



The Landing Stage 7 Earthworks Completion Report

WFH PROPERTIES LIMITED

One Tree Point
The Landing
Stage 7



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1. Limitations

This report and the stated or inferred professional opinions found within, relating to the suitability of the areas being ready for building development, shall not be construed as a guarantee.

This report and the inferred professional opinions found within does not remove the necessity for site-specific geotechnical investigation, normal inspection, and design of foundations for each lot, as would be made in natural ground and NZS3604 for standard residential building foundations.

2. Executive Summary

Cook Costello was engaged by WFH Properties Ltd, to provide technical advice for earthworks and be the geo-professional for the Landing Stage 7 subdivision at One Tree Point, Northland. Cook Costello designed earthwork cuts and placement of controlled sand-engineered fill, in order to enable the construction of the building platforms within the proposed development.

A requirement of the consenting authority WDC (Whangarei District Council) is that a “Statement of Professional Opinion on Suitability of Land for Building Construction” (Statement of Suitability) is made by the geo-professional at the end of construction (prior to building developments). This process requires “WDC form EES-PO1” to be completed, and requires a geotechnical completion report. The completion report summarises the situation and is used to describe any departure from the standard foundation conditions expected by the building industry and outline any restrictions or recommendations if required. The purpose of this report is to provide the supporting details required for the Statement of Suitability.

The Statement of Professional Opinion on Suitability of Land for Building Construction - Form EES-PO1 has been attached to Appendix 6.

3. Introduction

Cook Costello was engaged by WFH Properties Ltd, to provide technical advice for earthworks and be the geo-professional for Stage 7 of the Landing subdivision at One Tree Point, Northland. Cook Costello designed earthwork cuts and placement of controlled sand-engineered fill, in order to enable the construction of the building platforms within the proposed development.

Previous reports and geotechnical information at the site comprise of:

- Ormiston Associates Ltd. Geotechnical Report (dated September 2005).
- Cook Costello Earthworks Specification (dated October 2018).

This report is for the completion of the subdivision works in relation to the developed sections and covers the information required by the Whangarei District Council for preparing consent notices for the future property titles and provides geotechnical information to the future lot owners. It covers the requirements of the Whangarei District Council Engineering Standards (Issue 0.4, Revised – 2022) for subdivision completion and is an addendum to the Form EES-PO1 certificate.

On completion of the works, the developer shall provide the following:

- Geotechnical reports and plans,
- All limitations on the development of the properties, including hazards, easement requirements, etc.

This report relates to the lots in Stage 7 of the subdivision only. Stage 7 was split into 7A and 7B for civil design however, all geotechnical works have been carried out across both Stage 6, 7A and 7B at once. The lot numbers for Stage 7 (as shown on the Scheme Plan appended to Appendix 1 covered by this report are:

Stage 7:

- 52 Residential Lots (Lots 292-315, 336-337, 340-341, 466, 184, 186, 208-213, 235-236, 238-249 & 333)
- Roads 7, 9, 10, 12 & 15.
- JOAL 705

The subdivision has been designed and constructed to satisfy Whangarei District Council Environmental and Engineering Standards 2022.

4. Site Description

The Landing subdivision is situated at One Tree Point, approximately 17 km southeast of Whangarei Central Business District. The subdivision consists of 9 stages, with Stages 1, 2, 3, 4, 5, 6, and 7 completed. Stages 8, and 9 are currently under construction. The civil design has been carried out across two sub-stages of Stage 7 labelled 7A and 7B. However, all geotechnical works were carried out across the entirety of Stage 7. The scheme plan for Stage 7 can be seen in Appendix 1.

5. Geology

The property is regionally placed as part of the Marsden Point Barrier Spit, a broad peninsula, comprised of coastal SAND dunes, estuarine and alluvial sediments, that partly enclose the Whangarei Harbour. These are considered young soils.

The spit has been built up by a prograding (seaward advancing) foreshore depositional process in the vicinity of the harbour entrance with sequences of aeolian-influenced coastal SAND dunes and alluvial and estuarine sediments.

The GNS Science online geology map defines the underlying geology of the site as comprised of Late Pleistocene stable dune deposits (Karioitahi Group). Weakly cemented sand in fixed transverse dune ridges.

The soil type in the area is defined on NZMS290 Sheet Q06/07 Hukerenui - Whangarei (SOILS) as a combination of Ruakaka Loamy Peat, One Tree Point Peaty Sand, and Tangitiki Sandy Loam and Sand (imperfectly to poorly drained).

The rock type in the area is defined on NZMS290 Q06/07 Hukerenui - Whangarei (ROCK TYPES) as Sand: felspathic with some quartz, minor dark minerals and clay forming fixed dunes, minor swamp deposits; unconsolidated to very soft. Unweathered or weathered to brown-stained very soft clayey sand to depths of 5m.

6. Construction Methodology

The earthworks were carried out under Cook Costello as the supervising engineering consultant with Geocivil Ltd carrying out the physical testing. The general methodology consisted of a removal of organic material (peat and topsoil) stripped ground inspection, cut to fill, with the fill being tested, and covering complete fill with organic topsoil peat.

A bulk earthworks plan showing the finished earthworks and contours is included in Appendix 2.

6.1. Earthworks

A bulk earthworks operation was carried out over the site to improve the drainage and contour of the Lots. Earthworks were also carried out to establish reasonable building platforms. Stage 7 of the Landing used the following methodology:

1. The topsoil and the peat were stripped off using motor scrapers and 50-ton Moxy dump trucks (Cat 725) with 20 – 30 ton excavators (Cat 320).
2. Cut to fill in the old sand dune complex using Sand fill was undertaken to bring the lots up to the finished level.
3. Testing was undertaken to achieve a medium dense compacted sand with an allowable bearing capacity of greater than 100 kPa (Ultimate Bearing Capacity of 300kPa). This meets the requirements of the New Zealand Standard 4404 and the New Zealand Building Code.
4. Once the desired contours were achieved topsoil was spread from the temporary stockpile using Motor scrapers. This was track rolled with a D6 dozer and levelling bar.
5. Grassing of Stage 7 occurred very shortly after the top soiling process was completed.

6.2. Roothing

A standard industrial/commercial roading operation was undertaken on Stage 7. The roading has been achieved using the following methodology:

1. Trim subgrade sand layer to level using Motor Scrapers and graders.
2. Check the subgrade CBR by Scala Penetrometer analysis.
3. Place lay and spread AP65 subbase layer using a Grader and 10-ton dynamic and static rollers to achieve optimum density.
4. Prepared Kerb lines using a grader and a 4-ton Dynapac roller.
5. Place, Laid, and formed slip form kerb and channels.
6. Backfilled kerb & channel using 12 Ton excavator.
7. Place lay and spread AP40 basecourse layer using a grader and 10-ton dynamic and static rollers to achieve optimum density, using a 9-ton PTR to tighten the top layer ready for sealing.

8. Check the compaction of the basecourse layer by Nuclear Densometer Readings and Benkelman Beam testing.
9. Sweep / clean the road of loose material and debris ready for seal.
10. Seal the street with a waterproofing seal coat and single coat chip seal (grade 5) using automatic pressurised bitumen sprayer 6-wheel trucks with chip spreading boxes on to spread both the bitumen and chip over the surface evenly.
11. Apply asphaltic concrete over the waterproofing layer using a paving machine and rollers. Asphaltic concrete to be DG10 or AC10 (refer to paving plan) to comply with NZTA M/10 Specification.

7. Testing & Inspection Methodology

The relevant quality control testing for the bulk earthworks was undertaken by Cook Costello and Geocivil Ltd at the required intervals. Testing locations are appended in Appendix 3, results of the tests can be found in Appendix 4.

Supervision by the Engineers was required at key critical stages, and a series of hold points were identified and agreed upon with the Contractor.

Testing was carried out at the same time for both Stages 6 and 7 by Geocivil Ltd. The testing has been issued as one package by Geocivil and can be found in Appendix 4. However, this report only utilises the Stage 7 testing as shown on the site testing plans in Appendix 3.

7.1. Pre-earthworks Testing to Determine Design

A range of geotechnical testing has been completed within Stage 7 that has allowed the appropriate design of the earthworks that have now been carried out.

This testing included:

- Cone penetration testing (CPT) to determine subsoil strengths and depths.
- Test pits to determine depths to the consolidated sand (hardpan).

The locations of the testing are found on the *Pre-earthworks Site Testing Plan* in Appendix 3.

7.1.1. Cone Penetration Testing

4 CPT's were conducted across Stage 7 by Geocivil on the 11th of May 2021. The CPTs enabled an understanding of the soil profile and strength across the stage. A summary of the results can be found in Table 1 below. CPT test locations can be found in Appendix 3 and detailed CPT logs can be found in Appendix 4.

Table 1: CPT testing completed before the earthworks

Test ID	Depth (m)	Groundwater Table (m)	Depth (m)	qc (MPa) ¹	Interpreted Soil Description
CPTH8	0.36 (anchor failure)	Not Encountered	Early anchor failure		
CPTJ6	1.0 (anchor failure)	Not Encountered	0.0 – 1.0	12	SAND and Silty SAND
CPTK9	0.95 (anchor failure)	Not Encountered	0.0 – 0.95	2.7	CLAY & Silty CLAY
CPTL6	1.2 (anchor failure)	Not Encountered	0.0 – 0.6	1.8	Silty SAND and Sandy SILT
			0.6 – 1.2	12	SAND and Silty SAND

7.1.2. Test Pits

9 test pits were carried out by Geocivil on the 15th of April 2021 across Stage 7. The test pits enabled the depth to the consolidated sand (hardpan) to be determined across the Stage. Geocivil carried out the test pits using a 12-tonne excavator. A summary of the test pit results can be seen in Table 2 below. Test-pit locations can be found in Appendix 3 and detailed soil logs can be found in Appendix 4.

Table 2: Summary of the test pits carried out pre-earthworks by Geocivil

Test ID	Depth (m)	Groundwater Table (m)	Layer Depth (m)	Soil Description
G8	0.3	Not Encountered	0.0 – 0.3	SAND trace silt
H09	0.8	Not Encountered	0.0 – 0.2	Sandy TOPSOIL
			0.2 – 0.65	Sandy SILT/Sandy PEAT
			0.65 – 0.8	Cemented SAND
J06	1.0	Not Encountered	0.0 – 1.0	SAND
J08	0.7	Not Encountered	0.0 – 0.2	Silty TOPSOIL
			0.2 – 0.4	Sandy PEAT
			0.4 – 0.7	SAND minor silt
J09	1.4	Not Encountered	0.0 – 0.1	Sandy TOPSOIL
			0.1 – 0.6	Amorphous PEAT
			0.6 – 1.4	SAND minor silt
K06	0.55	Not Encountered	0.0 – 0.1	Peaty TOPSOIL
			0.1 – 0.4	Amorphous PEAT some sand
			0.45 – 0.55	Cemented SAND
K08	0.85	Not Encountered	0.0 – 0.2	Peaty TOPSOIL
			0.2 – 0.6	Silty PEAT minor sand
			0.6 – 0.85	Cemented SAND
L08	1.0	Not Encountered	0.0 – 0.1	Peaty TOPSOIL
			0.1 – 0.5	Amorphous PEAT

Test ID	Depth (m)	Groundwater Table (m)	Layer Depth (m)	Soil Description
M07	0.9	Not Encountered	0.5 – 0.8	Silty SAND
			0.8 – 1.0	Cemented SAND some silt
			0.0 – 0.65	Amorphous PEAT minor sand
			0.65 – 0.75	Silty SAND
			0.75 – 0.9	SAND minor silt

7.2. Fill Testing

The Cook Costello Earthworks Specification (dated October 2018) initially suggested testing consisting of a Light Weight Deflectometer (LWD), Scala Penetrometers (DCP), and Nuclear Densometers (NDM).

However, as observed during the compaction of the material in the other stages, it was discovered that there was a delay of approximately 4 – 5 weeks between compaction and achieving the desired compaction results. This is due to pore-pressure build-up in the compacted fill material caused by the compaction process. The delay between testing and receiving results was unacceptable in terms of constructability.

As a result, it was decided to test the fill material using Static Plate Load Tests (PLT) where fill to undercut levels were deeper than 1.5m. This allowed the testing to be conducted at the finished level, speeding up the construction process. DCPs, NDMs, and LWDs were conducted at the finished level after the excess pore pressure was allowed to dissipate where fill depth to undercut was less than 1.5m depth.

The frequency of testing has been set up to be not less than:

- 1 test per layer or 200 mm thickness per material type per 2500 m²; or
- 1 test per 500 m³ distributed reasonably evenly throughout full depth and area; or
- 3 tests per visit; whichever requires the most tests.

The FILL testing was carried out across both Stages 6 & 7 and issued as one package by Geocivil. The following testing has been carried out on the sand FILL areas:

- No. 35 Plate Load Tests
- No. 8 CPTs
- Approximately 100 Scals and LWDs.

Locations of testing on the fill areas are shown on Drawing SK010 and SK011 appended to Appendix 3.

It is to be noted that the 300kPa ultimate bearing capacity has been calculated according to DIN 18134:2012-04 at 5mm vertical settlement (DIN 18134:2012-04: German Standard Soil Testing procedures and testing equipment – Plate load test, English translation of DIN 18134:2012-04).

7.3. Undercut Testing

The Cook Costello Earthworks Specification (dated October 2018) suggested testing consisting of a Light Weight Deflectometer (LWD) and Scala Penetrometers (DCP). Prior to fill placement, the area was stripped of vegetation and topsoil and inspected by Cook Costello and Geocivil Ltd. Site testing with DCPs was conducted to identify areas and depths that required further undercutting. Undercutting terminates on the consolidated sand layers (i.e. hard pan) and/or at the bottom of the peat or sandy peat layer.

Enabling works, undercut, and benching to competent material were inspected and approved by the supervising Engineer prior to filling.

Approximately 50 Scala penetrometer tests were carried out to assess the suitability of the undercut areas.

Locations of testing on the undercut areas are shown in Drawing SK010 and SK011 appended to Appendix 3. The testing package for Stages 6 & 7 as issued by Geocivil is appended in Appendix 4.

7.4. Laboratory Testing

Laboratory testing was undertaken during construction to determine the following characteristics for the sand fill and for enabling site testing procedures. Laboratory testing is attached to Appendix 4. An exhaustive list of laboratory testing is reported below:

- Determination of the Dry density/water content relationship – New Zealand Standard Compaction - NZS 4402: 1986 Test 4.1.1
- Determination of the particle size distribution-Dry sieving method - NZS 4407:2015 Test 3.8.2
- Determination of the Dry density/water content relationship – New Zealand Heavy Compaction - NZS 4402: 1986 Test 4.1.2
- Determination of pH levels from Piezometers

8. Foundation Design

8.1. Ultimate Bearing Capacity

Investigations have been carried out by or under the supervision of Geocivil Ltd or Cook Costello. The locations of tests are shown in Appendix 3. Test results are shown in Appendix 4.

In accordance with the Whangarei District Council Environmental Engineering Standards dated 2010 clause 2.7 The Councils Report on Completion of Construction undertook testing as the excavation or filling was carried out. The following testing was undertaken to support the statement of professional opinion as to the compliance of the filled/cut ground to the specification and the suitability of the land for Building Construction. (WDC Form EES-PO1). The testing undertaken in our view provides sufficient information to allow identification of any specific design requirements that necessitate the building foundation design to deviate from NZS 3604 and NZS 4229 and design parameters for the detailed design of the foundations (such as bearing capacity, suitable founding depth etc).

The testing approach has been to test and demonstrate that the bearing capacity requirements of NZS3604 and NZS 4229 have met or exceeded the requirements of the definition of “Good Ground” where the tests were undertaken. It is assumed that the extent of testing represents that 300kPa ultimate bearing capacity is exceeded over the entire building platform even though not every piece of that ground/soil has been tested.

The existing depth of peat/peaty sand was determined by the pre-earthworks testing as summarised in Section 7.1 of this report. The Geotechnical Investigation Report carried out by Ormiston Associated Ltd for the residential subdivision (ref. # 1600/2114, dated September 2005) was also referred to. This included 51 CPTs, 25 Flight Augers, and 4 test pits which were carried out across all stages in 2005. Due to the ongoing long-term settlement and shrinkage properties of the peat and organic soils, it was decided to remove this material as part of the bulk earthworks operations.

Scala Penetrometer and Plate Load testing were carried out to identify the compaction and ultimate bearing capacity of the sand fill layers. Scala Penetrometers were used to determine ultimate bearing capacity in cut areas. The bearing capacity results are summarised in Table 3. The provided ultimate bearing capacity of 300kPa is available below any topsoil that has been spread on site after the completion of the earthworks. It is to be noted that between 100 – 300 mm of topsoil has been spread throughout the site with an average of 200 mm.

Table 3: Bearing capacity summary for Stage 4 & Stage 5 of The Landing Subdivision.

Area	Depth (mbgl)	Ultimate Static Bearing Capacity (kPa)	Dependable Static Bearing Capacity (kPa)
Stage 7 (All lots)	0.1 – 0.5	300	150

The Statement of Professional Opinion on Suitability of Land for Building Construction - Form EES-PO1 is included in Appendix 6.

8.2. Static Settlements

Foundation design should limit the probable maximum differential settlement over a horizontal distance of 6 m to no more than 25 mm under serviceability limit state load combinations of AS/NZS 1170 Part 0 unless the structure is specifically designed to prevent damage under a greater settlement.

8.3. Subsoil Class

Generally, across the entire site, the soils are consistent with site subsoil classification Class C – Shallow Soil sites as per NZS1170.5, based on estimated shear velocity (V_s) values from the CPTs presented within Ormiston Associated Ltd (ref. # 1600/2114, dated September 2005) and the calculated natural period of the site was less than 0.6 seconds.

8.4. Liquefaction Potential

A liquefaction analysis has been carried out utilising the CPT investigations across both Stages 6 & 7. Five CPT investigations were conducted in Stage 6 and 3 were conducted in Stage 7. The location of this testing can be found in Appendix 3. Detailed test logs can be found in Appendix 4.

8.4.1. Previous Liquefaction Analysis

As stated in the Geotechnical Investigation Report carried out by Ormiston Associated Ltd (ref. # 1600/2114, dated September 2005) the site presents a low risk for the development of liquefaction during an earthquake. The investigations at the property presented in the Ormiston Geotechnical report, in particular the CPT tests, indicate that the site is underlain by upper dense sands (q_c varying from 8MPa to 20MPa) overlying a layer of loose to medium dense sands.

Groundwater was not encountered during any of our geotechnical testing. However, from CPTs conducted across the Stages as reported in the Ormiston Associated Ltd (ref. # 1600/2114, dated September 2005) groundwater has been encountered, varying between 4.5m and 5.3m. Liquefaction does not occur above the groundwater table and this relatively deep groundwater decreases the potential of liquefaction within the shallow layers that have been cut up to the consolidated sands (hardpan) or filled using compacted sands.

In the sand-filled areas, where unsuitable materials have been removed, sand fill has been compacted, increasing the relative density of the sands. Subsequently, further CPTs testing has been carried out to assess the liquefaction potential of the compacted sand fill.

8.4.2. CPT Investigations

Geocivil Ltd conducted eight CPTs to a 20 m target depth on 23 December 2021 where the sand fill depths were more significant within Stages 6 and 7. It is to be noted that between 100 – 300 mm of topsoil has been spread throughout the site. All the test results show Dense / Very Dense Sand below the topsoil with a cone resistance q_c between 4 and 22 MPa.

The CPT investigations carried out within Stage 7 are summarised in Table 4. CPT test locations are shown in Appendix 3. Detailed testing results are shown in Appendix 4.

Table 4: CPT Investigation results.

Test ID	Depth (m)	Groundwater Table (m)	Depth (m)	qc (MPa) ¹	Interpreted Soil Description
CPT01 (Stage 7)	2.1 (anchor failure)	Not Encountered	0.0 – 0.7	12	SAND & Silty SAND
			0.7 – 2.1	22	SAND
CPT02 (Stage 6)	1.1 (anchor failure)	Not Encountered	0.0 – 0.2	2	SAND & Silty SAND
			0.2 – 0.95	14	SAND & Silty SAND
			0.95 – 1.1	7.5	SAND & Silty SAND
CPT03 (Stage 6)	1.8 (anchor failure)	Not encountered	0.0 – 1.3	8.5	SAND & Silty SAND
			1.3 – 1.8	20	SAND
CPT04 (Stage 7)	22 (anchor failure)	Hole collapse at 2.5 m	0.0 – 3.0	8.5	SAND & Silty SAND
			3.0 – 5.2	12.3	SAND & Silty SAND
			5.2 – 9.7	8.3	SAND & Silty SAND
			9.7 – 14.5	5	SAND & Silty SAND
			14.5 - 21	6.2	Silty SAND & Sandy SILT
			21 – 22	15	Silty SAND & Sandy SILT
CPT05 (Stage 6)	20.7 (anchor failure)	Hole collapse at 2.9 m	0.0 – 1.0	7.5	SAND & Silty SAND
			1.0 – 5.0	14.5	SAND & Silty SAND
			5.0 – 7.8	10	SAND & Silty SAND
			7.8 – 13.7	7	SAND & Silty SAND
			13.7 – 18.8	4.3	Silty SAND & Sandy SILT
			18.8 – 20.7	8.2	Silty SAND & Sandy SILT
CPT06 (Stage 6)	3.1 (anchor failure)	Not encountered	0.0 – 0.7	7	SAND & Silty SAND
			0.7 – 1.9	4.3	SAND & Silty SAND
			1.9 – 2.5	10.7	SAND & Silty SAND
			2.5 – 3.1	17.8	SAND
CPT07 (Stage 6)	1.2 (anchor failure)	Not encountered	0.0 – 0.2	5	SAND & Silty SAND
			0.2 – 1.2	12	SAND & Silty SAND
CPT08 (Stage 7)	3.4 (anchor failure)	Not encountered	0.0 – 1.0	13.3	SAND & Silty SAND
			1.0 – 2.1	20.1	SAND

Test ID	Depth (m)	Groundwater Table (m)	Depth (m)	qc (MPa) ¹	Interpreted Soil Description
			2.1 – 2.9	7.1	SAND & Silty SAND
			2.9 – 3.4	22.1	SAND & Silty SAND

1. Cone tip resistance

8.4.3. Peak Ground Acceleration

According to NZS 1170.5:2004, Importance Level 2 buildings are required to be designed to resist earthquake shaking with an annual probability of exceedance of 1/500 (i.e. a 500-year return period). This is the ultimate limit state (ULS) design seismic loading. Structures are expected to retain their structural integrity during the ULS earthquake, and not collapse or endanger life.

Peak horizontal ground accelerations (PGA) have been calculated in accordance with MBIE/NZGS Module 1 (2016) using the following formula:

$$PGA = C_{0,1000} R f g / 1.3$$

$$C_{0,1000} = 0.19 \text{ for Whangarei (NZGS/MBIE Module 1)}$$

$$R = 1.0 \text{ for a 500-year return period event (NZS 1170.5)}$$

$$f = 1.33 \text{ for Class C}$$

Thus, the $PGA = 0.19 \times 1.0 \times 1.33 g / 1.3 = 0.19 g$ for ULS.

For the SLS case, the parameters have been selected as per NZGS Module 1 for a 25-year return period.

The seismic parameters are summarised in Table 5.

Table 5: Seismic parameters.

Importance Level	Limit State	Peak Ground Acceleration, PGA or C(T)	Effective Magnitude, M_w
2	ULS ¹	0.19	6.3
2	SLS ²	0.03	5.8

1. Ultimate Limit State
2. Serviceability Limit State

8.4.4. Method of Analysis

CPT results have been analysed using CLiq software to assess the potential soil liquefaction and settlement. Boulanger & Idriss (2014) was used to evaluate the liquefaction potential (triggering) of the soil strata at the site, and the method proposed by Zhang et al. (2002) was used for settlement calculations.

Liquefaction analysis results are attached in Appendix 5.

The assessment of liquefaction has been undertaken under ultimate limit state design (ULS) criteria and serviceability limit state design (SLS) criteria. The serviceability limit state is the point where a structure can no longer be used for its intended purpose but would still be structurally sound. The tolerances for serviceability depend on the intended use of the structure and can vary significantly (Section 2 of NZS 1170.5:2004).

A groundwater level of 3.0 mbgl was conservatively considered during earthquake events for the liquefaction analysis which is the shallowest recorded value within the Geotechnical Investigation Report carried out by Ormiston Associated Ltd.

8.4.5. Liquefaction Severity Number (LSN)

The Liquefaction Severity Number (LSN) is a method developed by Van Ballegooy et al (2013) which provides an estimate of liquefaction damage manifesting at the ground surface. The LSN parameter refines the calculated settlement by including a depth weighting function and can be used to differentiate the most severely damaged land from the least affected land. Table 6 provides the LSN ranges and associated damage classifications.

Table 6: LSN Ranges and damage classifications

LSN Range	Damage Classification
0 – 10	Little to No expression of liquefaction
10 – 20	Minor expression of liquefaction
20 – 30	Moderate expression of liquefaction
30 – 40	Moderate to severe expression of liquefaction
40 – 50	Major expression of liquefaction
50+	Severe damage

8.4.6. Ultimate Limit State (ULS)

A PGA value of 0.19 g and an earthquake magnitude (M_w) of 6.3 have been used for liquefaction analysis in accordance with NZGS Module 1 and the NZTA Bridge Manual guidelines.

8.4.6.1. Liquefaction Severity Number

The LSN for the ULS design case was 10.9 in CPT04 and 11.6 in CPT05. The rest of the CPT did not indicate any expression of liquefaction. This indicates *Minor expression of liquefaction* according to Table 6. Refer to Figure 1 below.

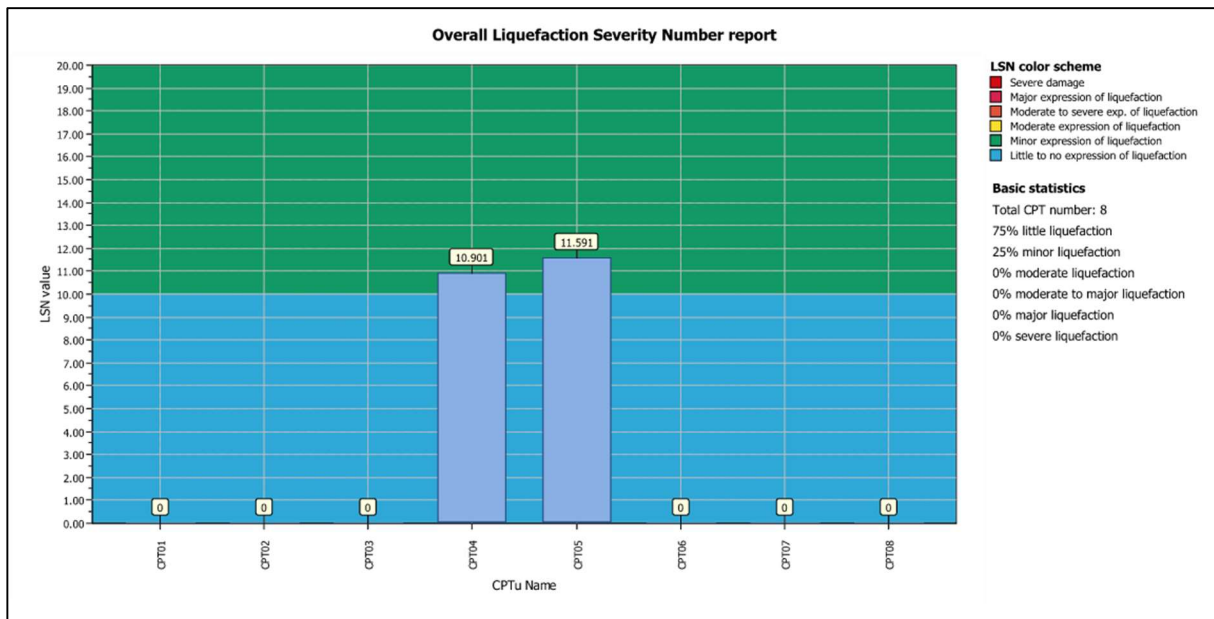


Figure 1: LSN results summary (ULS).

8.4.6.2. Liquefaction Induced Subsidence

Up to 85 mm of settlement has been noted under the ULS design earthquake parameters for CPT04 and 89 mm of settlement for CPT05. All other CPTs showed nil settlement. It should be noted that this is a free-field settlement and does not consider the weight or dynamic behaviour of any structure supported on the ground surface or the presence of a non-liquefiable crust at the surface. Table 7 summarises the settlement estimation in ULS conditions.

Refer to the liquefaction results attached in Appendix 5.

Table 7: Liquefaction profile under design ULS seismic loading conditions.

Test Location	Settlement (mm)
CPT04	85
CPT05	89

All CPTs refused early other than CPT04 and CPT05 which indicate a dense crust is available to a depth of approximately 2 – 5 m. This dense layer comprises of the compacted sandfill and hardpan which has been identified through our acceptance testing. This dense crust has an indicative tip resistance (q_c) that is generally in excess of 15 MPa. From our liquefaction analysis, and due to the dense nature of this crust we consider this upper layer to be non-liquefiable. Studies such as Ishihara (1985) show that the presence of a non-liquefiable crust at the ground surface may reduce the manifestation and damaging effects of liquefaction. Using the $PGA = 0.2g$ $H_2 - H_1$ chart developed by Ishihara (1985),

analysis with the software CLiq indicates that liquefaction-induced ground damage is unlikely to occur during the ULS earthquake.

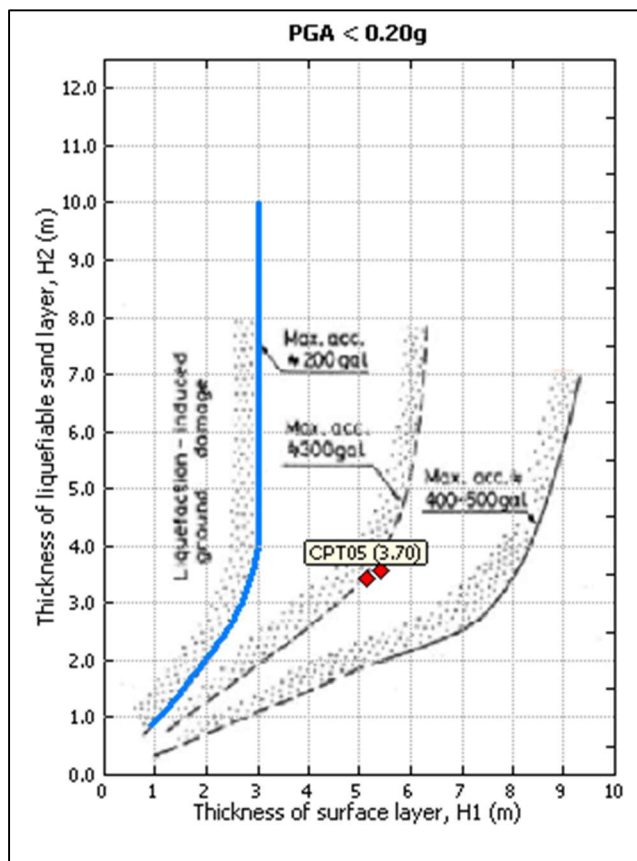


Figure 2: H2-H1 Chart for liquefaction-induced damage (Ishihara, 1985)

8.4.6.3. Lateral Displacement

We have calculated nil lateral displacements in the ULS earthquake case across all CPTs.

8.4.7. Serviceability Limit State (SLS)

A PGA value of 0.03 g and an earthquake magnitude (M_w) of 5.8 have been used for liquefaction analysis for the SLS case in accordance with NZGS Module 1 and the NZTA Bridge Manual guidelines.

8.4.7.1. Liquefaction Severity Number

The LSN for the SLS design case was nil. This indicates *Little to no expression of liquefaction* according to Table 6. Refer to Figure 2 below.

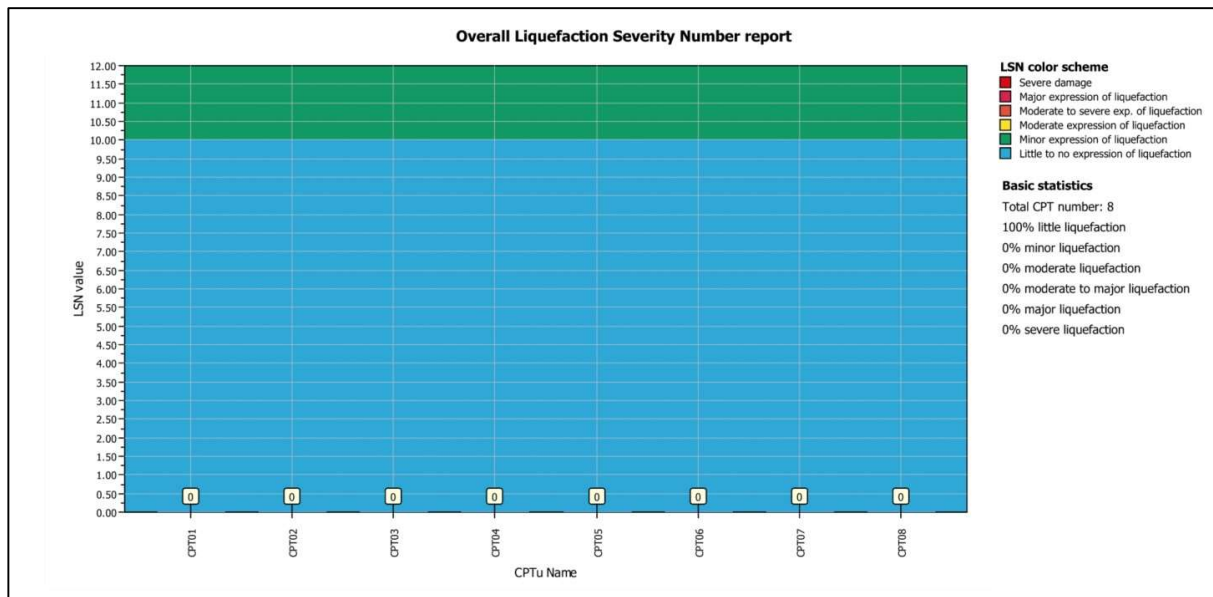


Figure 3: LSN results summary (SLS).

8.4.7.2. Liquefaction Induced Subsidence

No settlement has been noted under the SLS design earthquake parameter. Refer to the liquefaction results attached in Appendix 5.

8.4.8. Liquefaction Summary

The liquefaction assessment has been carried out across Stages 6 & 7 as one package. Liquefaction potential is considered to be low. A minor expression of liquefaction is expected within the Stages 6 & 7 subdivision. Liquefaction analysis results are attached in Appendix 5. Up to 89 mm of settlements could be expected under the ULS earthquake case. No settlement is expected during the SLS which is within the tolerance of the building code that is 25 mm over 6 m according to Clause B1/VM1 for static settlements. No lateral displacement is expected.

All CPTs refused early other than CPT04 and CPT05 which indicate a dense crust is available to a depth of approximately 2 – 5 m. This dense layer comprises of the compacted sandfill and hardpan which has been identified through our acceptance testing. This dense crust has an indicative tip resistance (q_c) that is generally in excess of 15 MPa. From our liquefaction analysis, and due to the dense nature of this crust we consider this upper layer to be non-liquefiable. Studies such as Ishihara (1985) show that the presence of a non-liquefiable crust at the ground surface may reduce the manifestation and damaging effects of liquefaction. Using the $PGA = 0.2g$ H2 – H1 chart developed by Ishihara (1985), analysis with the software CLiq indicates that liquefaction-induced ground damage is unlikely to occur during the ULS earthquake.

8.5. Acid Sulphate Risk

8.5.1. Acid Sulphate Testing Discussion

The Landing Stage 6 subdivision is mapped on the Whangarei District Council Map to be in the Acid Sulphate Risk Area. Acid Sulphate Soil Field PH Tests have been conducted on-site following the Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1, Section H, published by Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia, June 2004. This Australian guide applies to soils below an RL of 5.0m.

Given the vicinity of Stage 3, no further testing was carried out for Stage 6. Outcomes of further testing would not have changed the conservative approach to the mitigation measures for the foundation design recommended in Sections 8.5.2 and 8.5.3.

Field pH (pH_F) recording has been undertaken on-site at the invert level (Test B) of proposed infrastructures (i.e. stormwater and sewer pipes) and 1 m above the invert level (Test A) in 10 different locations. Field testing is appended to Appendix 4.

For both Test A and Test B cases, a field pH peroxide test (pH_{ox}) was performed on each of the 10 samples adding 30% of H₂O₂ (Hydrogen peroxide) to the 10 samples taken from the field in order to determine soil pH following complete oxidation.

After the reaction, the rate of the reaction indicates the level of sulfides present. The reaction is characterised by heat and gas evolution. A soil containing very little sulfides only rates an 'X' (Slight Reaction) however a soil containing high levels of sulfides is likely to rate an 'XXXX' (Very Vigorous Reaction). All the soil reactions of the pH_{ox} tests undertaken by Geocivil are characterised by an "X", therefore soils are likely to contain very few sulfides. Also, according to the ASS Sampling & Analysis Guidelines, 1998, a pH_{ox} value at least one unit below field pH_F indicates the potential presence of acid sulphate soils. The greater the difference between the two measurements, the more indicative the value is of a PASS (Potential Acid Sulphate Soils). The lower the final pH_{ox} value is, the better the indication of a positive result. The lab testing generally shows a pH_{ox} value less than one unit below field pH, therefore the presence of acid sulphate soils could be little. Another qualitative indication of little sulphides is that if the measured pH_{ox} < 3. The more the pH_{ox} drops below 3, the more positive the presence of sulfides is. There is one pH_{ox} value recorded below 3.

These results are consistent with local observations of good quality concrete that had been in the ground for a long time and has been excavated and shows no sulphate acid damage.

However, the PH_F and pH_{ox} values are comprised of between 2.92 and 5.22. According to NZS 3101:Part 1:2006 Section 3.4.3.2, an acidity represented by a PH of 5.0 to 5.5 may be considered as a practical limit of tolerance of high-quality concrete in contact with any acids. For pH lower than 5.0, the environment shall be assessed as exposure classification U. As per Section 3.8, NZS 3101, Exposure Classification U represents an exposure environment not specified in Table 3.1 of NZS 3101 for which the degree of severity should be assessed by the designer. Concrete in members subject to exposure classification U shall be specified to ensure durability under the particular exposure environment and for

the chosen design life. Protective coatings may be taken into account in the assessment of concrete requirements.

Alternatively, as reported in the Acid Sulphate Soil Planning Policy Basic Guide prepared for WDC by Opus International Consultants, Australian Standard AS 2159 – 2009 Section 6 is relevant when designing concrete and steel structures to withstand corrosive environments. This standard refers to piles, however, the knowledge can be transferred to other structures.

8.5.2. Mitigation measures for Shallow Foundations

Given the acid sulphate soil risk and low pH values recorded on site, it is recommended to install a waterproof membrane underneath any shallow foundations, the membrane should be extended up to the edge of the foundations. If the above recommendations are followed, the concrete exposure class can be A1 according to NZS3101. A typical detail is shown in Figure 4 showing the damp-proof membrane for a typical foundation detail.

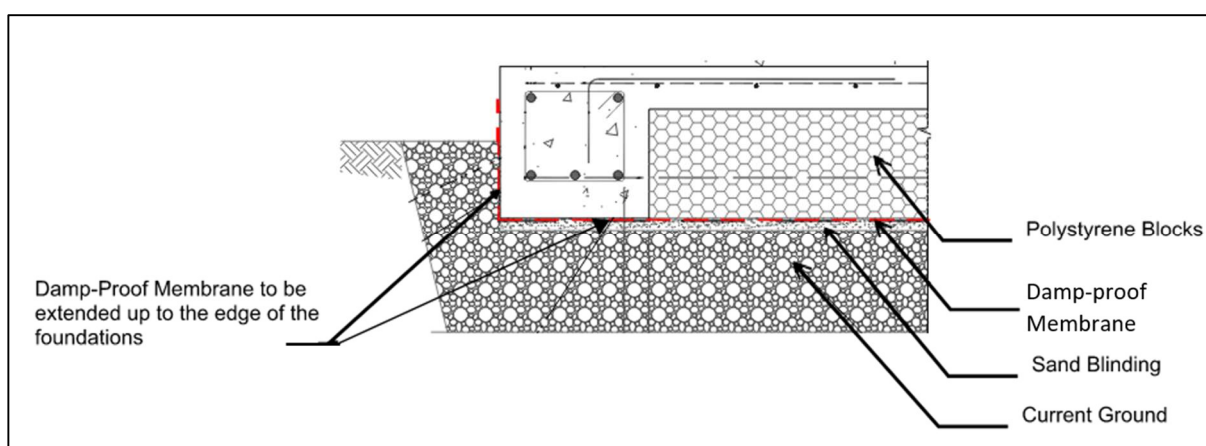


Figure 4: Damp-Proof Membrane Detail

8.5.3. Mitigation measures for Deep Foundations

8.5.3.1. Concrete

In case of deep concrete foundations were used on-site, it is recommended to refer to the Australian Standard AS 2159 – 2009 Section 6 when designing concrete and steel structures to withstand corrosive environments.

The exposure classification of concrete is *Very Severe* according to Table 6.4.2 (C) of AS 2159 – 2009, considering a pH of less than 4 and soil Conditions A (high permeability soils). It is recommended to refer to Table 6.4.3 of AS 2159 – 2009 to select the minimum strength of concrete and concrete cover relevant for the *Very Severe* Exposure Classification and design life.

8.5.3.2. Steel

If steel elements are used in the ground (i.e. driven H-steel piles, etc.), it is recommended to adopt the Severe Exposure Classification shown in Table 6.5.2 (C) of AS 2159 – 2009, considering a pH less than 3 and soil Conditions A (high permeability soils).

A uniform corrosion allowance of 0.04-0.1 mm/year should be adopted during the design of any underground steel structure.

8.5.3.3. Timber

No precautions are required to be taken for timber piles. Timber is not susceptible to acidic corrosion.

8.6. Proposed Building Foundations

The test results indicate that the sites (once the peat/topsoil layer is removed) are suitable for standard foundations for buildings.

If a shallow concrete strip footing or concrete slab on grade is to be used, any organic soil such as peat and topsoil in the building footprint is to be excavated and replaced with an engineered hard fill layer of compacted aggregate in accordance with NZS 4431 or AS 3798:2007.

The Sandy material across all lots in Stage 7 is consistent with a Class A site as defined by AS 2870:2011 indicating little to no ground movement from moisture changes is expected.

This means that the finished ground within the lots is suitable for the erection of buildings on “Good Ground” in terms of NZS 3604:2011 (Timber Framed Buildings) & NZS 4229:2013 (Concrete Masonry Buildings Not Requiring Specific Engineering Design) and related documents providing that:

- A standard check of excavated foundations is carried out at the time of construction.
- Buildings subject to heavy loads or vibrations will require specific design.
- Buildings not meeting the criteria for NZS3604:2011 and NZS4229:2013 will require specific design.

This report and the inferred professional opinions found within do not remove the necessity for normal inspection and design of foundations, as would be made in natural ground.

Site-specific testing should be carried out within each lot within the proposed building footprint and should be selected to give adequate information about the soil over the entire plan area of the proposed building.

There shall be a minimum of four test sites for a building up to 200 m², with at least one additional test site for each additional 100 m² plan area of building as recommended by NZS3604.

9. Conclusions

Cook Costello was engaged by WFH Properties Ltd, to provide technical advice for earthworks and be the geo-professional for the Landing Stage 7 subdivision at One Tree Point, Northland. Cook Costello designed earthwork cuts and placement of controlled sand-engineered fill, in order to enable the construction of the building platforms within the proposed development.

All lots have been subject to bulk earthworks to provide sites suitable for standard foundations for typical residential buildings. Any heavy structures or heavy industry users will require specific design and further investigations. A layer of topsoil was spread over the lots to ensure moisture is retained and grass will grow to prevent wind-blown erosion.

Based on our investigations we make the following conclusions and recommendations:

- The test results indicate that the sites (once the peat/topsoil layer is removed) are suitable for standard foundations for buildings.
- An ultimate bearing capacity of 300kPa is available from approximately 0.1 – 1.3 m across Stage 7, below any peat/topsoil that has been spread on site after the completion of the earthworks.
- Between 100 – 300 mm of topsoil has been spread throughout the site with an average of 200 mm.
- The site is consistent with Subsoil Class C – Shallow Soil sites as per NZS1170.5.
- Liquefaction potential is low. Minor expression of liquefaction is expected within Stage 6 and Stage 7 subdivisions in ULS conditions. No expression of liquefaction is expected during SLS conditions.
- No seismic-induced settlement is expected during SLS conditions.
- Up to 89 mm of settlements could be expected under the ULS earthquake case. However, taking into account the 2 – 5 m thick non-liquefiable, dense crust and according to Ishihara (1985) analysis with CLiq software indicates that liquefaction-induced ground damage is unlikely to occur during the SLS and ULS conditions.
- No seismic-induced lateral spreading is expected under both SLS and ULS conditions.
- Foundation design should limit the probable maximum differential settlement over a horizontal distance of 6 m to no more than 25 mm under serviceability limit state (SLS) load combinations of AS/NZS 1170 Part 0 unless the structure is specifically designed to prevent damage under a greater settlement.
- The Landing Stage 7 subdivision is mapped on the Whangarei District Council Map to be in the Acid Sulphate Risk Area is a well-known hazard in the area and well addressed with standard construction measures (i.e. waterproof membrane for shallow foundations).

Acid Sulphate Soil Field PH Tests have been conducted. Results of lab testing suggest that soils are likely to contain very few sulfides.

- However, the PH_f and pH_{ox} values are comprised of between 2.92 and 5.22. According to NZS 3101:Part 1:2006 Section 3.4.3.2, an acidity represented by a PH of 5.0 to 5.5 may be considered as a practical limit of tolerance of high-quality concrete in contact with any acids.
 - For pH lower than 5.0, the environment shall be assessed as exposure classification U as per NZS 3101.
 - Alternatively, as reported in the Acid Sulphate Soil Planning Policy Basic Guide prepared for WDC by Opus International Consultants, Australian Standard AS 2159 – 2009 Section 6 is relevant when designing concrete and steel structures to withstand corrosive environments.
 - It is recommended to install a waterproof membrane underneath any shallow foundations, the membrane should be extended up to the edge of the foundations to mitigate the presence of a corrosive environment. If the above recommendations are followed, the concrete exposure class can be A1 according to NZS3101.
 - In case of deep concrete foundations were used on-site, it is recommended to refer to the Australian Standard AS 2159 – 2009 Section 6 when designing concrete and steel structures to withstand corrosive environments. The exposure classification of concrete is *Very Severe* according to Table 6.4.2 (C) of AS 2159 – 2009, considering a pH less than 4 and soil Conditions A (high permeability soils). It is recommended to refer to Table 6.4.3 of AS 2159 – 2009 to select the minimum strength of concrete and concrete cover relevant for the *Very Severe* Exposure Classification and design life.
 - If steel elements are used in the ground (i.e. driven H-steel piles, etc.), it is recommended to adopt the Severe Exposure Classification shown in Table 6.5.2 (C) of AS 2159 – 2009, considering a pH less than 3 and soil Conditions A (high permeability soils). A uniform corrosion allowance of 0.04-0.1 mm/year should be adopted during the design of any underground steel structure.
 - No precautions are required to be taken for timber piles. Timber is not susceptible to corrosion by acid.
- If a shallow concrete strip footing or concrete slab on grade is to be used, any organic soil such as peat and topsoil in the building footprint is to be excavated and replaced with an engineered hard fill layer of compacted aggregate in accordance with NZS 4431 or AS 3798:2007.
 - The Sandy material for all lots in Stage 7 is consistent with a Class A site as defined by AS 2870:2011 indicating little to no ground movement from moisture changes is expected.
 - The finished ground within the lots is suitable for the erection of buildings on “Good Ground” in terms of NZS 3604:2011 (Timber Framed Buildings) & NZS 4229:2013 (Concrete Masonry Buildings Not Requiring Specific Engineering Design) and related documents providing that:
 - A standard check of excavated foundations is carried out at the time of construction.

- Buildings subject to heavy loads or vibrations will require specific design.
- Buildings not meeting the criteria for NZS3604:2011 and NZS4229:2013 will require specific design.
- This report and the inferred professional opinions found within do not remove the necessity for site-specific geotechnical investigation, normal inspection, and design of foundations, as would be made in natural ground.

10. Limitations

This report has been prepared for the benefit of WFH Properties Limited as our client with respect to a geotechnical completion report for Stage 7 of The Landing Subdivision, One Tree Point. It shall not be relied upon for any other purpose. The reliance by other parties on the information or opinions contained in this report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Opinions and judgments expressed herein are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions. Where opinions or judgments are to be relied on they should be independently verified with appropriate legal advice. Any recommendations, opinions, or guidance provided by Cook Costello in this report are limited to technical engineering requirements and are not made under the Financial Advisers Act 2008.

Recommendations and opinions in this report are based on data from testing undertaken on-site. The nature and continuity of subsoil conditions away from the tests are inferred and it must be appreciated that actual conditions could vary considerably from the assumed model.

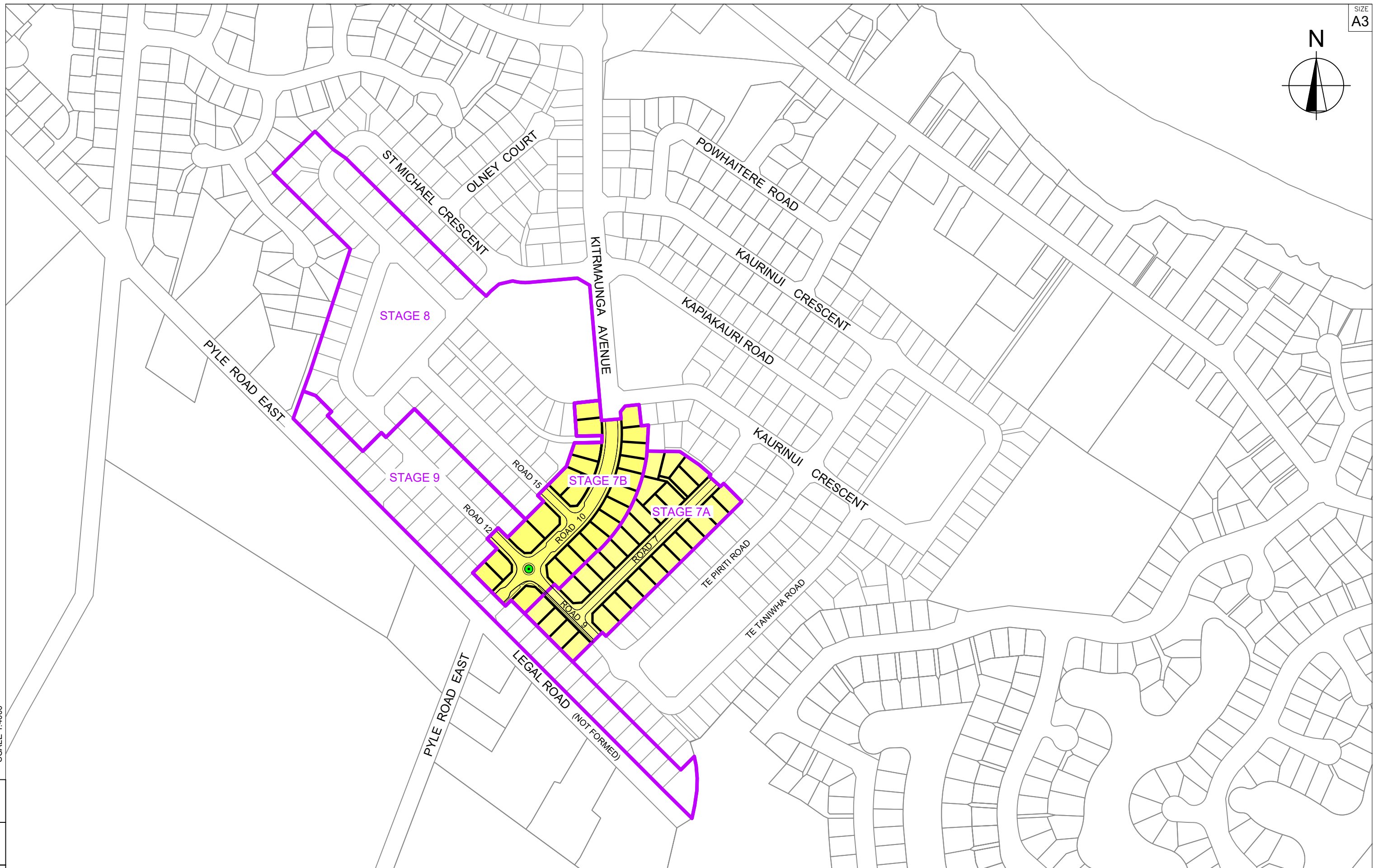
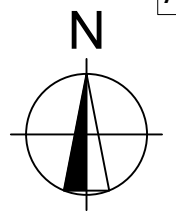
During excavation and construction, the site should be examined by a Cook Costello Engineer or Engineering Geologist to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoil may require further investigation and modification of the design based on this report. In any event, it is essential that the firm is notified if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

Cook Costello has performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment. No guarantees are either expressed or implied.

There is no investigation that is thorough enough to preclude the presence of materials at the site which presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable now may in the future become subject to different regulatory standards which cause them to become unacceptable and require further remediation for this site to be suitable for the existing or proposed land use activities.

This report is generally appropriate for engineering use for five years, however, it should be considered that future seismic events may change soil parameters and as a result, a new assessment of the site may be necessitated. Local changes in groundwater tables may also necessitate a reassessment of the site. It is recommended that if an interpretive report is more than two years old, or the proposed building that the report originally applied to has changed significantly, (e.g., layout, height, weight of building materials, foundation loads, etc.) and/or design loadings have changed (e.g., design PGA levels), then the report is reviewed by the geotechnical engineer for current applicability.

Appendix 1 – Scheme Plan



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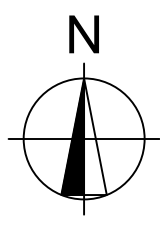


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PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGE 7
ONE TREE POINT
RUAKAKA

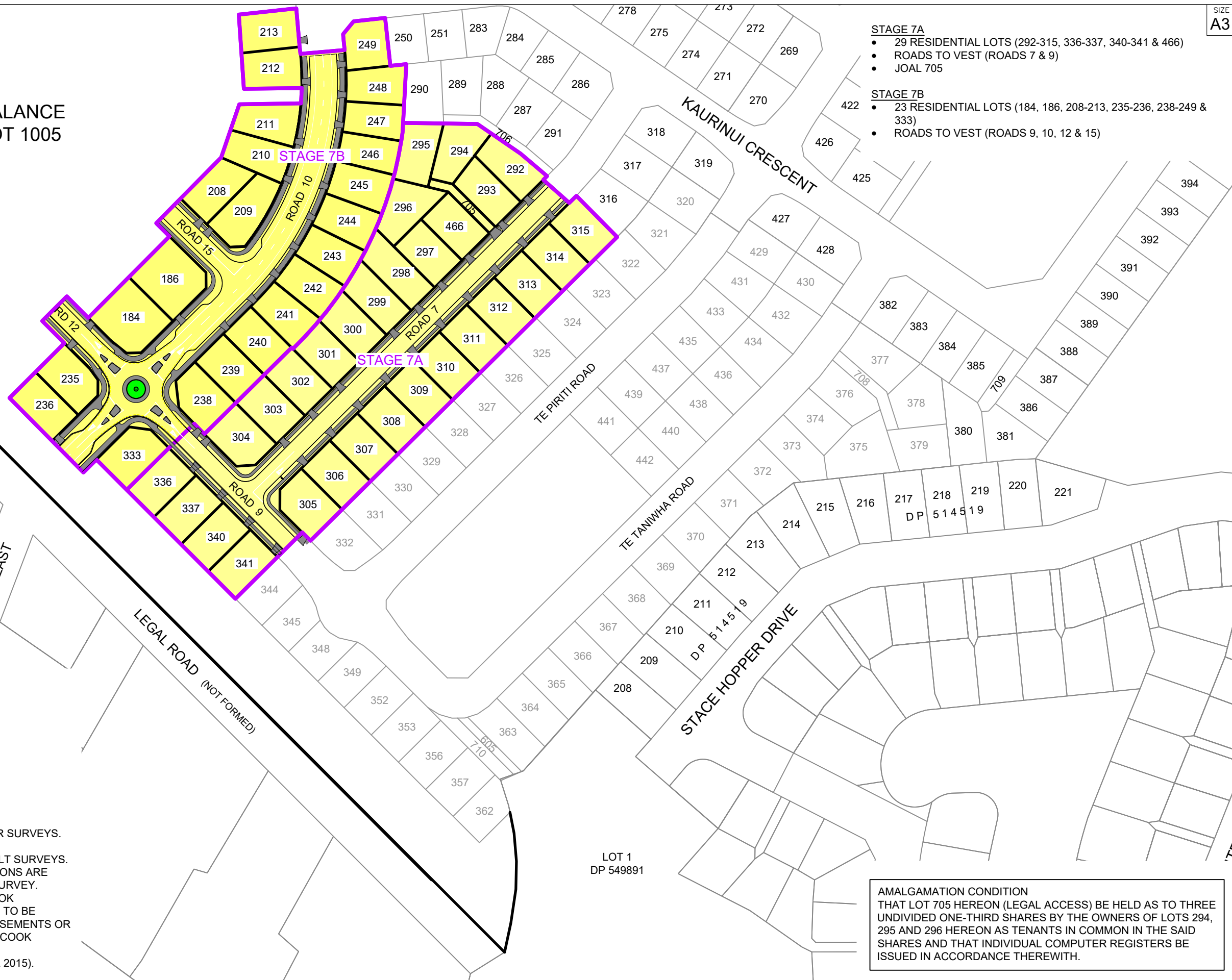
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SCHEME PLAN - STAGES 7A & 7B OVERVIEW
PROPOSED SUBDIVISION OF
LOT 1003 (STAGE 6)
SHEET 1 OF 4

DATE CREATED ??/??/2022	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
CCL REF NO 14333-006	SCALE 1:4000 @ A3	STATUS FOR APPROVAL	
DWG NUMBER SCH01	REVISION A		



BALANCE LOT 1005

- STAGE 7A**
- 29 RESIDENTIAL LOTS (292-315, 336-337, 340-341 & 466)
 - ROADS TO VEST (ROADS 7 & 9)
 - JOAL 705
- STAGE 7B**
- 23 RESIDENTIAL LOTS (184, 186, 208-213, 235-236, 238-249 & 333)
 - ROADS TO VEST (ROADS 9, 10, 12 & 15)



100 SCALE 1:2000
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- NOTES**
1. ALL AREAS ARE SUBJECT TO FINAL LAND TRANSFER SURVEYS.
 2. FINAL LAYOUT SUBJECT TO CONSTRUCTION.
 3. FINAL LAYOUT TO BE CONFIRMED WITH 224c AS BUILT SURVEYS.
 4. THIS IS A CONCEPT PLAN. ALL AREAS AND DIMENSIONS ARE APPROXIMATE ONLY AND ARE SUBJECT TO FINAL SURVEY.
 5. THE VENDOR AND PURCHASER MUST CONTACT COOK COSTELLO IF SALE & PURCHASE AGREEMENTS ARE TO BE ENTERED INTO USING THIS PLAN. BOUNDARIES, EASEMENTS OR OTHER DETAIL WILL NEED TO BE CONFIRMED WITH COOK COSTELLO.
 6. THIS PLAN IS COPYRIGHT TO COOK COSTELLO (CCL 2015).

AMALGAMATION CONDITION
 THAT LOT 705 HEREON (LEGAL ACCESS) BE HELD AS TO THREE UNDIVIDED ONE-THIRD SHARES BY THE OWNERS OF LOTS 294, 295 AND 296 HEREON AS TENANTS IN COMMON IN THE SAID SHARES AND THAT INDIVIDUAL COMPUTER REGISTERS BE ISSUED IN ACCORDANCE THEREWITH.

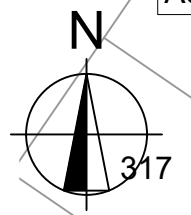


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PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGE 7
ONE TREE POINT
RUAKAKA

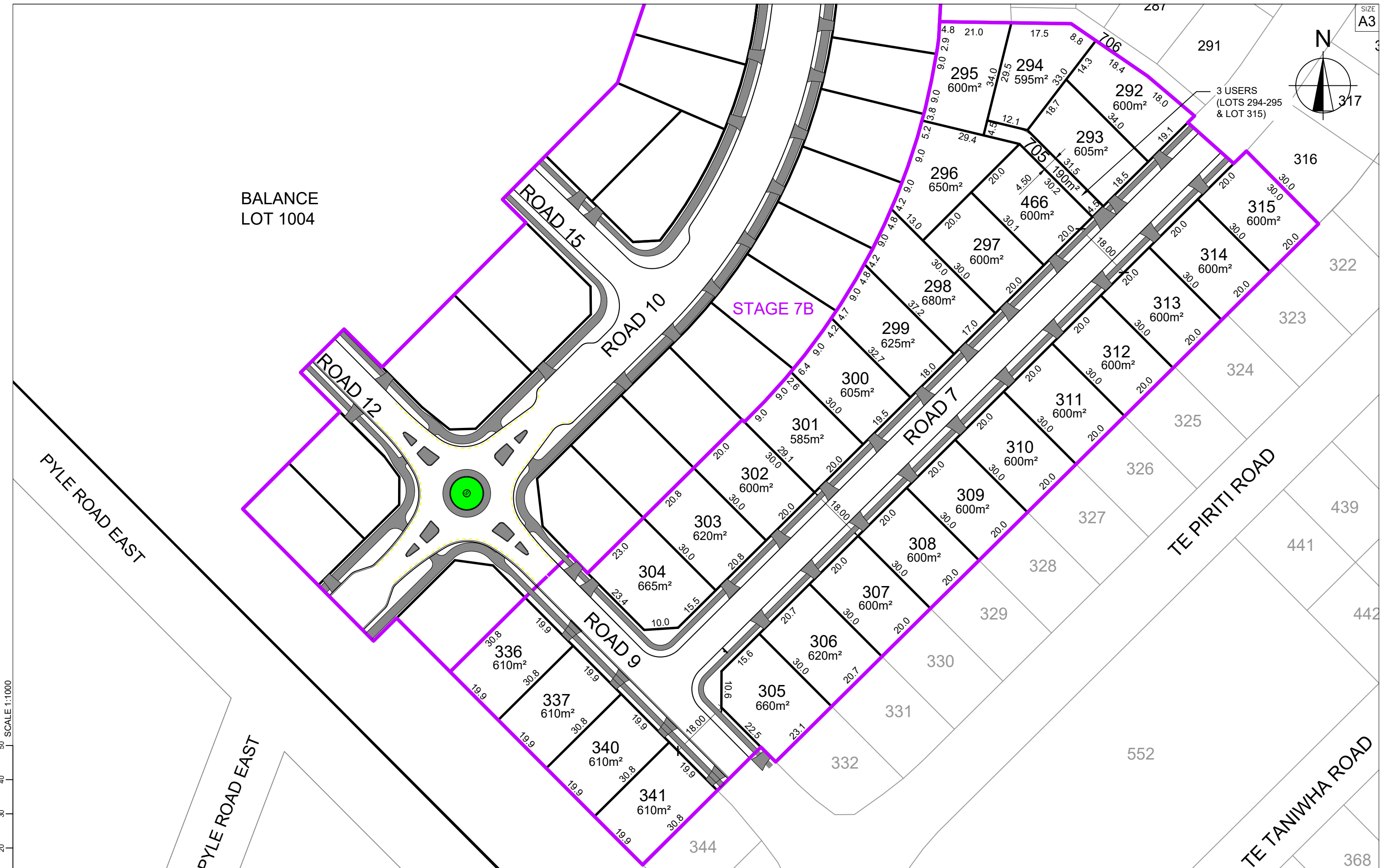
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SCHEME PLAN - STAGES 7A & 7B
PROPOSED SUBDIVISION OF
LOT 1003 (STAGE 6)
SHEET 2 OF 4

DATE CREATED ??/??/2022	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
CCL REF NO 14333-006	SCALE 1:2000 @ A3	STATUS FOR APPROVAL	
DWG NUMBER SCH02	REVISION A		



3 USERS
(LOTS 294-295
& LOT 315)

BALANCE
LOT 1004



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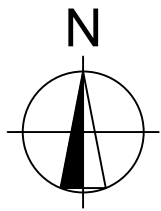
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PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGE 7
ONE TREE POINT
RUAKAKA

TITLE
SCHEME PLAN - STAGE 7A
PROPOSED SUBDIVISION OF
LOT 1003 (STAGE 6)
SHEET 3 OF 4

DATE CREATED ??/??/2022	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
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DWG NUMBER SCH03	REVISION A		

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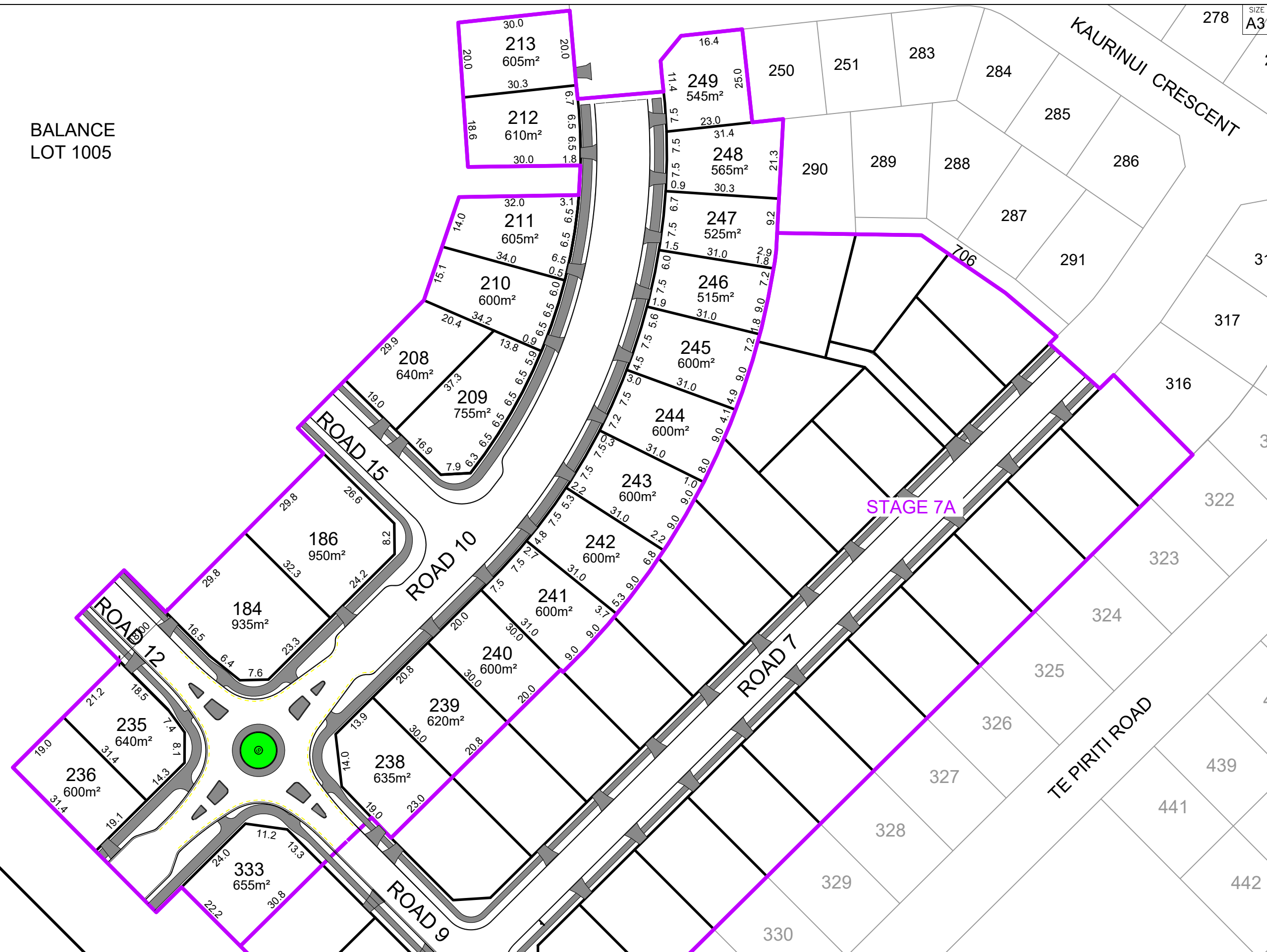
BALANCE
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PYLE ROAD EAST



STAGE 7A

TE PIRITI ROAD



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PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGE 7
ONE TREE POINT
RUAKAKA

TITLE
SCHEME PLAN - STAGE 7B
PROPOSED SUBDIVISION OF
LOT 1004 (STAGE 7A)
SHEET 4 OF 4

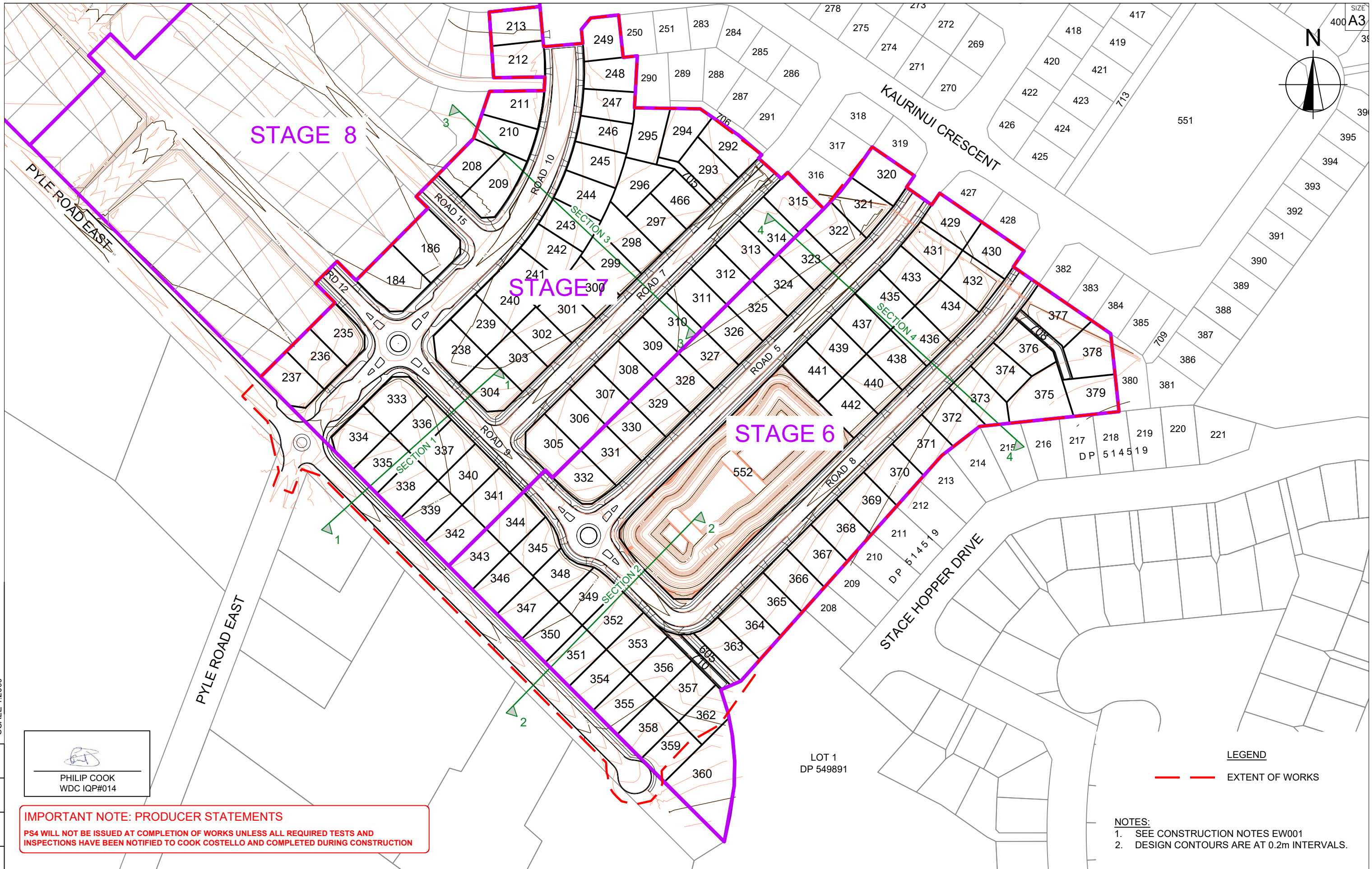
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DWG NUMBER	SCH04		REVISION		A		

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Appendix 2 – Finished Contours Plan



IMPORTANT NOTE: PRODUCER STATEMENTS
 PS4 WILL NOT BE ISSUED AT COMPLETION OF WORKS UNLESS ALL REQUIRED TESTS AND INSPECTIONS HAVE BEEN NOTIFIED TO COOK COSTELLO AND COMPLETED DURING CONSTRUCTION

LEGEND
 --- EXTENT OF WORKS

NOTES:
 1. SEE CONSTRUCTION NOTES EW001
 2. DESIGN CONTOURS ARE AT 0.2m INTERVALS.



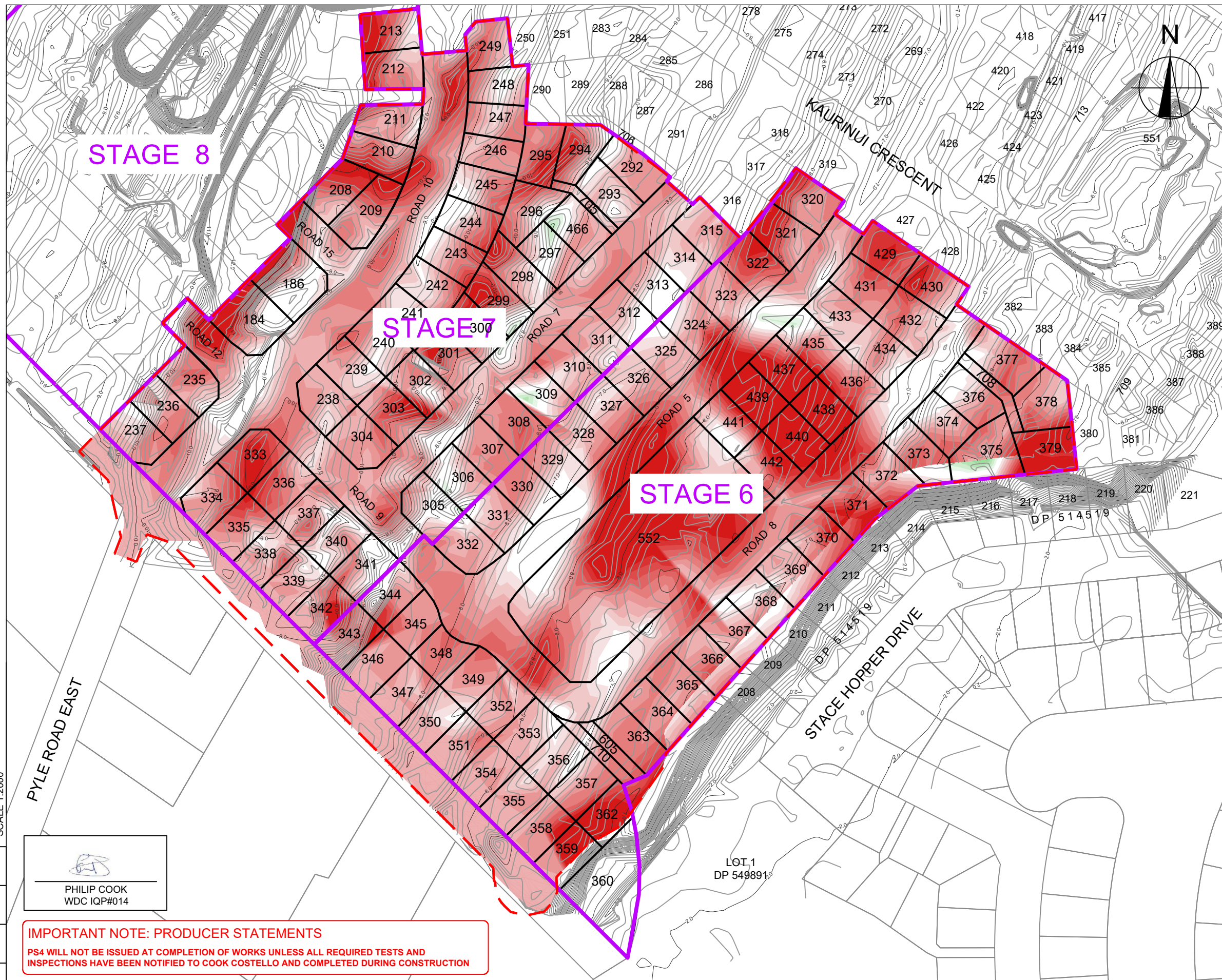
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REV.	REVISION DETAILS	DRAWN APP.	

PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGES 6 & 7
ONE TREE POINT
RUAKAKA

TITLE
FINISHED LEVELS PLAN

DATE CREATED 28/05/2021	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
CCL REF NO 14333-006	SCALE 1:2000 @ A3	STATUS FOR APPROVAL	
DWG NUMBER EW400		REVISION A	

- NOTES:**
 1. SEE CONSTRUCTION NOTES EW001
 2. EXISTING CONTOURS ARE AT 0.2m INTERVALS



DEPTH RANGE LEGEND		Colour	
Lower_value	Upper_value		
-6.0	to -1.8	m	Dark Red
-1.8	to -1.6	m	Red
-1.6	to -1.4	m	Red-Orange
-1.4	to -1.2	m	Orange
-1.2	to -1.0	m	Light Orange
-1.0	to -0.8	m	Light Red
-0.8	to -0.6	m	Light Orange
-0.6	to -0.4	m	Light Red
-0.4	to -0.2	m	Light Orange
0.0	to 0.2	m	Light Red
0.2	to 0.4	m	Light Orange
0.4	to 0.6	m	Light Red
0.6	to 0.8	m	Light Orange
0.8	to 1.0	m	Light Red
1.0	to 1.2	m	Light Orange
1.2	to 1.4	m	Light Red
1.4	to 1.6	m	Light Orange
1.6	to 1.8	m	Light Red
1.8	to 2.0	m	Light Orange
2.0	to 5.0	m	Light Red

LEGEND
 EXTENT OF WORKS

QUANTITIES:
 TOPSOIL STRIP AREA = 116,753m²
 TOTAL TOPSOIL STRIP 200mm THICK = 23,350m³
 TOTAL PEAT STRIP = 110,600m³
 TOTAL FILL = 272m³

VOLUMES BASED ON COMPARISON BETWEEN EXISTING TOPO DATA AND ASSUMED TOP OF SAND LAYER.

- NOTES:**
1. THE TOP OF SAND SURFACE HAS BEEN INFERRED BASED ON GEOTECHNICAL TESTING AND WILL NEED TO BE CONFIRMED ON SITE DURING EXCAVATION.
 2. VOLUME ABOVE IS BASED ON SOLID MEASURE. IT IS RECOMMENDED THAT FURTHER ADJUSTMENTS BE MADE TO THE VOLUMES MENTIONED ABOVE TO ALLOW FOR ITEMS SUCH AS BULKING FACTORS AND PAVEMENT BOXING.
 3. ALL 1 IN 1 BATTERS TO HAVE A TEMPORARY SAFETY FENCE ERECTED AT TOP OF BATTER OR OTHER APPROVED SAFETY MANAGEMENT PLAN.

100 SCALE 1:2000
80
60
40
20
0

PHILIP COOK
 WDC IQP#014

IMPORTANT NOTE: PRODUCER STATEMENTS
 PS4 WILL NOT BE ISSUED AT COMPLETION OF WORKS UNLESS ALL REQUIRED TESTS AND INSPECTIONS HAVE BEEN NOTIFIED TO COOK COSTELLO AND COMPLETED DURING CONSTRUCTION



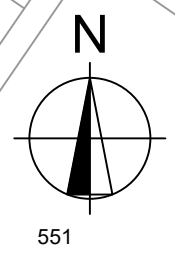
C			
B			
A	IST ISSUE	28-05-21	KH PC
REV.	REVISION DETAILS	DATE	DRAWN APP.

PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGES 6 & 7
ONE TREE POINT
RUAKAKA

TITLE
PEAT STRIP PLAN

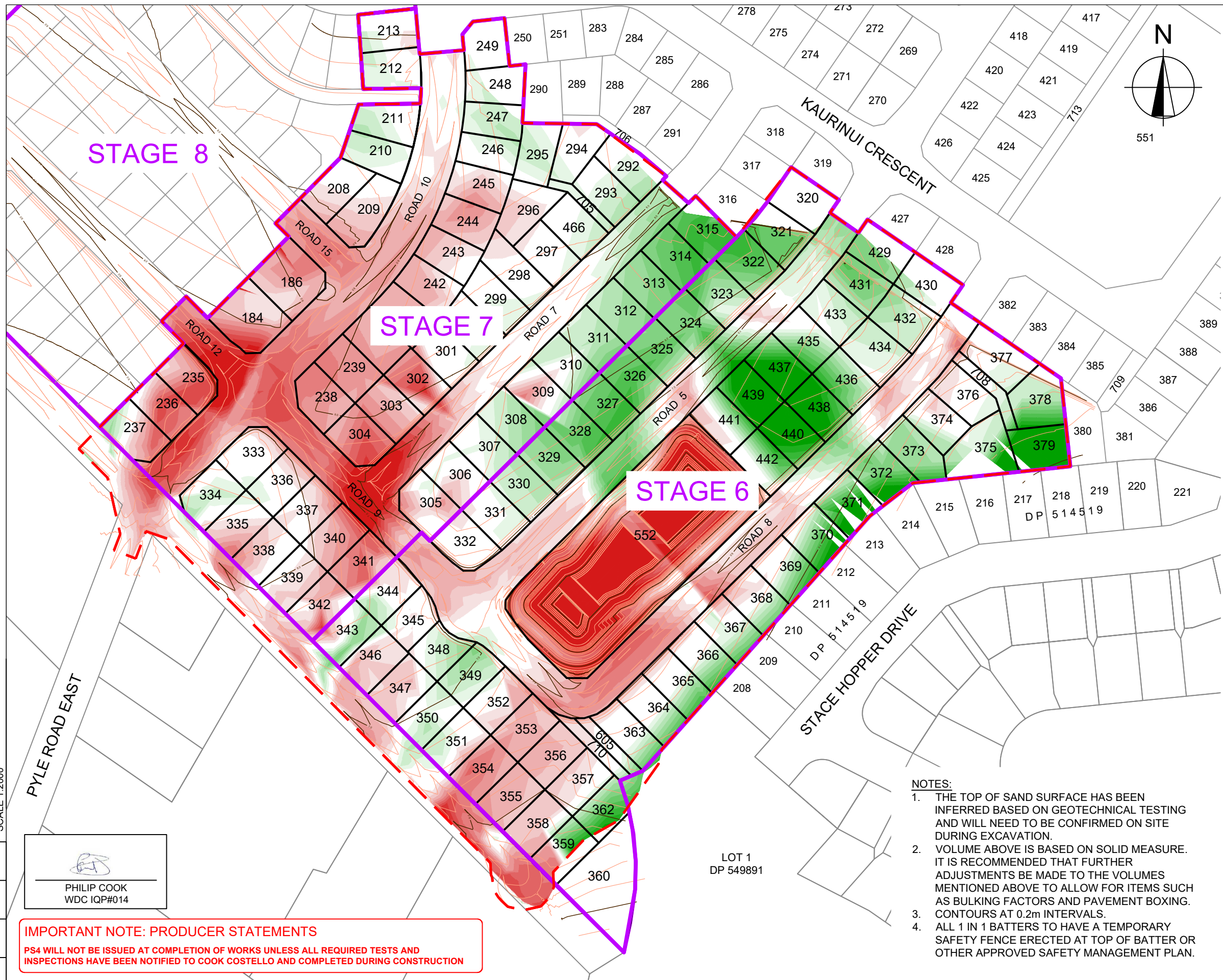
DATE CREATED 28/05/2021	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
CCL REF NO 14333-006	SCALE 1:2000 @ A3	STATUS FOR APPROVAL	
DWG NUMBER EW500		REVISION A	

NOTES:
1. SEE CONSTRUCTION NOTES EW001
2. DESIGN CONTOURS ARE AT 0.2m INTERVALS.



Lower_value	Upper_value	Colour	
-6.0	to -1.8	m	Dark Red
-1.8	to -1.6	m	Red
-1.6	to -1.4	m	Red-Orange
-1.4	to -1.2	m	Orange
-1.2	to -1.0	m	Light Orange
-1.0	to -0.8	m	Light Red
-0.8	to -0.6	m	Light Pink
-0.6	to -0.4	m	Very Light Pink
-0.4	to -0.2	m	White
-0.2	to 0.0	m	White
0.0	to 0.2	m	White
0.2	to 0.4	m	Light Green
0.4	to 0.6	m	Light Green
0.6	to 0.8	m	Light Green
0.8	to 1.0	m	Light Green
1.0	to 1.2	m	Light Green
1.2	to 1.4	m	Light Green
1.4	to 1.6	m	Light Green
1.6	to 1.8	m	Light Green
1.8	to 2.0	m	Light Green
2.0	to 5.0	m	Dark Green

LEGEND
— EXTENT OF WORKS



NOTES:
1. THE TOP OF SAND SURFACE HAS BEEN INFERRED BASED ON GEOTECHNICAL TESTING AND WILL NEED TO BE CONFIRMED ON SITE DURING EXCAVATION.
2. VOLUME ABOVE IS BASED ON SOLID MEASURE. IT IS RECOMMENDED THAT FURTHER ADJUSTMENTS BE MADE TO THE VOLUMES MENTIONED ABOVE TO ALLOW FOR ITEMS SUCH AS BULKING FACTORS AND PAVEMENT BOXING.
3. CONTOURS AT 0.2m INTERVALS.
4. ALL 1 IN 1 BATTERS TO HAVE A TEMPORARY SAFETY FENCE ERECTED AT TOP OF BATTER OR OTHER APPROVED SAFETY MANAGEMENT PLAN.

SAND BULK EARTHWORKS QUANTITIES:
TOTAL EARTHWORKS AREA = 116,753m²
TOP SOIL RESPREAD = 0.2m X 116,753 = 23,350m³

TOTAL SAND CUT = 52,740m³
TOTAL SAND FILL = 35,728m³
BALANCE = 17,012m³ (EXCESS SAND)

VOLUMES BASED ON COMPARISON BETWEEN ASSUMED TOP OF SAND TO DESIGN SUBGRADE.

IMPORTANT NOTE: PRODUCER STATEMENTS
PS4 WILL NOT BE ISSUED AT COMPLETION OF WORKS UNLESS ALL REQUIRED TESTS AND INSPECTIONS HAVE BEEN NOTIFIED TO COOK COSTELLO AND COMPLETED DURING CONSTRUCTION

PHILIP COOK
WDC IQP#014

SCALE 1:2000
0 20 40 60 80 100



C			
B			
A	IST ISSUE	28-05-21	KH PC
REV.	REVISION DETAILS	DATE	DRAWN APP.

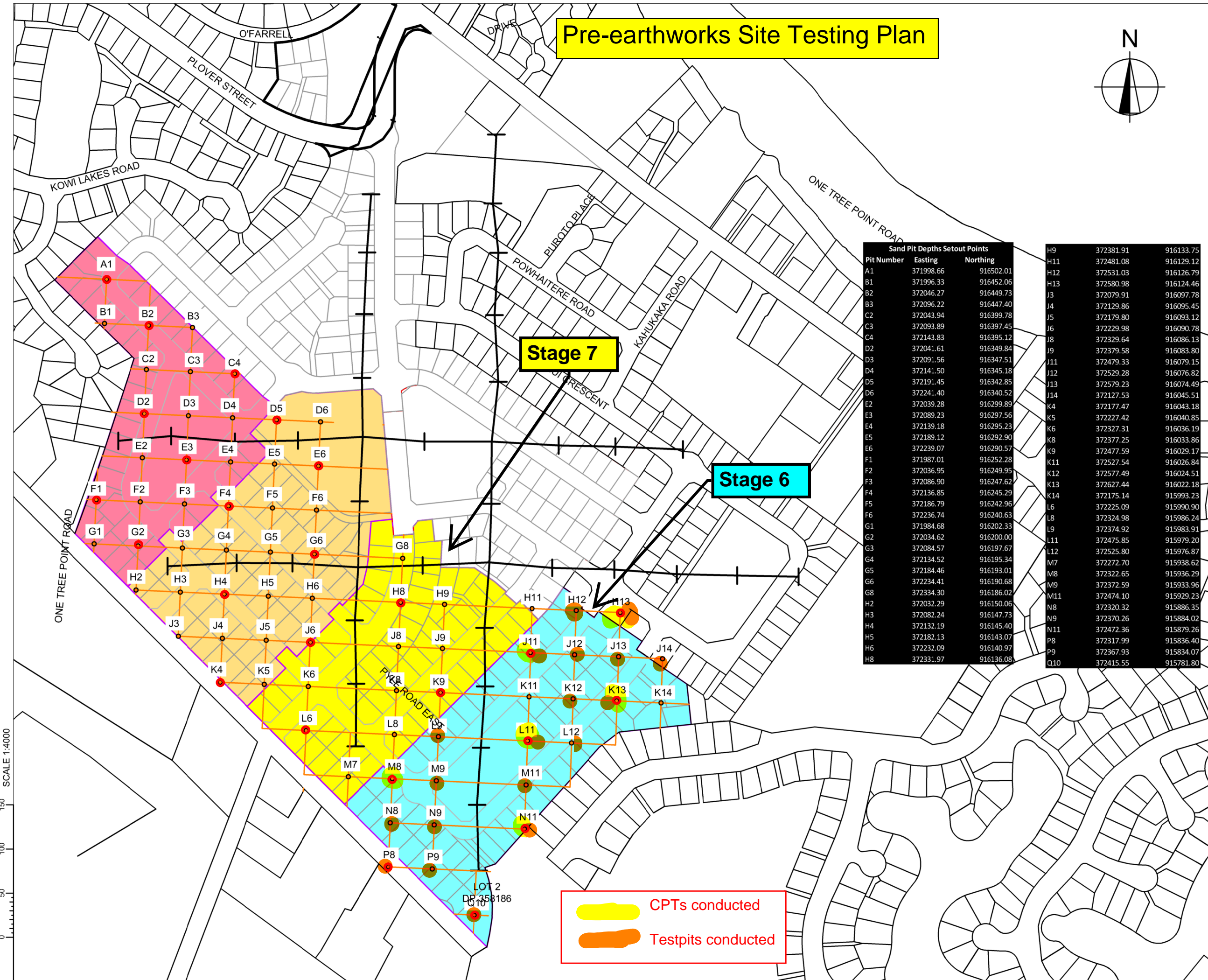
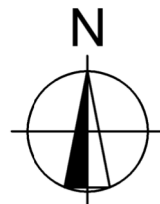
PROJECT DETAILS
WFH PROPERTIES LIMITED
THE LANDING - STAGES 6 & 7
ONE TREE POINT
RUAKAKA

TITLE
SAND BULK EARTHWORKS PLAN

DATE CREATED 28/05/2021	DRAWN K HANSARD	DESIGNED R BROOKES	APPROVED P COOK
CCL REF NO 14333-006	SCALE 1:2000 @ A3	STATUS FOR APPROVAL	
DWG NUMBER EW600		REVISION A	

Appendix 3 – Site Testing Locations

Pre-earthworks Site Testing Plan



Sand Pit Depths Setout Points		
Pit Number	Easting	Northing
A1	371998.66	916502.01
B1	371996.33	916452.06
B2	372046.27	916449.73
B3	372096.22	916447.40
C2	372043.94	916399.78
C3	372093.89	916397.45
C4	372143.83	916395.12
D2	372041.61	916349.84
D3	372091.56	916347.51
D4	372141.50	916345.18
D5	372191.45	916342.85
D6	372241.40	916340.52
E2	372039.28	916299.89
E3	372089.23	916297.56
E4	372139.18	916295.23
E5	372189.12	916292.90
E6	372239.07	916290.57
F1	371987.01	916252.28
F2	372036.95	916249.95
F3	372086.90	916247.62
F4	372136.85	916245.29
F5	372186.79	916242.96
F6	372236.74	916240.63
G1	371984.68	916202.33
G2	372034.62	916200.00
G3	372084.57	916197.67
G4	372134.52	916195.34
G5	372184.46	916193.01
G6	372234.41	916190.68
H2	372032.29	916150.06
H3	372082.24	916147.73
H4	372132.19	916145.40
H5	372182.13	916143.07
H6	372232.09	916140.74
H8	372331.97	916136.08
H9	372381.91	916133.75
H11	372481.08	916129.12
H12	372531.03	916126.79
H13	372580.98	916124.46
J3	372079.91	916097.78
J4	372129.86	916095.45
J5	372179.80	916093.12
J6	372229.74	916090.78
J8	372329.64	916086.13
J9	372379.58	916083.80
J11	372479.33	916079.15
J12	372529.28	916076.82
J13	372579.23	916074.49
J14	372629.18	916072.16
K4	372177.47	916043.18
K5	372227.42	916040.85
K6	372277.37	916038.52
K8	372377.25	916033.86
K9	372427.19	916029.17
K11	372527.14	916024.51
K12	372577.09	916021.84
K13	372627.04	916019.17
K14	372676.99	916016.50
L6	372225.09	915990.90
L8	372324.98	915986.24
L9	372374.92	915983.57
L11	372474.85	915979.20
L12	372524.80	915976.53
M7	372272.70	915938.62
M8	372322.65	915935.95
M9	372372.59	915933.28
M11	372472.52	915929.61
N8	372320.32	915886.35
N9	372370.26	915883.68
N11	372470.19	915879.01
P8	372317.99	915836.40
P9	372367.93	915833.73
Q10	372415.55	915781.80

● = Test pit replaced by CPT
 CPT = CONE PENETRATION TEST
 FA = FLIGHT AUGER
 TOS = TOP OF SAND

B		
A	1ST ISSUE	08-04-21
REV.	REVISION DETAILS	DRAWN APP. KAHL GMcG

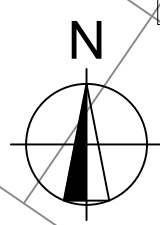
www.coco.co.nz

 Whangarei | Auckland | Wellington | Christchurch

PROJECT DETAILS	
TITLE	
SAND DEPTH TEST PITS	
DATE CREATED	CCL REF NO
08-04-2021	14333
DRAWN	DESIGNED
R BROOKES	R BROOKES
APPROVED	
G MCGREGOR	
SCALE	STATUS
1:4000 @ A3	PRELIMINARY
DWG NUMBER	REVISION
SK01	A

SCALE 1:4000

SCALE 1:4000



LEGEND

TESTING TO BE CARRIED OUT

- PLT R9 SCALA PENETROMETER
- SC B40 SCALA PENETROMETER AND LWD ON THE SAND FILL, FOR DEPTH LESS THAN 0.6m
- SC P21 SCALA AND LWD TO TEST UNDERCUT

TESTING CARRIED OUT

- SP 104 SCALA PENETROMETER UNDERTAKEN ON THE CUT - 2021
- SP 353 SCALA PENETROMETER UNDERTAKEN ON 2019 DURING STAGES 4-5 EARTHWORKS
- SP 353 SCALA PENETROMETER TO BOTTOM OF PEAT BEFORE FILL PLACEMENT

FILL DEPTHS

- 0.5m
- 1.0m
- 1.5m



50 SCALE 1:1000
40
30
20
10
0



C			
B			
A	1st ISSUE	??-??-22	KH PC
REV.	REVISION DETAILS	DRAWN APP.	

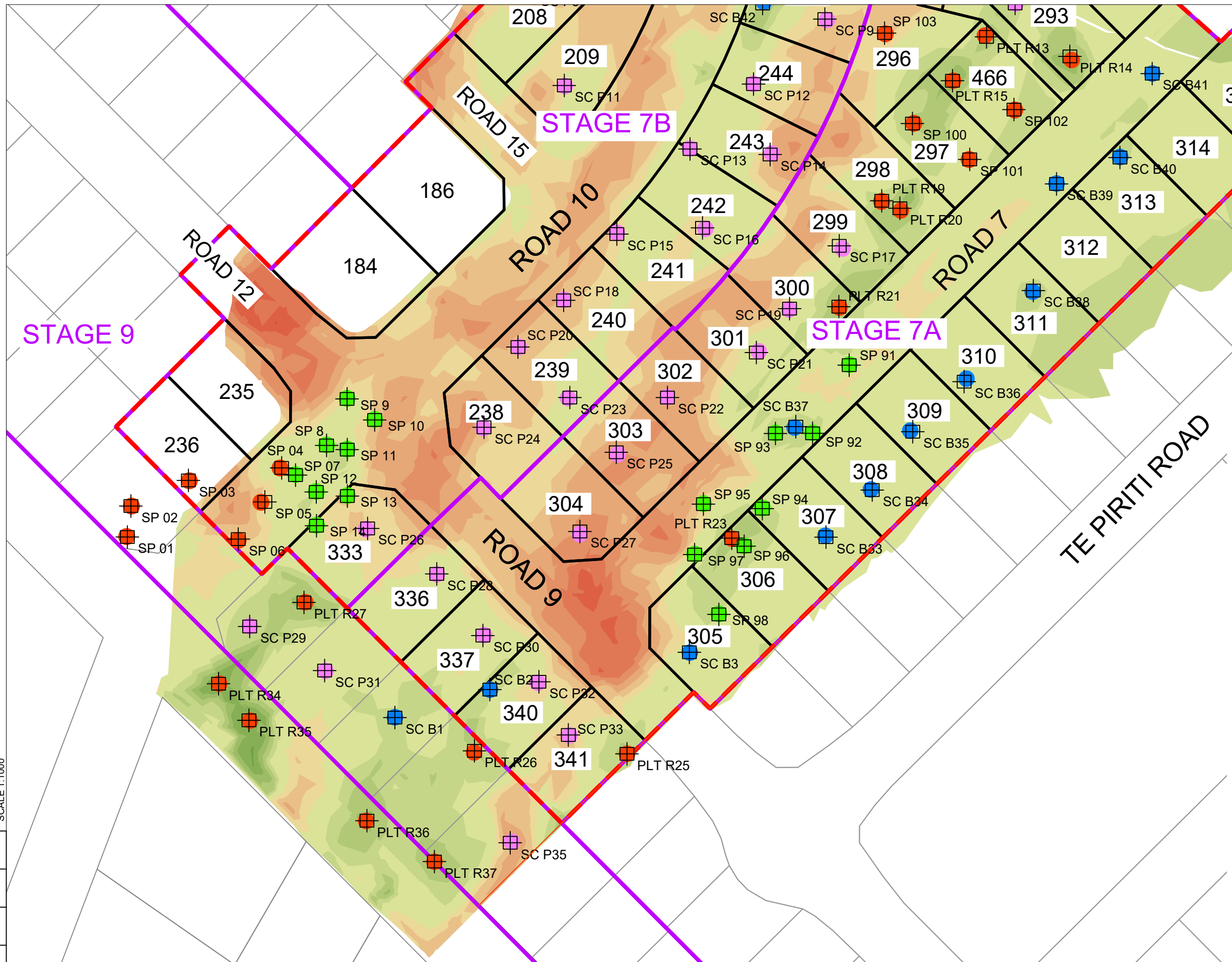
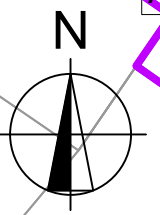
PROJECT DETAILS

WFH PROPERTIES LIMITED
THE LANDING - STAGES 6 & 7
ONE TREE POINT
RUAKAKA

TITLE

STAGES 7A & 7B
FILL TESTING
SHEET 1

DATE CREATED	??/??/2022	DRAWN	K HANSARD	DESIGNED	R BROOKES	APPROVED	P COOK
CCL REF NO	14333-006	SCALE	1:1000 @ A3	STATUS		DRAFT	
DWG NUMBER	SK010	REVISION		A			



LEGEND

TESTING TO BE CARRIED OUT

- SCALA PENETROMETER PLT R9
- SCALA PENETROMETER AND LWD ON THE SAND FILL, FOR DEPTH LESS THAN 0.6m SC B40
- SCALA AND LWD TO TEST UNDERCUT SC P21

TESTING CARRIED OUT

- SCALA PENETROMETER UNDERTAKEN ON THE CUT - 2021 SP 104
- SCALA PENETROMETER UNDERTAKEN ON 2019 DURING STAGES 4-5 EARTHWORKS SP 353
- SCALA PENETROMETER TO BOTTOM OF PEAT BEFORE FILL PLACEMENT SP 353

FILL DEPTHS

- 0.5m
- 1.0m
- 1.5m

50 SCALE 1:1000
40
30
20
10
0



C			
B			
A	1st ISSUE	??/??/22	
REV.	REVISION DETAILS	KH	PC

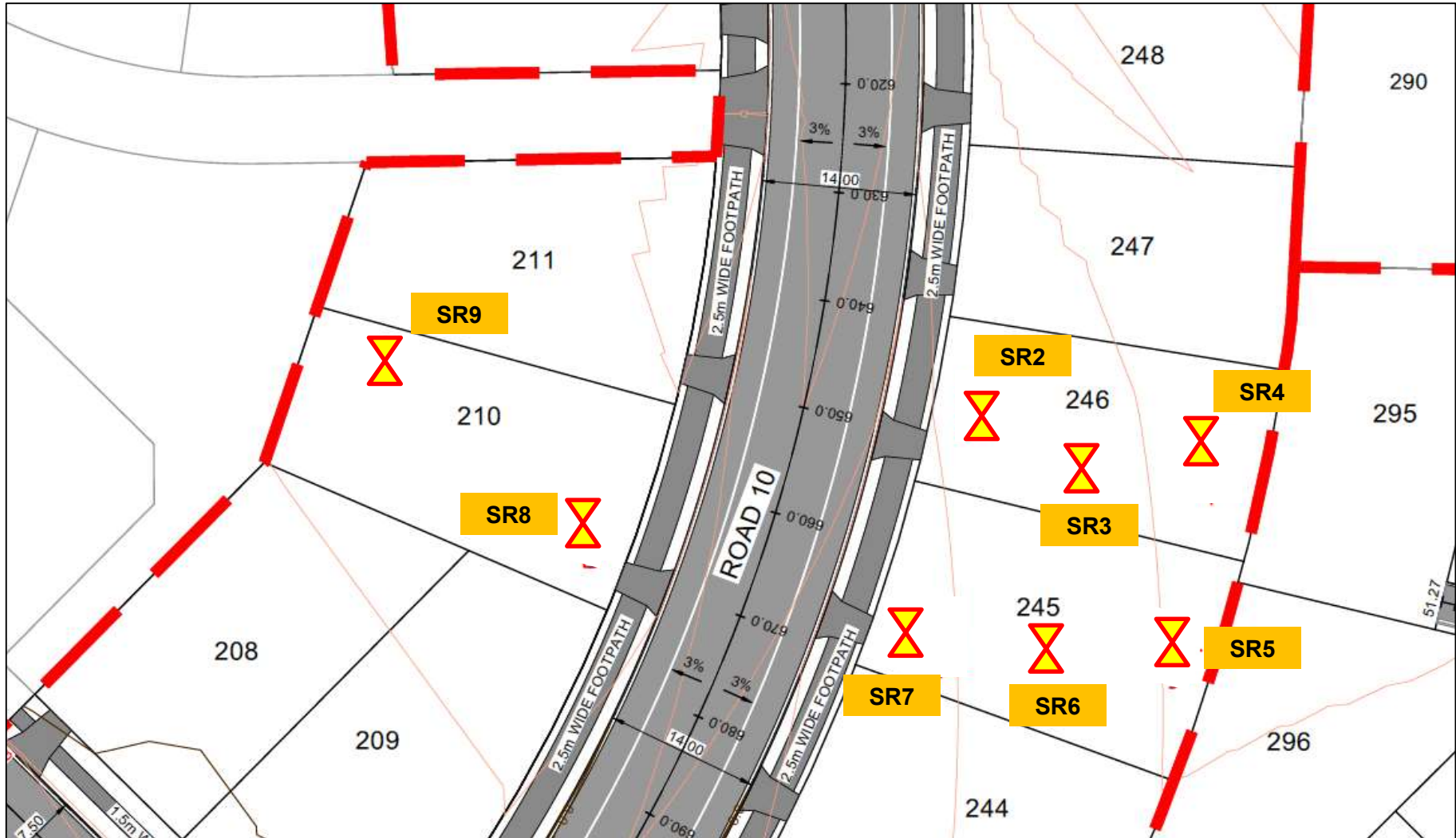
PROJECT DETAILS


WFH PROPERTIES LIMITED
THE LANDING - STAGE 7
ONE TREE POINT
RUAKAKA

TITLE

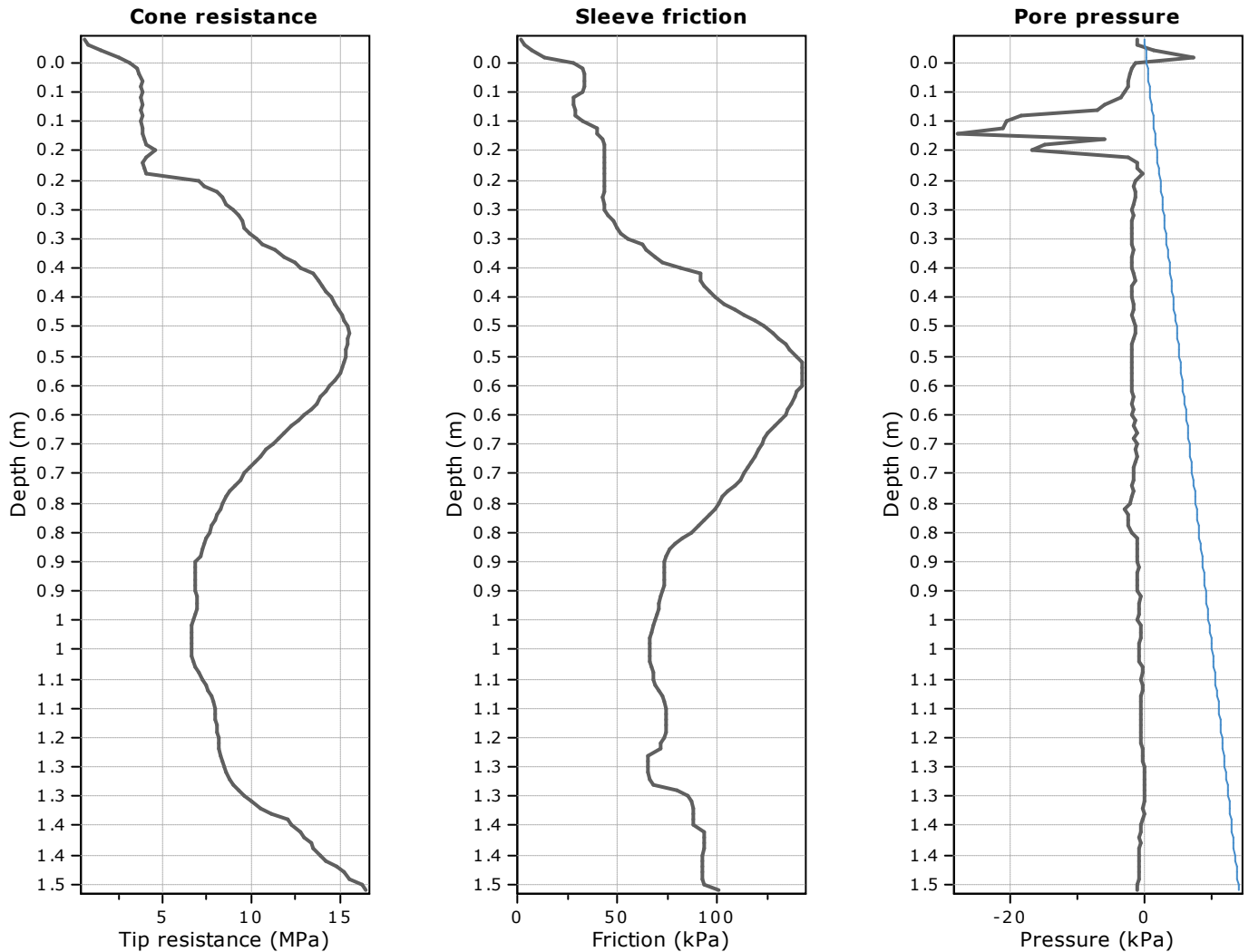
STAGES 7A & 7B
FILL TESTING
SHEET 2

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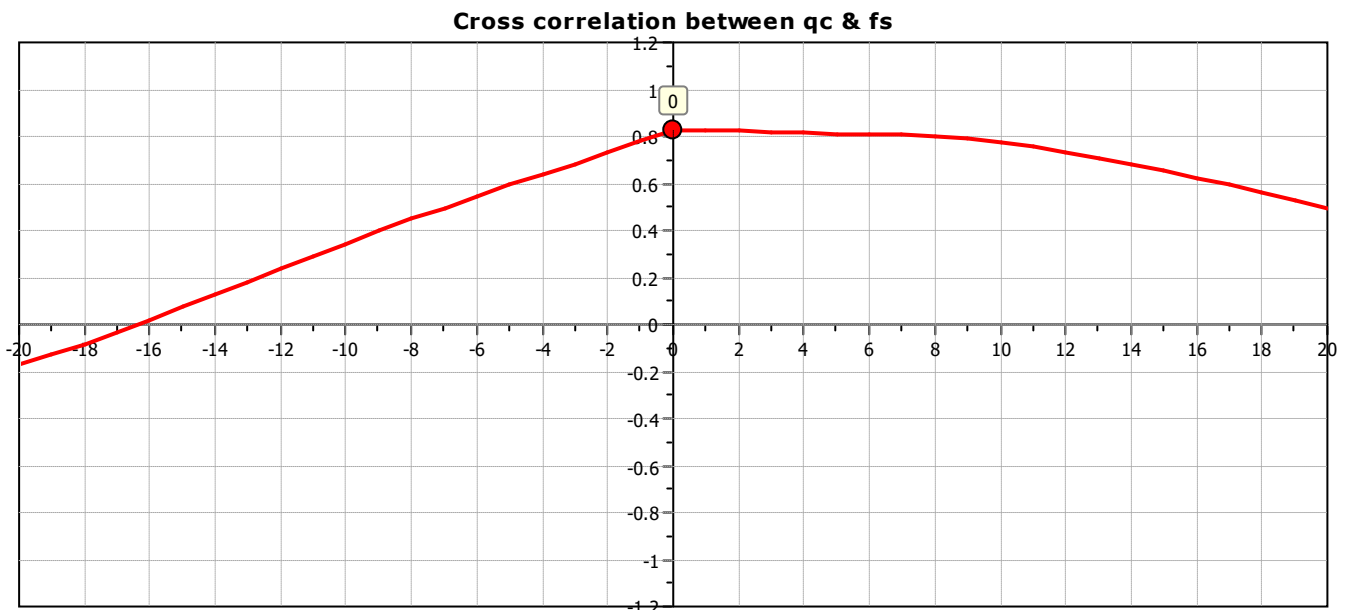


SCALES:	Not To Scale		Geotechnical Investigation SITE TESTING PLAN Address: Stage 7 Landings Subdivision	 cook costello Consulting Engineers	DATE:	10/08/2022	Rev 0	
DRAWN:	NM	-			CCL JOB No:	14333-007	Client:	WFH Properties

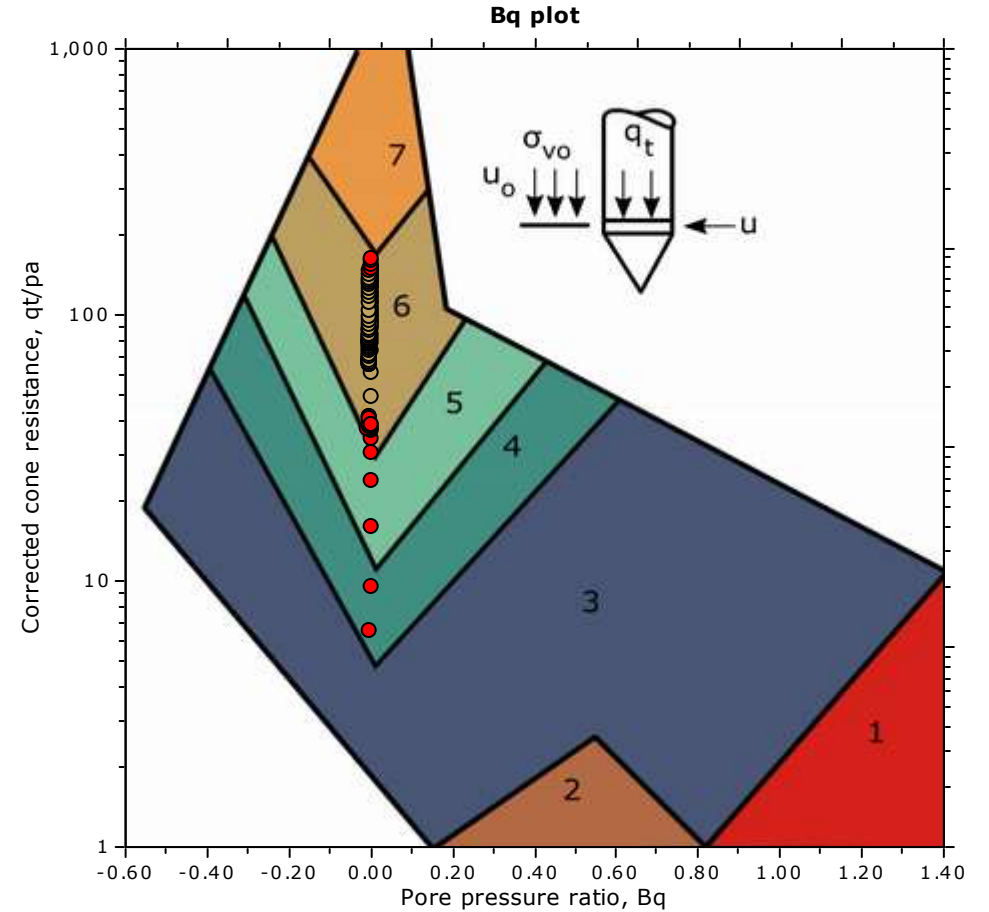
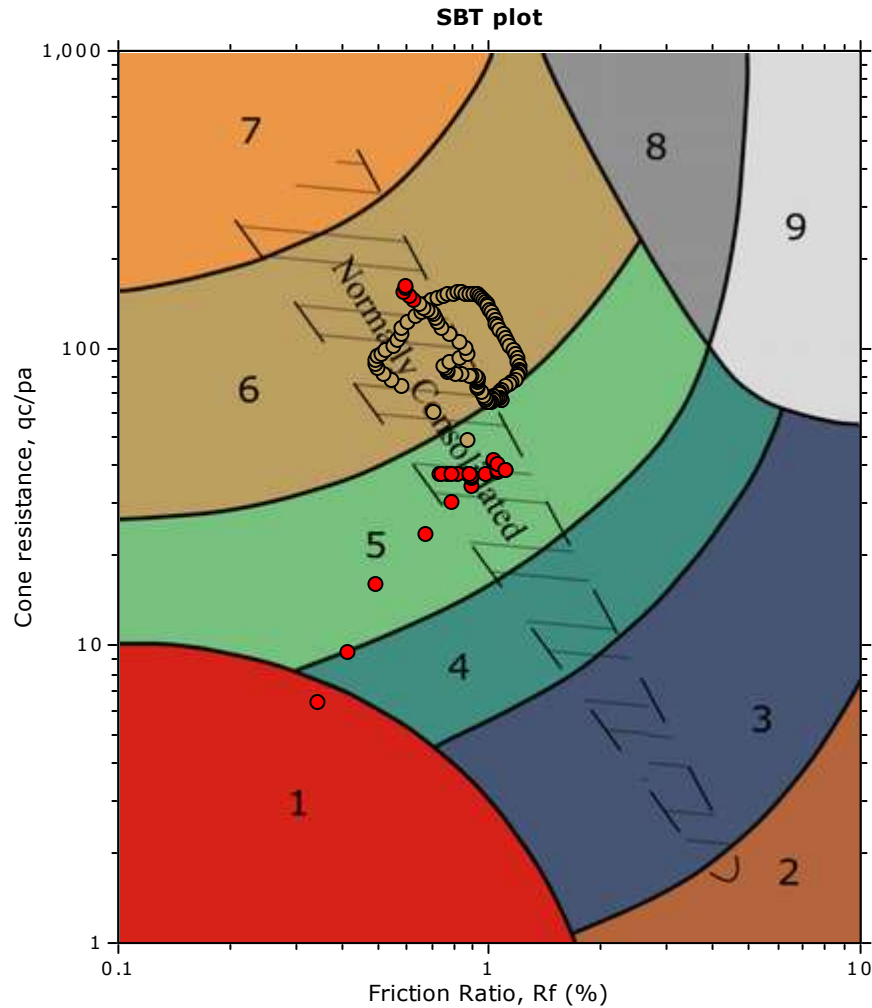
Appendix 4 – Site Testing Results

Project: The Landings Stage 6 & 7 Pre-earthworks Testing
Location: One Tree Point, Landings Subdivision


The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

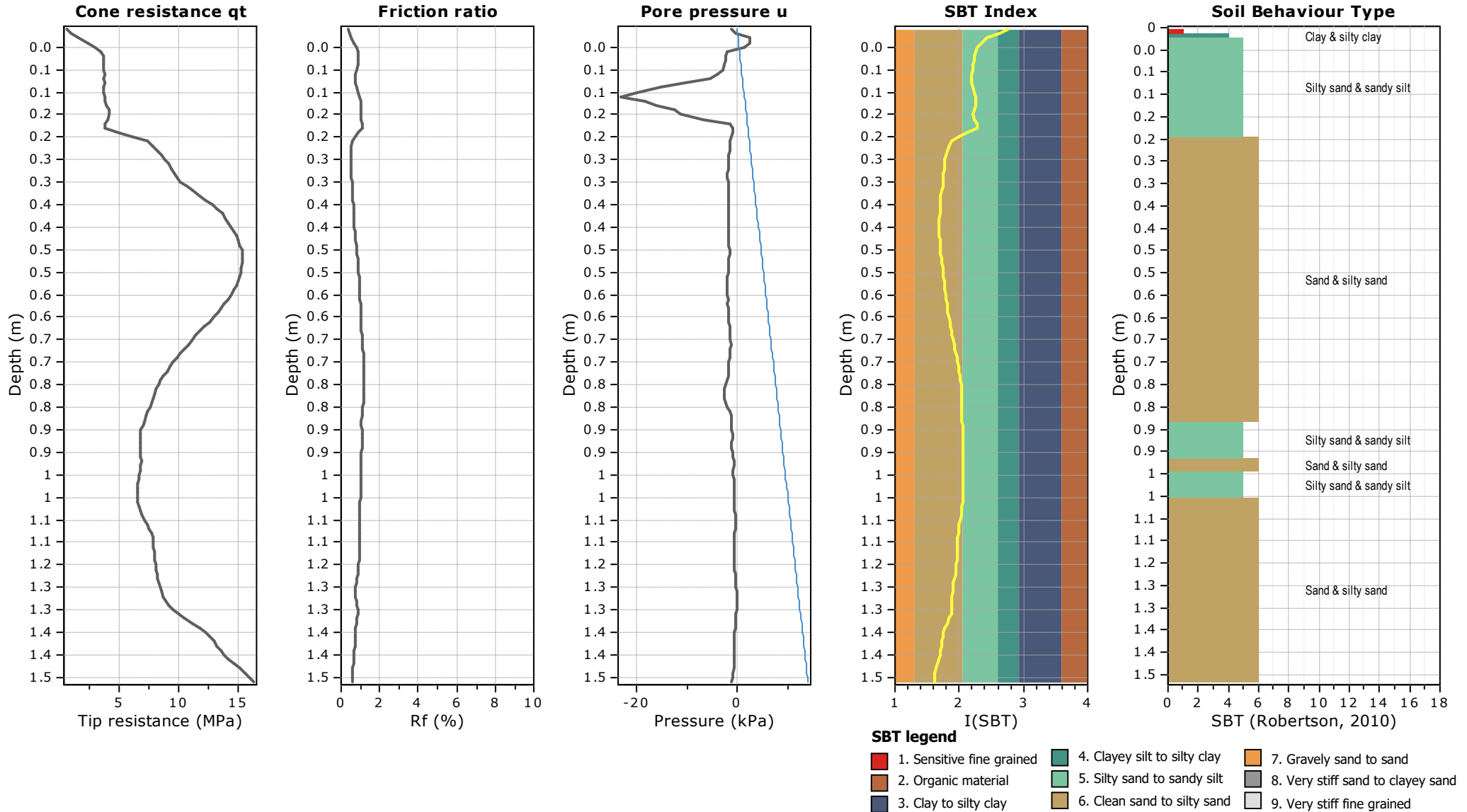


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

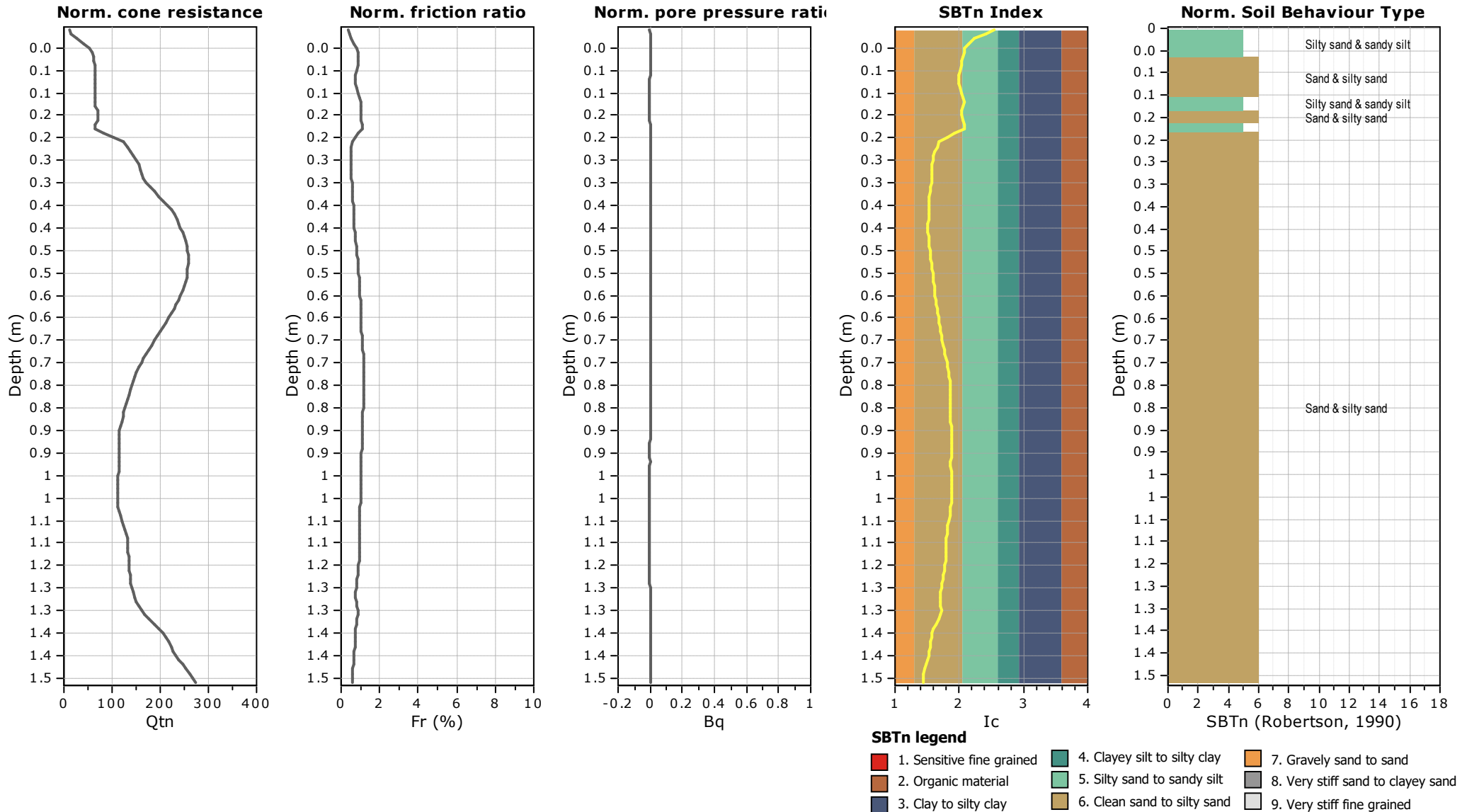
Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



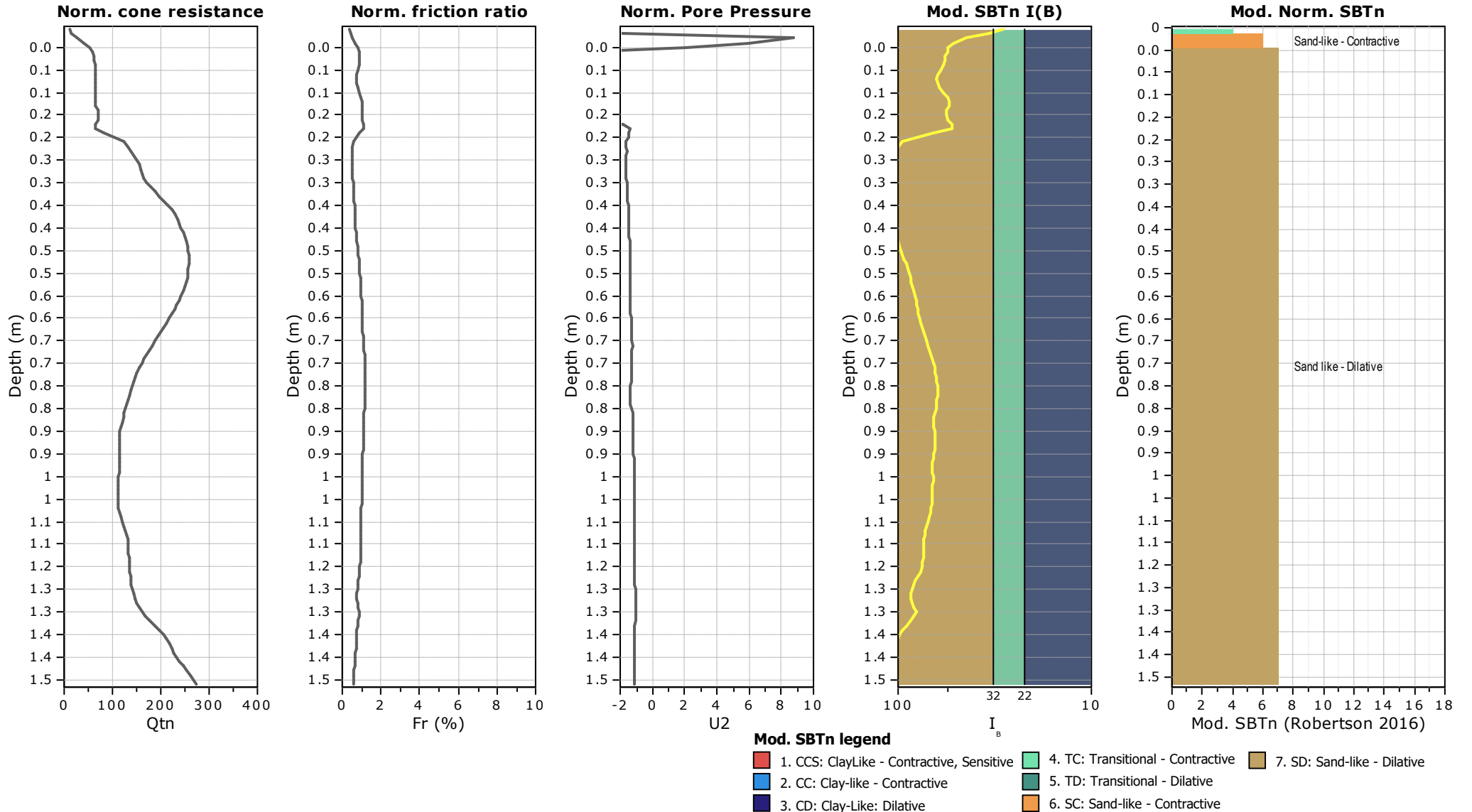
Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision





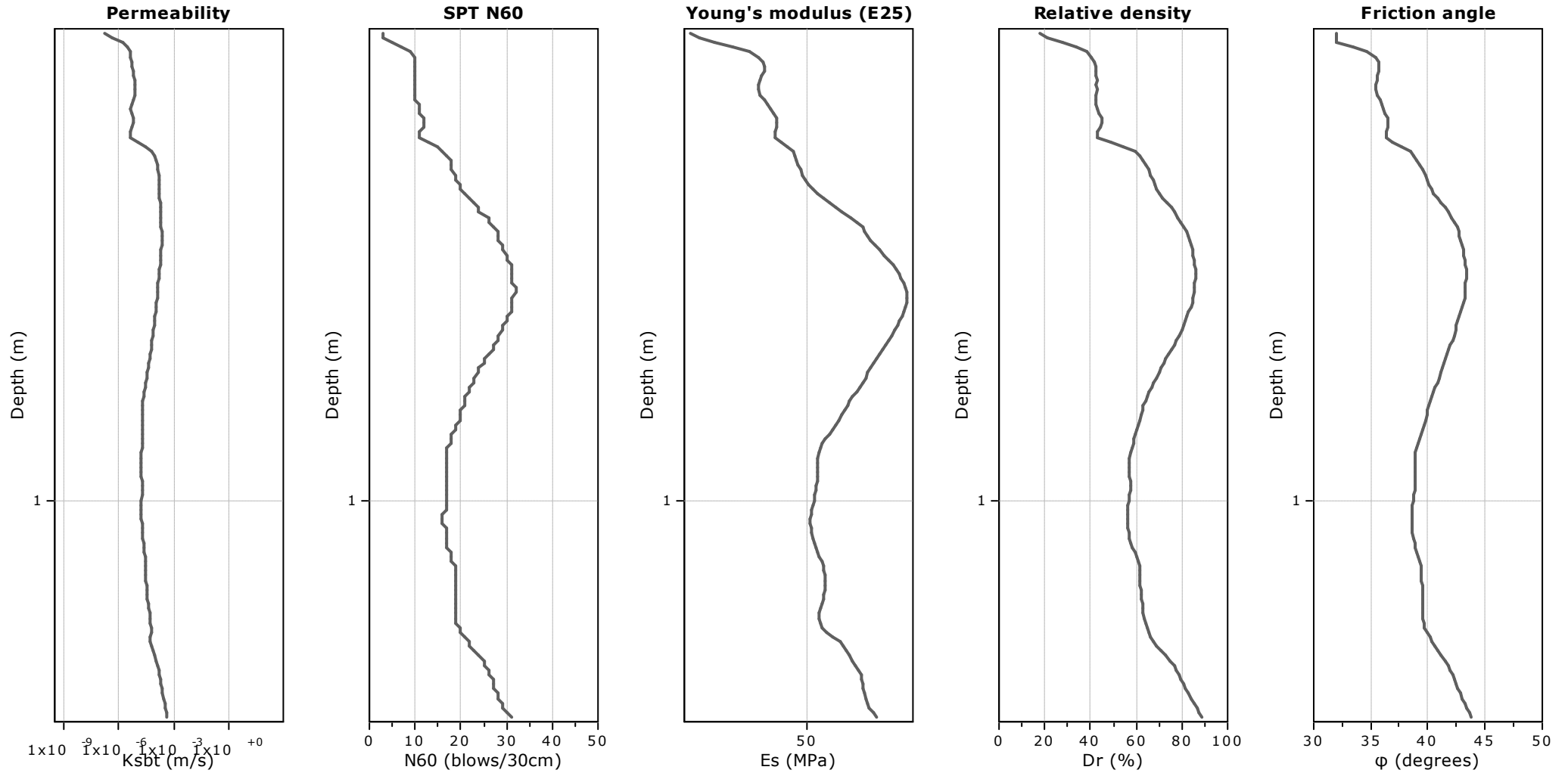
Cook Costello
 Geotechnical Engineers
 2 Norfolk St
 Whangarei

CPT: CPTH8

Total depth: 1.46 m, Date: 10/03/2022
 Surface Elevation: 0.00 m
 Coords: X:0.00, Y:0.00
 Cone Type:
 Cone Operator:

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

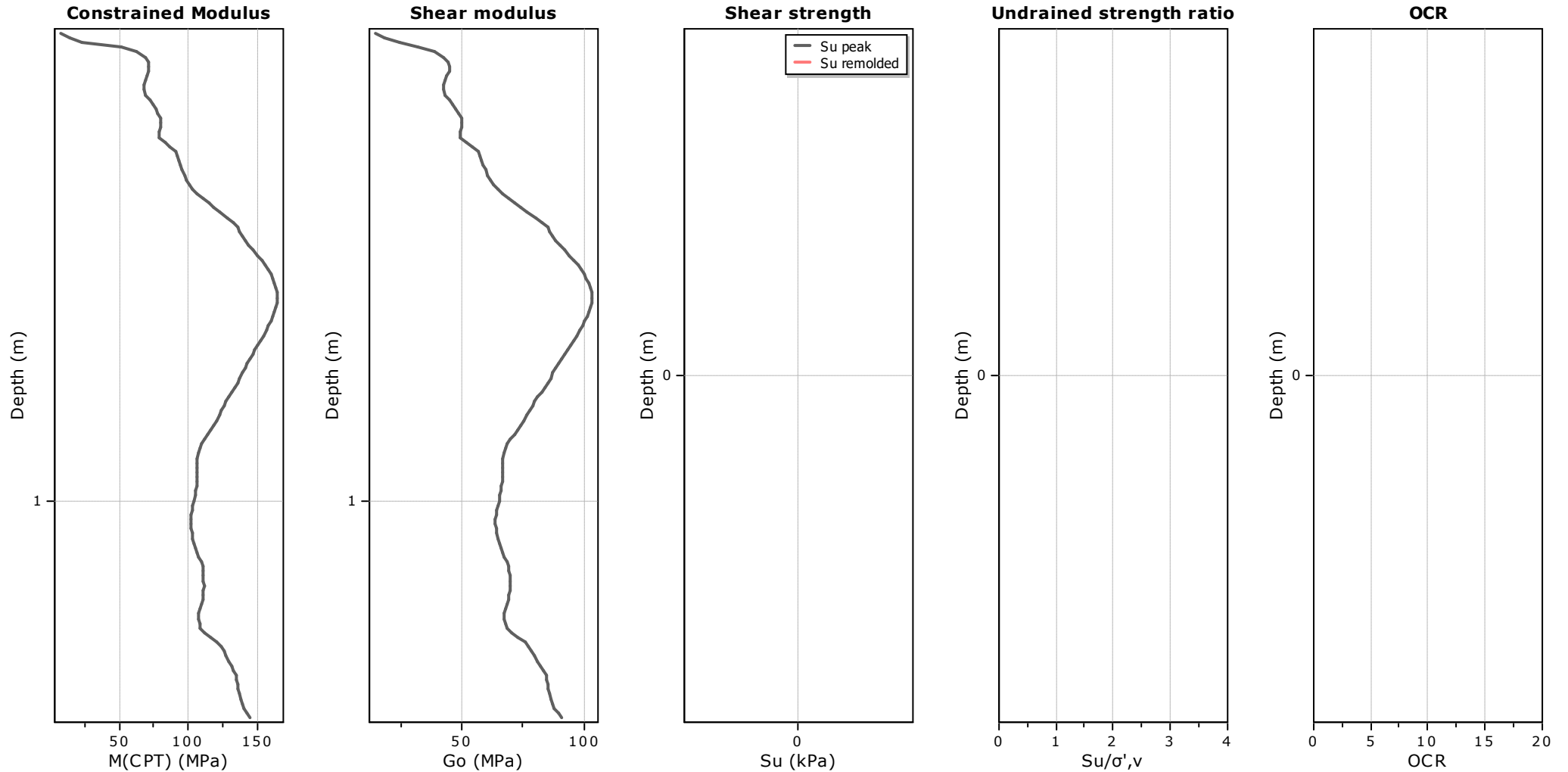
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

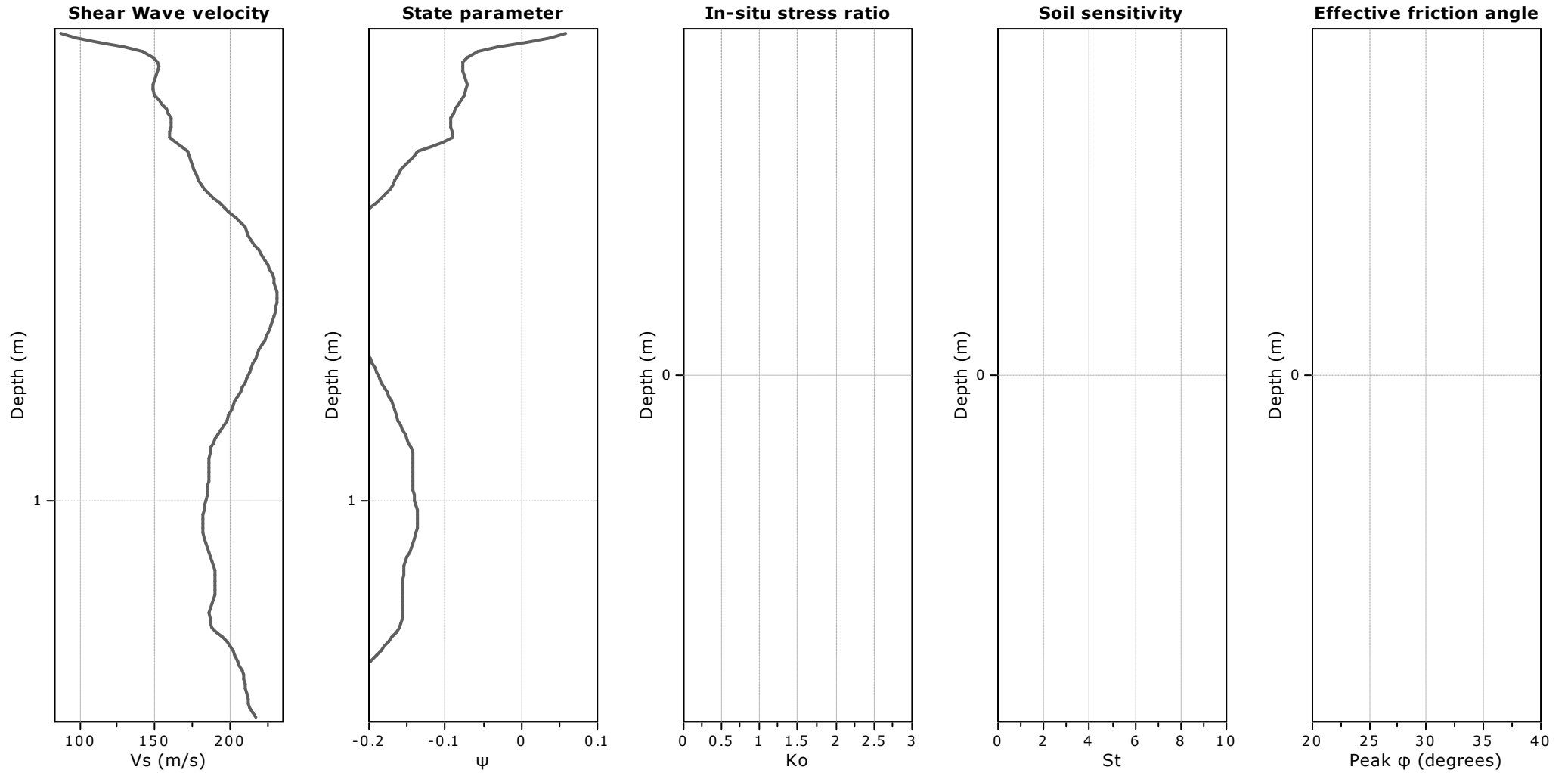
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

