Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Douglas Partners
Geotechnics / Environment / Groundwater

bsi. ISO 9001 Quality Management
FS 604853

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Report on Geotechnical Assessment
Moriah College
Queens Park Road, Queens Park

1. Introduction

2. Site Description

3. Geology

4. Field Work Methods

5. Field Work Results

6. Proposed Development

7. Comments

7.1 Groundwater

7.2 Excavation

[illegible]

[illegible]

7.3 Excavation Support

7.3.1 General

[illegible]

[illegible] imaginary 'influence' line rising at 45 degree from the base of the excavation or pit, [illegible]

[illegible]

7.3.2 Earth Pressures

[illegible]

[illegible] using 'at rest' conditions and K[illegible]

[illegible]

7.3.3 Temporary Ground Anchors

[illegible]

Only experienced contractors should be engaged to install anchors because anchors in sand often “slip”

[illegible]

contractor to demonstrate a ‘reserve’ capacity above their nominated design bond stress values.

7.4 Foundations

[illegible]

7.4.1 Shallow Footings

[illegible]

Table 1: Typical Allowable bearing Pressures for Spread Footings.

Embedment Depth	Pad Footing		Strip Footing	
	1 m square	1.5 m square	0.5 m wide	1 m wide
[illegible]	[illegible]	[illegible]	2[illegible]	2[illegible]
1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

7.4.2 Deep Footings

[illegible] 22 m, piles are expected to be designed as 'friction [illegible]es' with the friction [illegible]

[illegible]

Table 2 : Typical Design Geotechnical Strengths for CFA piles

Founding Depth	450 mm diameter Pile	600 mm diameter Pile
[illegible]	[illegible]	12[illegible]
[illegible]	1[illegible]	1[illegible]
1[illegible]	12[illegible]	2[illegible]

[illegible]

[illegible] strength reduction factor (Φ[illegible] 21[illegible] – 2[illegible] *Piling – Design and installation.*

[illegible]

[illegible]

[illegible]

[illegible]

7.5 Pavements and Slabs

[illegible]

[illegible]

7.6 Seismicity

[illegible] *Structural design actions – Part 4: Earthquake actions in Australia* [illegible]

7.7 Further Investigation

[illegible]

[illegible]

8. Limitations

[illegible] accordance with DP's proposal dated 11 [illegible] DP's Conditions of [illegible]

[illegible]

[illegible] and also as a result of human influences. Such changes may occur after DP's field testing has been [illegible]

DP's advice is based [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Douglas Partners Pty Ltd

