SOIL INVESTIGATION WORKS

FOR ST28 (LV PLOTS)

ALONG SUNGEI TENGAH ROAD

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

RYOBI GEOTECHNIQUE INTERNATIONAL PTE LTD

ACCREDITED INSPECTION BODY
SAC
Cert No: IB-2016-129-F

PROFESSIONAL ENGINEER
CIVIL
DONG WEI BIN
3885
SINGAPORE

Project No. : K5728

DATE : 29th September2018

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58A SungeiKadut Loop, Ryobi Industrial Building,Singapore 729505. Tel: 6369 7100 Fax: 6362 5848

Email: rock@ryobi-g.com

Co.Reg.No. 200500891W

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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 ST28 (LV PLOTS)ALONG SUNGEI TENGAH ROAD

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/ST28-FINAL REPORT*

3. Total number of pages in the Site Investigation Report is 734 .



Professional Engineer for Site Investigation Signature and Stamp

29 –September-2018
Date

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1. INTRODUCTION

1.1 General

This report presents the results of soil investigation works consisting of seventeen (17) land boreholes (i.e. BH1 – BH3, BH3A, BH4 – BH5, BH5A, BH6 – BH15) carried out for Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road. (See *Figure 1.1*).

1.2 Project Description

(a) Title of Project

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

(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
- Monitoring of groundwater level including installation of water standpipes
- 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 seventeen (17) boreholes (i.e. BH1 – BH3, BH3A, BH4 – BH5, BH5A, BH6 – BH15) 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 7 August 2018 and completed on 5 September 2018. A total number of seventeen (17) boreholes were drilled to depths ranging from 18.500m to 30.450m below the existing ground level.

2.2 Groundwater Observation

For the monitoring of groundwater at the project site, three (3) Water Standpipes (WSP) were installed in the completed boreholes, i.e. Borehole Nos. BH3, BH8 and BH13 selected by Consultant during the course of field investigation.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

Co.Reg.No. 200500891W

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

Table 2.1 Types and Quantities of Field Works

Borehole	Coordinates		Reduced Lev	Borehole Exploration (m)			Soil Samples, Field Tests & Instruments (Nos)								
	Northing (m)	Eas ing (m)		Termination Depth	Soil Drilling	Rock Coring	Standard Penetration	Disturbed Sample (from ' a)	Thin-walled Tube Sam	Mazier Sample	Piston Sample	Plate Load Test	pressuremeter Tes	Water Standpipe	Downhole Seismic Te
BH1	42382.066	16503.513	106 233	25.800	25.800	-	12	-	3	-	-	-	-	-	-
BH2	42387.183	16559.188	105 894	25.800	25.800	-	12	-	4	-	-	-	-	-	-
BH3	42438.663	16522.071	106.418	21.500	21.500	-	10	-	3	-	-	-	-	1	-
BH3A	42431.799	16526.310	106.636	25.700	25.700	-	13	-	2	1	-	-	-	-	-
BH4	42465.843	16478.876	106 249	24.500	24.500	-	12	-	3	-	-	-	-	-	-
BH5	42507.411	16517.272	106 850	21.800	21.800	-	10	-	3	-	-	-	-	-	-
BH5A	42507.883	16507.640	106 244	18.500	18.500	-	9	-	2	-	-	-	-	-	-
BH6	42510.049	16457.531	106.757	27.350	27.350	-	13	-	3	-	-	-	-	-	-
BH7	42540.601	16499.812	105 008	23.750	23.750	-	11	-	3	-	-	-	-	-	-
BH8	42582.529	16450.376	106 899	30.450	30.450	-	15	-	4	-	-	-	1	1	-
BH9	42634.207	16395.736	106 362	30.450	30.450	-	15	-	4	-	-	-	1	-	-
BH10	42662.484	16435.415	106.487	30.450	30.450	-	15	-	4	-	-	-	-	-	-
BH11	42693.461	16417.895	106 949	30.450	30.450	-	14	-	4	-	-	-	1	-	-
BH12	42693.789	16348.922	106.452	30.450	30.450	-	15	-	4	-	-	-	1	-	-
BH13	42734.778	16368.011	106.653	30.450	30.450	-	15	-	4	-	-	-	-	1	-
BH14	42738.052	16302.515	106.637	30.450	30.450	-	15	-	4	-	-	-	-	-	-
BH15	42785.222	16354.795	106 543	28.100	28.100	-	14	-	4	-	-	-	1	-	-
			Total	455.950	455 950	-	220	-	58	1	-	-	5	3	-

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.

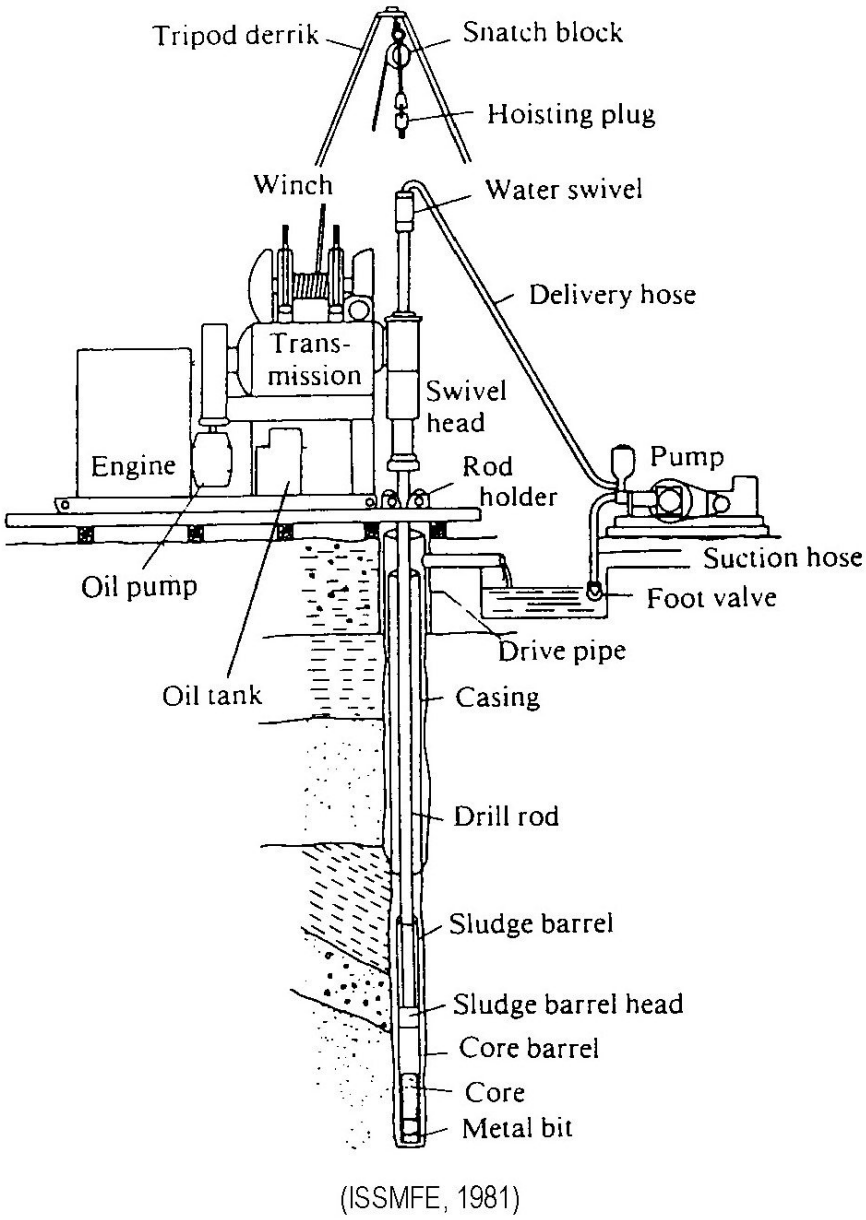


Figure 3.1SchematicDiagram of Rotary Wash Boring

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.

3.1.2.2.2 Mazier sample (MZ)

For sampling work in hard soil with SPT-N > 30, undisturbed soil samples were recovered by using Mazier sampler consisting of 75mm I.D. x 1000mm length rotary triple tube with an outer and an inner barrels, a PVC tube (73m I.D x 1000mm length x 2mm thickness), a sampler head, a cutting shoe and a drill bit which will cut soil and reduce resistance for advancing the sampler into very stiff to hard soils for the required sampling works.

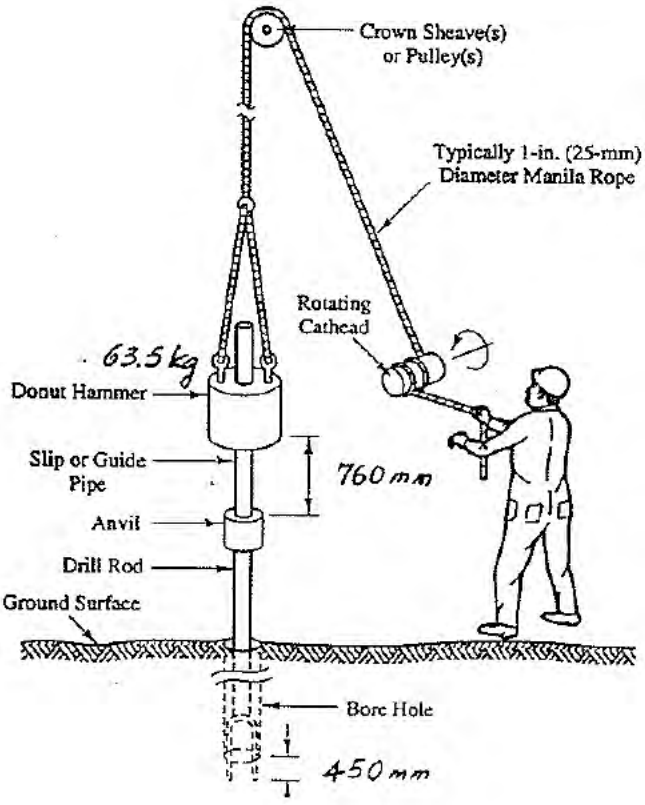
Undisturbed samples were taken at intervals specified, stored vertically in suitable racks, waxed at both ends, and labelled properly before transporting to the laboratory for testing. Samples were properly stored in sample delivery box with sufficient protection for minimizing sample disturbance during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

Client. The purpose of this empirical dynamic penetration test is to ıe resistance of soils to the penetration (i.e. 450mm or lesser) of a ;ampler of 50 mm external diameter which was driven by a 63.5 kg drop hammer with a free fall of 760 mm. (Figure 3.2). The value of resistance, N is the number of blows required to achieve a 300 mm of the barrel after an initial penetration of 150mm was achieved or low count number of 25 was recorded. This was achieved by ordi ıe blows for every 75mm penetration. Standard Penetration Tests cted at specified depth according to Client's requirements. The of N obtained in this investigation were recorded in the borehole logs presented *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 = Sum of last four readings.

igure 3.2General Setup and Procedure of SPT

lote: Manual hammer instead of automatic hammerwas 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 25.7and 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).