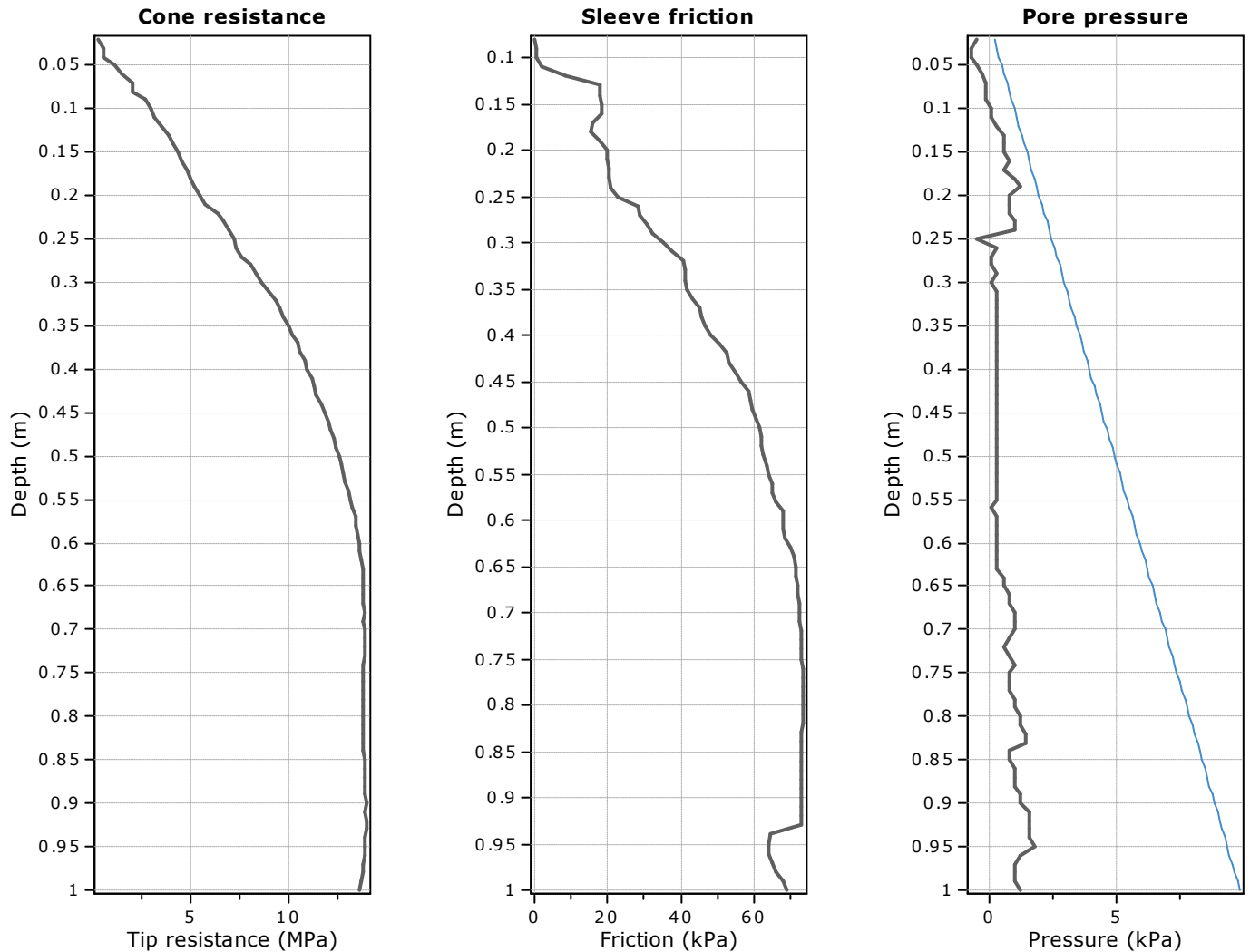
Location: One Tree Point, Landings Subdivision



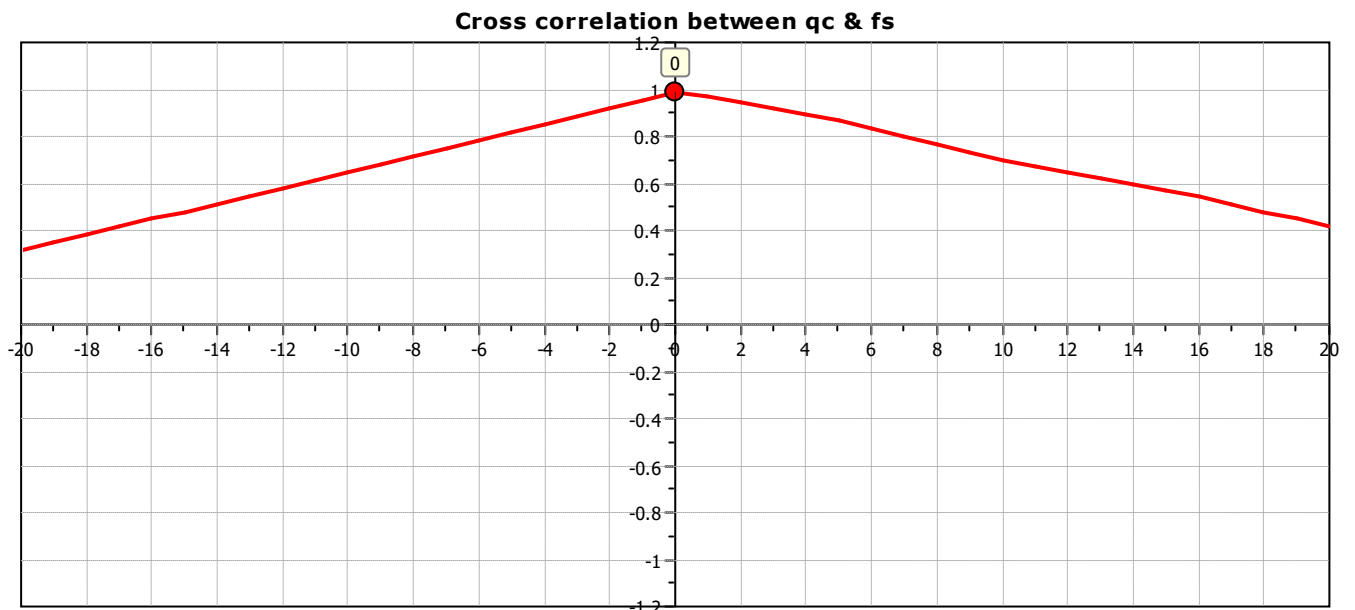
Calculation parameters

Soil Sensitivity factor, N_s : 7.00

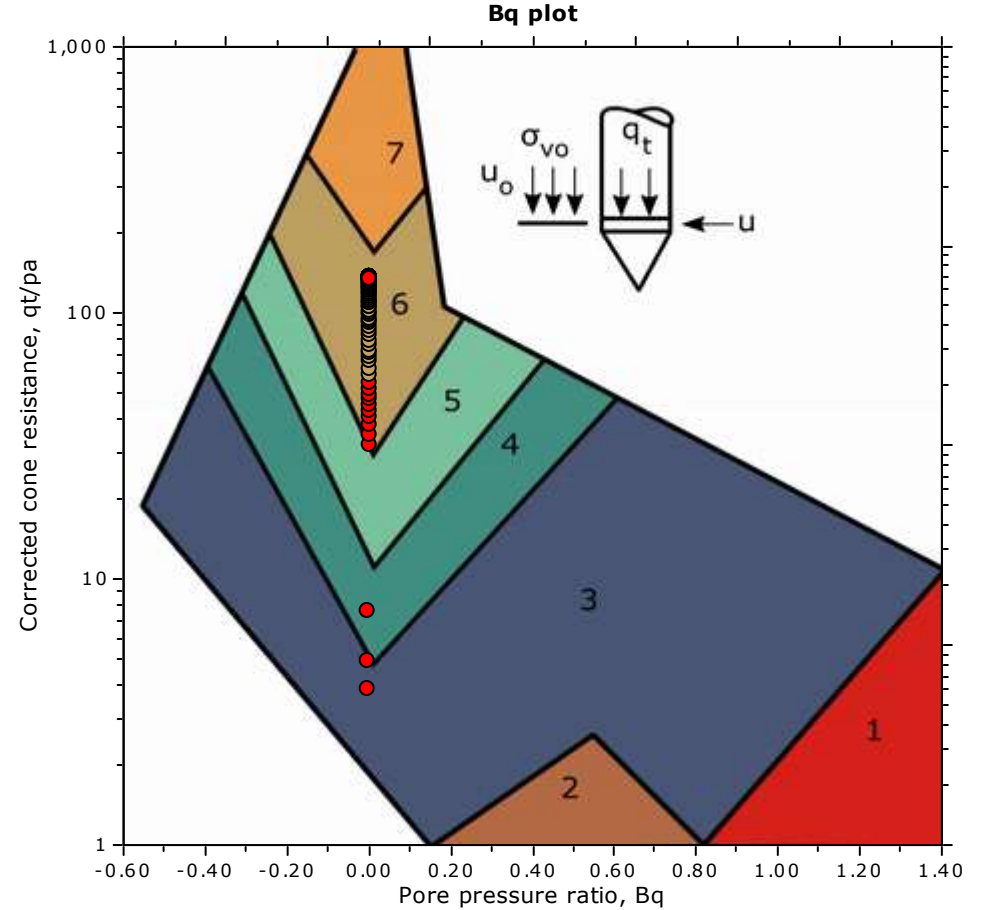
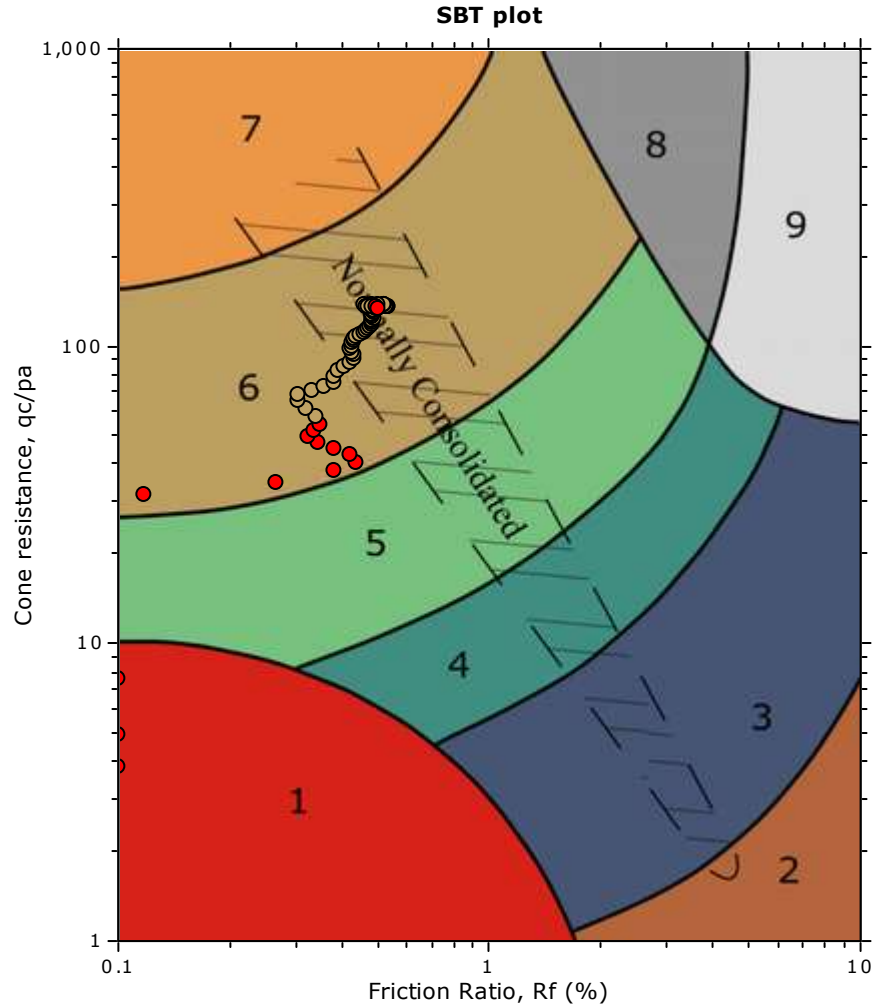
—●— User defined estimation data



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

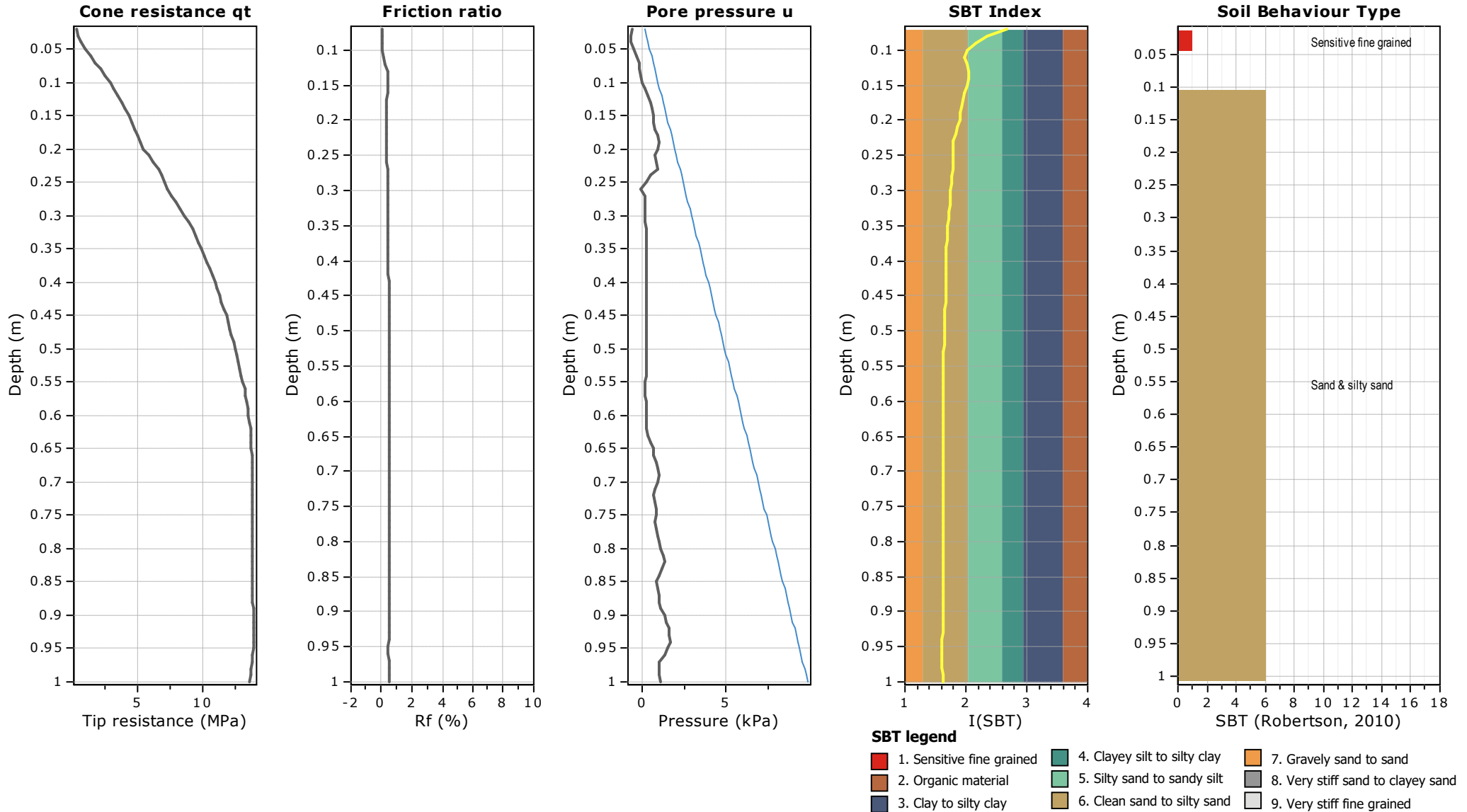


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

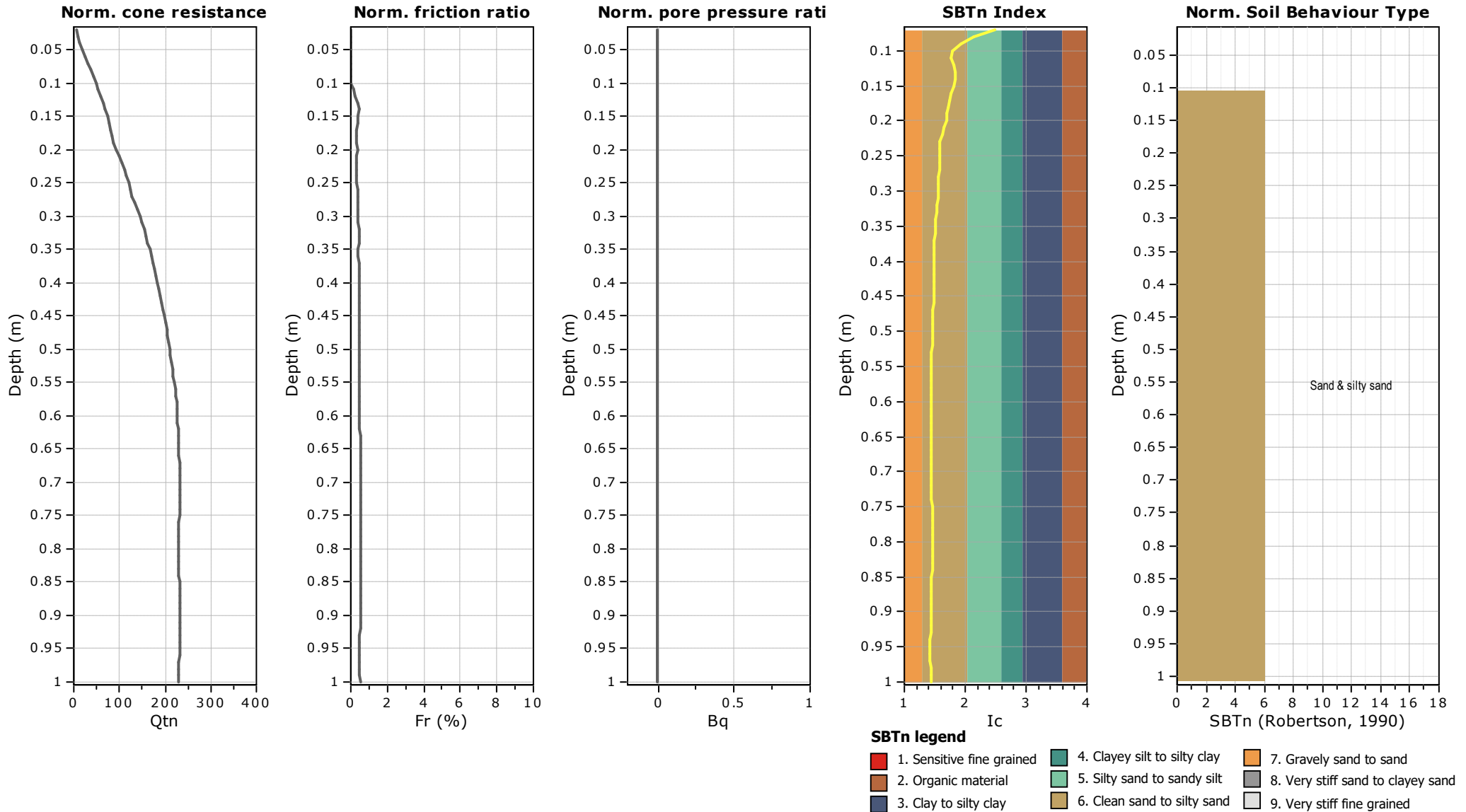
Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



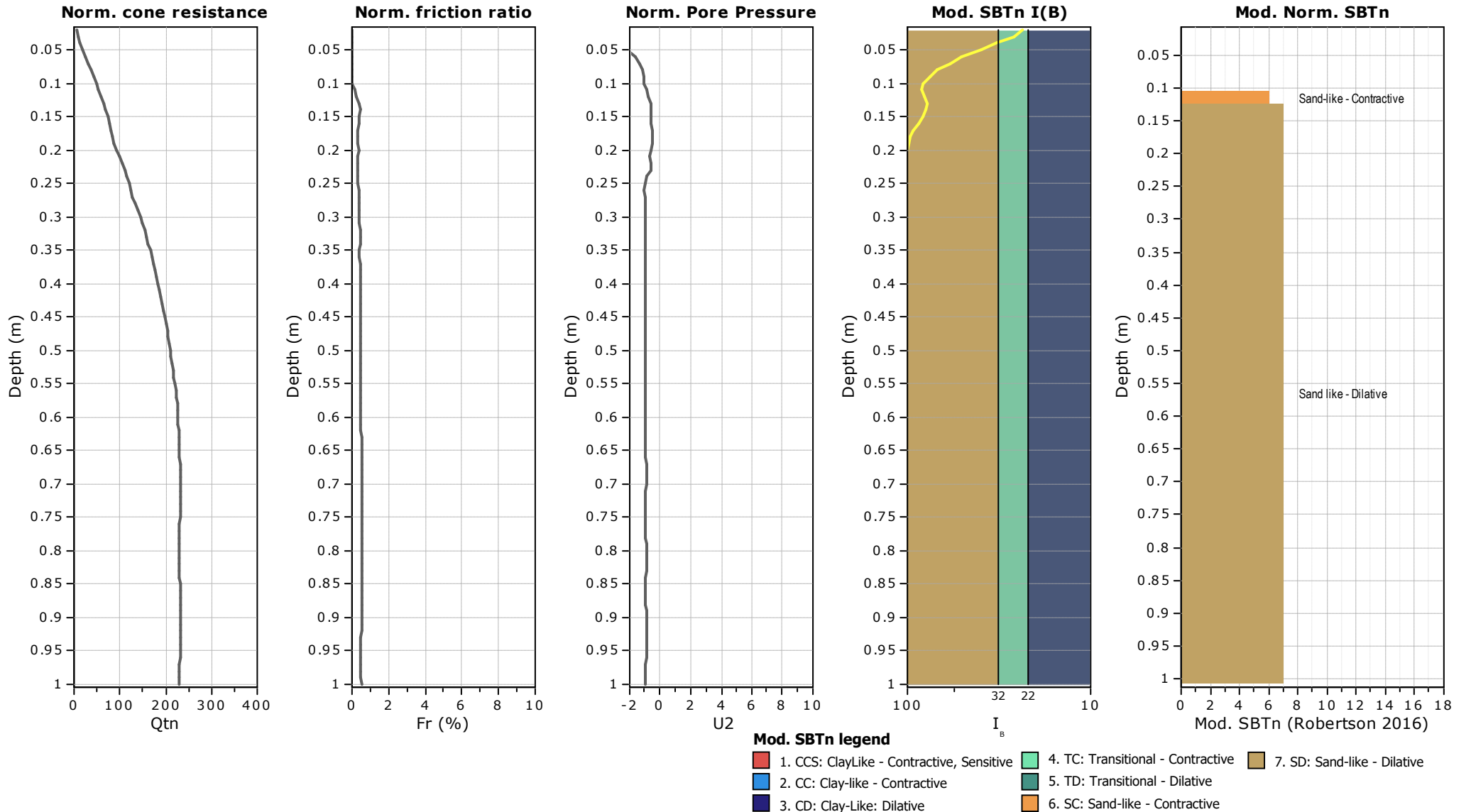
Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Project: The Landings Stage 6 & 7 Pre-earthworks Testing

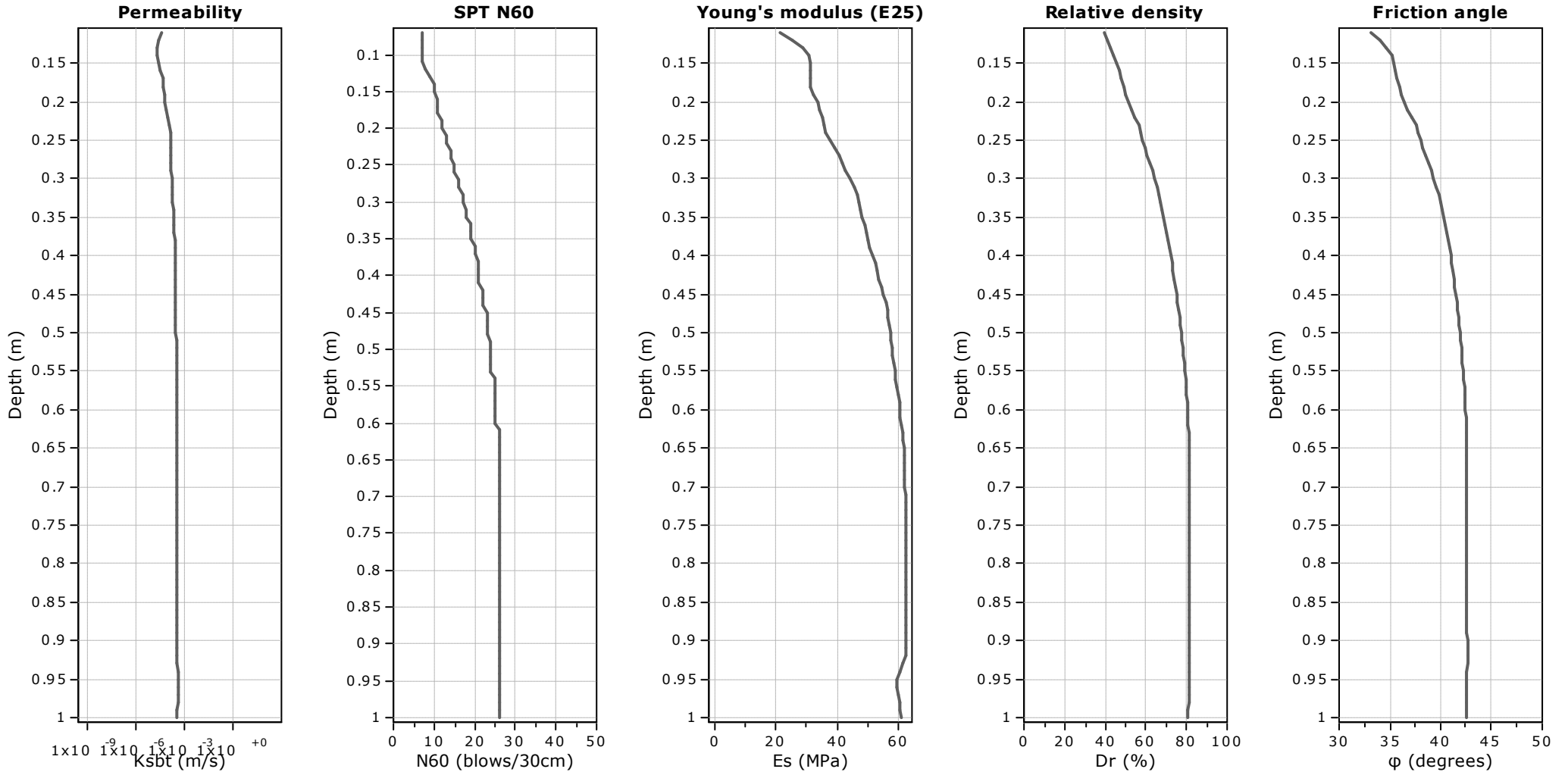
Location: One Tree Point, Landings Subdivision





Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

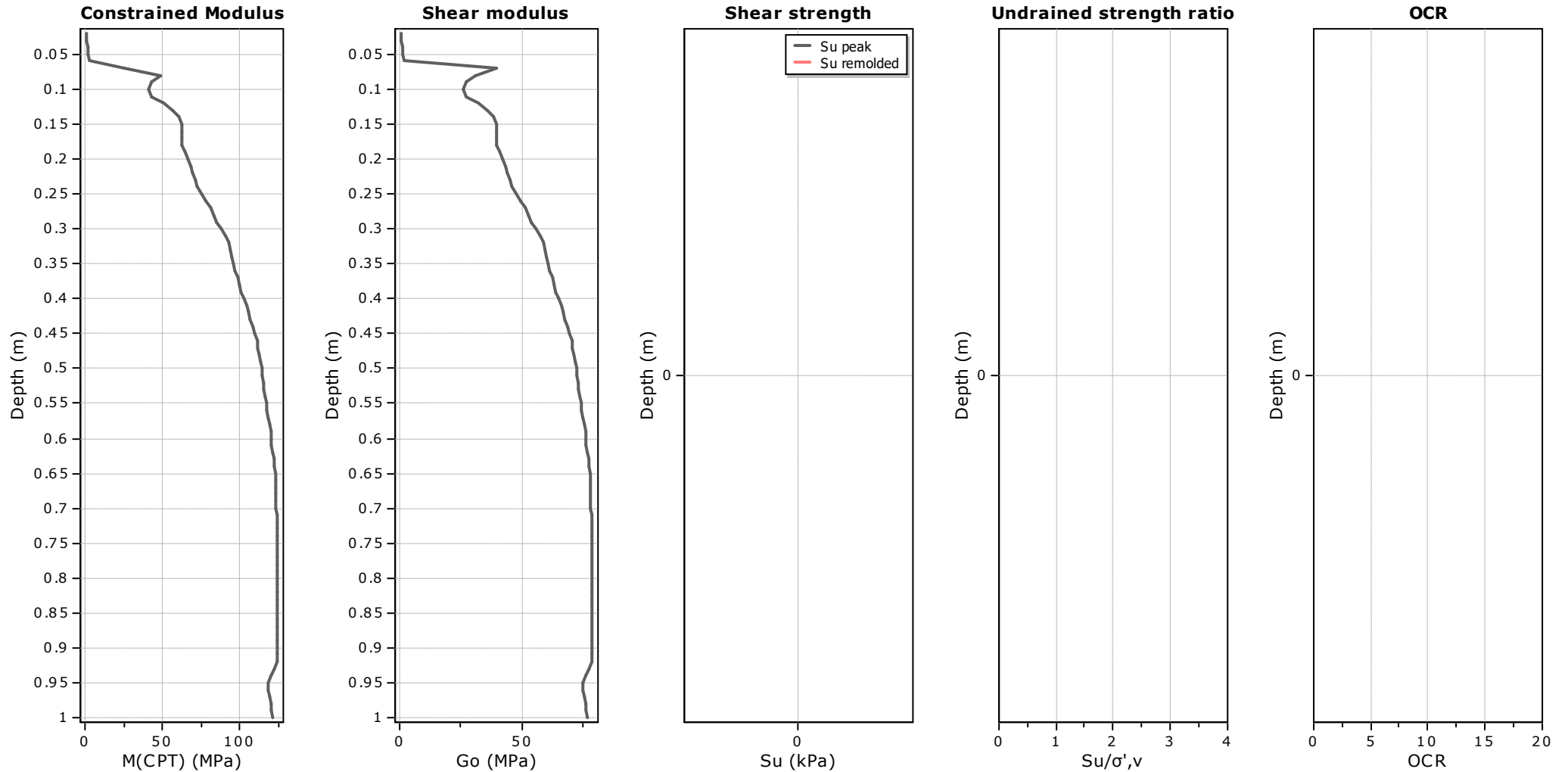
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

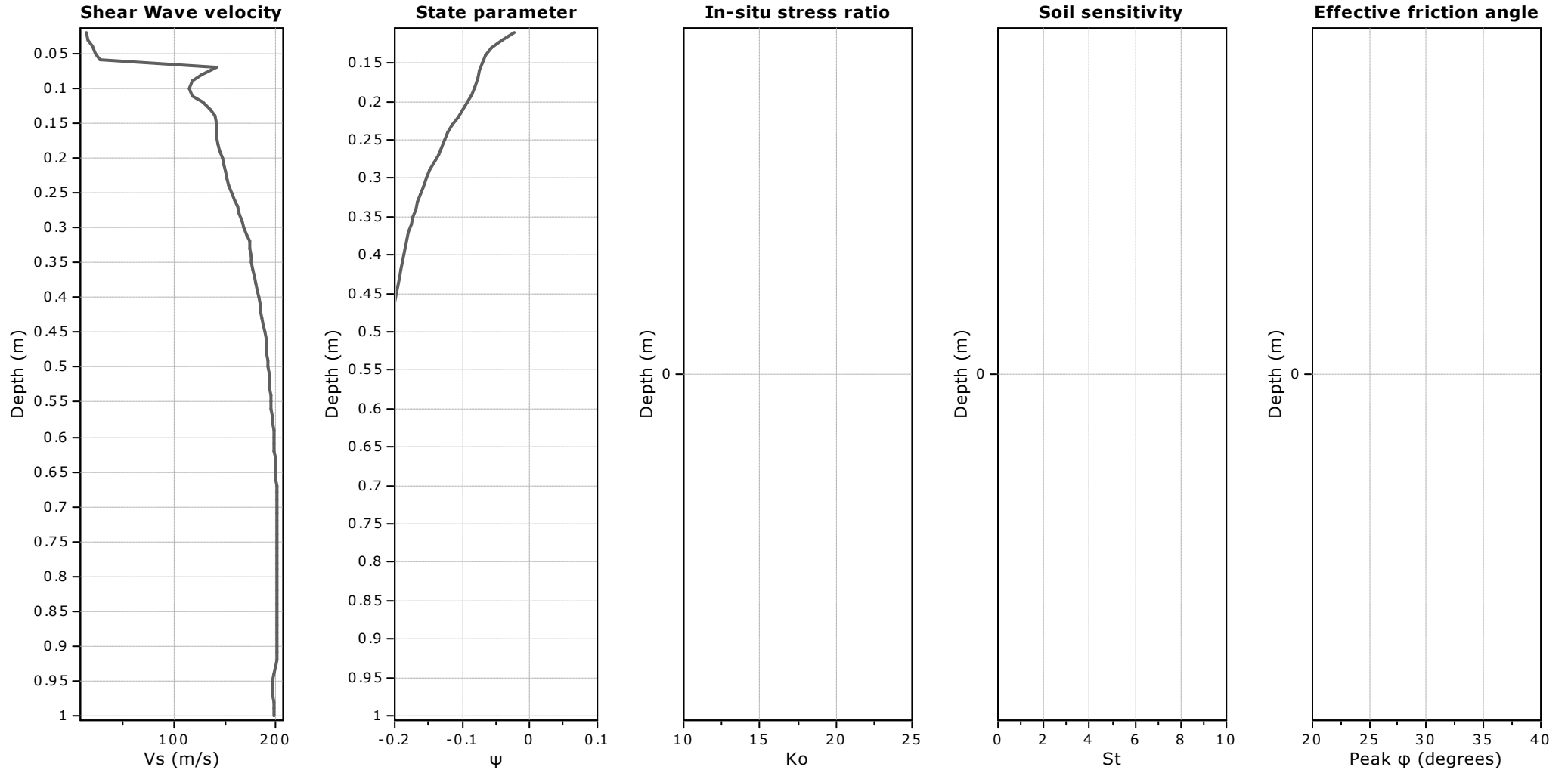
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

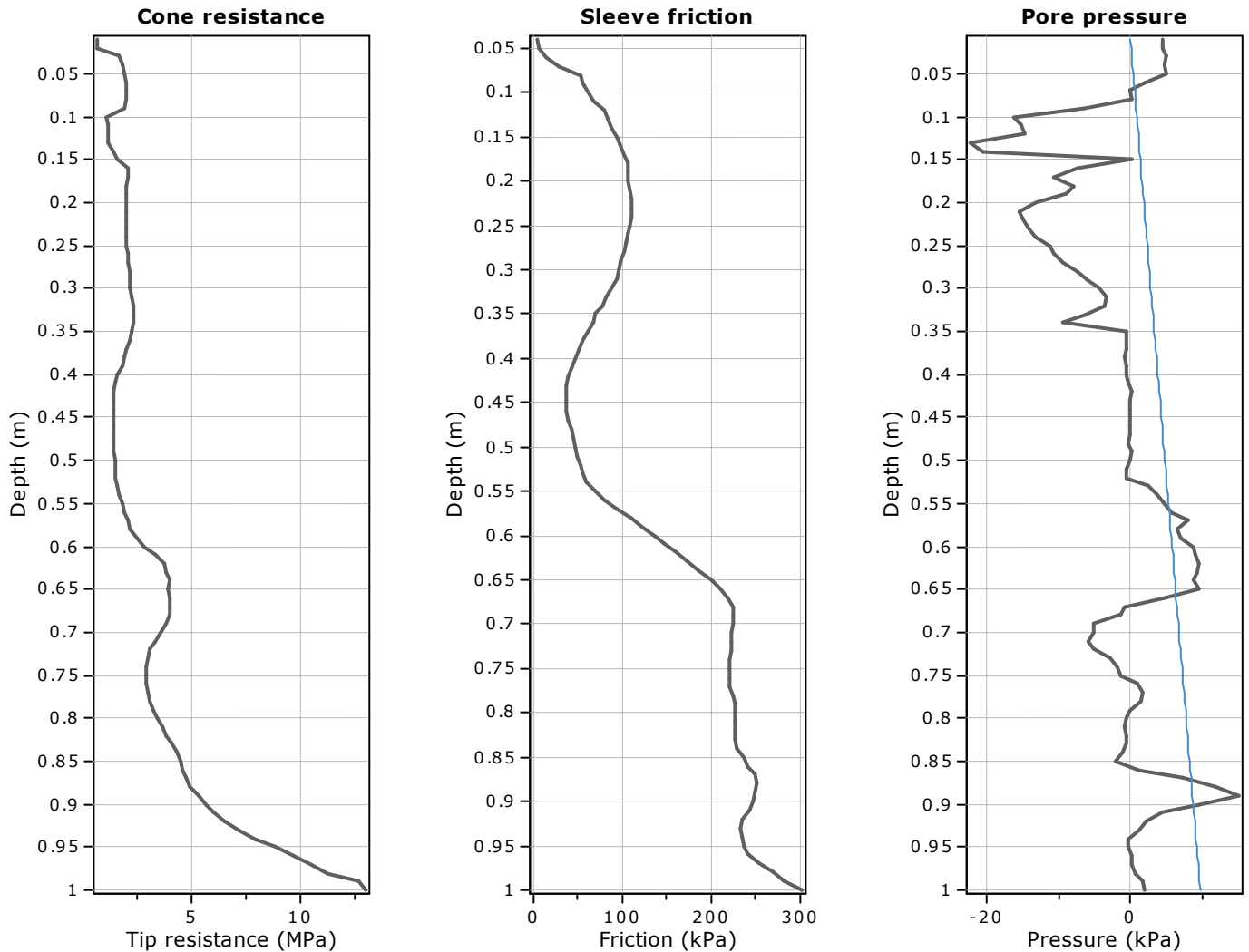
Location: One Tree Point, Landings Subdivision



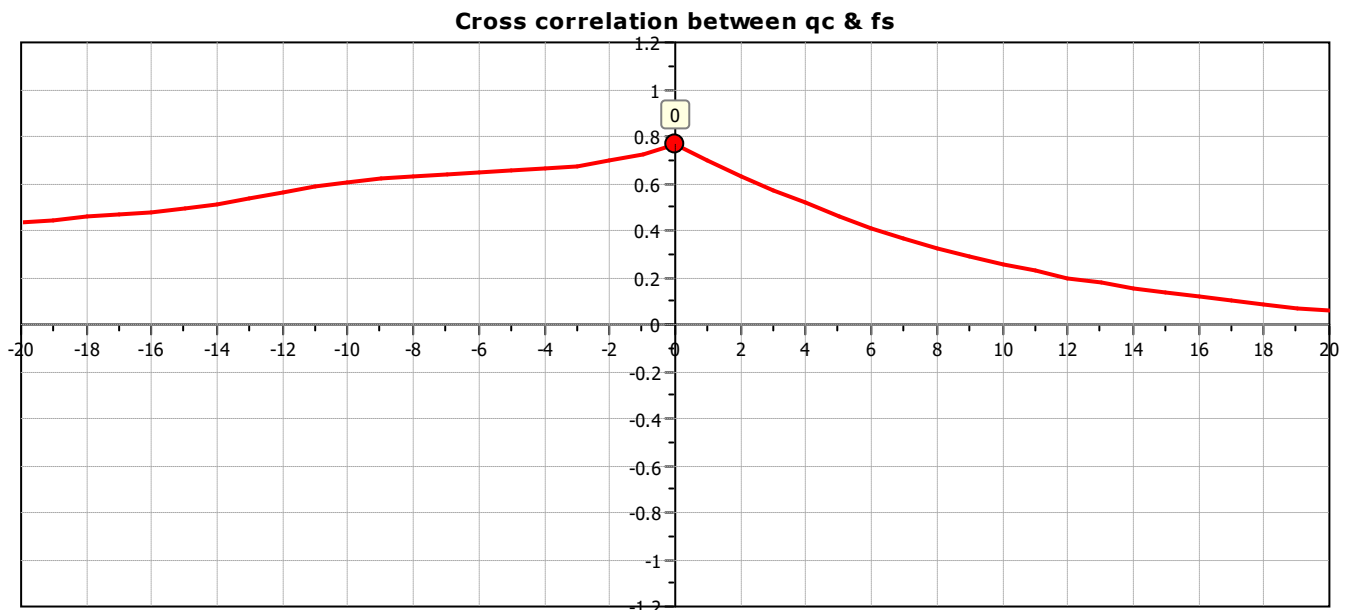
Calculation parameters

Soil Sensitivity factor, N_s : 7.00

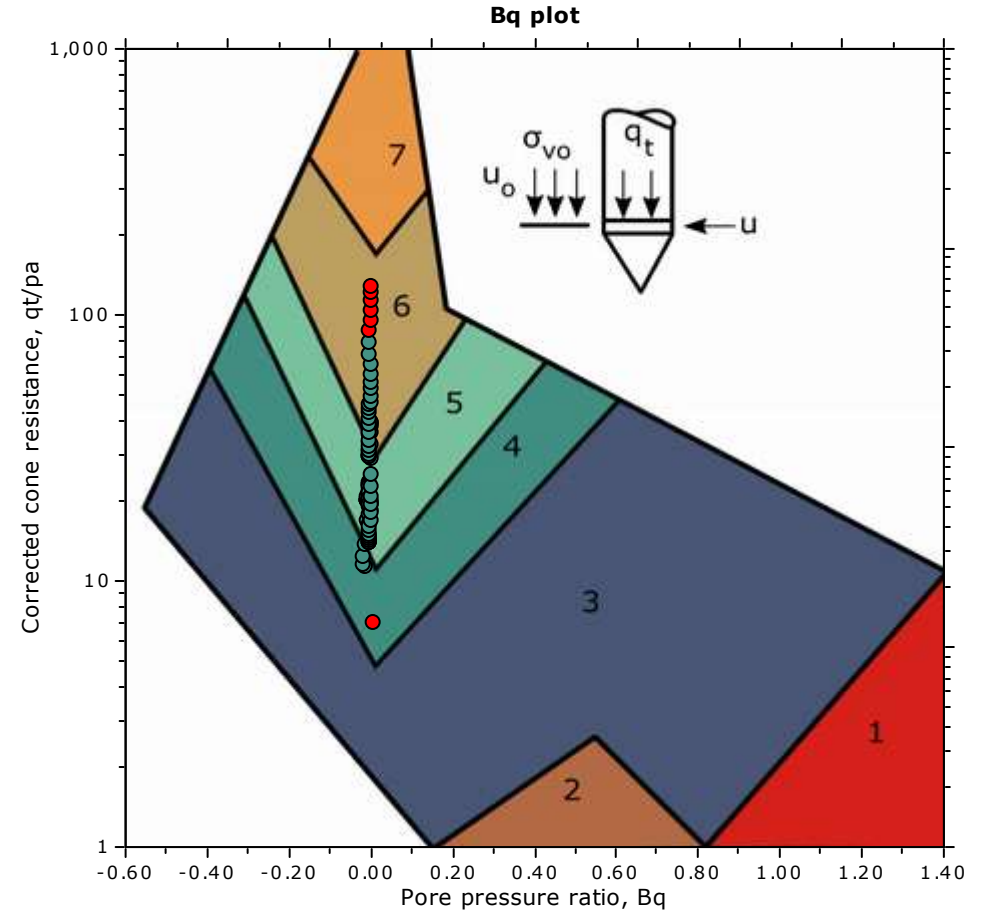
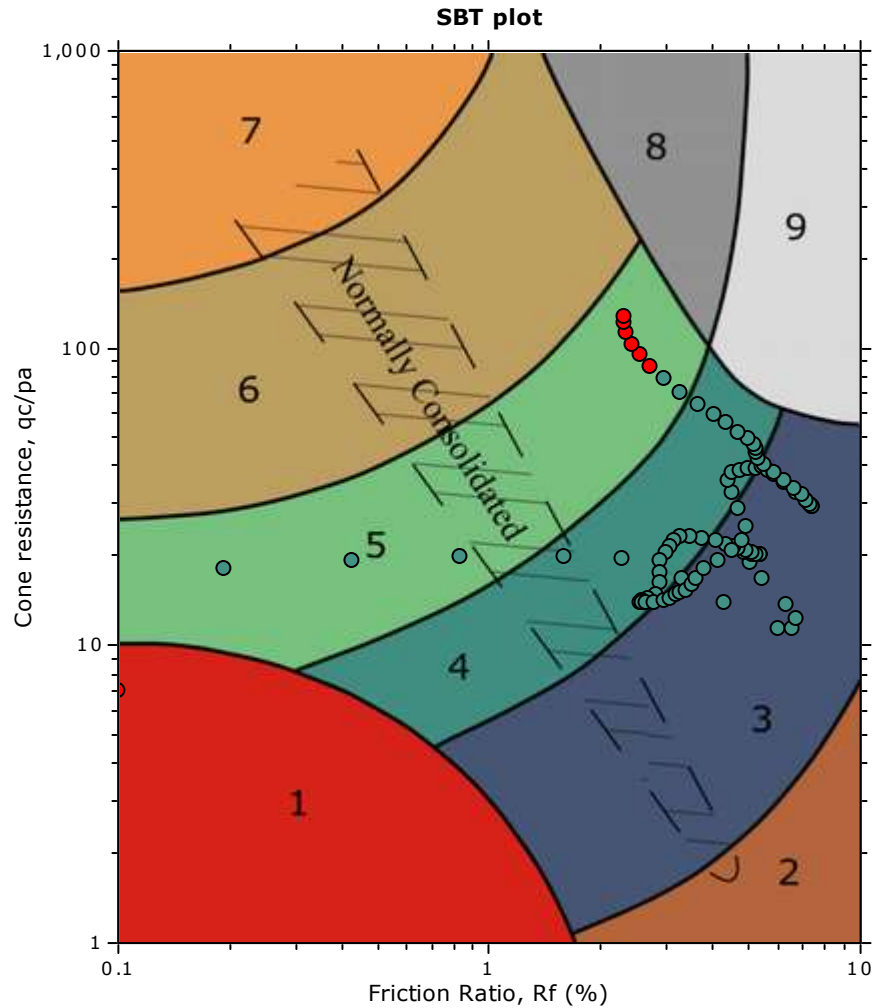
—●— User defined estimation data



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

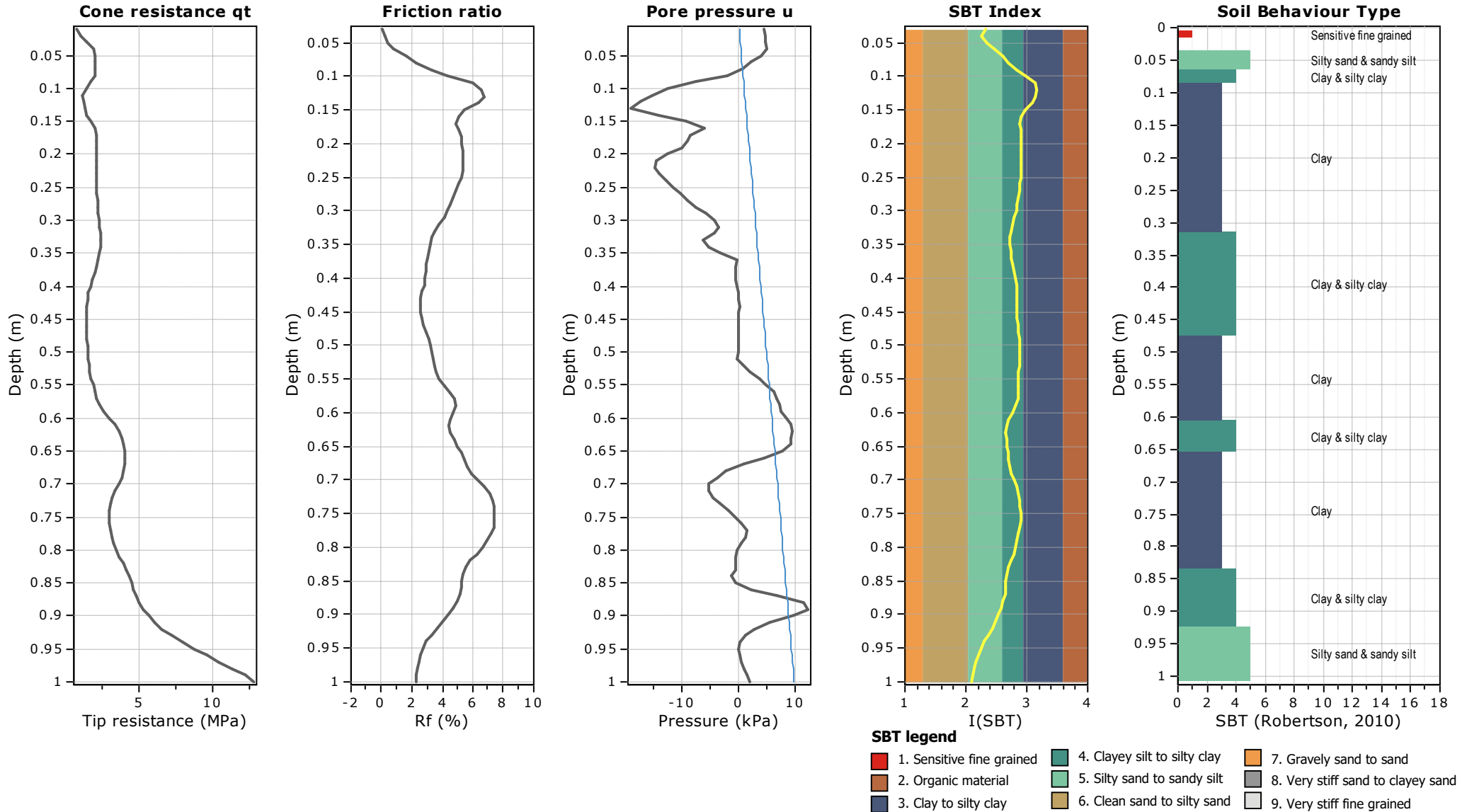


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

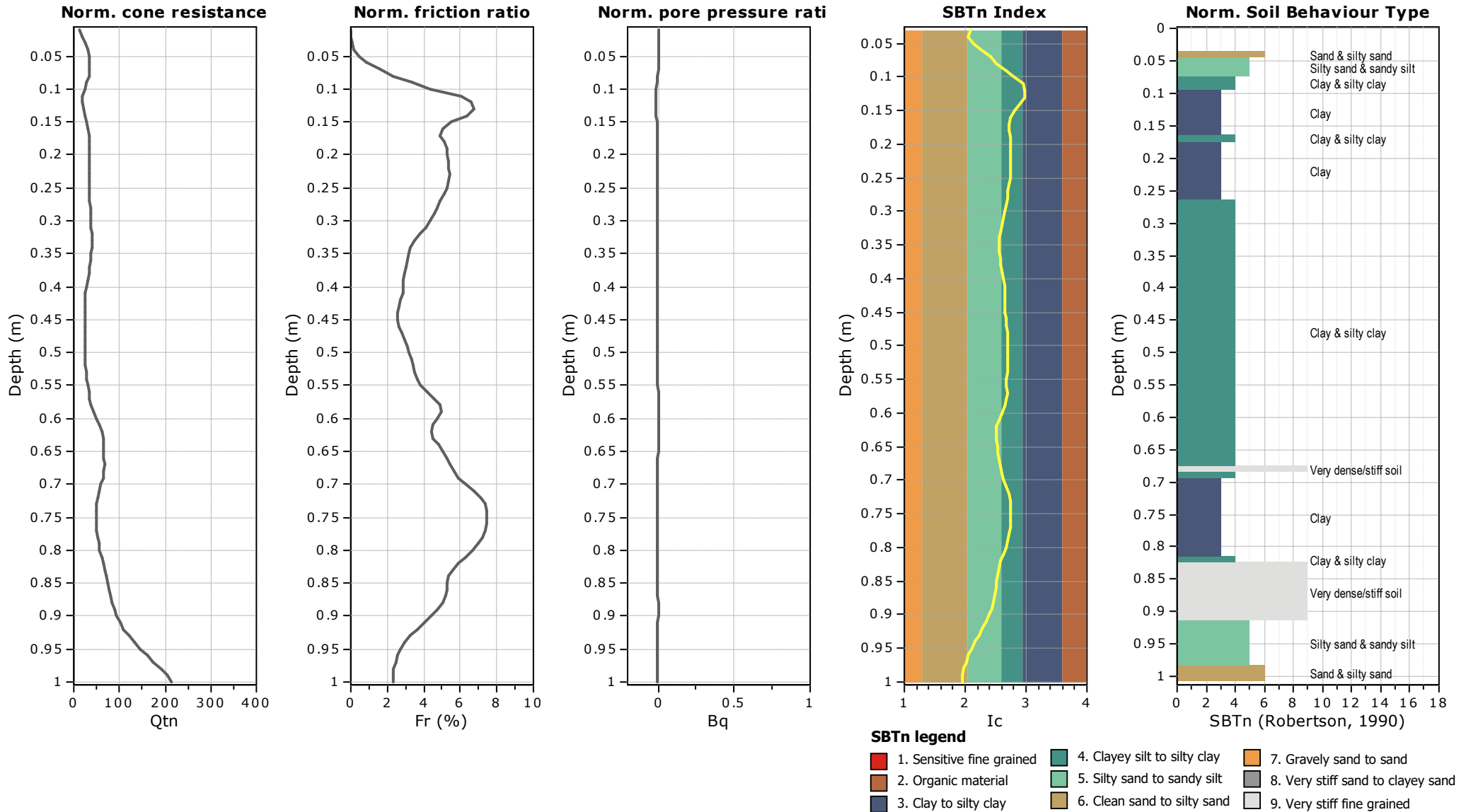
Project: The Landings Stage 6 & 7 Pre-earthworks Testing

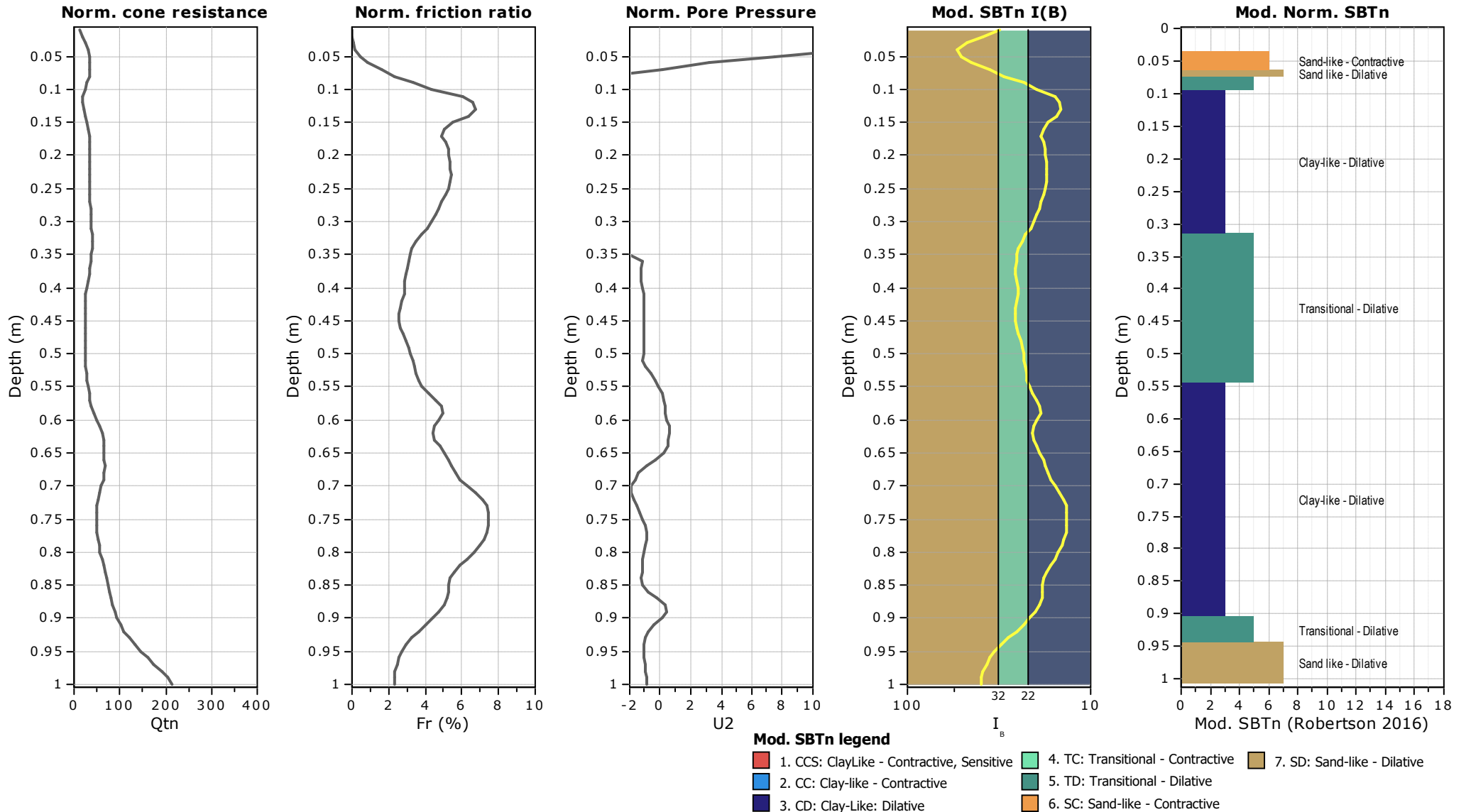
Location: One Tree Point, Landings Subdivision



Project: The Landings Stage 6 & 7 Pre-earthworks Testing

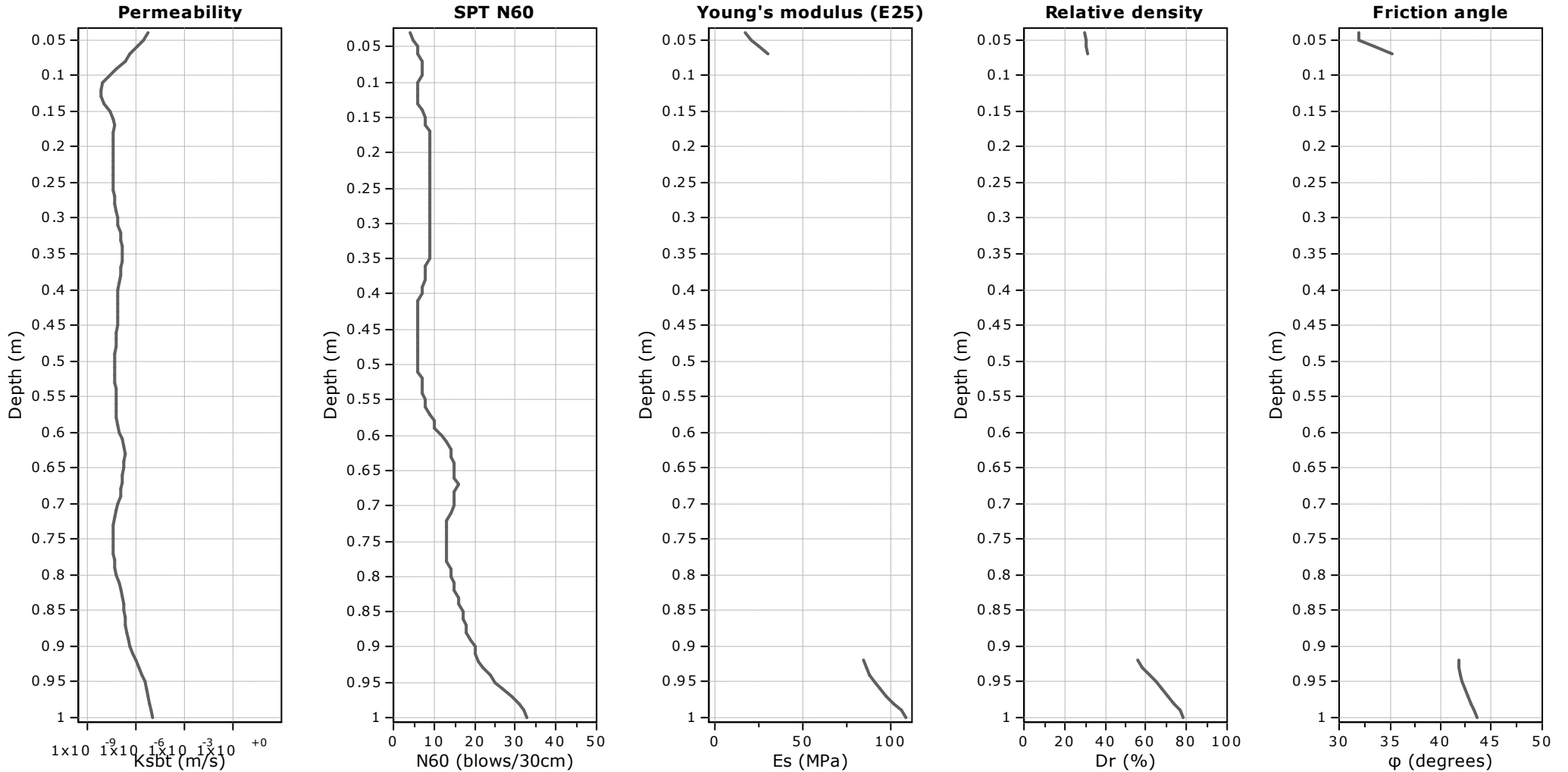
Location: One Tree Point, Landings Subdivision





Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

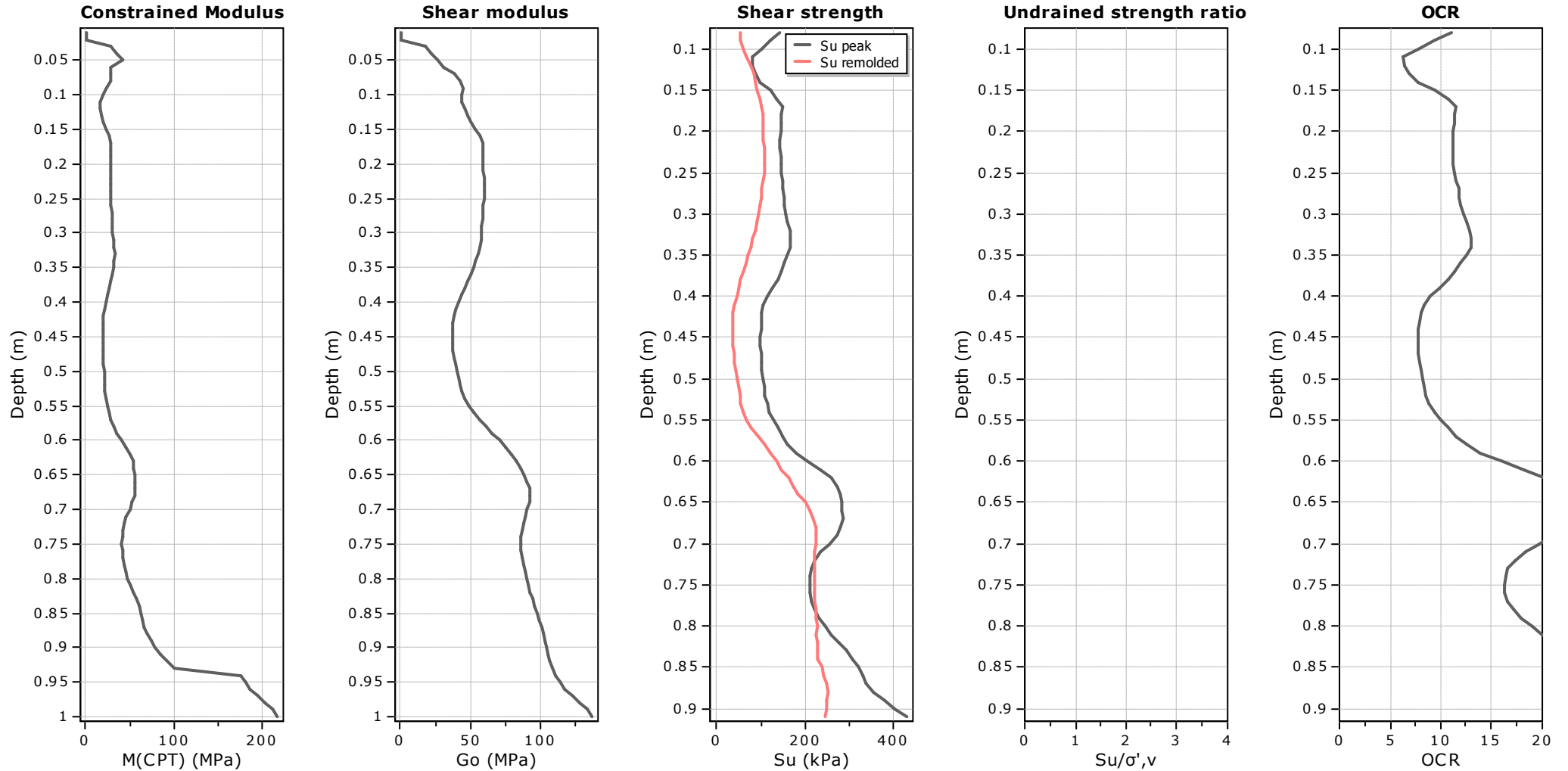
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

OCR factor for clays, N_{kt} : 0.33

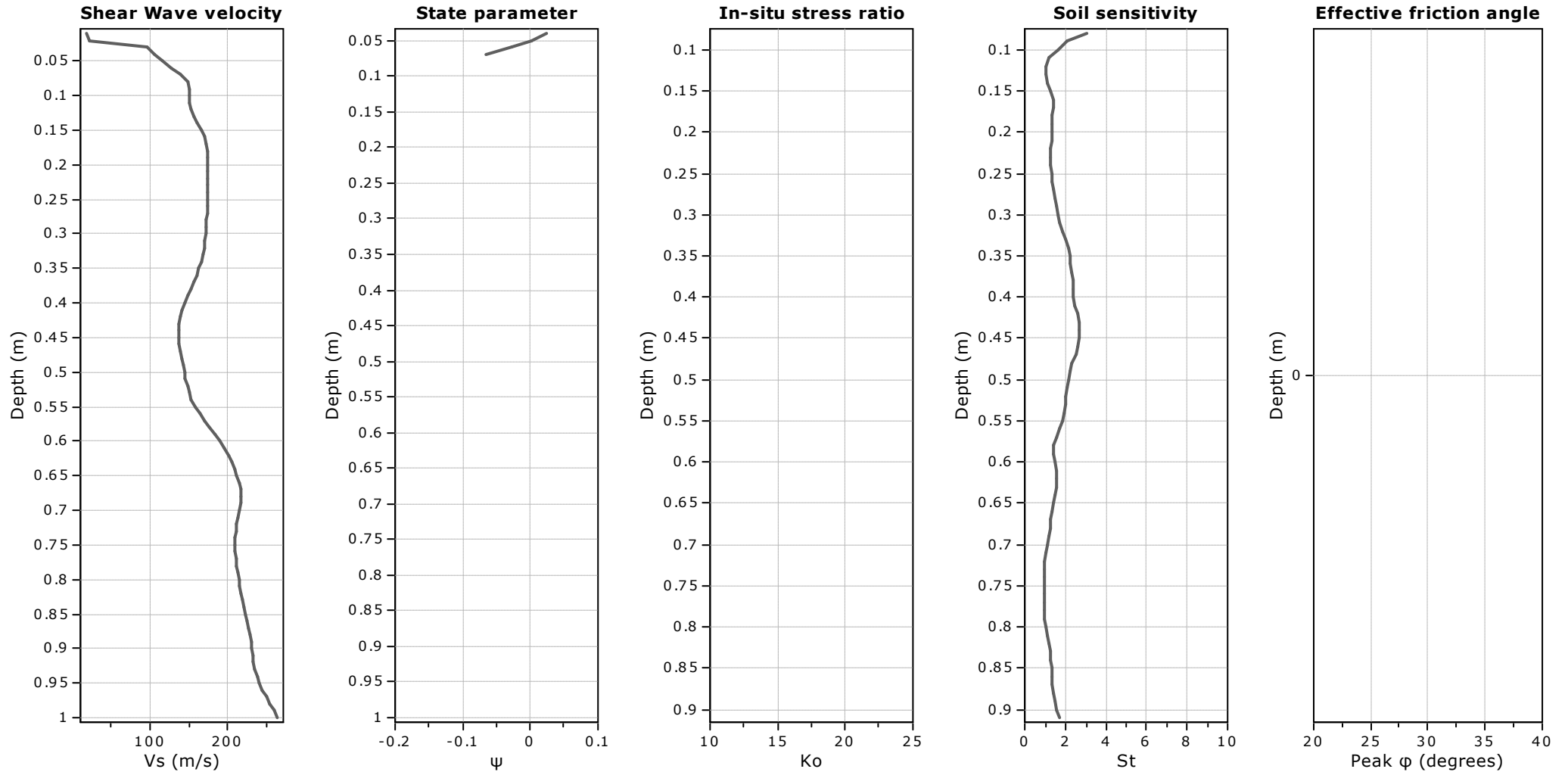
● User defined estimation data

● Flat Dilatometer Test data



Project: The Landings Stage 6 & 7 Pre-earthworks Testing

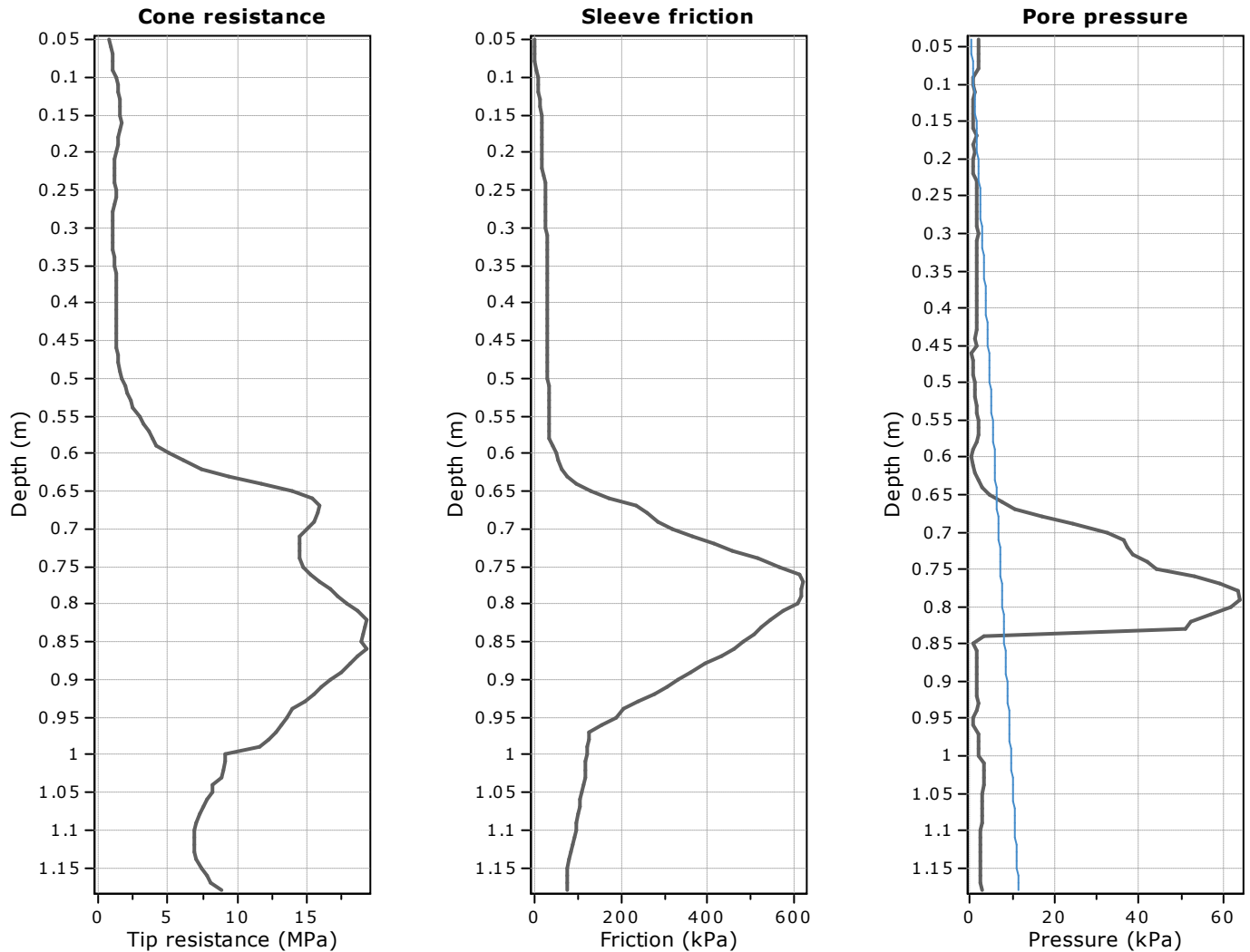
Location: One Tree Point, Landings Subdivision



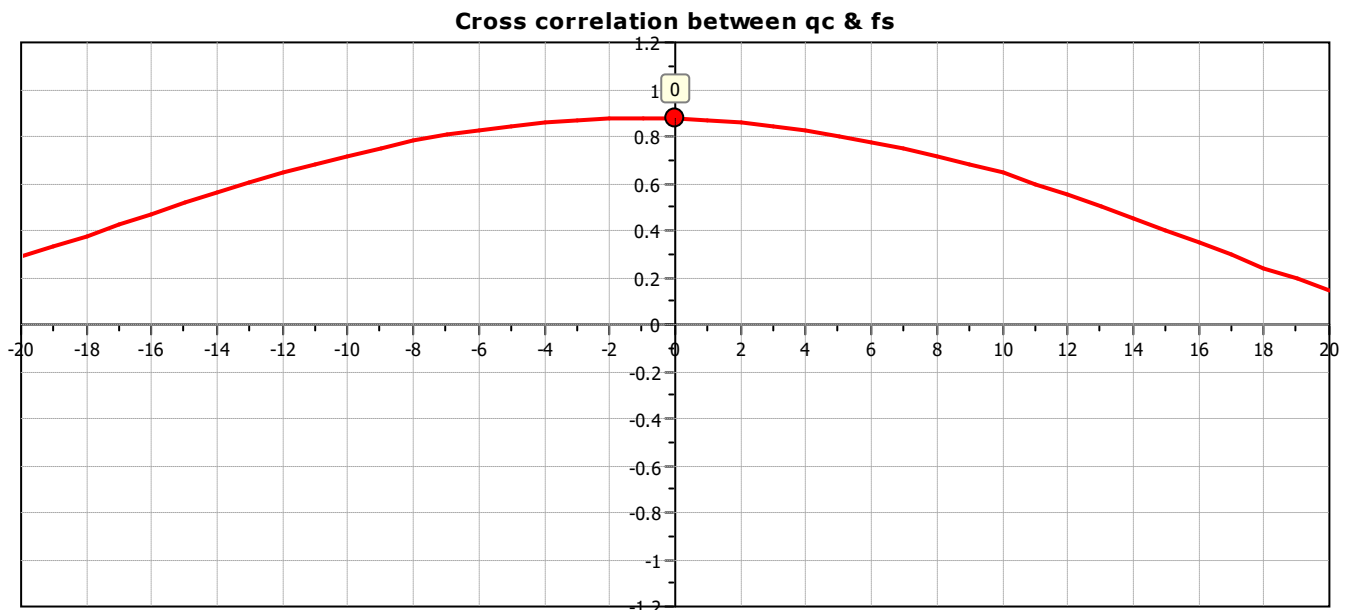
Calculation parameters

Soil Sensitivity factor, N_s : 7.00

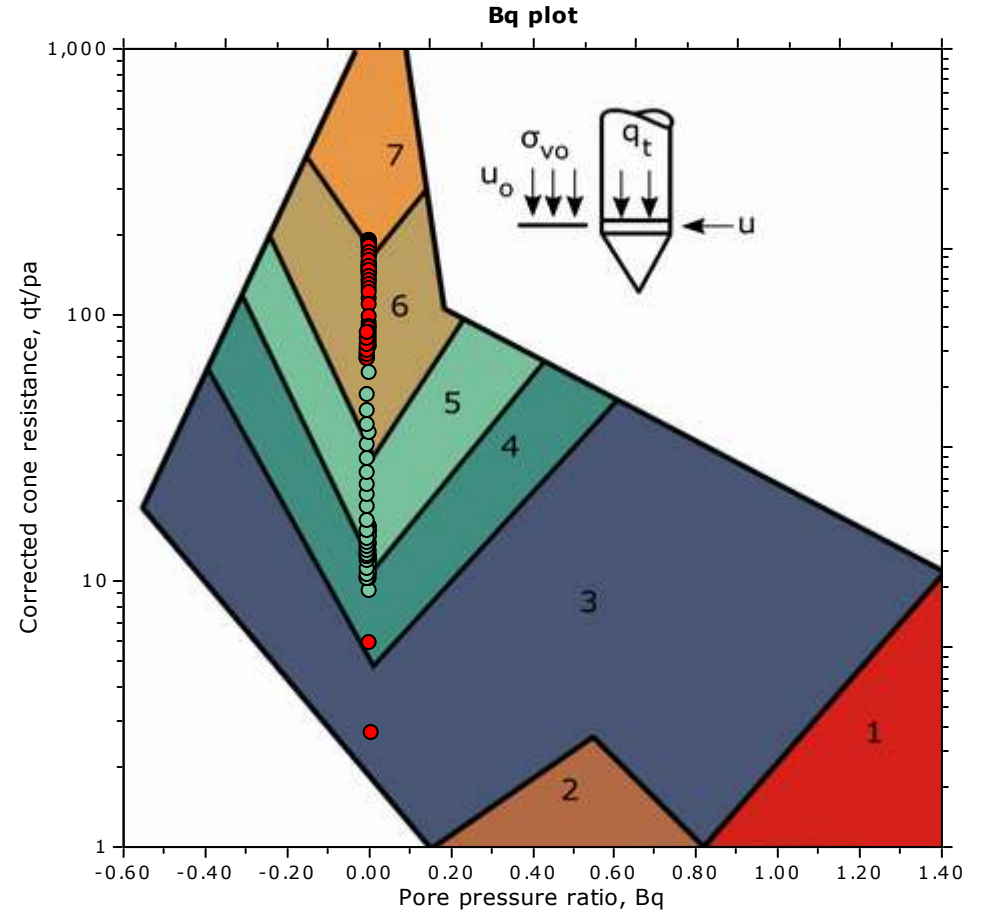
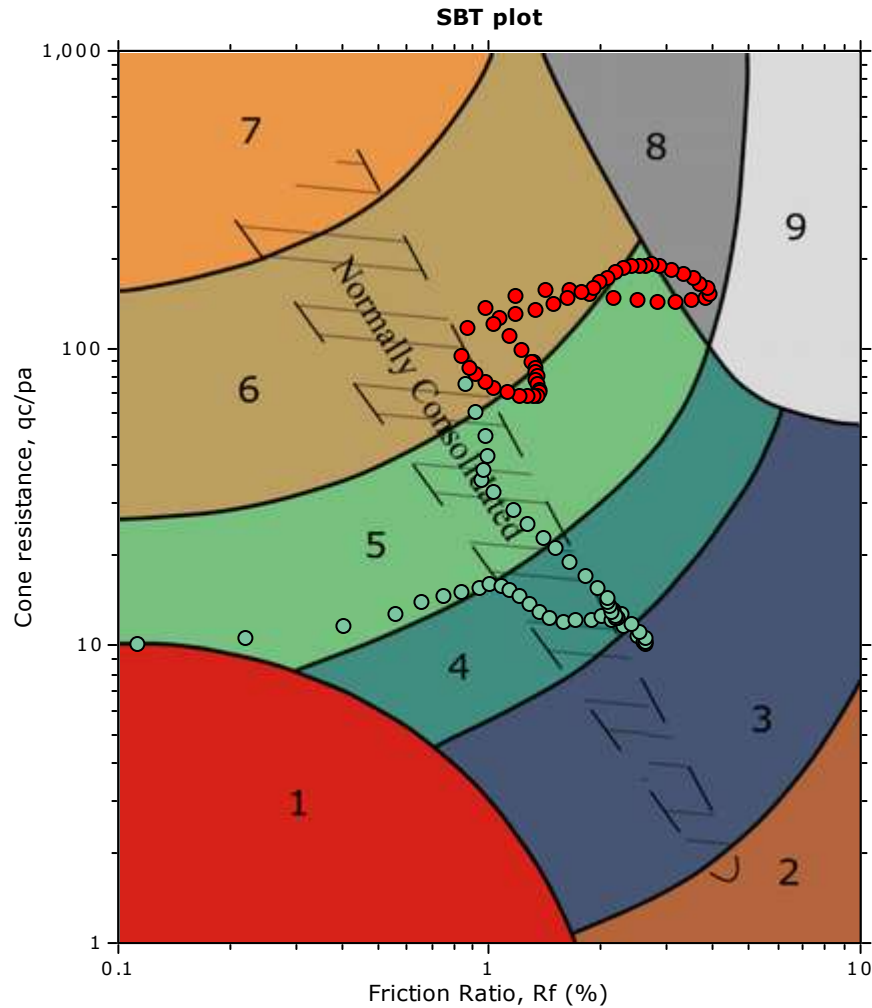
—●— User defined estimation data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing
Location: One Tree Point, Landings Subdivision


The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

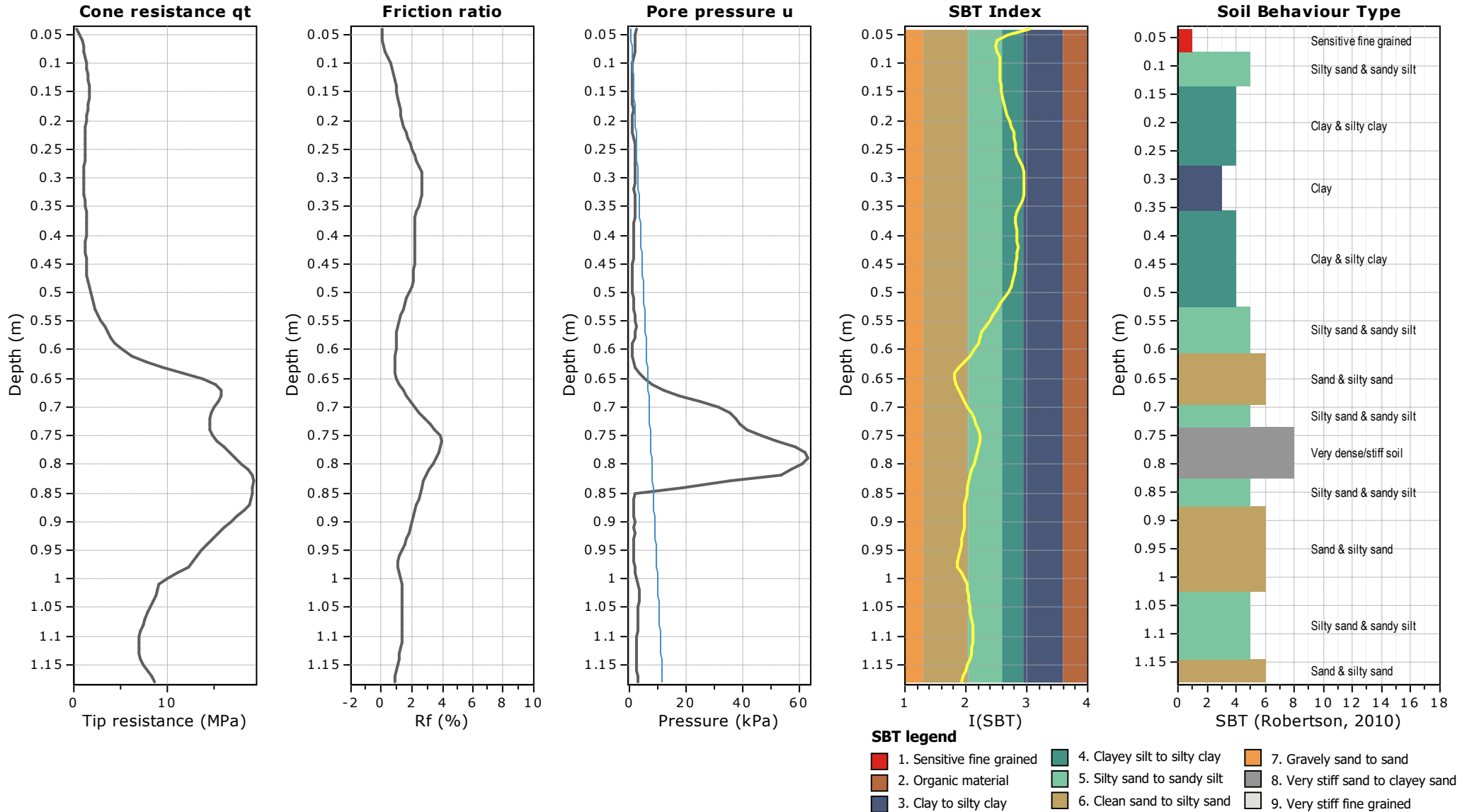


SBT - Bq plots



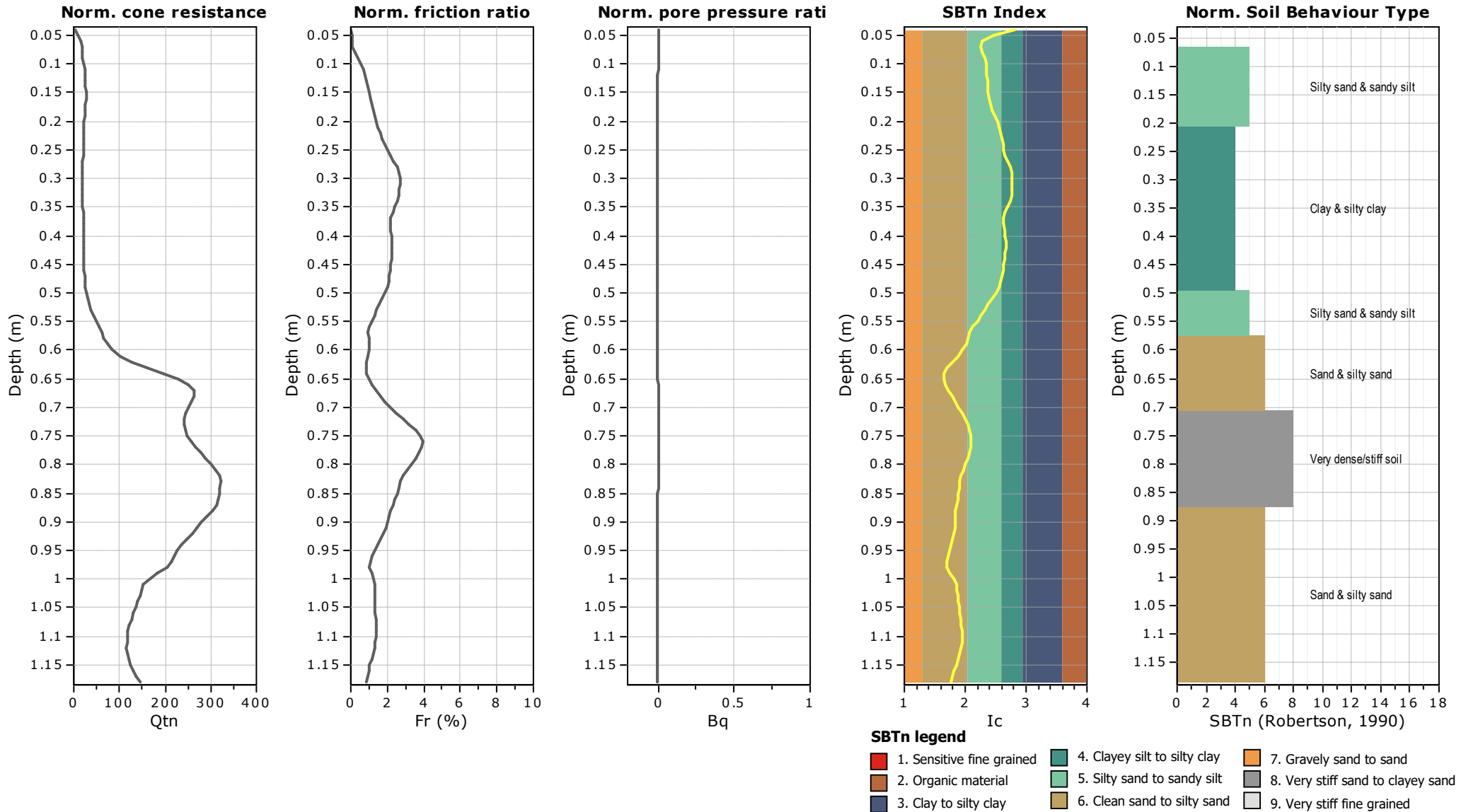
SBT legend

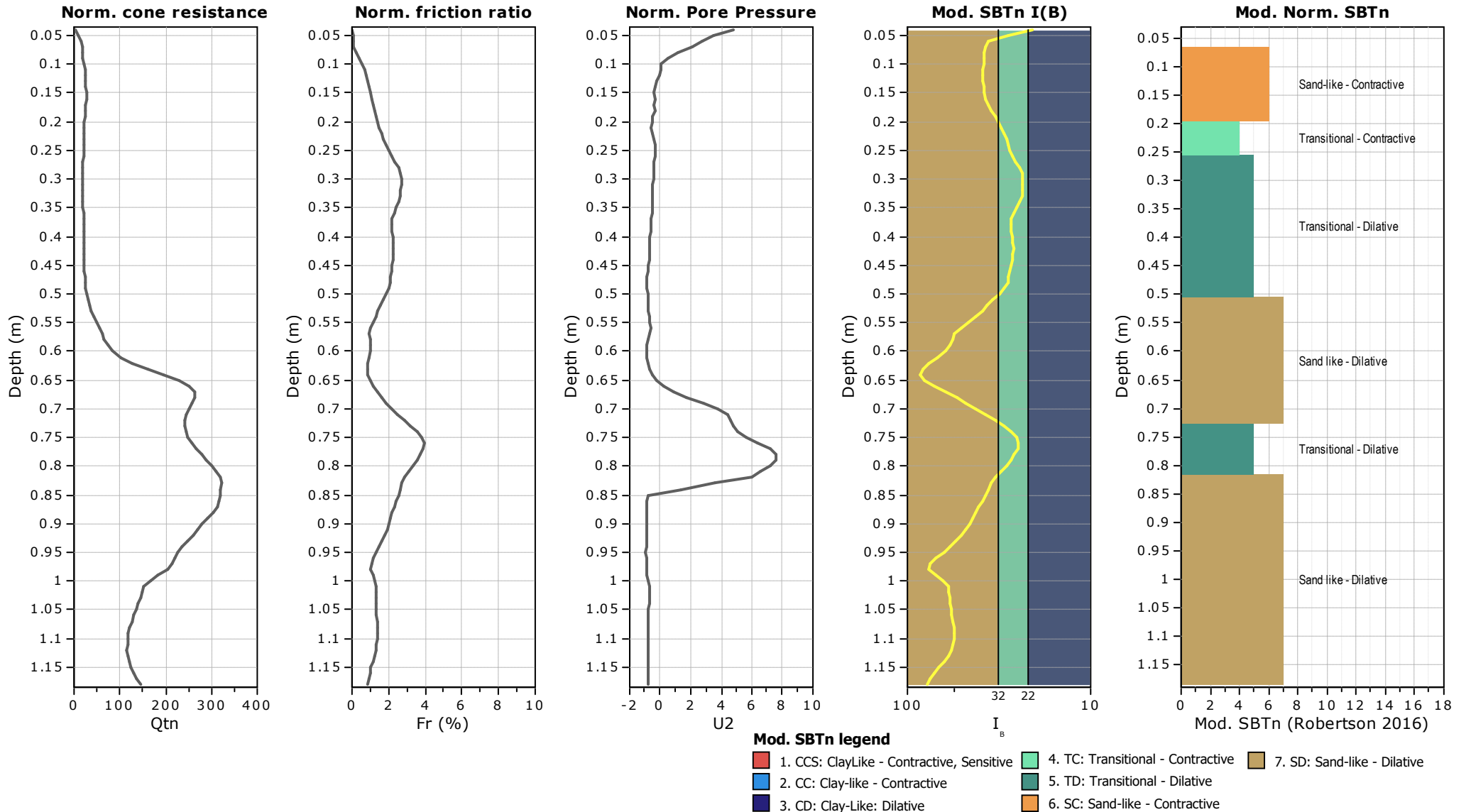
- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |



Project: The Landings Stage 6 & 7 Pre-earthworks Testing

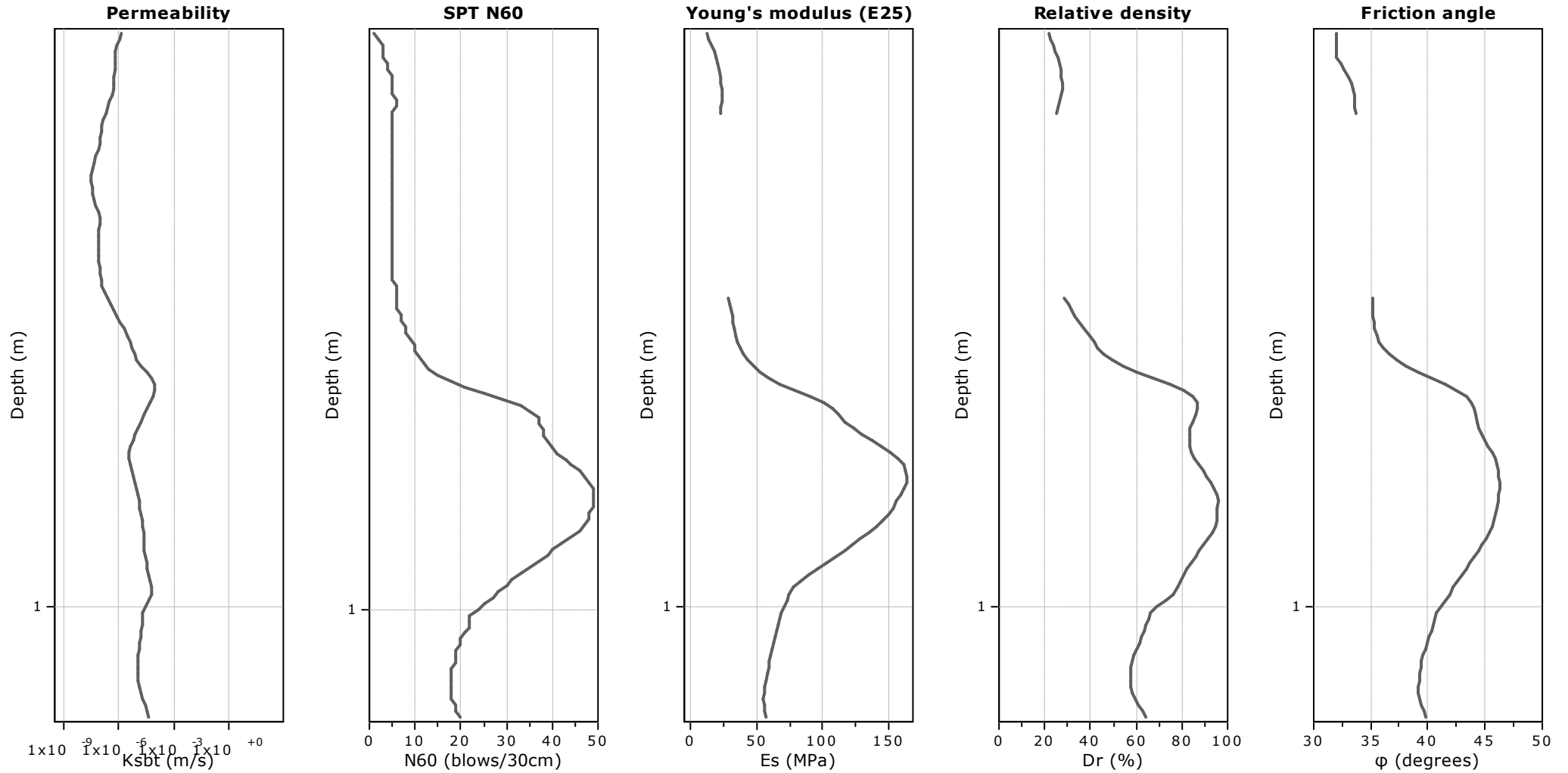
Location: One Tree Point, Landings Subdivision





Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

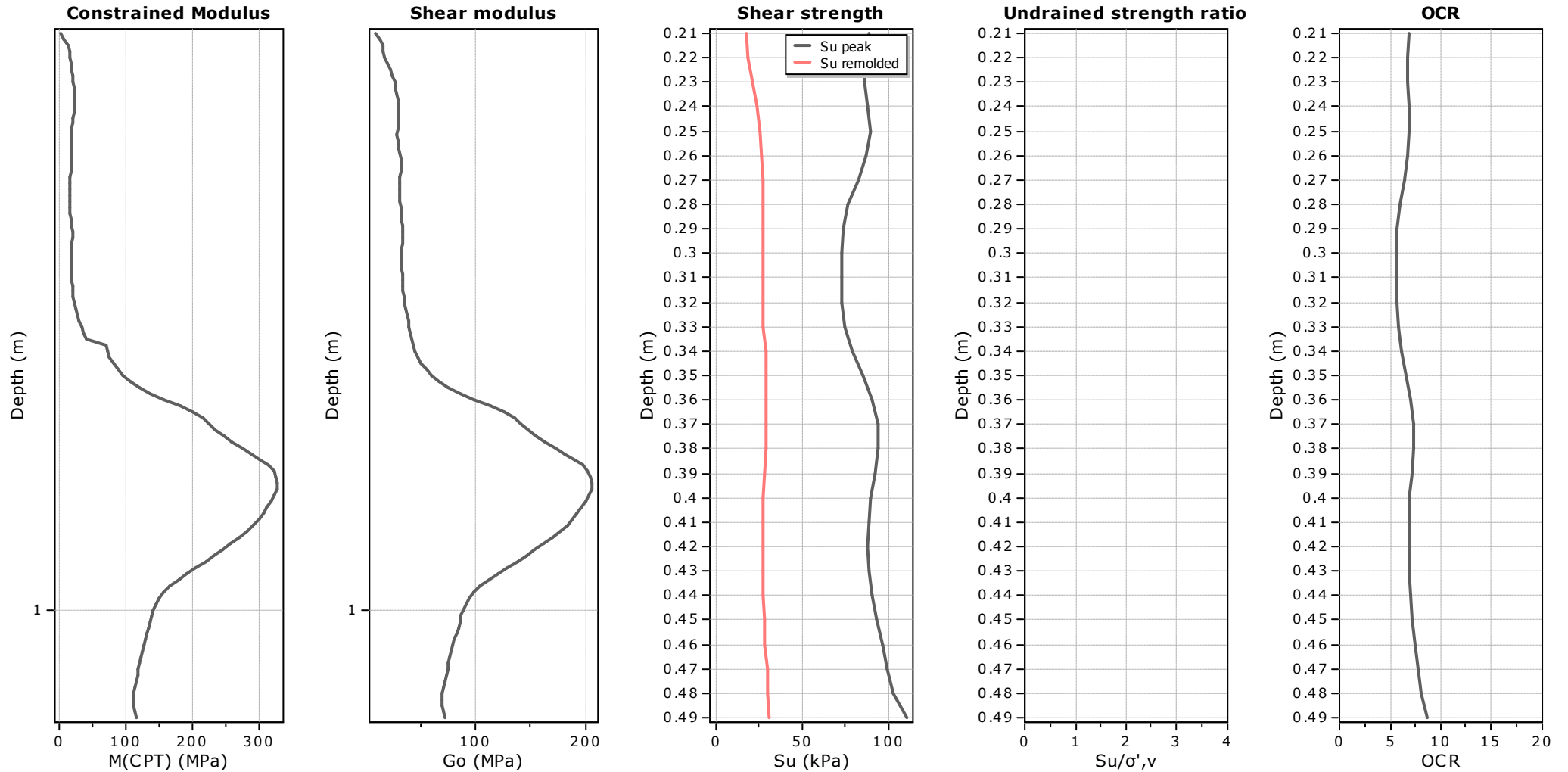
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

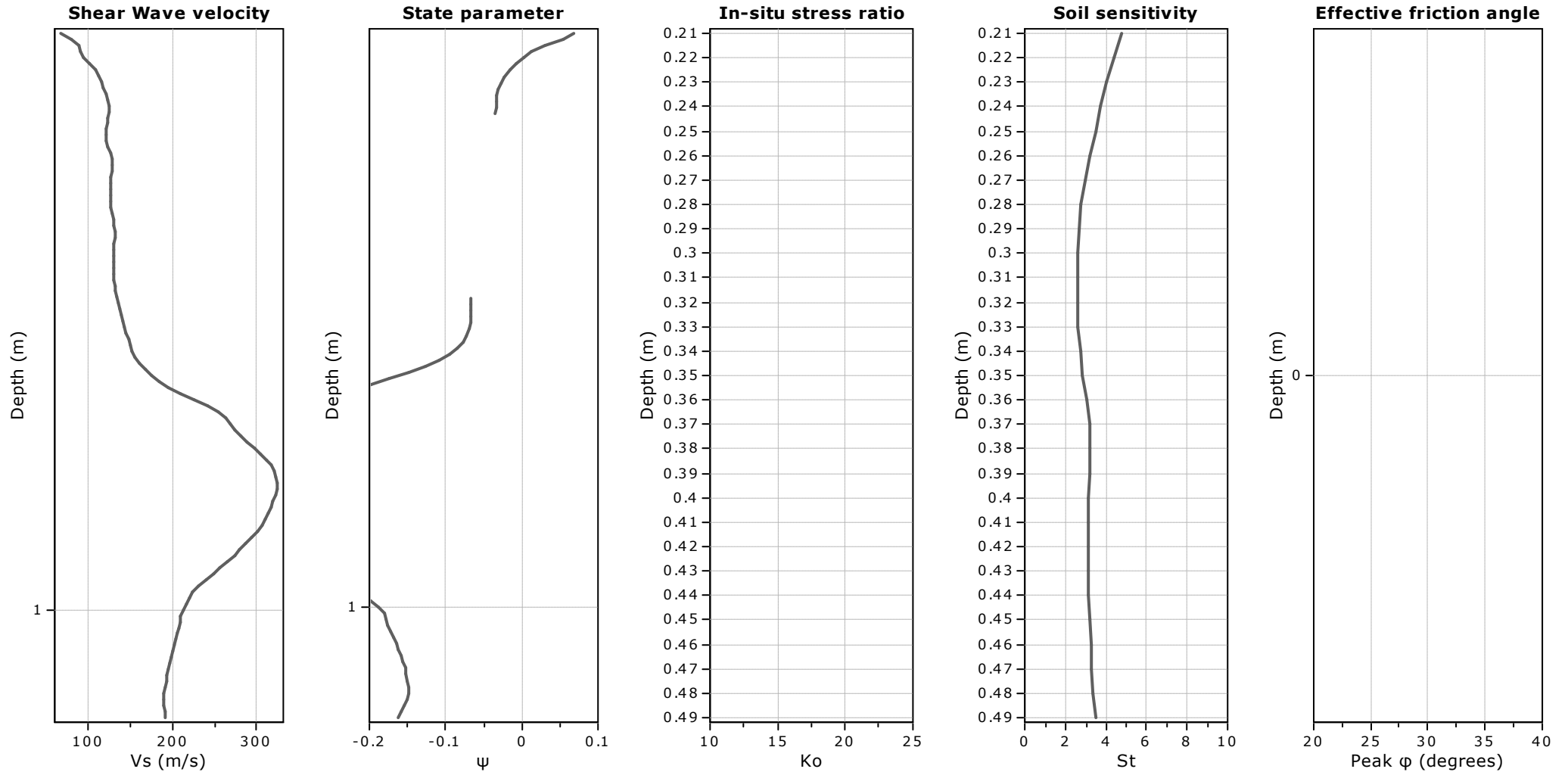
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: The Landings Stage 6 & 7 Pre-earthworks Testing

Location: One Tree Point, Landings Subdivision



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 31/05/2021
Date of Re-Issue: -
Page: 1 of 48

Test Report No.
W21-578

PROJECT: **The Landing**
CLIENT: Cook Costello
2 Norfolk Street
Whangarei
ATTENTION: Bernard Devine

TEST METHODS: Test Pit Log where required (not accredited)
NZGS December 2005 (not accredited)

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets



A.Millar

Admin



S. Kokich

Senior Technician



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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: C02
Hole Depth: 1.45 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Samples
							Scala Penetrometer		
							Tested in accordance with NZGS Aug 2001 NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)		
	Amorphous PEAT, traces of sand and rootlets, black/dark brown, moist buried logs upto 400mm diameter	Pt		0.0 - 1.5	Groundwater Not Encountered		Peak	Residual	
	Cemented SAND, some silt, traces of rootlets, brown, moist, sand is fine to medium, well graded	SW		1.5 - 1.45					
	End of Test Pit			1.45					

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test</p> <p>Note: Scala Penetrometer interpretation is not endorsed</p>	▼ Standing Water Level ◁ Out flow ▷ In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: C03
Hole Depth: 0.80 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Cemented silty SAND, traces of rootlets, darkish brown, moist, sand is fine to medium, well graded	SM									
	Amorphous PEAT, some sand, traces of rootlets, black/dark brown, moist	Pt		0.5	Groundwater Not Encountered						
	Cemented SAND, some silt, traces of rootlets, brown, moist, sand is fine to medium, well graded	SW									
	End of Test Pit										

Remarks		Water		Investigation Type	
		<input checked="" type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests	
		Recorded Date: 15/04/2021			

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166 Bank Street,
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Lab Job No.: 8020-1727

Borehole No.: D03

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 3.20 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Amorphous PEAT, traces of rootlets, black/dark brown, moist	Pt		0.0 - 0.5							
	Buried TOPSOIL, minor sand, dark greyish brown, moist, traces of rootlets, (buried logs upto 300mm diam)	OL		0.5 - 3.0	Groundwater Not Encountered						
	End of Test Pit (unable to dig further)			3.0 - 3.2							

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	<i>Alex Millar</i>		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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AUGERHOLE LOG

166 Bank Street,
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E:info@geocivil.co.nz

Lab Job No.: 8020-1727 **Borehole No.:** E02 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.90 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	TOPSOIL, traces of sands and rootlets, dark brown, moist	OL		0.0 - 0.1							
	Amorphous PEAT, traces of rootlets, black/dark brown, moist	Pt		0.1 - 0.6	Groundwater Not Encountered						
	Cemented silty SAND, traces of rootlets, brown, moist, sand is fine to medium, well graded	SM		0.6 - 1.0							
	End of Test Pit			1.0							

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</p>	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i>	Approved Signatory:
		Recorded Date: 15/04/2021	Alex Millar	No accredited tests

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166 Bank Street,
Whangarei,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: E04
Hole Depth: 1.50 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples	
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	Amorphous PEAT, minor sand, traces of rootlets, black/dark brown, moist	Pt		0.5	Groundwater Not Encountered							
	Amorphous PEAT, minor sand, traces of rootlets, black/dark brown, saturated	Pt		1.0								
	SAND, minor silt, brown, moist, sand is fine to medium, well graded	SW		1.5								
	End of Test Pit			1.5								

Remarks		Water		Investigation Type	
		▼ Standing Water Level	<input checked="" type="checkbox"/> Hand Auger		
		◁ Out flow	<input type="checkbox"/> Hand Auger + Scala (DCP)		
		▷ In flow			
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests	
		Recorded Date: 15/04/2021			

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166 Bank Street,
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Lab Job No.: 8020-1727

Borehole No.: E05

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.60 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples	
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
							5	10	15	20		
	Sandy TOPSOIL, traces of rootlets, brown, moist		OL	0.0 - 0.5								
	SAND, minor silt, brown with dark brown mottling, moist, sand is fine to medium, well graded		SM	0.5 - 0.6	Groundwater Not Encountered							
	End of Test Pit			0.6								

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	Alex Millar		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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166 Bank Street,
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Lab Job No.: 8020-1727 **Borehole No.:** F02 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.50 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, traces of sand and rootlets, dark brown, moist	OL									
	Amorphous PEAT, traces of sand and rootlets, black/dark brown, moist	Pt			Groundwater Not Encountered						
	Cemented silty SAND, traces of rootlets, brown, moist to dry, sand is fine to medium, well graded	SM									
	End of Test Pit			0.5							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727

Borehole No.: F03

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 1.60 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Report No.: W21-578

Location: The Landing

Ground Level:

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, traces of rootlets and bark, dark brown/black, moist, peat is amorphous	OL		0.0 - 0.5							
	Amorphous PEAT, some sand, traces of rootlets, black/dark brown, moist	Pt		0.5 - 1.5	Groundwater Not Encountered						
	Cemented SAND, orangey brown, moist, sand is fine to coarse, well graded	SW		1.5 - 1.6							
	End of Test Pit			1.6							

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test</p> <p>Note: Scala Penetrometer interpretation is not endorsed</p>	<p>▼ Standing Water Level</p> <p>◁ Out flow</p> <p>▷ In flow</p>	<p><input checked="" type="checkbox"/> Hand Auger</p> <p><input type="checkbox"/> Hand Auger + Scala (DCP)</p>

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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AUGERHOLE LOG

166 Bank Street,
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E:info@geocivil.co.nz

Lab Job No.: 8020-1727

Borehole No.: G01

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 1.35 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	TOPSOIL, traces of sand and rootlets, dark brown, moist	OL		0.0 - 0.1							
	Amorphous PEAT, traces of rootlets, dark brown/black, moist	Pt		0.1 - 1.35	Groundwater Not Encountered						
	Cemented silty SAND, brown, moist, sand is fine to medium, well graded	SW		1.35 - 1.5							
	End of Test Pit			1.5							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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AUGERHOLE LOG

166 Bank Street,
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M:0276565226
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: G03
Hole Depth: 1.60 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	TOPSOIL, traces of sand and rootlets, dark brown, moist	OL		0.0 - 0.2							
	Amorphous PEAT, traces of rootlets, dark brown/black, moist. Branches/logs found buried upto 200mm diameter	Pt		0.2 - 1.5							
	End of Test Pit			1.5	SWL 1.55m						

Remarks		Water		Investigation Type	
		<input checked="" type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	Alex Millar		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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AUGERHOLE LOG

166 Bank Street,
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Lab Job No.: 8020-1727

Borehole No.: G04

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 1.55 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	TOPSOIL, minor sand, traces of rootlets, dark brown, moist	OL		0.0 - 0.1							
	Amorphous PEAT, traces of rootlets, dark brown/black, moist. (some small branches 20-30mm diameter)	Pt		0.1 - 1.5	Groundwater Not Encountered						
	Cemented silty SAND, brown, moist, sand is fine to medium, well graded	SW		1.5 - 1.55							
	End of Test Pit			1.55							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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AUGERHOLE LOG

166 Bank Street,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: G08
Hole Depth: 0.30 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	SAND, traces of silt and rootlets, brown, moist, sand is fine to medium, well graded				Groundwater Not Encountered							
	End of Test Pit											

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: H06
Hole Depth: 1.00 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples	
							Tested in accordance with NZGS Aug 2001						
							Scala Penetrometer						
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)						
							5	10	15	20			
	Sandy TOPSOIL, minor rootlets, dark brown, moist, sand is fine to medium, well graded	OL		0.0 - 0.2	Groundwater Not Encountered								
	Silty SAND, traces of rootlets, darkish brown, moist, sand is fine to medium, well graded	SW		0.2 - 0.5									
	Amorphous PEAT, some sand, black/dark brown, moist, sand is fine to medium	Pt		0.5 - 0.8									
	Cemented SAND, some silt, brown-orangey brown, moist, sand is fine to medium, well graded	SW		0.8 - 1.0									
	End of Test Pit			1.0									

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727

Borehole No.: H09

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.80 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
							5	10	15	20		
	Sandy TOPSOIL, traces of rootlets, dark brown, moist	OL										
	Sandy SILT, brown, moist, sand is fine to medium, well graded	ML			Groundwater Not Encountered							
	Sandy PEAT, traces of rootlets, black/dark brown, moist, peat is amorphous, sand is fine to medium, well graded	OL		0.5								
	Cemented SAND, minor silt, orangey brown, moist, sand is fine to medium, well graded	SW										
	End of Test Pit											

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727 **Borehole No.:** H11 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.40 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples	
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	Amorphous PEAT, minor sand, traces of rootlets, dark brown/black, moist	Pt			Groundwater Not Encountered							
	SAND, brown, moist, sand is fine to medium, well graded	SW										
	Colour Change: light brown	SW										
	End of Test Pit			0.5								

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</p>	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727

Borehole No.: H12

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.80 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples	
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
							5	10	15	20		
	Amorphous PEAT, traces of sand and rootlets, dark brown, moist	Pt										
	SAND, traces of silt, brown, moist, sand is fine to medium, well graded	SW			Groundwater Not Encountered							
	Peaty SAND, traces of silt, dark brown, moist, sand is fine to medium, well graded	SW		0.5								
	End of Test Pit											

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	<i>Alex Millar</i>		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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Lab Job No.: 8020-1727

Borehole No.: H13

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.95 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, traces of sand and rootlets, dark brown, specks/spots of orangey brown sand, moist, peat is amorphous		OL	0.0 - 0.5	Groundwater Not Encountered						
	SAND, traces of silt, brown, moist-wet, sand is fine to medium, well graded		SW	0.5 - 1.0	Groundwater Not Encountered						
	End of Test Pit			1.0							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727 **Borehole No.:** J03 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 1.20 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Amorphous PEAT, traces of rootlets and barks, black/dark brown, moist. some buried logs 100-250mm diameter			0.5	Groundwater Not Encountered						
	End of Test pit			1.0							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: J04
Hole Depth: 0.90 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	Silty TOPSOIL, minor sand, traces of rootlets, dark brown, moist	OL		0.0 - 0.5								
	Amorphous PEAT, some silt, traces of rootlets, black/dark brown, wet	Pt		0.5 - 1.0	Groundwater Not Encountered							
	Cemented silty SAND, traces of rootlets, orangey brown, moist	SM		1.0 - 1.5								
	End of Test Pit			1.5								

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727 **Borehole No.:** J05 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 1.20 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, minor sand, traces of rootlets, dark brown/black, moist, peat is amorphous	OL		0.0 - 0.2	Groundwater Not Encountered						
	Silty SAND, traces of rootlets, orangey brown, moist, sand is fine to medium, well graded	SW		0.2 - 0.4							
	SAND, minor peat, dark brown, moist, sand is fine to medium, well graded	SW		0.4 - 1.0							
	Cemented SAND, greyish brown, moist, sand is fine to medium, well graded, hard	SW		1.0 - 1.2							
	End of Test Pit			1.2							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: J06
Hole Depth: 1.00 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa) <small>Tested in accordance with NZGS Aug 2001</small>		Blows	Peak Residual	Samples
							Scala Penetrometer <small>NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)</small>				
	SAND, light brown, moist, sand is fine to medium, well graded										
		SW		0.5	Groundwater Not Encountered						
	End of Test Pit			1.0							

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:	
		Recorded Date: 15/04/2021		No accredited tests	

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Lab Job No.: 8020-1727 **Borehole No.:** J08 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.70 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Silty TOPSOIL, some sand, traces of rootlets, dark brown, moist	OL									
	Sandy PEAT, dark brown, moist, peat is amorphous, sand is fine to medium, well graded	Pt			Groundwater Not Encountered						
	SAND, minor silt, brown, moist, sand is fine to medium, well graded	SW		0.5							
	End of Test Pit										

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: J09
Hole Depth: 1.40 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, brown, moist	OL		0.0 - 0.2							
	Amorphous PEAT, traces of sand, dark brown, moist	Pt		0.2 - 0.6							
	SAND, minor silt, brown, moist, sand is fine to medium, well graded	SW		0.6 - 1.4	Groundwater Not Encountered						
	End of Test Pit			1.4							

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:	
		Recorded Date: 15/04/2021		No accredited tests	

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: J10
Hole Depth: 1.30 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Amorphous PEAT, traces of sand and rootlets, dark brown, moist	Pt		0.0 - 0.5	Groundwater Not Encountered						
	Silty SAND, traces of rootlets, brown, dry, sand is fine to coarse, well graded	SW		0.5 - 0.7							
	Friable Sandy SILT, traces of fine gravels, brown, dry, sand is fine to medium, well graded	ML		0.7 - 1.0							
	Sandy SILT, brown, dry, sand is fine to medium, well graded	ML		1.0 - 1.3							
	End of Test Pit			1.3							

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test</p> <p>Note: Scala Penetrometer interpretation is not endorsed</p>	<p>▼ Standing Water Level</p> <p>◁ Out flow</p> <p>▷ In flow</p>	<p><input checked="" type="checkbox"/> Hand Auger</p> <p><input type="checkbox"/> Hand Auger + Scala (DCP)</p>

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727 **Borehole No.:** J11 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.65 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	PEAT, traces of sand, traces of rootlets, dark brown, moist	Pt			Groundwater Not Encountered						
	Change: wet and no sand	Pt									
	SAND, minor peat, brown, moist, sand is fine to medium, well graded	SW		0.5							
	End of Test Pit										

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
 Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i>	Approved Signatory:
		Recorded Date: 15/04/2021	Alex Millar	No accredited tests

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: J12
Hole Depth: 0.70 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, traces of rootlets, brown, moist, sand is fine to medium, well graded	OL									
	Amorphous PEAT, some sand, dark brown, moist	Pt			Groundwater Not Encountered						
	SAND, brown, moist, sand is fine to medium, well graded	SW		0.5							
	End of Test Pit										

Remarks		Water		Investigation Type	
		<input checked="" type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:	
		Recorded Date: 15/04/2021		No accredited tests	

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AUGERHOLE LOG

166 Bank Street,
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Lab Job No.: 8020-1727

Borehole No.: J13

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.75 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, brown, moist, sand is fine to medium, well graded	OL									
	Amorphous PEAT, some sand, traces of rootlets, dark brown, moist	Pt			Groundwater Not Encountered						
	SAND, traces of silt, brown, dry to moist, sand is fine to medium, well graded	SW		0.5							
	End of Test Pit										

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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166 Bank Street,
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Lab Job No.: 8020-1727 **Borehole No.:** J14 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.50 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples	
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
							5	10	15	20		
	Peaty TOPSOIL, traces of rootlets, dark brown, moist, peat is amorphous		OL									
	SAND, traces of silt, brown, wet to moist, sand is fine to medium, well graded		SW		Groundwater Not Encountered							
	End of Test Pit			0.5								

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727

Borehole No.: K05

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.75 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	Silty TOPSOIL, traces of rootlets, dark brown, moist	OL										
	Amorphous PEAT, traces of sand and rootlets, dark brown/black, moist. (some bark found buried)	Pt			Groundwater Not Encountered							
	End of Test Pit											

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727

Borehole No.: K06

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.55 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples					
							Tested in accordance with NZGS Aug 2001										
							Scala Penetrometer										
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)										
							25	50	75	100	125	150	175	200	225		
							5	10	15	20							
	Peaty TOPSOIL, some sand, traces of rootlets, dark brown/black, moist.	OL															
	Amorphous PEAT, some sand, traces of rootlets, dark brown/black, moist	Pt			Groundwater Not Encountered												
	Cemented SAND, some silt, orangey brown, moist, sand is fine to medium, well graded	SW		0.5													
	End of Test Pit																

Remarks		Water		Investigation Type	
		▼ Standing Water Level	<input checked="" type="checkbox"/> Hand Auger		
		◁ Out flow	<input type="checkbox"/> Hand Auger + Scala (DCP)		
		▷ In flow			
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	<i>Alex Millar</i>		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: K08
Hole Depth: 0.85 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, some sand, traces of rootlets, dark brown/black, moist.	OL		0.0 - 0.2							
	Silty PEAT, minor sand, traces of rootlets, dark brown/black, moist, peat is amorphous	Pt		0.2 - 0.8	Groundwater Not Encountered						
	Cemented SAND, traces of silt, light brown, moist, sand is fine to medium, well graded	SW		0.8 - 1.0							
	End of Test Pit			1.0							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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166 Bank Street,
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Lab Job No.: 8020-1727 **Borehole No.:** K12 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.90 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Amorphous PEAT, traces of sand and rootlets, dark brown, wet	Pt		0.0 - 0.5	Groundwater Not Encountered						
	SAND, brown, moist, sand is fine to medium, well graded	SW		0.5 - 1.0							
	End of Test Pit			1.0							

Remarks	Water	Investigation Type
<p>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</p>	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i>	Approved Signatory:
		Recorded Date: 15/04/2021	Alex Millar	No accredited tests

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166 Bank Street,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: K13
Hole Depth: 1.40 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples	
							Tested in accordance with NZGS Aug 2001						
							Scala Penetrometer						
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)						
							5	10	15	20			
	Sandy TOPSOIL, traces of rootlets and roots, dark brown, moist		OL	0.0 - 0.5									
	SAND, minor silt, brown with orangey brown mottling, moist, sand is fine to medium, well graded		SW	0.5 - 1.5	Groundwater Not Encountered								
	End of Test Pit			1.5									

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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166 Bank Street,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: L08
Hole Depth: 1.00 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples
							Tested in accordance with NZGS Aug 2001					
							Scala Penetrometer					
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)					
	Peaty TOPSOIL, dark brown, moist, peat is amorphous	OL		0.0 - 0.1								
	Amorphous PEAT, traces of roots, rootlets and sand, black/dark brown, moist	Pt		0.1 - 0.5								
	Silty SAND, traces of rootlets, brown, dry, sand is fine to coarse	SM		0.5 - 0.8	Groundwater Not Encountered							
	Cemented SAND, some silt, orangey brown, moist, fine to medium, well graded	SW		0.8 - 1.0								
	End of Test Pit			1.0								

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: L09
Hole Depth: 0.85 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, dark brown, moist, peat is amorphous	OL		0.0 - 0.5	Groundwater Not Encountered		-25 -50 -75 -100 -125 -150 -175 -200 -225				
	Amorphous PEAT, minor sand, traces of rootlets, spots of orangey brown sand, black/dark brown, moist	Pt		0.5 - 1.0							
	SILT, traces of sand and rootlets, greyish light brown, moist	ML		1.0 - 1.5							
	End of Test Pit			1.5							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: L11
Hole Depth: 0.80 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, dark brown, moist		TS	0.0 - 0.2							
	Amorphous PEAT, some sand, traces of rootlets, dark brown with orangey brown streaks, moist		Pt	0.2 - 0.5	Groundwater Not Encountered						
	SAND, traces of silt, orangey brown, moist, sand is fine to medium, well graded		SW	0.5 - 0.8							
	End of Test Pit			0.8							

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:	
		Recorded Date: 15/04/2021		No accredited tests	

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166 Bank Street,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: L12
Hole Depth: 1.20 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples	
							Tested in accordance with NZGS Aug 2001						
							Scala Penetrometer						
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)						
							5	10	15	20			
	Sandy TOPSOIL, traces of rootlets and roots, dark brown, moist	OL		0.0 - 0.2									
	Sandy SILT, light brown, moist, friable, sand is fine to medium, well graded	ML		0.2 - 0.8	Groundwater Not Encountered								
	SAND, some silt, brown, moist, sand is fine to medium, well graded	SW		0.8 - 1.2									
	End of Test Pit			1.2									

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: M07
Hole Depth: 0.90 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, dark brown, moist, peat is amorphous	OL		0.0 - 0.1							
	Amorphous PEAT, minor sand, traces of rootlets, black/dark brown, moist	Pt		0.1 - 0.4							
	Change: wet, no rootlets	Pt		0.4 - 0.5							
	Silty SAND, traces of rootlets, brown, moist, sand is fine to medium, well graded	SW		0.5 - 0.6							
	SAND, minor silt, orangey brown, moist, fine to medium, well graded	SW		0.6 - 0.9							
	End of test pit			0.9							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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Lab Job No.: 8020-1727 **Borehole No.:** M09 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.60 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Peaty TOPSOIL, traces of sand and rootlets, dark brown, moist	OL									
	Silty SAND, traces of rootlets, brown, moist, sand is fine to medium, well graded	SM			Groundwater Not Encountered						
	SAND, some silt, traces of rootlets, light brown, moist, sand is fine to medium, well graded	SW		0.5							
	End of Test Pit										

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		



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166 Bank Street,
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Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Borehole No.: M11
Hole Depth: 0.80 m
Coordinates:

Sheet: 1 of 1
Date: 15/04/21

Report No.: W21-578
Client Ref. No.: 14333-004

Location: The Landing

Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak	Residual	Samples	
							Tested in accordance with NZGS Aug 2001						
							Scala Penetrometer						
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)						
							5	10	15	20			
	Sandy TOPSOIL, traces of rootlets, dark brown, moist, sand is fine to medium, well graded	OL		0.0 - 0.1									
	SAND, minor silt, brown, moist, sand is fine to medium, well graded	SW		0.1 - 0.5	Groundwater Not Encountered								
	Colour Change: light brown	SW		0.5 - 0.8									
	End of Test Pit			0.8									

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

Produced with CORE-GS by Geroc



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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727

Borehole No.: N08

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.65 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples					
							Tested in accordance with NZGS Aug 2001									
							Scala Penetrometer									
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)									
							25	50	75	100	125	150	175	200	225	
							5	10	15	20						
	Peaty TOPSOIL, minor sand, traces of rootlets, dark brown, moist.	OL														
	Amorphous PEAT, traces of sand and rootlets, black/dark brown, moist	Pt														
	SILT, minor sand, traces of clays and rootlets, brown, moist	ML														
	Cemented SAND, some silt, brown, moist, sand is fine to medium, well graded	SW		0.5												
	End of Test Pit															

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>		

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727 **Borehole No.:** N09 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.55 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	TOPSOIL, some sand, traces of rootlets, brown, dry.		TS								
	Amorphous PEAT, traces of rootlets, dark brown, moist		Pt		Groundwater Not Encountered						
	SAND, some silt, brown, moist, sand is fine to medium, well graded		SW	0.5							
	End of Test Pit										

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: Alex Millar	Approved Signatory: No accredited tests
		Recorded Date: 15/04/2021		

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727 **Borehole No.:** N11 **Sheet:** 1 of 1
Client: Cook Costello **Hole Depth:** 0.90 m
Job: Geotechnical Investigation **Coordinates:** **Date:** 15/04/21
Report No.: W21-578 **Location:** The Landing **Ground Level:**
Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, traces of rootlets, dark brown, moist, sand is fine to medium, well graded	OL		0.0 - 0.5							
	Peaty SAND, traces of rootlets, dark brown with brown mottling, moist, sand is fine to medium, well graded, peat is amorphous	SW		0.5 - 1.0	Groundwater Not Encountered						
	SAND, traces of silt, light brown, moist, sand is fine to medium, well graded	SW		1.0 - 1.5							
	End of Test Pit			1.5							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
 Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i>	Approved Signatory:
		Recorded Date: 15/04/2021	Alex Millar	No accredited tests

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation

Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: P08
Hole Depth: 0.80 m
Coordinates:

Location: The Landing

Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Amorphous PEAT, some roots and rootlets, dark brown/black, moist										
	Cemented silty SAND, traces of rootlets, dark brown, moist, sand is fine to medium, well graded	OL		0.5	Groundwater Not Encountered						
	End of Test Pit	SW									

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	<i>Alex Millar</i>		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727

Borehole No.: P09

Sheet: 1 of 1

Client: Cook Costello

Hole Depth: 0.90 m

Date: 15/04/21

Job: Geotechnical Investigation

Coordinates:

Ground Level:

Report No.: W21-578

Location: The Landing

Client Ref. No.: 14333-004

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Tested in accordance with NZGS Aug 2001				
							Scala Penetrometer				
							NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, brown, moist, sand is fine to medium, well graded	OL									
	Amorphous PEAT, traces of sand and rootlets, black/dark brown, moist	Pt			Groundwater Not Encountered						
	SAND, some silt, reddish brown, moist, sand is fine to medium, well graded	SW									
	End of Test Pit			1.0							

Remarks	Water	Investigation Type
	<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow	<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)

Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test
Note: Scala Penetrometer interpretation is not endorsed

Contractor: Geocivil	Equipment: 12T Excavator	Recorded By: D.O/A.B	Laboratory Technician: <i>Alex Millar</i> Alex Millar	Approved Signatory:
		Recorded Date: 15/04/2021		No accredited tests

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AUGERHOLE LOG

166 Bank Street,
Whangarei,
M:0276565226
E:info@geocivil.co.nz

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation
Report No.: W21-578
Client Ref. No.: 14333-004

Borehole No.: Q10
Hole Depth: 1.50 m
Coordinates:
Location: The Landing

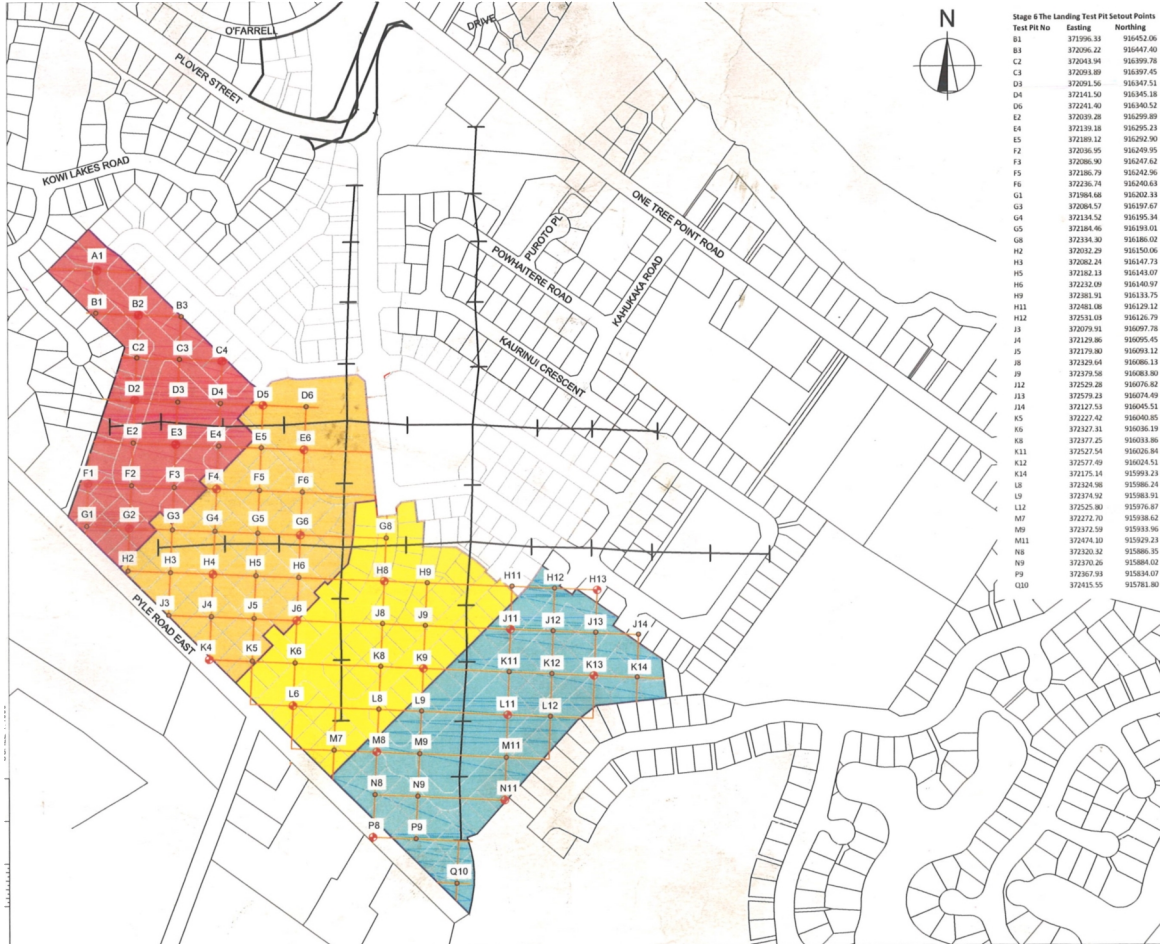
Sheet: 1 of 1
Date: 15/04/21
Ground Level:

Unit	Geological Interpretation In accordance with NZGS 2005	UCS	Legend	Depth (m)	Water	Relative Density	Vane Shear Strength (kPa)		Blows	Peak Residual	Samples
							Scala Penetrometer NZS4402: 1988 Test 6.5.2 - Procedure 2 (blows / 50mm)				
	Sandy TOPSOIL, traces of rootlets, dark brown, moist, sand is fine to medium, well graded	OL		0.0 - 0.2	Groundwater Not Encountered						
	Silty SAND, some peat, dark brown, moist, sand is fine to medium, well graded	SW		0.2 - 1.5							
	SAND, minor silt, light brown, moist, sand is fine to medium, well graded	SW		1.5 - 1.5							
	End of Test Pit			1.5							

Remarks		Water		Investigation Type	
		<input type="checkbox"/> Standing Water Level <input type="checkbox"/> Out flow <input type="checkbox"/> In flow		<input checked="" type="checkbox"/> Hand Auger <input type="checkbox"/> Hand Auger + Scala (DCP)	
<small>Note: All Scala Penetrometer readings taken below 1.5m from start depth are outside the scope of this test Note: Scala Penetrometer interpretation is not endorsed</small>					
Contractor:	Equipment:	Recorded By:	Laboratory Technician:	Approved Signatory:	
Geocivil	12T Excavator	D.O/A.B	<i>Alex Millar</i>		
		Recorded Date:	Alex Millar	No accredited tests	
		15/04/2021			

Produced with CORE-GS by Geroc

Lab Job No.: 8020-1727
Client: Cook Costello
Job: Geotechnical Investigation
Location: The Landing
Client Ref. No.: 14333-004
Report No.: W21-578



Test Pit No	Easting	Northing
B1	371996.33	916454.36
B1	372096.22	916447.40
C2	372043.94	916399.78
C3	372093.89	916397.45
D3	372091.56	916347.51
D4	372141.50	916345.18
D6	372241.40	916340.52
E2	372039.28	916299.89
E4	372139.18	916295.23
E5	372189.12	916292.90
F2	372036.95	916249.95
F3	372086.80	916247.62
F5	372186.79	916242.96
F6	372236.74	916240.63
G1	372084.68	916200.18
G3	372084.57	916197.67
G4	372134.52	916195.34
G5	372184.46	916193.01
G8	372334.30	916188.02
H2	372032.29	916150.06
H3	372082.24	916147.73
H5	372182.13	916143.07
H6	372232.09	916140.97
H9	372381.91	916133.75
H11	372531.88	916129.12
H12	372531.03	916126.79
J1	372079.91	916097.78
J4	372129.86	916095.45
J5	372179.80	916093.12
J8	372329.64	916086.13
J9	372379.58	916083.80
J12	372529.28	916076.82
J13	372579.23	916074.49
J14	372127.53	916045.51
K5	372227.42	916040.85
K6	372327.31	916036.19
K8	372377.25	916033.86
K11	372527.54	916028.94
K12	372577.49	916024.51
K14	372175.14	915993.23
L8	372324.98	915986.24
L9	372374.92	915983.91
L12	372525.80	915976.87
M7	372272.70	915938.62
M9	372372.59	915933.96
M11	372474.10	915929.23
N8	372320.32	915886.35
N9	372370.26	915883.02
P9	372367.93	915834.07
G10	372415.55	915781.80

CPT No	Easting	Northing
A1	371998.66	916040.01
B2	372086.27	916469.73
C4	372143.83	916395.12
D2	372041.61	916349.84
D5	372191.45	916342.85
E3	372089.23	916297.56
E6	372239.07	916240.57
F1	371987.01	916252.28
F4	372136.85	916245.29
G2	372034.62	916200.00
G6	372234.41	916190.68
H4	372132.19	916145.40
H8	372331.97	916136.08
H13	372580.98	916124.46
J6	372229.98	916090.78
J11	372479.33	916079.15
K4	372127.53	916045.51
K9	372377.25	916033.86
K13	372577.49	916024.51
L6	372225.09	915990.90
L11	372475.85	915979.20
M8	372322.65	915936.29
M11	372472.36	915879.26
P8	372317.99	915836.40

CPT = CONE PENETRATION TEST
 FA = FLIGHT AUGER
 TOS = TOP OF SAND

B		
A	1ST ISSUE	13-04-21
REV	REVISION DETAILS	DRAWN APP.

cook | costello
 www.cookcostello.co.nz
 Whangarei | Auckland | Wellington | Christchurch

PROJECT DETAILS

TITLE: SAND DEPTH TEST PITS

DATE CREATED	13-04-2021	COLL. REF. NO.	14333
DRAWN	R BROOKES	DESIGNED	R BROOKES
SCALE	1:400 @ A3	APPROVED	P COOK
DWG NUMBER	SK01	STATUS	PRELIMINARY
		REVISION	A



TEST RIGHT • BUILD RIGHT

Whangarei Laboratory
166 Bank Street,
Whangarei
M: 021 0263 7711
E: martin@geocivil.co.nz

