GEOPACIFIC CONSULTANTS

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TDK Metro Terminals
#10-480 Audley Blvd
Delta, B.C.
V3M 5S4

January 30, 2023
File: 21920
R2

Attention: Tish Kumar

Re: Geotechnical Investigation Report – Proposed Distribution Hub
480 Audley Boulevard, Delta, BC

1.0 INTRODUCTION

We understand that TDK Logistics Ltd. intends to expand their existing TDK Metro Terminals Facility at the above referenced site. Preliminary plans show the construction of an expanded container yard, including two new rail siding tracks, the demolition of the existing warehouse, a new three-lane truck gate and the implementation of a grain transload operation.

This report presents the results of a geotechnical investigation of the soil and groundwater conditions at the site and provides recommendations for the design and construction of the proposed development. This report has been prepared exclusively for TDK Metro Terminals, for their use, and the use of others on their design team. We also understand that this report will be relied upon by the Port of Vancouver during their permit process. No other use of the report is permitted without the written consent of GeoPacific.

2.0 SITE DESCRIPTION

The subject development site is located at 480 Audley Boulevard, in Delta, BC. The property is improved by a warehouse at the northwest side of the site. The remainder of the site is used for container and building material storage. The site is bounded by Audley Boulevard to the north, the Fraser River to the east and Cundy Avenue to the west and north. The site is approximately rectangular in shape and relatively flat.

The location of the subject site relative to surrounding properties and roads is shown on our Drawing No. 21920-01, attached to this report.

3.0 FIELD INVESTIGATION

A geotechnical investigation for this site was completed by GeoPacific Consultants Ltd. on October 5th and 6th, 2022 using the subcontracted services of Southland Drilling of Delta, BC. The site investigation was comprised of 17 augured test hole and 2 cone penetration tests (CPT) sounding, supplemented with one shear wave velocity profile. Additionally, an investigation was conducted at the adjacent property at 410/420 Audley Boulevard, in Delta BC, on March 3rd and 7th, 2022. This investigation was comprised of 9 augured test hole and 6 cone penetration tests (CPT) sounding, supplemented with one shear wave velocity profile. For both investigations, the soils were logged in the field and samples were collected for laboratory moisture content analysis. The test hole logs are presented in Appendix A.

The CPT operates by advancing a cone penetrometer into the ground and recording tip resistance, sleeve friction, pore water pressure, temperature, and inclination at 5 cm intervals to a purpose-built data acquisition system. Analysis of the CPT sounding data allows an estimation of geotechnical design parameters and inference of the sub-surface stratigraphy from soil-type behaviour characteristics. The CPT logs are presented in Appendix B of

this report. Geotechnical parameters interpreted from the CPT soundings, such as undrained shear strength and standard penetration $N1_{(60)}$ values, are presented in Appendix C, and shear wave velocity data is presented in Appendix D, following the text of this report.

Prior to the geotechnical investigation, all underground utilities were located through BC One Calls. In addition, our selected test hole locations were cleared from underground utilities by Municon West Coast using geophysical methods.

The approximate locations of the test holes, and CPT soundings are shown on our attached site plan, Drawings No. 20766-01 and No. 21920-01.

4.0 SUBSURFACE CONDITIONS

4.1 Soil Conditions

The general geology of the region under investigation is described as Fraser River Sediments according to the Geological Survey of Canada (Map 1484A). The Fraser River Sediments are characterized as deltaic and distributary channel fill which overlay and cutting estuarine sediments. These materials are often overlain by overbank deposits. A detailed description of the soils encountered is given below.

Sand and Gravel Fill

At all test hole locations sand to sand and gravel fill was encountered. The upper 0.3m of fill is road base fill and transitions to medium grained sand with trace gravel. The fill is compact to dense and slightly moist. The fill was observed between 1.8m and 2.6m below current site grades.

Silty Clay to Clayey Silt (Overbank Silt)

The fill is underlain by overbank deposited silt. The silt is firm to stiff and contains trace organics. Laboratory moisture content analyses indicate the silty clay has a moisture content between 28.2 and 62.3 percent, and the interpreted undrained shear strength varies from approximately 75 to 100 kPa. Based on interpreted shear strength and moisture content, the silty clay is inferred to have low to moderate compressibility.

Clean Sand to Silty Sand (Channel Sand)

The silt is underlain by a sequence of channel deposited sand. In general, the sand consists of alternately clean sand to silty sand. The slight variation in the in-situ density, compressibility, mineralogy and grain sized are reflected in the shape of the tip resistance curves shown on the CPT sounding plots. In general, the Fraser River channel sands are well graded, medium grained, predominantly quartz, highly stratified and compact to medium dense. The channel sand was observed to extend at least to the maximum depth of investigation of 30 m below current site grades. The sand is underlain by a deep marine clay silt deposit inferred to be at 60 to 70 m below site grades.

For a more detailed description of the subsurface soil conditions refer to the test hole logs located in Appendix A, CPT sounding logs in Appendix B and interpreted strength parameters in Appendix C. The liquefaction analysis results are presented in Appendix D. The shear wave velocity data is presented in Appendix E.

4.2 Groundwater Conditions

At the time of our investigation the static groundwater table was estimated to be at an approximate depth of 2.1 to 3.6 metres below grade from the test holes. Pore pressure measurements during CPT soundings resulted in an inferred groundwater level of approximately 3 to 5 metres in depth. Occasional perched water was not observed in the surficial fill material however should be expected to occur during wetter periods. Groundwater levels are expected to vary seasonally with generally higher levels following sustained precipitation and with changes in the river elevation.

5.0 DISCUSSION

5.1 General Comments

As noted above, the project will consist of an expansion of their existing facility at the proposed site. The proposed project includes two new rail siding tracks and a reconfiguration of the existing container yard. From the design drawings provided track work will be located along the south east section of the site and adjacent to the foreshore. We anticipate E80 or E90 track loading. Additionally traffic estimates were provided to us, by Mott MacDonald and are as follows.

> Load #1: Reach stacker with laden loading of 100 t on the front axle (4-wheels) and 18.5 t on the rear axle. Tire contact areas of 981,000 mm^2 and 181,500 mm^2 were provided for the front and rear tires, respectively. Load applications are expected to be 225,000 over the design life.
>
> Load #2: Top-Pick Container Handler with front and rear axle weights of 95 t and 7 t, respectively. A ground contact pressure of 1050 kPa was also provided. Load applications are expected to be 225,000 over the design life.
>
> Load #3: Haul truck with total load applications of 1,319,000 over the design life.

We confirm from a geotechnical point of view that the proposed development is feasible provided that our recommendations are implemented during the design and construction of the development.

5.2 Seismic Considerations

It is generally accepted that loose to compact and saturated non-plastic silts and sands are prone to liquefaction or strain softening during cyclic loading caused by large earthquakes. The strength reduction caused by soil liquefaction can cause conventional foundations to punch. Furthermore, once liquefaction has been triggered, experience has shown that significant permanent vertical and horizontal movements may be experienced.

We expect that the new tracks will be designed to AREMA standards. Tracks are generally designed such that during moderate earthquakes (termed “Ground Motion Level 2”) result in heavy, but repairable damage with only a short period of service disruption (Table 9-1-2, AREMA 2022). Under higher magnitude but lower probability (termed “Ground Motion Level 3”) earthquake events, the tracks are permitted to experience severe damage resulting in reconstruction and indefinite disruptions to track service. Ground Motion Levels 2 and 3 are defined as having return periods up to 475 and 2475 years, respectively (Table 9-1-4, AREMA 2022). The seismic hazard referenced in AREMA is the National Building Code (NBC) of Canada. The latest version is NBC 2020, therefore we have referenced the NBC 2020 seismic hazard herein.

We have completed a liquefaction assessment based on the 475 and 2,475 year design earthquakes referred to in NBC 2020. The NBC 2020 utilizes the 6th Generation Seismic Hazard Model of Canada which was considered in our assessment. The 6th generation model incorporates an updated catalogue of earthquakes, ground motion models, seismic activity rates and sources which has generally increased the seismic hazard in comparison to the previous 5th generation model.

Peak ground acceleration on firm ground for the approximate site location is 0.27 and 0.50 g (Natural Resources Canada, Site Coordinates: 49.174° North, 122.931° West) considering the 475 and 2,475 year, respectively, return period design earthquakes per NBC 2020. Based on the sequence of deposits underlying the site, we anticipate significant de-amplification under the 2475 year return period which would reduce surface accelerations to about 0.35 g. No significant de-amplification is anticipated under the 475 year return period event therefore we utilized 0.27 g for the 475 year design case.

Liquefaction and predicted post liquefaction ground movements are presented in Appendix D of this report. The results indicate the channel sequence deposit as described above may be prone to ground liquefaction in the event of the design earthquake.

Liquefaction is expected to contribute to post liquefaction ground settlements on the order of 20 to 150 mm for locations inland and not influenced by liquefaction induced movement near the foreshore. We understand that the new trackwork would be located within 30 m of the foreshore slope crest. Due to the proximity of the slope down to the Fraser River near the proposed improvements, elevated horizontal movements caused by liquefaction are expected. Horizontal movements caused by liquefaction are expected to be on the order of 400 to 500 mm at offsets of 30 m or greater from the slope crest and 700 to 800 mm at 26 m (closest track to foreshore slope crest).

Densification of the channel sand stratum near the foreshore will be required to minimize the potential for the seismically induced movements to the values on the order of those given above. We expect full displacement dry bottom-fed stone columns or Rammed Aggregate Pier (RAP) ground densification to be the most suitable options for mitigation of liquefaction risk. The stone column or RAP elements should extend to a depth of approximately 15 m below existing site grades.

The predicted movements are based on empirical observations from other earthquake sites around the world on relatively flat ground away from the influence of the surrounding structures and should not be taken as exact calculations of movements but rather order of magnitude estimates. Differential settlements should be less than about 50 percent of the total settlements predicted. Our calculations of ground movements are based on Tokimatsu and Seed, 1987 and Youd et al., 2002.

5.3 Slope Stability Analysis

We have completed a slope stability assessment for the proposed distribution hub at the above reference site. The slope stability assessment was completed under static, seismic, and post seismic conditions in accordance with the 475 year return period design earthquakes and the EGBC "Landslide Assessments in BC" (Revised September 2022) guidelines. The 475 year return period was considered to evaluate the anticipated movements in comparison to a "repairable" scenario consistent with AREMA (2022).

Subsurface stratigraphy and soil parameters were evaluated based on our geotechnical site investigation. The provided grading drawings, dated November 2022, from Mott MacDonald were used to create sections through the proposed development and existing slopes. The critical section was determined to be along the natural slope and within the proposed development as shown on Section A.

The stability assessment was carried out using the numerical modelling software GeoStudio Slope/W (2021),

which employs the Morgenstern-Price limit equilibrium method. A wide range of potential slip surfaces were calculated to determine the lowest factor of safety.

The stability analysis was developed by applying a conservative 35 kPa uniformly distributed load to represent the average track loads, with an offset of 9 m from the property line along the Fraser River. Slope stability results for static conditions indicate that the minimum factor of safety for the proposed development exceeds 1.5 under static conditions. According to the EGBC "Landslide Assessments in BC" (Revised September 2022) guidelines, flow slide analysis is required if the factor of safety does not exceed 1.0 under seismic conditions. The factor of safety against flow slide failure, considering the residual strength of the liquified sand, is greater than 1.0. This is contingent on providing a 17 m wide densification zone along the southeast property line adjacent to the Fraser River. The densification zone should extend to a depth of at least 15 m below existing site grades as noted in Section 5.2 above. The densification zone should extend alongside the proposed tracks and any other areas of the site which require post-seismic movements to be limited.

The EGBC guideline requires a probabilistic method of analysis to determine seismic slope displacement from each earthquake source type contributing to the hazard at a specified response spectral acceleration. We used a probabilistic approach to determine seismic slope displacement from each earthquake source types contributing to the hazard at a specified response spectral acceleration. The results indicate that the predicted slope displacements are less than 15 cm under all source of earthquakes under the 475 year return period seismic event, which is determined as the tolerable slope displacement by EGBC's guidelines.

Although the probabilistic seismic slope displacement analysis shows tolerable and relatively small seismic displacements using the method described above, it does not account for post-seismic liquefaction induced ground displacements. The calculated post-seismic liquefaction ground displacements are much larger and will govern the 475 year design earthquake case. Therefore, we recommend that post-liquefaction movements described above be considered by the design team and owner. To mitigate the potential for large-scale movements associated with liquefaction-induced flow slides near the foreshore, we recommend that the densification described above be completed to meet the damage criterion of AREMA (2022) under 475 year return period event. Further densification could be considered if the above-described liquefaction-induced movements are considered intolerable by the design team or owner.

The results of our assessment are detailed in Appendix F.

6.0 PAVEMENT DESIGN

A pavement design was carried out in general accordance with AASHTO's Guide for Design of Pavement Structures (1993) and Asphalt Institute's MS-23 Manual *Thickness Design, Asphalt Pavements for Heavy Wheel Loads.* The following sections outline the design assumptions and parameters used in our design. The subsequent pavement structure thicknesses and material recommendations are provided in Section 7.0.

6.1 Traffic Analysis

Traffic estimates were provided to us to determine the total design Equivalent Single Axle Load (ESAL). Three loading situations were provided for our use, as described below.

> Load #1: Reach stacker with laden loading of 100 t on the front axle (4-wheels) and 18.5 t on the rear axle. Tire contact areas of 981,000 mm^2 and 181,500 mm^2 were provided for the front and rear tires, respectively. Load applications are expected to be 225,000 over the design life.

Load #2: Top-Pick Container Handler with front and rear axle weights of 95 t and 7 t, respectively. A ground contact pressure of 1050 kPa was also provided. Load applications are expected to be 225,000 over the design life.

Load #3: Haul truck with total load applications of 1,319,000 over the design life.

The following summarizes the resulting traffic volume parameters and the resulting Design ESAL used for our design.

Table 1 - Traffic Volume Parameters

Parameter	Load #1	Load #2	Load #3
Load Equivalency Factor (LEF):	22,530	19,289	2 (assumed)
Load Applications	225,000	225,000	1,319,000
Design ESALs:	9,413,000,000		

6.2 Road Design Parameters

The following design parameters were utilized for the determination of the structural number in the flexible pavement equation as outlined in AASHTO's Guide for Design of Pavement Structures (1993), supplemented with recommendations in the BC Ministry of Transportation and Infrastructure Pavement Structure Design Guidelines Jan. 26, 2015.

Table 2 - Road Design Parameters

Reliability, R (%):	95
Initial Design Serviceability, p_0:	4.2
Design Terminal Serviceability, p_t:	2.5
Standard Deviation, S_0:	0.45

6.3 Subgrade Evaluation

Based on our test hole investigation and assuming site grades will generally remain unchanged, we expect the subgrade conditions will consist of compact to dense medium grained sand with trace gravel. We also anticipate fractured base and subbase sand and gravels will be present underlying the asphalt stratum. Subgrade strength of the compact to dense sand was estimated by correlating DCPT values from our investigation to a CBR value and, subsequently, to a Resilient Modulus (M_R) value for use in our pavement design. An *effective* resilient modulus was also estimated for the surficial base course material to determine the asphalt thickness, in accordance with Asphalt Institute's MS-23 manual. Design M_R values are summarized below.

Table 3 – Design Resilient Modulus Values

Strata	CBR	Resilient Modulus (MPa)
Base Course (19 mm Road Base)	50	215
Subgrade (Medium Grained Sand)	15	100
Subgrade (Firm to Stiff Silt)	6	55

7.0 RECOMMENDATIONS

7.1 Site Preparation

All organic materials, fills, loose soils, or otherwise deleterious material is to be removed from site prior to construction of foundation elements, to expose a subgrade of compact sand fill.

Should any grade reinstatement or general site grading be required, we recommend the use of engineered fill. For the context of this report, engineered fill is generally defined as clean sand to sand and gravel that contains less than 5% by weight of particles smaller than 75µm in diameter (silts and clays). All engineered fill should be compacted in 300 mm loose lifts to a minimum of 95% of the Modified Proctor Dry Density (ASTM D1557) at a moisture tent that is within 2% of the optimum compaction.

Placement and compaction of Engineered Fill must be reviewed by the geotechnical engineer.

7.2 Pavement Structure Thicknesses

Table 4 below outlines our minimum pavement structure thicknesses. Structural layer coefficients of 0.44, 0.14, and 0.13 were used for asphalt concrete, granular base, and granular sub-base respectively. A drainage coefficient of 0.95 was used for both base and sub-base materials. Based on our test hole logs, we have assumed a minimum sand fill thickness of 1.2 m will underlay the below pavement structure.

Table 4 - Pavement Structure Thicknesses

Thickness (mm)		
Asphalt	**Granular Base Course**	**Granular Subbase Course**
300	375	400

Granular base material shall consist of 19 mm minus crushed gravel, free from any organics, foreign matter, or deleterious substances. The gravel shall be durable, uniform in quality, and 100% of the gravel shall have at least one fractured face. The aggregate shall conform to the gradation curve given in MMCD Platinum Edition Section 31 05 17 2.10.1 Granular Base and shall have a minimum soaked CBR (ASTM D1883) of 80 at 95% Modified Proctor Dry Density (MPDD).

Granular subbase material shall consist of 75 mm minus crushed gravel, free from any organics, foreign matter, or deleterious substances. The gravel shall be durable, uniform in quality, and 100% of the gravel shall have at least one fractured face. The aggregate shall conform to the gradation curve given in MMCD Platinum Edition Section 31 05 17 2.9 Crushed Granular Sub-base and shall have a minimum soaked CBR (ASTM D1883) of 80 at 95% MPDD.

Asphalt pavement shall be provided and placed in accordance with MMCD specifications. Asphalt mix designs and trial mixes shall be submitted to GeoPacific Consultants for review at least 2 weeks prior to paving. The following asphalt mixes and thicknesses are recommended.

Table 5 – Asphalt Mix Types

Asphalt Layer	Specification	Thickness (mm)
Layer 1 (Surface)	MMCD 12.5 mm Superpave	55
Layer 2	MMCD 19 mm Superpave	120
Layer 3 (Base)	MMCD 25 mm Superpave	125

7.3 Densification

As noted in Section 5.2, densification of the channel sand stratum near the foreshore will be required to limit the seismically induced movements considering the design earthquake. We expect full displacement dry bottom-fed stone columns or Rammed Aggregate Pier (RAP) ground densification to be the most suitable options for mitigation of liquefaction risk. The stone column or RAP elements should extend to a depth of approximately 15 m below existing site grades.

The densification work will be required to meet a performance-based specification. On-site testing will be completed during densification to confirm that the density specification is being achieved.

From a geotechnical perspective, a number of densification options are feasible for this purpose, including rammed aggregate piers (RAP) or bottom feed stone columns. Standard stone columns are not be preferred due to the quantity of silty waste water produced by vibration and water injection, and this technique does not result in full displacement columns. RAP and bottom feed stone columns use air injection or tamping to advance the columns/piers, therefore limiting the need for containment.

It will be the contractor's responsibility to determine the appropriate densification pattern to achieve the densification specification. However, based on our past experience we expect that the following densification patterns to be suitable:

- 600mm diameter RAPs at 2.4 m triangular spacing
- 900mm diameter bottom feed stone columns at 3.0 m triangular spacing.

The densification zone should extend at least 17 m beyond any areas intended to be protected against flow slide under the design earthquake.

7.4 New Rail Structures

We understand that a new rail system (designed by others) will be constructed as part of the project. Assuming train loading of 90 kPa and minimal to no grade changes, we recommend a minimum of 450 mm of MMCD Crushed Granular Subbase be placed underlying proposed sub-ballast material. Prior to sub-ballast placement, we recommend that the subgrade be proof-rolled to locate any soft/loose zones. Any weak zones detected should be excavated and replaced with MMCD Crushed Granular Subbase material. We expect post-construction settlements will be within 25 to 50 m, assuming that no substantial grade changes are made along or near proposed rail structures. We recommend the grading plan be provided to GeoPacific for review in advance of construction.

7.5 Temporary Excavations

We expect that excavations will be relatively shallow for the track works. Any excavations exceeding 1.2 m in depth require review by a Professional Engineer prior to worker-entry, in accordance with WorkSafe BC requirements.

8.0 FIELD REVIEWS

GeoPacific Consultants Ltd. must carry out sufficient field reviews during construction to ensure that the geotechnical design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way effect the contractor's obligations to perform under the terms of his/her contract.

It is the contractors' responsibility to advise GeoPacific Consultants Ltd. (a minimum of 48 hours in advance) that a field review is required. Geotechnical field reviews are normally required at the time of the following:

1. Stripping/Clearing:	Review of clearing and removal of existing structures on site
2. Proof Rolling:	Review proof rolling in track and parking lot areas
3. Compaction:	Review of compaction of engineered fill placed for grading purposes
4. Subgrade:	Review of subgrade preparation for footings and pavement structures
5. Pavement Structure:	Review of pavement structure materials and compaction
6. Excavations:	Review of excavations exceeding 1.2 metres in depth requiring person entry
7. Densification:	Full time review of ground improvement

It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site review this document in advance of any work being carried out so that they become familiarised with the sensitive aspects of the works proposed. It is the responsibility of the developer to notify GeoPacific Consultants Ltd. when conditions or situations not outlined within this document are encountered.

9.0 CLOSURE

This report has been prepared exclusively for TDK Metro Terminals for the purpose of providing geotechnical recommendations for the design and construction of the proposed buildings and related earthworks and for the Port of Vancouver for planning and permitting purposes. The report remains the property of GeoPacific Consultants Ltd. and unauthorized use of, or duplication of, this report is prohibited.

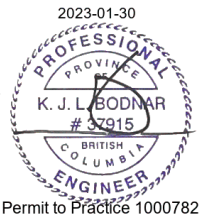
We are pleased to assist you with this project and we trust this information is helpful and sufficient for your purposes at this time. However, please do not hesitate to call the undersigned if you should require any clarification or additional details.

For:
GeoPacific Consultants Ltd.

