
**SOIL INVESTIGATION WORKS FOR 114A &
LCK 114B NEAR NEO TIEW CRESCENT
(VOL. 2 : BH3–BH7)**

**TERM CONTRACT ON SOIL INVESTIGATION
WORKS FOR AVA PROJECTS FOR A PERIOD
OF 36 MONTHS**



RYOBI GEOTECHNIQUE INTERNATIONAL PTE LTD



Project No. : K5728

DATE: 16th June 2018

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Certification by Professional Engineer for Site Investigation Report

1. I, Dong Weibin the Professional Engineer, PE Registration No. 3885 certify that the Soil Investigation Report.

SOIL INVESTIGATION WORKS FOR 114A & LCK 114B NEAR NEO TIEW CRESCENT (VOL. 2 : BH3-BH7)

comprising all field and laboratory data, tests and results there 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: RG/K5728/Vol.2-FINAL REPORT
3. Total number of pages in the Site Investigation Report is 208.



Professional Engineer for Site Investigation Signature and Stamp

16 -June- 2018

Date

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1. INTRODUCTION

1.1 General

This report (Vol. 2) presents the results of soil investigation works consisting of five (5) land boreholes carried out for Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent. (See *Figure 1.1*).

1.2 Project Description

(a) Title of Project

Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent
(Vol. 2 : BH3 – BH7)

(b) Client

Agri-Food & Veterinary Authority of Singapore (AVA)

(c) Soil Investigation Contractor

Ryobi Geotechnique International Pte Ltd

1.3 Scope of Work

The scope of work covering the soil investigation services of this project are summarised as follows:

- Soil drilling and diamond coring (if any) at designated borehole locations
- Obtaining undisturbed samples and SPT split spoon samples and delivery of soil samples to laboratory for testing
- Performing Standard Penetration Tests (SPT) including collection of split spoon samples and Pressuremeter Tests
- Conducting laboratory tests for selected soil samples obtained from field sampling



Source: OneMap (NTS)

Figure 1.1 Site Location Plan

2. SITE INVESTIGATION WORKS

2.1 Field Exploration

The field exploration works consisting of five (5) boreholes (i.e. BH3 to BH7) were carried out using rotary wash boring method for obtaining representative field data and good quality samples. The field works consisting of boreholes and relevant field tests as summarized in Table 2.1 were carried out under the supervision of a Geologist from M/s Ryobi Geotechnique International Pte Ltd.

The field exploration program was started on 19 May 2018 and completed on 26 May 2018. A total number of five (5) boreholes were drilled to depths ranging from 30.430m to 30.950m below the existing ground level.

2.2 Groundwater Observation

For the monitoring of groundwater level at the project site, two (2) Water Standpipes (WSP) were installed in the completed borehole, i.e. Borehole Nos. BH3 & BH5 selected by Client during the course of field investigation.

TERM CONTRACT ON SOIL INVESTIGATION WORKS FOR AVA PROJECTS FOR A PERIOD OF 36 MONTHS**PROJECT :** Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)**CLIENT :** Agri-Food & Veterinary Authority of Singapore (AVA)**Table 2.1 Types and Quantities of Field Works**

Borehole No.	Coordinates		Reduced Level (m)	Borehole Exploration (m)			Soil Samples, Field Tests & Instruments (Nos)								
	Northing (m)	Easting (m)		Termination Depth	Soil Drilling	Rock Coring	Standard Penetration Test	Disturbed Sample (from Trial Pit)	Thin-walled Tube Sample	Mazier Sample	Piston Sample	Plate Load Test	Pressuremeter Test	Water Standpipe	Downhole Seismic Tests
BH3	47245.815	16466.040	107.101	30.430	30.430	-	11	1	3	-	-	-	1	1	-
BH4	47167.598	16486.240	106.747	30.450	30.450	-	12	1	3	-	-	-	-	-	-
BH5	47271.586	16576.971	106.064	30.950	30.950	-	12	1	3	-	-	-	1	1	-
BH6	47199.933	16595.205	106.890	30.450	30.450	-	12	1	3	-	-	-	-	-	-
BH7	47397.750	16476.472	105.275	30.450	30.450	-	11	1	3	-	-	-	1	-	-
Total				152.730	152.730	-	58	5	15	-	-	-	3	2	-

3. METHOD OF SITE INVESTIGATION WORKS

The site investigation works consisting of borehole exploration and field tests were carried out in accordance with BS5930:2015, Site Investigation and relevant Eurocodes and also the requirements specified by Client as described in following sections.

3.1 Borehole Exploration Works

The borehole exploration works consisting of borehole drilling, soil sampling and common field tests (e.g. SPT) conform to British Code of Practice (BS5930:2015, Site Investigation), BS EN ISO 22475-1:2006 (Geotechnical Investigation and Testing-Part 1), BS EN ISO 22476-3:2005 (Geotechnical Investigation and Testing-Part 3), local standards (e.g. SAC Inspection Body) and the requirements specified by Client.

3.1.1 Rotary Wash Boring

Prior to drilling, cable detection works were carried out at all designated borehole locations. Trial pits up to at least 1.5m followed by auger hole down to 2.0m depth were done at each borehole location to ascertain the absence of buried cables and services or any other man-made obstruction that could hinder drilling works. The technique employed was by rotary wash boring whereby boring was advanced by rotating drilling bit with cuttings removed by circulating water as the drilling fluid. Casings were used to support unstable grounds when soft cohesive soil or loose non-cohesive soil is encountered in the drilling process. The diameter of the drilled borehole is 100 mm. The borehole was terminated based on the termination criteria specified in the contract. Figure 3.1 shows the schematic diagram of Rotary Wash Boring.

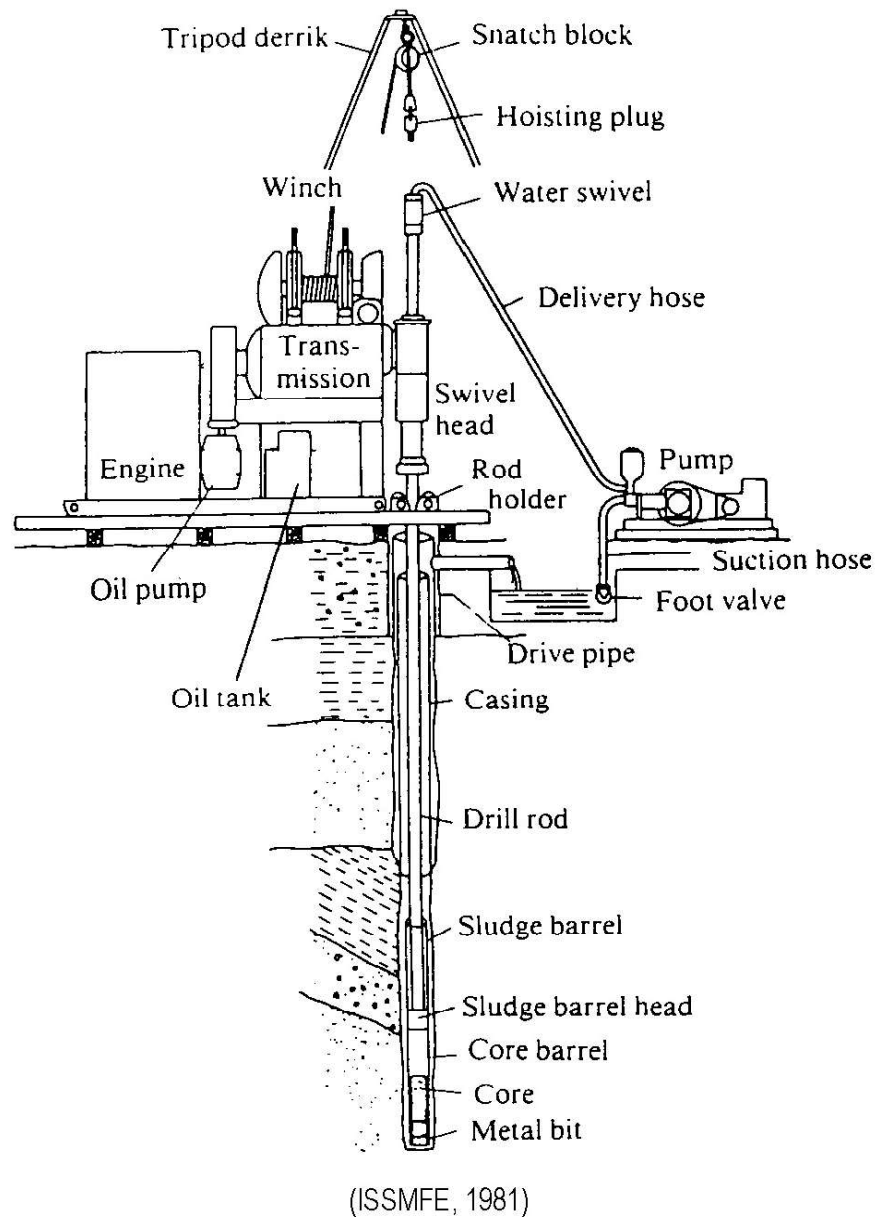


Figure 3.1 Schematic Diagram of Rotary Wash Boring

3.1.2 Soil Sampling

3.1.2.1 Disturbed Sample

Disturbed samples were taken from split spoon sampler for identification purpose. All the collected samples were stored in sealed plastic containers and properly labelled for delivery to office.

3.1.2.2 Undisturbed Sample

3.1.2.2.1 Thin-walled Tube Sample (TW)

Undisturbed samples were taken from various soil layers by using 75mm x 1000mm length thin-walled tube sampler which was advanced by hydraulic jacking force for achieving the penetration into the original soil below the base of borehole at levels before carrying out Standard Penetration Test (SPT). The sampler possesses with a sharp cutting edge at its lower end is capable for recovering samples from soil layers with SPT-N values not exceeding 30 blows per 30cm penetration using hydraulic means for minimizing soil disturbance.

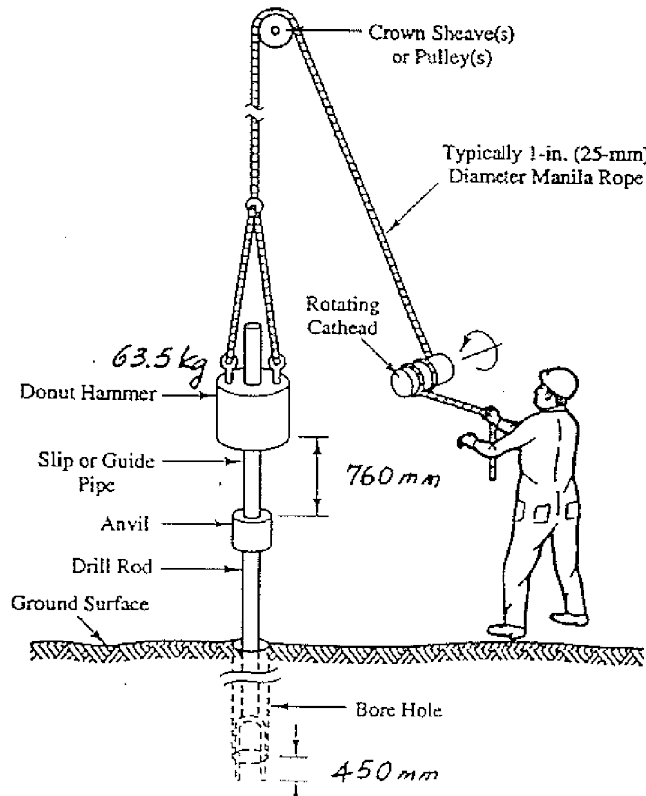
Undisturbed samples were taken at intervals specified, stored vertically in suitable racks, waxed at both ends, and labelled properly before transporting to the laboratory for testing. Samples were properly stored in sample delivery box with sufficient protection for minimizing sample disturbance during transport to the laboratory.

3.2 In-Situ Tests

3.2.1 Standard Penetration Test

Standard Penetration Test (SPT) was conducted in accordance with British Code of Practice (BS5930:2015, Site Investigation) and Eurocode of Practice (BS EN ISO 22476, 3:2005+A1:2011, Standard Penetration Test) and the requirements specified by Client. The purpose of this empirical dynamic penetration test is to determine the resistance of soils to the penetration (i.e. 450mm or lesser) of a split barrel sampler of 50 mm external diameter which was driven by a 63.5 kg automatic drop hammer with a free fall of 760 mm. (Figure 3.2). The value of penetration resistance, N is the number of blows required to achieve a 300 mm penetration of the barrel after an initial penetration of 150mm was achieved or an initial blow count number of 25 was recorded. This was achieved by recording the blows for every 75mm penetration. Standard Penetration Tests were conducted at specified depth according to Client's requirements. The

values of N obtained in this investigation were recorded in the borehole logs presented in *Appendix B: Soil Boring Log*.



Test Procedure:

1. Lower sampler to bottom.
2. Drive sampler through 0.45 m.
3. Record number of blows required to advance every 75 mm.
4. $N = \text{Sum of last four readings.}$

Figure 3.2 General Setup and Procedure of SPT

(Note: Manual hammer instead of automatic hammer was shown)

3.2.2 Pressuremeter Test

Pressuremeter Test (PMT) was performed to determine the deformability and strength properties of soil at depth specified by the Client using OYO Pressuremeter in the present study. The method of test conforms to BS 5930 : 2015, Section 25.7 and EURO Code of Practice BS EN ISO 22476-4: 2012, manufacturer's recommendations and the requirements specified by Client.

The OYO Pressuremeter used in present study consists Elastmeter 2 & Elast Logger 2 (Figure 3.4). The "OYO Elastmeter-2" is a horizontal loading tester with a maximum capacity of 20MPa for the testing of soil and rock in borehole. The device can perform a series of operation from pressure and displacement data collection to plotting of the results. Moreover, with the Elast Elastmeter-2,

mechanical information such as the Young's modulus (i.e. Pressuremeter Modulus) can be obtained.

The equipment comprises four (4) major components, namely i) Elast Logger-2, ii) Elastometer HQ Sonde, iii) tubing/cable and iv) high pressure hand pump. Two (2) types of rubber tubes (i.e. soft and hard) are available for test according to the stiffness of soil.

The probe was calibrated against pressure at ground surface before its first use and was then inserted into the borehole and lowered down to the predetermined test depth for testing. The test was conducted by inflating the probe with water via pressure generated by the hand pump at suitable pumping rate, e.g. not exceeding 1.0MPa/min recommended by manufacturer. The pressure and radius of probe can be automatically captured by the logger at specified intervals (e.g. 0.5, 1, 2, 5, 10, 20 & 30 seconds and 1, 2 5 & 10 mins) according to soil type which can be stored in internal memory or on an external USB palm drive (excluding 0.5 & 1 sec for USB drive). When a constant creep was noted, the pressure was unloaded and again reloaded to failure or until the maximum capacity of the pressuremeter (i.e. 20MPa) or the maximum radius of the inflated rubber tube (i.e. 90mm) has reached. The test was terminated by releasing the pressure at minimum 6 pressure decrements to zero pressure.

The co-relationship between pressure and deformation captured by the logger will allow the determination soil parameters, e.g. At-Rest Earth Pressure, Yield Pressure and Pressuremeter Modulus (E_m) and also the Pressuremeter Cyclic Modulus (E_r).

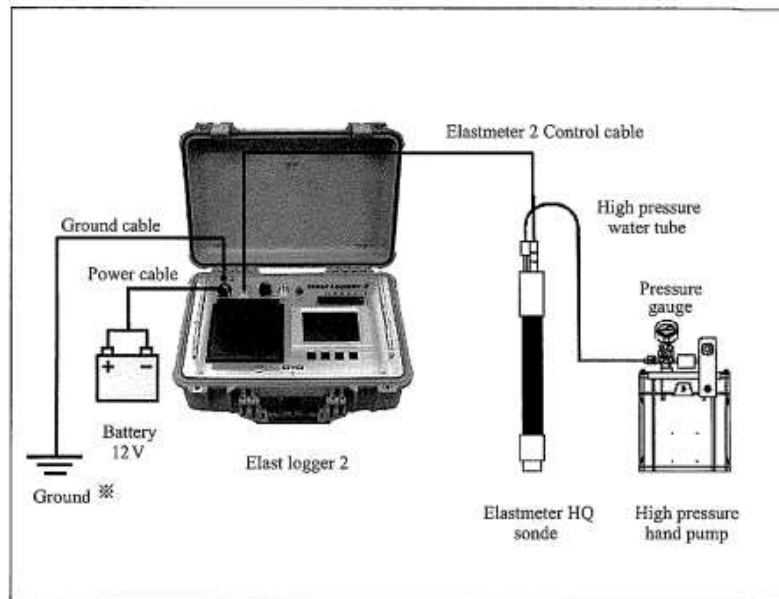


Figure 3.3 OYO Elastmeter 2 & Elast Logger 2

3.3 Water Standpipe Installation

Water standpipes (WSP) were installed in selected, completed boreholes at depth (i.e. 12m) specified by Client for the monitoring of groundwater level in the project site area. The water standpipe consisting of a 50mm dia. PVC pipe with lower 2/3 length of pipe in perforated section formed by 2mm hacksaw cuts on two sides of pipe were wrapped with nylon nets with end cap to prevent intrusion of sediment. After the termination of borehole, the hole was sealed with cement / bentonite grout up to ~0.5m below the specified installation depth. The hole section prepared for standpipe installation was flashing with clean water before the PVC pipe was inserted into borehole and lowered down to the installation depth. The gap between the PVC pipe and drilled hole was then backfilled with clean sand up to the top of the perforated section and followed by the sealing of upper section of hole with bentonite / cement grout up to 0.3m depth below existing grade. The protruded top of PVC pipe was protected with top cap and metal protective box for preventing obstruction from foreign material and damage caused by vehicle movements.

4. LABORATORY TESTING

4.1 General

The laboratory test program scheduled by Client was executed to evaluate the soil properties in the present investigation. All the tests were carried out by Ryobi Geotechnique International Pte Ltd, accredited laboratory of SAC-SINGLAS except for the chemical contents tests which were conducted by ALS Technichem (S) Pte Ltd. Table 4.1 summarizes the types and quantities of laboratory tests performed according to Client's instruction in this investigation.

4.2 Physical Properties

4.2.1 Determination of Moisture Content

At least 50 gm of representative sample is weighed and placed in the oven to dry at 105°C to 110°C for over 16 hrs. The weight of the oven, dried sample is measured after it is cool in the desiccators. The determination of moisture content of the soils is conducted in accordance with BS 1377 PART 2:1990 Method 3.

4.2.2 Determination of Bulk Density

The dimensions (circumference and height) and the weight of the soil sample are measured in accordance with BS 1377 PART 2:1990 Method 7 for the determination of bulk density.

4.2.3 Determination of Particle Density

The particle density (i.e. specific gravity) of the soil grains is determined by comparing the bulk density of the soil grains with the density of the distilled and de-aired water. The particle density test is conducted in accordance with BS1377 PART 2:1990 Method 8.

4.2.4 Determination of Atterberg Limits

Atterberg Limits, i.e. Plastic Limit (PL) and Liquid Limit (LL) are water content where the behaviour of a soil sample changes and is very important in soil classification. At the water content below the Plastic Limit, the soil behaves like

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CLIENT :	Agri-Food & Veterinary Authority of Singapore (AVA)

Table 4.1 Types and Quantities of Laboratory Test

Borehole No.	Index Tests						Strength Tests					Permeability Test by Falling Head Method	One-dimensional Consolidation Test	Chemical Tests															
	Moisture Content	Bulk Density	Particle Density	Liquid and Plastic Limits	Grading by Hydrometer Method	Grading by Mechanical Analysis	Unconsolidated-undrained Triaxial Compression (UU) Test	Consolidated-undrained Triaxial Compression (CU) Test	Consolidated -drained Triaxial Compression (CD) Test	Unconfined Compression (UC) Test	Point Load Test on Rock Sample			pH value for soil sample or water sample		Organic Content in soil sample or water sample		Total Sulphate content of soil sample or water sample		Chloride content in soil sample or water sample		Chemical Test for Metal (Arsenic, Copper, Cadmium, Chromium, Lead, Mercury, Nickel, Zinc)							
														Soil	Water	Soil	Water	Soil	Water	Soil	Water	As	Cu	Cd	Cr	Pb	Hg	Ni	Zn
BH3	6	5	6	5	6	6	3	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH4	6	6	6	6	6	6	2	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH5	6	6	6	4	6	6	2	1	-	-	-	-	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH6	6	6	6	4	6	6	2	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH7	6	6	6	6	6	6	2	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
Total	30	29	30	25	30	30	11	4	-	-	-	-	1	5	5	5	5	5	5	5	5	-	-	-	-	-	-	-	-

in a “solid” state. At the water content beyond the Liquid Limit, the soil behaves as if in the “liquid” state. The difference of water content between the Plastic Limit and the Liquid Limit is termed as Plasticity Index (PI). The determination of the Atterberg Limits is conducted in accordance with BS 1377: PART 2:1990 Methods 4 and 5.

4.2.5 Particle Size Distribution Analysis (Sieve & Hydrometer Methods)

For coarse-grained soils, the grain size distribution of the soil is determined from mechanical sieving of the dry soil grains through various aperture sizes (0.063mm to 50mm) sieve pans. If substantial amount of soil grains (mainly silt and clay-size particle) passes through the sieve pan with aperture of 0.063mm, hydrometer test is conducted to determine the percentage of silt and clay particles. The grain size analysis is conducted in accordance with BS 1377: PART 2:1990 Method 9.3.

4.3 Shear Strength Characteristics

4.3.1 Unconsolidated-undrained Triaxial Compression (UU) Test

Unconsolidated-undrained triaxial compression test was conducted to determine the undrained shear strength (c_u) of cohesive soil. The soil samples were sheared in undrained condition (i.e. no change in moisture content is allowed) under an applied confining pressure without allowing soil consolidation. The axial load is increased by applying a constant rate of strain until the specimen fails. The UU test is conducted in accordance with BS1377 Part 7:1990 Method 8.

4.3.2 Consolidated-undrained Triaxial Compression (CU) Test

For CU test, specimens were first isotropically consolidated after saturation and then sheared under undrained condition. The pore water pressures developed in the specimen during shearing were monitored by using a pressure transducer. Three stages of consolidation and shearing were carried out for each series of CU test, so that a failure envelope can be defined and effective shear strength parameters can be determined. The CU test is conducted in accordance with BS1377: PART 8:1990 Method 7.

4.4 Compressibility Characteristics

4.4.1 One-dimensional Consolidation Test

One-dimensional consolidation tests were conducted on samples of fine-grained soil to evaluate their compressibility characteristics, such as coefficient of consolidation (C_v), compression index (C_c) and preconsolidation pressure (p_c). Specimens for consolidation test were prepared from 30mm to 40mm thick slice of undisturbed sample. The outer edge of the slice was trimmed to a diameter slightly larger than the diameter of oedometer ring. The sharp end of the oedometer ring was then pressed into the trimmed sample carefully. The soil specimen was trimmed at the top and at the bottom of the oedometer ring by using a wire-saw. The test specimen placed in an oedometer cell was then set on a conventional loading frame equipped with strain gauge to measure soil compression. The soil specimens were subjected to 7 loading + 3 unloading steps in one cycle. Loading was achieved by calibrated dead weights placed on the loading pedestal of cantilevered loading frame. The consolidation test is conducted in accordance with BS1377 Part 5:1990 Method 3.

4.5 Chemical Contents

Selected soil and water samples collected from different boreholes were assigned for chemical contents tests which include pH Value, Organic Content, Total Sulphate Content and Chloride Content in the present investigation. The chemical content tests are conducted in accordance with BS1377 Part 3:1990.