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 12/05/2022
Date of Re-Issue: -
Page: 1 of 35

Test Report No.
WRE8020-1727-R007

PROJECT: The Landing - Plate Load Testing

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Static Plate Load Test
DIN 18134:2012-04

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

A. Brooke

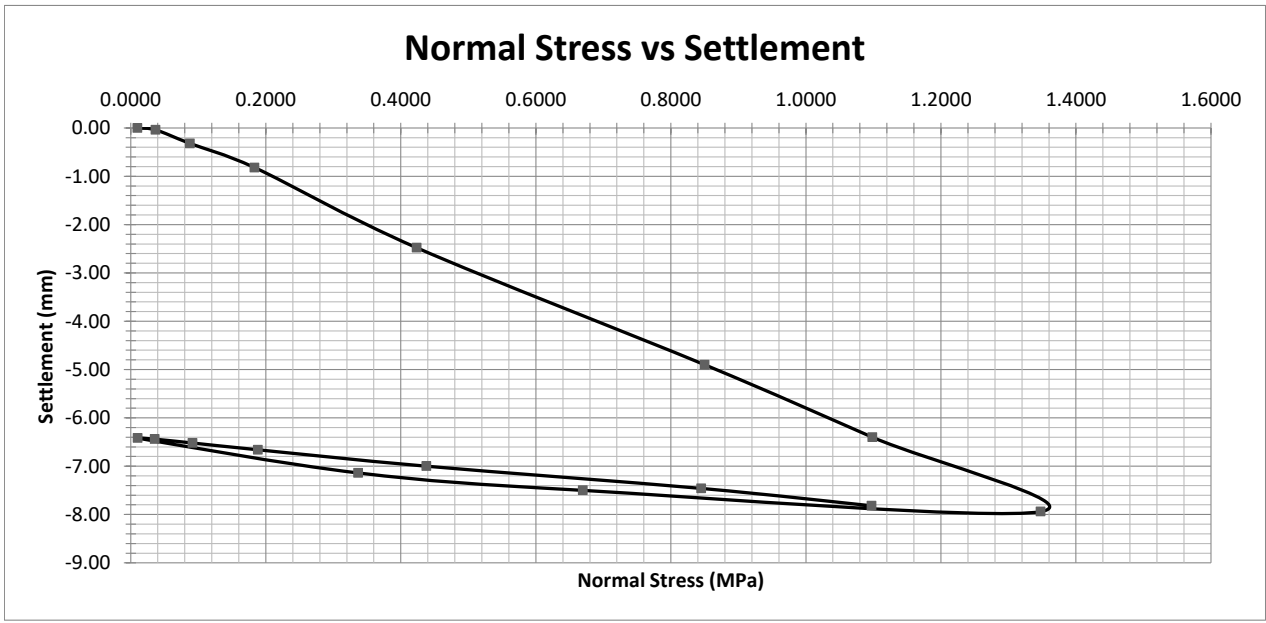
Laboratory Technician

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	14/01/2022
Site:	The Landing	Tested by:	D.O, A.B
Job No:	8020-1727	Test No.:	PLT R 01
Report No:	WRE8020-1727-R007	Page:	2 of 35
Client Reference:	-	Checked by:	M.A
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0369	-0.04	
3	0.0880	0.0877	-0.32	
4	0.1870	0.1835	-0.82	
5	0.4240	0.4237	-2.48	
6	0.8480	0.8500	-4.90	
7	1.0980	1.0984	-6.40	
8	1.3480	1.3479	-7.94	
9	0.6740	0.6698	-7.50	
10	0.3370	0.3369	-7.14	Unloaded
11	0.0100	0.0105	-6.42	
12	0.0310	0.0354	-6.44	Secondary load
13	0.0880	0.0917	-6.52	
14	0.1870	0.1882	-6.66	
15	0.4240	0.4380	-7.00	
16	0.8480	0.8452	-7.46	
17	1.0980	1.0975	-7.82	



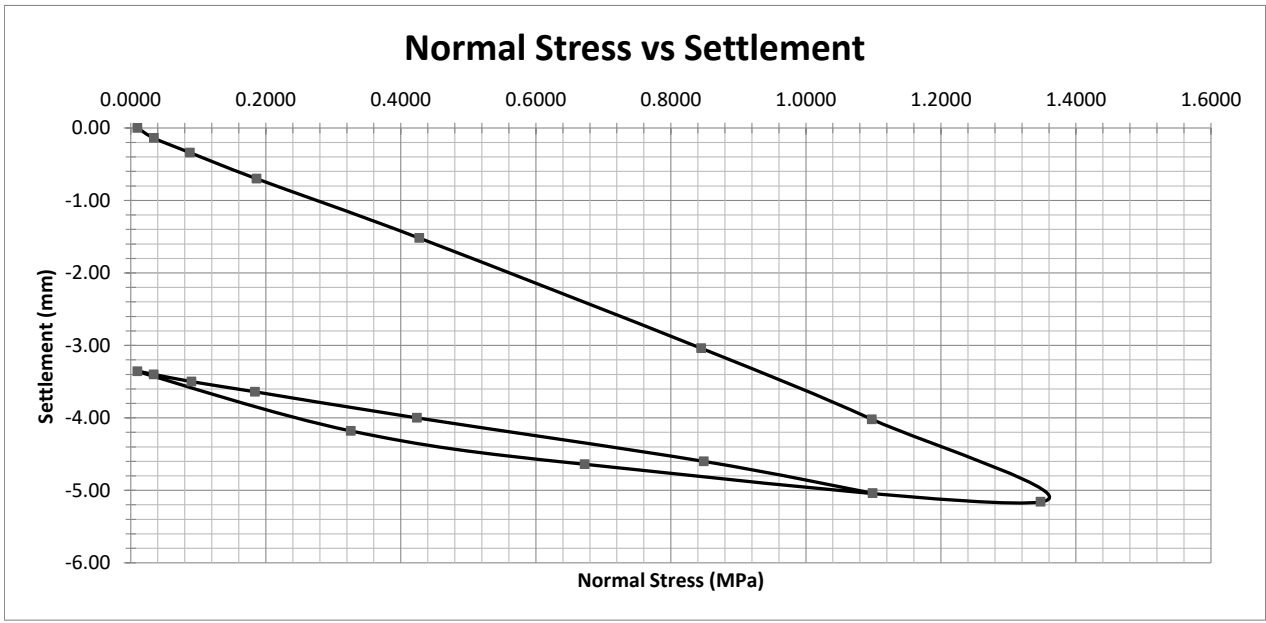
Ev1 (MPa)	37.32	Ev2 (MPa)	178.06
Ev2/Ev1=4.77			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	14/01/2022
Site:	The Landing	Tested by:	D.O, A.B
Job No:	8020-1727	Test No.:	PLT R 02
Report No:	WRE8020-1727-R007	Page:	3 of 35
Client Reference:	-	Checked by:	M.A
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0343	-0.14	
3	0.0880	0.0876	-0.34	
4	0.1870	0.1863	-0.70	
5	0.4240	0.4275	-1.52	
6	0.8480	0.8450	-3.04	
7	1.0980	1.0978	-4.02	
8	1.3480	1.3478	-5.16	
9	0.6740	0.6723	-4.64	
10	0.3370	0.3259	-4.18	Unloaded
11	0.0100	0.0098	-3.36	
12	0.0310	0.0342	-3.40	Secondary load
13	0.0880	0.0901	-3.50	
14	0.1870	0.1841	-3.64	
15	0.4240	0.4238	-4.00	
16	0.8480	0.8488	-4.60	
17	1.0980	1.0989	-5.04	



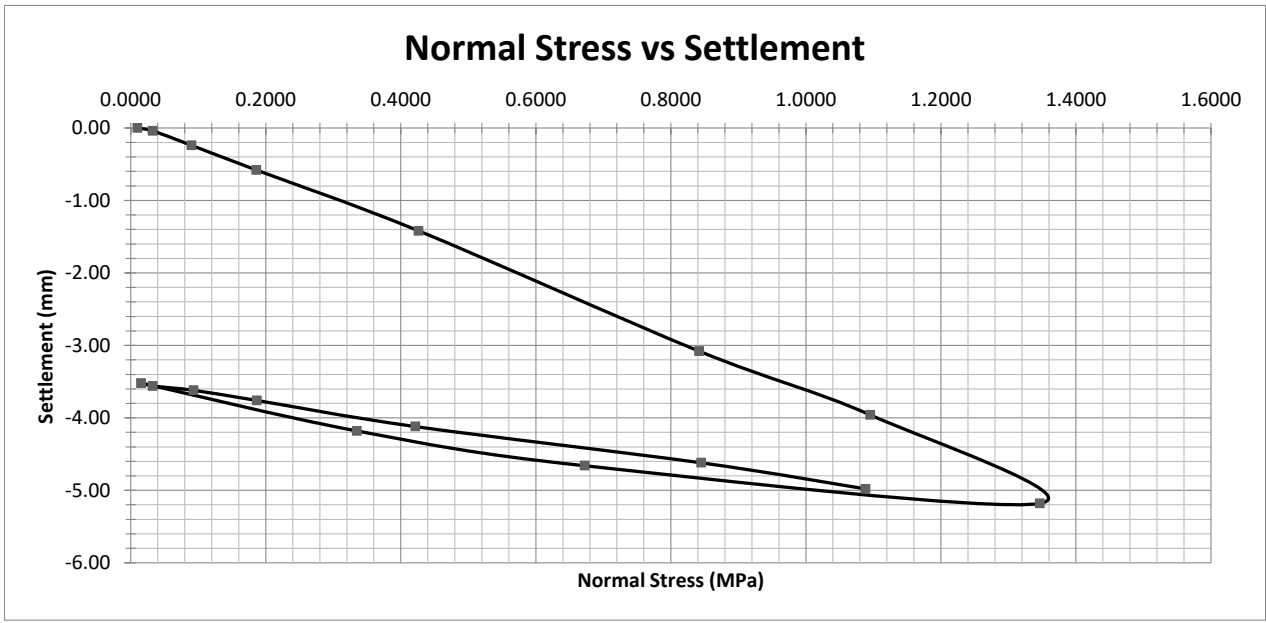
Ev1 (MPa)	59.87	Ev2 (MPa)	147.16
Ev2/Ev1=2.46			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	13/01/2022
Site:	The Landing	Tested by:	A.B / D.O
Job No.:	8020-1727	Test No.:	PLT R 03
Report No.:	WRE8020-1727-R007	Page:	4 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0324	-0.04	
3	0.0880	0.0900	-0.24	
4	0.1870	0.1860	-0.58	
5	0.4240	0.4265	-1.42	
6	0.8480	0.8419	-3.08	
7	1.0980	1.0954	-3.96	
8	1.3480	1.3465	-5.18	
9	0.6740	0.6723	-4.66	
10	0.3370	0.3350	-4.18	Unloaded
11	0.0100	0.0155	-3.52	
12	0.0310	0.0325	-3.56	Secondary load
13	0.0880	0.0932	-3.62	
14	0.1870	0.1870	-3.76	
15	0.4240	0.4216	-4.12	
16	0.8480	0.8449	-4.62	
17	1.0980	1.0883	-4.98	



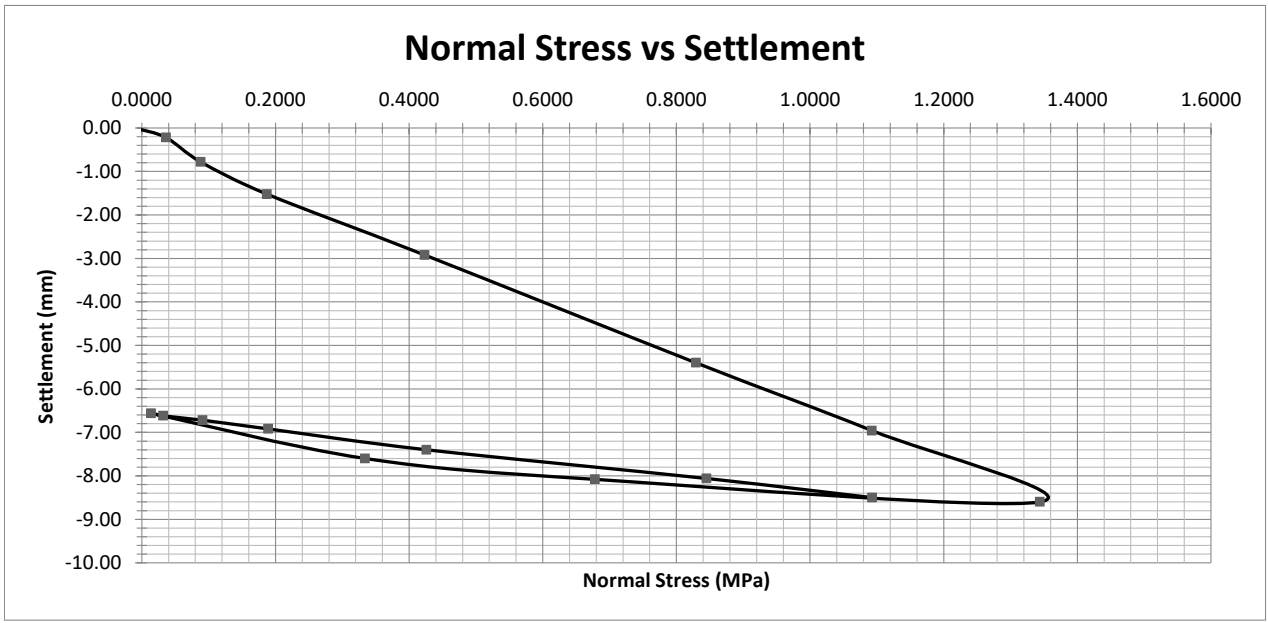
Begin Time:		End Time:	
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	13/01/2022
Site:	The Landing	Tested by:	A.B / D.O
Job No.:	8020-1727	Test No.:	PLT R 04
Report No.:	WRE8020-1727-R007	Page:	5 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	-0.0100	0.00	Primary load
2	0.0310	0.0361	-0.22	
3	0.0880	0.0880	-0.78	
4	0.1870	0.1870	-1.52	
5	0.4240	0.4231	-2.92	
6	0.8480	0.8292	-5.40	
7	1.0980	1.0927	-6.96	
8	1.3480	1.3441	-8.60	
9	0.6740	0.6782	-8.08	
10	0.3370	0.3340	-7.60	Unloaded
11	0.0100	0.0139	-6.56	
12	0.0310	0.0318	-6.62	Secondary load
13	0.0880	0.0910	-6.72	
14	0.1870	0.1890	-6.92	
15	0.4240	0.4260	-7.40	
16	0.8480	0.8450	-8.06	
17	1.0980	1.0929	-8.50	



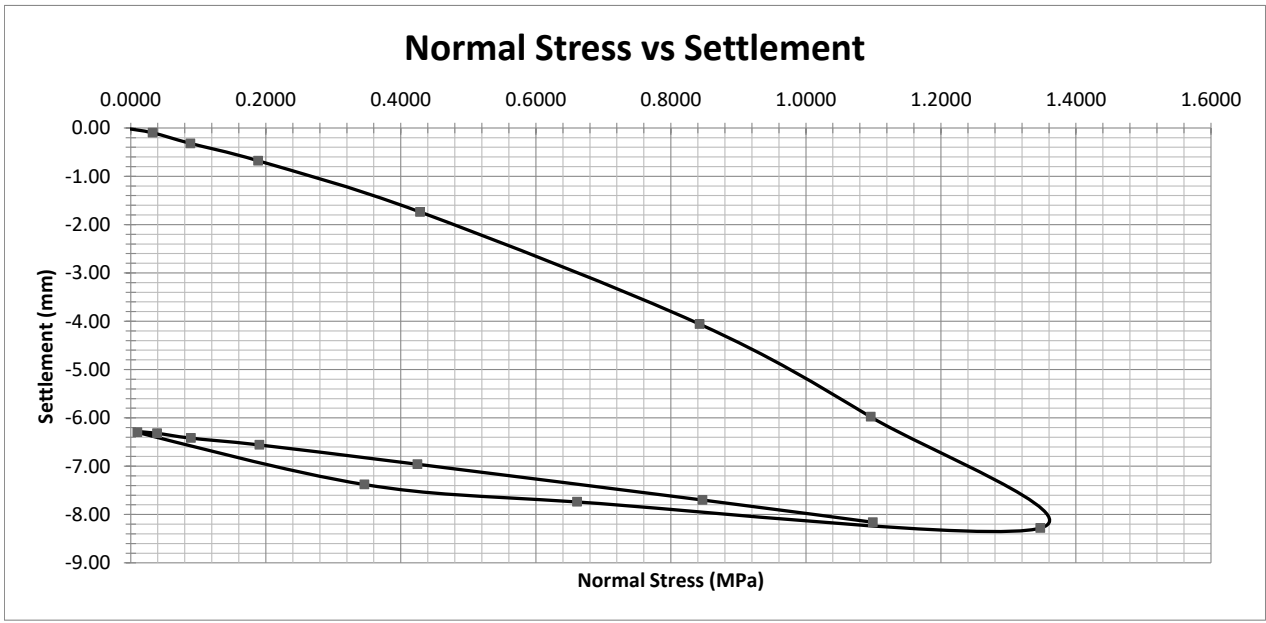
Ev1 (MPa)	36.05	Ev2 (MPa)	131.45
Ev2/Ev1=3.65			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	13/01/2022
Site:	The Landing	Tested by:	A.B / D.O
Job No:	8020-1727	Test No.:	PLT R 05
Report No:	WRE8020-1727-R007	Page:	6 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	-0.0100	0.00	Primary load
2	0.0310	0.0323	-0.10	
3	0.0880	0.0884	-0.32	
4	0.1870	0.1889	-0.68	
5	0.4240	0.4288	-1.74	
6	0.8480	0.8426	-4.06	
7	1.0980	1.0960	-5.98	
8	1.3480	1.3475	-8.28	
9	0.6740	0.6610	-7.74	
10	0.3370	0.3463	-7.38	Unloaded
11	0.0100	0.0099	-6.30	
12	0.0310	0.0390	-6.32	Secondary load
13	0.0880	0.0891	-6.42	
14	0.1870	0.1906	-6.56	
15	0.4240	0.4247	-6.96	
16	0.8480	0.8470	-7.70	
17	1.0980	1.0991	-8.16	



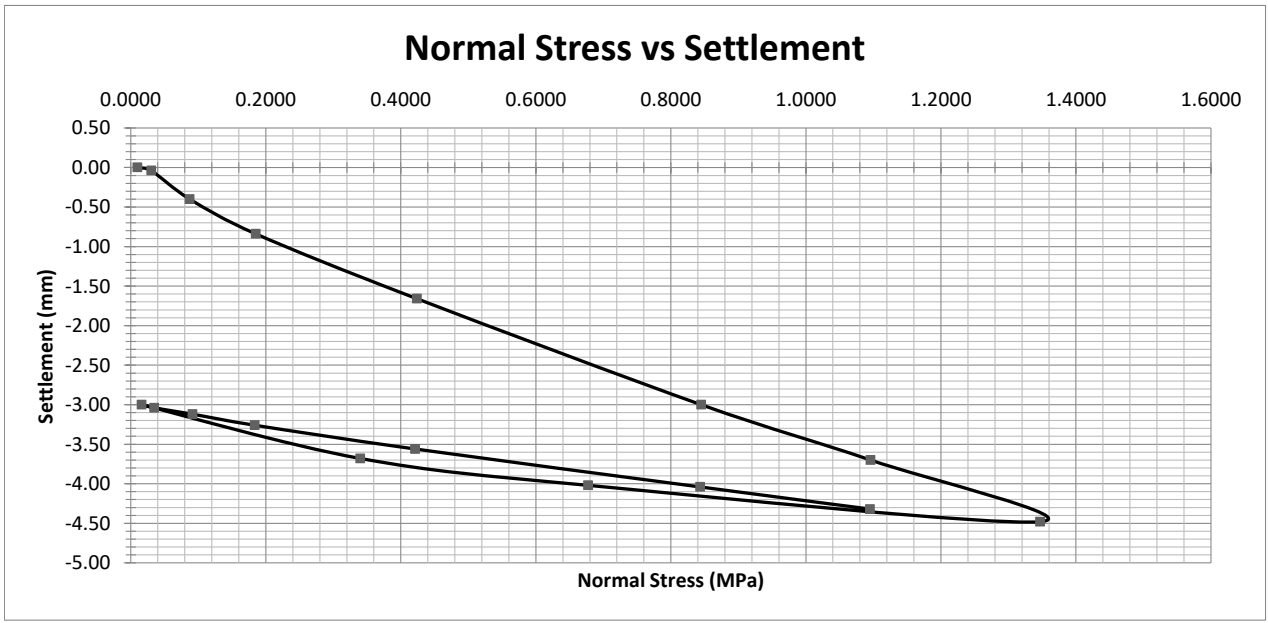
Ev1 (MPa)	37.05	Ev2 (MPa)	127.87
Ev2/Ev1=3.45			
Begin Time:		End Time	
Coordinates:		NZTM Format	
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	14/01/2022
Site:	The Landing	Tested by:	A.B
Job No.:	8020-1727	Test No.:	PLT R 06
Report No.:	WRE8020-1727-R007	Page:	7 of 35
Client Reference:	-	Checked by:	M.A
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0304	-0.04	
3	0.0880	0.0874	-0.40	
4	0.1870	0.1853	-0.84	
5	0.4240	0.4240	-1.66	
6	0.8480	0.8449	-3.00	
7	1.0980	1.0957	-3.70	
8	1.3480	1.3468	-4.48	
9	0.6740	0.6776	-4.02	
10	0.3370	0.3400	-3.68	Unloaded
11	0.0100	0.0160	-3.00	
12	0.0310	0.0349	-3.04	Secondary load
13	0.0880	0.0917	-3.12	
14	0.1870	0.1838	-3.26	
15	0.4240	0.4212	-3.56	
16	0.8480	0.8433	-4.04	
17	1.0980	1.0951	-4.32	



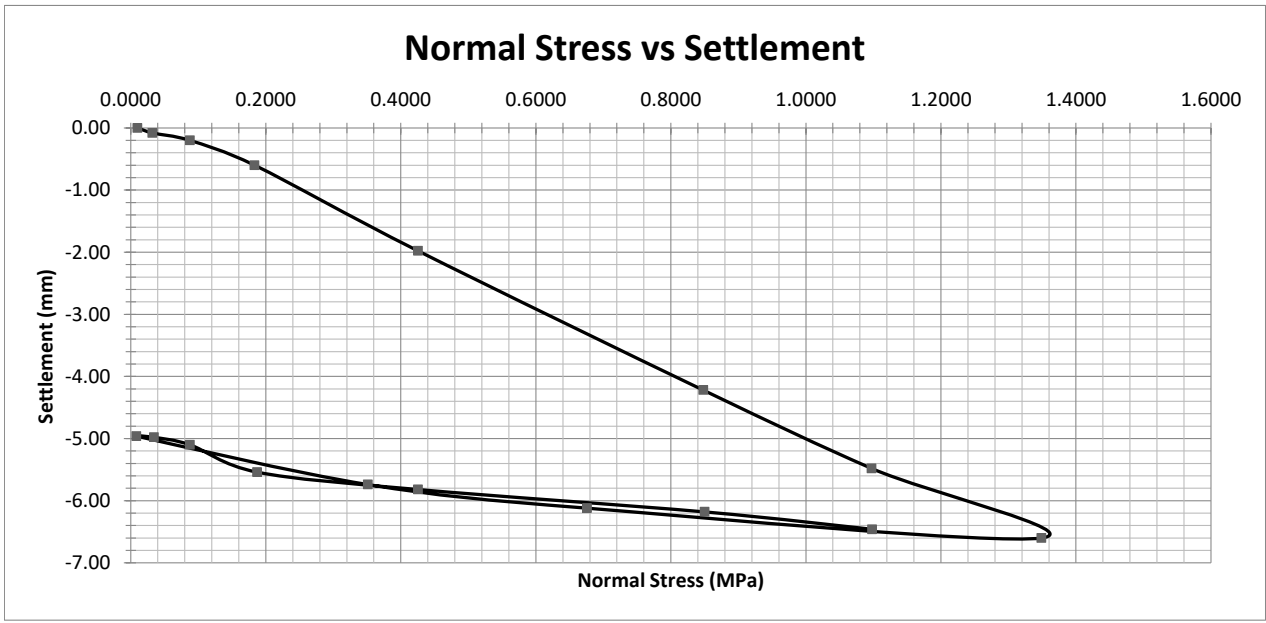
Ev1 (MPa)	68.73	Ev2 (MPa)	194.64
Ev2/Ev1=2.83			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	21/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 07
Report No.:	WRE8020-1727-R007	Page:	8 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0322	-0.08	
3	0.0880	0.0876	-0.20	
4	0.1870	0.1835	-0.60	
5	0.4240	0.4257	-1.98	
6	0.8480	0.8480	-4.22	
7	1.0980	1.0972	-5.48	
8	1.3480	1.3489	-6.60	
9	0.6740	0.6758	-6.12	
10	0.3370	0.3511	-5.74	Unloaded
11	0.0100	0.0085	-4.96	
12	0.0310	0.0344	-4.98	Secondary load
13	0.0880	0.0876	-5.10	
14	0.1870	0.1871	-5.54	
15	0.4240	0.4256	-5.82	
16	0.8480	0.8499	-6.18	
17	1.0980	1.0981	-6.46	



Ev1 (MPa)	44.05	Ev2 (MPa)	212.79
Ev2/Ev1=4.83			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

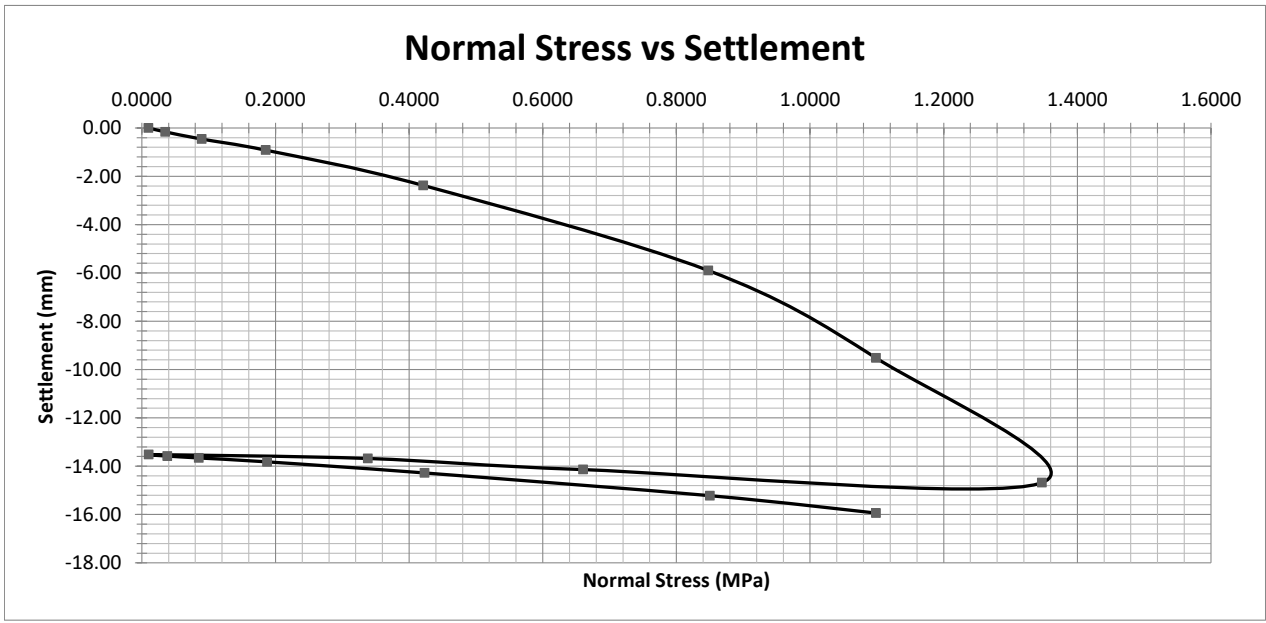
STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client: Cook Costello
Site: The Landing
Job No.: 8020-1727
Report No.: WRE8020-1727-R007
Client Reference: -

Date: 20/01/2022
Tested by: D.O
Test No.: PLT R 09
Page: 9 of 35
Checked by: A.B
Date: 9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0349	-0.16	
3	0.0880	0.0896	-0.46	
4	0.1870	0.1856	-0.92	
5	0.4240	0.4214	-2.38	
6	0.8480	0.8478	-5.90	
7	1.0980	1.0987	-9.52	
8	1.3480	1.3472	-14.68	
9	0.6740	0.6604	-14.14	
10	0.3370	0.3382	-13.68	Unloaded
11	0.0100	0.0104	-13.52	
12	0.0310	0.0382	-13.58	Secondary load
13	0.0880	0.0855	-13.66	
14	0.1870	0.1873	-13.82	
15	0.4240	0.4232	-14.28	
16	0.8480	0.8502	-15.22	
17	1.0980	1.0990	-15.94	



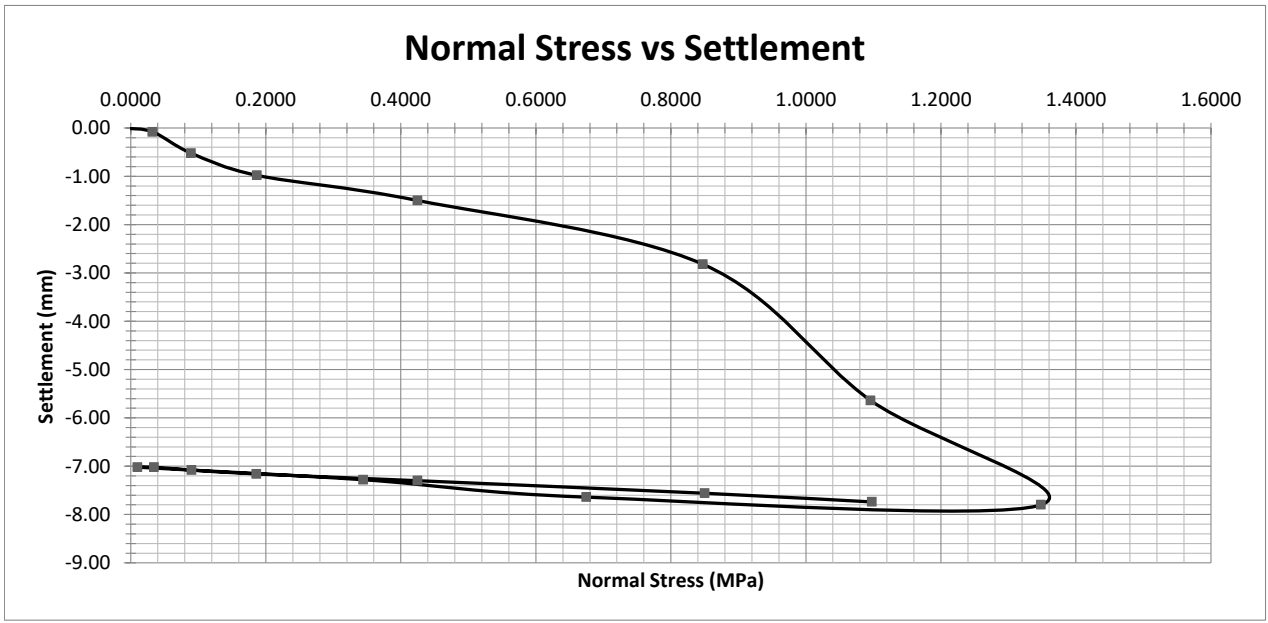
Ev1 (MPa)	21.61	Ev2 (MPa)	95.75
Ev2/Ev1=4.43			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	20/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 13
Report No:	WRE8020-1727-R007	Page:	10 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	-0.0100	0.00	Primary load
2	0.0310	0.0322	-0.08	
3	0.0880	0.0893	-0.52	
4	0.1870	0.1869	-0.98	
5	0.4240	0.4247	-1.50	
6	0.8480	0.8474	-2.82	
7	1.0980	1.0959	-5.64	
8	1.3480	1.3481	-7.80	
9	0.6740	0.6747	-7.64	
10	0.3370	0.3441	-7.28	Unloaded
11	0.0100	0.0098	-7.02	
12	0.0310	0.0344	-7.02	Secondary load
13	0.0880	0.0900	-7.08	
14	0.1870	0.1862	-7.16	
15	0.4240	0.4248	-7.30	
16	0.8480	0.8501	-7.56	
17	1.0980	1.0978	-7.74	



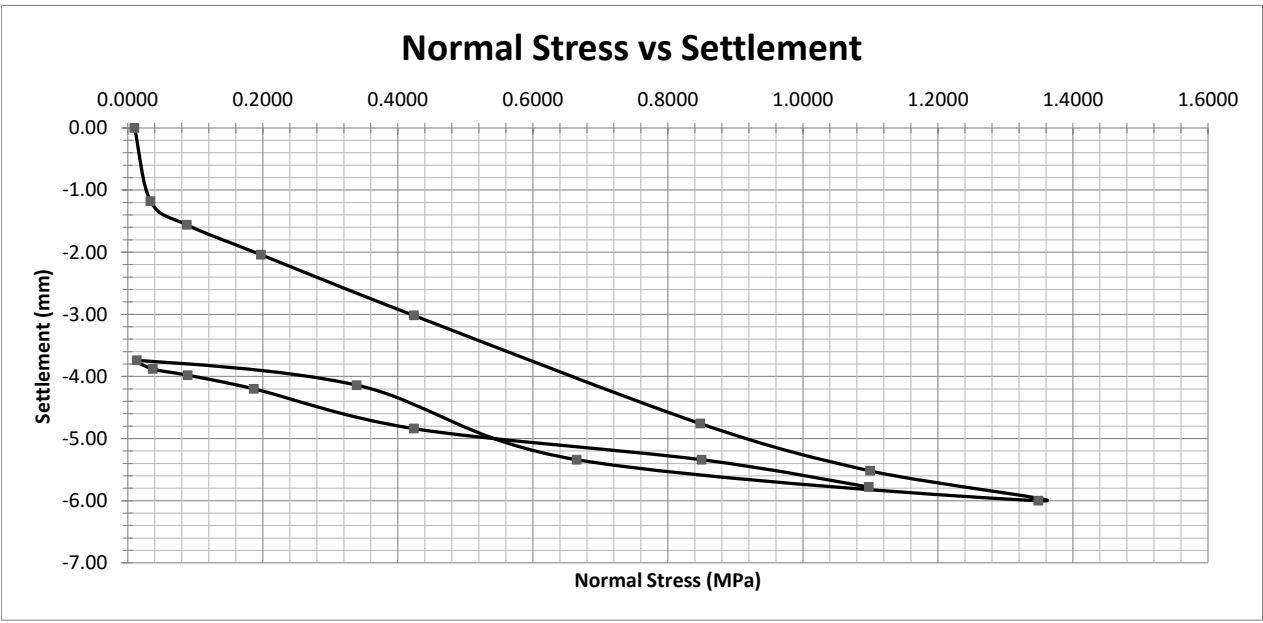
Ev1 (MPa)	41.24	Ev2 (MPa)	348.02
Ev2/Ev1=8.44			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	24/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLTR 14
Report No.:	WRE8020-1727-R007	Page:	11 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0338	-1.18	
3	0.0880	0.0876	-1.56	
4	0.1870	0.1972	-2.04	
5	0.4240	0.4241	-3.02	
6	0.8480	0.8483	-4.76	
7	1.0980	1.0995	-5.52	
8	1.3480	1.3488	-6.00	
9	0.6740	0.6652	-5.34	
10	0.3370	0.3392	-4.14	Unloaded
11	0.0100	0.0134	-3.74	
12	0.0310	0.0371	-3.88	Secondary load
13	0.0880	0.0889	-3.98	
14	0.1870	0.1870	-4.20	
15	0.4240	0.4239	-4.84	
16	0.8480	0.8499	-5.34	
17	1.0980	1.0978	-5.78	



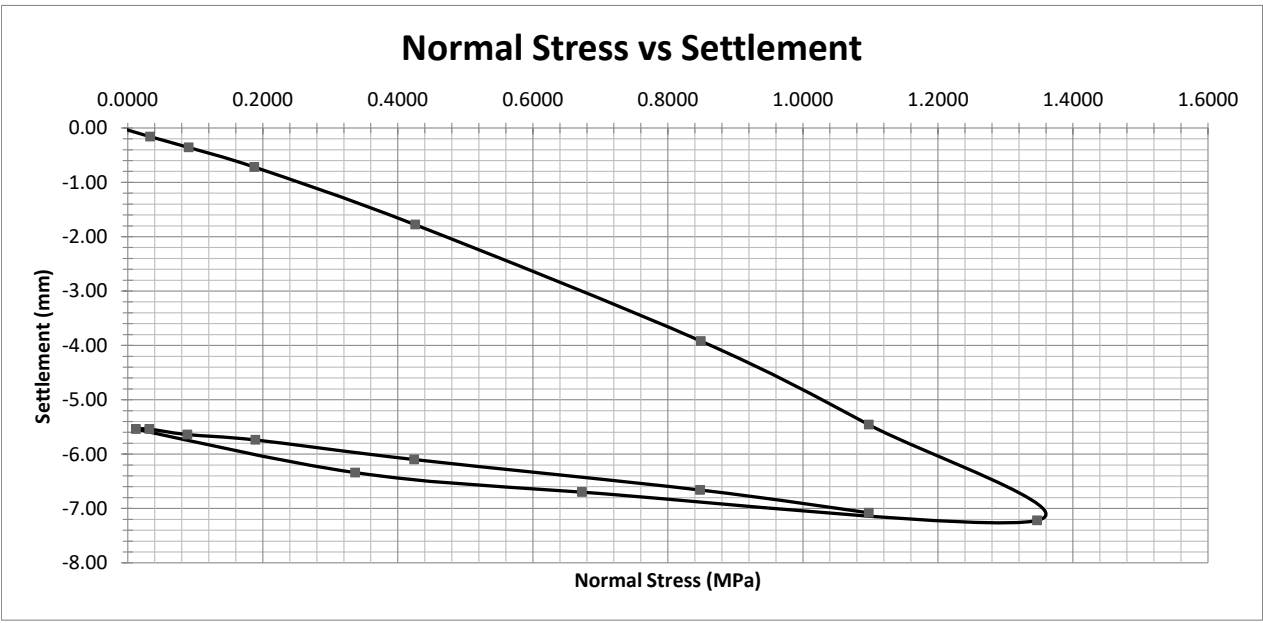
Ev1 (MPa)	60.45	Ev2 (MPa)	140.86
Ev2/Ev1=2.33			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	20/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 15
Report No.:	WRE8020-1727-R007	Page:	12 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	-0.0100	0.00	Primary load
2	0.0310	0.0332	-0.16	
3	0.0880	0.0904	-0.36	
4	0.1870	0.1876	-0.72	
5	0.4240	0.4258	-1.78	
6	0.8480	0.8488	-3.92	
7	1.0980	1.0978	-5.46	
8	1.3480	1.3470	-7.22	
9	0.6740	0.6728	-6.70	
10	0.3370	0.3370	-6.34	Unload
11	0.0100	0.0124	-5.54	
12	0.0310	0.0320	-5.54	Secondary load
13	0.0880	0.0884	-5.64	
14	0.1870	0.1893	-5.74	
15	0.4240	0.4244	-6.10	
16	0.8480	0.8476	-6.66	
17	1.0980	1.0979	-7.08	



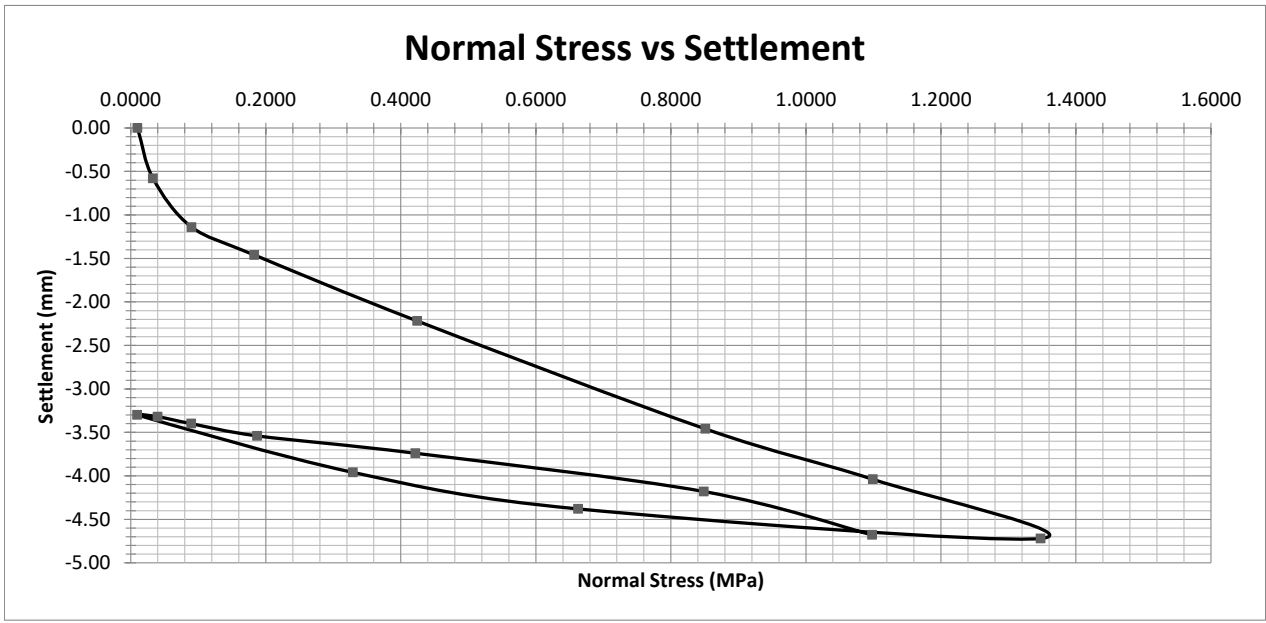
Ev1 (MPa)	42.38	Ev2 (MPa)	154.96
Ev2/Ev1=3.66			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	20/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLTR 19
Report No:	WRE8020-1727-R007	Page:	13 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0330	-0.58	
3	0.0880	0.0901	-1.14	
4	0.1870	0.1831	-1.46	
5	0.4240	0.4245	-2.22	
6	0.8480	0.8511	-3.46	
7	1.0980	1.0992	-4.04	
8	1.3480	1.3476	-4.72	
9	0.6740	0.6628	-4.38	
10	0.3370	0.3292	-3.96	Unloaded
11	0.0100	0.0097	-3.30	
12	0.0310	0.0400	-3.32	Secondary load
13	0.0880	0.0898	-3.40	
14	0.1870	0.1871	-3.54	
15	0.4240	0.4218	-3.74	
16	0.8480	0.8489	-4.18	
17	1.0980	1.0983	-4.68	



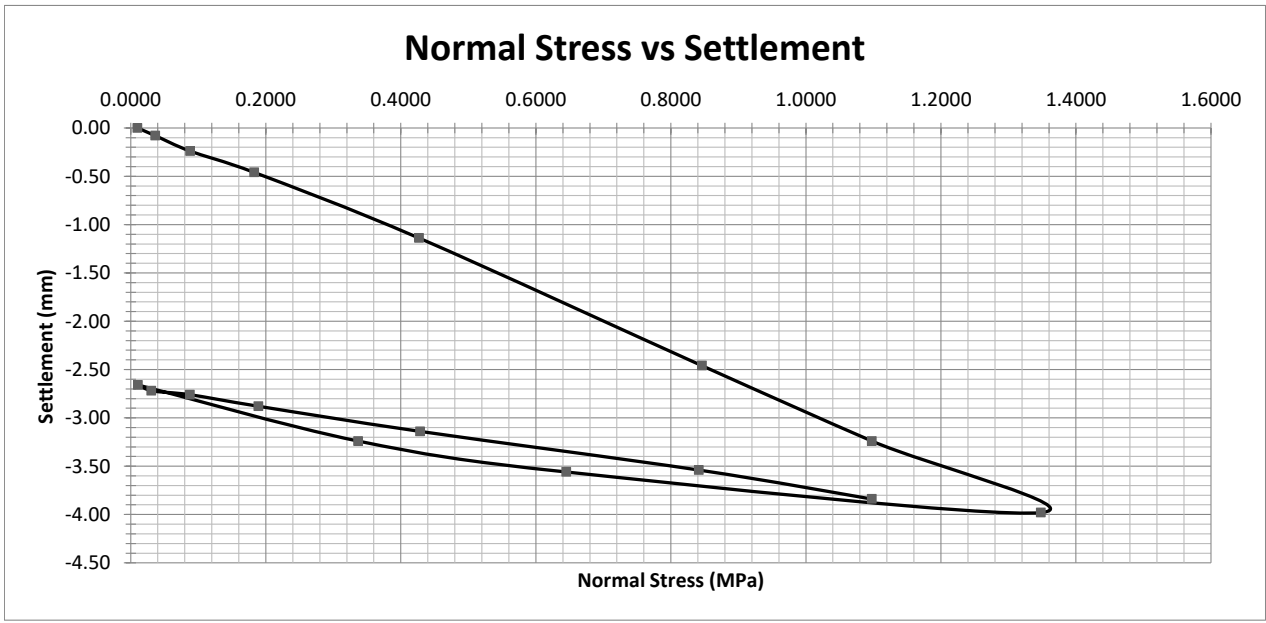
Ev1 (MPa)	75.76	Ev2 (MPa)	173.40
Ev2/Ev1=2.29			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	20/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 20
Report No.:	WRE8020-1727-R007	Page:	14 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0364	-0.08	
3	0.0880	0.0882	-0.24	
4	0.1870	0.1829	-0.46	
5	0.4240	0.4272	-1.14	
6	0.8480	0.8461	-2.46	
7	1.0980	1.0978	-3.24	
8	1.3480	1.3480	-3.98	
9	0.6740	0.6452	-3.56	
10	0.3370	0.3369	-3.24	Unloaded
11	0.0100	0.0108	-2.66	
12	0.0310	0.0305	-2.72	Secondary load
13	0.0880	0.0875	-2.76	
14	0.1870	0.1893	-2.88	
15	0.4240	0.4288	-3.14	
16	0.8480	0.8416	-3.54	
17	1.0980	1.0977	-3.84	



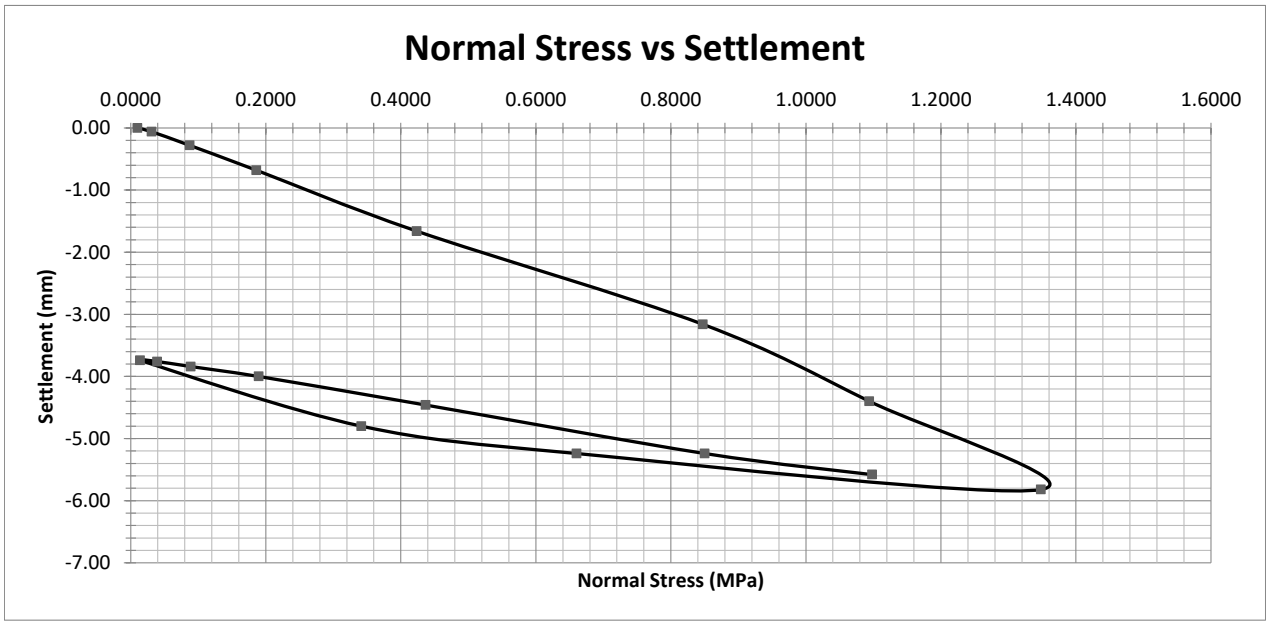
Ev1 (MPa)	75.14	Ev2 (MPa)	213.93
Ev2/Ev1=2.85			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	20/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLTR 21
Report No.:	WRE8020-1727-R007	Page:	15 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0308	-0.06	
3	0.0880	0.0873	-0.28	
4	0.1870	0.1860	-0.68	
5	0.4240	0.4234	-1.66	
6	0.8480	0.8473	-3.16	
7	1.0980	1.0940	-4.40	
8	1.3480	1.3483	-5.82	
9	0.6740	0.6605	-5.24	Unloaded
10	0.3370	0.3416	-4.80	
11	0.0100	0.0138	-3.74	
12	0.0310	0.0392	-3.76	Secondary load
13	0.0880	0.0888	-3.84	
14	0.1870	0.1894	-4.00	
15	0.4240	0.4370	-4.46	
16	0.8480	0.8501	-5.24	
17	1.0980	1.0982	-5.58	



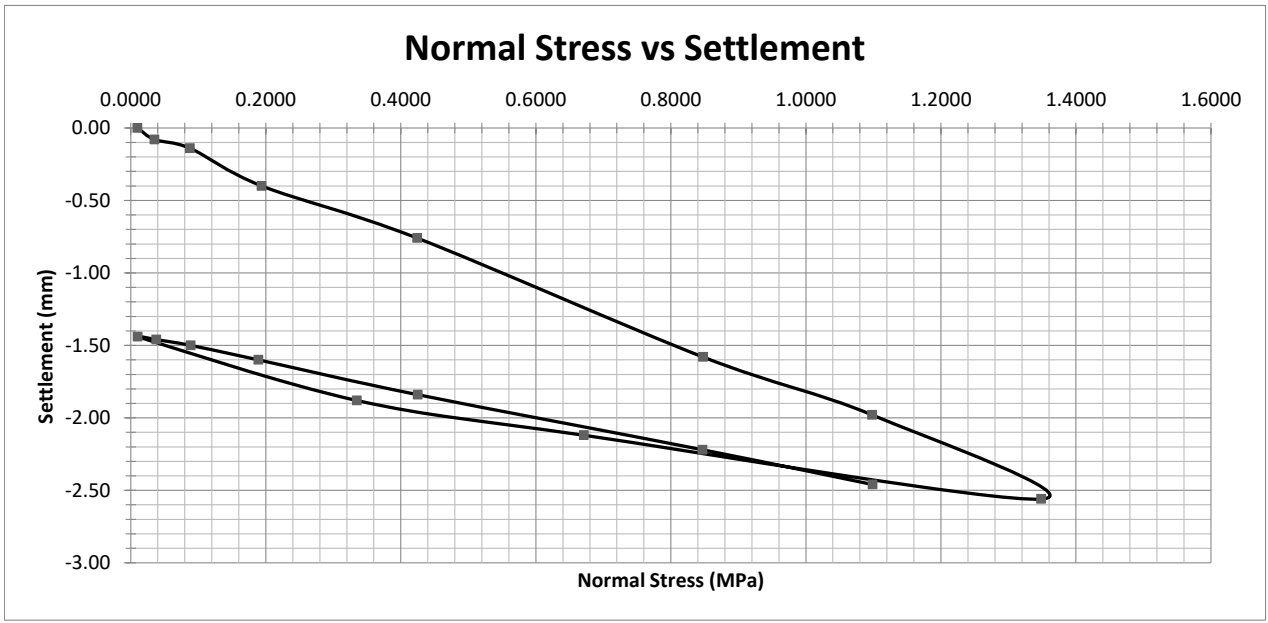
Ev1 (MPa)	52.94	Ev2 (MPa)	130.36
Ev2/Ev1=2.46			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	21/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 22
Report No:	WRE8020-1727-R007	Page:	16 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0353	-0.08	
3	0.0880	0.0878	-0.14	
4	0.1870	0.1940	-0.40	
5	0.4240	0.4244	-0.76	
6	0.8480	0.8476	-1.58	
7	1.0980	1.0982	-1.98	
8	1.3480	1.3486	-2.56	
9	0.6740	0.6714	-2.12	
10	0.3370	0.3349	-1.88	Unloaded
11	0.0100	0.0102	-1.44	
12	0.0310	0.0380	-1.46	Secondary load
13	0.0880	0.0889	-1.50	
14	0.1870	0.1891	-1.60	
15	0.4240	0.4250	-1.84	
16	0.8480	0.8470	-2.22	
17	1.0980	1.0990	-2.46	



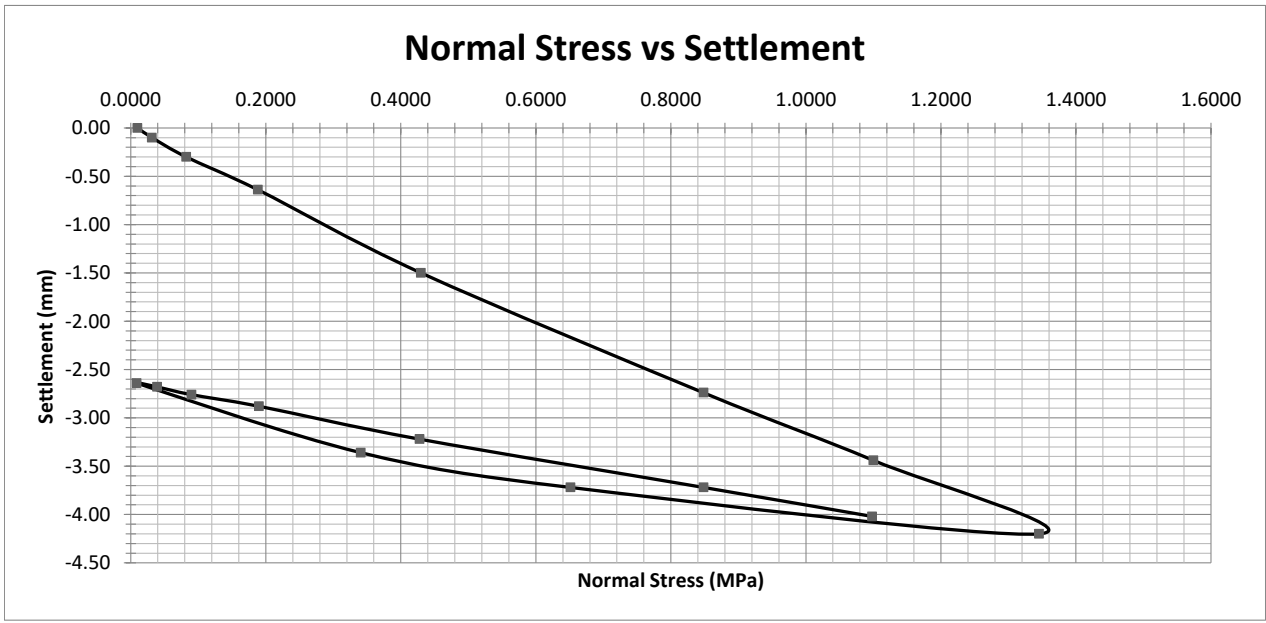
Begin Time:		End Time	
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	21/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 23
Report No.:	WRE8020-1727-R007	Page:	17 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0315	-0.10	
3	0.0880	0.0821	-0.30	
4	0.1870	0.1884	-0.64	
5	0.4240	0.4299	-1.50	
6	0.8480	0.8484	-2.74	
7	1.0980	1.1000	-3.44	
8	1.3480	1.3455	-4.20	
9	0.6740	0.6516	-3.72	
10	0.3370	0.3409	-3.36	Unloaded
11	0.0100	0.0088	-2.64	
12	0.0310	0.0392	-2.68	Secondary load
13	0.0880	0.0899	-2.76	
14	0.1870	0.1900	-2.88	
15	0.4240	0.4277	-3.22	
16	0.8480	0.8487	-3.72	
17	1.0980	1.0983	-4.02	



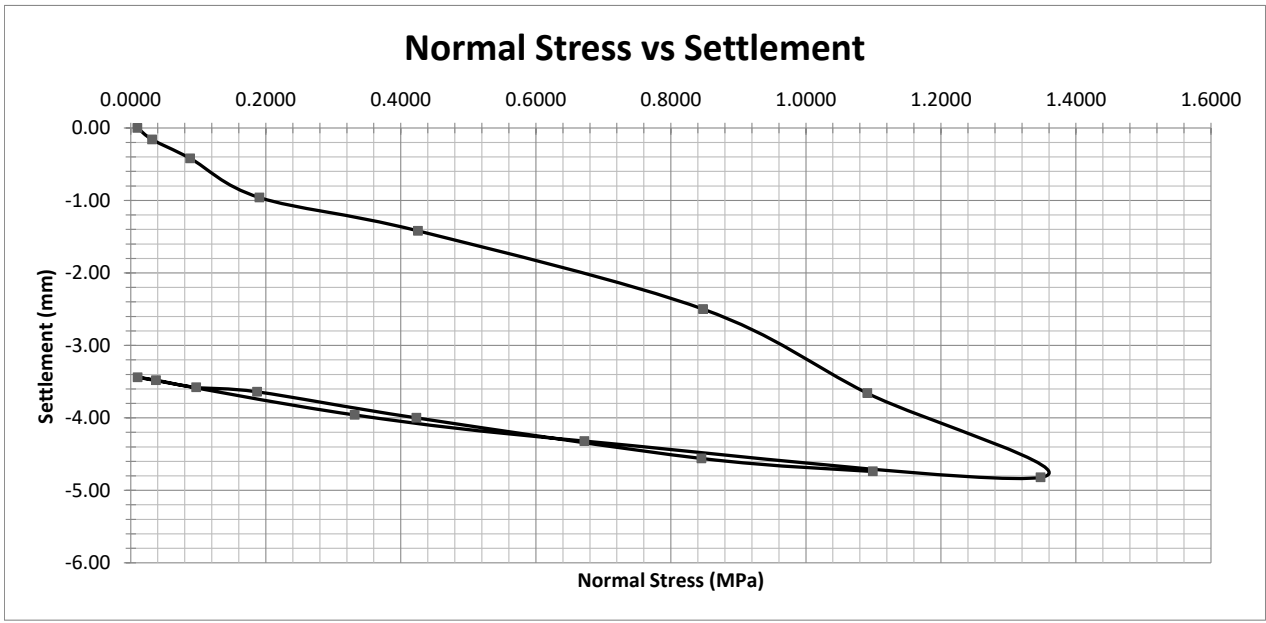
Ev1 (MPa)	72.77	Ev2 (MPa)	182.94
Ev2/Ev1=2.51			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	21/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 24
Report No:	WRE8020-1727-R007	Page:	18 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0318	-0.16	
3	0.0880	0.0881	-0.42	
4	0.1870	0.1907	-0.96	
5	0.4240	0.4257	-1.42	
6	0.8480	0.8479	-2.50	
7	1.0980	1.0910	-3.66	
8	1.3480	1.3479	-4.82	
9	0.6740	0.6721	-4.32	Unloaded
10	0.3370	0.3320	-3.96	
11	0.0100	0.0104	-3.44	
12	0.0310	0.0377	-3.48	Secondary load
13	0.0880	0.0972	-3.58	
14	0.1870	0.1871	-3.64	
15	0.4240	0.4232	-4.00	
16	0.8480	0.8453	-4.56	
17	1.0980	1.0994	-4.74	



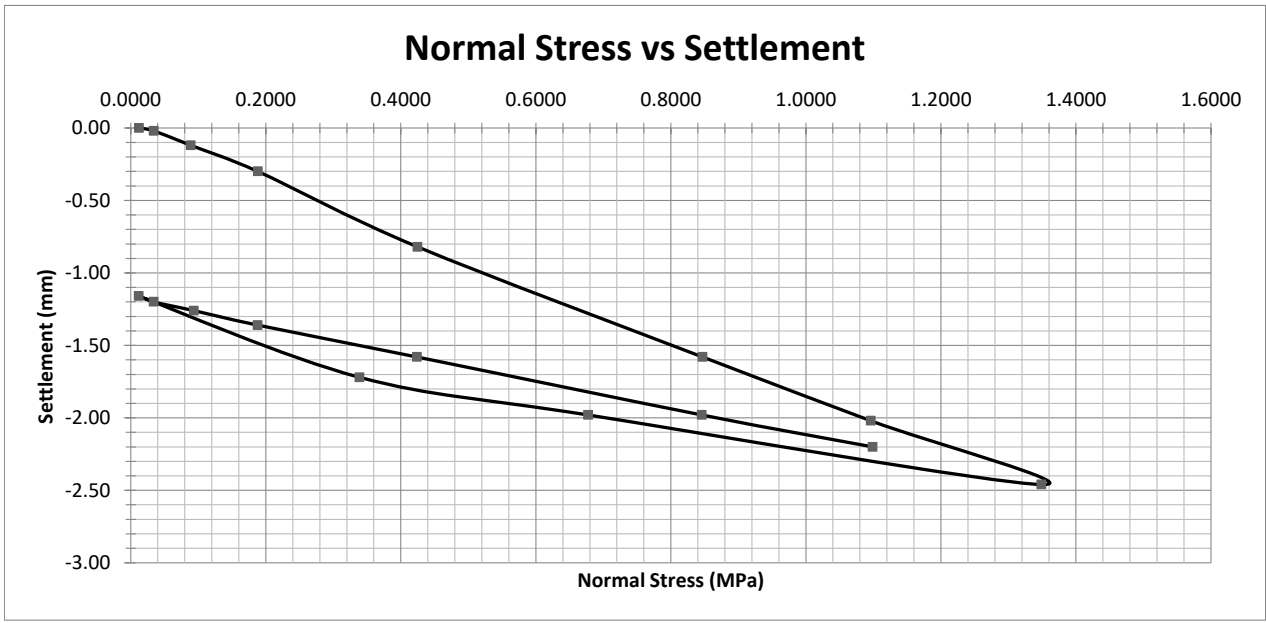
Ev1 (MPa)	67.53	Ev2 (MPa)	194.06
Ev2/Ev1=2.87			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	18/01/2022
Site:	The Landing	Tested by:	A.B
Job No:	8020-1727	Test No.:	PLT R 25
Report No:	WRE8020-1727-R007	Page:	19 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0122	0.00	Primary load
2	0.0310	0.0341	-0.02	
3	0.0880	0.0890	-0.12	
4	0.1870	0.1883	-0.30	
5	0.4240	0.4247	-0.82	
6	0.8480	0.8470	-1.58	
7	1.0980	1.0961	-2.02	
8	1.3480	1.3488	-2.46	
9	0.6740	0.6775	-1.98	
10	0.3370	0.3387	-1.72	Unloaded
11	0.0100	0.0117	-1.16	
12	0.0310	0.0342	-1.20	Secondary load
13	0.0880	0.0934	-1.26	
14	0.1870	0.1880	-1.36	
15	0.4240	0.4240	-1.58	
16	0.8480	0.8459	-1.98	
17	1.0980	1.0988	-2.20	



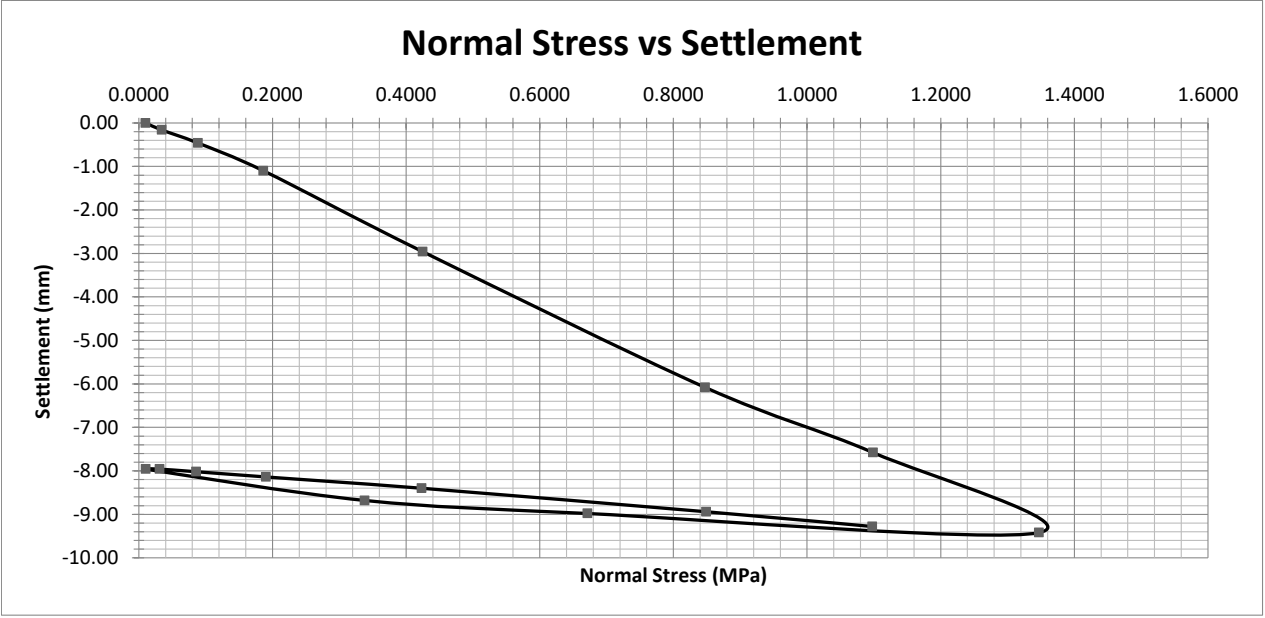
Ev1 (MPa)	120.64	Ev2 (MPa)	243.38
Ev2/Ev1=2.02			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 26
Report No.:	WRE8020-1727-R007	Page:	20 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0342	-0.16	
3	0.0880	0.0883	-0.46	
4	0.1870	0.1865	-1.10	
5	0.4240	0.4249	-2.96	
6	0.8480	0.8473	-6.08	
7	1.0980	1.0988	-7.58	
8	1.3480	1.3472	-9.42	
9	0.6740	0.6713	-8.98	
10	0.3370	0.3380	-8.68	Unloaded
11	0.0100	0.0105	-7.96	
12	0.0310	0.0310	-7.96	Secondary load
13	0.0880	0.0859	-8.02	
14	0.1870	0.1901	-8.14	
15	0.4240	0.4233	-8.40	
16	0.8480	0.8488	-8.94	
17	1.0980	1.0978	-9.28	



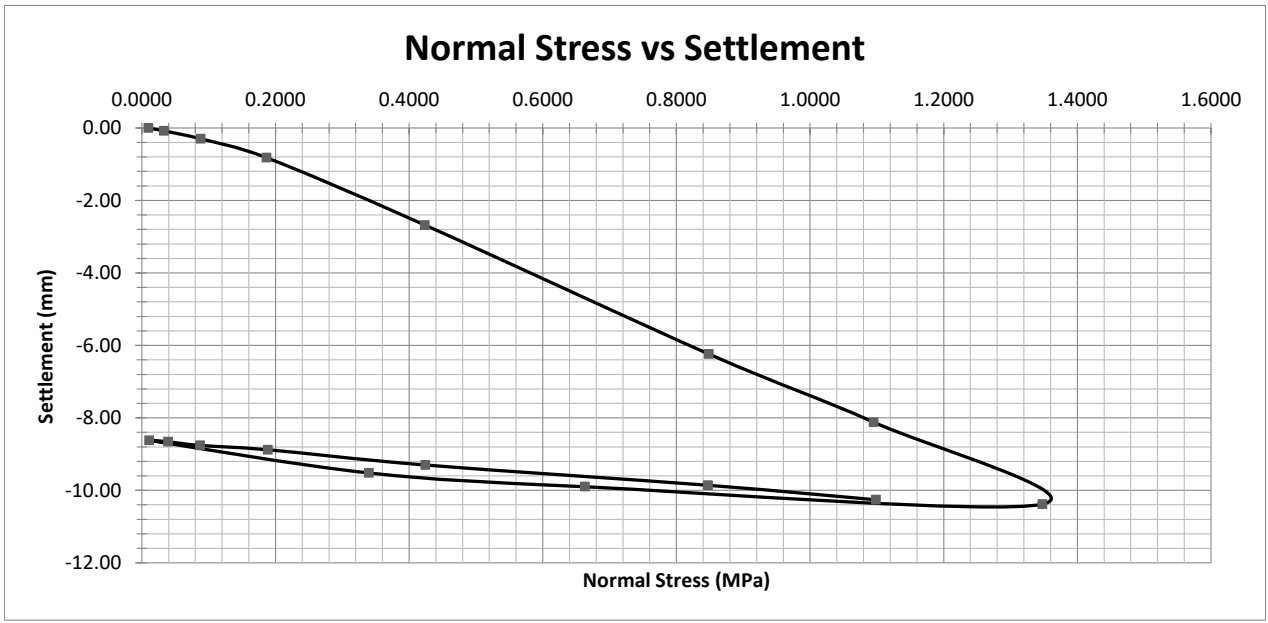
Ev1 (MPa)	31.69	Ev2 (MPa)	176.91
Ev2/Ev1=5.58			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 34
Report No.:	WRE8020-1727-R007	Page:	22 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0330	-0.08	
3	0.0880	0.0881	-0.30	
4	0.1870	0.1866	-0.82	
5	0.4240	0.4237	-2.68	
6	0.8480	0.8487	-6.24	
7	1.0980	1.0953	-8.12	
8	1.3480	1.3478	-10.38	
9	0.6740	0.6632	-9.90	Unloaded
10	0.3370	0.3397	-9.52	
11	0.0100	0.0112	-8.62	
12	0.0310	0.0394	-8.66	Secondary load
13	0.0880	0.0872	-8.76	
14	0.1870	0.1887	-8.88	
15	0.4240	0.4242	-9.30	
16	0.8480	0.8473	-9.86	
17	1.0980	1.0988	-10.26	



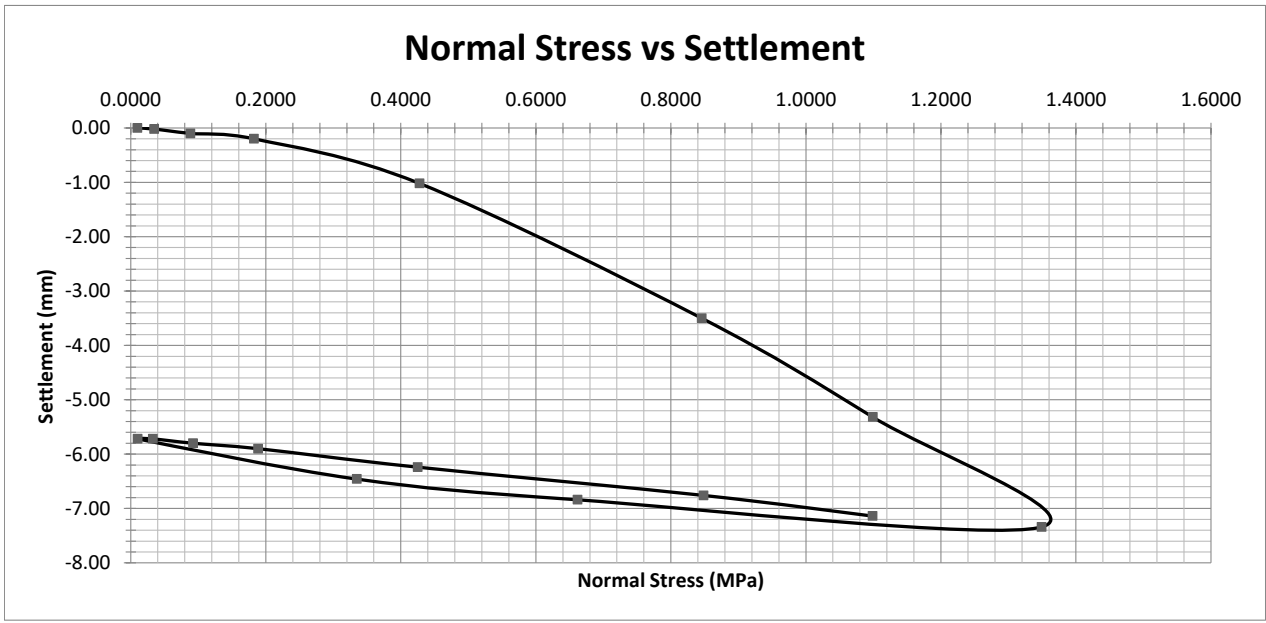
Ev1 (MPa)	28.34	Ev2 (MPa)	153.17
Ev2/Ev1=5.41			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No.:	8020-1727	Test No.:	PLT R 35
Report No.:	WRE8020-1727-R007	Page:	23 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0348	-0.02	
3	0.0880	0.0886	-0.10	
4	0.1870	0.1826	-0.20	
5	0.4240	0.4277	-1.02	
6	0.8480	0.8457	-3.50	
7	1.0980	1.0992	-5.32	
8	1.3480	1.3492	-7.34	
9	0.6740	0.6620	-6.84	
10	0.3370	0.3350	-6.46	Unloaded
11	0.0100	0.0104	-5.72	
12	0.0310	0.0328	-5.72	Secondary load
13	0.0880	0.0925	-5.80	
14	0.1870	0.1887	-5.90	
15	0.4240	0.4250	-6.24	
16	0.8480	0.8487	-6.76	
17	1.0980	1.0988	-7.14	



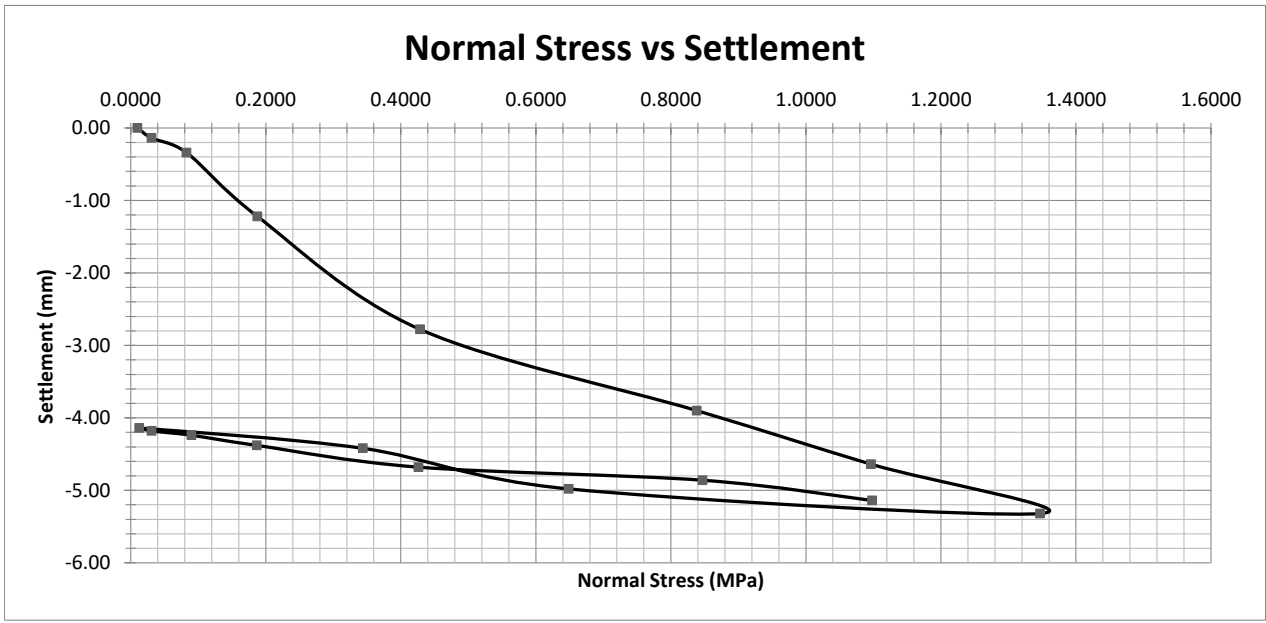
Ev1 (MPa)	40.25	Ev2 (MPa)	167.74
Ev2/Ev1=4.17			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 36
Report No:	WRE8020-1727-R007	Page:	24 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0310	-0.14	
3	0.0880	0.0826	-0.34	
4	0.1870	0.1875	-1.22	
5	0.4240	0.4287	-2.78	
6	0.8480	0.8385	-3.90	
7	1.0980	1.0967	-4.64	
8	1.3480	1.3469	-5.32	
9	0.6740	0.6488	-4.98	
10	0.3370	0.3439	-4.42	Unloaded
11	0.0100	0.0126	-4.14	
12	0.0310	0.0311	-4.18	Secondary load
13	0.0880	0.0900	-4.24	
14	0.1870	0.1868	-4.38	
15	0.4240	0.4263	-4.68	
16	0.8480	0.8469	-4.86	
17	1.0980	1.0982	-5.14	



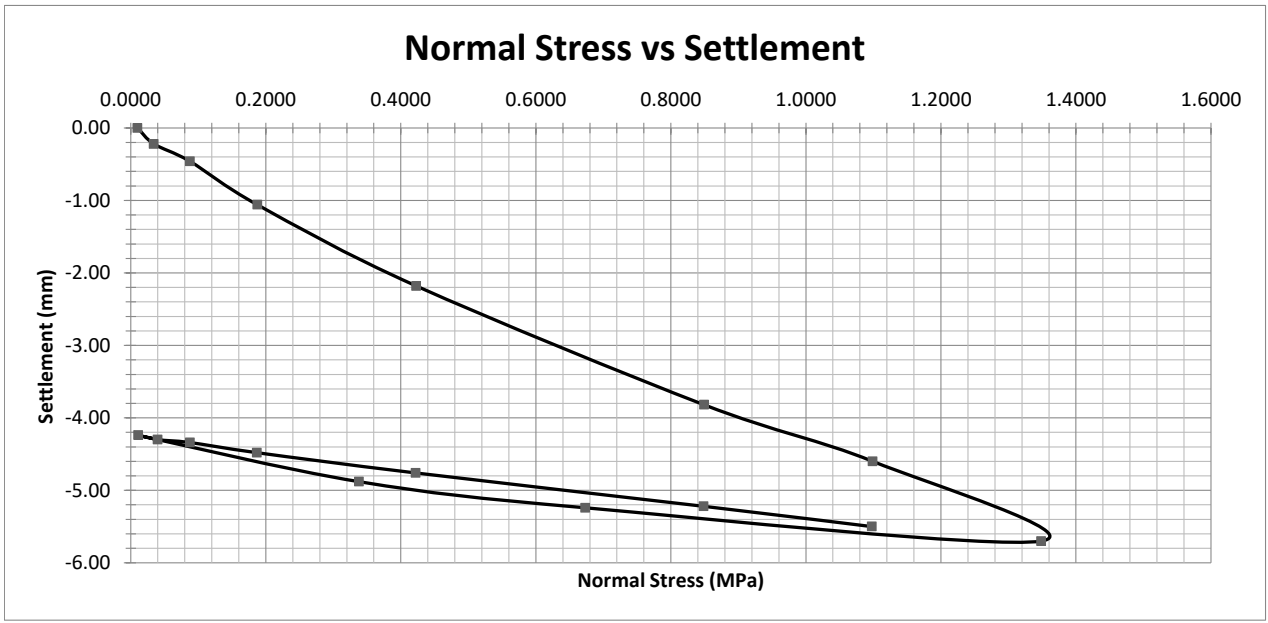
Ev1 (MPa)	58.13	Ev2 (MPa)	289.04
Ev2/Ev1=4.97			
Begin Time:		End Time	
Coordinates:		NZTM Format	
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 37
Report No:	WRE8020-1727-R007	Page:	25 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0342	-0.22	
3	0.0880	0.0876	-0.46	
4	0.1870	0.1877	-1.06	
5	0.4240	0.4229	-2.18	
6	0.8480	0.8494	-3.82	
7	1.0980	1.0990	-4.60	
8	1.3480	1.3484	-5.70	
9	0.6740	0.6730	-5.24	
10	0.3370	0.3382	-4.88	Unloaded
11	0.0100	0.0109	-4.24	
12	0.0310	0.0400	-4.30	Secondary load
13	0.0880	0.0876	-4.34	
14	0.1870	0.1868	-4.48	
15	0.4240	0.4222	-4.76	
16	0.8480	0.8484	-5.22	
17	1.0980	1.0978	-5.50	



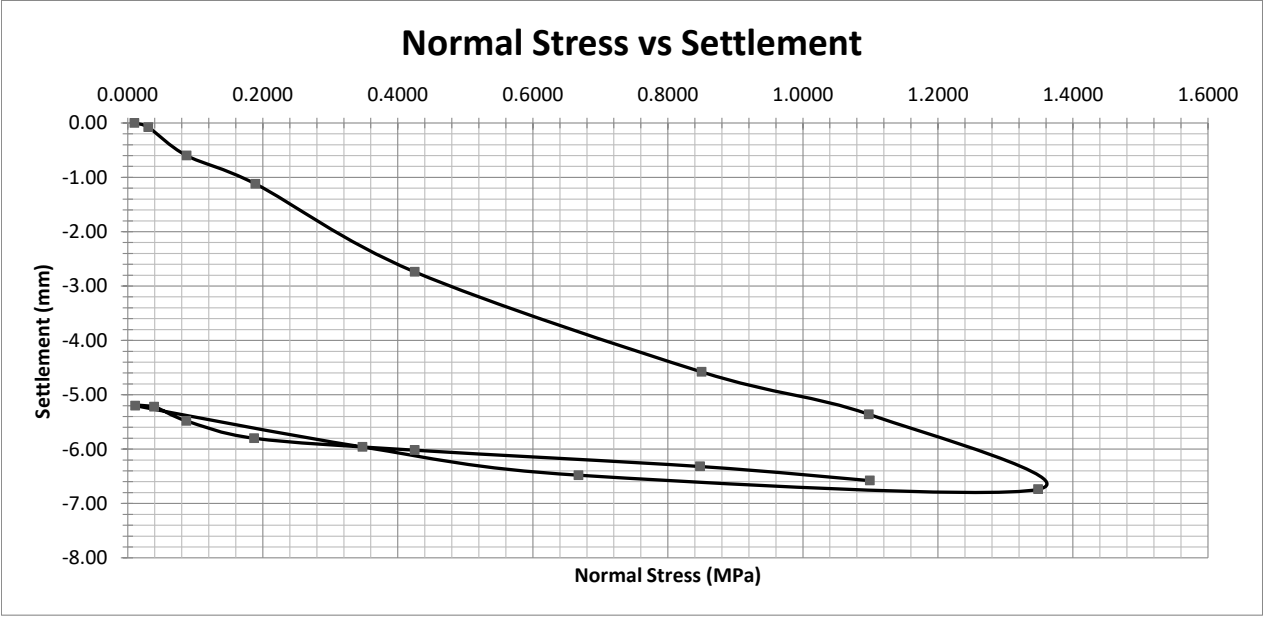
Ev1 (MPa)	55.06	Ev2 (MPa)	201.92
Ev2/Ev1=3.67			
Begin Time:		End Time	
Coordinates:		NZTM Format	
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	19/01/2022
Site:	The Landing	Tested by:	D.O
Job No:	8020-1727	Test No.:	PLT R 27
Report No:	WRE8020-1727-R007	Page:	21 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0306	-0.08	
3	0.0880	0.0871	-0.60	
4	0.1870	0.1890	-1.12	
5	0.4240	0.4252	-2.74	
6	0.8480	0.8500	-4.58	
7	1.0980	1.0976	-5.36	
8	1.3480	1.3484	-6.74	
9	0.6740	0.6679	-6.48	
10	0.3370	0.3476	-5.96	Unloaded
11	0.0100	0.0110	-5.20	
12	0.0310	0.0391	-5.22	Secondary load
13	0.0880	0.0869	-5.48	
14	0.1870	0.1871	-5.80	
15	0.4240	0.4253	-6.02	
16	0.8480	0.8479	-6.32	
17	1.0980	1.0994	-6.58	



Ev1 (MPa)	46.24	Ev2 (MPa)	249.97
Ev2/Ev1=5.41			
Begin Time:		End Time	
Coordinates:		NZTM Format	
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

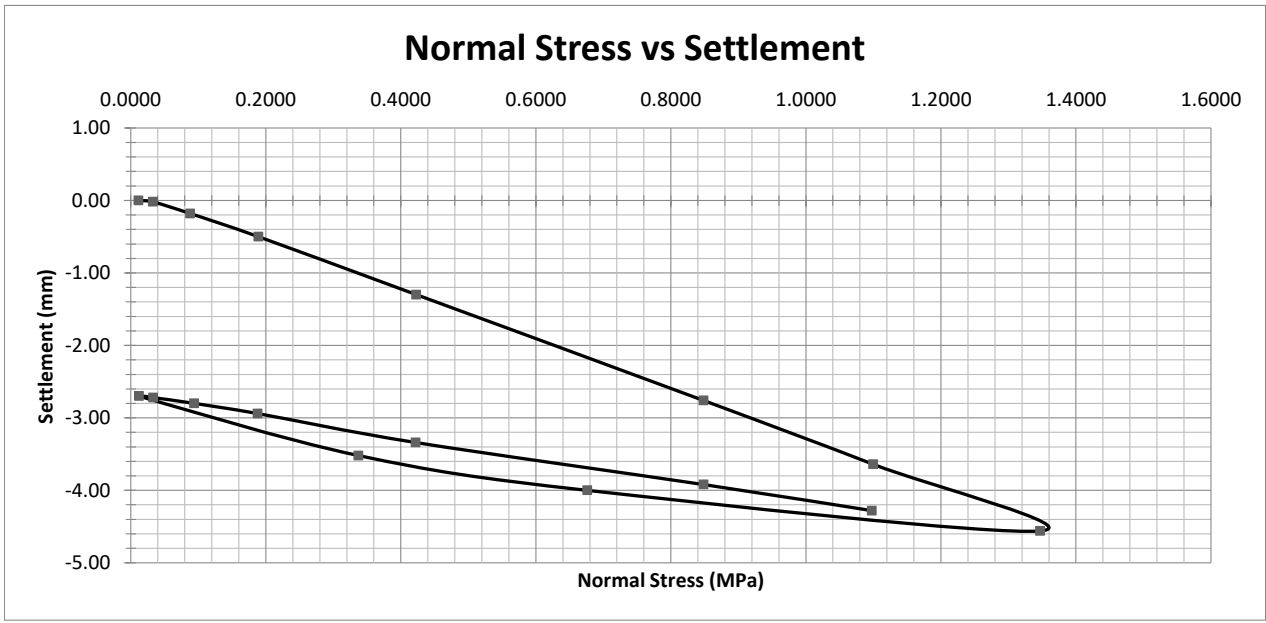
STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client: Cook Costello
Site: The Landing
Job No.: 8020-1727
Report No.: WRE8020-1727-R007
Client Reference: -

Date: 18/01/2022
Tested by: A.B
Test No.: PLT R 38
Page: 26 of 35
Checked by: A.B
Date: 9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0116	0.00	Primary load
2	0.0310	0.0330	-0.02	
3	0.0880	0.0880	-0.18	
4	0.1870	0.1891	-0.50	
5	0.4240	0.4230	-1.30	
6	0.8480	0.8484	-2.76	
7	1.0980	1.0995	-3.64	
8	1.3480	1.3471	-4.56	
9	0.6740	0.6764	-4.00	Unloaded
10	0.3370	0.3373	-3.52	
11	0.0100	0.0123	-2.70	Secondary load
12	0.0310	0.0332	-2.72	
13	0.0880	0.0938	-2.80	
14	0.1870	0.1879	-2.94	
15	0.4240	0.4220	-3.34	
16	0.8480	0.8484	-3.92	
17	1.0980	1.0978	-4.28	



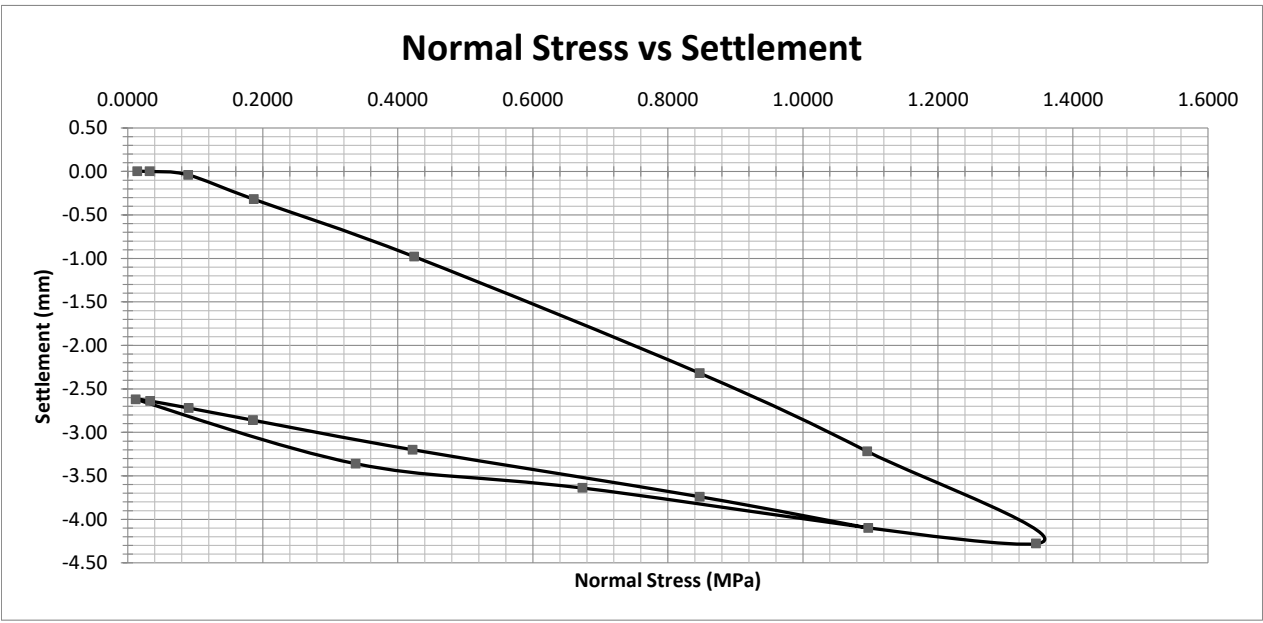
Ev1 (MPa)	65.13	Ev2 (MPa)	156.32
Ev2/Ev1=2.4			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	18/01/2022
Site:	The Landing	Tested by:	A.B
Job No.:	8020-1727	Test No.:	PLT R 39
Report No.:	WRE8020-1727-R007	Page:	27 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0142	0.00	Primary load
2	0.0310	0.0323	0.00	
3	0.0880	0.0896	-0.04	
4	0.1870	0.1867	-0.32	
5	0.4240	0.4244	-0.98	
6	0.8480	0.8473	-2.32	
7	1.0980	1.0955	-3.22	
8	1.3480	1.3455	-4.28	
9	0.6740	0.6737	-3.64	
10	0.3370	0.3375	-3.36	Unloaded
11	0.0100	0.0120	-2.62	
12	0.0310	0.0332	-2.64	Secondary load
13	0.0880	0.0903	-2.72	
14	0.1870	0.1855	-2.86	
15	0.4240	0.4221	-3.20	
16	0.8480	0.8474	-3.74	
17	1.0980	1.0971	-4.10	



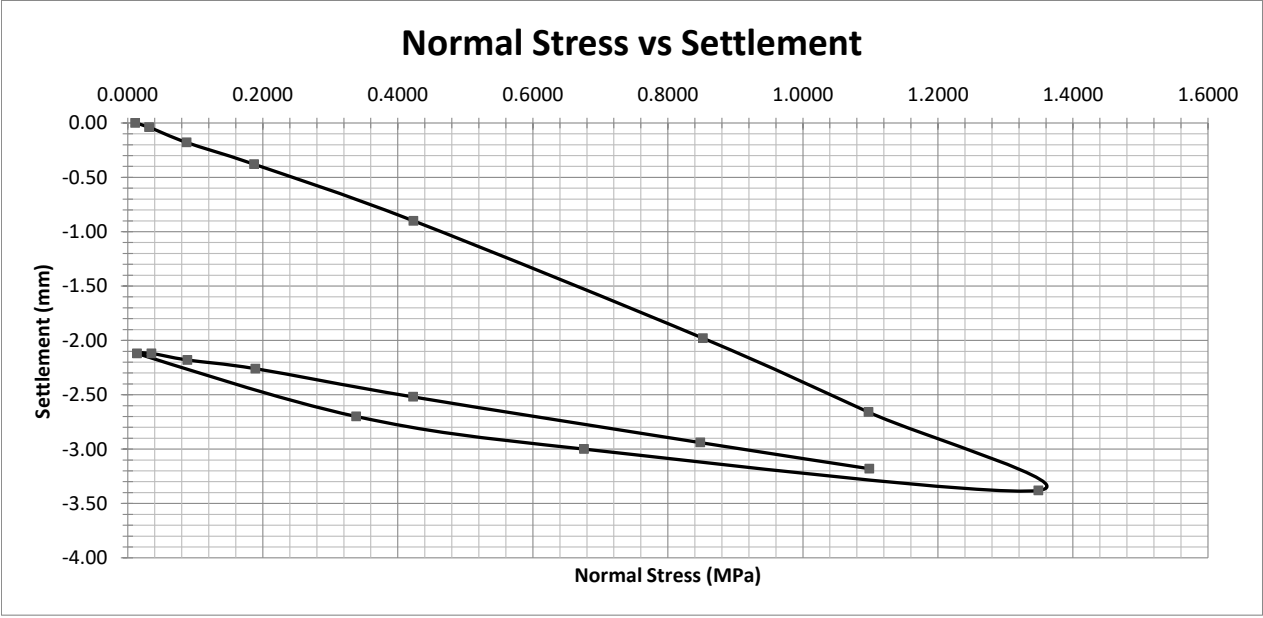
Ev1 (MPa)	69.07	Ev2 (MPa)	166.72
Ev2/Ev1=2.41			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	18/01/2022
Site:	The Landing	Tested by:	A.B
Job No:	8020-1727	Test No.:	PLT R 40
Report No:	WRE8020-1727-R007	Page:	28 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0109	0.00	Primary load
2	0.0310	0.0318	-0.04	
3	0.0880	0.0874	-0.18	
4	0.1870	0.1873	-0.38	
5	0.4240	0.4231	-0.90	
6	0.8480	0.8521	-1.98	
7	1.0980	1.0972	-2.66	
8	1.3480	1.3488	-3.38	
9	0.6740	0.6761	-3.00	
10	0.3370	0.3385	-2.70	Unloaded
11	0.0100	0.0137	-2.12	
12	0.0310	0.0351	-2.12	Secondary load
13	0.0880	0.0884	-2.18	
14	0.1870	0.1891	-2.26	
15	0.4240	0.4228	-2.52	
16	0.8480	0.8480	-2.94	
17	1.0980	1.0984	-3.18	



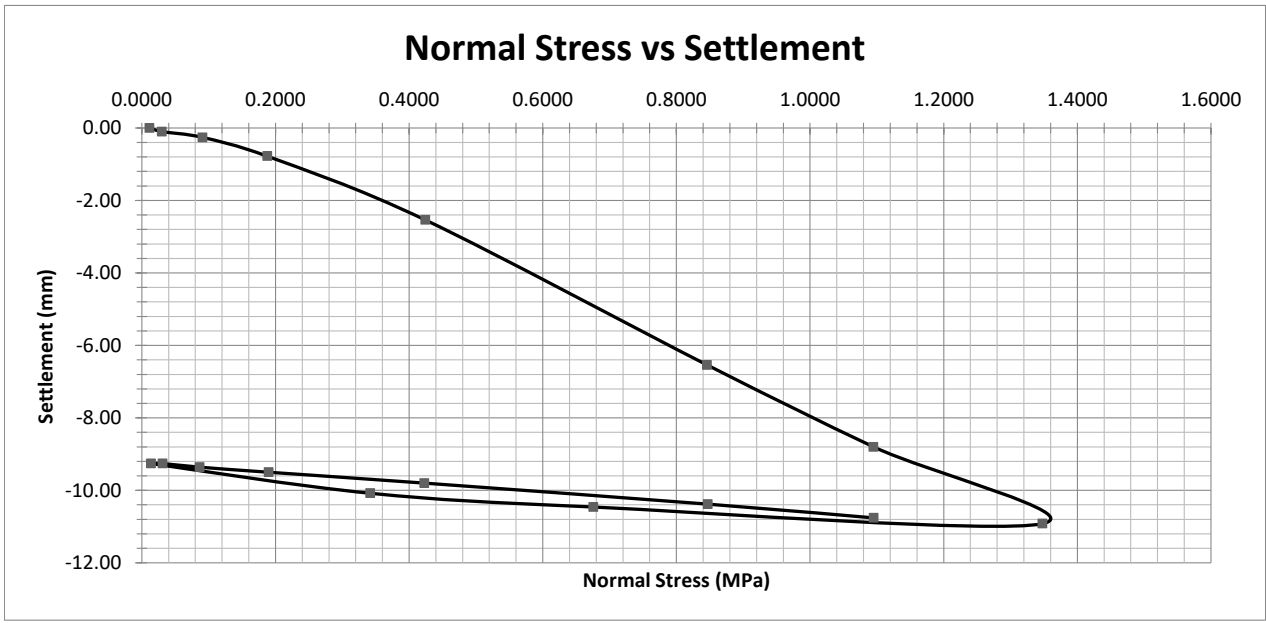
Ev1 (MPa)	89.26	Ev2 (MPa)	226.34
Ev2/Ev1=2.54			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	17/01/2022
Site:	The Landing	Tested by:	A.B
Job No.:	8020-1727	Test No.:	PLTR 41
Report No.:	WRE8020-1727-R007	Page:	29 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0116	0.00	Primary load
2	0.0310	0.0300	-0.10	
3	0.0880	0.0908	-0.26	
4	0.1870	0.1877	-0.78	
5	0.4240	0.4244	-2.54	
6	0.8480	0.8460	-6.54	
7	1.0980	1.0950	-8.80	
8	1.3480	1.3477	-10.92	
9	0.6740	0.6757	-10.46	
10	0.3370	0.3417	-10.08	Unloaded
11	0.0100	0.0140	-9.26	
12	0.0310	0.0313	-9.26	Secondary load
13	0.0880	0.0866	-9.36	
14	0.1870	0.1897	-9.50	
15	0.4240	0.4229	-9.80	
16	0.8480	0.8471	-10.38	
17	1.0980	1.0954	-10.76	



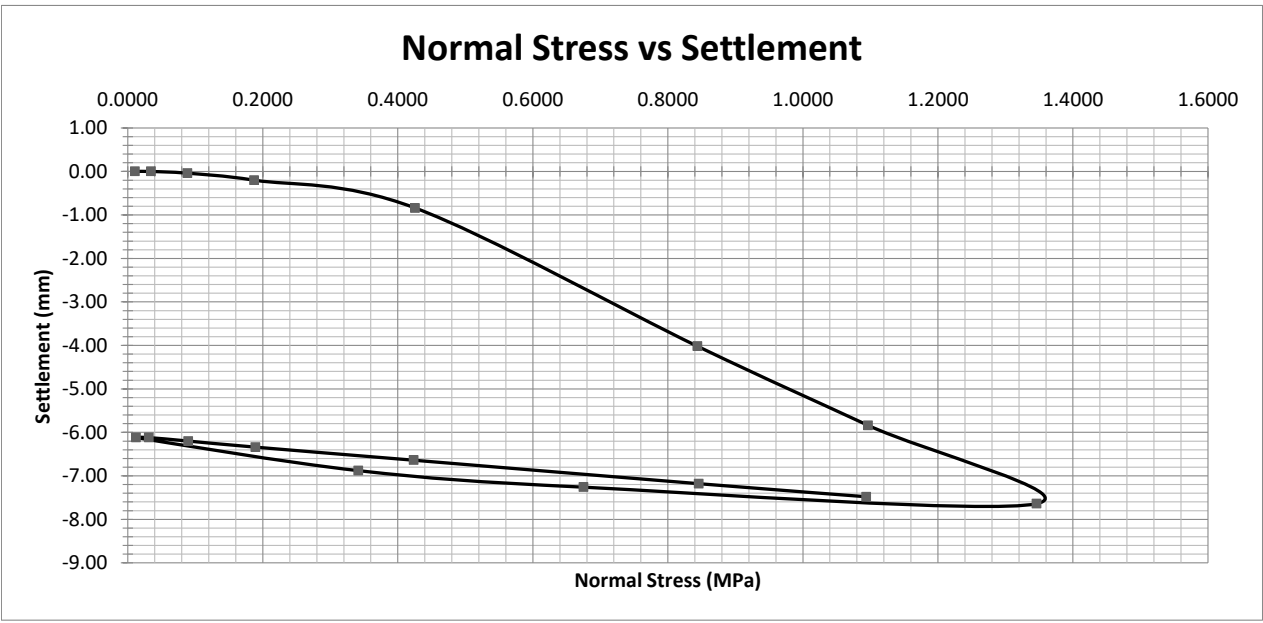
Begin Time:		End Time	
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	17/01/2022
Site:	The Landing	Tested by:	A.B
Job No.:	8020-1727	Test No.:	PLT R 42
Report No.:	WRE8020-1727-R007	Page:	30 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0108	0.00	Primary load
2	0.0310	0.0344	0.00	
3	0.0880	0.0884	-0.04	
4	0.1870	0.1874	-0.20	
5	0.4240	0.4257	-0.84	
6	0.8480	0.8439	-4.02	
7	1.0980	1.0967	-5.84	
8	1.3480	1.3461	-7.64	
9	0.6740	0.6751	-7.26	
10	0.3370	0.3417	-6.88	Unloaded
11	0.0100	0.0123	-6.12	
12	0.0310	0.0313	-6.12	Secondary load
13	0.0880	0.0898	-6.20	
14	0.1870	0.1893	-6.34	
15	0.4240	0.4234	-6.64	
16	0.8480	0.8460	-7.18	
17	1.0980	1.0940	-7.48	



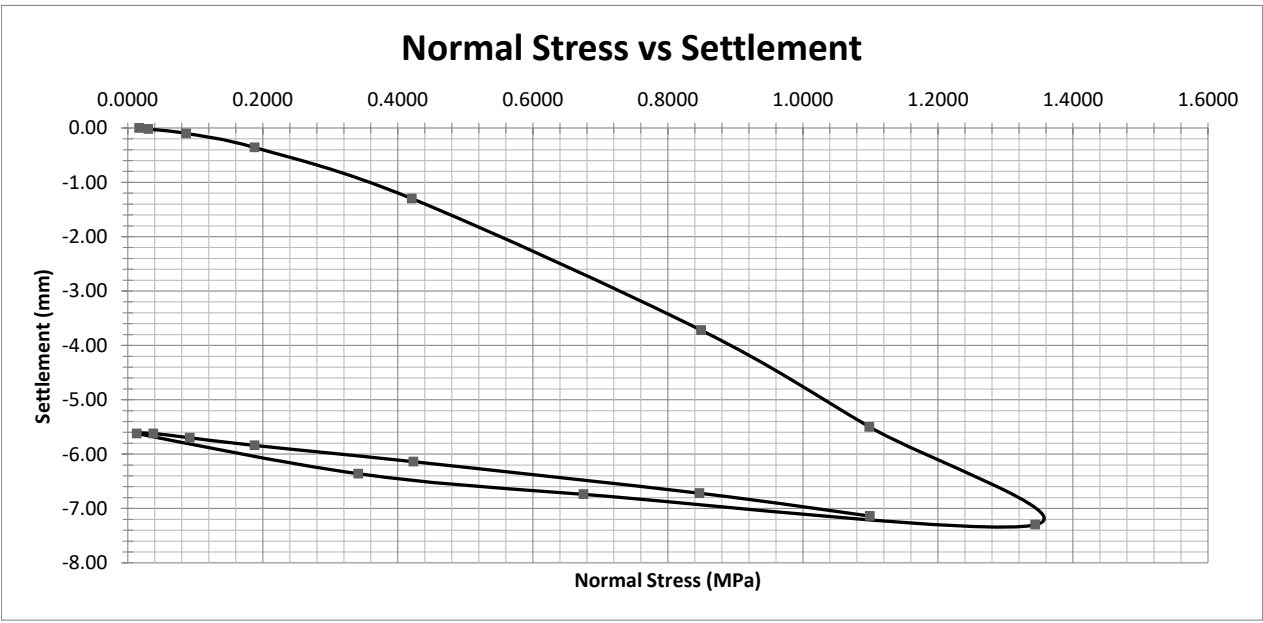
Ev1 (MPa)	37.30	Ev2 (MPa)	178.31
Ev2/Ev1=4.78			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	17/01/2022
Site:	The Landing	Tested by:	A.B
Job No.:	8020-1727	Test No.:	PLT R 43
Report No.:	WRE8020-1727-R007	Page:	31 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0169	0.00	Primary load
2	0.0310	0.0306	-0.02	
3	0.0880	0.0864	-0.10	
4	0.1870	0.1880	-0.36	
5	0.4240	0.4210	-1.30	
6	0.8480	0.8492	-3.72	
7	1.0980	1.0987	-5.50	
8	1.3480	1.3443	-7.30	
9	0.6740	0.6751	-6.74	
10	0.3370	0.3414	-6.36	Unloaded
11	0.0100	0.0133	-5.62	
12	0.0310	0.0380	-5.62	Secondary load
13	0.0880	0.0921	-5.70	
14	0.1870	0.1879	-5.84	
15	0.4240	0.4233	-6.14	
16	0.8480	0.8471	-6.72	
17	1.0980	1.0994	-7.14	



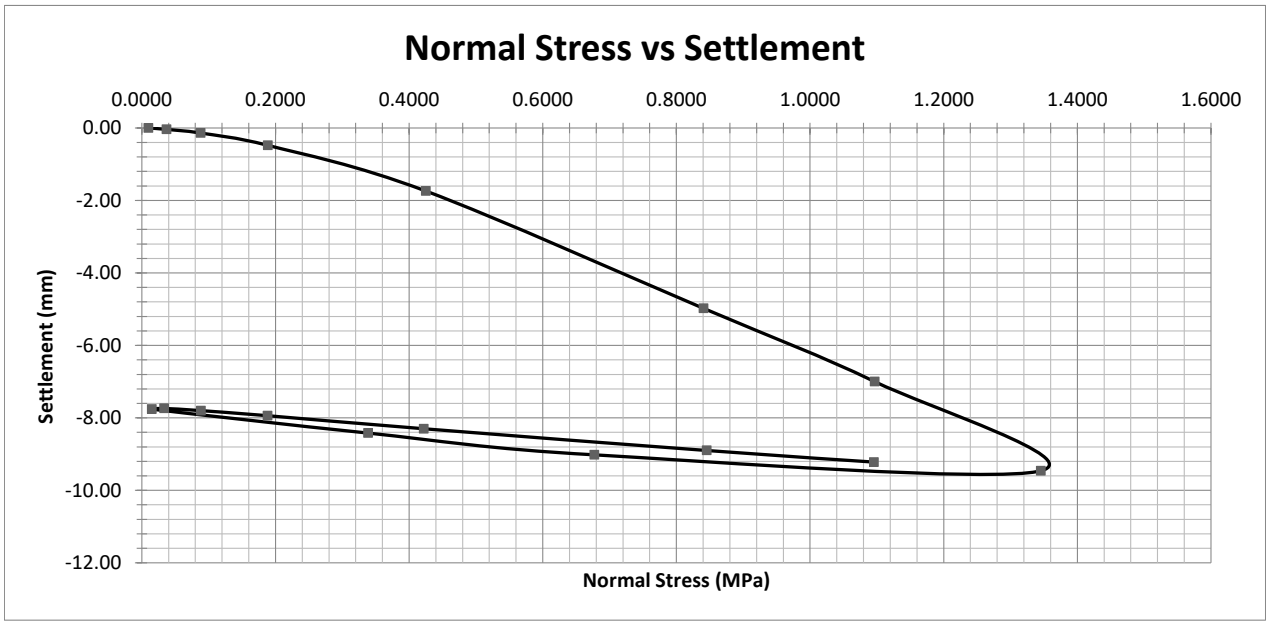
Ev1 (MPa)	40.27	Ev2 (MPa)	155.82
Ev2/Ev1=3.87			
Begin Time:		End Time	
Coordinates:		NZTM Format	
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	17/01/2022
Site:	The Landing	Tested by:	A.B
Job No:	8020-1727	Test No.:	PLT R 44
Report No:	WRE8020-1727-R007	Page:	32 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0372	-0.04	
3	0.0880	0.0880	-0.14	
4	0.1870	0.1887	-0.48	
5	0.4240	0.4250	-1.74	
6	0.8480	0.8408	-4.98	
7	1.0980	1.0967	-7.00	
8	1.3480	1.3454	-9.46	
9	0.6740	0.6775	-9.02	
10	0.3370	0.3388	-8.42	Unloaded
11	0.0100	0.0151	-7.76	
12	0.0310	0.0335	-7.74	Secondary load
13	0.0880	0.0886	-7.80	
14	0.1870	0.1884	-7.94	
15	0.4240	0.4221	-8.30	
16	0.8480	0.8454	-8.90	
17	1.0980	1.0958	-9.22	



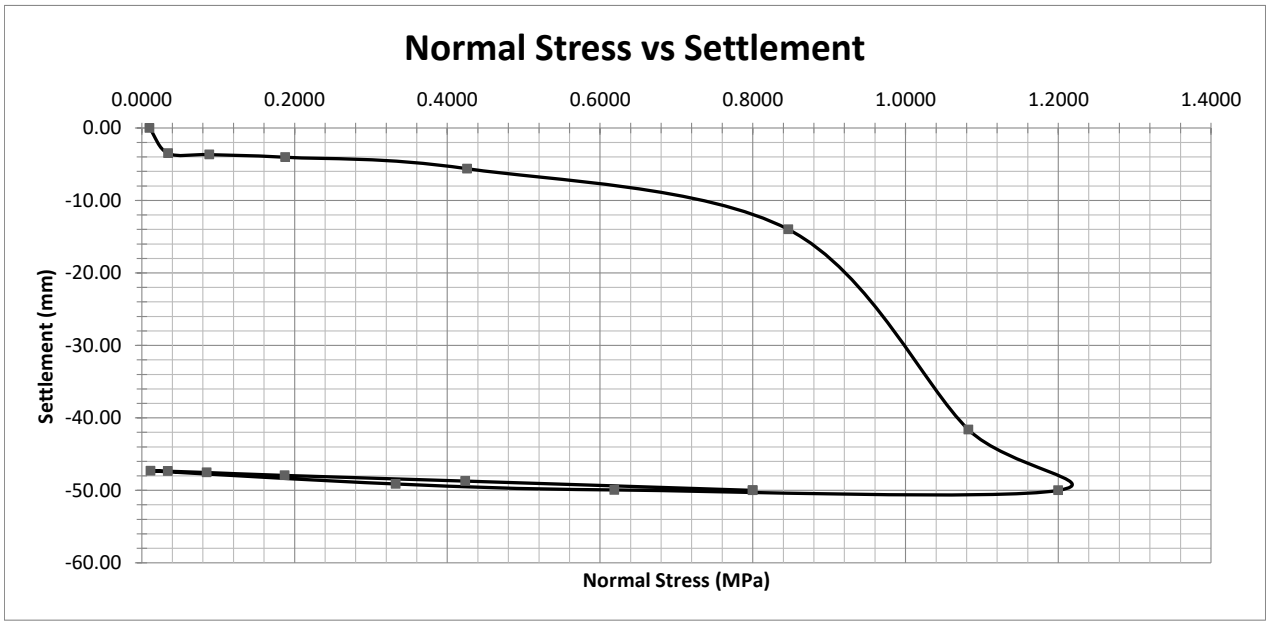
Ev1 (MPa)	31.11	Ev2 (MPa)	161.33
Ev2/Ev1=5.18			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	14/01/2022
Site:	The Landing	Tested by:	A.B / D.O
Job No.:	8020-1727	Test No.:	PLT R 45
Report No.:	WRE8020-1727-R007	Page:	33 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0344	-3.50	
3	0.0880	0.0886	-3.68	
4	0.1870	0.1877	-4.04	
5	0.4240	0.4261	-5.62	
6	0.8480	0.8466	-14.00	
7	1.0980	1.0825	-41.64	
8	1.3480	1.2000	-50.00	
9	0.6740	0.6187	-49.94	Unloaded
10	0.3370	0.3326	-49.12	
11	0.0100	0.0113	-47.30	Secondary load
12	0.0310	0.0341	-47.36	
13	0.0880	0.0850	-47.54	
14	0.1870	0.1870	-47.94	
15	0.4240	0.4234	-48.72	
16	0.8480	0.8000	-50.00	
17	1.0980	0.8000	-50.00	



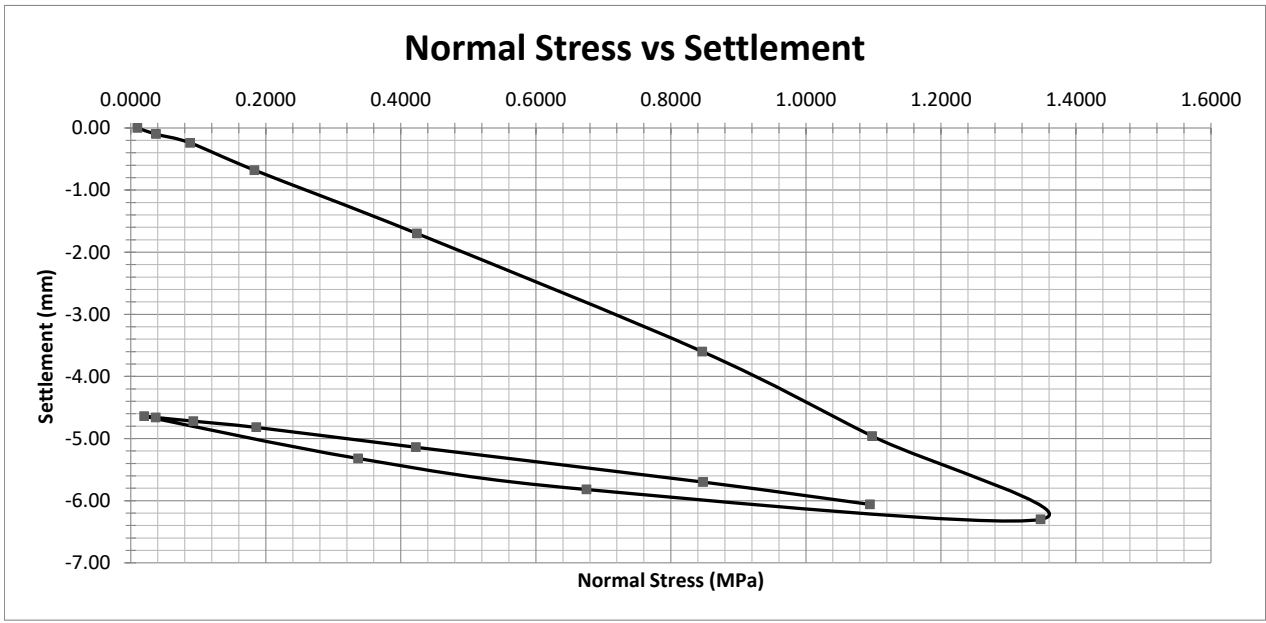
Ev1 (MPa)	6.19	Ev2 (MPa)	66.85
Ev2/Ev1=10.8			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	Max Pressure not achieved

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	14/01/2022
Site:	The Landing	Tested by:	A.B / D.O
Job No.:	8020-1727	Test No.:	PLT R 46
Report No.:	WRE8020-1727-R007	Page:	34 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0375	-0.10	
3	0.0880	0.0880	-0.24	
4	0.1870	0.1835	-0.68	
5	0.4240	0.4241	-1.70	
6	0.8480	0.8466	-3.60	
7	1.0980	1.0981	-4.96	
8	1.3480	1.3478	-6.30	
9	0.6740	0.6752	-5.82	
10	0.3370	0.3368	-5.32	Unloaded
11	0.0100	0.0202	-4.64	
12	0.0310	0.0370	-4.66	Secondary load
13	0.0880	0.0929	-4.72	
14	0.1870	0.1859	-4.82	
15	0.4240	0.4224	-5.14	
16	0.8480	0.8477	-5.70	
17	1.0980	1.0951	-6.06	



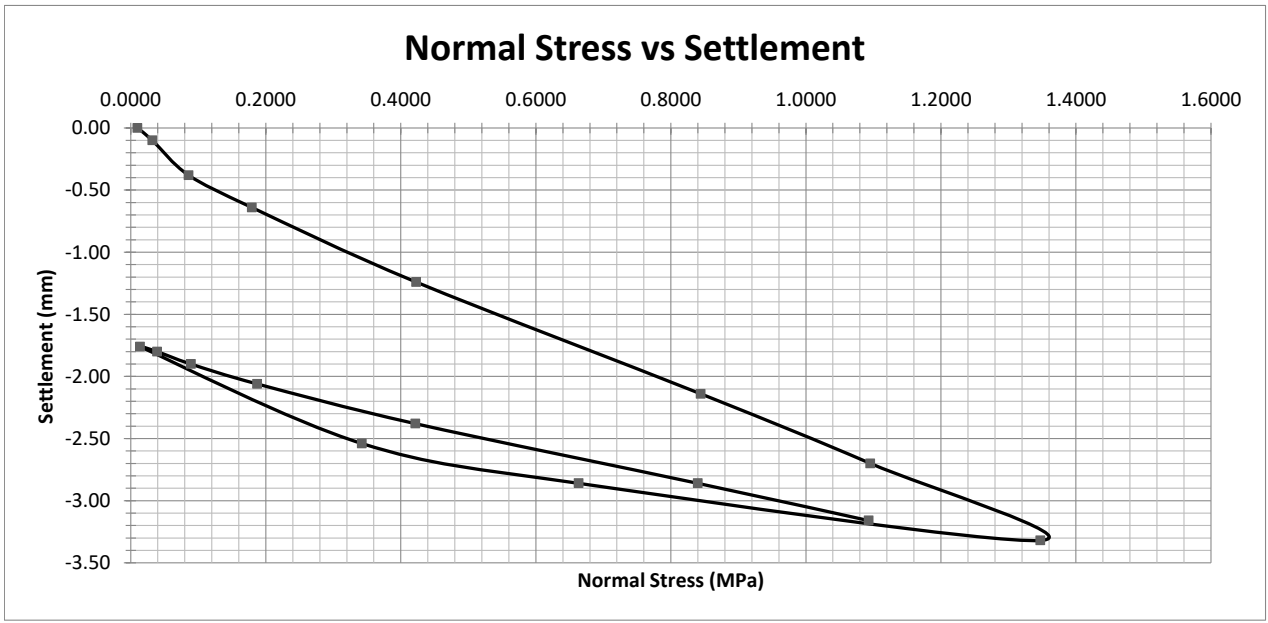
Ev1 (MPa)	47.68	Ev2 (MPa)	165.75
Ev2/Ev1=3.48			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

STATIC PLATE LOAD TEST

DIN 18134:2012-04

Client:	Cook Costello	Date:	12/01/2022
Site:	The Landing	Tested by:	S.K / D.O
Job No.:	8020-1727	Test No.:	PLTR 47
Report No.:	WRE8020-1727-R007	Page:	35 of 35
Client Reference:	-	Checked by:	A.B
		Date:	9/02/2022

Loading Stage	Preferred Normal Stress (MPa)	Actual Normal Stress (MPa)	Settlement of Loading Plate (mm)	Load Cycle
1	0.0100	0.0100	0.00	Primary load
2	0.0310	0.0320	-0.10	
3	0.0880	0.0856	-0.38	
4	0.1870	0.1794	-0.64	
5	0.4240	0.4227	-1.24	
6	0.8480	0.8444	-2.14	
7	1.0980	1.0955	-2.70	
8	1.3480	1.3472	-3.32	
9	0.6740	0.6634	-2.86	
10	0.3370	0.3425	-2.54	Unloaded
11	0.0100	0.0139	-1.76	
12	0.0310	0.0390	-1.80	Secondary load
13	0.0880	0.0891	-1.90	
14	0.1870	0.1872	-2.06	
15	0.4240	0.4217	-2.38	
16	0.8480	0.8399	-2.86	
17	1.0980	1.0930	-3.16	



Ev1 (MPa)	95.86	Ev2 (MPa)	187.27
Ev2/Ev1=1.95			
Begin Time:	End Time		
Coordinates:	NZTM Format		
Device:	HMP PDG pro (0799)	Weather/Temp:	Sunny, with Breeze
Plate Size:	300mm	Bedding Assistance:	Fine to Medium Sand
Soil:	Sand	Remarks:	

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 15/02/2022
Date of Re-Issue: -
Page: 1 of 31

Test Report No. W21-1400

PROJECT: The Landing Stage 6/7 Scala Testing 30/11/21

CLIENT: Cook Costello
2 Norfolk Street,
Whangārei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Determination of the penetration resistance using a dynamic cone (scala) Penetrometer
NZS 4402: 1988 Test 6.5.2

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

Alex Millar

A. Millar

Administrator

S. Kokich

S. Kokich

Approved Signatory



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

DYNAMIC CONE (SCALA) PENETROMETER

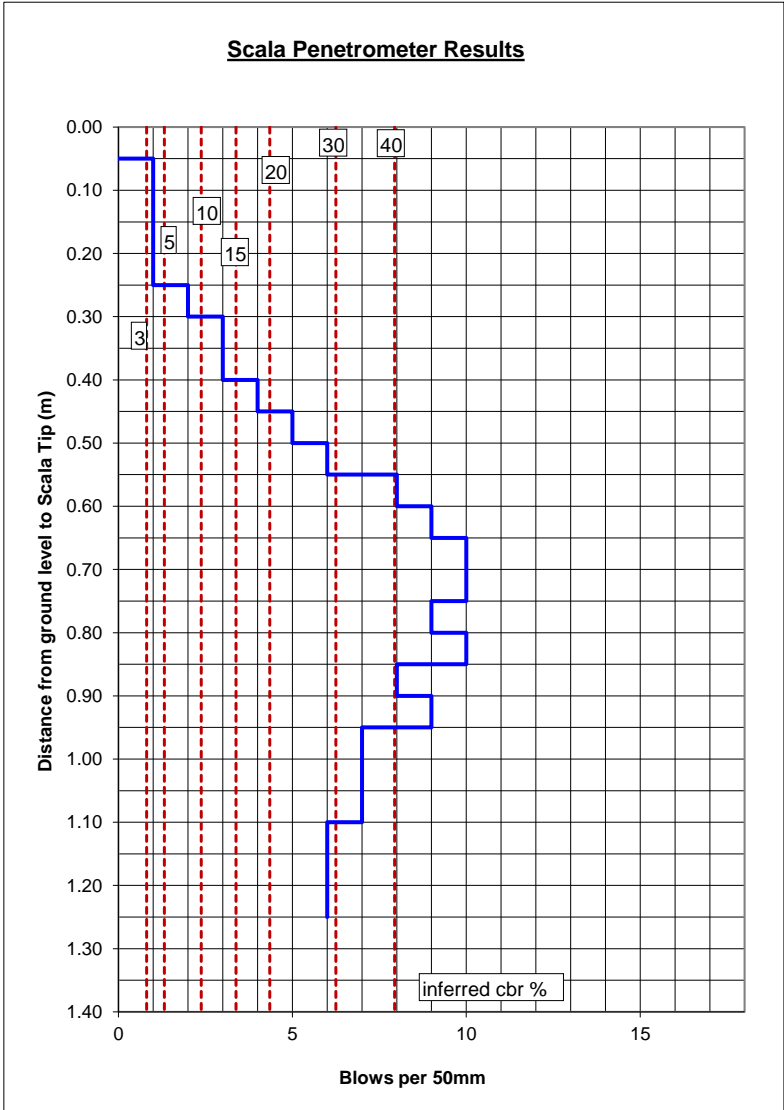
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
 Client: Cook Costello
 Job: The Landing, Stage 6-7
 Location: Stage 6-7
 Start Depth (m): 0.05

Scala No: SCB 6
 Ref: -
 Report No: W21-1400
 Page: 4 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
 (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
1	2	6	1	0.10
1	2	6	2	0.15
1	2	6	3	0.20
1	2	6	4	0.25
2	4	12	6	0.30
3	6	18	9	0.35
3	6	18	12	0.40
4	8	24	16	0.45
5	10	30	21	0.50
6	12	36	27	0.55
8	16	48	35	0.60
9	18	54	44	0.65
10	20	60	54	0.70
10	20	60	64	0.75
9	18	54	73	0.80
10	20	60	83	0.85
8	16	48	91	0.90
9	18	54	100	0.95
7	14	42	107	1.00
7	14	42	114	1.05
7	14	42	121	1.10
6	12	36	127	1.15
6	12	36	133	1.20
6	12	36	139	1.25



Recorded By: A.B
 Date: 30/11/2021
 Checked by: A.M
 Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test



S. Kokich
 Approved Signatory

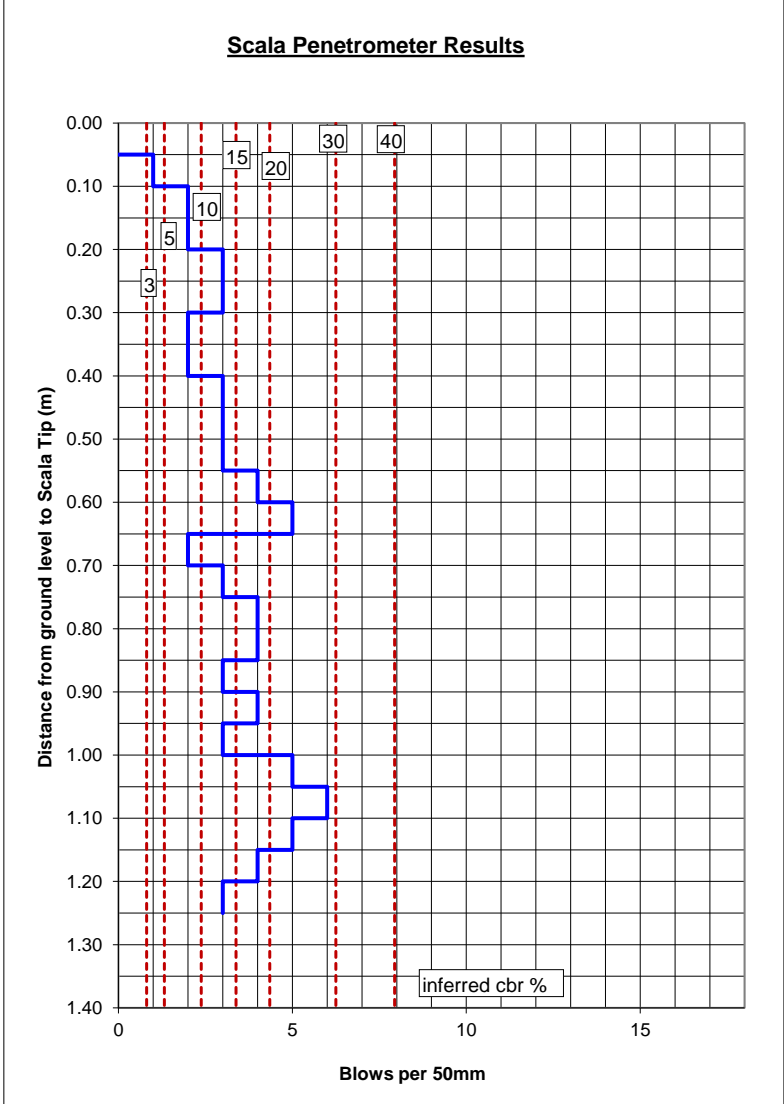
DYNAMIC CONE (SCALA) PENETROMETER
 NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05

Scala No: SCB 7
Ref : -
Report No: W21-1400
Page: 5 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
 (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
1	2	6	1	0.10
2	4	12	3	0.15
2	4	12	5	0.20
3	6	18	8	0.25
3	6	18	11	0.30
2	4	12	13	0.35
2	4	12	15	0.40
3	6	18	18	0.45
3	6	18	21	0.50
3	6	18	24	0.55
4	8	24	28	0.60
5	10	30	33	0.65
2	4	12	35	0.70
3	6	18	38	0.75
4	8	24	42	0.80
4	8	24	46	0.85
3	6	18	49	0.90
4	8	24	53	0.95
3	6	18	56	1.00
5	10	30	61	1.05
6	12	36	67	1.10
5	10	30	72	1.15
4	8	24	76	1.20
3	6	18	79	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test


 S. Kokich
 Approved Signatory

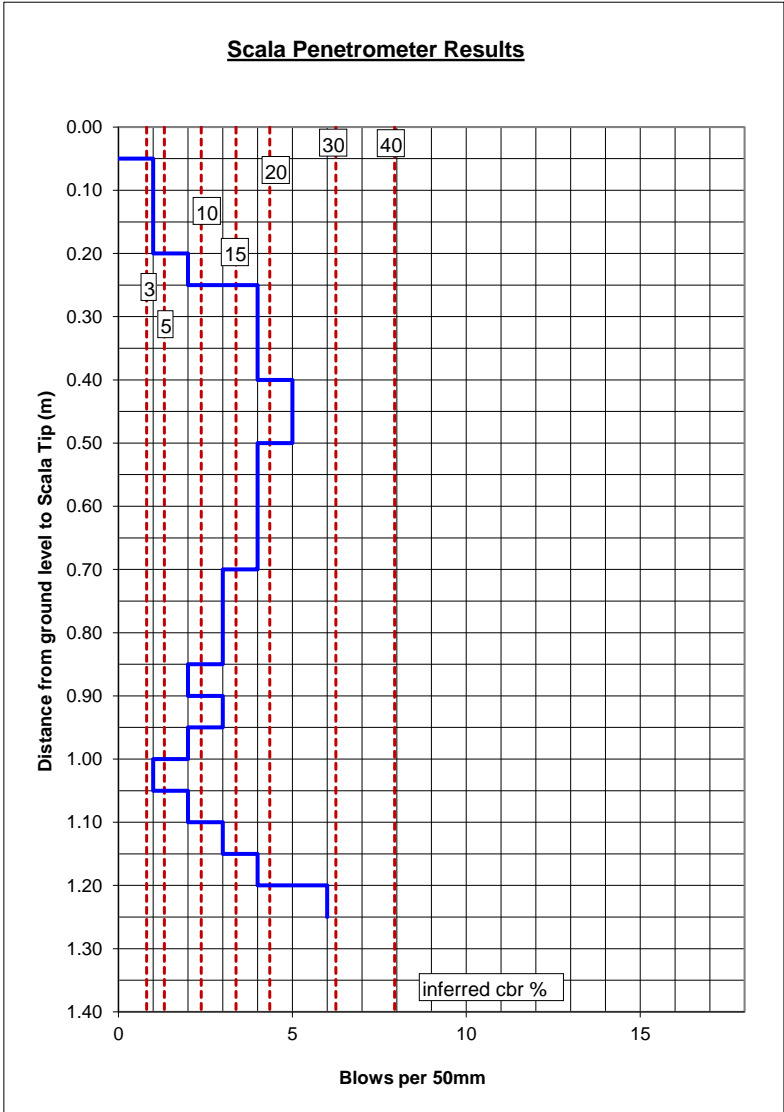
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05

Scala No: SCB 10
Ref : -
Report No: W21-1400
Page: 8 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
1	2	6	1	0.10
1	2	6	2	0.15
1	2	6	3	0.20
2	4	12	5	0.25
4	8	24	9	0.30
4	8	24	13	0.35
4	8	24	17	0.40
5	10	30	22	0.45
5	10	30	27	0.50
4	8	24	31	0.55
4	8	24	35	0.60
4	8	24	39	0.65
4	8	24	43	0.70
3	6	18	46	0.75
3	6	18	49	0.80
3	6	18	52	0.85
2	4	12	54	0.90
3	6	18	57	0.95
2	4	12	59	1.00
1	2	6	60	1.05
2	4	12	62	1.10
3	6	18	65	1.15
4	8	24	69	1.20
6	12	36	75	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

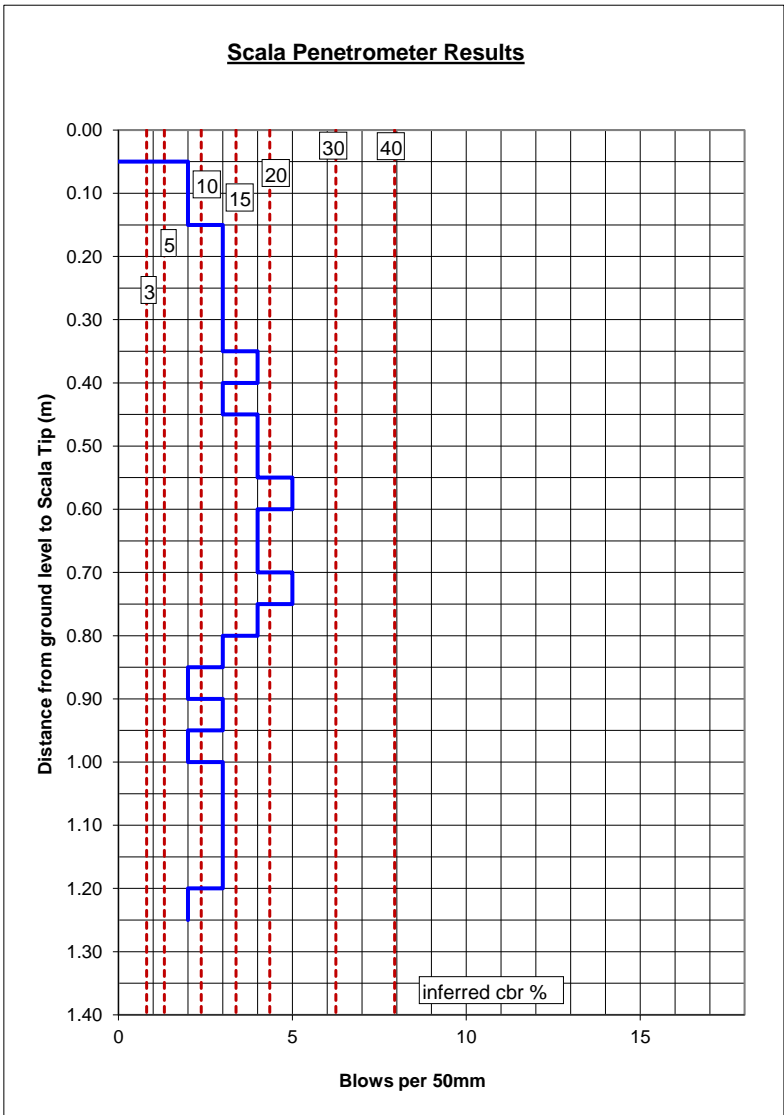
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05
LWD (MPa): 58

Scala No: SCB 12
Ref : -
Report No: W21-1400
Page: 10 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
2	4	12	4	0.15
3	6	18	7	0.20
3	6	18	10	0.25
3	6	18	13	0.30
3	6	18	16	0.35
4	8	24	20	0.40
3	6	18	23	0.45
4	8	24	27	0.50
4	8	24	31	0.55
5	10	30	36	0.60
4	8	24	40	0.65
4	8	24	44	0.70
5	10	30	49	0.75
4	8	24	53	0.80
3	6	18	56	0.85
2	4	12	58	0.90
3	6	18	61	0.95
2	4	12	63	1.00
3	6	18	66	1.05
3	6	18	69	1.10
3	6	18	72	1.15
3	6	18	75	1.20
2	4	12	77	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

S. Kokich
S. Kokich
Approved Signatory

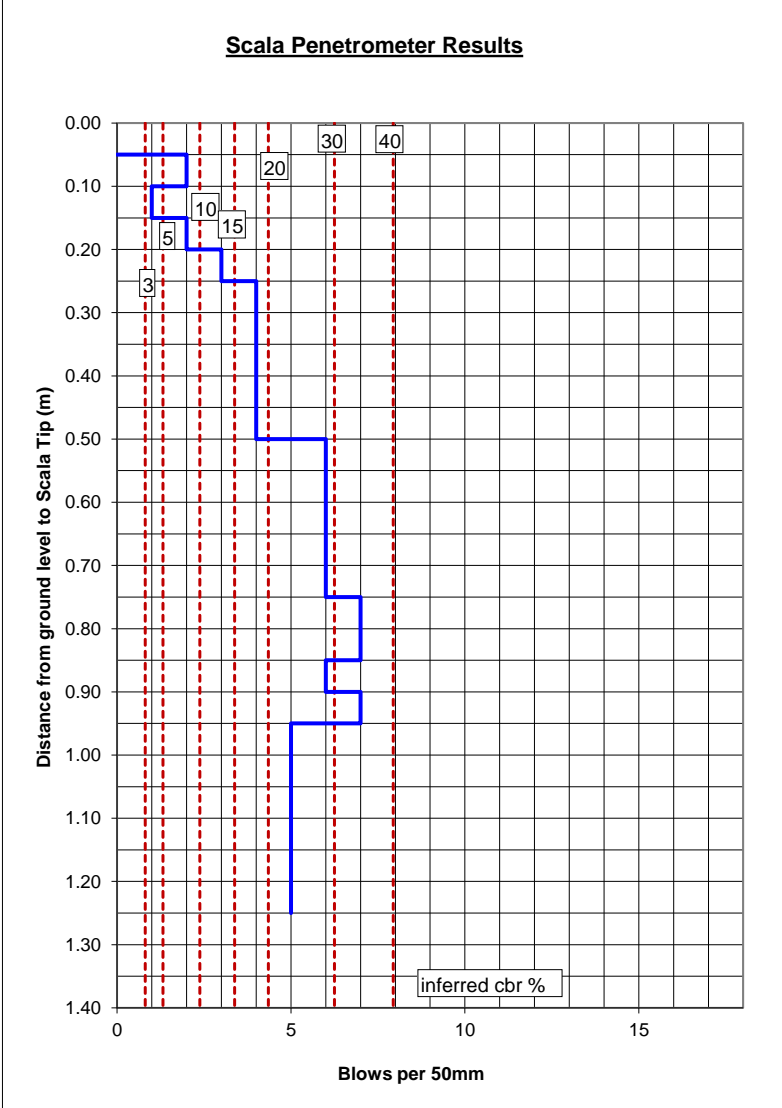
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05
LWD (MPa): 25.6