Appendix A

About this Report

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Introduction

Copyright

Borehole and Test Pit Logs

Groundwater

Reports

About this Report

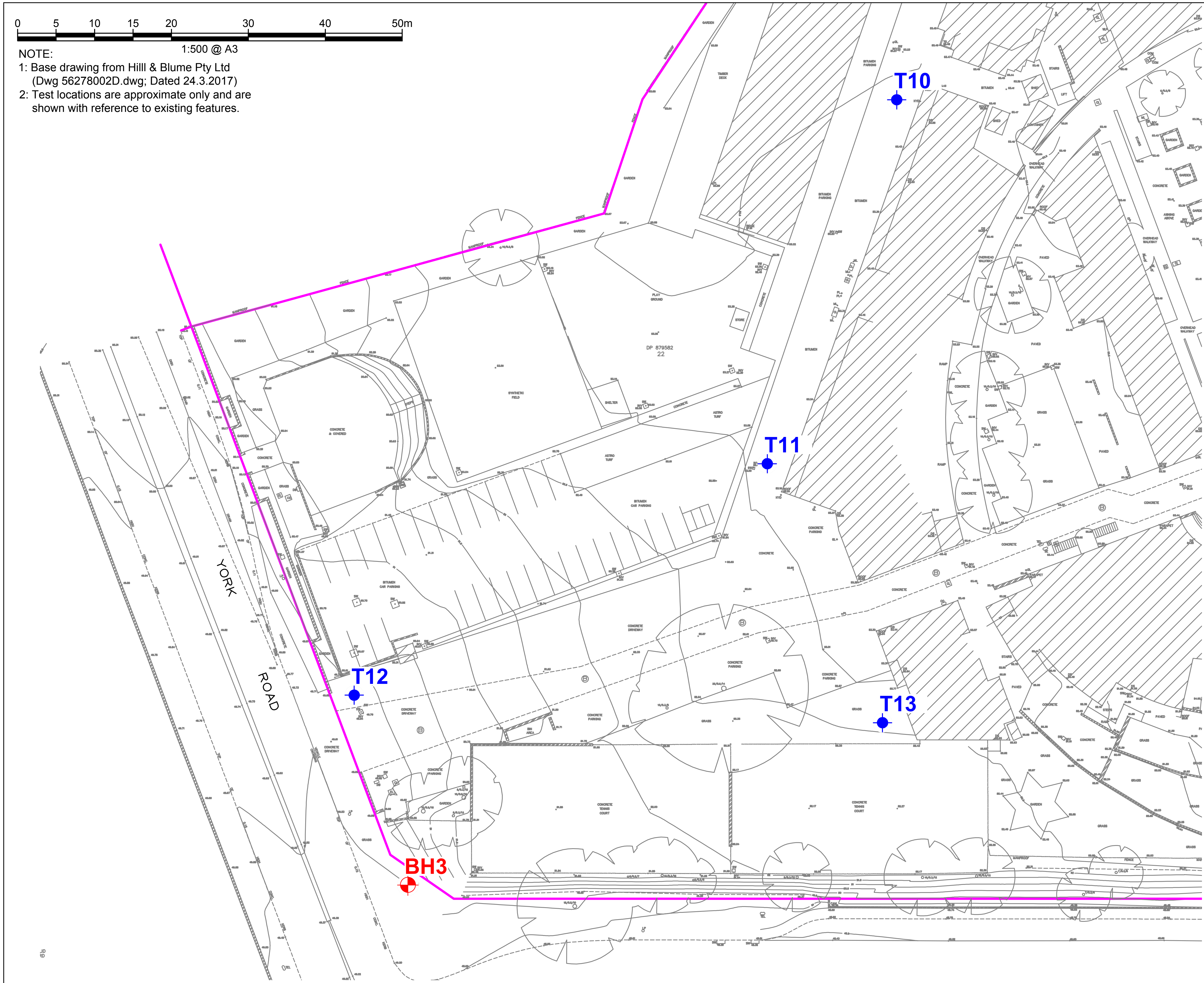
Site Anomalies

Information for Contractual Purposes

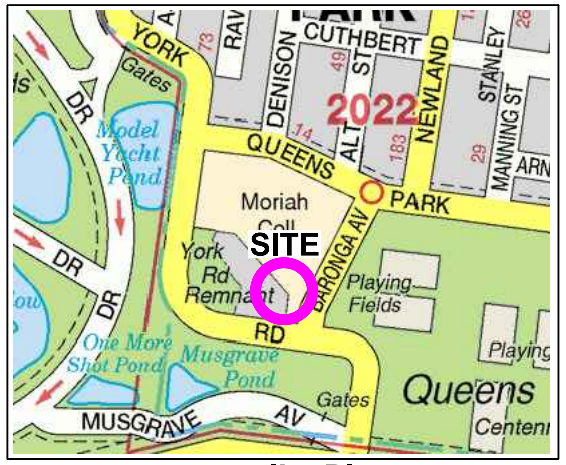
Site Inspection

Appendix B

Dr



NOTE:
1: Base drawing from Hilll & Blume Pty Ltd (Dwg 56278002D.dwg; Dated 24.3.2017)
2: Test locations are approximate only and are shown with reference to existing features.



Locality Plan

LEGEND
- Borehole location
- Cone penetration test location (CPT)

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Geotechnics / Environment / Groundwater

CLIENT: Moriah College		TITLE: **Location of Tests**	PROJECT No: 86890.00
OFFICE: Sydney	DRAWN BY: PSCH	**Moriah College**	DRAWING No: 1
SCALE: 1:500 @ A3	DATE: 8.8.2019	**3 Queens Park Road, QUEENS PARK**	REVISION: 1

Appendix C

Sampling Methods

Sampling

Test Pits

Large Diameter Augers

Continuous Spiral Flight Augers

Non-core Rotary Drilling

Continuous Core Drilling

Standard Penetration Tests

Sampling Methods

[illegible]

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

[illegible]

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Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.

  Soil tends to stick together.

  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.

  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

Symbols & Abbreviations

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Introduction

Drilling or Excavation Methods

Water

Sampling and Testing

Description of Defects in Rock

Defect Type

Orientation

Coating or Infilling Term

Coating Descriptor

Shape

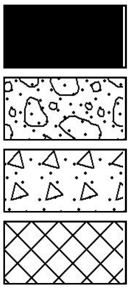
Roughness

Other

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General



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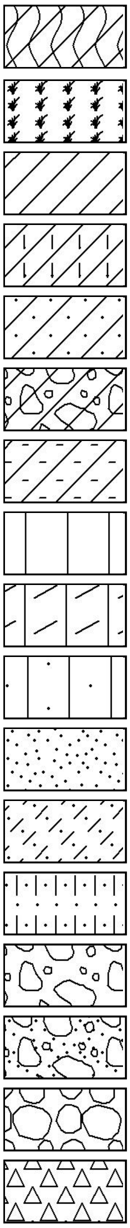
Soils



