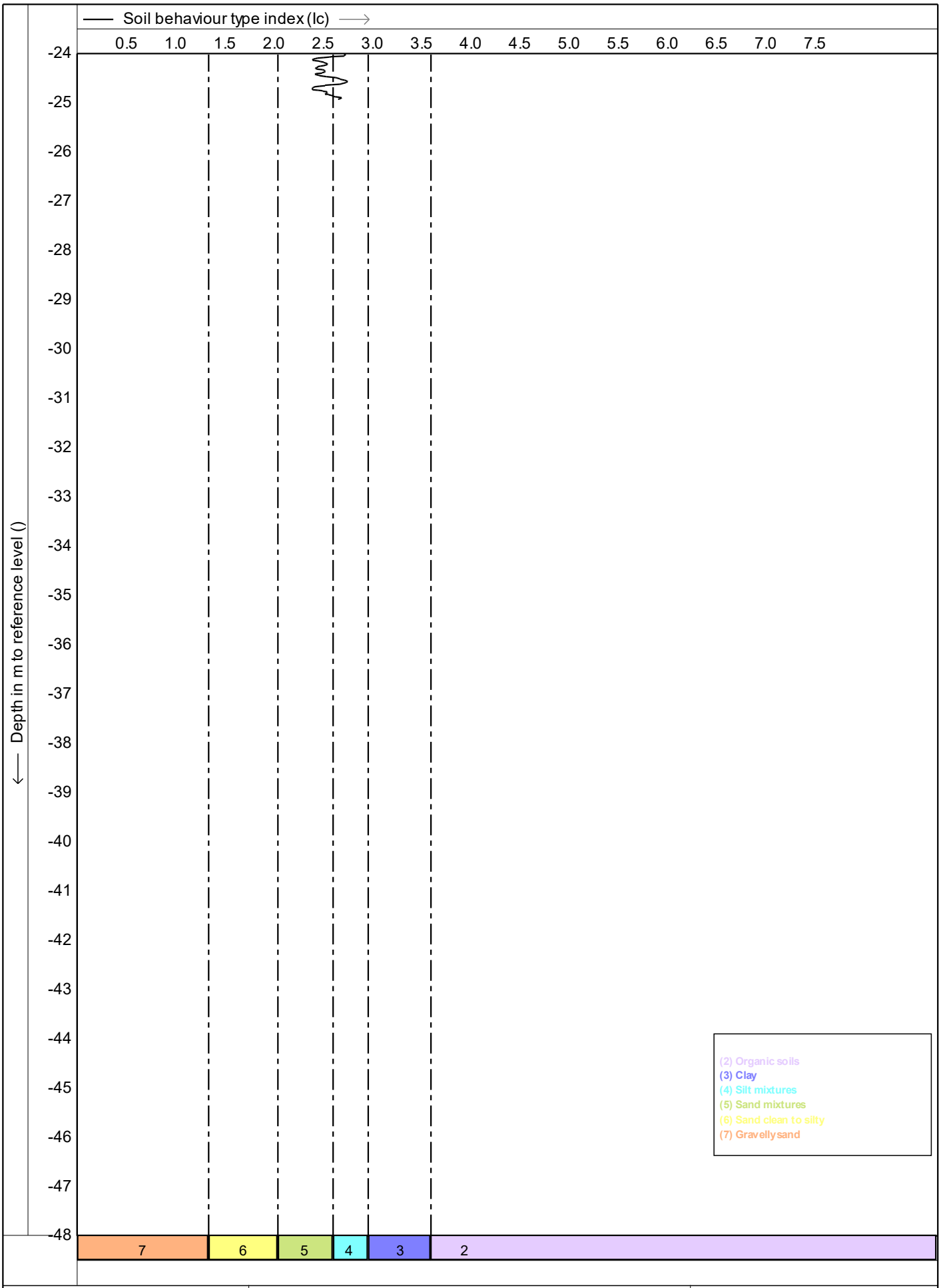
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT07** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

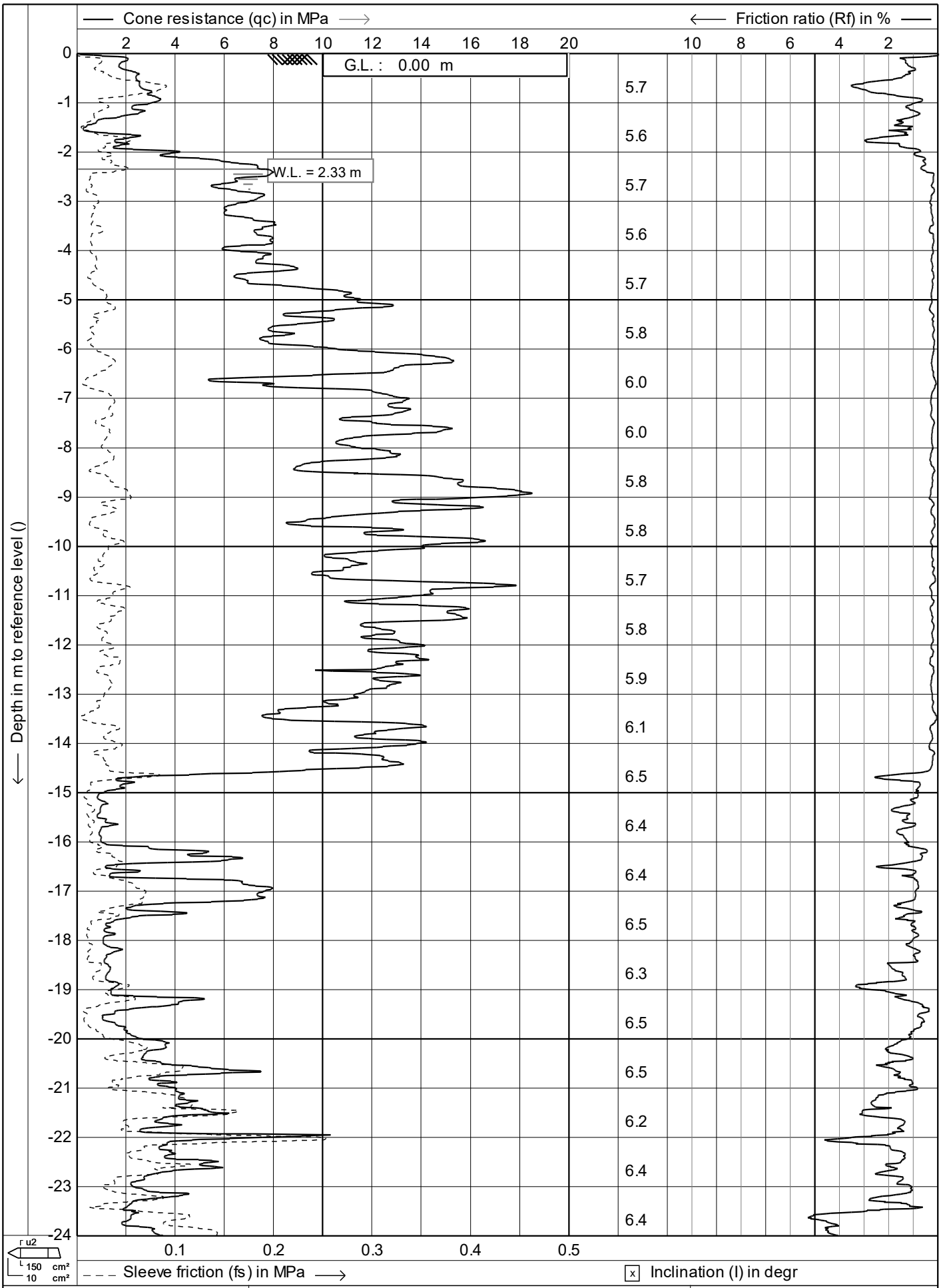
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

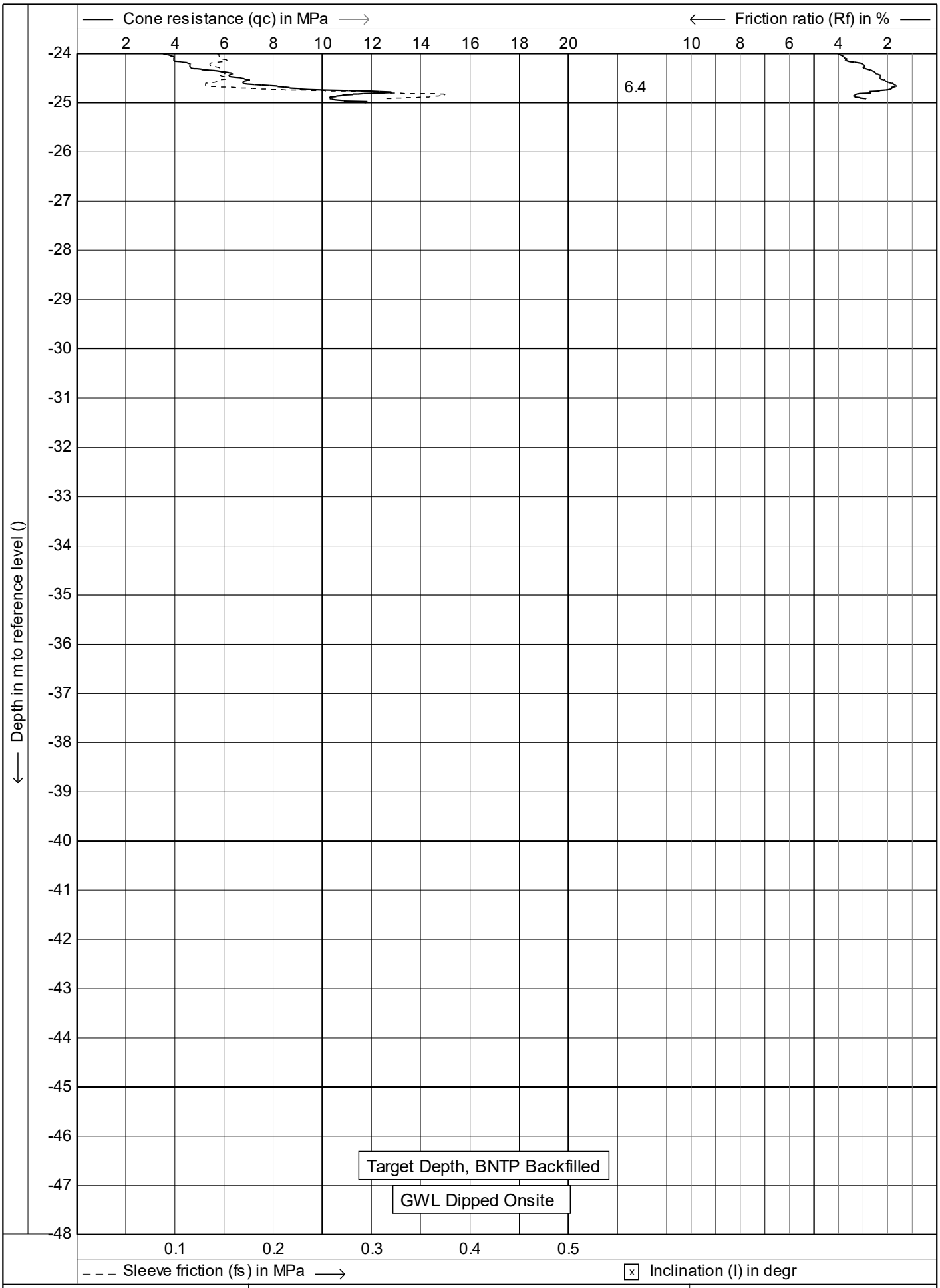
Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT07** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT08** 1/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

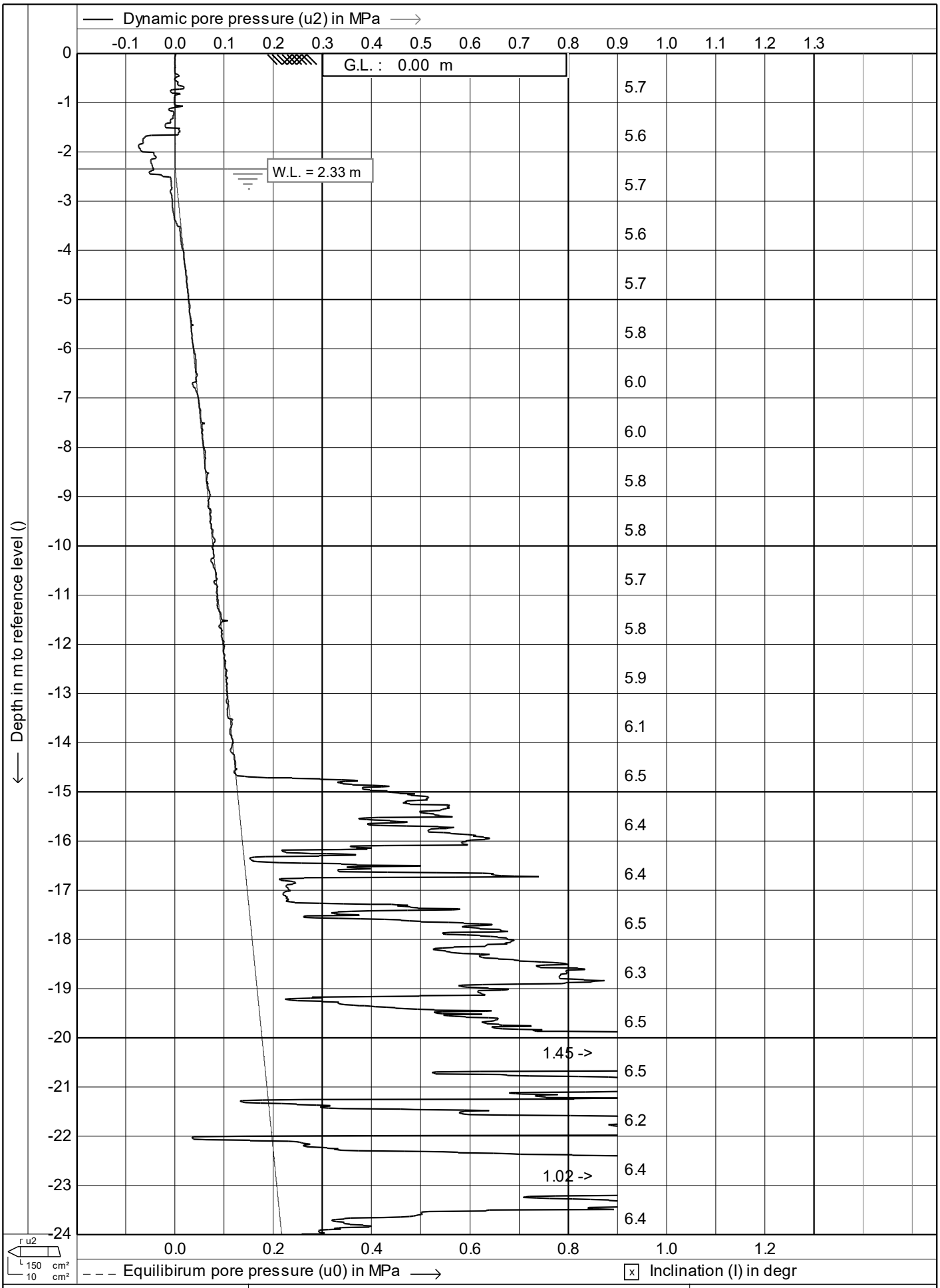
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT08** **2/28**

1.49



A.S.T.M D5778-12

PERRY GEOTECH

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

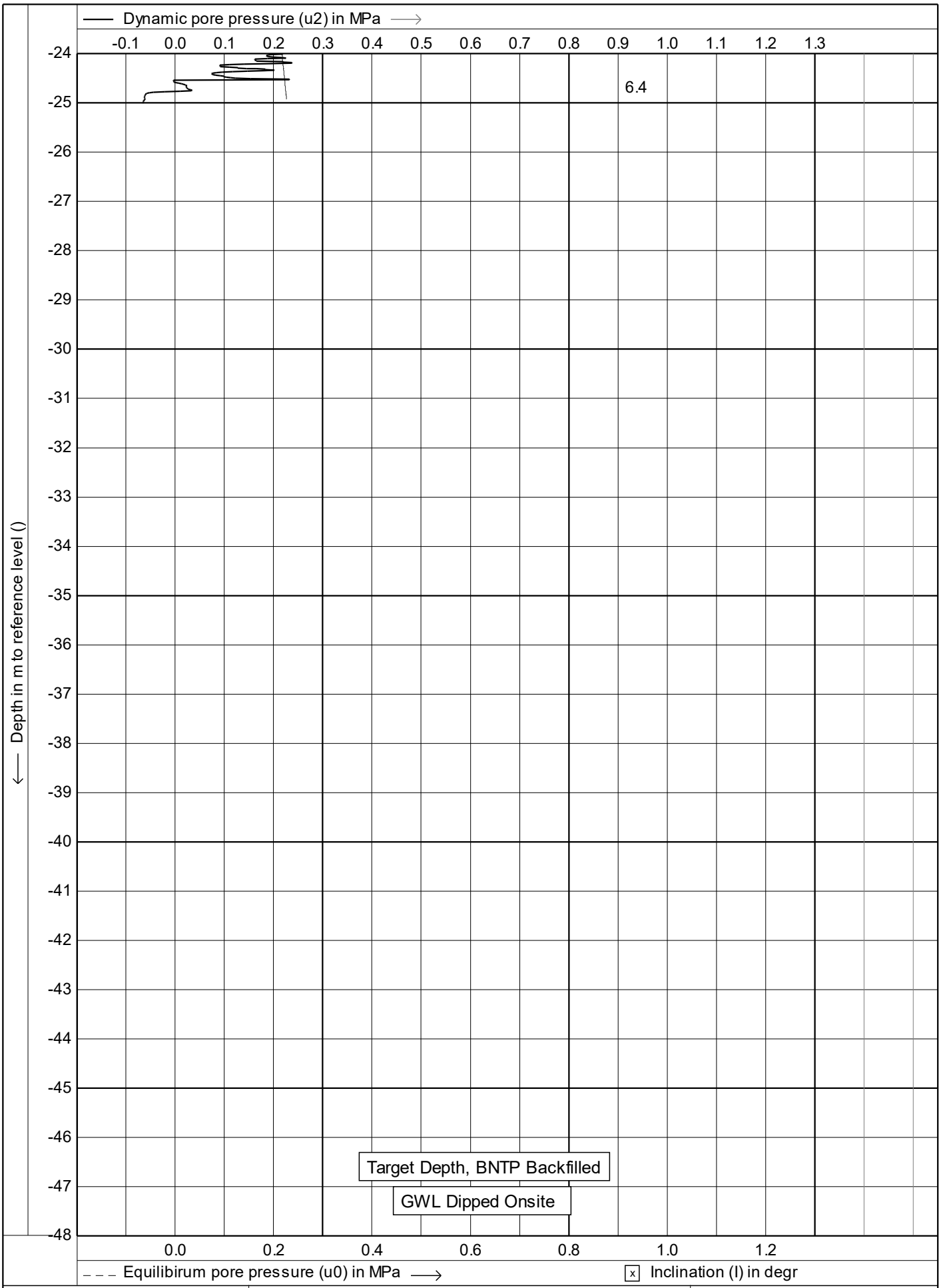
Date : **24/02/2022**

Cone no. : **C10CFIIP.C15212**

Project no. : **02CMW008**

CPT no. : **SCPT08** **3/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

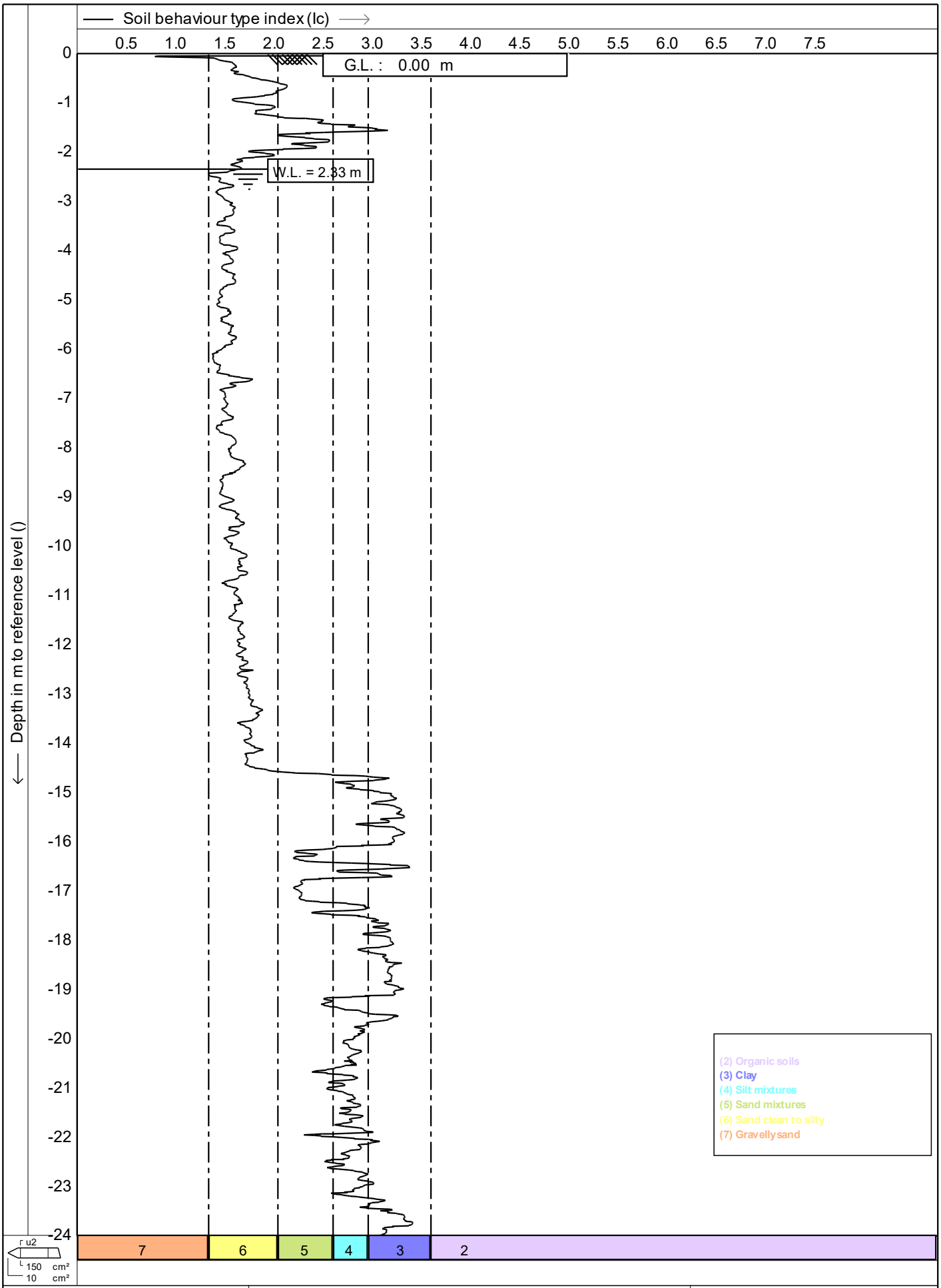
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

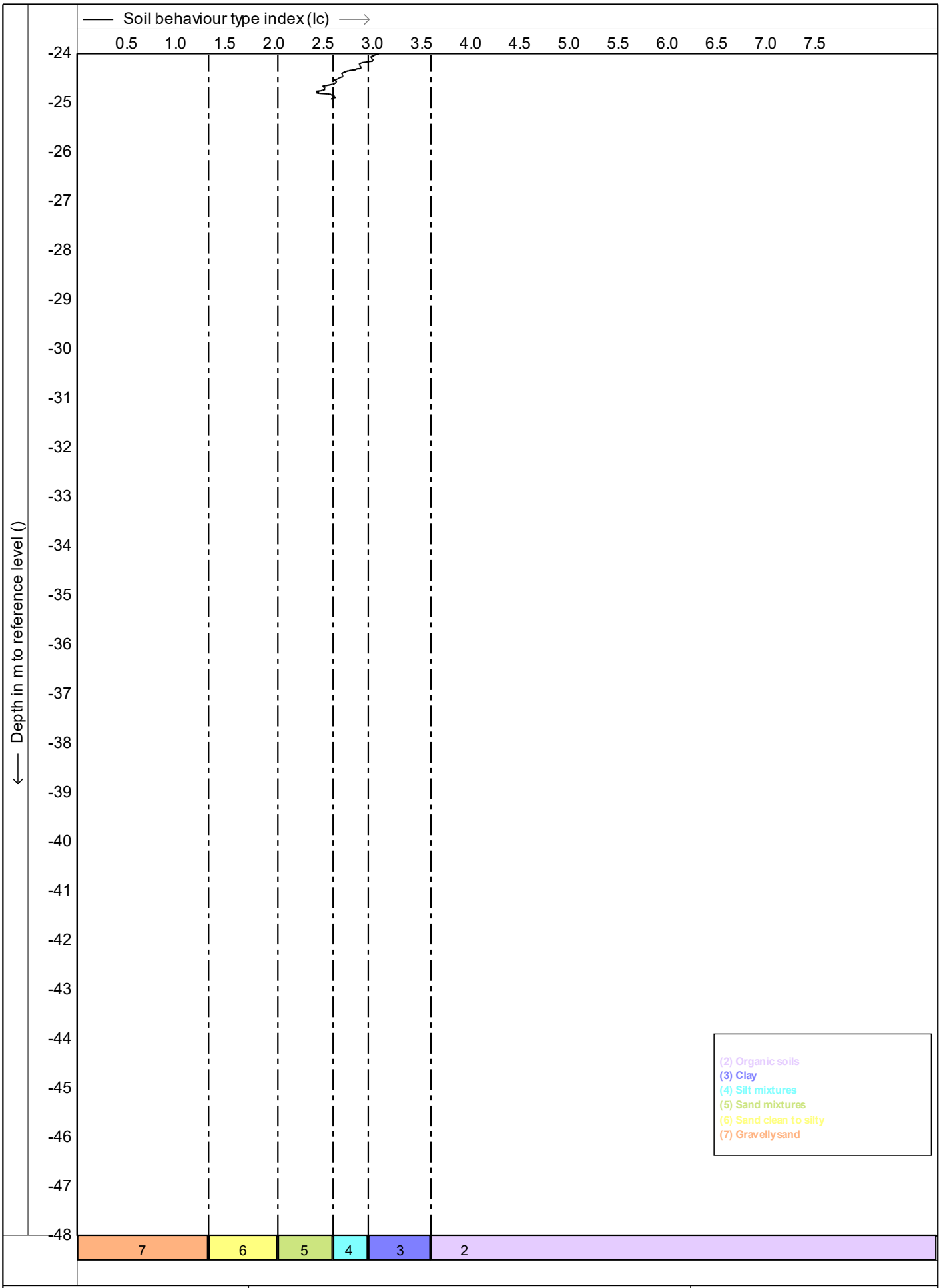
Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT08** **4/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **24/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT08** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

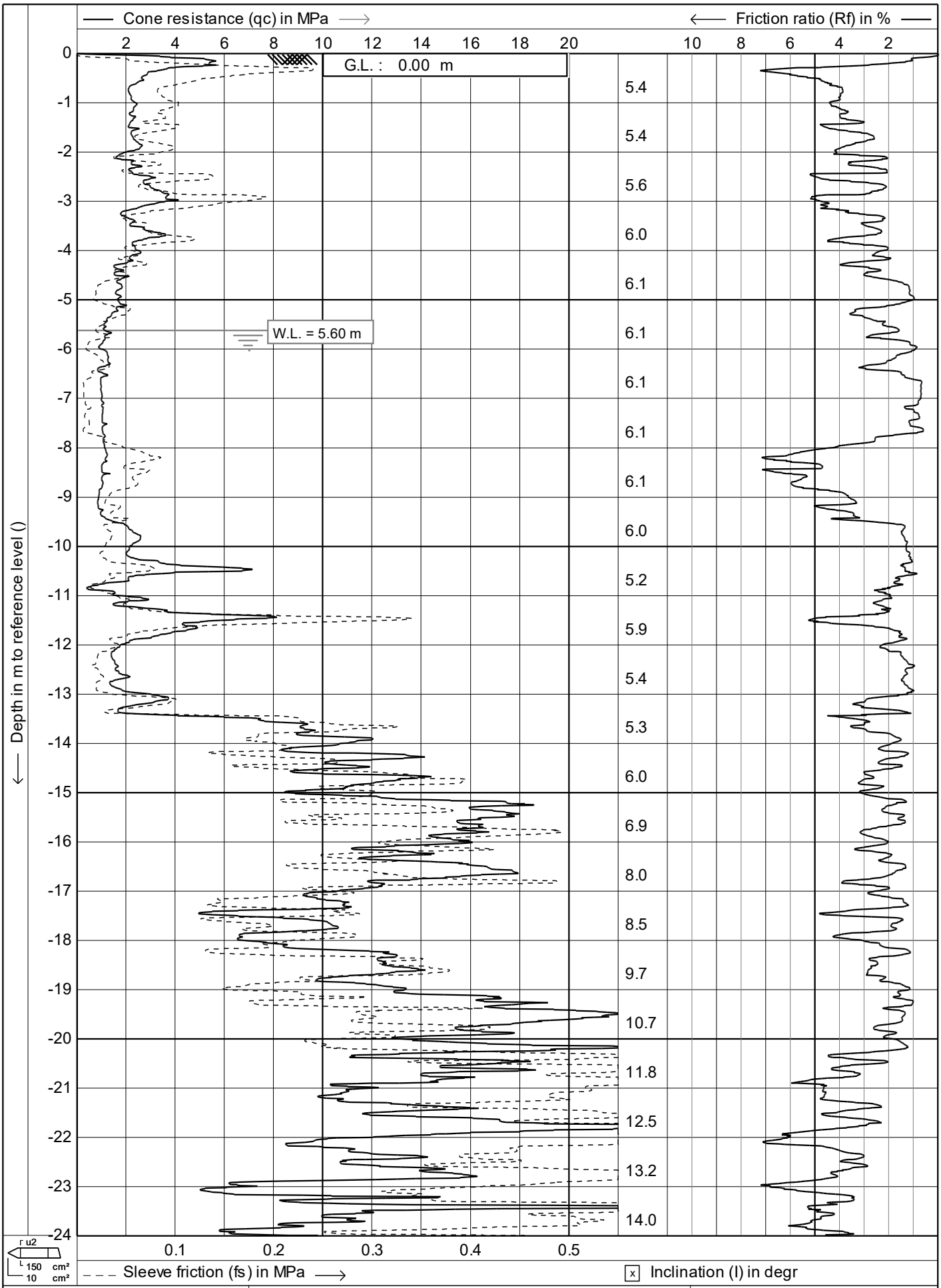
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

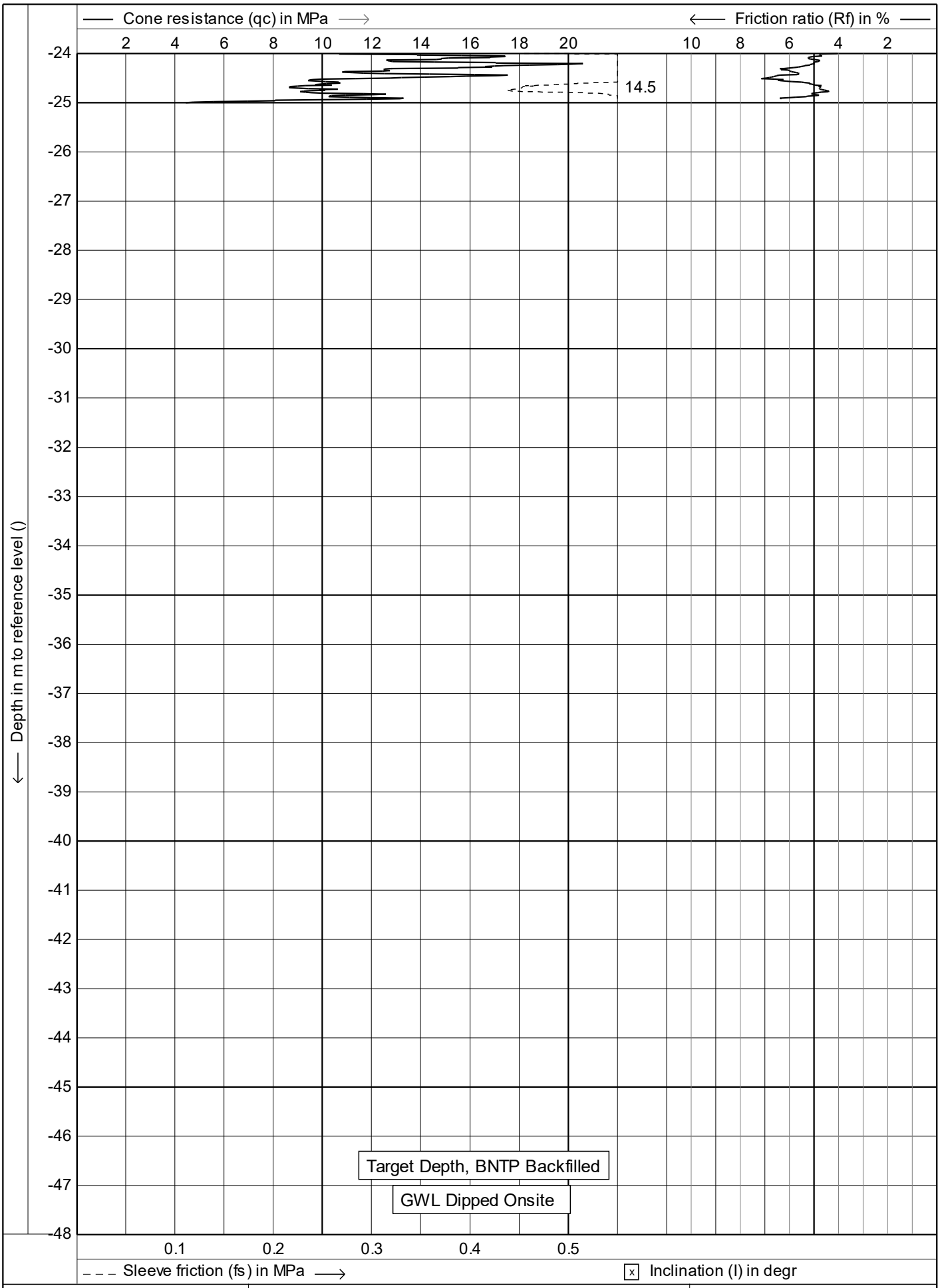
Date	: **24/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT08** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **25/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT09** 1/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

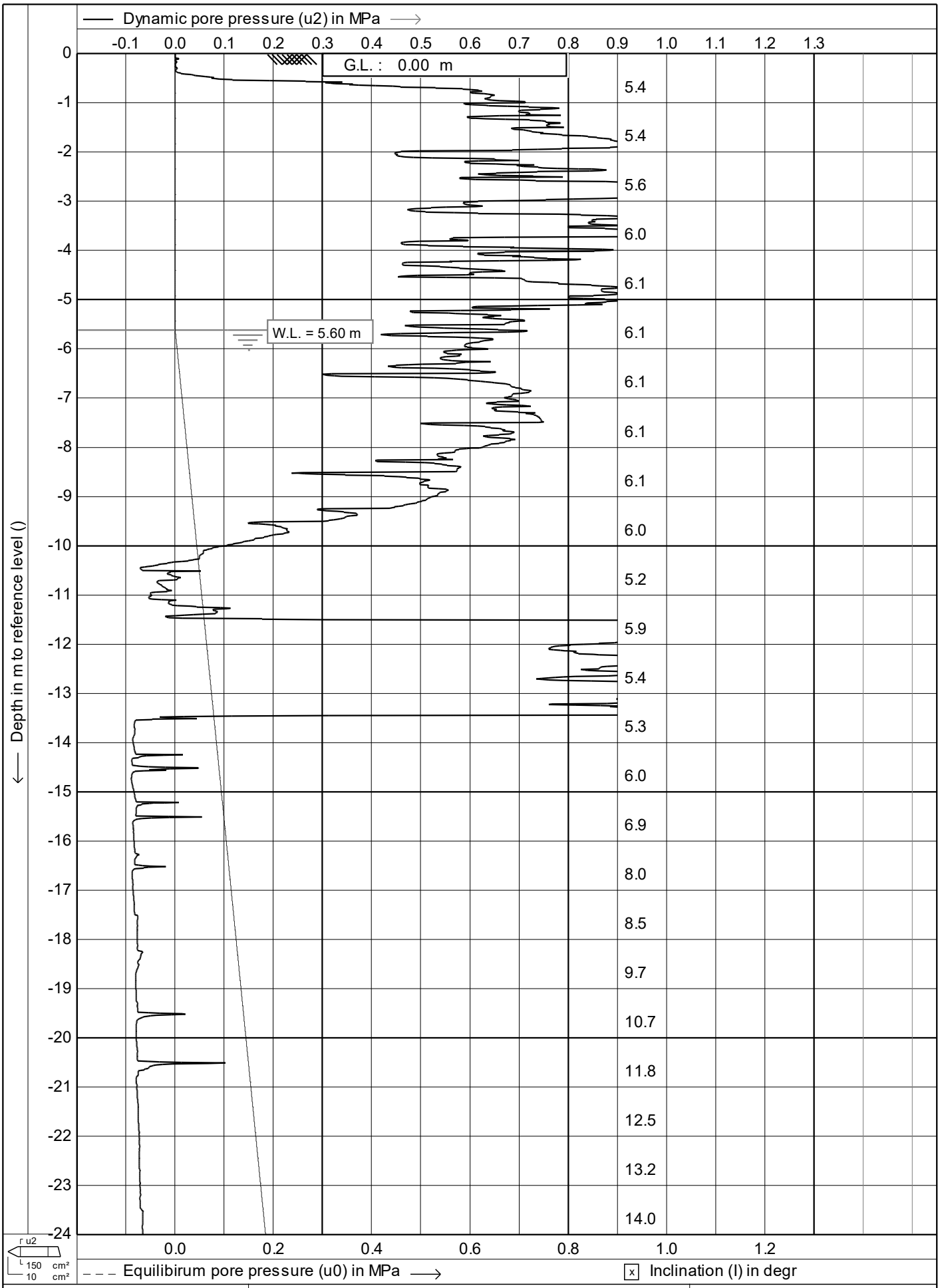
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT09** **2/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

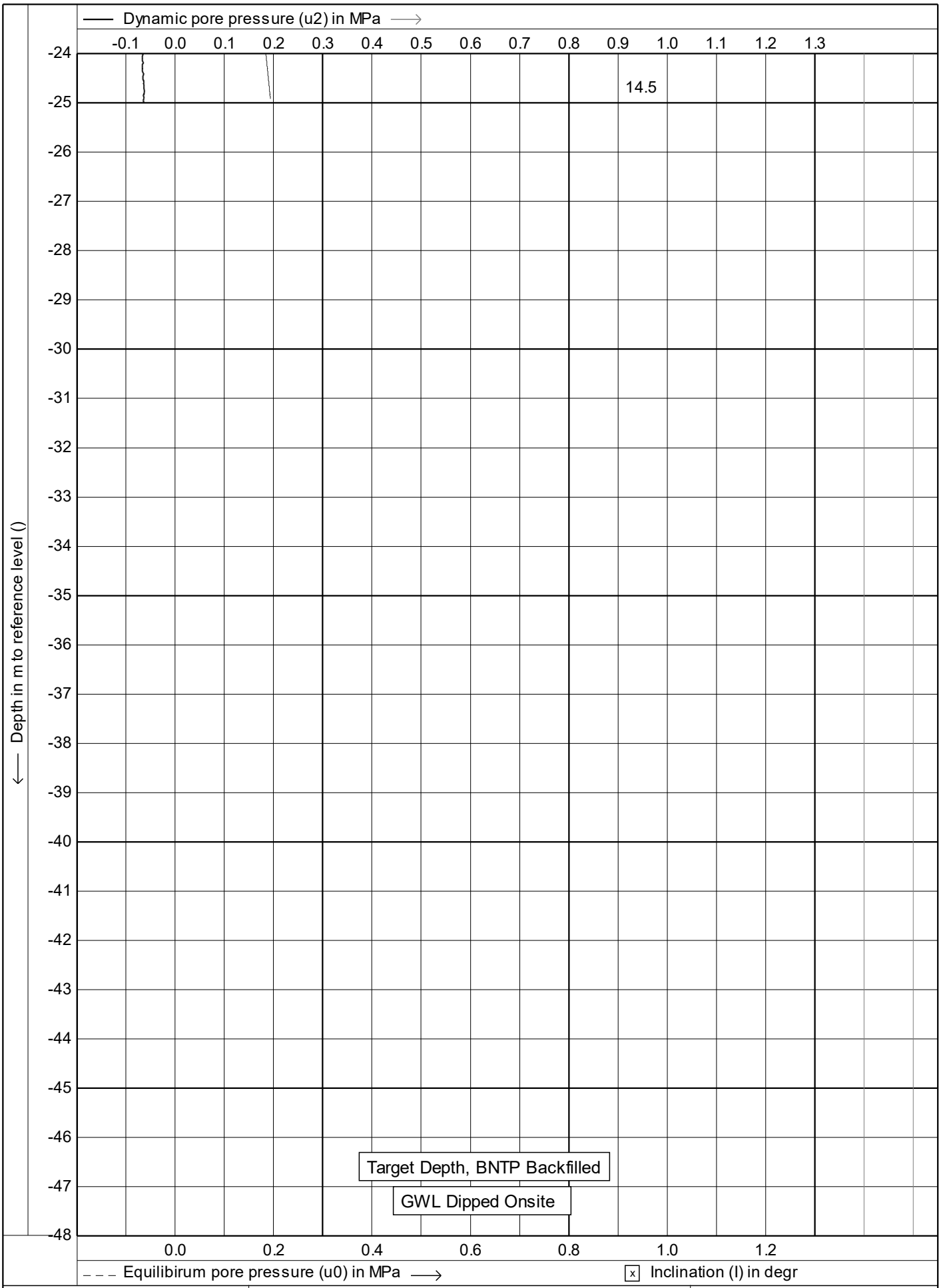
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT09** **3/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

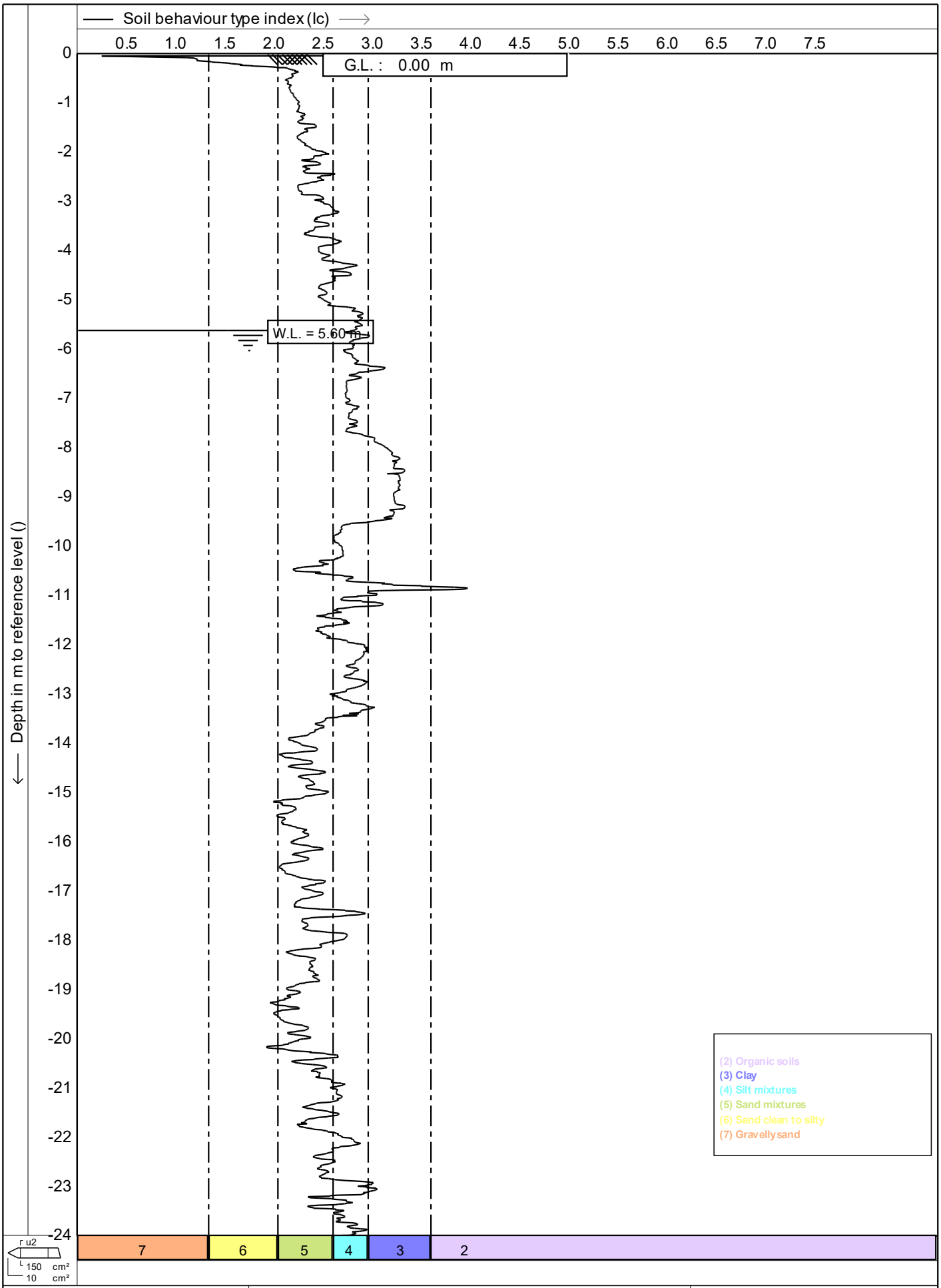
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT09** **4/28**

1.49



A.S.T.M D5778-12

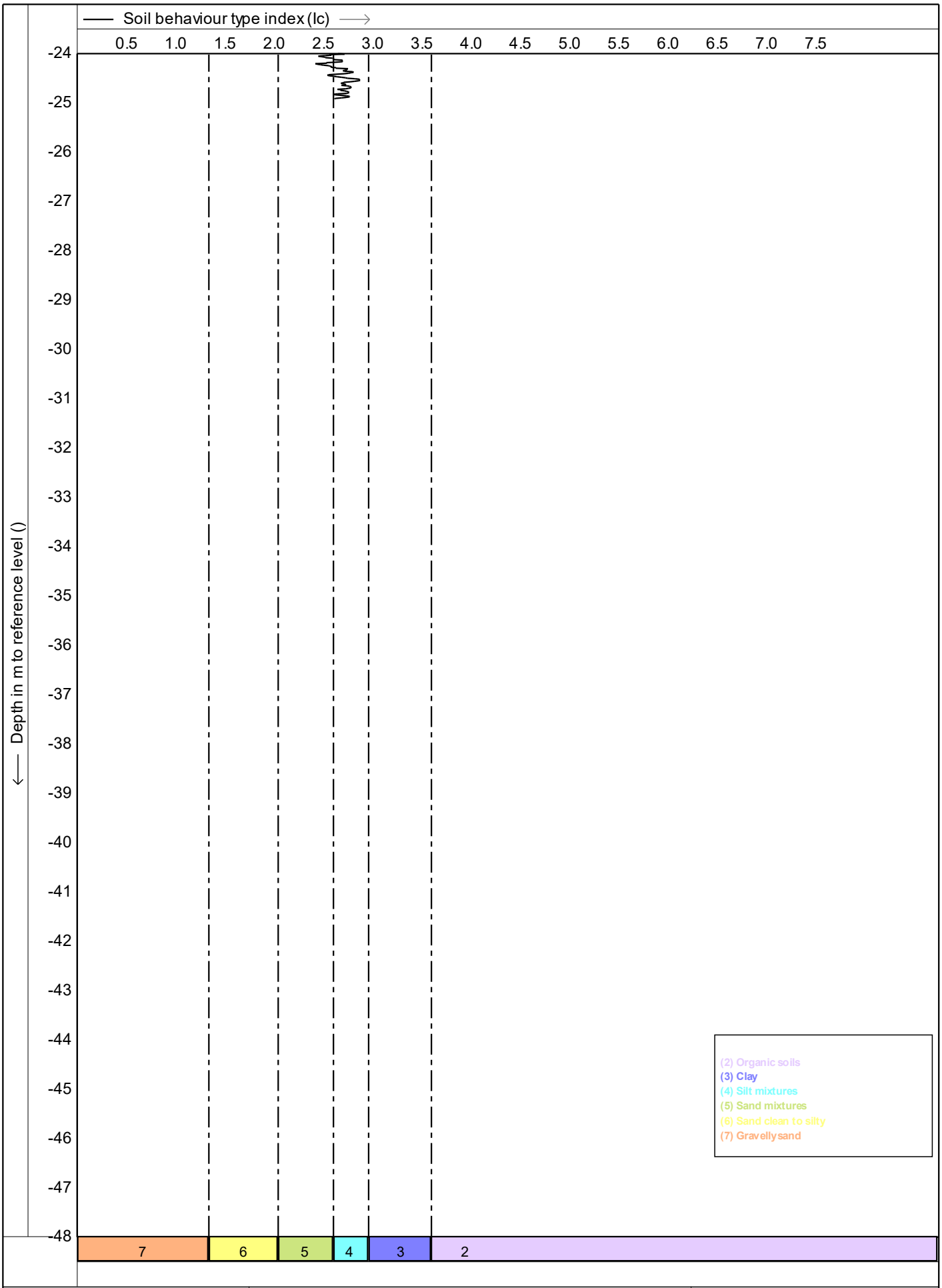
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT09** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

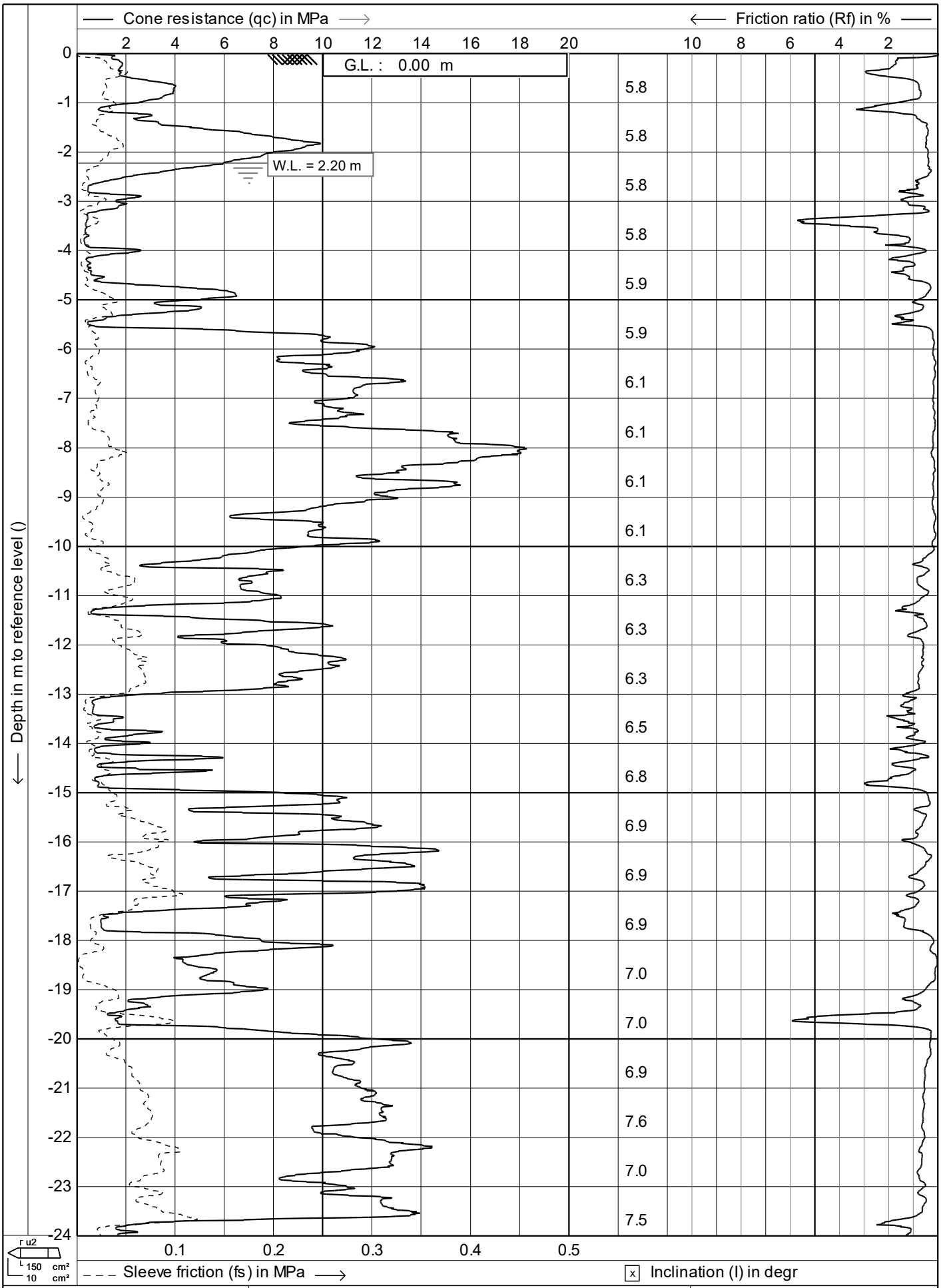
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

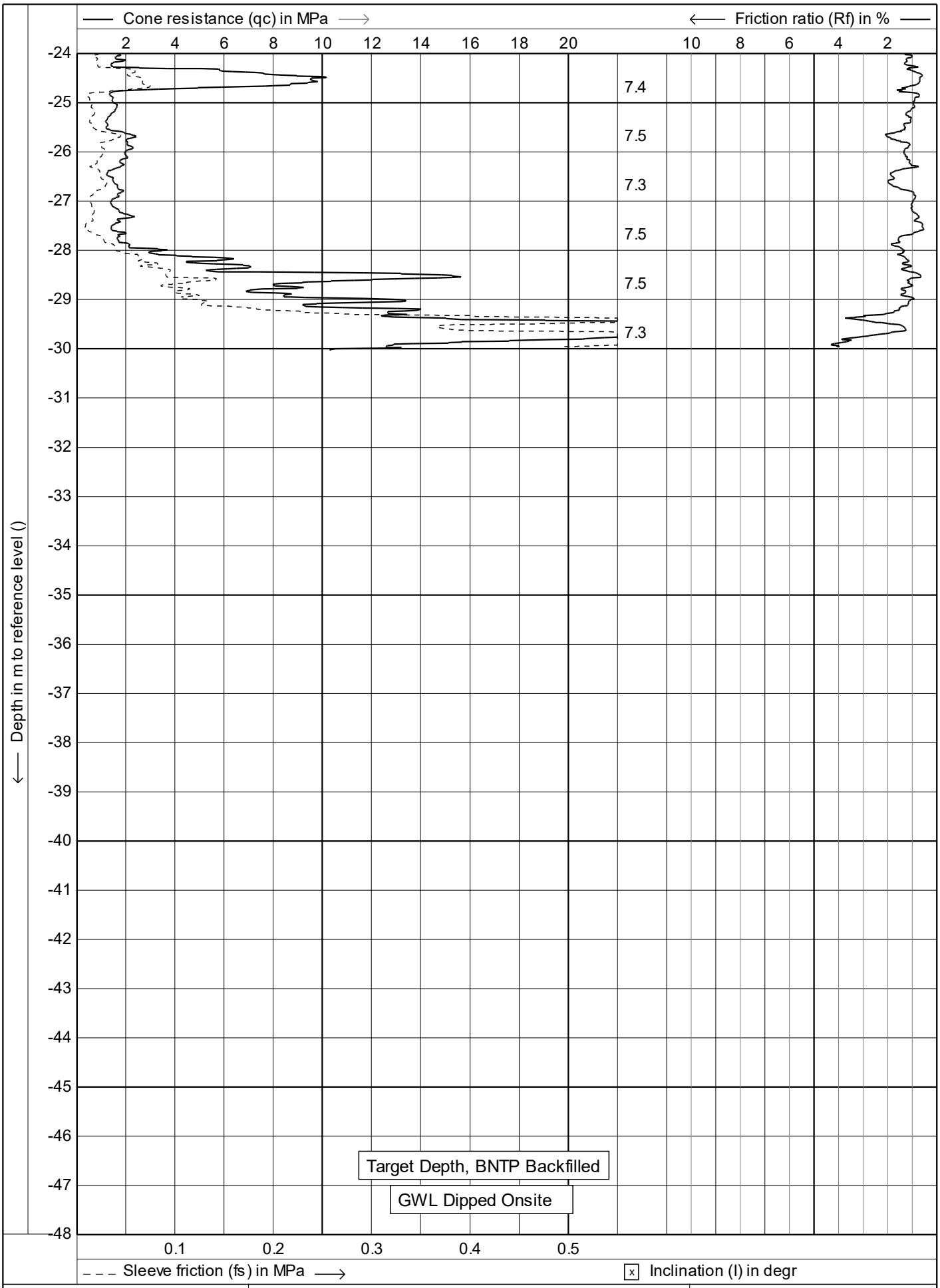
Date	: **25/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT09** **18/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **23/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT01** 1/28

1.49



PERRY GEOTECH

A.S.T.M D5778-12

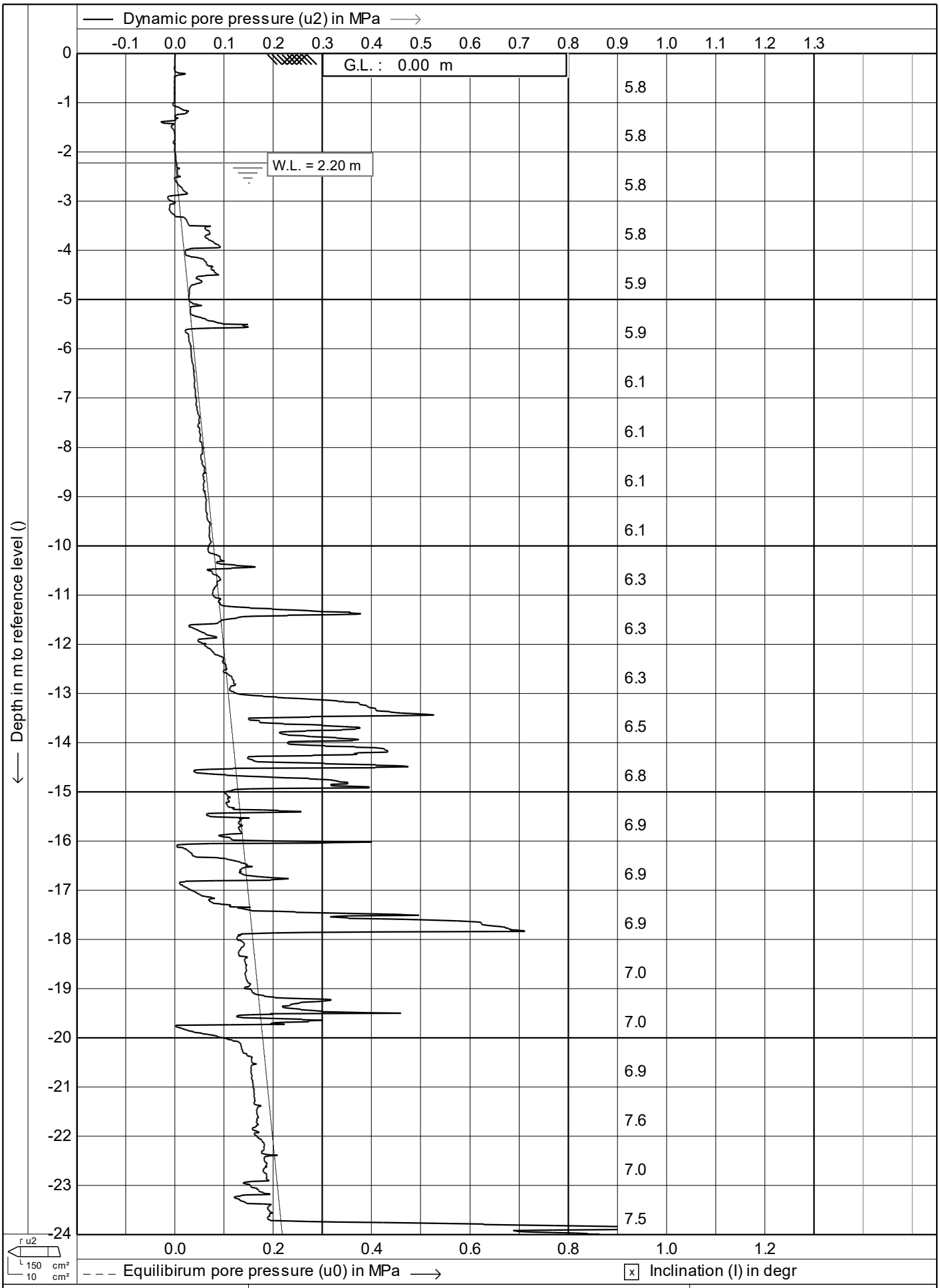
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT01** **2/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

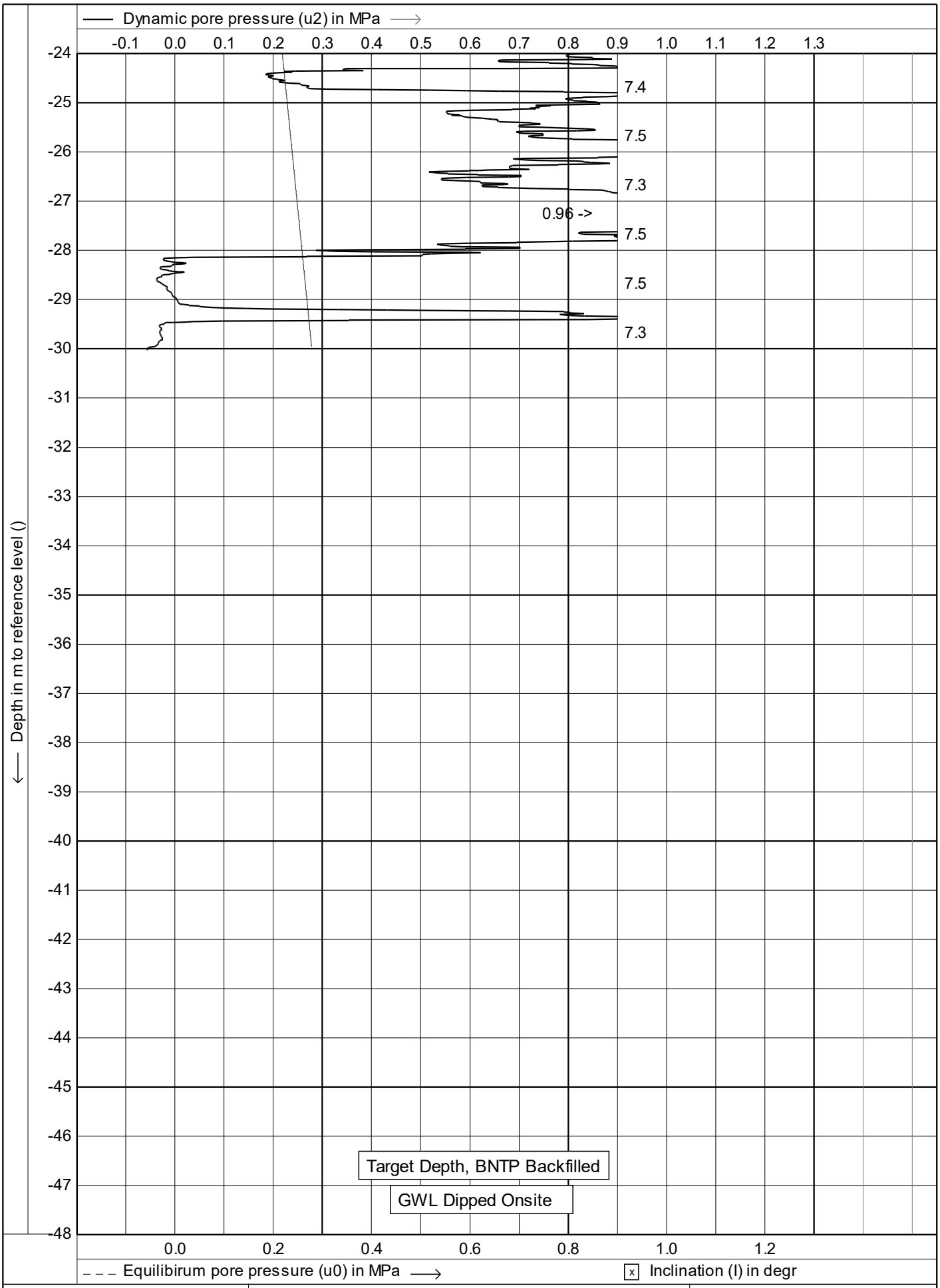
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

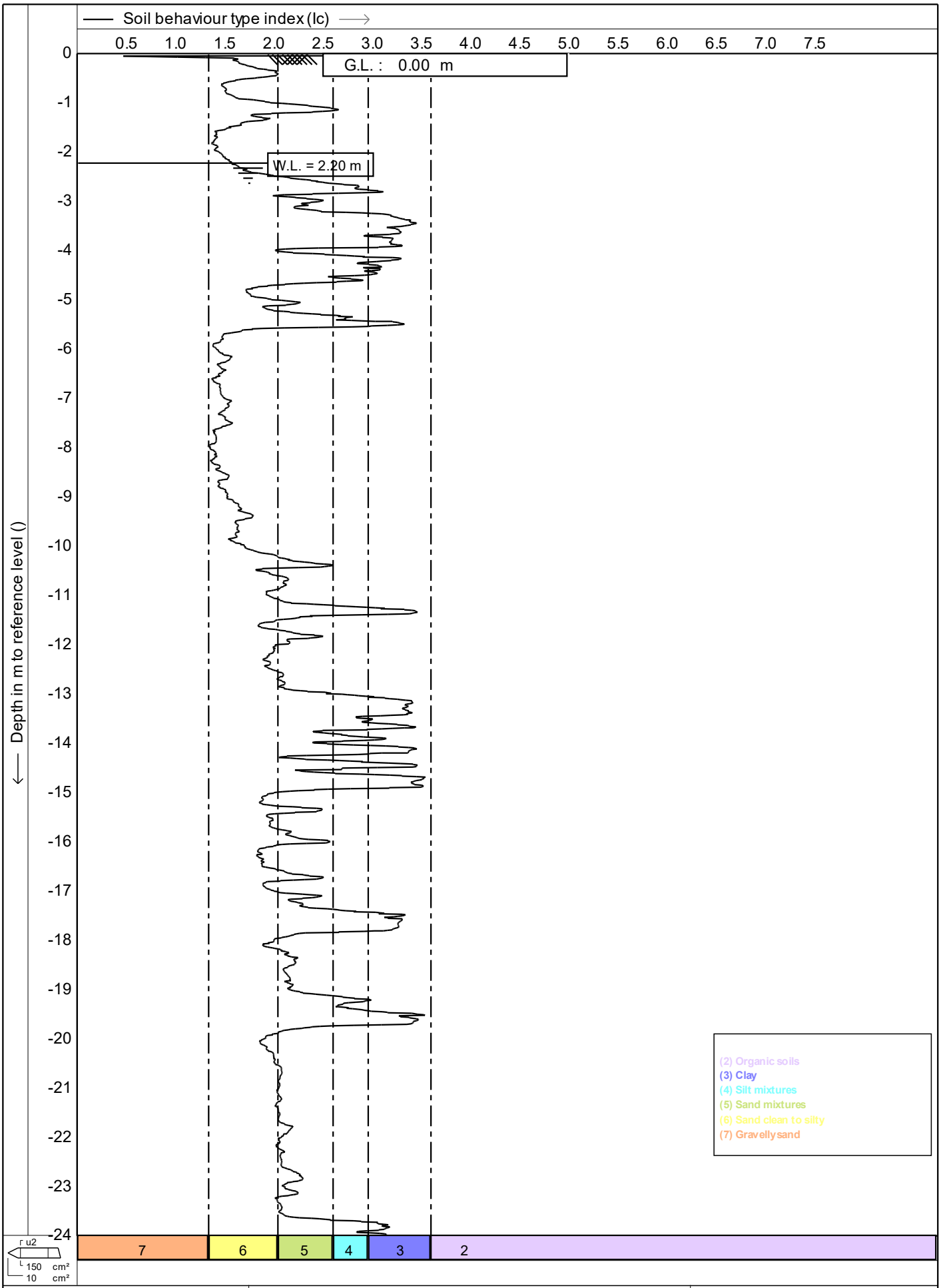
Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT01** **3/28**

1.49



PERRY GEOTECH	A.S.T.M D5778-12	Date : **23/02/2022**
	Project : **Site Investigations**	Cone no. : **C10CFIIP.C15212**
	Location: **Ruakura Research Campus**	Project no. : **02CMW008**
	Position: **0, 0**	CPT no. : **SCPT01** **4/28**

1.49



A.S.T.M D5778-12

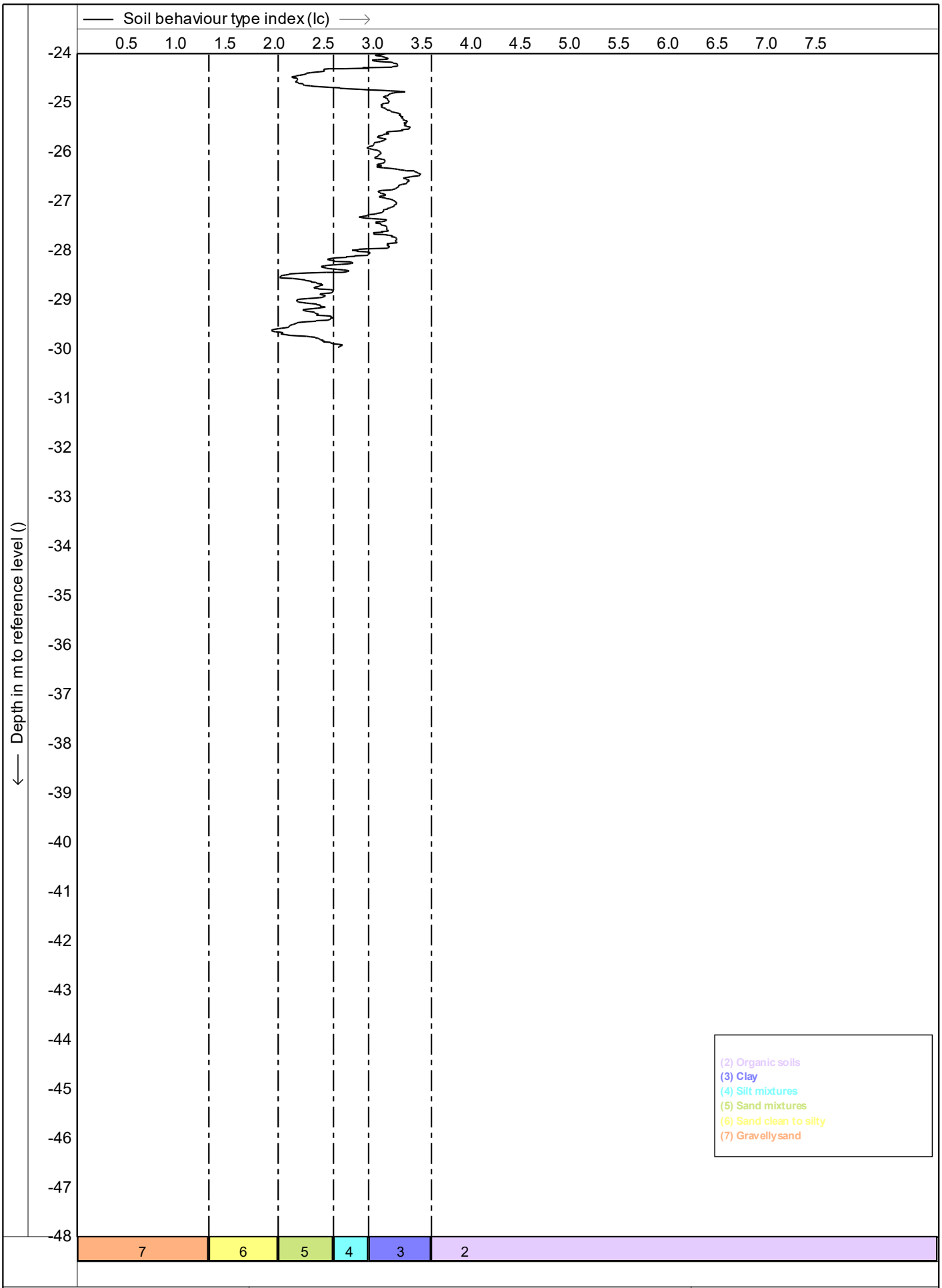
Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT01** **17/28**

1.49



PERRY GEOTECH

A.S.T.M D5778-12

Project : **Site Investigations**

Location: **Ruakura Research Campus**

Position: **0, 0**

Date	: **23/02/2022**
Cone no.	: **C10CFIIP.C15212**
Project no.	: **02CMW008**
CPT no.	: **SCPT01** **18/28**

1.49

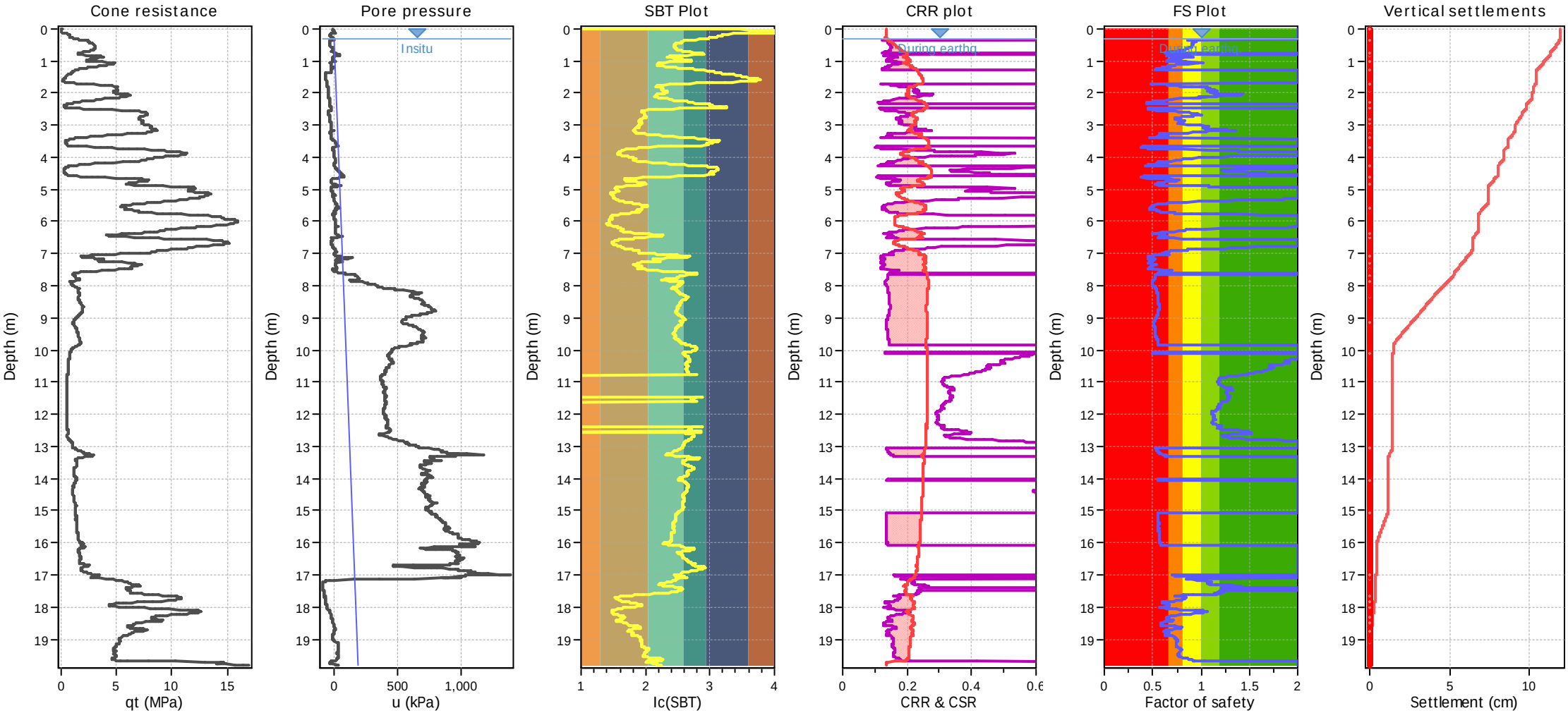
Appendix C: Liquefaction Assessment

0.25g – Total ULS

CMW Geosciences
Suite 2, 5 Hill Street
Hamilton
cmwgeo.com

Project: Tramway Rezoning
Location: Ruakura

CPT: CPT201
Total depth: 19.81 m

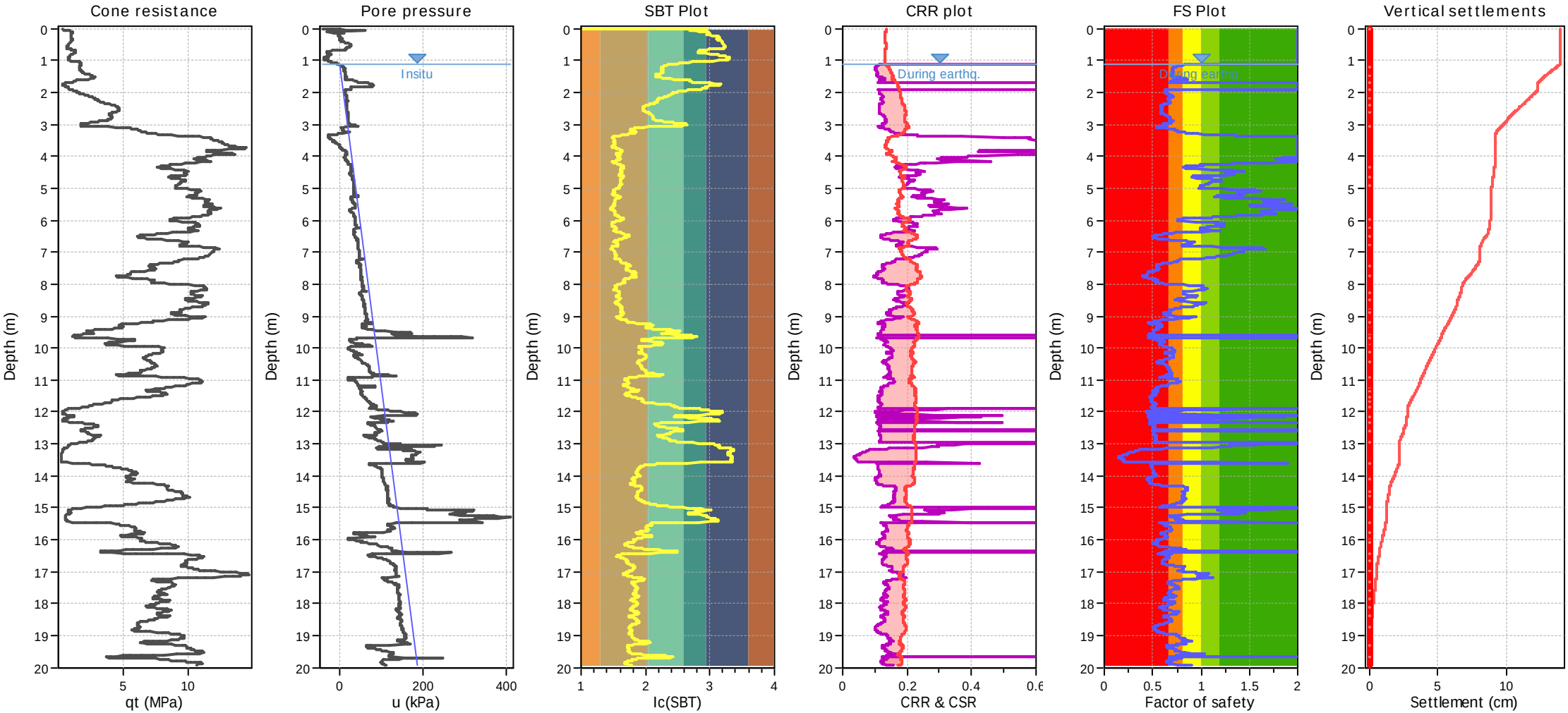


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.30 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Suite 2, 5 Hill Street
Hamilton
cmwgeo.com

