
M/s. AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

SOIL INVESTIGATION WORKS AT LIM CHU KANG AND

SUNGEI TENGAH

REPORT NO.12 (BH34 to BH51)

Soil Investigation Report

Appendices of

Tables, Figure, Dwg, Logs, Photo, Field, Cross-section and Lab



SOIL INVESTIGATION PTE LTD

Prepared By:	Reviewed By:	Approved By P.E:
Kyi Kyi Moe	Aung Thura	Lee Hong Keow
		



REPORT No.: SIL/S7518/15/SI

DATE SUBMITTED: 26 October 2015

Blk 14 Little Road #06-01 Singapore 536987
Tel : 65-67456765 Fax : 65-67471733
E-mail: soil@soilinvestigation.com.sg Website: www.soilinvestigation.com.sg

Certification by Professional Engineer for Site Investigation Report

1. I, Lee Hong Keow the Professional Engineer, PE Registration No. 2307 certify that the
Site Investigation Report
Soil Investigation Works at Lim Chu Kang and Sungei Tengah
Lim Chu Kang
comprising all field and laboratory data, tests and results therein has been carried out by me or
under my supervision or direction, and I have verified the accuracy of the information given in
the site investigation report, and to the best of my knowledge and belief, all have been prepared
in compliance in all respects with the provisions of the Building Control Act and Regulations,
relevant Codes of Practice and Standards.
2. I further certify that I have the appropriate qualifications and experience, and I am familiar with
the purpose of the investigation for which this Site Investigation Report is prepared in reference
to Project Ref. No: SIL/S7518/15/SI
3. Total number of pages in the Site Investigation Report is 377



Professional Engineer for Site Investigation Signature and Stamp

26 October 2015

Date

CONTENTS

	Page
1.0 INTRODUCTION	1
1.1 General	
1.2 Project Description	
2.0 SCOPE OF WORK	2
2.1 General	
2.2 Description of Field Investigation	
2.2.1 Soil Boring and Sampling	
2.2.2 Standard Penetration Test	3
2.2.3 Installation and Monitoring of Water Standpipes	
2.3 Description of Laboratory Testing	4
2.3.1 General	
2.3.2 Code of Practice	
2.3.3 Physical Properties	
2.3.3.1 Moisture Content, Bulk & Dry Density	
2.3.3.2 Atterberg Limits	
2.3.3.3 Particle Density	
2.3.3.4 Particle Size Distribution	
2.3.4 Strength and Compressibility Properties	5
2.3.4.1 Unconsolidated Undrained (UU) Triaxial Compression Test	
2.3.4.2 Consolidated Undrained (CU) Triaxial Compression Test	
2.3.4.3 Unconfined Compression (UCT) Triaxial Compression Test	
2.3.4.4 Oedometer Consolidation Test	
3.0 SUB-SURFACE CONDITION	6
3.1 General Geology	
3.2 Description of Soil Classification	7-16
3.3 List of Geological Cross-Sections	17

APPENDICES

TABLES

1.1	Quantities of Field Works	18
1.2	Quantities of Laboratory Tests	19
1.3	Certificate of Accreditation	20-22
3.1	Geological Classification - Description of Soil and Rock Types	23-24
3.2	Identification and Description of Soils	25-26
3.3	Aid To Identification of Rocks For Engineering Purposes	27-28
3.4	Rock Weathering Classification	29-30

FIGURES

2.1	Illustration of Boring Work	31
2.2	Standard Penetration Test	32
2.3	Plasticity Chart	33
2.4	Installation and Monitoring of Water Standpipe	34

DWG	Borehole Location Plans	35-37
------------	-------------------------	-------

LOGS	Borehole Logs, Field Test & Laboratory Test Results	38-75
-------------	---	-------

PHOTO	Site Photos	76-93
--------------	-------------	-------

FIELD	Water Standpipe	94-114
--------------	-----------------	--------

CROSS-SECTION		115-120
----------------------	--	---------

LABORATORY

Summary of Laboratory Test Results	121-128
Particle Density Test	129-153
Atterberg Limits Test	154-170
Particle Size Distribution Test	171-188
Unconsolidated Undrained Triaxial Compression Test	189-248
Consolidated Undrained Triaxial Compression Test	249-326
Unconfined Compression Test	327-344
Consolidation Test	345-377

1.0 INTRODUCTION

1.1 General

Soil Investigation Pte Ltd was engaged to carry out Soil Investigation Works at Lim Chu Kang and Sungei Tengah for **AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE**. The field exploration and tests described in this report were carried out as per specification and under the technical direction of the client.

1.2 Project Description

(a) *Title of Project*

SOIL INVESTIGATION WORKS AT LIM CHU KANG AND SUNGEI TENGAH

(Boreholes: **BH34 TO BH51**) – Total Eighteen (18) boreholes.

(b) *Client*

AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

(c) *Geotechnical Contractor*

SOIL INVESTIGATION PTE LTD

(d) *Soil and Rock Testing Laboratories*

Soil Investigation Pte Ltd – soil testing

(e) *Duration of Investigation Works*

24 August 2015 to 08 September 2015

(f) *Purpose of Work*

The purpose of the investigation works by eighteen (18) boreholes (BH34 to BH51) and by laboratory tests on soil samples is to explore the subsurface soil conditions at the proposed borehole locations.

(g) *Quantities of Field Works & Laboratory Tests*

The quantities of field works are shown in Table 1.1 and the quantities of laboratory tests are shown in Table 1.2.

2.0 SCOPE OF WORK

2.1 General

Site investigation, including boring work, field tests were carried out in accordance with BS 5930: 1999 "Code of Practice for Site Investigations", from 24 August 2015 to 08 September 2015. All of the field works were carried out by Soil Investigation Pte Ltd under the supervision of our supervisors.

2.2 Description of Field Investigation

2.2.1 Soil Boring and Sampling

Setting out the borehole points and cable detection works were carried out at each borehole location to detect the existence of any buried services prior to commencement of the site investigation work. A registered surveyor was engaged to mark the proposed locations and the as-built locations of all boreholes are given in the Borehole Location Plans depicted in the Appendices of DWG.

Trial pit followed by hand augering down to 2.0m depth was conducted at each borehole before the commencement of drilling works. The borehole was drilled by rotary method. The diameter of the borehole is 100mm.

Disturbed and Undisturbed soil samples were taken from each borehole. The first surface soil sample was taken during digging of trial pit at 0.30 to 0.50m below ground level (bgl) and the next sample was taken by thin-wall sampler.

Undisturbed soil samples were recovered by using Thin-Walled samplers for the soils that are particularly sensitive to sampling disturbance, and consist of a thin-walled steel tube whose lower end is shaped to form a cutting edge with a small inside clearance. These samplers are suitable only for fine soils up to a firm consistency, and free from large particles. They generally give class (1) samples in all fine cohesive soils, including sensitive clays, provided that the soil has not been disturbed by sinking the borehole. 75mm diameter samples are normally obtained. Both sides of the samplers are properly sealed by wax, properly labeled and kept under the shade by standing rack till end of working hour daily before sending to the laboratory.

All boreholes were backfilled with cement/bentonite grout upon completion of drilling unless installation of instrument was carried out. Reinstatement works were performed as appropriate to restore the original site condition.

2.2.2 Standard Penetration Test

Standard penetration tests were carried out 2.00m interval for the first 6.00m depth and afterward 3.00m interval till end of the borehole and the tests were carried out in accordance with BS 1377: 1990. The SPT tests service for the following purposes:

- a) to determine the relative density or consistency of soils, and
- b) to recover disturbed samples for visual inspection.

This empirical dynamic penetration test determines the resistance of soils to the penetration of a split barrel sampler (spoon sampler) of 50mm external diameter, driven by a 63.5 kg automatic drop hammer, allowing a free fall of 760mm. The penetration resistance, N value is the number of blows required to effect a 300mm penetration below the seating drive which was, for this project, taken as completed at 25 blows or 150mm penetration. Standard penetration tests were also conducted when the subsoils were too stiff for undisturbed soil samples to be obtained. SPT samples were kept inside two containers.

The values of N obtained in this investigation are recorded in borehole logs attached in the Appendices of LOGS.

2.2.3 Installation & Monitoring of Water Standpipes

Seven (7) water standpipes were installed in selected completed borehole BH35, BH38, BH41, BH44, BH45, BH47 & BH49 and at 6.00 to 9.00m depths. A slotted 50mm diameter PVC pipe was installed at the installation depth followed by backfilling of borehole with clean sand.

A typical installation detail of a water standpipe is given in Figure 2.4.

The water standpipe installation data and monitoring results are shown in the Appendices of FIELD. It should be noted that other factors like heavy rain, tidal fluctuation and type of fill materials used, as well as construction activities might affect the direction of groundwater flow.

2.3 Description of Laboratory Testing

2.3.1 General

The laboratory test program is to evaluate the soil properties as scheduled by the Client. All laboratory tests were carried out at SAC-SINGLAS accredited laboratory of Soil Investigation Pte Ltd.

Summary of laboratory test results in the Appendices of LAB while the detailed test reports are attached in the Appendices of LABORATORY.

2.3.2 Code of Practice

Unless mentioned otherwise, the following tests were carried out in accordance with BS1377: 1990 - "Methods of Test for Civil Engineering Purposes".

2.3.3 Physical Properties

2.3.3.1 Moisture Content, Bulk & Dry Density

Moisture content, bulk & dry density of representative soil sample was determined for the identification, classification and correlation of the soil types encountered.

2.3.3.2 Atterberg Limits

Atterberg Limits was conducted to aid the soil classification. Primarily, plasticity index, liquid and plastic limits were determined.

2.3.3.3 Particle Density

The particle density of the soil samples was determined its value given by the ratio between the mass of dry solids and the mass of distilled water displaced by dry soil particles.

2.3.3.4 Particle Size Distribution

Grain size distribution in soil sample was determined for classification purposes. The percentages retained or passing through the specified sieves were plotted. The results are presented as grading curves.

2.3.4 Strength and Compressibility Properties

2.3.4.1 Unconsolidated Undrained (UU) Triaxial Compression Test

Unconsolidated undrained triaxial compression test was conducted to determine the undrained shear strength of the soil. The soil specimen is subjected to a constant confining pressure and to strain-controlled axial loading, when no change in total moisture content is allowed. The axial load is increased by applying a constant rate of strain until the specimen fails.

2.3.4.2 Consolidated Undrained (CU) Triaxial Compression Test

Consolidated undrained triaxial compression test was conducted to determine the effective parameters of the soil. Drainage of the soil specimen is permitted under a specified all-round pressure until consolidation is complete; the principal stress difference is then applied with no drainage being permitted. Pore water pressure measurements are made during the undrained part of the test.

2.3.4.3 Unconfined Compression (UCT) Triaxial Compression Test

Several cohesive soil samples were subjected to unconfined Compression test which measures the compressive strength of a cylinder of soil to which no lateral support is offered. The shear strength is taken as equal to half the compressive strength.

2.3.4.4 Oedometer Consolidation Test

Consolidation tests were performed to assess the compressibility characteristics of the strata encountered. One dimensional Oedometer test was conducted and the results presented as plots of void ratio, e vs. pressure, P . The tests were carried out in accordance with BS 1377: Part 5: 1990, and obtained the C_v results in accordance with item 3.6.3.3 Square root time curve-fitting method.

3.0 SUB-SURFACE CONDITION

3.1 General Geology

Gombak Norite, Palaeozoic Volcanics and sediments of Sajahat Formation were considered as the oldest geological records in Singapore. Granite emplacement in central and eastern Singapore may have commenced in late Permian time, but was most pronounced in early Triassic time. There were evidences of assimilation, mineral segregation and the production of several phases of hybrid rock, and a mixing of the hybrid rock types could be observed as marginal facies of the Bukit Timah Granite.

As a plutonic mass continued to rise in fairly slow pace to allow for deep weathering of the covering strata and deposition of the Jurong Formation took place in the backarc sedimentary basin. This basin was to be considered as an active basin throughout sedimentation as evidenced by the rapid variation in facies changes from marine to terrestrial sedimentation and vice-versa.

Tectonic movement, accompanied by volcanic activity, giving spilite, dolerite and tuff, was taken place together with faulting in the sediments of both marine and terrestrial deposits. But by mid-Jurassic time, Singapore was to be thought above sea-level and there were no sedimentation in that period. Faulting and folding might have continued however for a short period.

There was no evidence of any further geological events in Singapore from early Jurassic until late Tertiary time. The Old Alluvium was then deposited as a thick pile of alluvial to deltaic deposits of coarse sand with occasional incursions of marine sediment. Sedimentation continued through into the Pleistocene. The nature of the sediment suggested that the province of the source rock was of a well exposed quartz-rich, probably granite terrain, and a far lower rate of chemical weathering than was experienced today.

Tectonic activity appeared to have recommenced in late Tertiary time giving rise to a trough which now plunges to the south beneath the Old Alluvium on the eastern side of Singapore.

Fort Canning Boulder Bed (FCBB) was deposited along limited areas of eastern flank of relatively higher land (Fort Canning Hill), mainly composed of gravel to boulder sized quartzose sandstone, probably derived from Rimau Facies of Jurong Formation, with stiff sandy/silty clay matrix. The origin and formation of this bed is still in questions. A tectonic fault, land sliding process and mud flow inside the boulders are all acceptable processes. Some field evidences showed that the formation of FCBB took place during the deposition of Old Alluvium. When Old Alluvium was formed as alluvial deposit in an open trough

with different provinces or source of sediments, FCBB was deposited near the uplifted fault block as colluvial deposit.

Because of the requirement of a cool dry climate to provide the necessary detritus, it appeared that the Old Alluvium must have been deposited rapidly in an initially subsiding trough during a transition from glacial to interglacial conditions.

Lowering of sea-levels associated with the inter-stadials of the last Wurm Glaciation was recorded as a next geological event in Singapore. Erosion was vigorous throughout Singapore and rivers down cut their valleys. These valleys were back filled with both the Alluvial and Marine Members of the Kallang Formation as the sea transgressed, but during the regression of the sea, the rivers re-excavated its sediments. The older deposits of the Kallang Formation were exposed to the atmosphere at this time and were both desiccated and weathered to form the stiff red brown clay found within the Marine Members. At the end of the Pleistocene glacial period, sea-level transgressed again (up to about 6m above present sea-level) at about 6,000 BP to 7,000 BP, to allow for the deposition of the Tekong Formation, and also the renewed deposition of the Alluvial and Marine Members in the drowned river valleys. Minor fluctuations of sea-level continued through to the present.

The area under investigation is mainly composed of Fill, Kallang Formation and Old Alluvium deposits.

3.2 Description of Soil Classification

The present site investigation report is mainly based on the LTA's "Guidance Note on Weathering Classification and Descriptions". (Table 3.1& 3.4) and Code of practice for site investigations, British Standard BS5930:1999 (Table 3.2 & 3.3)

Based on the borehole data and in-situ tests results obtained from the boreholes, the underlying subsoil can be sub-divided into the following layers:

- FILL
- KALLANG FORMATION
- OLD ALLUVIUM

Following table 3.2 is a summary of Geological Units.

3.2 Summary of Geological Units

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH34	0.00	2.70			Slightly gravelly fine to coarse sandy SILT	MG	(MADE GROUND)
	2.70	2.90			Slightly fine sandy CLAY	F2	(KALLANG FORMATION)
	2.90	4.00	0	0	Peaty CLAY	E	
	4.00	6.00	6	6	Slightly sandy SILT	F2	
	6.00	9.00	11	11	Slightly sandy CLAY	O(D)	
	9.00	18.00	32	48	Slightly fine sandy CLAY	O(C)	
	18.00	24.00	62	66	Slightly fine sandy SILT	O(B)	
	24.00	27.00	100	100	Fine sandy SILT	O(A)	
	27.00	30.36	100	100	Fine sandy CLAY		
	BH35	0.00	2.00			Slightly gravelly fine to coarse sandy SILT	MG
2.00		6.00	8	9	Slightly fine sandy CLAY	F2	(KALLANG FORMATION)
6.00		9.00	11	11	Slightly sandy CLAY	O(D)	(OLD ALLUVIUM)
9.00		9.25	38	38	Clayey fine to coarse SAND	O(C)	
9.25		12.00			Slightly fine sandy CLAY		
12.00		15.00	64	64	Slightly fine sandy CLAY	O(B)	
15.00		21.00	59	82	Silty fine to medium SAND		
21.00		24.00	100	100	Slightly fine sandy CLAY	O(A)	
24.00		27.00	100	100	Fine to medium sandy SILT		
27.00		30.00	100	100	Slightly fine sandy CLAY		
30.00	30.28	100	100	Fine sandy SILT			

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH36	0.00	2.00			Sandy SILT	MG	(MADE GROUND)
	2.00	4.00	6	6	Sandy SILT		
	4.00	6.00	5	5	Slightly sandy CLAY	F2	(KALLANG FORMATION)
	6.00	9.00	8	8	Slightly sandy SILT		
	9.00	12.00	23	23	Slightly sandy CLAY	O(D)	
	12.00	18.00	31	41	Slightly sandy CLAY	O(C)	
	18.00	24.00	67	86	Slightly sandy CLAY	O(B)	(OLD ALLUVIUM)
	24.00	27.00	100	100	Silty fine to medium SAND		
	27.00	30.38	100	100	Slightly fine sandy CLAY	O(A)	
BH37	0.00	1.50			Slightly gravelly fine to coarse sandy CLAY	MG	(MADE GROUND)
	1.50	4.00	3	3	Fine sandy SILT		
	4.00	4.40			Peaty CLAY	E	
	4.40	6.00	4	4	Slightly sandy CLAY	F2	(KALLANG FORMATION)
	6.00	9.00	6	6	Slightly sandy SILT		
	9.00	15.00	18	29	Sandy SILT	O(D)	
	15.00	18.00	43	43	Silty fine to medium SAND		
	18.00	21.00	40	40	Silty fine to coarse SAND	O(C)	
	21.00	24.00	65	65	Slightly fine sandy CLAY		
	24.00	27.00	77	77	Fine sandy CLAY	O(B)	(OLD ALLUVIUM)
	27.00	30.00	78	78	Fine to medium sandy SILT		
	30.00	33.00	63	63	Fine sandy SILT		
	33.00	36.00	100	100	Silty fine to medium SAND		
	36.00	39.31	100	100	Silty fine to coarse SAND	O(A)	

3.2 Summary of Geological Units (Continued)

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH38	0.00	2.90			Slightly gravelly fine to coarse sandy SILT	MG	(MADE GROUND)
	2.90	3.20	3	3	Silty fine to coarse SAND	F1	(KALLANG FORMATION)
	3.20	6.00	4	4	Slightly sandy CLAY	F2	
	6.00	9.00	9	9	Sandy SILT	O(E)	
	9.00	12.00	22	22	Slightly sandy SILT	O(D)	
	12.00	15.00	31	31	Fine sandy SILT	O(C)	
	15.00	18.00	53	53	Slightly fine sandy CLAY	O(B)	
	18.00	21.00	62	62	Slightly fine sandy CLAY		
	21.00	24.00	58	58	Fine sandy SILT		
	24.00	27.00	100	100	Slightly fine sandy CLAY	O(A)	
	27.00	30.00	100	100	Silty fine to medium SAND		
	30.00	30.41	100	100	Slightly fine sandy CLAY		
BH39	0.00	5.00	8	8	Slightly sandy SILT	MG	(MADE GROUND)
	5.00	5.90			Slightly gravelly sandy SILT	F2	(KALLANG FORMATION)
	5.90	8.40	5	5	Slightly sandy CLAY		
	8.40	12.00	23	23	Slightly sandy CLAY		
	12.00	15.00	28	28	Sandy CLAY	O(D)	(OLD ALLUVIUM)
	15.00	21.00	43	46	Slightly sandy CLAY	O(C)	
	21.00	24.00	74	74	Slightly sandy CLAY	O(B)	
	24.00	27.00	100	100	Slightly sandy CLAY	O(A)	
	27.00	30.00	100	100	Silty SAND		
	30.00	30.28	100	100	Silty SAND		

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH40	0.00	2.50			Slightly sandy SILT	MG	(MADE GROUND)
	2.50	3.00			Slightly clayey SAND		
	3.00	5.00	7	7	Slightly sandy SILT	F2	(KALLANG FORMATION)
	5.00	5.90			Slightly sandy CLAY		
	5.90	8.50	16	16	Slightly sandy CLAY	O(D)	(OLD ALLUVIUM)
	8.50	12.00	25	25	Slightly gravelly clayey SAND		
	12.00	15.00	28	28	Slightly sandy CLAY		
	15.00	18.00	55	55	Slightly sandy CLAY	O(B)	(OLD ALLUVIUM)
	18.00	21.00	52	52	Silty SAND		
	21.00	24.00	87	87	Sandy CLAY		
	24.00	27.00	100	100	Sandy SILT	O(A)	(OLD ALLUVIUM)
	27.00	29.50	100	100	Silty SAND		
BH41	29.50	30.28	100	100	Slightly sandy SILT	MG	(MADE GROUND)
	0.00	5.70	4	4	Slightly gravelly slightly sandy SILT		
	5.70	5.90			Peaty SILT	E	(KALLANG FORMATION)
	5.90	9.00	6	6	Very fine sandy SILT	F2	
	9.00	9.50			Slightly sandy CLAY	O(C)	(OLD ALLUVIUM)
	9.50	12.00	44	44	Very gravelly very clayey SAND		
	12.00	18.00	40	46	Silty fine to coarse SAND		
	18.00	21.00	62	62	Slightly sandy SILT	O(B)	(OLD ALLUVIUM)
	21.00	24.00	72	72	Fine sandy SILT		
	24.00	27.00	86	86	Silty fine to coarse SAND		
	27.00	30.00	100	100	Silty fine to medium SAND	O(A)	(OLD ALLUVIUM)
	30.00	33.24	100	100	Silty fine to coarse SAND		

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH42	0.00	4.50	3	3	Slightly gravelly sandy CLAY	MG	(MADE GROUND)
	4.50	6.20			Peaty CLAY	E	(KALLANG FORMATION)
	6.20	9.00	9	9	Silty fine to coarse SAND	O(E)	(OLD ALLUVIUM)
	9.00	12.00	14	14	Slightly gravelly sandy SILT	O(D)	
	12.00	15.00	22	22	Slightly gravelly fine to medium silty SAND	O(D)	
	15.00	18.00	36	36	Silty fine to medium SAND	O(C)	
	18.00	24.00	55	56	Silty fine to coarse SAND	O(B)	
	24.00	27.00	81	81	Silty fine to medium SAND	O(B)	
	27.00	30.00	100	100	Slightly gravelly fine to coarse silty SAND	O(A)	
	30.00	33.34	100	100	Silty fine to medium SAND	O(A)	
BH43	0.00	4.00	5	5	Slightly sandy SILT	MG	(MADE GROUND)
	4.00	4.50			Peaty CLAY	E	(KALLANG FORMATION)
	4.50	6.00	2	2	Sandy CLAY	O(E)	(OLD ALLUVIUM)
	6.00	9.00	8	8	Gravelly very clayey SAND	O(E)	
	9.00	12.00	14	14	Slightly gravelly sandy SILT	O(D)	
	12.00	18.00	34	36	Silty fine to coarse SAND	O(C)	
	18.00	21.00	41	41	Slightly gravelly silty fine to coarse SAND	O(C)	
	21.00	27.00	67	69	Slightly gravelly silty fine to coarse SAND	O(B)	
	27.00	30.00	88	88	Silty very fine SAND	O(B)	
	30.00	33.00	92	92	Slightly gravelly silty fine to coarse SAND	O(B)	
	33.00	36.00	100	100	Slightly gravelly sandy SILT	O(A)	
	36.00	39.21	100	100	Silty fine to coarse SAND	O(A)	

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH44	0.00	2.50			Slightly sandy SILT	MG	(MADE GROUND)
	2.50	4.00	2	2	Peaty CLAY	E	(KALLANG FORMATION)
	4.00	6.00	5	5	Slightly sandy SILT	F2	
	6.00	9.00			Slightly sandy CLAY		
	9.00	15.00			Silty fine to coarse SAND	O(D)	(OLD ALLUVIUM)
	15.00	18.00	86	86	Silty very fine SAND	O(B)	
	18.00	21.00	71	71	Slightly gravelly fine to coarse silty SAND		
	21.00	24.00	89	89	Silty fine to coarse SAND		
	24.00	27.00	61	61	Sandy SILT		
	27.00	30.00	74	74	Slightly gravelly fine to coarse silty SAND	O(A)	
	30.00	33.00	100	100	Silty very fine SAND		
	33.00	36.25	100	100	Slightly gravelly fine to coarse silty SAND		
BH45	0.00	2.00			Slightly gravelly silty SAND	MG	(MADE GROUND)
	2.00	2.90			Silty fine SAND	F1	(KALLANG FORMATION)
	2.90	6.00	1	3	Slightly sandy CLAY	F2	
	6.00	9.00	19	19	Sandy SILT	O(D)	(OLD ALLUVIUM)
	9.00	15.00	55	62	Fine sandy CLAY	O(B)	
	15.00	33.00	65	85	Fine sandy SILT		
	33.00	36.00	100	100	Fine sandy SILT	O(A)	
	36.00	39.00	100	100	Fine sandy SILT		
	39.00	39.24	100	100	Silty fine SAND		

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH46	0.00	2.50			Slightly gravelly silty SAND	MG	(MADE GROUND)
	2.50	4.00	3	3	Peaty CLAY	E	
	4.00	6.00	2	2	Slightly sandy CLAY	F2	(KALLANG FORMATION)
	6.00	6.90			Slightly sandy SILT		
	6.90	9.00	11	11	Silty fine SAND	O(D)	
	9.00	12.00	22	22	Fine sandy SILT		
	12.00	21.00	35	74	Fine sandy SILT		
	21.00	24.00	78	78	Silty fine SAND	O(B)	(OLD ALLUVIUM)
	24.00	27.00	78	78	Silty fine SAND		
	27.00	30.00	100	100	Fine sandy SILT		
BH47	30.00	33.00	100	100	Silty fine SAND	O(A)	
	33.00	33.28	100	100	Fine sandy SILT		
	0.00	1.50			Slightly gravelly sandy SILT	MG	(MADE GROUND)
	1.50	4.00	4	4	Slightly sandy SILT		
	4.00	4.90			Peaty SILT	E	(KALLANG FORMATION)
	4.90	9.00	7	8	Slightly sandy CLAY	F2	
	9.00	9.90			Slightly sandy SILT		
	9.90	12.00	15	15	Slightly sandy CLAY	O(D)	
	12.00	15.00	21	21	Slightly sandy CLAY		
	15.00	18.00	31	31	Slightly sandy SILT	O(C)	(OLD ALLUVIUM)
	18.00	21.00	75	75	Silty fine to coarse SAND		
	21.00	30.00	55	76	Slightly sandy SILT	O(B)	
	30.00	36.00	100	100	Slightly sandy CLAY		
	36.00	36.38	100	100	Silty fine to coarse SAND	O(A)	
	36.38	36.38			Silty fine to coarse SAND		

3.2 Summary of Geological Units (Continued)

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH48	0.00	2.00			Slightly gravelly sandy SILT	MG	(MADE GROUND)
	2.00	4.00	7	7	Slightly gravelly sandy SILT		
	4.00	4.50			Peaty SILT	E	
	4.50	6.00	5	5	Slightly fine sandy CLAY	F2	
	6.00	7.10	8	8	Very clayey SAND	F1	(KALLANG FORMATION)
	7.10	9.70			Slightly sandy CLAY	F2	
	9.70	12.00	21	21	Slightly fine sandy SILT	O(D)	
	12.00	15.00	32	32	Slightly fine sandy SILT	O(C)	
	15.00	21.10	36	95	Slightly fine sandy SILT		
	21.10	24.00			Slightly silty fine to medium SAND	O(B)	(OLD ALLUVIUM)
	24.00	27.00	93	93	Slightly fine sandy SILT		
	27.00	30.00	100	100	Slightly fine sandy SILT	O(A)	
BH49	30.00	30.20	100	100	Fine to medium sandy SILT		
	30.20	33.00			Slightly silty fine to coarse SAND		
	33.00	33.38	100	100	Fine sandy SILT		
	0.00	2.20			Sandy SILT	MG	(MADE GROUND)
	2.20	4.00	0	0	Peaty CLAY	E	
	4.00	6.00	4	4	Slightly sandy SILT	F2	(KALLANG FORMATION)
	6.00	9.00	7	7	Slightly sandy CLAY		
	9.00	9.90			Slightly sandy SILT		
	9.90	12.00	32	32	Slightly fine sandy SILT	O(C)	
	12.00	15.00	36	36	Fine to coarse sandy SILT		
	15.00	18.00	47	47	Slightly fine sandy SILT		
	18.00	24.00	62	93	Slightly fine sandy SILT		
	24.00	27.00	96	96	Slightly silty fine to coarse SAND	O(B)	(OLD ALLUVIUM)
	27.00	30.00	100	100	Slightly fine sandy SILT		
	30.00	33.00	100	100	Slightly silty fine to coarse SAND	O(A)	
	33.00	33.40	100	100	Slightly fine sandy SILT		

3.2 Summary of Geological Units (Continued')

Bore Hole No.	Depth of layer		SPT Results		Soil/Rock Description	Geological Units	
	Top (m)	Btm.(m)	Min	Max		Type Name	Others
BH50	0.00	2.90			Slightly sandy SILT	MG	(MADE GROUND)
	2.90	4.50	2	2	Slightly gravelly slightly sandy SILT		
	4.50	4.90			Peaty SILT	E	
	4.90	7.00	6	9	Silty fine to coarse SAND	F1	(KALLANG FORMATION)
	7.00	12.00	10	10	Slightly sandy CLAY	O(D)	
	12.00	15.00	14	14	Silty fine SAND		
	15.00	18.00	38	38	Fine sandy SILT	O(C)	
	18.00	21.00	52	52	Silty fine to coarse SAND		
	21.00	24.00	68	68	Fine sandy SILT	O(B)	(OLD ALLUVIUM)
	24.00	27.00	100	100	Silty fine to coarse SAND		
BH51	27.00	30.40	100	100	Very fine sandy SILT	O(A)	
	0.00	4.00	1	1	Slightly gravelly sandy SILT	MG	(MADE GROUND)
	4.00	4.90			Slightly sandy SILT	F2	
	4.90	6.00	2	2	Peaty CLAY	E	(KALLANG FORMATION)
	6.00	9.00	3	3	Slightly sandy CLAY		
	9.00	9.90			Slightly sandy SILT	F2	
	9.90	12.00	12	12	Very fine sandy SILT		
	12.00	15.00	27	27	Silty fine to medium SAND	O(D)	
	15.00	18.00	50	50	Slightly sandy SILT	O(C)	
	18.00	24.00	54	55	Fine sandy SILT		
	24.00	30.00	59	71	Silty fine to coarse SAND		
	30.00	33.00	88	88	Silty very fine SAND	O(B)	(OLD ALLUVIUM)
	33.00	36.00	100	100	Silty fine SAND		
	36.00	39.00	100	100	Silty fine to medium SAND		
	39.00	39.20	100	100	Slightly gravelly fine to coarse silty SAND	O(A)	

3.3 List of Geological Cross-Sections

SECTION	BOREHOLES
1	BH34 – BH45
2	BH35 – BH46
3	BH36 – BH47 – BH48 – BH49
4	BH37 – BH50 – BH51
5	BH38 – BH39 – BH40 – BH41
6	BH41 – BH42 – BH43 – BH44

TABLE 1.1
QUANTITIES OF FIELD WORKS

TABLE 1.1
QUANTITIES OF FIELD WORKS

Project : Soil Investigation Works at Lim Chu Kang and Sungei Tengah (Report No.12)

Borehole No.	Termination Depth	Drilling in Soil	Drilling in Rock	Water Standpipe	Casagrande Piezometer	Pneumatic VW Piezometer	SPT	Thin Wall	Disturbed Sample	Piston Sample	Mazier Sample	Water Sample	Field Vane Shear Test	Packer Test	Permeability Test
	(m)	(m)	(m)	No	No	No	No	No	No	No	No	No	No	No	No
BH34	30.36	30.36	-	-	-	-	11	3	1	-	-	-	-	-	-
BH35	30.28	30.28	-	1	-	-	11	2	1	-	-	-	-	-	-
BH36	30.38	30.38	-	-	-	-	11	3	1	-	-	-	-	-	-
BH37	39.31	39.31	-	-	-	-	14	4	1	-	-	-	-	-	-
BH38	30.41	30.41	-	1	-	-	11	4	1	-	-	-	-	-	-
BH39	30.28	30.28	-	-	-	-	10	3	1	-	-	-	-	-	-
BH40	30.28	30.28	-	-	-	-	10	3	1	-	-	-	-	-	-
BH41	33.24	33.24	-	1	-	-	11	3	1	-	-	-	-	-	-
BH42	33.34	33.34	-	-	-	-	11	3	1	-	-	-	-	-	-
BH43	39.21	39.21	-	-	-	-	14	3	1	-	-	-	-	-	-
BH44	36.25	36.25	-	1	-	-	13	3	1	-	-	-	-	-	-
BH45	39.24	39.24	-	1	-	-	14	3	1	-	-	-	-	-	-
BH46	33.28	33.28	-	-	-	-	12	3	1	-	-	-	-	-	-
BH47	36.38	36.38	-	1	-	-	13	4	1	-	-	-	-	-	-
BH48	33.38	33.38	-	-	-	-	12	4	1	-	-	-	-	-	-
BH49	33.40	33.40	-	1	-	-	12	4	1	-	-	-	-	-	-
BH50	30.40	30.40	-	-	-	-	11	3	1	-	-	-	-	-	-
BH51	39.20	39.20	-	-	-	-	14	4	1	-	-	-	-	-	-
Total	608.62	608.62	0	7	0	0	215	59	18	0	0	0	0	0	0

Soil Investigation Pte Ltd

TABLE 1.2

QUANTITIES OF LABORATORY TESTS

TABLE 1.2

QUANTITIES OF LABORATORY TESTS

Project : Soil Investigation Works at Lim Chu Kang and Sungai Tengah (Report No.12)

Borehole	Moisture Content	Bulk Density	Dry Density	Atterberg Limits	Particle Density	Grain Size Analysis (Sieving)	Grain Size Analysis (Hydrometer)	Unconsolidated-Undrained (UU)	Consolidated-Undrained (CU)	Unconfined-Compression (UCT)	Consolidated-Drained (CD)	Consolidation	Uniaxial Compressive Strength (Rock)	Point Load Test (Rock)	Chemical Test (Soil)				Chemical Test (Water)			Toxicity (Soil)	Toxicity (Water)
															pH	SO3	Cl	OMS	pH	SO3	Cl		
(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	
BH34	3	3	3	2	2	2	2	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
BH35	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH36	2	2	2	2	2	2	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
BH37	4	4	4	3	3	3	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
BH38	6	6	6	3	3	3	3	3	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH39	5	5	5	2	2	2	2	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH40	5	5	5	2	2	2	2	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH41	5	5	5	1	4	4	4	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH42	4	3	3	2	2	2	2	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH43	2	2	2	-	2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH44	3	3	3	1	1	1	1	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH45	3	3	3	1	2	2	2	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
BH46	4	4	4	2	2	2	2	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH47	3	3	3	3	3	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH48	3	3	3	2	3	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH49	4	4	4	3	3	3	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
BH50	5	5	5	2	3	3	3	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
BH51	6	6	6	3	2	3	3	3	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Total	68	67	67	35	42	43	43	30	13	9	0	14	0	0	0	0	0	0	0	0	0	0	0

Soil Investigation Pte Ltd

TABLE 1.3

CERTIFICATE OF ACCREDITATION

Building and Construction Authority



CERTIFICATE OF LICENCE

This is to certify that

SOIL INVESTIGATION PTE. LIMITED

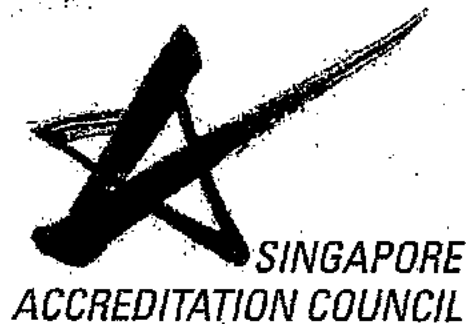
(Unique Entity Number / ACRA Registration Number: 197000207W)

is licensed as a
Specialist Builder (Site Investigation Work)
(16 Jun 2015 to 16 Jun 2018)

under the Building Control (Amendment) Act 2007 and
Building Control (Licensing of Builders) Regulations 2008

Commissioner of Building Control
Singapore

Date: 18 May 2015



**SINGAPORE
LABORATORY
ACCREDITATION SCHEME**

Number: LA-2000-0203-B
Date of Issue: 11 February 2012
Date of Expiry: 10 February 2016

Certificate of Accreditation

This certifies that

**Soil Investigation Pte Ltd
14 Little Road
#06-01 Tropical Industrial Building
Singapore 536987**

is accredited under the Singapore Accreditation Council
– Singapore Laboratory Accreditation Scheme to

ISO / IEC 17025 : 2005

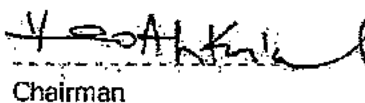
for specific tests/items within the field of

Civil Engineering Testing

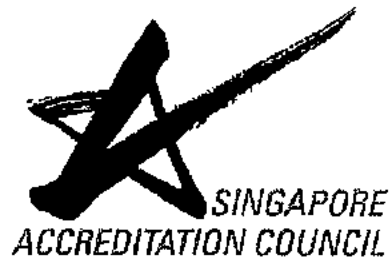
as detailed in the attached schedule.

This Certificate is awarded subject to the testing organisation's compliance with the prescribed regulations and technical requirements of the Singapore Accreditation Council – Singapore Laboratory Accreditation Scheme (SAC-SINGLAS).

This Certificate may not be reproduced except with the written permission of the Chairman.


Chairman

SINGAPORE LABORATORY
ACCREDITATION SCHEME



Number : **LA-1993-0064-A**

Date of Issue : **15 April 2014**

Date of Expiry: **14 April 2018**

Certificate of Accreditation

This certifies that

ALS Technichem (S) Pte Ltd
121 Genting Lane
#04-01 ALS Building
Singapore 349572

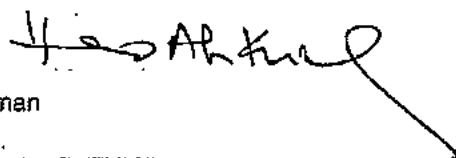
is accredited by the Singapore Accreditation Council to

ISO / IEC 17025 : 2005

for specific scope within the field of

Chemical & Biological Testing

as detailed in the attached schedule.


Chairman

This Certificate is awarded subject to the organisation's compliance with the stated criteria and terms and conditions laid down by the Singapore Accreditation Council.

This Certificate may not be reproduced except with the written permission of the Chairman.

TABLE 3.1 – 3.4

Geological Classification – Description of Soil and Rock Types

Identification and Description of Soils

Aid To Identification of Rocks For Engineering Purposes

Rock Weathering Classification

Table 3.1 GEOLOGICAL CLASSIFICATION – DESCRIPTION OF SOIL AND ROCK TYPES

REFERENCE	SOIL & ROCK TYPE	GENERAL DESCRIPTION	GEOLOGICAL FORMATION (PWD, 1976)
B	BEACH (Littoral)	Sandy, sometimes silty, with gravels, coral and shells.	Littoral Member, possibly also part of all other members & TEKONG (KALLANG FORMATION)
E	ESTUARINE (Transitional)	Peats, peaty and organic clays, organic sands.	Transitional/Estuarine Member, possibly part of Alluvial and Marine. (KALLANG FORMATION)
F	FLUVIAL (Alluvial)	Sands, silty sands, silts and clays.	Alluvial Member, possibly part of all other members and TEKONG. (KALLANG FORMATION)
F1		Predominantly granular soils including silty sands, clayey sands.	Bed of Alluvial Member of KALLANG. (Fluvial SAND/GRAVEL) (KALLANG FORMATION)
F2		Cohesive soils including silty clays, sandy clays and clayey silt.	Bed of Alluvial Member of KALLANG. (Fluvial CLAY/SILT) (KALLANG FORMATION)
M	MARINE	Very soft to soft blue or grey clay.	Marine Member (KALLANG FORMATION)
O	OLD ALLUVIUM	Very weak to weak beds of sandstone and mudstone. See Table 3.4 for weathering classification.	OLD ALLUVIUM
FCBB	FORT CANNING BOULDER BED (also known as S3, Boulderly CLAY or Boulder BED)	A colluvial deposit of boulders in a soil matrix. The matrix is typically a hard silty clay, but can be granular. The material is largely derived from the rocks and weathered rocks of the Jurong Formation.	Not Shown in PWD (1976)

Table 3.1 Cont'd

REFERENCE	SOIL & ROCK TYPE	GENERAL DESCRIPTION	GEOLOGICAL FORMATION (PWD, 1976)
S	SEDIMENTARIES (Rocks & associated soils)	Sandstones, siltstones mudstones, conglomerate and limestone. The rock has been subjected to a varying degree of metamorphism. See Table 3.4 for weathering classification	JURONG FORMATION, Tengah, Rimau, Ayer Chawan and Queenstown Facies (Plus the Pandan Limestone, which was not identified in PWD (1976).
G	GRANITE (Rock and associated Residual soils)	Granitic rocks, including granodiorite, adamellite and granite. See Table 3.4 for weathering classification.	BUKIT TIMAH GRANITE

TABLE 3.2 – IDENTIFICATION & DESCRIPTION OF SOILS

Soil group	Density/compactness/strength		Discontinuities		Bedding		Colour	Composite soil types (mixtures of basic soil types)		Particle shape	Particle size	PRINCIPAL SOIL TYPE
	Term	Field test										
Very coarse soils	Loose	By inspection of voids and particle packing	Scale of spacing of discontinuities		Scale of bedding thickness		Red Orange Yellow	For mixtures involving very coarse soils, see 41.4.4.3		Angular Sub angular	200 60	BOULDERS COBBLES
	Dense		Term	Mean spacing mm	Term	Mean thickness mm		Term	Approx. % secondary			
Coarse soils (over about 65% sand and gravel sizes)	Borehole with SPT N-value		Very widely	Over 2 000	Very thickly bedded	Over 2 000	Brown	Slightly (sandy ^d)	< 5	Sub rounded	Coarse	GRAVEL
	Very loose	0 - 4	Widely	2 000 to 600	Thickly bedded	2 000 to 600	Green					
	Loose	4 - 10	Medium	600 to 200	Medium bedded	600 to 200	Blue	(sandy ^d)	5 to 20 ^b	Rounded	Medium	
	Medium dense	10 - 30	Closely	200 to 60	Thinly bedded	200 to 60	White					
	Dense	30 - 50	Very closely	60 to 20	Very thinly bedded	60 to 20	Cream	Very (sandy ^d)	> 20 ^b	Tabular	Fine	
	Very dense	> 50	Extremely closely	Under 20	Thickly laminated	20 to 6	Grey			Elongated	Coarse	
	Slightly cemented	Visual examination: pick removes soil in lumps which can be abraded	Fractured	Breaks into blocks along unpolished discontinuities	Thinly laminated	Under 6	Black	SAND AND GRAVEL	about 50 ^b	Minor constituent type	Medium	
												Fine
	Fine soils (over about 35% silt and clay sizes)	Uncompact	Easily moulded or crushed in the fingers	Sheared	Breaks into blocks along polished discontinuities	Inter-bedded	Alternating layers of different types. Prequalified by thickness term if in equal proportions. Otherwise thickness of and spacing between subordinate layers defined	Light Dark Mottled	Term	Approx. % secondary	Slightly calcareous, calcareous, very calcareous.	Coarse
		Compact	Can be moulded or crushed by strong pressure in the fingers						Slightly (sandy ^d)	< 35		Medium
Very soft		Finger easily pushed in up to 25 mm	Spacing terms also used for distance between partings, isolated beds or laminae, desiccation cracks, rootlets etc.		Inter-laminated			(sandy ^d)	35 to 65 ^d	% defined on a site or material specific basis or subjective	Fine	
Soft		Finger pushed in up to 10 mm										
Firm		Thumb makes impression easily										
Stiff		Can be indented slightly by thumb										
Very stiff		Can be indented by thumb nail										
Hard (or very weak mudstone) Cu > 300 kPa		Can be scratched by thumbnail see 41.2.2										
Organic soils		Firm	Fibres already compressed together	Fibrous	Plant remains recognizable and retains some strength	Transported mixtures		Colour		Contains finely divided or discrete particles of organic matter, often with distinctive smell, may oxidize rapidly. Describe as for inorganic soils using terminology above.		
		Spongy	Very compressible and open structure	Pseudo-fibrous	Plant remains recognizable, strength lost	Slightly organic clay or silt Slightly organic sand		Gray as mineral				
	Organic clay or silt Organic sand					Dark grey Dark grey						
	Very organic clay or silt Very organic sand					Black Black						
	Plastic	Can be moulded in hand and smears fingers	Amorphous	Recognizable plant remains absent	Accumulated in situ		Predominantly plant remains, usually dark brown or black in colour, distinctive smell, low bulk density. Can contain disseminated or discrete mineral soils					
					Peat							

TABLE 3.2 – IDENTIFICATION & DESCRIPTION OF SOILS (Continued)

PRINCIPAL SOIL TYPE	Visual identification	Minor constituents	Stratum name	Example descriptions
BOULDERS	Only seen complete in pits or exposures	Shell fragments, pockets of peat, gypsum crystals, flint gravel, fragments of brick, roof tiles, plastic bags etc. using terms such as: with rare with occasional with abundant/frequent/numerous % defined on a site or material specific basis or subjective	RECENT DEPOSITS, ALLUVIUM, WEATHERED BRACKLESHAM CLAY, LIAS CLAY, EMBANKMENT FILL, TOPSOIL, MADE GROUND OR GLACIAL DEPOSITS ? etc.	Loose brown very sandy sub-angular fine to coarse flint GRAVEL with small pockets (up to 30 mm) of clay. (TERRACE GRAVELS)
COBBLES	Often difficult to recover whole from boreholes			
GRAVEL	Easily visible to naked eye; particle shape can be described; grading can be described,			Medium dense light brown gravelly clayey fine SAND. Gravel is fine (GLACIAL DEPOSITS)
SAND	Visible to naked eye; no cohesion when dry; grading can be described.			
SILT	Only coarse silt visible with hand lens; exhibits little plasticity and marked dilatancy; slightly granular or silky to the touch; disintegrates in water; lumps dry quickly; possesses cohesion but can be powdered easily between fingers			Stiff very closely sheared orange mottled brown slightly gravelly CLAY. Gravel is fine and medium of rounded quartzite. (REWORKED WEATHERED LONDON CLAY)
CLAY/ SILT	Intermediate in behaviour between clay and silt. Slightly dilatant			
CLAY	Dry lumps can be broken but not powdered between the fingers; they also disintegrate under water but more slowly than silt; smooth to the touch; exhibits plasticity but no dilatancy; sticks to the fingers and dries slowly; shrinks appreciably on drying usually showing cracks.			Firm thinly laminated grey CLAY with closely spaced thick laminae of sand. (ALLUVIUM) Plastic brown clayey amorphous PEAT. (RECENT DEPOSITS)

NOTES

- | | |
|---|--|
| a) Or described as coarse soil depending on mass behaviour | d) Gravely or sandy and/or silty or clayey |
| b) Or described as fine soil depending on mass behaviour | e) Gravely and/or sandy |
| c) % coarse or fine soil type assessed excluding cobbles and boulders | f) Gravely or sandy |

Table 3.3 AID TO IDENTIFICATION OF ROCKS FOR ENGINEERING PURPOSES

Grain size mm		Bedded rocks (mostly sedimentary)											
20	Grain size description		CONGLOMERATE Rounded boulders, cobbles and gravel cemented in a finer matrix. Breccia Irregular rock fragments in a finer matrix.		At least 50% of grains are of carbonate		At least 50% of grains are of grained volcanic rock		SALINE ROCKS				
	RUDACEOUS				LIMESTONE and DOLOMITE (undifferentiated)		Calcarudite		Fragments of volcanic ejecta in a finer matrix. Rounded grains AGGLOMERATE Angular grains VOLCANIC BRECCIA		HALITE ANHYDRITE		
							Cemented volcanic ash		GYPSUM				
Grain size boundaries approximate	ARENACEOUS		Coarse		SANDSTONE Angular or rounded grains commonly cemented by clay, calcitic or iron minerals. Quartzite Quartz grains and siliceous cement Arkose Many feldspar grains Greywacke Many rock chips		Calcarearenite		TUFF				
			Medium										
			Fine										
			0.06										
0.002	ARGILLACEOUS		MUDSTONE		SILTSTONE Mostly silt		Calcsilt-lite		Fine-grained TUFF				
					Calcareous mudstone		Calcsilt-lite		Very fine-grained TUFF				
Amorphous or crypto- crystalline						Flint: occur as bands of nodules in the Chalk Chert: occur as nodules and beds in limestone and calcareous sandstone				COAL LIGNITE			
Granular cemented - except amorphous rocks													
SILICEOUS				CALCAREOUS				SILICEOUS				CARBON- ACEOUS	

SEDIMENTARY ROCKS

Granular cemented rocks vary greatly in strength, some sandstones are stronger than many igneous rocks. Bedding may not show in hand specimens and is best seen in outcrop. Only sedimentary rocks and metamorphic rocks derived from them, contain fossils.

Calcareous rocks contain calcite (calcium carbonate) which effervesces with dilute hydrochloric acid.