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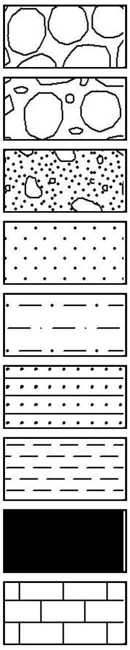
Sedimentary Rocks



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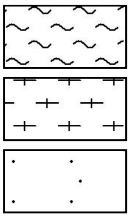
Metamorphic Rocks



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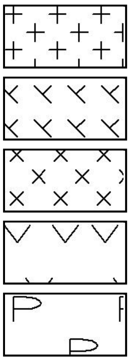
Igneous Rocks



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Cone Penetration Tests

Introduction

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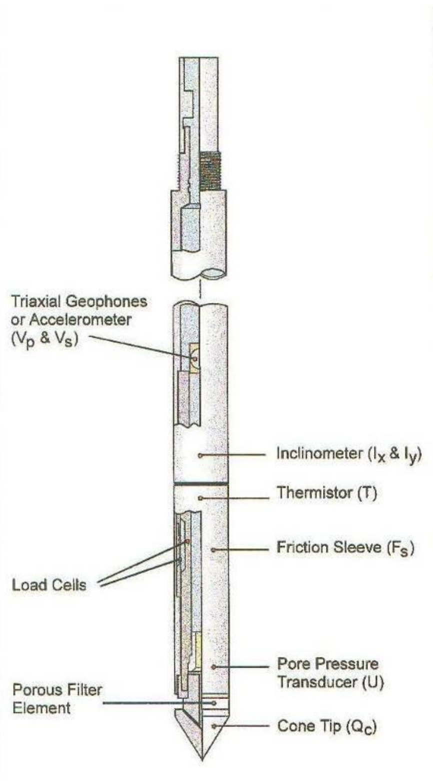

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Types of CPTs

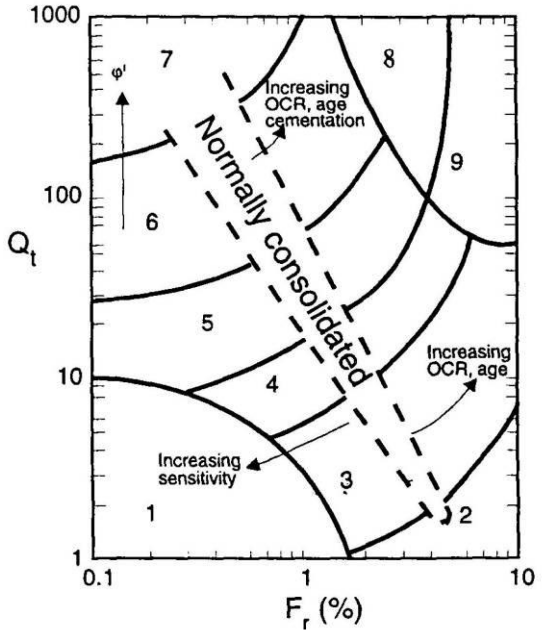
[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Strata Interpretation

[illegible]

Cone Penetration Tests



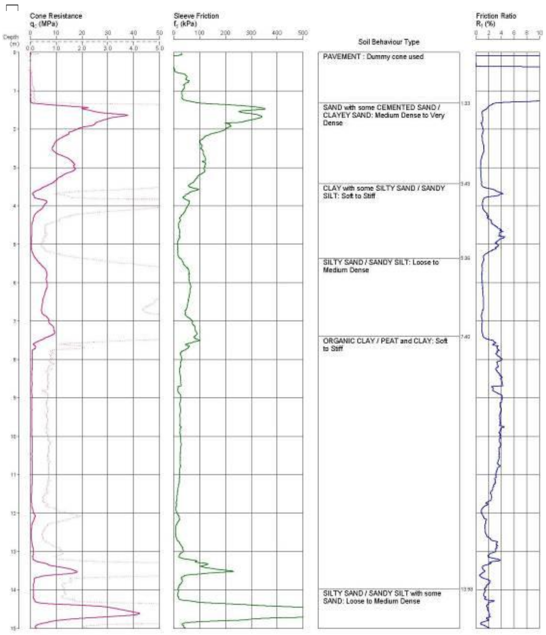
Engineering Applications

Settlement

Pile Capacity

Dynamic or Earthquake Analysis

Other Applications



BOREHOLE LOG

CLIENT: Colin Ging & Partners
PROJECT: Moriah War Memorial College
LOCATION: Queens Park Road, Bondi Junction