Alireza Ansari, B.Sc. M.A.Sc., EIT
Geotechnical Engineer in Training

Steve Hasegawa, B.Sc., P.Geo.
Geoscientist

Reviewed by:



Permit to Practice 1000782

Kevin Bodnar, M.Eng., P.Eng., P.E.
Principal

LEGEND:

- SCPT#-# – SEISMIC CONE PENETRATION TEST (SCPT) LOCATION
- CPT#-# – CONE PENETRATION TEST (CPT) LOCATION
- TH#-# – TEST HOLE (TH) LOCATION

SITE PLAN

*TEST LOCATIONS ARE APPROXIMATE

REFERENCE:

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY
1779 West 75th Ave.
Vancouver, B.C. V6P 6P2
P 604.439.0922
F 604.439.9189

DATE:		
03-Mar-2022		
DRAWN BY:	APPROVED BY:	REVIEWED BY:
BE	SH	SH
SCALE:		
AS SHOWN		

LONGO DEVELOPMENT CORP.

410/ 420 AUDLEY BLVD, DELTA BC

TEST HOLE SITE PLAN

FILE NO.: 20766

DWG. NO.: 20766-01

REVISIONS:
A.
B.
C.

ORIGINAL PAPER SIZE 8.5"x11"

LEGEND:

- SCPT#-# – SEISMIC CONE PENETRATION TEST (SCPT) LOCATION
- CPT#-# – CONE PENETRATION TEST (CPT) LOCATION
- TH#-# – TEST HOLE (TH) LOCATION

SITE PLAN

*TEST LOCATIONS ARE APPROXIMATE

REFERENCE:

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY
1779 West 75th Ave.
Vancouver, B.C. V6P 6P2
P 604.439.0922
F 604.439.9189

DATE:	05/06-Oct-2022	
DRAWN BY: SH	APPROVED BY:	REVIEWED BY:
SCALE: AS SHOWN		

NEW DISTRIBUTION HUB

480 AUDLEY DRIVE, DELTA, BC

TEST HOLE SITE PLAN

FILE NO.: 21920

DWG. NO.: 21920-01

REVISIONS:
A.
B.
C.

ORIGINAL PAPER SIZE 8.5"x11"

APPENDIX A - TEST HOLE LOGS

Test Hole Log: TH22-01 (CPT22-01)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE							
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		SAND and GRAVEL (fill) Tan, moist sand and gravel FILL; loose	0.0				
		SAND Tan, homogeneous, medium-grained SAND with trace granules; moist	0.6	8.0			
		SILTY CLAY Mottled tan and grey, stiff SILTY CLAY; moist and with patches of oxidation	1.4	33.9			
		SILTY SAND Grey, compact silty SAND; wet, homogeneous	3.0	26.1			
		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.01

Test Hole Log: TH22-02 (CPT22-02)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0 / 0		Ground Surface					
		SAND Tan, compact, medium-grained SAND with trace granules; moist, homogeneous	0.0	8.9			
10 / 3		***SILTY CLAY*** Mottled pale green and grey, firm SILTY CLAY; moist to mostly dry, homogeneous	2.7	30.9			
13 / 4		***SILTY SAND*** Grey, fine-grained silty SAND, wet, compact	3.7	25.6			
19 / 6		coarsens downhole to medium-grained					
		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.02

Test Hole Log: TH22-03 (CPT22-03)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
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INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0 / 0		Ground Surface					
0–3 / 0–1		***SAND*** Tan, homogeneous, medium-grained SAND with trace granules; moist	0.0	8.6			Significantly harder 1" thick bed of "till fill" present, distinct light grey colour
3–10 / 1–3		***SILTY CLAY*** Mottled, firm to stiff SILTY CLAY with trace organics; moist	1.5	34.8			
10–20 / 3–6		***SAND*** Tan, fine- to medium-grained SAND, wet, compact; patches of oxidation observed	3.0	27.7			
20 / 6		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.03

Test Hole Log: TH22-04 (CPT22-04)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
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INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0 / 0		Ground Surface					
0–3 / 0–1		***SAND*** Tan, homogeneous, medium-grained SAND with trace granules; moist	0.0	4.5			
3–10 / 1–3		***SILTY CLAY*** Brown to grey, moderately firm SILTY CLAY with interbedded coarse sand (light grey); wet	1.2	39.1			
10–20 / 3–6		***SILTY SAND*** Grey, fine-grained silty SAND, wet, compact; features some interbedded silty clay	3.0	27.2			
20 / 6		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.04

Test Hole Log: TH22-05 (CPT22-05)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

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1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		SAND Tan, homogeneous, medium-grained SAND with trace granules; moist	0.0	6.0			
7 / 2		***SAND*** Grey, compact, coarse-grained SAND; wet	2.1	29.2			
		SILTY CLAY Mottled tan and grey, stiff SILTY CLAY; moist		31.3			
15 / 5		***SAND*** Tan, compact, medium- to fine-grained SAND; wetTan, compact, medium- to fine-grained SAND; wetTan, compact, medium- to fine-grained SAND; wet	4.6				
20 / 6		End of Borehole	6.1				
25 / 7							

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.05

Test Hole Log: TH22-06 (CPT22-06)

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

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INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***SAND*** Tan to grey, homogeneous, medium-grained SAND with trace granules; moist	0.0	6.6			
10 / 3		***SILTY CLAY*** Tan to grey, mottled, moist stiff SILTY CLAY with interbedded with medium sand	3.0	28.2			
12 / 4		***SAND*** Tan, compact, wet, medium- to fine-grained SAND; trace silt	3.7				
20 / 6		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.06

Test Hole Log: TH22-07

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

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INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		SAND Tan to grey, compact coarse-grained SAND, moist	0.0				
		grades into underlying unit		8.8			
		SILTY SAND Grey, fine-grained silty SAND, wet, compact	1.4				
		SILTY CLAY Tan and grey, stiff, mottled SILTY CLAY; wet, variably soft		35.7			
		SAND Grey, compact, fine-grained SAND; wet	3.0				
		Becomes coarse-grained at ~ 5.8m		28.9			
		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.07

Test Hole Log: TH22-08

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

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INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0 / 0		Ground Surface					
		SAND Tan, homogeneous, medium-grained SAND with trace granules; moist	0.0	8.0			
3 / 1		***SILTY CLAY*** Tan to grey, mottled, firm to stiff SILTY CLAY; variably soft	1.7	31.9			Silty clay becomes soft where water table is introduced @ 3.0 m
10 / 3		***SAND*** Grey, compact, fine-grained SAND; wet	3.4				
13 / 4		Coarsens downhole		29.4			
16 / 5							
20 / 6		End of Borehole	6.1				
23 / 7							

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.08

Test Hole Log: TH22-09

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Site Location: 410/420 Audley Blvd, Delta BC

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INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 10 20 30 40	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		SAND Tan, homogeneous, medium-grained SAND with trace granules; moist	0.0				
		SILTY CLAY Brown to grey, mottled, stiff SILTY CLAY with some organics; wet	0.3	24.3			
		SILTY SAND Tan, fine-grained silty SAND, wet, compact; trace organics	1.5	37.5			
		SILTY CLAY Grey, moderately firm SILTY CLAY; wet, homogeneous	3.0				
		SAND Tan to grey, compact, medium-grained SAND; wet	3.4	28.7			
20 / 6		End of Borehole	6.1				

Logged: BE
Method: Solid stem auger
Date: 2022-03-03

Datum: Ground elevation
Figure Number: A.09

Test Hole Log: TH22-01 (SCPT22-01)

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

Depth (ft)	Depth (m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0	0		Ground Surface					
0	0		***Sand and Gravel [Fill]*** dense SAND and GRAVEL, road base fill	0.0				
3	1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist grey at 2.4m		4.9			
9	3		***Silt*** firm to stiff SILT, trace wood fragments, brown at upper contact becoming grey at depth, wet	2.7	62.3 31.5			
12	4		***Sand*** compact SAND, some silt, medium grained, grey to darkgrey, wet	3.7	29.9		▼	5.0m water table depth based on CPT pore water pressure analysis
20	6		End of Borehole	6.1				

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.01

Test Hole Log: TH22-02 (CPT22-02)

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

Depth (ft)	Depth (m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0	0		Ground Surface					
0	0		***Sand and Gravel [Fill]*** dense SAND and GRAVEL, road base fill	0.0				
3	1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist		3.2			
9	3		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.7	48.2			
12	4		***Sand*** compact SAND, some silt, medium grained, grey to darkgrey, wet	3.7				
16	5				26.0		▼	5.0m water table depth based on CPT pore water pressure analysis
20	6		End of Borehole	6.1				
23	7							
26	8							
29	9							
32								

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.02

Test Hole Log: TH22-03

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Depth (ft / m)	Symbol	INFERRED PROFILE — SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.0				
		Sand and Gravel [Fill] compact to dense SAND and GRAVEL, medium grained sand, gravel >5mm, light grey, slightly moist		2.0			
1 / 2		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	1.5				
			2.3				
3		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet		34.6			
			3.4			▼	3.6m observed water table depth
4		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet		38.2			
5							
6				25.3			
		End of Borehole	6.1				
7							
8							
9							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.03

Test Hole Log: TH22-04

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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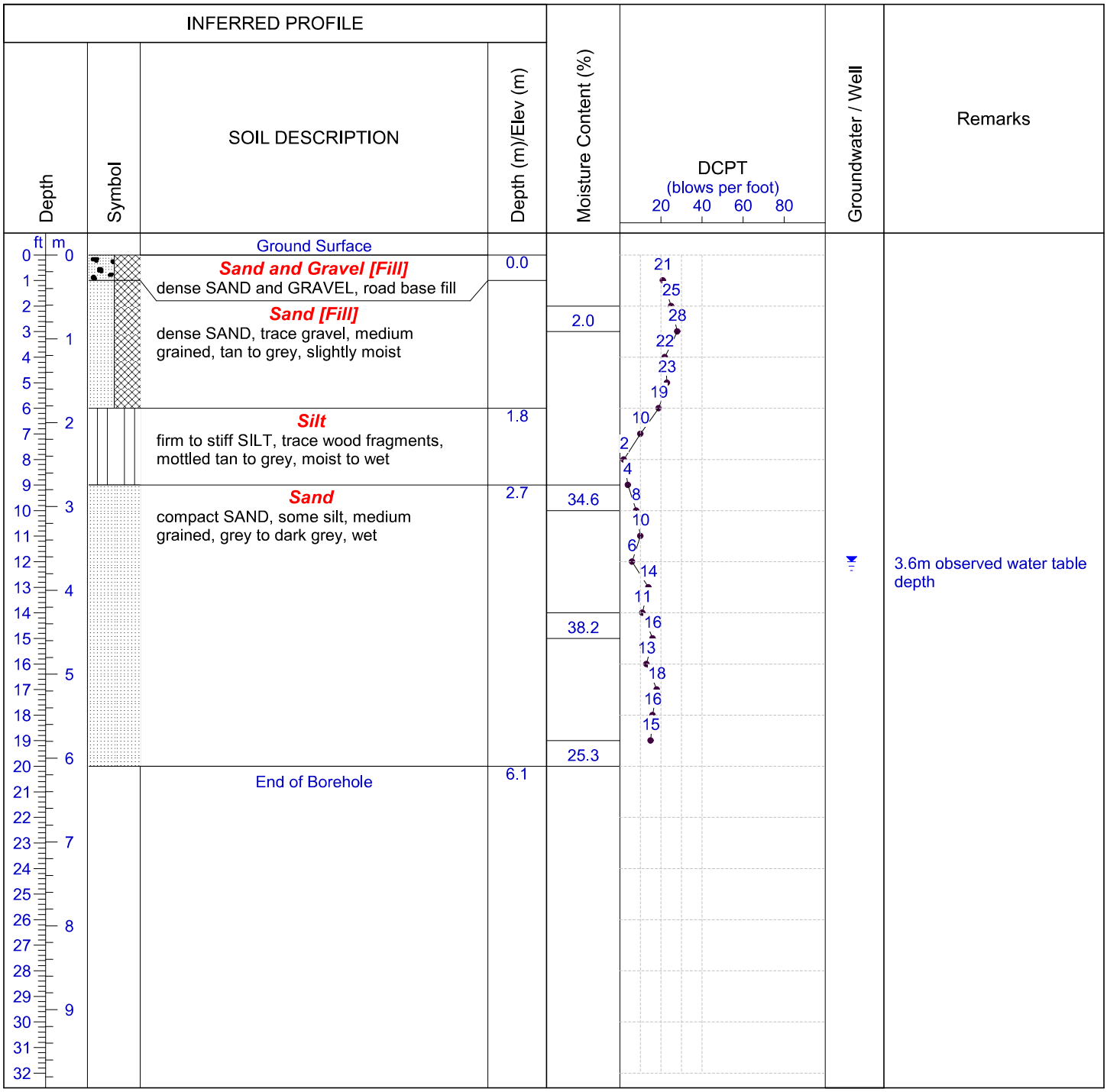
Tel: 604-439-0922 Fax:604-439-9189



Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.04

Test Hole Log: TH22-05

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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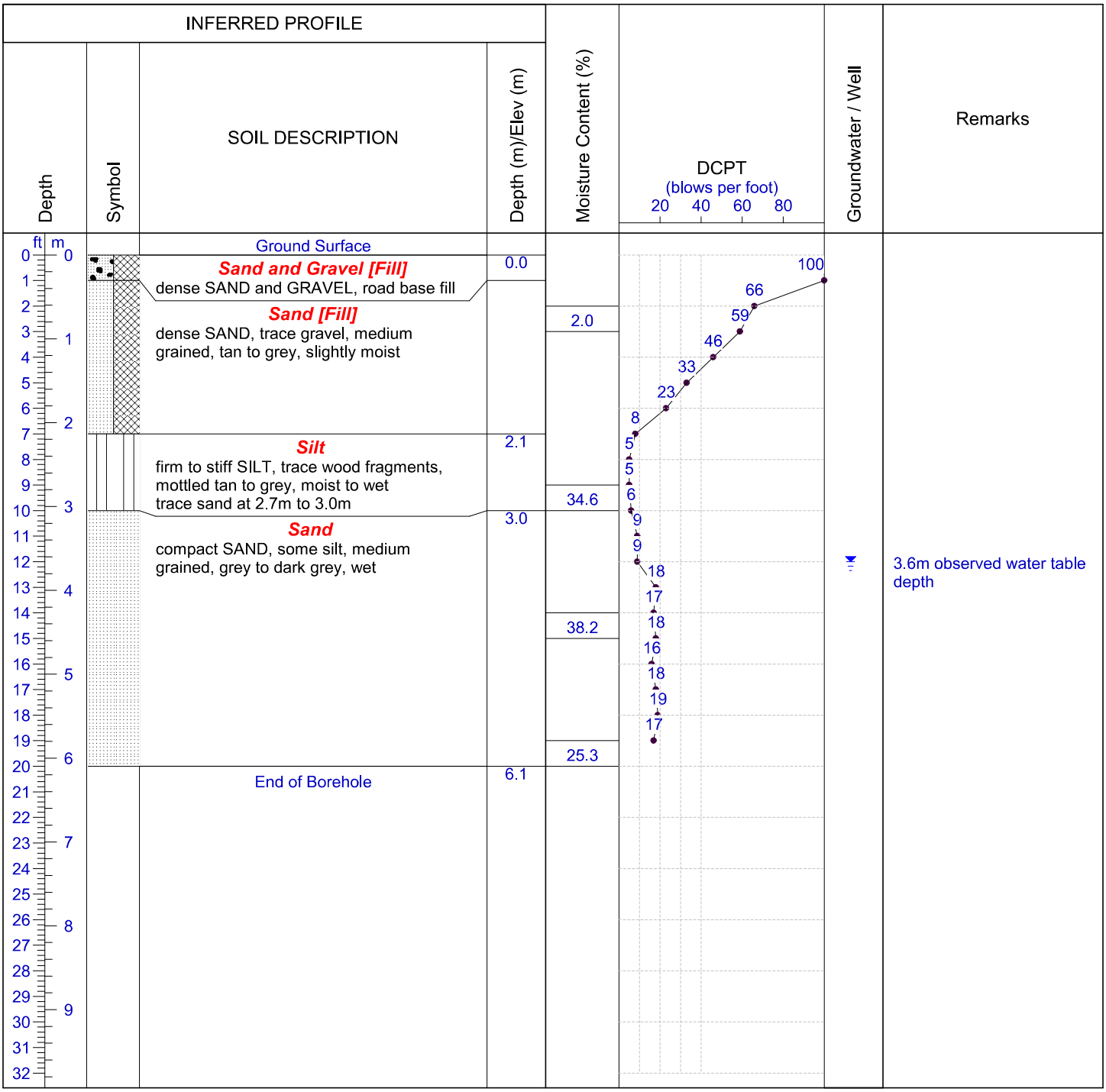

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.05

Test Hole Log: TH22-06

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***Sand and Gravel [Fill]*** dense SAND and GRAVEL, road base fill	0.0				
1 / 0		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist					
2 / 1		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet trace sand at 2.7m to 3.0m	2.0	40.7			
3 / 1		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.0	29.5		▼	3.4m observed water table depth
6 / 2		End of Borehole	6.1				

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.06

Test Hole Log: TH22-07

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)
0 / 0		Ground Surface	
0 / 0		***Sand and Gravel [Fill]*** dense SAND and GRAVEL, road base fill	0.0
1 / 0 – 2 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	
8 / 2.4		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet trace sand at 2.7m to 3.0m	2.4
12 / 3.7		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.7
20 / 6.1		End of Borehole	6.1

Moisture Content (%): 38.0; 29.7

DCPT (blows per foot) 20 40 60 80: 100, 58, >100, >100, 68, 57, 43, 36, 24, 8, 7, 8, 16, 18, 21, 24, 23, 29, 21

Groundwater / Well: 2.4m observed water table depth

Remarks

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-05

Datum: Ground Elevaton
Figure Number: A.07

Test Hole Log: TH22-08

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill					
3 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist to dry		5.9			
7 / 2		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet trace sand at 2.7m to 3.0m	2.1	32.4		▼	2.7m observed water table depth
10 / 3		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.2	26.6			
13 / 4							
20 / 6		End of Borehole	6.1				
23 / 7							
26 / 8							
29 / 9							
32							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.08

Test Hole Log: TH22-09

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill					
1 / 2		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist			22, 33, 31, 15, 9, 13, 9, 9, 10, 4, 6, 12, 12, 14, 14, 14, 12, 14, 12		
3		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.4	31.6		▼	2.4m observed water table depth
4		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.4	26.3			
6		End of Borehole	6.1				

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.09

Test Hole Log: TH22-10

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.5				
1 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist		4.9			
2 / 2						▼	2.1m observed water table depth
		Silt firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.3	34.9			
3 / 3		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.0				
4 / 4							
5 / 5							
6 / 6				25.9			
		End of Borehole	6.1				
7 / 7							
8 / 8							
9 / 9							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.10

Test Hole Log: TH22-11

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.5				
3 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	1.2				
		Silt firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet		28.2		▼	2.1m observed water table depth
10 / 3		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.0	34.2			
20 / 6		End of Borehole	6.1				
32 / 9							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.11

Test Hole Log: TH22-12

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)
0 / 0		Ground Surface	
		Asphalt [76mm]	0.0
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.5
3 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	1.2
7 / 2		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.4
10 / 3		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	
20 / 6		End of Borehole	6.1

Moisture Content (%): 29.3, 32.4, 28.0

DCPT (blows per foot) 20 40 60 80: 26, 68, 52, 44, 21, 10, 10, 7, 9, 11, 8, 11, 8, 7, 9, 9, 16, 16, 14

Groundwater / Well: ▼

Remarks: 2.4m observed water table depth

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.12

Test Hole Log: TH22-13

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.5				
3 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	1.2	35.0			
7 / 2		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.4	34.2		▼	2.4m observed water table depth
10 / 3		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet					
16 / 5				28.1			
20 / 6		End of Borehole	6.1				
32 / 9							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.13

Test Hole Log: TH22-14

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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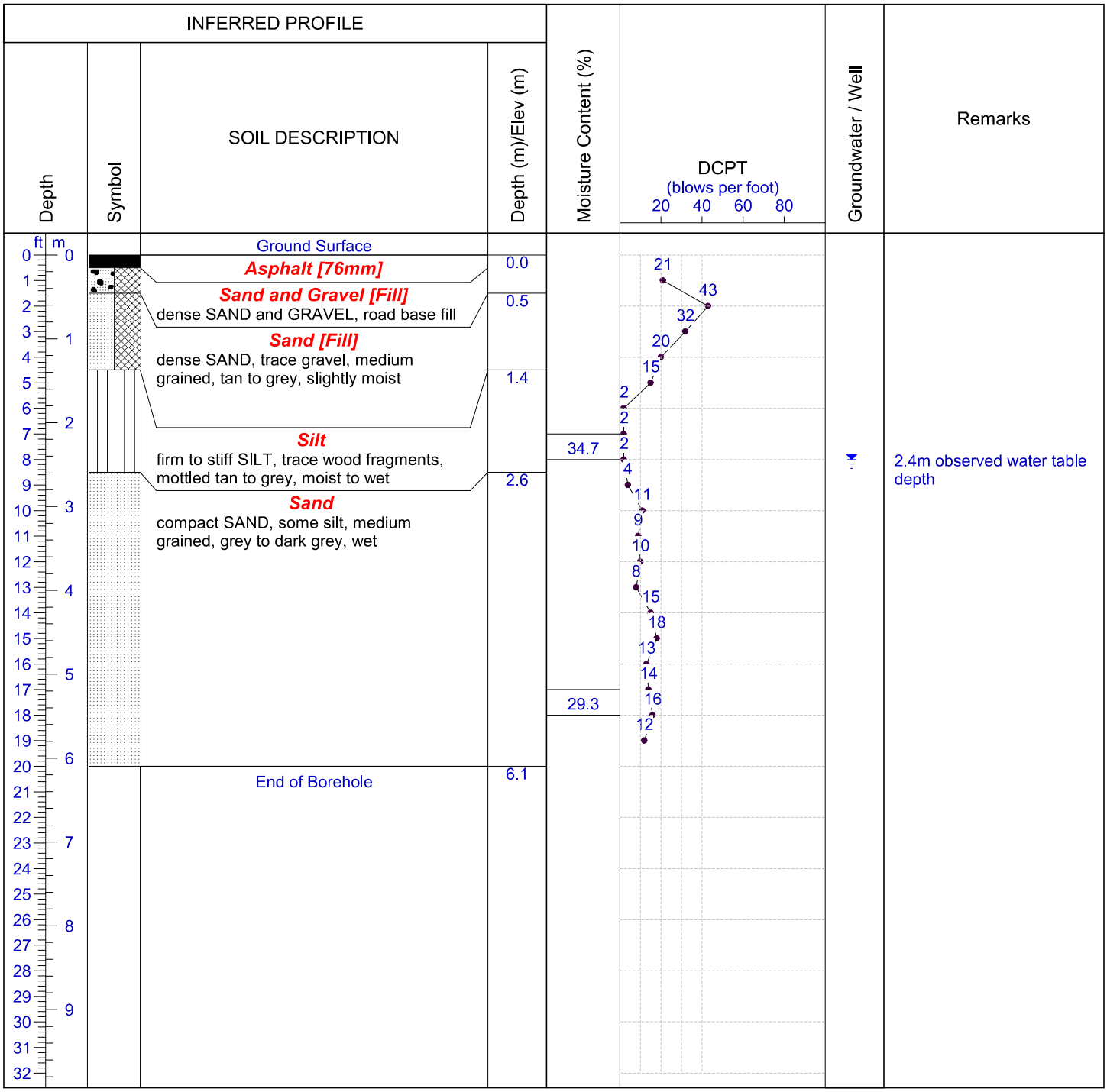