Scala No: SCB 22
Ref : -
Report No: W21-1400
Page: 19 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
3	6	18	8	0.25
4	8	24	12	0.30
4	8	24	16	0.35
4	8	24	20	0.40
4	8	24	24	0.45
4	8	24	28	0.50
6	12	36	34	0.55
6	12	36	40	0.60
6	12	36	46	0.65
6	12	36	52	0.70
6	12	36	58	0.75
7	14	42	65	0.80
7	14	42	72	0.85
6	12	36	78	0.90
7	14	42	85	0.95
5	10	30	90	1.00
5	10	30	95	1.05
5	10	30	100	1.10
5	10	30	105	1.15
5	10	30	110	1.20
5	10	30	115	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 17/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test



S. Kokich
Approved Signatory

DYNAMIC CONE (SCALA) PENETROMETER

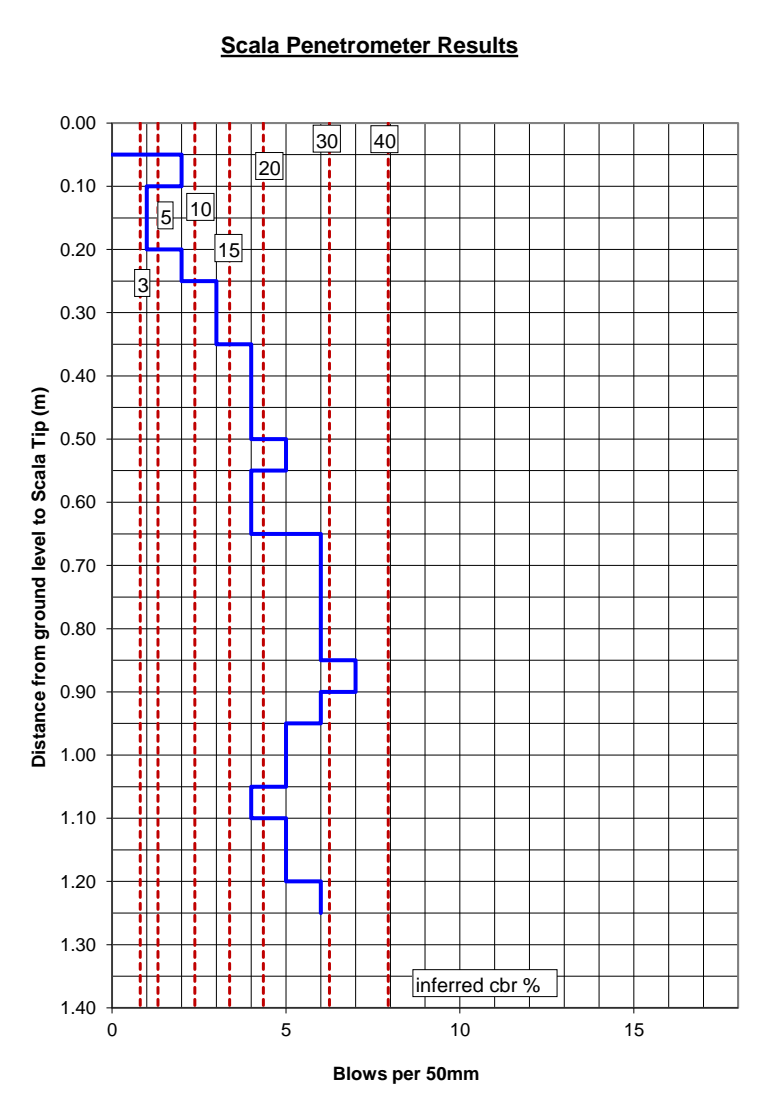
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05
LWD (MPa): 12.6

Scala No: SCB 24
Ref : -
Report No: W21-1400
Page: 21 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
1	2	6	3	0.15
1	2	6	4	0.20
2	4	12	6	0.25
3	6	18	9	0.30
3	6	18	12	0.35
4	8	24	16	0.40
4	8	24	20	0.45
4	8	24	24	0.50
5	10	30	29	0.55
4	8	24	33	0.60
4	8	24	37	0.65
6	12	36	43	0.70
6	12	36	49	0.75
6	12	36	55	0.80
6	12	36	61	0.85
7	14	42	68	0.90
6	12	36	74	0.95
5	10	30	79	1.00
5	10	30	84	1.05
4	8	24	88	1.10
5	10	30	93	1.15
5	10	30	98	1.20
6	12	36	104	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 17/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

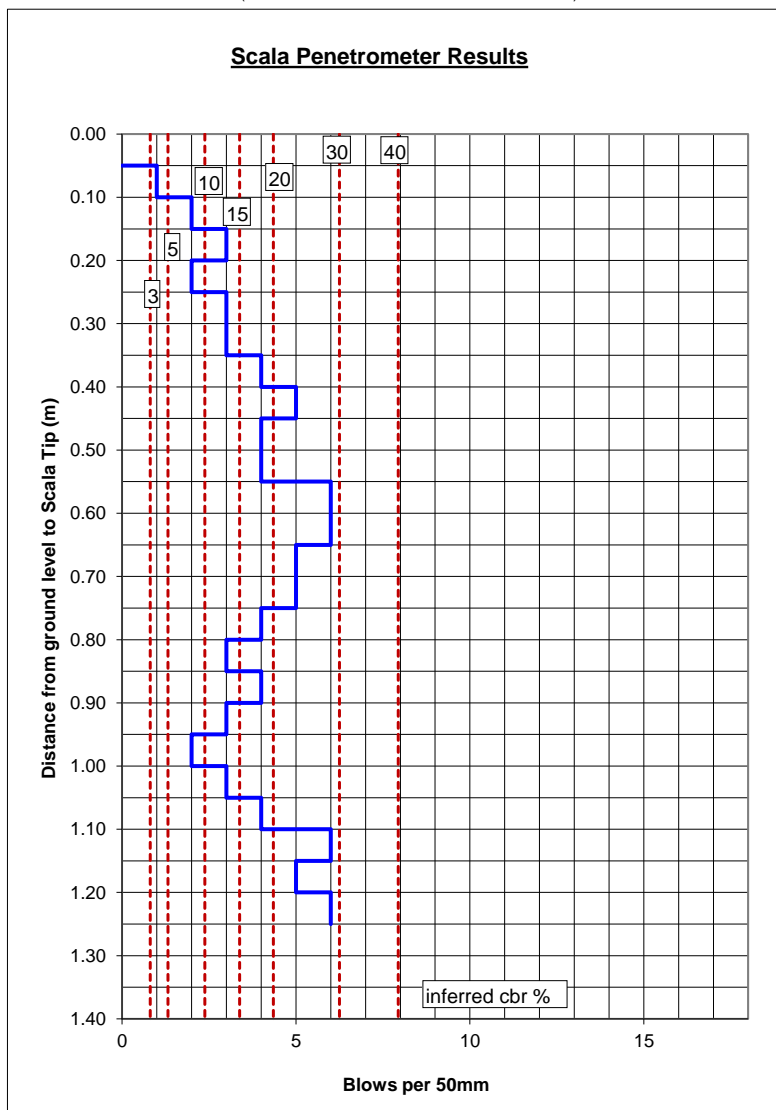
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05
LWD (MPa): 33.8

Scala No: SCB 25
Ref : -
Report No: W21-1400
Page: 22 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements" (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
1	2	6	1	0.10
2	4	12	3	0.15
3	6	18	6	0.20
2	4	12	8	0.25
3	6	18	11	0.30
3	6	18	14	0.35
4	8	24	18	0.40
5	10	30	23	0.45
4	8	24	27	0.50
4	8	24	31	0.55
6	12	36	37	0.60
6	12	36	43	0.65
5	10	30	48	0.70
5	10	30	53	0.75
4	8	24	57	0.80
3	6	18	60	0.85
4	8	24	64	0.90
3	6	18	67	0.95
2	4	12	69	1.00
3	6	18	72	1.05
4	8	24	76	1.10
6	12	36	82	1.15
5	10	30	87	1.20
6	12	36	93	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 17/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

[Signature]
S. Kokich
Approved Signatory

DYNAMIC CONE (SCALA) PENETROMETER

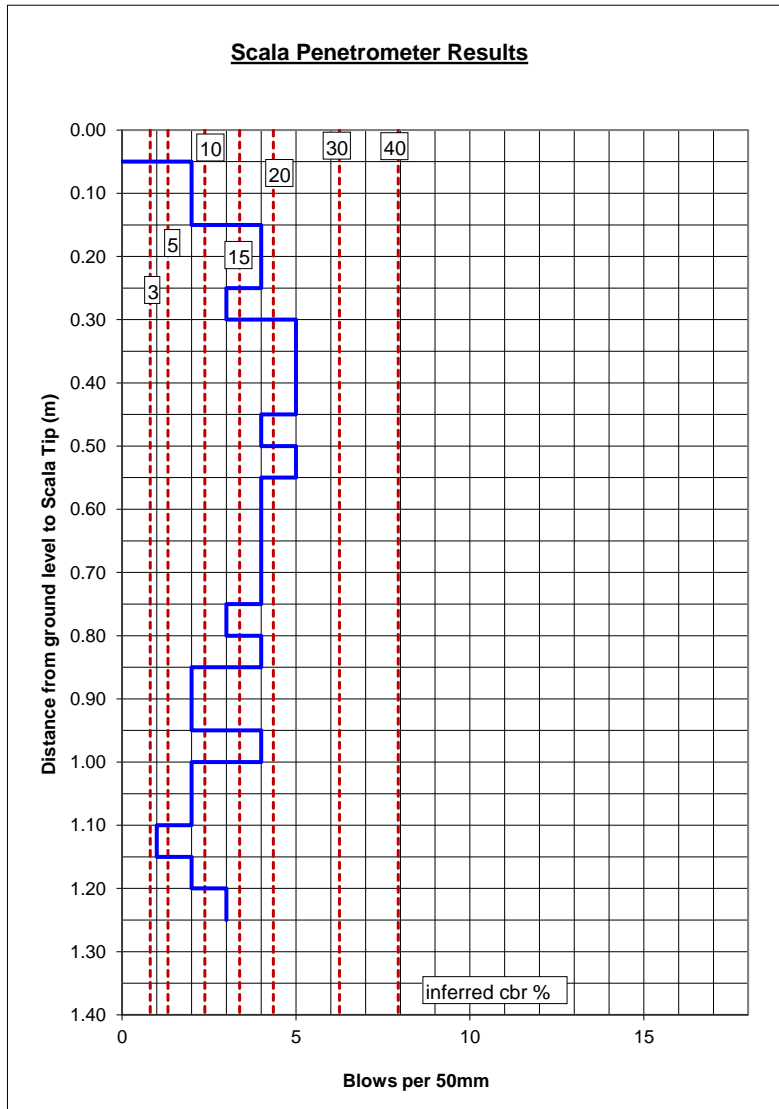
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05
LWD (MPa): 24.5

Scala No: SCB 26
Ref : -
Report No: W21-1400
Page: 23 of 31

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
 (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
2	4	12	4	0.15
4	8	24	8	0.20
4	8	24	12	0.25
3	6	18	15	0.30
5	10	30	20	0.35
5	10	30	25	0.40
5	10	30	30	0.45
4	8	24	34	0.50
5	10	30	39	0.55
4	8	24	43	0.60
4	8	24	47	0.65
4	8	24	51	0.70
4	8	24	55	0.75
3	6	18	58	0.80
4	8	24	62	0.85
2	4	12	64	0.90
2	4	12	66	0.95
4	8	24	70	1.00
2	4	12	72	1.05
2	4	12	74	1.10
1	2	6	75	1.15
2	4	12	77	1.20
3	6	18	80	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 17/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

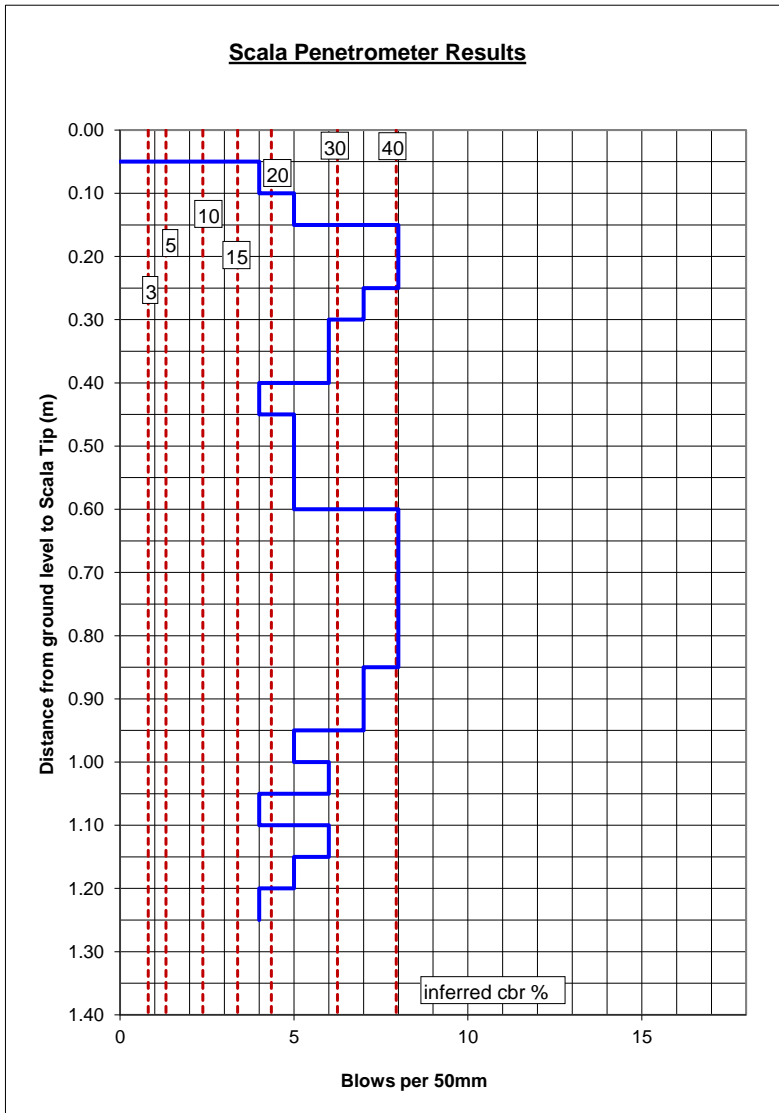
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 6-7
Start Depth (m): 0.05

Scala No: SCB 34
Ref : -
Report No: W21-1400
Page: 31 of 31

LWD (MPa): 64.5

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
4	8	24	4	0.10
5	10	30	9	0.15
8	16	48	17	0.20
8	16	48	25	0.25
7	14	42	32	0.30
6	12	36	38	0.35
6	12	36	44	0.40
4	8	24	48	0.45
5	10	30	53	0.50
5	10	30	58	0.55
5	10	30	63	0.60
8	16	48	71	0.65
8	16	48	79	0.70
8	16	48	87	0.75
8	16	48	95	0.80
8	16	48	103	0.85
7	14	42	110	0.90
7	14	42	117	0.95
5	10	30	122	1.00
6	12	36	128	1.05
4	8	24	132	1.10
6	12	36	138	1.15
5	10	30	143	1.20
4	8	24	147	1.25



Recorded By: A.B
Date: 30/11/2021
Checked by: A.M
Date: 17/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test



S. Kokich
Approved Signatory

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727
Client: CCL
Job: The Landing Stage 6 - 7
Location: Ruakaka
Report No: **Preliminary**
Ref:

Tested By: J.H
Date: 1/12/2021
Checked By: A.M
Date: 12/01/2022
Page: 2 of 15

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
1/12/2021	SCB1	76.3	Retest	300
1/12/2021	SCB2	76.8	Retest	275
1/12/2021	SCB6	73.5	Retest	250
1/12/2021	SCB7	84.6	Retest	300
1/12/2021	SCB8	81.5	Retest	200
1/12/2021	SCB9	40	Retest	200
1/12/2021	SCB10	76.5	Retest	200
1/12/2021	SCB13	60.5	Retest	300
1/12/2021	SCB14	65.2	Retest	300
1/12/2021	SCB27	75.5	Retest	250
1/12/2021	SCB28	95.3	Retest	250
1/12/2021	SCB29	69.9	Retest	250
1/12/2021	SCB30	84.6	Retest	250
1/12/2021	SCB31	85.2	Retest	300

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727	Tested By: A.B
Client: CCL	Date: 14/01/2022
Job: The Landing Stage 6 - 7	Checked By: A.M
Location: Ruakaka	Date: 27/01/2022
Report No: Preliminary	Page: 2 of 17
Ref: -	

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
14/01/2022	SCB17	108.7	Retest	300
14/01/2022	SCB18	51.6	Retest	300

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727	Tested By: D.O
Client: CCL	Date: 21/01/2022
Job: The Landing Stage 6 - 7	Checked By: A.B
Location: Ruakaka	Date: 9/02/2022
Report No: Preliminary	Page: 2 of 2
Ref: -	

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
21/01/2022	SCB22	126.4	Retest	300
21/01/2022	SCB23	86.2	Retest	300
21/01/2022	SCB24	85.9	Retest	300
21/01/2022	SCB25	89.3	Retest	300
21/01/2022	SCB26	82.4	Retest	300
21/01/2022	SCB21	115.4	Retest	300

TEST REPORT

Lab Job No: 8020-1727

Your ref.: -

Date of Issue: 11/01/2022

Date of Re-Issue: -

Page: 1 of 5

Test Report No. W21-1399

PROJECT: The Landing Stage 4/5 Scala Retest Testing 13/10/21

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Bernard Devine

TEST METHODS: Determination of the penetration resistance using a dynamic cone (scala) Penetrometer
NZS 4402: 1988 Test 6.5.2

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

Alex Millar

A. Millar

Administrator

S. Kokich

S. Kokich

Approved Signatory



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

-CPT - Aggregates Testing - Soil Testing -

This report shall not be reproduced except in full, without written approval of the laboratory

DYNAMIC CONE (SCALA) PENETROMETER

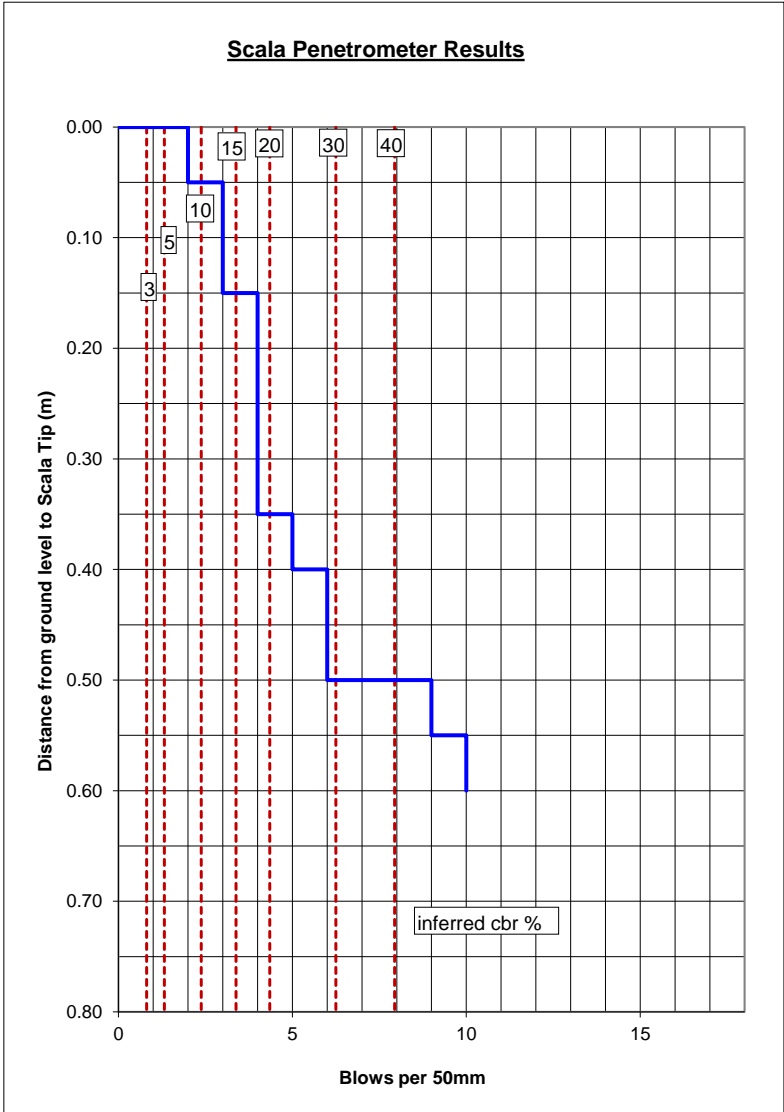
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
 Client: CCL
 Job: The Landing Stage 4/5
 Location: Road 10 retest
 Start Depth (m): 0
 CH540

Scala No: SP1
 Ref : -
 Report No: W21-1399
 Page: 2 of 5

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
 (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
2	4	12	2	0.05
3	6	18	5	0.10
3	6	18	8	0.15
4	8	24	12	0.20
4	8	24	16	0.25
4	8	24	20	0.30
4	8	24	24	0.35
5	10	30	29	0.40
6	12	36	35	0.45
6	12	36	41	0.50
9	18	54	50	0.55
10	20	60	60	0.60



Recorded By: J.A
 Date: 13/10/2021
 Checked by: A.M
 Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

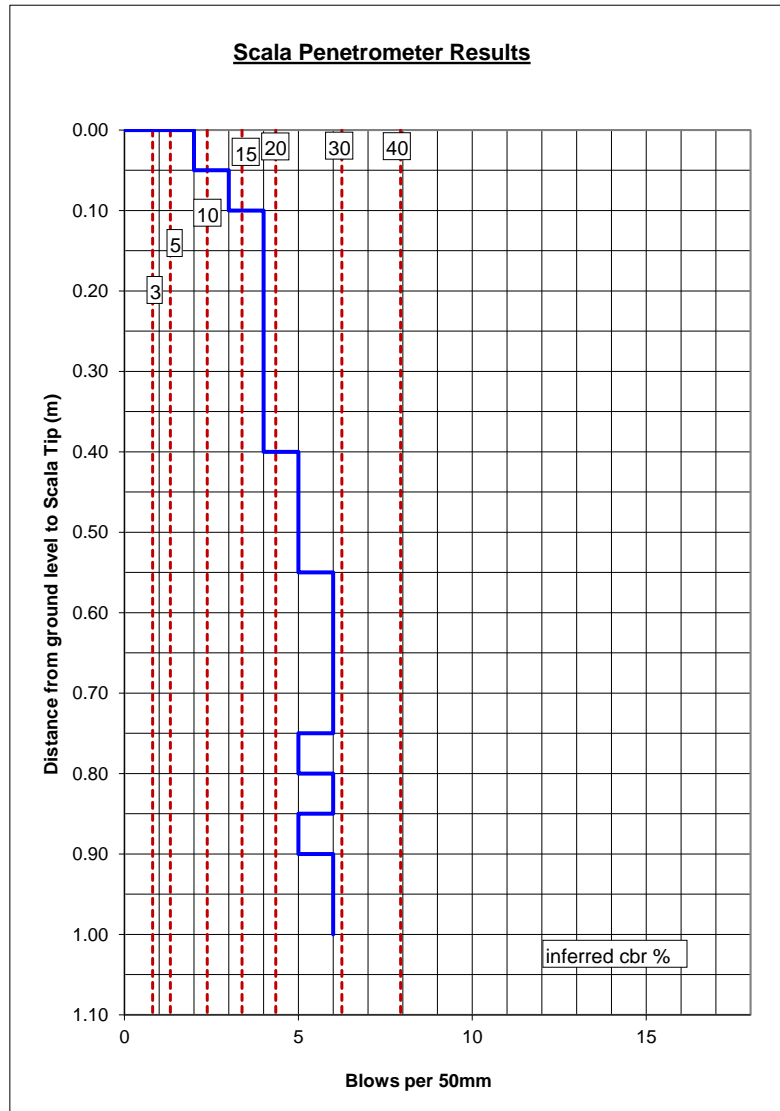
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing Stage 4/5
Location: Road 7
Start Depth (m): 0
CH20

Scala No: SP3
Ref : -
Report No: W21-1399
Page: 4 of 5

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
2	4	12	2	0.05
3	6	18	5	0.10
4	8	24	9	0.15
4	8	24	13	0.20
4	8	24	17	0.25
4	8	24	21	0.30
4	8	24	25	0.35
4	8	24	29	0.40
5	10	30	34	0.45
5	10	30	39	0.50
5	10	30	44	0.55
6	12	36	50	0.60
6	12	36	56	0.65
6	12	36	62	0.70
6	12	36	68	0.75
5	10	30	73	0.80
6	12	36	79	0.85
5	10	30	84	0.90
6	12	36	90	0.95
6	12	36	96	1.00



Recorded By: J.A
Date: 13/10/2021
Checked by: A.M
Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

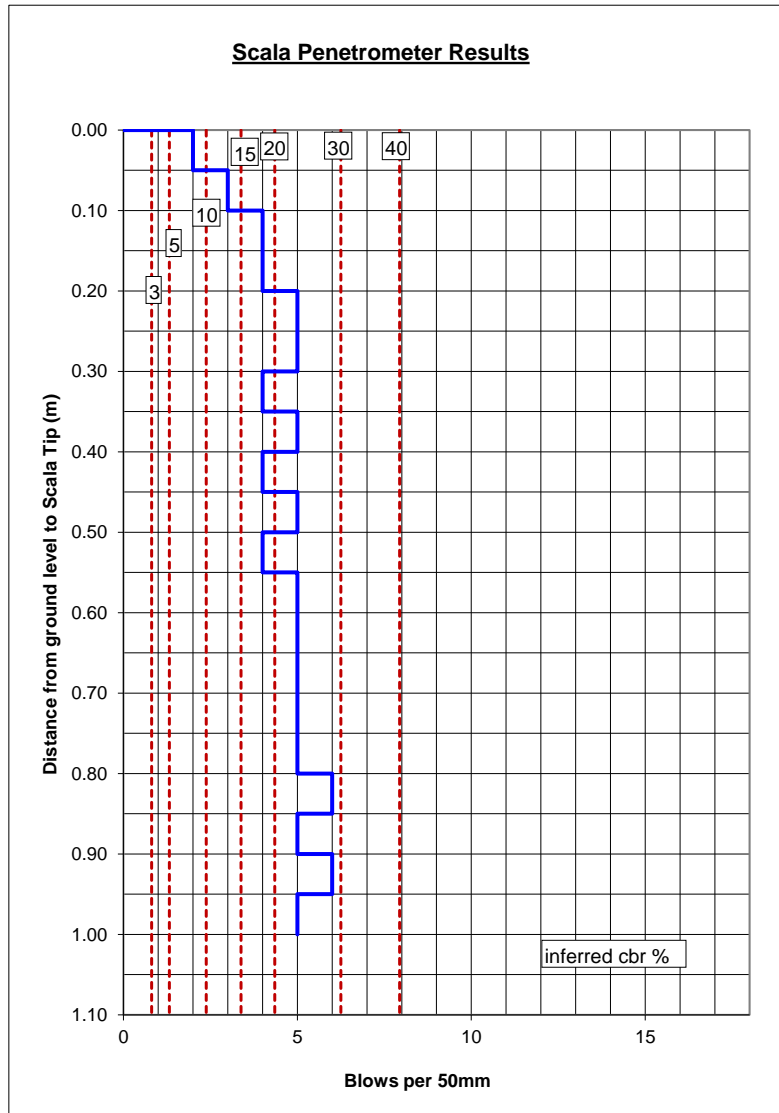
DYNAMIC CONE (SCALA) PENETROMETER
 NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing Stage 4/5
Location: Road 7
Start Depth (m): 0
 CH60

Scala No: SP4
Ref : -
Report No: W21-1399
Page: 5 of 5

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
 (This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
2	4	12	2	0.05
3	6	18	5	0.10
4	8	24	9	0.15
4	8	24	13	0.20
5	10	30	18	0.25
5	10	30	23	0.30
4	8	24	27	0.35
5	10	30	32	0.40
4	8	24	36	0.45
5	10	30	41	0.50
4	8	24	45	0.55
5	10	30	50	0.60
5	10	30	55	0.65
5	10	30	60	0.70
5	10	30	65	0.75
5	10	30	70	0.80
6	12	36	76	0.85
5	10	30	81	0.90
6	12	36	87	0.95
5	10	30	92	1.00



Recorded By: J.A
Date: 13/10/2021
Checked by: A.M
Date: 16/12/2021

Note: All readings taken below 1.5m from start depth are outside the scope of this test

TEST REPORT

Lab Job No: 8020-1727
Your ref.: 16103
Date of Issue: 14/02/2022
Date of Re-Issue: -
Page: 1 of 15

Test Report No.
WRE8020-1727-R003

PROJECT: The Landing - Stage 7a Scala and LWD Testing 1/12/2021

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Light Weight Deflectometer (LWD) (Not accredited)
ASTM E2835-11 (Not accredited)
Determination of the penetration resistance using a dynamic cone (scala) Penetrometer
NZS 4402: 1988 Test 6.5.2

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets



A. Millar

Administrator



S. Kokich

Approved Signatory



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727
Client: CCL
Job: The Landing Stage 6 - 7
Location: Ruakaka
Report No: WRE8020-1727-R003
Ref: 16103

Tested By: J.H
Date: 1/12/2021
Checked By: A.M
Date: 12/01/2022
Page: 2 of 15

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
1/12/2021	SCB1	76.3	Retest	300
1/12/2021	SCB2	76.8	Retest	275
1/12/2021	SCB6	73.5	Retest	250
1/12/2021	SCB7	84.6	Retest	300
1/12/2021	SCB8	81.5	Retest	200
1/12/2021	SCB9	40.0	Retest	200
1/12/2021	SCB10	76.5	Retest	200
1/12/2021	SCB13	60.5	Retest	300
1/12/2021	SCB14	65.2	Retest	300
1/12/2021	SCB27	75.5	Retest	250
1/12/2021	SCB28	95.3	Retest	250
1/12/2021	SCB29	69.9	Retest	250
1/12/2021	SCB30	84.6	Retest	250
1/12/2021	SCB31	85.2	Retest	300

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

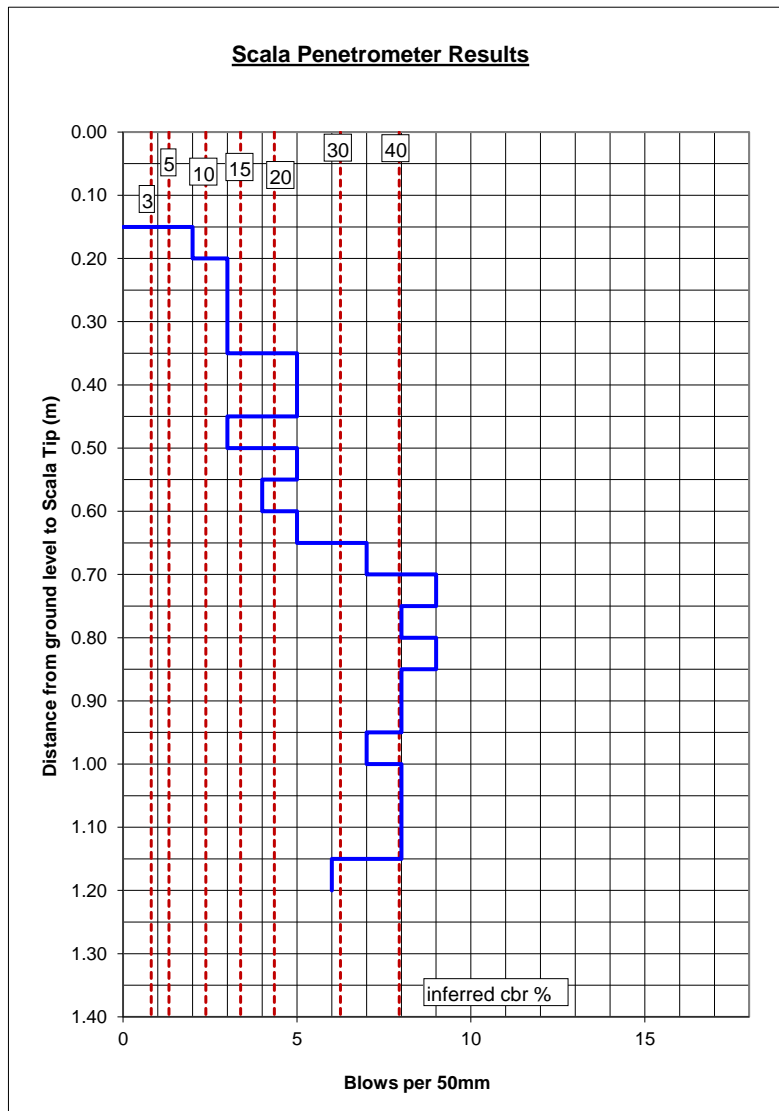
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.15

Scala No: SCB 3
Ref : 16103
Report No: WRE8020-1727-R003
Page: 3 of 15

LWD (MPa): 56.4

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.15
2	4	12	2	0.20
3	6	18	5	0.25
3	6	18	8	0.30
3	6	18	11	0.35
5	10	30	16	0.40
5	10	30	21	0.45
3	6	18	24	0.50
5	10	30	29	0.55
4	8	24	33	0.60
5	10	30	38	0.65
7	14	42	45	0.70
9	18	54	54	0.75
8	16	48	62	0.80
9	18	54	71	0.85
8	16	48	79	0.90
8	16	48	87	0.95
7	14	42	94	1.00
8	16	48	102	1.05
8	16	48	110	1.10
8	16	48	118	1.15
6	12	36	124	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

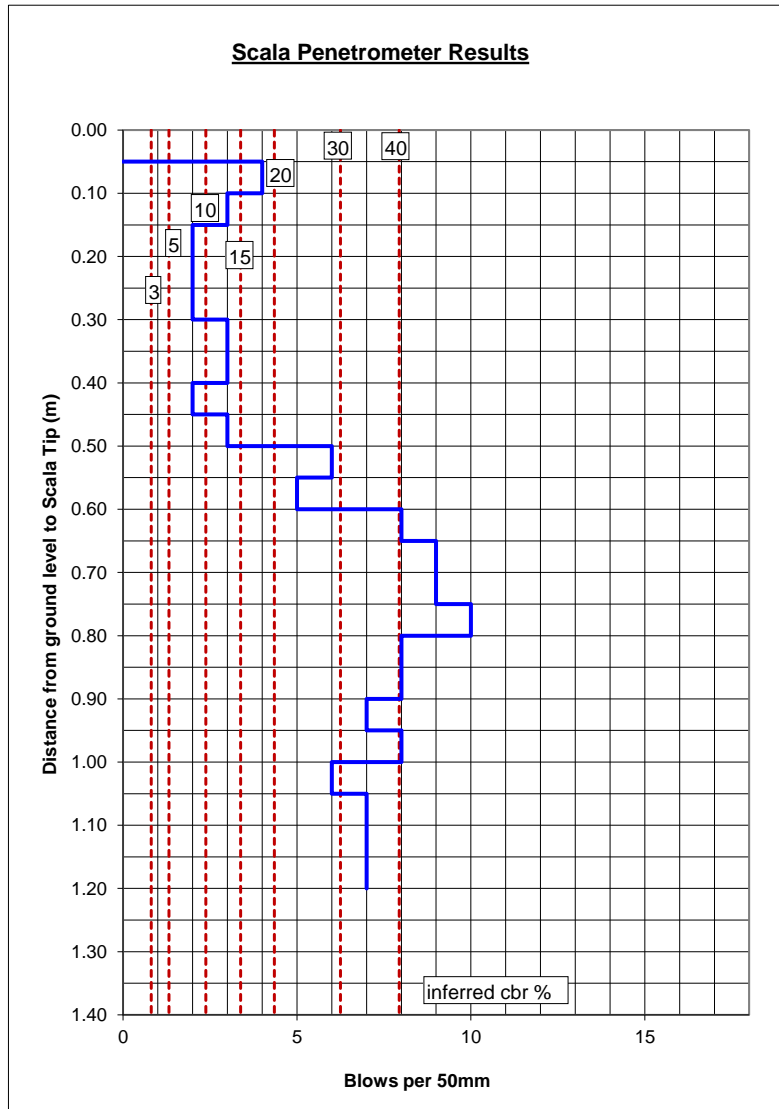
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.05

Scala No: SCB 4
Ref : 16103
Report No: WRE8020-1727-R003
Page: 4 of 15

LWD (MPa): 49.1

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
4	8	24	4	0.10
3	6	18	7	0.15
2	4	12	9	0.20
2	4	12	11	0.25
2	4	12	13	0.30
3	6	18	16	0.35
3	6	18	19	0.40
2	4	12	21	0.45
3	6	18	24	0.50
6	12	36	30	0.55
5	10	30	35	0.60
8	16	48	43	0.65
9	18	54	52	0.70
9	18	54	61	0.75
10	20	60	71	0.80
8	16	48	79	0.85
8	16	48	87	0.90
7	14	42	94	0.95
8	16	48	102	1.00
6	12	36	108	1.05
7	14	42	115	1.10
7	14	42	122	1.15
7	14	42	129	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

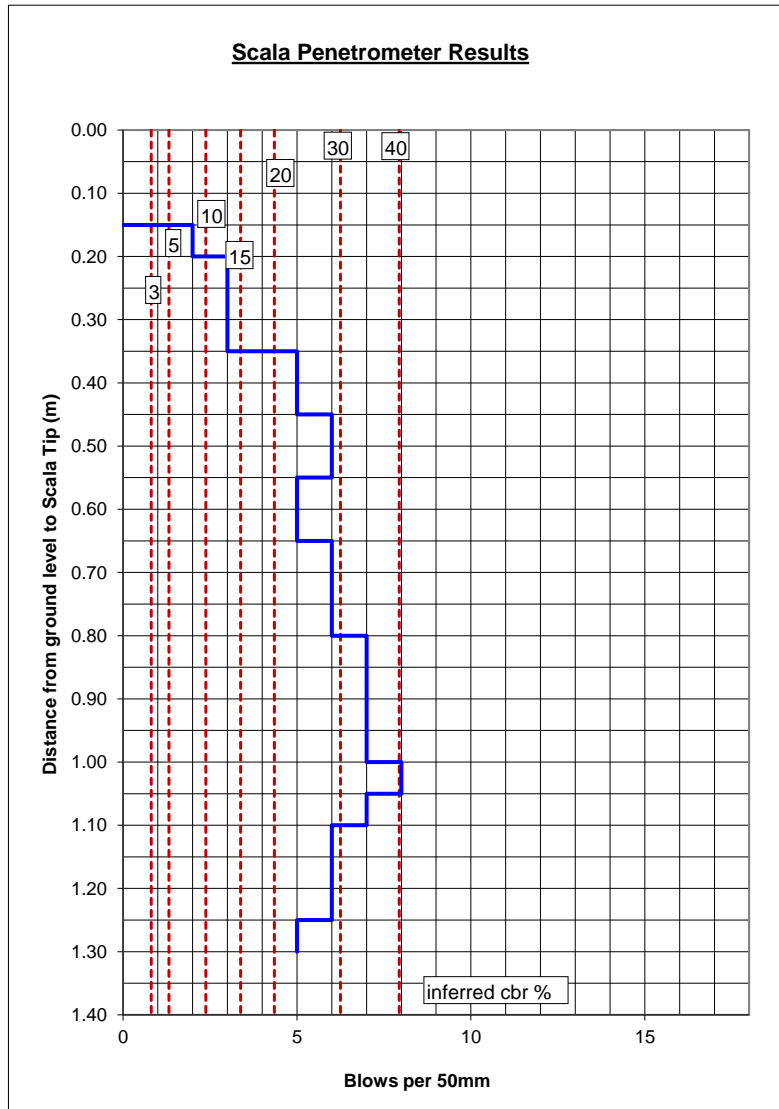
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.15
LWD (MPa): 55.7

Scala No: SCB 5
Ref : 16103
Report No: WRE8020-1727-R003
Page: 5 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.15
2	4	12	2	0.20
3	6	18	5	0.25
3	6	18	8	0.30
3	6	18	11	0.35
5	10	30	16	0.40
5	10	30	21	0.45
6	12	36	27	0.50
6	12	36	33	0.55
5	10	30	38	0.60
5	10	30	43	0.65
6	12	36	49	0.70
6	12	36	55	0.75
6	12	36	61	0.80
7	14	42	68	0.85
7	14	42	75	0.90
7	14	42	82	0.95
7	14	42	89	1.00
8	16	48	97	1.05
7	14	42	104	1.10
6	12	36	110	1.15
6	12	36	116	1.20
6	12	36	122	1.25
5	10	30	127	1.30



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

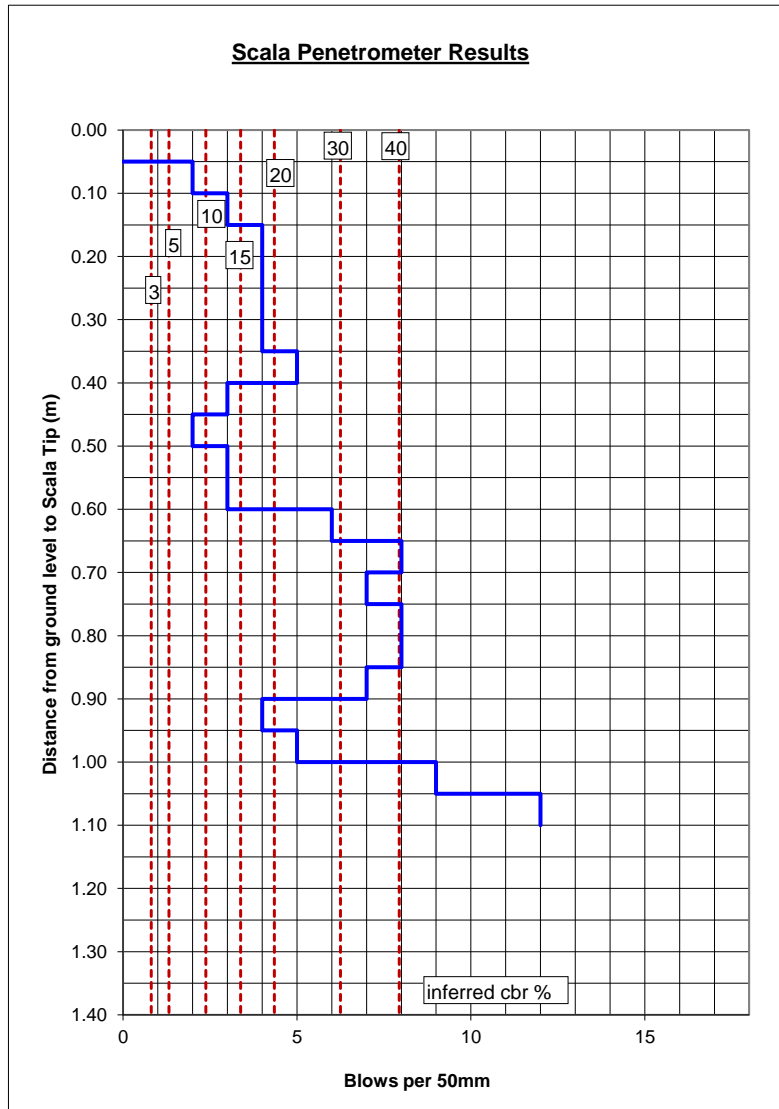
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.05
LWD (MPa): 49

Scala No: SCB 35
Ref : 16103
Report No: WRE8020-1727-R003
Page: 6 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
3	6	18	5	0.15
4	8	24	9	0.20
4	8	24	13	0.25
4	8	24	17	0.30
4	8	24	21	0.35
5	10	30	26	0.40
3	6	18	29	0.45
2	4	12	31	0.50
3	6	18	34	0.55
3	6	18	37	0.60
6	12	36	43	0.65
8	16	48	51	0.70
7	14	42	58	0.75
8	16	48	66	0.80
8	16	48	74	0.85
7	14	42	81	0.90
4	8	24	85	0.95
5	10	30	90	1.00
9	18	54	99	1.05
12	24	72	111	1.10



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

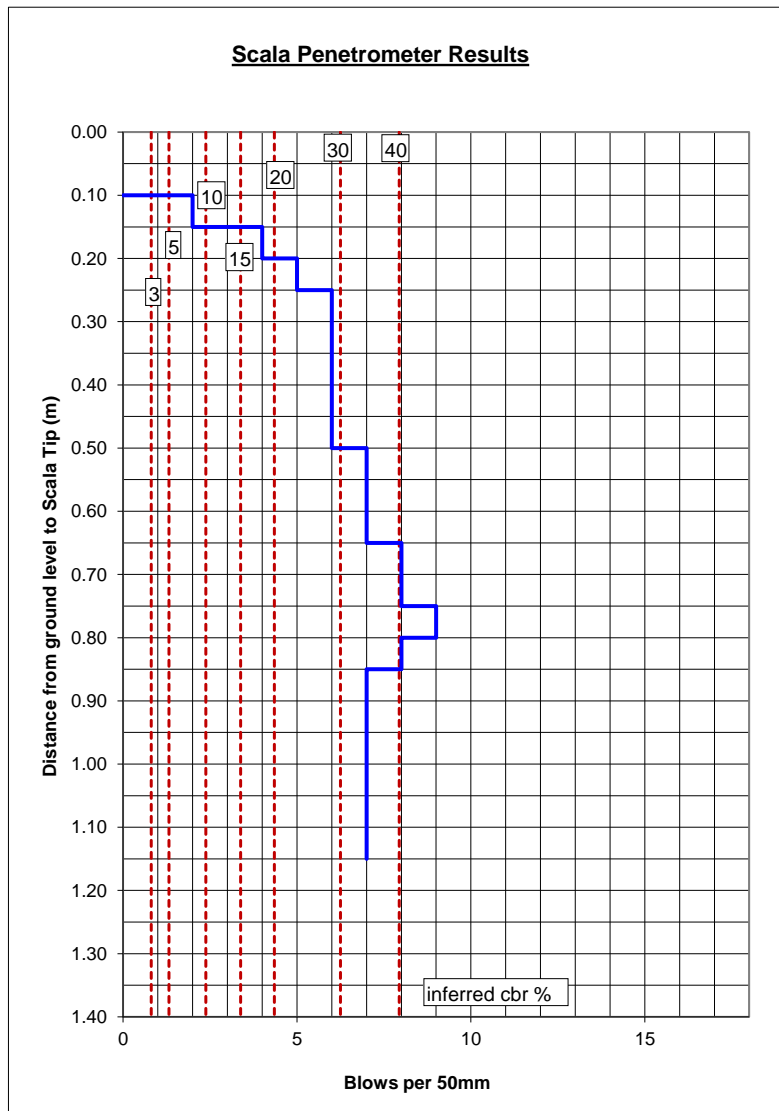
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.1

Scala No: SCB 36
Ref : 16103
Report No: WRE8020-1727-R003
Page: 7 of 15

LWD (MPa): 69.7

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.10
2	4	12	2	0.15
4	8	24	6	0.20
5	10	30	11	0.25
6	12	36	17	0.30
6	12	36	23	0.35
6	12	36	29	0.40
6	12	36	35	0.45
6	12	36	41	0.50
7	14	42	48	0.55
7	14	42	55	0.60
7	14	42	62	0.65
8	16	48	70	0.70
8	16	48	78	0.75
9	18	54	87	0.80
8	16	48	95	0.85
7	14	42	102	0.90
7	14	42	109	0.95
7	14	42	116	1.00
7	14	42	123	1.05
7	14	42	130	1.10
7	14	42	137	1.15



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

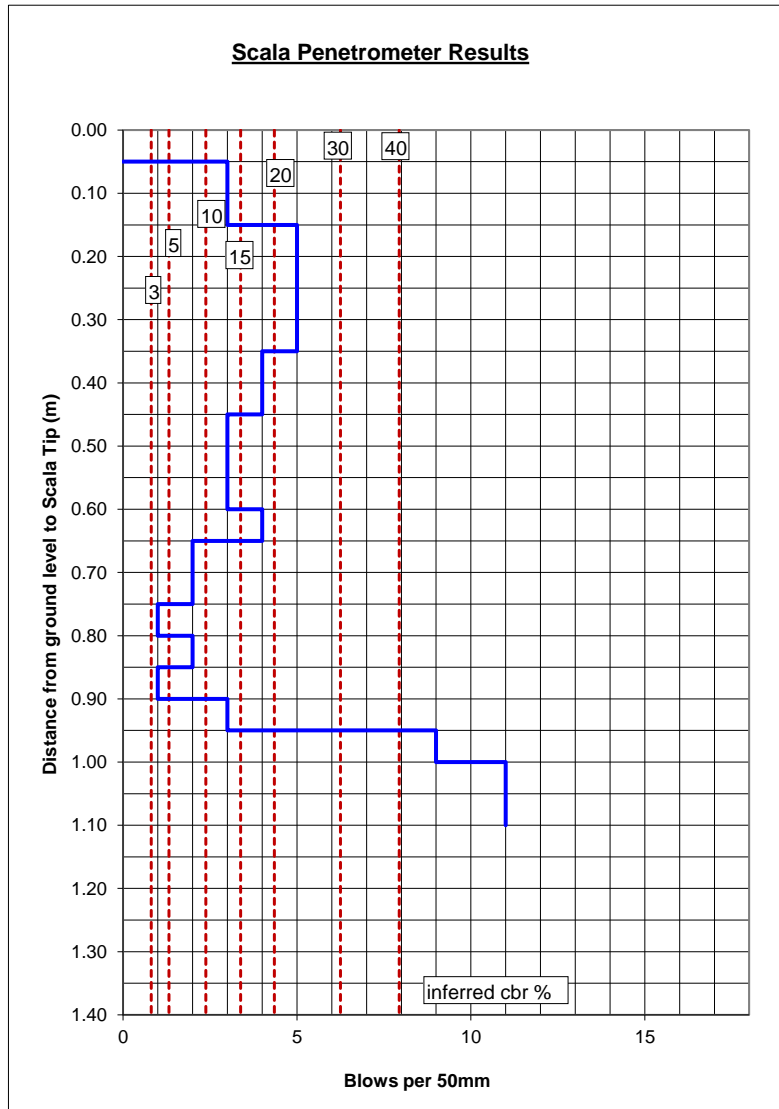
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.05
LWD (MPa): 58.1

Scala No: SCB 37
Ref : 16103
Report No: WRE8020-1727-R003
Page: 8 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
3	6	18	6	0.15
5	10	30	11	0.20
5	10	30	16	0.25
5	10	30	21	0.30
5	10	30	26	0.35
4	8	24	30	0.40
4	8	24	34	0.45
3	6	18	37	0.50
3	6	18	40	0.55
3	6	18	43	0.60
4	8	24	47	0.65
2	4	12	49	0.70
2	4	12	51	0.75
1	2	6	52	0.80
2	4	12	54	0.85
1	2	6	55	0.90
3	6	18	58	0.95
9	18	54	67	1.00
11	22	66	78	1.05
11	22	66	89	1.10



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

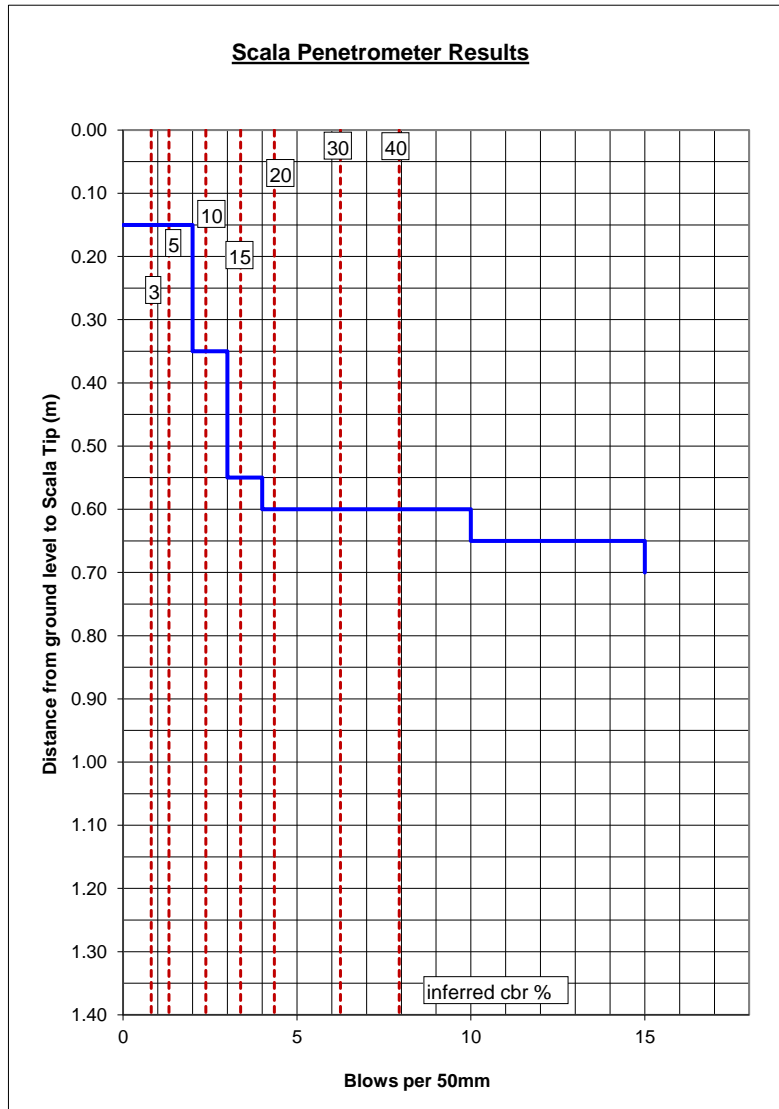
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.15
LWD (MPa): 32.7

Scala No: SCB 38
Ref : 16103
Report No: WRE8020-1727-R003
Page: 9 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.15
2	4	12	2	0.20
2	4	12	4	0.25
2	4	12	6	0.30
2	4	12	8	0.35
3	6	18	11	0.40
3	6	18	14	0.45
3	6	18	17	0.50
3	6	18	20	0.55
4	8	24	24	0.60
10	20	60	34	0.65
15	30	90	49	0.70



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

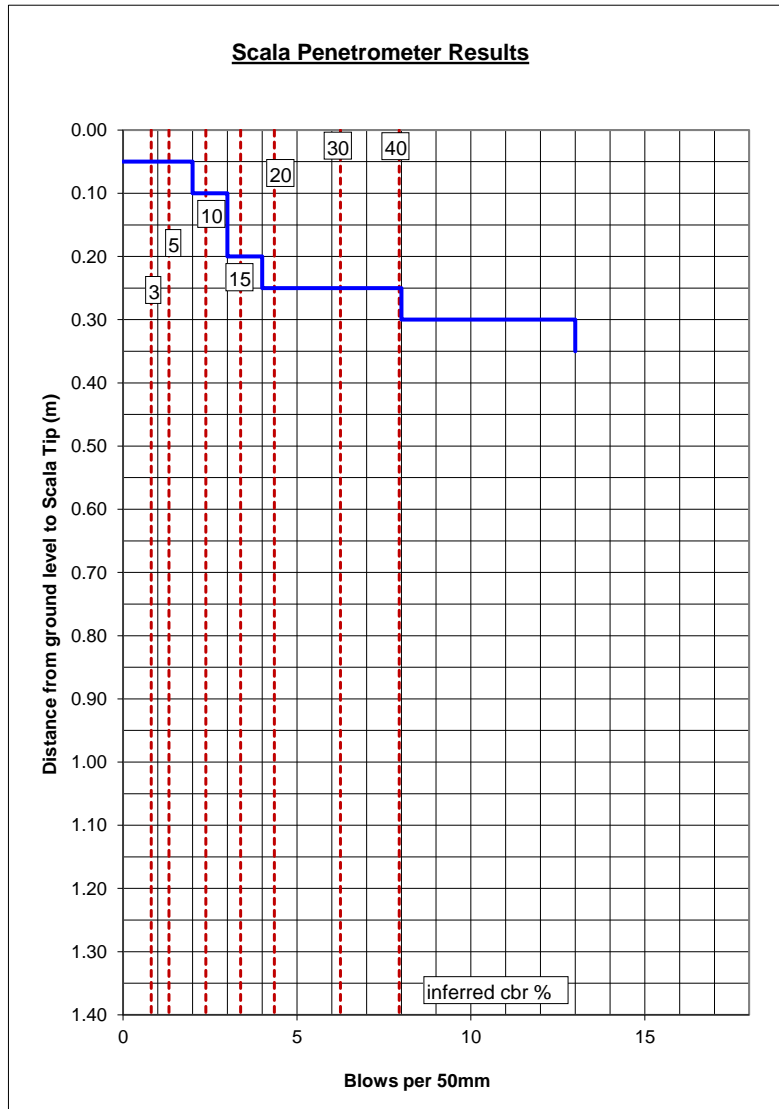
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.05
LWD (MPa): 55.7

Scala No: SCB 39
Ref : 16103
Report No: WRE8020-1727-R003
Page: 10 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
3	6	18	5	0.15
3	6	18	8	0.20
4	8	24	12	0.25
8	16	48	20	0.30
13	26	78	33	0.35



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

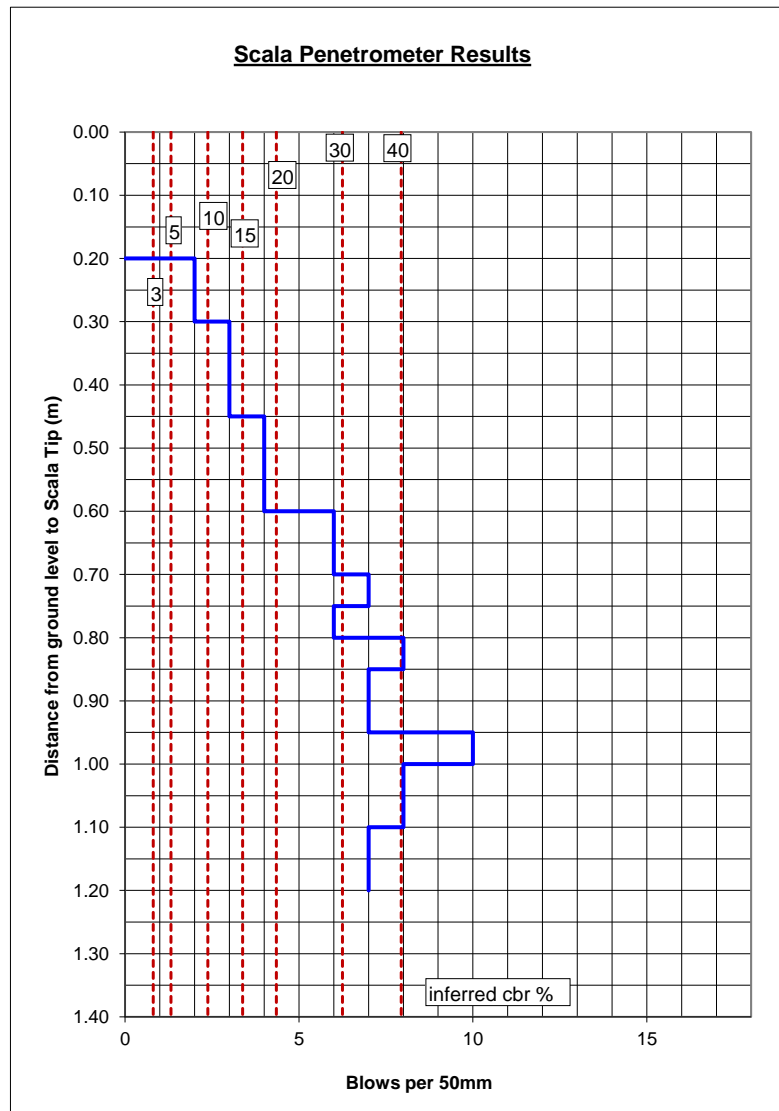
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.2
LWD (MPa): 83

Scala No: SCB 40
Ref : 16103
Report No: WRE8020-1727-R003
Page: 11 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.20
2	4	12	2	0.25
2	4	12	4	0.30
3	6	18	7	0.35
3	6	18	10	0.40
3	6	18	13	0.45
4	8	24	17	0.50
4	8	24	21	0.55
4	8	24	25	0.60
6	12	36	31	0.65
6	12	36	37	0.70
7	14	42	44	0.75
6	12	36	50	0.80
8	16	48	58	0.85
7	14	42	65	0.90
7	14	42	72	0.95
10	20	60	82	1.00
8	16	48	90	1.05
8	16	48	98	1.10
7	14	42	105	1.15
7	14	42	112	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

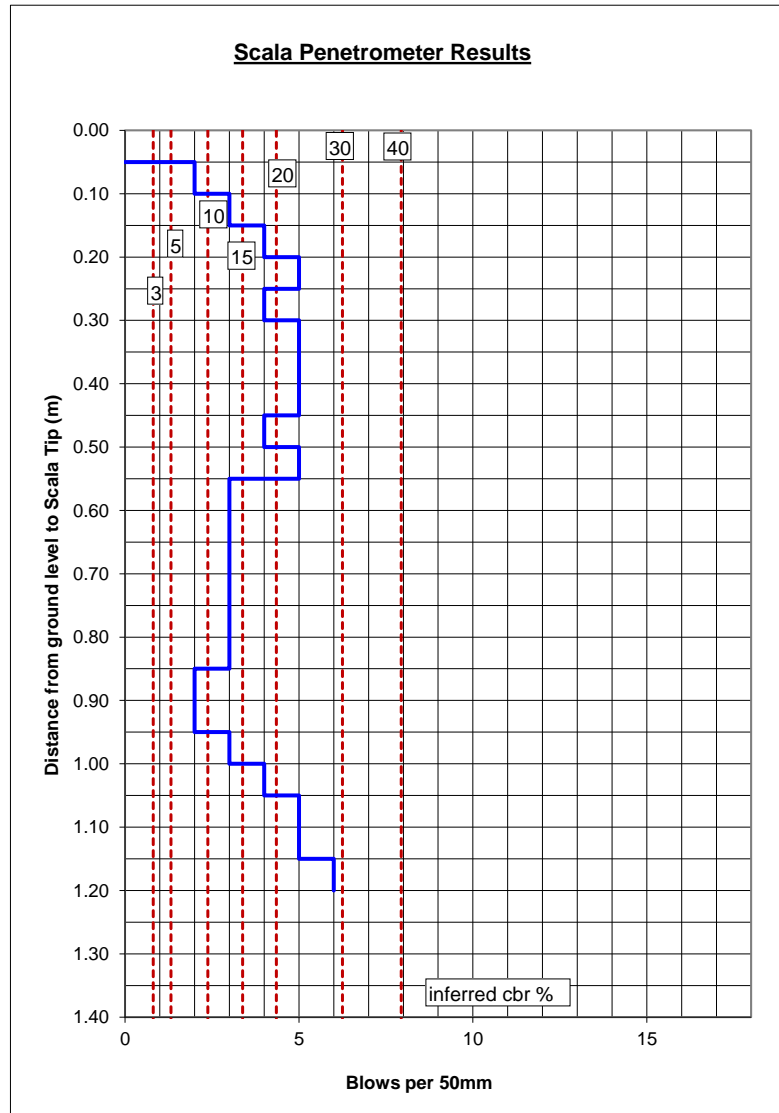
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.05

Scala No: SCB 41
Ref : 16103
Report No: WRE8020-1727-R003
Page: 12 of 15

LWD (MPa): 78.4

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
3	6	18	5	0.15
4	8	24	9	0.20
5	10	30	14	0.25
4	8	24	18	0.30
5	10	30	23	0.35
5	10	30	28	0.40
5	10	30	33	0.45
4	8	24	37	0.50
5	10	30	42	0.55
3	6	18	45	0.60
3	6	18	48	0.65
3	6	18	51	0.70
3	6	18	54	0.75
3	6	18	57	0.80
3	6	18	60	0.85
2	4	12	62	0.90
2	4	12	64	0.95
3	6	18	67	1.00
4	8	24	71	1.05
5	10	30	76	1.10
5	10	30	81	1.15
6	12	36	87	1.20
6	12	36	93	1.25



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

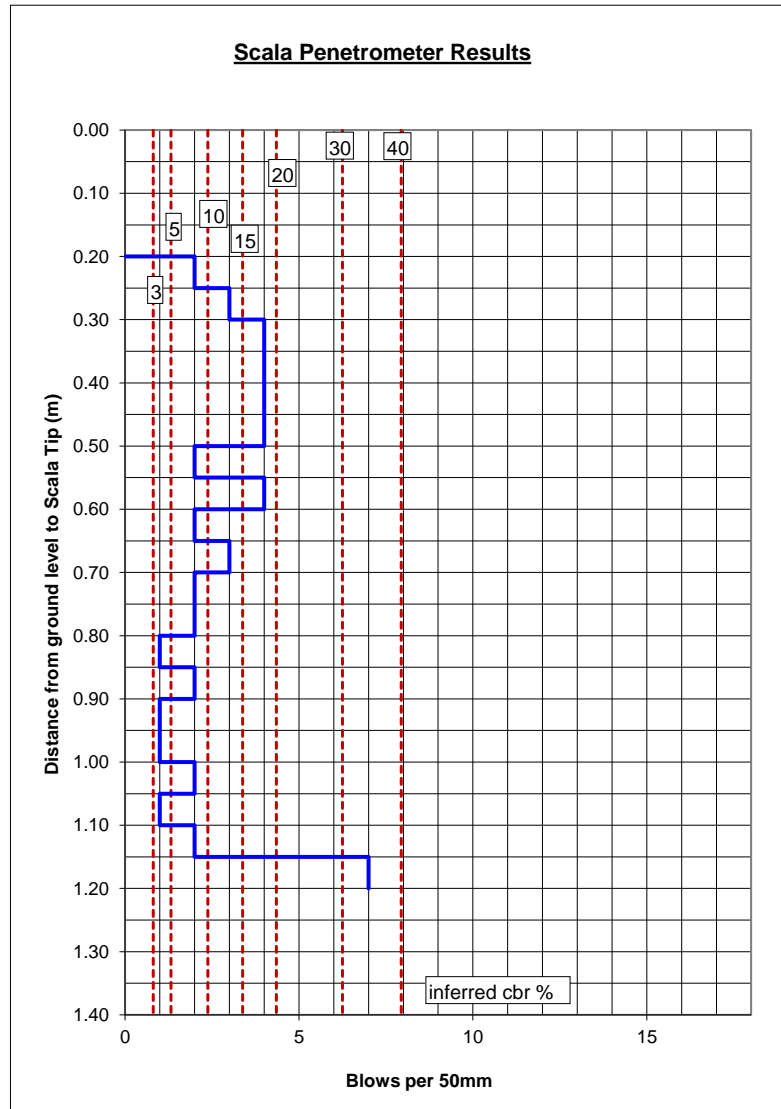
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.2
LWD (MPa): 53.3

Scala No: SCB 42
Ref : 16103
Report No: WRE8020-1727-R003
Page: 13 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.20
2	4	12	2	0.25
3	6	18	5	0.30
4	8	24	9	0.35
4	8	24	13	0.40
4	8	24	17	0.45
4	8	24	21	0.50
2	4	12	23	0.55
4	8	24	27	0.60
2	4	12	29	0.65
3	6	18	32	0.70
2	4	12	34	0.75
2	4	12	36	0.80
1	2	6	37	0.85
2	4	12	39	0.90
1	2	6	40	0.95
1	2	6	41	1.00
2	4	12	43	1.05
1	2	6	44	1.10
2	4	12	46	1.15
7	14	42	53	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

DYNAMIC CONE (SCALA) PENETROMETER

NZS 4402 :1988 Test 6.5.2 Procedure 2

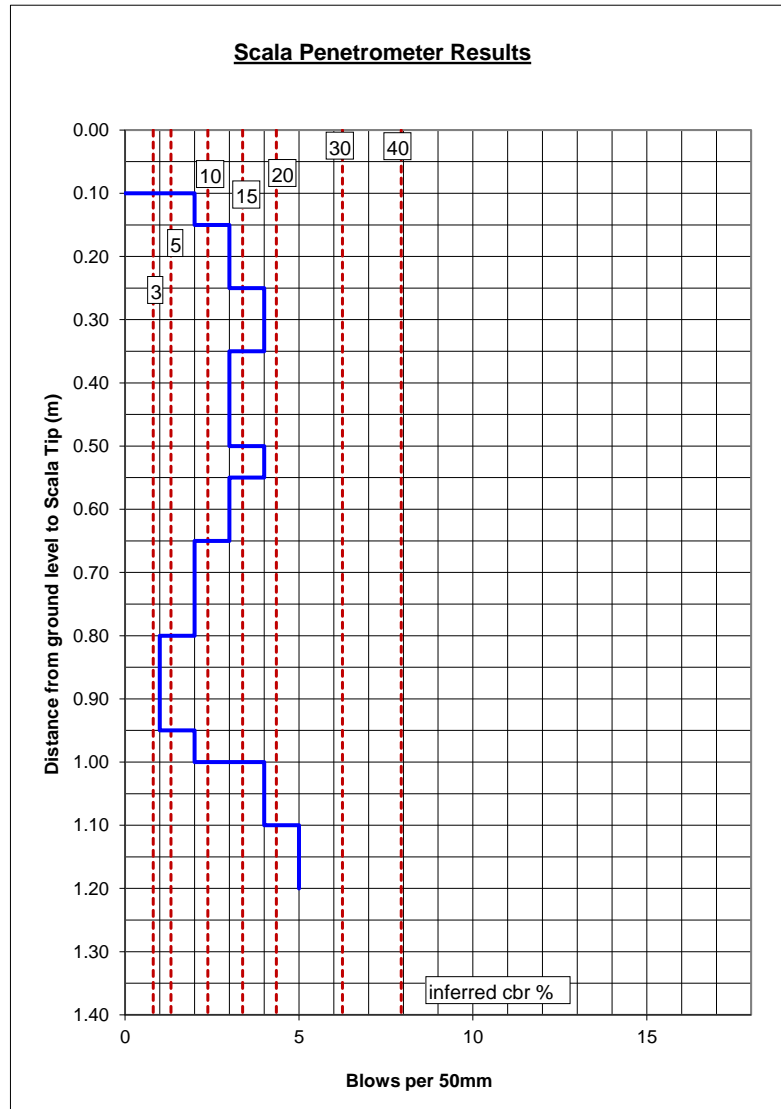
Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.1

Scala No: SCB 43
Ref : 16103
Report No: WRE8020-1727-R003
Page: 14 of 15

LWD (MPa): 52.9

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.10
2	4	12	2	0.15
3	6	18	5	0.20
3	6	18	8	0.25
4	8	24	12	0.30
4	8	24	16	0.35
3	6	18	19	0.40
3	6	18	22	0.45
3	6	18	25	0.50
4	8	24	29	0.55
3	6	18	32	0.60
3	6	18	35	0.65
2	4	12	37	0.70
2	4	12	39	0.75
2	4	12	41	0.80
1	2	6	42	0.85
1	2	6	43	0.90
1	2	6	44	0.95
2	4	12	46	1.00
4	8	24	50	1.05
4	8	24	54	1.10
5	10	30	59	1.15
5	10	30	64	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

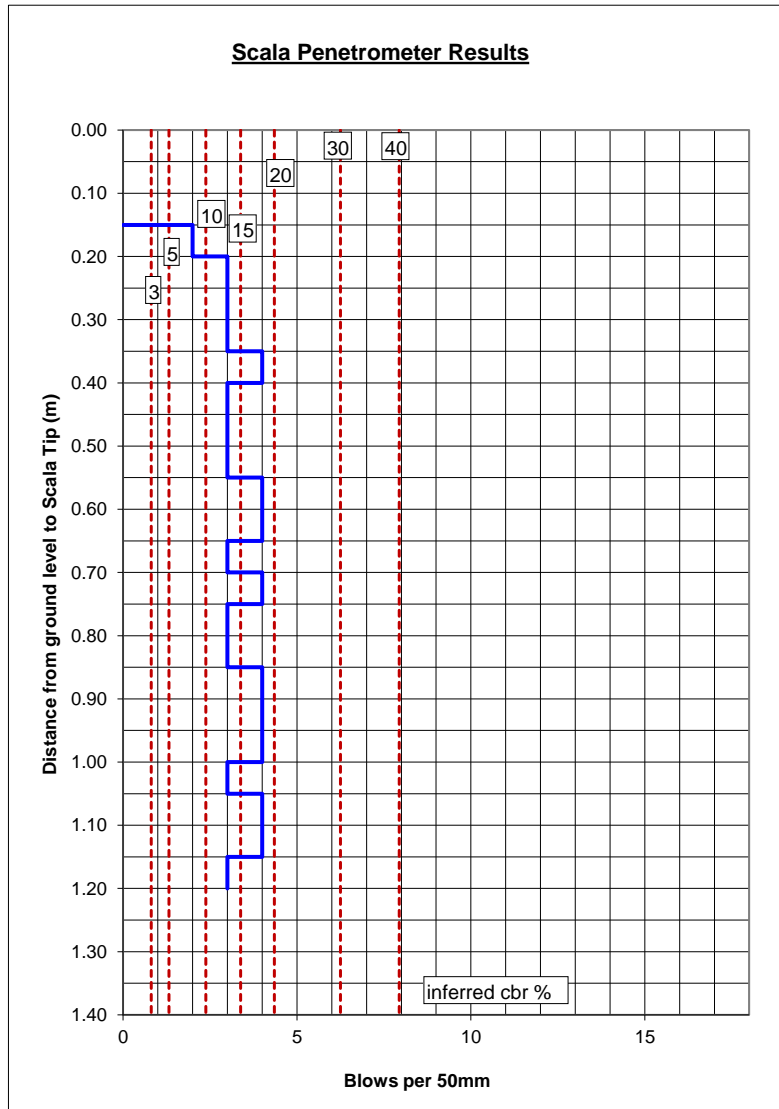
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing, Stage 6-7
Location: Stage 7a
Start Depth (m): 0.15
LWD (MPa): 56

Scala No: SCB 44
Ref : 16103
Report No: WRE8020-1727-R003
Page: 15 of 15

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.15
2	4	12	2	0.20
3	6	18	5	0.25
3	6	18	8	0.30
3	6	18	11	0.35
4	8	24	15	0.40
3	6	18	18	0.45
3	6	18	21	0.50
3	6	18	24	0.55
4	8	24	28	0.60
4	8	24	32	0.65
3	6	18	35	0.70
4	8	24	39	0.75
3	6	18	42	0.80
3	6	18	45	0.85
4	8	24	49	0.90
4	8	24	53	0.95
4	8	24	57	1.00
3	6	18	60	1.05
4	8	24	64	1.10
4	8	24	68	1.15
3	6	18	71	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 15/02/2022
Date of Re-Issue: -
Page: 1 of 42

Test Report No.
WRE8020-1727-R004

PROJECT: The Landing - Stage 6-7 Scala Fill Testing 1/12/2021 & 16/12/2021

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Determination of the penetration resistance using a dynamic cone (scala) Penetrometer
NZS 4402: 1988 Test 6.5.2
Light Weight Deflectometer (LWD) (Not accredited)
ASTM E2835-11 (Not accredited)

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets



A. Millar

Administrator



S. Kokich

Approved Signatory



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

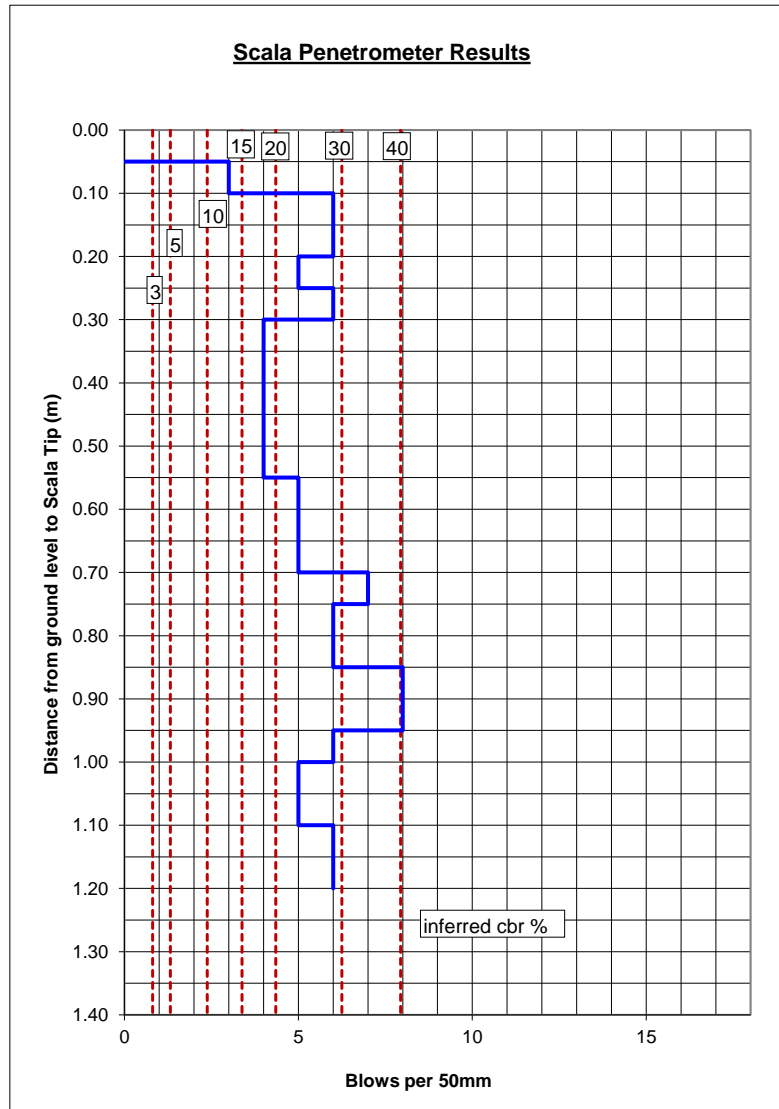
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 62

Scala No: SCP1
Ref : -
Report No: WRE8020-1727-R004
Page: 2 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
6	12	36	9	0.15
6	12	36	15	0.20
5	10	30	20	0.25
6	12	36	26	0.30
4	8	24	30	0.35
4	8	24	34	0.40
4	8	24	38	0.45
4	8	24	42	0.50
4	8	24	46	0.55
5	10	30	51	0.60
5	10	30	56	0.65
5	10	30	61	0.70
7	14	42	68	0.75
6	12	36	74	0.80
6	12	36	80	0.85
8	16	48	88	0.90
8	16	48	96	0.95
6	12	36	102	1.00
5	10	30	107	1.05
5	10	30	112	1.10
6	12	36	118	1.15
6	12	36	124	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

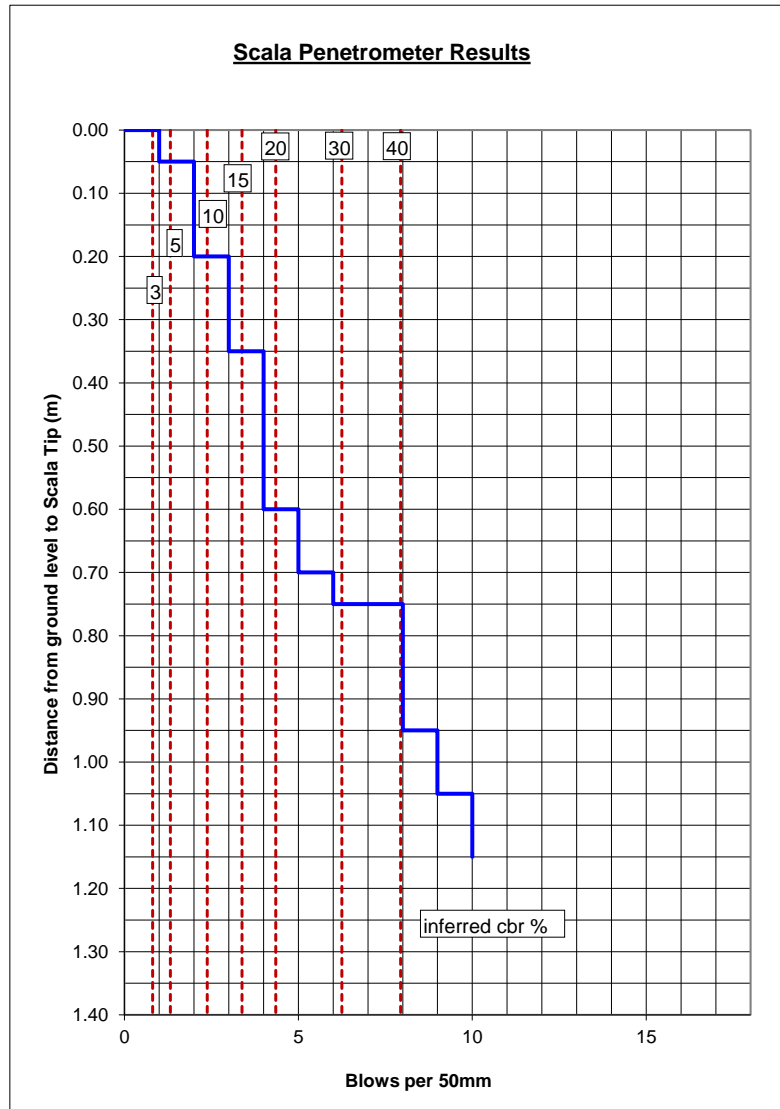
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 47.7

Scala No: SCP2
Ref : -
Report No: WRE8020-1727-R004
Page: 3 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
3	6	18	10	0.25
3	6	18	13	0.30
3	6	18	16	0.35
4	8	24	20	0.40
4	8	24	24	0.45
4	8	24	28	0.50
4	8	24	32	0.55
4	8	24	36	0.60
5	10	30	41	0.65
5	10	30	46	0.70
6	12	36	52	0.75
8	16	48	60	0.80
8	16	48	68	0.85
8	16	48	76	0.90
8	16	48	84	0.95
9	18	54	93	1.00
9	18	54	102	1.05
10	20	60	112	1.10
10	20	60	122	1.15



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

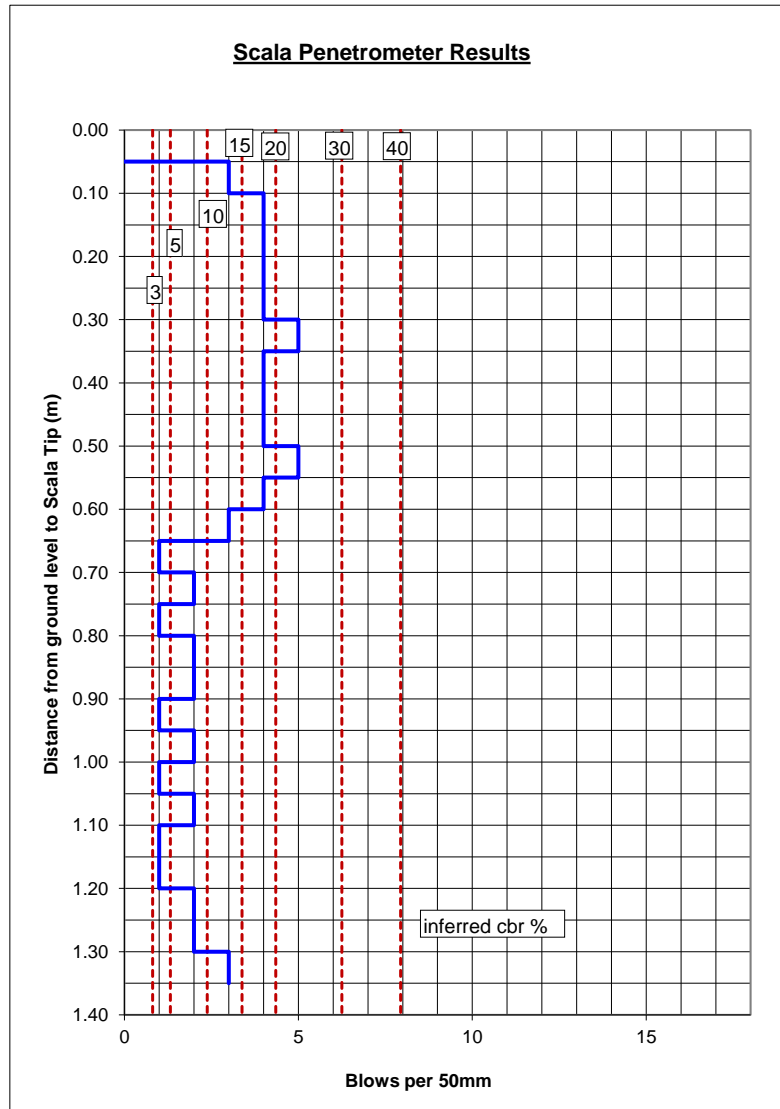
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 59

Scala No: SCP3
Ref : -
Report No: WRE8020-1727-R004
Page: 4 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
4	8	24	7	0.15
4	8	24	11	0.20
4	8	24	15	0.25
4	8	24	19	0.30
5	10	30	24	0.35
4	8	24	28	0.40
4	8	24	32	0.45
4	8	24	36	0.50
5	10	30	41	0.55
4	8	24	45	0.60
3	6	18	48	0.65
1	2	6	49	0.70
2	4	12	51	0.75
1	2	6	52	0.80
2	4	12	54	0.85
2	4	12	56	0.90
1	2	6	57	0.95
2	4	12	59	1.00
1	2	6	60	1.05
2	4	12	62	1.10
1	2	6	63	1.15
1	2	6	64	1.20
2	4	12	66	1.25
2	4	12	68	1.30
3	6	18	71	1.35



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

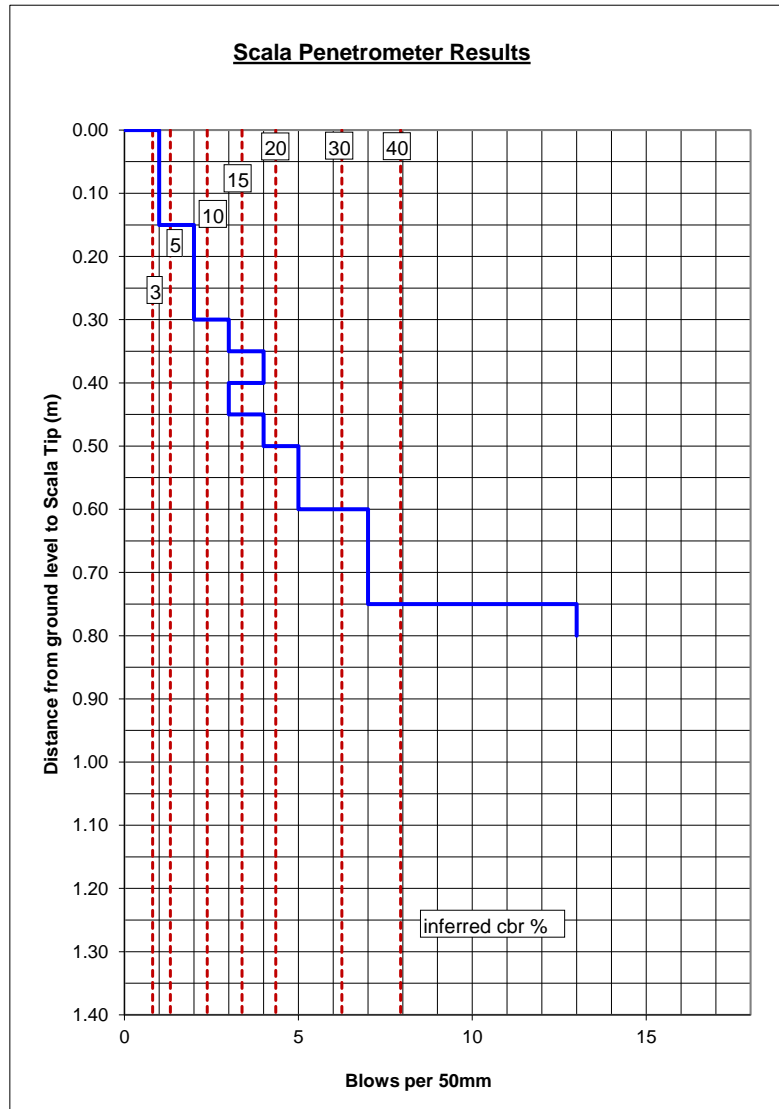
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): **49.9**
-35.83209, 174.45813

Scala No: SCP4
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
2	4	12	7	0.25
2	4	12	9	0.30
3	6	18	12	0.35
4	8	24	16	0.40
3	6	18	19	0.45
4	8	24	23	0.50
5	10	30	28	0.55
5	10	30	33	0.60
7	14	42	40	0.65
7	14	42	47	0.70
7	14	42	54	0.75
13	26	78	67	0.80



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

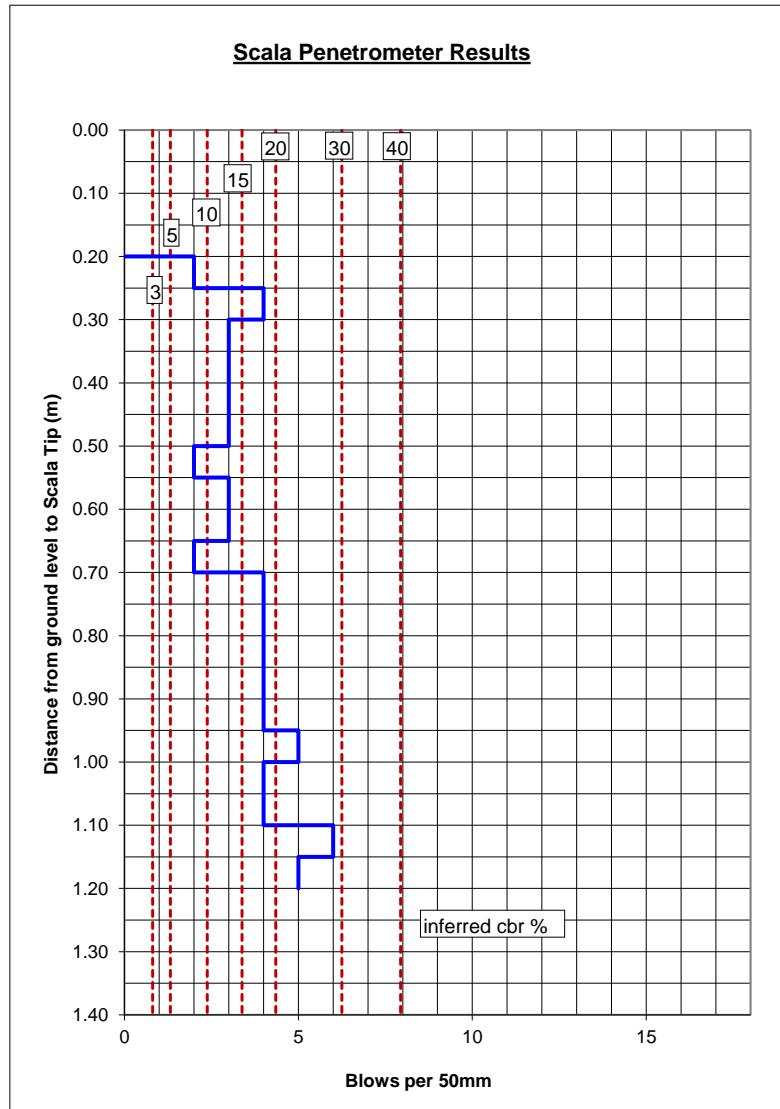
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.20
LWD (MPa): 40

Scala No: SCP5
Ref : -
Report No: WRE8020-1727-R004
Page: 6 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.20
2	4	12	2	0.25
4	8	24	6	0.30
3	6	18	9	0.35
3	6	18	12	0.40
3	6	18	15	0.45
3	6	18	18	0.50
2	4	12	20	0.55
3	6	18	23	0.60
3	6	18	26	0.65
2	4	12	28	0.70
4	8	24	32	0.75
4	8	24	36	0.80
4	8	24	40	0.85
4	8	24	44	0.90
4	8	24	48	0.95
5	10	30	53	1.00
4	8	24	57	1.05
4	8	24	61	1.10
6	12	36	67	1.15
5	10	30	72	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

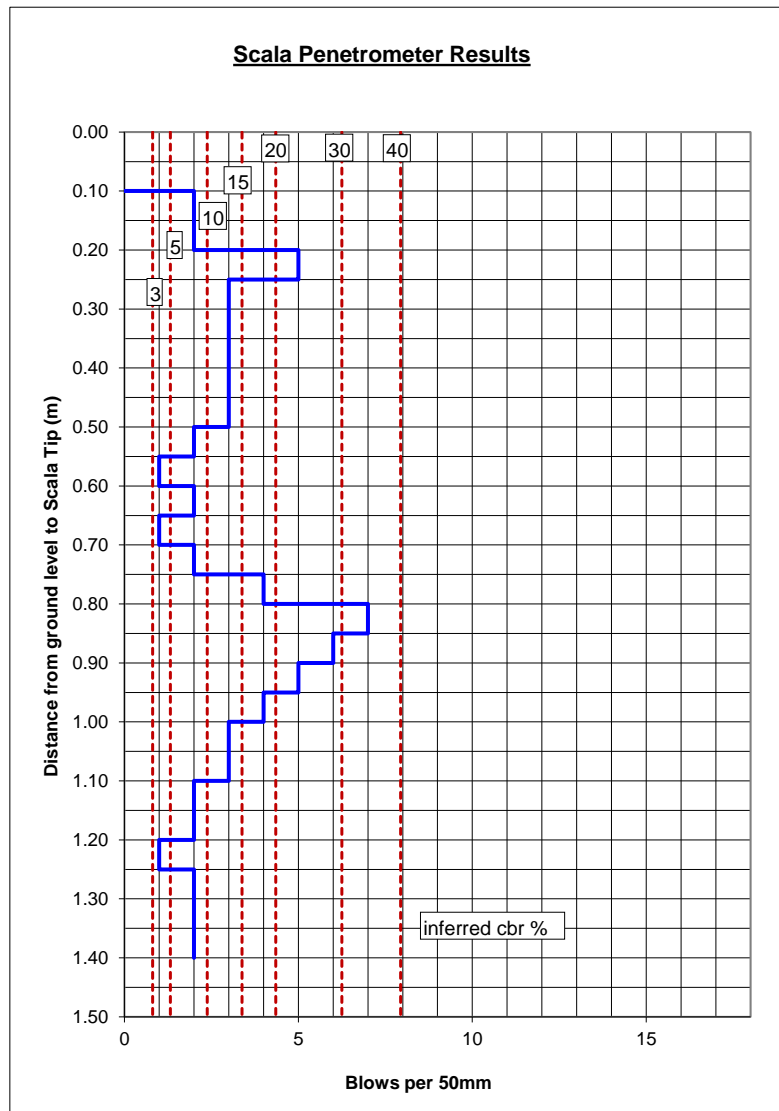
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.10
LWD (MPa): 35

Scala No: SCP6
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.10
2	4	12	2	0.15
2	4	12	4	0.20
5	10	30	9	0.25
3	6	18	12	0.30
3	6	18	15	0.35
3	6	18	18	0.40
3	6	18	21	0.45
3	6	18	24	0.50
2	4	12	26	0.55
1	2	6	27	0.60
2	4	12	29	0.65
1	2	6	30	0.70
2	4	12	32	0.75
4	8	24	36	0.80
7	14	42	43	0.85
6	12	36	49	0.90
5	10	30	54	0.95
4	8	24	58	1.00
3	6	18	61	1.05
3	6	18	64	1.10
2	4	12	66	1.15
2	4	12	68	1.20
1	2	6	69	1.25
2	4	12	71	1.30
2	4	12	73	1.35
2	4	12	75	1.40



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

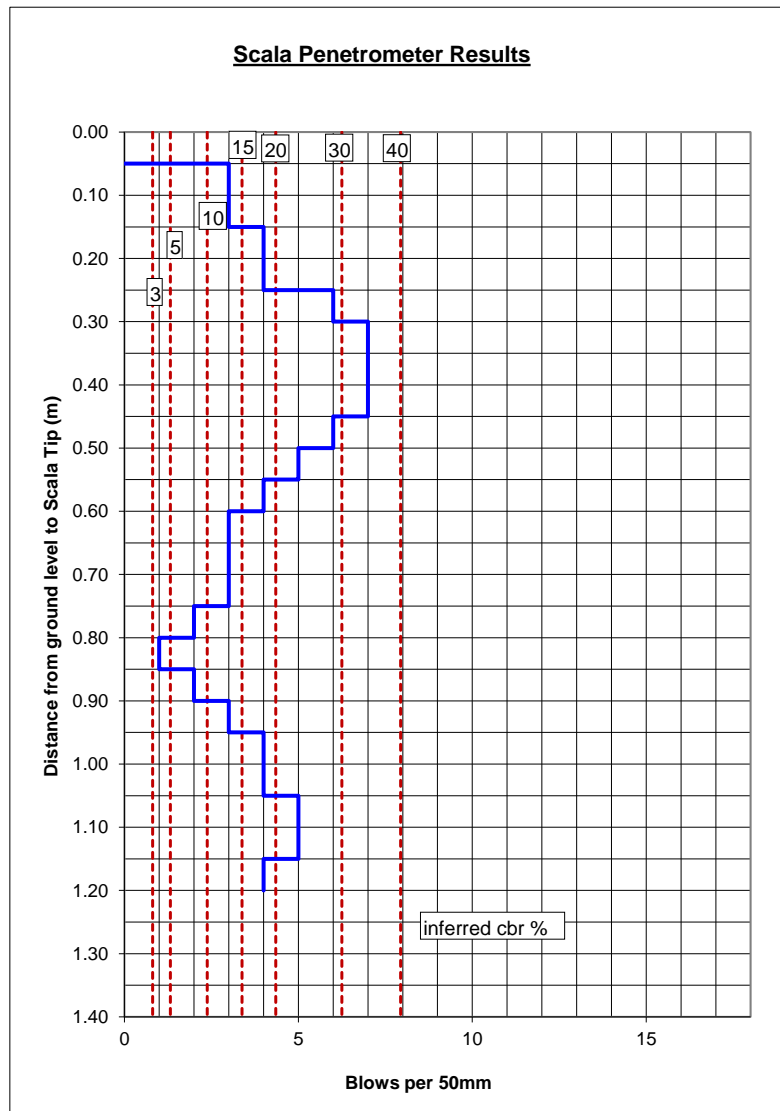
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 42

Scala No: SCP7
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
3	6	18	6	0.15
4	8	24	10	0.20
4	8	24	14	0.25
6	12	36	20	0.30
7	14	42	27	0.35
7	14	42	34	0.40
7	14	42	41	0.45
6	12	36	47	0.50
5	10	30	52	0.55
4	8	24	56	0.60
3	6	18	59	0.65
3	6	18	62	0.70
3	6	18	65	0.75
2	4	12	67	0.80
1	2	6	68	0.85
2	4	12	70	0.90
3	6	18	73	0.95
4	8	24	77	1.00
4	8	24	81	1.05
5	10	30	86	1.10
5	10	30	91	1.15
4	8	24	95	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

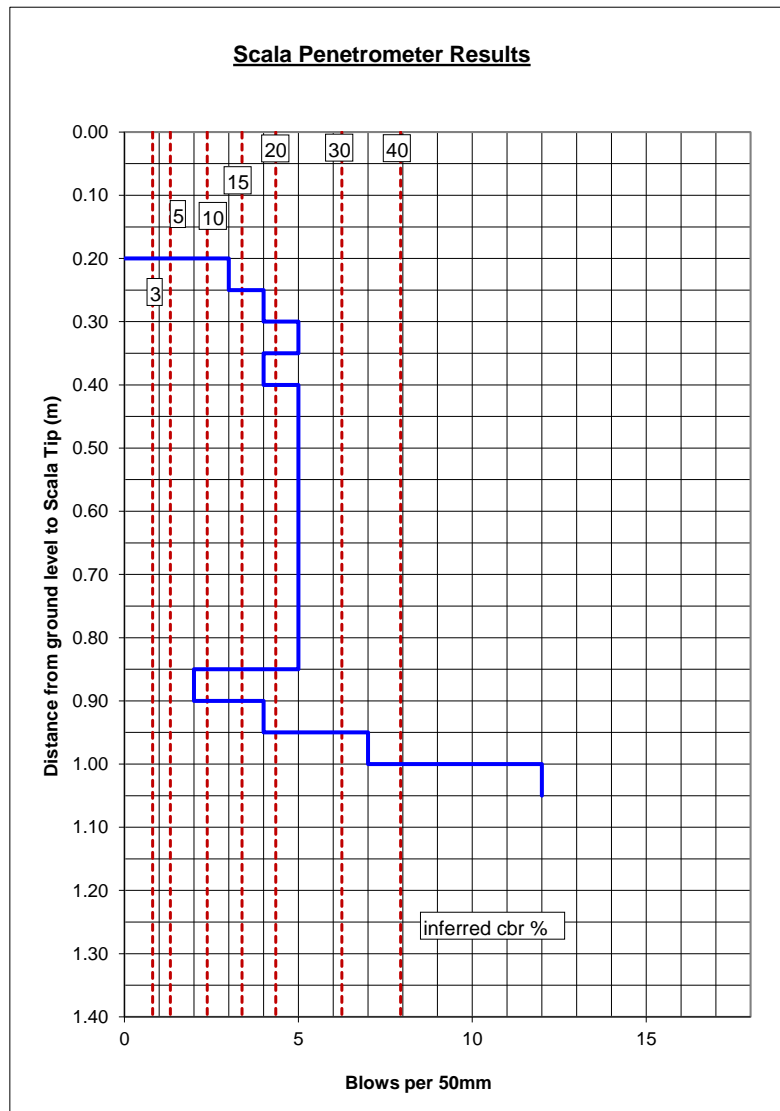
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.20
LWD (MPa): 38

Scala No: SCP8
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.20
3	6	18	3	0.25
4	8	24	7	0.30
5	10	30	12	0.35
4	8	24	16	0.40
5	10	30	21	0.45
5	10	30	26	0.50
5	10	30	31	0.55
5	10	30	36	0.60
5	10	30	41	0.65
5	10	30	46	0.70
5	10	30	51	0.75
5	10	30	56	0.80
5	10	30	61	0.85
2	4	12	63	0.90
4	8	24	67	0.95
7	14	42	74	1.00
12	24	72	86	1.05



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

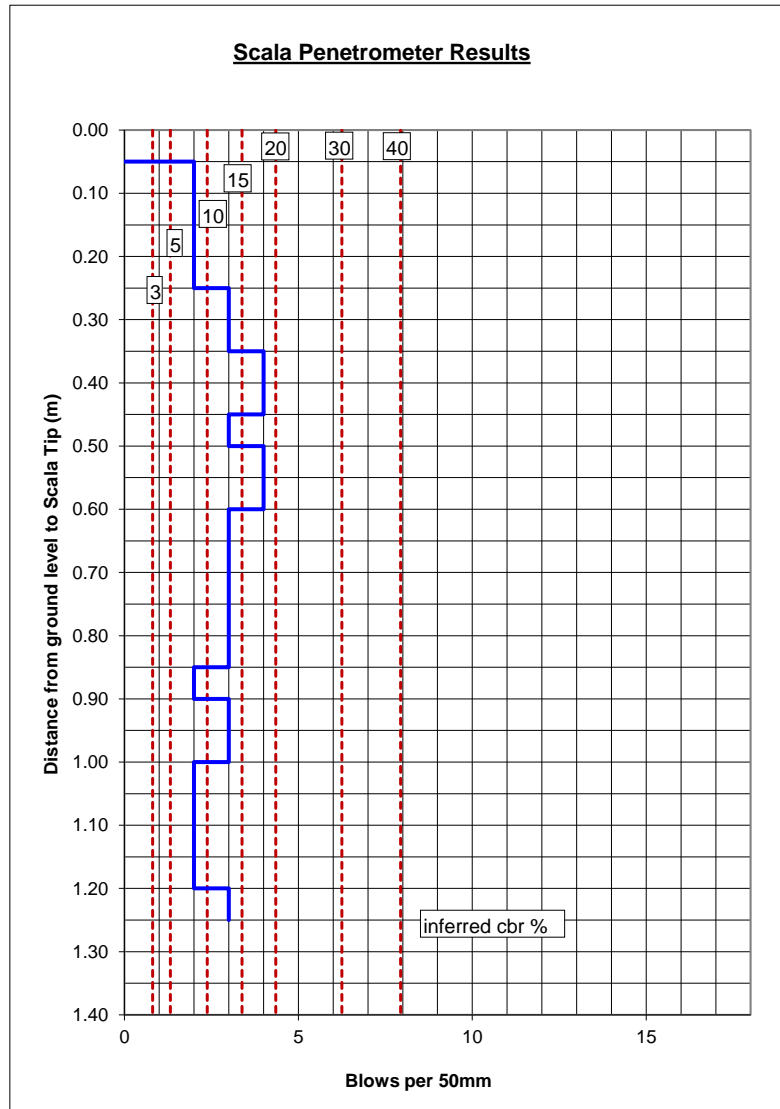
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 48

Scala No: SCP10
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
2	4	12	8	0.25
3	6	18	11	0.30
3	6	18	14	0.35
4	8	24	18	0.40
4	8	24	22	0.45
3	6	18	25	0.50
4	8	24	29	0.55
4	8	24	33	0.60
3	6	18	36	0.65
3	6	18	39	0.70
3	6	18	42	0.75
3	6	18	45	0.80
3	6	18	48	0.85
2	4	12	50	0.90
3	6	18	53	0.95
3	6	18	56	1.00
2	4	12	58	1.05
2	4	12	60	1.10
2	4	12	62	1.15
2	4	12	64	1.20
3	6	18	67	1.25



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

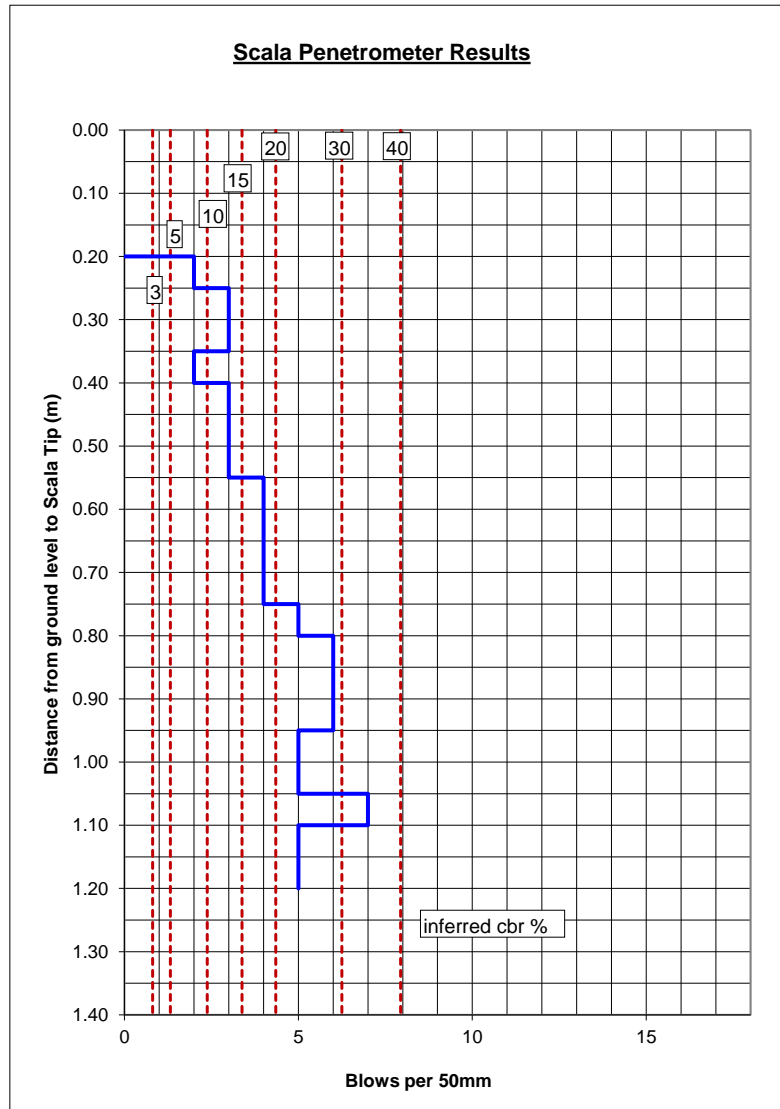
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.20
LWD (MPa): 39

Scala No: SCP11
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.20
2	4	12	2	0.25
3	6	18	5	0.30
3	6	18	8	0.35
2	4	12	10	0.40
3	6	18	13	0.45
3	6	18	16	0.50
3	6	18	19	0.55
4	8	24	23	0.60
4	8	24	27	0.65
4	8	24	31	0.70
4	8	24	35	0.75
5	10	30	40	0.80
6	12	36	46	0.85
6	12	36	52	0.90
6	12	36	58	0.95
5	10	30	63	1.00
5	10	30	68	1.05
7	14	42	75	1.10
5	10	30	80	1.15
5	10	30	85	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

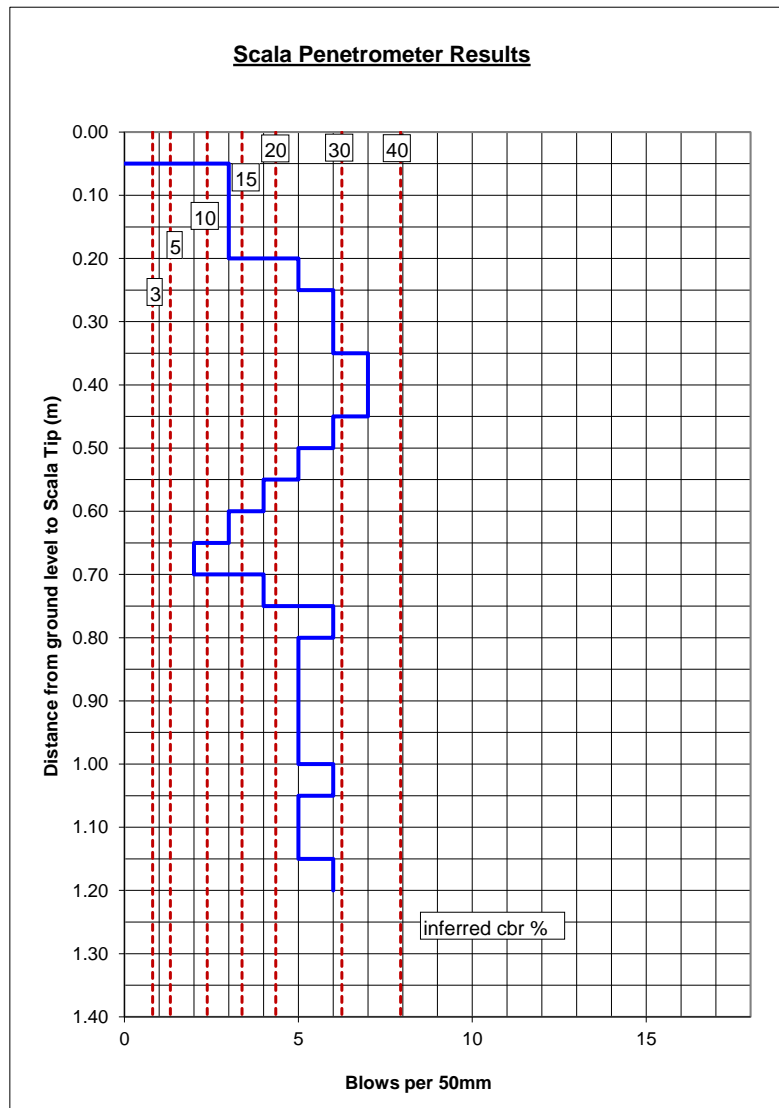
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 39

Scala No: SCP12
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
3	6	18	6	0.15
3	6	18	9	0.20
5	10	30	14	0.25
6	12	36	20	0.30
6	12	36	26	0.35
7	14	42	33	0.40
7	14	42	40	0.45
6	12	36	46	0.50
5	10	30	51	0.55
4	8	24	55	0.60
3	6	18	58	0.65
2	4	12	60	0.70
4	8	24	64	0.75
6	12	36	70	0.80
5	10	30	75	0.85
5	10	30	80	0.90
5	10	30	85	0.95
5	10	30	90	1.00
6	12	36	96	1.05
5	10	30	101	1.10
5	10	30	106	1.15
6	12	36	112	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test


S. Kokich
Approved Signatory

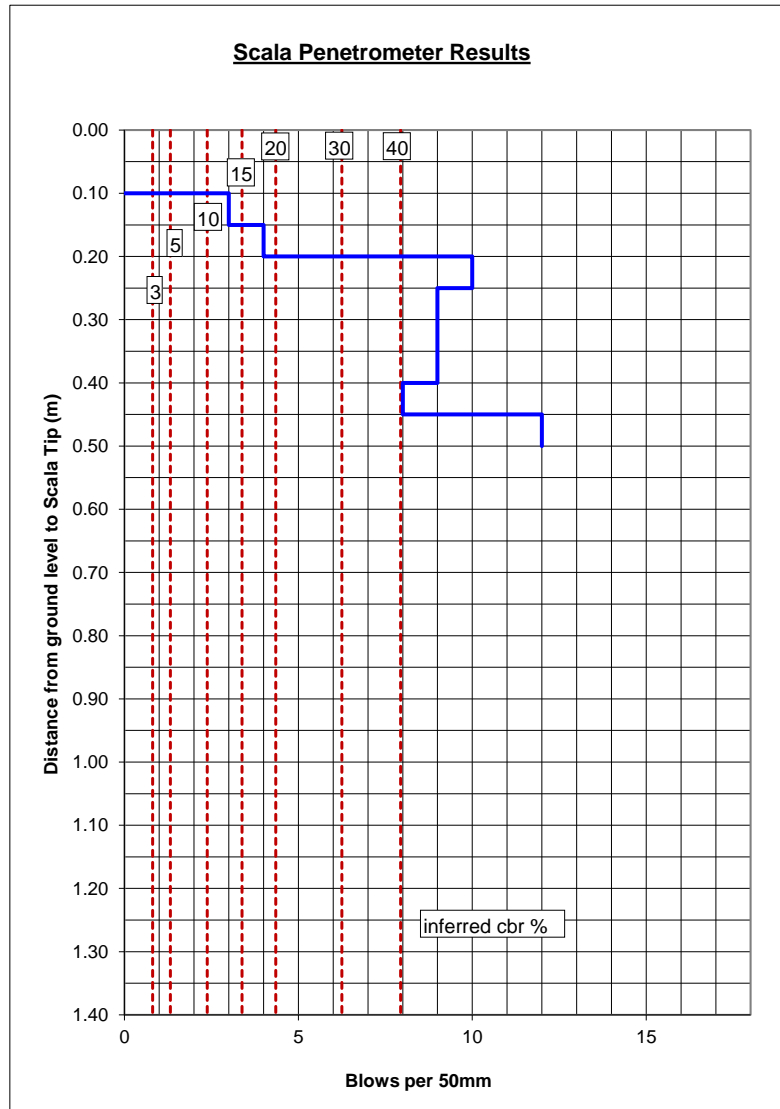
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.10
LWD (MPa): 56

Scala No: SCP13
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.10
3	6	18	3	0.15
4	8	24	7	0.20
10	20	60	17	0.25
9	18	54	26	0.30
9	18	54	35	0.35
9	18	54	44	0.40
8	16	48	52	0.45
12	24	72	64	0.50



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

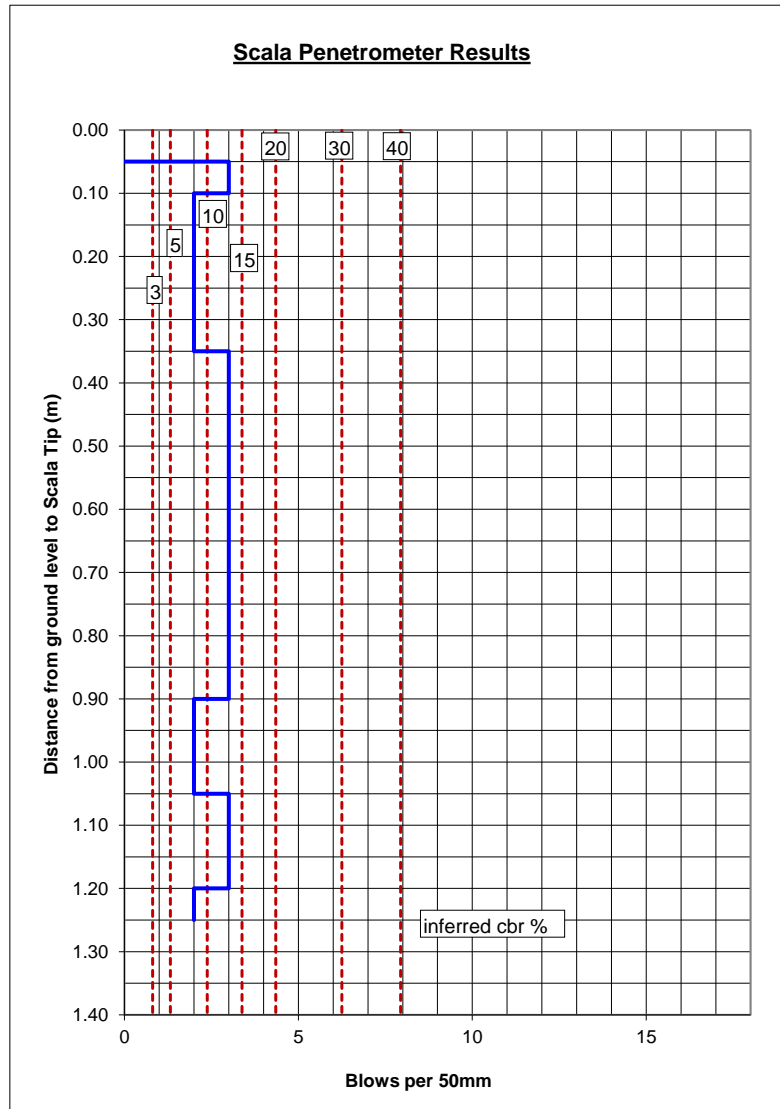
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 57

Scala No: SCP14
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
2	4	12	9	0.25
2	4	12	11	0.30
2	4	12	13	0.35
3	6	18	16	0.40
3	6	18	19	0.45
3	6	18	22	0.50
3	6	18	25	0.55
3	6	18	28	0.60
3	6	18	31	0.65
3	6	18	34	0.70
3	6	18	37	0.75
3	6	18	40	0.80
3	6	18	43	0.85
3	6	18	46	0.90
2	4	12	48	0.95
2	4	12	50	1.00
2	4	12	52	1.05
3	6	18	55	1.10
3	6	18	58	1.15
3	6	18	61	1.20
2	4	12	63	1.25



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

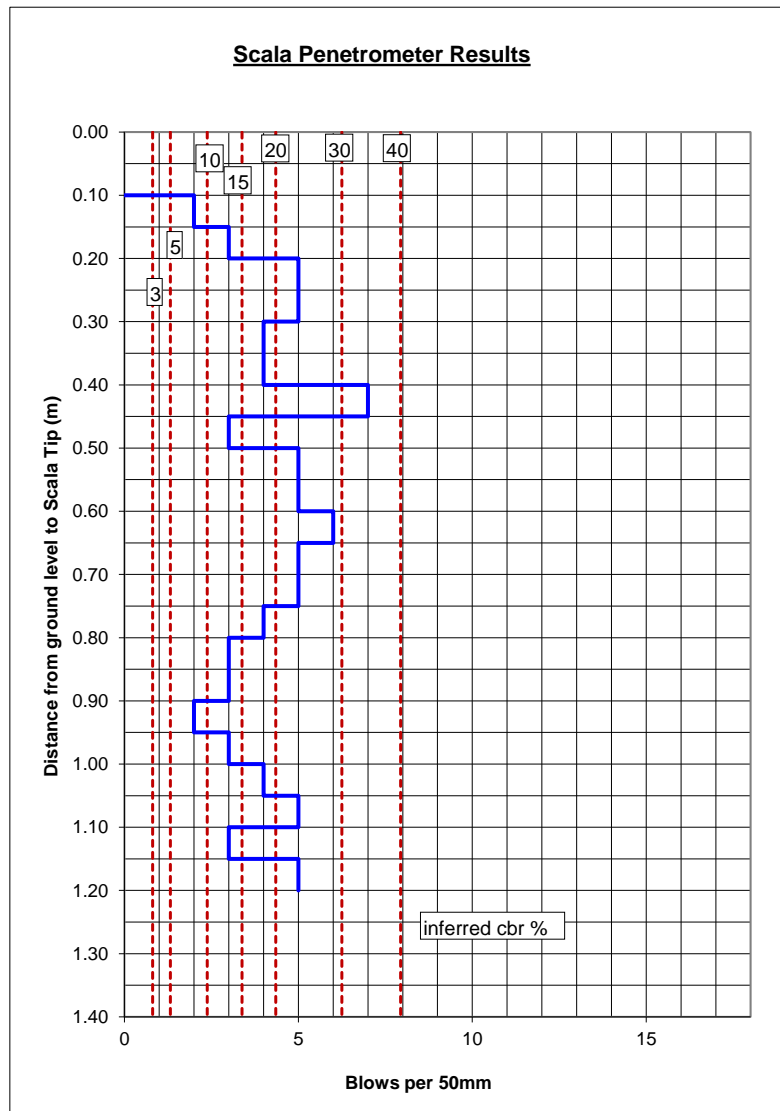
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.10
LWD (MPa): 45

Scala No: SCP15
Ref : -
Report No: WRE8020-1727-R004
Page: 15 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.10
2	4	12	2	0.15
3	6	18	5	0.20
5	10	30	10	0.25
5	10	30	15	0.30
4	8	24	19	0.35
4	8	24	23	0.40
7	14	42	30	0.45
3	6	18	33	0.50
5	10	30	38	0.55
5	10	30	43	0.60
6	12	36	49	0.65
5	10	30	54	0.70
5	10	30	59	0.75
4	8	24	63	0.80
3	6	18	66	0.85
3	6	18	69	0.90
2	4	12	71	0.95
3	6	18	74	1.00
4	8	24	78	1.05
5	10	30	83	1.10
3	6	18	86	1.15
5	10	30	91	1.20



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

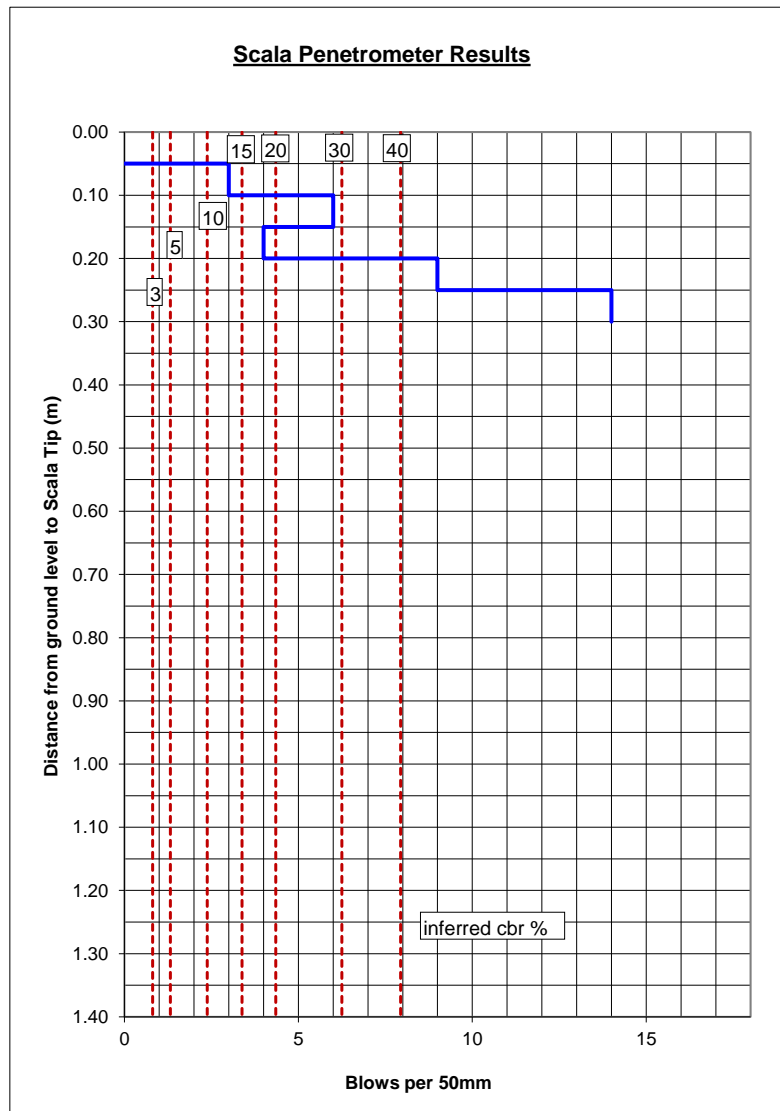
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.05
LWD (MPa): 46

Scala No: SCP16
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
3	6	18	3	0.10
6	12	36	9	0.15
4	8	24	13	0.20
9	18	54	22	0.25
14	28	84	36	0.30



Recorded By: A.B
Date: 1/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

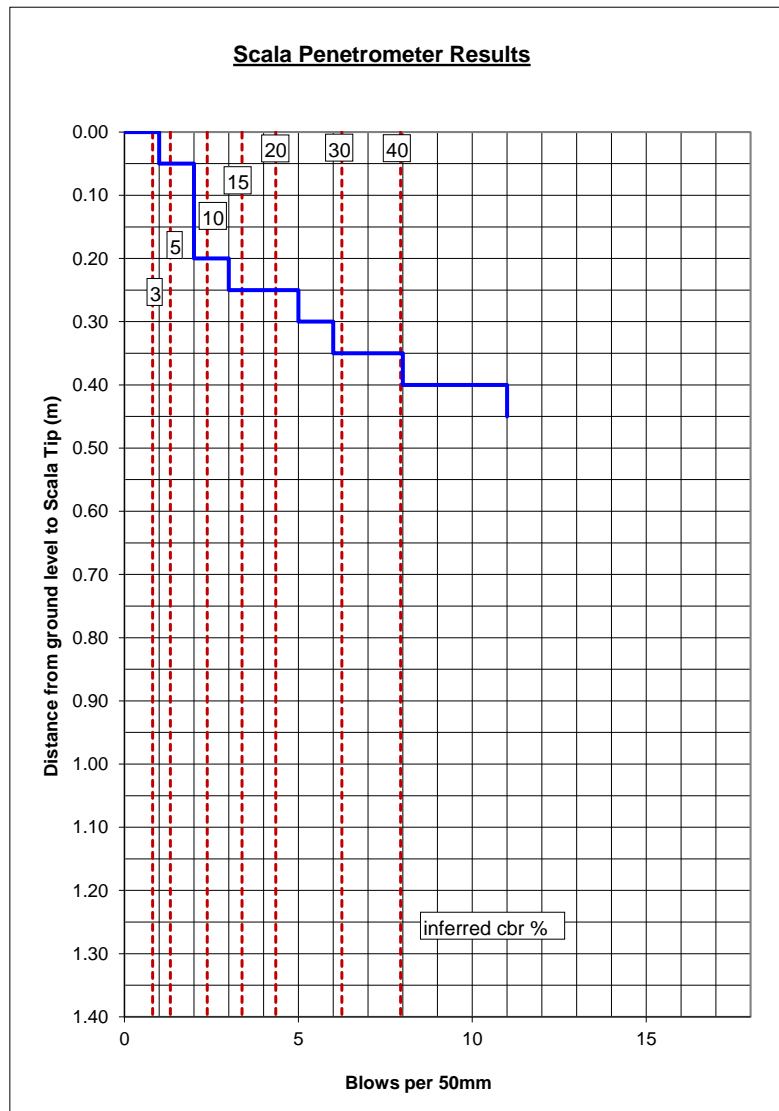
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 64

Scala No: SCP17
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
3	6	18	10	0.25
5	10	30	15	0.30
6	12	36	21	0.35
8	16	48	29	0.40
11	22	66	40	0.45



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

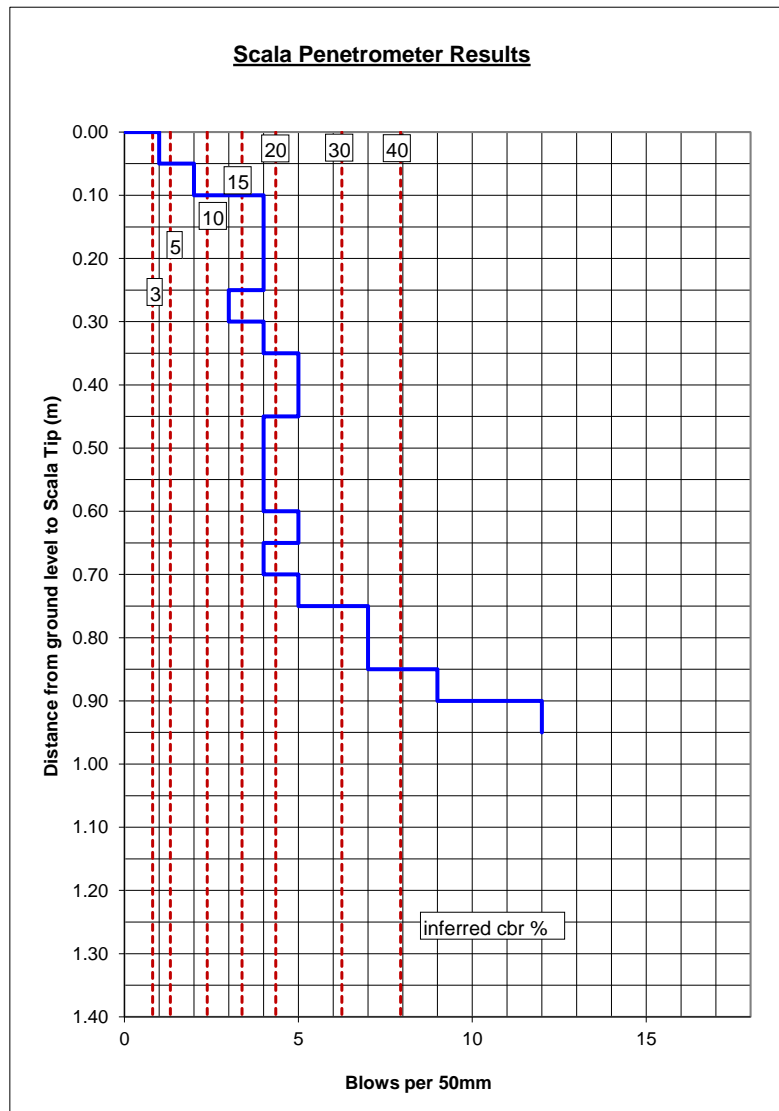
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 46

Scala No: SCP18
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
4	8	24	7	0.15
4	8	24	11	0.20
4	8	24	15	0.25
3	6	18	18	0.30
4	8	24	22	0.35
5	10	30	27	0.40
5	10	30	32	0.45
4	8	24	36	0.50
4	8	24	40	0.55
4	8	24	44	0.60
5	10	30	49	0.65
4	8	24	53	0.70
5	10	30	58	0.75
7	14	42	65	0.80
7	14	42	72	0.85
9	18	54	81	0.90
12	24	72	93	0.95



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

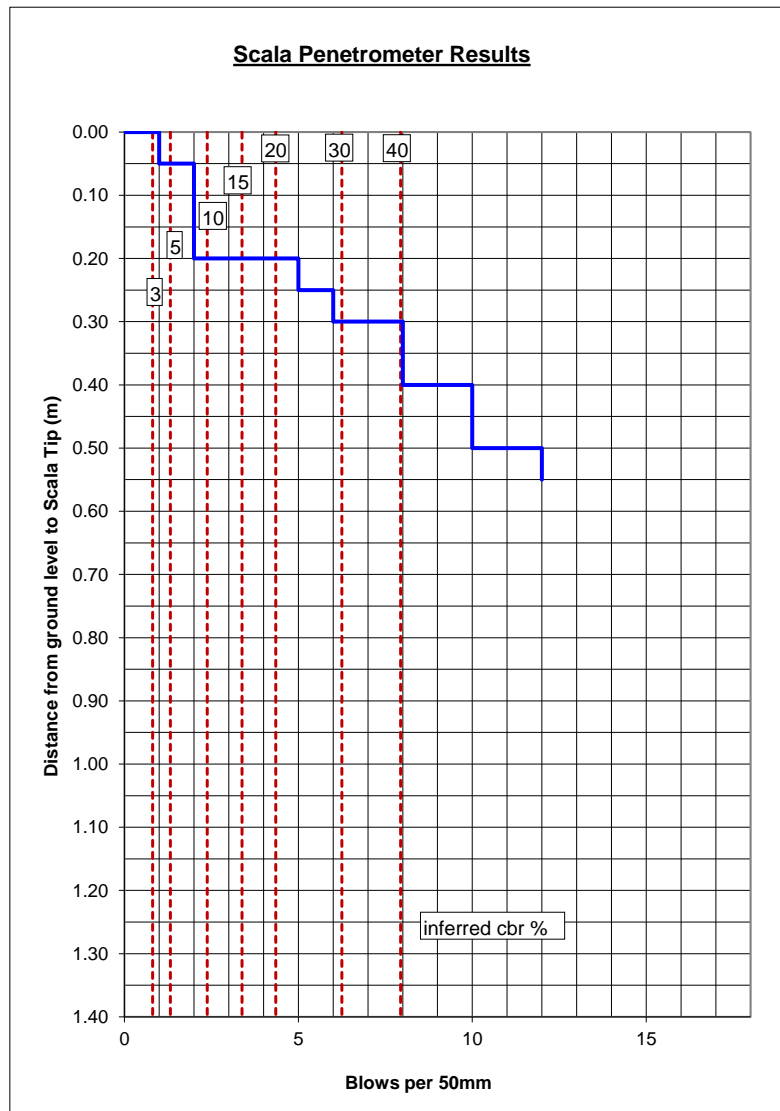
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 42

Scala No: SCP19
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
5	10	30	12	0.25
6	12	36	18	0.30
8	16	48	26	0.35
8	16	48	34	0.40
10	20	60	44	0.45
10	20	60	54	0.50
12	24	72	66	0.55



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

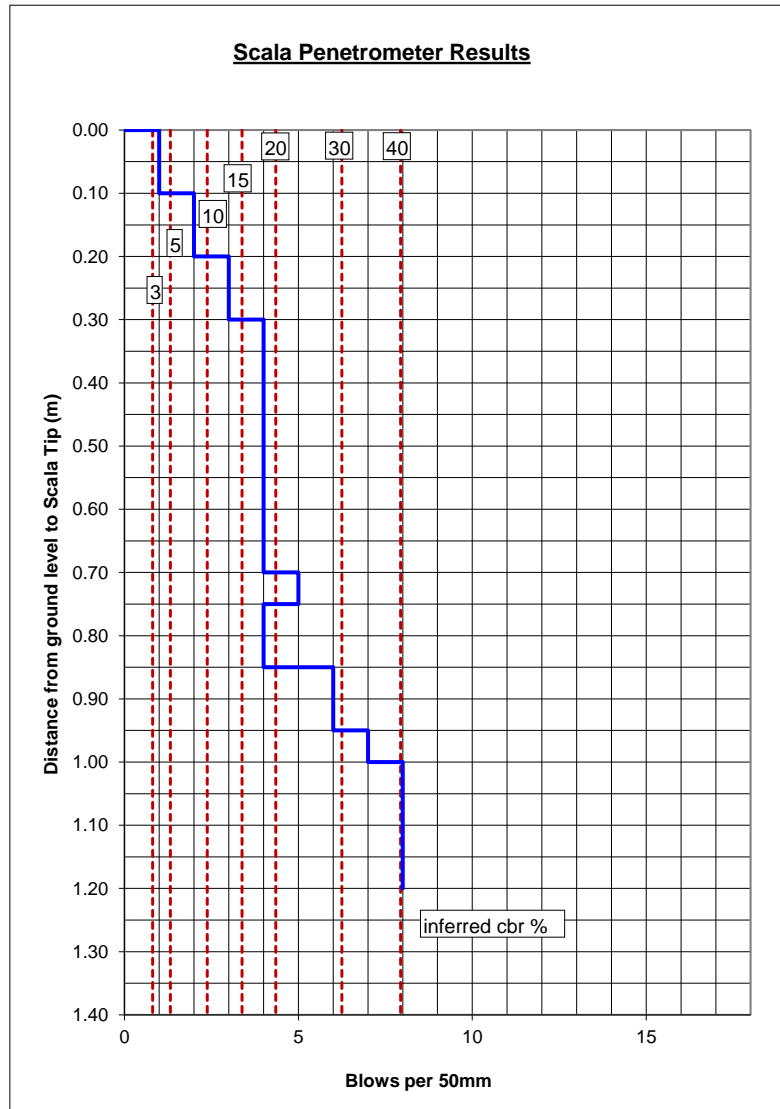
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 65

Scala No: SCP20
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
3	6	18	9	0.25
3	6	18	12	0.30
4	8	24	16	0.35
4	8	24	20	0.40
4	8	24	24	0.45
4	8	24	28	0.50
4	8	24	32	0.55
4	8	24	36	0.60
4	8	24	40	0.65
4	8	24	44	0.70
5	10	30	49	0.75
4	8	24	53	0.80
4	8	24	57	0.85
6	12	36	63	0.90
6	12	36	69	0.95
7	14	42	76	1.00
8	16	48	84	1.05
8	16	48	92	1.10
8	16	48	100	1.15
8	16	48	108	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

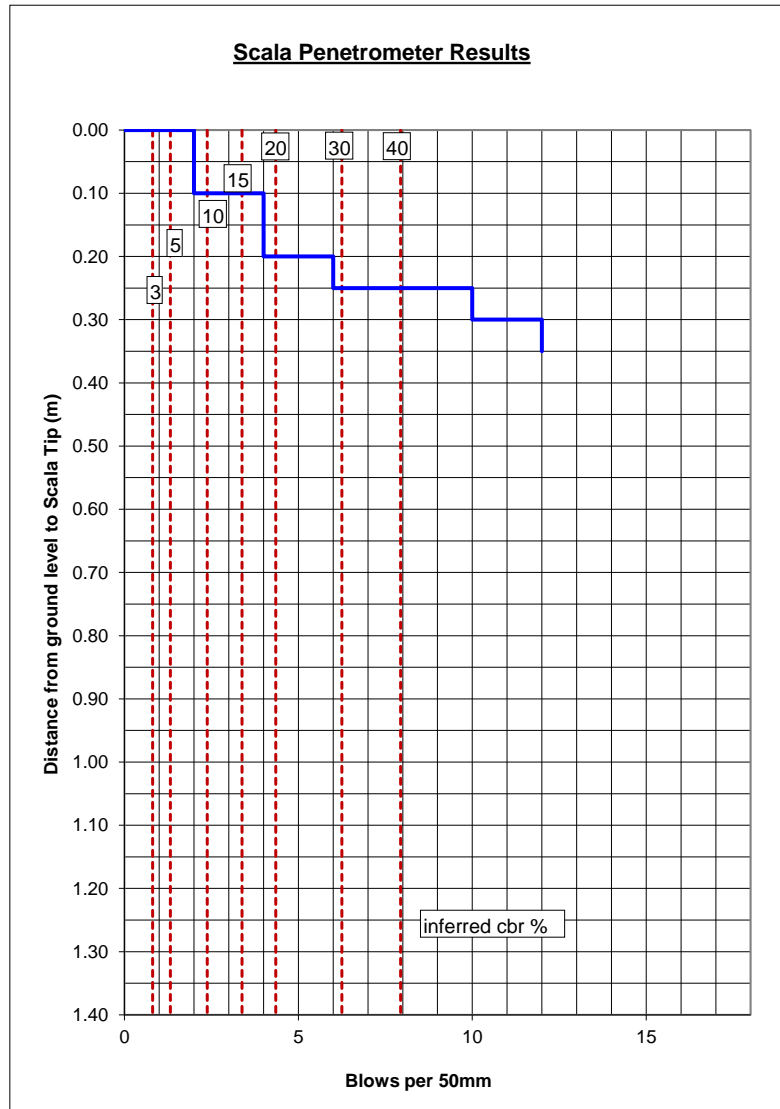
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 42