Project: Tramway Rezoning
Location: Ruakura

CPT: CPT202
Total depth: 19.93 m

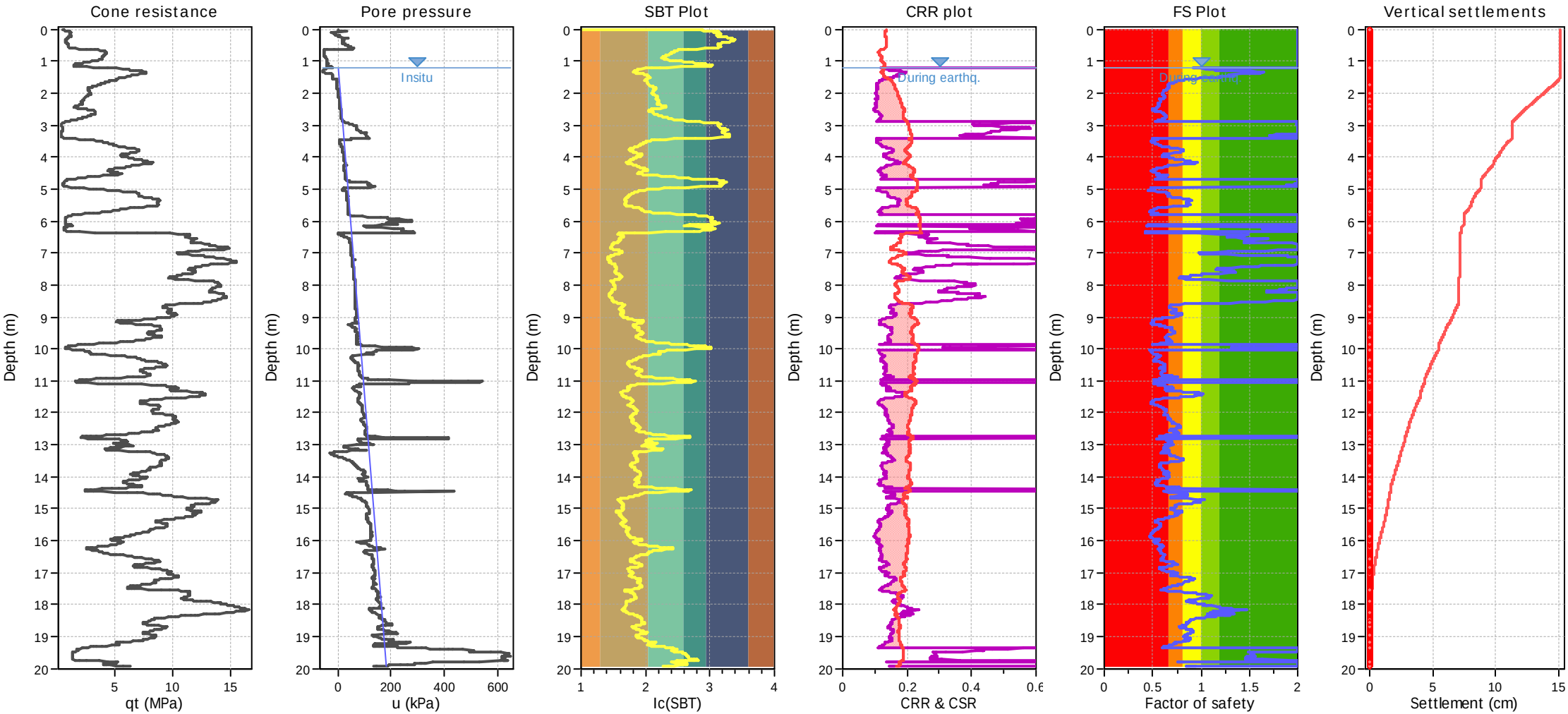


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

CMW Geosciences
Suite 2, 5 Hill Street
Hamilton
cmwgeo.com

Project: Tramway Rezoning
Location: Ruakura

CPT: CPT203
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.20 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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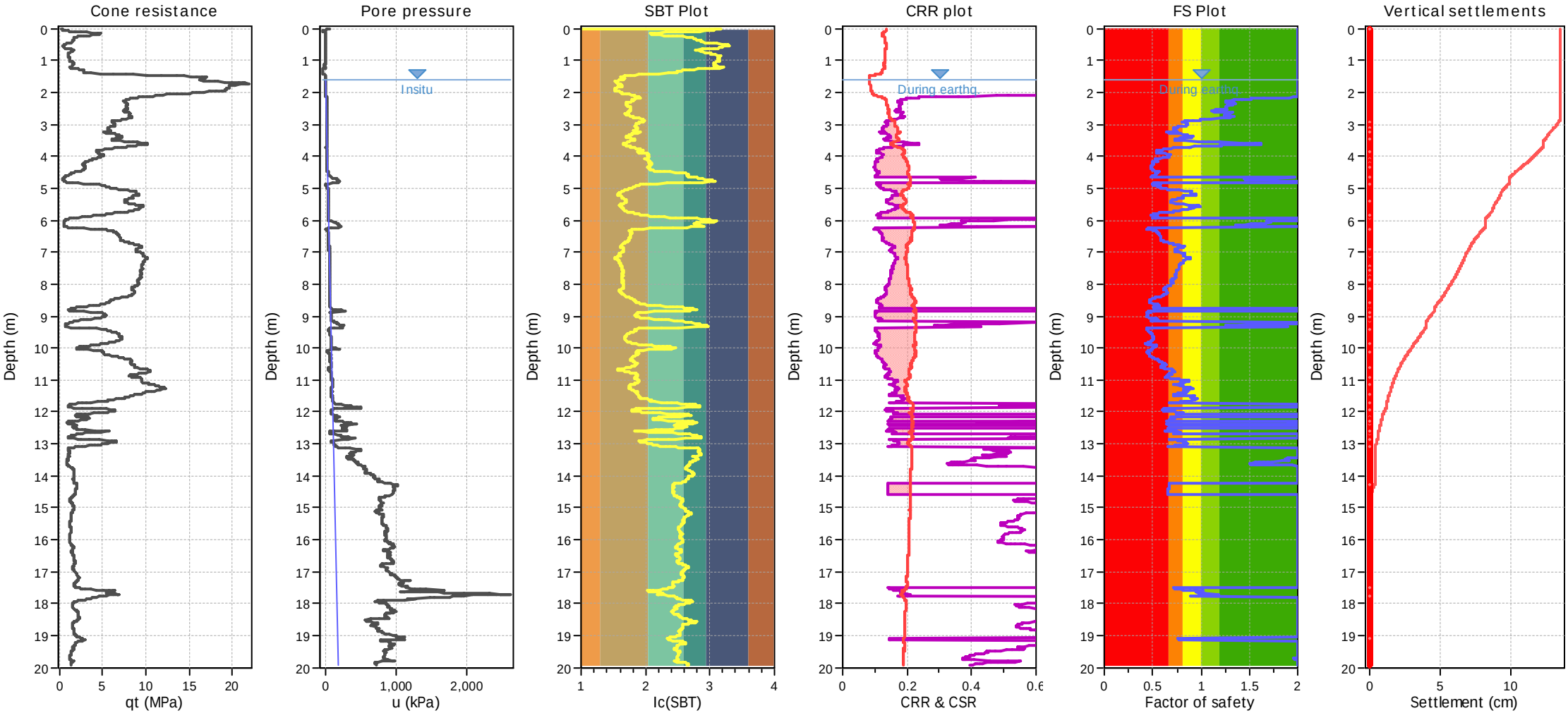
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT204
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.60 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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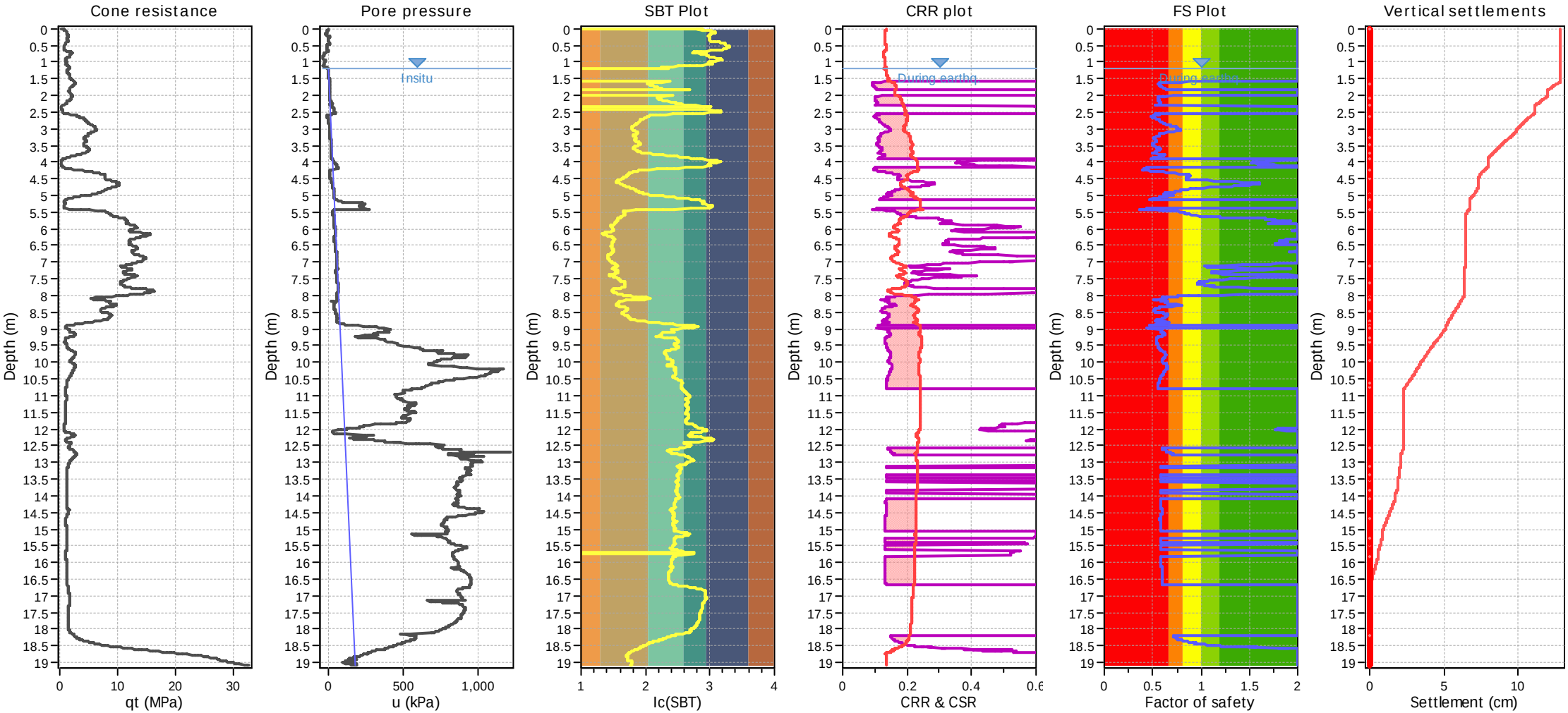
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT207
Total depth: 19.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.20 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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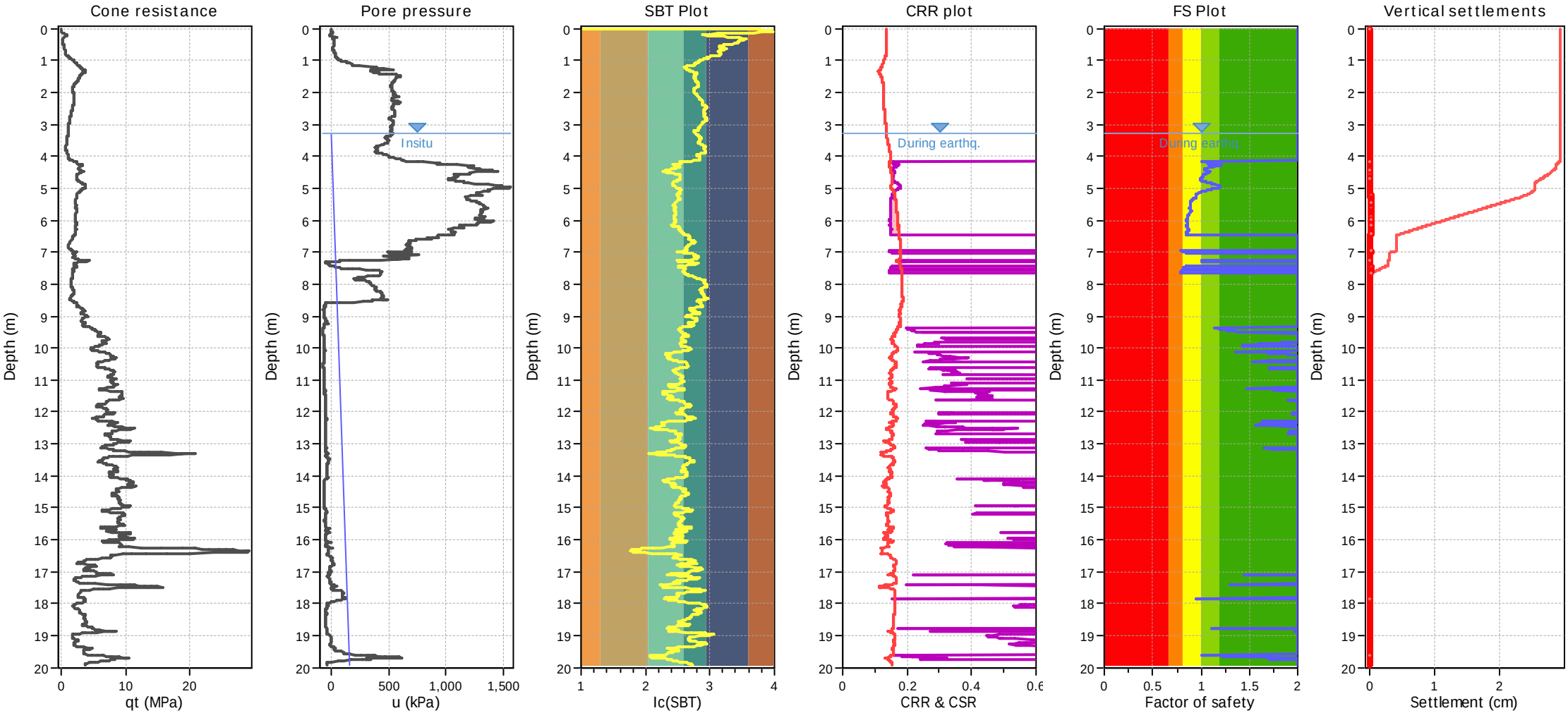
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT208
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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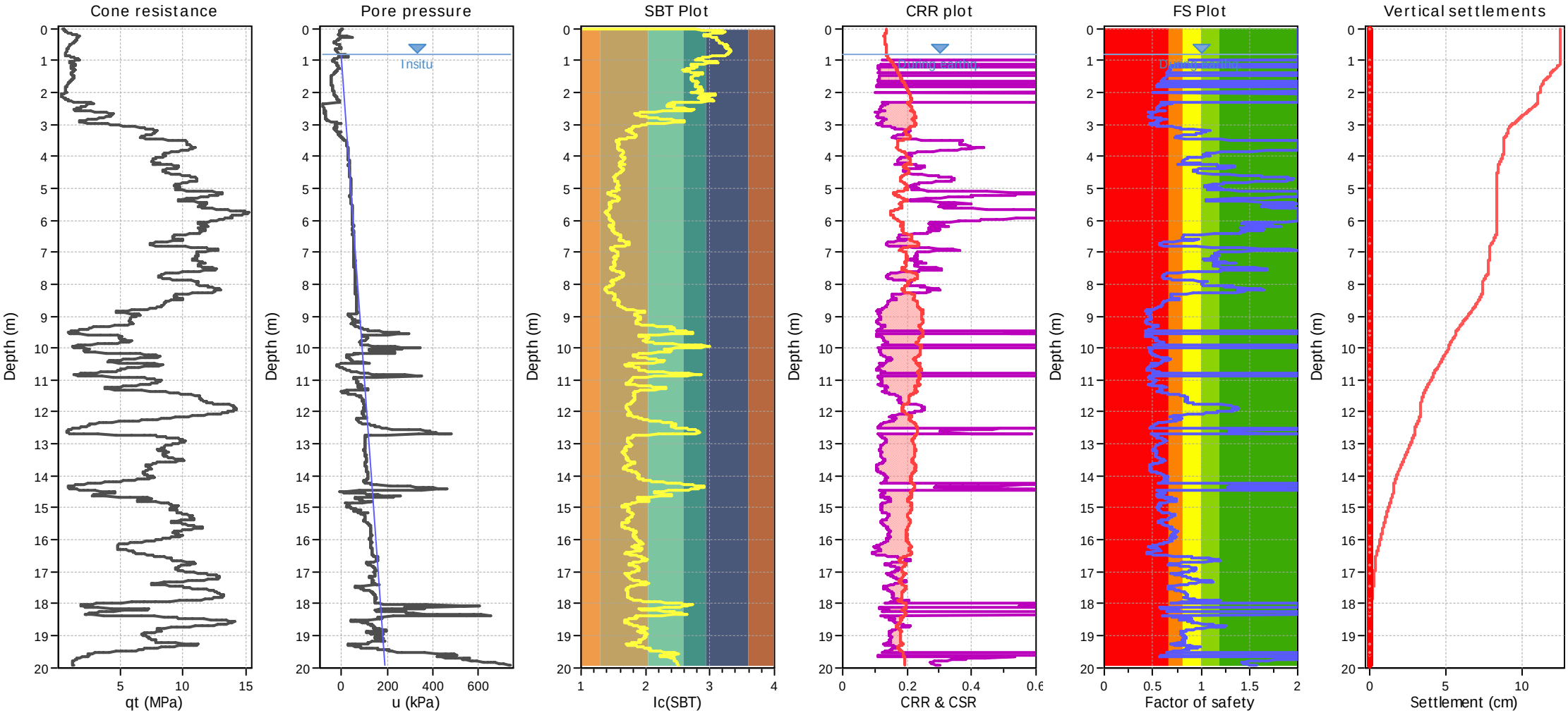
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT210
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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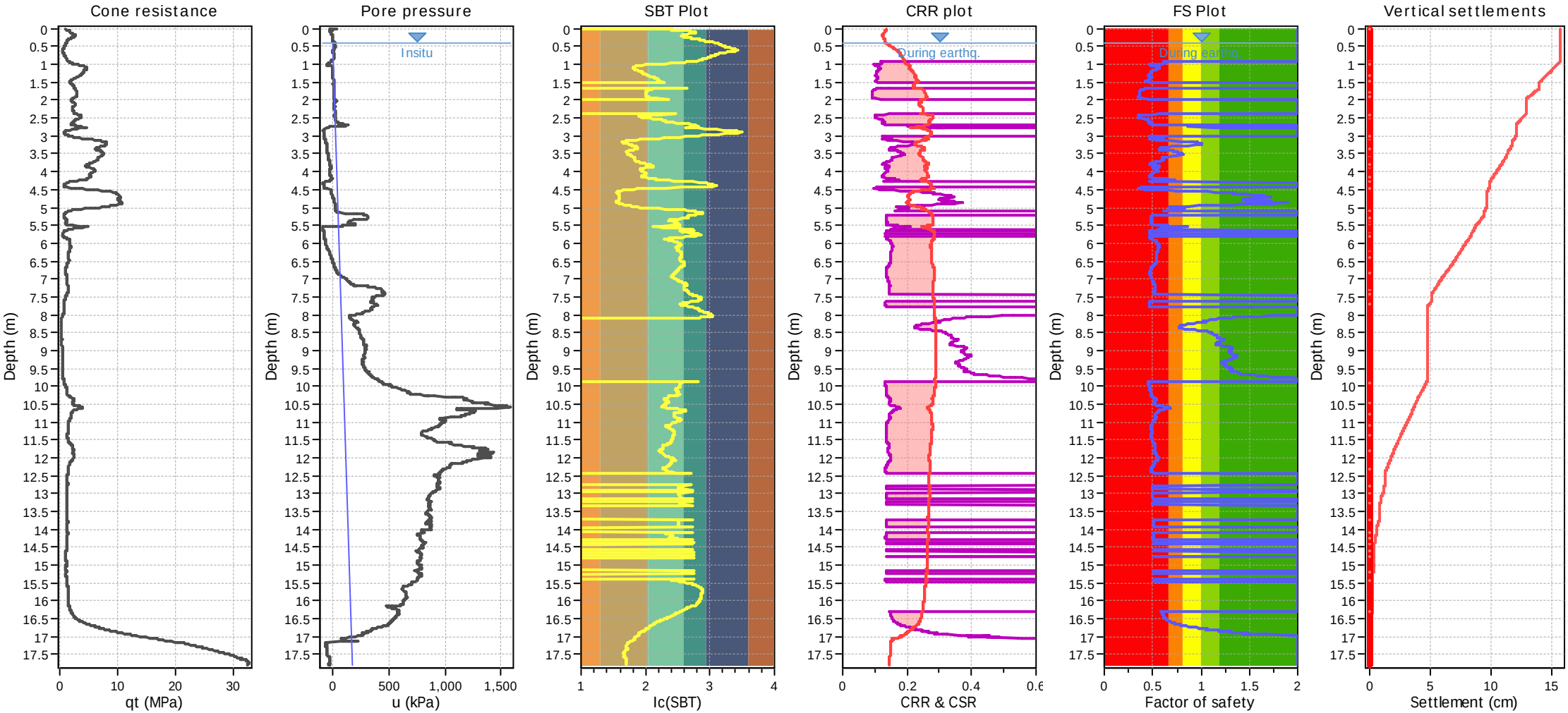
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT211
Total depth: 17.80 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.40 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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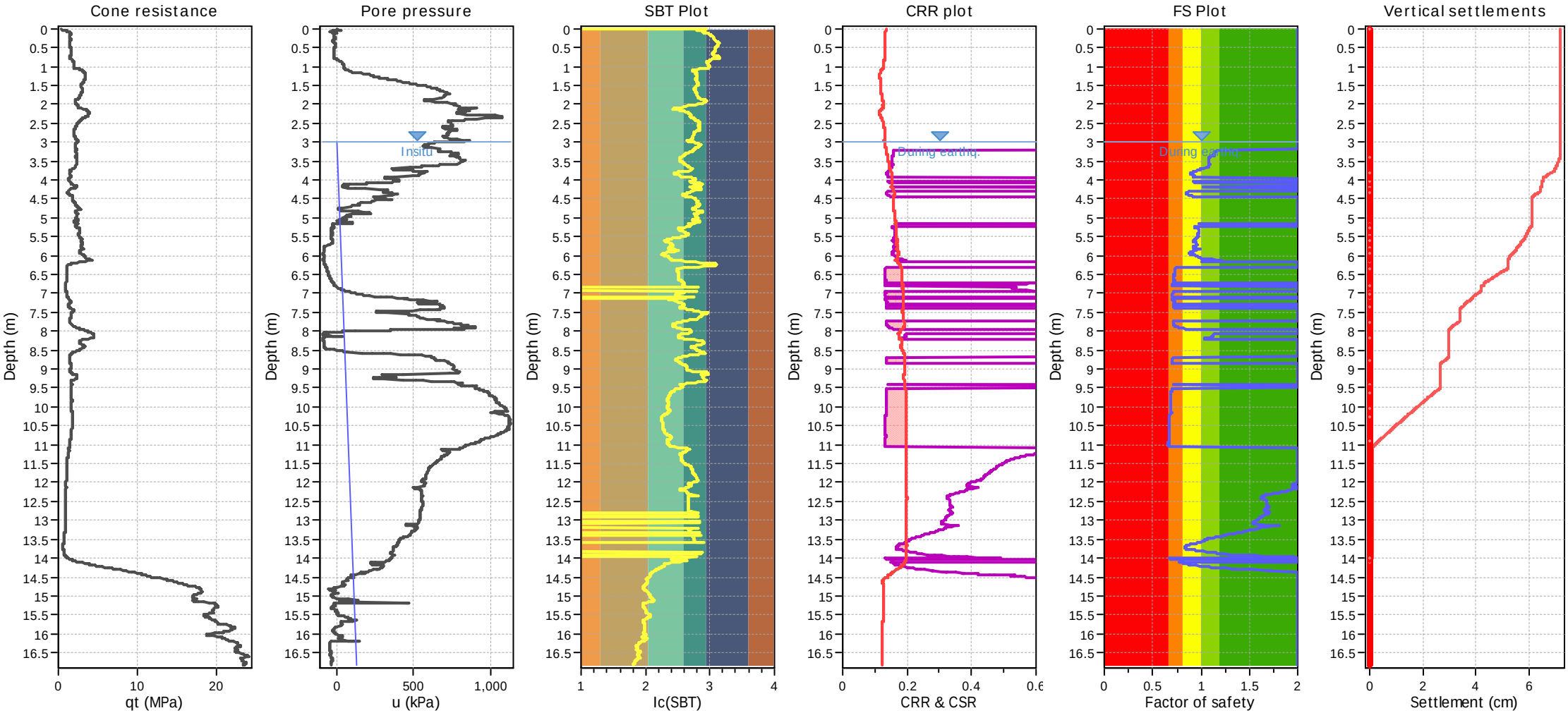
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT212
Total depth: 16.83 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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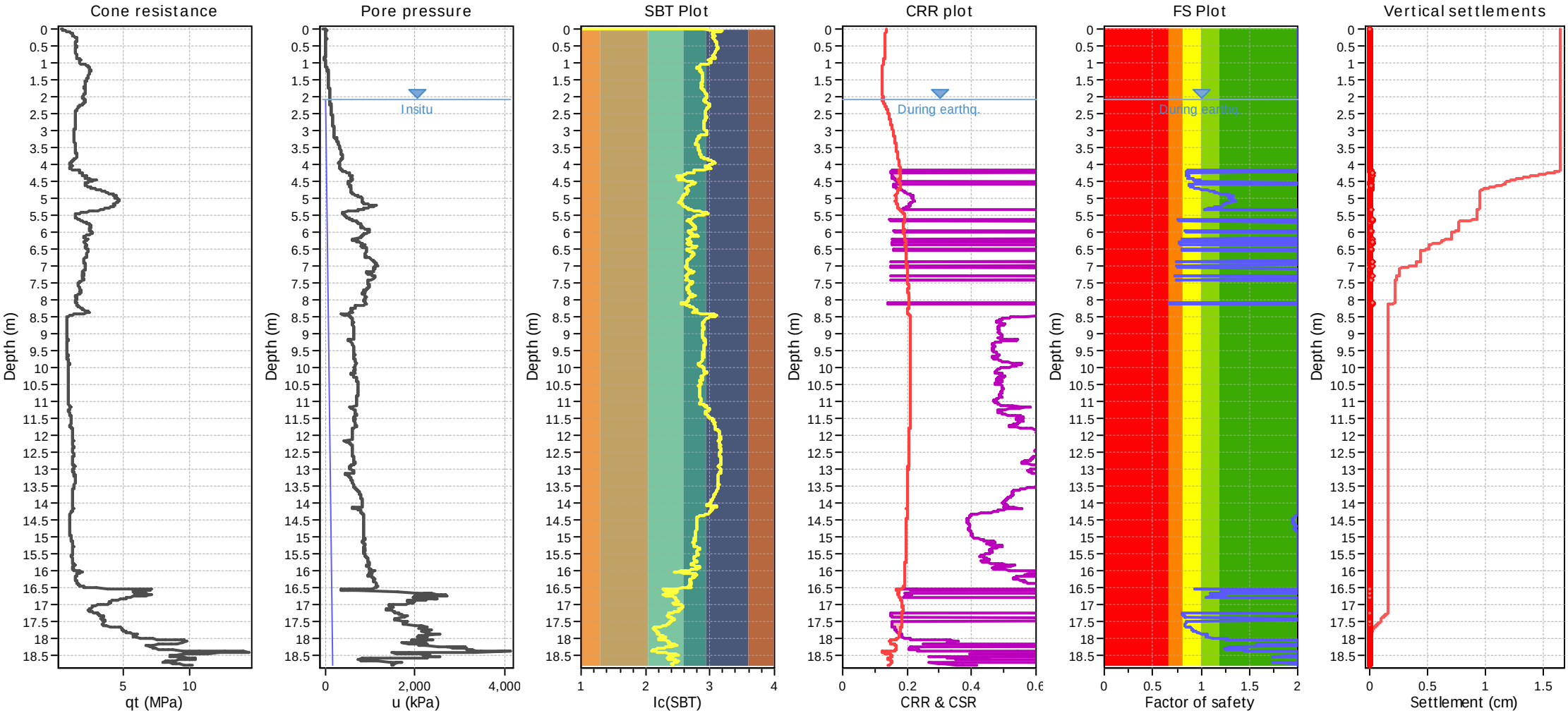
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT213
Total depth: 18.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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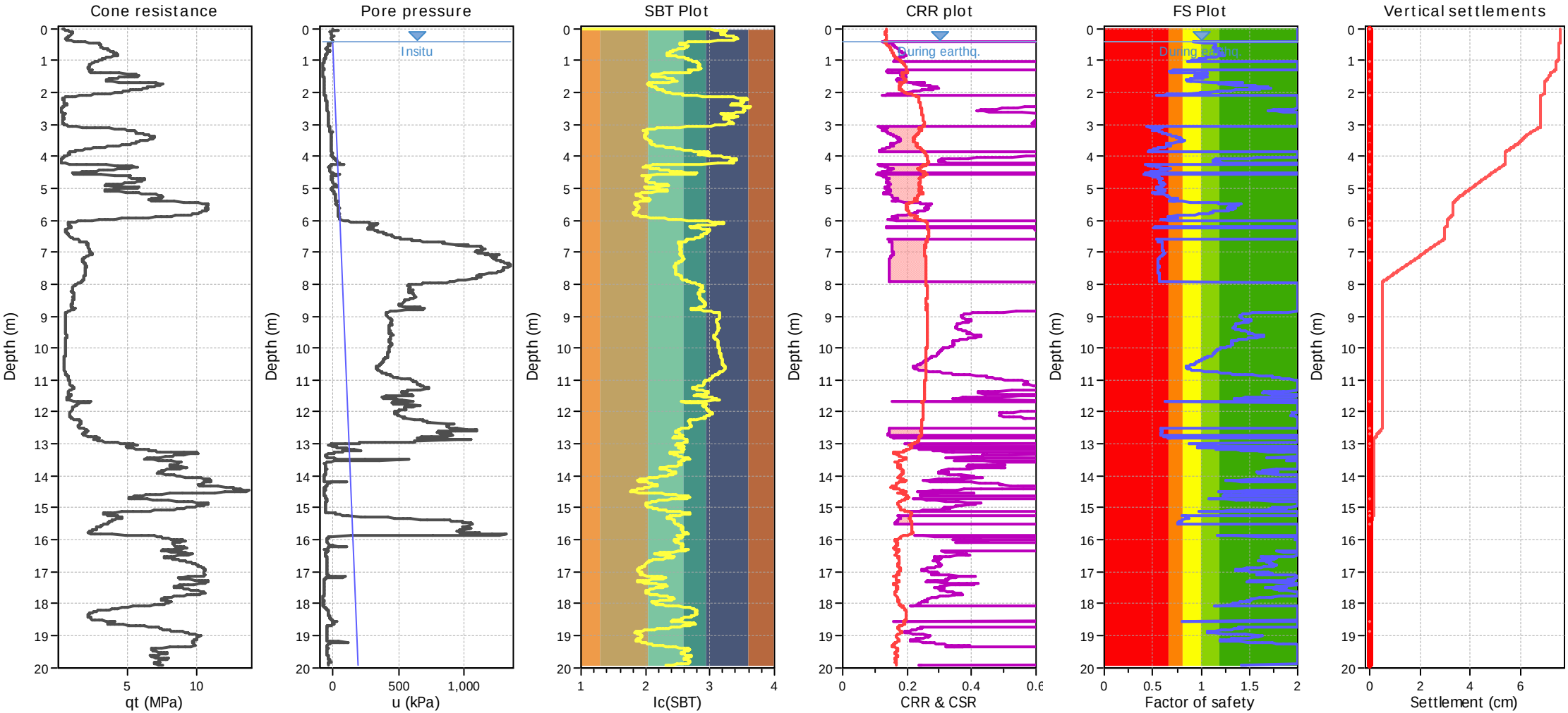
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT214
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.40 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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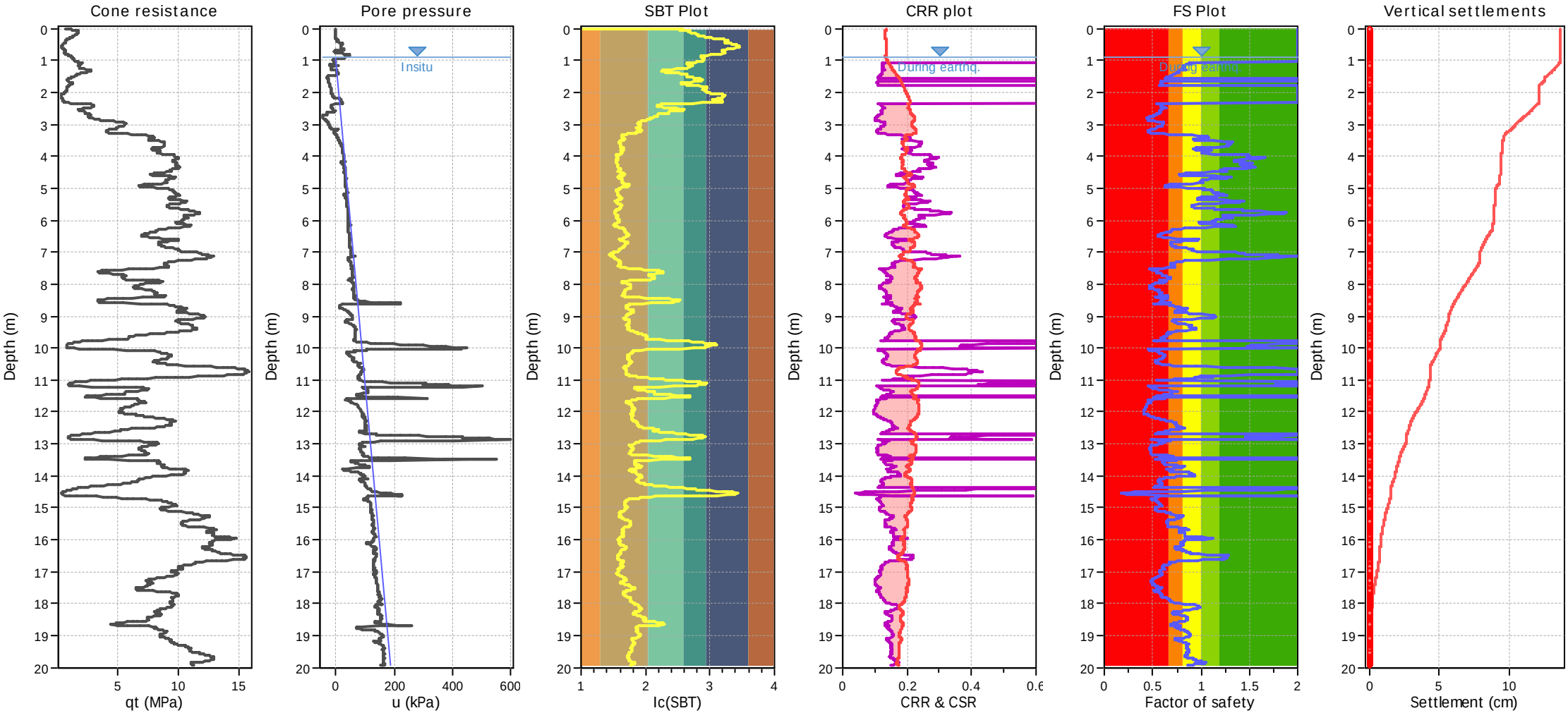
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT215
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.90 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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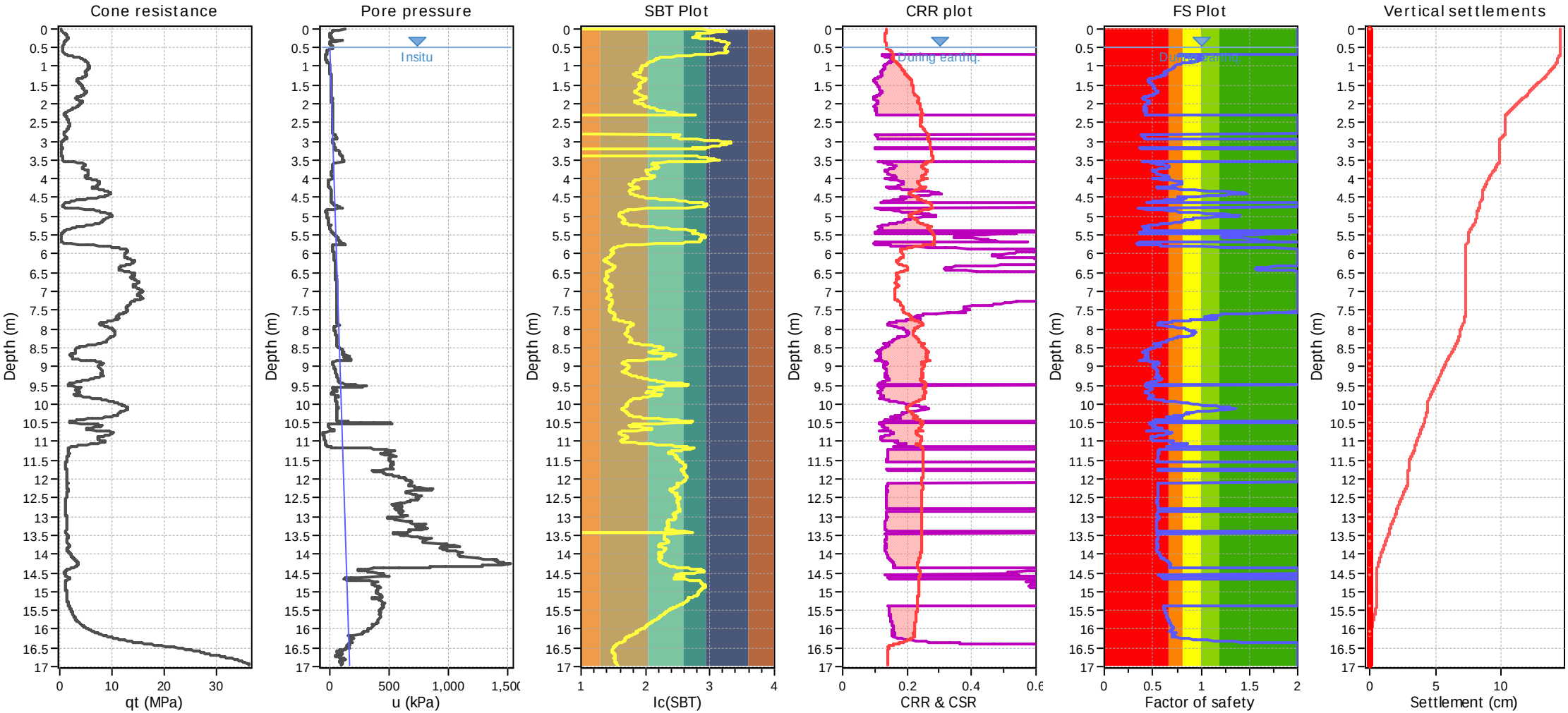
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT216
Total depth: 16.96 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.50 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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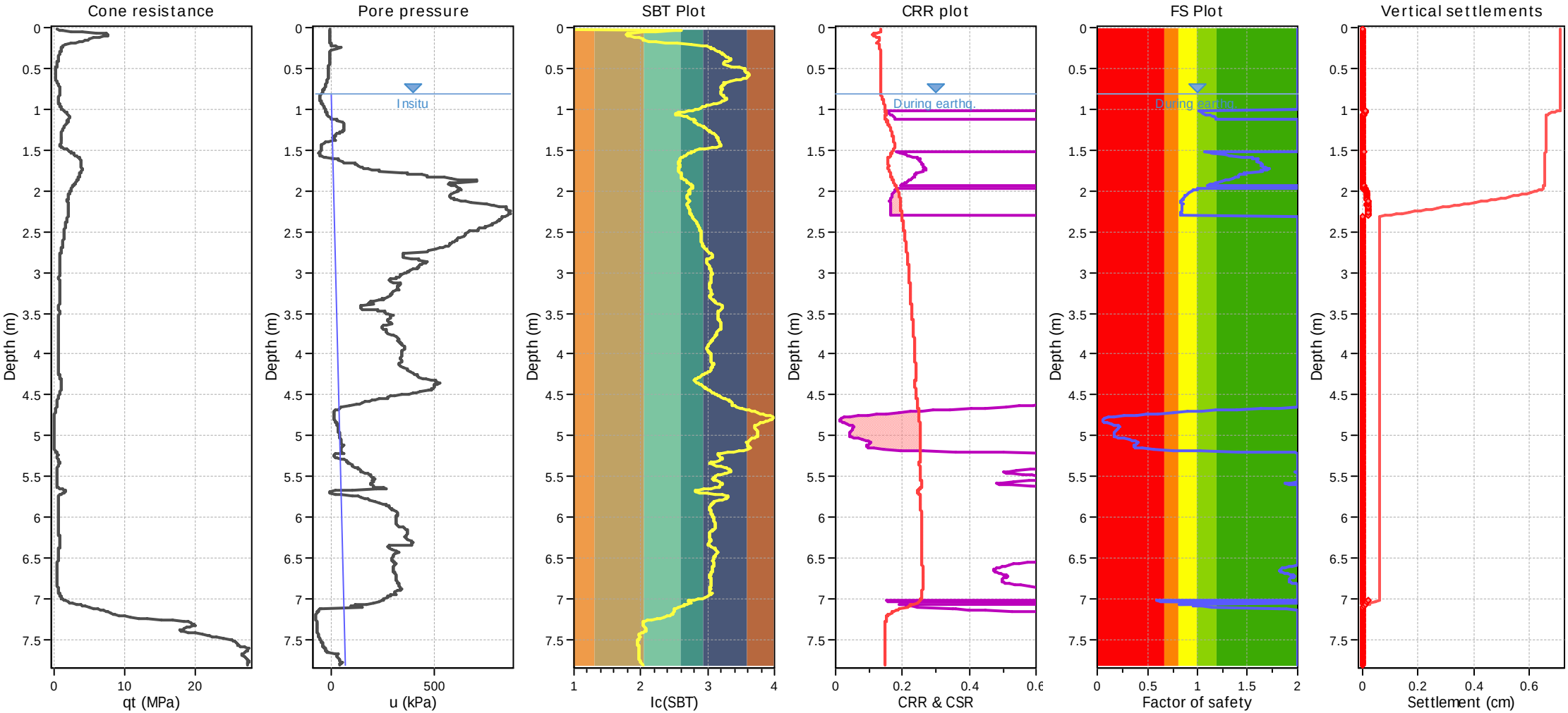
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT217
Total depth: 7.82 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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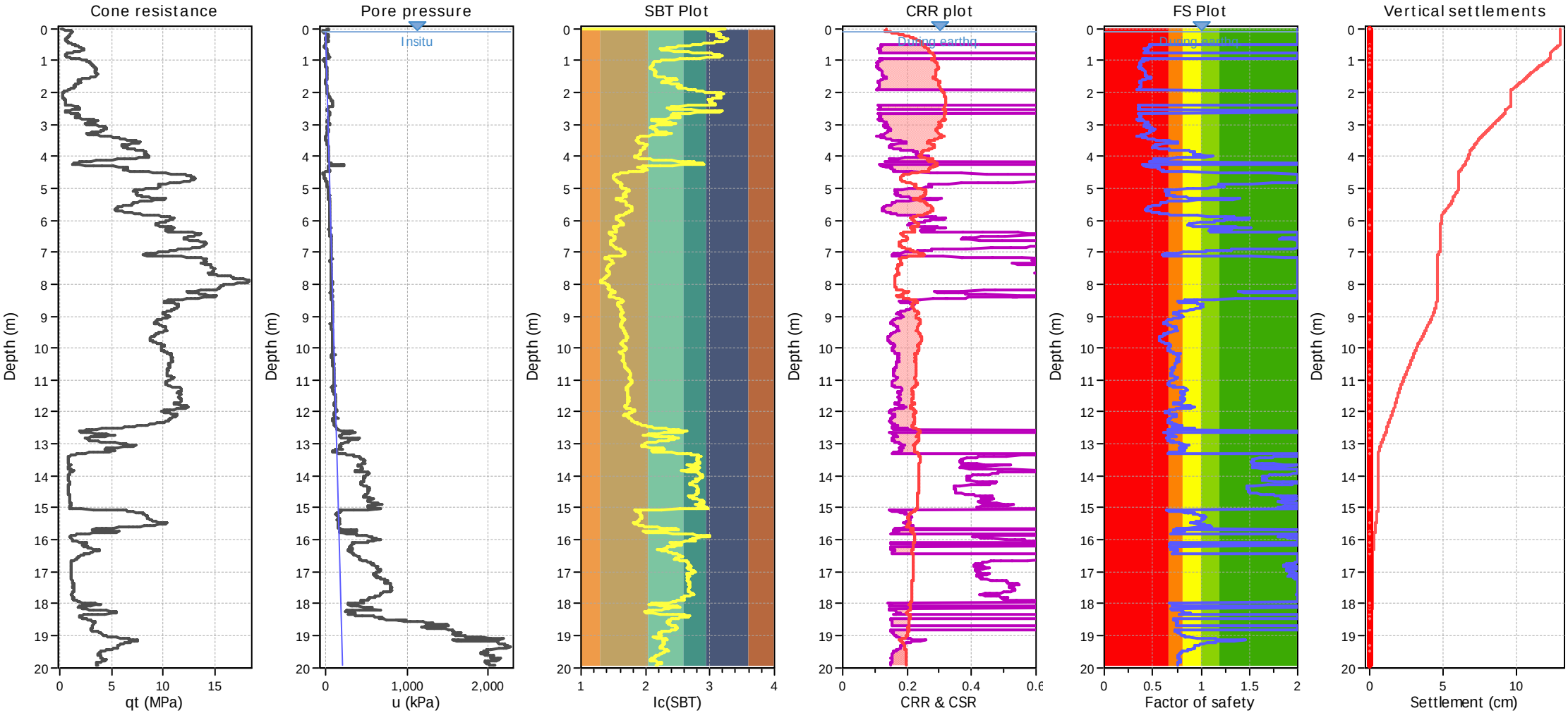
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT218
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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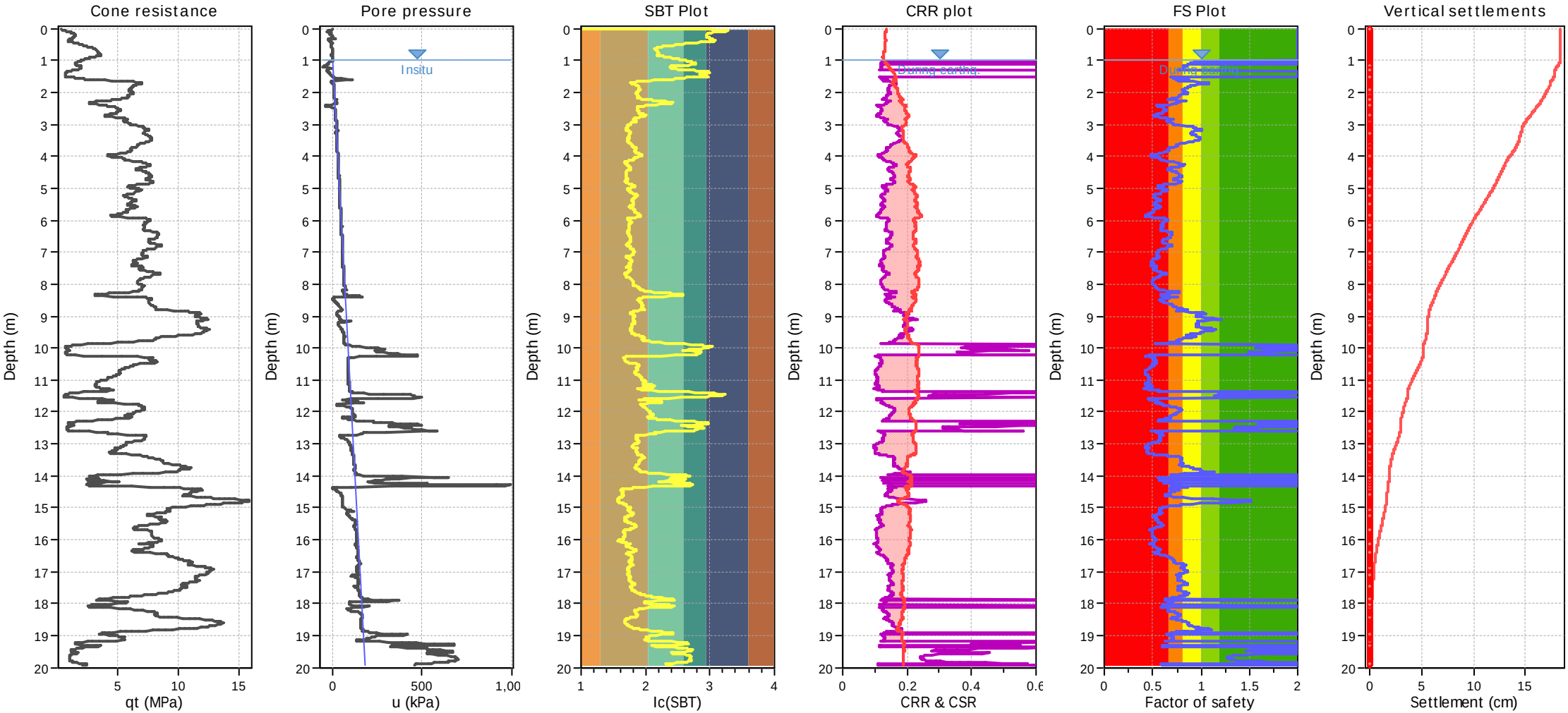
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT219
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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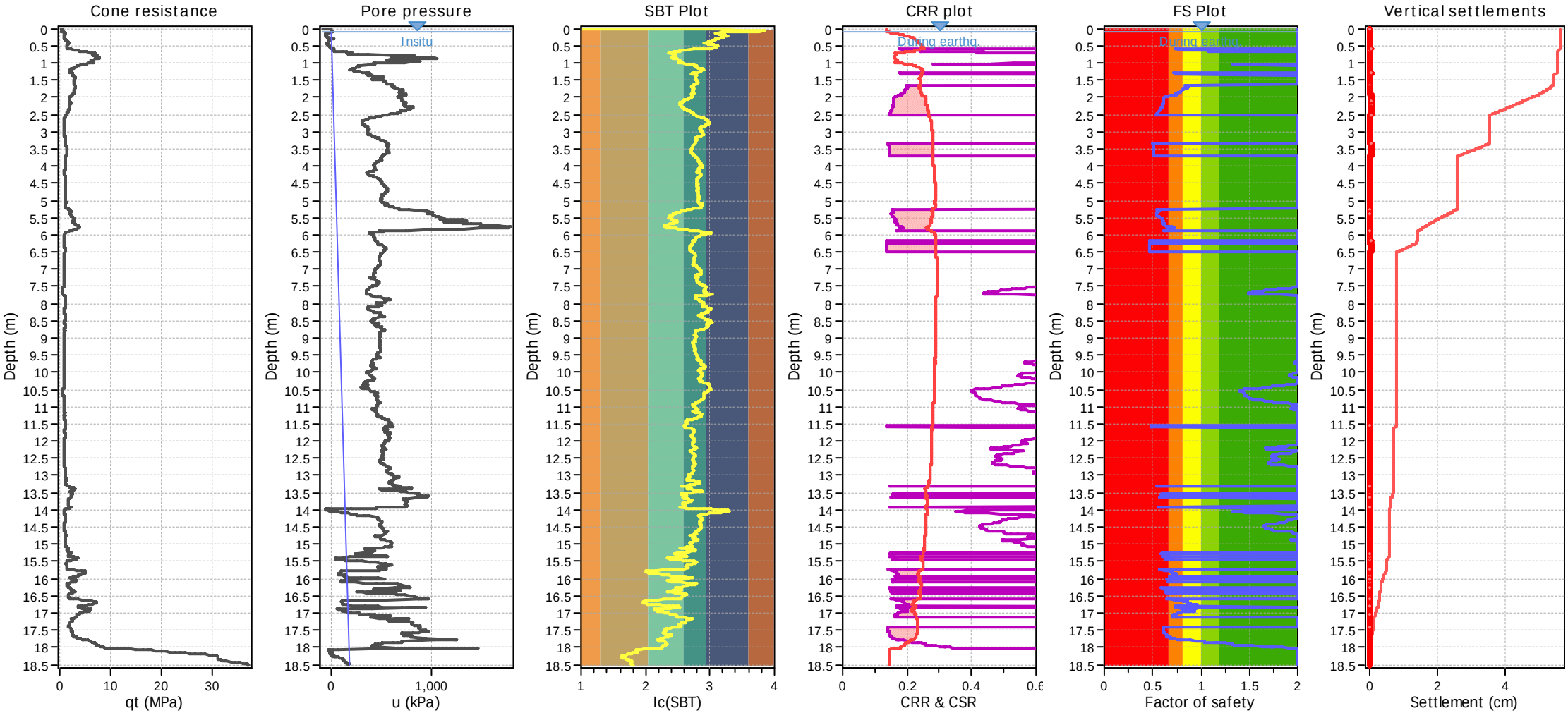
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT220
Total depth: 18.52 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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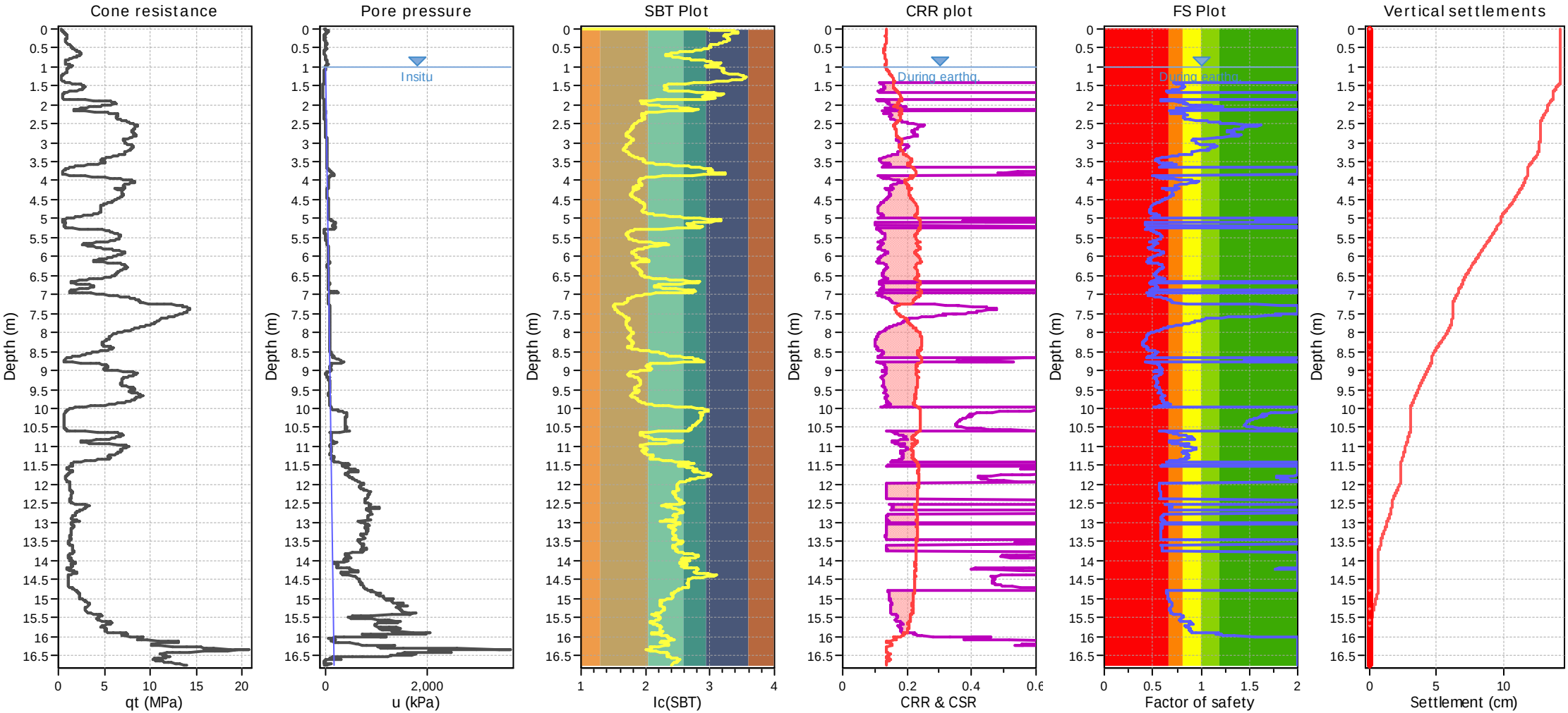
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT221
Total depth: 16.76 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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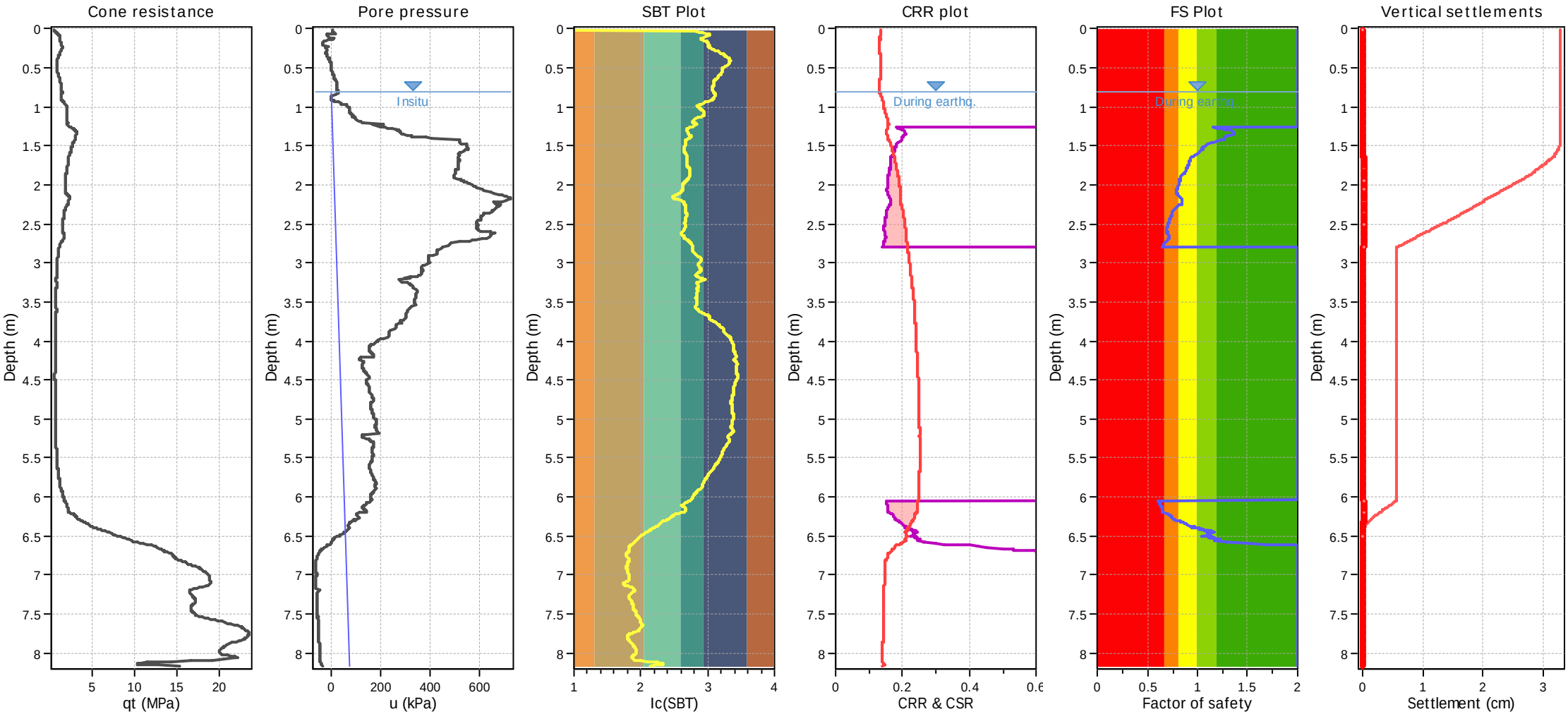
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT222
Total depth: 8.17 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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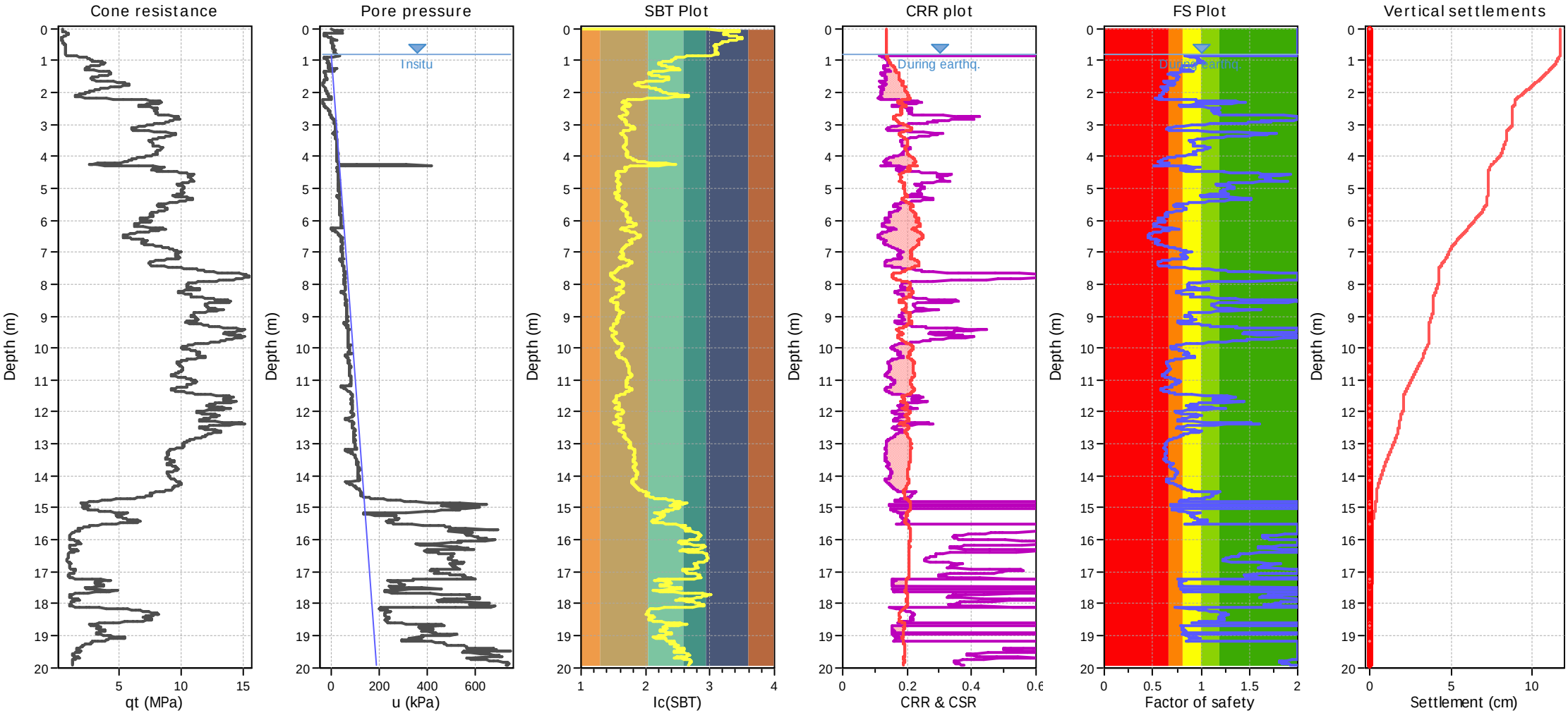
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT223
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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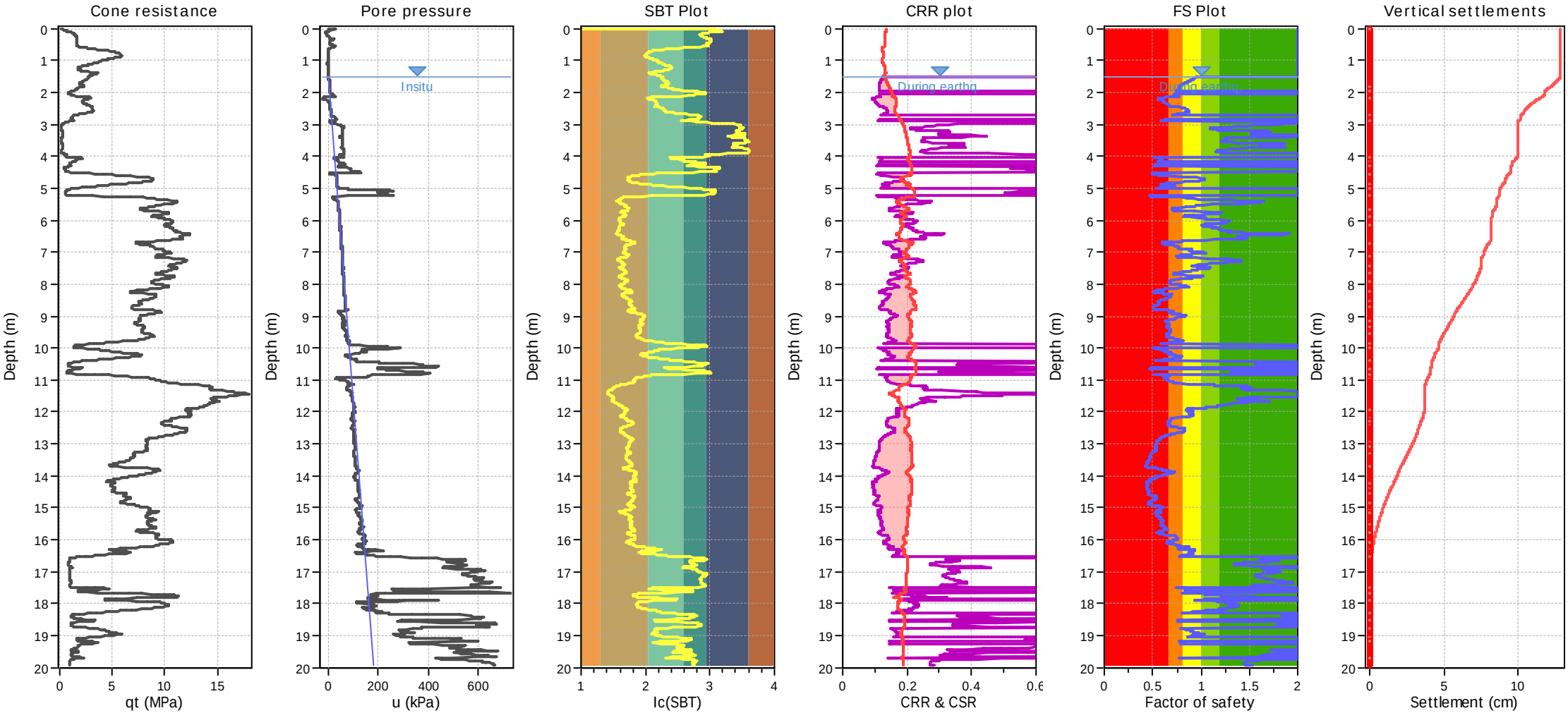
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT224
Total depth: 19.93 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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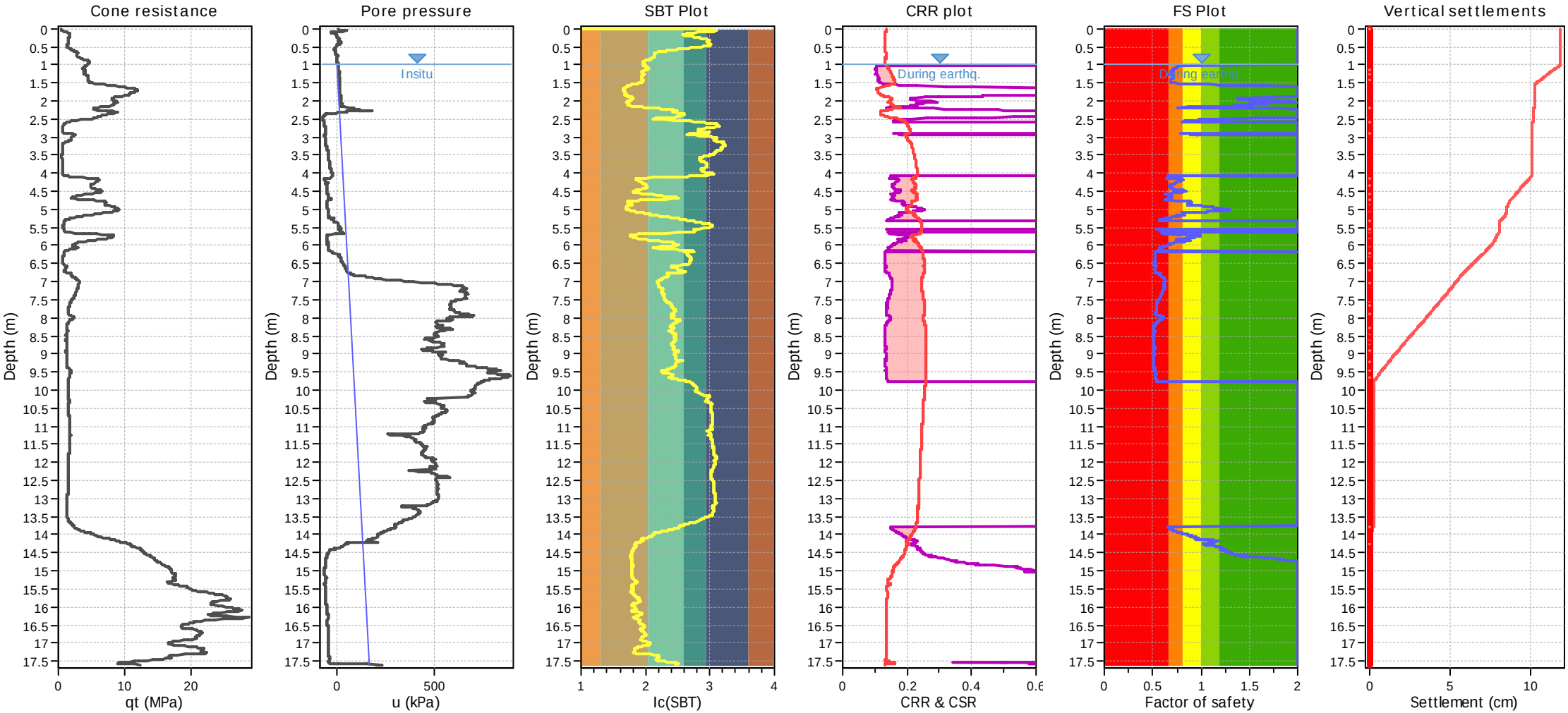
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT225
Total depth: 17.61 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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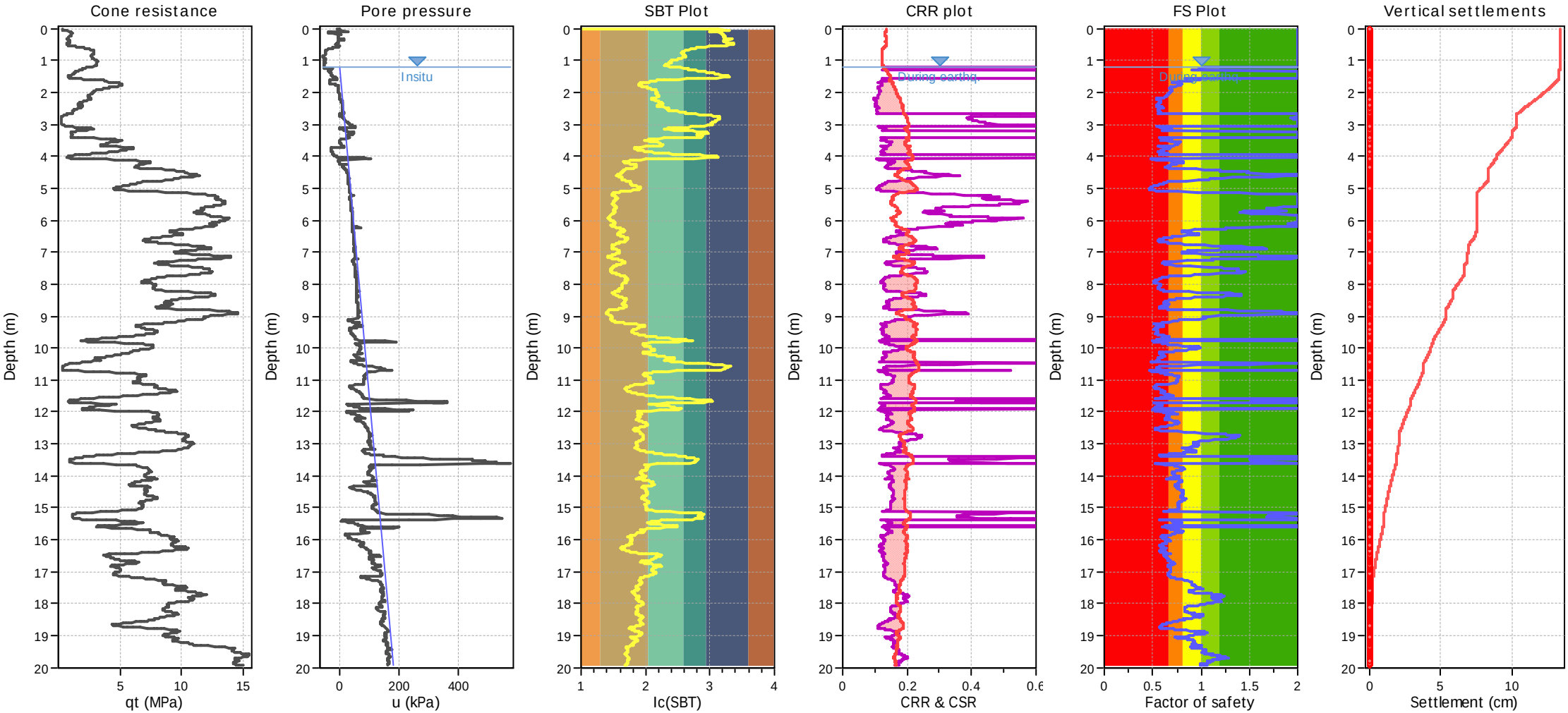
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT227
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.20 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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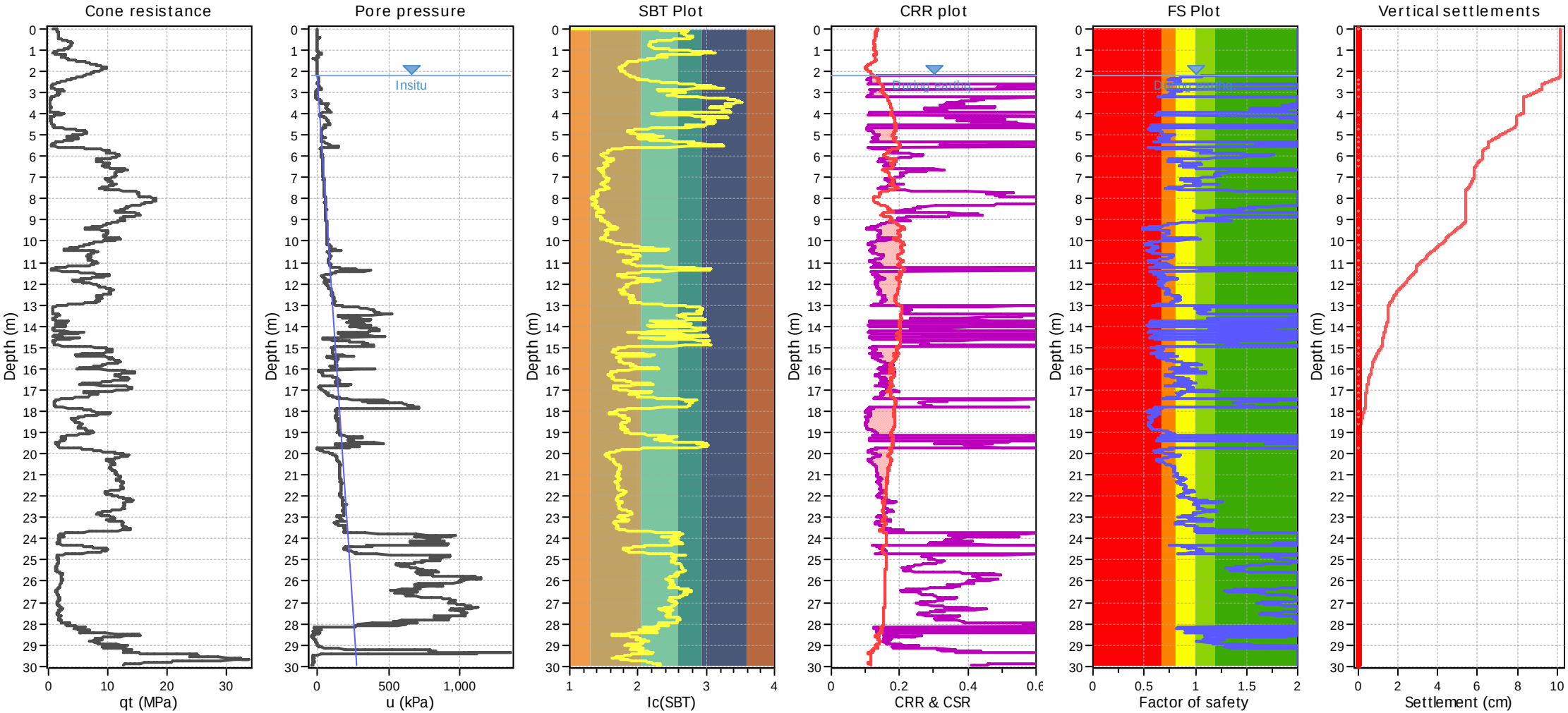
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-01
Total depth: 29.95 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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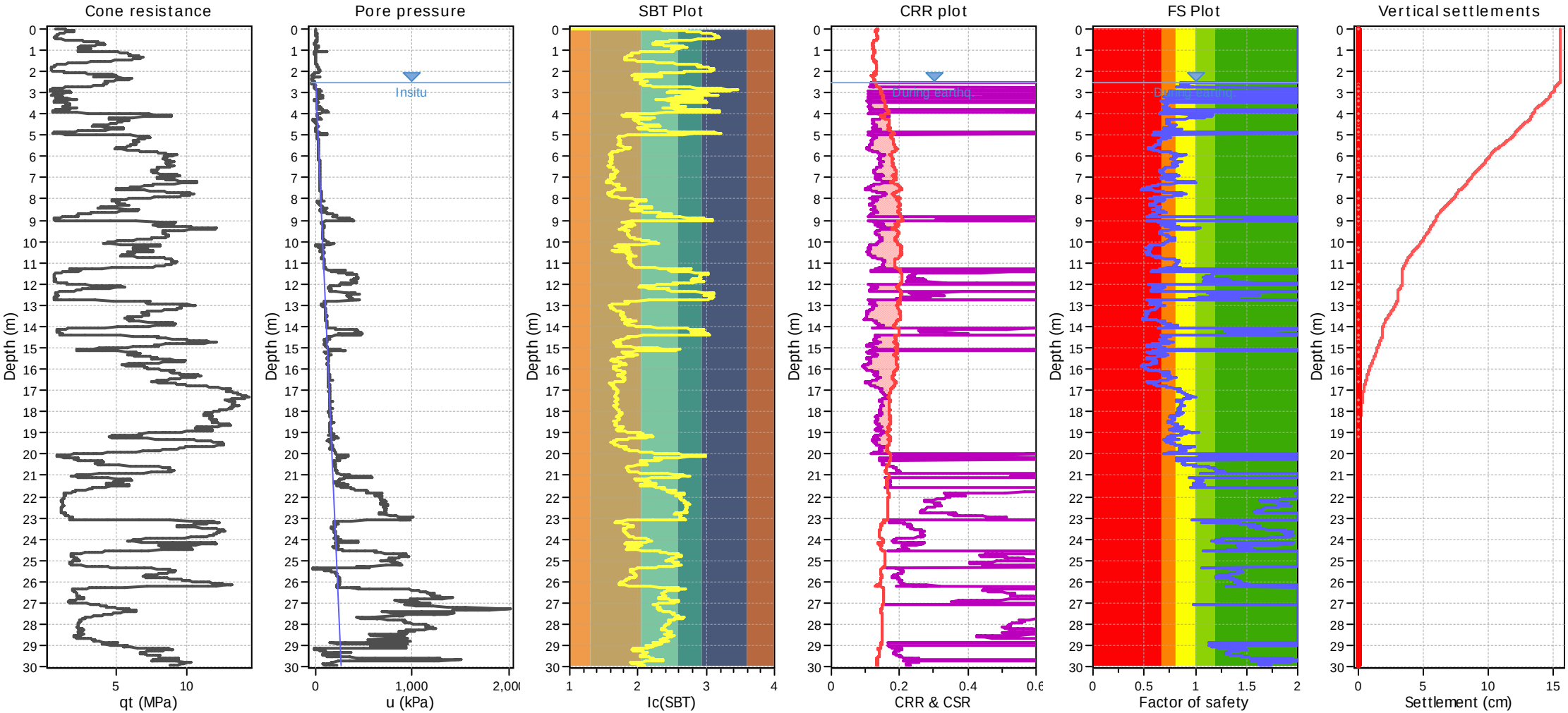
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-02
Total depth: 29.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.50 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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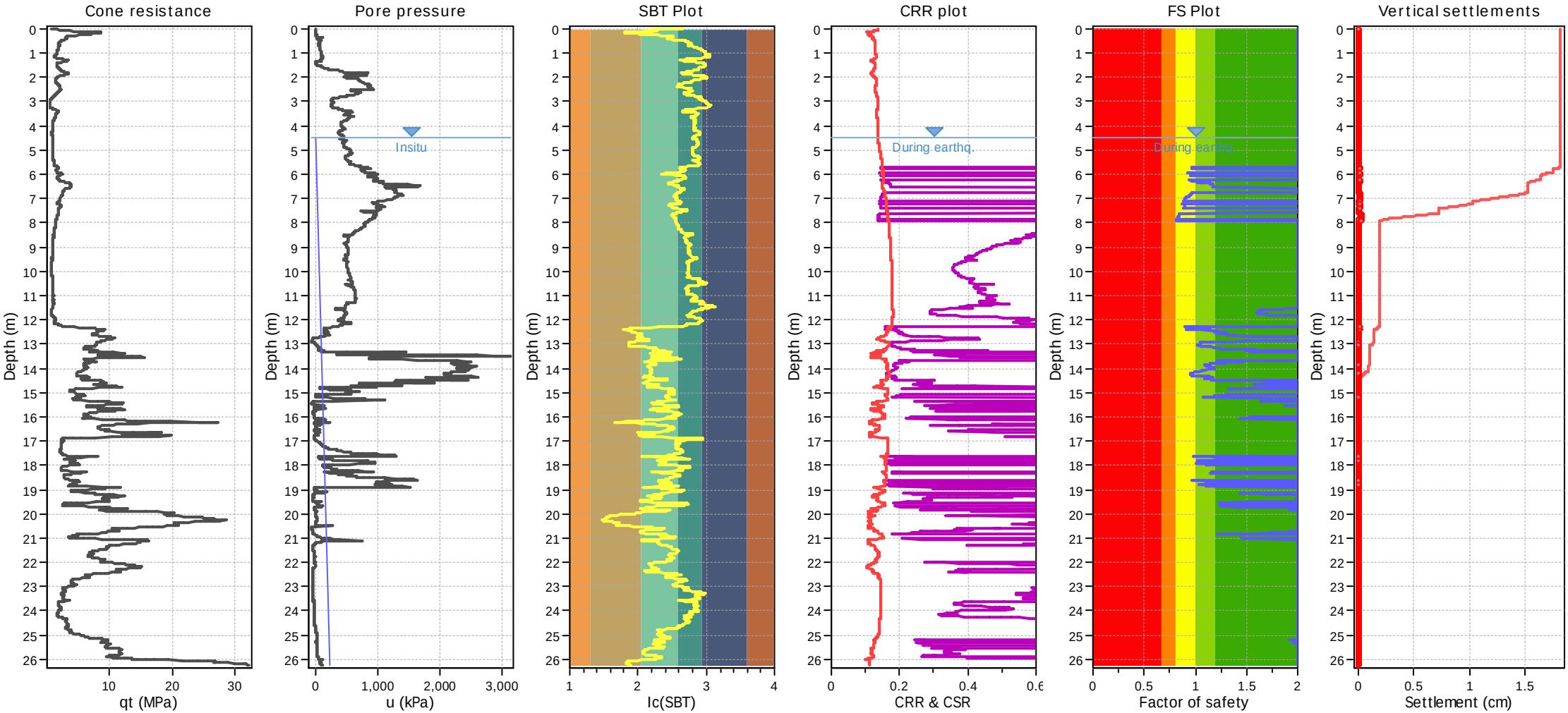
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-03
Total depth: 26.24 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.50 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.50 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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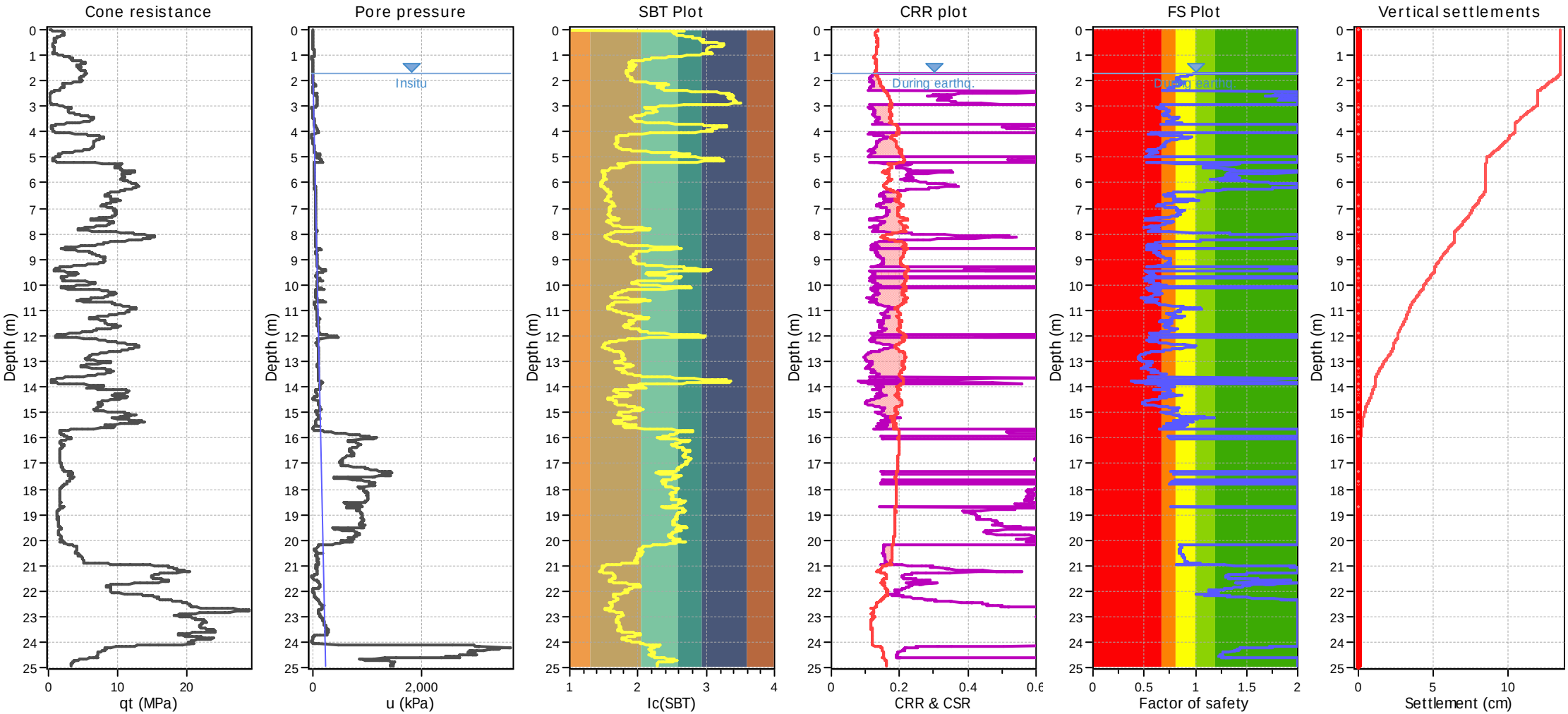
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-04
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.74 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.74 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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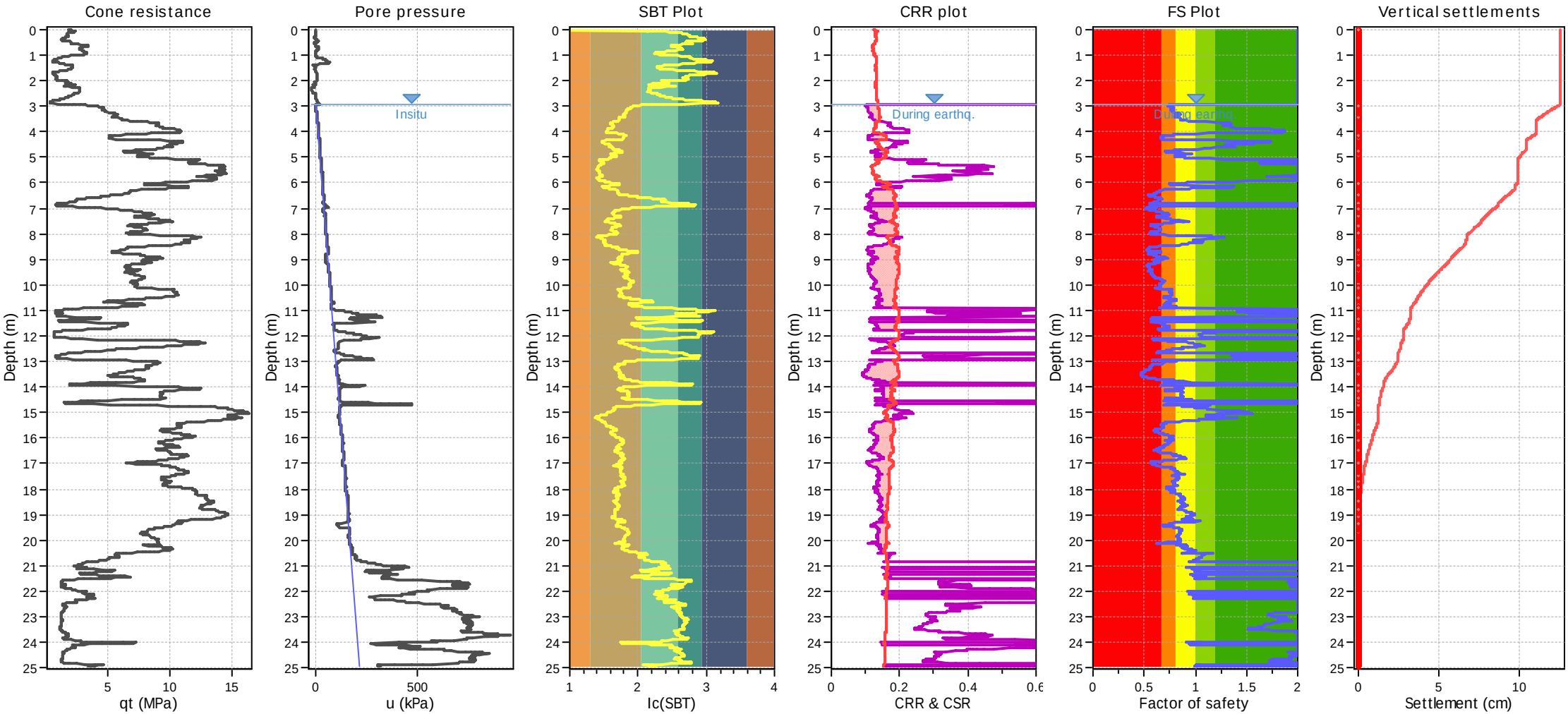
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-05
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.94 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.94 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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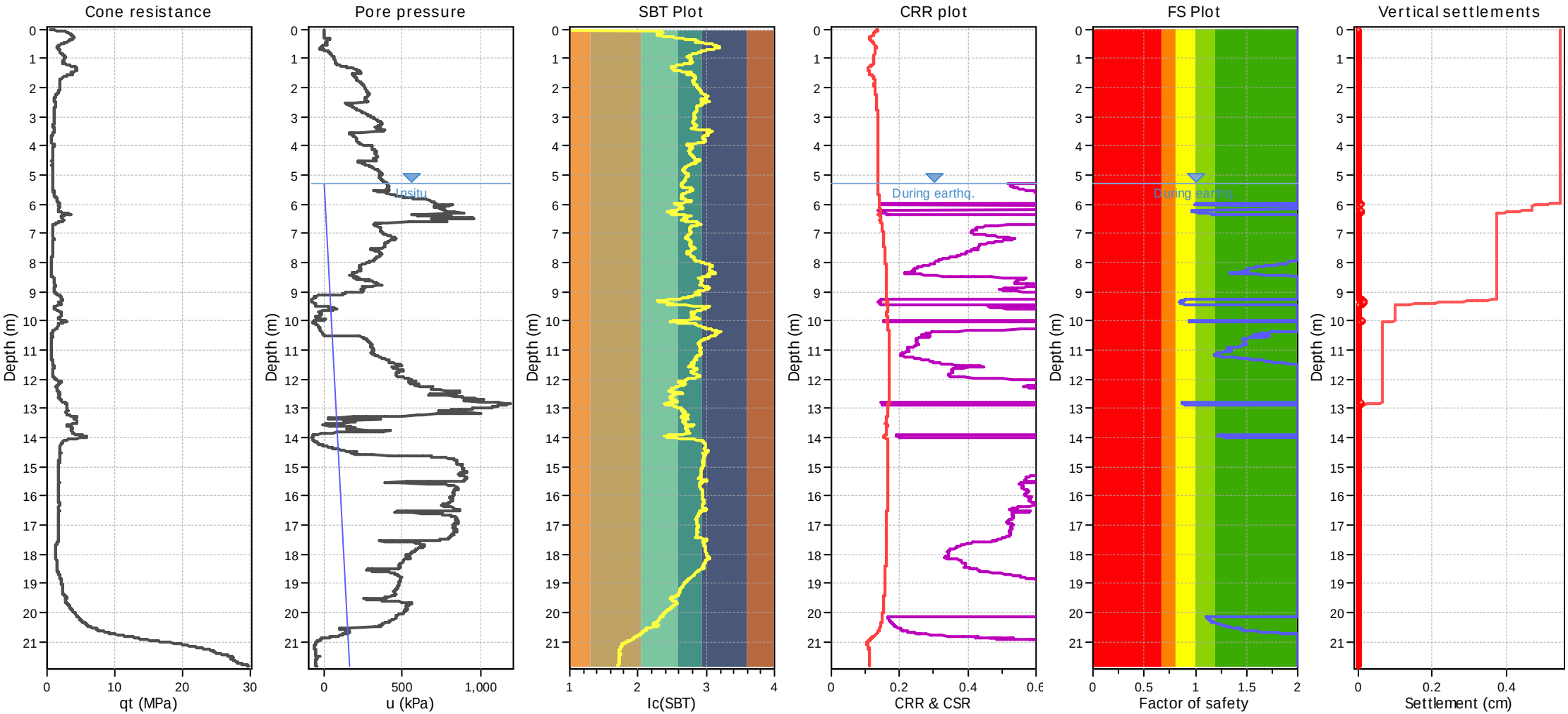
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-06
Total depth: 21.84 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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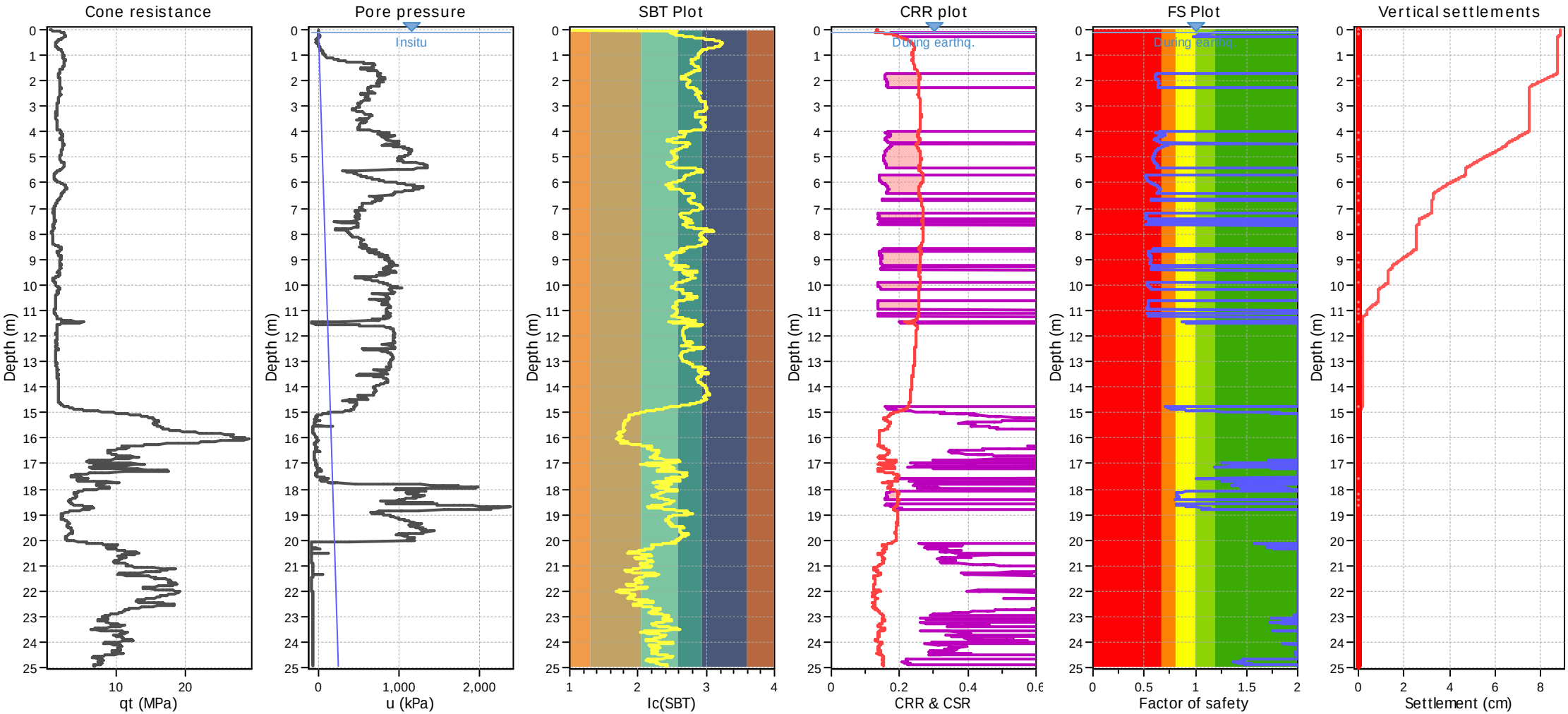
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-07
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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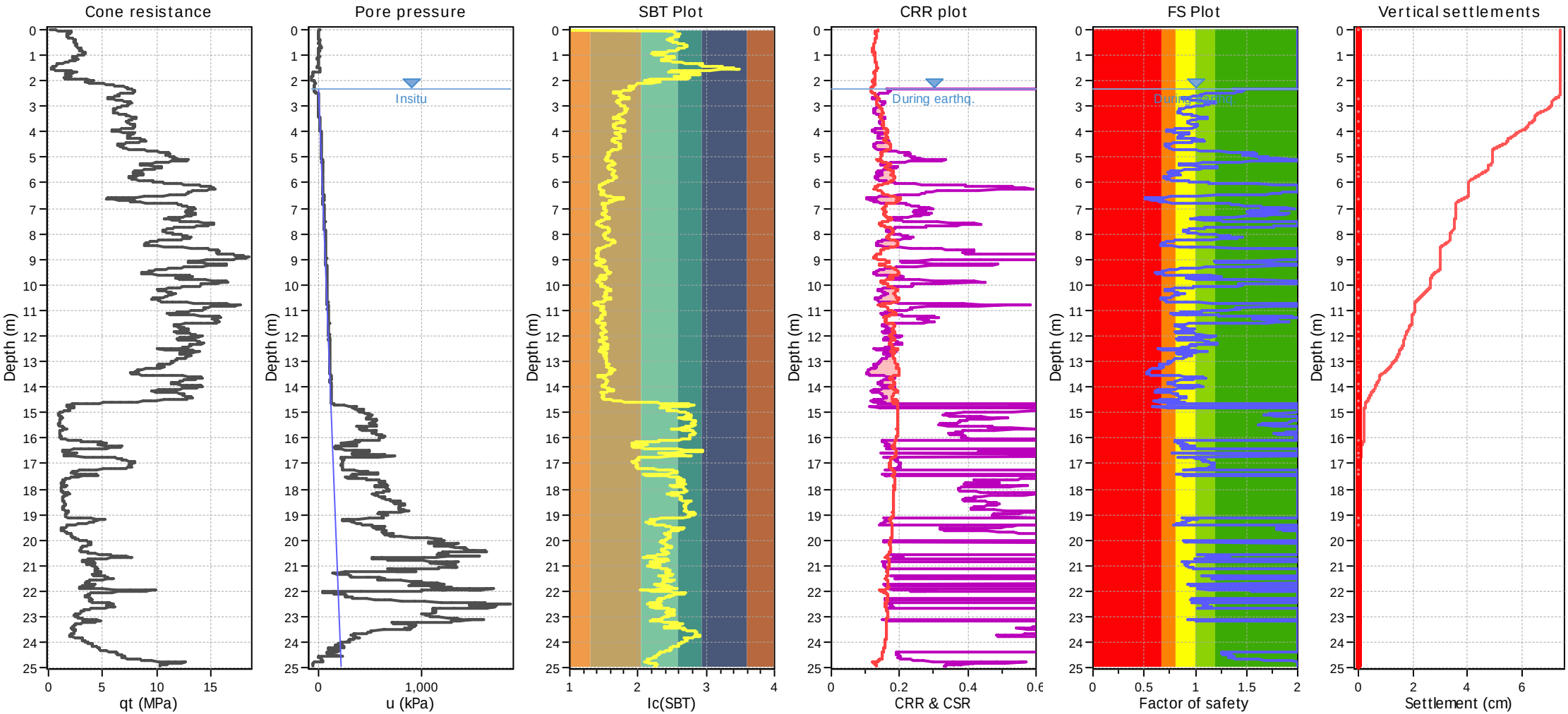
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-08
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.33 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.33 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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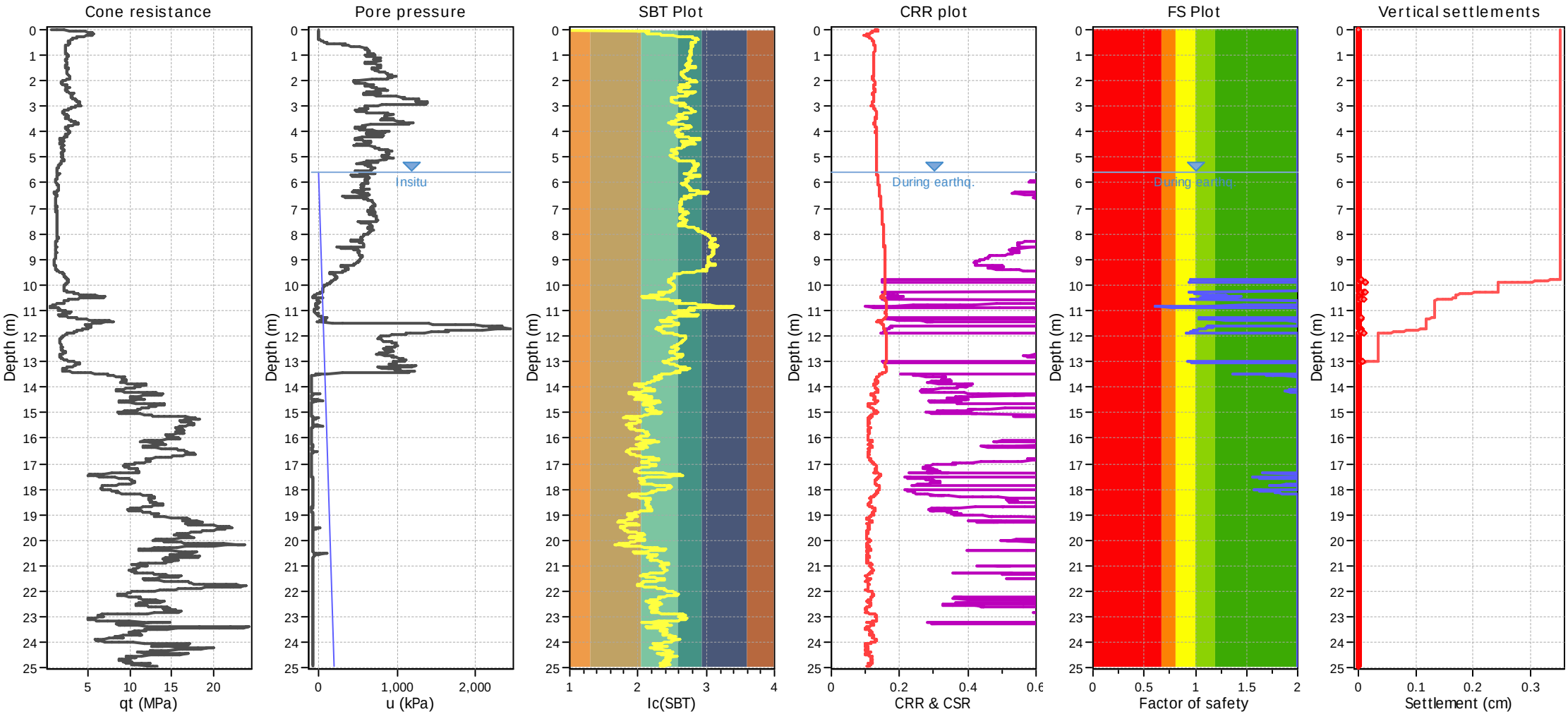
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-09
Total depth: 24.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.60 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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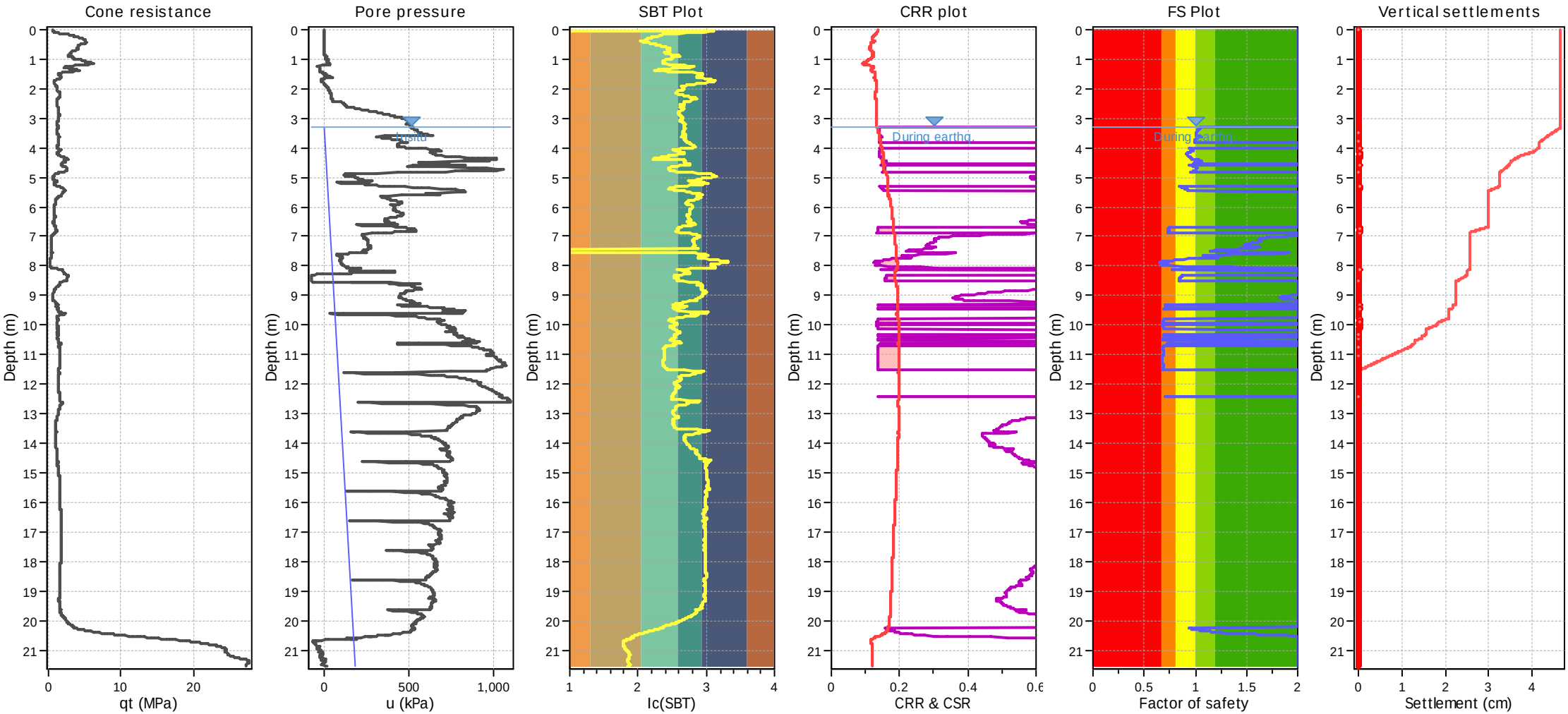
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT102
Total depth: 21.53 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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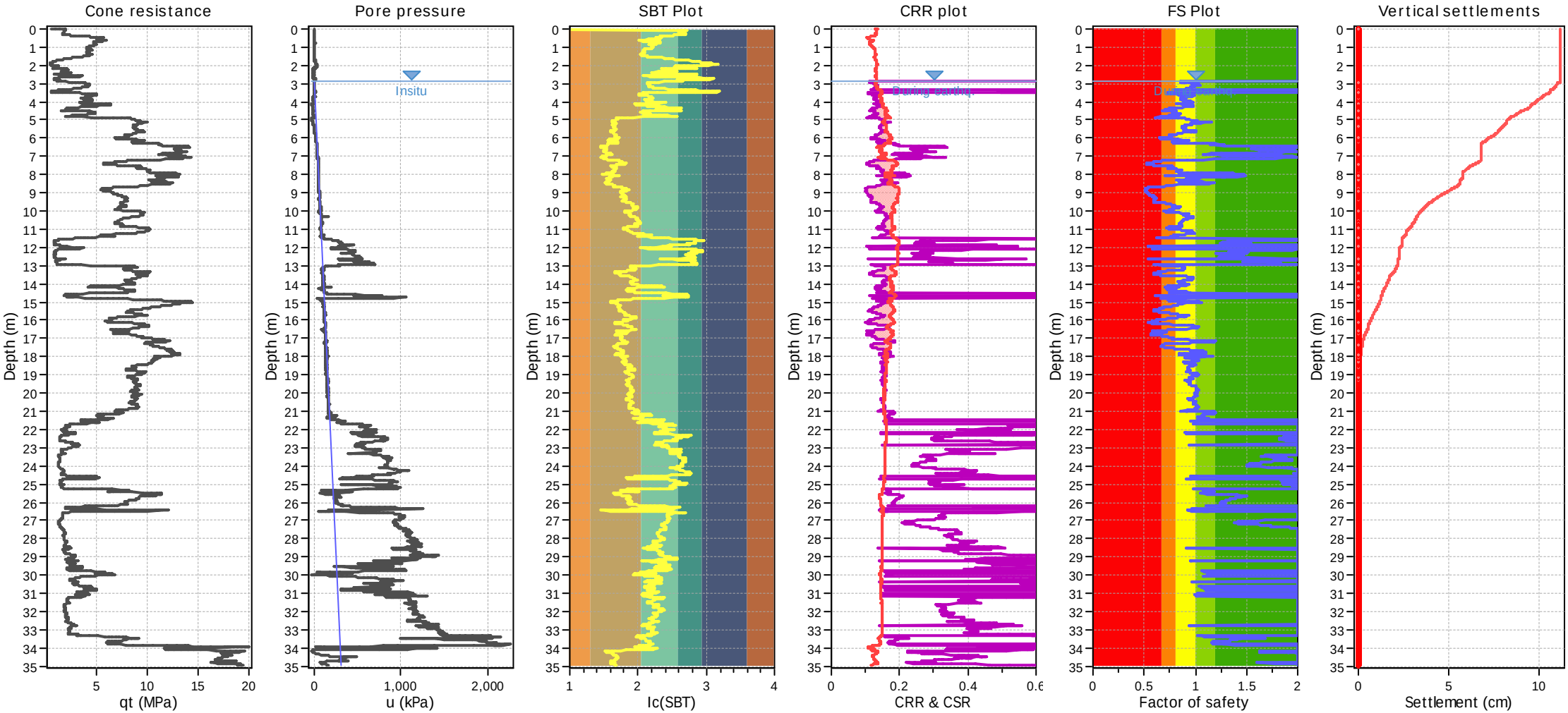
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT103
Total depth: 34.94 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.90 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.90 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