4.5.1 pH Value

The pH value is measured electrometrically from a previously calibrated pH meter after sample preparation.

4.5.2 Organic Content

The organic matter was analysed by oxidation using dichromate technique.

4.5.3 Total Sulphate Content

Sulphate is precipitated in a hydrochloric acid solution as Barium sulphate by the addition of barium chloride. The precipitate is carried out near the boiling temperature and after a period of digestion, the precipitates is filtered, washed with water until free from chloride, ignited and weighed as Barium sulphate.

4.5.4 Chloride Content

Chloride are extracted with dilute nitric acid and then analyzed by titration using Volhard's method.

5. GROUND CONDITIONS

5.1 General Geology

The subsurface within the vicinity of the project site is classified as OLD ALLUVIUM FORMATION (Figure 5.1). The geological formation is described as follows:

OLD ALLUVIUM

The OLD ALLUVIUM was probably dominant by fluvial condition with subordinate marine sediments during Pliocene to Mid-Pleistocene. The deposits of the OLD ALLUVIUM mainly cover the eastern part of Singapore. The OLD ALLUVIUM was then deposited as a thick pile of alluvial to deltaic deposits of coarse sand with occasional incursions of marine sediments. 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. The thickness of OLD ALLUVIUM in Singapore varies from 10 meters to more than 100 meters.

5.2 Subsoil Condition

According to the results of present boreholes, the subsoils at the 5 completed boreholes locations can be classified into five (5) layers as follows. The soil/rock description was made based on BS5930 according to current local practice. Re-classification of soil and rock from BS to EC (if required) can be referred to Annex A of “*Guide on Ground Investigation and Geotechnical Characteristics Values to Eurocode 7*” (GeoSS 2015).

LAYER 1

FILL

Slightly Sandy SILT with hard cores, Slightly Silty SAND with hard cores (N=3)

This layer consisting of Slightly Sandy SILT with hard cores and Slightly Silty SAND with hard cores was found in all boreholes except Borehole No. BH6 with thickness ranging from 2.000m to 4.000m.

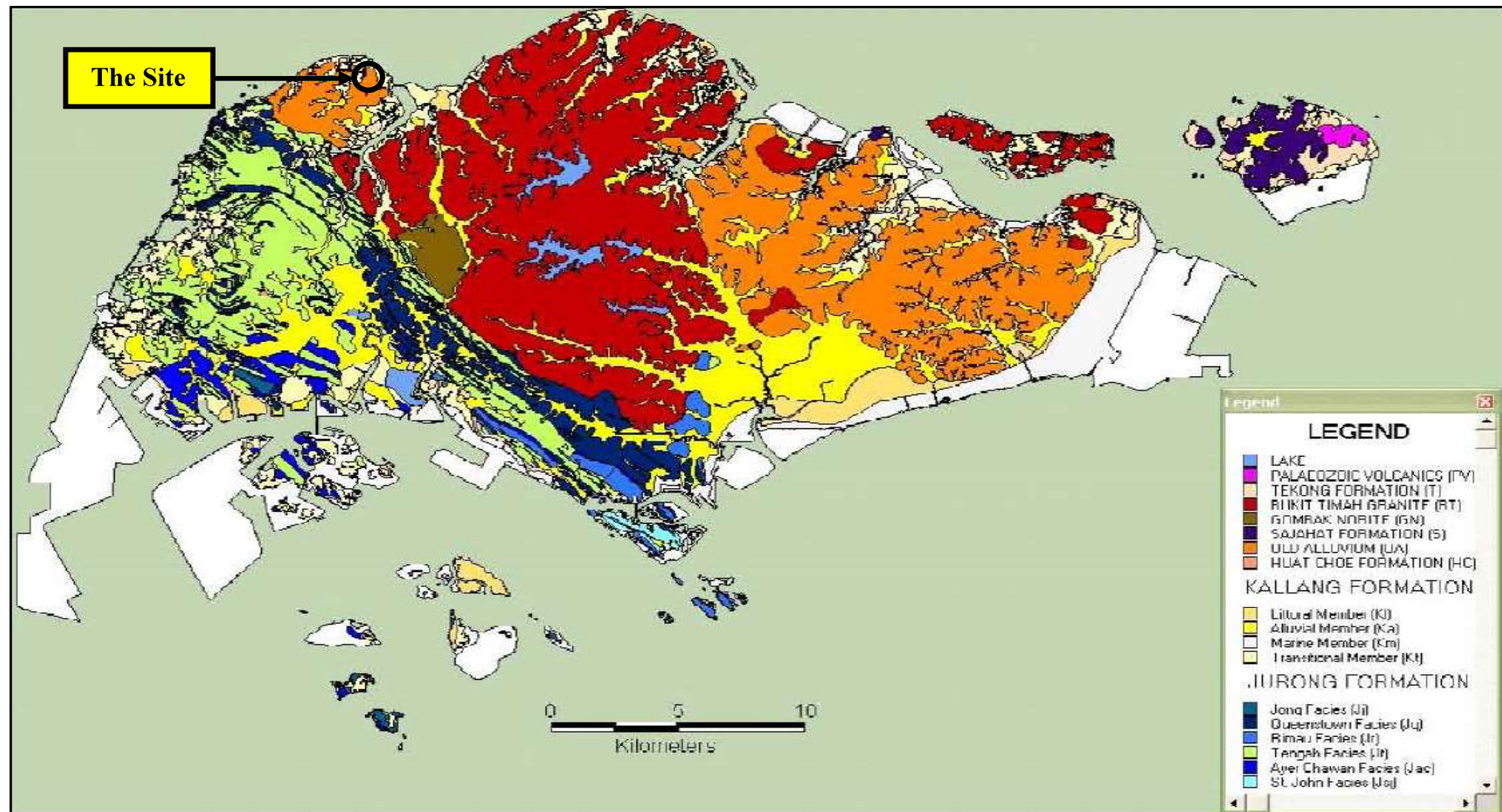


Figure 5.1 Geological Map

LAYER 2 {O(E)} Residual (OLD ALLUVIUM)

Slightly Gravelly Sandy CLAY, Very Gravelly very Clayey SAND, Gravelly Silty fine to coarse grained SAND, Slightly Sandy SILT with hard cores, Very fine grained Sandy SILT, Very Clayey very Gravelly SAND, SILT, Silty SAND with brick debris and hard cores, Very silty fine to coarse grained SAND with gravels, Very Clayey SAND with traces of gravels ($4 \leq N \leq 10$)

This layer consisting of Slightly Gravelly Sandy CLAY, Very Gravelly very Clayey SAND, Gravelly Silty fine to coarse grained SAND, Slightly Sandy SILT with hard cores, Very fine grained Sandy SILT, Very Clayey very Gravelly SAND, SILT, Silty SAND with brick debris and hard cores, Very silty fine to coarse grained SAND with gravels and Very Clayey SAND with traces of gravels was found in the present 5 boreholes with thickness ranging from 4.000m to 14.000m. One slightly high SPT-N value of 11 was recorded in Borehole No. BH6.

LAYER 3 {O(D)} Destructured (OLD ALLUVIUM)

Silty fine to coarse grained SAND with gravels, Slightly Sandy CLAY, Very Clayey SAND with traces of gravels, Slightly Gravelly very Clayey SAND, Slightly Sandy SILT, SILT ($11 \leq N \leq 28$)

This layer consisting of Silty fine to coarse grained SAND with gravels, Slightly Sandy CLAY, Very Clayey SAND with traces of gravels, Slightly Gravelly very Clayey SAND, Slightly Sandy SILT and SILT was found in the present 5 boreholes with thickness ranging from 4.000m to 16.500m. Two abnormally high SPT-N values of 47 and 44 were recorded in Borehole Nos. BH1 and BH7, respectively.

LAYER 4 {O(C)} Distinctly Weathered (OLD ALLUVIUM)

Slightly Sandy CLAY, Silty fine to coarse grained SAND with gravels, Gravelly very Clayey SAND ($32 \leq N \leq 43$)

This layer consisting of Slightly Sandy CLAY, Silty fine to coarse grained SAND with gravels, Gravelly very Clayey SAND was found in all boreholes except Borehole No. BH5. The thickness of this layer verified within the exploration depth of present boreholes ranges from 2.000m to 6.000m.

LAYER 5 {O(B)} Partially Weathered (OLD ALLUVIUM)

Slightly Gravelly very Clayey SAND, Silty fine to coarse grained SAND with gravels, Slightly Sandy CLAY ($54 \leq N \leq 91$)

This layer consisting of Slightly Gravelly very Clayey SAND, Silty fine to coarse grained SAND with gravels and Slightly Sandy CLAY was found in all boreholes except Borehole No. BH6. The thickness of this layer verified within the exploration depth of present boreholes ranges from 0.430m to 6.450m.

5.3 Groundwater Condition

Groundwater level was measured in the two (2) water standpipes (WSP) installed in Boreholes Nos. BH3 & BH5 selected by Client. During the present investigation period between 24 May 2018 and 13 June 2018, the water levels were found fluctuating between the levels as shown below:

- BH3 - between RL 104.90m and RL 105.60m
- BH5 - between RL 104.16m and RL 105.06m

6. CONCLUSIONS

On the basis of the results of field and laboratory tests conducted in the present study, the findings are summarized as follows for design reference:

1. The subsoils found in the present five (5) boreholes consist of the following 5 layers.

Layer No.	Geological Formation	Soil / Rock Description	SPT-N	Layer Thickness
1	FILL, BF (Not found in BH6)	Slightly Sandy SILT with hard cores, Slightly Silty SAND with hard cores	N=3	2.000m to 4.000m
2	Residual OLD ALLUVIUM, O(E)	Slightly Gravelly Sandy CLAY, Very Gravelly very Clayey SAND, Gravelly Silty fine to coarse grained SAND, Slightly Sandy SILT with hard cores, Very fine grained Sandy SILT, Very Clayey very Gravelly SAND, SILT, Silty SAND with brick debris and hard cores, Very silty fine to coarse grained SAND with gravels, Very Clayey SAND with traces of gravels	$4 \leq N \leq 10$ One slightly high SPT-N value of 11 was found in BH6	4.000m to 14.000m
3	Destructured OLD ALLUVIUM, O(D)	Silty fine to coarse grained SAND with gravels, Slightly Sandy CLAY, Very Clayey SAND with traces of gravels, Slightly Gravelly very Clayey SAND, Slightly Sandy SILT, SILT	$11 \leq N \leq 28$ Two abnormally high SPT-N values of 47 and 44 were found in BH3 & BH7, respectively	4.000m to 16.500m
4	Distinctly Weathered OLD ALLUVIUM, O(C) (Not found in BH5)	Slightly Sandy CLAY, Silty fine to coarse grained SAND with gravels, Gravelly very Clayey SAND	$32 \leq N \leq 43$	*2.000m to 6.000m
5	Partially Weathered OLD ALLUVIUM, O(B) (Not found in BH6)	Slightly Gravelly very Clayey SAND, Silty fine to coarse grained SAND with gravels, Slightly Sandy CLAY	$54 \leq N \leq 91$	*0.430m to 6.450m

*within the exploration depth of present boreholes

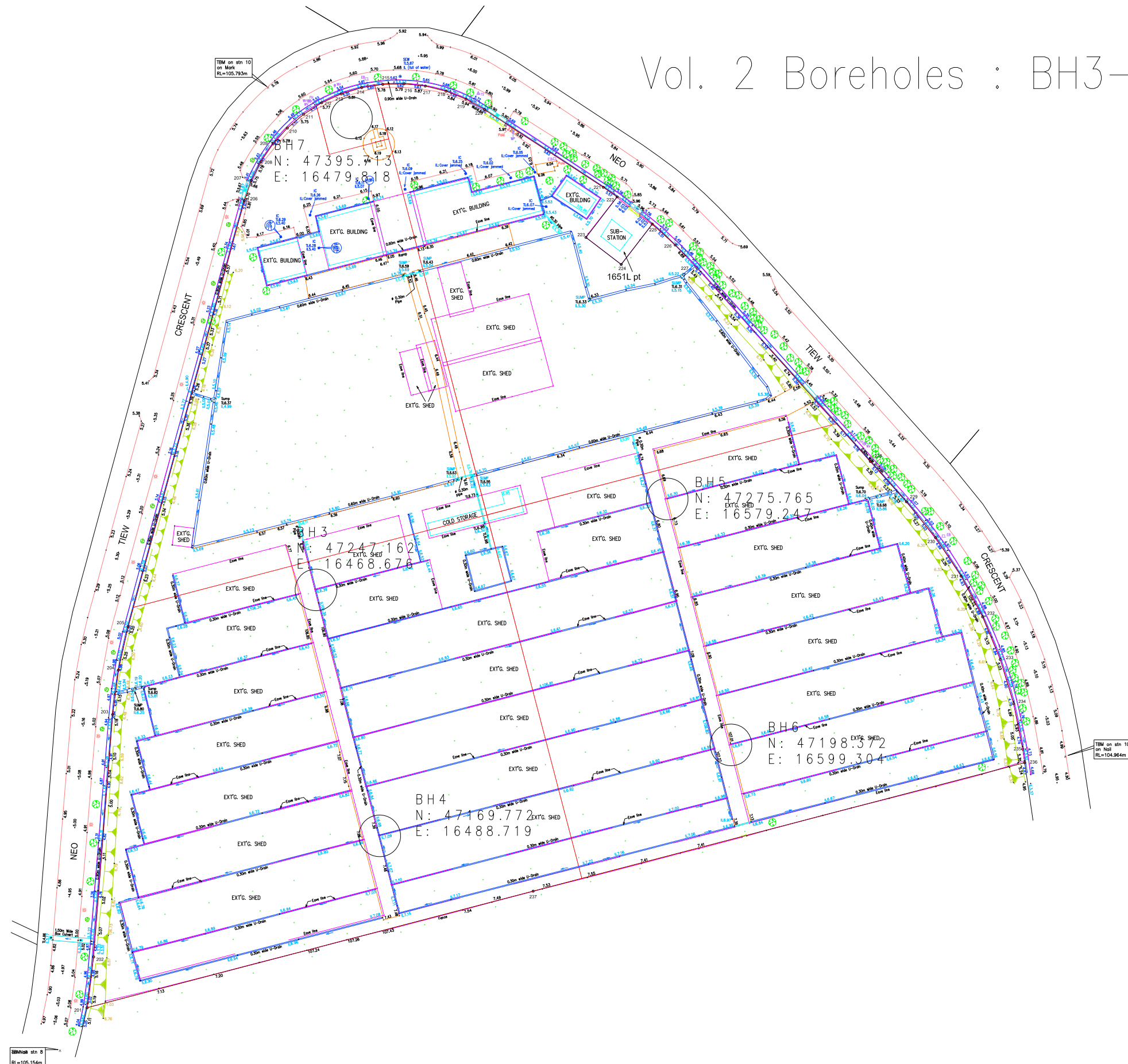
2. Groundwater level fluctuation was observed between RL 104.90m and RL 105.60m in BH3 and between RL 104.16m and RL 105.06m in BH5 during the present investigation period.

7. REFERENCES

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APPENDIX A
LAYOUT OF BOREHOLES
AND CROSS SECTIONS FOR GEOLOGICAL PROFILES

Vol. 2 Boreholes : BH3–BH7



APPENDIX B

SOIL BORING LOGS

ENGINEERING CLASSIFICATION

	AS : ASPHALT, TAR		PtC : CLAYEY PEAT
	BF : BACKFILL		CG : GRAVELLY CLAY
	BE : BEDROCK		CNG : CONGLOMERATE
	BO : BOULDER		CS : SANDY CLAY
	BR : BRICK		GM : SILTY GRAVEL
	C : CLAY / MARINE CLAY		G : GRAVEL
	CO : ORGANIC CLAY		GS : SANDY GRAVEL
	MU : MUDSTONE		S : SAND
	MS : SANDY SILT		SG : GRAVELLY SAND
	MO : ORGANIC SILT		SO : ORGANIC SAND
	Pt : PEAT		SM : SILTY SAND
	PtS : SANDY PEAT		SC : CLAYEY SAND
	PtG : GRAVELLY PEAT		SPt : PEATY SAND
	PtM : SILTY PEAT		SA : SANDSTONE
	GC : CLAYEY GRAVEL		GR : GRANITE
	M : SILT		SI : SILTSTONE
	MG : GRAVELLY SILT		SH : SHALE
	MPt : PEATY SILT		SCH : SCHIST
	GO : ORGANIC GRAVEL		LI : LIMESTONE
			TB : TIMBER

LEGEND OF SOIL PATTERN

LOCATION: Neo Tiew Crescent Road		BOREHOLE NO. BH3	
FIELD TESTS		NORTHING: (m): 47245.815 m	
SPT N VALUE		EASTING: (m): 16466.040 m	
SPT-N, Blow/mm		REDUCED LEVEL : 107.101 m	
SCR%		DESCRIPTION	
DAILY WATER LEVEL		Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m - 2.0m	
DATE (dd/mm/yy)	READING (m.BGL)	Soft	
21/05/18	0.70	Yellowish brown	
22/05/18	1.80	Sandy SILT with hard cores	
22/05/18	1.10	(FILL)	
23/05/18	2.10	D1 (pH=7.2, Cl=<0.01%, OMS=0.5%, SO3=<0.01%)	
23/05/18	1.20	Soft	
		Yellowish brown spotted with reddish brown	
		Sandy SILT with hard cores	
		(FILL)	
		Firm	
		Yellow	
		Slightly Gravelly Sandy CLAY	
		Residual Soil (OLD ALLUVIUM)	
		SPT2 (MC=24.3, BD=2.01, PD=2.62, GRAVEL=2, SAND=62, SILT=16, CLAY=20)	
		SPT3 (LL=34, PL=17.3)	
		Firm to stiff	
		Light grey, yellowish brown and reddish brown	
		Slightly Sandy CLAY	
		Residual Soil (OLD ALLUVIUM)	
		TW1 (MC=25.1, BD=2.03, PD=2.62, GRAVEL=0, SAND=24, SILT=46, CLAY=30, LL=42.6, PL=19, Cuw=102.5)	
		SPT5 (LL=42.9, PL=16.9)	
		Medium dense	
		Light grey	
		Silty fine to coarse grained SAND with gravels	
		Destructured (OLD ALLUVIUM)	
		Firm to stiff	
		Light grey and light yellow	
		Sandy CLAY	
		Destructured (OLD ALLUVIUM)	
		TW2 (MC=23.8, BD=2.04, PD=2.63, GRAVEL=0, SAND=52, SILT=29, CLAY=19, LL=36.2, PL=17.8, Cuw=43.2)	

LOCATION: Neo Tiew Crescent Road		BOREHOLE NO. BH3	
		NORTHING: (m): 47245.815 m	
		EASTING: (m): 16466.040 m	
		REDUCED LEVEL : 107.101 m	
FIELD TESTS	SPT N VALUE 0 10 20 30 40 50 60 70 80 90 100	SPT-N, Blow/mm SCR%	DESCRIPTION
PMT1 at 28.00-28.50m Em : 66.220 MPa Er : 236.630 MPa		18/300	Very stiff Greenish grey Slightly Sandy CLAY Destructured (OLD ALLUVIUM) SPT8 (MC=23.8, BD=2.05, PD=2.65, GRAVEL=0, SAND=4, SILT=75, CLAY=21)
		47/300	Hard Greenish grey Slightly Sandy CLAY Destructured (OLD ALLUVIUM)
		35/300	Stiff to Hard Yellow Slightly Sandy CLAY Distinctly weathered (OLD ALLUVIUM) TW3 (MC=23.9, BD=2.02, PD=2.61, GRAVEL=0, SAND=5, SILT=66, CLAY=29, LL=58.5, PL=25.7, Cuw=131.3)
		78/300	Very dense Light greenish grey Slightly Gravelly very Clayey SAND Partially Weathered (OLD ALLUVIUM) SPT11 (MC=15.5, PD=2.62, GRAVEL=2, SAND=72, SILT=20, CLAY=6)
			End of borehole at 30.430m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". Water standpipe installed at 12.00m WS (pH=12.2, Cl=<0.01g/L, OMS=<0.10, SO3=<0.01g/L)
RCG RCG DIAMETER(mm) 115 TCR, RQD (%) 			MC MOISTURE CONTENT (%) BD BULK DENSITY (Mg/m ³) PD PARTICLE DENSITY (Mg/m ³) LL LIQUID LIMIT (%) PL PLASTIC LIMIT (%) Pc PRECONSOLIDATION PRESSURE(kPa) Cc COMPRESSION INDEX C _u UNDRAINED SHEAR STRENGTH (kPa) C _u /C _c /C _s EFFECTIVE COHESION INTERCEPT(kPa) φ _{cu/20,95} EFFECTIVE FRICTION ANGLE (degree) k(Lab) LAB PERMEABILITY (m/sec) UCS ROCK COMPRESSIVE STRENGTH (MPa) Is(50) POINT LOAD STRENGTH (MPa) OMS ORGANIC MATTER CONTENT(%) Cl CHLORIDE CONTENT(%) SO3 SULPHATE CONTENT(%) pH pH VALUE
CLIENT: Agri-Food & Veterinary Authority of Singapore (AVA)		LOG OF BORING GEOTECHNICAL STUDY – FIELD INVESTIGATIONS	
PROJECT: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)		DRILLER/SUPERVISOR Matiar / Nyi Nyi Htut	DURATION OF FIELD WORK: 21/05/18-23/05/18
58A SUNGEI KADUT LOOP SINGAPORE 729505 TEL: 65 63697100 FAX: 65 63625848 		PROJECT ENGINEER/PROJECT MANAGER Harry Chen / Yuet Ling Yen	SHEET NO. <2> / <2>

LOCATION: Neo Tiew Crescent Road		BOREHOLE NO. BH5										
		NORTHING: (m):	47271.586 m									
		EASTING: (m):	16576.971 m									
		REDUCED LEVEL :	106.064 m									
		DESCRIPTION										
FIELD TESTS	SPT N VALUE	SPT-N, Blow/mm SCR%	FRACTURE PER METER	WEATHERING GRADE	REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)		
	0 10 20 30 40 50 60 70 80 90 100											
PMT1 at 29.50–30.00m Em : 54.775 MPa Er : 268.247 MPa		23/300				20.00 SPT8 20.45	X				Medium dense Light greenish grey Slightly Gravelly very Clayey SAND Destructured (OLD ALLUVIUM) SPT8 (MC=18.6, BD=1.88, PD=2.58, GRAVEL=3, SAND=68, SILT=20, CLAY=9)	
		25/300			84.06	22.00 SPT9 22.45	X	X	O(D)	SC	Very stiff Light grey Slightly Sandy SILT Destructured (OLD ALLUVIUM) SPT9 (LL=54.9, PL=29.3)	
		24/300				24.00 TW3 24.90	X	X	O(D)	MS	Very stiff Greenish grey and yellowish brown Sandy CLAY Destructured (OLD ALLUVIUM) TW3 (MC=20.2, BD=2.10, PD=2.64, GRAVEL=0, SAND=37, SILT=56, CLAY=7, LL=54, PL=24.6, Ccu/cb/ps=24.9/-/-, ϕ cu/cb/ps=34.0/-/-)	
		28/300			78.06	28.00 SPT11 28.45	X	X	O(D)	CS	Medium dense Light greenish grey Gravelly very Clayey SAND Destructured (OLD ALLUVIUM) SPT11 (MC=19, BD=1.80, PD=2.6, GRAVEL=6, SAND=66, SILT=24, CLAY=4)	
		54/300			75.56	30.50 SPT12 30.95	X	X	O(D)	SC	Very dense Light greenish grey Silty fine grained SAND Partially Weathered (OLD ALLUVIUM)	
					75.11		X	X	O(B)	SM		
												End of borehole at 30.950m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". Water standpipe installed at 12.00m
												WS (pH=12.3, Cl=<0.01g/L, OMS=<0.10, SO3=<0.01g/L
RCG	RCG	TCR,RQD (%)										
DIAMETER(mm) 115												