SURFACE LEVEL: 49.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 28900
DATE: 28-4-2000
SHEET 1 OF 1

Depth (m)	Description of Strata	Graphic Log
0.0–0.5	FILL: light grey sand, concrete and brick fill	Fill
0.5–5.5	SAND: very loose and loose, humid to damp, light yellow brown, fine to medium grained sand 4.0m to 5.5m: medium dense	Sand
5.5–10.0	SAND: medium dense theb very dense, humid to damp, light grey, fine to medium grained sand with a trace of clay	Sand

Bore discontinued at 10.0m

Columns printed but empty: Degree of Weathering (EW, HW, MW, SW, FS, FR); Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High); Water; Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00); Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault); Core Rec. %; RQD %.

Sampling & In Situ Testing

Approx. Depth (m)	Type	Test Results & Comments
1.1–1.55	S	2,2,2 N = 4
2.6–2.95	S	3,3,3 N = 6
4.0–4.45	S	4,6,7 N = 13
5.5–5.95	S	8.,9,10 N = 19
7.0–7.45	S	14,13,13 N = 26
9.0–9.45	S	17,25/130 refusal

RIG: Scout **DRILLER:** Kiernan **LOGGED:** Parmar **CASING:**

TYPE OF BORING: Solid flight auger to 4.0m; Rotary (mud) to 10.0m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Surface level interpolated from survey plan

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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CONE PENETRATION TEST