Table 3.3 AID TO IDENTIFICATION OF ROCKS FOR ENGINEER PURPOSES (Continued)

Igneous rocks generally massive structure and crystalline texture				
Grain size description				
COARSE	GRANITE ¹	DIORITE ^{1,2}	GABBRO ^{1,2}	Pyroxenite Pentrite
	These rocks are sometimes porphyritic and are then described for example, as porphyritic granite			
MEDIUM	MICROGRANITE ¹	MICRODIORITE ^{1,2}	DOLERITE ^{3,4}	
	These rocks are sometimes porphyritic and are then described as porphyries			
FINE	RHYOLITE ^{4,5}	ANDESITE ^{4,5}	BASALT ⁵	
	These rocks are sometimes porphyritic and are then described as porphyries			
Amorphous Crypto-crystalline	OBSIDIAN ⁵	VOLCANIC GLASS		
Increasing grain size ↑				
Colour ← Pale → Dark				
ACID Much quartz		INTER-MEDIATE Some quartz	BASIC Little or no quartz	ULTRA BASIC

Metamorphic rocks	
Foliated	Massive
GNEISS Well developed but often widely spaced foliation sometimes with schistose bands Migmatite Irregularly foliated, mixed schists and gneisses.	MARBLE QUARTZITE GRANULITE HORNFELS AMPHIBOLITE SERPENTINE
SCHIST Well developed undulose foliation; generally much mica	
PHYLITE Slightly undulose foliation; sometimes spotted SLATE Well developed plane cleavage (foliation)	
MYLONITE Found in fault zones, mainly in igneous and metamorphic areas	
CRYSTALLINE	
SILICEOUS	Mainly SILICEOUS

IGNEOUS ROCKS

Composed of closely interlocking mineral grains. Strong when fresh; not porous.

Mode of occurrence:
1. Batholiths
2. Laccoliths
3. Sills
4. Dykes
5. Lava flows
6. Veins

METAMORPHIC ROCKS

Generally classified according to fabric and mineralogy rather than grain size.

Most metamorphic rocks are distinguished by foliation which may impart fissility. Foliation in gneisses is best observed in outcrop. Non-foliated metamorphics are difficult to recognise except by association.

Most fresh metamorphic rocks are strong although perhaps fissile.

IGNEOUS ROCKS

Composed of closely interlocking mineral grains. Strong when fresh; not porous.

Mode of occurrence:

1. Batholiths
2. Laccoliths
3. Sills
4. Dykes
5. Lava flows
6. Veins

METAMORPHIC ROCKS

Generally classified according to fabric and mineralogy rather than grain size.

Most metamorphic rocks are distinguished by foliation which may impart fissility. Foliation in gneisses is best observed in outcrop. Non-foliated metamorphics are difficult to recognise except by association.

Most fresh metamorphic rocks are strong although perhaps fissile.

Table 3.4 ROCK WEATHERING CLASSIFICATION**Table (i) – Bukit Timah Granite and Gombak Norite**

Weathering Classification for Bukit Timah Granite and Gombak Norite	
Grade	Basis for assessment
I	Intact strength, unaffected by weathering. Not broken easily by hammer - rings when struck. No visible discolouration.
II	Not broken easily by hammer - rings when struck. Fresh rock colours generally retained but stained near joint surfaces.
III	Cannot be broken by hand. Easily broken by hammer. Makes a dull or slight ringing sound when struck with hammer. Stained throughout.
IV	Core can be broken by hand. Does not slake in water. Completely discoloured.
V	Original rock texture preserved, can be crumbled by hand. Slakes in water. Completely discoloured.
VI	Original rock structure completely degraded to a soil, with none of the original fabric remains. Can be crumbled by hand.

Table (ii) – Jurong Formation

Weathering Classification for Jurong Formation	
Grade	Basis for assessment
I	Intact strength, unaffected by weathering.
II	Slightly weakened, slight discolouration, particularly along joints.
III	Considerably weakened & discoloured, but larger pieces cannot be broken by hand. (RQD is generally >0, but RQD should not be used as the major criterion for assessment.)
IV	Core can be broken by hand or consists of gravel size pieces. Generally highly to very highly fractured, but majority of sample consists of lithorelics. (RQD generally = 0, but RQD should not be used as the major guide for assessment.) For siltstone, shale, sandstone, quartzite and conglomerate, the slake test can be used to differentiate between Grade V (slakes) and Grade IV (does not slake).
V	Rock weathered down to soil - like material, but bedding intact. Material slakes in water.
VI	Rock degraded to a soil in which none to the original bedding remains.

Note: "Extracted from LTA Design Criteria Chapter 5"

Table 3.4

Table (iii) – Old Alluvium

Weathering Classification for Old Alluvium			
Class	Classifier	Characteristics	Indicative SPT, Blows/300mm*
A	Unweathered	Original strength	>50 (cannot usually be penetrated by CPTs with 20t load capacity)
B	Partially Weathered	Slightly reduced strength	
C	Distinctly Weathered	Further weakened	30 to 50
D	Destructured	Greatly weakened, often mottled, bedding disturbed	10 to 30
E	Residual	No bedding remains	<10

Note: "Extracted from LTA Design Criteria Chapter 5"

Figure 2.1 Illustration of Boring Work

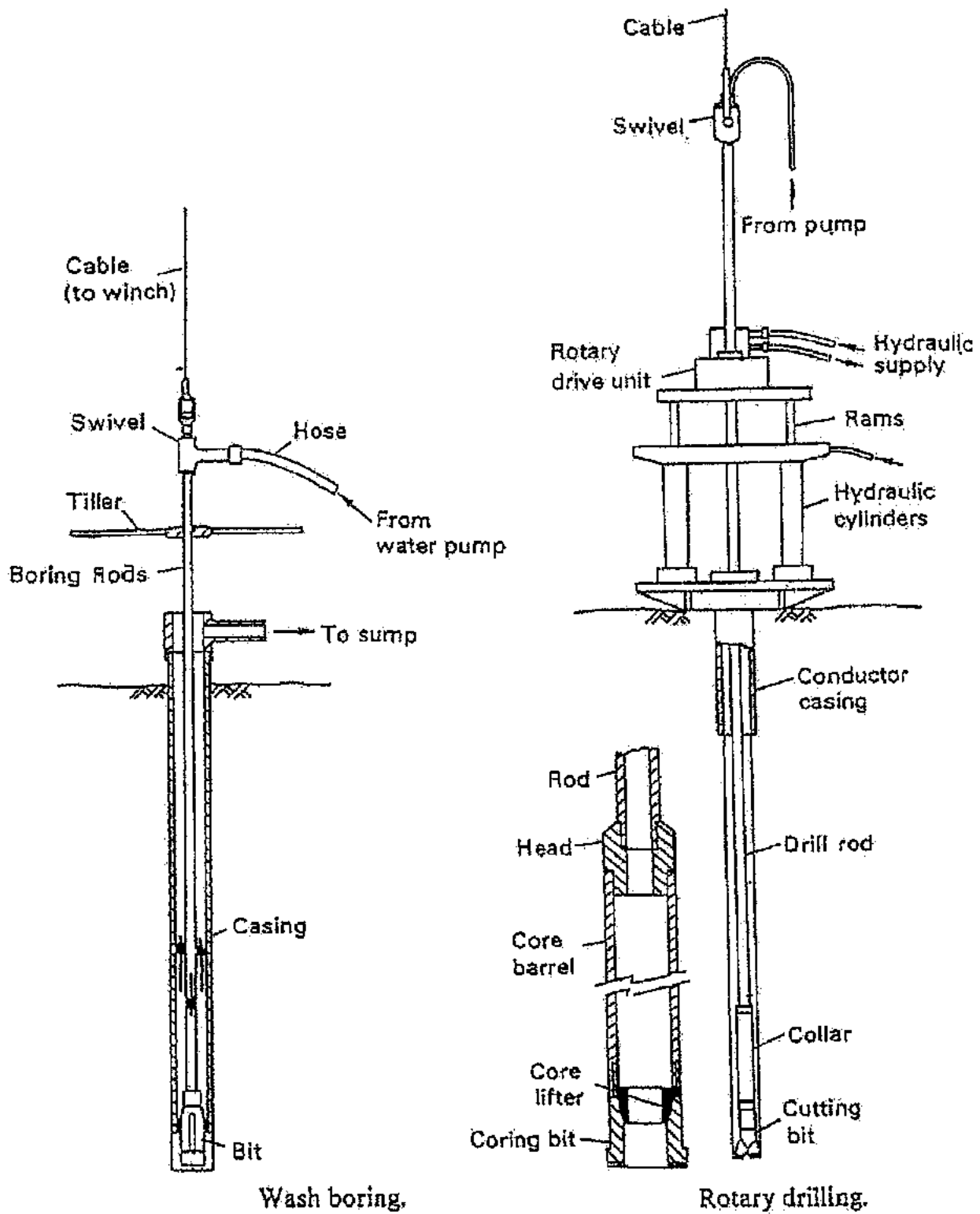
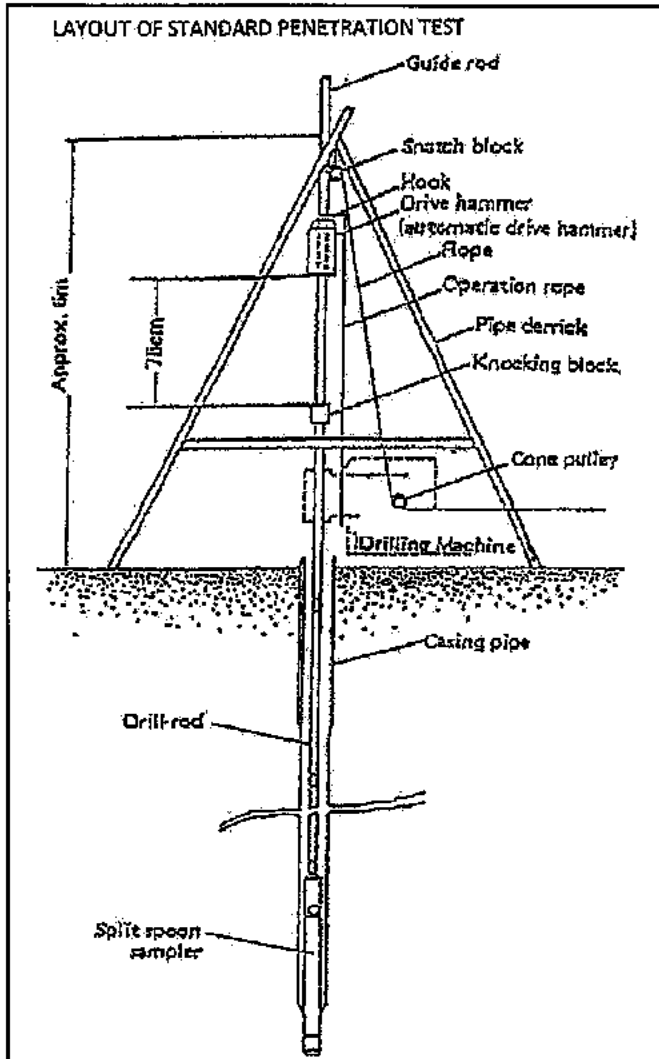
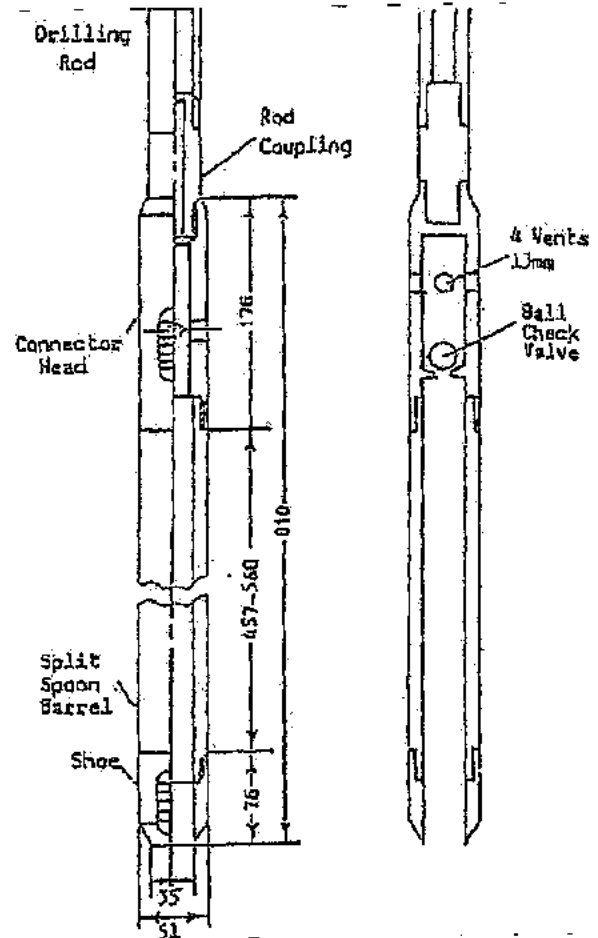


Figure 2.2 Standard Penetration Test



SPLIT SPOON SAMPLER



Specification of Split Spoon Barrel

- Shoe Length : 75 mm
- Split Spoon Barrel : 456 – 560 mm
- In-Situ Diameter of Spoon Barrel : 35 mm
- Outside Diameter of Spoon Barrel : 51 mm
- Shoe Angle : 19° 47'

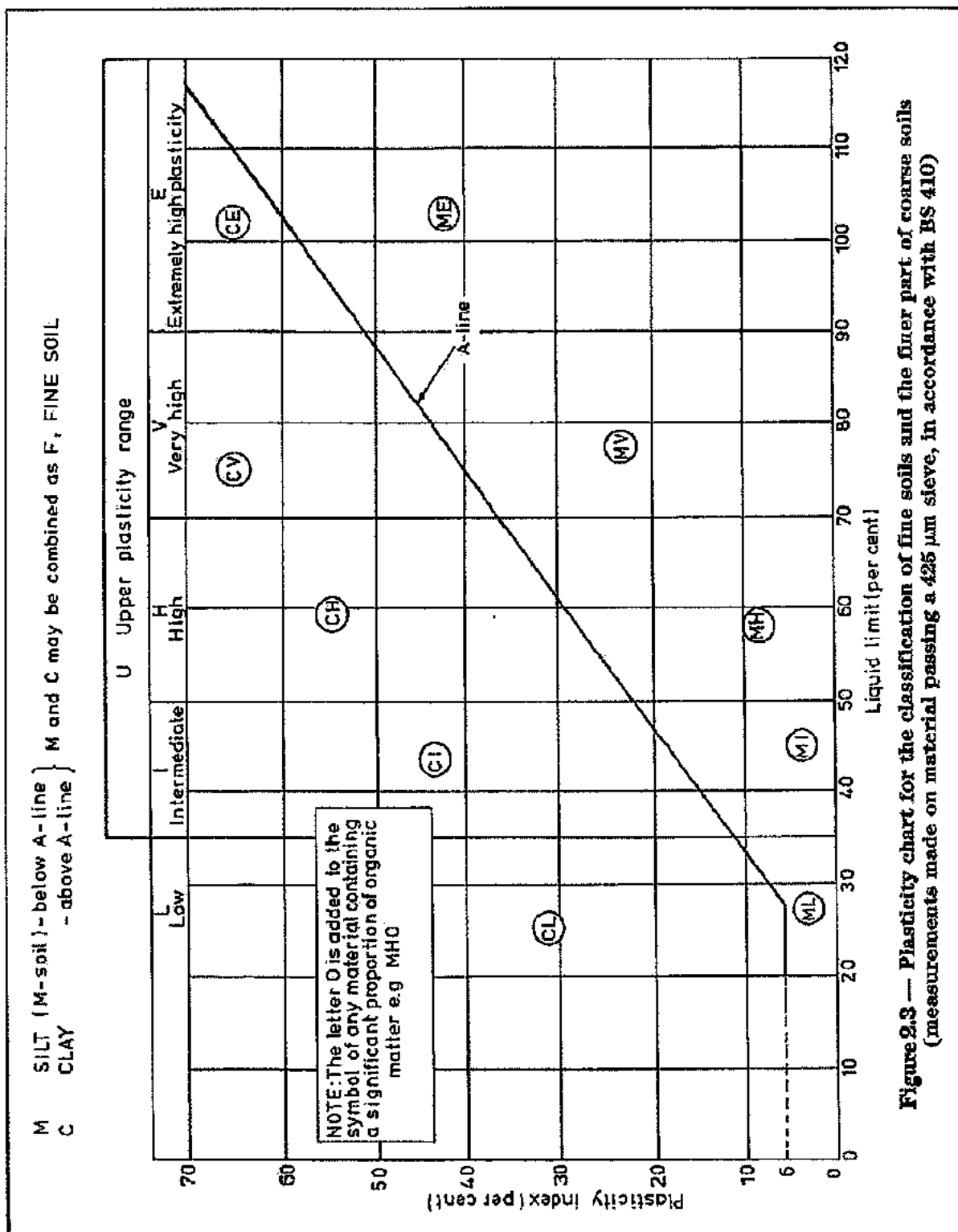
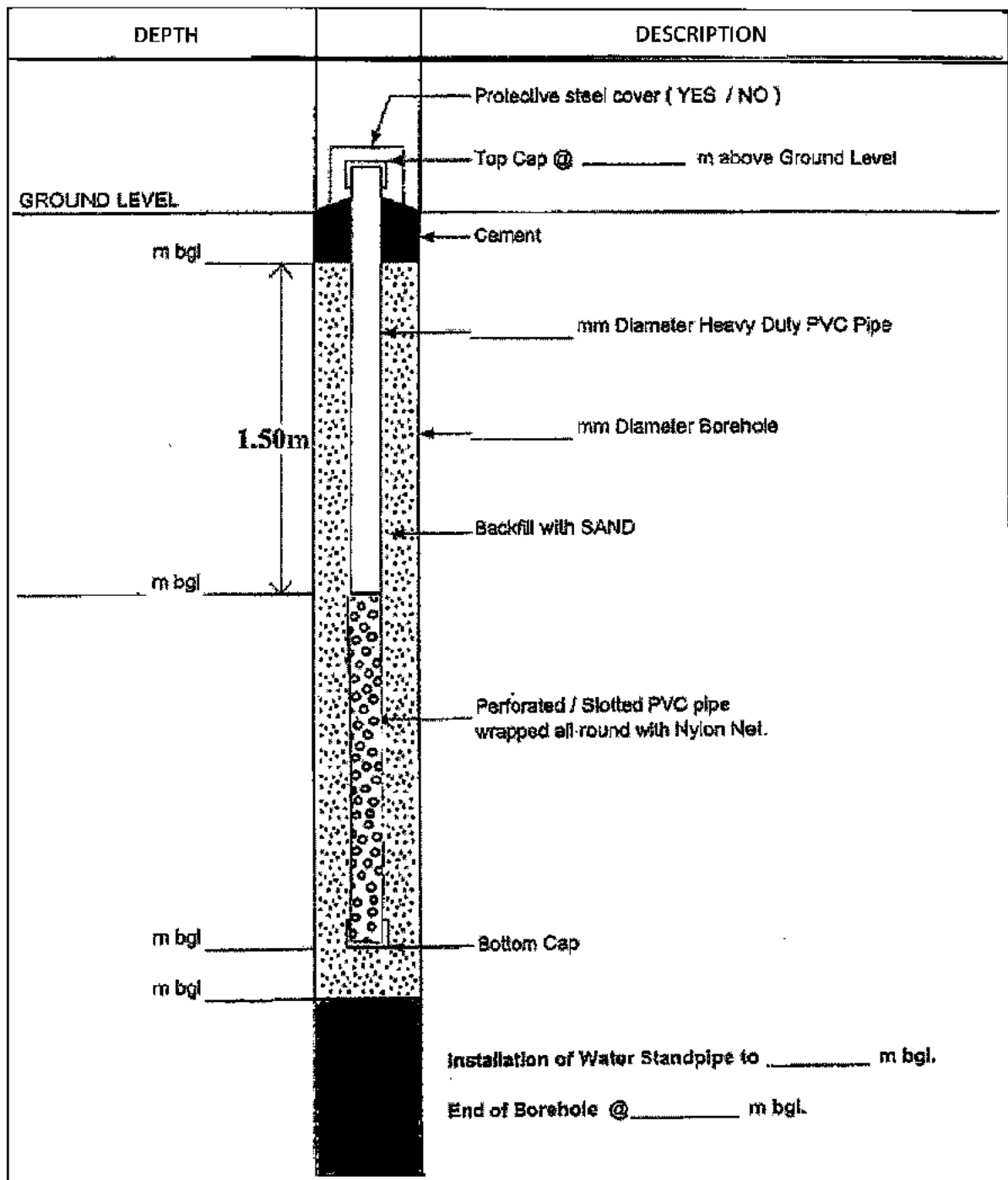


Figure 2.4 Typical Installation Details of Water Standpipe



Wisescan Engineering Services Pte Ltd

14, Little Road, #02-01, Singapore 536987.

Tel: (65) 6841 0880 Fax: (65) 6841 0770

As Built Coordinates approved by SI contractor

Client : Agri-Food & Veterinary Authority of Singapore
 Project Title : Site Investigation Works for Lim Chu Kang and Sungei Tengah
 Location : Lim Chu Kang

Sr No	BH No	As Built Coordinates			Remarks
		Northing	Easting	Reduced Level (m)	
34	BH-34	45043.834	15621.866	104.714	
35	BH-35	44944.886	15559.106	104.636	
36	BH-36	44865.293	15543.683	105.346	
37	BH-37	44733.458	15585.086	105.045	
38	BH-38	44604.627	15549.618	105.177	
39	BH-39	44561.459	15669.673	105.708	
40	BH-40	44468.959	15801.469	104.033	
41	BH-41	44441.083	15912.669	103.834	
42	BH-42	44418.097	16001.872	103.708	
43	BH-43	44383.614	16089.095	103.744	
44	BH-44	44323.007	16184.013	103.738	
45	BH-45	44995.614	15766.640	104.277	
46	BH-46	44903.745	15739.190	104.392	
47	BH-47	44789.035	15716.949	104.359	
48	BH-48	44736.592	15898.905	104.436	
49	BH-49	44738.179	16041.702	103.755	
50	BH-50	44664.014	15737.642	105.051	
51	BH-51	44628.477	15965.598	104.448	

Submitted by Surveyor

Name / Signature:

Stamp:



Checked by SI Contractor

Name / Signature:



AUNDA THURA



Borehole Location on Google earth



LEGENDS FOR DIFFERENT SOIL AND ROCK TYPES

HATCHING PATTERNS FOR GEOLOGICAL FORMATION CLASSIFICATION



FILL

KALLANG FORMATION



F1 : FLUVIAL SAND



F2 : FLUVIAL CLAY



E : PEAT/ORGANIC CLAY



M : MARINE CLAY



Kr : REEF MEMBER



B : BEACH (LITTORAL)

OLD ALLUVIUM



O(A)



O(D)



O(B)



O(E)



O(C)

JURONG FORMATION



S(I)



S(IV)



S(II)



S(V)



S(III)



S(VI)

BUKIT TIMAH GRANITE



G(I)



G(IV)



G(II)



G(V)



G(III)



G(VI)

FORT CANNING BOULDER BED



FCBB

HATCHING PATTERNS FOR SOIL CLASSIFICATION (BORELOGS)



AS : ASPHALT, TAR



BF : BACKFILL



BE : BEDROCK



BR : BRICK



BO : BOULDER



C : CLAY / MARINE CLAY



CO : ORGANIC CLAY



CS : SANDY CLAY



CG : GRAVELLY CLAY



CPt : PEATY CLAY



CNG : CONGLOMERATE



CON : CONCRETE



GM : SILTY GRAVEL



G : GRAVEL



GS : SANDY GRAVEL



GPt : PEATY GRAVEL



GC : CLAYEY GRAVEL



GR : GRANITE



GO : ORGANIC GRAVEL



LI : LIMESTONE



M : SILT



MPt : PEATY SILT



MG : GRAVELLY SILT



MU : MUDSTONE



MS : SANDY SILT



MO : ORGANIC SILT



Pt : PEAT



PtS : SANDY PEAT



PtG : GRAVELLY PEAT



PtM : SILTY PEAT



PtC : CLAYEY PEAT



S : SAND



SG : GRAVELLY SAND



SO : ORGANIC SAND



SM : SILTY SAND



SC : CLAYEY SAND



SPt : PEATY SAND



SA : SANDSTONE



BA : BASALT



SI : SILTSTONE



SH : SHALE



SCH : SCHIST



TB : TIMBER



Rf : REEF



RH : RHYOLITE



DI : DIORITE

KEY TO ABBREVIATIONS USED IN BOREHOLE LOG

FIELD SAMPLING

☒	-SAMPLE
▢	-CORE RUN
□	-Attempt TW,P,MZ,U
PS	-PISTON SAMPLE
TW	-THIN WALL PUSH IN
MZ	-MAZIER
U	-THICK WALL OPEN DRIVE
CR	-CORE RUN
SPTLS	-SPT LINER
W	-WATER

FIELD TEST

•	-SPT N VALUE
■	-PRESSURE METER TEST (PRM)
⊕	-VANE SHEAR TEST (VST)
△	-PERMEABILITY/PACKER TEST (PBT/PKT)

INSTALLATION

PZS	-CASAGRANDE PIEZOMETER
PZW	-VIBRATING WIRE PIEZOMETER
WSP	-WATER STANDPIPE

LABORATORY TEST RESULTS

MC	-MOISTURE CONTENT (%)	DSB	-DIRECT SHEAR BOX
BD	-BULK DENSITY (Mg/m^3)	DSB ϕ'	-Angle of Shear Resistance
PD	-PARTICLE DENSITY (Mg/m^3)	DSBc'	-Cohesion
LL	-LIQUID LIMIT (%)	DSB ϕ'_r	-Angle of residual Shear Resistance
PL	-PLASTIC LIMIT (%)	DSBc'_r	-Cohesion
Pc	-PRECONSOLIDATION PRESSURE (kN/m^2)	pH	-pH Value
Cc	-COMPRESSION INDEX	SO3	-SOLUBLE SULPHATE g/L
PLT	-POINT LOAD STRENGTH INDEX (MN/m^2)	OMS	-ORGANIC MATTER %
UCS	-UNIAXIAL COMPRESSION STRENGTH (MN/m^2)	Cl	-CHLORIDE CONTENT %
Cuu	-COHESION c (kPa)	As	-ARSENIC mg/kg
ϕ_{uu}	-FRICTION ANGLE ϕ_i	Cd	-CADMIUM mg/kg
C'uup	-COHESION c (kPa)	Cr	-CHROMIUM mg/kg
ϕ'_{uup}	-FRICTION ANGLE ϕ_i	Cu	-COPPER mg/kg
C'cu/C'co	-EFFECTIVE STRESS COHESION c' (kPa)	Ni	-NICKEL mg/kg
ϕ'_{cu}/ϕ'_{co}	-FRICTION ANGLE ϕ_i'	Pb	-LEAD mg/kg
Lab PBT k	-Falling/Constant HEAD PERMEABILITY m/s	Zn	-Zinc mg/kg
SLD	-SLAKE DURALITY %	Hg	-MERCURY mg/kg
CC	-CHERCHAR TEST	Cucr	-COHESION c (kPa)
Pdl	-PADDLE TEST	ϕ_{ucr}	-FRICTION ANGLE ϕ_i
Tv	-TORVANE TEST	Cu	-Shear Strength (kPa)
Pm	-POCKET PENETROMETER	q _u	-Unconfined Compression Strength (kPa)



[illegible]

PROJECT NO. SIL/S7518/15/SI		Borehole NO. BH34	
LOCATION : Lim Chu Kang Lane 1		NORTHING 45043.834	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		EASTING 15621.866	
SPT N VALUE		REDUCED LEVEL 104.714 m	
10 20 30 40 50 60 70 80 90 100		DESCRIPTION	
SPT (N) / mm		WEATHERING GRADE	
REDUCED LEVEL (m)		DEPTH (m)	
SAMPLE TYPE		GRAPHIC LOG	
THICKNESS (m)		GEOLOGICAL CLASSIFICATION	
BS SOIL CLASSIFICATION			
Hard Reddish brown mottled yellowish brown and light grey Slightly fine sandy SILT Partially Weathered (OLD ALLUVIUM)		Hard Yellowish brown spotted reddish brown and light grey Fine sandy SILT Unweathered (OLD ALLUVIUM)	
Hard Yellowish brown mottled reddish brown and light grey Fine sandy CLAY Unweathered (OLD ALLUVIUM)		Borehole terminated at 30.36m	
Borehole TYPE Rotary DIAMETER (mm) 100		SPT N VALUE VANE SHEAR TEST (VST) PRESSUREMETER TEST (PMT) PERMEABILITY (PBT) / PACKER TEST (PKT)	
CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER		MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) U _U /C _U -UNCONSOLIDATED C _U /C ₀ -CONSOLIDATED UNDRAINED/DRAINED (kPa)	
Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		GEO TECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR:  SOIL INVESTIGATION PTE LTD		LOG BY: Phyo Han Kyaw	
		DATE OF FIELD WORK: 01/09/15 - 03/09/15	
		CHECKED BY: Aung Thura	
		SHEET NO. 2/2	

42

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH35	
LOCATION : Lim Chu Kang Lane 1		NORTHING 44944.886	
		EASTING 15559.106	
		REDUCED LEVEL 104.636 m	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		DESCRIPTION	
SPT N VALUE			
10 20 30 40 50 60 70 80 90 100			
SPT (N) / mm			
WEATHERING GRADE			
REDUCED LEVEL (m)			
DEPTH (m)			
SAMPLE TYPE			
GRAPHIC LOG			
THICKNESS (m)			
GEOLOGICAL CLASSIFICATION			
BS SOIL CLASSIFICATION			
Very Dense Yellowish brown mottled light grey Silty fine to medium SAND Partially Weathered (OLD ALLUVIUM)			
Hard Yellowish brown mottled reddish brown and light grey Slightly fine sandy CLAY Unweathered (OLD ALLUVIUM)			
Hard Yellowish brown mottled purplish brown and light grey Fine to medium sandy SILT Unweathered (OLD ALLUVIUM)			
Hard Yellowish brown mottled reddish brown Slightly fine sandy CLAY Unweathered (OLD ALLUVIUM)			
Hard Reddish brown mottled yellowish brown Fine sandy SILT Unweathered (OLD ALLUVIUM)			
Borehole terminated at 30.28m			
BORING TYPE Rotary DIAMETER (mm) 100			
FRACTURE PER METRE			
RQD %			
SCR %			
TCR %			
WEATHERING GRADE			
- SPT N VALUE			
- VANE SHEAR TEST (VST)			
- PRESSUREMETER TEST (PMT)			
- PERMEABILITY (PBT) / PACKER TEST (PKT)			
- SAMPLE			
- CORE RUN			
- Attempt TW, PMZU			
CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER			
MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/CU-UNCONSOLIDATED CU/CD-CONSOLIDATED UDR/DR-DRAINED (kPa)			
Client: Agri-Food and Veterinary Authority		LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		LOG BY: Phyo Han Kyaw	
CONTRACTOR: SOIL INVESTIGATION PTE LTD		DATE OF FIELD WORK: 31/08/15 - 01/09/15	
		CHECKED BY: Aung Thura	
		SHEET NO. 02/02	

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH36									
LOCATION : Lim Chu Kang Lane 1										NORTHING 44865.293									
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE										EASTING 15543.683									
DAILY WATER TABLE READING										REDUCED LEVEL 105.346 m									
DATE										DESCRIPTION									
3/9/2015 2.50										Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-2.00m Stiff Reddish brown mottled yellowish brown and dark grey Sandy SILT With hardcore (MADE GROUND)									
4/9/2015 1.30																			
4/9/2015 1.50																			
6/300										Firm Yellowish brown mottled reddish brown Sandy SILT (MADE GROUND)									
5/300										Firm Light grey mottled yellowish brown Slightly sandy CLAY With peat Alluvial Member (KALLANG FORMATION) TW2 (MC=39.7, BD=1.73, PD=2.6, GRAVEL=0, SAND=6, SILT=43, CLAY=51, LL=37, PL=20, P _u =70, C _u =0.32)									
8/300										Firm to Stiff Light grey mottled dark grey and yellowish brown Slightly sandy SILT With traces of peat Alluvial Member (KALLANG FORMATION) TW3 (MC=24, BD=2.04, PD=2.7, GRAVEL=0, SAND=7, SILT=48, CLAY=45, LL=42, PL=19, C _u =52, I _p =0)									
23/300										Very Stiff Yellowish brown mottled reddish brown and light grey Slightly sandy CLAY Destructured (OLD ALLUVIUM)									
31/300										Hard Yellowish brown mottled reddish brown and light grey Slightly sandy CLAY Distinctly Weathered (OLD ALLUVIUM)									
41/300																			
67/300										Hard Reddish brown mottled yellowish brown and light grey Slightly sandy CLAY Partially Weathered (OLD ALLUVIUM)									
BOREHOLE TYPE: Rotary DIAMETER(mm): 100										CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER									
FRACTURE PER METRE RQD % SCR % TCR %										MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/CU=UNCONSOLIDATED CU/CD=CONSOLIDATED UNDRAINED/DRAINED (kPa)									
Client: Agri-Food and Veterinary Authority										LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS									
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)										LOG BY: Zaw Htat Aung DATE OF FIELD WORK: 03/09/15 - 04/09/15									
CONTRACTOR: SOIL INVESTIGATION PTE LTD										CHECKED BY: Aung Thura SHEET NO. <1>/<2>									

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH36										
LOCATION : Lim Chu Kang Lane 1										NORTHING 44865.293										
										EASTING 15543.683										
										REDUCED LEVEL 105.346 m										
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE								SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	DESCRIPTION	
		10	20	30	40	50	60	70	80											90
											86/300		21.00 21.45	21	⊗					Hard Reddish brown mottled yellowish brown and light grey Slightly sandy CLAY Partially Weathered (OLD ALLUVIUM)
											100/290	81.35	24.00 24.44	24	⊗		4.00	O(B)	CS	Very Dense Yellowish brown mottled reddish brown Silty fine to medium SAND Unweathered (OLD ALLUVIUM)
											100/290	78.35	27.00 27.43	27	⊗		3.00	O(A)	SM	Hard Yellowish brown mottled reddish brown and light grey Slightly fine sandy CLAY Unweathered (OLD ALLUVIUM)
											100/250	74.97	30.00 30.38	30	⊗		3.38	O(A)	CS	Borehole terminated at 30.38m
														31						
														32						
														33						
														34						
														35						
														36						
														37						
														38						
														39						
														40						

BORING TYPE Rotary DIAMETER(mm) 100		FRACTURE PER METRE 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50	RQD %	SCR %	TCR %	WEATHERING GRADE I II III IV V	• - SPT N VALUE ⊕ - VANE SHEAR TEST (VST) ■ - PRESSUREMETER TEST (PMT) △ - PERMEABILITY (PBT) / PACKER TEST (PKT)	⊗ - SAMPLE ■ - CORE RUN □ - Attempt TW,P,MZ,U	CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER	MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/OU=UNCONSOLIDATED CU/CO=CONSOLIDATED UNDRAINED/DRAINED (kPa)
---	--	--	----------	----------	----------	-----------------------------------	--	---	--	---

Client: Agri-Food and Veterinary Authority		LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		LOG BY: Zaw Htat Aung	DATE OF FIELD WORK: 03/09/15 - 04/09/15
CONTRACTOR: SOIL INVESTIGATION PTE LTD		CHECKED BY: Aung Thura	SHEET NO. 2/2

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH37									
LOCATION : Lim Chu Kang Lane 1		NORTHING 44733.458									
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		EASTING 15585.086									
		REDUCED LEVEL 105.045 m									
		DESCRIPTION									
		Dense Light grey mottled reddish brown Silty fine to coarse SAND Distinctly Weathered (OLD ALLUVIUM)									
		Hard Yellowish brown mottled pinkish grey Slightly fine sandy CLAY Partially Weathered (OLD ALLUVIUM)									
		Hard Reddish brown spotted yellowish brown and light grey Fine sandy CLAY Partially Weathered (OLD ALLUVIUM)									
		Hard Reddish brown mottled yellowish brown Fine to medium sandy SILT Partially Weathered (OLD ALLUVIUM)									
		Hard Reddish brown mottled light grey Fine sandy SILT Partially Weathered (OLD ALLUVIUM)									
		Very Dense Reddish brown mottled yellowish brown and light grey Silty fine to medium SAND Unweathered (OLD ALLUVIUM)									
		Very Dense Reddish brown mottled yellowish brown and light grey Silty fine to coarse SAND Unweathered (OLD ALLUVIUM)									
		Borehole terminated at 39.31m									
BORING TYPE Rotary DIAMETER(mm) 100		2 FRACTURE PER METRE	4 RQD %	16 SCR %	32 TCR %	64 WEATHERING GRADE	80 SPT N VALUE	96 WEATHERING GRADE	112 WEATHERING GRADE	128 WEATHERING GRADE	144 WEATHERING GRADE
		• - SPT N VALUE ⊕ - VANE SHEAR TEST (VST) ■ - PRESSUREMETER TEST (PMT) △ - PERMEABILITY (PBT) / PACKER TEST (PKT)									
		⊗ - SAMPLE ■ - CORE RUN □ - Attempt TWP, MZU									
		CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER									
		MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/CU=UNCONSOLIDATED CU/CD=CONSOLIDATED UNDRAINED/DRAINED (kPa)									
Client: Agri-Food and Veterinary Authority					LOG OF BORING						
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)					GEOTECHNICAL STUDY - FIELD INVESTIGATIONS						
CONTRACTOR:  SOIL INVESTIGATION PTE LTD					LOG BY: Zaw Htat Aung		DATE OF FIELD WORK: 28/08/15 - 31/08/15				
					CHECKED BY: Aung Thura		SHEET NO. 2/2				

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH38									
LOCATION : Lim Chu Kang Lane 1										NORTHING 44604.627									
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE										EASTING 15549.618									
SPT N VALUE										REDUCED LEVEL 105.177 m									
DAILY WATER TABLE READING										DESCRIPTION									
DATE READING (m.BGL)										Trial Pit: 1.00 x 0.80 x 1.00m									
28/8/2015 0.80										Hand Auger: 1.00-2.00m									
29/8/2015 1.90										Installation of Water Standpipe at 6.00m bgl									
29/8/2015 1.00										Firm									
30/8/2015 1.50										Yellowish brown mottled reddish brown and grey									
30/8/2015 1.20										Slightly gravelly fine to coarse sandy SILT									
										With hardcore									
										(MADE GROUND)									
										Very Loose									
										Light grey									
										Silty fine to coarse SAND									
										Alluvial Member (KALLANG FORMATION)									
										Soft to Firm									
										Light grey									
										Slightly sandy CLAY									
										With traces of peat									
										Alluvial Member (KALLANG FORMATION)									
										TW2 (MC=35, BD=1.90, PD=2.69, GRAVEL=0, SAND=15, SILT=39, CLAY=46, LL=65, PL=24, Cuu=22, #uu=0)									
										TW2 (MC=31.3, BD=1.86, C'cu=13, #cu=15)									
										TW2 (MC=23.3, BD=2.03, Pc=232, Co=0.174)									
										Stiff									
										Light grey									
										Sandy SILT									
										Residual (OLD ALLUVIUM)									
										TW3 (MC=18.7, BD=2.11, PD=2.68, GRAVEL=0, SAND=61, SILT=23, CLAY=15, LL=25, PL=15, Cuu=97, #uu=0)									
										Stiff to Very Stiff									
										Yellowish brown mottled reddish brown and light grey									
										Slightly sandy SILT									
										Deconstructed (OLD ALLUVIUM)									
										TW4 (MC=21, BD=2.09, PD=2.71, GRAVEL=0, SAND=5, SILT=56, CLAY=39, LL=55, PL=21, Cuu=92, #uu=0)									
										TW4 (MC=22.5, BD=2.08, Cuu=111, #uu=0)									
										Hard									
										Yellowish brown mottled reddish brown and light grey									
										Fine sandy SILT									
										Distinctly Weathered (OLD ALLUVIUM)									
										Hard									
										Yellowish brown mottled reddish brown and light grey									
										Slightly fine sandy CLAY									
										Partially Weathered (OLD ALLUVIUM)									
										Hard									
										Reddish brown mottled yellowish brown									
										Slightly fine sandy CLAY									
										Partially Weathered (OLD ALLUVIUM)									

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH39	
LOCATION : Lim Chu Kang Lane 1										NORTHING 44561.459	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE										EASTING 15669.673	
SPT N VALUE										REDUCED LEVEL 105.708 m	
SPT (N) / mm										DESCRIPTION	
DAILY WATER TABLE READING											
DATE READING (m.BGL)											
26/8/2015 1.50											
27/8/2015 FULL											
27/8/2015 1.90											
0/300										Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-2.00m Firm to Stiff Reddish brown mottled yellowish brown Slightly sandy SILT (MADE GROUND)	
5/300										Very Soft Brownish grey Slightly gravelly sandy SILT With traces of peat and decayed wood Alluvial Member (KALLANG FORMATION) TW2 (MC=47, BD=1.65, PD=2.64, GRAVEL=1, SAND=42, SILT=42, CLAY=15, LL=45, PL=26, Cuu=18, #uu=0) TW2 (MC=40.3, BD=1.76, C'cu=3, #cu=28) TW2 (MC=32.3, BD=1.87, Pc=145, Cc=0.264)	
23/300										Firm Light grey Slightly sandy CLAY With traces of peat Alluvial Member (KALLANG FORMATION) TW3T (MC=21.5, BD=2.09, PD=2.73, GRAVEL=0, SAND=4, SILT=45, CLAY=51, LL=42, PL=18, Cuu=66, #uu=0)	
28/300										Very Stiff Reddish brown mottled yellowish brown and light grey Slightly sandy CLAY Alluvial Member (KALLANG FORMATION) TW3B (MC=19, BD=2.13, Cuap=138, #uap=0)	
46/300										Very Stiff Reddish brown mottled yellowish brown and light grey Sandy CLAY Deconstructed (OLD ALLUVIUM)	
43/300										Hard Yellowish brown mottled reddish brown Slightly sandy CLAY Distinctly Weathered (OLD ALLUVIUM)	
BORING TYPE Rotary DIAMETER(mm) 100											
FRACTURE PER METRE											
RQD %											
SCR %											
TCR %											
WEATHERING GRADE											
- SPT N VALUE										- SAMPLE	
- VANE SHEAR TEST (VST)										- CORE RUN	
- PRESSUREMETER TEST (PMT)										- Attempt TWP, MZU	
- PERMEABILITY (PBT) / PACKER TEST (PKT)											
CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER										MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/UU=UNCONSOLIDATED CU/CO=CONSOLIDATED UNDRAINED/DRAINED (kPa)	
Client: Agri-Food and Veterinary Authority										LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)										GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SOIL INVESTIGATION PTE LTD										LOG BY: Zow Htat Aung	
										DATE OF FIELD WORK: 25/08/15 - 27/08/15	
										CHECKED BY: Aung Thura	
										SHEET NO. <1>/<2>	

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH39																	
LOCATION : Lim Chu Kang Lane 1		NORTHING 44561.459																	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		EASTING 15669.673																	
SPT N VALUE		REDUCED LEVEL 105.708 m																	
		DESCRIPTION																	
10	20	30	40	50	60	70	80	90	100	SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	
																			Hard Yellowish brown mottled reddish brown Slightly sandy CLAY Distinctly Weathered (OLD ALLUVIUM)
										74/300		84.71	21	SP17		1.00	Q(C)	CS	Hard Reddish brown mottled yellowish brown and light grey Slightly sandy CLAY Partially Weathered (OLD ALLUVIUM)
												81.71	24	SP18		3.00	Q(B)	CS	Hard Yellowish brown mottled light grey Slightly sandy CLAY Unweathered (OLD ALLUVIUM)
										100/300			25						
												78.71	27	SP19		3.00	Q(A)	CS	Very Dense Reddish brown mottled light grey Silty SAND Unweathered (OLD ALLUVIUM)
										100/260			28						
												75.71	30	SP110		3.00	Q(A)	SM	Very Dense Light grey mottled yellowish brown Silty SAND Unweathered (OLD ALLUVIUM)
										100/210		75.43	30			0.28	Q(A)	SM	Borehole terminated at 30.28m
													31						
													32						
													33						
													34						
													35						
													36						
													37						
													38						
													39						
													40						

BORING TYPE
Rotary

DIAMETER(mm)
100

FRACTURE PER METRE
2 4 6 8 10

RQD %
0 20 40 60 80 100

SCR %
0 20 40 60 80 100

TCR %
0 20 40 60 80 100

WEATHERING GRADE
I II III IV V

WEATHERING GRADE
I II III IV V

LEGEND

- - SPT N VALUE
- ⊕ - VANE SHEAR TEST (VST)
- - PRESSUREMETER TEST (PMT)
- △ - PERMEABILITY (PBT) / PACKER TEST (PKT)
- ⊗ - SAMPLE
- - CORE RUN
- - Attempt TW/P/MZU

CR-CORE RUN
MZ-MAZIER SAMPLE
P-PISTON SAMPLE
TW-THIN WALL PUSH IN
U-THICK WALL OPEN DRIVE
W-WATER
WSP-WATER STANDPIPE
PZS-CASAGRANDE PIEZOMETER

MC-MOISTURE CONTENT
BD-BULK DENSITY
PD-PARTICLE DENSITY
LL-LIQUID LIMIT (%)
PL-PLASTIC LIMIT (%)
UU/CU=UNCONSOLIDATED
CU/CD=CONSOLIDATED
UNDRAINED/DRAINED (U/D)

Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SOIL INVESTIGATION PTE LTD		LOG BY: Zaw Htat Aung	DATE OF FIELD WORK: 25/08/15 - 27/08/15
		CHECKED BY: Aung Thura	SHEET NO. <2>/<2>

PROJECT NO. SIL/S7518/15/SI		LOCATION : Lim Chu Kang Lane 1		FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE		SPT (N) / mm		WEATHERING GRADE		REDUCED LEVEL (m)		DEPTH (m)		SAMPLE TYPE		GRAPHIC LOG		THICKNESS (m)		GEOLOGICAL CLASSIFICATION		BS SOIL CLASSIFICATION		BOREHOLE NO. BH40	
DAILY WATER TABLE READING		DATE		READING (m.BGL)																						DESCRIPTION	
26/8/2015		1.80																								Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-2.50m Firm Reddish brown mottled yellowish brown Slightly sandy SILT (MADE GROUND)	
27/8/2015		1.90																								Loose Dark grey mottled yellowish brown Slightly clayey SAND (MADE GROUND)	
27/8/2015		2.10																								Firm Reddish brown mottled yellowish brown Slightly sandy SILT (MADE GROUND)	
28/8/2015		1.90																								Firm Light grey mottled reddish brown Slightly sandy CLAY Alluvial Member (KALLANG FORMATION) TW2 (MC=25, BD=2.03, PD=2.73, GRAVEL=0, SAND=30, SILT=31, CLAY=39, LL=46, PL=19, Cu=68, ϕ_{cu} =0)	
28/8/2015		2.50																								TW2 (MC=23.7, BD=2.08, C_{cu} =4, ϕ_{cu} =24) TW2 (MC=20.8, BD=2.10, P_c =252, C_c =0.167) Stiff to Very Stiff Reddish brown mottled brownish grey Slightly sandy CLAY Deconstructed (OLD ALLUVIUM) TW3 (MC=19, BD=2.21, PD=2.69, GRAVEL=0, SAND=34, SILT=29, CLAY=37, LL=40, PL=15, C_{uc} =127, ϕ_{uc} =0) TW3 (MC=18.3, BD=2.20, C_{uc} =135, ϕ_{uc} =0) Medium Dense Light grey mottled reddish brown Slightly gravelly clayey SAND Deconstructed (OLD ALLUVIUM)	
																										Very Stiff Yellowish brown mottled reddish brown and light grey Slightly sandy CLAY Deconstructed (OLD ALLUVIUM)	
																										Hard Yellowish brown mottled reddish brown and light grey Slightly sandy CLAY Partially Weathered (OLD ALLUVIUM)	
																										Very Dense Light greenish grey spotted white Silty SAND Partially Weathered (OLD ALLUVIUM)	
																										CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER NSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER	
																										MC=MOISTURE CONTENT BD=BULK DENSITY PD=PARTICLE DENSITY LL=LIQUID LIMIT (%) PL=PLASTIC LIMIT (%) UU/UU=UNCONSOLIDATED CU/CO=CONSOLIDATED UNDRAINED/DRAINED (k_P)	
BORING TYPE Rotary		DIAMETER (mm) 100		FRACTURE PER METRE		RQD %		SCR %		TOR %		WEATHERING GRADE															

Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SIL SOIL INVESTIGATION PTE LTD		LOG BY: Zaw Htat Aung	DATE OF FIELD WORK: 26/08/15 - 28/08/15
		CHECKED BY: Aung Thura	SHEET NO. <1>/<2>