Scala No: SCP21
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
2	4	12	2	0.05
2	4	12	4	0.10
4	8	24	8	0.15
4	8	24	12	0.20
6	12	36	18	0.25
10	20	60	28	0.30
12	24	72	40	0.35



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

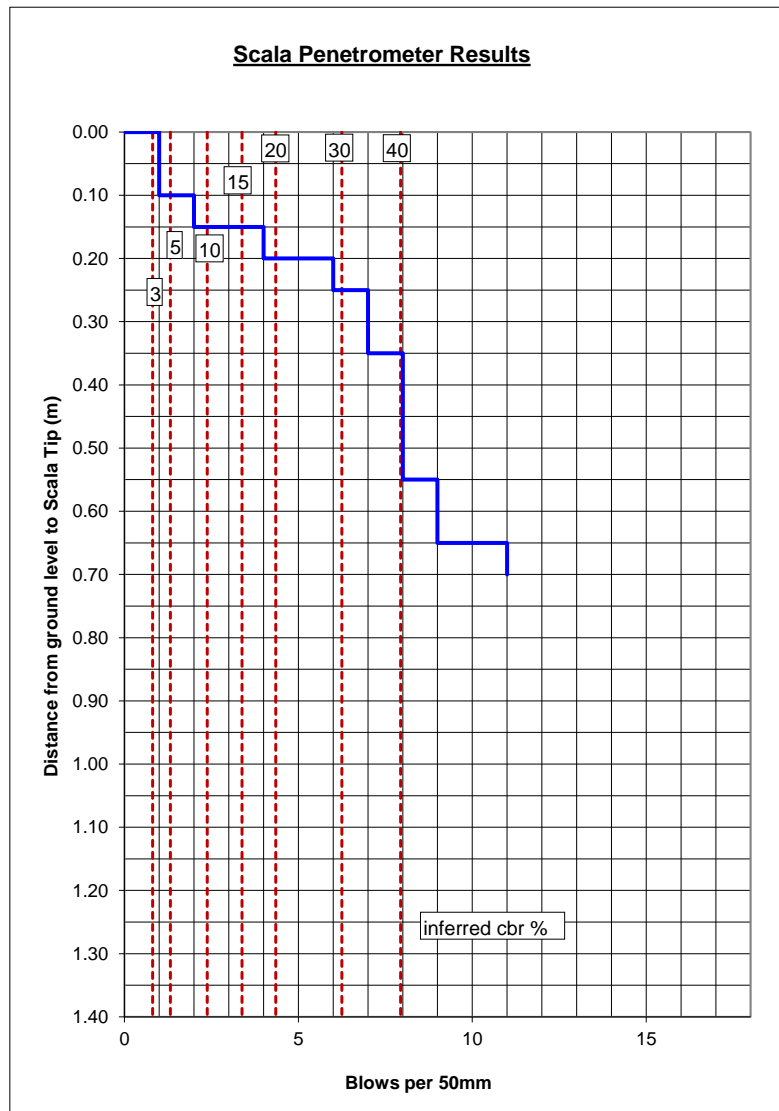
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 73

Scala No: SCP22
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
4	8	24	8	0.20
6	12	36	14	0.25
7	14	42	21	0.30
7	14	42	28	0.35
8	16	48	36	0.40
8	16	48	44	0.45
8	16	48	52	0.50
8	16	48	60	0.55
9	18	54	69	0.60
9	18	54	78	0.65
11	22	66	89	0.70



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

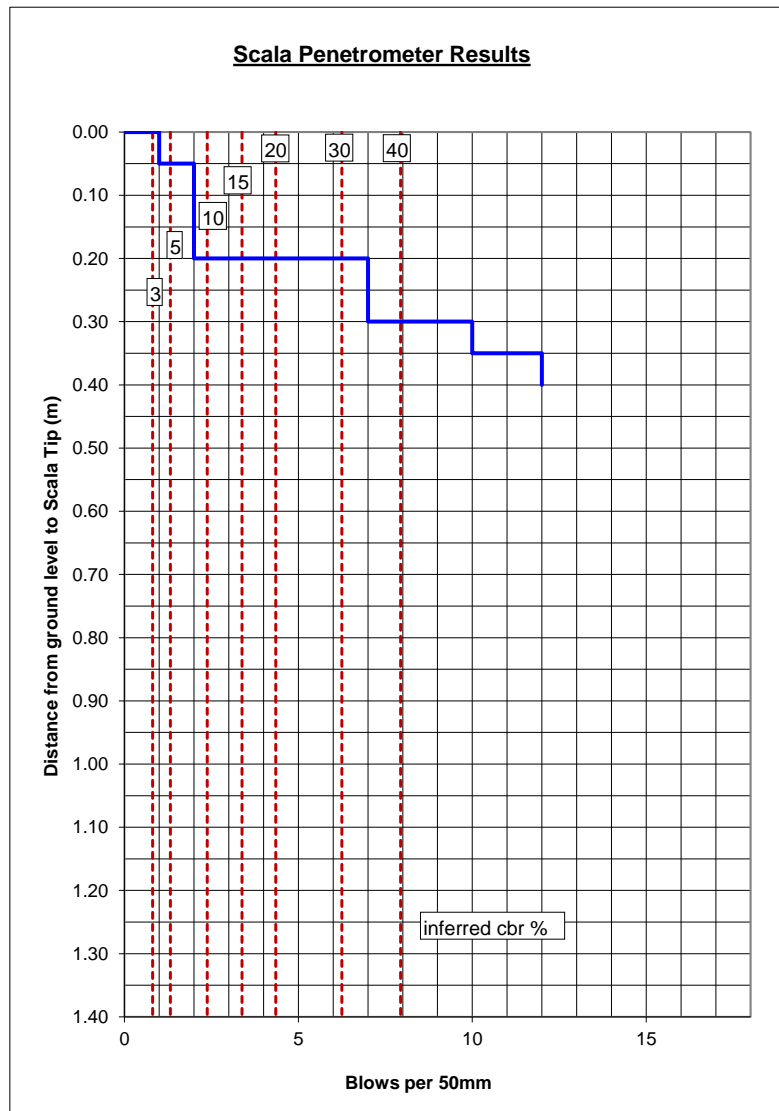
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 54

Scala No: SCP23
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
7	14	42	14	0.25
7	14	42	21	0.30
10	20	60	31	0.35
12	24	72	43	0.40



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

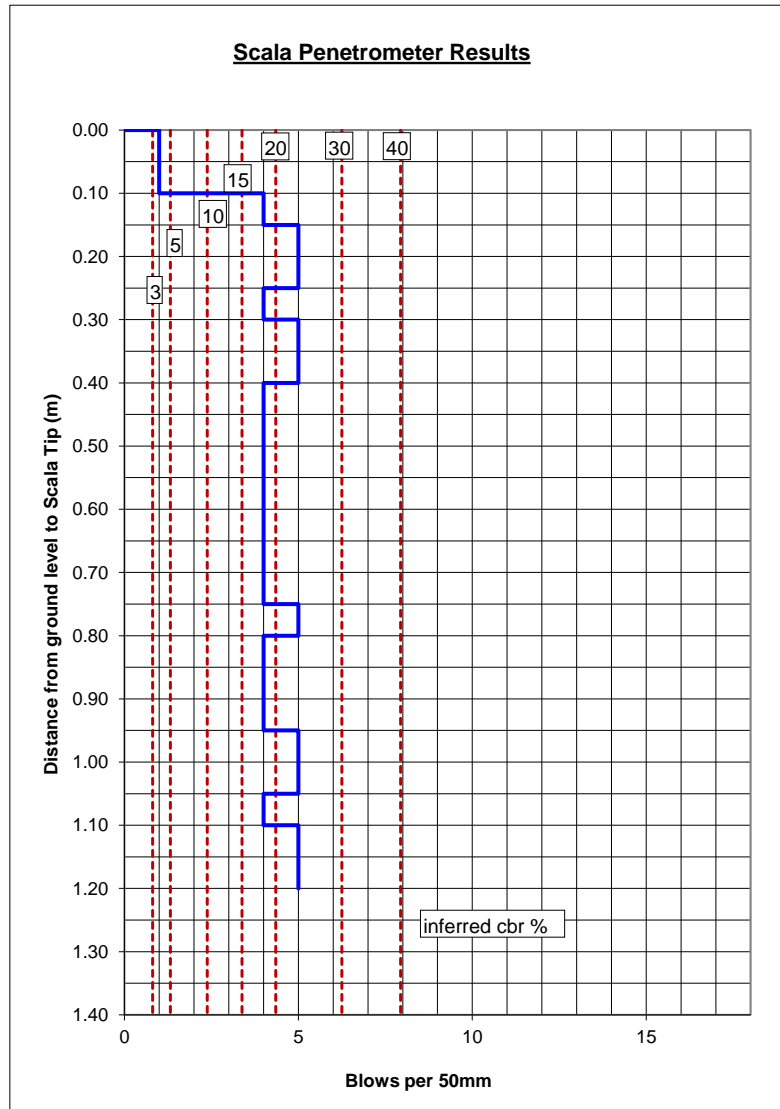
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 41

Scala No: SCP24
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
4	8	24	6	0.15
5	10	30	11	0.20
5	10	30	16	0.25
4	8	24	20	0.30
5	10	30	25	0.35
5	10	30	30	0.40
4	8	24	34	0.45
4	8	24	38	0.50
4	8	24	42	0.55
4	8	24	46	0.60
4	8	24	50	0.65
4	8	24	54	0.70
4	8	24	58	0.75
5	10	30	63	0.80
4	8	24	67	0.85
4	8	24	71	0.90
4	8	24	75	0.95
5	10	30	80	1.00
5	10	30	85	1.05
4	8	24	89	1.10
5	10	30	94	1.15
5	10	30	99	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

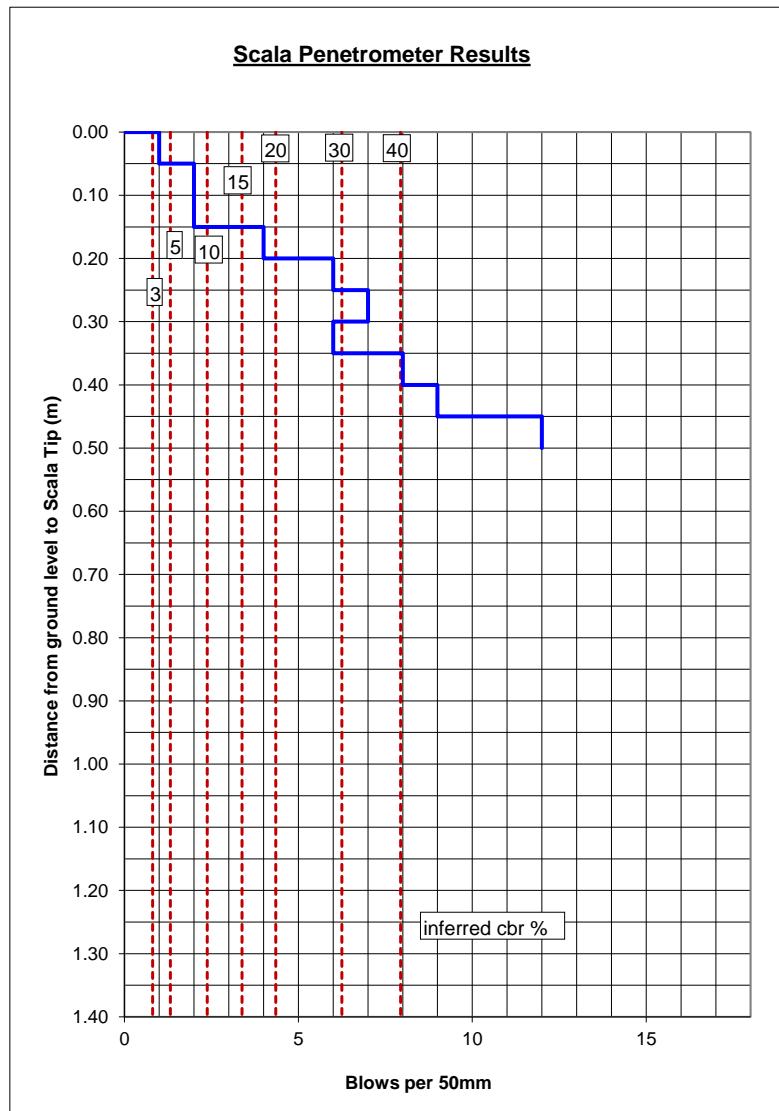
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 68

Scala No: SCP25
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
4	8	24	9	0.20
6	12	36	15	0.25
7	14	42	22	0.30
6	12	36	28	0.35
8	16	48	36	0.40
9	18	54	45	0.45
12	24	72	57	0.50



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

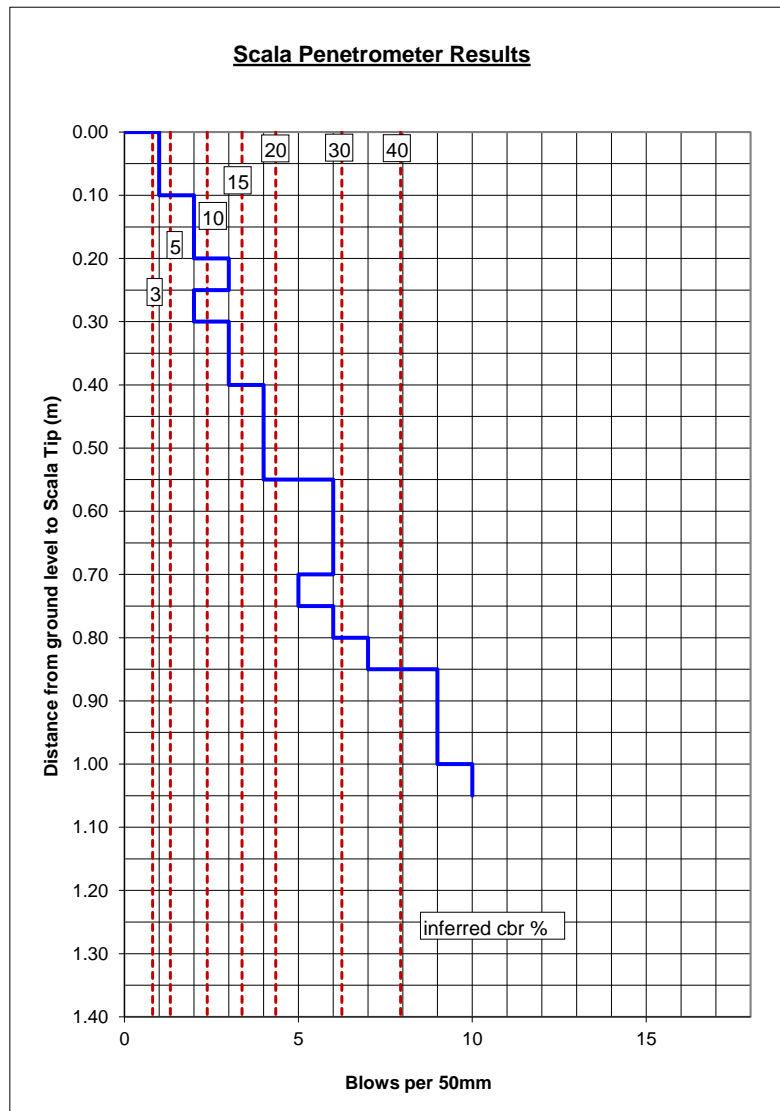
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 38

Scala No: SCP26
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
3	6	18	9	0.25
2	4	12	11	0.30
3	6	18	14	0.35
3	6	18	17	0.40
4	8	24	21	0.45
4	8	24	25	0.50
4	8	24	29	0.55
6	12	36	35	0.60
6	12	36	41	0.65
6	12	36	47	0.70
5	10	30	52	0.75
6	12	36	58	0.80
7	14	42	65	0.85
9	18	54	74	0.90
9	18	54	83	0.95
9	18	54	92	1.00
10	20	60	102	1.05



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

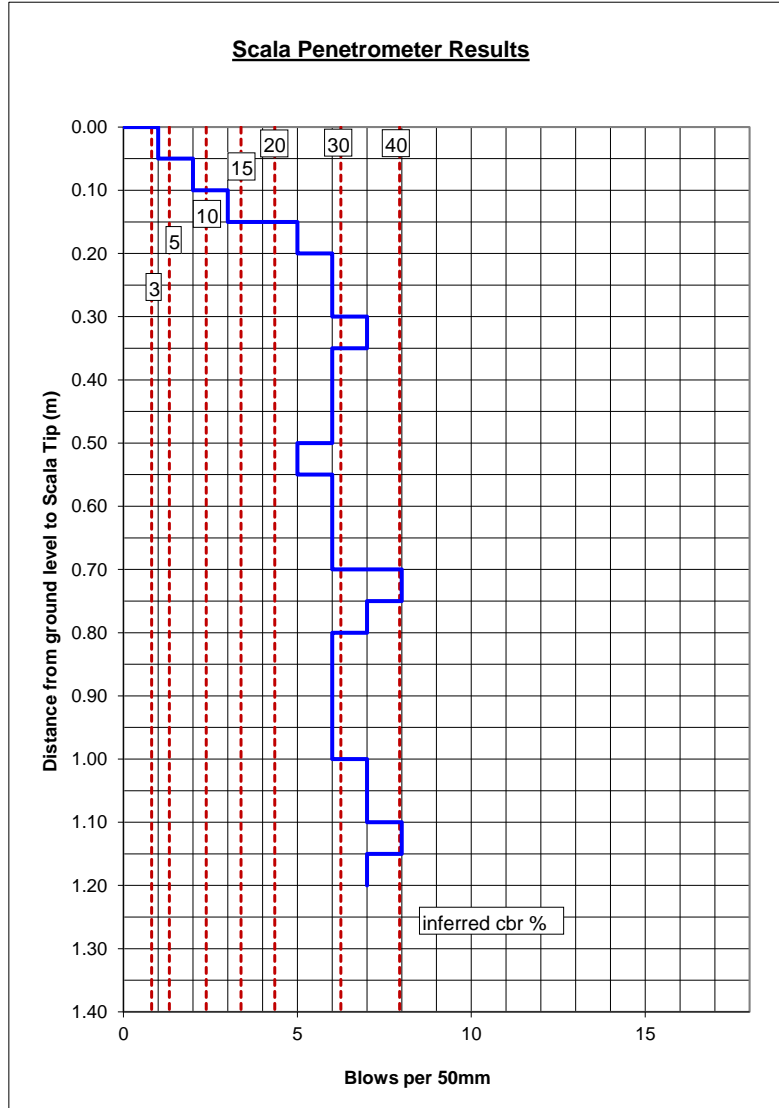
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 47

Scala No: SCP27
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
3	6	18	6	0.15
5	10	30	11	0.20
6	12	36	17	0.25
6	12	36	23	0.30
7	14	42	30	0.35
6	12	36	36	0.40
6	12	36	42	0.45
6	12	36	48	0.50
5	10	30	53	0.55
6	12	36	59	0.60
6	12	36	65	0.65
6	12	36	71	0.70
8	16	48	79	0.75
7	14	42	86	0.80
6	12	36	92	0.85
6	12	36	98	0.90
6	12	36	104	0.95
6	12	36	110	1.00
7	14	42	117	1.05
7	14	42	124	1.10
8	16	48	132	1.15
7	14	42	139	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

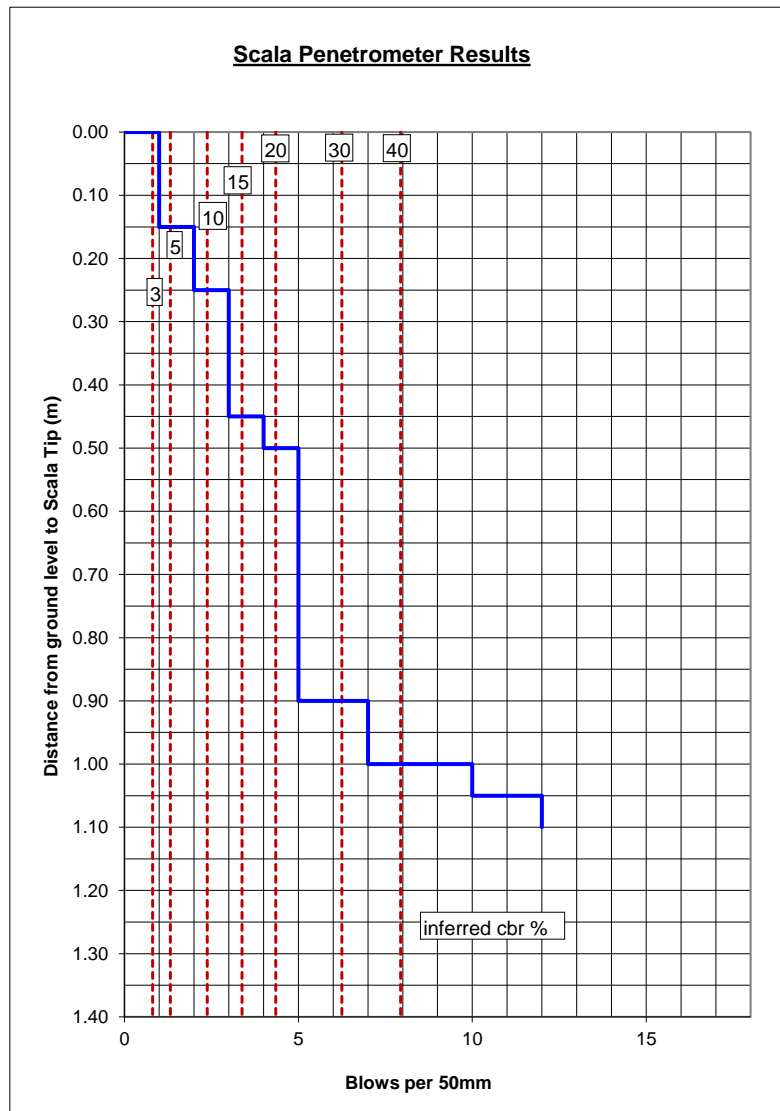
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 56

Scala No: SCP28
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
2	4	12	7	0.25
3	6	18	10	0.30
3	6	18	13	0.35
3	6	18	16	0.40
3	6	18	19	0.45
4	8	24	23	0.50
5	10	30	28	0.55
5	10	30	33	0.60
5	10	30	38	0.65
5	10	30	43	0.70
5	10	30	48	0.75
5	10	30	53	0.80
5	10	30	58	0.85
5	10	30	63	0.90
7	14	42	70	0.95
7	14	42	77	1.00
10	20	60	87	1.05
12	24	72	99	1.10



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

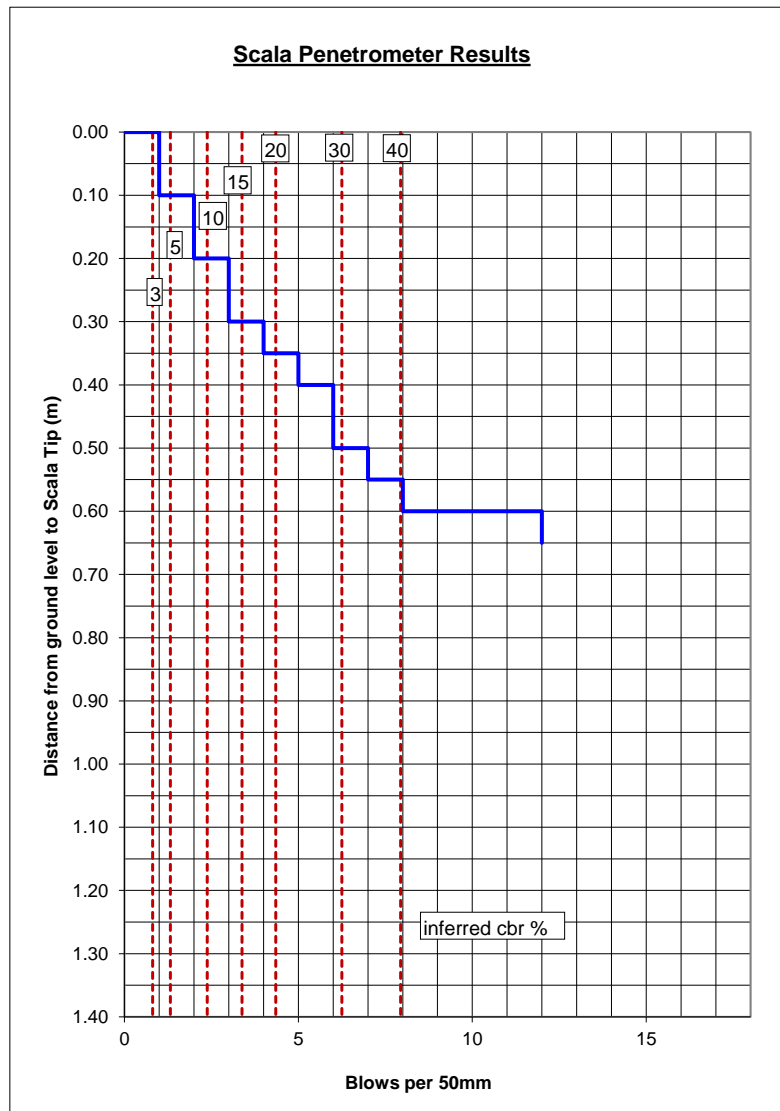
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00

Scala No: SCP29
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
3	6	18	9	0.25
3	6	18	12	0.30
4	8	24	16	0.35
5	10	30	21	0.40
6	12	36	27	0.45
6	12	36	33	0.50
7	14	42	40	0.55
8	16	48	48	0.60
12	24	72	60	0.65



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

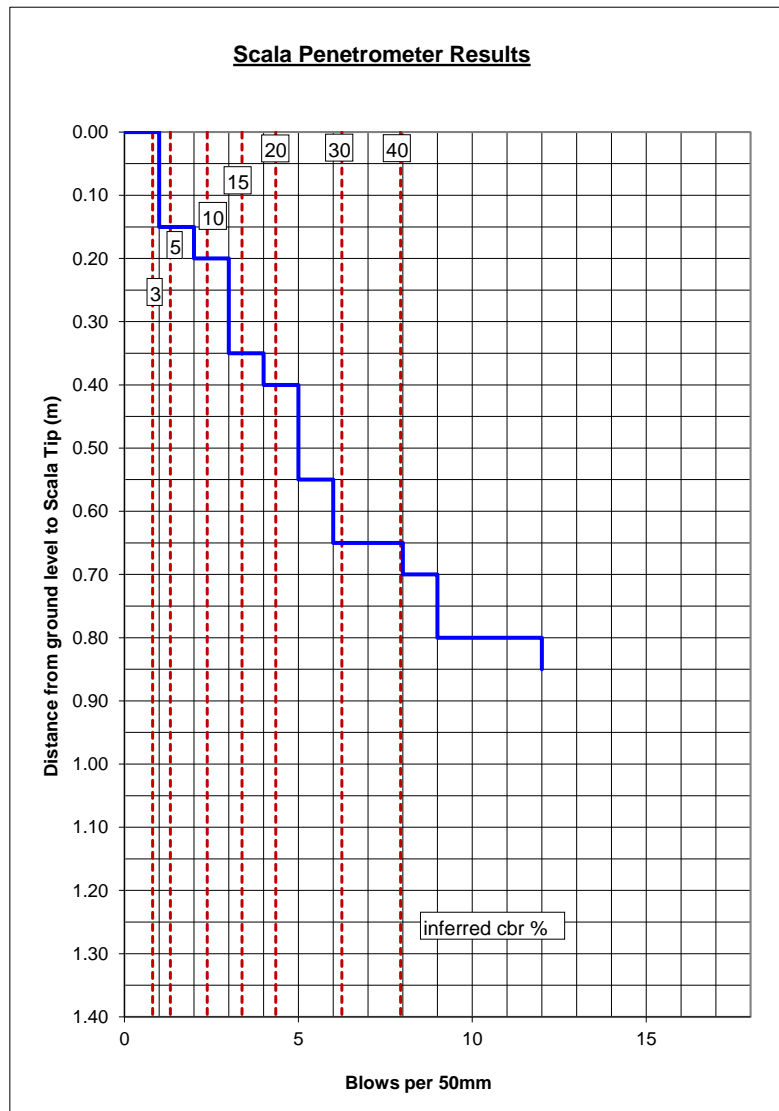
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 42

Scala No: SCP30
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
3	6	18	8	0.25
3	6	18	11	0.30
3	6	18	14	0.35
4	8	24	18	0.40
5	10	30	23	0.45
5	10	30	28	0.50
5	10	30	33	0.55
6	12	36	39	0.60
6	12	36	45	0.65
8	16	48	53	0.70
9	18	54	62	0.75
9	18	54	71	0.80
12	24	72	83	0.85



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

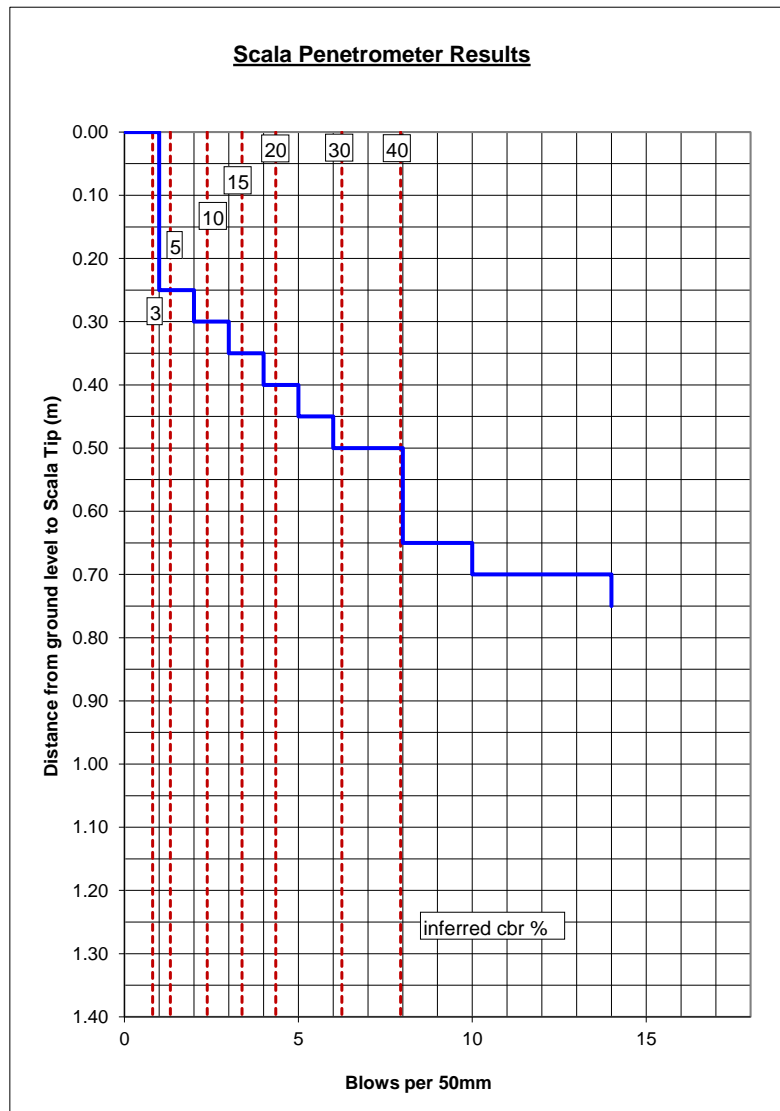
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 46

Scala No: SCP31
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
1	2	6	4	0.20
1	2	6	5	0.25
2	4	12	7	0.30
3	6	18	10	0.35
4	8	24	14	0.40
5	10	30	19	0.45
6	12	36	25	0.50
8	16	48	33	0.55
8	16	48	41	0.60
8	16	48	49	0.65
10	20	60	59	0.70
14	28	84	73	0.75



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

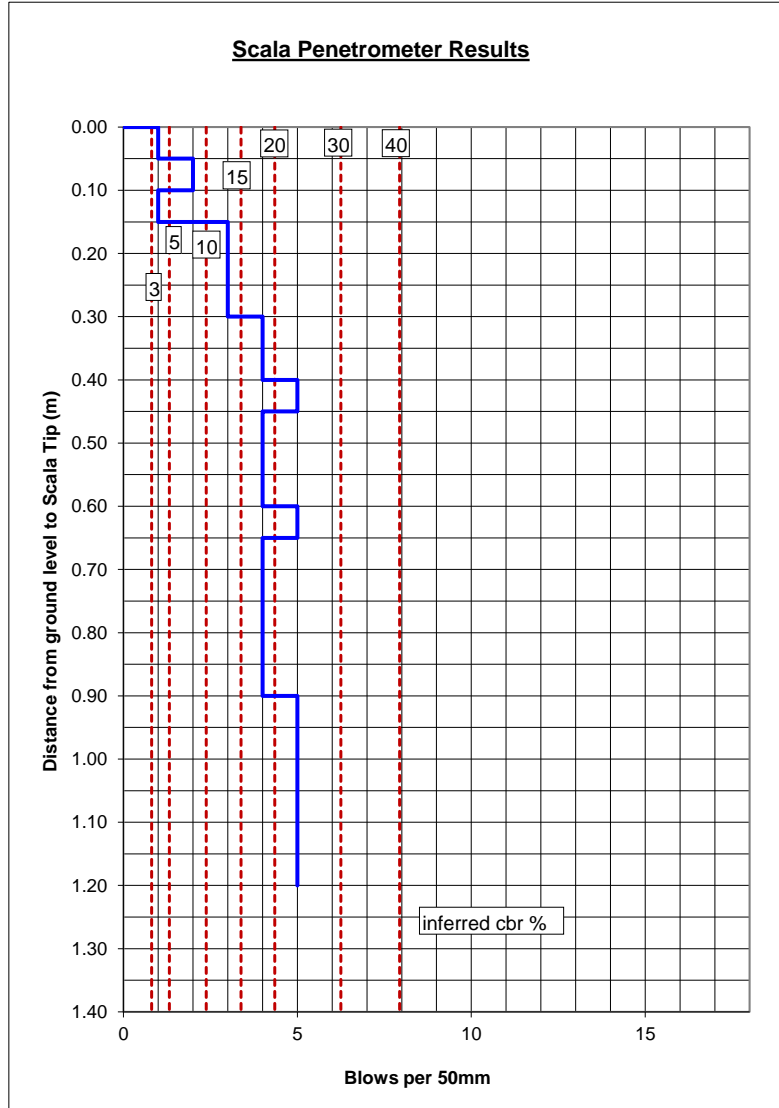
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 40

Scala No: SCP32
Ref : -
Report No: WRE8020-1727-R004
Page: 32 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
1	2	6	4	0.15
3	6	18	7	0.20
3	6	18	10	0.25
3	6	18	13	0.30
4	8	24	17	0.35
4	8	24	21	0.40
5	10	30	26	0.45
4	8	24	30	0.50
4	8	24	34	0.55
4	8	24	38	0.60
5	10	30	43	0.65
4	8	24	47	0.70
4	8	24	51	0.75
4	8	24	55	0.80
4	8	24	59	0.85
4	8	24	63	0.90
5	10	30	68	0.95
5	10	30	73	1.00
5	10	30	78	1.05
5	10	30	83	1.10
5	10	30	88	1.15
5	10	30	93	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

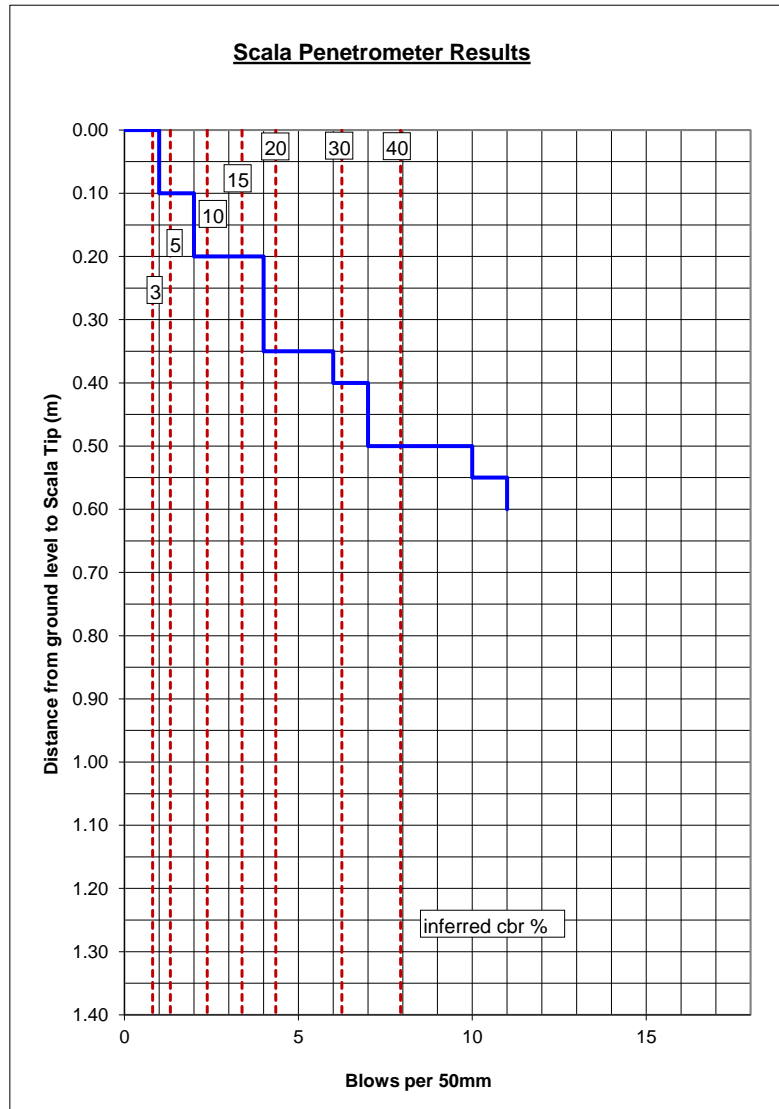
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 56

Scala No: SCP33
Ref : -
Report No: WRE8020-1727-R004
Page: 33 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
4	8	24	10	0.25
4	8	24	14	0.30
4	8	24	18	0.35
6	12	36	24	0.40
7	14	42	31	0.45
7	14	42	38	0.50
10	20	60	48	0.55
11	22	66	59	0.60



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

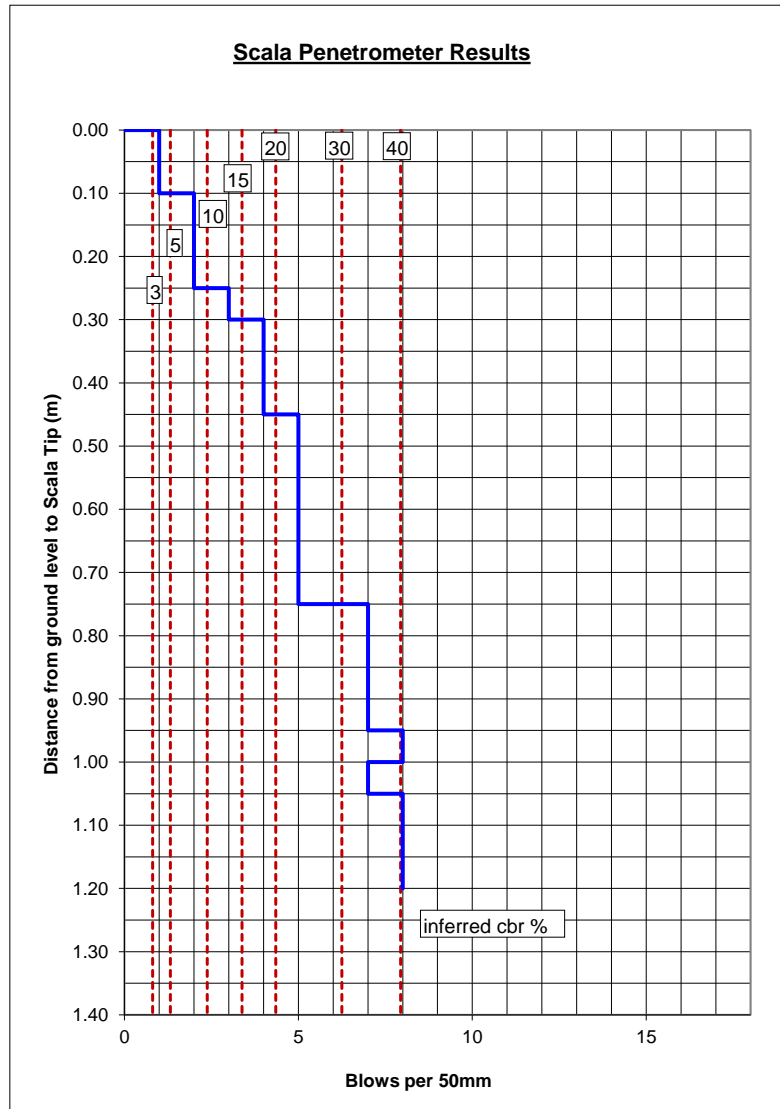
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 65

Scala No: SCP34
Ref : -
Report No: WRE8020-1727-R004
Page: 34 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
2	4	12	8	0.25
3	6	18	11	0.30
4	8	24	15	0.35
4	8	24	19	0.40
4	8	24	23	0.45
5	10	30	28	0.50
5	10	30	33	0.55
5	10	30	38	0.60
5	10	30	43	0.65
5	10	30	48	0.70
5	10	30	53	0.75
7	14	42	60	0.80
7	14	42	67	0.85
7	14	42	74	0.90
7	14	42	81	0.95
8	16	48	89	1.00
7	14	42	96	1.05
8	16	48	104	1.10
8	16	48	112	1.15
8	16	48	120	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

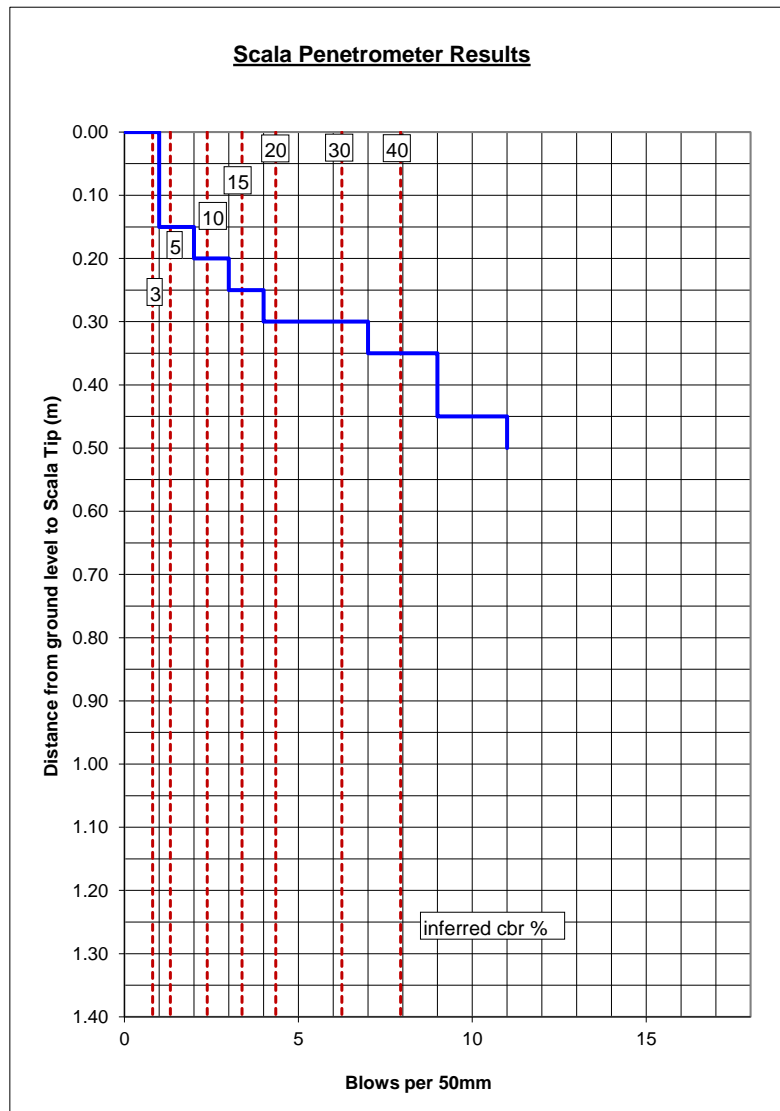
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 63

Scala No: SCP35
Ref : -
Report No: WRE8020-1727-R004
Page: 35 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
3	6	18	8	0.25
4	8	24	12	0.30
7	14	42	19	0.35
9	18	54	28	0.40
9	18	54	37	0.45
11	22	66	48	0.50



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

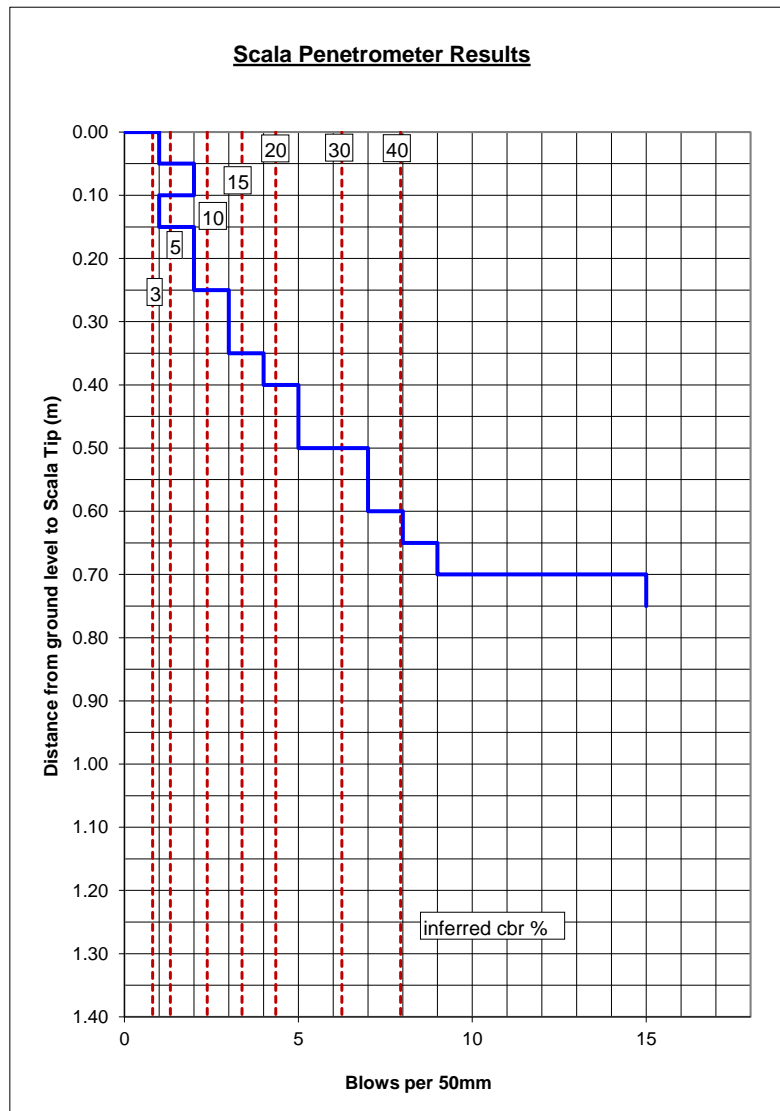
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 48

Scala No: SCP36
Ref : -
Report No: WRE8020-1727-R004
Page: 36 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
1	2	6	4	0.15
2	4	12	6	0.20
2	4	12	8	0.25
3	6	18	11	0.30
3	6	18	14	0.35
4	8	24	18	0.40
5	10	30	23	0.45
5	10	30	28	0.50
7	14	42	35	0.55
7	14	42	42	0.60
8	16	48	50	0.65
9	18	54	59	0.70
15	30	90	74	0.75



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

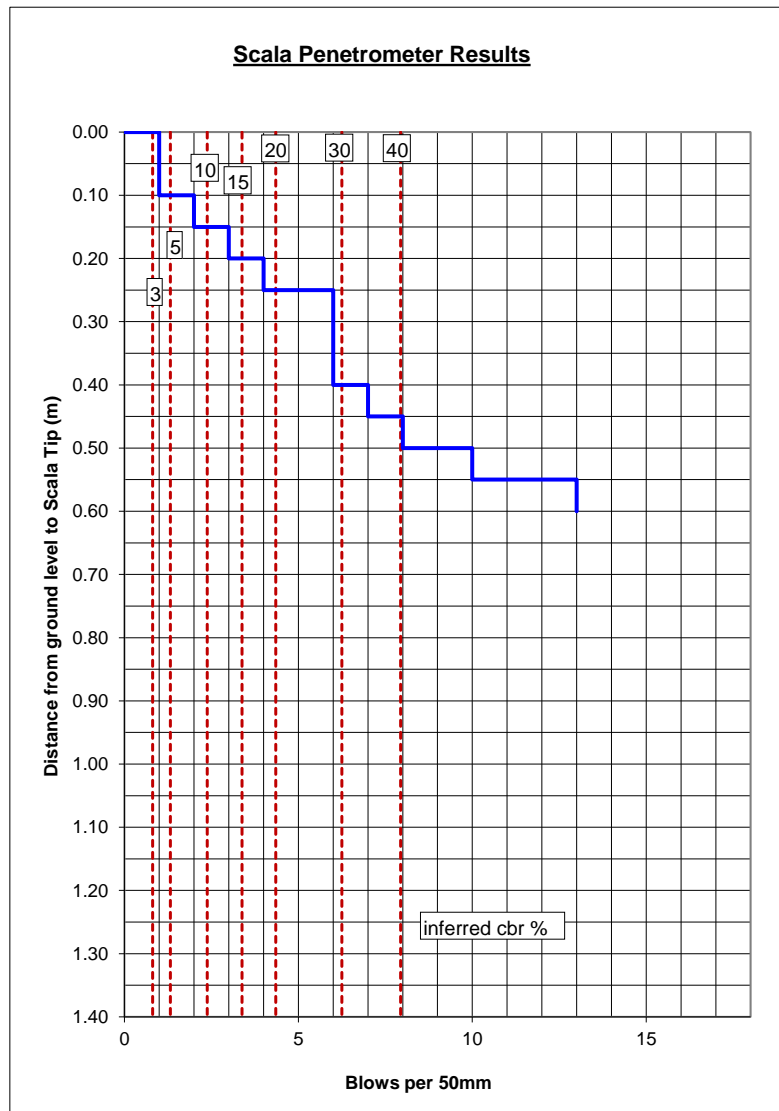
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 57

Scala No: SCP37
Ref : -
Report No: WRE8020-1727-R004
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The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
3	6	18	7	0.20
4	8	24	11	0.25
6	12	36	17	0.30
6	12	36	23	0.35
6	12	36	29	0.40
7	14	42	36	0.45
8	16	48	44	0.50
10	20	60	54	0.55
13	26	78	67	0.60



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

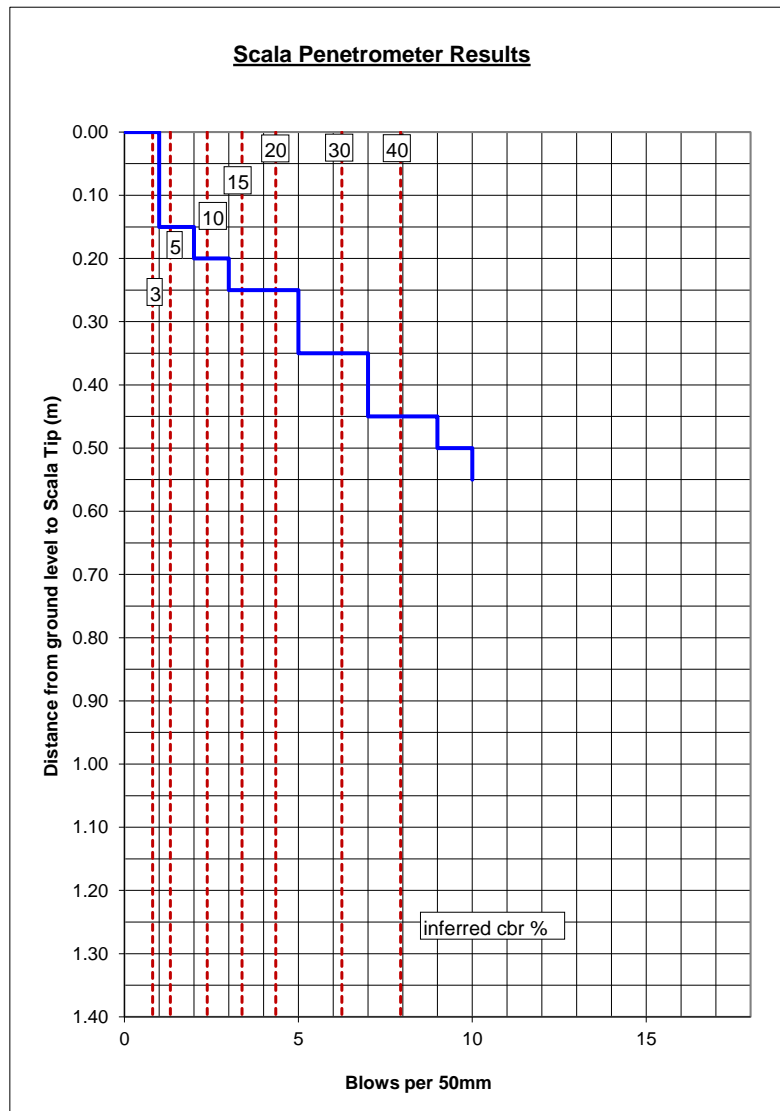
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 50

Scala No: SCP38
Ref : -
Report No: WRE8020-1727-R004
Page: 38 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
3	6	18	8	0.25
5	10	30	13	0.30
5	10	30	18	0.35
7	14	42	25	0.40
7	14	42	32	0.45
9	18	54	41	0.50
10	20	60	51	0.55



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

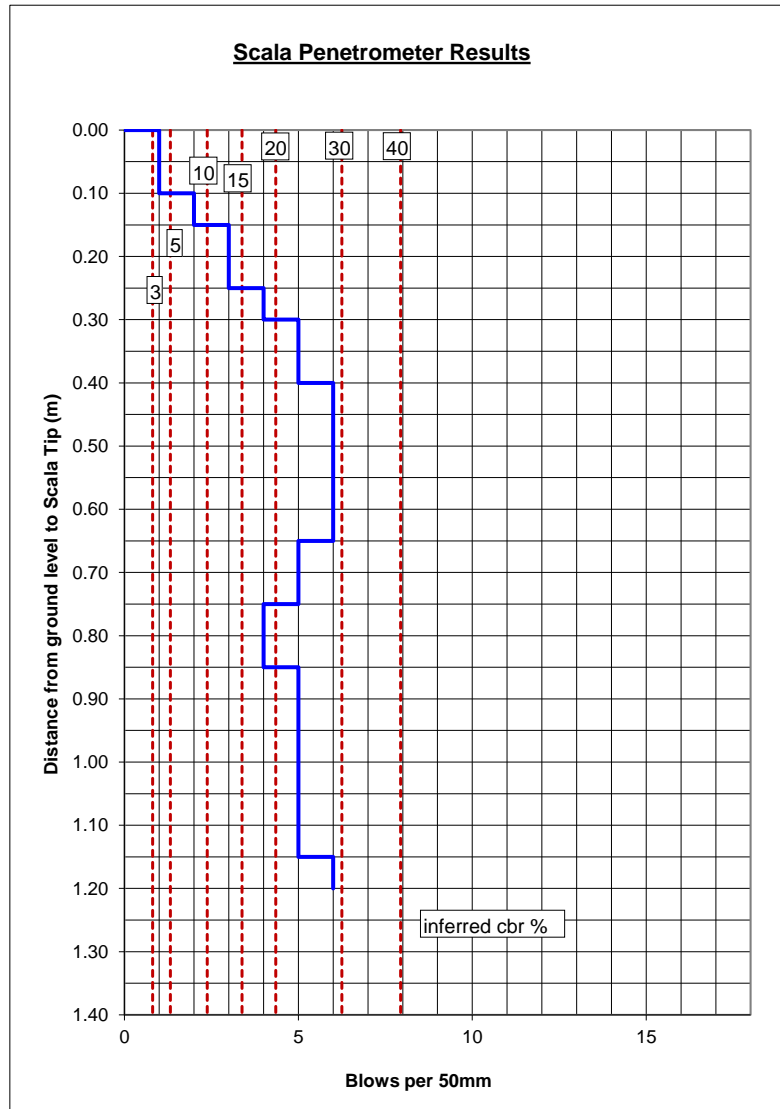
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 61

Scala No: SCP39
Ref : -
Report No: WRE8020-1727-R004
Page: 39 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
3	6	18	7	0.20
3	6	18	10	0.25
4	8	24	14	0.30
5	10	30	19	0.35
5	10	30	24	0.40
6	12	36	30	0.45
6	12	36	36	0.50
6	12	36	42	0.55
6	12	36	48	0.60
6	12	36	54	0.65
5	10	30	59	0.70
5	10	30	64	0.75
4	8	24	68	0.80
4	8	24	72	0.85
5	10	30	77	0.90
5	10	30	82	0.95
5	10	30	87	1.00
5	10	30	92	1.05
5	10	30	97	1.10
5	10	30	102	1.15
6	12	36	108	1.20



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

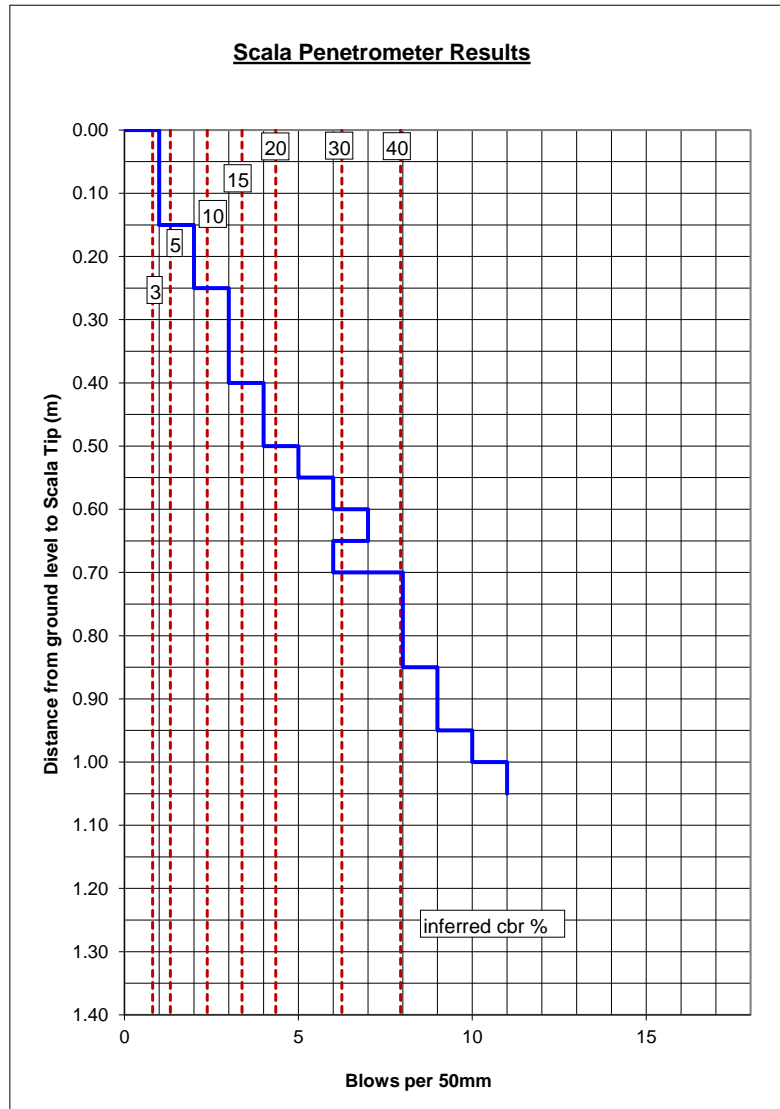
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 38

Scala No: SCP40
Ref : -
Report No: WRE8020-1727-R004
Page: 40 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
1	2	6	3	0.15
2	4	12	5	0.20
2	4	12	7	0.25
3	6	18	10	0.30
3	6	18	13	0.35
3	6	18	16	0.40
4	8	24	20	0.45
4	8	24	24	0.50
5	10	30	29	0.55
6	12	36	35	0.60
7	14	42	42	0.65
6	12	36	48	0.70
8	16	48	56	0.75
8	16	48	64	0.80
8	16	48	72	0.85
9	18	54	81	0.90
9	18	54	90	0.95
10	20	60	100	1.00
11	22	66	111	1.05



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

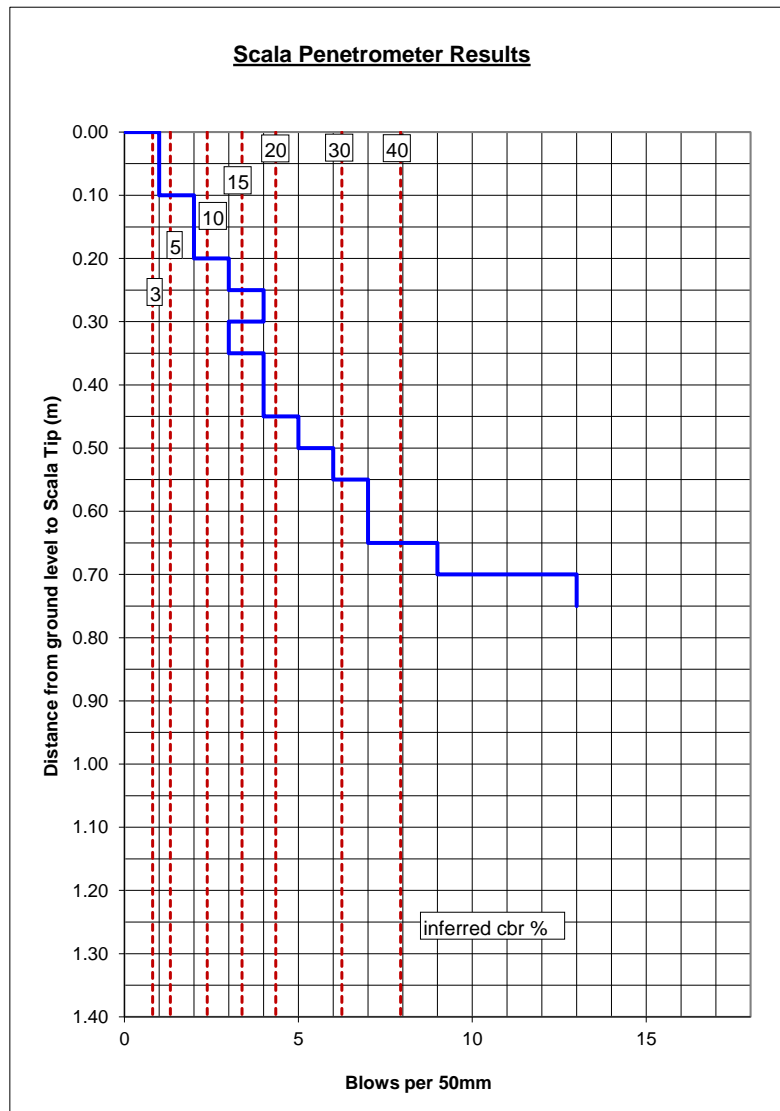
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 59

Scala No: SCP41
Ref : -
Report No: WRE8020-1727-R004
Page: 41 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
1	2	6	2	0.10
2	4	12	4	0.15
2	4	12	6	0.20
3	6	18	9	0.25
4	8	24	13	0.30
3	6	18	16	0.35
4	8	24	20	0.40
4	8	24	24	0.45
5	10	30	29	0.50
6	12	36	35	0.55
7	14	42	42	0.60
7	14	42	49	0.65
9	18	54	58	0.70
13	26	78	71	0.75



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

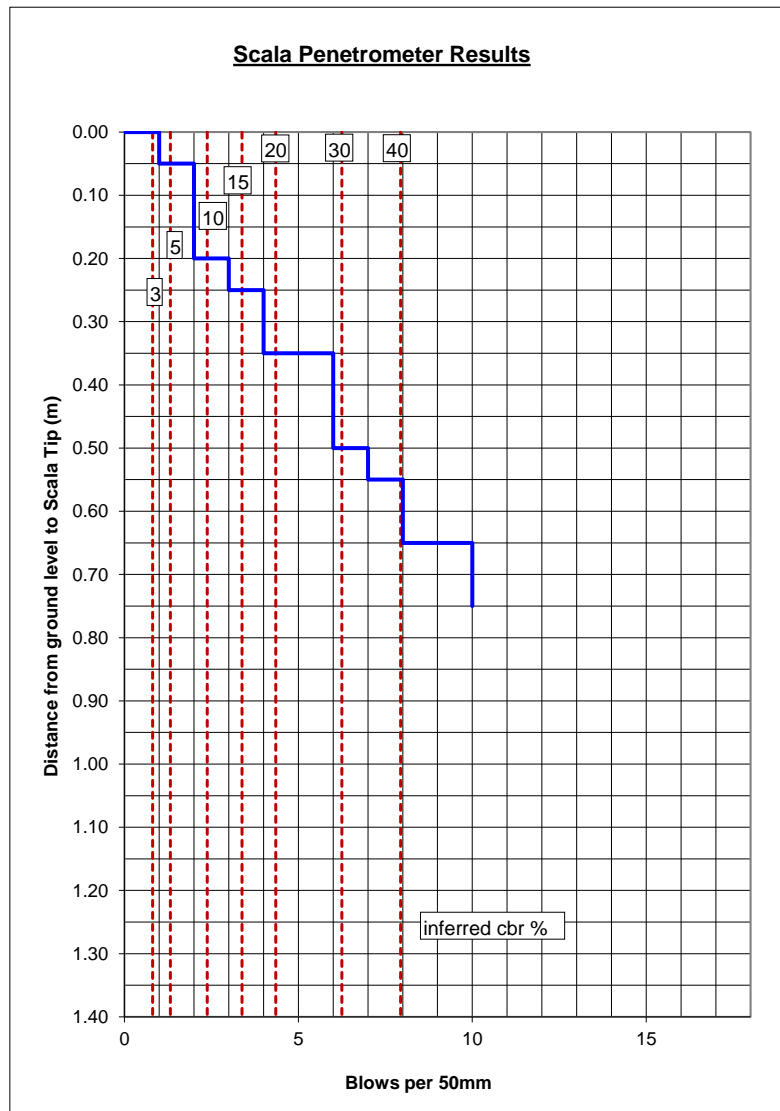
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: Cook Costello
Job: The Landing
Location: Stage 6-7, fill testing
Start Depth (m): 0.00
LWD (MPa): 37

Scala No: SCP42
Ref : -
Report No: WRE8020-1727-R004
Page: 42 of 42

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.00
1	2	6	1	0.05
2	4	12	3	0.10
2	4	12	5	0.15
2	4	12	7	0.20
3	6	18	10	0.25
4	8	24	14	0.30
4	8	24	18	0.35
6	12	36	24	0.40
6	12	36	30	0.45
6	12	36	36	0.50
7	14	42	43	0.55
8	16	48	51	0.60
8	16	48	59	0.65
10	20	60	69	0.70
10	20	60	79	0.75



Recorded By: L.C / D.O
Date: 16/12/2021
Checked by: A.M
Date: 12/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 14/02/2022
Date of Re-Issue: -
Page: 1 of 17

Test Report No.
WRE8020-1727-R005

PROJECT: The Landing - Stage 6/7 Scala and LWD Testing 13-14/01/22

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Light Weight Deflectometer (LWD) (Not accredited)
ASTM E2835-11 (Not accredited)
Determination of the penetration resistance using a dynamic cone (scala) Penetrometer
NZS 4402: 1988 Test 6.5.2

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets



A. Millar

Administrator



S. Kokich

Approved Signatory



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727	Tested By: A.B
Client: CCL	Date: 14/01/2022
Job: The Landing Stage 6 - 7	Checked By: A.M
Location: Ruakaka	Date: 27/01/2022
Report No: WRE8020-1727-R005	Page: 2 of 17
Ref: -	

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
14/01/2022	SCB17	108.7	Retest	300
14/01/2022	SCB18	51.6	Retest	300

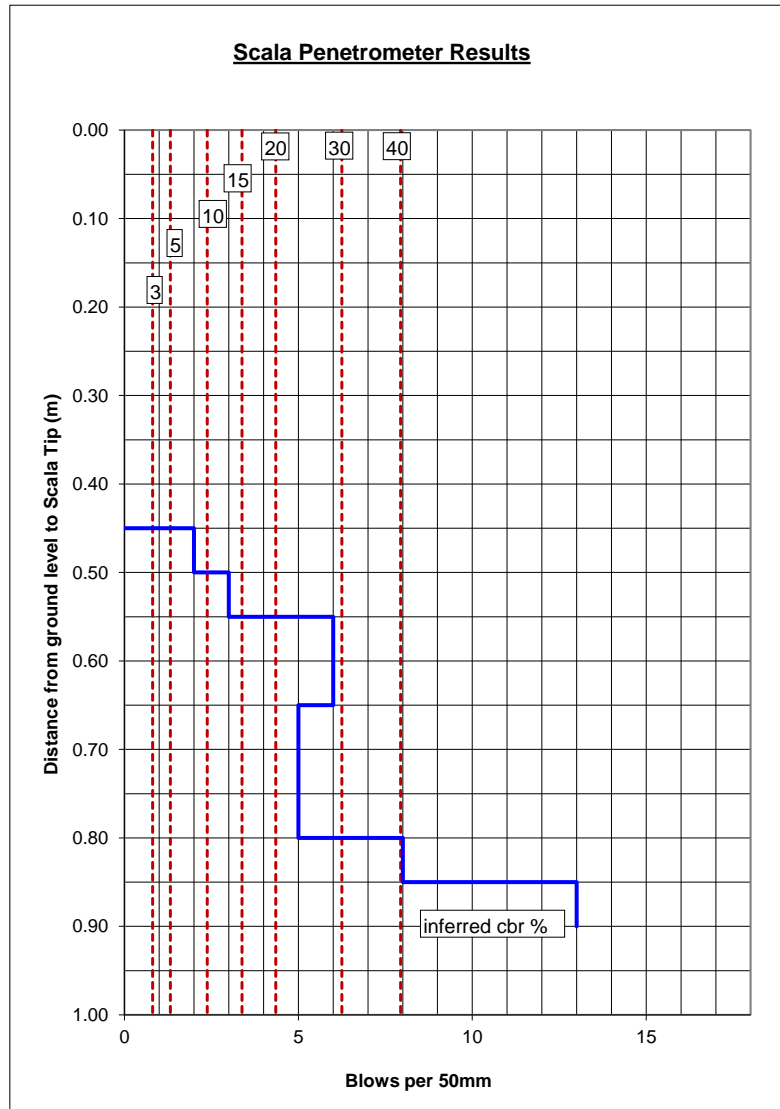
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.45
LWD (Mpa): 100.9

Scala No: SCP 43
Ref : -
Report No: WRE8020-1727-R005
Page: 3 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.45
2	4	12	2	0.50
3	6	18	5	0.55
6	12	36	11	0.60
6	12	36	17	0.65
5	10	30	22	0.70
5	10	30	27	0.75
5	10	30	32	0.80
8	16	48	40	0.85
13	26	78	53	0.90



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

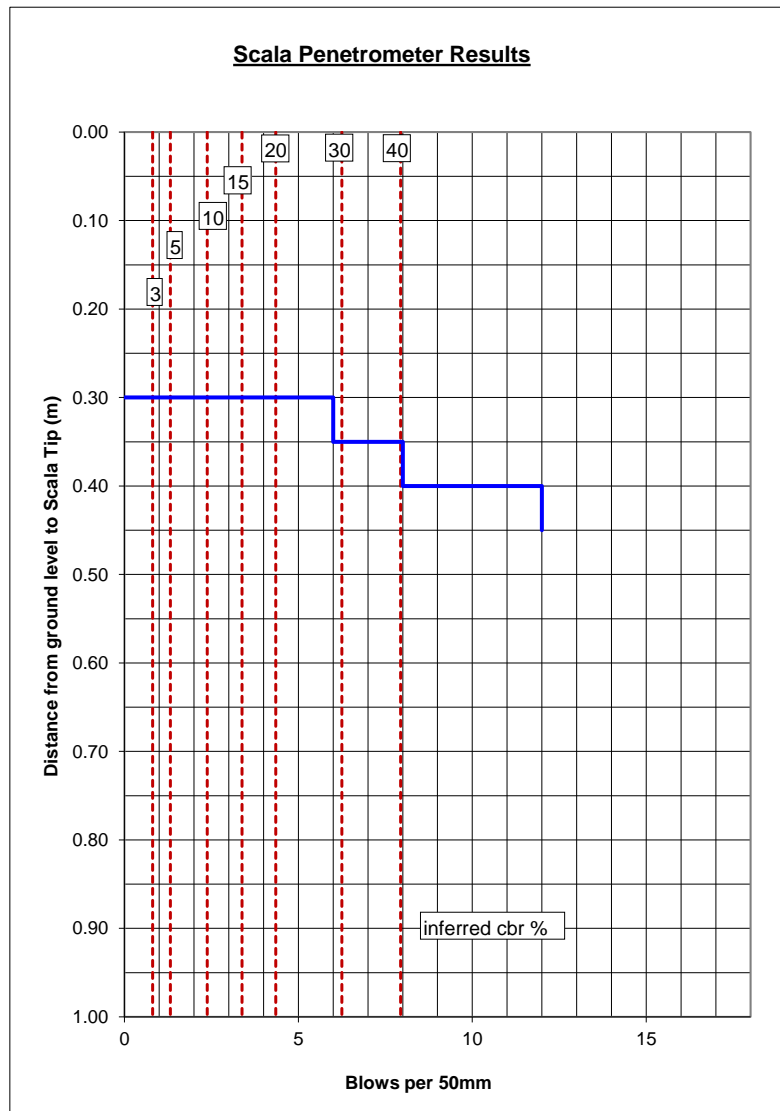
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.3
LWD (Mpa): 148

Scala No: SCP 44
Ref : -
Report No: WRE8020-1727-R005
Page: 4 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.30
6	12	36	6	0.35
8	16	48	14	0.40
12	24	72	26	0.45



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

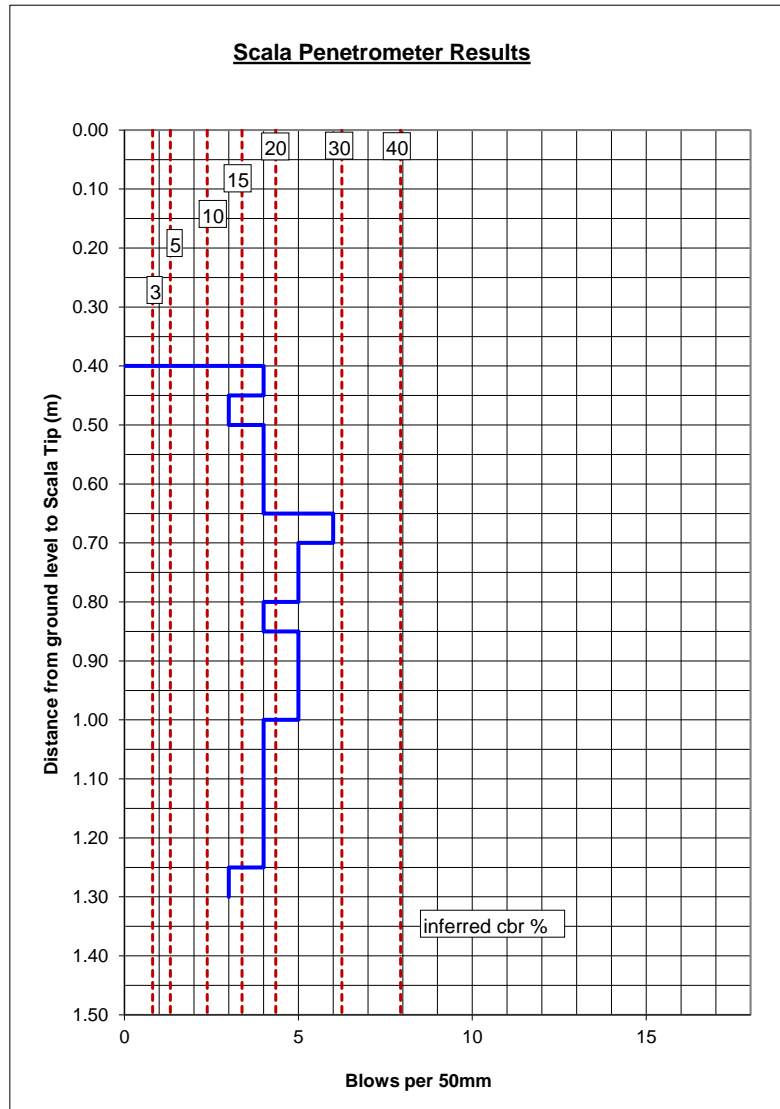
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.4
LWD (Mpa): 65.8

Scala No: SCP 45
Ref : -
Report No: WRE8020-1727-R005
Page: 5 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.40
4	8	24	4	0.45
3	6	18	7	0.50
4	8	24	11	0.55
4	8	24	15	0.60
4	8	24	19	0.65
6	12	36	25	0.70
5	10	30	30	0.75
5	10	30	35	0.80
4	8	24	39	0.85
5	10	30	44	0.90
5	10	30	49	0.95
5	10	30	54	1.00
4	8	24	58	1.05
4	8	24	62	1.10
4	8	24	66	1.15
4	8	24	70	1.20
4	8	24	74	1.25
3	6	18	77	1.30



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

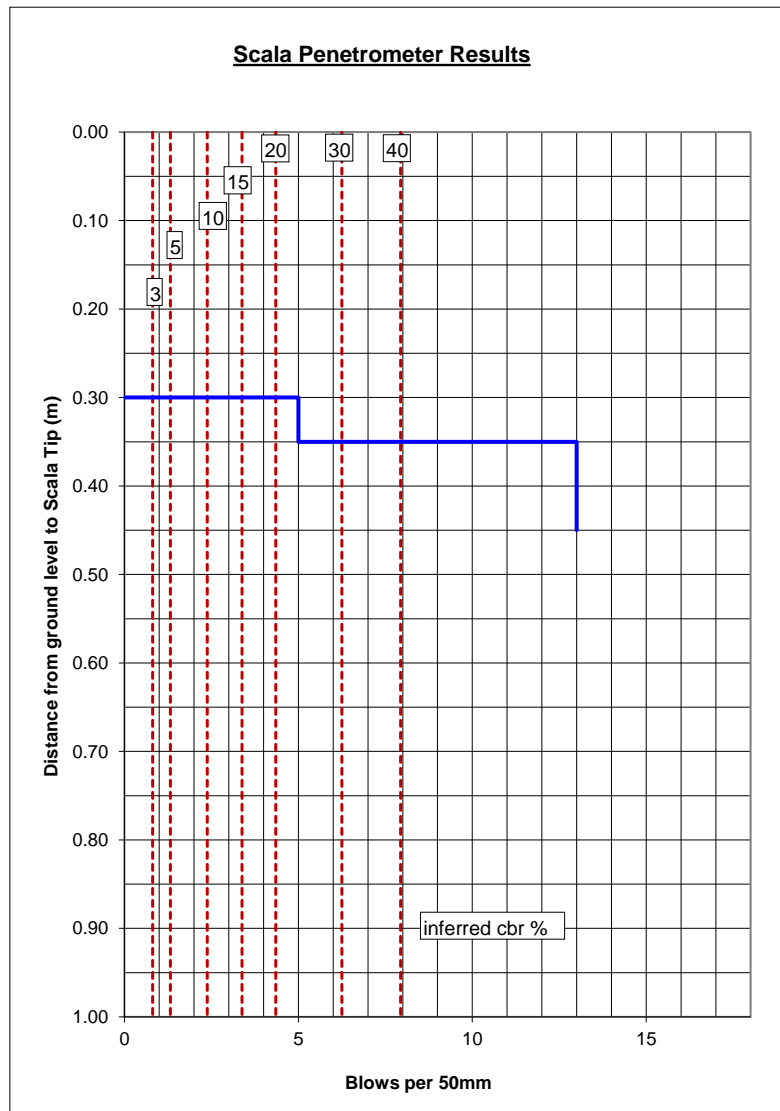
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.3
LWD (Mpa): 100.5

Scala No: SCP 46
Ref : -
Report No: WRE8020-1727-R005
Page: 6 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.30
5	10	30	5	0.35
13	26	78	18	0.40
13	26	78	31	0.45



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

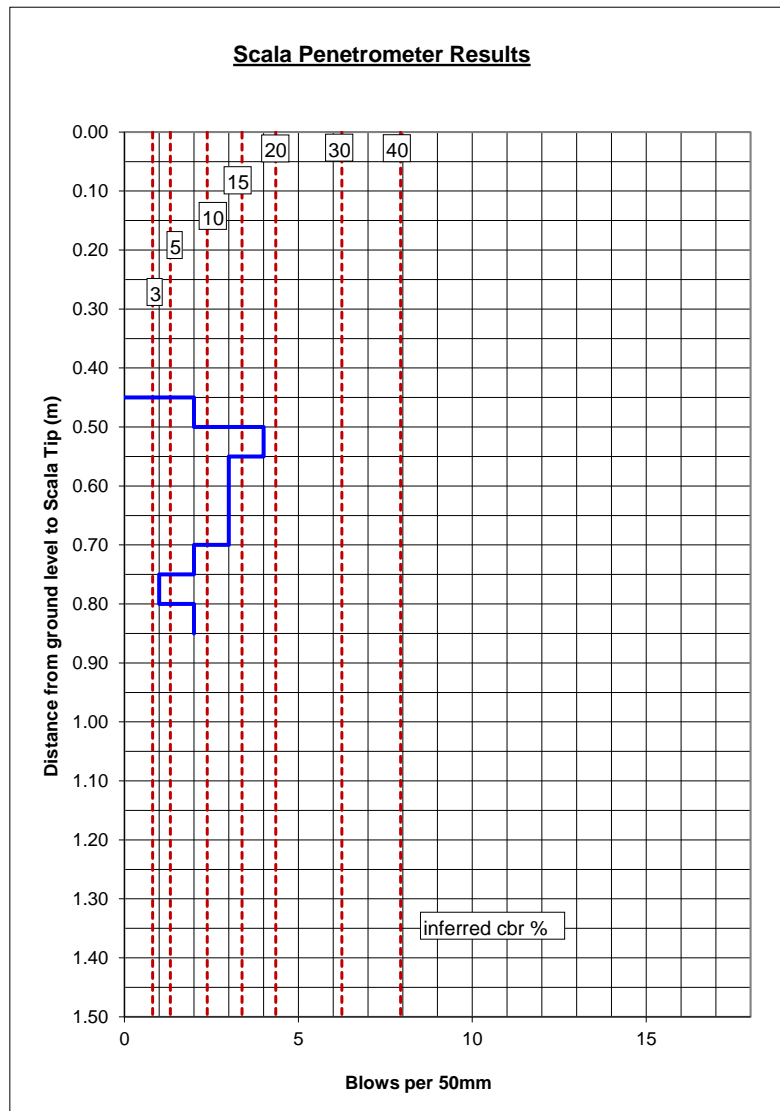
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.45
LWD (Mpa): 50.9

Scala No: SCP 47
Ref : -
Report No: WRE8020-1727-R005
Page: 7 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.45
2	4	12	2	0.50
4	8	24	6	0.55
3	6	18	9	0.60
3	6	18	12	0.65
3	6	18	15	0.70
2	4	12	17	0.75
1	2	6	18	0.80
2	4	12	20	0.85
1	2	6	21	0.90
2	4	12	23	0.95
3	6	18	26	1.00
3	6	18	29	1.05
3	6	18	32	1.10
4	8	24	36	1.15
3	6	18	39	1.20
4	8	24	43	1.25
4	8	24	47	1.30
6	12	36	53	1.35



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

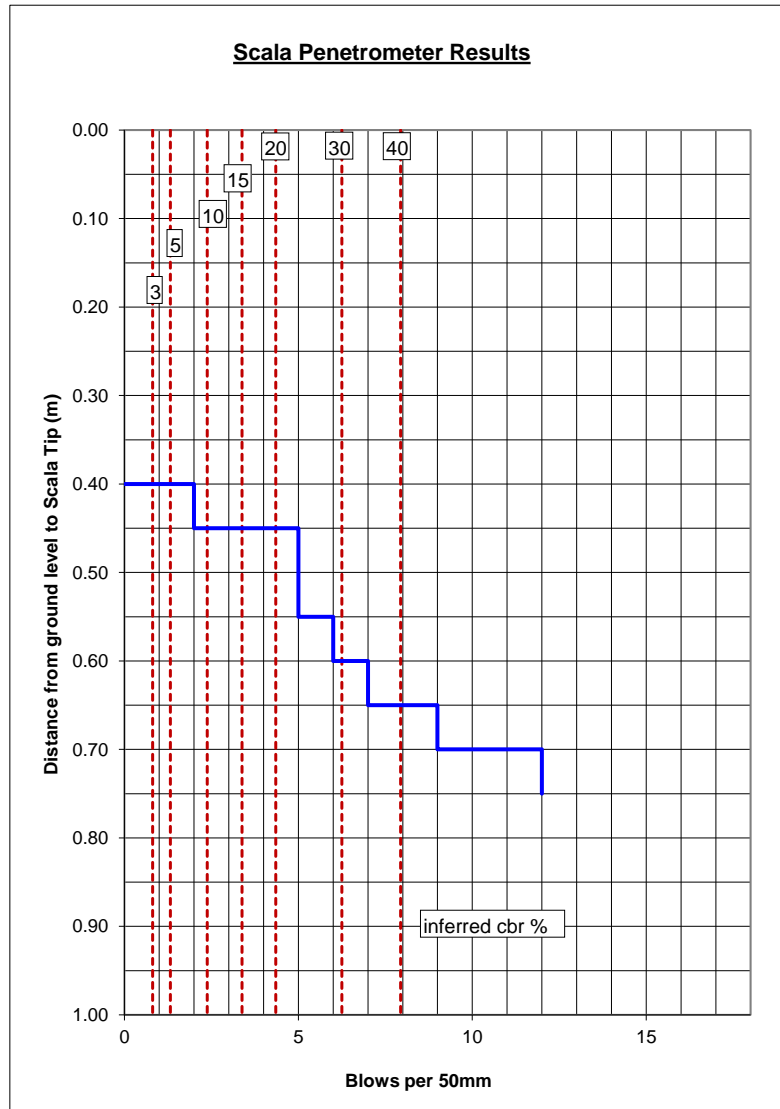
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.4
LWD (Mpa): 112.5

Scala No: SCP 48
Ref : -
Report No: WRE8020-1727-R005
Page: 8 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.40
2	4	12	2	0.45
5	10	30	7	0.50
5	10	30	12	0.55
6	12	36	18	0.60
7	14	42	25	0.65
9	18	54	34	0.70
12	24	72	46	0.75



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

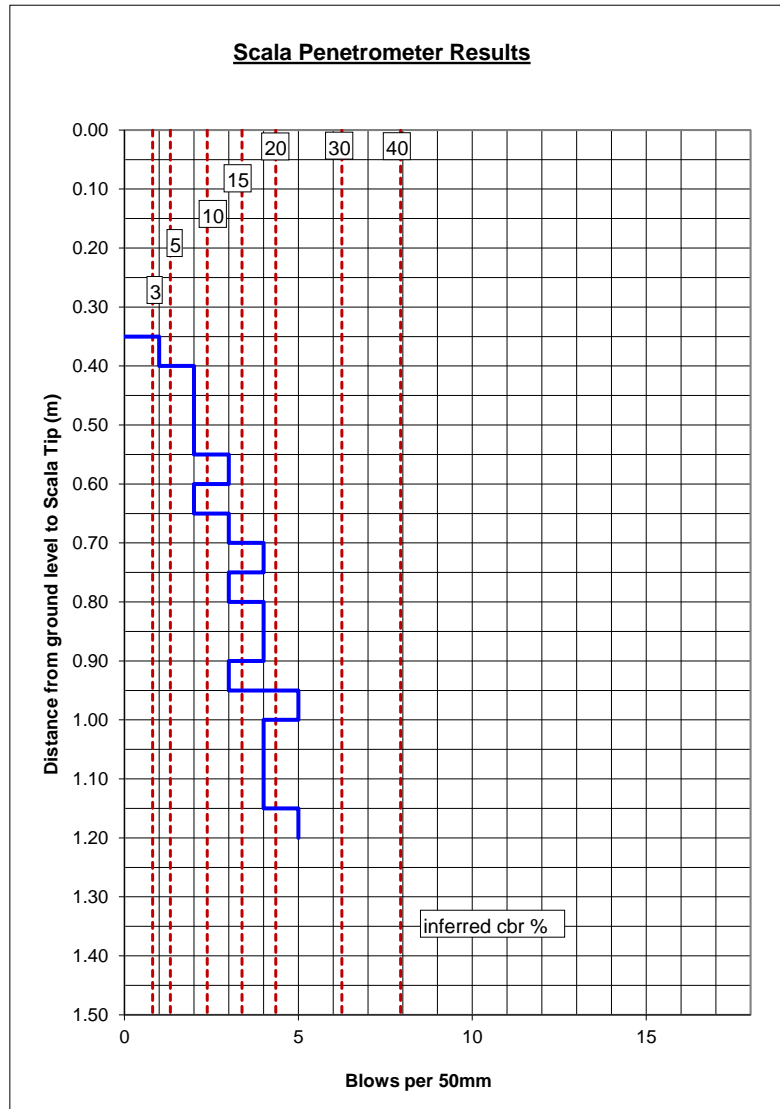
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.35
LWD (Mpa): 86.9

Scala No: SCP 49
Ref : -
Report No: WRE8020-1727-R005
Page: 9 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.35
1	2	6	1	0.40
2	4	12	3	0.45
2	4	12	5	0.50
2	4	12	7	0.55
3	6	18	10	0.60
2	4	12	12	0.65
3	6	18	15	0.70
4	8	24	19	0.75
3	6	18	22	0.80
4	8	24	26	0.85
4	8	24	30	0.90
3	6	18	33	0.95
5	10	30	38	1.00
4	8	24	42	1.05
4	8	24	46	1.10
4	8	24	50	1.15
5	10	30	55	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

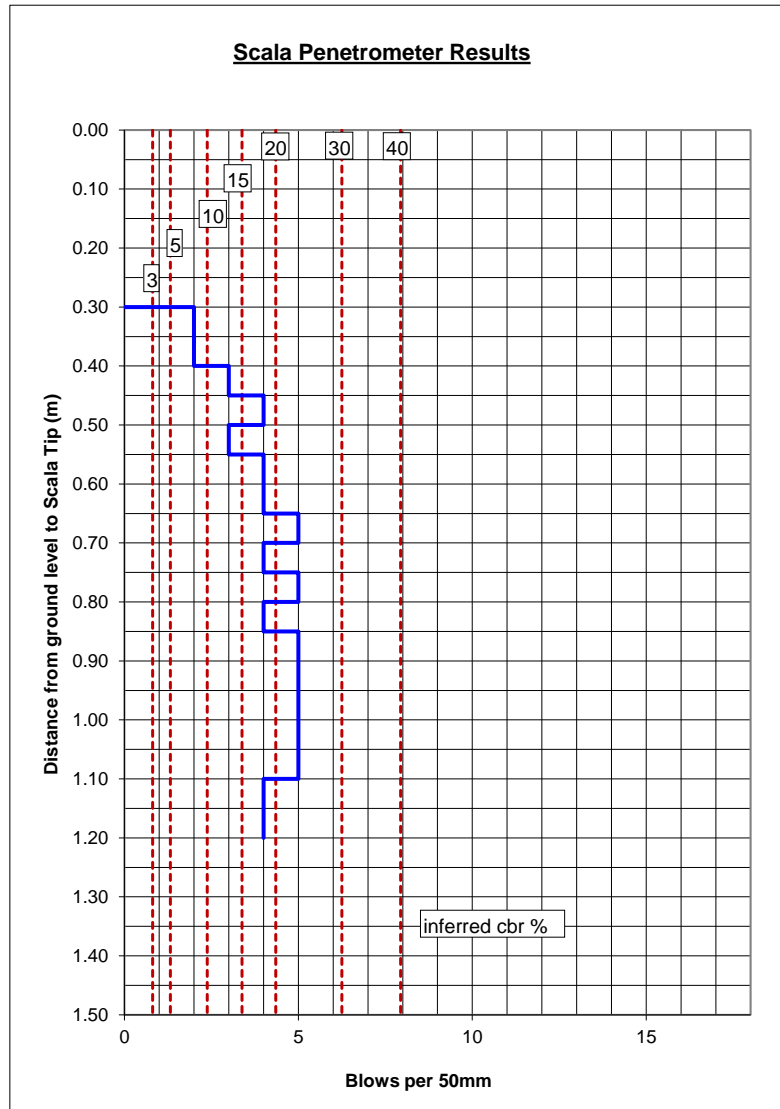
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.3
LWD (Mpa): 103.7

Scala No: SCP 50
Ref : -
Report No: WRE8020-1727-R005
Page: 10 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.30
2	4	12	2	0.35
2	4	12	4	0.40
3	6	18	7	0.45
4	8	24	11	0.50
3	6	18	14	0.55
4	8	24	18	0.60
4	8	24	22	0.65
5	10	30	27	0.70
4	8	24	31	0.75
5	10	30	36	0.80
4	8	24	40	0.85
5	10	30	45	0.90
5	10	30	50	0.95
5	10	30	55	1.00
5	10	30	60	1.05
5	10	30	65	1.10
4	8	24	69	1.15
4	8	24	73	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

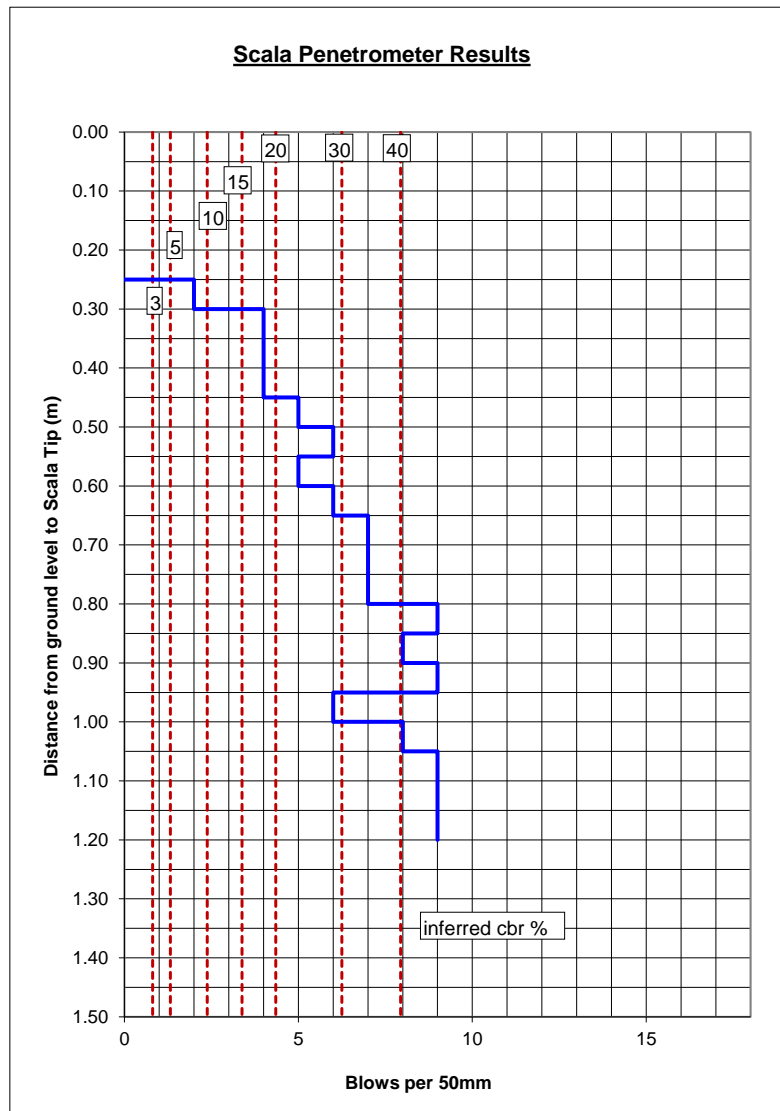
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.25
LWD (Mpa): 101.8

Scala No: SCP 51
Ref : -
Report No: WRE8020-1727-R005
Page: 11 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.25
2	4	12	2	0.30
4	8	24	6	0.35
4	8	24	10	0.40
4	8	24	14	0.45
5	10	30	19	0.50
6	12	36	25	0.55
5	10	30	30	0.60
6	12	36	36	0.65
7	14	42	43	0.70
7	14	42	50	0.75
7	14	42	57	0.80
9	18	54	66	0.85
8	16	48	74	0.90
9	18	54	83	0.95
6	12	36	89	1.00
8	16	48	97	1.05
9	18	54	106	1.10
9	18	54	115	1.15
9	18	54	124	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

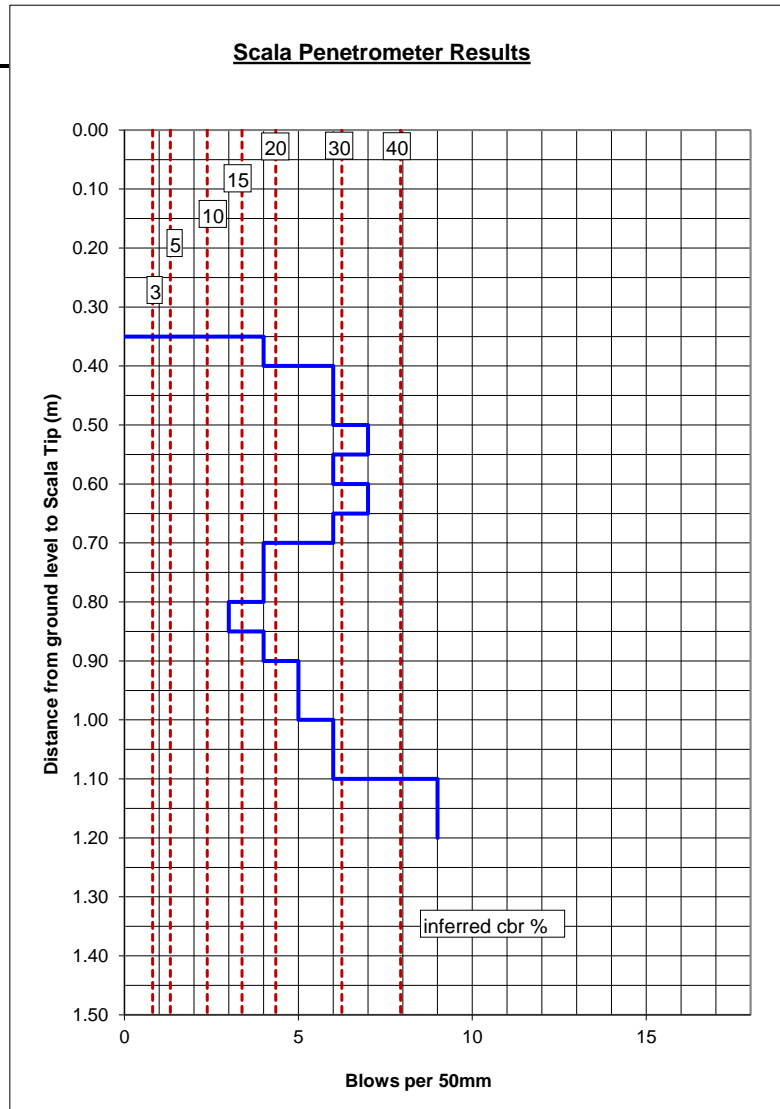
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.35
LWD (Mpa): 131.6

Scala No: SCP 52
Ref : -
Report No: WRE8020-1727-R005
Page: 12 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.35
4	8	24	4	0.40
6	12	36	10	0.45
6	12	36	16	0.50
7	14	42	23	0.55
6	12	36	29	0.60
7	14	42	36	0.65
6	12	36	42	0.70
4	8	24	46	0.75
4	8	24	50	0.80
3	6	18	53	0.85
4	8	24	57	0.90
5	10	30	62	0.95
5	10	30	67	1.00
6	12	36	73	1.05
6	12	36	79	1.10
9	18	54	88	1.15
9	18	54	97	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

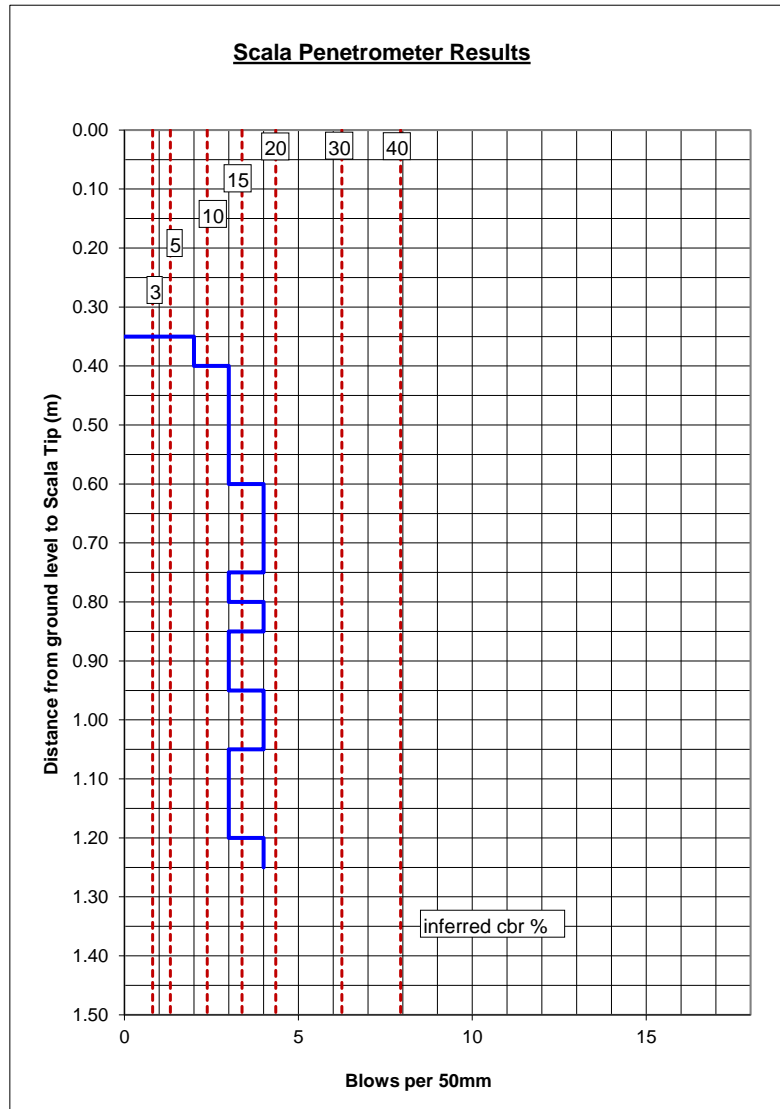
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.35
LWD (Mpa): 86.9

Scala No: SCP 53
Ref : -
Report No: WRE8020-1727-R005
Page: 13 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.35
2	4	12	2	0.40
3	6	18	5	0.45
3	6	18	8	0.50
3	6	18	11	0.55
3	6	18	14	0.60
4	8	24	18	0.65
4	8	24	22	0.70
4	8	24	26	0.75
3	6	18	29	0.80
4	8	24	33	0.85
3	6	18	36	0.90
3	6	18	39	0.95
4	8	24	43	1.00
4	8	24	47	1.05
3	6	18	50	1.10
3	6	18	53	1.15
3	6	18	56	1.20
4	8	24	60	1.25



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

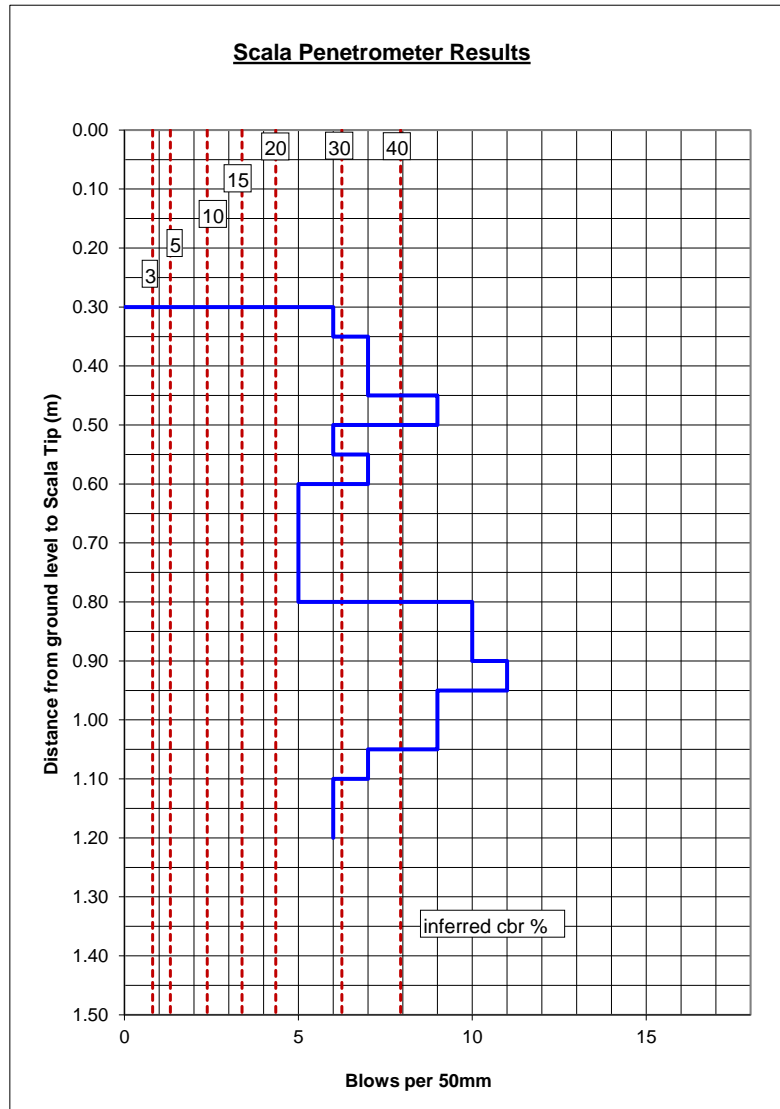
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.3
LWD (Mpa): 69.2

Scala No: SCP 54
Ref : -
Report No: WRE8020-1727-R005
Page: 14 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.30
6	12	36	6	0.35
7	14	42	13	0.40
7	14	42	20	0.45
9	18	54	29	0.50
6	12	36	35	0.55
7	14	42	42	0.60
5	10	30	47	0.65
5	10	30	52	0.70
5	10	30	57	0.75
5	10	30	62	0.80
10	20	60	72	0.85
10	20	60	82	0.90
11	22	66	93	0.95
9	18	54	102	1.00
9	18	54	111	1.05
7	14	42	118	1.10
6	12	36	124	1.15
6	12	36	130	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

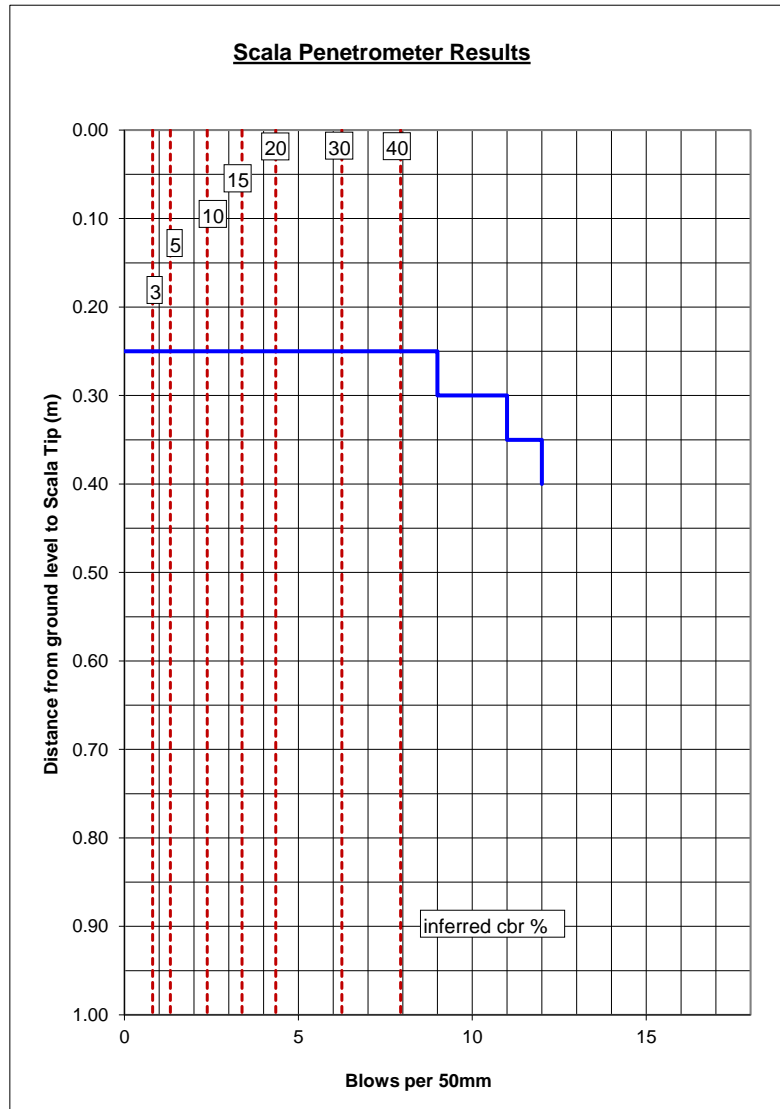
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.25
LWD (Mpa): 90.4

Scala No: SCP 55
Ref : -
Report No: WRE8020-1727-R005
Page: 15 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.25
9	18	54	9	0.30
11	22	66	20	0.35
12	24	72	32	0.40



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

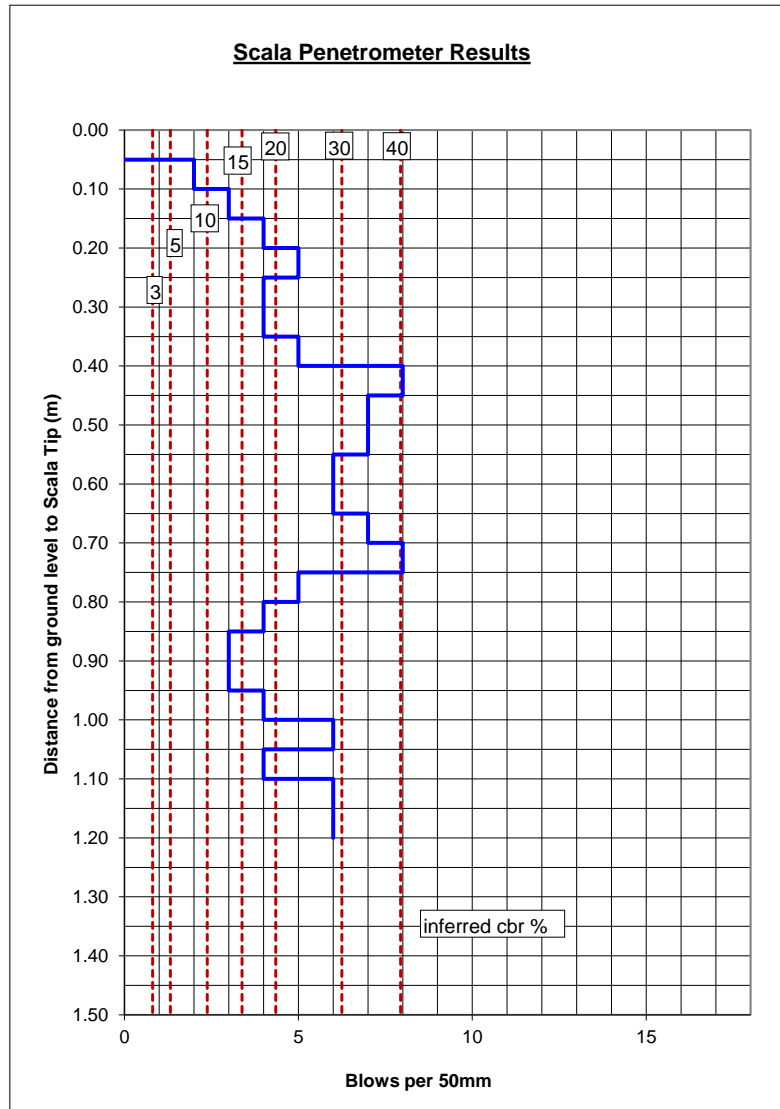
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.05
LWD (Mpa): 62.5

Scala No: SCP 56
Ref : -
Report No: WRE8020-1727-R005
Page: 16 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTRROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
2	4	12	2	0.10
3	6	18	5	0.15
4	8	24	9	0.20
5	10	30	14	0.25
4	8	24	18	0.30
4	8	24	22	0.35
5	10	30	27	0.40
8	16	48	35	0.45
7	14	42	42	0.50
7	14	42	49	0.55
6	12	36	55	0.60
6	12	36	61	0.65
7	14	42	68	0.70
8	16	48	76	0.75
5	10	30	81	0.80
4	8	24	85	0.85
3	6	18	88	0.90
3	6	18	91	0.95
4	8	24	95	1.00
6	12	36	101	1.05
4	8	24	105	1.10
6	12	36	111	1.15
6	12	36	117	1.20



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test

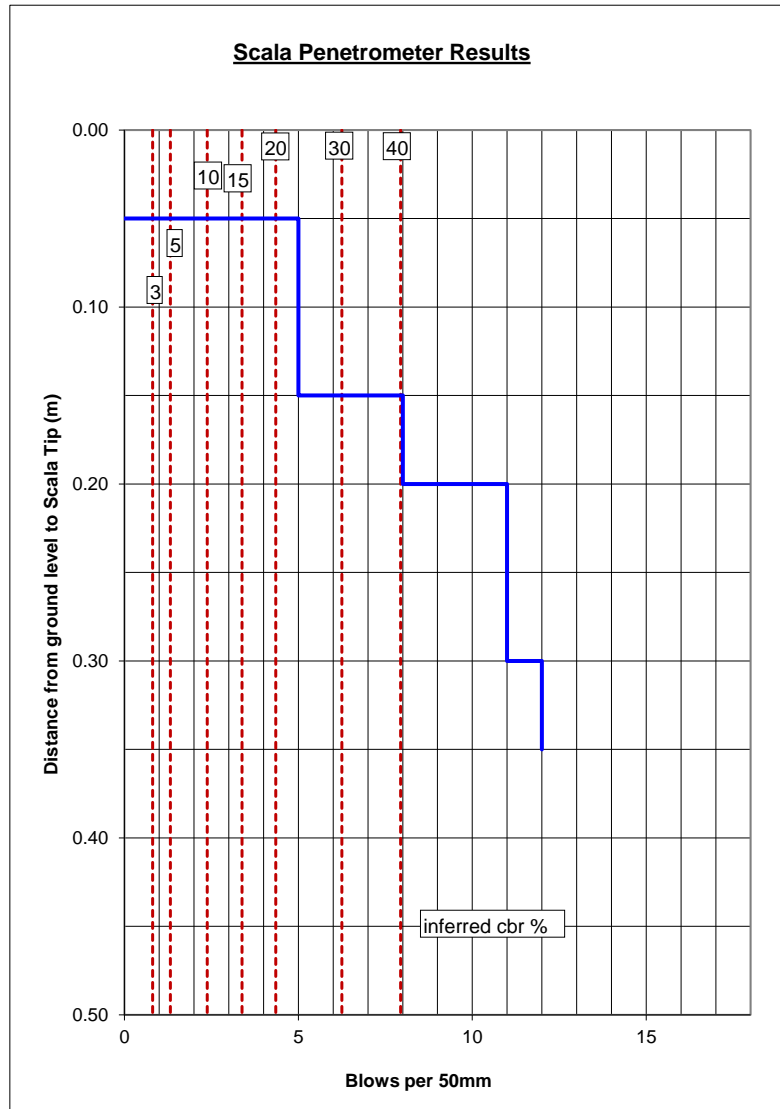
DYNAMIC CONE (SCALA) PENETROMETER
NZS 4402 :1988 Test 6.5.2 Procedure 2

Lab Job No: 8020-1727
Client: CCL
Job: The Landing
Location: Stage 6 & 7
Start Depth (m): 0.05
LWD (Mpa): 71

Scala No: SCP 57
Ref : -
Report No: WRE8020-1727-R005
Page: 17 of 17

The line are the suggested correlation of CBR values based on Figure 5.3, Correlation of Dynamic Cone Penetration and CBR AUSTROADS (2004) "Pavement Design - a guide to the design of road Pavements"
(This comment is excluded from endorsement)

Blows / 50mm	Blows / 100mm	Blows / 300mm	Total Blows	depth (m)
0	0	0	0	0.05
5	10	30	5	0.10
5	10	30	10	0.15
8	16	48	18	0.20
11	22	66	29	0.25
11	22	66	40	0.30
12	24	72	52	0.35



Recorded By: A.B
Date: 13/01/2022
Checked by: A.M
Date: 27/01/2022

Note: All readings taken below 1.5m from start depth are outside the scope of this test



TEST RIGHT • BUILD RIGHT

Whangarei Laboratory
166 Bank Street,
Whangarei
M: 021 0263 7711
E: martin@geocivil.co.nz

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 15/02/2022
Date of Re-Issue: -
Page: 1 of 2

Test Report No.
WRE8020-1727-R006

PROJECT: The Landing - LWD Testing 21/01/2022

CLIENT: Cook Costello
2 Norfolk Street,
Whangarei 0110

ATTENTION: Stefano Rotatori

TEST METHODS: Light Weight Deflectometer (LWD)
ASTM E2835-11

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

A. Brooke

Laboratory Technician

S. Kokich

Senior Technician

LIGHTWEIGHT DEFLECTOMETER READINGS
ASTM E2583-07 (2015)

Lab Job No.: 8020-1727	Tested By: D.O
Client: CCL	Date: 21/01/2022
Job: The Landing Stage 6 - 7	Checked By: A.B
Location: Ruakaka	Date: 9/02/2022
Report No.: WRE8020-1727-R006	Page: 2 of 2
Ref: -	

Date	Location	Evd (MPa)	Comments	Approximate Depth of Excavation (mm)
21/01/2022	SCB22	126.4	Retest	300
21/01/2022	SCB23	86.2	Retest	300
21/01/2022	SCB24	85.9	Retest	300
21/01/2022	SCB25	89.3	Retest	300
21/01/2022	SCB26	82.4	Retest	300
21/01/2022	SCB21	115.4	Retest	300



DYNAMIC CONE (SCALA) PENETROMETER

Test 23 / NZS 4402 : 1988 Test 6.5.2

Job: 14333-009

Client: WFH Properties

Date: 10/08/2022

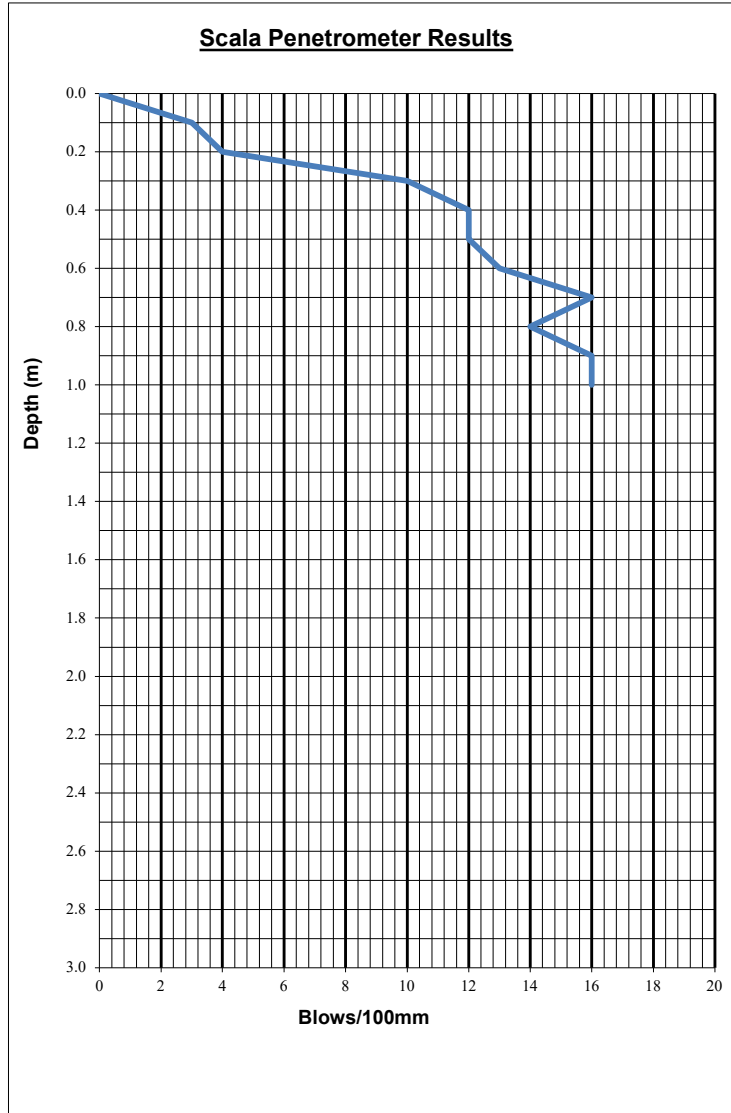
Location: Stage 7 Landings Subdivision

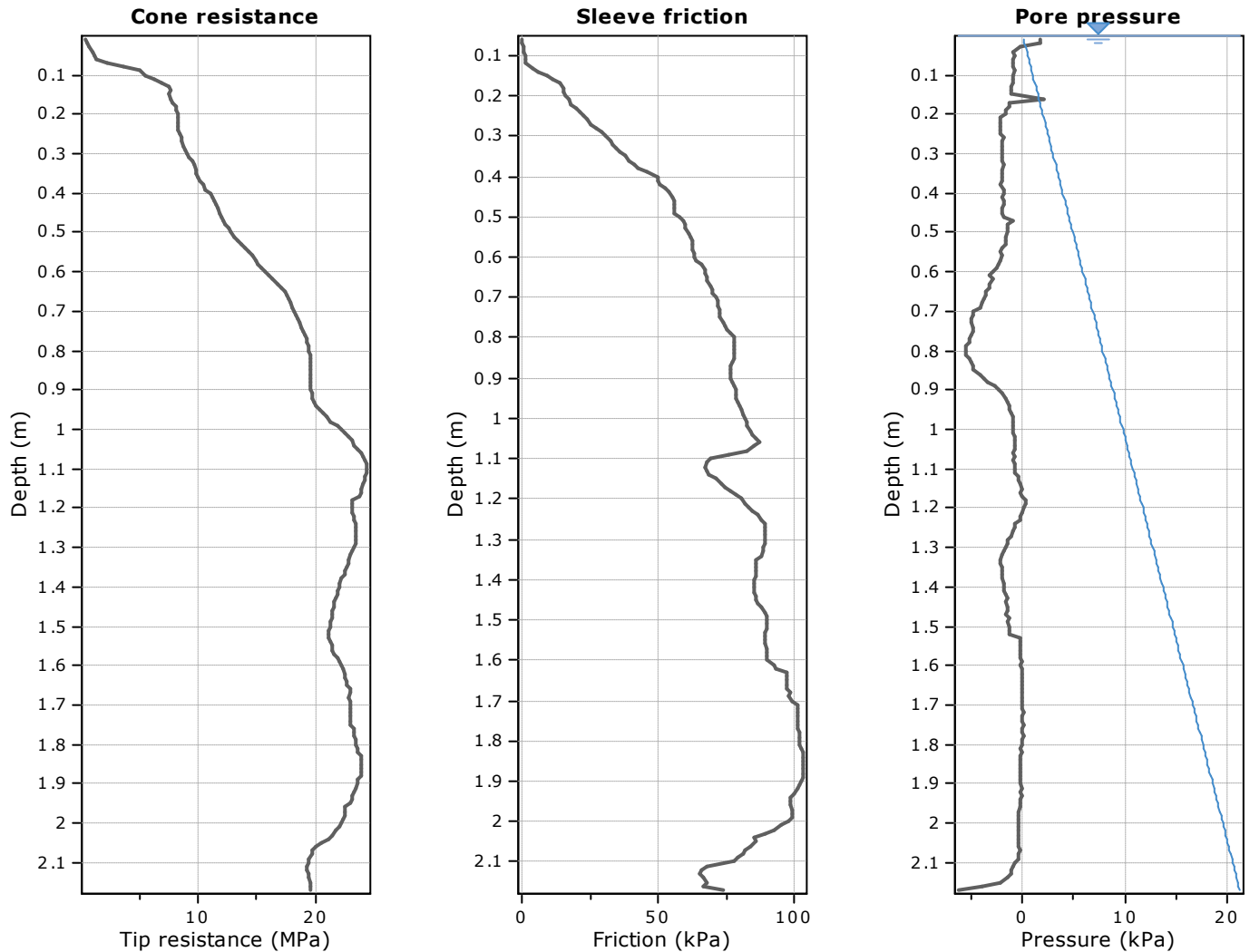
Scala No.: SR8 (Lot 210 re-test)

Tested by: NM/JP

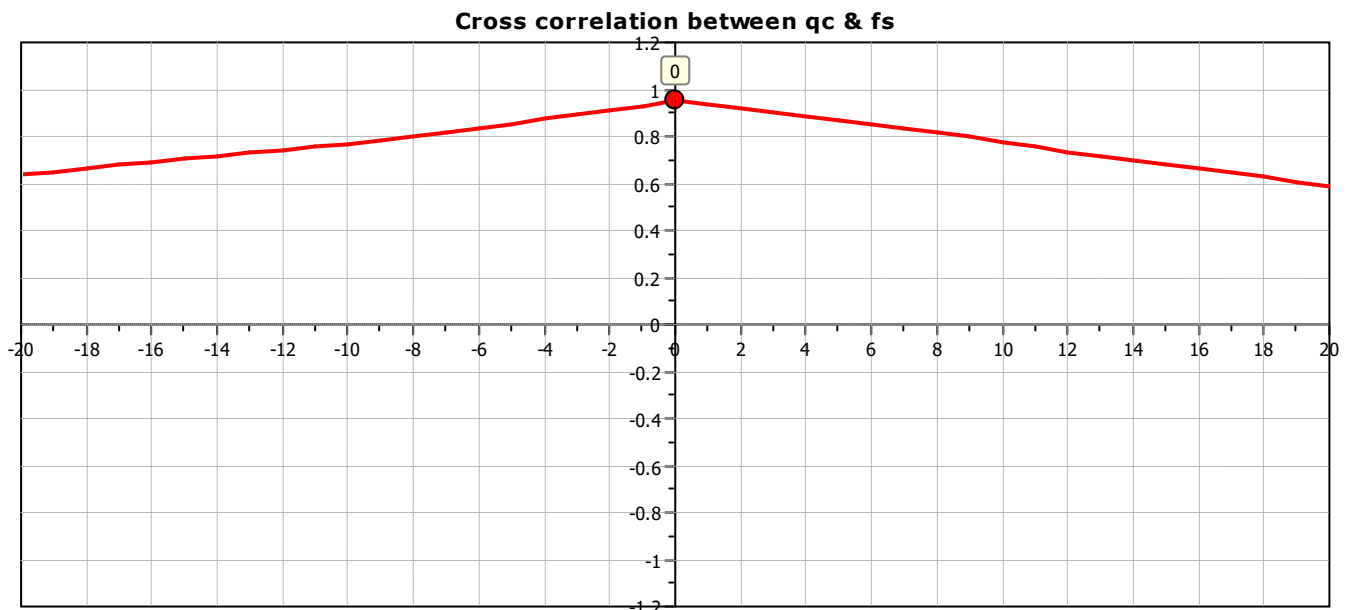
Logged by: NM/JP

blows/100 mm	depth (m)
0	0.0
3	0.10
4	0.20
10	0.3
12	0.40
12	0.50
13	0.6
16	0.70
14	0.80
16	0.9
16	1.00
	1.10
	1.2
	1.30
	1.40
	1.5
	1.60
	1.70
	1.8
	1.90
	2.00
	2.1
	2.20
	2.30
	2.4
	2.50
	2.60
	2.7
	2.80
	2.90
	3.0

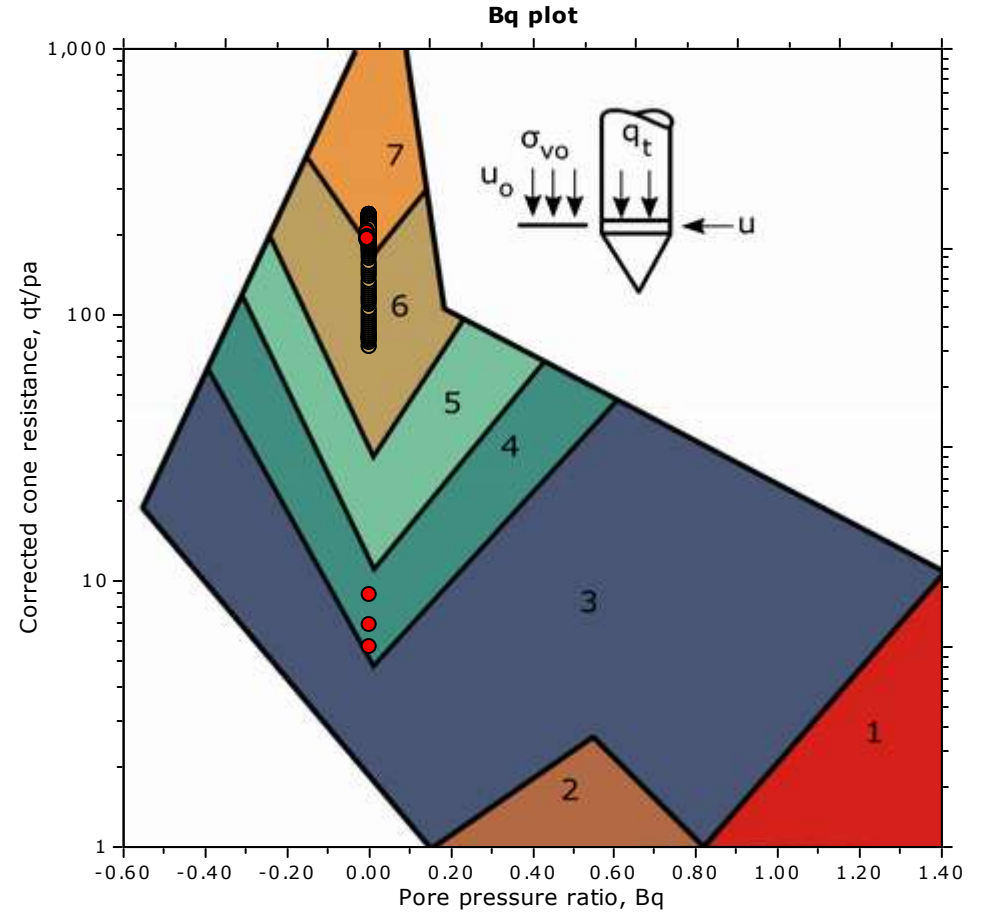
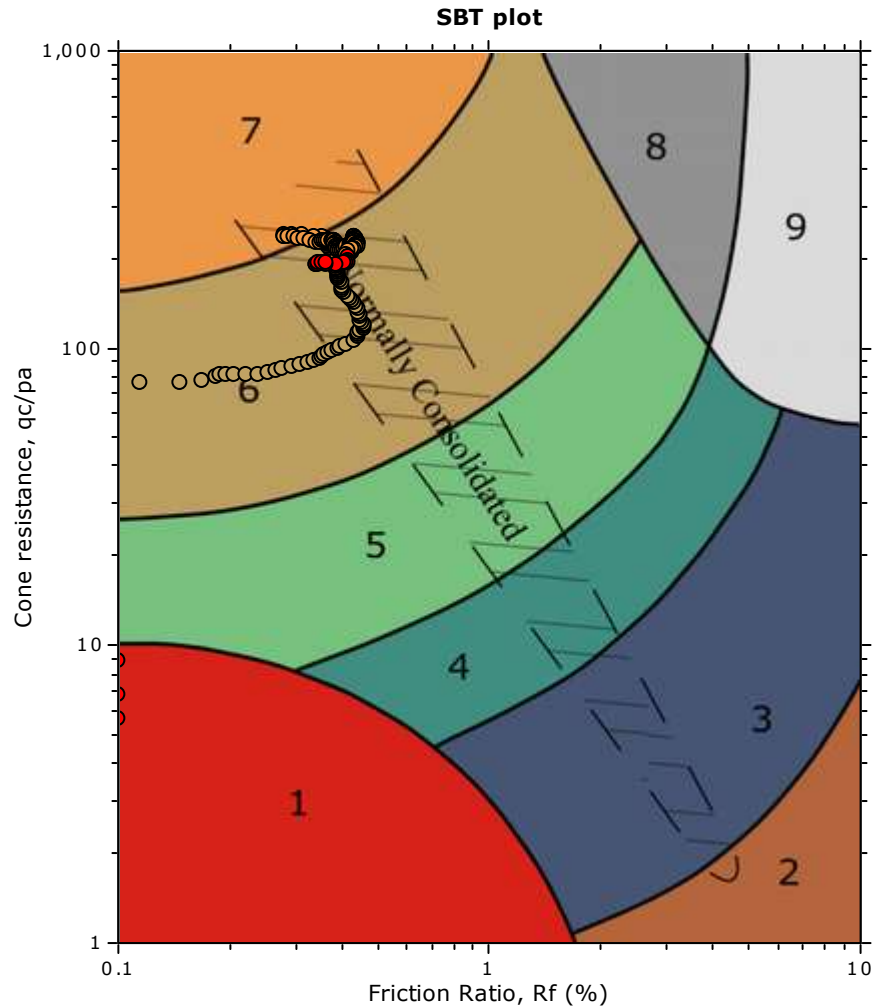