CLIENT: COLIN GING AND PARTNERS

PROJECT: MORIAH WAR MEMORIAL COLLEGE

LOCATION: QUEENS PARK ROAD, BONDI JUNCTION

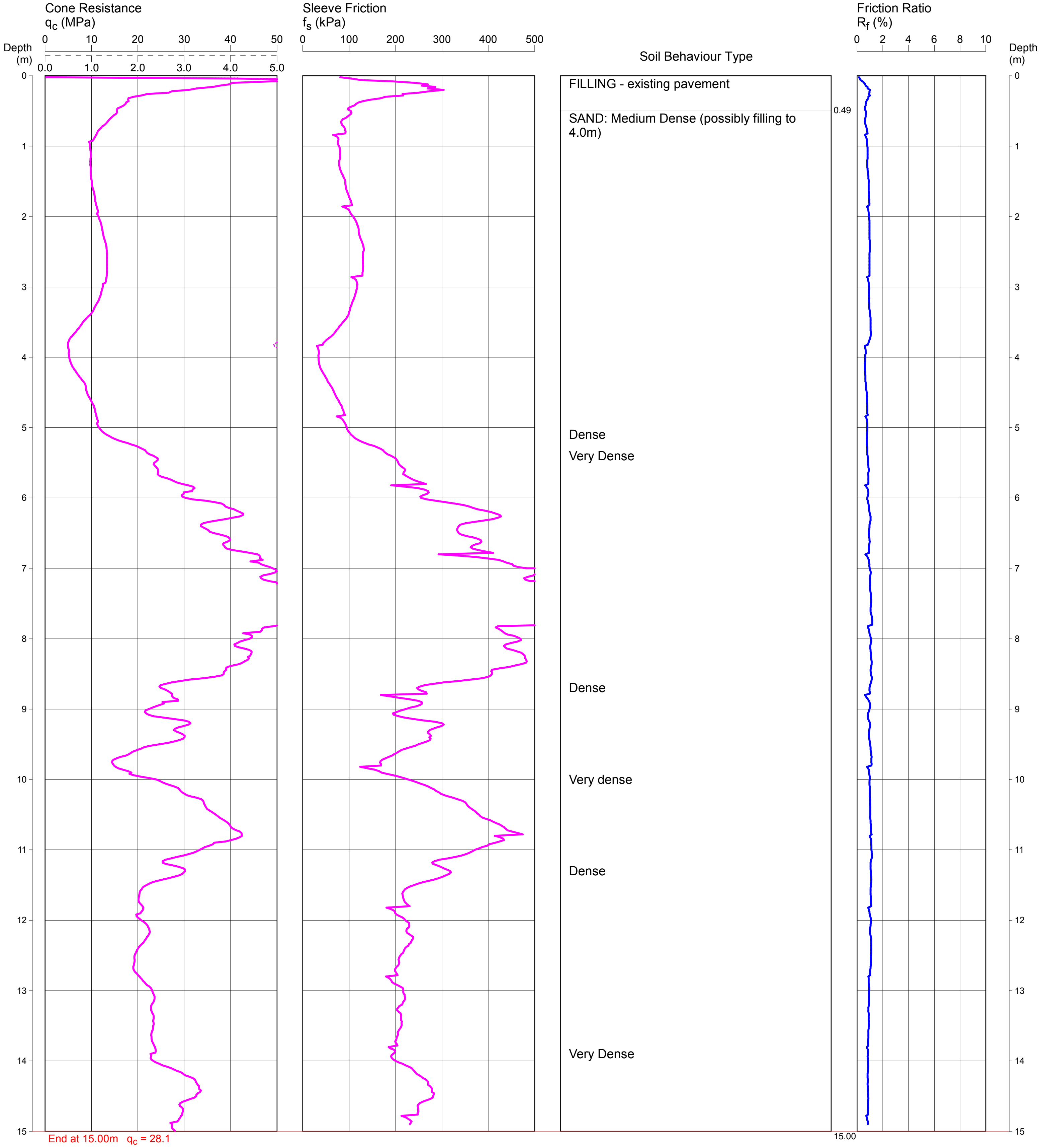
REDUCED LEVEL: 53.5

COORDINATES: AHD

CPT T10

DATE 12 APR 2000

PROJECT No: 28900



REMARKS: NO FREE GROUND WATER OBSERVED TO 8 METRES DEPTH

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Cone ID: CONE-157 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: COLIN GING AND PARTNERS