53

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH41									
LOCATION : Lim Chu Kang Lane 1		NORTHING 44441.083									
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		EASTING 15912.669									
SPT N VALUE		REDUCED LEVEL 103.834 m									
		DESCRIPTION									
		Hard Reddish brown mottled yellowish brown Slightly sandy SILT Partially Weathered (OLD ALLUVIUM)									
		Hard Bluish grey mottled reddish brown Fine sandy SILT Partially Weathered (OLD ALLUVIUM)									
		Very Dense Bluish grey mottled reddish brown Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)									
		Very Dense Bluish grey mottled brown Silty fine to medium SAND Unweathered (OLD ALLUVIUM)									
		Very Dense Bluish grey mottled brown Silty fine to coarse SAND Unweathered (OLD ALLUVIUM)									
		Very Dense Bluish grey mottled brown Silty fine to coarse SAND Unweathered (OLD ALLUVIUM)									
		Borehole terminated at 33.24m									
BORING TYPE Rotary DIAMETER(mm) 100		FRAC PER METRE	RQD %	SCR %	TCR %	WEATHERING GRADE	- SPT N VALUE ⊕ - VANE SHEAR TEST (VST) ■ - PRESSUREMETER TEST (PMT) △ - PERMEABILITY (PBT) / PACKER TEST (PKT)	☒ - SAMPLE ■ - CORE RUN □ - Attempt TWP, NZU	CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER	MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/UU=UNCONSOLIDATED CU/CU=CONSOLIDATED UNDRAINED/DRAINED (kPa)	
Client: Agri-Food and Veterinary Authority							LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS				
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)							LOG BY: Hadi Shahrin		DATE OF FIELD WORK: 25/08/15 - 27/08/15		
CONTRACTOR:  SOIL INVESTIGATION PTE LTD							CHECKED BY: Aung Thuro		SHEET NO. <2>/<2>		

PROJECT NO. SIL/S7518/15/SI		LOCATION : Lim Chu Kang Lane 1		FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE		SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	BOREHOLE NO. BH42		
DAILY WATER TABLE READING		DATE		READING (m.BGL)		10 20 30 40 50 60 70 80 90 100											NORTHING 44418.097		EASTING 16001.872
DESCRIPTION Trid Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-1.50m Soft Yellowish brown Slightly gravelly sandy CLAY (MADE GROUND)																			
TW2T (MC=38.4, PD=2.83, GRAVEL=6, SAND=42, SILT=17, CLAY=35, LL=39, PL=19) Soft Dark grey Peaty CLAY Transitional/Estuarine Member (KALLANG FORMATION) TW2B (MC=43.8, BD=1.73, Pc=42, Cc=0.255)																			
Loose Grey mottled reddish brown Silty fine to coarse SAND Residual (OLD ALLUVIUM)																			
Stiff Light grey mottled reddish brown Slightly gravelly sandy SILT Deconstructed (OLD ALLUVIUM) TW3 (MC=20, BD=2.04, PD=2.76, GRAVEL=1, SAND=58, SILT=31, CLAY=10, LL=45, PL=19, Cu=64, ϕ_{uc}=0) TW3 (MC=20.3, BD=2.10, Cu=112, ϕ_{uc}=0)																			
Medium Dense Bluish grey mottled brown Slightly gravelly fine to medium silty SAND Deconstructed (OLD ALLUVIUM)																			
Dense Bluish grey mottled reddish brown Silty fine to medium SAND Distinctly Weathered (OLD ALLUVIUM)																			
Very Dense Bluish grey mottled reddish brown Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)																			
BOREHOLE TYPE Rotary DIAMETER(mm) 100		FRACTURE PER METRE		RQD %		SCR %		TCR %		WEATHERING GRADE		• -SPT N VALUE ⊕ -VANE SHEAR TEST (VST) ■ -PRESSUREMETER TEST (PMT) △ -PERMEABILITY (PBT) / PACKER TEST (PKT)		⊗ -SAMPLE ■ -CORE RUN □ -Attempt TW/PMZU		CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER		MC=MOISTURE CONTENT BD=BULK DENSITY PD=PARTICLE DENSITY LL=LIQUID LIMIT (%) PL=PLASTIC LIMIT (%) UU/UU=UNCONSOLIDATED CU/CO=CONSOLIDATED UNDRAINED/DRAINED (ϕ_{ud})	
Client: Agri-Food and Veterinary Authority										LOG OF BORING									
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungai Tengah (Phase 5)										GEOTECHNICAL STUDY - FIELD INVESTIGATIONS				LOG BY: Hadi Shahrin					
CONTRACTOR:  SOIL INVESTIGATION PTE LTD										CHECKED BY: Aung Thura				DATE OF FIELD WORK: 25/08/15 - 27/08/15					
														SHEET NO. <1>/<2>					

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH42													
LOCATION : Lim Chu Kang Lane 1										NORTHING 44418.097													
										EASTING 16001.872													
										REDUCED LEVEL 103.708 m													
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE								SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	DESCRIPTION				
		10	20	30	40	50	60	70	80											90	100		
										56/300			21	21.00 21.48	X					Very Dense Bluish grey mottled reddish brown Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)			
													22		X								
													23		X								
													24	24.00 24.41	X								
										81/300			25		X				Very Dense Bluish grey mottled reddish brown Silty fine to medium SAND Partially Weathered (OLD ALLUVIUM)				
													26		X								
													27	27.00 27.17	X						Very Dense Bluish grey Slightly gravelly fine to coarse silty SAND Unweathered (OLD ALLUVIUM)		
										100/200			28		X								
													29		X						Very Dense Bluish grey mottled reddish brown Silty fine to medium SAND Unweathered (OLD ALLUVIUM)		
													30	30.00 30.20	X								
								100/140			31		X					Very Dense Bluish grey mottled reddish brown Silty fine to medium SAND Unweathered (OLD ALLUVIUM)					
											32		X										
											33	33.00 33.34	X					Very Dense Bluish grey mottled brown Silty fine to medium SAND Unweathered (OLD ALLUVIUM)					
								100/250			34		X										
Borehole terminated at 33.34m																							
BORING TYPE Rotary		FRACTURE PER METRE		RQD %		SCR %		TCR %		WEATHERING GRADE		• -SPT N VALUE ⊕ -VANE SHEAR TEST (VST) ■ -PRESSUREMETER TEST (PMT) △ -PERMEABILITY (PBT) / PACKER TEST (PKT)		X -SAMPLE ■ -CORE RUN □ -Attempt TW/PJ/MZJ		CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER				MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) U _U /C _U -UNCONSOLIDATED C _U /C _U -CONSOLIDATED UN-DRAINED/DRAINED (N _{Pc})			
Client: Agri-Food and Veterinary Authority												LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS											
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)												LOG BY: Hadi Shahrin				DATE OF FIELD WORK: 25/08/15 -- 27/08/15							
CONTRACTOR: SOIL INVESTIGATION PTE LTD												CHECKED BY: Aung Thura				SHEET NO. 2/2							

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH43	
LOCATION : Lim Chu Kang Lane 1		NORTHING 44383.614	
		EASTING 16089.095	
		REDUCED LEVEL 103.744 m	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		DESCRIPTION	
SPT N VALUE		SPT (N) / mm	
0 10 20 30 40 50 60 70 80 90 100		WEATHERING GRADE	
REDUCED LEVEL(m)		DEPTH (m)	
SAMPLE TYPE		GRAPHIC LOG	
THICKNESS(m)		GEOLOGICAL CLASSIFICATION	
BS SOIL CLASSIFICATION		DESCRIPTION	
DAILY WATER TABLE READING		DATE	
READING (m.BGL)		7/9/2015	
1.20		5/300	
2/300		8/300	
14/300		35/300	
34/300		41/300	
83.74		2.00	
85.74		6.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74		2.00	
85.74			

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH43									
LOCATION : Lim Chu Kang Lane 1										NORTHING 44383.614									
										EASTING 16089.095									
										REDUCED LEVEL 103.744 m									
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE										DESCRIPTION									
										Dense Bluish grey mottled reddish brown and brown Slightly gravelly silty fine to coarse SAND Distinctly Weathered (OLD ALLUVIUM)									
										Very Dense Bluish grey mottled yellowish brown Slightly gravelly silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)									
										Very Dense Bluish grey mottled brown Silty very fine SAND Partially Weathered (OLD ALLUVIUM)									
										Very Dense Bluish grey mottled brown Slightly gravelly silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)									
										Hard Greenish grey mottled greenish brown Slightly gravelly sandy SILT Unweathered (OLD ALLUVIUM)									
										Very Dense Bluish grey mottled yellowish brown Silty fine to coarse SAND Unweathered (OLD ALLUVIUM)									
										Borehole terminated at 39.21m									
BORING TYPE Rotary DIAMETER(mm) 100										CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER									
FRACTURE PER METRE										MC-MOISTURE CONTENT									
RQD %										BD-BULK DENSITY									
SCR %										PD-PARTICLE DENSITY									
TCR %										LL-LIQUID LIMIT (%)									
WEATHERING GRADE										PL-PLASTIC LIMIT (%)									
										UU/UC=UNCONSOLIDATED									
										CU/CD=CONSOLIDATED									
										UNDRAINED/DRAINED (kPa)									
Client: Agri-Food and Veterinary Authority										LOG OF BORING									
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)										GEOTECHNICAL STUDY - FIELD INVESTIGATIONS									
CONTRACTOR:  SOIL INVESTIGATION PTE LTD										LOG BY: Hadi Shahrin									
										DATE OF FIELD WORK: 07/09/15 - 08/09/15									
										CHECKED BY: Aung Thuro									
										SHEET NO. 2/2									

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH44			
LOCATION : Lim Chu Kang Lane 1		NORTHING 44323.007			
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		EASTING 16184.013			
SPT N VALUE		REDUCED LEVEL 103.738 m			
10 20 30 40 50 60 70 80 90 100 SPT (N) / mm		WEATHERING GRADE REDUCED LEVEL (m) DEPTH (m) SAMPLE TYPE GRAPHIC LOG THICKNESS (m) GEOLOGICAL CLASSIFICATION BS SOIL CLASSIFICATION			
DAILY WATER TABLE READING DATE: 7/9/2015, 8/9/2015 READING (m.BGL): FULL, 1.90		DESCRIPTION Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-1.50m Installation of Water Standpipe at 9.00m bgl Soft to Firm Orange mottled yellowish brown Slightly sandy SILT (MADE GROUND)			
2/300 5/300 3/300 15/300 19/300 85/300 71/300		101.34 TW1 TW2 SPT1 99.74 4.00 TW2 SPT2 97.74 6.00 TW3 SPT3 94.74 9.00 SPT4 12.00 SPT5 12.40 15.00 SPT6 15.40 18.00 SPT7 18.40 83.74 20.00			
		2.40 MO MS 1.60 E CP 2.00 F2 MS 3.00 F2 CS 6.00 O(0) SM 3.00 O(0) SM 2.00 O(0) SM			
		Very Soft Dark grey Peaty CLAY With sand Transitional/Estuarine Member (KALLANG FORMATION)			
		Firm Grey mottled reddish brown Slightly sandy SILT Alluvial Member (KALLANG FORMATION) TW2 (MC=24.3, BD=2.02, PD=2.71, GRAVEL=0, SAND=20, SILT=41, CLAY=39, LL=39, PL=16, Cu=43, wu=0)			
		Soft Grey Slightly sandy CLAY Alluvial Member (KALLANG FORMATION) TW3 (MC=36, BD=1.86, Cu=14, wu=0) TW3 (MC=59.3, BD=1.87, Pc=124, Cc=0.405)			
		Medium Dense Bluish grey Silty fine to coarse SAND Destructured (OLD ALLUVIUM)			
		Very Dense Bluish grey mottled reddish brown and brown Silty very fine SAND Partially Weathered (OLD ALLUVIUM)			
		Very Dense Bluish grey mottled reddish brown and brown Slightly gravelly fine to coarse silty SAND Partially Weathered (OLD ALLUVIUM)			
		BORE TYPE: Rotary DIAMETER (mm): 100		CR-CORE RUN MZ-MAZIER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER	
		MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/UU-UNCONSOLIDATED CU/CD=CONSOLIDATED UNDRAINED/DRAINED (kPa)		LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
Client: Agri-Food and Veterinary Authority		LOG BY: Hadi Shahrin			
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		DATE OF FIELD WORK: 07/09/15 - 08/09/15			
CONTRACTOR: SIL SOIL INVESTIGATION PTE LTD		CHECKED BY: Aung Thura			
SHEET NO. <1>/<2>		SHEET NO.			

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH44											
LOCATION : Lim Chu Kang Lane 1										NORTHING 44323.007											
										EASTING 16184.013											
										REDUCED LEVEL 103.738 m											
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE								SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	DESCRIPTION		
		10	20	30	40	50	60	70	80											90	100
										89/300		82.74	21	21.00 SPT8 21.48	X	1.00	O(B)	SM	Very Dense Bluish grey mottled reddish brown and brown Slightly gravelly fine to coarse silty SAND Partially Weathered (OLD ALLUVIUM)		
													22		X				Very Dense Bluish grey mottled reddish brown and brown Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)		
													23		X						
													24		X						
												61/300		79.74	24	24.00 SPT9 24.48	X	3.00	O(B)	SM	Hard Bluish grey mottled reddish brown Sandy SILT Partially Weathered (OLD ALLUVIUM)
															25		X				
															26		X				
												74/300		78.74	27	27.00 SPT10 27.48	X	3.00	O(B)	MS	Very Dense Bluish grey Slightly gravelly fine to coarse silty SAND Partially Weathered (OLD ALLUVIUM)
															28		X				
															29		X				
												100/270		73.74	30	30.00 SPT11 30.36	X	3.00	O(B)	SM	Very Dense Bluish grey Silty very fine SAND Unweathered (OLD ALLUVIUM)
															31		X				
															32		X				
										100/190		70.74	33	33.00 SPT12 33.36	X	3.00	O(A)	SM	Very Dense Bluish grey Slightly gravelly fine to coarse silty SAND Unweathered (OLD ALLUVIUM)		
													34		X						
													35		X						
										100/210		67.49	36	36.00 SPT13 36.36	X	3.25	O(A)	SM	Borehole terminated at 36.25m		
													37								
													38								
													39								
													40								

BORING TYPE Rotary DIAMETER(mm) 100		FRACTURE PER METRE 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50	RQD % 0 10 20 30 40 50 60 70 80 90 100	SCR % 0 10 20 30 40 50 60 70 80 90 100	TCR % 0 10 20 30 40 50 60 70 80 90 100	WEATHERING GRADE I II III IV V VI VII VIII IX X XI XII XIII XIV XV XVI XVII XVIII XIX XX XXI XXII XXIII XXIV XXV XXVI XXVII XXVIII XXIX XXX	• -SPT N VALUE ⊕ -VANE SHEAR TEST (VST) ■ -PRESSUREMETER TEST (PMT) △ -PERMEABILITY (PBT) / PACKER TEST (PKT)	X -SAMPLE — CORE RUN □ -Attempt TW.P.M.Z.U	CR-CORE RUN MZ-MAZEP SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PREZOMETER	MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/CU=UNCONSOLIDATED CU/CD=CONSOLIDATED UNDRAINED/DRAINED (N ₆₀)
--	--	---	--	--	--	---	--	--	---	--

Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		GEO TECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SOIL INVESTIGATION PTE LTD		LOG BY: Hadi Shohrim	DATE OF FIELD WORK: 07/09/15 - 08/09/15
		CHECKED BY: Aung Thura	SHEET NO. 01/01

PROJECT NO. SIL/S7518/15/SI		BOREHOLE NO. BH46	
LOCATION : Lim Chu Kong Lane 1		NORTHING 44903.745	
		EASTING 15739.19	
		REDUCED LEVEL 104.392 m	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		DESCRIPTION	
DAILY WATER TABLE READING		Trial Pit: 1.00 x 0.80 x 1.00m	
DATE	READING (m.BGL)	Hand Auger: 1.00-1.50m	
1/9/2015	1.20	Firm to Stiff	
1/9/2015	1.00	Orange mottled yellowish brown	
2/9/2015	2.40	Slightly gravelly silty SAND	
2/9/2015	FULL	(MADE GROUND)	
3/9/2015	FULL		

[illegible]

PROJECT NO. SIL/S7518/15/SI										BOREHOLE NO. BH47	
LOCATION : Lim Chu Kang Lane 1										NORTHING 44789.035	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE										EASTING 15716.949	
SPT N VALUE										REDUCED LEVEL 104.359 m	
SPT (N) / mm										DESCRIPTION	
DAILY WATER TABLE READING											
DATE READING (m.BGL)											
1/9/2015 1.30											
2/9/2015 1.35											
4/300										Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-1.50m Installation of Water Standpipe at 9.00m bgl Firm to Stiff Yellowish brown mottled reddish brown and white Slightly gravelly sandy SILT With hardpore (MADE GROUND) Soft to Firm Yellowish brown mottled reddish brown Slightly sandy SILT (MADE GROUND)	
7/300										Very Soft to Soft Dark grey Peaty SILT Transitional/Estuarine Member (KALLANG FORMATION) TW2 (MC=64.3, BD=1.56, PD=2.49, GRAVEL=1, SAND=34, SILT=47, CLAY=18, LL=91, PL=46, C _{cu} =7, # _{cu} =31) Firm Light grey mottled yellowish brown Slightly sandy CLAY Alluvial Member (KALLANG FORMATION) TW3 (MC=25, BD=2.01, PD=2.68, GRAVEL=0, SAND=7, SILT=42, CLAY=51, LL=44, PL=18, C _{cu} =57, # _{cu} =0)	
8/300											
15/300										Stiff Light grey mottled yellowish brown Slightly sandy SILT Alluvial Member (KALLANG FORMATION) TW4 (MC=18.3, BD=2.14, PD=2.71, GRAVEL=0, SAND=20, SILT=52, CLAY=28, LL=37, PL=14, C _{cu} =104, # _{cu} =0) Stiff Reddish brown mottled white Slightly sandy CLAY Deconstructed (OLD ALLUVIUM)	
21/300										Very Stiff Reddish brown mottled yellowish brown and white Slightly sandy CLAY Deconstructed (OLD ALLUVIUM)	
31/300										Hard Reddish brown mottled yellowish brown Slightly sandy SILT Distinctly Weathered (OLD ALLUVIUM)	
75/300										Very Dense Light grey Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)	
BORING TYPE Rotary											
DIAMETER(mm) 100											
FRACTURE PER METRE											
RQD %											
SCR %											
TCR %											
WEATHERING GRADE											
- SPT N VALUE										- SAMPLE	
- VANE SHEAR TEST (VST)										- CORE RUN	
- PRESSUREMETER TEST (PMT)										- Attempt TW, PMZU	
- PERMEABILITY (PBT) / PACKER TEST (PKT)											
OR-CORE RUN										MC-MOISTURE CONTENT	
MZ-MAZAR SAMPLE										BD-BULK DENSITY	
P-PISTON SAMPLE										PD-PARTICLE DENSITY	
TW-THIN WALL PUSH IN										LL-LIQUID LIMIT (%)	
U-THICK WALL OPEN DRIVE										PL-PLASTIC LIMIT (%)	
W-WATER										UU/OU=UNCONSOLIDATED	
WSP-WATER STANDPIPE										CU/CO=CONSOLIDATED	
PZS-CASAGRANDE PIEZOMETER										UNDRAINED/DRAINED (kPa)	

Client: Agri-Food and Veterinary Authority

PROJECT: Soil Investigation Works at Lim Chu Kang & Sungai Tengah (Phase 5)

CONTRACTOR: SOIL INVESTIGATION PTE LTD

LOG OF BORING

GEOTECHNICAL STUDY - FIELD INVESTIGATIONS

LOG BY: Phyo Thu Kha

CHECKED BY: Aung Thura

DATE OF FIELD WORK: 01/09/15 - 03/09/15

SHEET NO. <1>/<2>

67

[illegible]

PROJECT NO. SIL/S751B/15/SI										BOREHOLE NO. BH48	
LOCATION : Lim Chu Kang Lane 1										NORTHING 44736.592	
										EASTING 15898.905	
										REDUCED LEVEL 104.436 m	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE								SPT (N) / mm	
		10	20	30	40	50	60	70	80		
										WEATHERING GRADE	
										REDUCED LEVEL (m)	
										DEPTH (m)	
										SAMPLE TYPE	
										GRAPHIC LOG	
										THICKNESS (m)	
										GEOLOGICAL CLASSIFICATION	
										BS SOIL CLASSIFICATION	
DESCRIPTION											
Hard Reddish brown mottled yellowish brown and light grey Slightly fine sandy SILT Distinctly Weathered (OLD ALLUVIUM)											
Very Dense Light grey Slightly silty fine to medium SAND Partially Weathered (OLD ALLUVIUM)											
Hard Reddish brown mottled light grey Slightly fine sandy SILT Partially Weathered (OLD ALLUVIUM)											
Hard Reddish brown mottled yellowish brown Slightly fine sandy SILT Unweathered (OLD ALLUVIUM)											
Hard Reddish brown mottled light grey Fine to medium sandy SILT Unweathered (OLD ALLUVIUM)											
Very Dense Reddish brown mottled light grey Slightly silty fine to coarse SAND Unweathered (OLD ALLUVIUM)											
Hard Light greenish grey mottled yellowish brown Fine sandy SILT Unweathered (OLD ALLUVIUM)											
Borehole terminated at 33.38m											
BORING TYPE Rotary DIAMETER (mm) 100		FRACTURE PER METRE		RQD %		SCR %		TCR %		WEATHERING GRADE	
* - SPT N VALUE ⊕ - VANE SHEAR TEST (VST) ■ - PRESSUREMETER TEST (PMT) △ - PERMEABILITY (PBT) / PACKER TEST (PKT) ☒ - SAMPLE ■ - CORE RUN □ - Attempt TW, P, MZ, U CR - CORE RUN MZ - MAZIER SAMPLE P - PISTON SAMPLE TW - THIN WALL PUSH IN U - THICK WALL OPEN DRINE W - WATER WSP - WATER STANDPIPE PZS - CASAGRANDE PIEZOMETER MC - MOISTURE CONTENT BD - BULK DENSITY PD - PARTICLE DENSITY LL - LIQUID LIMIT (%) PL - PLASTIC LIMIT (%) UU / CU = UNCONSOLIDATED CU / CD = CONSOLIDATED UNDRAINED / DRAINED (kPa)											
Client: Agri-Food and Veterinary Authority						LOG OF BORING GEOTECHNICAL STUDY - FIELD INVESTIGATIONS					
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)						LOG BY: Aung Si Thu			DATE OF FIELD WORK: 29/08/15 - 31/08/15		
CONTRACTOR: SOIL INVESTIGATION PTE LTD						CHECKED BY: Aung Thura			SHEET NO. <2>/<2>		

PROJECT NO. SL/S7518/15/SI		BOREHOLE NO. BH49	
LOCATION : Lim Chu Kang Lane 1		NORTHING 44738.179	
		EASTING 16041.702	
		REDUCED LEVEL 103.755 m	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		DESCRIPTION	
SPT N VALUE			
10 20 30 40 50 60 70 80 90 100			
SPT (N) / mm			
WEATHERING GRADE			
REDUCED LEVEL (m)			
DEPTH (m)			
SAMPLE TYPE			
GRAPHIC LOG			
THICKNESS (m)			
GEOLOGICAL CLASSIFICATION			
BS SOIL CLASSIFICATION			
93/300		Hard Reddish brown mottled yellowish brown and light grey Slightly fine sandy SILT Partially Weathered (OLD ALLUVIUM)	
96/300		Very Dense Light greenish grey Slightly silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)	
100/290		Hard Reddish brown mottled yellowish brown and light grey Slightly fine sandy SILT Unweathered (OLD ALLUVIUM)	
100/230		Very Dense Light greenish grey Slightly silty fine to coarse SAND Unweathered (OLD ALLUVIUM)	
100/250		Hard Yellowish brown mottled reddish brown and light grey Slightly fine sandy SILT Unweathered (OLD ALLUVIUM)	
		Borehole terminated at 33.40m	
BORING TYPE Rotary		CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER	
DIAMETER (mm) 0		MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) UU/CU=UNCONSOLIDATED CU/CD=CONSOLIDATED UNDRAINED/DRAINED (kPa)	
FRACTURE PER METRE			
RQD %			
SCR %			
TCR %			
WEATHERING GRADE			
- SPT N VALUE		- SAMPLE	
- VANE SHEAR TEST (VST)		- CORE RUN	
- PRESSUREMETER TEST (PMT)		- Attempt TW,P,MZ,U	
- PERMEABILITY (PBT) / PACKER TEST (PKT)			
Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)		GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SOIL INVESTIGATION PTE LTD		LOG BY: Aung Si Thu	
		DATE OF FIELD WORK: 29/08/15 - 01/09/15	
		CHECKED BY: Aung Thura	
		SHEET NO. 2/2	

PROJECT NO. SIL/57518/15/SI		LOCATION : Lim Chu Kang Lane 1		FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE		SPT (N) / mm	WEATHERING GRADE	REDUCED LEVEL(m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	THICKNESS(m)	GEOLOGICAL CLASSIFICATION	BS SOIL CLASSIFICATION	BOREHOLE NO. BH50				
DAILY WATER TABLE READING		DATE		READING (m.BGL)													NORTHING 44664.014		EASTING 15737.642		REDUCED LEVEL 105.051 m
DESCRIPTION																					
Trial Pit: 1.00 x 0.80 x 1.00m Hand Auger: 1.00-1.50m Firm to Stiff Orange mottled reddish brown Slightly sandy SILT (MADE GROUND)																					
Very Soft Brownish grey and reddish brown Slightly gravelly slightly sandy SILT (MADE GROUND) TW2T (MC=51, BD=1.93, PD=2.81, GRAVEL=4, SAND=21, SILT=50, CLAY=25, LL=62, PL=36, C _{cu} =1, I _p =33)																					
Soft Dark brown Peaty SILT With wood Transitional/Estuarine Member (KALLANG FORMATION) TW2B (MC=82.5, BD=1.42, PD=2.41, GRAVEL=6, SAND=22, SILT=57, CLAY=15, LL=97, PL=56, C _{cu} =25, I _p =0)																					
TW2B (MC=113.3, BD=1.34, P _{cu} =72, C _u =1.15) Loose Dark brown Silty fine to coarse SAND Alluvial Member (KALLANG FORMATION) Firm to Stiff Grey spotted reddish brown Slightly sandy CLAY Destructured (OLD ALLUVIUM) TW3 (MC=24, BD=2.03, PD=2.71, GRAVEL=0, SAND=10, SILT=46, CLAY=44, C _{cu} =36, I _p =0)																					
TW3 (MC=22.7, BD=2.08, C _{cu} =48, I _p =0) Medium Dense Greenish brown mottled reddish brown and brown Silty fine SAND Destructured (OLD ALLUVIUM)																					
Hard Reddish brown mottled brown Fine sandy SILT Distinctly Weathered (OLD ALLUVIUM)																					
Very Dense Grey mottled reddish brown Silty fine to coarse SAND Partially Weathered (OLD ALLUVIUM)																					
BOREHOLE TYPE Rotary DIAMETER(mm) 100		FRACTURE PER METRE 2 1 0		RQD %		SCR %		TCR %		WEATHERING GRADE I II III IV V		SPT N VALUE 10 20 30 40 50 60 70 80 90 100		- SPT N VALUE ⊕ - VANE SHEAR TEST (VST) ■ - PRESSUREMETER TEST (PMT) △ - PERMEABILITY (PBT) / PACKER TEST (PKT)		- SAMPLE - CORE RUN - Attempt TWP/MZU		CR-CORE RUN MZ-MAZER SAMPLE P-PISTON SAMPLE TW-THIN WALL PUSH IN U-THICK WALL OPEN DRIVE W-WATER WSP-WATER STANDPIPE PZS-CASAGRANDE PIEZOMETER		MC-MOISTURE CONTENT BD-BULK DENSITY PD-PARTICLE DENSITY LL-LIQUID LIMIT (%) PL-PLASTIC LIMIT (%) CU/CU-UNCONSOLIDATED CU/CD-CONSOLIDATED UNDRAINED/DRAINED (K _f)	
Client: Agri-Food and Veterinary Authority										LOG OF BORING											
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)										GEOTECHNICAL STUDY - FIELD INVESTIGATIONS											
CONTRACTOR: SIL SOIL INVESTIGATION PTE LTD										LOG BY: Hadi Shahrin											
										DATE OF FIELD WORK: 29/08/15 - 31/08/15											
										CHECKED BY: Aung Thura											
										SHEET NO. <1>/<2>											

PROJECT NO. SIL/S7518/15/SI		LOCATION : Lim Chu Kang Lane 1		BOREHOLE NO. BH50	
FIELD & LABORATORY DATA & TESTS REPORTED ELSEWHERE		SPT N VALUE		SPT (N) / mm	
		10 20 30 40 50 60 70 80 90 100			
				WEATHERING GRADE	
				REDUCED LEVEL (m)	
				DEPTH (m)	
				SAMPLE TYPE	
				GRAPHIC LOG	
				THICKNESS (m)	
				GEOLOGICAL CLASSIFICATION	
				BS SOIL CLASSIFICATION	
				DESCRIPTION	
				68/300	
				64.05	
				21	
				21.00	
				21.48	
				22	
				23	
				24	
				24.00	
				24.43	
				25	
				26	
				27	
				27.00	
				27.43	
				28	
				29	
				30	
				30.00	
				30.44	
				31	
				32	
				33	
				34	
				35	
				36	
				37	
				38	
				39	
				40	
				Borehole terminated at 30.40m	

BOREHOLE TYPE
Rotary

DIAMETER (mm)
100

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

FRACTURE PER METRE

RQD %

SCR %

TCR %

WEATHERING GRADE

● - SPT N VALUE

⊕ - VANE SHEAR TEST (VST)

■ - PRESSUREMETER TEST (PMT)

△ - PERMEABILITY (PBT) / PACKER TEST (PKT)

⊗ - SAMPLE

□ - CORE RUN

□ - Attempt TW, P, M, Z, U

CR - CORE RUN

MZ - MAYER SAMPLE

P - PISTON SAMPLE

TW - THIN WALL PUSH IN

U - THICK WALL OPEN DRIVE

W - WATER

WSP - WATER STANDPIPE

PZS - CASAGRANDE PIEZOMETER

MC - MOISTURE CONTENT

BD - BULK DENSITY

PD - PARTICLE DENSITY

LL - LIQUID LIMIT (%)

PL - PLASTIC LIMIT (%)

UU/CU - UNCONSOLIDATED

CU/CD - CONSOLIDATED

UNDRAINED/DRAINED (kPa)

Client: Agri-Food and Veterinary Authority		LOG OF BORING	
PROJECT: Soil Investigation Works at Lim Chu Kang & Sungai Tengah (Phase 5)		GEOTECHNICAL STUDY - FIELD INVESTIGATIONS	
CONTRACTOR: SOIL INVESTIGATION PTE LTD		LOG BY: Hadi Shahrin	DATE OF FIELD WORK: 29/08/15 - 31/08/15
		CHECKED BY: Aung Thura	SHEET NO. <2>/<2>

74

75

SITE PHOTOS



BH34

Project: Soil Investigation Works at Lim Chu Kang
 Location: Lim Chu Kang Lane 1
 Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE
 Borehole No: BH34

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



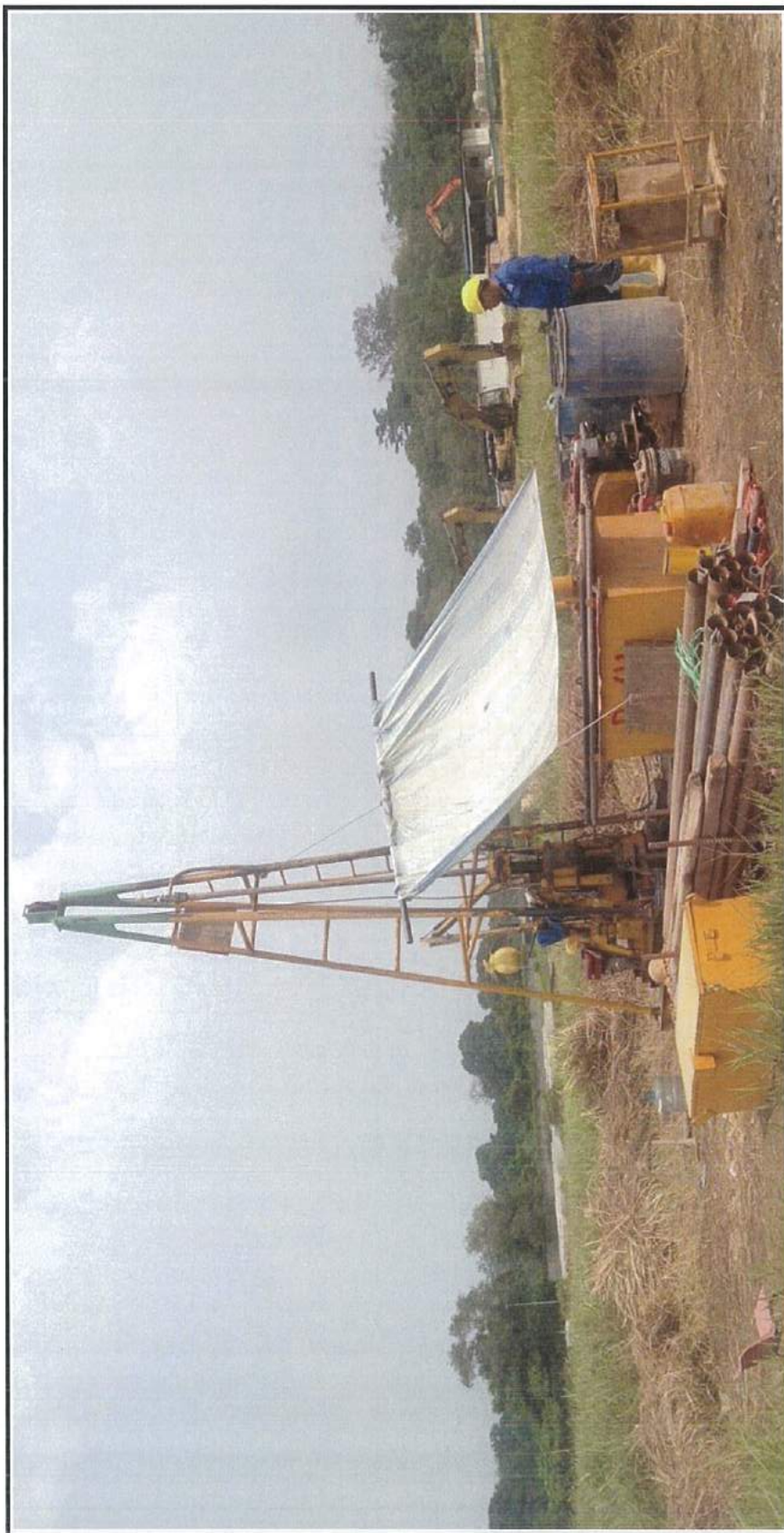
BH35

Project: Soil Investigation Works at Lim Chu Kang
 Location: Lim Chu Kang Lane 1
 Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE
 Borehole No: BH35

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH36

Project: Soil Investigation Works at Lim Chu Kang
 Location: Lim Chu Kang Lane 1
 Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE
 Borehole No: BH36

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH37

Project: Soil Investigation Works at Lim Chu Kang
 Location: Lim Chu Kang Lane 1
 Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE
 Borehole No: BH37

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH38

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

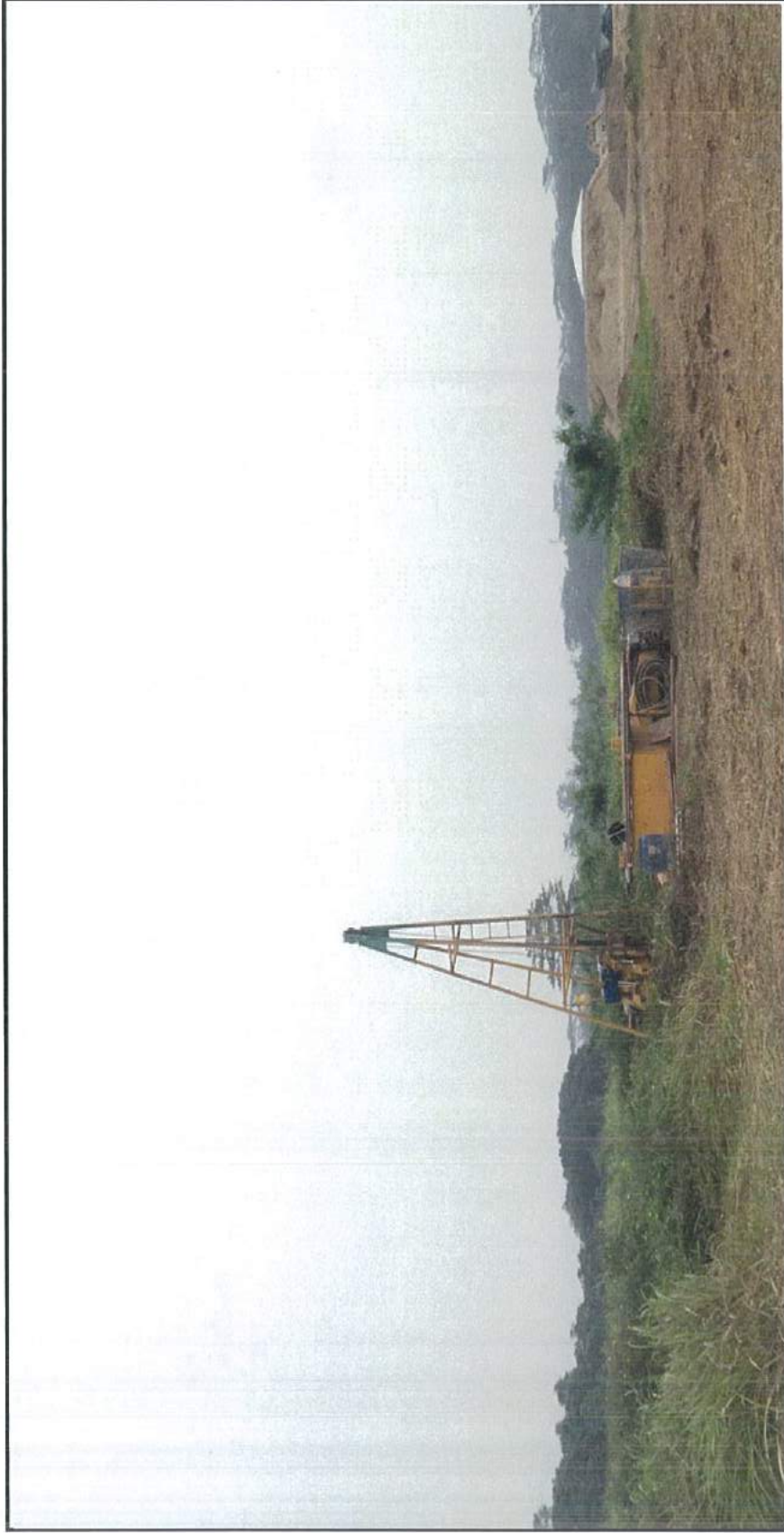
Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH38

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH39

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

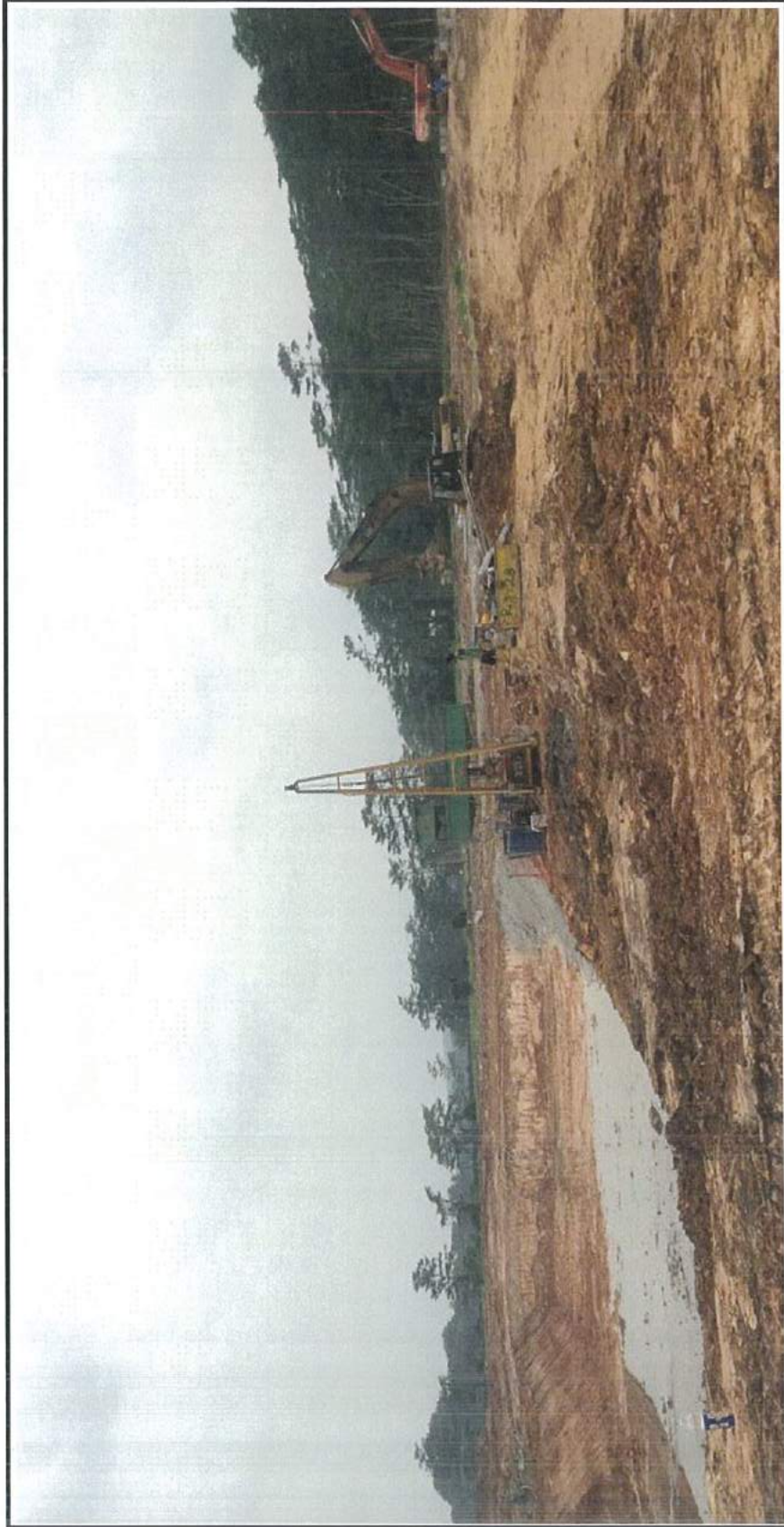
Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH39

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



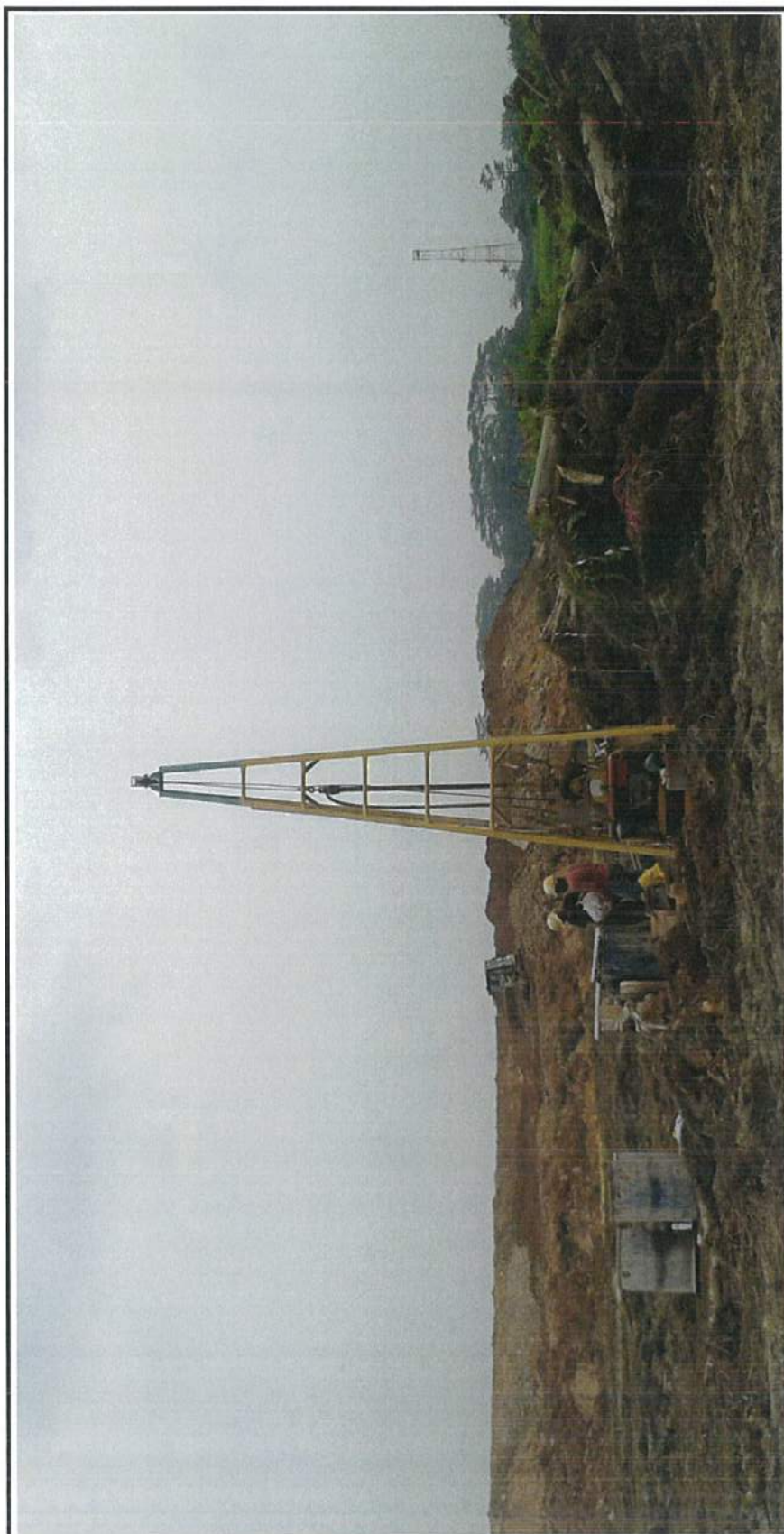
BH40

Project: Soil Investigation Works at Lim Chu Kang
 Location: Lim Chu Kang Lane 1
 Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE
 Borehole No: BH40

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH41

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH41

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH42

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH42

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH43

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH43

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH44

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH44

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH45

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH45

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH46

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH46

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH47

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH47

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH48

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH48

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH49

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH49

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH50

Project: Soil Investigation Works at Lim Chu Kang

Location: Lim Chu Kang Lane 1

Client: AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE

Borehole No: BH50

SITE PHOTOGRAPH



SOIL INVESTIGATION PTE LTD



BH51



Project: Soil Investigation Works at Lim Chu Kang

Location: **Lim Chu Kang Lane 1**

Client: **AGRI-FOOD & VETERINARY AUTHORITY OF SINGAPORE**

Borehole No: BH51

SITE PHOTOGRAPH

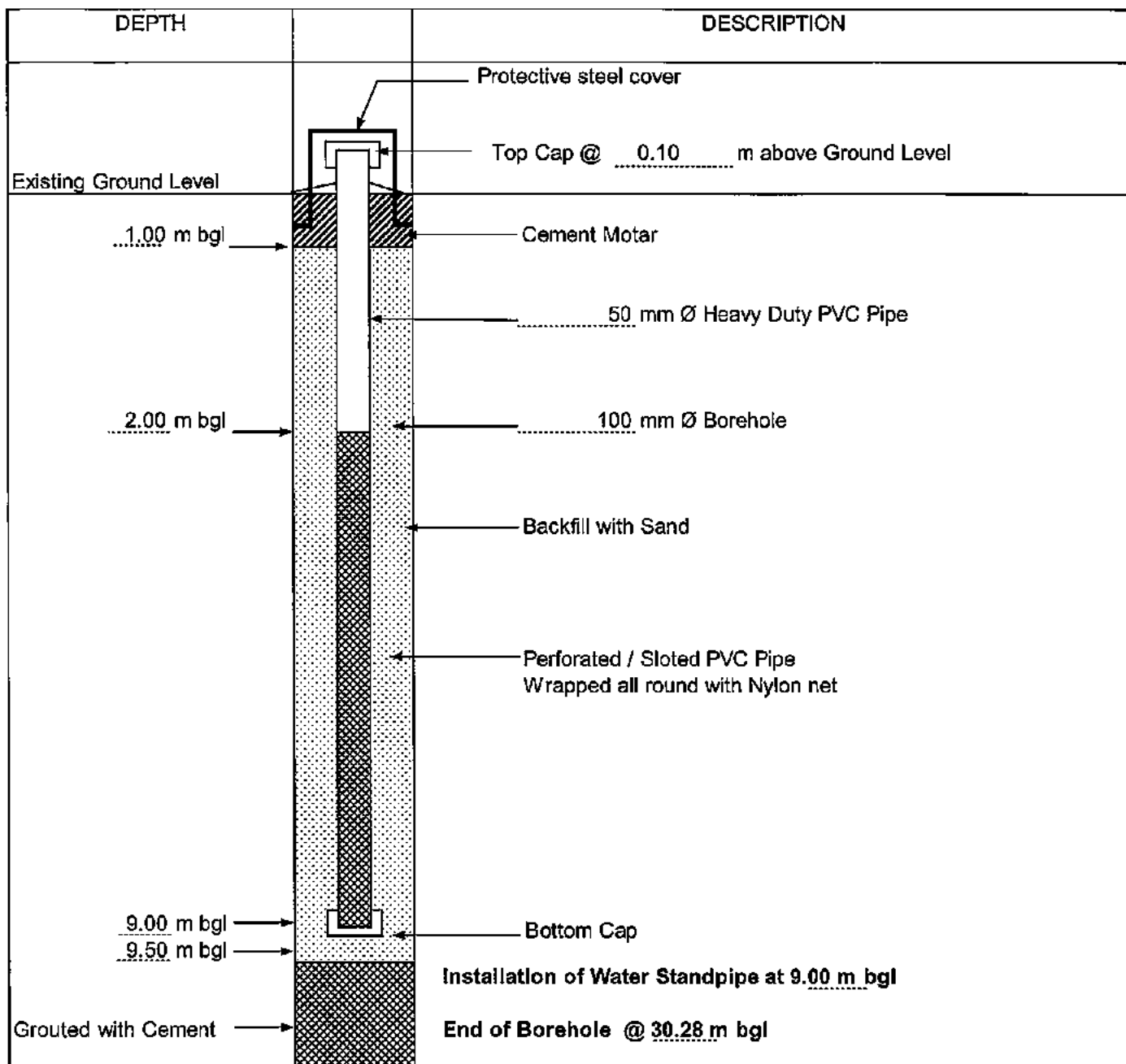


SOIL INVESTIGATION PTE LTD

WATER STANDPIPE

WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Fine
 Borehole No.: BH35 Installed by: Phyo Han Kyaw
 Date Installed: 2-Sep-15