LOCATION: Neo Tiew Crescent Road		SPT-N, Blow/mm SCR%		FRACTURE PER METER	WEATHERING GRADE	REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	BOREHOLE NO. BH6	
FIELD TESTS		SPT N VALUE										NORTHING: (m): 47199.933 m	EASTING: (m): 16595.205 m
												REDUCED LEVEL : 106.890 m	
												DESCRIPTION	
				11/300			20.00 SPT8 20.45					Medium dense Light grey and light yellow Gravelly very Clayey SAND Destructured (OLD ALLUVIUM) SPT8 (MC=22.3, BD=2.03, PD=2.59, GRAVEL=5, SAND=68, SILT=15, CLAY=12)	
				12/300		84.89	22.00 SPT9 22.45			O(D)	SC	Medium dense Light grey Silty fine to medium grained SAND Destructured (OLD ALLUVIUM)	
						82.89	24.00 TW3 24.90			O(D)	SM	Very stiff Yellowish grey and reddish brown Slightly Sandy CLAY Destructured (OLD ALLUVIUM) TW3 (MC=21.7, BD=2.09, PD=2.65, GRAVEL=0, SAND=3, SILT=51, CLAY=46, LL=51.9, PL=23.7, C _{uu} =149.4)	
				24/300		80.89	26.00 SPT10 26.45			O(D)	CS	Medium dense Greenish grey Silty fine to medium grained SAND Destructured (OLD ALLUVIUM)	
				36/300		78.89	28.00 SPT11 28.45			O(D)	SM	Dense Light grey and light yellow Gravelly very Clayey SAND Distinctly Weathered (OLD ALLUVIUM) SPT11 (MC=16.4, BD=1.94, PD=2.62, GRAVEL=10, SAND=69, SILT=17, CLAY=4)	
				43/300		76.89	30.00 SPT12 30.45			O(C)	SC	Dense Greenish grey Silty fine to coarse grained SAND with gravels Distinctly Weathered (OLD ALLUVIUM)	
						76.44				O(C)	SM	Silty fine to coarse grained SAND with gravels Distinctly Weathered (OLD ALLUVIUM)	
												End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS (pH=7.6, Cl=<0.01g/L, OMS=<0.10, SO3=0.01g/L	
RCG RCG DIAMETER(mm) 115	20 40 60 80 TCR, RQD (%)	TCR RQD	☒ SAMPLE ☐ PRESSUREMETER TEST ☐ CORE RUN ☒ VANE SHEAR TEST	☒ PERMEABILITY TEST /PACKER TEST ☐ SPT-N VALUE ☐ PS PISTON SAMPLE ☐ TW THIN WALLED TUBE SAMPLE ☐ MZ MAZIER SAMPLE ☐ CR CORE SAMPLE ☐ SPT SPLIT SPOON SAMPLE ☐ WS WATER SAMPLE	MC MOISTURE CONTENT (%) BD BULK DENSITY (Mg/m ³) PD PARTICLE DENSITY (Mg/m ³) LL LIQUID LIMIT (%) PL PLASTIC LIMIT (%) P _c PRECONSOLIDATION PRESSURE(kPa) C _c COMPRESSION INDEX C _u UNDRAINED SHEAR STRENGTH (kPa)	C _{cu} /C _u /C _u E _{cu} /E _{cu} k(Lab) UCS I _s (50) OMS CI SO3 pH	EFFECTIVE COHESION INTERCEPT(kPa) EFFECTIVE FRICTION ANGLE (degree) LAB PERMEABILITY (m/sec) ROCK COMPRESSIVE STRENGTH (MPa) POINT LOAD STRENGTH (MPa) ORGANIC MATTER CONTENT(%) CHLORIDE CONTENT(%) SULPHATE CONTENT(%) pH VALUE						
CLIENT: Agri-Food & Veterinary Authority of Singapore (AVA)						LOG OF BORING GEOTECHNICAL STUDY – FIELD INVESTIGATIONS							
PROJECT: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)						DRILLER/SUPERVISOR Kumar / Nyi Nyi Htut			DURATION OF FIELD WORK: 24/05/18-26/05/18				
 58A SUNGEI KADUT LOOP SINGAPORE 729505 TEL: 65 63697100 FAX: 65 63625848						 ACCREDITED INSPECTION BODY SAC			PROJECT ENGINEER/PROJECT MANAGER Harry Chen / Yuet Ling Yen			SHEET NO. 	

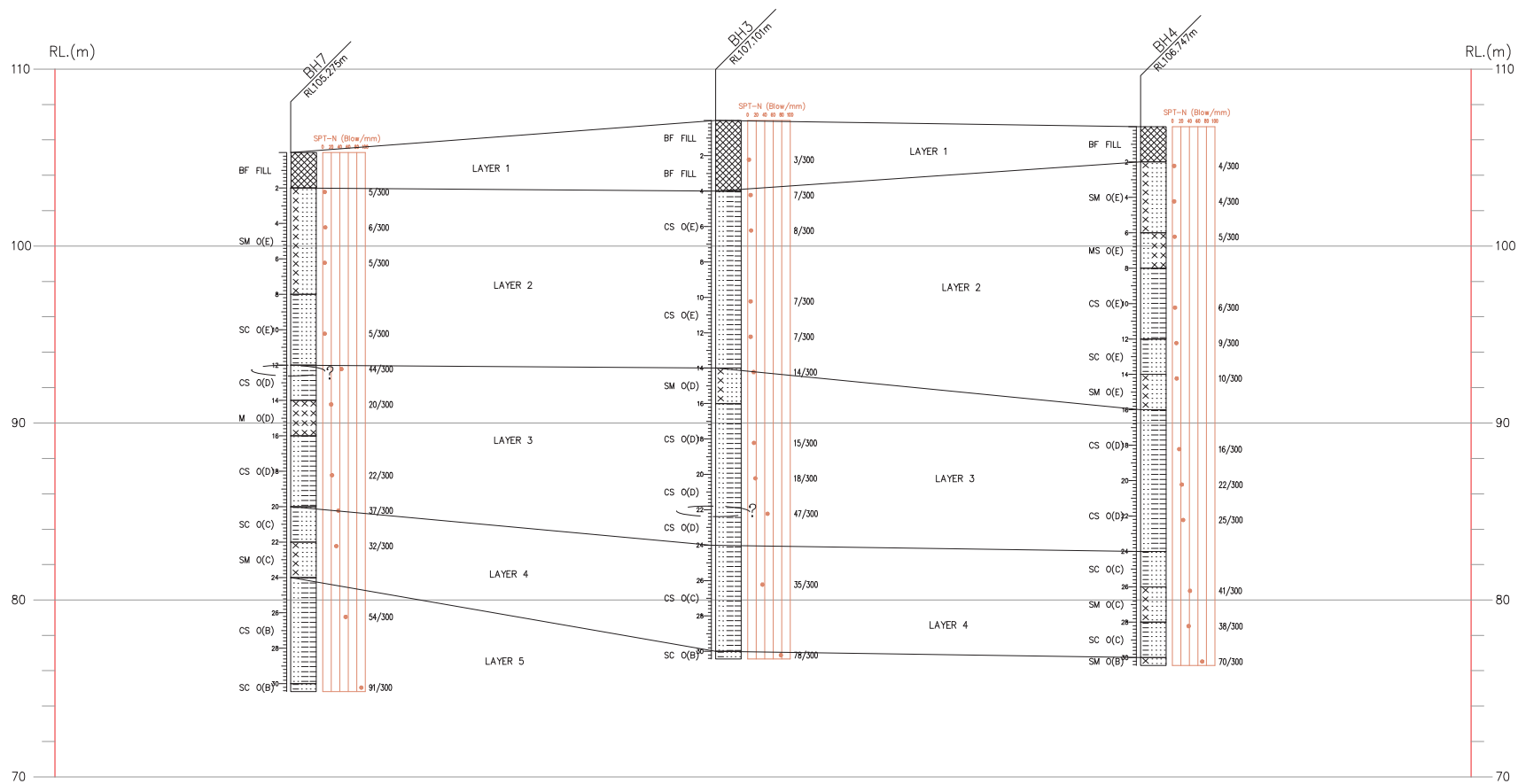
LOCATION: Neo Tiew Crescent Road		BOREHOLE NO. BH7	
FIELD TESTS		NORTHING: (m): 47397.750 m	
SPT N VALUE		EASTING: (m): 16476.472 m	
SPT-N, Blow/mm SCR%		REDUCED LEVEL : 105.275 m	
DAILY WATER LEVEL		DESCRIPTION	
DATE (dd/mm/yy)	READING (m.BGL)	Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m - 2.0m Loose Yellowish brown Slightly Silty SAND with hard cores (FILL) D1 (pH=6.5, Cl=<0.01%, OMS=0.5%, SO3=<0.01%)	
22/05/18	1.30	5/300	
23/05/18	1.00		
24/05/18	0.70	6/300	
25/05/18	1.50		
		Loose Light grey Silty fine to coarse grained SAND with gravels Residual Soil (OLD ALLUVIUM) SPT3 (LL=40, PL=24)	
		97.27	
		O(E) SM	
		Loose Light grey Gravelly very Clayey SAND Residual Soil (OLD ALLUVIUM) TW1 (MC=18.8, BD=2.05, PD=2.58, GRAVEL=5, SAND=69, SILT=17, CLAY=9, LL=45.2, PL=26.3, Ccu/cd/ps=5.0/-/-, øcu/cd/ps=34.3/-/-)	
		93.27	
		O(E) SC	
		Hard Light grey and yellowish brown Sandy CLAY Destructured (OLD ALLUVIUM) SPT5 (MC=16.3, BD=2.06, PD=2.62, GRAVEL=0, SAND=64, SILT=30, CLAY=6)	
		91.27	
		O(D) CS	
		Very stiff Reddish brown mottled with grey SILT Destructured (OLD ALLUVIUM) SPT6 (LL=56, PL=26.5)	
		89.27	
		O(D) M	
		Very stiff Light greenish grey and yellowish brown Sandy CLAY Destructured (OLD ALLUVIUM) TW2 (MC=20.9, BD=2.09, PD=2.63, GRAVEL=0, SAND=43, SILT=47, CLAY=10, LL=45.9, PL=22.5, Ccu=193.1)	
		85.27	
		O(D) CS	
RCG	RCG		
DIAMETER(mm)	115		
TCR,RQD (%)			
TCR			
RQD			
SAMPLE		PERMEABILITY TEST	
PRESSUREMETER TEST		SPT-N VALUE	
CORE RUN		PISTON SAMPLE	
VANE SHEAR TEST		THIN WALLED TUBE SAMPLE	
		MAZIER SAMPLE	
		CORE SAMPLE	
		SPT SPLIT SPOON SAMPLE	
		WATER SAMPLE	
		MOISTURE CONTENT (%)	
		BULK DENSITY (Mg/m ³)	
		PARTICLE DENSITY (Mg/m ³)	
		LIQUID LIMIT (%)	
		PLASTIC LIMIT (%)	
		PRECONSOLIDATION PRESSURE(kPa)	
		COMPRESSION INDEX	
		UNDRAINED SHEAR STRENGTH (kPa)	
		C _{cu} /c _d /ps	
		EFFECTIVE COHESION INTERCEPT(kPa)	
		EFFECTIVE FRICTION ANGLE (degree)	
		LAB PERMEABILITY (m/sec)	
		ROCK COMPRESSIVE STRENGTH (MPa)	
		POINT LOAD STRENGTH (MPa)	
		ORGANIC MATTER CONTENT(%)	
		CHLORIDE CONTENT(%)	
		SULPHATE CONTENT(%)	
		pH VALUE	
CLIENT:		LOG OF BORING	
Agri-Food & Veterinary Authority of Singapore (AVA)		GEOTECHNICAL STUDY – FIELD INVESTIGATIONS	
PROJECT:		DURATION OF FIELD WORK:	
Soil Investigation Works for I14A & LCK I14B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)		22/05/18-25/05/18	
		DRILLER/SUPERVISOR	
		Allwan / Nyi Nyi Htut	
		PROJECT ENGINEER/PROJECT MANAGER	
		Harry Chen / Yuet Ling Yen	
		SHEET NO.	
		<1> / <2>	

APPENDIX C

GEOLOGICAL PROFILES

List of Geological Cross-Section for Geological Profile

SECTION	BOREHOLES
A-A	BH7, BH3 & BH4
B-B	BH5 & BH6

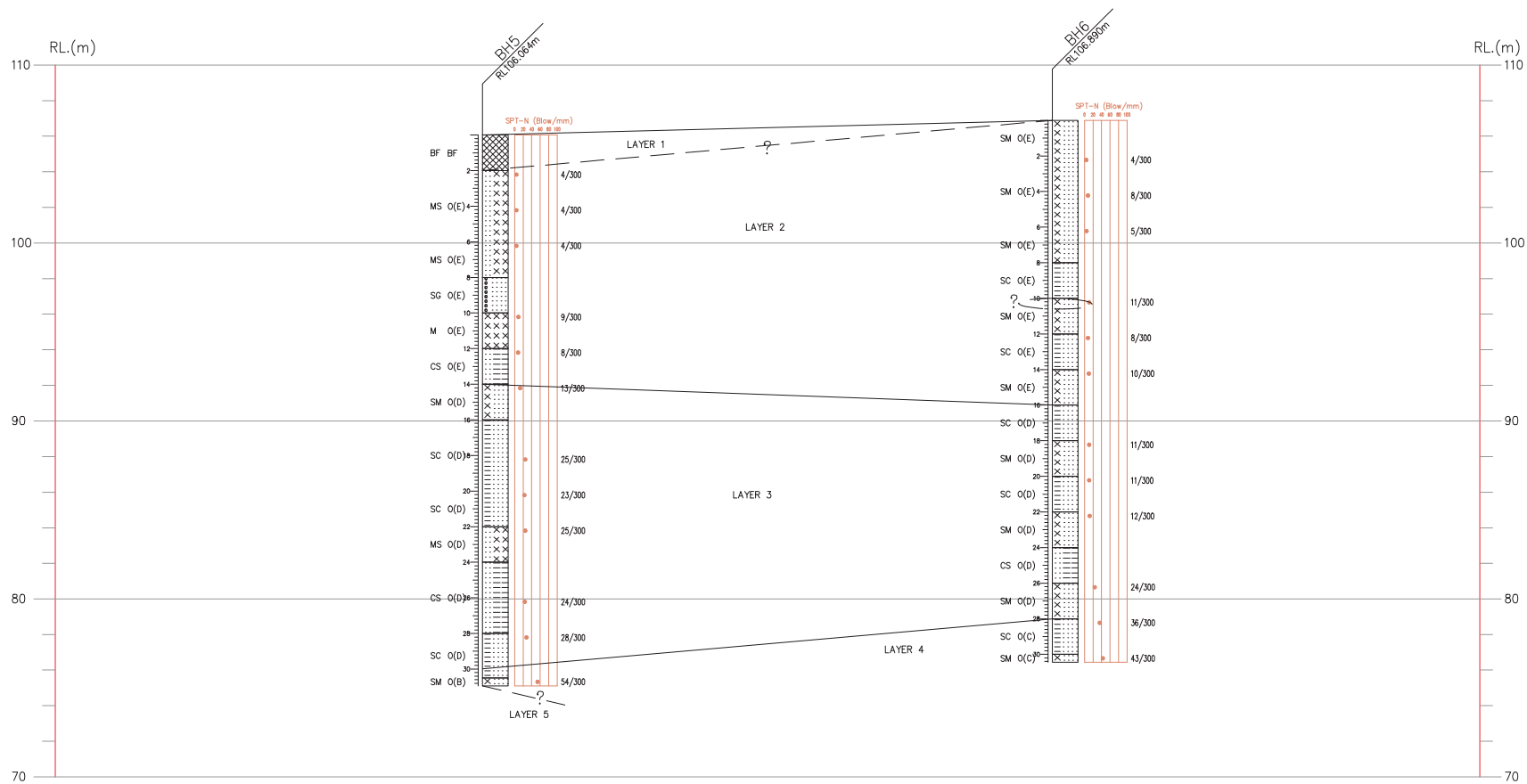


Legends

LAYER 1 - BF FILL
 LAYER 2 - O(E) Residual (OLD ALLUVIUM)
 LAYER 3 - O(D) Destructured (OLD ALLUVIUM)

LAYER 4 - O(C) Distinctly Weathered (OLD ALLUVIUM)
 LAYER 5 - O(B) Partially Weathered (OLD ALLUVIUM)
 --?-- - Uncertainty due to localized existence

Remarks: BH7-BH3-BH4	Section No. A-A	Drawing Title: Geological Profile	Drawn by: Nur Ikma Idrus	Checked by: Harry Chen	Date: 16.06.2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assuming that the borehole details accurate	Scale As shown	Project Title: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)	Ryobi G 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		
EXCEL FILE REF: AutoCAD FILE REF:					



Legends

LAYER 1 - BF FILL
 LAYER 2 - O(E) Residual
 LAYER 3 - O(D) Destructured

(OLD ALLUVIUM)
 (OLD ALLUVIUM)

LAYER 4 - O(C) Distinctly Weathered (OLD ALLUVIUM)
 LAYER 5 - O(B) Partially Weathered (OLD ALLUVIUM)
 --?-- - Uncertainty due to localized existence

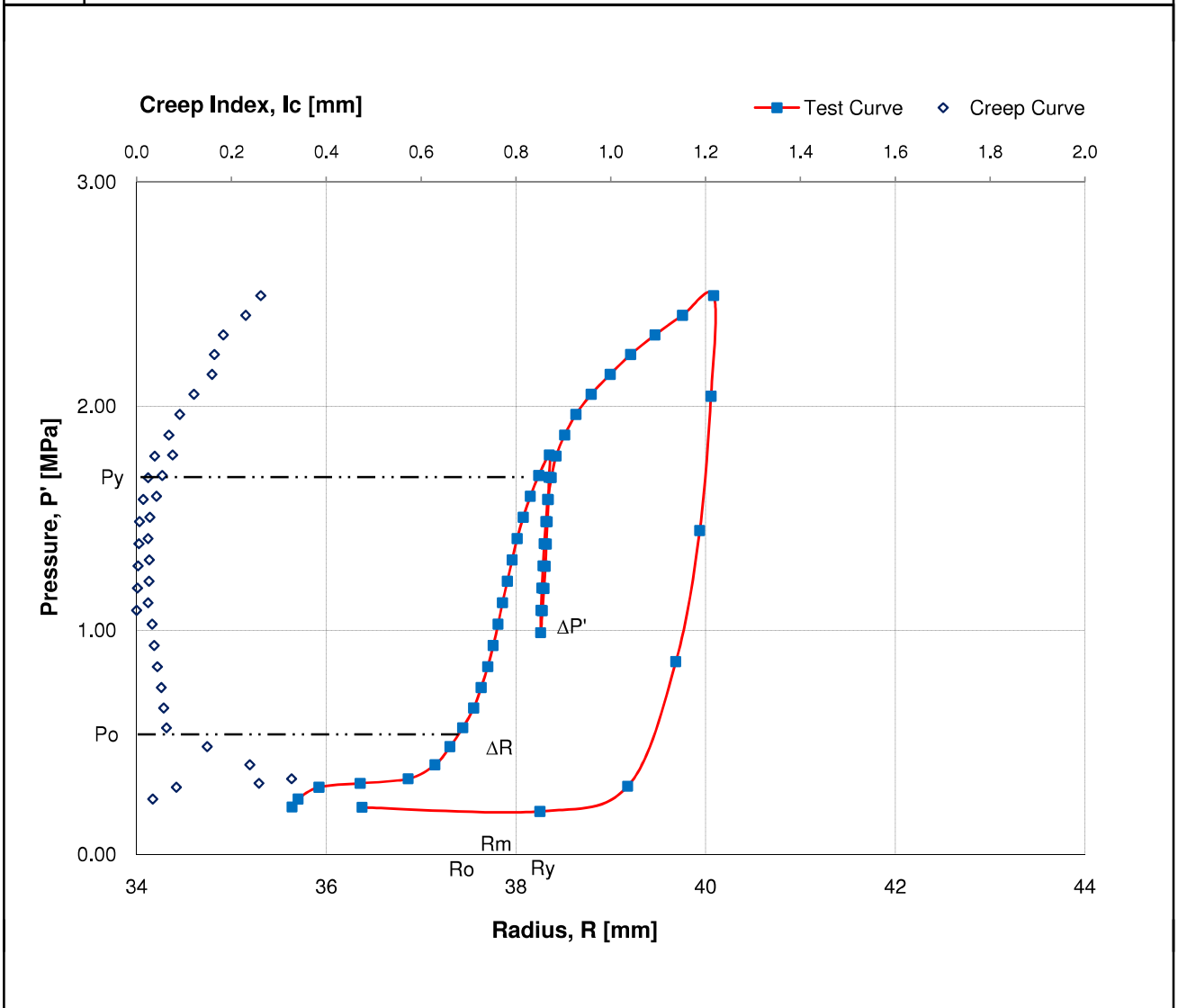
Remarks: BH5-BH6	Section No. B-B	Drawing Title: Geological Profile	Drawn by: Nur Ikma Idrus	Checked by: Harry Chen	Date: 16.06.2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assuming that the borehole details accurate	Scale As shown	Project Title: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)	 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		
EXCEL FILE REF: AutoCAD FILE REF:					

APPENDIX D

RESULTS OF PRESSUREMETER TESTS

PRESSUREMETER TEST - OYO ELASTMETER-2 / ELAST LOGGER-2

Client : AVA Project : K5728 Location : Neo Tiew Crescent Measured By : Than Oo Date : 23/5/2018 BH No : BH3 Test No : PMT1 Depth : 28.00 - 28.50m Soil Type : Silty SAND with gravels SPT (N) : 78 Rubber Type : Hard					
Test Cycle	Earth Pressure at Rest	Yield Pressure	Coefficient of Soil Reaction	Modulus of Elasticity	Mean Radius
1st	Po (MPa)	Py (MPa)	Km (MPa/cm)	Em (MPa)	Rm (cm)
	0.570	1.690	14.000	66.220	3.784
	$Km = \Delta P' / \Delta R = (1.690 - 0.570) / (3.824 - 3.744) = 14.000 \text{ Mpa/cm}$ $Em = (1 + \mu) \times Km \times Rm = (1 + 0.25) \times 14.000 \times 3.784 = 66.220 \text{ Mpa}$				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	-	49.375	236.630	3.834
	$Kr = \Delta P' / \Delta R = (1.780 - 0.990) / (3.842 - 3.826) = 49.375 \text{ Mpa/cm}$ $Er = (1 + \mu) \times Kr \times Rr = (1 + 0.25) \times 49.375 \times 3.834 = 236.630 \text{ Mpa}$				