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.14
Page: 1 of 1

Test Hole Log: TH22-15

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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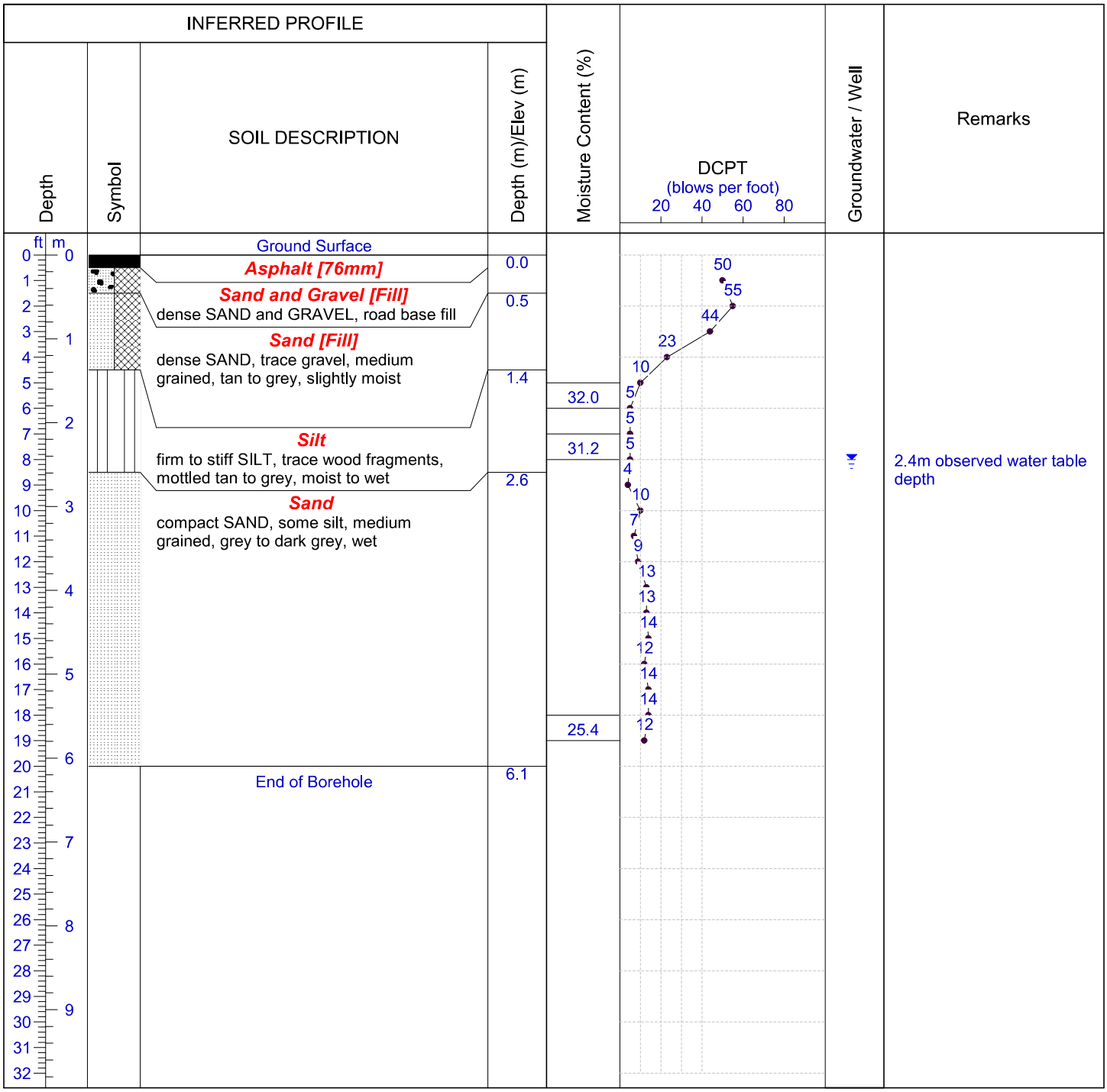

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.15

Test Hole Log: TH22-16

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

GEOPACIFIC CONSULTANTS
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Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)
0 / 0		Ground Surface	
0 / 0		***Sand and Gravel [Fill]*** dense SAND and GRAVEL, road base fill	0.0
1 / 0		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist	0.5
8 / 2.4		***Silt*** firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.4
13 / 4		***Sand*** compact SAND, some silt, medium grained, grey to dark grey, wet	3.7
20 / 6.1		End of Borehole	6.1

Moisture Content (%): 3.0, 32.6, 29.5

DCPT (blows per foot) 20 40 60 80: 27, 42, 45, 38, 34, 21, 11, 9, 6, 5, 6, 8, 11, 6, 14, 13, 15, 14, 15

Groundwater / Well: ▼ 2.4m observed water table depth

Remarks

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.16

Test Hole Log: TH22-17

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Site Location: 480 AUDLEY DRIVE, DELTA

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1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot) 20 40 60 80	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		Asphalt [76mm]	0.0				
		Sand and Gravel [Fill] dense SAND and GRAVEL, road base fill	0.5				
1 / 1		***Sand [Fill]*** dense SAND, trace gravel, medium grained, tan to grey, slightly moist					
2 / 2							
		Silt firm to stiff SILT, trace wood fragments, mottled tan to grey, moist to wet	2.3	32.5		▼	2.4m observed water table depth
3 / 3				29.9			
		Sand compact SAND, some silt, medium grained, grey to dark grey, wet	3.7				
4 / 4							
5 / 5							
6 / 6							
		End of Borehole	6.1				
7 / 7							
8 / 8							
9 / 9							

Logged: SH
Method: Solid Stem Auger
Date: 2022-10-06

Datum: Ground Elevaton
Figure Number: A.17

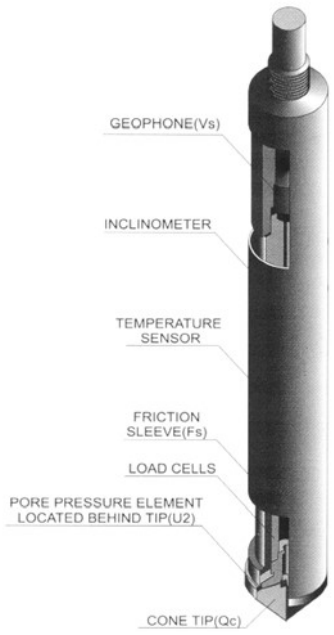
APPENDIX B - ELECTRONIC CONE PENETRATION RESULTS

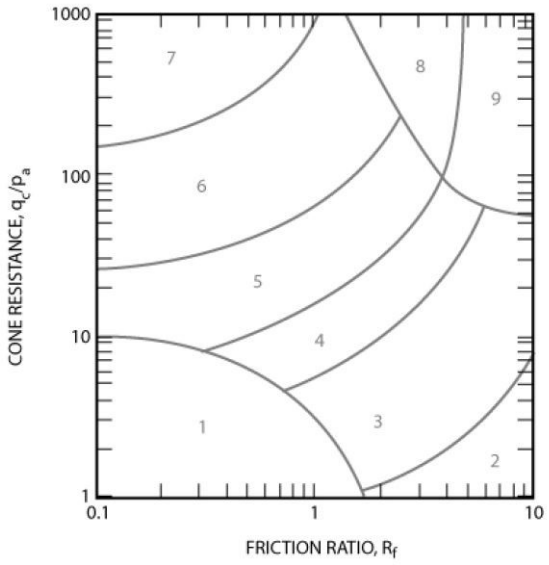
The system used is owned and operated by GeoPacific and employs a 35.7 mm diameter cone that records tip resistance, sleeve friction, dynamic pore pressure, inclination and temperature at 5 cm intervals on a digital computer system. The system is a Hogentogler electronic cone system and the cone used was a 10 ton cone with pore pressure element located behind the tip and in front of the sleeve as shown on the adjacent figure.

In addition to the capabilities described above, the cone can be stopped at specified depths and dissipation tests carried out. These dissipation tests can be used to determine the groundwater pressures at the specified depth. This is very useful for identifying artesian pressures within specific layers below the ground surface.

Interpretation of the cone penetration test results are carried out by computer using the interpretation chart presented below by Robertson[1]. Raw data collected by the field computer includes tip resistance, sleeve friction and pore pressure. The tip resistance is corrected for water pressure and the friction ratio is calculated as the ratio of the sleeve friction on the side of the cone to the corrected tip resistance expressed as a percent. These two parameters are used to determine the soil behaviour type as shown in the chart below. The interpreted soil type may be different from other classification systems such as the Unified Soil Classification that is based upon grain size and plasticity.

Electronic Cone Penetrometer



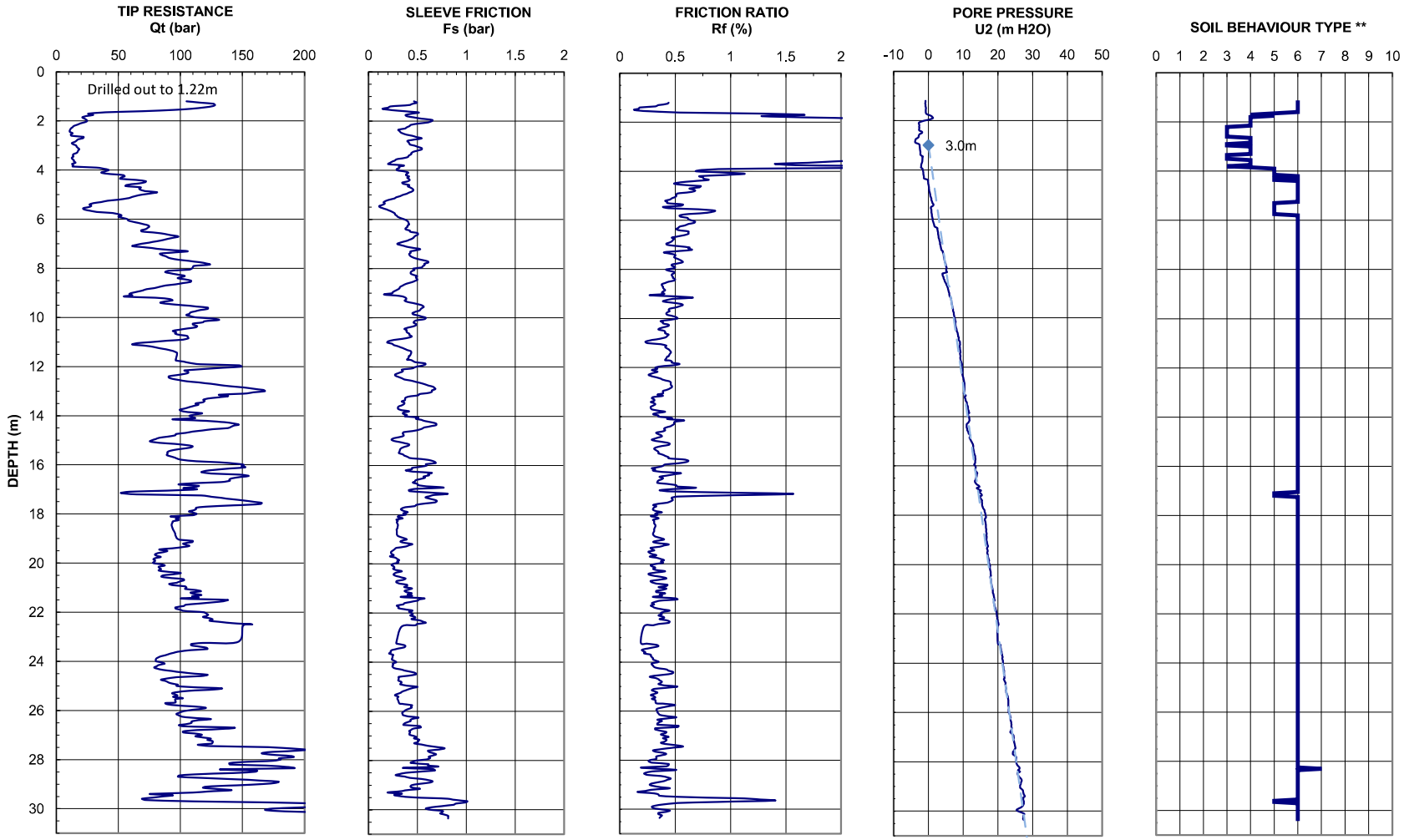


Zone	*Soil Behavior Type*
1	*Sensitive, fine grained*
2	*Organic soils - clay*
3	*Clay – silty clay to clay*
4	*Silt mixtures – clayey silt to silty clay*
5	*Sand mixtures – silty sand to sandy silt*
6	*Sands – clean sand to silty sand*
7	*Gravelly sand to dense sand*
8	*Very stiff sand to clayey sand**
9	*Very stiff fine grained**

** Heavily overconsolidated or cemented*

[1] Robertson, P.K., 2010, "Soil behaviour type from the CPT: an update.", 2nd *International Symposium on Cone Penetration Testing,* CPT'10, Huntington Beach, CA, USA.

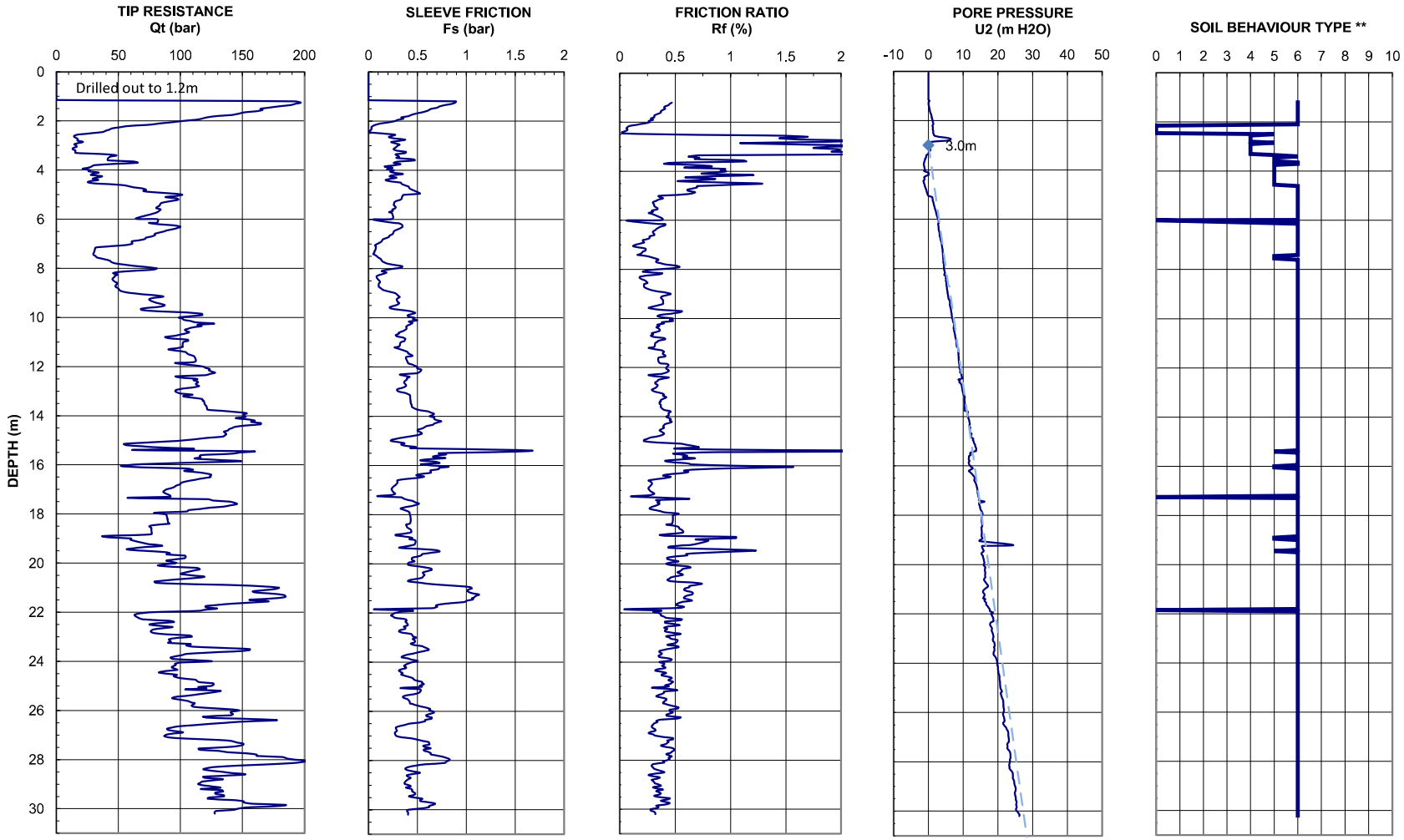
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-01	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.01



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

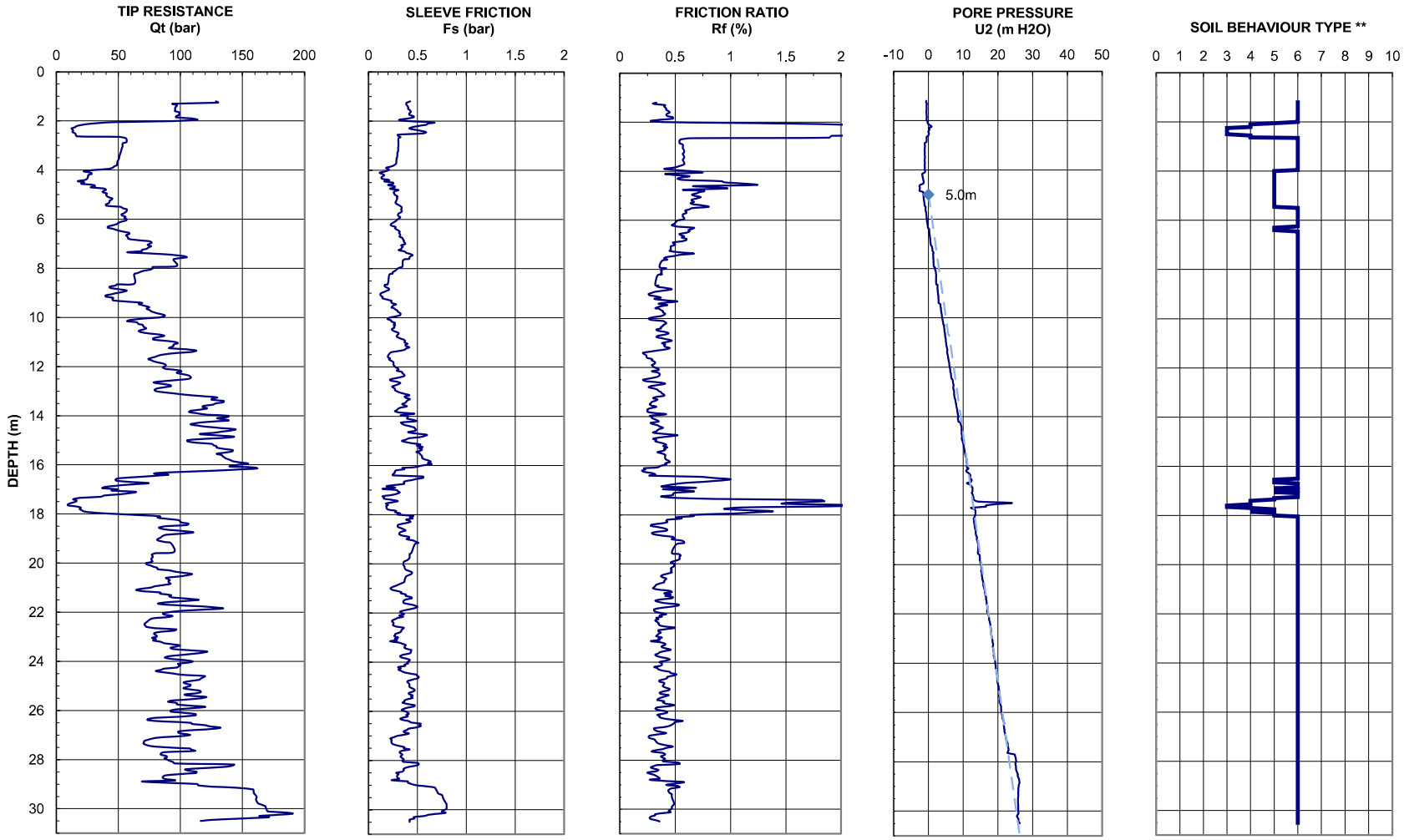
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-02	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.02