0.25g – Index ULS

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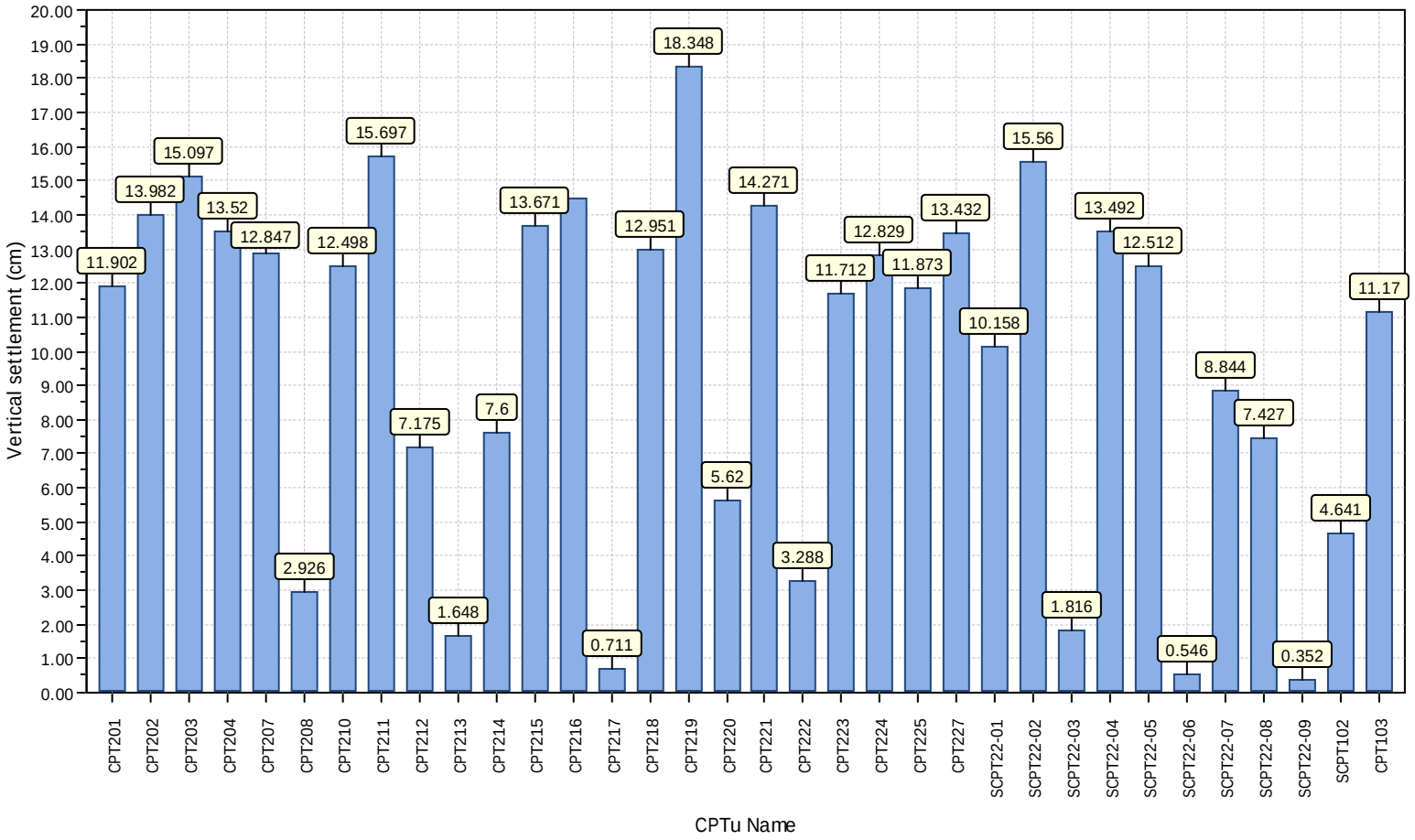
Project title : Tramway Rezoning

Location : Ruakura

Overall vertical settlements report



0.25g with fill– Total ULS

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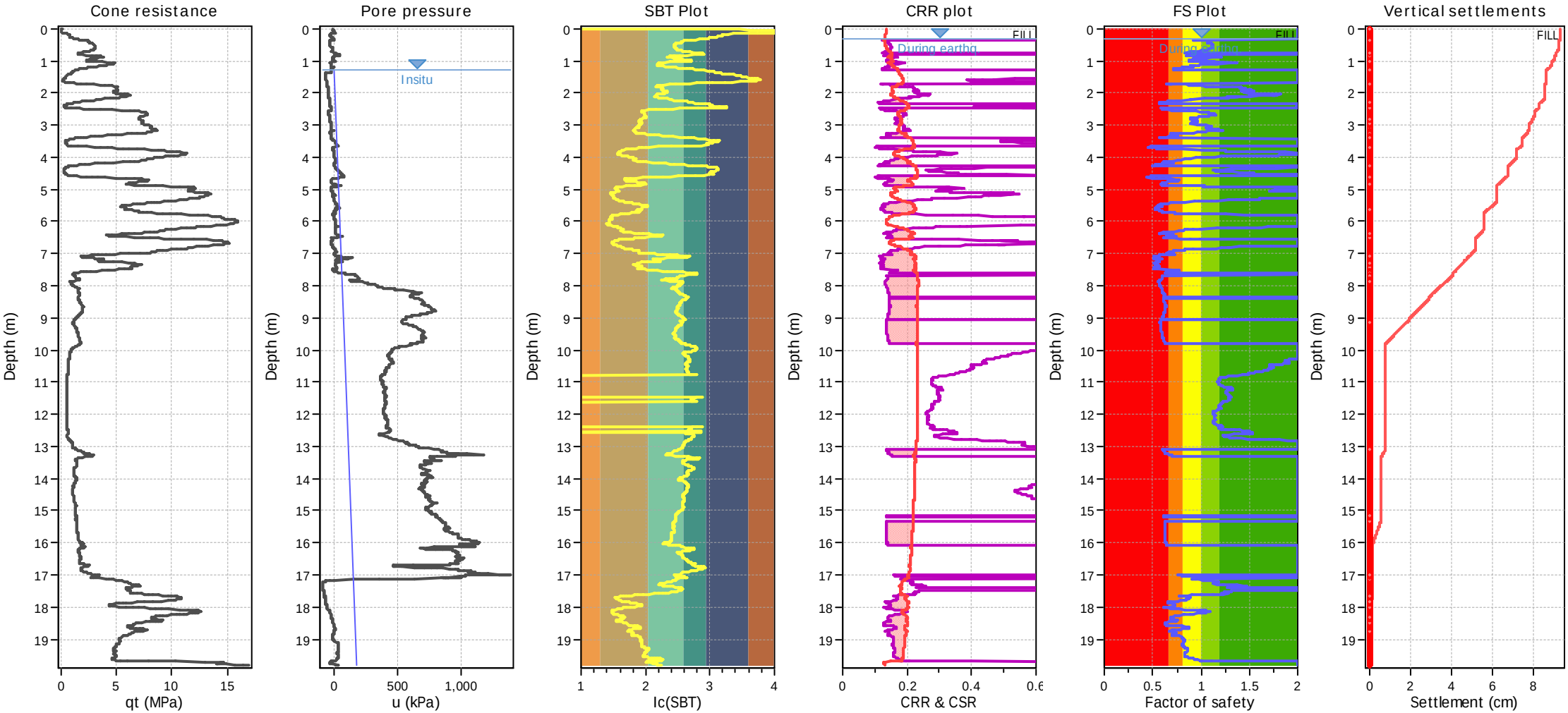
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT201
Total depth: 19.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.30 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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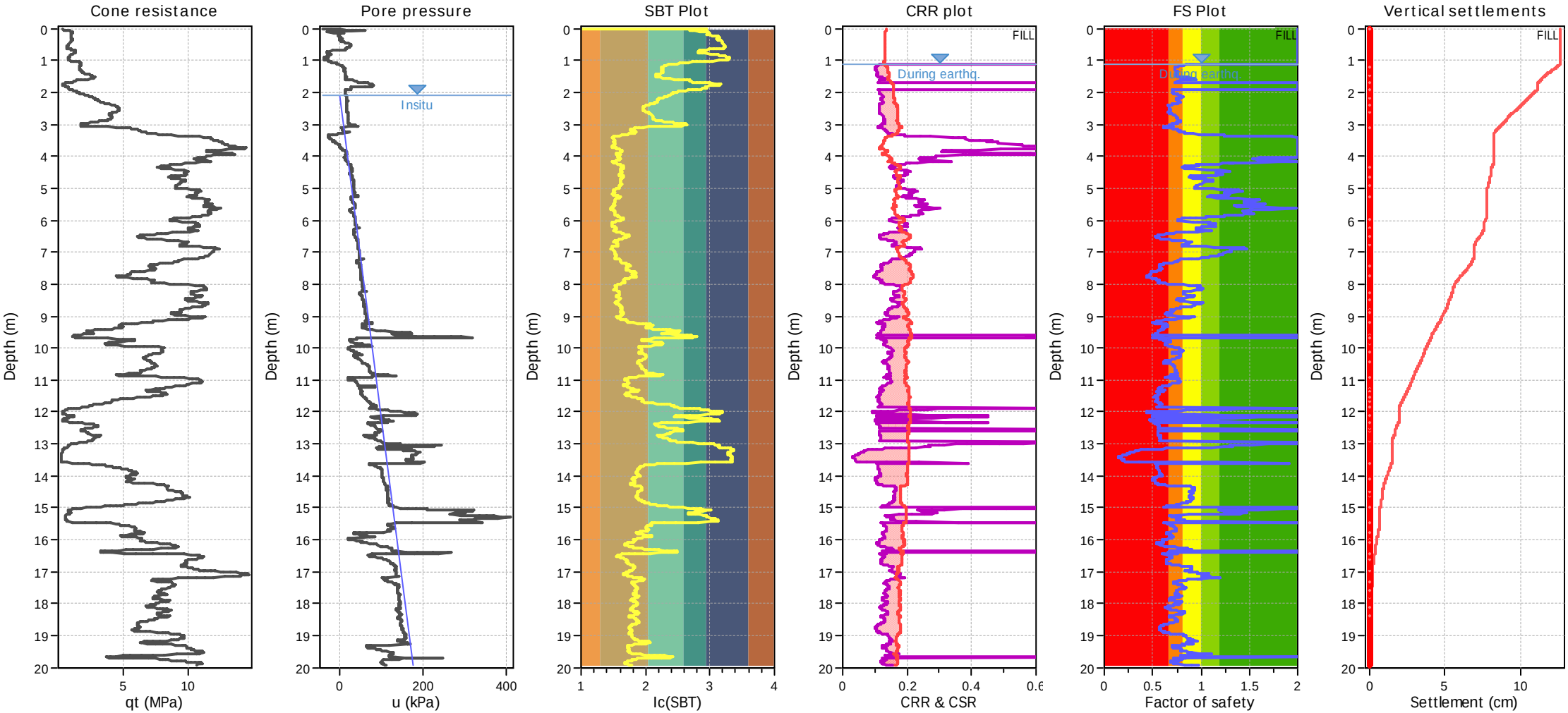
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT202
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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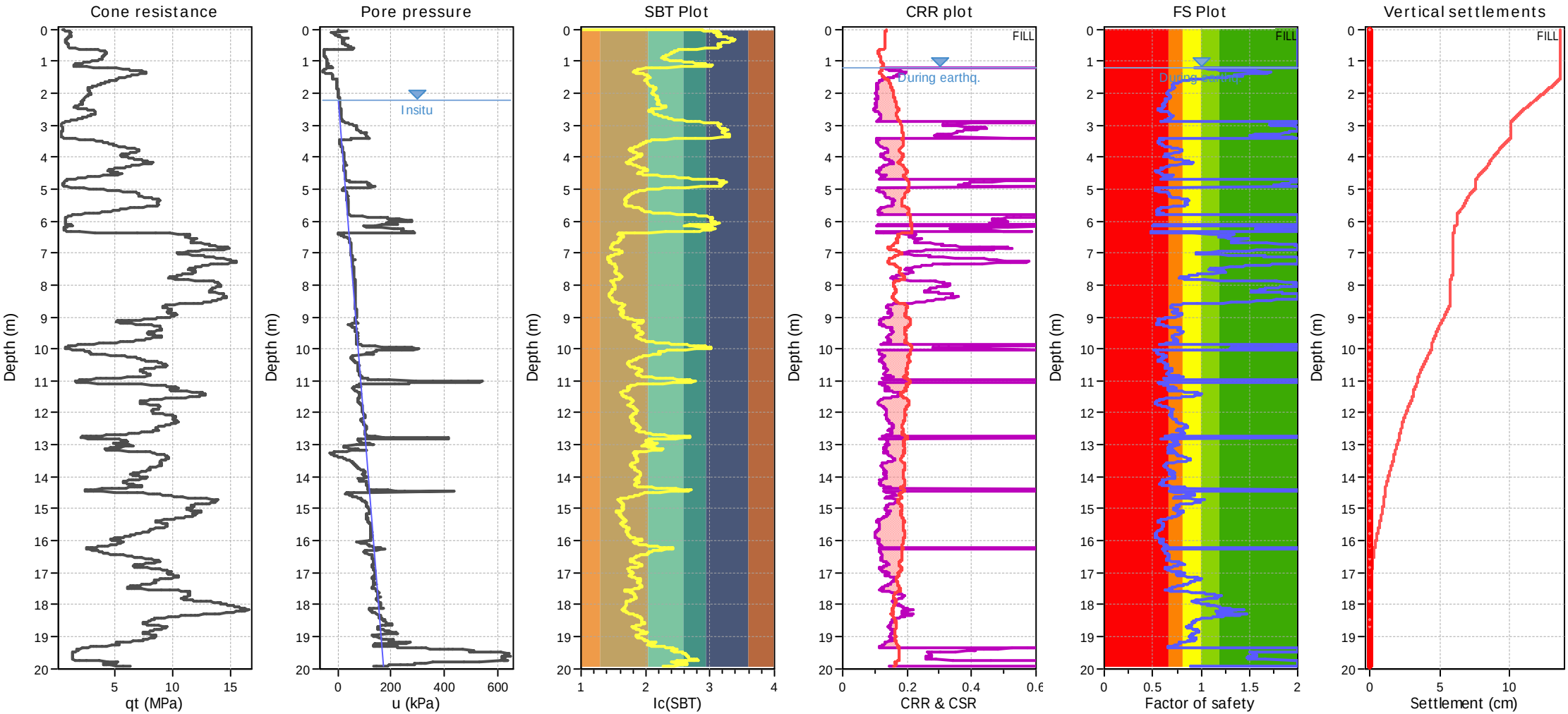
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT203
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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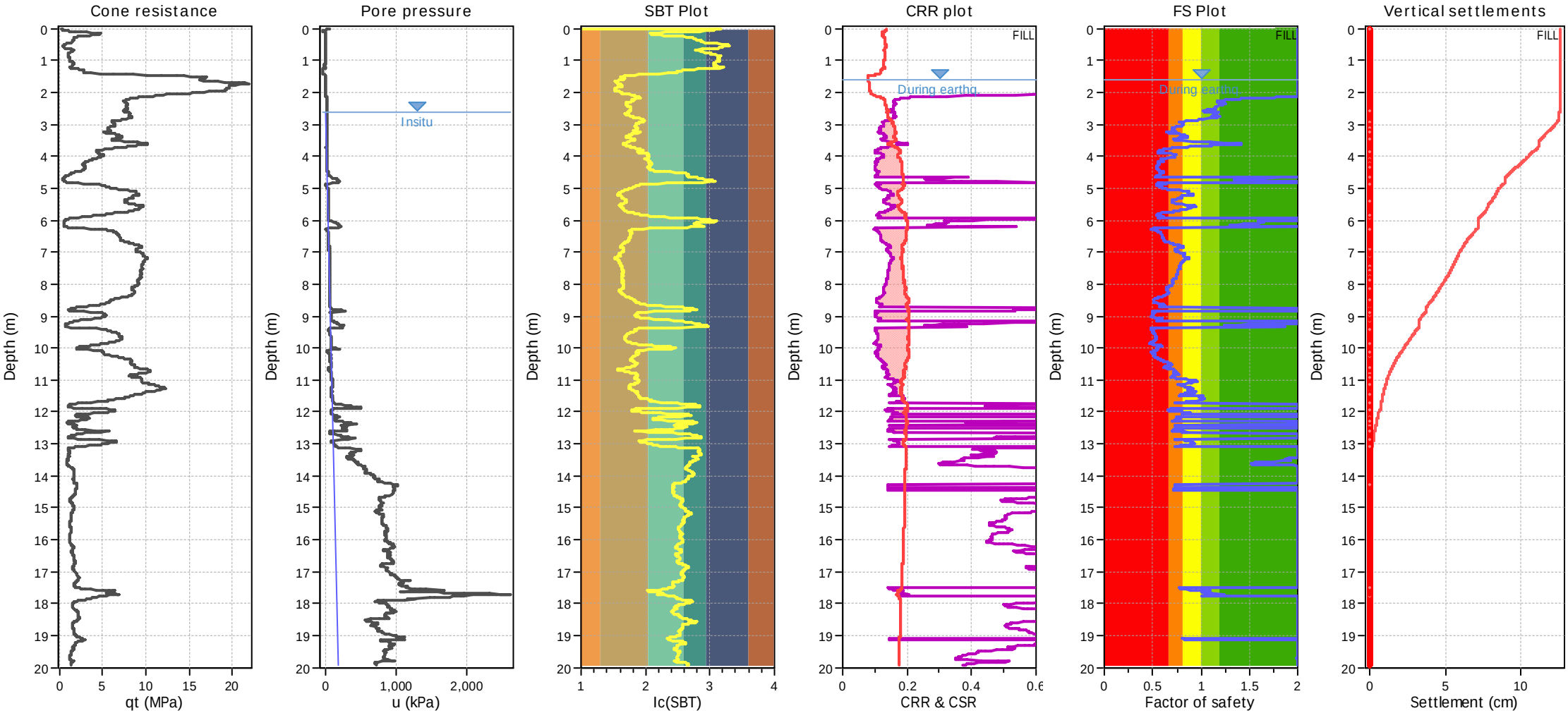
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT204
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.60 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.60 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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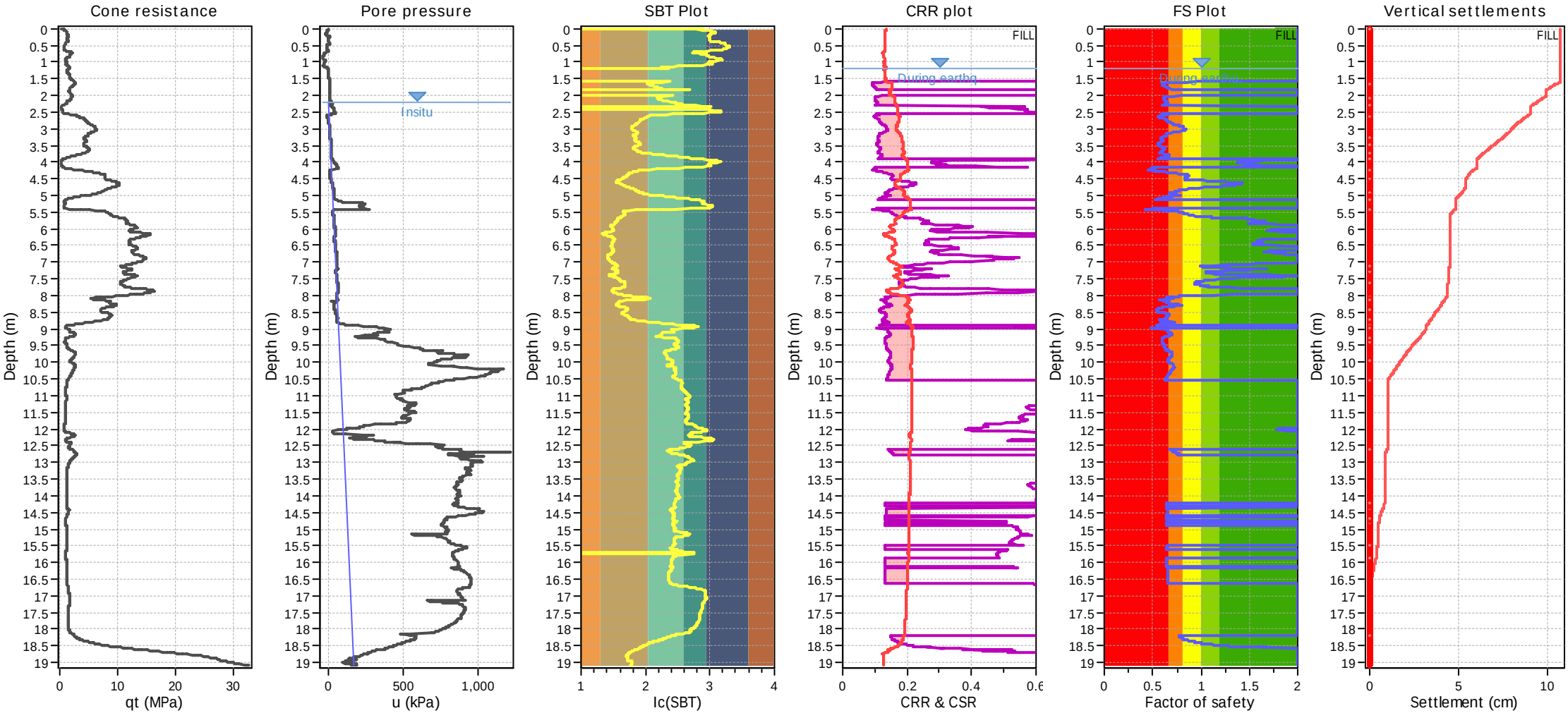
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT207
Total depth: 19.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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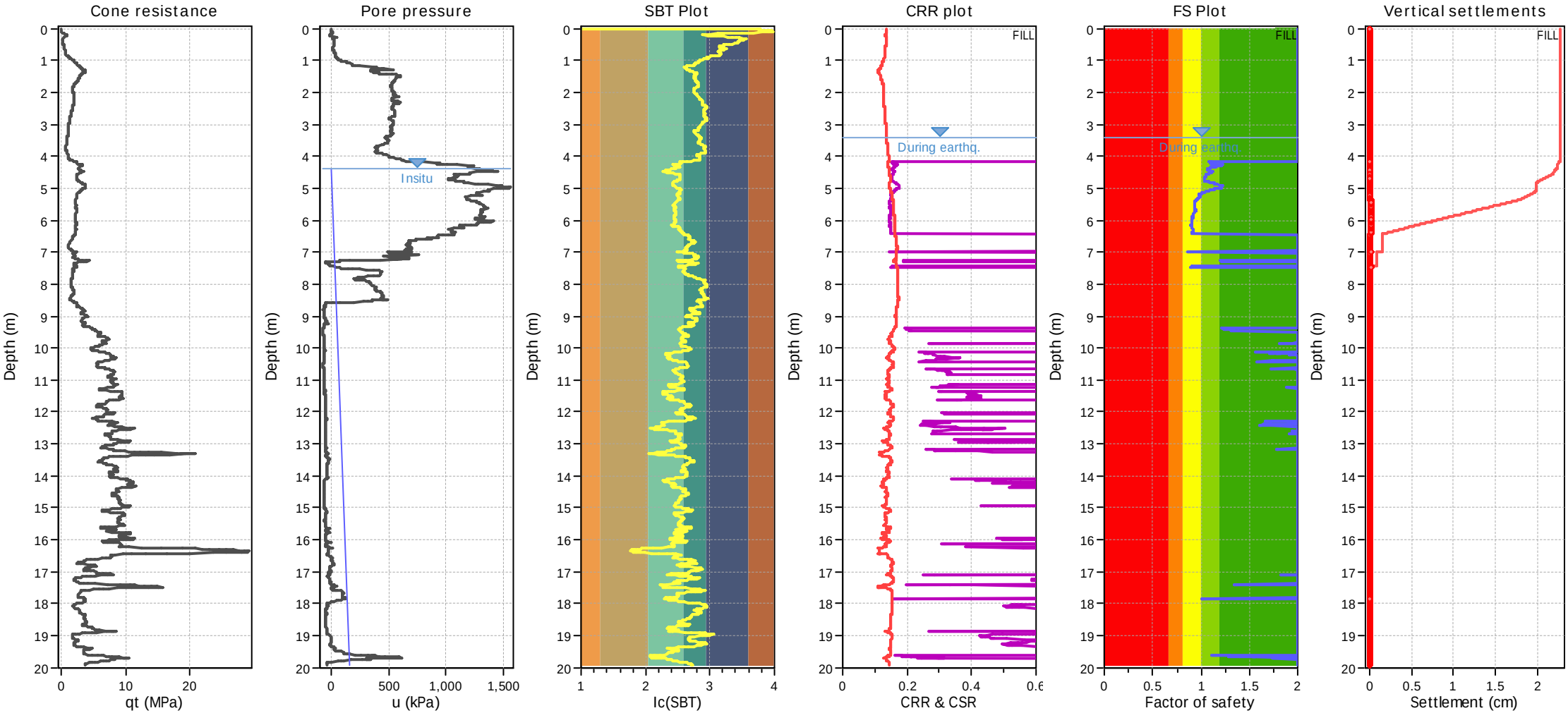
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT208
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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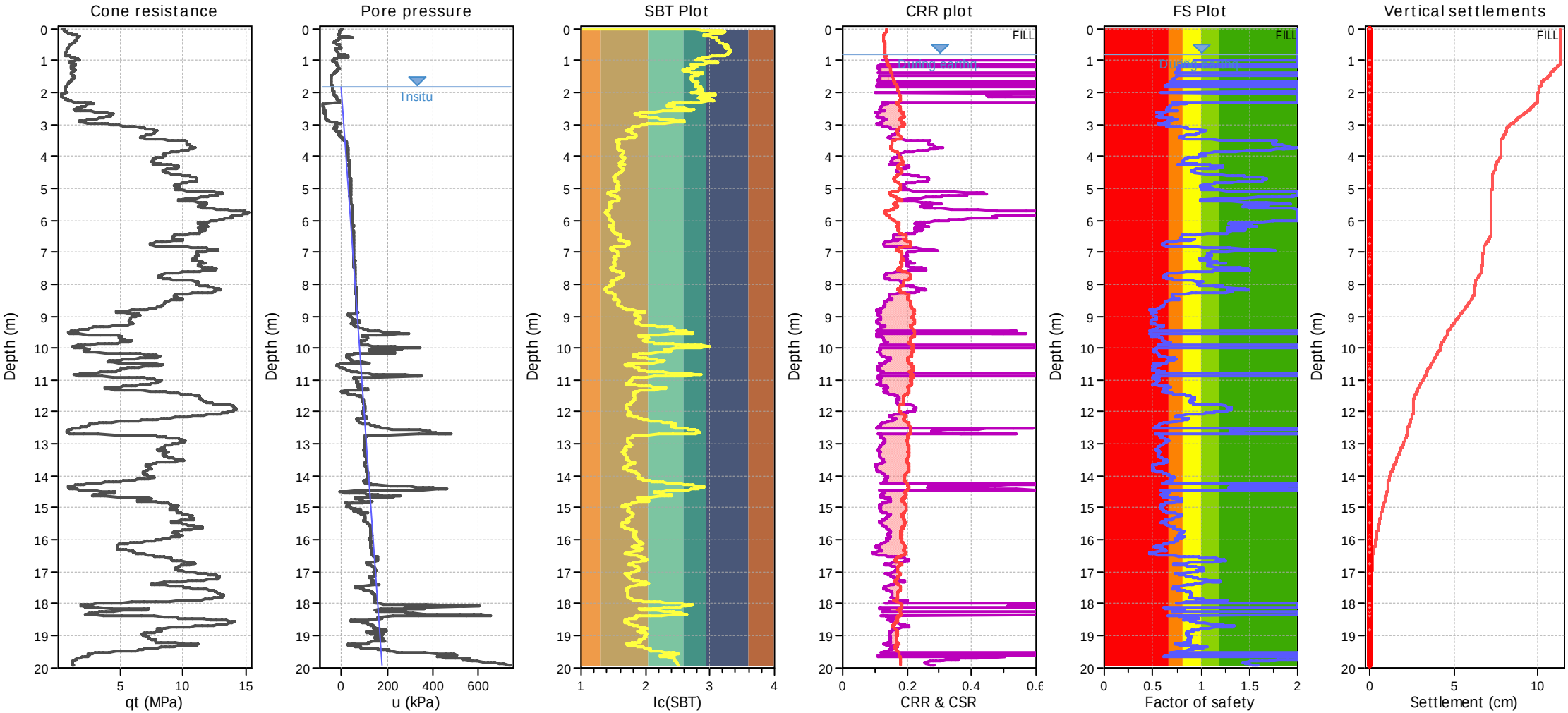
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT210
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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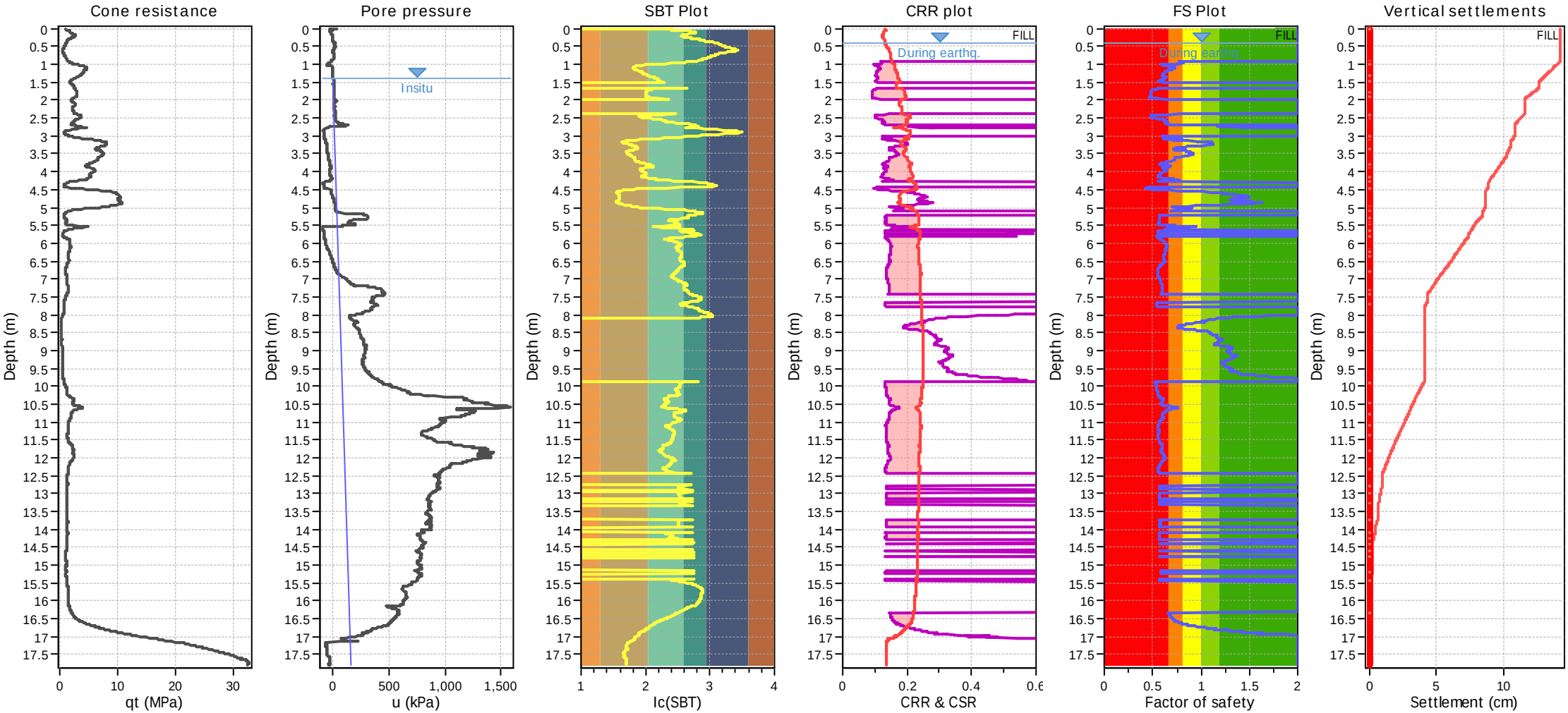
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT211
Total depth: 17.80 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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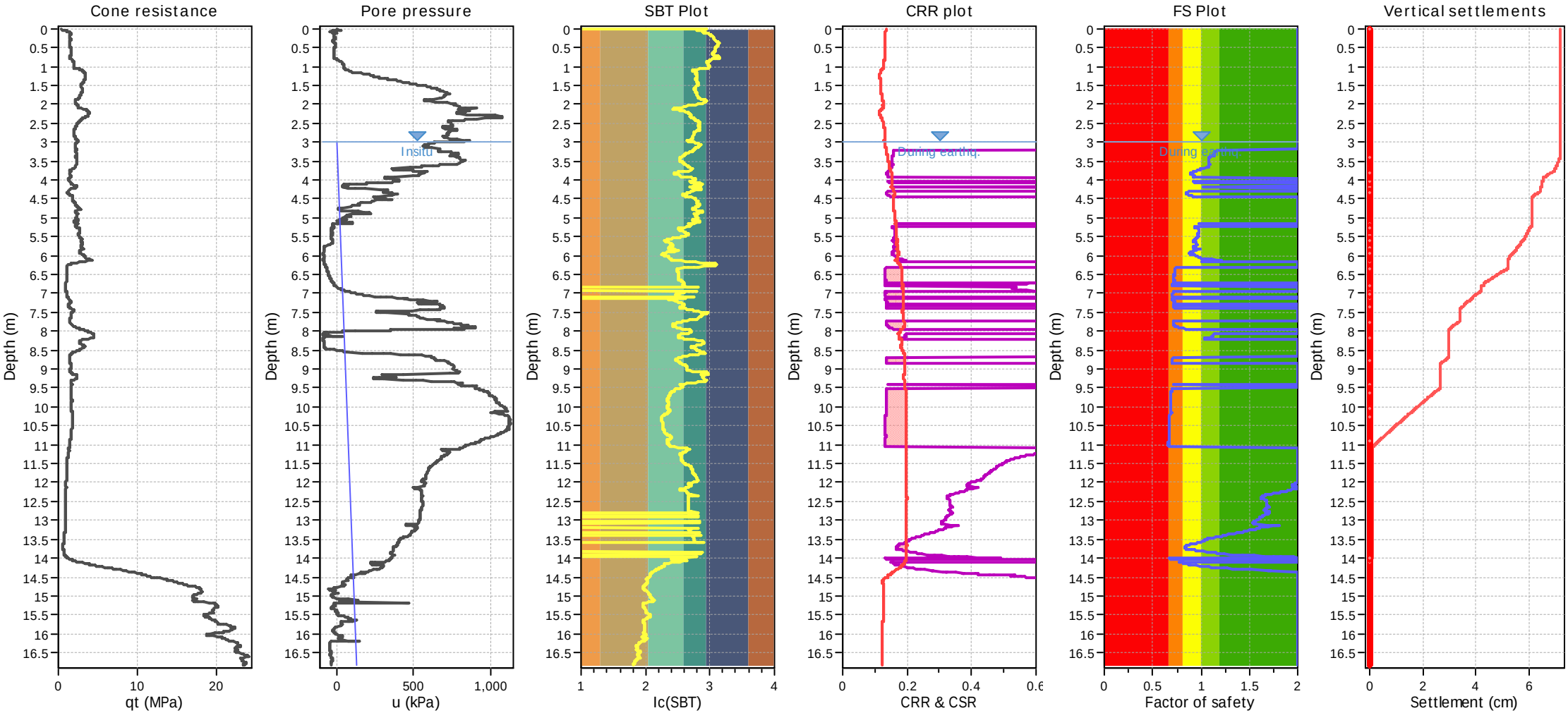
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT212
Total depth: 16.83 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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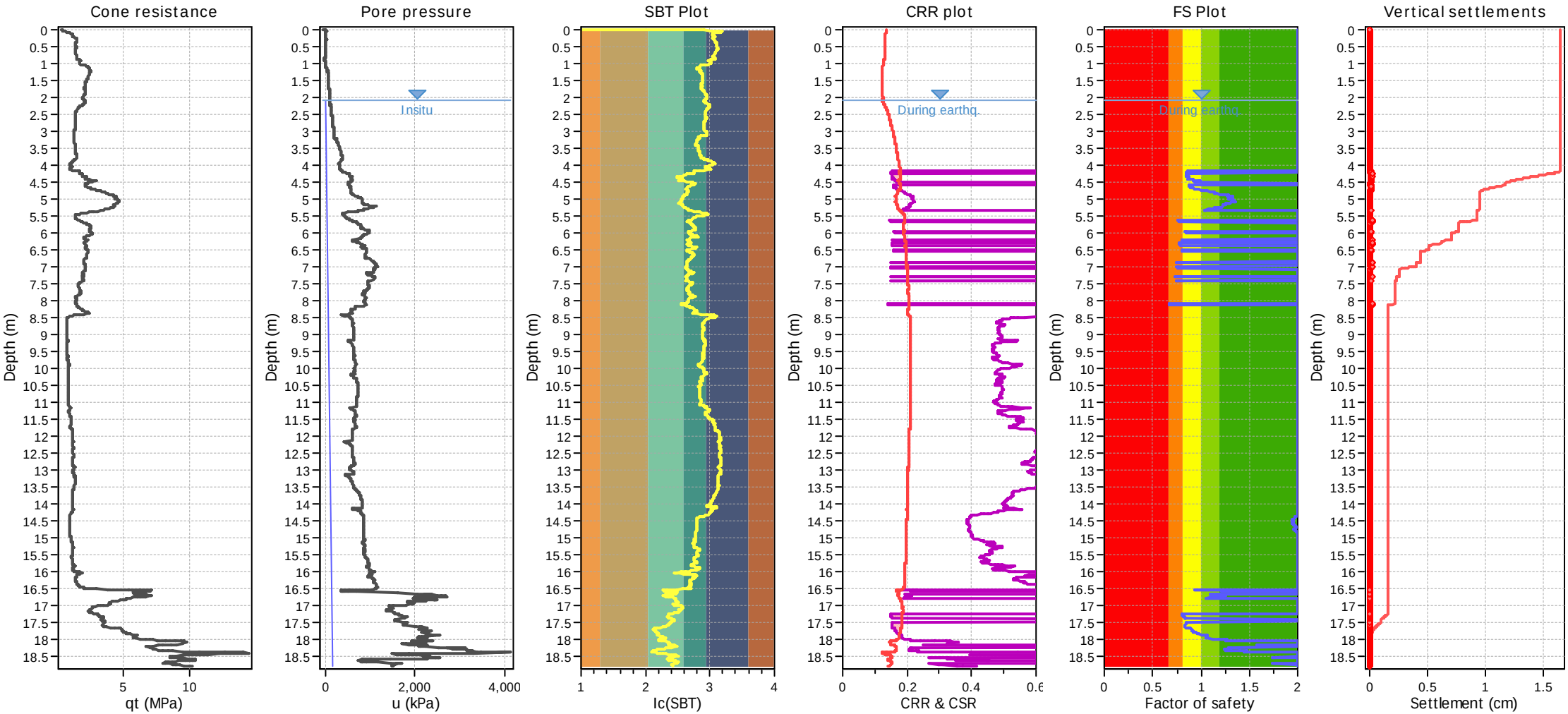
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT213
Total depth: 18.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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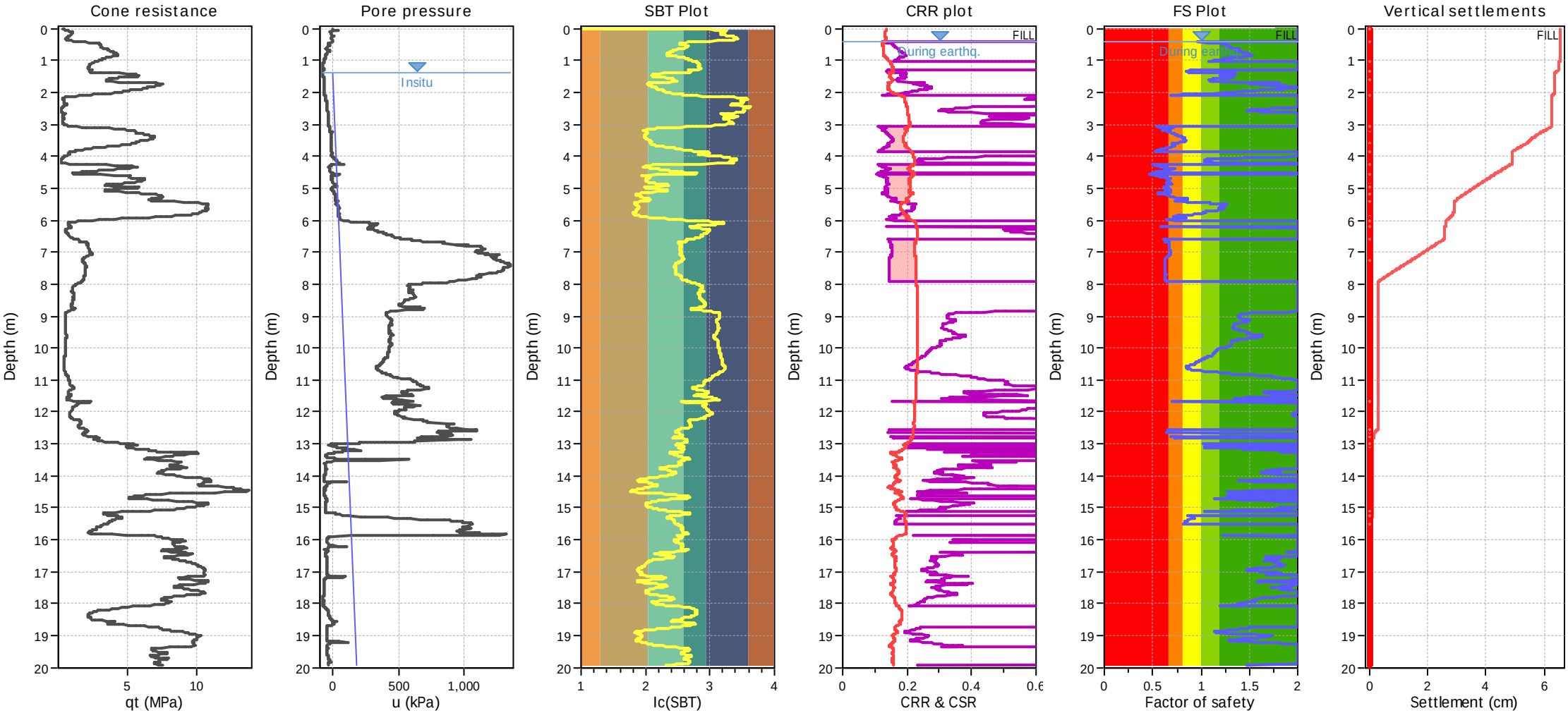
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT214
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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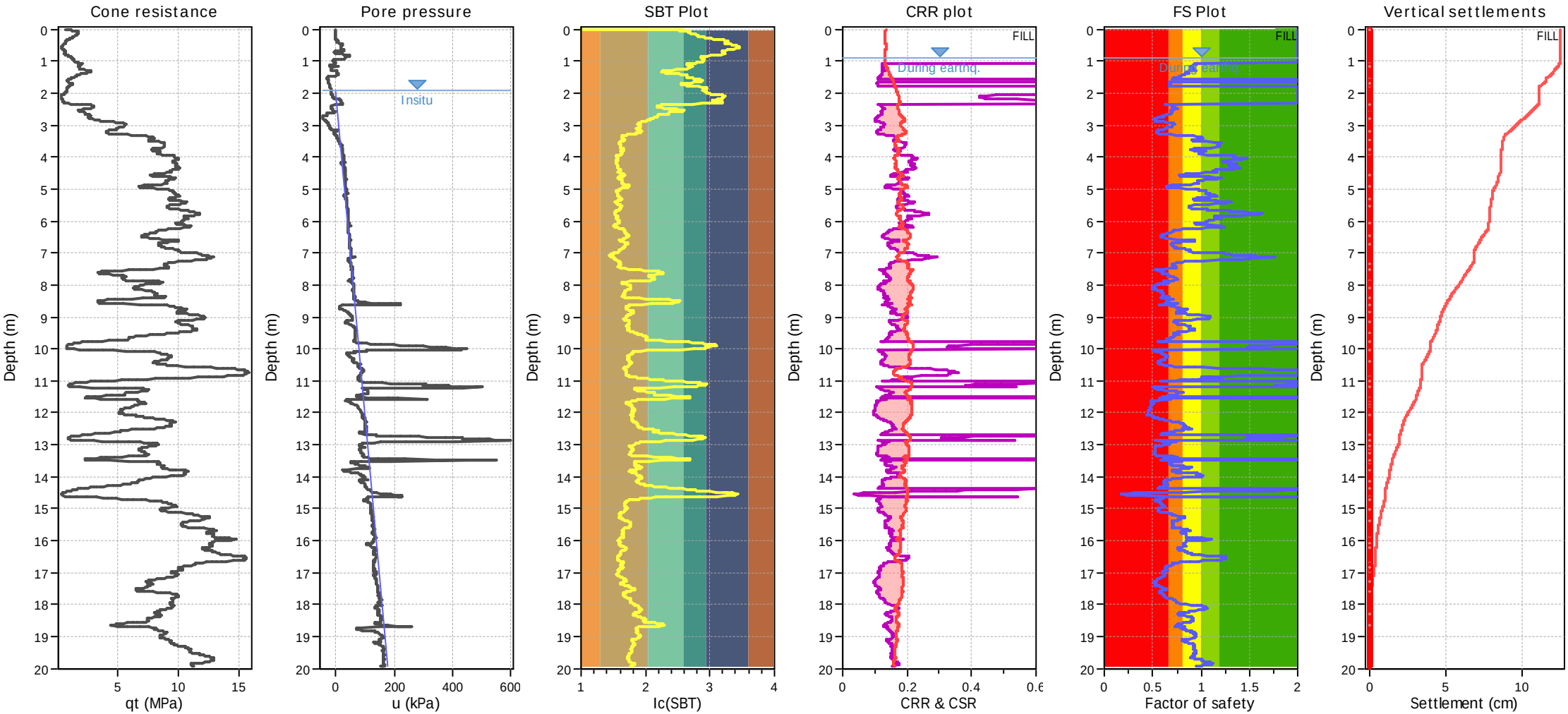
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT215
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.90 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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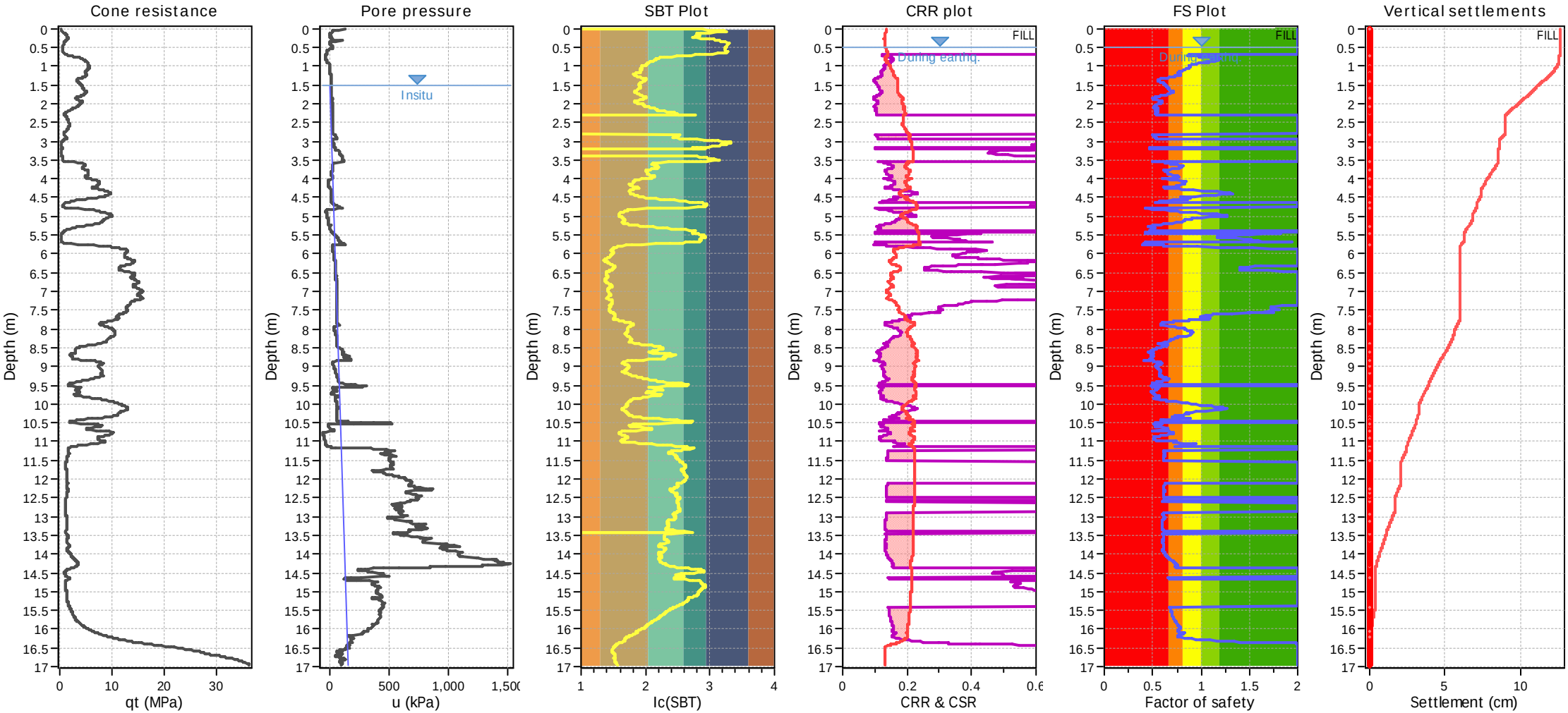
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT216
Total depth: 16.96 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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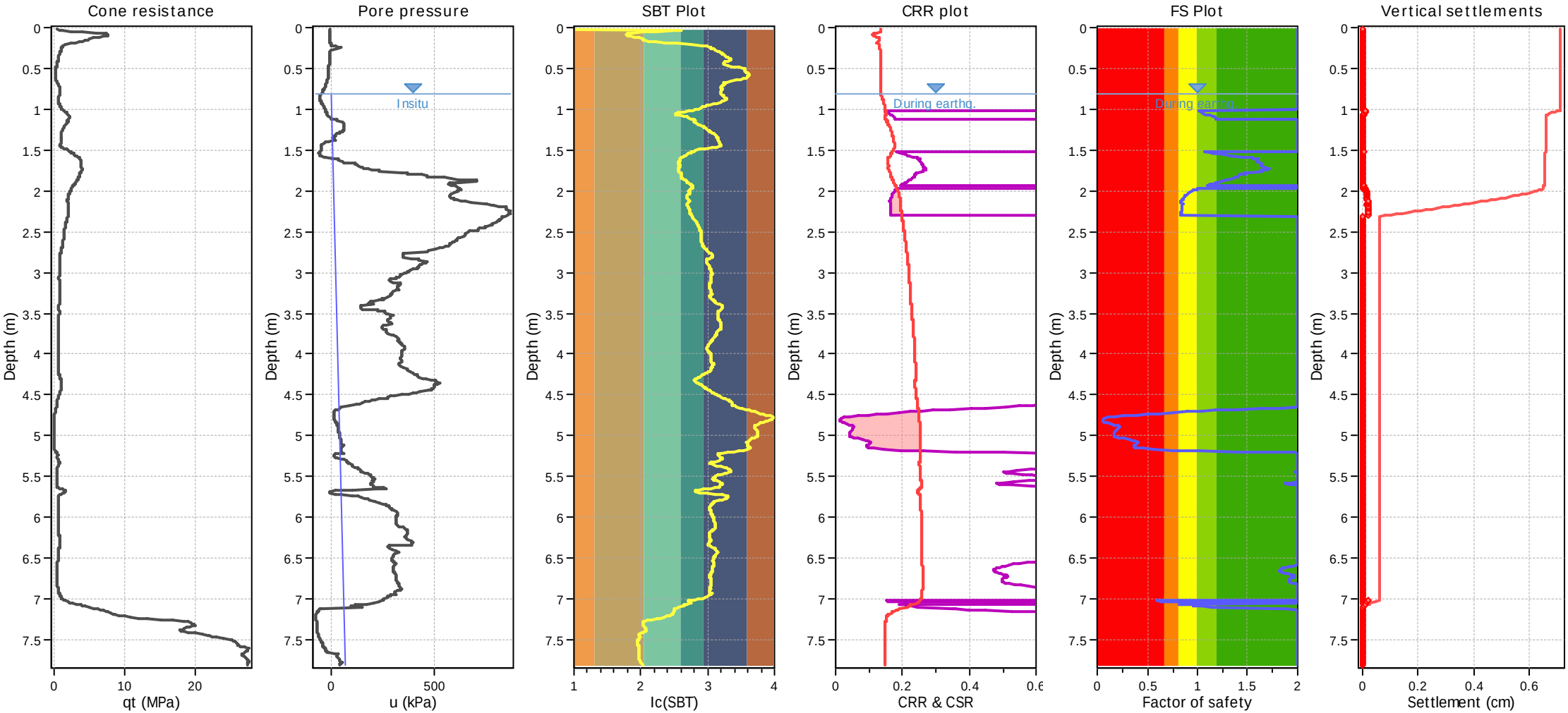
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT217
Total depth: 7.82 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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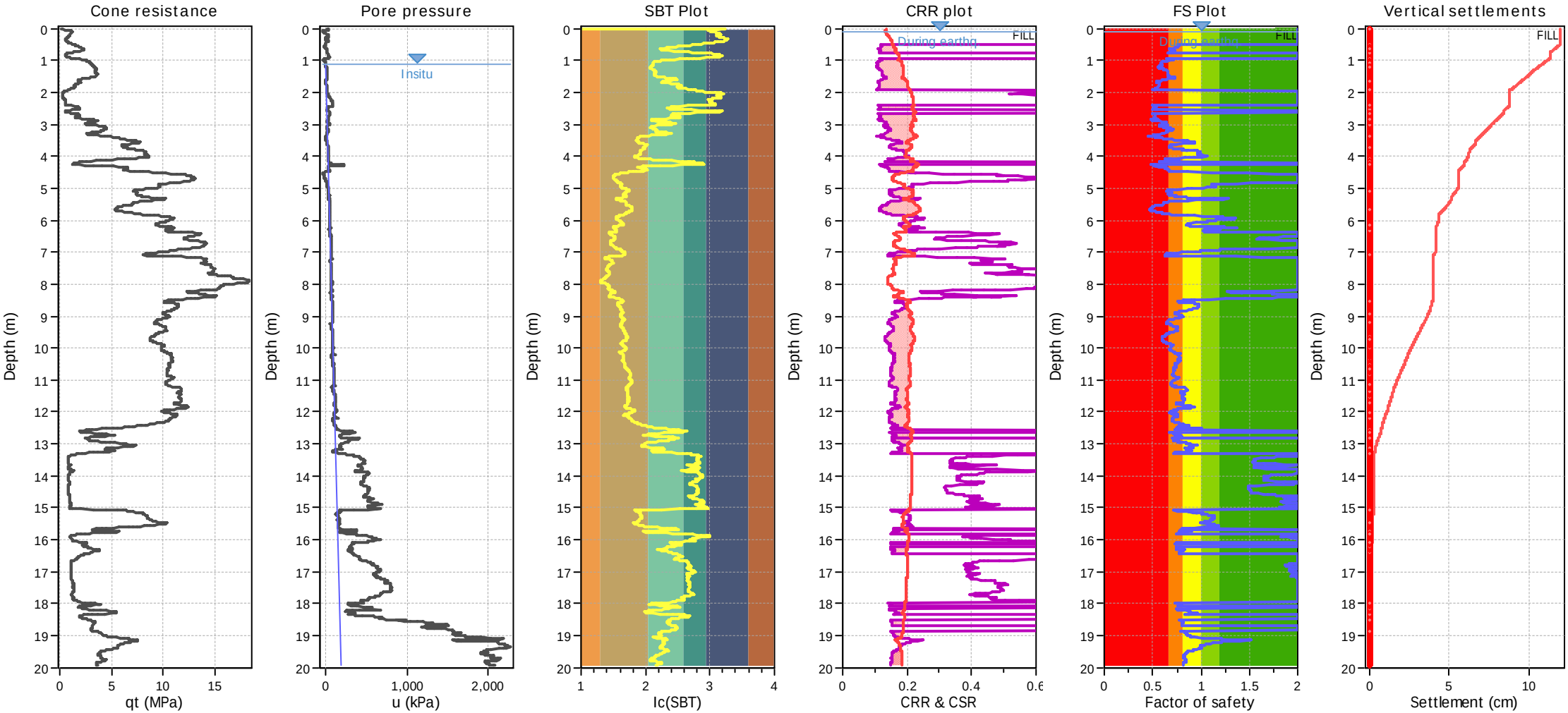
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT218
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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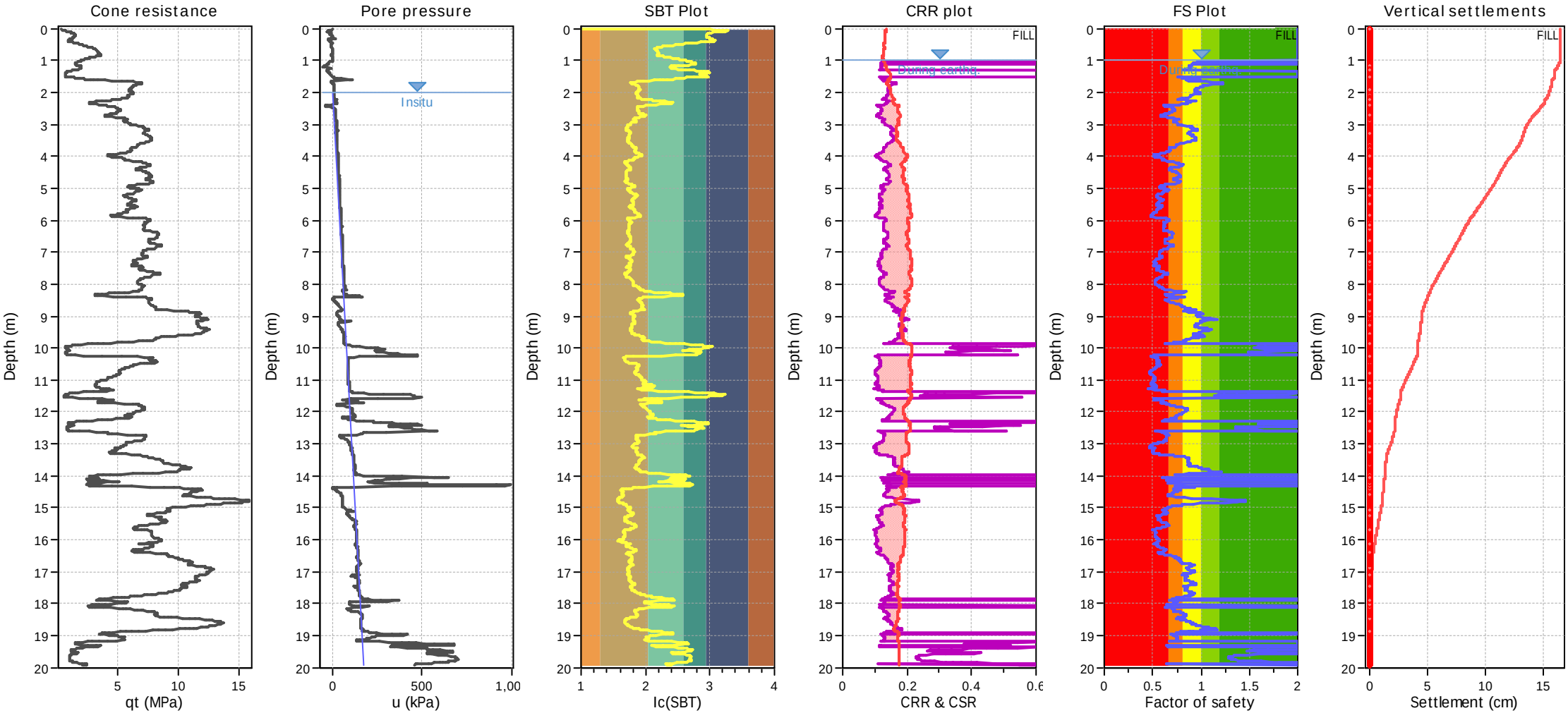
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT219
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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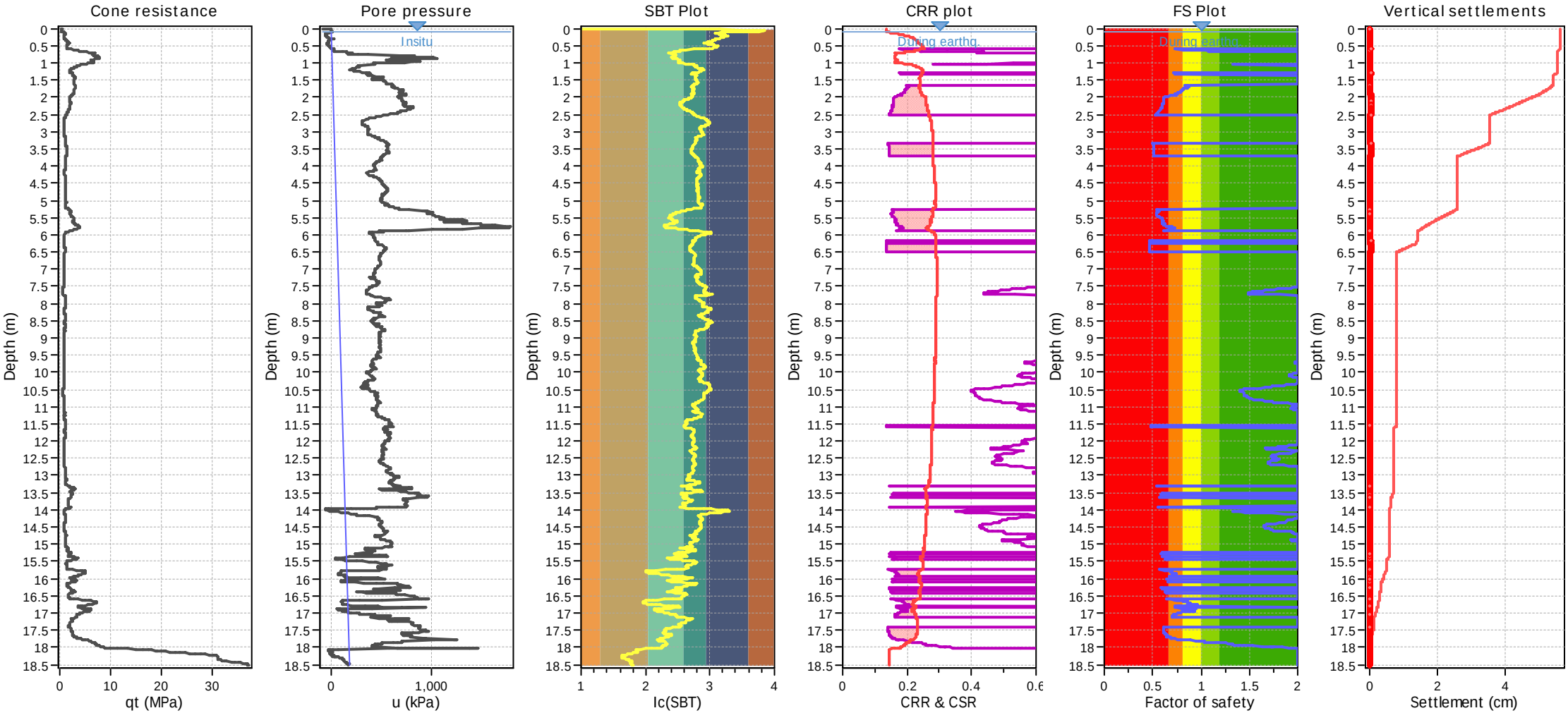
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT220
Total depth: 18.52 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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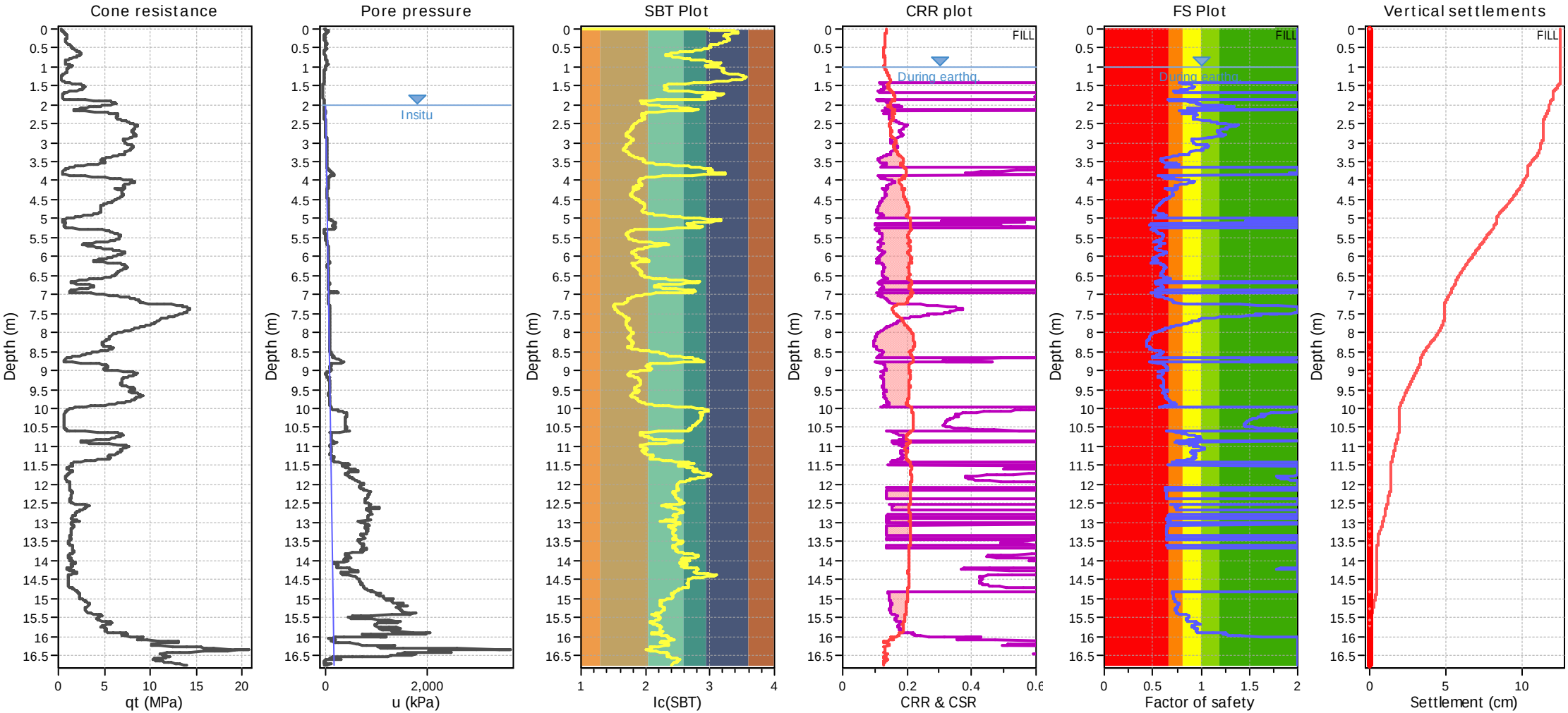
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT221
Total depth: 16.76 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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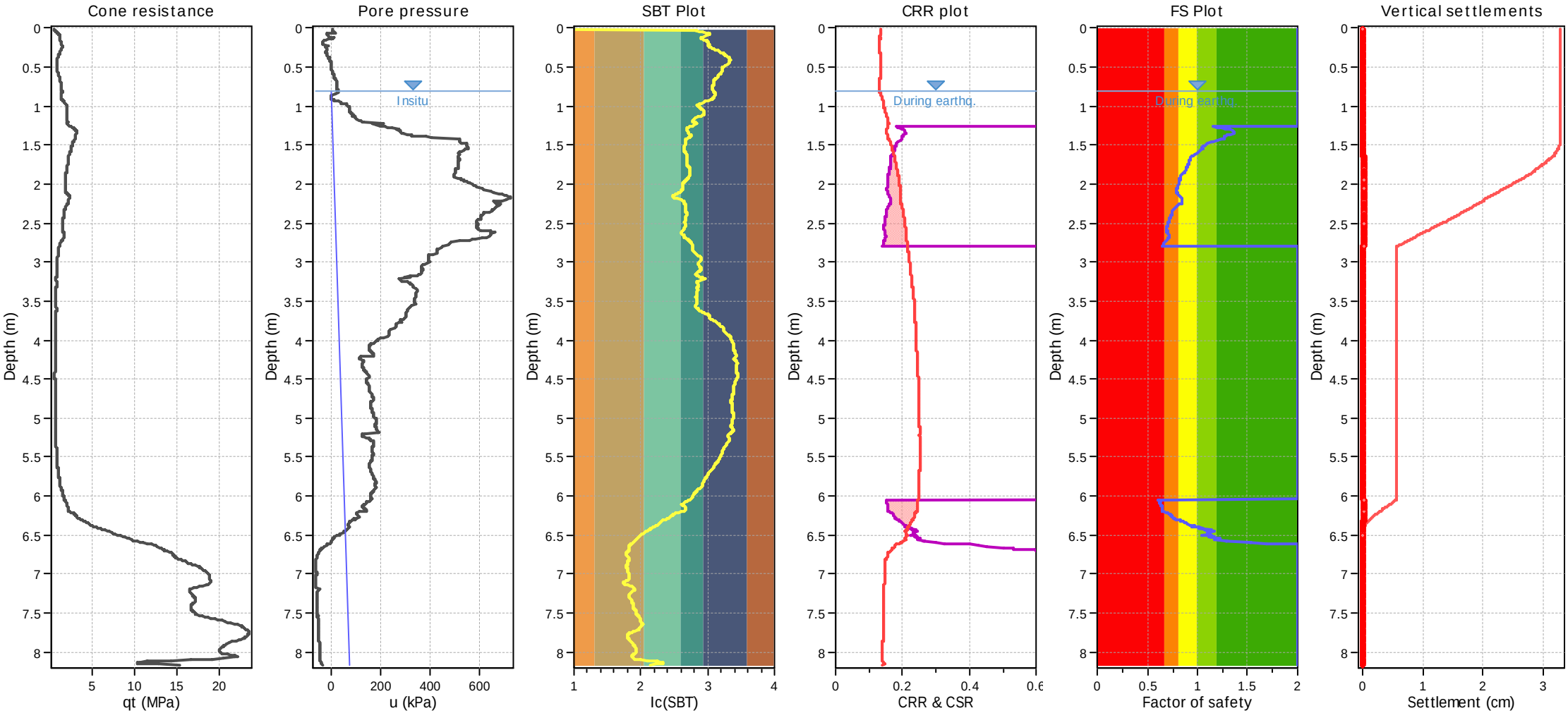
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT222
Total depth: 8.17 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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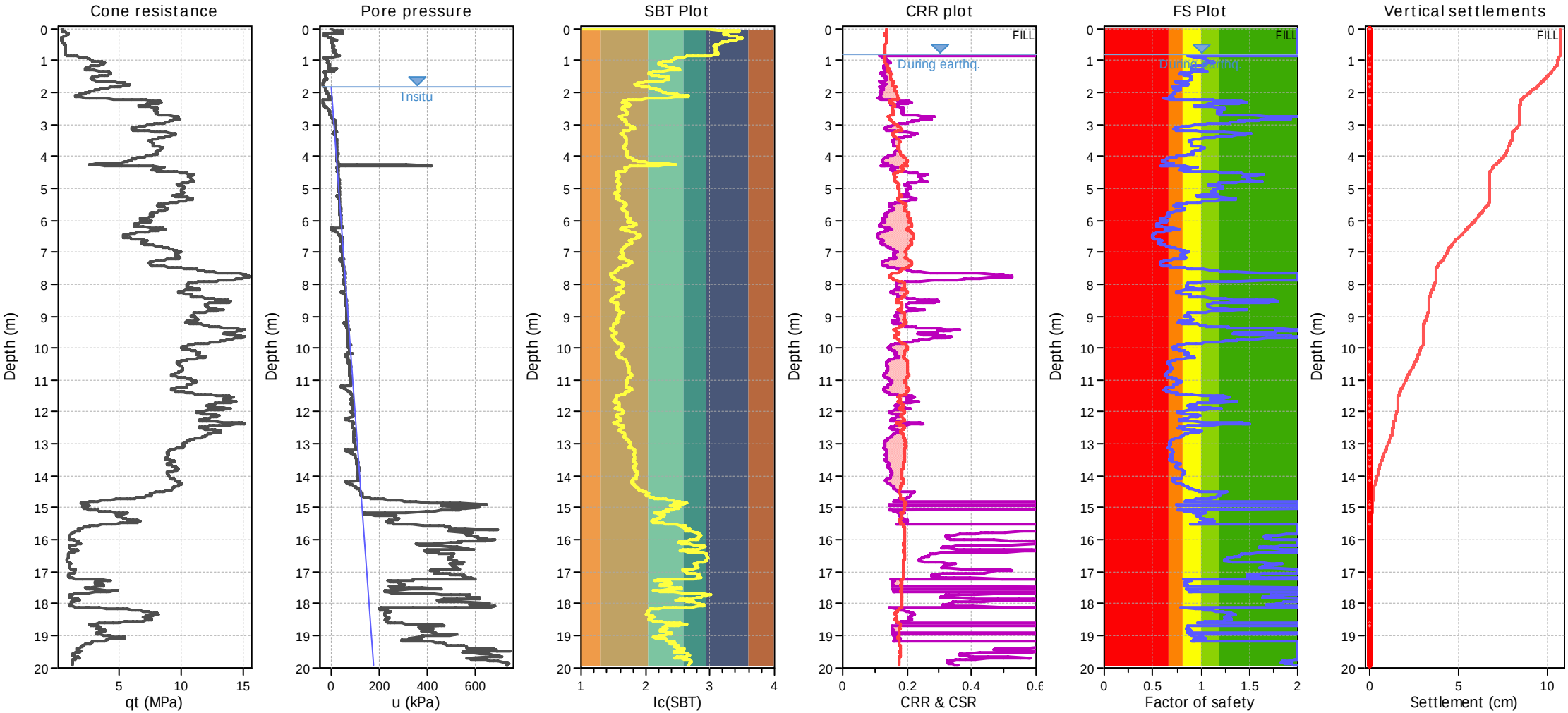
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT223
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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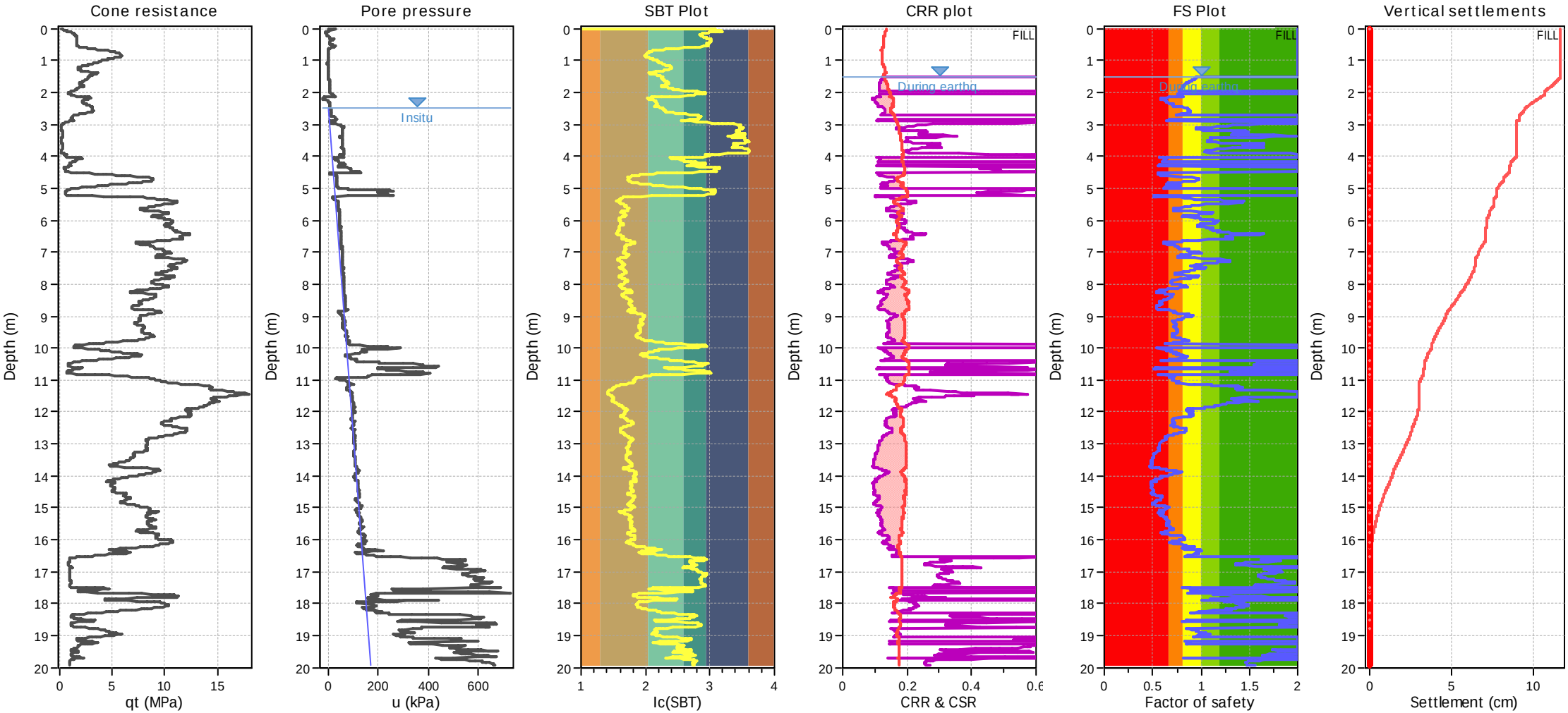
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT224
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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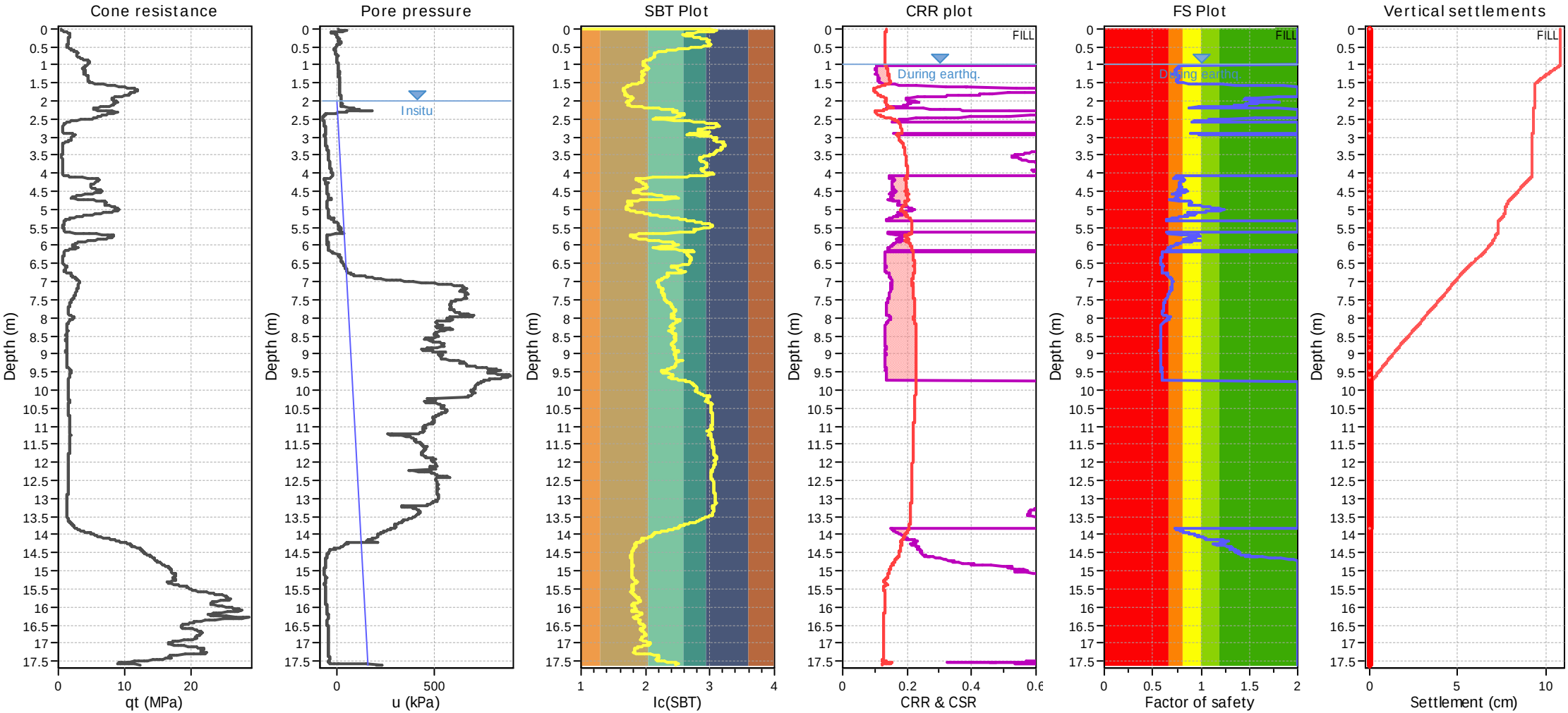
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT225
Total depth: 17.61 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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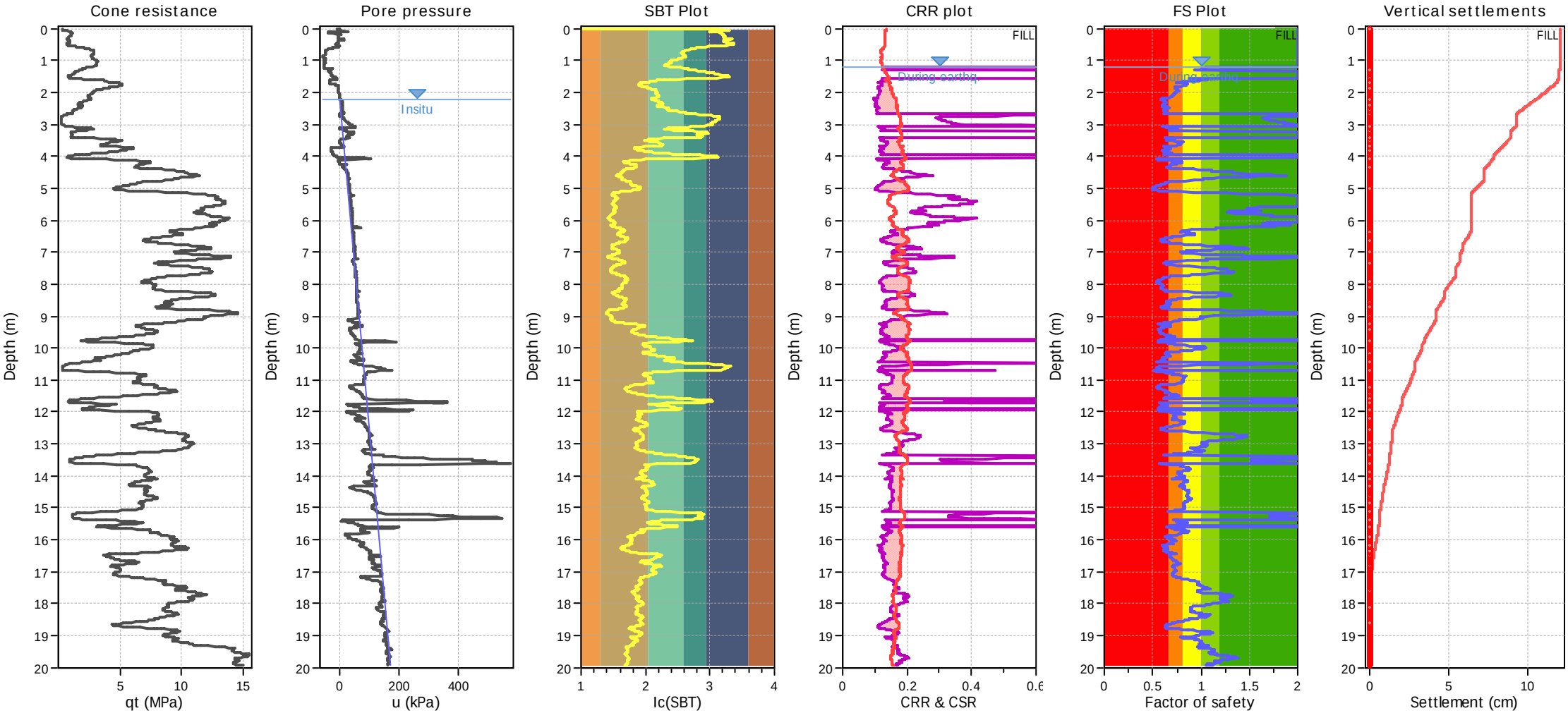
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT227
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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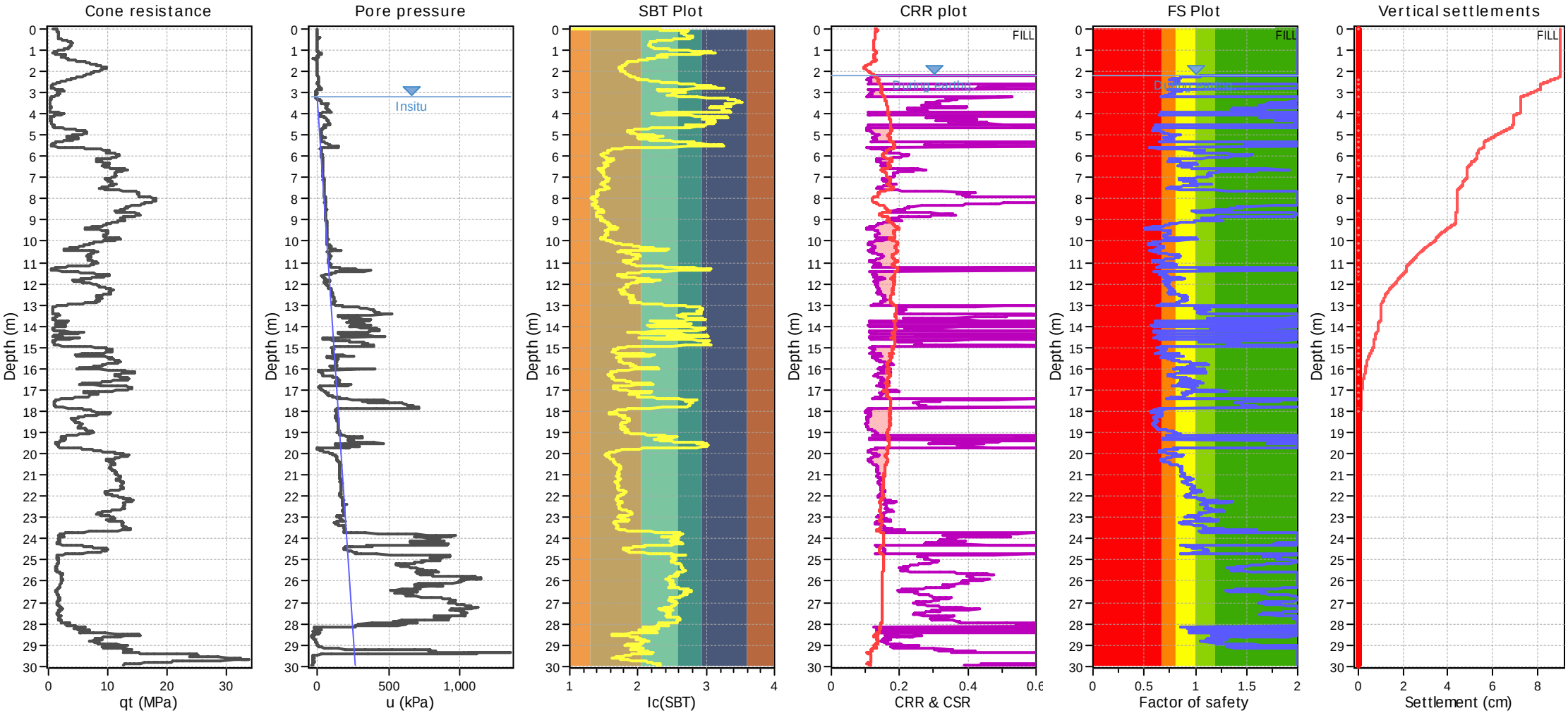
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-01
Total depth: 29.95 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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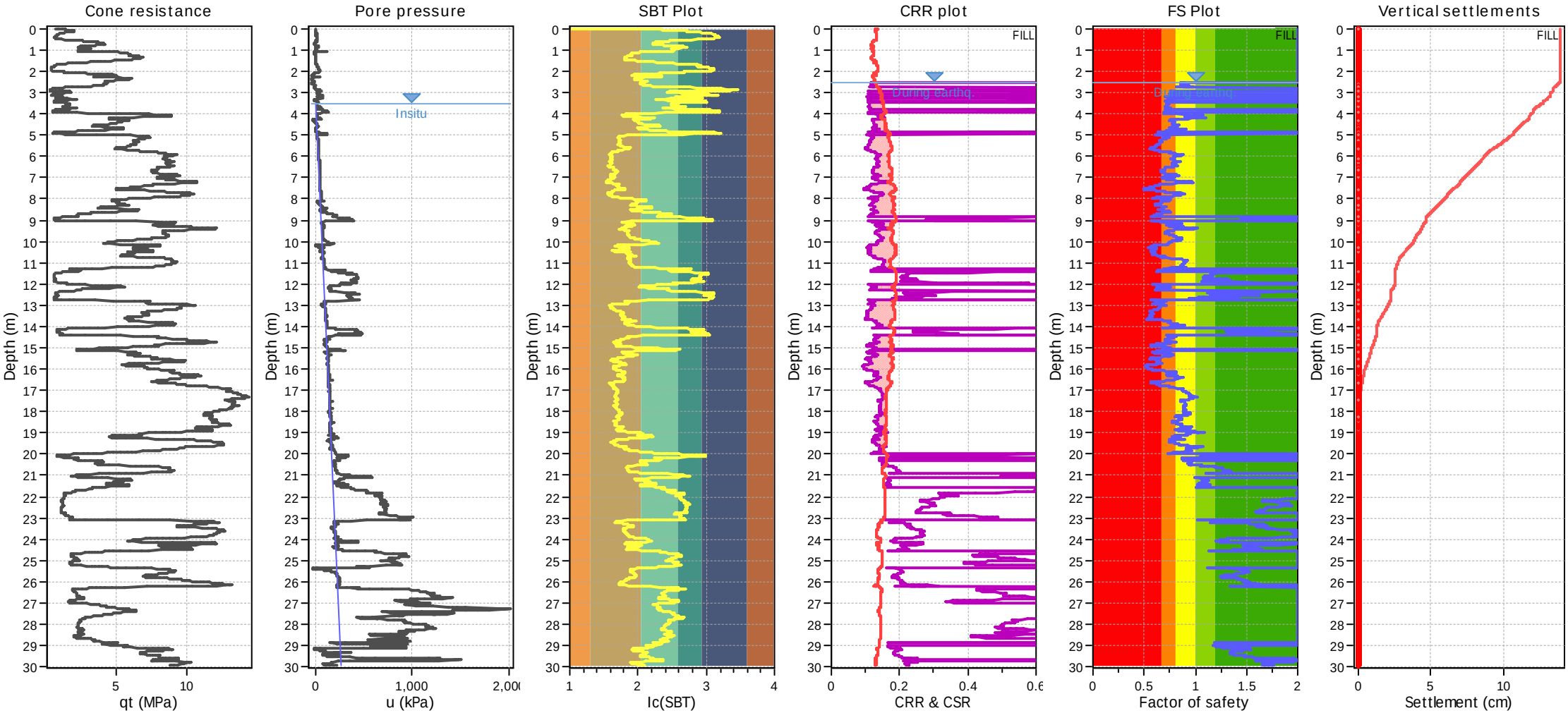
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-02
Total depth: 29.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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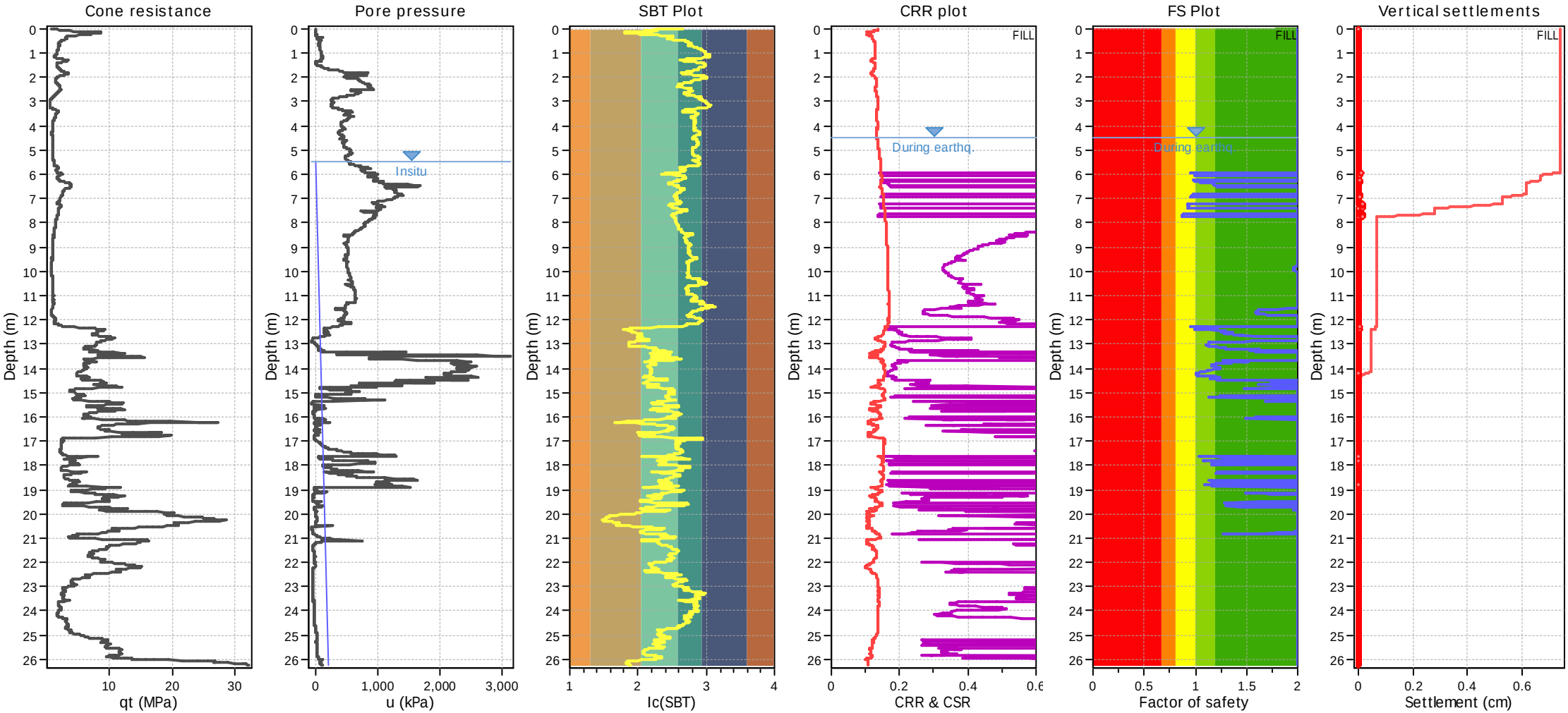
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-03
Total depth: 26.24 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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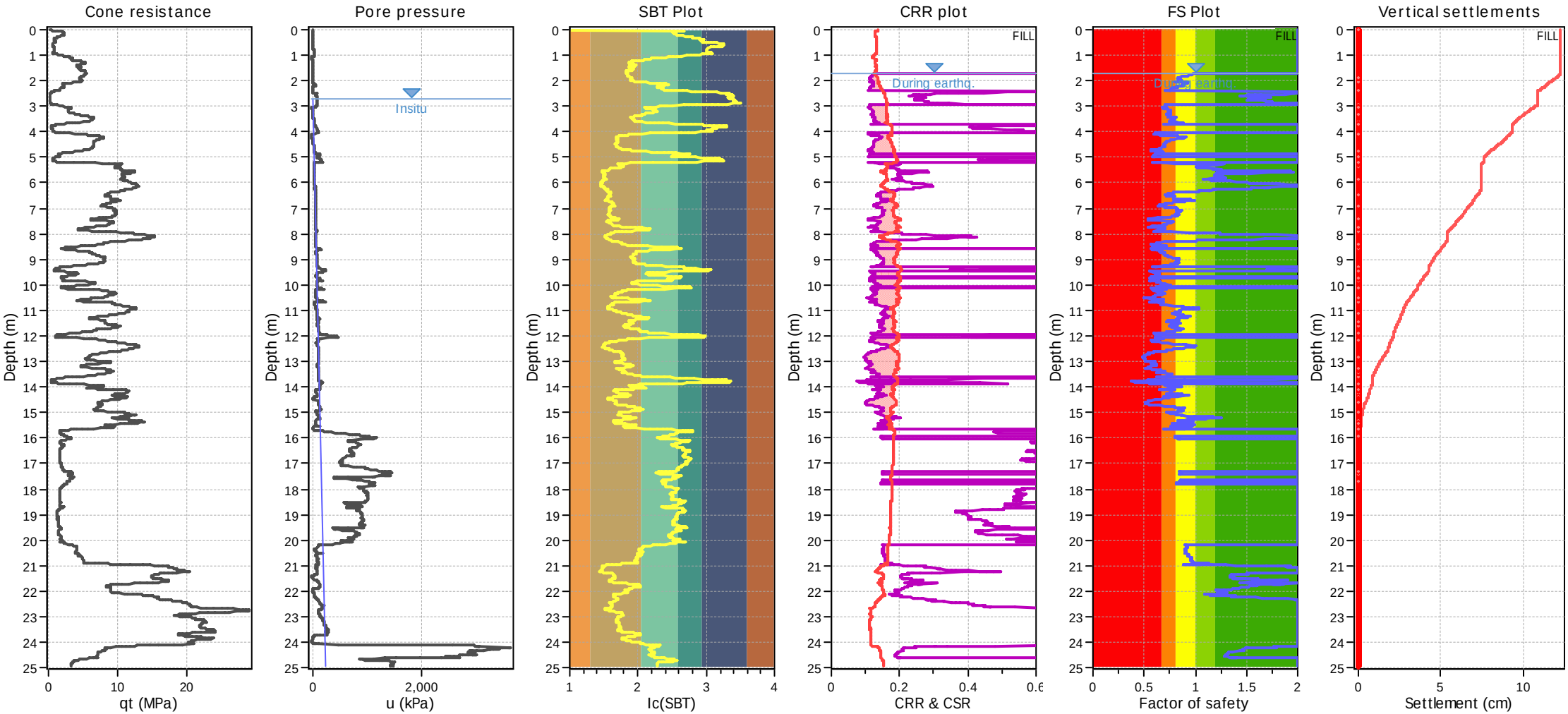
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-04
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.74 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.74 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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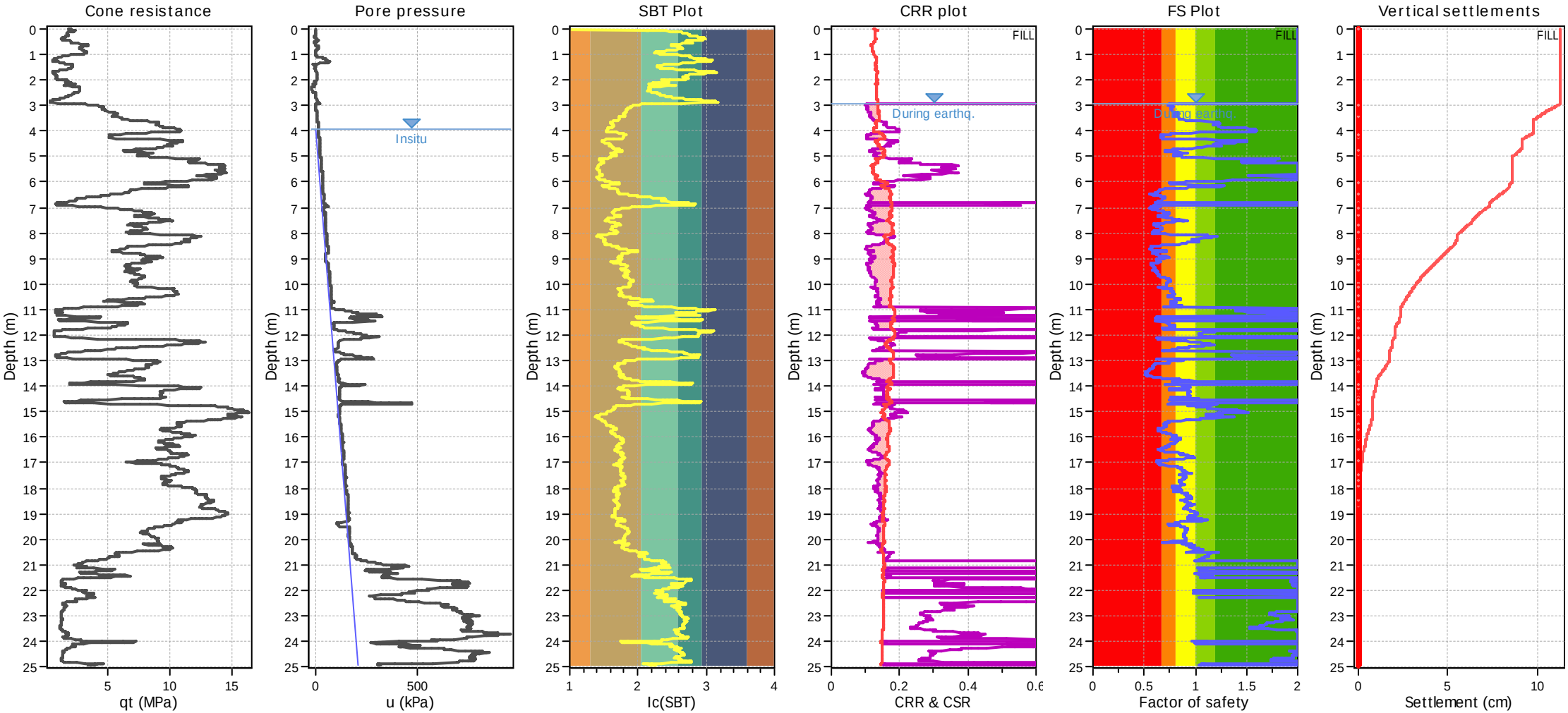
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-05
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.94 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.94 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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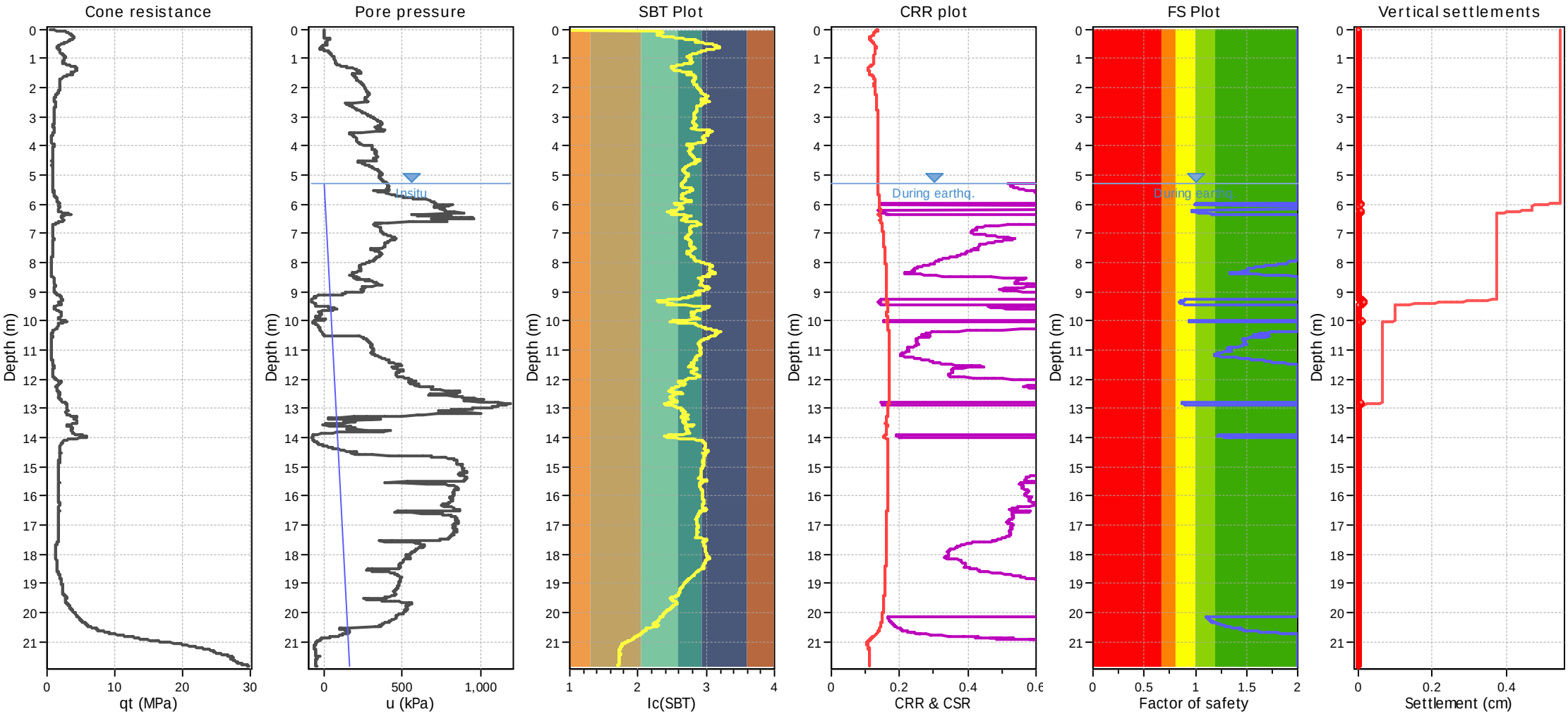
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-06
Total depth: 21.84 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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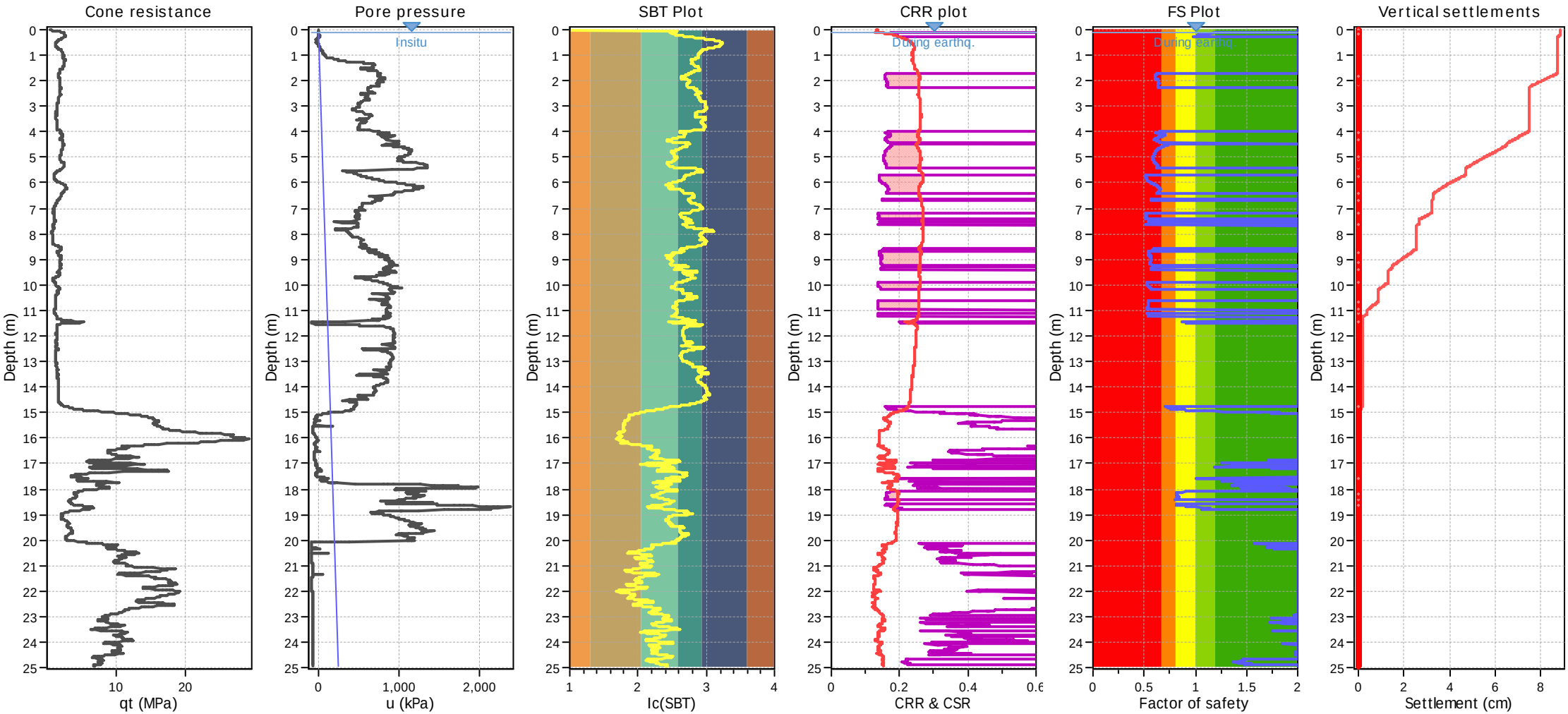
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-07
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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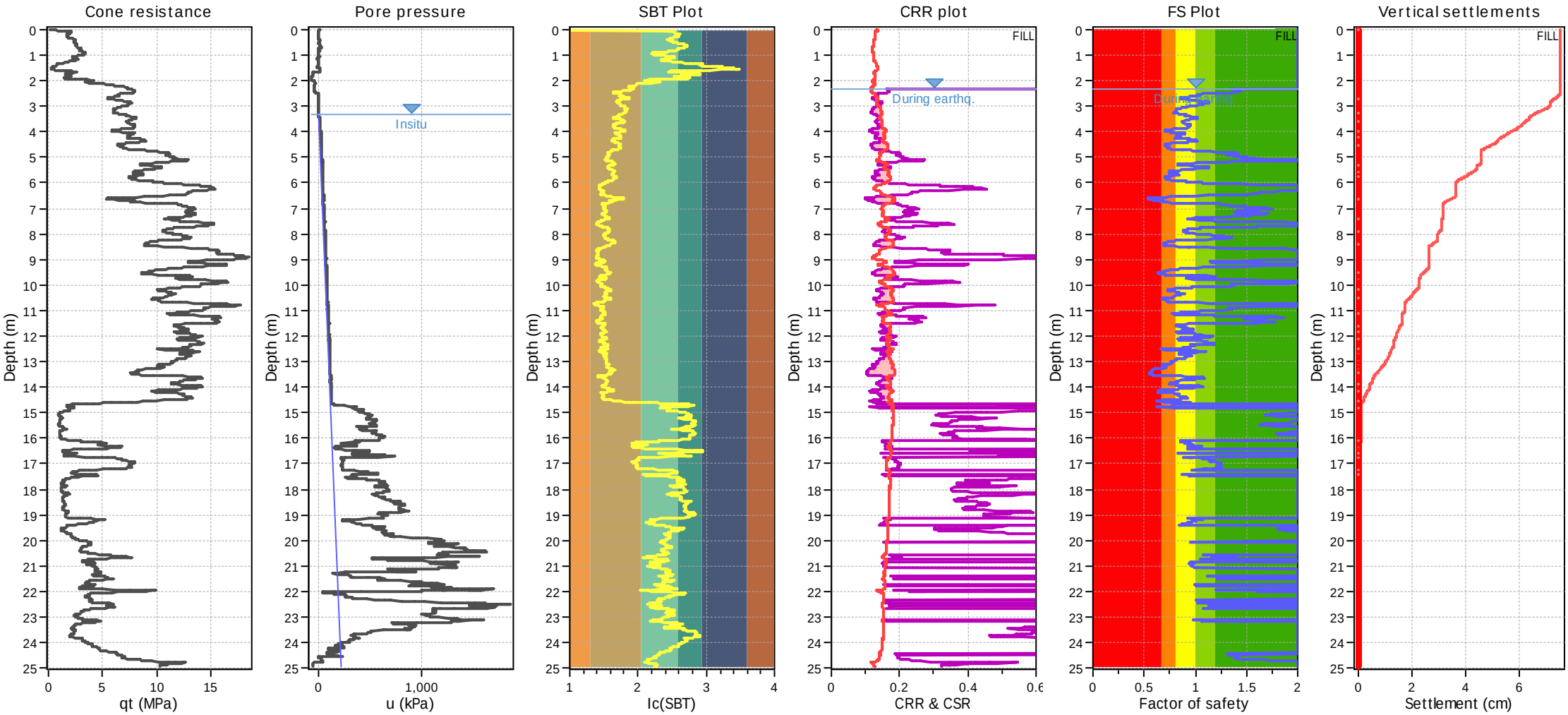
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-08
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.33 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.33 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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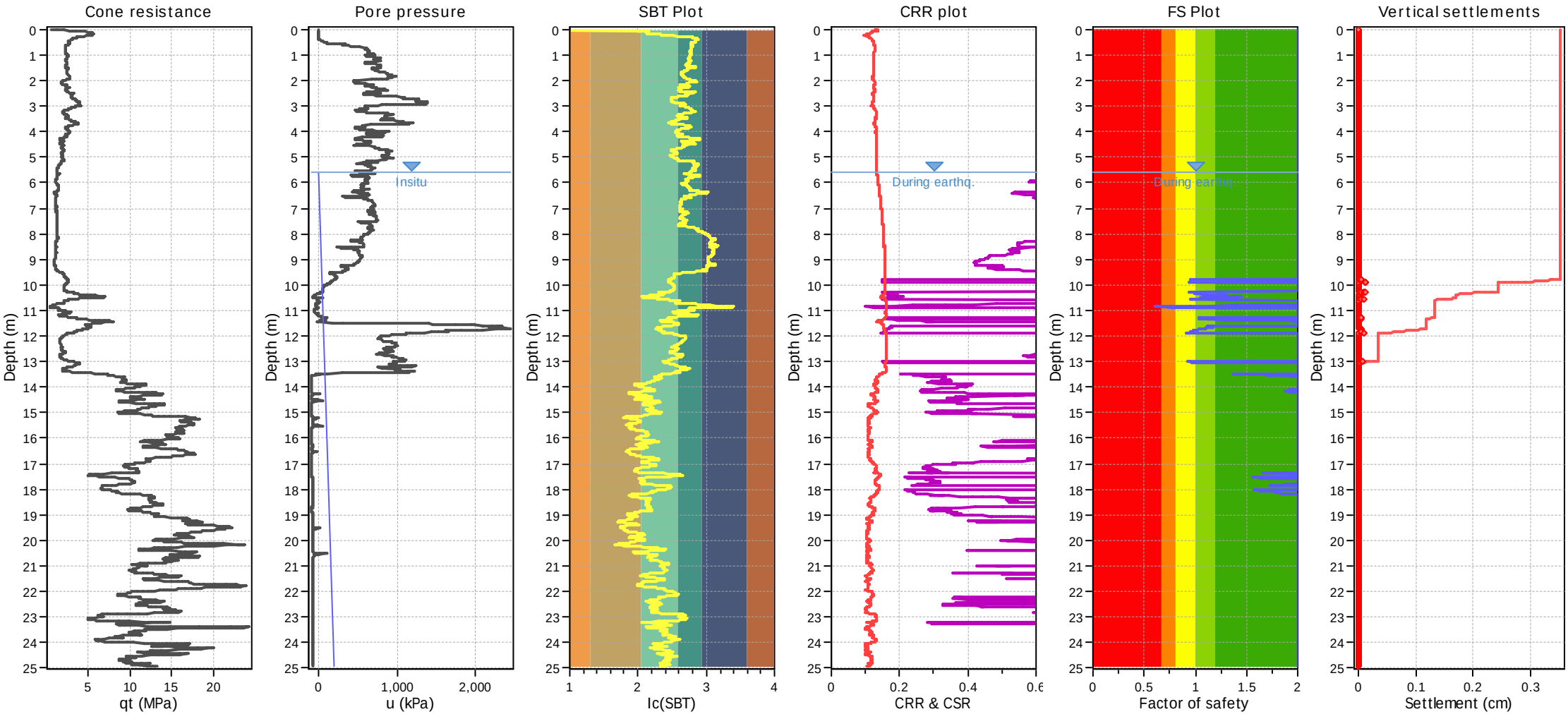
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-09
Total depth: 24.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.60 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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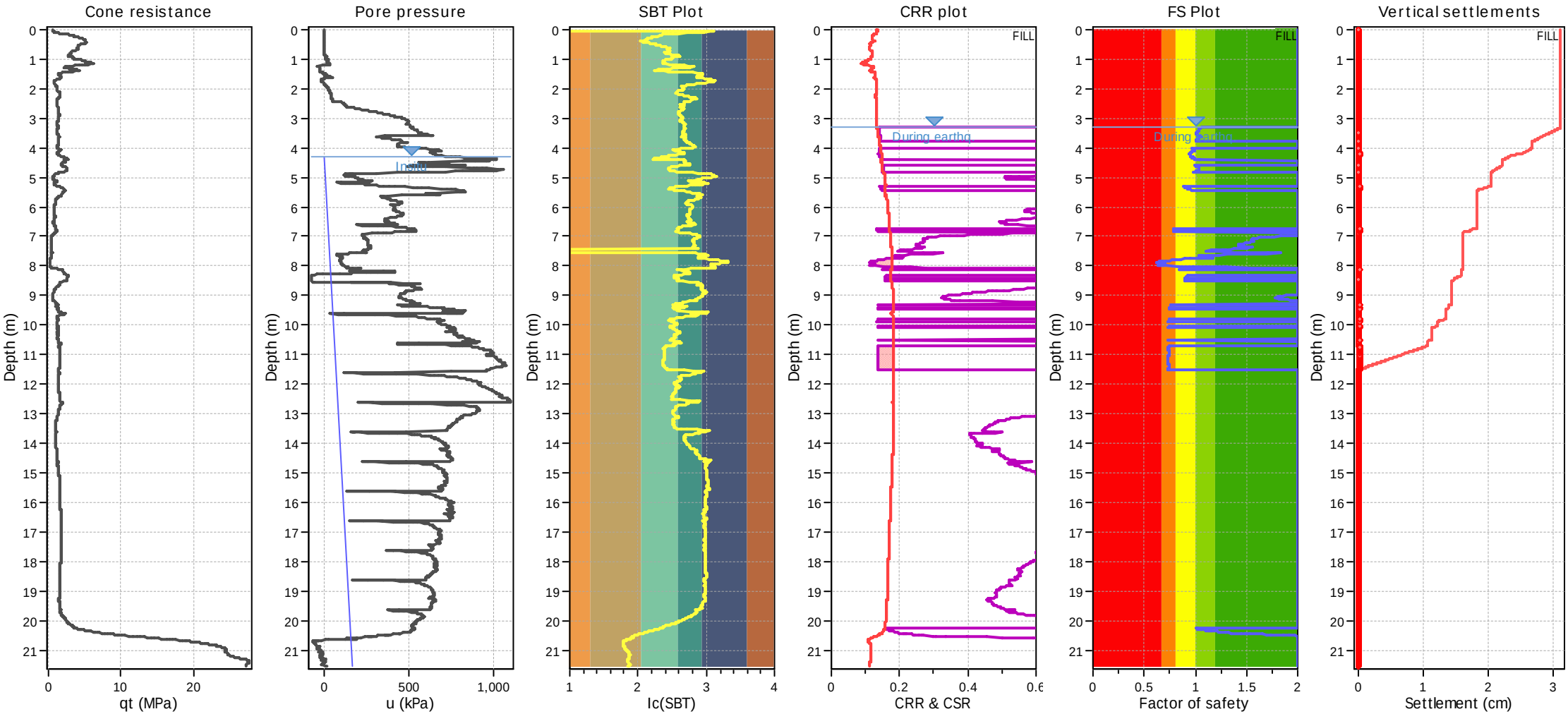
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT102
Total depth: 21.53 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.30 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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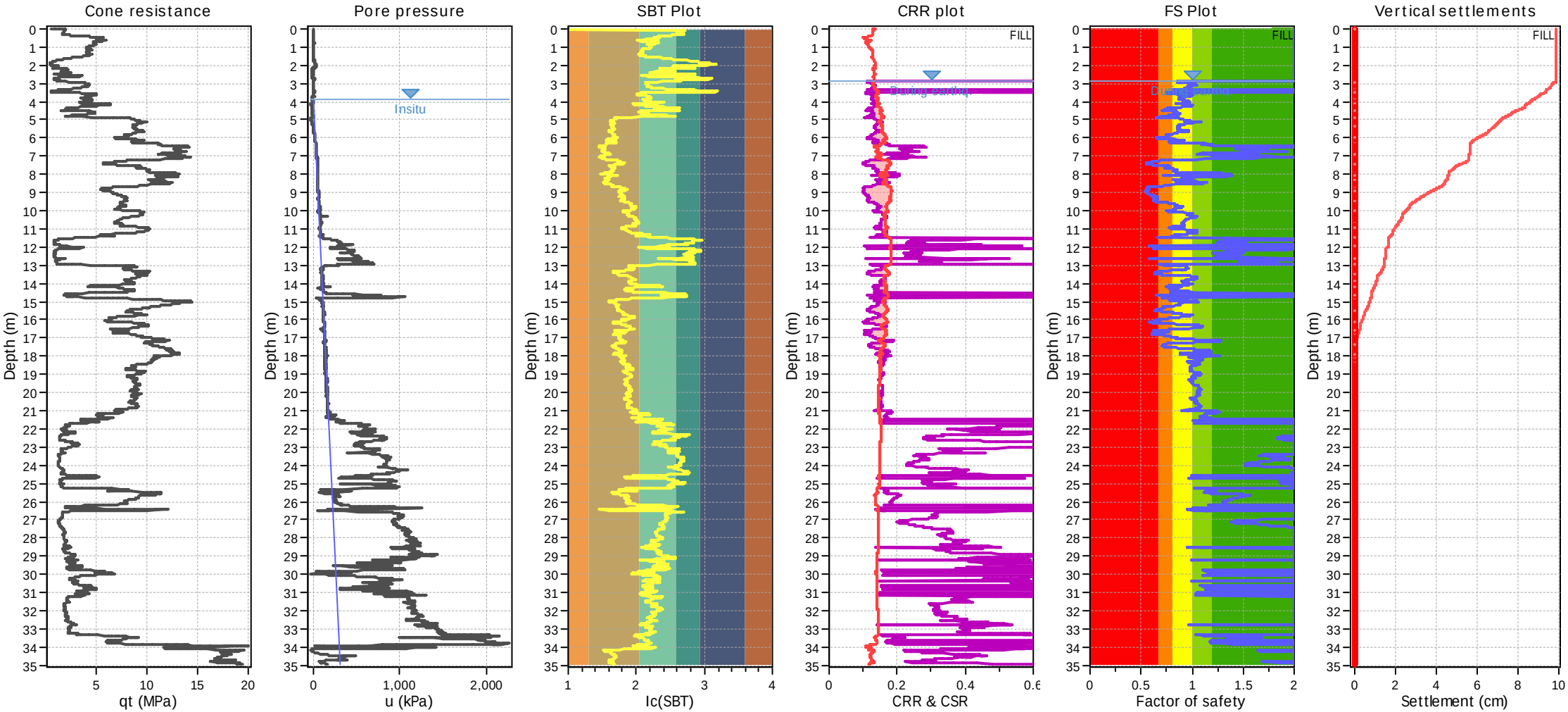
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT103
Total depth: 34.94 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.90 m	Fill height:	1.00 m		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth applied:	No
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.25	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