OYO

ELAST LOGGER2 DATA

FILE ID. 1
 DATE 23/05/2018
 TIME 3:24:47 PM
 HOLE NO. BH3
 DEPTH[m] 28.5
 TUBE NXH

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
1	0:00:00	0.25	-1.061	35.64		0.21	0.04
2	0:00:30	0.30	-0.994	35.68		0.25	0.05
3	0:01:00	0.30	-0.971	35.70		0.25	0.05
4	0:01:30	0.30	-0.963	35.70		0.25	0.05
5	0:02:00	0.30	-0.960	35.70	0.034	0.25	0.05
6	0:02:30	0.40	-0.700	35.87		0.31	0.09
7	0:03:00	0.40	-0.648	35.90		0.30	0.10
8	0:03:30	0.40	-0.635	35.91		0.30	0.10
9	0:04:00	0.40	-0.616	35.92	0.084	0.30	0.10
10	0:04:30	0.50	-0.201	36.19		0.35	0.15
11	0:05:00	0.50	-0.067	36.28		0.33	0.17
12	0:05:30	0.50	0.019	36.33		0.32	0.18
13	0:06:00	0.50	0.057	36.36	0.258	0.32	0.18
14	0:06:30	0.60	0.498	36.65		0.37	0.23
15	0:07:00	0.60	0.618	36.73		0.36	0.24
16	0:07:30	0.60	0.720	36.79		0.35	0.25
17	0:08:00	0.60	0.825	36.86	0.327	0.34	0.26
18	0:08:30	0.70	1.010	36.99		0.42	0.28
19	0:09:00	0.70	1.107	37.05		0.41	0.29
20	0:09:30	0.70	1.179	37.10		0.41	0.29
21	0:10:00	0.70	1.249	37.15	0.239	0.40	0.30
22	0:10:30	0.80	1.335	37.20		0.49	0.31
23	0:11:00	0.80	1.392	37.24		0.49	0.31
24	0:11:30	0.80	1.433	37.27		0.48	0.32
25	0:12:00	0.80	1.484	37.30	0.149	0.48	0.32
26	0:12:30	0.90	1.622	37.40		0.57	0.33
27	0:13:00	0.90	1.644	37.41		0.57	0.33
28	0:13:30	0.90	1.665	37.43		0.57	0.33
29	0:14:00	0.90	1.685	37.44	0.063	0.57	0.33
30	0:14:30	1.00	1.796	37.52		0.66	0.34
31	0:15:00	1.00	1.802	37.52		0.66	0.34
32	0:15:30	1.00	1.824	37.53		0.66	0.34
33	0:16:00	1.00	1.853	37.55	0.057	0.65	0.35
34	0:16:30	1.10	1.917	37.60		0.75	0.35
35	0:17:00	1.10	1.923	37.60		0.75	0.35
36	0:17:30	1.10	1.946	37.62		0.75	0.35
37	0:18:00	1.10	1.969	37.63	0.052	0.74	0.36
38	0:18:30	1.20	2.030	37.67		0.84	0.36
39	0:19:00	1.20	2.040	37.68		0.84	0.36
40	0:19:30	1.20	2.058	37.69		0.84	0.36
41	0:20:00	1.20	2.074	37.70	0.044	0.84	0.36

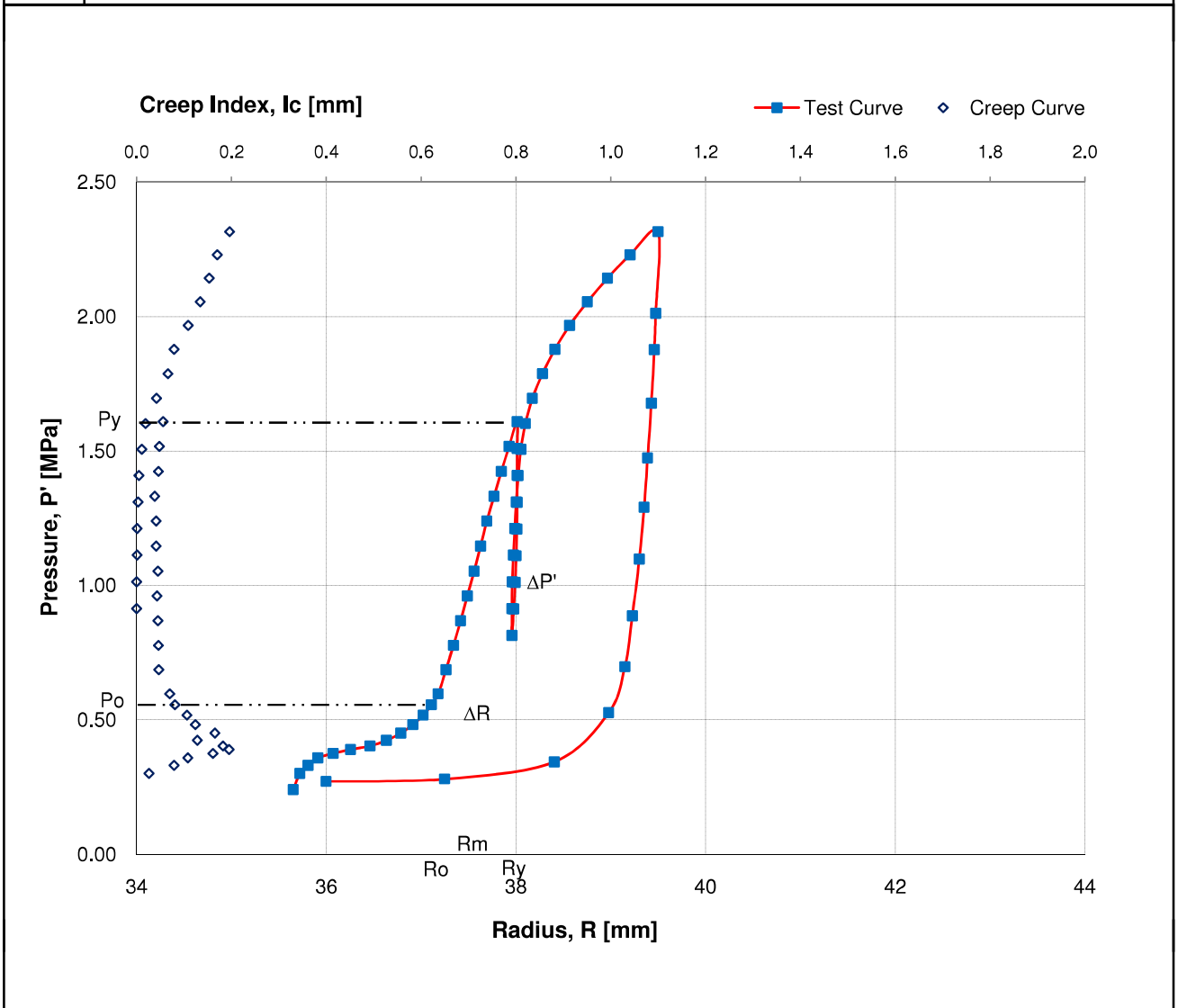
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	1.30	2.118	37.73		0.93	0.37
43	0:21:00	1.30	2.135	37.75		0.93	0.37
44	0:21:30	1.30	2.146	37.75		0.93	0.37
45	0:22:00	1.30	2.155	37.76	0.037	0.93	0.37
46	0:22:30	1.40	2.198	37.79		1.03	0.37
47	0:23:00	1.40	2.214	37.80		1.03	0.37
48	0:23:30	1.40	2.220	37.80		1.03	0.37
49	0:24:00	1.40	2.231	37.81	0.033	1.03	0.37
50	0:24:30	1.50	2.276	37.84		1.12	0.38
51	0:25:00	1.50	2.284	37.85		1.12	0.38
52	0:25:30	1.50	2.292	37.85		1.12	0.38
53	0:26:00	1.50	2.300	37.86	0.024	1.12	0.38
54	0:26:30	1.60	2.349	37.89		1.22	0.38
55	0:27:00	1.60	2.358	37.90		1.22	0.38
56	0:27:30	1.60	2.367	37.91		1.22	0.38
57	0:28:00	1.60	2.375	37.91	0.026	1.22	0.38
58	0:28:30	1.70	2.420	37.94		1.32	0.38
59	0:29:00	1.70	2.434	37.95		1.31	0.39
60	0:29:30	1.70	2.441	37.96		1.31	0.39
61	0:30:00	1.70	2.447	37.96	0.027	1.31	0.39
62	0:30:30	1.80	2.501	38.00		1.41	0.39
63	0:31:00	1.80	2.513	38.01		1.41	0.39
64	0:31:30	1.80	2.519	38.01		1.41	0.39
65	0:32:00	1.80	2.525	38.01	0.024	1.41	0.39
66	0:32:30	1.90	2.588	38.06		1.51	0.39
67	0:33:00	1.90	2.601	38.07		1.51	0.39
68	0:33:30	1.90	2.609	38.07		1.50	0.40
69	0:34:00	1.90	2.616	38.08	0.028	1.50	0.40
70	0:34:30	2.00	2.683	38.12		1.60	0.40
71	0:35:00	2.00	2.704	38.14		1.60	0.40
72	0:35:30	2.00	2.715	38.14		1.60	0.40
73	0:36:00	2.00	2.725	38.15	0.042	1.60	0.40
74	0:36:30	2.10	2.801	38.20		1.69	0.41
75	0:37:00	2.10	2.829	38.22		1.69	0.41
76	0:37:30	2.10	2.843	38.23		1.69	0.41
77	0:38:00	2.10	2.855	38.24	0.054	1.69	0.41
78	0:38:30	2.20	2.938	38.30		1.79	0.41
79	0:39:00	2.20	2.972	38.32		1.78	0.42
80	0:39:30	2.20	2.996	38.34		1.78	0.42
81	0:40:00	2.20	3.014	38.35	0.076	1.78	0.42
82	0:40:30	2.10	3.013	38.35		1.68	0.42
83	0:41:00	2.10	3.013	38.35		1.68	0.42
84	0:41:30	2.10	3.013	38.35		1.68	0.42
85	0:42:00	2.10	3.013	38.35		1.68	0.42
86	0:42:30	2.00	3.001	38.34		1.58	0.42
87	0:43:00	2.00	3.001	38.34		1.58	0.42
88	0:43:30	2.00	3.001	38.34		1.58	0.42
89	0:44:00	2.00	3.001	38.34		1.58	0.42
90	0:44:30	1.90	2.984	38.33		1.48	0.42
91	0:45:00	1.90	2.984	38.33		1.48	0.42
92	0:45:30	1.90	2.984	38.33		1.48	0.42
93	0:46:00	1.90	2.984	38.33		1.48	0.42
94	0:46:30	1.80	2.966	38.32		1.39	0.41

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
95	0:47:00	1.80	2.966	38.32		1.39	0.41
96	0:47:30	1.80	2.966	38.32		1.39	0.41
97	0:48:00	1.80	2.967	38.32		1.39	0.41
98	0:48:30	1.70	2.953	38.31		1.29	0.41
99	0:49:00	1.70	2.953	38.31		1.29	0.41
100	0:49:30	1.70	2.953	38.31		1.29	0.41
101	0:50:00	1.70	2.953	38.31		1.29	0.41
102	0:50:30	1.60	2.933	38.30		1.19	0.41
103	0:51:00	1.60	2.933	38.30		1.19	0.41
104	0:51:30	1.60	2.933	38.30		1.19	0.41
105	0:52:00	1.60	2.933	38.30		1.19	0.41
106	0:52:30	1.50	2.914	38.28		1.09	0.41
107	0:53:00	1.50	2.914	38.28		1.09	0.41
108	0:53:30	1.50	2.914	38.28		1.09	0.41
109	0:54:00	1.50	2.909	38.28		1.09	0.41
110	0:54:30	1.40	2.883	38.26		0.99	0.41
111	0:55:00	1.40	2.883	38.26		0.99	0.41
112	0:55:30	1.40	2.883	38.26		0.99	0.41
113	0:56:00	1.40	2.883	38.26		0.99	0.41
114	0:56:30	1.50	2.888	38.26		1.09	0.41
115	0:57:00	1.50	2.888	38.26		1.09	0.41
116	0:57:30	1.50	2.888	38.26		1.09	0.41
117	0:58:00	1.50	2.888	38.26		1.09	0.41
118	0:58:30	1.60	2.898	38.27		1.19	0.41
119	0:59:00	1.60	2.898	38.27		1.19	0.41
120	0:59:30	1.60	2.900	38.27		1.19	0.41
121	1:00:00	1.60	2.900	38.27	0.002	1.19	0.41
122	1:00:30	1.70	2.915	38.28		1.29	0.41
123	1:01:00	1.70	2.916	38.28		1.29	0.41
124	1:01:30	1.70	2.917	38.28		1.29	0.41
125	1:02:00	1.70	2.918	38.29	0.003	1.29	0.41
126	1:02:30	1.80	2.933	38.30		1.39	0.41
127	1:03:00	1.80	2.935	38.30		1.39	0.41
128	1:03:30	1.80	2.936	38.30		1.39	0.41
129	1:04:00	1.80	2.938	38.30	0.005	1.39	0.41
130	1:04:30	1.90	2.956	38.31		1.49	0.41
131	1:05:00	1.90	2.958	38.31		1.49	0.41
132	1:05:30	1.90	2.960	38.31		1.49	0.41
133	1:06:00	1.90	2.962	38.32	0.006	1.49	0.41
134	1:06:30	2.00	2.975	38.32		1.58	0.42
135	1:07:00	2.00	2.976	38.33		1.58	0.42
136	1:07:30	2.00	2.986	38.33		1.58	0.42
137	1:08:00	2.00	2.989	38.33	0.014	1.58	0.42
138	1:08:30	2.10	3.021	38.36		1.68	0.42
139	1:09:00	2.10	3.029	38.36		1.68	0.42
140	1:09:30	2.10	3.032	38.36		1.68	0.42
141	1:10:00	2.10	3.045	38.37	0.024	1.68	0.42
142	1:10:30	2.20	3.080	38.40		1.78	0.42
143	1:11:00	2.20	3.091	38.41		1.78	0.42
144	1:11:30	2.20	3.100	38.41		1.78	0.42
145	1:12:00	2.20	3.118	38.42	0.038	1.78	0.42
146	1:12:30	2.30	3.180	38.47		1.87	0.43
147	1:13:00	2.30	3.205	38.49		1.87	0.43

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
148	1:13:30	2.30	3.224	38.50		1.87	0.43
149	1:14:00	2.30	3.248	38.52	0.068	1.87	0.43
150	1:14:30	2.40	3.325	38.57		1.97	0.43
151	1:15:00	2.40	3.365	38.60		1.97	0.43
152	1:15:30	2.40	3.395	38.62		1.96	0.44
153	1:16:00	2.40	3.416	38.63	0.091	1.96	0.44
154	1:16:30	2.50	3.525	38.71		2.06	0.44
155	1:17:00	2.50	3.583	38.75		2.06	0.44
156	1:17:30	2.50	3.620	38.78		2.05	0.45
157	1:18:00	2.50	3.646	38.79	0.121	2.05	0.45
158	1:18:30	2.60	3.771	38.88		2.15	0.45
159	1:19:00	2.60	3.837	38.93		2.15	0.45
160	1:19:30	2.60	3.885	38.96		2.14	0.46
161	1:20:00	2.60	3.930	38.99	0.159	2.14	0.46
162	1:20:30	2.70	4.071	39.09		2.24	0.46
163	1:21:00	2.70	4.145	39.15		2.23	0.47
164	1:21:30	2.70	4.196	39.18		2.23	0.47
165	1:22:00	2.70	4.235	39.21	0.164	2.23	0.47
166	1:22:30	2.80	4.411	39.34		2.32	0.48
167	1:23:00	2.80	4.490	39.39		2.32	0.48
168	1:23:30	2.80	4.549	39.43		2.32	0.48
169	1:24:00	2.80	4.594	39.47	0.183	2.32	0.48
170	1:24:30	2.90	4.769	39.59		2.41	0.49
171	1:25:00	2.90	4.883	39.67		2.41	0.49
172	1:25:30	2.90	4.949	39.72		2.41	0.49
173	1:26:00	2.90	4.999	39.76	0.23	2.41	0.49
174	1:26:30	3.00	5.190	39.90		2.50	0.50
175	1:27:00	3.00	5.307	39.98		2.50	0.50
176	1:27:30	3.00	5.392	40.04		2.49	0.51
177	1:28:00	3.00	5.452	40.09	0.262	2.49	0.51
178	1:28:30	2.40	5.415	40.06		2.04	0.36
179	1:29:00	1.80	5.249	39.94		1.45	0.35
180	1:29:30	1.20	4.899	39.69		0.86	0.34
181	1:30:00	0.61	4.190	39.18		0.30	0.31
182	1:30:30	0.44	2.873	38.25		0.19	0.25
183	1:31:00	0.29	0.086	36.38		0.21	0.08

PRESSUREMETER TEST - OYO ELASTMETER-2 / ELAST LOGGER-2

Client : AVA Project : K5728 Location : Neo Tiew Crescent Measured By : Lian Date : 22/5/2018 BH No : BH5 Test No : PMT1 Depth : 29.50 - 30.00m Soil Type : Silty SAND SPT (N) : 54 Rubber Type : Hard					
Test Cycle	Earth Pressure at Rest	Yield Pressure	Coefficient of Soil Reaction	Modulus of Elasticity	Mean Radius
1st	Po (MPa)	Py (MPa)	Km (MPa/cm)	Em (MPa)	Rm (cm)
	0.560	1.610	11.667	54.775	3.756
	$Km = \Delta P' / \Delta R = (1.610 - 0.560) / (3.801 - 3.711) = 11.667 \text{ Mpa/cm}$ $Em = (1 + \mu) \times Km \times Rm = (1 + 0.25) \times 11.667 \times 3.756 = 54.775 \text{ Mpa}$				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	-	56.429	268.247	3.803
	$Kr = \Delta P' / \Delta R = (1.600 - 0.810) / (3.810 - 3.796) = 56.429 \text{ Mpa/cm}$ $Er = (1 + \mu) \times Kr \times Rr = (1 + 0.25) \times 56.429 \times 3.803 = 268.247 \text{ Mpa}$				



OYO

ELAST LOGGER2 DATA

FILE ID. 0
 DATE 18/05/22
 TIME 2:40:16 PM
 HOLE NO. 00_05
 DEPTH[m] 30
 TUBE NXH

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
1	0:00:00	0.27	-1.108	35.65		0.24	0.03
2	0:00:30	0.35	-1.022	35.71		0.30	0.05
3	0:01:00	0.35	-1.006	35.72		0.30	0.05
4	0:01:30	0.35	-1.001	35.72		0.30	0.05
5	0:02:00	0.35	-0.996	35.72	0.026	0.30	0.05
6	0:02:30	0.40	-0.936	35.76		0.34	0.06
7	0:03:00	0.40	-0.904	35.78		0.34	0.06
8	0:03:30	0.40	-0.882	35.79		0.33	0.07
9	0:04:00	0.40	-0.857	35.81	0.079	0.33	0.07
10	0:04:30	0.45	-0.800	35.84		0.37	0.08
11	0:05:00	0.45	-0.753	35.87		0.37	0.08
12	0:05:30	0.45	-0.726	35.89		0.36	0.09
13	0:06:00	0.45	-0.692	35.91	0.108	0.36	0.09
14	0:06:30	0.50	-0.599	35.97		0.40	0.10
15	0:07:00	0.50	-0.541	36.01		0.39	0.11
16	0:07:30	0.50	-0.498	36.03		0.38	0.12
17	0:08:00	0.50	-0.438	36.07	0.161	0.38	0.12
18	0:08:30	0.55	-0.342	36.13		0.41	0.14
19	0:09:00	0.55	-0.273	36.18		0.41	0.14
20	0:09:30	0.55	-0.210	36.22		0.40	0.15
21	0:10:00	0.55	-0.147	36.26	0.195	0.39	0.16
22	0:10:30	0.60	-0.009	36.34		0.42	0.18
23	0:11:00	0.60	0.042	36.38		0.42	0.18
24	0:11:30	0.60	0.128	36.43		0.41	0.19
25	0:12:00	0.60	0.173	36.46	0.182	0.40	0.20
26	0:12:30	0.65	0.316	36.55		0.44	0.21
27	0:13:00	0.65	0.350	36.57		0.43	0.22
28	0:13:30	0.65	0.402	36.61		0.43	0.22
29	0:14:00	0.65	0.444	36.64	0.128	0.42	0.23
30	0:14:30	0.70	0.513	36.68		0.47	0.23
31	0:15:00	0.70	0.584	36.73		0.46	0.24
32	0:15:30	0.70	0.635	36.76		0.46	0.24
33	0:16:00	0.70	0.678	36.79	0.165	0.45	0.25
34	0:16:30	0.75	0.749	36.83		0.49	0.26
35	0:17:00	0.75	0.797	36.86		0.49	0.26
36	0:17:30	0.75	0.836	36.89		0.49	0.26
37	0:18:00	0.75	0.873	36.91	0.124	0.48	0.27
38	0:18:30	0.80	0.931	36.95		0.53	0.27
39	0:19:00	0.80	0.971	36.98		0.52	0.28
40	0:19:30	0.80	1.009	37.00		0.52	0.28
41	0:20:00	0.80	1.037	37.02	0.106	0.52	0.28

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	0.85	1.087	37.05		0.56	0.29
43	0:21:00	0.85	1.110	37.07		0.56	0.29
44	0:21:30	0.85	1.141	37.09		0.56	0.29
45	0:22:00	0.85	1.168	37.11	0.081	0.56	0.29
46	0:22:30	0.90	1.207	37.13		0.60	0.30
47	0:23:00	0.90	1.232	37.15		0.60	0.30
48	0:23:30	0.90	1.258	37.17		0.60	0.30
49	0:24:00	0.90	1.277	37.18	0.07	0.60	0.30
50	0:24:30	1.00	1.357	37.23		0.69	0.31
51	0:25:00	1.00	1.360	37.23		0.69	0.31
52	0:25:30	1.00	1.386	37.25		0.69	0.31
53	0:26:00	1.00	1.404	37.26	0.047	0.69	0.31
54	0:26:30	1.10	1.478	37.31		0.78	0.32
55	0:27:00	1.10	1.484	37.32		0.78	0.32
56	0:27:30	1.10	1.504	37.33		0.78	0.32
57	0:28:00	1.10	1.524	37.34	0.046	0.78	0.32
58	0:28:30	1.20	1.590	37.39		0.87	0.33
59	0:29:00	1.20	1.597	37.39		0.87	0.33
60	0:29:30	1.20	1.617	37.40		0.87	0.33
61	0:30:00	1.20	1.635	37.42	0.045	0.87	0.33
62	0:30:30	1.30	1.701	37.46		0.96	0.34
63	0:31:00	1.30	1.716	37.47		0.96	0.34
64	0:31:30	1.30	1.729	37.48		0.96	0.34
65	0:32:00	1.30	1.744	37.49	0.043	0.96	0.34
66	0:32:30	1.40	1.805	37.53		1.06	0.34
67	0:33:00	1.40	1.820	37.54		1.06	0.34
68	0:33:30	1.40	1.838	37.55		1.05	0.35
69	0:34:00	1.40	1.850	37.56	0.045	1.05	0.35
70	0:34:30	1.50	1.911	37.60		1.15	0.35
71	0:35:00	1.50	1.922	37.61		1.15	0.35
72	0:35:30	1.50	1.937	37.62		1.15	0.35
73	0:36:00	1.50	1.952	37.63	0.041	1.15	0.35
74	0:36:30	1.60	2.009	37.67		1.24	0.36
75	0:37:00	1.60	2.025	37.68		1.24	0.36
76	0:37:30	1.60	2.039	37.69		1.24	0.36
77	0:38:00	1.60	2.050	37.69	0.041	1.24	0.36
78	0:38:30	1.70	2.124	37.74		1.33	0.37
79	0:39:00	1.70	2.142	37.76		1.33	0.37
80	0:39:30	1.70	2.150	37.76		1.33	0.37
81	0:40:00	1.70	2.162	37.77	0.038	1.33	0.37
82	0:40:30	1.80	2.233	37.82		1.43	0.37
83	0:41:00	1.80	2.252	37.83		1.43	0.37
84	0:41:30	1.80	2.267	37.84		1.43	0.37
85	0:42:00	1.80	2.279	37.85	0.046	1.42	0.38
86	0:42:30	1.90	2.350	37.90		1.52	0.38
87	0:43:00	1.90	2.368	37.91		1.52	0.38
88	0:43:30	1.90	2.384	37.92		1.52	0.38
89	0:44:00	1.90	2.398	37.93	0.048	1.52	0.38
90	0:44:30	2.00	2.469	37.98		1.61	0.39
91	0:45:00	2.00	2.489	37.99		1.61	0.39
92	0:45:30	2.00	2.506	38.00		1.61	0.39
93	0:46:00	2.00	2.525	38.01	0.056	1.61	0.39
94	0:46:30	1.90	2.525	38.01		1.51	0.39