NOTE: (Drawing NOT TO SCALE)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah

CLIENT : Agri-Food and Veterinary Authority

LOCATION : Lim Chu Kang

BH NO. : BH35

**WATER TABLE
MONITORING GRAPH**

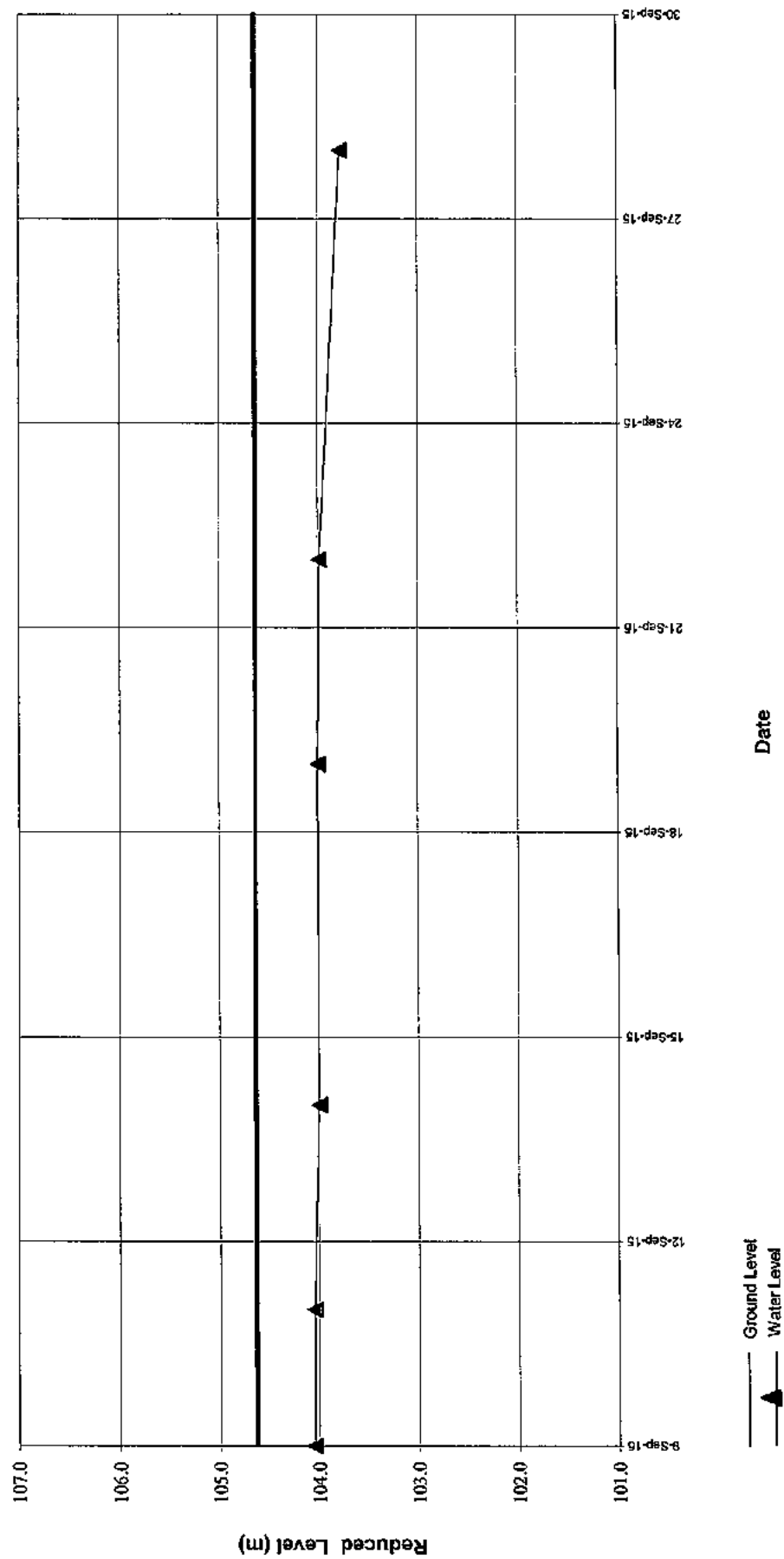
INSTALLED DATE : 2-Sep-15

LENGTH OF WATER STANDPIPE : 9 m

PERFORATED/TEST SECTION : 2.00 m - 9.00 m

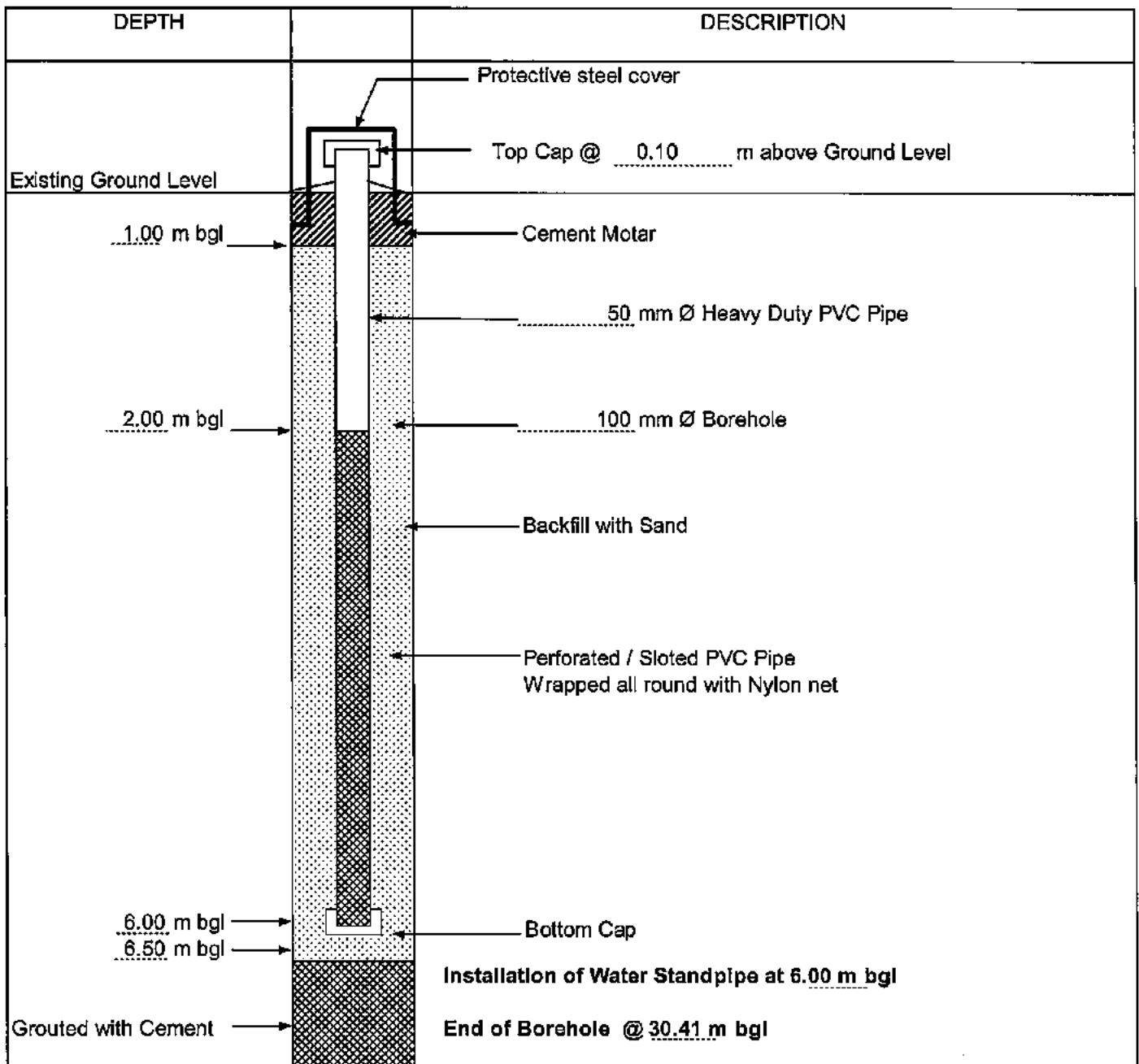
SOIL TYPE : Slightly sandy CLAY

BH35



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Fine
 Borehole No.: BH38 Installed by: Phyo Han Kyaw
 Date Installed: 31-Aug-15



NOTE: (Drawing NOT TO SCALE)

PROJECT	: SI Works at Lim Chu Kang & Sungai Tengah
CLIENT	: Agri-Food and Veterinary Authority
LOCATION	: Lim Chu Kang
BH NO.	: BH38
BH RL	: 105.177 m
INSTALLED DATE	: 31-Aug-15
LENGTH OF WATER STANDPIPE	: 6.00 m
PERFORATED/TEST SECTION	: 2.00 m - 6.00 m
SOIL TYPE	: Silty SAND/Slightly sandy CLAY
PIPE ABOVE GROUND LEVEL	: 0.100m

[illegible]

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah

CLIENT : Agri-Food and Veterinary Authority

LOCATION : Lim Chu Kang

BH NO. : BH38

**WATER TABLE
MONITORING GRAPH**

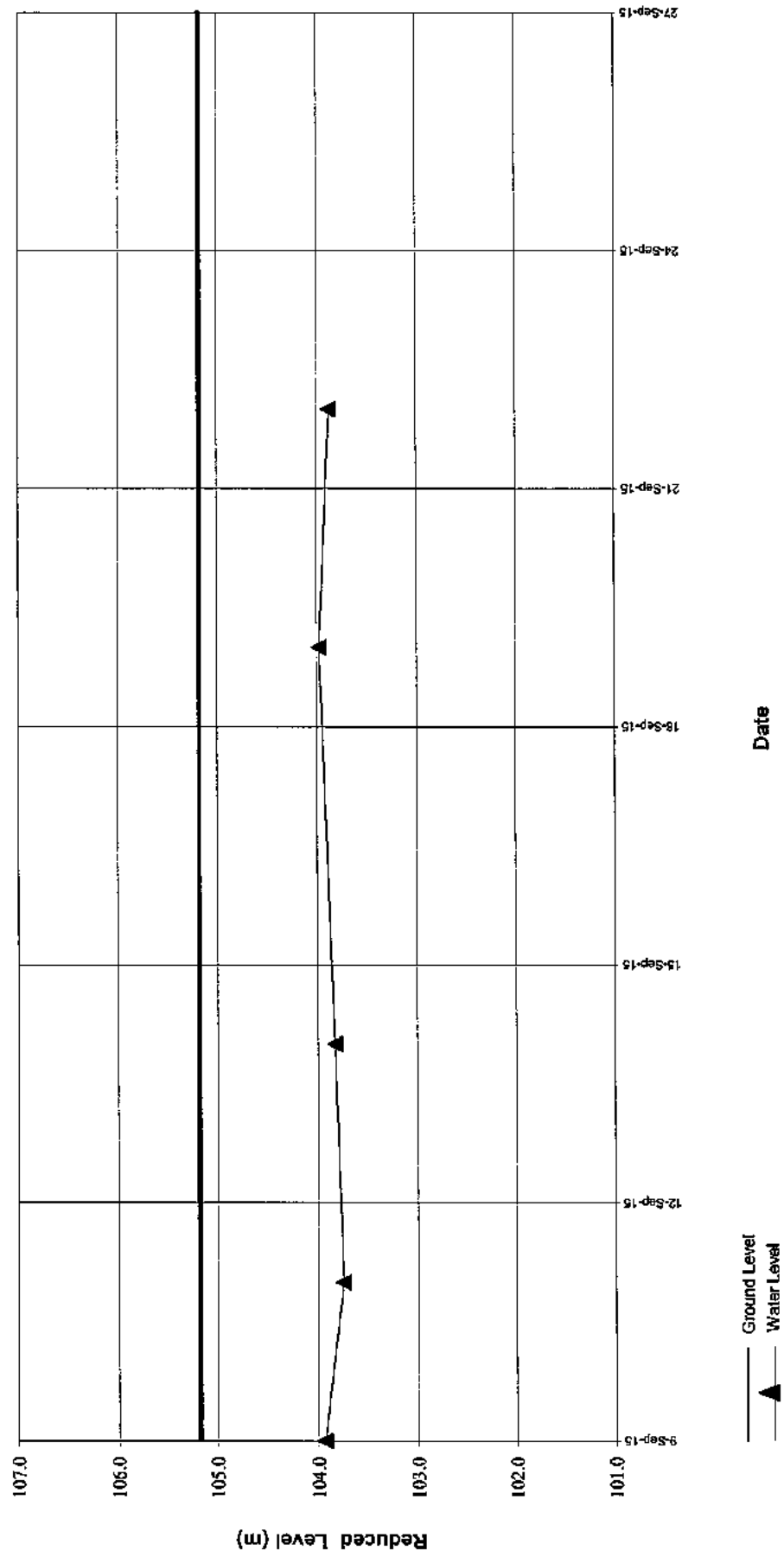
INSTALLED DATE : 31-Aug-15

LENGTH OF WATER STANDPIPE : 6 m

PERFORATED/TEST SECTION : 2.00 m - 6.00 m

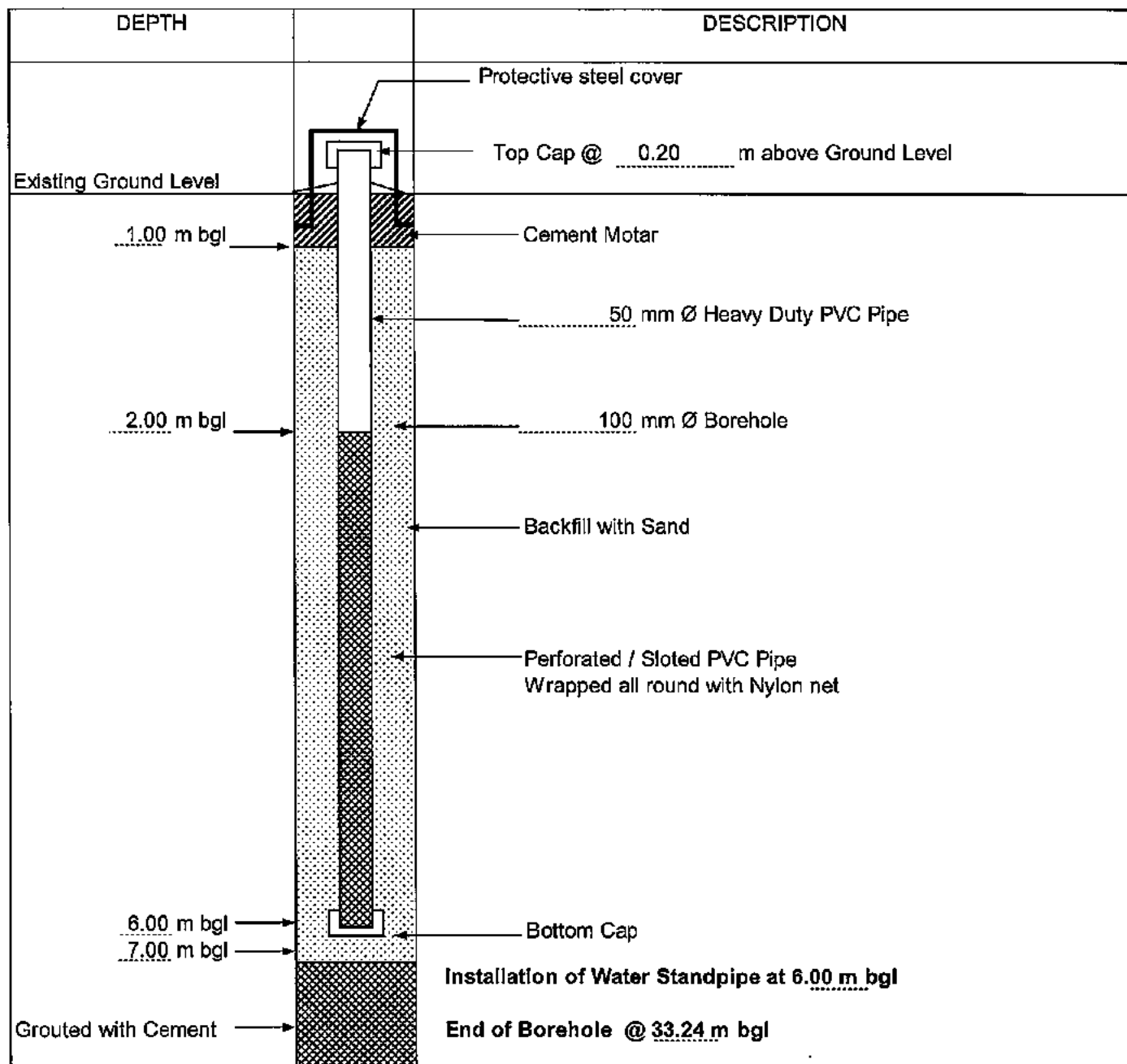
SOIL TYPE : Silty SAND/Slightly sandy CLAY

BH38



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Fine
 Borehole No.: BH41 Installed by: Hadi Shahrin
 Date Installed: 28-Aug-15



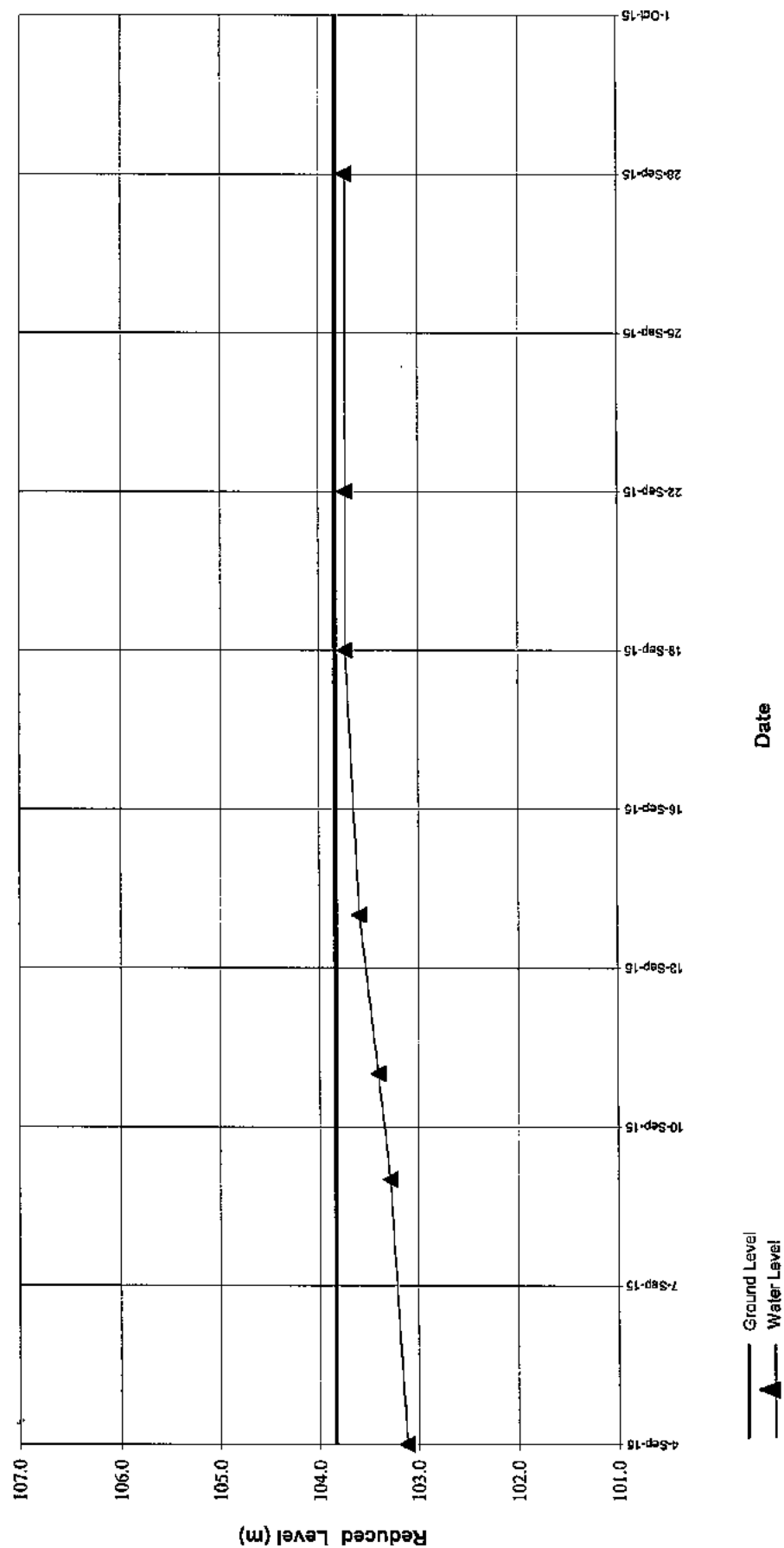
NOTE: (Drawing NOT TO SCALE)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah
CLIENT : Agri-Food and Veterinary Authority
LOCATION : Lim Chu Kang
BH NO. : BH41

**WATER TABLE
MONITORING GRAPH**

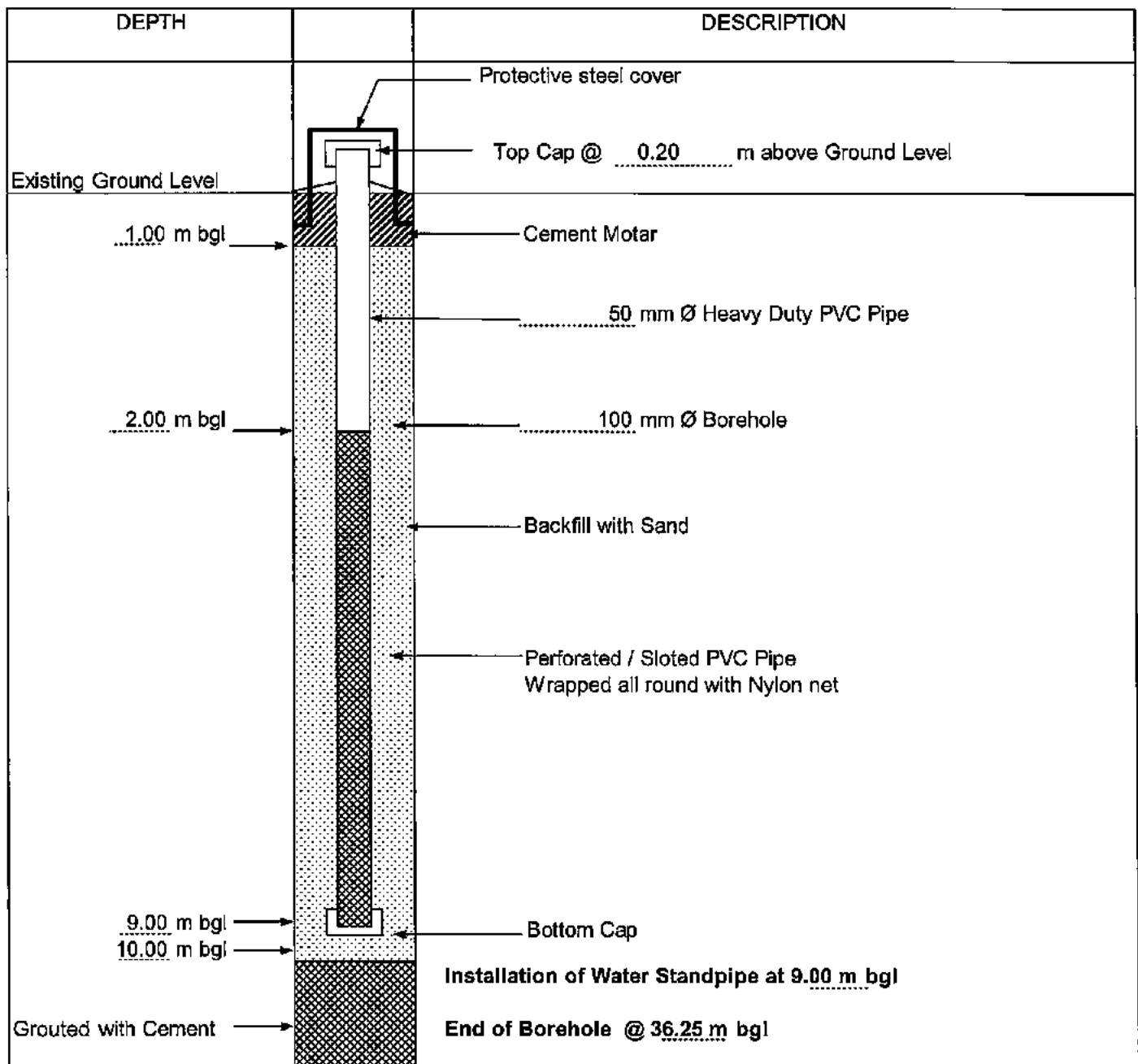
INSTALLED DATE : 28-Aug-15
LENGTH OF WATER STANDPIPE : 6 m
PERFORATED/TEST SECTION : 2.00 m - 6.00 m
SOIL TYPE : Slightly gravelly slightly sandy SILT/Peaty SILT

BH41



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Sunny
 Borehole No.: BH44 Installed by: Hadi Shahrin
 Date Installed: 9-Sep-15



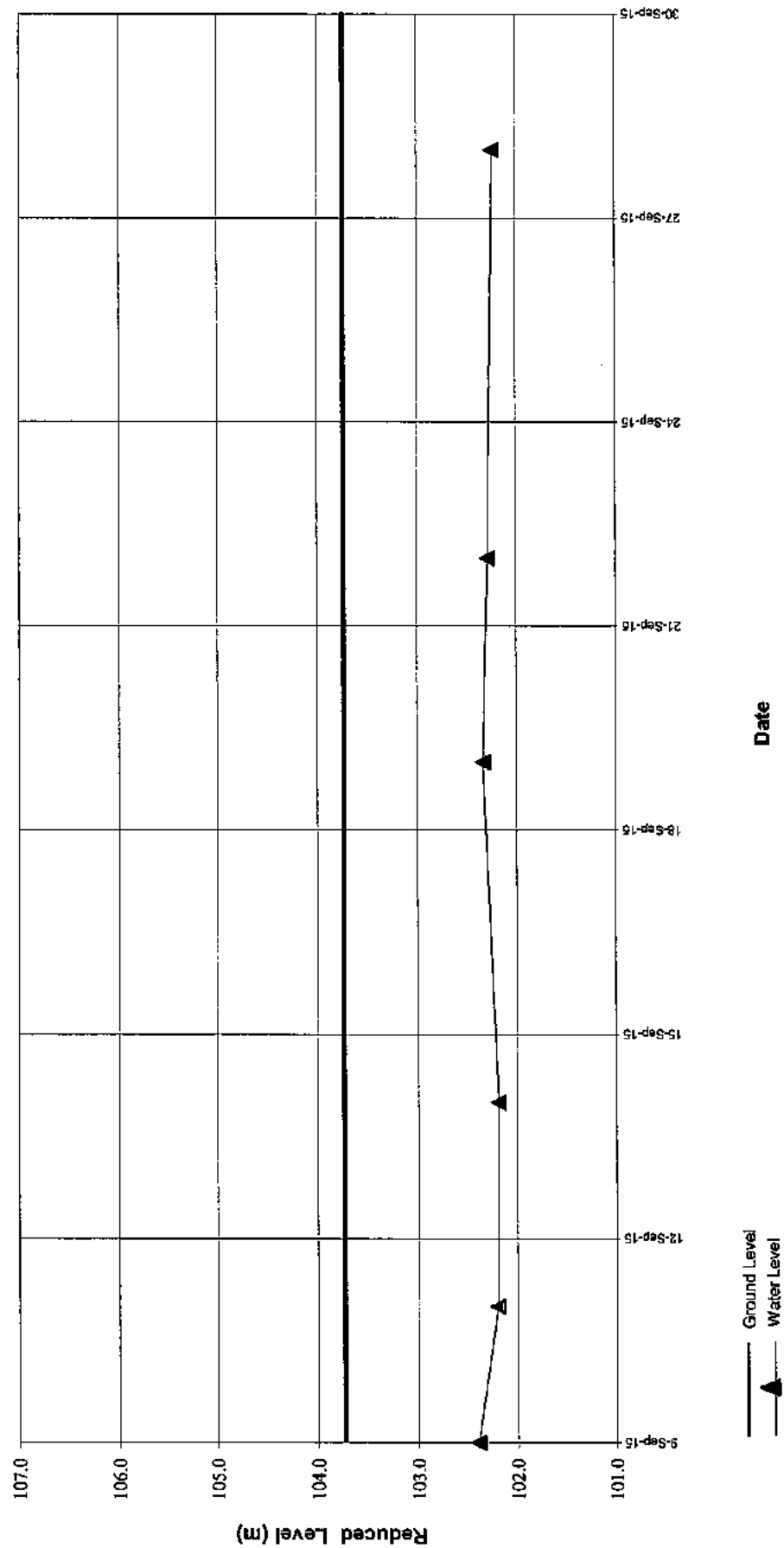
NOTE: (Drawing NOT TO SCALE)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah
CLIENT : Agri-Food and Veterinary Authority
LOCATION : Lim Chu Kang
BH NO. : BH44

**WATER TABLE
MONITORING GRAPH**

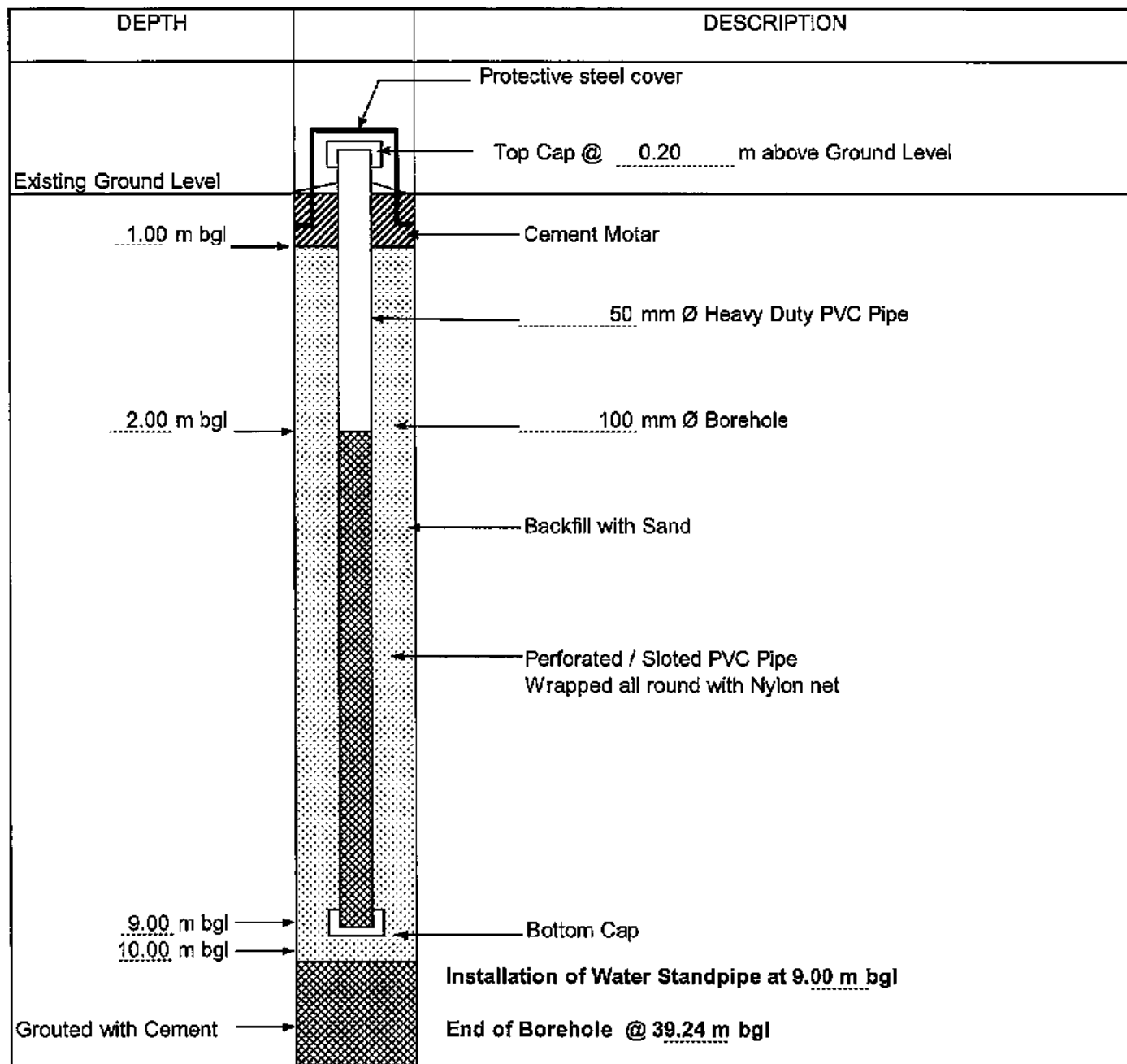
INSTALLED DATE : 9-Sep-15
LENGTH OF WATER STANDPIPE : 9 m
PERFORATED/TEST SECTION : 2.00 m - 9.00 m
SOIL TYPE : Peaty CLAY/Slightly sandy SILT/Slightly sandy CLAY

BH44



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Sunny
 Borehole No.: BH45 Installed by: Hadi Shahrim
 Date Installed: 3-Sep-15



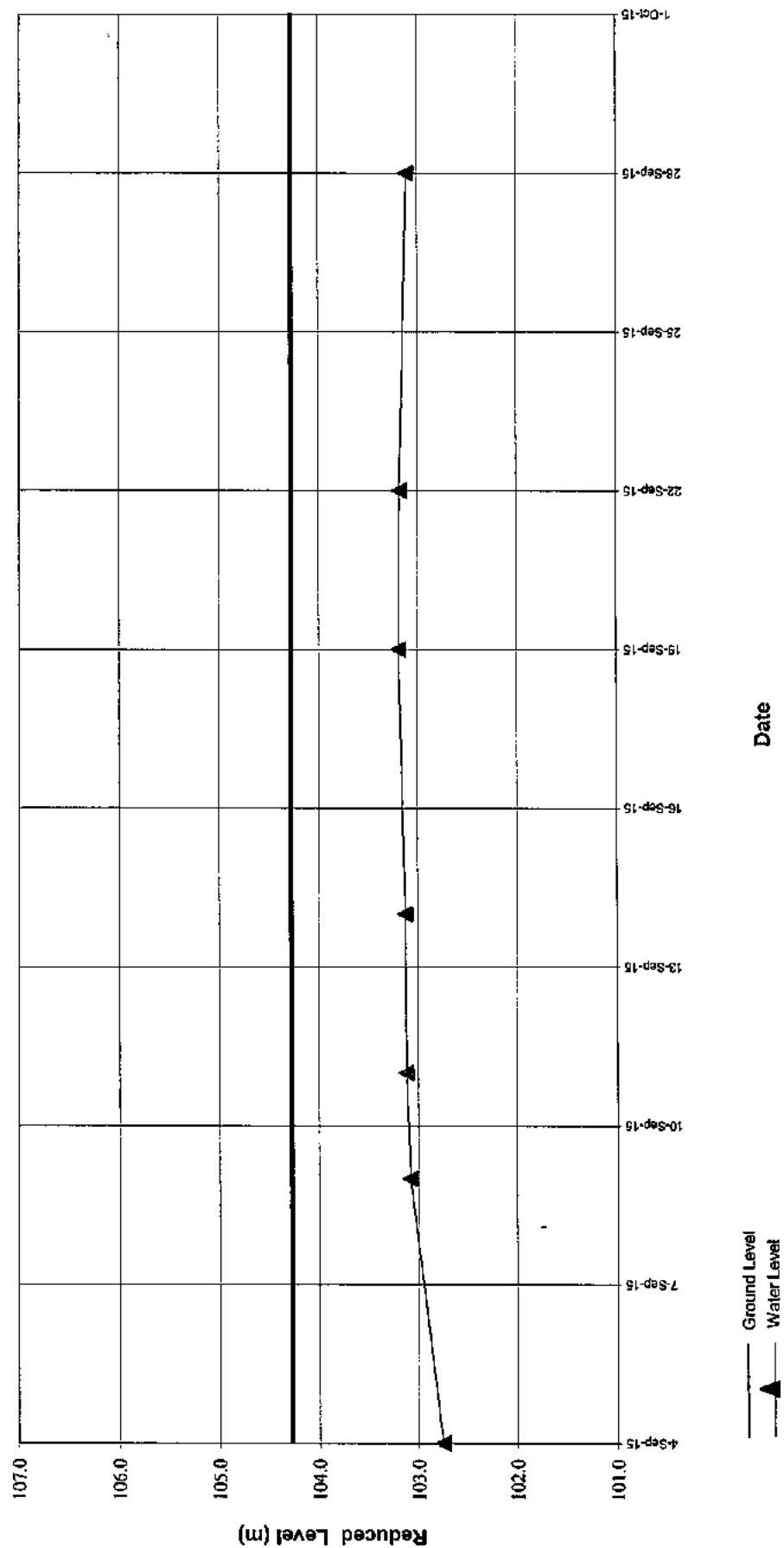
NOTE: (Drawing **NOT TO SCALE**)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah
CLIENT : Agri-Food and Veterinary Authority
LOCATION : Lim Chu Kang
BH NO. : BH45

WATER TABLE
MONITORING GRAPH

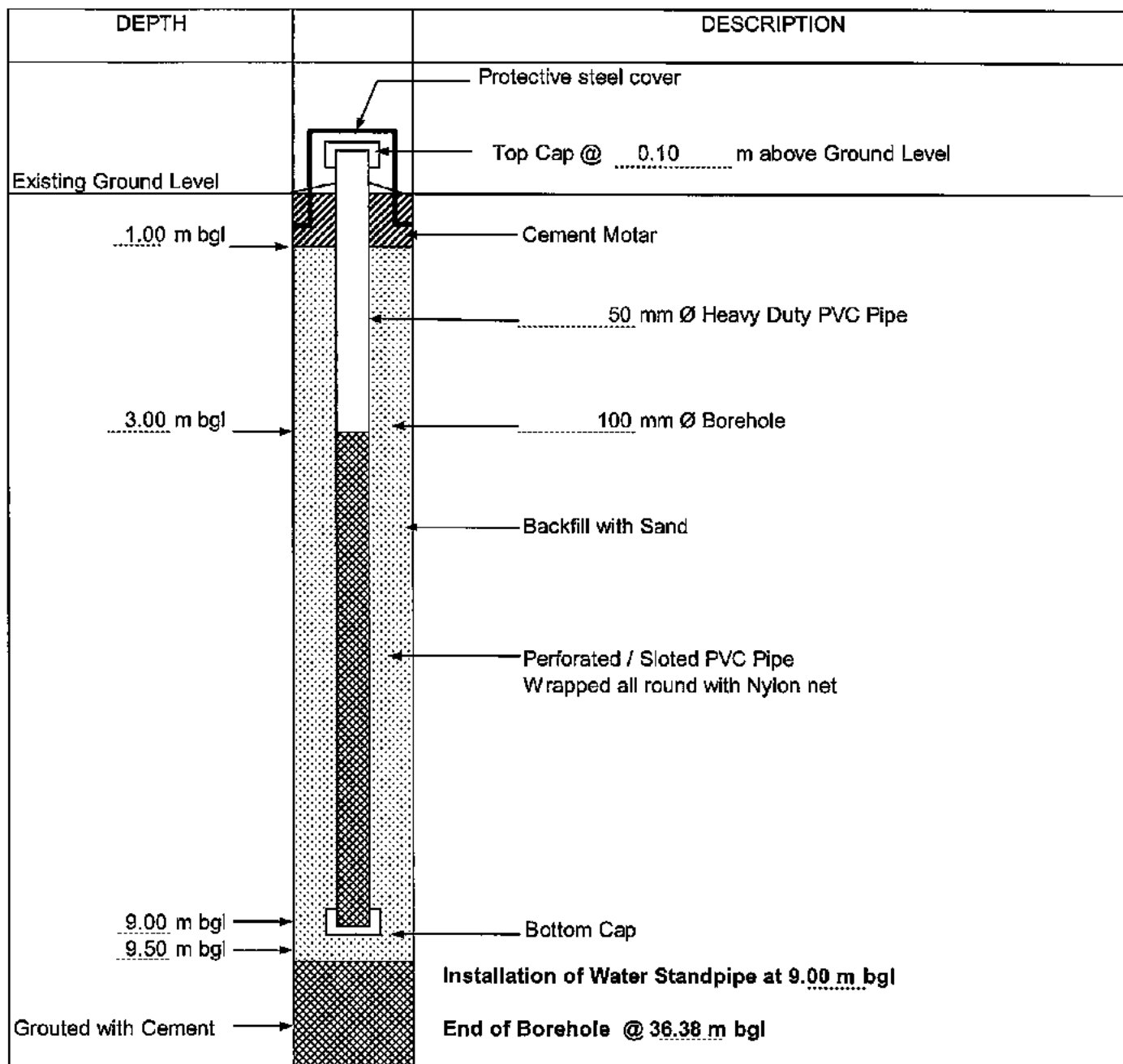
INSTALLED DATE : 3-Sep-15
LENGTH OF WATER STANDPIPE : 9 m
PERFORATED/TEST SECTION : 2.00 m - 9.00 m
SOIL TYPE : SILTY SAND/Slightly sandy CLAY/Sandy SILT

BH45



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

Client: M/s. Agri-Food and Veterinary Authority
 Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)
 Location: Lim Chu Kang Weather: Fine
 Borehole No.: BH47 Installed by: Phyo Thu Kha
 Date Installed: 3-Sep-15

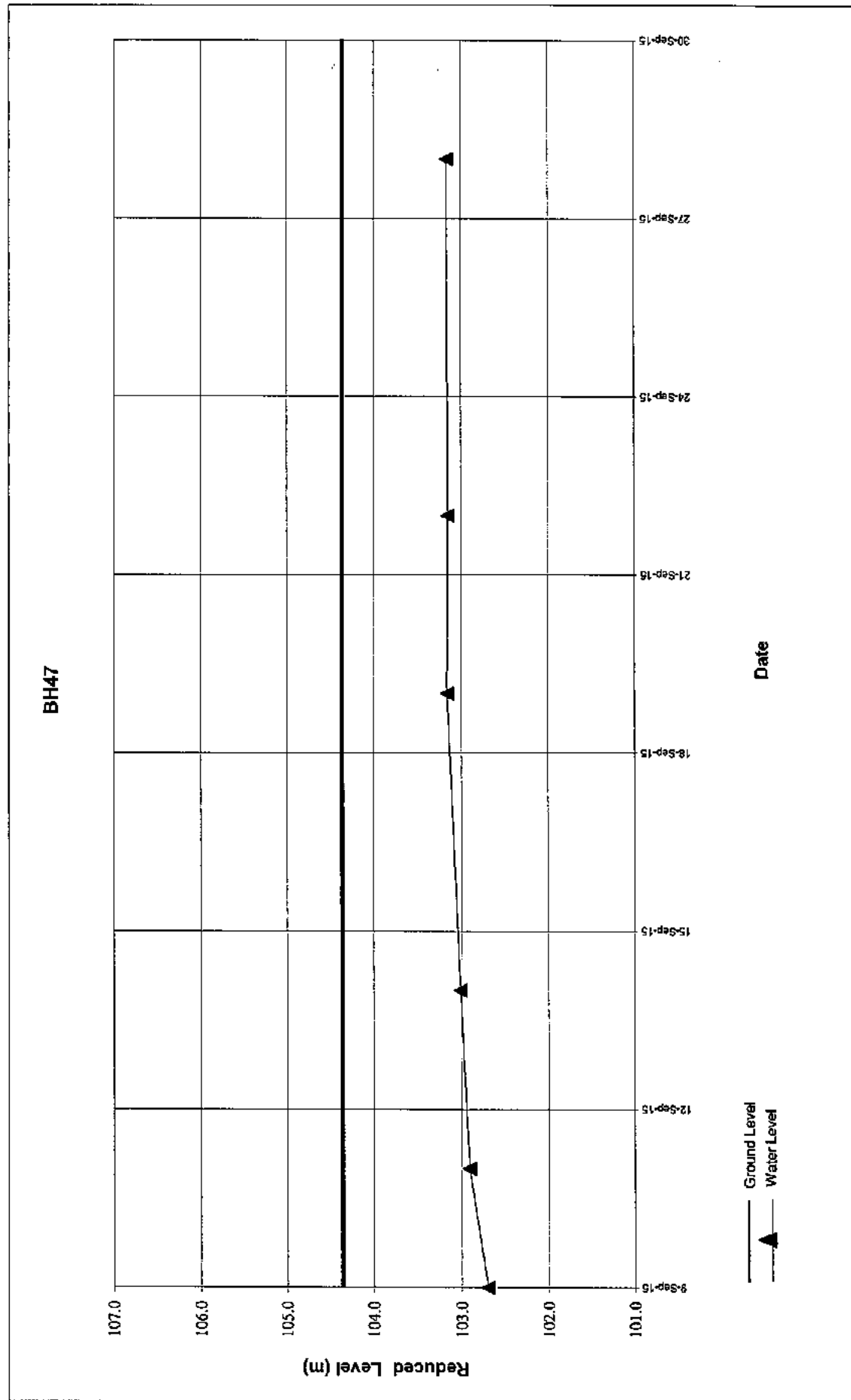


NOTE: (Drawing NOT TO SCALE)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah
CLIENT : Agri-Food and Veterinary Authority
LOCATION : Lim Chu Kang
BH NO. : BH47

**WATER TABLE
MONITORING GRAPH**

INSTALLED DATE : 3-Sep-15
LENGTH OF WATER STANDPIPE : 9 m
PERFORATED/TEST SECTION : 3.00 m - 9.00 m
SOIL TYPE : Slightly sandy SILT/Peaty SILT/Slightly sandy CLAY



WATER STANDPIPE INSTALLATION SHEET / DIAGRAM

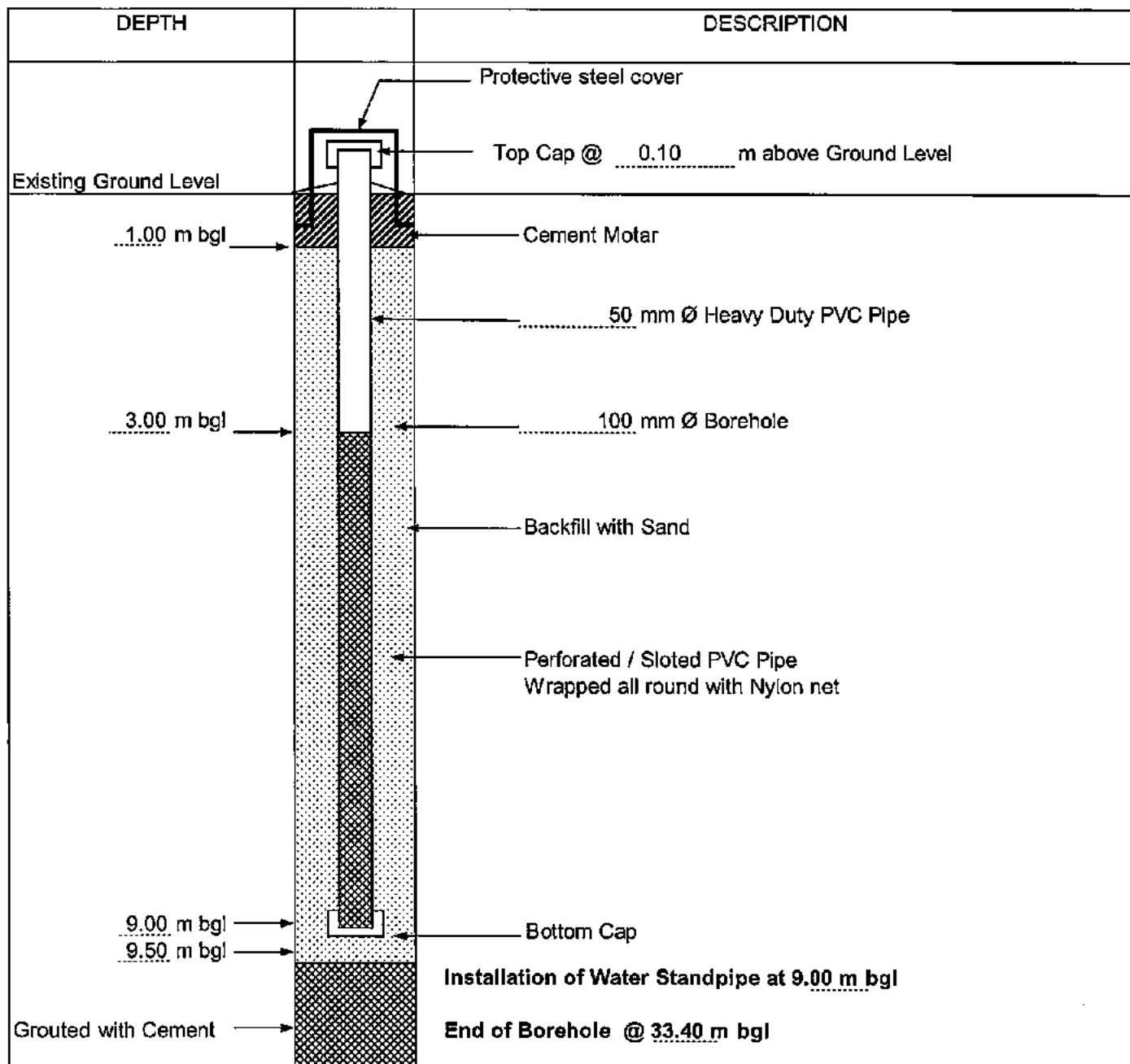
Client: M/s. Agri-Food and Veterinary Authority