0.25g with fill – Index ULS

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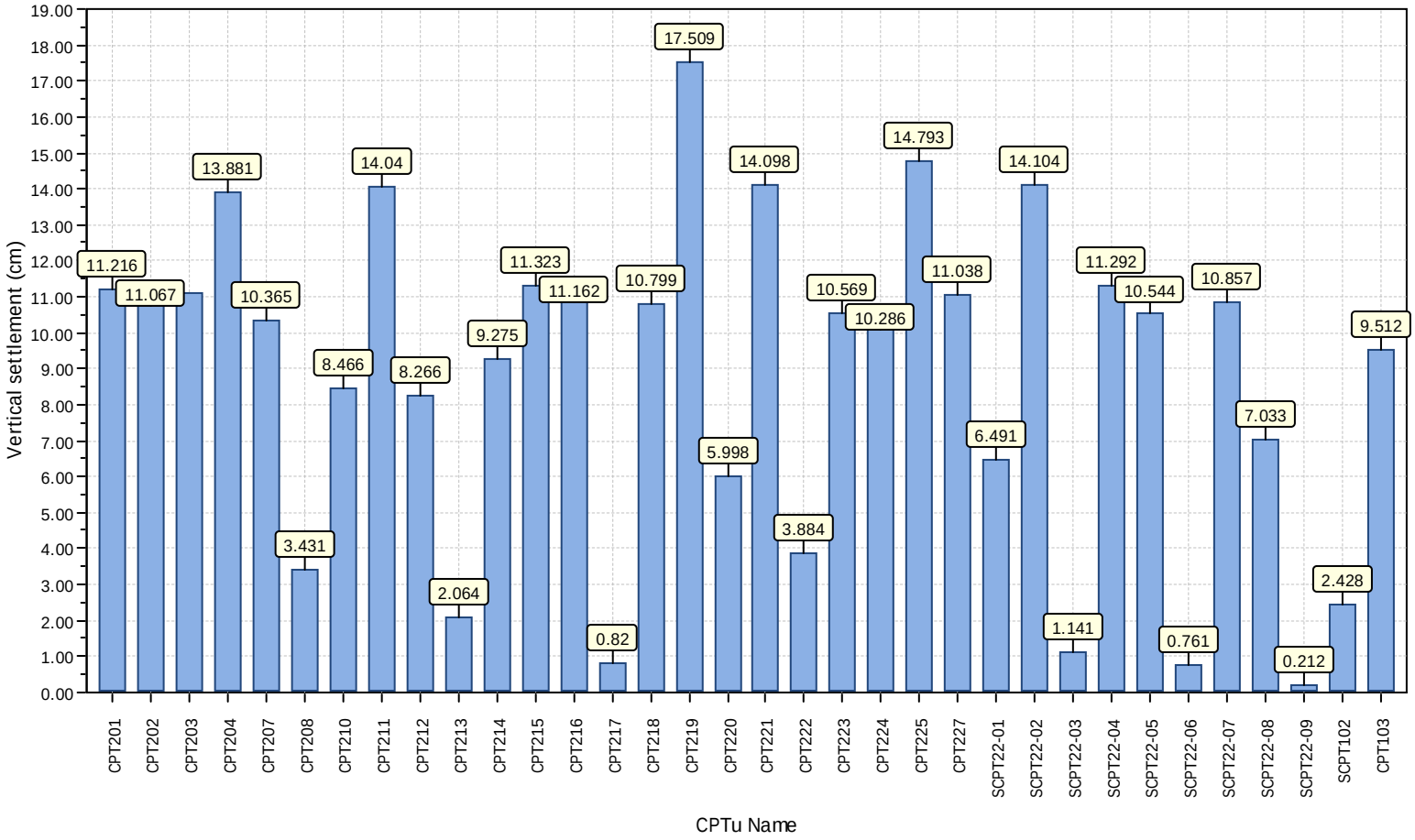
Project title : Tramway Rezoning