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

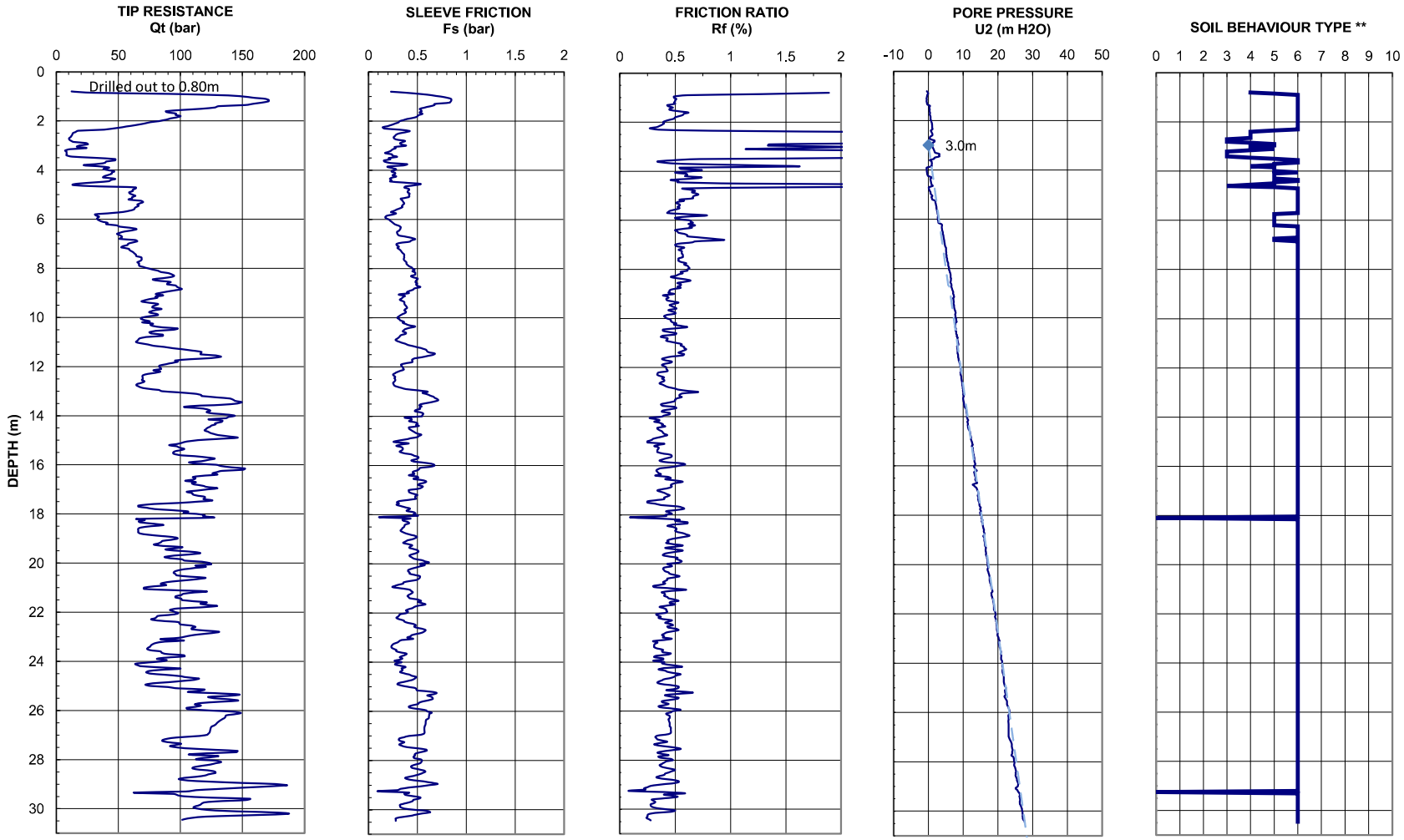
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-03	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.03



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

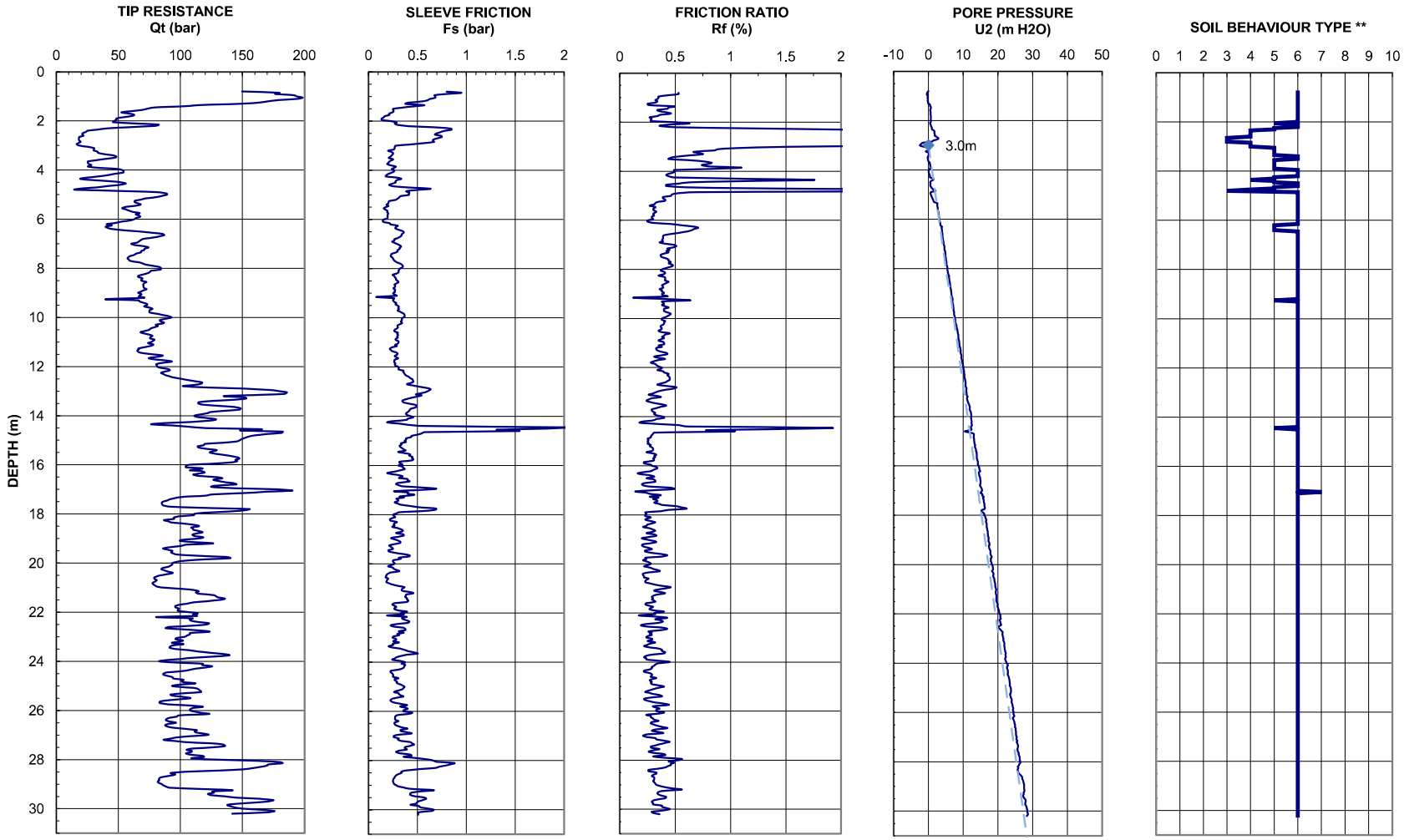
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-04	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.04



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

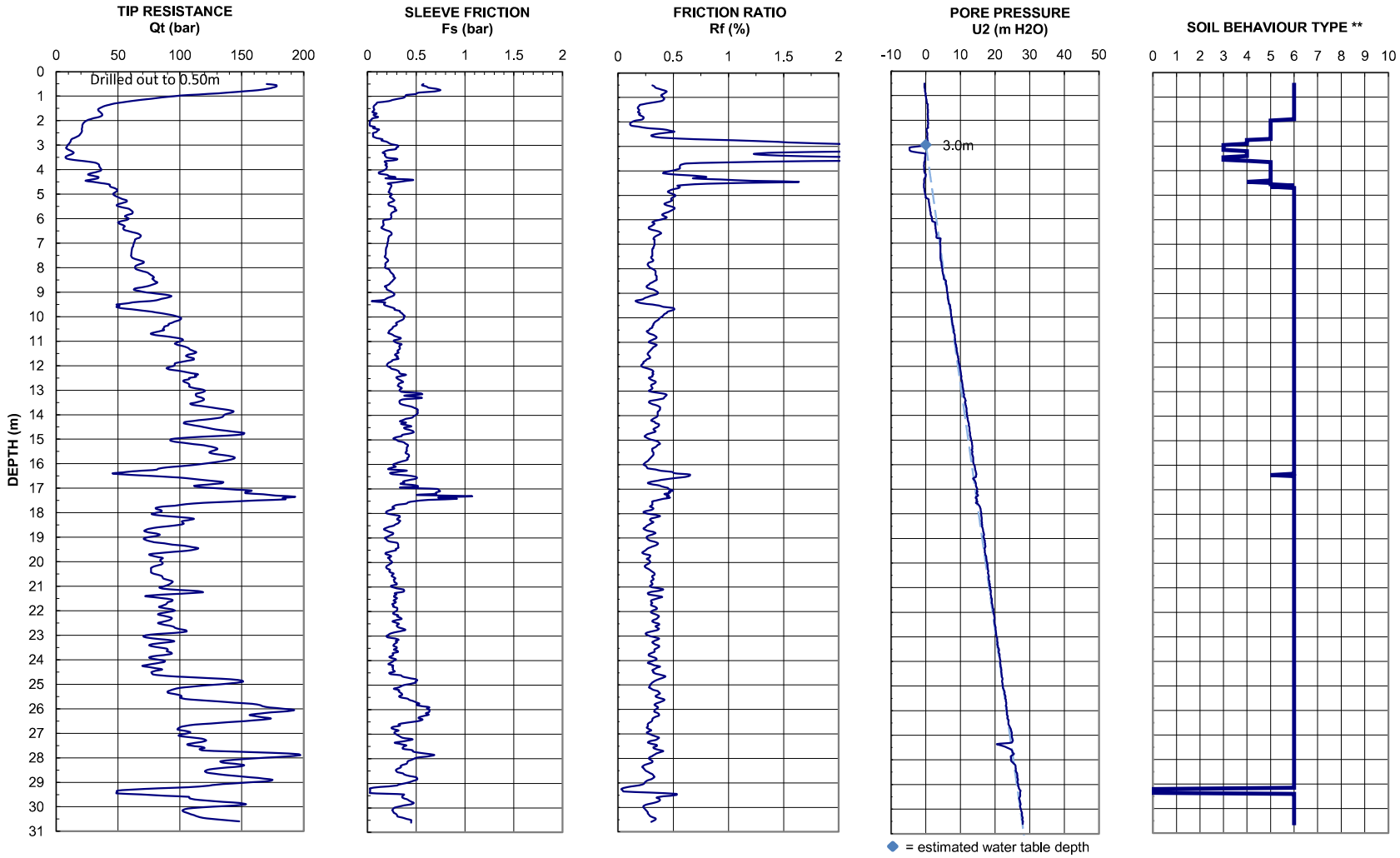
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-05	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.05



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

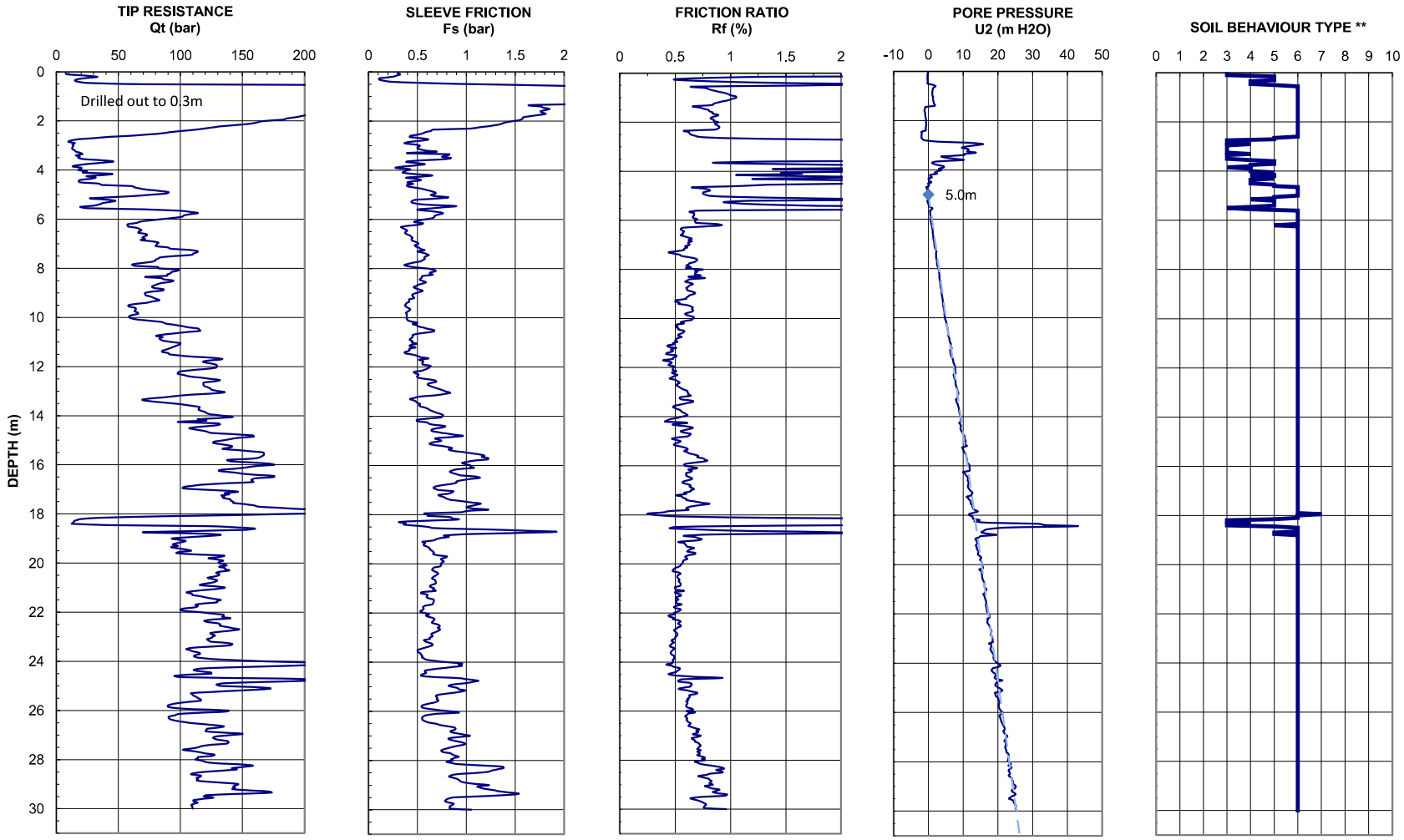
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-06	410/420 AUDLEY BOULEVARD, DELTA	Figure: B.06



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

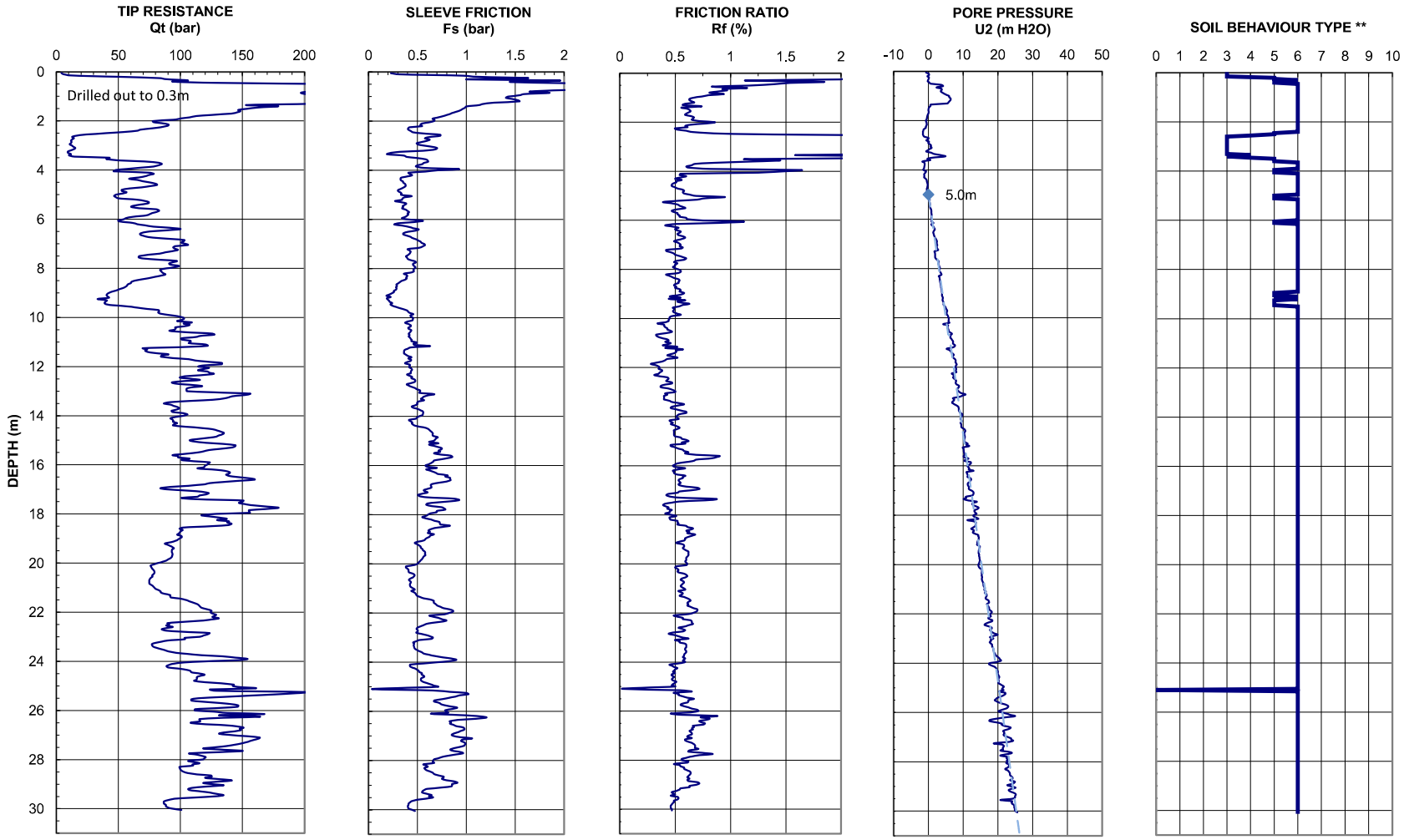
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-01	480 AUDLEY DRIVE, DELTA	Figure: B.01



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-02	480 AUDLEY DRIVE, DELTA	Figure: B.02



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

APPENDIX C - INTERPRETED PARAMETERS

The following charts plot the Standard Penetration Test (SPT) values and the undrained strength of fine grained soils based upon generally accepted correlations. The methods of correlation are presented below.

STANDARD PENETRATION TEST CORRELATION

The Standard Penetration Test $N_{1(60)}$ value is related to the cone tip resistance through a Qc/N ratio that depends upon the mean grain size of the soil particles. The soil type is determined from the interpretation described in Appendix B and the data of Table C.1 below is used to calculate the value of $N_{(60)}$.

Table C.1. Tablulated $Qc/N_{1(60)}$ Ratios for Interpreted Soil Types

Soil Type	Qc/N Ratio
Organic soil - Peat	1.0
Sensitive Fine Grained	2.0
Clay	1.0
Silty Clay to Clay	1.5
Clayey Silt to Silty Clay	2.0
Silt	2.5
Silty Sand to Sandy Silt	3.0
Clean Sand to Silty Sand	4.0
Clean Sand	5.0
Gravelly Sand to Sand	6.0
Very Stiff Fine Grained	1.0
Sand to Clayey Sand	2.0

The $Qc/N_{1(60)}$ ratio is based upon the published work of Robertson (1985)[2]. The values of N are corrected for overburden pressure in accordance with the correction suggested by Liao and Whitman using a factor of 0.5. Where the correction is of the form:

$$N_1 = \sigma^{0.5} * N$$

All calculations are carried out by computer using the software program CPTint.exe developed by UBC Civil Engineering Department. The results of the interpretation are presented on the following Figures.