Project: Soil Investigation Works at Lim Chu Kang & Sungei Tengah (Phase 5)

Location: Lim Chu Kang Weather: Fine

Borehole No.: BH49 Installed by: Aung Si Thu

Date Installed: 2-Sep-15



NOTE: (Drawing NOT TO SCALE)

PROJECT : SI Works at Lim Chu Kang & Sungai Tengah

CLIENT : Agri-Food and Veterinary Authority

LOCATION : Lim Chu Kang

BH NO. : BH49

**WATER TABLE
MONITORING GRAPH**

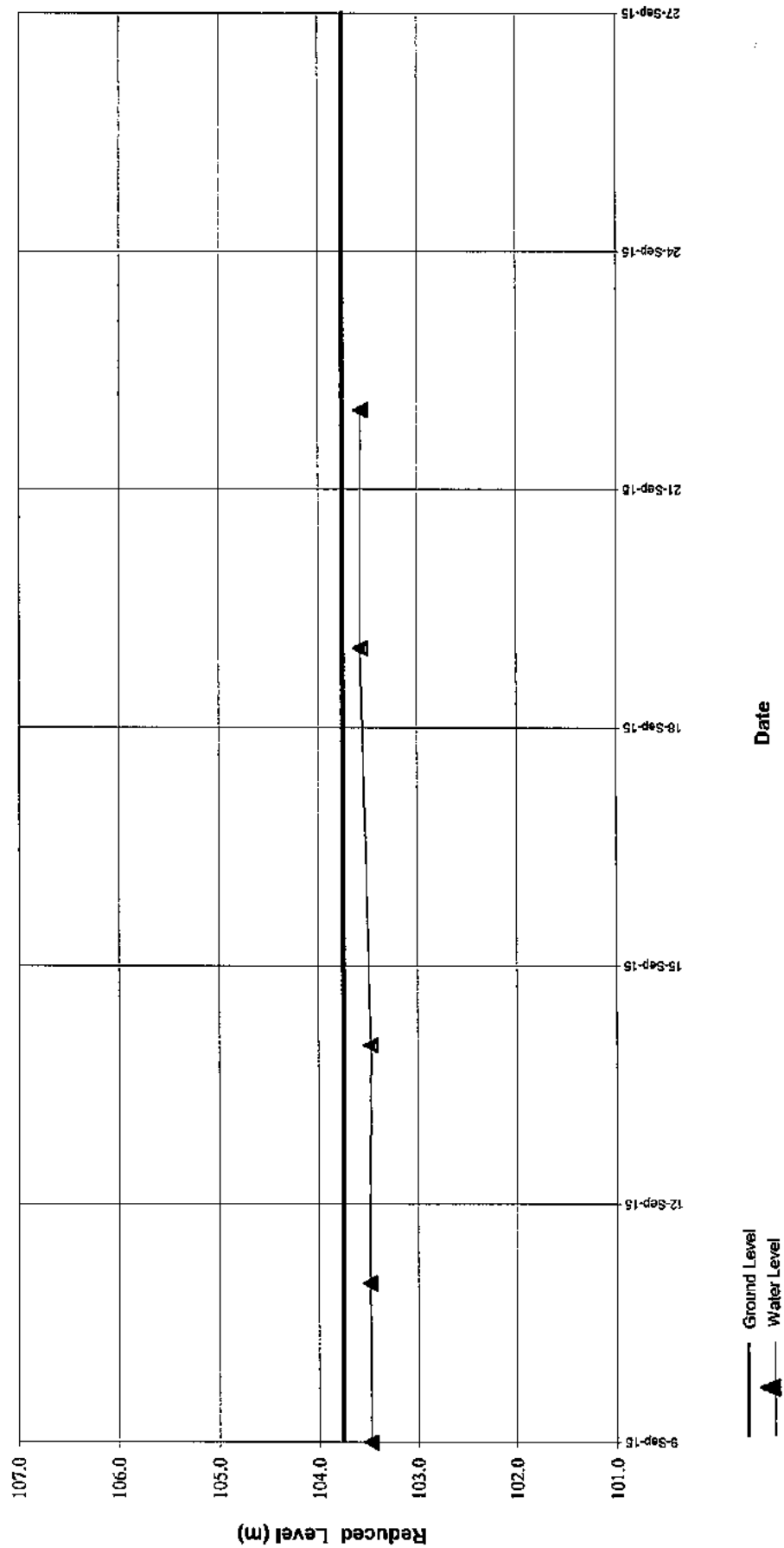
INSTALLED DATE : 2-Sep-15

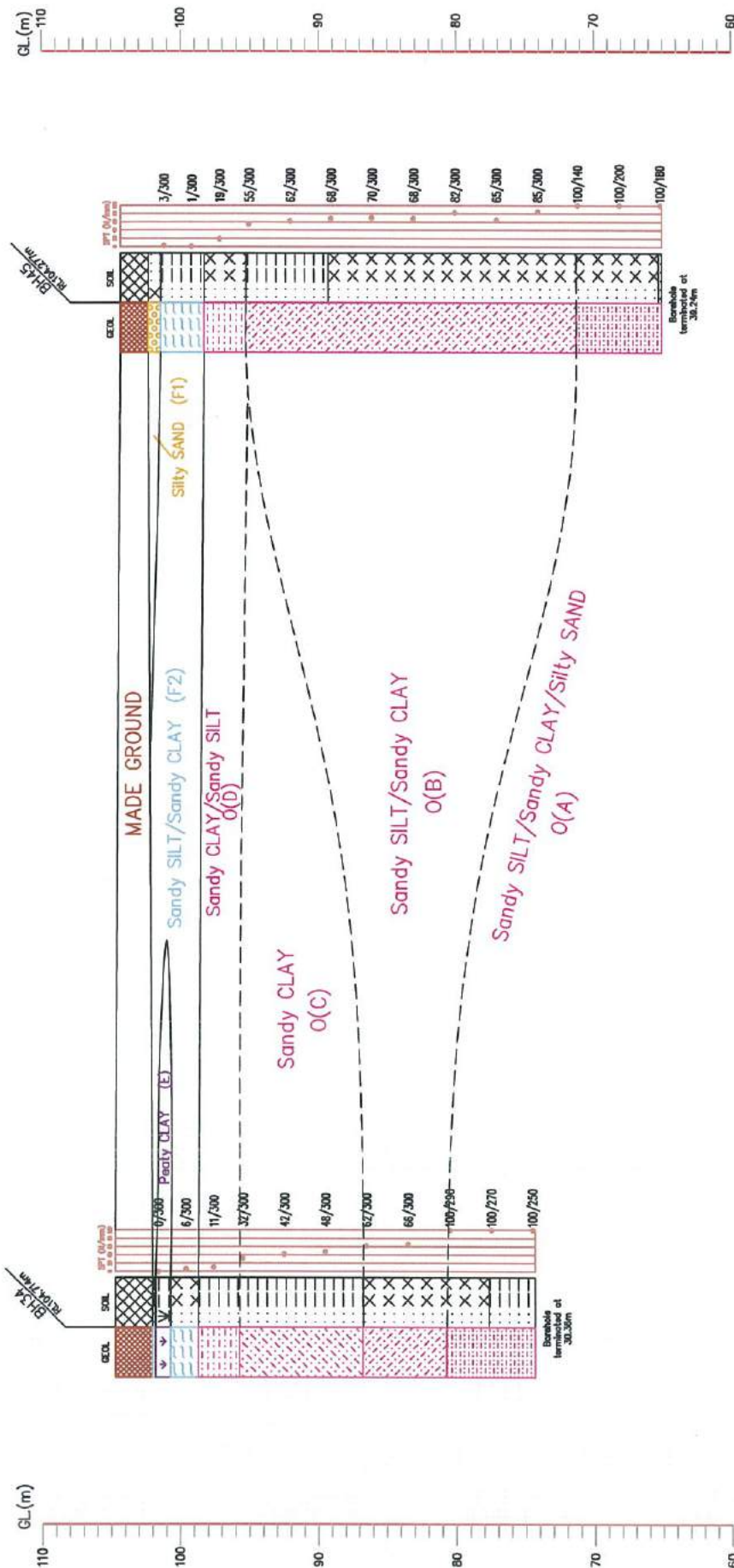
LENGTH OF WATER STANDPIPE : 9 m

PERFORATED/TEST SECTION : 3.00 m - 9.00 m

SOIL TYPE : Peaty CLAY/Slightly sandy SILT/Slightly sandy CLAY

BH49





SECTION 1

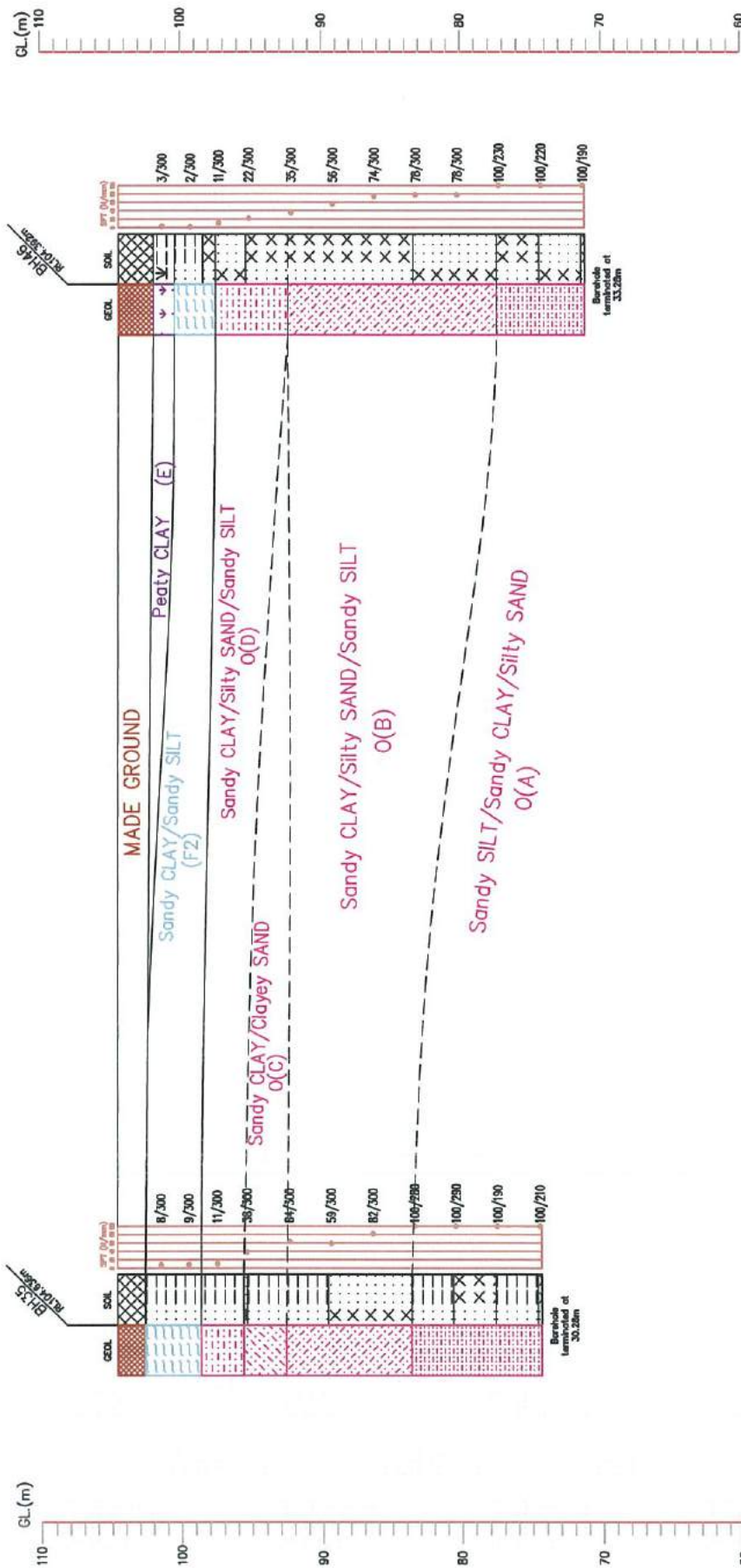
GEOLOGICAL CLASSIFICATION

KALLANG FORMATION		OLD ALLUVIUM		JURONG FORMATION		BUKIT TIMAH GRANITE	
F1 : FLUVIAL SAND		Q(A) : OLD ALLUVIUM UNWEATHERED		S(0) : FRESH		Q(0) : FRESH	
F2 : FLUVIAL CLAY		Q(B) : OLD ALLUVIUM PARTIALLY WEATHERED		S(0) : SLIGHTLY WEATHERED		Q(0) : SLIGHTLY WEATHERED	
E : PEAT/ORGANIC CLAY		Q(C) : OLD ALLUVIUM DISTINCTLY WEATHERED		S(0) : MODERATELY WEATHERED		Q(0) : MODERATELY WEATHERED	
M : MARINE CLAY		Q(D) : OLD ALLUVIUM DESTROYED		S(0) : HIGHLY WEATHERED		Q(0) : HIGHLY WEATHERED	
		Q(E) : OLD ALLUVIUM-RESIDUAL		S(0) : COMPLETELY WEATHERED		Q(0) : COMPLETELY WEATHERED	
				S(V) : RESIDUAL SOIL		Q(V) : RESIDUAL SOIL	

Note: Strata are interpolated and may vary considerably between boreholes.

VERTICAL SCALE - 1:300		Drawn By: K K Moe	Date: 29/09/2015
HORIZONTAL SCALE - NOT TO SCALE		Checked By: Aung Thura	Date: 30/09/2015
CLIENT: Agri-Food & Veterinary Authority			
PROJECT: SI Works at Lim Chu Kang and Sungei Tengah			





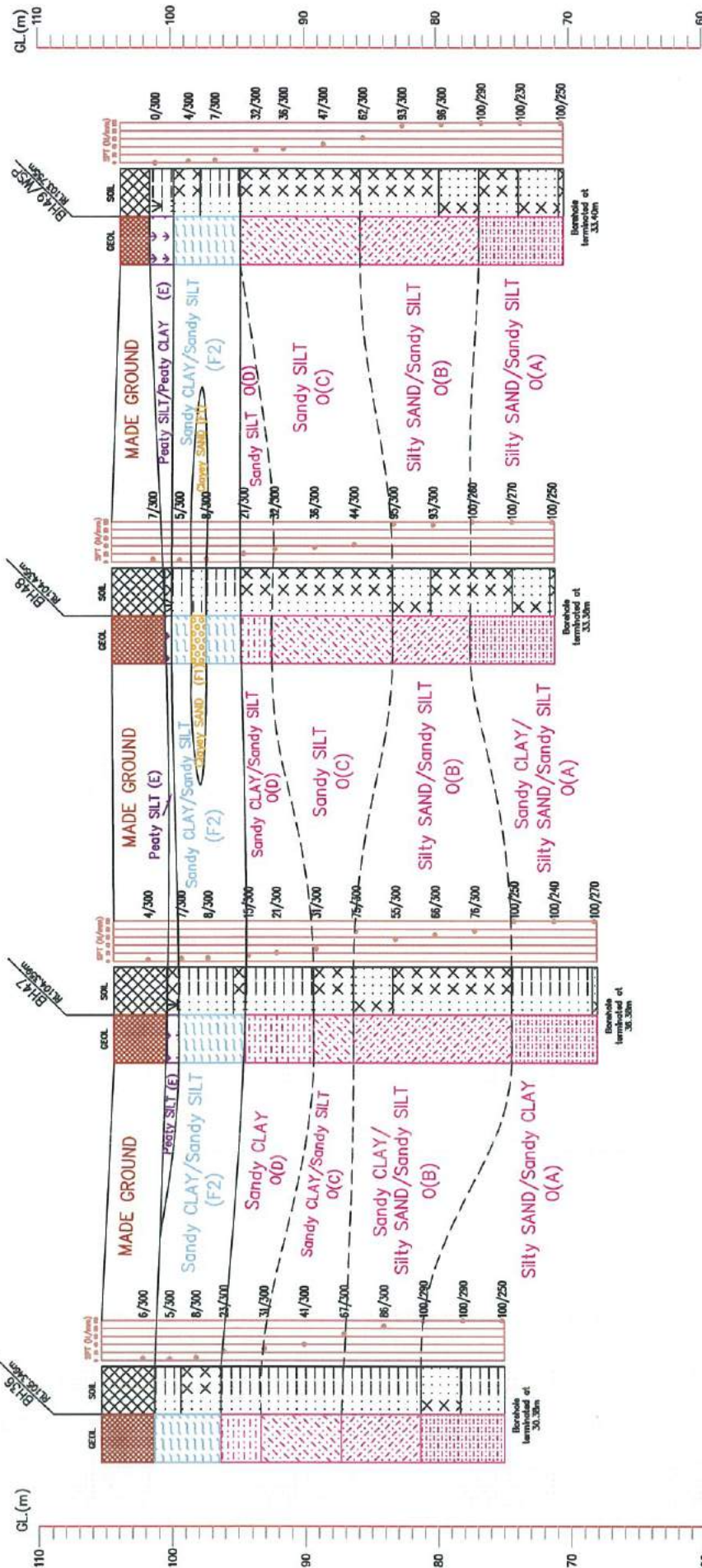
SECTION 2

GEOLOGICAL CLASSIFICATION

KALLANG FORMATION	OLD ALLUVIUM	JURONG FORMATION	BUKIT TIMAH GRANITE	FILL
F1 : FLUVIAL SAND	QA) OLD ALLUVIUM UNWEATHERED	S0) FRESH	Q0) FRESH	
F2 : FLUVIAL CLAY	QB) OLD ALLUVIUM PARTIALLY WEATHERED	S1) SLIGHTLY WEATHERED	Q1) SLIGHTLY WEATHERED	
E : PEAT/ORGANIC CLAY	QC) OLD ALLUVIUM DISTINCTLY WEATHERED	S2) MODERATELY WEATHERED	Q2) MODERATELY WEATHERED	
M : MARINE CLAY	QD) OLD ALLUVIUM DESTRUCTURED	S3) HIGHLY WEATHERED	Q3) HIGHLY WEATHERED	
	QE) OLD ALLUVIUM-RESIDUAL	S4) COMPLETELY WEATHERED	Q4) COMPLETELY WEATHERED	
		S5) RESIDUAL SOIL	Q5) RESIDUAL SOIL	

Note: Strata are interpolated and may vary considerably between boreholes.

VERTICAL SCALE - 1:300		Drawn By: K K Moe	Date: 29/09/2015
HORIZONTAL SCALE - NOT TO SCALE		Checked By: Aung Thura	Date: 30/09/2015
CLIENT: Agri-Food & Veterinary Authority			
PROJECT: SI Works at Lim Chu Kang and Sungai Tengah			



SECTION 3

GEOLOGICAL CLASSIFICATION

KALLANG FORMATION

F1: FLUVIAL SAND	
F2: FLUVIAL CLAY	
E: PEAT/ORGANIC CLAY	
M: MARINE CLAY	

OLD ALLUVIUM

Q(A): OLD ALLUVIUM UNWEATHERED	
Q(B): OLD ALLUVIUM PARTIALLY WEATHERED	
Q(C): OLD ALLUVIUM DISTINCTLY WEATHERED	
Q(D): OLD ALLUVIUM DESTROYED	
Q(E): OLD ALLUVIUM-RESIDUAL	

JURONG FORMATION

S(0)- FRESH	
S(0)- SLIGHTLY WEATHERED	
S(0)- MODERATELY WEATHERED	
S(0)- HIGHLY WEATHERED	
S(V)- COMPLETELY WEATHERED	
S(V)- RESIDUAL SOIL	

BUKIT TIMAH GRANITE

Q(0)- FRESH	
Q(0)- SLIGHTLY WEATHERED	
Q(0)- MODERATELY WEATHERED	
Q(0)- HIGHLY WEATHERED	
Q(V)- COMPLETELY WEATHERED	
Q(V)- RESIDUAL SOIL	

FILL

FILL

Note: Strata are interpolated and may vary considerably between boreholes.

VERTICAL SCALE - 1:300

HORIZONTAL SCALE - NOT TO SCALE

Date: 29/09/2015

Drawn By: K K Mue

Date: 30/09/2015

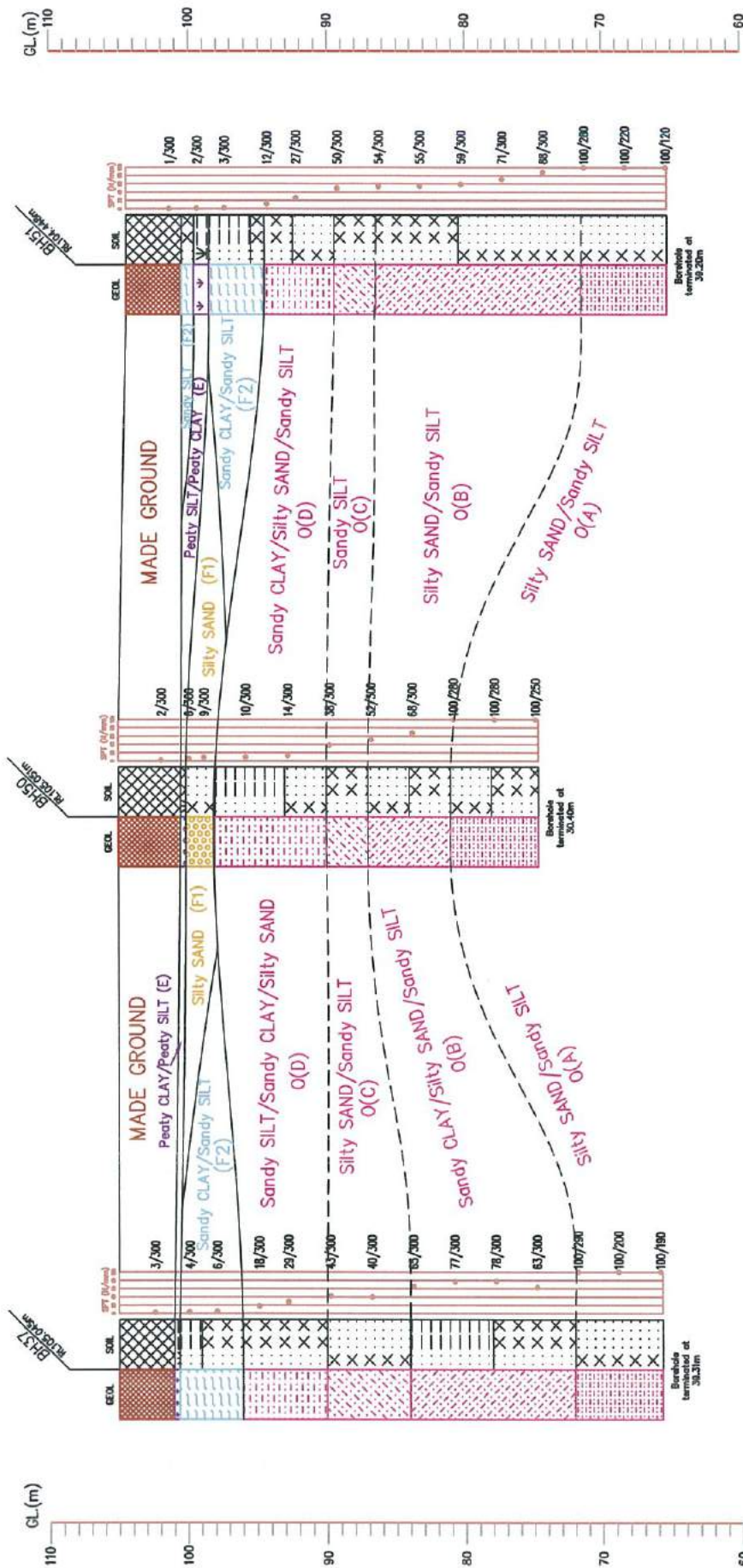
Checked By: Aung Thura

CLIENT: Agri-Food & Veterinary Authority

PROJECT:



SI Works at Lim Chu Kang and Sungai Tengah



SECTION 4

GEOLOGICAL CLASSIFICATION

KALLANG FORMATION
F1 : FLUVIAL SAND
F2 : FLUVIAL CLAY
E : PEAT/ORGANIC CLAY
M : MARINE CLAY

OLD ALLUVIUM
QA: OLD ALLUVIUM UNWEATHERED
QB: OLD ALLUVIUM PARTIALLY WEATHERED
QC: OLD ALLUVIUM DISTINCTLY WEATHERED
QD: OLD ALLUVIUM DESTROYED
QE: OLD ALLUVIUM-RESIDUAL

JURONG FORMATION
S0: FRESH
S1: SLIGHTLY WEATHERED
S2: MODERATELY WEATHERED
S3: HIGHLY WEATHERED
S4: COMPLETELY WEATHERED
S5: RESIDUAL SOIL

BUKIT TIMAH GRANITE
G0: FRESH
G1: SLIGHTLY WEATHERED
G2: MODERATELY WEATHERED
G3: HIGHLY WEATHERED
G4: COMPLETELY WEATHERED
G5: RESIDUAL SOIL



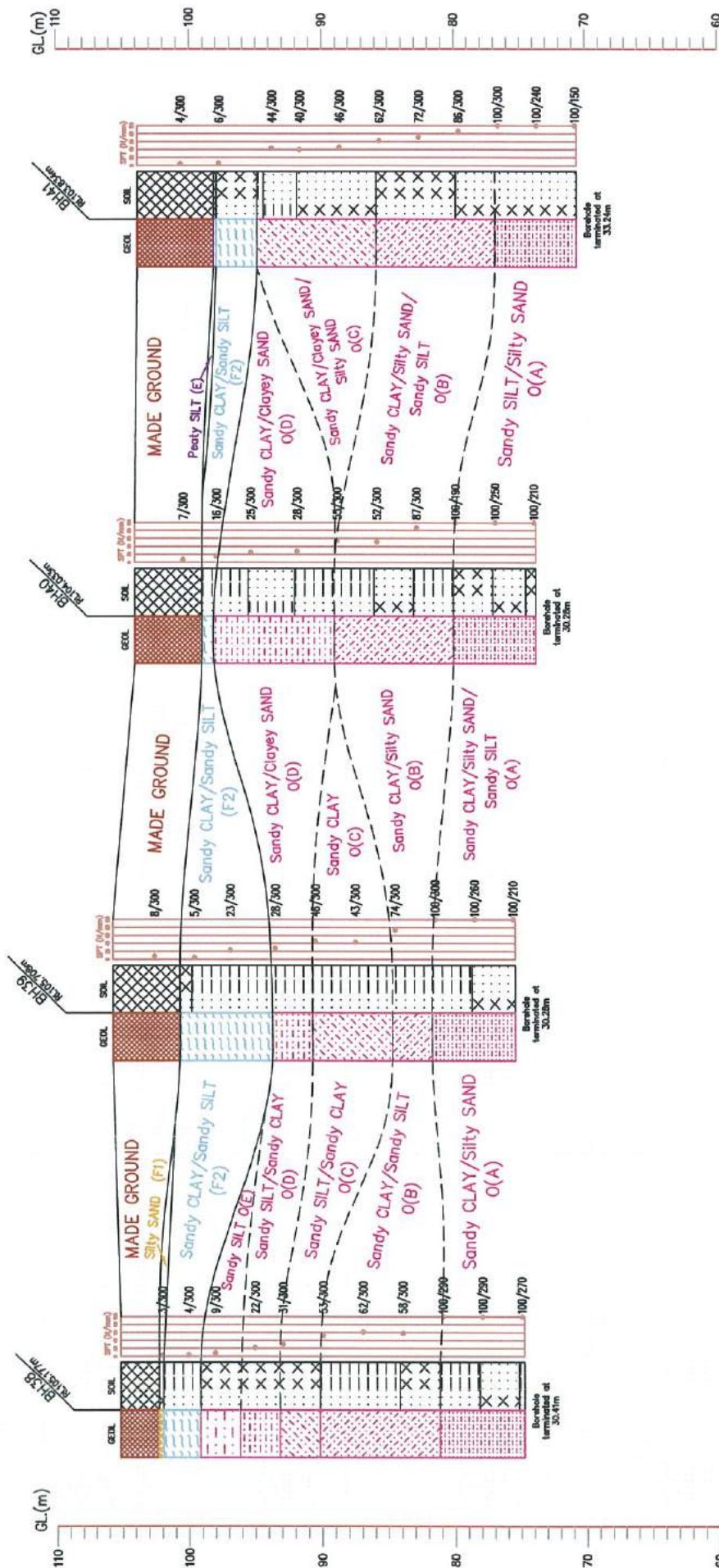
Note: Strata are interpolated and may vary considerably between boreholes.

VERTICAL SCALE - 1:300	Drawn By: K.K. Moe	Date: 29/09/2015
HORIZONTAL SCALE - NOT TO SCALE	Checked By: Aung Thura	Date: 30/09/2015



CLIENT: Agri-Food & Veterinary Authority

PROJECT: SI Works at Lim Chu Kang and Sungai Tengah



SECTION 5

GEOLOGICAL CLASSIFICATION

KALLANG FORMATION

F1 : FLUVIAL SAND	
F2 : FLUVIAL CLAY	
E : PEAT/ORGANIC CLAY	
M : MARINE CLAY	

OLD ALLUVIUM

O(A) : OLD ALLUVIUM UNWEATHERED	
O(B) : OLD ALLUVIUM PARTIALLY WEATHERED	
O(C) : OLD ALLUVIUM DISTINCTLY WEATHERED	
O(D) : OLD ALLUVIUM DESTRUCTURED	
O(E) : OLD ALLUVIUM-RESIDUAL	

JURONG FORMATION

S0 : FRESH	
S1 : SLIGHTLY WEATHERED	
S2 : MODERATELY WEATHERED	
S3 : HIGHLY WEATHERED	
S4 : COMPLETELY WEATHERED	
S5 : RESIDUAL SOIL	

BUKIT TIMAH GRANITE

G0 : FRESH	
G1 : SLIGHTLY WEATHERED	
G2 : MODERATELY WEATHERED	
G3 : HIGHLY WEATHERED	
G4 : COMPLETELY WEATHERED	
G5 : RESIDUAL SOIL	

FILL

FILL

Note: Strata are interpolated and may vary considerably between boreholes.

VERTICAL SCALE - 1:300

HORIZONTAL SCALE - NOT TO SCALE

Date: 29/09/2015

Drawn By: K.K. Moc

Date: 30/09/2015

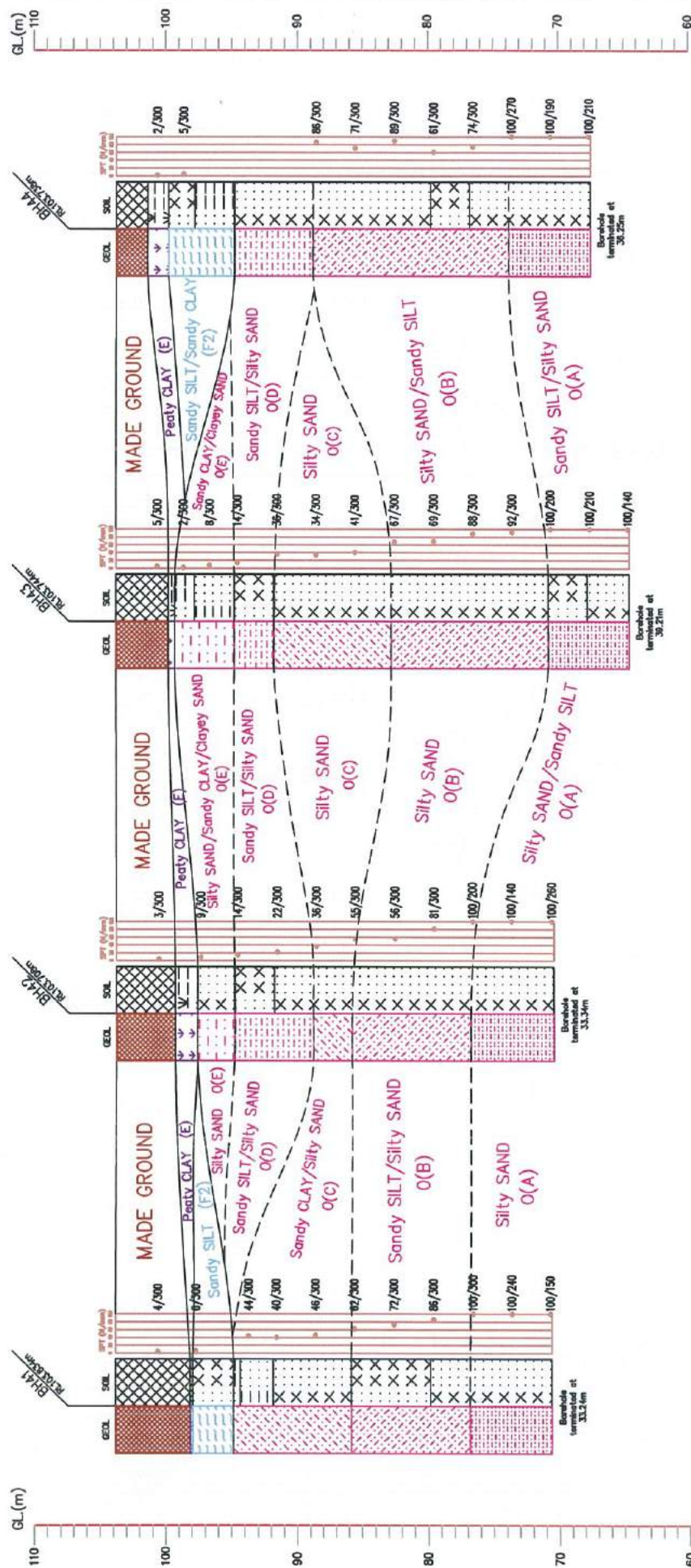
Checked By: Aung Thura

CLIENT: Agri-Food & Veterinary Authority

PROJECT:

SI Works at Lim Chu Kang and Sungai Tengah





SECTION 6

GEOLOGICAL CLASSIFICATION

KALLANG FORMATION		OLD ALLUVIUM		JURONG FORMATION		BUKIT TIMAH GRANITE	
F1 : FLUVIAL SAND		Q(A): OLD ALLUVIUM UNWEATHERED		S(1): FRESH		Q(1): FRESH	
F2 : FLUVIAL CLAY		Q(B): OLD ALLUVIUM PARTIALLY WEATHERED		S(2): SLIGHTLY WEATHERED		Q(2): SLIGHTLY WEATHERED	
E : PEAT/ORGANIC CLAY		Q(C): OLD ALLUVIUM DISTINCTLY WEATHERED		S(3): MODERATELY WEATHERED		Q(3): MODERATELY WEATHERED	
M : MARINE CLAY		Q(D): OLD ALLUVIUM DESTROYED		S(4): HIGHLY WEATHERED		Q(4): HIGHLY WEATHERED	
		Q(E): OLD ALLUVIUM-RESIDUAL		S(5): COMPLETELY WEATHERED		Q(5): COMPLETELY WEATHERED	
				S(N): RESIDUAL SOIL		Q(N): RESIDUAL SOIL	

**SUMMARY OF LABORATORY TEST
RESULTS**

[illegible]

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

*Please refer to Volumn II for chemical test result.

U.C.T. - Unconfined Compression
U.U. - Unconsolidated-Undrained
S.U.U. - Saturated UU w/Pore Pressure

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Client :	Agri-Food & Veterinary Authority of Singapore
Location :	Lim Chu Kang
Job No. :	SIL/S75/18/15/SI

SIL/S7518/15/SI

Prepared by :

Approved by :

5

Date: 30.9.2015



SOIL
INVESTIGATION
PTE LTD

SUMMARY OF LABORATORY TEST RESULTS

ACCREDITED
LABORATORY
SAC-SINGLAS
Cer no. LA-2000-0203-B

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
									U.U	C.U	C.D	Phi Angle (°)	Cohesion (kN/m²)	Phi Angle (°)	Cohesion (kN/m²)	Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)		Sand (%)	Silt (%)	Clay (%)	Compressive Strength (MPa)	P.L.T	Soil	Water	pH Value																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
BH37	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Note: * Conducted by another accredited laboratory

*Please refer to Volume II for chemical test result.

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated U.U w/Pore Pressure

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Client : Agri-Food & Veterinary Authority of Singapore
Location : Lim Chu Kang
Job No. : SIL/S7518/15/SI

Prepared by :

Approved by :

Date : 30.5.2015

SUMMARY OF LABORATORY TEST RESULTS

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
									U.U		C.U		C.D		Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)		Silt (%)	Clay (%)	Compressive Strength (MPa)	P.L.T	Soil	Water	pH Value																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
BH39	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Note: * Conducted by another accredited laboratory +Not accredited

*Please refer to Volume II for chemical test result.

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated UU w/Pore Pressure

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Client : Agri-Food & Veterinary Authority of Singapore

Location : Lim Chu Kang

Job No. : SIL/S7518/15/SI

Prepared by :

Approved by :

Date : 9.10.2015

SUMMARY OF LABORATORY TEST RESULTS

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Rock		Chemical								
									U.U		C.U		C.D		Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Particle Density (Mg/m³)	Compressive Strength (MPa)	P.L.T	Soluble Sulphate	Content ~ SO ₃ (g/L)	Organic Matter Content (%)	Soluble Chloride Content ~ Cl (%)	pH Value	Soluble Sulphate
BH41	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	TW1	1.50-2.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	TW2T	5.00-5.70	1.75	1.22	44.0	-	-	-	-	9	29	-	-	-	-	-	-	-	2	23	49	26	2.72	-	-	-	-	-	-	-	-	-	-	
	TW2B	5.70-5.90	1.39	0.73	91.0	-	-	-	33	0	-	-	-	-	-	83	42	41	2	28	49	21	2.63	-	-	-	-	-	-	-	-	-	-	
	TW3T	9.00-9.50	2.11	1.77	19.0	1.955	87.31	67	-	-	-	-	-	-	-	-	-	-	0	29	34	37	2.72	-	-	-	-	-	-	-	-	-	-	
	TW3B	9.50-9.90	2.08	1.76	18.0	-	-	-	100	0	-	-	-	-	-	-	-	-	26	44	8	22	2.69	-	-	-	-	-	-	-	-	-	-	-
BH42	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	TW1	1.50-2.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	TW2T	4.00-4.80	-	-	38.4	-	-	-	-	-	-	-	-	-	-	39	19	20	6	42	17	35	2.63	-	-	-	-	-	-	-	-	-	-	
	TW2B	4.80-4.90	1.73	1.20	43.8	0.917	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	TW3	10.00-10.90	2.04	1.70	20.0	-	-	64	-	112	0	-	-	-	-	45	19	26	1	58	31	10	2.76	-	-	-	-	-	-	-	-	-	-	-
			2.10	1.75	20.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

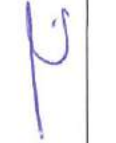
Note: ^ Conducted by another accredited laboratory +Not accredited

*Please refer to Volume II for chemical test result.

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Undrained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated U.U w/Pore Pressure

Client : Agri-Food & Veterinary Authority of Singapore
Location : Lim Chu Kang
Job No. : SIL/S7518/15/I

Approved by : 

Date : 30.9.2015

SUMMARY OF LABORATORY TEST RESULTS

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
									U.U	C.U	C.D	Cohesion (kN/m²)	Phi Angle (°)	Cohesion (kN/m²)	Phi Angle (°)	Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)		Silt (%)	Clay (%)	U.C	P.L.T	Soil	Water	Strength Index (s ₅₀)	Compressive Strength (MPa)	Soluble Sulphate Content - SO ₃ (g/L)	Organic Matter Content (%)	Soluble Chloride Content - Cl (%)	pH Value	Soluble Sulphate Content - SO ₃ (g/L)	Soluble Chloride Content - Cl (g/L)	pH Value																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
BH43	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Client : Agri-Food & Veterinary Authority of Singapore
Location : Lim Chu Kang
Job No. : SIL/S7518/15/SI

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated UU w/Pore Pressure

*Please refer to Volume II for chemical test result.

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Prepared by : 

Approved by :

Date : 9.10.2015

Note: ^ Conducted by another accredited laboratory

*Not accredited



SOIL
INVESTIGATION
PTE LTD

SUMMARY OF LABORATORY TEST RESULTS



Cer no. LA-2000-0203-B

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
									U.U	C.U	C.D	Cohesion (kN/m³)	Phi Angle (°)	Cohesion (kN/m³)	Phi Angle (°)	Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (Cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)		Sand (%)	Silt (%)	Clay (%)	Compressive Strength (MPa)	P.L.T	Soluble Sulphate Content ~ SO₃ (g/L)	Organic Matter Content (%)	Soluble Chloride Content ~ Cl (%)	pH Value	Soluble Sulphate Content ~ SO₃ (g/L)	Soluble Chloride Content ~ Cl (g/L)	pH Value																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BH46	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Client : Agri-Food & Veterinary Authority of Singapore
Location : Lim Chu Kang
Job No. : SIL/S7518/15/SI

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated UU w/Pore Pressure

*Please refer to Volume II for chemical test result.

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Prepared by :

Cyral

Approved by :

E

Date :

30.9.2015



SOIL
INVESTIGATION
PTE LTD

SUMMARY OF LABORATORY TEST RESULTS



Cer no. LA-2000-0203-B

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical					
									U.U	C.U		C.D	Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		Compressive Strength (MPa)	P.L.T	Soluble Sulphate Content ~ SO ₃ (g/L)	Organic Matter Content (%)	Soluble Chloride Content ~ Cl (%)	pH Value	Soluble Sulphate Content ~ SO ₃ (g/L)	Soluble Chloride Content ~ Cl (g/L)
BH48	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW1	2.00-2.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW2T	4.00-4.50	1.50	0.84	77.7	-	-	-	9	29	-	-	-	-	-	82	49	33	3	54	31	12	2.48	-	-	-	-	-	-	-	-	-
	TW2B	4.50-4.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW3	6.00-6.90	2.10	1.82	15.7	-	-	148	0	-	-	-	-	-	-	-	-	-	0	66	15	19	2.66	-	-	-	-	-	-	-	-	-
	TW4	9.00-9.70	2.10	1.76	19.3	-	-	75	0	-	-	-	-	-	-	43	17	26	0	11	43	46	2.68	-	-	-	-	-	-	-	-	-
BH49	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW1	1.50-2.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW2	4.00-4.90	2.00	1.60	24.7	-	-	28	0	-	-	-	-	-	38	18	20	0	9	46	45	2.71	-	-	-	-	-	-	-	-	-	-
	TW3	6.00-6.90	2.04	1.65	23.6	0.642	99.62	-	2	24	-	0.497	100	246	0.190	36	13	23	0	9	44	47	2.70	-	-	-	-	-	-	-	-	-
	TW4	9.00-9.90	2.05	1.68	22.3	-	-	120	0	-	-	-	-	-	42	17	25	0	16	46	38	2.70	-	-	-	-	-	-	-	-	-	-
				2.16	1.84	17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Note: * Conducted by another accredited laboratory *Not accredited

*Please refer to Volume II for chemical test result.

U.C.T - Unconfined Compression

U.U - Unconsolidated-Undrained

S.U.U - Saturated UU w/Pore Pressure

C.U - Consolidated-Undrained w/Pore Pressure

C.D - Consolidated-Drained w/Volume Change

U.C - Uniaxial Compressive Strength of Intact Rock Core

P.L.T - Point Load Test

Client : Agri-Food & Veterinary Authority of Singapore

Location : Lim Chu Kang

Job No. : SIL/S7518/15/SI

Prepared by :

Coplad

Approved by :

E

Date :

30.9.2015



SOIL
INVESTIGATION
PTE LTD

SUMMARY OF LABORATORY TEST RESULTS

Borehole No.	Sample No.	Depth (m)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Moisture Content (%)	Initial Void Ratio	Degree of Saturation (%)	U.C.T	Triaxial Compression				Consolidation				Atterberg Limits			Particle Size Distribution				Particle Density (Mg/m³)	Rock		Chemical					
									U.U		C.U		C.D		Final Void Ratio	Degree of Saturation (%)	Preconsolidation Pressure (kN/m²)	Compression Index (C _c)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)		Silt (%)	Clay (%)	Compressive Strength (MPa)	P.L.T	Soluble Sulphate Content ~ SO ₃ (g/L)	Organic Matter Content (%)	Soluble Chloride Content ~ Cl (%)	pH Value
BH50	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW1	2.00-2.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW2T	4.00-4.05	1.93	1.28	51.0	-	-	-	-	1	33	-	-	-	-	62	36	26	4	21	50	25	2.81	-	-	-	-	-	-	-	-	-
	TW2B	4.50-4.90	1.42	0.78	82.5	-	96.66	-	25	0	-	-	-	-	97	56	41	6	22	57	15	2.41	-	-	-	-	-	-	-	-	-	-
	TW3	7.00-7.90	2.03	1.64	24.0	-	-	36	46	0	-	-	-	-	-	-	-	-	0	10	46	44	2.71	-	-	-	-	-	-	-	-	-
BH51	D1	0.30-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW1	2.00-2.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TW2	4.00-4.90	1.78	1.20	48.0	-	-	-	11	0	-	-	-	-	53	29	24	0	15	60	25	2.72	-	-	-	-	-	-	-	-	-	-
	TW3	6.00-6.90	1.92	1.45	32.0	-	100	36	41	0	-	-	-	-	55	23	32	0	2	35	63	2.67	-	-	-	-	-	-	-	-	-	-
	TW4	9.00-9.90	1.97	1.54	27.7	-	-	-	77	0	-	-	-	-	33	17	16	0	28	41	31	-	-	-	-	-	-	-	-	-	-	-

The results reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

These results are for the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Note: * Conducted by another accredited laboratory +Not accredited

*Please refer to Volume II for chemical test result.