Location : Ruakura

Overall vertical settlements report



0.19g – Total ULS

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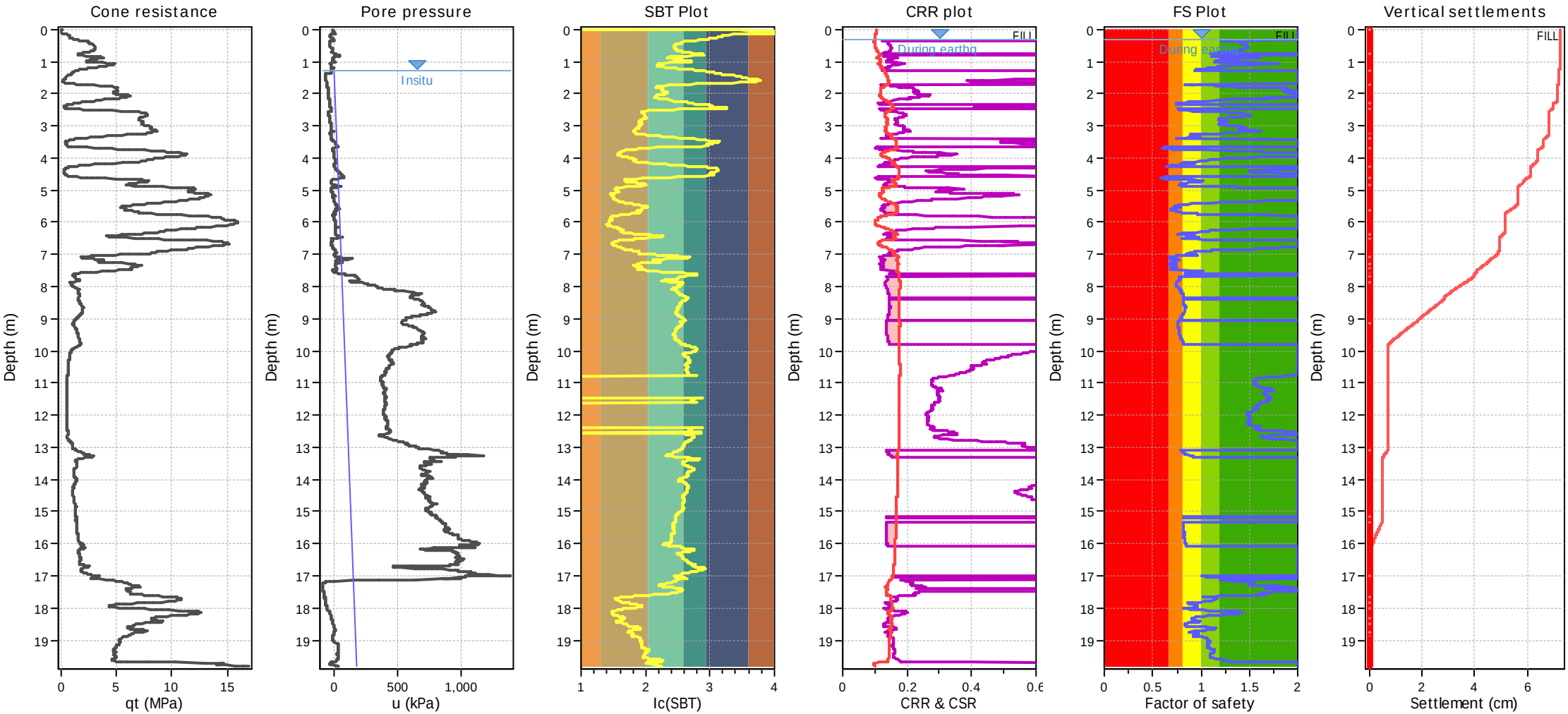
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT201
Total depth: 19.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.30 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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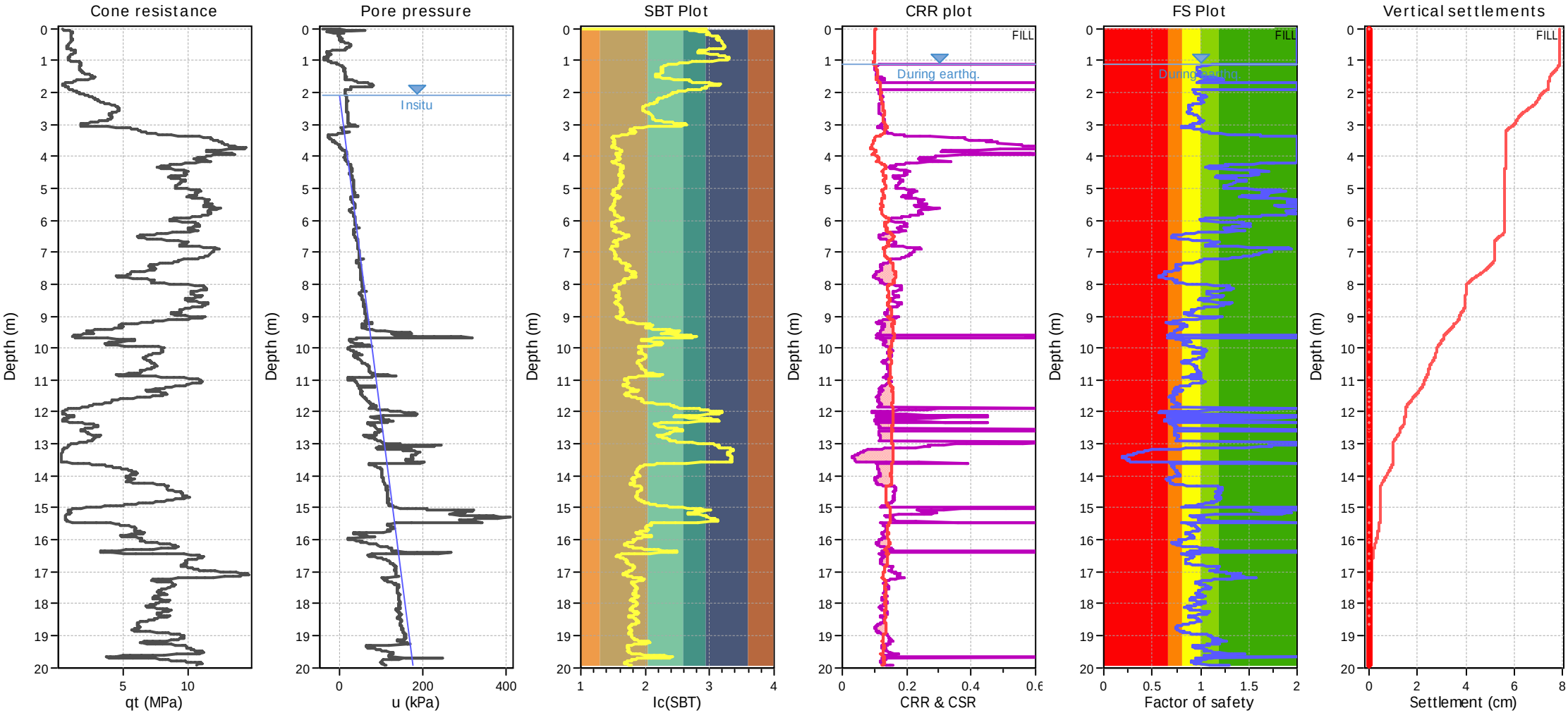
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT202
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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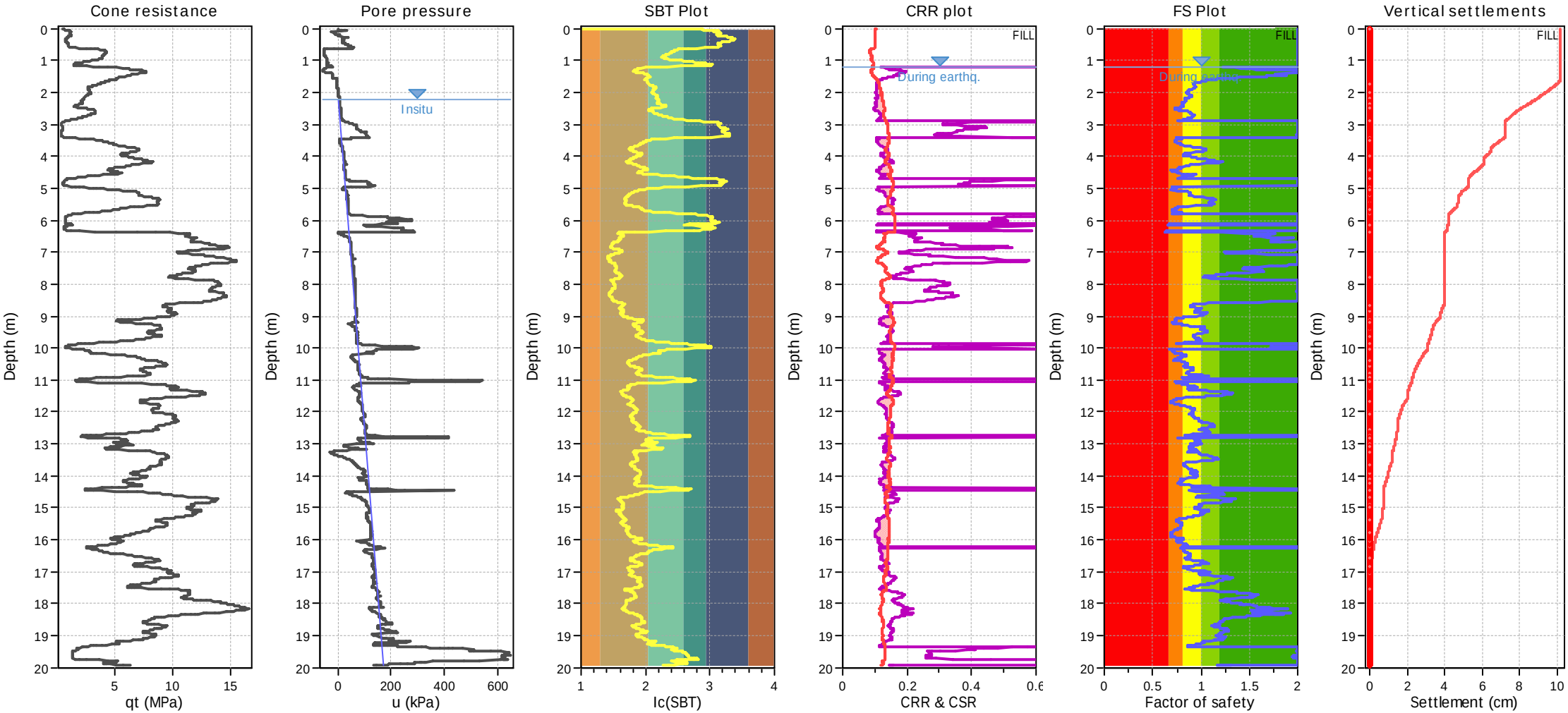
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT203
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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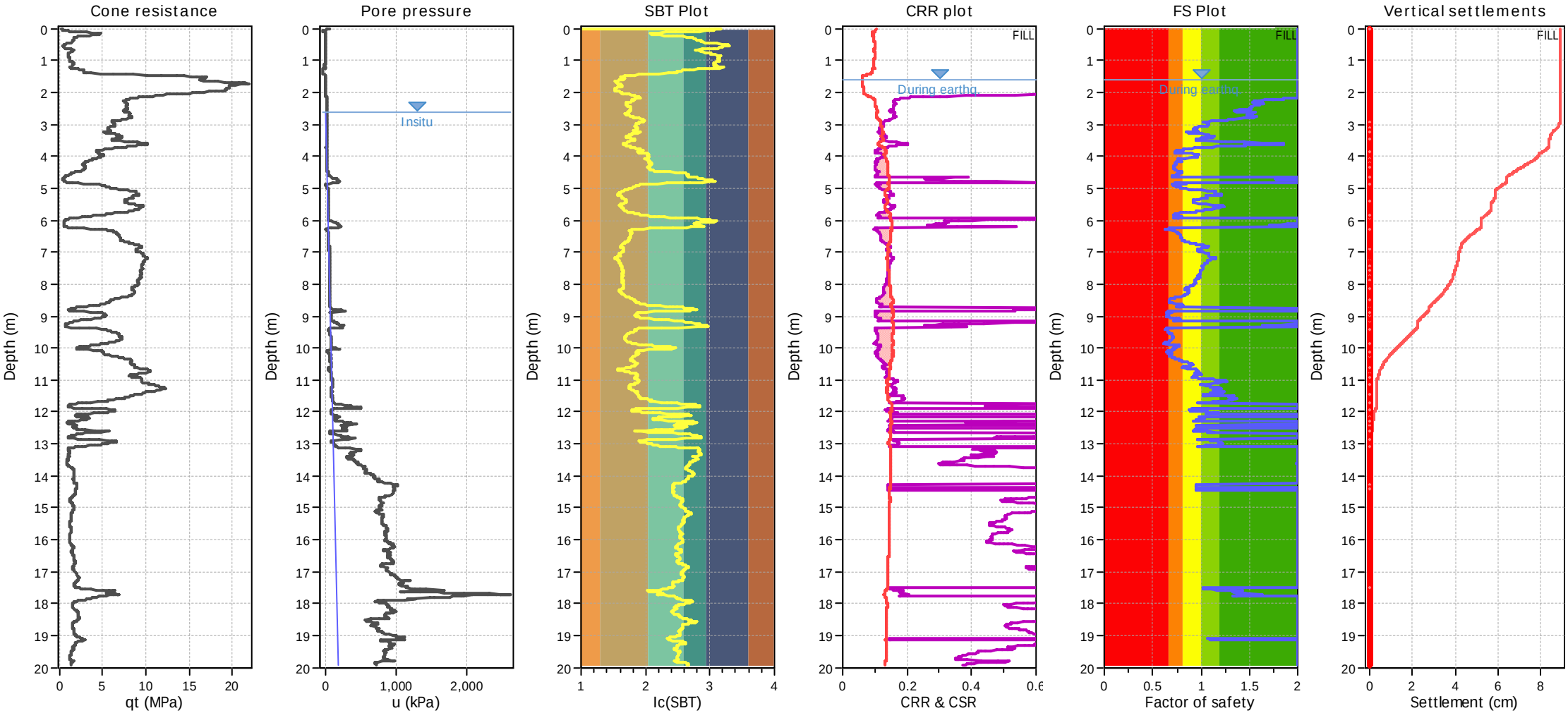
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT204
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.60 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.60 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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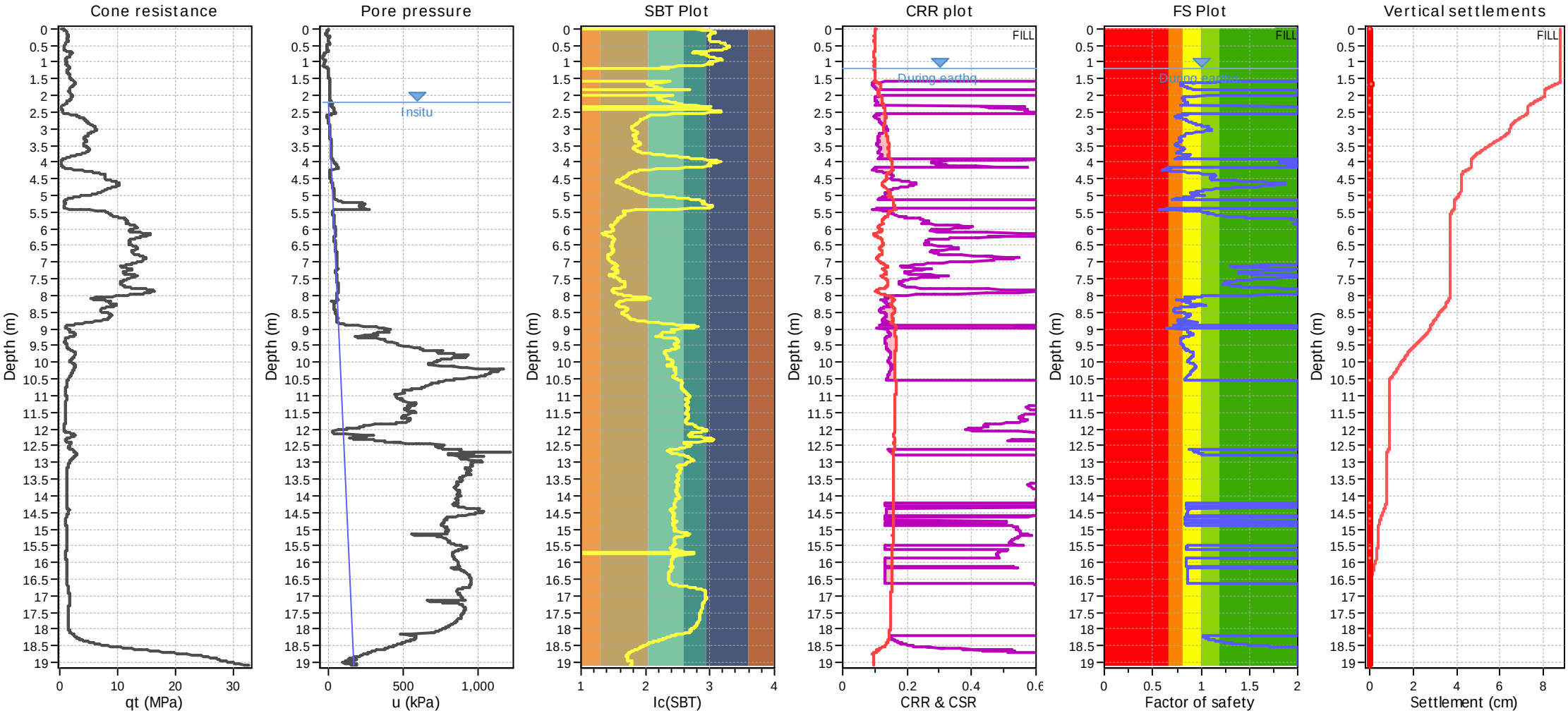
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT207
Total depth: 19.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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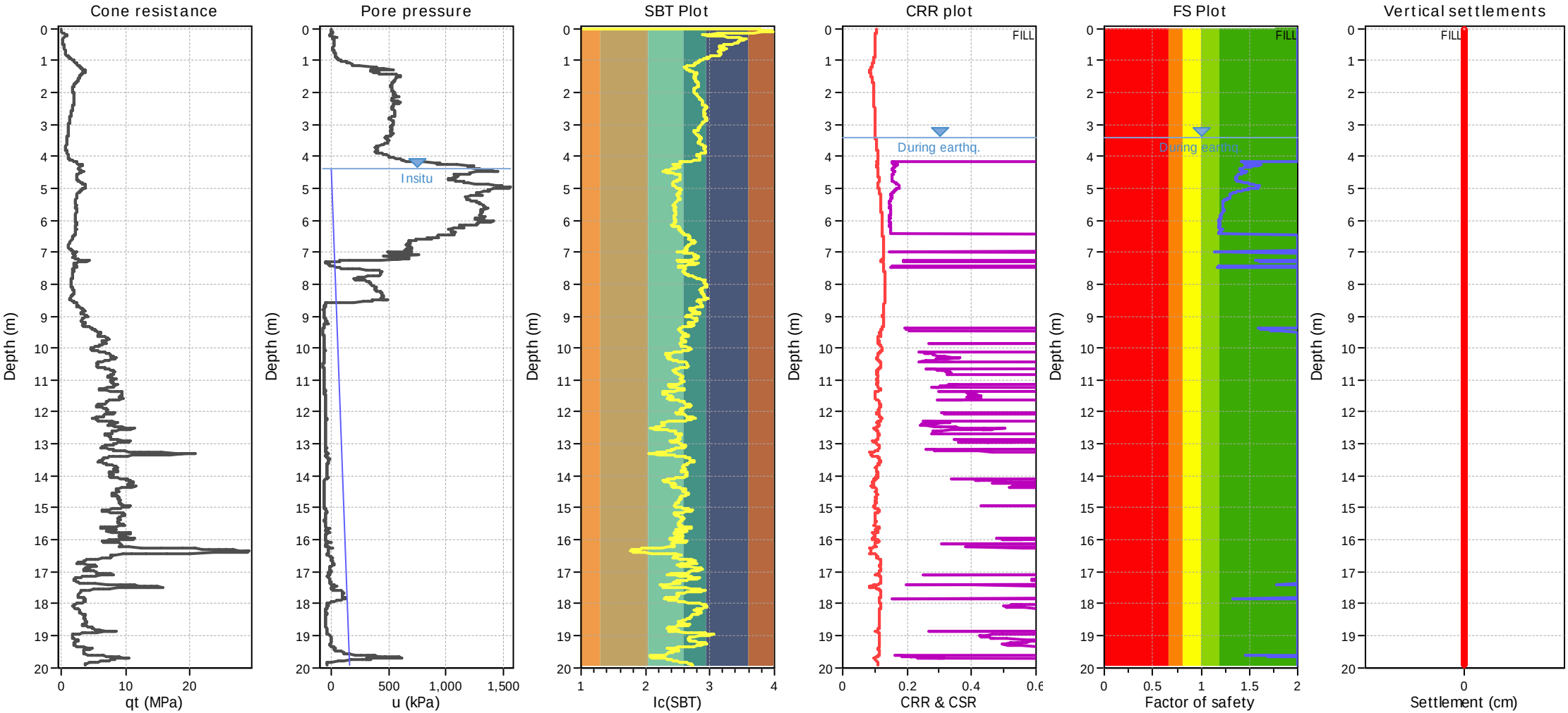
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT208
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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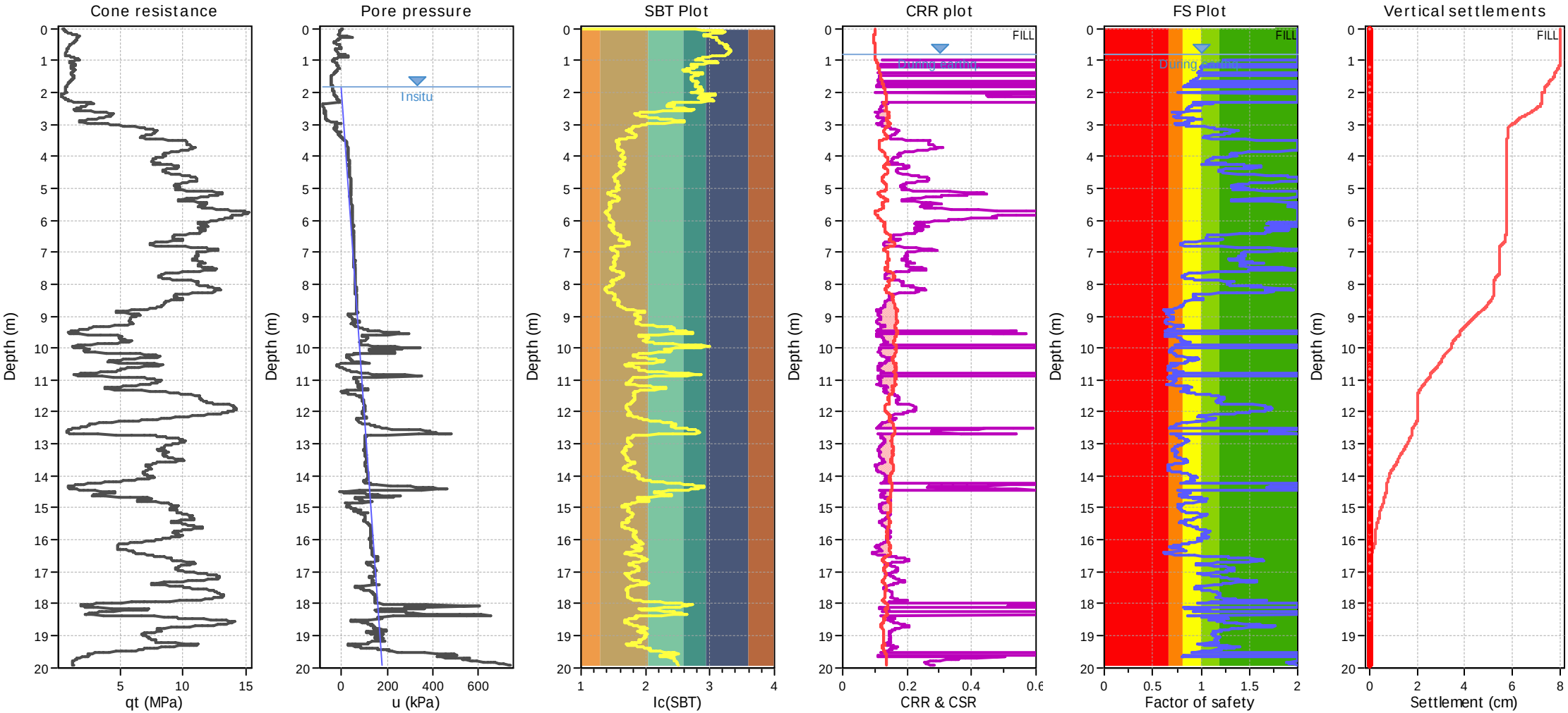
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT210
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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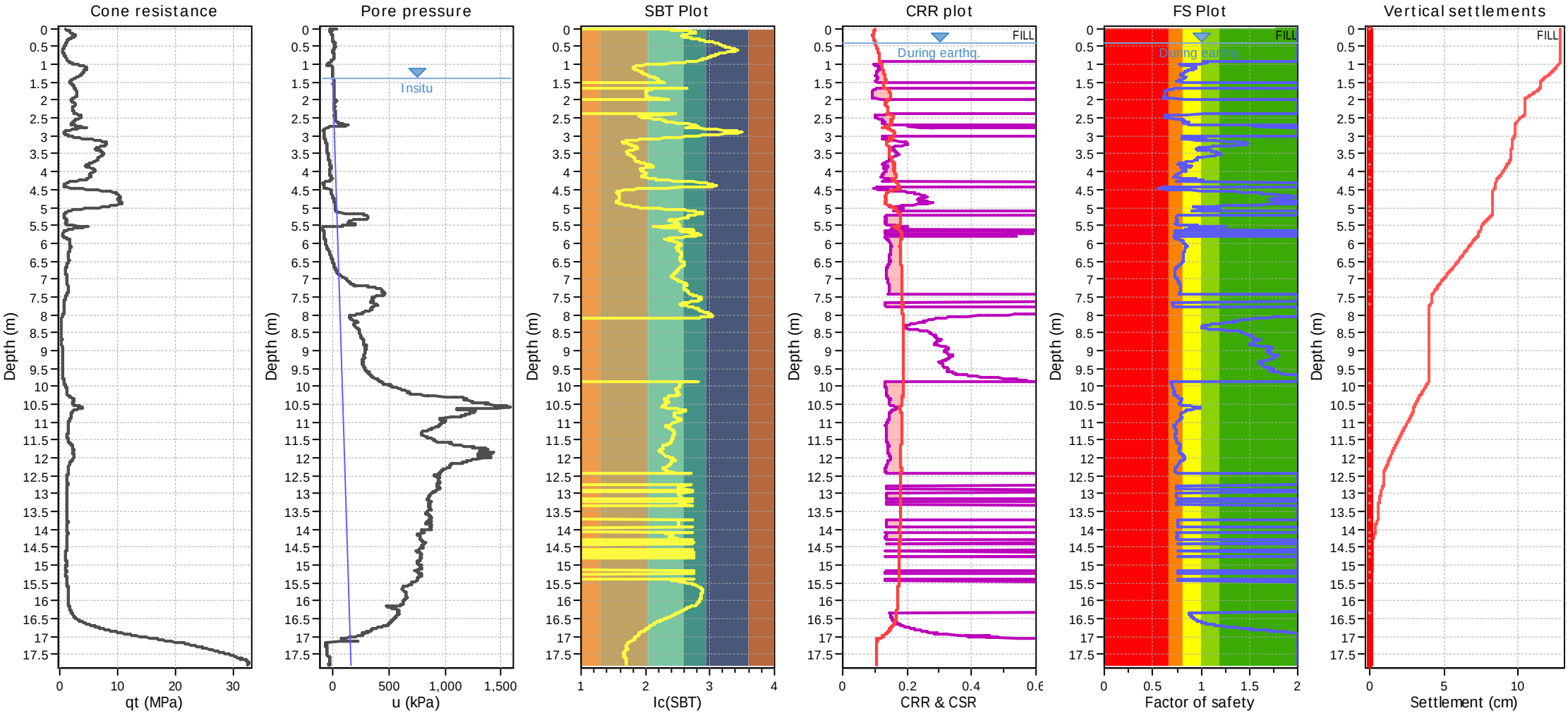
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT211
Total depth: 17.80 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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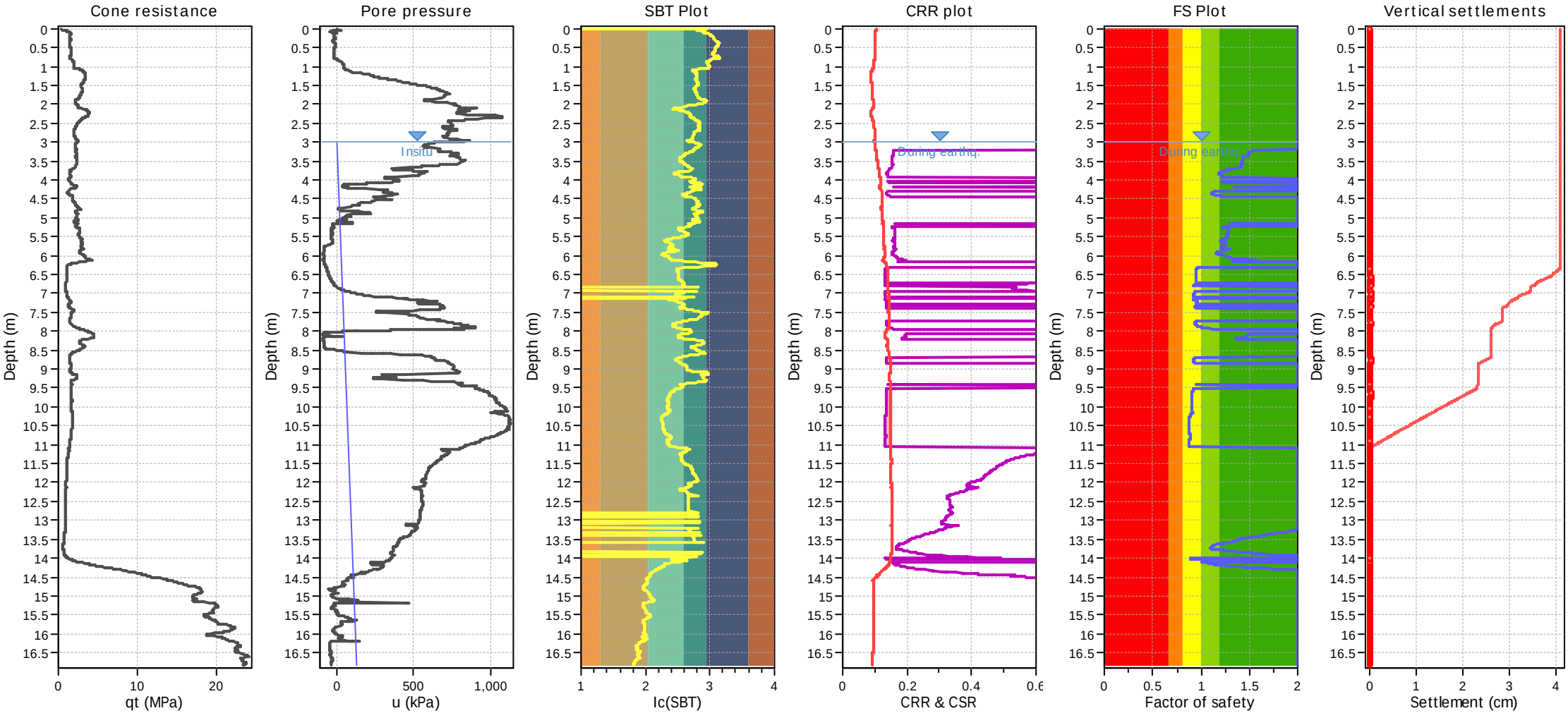
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT212
Total depth: 16.83 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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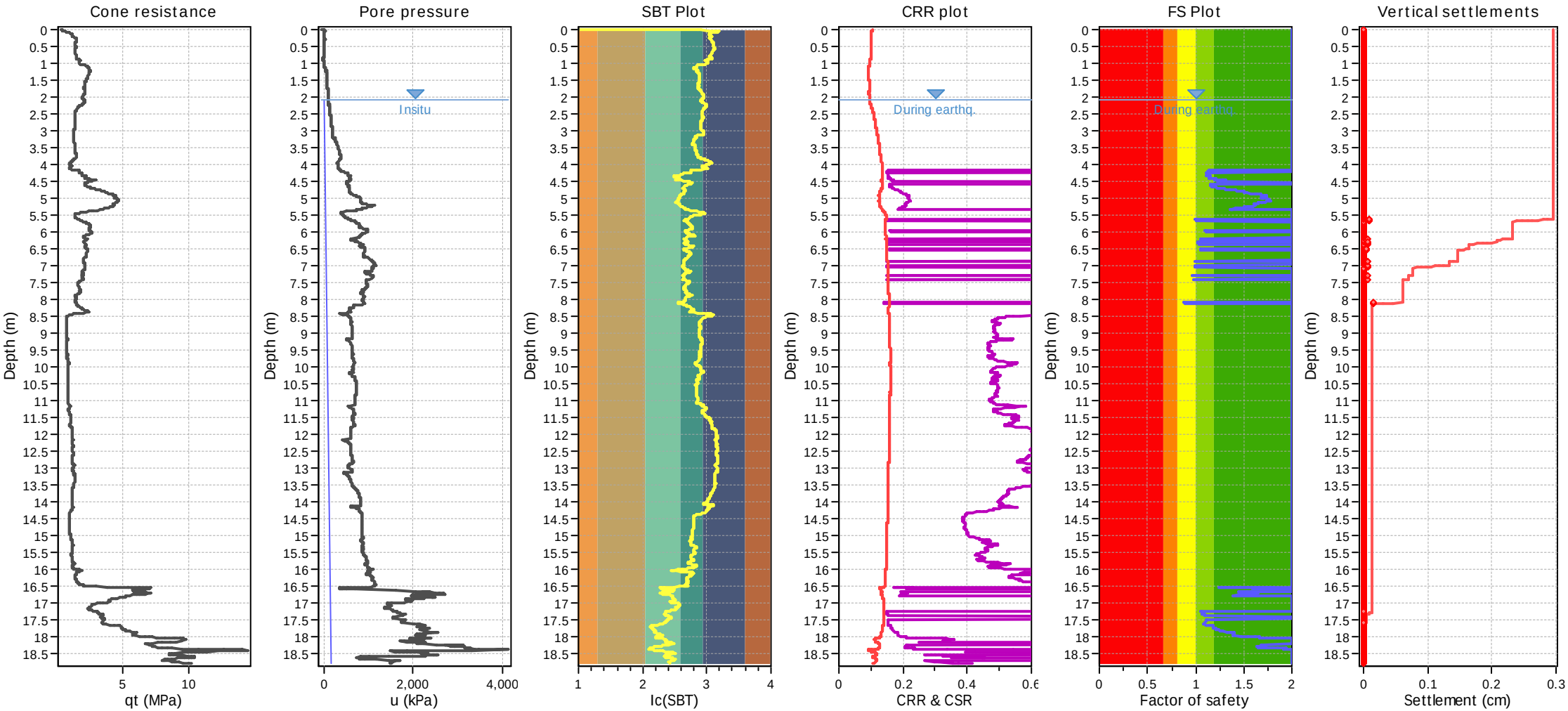
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT213
Total depth: 18.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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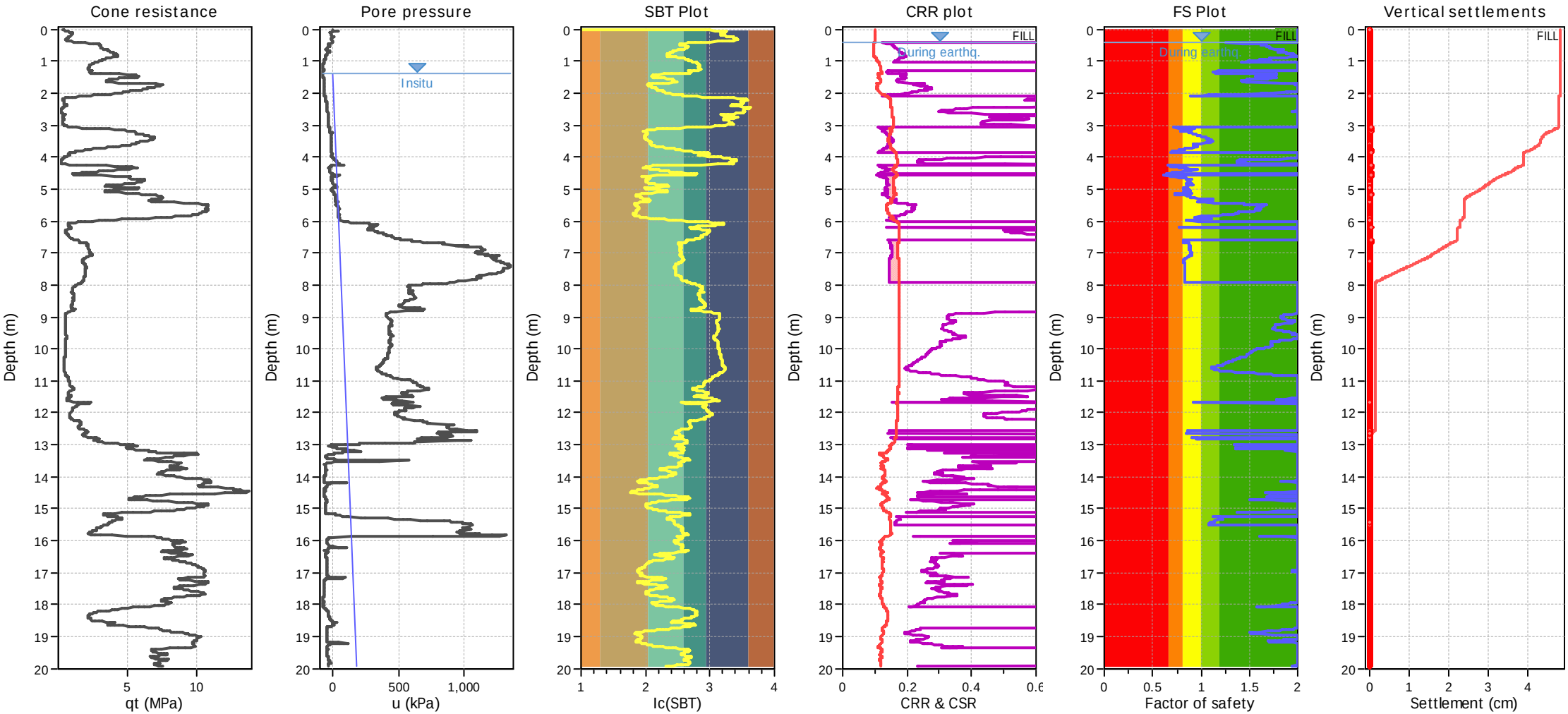
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT214
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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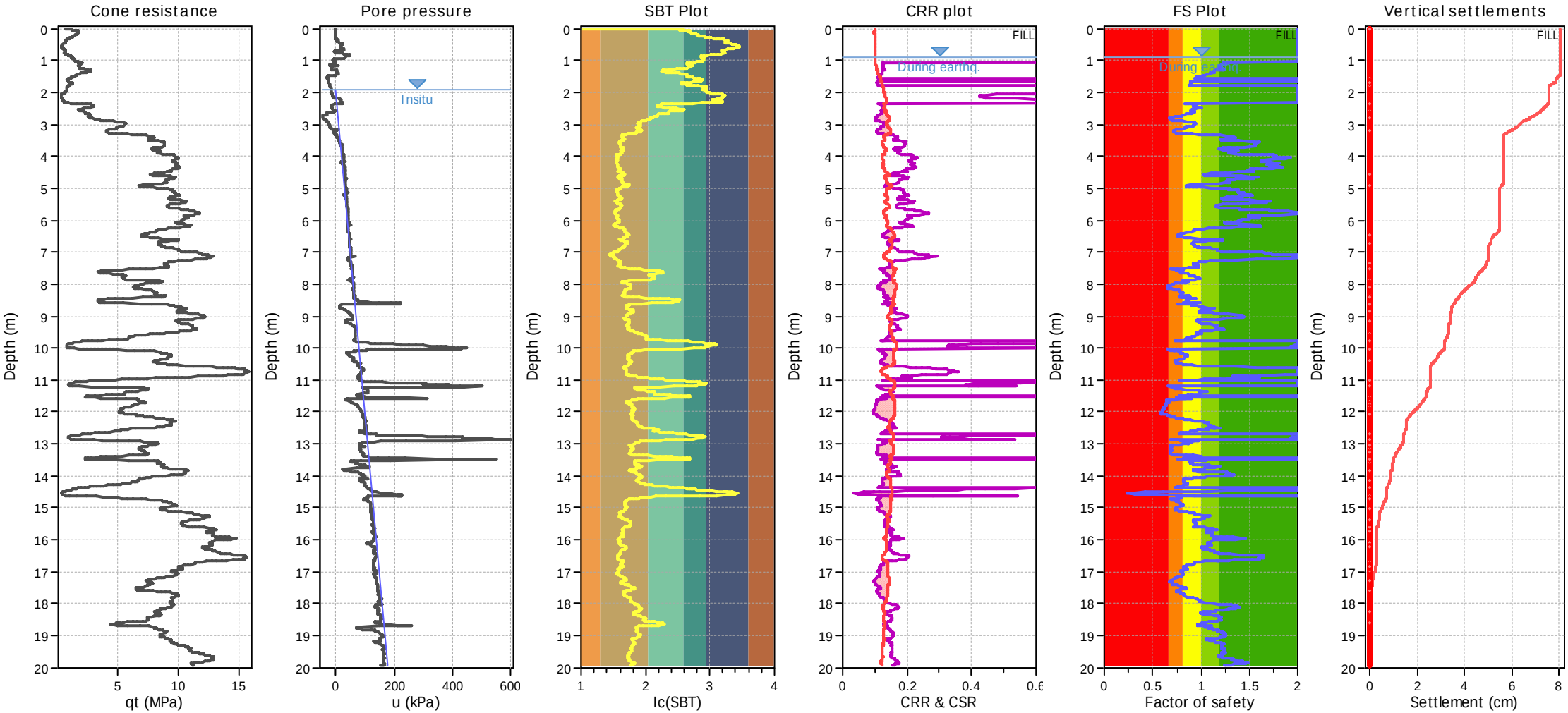
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT215
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.90 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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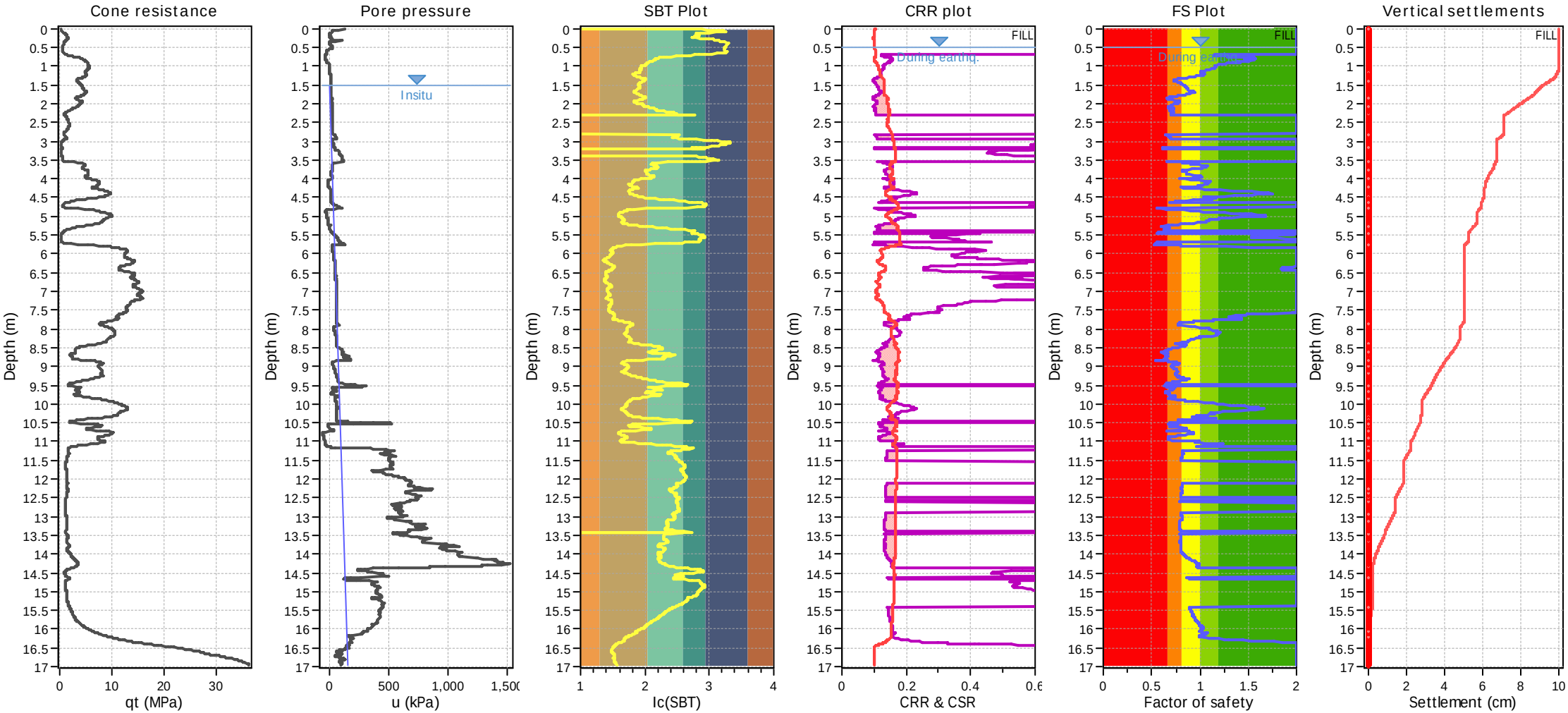
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT216
Total depth: 16.96 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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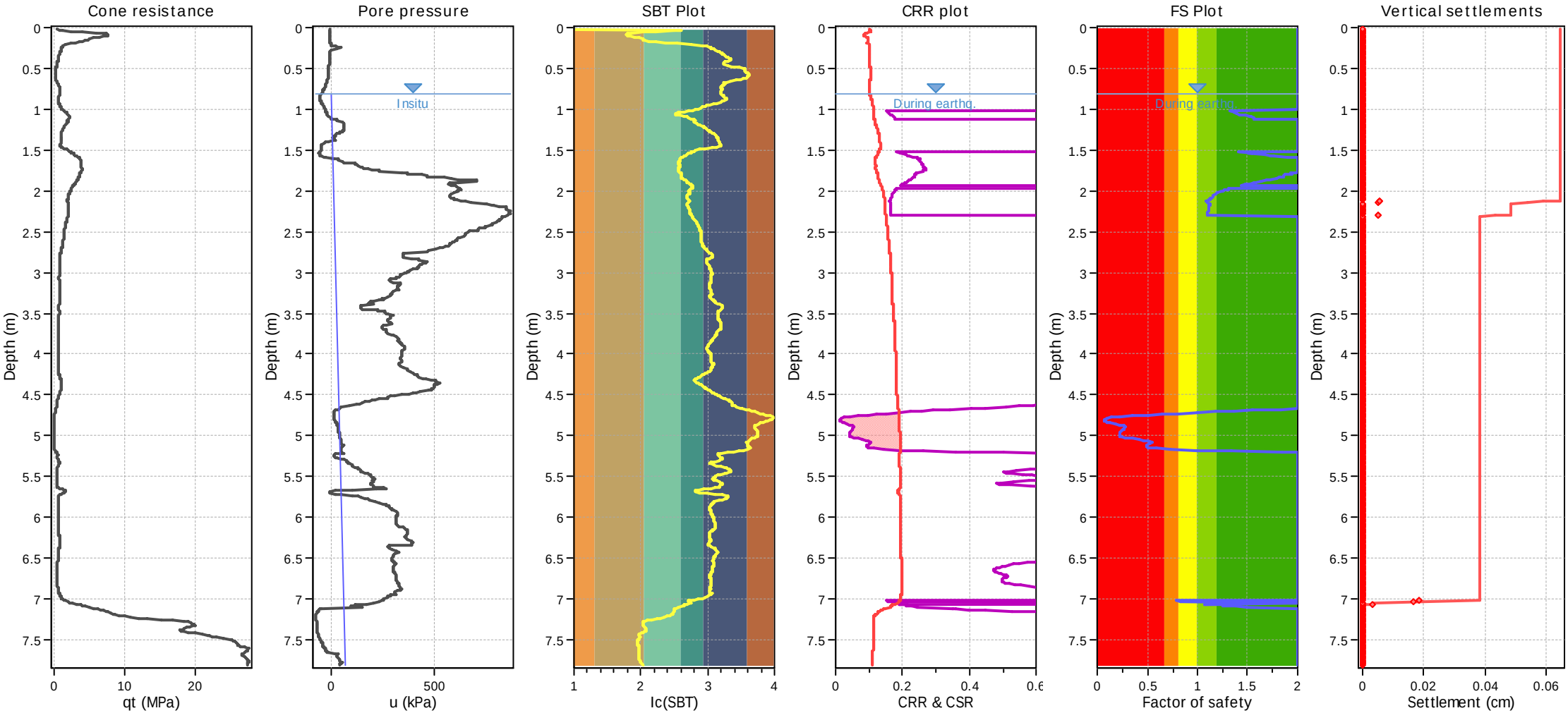
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT217
Total depth: 7.82 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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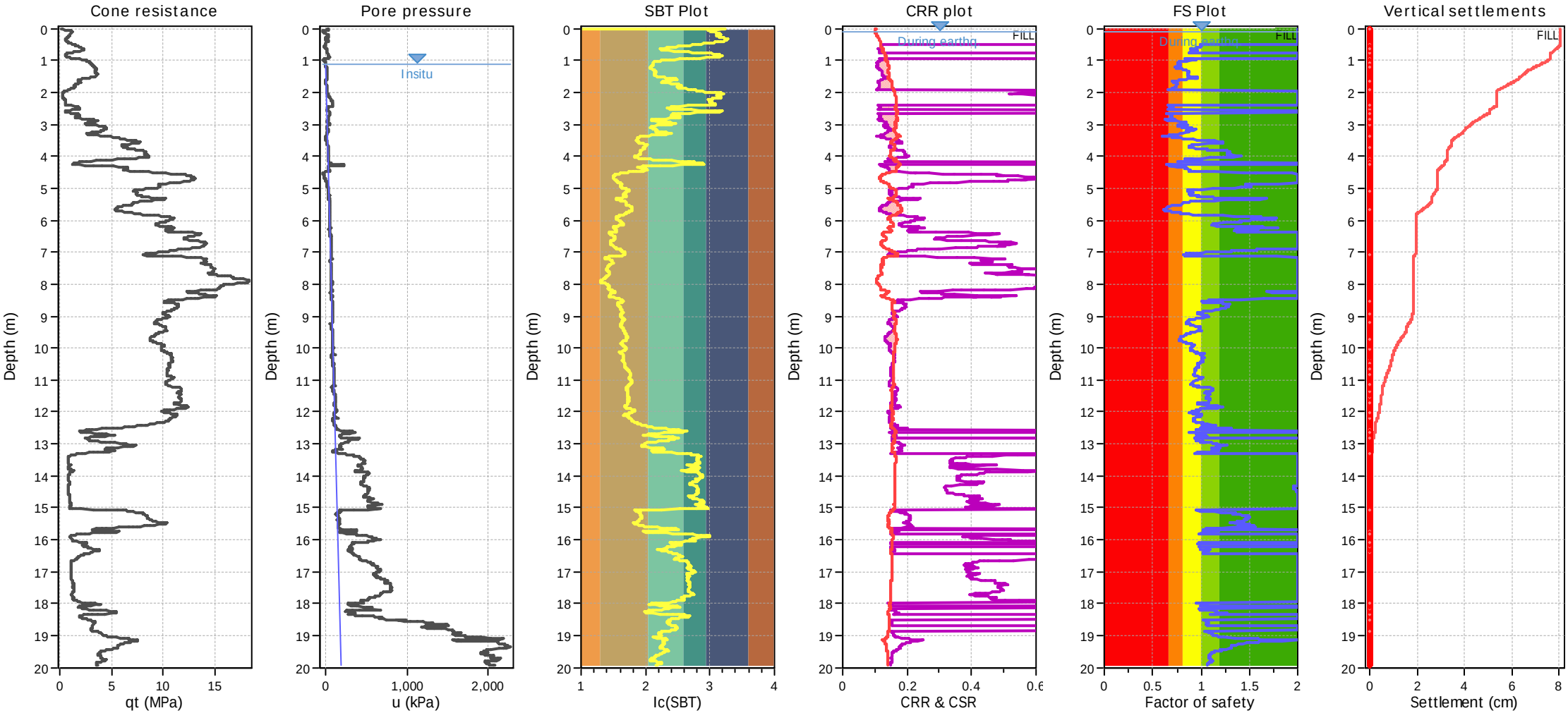
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT218
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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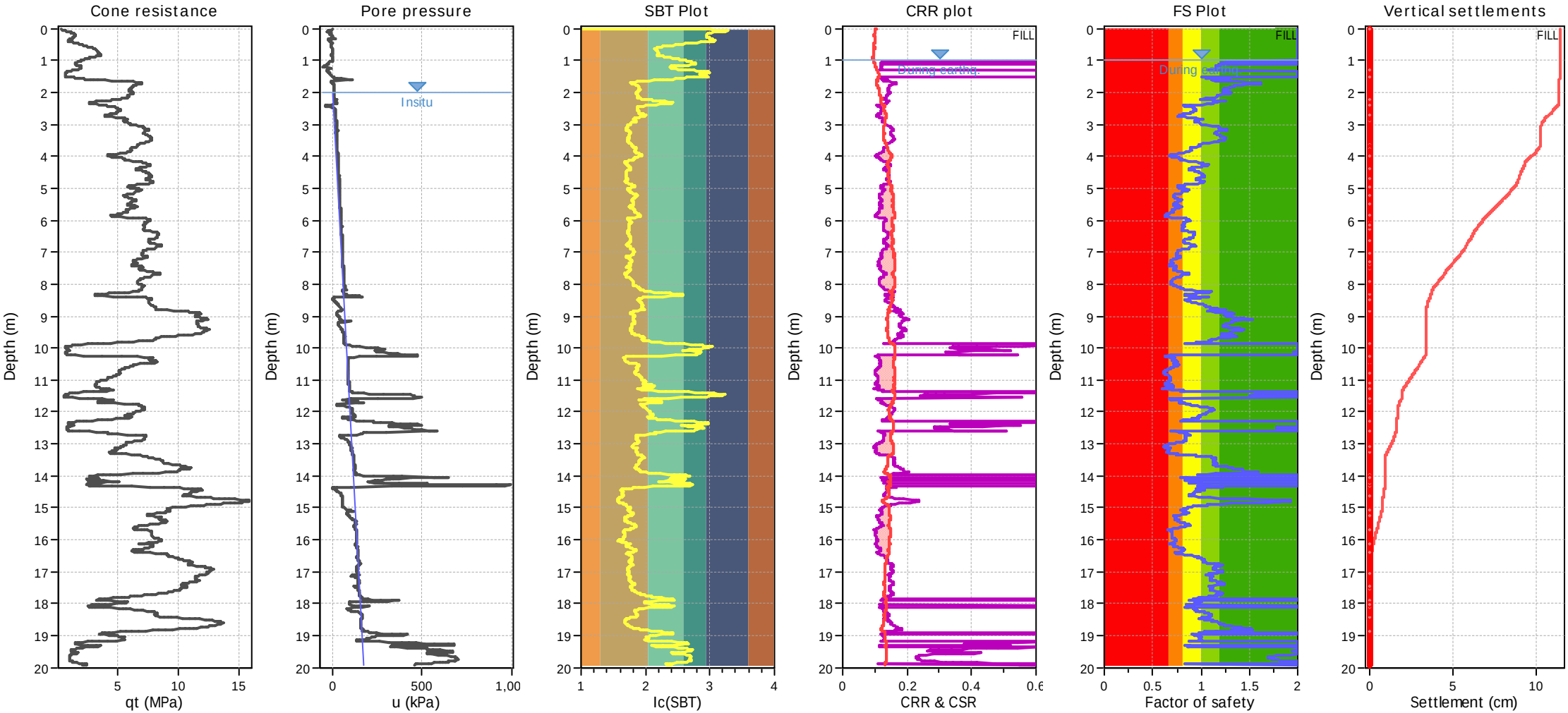
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT219
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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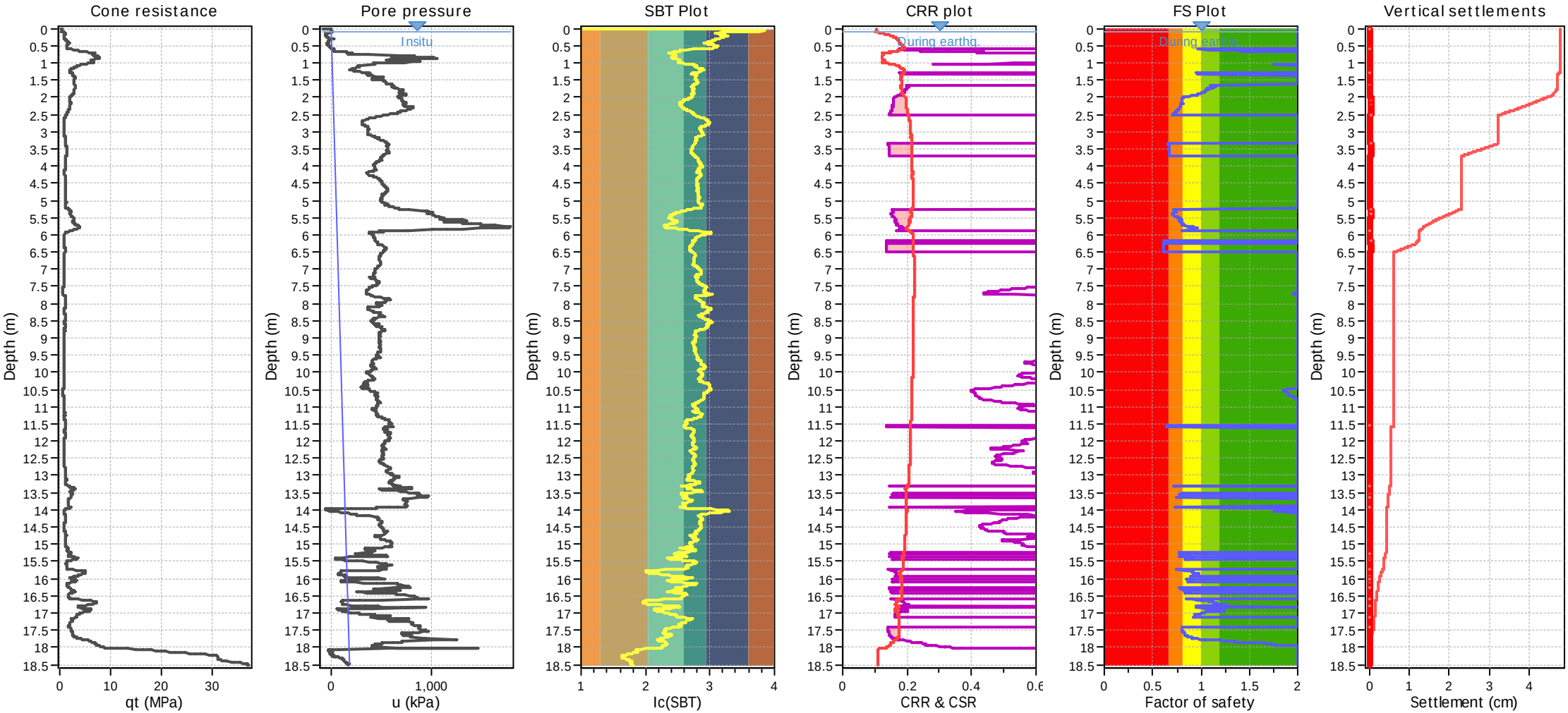
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT220
Total depth: 18.52 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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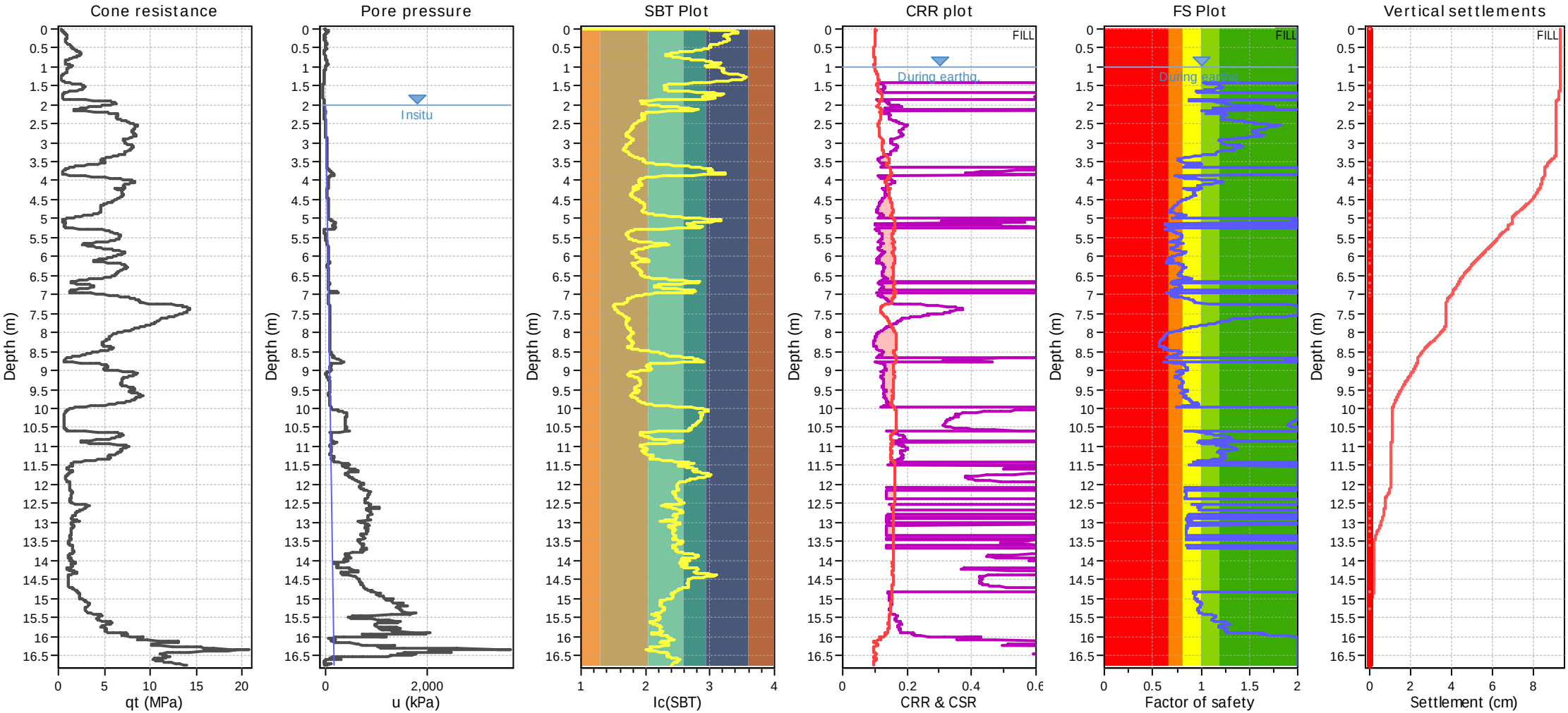
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT221
Total depth: 16.76 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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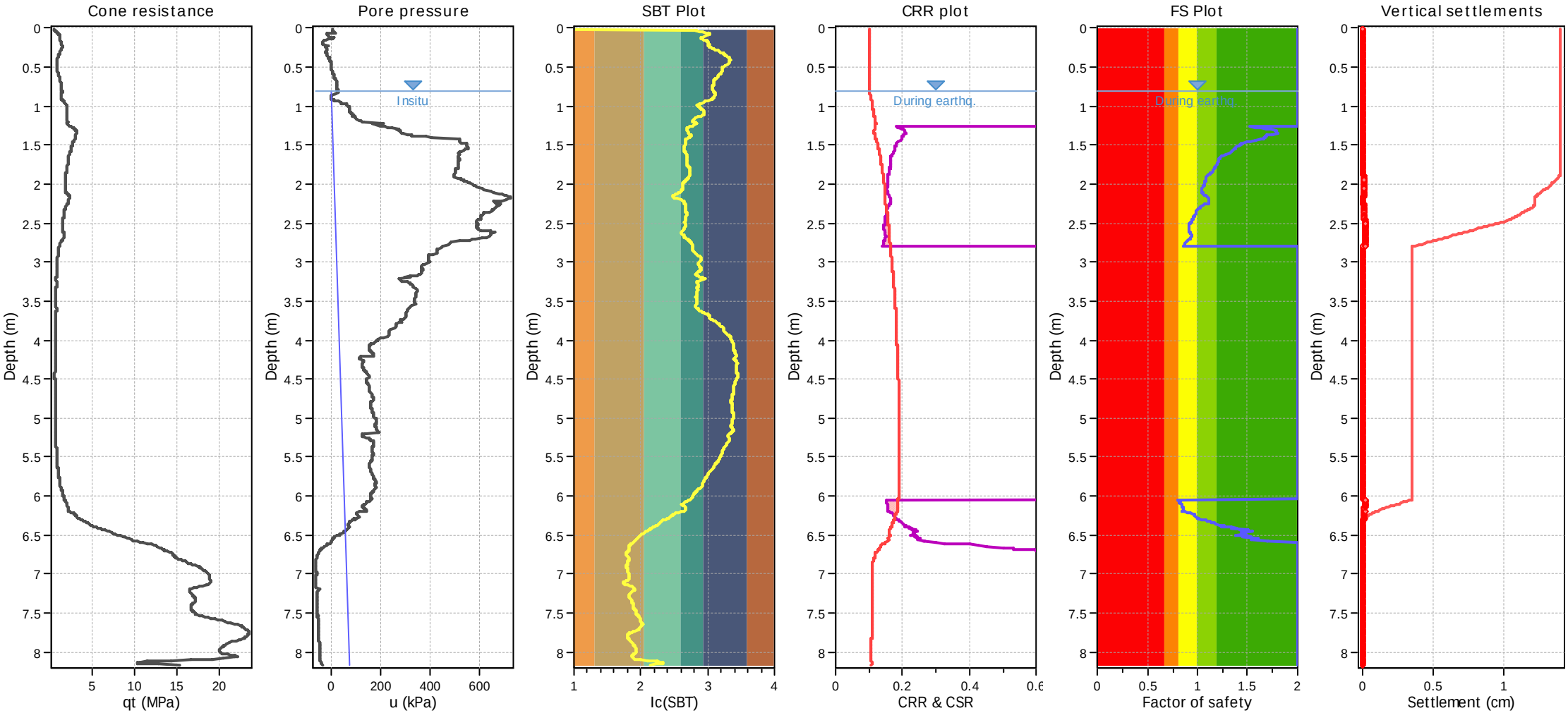
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT222
Total depth: 8.17 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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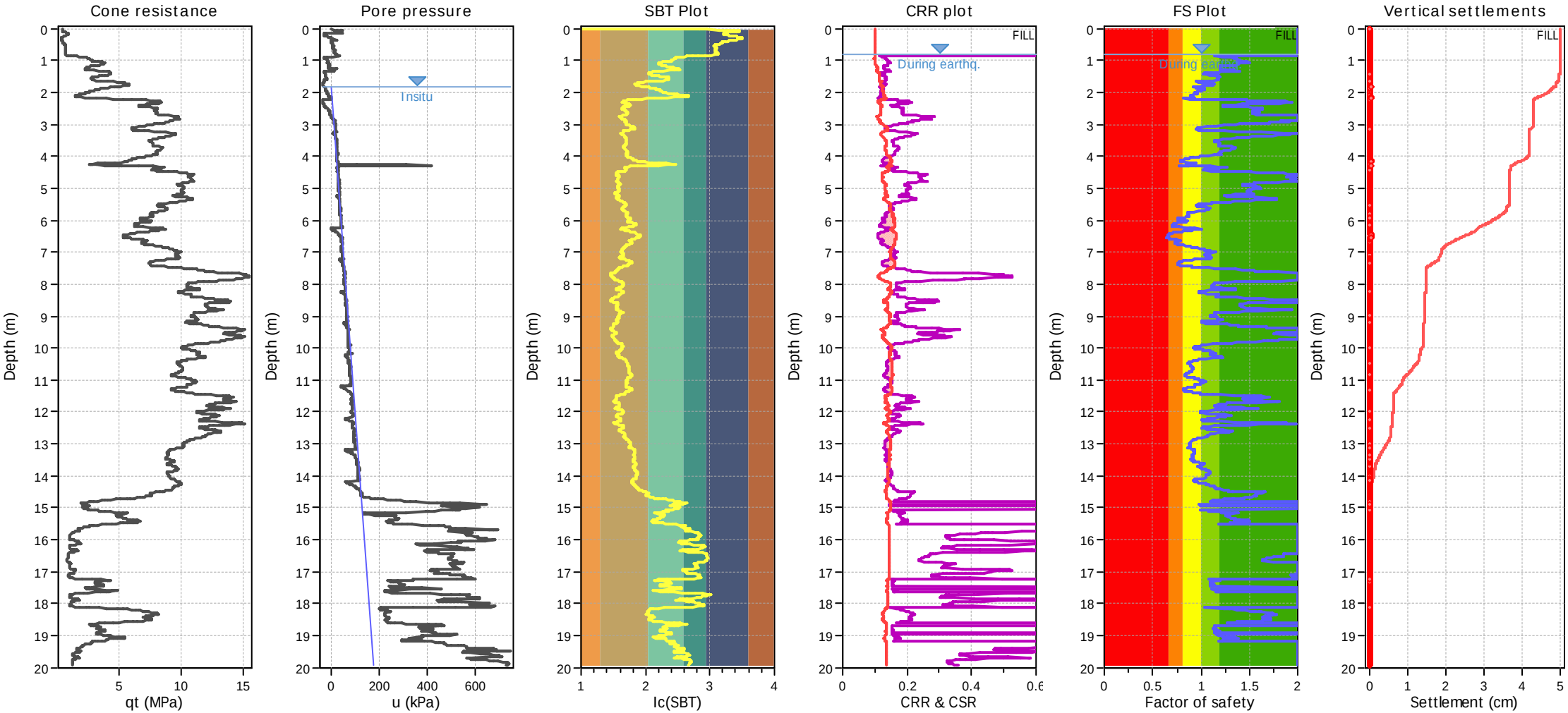
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT223
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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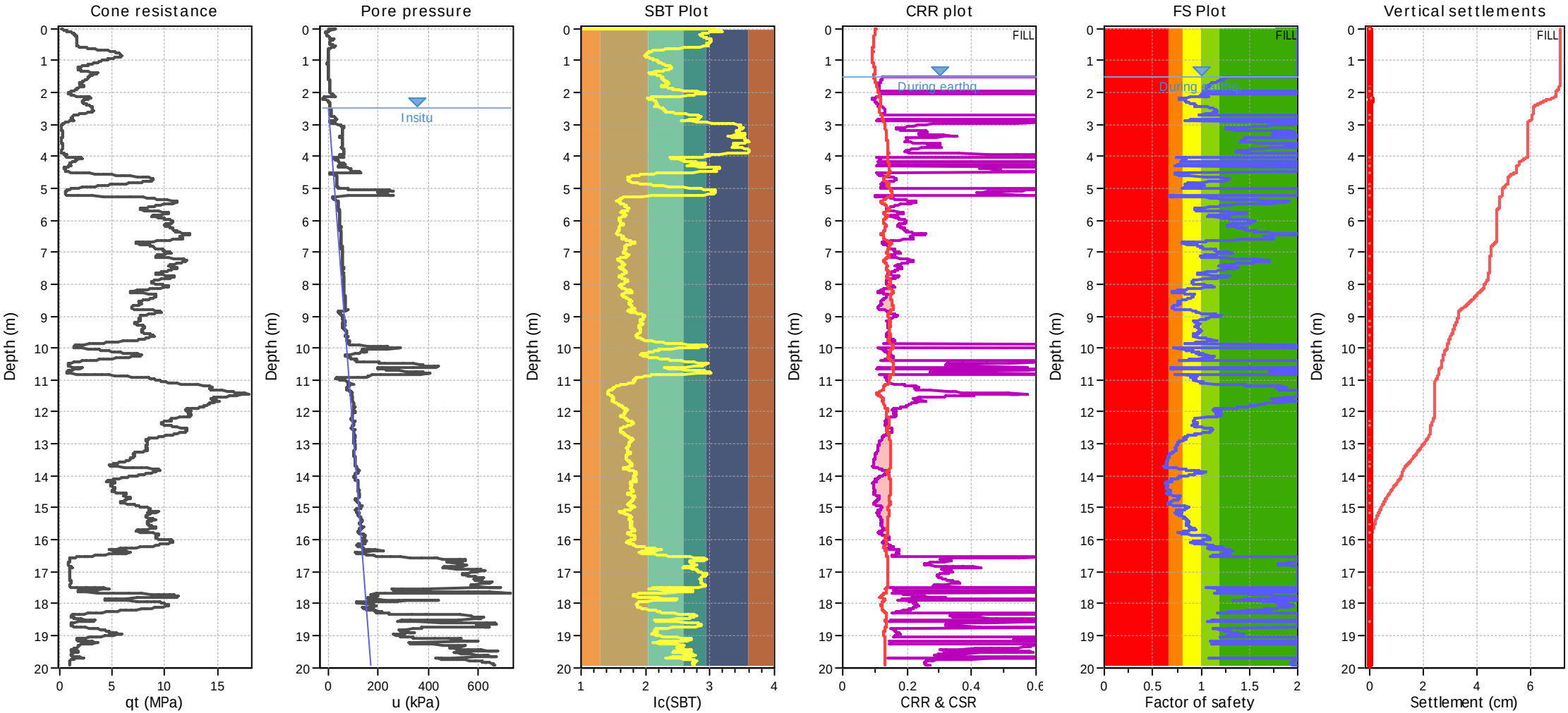
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT224
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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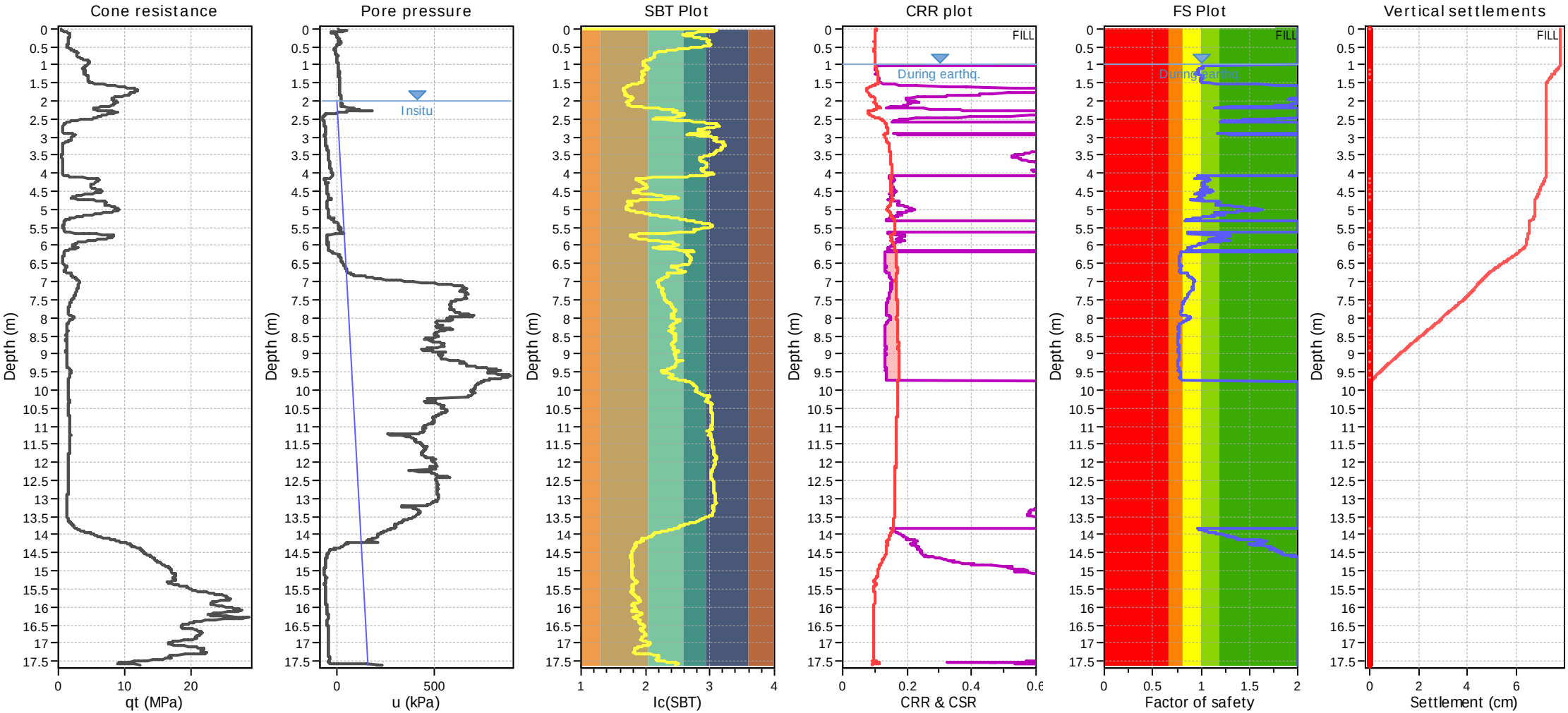
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT225
Total depth: 17.61 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m^3	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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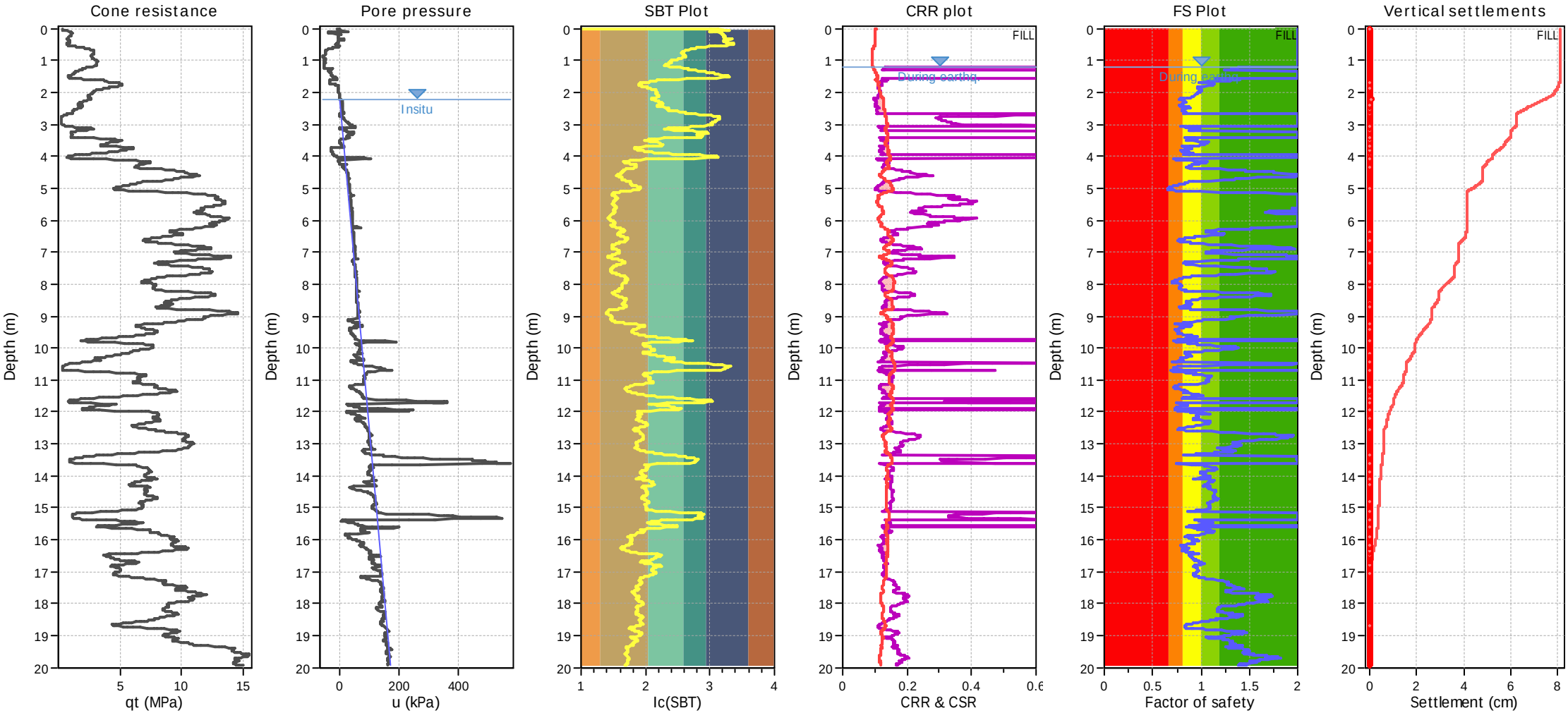
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT227
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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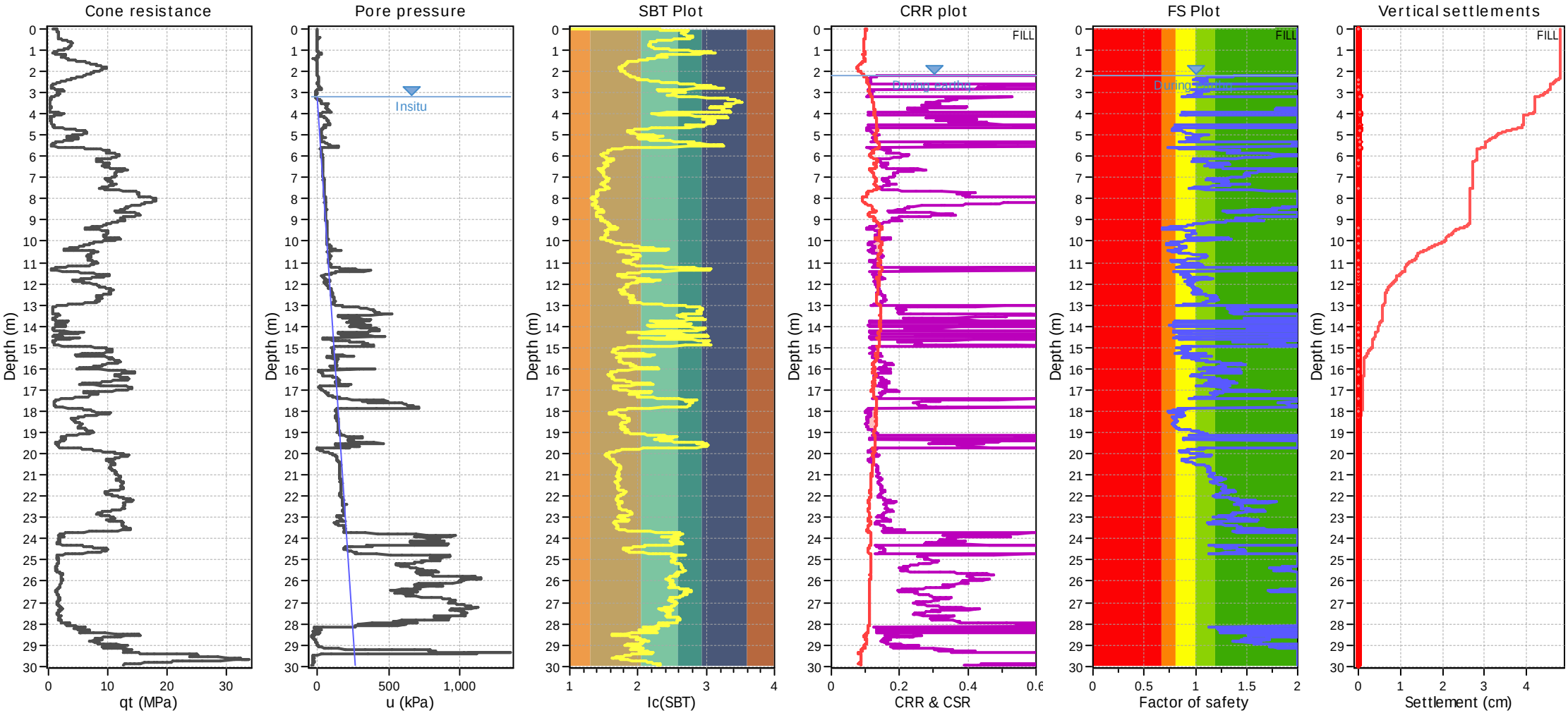
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-01
Total depth: 29.95 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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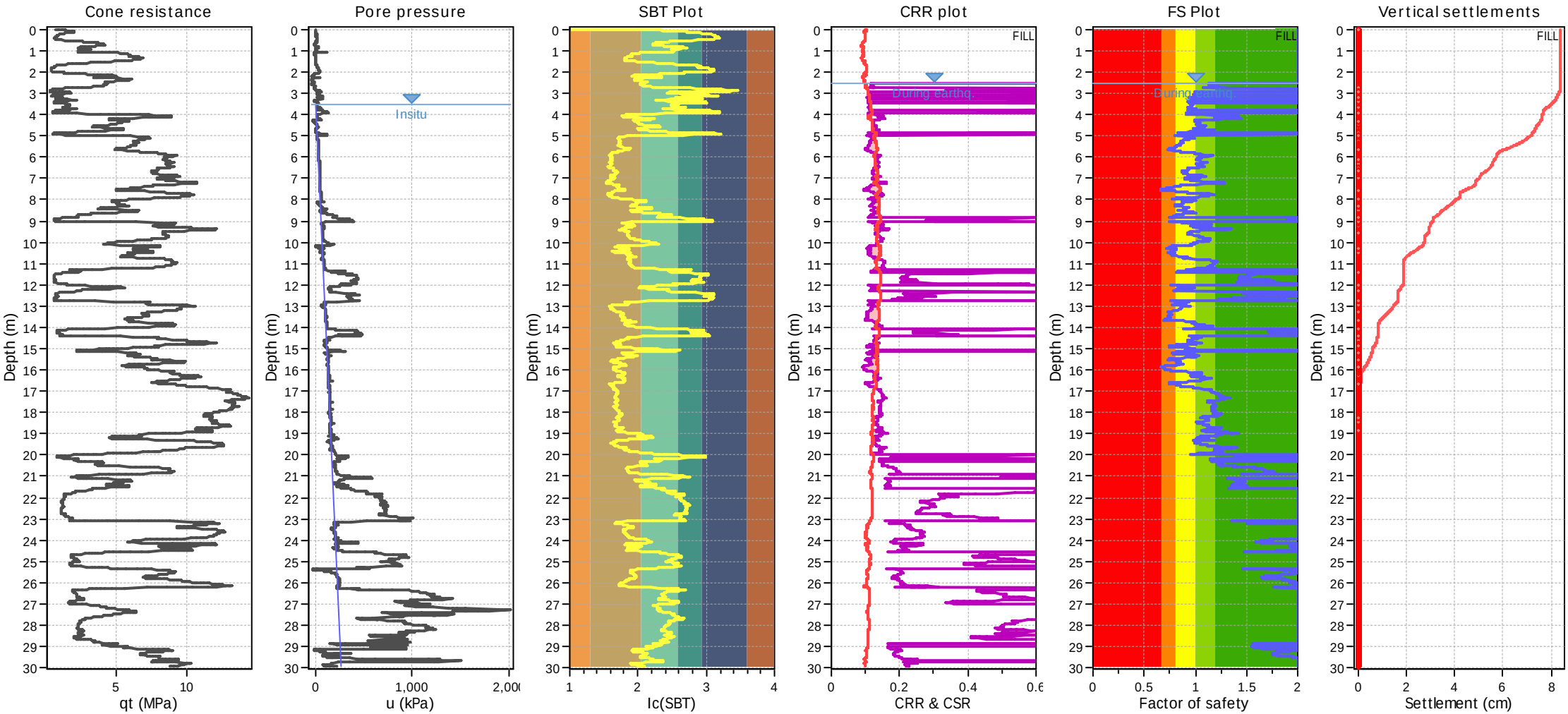
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-02
Total depth: 29.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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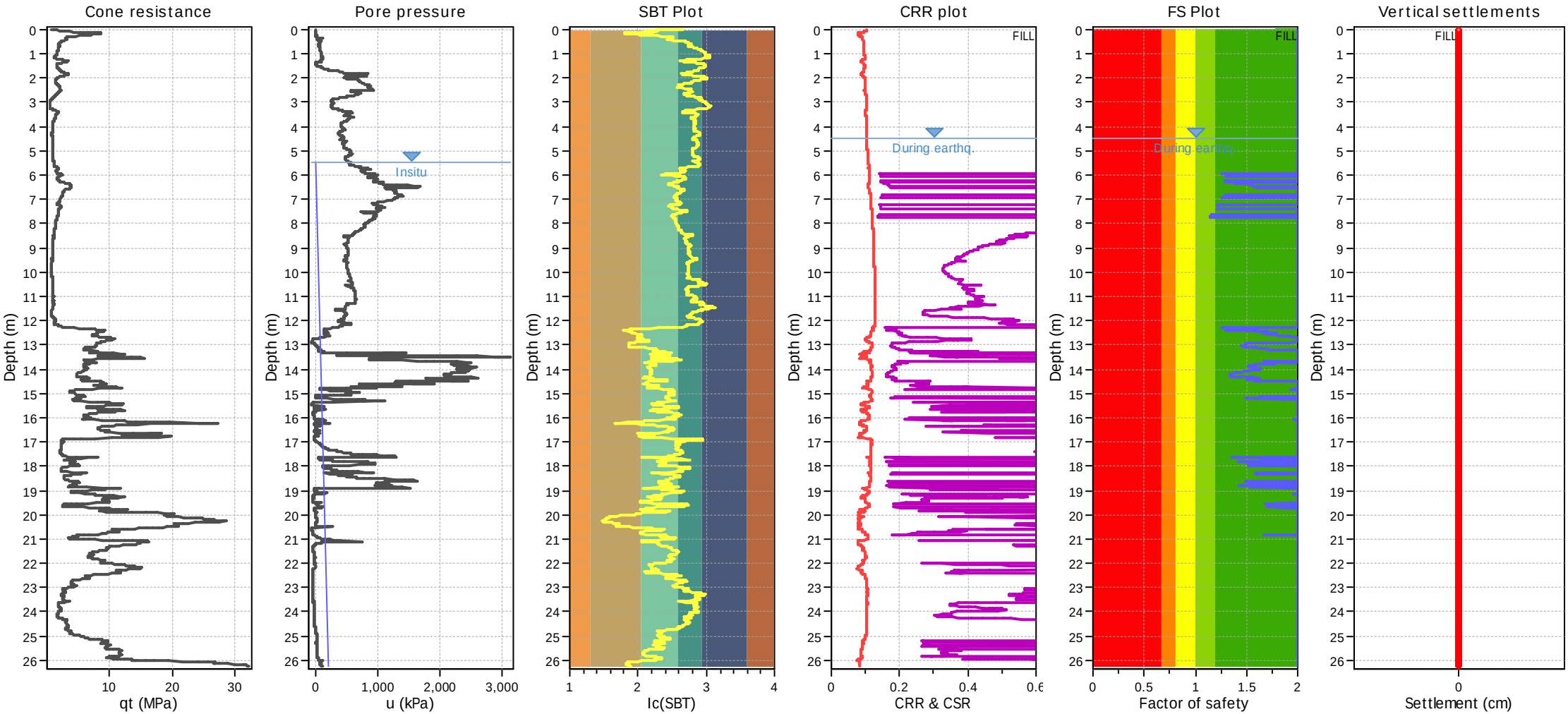
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-03
Total depth: 26.24 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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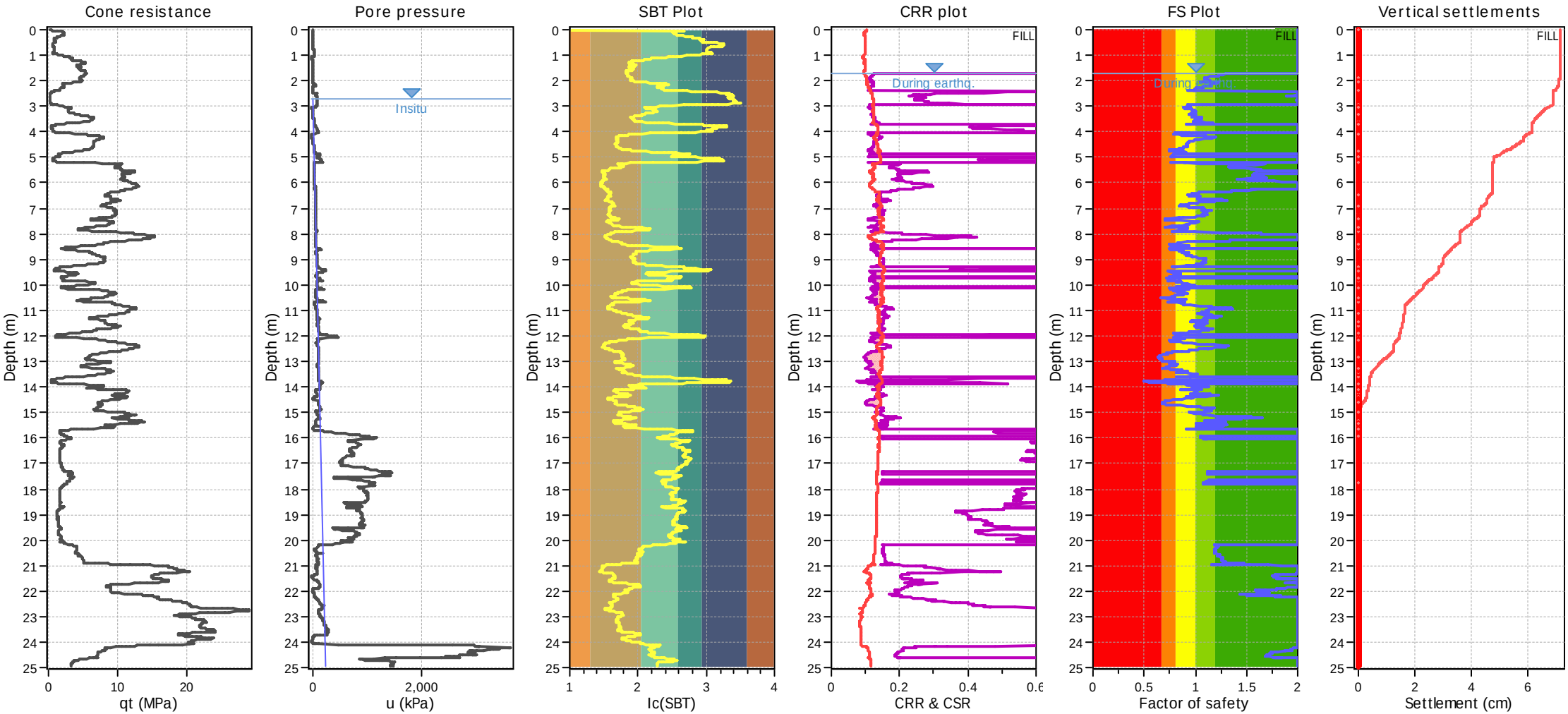
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-04
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.74 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.74 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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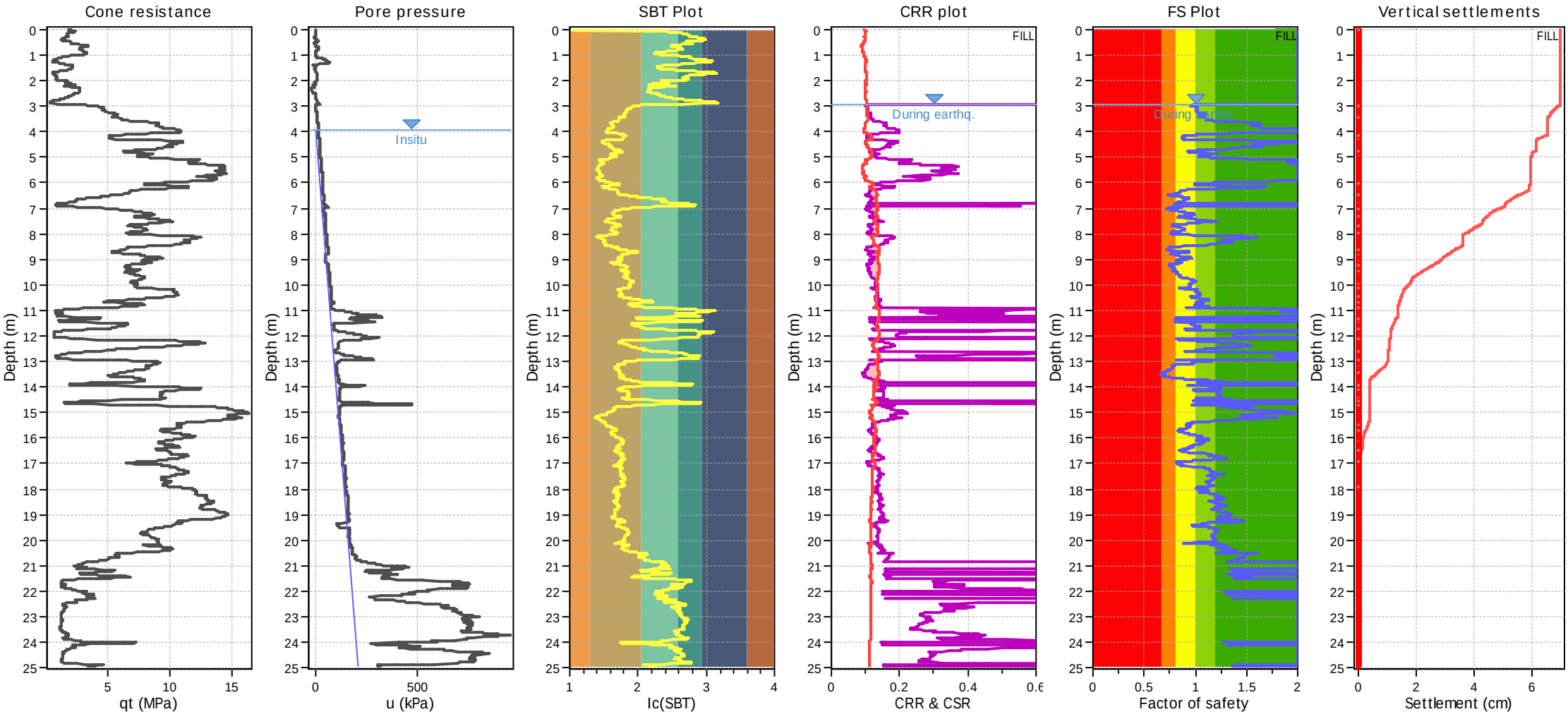
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-05
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.94 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.94 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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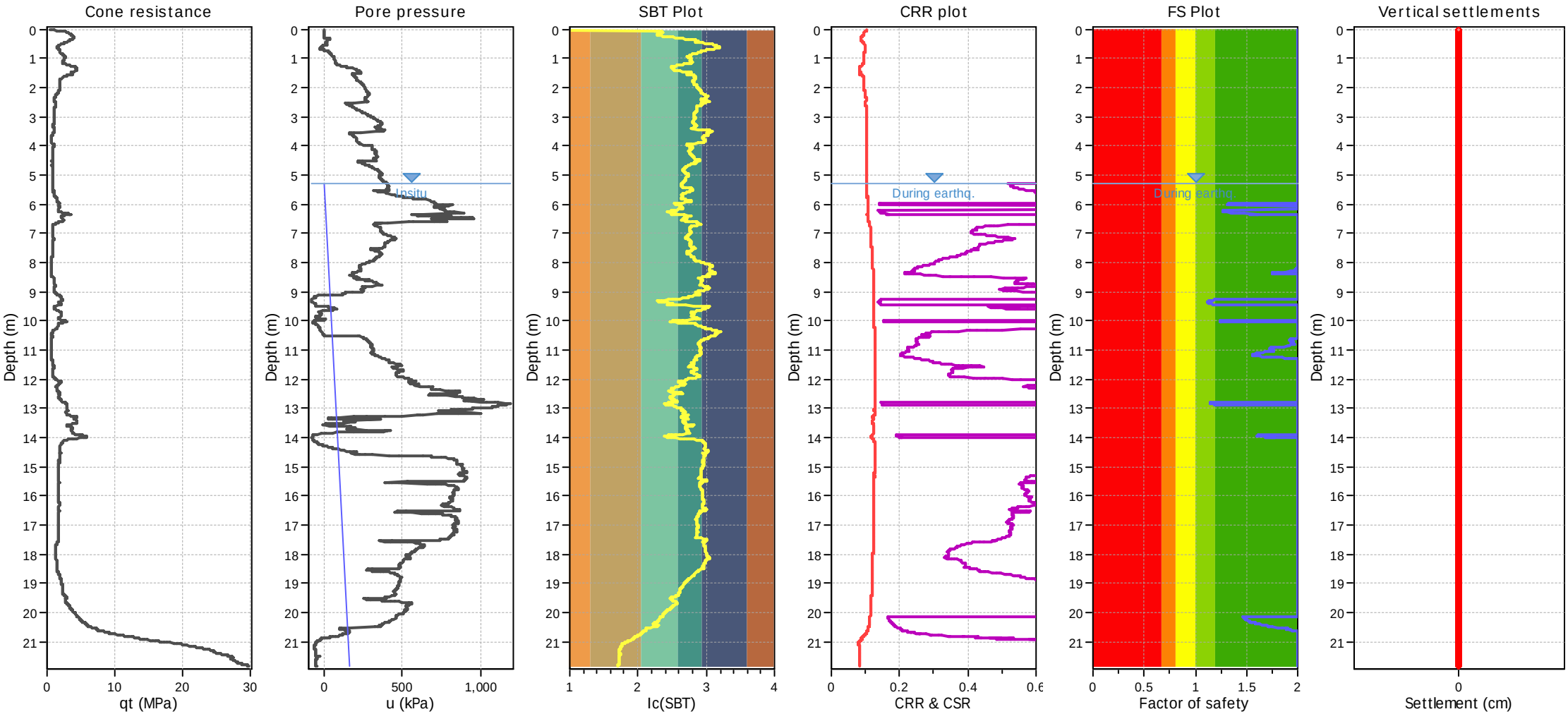
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-06
Total depth: 21.84 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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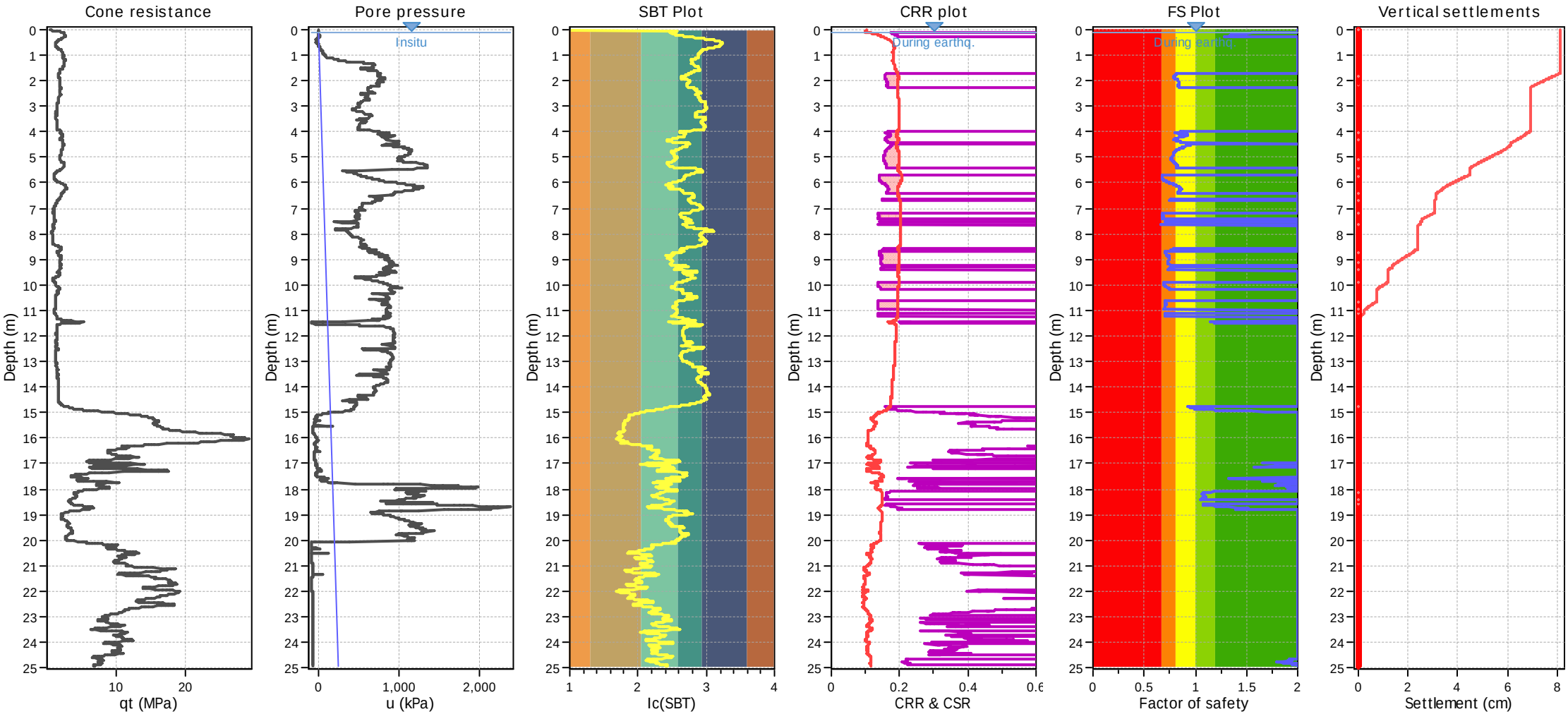
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-07
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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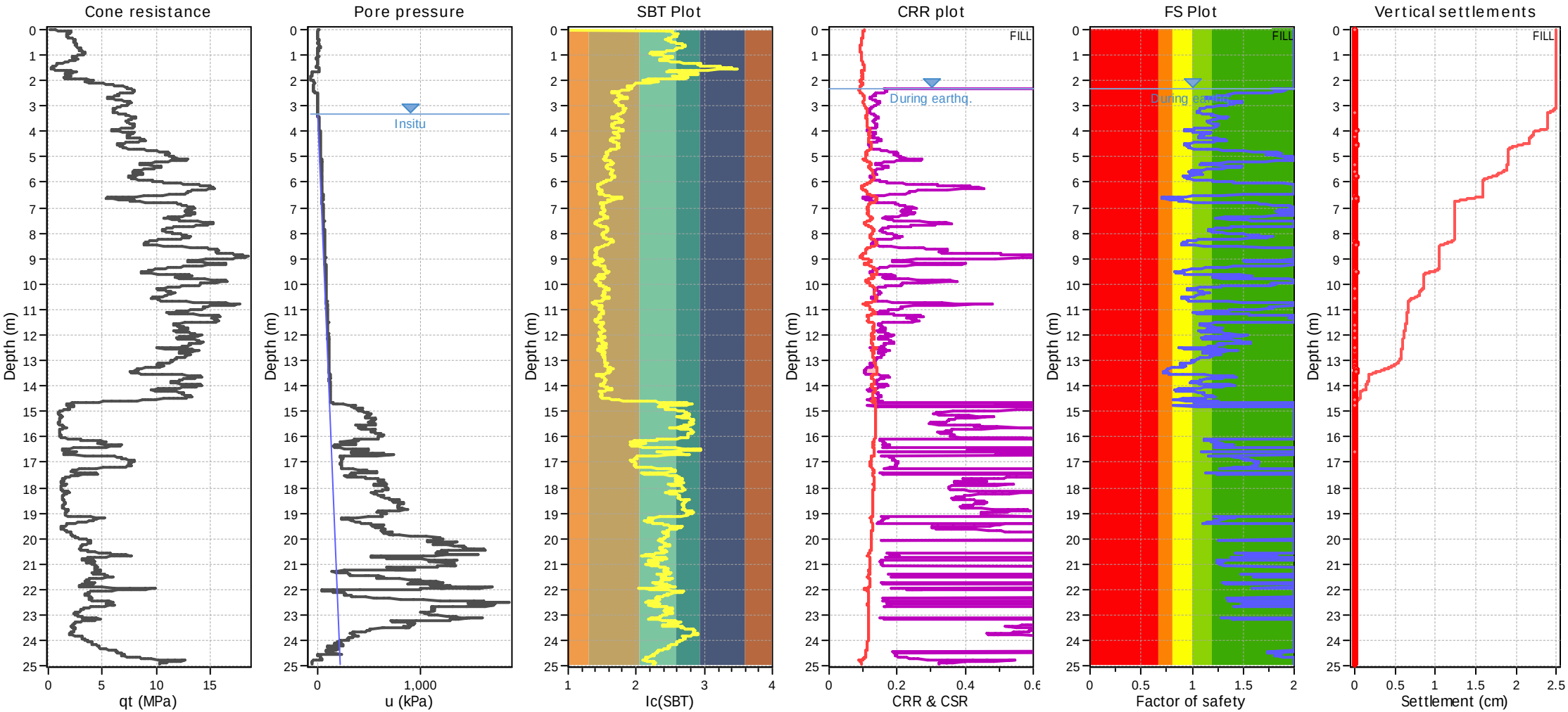
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-08
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.33 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.33 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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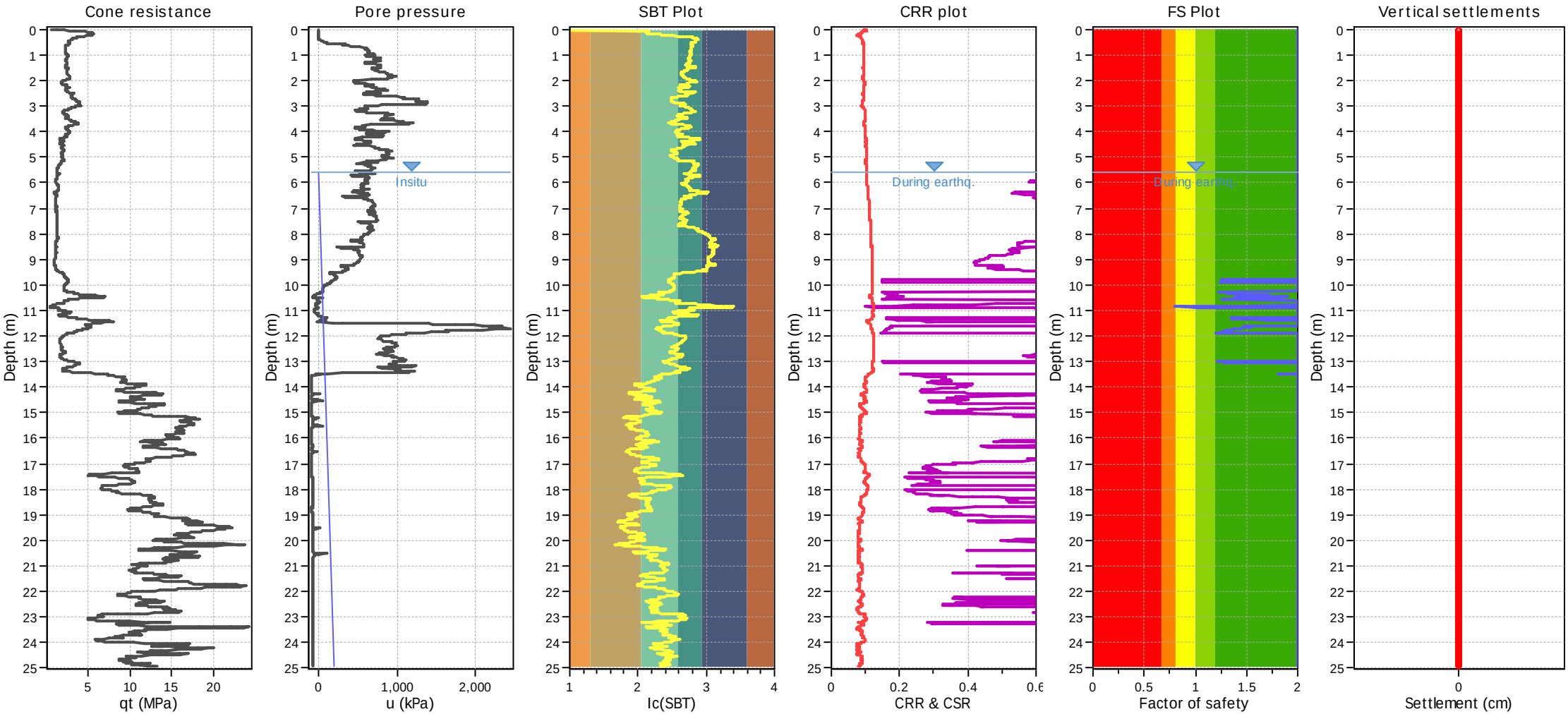
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-09
Total depth: 24.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.60 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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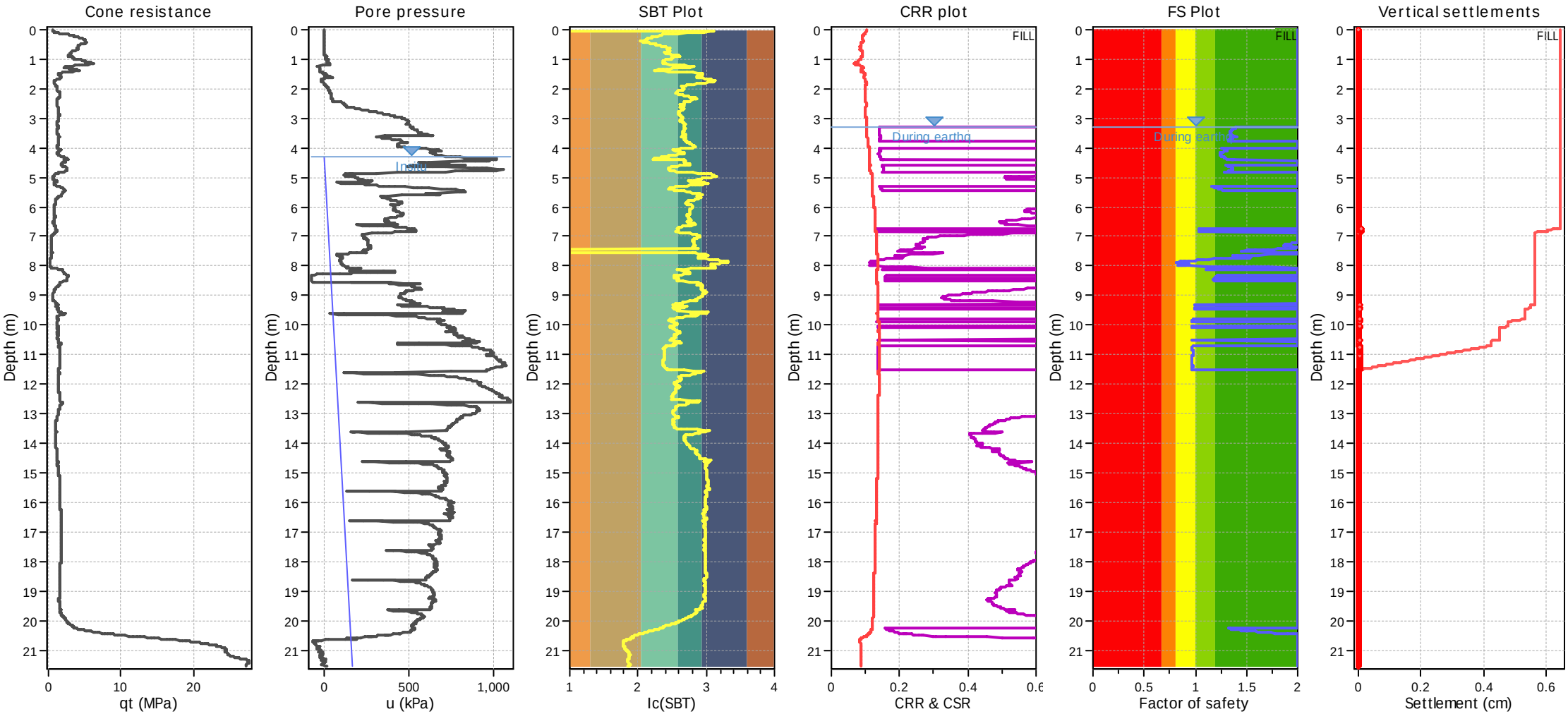
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT102
Total depth: 21.53 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.30 m	Fill height:	1.00 m		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth applied:	No
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

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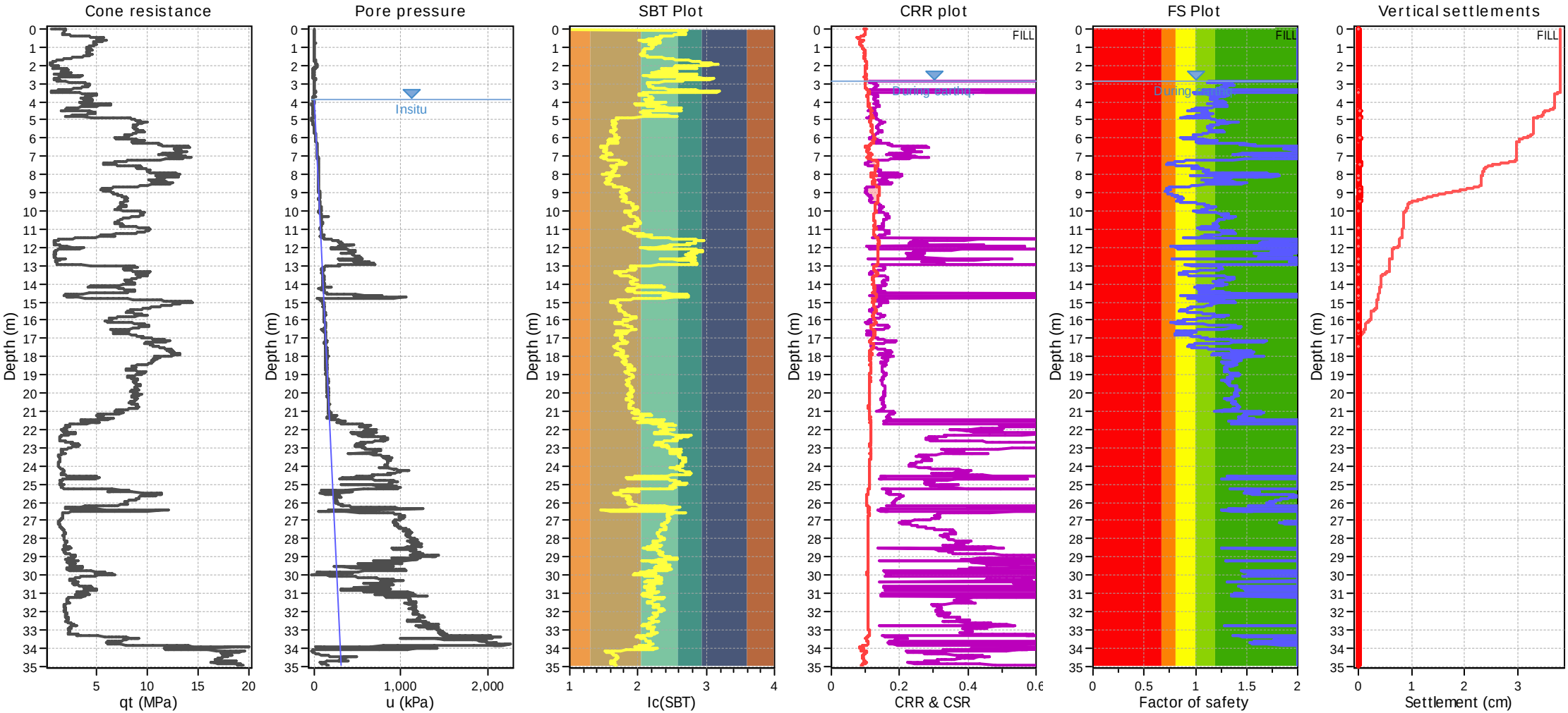
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT103
Total depth: 34.94 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.90 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

0.19g – Index ULS

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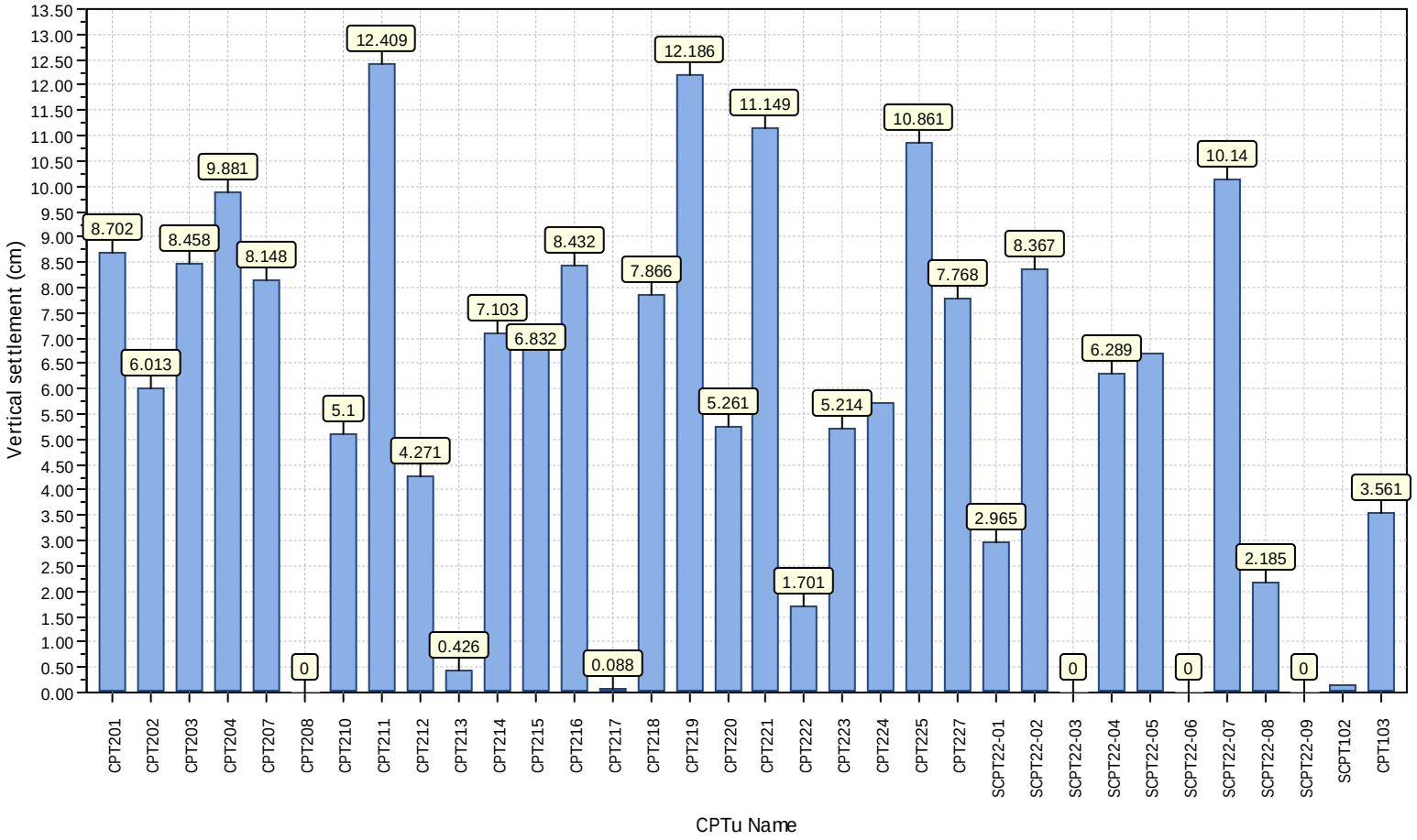
Project title : Tramway Rezoning