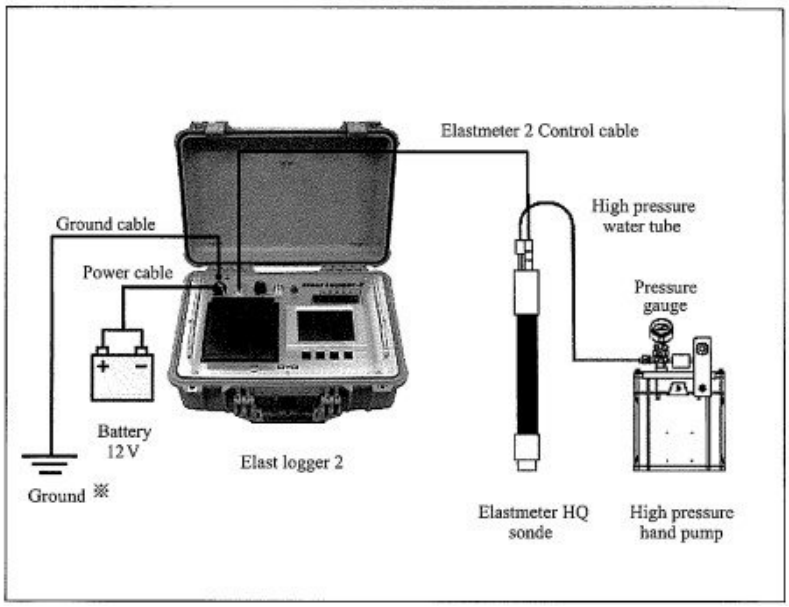


Figure 3.3 OYO Elastmeter 2 & Elast Logger 2

3.3 Water Standpipe Installation

Water standpipes (WSP) were installed in selected, completed boreholes at depth (i.e. 12m) specified by Consultant 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 ~0.5mbelow the specified installation depth. The hole section prepared for standpipe installation was flushed 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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

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

Table 4.1 Types and Quantities of Laboratory Test

Borehole N	Index Tests						Strength Tests								Chemical Tests															
	Moisture Content	Bulk Density	Particle Density	Liquid and Plastic Lim	Grading by Hydrometer A	Grading by Mechanical An	Unconsolidated-undrained Triaxial Co Test	Consolidated-undrained Triaxial Co Test on 38mm diame	Consolidated-undrained Triaxial Co Test on 70mm diame	Consolidated -drained Triaxial Comp	Unconfined Compression (U	Point Load Test on Rock S	Permeability Test by Falli	One-dimensional Cons	pH value of soil sample c		Organic Content of soil sa sample		Chloride content of soil sa sample		Sulphate contect of soil s p 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
BH1	7	7	7	7	7	7	1	1	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH2	8	8	8	8	8	8	3	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH3	7	6	6	6	6	6	1	1	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH3A	7	6	7	7	5	7	1	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH4	6	6	6	4	6	6	3	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH5	5	5	5	3	5	5	3	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH5A	4	4	4	2	4	4	2	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH6	7	6	7	4	7	7	3	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH7	6	6	6	3	6	6	2	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH8	9	8	7	6	8	8	2	1	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH9	8	8	7	6	7	7	4	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH10	7	7	7	5	7	7	4	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH11	9	8	5	7	8	7	3	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH12	7	7	6	6	7	7	4	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH13	7	7	7	5	7	7	3	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH14	7	7	7	5	6	7	4	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
BH15	7	7	7	4	7	6	3	-	1	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-
Total	118	113	109	88	111	112	46	3	9	-	-	-	-	-	17	17	17	17	17	17	17	17	-	-	-	-	-	-	-	-

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 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 7: 1990 Method 7.

4.4 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.

4.4.1 pH Value

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

4.4.2 Organic Content

The organic matter was analysed by oxidation using dichromate technique.

4.4.3 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.

4.4.4 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 BUKIT TIMAH GRANITE (Figure 5.1). The geological formation is described as follows:

BUKIT TIMAH GRANITE (BT)

The BUKIT TIMAH GRANITE occupies more than one third area of Singapore in the centre part of Singapore Island. The outcrops of the BUKIT TIMAH GRANITE are rare. It is covered by weathered residual soil, recent deposits of KALLANG FORMATION. The BUKIT TIMAH GRANITE varies from igneous rock Granite through Adamelite to Granodiorite and several hybrid rocks are included within the formation. Both Hornblende-rich Granite and Biotite-rich Granite occur. Zone of Norite-Granite mixed rocks are also seen. The color of the BUKIT TIMAH GRANITE is light grey to dark grey, spotted with white. The color of the weathered residual soil varies from red, light grey, grey, and white, depend on the content of the ferromagnesian minerals. The residual soil includes, Sandy SILT, SILT, Sandy CLAY, Silty SAND and Clayey SAND etc. The geological period is early to middle Triassic.

5.2 Subsoil Condition

According to the results of present boreholes, the subsoils at the seventeen (17) completed borehole locations can be classified into three (3) 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 to Sandy SILT with hard cores, Slightly gravelly sandy CLAY to Slightly gravelly slightly sandy CLAY with traces of decayed woods and concrete debris, SAND, Silty SAND to Very silty SAND, Sandy CLAY with traces of

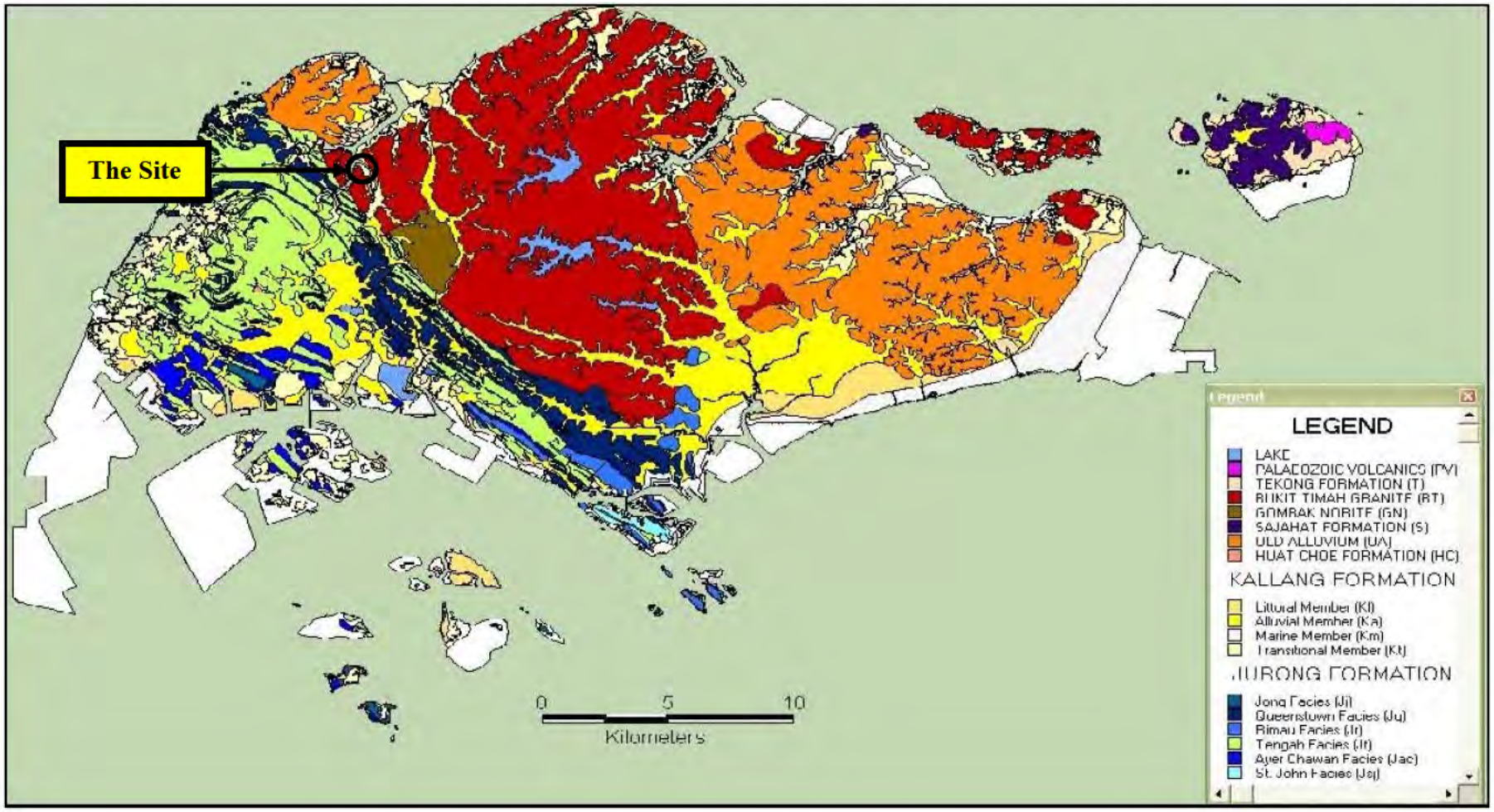


Figure 5.1 Geological Map

decayed woods, Slightly gravelly sandy SILT with concrete debris (2≤N≤9)

This layer consists mainly of Slightly Sandy SILT to Sandy SILT with hard cores, Slightly gravelly sandy CLAY to Slightly gravelly slightly sandy CLAY with traces of decayed woods and concrete debris, SAND, Silty SAND to Very silty SAND, Sandy CLAY with traces of decayed woods and Slightly gravelly sandy SILT with concrete debris were found in this layer at some locations. This layer was found in all boreholes with thickness ranging from 2.000m to 6.000m.