U.C.T - Unconfined Compression
U.U - Unconsolidated-Undrained
S.U.U - Saturated UU w/Pore Pressure

C.U - Consolidated-Undrained w/Pore Pressure
C.D - Consolidated-Drained w/Volume Change
U.C - Uniaxial Compressive Strength of Intact Rock Core
P.L.T - Point Load Test

Client : Agri-Food & Veterinary Authority of Singapore
Location : Lim Chu Kang
Job No. : SIL/S7518/15/SI

Prepared by :

Copy

Approved by :

Copy

Date : 30.9.2015

PARTICLE DENSITY

Particle Density Test

Small Pyknometer method

Borehole No. : BH34

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Light grey spotted reddish brown and yellowish brown, Slightly sandy SILT with traces of peat

Specimen Reference			A	
Pyknometer No.			1	2
Mass of bottle + Soil + Water	m_3	g	84.627	83.452
Mass of bottle + Soil	m_2	g	36.646	35.915
Mass of bottle full of water	m_4	g	80.717	79.494
Mass of bottle	m_1	g	30.467	29.639
Mass of soil	$m_2 - m_1$	g	6.179	6.276
Mass of water in full bottle	$m_4 - m_1$	g	50.250	49.855
Mass of water used	$m_3 - m_2$	g	47.981	47.537
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.269	2.318
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.723	2.708
Average Value P_s		Mg/m ³	2.72	

Liquid used : Distilled Water

Borehole No. : BH34

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey mottled yellowish brown, Slightly sandy CLAY

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.686	85.549
Mass of bottle + Soil	m_2	g	33.719	37.649
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.188	6.213
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.967	47.900
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.243	2.269
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.759	2.738
Average Value P_s		Mg/m ³	2.75	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

10/9/15

Checked by:

Test Name : PD

Date of Test : 10/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH34

Approved by:

Signature

Particle Density Test

Small Pyknometer method

Borehole No. : BH35

Sample No. : TW 2 (6.00-6.90m)

Sample Description : Reddish brown mottled yellowish brown and light grey, Slightly sandy CLAY

Specimen Reference			A	
Pyknometer No.			1	2
Mass of bottle + Soil + Water	m_3	g	84.622	83.471
Mass of bottle + Soil	m_2	g	36.675	35.973
Mass of bottle full of water	m_4	g	80.717	79.494
Mass of bottle	m_1	g	30.467	29.639
Mass of soil	$m_2 - m_1$	g	6.208	6.334
Mass of water in full bottle	$m_4 - m_1$	g	50.250	49.855
Mass of water used	$m_3 - m_2$	g	47.947	47.498
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.303	2.357
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.696	2.687
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]* 15/9/15

Checked by: *[Signature]* 22/9/15

Test Name : PD

Date of Test : 15/09/15

Sample No. : TW 2 (6.00-6.90m)

Borehole : BH35

Approved by: *[Signature]* 22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH36

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Light grey mottled yellowish brown, Slightly sandy CLAY with peat

Specimen Reference			H	
Pyknometer No.			H09	H10
Mass of bottle + Soil + Water	m_3	g	86.495	87.292
Mass of bottle + Soil	m_2	g	37.838	38.491
Mass of bottle full of water	m_4	g	82.660	83.423
Mass of bottle	m_1	g	31.609	32.186
Mass of soil	$m_2 - m_1$	g	6.229	6.305
Mass of water in full bottle	$m_4 - m_1$	g	51.051	51.237
Mass of water used	$m_3 - m_2$	g	48.657	48.801
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.394	2.436
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.602	2.588
Average Value P_s		Mg/m ³	2.60	

Liquid used : Distilled Water

Borehole No. : BH36

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey mottled dark grey and yellowish brown, Slightly sandy SILT with traces of peat

Specimen Reference			U	
Pyknometer No.			H13	H14
Mass of bottle + Soil + Water	m_3	g	84.753	85.225
Mass of bottle + Soil	m_2	g	38.486	37.865
Mass of bottle full of water	m_4	g	80.828	81.212
Mass of bottle	m_1	g	32.245	31.494
Mass of soil	$m_2 - m_1$	g	6.241	6.371
Mass of water in full bottle	$m_4 - m_1$	g	48.583	49.718
Mass of water used	$m_3 - m_2$	g	46.267	47.360
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.316	2.358
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.695	2.702
Average Value P_s		Mg/m ³	2.70	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 15/9/15

Checked by:

Test Name : PD

Date of Test : 15/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH36

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH37

Sample No. : TW 2B (4.40-4.90m)

Sample Description : Light grey, Slightly sandy CLAY with traces of peat

Specimen Reference			F	
Pyknometer No.			11	12
Mass of bottle + Soil + Water	m_3	g	84.327	84.118
Mass of bottle + Soil	m_2	g	36.907	36.551
Mass of bottle full of water	m_4	g	80.389	80.128
Mass of bottle	m_1	g	30.640	30.215
Mass of soil	$m_2 - m_1$	g	6.267	6.336
Mass of water in full bottle	$m_4 - m_1$	g	49.749	49.913
Mass of water used	$m_3 - m_2$	g	47.420	47.567
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.329	2.346
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.691	2.701
Average Value P_s		Mg/m ³	2.70	

Liquid used : Distilled Water

Borehole No. : BH37

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey, Slightly sandy SILT with traces of peat

Specimen Reference			H	
Pyknometer No.			H09	H10
Mass of bottle + Soil + Water	m_3	g	86.555	87.402
Mass of bottle + Soil	m_2	g	37.785	38.501
Mass of bottle full of water	m_4	g	82.660	83.423
Mass of bottle	m_1	g	31.609	32.186
Mass of soil	$m_2 - m_1$	g	6.176	6.315
Mass of water in full bottle	$m_4 - m_1$	g	51.051	51.237
Mass of water used	$m_3 - m_2$	g	48.770	48.901
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.281	2.336
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.708	2.703
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 1 8/9/15

Checked by:

Test Name : PD

Date of Test : 08/09/15

Sample No. : TW 2B (4.40-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH37

Approved by:

Signature and date 22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH37

Sample No. : TW 4 (9.00-9.90m)

Sample Description : Light grey, Sandy SILT

Specimen Reference			U	
Pyknometer No.			H13	H14
Mass of bottle + Soil + Water	m_3	g	84.817	85.152
Mass of bottle + Soil	m_2	g	38.611	37.783
Mass of bottle full of water	m_4	g	80.828	81.212
Mass of bottle	m_1	g	32.245	31.494
Mass of soil	$m_2 - m_1$	g	6.366	6.289
Mass of water in full bottle	$m_4 - m_1$	g	48.583	49.718
Mass of water used	$m_3 - m_2$	g	46.206	47.369
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.377	2.349
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.678	2.677
Average Value P_s		Mg/m ³	2.68	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: 8/9/15

Checked by:

Test Name : PD

Date of Test : 08/09/15

Sample No. : TW 4 (9.00-9.90m)

Borehole : BH37

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH38

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Light grey, Slightly sandy CLAY with traces of peat

Specimen Reference			F	
Pyknometer No.			11	12
Mass of bottle + Soil + Water	m_3	g	84.361	84.011
Mass of bottle + Soil	m_2	g	36.955	36.400
Mass of bottle full of water	m_4	g	80.389	80.128
Mass of bottle	m_1	g	30.640	30.215
Mass of soil	$m_2 - m_1$	g	6.315	6.185
Mass of water in full bottle	$m_4 - m_1$	g	49.749	49.913
Mass of water used	$m_3 - m_2$	g	47.406	47.611
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.343	2.302
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.695	2.687
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water

Borehole No. : BH38

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey, Sandy SILT

Specimen Reference			H	
Pyknometer No.			H09	H10
Mass of bottle + Soil + Water	m_3	g	86.565	87.313
Mass of bottle + Soil	m_2	g	37.849	38.389
Mass of bottle full of water	m_4	g	82.660	83.423
Mass of bottle	m_1	g	31.609	32.186
Mass of soil	$m_2 - m_1$	g	6.240	6.203
Mass of water in full bottle	$m_4 - m_1$	g	51.051	51.237
Mass of water used	$m_3 - m_2$	g	48.716	48.924
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.335	2.313
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.672	2.682
Average Value P_s		Mg/m ³	2.68	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 4/9/15

Checked by:

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH38

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH38

Sample No. : TW 4 (9.00-9.90m)

Sample Description : Yellowish brown mottled reddish brown and light grey, Slightly sandy SILT

Specimen Reference			U	
Pyknometer No.			H13	H14
Mass of bottle + Soil + Water	m_3	g	84.836	85.298
Mass of bottle + Soil	m_2	g	38.592	37.962
Mass of bottle full of water	m_4	g	80.828	81.212
Mass of bottle	m_1	g	32.245	31.494
Mass of soil	$m_2 - m_1$	g	6.347	6.468
Mass of water in full bottle	$m_4 - m_1$	g	48.583	49.718
Mass of water used	$m_3 - m_2$	g	46.244	47.336
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.339	2.382
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.714	2.715
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: 14/9/15

Checked by: Cplaf 22/9/15

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 4 (9.00-9.90m)

Borehole : BH38

Approved by: 1.22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH39

Sample No. : TW 2 (5.00-5.90m)

Sample Description : Brownish grey, Slightly gravelly sandy SILT with traces of peat and decayed wood

Specimen Reference			A	
Pyknometer No.			1	2
Mass of bottle + Soil + Water	m_3	g	84.600	83.366
Mass of bottle + Soil	m_2	g	36.714	35.879
Mass of bottle full of water	m_4	g	80.717	79.494
Mass of bottle	m_1	g	30.467	29.639
Mass of soil	$m_2 - m_1$	g	6.247	6.240
Mass of water in full bottle	$m_4 - m_1$	g	50.250	49.855
Mass of water used	$m_3 - m_2$	g	47.886	47.487
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.364	2.368
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.643	2.635
Average Value P_s		Mg/m ³	2.64	

Liquid used : Distilled Water

Borehole No. : BH39

Sample No. : TW 3T (8.00-8.40m)

Sample Description : Light grey, Slightly sandy CLAY with traces of peat

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.732	85.762
Mass of bottle + Soil	m_2	g	33.827	37.997
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.296	6.561
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.905	47.765
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.305	2.404
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.731	2.729
Average Value P_s		Mg/m ³	2.73	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PD

Date of Test : 02/09/15

Sample No. : TW 2 (5.00-5.90m) & TW 3T (8.00-8.40m)

Borehole : BH39

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH40

Sample No. : TW 2 (5.00-5.90m)

Sample Description : Light grey mottled reddish brown, Slightly sandy CLAY

Specimen Reference			U	
Pyknometer No.			H13	H14
Mass of bottle + Soil + Water	m_3	g	84.846	85.356
Mass of bottle + Soil	m_2	g	38.596	38.013
Mass of bottle full of water	m_4	g	80.828	81.212
Mass of bottle	m_1	g	32.245	31.494
Mass of soil	$m_2 - m_1$	g	6.351	6.519
Mass of water in full bottle	$m_4 - m_1$	g	48.583	49.718
Mass of water used	$m_3 - m_2$	g	46.250	47.343
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.333	2.375
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.722	2.745
Average Value P_s		Mg/m ³	2.73	

Liquid used : Distilled Water

Borehole No. : BH40

Sample No. : TW 3 (8.00-8.50m)

Sample Description : Reddish brown mottled brownish grey, Slightly sandy CLAY

Specimen Reference			A	
Pyknometer No.			1	2
Mass of bottle + Soil + Water	m_3	g	84.756	83.555
Mass of bottle + Soil	m_2	g	36.889	36.108
Mass of bottle full of water	m_4	g	80.717	79.494
Mass of bottle	m_1	g	30.467	29.639
Mass of soil	$m_2 - m_1$	g	6.422	6.469
Mass of water in full bottle	$m_4 - m_1$	g	50.250	49.855
Mass of water used	$m_3 - m_2$	g	47.867	47.447
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.383	2.408
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.695	2.686
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

4/9/15

Checked by:

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 2 (5.00-5.90m) & TW 3 (8.00-8.50m)

Borehole : BH40

Approved by:

22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH41

Sample No. : TW 2T (5.00-5.70m)

Sample Description : Yellowish brown mottled dark grey, Slightly gravelly slightly sandy SILT (MADE GROUND)

Specimen Reference			A	
Pyknometer No.			1	2
Mass of bottle + Soil + Water	m_3	g	84.659	83.432
Mass of bottle + Soil	m_2	g	36.694	35.876
Mass of bottle full of water	m_4	g	80.717	79.494
Mass of bottle	m_1	g	30.467	29.639
Mass of soil	$m_2 - m_1$	g	6.227	6.237
Mass of water in full bottle	$m_4 - m_1$	g	50.250	49.855
Mass of water used	$m_3 - m_2$	g	47.965	47.556
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.285	2.299
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.725	2.713
Average Value P_s		Mg/m ³	2.72	

Liquid used : Distilled Water

Borehole No. : BH41

Sample No. : TW 2B (5.70-5.90m)

Sample Description : Dark brown, Peaty SILT

Specimen Reference			E	
Pyknometer No.			9	10
Mass of bottle + Soil + Water	m_3	g	82.661	82.198
Mass of bottle + Soil	m_2	g	35.096	34.409
Mass of bottle full of water	m_4	g	78.827	78.292
Mass of bottle	m_1	g	28.898	28.123
Mass of soil	$m_2 - m_1$	g	6.198	6.286
Mass of water in full bottle	$m_4 - m_1$	g	49.929	50.169
Mass of water used	$m_3 - m_2$	g	47.565	47.789
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.364	2.380
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.622	2.641
Average Value P_s		Mg/m ³	2.63	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

3/9/15

Checked by:

Test Name : PD

Date of Test : 03/09/15

Sample No. : TW 2T (5.00-5.70m) & TW 2B (5.70-5.90m)

Borehole : BH41

Approved by:

22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH41

Sample No. : TW 3T (9.00-9.50m)

Sample Description : Light grey mottled reddish brown, Slightly sandy CLAY

Specimen Reference			F	
Pyknometer No.			11	12
Mass of bottle + Soil + Water	m_3	g	84.345	84.215
Mass of bottle + Soil	m_2	g	36.902	36.686
Mass of bottle full of water	m_4	g	80.389	80.128
Mass of bottle	m_1	g	30.640	30.215
Mass of soil	$m_2 - m_1$	g	6.262	6.471
Mass of water in full bottle	$m_4 - m_1$	g	49.749	49.913
Mass of water used	$m_3 - m_2$	g	47.443	47.529
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.306	2.384
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.716	2.714
Average Value P_s		Mg/m ³	2.72	

Liquid used : Distilled Water

Borehole No. : BH41

Sample No. : TW 3B (9.50-9.90m)

Sample Description : Light grey, Very gravelly very clayey SAND

Specimen Reference			H	
Pyknometer No.			H09	H10
Mass of bottle + Soil + Water	m_3	g	86.576	87.437
Mass of bottle + Soil	m_2	g	37.847	38.583
Mass of bottle full of water	m_4	g	82.660	83.423
Mass of bottle	m_1	g	31.609	32.186
Mass of soil	$m_2 - m_1$	g	6.238	6.397
Mass of water in full bottle	$m_4 - m_1$	g	51.051	51.237
Mass of water used	$m_3 - m_2$	g	48.729	48.854
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.322	2.383
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.686	2.684
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SJL/S7518/15/SI

Tested by: 13/9/15

Checked by: Cyprian 21/9/15

Test Name : PD

Date of Test : 03/09/15

Sample No. : TW 3T (9.00-9.50m) & TW 3B (9.50-9.90m)

Borehole : BH41

Approved by: 21/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH42

Sample No. : TW 2T (4.00-4.80m)

Sample Description : Yellowish brown, Slightly gravelly sandy CLAY (MADE GROUND)

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.939	85.456
Mass of bottle + Soil	m_2	g	34.312	37.633
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.781	6.197
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.627	47.823
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.583	2.346
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.625	2.642
Average Value P_s		Mg/m ³	2.63	

Liquid used : Distilled Water

Borehole No. : BH42

Sample No. : TW 3 (10.00-10.90m)

Sample Description : Light grey mottled reddish brown, Slightly gravelly sandy SILT

Specimen Reference			C	
Pyknometer No.			5	6
Mass of bottle + Soil + Water	m_3	g	82.602	81.934
Mass of bottle + Soil	m_2	g	35.201	34.074
Mass of bottle full of water	m_4	g	78.635	77.816
Mass of bottle	m_1	g	28.976	27.624
Mass of soil	$m_2 - m_1$	g	6.225	6.450
Mass of water in full bottle	$m_4 - m_1$	g	49.659	50.192
Mass of water used	$m_3 - m_2$	g	47.401	47.860
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.258	2.332
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.757	2.766
Average Value P_s		Mg/m ³	2.76	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SJL/S7518/15/SI

Tested by:

13/9/15

Checked by:

Test Name : PD

Date of Test : 03/09/15

Sample No. : TW 2T (4.00-4.80m) & TW 3 (10.00-10.90m)

Borehole : BH42

Approved by:

13/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH43

Sample No. : TW 2B (4.50-4.90m)

Sample Description : Light grey mottled yellowish brown, Sandy CLAY

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.702	85.532
Mass of bottle + Soil	m_2	g	33.783	37.642
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.252	6.206
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.919	47.890
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.291	2.279
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.729	2.723
Average Value P_s		Mg/m ³	2.73	

Liquid used : Distilled Water

Borehole No. : BH43

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Yellowish brown mottled reddish brown, Gravelly very clayey SAND

Specimen Reference			C	
Pyknometer No.			5	6
Mass of bottle + Soil + Water	m_3	g	82.601	81.732
Mass of bottle + Soil	m_2	g	35.248	33.821
Mass of bottle full of water	m_4	g	78.635	77.816
Mass of bottle	m_1	g	28.976	27.624
Mass of soil	$m_2 - m_1$	g	6.272	6.197
Mass of water in full bottle	$m_4 - m_1$	g	49.659	50.192
Mass of water used	$m_3 - m_2$	g	47.353	47.911
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.306	2.281
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.720	2.717
Average Value P_s		Mg/m ³	2.72	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 14/9/15

Checked by: Cplal 20/9/15

Test Name : PD

Date of Test : 14/09/15

Sample No. : TW 2B (4.50-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH43

Approved by: 22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH44

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Grey mottled reddish brown, Slightly sandy SILT

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.796	85.523
Mass of bottle + Soil	m_2	g	33.969	37.643
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.438	6.207
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.827	47.880
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.383	2.289
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.702	2.712
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 14/9/15

Checked by:

Test Name : PD

Date of Test : 14/09/15

Sample No. : TW 2 (4.00-4.90m)

Borehole : BH44

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH45

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Grey mottled reddish brown and yellowish brown, Slightly sandy CLAY

Specimen Reference			S	
Pyknometer No.			K33	K34
Mass of bottle + Soil + Water	m_3	g	84.514	84.795
Mass of bottle + Soil	m_2	g	37.703	37.572
Mass of bottle full of water	m_4	g	80.642	80.901
Mass of bottle	m_1	g	31.531	31.380
Mass of soil	$m_2 - m_1$	g	6.172	6.192
Mass of water in full bottle	$m_4 - m_1$	g	49.111	49.521
Mass of water used	$m_3 - m_2$	g	46.811	47.223
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.300	2.298
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.683	2.695
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water

Borehole No. : BH45

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Grey mottled reddish brown, Sandy SILT

Specimen Reference			T	
Pyknometer No.			K47	K48
Mass of bottle + Soil + Water	m_3	g	84.979	83.054
Mass of bottle + Soil	m_2	g	38.062	37.243
Mass of bottle full of water	m_4	g	81.050	79.087
Mass of bottle	m_1	g	31.808	30.931
Mass of soil	$m_2 - m_1$	g	6.254	6.312
Mass of water in full bottle	$m_4 - m_1$	g	49.242	48.156
Mass of water used	$m_3 - m_2$	g	46.917	45.811
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.325	2.345
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.690	2.692
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PD

Date of Test : 15/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH45

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH46

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Grey spotted dark grey, Slightly sandy CLAY with traces of peat

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.660	85.486
Mass of bottle + Soil	m_2	g	33.771	37.620
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.240	6.184
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.889	47.866
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.321	2.303
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.688	2.685
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water

Borehole No. : BH46

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Grey spotted dark grey, Slightly sandy SILT with traces of peat

Specimen Reference			C	
Pyknometer No.			5	6
Mass of bottle + Soil + Water	m_3	g	82.554	81.783
Mass of bottle + Soil	m_2	g	35.229	33.930
Mass of bottle full of water	m_4	g	78.635	77.816
Mass of bottle	m_1	g	28.976	27.624
Mass of soil	$m_2 - m_1$	g	6.253	6.306
Mass of water in full bottle	$m_4 - m_1$	g	49.659	50.192
Mass of water used	$m_3 - m_2$	g	47.325	47.853
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.334	2.339
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.679	2.696
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PD

Date of Test : 15/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH46

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH47

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Dark grey, Peaty SILT

Specimen Reference			P	
Pyknometer No.			K3	K4
Mass of bottle + Soil + Water	m_3	g	84.149	84.224
Mass of bottle + Soil	m_2	g	37.309	37.757
Mass of bottle full of water	m_4	g	80.458	80.474
Mass of bottle	m_1	g	31.138	31.491
Mass of soil	$m_2 - m_1$	g	6.171	6.266
Mass of water in full bottle	$m_4 - m_1$	g	49.320	48.983
Mass of water used	$m_3 - m_2$	g	46.840	46.467
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.480	2.516
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.488	2.490
Average Value P_s		Mg/m ³	2.49	

Liquid used : Distilled Water

Borehole No. : BH47

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey mottled yellowish brown, Slightly sandy CLAY

Specimen Reference			Q	
Pyknometer No.			K7	K8
Mass of bottle + Soil + Water	m_3	g	86.101	84.519
Mass of bottle + Soil	m_2	g	36.821	37.120
Mass of bottle full of water	m_4	g	81.986	80.619
Mass of bottle	m_1	g	30.274	30.922
Mass of soil	$m_2 - m_1$	g	6.547	6.198
Mass of water in full bottle	$m_4 - m_1$	g	51.712	49.697
Mass of water used	$m_3 - m_2$	g	49.280	47.399
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.432	2.298
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.692	2.697
Average Value P_s		Mg/m ³	2.69	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 14/9/15

Checked by: Cplal m/15

Test Name : PD

Date of Test : 14/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH47

Approved by: 21/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH47

Sample No. : TW 4 (9.00-9.90m)

Sample Description : Light grey mottled yellowish brown, Slightly sandy SILT

Specimen Reference			R	
Pyknometer No.			K19	K20
Mass of bottle + Soil + Water	m_3	g	85.673	84.463
Mass of bottle + Soil	m_2	g	37.762	37.237
Mass of bottle full of water	m_4	g	81.716	80.448
Mass of bottle	m_1	g	31.494	30.867
Mass of soil	$m_2 - m_1$	g	6.268	6.370
Mass of water in full bottle	$m_4 - m_1$	g	50.222	49.581
Mass of water used	$m_3 - m_2$	g	47.911	47.226
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.311	2.355
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.712	2.705
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

14/9/15

Checked by:

Test Name : PD

Date of Test : 14/09/15

Sample No. : TW 4 (9.00-9.90m)

Borehole : BH47

Approved by:

14/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH48

Sample No. : TW 2T (4.00-4.50m)

Sample Description : Dark grey, Peaty SILT with traces of sand

Specimen Reference			V	
Pyknometer No.			H17	H18
Mass of bottle + Soil + Water	m_3	g	85.094	85.376
Mass of bottle + Soil	m_2	g	37.866	37.602
Mass of bottle full of water	m_4	g	81.374	81.686
Mass of bottle	m_1	g	31.636	31.412
Mass of soil	$m_2 - m_1$	g	6.230	6.190
Mass of water in full bottle	$m_4 - m_1$	g	49.738	50.274
Mass of water used	$m_3 - m_2$	g	47.228	47.774
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.510	2.500
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.482	2.476
Average Value P_s		Mg/m ³	2.48	

Liquid used : Distilled Water

Borehole No. : BH48

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey spotted black, Very clayey SAND with traces of peat

Specimen Reference			P	
Pyknometer No.			K3	K4
Mass of bottle + Soil + Water	m_3	g	84.385	84.522
Mass of bottle + Soil	m_2	g	37.445	37.974
Mass of bottle full of water	m_4	g	80.458	80.474
Mass of bottle	m_1	g	31.138	31.491
Mass of soil	$m_2 - m_1$	g	6.307	6.483
Mass of water in full bottle	$m_4 - m_1$	g	49.320	48.983
Mass of water used	$m_3 - m_2$	g	46.940	46.548
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.380	2.435
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.650	2.662
Average Value P_s		Mg/m ³	2.66	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

9/9/15

Checked by:

Test Name : PD

Date of Test : 09/09/15

Sample No. : TW 2T (4.00-4.50m) & TW 3 (6.00-6.90m)

Borehole : BH48

Approved by:

22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH48

Sample No. : TW 4 (9.00-9.70m)

Sample Description : Light grey spotted black, Slightly sandy CLAY with traces of peat

Specimen Reference			Q	
Pyknometer No.			K7	K8
Mass of bottle + Soil + Water	m_3	g	85.886	84.732
Mass of bottle + Soil	m_2	g	36.495	37.480
Mass of bottle full of water	m_4	g	81.986	80.619
Mass of bottle	m_1	g	30.274	30.922
Mass of soil	$m_2 - m_1$	g	6.221	6.558
Mass of water in full bottle	$m_4 - m_1$	g	51.712	49.697
Mass of water used	$m_3 - m_2$	g	49.391	47.252
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.321	2.445
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.680	2.682
Average Value P_s		Mg/m ³	2.68	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PD

Date of Test : 09/09/15

Sample No. : TW 4 (9.00-9.70m)

Borehole : BH48

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH49

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Light grey spotted dark grey, Slightly sandy SILT with traces of peat

Specimen Reference			F	
Pyknometer No.			11	12
Mass of bottle + Soil + Water	m_3	g	84.431	84.168
Mass of bottle + Soil	m_2	g	37.041	36.621
Mass of bottle full of water	m_4	g	80.389	80.128
Mass of bottle	m_1	g	30.640	30.215
Mass of soil	$m_2 - m_1$	g	6.401	6.406
Mass of water in full bottle	$m_4 - m_1$	g	49.749	49.913
Mass of water used	$m_3 - m_2$	g	47.390	47.547
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.359	2.366
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.713	2.708
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water

Borehole No. : BH49

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Light grey spotted dark grey, Slightly sandy CLAY with traces of peat

Specimen Reference			H	
Pyknometer No.			H09	H10
Mass of bottle + Soil + Water	m_3	g	86.672	87.551
Mass of bottle + Soil	m_2	g	37.964	38.759
Mass of bottle full of water	m_4	g	82.660	83.423
Mass of bottle	m_1	g	31.609	32.186
Mass of soil	$m_2 - m_1$	g	6.355	6.573
Mass of water in full bottle	$m_4 - m_1$	g	51.051	51.237
Mass of water used	$m_3 - m_2$	g	48.708	48.792
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.343	2.445
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.712	2.688
Average Value P_s		Mg/m ³	2.70	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 19/9/15

Checked by:

Test Name : PD

Date of Test : 09/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

Borehole : BH49

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH49

Sample No. : TW 4 (9.00-9.90m)

Sample Description : Yellowish brown mottled reddish brown, Slightly sandy SILT

Specimen Reference			U	
Pyknometer No.			H13	H14
Mass of bottle + Soil + Water	m_3	g	84.729	85.197
Mass of bottle + Soil	m_2	g	38.451	37.810
Mass of bottle full of water	m_4	g	80.828	81.212
Mass of bottle	m_1	g	32.245	31.494
Mass of soil	$m_2 - m_1$	g	6.206	6.316
Mass of water in full bottle	$m_4 - m_1$	g	48.583	49.718
Mass of water used	$m_3 - m_2$	g	46.278	47.387
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.305	2.331
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.692	2.710
Average Value P_s		Mg/m ³	2.70	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: 19/9/15

Checked by: Cpl. 22/9/15

Test Name : PD

Date of Test : 09/09/15

Sample No. : TW 4 (9.00-9.90m)

Borehole : BH49

Approved by: 22/9/15

Particle Density Test

Small Pyknometer method

Borehole No. : BH50

Sample No. : TW 2T (4.00-4.50m)

Sample Description : Brownish grey and reddish brown, Slightly gravelly slightly sandy SILT (MADE GROUND)

Specimen Reference			B	
Pyknometer No.			3	4
Mass of bottle + Soil + Water	m_3	g	81.804	85.674
Mass of bottle + Soil	m_2	g	33.846	37.747
Mass of bottle full of water	m_4	g	77.741	81.605
Mass of bottle	m_1	g	27.531	31.436
Mass of soil	$m_2 - m_1$	g	6.315	6.311
Mass of water in full bottle	$m_4 - m_1$	g	50.210	50.169
Mass of water used	$m_3 - m_2$	g	47.958	47.927
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.252	2.242
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.804	2.815
Average Value P_s		Mg/m ³	2.81	

Liquid used : Distilled Water

Borehole No. : BH50

Sample No. : TW 2B (4.50-4.90m)

Sample Description : Dark brown, Peaty SILT with wood

Specimen Reference			C	
Pyknometer No.			5	6
Mass of bottle + Soil + Water	m_3	g	82.258	81.529
Mass of bottle + Soil	m_2	g	35.178	33.963
Mass of bottle full of water	m_4	g	78.635	77.816
Mass of bottle	m_1	g	28.976	27.624
Mass of soil	$m_2 - m_1$	g	6.202	6.339
Mass of water in full bottle	$m_4 - m_1$	g	49.659	50.192
Mass of water used	$m_3 - m_2$	g	47.080	47.566
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.579	2.626
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.405	2.414
Average Value P_s		Mg/m ³	2.41	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

4/9/15

Checked by:

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 2T (4.00-4.50m) & TW 2B (4.50-4.90m)

Borehole : BH50

Approved by:

22/9/15

Particle Density Test

Small Pycnometer method

Borehole No. : BH50

Sample No. : TW 3 (7.00-7.90m)

Sample Description : Grey spotted reddish brown, Slightly sandy SILT

Specimen Reference			E	
Pyknometer No.			9	10
Mass of bottle + Soil + Water	m_3	g	82.829	82.181
Mass of bottle + Soil	m_2	g	35.241	34.293
Mass of bottle full of water	m_4	g	78.827	78.292
Mass of bottle	m_1	g	28.898	28.123
Mass of soil	$m_2 - m_1$	g	6.343	6.170
Mass of water in full bottle	$m_4 - m_1$	g	49.929	50.169
Mass of water used	$m_3 - m_2$	g	47.588	47.888
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.341	2.281
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.710	2.705
Average Value P_s		Mg/m ³	2.71	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 :1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: /

Checked by:

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 3 (7.00-7.90m)

Borehole : BH50

Approved by:

Particle Density Test

Small Pyknometer method

Borehole No. : BH51

Sample No. : TW 2 (4.00-4.90m)

Sample Description : Reddish brown mottled yellowish brown spotted dark grey, Slightly sandy SILT

Specimen Reference			V	
Pyknometer No.			H17	H18
Mass of bottle + Soil + Water	m_3	g	85.303	85.625
Mass of bottle + Soil	m_2	g	37.852	37.649
Mass of bottle full of water	m_4	g	81.374	81.686
Mass of bottle	m_1	g	31.636	31.412
Mass of soil	$m_2 - m_1$	g	6.216	6.237
Mass of water in full bottle	$m_4 - m_1$	g	49.738	50.274
Mass of water used	$m_3 - m_2$	g	47.451	47.976
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.287	2.298
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.718	2.714
Average Value P_s		Mg/m ³	2.72	

Liquid used : Distilled Water

Borehole No. : BH51

Sample No. : TW 3 (6.00-6.90m)

Sample Description : Grey mottled yellowish brown, Slightly sandy CLAY

Specimen Reference			P	
Pyknometer No.			K3	K4
Mass of bottle + Soil + Water	m_3	g	84.395	84.494
Mass of bottle + Soil	m_2	g	37.442	37.914
Mass of bottle full of water	m_4	g	80.458	80.474
Mass of bottle	m_1	g	31.138	31.491
Mass of soil	$m_2 - m_1$	g	6.304	6.423
Mass of water in full bottle	$m_4 - m_1$	g	49.320	48.983
Mass of water used	$m_3 - m_2$	g	46.953	46.580
Volume of soil particles	$(m_4 - m_1) - (m_3 - m_2)$	mL	2.367	2.403
Particle Density $P_s =$	$\frac{m_2 - m_1}{(m_4 - m_1) - (m_3 - m_2)}$	Mg/m ³	2.663	2.673
Average Value P_s		Mg/m ³	2.67	

Liquid used : Distilled Water



Test Method : BS1377 : Part 2 : 1990
(Clause 8.3)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: 4/9/15

Checked by: Cplal 22/9/15

Test Name : PD

Date of Test : 04/09/15

Sample No. : TW 2 (4.00-4.90m) & TW 3 (6.00-6.90m)

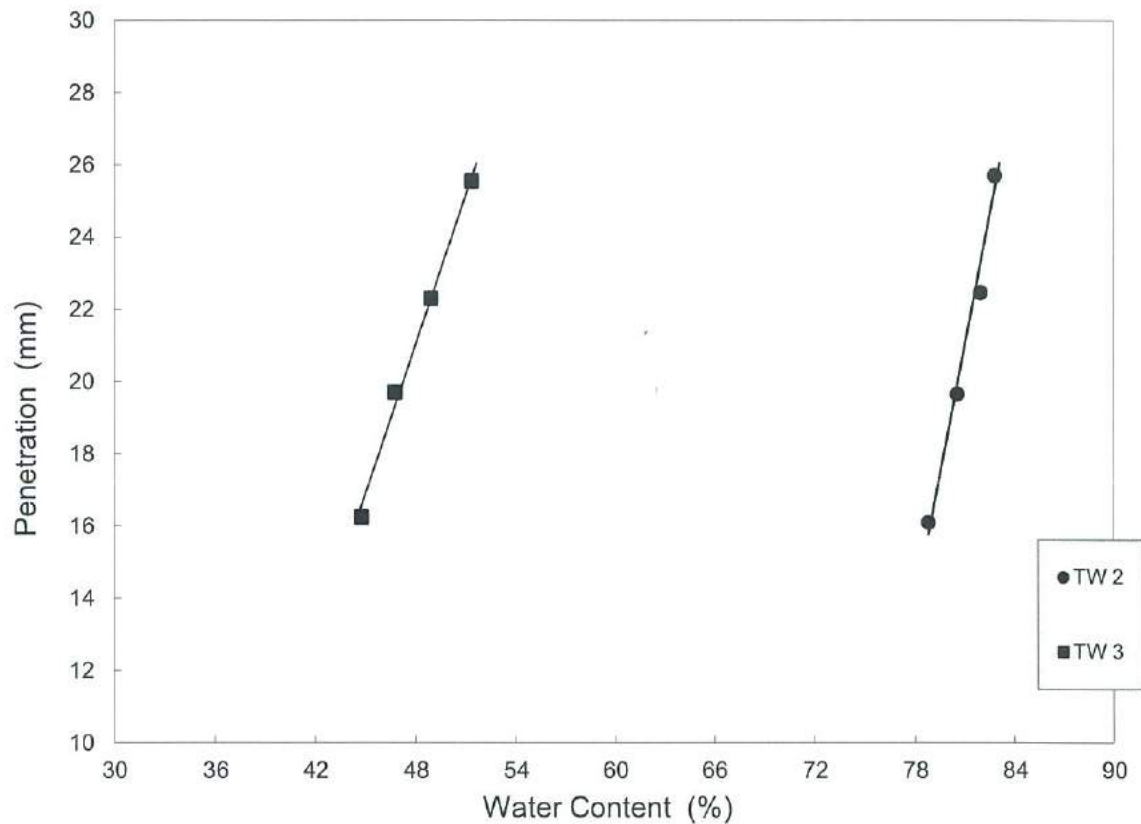
Borehole : BH51

Approved by: 22/9/15

ATTERBERG LIMITS TEST

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey spotted reddish brown and yellowish brown, Slightly sandy SILT with traces of peat		
TW 2	HISTORY OF SAMPLE		LIQUID LIMIT (%) 81
4.00-4.90	Natural State		PLASTIC LIMIT (%) 17
(m)			PLASTICITY INDEX (%) 64

Sample No.	Description: Light grey mottled yellowish brown, Slightly sandy CLAY		
TW 3	HISTORY OF SAMPLE		LIQUID LIMIT (%) 48
6.00-6.90	Natural State		PLASTIC LIMIT (%) 17
(m)			PLASTICITY INDEX (%) 31



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

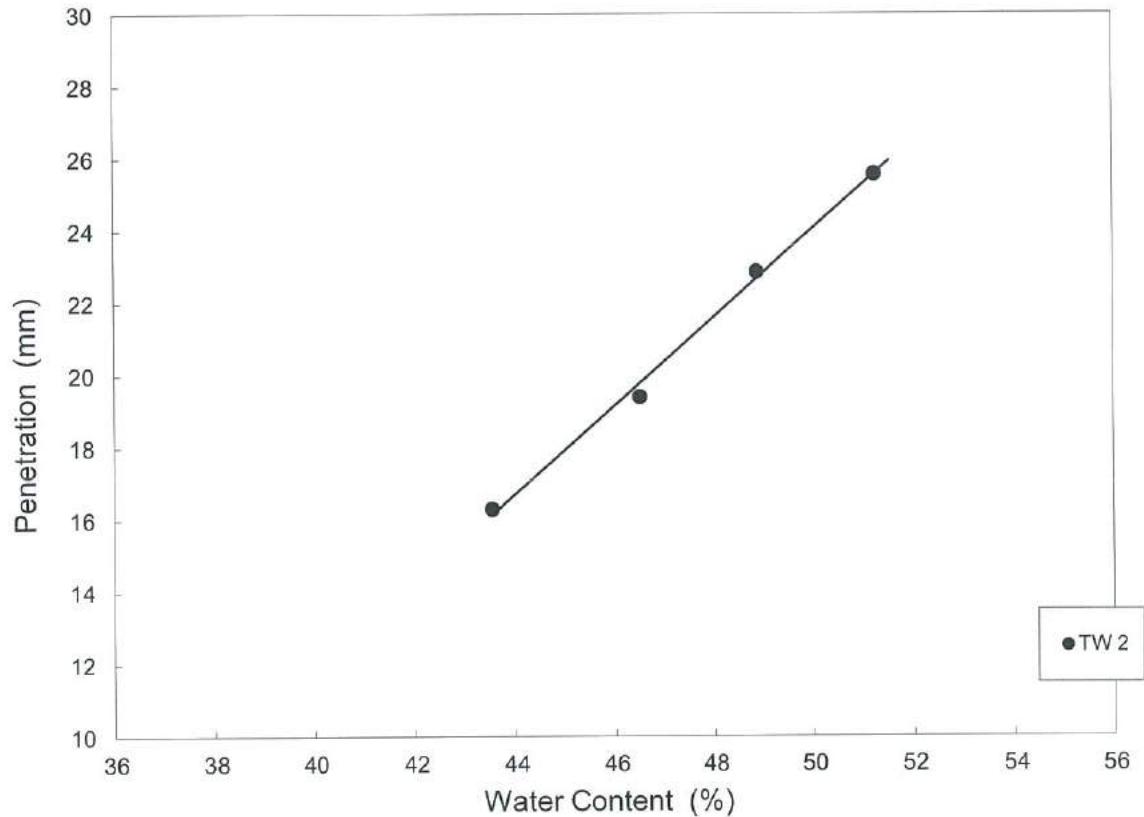
Checked by: *[Signature]* 22/9/15

Test Name : AL
Date of Test : 17/09/15
Borehole : BH34

Approved by: *[Signature]* 22/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Reddish brown mottled yellowish brown and light grey, Slightly sandy CLAY		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	47
6.00-6.90		PLASTIC LIMIT (%)	17
(m)		PLASTICITY INDEX (%)	30



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Ang

Checked by :

Cyber 22/9/15

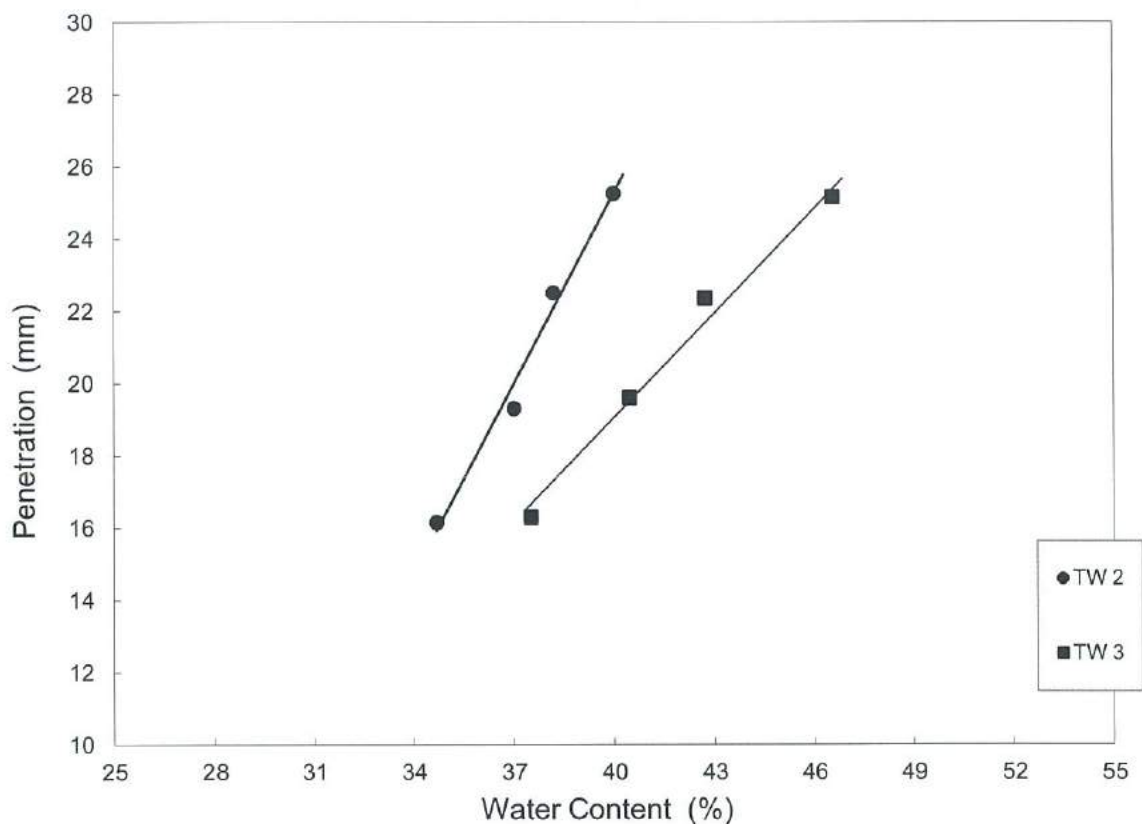
Test Name : AL
Date of Test : 17/09/15
Borehole : BH35

Approved by :

Sadman
17/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey mottled yellowish brown, Slightly sandy CLAY with peat		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	37
4.00-4.90		PLASTIC LIMIT (%)	20
(m)		PLASTICITY INDEX (%)	17

Sample No.	Description: Light grey mottled dark grey and yellowish brown, Slightly sandy SILT with traces of peat		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	42
6.00-6.90		PLASTIC LIMIT (%)	19
(m)		PLASTICITY INDEX (%)	23



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: *Arday*

Checked by :

Test Name : AL
Date of Test : 17/09/15
Borehole : BH36

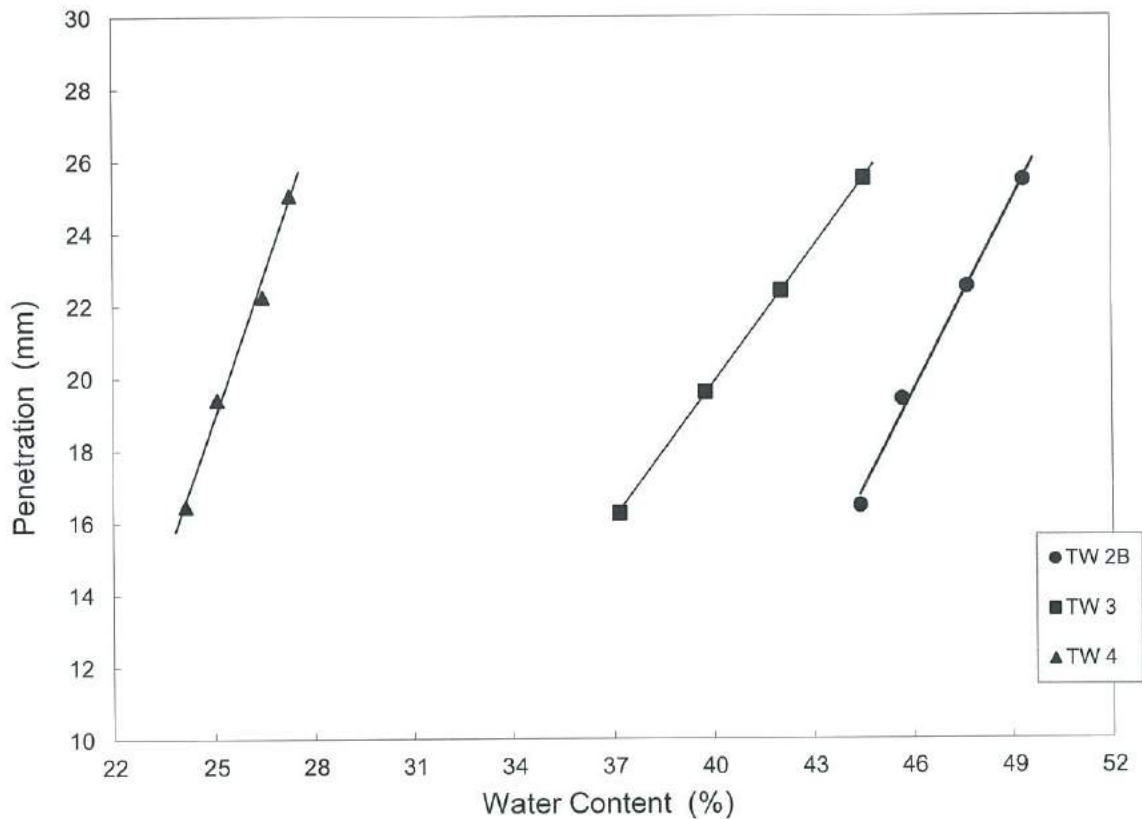
Arday 22/9/15

Approved by :

Arday 22/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey, Slightly sandy CLAY with traces of peat		
TW 2B	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	46
4.40-4.90		PLASTIC LIMIT (%)	20
(m)		PLASTICITY INDEX (%)	26

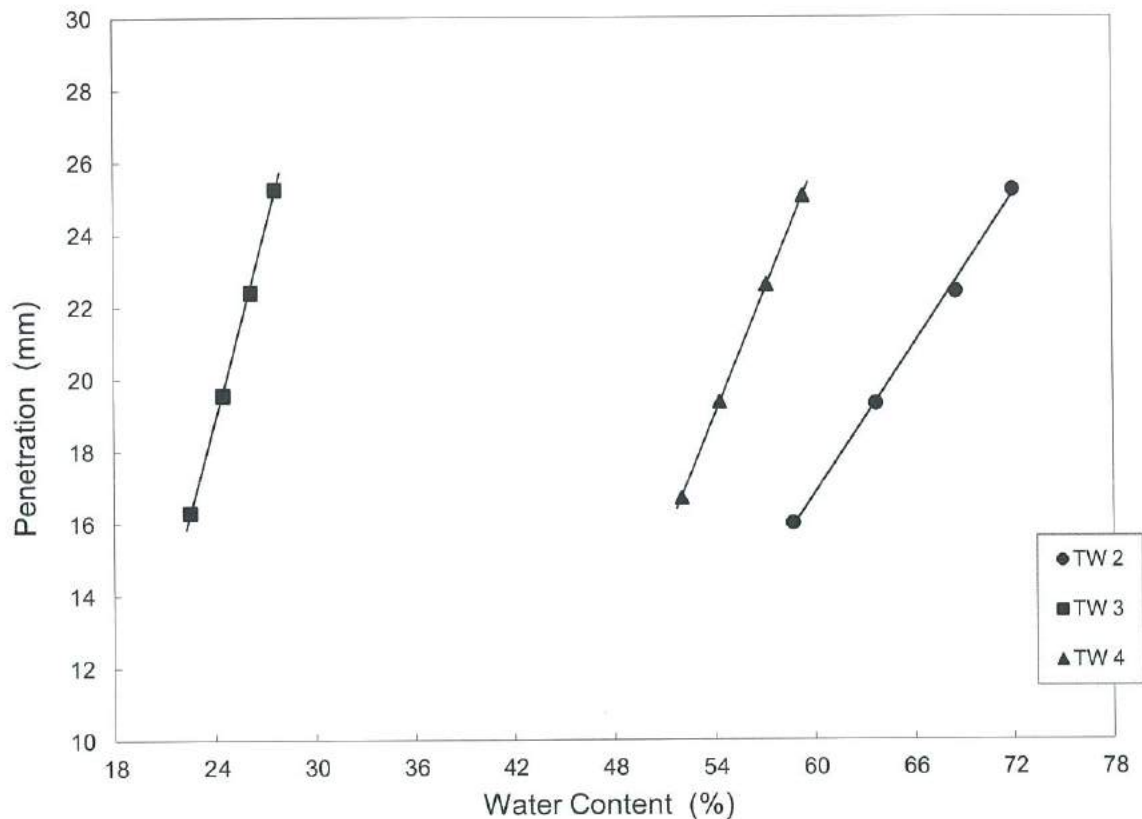
Sample No.	Description: Light grey, Slightly sandy SILT with traces of peat		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	40
6.00-6.90		PLASTIC LIMIT (%)	16
(m)		PLASTICITY INDEX (%)	24

Sample No.	Description: Light grey, Sandy SILT		
TW 4	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	26
9.00-9.90		PLASTIC LIMIT (%)	15
(m)		PLASTICITY INDEX (%)	11

	Test Method : BS1377 : Part 2 : 1990 (Clause 4.3 & 5)		Test Name : AL	
	Site Reference : Lim Chu Kang		Date of Test : 12/09/15	
	Jobfile : SIL/S7518/15/SI		Borehole : BH37	
	Tested by: <i>[Signature]</i>	Checked by : <i>[Signature]</i>	Approved by : <i>[Signature]</i>	

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey, Slightly sandy CLAY with traces of peat		
TW 2	HISTORY OF SAMPLE		LIQUID LIMIT (%) 65
4.00-4.90 (m)	Natural State		PLASTIC LIMIT (%) 24
			PLASTICITY INDEX (%) 41

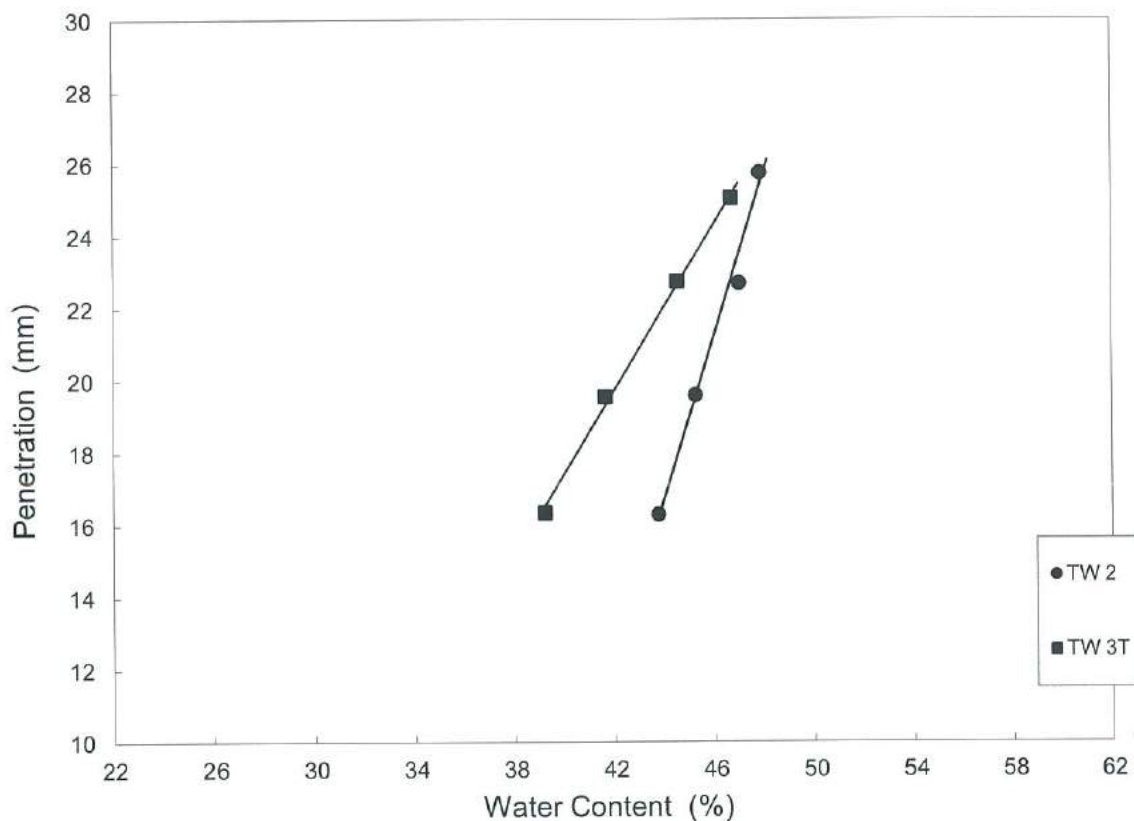
Sample No.	Description: Light grey, Sandy SILT		
TW 3	HISTORY OF SAMPLE		LIQUID LIMIT (%) 25
6.00-6.90 (m)	After Wet Sieving		PLASTIC LIMIT (%) 15
	Material passing 425um test sieve	70 %	PLASTICITY INDEX (%) 10