Location : Ruakura

Overall vertical settlements report



0.15g – Total ULS

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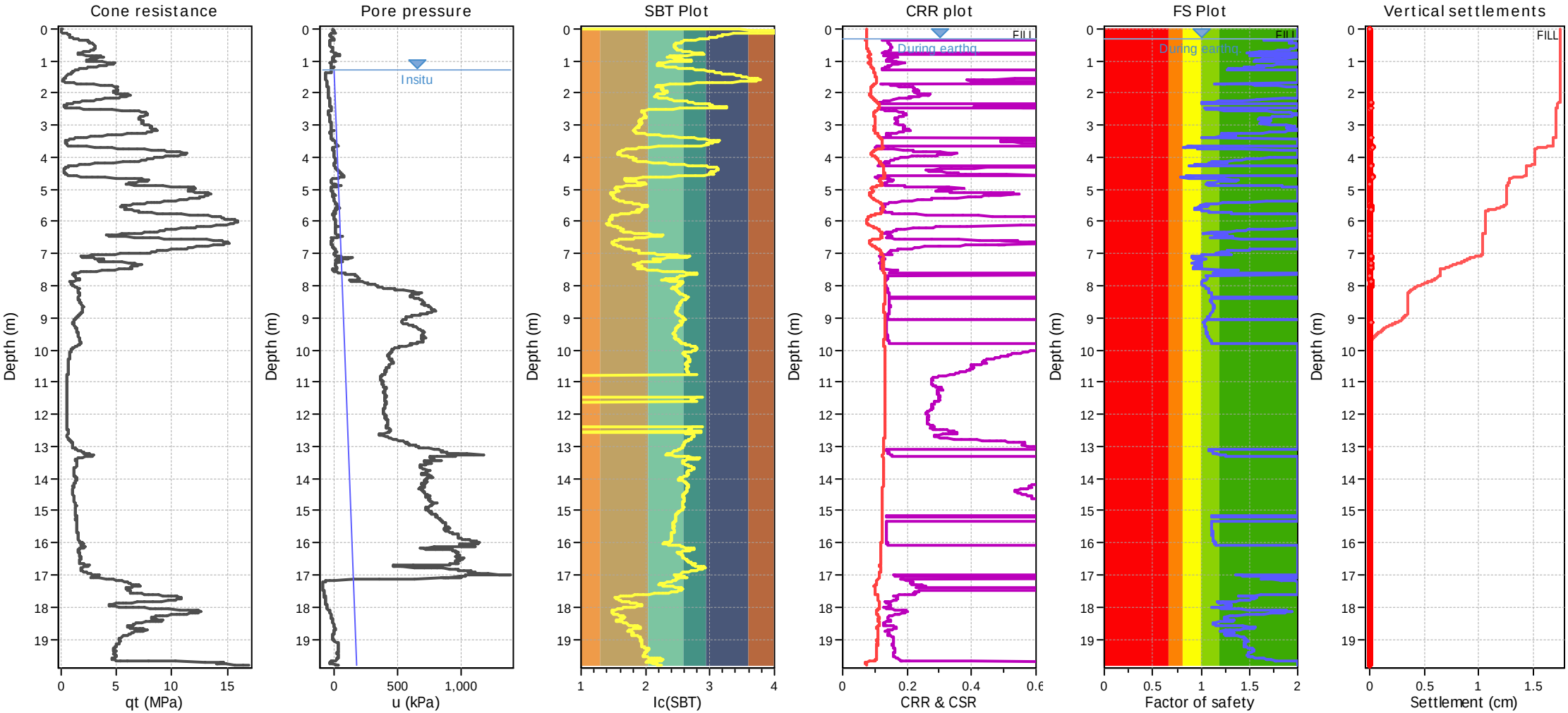
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT201
Total depth: 19.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.30 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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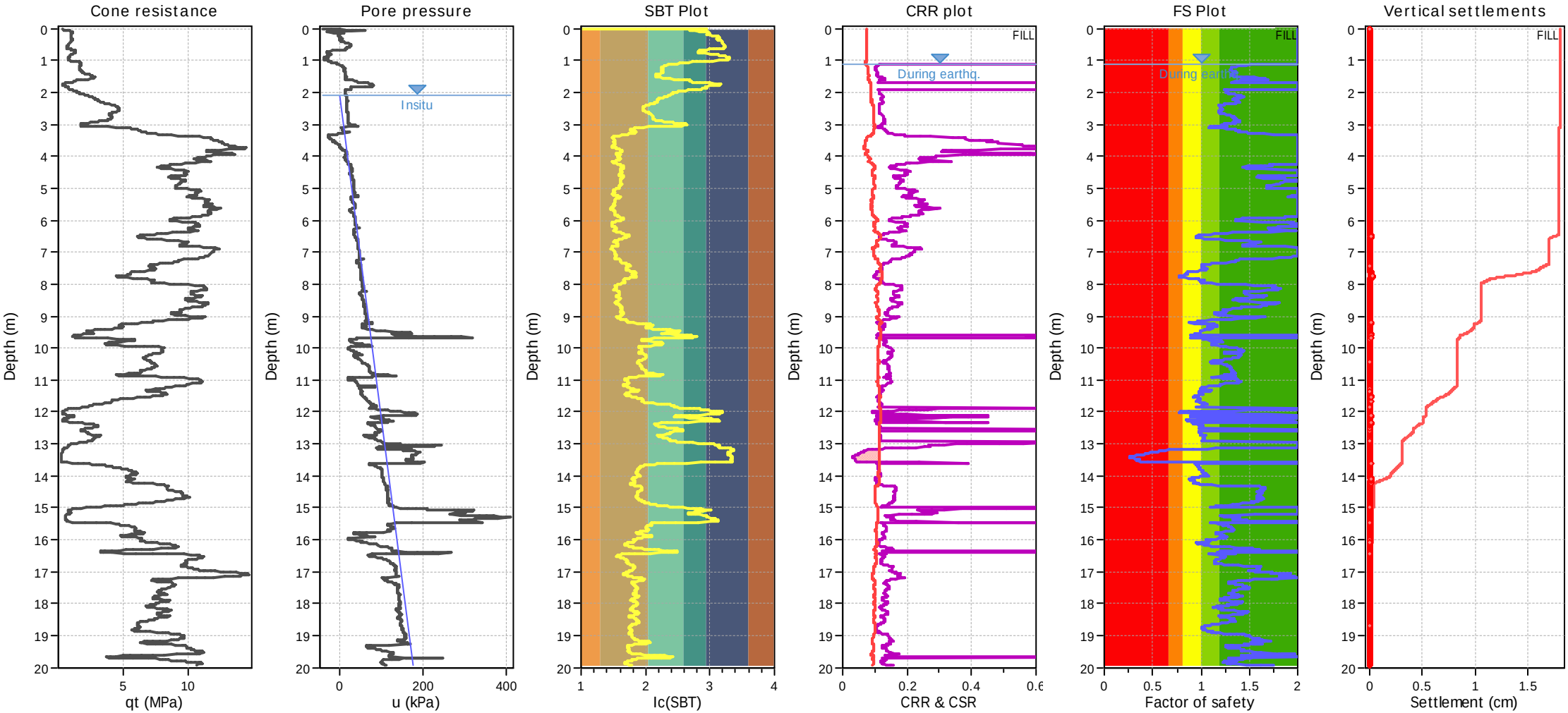
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT202
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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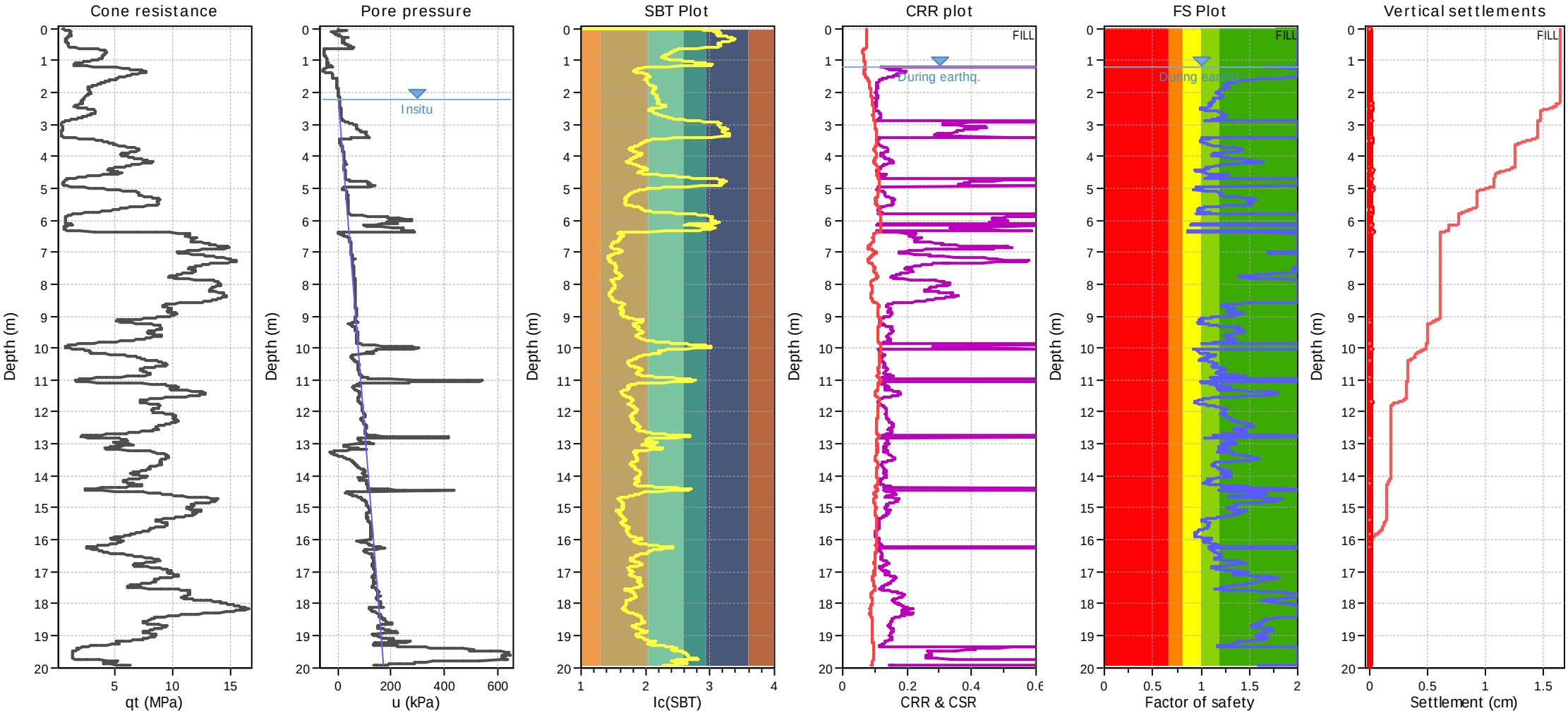
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT203
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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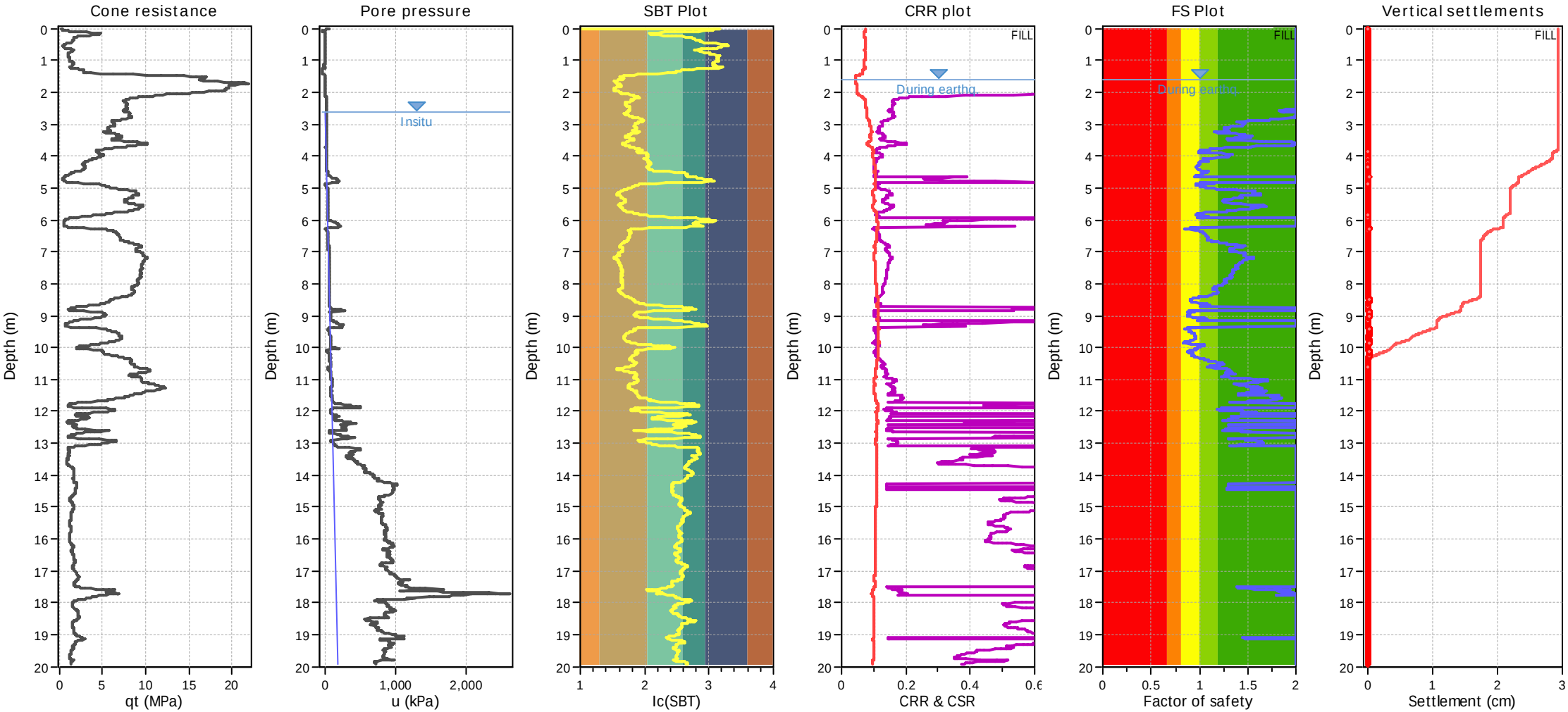
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT204
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.60 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.60 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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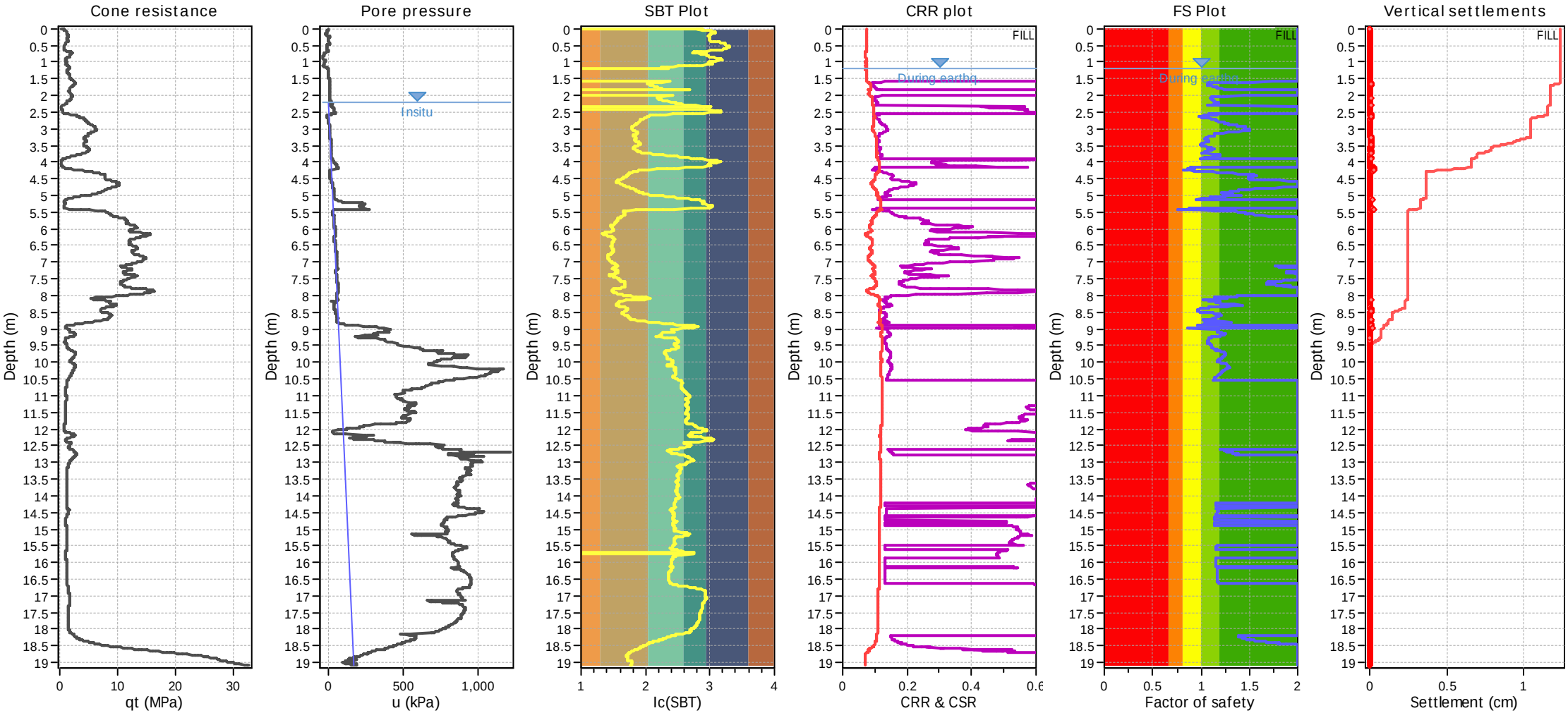
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT207
Total depth: 19.08 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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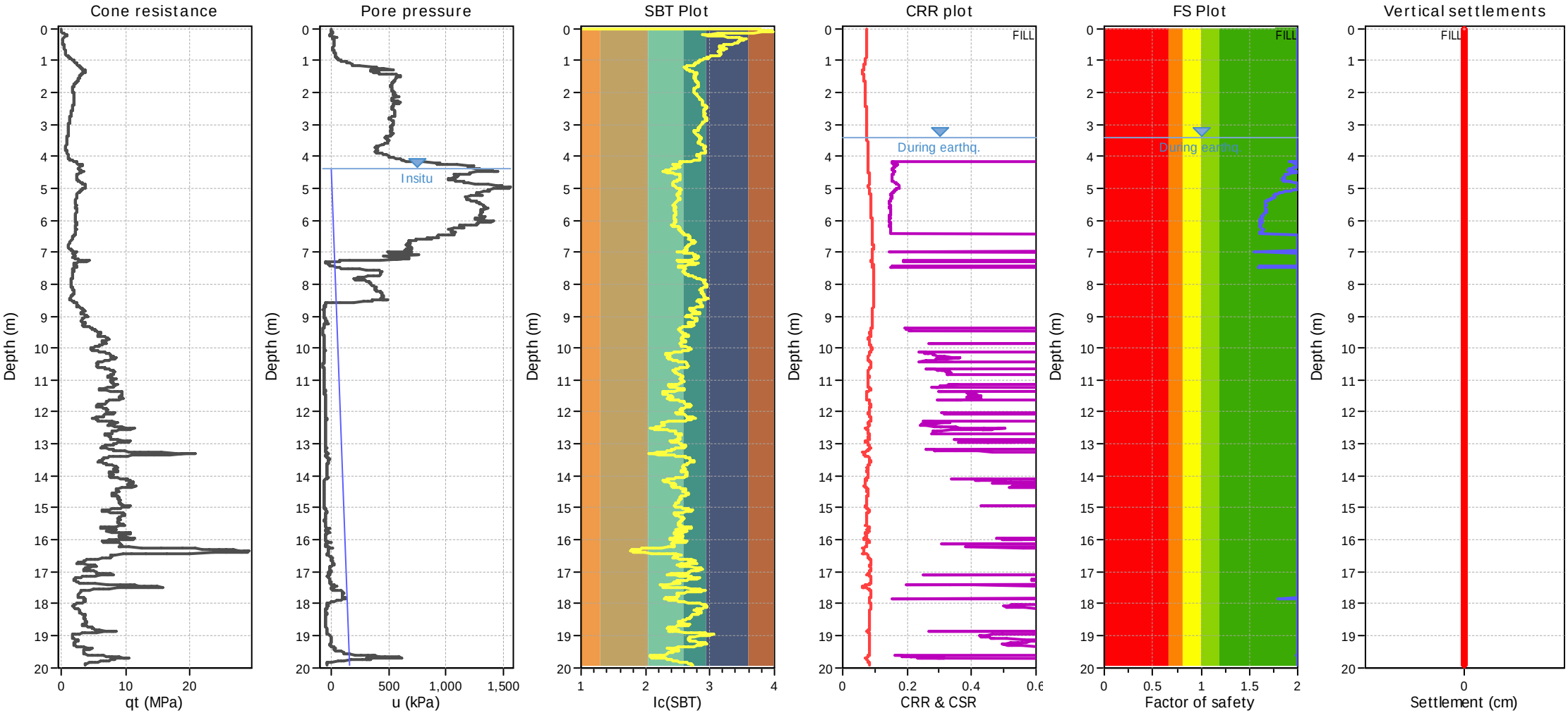
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT208
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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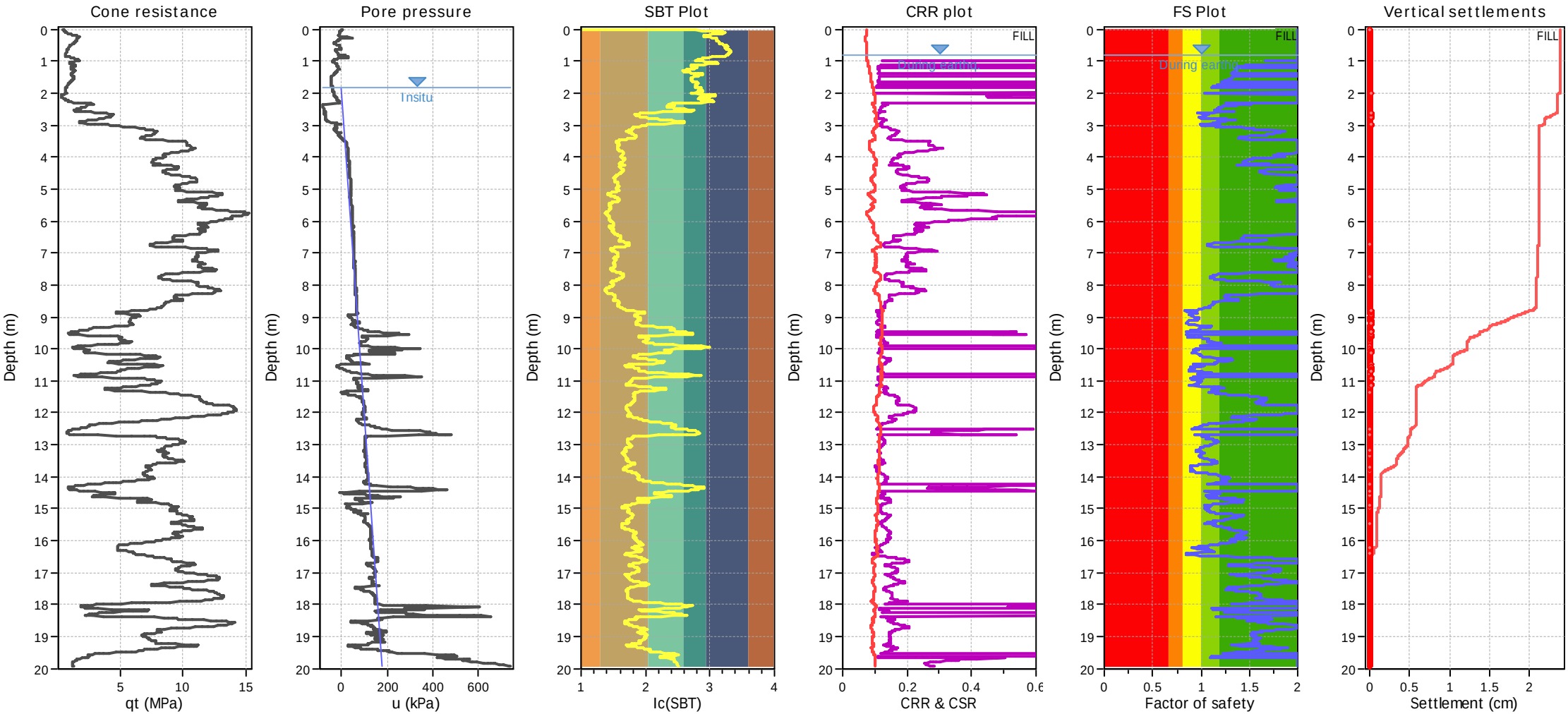
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT210
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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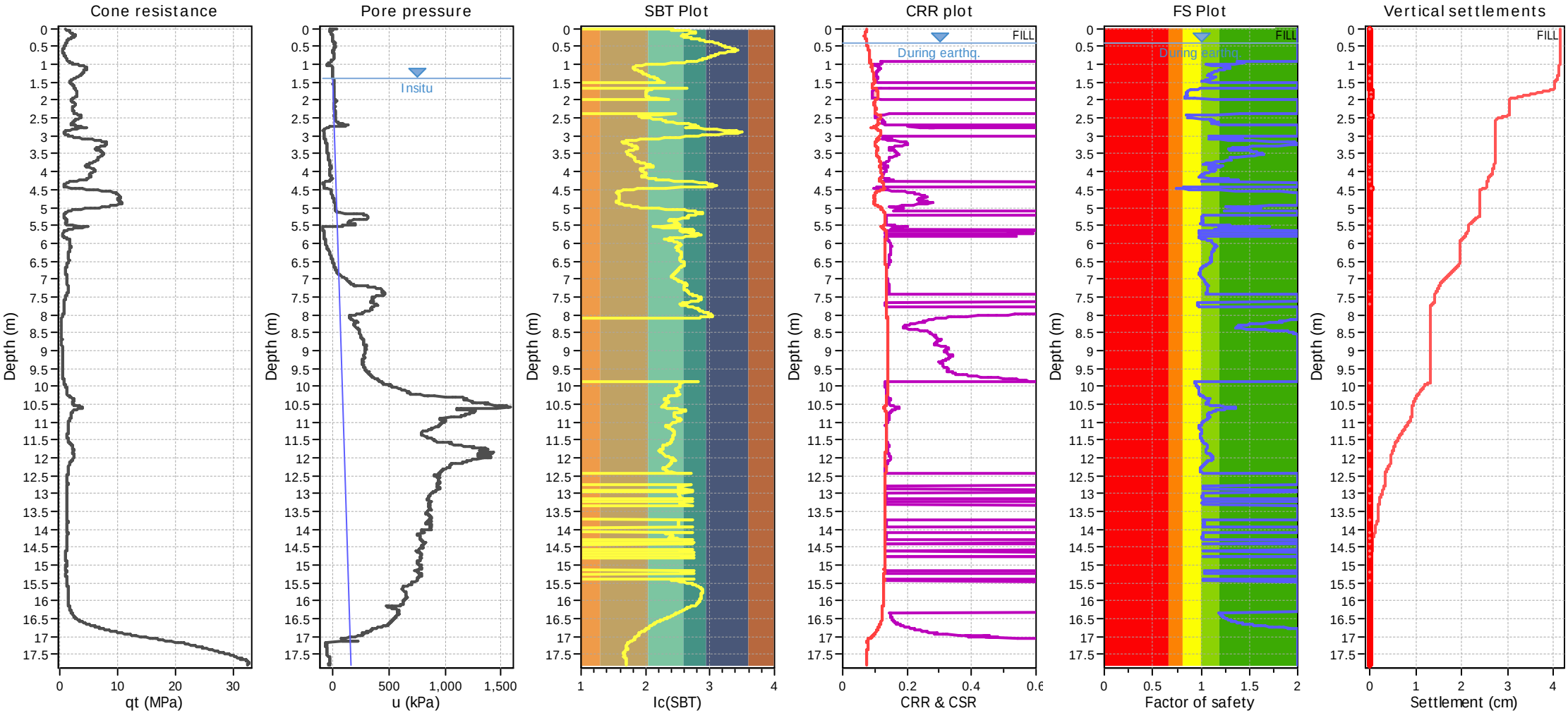
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT211
Total depth: 17.80 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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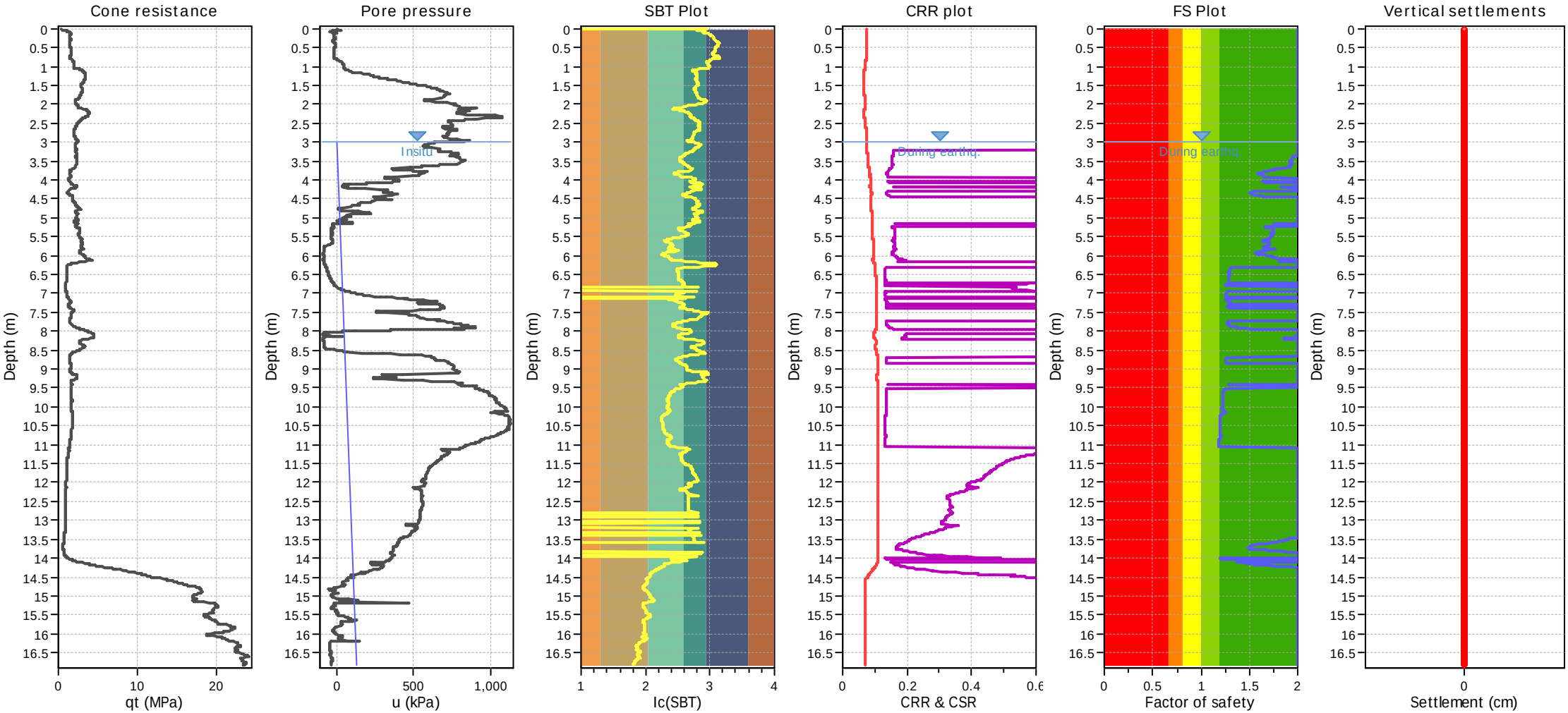
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT212
Total depth: 16.83 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.00 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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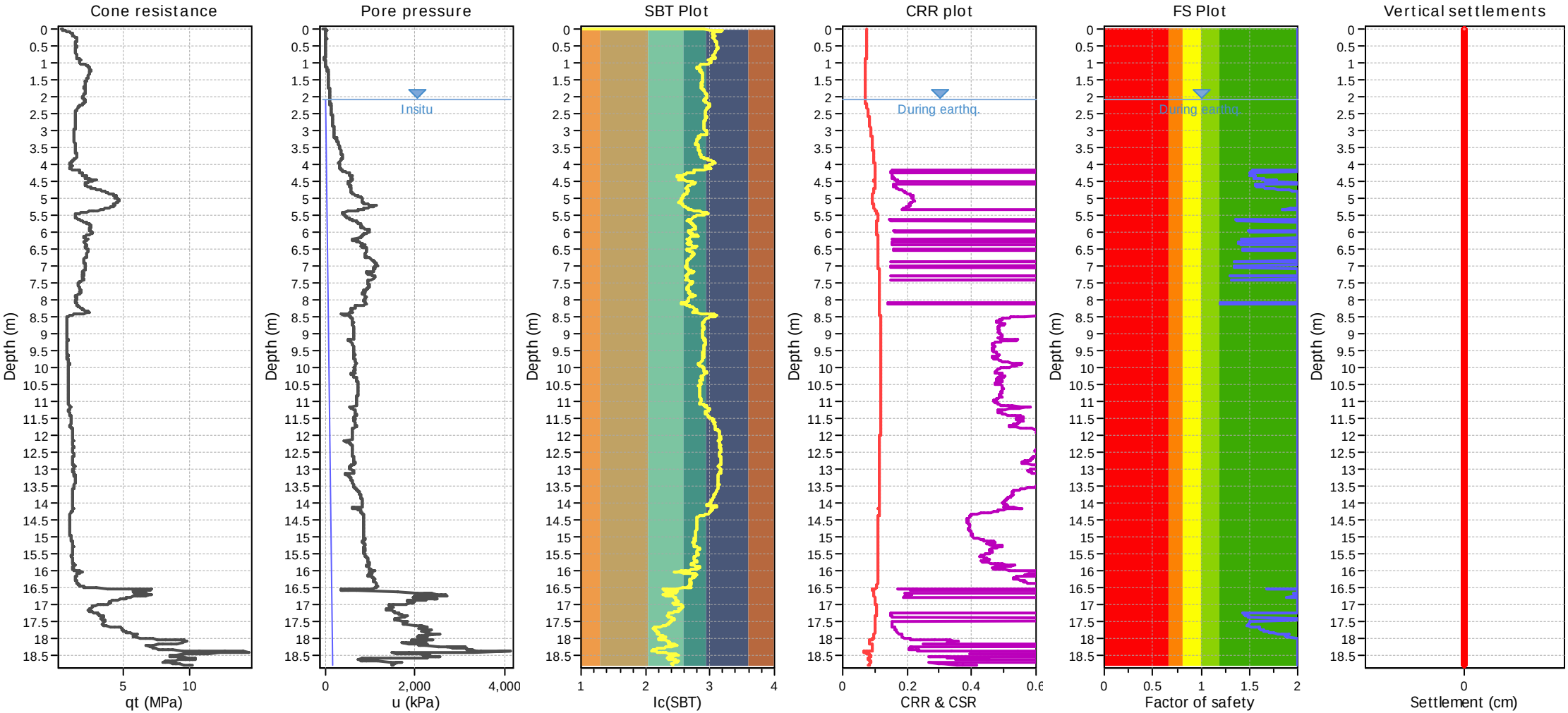
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT213
Total depth: 18.81 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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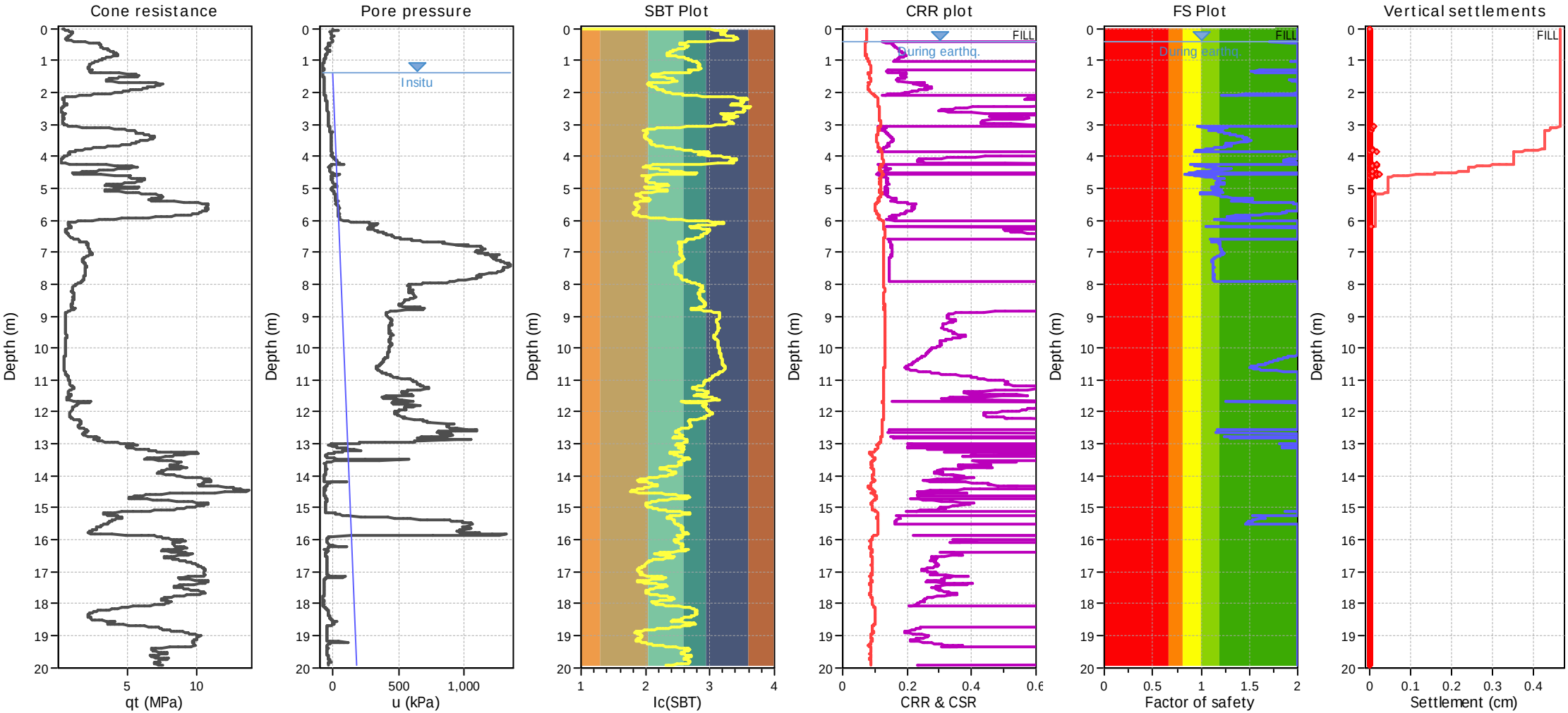
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT214
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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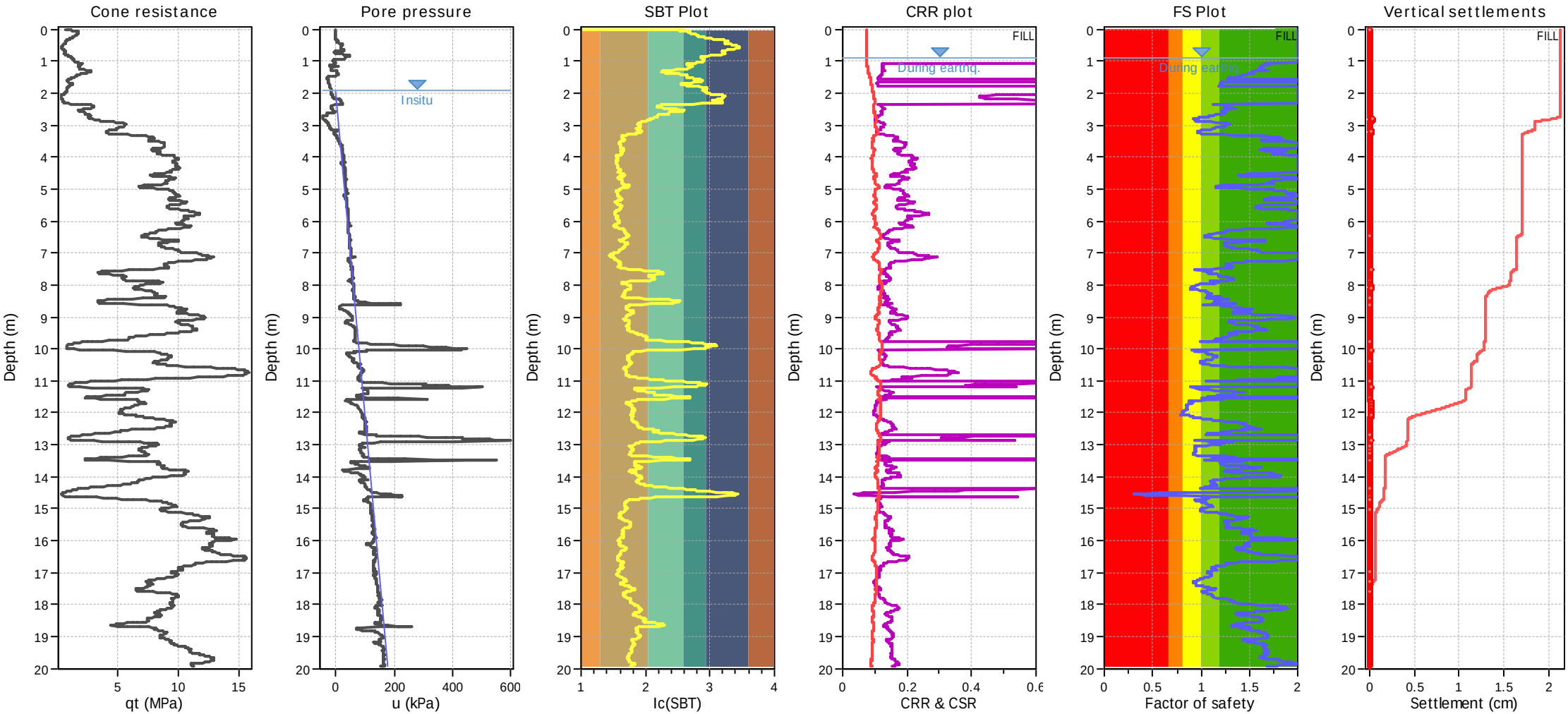
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT215
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.90 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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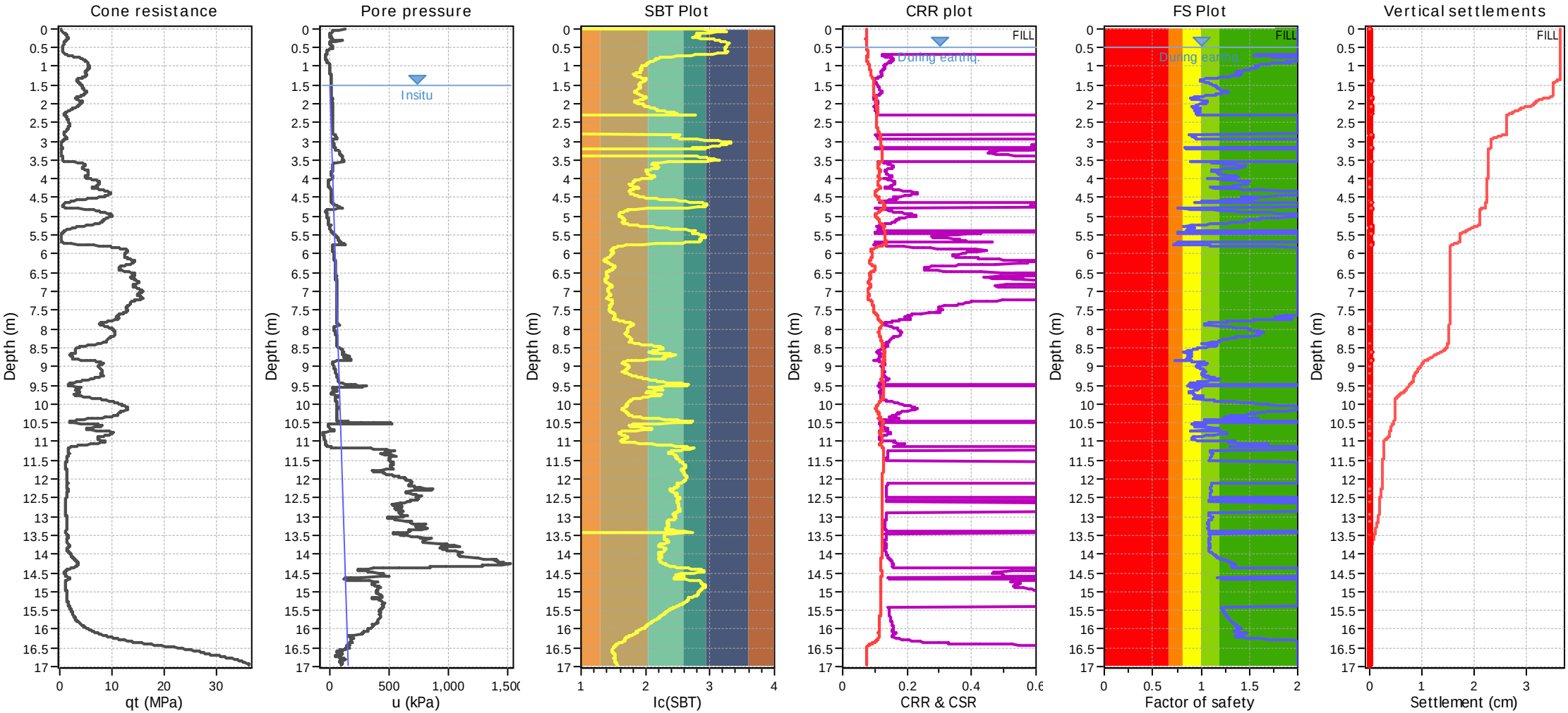
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT216
Total depth: 16.96 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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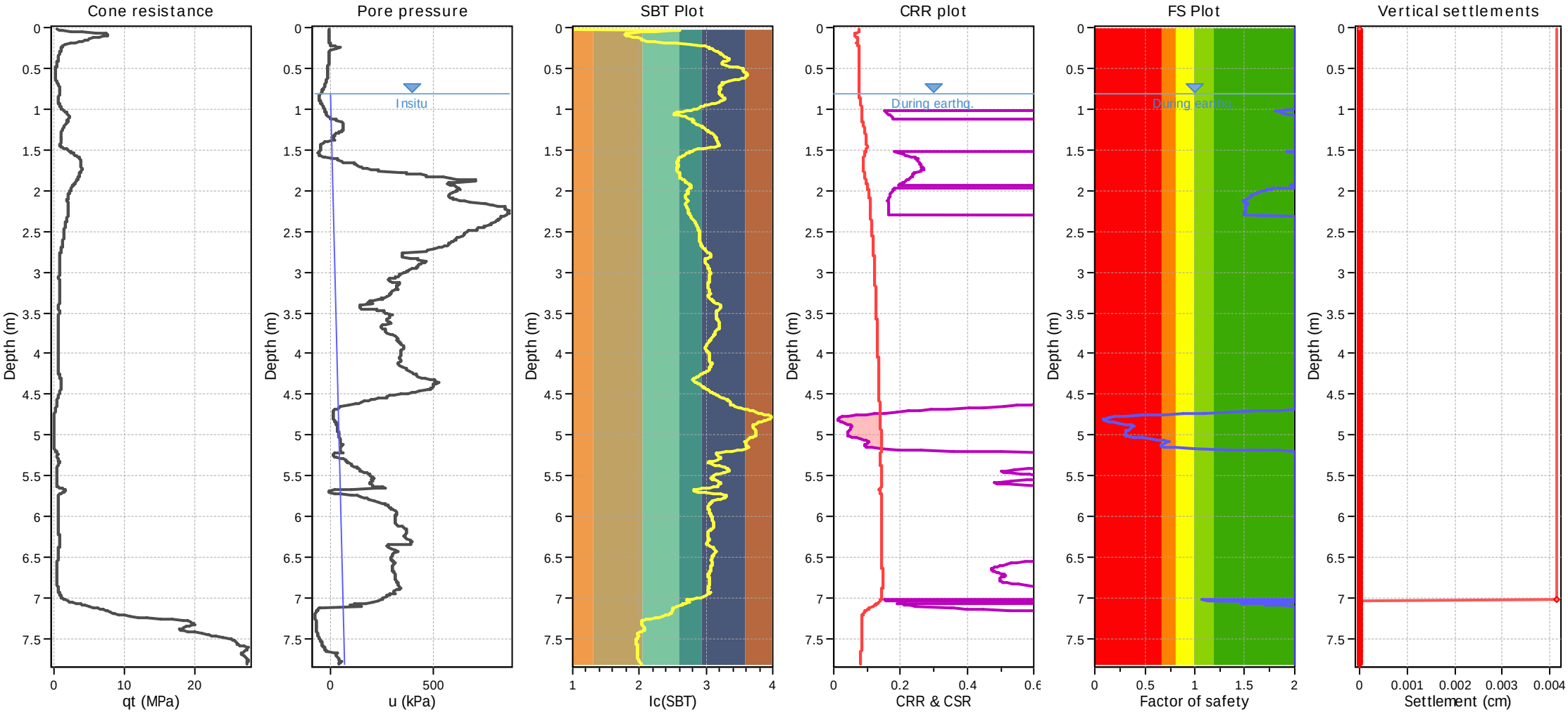
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT217
Total depth: 7.82 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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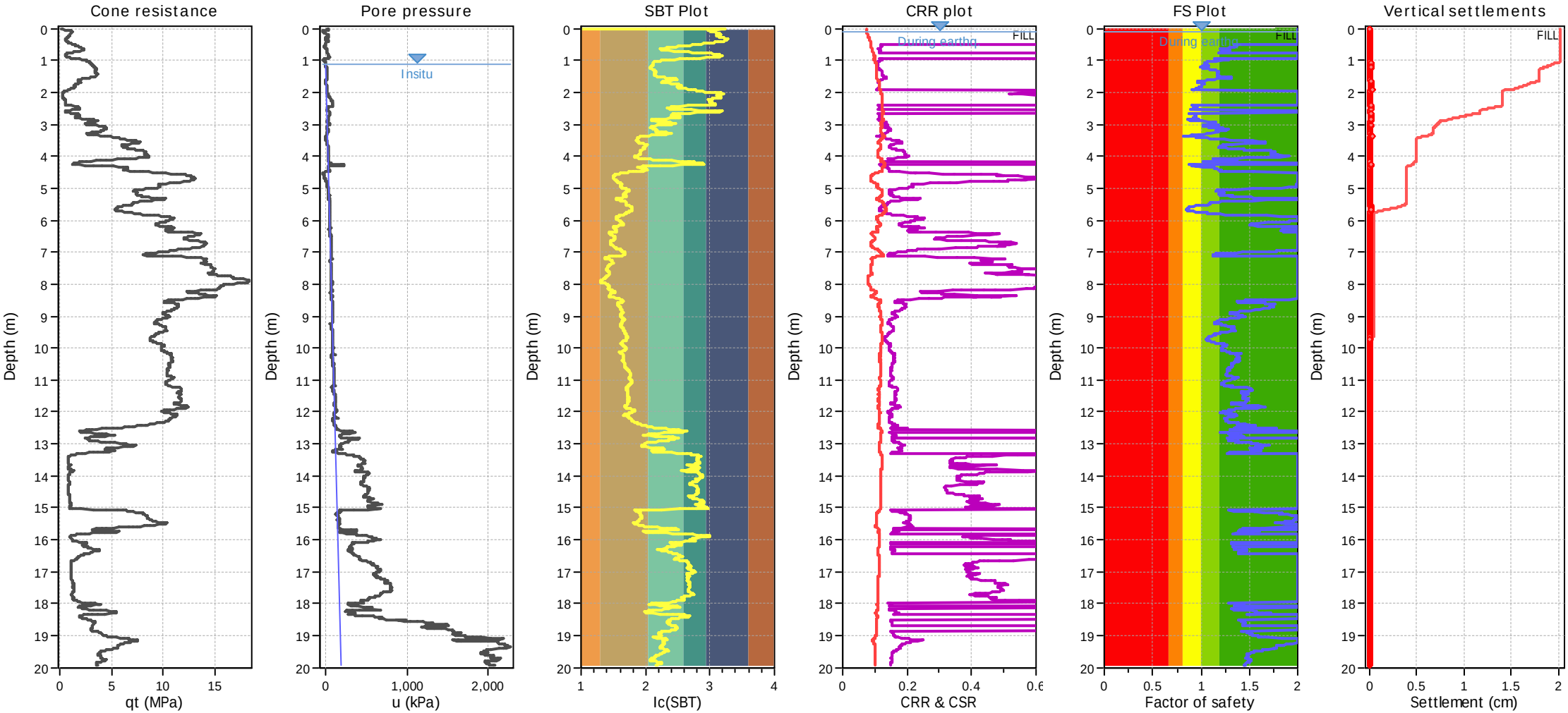
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT218
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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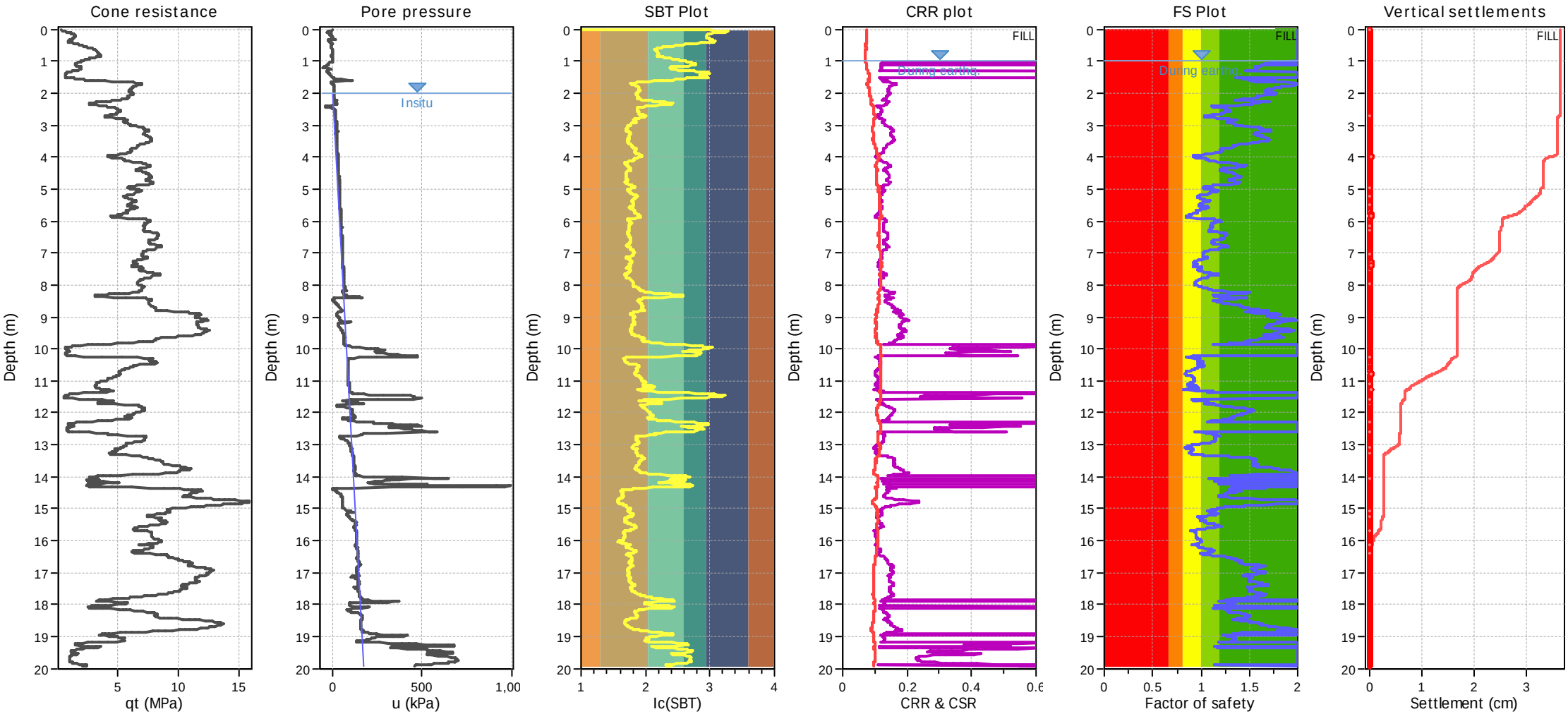
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT219
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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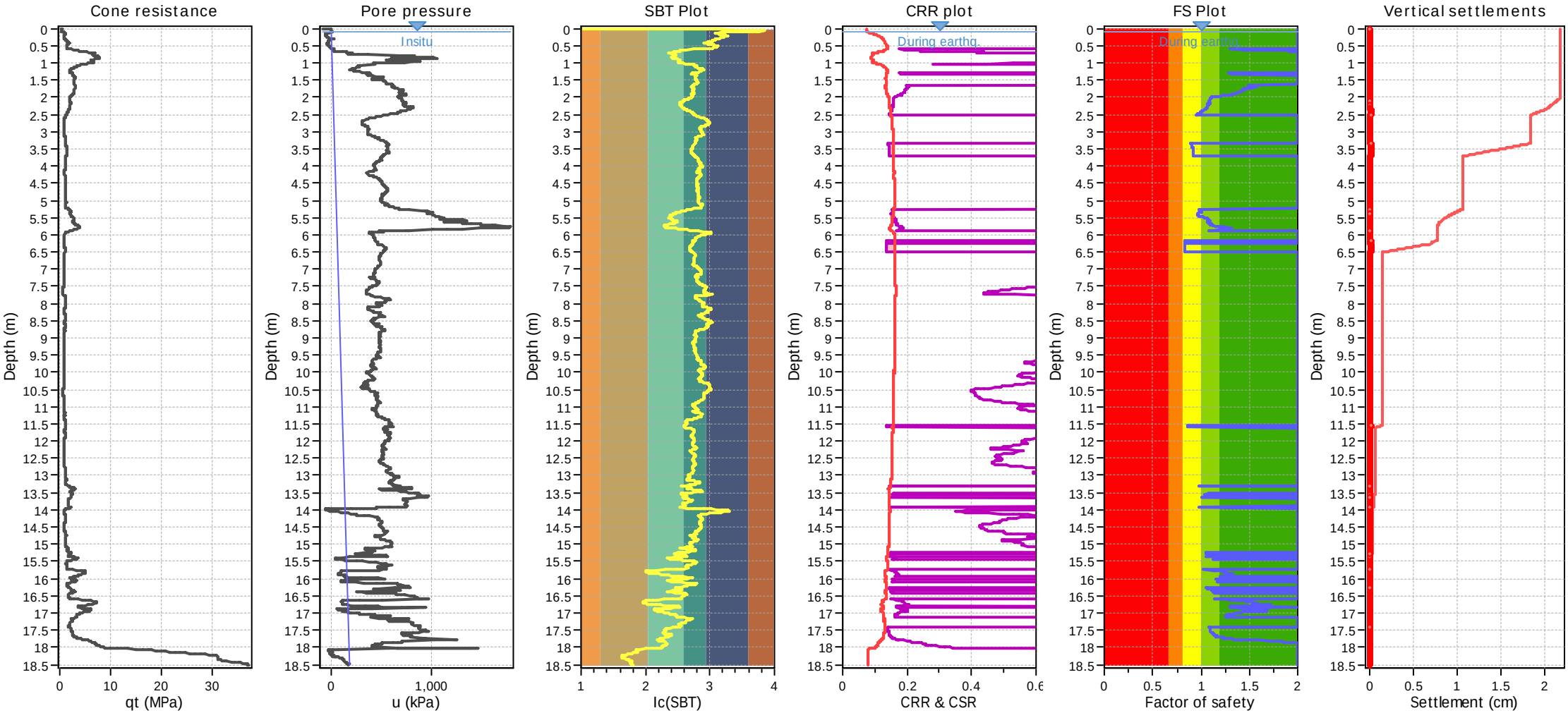
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT220
Total depth: 18.52 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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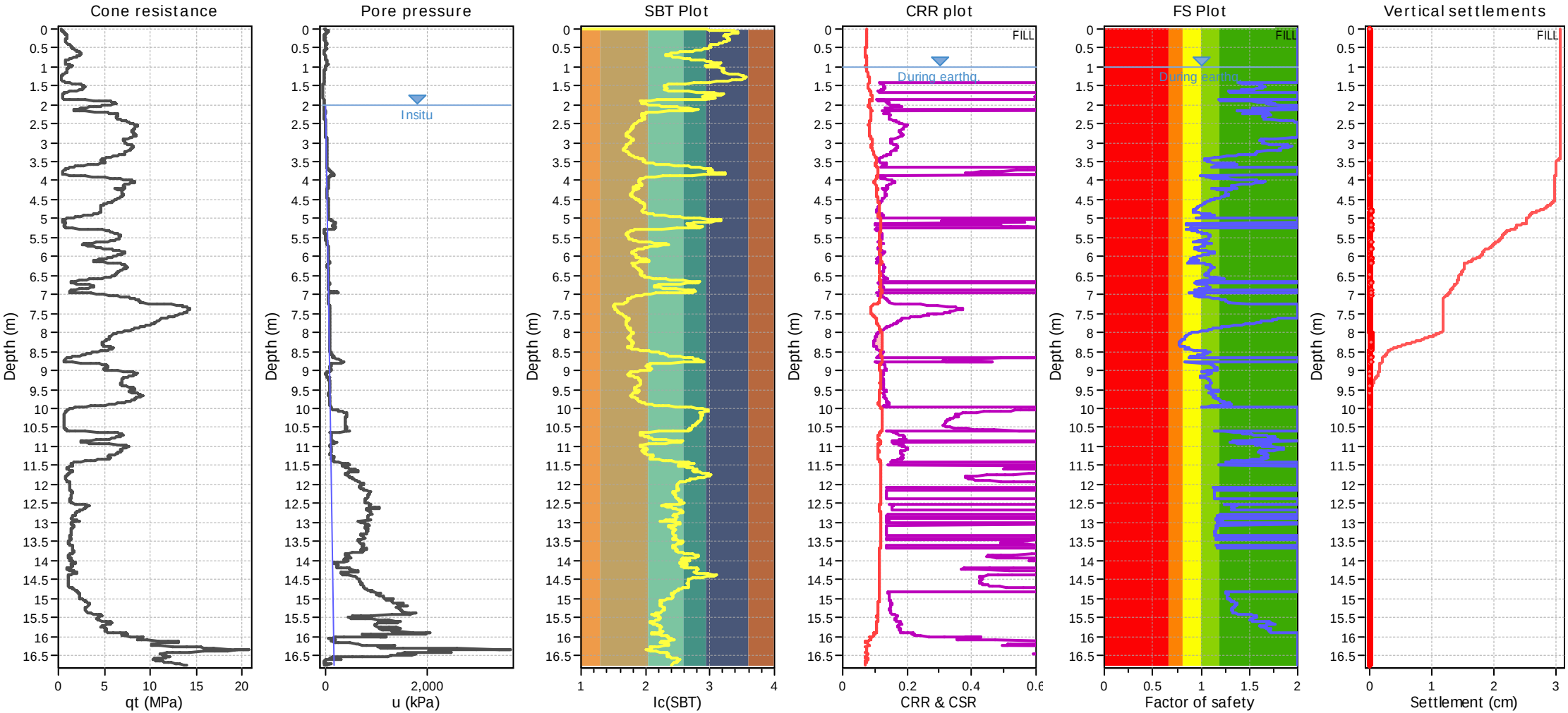
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT221
Total depth: 16.76 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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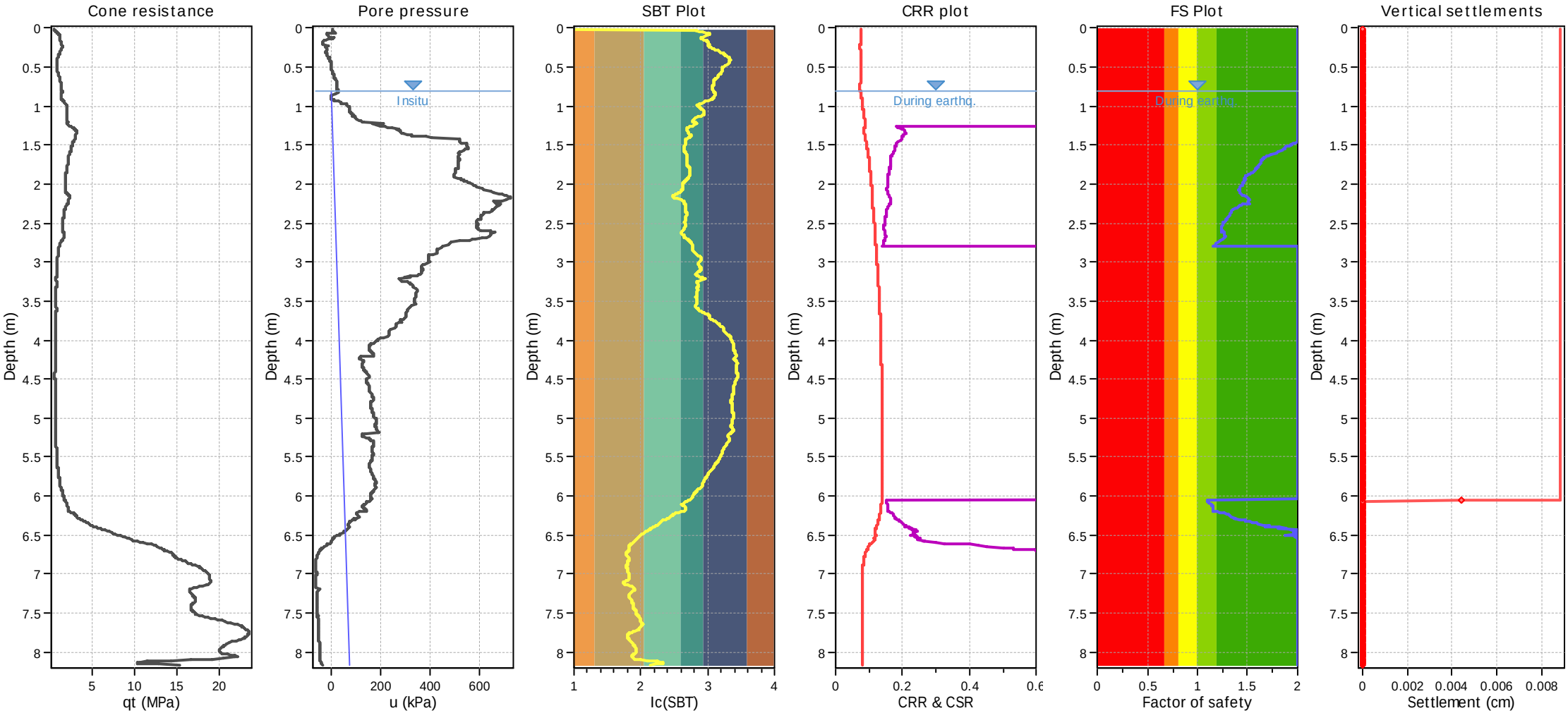
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT222
Total depth: 8.17 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.80 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.80 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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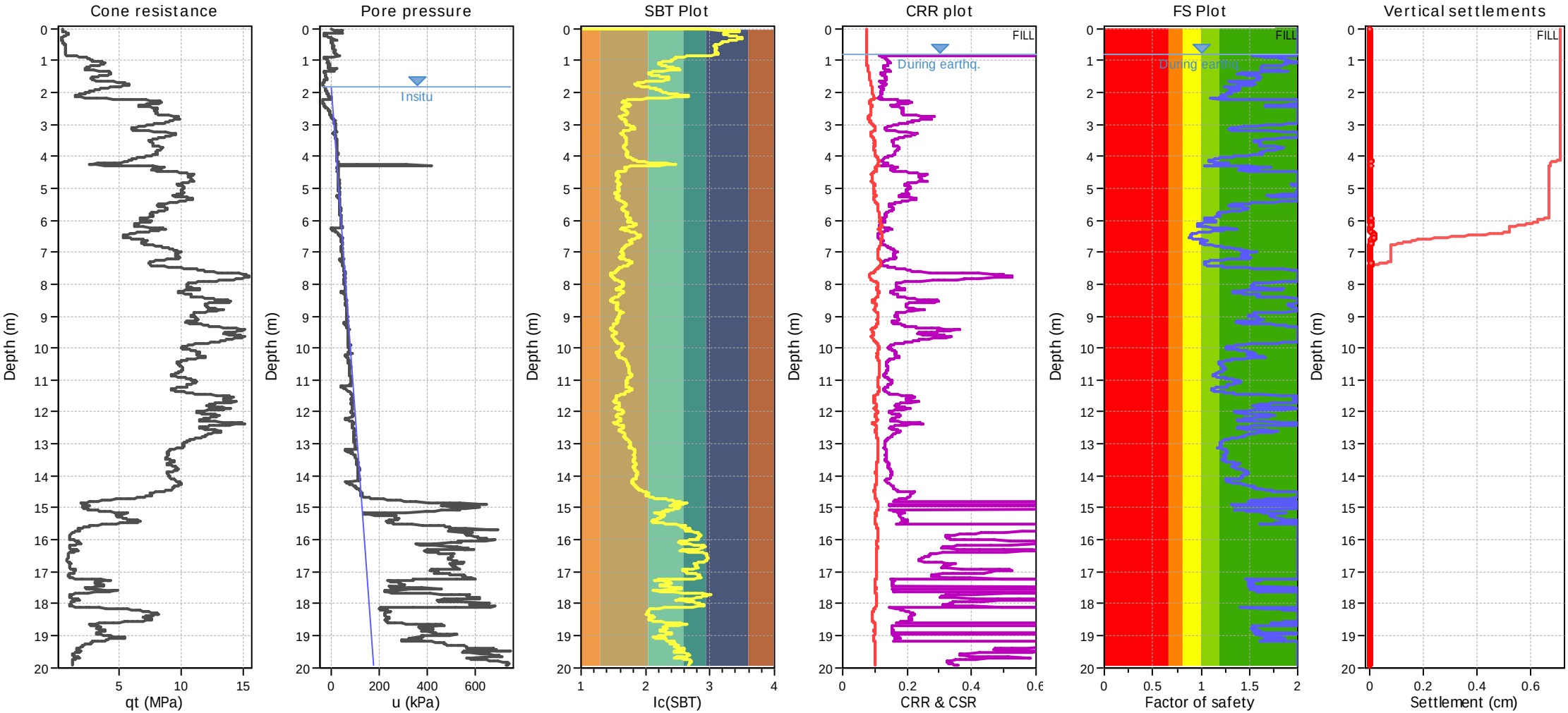
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT223
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.80 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.80 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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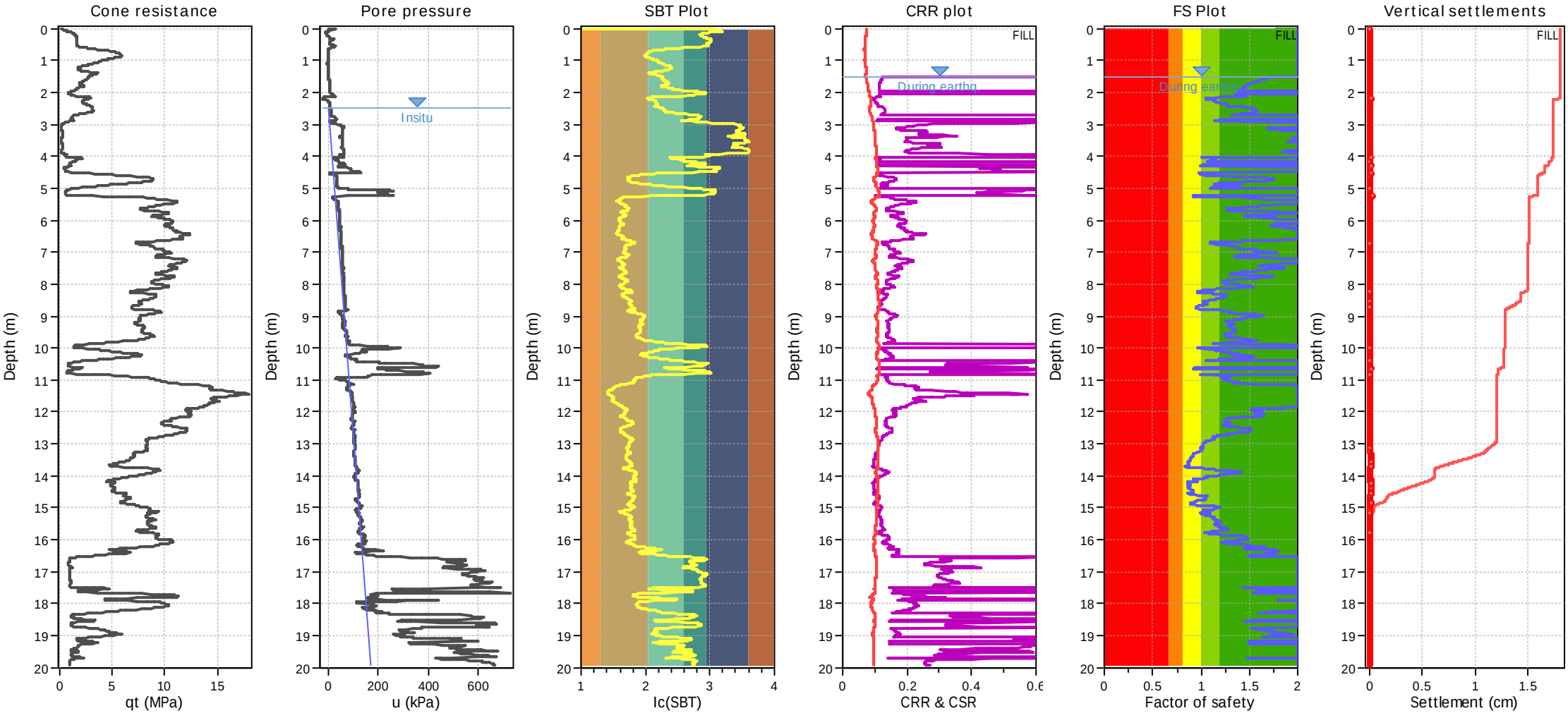
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT224
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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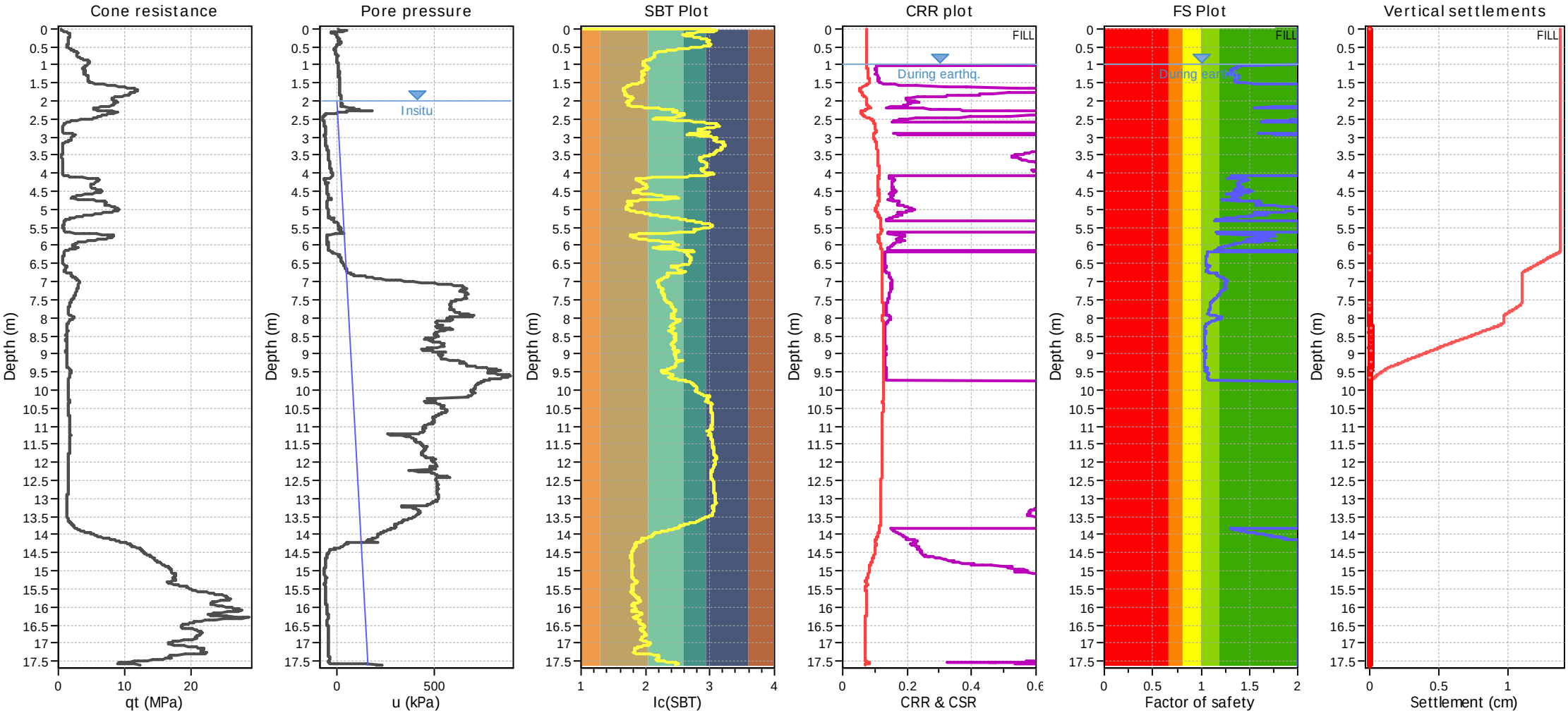
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT225
Total depth: 17.61 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.00 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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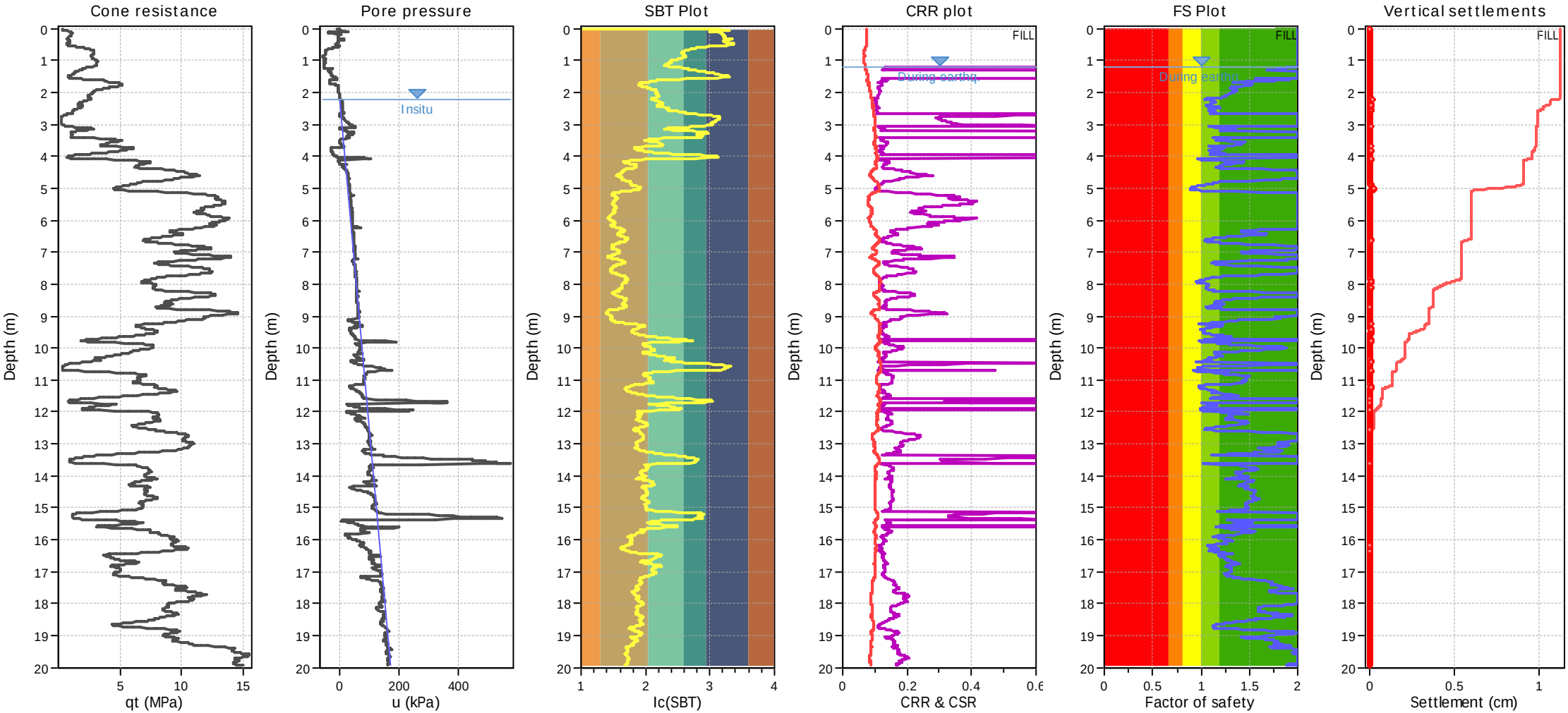
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT227
Total depth: 19.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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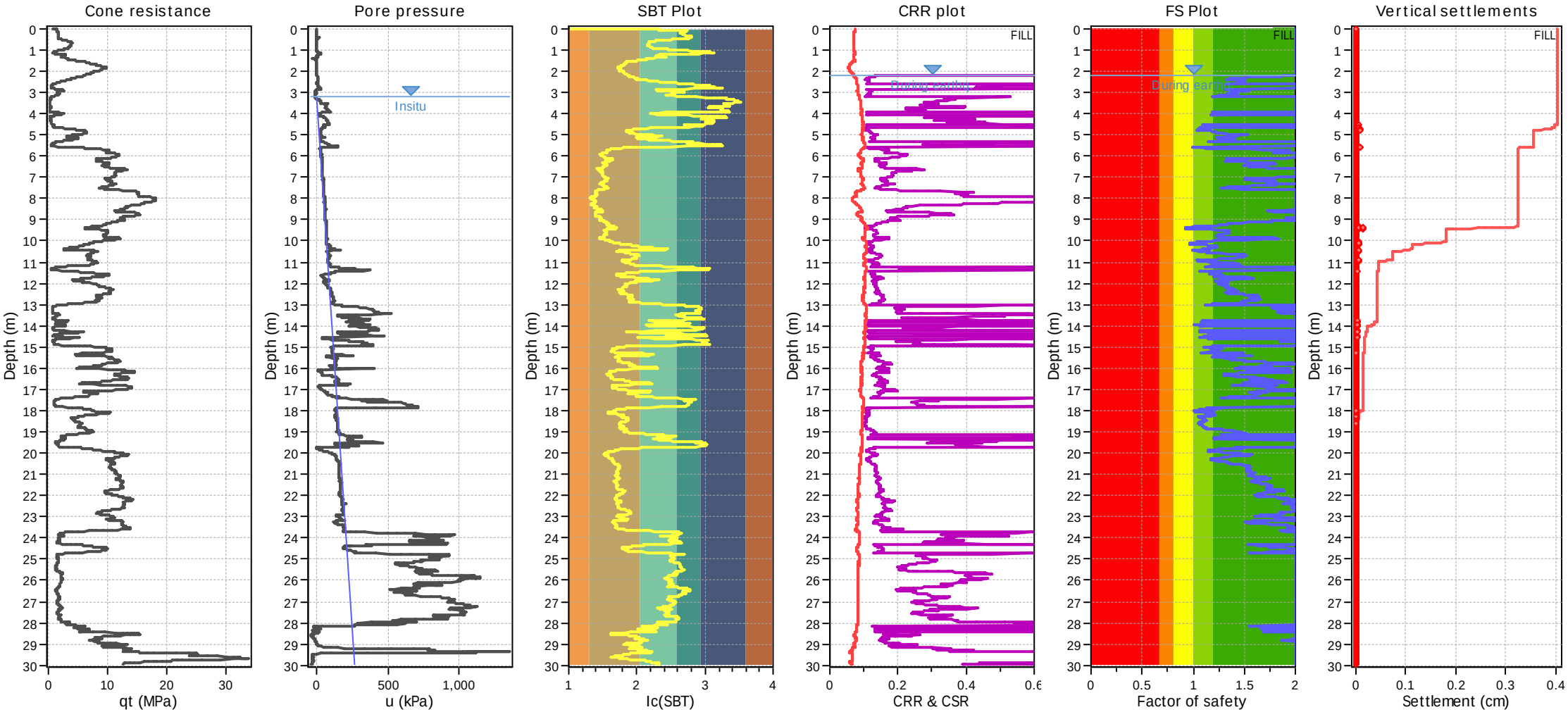
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-01
Total depth: 29.95 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.20 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.20 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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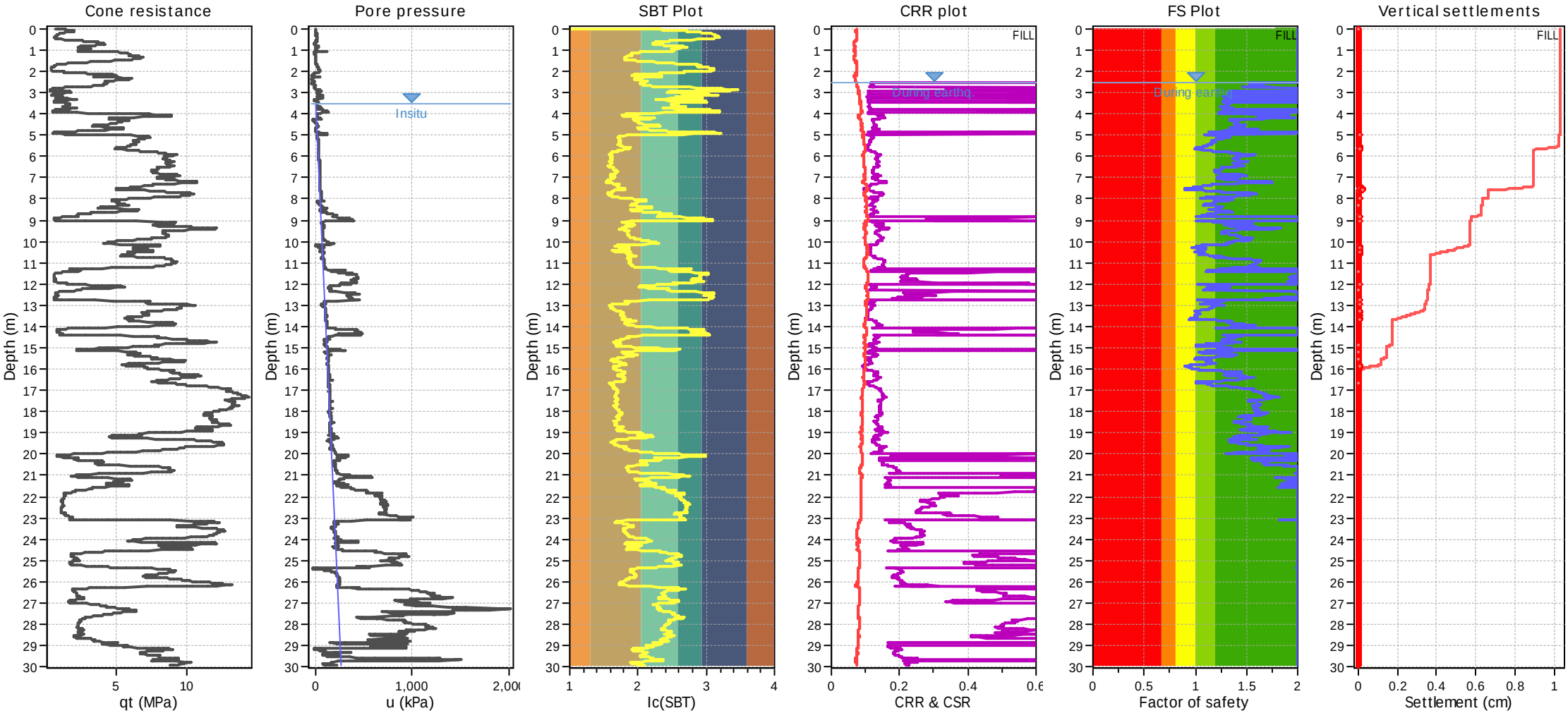
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-02
Total depth: 29.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.50 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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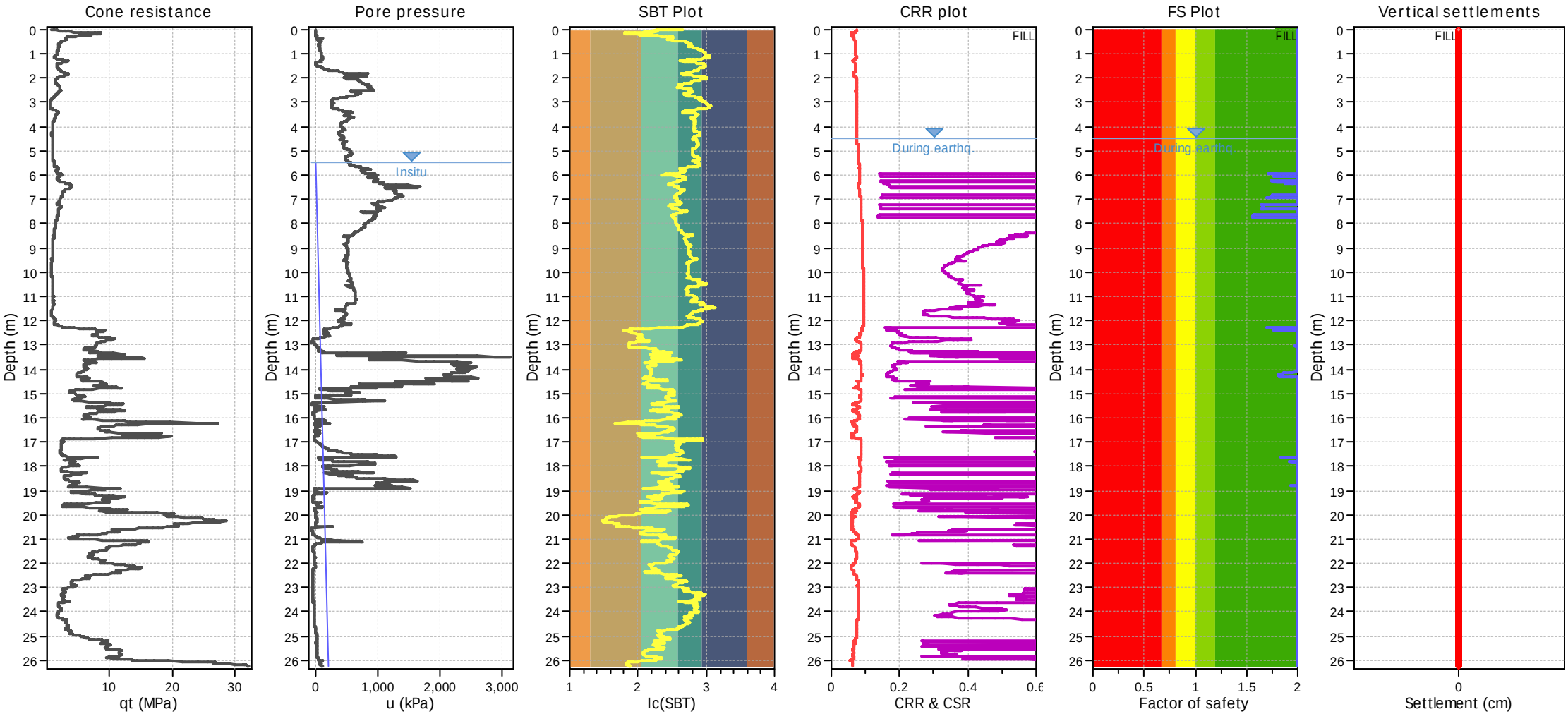
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-03
Total depth: 26.24 m



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Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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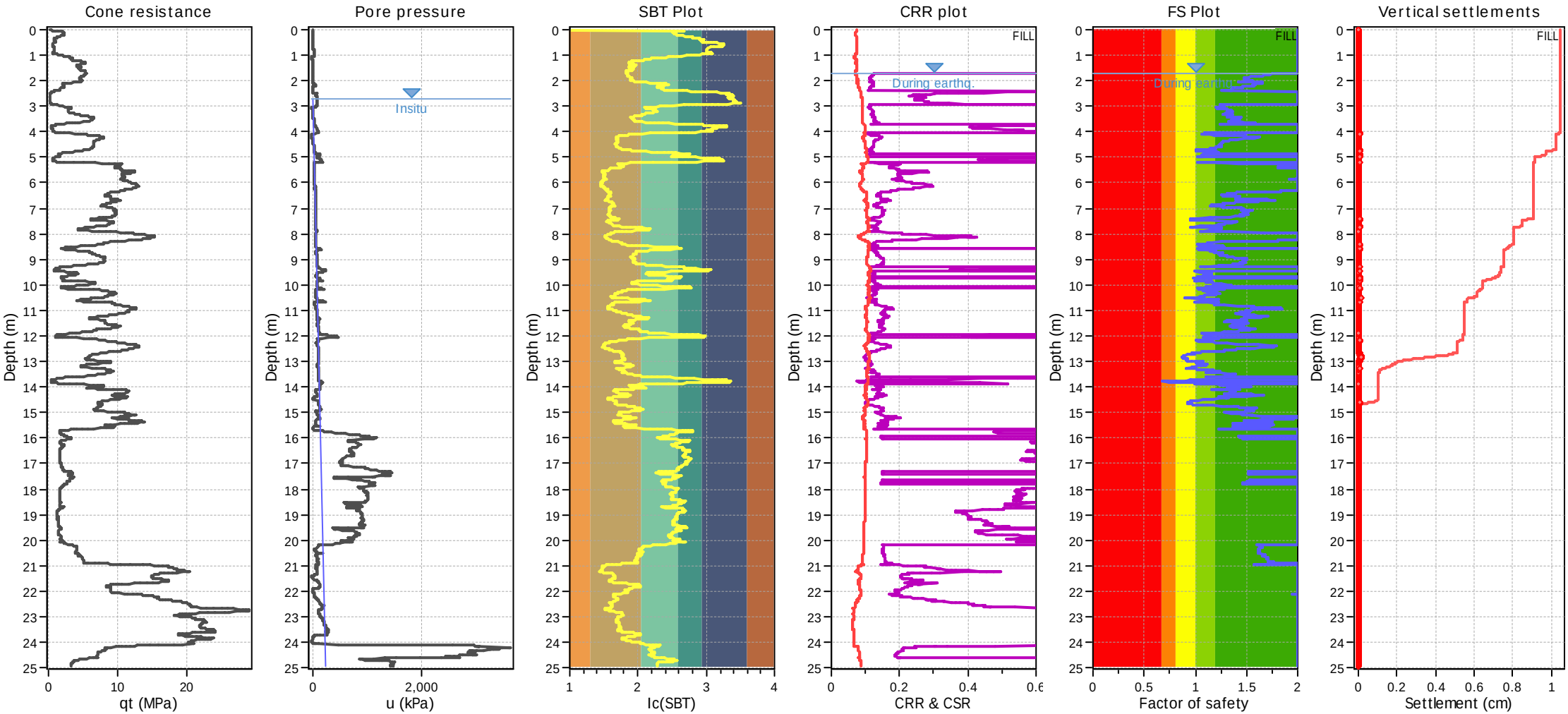
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-04
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.74 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.74 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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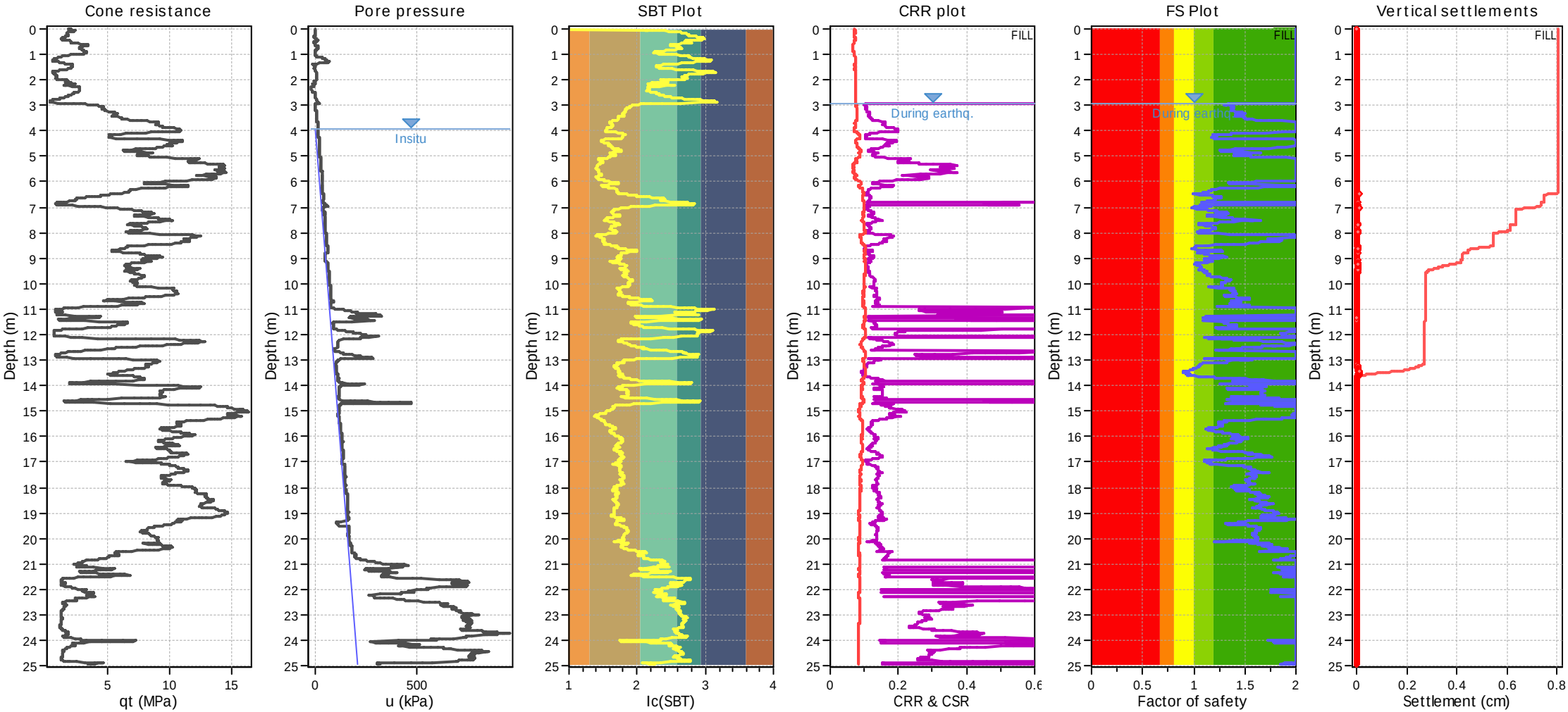
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-05
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.94 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.94 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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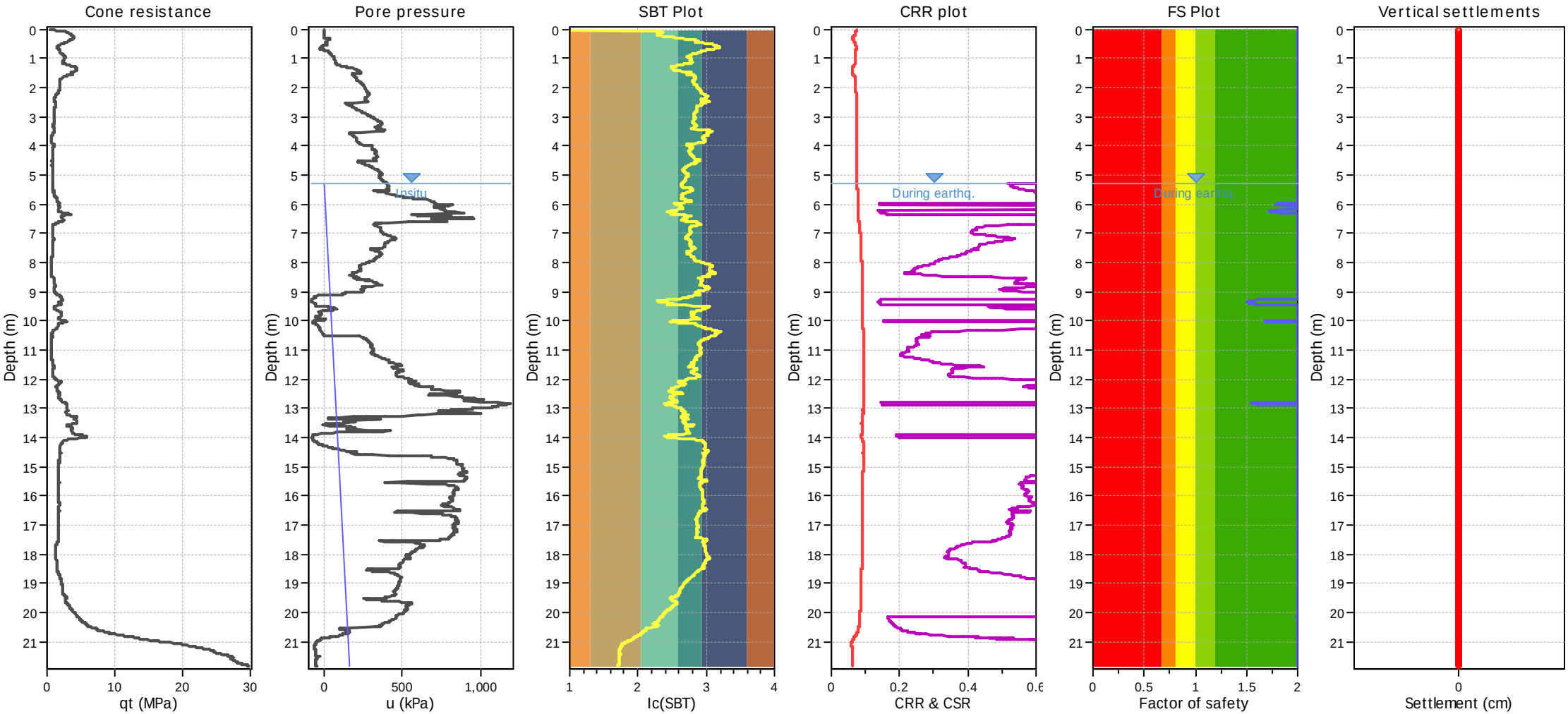
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-06
Total depth: 21.84 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.30 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.30 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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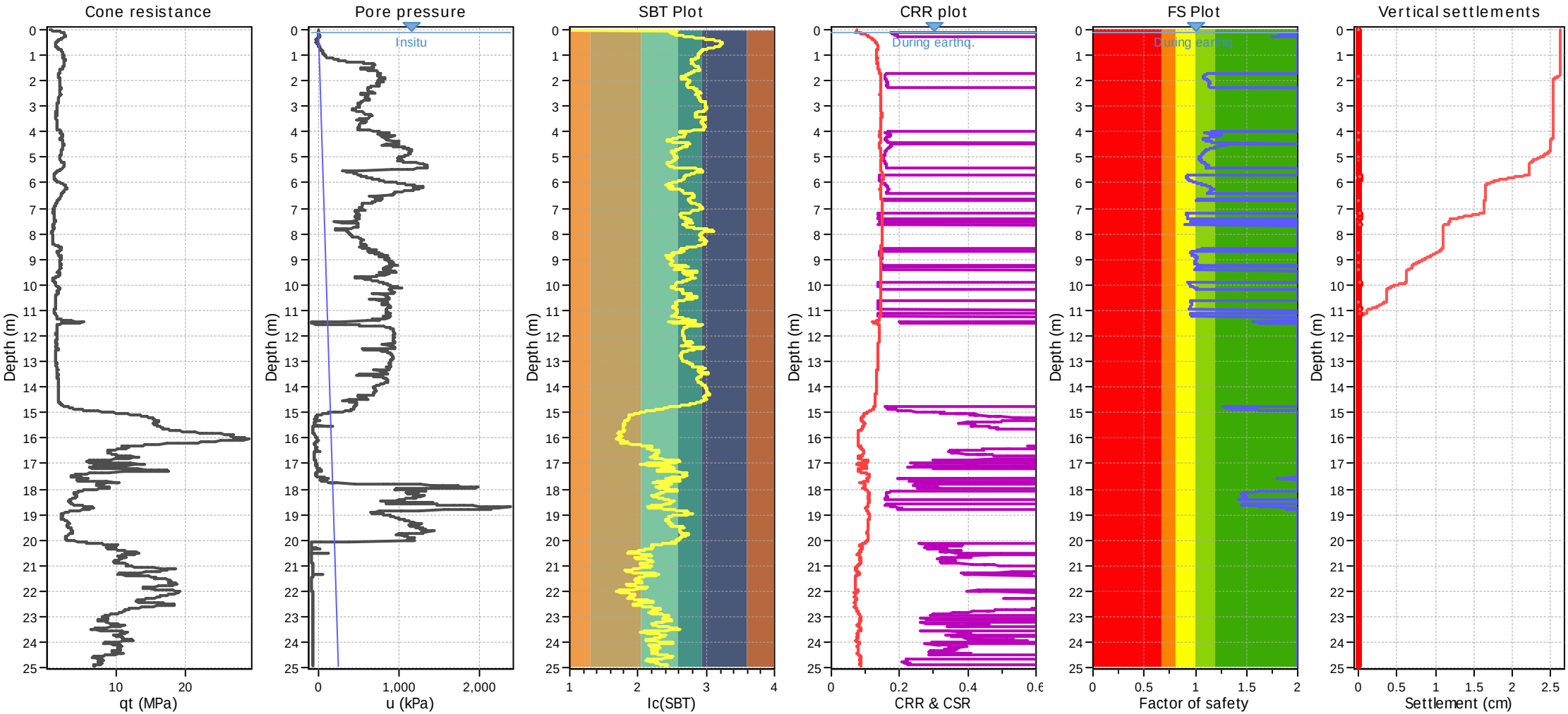
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-07
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.10 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.10 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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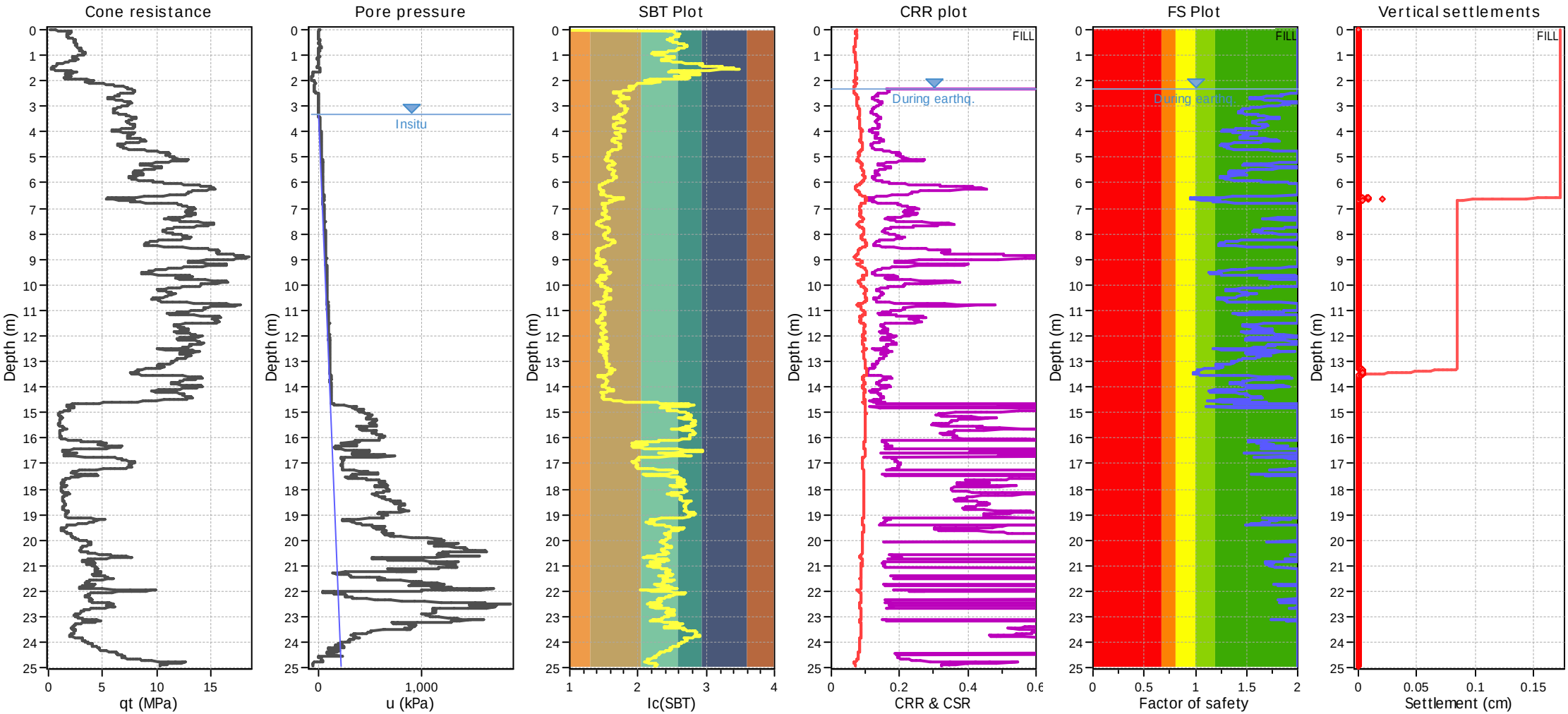
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-08
Total depth: 24.93 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.33 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.33 m	Fill height:	1.00 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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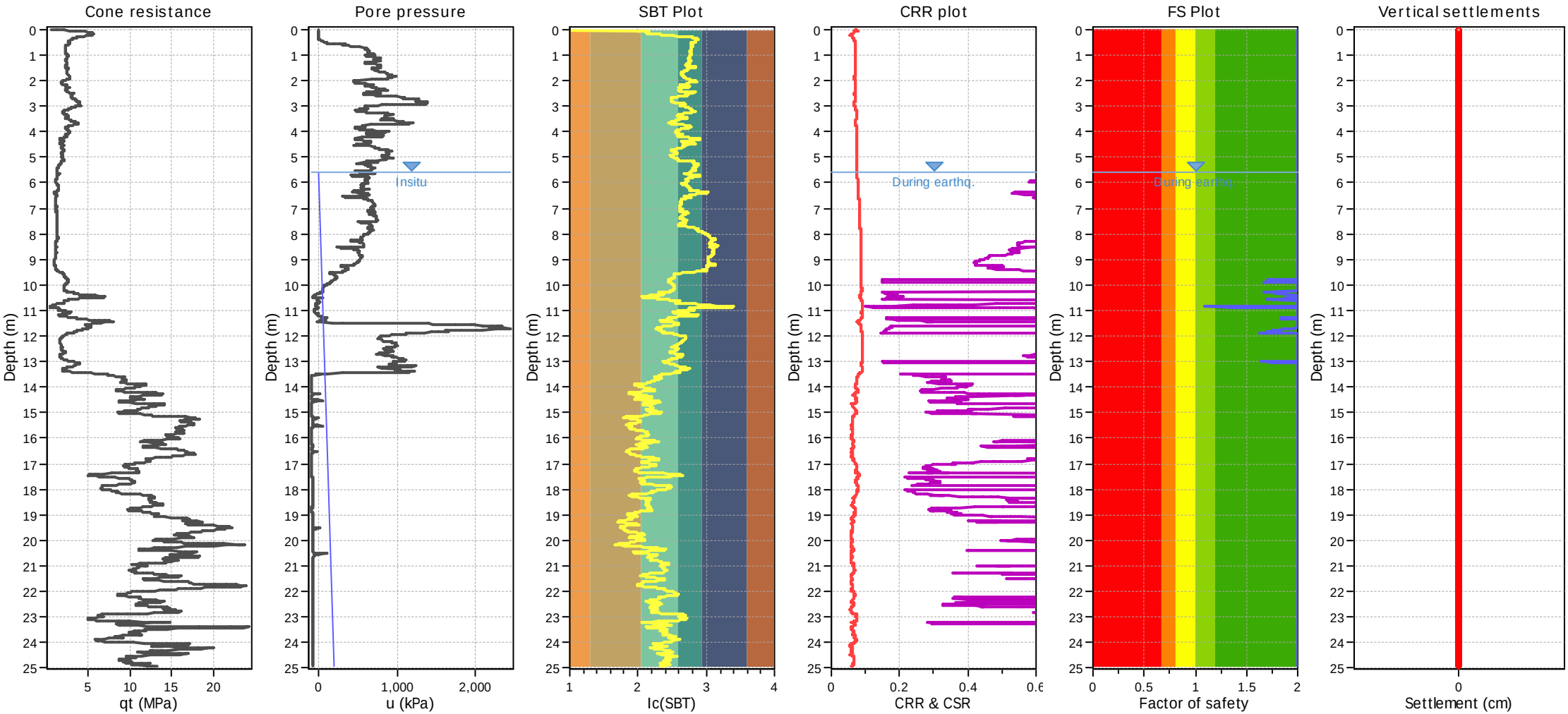
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT22-09
Total depth: 24.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.60 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.60 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:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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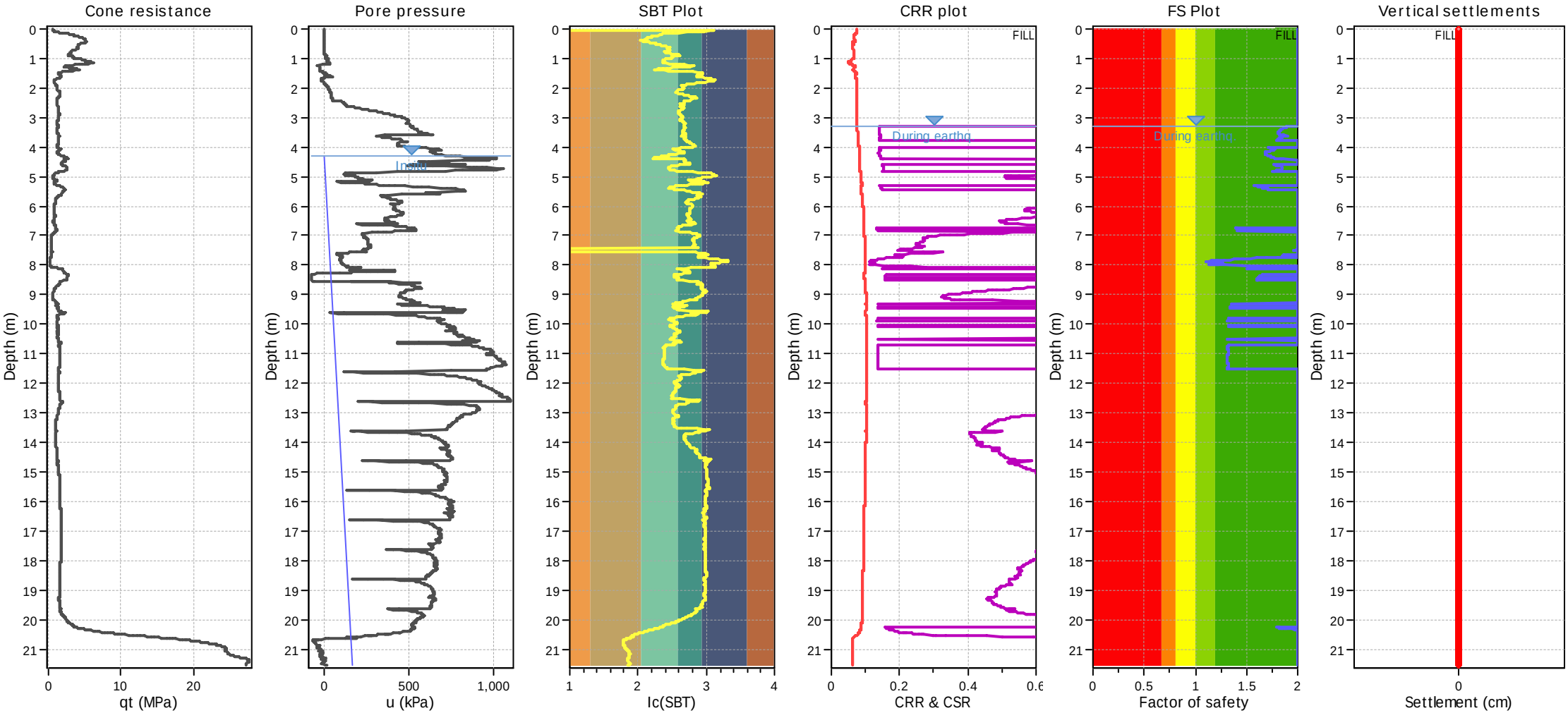
Project: Tramway Rezoning
Location: Ruakura