UNDRAINED SHEAR STRENGTH CORRELATION

It is generally accepted that there is a correlation between undrained shear strength of clay and the tip resistance as

$$S_u = \frac{(q_c - \sigma_v)}{N_k}$$

determined from the cone penetration testing. Generally the correlation is of the form:

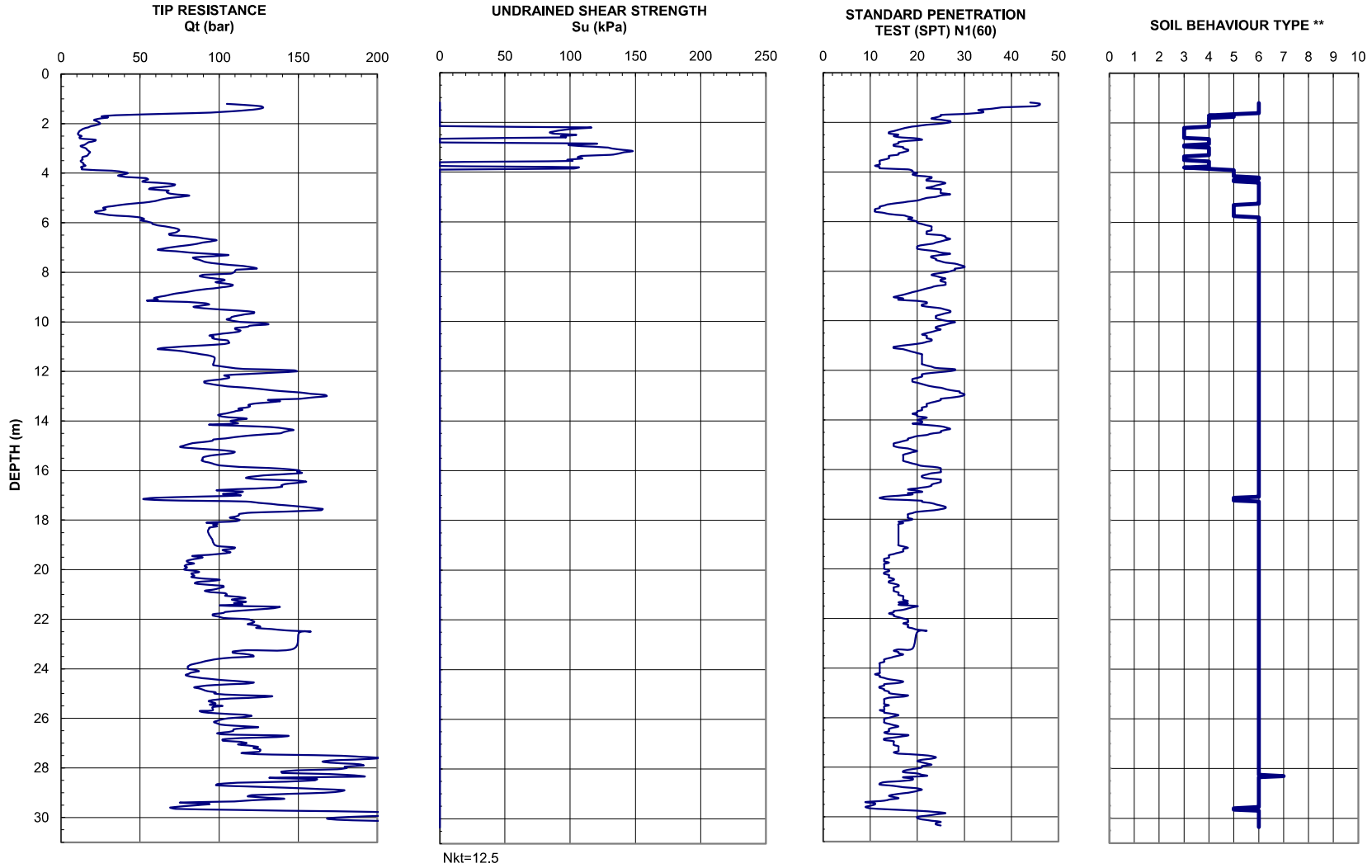
where q_c = cone tip resistance, σ = in situ total stress, N_k = cone constant

The undrained shear strength of the clay has been calculated using the cone tip resistance and an N_k factor of 12.5. All calculations have been carried out automatically using the program CPTeT-IT2. The results are presented on the figures following.

---

[2] Robertson, P.K., 1985, "In-Situ Testing and Its Application to Foundation Engineering", 1985 Canadian Geotechnical Colloquium, Canadian Geotechnical Journal, Vol. 23, No. 23, 1986

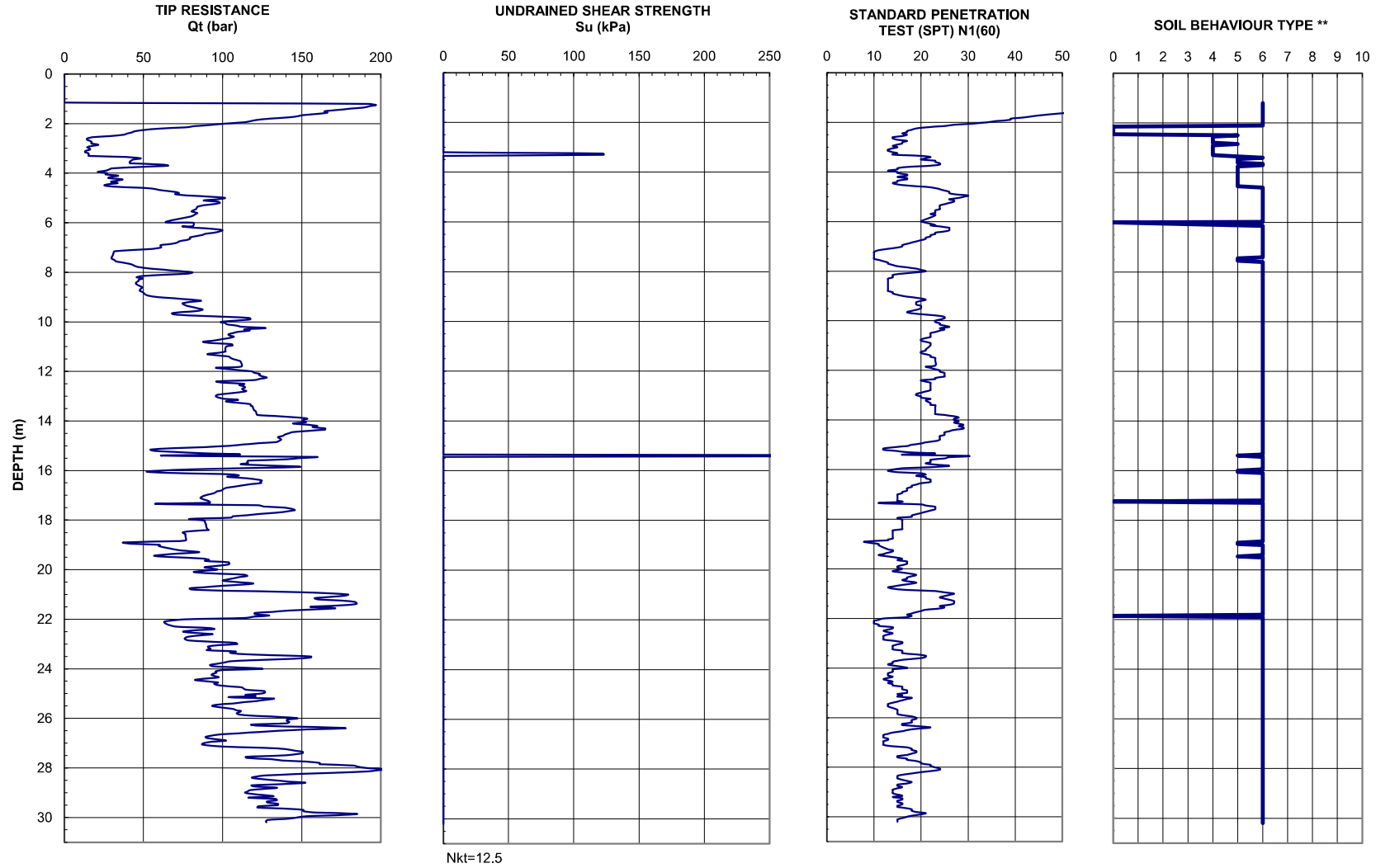
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-01	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.01



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-02	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.02



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
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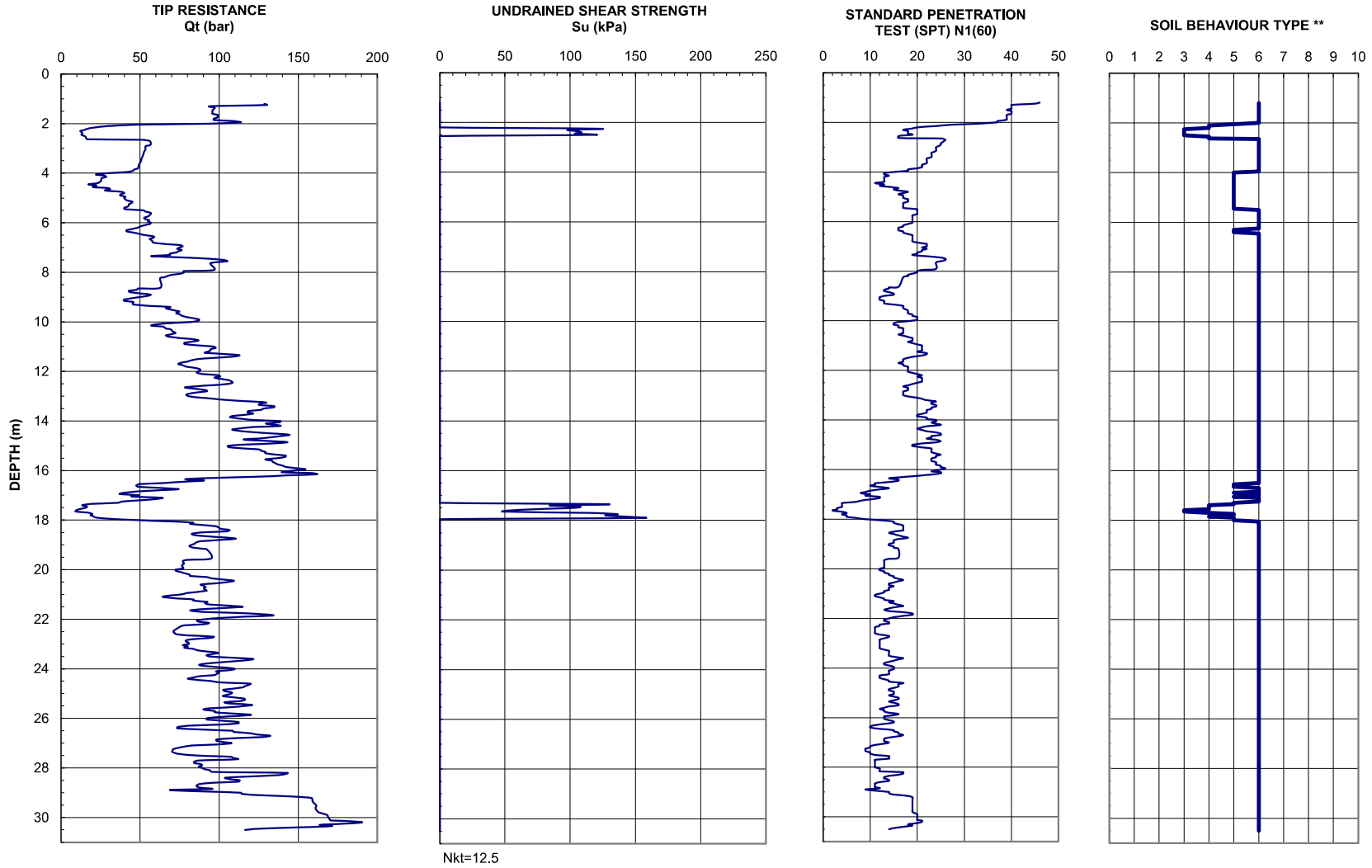
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-03	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.03



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
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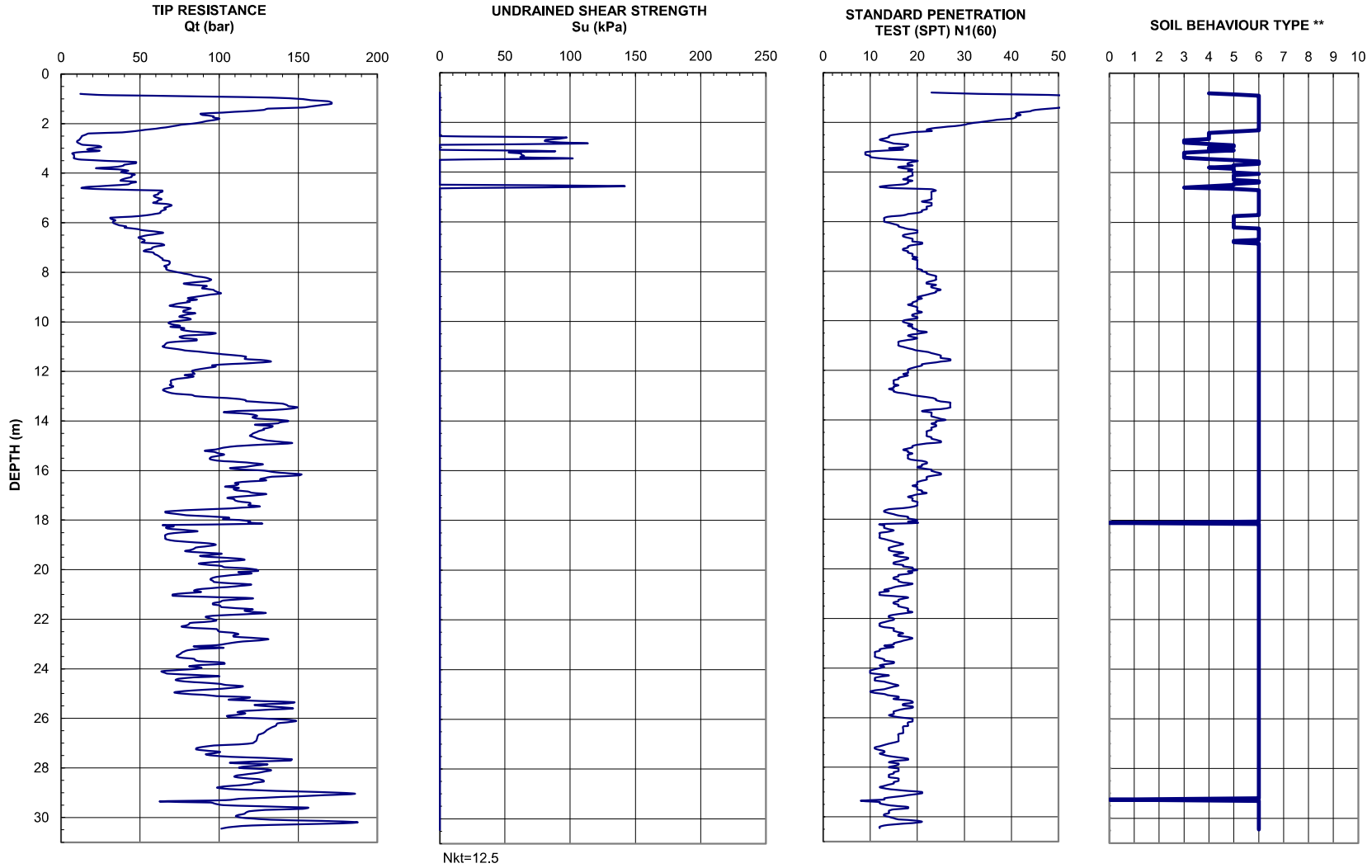
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

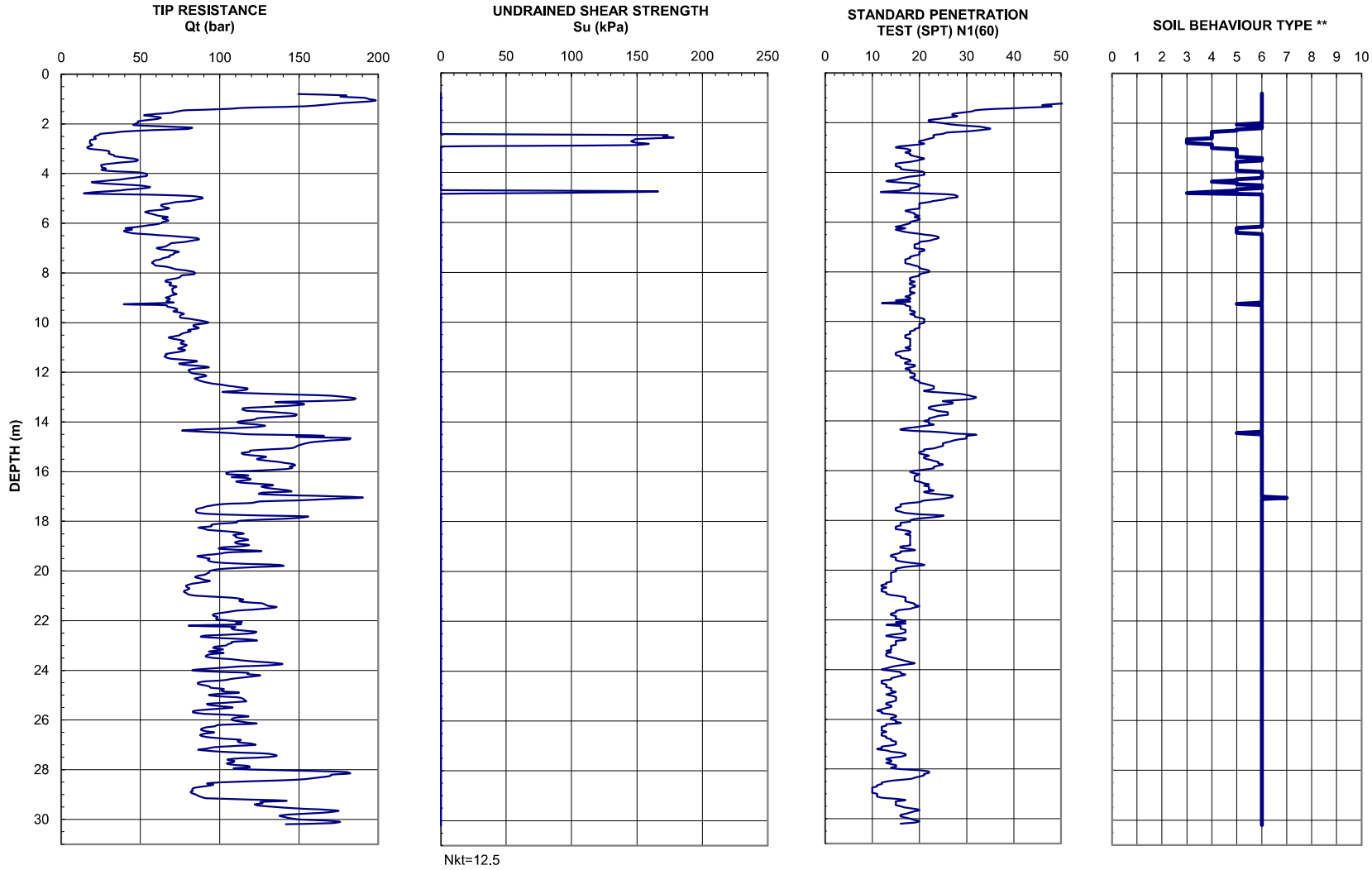
GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-04	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.04



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-05	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.05



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1 Sensitive Fine Grained
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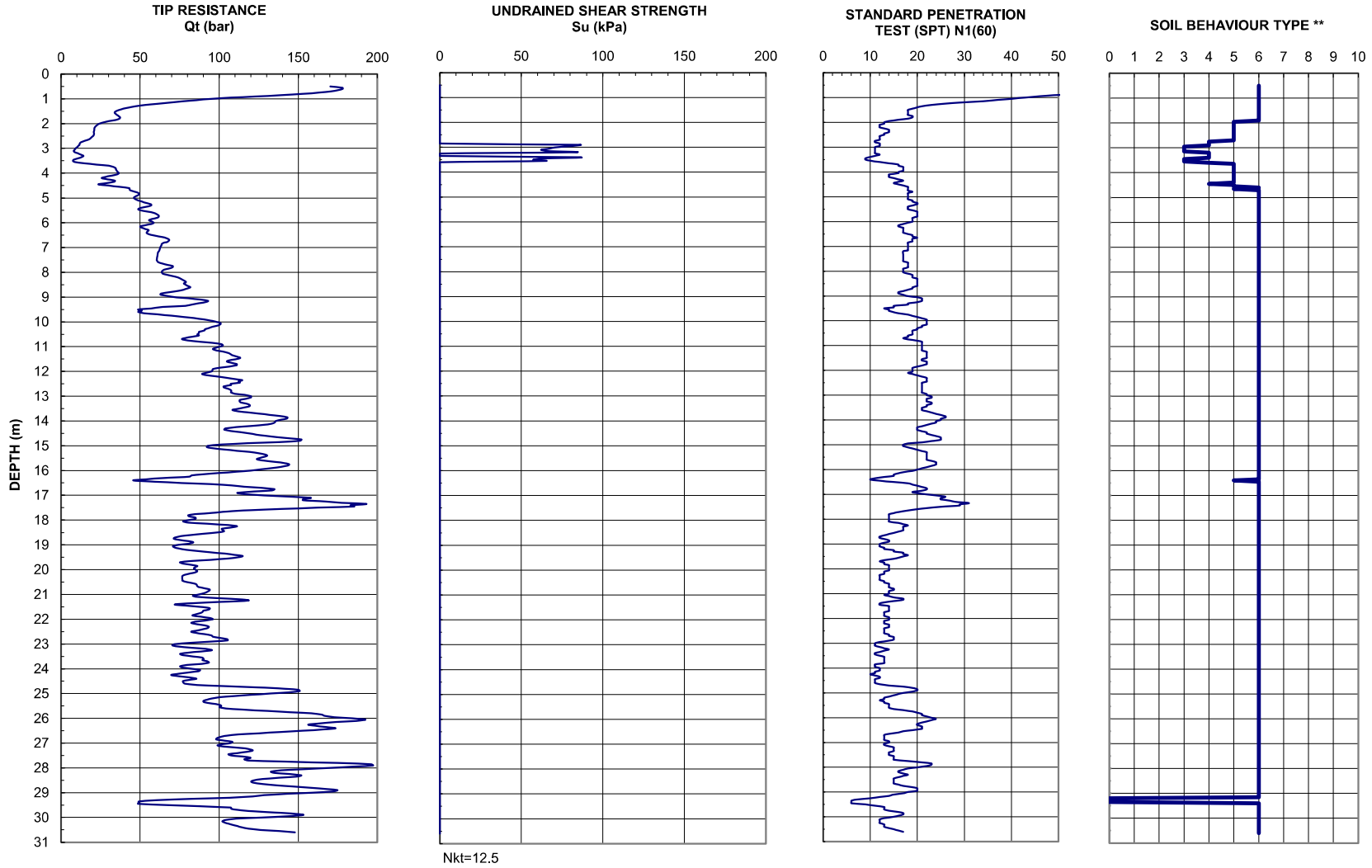
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-06	410/420 AUDLEY BOULEVARD, DELTA	Figure: C.06