The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

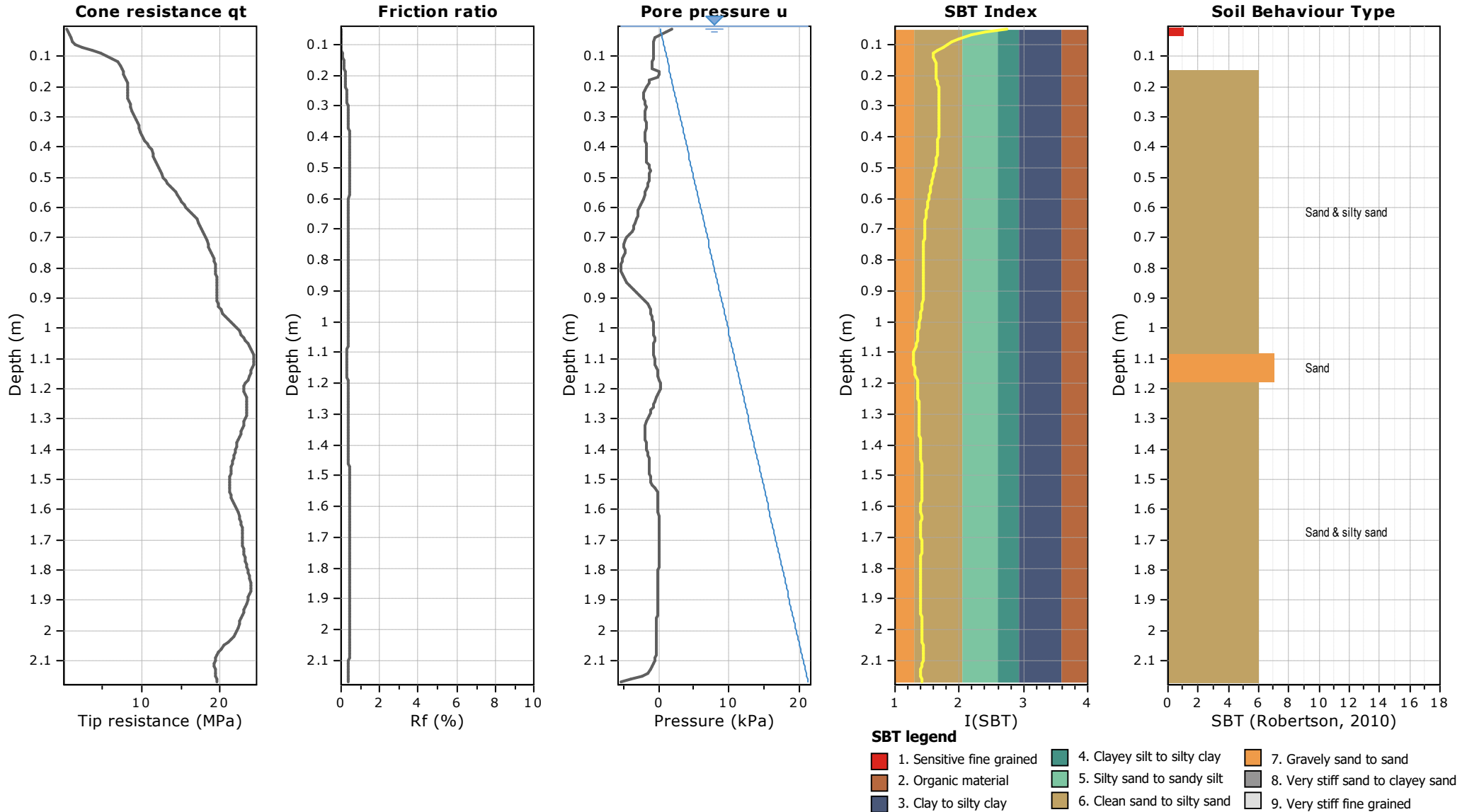


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

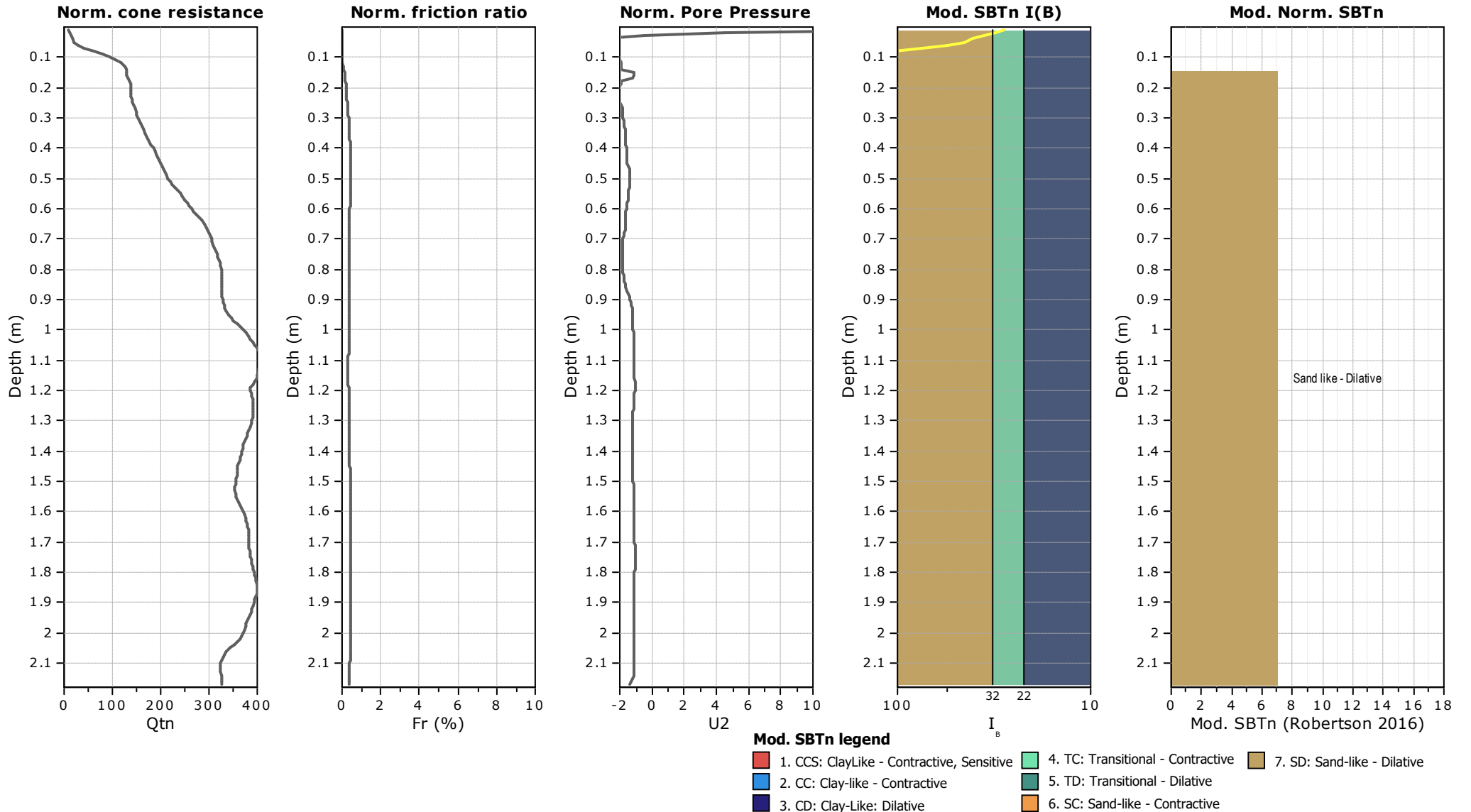
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



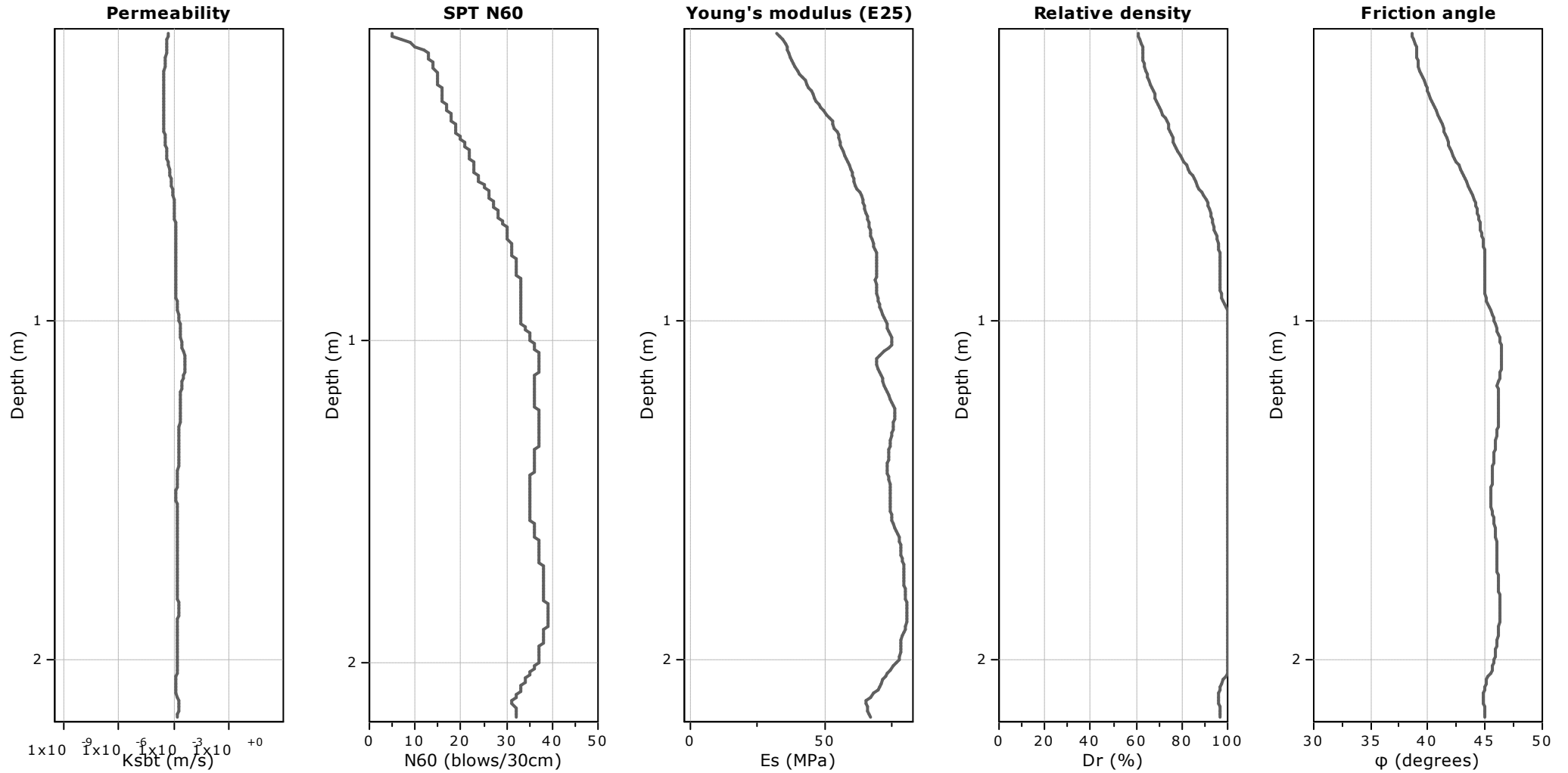
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

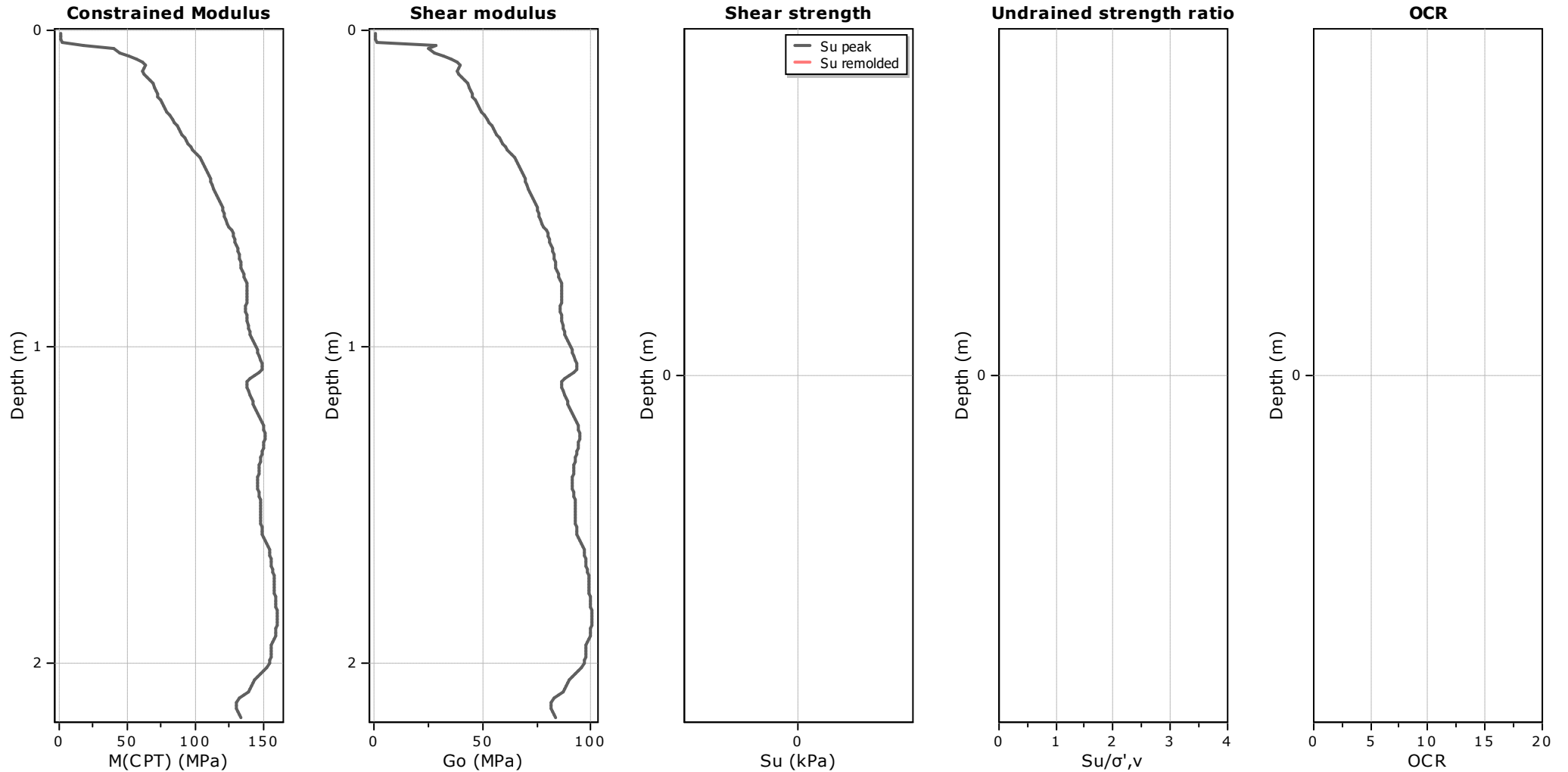
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

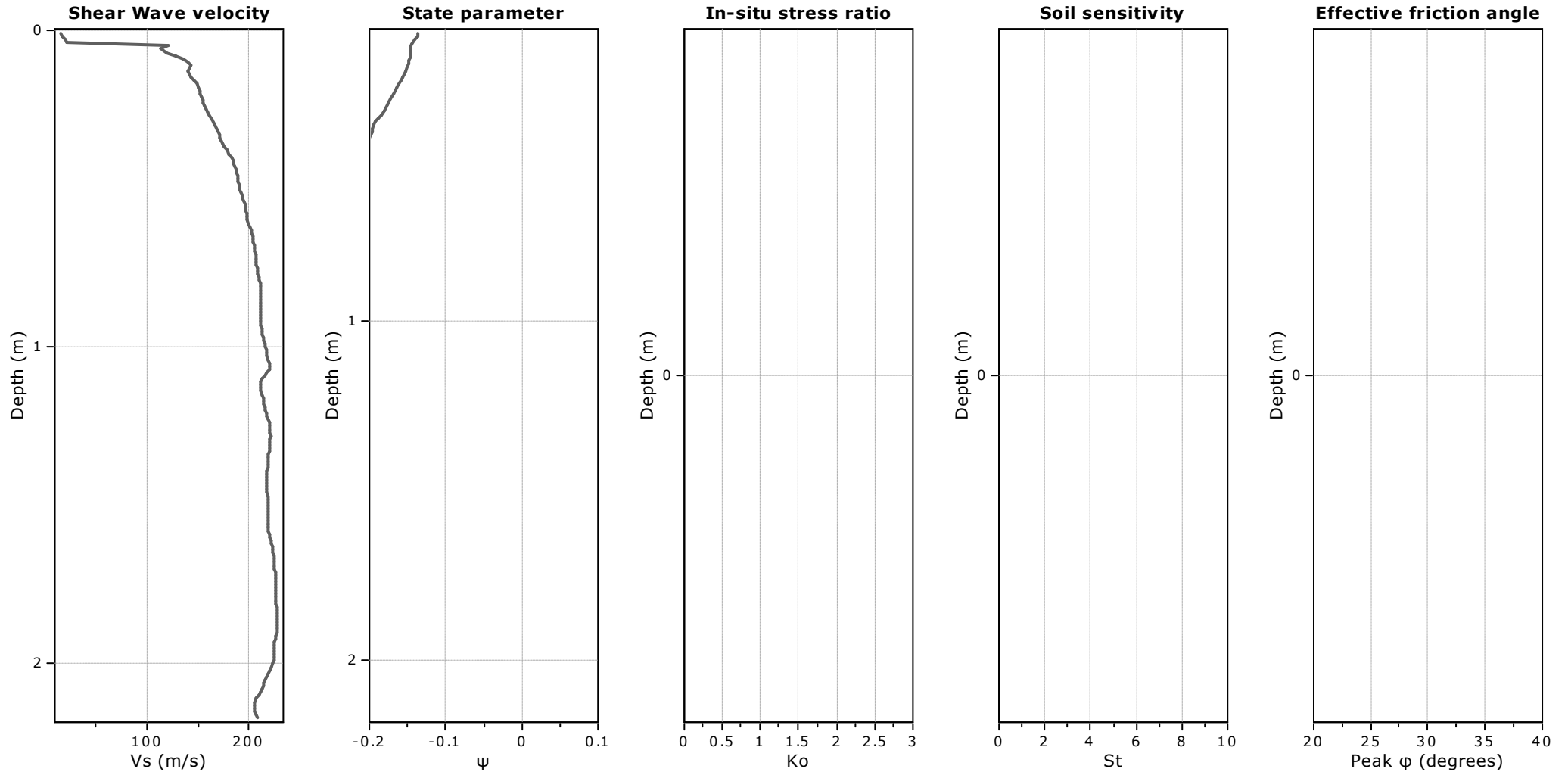
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

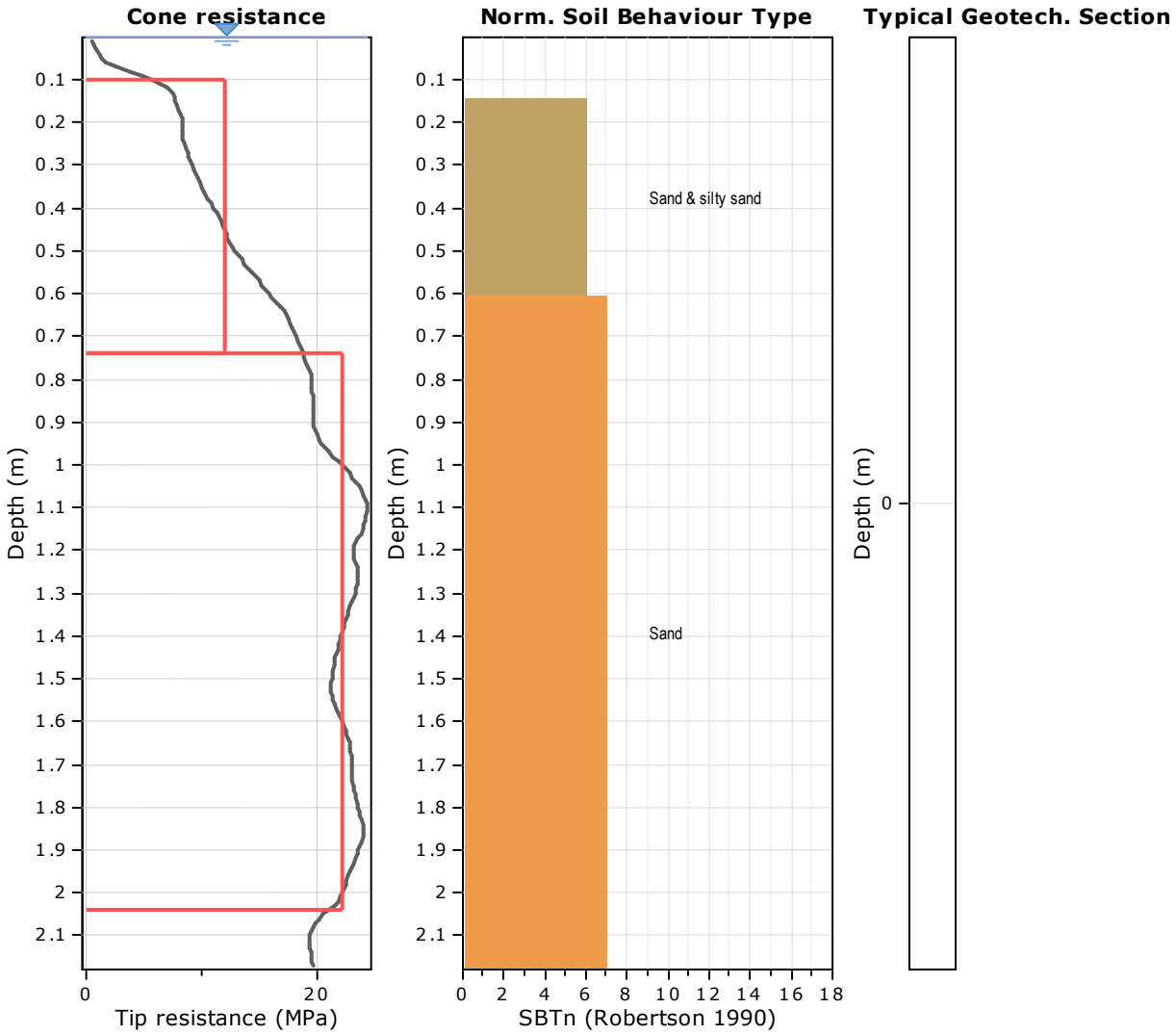
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

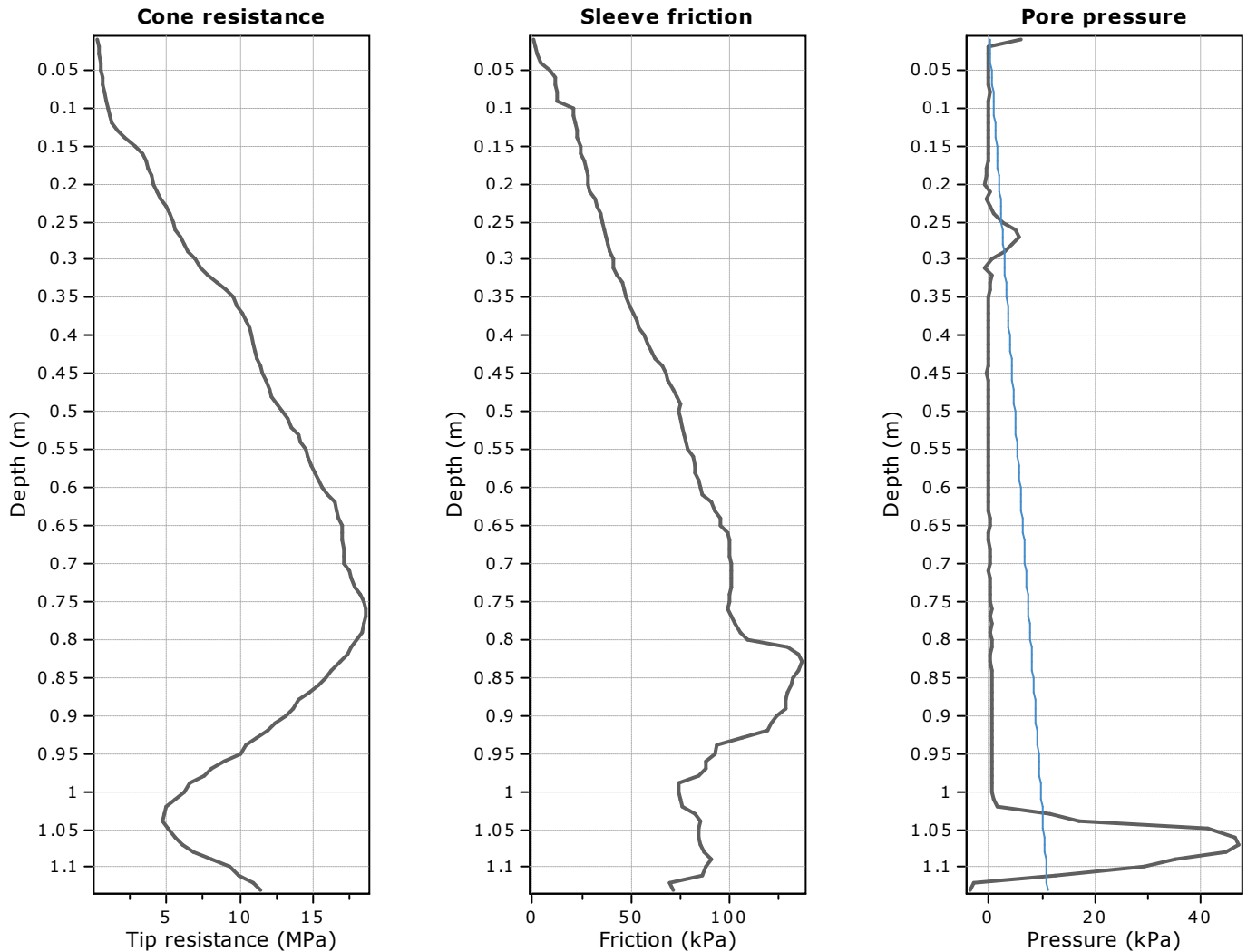
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

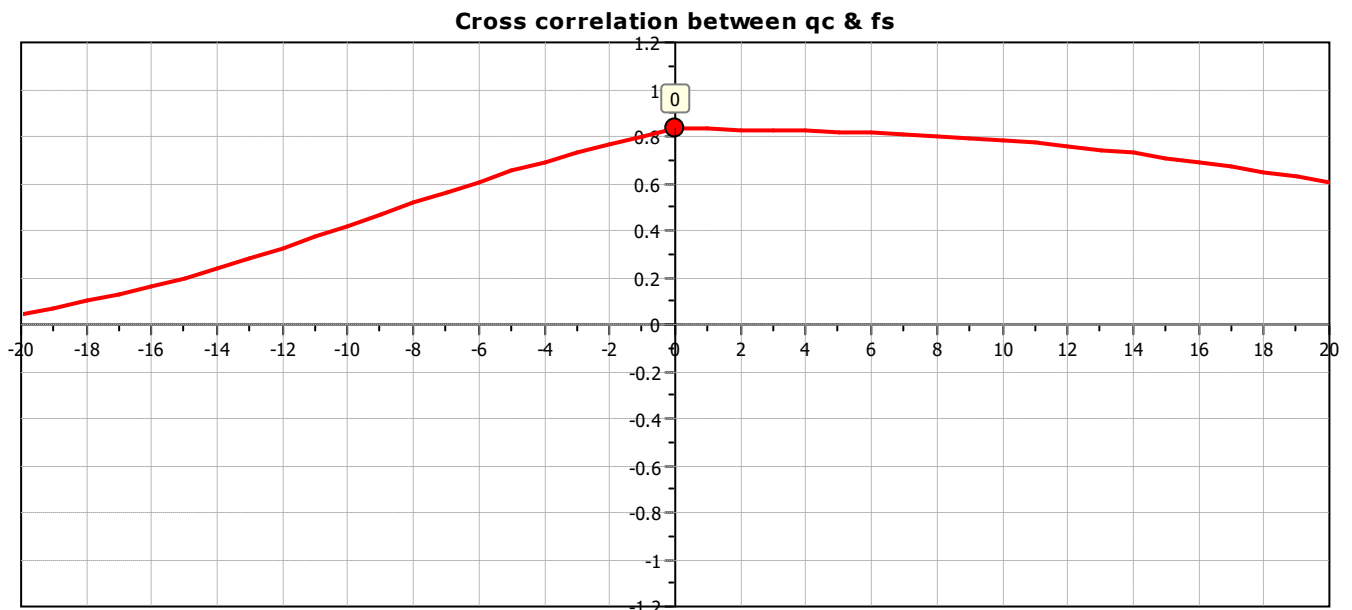


Tabular results

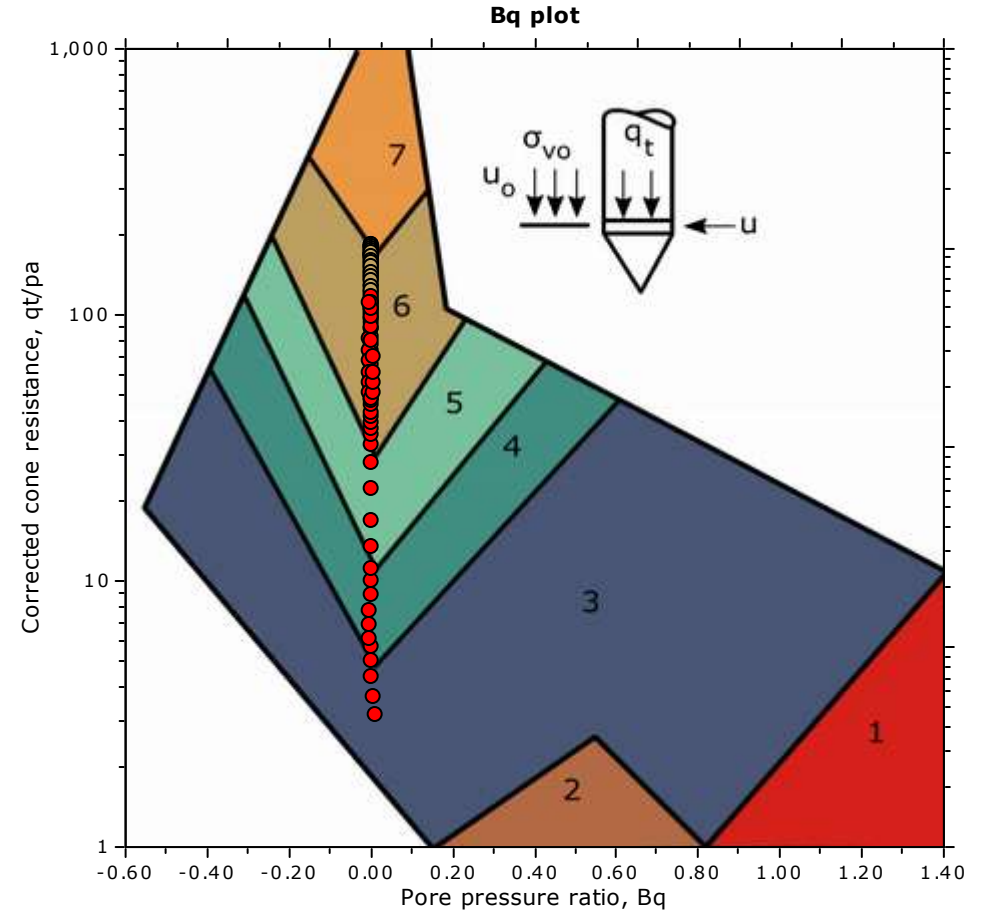
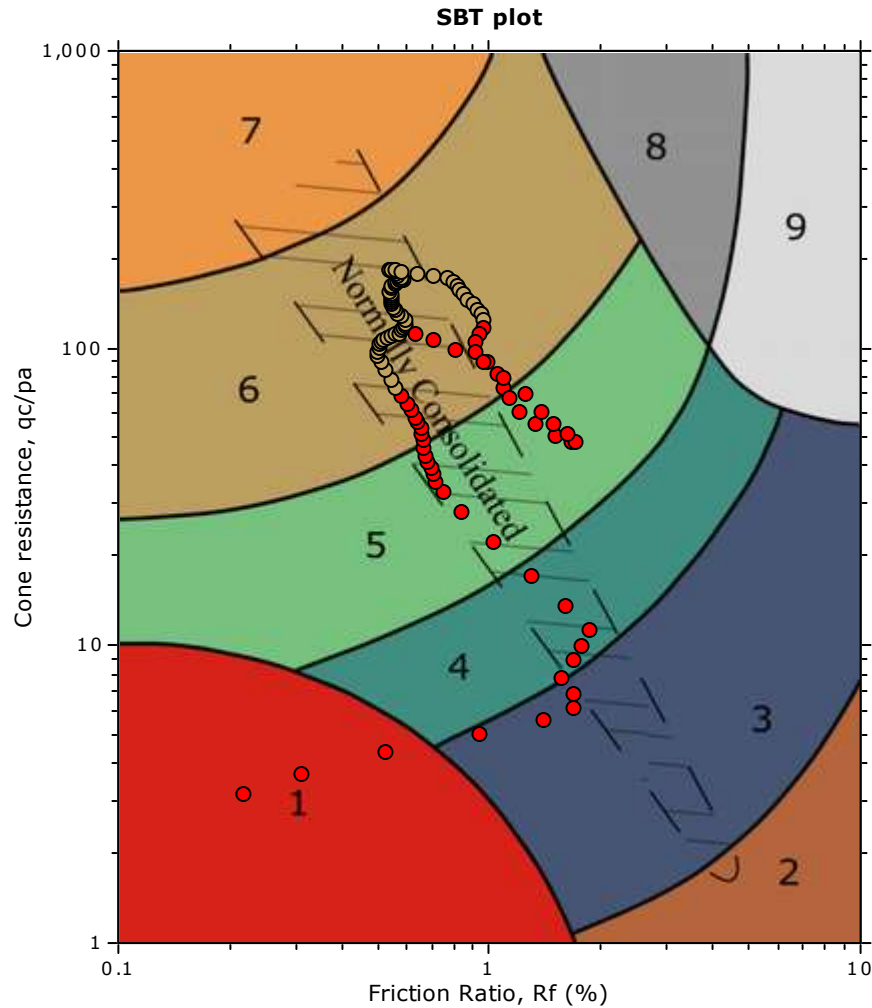
:: Layer No: 1 ::		
Code: Layer_1 Start depth: 0.10 (m), End depth: 0.74 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 12.00 ±3.77 MPa	Permeability: 5.49E-04 ±3.25E-04 m/s	Constrained Mod.: 100.80 ±23.39 MPa
Sleeve friction: 43.91 ±22.49 kPa	N ₆₀ : 21.83 ±5.88 blows	Go: 63.17 ±14.66 MPa
Ic: 1.41 ±0.08	Es: 52.02 ±10.66 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 76.39 ±11.08	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 41.57 ±1.99 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	

Project: Stage 6 Landings Fill Testing CPTs
Location: OTP The Landings Stage 6 & 7 Subdivision


The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

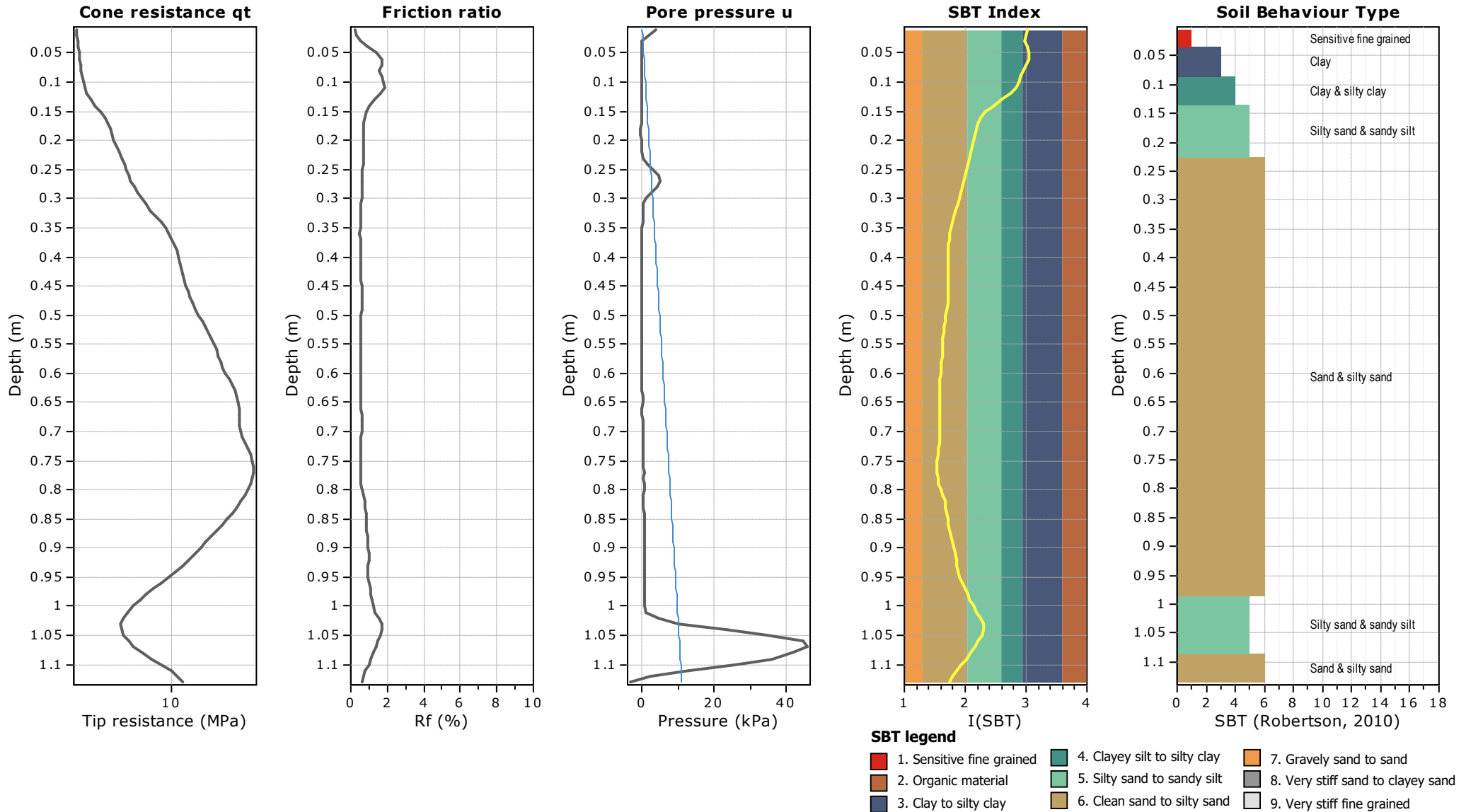


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

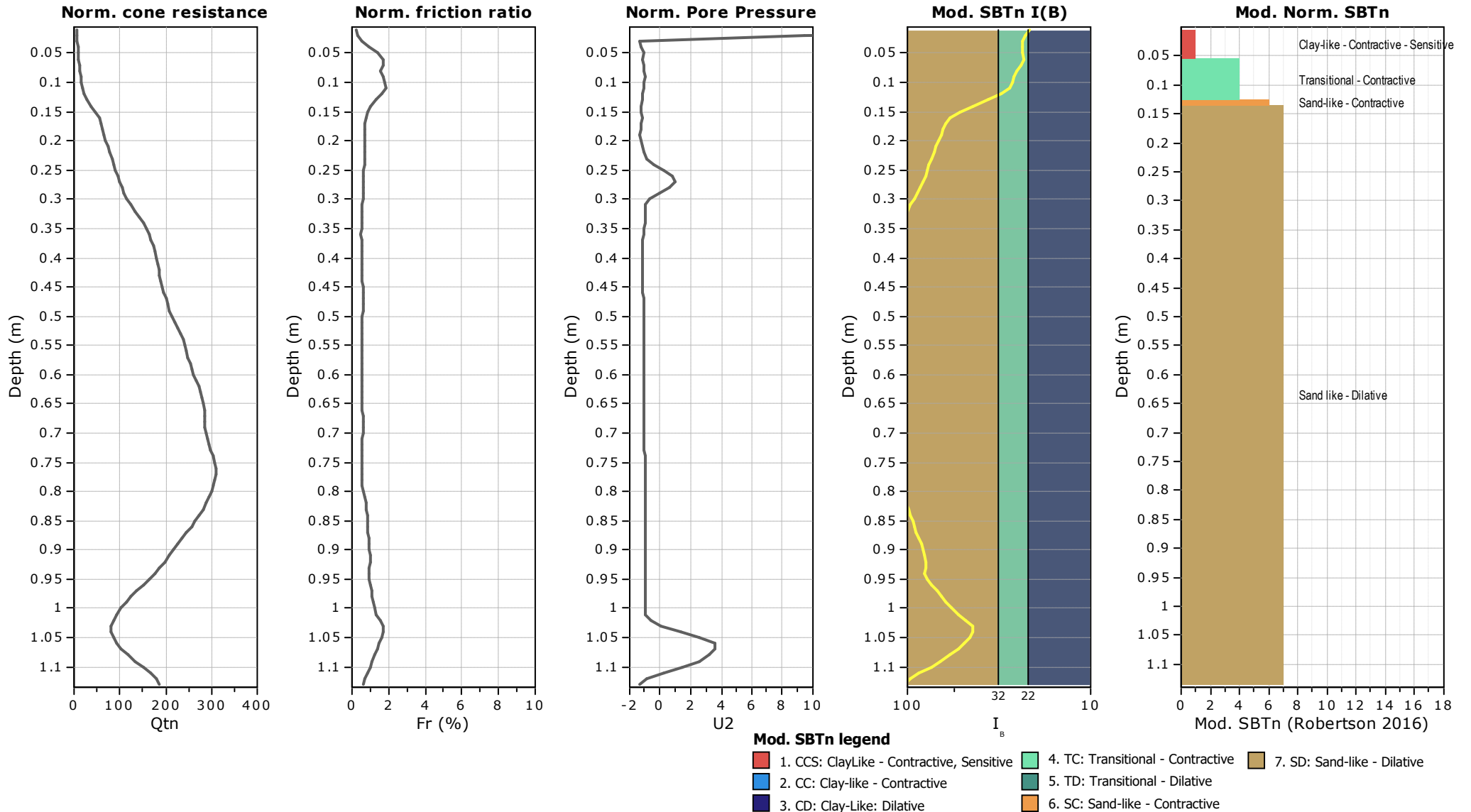
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



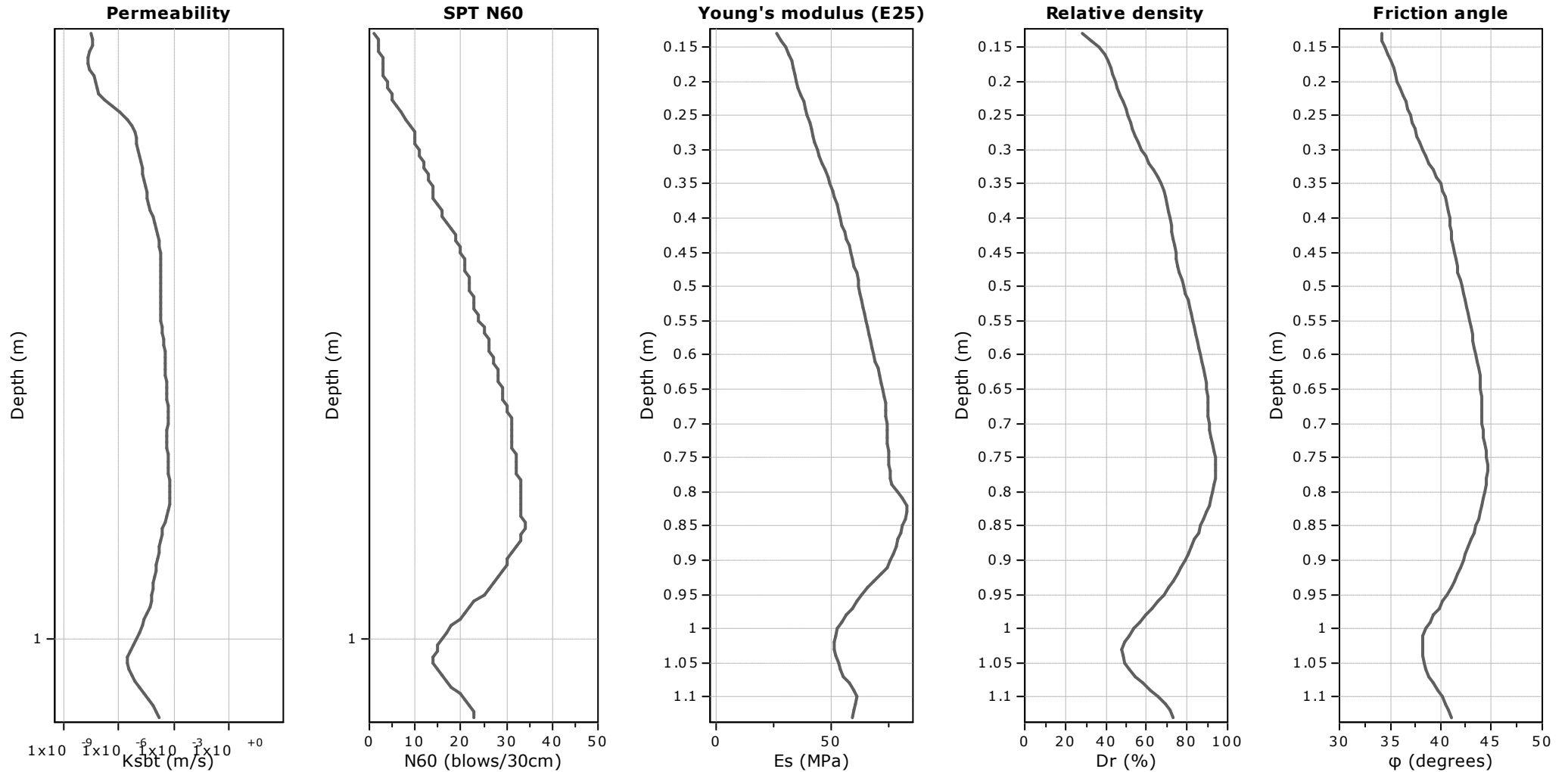
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

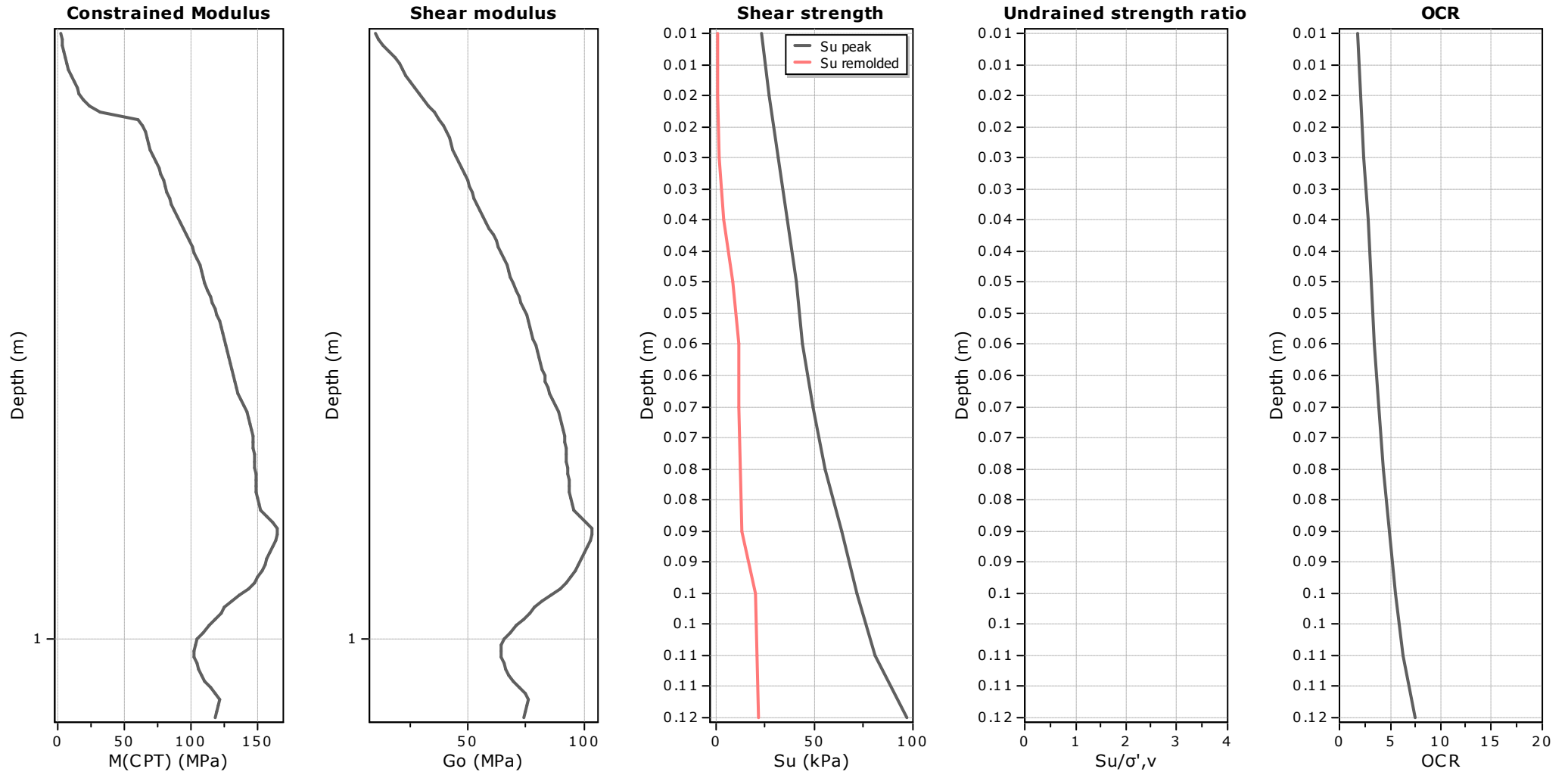
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

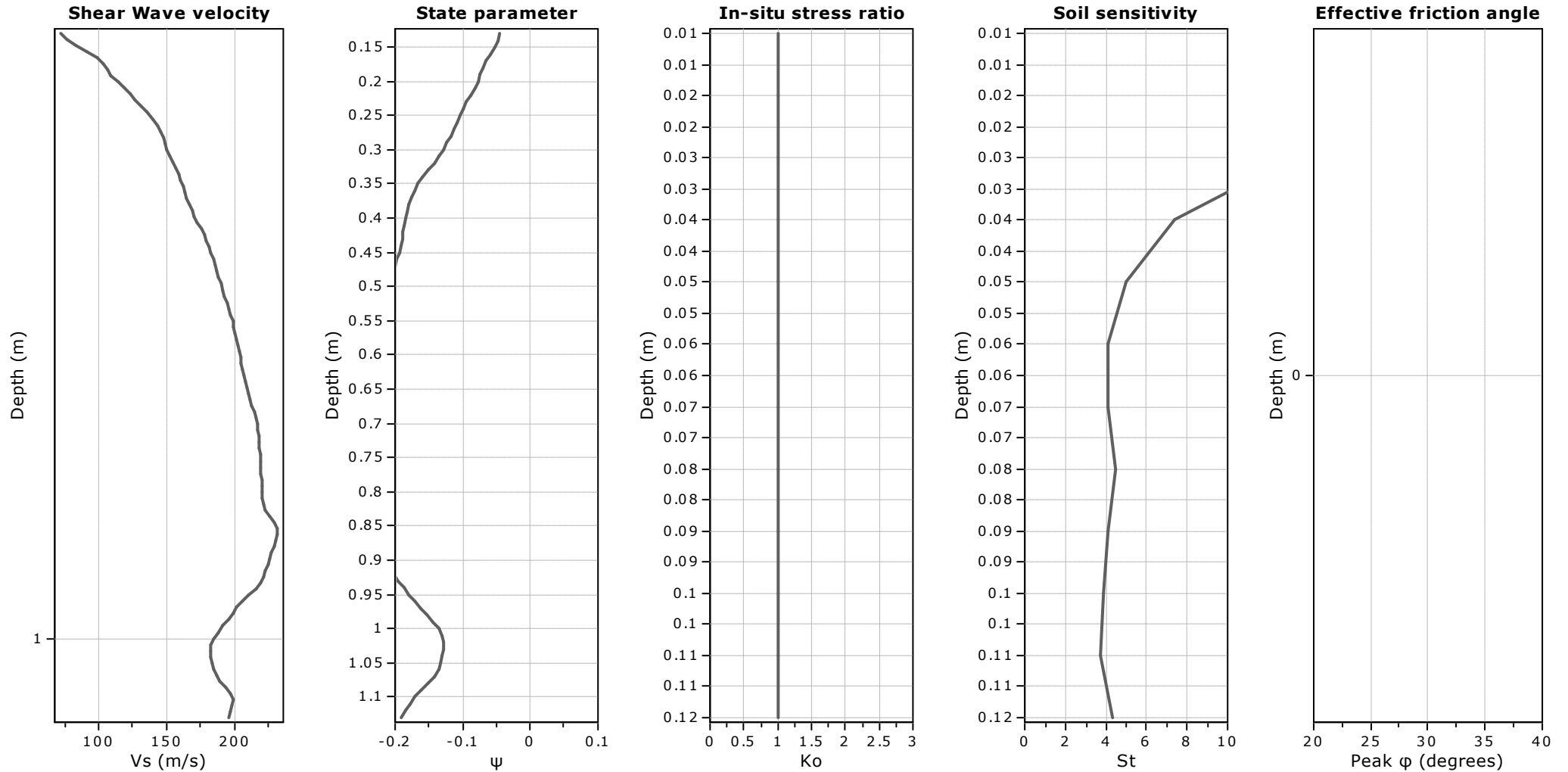
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

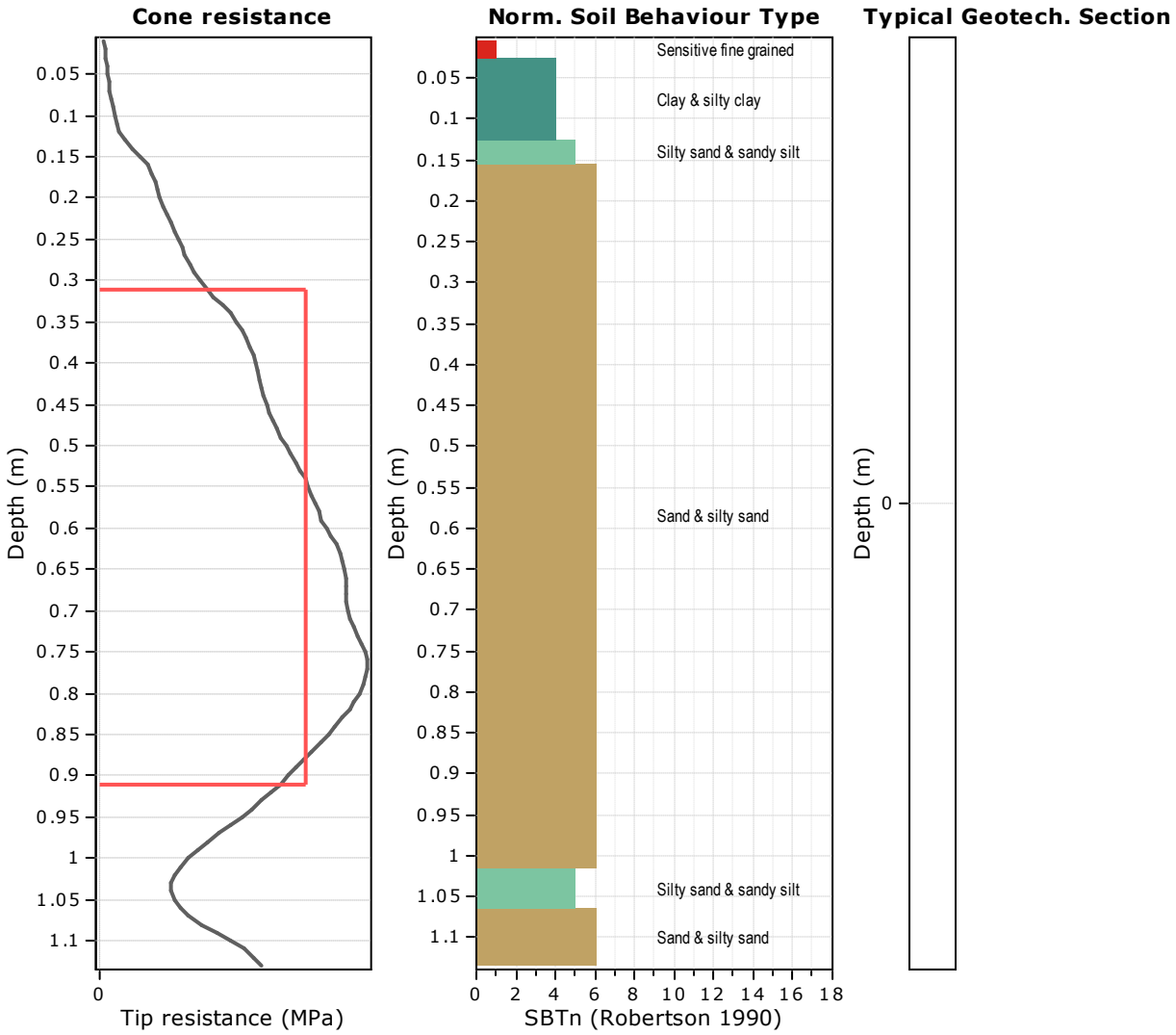
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

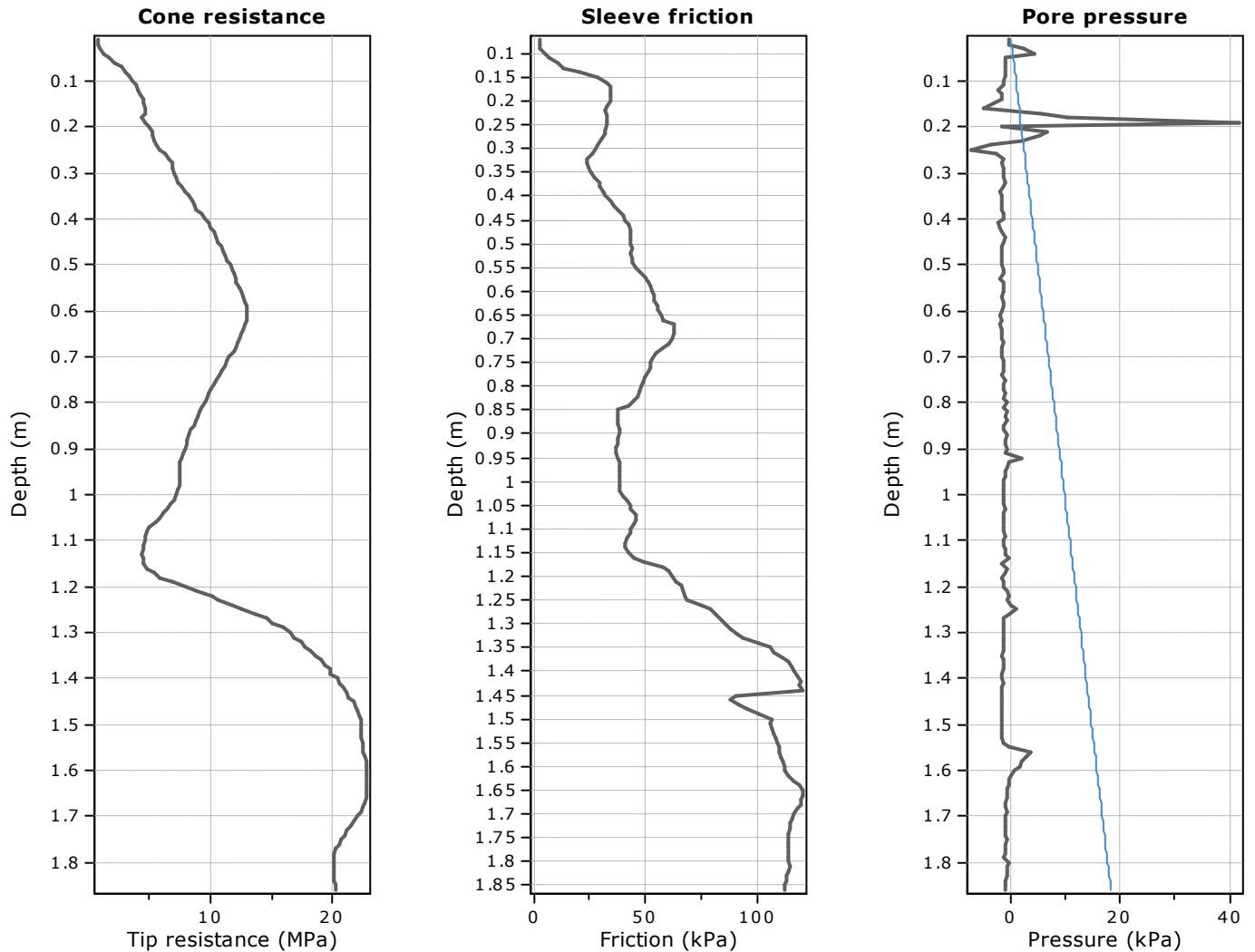
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

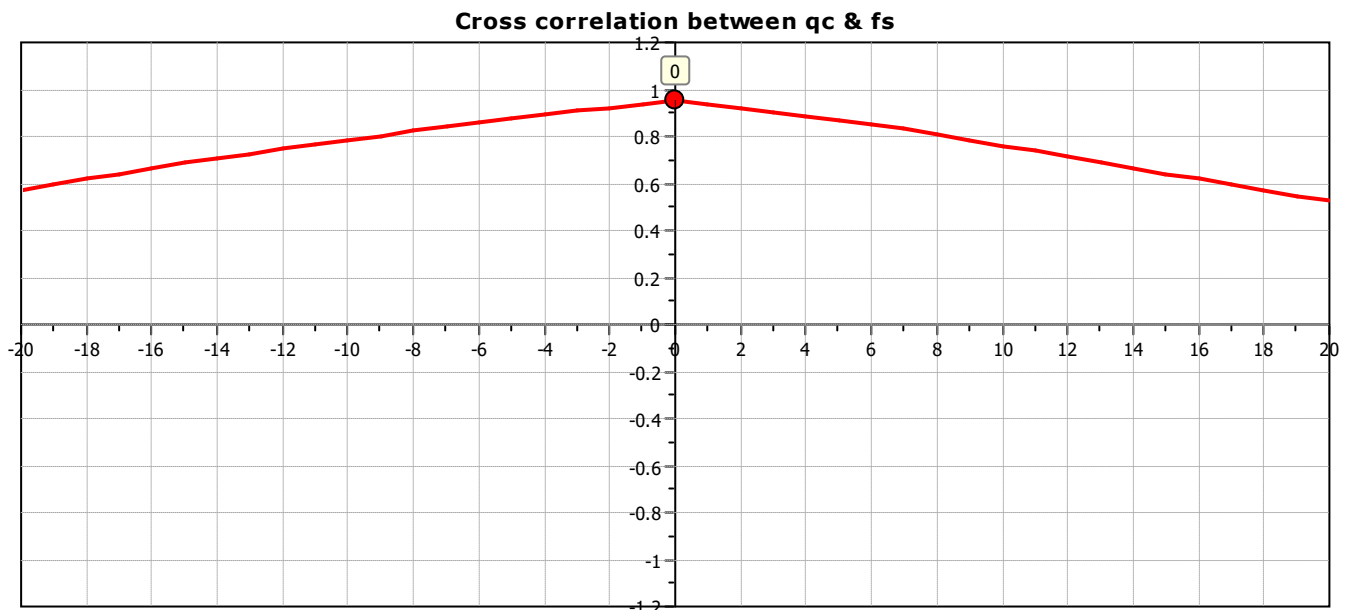


Tabular results

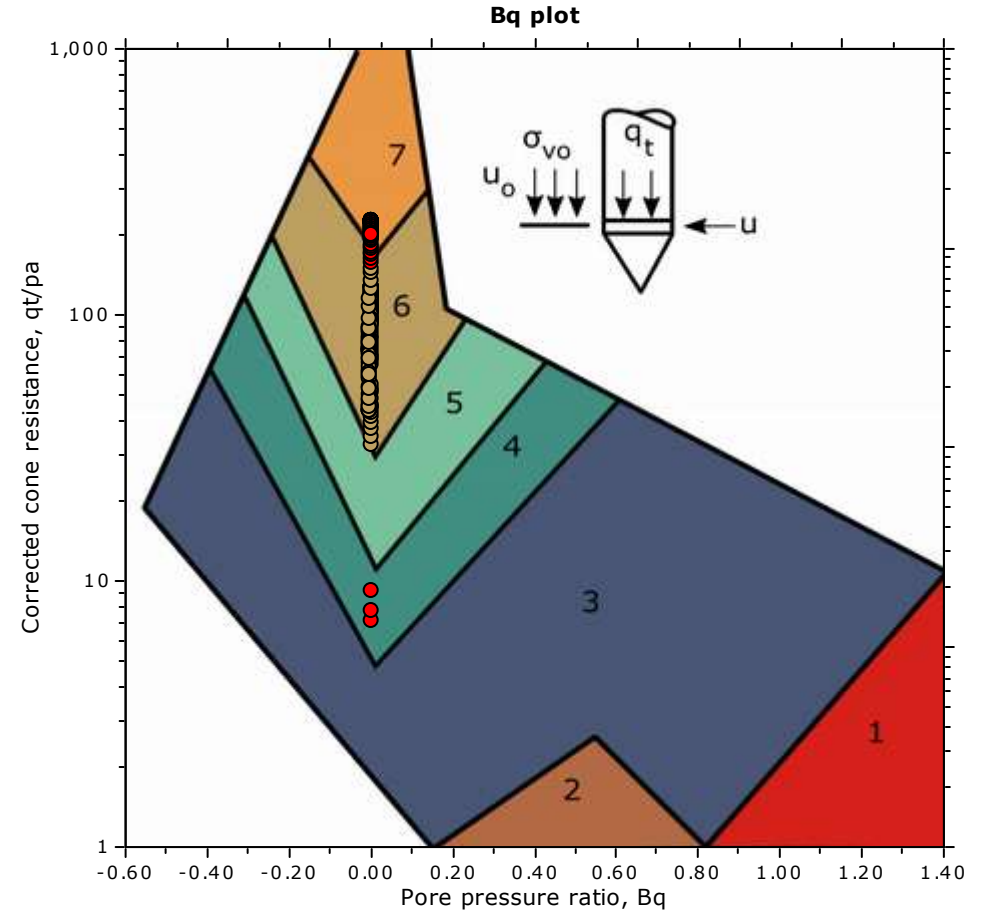
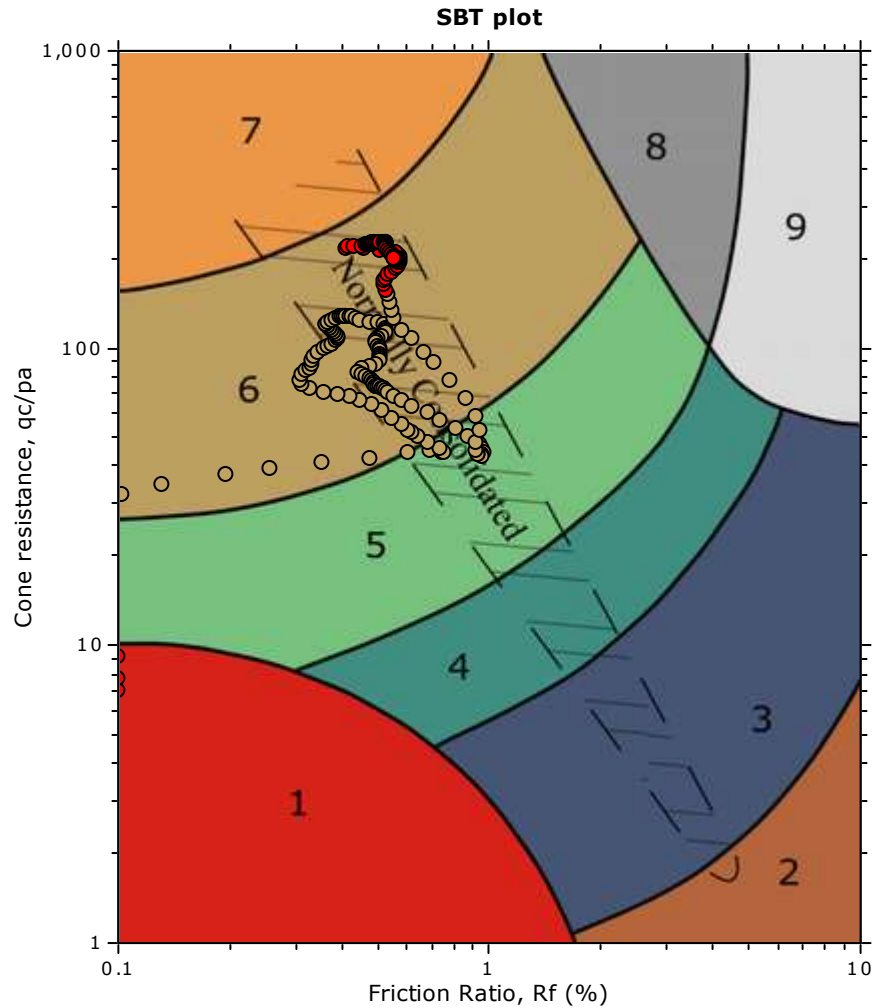
::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.31 (m), End depth: 0.91 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 14.26 ±3.09 MPa	Permeability: 3.06E-04 ±1.60E-04 m/s	Constrained Mod.: 133.59 ±20.94 MPa
Sleeve friction: 87.93 ±26.84 kPa	N ₆₀ : 27.44 ±4.99 blows	Go: 83.72 ±13.12 MPa
Ic: 1.49 ±0.08	Es: 66.80 ±10.47 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 82.14 ±9.31	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 42.62 ±1.62 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

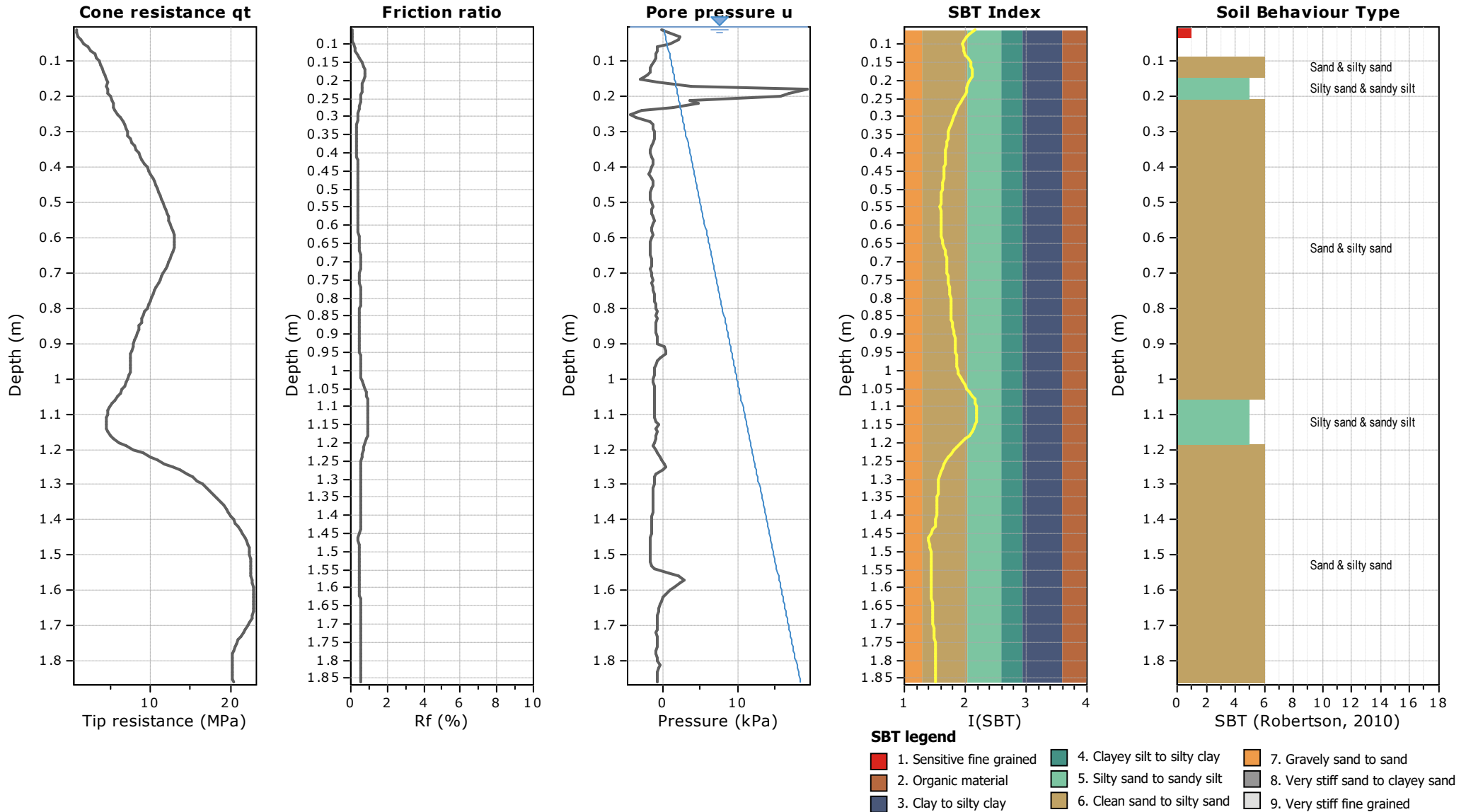


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

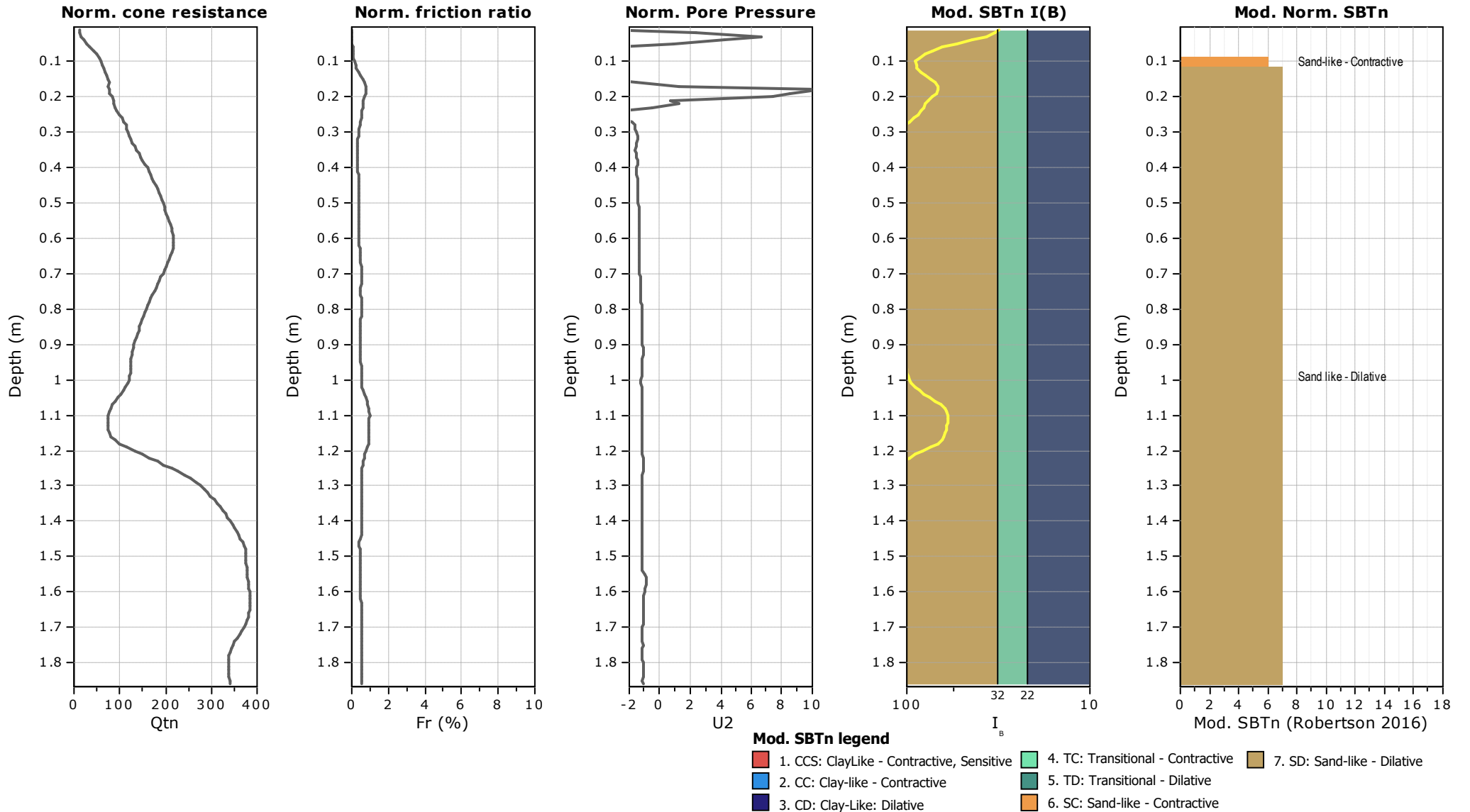
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



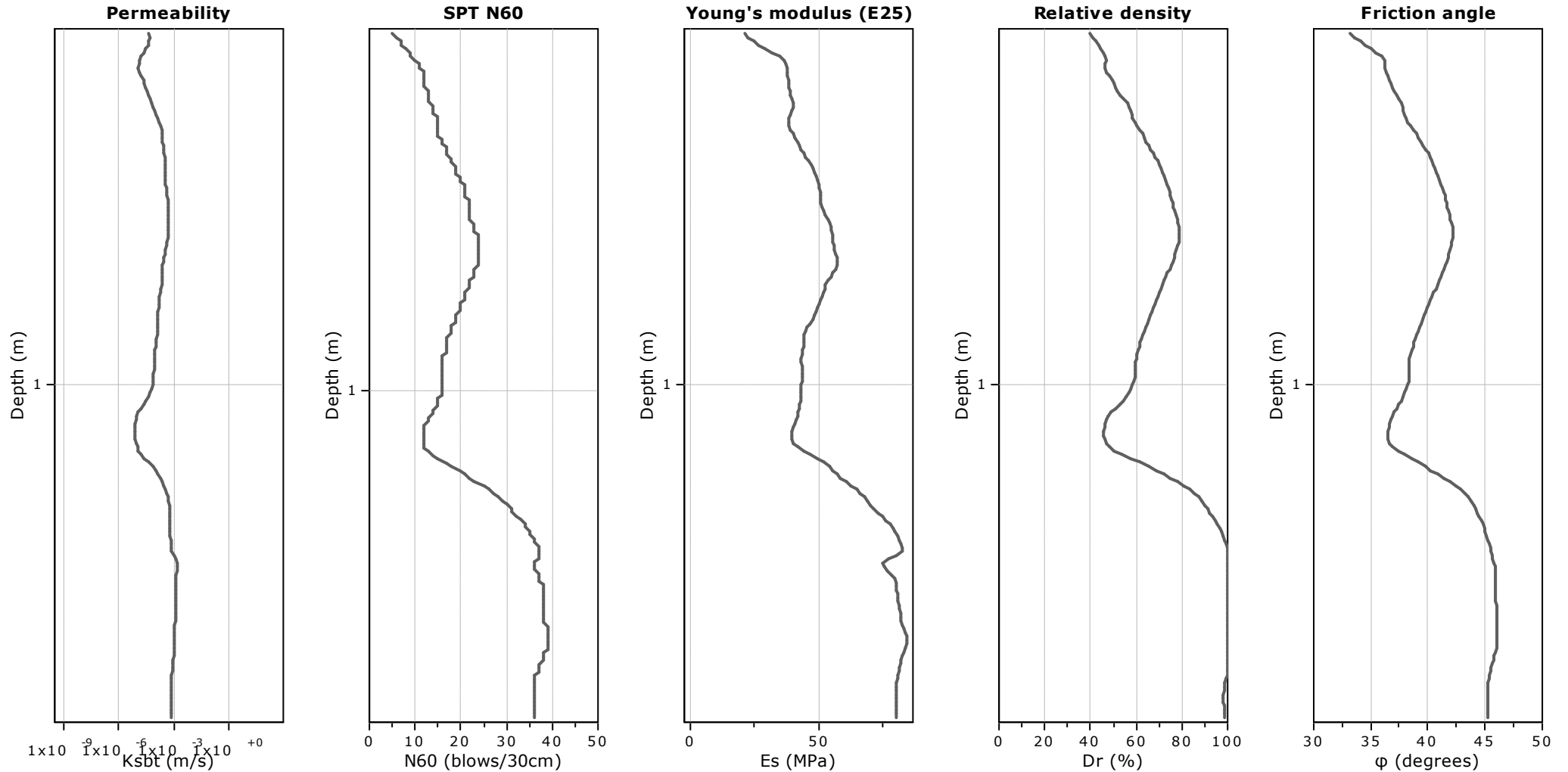
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

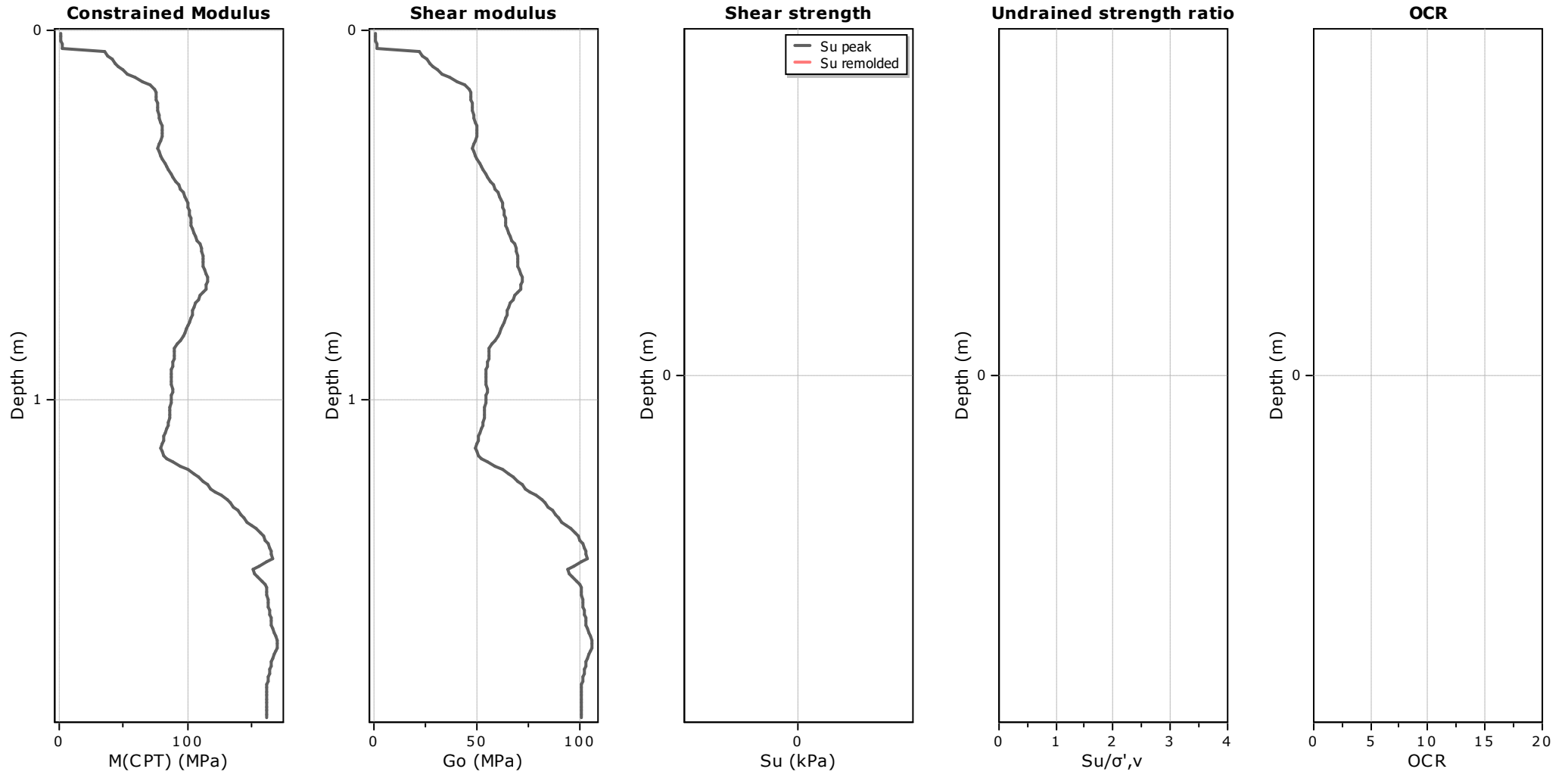
Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

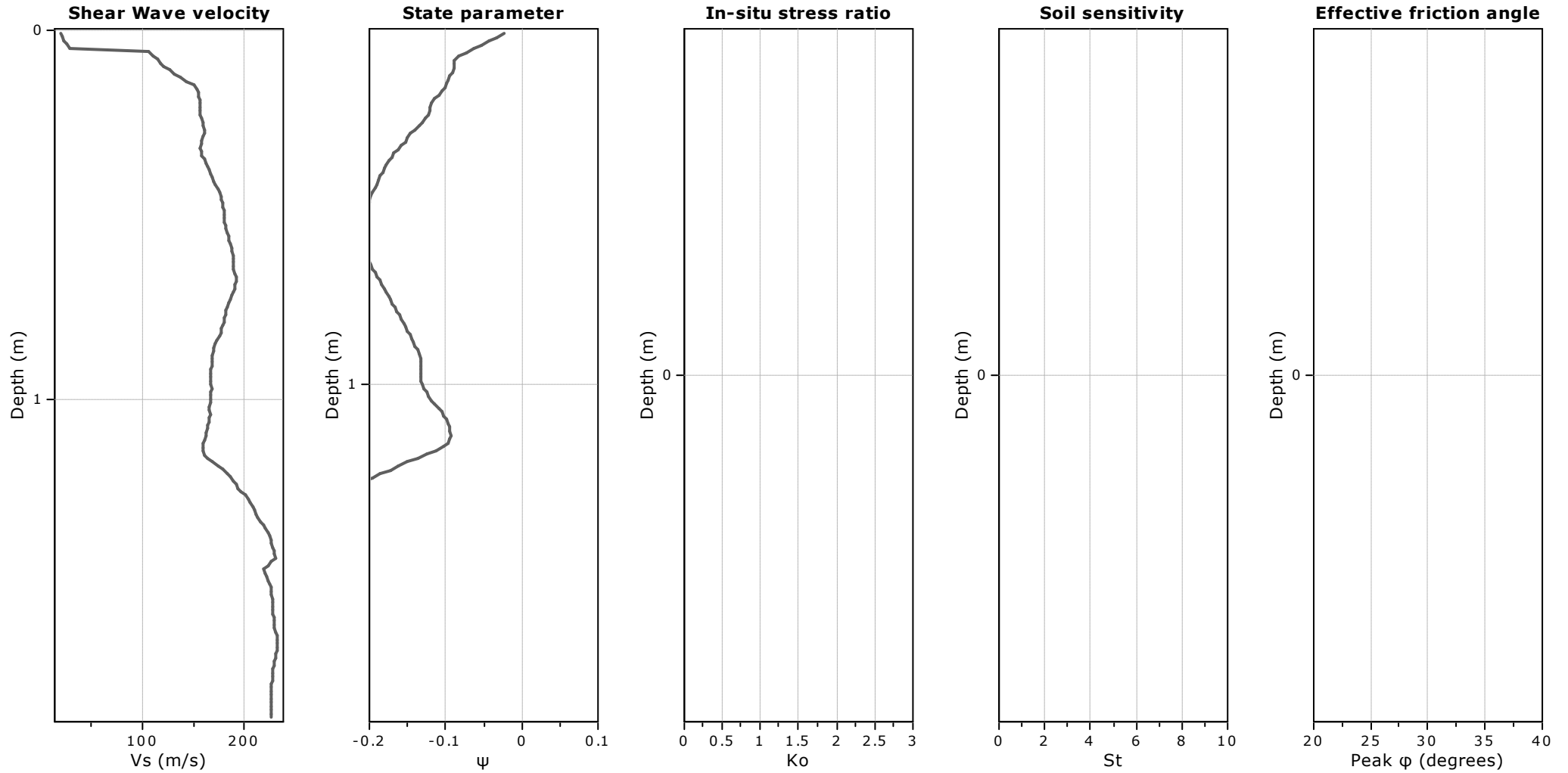
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

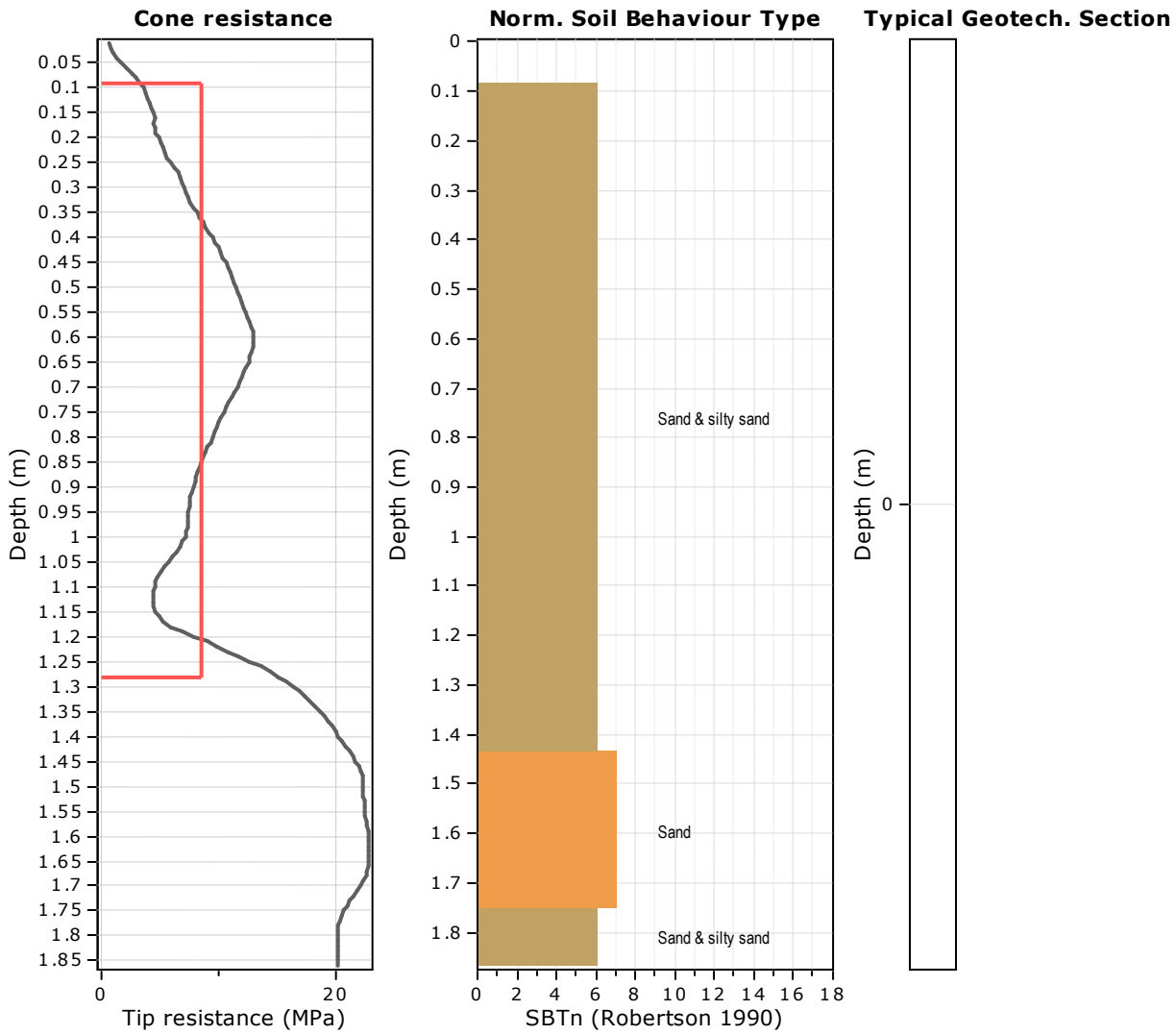
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

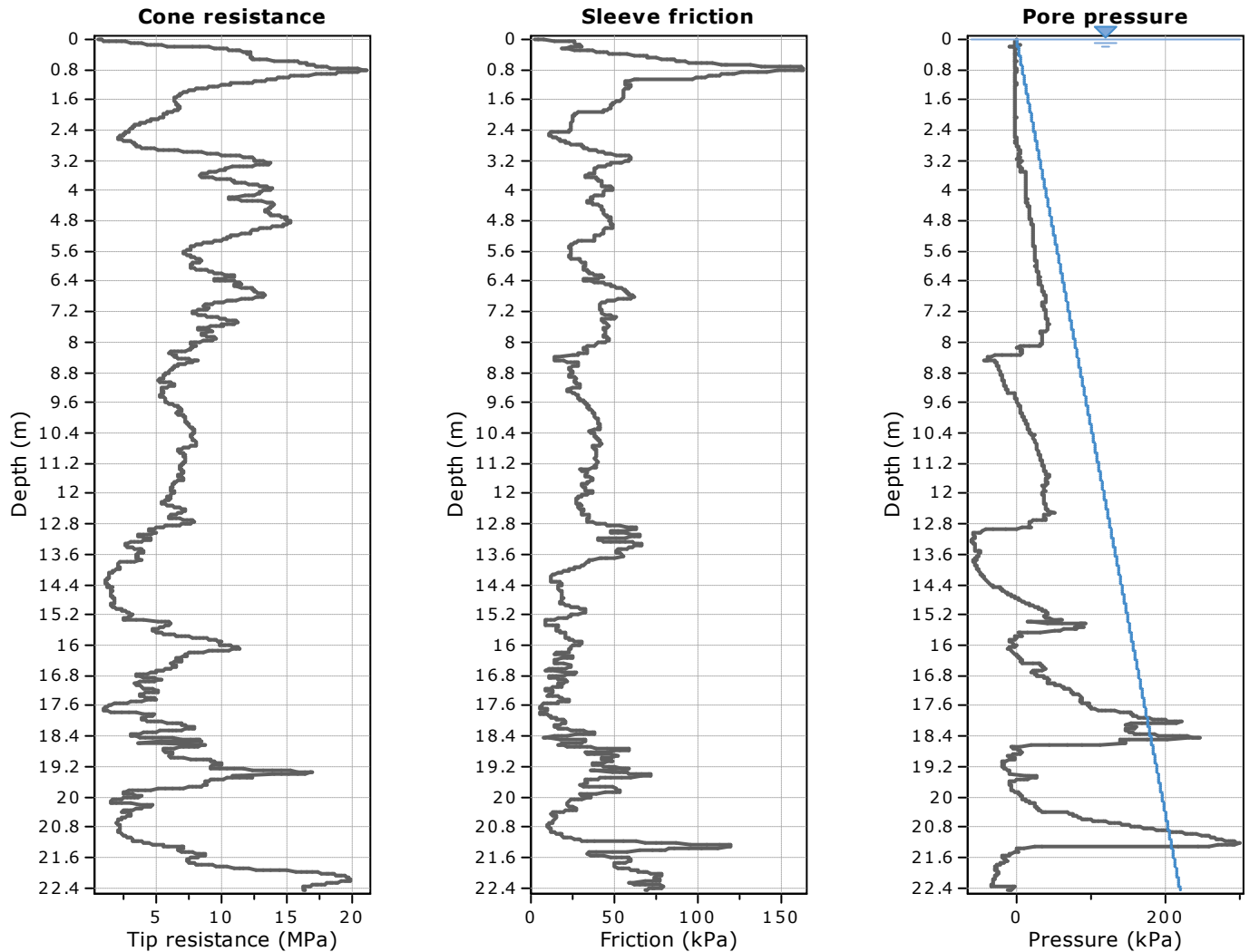
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

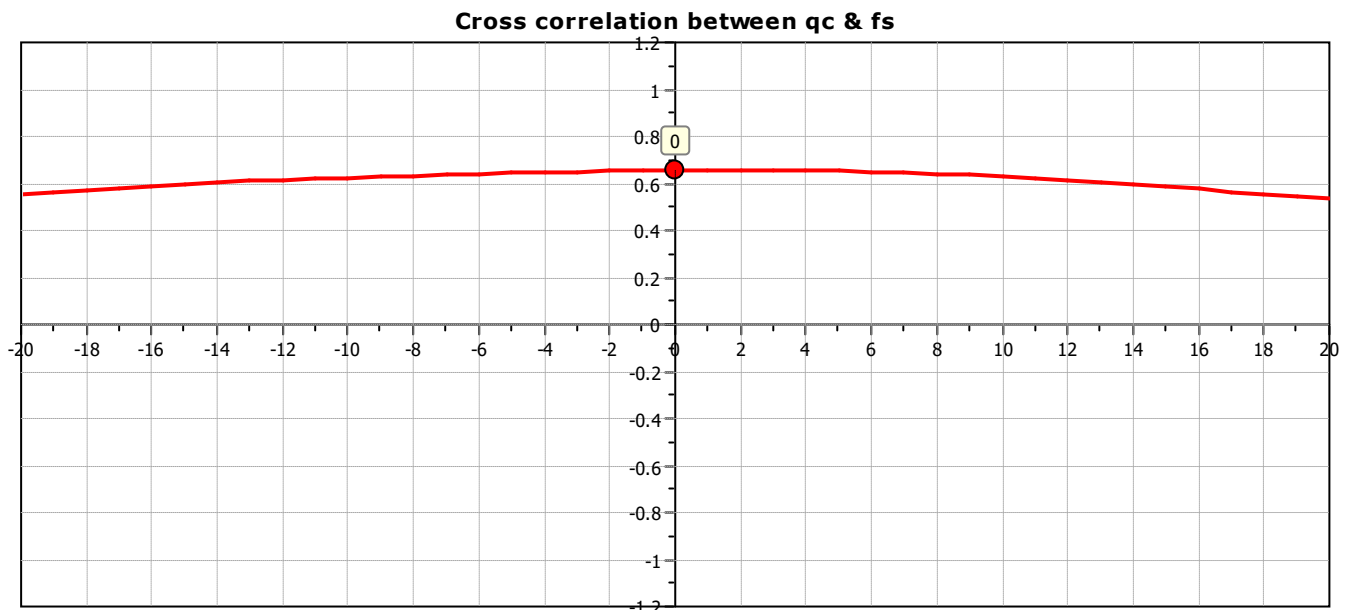


Tabular results

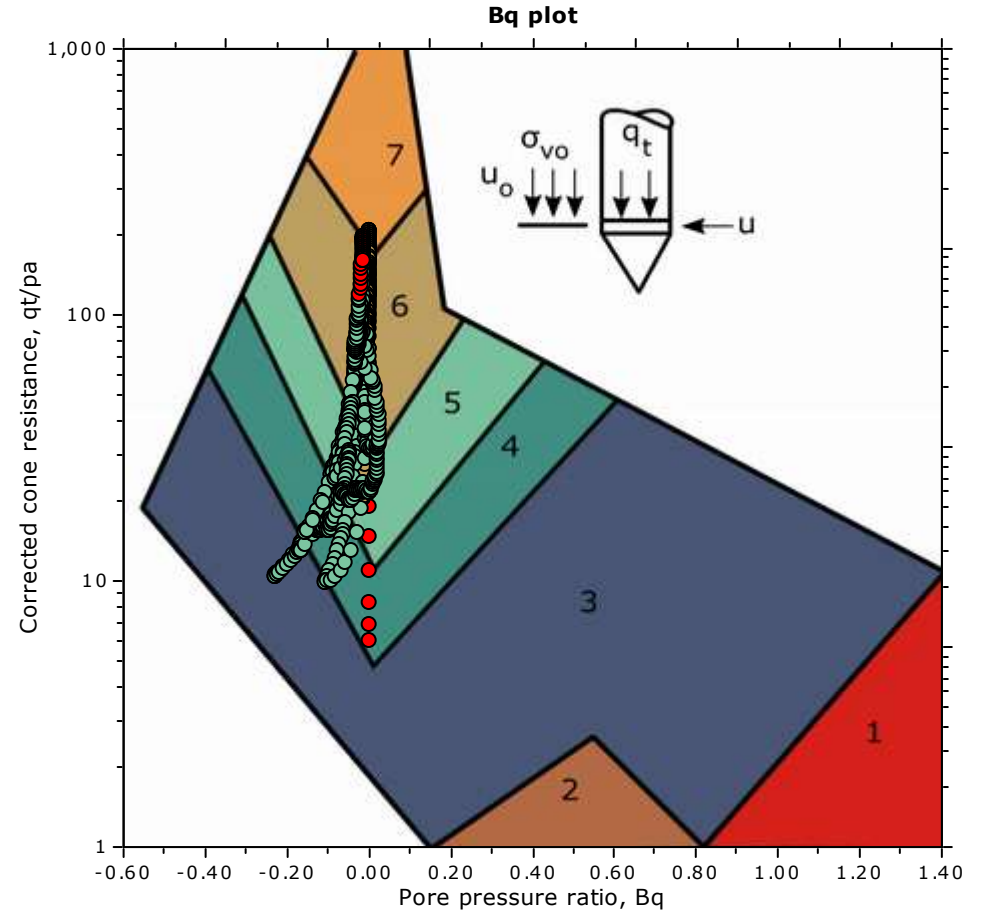
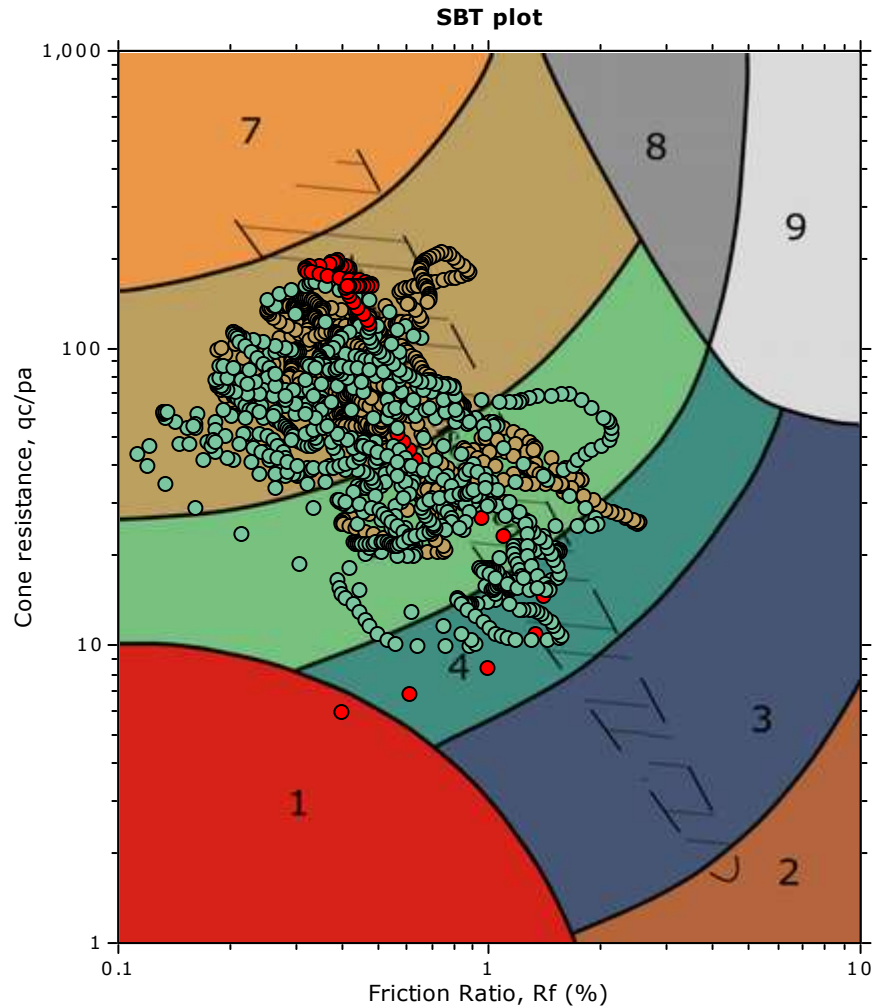
::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.09 (m), End depth: 1.28 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 8.51 ±2.98 MPa	Permeability: 1.76E-04 ±1.55E-04 m/s	Constrained Mod.: 91.76 ±16.42 MPa
Sleeve friction: 42.44 ±14.10 kPa	N ₆₀ : 17.57 ±4.52 blows	Go: 57.50 ±10.29 MPa
Ic: 1.63 ±0.18	Es: 45.88 ±8.21 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 62.80 ±11.45	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 39.12 ±2.20 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

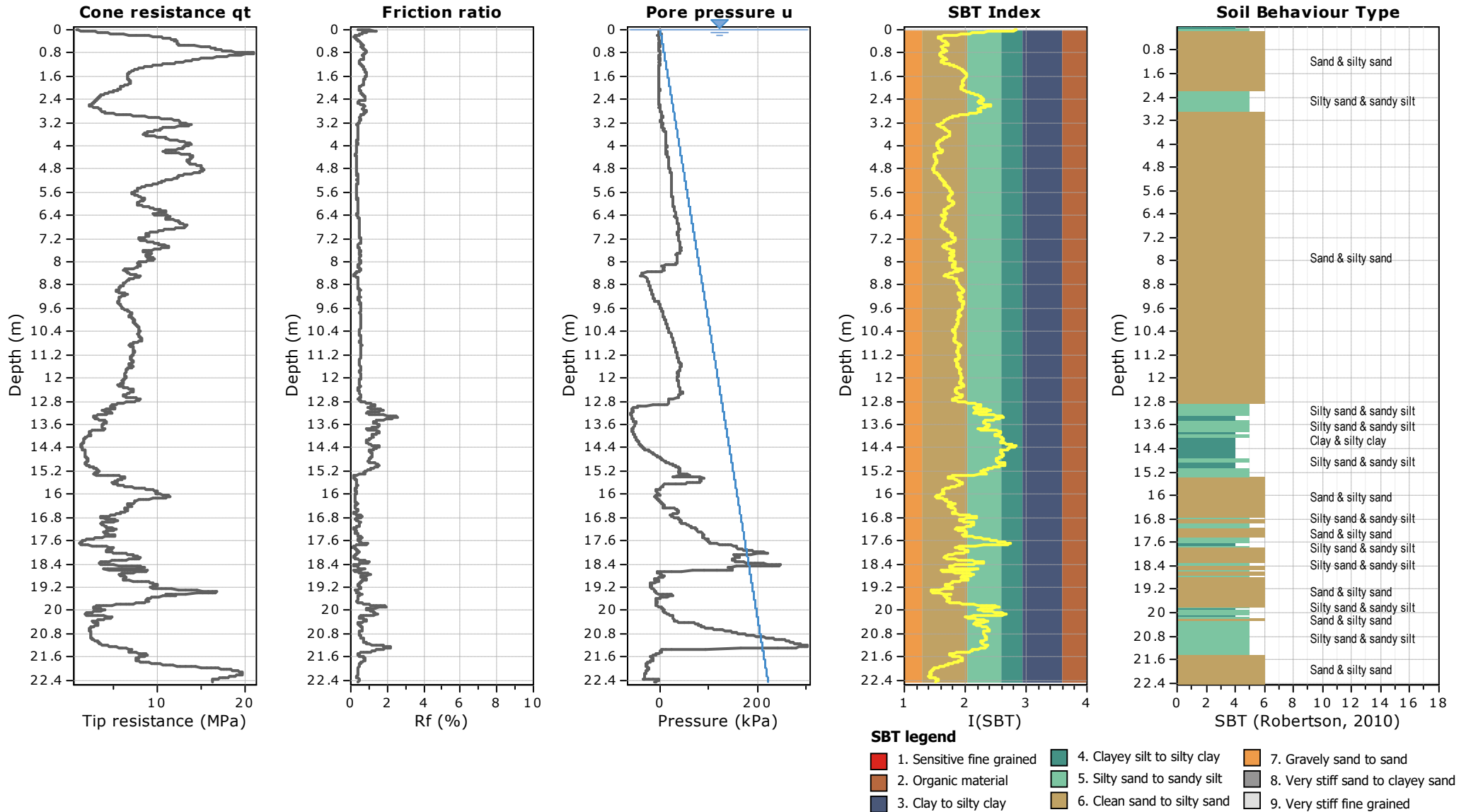


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

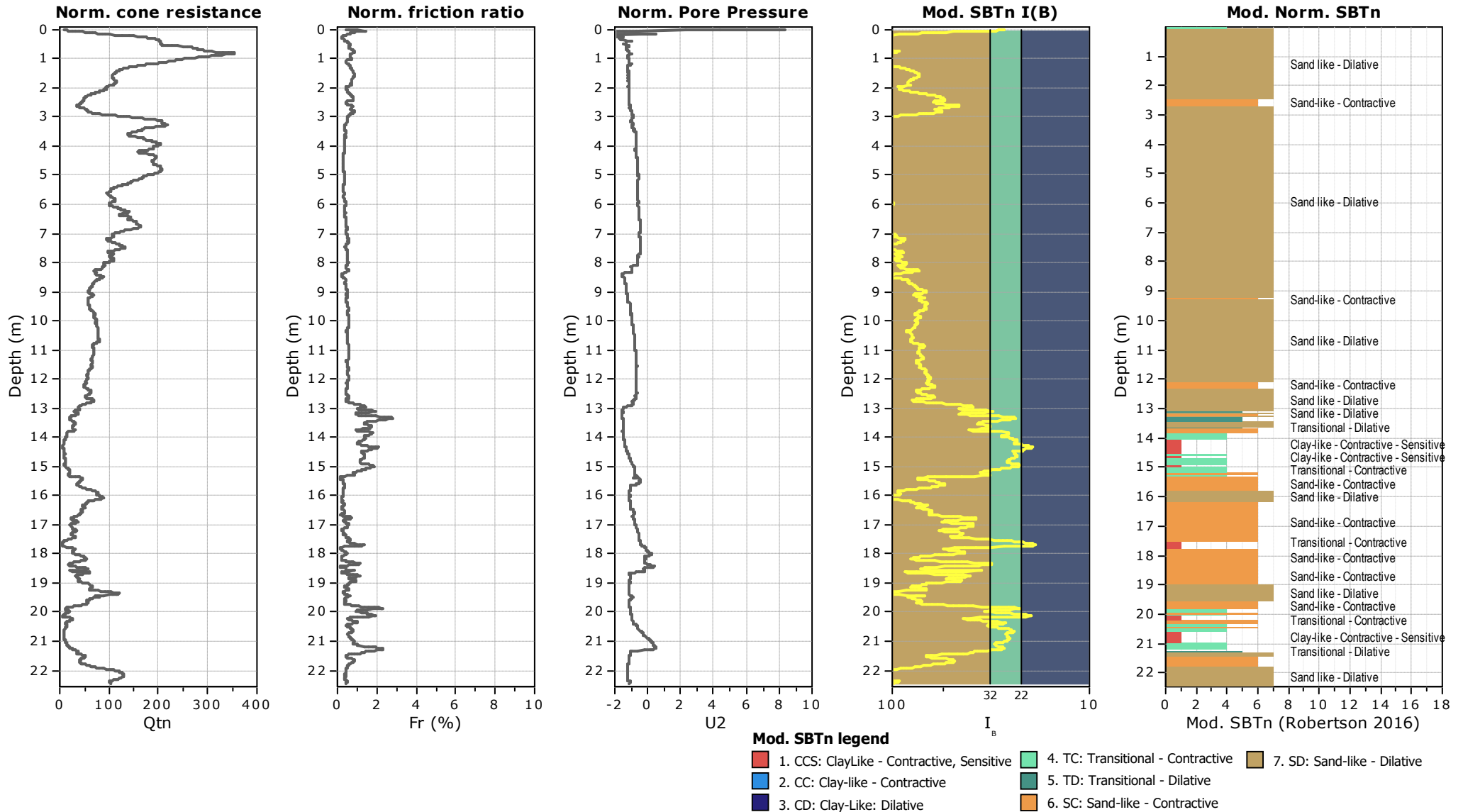
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



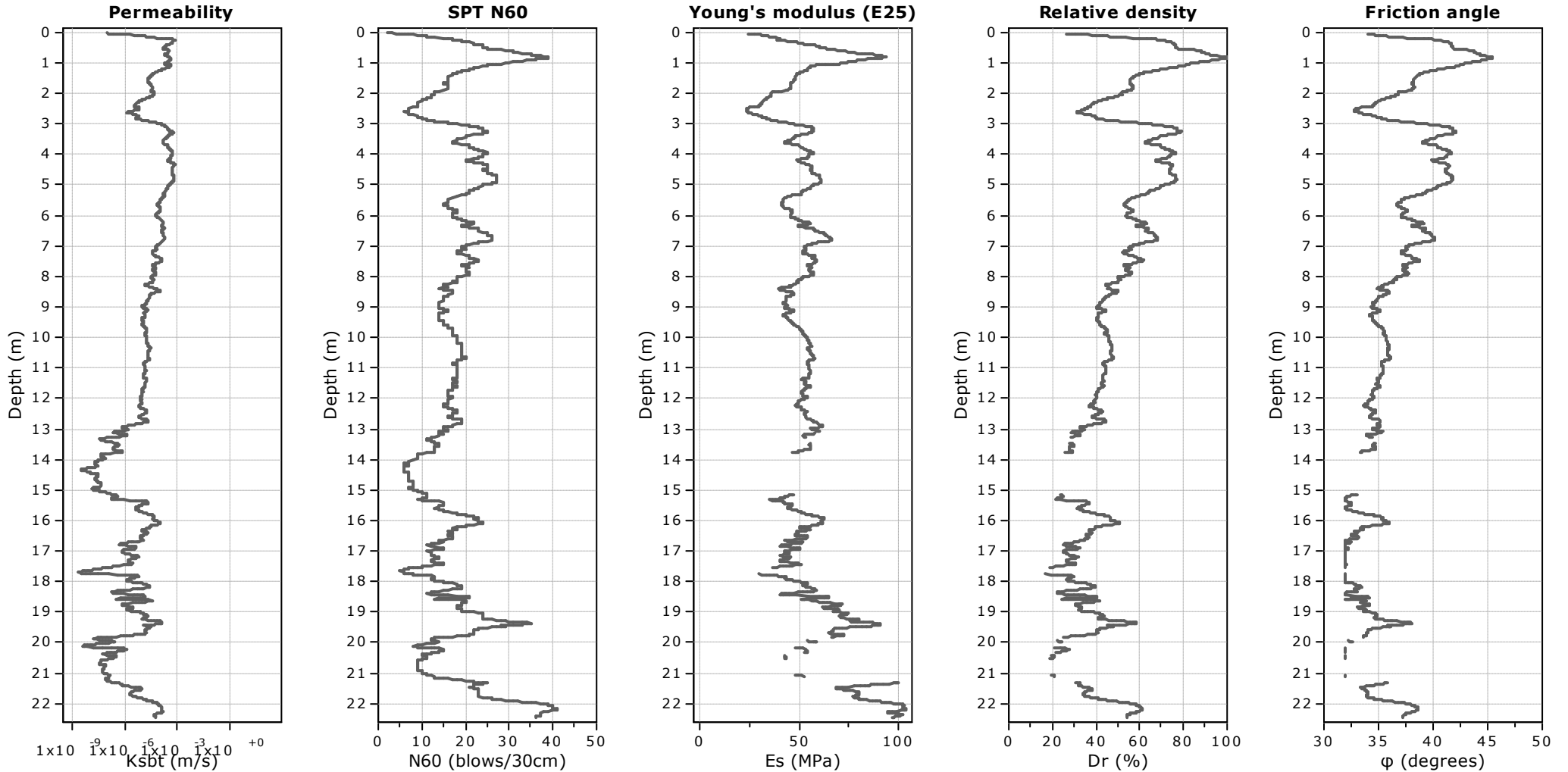
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

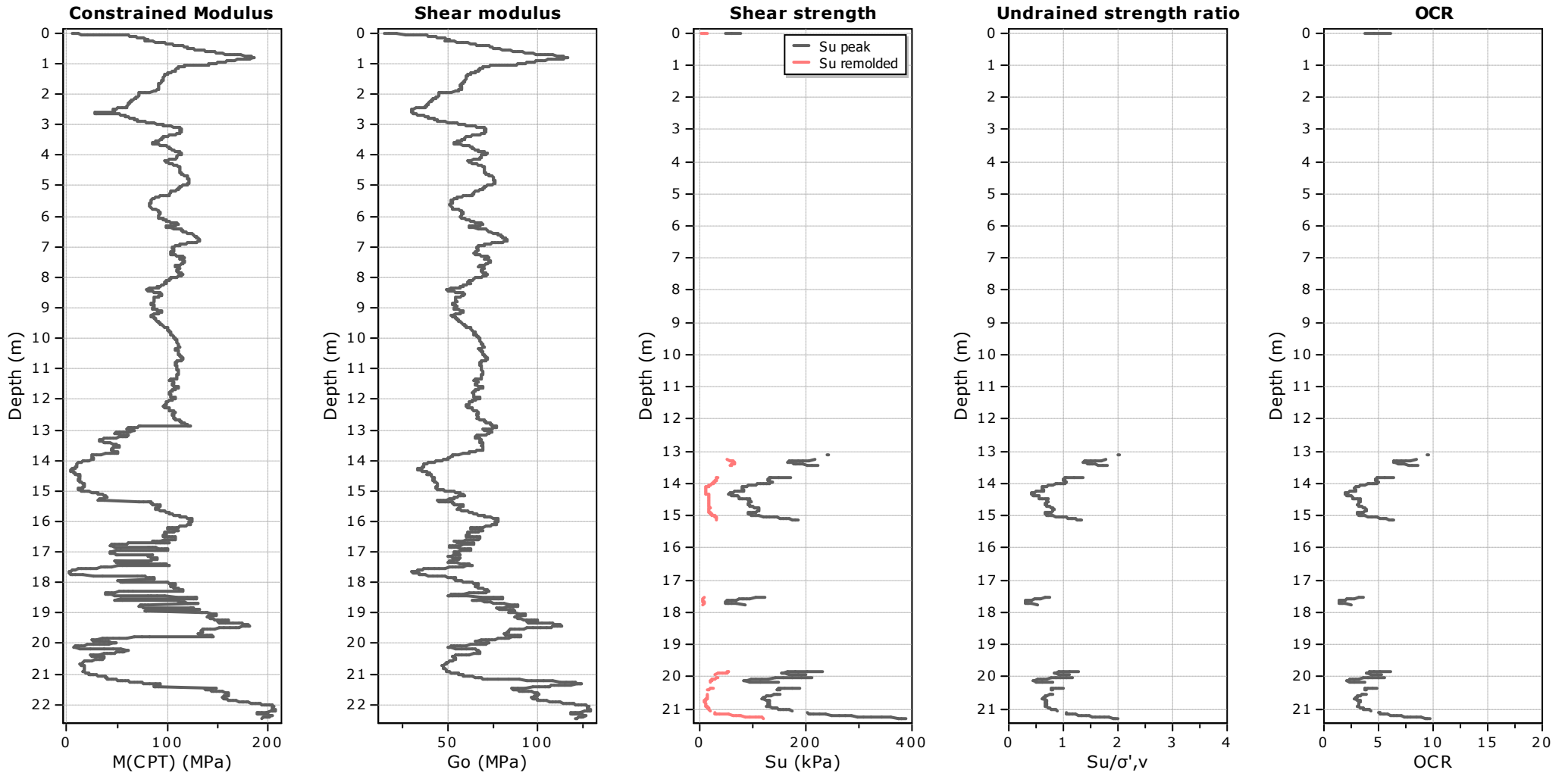
Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{in} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

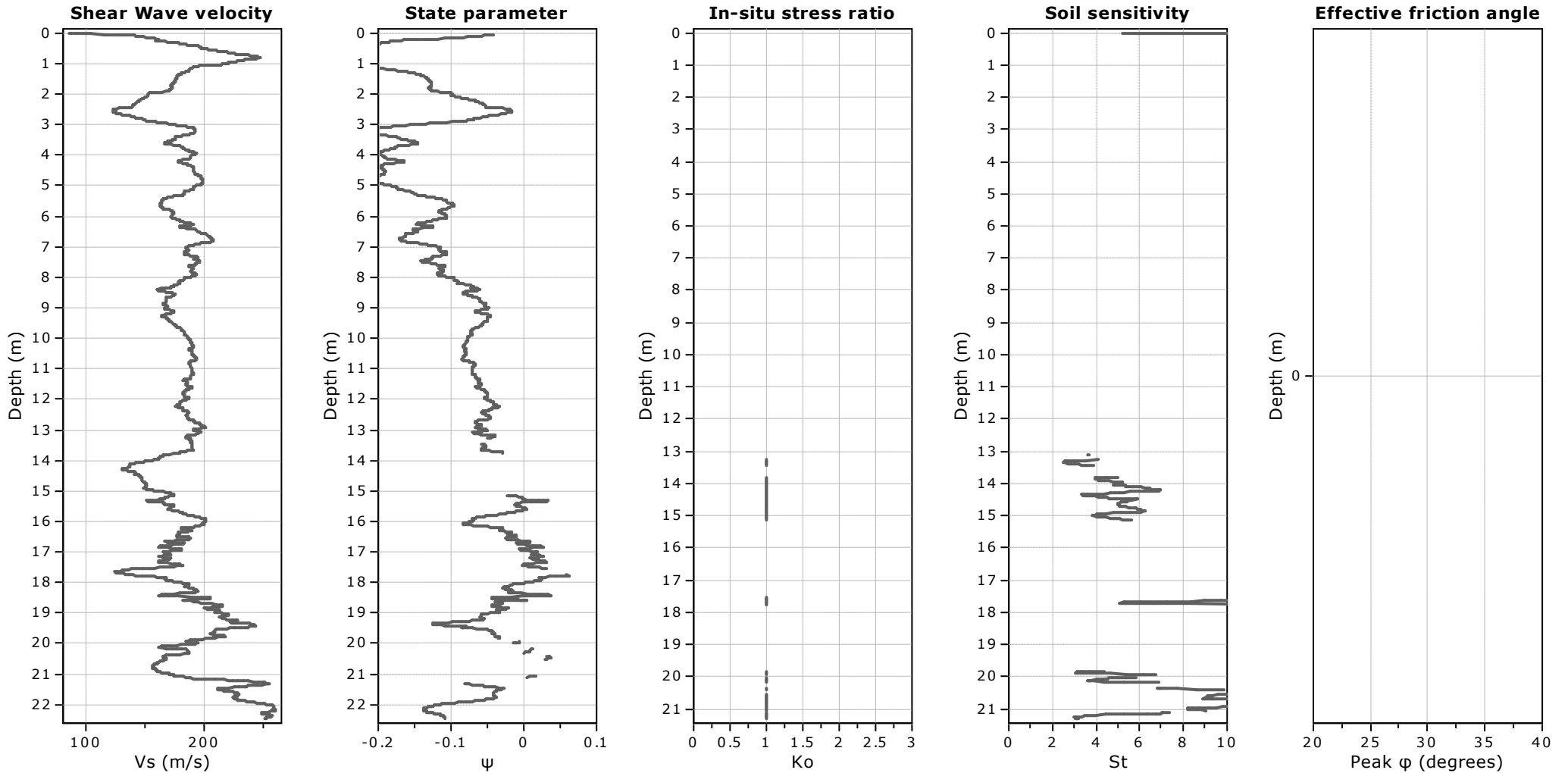
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

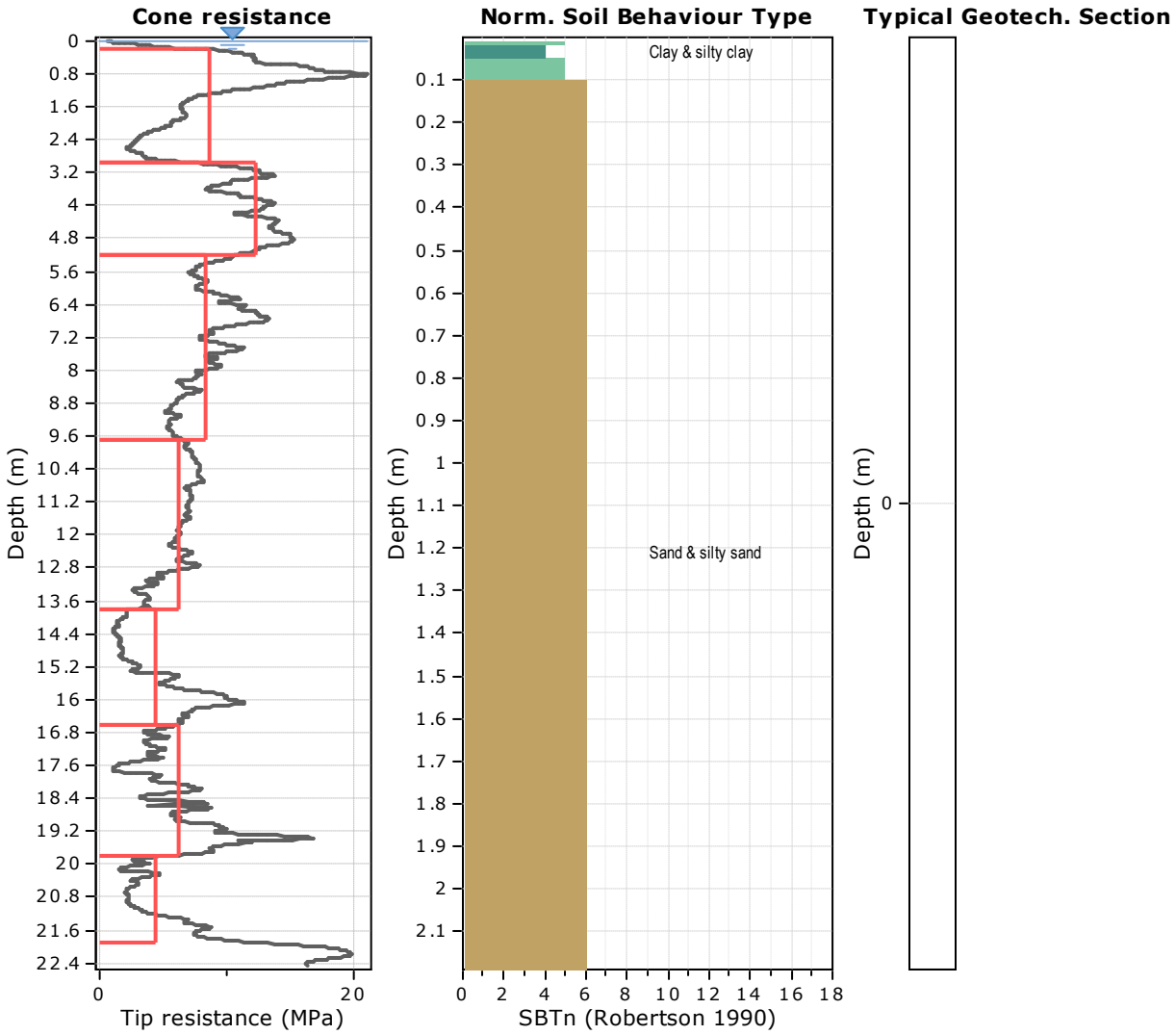
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

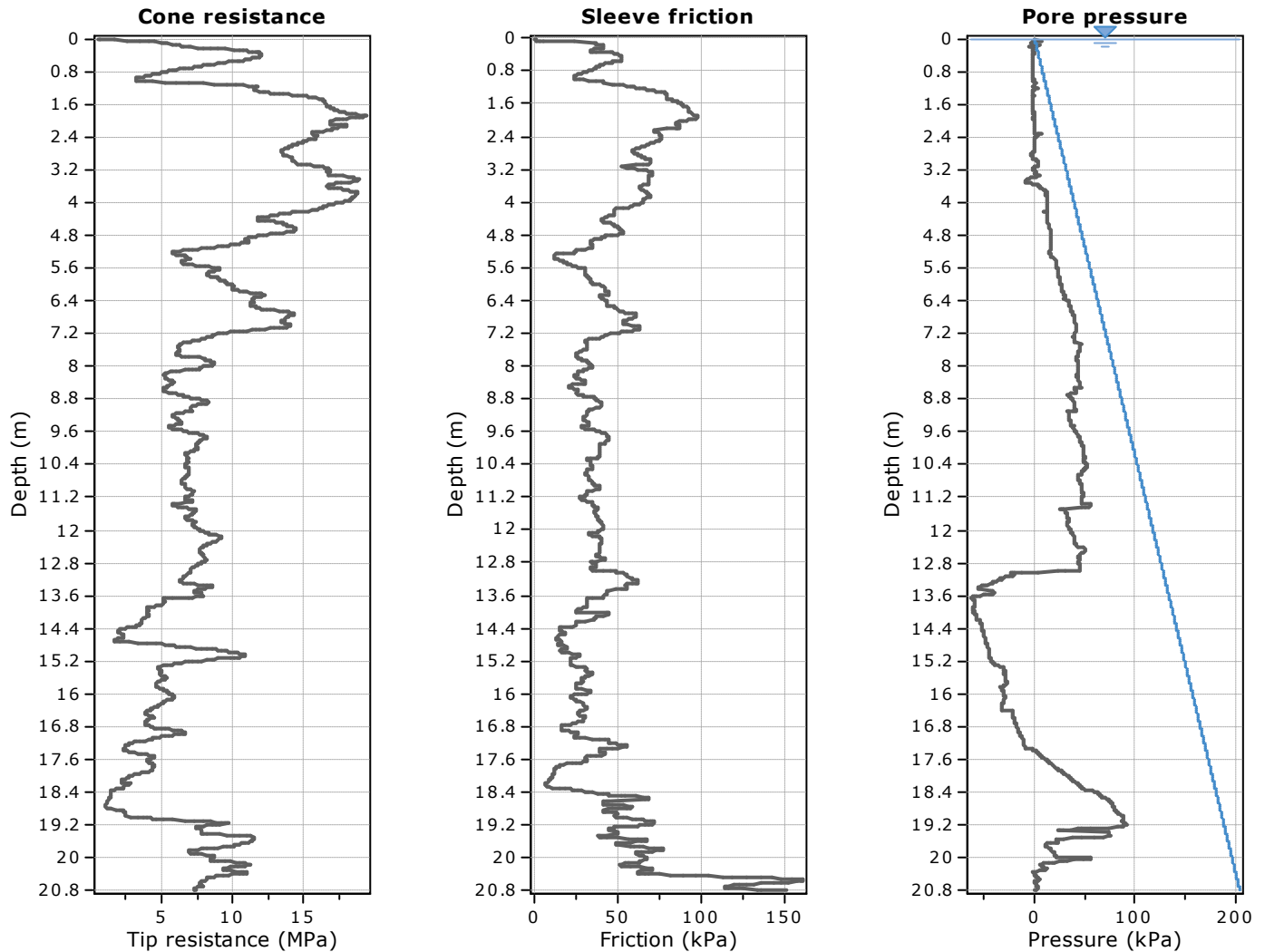
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

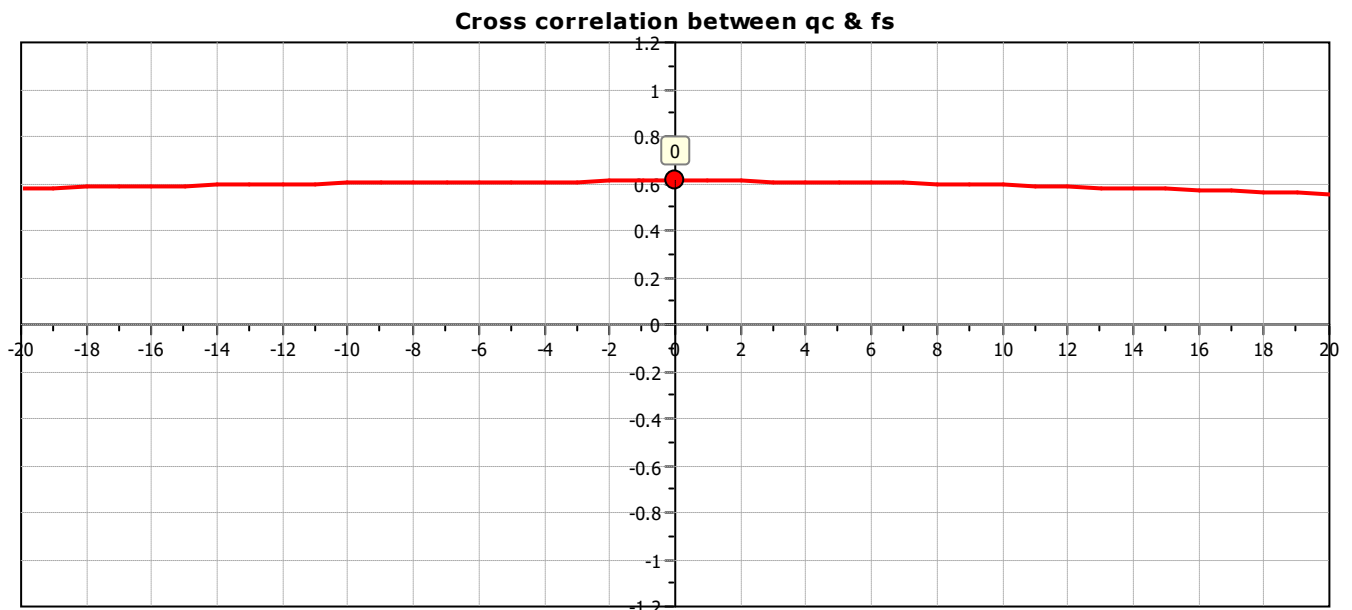


Tabular results

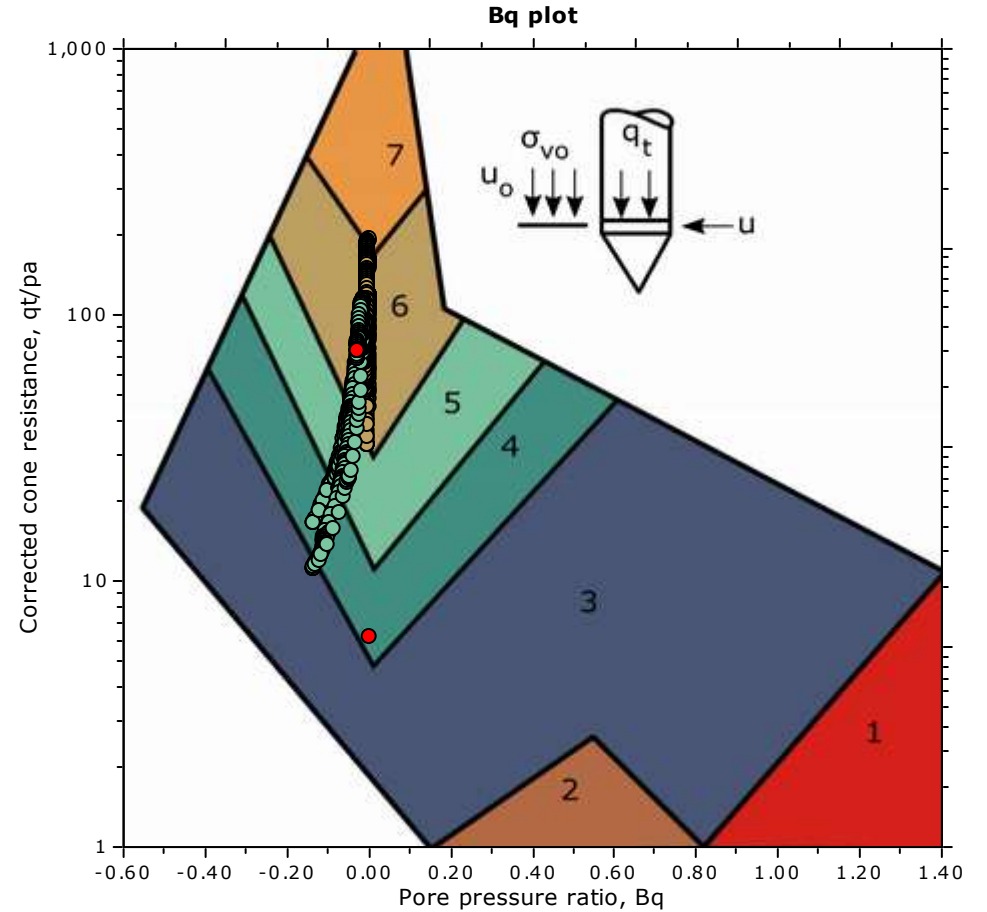
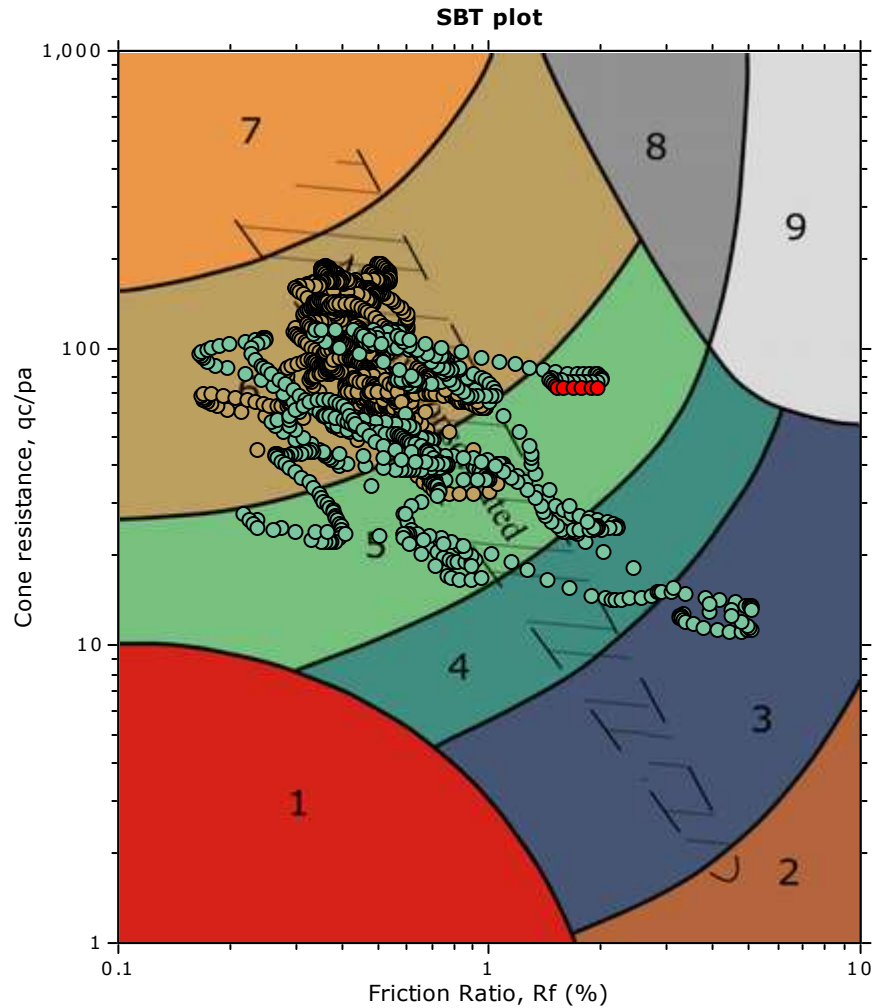
::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.20 (m), End depth: 2.97 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 8.56 ±5.14 MPa	Permeability: 1.43E-04 ±1.75E-04 m/s	Constrained Mod.: 96.43 ±36.21 MPa
Sleeve friction: 53.80 ±37.23 kPa	N ₆₀ : 18.06 ±8.65 blows	Go: 60.66 ±22.32 MPa
Ic: 1.73 ±0.24	Es: 48.40 ±17.81 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 61.06 ±19.05	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 38.76 ±3.54 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	

Project: Stage 6 Landings Fill Testing CPTs
Location: OTP The Landings Stage 6 & 7 Subdivision