LAYER 2 {G(VI)} Residual Soil (BUKIT TIMAH GRANITE)

SILT, Slightly sandy SILT to Sandy SILT with Rock fragments, Slightly sandy slightly gravelly SILT to Slightly sandy gravelly SILT, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT, Slightly gravelly clayey SAND (1≤N≤29)

This layer consisting of SILT, Slightly sandy SILT to Sandy SILT with Rock fragments, Slightly sandy slightly gravelly SILT to Slightly sandy gravelly SILT, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT and Slightly gravelly clayey SAND was found in all boreholes with thickness ranging from 2.900m to 28.450m.

LAYER 3 {G(V)} Completely Weathered (BUKIT TIMAH GRANITE)

Silty very gravelly SAND to Gravelly silty SAND, Silty SAND, Gravelly slightly sandy SILT to Gravelly sandy SILT, Slightly sandy SILT to Sandy SILT with rock fragments and traces of gravels, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT, Slightly sandy gravelly SILT to Slightly sandy slightly gravelly SILT, Very gravelly sandy SILT with weathered rock fragments, SILT (5≤N≤100)

This layer consisting of Silty very gravelly SAND to Gravelly silty SAND, Silty SAND, Gravelly slightly sandy SILT to Gravelly sandy SILT, Slightly sandy SILT to Sandy SILT with rock fragments and traces of gravels, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT, Slightly sandy gravelly SILT to Slightly sandy slightly gravelly SILT, Very gravelly sandy SILT with weathered rock fragments and SILT was found in all boreholes except Borehole No. BH14 with thickness ranging from 2.450m to 12.450m verified within the exploration depth of present boreholes.

5.3 Groundwater Condition

Groundwater level was measured in the water standpipes (WSP) installed in three (3) boreholes (i.e. BH3, BH8, & BH13) selected by Consultant. During the present investigation period between 15 August 2018 and 26 September 2018, the water level fluctuations observed in the water standpipes are as follows:

- WSP1 (BH3) - between RL 105.21m and RL 105.25m
- WSP2 (BH8) - between RL 105.65m and RL 105.69m
- WSP3 (BH13) - between RL 105.38m and RL 105.45m

Further measurements are recommended to confirm the true groundwater level at these instrument locations.

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 sub-soils found in the present seventeen (17) boreholes consist of the following 3 layers.

Layer No.	Geological Formation	Soil / Rock Description	SPT-N	Layer Thickness
1	FILL	Slightly Sandy SILT to Sandy SILT with hard cores, Slightly gravelly sandy CLAY to Slightly gravelly slightly sandy CLAY with traces of decayed woods and concrete debris, SAND, Silty SAND to Very silty SAND, Sandy CLAY with traces of decayed woods, Slightly gravelly sandy SILT with concrete debris	2≤N≤9	2.000m to 6.000m
2	Residual Soil (BUKIT TIMAH GRANITE), G(VI)	SILT, Slightly sandy SILT to Sandy SILT with Rock fragments, Slightly sandy slightly gravelly SILT to Slightly sandy gravelly SILT, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT, Slightly gravelly clayey SAND	1≤N≤29	2.900m to 28.450m
3	Completely Weathered (BUKIT TIMAH GRANITE), G(V) *(Only not found inBH14)*	Silty very gravelly SAND to Gravelly silty SAND, Silty SAND, Gravelly slightly sandy SILT to Gravelly sandy SILT, Slightly sandy SILT to Sandy SILT with rock fragments and traces of gravels, Slightly gravelly slightly sandy SILT to Slightly gravelly sandy SILT, Slightly sandy gravelly SILT to Slightly sandy slightly gravelly SILT, Very gravelly sandy SILT with weathered rock fragments, SILT	5≤N≤100	*2.450m to 12.450m

*within the exploration depth of present boreholes

2. Groundwater level fluctuation was observed between RL 105.21m and RL 105.25m in WSP1 (BH3), between RL 105.65m and RL 105.69m in WSP2 (BH8) and between RL 105.38m and RL 105.45m in WSP3 (BH13) during the present monitoring period between 15 August 2018 and 26 September 2018. Further measurements are recommended to confirm the true groundwater level at these instrument locations.

7. REFERENCES

1. BS EN ISO 22475-1:2006, “Geotechnical Investigation and Testing-Sampling Methods and Groundwater Measurement-Part 1: Technical Principles for Execution”.

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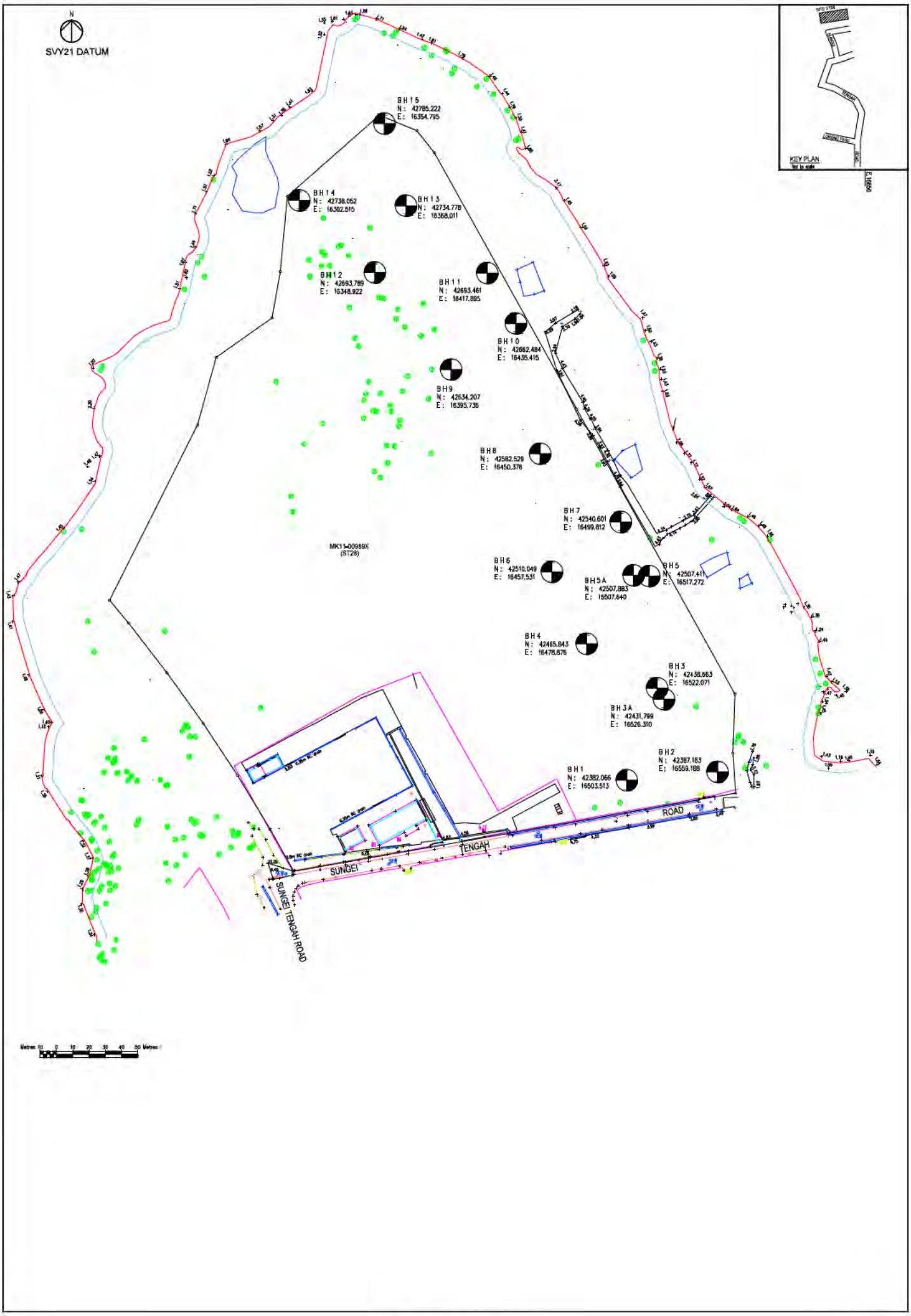
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APPENDIX A
LAYOUT OF BOREHOLES
AND CROSS SECTIONS FOR GEOLOGICAL PROFILES


N
SVY21 DATUM
KEY PLAN
BH15
N: 42785.222
E: 16354.795
BH14
N: 42738.052
E: 16302.515
BH13
N: 42734.778
E: 16368.011
BH12
N: 42693.789
E: 16348.922
BH11
N: 42693.461
E: 16417.895
BH10
N: 42662.484
E: 16435.415
BH9
N: 42634.207
E: 16395.736
BH8
N: 42582.529
E: 16450.376
BH7
N: 42540.601
E: 16499.812
MK11-00969X
(ST28)
BH6
N: 42510.049
E: 16457.531
BH5A
N: 42507.883
E: 16507.640
BH5
N: 42507.411
E: 16517.272
BH4
N: 42485.843
E: 16478.876
BH3
N: 42438.663
E: 16522.071
BH3A
N: 42431.799
E: 16526.310
BH2
N: 42387.183
E: 16559.188
BH1
N: 42382.066
E: 16503.513
ROAD
TENGAH
SUNGEI
SUNGEI TENGAH ROAD

APPENDIX B
SOIL BORING LOGS

LEGENDS FOR DIFFERENT SOIL AND ROCK TYPES

HATCHING PATTERNS FOR SOIL PROFILE
(GEOLOGICAL CLASSIFICATION)

FILL

KALLANG FORMATION
- F1 : FLUVIAL SAND
- F2 : FLUVIAL CLAY
- E : PEAT/ORGANIC CLAY
- M : MARINE CLAY
- Kr : REEF MEMBER

OLD ALLUVIUM
- O(A)
- O(B)
- O(C)
- O(D)
- O(E)