CPT: SCPT102
Total depth: 21.53 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	4.30 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	4.30 m	Fill height:	1.00 m		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth applied:	No
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

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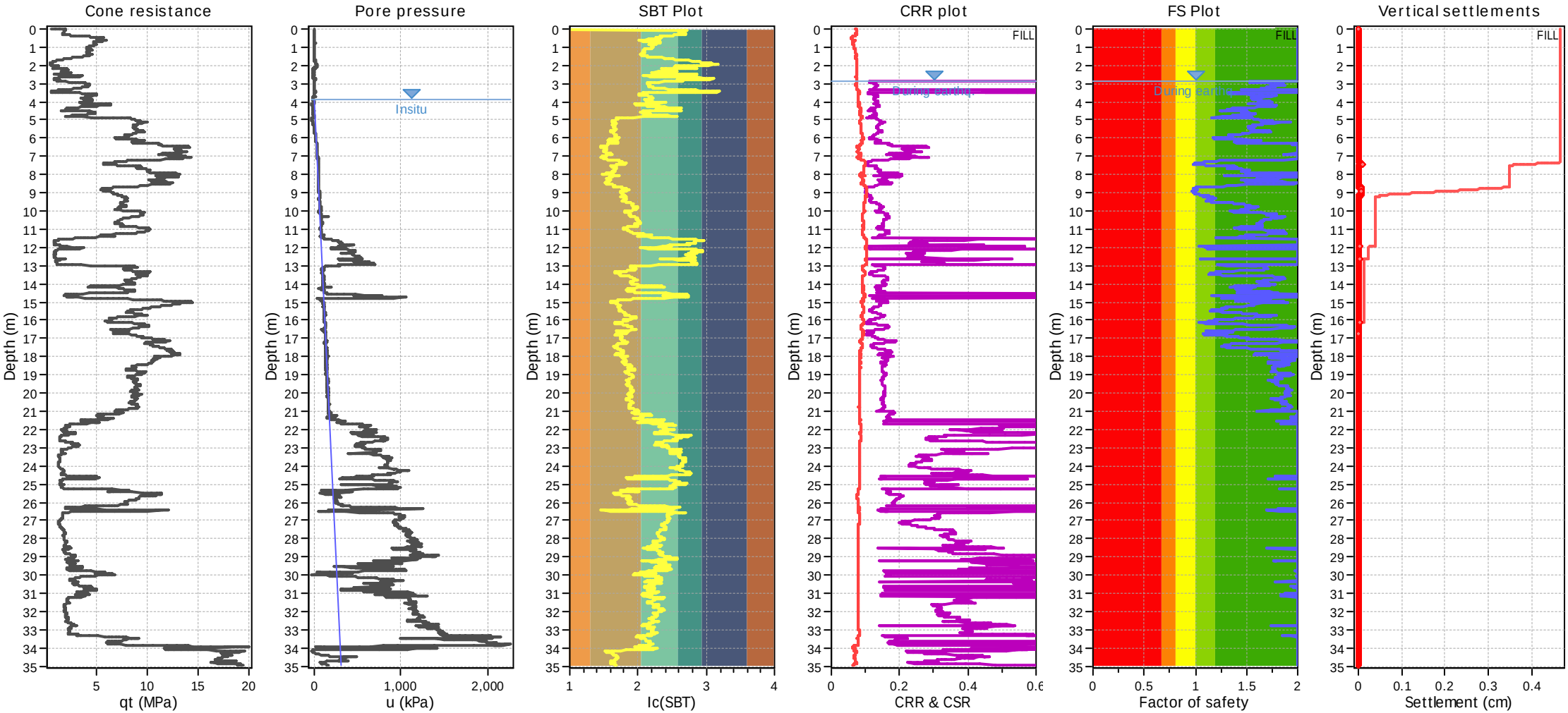
Project: Tramway Rezoning
Location: Ruakura

CPT: CPT103
Total depth: 34.94 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.90 m	Use fill:	Yes	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.90 m	Fill height:	1.00 m		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	16.00 kN/m³	Limit depth applied:	No
Earthquake magnitude M_w:	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.14	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

0.15g – Index ULS

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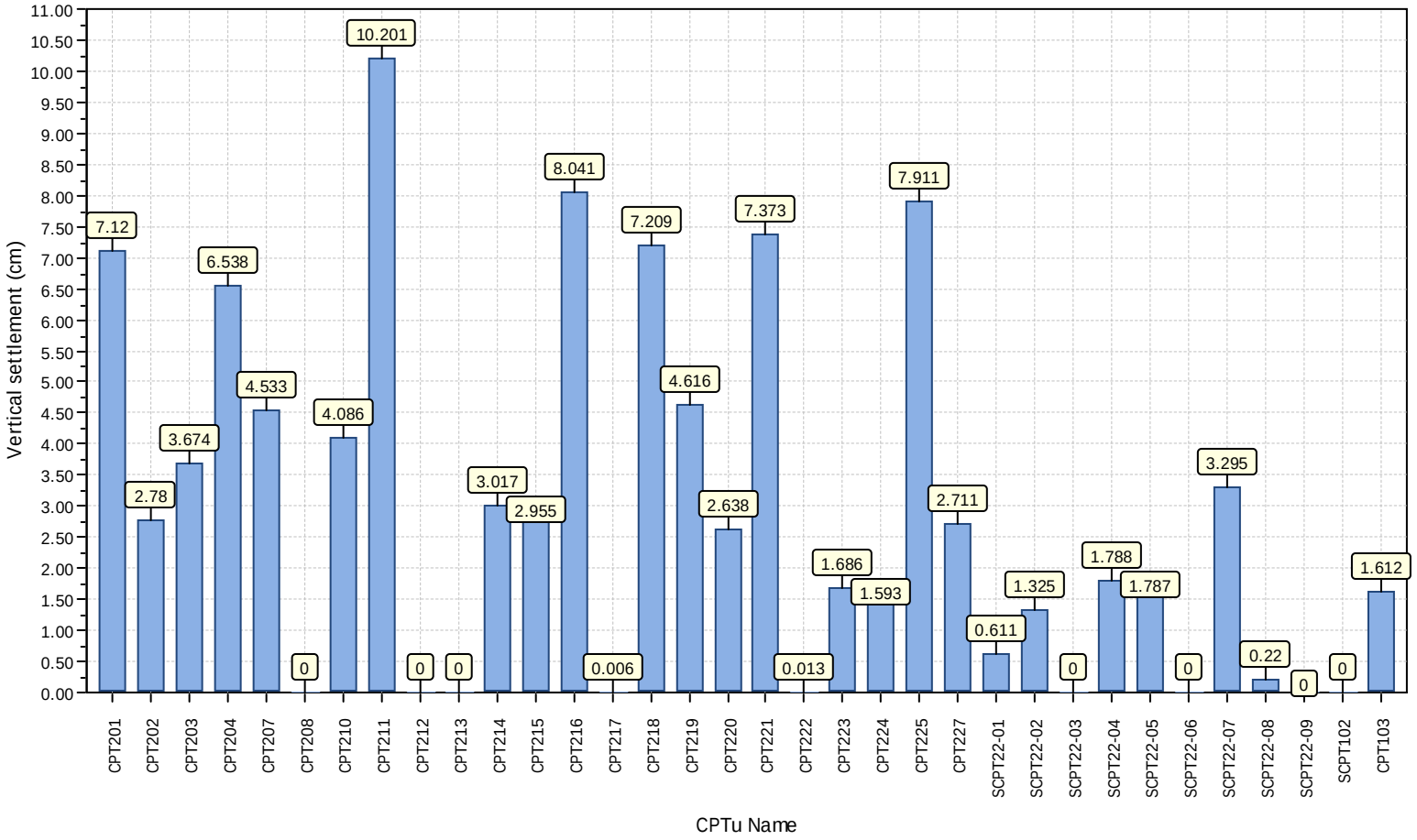
Project title : Tramway Rezoning

Location : Ruakura

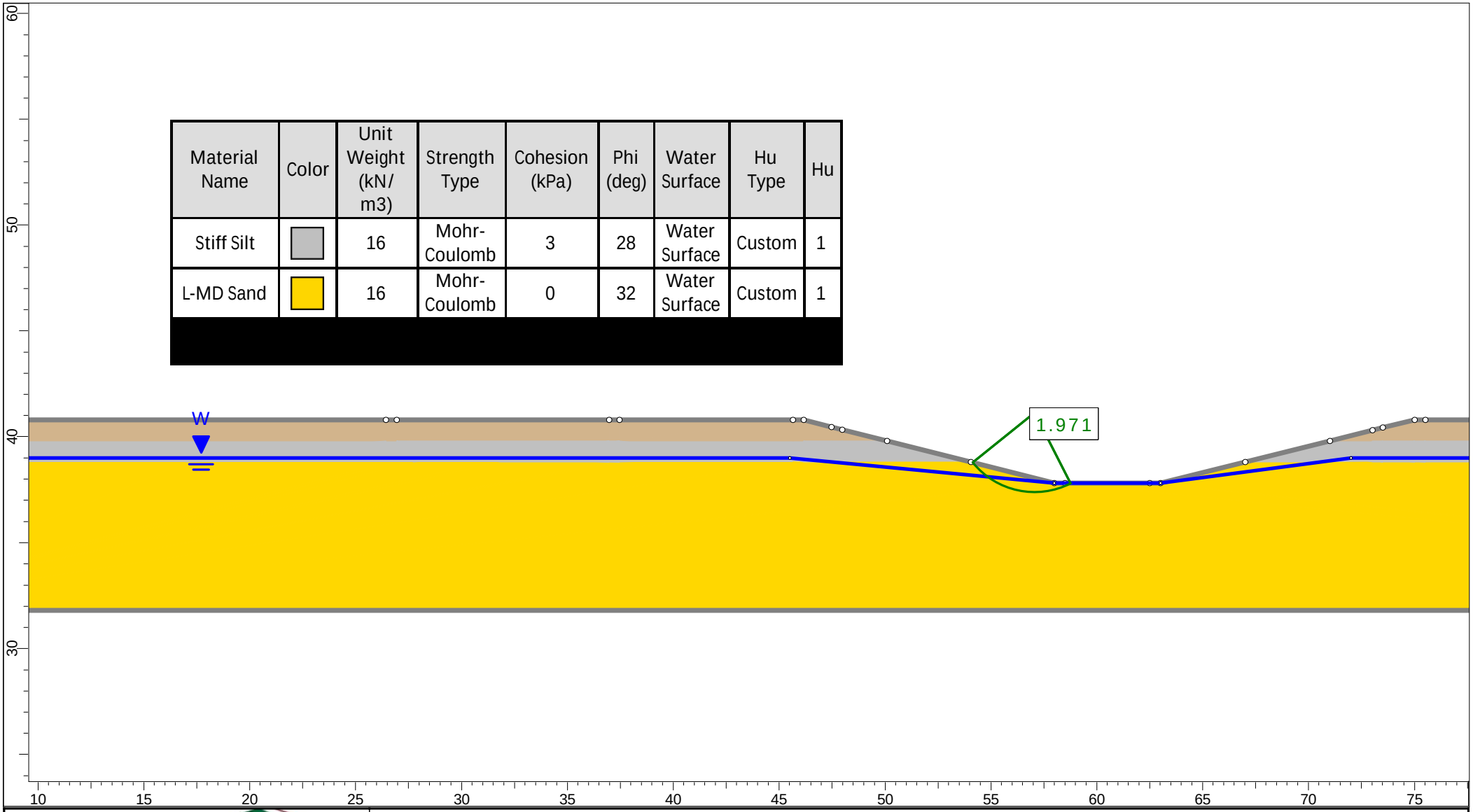
Overall vertical settlements report



Appendix D: Slope Stability Assessment

Sand Fill - Swale

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1



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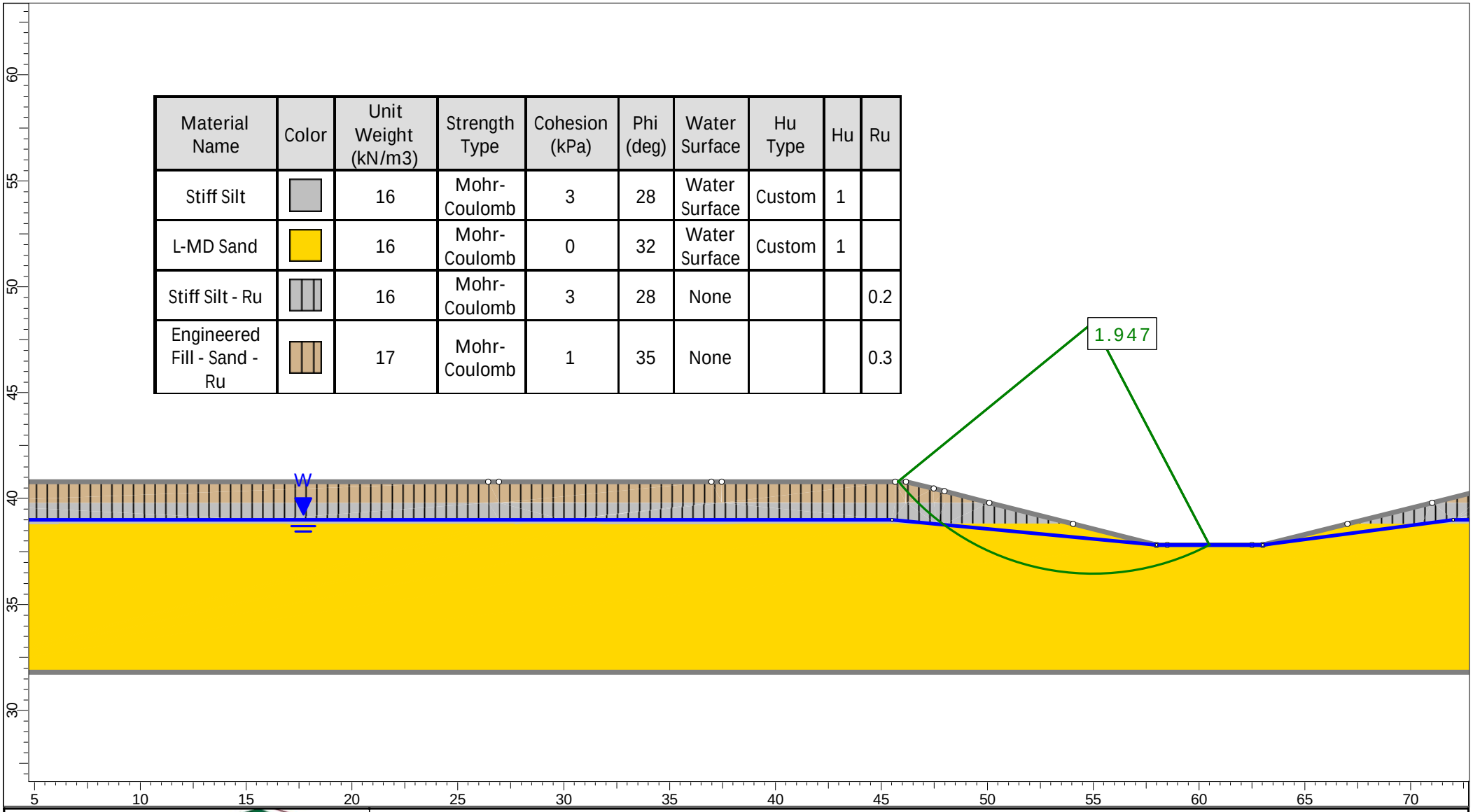
SLIDEINTERPRET 9.022

Project	Tramway Rezoning		
Analysis Description	Prevailing		
Drawn By	Date: 30/05/2022	Scale 1:250	Company
Figure No	Job No	File Name	3m Deep Swale.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1	
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1	
Stiff Silt - Ru		16	Mohr-Coulomb	3	28	None			0.2
Engineered Fill - Sand - Ru		17	Mohr-Coulomb	1	35	None			0.3



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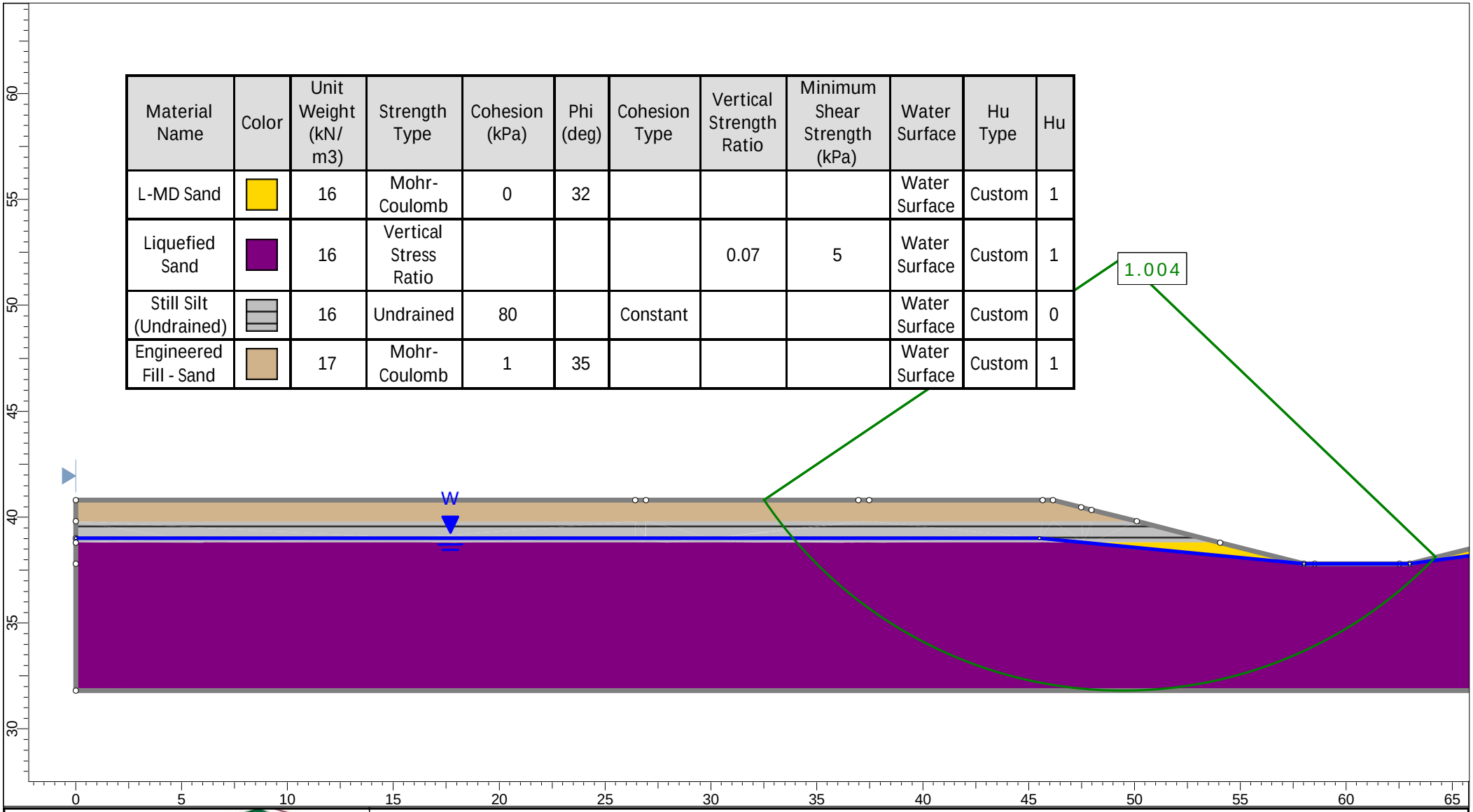
SLIDEINTERP 9.022

Project	Tramway Rezoning		
Analysis Description	Elevated		
Drawn By	Date: 30/05/2022	Scale 1:250	Company
Figure No	Job No	File Name	3m Deep Swale.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type	Hu
L-MD Sand		16	Mohr-Coulomb	0	32				Water Surface	Custom	1
Liquefied Sand		16	Vertical Stress Ratio				0.07	5	Water Surface	Custom	1
Still Silt (Undrained)		16	Undrained	80		Constant			Water Surface	Custom	0
Engineered Fill - Sand		17	Mohr-Coulomb	1	35				Water Surface	Custom	1



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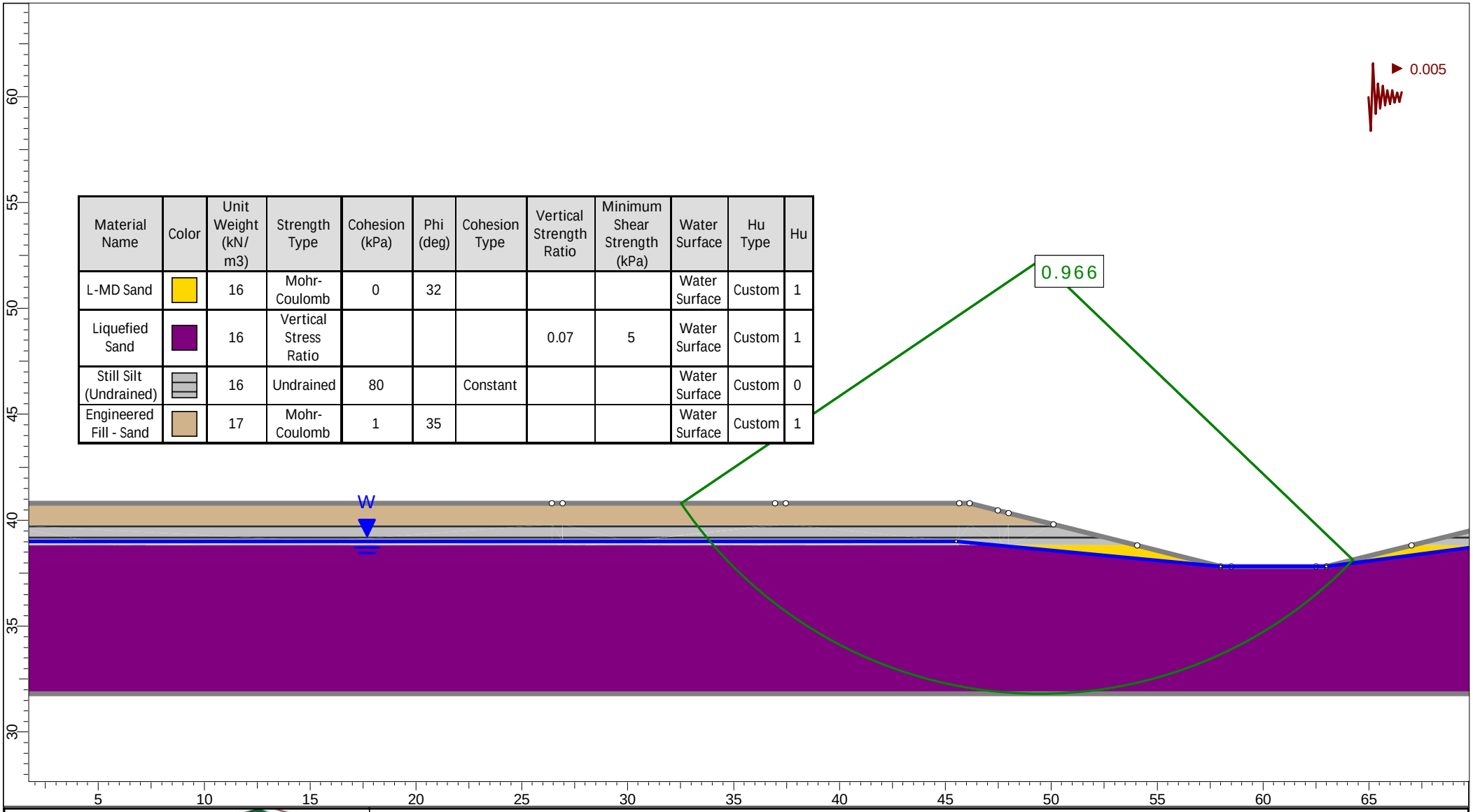
Project	Tramway Rezoning			
Analysis Description	Seismic (0g)			
Drawn By	Date: 30/05/2022	Scale 1:250	Company	
Figure No	Job No	File Name	3m Deep Swale.slmd	



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type	Hu
L-MD Sand		16	Mohr-Coulomb	0	32				Water Surface	Custom	1
Liquefied Sand		16	Vertical Stress Ratio				0.07	5	Water Surface	Custom	1
Still Silt (Undrained)		16	Undrained	80		Constant			Water Surface	Custom	0
Engineered Fill - Sand		17	Mohr-Coulomb	1	35				Water Surface	Custom	1

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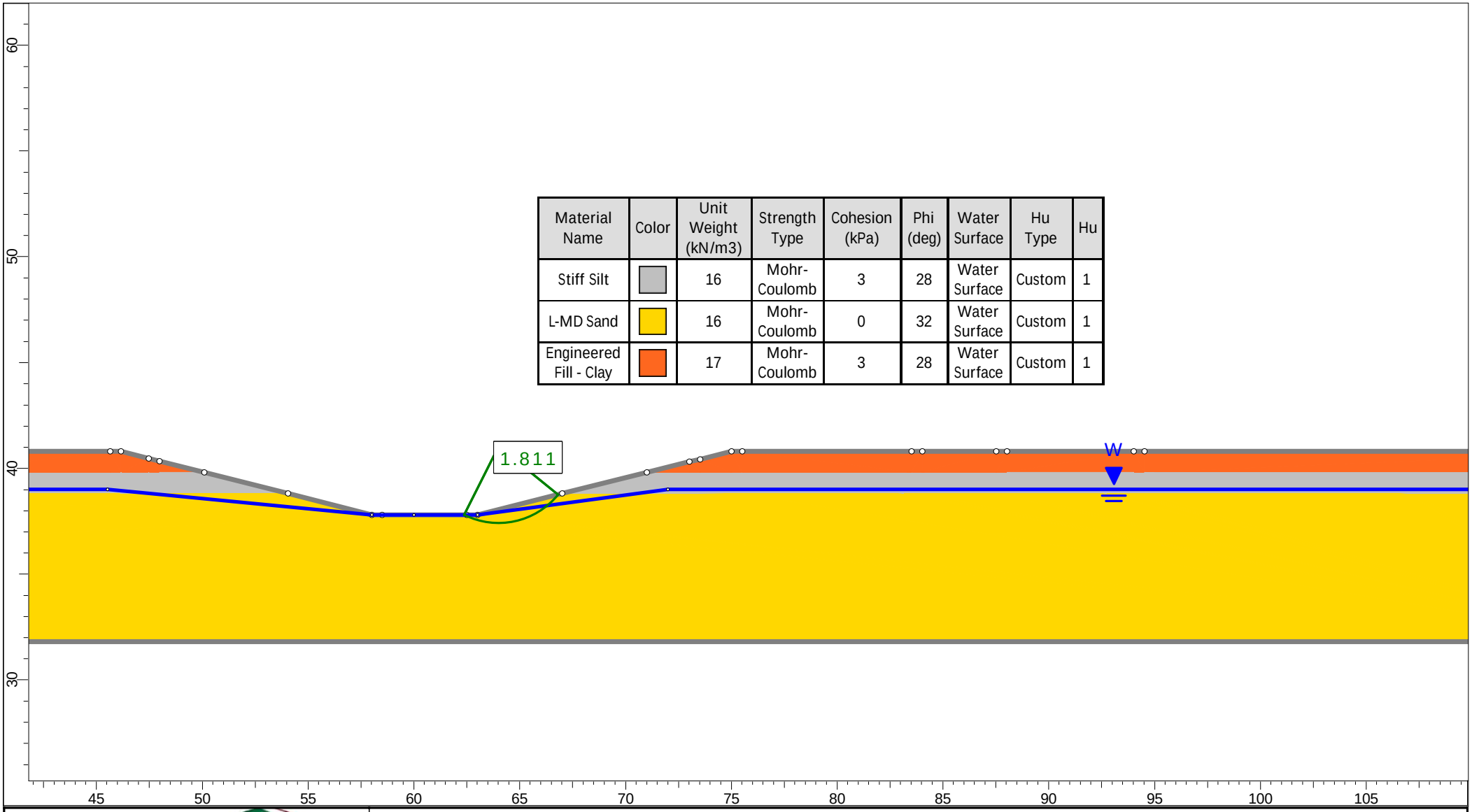
SLIDEINTERP 9.022

Project	Tramway Rezoning		
Analysis Description	Seismic (0.01g)		
Drawn By	*Date:* 30/05/2022	*Scale* 1:250	*Company*
Figure No	*Job No*	*File Name*	3m Deep Swale.slmd

Clay Fill – Swale

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1
Engineered Fill - Clay		17	Mohr-Coulomb	3	28	Water Surface	Custom	1



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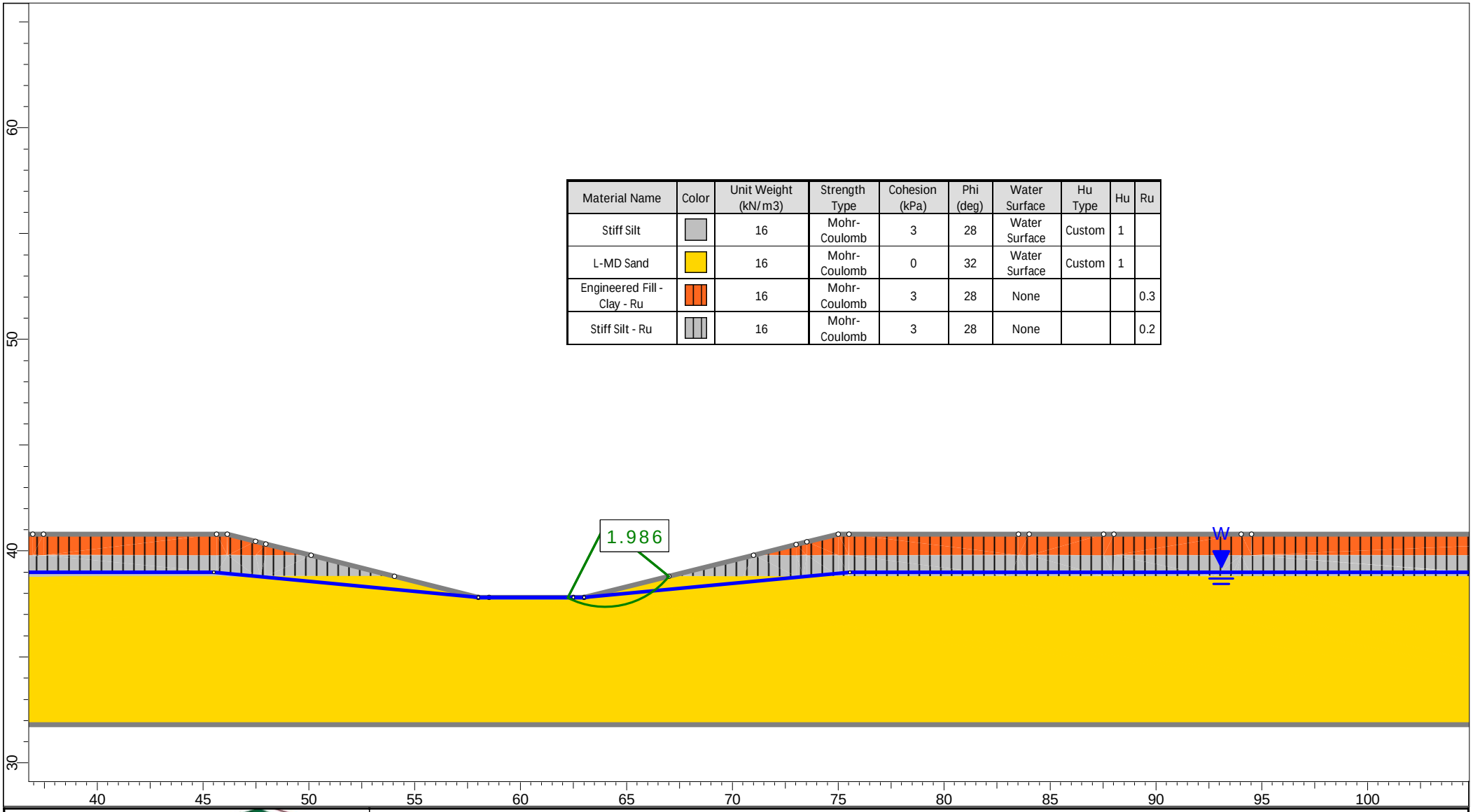
SLIDEINTERPRET 9.022

Project: Tramway Rezoning			
Analysis Description: Prevailing			
Drawn By	Date: 30/05/2022	Scale 1:250	Company
Figure No	Job No	File Name 3m Deep Swale.slmd	

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1	
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1	
Engineered Fill - Clay - Ru		16	Mohr-Coulomb	3	28	None			0.3
Stiff Silt - Ru		16	Mohr-Coulomb	3	28	None			0.2



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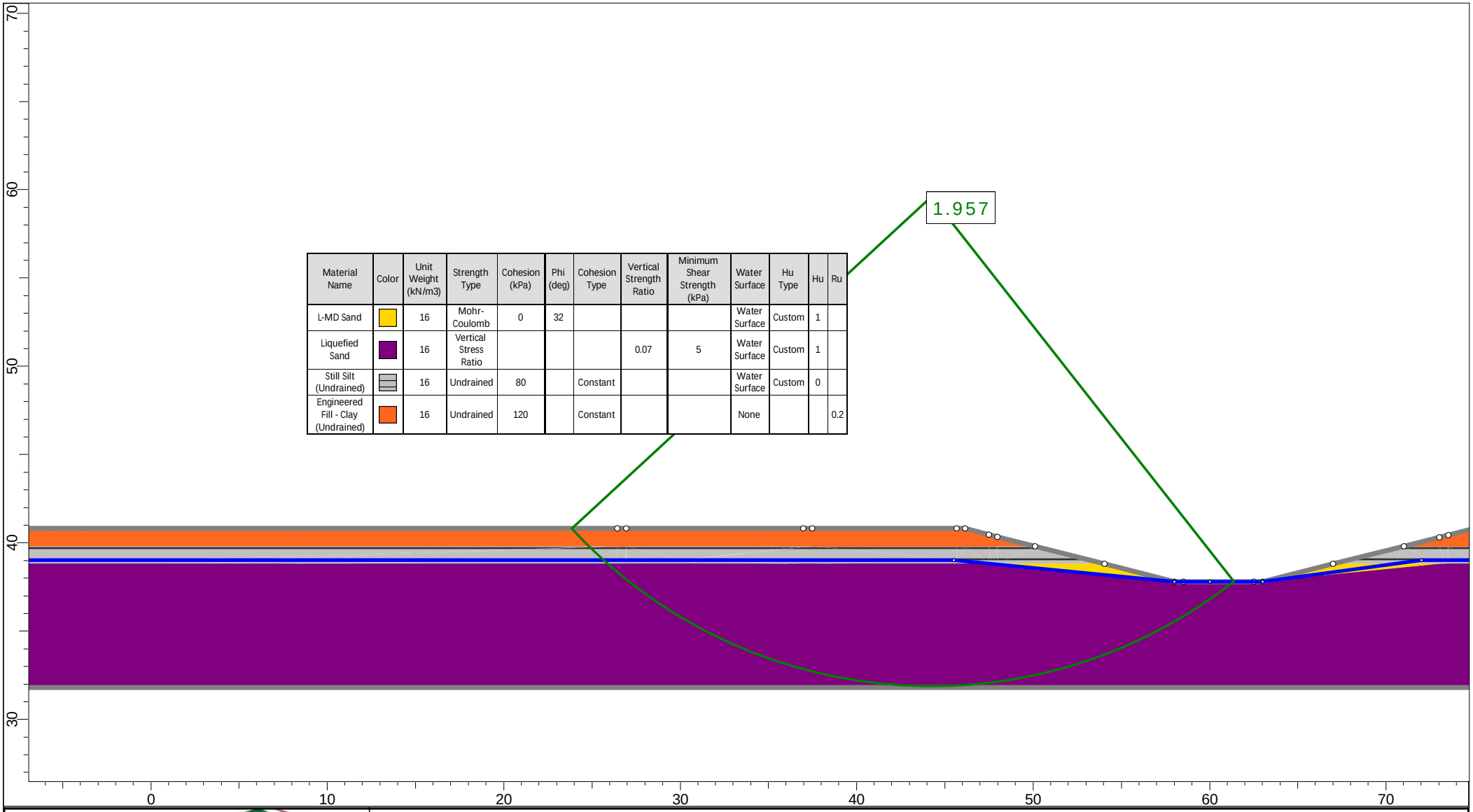
SLIDEINTERPRET 9.022

Project	Tramway Rezoning		
Analysis Description	Elevated		
Drawn By	Date: 30/05/2022	Scale 1:250	Company
Figure No	Job No	File Name	3m Deep Swale.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type	Hu	Ru
L-MD Sand		16	Mohr-Coulomb	0	32				Water Surface	Custom	1	
Liquefied Sand		16	Vertical Stress Ratio				0.07	5	Water Surface	Custom	1	
Still Silt (Undrained)		16	Undrained	80		Constant			Water Surface	Custom	0	
Engineered Fill - Clay (Undrained)		16	Undrained	120		Constant			None			0.2

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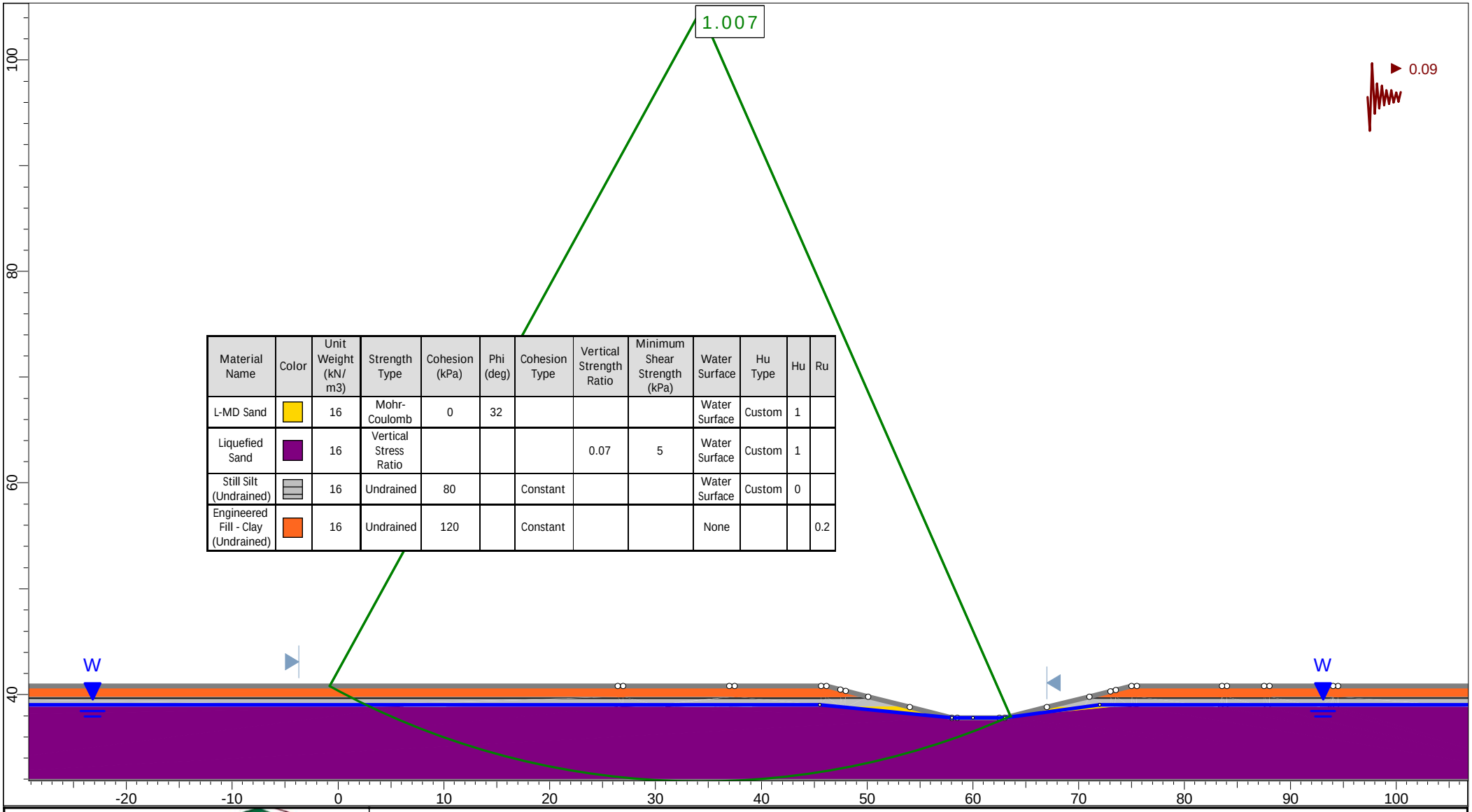
SLIDEINTERPRET 9.022

Project	Tramway Rezoning		
Analysis Description	0.0 - Flow Failure Check		
Drawn By	*Date:* 30/05/2022	*Scale* 1:300	*Company*
Figure No	*Job No*	*File Name*	3m Deep Swale.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type	Hu	Ru
L-MD Sand		16	Mohr-Coulomb	0	32				Water Surface	Custom	1	
Liquefied Sand		16	Vertical Stress Ratio				0.07	5	Water Surface	Custom	1	
Still Silt (Undrained)		16	Undrained	80		Constant			Water Surface	Custom	0	
Engineered Fill - Clay (Undrained)		16	Undrained	120		Constant			None			0.2

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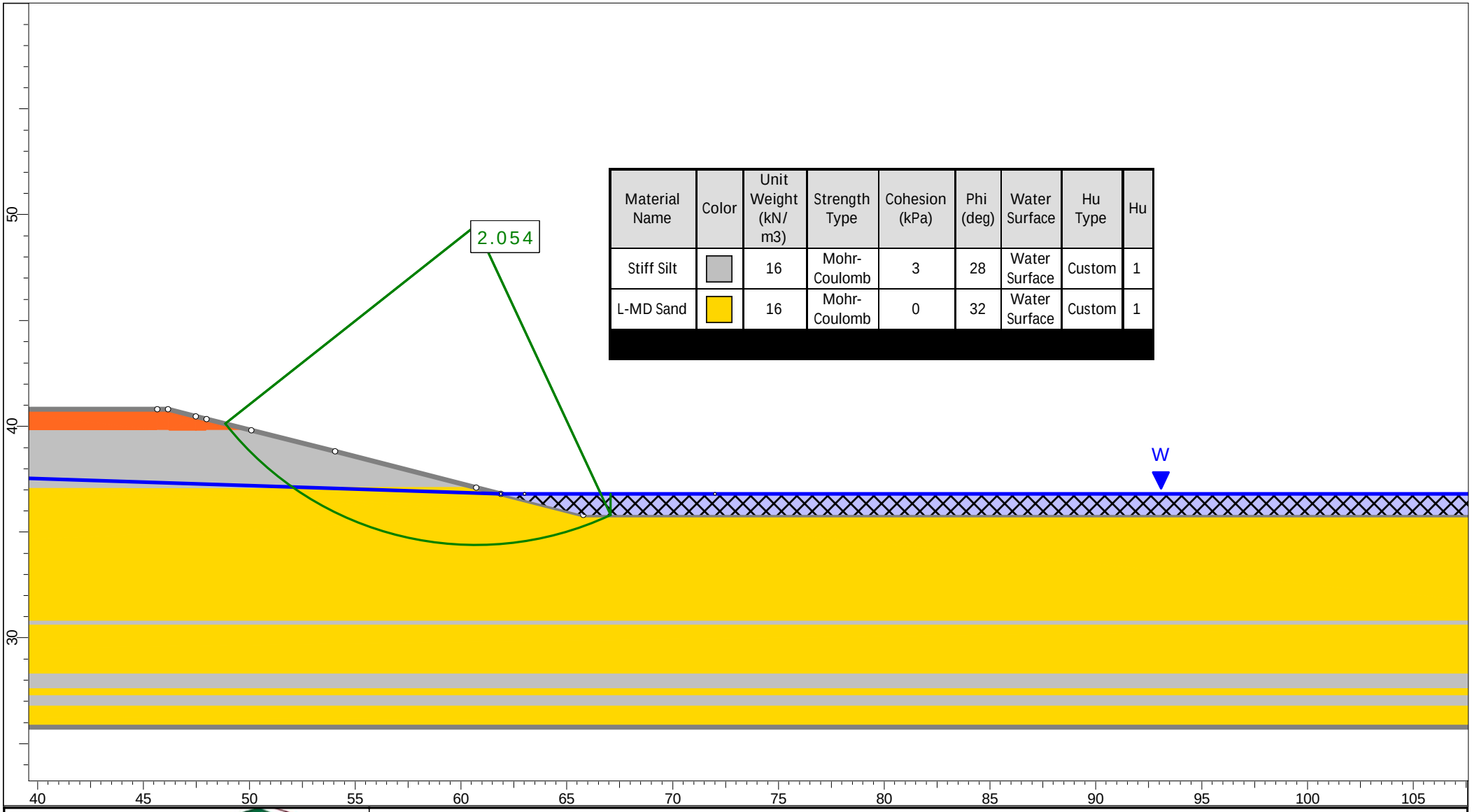
SLIDEINTERP 9.022

Project	Tramway Rezoning		
Analysis Description	50m		
Drawn By	*Date:* 30/05/2022	*Scale* 1:500	*Company*
Figure No	*Job No*	*File Name*	3m Deep Swale.slmd

Pond



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1

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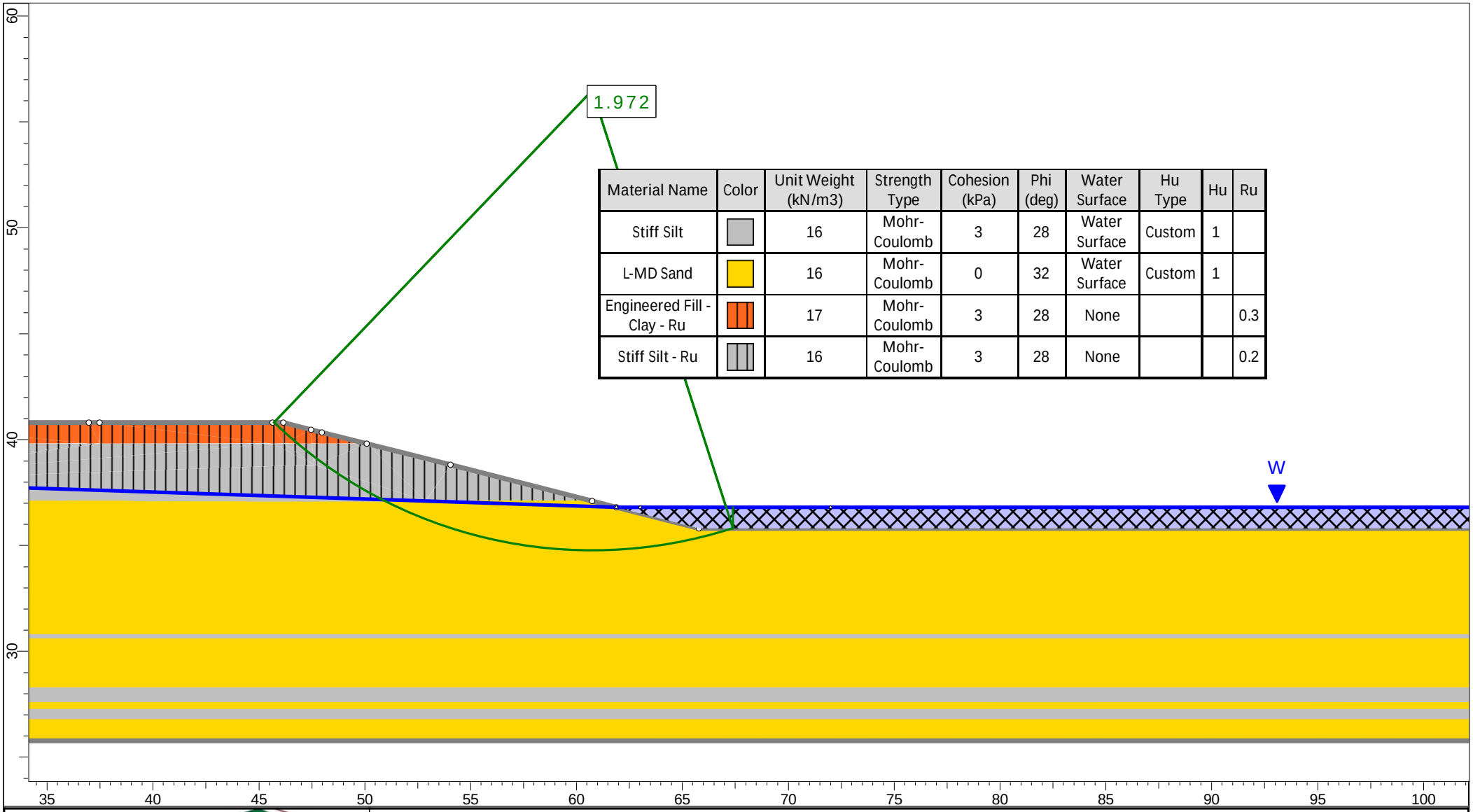
SLIDEINTERPRET 9.022

Project	Tramway Rezoning		
Analysis Description	Prevailing		
Drawn By	*Date:* 30/05/2022	*Scale* 1:250	*Company*
Figure No	*Job No*	*File Name*	5m Deep Pond.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Stiff Silt		16	Mohr-Coulomb	3	28	Water Surface	Custom	1	
L-MD Sand		16	Mohr-Coulomb	0	32	Water Surface	Custom	1	
Engineered Fill - Clay - Ru		17	Mohr-Coulomb	3	28	None			0.3
Stiff Silt - Ru		16	Mohr-Coulomb	3	28	None			0.2

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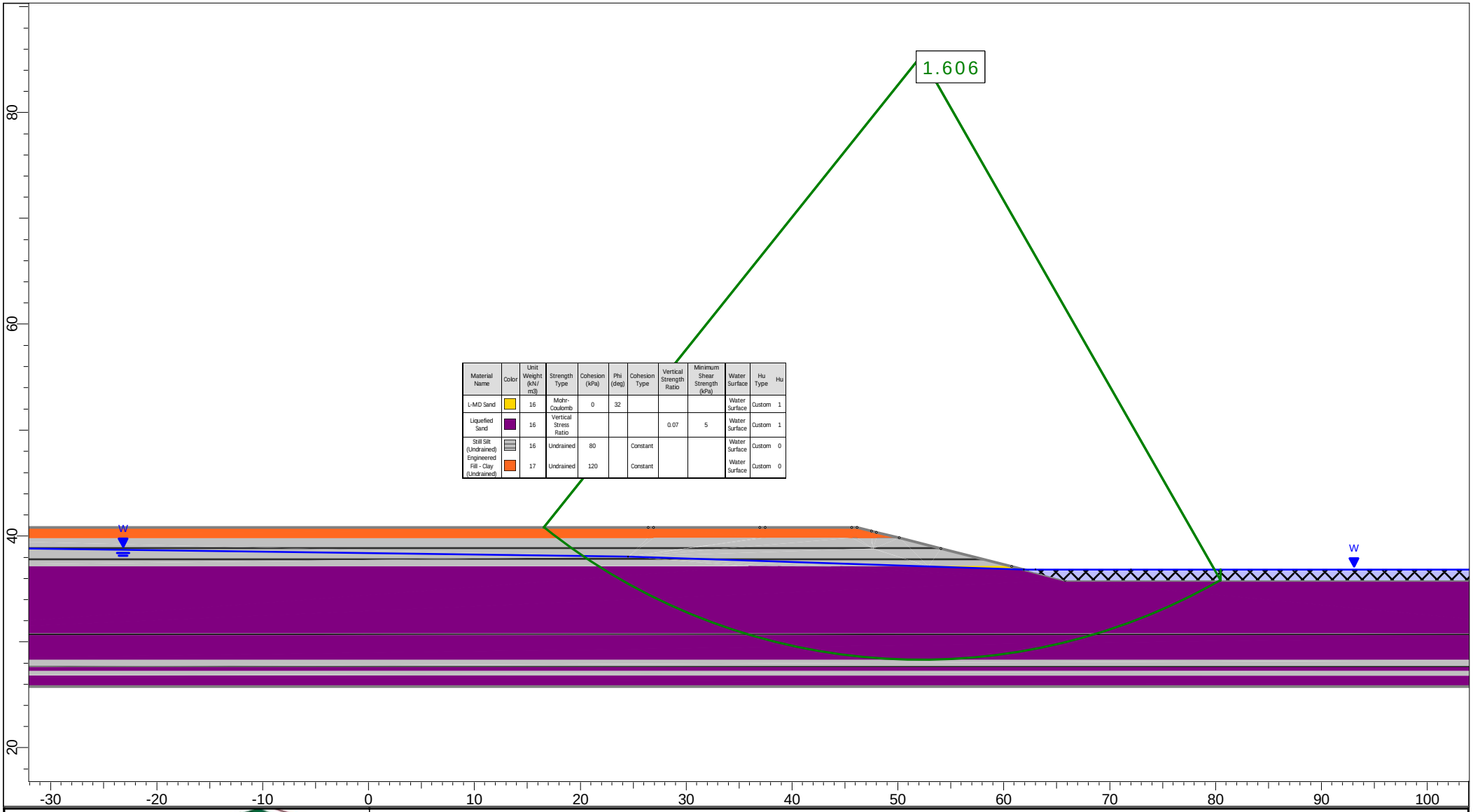
SLIDEINTERPRET 9.022

Project	Tramway Rezoning			
Analysis Description	Elevated			
Drawn By	*Date:* 30/05/2022	*Scale* 1:250	*Company*	
Figure No	*Job No*		*File Name*	5m Deep Pond.slmd



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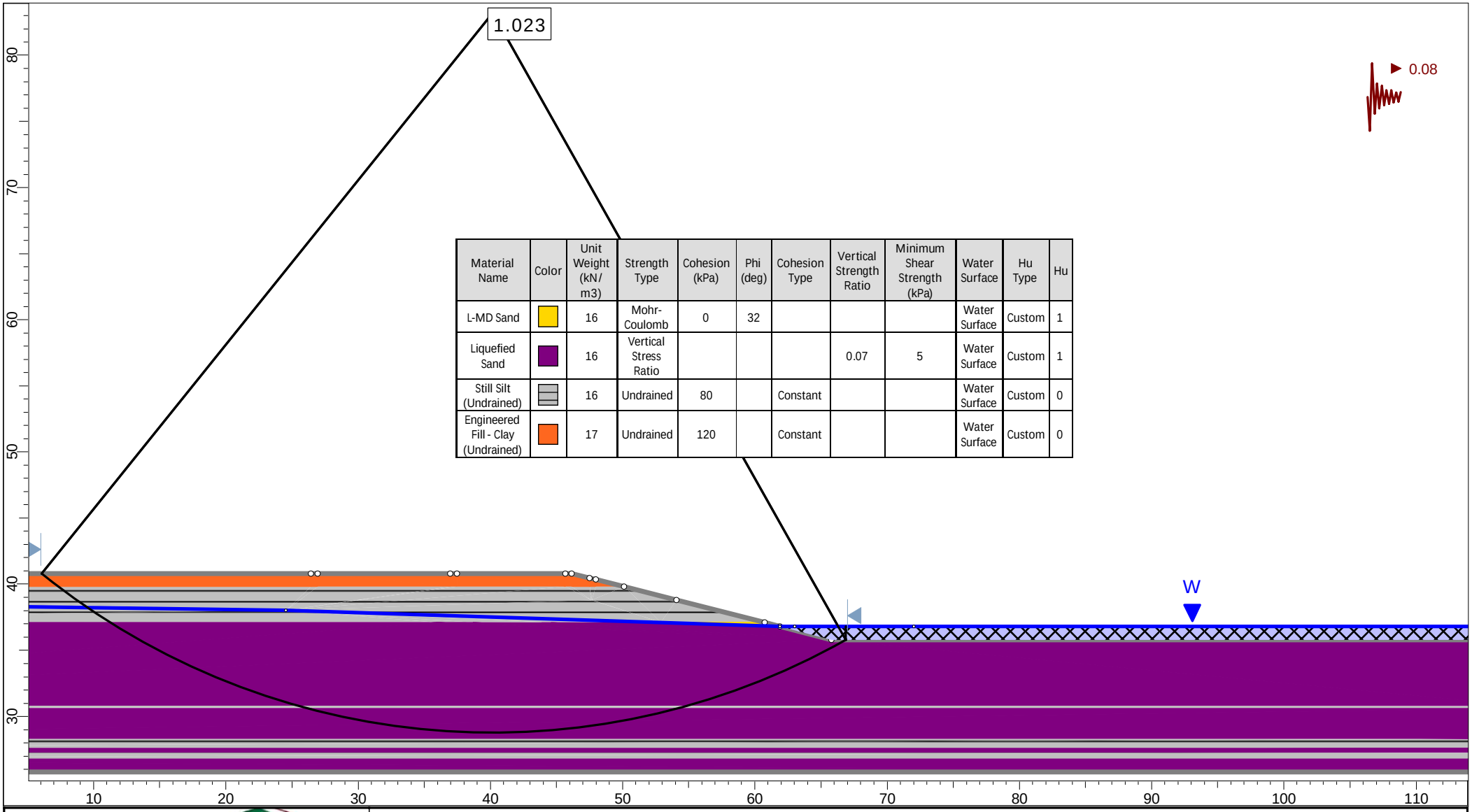
SLIDEINTERPRET 9.022

Project	Tramway Rezoning		
Analysis Description	0.0 - Flow Failure Check		
Drawn By	*Date:* 30/05/2022	*Scale* 1:500	*Company*
Figure No	*Job No*	*File Name*	5m Deep Pond.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type	Hu
L-MD Sand		16	Mohr-Coulomb	0	32				Water Surface	Custom	1
Liquefied Sand		16	Vertical Stress Ratio				0.07	5	Water Surface	Custom	1
Still Silt (Undrained)		16	Undrained	80		Constant			Water Surface	Custom	0
Engineered Fill - Clay (Undrained)		17	Undrained	120		Constant			Water Surface	Custom	0

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SLIDEINTERP 9.022

Project	Tramway Rezoning		
Analysis Description	40m		
Drawn By	*Date:* 30/05/2022	*Scale* 1:400	*Company*
Figure No	*Job No*	*File Name*	5m Deep Pond.slmd