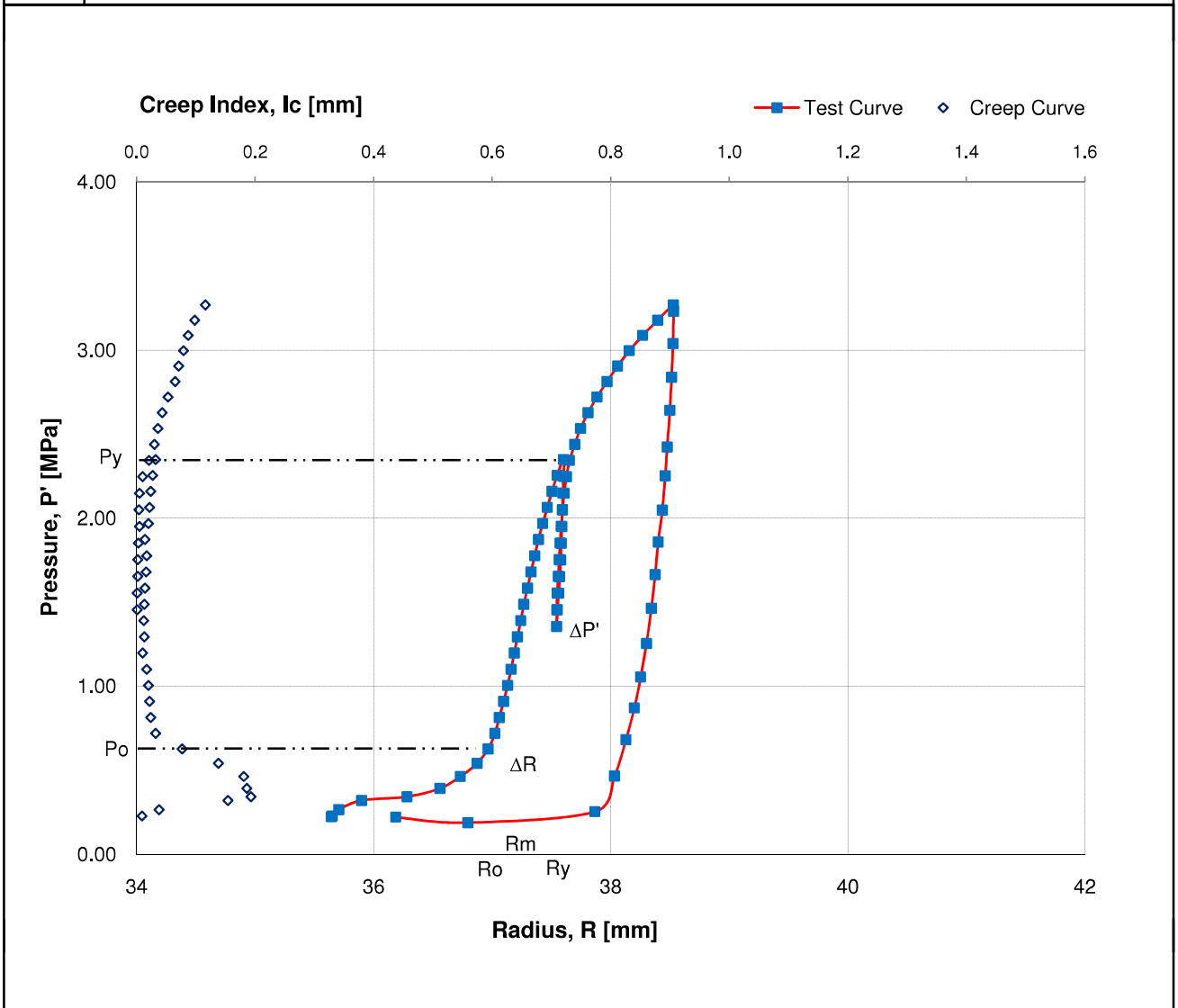
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
95	0:47:00	1.90	2.525	38.01		1.51	0.39
96	0:47:30	1.90	2.525	38.01		1.51	0.39
97	0:48:00	1.90	2.525	38.01		1.51	0.39
98	0:48:30	1.80	2.524	38.01		1.41	0.39
99	0:49:00	1.80	2.524	38.01		1.41	0.39
100	0:49:30	1.80	2.525	38.01		1.41	0.39
101	0:50:00	1.80	2.525	38.01		1.41	0.39
102	0:50:30	1.70	2.525	38.01		1.31	0.39
103	0:51:00	1.70	2.525	38.01		1.31	0.39
104	0:51:30	1.70	2.525	38.01		1.31	0.39
105	0:52:00	1.70	2.525	38.01		1.31	0.39
106	0:52:30	1.60	2.521	38.01		1.21	0.39
107	0:53:00	1.60	2.521	38.01		1.21	0.39
108	0:53:30	1.60	2.521	38.01		1.21	0.39
109	0:54:00	1.60	2.521	38.01		1.21	0.39
110	0:54:30	1.50	2.508	38.00		1.11	0.39
111	0:55:00	1.50	2.508	38.00		1.11	0.39
112	0:55:30	1.50	2.508	38.00		1.11	0.39
113	0:56:00	1.50	2.509	38.00		1.11	0.39
114	0:56:30	1.40	2.494	37.99		1.01	0.39
115	0:57:00	1.40	2.493	37.99		1.01	0.39
116	0:57:30	1.40	2.494	37.99		1.01	0.39
117	0:58:00	1.40	2.494	37.99		1.01	0.39
118	0:58:30	1.30	2.469	37.98		0.91	0.39
119	0:59:00	1.30	2.469	37.98		0.91	0.39
120	0:59:30	1.30	2.469	37.98		0.91	0.39
121	1:00:00	1.30	2.470	37.98		0.91	0.39
122	1:00:30	1.20	2.444	37.96		0.81	0.39
123	1:01:00	1.20	2.444	37.96		0.81	0.39
124	1:01:30	1.20	2.444	37.96		0.81	0.39
125	1:02:00	1.20	2.443	37.96		0.81	0.39
126	1:02:30	1.30	2.444	37.96		0.91	0.39
127	1:03:00	1.30	2.444	37.96		0.91	0.39
128	1:03:30	1.30	2.445	37.96		0.91	0.39
129	1:04:00	1.30	2.444	37.96		0.91	0.39
130	1:04:30	1.40	2.450	37.96		1.01	0.39
131	1:05:00	1.40	2.451	37.96		1.01	0.39
132	1:05:30	1.40	2.450	37.96		1.01	0.39
133	1:06:00	1.40	2.450	37.96		1.01	0.39
134	1:06:30	1.50	2.466	37.97		1.11	0.39
135	1:07:00	1.50	2.466	37.97		1.11	0.39
136	1:07:30	1.50	2.466	37.97		1.11	0.39
137	1:08:00	1.50	2.467	37.97	0.001	1.11	0.39
138	1:08:30	1.60	2.486	37.99		1.21	0.39
139	1:09:00	1.60	2.486	37.99		1.21	0.39
140	1:09:30	1.60	2.488	37.99		1.21	0.39
141	1:10:00	1.60	2.487	37.99	0.001	1.21	0.39
142	1:10:30	1.70	2.508	38.00		1.31	0.39
143	1:11:00	1.70	2.508	38.00		1.31	0.39
144	1:11:30	1.70	2.511	38.00		1.31	0.39
145	1:12:00	1.70	2.511	38.00	0.003	1.31	0.39
146	1:12:30	1.80	2.536	38.02		1.41	0.39
147	1:13:00	1.80	2.538	38.02		1.41	0.39

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
148	1:13:30	1.80	2.542	38.03		1.41	0.39
149	1:14:00	1.80	2.541	38.02	0.005	1.41	0.39
150	1:14:30	1.90	2.572	38.05		1.51	0.39
151	1:15:00	1.90	2.576	38.05		1.51	0.39
152	1:15:30	1.90	2.580	38.05		1.51	0.39
153	1:16:00	1.90	2.583	38.05	0.011	1.51	0.39
154	1:16:30	2.00	2.633	38.09		1.60	0.40
155	1:17:00	2.00	2.641	38.09		1.60	0.40
156	1:17:30	2.00	2.648	38.10		1.60	0.40
157	1:18:00	2.00	2.652	38.10	0.019	1.60	0.40
158	1:18:30	2.10	2.718	38.14		1.70	0.40
159	1:19:00	2.10	2.735	38.16		1.70	0.40
160	1:19:30	2.10	2.751	38.17		1.70	0.40
161	1:20:00	2.10	2.760	38.17	0.042	1.70	0.40
162	1:20:30	2.20	2.851	38.24		1.79	0.41
163	1:21:00	2.20	2.877	38.25		1.79	0.41
164	1:21:30	2.20	2.902	38.27		1.79	0.41
165	1:22:00	2.20	2.917	38.28	0.066	1.79	0.41
166	1:22:30	2.30	3.030	38.36		1.88	0.42
167	1:23:00	2.30	3.055	38.37		1.88	0.42
168	1:23:30	2.30	3.083	38.39		1.88	0.42
169	1:24:00	2.30	3.109	38.41	0.079	1.88	0.42
170	1:24:30	2.40	3.226	38.49		1.97	0.43
171	1:25:00	2.40	3.276	38.53		1.97	0.43
172	1:25:30	2.40	3.312	38.55		1.97	0.43
173	1:26:00	2.40	3.335	38.57	0.109	1.97	0.43
174	1:26:30	2.50	3.470	38.66		2.06	0.44
175	1:27:00	2.50	3.537	38.71		2.06	0.44
176	1:27:30	2.50	3.572	38.73		2.06	0.44
177	1:28:00	2.50	3.604	38.75	0.134	2.06	0.44
178	1:28:30	2.60	3.758	38.86		2.15	0.45
179	1:29:00	2.60	3.804	38.89		2.15	0.45
180	1:29:30	2.60	3.872	38.94		2.14	0.46
181	1:30:00	2.60	3.911	38.97	0.153	2.14	0.46
182	1:30:30	2.70	4.082	39.09		2.24	0.46
183	1:31:00	2.70	4.167	39.14		2.23	0.47
184	1:31:30	2.70	4.214	39.18		2.23	0.47
185	1:32:00	2.70	4.252	39.20	0.170	2.23	0.47
186	1:32:30	2.80	4.475	39.36		2.32	0.48
187	1:33:00	2.80	4.559	39.42		2.32	0.48
188	1:33:30	2.80	4.605	39.45		2.32	0.48
189	1:34:00	2.80	4.671	39.50	0.196	2.32	0.48
190	1:34:30	2.60	4.674	39.50		2.27	0.33
191	1:35:00	2.34	4.636	39.47		2.01	0.33
192	1:35:30	2.20	4.616	39.46		1.88	0.33
193	1:36:00	2.00	4.571	39.43		1.68	0.32
194	1:36:30	1.80	4.514	39.39		1.47	0.32
195	1:37:00	1.61	4.462	39.35		1.29	0.32
196	1:37:30	1.41	4.390	39.30		1.10	0.32
197	1:38:00	1.20	4.288	39.23		0.89	0.31
198	1:38:30	1.01	4.173	39.15		0.70	0.31
199	1:39:00	0.82	3.928	38.98		0.53	0.30
200	1:39:30	0.60	3.099	38.40		0.34	0.26

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
201	1:40:00	0.45	1.381	37.25		0.28	0.17
202	1:40:30	0.30	-0.555	36.00		0.27	0.03

PRESSUREMETER TEST - OYO ELASTMETER-2 / ELAST LOGGER-2

Client : AVA Project : K5728 Location : Neo Tiew Crescent Measured By : Htoo Date : 25/5/2018 BH No : BH7 Test No : PMT1 Depth : 28.50 - 29.00m Soil Type : Sandy SILT SPT (N) : 91 Rubber Type : Hard					
Test Cycle	Earth Pressure at Rest	Yield Pressure	Coefficient of Soil Reaction	Modulus of Elasticity	Mean Radius
1st	Po (MPa)	Py (MPa)	Km (MPa/cm)	Em (MPa)	Rm (cm)
	0.630	2.350	27.302	127.242	3.729
	$Km = \Delta P' / \Delta R = (2.350 - 0.630) / (3.760 - 3.697) = 27.302 \text{ Mpa/cm}$ $Em = (1+\mu) \times Km \times Rm = (1 + 0.25) \times 27.302 \times 3.729 = 127.242 \text{ Mpa}$				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	-	89.091	418.672	3.760
	$Kr = \Delta P' / \Delta R = (2.340 - 1.360) / (3.765 - 3.754) = 89.091 \text{ Mpa/cm}$ $Er = (1+\mu) \times Kr \times Rr = (1 + 0.25) \times 89.091 \times 3.760 = 418.672 \text{ Mpa}$				



OYO

ELAST LOGGER2 DATA

FILE ID. 1
 DATE 25/05/2018
 TIME 2:54:16 PM
 HOLE NO. BH7
 DEPTH[m] 28.5
 TUBE NXH

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
1	0:00:00	0.24	-1.191	35.64		0.22	0.02
2	0:00:30	0.25	-1.186	35.65		0.23	0.02
3	0:01:00	0.25	-1.183	35.65		0.23	0.02
4	0:01:30	0.25	-1.179	35.65		0.23	0.02
5	0:02:00	0.25	-1.177	35.65	0.009	0.23	0.02
6	0:02:30	0.30	-1.124	35.68		0.27	0.03
7	0:03:00	0.30	-1.100	35.70		0.27	0.03
8	0:03:30	0.30	-1.092	35.70		0.26	0.04
9	0:04:00	0.30	-1.086	35.71	0.038	0.26	0.04
10	0:04:30	0.40	-0.926	35.80		0.34	0.06
11	0:05:00	0.40	-0.814	35.87		0.33	0.07
12	0:05:30	0.40	-0.792	35.89		0.32	0.08
13	0:06:00	0.40	-0.772	35.90	0.154	0.32	0.08
14	0:06:30	0.50	-0.348	36.16		0.36	0.14
15	0:07:00	0.50	-0.275	36.21		0.36	0.14
16	0:07:30	0.50	-0.216	36.24		0.35	0.15
17	0:08:00	0.50	-0.155	36.28	0.193	0.34	0.16
18	0:08:30	0.60	0.100	36.44		0.41	0.19
19	0:09:00	0.60	0.168	36.48		0.40	0.20
20	0:09:30	0.60	0.229	36.52		0.40	0.20
21	0:10:00	0.60	0.286	36.56	0.186	0.39	0.21
22	0:10:30	0.70	0.376	36.62		0.48	0.22
23	0:11:00	0.70	0.442	36.66		0.47	0.23
24	0:11:30	0.70	0.502	36.70		0.47	0.23
25	0:12:00	0.70	0.557	36.73	0.181	0.46	0.24
26	0:12:30	0.80	0.641	36.78		0.55	0.25
27	0:13:00	0.80	0.695	36.82		0.55	0.25
28	0:13:30	0.80	0.741	36.85		0.55	0.25
29	0:14:00	0.80	0.779	36.87	0.138	0.54	0.26
30	0:14:30	0.90	0.848	36.92		0.64	0.26
31	0:15:00	0.90	0.877	36.94		0.63	0.27
32	0:15:30	0.90	0.906	36.95		0.63	0.27
33	0:16:00	0.90	0.925	36.97	0.077	0.63	0.27
34	0:16:30	1.00	0.981	37.00		0.72	0.28
35	0:17:00	1.00	0.989	37.01		0.72	0.28
36	0:17:30	1.00	1.001	37.02		0.72	0.28
37	0:18:00	1.00	1.013	37.02	0.032	0.72	0.28
38	0:18:30	1.10	1.048	37.05		0.82	0.28
39	0:19:00	1.10	1.058	37.05		0.82	0.28
40	0:19:30	1.10	1.068	37.06		0.82	0.28
41	0:20:00	1.10	1.072	37.06	0.024	0.81	0.29

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	1.20	1.105	37.08		0.91	0.29
43	0:21:00	1.20	1.114	37.09		0.91	0.29
44	0:21:30	1.20	1.121	37.09		0.91	0.29
45	0:22:00	1.20	1.127	37.10	0.022	0.91	0.29
46	0:22:30	1.30	1.159	37.12		1.01	0.29
47	0:23:00	1.30	1.170	37.12		1.01	0.29
48	0:23:30	1.30	1.174	37.13		1.01	0.29
49	0:24:00	1.30	1.179	37.13	0.020	1.01	0.29
50	0:24:30	1.40	1.207	37.15		1.10	0.30
51	0:25:00	1.40	1.215	37.15		1.10	0.30
52	0:25:30	1.40	1.219	37.16		1.10	0.30
53	0:26:00	1.40	1.224	37.16	0.017	1.10	0.30
54	0:26:30	1.50	1.256	37.18		1.20	0.30
55	0:27:00	1.50	1.262	37.18		1.20	0.30
56	0:27:30	1.50	1.262	37.18		1.20	0.30
57	0:28:00	1.50	1.266	37.19	0.010	1.20	0.30
58	0:28:30	1.60	1.295	37.21		1.30	0.30
59	0:29:00	1.60	1.304	37.21		1.30	0.30
60	0:29:30	1.60	1.305	37.21		1.30	0.30
61	0:30:00	1.60	1.308	37.21	0.013	1.29	0.31
62	0:30:30	1.70	1.339	37.23		1.39	0.31
63	0:31:00	1.70	1.342	37.24		1.39	0.31
64	0:31:30	1.70	1.347	37.24		1.39	0.31
65	0:32:00	1.70	1.351	37.24	0.012	1.39	0.31
66	0:32:30	1.80	1.378	37.26		1.49	0.31
67	0:33:00	1.80	1.384	37.26		1.49	0.31
68	0:33:30	1.80	1.388	37.27		1.49	0.31
69	0:34:00	1.80	1.391	37.27	0.013	1.49	0.31
70	0:34:30	1.90	1.424	37.29		1.59	0.31
71	0:35:00	1.90	1.429	37.29		1.59	0.31
72	0:35:30	1.90	1.434	37.30		1.58	0.32
73	0:36:00	1.90	1.438	37.30	0.014	1.58	0.32
74	0:36:30	2.00	1.468	37.32		1.68	0.32
75	0:37:00	2.00	1.474	37.32		1.68	0.32
76	0:37:30	2.00	1.478	37.32		1.68	0.32
77	0:38:00	2.00	1.484	37.33	0.016	1.68	0.32
78	0:38:30	2.10	1.514	37.35		1.78	0.32
79	0:39:00	2.10	1.522	37.35		1.78	0.32
80	0:39:30	2.10	1.524	37.35		1.78	0.32
81	0:40:00	2.10	1.531	37.36	0.017	1.78	0.32
82	0:40:30	2.20	1.566	37.38		1.87	0.33
83	0:41:00	2.20	1.570	37.38		1.87	0.33
84	0:41:30	2.20	1.577	37.39		1.87	0.33
85	0:42:00	2.20	1.580	37.39	0.014	1.87	0.33
86	0:42:30	2.30	1.614	37.41		1.97	0.33
87	0:43:00	2.30	1.625	37.42		1.97	0.33
88	0:43:30	2.30	1.630	37.42		1.97	0.33
89	0:44:00	2.30	1.634	37.43	0.020	1.97	0.33
90	0:44:30	2.40	1.672	37.45		2.07	0.33
91	0:45:00	2.40	1.681	37.46		2.07	0.33
92	0:45:30	2.40	1.690	37.46		2.06	0.34
93	0:46:00	2.40	1.694	37.46	0.022	2.06	0.34
94	0:46:30	2.50	1.731	37.49		2.16	0.34

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
95	0:47:00	2.50	1.743	37.50		2.16	0.34
96	0:47:30	2.50	1.752	37.50		2.16	0.34
97	0:48:00	2.50	1.755	37.50	0.024	2.16	0.34
98	0:48:30	2.60	1.794	37.53		2.26	0.34
99	0:49:00	2.60	1.806	37.54		2.26	0.34
100	0:49:30	2.60	1.813	37.54		2.26	0.34
101	0:50:00	2.60	1.821	37.55	0.027	2.26	0.34
102	0:50:30	2.70	1.871	37.58		2.35	0.35
103	0:51:00	2.70	1.884	37.59		2.35	0.35
104	0:51:30	2.70	1.895	37.60		2.35	0.35
105	0:52:00	2.70	1.903	37.60	0.032	2.35	0.35
106	0:52:30	2.60	1.901	37.60		2.25	0.35
107	0:53:00	2.60	1.901	37.60		2.25	0.35
108	0:53:30	2.60	1.901	37.60		2.25	0.35
109	0:54:00	2.60	1.902	37.60		2.25	0.35
110	0:54:30	2.50	1.896	37.60		2.15	0.35
111	0:55:00	2.50	1.896	37.60		2.15	0.35
112	0:55:30	2.50	1.896	37.60		2.15	0.35
113	0:56:00	2.50	1.896	37.60		2.15	0.35
114	0:56:30	2.40	1.886	37.59		2.05	0.35
115	0:57:00	2.40	1.886	37.59		2.05	0.35
116	0:57:30	2.40	1.886	37.59		2.05	0.35
117	0:58:00	2.40	1.886	37.59		2.05	0.35
118	0:58:30	2.30	1.881	37.59		1.95	0.35
119	0:59:00	2.30	1.882	37.59		1.95	0.35
120	0:59:30	2.30	1.882	37.59		1.95	0.35
121	1:00:00	2.30	1.882	37.59		1.95	0.35
122	1:00:30	2.20	1.874	37.58		1.85	0.35
123	1:01:00	2.20	1.874	37.58		1.85	0.35
124	1:01:30	2.20	1.874	37.58		1.85	0.35
125	1:02:00	2.20	1.874	37.58		1.85	0.35
126	1:02:30	2.10	1.867	37.58		1.75	0.35
127	1:03:00	2.10	1.867	37.58		1.75	0.35
128	1:03:30	2.10	1.866	37.58		1.75	0.35
129	1:04:00	2.10	1.866	37.58		1.75	0.35
130	1:04:30	2.00	1.858	37.57		1.65	0.35
131	1:05:00	2.00	1.857	37.57		1.65	0.35
132	1:05:30	2.00	1.853	37.57		1.65	0.35
133	1:06:00	2.00	1.853	37.57		1.65	0.35
134	1:06:30	1.90	1.841	37.56		1.55	0.35
135	1:07:00	1.90	1.841	37.56		1.55	0.35
136	1:07:30	1.90	1.841	37.56		1.55	0.35
137	1:08:00	1.90	1.840	37.56		1.55	0.35
138	1:08:30	1.80	1.824	37.55		1.46	0.34
139	1:09:00	1.80	1.824	37.55		1.46	0.34
140	1:09:30	1.80	1.824	37.55		1.46	0.34
141	1:10:00	1.80	1.824	37.55		1.46	0.34
142	1:10:30	1.70	1.814	37.54		1.36	0.34
143	1:11:00	1.70	1.814	37.54		1.36	0.34
144	1:11:30	1.70	1.814	37.54		1.36	0.34
145	1:12:00	1.70	1.814	37.54		1.36	0.34
146	1:12:30	1.80	1.815	37.54		1.46	0.34
147	1:13:00	1.80	1.816	37.54		1.46	0.34