JURONG FORMATION
- S(I)
- S(II)
- S(III)
- S(IV)
- S(V)
- S(VI)

BUKIT TIMAH GRANITE
- G(I)
- G(II)
- G(III)
- G(IV)
- G(V)
- G(VI)

FORT CANNING BOULDER BED
- FC

HATCHING PATTERNS FOR BORELOGS

- AS : ASPHALT, TAR
- BF : BACKFILL
- BE : BEDROCK
- BR : BRICK
- BO : BOULDER
- C : CLAY / MARINE CLAY
- CO : ORGANIC CLAY
- CS : SANDY CLAY
- CG : GRAVELY CLAY
- CPt : PEATY CLAY
- CNG : CONGLOMERATE
- CON : CONCRETE
- GM : SILTY GRAVEL
- G : GRAVEL
- GS : SANDY GRAVEL
- GPt : PEATY GRAVEL
- GC : CLAYEY GRAVEL
- GR : GRANITE
- GO : ORGANIC GRAVEL
- LI : LIMESTONE
- M : SILT
- MPt : PEATY SILT
- MG : GRAVELLY SILT

- MU : MUDSTONE
- MS : SANDY SILT
- MO : ORGANIC SILT
- Pt : PEAT
- PtS : SANDY PEAT
- PtG : GRAVELLY PEAT
- PtM : SILTY PEAT
- PtC : CLAYEY PEAT
- S : SAND
- SG : GRAVELLY SAND
- SO : ORGANIC SAND
- SM : SILTY SAND
- SC : CLAYEY SAND
- SPt : PEATY SAND
- SA : SANDSTONE
- SI : SILTSTONE
- SH : SHALE
- SCH : SCHIST
- TB : TIMBER
- Rf : REEF

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH1

NORTHING: (m): 42382.066 m

EASTING: (m): 16503.513 m

REDUCED LEVEL : 106.233 m

FIELD TESTS

SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
07/08/18	2.10
08/08/18	1.00
08/08/18	2.80
10/08/18	1.00
10/08/18	3.20

SPT-N, Blow/mm / SCR%	REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
						Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brown Sandy SILT with hard cores(FILL)
2/300	104.23	2.00 SPT1 2.45		FILL	BF	Very soft Brownish yellow Sandy SILT(FILL) SPT1 (PD=2.66, GRAVEL+SAND=58, SILT=25, CLAY=17)
	102.23			FILL	BF	Soft Reddish brown and yellow Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=43.1, GRAVEL=3, SAND=39, SILT+CLAY=58)
3/300		4.00 SPT2 4.45				
	100.23	6.00 SPT3 6.45		G(VI)	MS	Soft Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.75, LL=55.4, PL=29.9)
4/300	98.23			G(VI)	MS	Soft Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=39.1, BD=1.87, PD=2.66, GRAVEL=0, SAND=31, SILT=48, CLAY=21, LL=63.6, PL=35.5, Ccu/cd/ds=6.1/–/–, Øcu/cd/ds=35.5/–/–)
		8.00 TW1				
	97.33	8.90 SPT4 9.35		G(VI)	MS	Soft Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=39.6, LL=52.9, PL=31.2)
4/300	96.23			G(VI)	MS	Firm Reddish brown, light grey and yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.73, GRAVEL=2, SAND=34, SILT+CLAY=64)
5/300		10.00 SPT5 10.45				
	94.23	12.00 SPT6 12.45		G(VI)	MS	Firm Reddish brown, light grey and yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.65, GRAVEL=46, SAND=, SILT=36, CLAY=18)
6/300	92.23			G(VI)	MS	Firm Reddish brown and whitish grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=38, BD=1.84, PD=2.66, GRAVEL=3, SAND=35, SILT=46, CLAY=16, LL=59.9, PL=35.2, Ccu/cd/ds=6.7/–/–, Øcu/cd/ds=35.2/–/–)
		14.00 TW2				
	91.33	14.90 SPT7 15.35		G(VI)	MS	Firm Whitish grey and dark grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT7 (MC=31.1, BD=1.80, LL=40.5, PL=26.7)
5/300	90.23			G(VI)	MS	
14/300		16.00 SPT8 16.45				Stiff Whitish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT8 (PD=2.67, GRAVEL=3, SAND=41, SILT=45, CLAY=11)
	88.23			G(VI)	MS	
13/300		18.00 SPT9 18.45				Stiff Light grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (PH=4.5, OMS=0.3, SO3=<0.01, CL=<0.01)
	86.23			G(VI)	MS	

RCG

DIAMETER(mm) 100

HAMMER NO: 42

ER (%) : 75

TCR,RQD (%) (20 40 60 80)

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
Ccu/cd/ds	EFFECTIVE COHESION INTERCEPT(kPa)
Øcu/cd/ds	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Pandi / Mang Lian Khual

DURATION OF FIELD WORK: 07/08/18-10/08/18

Ryobi G
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. 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH1
NORTHING: (m): 42382.066 m
EASTING: (m): 16503.513 m
REDUCED LEVEL : 106.233 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
						20.80	TW2				Stiff to very stiff Whitish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=30.1, BD=1.98, PD=2.69, GRAVEL=1, SAND=49, SILT=38, CLAY=12, LL=53.2, PL=32.1, Cuu=78.9) SPT10 (MC=33.5)
		18/300				20.91 21	SPT10 21.35				
					84.23	22			G(VI)	MS	
		22/300				22.00	SPT11 22.45				Very stiff Light greenish grey and dark grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT11 (BD=1.77, GRAVEL+SAND=59, SILT=31, CLAY=10)
					82.23	24			G(V)	MS	
		100/35				24.00	SPT12 24.10				Very dense Greenish grey and light yellow grey Silty very gravelly SAND Completely Weathered (BUKIT TIMAH GRANITE) SPT12 (PD=2.71, GRAVEL=35, SAND=51, SILT+CLAY=14)
					80.43	26			G(V)	SM	
											End of borehole at 25.800m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout", WS1 (pH=11.6, OMS=<0.1, SO3=<0.01, Cl=0.05)

RCG	RCG
DIAMETER(mm)	100
HAMMER NO: 42 ER (%)	: 75

TCR,RQD (%) 20 40 60 80
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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
Ccu/cs/cs	EFFECTIVE COHESION INTERCEPT(kPa)
Φcu/cs/cs	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
Salinity	SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
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Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION AGENCY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH2

NORTHING: (m): 42387.183 m

EASTING: (m): 16559.188 m

REDUCED LEVEL : 105.894 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
07/08/18	2.10
08/08/18	0.79
08/08/18	2.45
09/08/18	1.08
09/08/18	2.86

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	SPT-N, Blow/mm, SCR%	DESCRIPTION
						Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Yellowish brown mottled with reddish brown Sandy SILT with hard cores(FILL)
103.89	2.00	SPT1 2.45	FILL	BF	3/300	Soft Reddish brown and yellow Sandy SILT(FILL) SPT1 (PD=2.67, GRAVEL+SAND=3, SILT=53, CLAY=44)
101.89	4.00	SPT2 4.45	FILL	BF	5/300	Firm Light grey and brown Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=31.2, GRAVEL=3, SAND=30, SILT+CLAY=67)
99.89	6.00	SPT3 6.45	G(VI)	MS	4/300	Soft Light grey and brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.78, LL=54.3, PL=33.6)
97.89	8.00	TW1	G(VI)	MS		Firm Whitish grey and light yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=57.2, BD=1.72, PD=2.66, GRAVEL=0, SAND=1, SILT=74, CLAY=25, LL=81.9, PL=48.4, $C_{CU/CD/DS}$=9.2/–/–, $\phi_{CU/CD/DS}$=32.7/–/–)
96.99	8.90	SPT4 9.35	G(VI)	MS	5/300	Firm Whitish grey and light yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=42.4, BD=1.72, LL=81.8, PL=48.3)
	10.00	SPT5 10.45			6/300	SPT5 (PH=5.2, OMS=0.3, SO3=<0.01, CL=<0.01)
93.89	12.00	SPT6 12.45	G(VI)	MS	7/300	Firm Whitish grey and light yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.68, GRAVEL=0, SAND=5, SILT=66, CLAY=29)
91.89	14.00	TW2	G(VI)	MS		Firm Whitish grey and light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=57.9, BD=1.72, PD=2.68, GRAVEL=0, SAND=2, SILT=72, CLAY=26, LL=69.4, PL=44.1, C_{UU}=68.2)
90.99	14.90	SPT7 15.35	G(VI)	MS	15/300	Stiff Whitish grey and grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT7 (MC=42.9, LL=57.1, PL=36.6)
89.89	16.00	SPT8 16.45	G(VI)	MS	12/300	Stiff Whitish grey and grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT8 (BD=1.77, GRAVEL+SAND=4, SILT=78, CLAY=18)
87.89	18.00	SPT9 18.45	G(VI)	MS	13/300	Stiff Light grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (PD=2.67, GRAVEL=2, SAND=5, SILT+CLAY=93)
85.89	20		G(VI)	MS		

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 22 | ER (%): 84

TCR,RQD (%) 20 40 60 80 — 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 (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
C_{uu}	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{Cu/CD/DS}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{Cu/CD/DS}$	EFFECTIVE FRICTION ANGLE (degree)		

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kanan / Nyi Nyi Htut

DURATION OF FIELD WORK: 07/08/18-09/08/18

Ryobi G
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.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH2
NORTHING: (m): 42387.183 m
EASTING: (m): 16559.188 m
REDUCED LEVEL : 105.894 m

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)	DESCRIPTION
					84.99	21	TW2		G(VI)	MS	Firm Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=43.4, BD=1.83, PD=2.7, GRAVEL=0, SAND=4, SILT=82, CLAY=14, LL=51.6, PL=34.1, Cuu=61.4)
		10/300					SPT10				
					83.89	22			G(V)	MS	Stiff Light grey and brown Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (MC=42.4, LL=47.5, PL=30.9)
		9/300					SPT11				
						23					
					81.89	24			G(V)	MS	Stiff Light greenish grey and yellow Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT11 (BD=1.83, GRAVEL+SAND=6, SILT=75, CLAY=19)
							TW4				
					80.99	25			G(V)	MS	
		35/300					SPT12				Stiff Light greenish grey and yellow Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW4 (MC=26.6, BD=2.05, PD=2.73, GRAVEL=13, SAND=21, SILT=54, CLAY=12, LL=54.6, PL=32.9, Cuu=109.9)
					80.09	26			G(V)	MS	Hard Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT12 (PD=2.73, GRAVEL=0, SAND=18, SILT+CLAY=82)
						27					End of borehole at 25.800m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=11.4, OMS=<0.10, SO3=<0.01, Cl=0.05)
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 22
ER (%): : 84