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1 Sensitive Fine Grained
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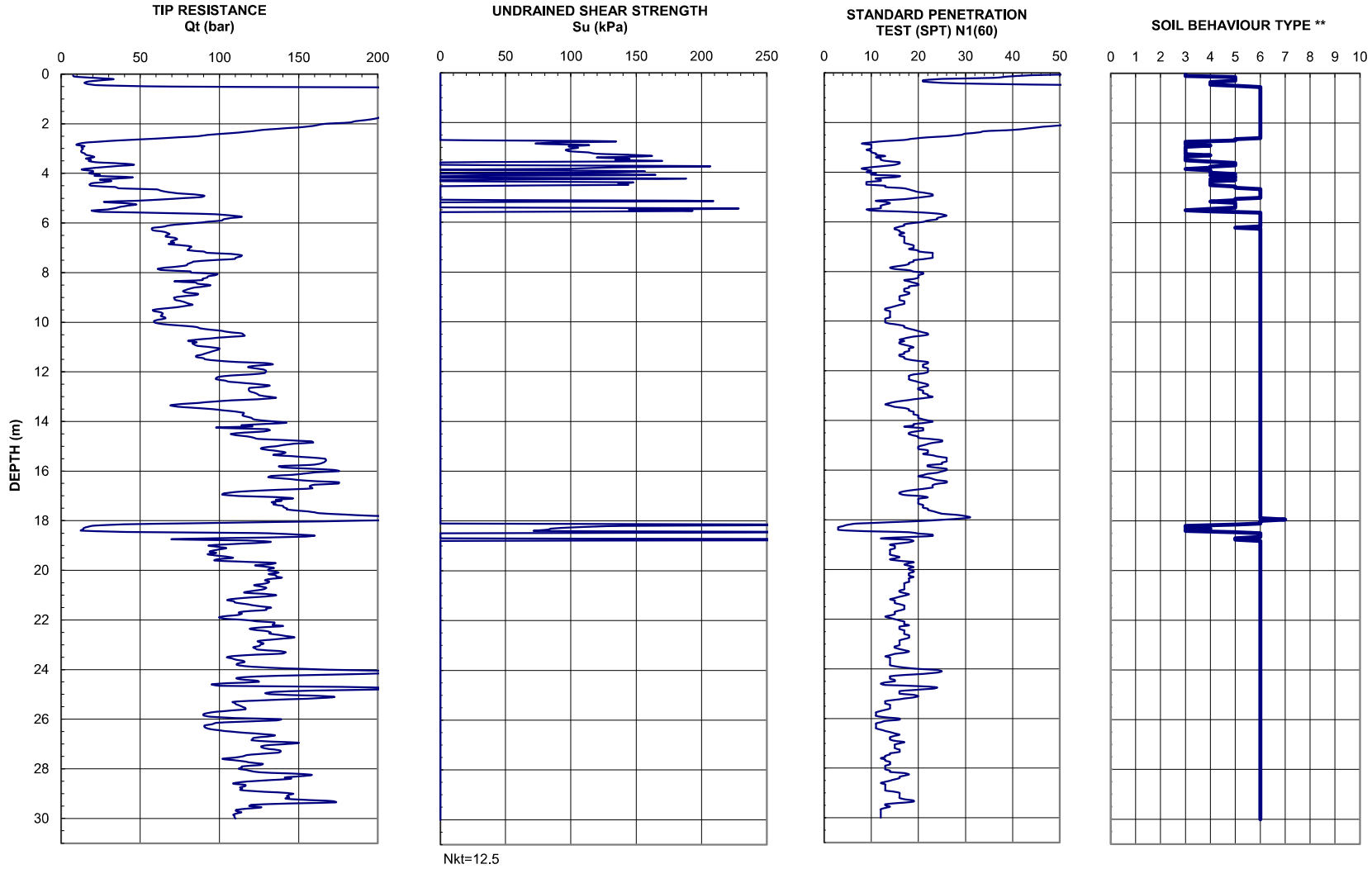
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-01	480 AUDLEY DRIVE, DELTA	Figure: C.01



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
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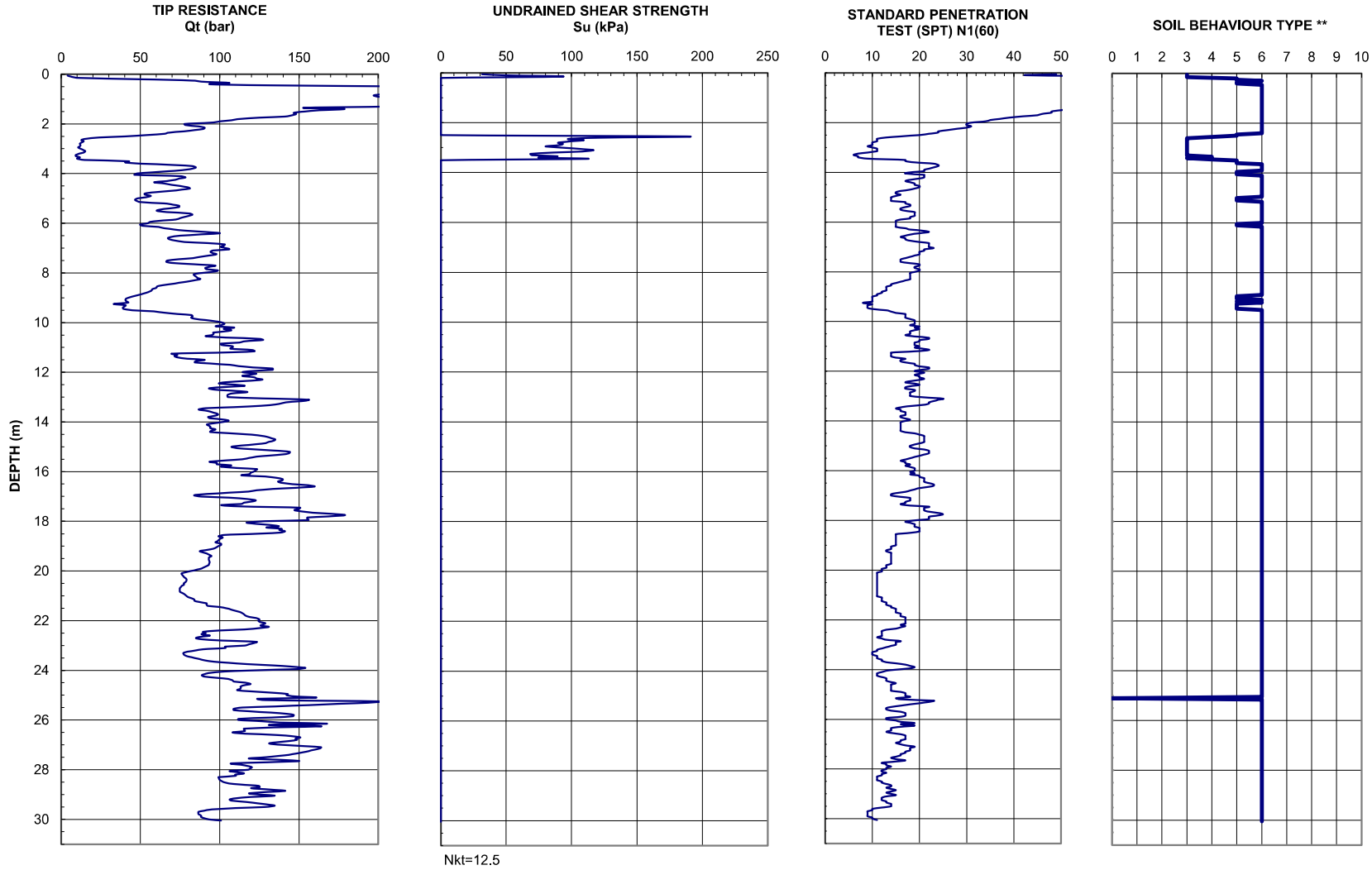
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
5 Silty Sand to Sandy Silt
6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-02	480 AUDLEY DRIVE, DELTA	Figure: C.02



** Based on Robertson et. al 1990

1 Sensitive Fine Grained
2 Organic Material
3 Clay to Silty Clay
4 Clayey Silt to Silty Clay
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6 Clean Sand to Silty Sand
7 Gravely Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff Fine Grained

APPENDIX D - LIQUEFACTION ANALYSIS

Assessment of the liquefaction potential of the ground has been determined by the Cone Penetration Test (CPT). The method of analysis is presented in the following sections.

FACTOR OF SAFETY AGAINST LIQUEFACTION

The factor of safety against liquefaction calculated here is the ratio of the cyclic resistance of the soil (CRR) to the cyclic stresses induced by the design earthquake (CSR). Where the ratio of CRR/CSR is greater than unity the soils ability to resist cyclic stresses is greater than the cyclic stresses induced by the earthquake and liquefaction will be unlikely. Where the CRR/CSR is less than unity then liquefaction could occur. This ratio is presented as the FOS against Liquefaction on the following charts. Calculation of the factor of safety is based on NCEER (1998) (Youd et al, 2001) [1] (Robertson, 2009) [2] which evaluates the CRR directly from cone penetration test sounding data. The value of the cyclic stress ratio has been calculated based on peak horizontal ground acceleration of the National Building Code (NBC) of Canada 2020 seismic design requirements.

SEISMIC INDUCED SETTLEMENT

In the event of a significant earthquake, settlement of the ground surface could occur as a result of densification of the looser soil layers as a result of liquefaction or due to the expulsion of sand in the form of sand dykes or sills from beneath the site. Tokimatsu and Seed (1987)[3] suggest a method of analysis for estimating vertical settlements as a result of earthquake induced accelerations. In this method the normalized standard penetration blow counts ($N_{1(60)}$) is compared with the cyclic stress ratio for the induced earthquake to determine the volumetric strain resulting from the earthquake shaking. The volumetric strain is assumed to result in only vertical settlement. The vertical settlement is summed for each depth at which settlement is predicted to occur and accumulated from the bottom of the test hole. The results are presented on the following charts labelled as Settlement.

HORIZONTAL DISPLACEMENT

Horizontal ground displacements known as "free field" displacements occur as a result of liquefaction of the ground and are assumed to occur without the influence of any structures. The horizontal displacements presented in our report are generally based upon the lateral spread method by of Youd, Bartlett, & Hansen (2002) [4]. Displacements are calculated based on an empirical relationship developed from observations from other earthquake sites on sloping ground or near a free face, such as an abrupt slope. The presence of the proposed embankment on-site is expected to induce a static bias within the soils at the margin of the embankment making the soils and embankment in this area subject to lateral spread induced movements. In the event of a real earthquake of significant magnitude to cause limited liquefaction, actual movements will be influenced by a wide variety of factors including the characteristics of the earthquake including duration, number of significant cycles, variations in peak particle velocity, wavelength, amplitude and frequencies as well as soil damping and variations in density and continuity of the soil layers.

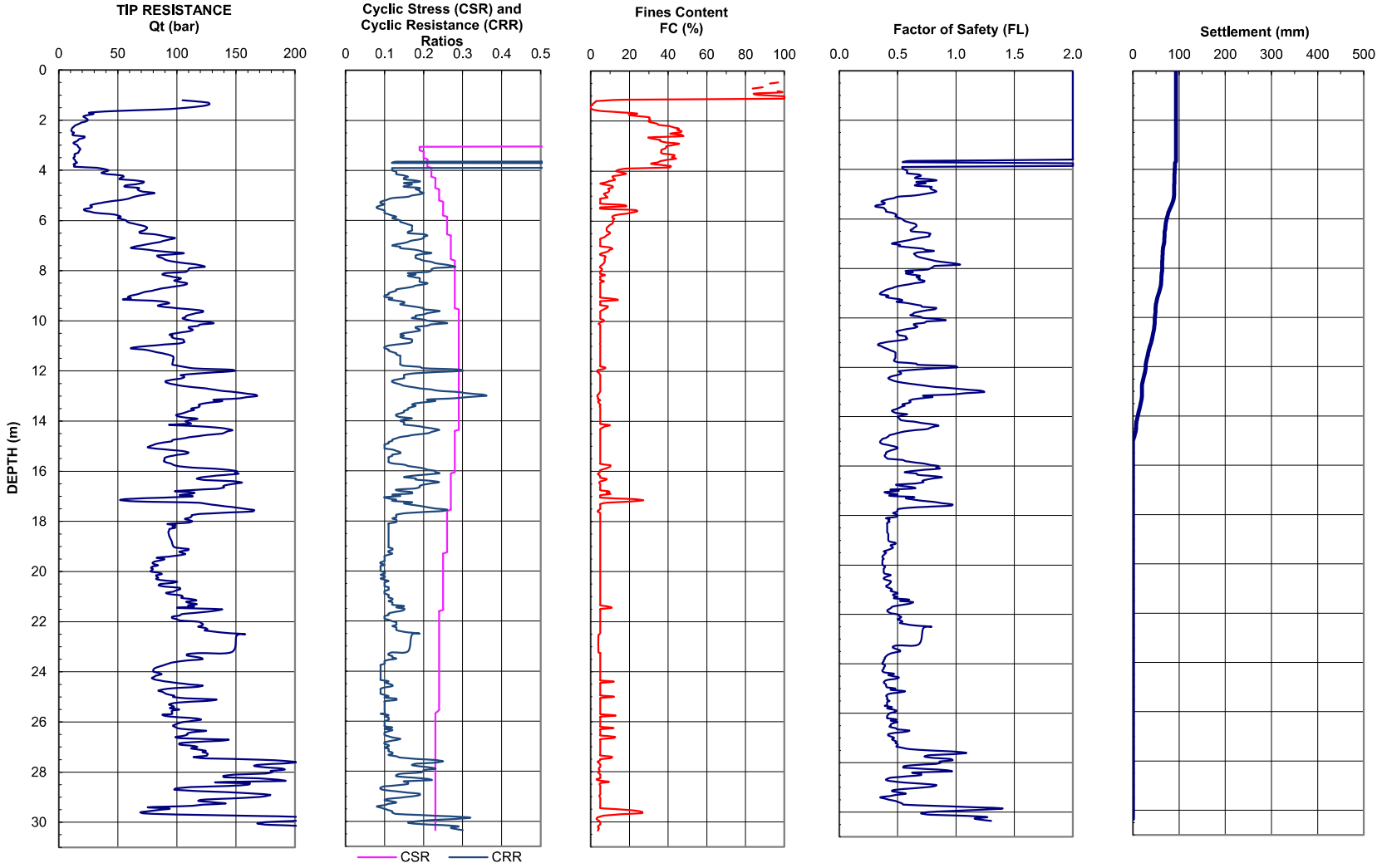
1 Youd, T. L., Idriss, I. M. (2001). “Liquefaction Resistance of Soils: Summary Report from the 1996 and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils”, Journal of Geotechnical and Geoenvironmental Engineering, Vol 127, 10, pp. 817-833

2 Robertson P.K. (2009) Performance Based Earthquake Design Using CPT, https://www.cpt-robertson.com/PublicationsPDF/Robpbe%20IS-Tokyo%202009.pdf

3 Tokimatsu, K.A.M. and Seed, H.B., 1987. "Evaluation of Settlement in Sands Due to Earthquake Shaking", Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8, pp. 861-878.

4 Youd, T.L., Bartlett, S.F., Hansen, C.M. (2002), "Revised MultiLinear Regression Equations for Prediction of Lateral Spread Displacements", Journal of Geotechnical and GeoEnvironmental Engineering, Vol. 128, No. 12, pp. 1007-1017

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-01	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.01

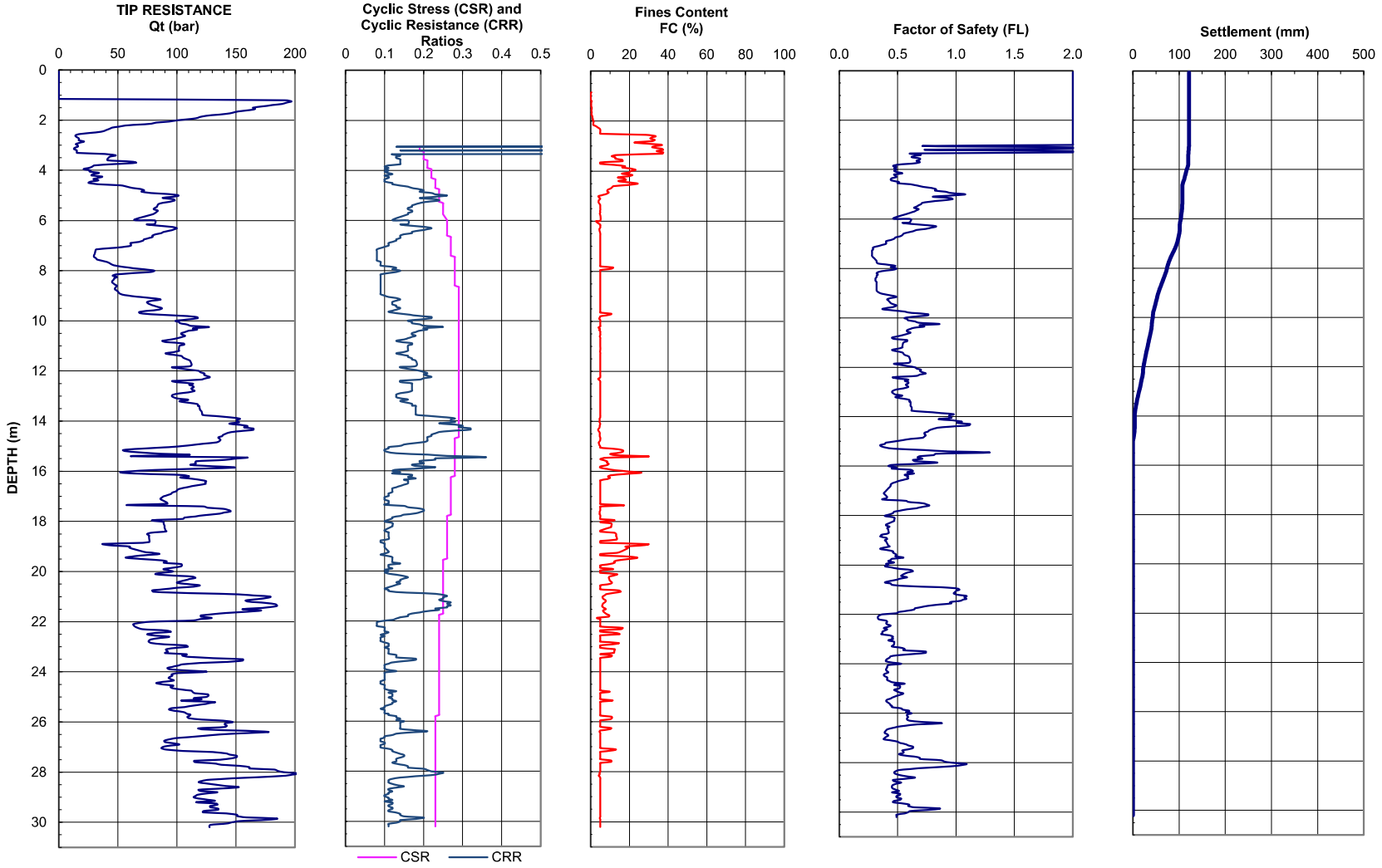


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-02	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.02

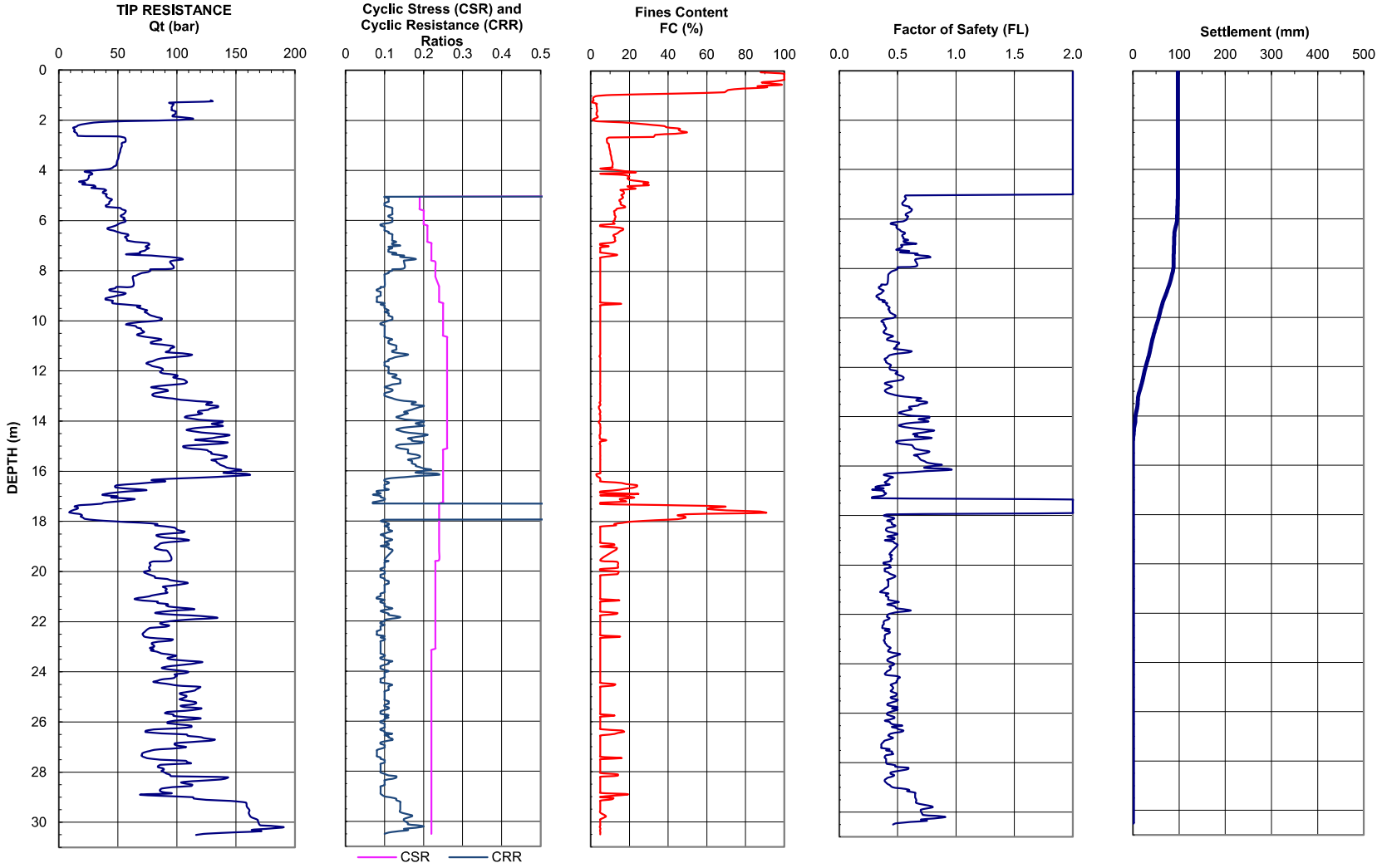


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-03	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.03