Sample No.	Description: Yellowish brown mottled reddish brown and light grey, Slightly sandy SILT		
TW 4	HISTORY OF SAMPLE		LIQUID LIMIT (%) 55
9.00-9.90 (m)	Natural State		PLASTIC LIMIT (%) 21
			PLASTICITY INDEX (%) 34

	Test Method : BS1377 : Part 2 : 1990 (Clause 4.3 & 5)		Test Name : AL	
	Site Reference : Lim Chu Kang		Date of Test : 09/09/15	
	Jobfile : SIL/S7518/15/SI		Borehole : BH38	
	Tested by: <i>Any</i>	Checked by: <i>Cyber 22/9/15</i>	Approved by: <i>22/9/15</i>	

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Brownish grey, Slightly gravelly sandy SILT with traces of peat and decayed wood		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	45
5.00-5.90		PLASTIC LIMIT (%)	26
(m)		PLASTICITY INDEX (%)	19

Sample No.	Description: Light grey, Slightly sandy CLAY with traces of peat		
TW 3T	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	42
8.00-8.40		PLASTIC LIMIT (%)	16
(m)		PLASTICITY INDEX (%)	26



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by :

[Signature] 2019/15

Test Name : AL

Date of Test : 03/09/15

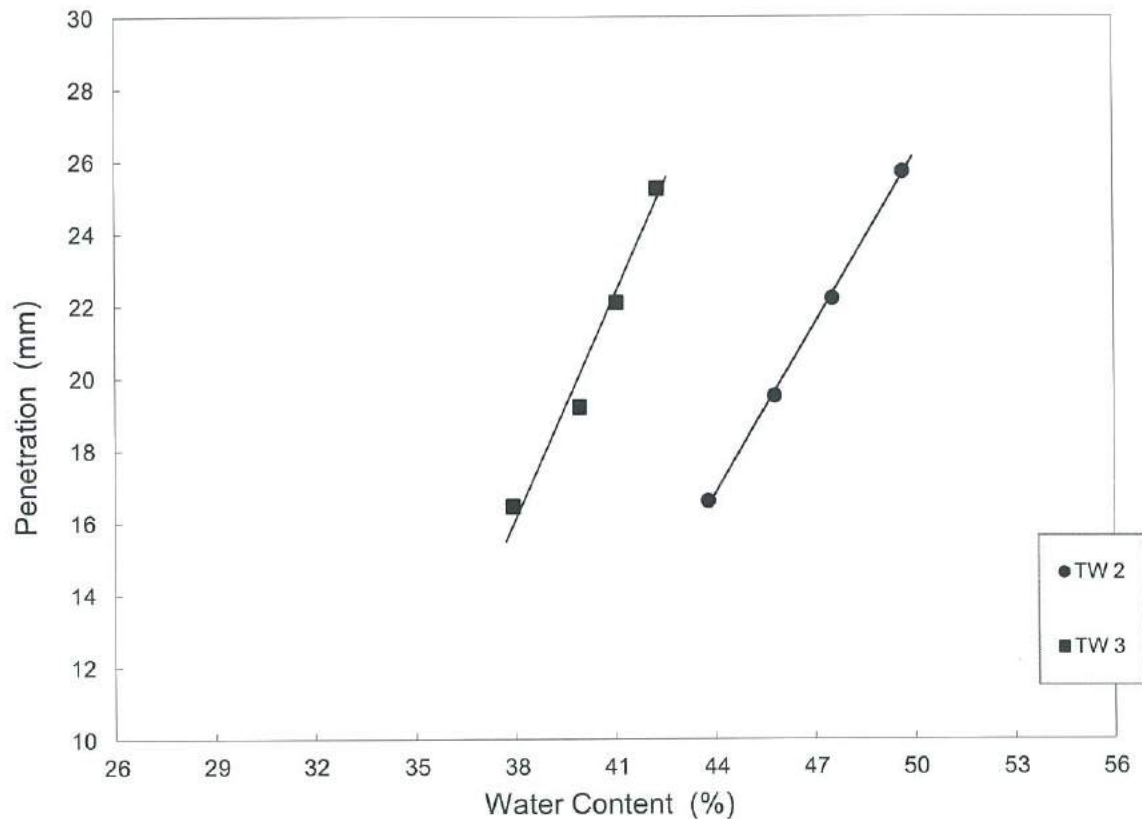
Borehole : BH39

Approved by :

[Signature] 2019/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey mottled reddish brown, Slightly sandy CLAY		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	46
5.00-5.90		PLASTIC LIMIT (%)	19
(m)		PLASTICITY INDEX (%)	27

Sample No.	Description: Reddish brown mottled brownish grey, Slightly sandy CLAY		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	40
8.00-8.50		PLASTIC LIMIT (%)	15
(m)		PLASTICITY INDEX (%)	25



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Amg

Checked by :

Test Name : AL

Date of Test : 11/09/15

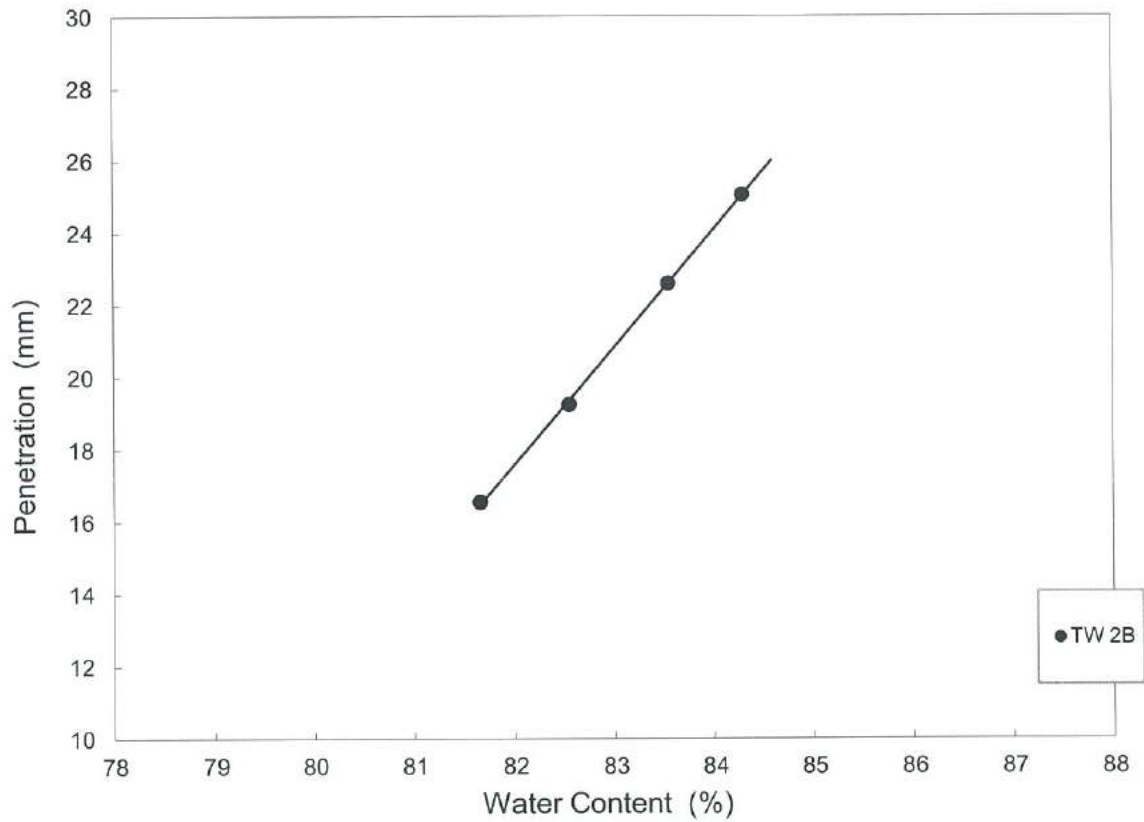
Borehole : BH40

Approved by :

Handwritten signature and date 11/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Dark brown, Peaty SILT		
TW 2B	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	83
5.70-5.90		PLASTIC LIMIT (%)	42
(m)		PLASTICITY INDEX (%)	41



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by :

Test Name : AL

Date of Test : 04/09/15

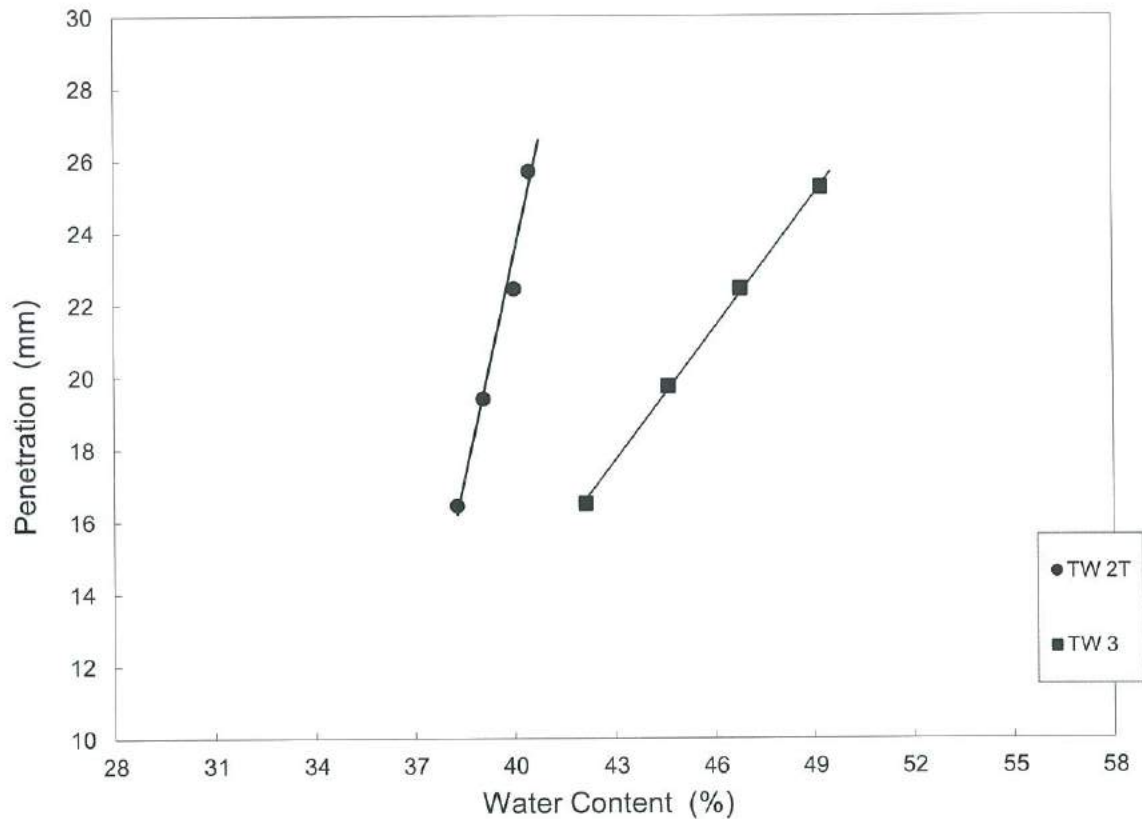
Borehole : BH41

Approved by :

[Signature]
22/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Yellowish brown, Slightly gravelly sandy CLAY (MADE GROUND)		
TW 2T	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	39
4.00-4.80		PLASTIC LIMIT (%)	19
(m)		PLASTICITY INDEX (%)	20

Sample No.	Description: Light grey mottled reddish brown, Slightly gravelly sandy SILT		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	45
10.00-10.90		PLASTIC LIMIT (%)	19
(m)		PLASTICITY INDEX (%)	26



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Asmy

Checked by :

Test Name : AL

Date of Test : 04/09/15

Borehole : BH42

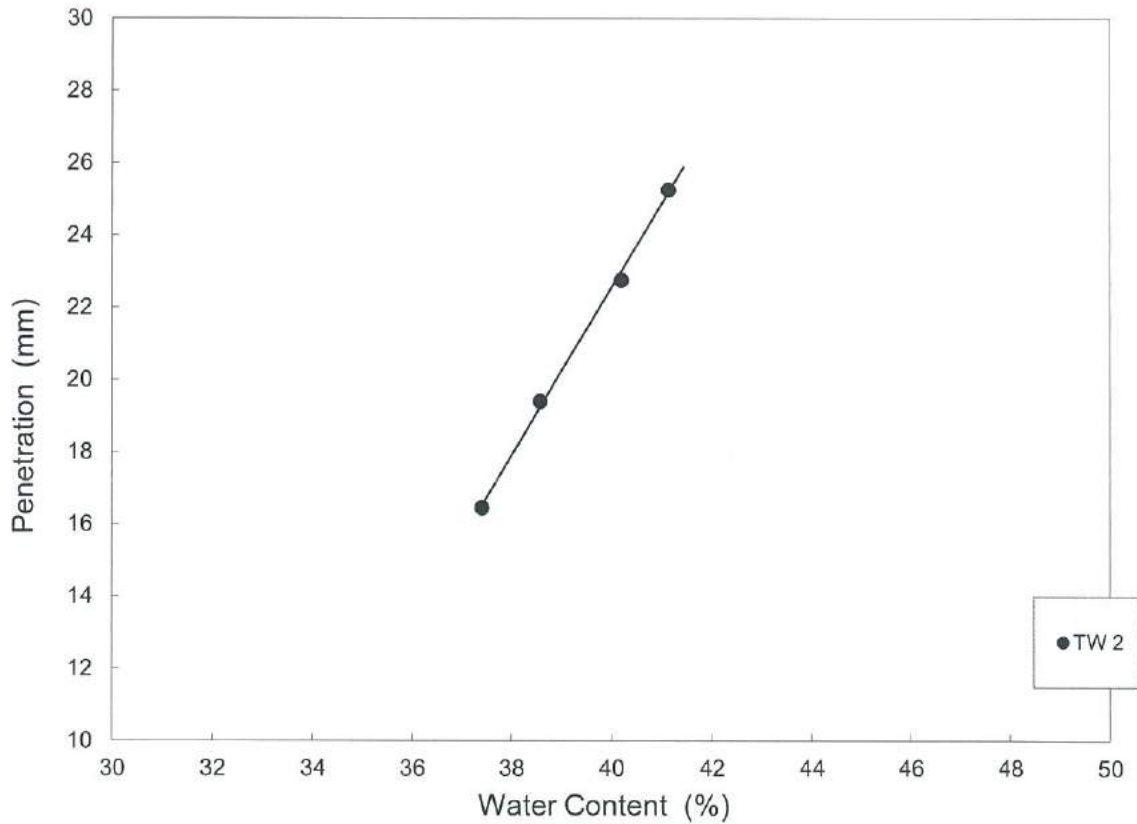
Cyral 27/9/15

Approved by :

Asmy 27/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Grey mottled reddish brown, Slightly sandy SILT		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	39
4.00-4.90		PLASTIC LIMIT (%)	16
(m)		PLASTICITY INDEX (%)	23



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Handwritten signature

Checked by :

Test Name : AL

Date of Test : 18/09/15

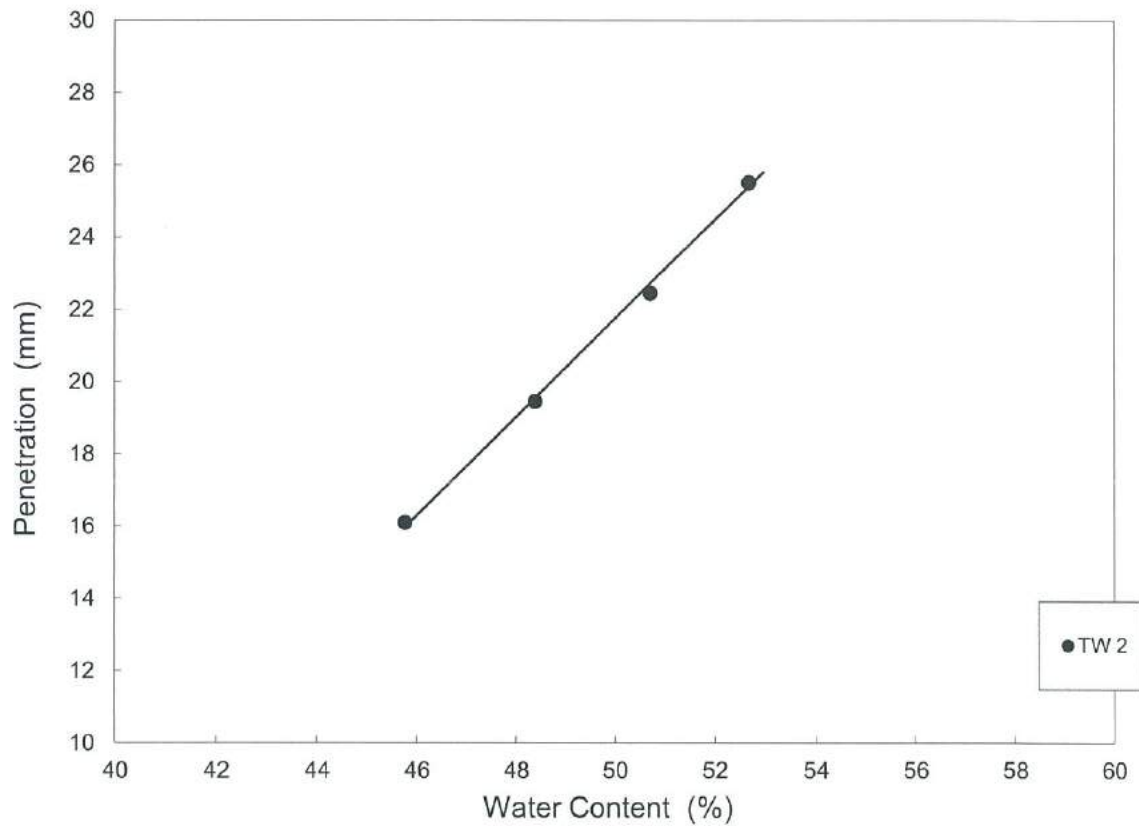
Borehole : BH44

Approved by :

Handwritten signature and date 20/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Grey mottled reddish brown and yellowish brown, Slightly sandy CLAY		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	49
4.00-4.90		PLASTIC LIMIT (%)	20
(m)		PLASTICITY INDEX (%)	29



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by :

Test Name : AL

Date of Test : 18/09/15

Borehole : BH45

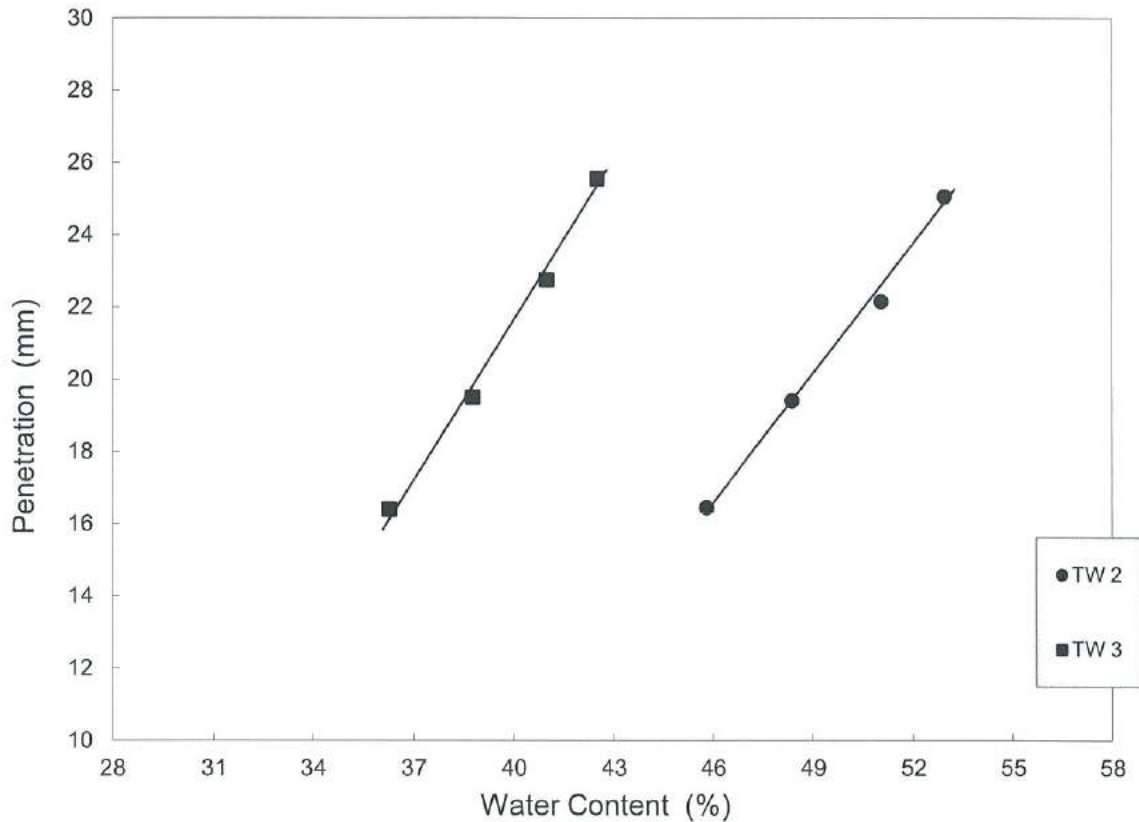
Approved by :

[Signature]
18/09/15

[Signature]
18/09/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Grey spotted dark grey, Slightly sandy CLAY with traces of peat		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	49
4.00-4.90		PLASTIC LIMIT (%)	20
(m)		PLASTICITY INDEX (%)	29

Sample No.	Description: Grey spotted dark grey, Slightly sandy SILT with traces of peat		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	39
6.00-6.90		PLASTIC LIMIT (%)	17
(m)		PLASTICITY INDEX (%)	22



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by :

Test Name : AL

Date of Test : 19/09/15

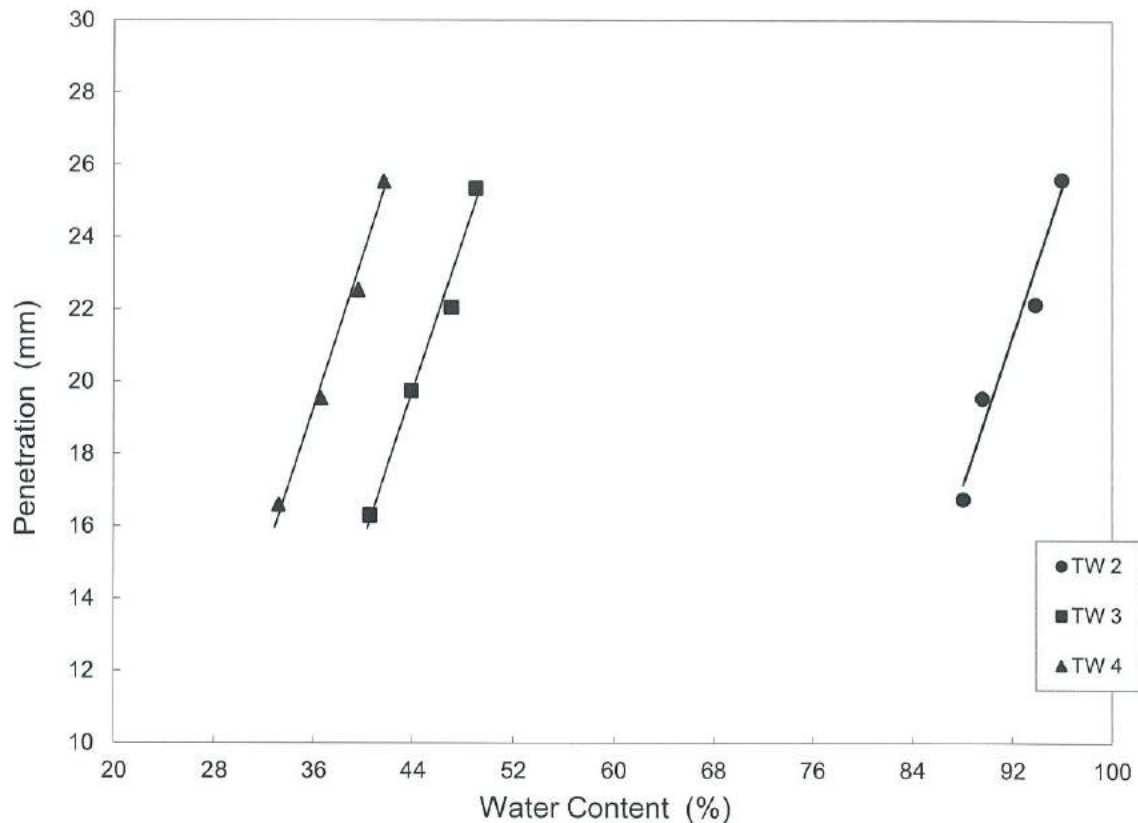
Borehole : BH46

Approved by :

[Signature]
19/09/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Dark grey, Peaty SILT		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	91
4.00-4.90		PLASTIC LIMIT (%)	46
(m)		PLASTICITY INDEX (%)	45

Sample No.	Description: Light grey mottled yellowish brown, Slightly sandy CLAY		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	44
6.00-6.90		PLASTIC LIMIT (%)	18
(m)		PLASTICITY INDEX (%)	26

Sample No.	Description: Light grey mottled yellowish brown, Slightly sandy SILT		
TW 4	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	37
9.00-9.90		PLASTIC LIMIT (%)	14
(m)		PLASTICITY INDEX (%)	23



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by :

Test Name : AL

Date of Test : 18/09/15

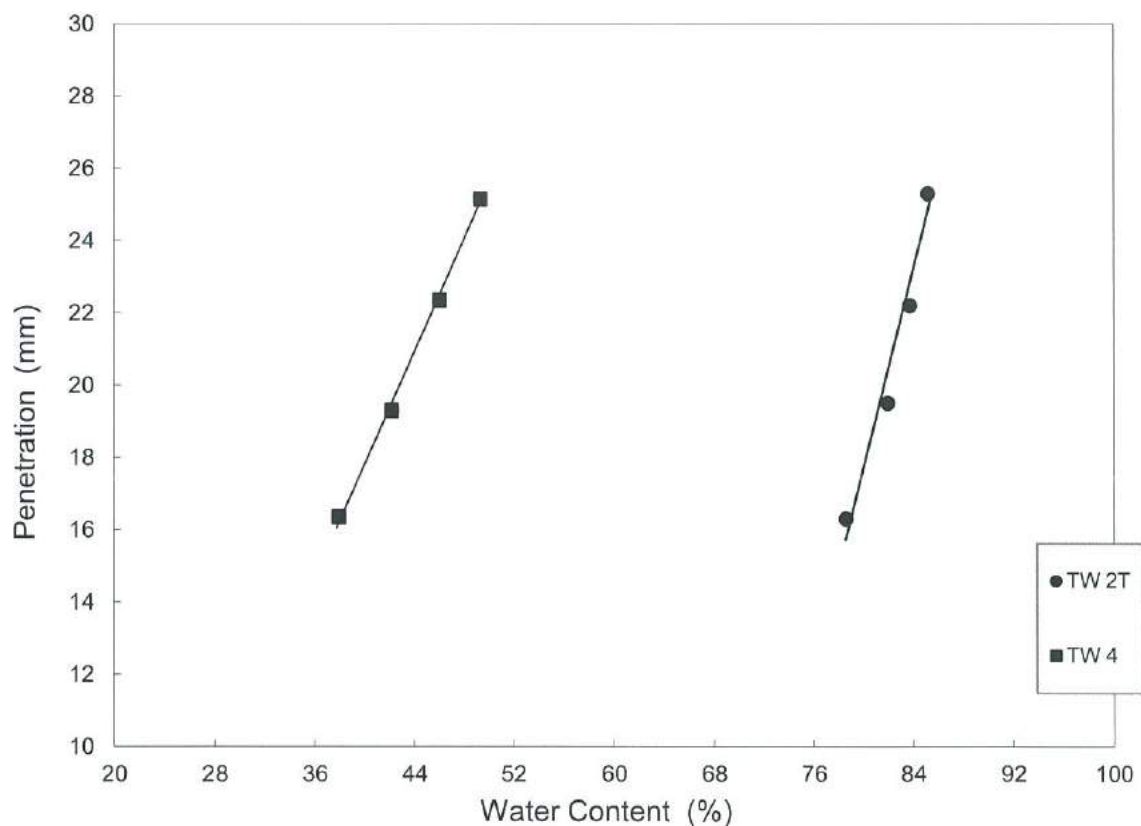
Borehole : BH47

Approved by :

[Signature]
18/09/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Dark grey, Peaty SILT with traces of sand		
TW 2T	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	82
4.00-4.50		PLASTIC LIMIT (%)	49
(m)		PLASTICITY INDEX (%)	33

Sample No.	Description: Light grey spotted black, Slightly sandy CLAY with traces of peat		
TW 4	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	43
9.00-9.70		PLASTIC LIMIT (%)	17
(m)		PLASTICITY INDEX (%)	26



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: *Andy*

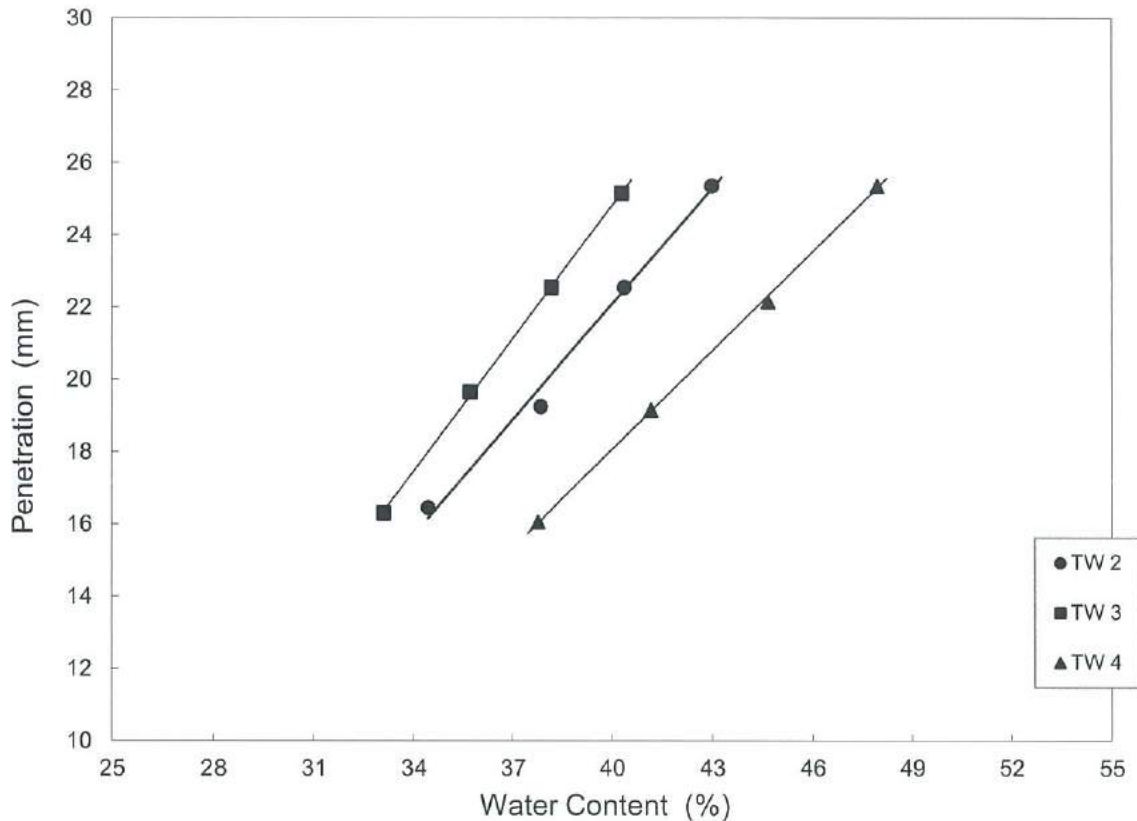
Checked by: *Cyril*

Test Name : AL
Date of Test : 09/09/15
Borehole : BH48

Approved by: *Lim Chu Kang*

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Light grey spotted dark grey, Slightly sandy SILT with traces of peat		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	38
4.00-4.90		PLASTIC LIMIT (%)	18
(m)		PLASTICITY INDEX (%)	20

Sample No.	Description: Light grey spotted dark grey, Slightly sandy CLAY with traces of peat		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	36
6.00-6.90		PLASTIC LIMIT (%)	13
(m)		PLASTICITY INDEX (%)	23

Sample No.	Description: Yellowish brown mottled reddish brown, Slightly sandy SILT		
TW 4	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	42
9.00-9.90		PLASTIC LIMIT (%)	17
(m)		PLASTICITY INDEX (%)	25



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by :

[Signature] 22/9/15

Test Name : AL

Date of Test : 14/09/15

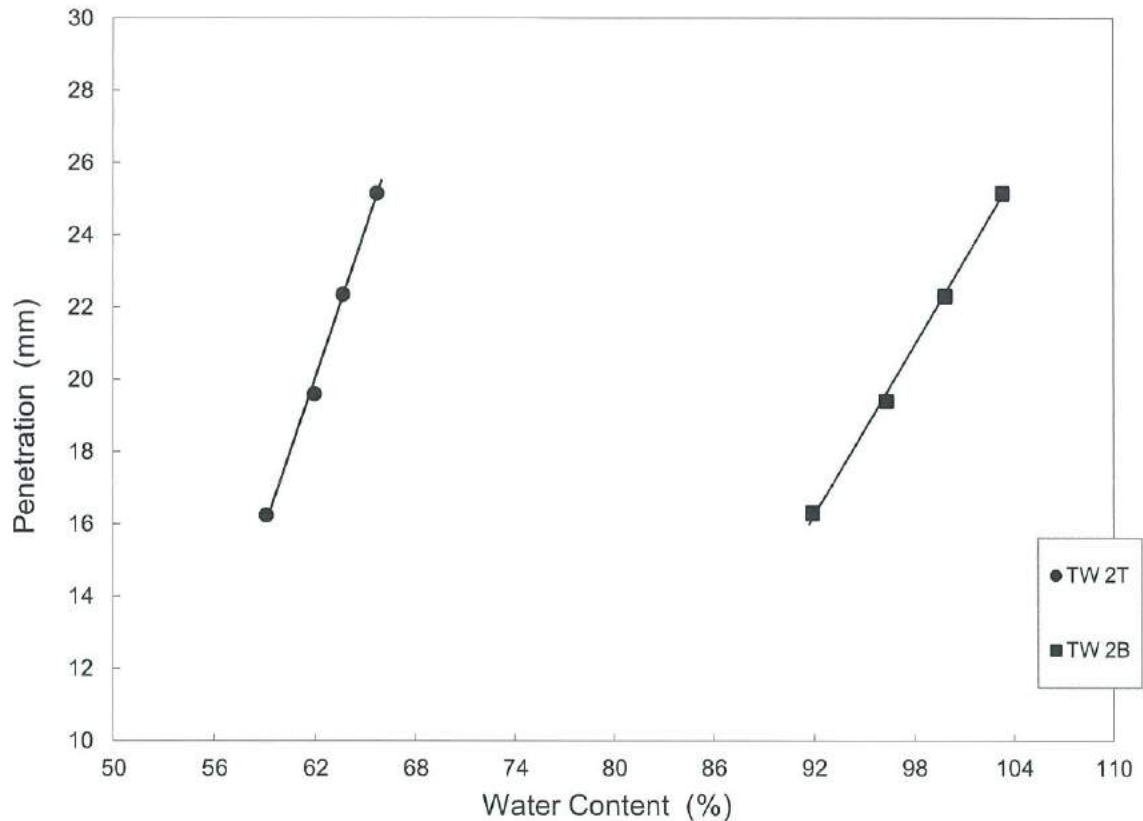
Borehole : BH49

Approved by :

[Signature] 22/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Brownish grey and reddish brown, Slightly gravelly slightly sandy SILT (MADE GROUND)		
TW 2T	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	62
4.00-4.50		PLASTIC LIMIT (%)	36
(m)		PLASTICITY INDEX (%)	26

Sample No.	Description: Dark brown, Peaty SILT with wood		
TW 2B	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	97
4.50-4.90		PLASTIC LIMIT (%)	56
(m)		PLASTICITY INDEX (%)	41



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by :

Test Name : AL

Date of Test : 08/09/15

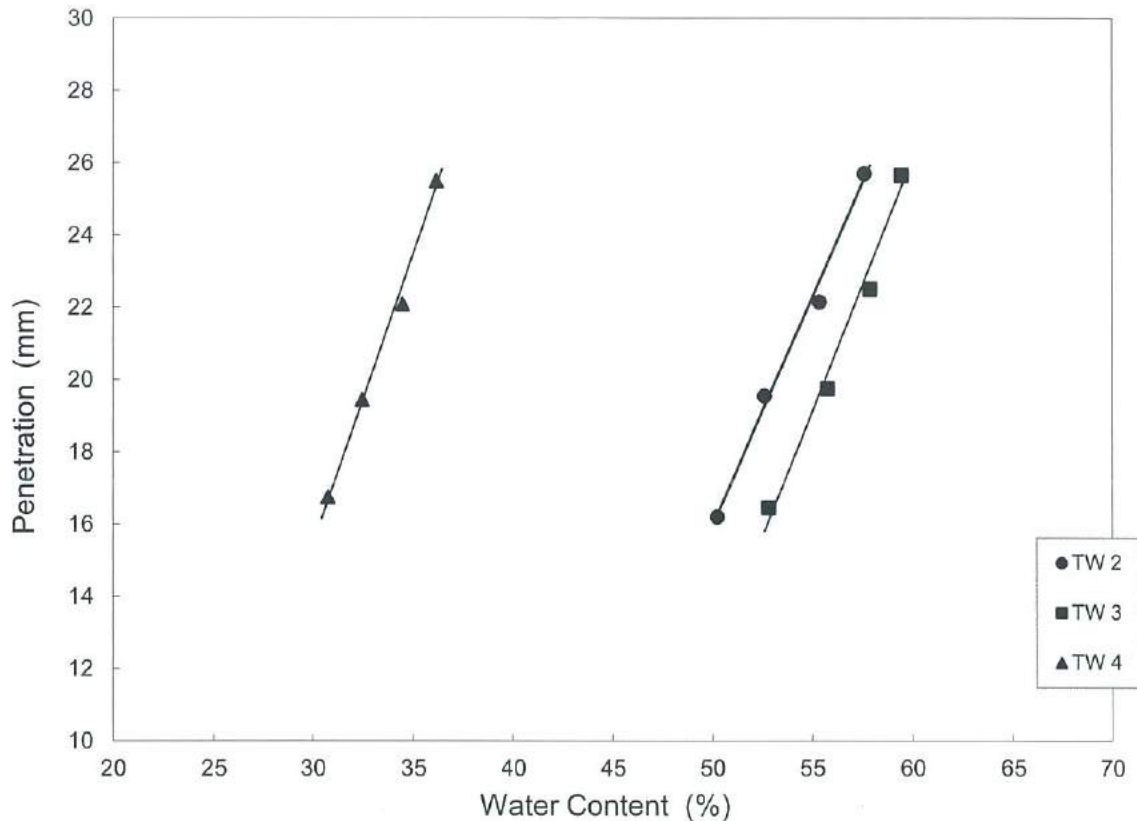
Borehole : BH50

Approved by :

[Signature]
27/9/15

Atterberg Limits Test

Cone Penetrometer Method



Sample No.	Description: Reddish brown mottled yellowish brown spotted dark grey, Slightly sandy SILT		
TW 2	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	53
4.00-4.90		PLASTIC LIMIT (%)	29
(m)		PLASTICITY INDEX (%)	24

Sample No.	Description: Grey mottled yellowish brown, Slightly sandy CLAY		
TW 3	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	55
6.00-6.90		PLASTIC LIMIT (%)	23
(m)		PLASTICITY INDEX (%)	32

Sample No.	Description: Grey mottled yellowish brown, Slightly sandy SILT		
TW 4	HISTORY OF SAMPLE Natural State	LIQUID LIMIT (%)	33
9.00-9.90		PLASTIC LIMIT (%)	17
(m)		PLASTICITY INDEX (%)	16



Test Method : BS1377 : Part 2 : 1990
(Clause 4.3 & 5)

Site Reference : Lim Chu Kang

Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by :

Test Name : AL

Date of Test : 08/09/15

Borehole : BH51

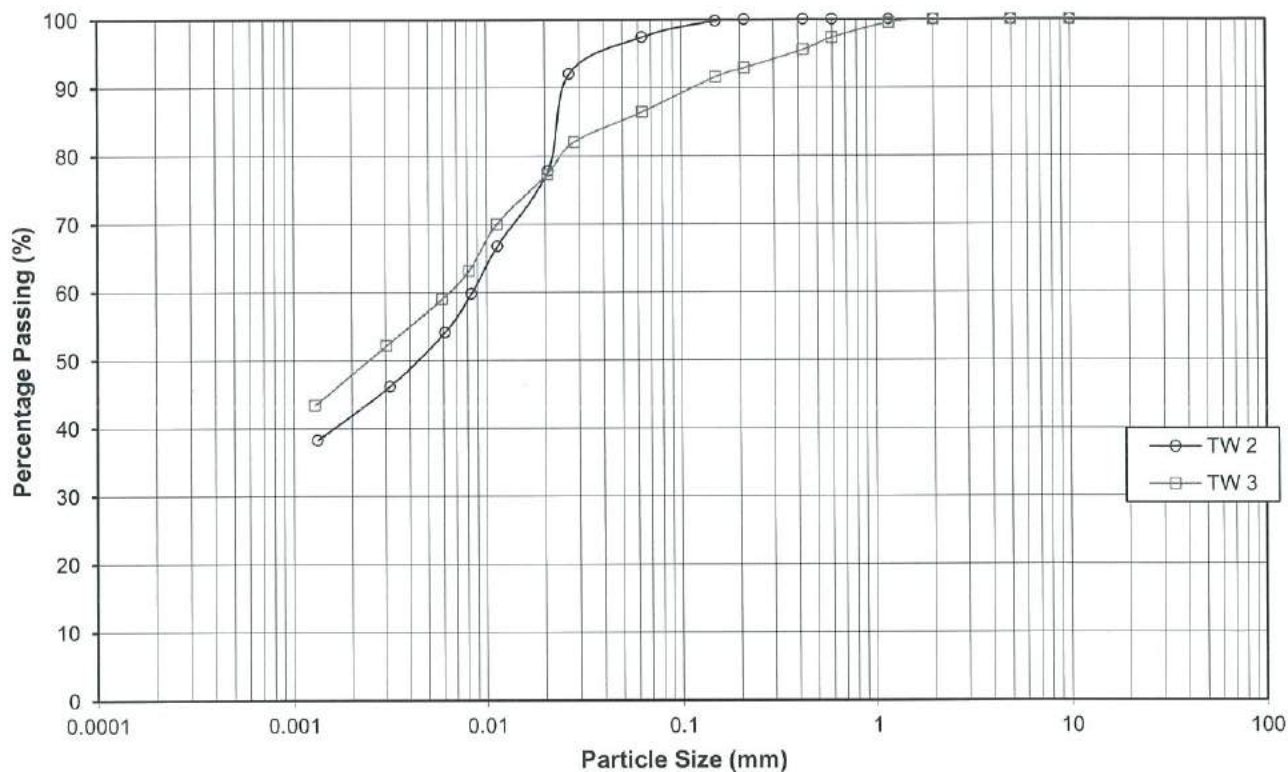
Approved by :

[Signature]
22/9/15

PARTICLE SIZE DISTRIBUTION TEST

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	3	55	42	Light grey spotted reddish brown and yellowish brown, Slightly sandy SILT with traces of peat
TW 3	6.00-6.90	0	14	38	48	Light grey mottled yellowish brown, Slightly sandy CLAY



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

[Signature] 21/9/15

Test Name : PS & HYD

Date of Test : 15/09/15

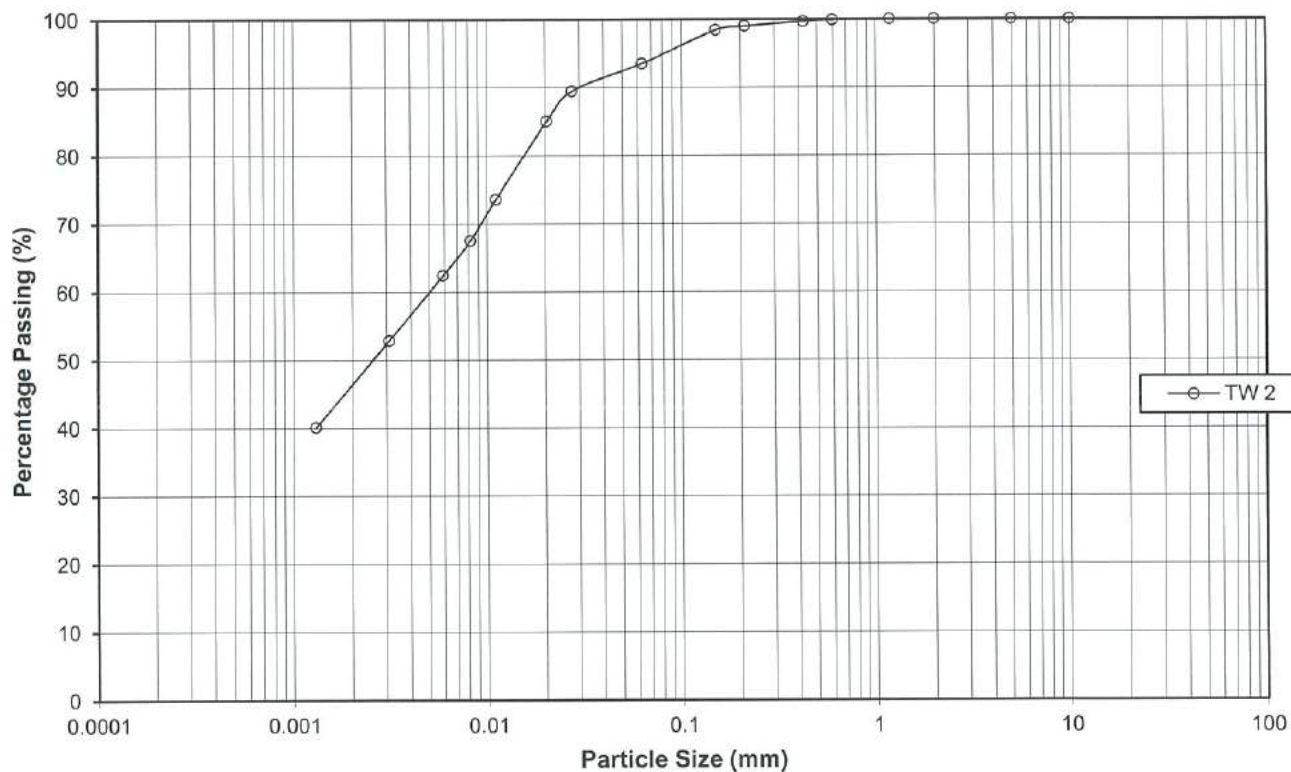
Borehole : BH34

Approved by:

[Signature] 21/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	6.00-6.90	0	7	46	47	Reddish brown mottled yellowish brown and light grey, Slightly sandy CLAY



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD
Date of Test : 16/09/15
Borehole : BH35