TCR,RQD (%): 20 40 60 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC MOISTURE CONTENT (%)
BD BULK DENSITY (Mg/m3)
PD PARTICLE DENSITY (Mg/m3)
LL LIQUID LMT (%)
PL PLASTIC LIMIT (%)
Pc PRECONSOLIDATION PRESSURE(kPa)
Cc COMPRESSION INDEX
Cuu UNDRAINED SHEAR STRENGTH (kPa)
$C_{ey/ev/e}$ EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{ey/ev/e}$ 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
Salinity SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Kanan / Nyi Nyi Htut

DURATION OF FIELD WORK:
07/08/18-09/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH3

NORTHING: (m): 42438.663 m

EASTING: (m): 16522.071 m

REDUCED LEVEL : 106.418 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
DAILY WATER LEVEL DATE (dd/mm/yy) / READING (m.BGL) 08/08/18 1.91 09/08/18 0.82 09/08/18 2.95 11/08/18 1.15 11/08/18 2.41											Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Yellowish brown mottled with grey Sandy SILT with traces of wood pieces(FILL)
		4/300			104.42	2.00 SPT1 2.45			FILL	BF	Soft Light grey Sandy CLAY with traces of decayed woods(FILL) SPT1 (PD=2.64, GRAVEL+SAND=25, SILT=30, CLAY=45)
		10/300			102.42	4.00 SPT2 4.45			FILL	BF	Stiff Reddish brown and yellow Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=30.4, GRAVEL=3, SAND=44, SILT+CLAY=53)
		8/300			100.42	6.00 SPT3 6.45			G(VI)	MS	Firm Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.70, LL=85.9, PL=49.4)
					98.42	8.00 TW1			G(VI)	MS	Stiff Yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=48.6, BD=1.78, PD=2.66, GRAVEL=0, SAND=4, SILT=73, CLAY=23, LL=68.1, PL=43.1, Ccu/cd/ds=7/-/-, ϕcu/cd/ds=35.4/-/-)
		11/300			97.52	8.90 SPT4 9.35			G(VI)	MS	Stiff Yellowish brown and light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=40.7, LL=52.6, PL=33.2)
		13/300			96.42	10.00 SPT5 10.45			G(VI)	MS	Stiff Greenish grey and yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.82, GRAVEL=0, SAND=25, SILT+CLAY=75)
		11/300			94.42	12.00 SPT6 12.45			G(VI)	MS	Stiff Light grey and greenish grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.71, GRAVEL=45, SAND=, SILT=45, CLAY=10)
					92.42	14.00 TW2			G(VI)	MS	Stiff Light grey and greenish grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=28.7, BD=2.01, PD=2.71, GRAVEL=0, SAND=38, SILT=53, CLAY=9, LL=37.9, PL=25.3, Ccu/cd/ds=8.7/-/-, ϕcu/cd/ds=36.3/-/-)
		11/300			91.52	14.90 SPT7 15.35			G(V)	MS	Stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT7 (MC=29, BD=1.85)
		23/300			90.42	16.00 SPT8 16.45			G(V)	MS	Very stiff Greenish grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT8 (PD=2.73, GRAVEL=0, SAND=51, SILT=46, CLAY=3)
		27/300			88.42	18.00 SPT9 18.45			G(V)	MS	Very stiff Greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (PH=7.4, OMS=0.5, SO3=<0.01, CL=<0.01)
					86.42	20			G(V)	MS	

RCG: RCG

DIAMETER(mm): 100

HAMMER NO: 11

ER (%) : 72

TCR,RQD (%) 20 40 60 80

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/m3)

PD PARTICLE DENSITY (Mg/m3)

LL LIQUID LIMIT (%)

PL PLASTIC LIMIT (%)

Pc PRECONSOLIDATION PRESSURE(kPa)

Cc COMPRESSION INDEX

Cuu UNDRAINED SHEAR STRENGTH (kPa)

Ccu/cd/ds EFFECTIVE COHESION INTERCEPT(kPa)

ϕcu/cd/ds 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

Salinity SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK: 08/08/18-11/08/18

Ryobi G
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.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH3

NORTHING: (m): 42438.663 m

EASTING: (m): 16522.071 m

REDUCED LEVEL : 106.418 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
						20.70					Very stiff Greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=33.5, BD=1.94, PD=2.69, GRAVEL=0, SAND=22, SILT=69, CLAY=9, LL=60.6, PL=33.1, C_{uu}=248)
					85.52	21	TW3		G(V)	MS	
		52/300			84.92	21.35	SPT10		G(V)	MS	Hard Greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (MC=29.9, LL=45.8, PL=30.5)
						22					End of borehole at 21.500m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". Water Standpipe installed at 12.000m. WS1 (pH=11.7, OMS=<0.1, SO3=<0.01, Cl=0.05)
						23					
						24					
						25					
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 11
ER (%) : 72

TCR,RQD (%): 20 40 60 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
C_{uu}	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{cu/cs}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{cu/cs}$	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY - FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK:
08/08/18-11/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH3A

NORTHING: (m): 42431.799 m

EASTING: (m): 16526.310 m

REDUCED LEVEL : 106.636 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
DAILY WATER LEVEL DATE (dd/mm/yy) / READING (m.BGL) 27/08/18 3.50 28/08/18 2.70 28/08/18 4.50 29/08/18 2.70 29/08/18 4.50					104.64	1			FILL	BF	Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brownish yellow and light reddish orange Slightly gravelly slightly sandy CLAY with traces of concrete debris(FILL)
		2/300				2.00 SPT1 2.45					Very soft Brown Sandy CLAY(FILL)
					102.64	4			FILL	BF	Stiff Yellow, light grey and reddish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=42.7, LL=84.5, PL=38.6)
		10/300				4.00 SPT2 4.45					
		8/300			100.64	6			G(VI)	MS	Firm Reddish brown and yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.75, GRAVEL=2, SAND=39, SILT+CLAY=59)
						6.00 SPT3 6.45					
					98.64	8			G(VI)	MS	Firm Yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=49, BD=1.77, PD=2.67, GRAVEL=0, SAND=4, SILT=78, CLAY=18, LL=64.4, PL=41.4, Cuu=66.2) SPT4 (LL=41.8, PL=26.3)
						8.00 TW1					
		5/300				8.90 SPT4 9.35					
					96.64	10			G(VI)	MS	Soft Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.95, GRAVEL+SAND=15, SILT=67, CLAY=18)
		4/300				10.00 SPT5 10.45					
					94.64	12			G(VI)	MS	Firm Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.71, GRAVEL=0, SAND=12, SILT+CLAY=88)
		5/300				12.00 SPT6 12.45					
					92.64	14			G(VI)	MS	Very stiff Light greenish grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW2 (MC=42.2, BD=1.84, PD=2.7, GRAVEL=0, SAND=42, SILT=53, CLAY=5, LL=62.5, PL=34.9, Ccu/cd/ds=8.1/–/–, Øcu/cd/ds=35.2/–/–)
						14.00 TW2					
					91.74	15			G(V)	MS	Very stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT7 (MC=33, LL=45.6, PL=27.5)
		19/300				14.90 SPT7 15.35					
					90.64	16			G(V)	MS	Stiff Light greenish grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT8 (PD=2.72, GRAVEL=0, SAND=39, SILT+CLAY=61)
		15/300				16.00 SPT8 16.45					
					88.44	18			G(V)	MS	Hard Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (MC=26.7, PD=2.73)
		48/300				18.20 SPT9 18.65					
					86.64	20			G(V)	MS	

RCG
RCG
DIAMETER(mm)
100
HAMMER NO: 35
ER (%) : 88

TCR,RQD (%) 20 40 60 80

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/m3)
PD PARTICLE DENSITY (Mg/m3)
LL LIQUID LIMIT (%)
PL PLASTIC LIMIT (%)
Pc PRECONSOLIDATION PRESSURE(kPa)
Cc COMPRESSION INDEX
Cuu UNDRAINED SHEAR STRENGTH (kPa)
Ccu/cd/ds EFFECTIVE COHESION INTERCEPT(kPa)
Øcu/cd/ds 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
Salinity SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kannan / Aung Thet

DURATION OF FIELD WORK: 27/08/18-29/08/18

Ryobi G
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. 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH3A
NORTHING: (m): 42431.799 m
EASTING: (m): 16526.310 m
REDUCED LEVEL : 106.636 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
	◉	26/300				20.00 SPT10 20.45					Very stiff Light greenish grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (PD=2.74, GRAVEL=4, SAND=52, SILT=41, CLAY=3)
					84.64	21					
	◉	58/300				22.00 SPT11 22.45					Hard Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE). Slightly gravelly at 24.0m depth SPT11 (MC=28.3, BD=1.97, LL=45.4, PL=27) MZ1 (MC=33.4, BD=1.77, PD=2.72, GRAVEL=2, SAND=21, SILT=71, CLAY=6, LL=38.7, PL=26.1)
					82.54	23			G(V)	MS	
						24.00 MZ1 24.45					Hard Light greenish grey Very gravelly sandy SILT with weathered rock fragments Completely Weathered (BUKIT TIMAH GRANITE)
					81.64	25			G(V)	MS	
	◉	46/300				25.00 SPT12 25.45					
	◉	100/0			80.94	25.70 SPT13 25.70			G(V)	MS	Hard Light grey spotted with yellowish grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT12 (pH=7, OMS=0.4, SO3=<0.01, CL=<0.01)
						26					End of borehole at 25.700m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=8.5, OMS=<0.10, SO3=0.06, Cl=0.03)
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 35
ER (%): 88

TCR,RQD (%) 20 40 60 80
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 (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Cs/c'cv/cr	EFFECTIVE COHESION INTERCEPT(kPa)		
Fs/c'cv/cr	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY - FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Kannan / Aung Thet