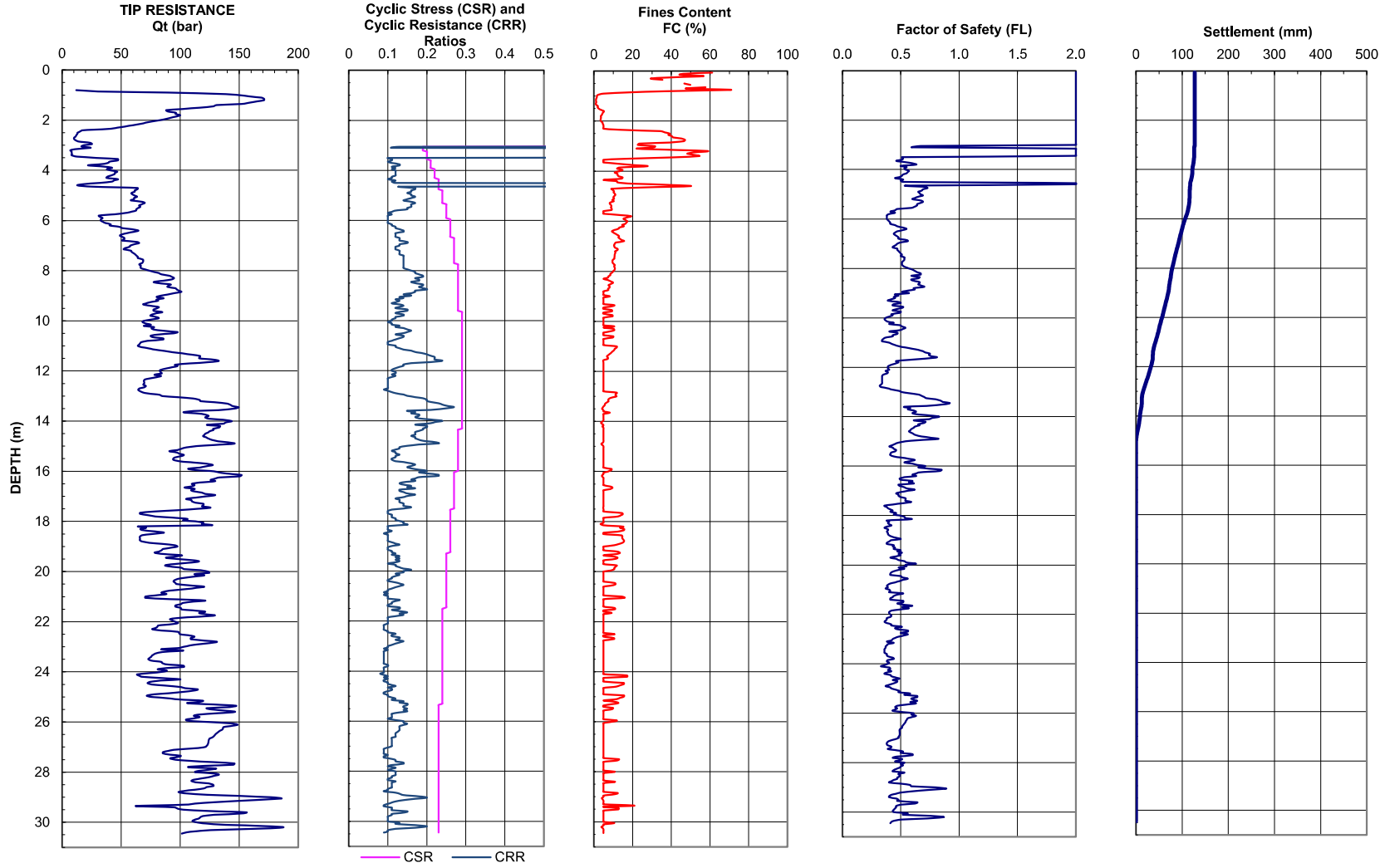


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-04	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.04

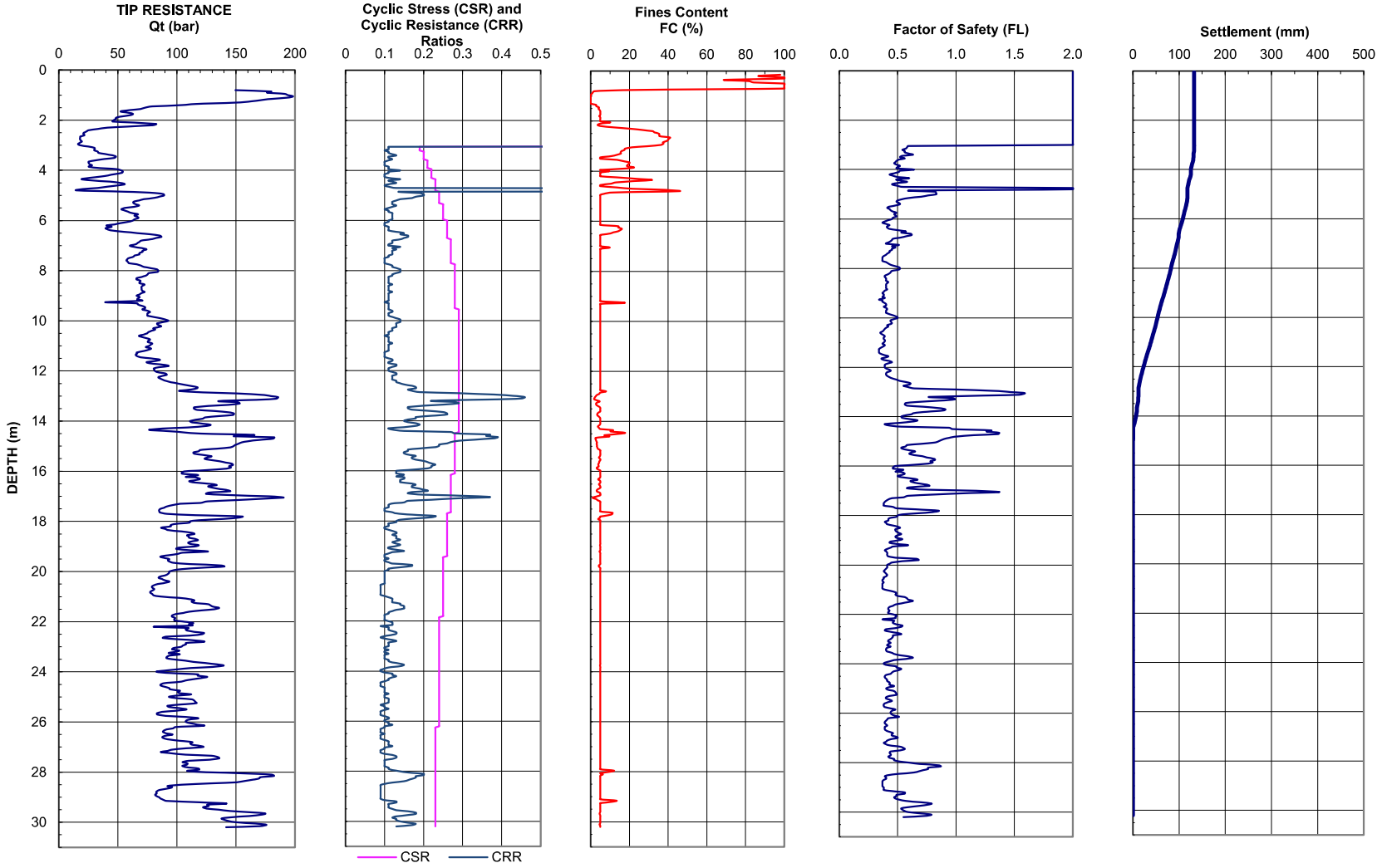


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-05	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.05

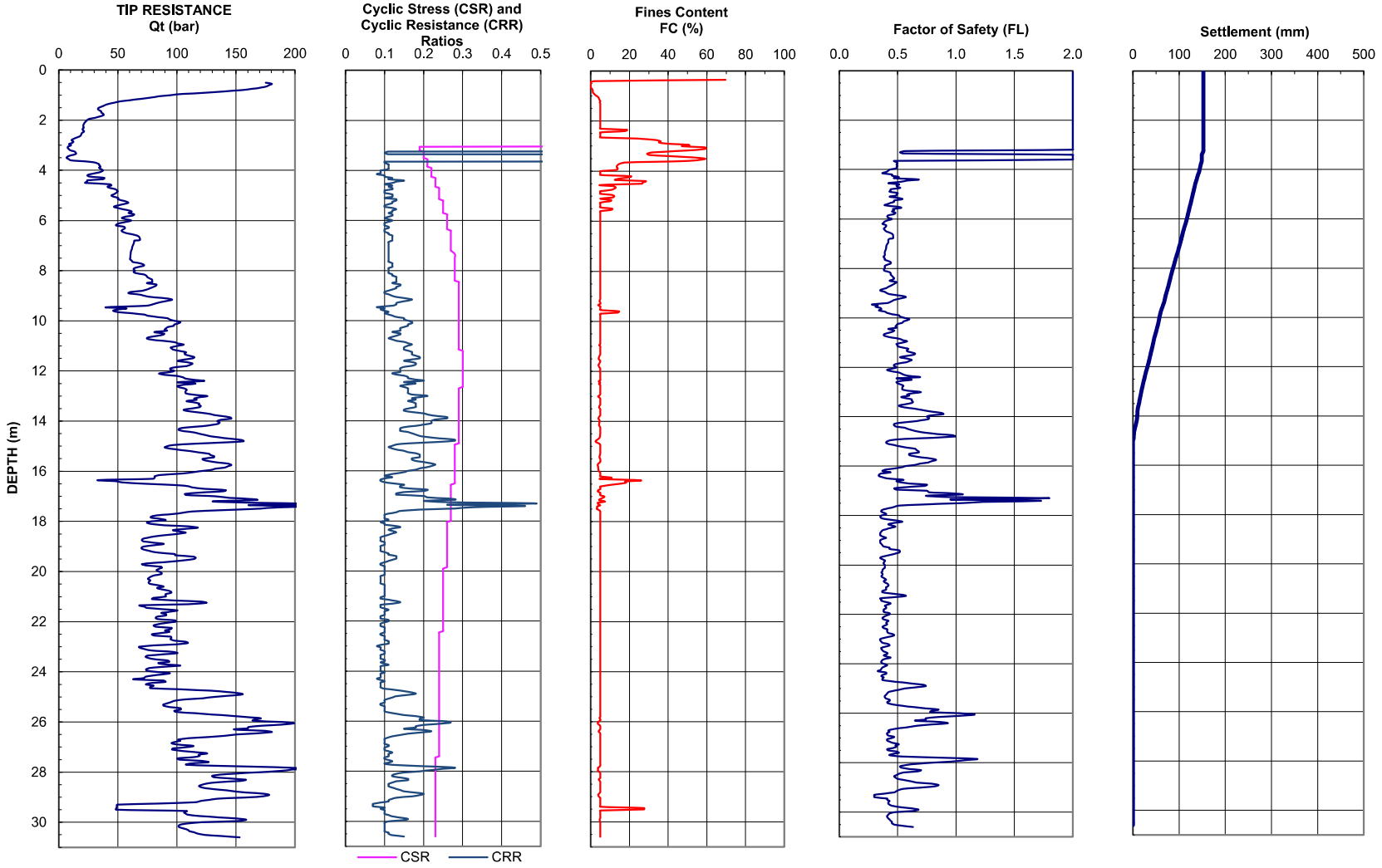


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Mar-3	LONGO DEVELOPMENT	GeoPacific Project #: 20766
	Sounding: CPT22-06	410/420 AUDLEY BOULEVARD, DELTA	Figure: D.06

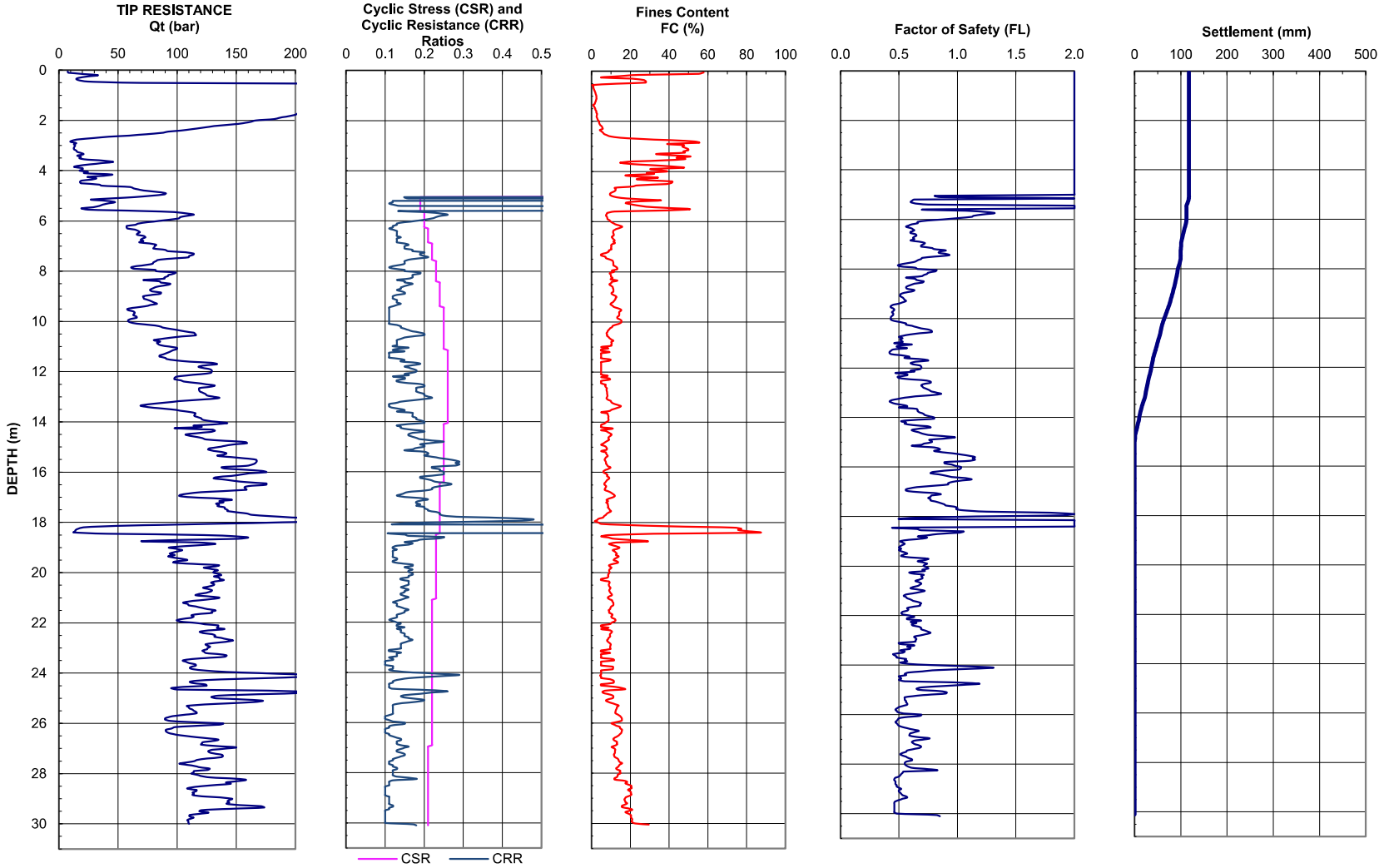


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-01	480 AUDLEY DRIVE, DELTA	Figure: D.01

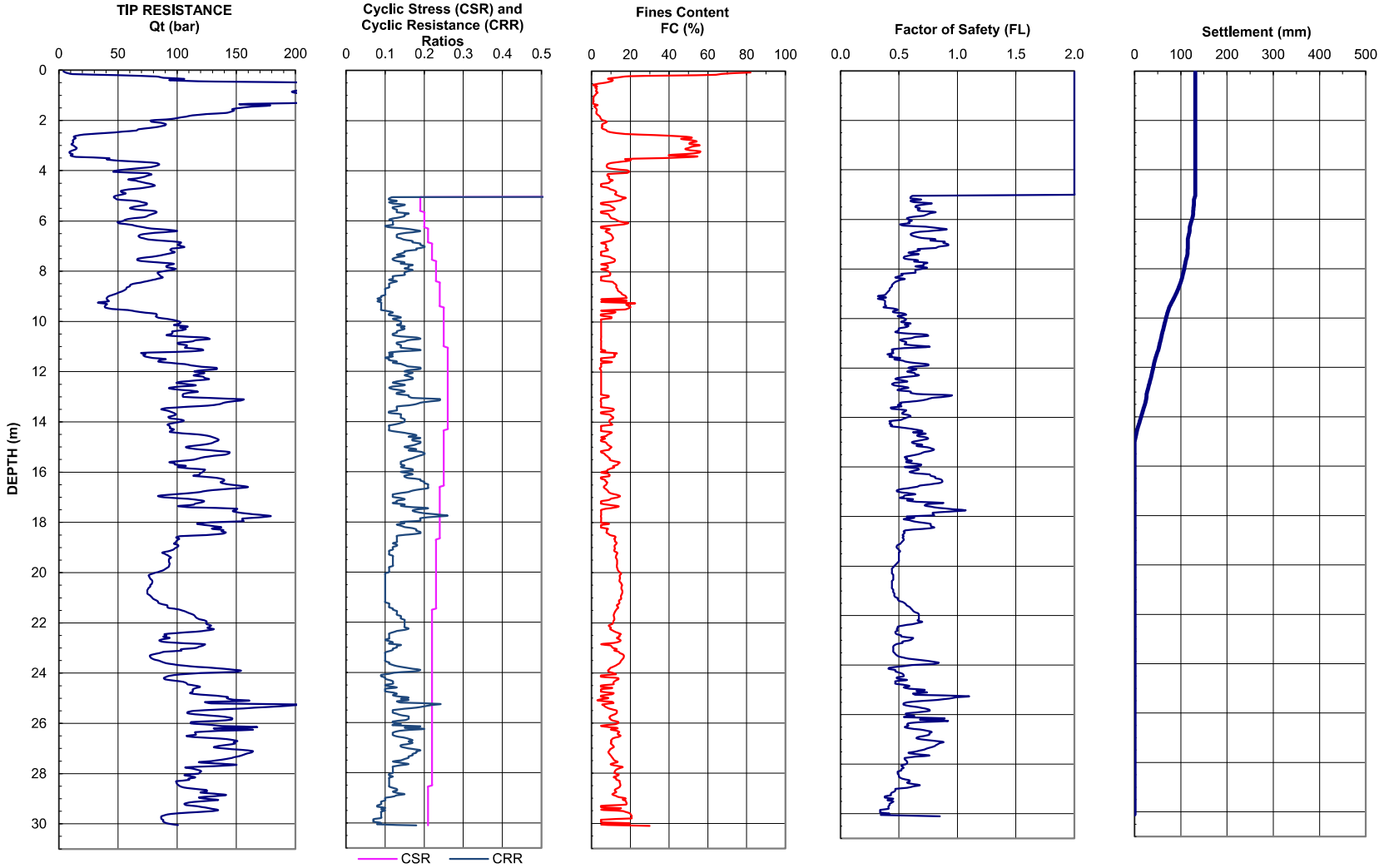


Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

GEOPACIFIC VANCOUVER KAMLOOPS CALGARY	2022-Oct-5	MOTT MACDONALD	GeoPacific Project #: 21920
	Sounding: CPT22-02	480 AUDLEY DRIVE, DELTA	Figure: D.02



Liquefaction interpretation: PGA = 0.35

magnitude = 7.0

settlement accumulation max depth = 15.00

APPENDIX E - SHEAR WAVE VELOCITY DATA (Vs)

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

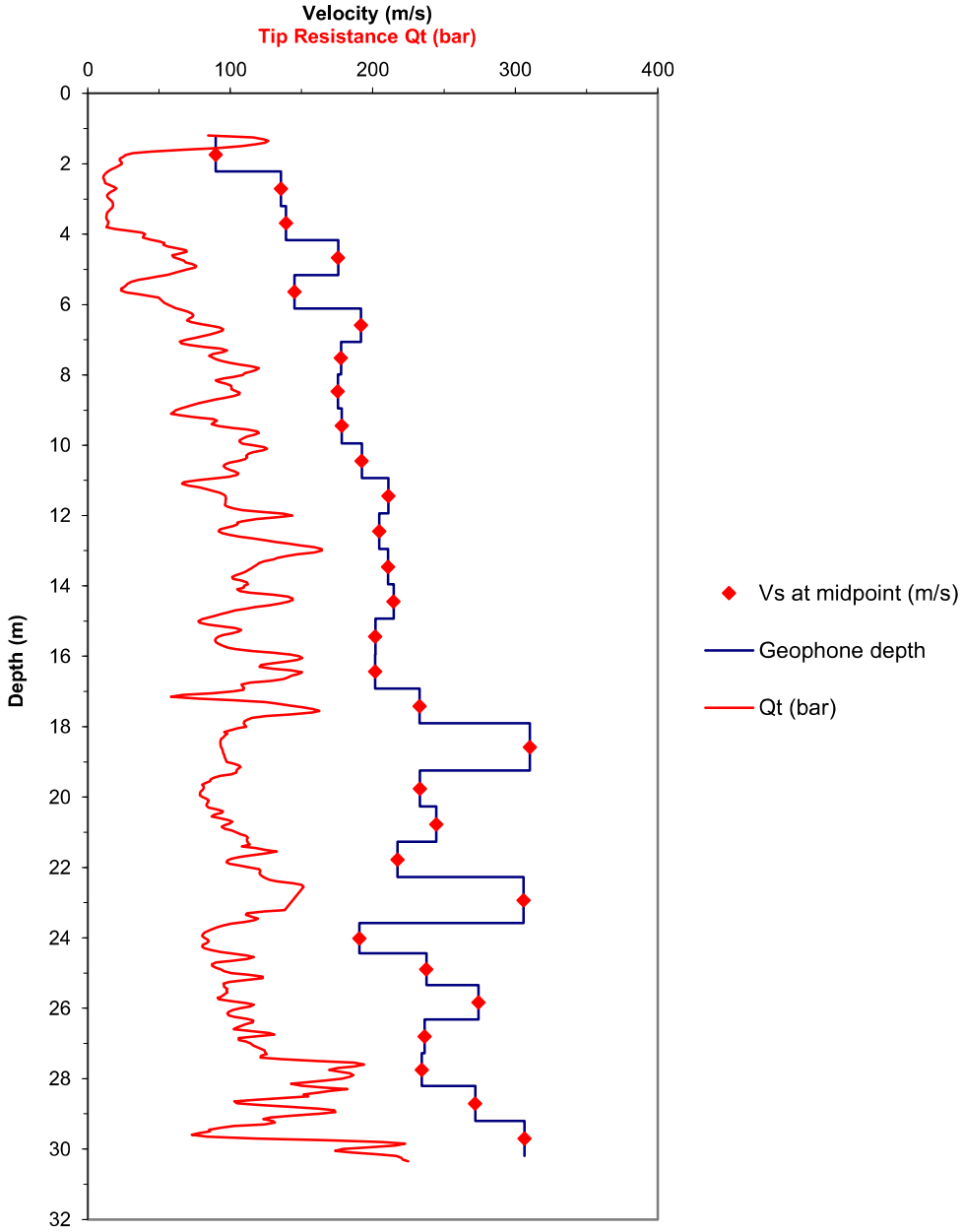
File:	20766
Project:	Industrial/Commercial Development
Client:	Longo Development Corp.
Location:	410/420 Audley Blvd, Delta BC
Sounding:	SCPT22-01
Date:	2022-Mar-03