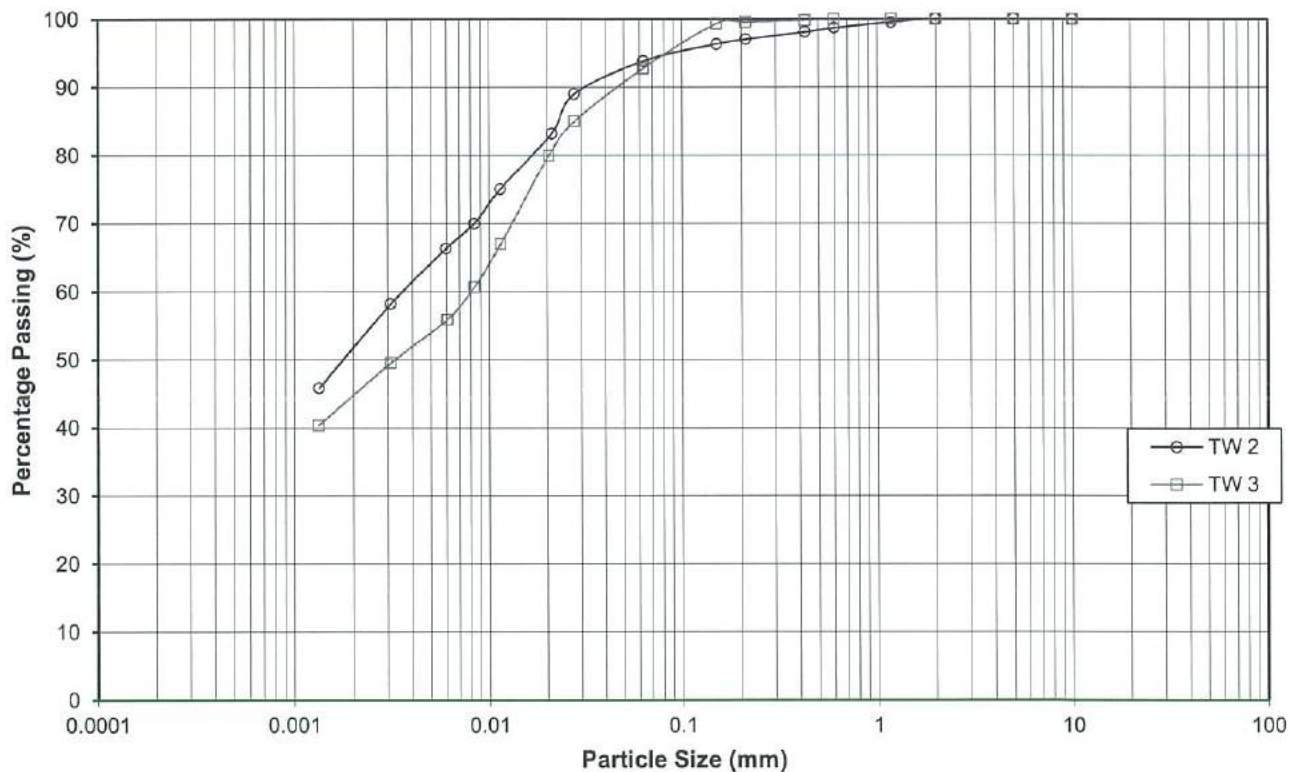
[Signature] 22/9/15

Approved by:

[Signature] 22/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	6	43	51	Light grey mottled yellowish brown, Slightly sandy CLAY with peat
TW 3	6.00-6.90	0	7	48	45	Light grey mottled dark grey and yellowish brown, Slightly sandy SILT with traces of peat



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

[Signature] 22/9/15

Test Name : PS & HYD

Date of Test : 15/09/15

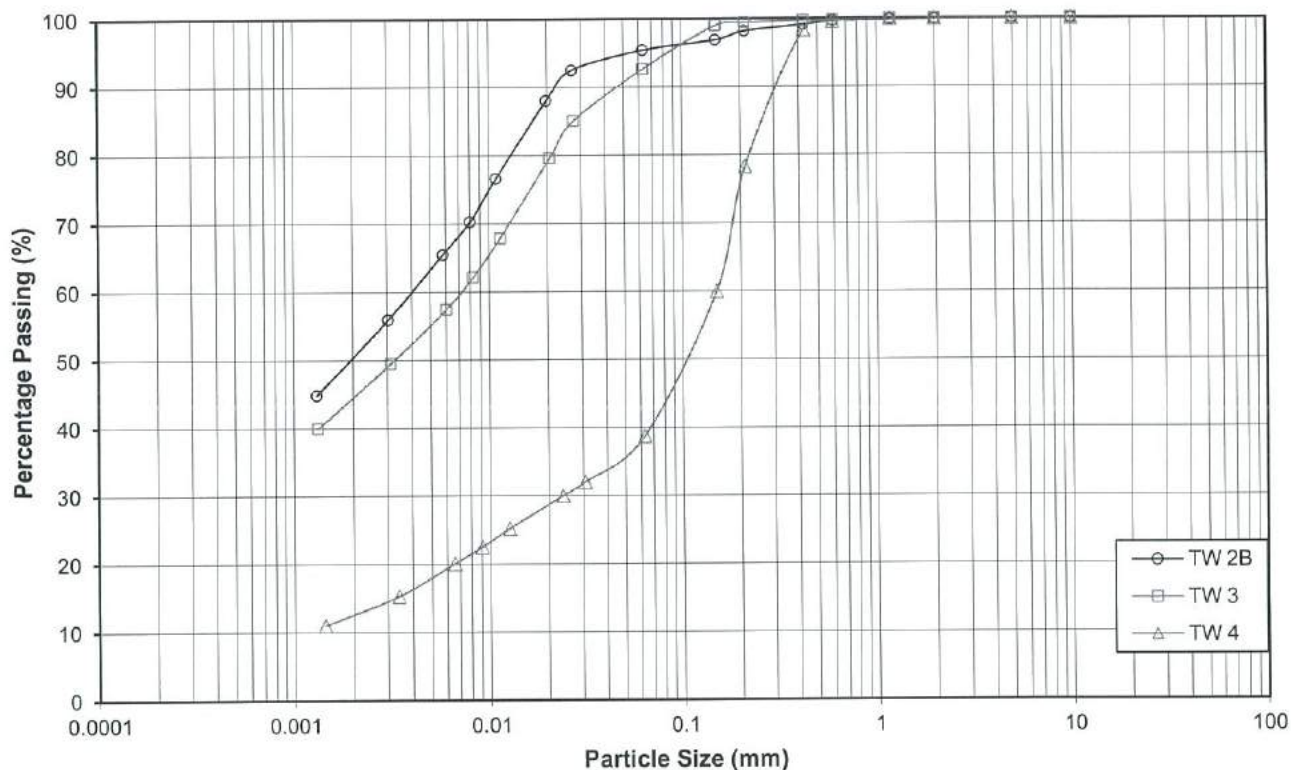
Borehole : BH36

Approved by:

[Signature] 22/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2B	4.40-4.90	0	5	45	50	Light grey, Slightly sandy CLAY with traces of peat
TW 3	6.00-6.90	0	7	49	44	Light grey, Slightly sandy SILT with traces of peat
TW 4	9.00-9.90	0	61	26	13	Light grey, Sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by: *[Signature]*

Checked by:

Test Name : PS & HYD

Date of Test : 09/09/15

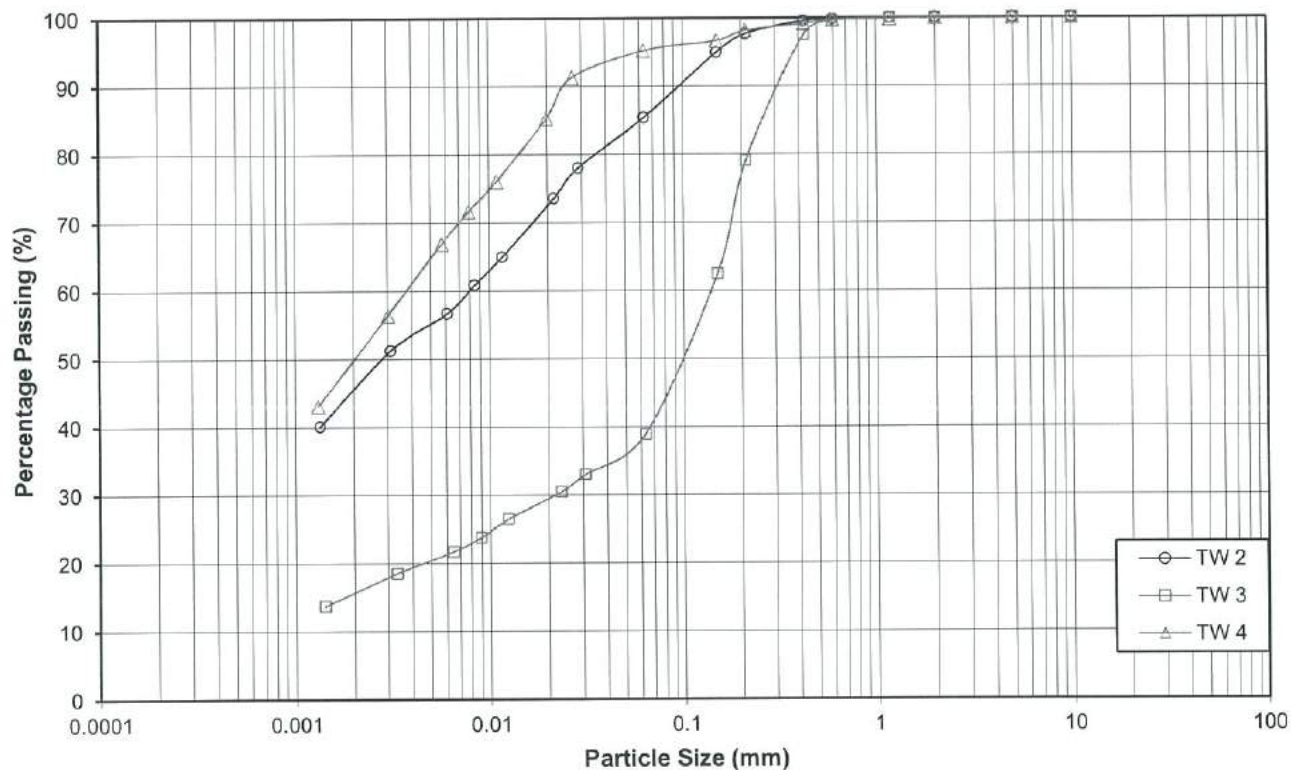
Borehole : BH37

Approved by:

[Signature] 21/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	15	39	46	Light grey, Slightly sandy CLAY with traces of peat
TW 3	6.00-6.90	0	61	23	16	Light grey, Sandy SILT
TW 4	9.00-9.90	0	5	56	39	Yellowish brown mottled reddish brown and light grey, Slightly sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD

Date of Test : 05/09/15

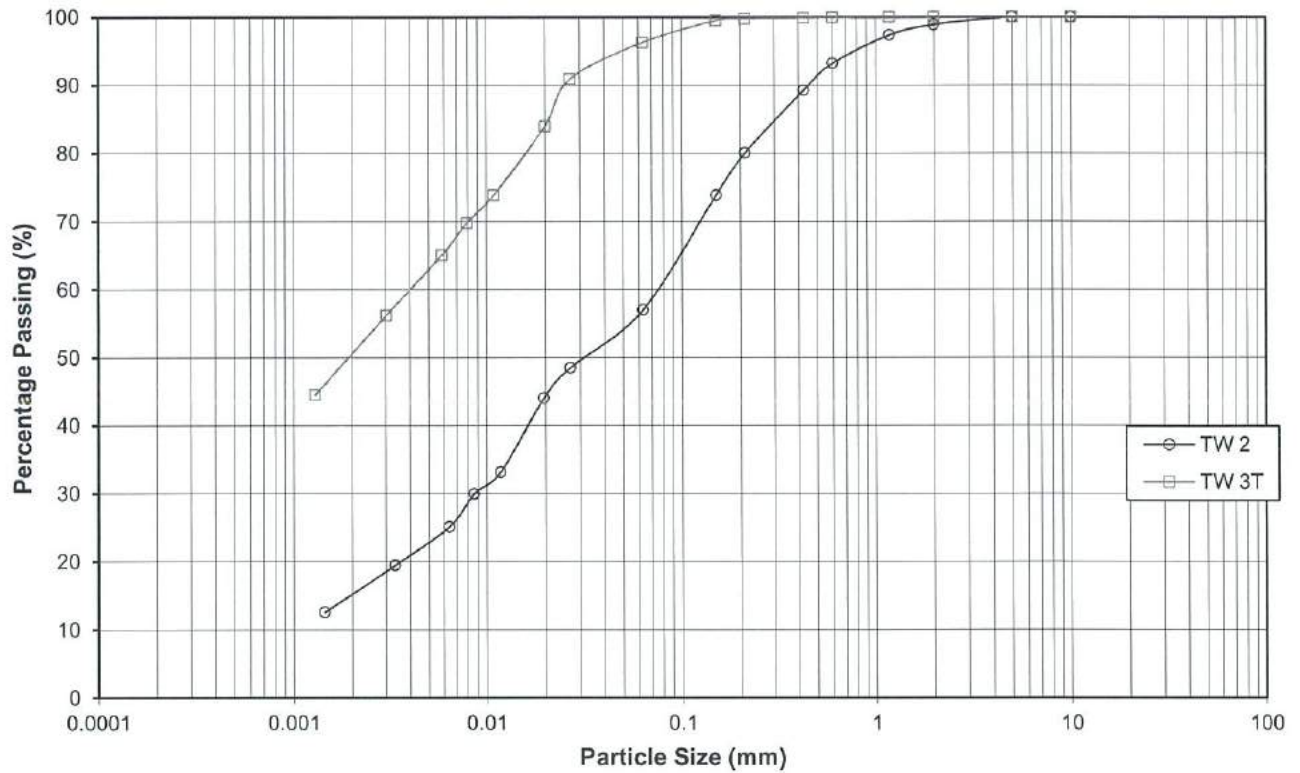
Borehole : BH38

Approved by:

[Signature]
5/16/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



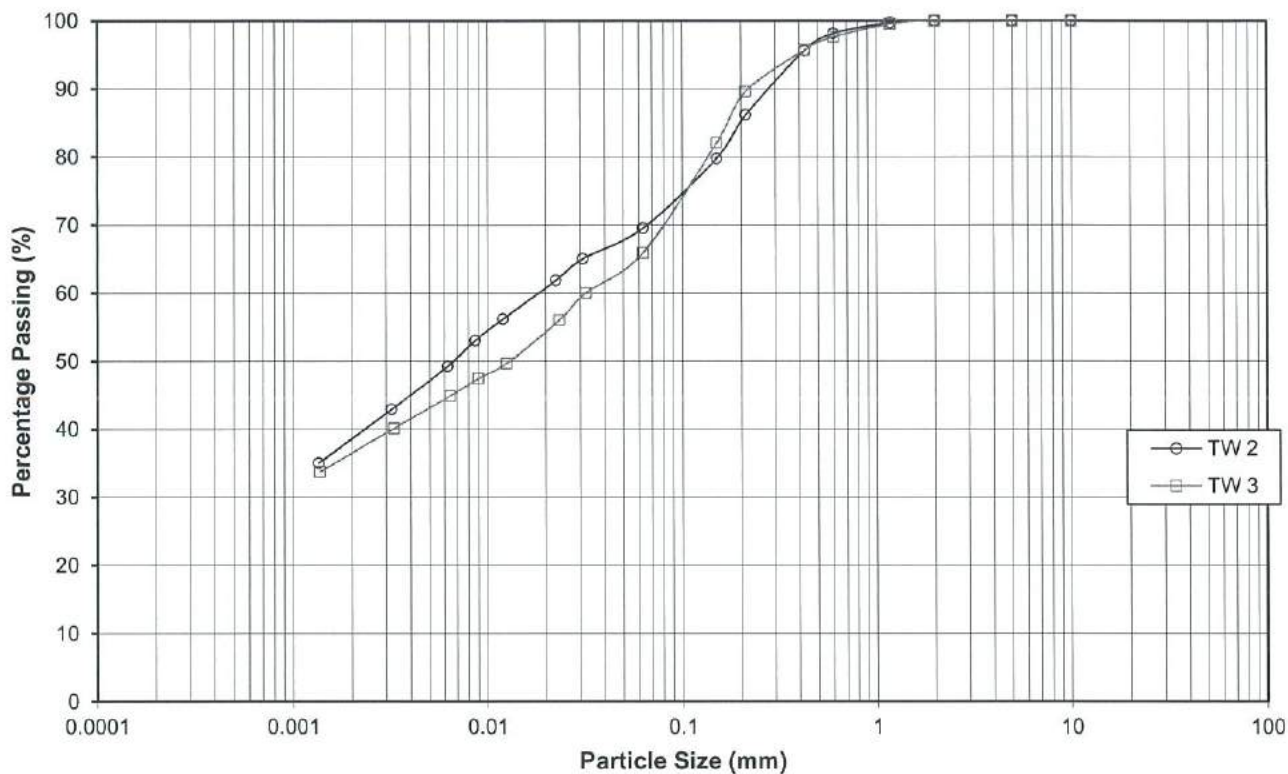
CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	5.00-5.90	1	42	42	15	Brownish grey, Slightly gravelly sandy SILT with traces of peat and decayed wood
TW 3T	8.00-8.40	0	4	45	51	Light grey, Slightly sandy CLAY with traces of peat

	Test Method : BS1377 : Part 2 :1990 (Clause 9.2 & 9.5)		Test Name : PS & HYD	
	Site Reference : Lim Chu Kang		Date of Test : 03/09/15	
	Jobfile : SIL/S7518/15/SI		Borehole : BH39	
	Tested by: 	Checked by: 	Approved by: 	

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	5.00-5.90	0	30	31	39	Light grey mottled reddish brown, Slightly sandy CLAY
TW 3	8.00-8.50	0	34	29	37	Reddish brown mottled brownish grey, Slightly sandy CLAY



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PS & HYD

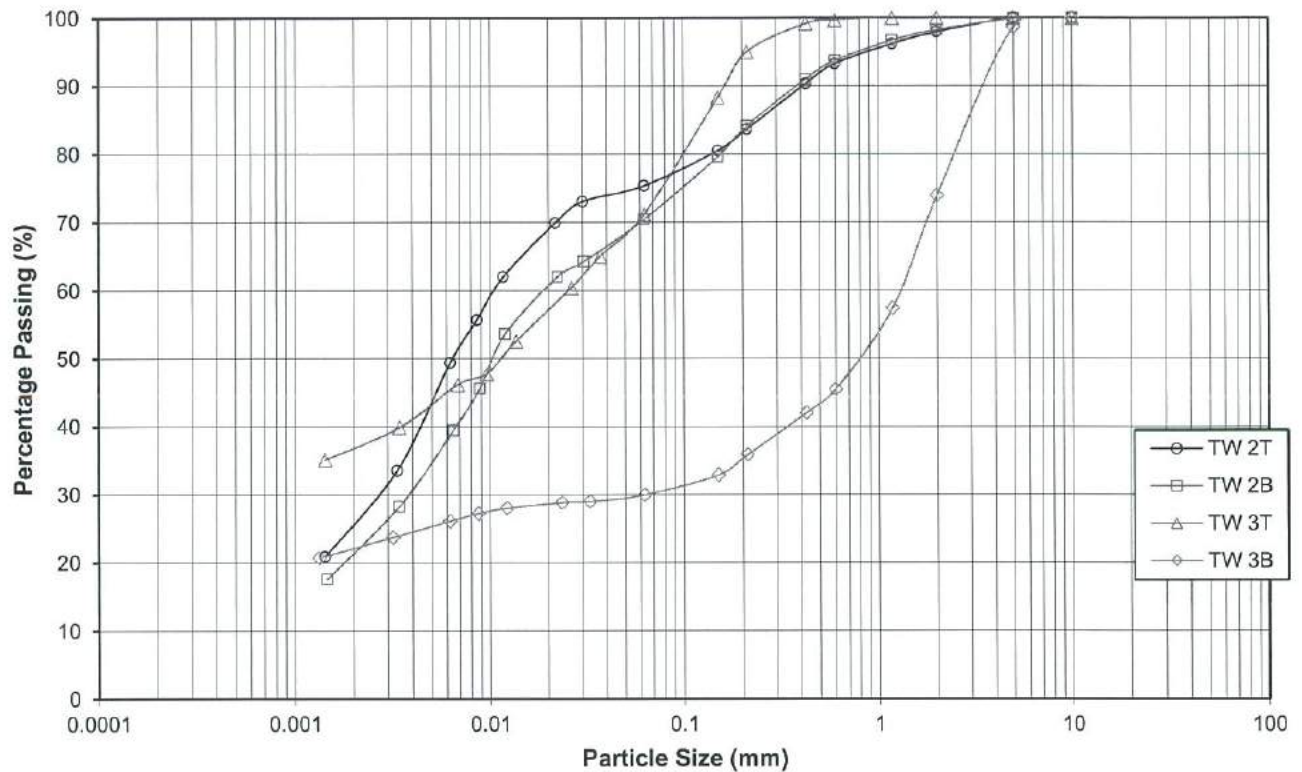
Date of Test : 04/09/15

Borehole : BH40

Approved by:

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2T	5.35-5.70	2	23	49	26	Yellowish brown mottled dark grey, Slightly gravelly slightly sandy SILT (MADE GROUND)
TW 2B	5.70-5.90	2	28	49	21	Dark brown, Peaty SILT
TW 3T	9.00-9.50	0	29	34	37	Light grey mottled reddish brown, Slightly sandy CLAY
TW 3B	9.50-9.90	26	44	8	22	Light grey, Very gravelly very clayey SAND



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PS & HYD

Date of Test : 09/09/15

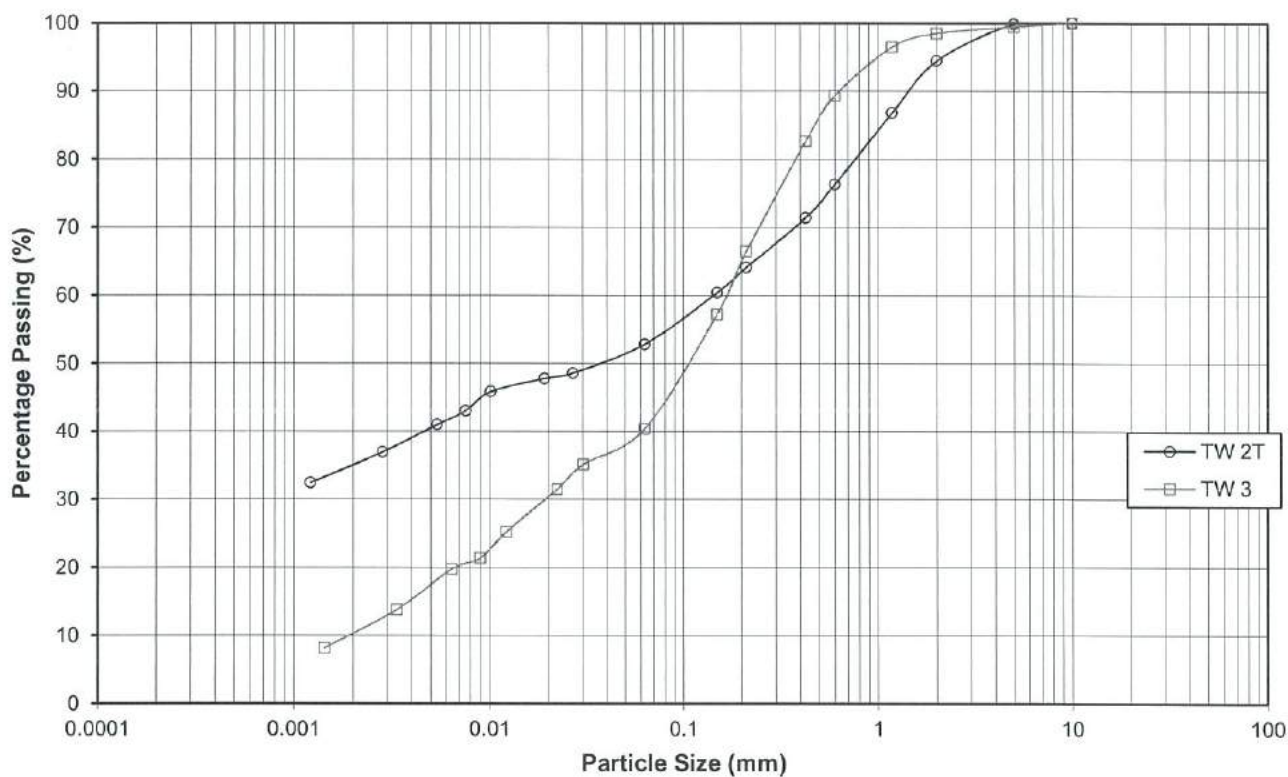
Borehole : BH41

Approved by:

Signature
27/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2T	4.00-4.80	6	42	17	35	Yellowish brown, Slightly gravelly sandy CLAY (MADE GROUND)
TW 3	10.00-10.90	1	58	31	10	Light grey mottled reddish brown, Slightly gravelly sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Checked by:

Test Name : PS & HYD

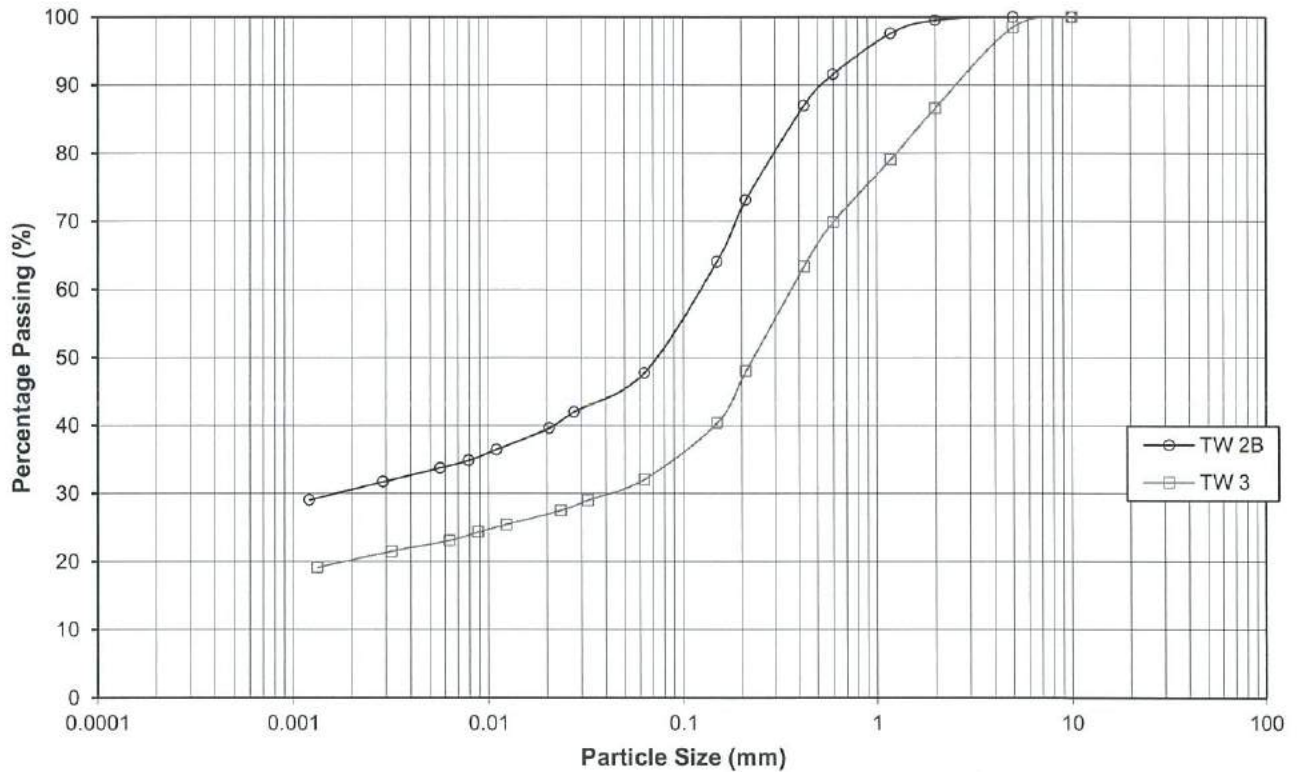
Date of Test : 04/09/15

Borehole : BH42

Approved by:

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2B	4.50-4.90	0	52	17	31	Light grey mottled yellowish brown, Sandy CLAY
TW 3	6.00-6.90	13	55	12	20	Yellowish brown mottled reddish brown, Gravelly very clayey SAND



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Handwritten signature

Checked by:

Test Name : PS & HYD

Date of Test : 17/09/15

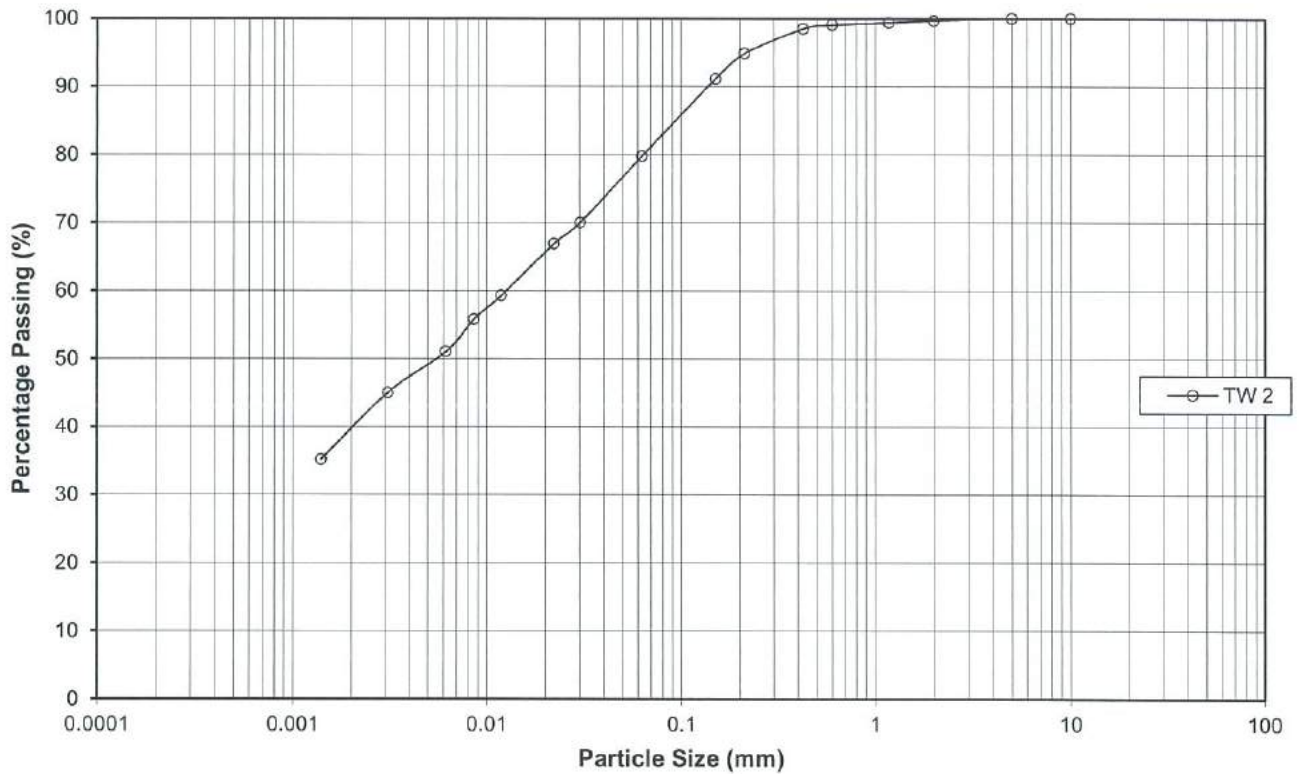
Borehole : BH43

Approved by:

Handwritten signature and date 22/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	20	41	39	Grey mottled reddish brown, Slightly sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD
Date of Test : 17/09/15
Borehole : BH44

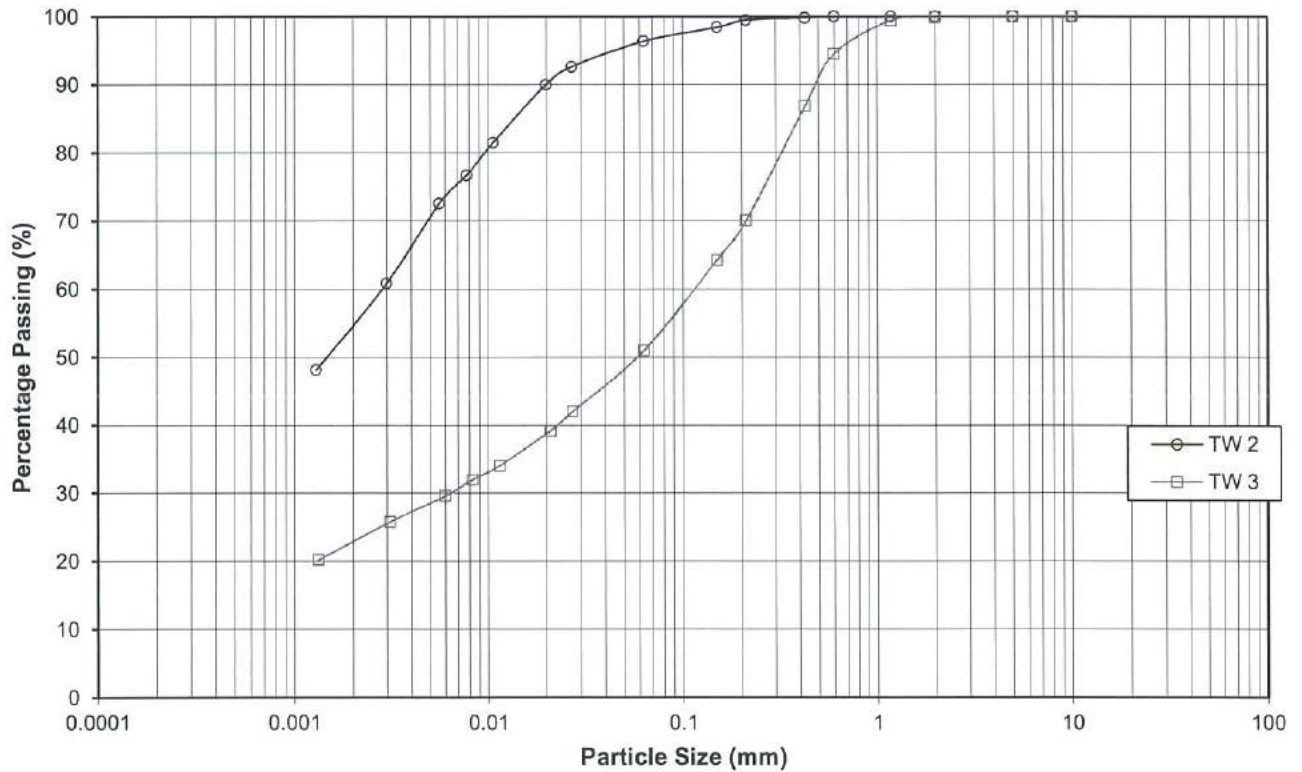
[Signature]
17/09/15

Approved by:

[Signature]
17/09/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	4	42	54	Grey mottled reddish brown and yellowish brown, Slightly sandy CLAY
TW 3	6.00-6.90	0	49	28	23	Grey mottled reddish brown, Sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

Handwritten signature

Checked by:

Test Name : PS & HYD
Date of Test : 17/09/15
Borehole : BH45

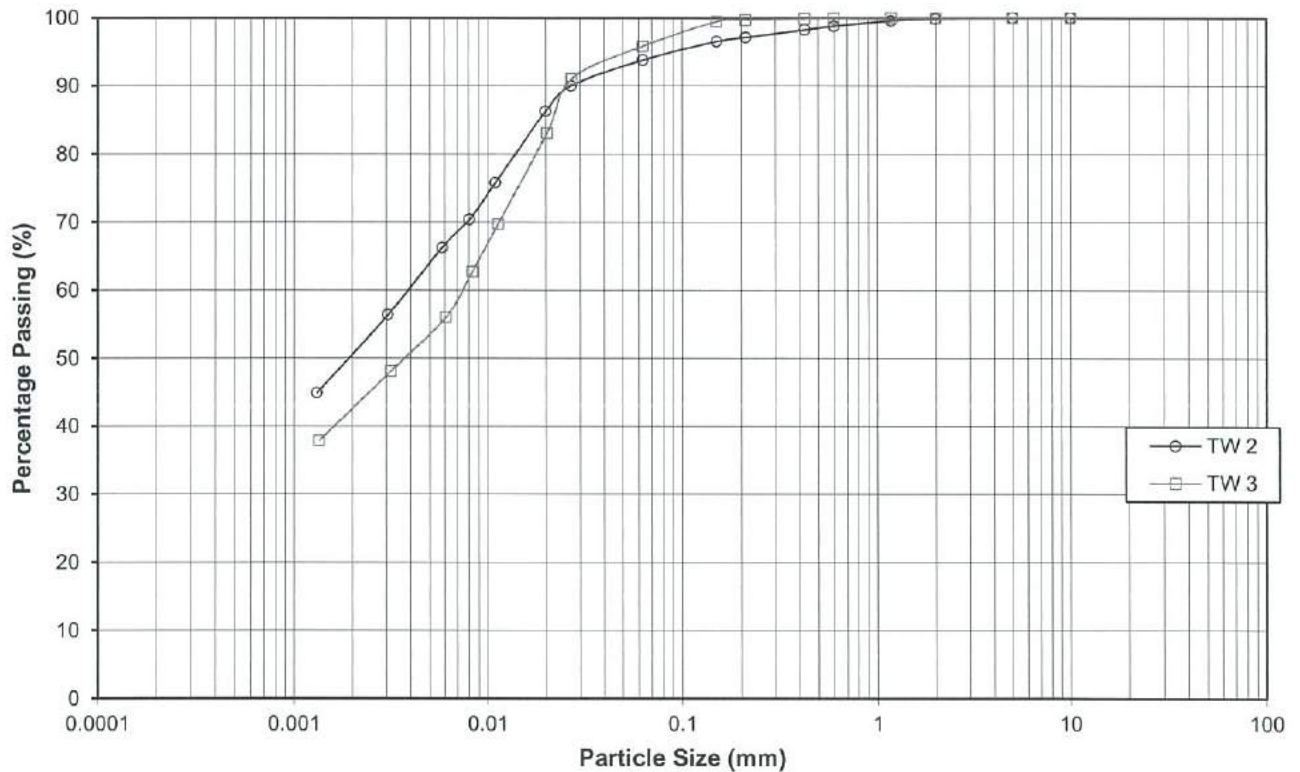
Handwritten signature and date 17/09/15

Approved by:

Handwritten signature and date 17/09/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	6	43	51	Grey spotted dark grey, Slightly sandy CLAY with traces of peat
TW 3	6.00-6.90	0	4	54	42	Grey spotted dark grey, Slightly sandy SILT with traces of peat



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD

Date of Test : 17/09/15

Borehole : BH46

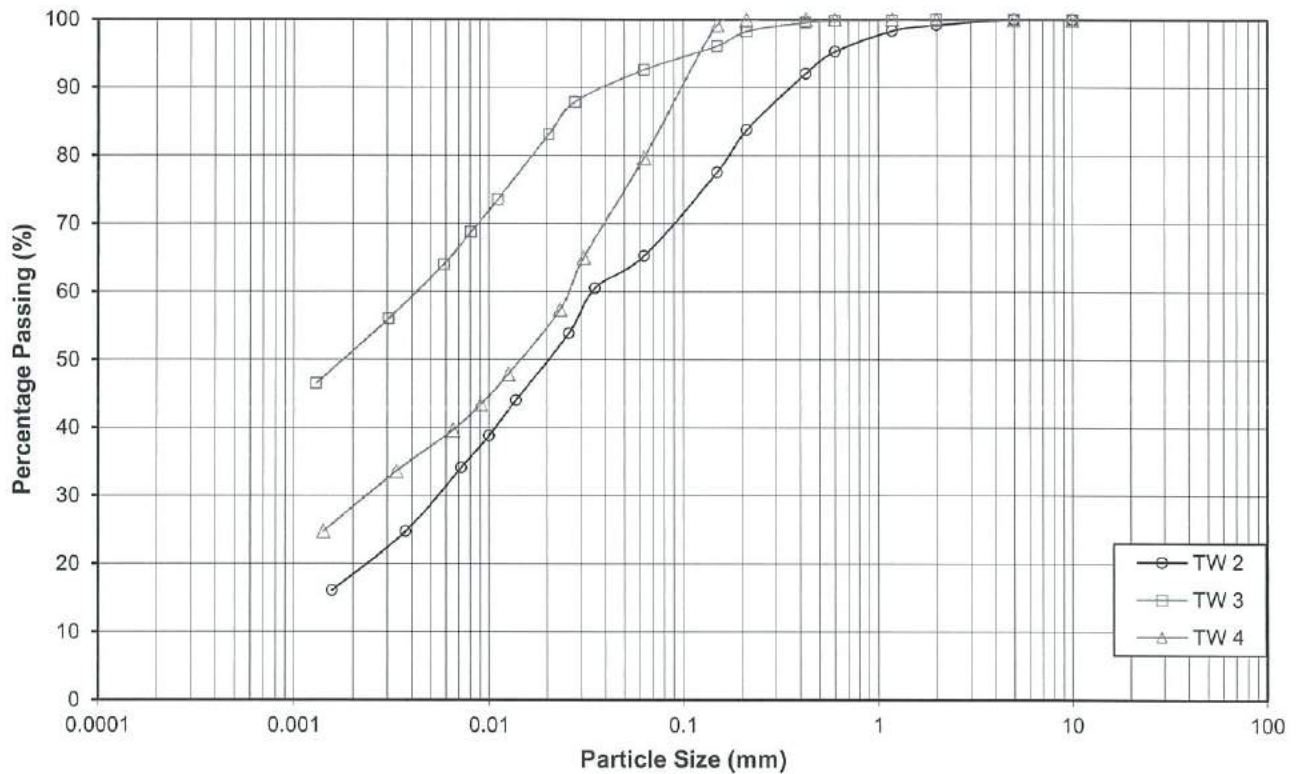
Approved by:

[Signature] 22/9/15

[Signature] 22/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	1	34	47	18	Dark grey, Peaty SILT
TW 3	6.00-6.90	0	7	42	51	Light grey mottled yellowish brown, Slightly sandy CLAY
TW 4	9.00-9.90	0	20	52	28	Light grey mottled yellowish brown, Slightly sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD
Date of Test : 17/09/15
Borehole : BH47

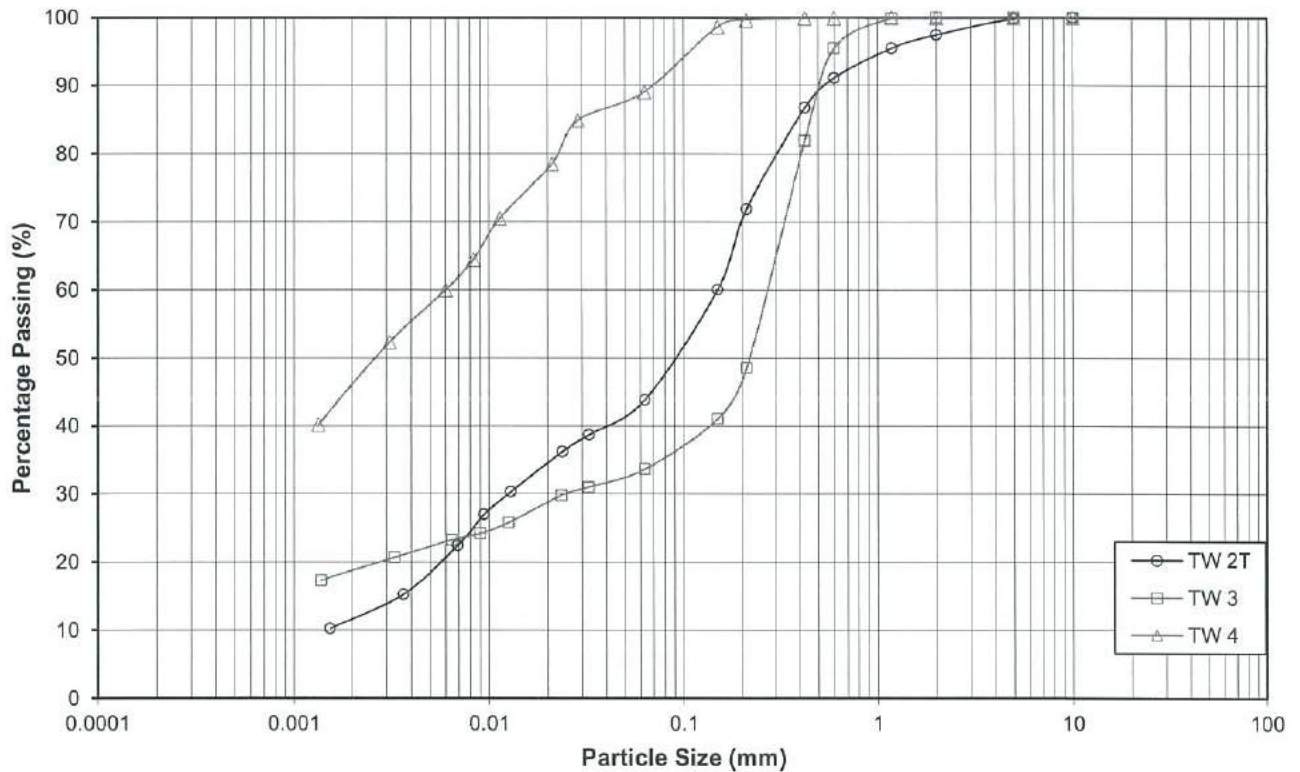
[Signature] 22/9/15

Approved by:

[Signature] 22/9/15

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2T	4.00-4.50	3	54	31	12	Dark grey, Peaty SILT with traces of sand
TW 3	6.00-6.90	0	66	15	19	Light grey spotted black, Very clayey SAND with traces of peat
TW 4	9.00-9.70	0	11	43	46	Light grey spotted black, Slightly sandy CLAY with traces of peat



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

AT

Checked by:

Test Name : PS & HYD

Date of Test : 10/09/15

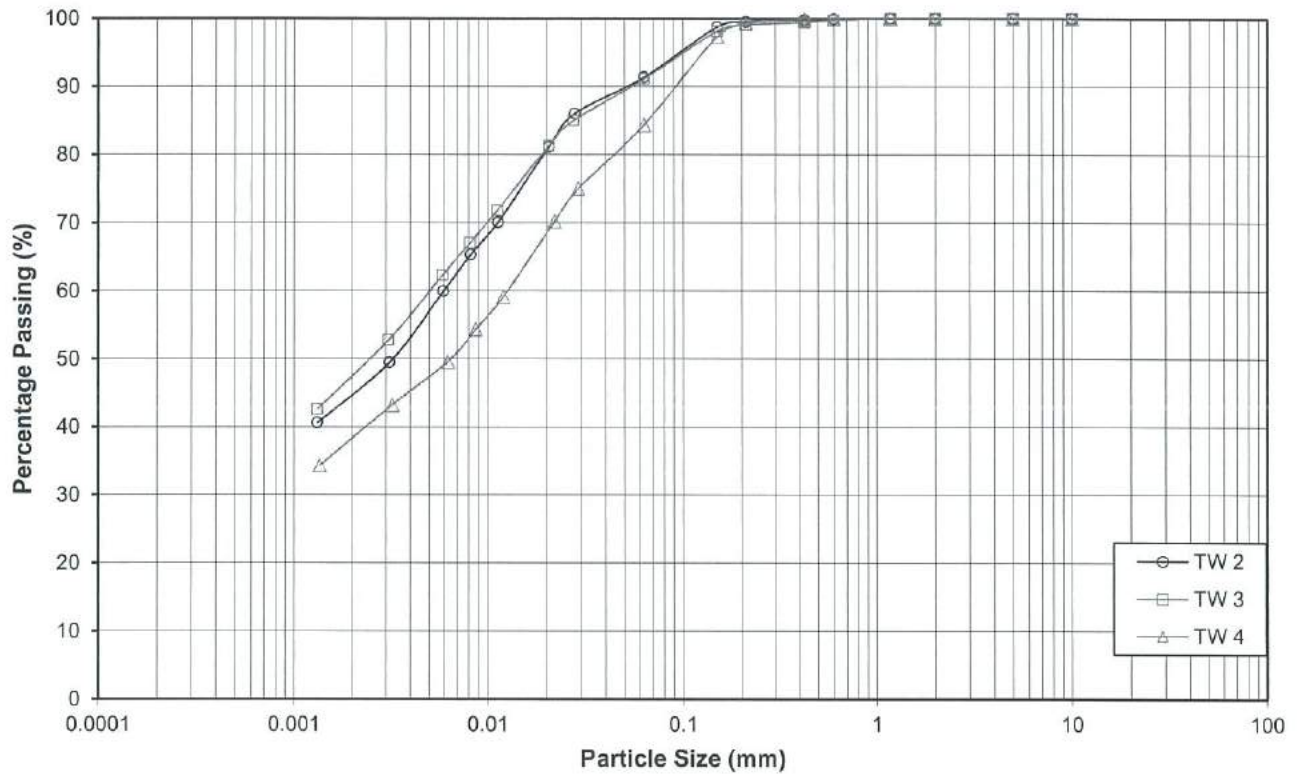
Borehole : BH48

Approved by:

Lim Guan Chuan
Chong

Particle Size Distribution

Wet Sieving & Hydrometer Method



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLE
	SILT			SAND			GRAVEL			

Sample No.	Depth (m)	Particle Size Analysis				Soil Description
		GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
TW 2	4.00-4.90	0	9	46	45	Light grey spotted dark grey, Slightly sandy SILT with traces of peat
TW 3	6.00-6.90	0	9	44	47	Light grey spotted dark grey, Slightly sandy CLAY with traces of peat
TW 4	9.00-9.90	0	16	46	38	Yellowish brown mottled reddish brown, Slightly sandy SILT



Test Method : BS1377 : Part 2 :1990
(Clause 9.2 & 9.5)

Site Reference : Lim Chu Kang
Jobfile : SIL/S7518/15/SI

Tested by:

[Signature]

Checked by:

Test Name : PS & HYD

Date of Test : 10/09/15

Borehole : BH49

Approved by:

[Signature]
22/9/15