DURATION OF FIELD WORK:
27/08/18-29/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH4

NORTHING: (m): 42465.843 m

EASTING: (m): 16478.876 m

REDUCED LEVEL : 106.249 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
DAILY WATER LEVEL DATE (dd/mm/yy) / READING (m.BGL) 13/08/18 2.20 14/08/18 1.00 14/08/18 2.90 15/08/18 1.00 15/08/18 2.88					104.25	1			FILL	BF	Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brown Sandy SILT with hard cores(FILL)
		3/300			102.25	2.00 SPT1 2.45			FILL	BF	Soft Reddish brown Sandy SILT with hard cores(FILL)
		4/300				4.00 SPT2 4.45					Soft Reddish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Light grey at 6.0m depth
		4/300				6.00 SPT3 6.45					
					98.25	8	8.00 TW1		G(VI)	MS	Firm Whitish grey and light yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=33.9, BD=1.87, PD=2.66, GRAVEL=0, SAND=41, SILT=38, CLAY=21, LL=71.8, PL=41.4, Cuu=42.4)
					97.35	8.90 9	8.90 SPT4 9.35		G(VI)	MS	Soft Reddish brown, light yellow and whitish grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=31.9, BD=1.77)
		4/300			96.25	10	10.00 SPT5 10.45		G(VI)	MS	
		6/300									Firm Light brownish grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (PD=2.65, GRAVEL=18, SAND=26, SILT=28, CLAY=28)
		7/300				12.00 SPT6 12.45					
					92.25	14	14.00 TW2		G(VI)	MS	Stiff to firm Light greenish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=28.7, BD=1.95, PD=2.66, GRAVEL=4, SAND=44, SILT=34, CLAY=18, LL=72.6, PL=47, Cuu=74.2)
		10/300				14.90 SPT7 15.35					SPT7 (MC=32.8, BD=1.78, LL=43.9, PL=27.9)
		8/300			90.25	16	16.00 SPT8 16.45		G(VI)	MS	Firm Yellowish grey spotted with dark grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT8 (PH=3.4, OMS=0.3, SO3=<0.01, CL=0.01)
					88.25	18	18.00 SPT9 18.45		G(VI)	MS	
		9/300									Stiff Whitish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (PD=2.65, GRAVEL=7, SAND=47, SILT=35, CLAY=11)
					86.25	20			G(VI)	MS	

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 22 | ER (%): 84

TCR,RQD (%) 20 40 60 80 — 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/m3); PD PARTICLE DENSITY (Mg/m3); LL LIQUID LIMIT (%); PL PLASTIC LIMIT (%); Pc PRECONSOLIDATION PRESSURE(kPa); Cc COMPRESSION INDEX; Cuu UNDRAINED SHEAR STRENGTH (kPa); $C_{cu/cd/os}$ EFFECTIVE COHESION INTERCEPT(kPa); $\phi_{cu/cd/os}$ 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; Salinity SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Muthu / Mang Lian Khual

DURATION OF FIELD WORK: 13/08/18-15/08/18

Ryobi G
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.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH4
NORTHING: (m): 42465.843 m
EASTING: (m): 16478.876 m
REDUCED LEVEL : 106.249 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
	10	10/300				21	TW2				Stiff Light greenish grey and yellowish brown Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=32.8, BD=1.92, PD=2.66, GRAVEL=0, SAND=44, SILT=42, CLAY=14, LL=35.6, PL=25.2, Cuu=85.3) SPT10 (PD=2.64, GRAVEL=0, SAND=44, SILT=38, CLAY=18) SPT11 (MC=27.9, BD=1.73)
	15	15/300				22	SPT10				
						23	SPT11				
	100	100/25			81.75	24	SPT12		G(V)	MS	
						25					End of borehole at 24.500m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=11.3, OMS=<0.10, SO3=<0.01, Cl=0.05)
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCD: RCD
DIAMETER(mm): 100
HAMMER NO: 22
ER (%) : 84

TCR,RQD (%) 0 20 40 60 80 100
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Cs/c'/cu	EFFECTIVE COHESION INTERCEPT(kPa)		
Fs/ø'/øu	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY - FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Muthu / Mang Lian Khual

DURATION OF FIELD WORK:
13/08/18-15/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH5

NORTHING: (m): 42507.411 m

EASTING: (m): 16517.272 m

REDUCED LEVEL : 106.850 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
14/08/18	2.10
15/08/18	0.72
15/08/18	2.82
16/08/18	1.05
16/08/18	2.28

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE	SPT-N, Blow/mm SCR%	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
	0					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Dark grey Silty fine to coarse SAND(FILL)
104.85	1.85			FILL	BF	
	2.00	SPT1	6/300			Loose Dark grey Silty fine to coarse SAND(FILL)
	2.45					
102.85	4.00			FILL	BF	
	4.00	SPT2	5/300			Firm Light grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (BD=1.80, GRAVEL+SAND=31, SILT=37, CLAY=32)
	4.45					
100.85	6.00			G(VI)	MS	
	6.00	SPT3	5/300			Firm Whitish grey Slightly gravelly Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (MC=28)
	6.45					
98.85	8.00			G(VI)	MS	Firm Yellowish brown, red and light grey Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE), Light grey and dark grey at 9.0m depth TW1 (MC=33.2, BD=1.92, PD=2.66, GRAVEL=33, SAND=17, SILT=25, CLAY=25, LL=87.8, PL=49.5, Cuu=49.9) SPT4 (MC=32.6)
	8.00	TW1				
	8.90	SPT4	6/300			
	9.35					
96.85	10.00			G(VI)	MS	
	10.00	SPT5	6/300			Firm Greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (PD=2.67, GRAVEL=0, SAND=6, SILT+CLAY=94)
	10.45					
	12.00	SPT6	6/300			
	12.45					
92.85	14.00			G(VI)	MS	Firm Greenish grey and light yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=38.8, BD=1.84, PD=2.65, GRAVEL=12, SAND=19, SILT=57, CLAY=12, LL=76.2, PL=41, Cuu=69.3)
	14.00	TW2				
91.95	14.90			G(VI)	MS	
	14.90	SPT7	9/300			Stiff Light greenish grey and whitish grey Slightly sandy slightly gravelly SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT7 (BD=1.78, GRAVEL=58, SAND=, SILT=33, CLAY=9) SPT8 (PD=2.65, GRAVEL=21, SAND=18, SILT+CLAY=61)
	15.35					
	16.00	SPT8	10/300			
	16.45					
88.85	18.00			G(V)	MS	
	18.00	SPT9	26/300			Very stiff Greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (pH=7.1, OMS=1, SO3=<0.01, CL=<0.01)
	18.45					
86.85	20			G(V)	MS	

RCG

DIAMETER(mm) 100

HAMMER NO: 11

ER (%) : 72

TCR,RQD (%) 20 40 60 80

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{Cu/cD/DS}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{Cu/cD/DS}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR

Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK:

14/08/18-16/08/18

Ryobi G

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.

1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH5
NORTHING: (m): 42507.411 m
EASTING: (m): 16517.272 m
REDUCED LEVEL : 106.850 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
	◉	35/300			85.05	21	TW3 / SPT 10		G(V)	MS	Hard Greenish grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=31.8, BD=1.96, PD=2.68, GRAVEL=1, SAND=9, SILT=79, CLAY=11, LL=52.6, PL=31.7, Cuu=124.1)
						22					End of borehole at 21.80m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=11.4, OMS=<0.1, SO3=0.04, Cl=0.04)
						23					
						24					
						25					
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 11
ER (%) : 72

TCR,RQD (%) 0 20 40 60 80 100
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
C'cu/c'cs	EFFECTIVE COHESION INTERCEPT(kPa)		
Φ'cu/Φ'cs	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK:
14/08/18-16/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH5A

NORTHING: (m): 42507.883 m

EASTING: (m): 16507.640 m

REDUCED LEVEL : 106.244 m

FIELD TESTS

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
25/08/18	4.00

SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)

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)	DESCRIPTION
			104.24	0			FILL	BF	Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Light reddish orange and light brownish yellow Slightly gravelly sandy CLAY with concrete debris(FILL)
4/300				2.00 SPT1 2.45					Soft Reddish brown Slightly gravelly sandy SILT(FILL), Light reddish orange and brownish yellow at 4.0m depth SPT1 (MC=22.1, PD=2.65)
2/300			101.89	4.00 SPT2 4.45			FILL	BF	
									Very loose Dark grey Fine to medium SAND(FILL)
			100.24	6			FILL	BF	
4/300				6.00 SPT3 6.45					Soft Whitish grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.83, GRAVEL+SAND=47, SILT=26, CLAY=27)
			98.24	8			G(VI)	MS	
				8.00 TW1					Firm Yellowish brown, light grey and red Slightly sandy gravelly SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=34.2, BD=1.84, PD=2.66, GRAVEL=31, SAND=16, SILT=33, CLAY=20, LL=84.9, PL=46.2, Cuu=41.2)
			97.34				G(VI)	MS	
5/300				8.90 SPT4 9.35					
5/300				10.00 SPT5 10.45					Firm Yellowish brown and red Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE), Light brownish grey at 10.0m depth, Light brownish grey at 12.0m depth SPT4 (BD=1.79, GRAVEL=25, SAND=26, SILT=30, CLAY=19) SPT5 (MC=30.9) SPT6 (PD=2.67, GRAVEL=28, SAND=34, SILT+CLAY=38)
7/300				12.00 SPT6 12.45					
			92.24	14			G(V)	MS	
				14.00 TW2					Stiff to very stiff Light grey and dark grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW2 (MC=24.4, BD=1.97, PD=2.65, GRAVEL=29, SAND=33, SILT=32, CLAY=6, LL=69.5, PL=44.2, Cuu=144.6) SPT7 (pH=7.5, OMS=0.2, SO3=<0.01, CL=<0.01)
21/300				14.90 SPT7 15.35					
			90.24	16			G(V)	MS	
31/300				16.00 SPT8 16.45					
									Dense Light grey mottled with grey Gravelly silty fine to coarse SAND Completely Weathered (BUKIT TIMAH GRANITE)
100/0			87.74	18.50			G(V)	SM	
				20					End of borehole at 18.500m and sealed borehole with 3 : 0.75 : 4 "cement–bentonite–water grout". WS1 (pH=8.6, OMS=<0.10, SO3=0.05, Cl=0.02)