PROJECT: MORIAH WAR MEMORIAL COLLEGE

LOCATION: QUEENS PARK ROAD, BONDI JUNCTION

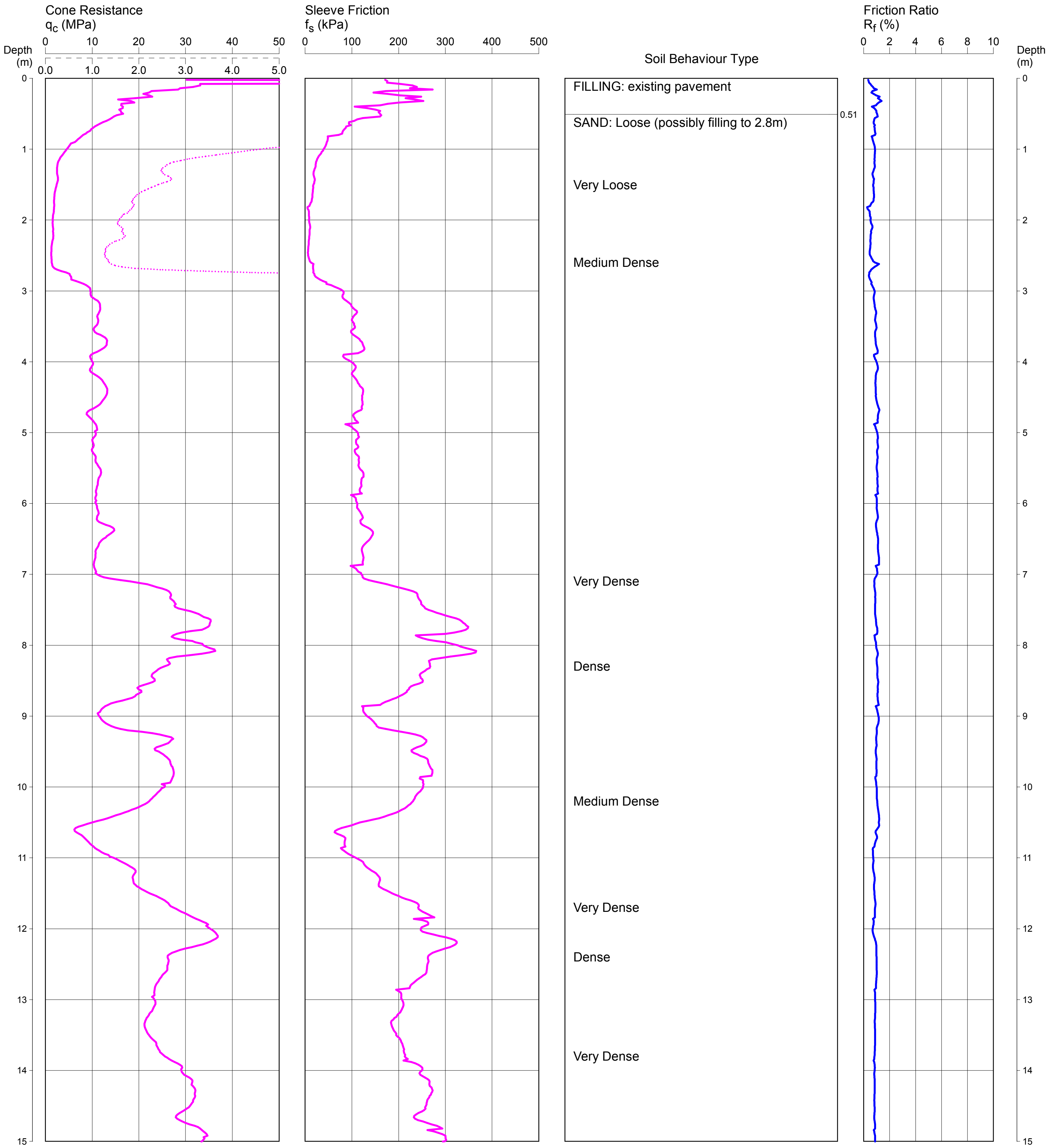
REDUCED LEVEL: 53.0

COORDINATES: AHD

CPT T11

DATE 12 APR 2000

PROJECT No: 28900



REMARKS: HOLE COLLAPSE AT 3.8 METRES DEPTH

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Cone ID: CONE-157 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: COLIN GING AND PARTNERS

PROJECT: MORIAH WAR MEMORIAL COLLEGE

LOCATION: QUEENS PARK ROAD, BONDI JUNCTION

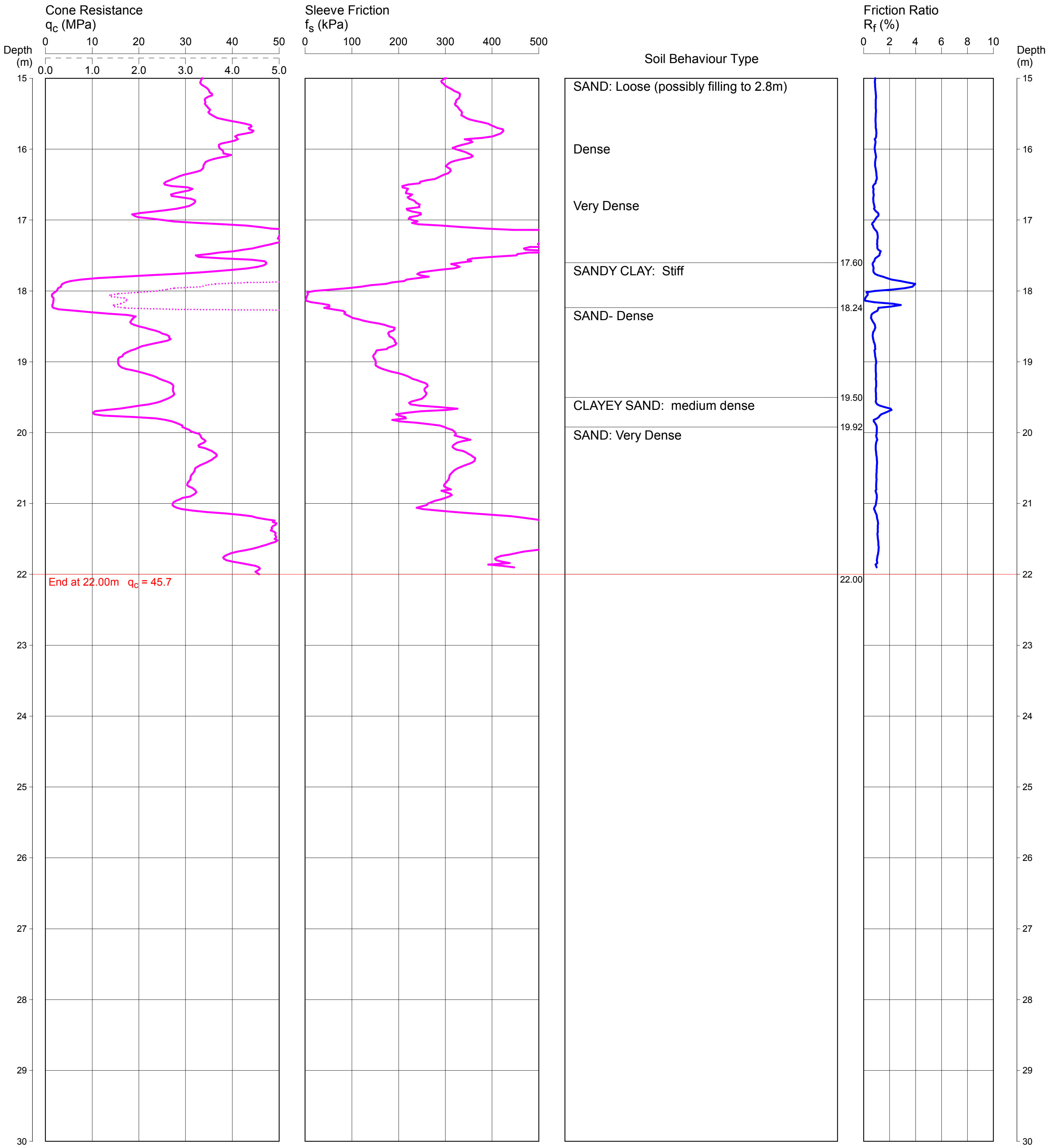
REDUCED LEVEL: 53.0

COORDINATES: AHD

CPT T11

DATE 12 APR 2000

PROJECT No: 28900



REMARKS: HOLE COLLAPSE AT 3.8 METRES DEPTH

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ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: COLIN GING AND PARTNERS