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
148	1:13:30	1.80	1.816	37.54		1.46	0.34
149	1:14:00	1.80	1.816	37.54	0.001	1.46	0.34
150	1:14:30	1.90	1.820	37.55		1.56	0.34
151	1:15:00	1.90	1.820	37.55		1.56	0.34
152	1:15:30	1.90	1.821	37.55		1.56	0.34
153	1:16:00	1.90	1.821	37.55	0.001	1.56	0.34
154	1:16:30	2.00	1.833	37.56		1.65	0.35
155	1:17:00	2.00	1.833	37.56		1.65	0.35
156	1:17:30	2.00	1.834	37.56		1.65	0.35
157	1:18:00	2.00	1.835	37.56	0.002	1.65	0.35
158	1:18:30	2.10	1.845	37.56		1.75	0.35
159	1:19:00	2.10	1.845	37.56		1.75	0.35
160	1:19:30	2.10	1.846	37.56		1.75	0.35
161	1:20:00	2.10	1.847	37.57	0.002	1.75	0.35
162	1:20:30	2.20	1.856	37.57		1.85	0.35
163	1:21:00	2.20	1.857	37.57		1.85	0.35
164	1:21:30	2.20	1.859	37.57		1.85	0.35
165	1:22:00	2.20	1.859	37.57	0.003	1.85	0.35
166	1:22:30	2.30	1.868	37.58		1.95	0.35
167	1:23:00	2.30	1.873	37.58		1.95	0.35
168	1:23:30	2.30	1.873	37.58		1.95	0.35
169	1:24:00	2.30	1.873	37.58	0.005	1.95	0.35
170	1:24:30	2.40	1.886	37.59		2.05	0.35
171	1:25:00	2.40	1.888	37.59		2.05	0.35
172	1:25:30	2.40	1.890	37.59		2.05	0.35
173	1:26:00	2.40	1.890	37.59	0.004	2.05	0.35
174	1:26:30	2.50	1.905	37.60		2.15	0.35
175	1:27:00	2.50	1.909	37.61		2.15	0.35
176	1:27:30	2.50	1.909	37.61		2.15	0.35
177	1:28:00	2.50	1.910	37.61	0.005	2.15	0.35
178	1:28:30	2.60	1.929	37.62		2.25	0.35
179	1:29:00	2.60	1.933	37.62		2.25	0.35
180	1:29:30	2.60	1.935	37.62		2.25	0.35
181	1:30:00	2.60	1.939	37.63	0.010	2.25	0.35
182	1:30:30	2.70	1.958	37.64		2.35	0.35
183	1:31:00	2.70	1.971	37.65		2.34	0.36
184	1:31:30	2.70	1.977	37.65		2.34	0.36
185	1:32:00	2.70	1.979	37.65	0.021	2.34	0.36
186	1:32:30	2.80	2.016	37.68		2.44	0.36
187	1:33:00	2.80	2.024	37.68		2.44	0.36
188	1:33:30	2.80	2.034	37.69		2.44	0.36
189	1:34:00	2.80	2.046	37.70	0.030	2.44	0.36
190	1:34:30	2.90	2.084	37.72		2.54	0.36
191	1:35:00	2.90	2.100	37.73		2.54	0.36
192	1:35:30	2.90	2.108	37.74		2.54	0.36
193	1:36:00	2.90	2.120	37.75	0.036	2.53	0.37
194	1:36:30	3.00	2.174	37.78		2.63	0.37
195	1:37:00	3.00	2.193	37.79		2.63	0.37
196	1:37:30	3.00	2.206	37.80		2.63	0.37
197	1:38:00	3.00	2.217	37.81	0.043	2.63	0.37
198	1:38:30	3.10	2.276	37.85		2.72	0.38
199	1:39:00	3.10	2.299	37.86		2.72	0.38
200	1:39:30	3.10	2.317	37.88		2.72	0.38

DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
201	1:40:00	3.10	2.329	37.88	0.053	2.72	0.38
202	1:40:30	3.20	2.392	37.93		2.82	0.38
203	1:41:00	3.20	2.417	37.94		2.82	0.38
204	1:41:30	3.20	2.440	37.96		2.81	0.39
205	1:42:00	3.20	2.457	37.97	0.065	2.81	0.39
206	1:42:30	3.30	2.519	38.01		2.91	0.39
207	1:43:00	3.30	2.547	38.03		2.91	0.39
208	1:43:30	3.30	2.571	38.04		2.91	0.39
209	1:44:00	3.30	2.590	38.06	0.071	2.91	0.39
210	1:44:30	3.40	2.659	38.10		3.00	0.40
211	1:45:00	3.40	2.695	38.13		3.00	0.40
212	1:45:30	3.40	2.720	38.14		3.00	0.40
213	1:46:00	3.40	2.738	38.16	0.079	3.00	0.40
214	1:46:30	3.50	2.819	38.21		3.09	0.41
215	1:47:00	3.50	2.855	38.23		3.09	0.41
216	1:47:30	3.50	2.880	38.25		3.09	0.41
217	1:48:00	3.50	2.906	38.27	0.087	3.09	0.41
218	1:48:30	3.60	2.997	38.33		3.18	0.42
219	1:49:00	3.60	3.039	38.36		3.18	0.42
220	1:49:30	3.60	3.071	38.38		3.18	0.42
221	1:50:00	3.60	3.095	38.40	0.098	3.18	0.42
222	1:50:30	3.70	3.174	38.45		3.27	0.43
223	1:51:00	3.70	3.223	38.48		3.27	0.43
224	1:51:30	3.70	3.259	38.51		3.27	0.43
225	1:52:00	3.70	3.290	38.53	0.116	3.27	0.43
226	1:52:30	3.50	3.293	38.53		3.23	0.27
227	1:53:00	3.31	3.285	38.53		3.04	0.27
228	1:53:30	3.11	3.269	38.51		2.84	0.27
229	1:54:00	2.91	3.246	38.50		2.64	0.27
230	1:54:30	2.69	3.215	38.48		2.42	0.27
231	1:55:00	2.52	3.189	38.46		2.25	0.26
232	1:55:30	2.31	3.153	38.44		2.05	0.26
233	1:56:00	2.12	3.101	38.40		1.86	0.26
234	1:56:30	1.92	3.064	38.38		1.66	0.26
235	1:57:00	1.72	3.015	38.34		1.46	0.26
236	1:57:30	1.51	2.954	38.30		1.25	0.25
237	1:58:00	1.31	2.881	38.25		1.06	0.25
238	1:58:30	1.12	2.801	38.20		0.87	0.25
239	1:59:00	0.92	2.696	38.13		0.68	0.24
240	1:59:30	0.70	2.553	38.03		0.47	0.23
241	2:00:00	0.47	2.302	37.87		0.25	0.22
242	2:00:30	0.31	0.659	36.80		0.19	0.12
243	2:01:00	0.27	-0.307	36.19		0.22	0.05

APPENDIX E

WATER STANDPIPE READINGS

CLIENT : Agri-Food & Veterinary Authority of Singapore
PROJECT TITLE: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)
WATER STANDPIPE: BH3
BOREHOLE NO. : BH3
GROUND RL (m) : 107.101
INSTALLED DATE : 24-May-18
REMARKS : Installed at 12.00m

BH3

Groundwater level (mRL)

Date

Date	Groundwater level (mRL)
24-May-18	105.20
26-May-18	105.00
30-May-18	105.30
3-Jun-18	105.60
5-Jun-18	105.40
9-Jun-18	105.10
11-Jun-18	105.30
13-Jun-18	104.90

CLIENT : Agri-Food & Veterinary Authority of Singapore
PROJECT TITLE: Soil Investigation Works for 114A & LCK 114B near Neo Tiew Crescent (Vol. 2 : BH3-BH7)
WATER STANDPIPE: BH5
BOREHOLE NO. : BH5
GROUND RL (m) : 106.064
INSTALLED DATE : 23-May-18
REMARKS : Installed at 12.00m

BH5

Groundwater level (mRL)

Date

Date	Groundwater level (mRL)
24-May-18	104.35
26-May-18	104.65
30-May-18	105.05
3-Jun-18	104.55
5-Jun-18	104.25
9-Jun-18	104.15
11-Jun-18	104.45
13-Jun-18	104.95

APPENDIX F

RESULTS OF LABORATORY TESTS


SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA								
PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)								
JOB NO. : K5728								
BOREHOLE NO :		BH-3						
SAMPLE NO :		D 1	SPT02	SPT03	TW01	SPT05	TW02	SPT08
SAMPLE DEPTH : m		1.00	4.00-4.45	6.00-6.45	8.00-8.90	12.00-12.45	16.00-16.90	20.00-20.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)	%	-	24.3	-	25.1	-	23.8	23.8
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)	Mg/m ³	-	2.01	-	2.03	-	2.04	2.05
DRY DENSITY (BS 1377 Part 2 : 1990 : Method 7)	Mg/m ³	-	-	-	-	-	-	-
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : Method 8 / Small Pyknometer)	Mg/m ³	-	2.62	-	2.62	-	2.63	2.65
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	2	-	0	-	0
	SAND	%	-	62	-	24	-	52
	SILT	%	-	16	-	46	-	29
	CLAY	%	-	20	-	30	-	19
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	34.0	42.6	42.9	36.2
	PLASTIC LIMIT	%	-	-	17.3	19.0	16.9	17.8
	PLASTICITY INDEX		-	-	17	24	26	18
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	UU	-	UU
	TOTAL COHESION	kPa	-	-	-	102.5	-	43.2
	TEST TYPE		-	-	-	-	-	-
	EFFECTIVE COHESION	kPa	-	-	-	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	-	-	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-
	COMPRESSION INDEX	C _c	-	-	-	-	-	-
ROCK TEST	POINT LOAD STRENGTH INDEX I _{s(50)}	MPa	-	-	-	-	-	-
	BULK DENSITY	Mg/m ³	-	-	-	-	-	-
	UNCONFINED COMPRESSIVE STRENGTH	MPa	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		7.2	-	-	-	-	-
	Chloride Content	%	<0.01	-	-	-	-	-
	Organic Content	%	0.5	-	-	-	-	-
	Sulphate Content	%	<0.01	-	-	-	-	-
LEGENDS : UU - Unconsolidated Undrained Test (Part 7/Method 8) CU - Consolidated Undrained Test (Part 8/Method 7) CD - Consolidated Drained Test (Part 8/Method 8)		REMARKS : -						
PREPARED BY : (Min Win Htut)		CHECKED BY : (Sio Keong Kong)				DATE : 11/06/2018		

This laboratory is accredited under the Singapore Accreditation Council-Singapore Laboratory Accreditation Scheme (SAC-SINGLAS) and has met the requirements of ISO /IEC 17025 : 2005. The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the SAC-SINGLAS.

SUMMARY OF LABORATORY TEST RESULTS

CLIENT :		AVA					
PROJECT :		36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)					
JOB NO. :		K5728					
BOREHOLE NO :		BH-3					
SAMPLE NO :		TW03	SPT10	SPT11	W1		
SAMPLE DEPTH :		m	24.00-24.90	26.00-26.45	30.00-30.43	Water Sample	
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	23.9	-	15.5		
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m ³	2.02	-	(B)	-	
DRY DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m ³	-	-	-	-	
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : Method 8 / Small Pyknometer)		Mg/m ³	2.61	-	2.62	-	
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	2	-	
	SAND	%	5	-	72	-	
	SILT	%	66	-	20	-	
	CLAY	%	29	-	6	-	
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	58.5	(A)	-	-	
	PLASTIC LIMIT	%	25.7		-	-	
	PLASTICITY INDEX		33		-	-	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		UU	-	-	-	
	TOTAL COHESION	kPa	131.3	-	-	-	
	TEST TYPE		-	-	-	-	
	EFFECTIVE COHESION	kPa	-	-	-	-	
	EFFECTIVE PHI ANGLE	degree	-	-	-	-	
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	
	COMPRESSION INDEX	C _c	-	-	-	-	
ROCK TEST	POINT LOAD STRENGTH INDEX I _{sg(50)}	MPa	-	-	-	-	
	BULK DENSITY	Mg/m ³	-	-	-	-	
	UNCONFINED COMPRESSIVE STRENGTH	MPa	-	-	-	-	
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	12.2	
	Chloride Content	g/L	-	-	-	<0.01	
	Organic Content	% (w/v)	-	-	-	<0.10	
	Sulphate Content	g/L	-	-	-	<0.01	
LEGENDS : UU - Unconsolidated Undrained Test (Part 7/Method 8) CU - Consolidated Undrained Test (Part 8/Method 7) CD - Consolidated Drained Test (Part 8/Method 8)		REMARKS : (A) - Atterberg limits test cancelled due to high content of sand. (B) - Test cancelled due to insufficient sample.					
PREPARED BY :  (Min Htut)		CHECKED BY :  (Sio Keong Kong)			DATE : 11/06/2018		

This laboratory is accredited under the Singapore Accreditation Council-Singapore Laboratory Accreditation Scheme (SAC-SINGLAS) and has met the requirements of ISO /IEC 17025 : 2005. The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the SAC-SINGLAS.



(TEST METHOD- BS 1377 Part 2 : 1990)

JOB NO. 5728

[illegible]

Method Used :	MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2) BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2) PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)
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TESTED BY: *MONJU*
Date : 30.05.2018

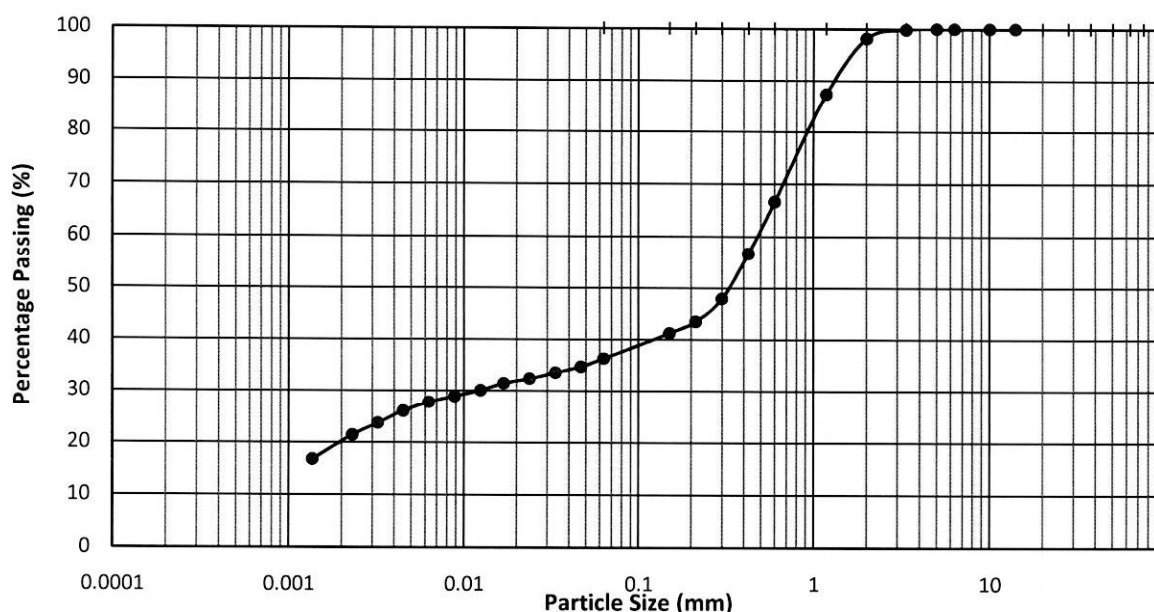
APPROVED BY: 
(Authorised Signatory - Min Win Htut)

DATE : 11.6.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
 JOB NO. : K5728
 BOREHOLE NO. : BH-3
 SAMPLE NO. : SPT02
 DEPTH (m) : 4.00-4.45m
 TEST DATE : 01.06.2018



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLE
	SILT			SAND			GRAVEL			

SOIL DESCRIPTION : **Yellow slightly gravelly sandy CLAY**

HYDROMETER + SIEVING

GRAVEL	=	2	%	
SAND	=	62	%	% of Passing 0.425 mm Sieve : 56.6
SILT	=	16	%	
CLAY	=	20	%	

TESTED BY :



APPROVED BY :



(Authorised Signatory - Min Win Htut)

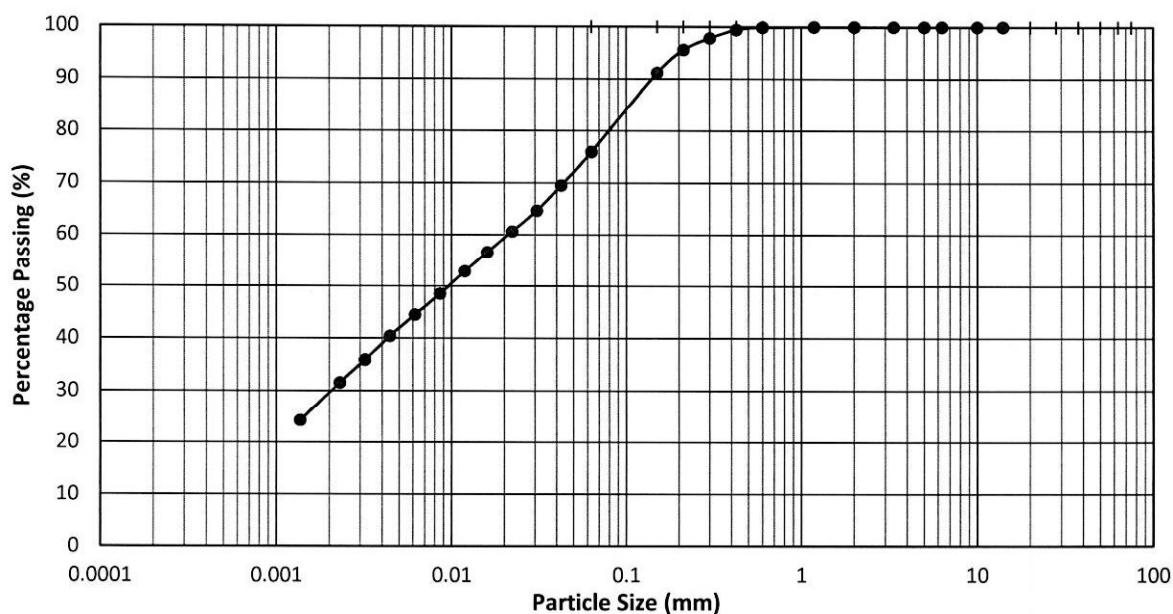
DATE :

11.6.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
 JOB NO. : K5728
 BOREHOLE NO. : BH-3
 SAMPLE NO. : TW01
 DEPTH (m) : 8.00-8.90m
 TEST DATE : 01.06.2018



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLE
	SILT			SAND			GRAVEL			

SOIL DESCRIPTION : **Light grey, yellowish brown and reddish brown slightly sandy CLAY**

HYDROMETER + SIEVING

GRAVEL	=	0	%	
SAND	=	24	%	% of Passing 0.425 mm Sieve : 99.4
SILT	=	46	%	
CLAY	=	30	%	

TESTED BY :



APPROVED BY :



(Authorised Signatory - Min Win Htut)

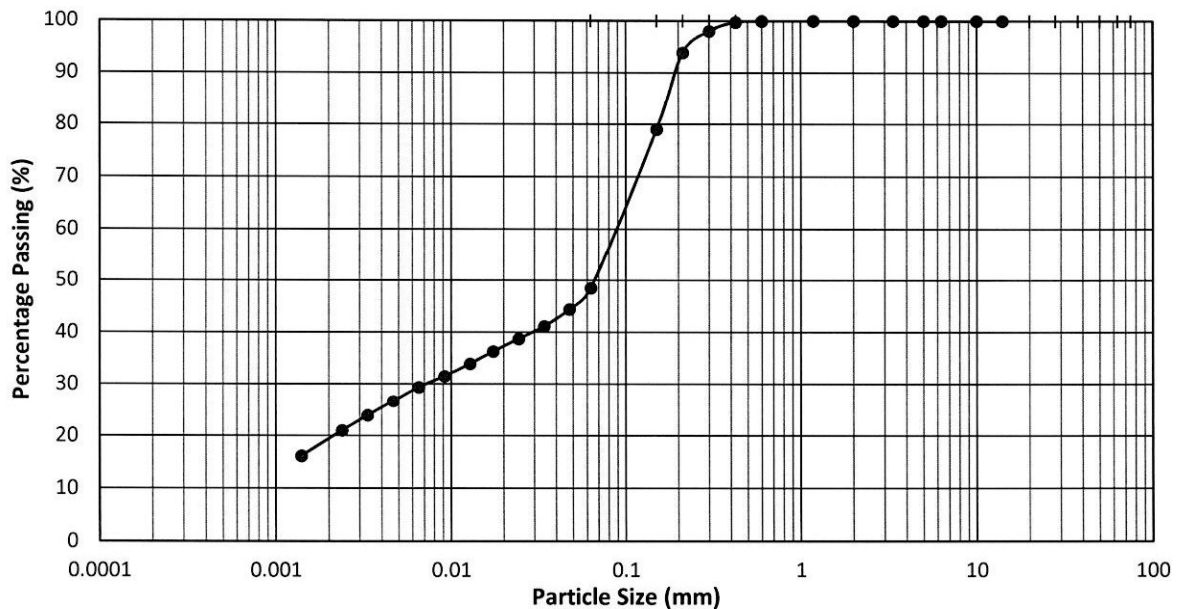
DATE :

11.6.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

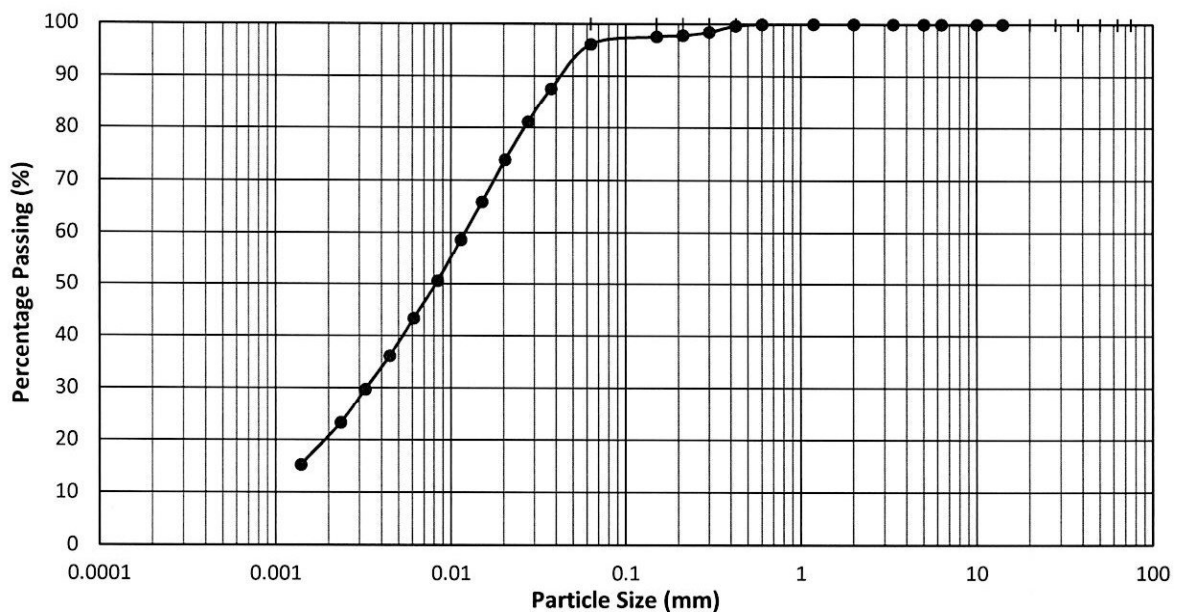
PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : TW02
DEPTH (m) : 16.00-16.90m
TEST DATE : 01.06.2018



GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : SPT08
DEPTH (m) : 20.00-20.45m
TEST DATE : 01.06.2018



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLE
	SILT			SAND			GRAVEL			

SOIL DESCRIPTION : **Greenish grey slightly sandy CLAY**

HYDROMETER + SIEVING

GRAVEL	=	0	%	
SAND	=	4	%	% of Passing 0.425 mm Sieve : 99.7
SILT	=	75	%	
CLAY	=	21	%	

TESTED BY :

[Signature]

APPROVED BY :

[Signature]
(Authorised Signatory - Min Win Htut)

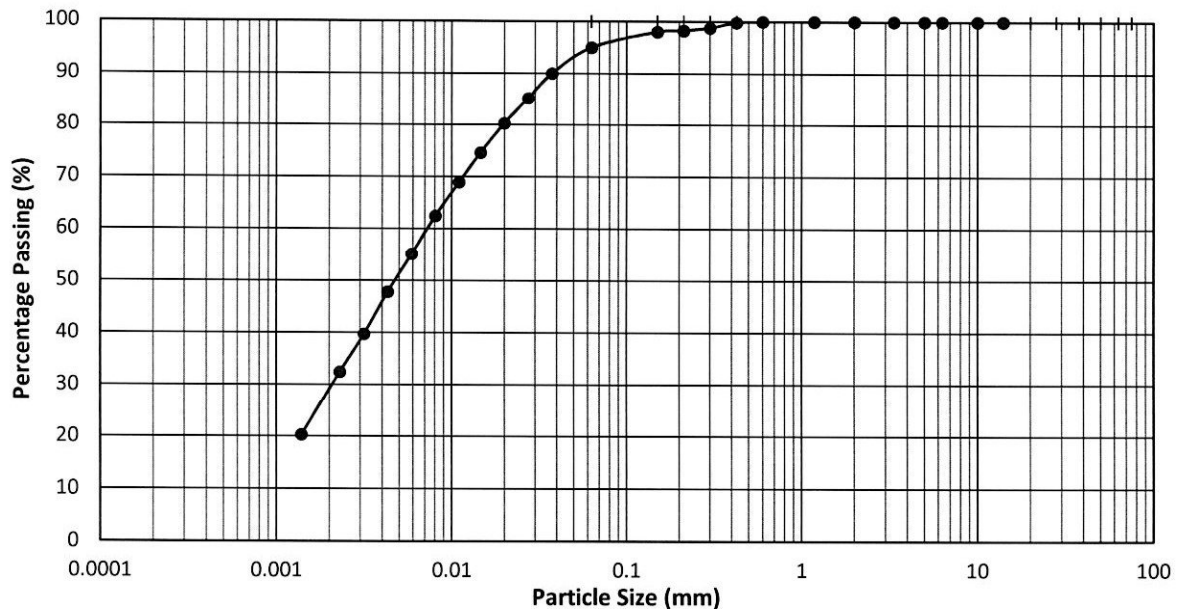
DATE :

11.6.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

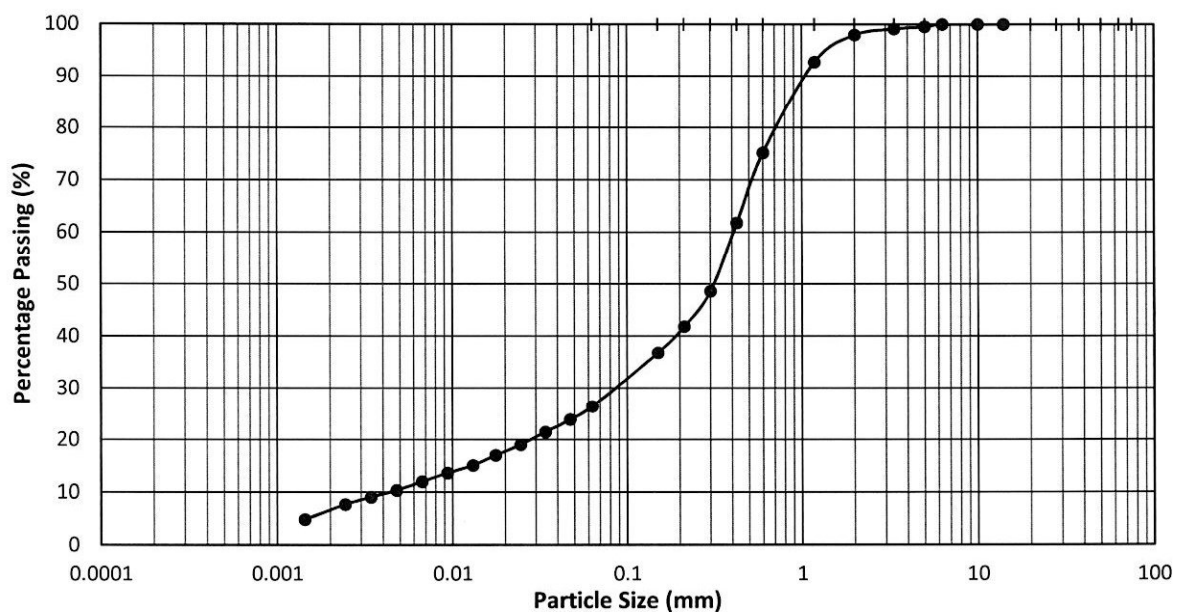
PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : TW03
DEPTH (m) : 24.00-24.90m
TEST DATE : 01.06.2018



GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clauses 9.3 & 9.5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : SPT11
DEPTH (m) : 30.00-30.43m
TEST DATE : 01.06.2018



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLE
	SILT			SAND			GRAVEL			

SOIL DESCRIPTION : **Light greenish grey slightly gravelly very clayey SAND**

HYDROMETER + SIEVING

GRAVEL	=	2	%	
SAND	=	72	%	% of Passing 0.425 mm Sieve : 61.8
SILT	=	20	%	
CLAY	=	6	%	

TESTED BY :

8- [Signature]

APPROVED BY :

[Signature]
(Authorised Signatory - Min Win Htut)

DATE :

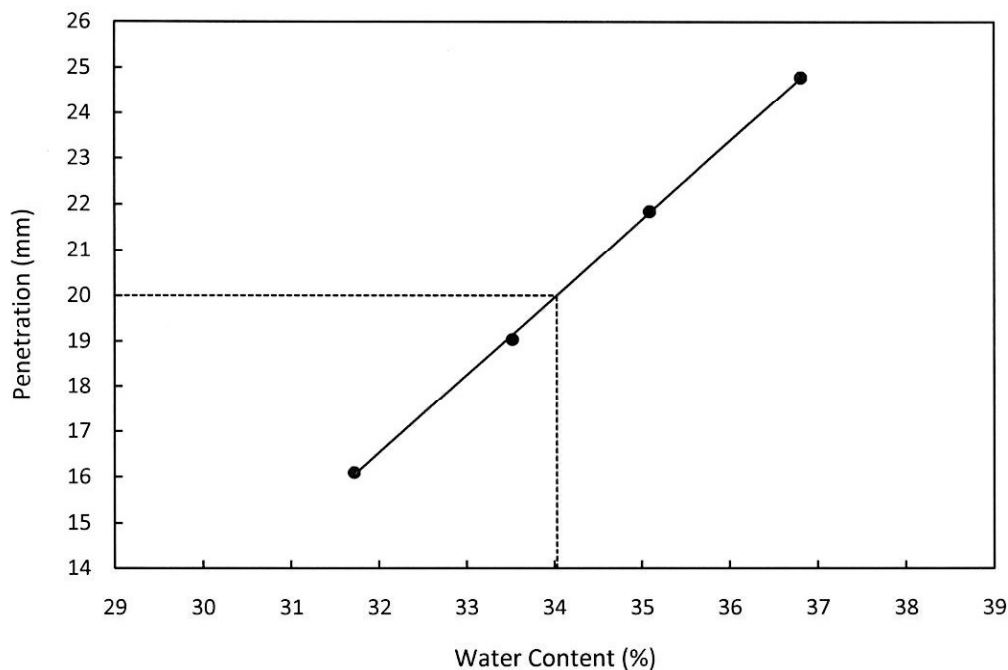
11.6.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

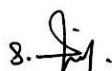
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : SPT03
DEPTH(M) : 6.00-6.45m
SOIL DESCRIPTION : Yellowish grey slightly sandy CLAY
SAMPLE CONDITION : Natural
% OF PASSING 0.425mm SIEVE : -
TEST DATE : 30.05.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.11	20.29	20.22	20.69	20.59	20.21
DRY WEIGHT + CUP	(g)	17.37	17.37	17.36	17.48	18.89	18.42
CUP WEIGHT	(g)	8.73	8.66	9.21	8.76	8.96	8.15
WATER CONTENT	(%)	31.7	33.5	35.1	36.8	17.1	17.4
PENETRATION	(mm)	16.1	19.0	21.9	24.8	-	-
LIQUID LIMIT	(%)	34.0		NOTE:		I : INTERMEDIATE PLASTICITY	
PLASTIC LIMIT	(%)	17.3		M : SILT		H : HIGH PLASTICITY	
PLASTICITY INDEX		17		C : CLAY		V : VERY HIGH PLASTICITY	
				L : LOW PLASTICITY		E : EXTREMELY HIGH PLASTICITY	



TESTED BY :



APPROVED BY :


(Authorised Signatory - Min Win Htut)

DATE :

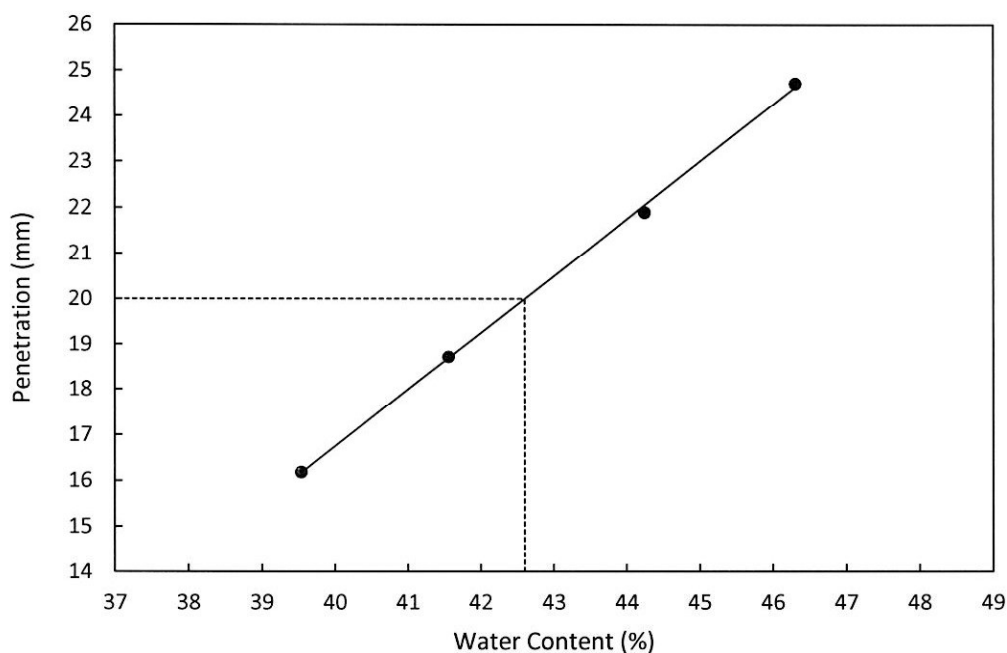
11.6.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : TW01
DEPTH(M) : 8.00-8.90m
SOIL DESCRIPTION : Light grey, yellowish brown and reddish brown slightly sandy CLAY
SAMPLE CONDITION : Natural
% OF PASSING 0.425mm SIEVE : 99
TEST DATE : 31.05.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.39	20.37	20.20	20.77	20.58	20.38
DRY WEIGHT + CUP	(g)	17.16	17.00	16.55	16.76	18.76	18.42
CUP WEIGHT	(g)	8.99	8.89	8.30	8.10	9.21	8.11
WATER CONTENT	(%)	39.5	41.6	44.2	46.3	19.1	19.0
PENETRATION	(mm)	16.2	18.7	21.9	24.7	-	-
LIQUID LIMIT	(%)	42.6		<u>NOTE:</u>		I : INTERMEDIATE PLASTICITY	
PLASTIC LIMIT	(%)	19.0		M : SILT		H : HIGH PLASTICITY	
PLASTICITY INDEX		24		C : CLAY		V : VERY HIGH PLASTICITY	
				L : LOW PLASTICITY		E : EXTREMELY HIGH PLASTICITY	



TESTED BY :



APPROVED BY :


(Authorised Signatory - Min Win Htut)

DATE :

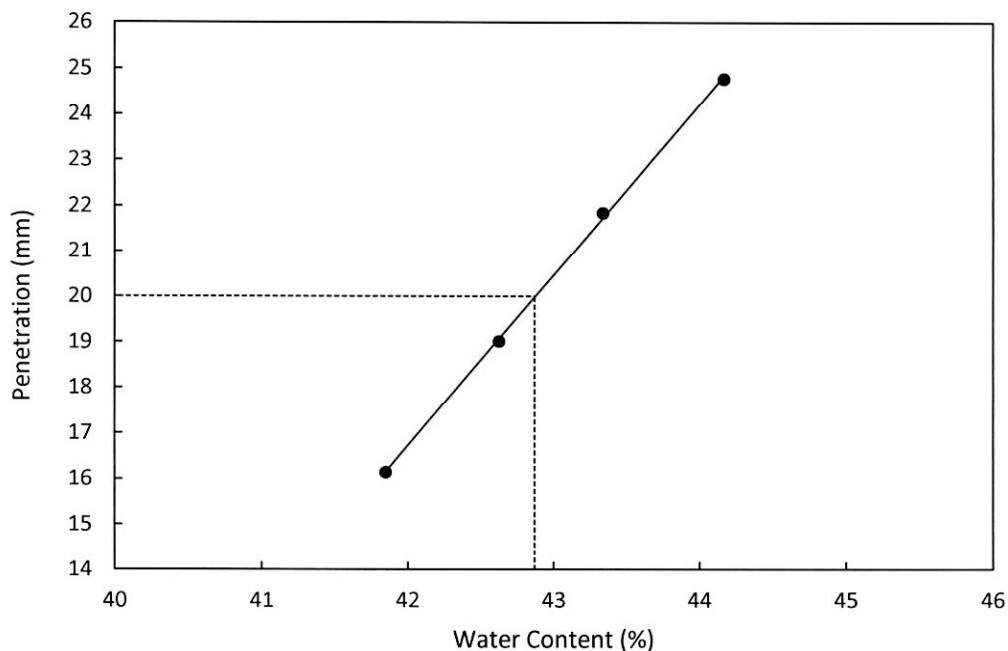
11.6.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : SPT05
DEPTH(M) : 12.00-12.45m
SOIL DESCRIPTION : Yellowish grey slightly sandy CLAY
SAMPLE CONDITION : Natural
% OF PASSING 0.425mm SIEVE : -
TEST DATE : 30.05.2018

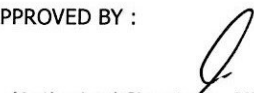
		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.09	20.32	20.85	20.53	20.76	20.24
DRY WEIGHT + CUP	(g)	16.60	16.65	17.11	16.82	19.10	18.49
CUP WEIGHT	(g)	8.26	8.04	8.48	8.42	9.26	8.20
WATER CONTENT	(%)	41.8	42.6	43.3	44.2	16.9	17.0
PENETRATION	(mm)	16.1	19.0	21.9	24.8	-	-
LIQUID LIMIT	(%)	42.9		<u>NOTE:</u>		I : INTERMEDIATE PLASTICITY	
PLASTIC LIMIT	(%)	16.9		M : SILT		H : HIGH PLASTICITY	
PLASTICITY INDEX		26		C : CLAY		V : VERY HIGH PLASTICITY	
				L : LOW PLASTICITY		E : EXTREMELY HIGH PLASTICITY	



TESTED BY :



APPROVED BY :


(Authorised Signatory - Min Win Htut)

DATE :

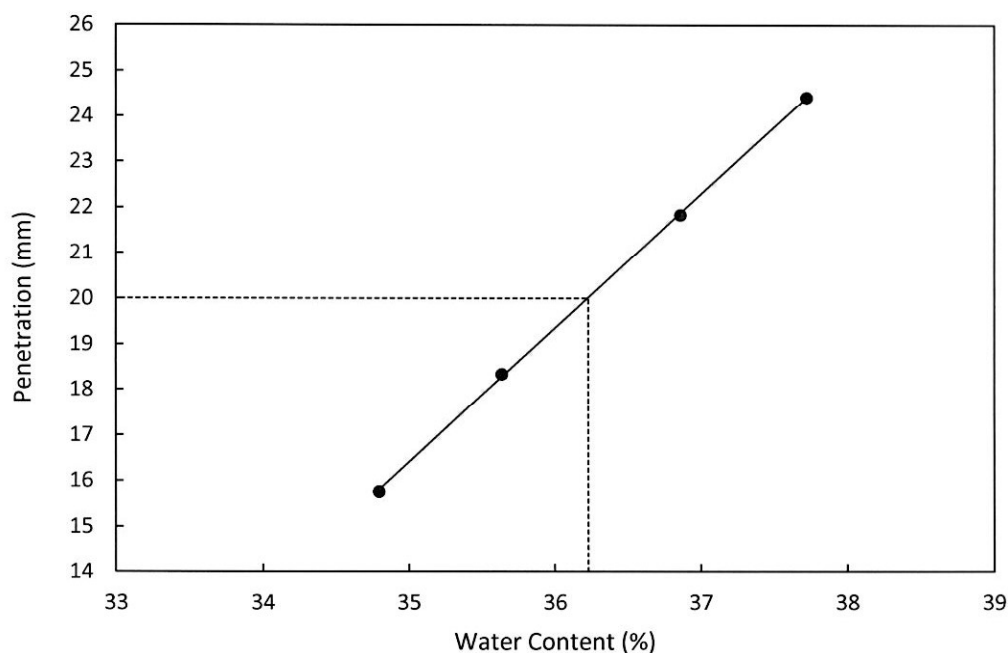
11. 6. 2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

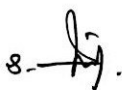
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
 JOB NO. : K5728
 BOREHOLE NO. : BH-3
 SAMPLE NO. : TW02
 DEPTH(M) : 16.00-16.90m
 SOIL DESCRIPTION : Light grey and light yellow sandy CLAY
 SAMPLE CONDITION : Natural
 % OF PASSING 0.425mm SIEVE : 100
 TEST DATE : 31.05.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.11	20.14	20.50	20.53	20.63	20.45
DRY WEIGHT + CUP	(g)	17.09	17.25	17.19	17.12	18.76	18.77
CUP WEIGHT	(g)	8.41	9.14	8.21	8.08	8.22	9.35
WATER CONTENT	(%)	34.8	35.6	36.9	37.7	17.7	17.8
PENETRATION	(mm)	15.8	18.3	21.8	24.4	-	-
LIQUID LIMIT	(%)	36.2		<u>NOTE:</u>		I : INTERMEDIATE PLASTICITY	
PLASTIC LIMIT	(%)	17.8		M : SILT		H : HIGH PLASTICITY	
PLASTICITY INDEX		18		C : CLAY		V : VERY HIGH PLASTICITY	
				L : LOW PLASTICITY		E : EXTREMELY HIGH PLASTICITY	



TESTED BY :



APPROVED BY :


 (Authorised Signatory - Min Win Htut)

DATE :

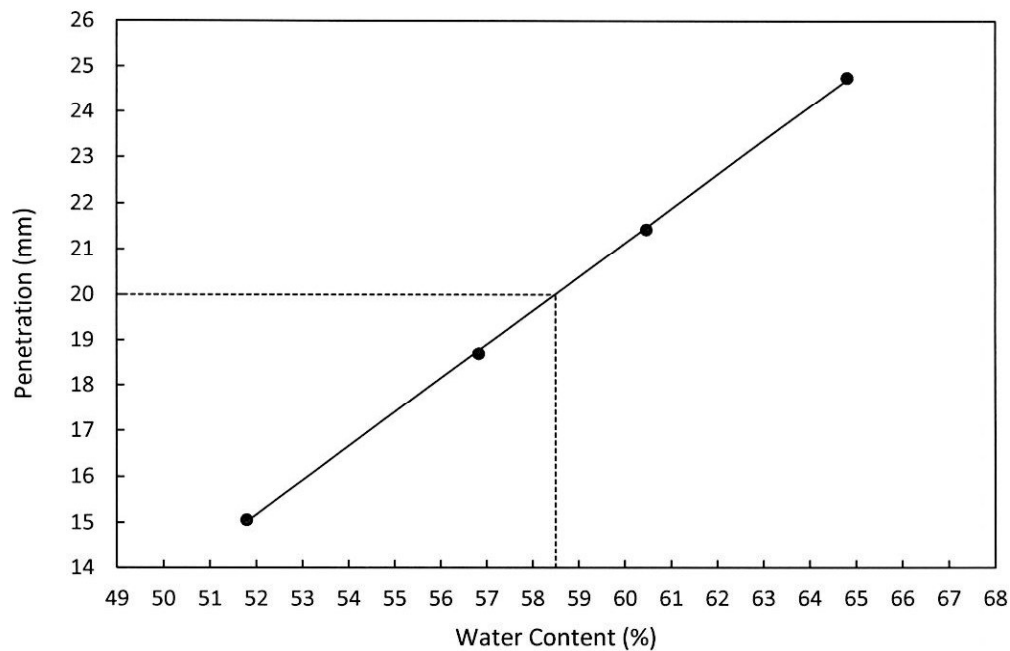
11. 6. 2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT : 36 months SI Term Contract for AVA at Neo Tiew Crescent (5BHs)
JOB NO. : K5728
BOREHOLE NO. : BH-3
SAMPLE NO. : TW03
DEPTH(M) : 24.00-24.90m
SOIL DESCRIPTION : Yellow slightly sandy CLAY
SAMPLE CONDITION : Natural
% OF PASSING 0.425mm SIEVE : 100
TEST DATE : 31.05.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.04	20.02	20.08	20.16	20.68	20.34
DRY WEIGHT + CUP	(g)	15.99	15.94	15.92	15.87	18.14	17.74
CUP WEIGHT	(g)	8.17	8.76	9.04	9.25	8.27	7.59
WATER CONTENT	(%)	51.8	56.8	60.5	64.8	25.7	25.6
PENETRATION	(mm)	15.1	18.7	21.4	24.8	-	-
LIQUID LIMIT	(%)	58.5		<u>NOTE:</u>		I : INTERMEDIATE PLASTICITY	
PLASTIC LIMIT	(%)	25.7		M : SILT		H : HIGH PLASTICITY	
PLASTICITY INDEX		33		C : CLAY		V : VERY HIGH PLASTICITY	
				L : LOW PLASTICITY		E : EXTREMELY HIGH PLASTICITY	



TESTED BY :



APPROVED BY :


(Authorised Signatory - Min Win Htut)

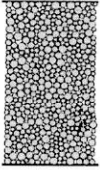
DATE :

11.6.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

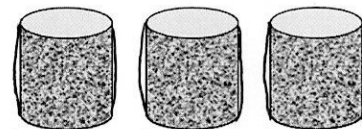
Sample Details		Depth	8.00-8.90m		
 sketch showing specimen location in original sample		Description	Stiff light grey, yellowish brown and reddish brown slightly sandy CLAY		
		Type	Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length		L ₀ (mm)	76.0	76.0	76.0
Initial Sample Diameter		D ₀ (mm)	38.0	38.0	38.0
Initial Sample Weight		W ₀ (gr)	174.6	174.9	176.0
Bulk Density		ρ ₀ (Mg/m ³)	2.03	2.03	2.04
Particle Density		ρ _s (Mg/m ³)	2.62	2.62	2.62

Initial Conditions			Spm. 1	2	3
Specimen					
Initial Cell Pressure	σ ₃ (kPa)		75	150	300
Strain Rate	m _s (mm/min)		0.76000	0.76000	0.76000
Membrane Thickness	m _b (mm)		0.20	0.20	0.20
Initial Moisture	ω _i % (%)		26	26	25
Initial Dry Density	ρ _{d0} (Mg/m ³)		1.60	1.61	1.64
Initial Voids Ratio	e ₀		0.63	0.62	0.60
Initial Degree of Saturation	S _o (%)		100	100	100

Final Conditions			Spm. 1	2	3
Max Deviator Stress	(σ ₁ - σ ₃) _f (kPa)		182.86	197.60	234.31
Membrane Correction	m _c (kPa)		1.860	1.330	1.730
Strain At Max Stress	ε _f % (%)		18.26	11.53	16.61
Shear Strength	c _u (kPa)		91.43	98.80	117.15
Final Moisture	ω _f % (%)		26	26	25
Final Dry Density	ρ _{df} (Mg/m ³)		1.60	1.61	1.64
Final Voids Ratio	e _f		0.63	0.62	0.60
Final Degree of Saturation	S _f (%)		100.0	100.0	100.0

Notes

Soil parameters in final condition are assumed the same with the initial condition.