The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

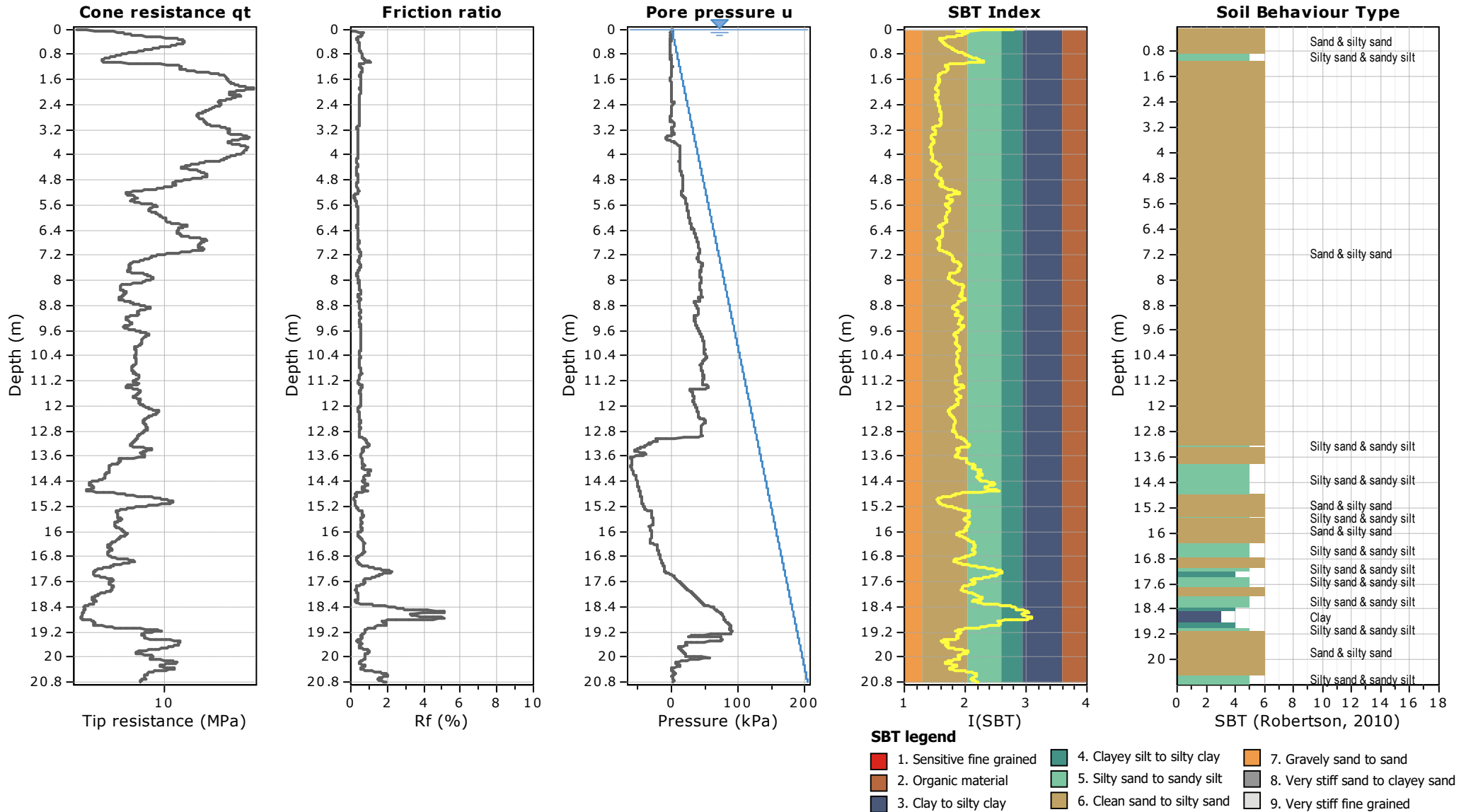


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

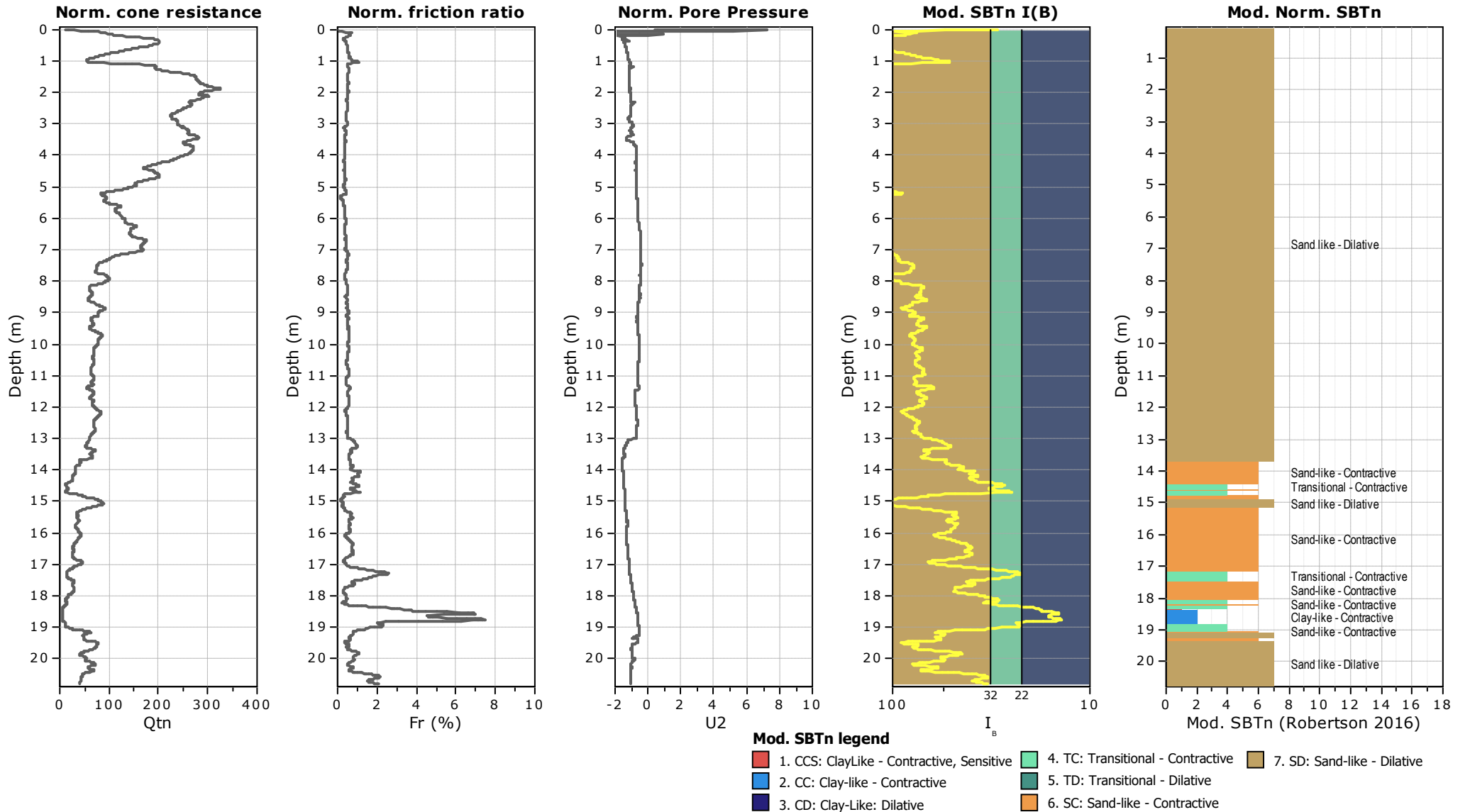
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



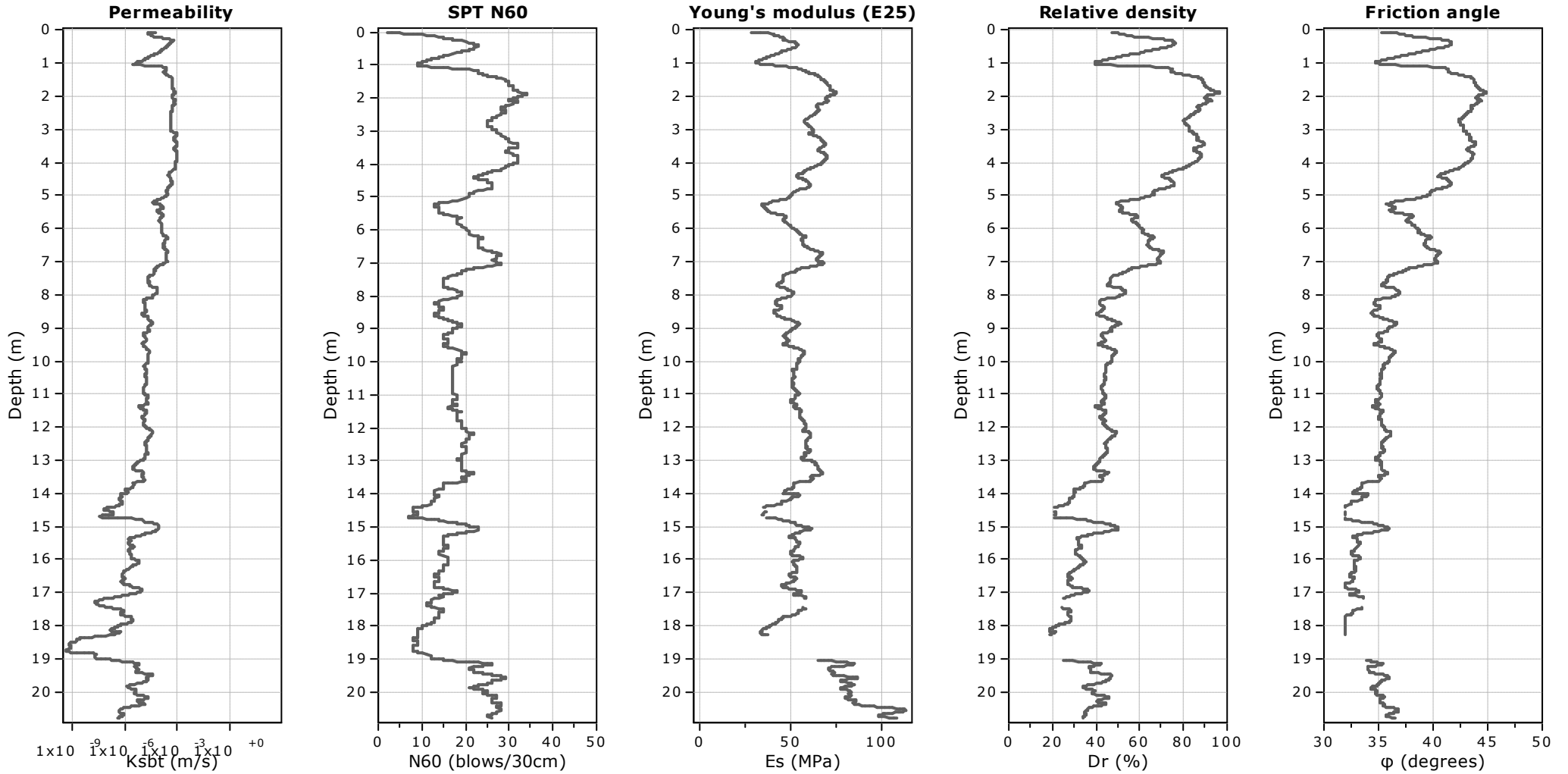
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

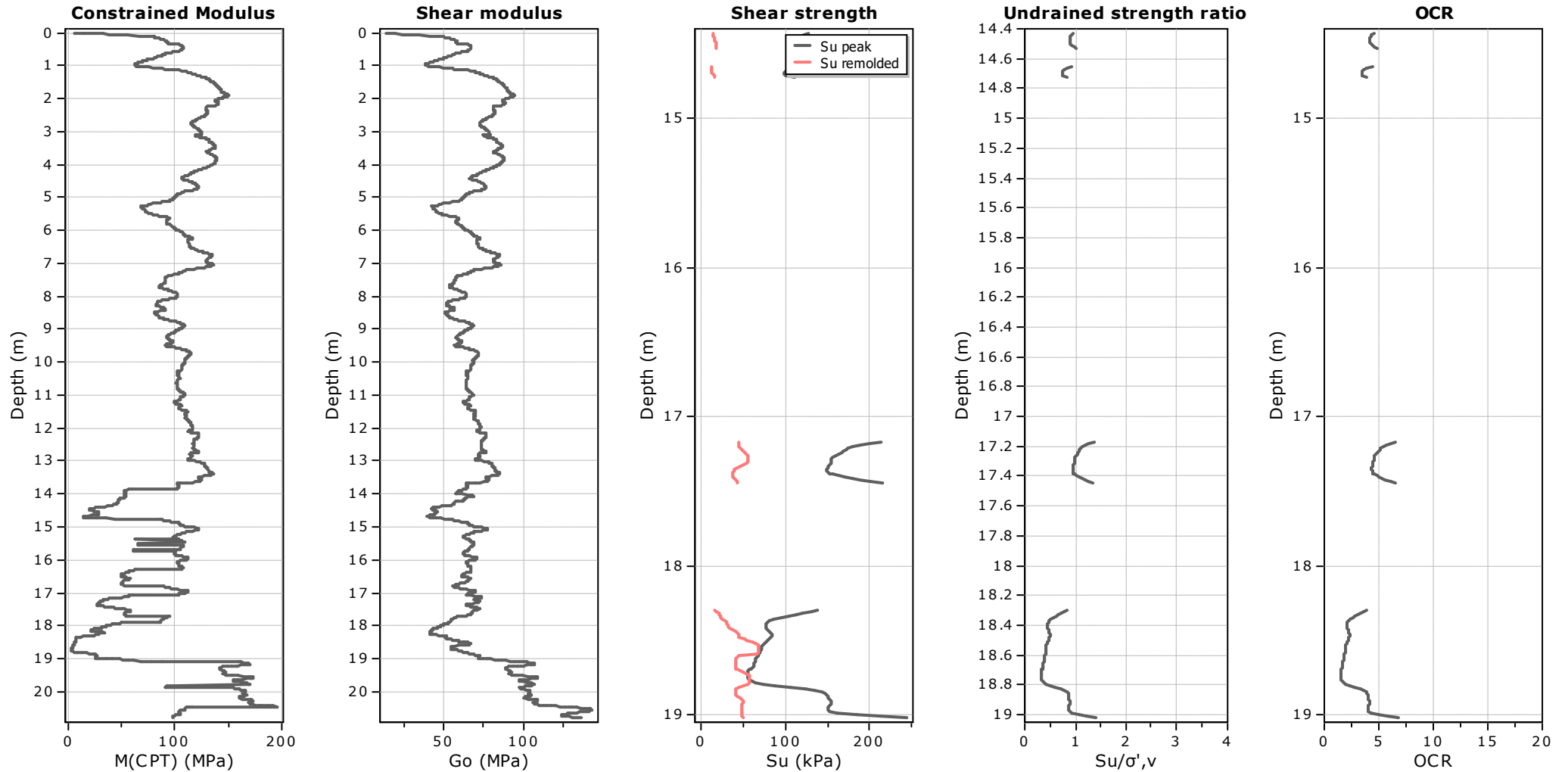
Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

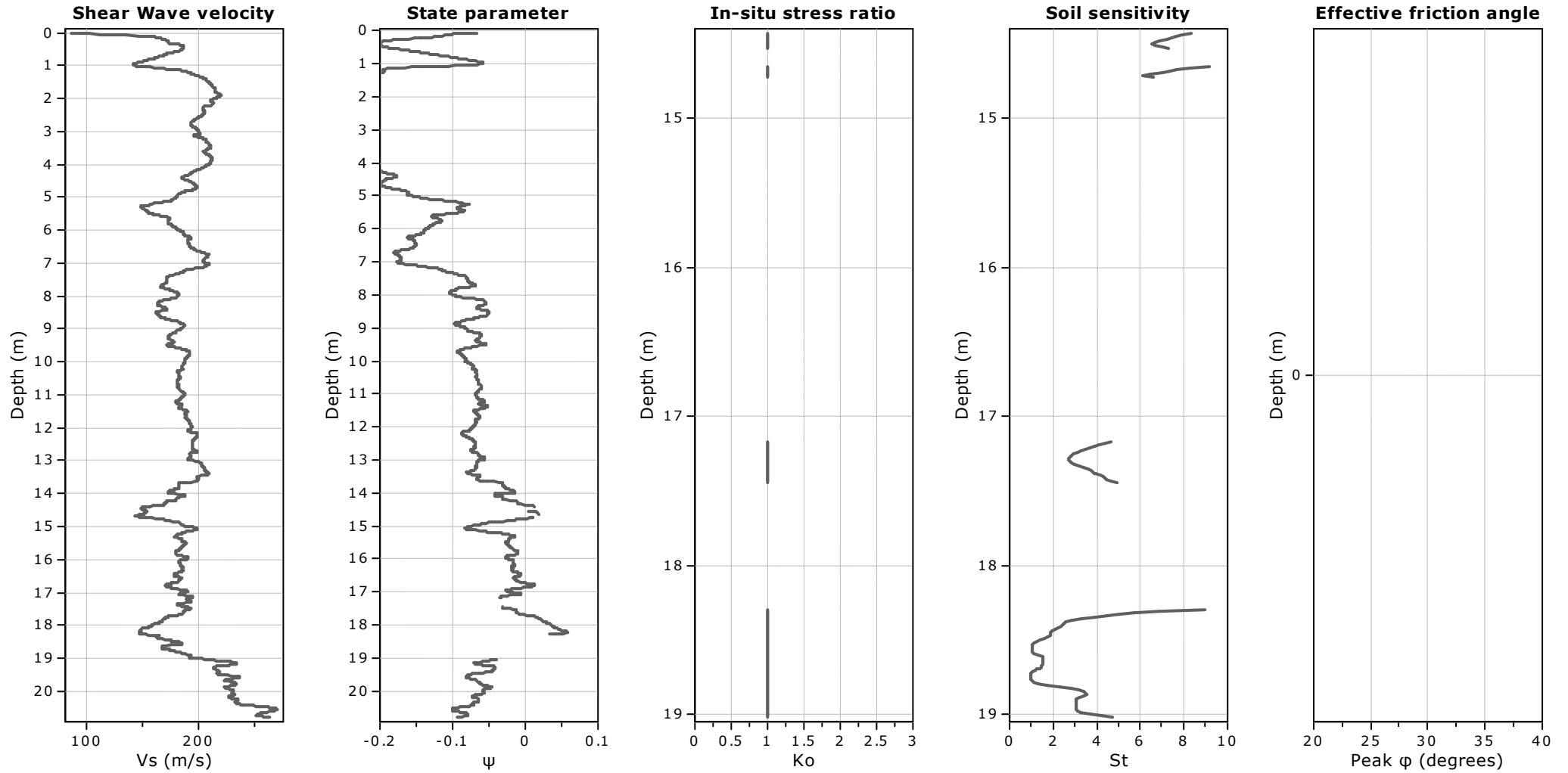
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

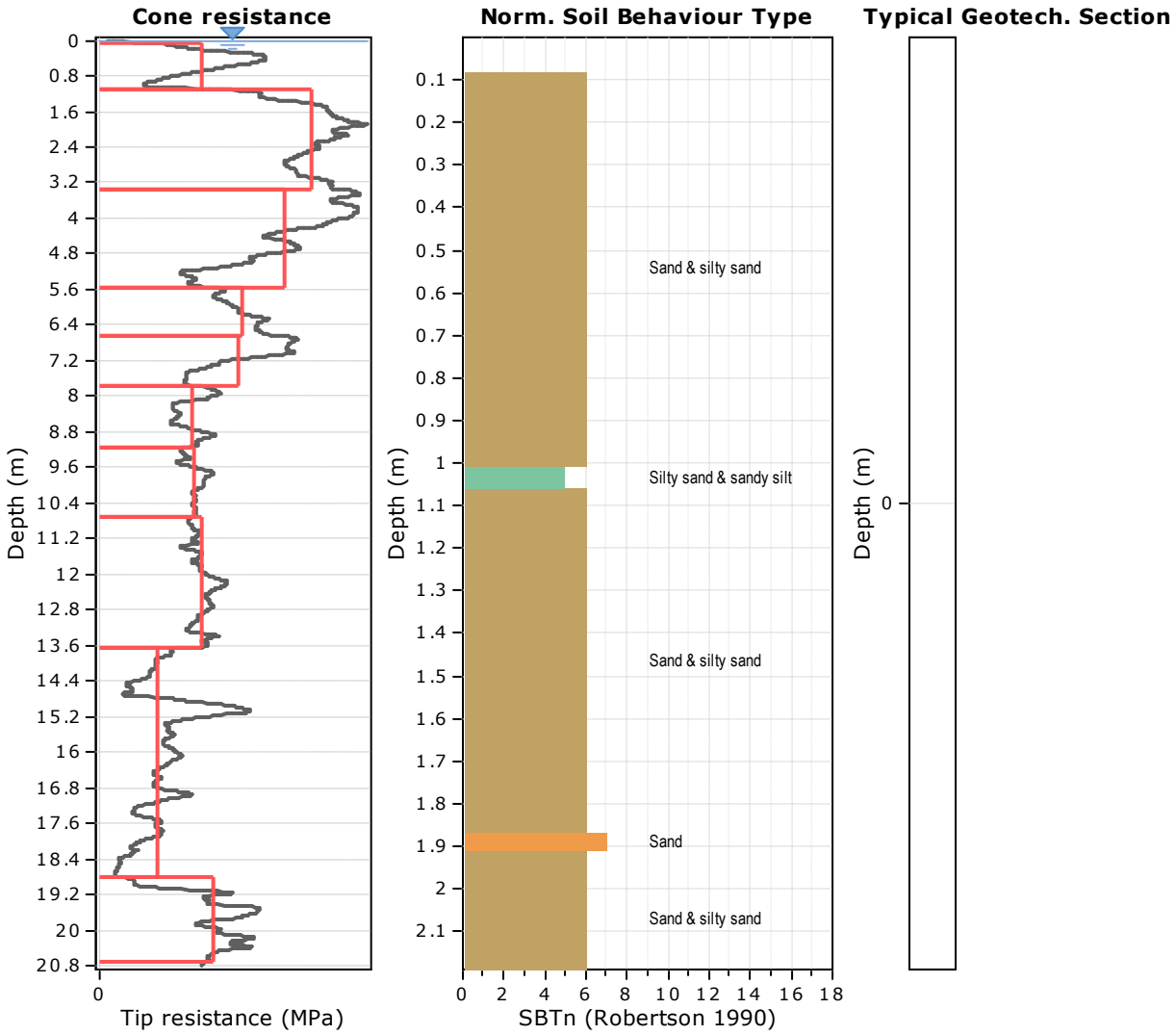
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

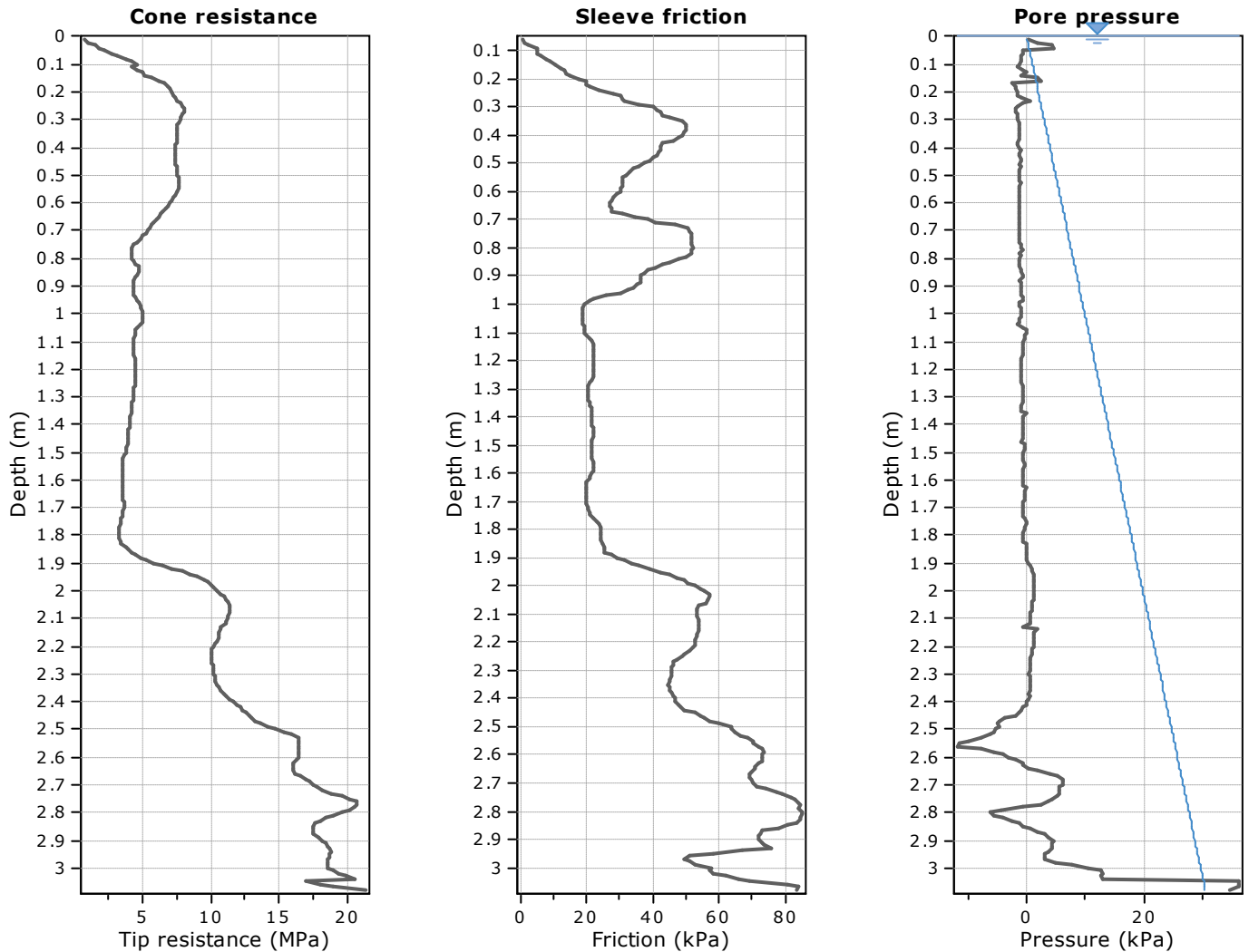
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

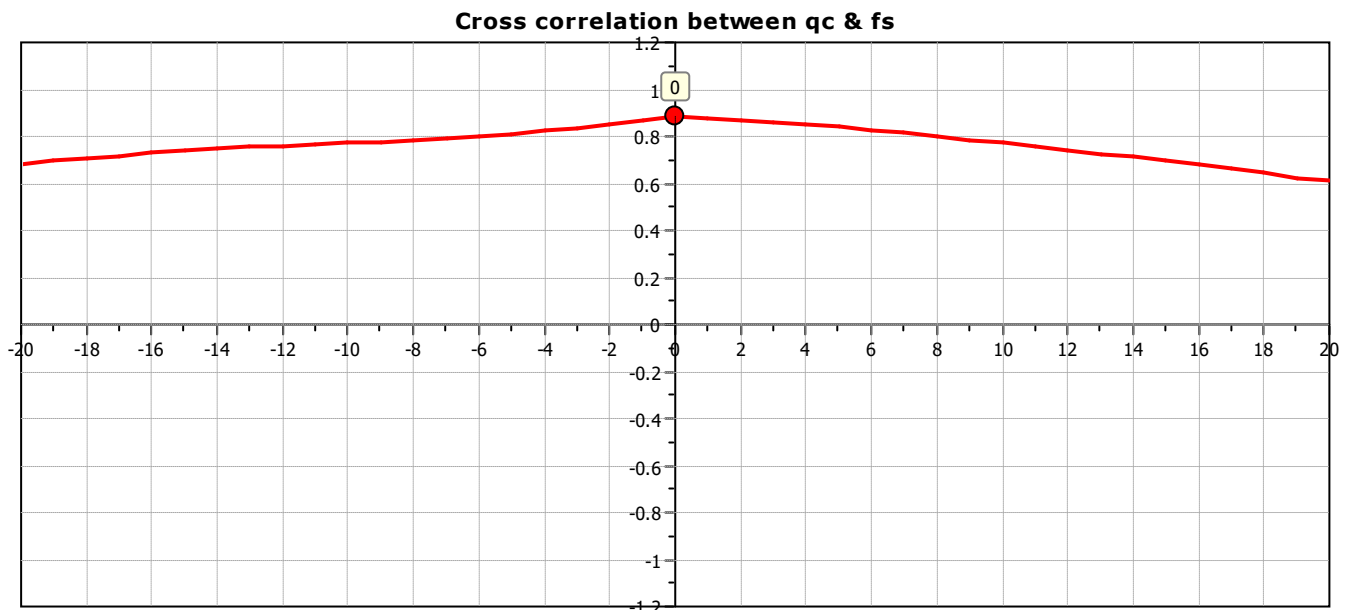


Tabular results

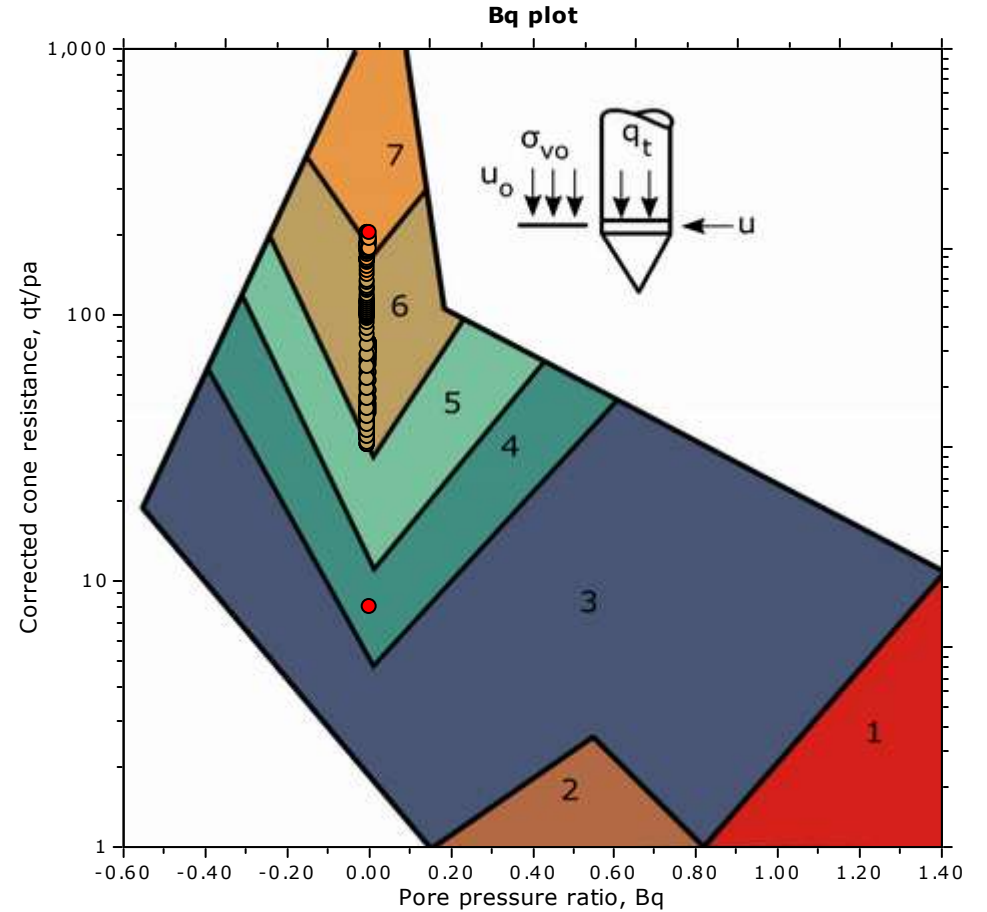
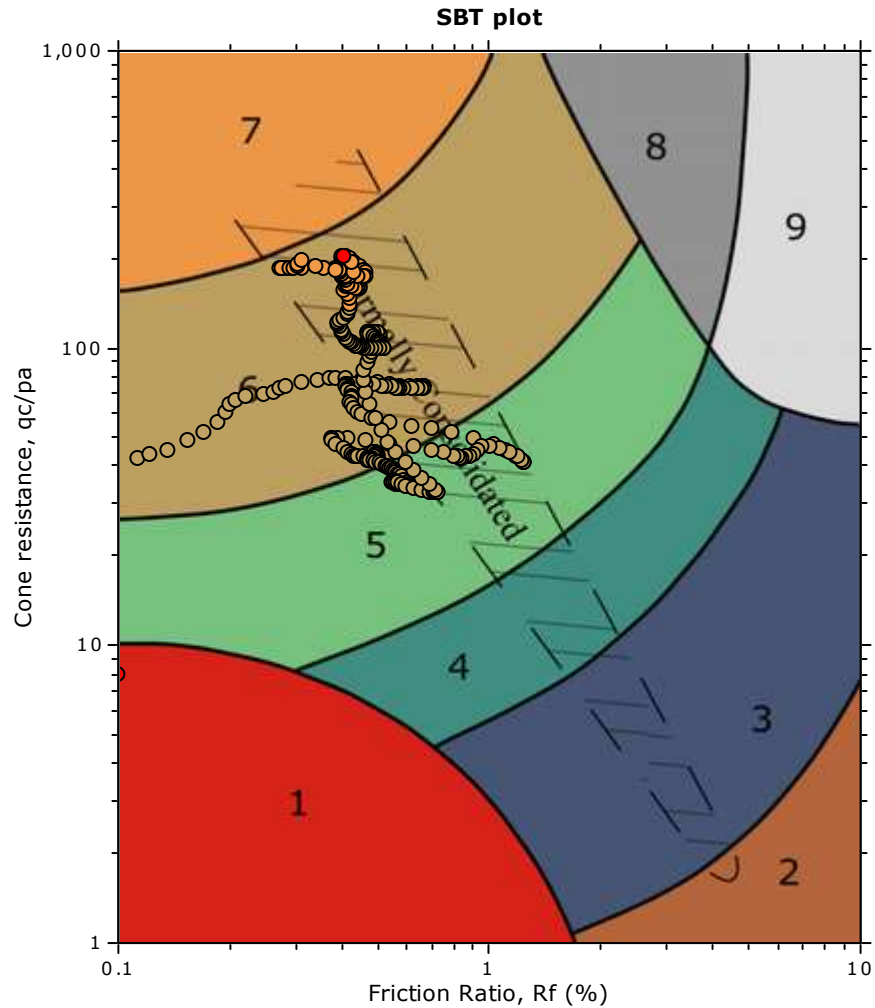
::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.05 (m), End depth: 1.09 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 7.45 ±3.02 MPa	Permeability: 1.45E-04 ±1.63E-04 m/s	Constrained Mod.: 85.19 ±15.91 MPa
Sleeve friction: 37.17 ±11.11 kPa	N ₆₀ : 15.80 ±4.66 blows	Go: 53.39 ±9.97 MPa
Ic: 1.69 ±0.21	Es: 43.22 ±7.18 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 58.98 ±12.13	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 38.42 ±2.27 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

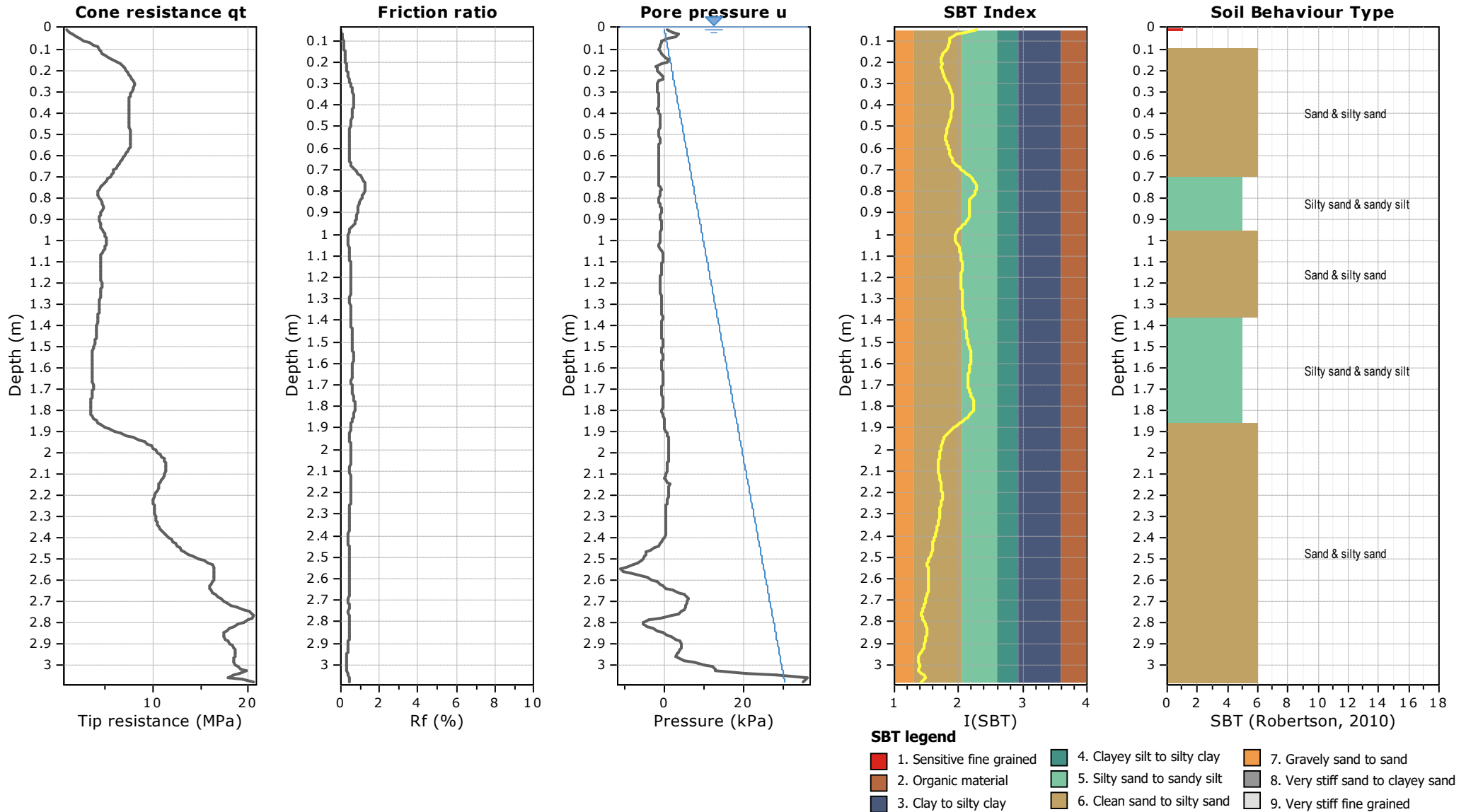


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

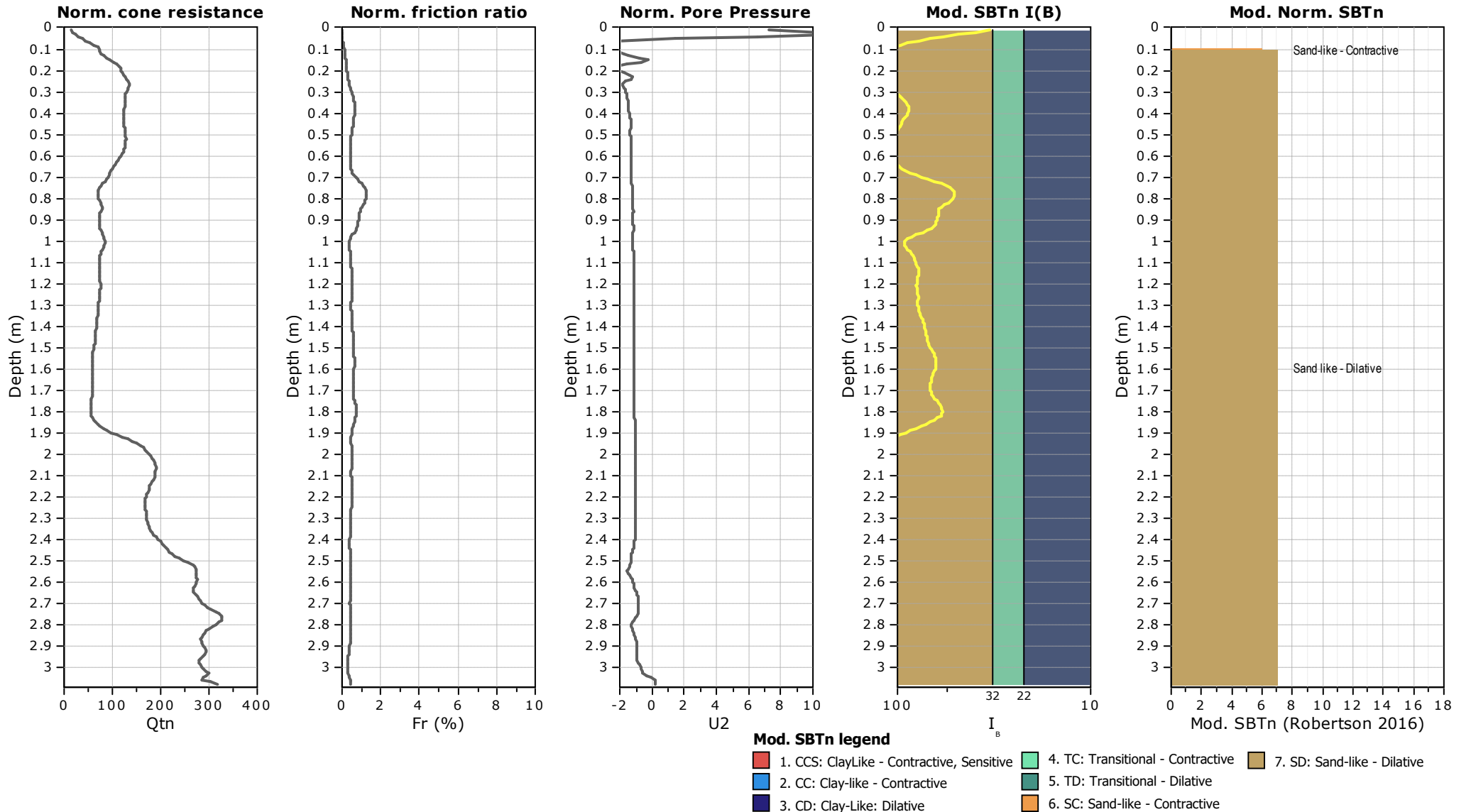
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



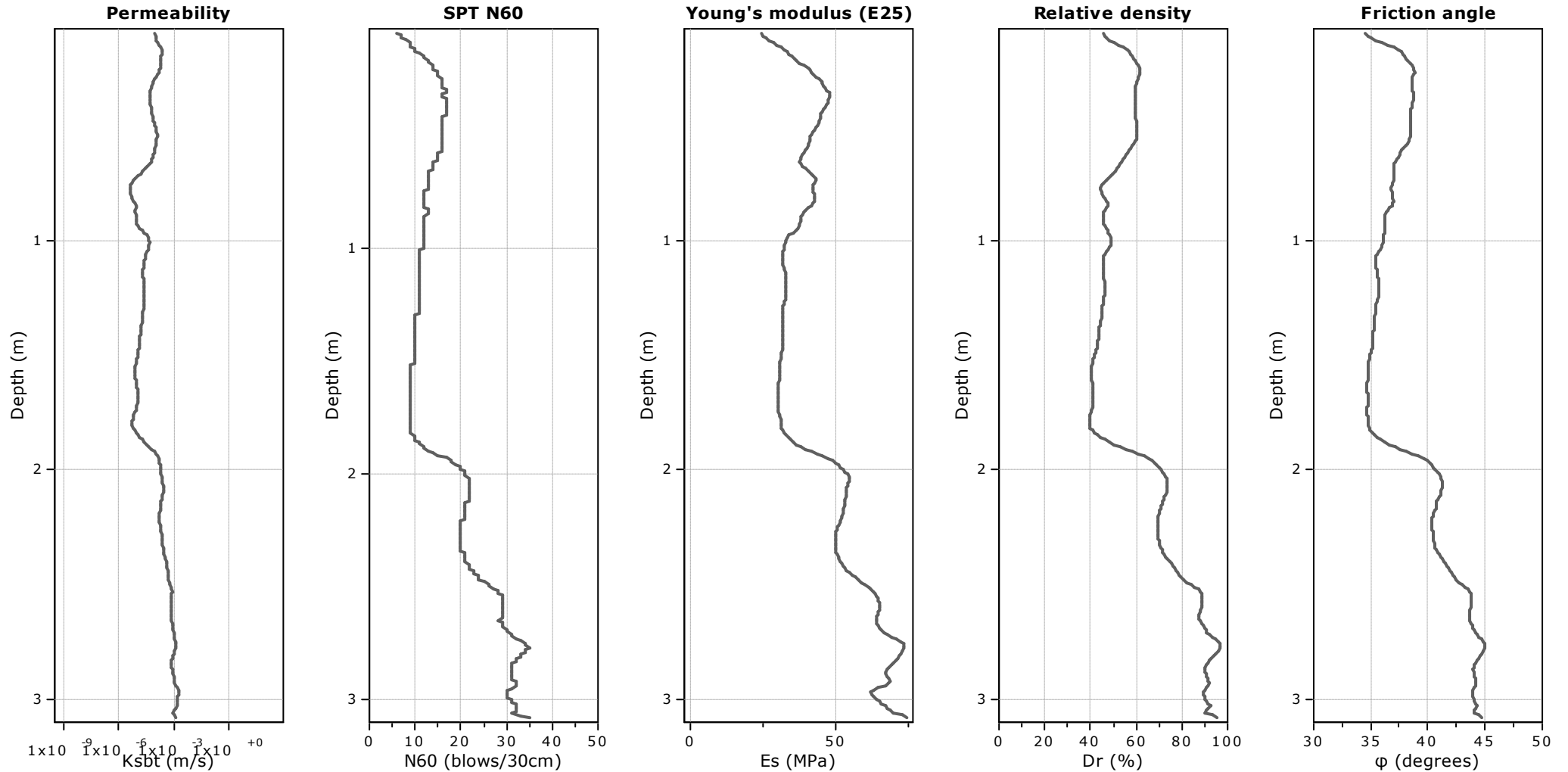
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

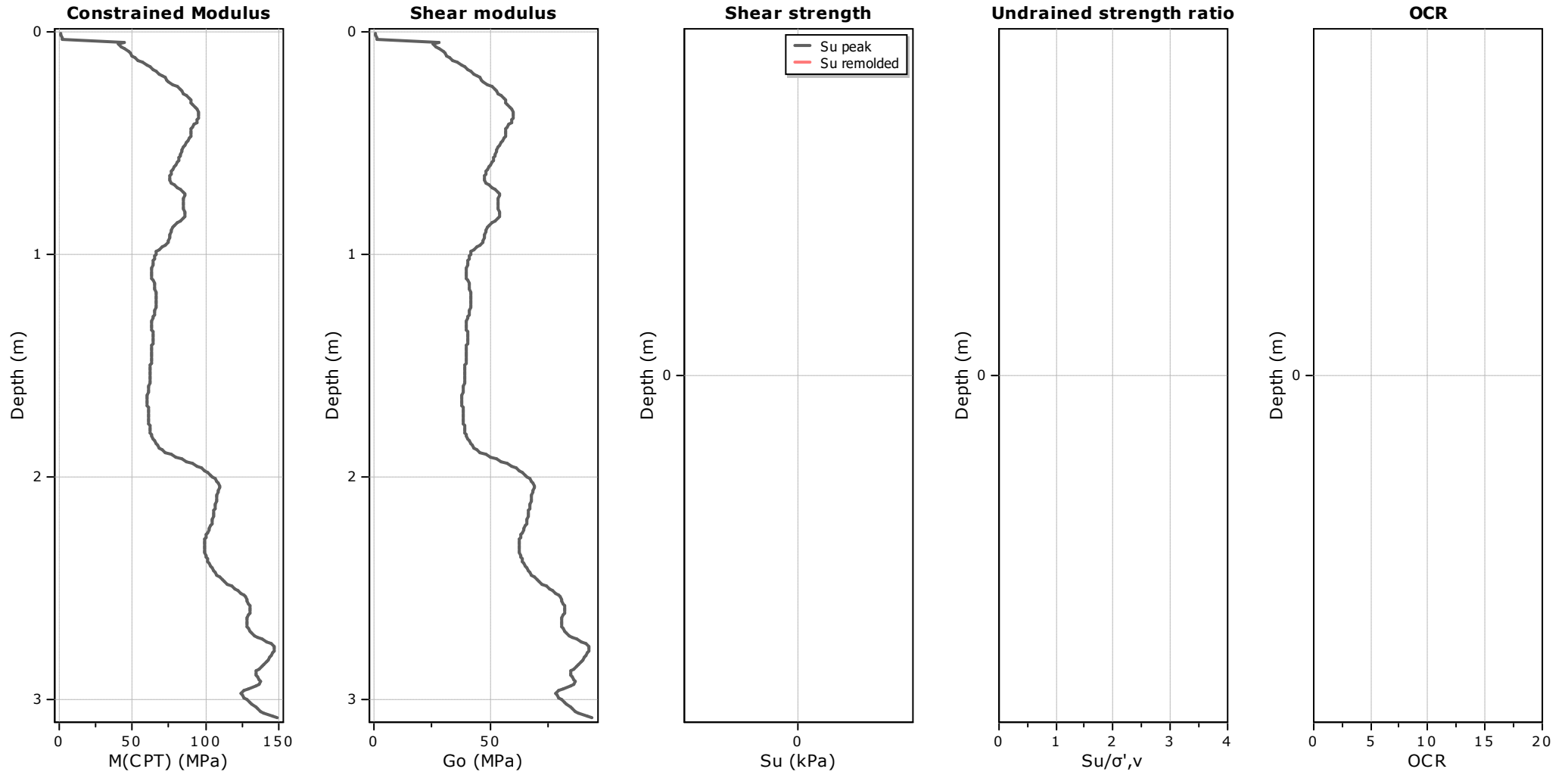
Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

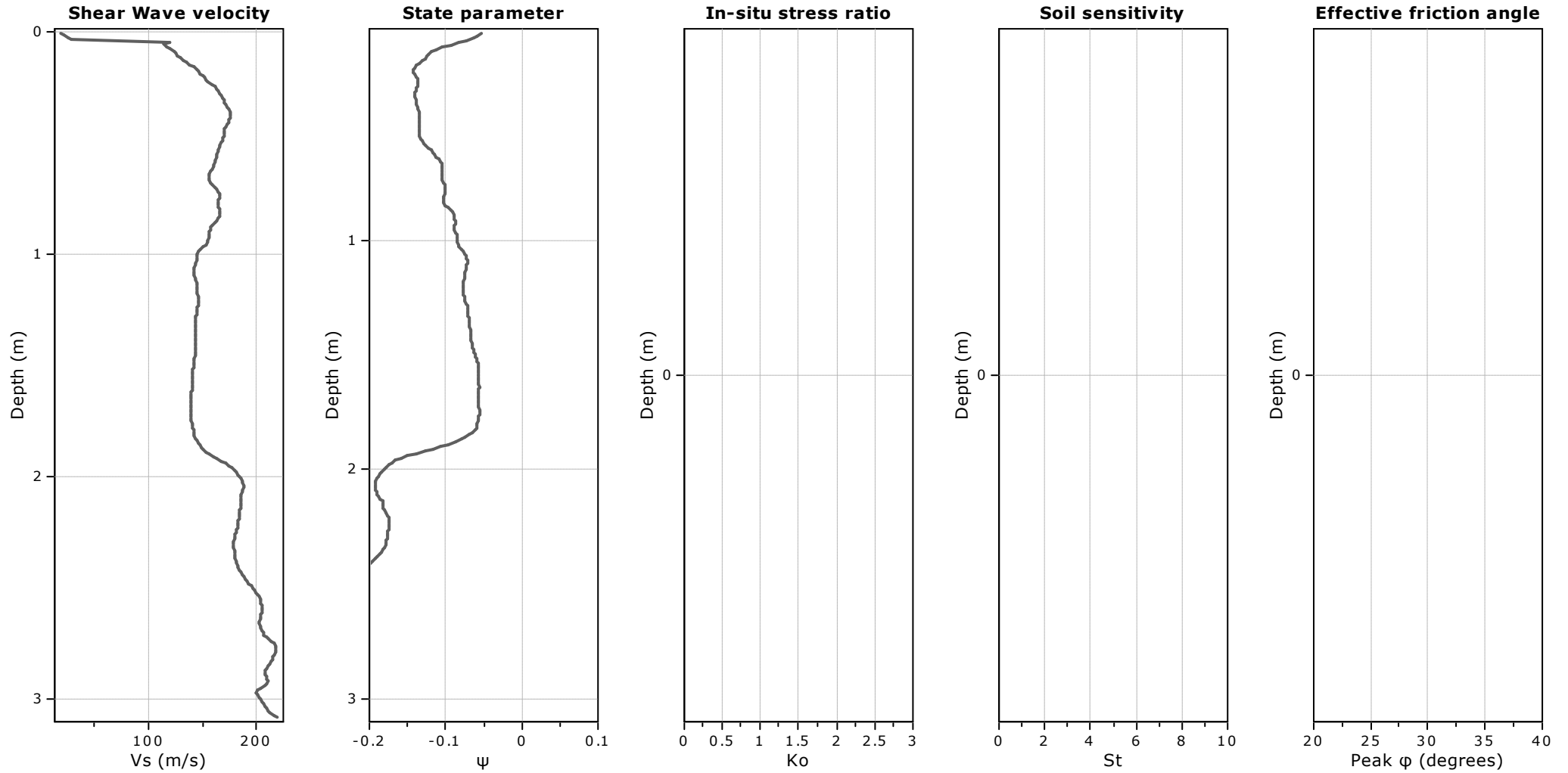
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

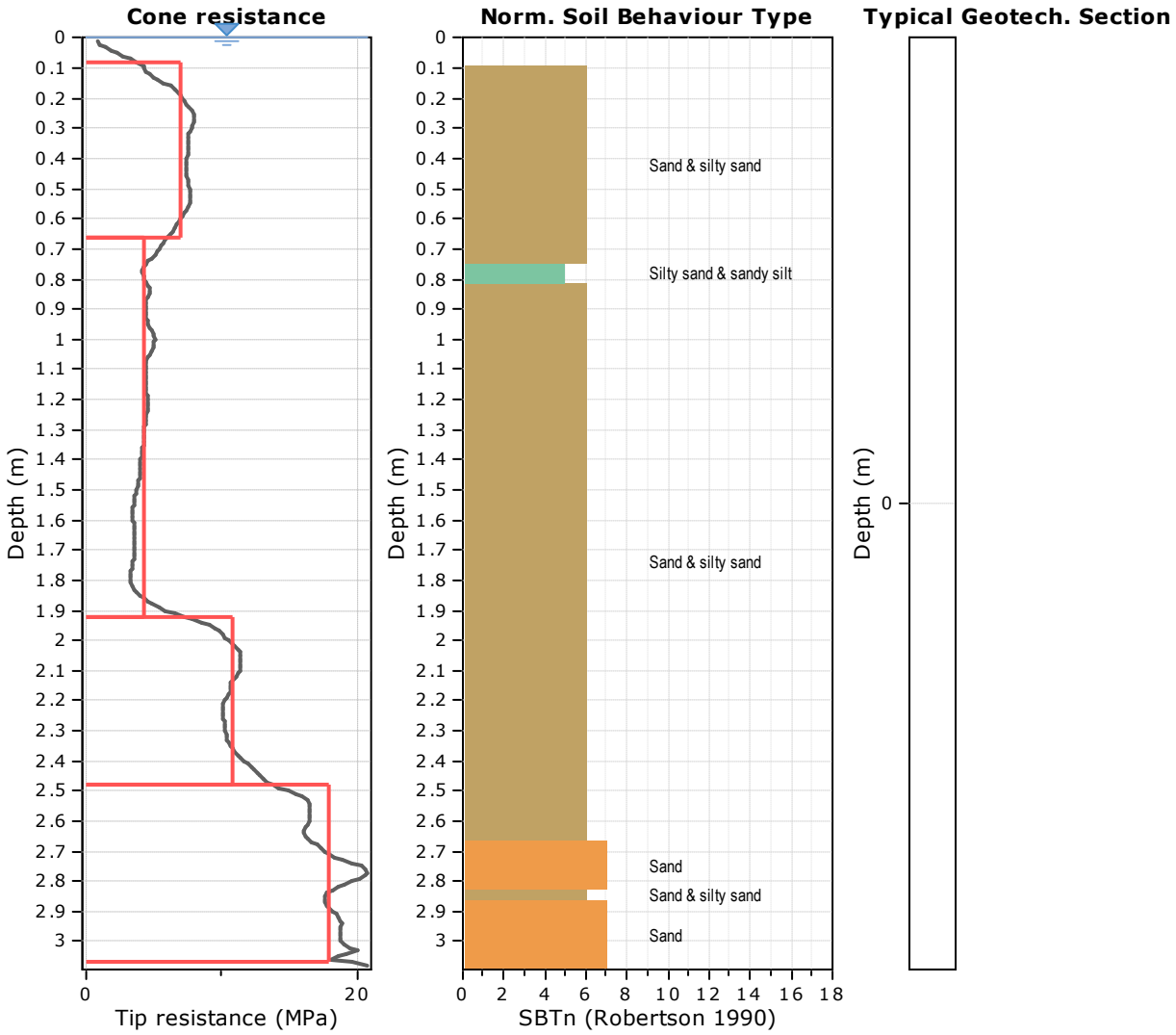
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

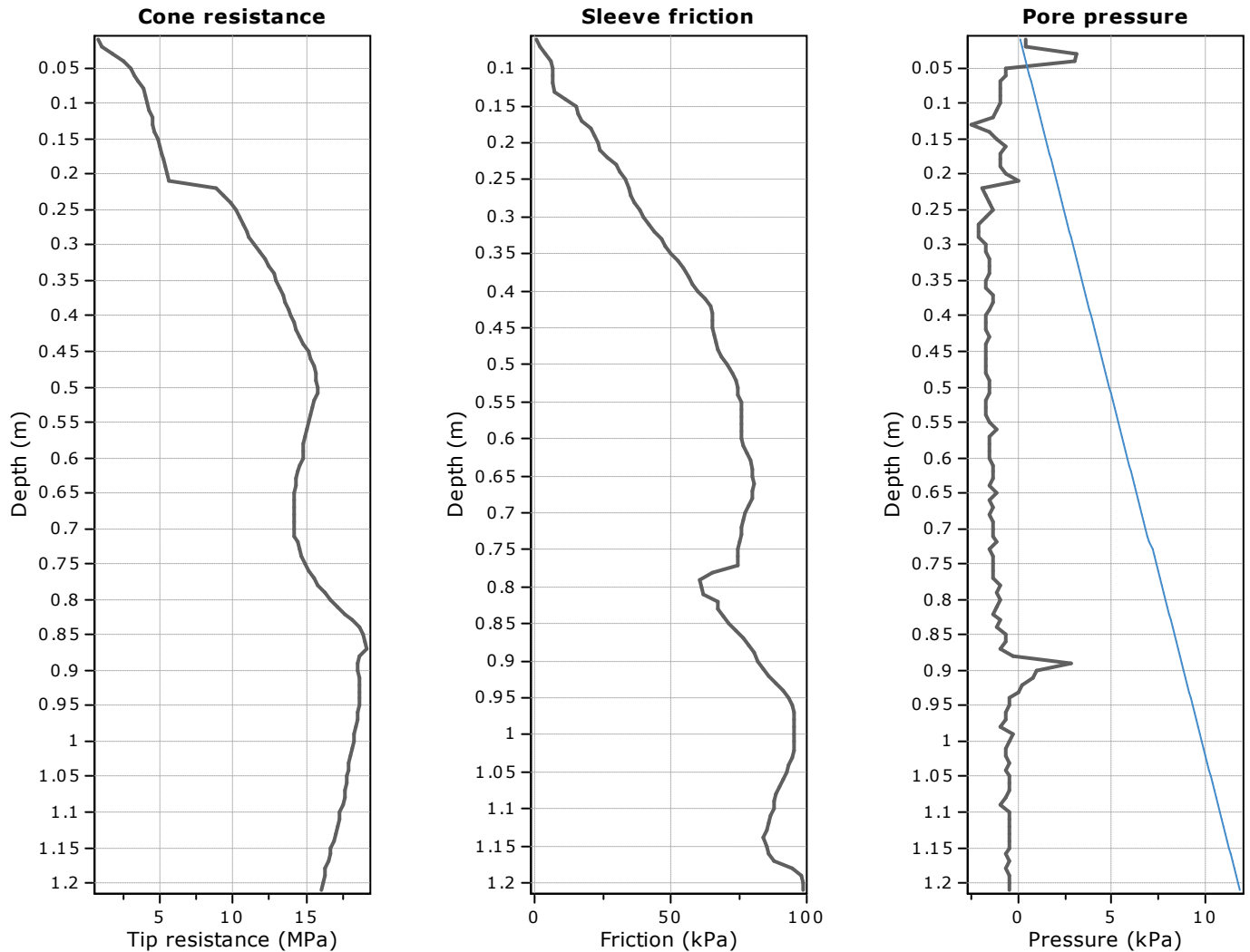
Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data

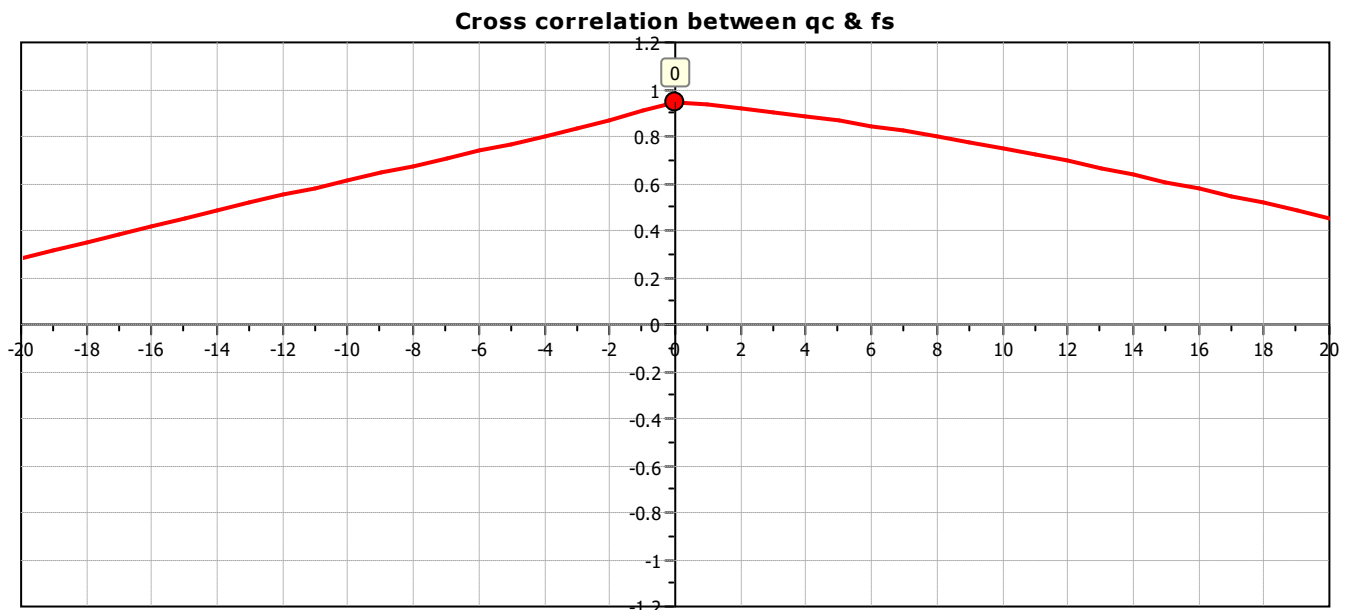


Tabular results

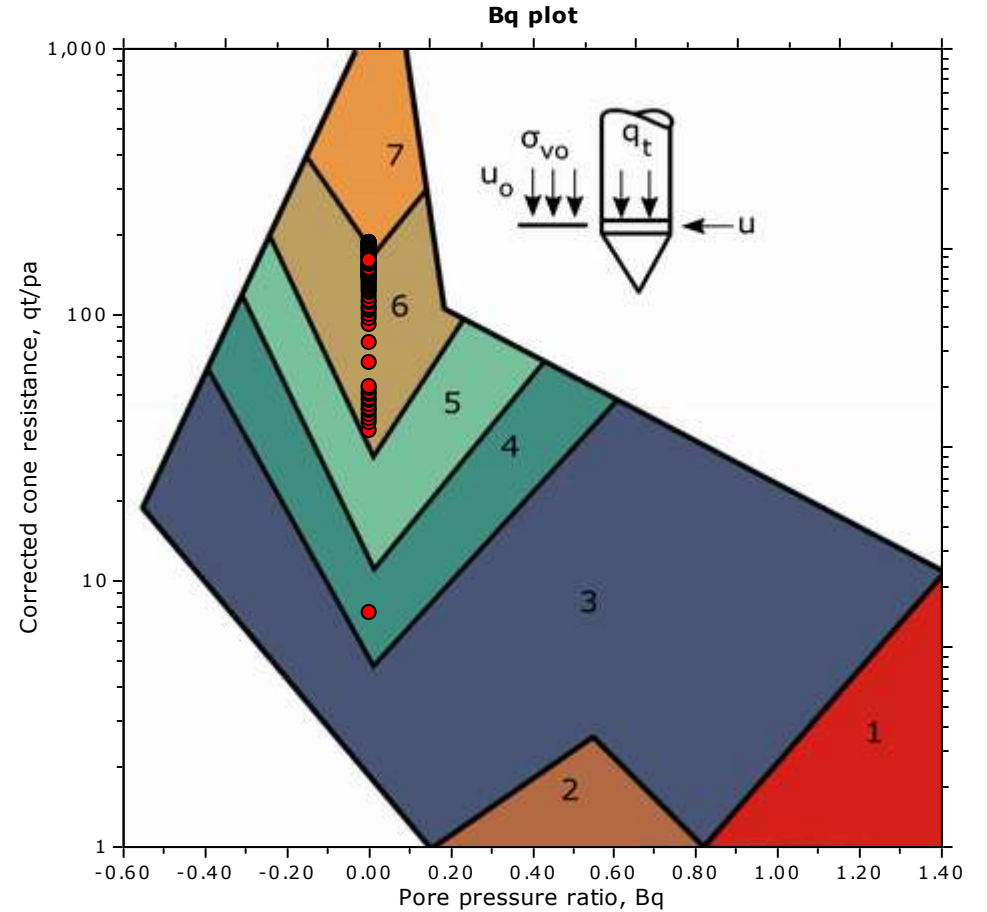
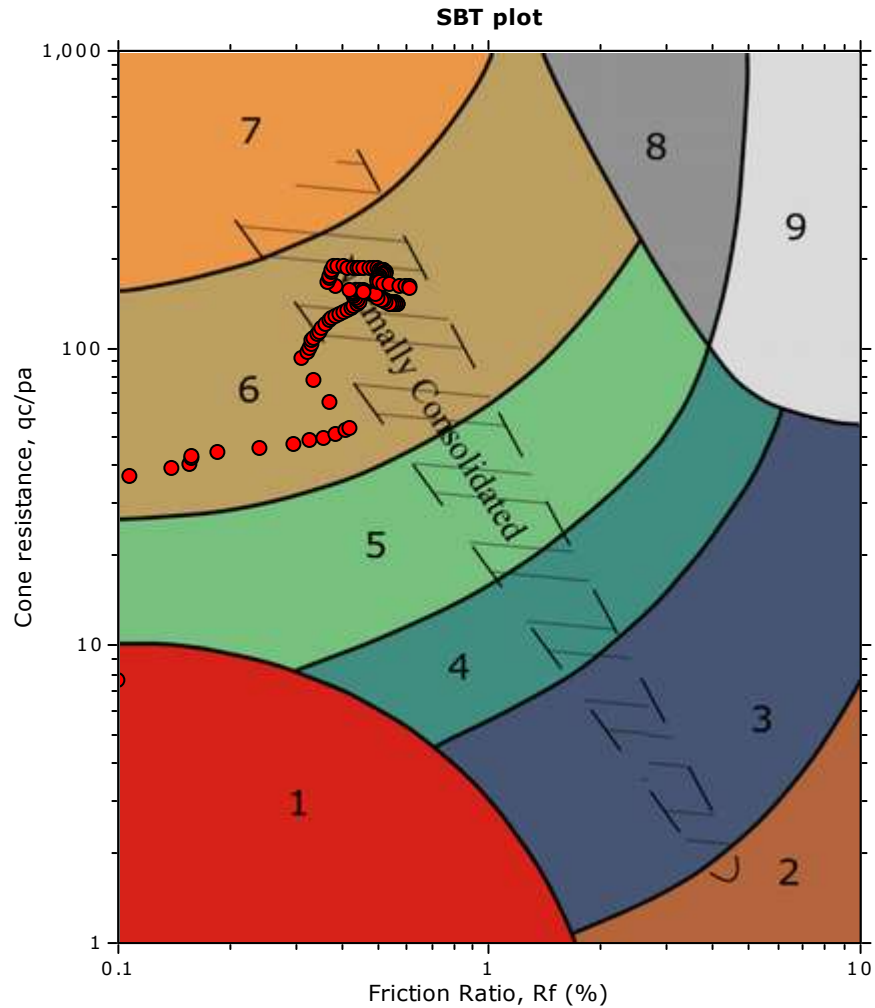
::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.08 (m), End depth: 0.66 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 6.95 ±1.05 MPa	Permeability: 1.09E-04 ±5.23E-05 m/s	Constrained Mod.: 79.09 ±13.67 MPa
Sleeve friction: 30.11 ±13.66 kPa	N ₆₀ : 14.75 ±2.35 blows	Go: 49.57 ±8.56 MPa
Ic: 1.63 ±0.06	Es: 40.12 ±6.19 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 58.01 ±3.92	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 37.99 ±1.03 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

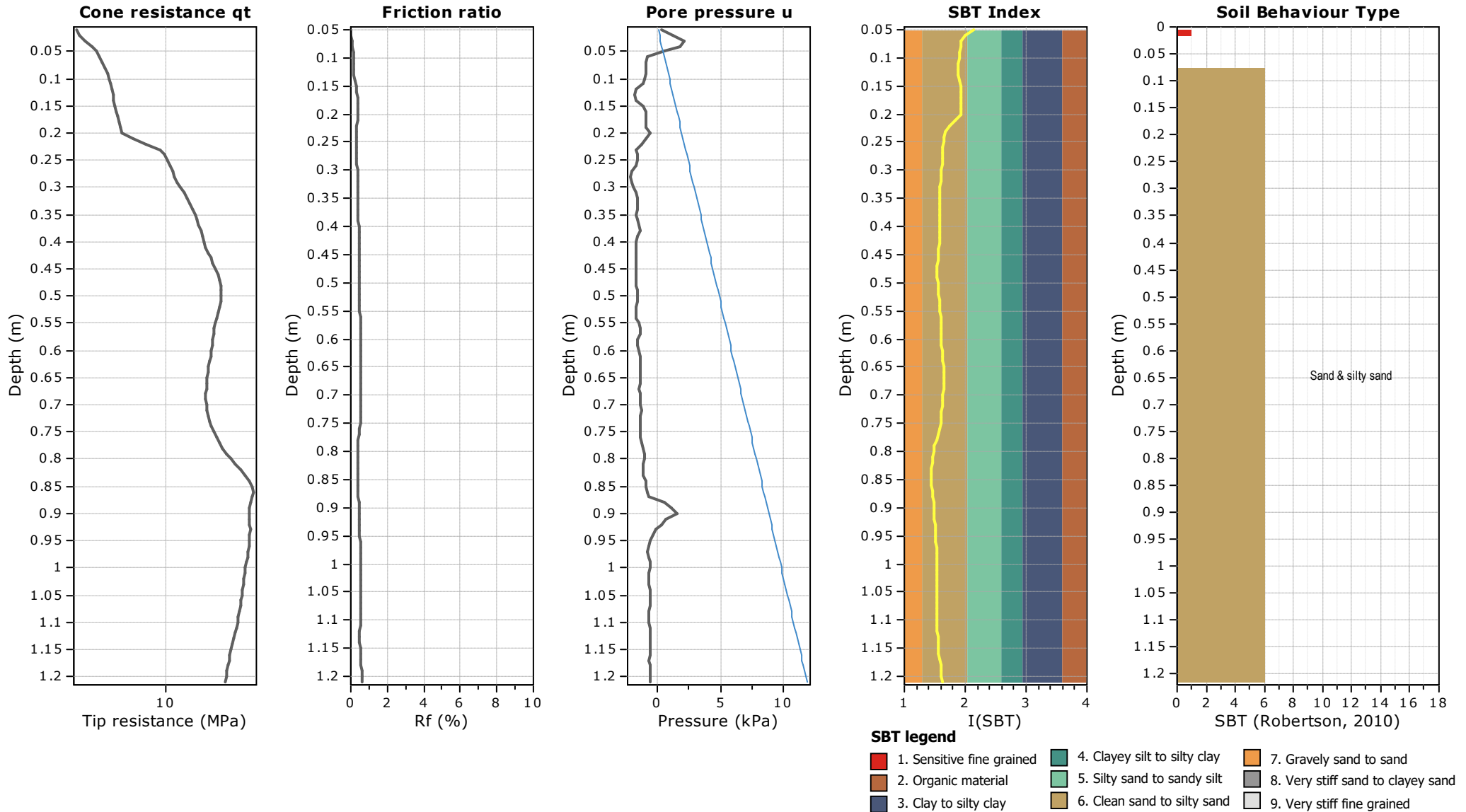


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

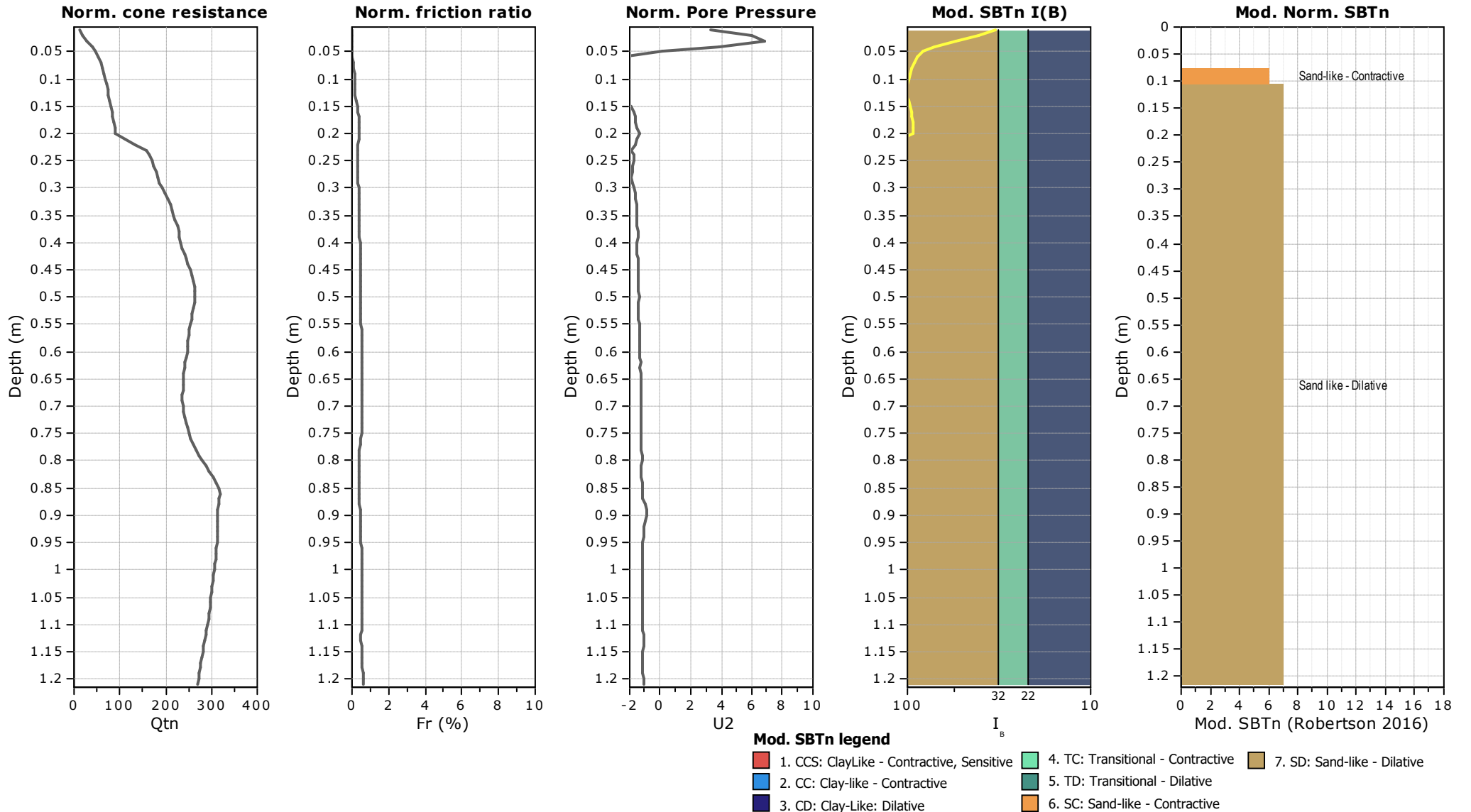
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



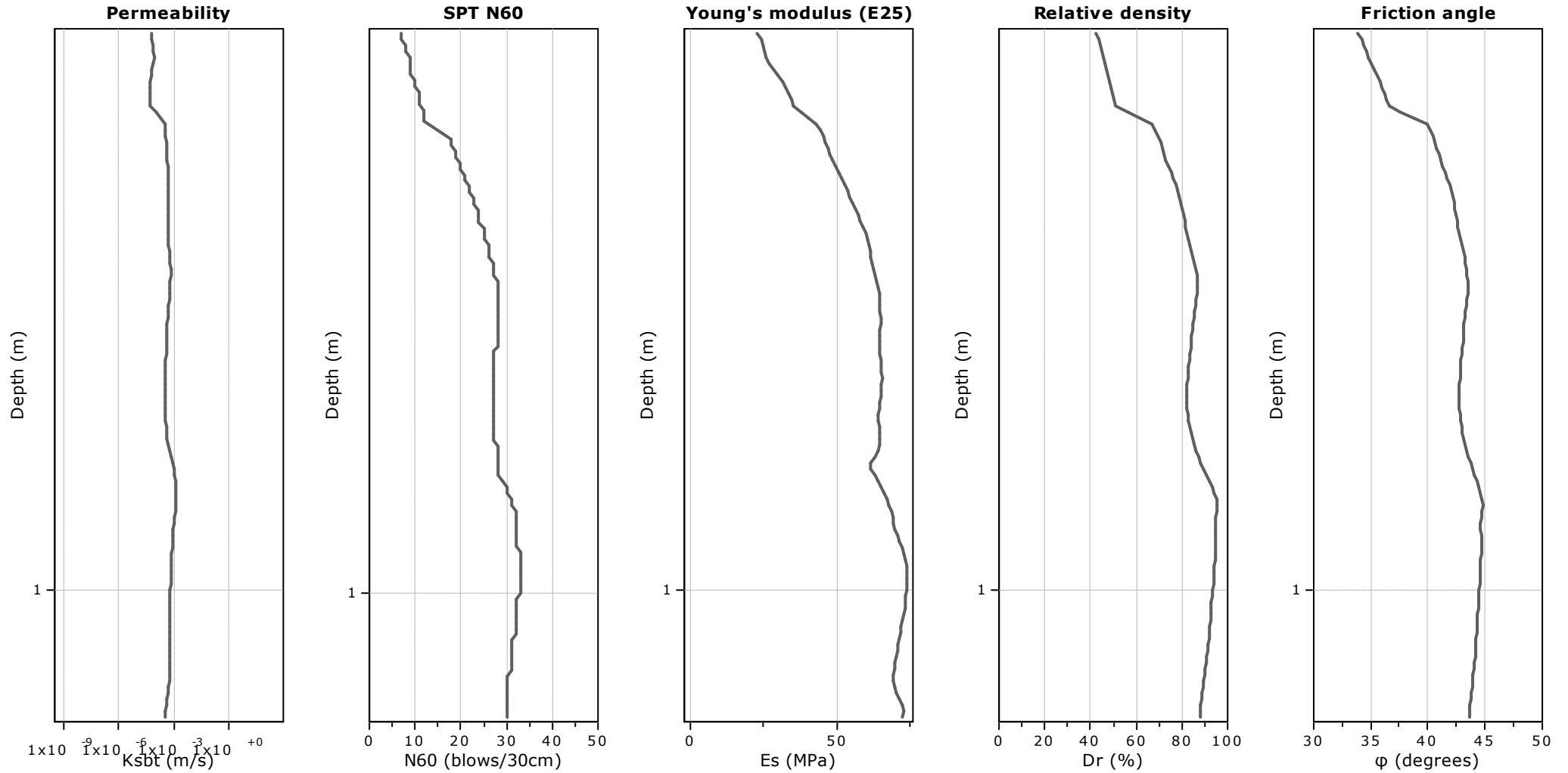
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

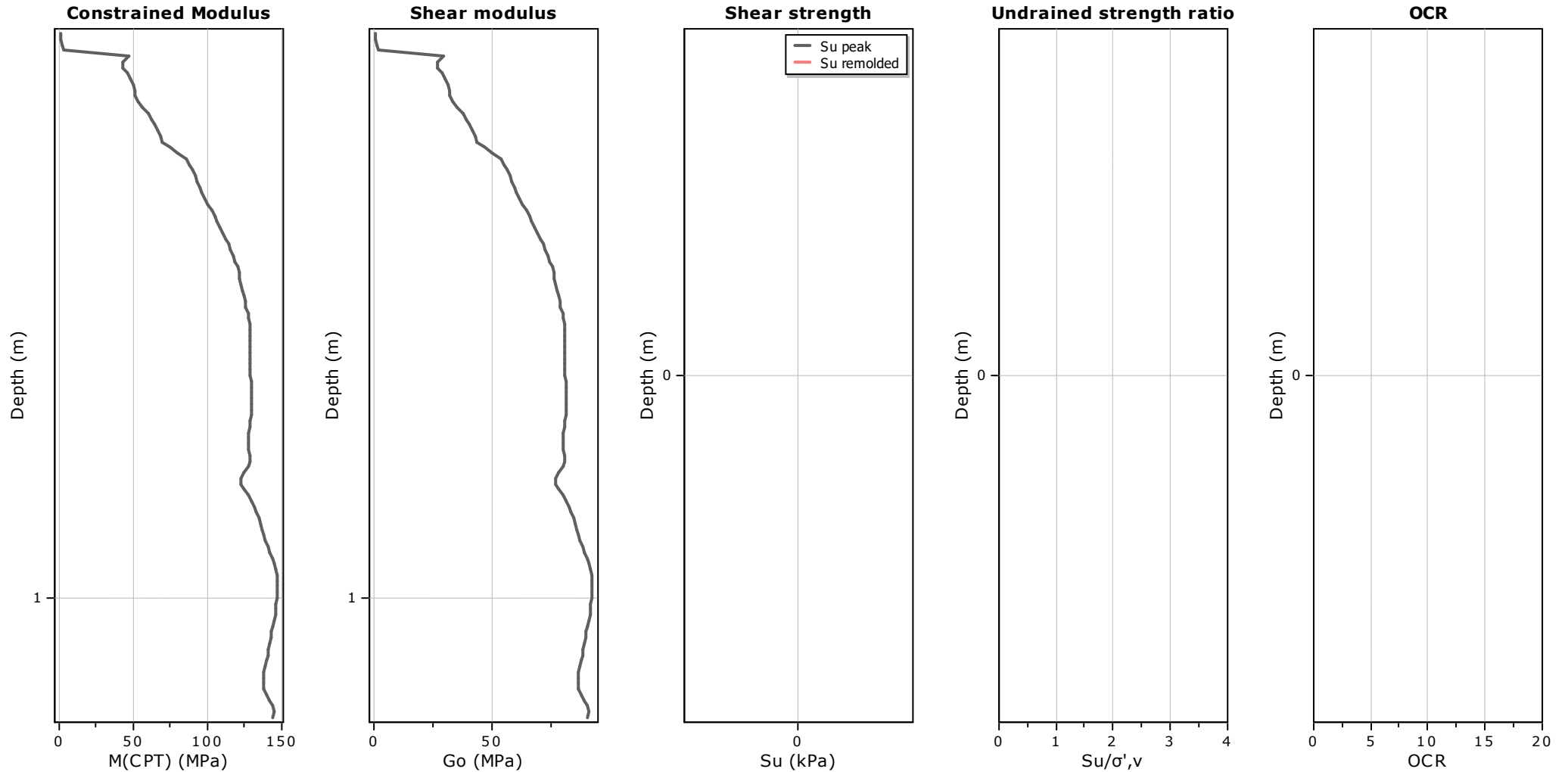
Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

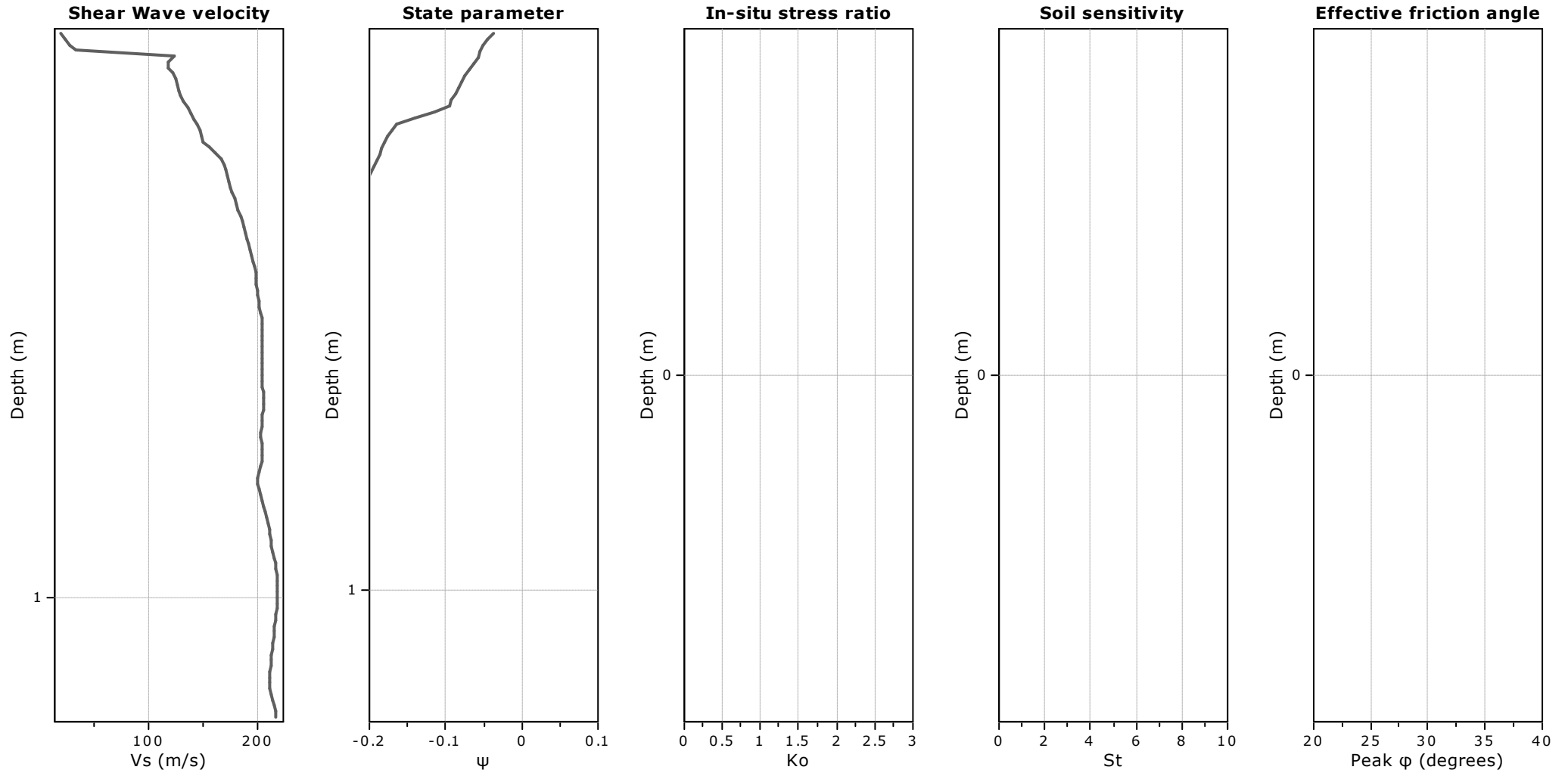
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

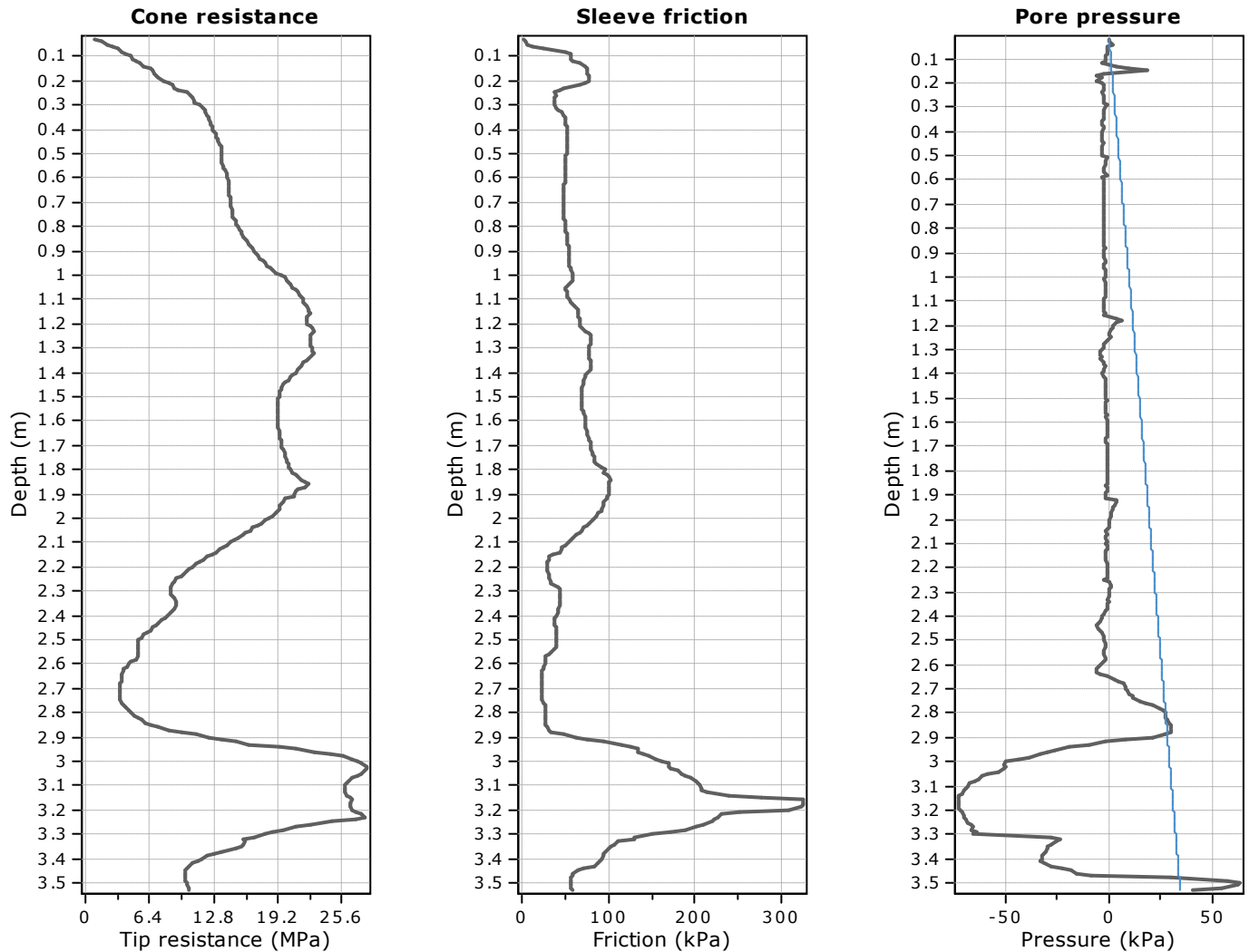
Location: OTP The Landings Stage 6 & 7 Subdivision



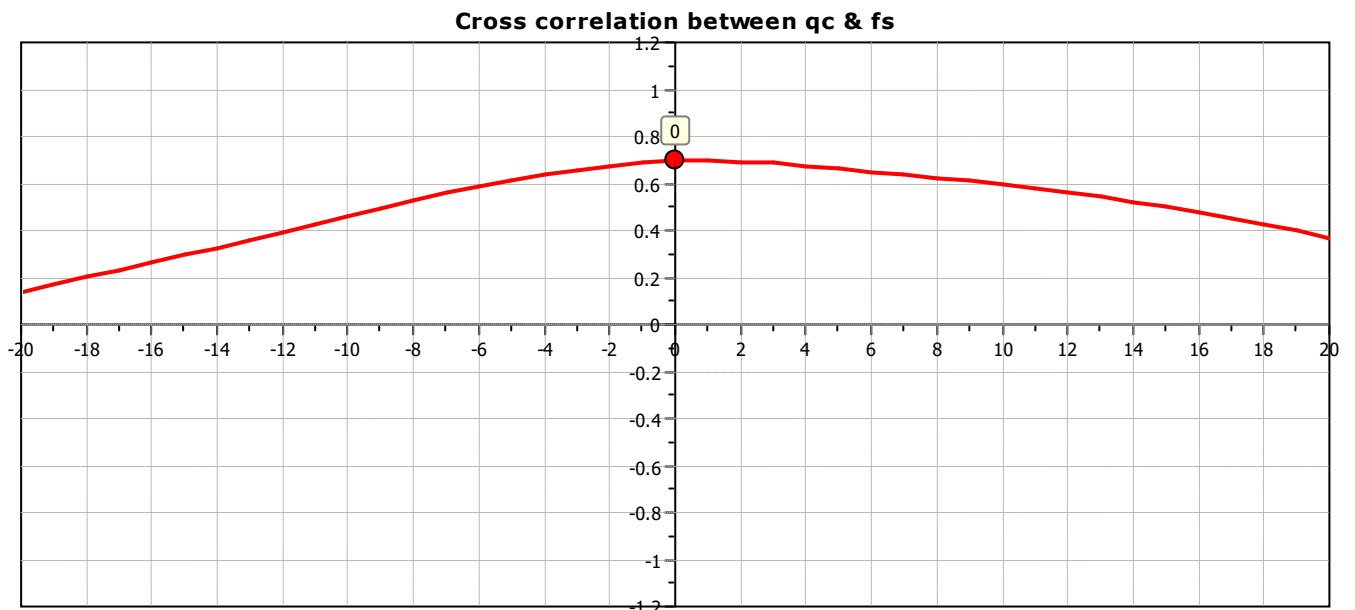
Calculation parameters

Soil Sensitivity factor, N_s : 7.00

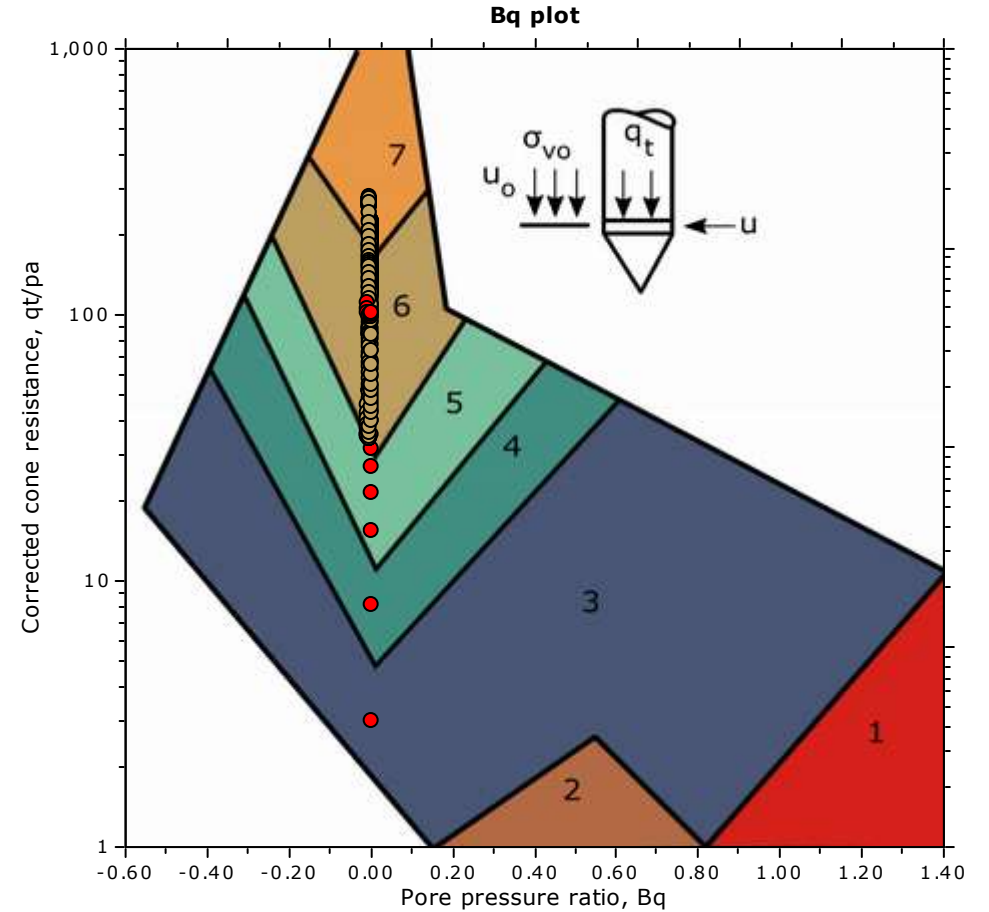
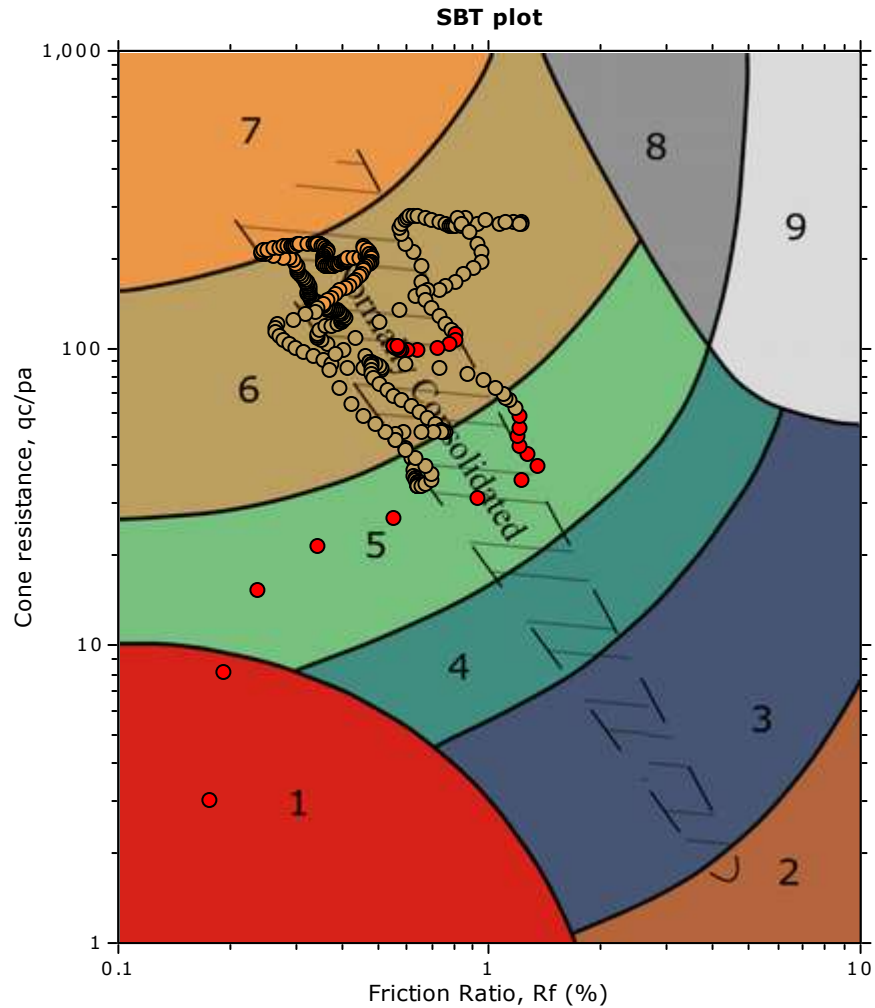
—●— User defined estimation data



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).



SBT - Bq plots

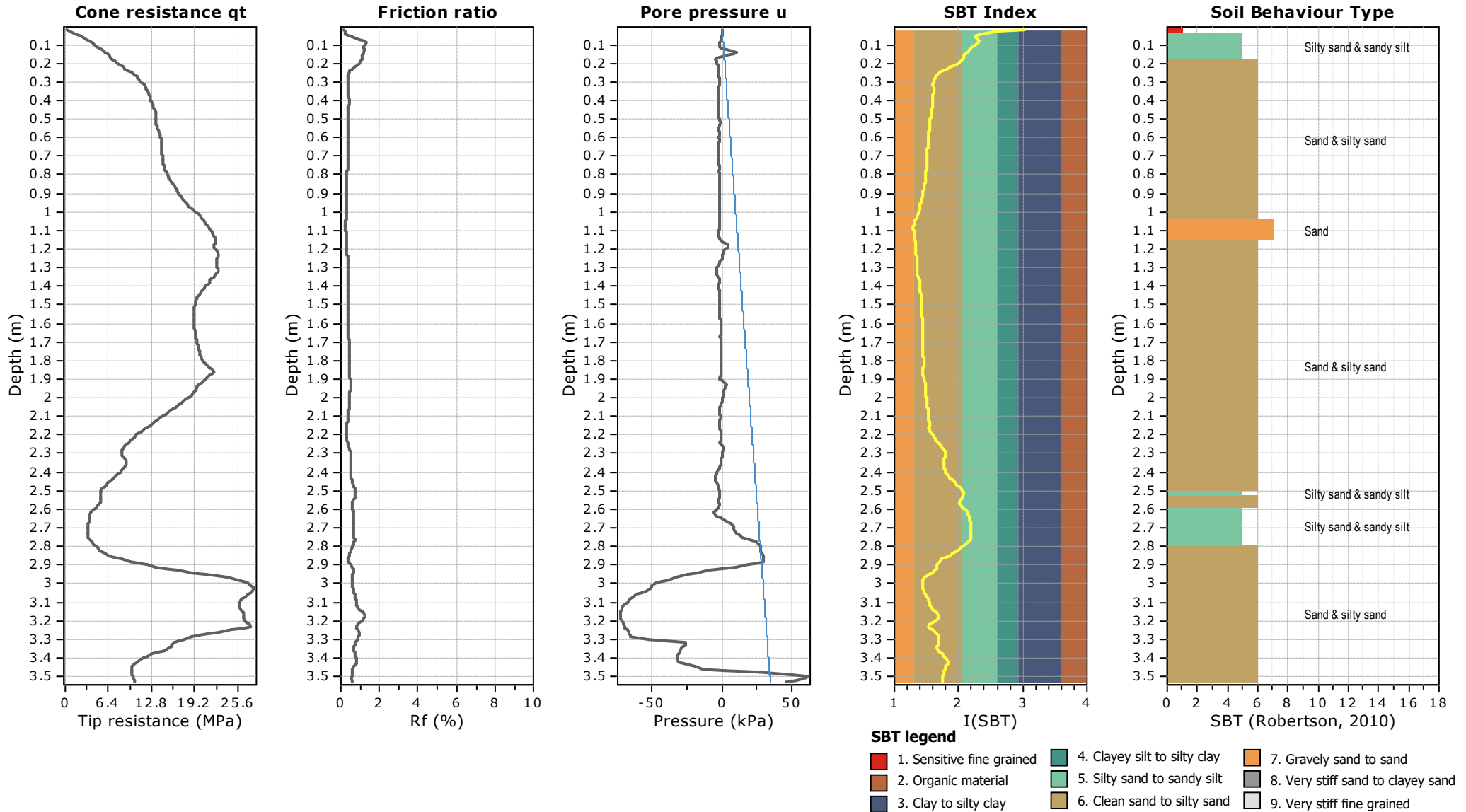


SBT legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravelly sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

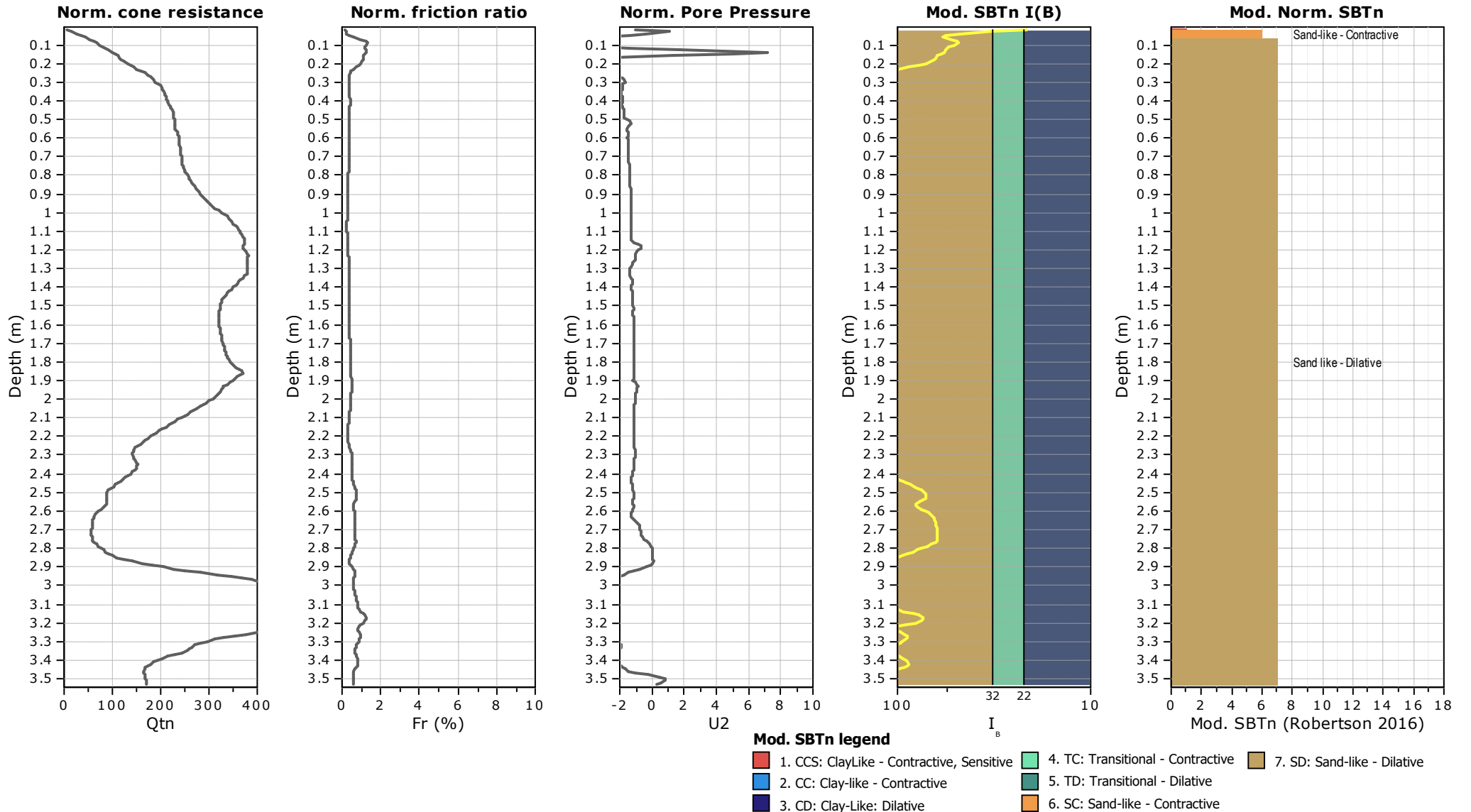
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



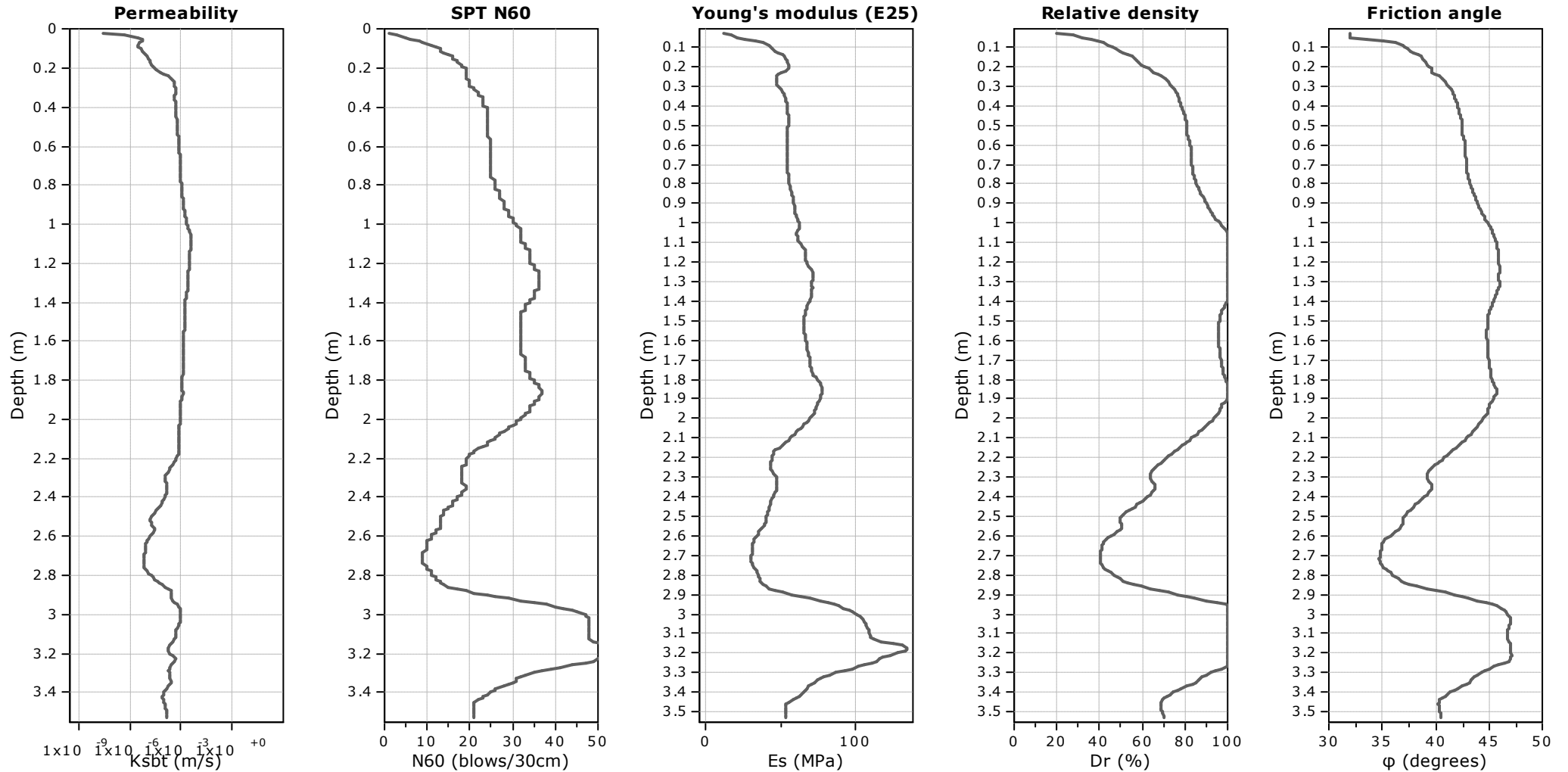
Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Permeability: Based on SBT_n

SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

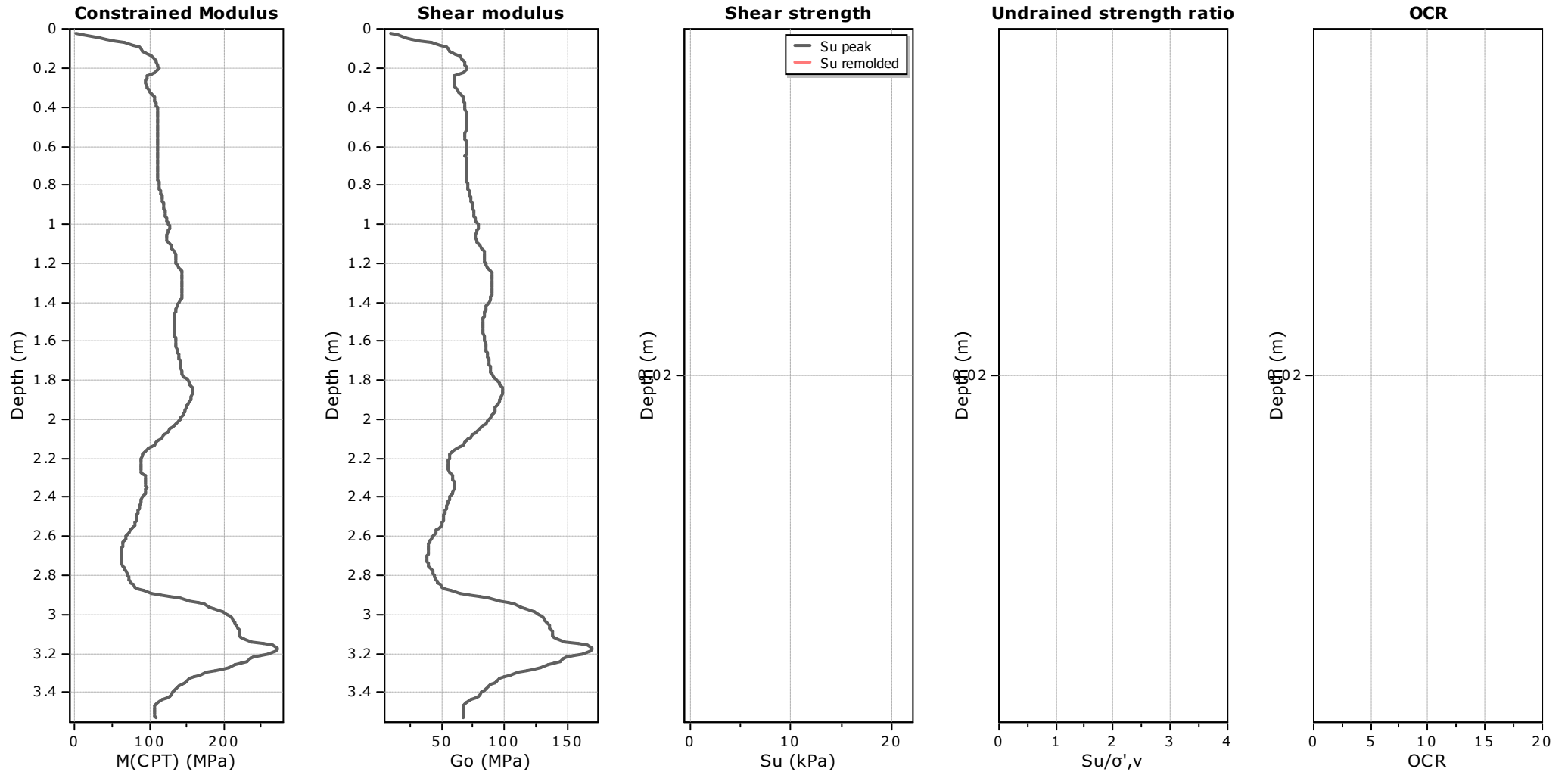
Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data

Project: Stage 6 Landings Fill Testing CPTs

Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{in} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : 14

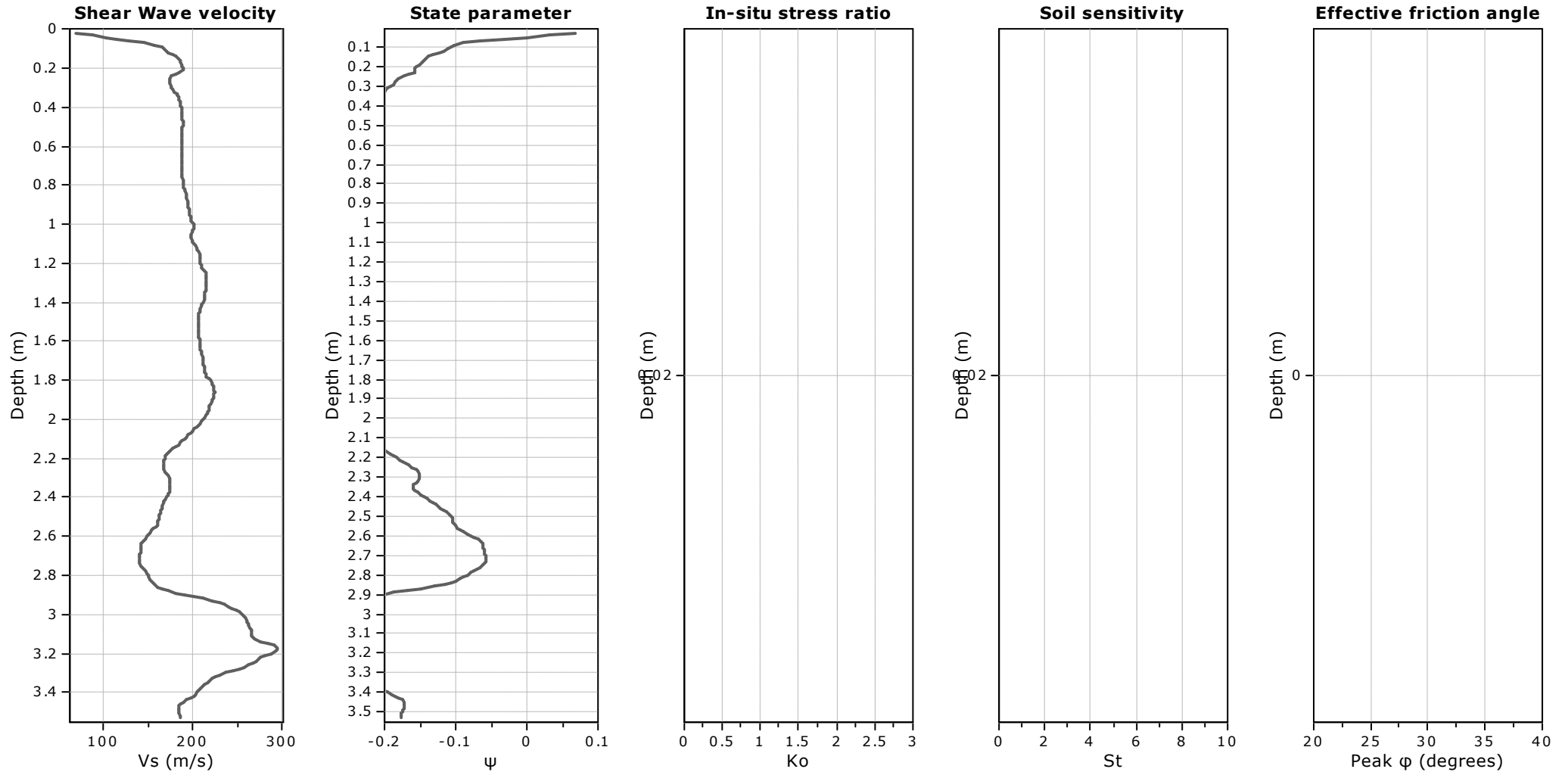
OCR factor for clays, N_{kt} : 0.33

● User defined estimation data

● Flat Dilatometer Test data

Project: Stage 6 Landings Fill Testing CPTs

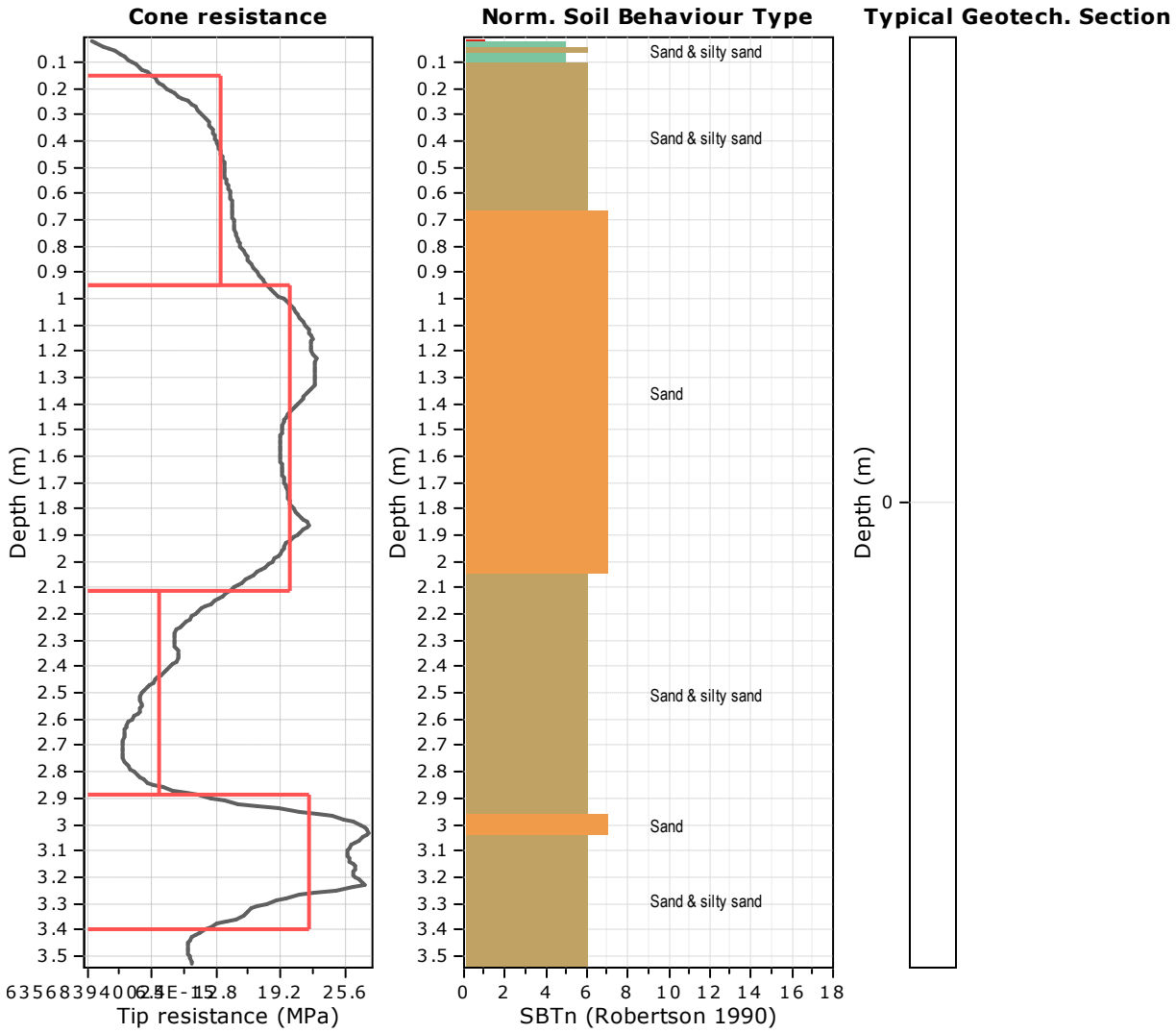
Location: OTP The Landings Stage 6 & 7 Subdivision



Calculation parameters

Soil Sensitivity factor, N_s : 7.00

—●— User defined estimation data



Tabular results

::: Layer No: 1 :::		
Code: Layer_1 Start depth: 0.15 (m), End depth: 0.95 (m)		
Description: Sand & silty sand		
Basic results	Estimation results	
Total cone resistance: 13.29 ±2.69 MPa	Permeability: 7.16E-04 ±4.13E-04 m/s	Constrained Mod.: 109.52 ±5.79 MPa
Sleeve friction: 52.00 ±8.79 kPa	N ₆₀ : 23.83 ±3.01 blows	Go: 68.63 ±3.63 MPa
Ic: 1.40 ±0.17	Es: 54.76 ±2.89 MPa	Su: 0.00 ±0.00 kPa
SBT _n : 6	Dr (%): 79.32 ±8.63	Su ratio: 0.00 ±0.00
SBTn description: Sand & silty sand	φ (degrees): 42.23 ±1.39 °	O.C.R.: 0.00 ±0.00
	Unit weight: 19.00 ±0.00 kN/m ³	

TEST REPORT

Lab Job No: 8020-1727
Your ref.: -
Date of Issue: 5/10/2021
Date of Re-Issue: -
Page: 1 of 2

Test Report No.
W21-1089

PROJECT: The Landing, Piezo pH Testing

CLIENT: Cook Costello
2 Norfolk Street,
Whangārei 0110

ATTENTION: Bernard Devine

TEST METHODS: pH, Inhouse method

SAMPLING METHOD: N/A

TEST RESULTS: As per attached sheets

Alex Millar

A. Millar

Administrator

S. Kokich

S. Kokich

Senior Technician

DETERMINATION OF THE pH LEVELS
In House

Lab Job No.:	8020-1727	Sample No.:	21-981
Client:	Cook Costello	Tested By:	M.A
Job:	The Landing, One Tree Point	Date:	16/09/2021
Location:	Groundwater piezos	Checked By:	A.M
Date Received:	16/09/2021	Date:	30/09/2021
Report No.:	W21-1089	Page:	2 of 2
Ref:	-	Sampled by:	J.A.

Sample Number	Sample Location	pH	pH Average
21-981	Stage 5 piezo	5.82	5.81
		5.79	
21-982	Stage 6 piezo	5.51	5.52
		5.53	
21-983	Stage 8 piezo	4.98	5.01
		5.04	
21-984	Stage 9 piezo	5.03	5.04
		5.04	

TEST REPORT

Lab Job No: 8020-1727
Your ref.: 14233
Date of Issue: 6/10/2021
Date of Re-Issue: -
Page: 1 of 5

Test Report No.
W21-1078

PROJECT: The Landing, Laboratory Testing
CLIENT: Cook Costello
2 Norfolk Street,
Whangārei 0110
ATTENTION: Stefano Rotatori
TEST METHODS: Determination of the particle size distribution- wet sieving method
NZS 4402:1986 Test 2.8.1

SAMPLING METHOD: Hand test pit - sampling not accredited

TEST RESULTS: As per attached sheets

Alex Millar

A. Millar

Administrator

S. Kokich

S. Kokich

Approved Signatory



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

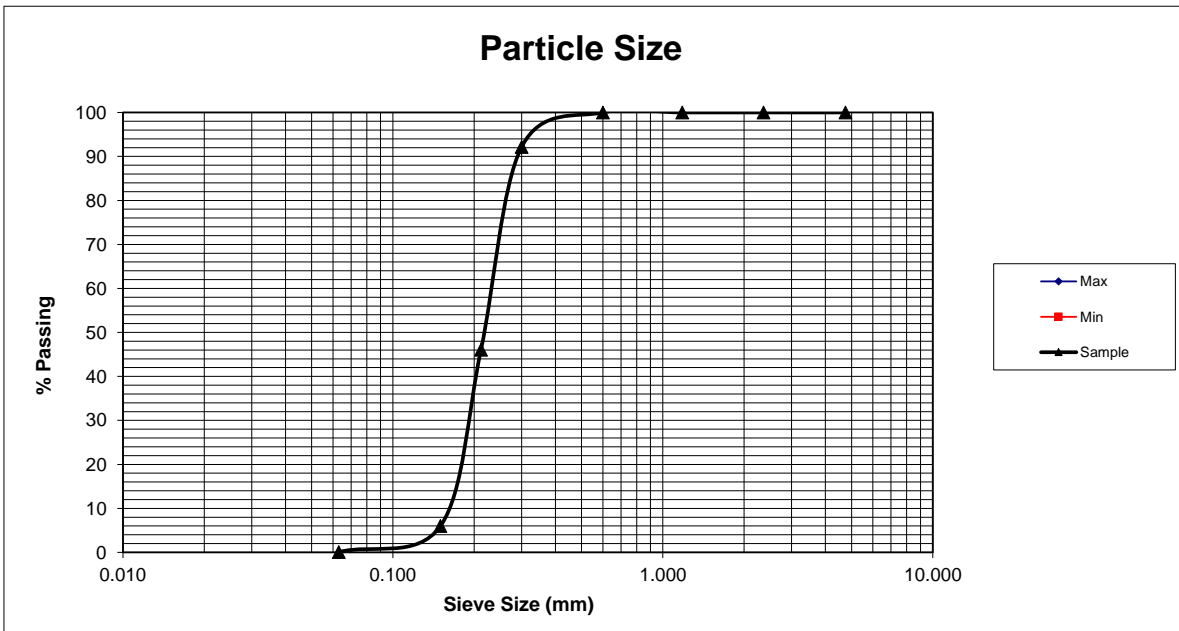
DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No:	8020-1727	Sample No:	21-929
Client:	Cook Costello Ltd	Tested By:	A.B
Location:	The Landing, One Tree Point Lot 349 cut area	Date:	13/09/2021
Date Received:	2/08/2021	Checked By:	A.M
Report No:	W21-1078	Date:	28/09/2021
REF:	14233	Page:	2 of 5
Sampling Method:	Hand test pit – Sampling not accredited	Sampled By:	A.B.
Date Sampled:	2/08/2021		
Test Details:	Wet sieving method		
History:	Natural state		

Description of Sample: SAND, fine to medium, minor silt, moist, pale orange-brown.

Sieve Size	% Passing		
	Max	Min	Sample
4.75			100
2.36			100
1.18			100
0.6			100
0.3			92
0.212			46
0.15			6
0.063			0



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF DRY DENSITY/ WATER CONTENT RELATIONSHIP
NEW ZEALAND STANDARD COMPACTION
NZS 4402:1986 Test 4.1.1

Lab Job No: 8020-1727
Client: Cook Costello Ltd
Project: The Landing, One Tree Point
Location: Lot 349 cut area

Sample No.: 21-929
Tested By: J.Att
Date: 3/09/2021
Checked By: A.M
Date: 28/09/2021
Page: 3 of 5

Date Received: 2/08/2021
Report No: W21-1078
REF: 14233

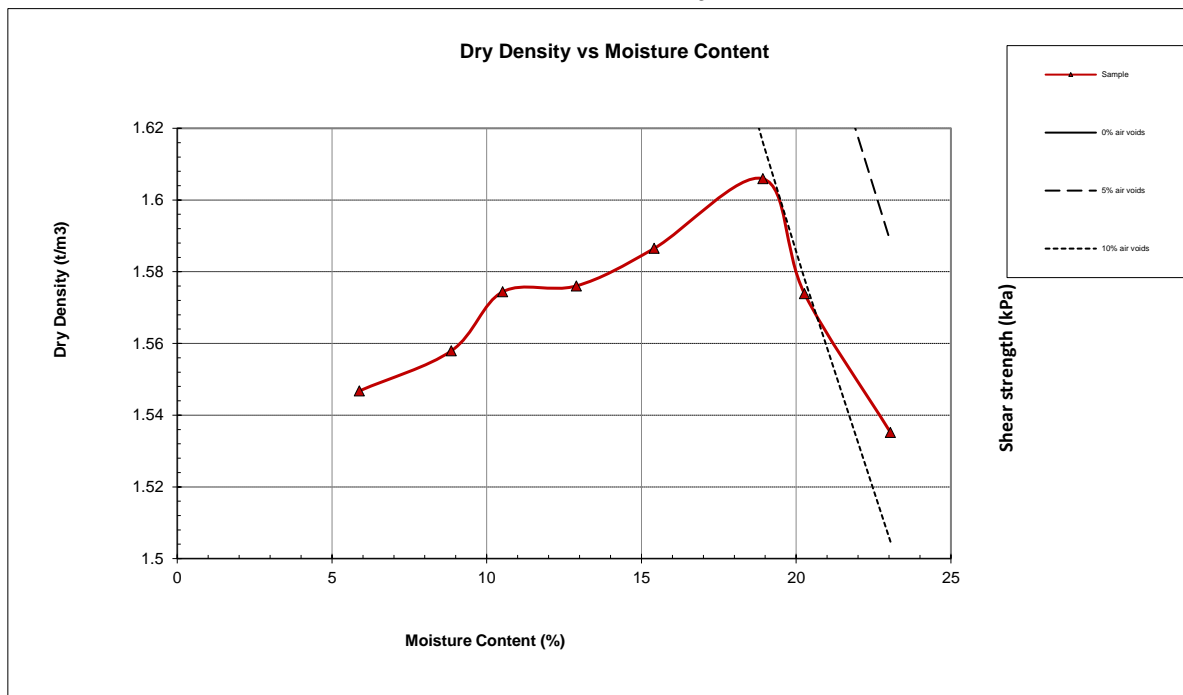
Sample Description: SAND, fine to medium, minor silt, moist, pale orange-brown.

Compaction used: New Zealand Standard Compaction Test performed on:
Whole sample

History: Natural

Total mass of sample: 20000 g

Mass retained on 19mm BS test sieve: 0 g



Test Results			
Water Content (%)	Dry Density (t/m ³)	Shear Vane (kPa)	
		Peak	Residual
5.9	1.547	-	-
8.9	1.558	-	-
10.5	1.574	-	-
12.9	1.576	-	-
15.4	1.587	-	-
18.9	1.606	-	-
20.3	1.574	-	-
23.0	1.535	-	-

Solid Density (t/m³) = 2.72 Assumed
Optimum Water Content (%) = 19
Max Dry Density (t/m³) = 1.61
Natural Water Content (%) = 9

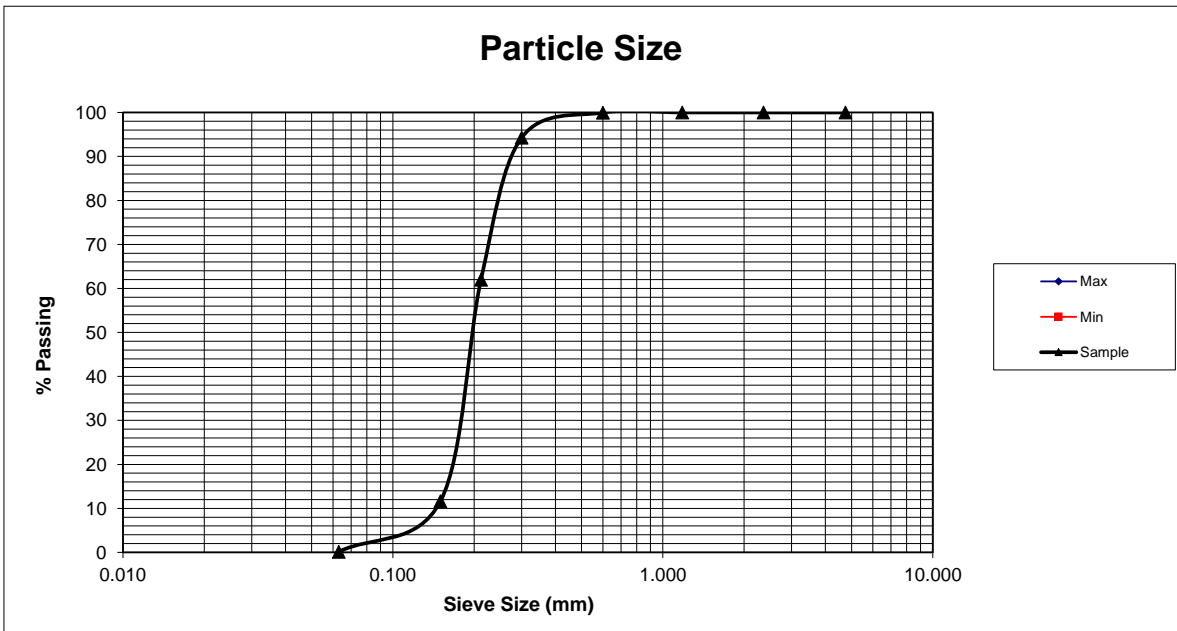
DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION - GRAPH

NZS 4402:1986 Test 2.8.1

Lab Job No:	8020-1727	Sample No:	21-930
Client:	Cook Costello Ltd	Tested By:	A.B
Location:	The Landing, One Tree Point Lot 379 cut area	Date:	13/09/2021
Date Received:	2/08/2021	Checked By:	A.M
Report No:	W21-1078	Date:	28/09/2021
REF:	14233	Page:	4 of 5
Sampling Method:	Hand test pit – Sampling not accredited	Sampled By:	A.B.
Date Sampled:	2/08/2021		
Test Details:	Wet sieving method		
History:	Natural state		

Description of Sample: SAND, fine to medium, minor silt, traces of amorphous organics, light brown.

Sieve Size	% Passing		
	Max	Min	Sample
4.75			100
2.36			100
1.18			100
0.6			100
0.3			94
0.212			62
0.15			12
0.063			0



The percentage passing the finest sieve was obtained by difference

DETERMINATION OF DRY DENSITY/ WATER CONTENT RELATIONSHIP
NEW ZEALAND STANDARD COMPACTION
NZS 4402:1986 Test 4.1.1

Lab Job No: 8020-1727
Client: Cook Costello Ltd
Project: The Landing, One Tree Point
Location: Lot 379 cut area

Sample No.: 21-930
Tested By: J.Att
Date: 6/09/2021
Checked By: A.M
Date: 28/09/2021
Page: 5 of 5

Date Received: 2/08/2021
Report No: W21-1078
REF: 14233

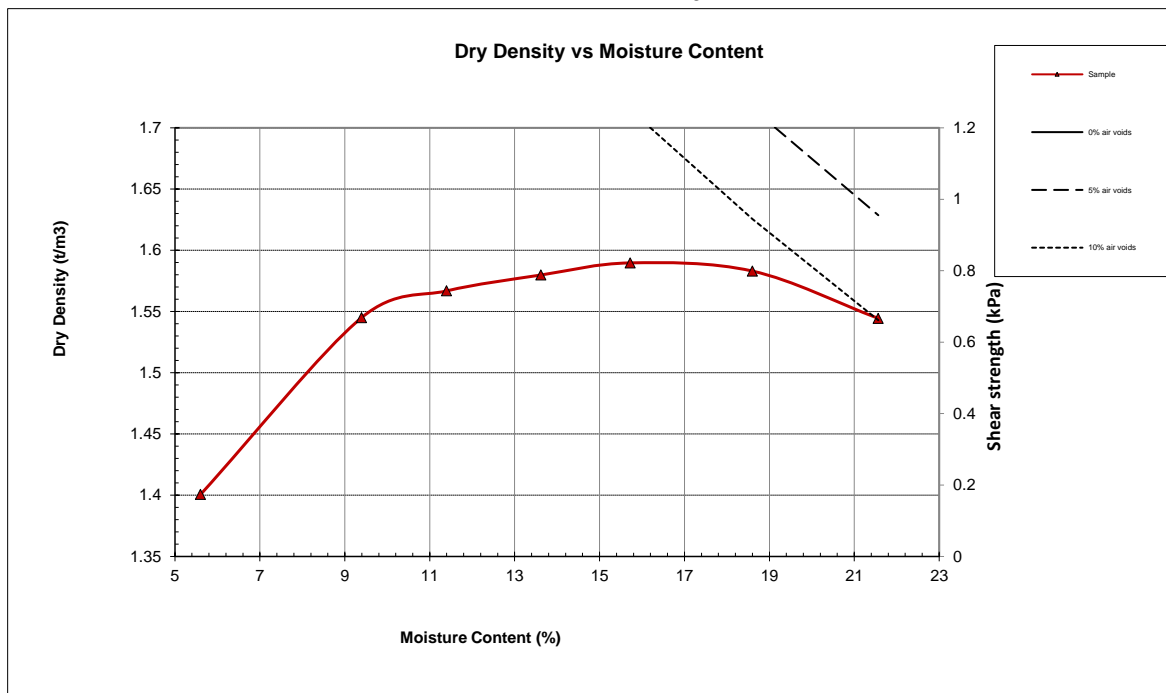
Sample Description: SAND, fine to medium, minor silt, traces of amorphous organics, light brown.