PROJECT: MORIAH WAR MEMORIAL COLLEGE

LOCATION: QUEENS PARK ROAD, BONDI JUNCTION

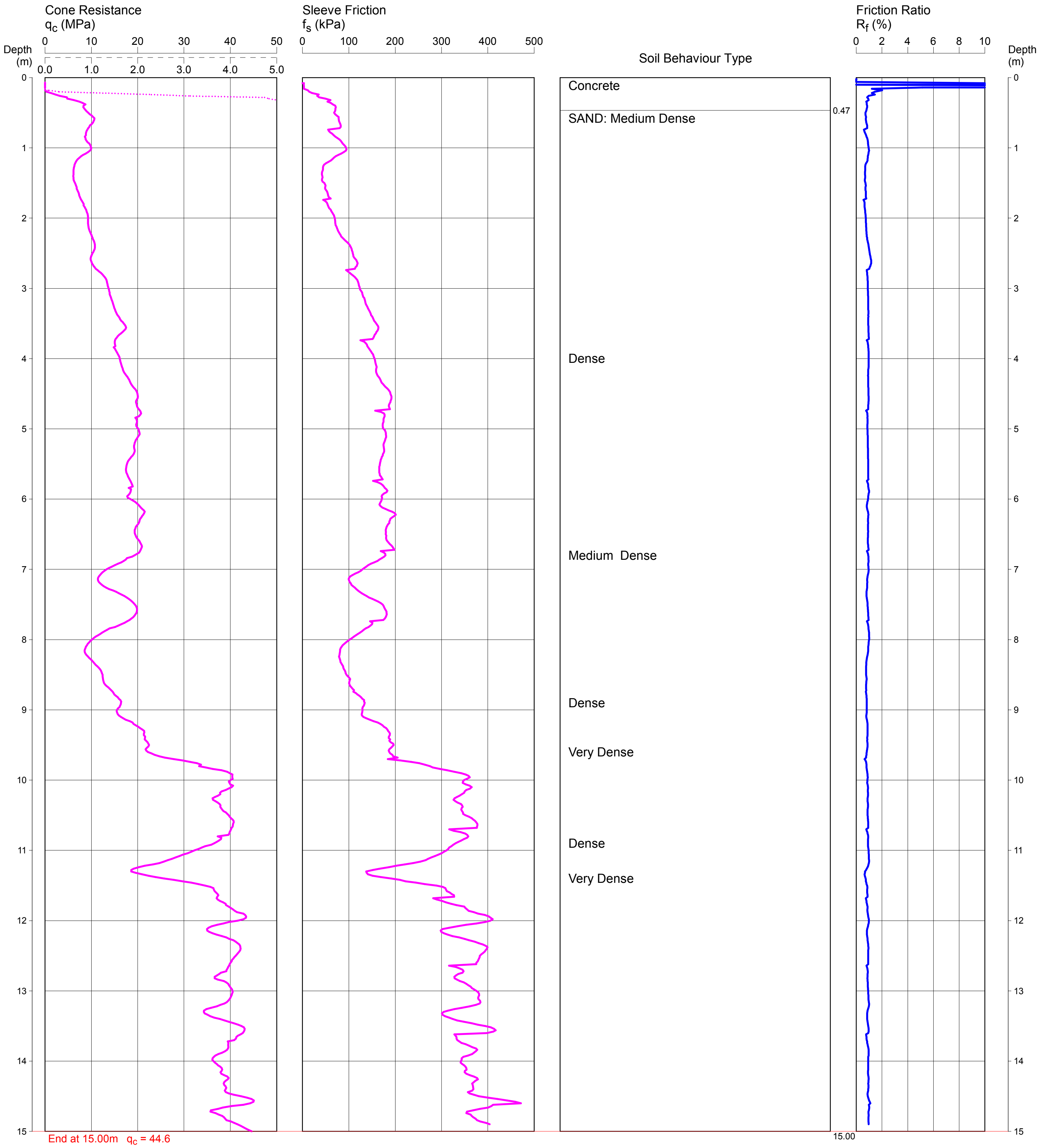
REDUCED LEVEL: 50.0

COORDINATES: AHD

CPT T12

DATE 13 APR 2000

PROJECT No: 28900



REMARKS: HOLE COLLAPSE AT 7.2 METRES DEPTH

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Cone ID: CONE-157 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: COLIN GING AND PARTNERS