RCG	RCG
DIAMETER(mm)	100
HAMMER NO: 35	
ER (%)	: 88

TCR,RQD (%) (20 40 60 80)

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{Cu/cb/os}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{Cu/cb/os}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kannan / Aung Thet

DURATION OF FIELD WORK: 25/08/18-25/08/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 1 / 1

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
ACCREDITED INSPECTION BODY SAC

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH6

NORTHING: (m): 42510.049 m

EASTING: (m): 16457.531 m

REDUCED LEVEL : 106.757 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
13/08/18	2.00
14/08/18	1.00
14/08/18	2.70
15/08/18	1.30
15/08/18	2.80

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	SPT-N, Blow/mm, SCR%	DESCRIPTION
	0					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brown Sandy SILT with hard cores(FILL)
104.76	2		FILL	BF		
	2.00	SPT1			3/300	Soft Brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=17.8)
	2.45					
	4.00	SPT2			4/300	
	4.45					
100.76	6		G(VI)	MS		
	6.00	SPT3			5/300	Firm Whitish grey and yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Yellow and reddish brown at 8.0m depth SPT3 (BD=1.65, GRAVEL=0, SAND=6, SILT+CLAY=94) TW1 (MC=60.8, BD=1.66, PD=2.65, GRAVEL=0, SAND=3, SILT=63, CLAY=34, LL=86.1, PL=50.9, Cuu=59.5)
	6.45					
	8.00	TW1				
97.86	9		G(VI)	MS		
	8.90	SPT4			5/300	Firm Reddish brown and yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (PD=2.69, GRAVEL+SAND=6, SILT=63, CLAY=31)
	9.35					
96.76	10		G(VI)	MS		
	10.00	SPT5			6/300	Firm Reddish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.67, LL=81.7, PL=43.6)
	10.45					
94.76	12		G(VI)	MS		
	12.00	SPT6			5/300	Firm Whitish grey and dark grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.65, GRAVEL=32, SAND=32, SILT+CLAY=36)
	12.45					
92.76	14		G(VI)	MS		
	14.00	TW2				Firm Greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=45.2, BD=1.81, PD=2.68, GRAVEL=0, SAND=9, SILT=77, CLAY=14, LL=48.8, PL=32.3, Cuu=58.9)
91.86	15		G(VI)	MS		
	14.90	SPT7			5/300	
	15.35					Firm Greenish grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT7 (MC=46.4, GRAVEL+SAND=20, SILT=59, CLAY=21) SPT8 (pH=6.5, OMS=0.4, SO3=<0.01, CL=<0.01)
	16.00	SPT8			5/300	
	16.45					
88.76	18		G(VI)	MS		
	18.00	SPT9			16/300	Very stiff Light grey spotted with dark grey Sandy SILT with rock fragments Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (MC=21)
	18.45					
86.76	20		G(V)	MS		

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 42 | ER (%) : 75

TCR,RQD (%) 20 40 60 80 — 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 (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{cu/cd/ps}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{cu/cd/ps}$	EFFECTIVE FRICTION ANGLE (degree)		

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Pandi / Mang Lian Khual

DURATION OF FIELD WORK: 13/08/18-15/08/18

Ryobi G
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.: 1 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH6

NORTHING: (m): 42510.049 m

EASTING: (m): 16457.531 m

REDUCED LEVEL : 106.757 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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)

DESCRIPTION

REDUCED LEVEL (m)	DEPTH (m)	SPT-N, Blow/mm SCR%	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
	20.00 TW3				Stiff Light yellowish and dark grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=24.3, BD=2.01, PD=2.65, GRAVEL=14, SAND=42, SILT=30, CLAY=14, LL=59.6, PL=41.5, Cuu=112.1)
85.86	20.90 SPT10 21.35	15/300	G(V)	MS	
84.76	22.00 SPT11 22.45	19/300	G(V)	MS	Stiff Light yellowish grey and dark grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (BD=1.84, GRAVEL+SAND=45, SILT=35, CLAY=20)
82.76	24.00 SPT12 24.45	72/300	G(V)	MS	Very stiff Light yellowish grey and dark grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT11 (PD=2.69, GRAVEL=25, SAND=40, SILT+CLAY=35)
80.76	26.00 SPT13 26.23	100/95	G(V)	MS	Hard Whitish grey and dark grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT12 (PD=2.67, GRAVEL=27, SAND=36, SILT+CLAY=37)
79.41			G(V)	MS	Hard Whitish grey and dark grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT13 (MC=26.7, GRAVEL+SAND=61, SILT=24, CLAY=15)
					End of borehole at 27.350m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=11.7, OMS=<0.10, SO3=<0.01, Cl=0.05)

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 42 | ER (%): 75

TCR,RQD (%) 20 40 60 80 — 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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cd/ps}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cd/ps}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri-Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Pandi / Mang Lian Khual

DURATION OF FIELD WORK: 13/08/18-15/08/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 2 / 2

58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH7

NORTHING: (m): 42540.601 m

EASTING: (m): 16499.812 m

REDUCED LEVEL : 105.008 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
20/08/18	2.25
21/08/18	1.22
21/08/18	2.95
23/08/18	1.02
23/08/18	3.05

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	SPT-N, Blow/mm, SCR%	DESCRIPTION
	1					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brown mottled with yellowish brown Slightly sandy SILT(FILL)
103.01	2		FILL	BF		
	2.00	SPT1 2.45			5/300	Firm Brown Slightly sandy SILT(FILL)
	3					
101.01	4		FILL	BF		Firm Whitish grey and dark brown Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=28.1)
	4.00	SPT2 4.45			5/300	
	5					Firm Whitish grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.89, GRAVEL+SAND=48, SILT=32, CLAY=20)
99.01	6		G(VI)	MS		
	6.00	SPT3 6.45			8/300	Firm Whitish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=35.1, BD=1.85, PD=2.65, GRAVEL=23, SAND=24, SILT=35, CLAY=18, LL=71.2, PL=41.9, Cuu=51.3)
97.01	8		G(VI)	MS		
	8.00	TW1				Firm to stiff Whitish grey Slightly sandy gravelly SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (PD=2.66, GRAVEL=36, SAND=18, SILT+CLAY=46) SPT5 (MC=30.2, GRAVEL+SAND=56, SILT=30, CLAY=14)
96.11			G(VI)	MS		
	8.90	SPT4 9.35			9/300	
	10					
	10.00	SPT5 10.45			8/300	Firm Light brownish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.69)
	11					
93.01	12		G(VI)	MS		
	12.00	SPT6 12.45			7/300	Firm Light greenish grey and whitish grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW2 (MC=26, BD=2.05, PD=2.71, GRAVEL=23, SAND=23, SILT=38, CLAY=16, LL=77.5, PL=45.5, Ccu/cd/ds=6.3/–/–, φcu/cd/ds=34.8/–/–)
91.01	13		G(VI)	MS		
	14.00	TW2				Firm Light grey Slightly sandy slightly gravelly SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT7 (BD=1.87, GRAVEL=30, SAND=26, SILT+CLAY=44)
90.11	14		G(V)	MS		
	14.90	SPT7 15.35			8/300	
89.01	15		G(V)	MS		
	16					
	16.00	SPT8 16.45			8/300	Firm Light grey spotted with dark grey Slightly sandy SILT with traces of gravels Completely Weathered (BUKIT TIMAH GRANITE) SPT8 (pH=6.4, OMS=0.3, SO3=<0.01, CL=<0.01)
87.01	17		G(V)	MS		
	18					
	18.00	SPT9 18.45			12/300	Stiff Whitish grey and dark grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (MC=20.7, GRAVEL=22, SAND=33, SILT+CLAY=45)
85.01	19		G(V)	MS		
	20					

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 11 | ER (%): 72

TCR,RQD (%) (20 40 60 80) — 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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
Ccu/cd/ds	EFFECTIVE COHESION INTERCEPT(kPa)
φcu/cd/ds	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Allwin / Nyi Nti Htut

DURATION OF FIELD WORK: 20/08/18-23/08/18

Ryobi G
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.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH7

NORTHING: (m): 42540.601 m

EASTING: (m): 16499.812 m

REDUCED LEVEL : 105.008 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
		16/300			84.11	21	TW2 20.90-21.35		G(V)	MS	Stiff Greenish grey and whitish grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=23.7, BD=2.03, PD=2.67, GRAVEL=15, SAND=39, SILT=33, CLAY=13, LL=55, PL=37, Cuu=105)
		100/210			83.01	22	SPT10 21.90-22.35		G(V)	MS	Very stiff Whitish grey and dark grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (BD=1.75, PD=2.66, GRAVEL+SAND=88, SILT=10, CLAY=2)
					81.26	23	SPT11 22.90-23.35		G(V)	SM	Very dense Whitish grey and dark grey Silty fine to coarse SAND Completely Weathered (BUKIT TIMAH GRANITE)
						24					End of borehole at 23.750m due to obstruction (possible rock material) encountered and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=10, OMS=<0.10, SO3=0.04, Cl=0.04)
						25					
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG	
RCG	
DIAMETER(mm)	100
HAMMER NO: 11	
ER (%)	: 72

TCR,RQD (%) 20 40 60 80

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LMT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cs/cn}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cs/cn}$	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
Salinity	SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Allwin / Nyi Nti Htut

DURATION OF FIELD WORK:
20/08/18-23/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. **BH8**