Appendix E: Settlement Assessment

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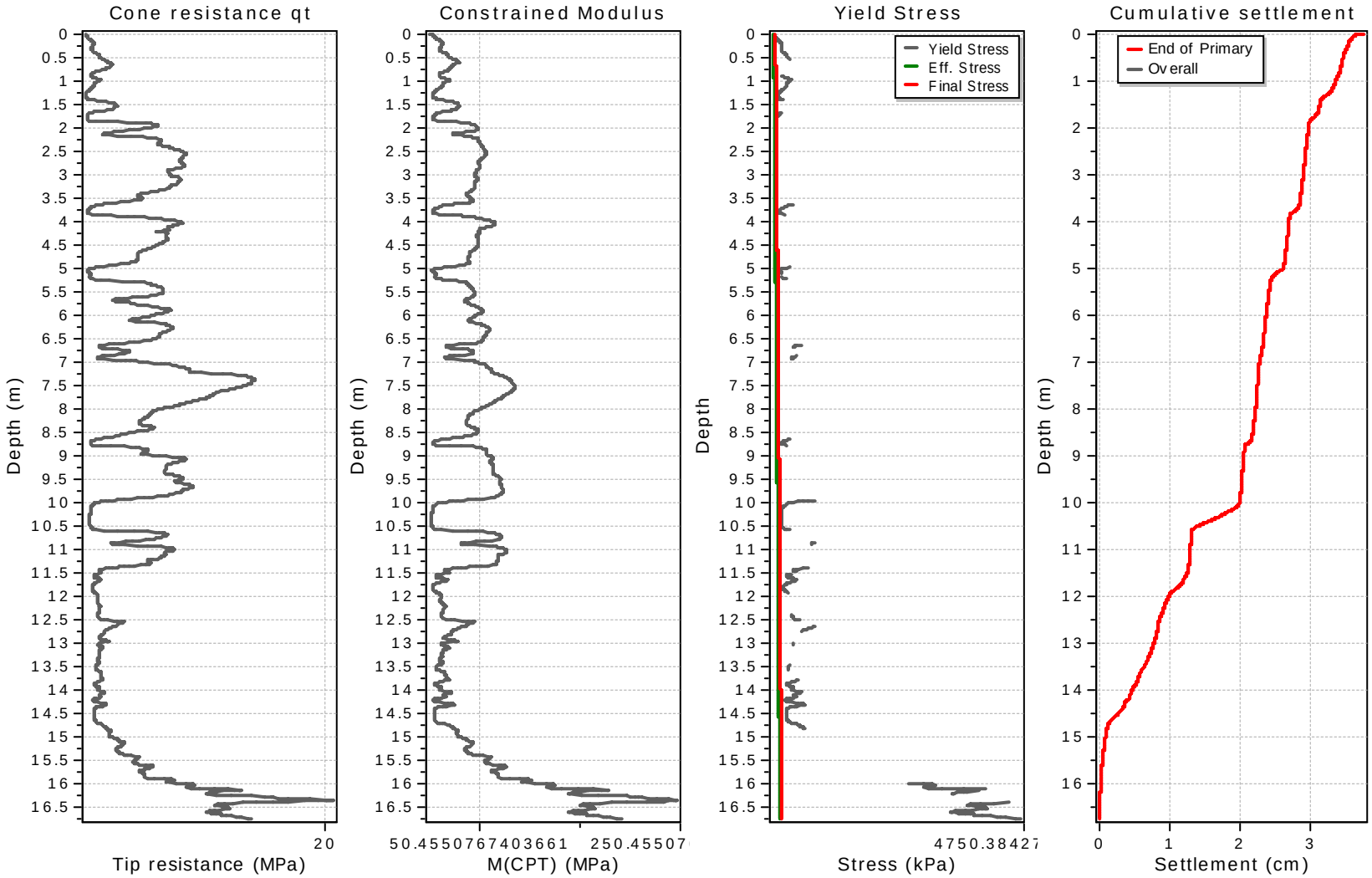
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT221
Total depth: 16.76 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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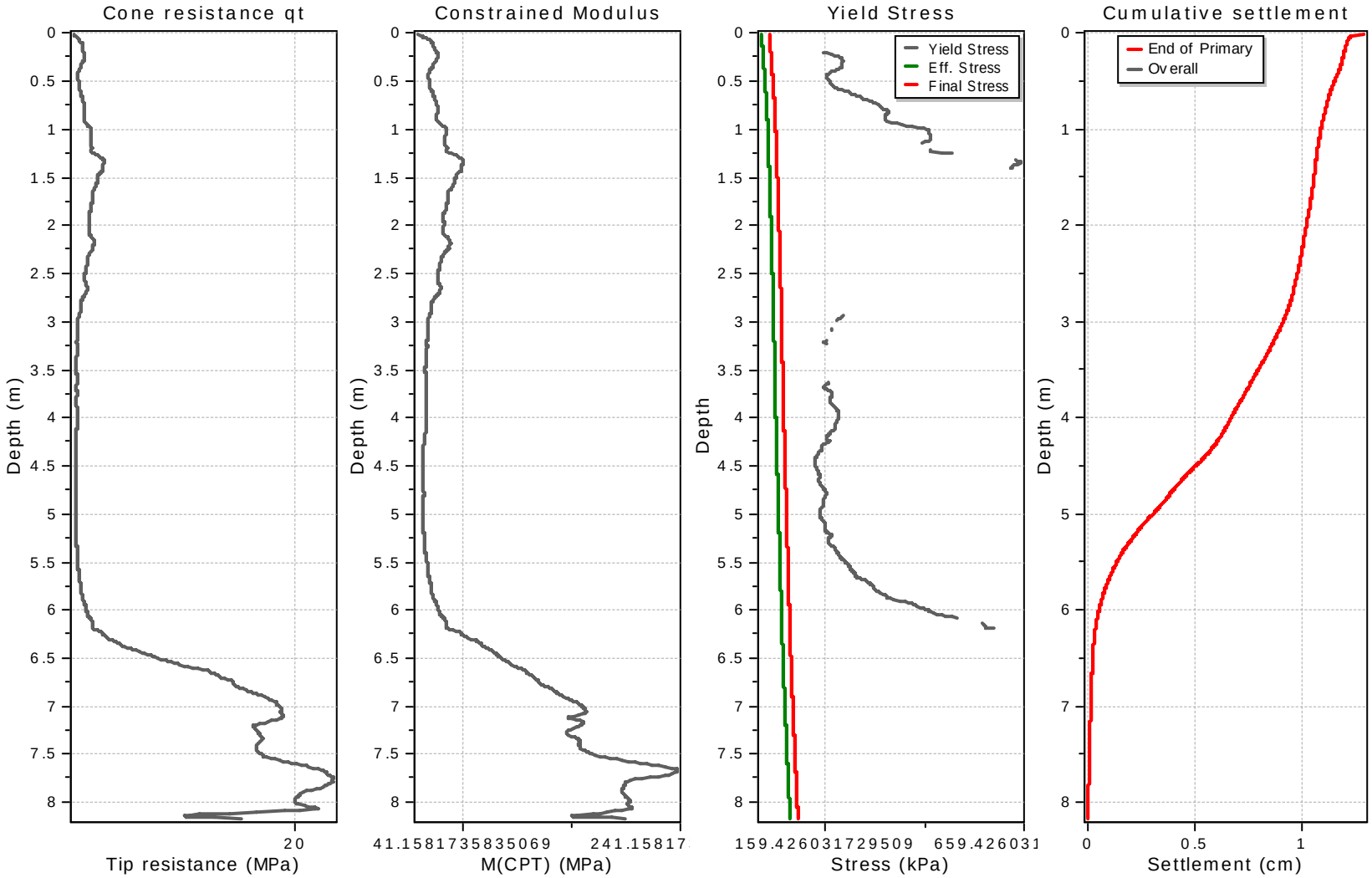
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT222
Total depth: 8.17 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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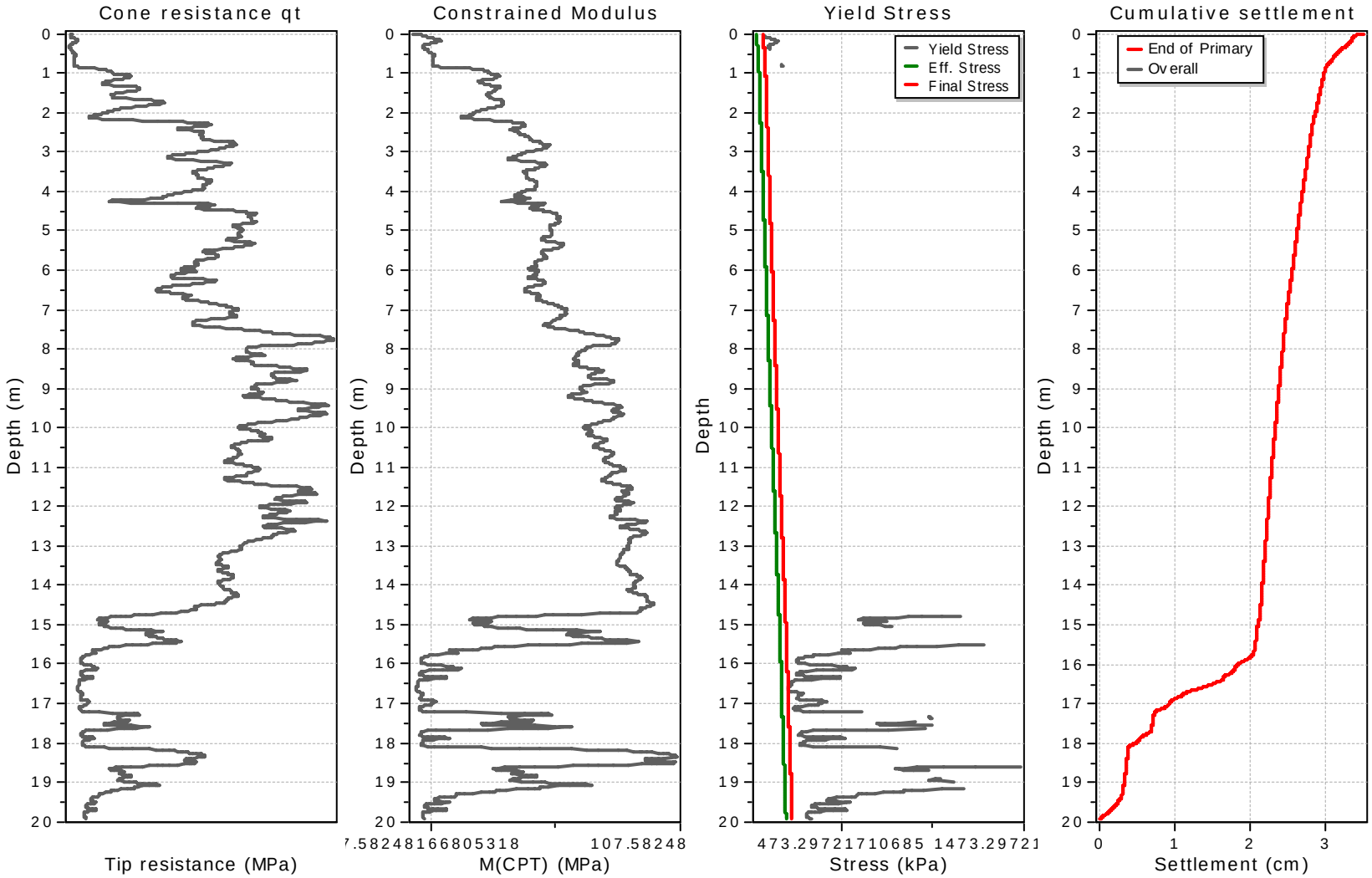
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT223
Total depth: 19.93 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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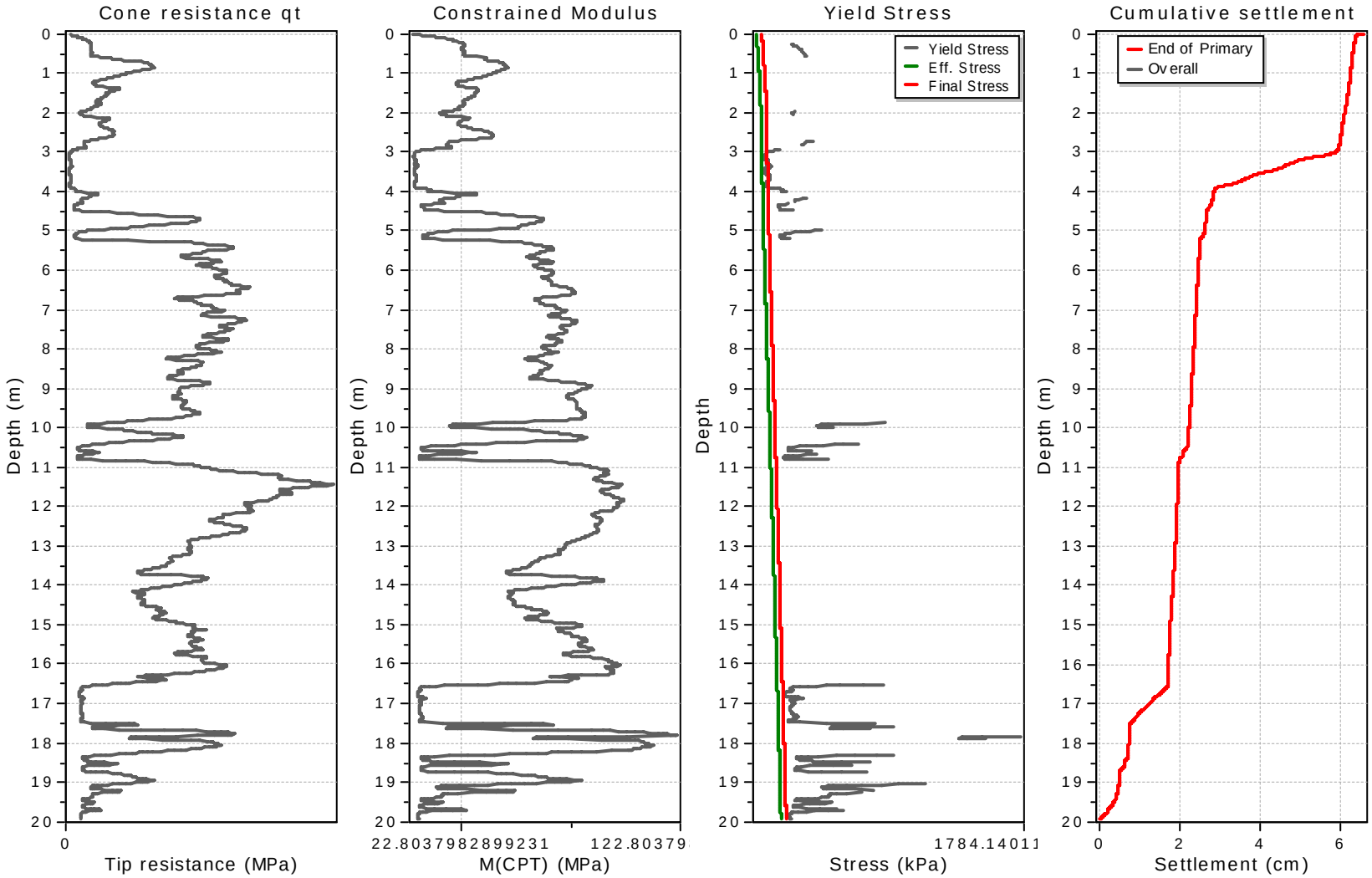
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT224
Total depth: 19.93 m, Date: 24/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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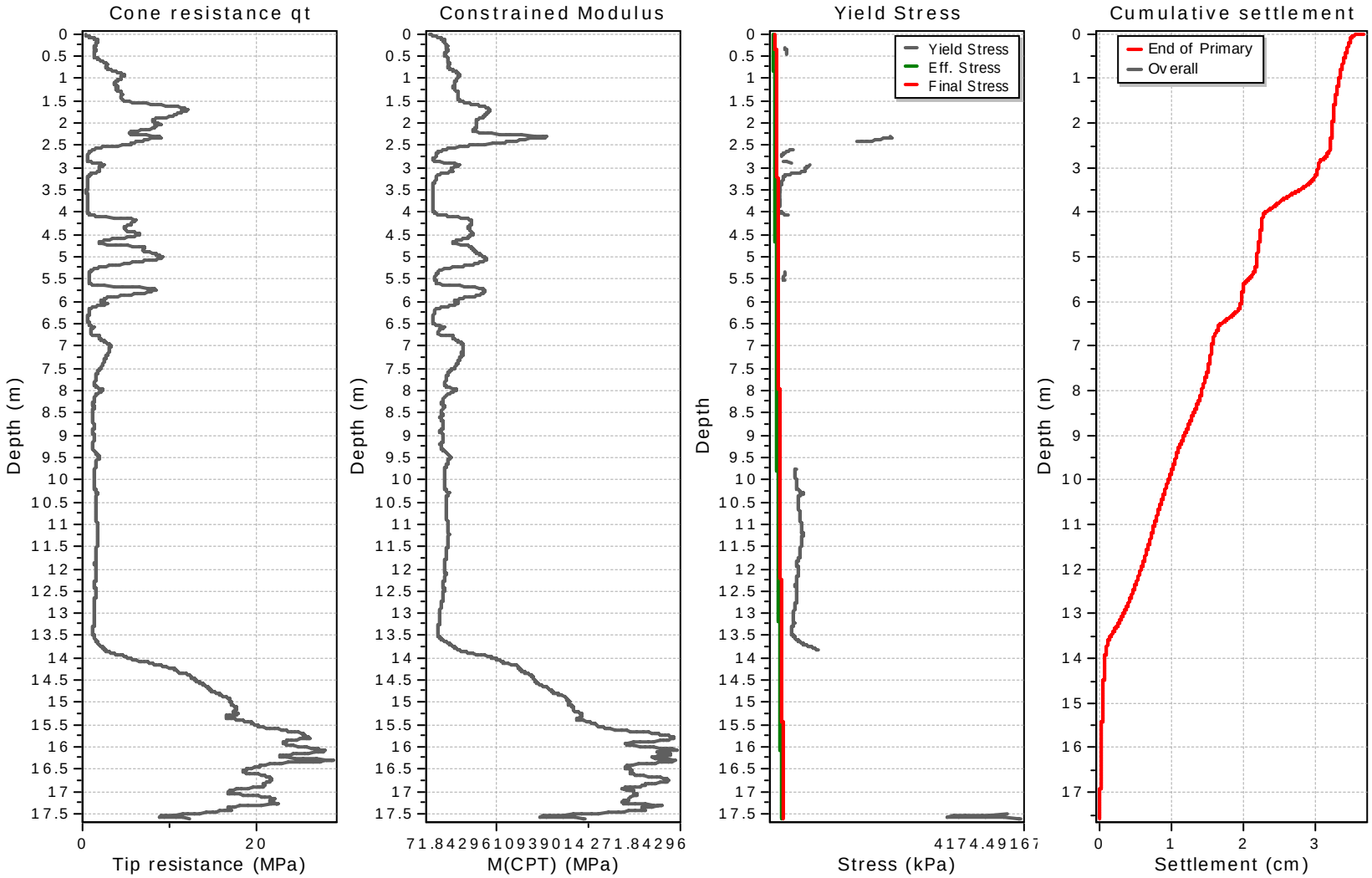
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT225
Total depth: 17.61 m, Date: 24/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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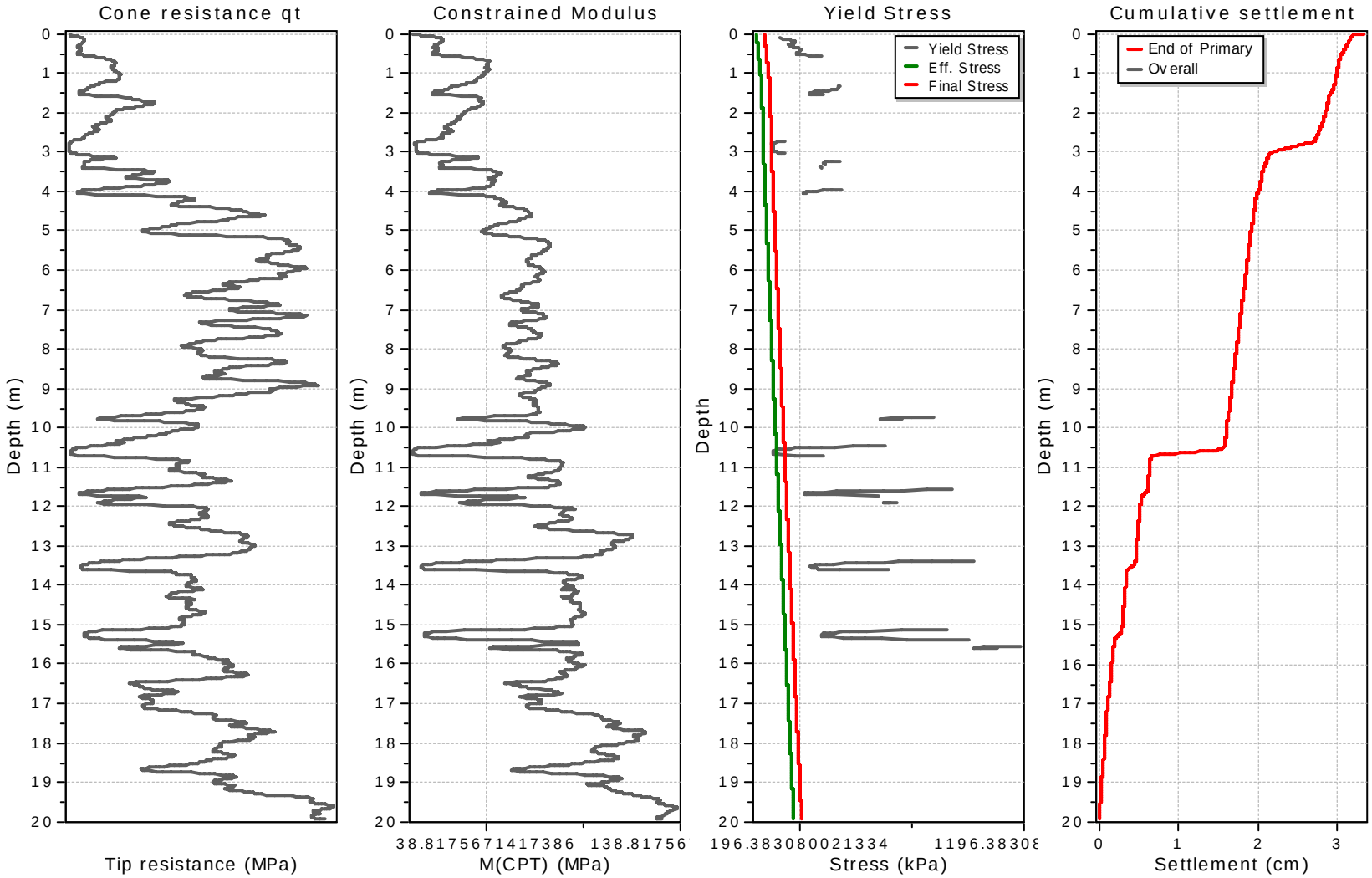
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT227
Total depth: 19.93 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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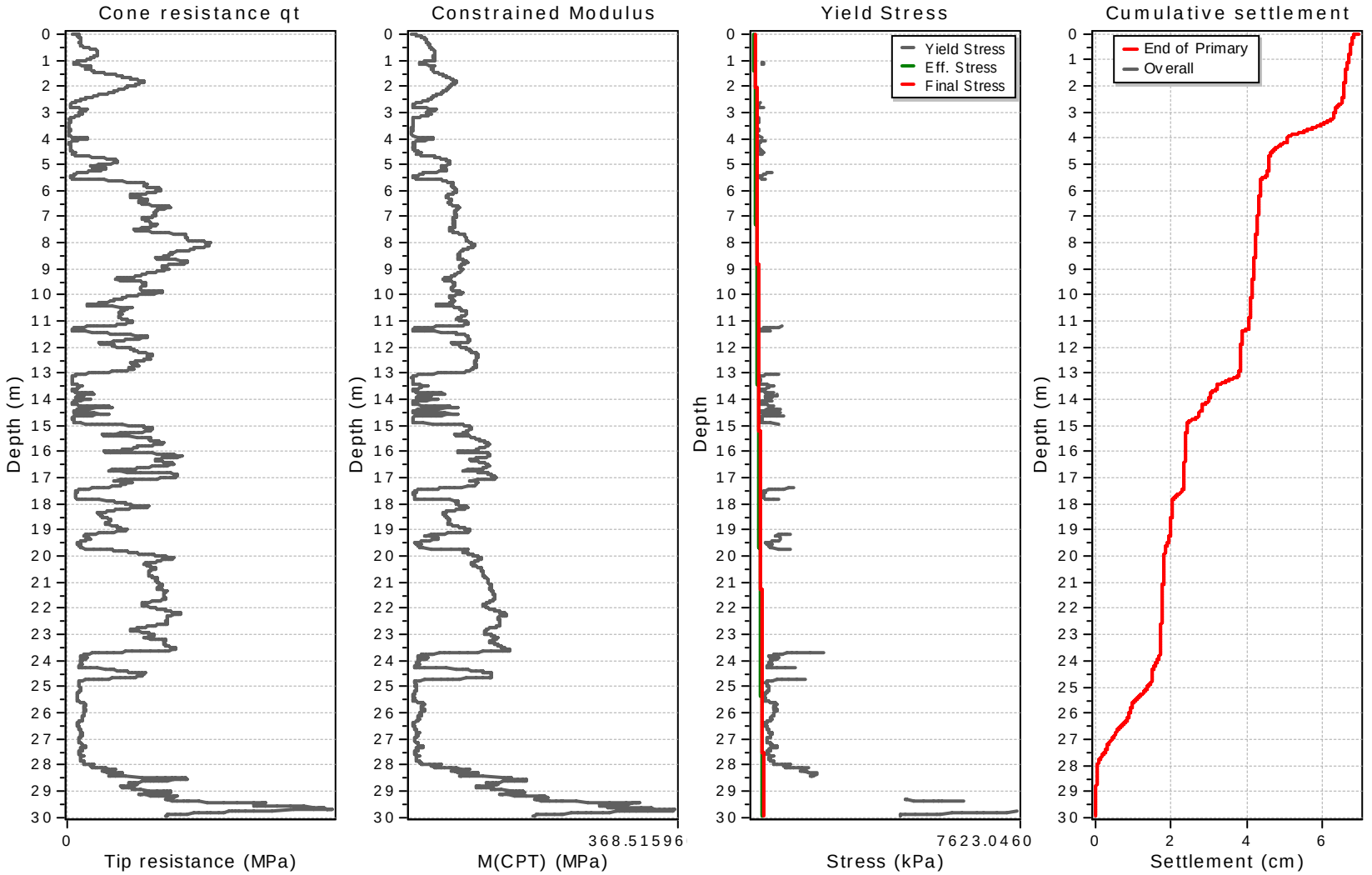
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-01
Total depth: 29.95 m, Date: 23/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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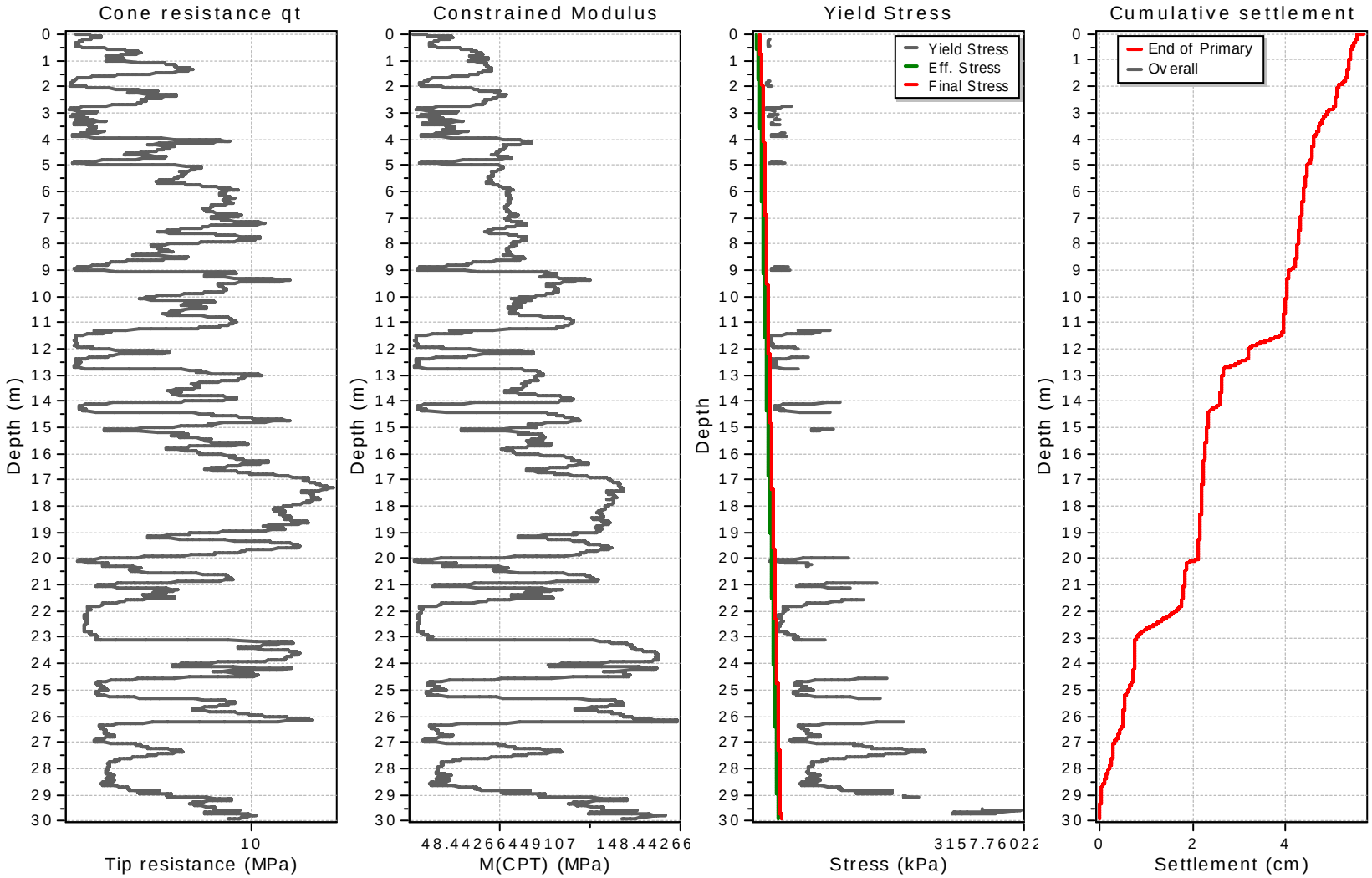
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-02
Total depth: 29.92 m, Date: 28/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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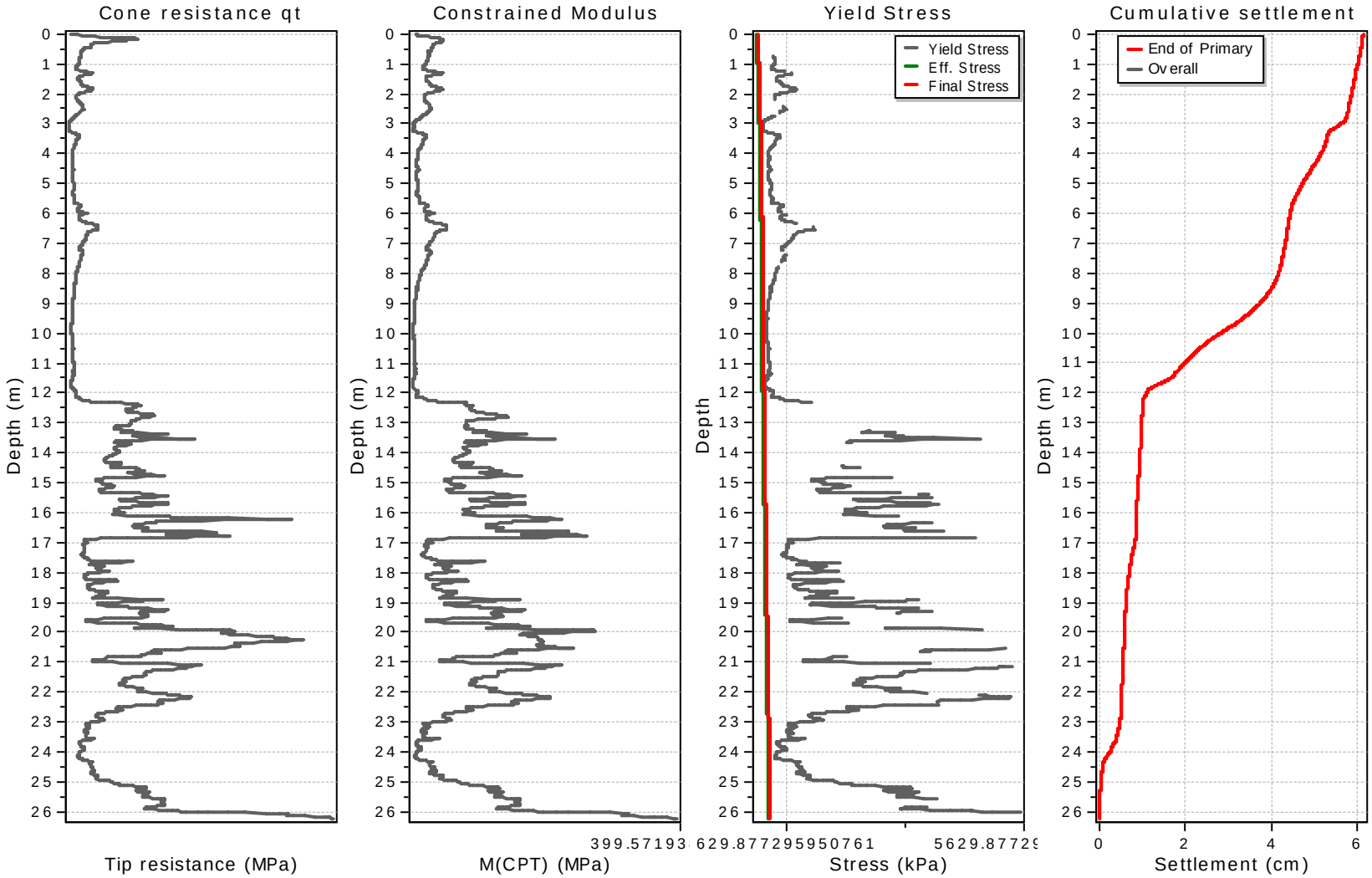
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-03
Total depth: 26.24 m, Date: 28/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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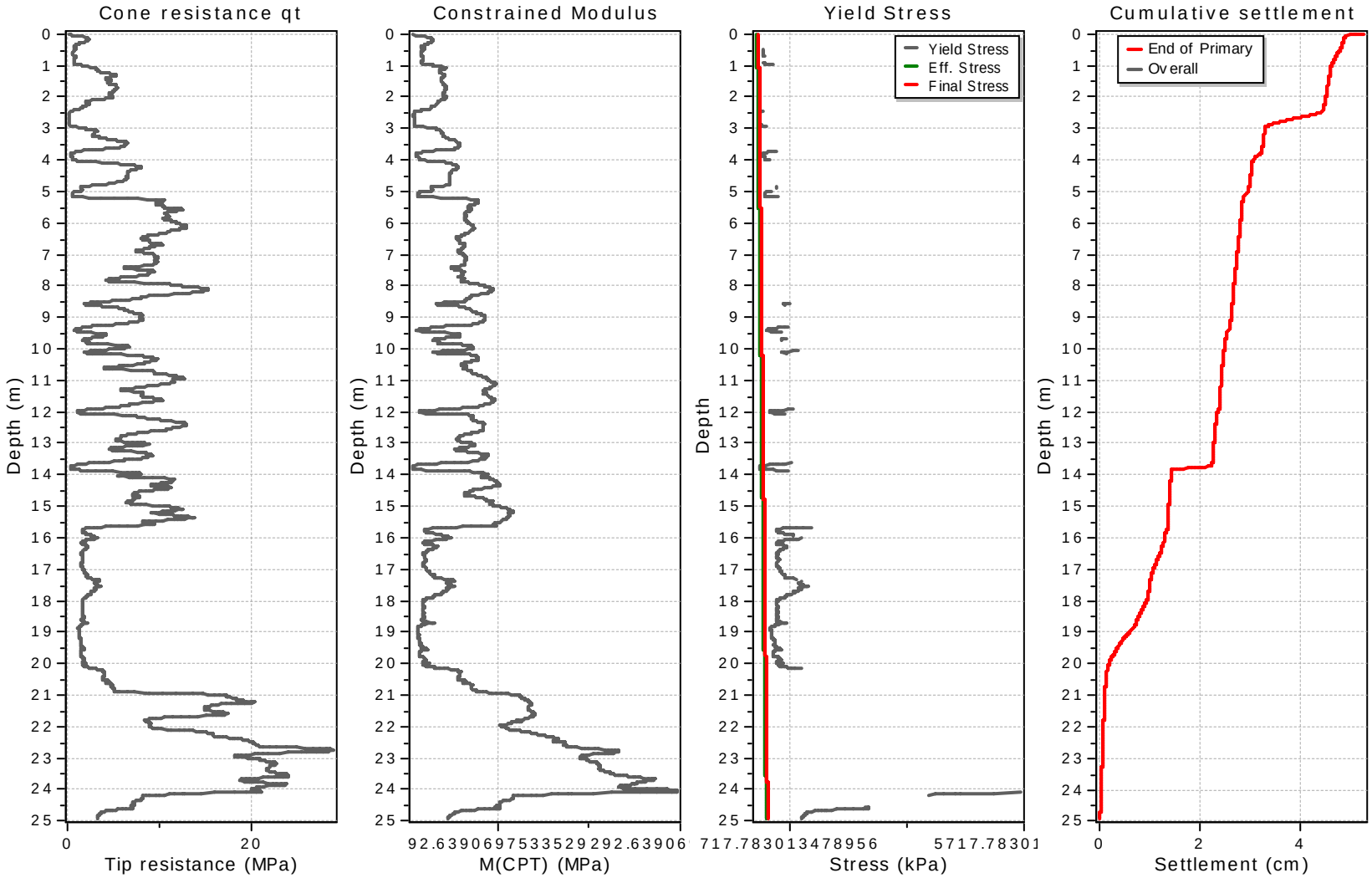
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-04
Total depth: 24.93 m, Date: 28/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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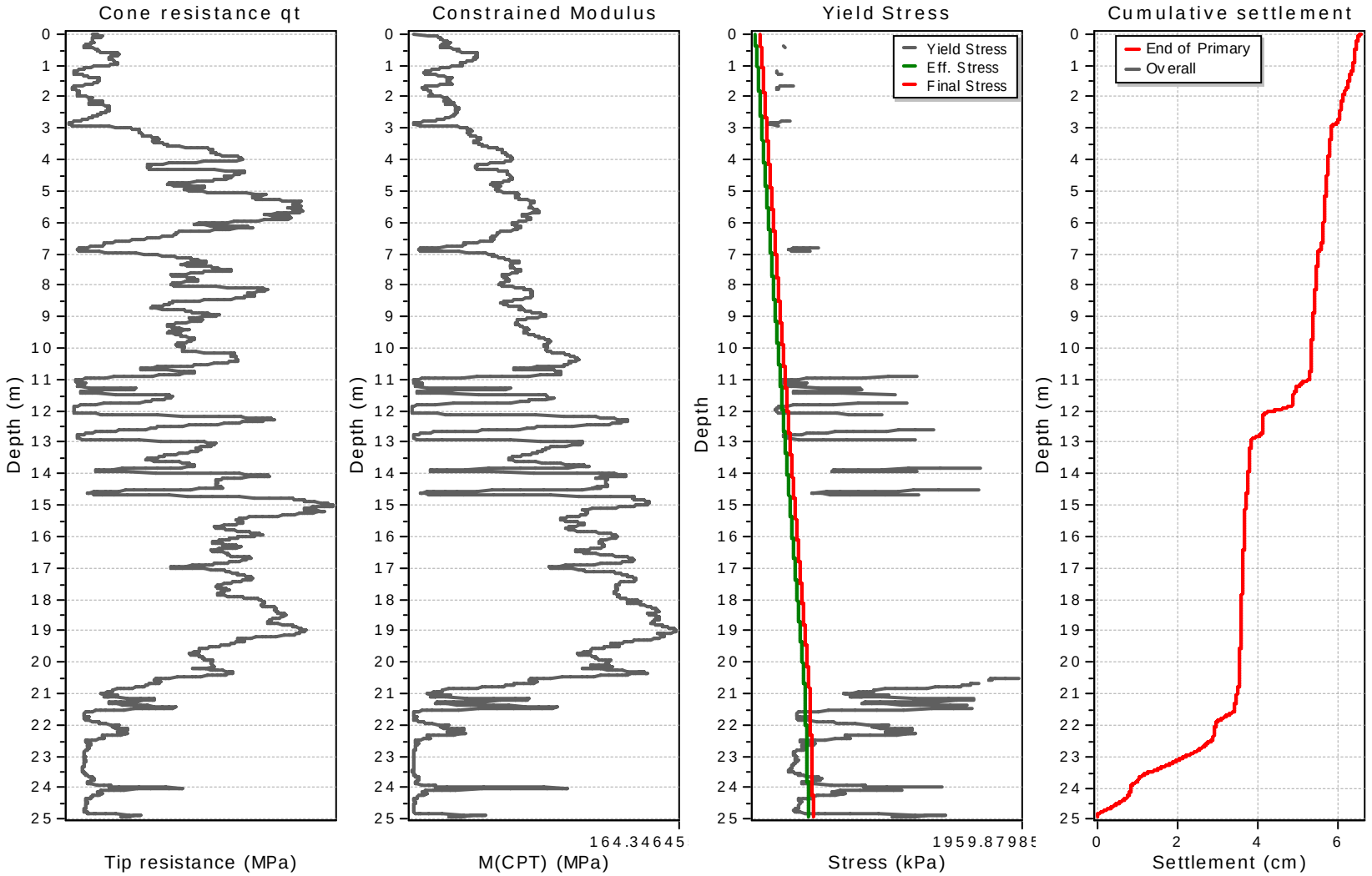
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-05
Total depth: 24.93 m, Date: 24/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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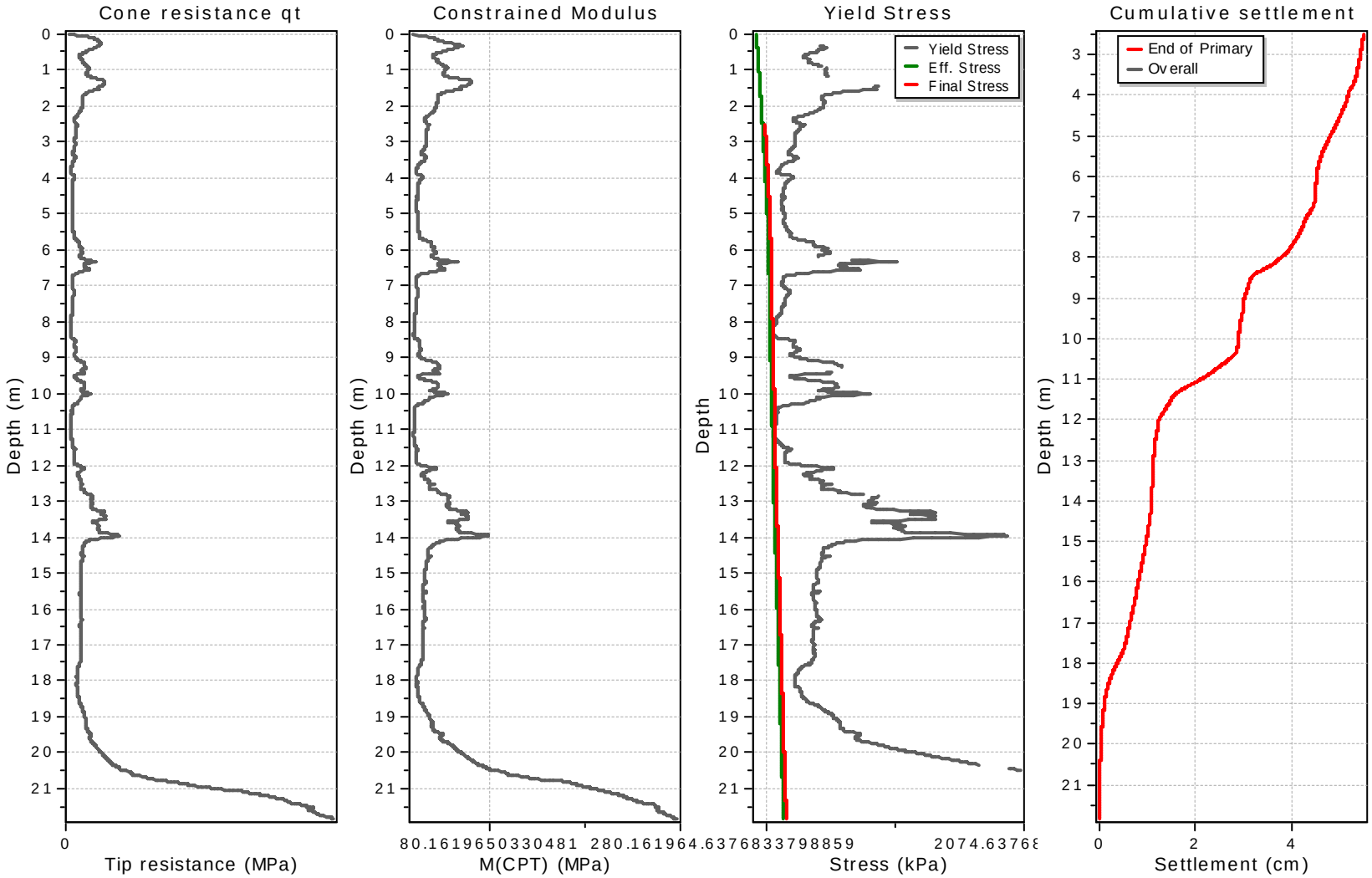
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-06
Total depth: 21.84 m, Date: 28/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 2.50 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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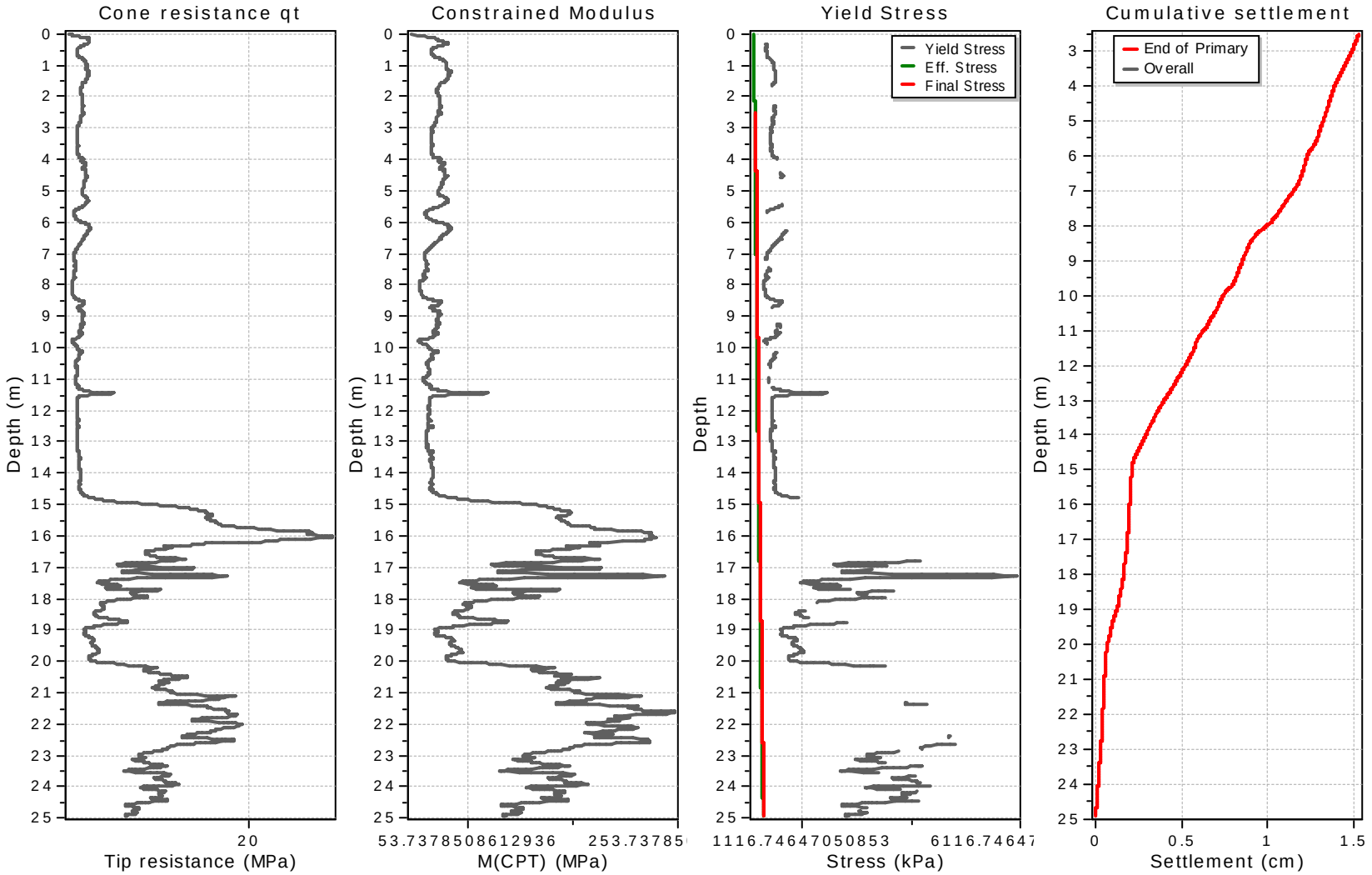
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-07
Total depth: 24.93 m, Date: 25/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 2.50 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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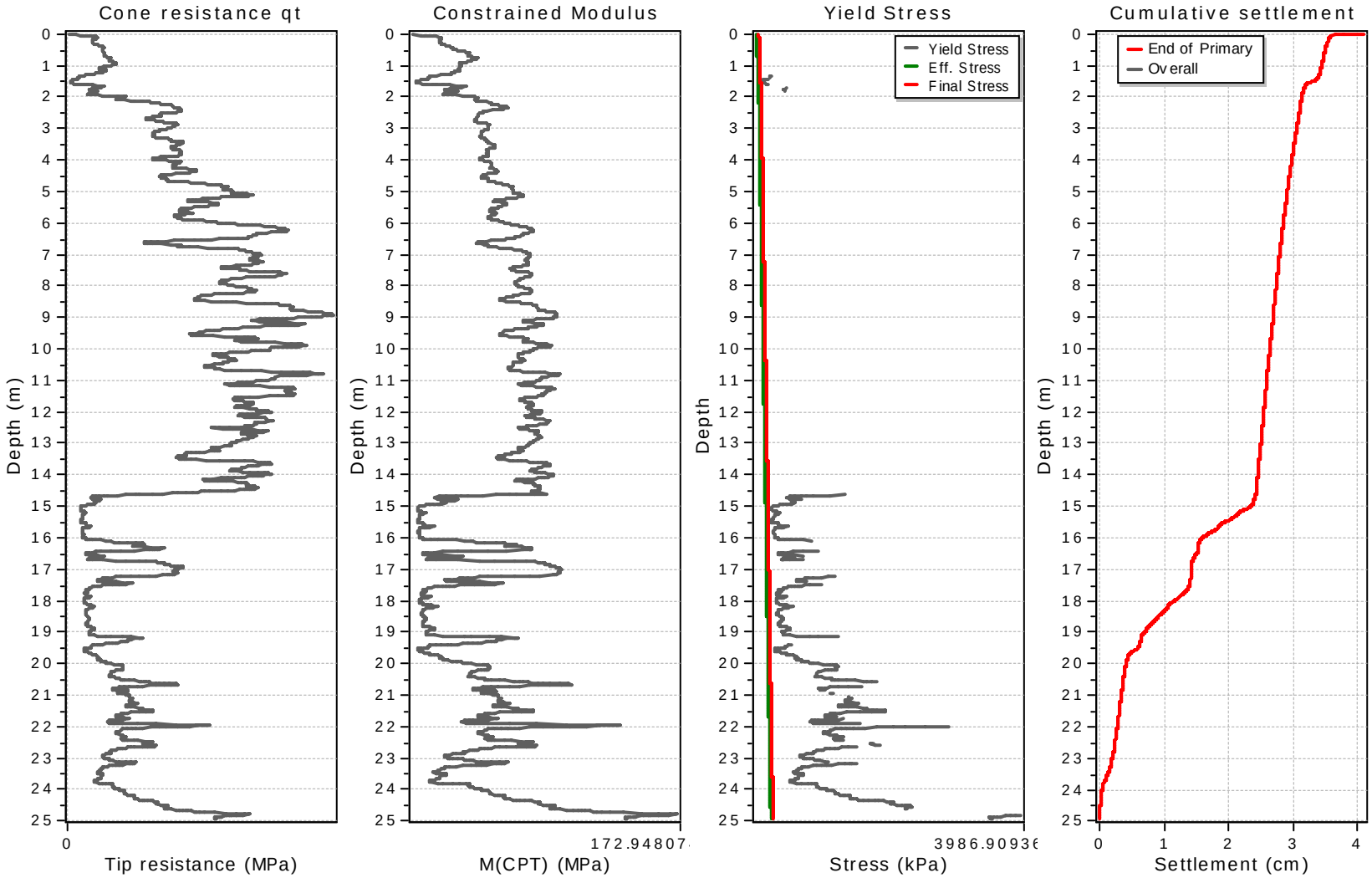
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-08
Total depth: 24.93 m, Date: 24/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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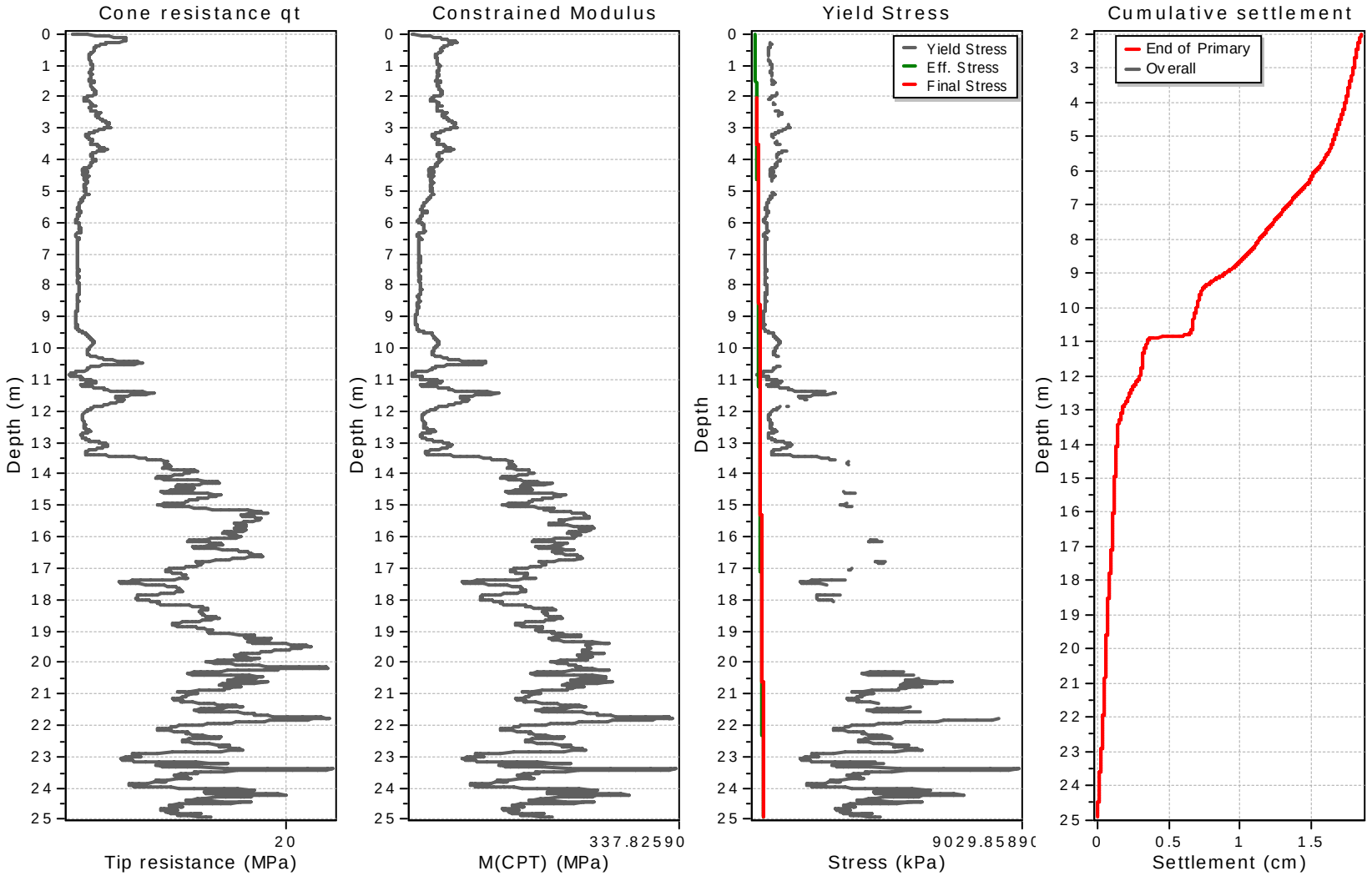
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: SCPT22-09
Total depth: 24.92 m, Date: 28/02/2022
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 2.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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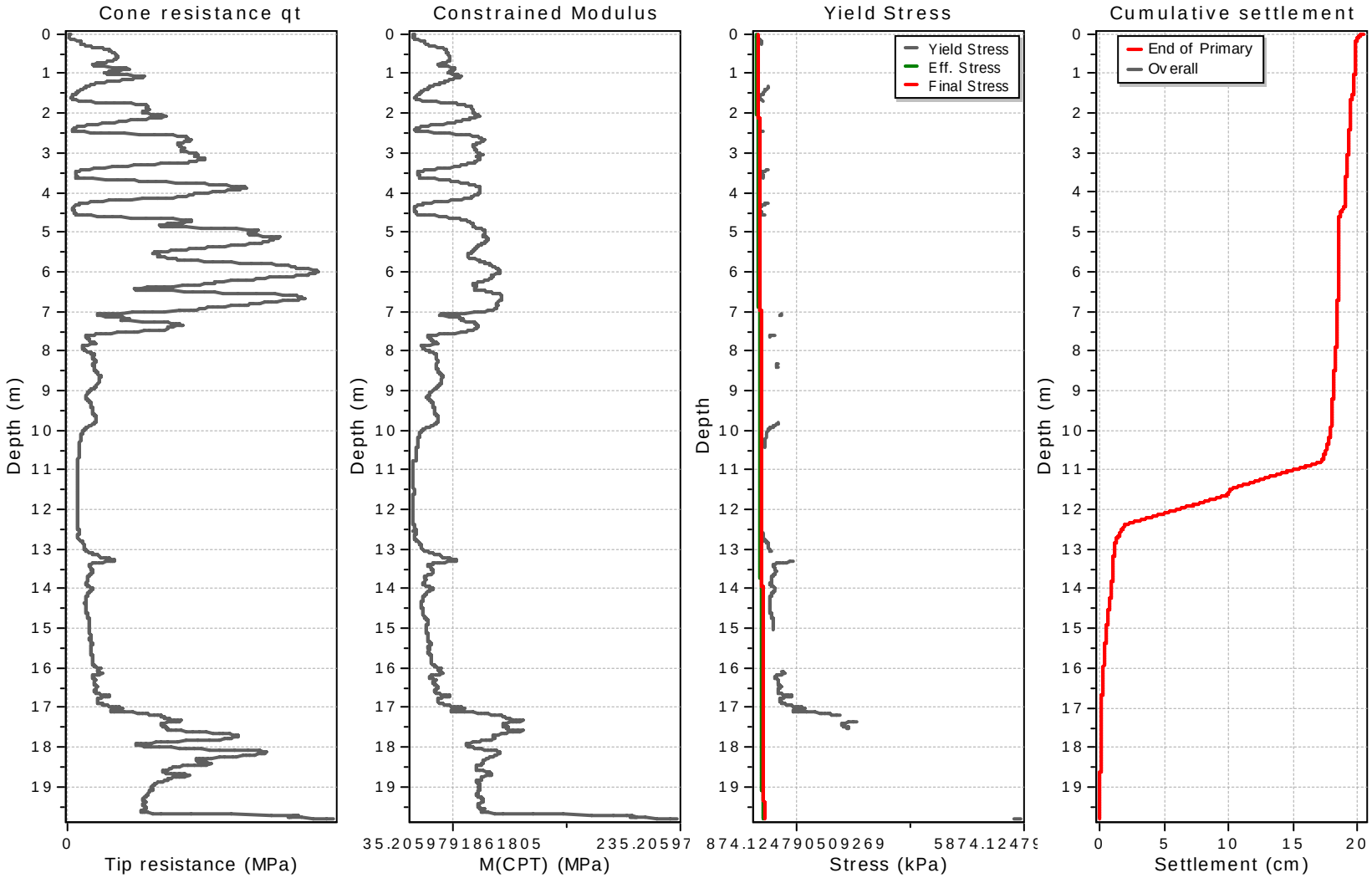
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT201
Total depth: 19.81 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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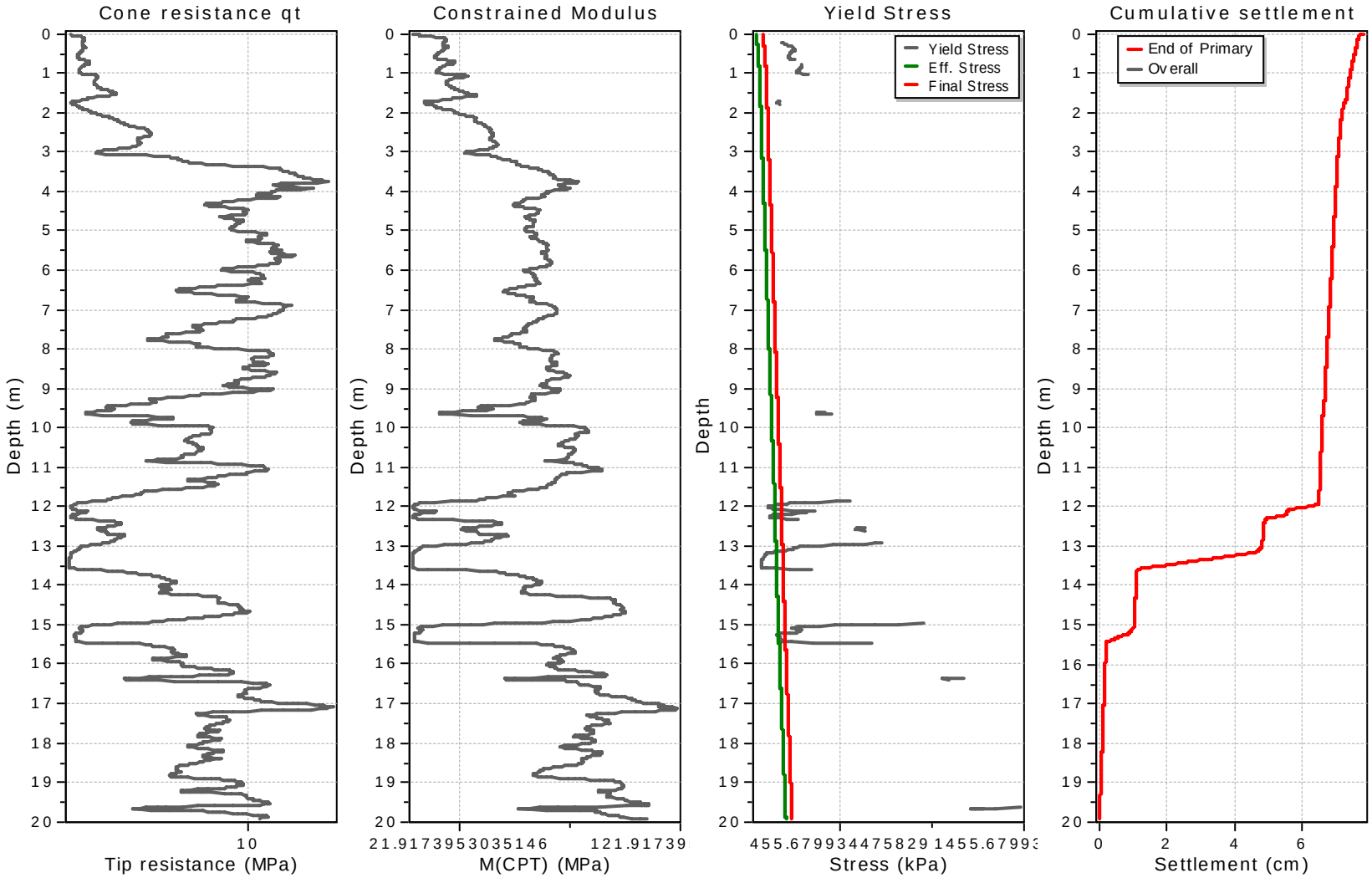
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT202
Total depth: 19.93 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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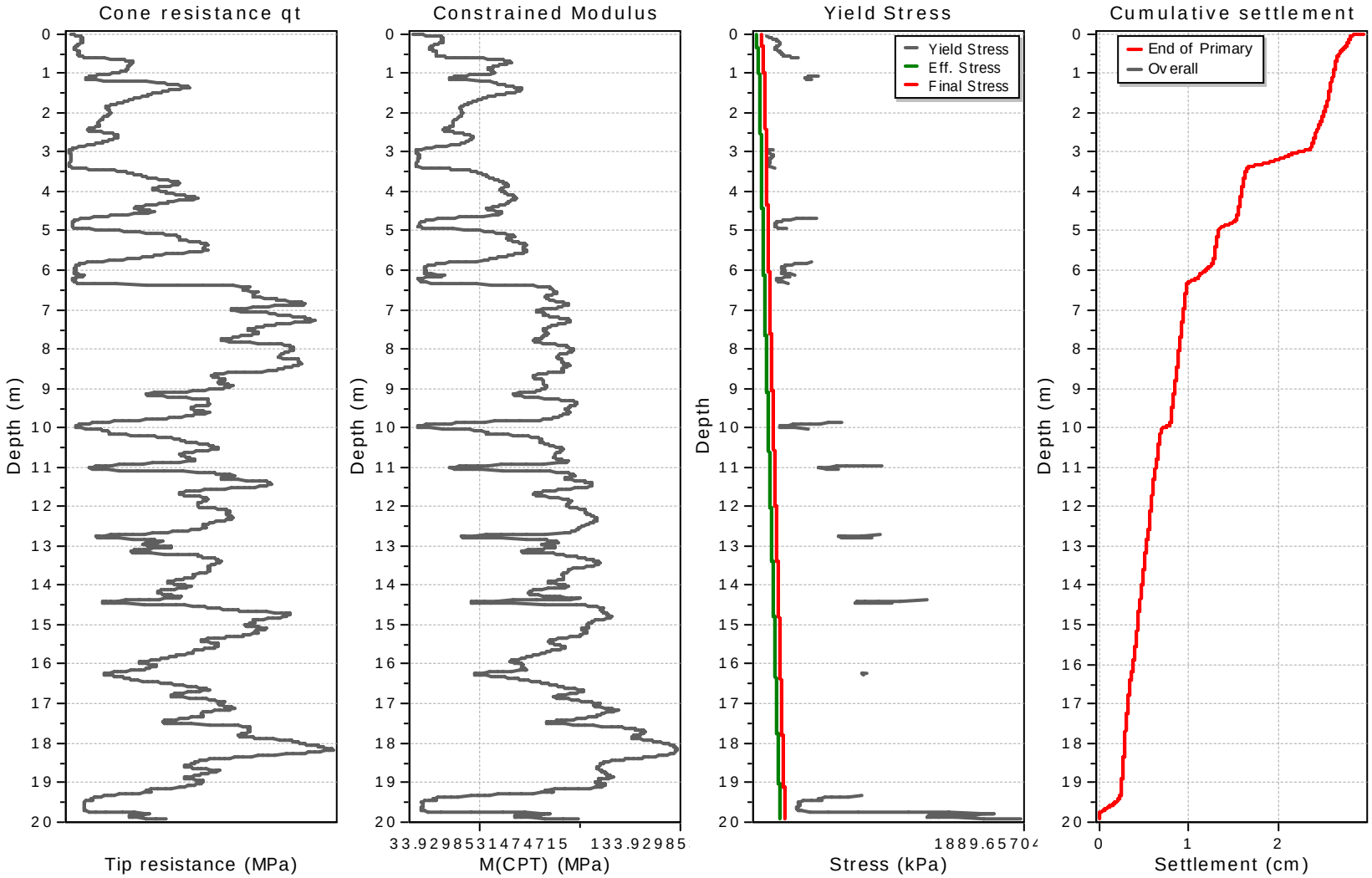
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT203
Total depth: 19.93 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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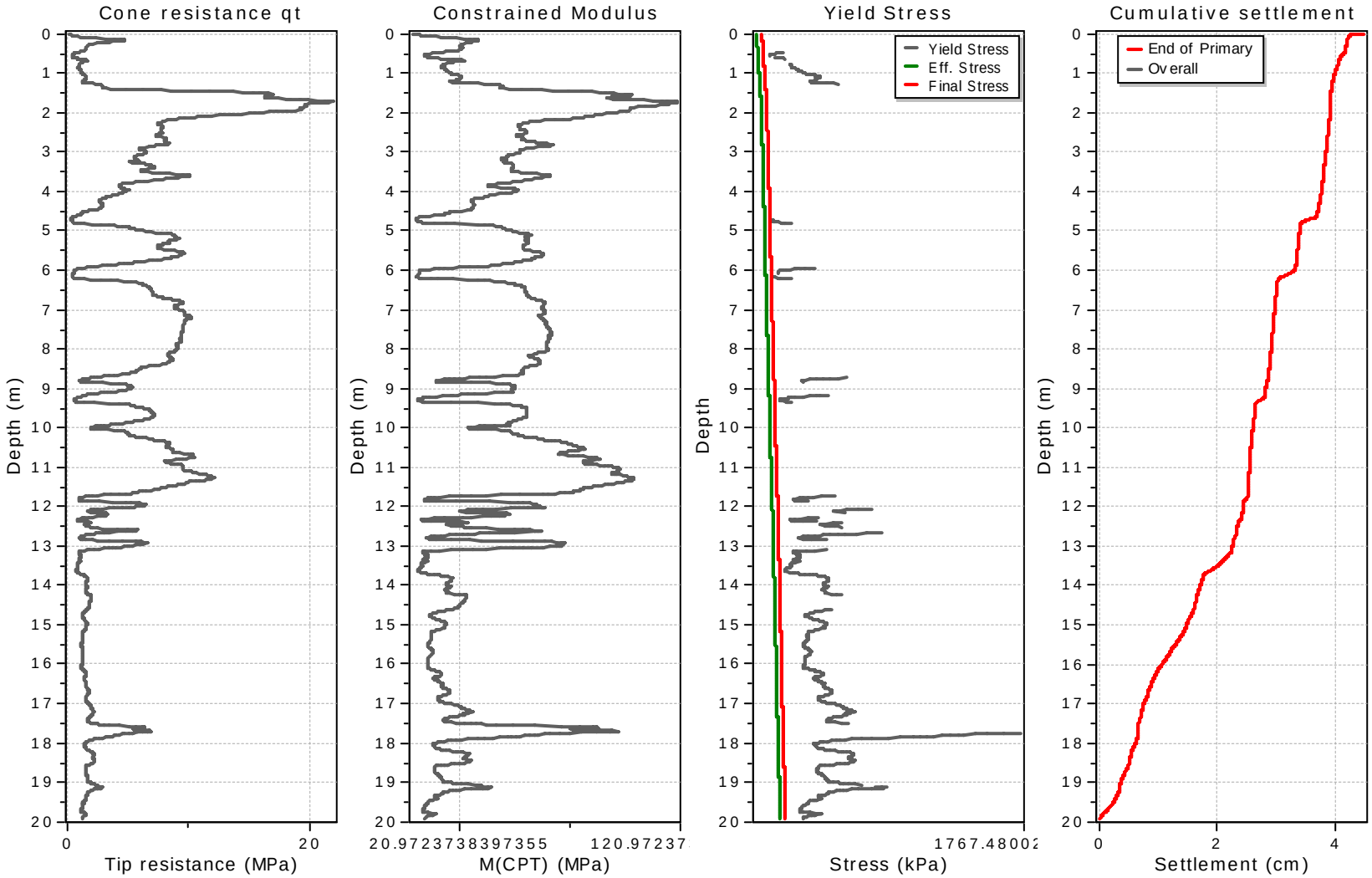
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT204
Total depth: 19.93 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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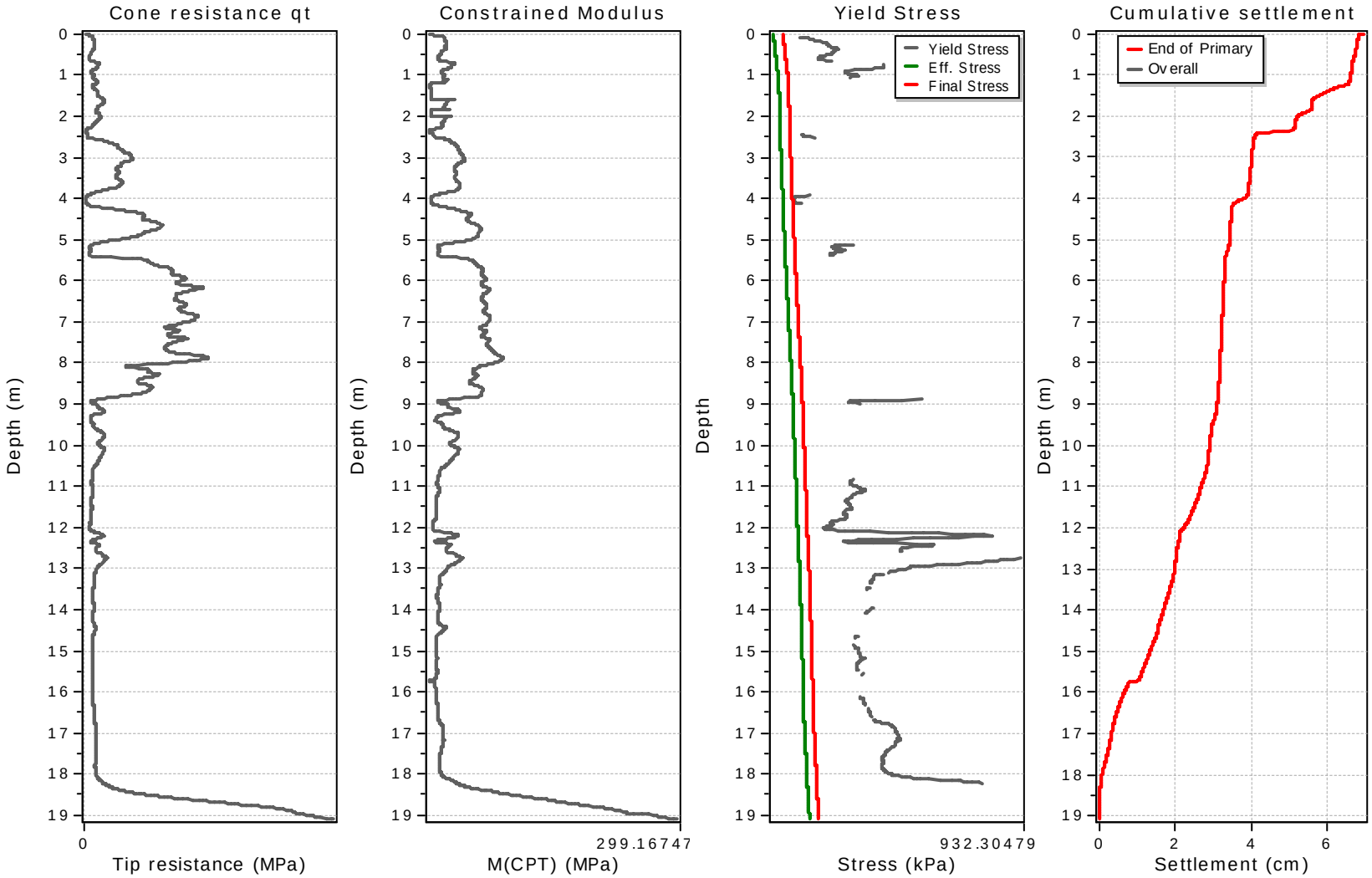
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT207
Total depth: 19.08 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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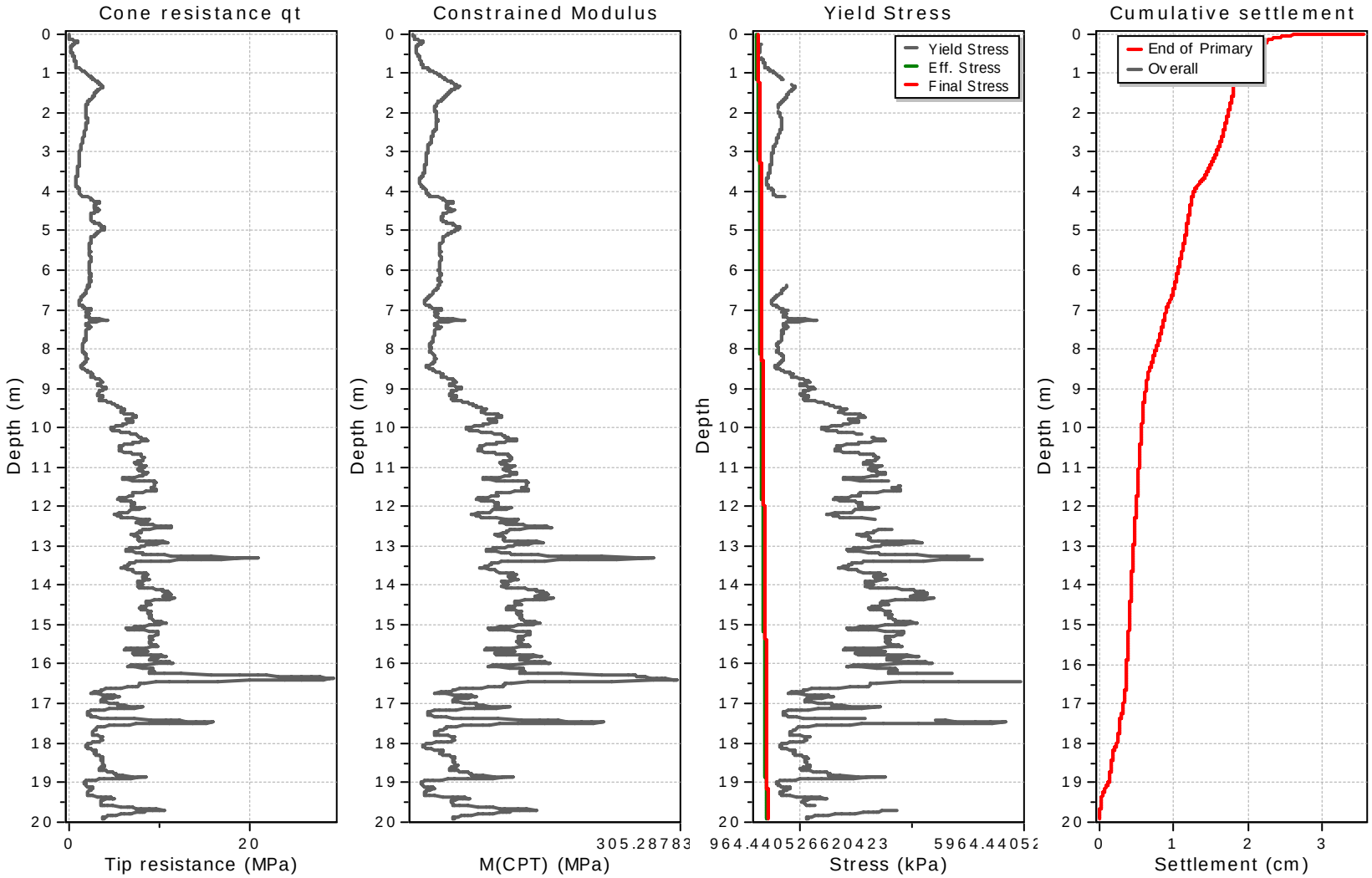
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT208
Total depth: 19.93 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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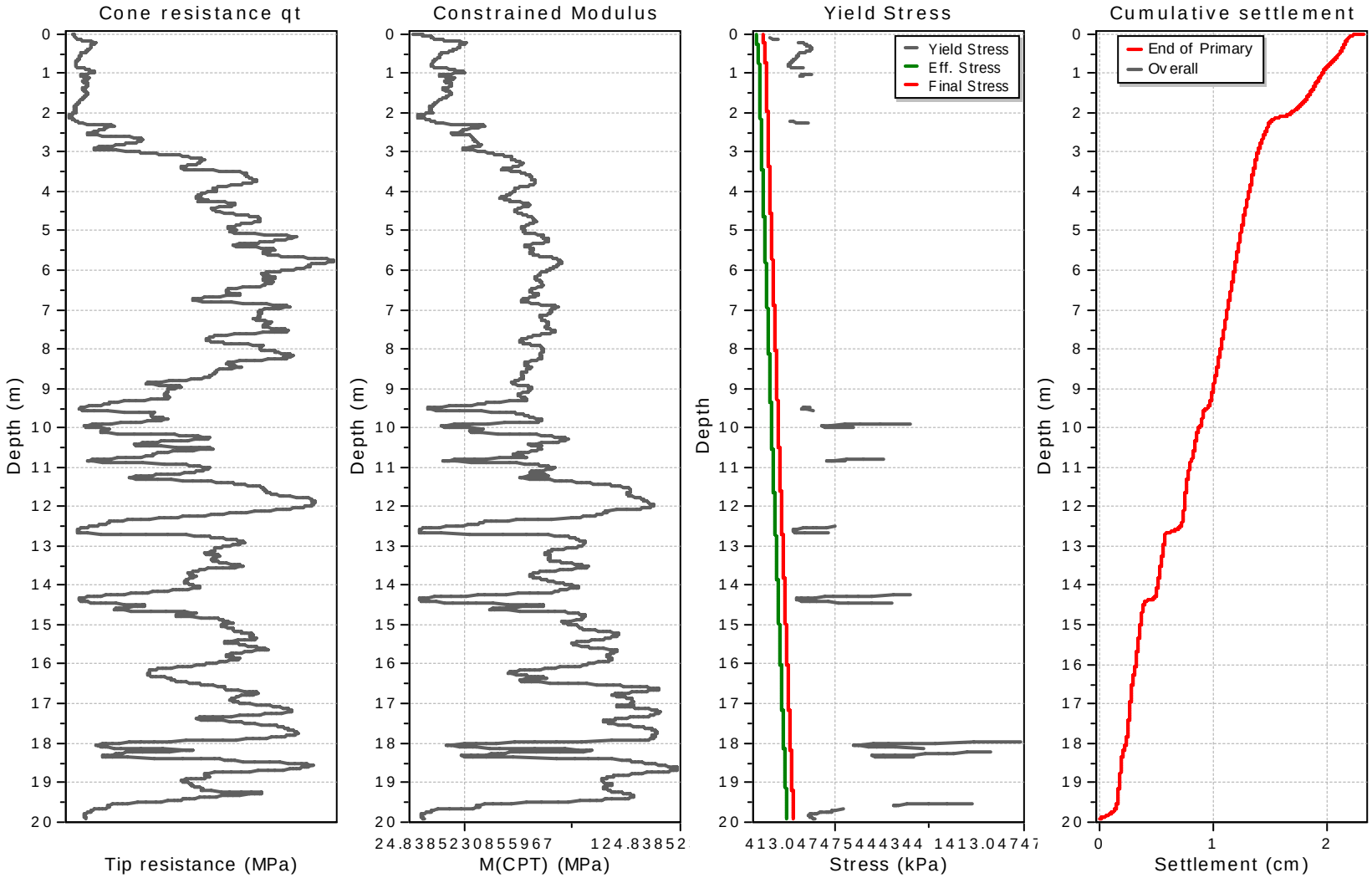
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT210
Total depth: 19.93 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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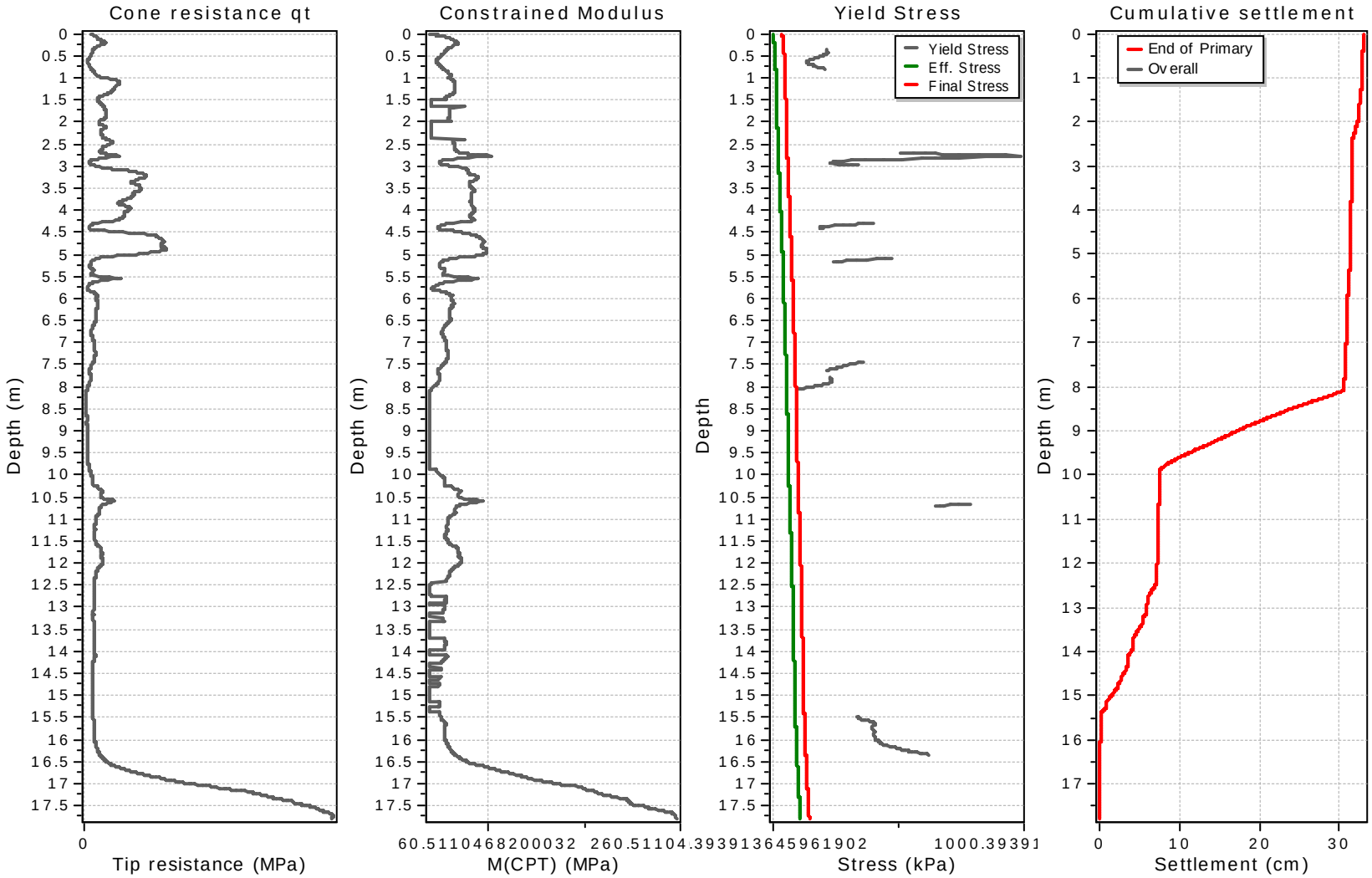
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT211
Total depth: 17.80 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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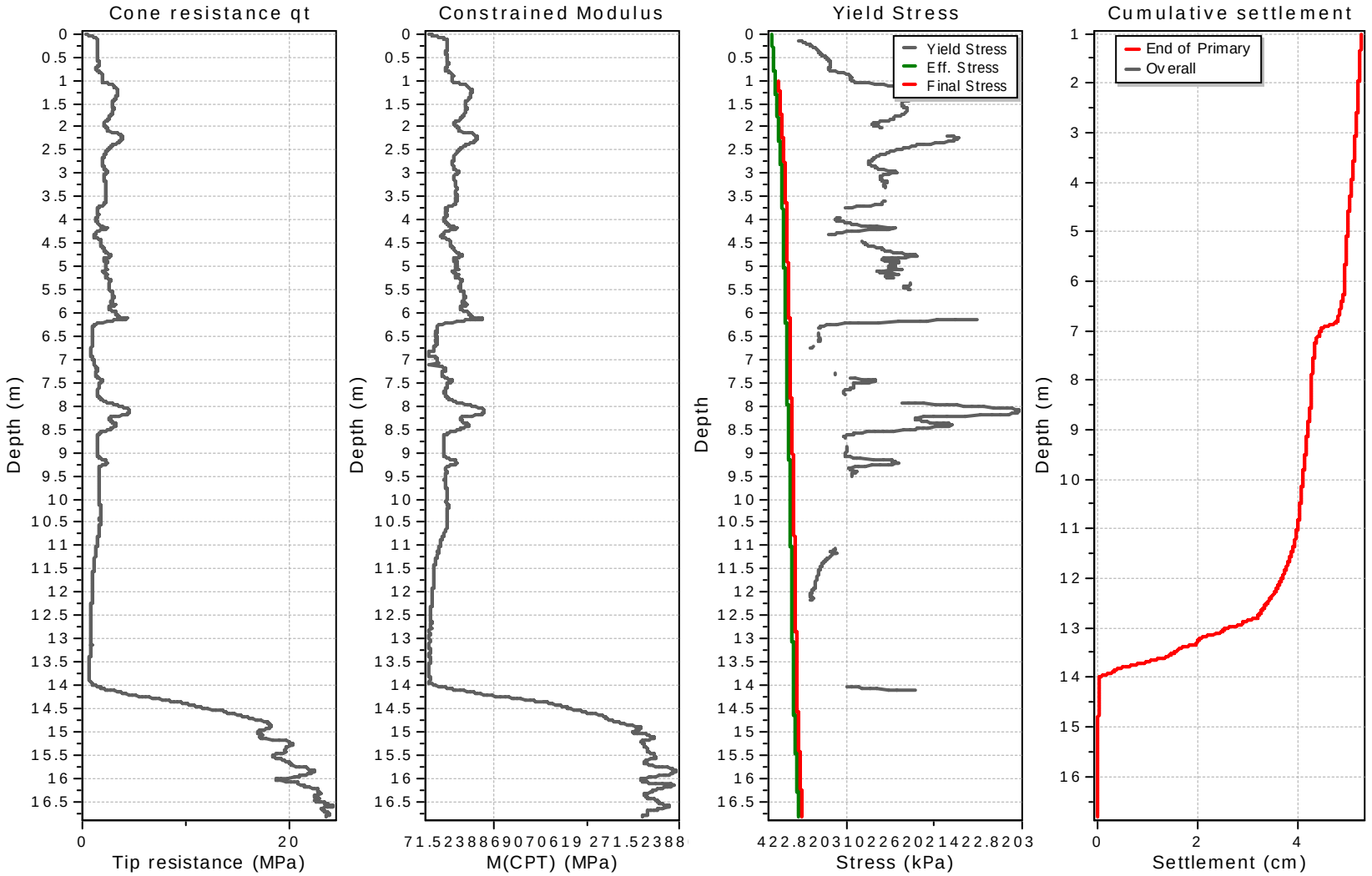
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT212
Total depth: 16.83 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 1.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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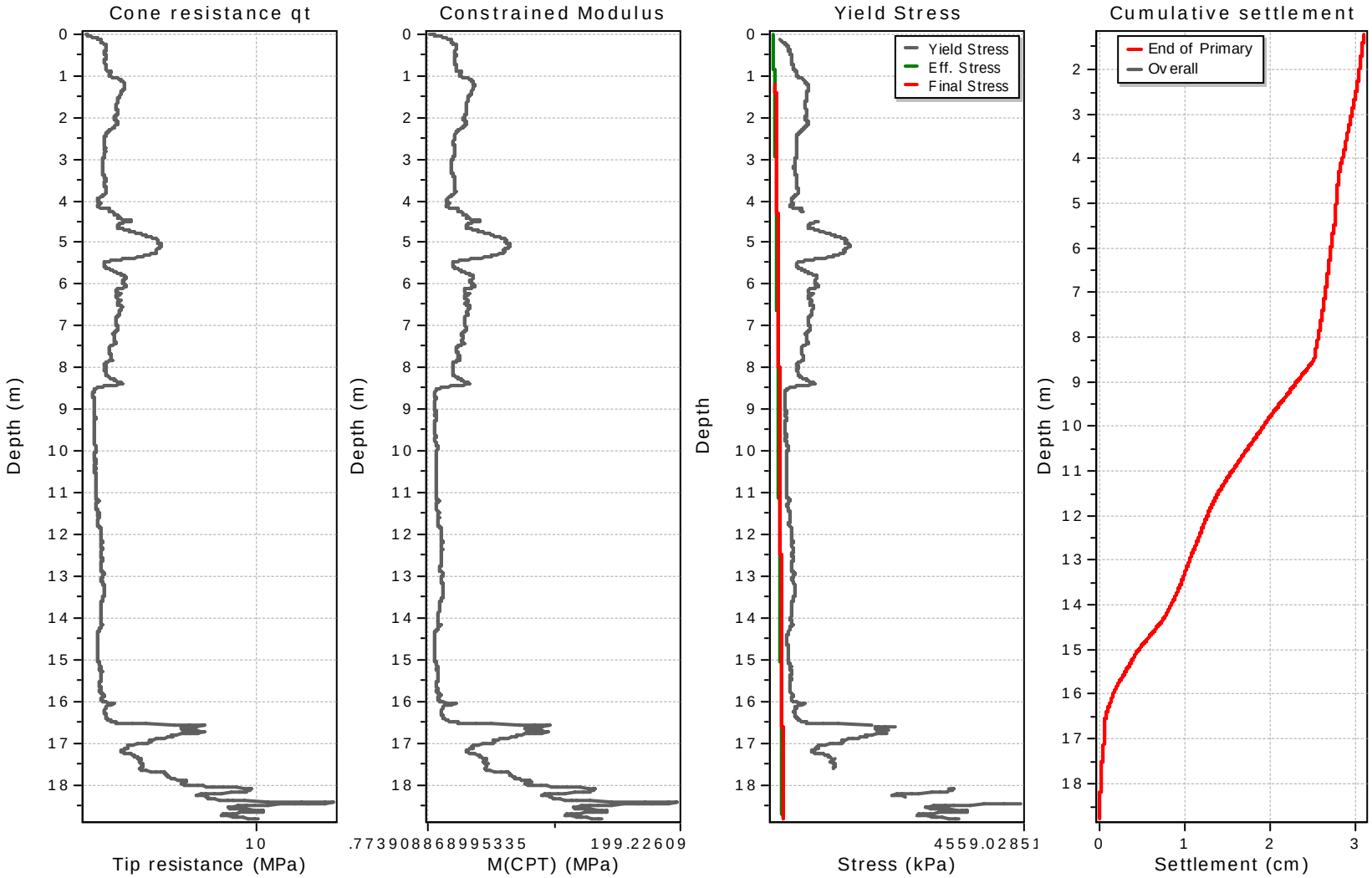
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT213
Total depth: 18.81 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 1.20 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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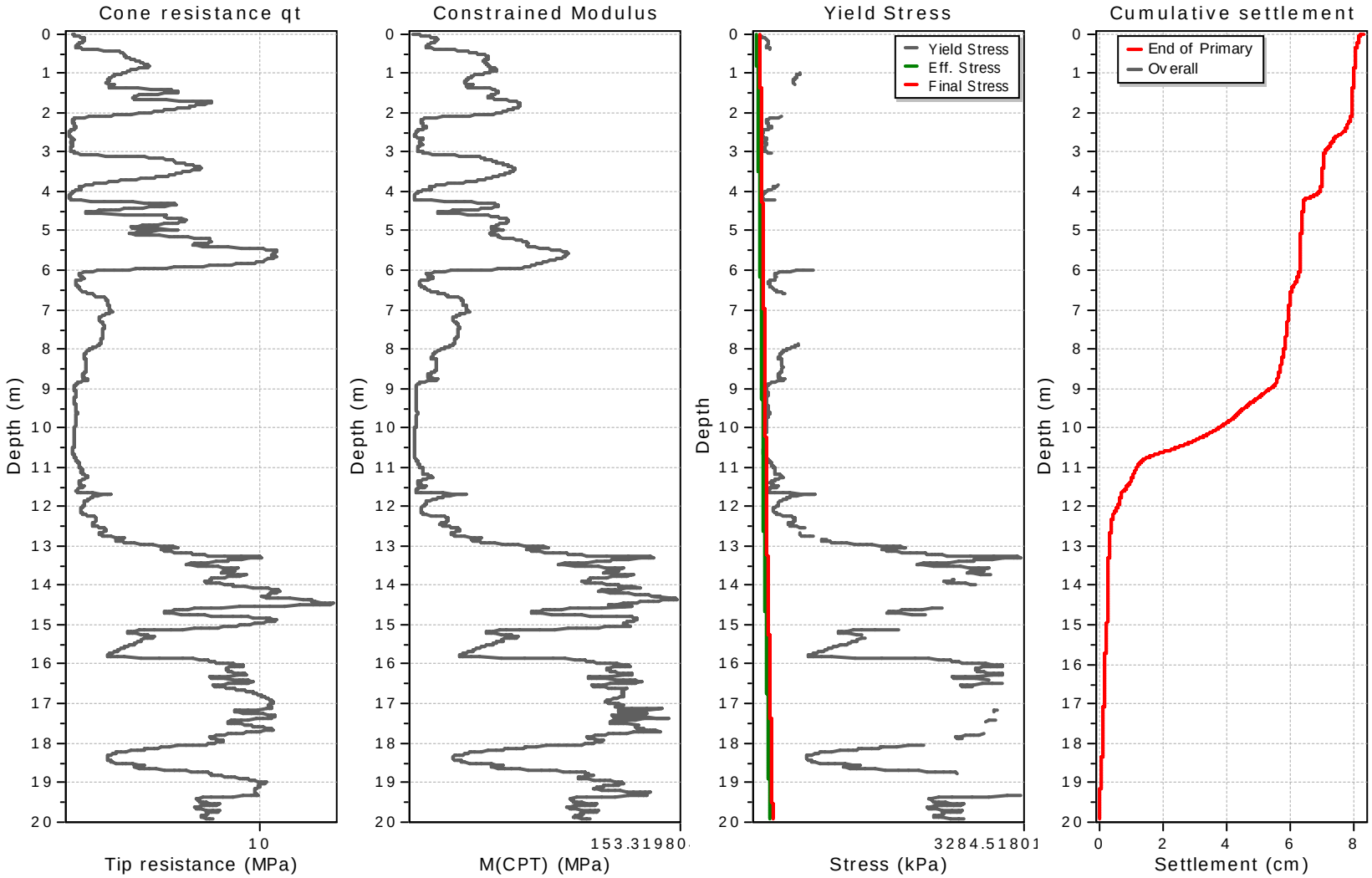
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT214
Total depth: 19.93 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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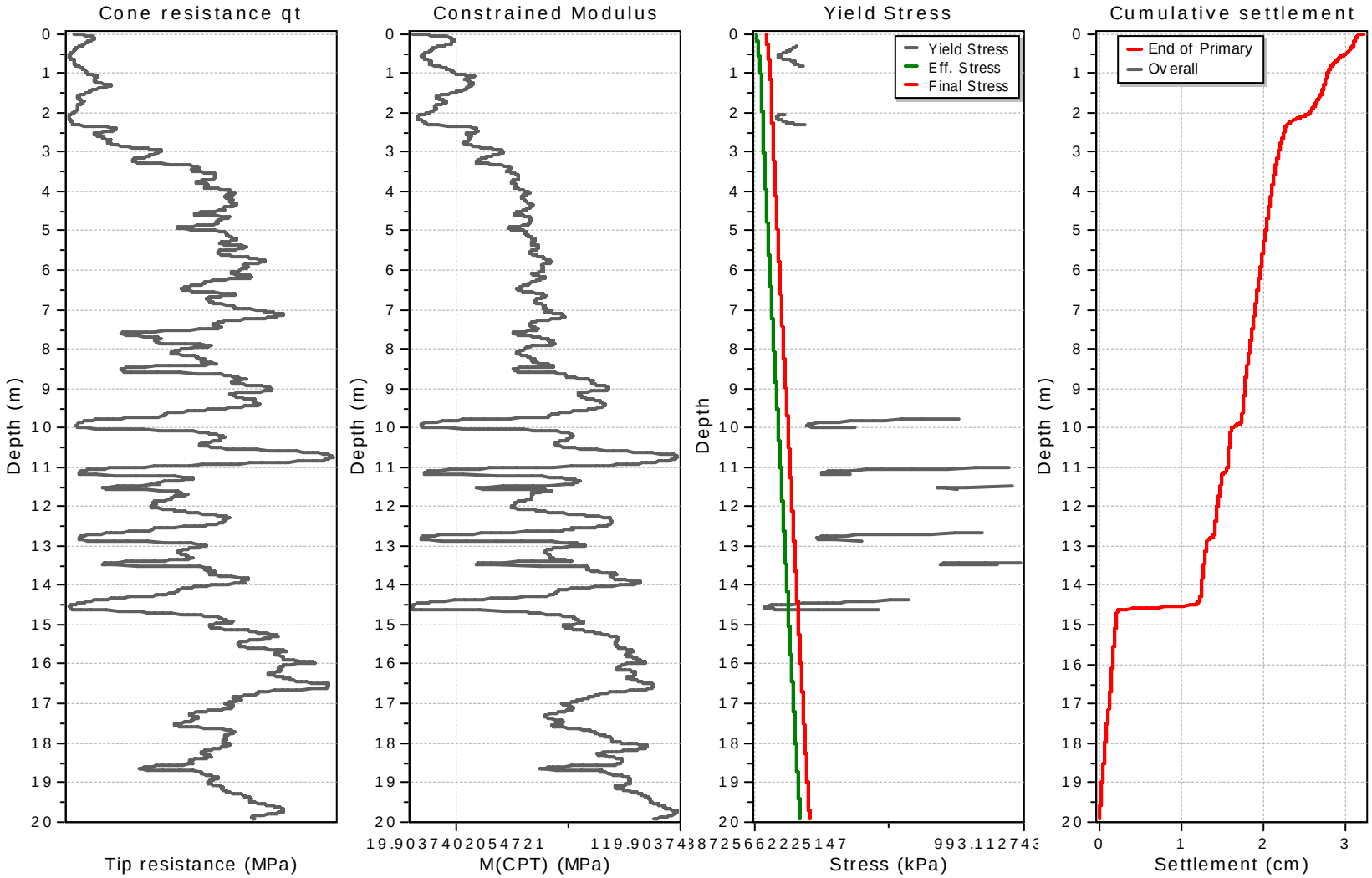
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT215
Total depth: 19.93 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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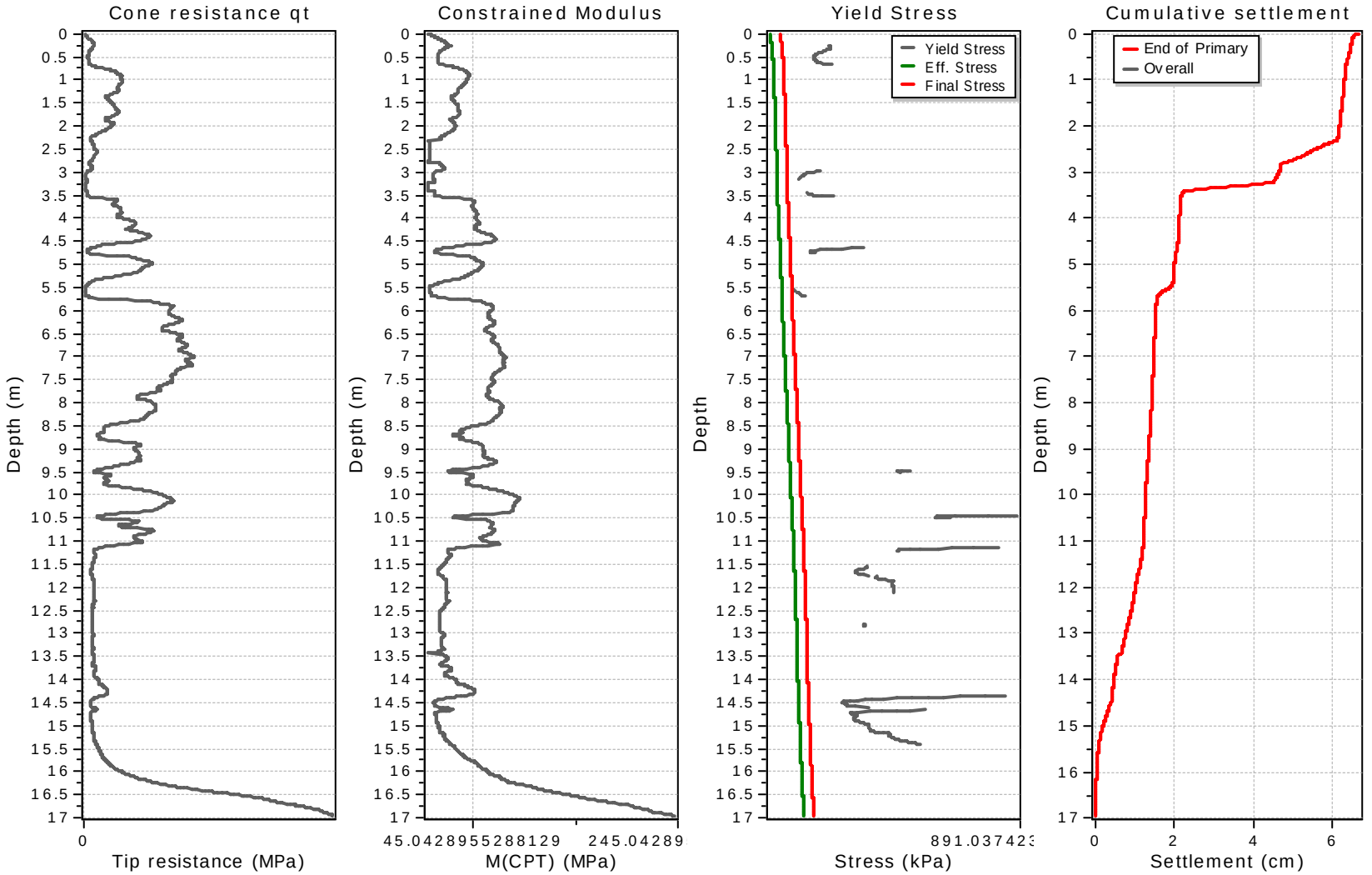
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT216
Total depth: 16.96 m, Date: 28/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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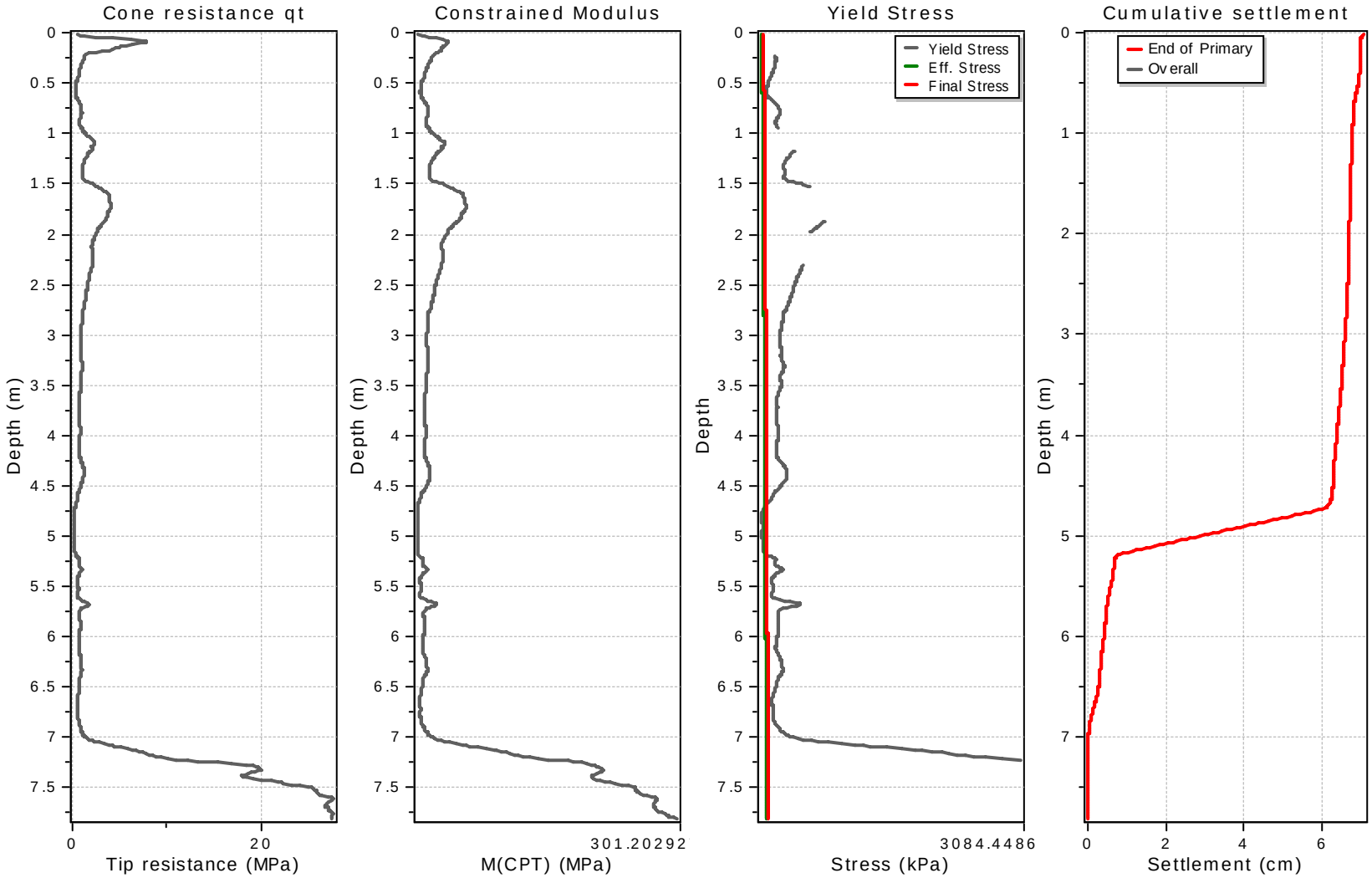
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT217
Total depth: 7.82 m, Date: 27/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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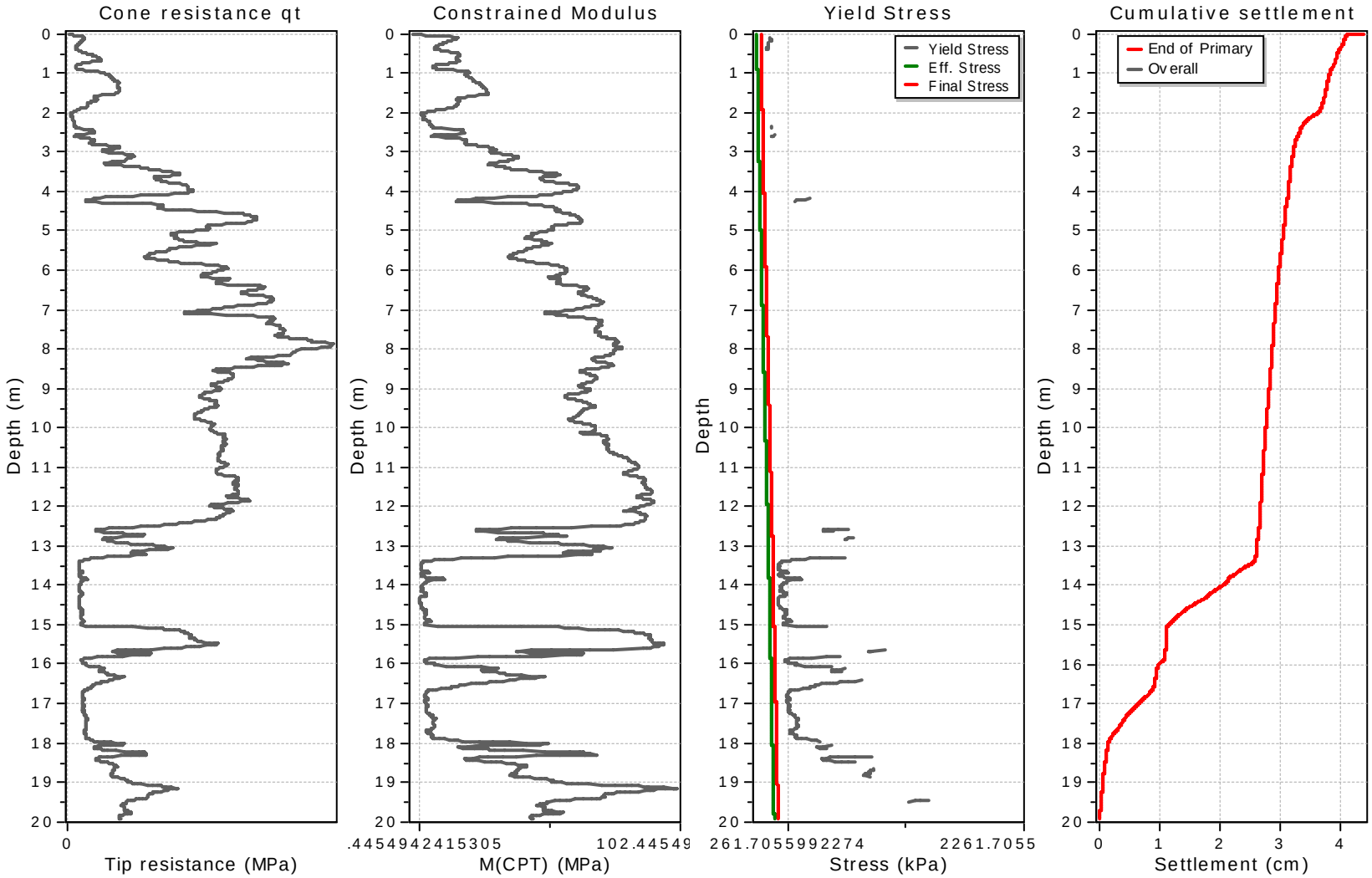
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT218
Total depth: 19.93 m, Date: 24/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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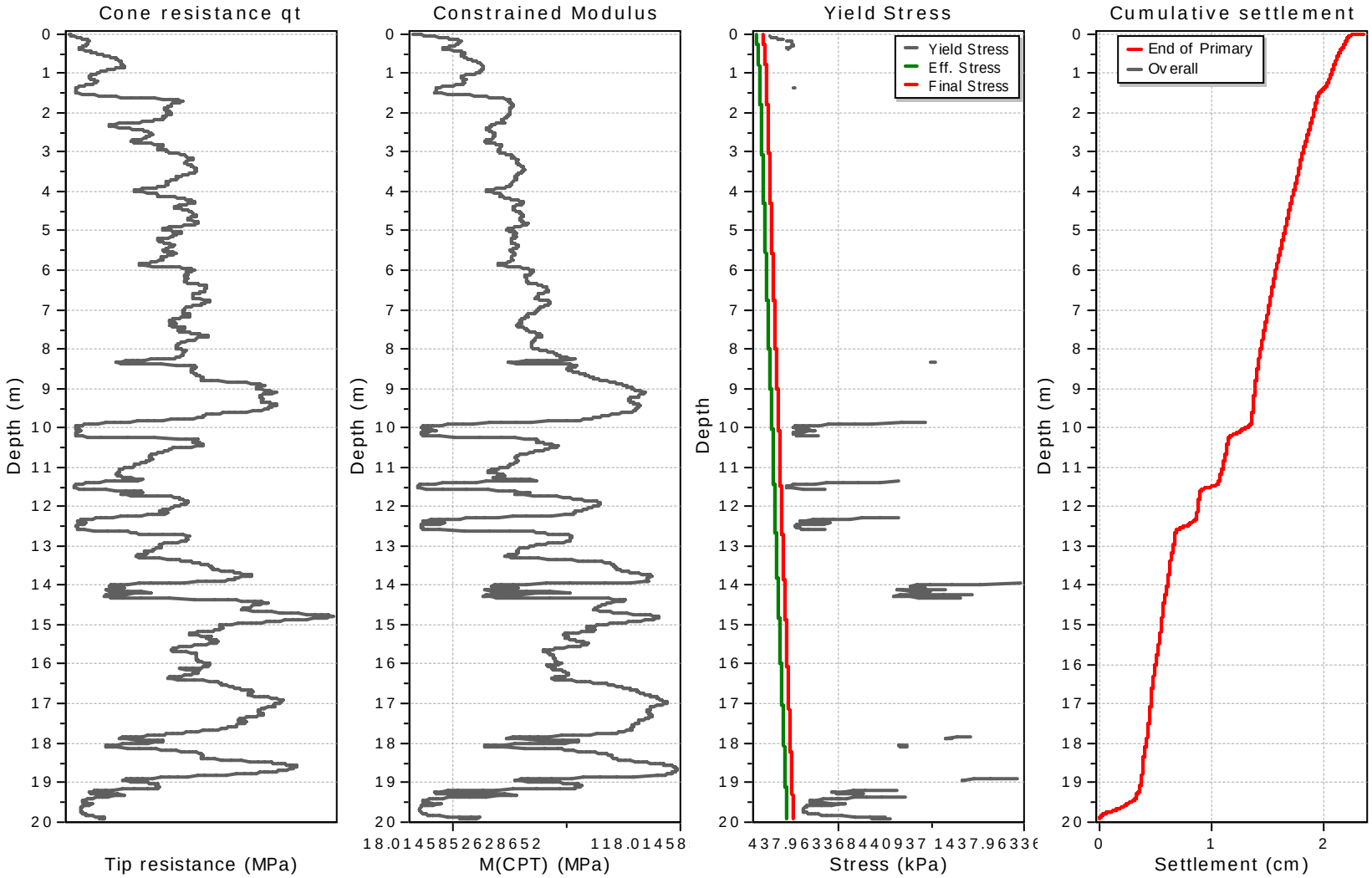
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT219
Total depth: 19.93 m, Date: 24/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 36.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation

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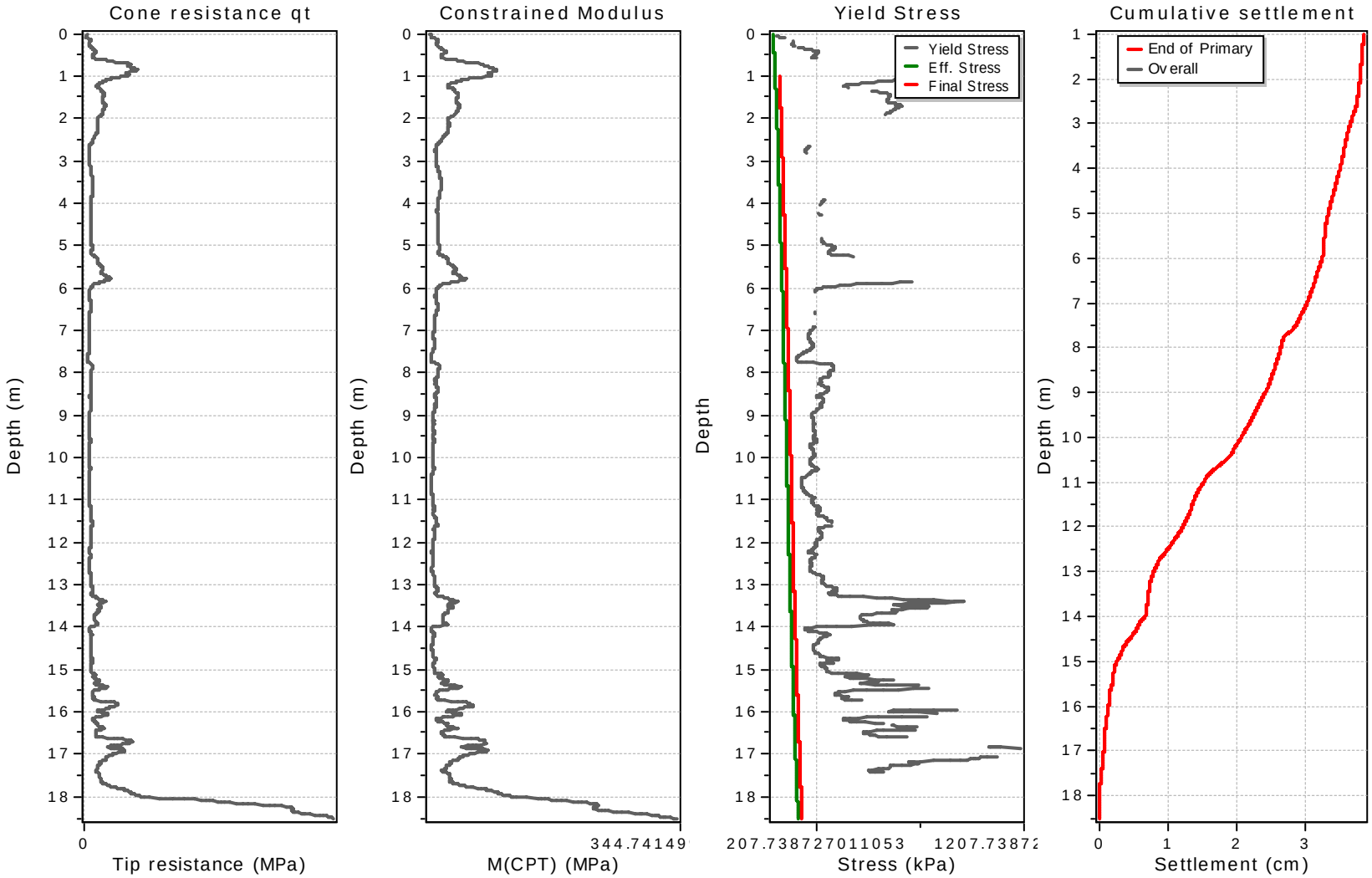
Project: Tramway Rezoning
Location: Ruakura, Hamilton

CPT: CPT220
Total depth: 18.52 m, Date: 24/08/2018
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 100.00 (m)
L/B: 1.0
Footing pressure: 20.00 (kPa)
Embedment depth: 1.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: No
Time period for primary consolidation: N/A
Time period for second. settlements: N/A

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where t_p is the duration of primary consolidation