PROJECT: MORIAH WAR MEMORIAL COLLEGE

LOCATION: QUEENS PARK ROAD, BONDI JUNCTION

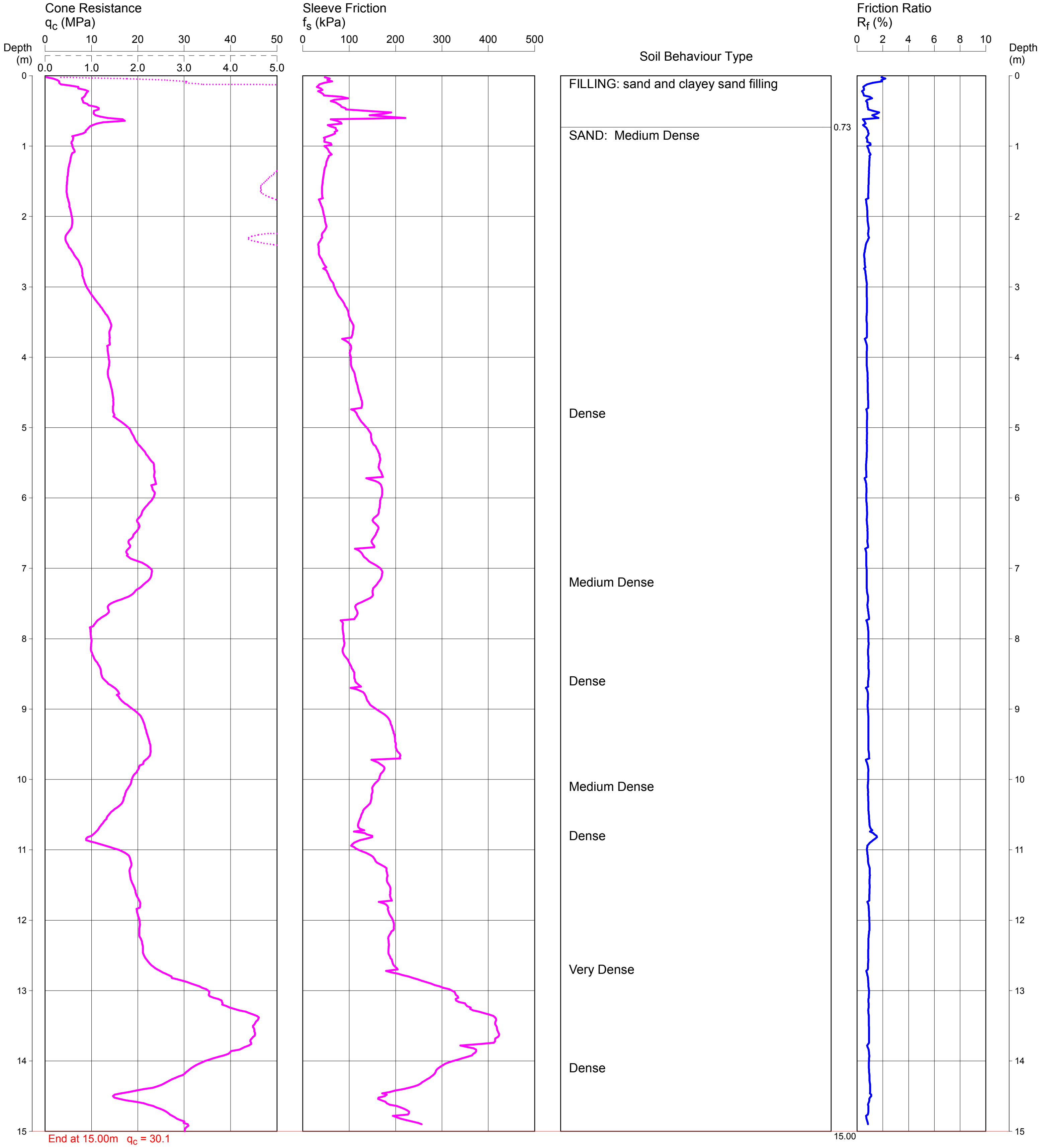
REDUCED LEVEL: 52.9

COORDINATES:

CPT T13

DATE 13 APR 2000

PROJECT No: 28900



REMARKS: NO FREE GROUND WATER TO 8 METRES DEPTH

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Cone ID: CONE-157 **Type:** 2 Standard

ConePlot Version 5.9.2

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