Failure Sketch

(surface inclination)

 	Test Method BS1377: Part 7 1990 : Clause 8		Test Name UU1-AVA-B3T1	
	Database: \SQLEXPRESS \ RyobiG-L3-2017		Test Date 31/5/2018	
	Site Reference	AVA-Neo Tiew Crescent (5BHs)	Borehole	BH-3
	Jobfile	AVA - Neo Tiew Crescent	Sample	TW01
	Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Hut	Approved
				Sio Keong Kong

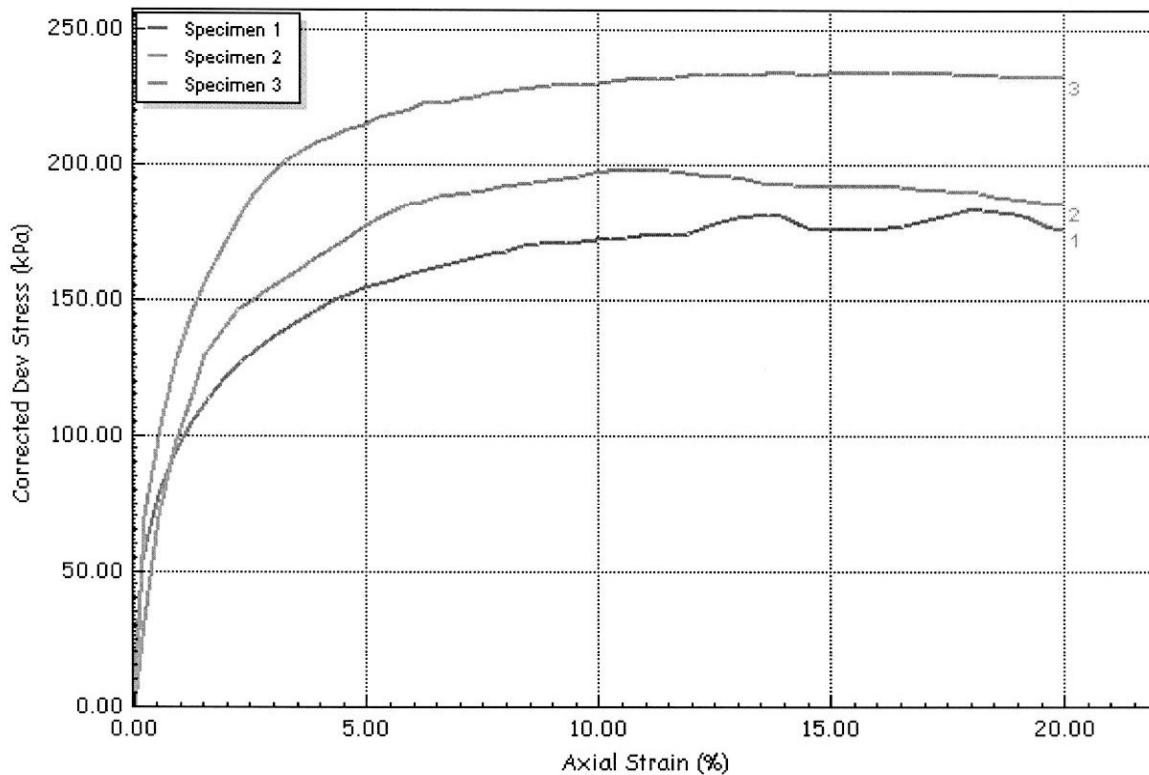
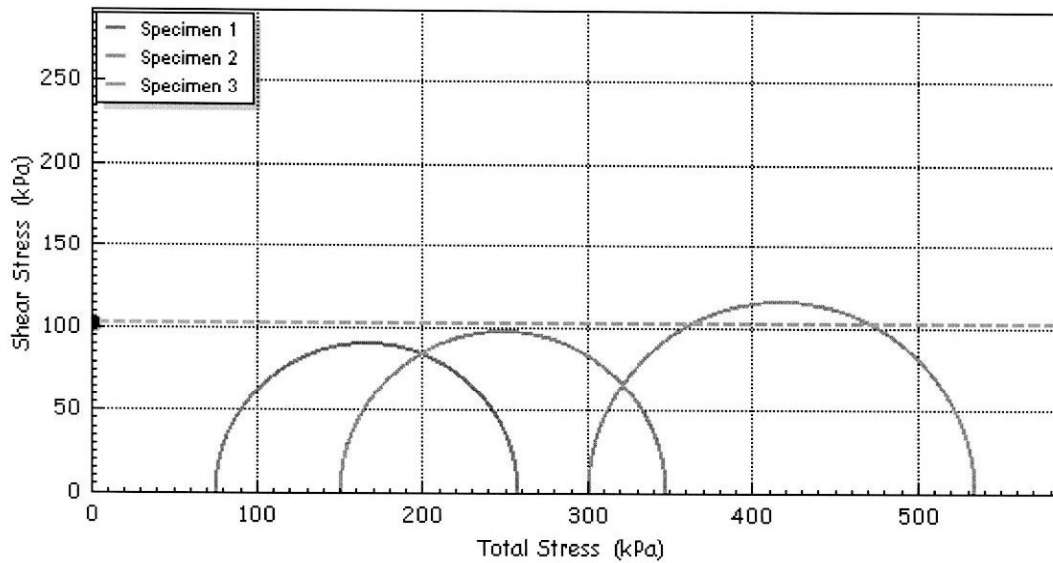
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	102.5
Friction Angle	ϕ	(deg)	0.0



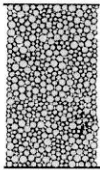
 	Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-AVA-B3T1
	Database:	.\SQLEXPRESS \ RyobiG-L3-2017	Test Date	31/5/2018
	Site Reference	AVA-Neo Tiew Crescent (5BHs)	Borehole	BH-3
	Jobfile	AVA - Neo Tiew Crescent	Sample	TW01
	Client	AVA	Depth	8.00-8.90m
Operator	Min Win Hui	Checked	Min Win Hui	Approved
				Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

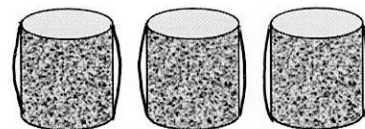
Sample Details  <i>sketch showing specimen location in original sample</i>	Depth	16.00-16.90m				
	Description	Firm light grey and light yellow sandy CLAY				
	Type	Undisturbed Sample				
			Spm. 1	2	3	
	Initial Sample Length	L ₀ (mm)	76.0	76.0	76.0	
	Initial Sample Diameter	D ₀ (mm)	38.0	38.0	38.0	
	Initial Sample Weight	W ₀ (gr)	174.9	174.9	177.3	
	Bulk Density	ρ ₀ (Mg/m ³)	2.03	2.03	2.06	
	Particle Density	ρ _s (Mg/m ³)	2.63	2.63	2.63	

Initial Conditions			Spm. 1	2	3
Specimen					
Initial Cell Pressure	σ ₃ (kPa)		150	300	600
Strain Rate	m _s (mm/min)		0.76000	0.76000	0.76000
Membrane Thickness	m _b (mm)		0.20	0.20	0.20
Initial Moisture	ω _i (%)		25	25	23
Initial Dry Density	ρ _{d0} (Mg/m ³)		1.62	1.62	1.67
Initial Voids Ratio	e ₀		0.63	0.62	0.58
Initial Degree of Saturation	S _o (%)		100	100	100

Final Conditions			Spm. 1	2	3
Max Deviator Stress	(σ ₁ - σ ₃) _f (kPa)		74.86	85.17	98.95
Membrane Correction	m _c (kPa)		1.460	1.570	1.530
Strain At Max Stress	ε _f (%)		13.01	14.46	13.93
Shear Strength	c _u (kPa)		37.43	42.59	49.47
Final Moisture	ω _f (%)		25	25	23
Final Dry Density	ρ _{df} (Mg/m ³)		1.62	1.62	1.67
Final Voids Ratio	e _f		0.63	0.62	0.58
Final Degree of Saturation	S _f (%)		100.0	100.0	100.0

Notes

Soil parameters in final condition are assumed the same with the initial condition.



Failure Sketch

(surface inclination)

  ACCREDITED LABORATORY Cert No: LA-2015-0523-B	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU2-AVA-B3T2	
	Database:	.SQLEXPRESS \ RyobiG-L3-2017		Test Date	31/5/2018	
	Site Reference	AVA-Neo Tiew Crescent (5BHs)		Borehole	BH-3	
	Jobfile	AVA - Neo Tiew Crescent		Sample	TW02	
	Client	AVA		Depth	16.00-16.90m	
Operator		Min Win Hut	Checked	Sio Keong Kong		Approved

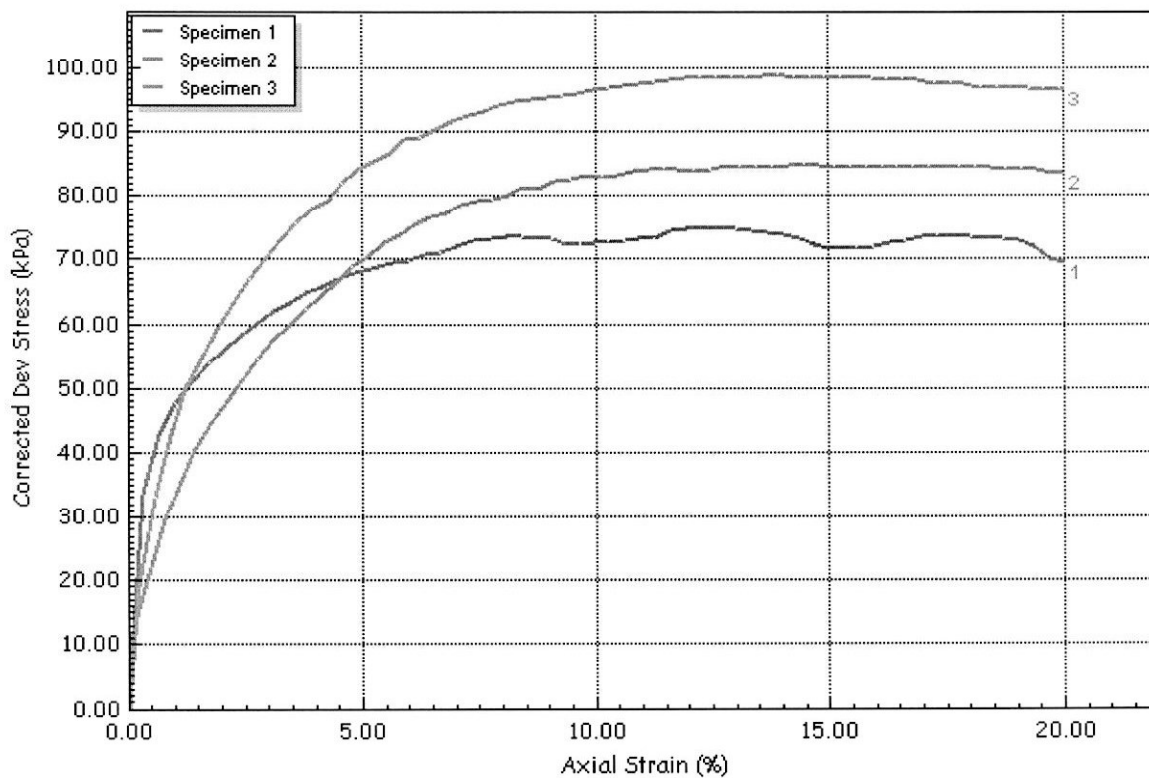
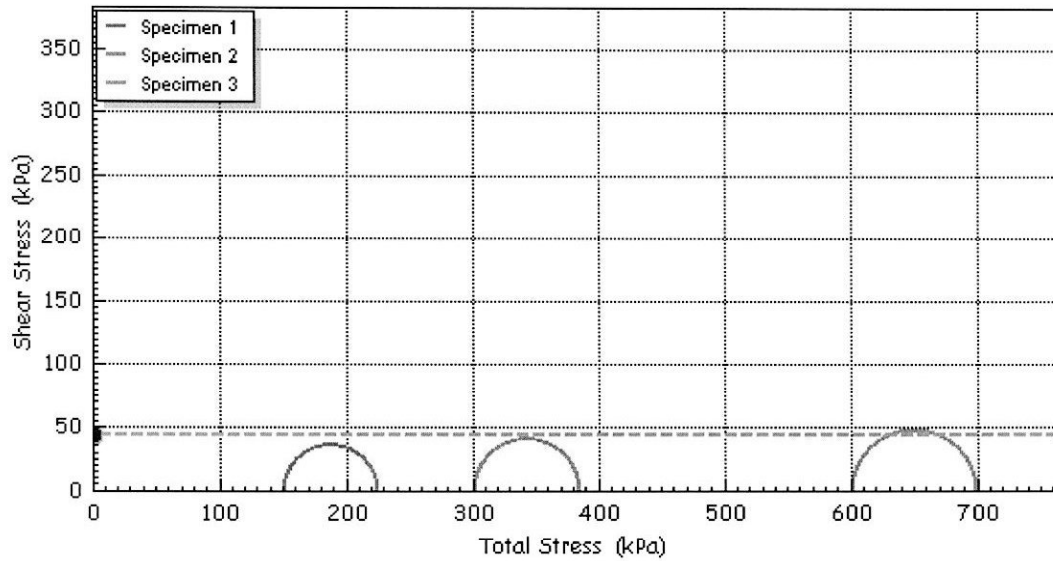
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	43.2
Friction Angle	ϕ	(deg)	0.0



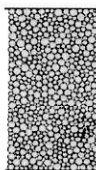
  Cert No: LA-2016-0623-B	Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-AVA-B3T2	
	Database:	.\SQLEXPRESS \ RyobiG-L3-2017	Test Date	31/5/2018	
	Site Reference	AVA-Neo Tiew Crescent (5BHs)	Borehole	BH-3	
	Jobfile	AVA - Neo Tiew Crescent	Sample	TW02	
	Client	AVA	Depth	16.00-16.90m	
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

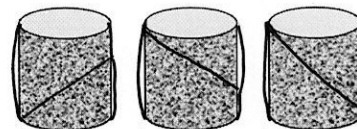
Sample Details		Depth	24.00-24.90m			
 <i>sketch showing specimen location in original sample</i>	Description	Stiff yellow slightly sandy CLAY				
	Type	Undisturbed Sample				
			Spm. 1	2	3	
	Initial Sample Length	L ₀	(mm)	76.0	76.0	76.0
	Initial Sample Diameter	D ₀	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W ₀	(gr)	176.3	180.1	180.7
	Bulk Density	ρ ₀	(Mg/m3)	2.05	2.09	2.10
	Particle Density	ρ _s	(Mg/m3)	2.61	2.61	2.61

Initial Conditions			Spm. 1	2	3
Specimen					
Initial Cell Pressure	σ ₃ (kPa)		225	450	850
Strain Rate	m _s (mm/min)		0.76000	0.76000	0.76000
Membrane Thickness	m _b (mm)		0.20	0.20	0.20
Initial Moisture	ω _i % (%)		25	24	23
Initial Dry Density	ρ _{d0} (Mg/m ³)		1.64	1.68	1.70
Initial Voids Ratio	e ₀		0.60	0.55	0.53
Initial Degree of Saturation	S _o (%)		100	100	100

Final Conditions			Spm. 1	2	3
Max Deviator Stress	(σ ₁ - σ ₃) _f (kPa)		253.73	259.26	274.84
Membrane Correction	m _c (kPa)		0.890	0.870	0.940
Strain At Max Stress	ε _f % (%)		6.91	6.67	7.33
Shear Strength	c _u (kPa)		126.86	129.63	137.42
Final Moisture	ω _f % (%)		25	24	23
Final Dry Density	ρ _{df} (Mg/m ³)		1.64	1.68	1.70
Final Voids Ratio	e _f		0.60	0.55	0.53
Final Degree of Saturation	S _f (%)		100.0	100.0	100.0

Notes

Soil parameters in final condition are assumed the same with the initial condition.



Failure Sketch

(surface inclination)

  Cert No: LA-2016-0623-B	Test Method BS1377: Part 7 1990 : Clause 8		Test Name UU3-AVA-B3T3		
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date 31/5/2018		
	Site Reference	AVA-Neo Tiew Crescent (5BHs)	Borehole	BH-3	
	Jobfile	AVA - Neo Tiew Crescent	Sample	TW03	
	Client	AVA	Depth	24.00-24.90m	
Operator 		Checked	Min Win Htut 	Approved	Sio Keong Kong 

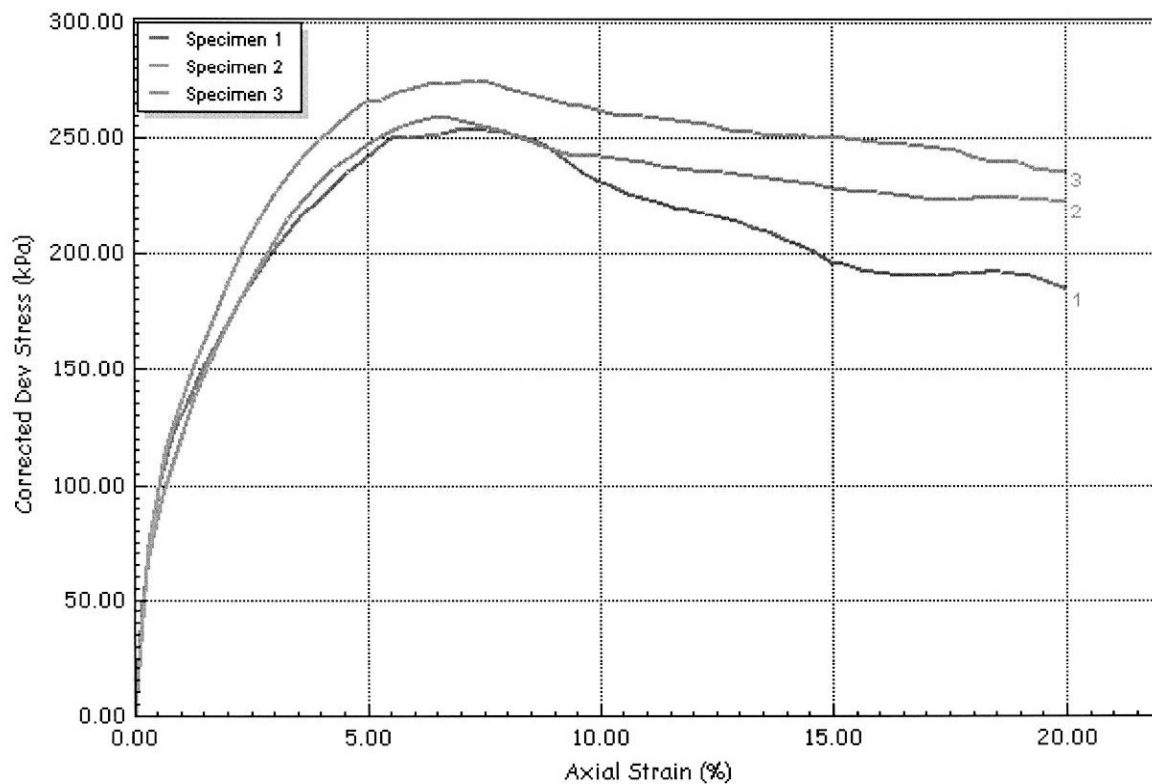
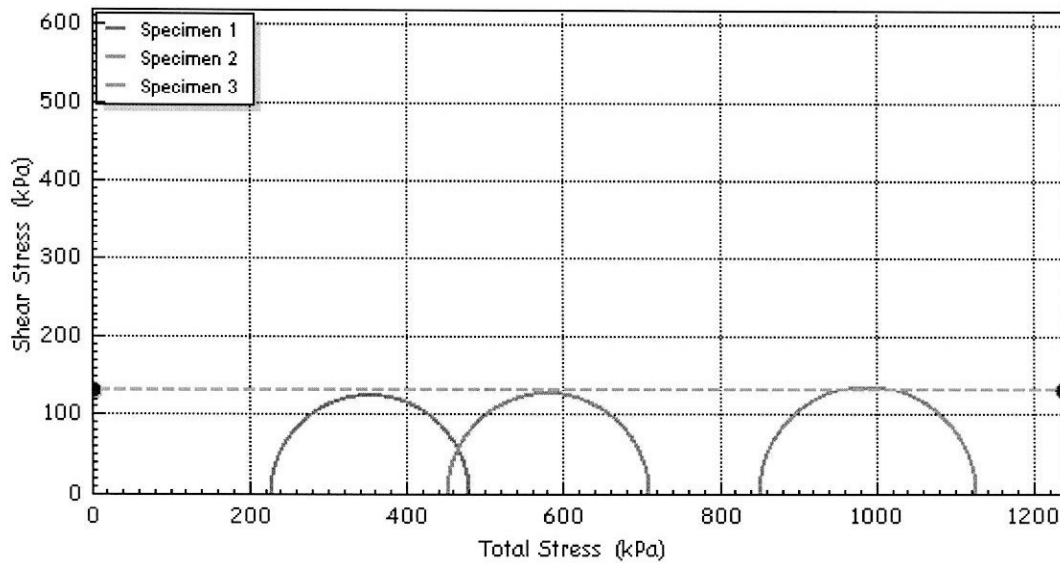
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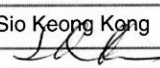
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	131.3
Friction Angle	ϕ	(deg)	0.0



  Cert No: LA-2018-0623-B	Test Method BS1377: Part 7 1990 : Clause 8		Test Name UU3-AVA-B3T3	
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date 31/5/2018	
	Site Reference AVA-Neo Tiew Crescent (5BHs)		Borehole BH-3	
	Jobfile AVA - Neo Tiew Crescent		Sample TW03	
	Client AVA		Depth 24.00-24.90m	
	Operator 	Checked	Min Win Hui 	Approved Sio Keong Kong 

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