Seismic Source:	Beam
Source to cone (m):	0.4

Shear Wave Velocity Data (Vs)

Depth (m)	Geophone Depth (m)	Ray Path (m)	Ray Path Difference d (m)	Midpoint (m)	Time Difference (ms)	Shear Wave Velocity Vs (m/s)	d/Vs
1.46	1.26	1.32	1.32	0.63	5.12		
2.42	2.22	2.26	0.93	1.74	10.40	90	0.0104
3.40	3.20	3.22	0.97	2.71	7.15	136	0.0071
4.37	4.17	4.19	0.96	3.69	6.93	139	0.0069
5.36	5.16	5.18	0.99	4.67	5.61	176	0.0056
6.31	6.11	6.12	0.95	5.64	6.53	145	0.0065
7.26	7.06	7.07	0.95	6.59	4.95	192	0.0049
8.18	7.98	7.99	0.92	7.52	5.17	178	0.0052
9.15	8.95	8.96	0.97	8.47	5.52	176	0.0055
10.14	9.94	9.95	0.99	9.45	5.55	178	0.0055
11.14	10.94	10.95	1.00	10.44	5.20	192	0.0052
12.14	11.94	11.95	1.00	11.44	4.74	211	0.0047
13.15	12.95	12.96	1.01	12.45	4.93	205	0.0049
14.15	13.95	13.96	1.00	13.45	4.74	211	0.0047
15.13	14.93	14.94	0.98	14.44	4.56	215	0.0046
16.14	15.94	15.95	1.01	15.44	5.00	202	0.0050
17.12	16.92	16.92	0.98	16.43	4.86	202	0.0049
18.10	17.90	17.90	0.98	17.41	4.21	233	0.0042
19.45	19.25	19.25	1.35	18.58	4.35	310	0.0043
20.47	20.27	20.27	1.02	19.76	4.37	233	0.0044
21.47	21.27	21.27	1.00	20.77	4.09	245	0.0041
22.47	22.27	22.27	1.00	21.77	4.60	217	0.0046
23.78	23.58	23.58	1.31	22.93	4.28	306	0.0043
24.64	24.44	24.44	0.86	24.01	4.51	191	0.0045
25.54	25.34	25.34	0.90	24.89	3.79	238	0.0038
26.52	26.32	26.32	0.98	25.83	3.57	274	0.0036
27.48	27.28	27.28	0.96	26.80	4.06	236	0.0041
28.41	28.21	28.21	0.93	27.75	3.97	234	0.0040
29.40	29.20	29.20	0.99	28.71	3.64	272	0.0036
30.39	30.19	30.19	0.99	29.70	3.23	306	0.0032
						Σ(d/Vs)	0.1445
						average Vs = Σd / Σ(d/Vs)	209

File: 20766
Project: Commercial/Industrial Development
Client: Longo Development Corp.
Location410/420 Audley Blvd, Delta BC
Sounding: SCPT22-01
Date: 2022-03-03



GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

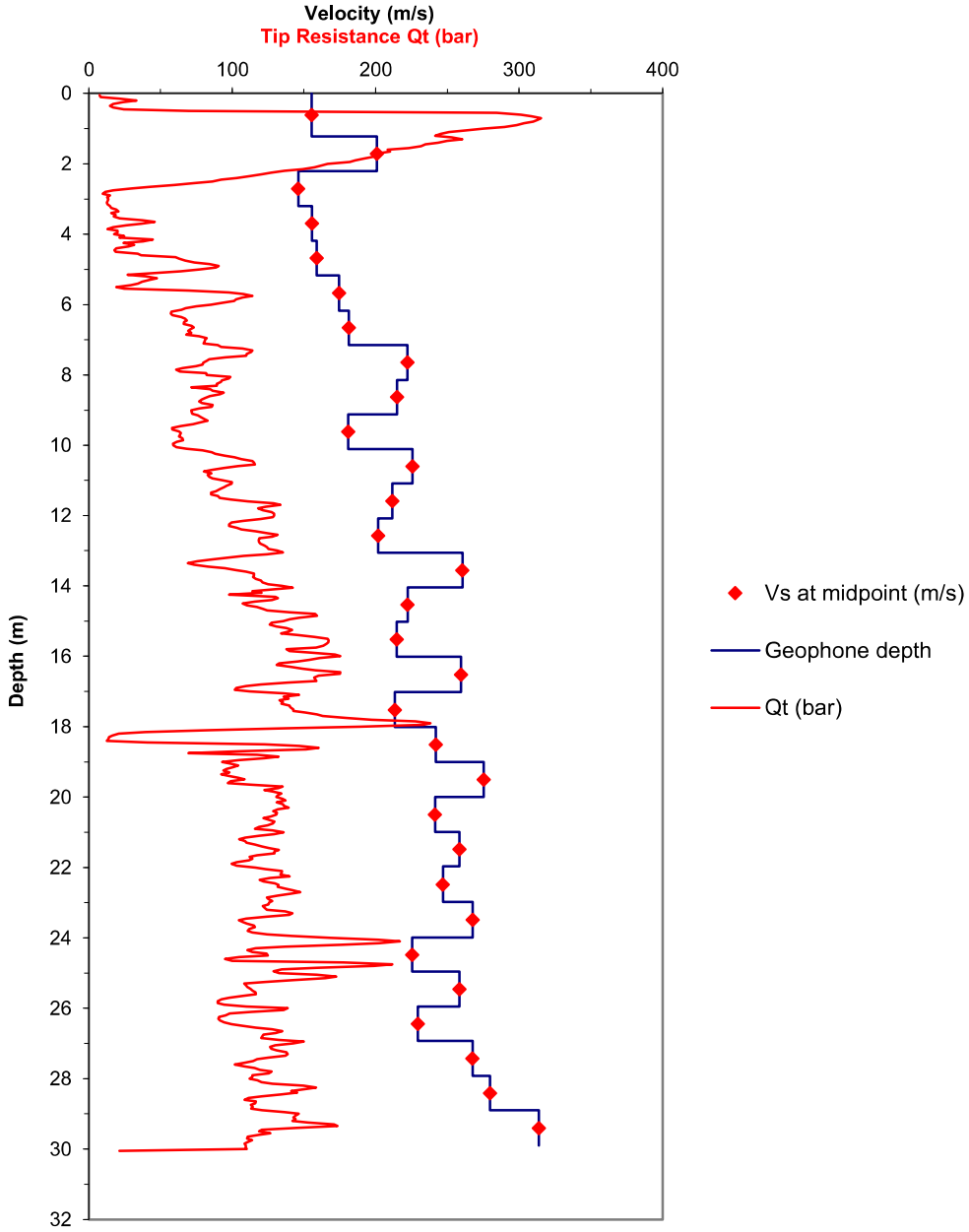
File:	21920
Project:	NEW DISTRIBUTION HUB
Client:	MOTT MACDONALD
Location:	480 AUDLEY DRIVE, DELTA
Sounding:	SCPT22-01
Date:	2022-Oct-05

Seismic Source: Beam
Source to cone (m): 0.4

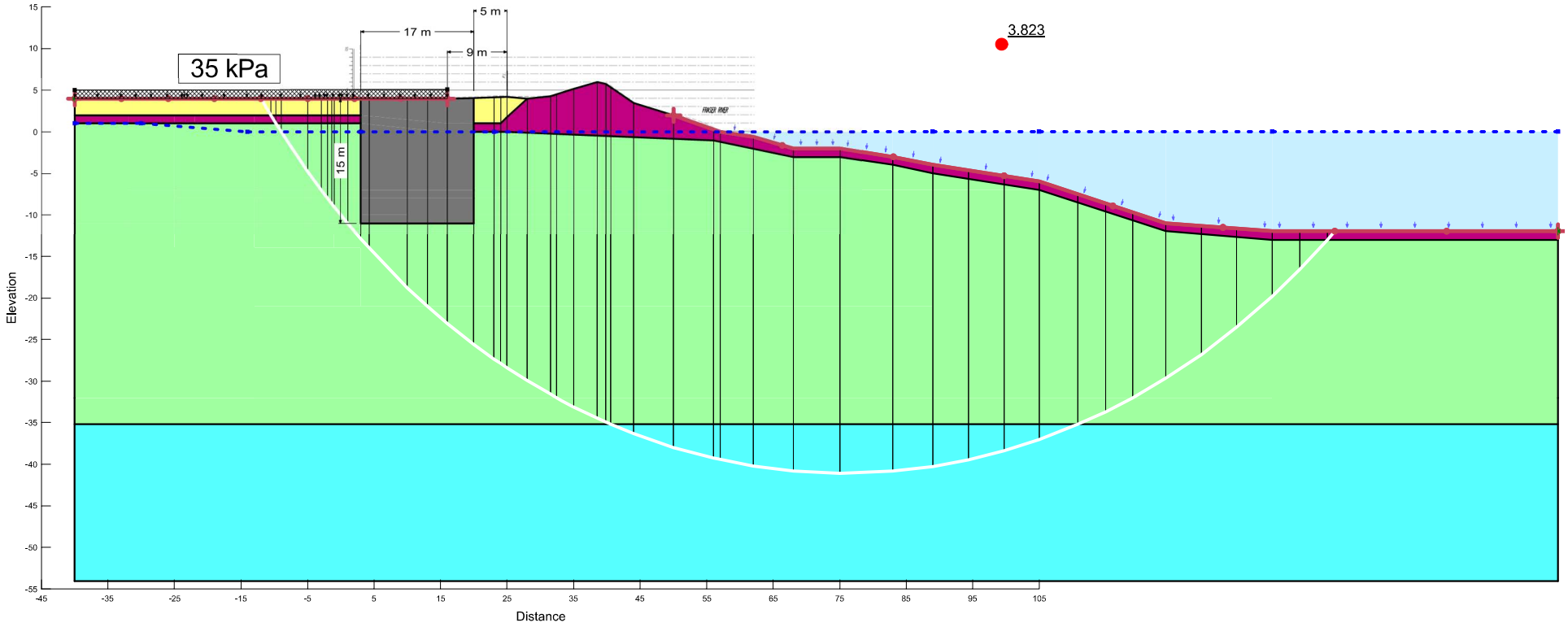
Shear Wave Velocity Data (Vs)

Depth (m)	Geophone Depth (m)	Ray Path (m)	Ray Path Difference d (m)	Midpoint (m)	Time Difference (ms)	Shear Wave Velocity Vs (m/s)	d/Vs
1.42	1.22	1.28	1.28	0.61	8.26	155	0.0083
2.41	2.21	2.25	0.96	1.72	4.79	201	0.0048
3.40	3.20	3.22	0.98	2.71	6.70	146	0.0067
4.39	4.19	4.21	0.98	3.70	6.33	156	0.0063
5.37	5.17	5.19	0.98	4.68	6.14	159	0.0061
6.37	6.17	6.18	1.00	5.67	5.72	174	0.0057
7.35	7.15	7.16	0.98	6.66	5.40	181	0.0054
8.34	8.14	8.15	0.99	7.65	4.45	222	0.0045
9.32	9.12	9.13	0.98	8.63	4.55	215	0.0046
10.31	10.11	10.12	0.99	9.62	5.47	181	0.0055
11.29	11.09	11.10	0.98	10.60	4.34	226	0.0043
12.28	12.08	12.09	0.99	11.59	4.67	212	0.0047
13.26	13.06	13.07	0.98	12.57	4.85	202	0.0049
14.24	14.04	14.05	0.98	13.55	3.76	261	0.0038
15.22	15.02	15.03	0.98	14.53	4.41	222	0.0044
16.21	16.01	16.01	0.99	15.52	4.61	215	0.0046
17.22	17.02	17.02	1.01	16.52	3.89	260	0.0039
18.21	18.01	18.01	0.99	17.52	4.64	213	0.0046
19.20	19.00	19.00	0.99	18.51	4.09	242	0.0041
20.20	20.00	20.00	1.00	19.50	3.63	275	0.0036
21.19	20.99	20.99	0.99	20.50	4.10	241	0.0041
22.17	21.97	21.97	0.98	21.48	3.79	259	0.0038
23.18	22.98	22.98	1.01	22.48	4.09	247	0.0041
24.19	23.99	23.99	1.01	23.49	3.77	268	0.0038
25.16	24.96	24.96	0.97	24.48	4.30	226	0.0043
26.15	25.95	25.95	0.99	25.46	3.83	258	0.0038
27.13	26.93	26.93	0.98	26.44	4.27	229	0.0043
28.12	27.92	27.92	0.99	27.43	3.70	268	0.0037
29.10	28.90	28.90	0.98	28.41	3.50	280	0.0035
30.10	29.90	29.90	1.00	29.40	3.19	314	0.0032
						Σ(d/Vs)	0.1392
						average Vs = Σd / Σ(d/Vs)	215

File: 21920
Project: NEW DISTRIBUTION HUB
Client: MOTT MACDONALD
Location: 480 AUDLEY DRIVE, DELTA
Sounding: SCPT22-01
Date: 2022-OCT-05



APPENDIX F – SLOPE STABILITY ANALYSIS



Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Densification Zone	19.5	0	45
	Fill	20	0	38
	Marine Silt (Drained)	17	5	28
	Sand	17	0	35
	Silt (drained)	16	5	25

Static Slope Stability

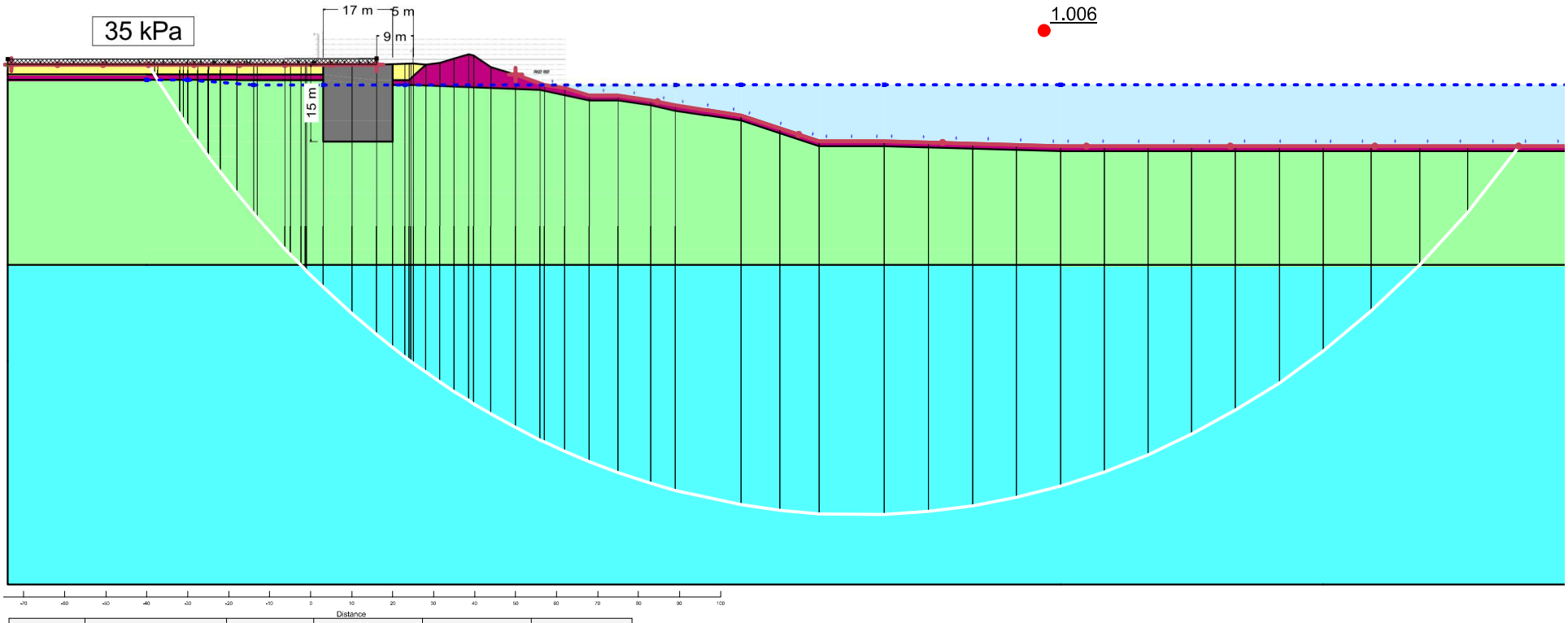
Horiz. Seismic Coefficient = 0

Section 1

Analyzed by: AAn

Job# 21920

GEOPACIFIC CONSULTANTS



Color	Name	Unit Weight (kN/m³)	Cohesion (kPa)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Densification Zone	19.5		0	45
	Fill	20		0	38
	Marine Silt (Undrained)	17	100		
	Sand	17		0	35
	Silt (Undrained)	16	25		

Seismic Slope Stability

Horiz. Seismic Coefficient = 0.124

Section 1

Analyzed by: AAn

Job# 21920

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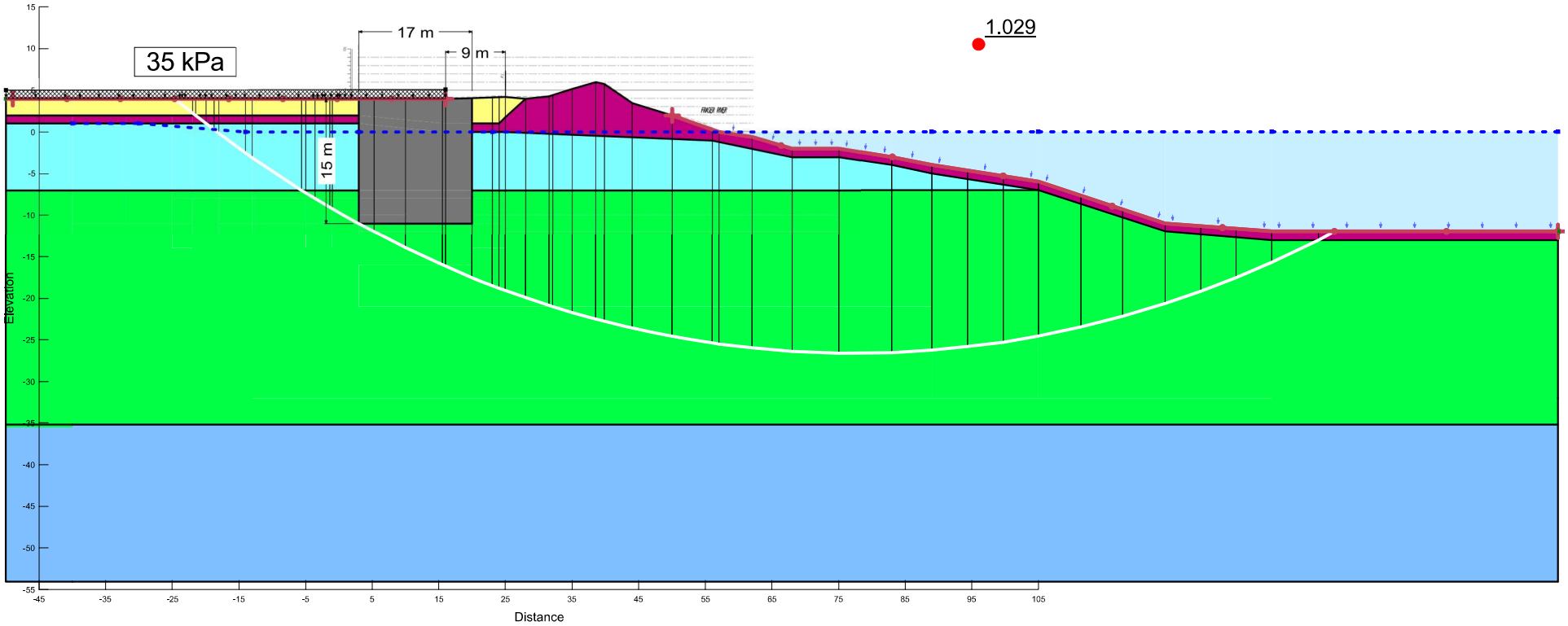

Color	Name	Unit Weight (kN/m³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Densification Zone	19.5			0	45
	Fill	20			0	38
	Lower Liquified Sand	17	16	0.14		
	Marine Silt (Drianed)	16.5			5	28
	Silt (Drained)	16			5	25
	Uper Liquified Sand	17	14	0.08		

Post Seismic Slope Stability

Horiz. Seismic Coefficient = 0

Section 1

Analyzed by: AAn

Job# 21920

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