Compaction used: New Zealand Standard Compaction Test performed on:
Whole sample

History: Natural

Total mass of sample: 20000 g

Mass retained on 19mm BS test sieve: 0 g

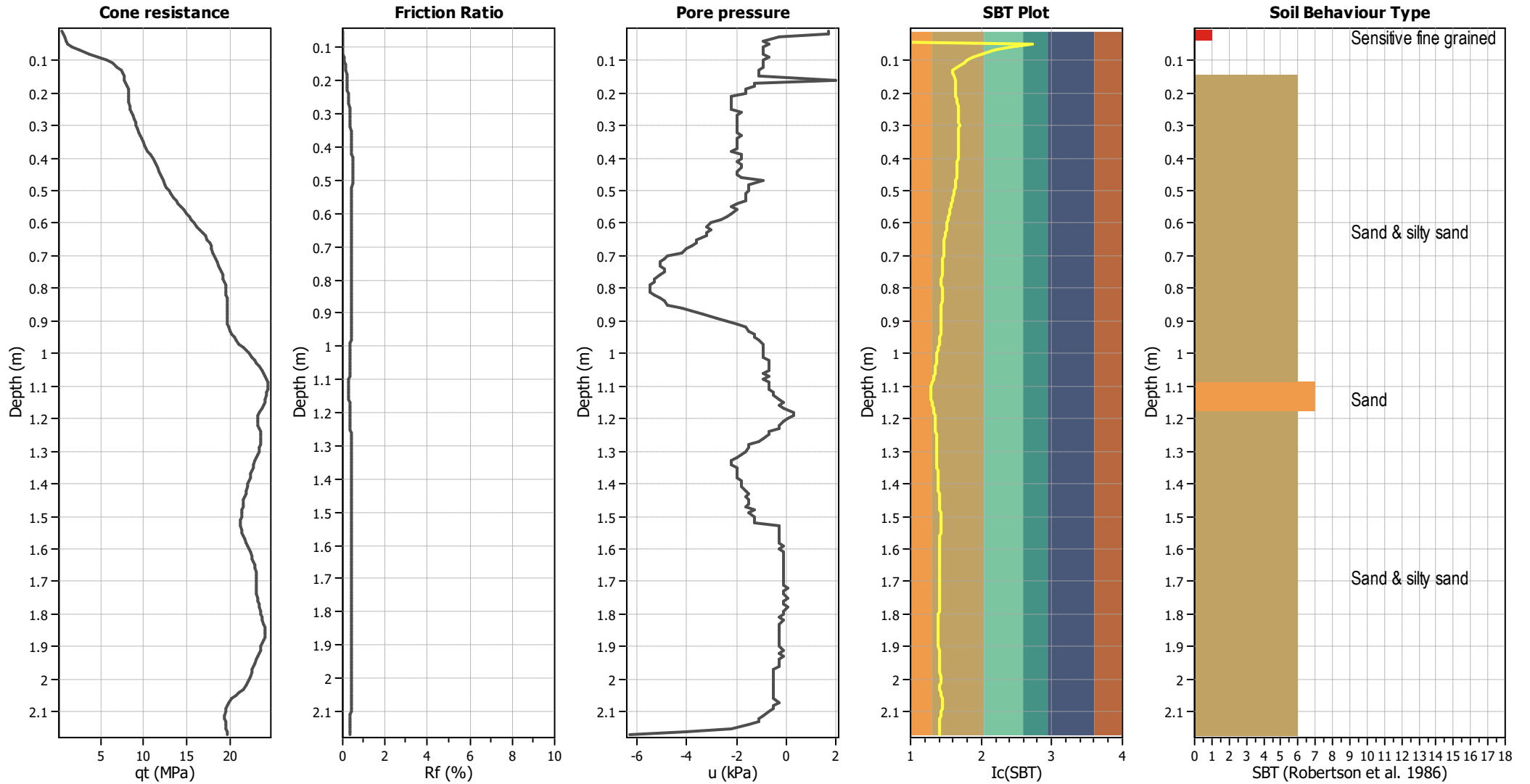


Test Results			
Water Content (%)	Dry Density (t/m ³)	Shear Vane (kPa)	
		Peak	Residual
5.6	1.401	-	-
9.4	1.545	-	-
11.4	1.567	-	-
13.6	1.580	-	-
15.7	1.590	-	-
18.6	1.583	-	-
21.6	1.544	-	-

Solid Density (t/m³) = 2.72 Assumed
Optimum Water Content (%) = 16
Max Dry Density (t/m³) = 1.59
Natural Water Content (%) = 11

Appendix 5 – Liquefaction Results

CPT basic interpretation plots



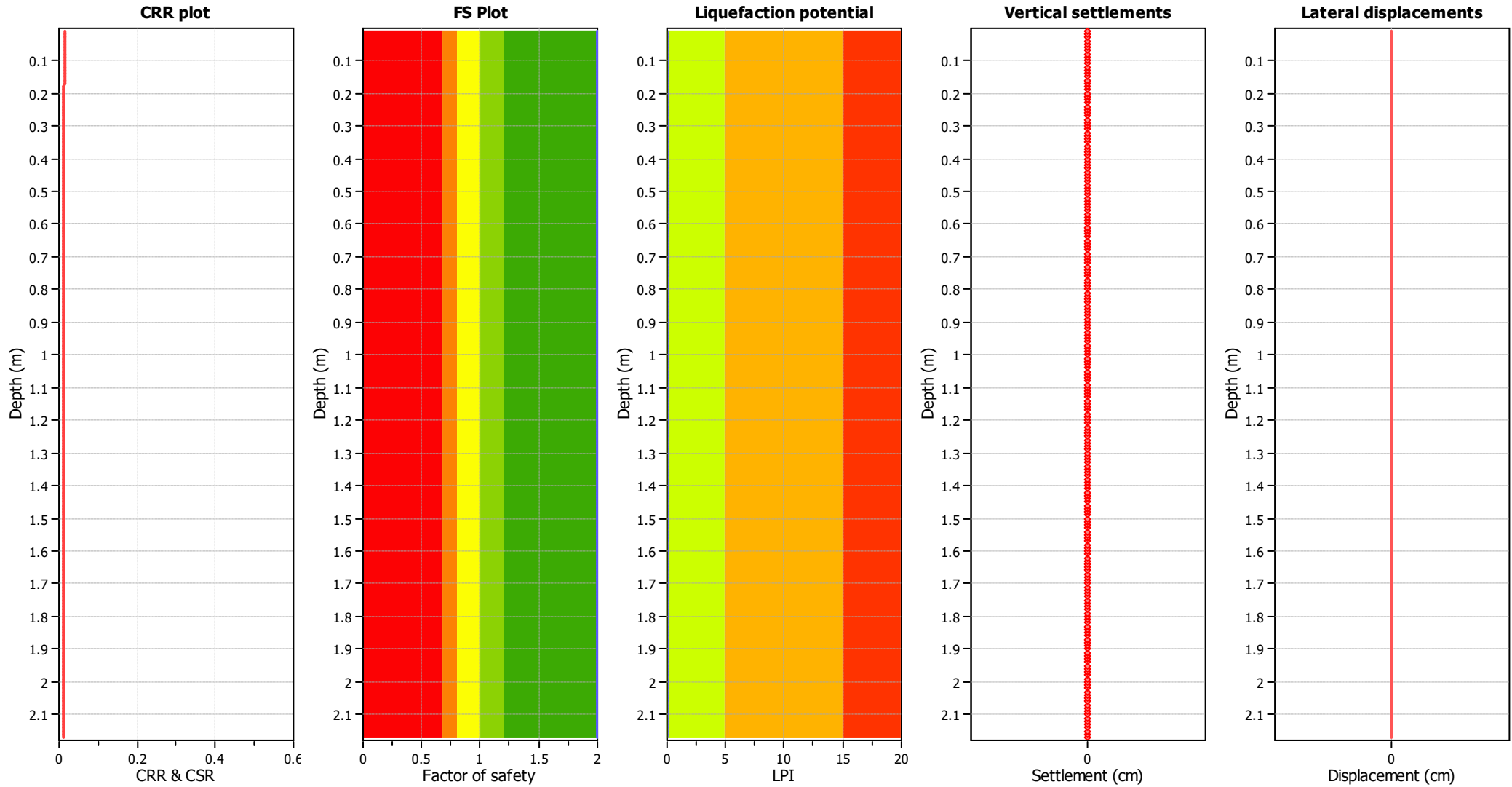
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

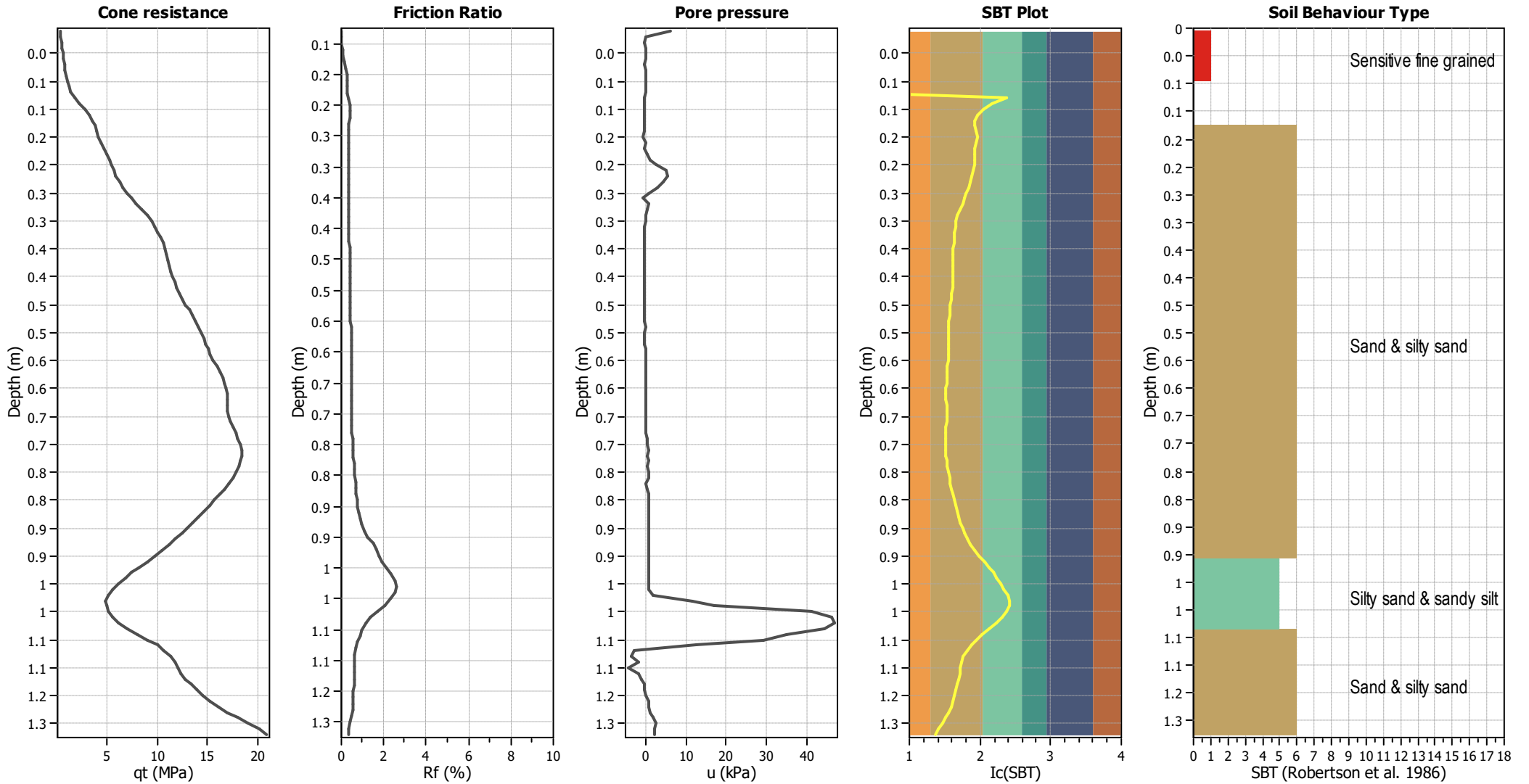
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



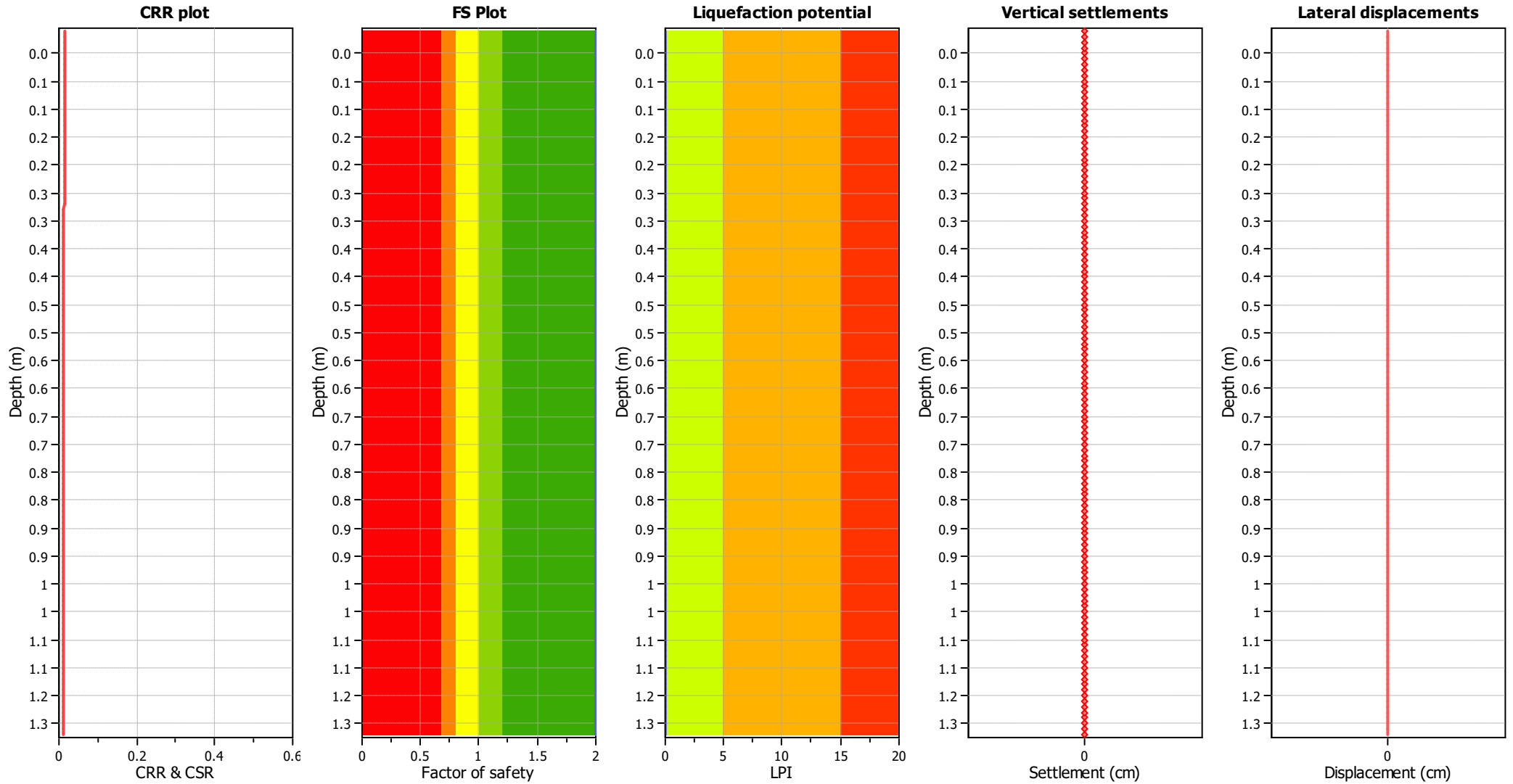
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

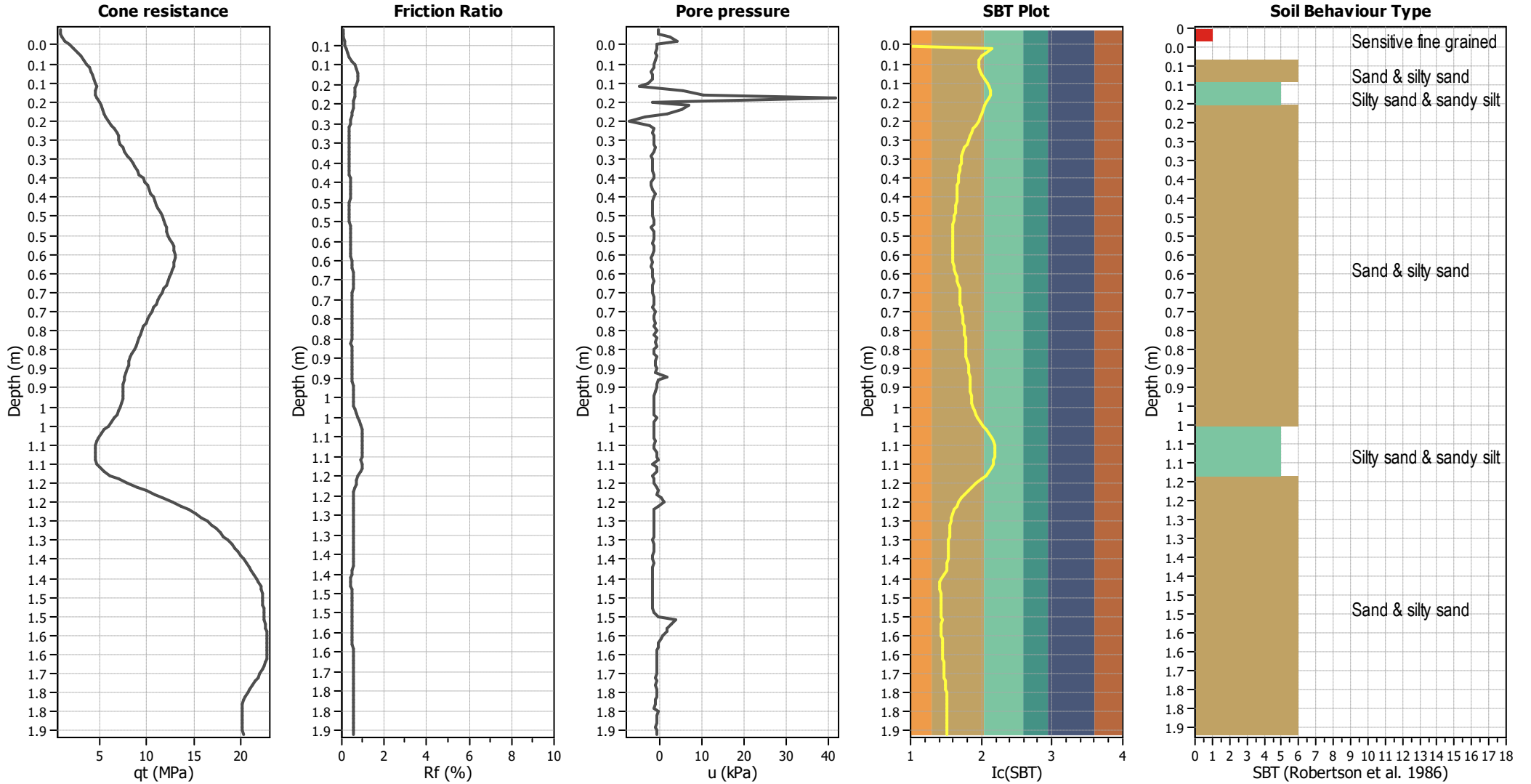
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



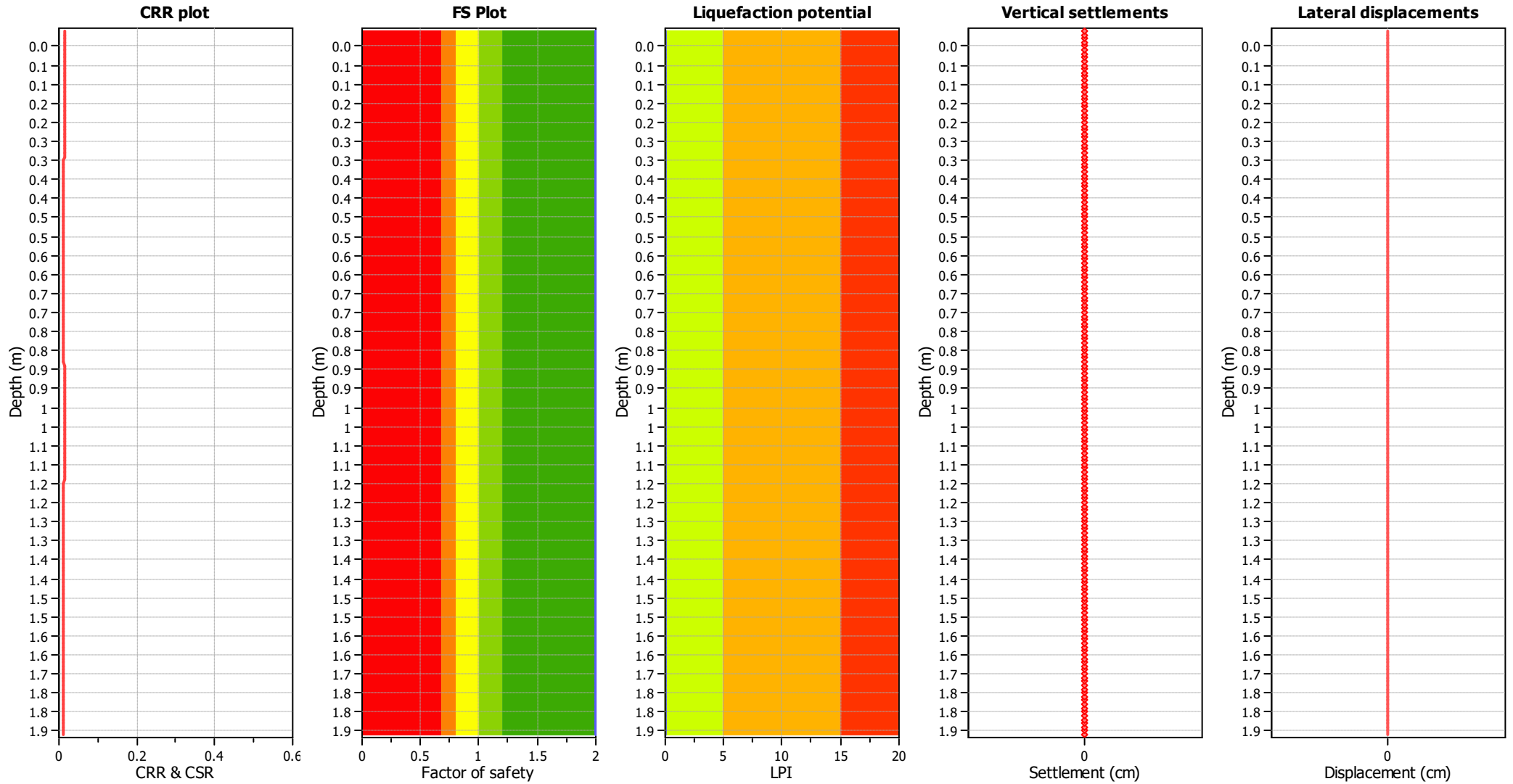
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

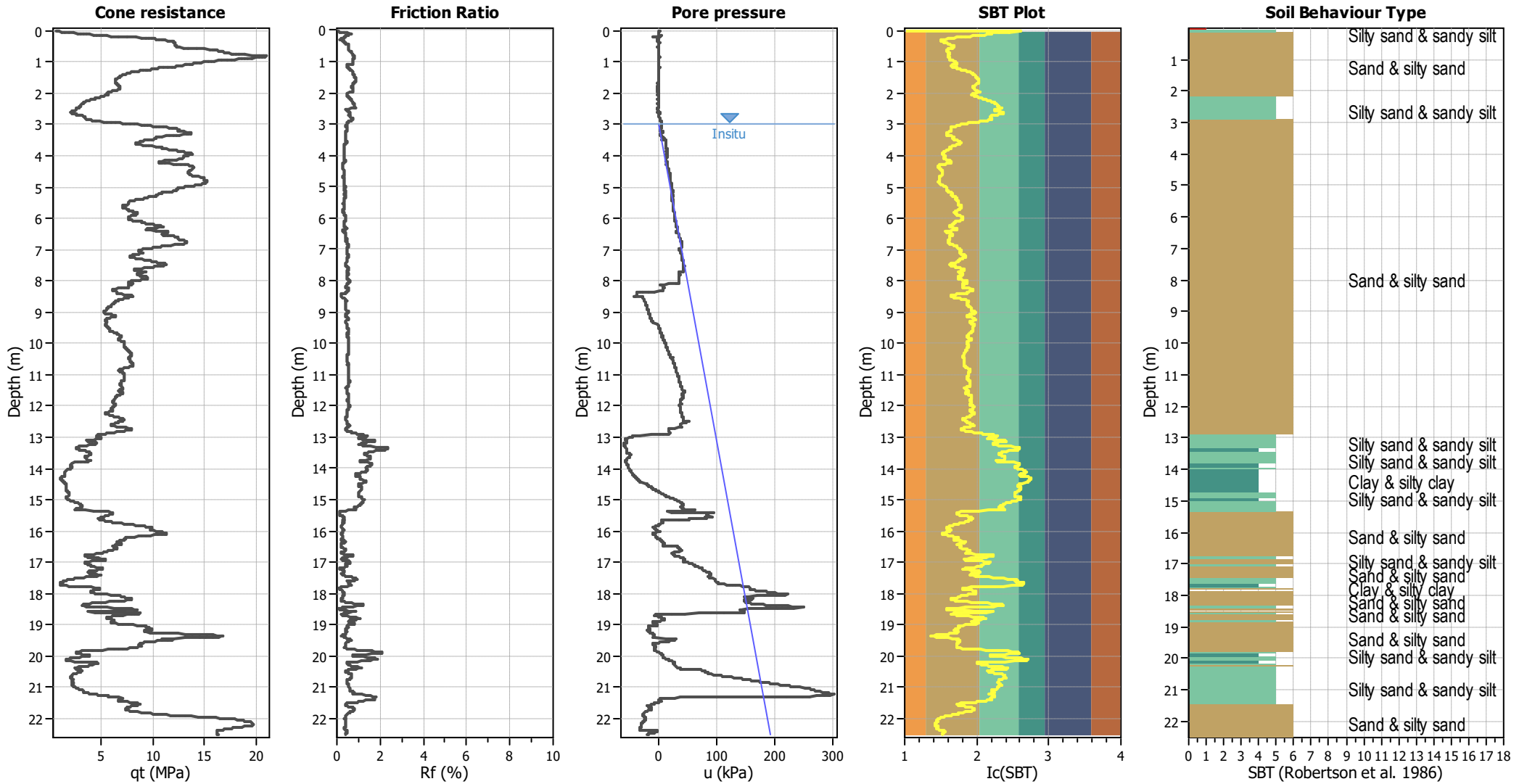
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



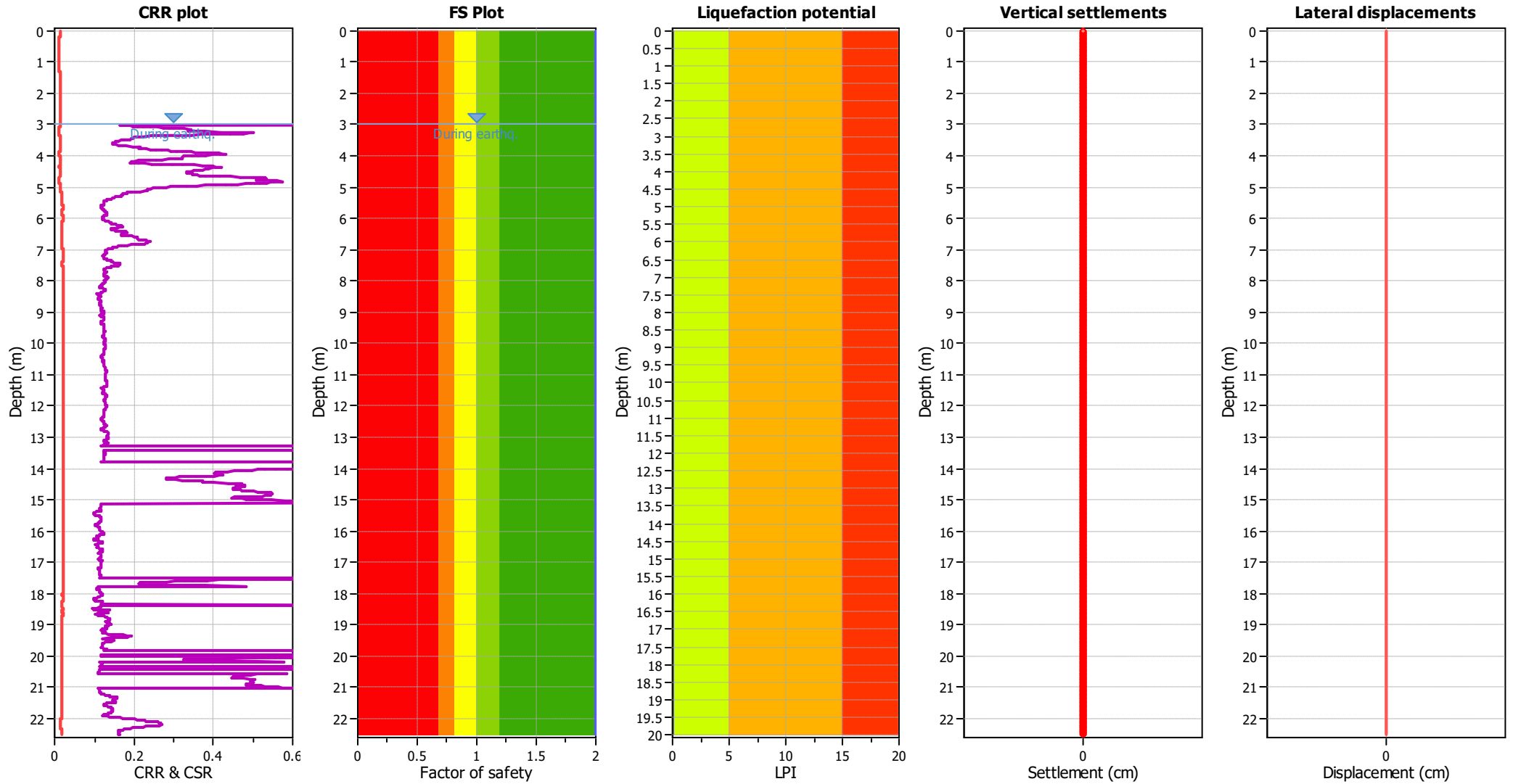
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

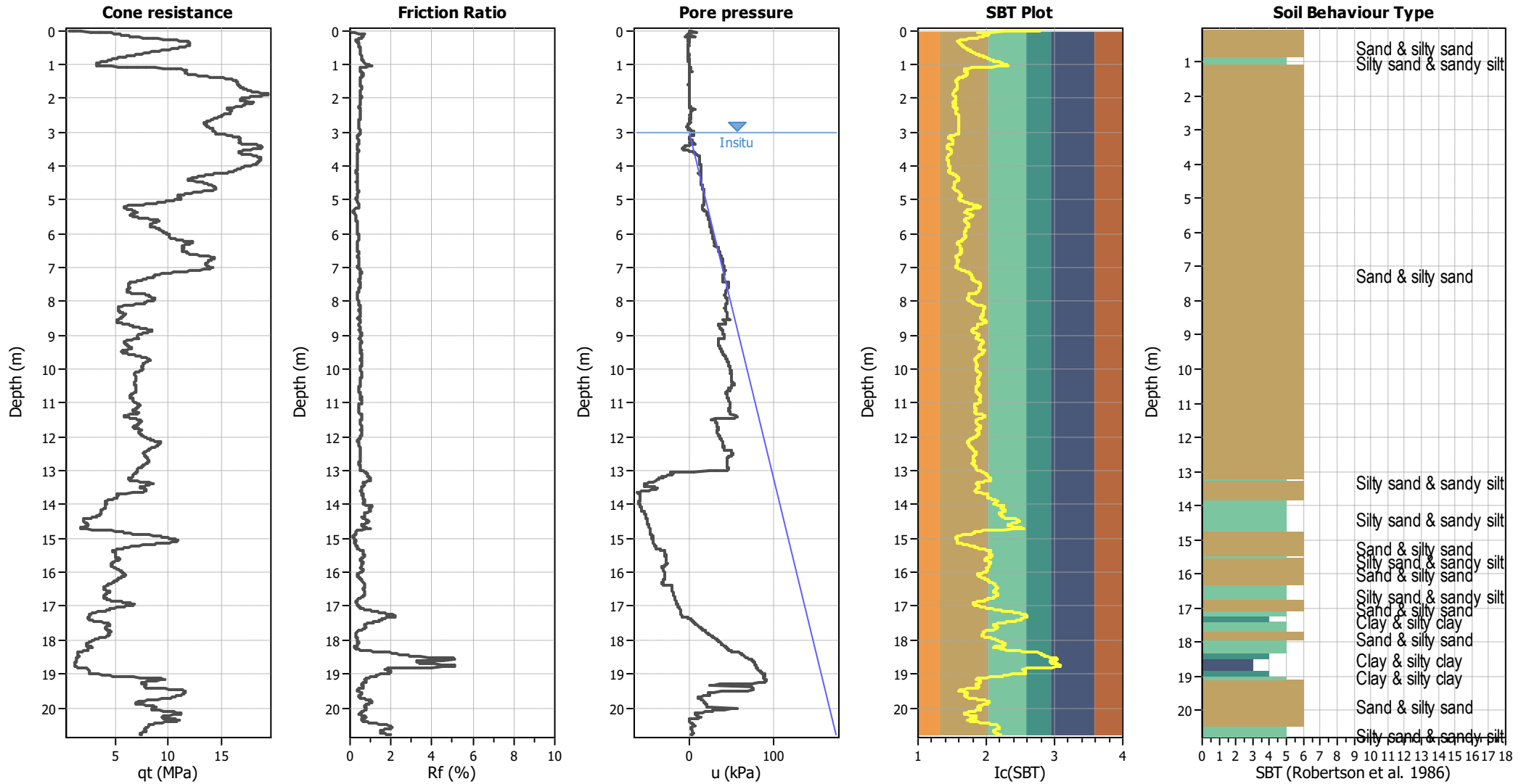
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



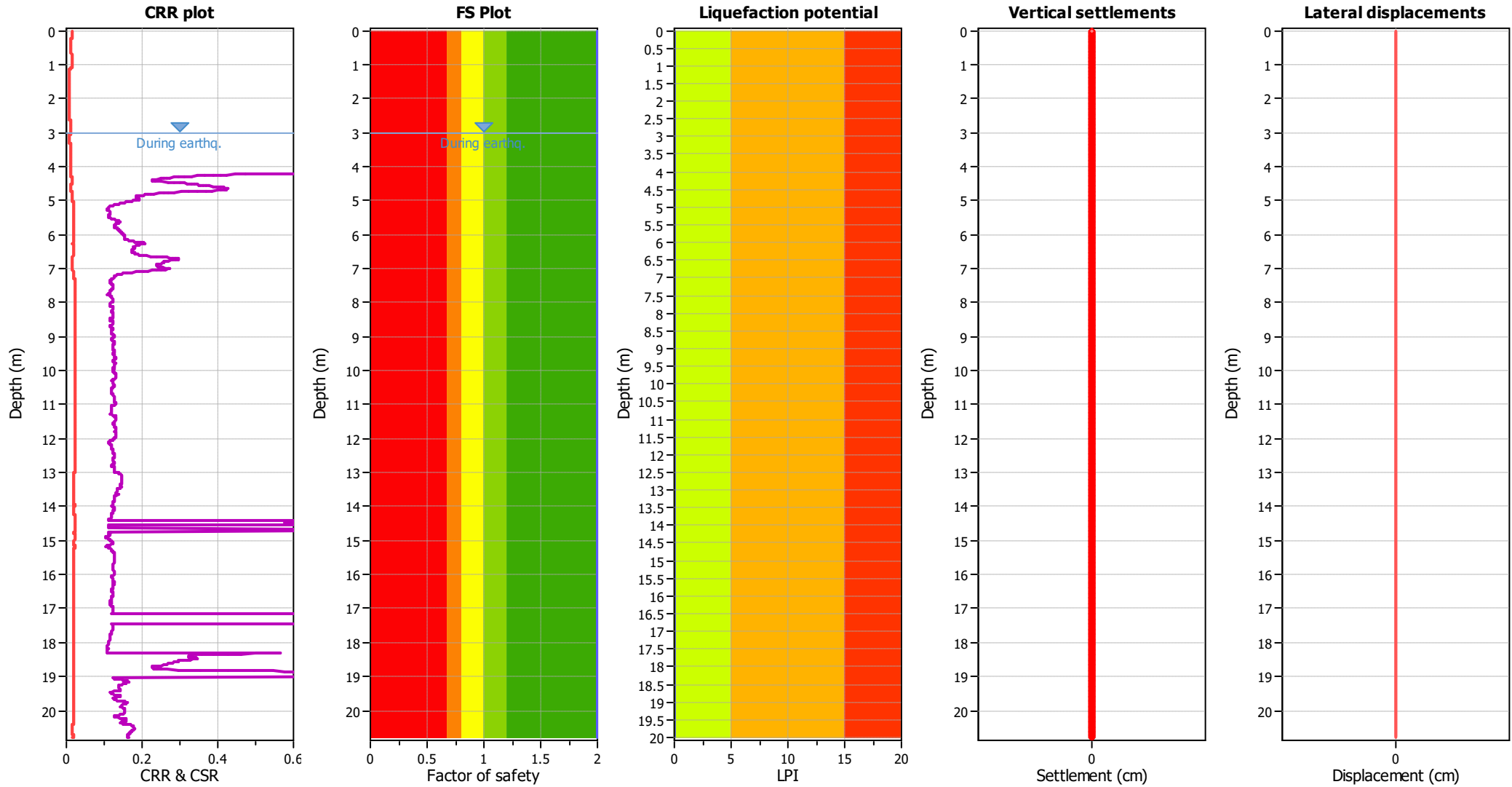
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

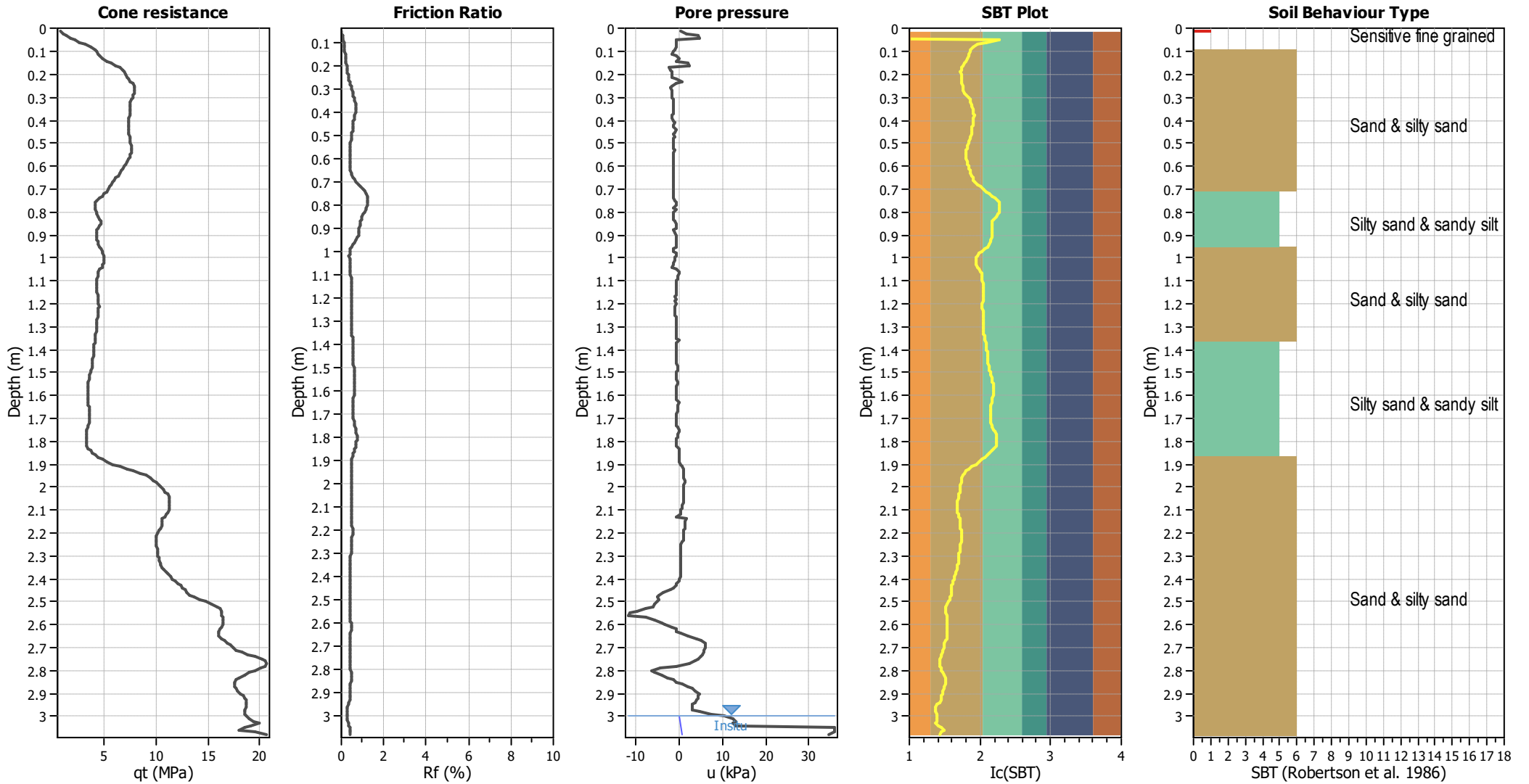
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



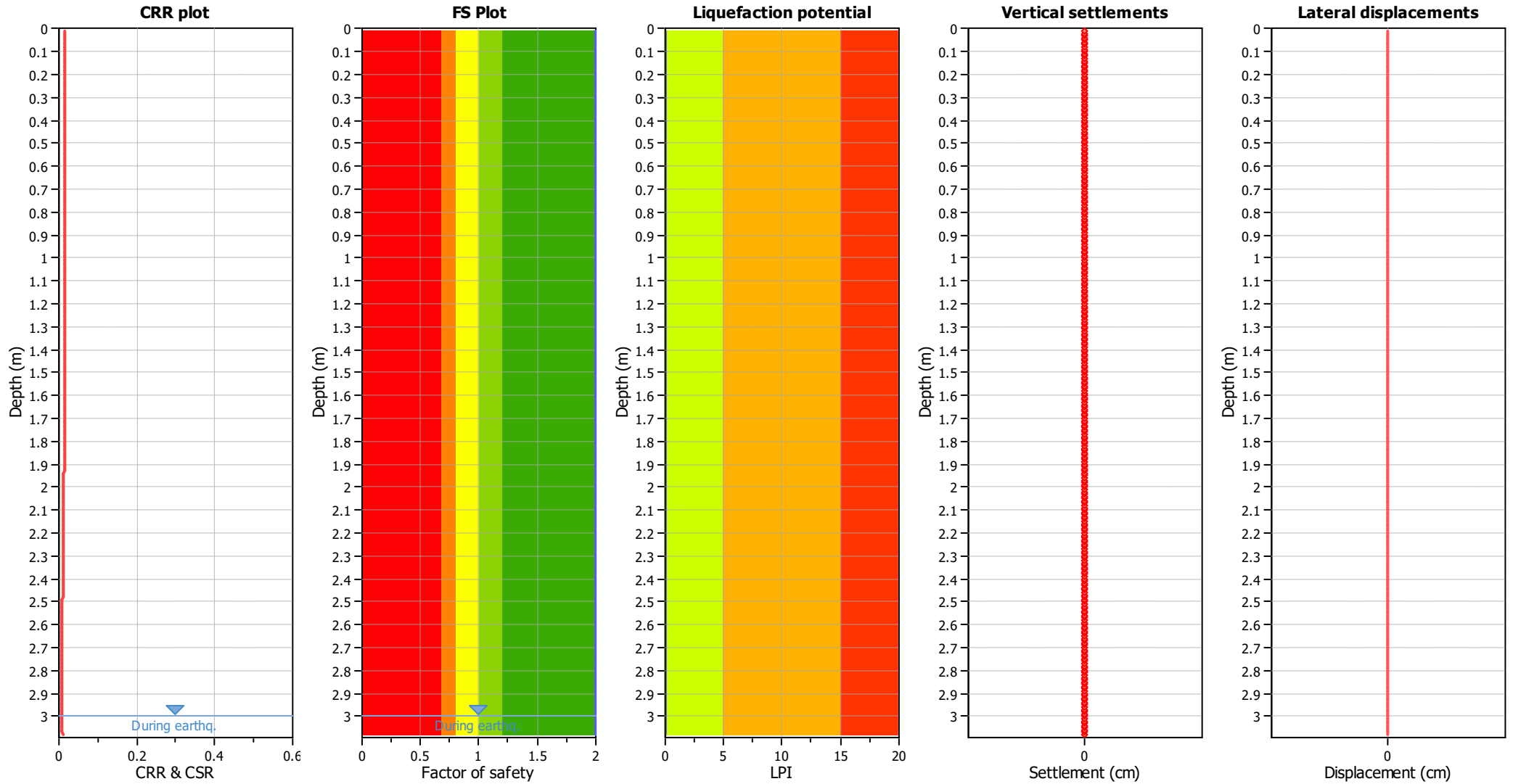
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

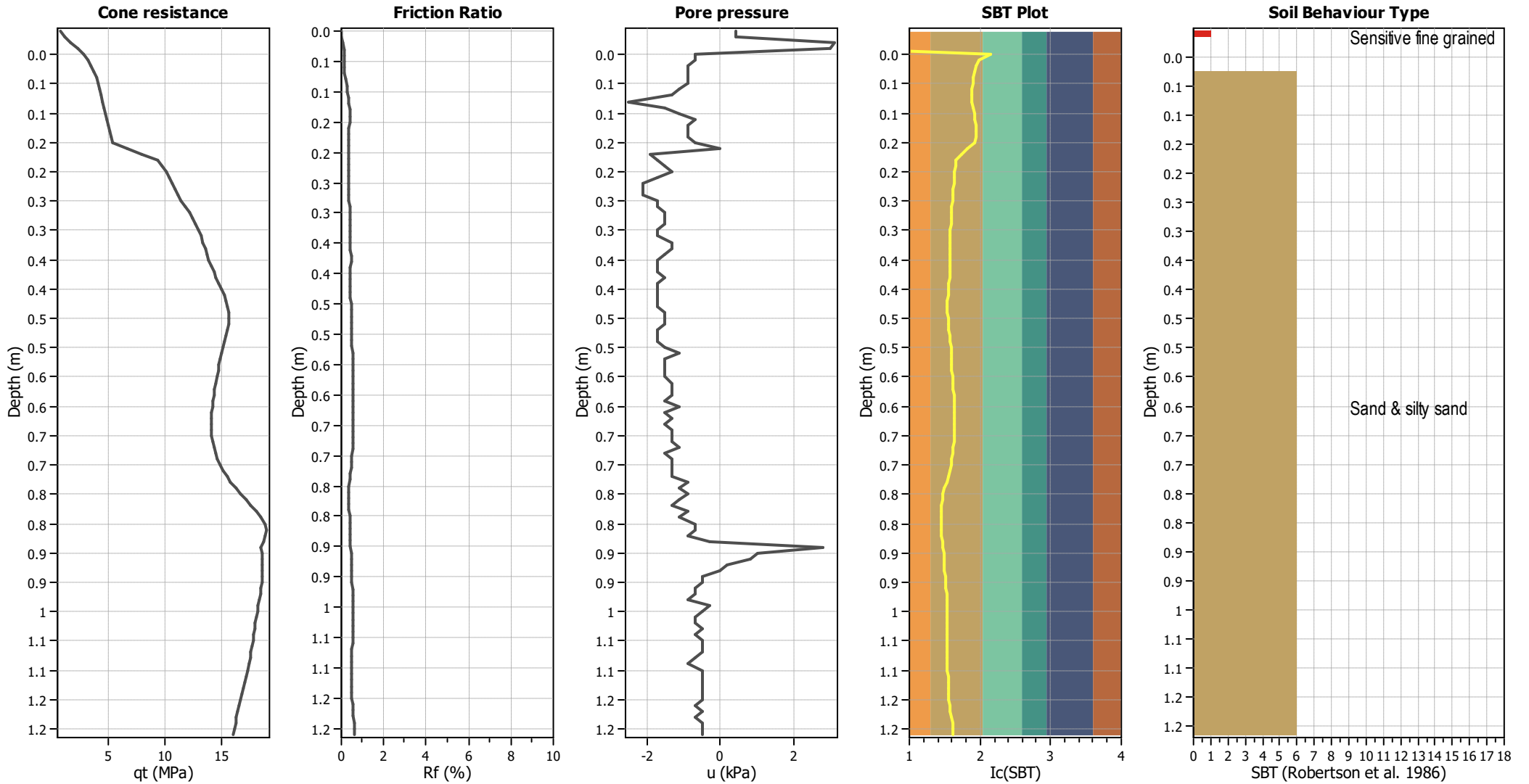
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



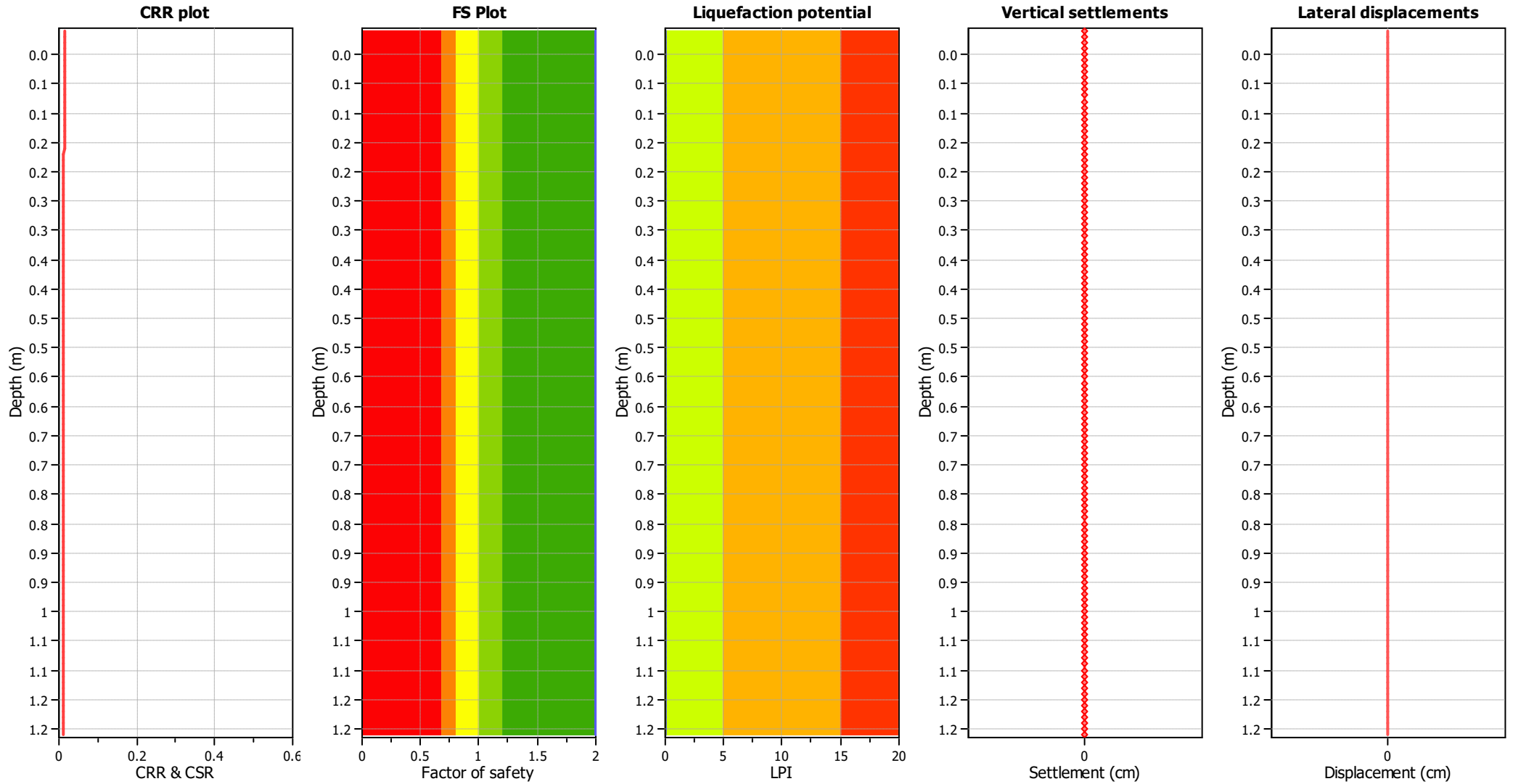
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

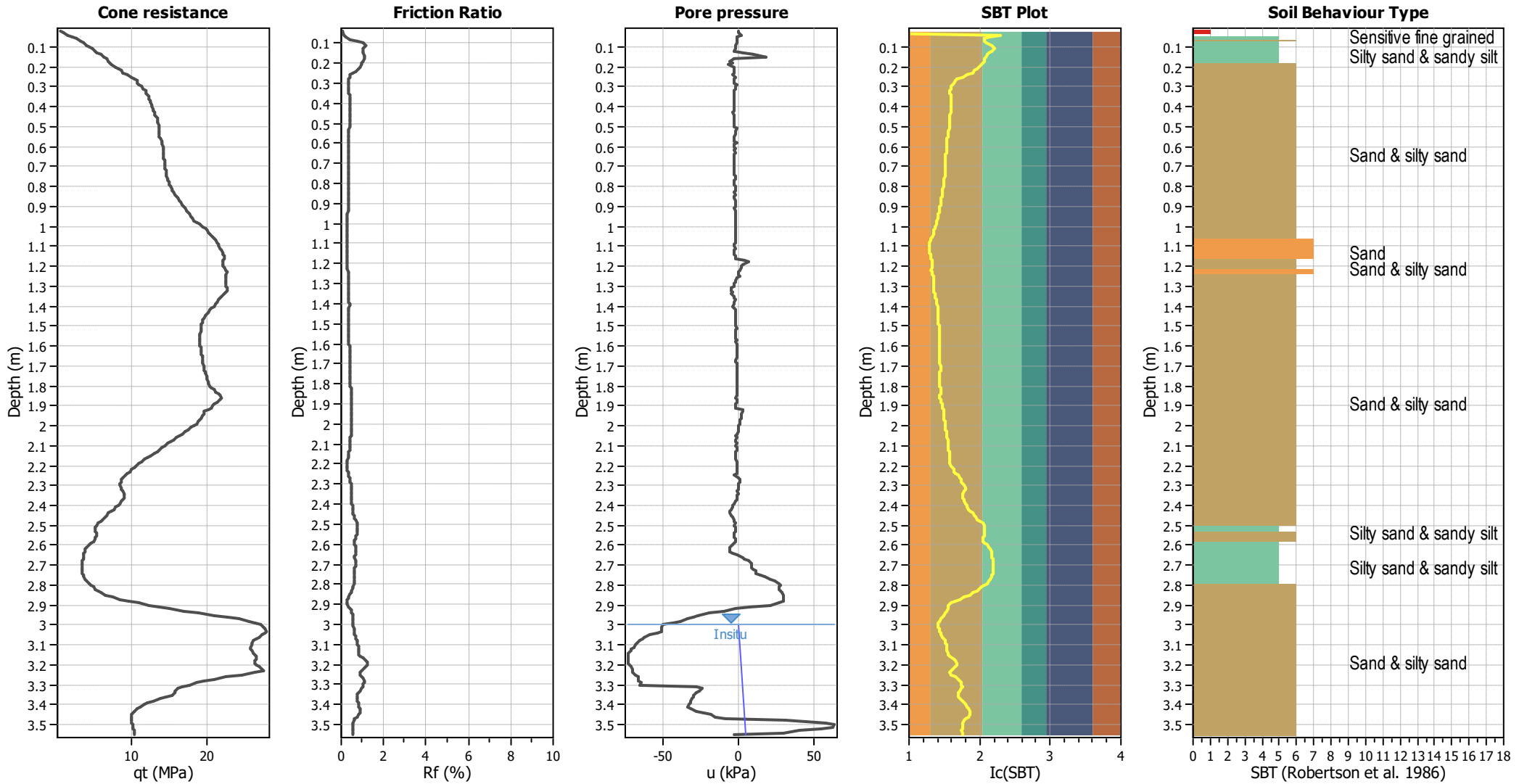
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



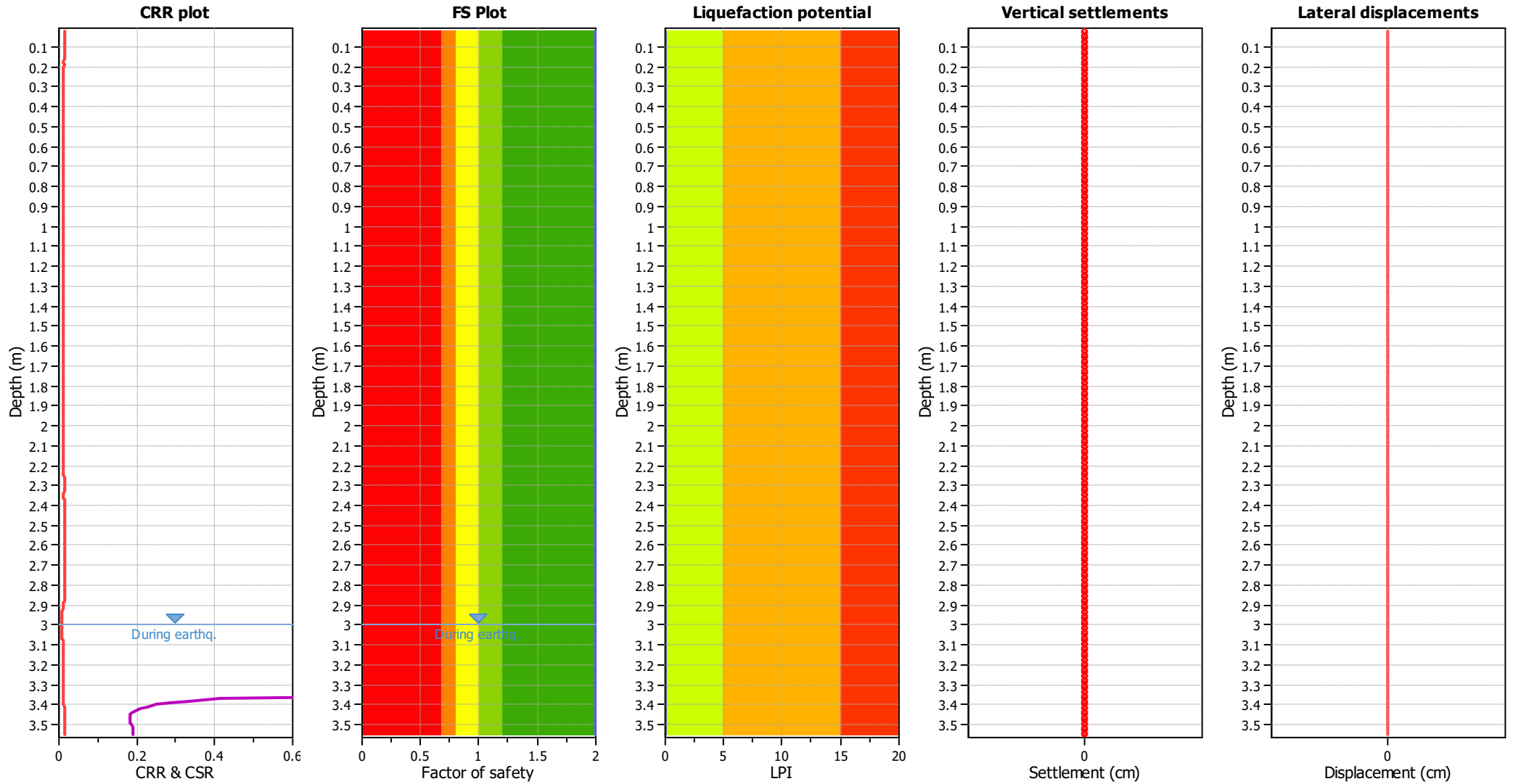
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_f applied:	Yes
Earthquake magnitude M_w :	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

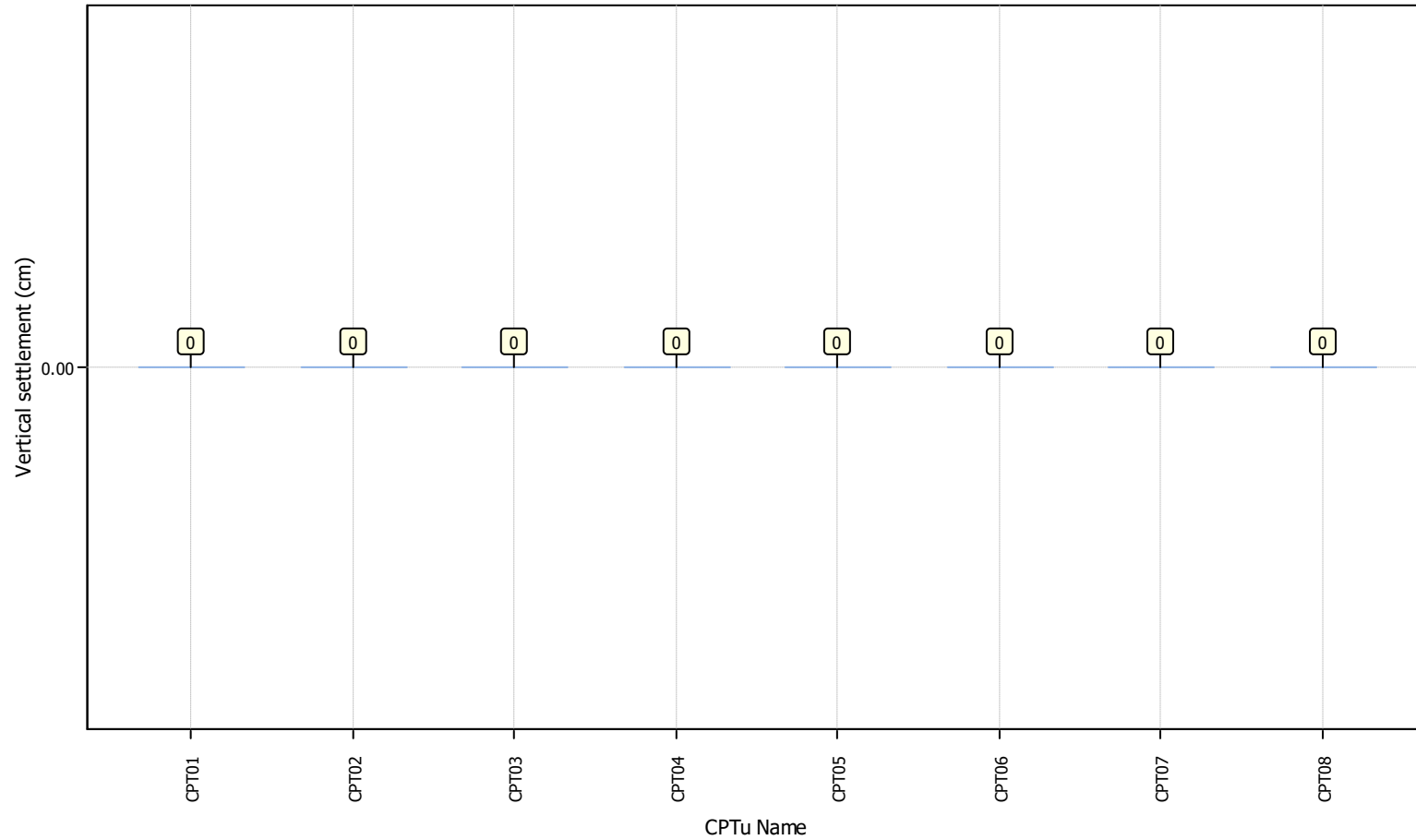
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Project title : 14333 Stage 6 & 7 Liquefaction Analysis - SLS
Location : The Landings, One Tree Point

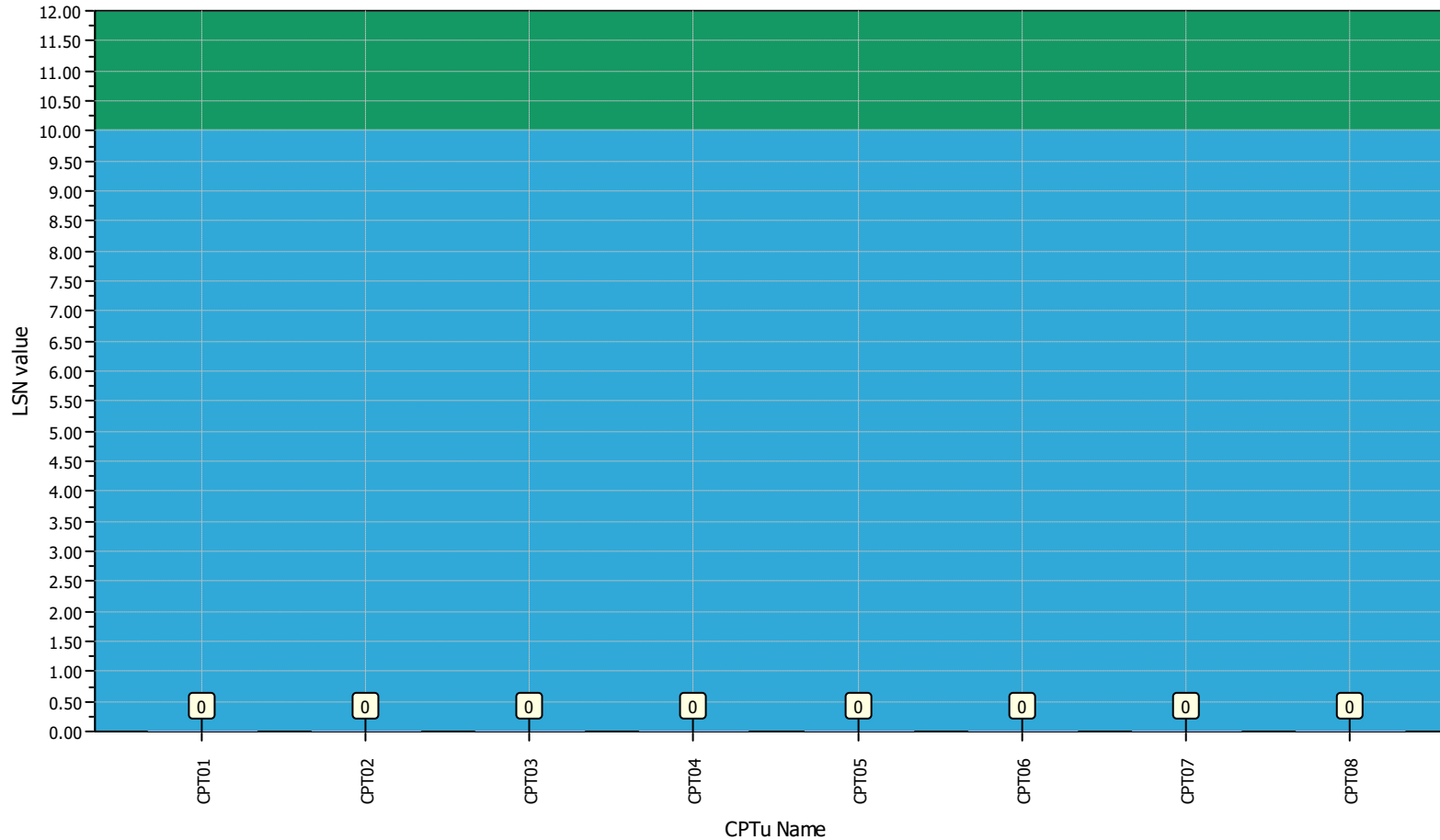
Overall vertical settlements report



Project title : 14333 Stage 6 & 7 Liquefaction Analysis - SLS

Location : The Landings, One Tree Point

Overall Liquefaction Severity Number report



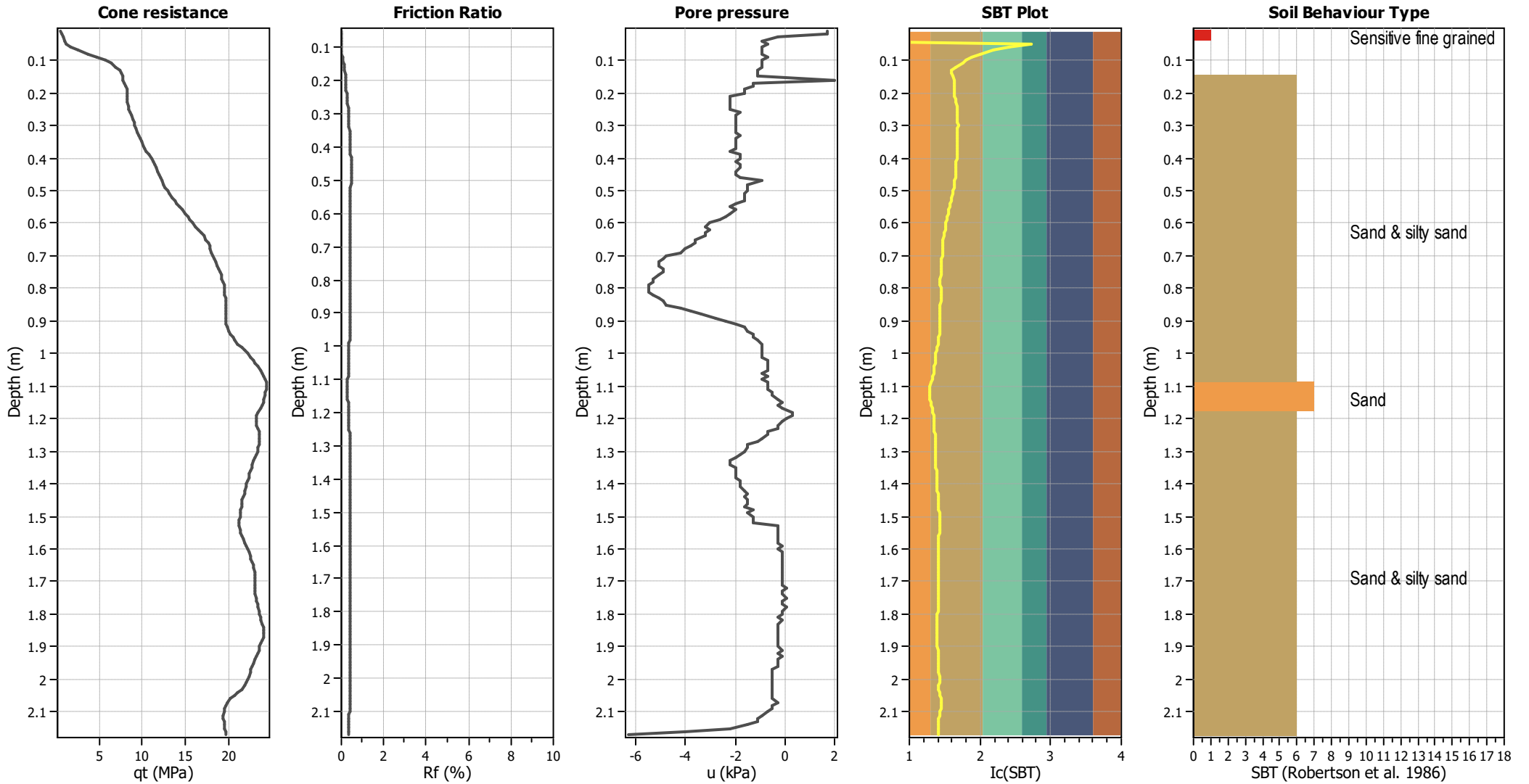
LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

- Total CPT number: 8
- 100% little liquefaction
- 0% minor liquefaction
- 0% moderate liquefaction
- 0% moderate to major liquefaction
- 0% major liquefaction
- 0% severe liquefaction

CPT basic interpretation plots



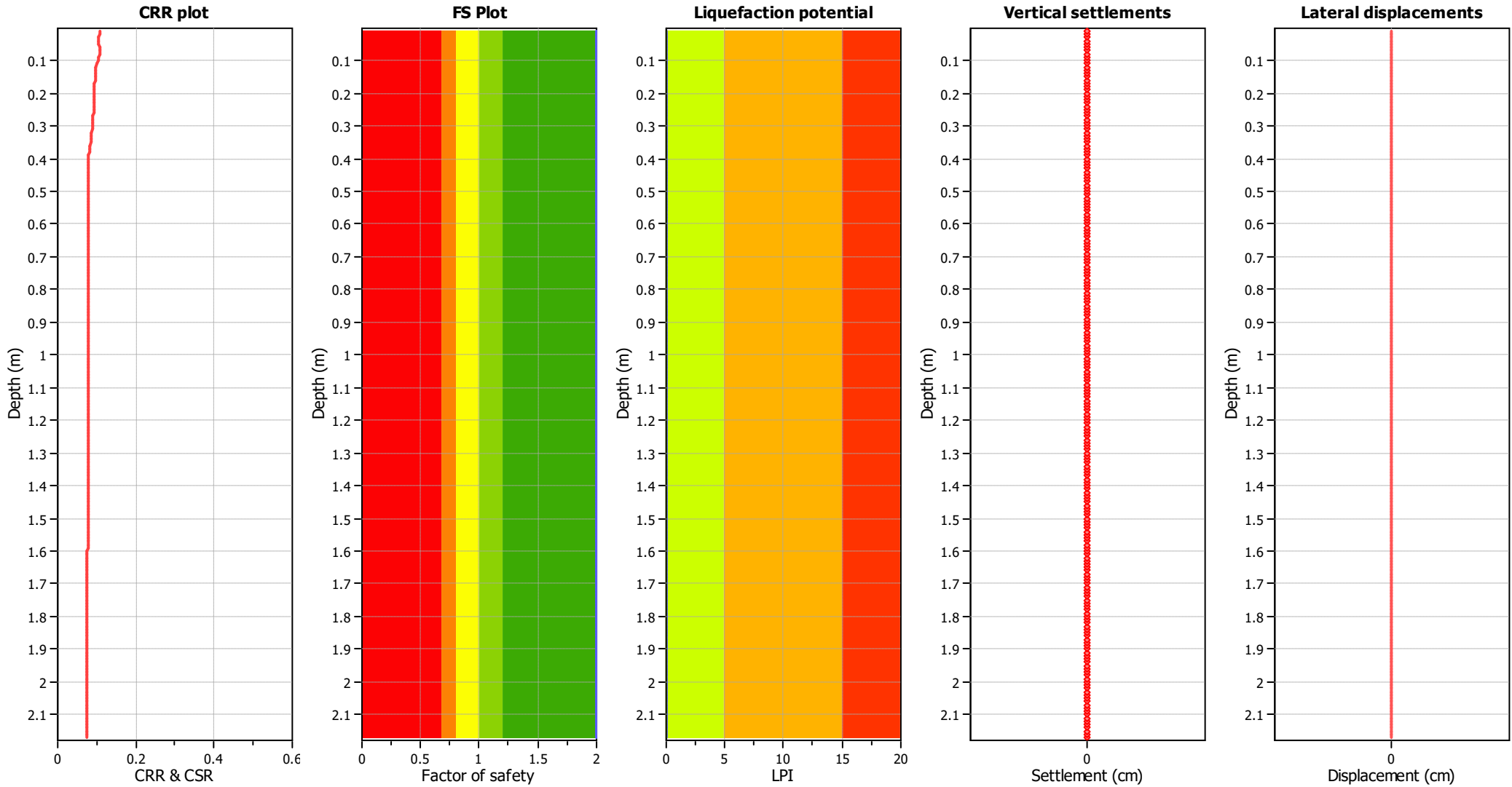
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

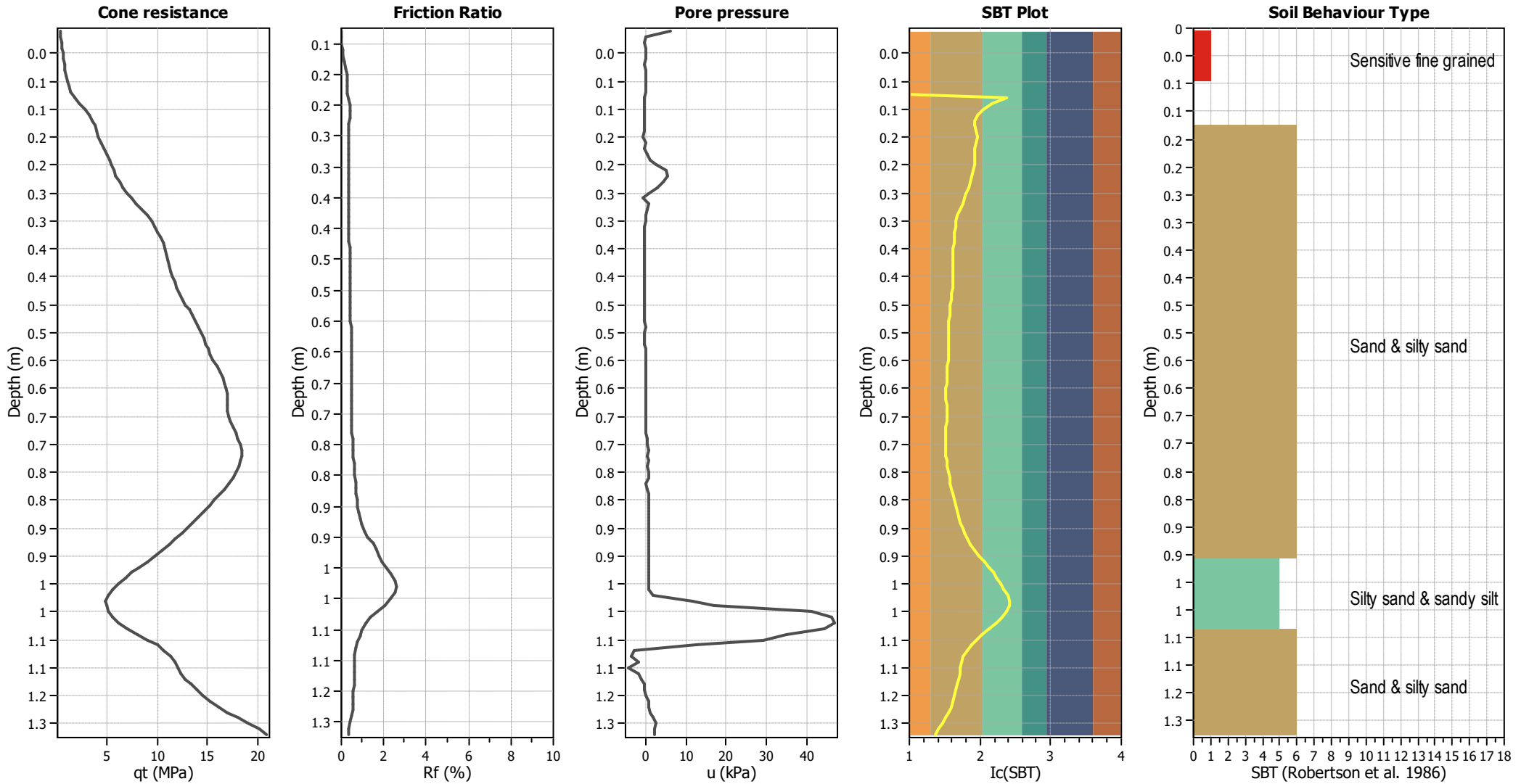
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



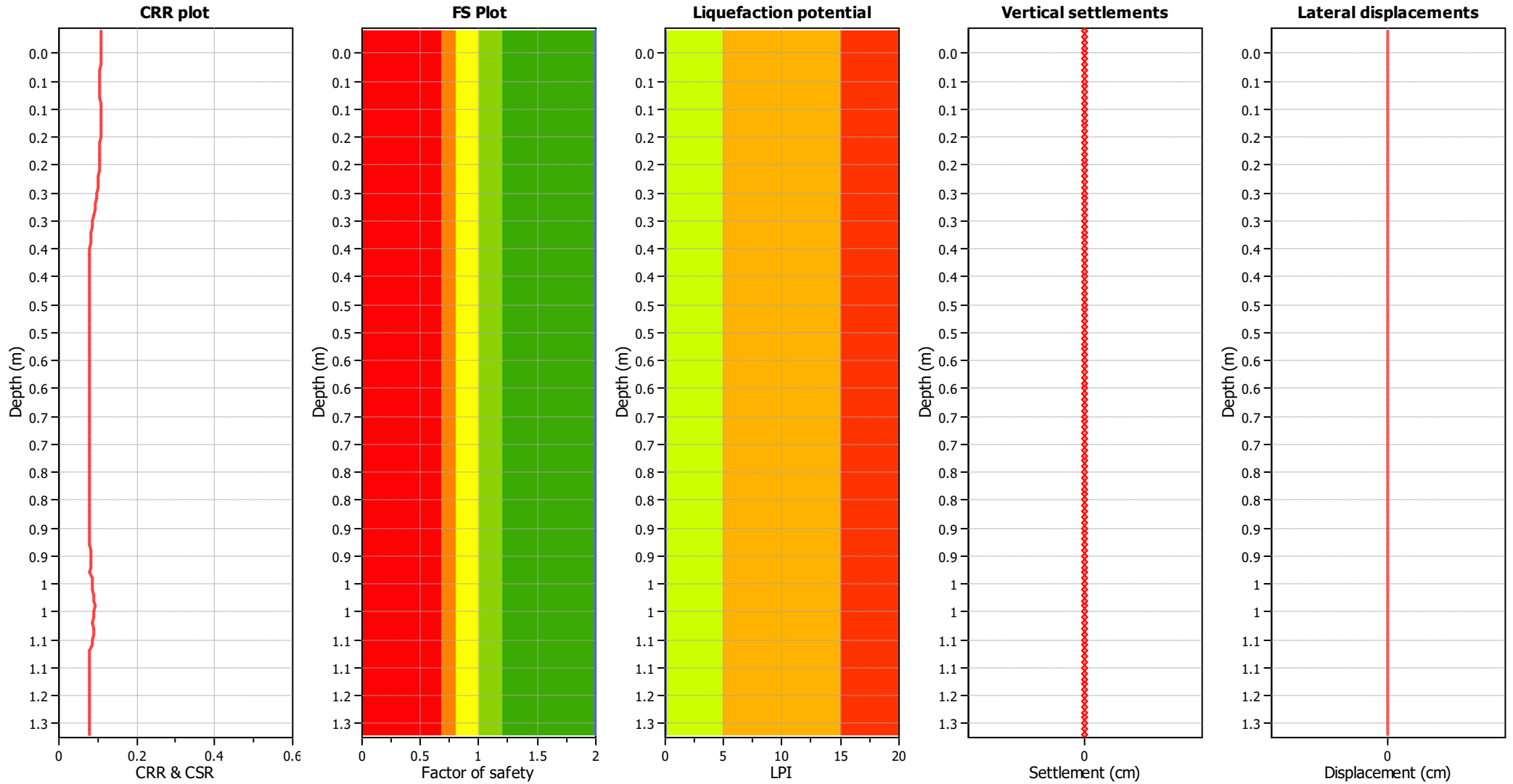
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

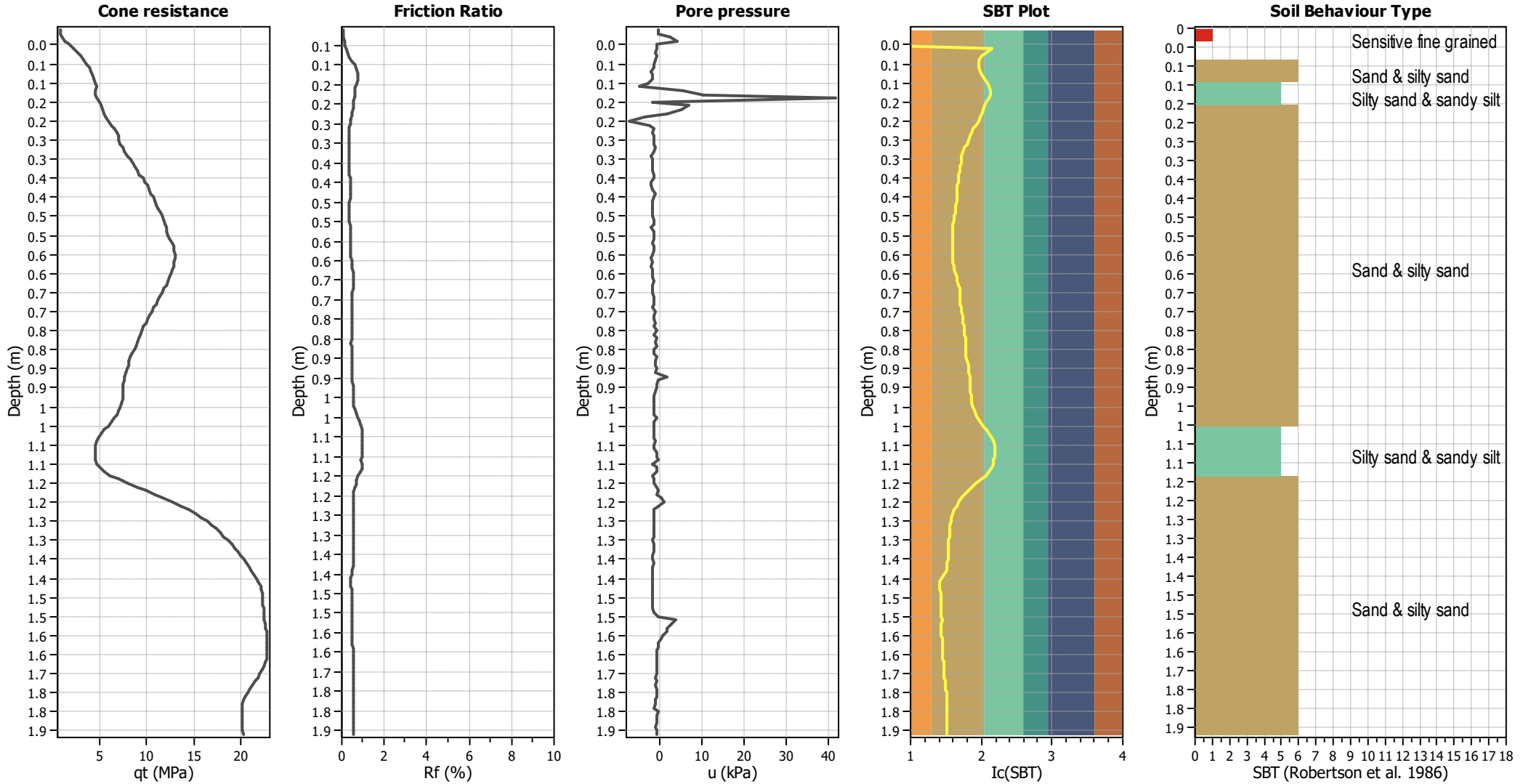
F.S. color scheme

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LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



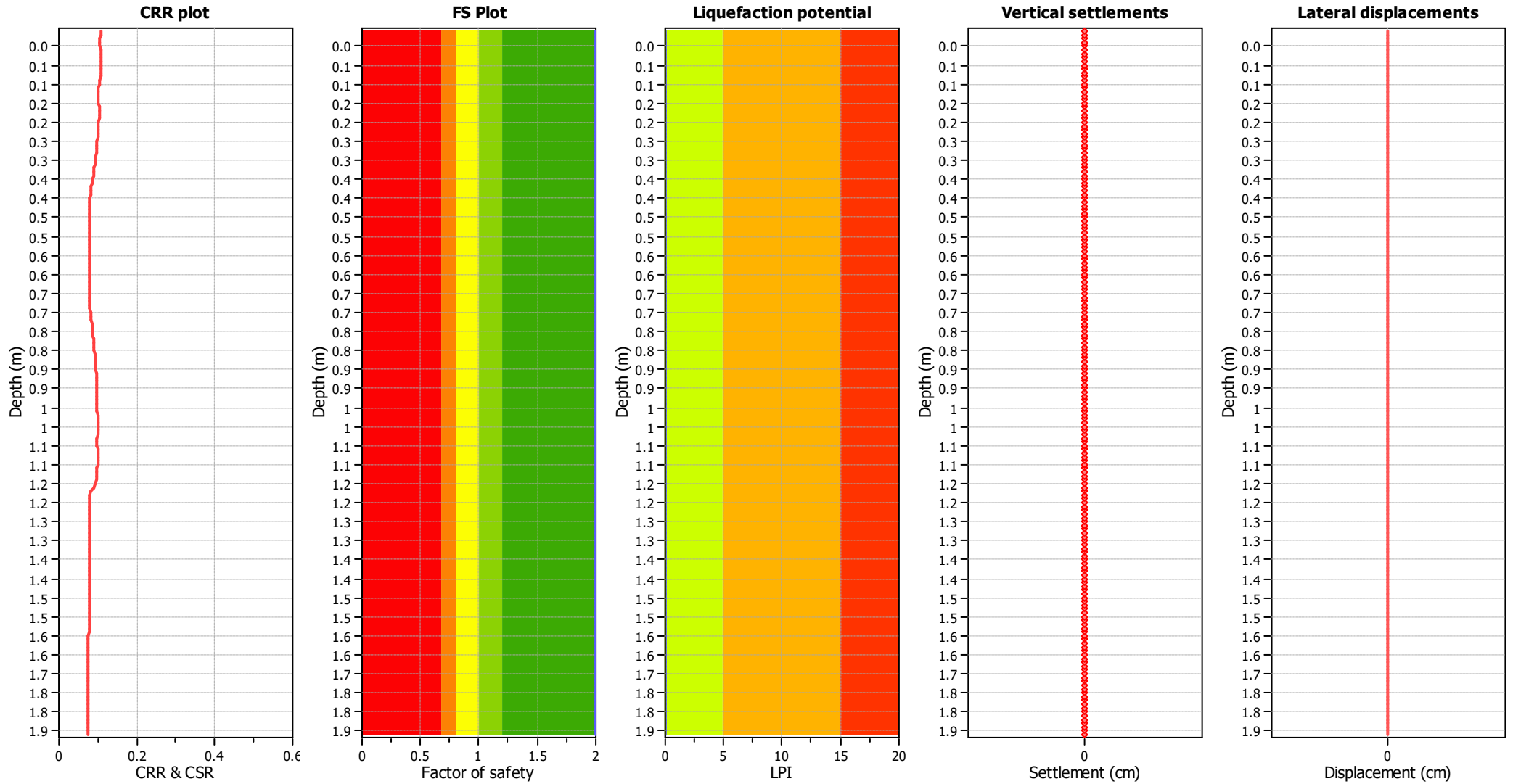
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

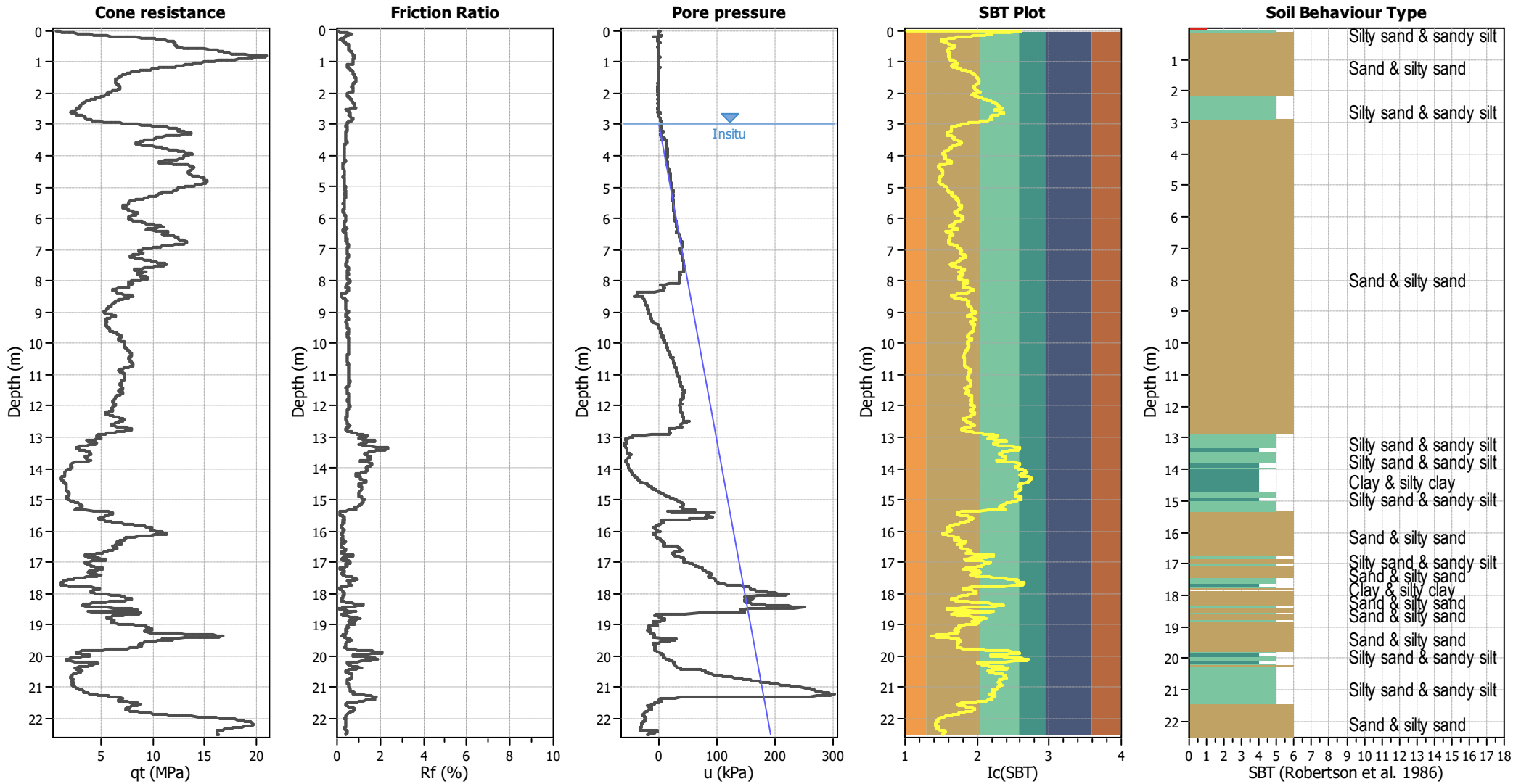
F.S. color scheme

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- Unlike to liquefy
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LPI color scheme

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- High risk
- Low risk

CPT basic interpretation plots



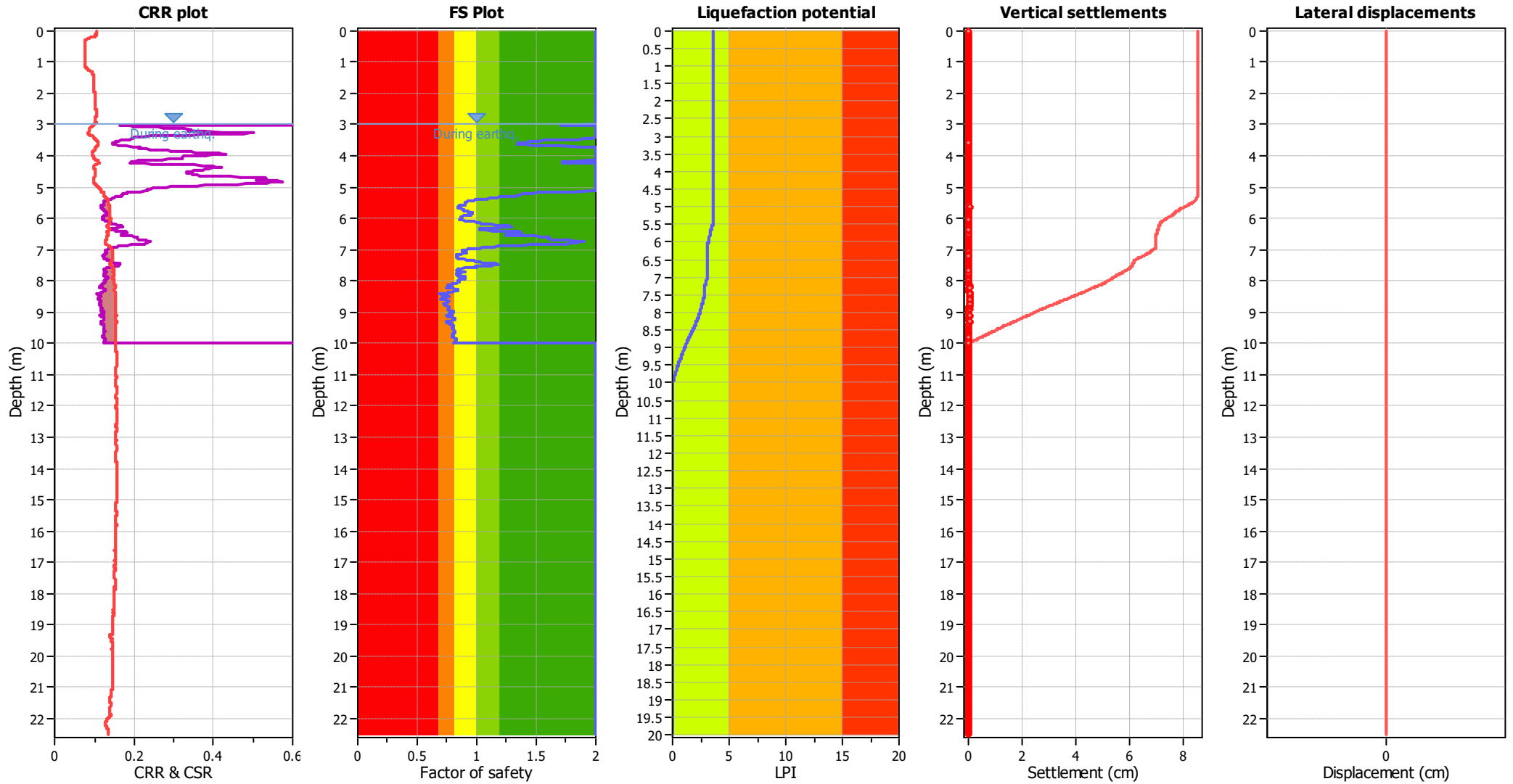
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _q applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_f applied:	Yes
Earthquake magnitude M_w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

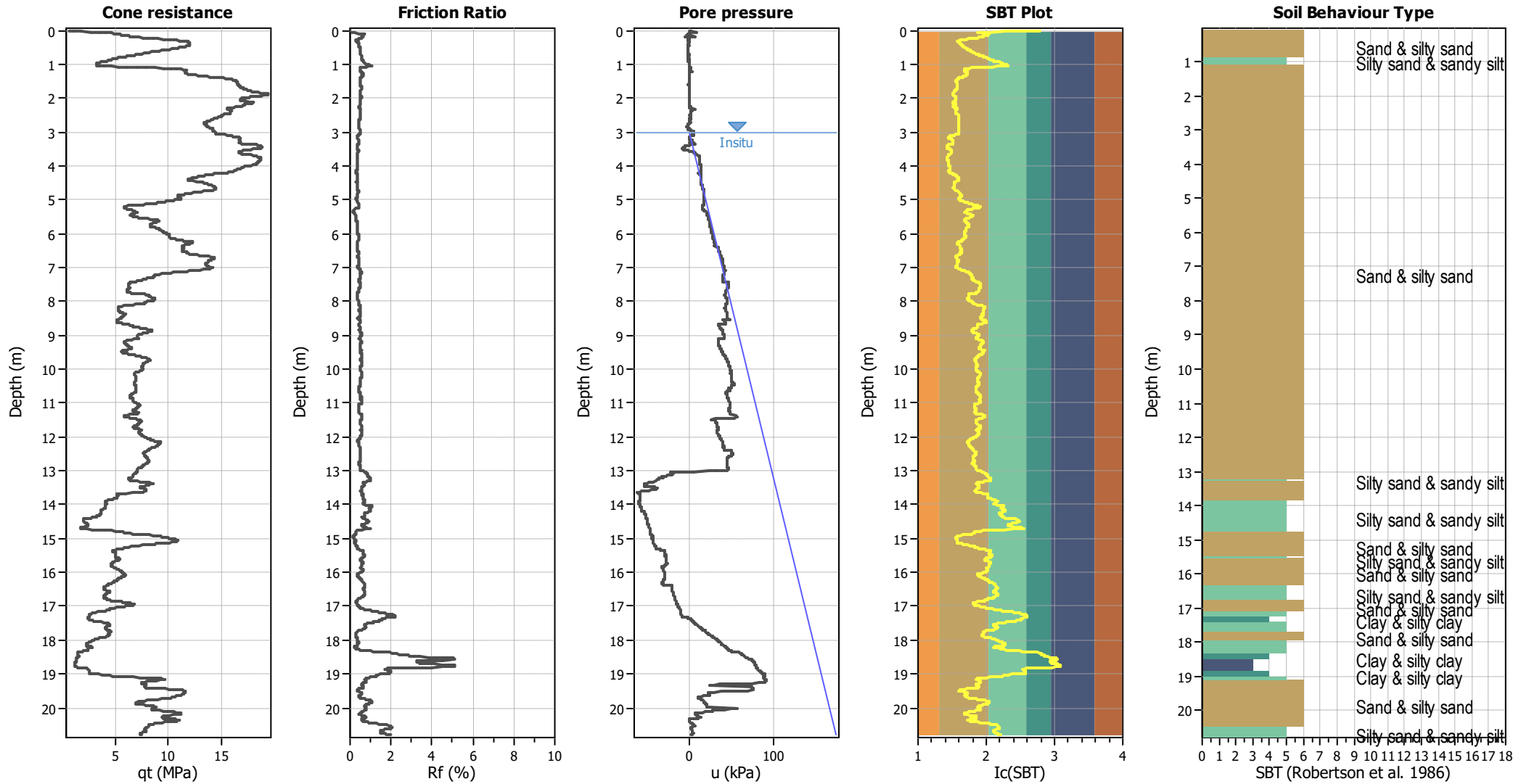
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



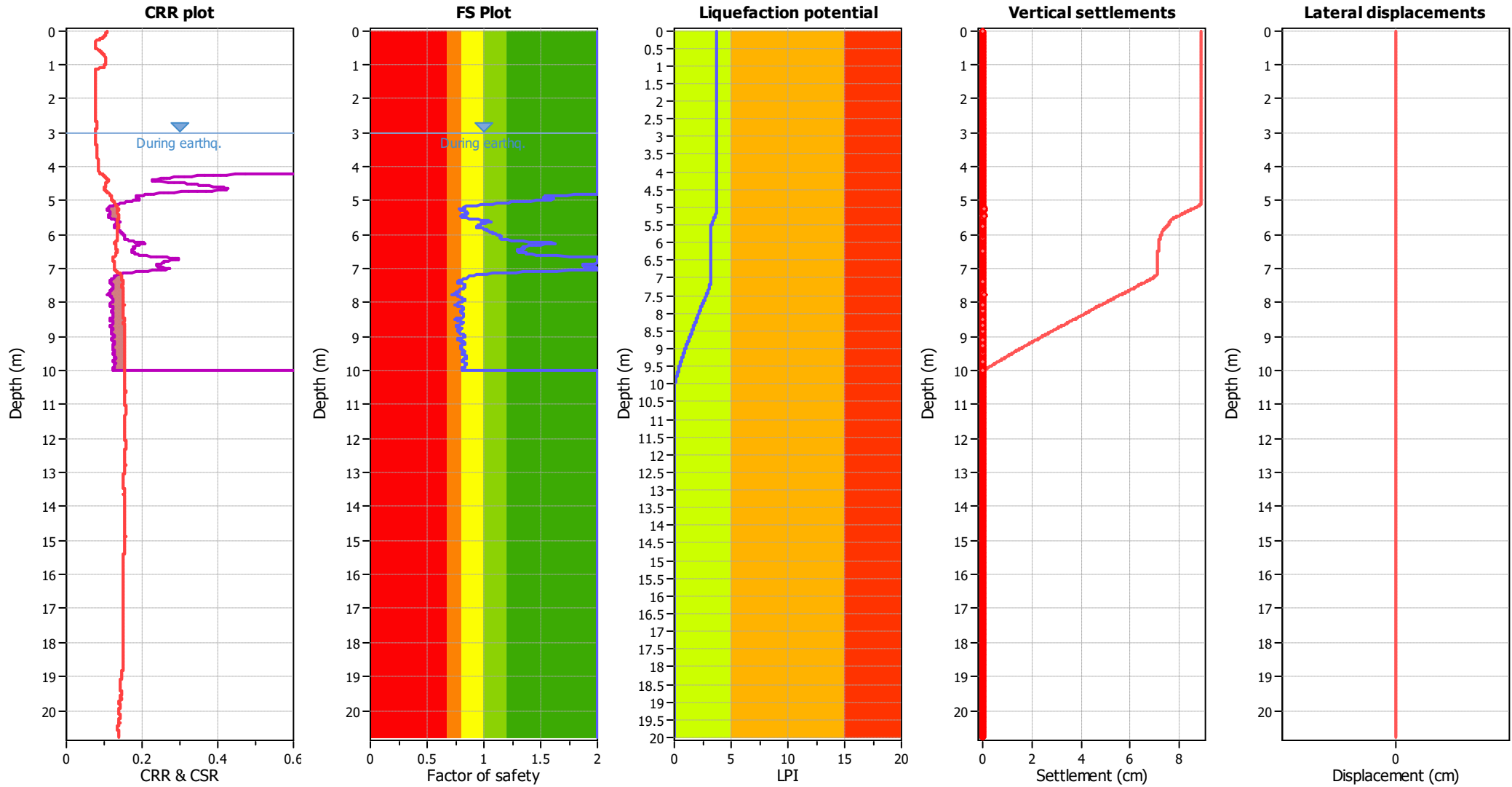
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_f applied:	Yes
Earthquake magnitude M_w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

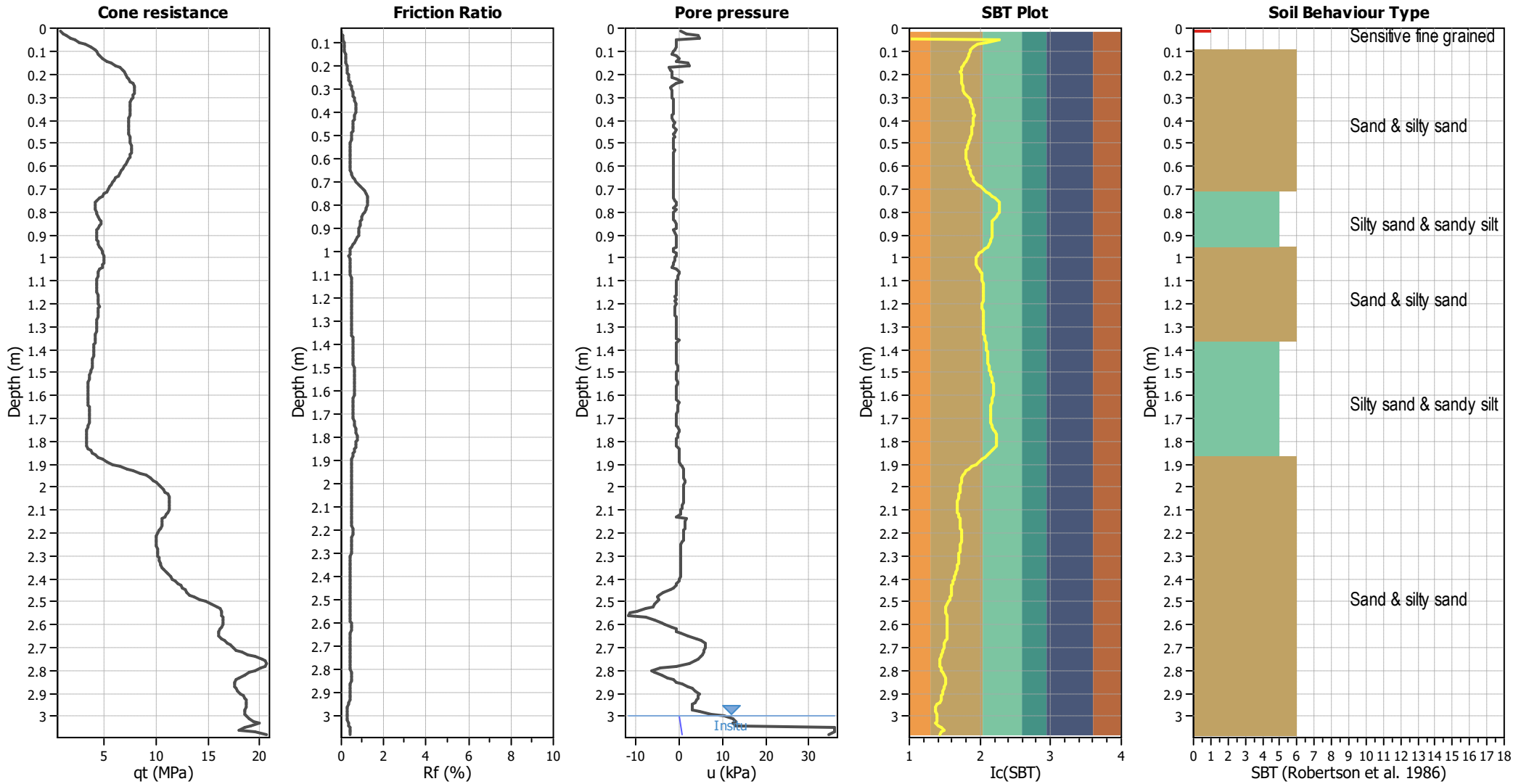
F.S. color scheme

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- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



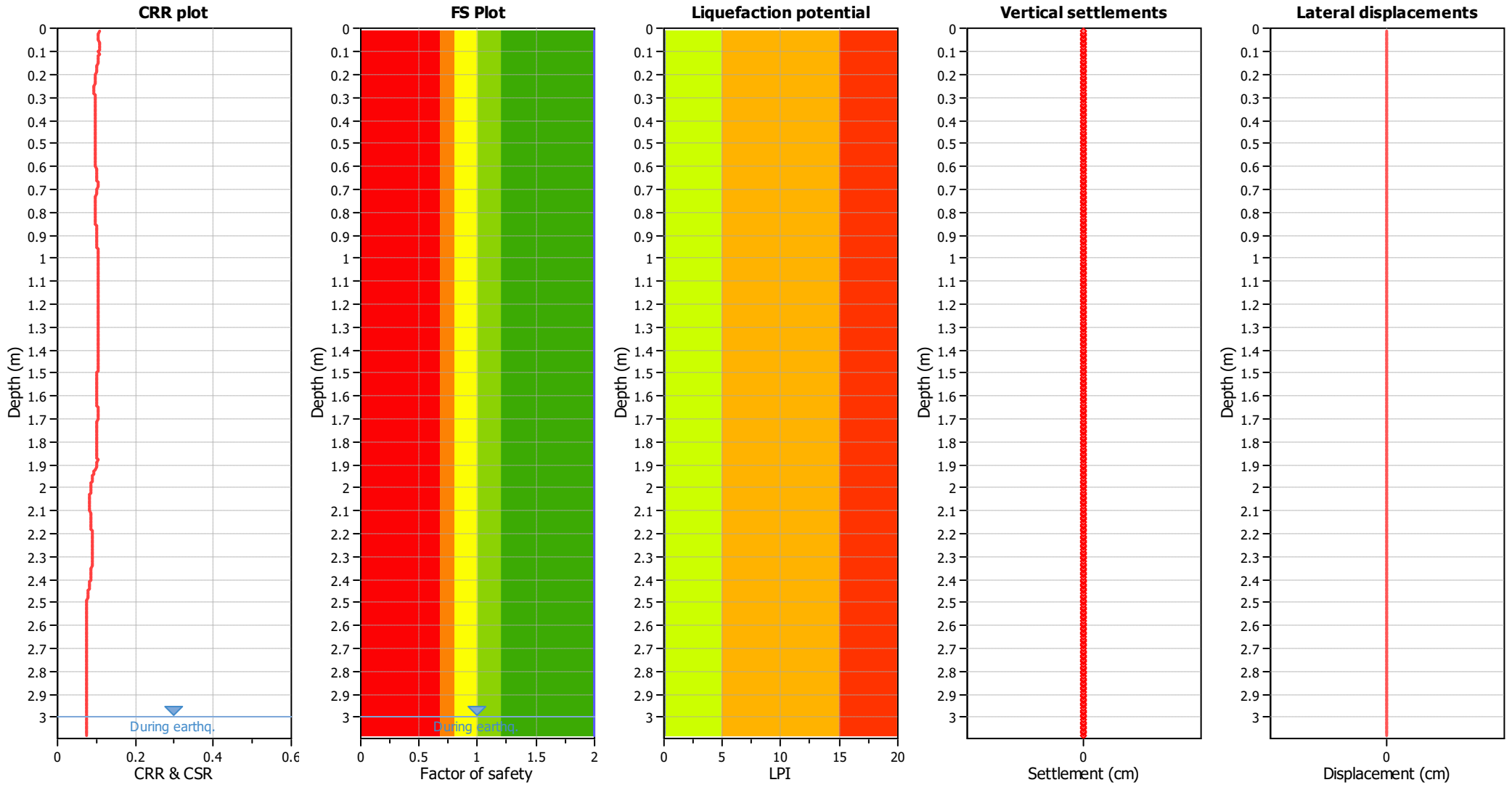
Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

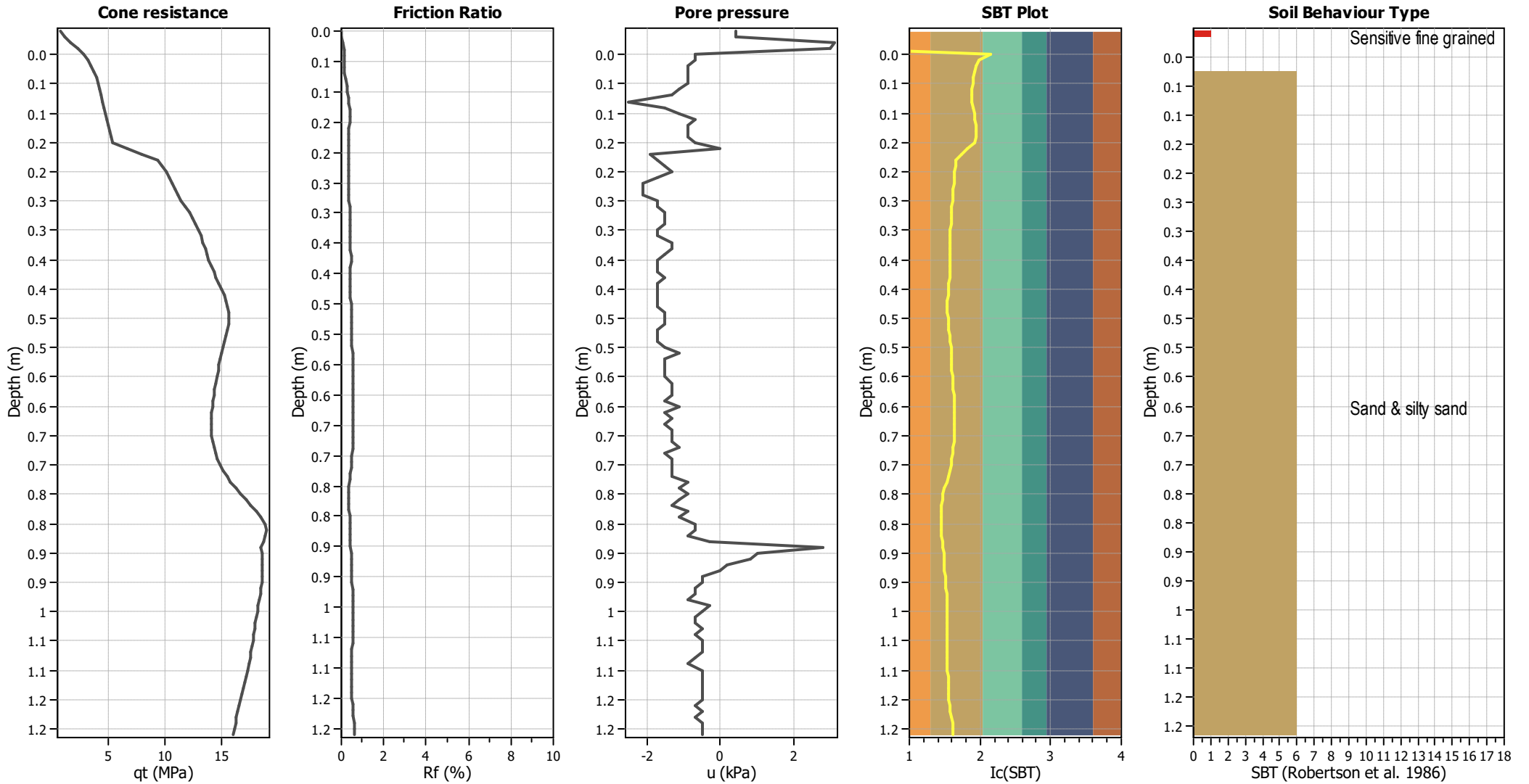
F.S. color scheme

- Almost certain it will liquefy
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- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



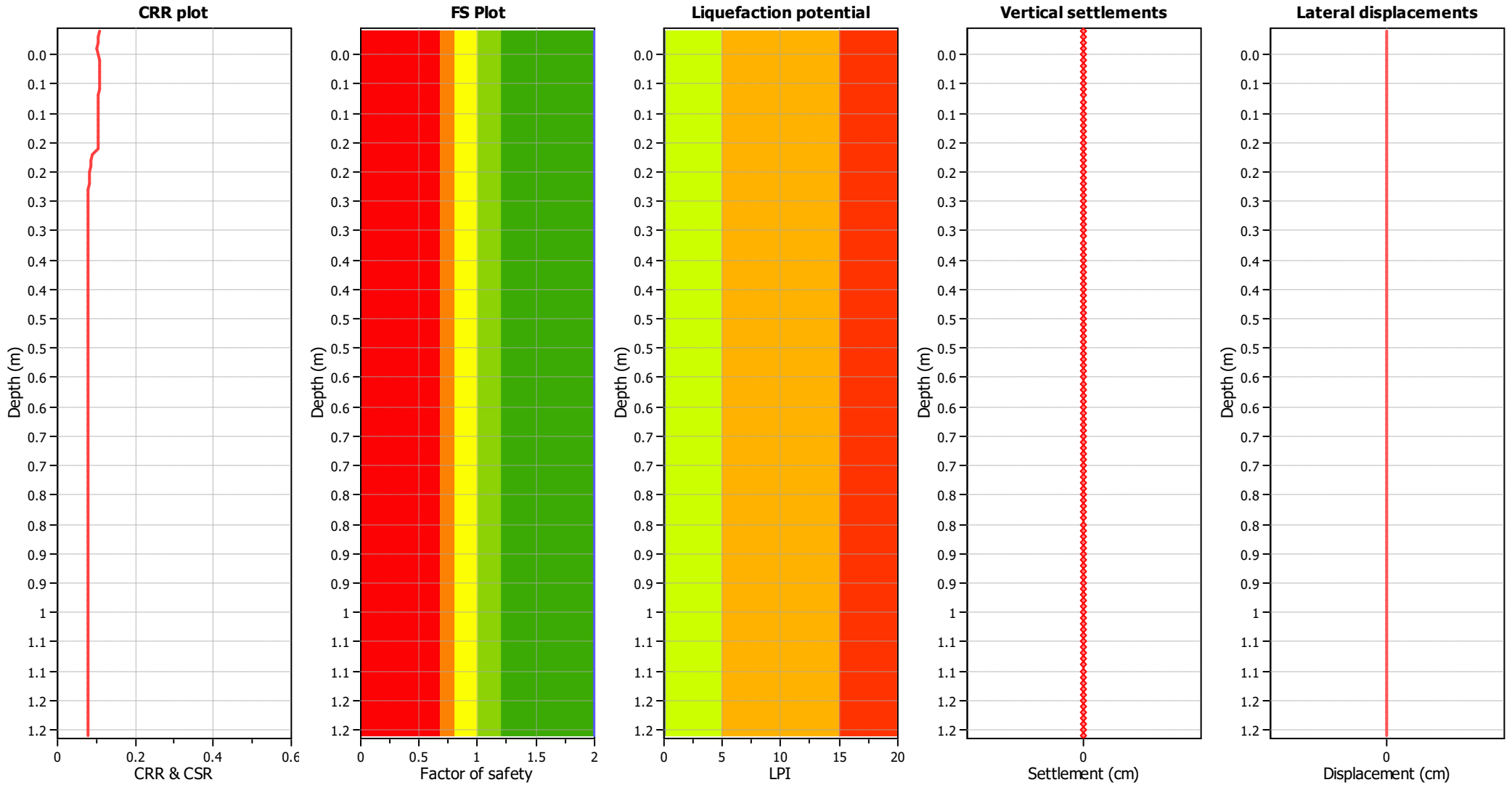
Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (earthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	3.00 m	Fill height:	N/A	Limit depth:	10.00 m

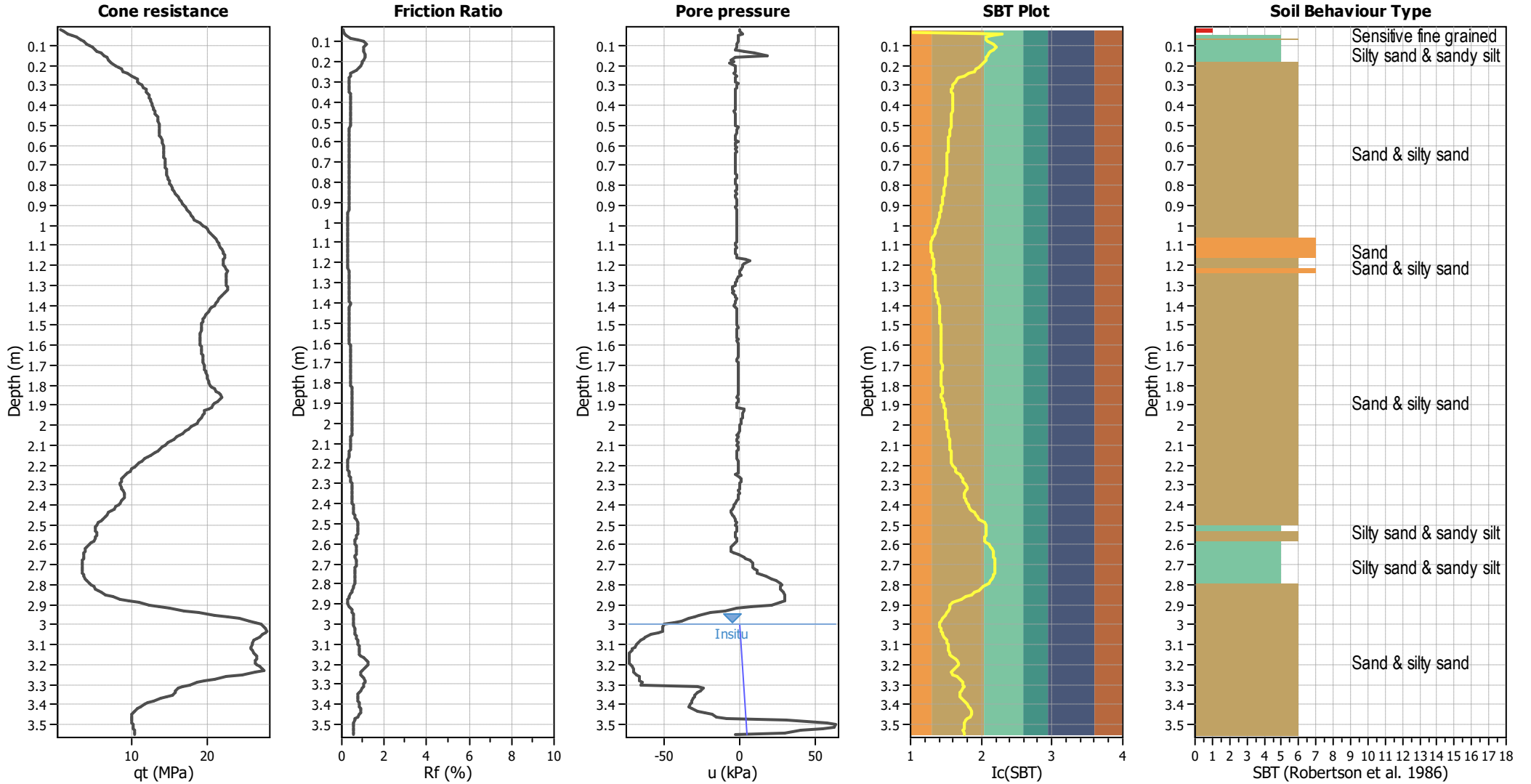
F.S. color scheme

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- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plots



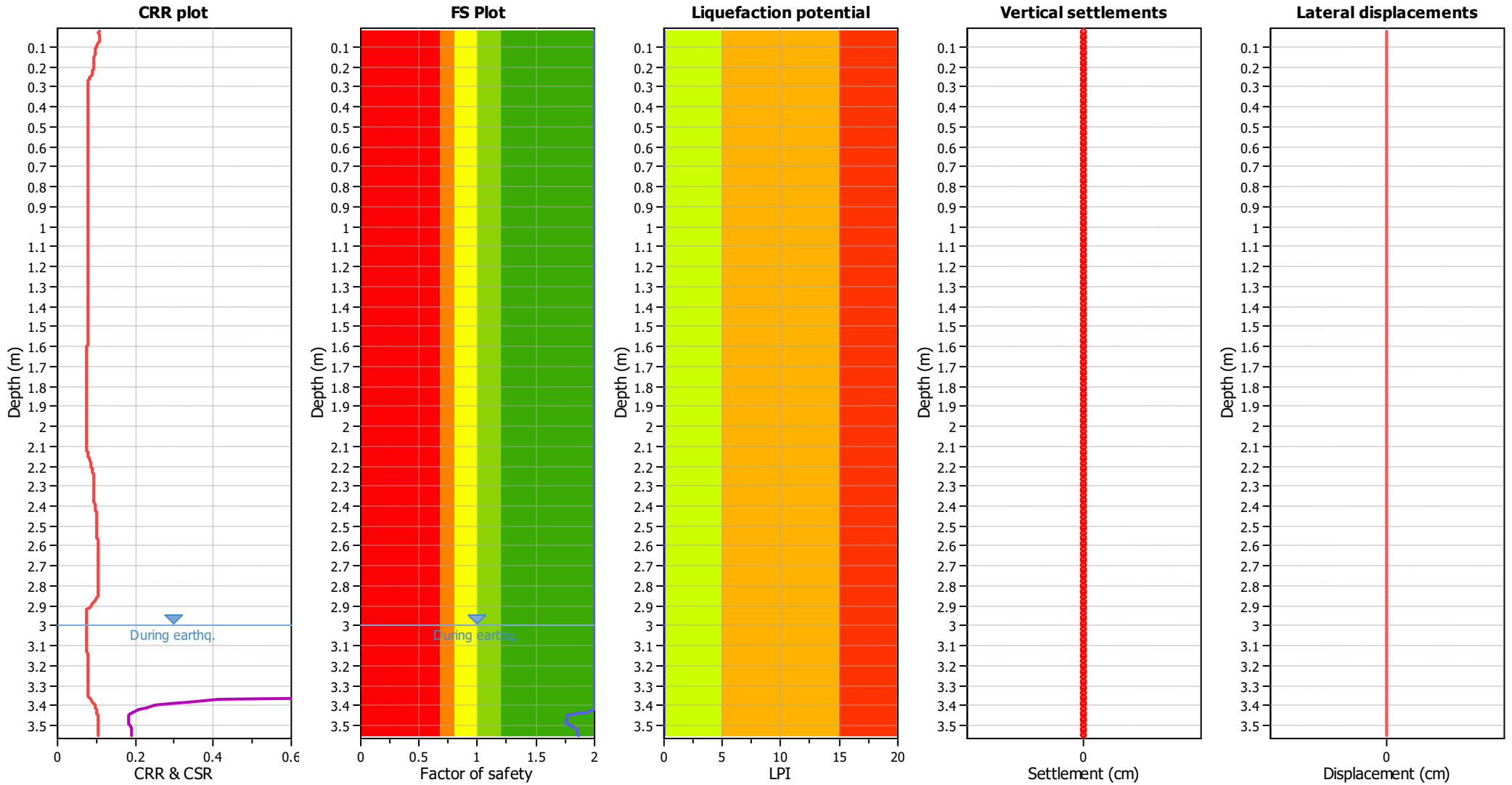
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	Yes
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SBT legend

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2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

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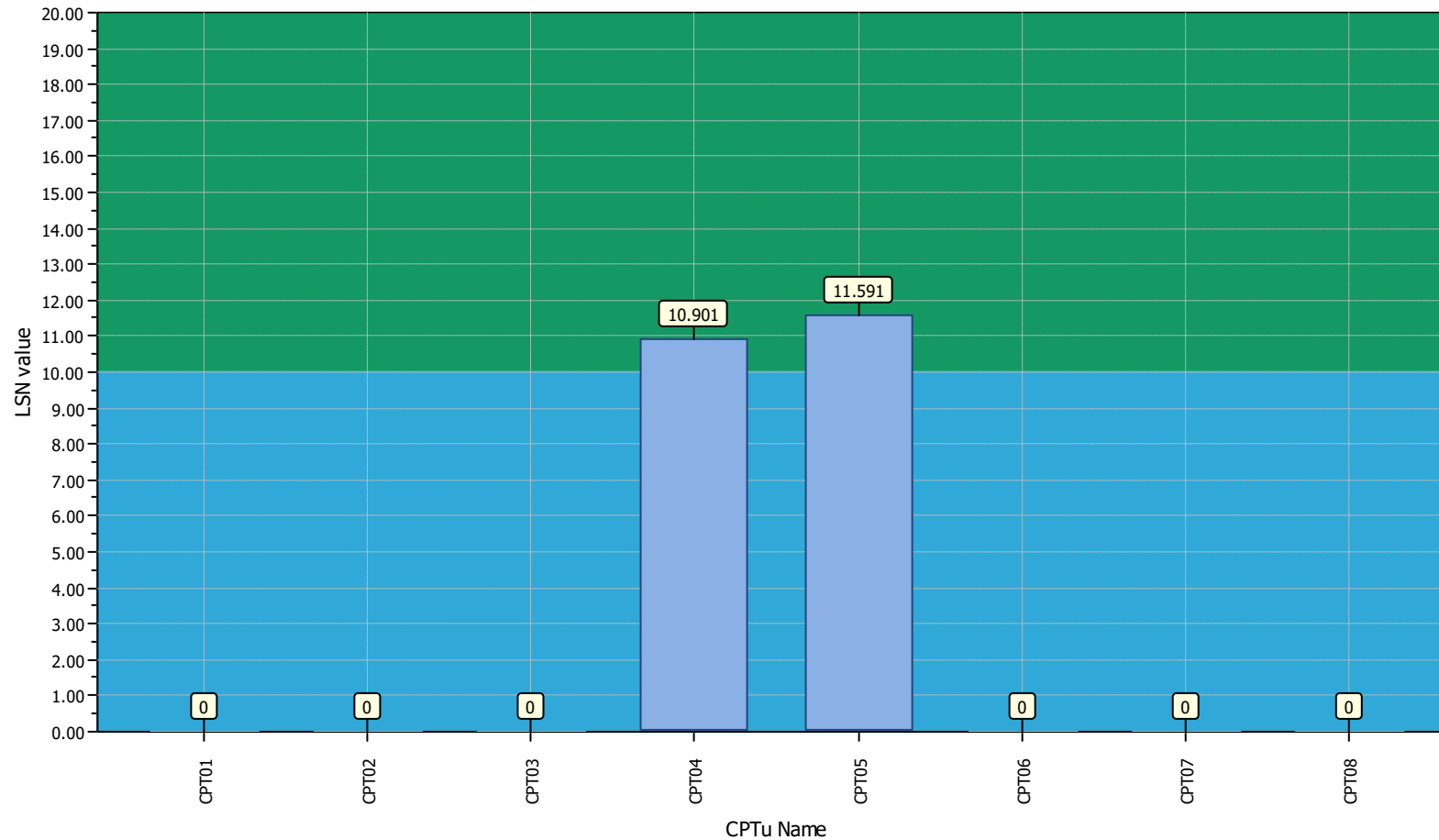
LPI color scheme

- Very high risk
- High risk
- Low risk

Project title : 14333 Stage 6 & 7 Liquefaction Analysis - ULS

Location : The Landings, One Tree Point

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

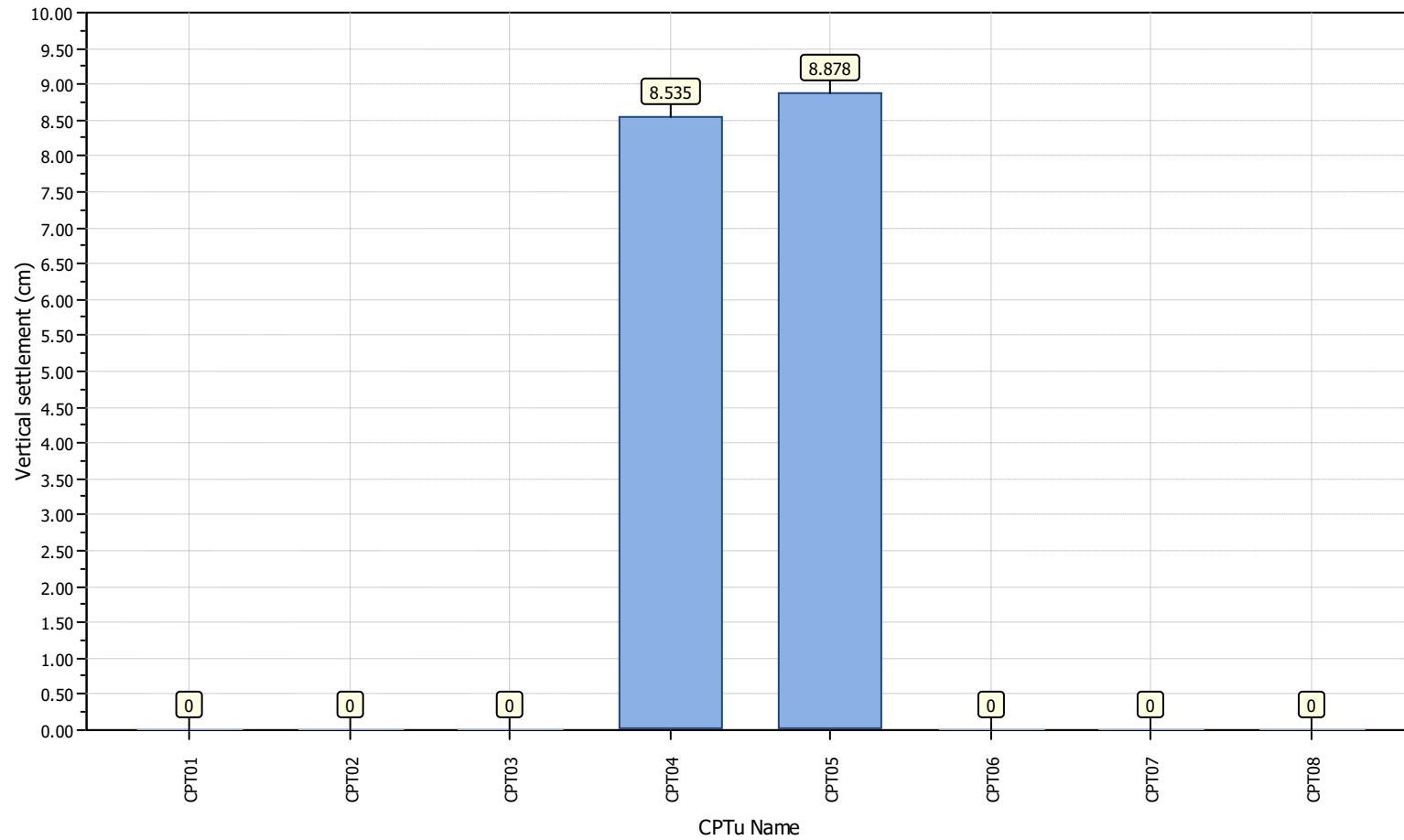
Basic statistics

- Total CPT number: 8
- 75% little liquefaction
- 25% minor liquefaction
- 0% moderate liquefaction
- 0% moderate to major liquefaction
- 0% major liquefaction
- 0% severe liquefaction

Project title : 14333 Stage 6 & 7 Liquefaction Analysis - ULS

Location : The Landings, One Tree Point

Overall vertical settlements report



Appendix 6 – Statement of Professional Opinion on Suitability of Land for Building Construction - Form EES-PO1

Statement of Professional Opinion on Suitability of Land for Building Construction

Development The Landing - Stage 7, One Tree Point

Developer WFH Properties Limited

Location One Tree Point

I (full name) Philip Joseph Cook

Of (Name and address of firm) Cook Costello Ltd, Norfolk House, 2 Norfolk St, Whangarei

- 1 I am a Geo-Professional as defined in Section 1.3 Abbreviations and Definitions and was retained by the Developer as the geo-professional on the above development
- 2 The extent of my preliminary investigations are described in my Report(s) number 14333-006 dated 08/08/2022 and the conclusions and recommendations of that/those document(s) have been re-evaluated in the preparation of this report. The extent of my inspections during construction, and the results of all tests and/or re-evaluations carried out are as described in my geotechnical completion report dated 08/08/2022.
- 3 In my professional opinion, not to be construed as a guarantee, I consider that (*delete as appropriate*):
 - a. The earth fills shown on the attached Plan No EW600 (Appendix 2) have been placed in compliance with the requirements of the Whangārei District Council and my specification. (However, lots NA did not pass final fill specification testing and as a result, specific site investigations and foundation designs will be required here at the time of building consent application)
 - b. The completed works take into account land slope and foundation stability considerations, subject to the appended foundation recommendations and earthworks restrictions, (*which should be read in conjunction with the appended final site contour plan*)
 - c. Subject to 3(a) and 3(b) above, the original ground not affected by filling satisfies the description of 'good ground' as described in B1 Acceptable Solutions and Verification Methods and NZS 4229:2013 Yes No

(If no, a specific foundation investigation/design will be required at the time of Building Consent)

- d. Subject to 3(a) and 3(b) above, the filled ground satisfies the description of 'good ground' as described in NZS 3604:2011 and NZS 4229:2013 Yes No

(If no, a specific foundation investigation/design will be required at the time of Building Consent)

- e. The original ground not affected by filling and the filled ground are not subject to erosion, subsidence, or slippage in accordance with the

provisions of section 106 of the Resource Management Act 1991 provided that:

i. Site-specific geotechnical investigation and design of foundations are to be carried out at the detailed design of buildings. The ground should be checked prior to construction in accordance with NZS4229 and NZS3604

ii. Standard inspection of excavated foundations is to be carried out at time of construction

iii. Buildings subject to heavy loads or vibrations will require specific design.

iv. Buildings subject to heavy loads or vibrations will require specific design.

4 This professional opinion is furnished to the TA and the Developer for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any building

5 This certificate shall be read in conjunction with my geotechnical report referred to in clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report



ME, IntPE (NZ), CEngNZ, CPEng #
1027758

08/09/2022

Signature

Professional Qualifications

Date