NORTHING: (m): 42582.529 m

EASTING: (m): 16450.376 m

REDUCED LEVEL : 106.899 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
DAILY WATER LEVEL DATE (dd/mm/yy) / READING (m.BGL) 14/08/18 0.00 14/08/18 2.50 15/08/18 2.50 15/08/18 3.70 16/08/18 2.70 16/08/18 3.80					104.90	1					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown and brownish yellow Slightly gravelly sandy SILT with concrete debris(FILL)
		9/300			102.90	2.00 SPT1 2.45			FILL	BF	Stiff Reddish brown and brownish yellow Slightly gravelly sandy SILT(FILL)
		5/300			100.90	4.00 SPT2 4.45			FILL	BF	Loose Dark brownish grey Very silty fine to medium SAND(FILL) SPT2 (MC=21.3, GRAVEL+SAND=74, SILT=23, CLAY=3)
		4/300			98.90	6.00 SPT3 6.45			G(VI)	MS	Soft Whitish grey and white yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.71, GRAVEL+SAND=28, SILT=50, CLAY=22)
		4/300			96.90	8.00 TW1 8.90 SPT4 9.35			G(VI)	MS	Soft Whitish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=40, BD=1.86, PD=2.67, GRAVEL=0, SAND=28, SILT=47, CLAY=25, LL=88.9, PL=52.2, $C_{cu/CD/DS}$=5.9/–/–, $\phi_{cu/CD/DS}$=34/–/–) SPT4 (MC=45, GRAVEL=0, SAND=10, SILT+CLAY=90)
		3/300			92.90	10.00 SPT5 10.45 12.00 SPT6 12.45			G(VI)	M	Soft to firm Yellowish grey SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.68, LL=83.9, PL=48.5) Soft Whitish grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
		3/300			90.90	14.00 TW2 14.90 SPT7 15.35 16.00 SPT8 16.45			G(VI)	MS	TW2 (MC=29.8, BD=1.90, PD=2.66, GRAVEL=16, SAND=42, SILT=35, CLAY=7, LL=56.1, PL=36.4, $C_{cu/CD/DS}$=7.7/–/–, $\phi_{cu/CD/DS}$=39.4/–/–) SPT7 (MC=31.5, GRAVEL=19, SAND=41, SILT+CLAY=40) Very loose Yellowish grey Slightly gravelly clayey fine to coarse SAND Residual Soil (BUKIT TIMAH GRANITE)
		1/300			88.90	18.00 TW3			G(VI)	SC	Firm Whitish grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=29, BD=1.87, PD=2.65, GRAVEL=16, SAND=39, SILT=37, CLAY=8, LL=57.1, PL=41.9, Cuu=40.6)
		4/300			88.00 86.90	18.90 SPT9 19.35			G(VI)	MS	Soft Whitish grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (PD=2.65, GRAVEL=14, SAND=35, SILT+CLAY=51)

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 35 | ER (%): 88

TCR,RQD (%) (20 40 60 80) — 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 (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{cu/cd/ds}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{cu/cd/ds}$	EFFECTIVE FRICTION ANGLE (degree)		

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Vellankanni / Aung Thet

DURATION OF FIELD WORK: 14/08/18-16/08/18

58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH8
NORTHING: (m): 42582.529 m
EASTING: (m): 16450.376 m
REDUCED LEVEL : 106.899 m

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)	DESCRIPTION
		16/300				20.00 SPT10 20.45					Very stiff Whitish grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT10 (BD=1.76, GRAVEL+SAND=54, SILT=35, CLAY=11) SPT11 (MC=46.7, LL=59.7, PL=33.5)
PMT1 at 22.50–23.50m Em=12.969 MPa Er=31.614 MPa		11/300			84.40	22.00 SPT11 22.45			G(V)	MS	
					82.90	24			G(V)	M	Stiff Light grey spotted with yellowish grey SILT Completely Weathered (BUKIT TIMAH GRANITE)
		15/300			80.90	24.00 TW4 24.50 25 SPT12 25.35 26			G(V)	MS	Stiff Whitish grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW4 (MC=37, BD=1.89, PD=2.67, GRAVEL=2, SAND=29, SILT=57, CLAY=12, LL=50.6, PL=30.8, Cuu=75.8) SPT12 (pH=4.8, OMS=0.2, SO3=<0.01, CL=0.01)
		17/300			78.90	26.00 SPT13 26.45 27 28			G(V)	MS	Very stiff Whitish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT13 (PD=2.66, GRAVEL=0, SAND=25, SILT=56, CLAY=19)
		13/300			76.90	28.00 SPT14 28.45 29 30			G(V)	MS	Stiff Light grey spotted with yellowish grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT14 (MC=33, BD=1.76)
		12/300			76.45	30.00 SPT15 30.45 31 32 33 34 35 36 37 38 39 40			G(V)	M	Stiff Light grey spotted with yellowish grey SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT15 (PD=2.64) End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout" Water Standpipe installed at 12.000m. WS1 (pH=10.6, OMS=<0.10, SO3=0.04, Cl=0.04)

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 35
ER (%) : 88

TCR,RQD (%) 20 40 60 80
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
WZ WAZER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC MOISTURE CONTENT (%)
BD BULK DENSITY (Mg/m3)
PD PARTICLE DENSITY (Mg/m3)
LL LIQUID LMT (%)
PL PLASTIC LIMIT (%)
Pc PRECONSOLIDATION PRESSURE(kPa)
Cc COMPRESSION INDEX
Cuu UNDRAINED SHEAR STRENGTH (kPa)
Cay/cw EFFECTIVE COHESION INTERCEPT(kPa)
Øay/cw 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
Salinity SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Vellankanni / Aung Thet

DURATION OF FIELD WORK:
14/08/18-16/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION AGENCY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

LOCATION: Sungei Tengah Road (WA7)

BOREHOLE NO. BH9

NORTHING: (m): 42634.207 m

EASTING: (m): 16395.736 m

REDUCED LEVEL : 106.362 m

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
17/08/18	1.80
18/08/18	1.00
18/08/18	2.70
20/08/18	1.50
20/08/18	3.30
21/08/18	1.50
21/08/18	3.30

DEPTH (m)	REDUCED LEVEL (m)	SPT-N, Blow/mm SCR%	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
0.00	106.362					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Yellowish brown mottled with reddish brown Sandy SILT(FILL)
2.00	104.36			FILL	BF	
2.00 SPT1 2.45		5/300				Firm Yellowish brown mottled with reddish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
4.00	102.36			G(VI)	MS	
4.00 SPT2 4.45		10/300				Stiff Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (BD=1.63, GRAVEL=0, SAND=10, SILT+CLAY=90) SPT3 (MC=33)
6.00 SPT3 6.45		9/300				
8.00	98.36			G(VI)	MS	Stiff Reddish brown and yellow Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=30.6, BD=1.98, PD=2.72, GRAVEL=16, SAND=14, SILT=53, CLAY=17, LL=59.8, PL=40.3, Cuu=111.8)
8.00 TW1				G(VI)	MS	
8.90	97.46			G(VI)	MS	Very stiff Reddish brown and yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (PD=2.71, GRAVEL+SAND=57, SILT=35, CLAY=8)
8.90 SPT4 9.35		29/300				
10.00	96.36			G(VI)	MS	
10.00 SPT5 10.45		5/300				Firm Reddish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
12.00	94.36			G(VI)	MS	
12.00 SPT6 12.45		13/300				Stiff Yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Whitish grey and yellowish brown at 14.0m depth, Sandy SILT at 15.0m–16.0m depth SPT6 (LL=70.2, PL=43.5) TW2 (MC=51.3, BD=1.71, PD=2.69, GRAVEL=0, SAND=5, SILT=74, CLAY=21, LL=74.6, PL=44.3, Cuu=114.3) SPT7 (MC=50.5, GRAVEL+SAND=8, SILT=67, CLAY=25) SPT8 (BD=1.62, PD=2.66)
14.00 TW2						
14.90 SPT7 15.35		10/300				
16.00 SPT8 16.45		9/300				
18.00	88.36			G(VI)	MS	
18.00 SPT9 18.45		17/300				Very stiff Whitish grey and dark grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (MC=19.8, GRAVEL+SAND=59, SILT=28, CLAY=13)
20.00	86.36			G(VI)	MS	

FIELD TESTS: SPT N VALUE (0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100)

FRACTURE PER METER

WEATHERING GRADE

RCG

DIAMETER(mm) 100

HAMMER NO: 22

ER (%) : 84

TCR,RQD (%) (20, 40, 60, 80)

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cd/os}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cd/os}$	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
Salinity	SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kanan / Mang Lian Khual

DURATION OF FIELD WORK: 17/08/18-21/08/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO. 1 / 2

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
ACCREDITED INSPECTION BODY SAC

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH9
NORTHING: (m): 42634.207 m
EASTING: (m): 16395.736 m
REDUCED LEVEL : 106.362m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
PMT1 at 21.50–22.00m Em=22.008 MPa Er=57.289 MPa		16/300			84.36	21	TW3 SPT10		G(VI)	MS	Very stiff Light greenish grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=20.4, BD=2.08, PD=2.68, GRAVEL=12, SAND=25, SILT=38, CLAY=25, LL=58.8, PL=31.7, Cuu=173.3) SPT10 (pH=5.1, OMS=0.4, SO3=<0.01, Cl=<0.01)
		19/300			82.36	23	SPT11		G(V)	MS	Very stiff Light greenish grey and whitish grey Slightly sandy gravelly SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT11 (BD=1.91, GRAVEL=37, SAND=17, SILT+CLAY=46)
		18/300			78.36	25	TW4 SPT12		G(V)	MS	Very stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE), Whitish grey and dark grey at 26.0m depth TW4 (MC=29.5, BD=1.97, PD=2.65, GRAVEL=0, SAND=12, SILT=80, CLAY=8, LL=57.2, PL=31.7, Cuu=177) SPT13 (PD=2.67)
		20/300				26	SPT13				
		29/300			75.91	28	SPT14		G(V)	MS	Very stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT14 (BD=1.94, GRAVEL=0, SAND=40, SILT+CLAY=60) SPT15 (MC=36.2, LL=47.2, PL=29.8)
		24/300				30	SPT15				
						31					End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement–bentonite–water grout". WS1 (pH=9, OMS=<0.10, SO3=0.04, Cl=0.04)
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 22
ER (%) : 84

TCR,RQD (%) 20 40 60 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{cu/cs/cs}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{cu/cs/cs}$	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Kanan / Mang Lian Khual

DURATION OF FIELD WORK:
17/08/18-21/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH10

NORTHING: (m): 42662.484 m

EASTING: (m): 16435.415 m

REDUCED LEVEL : 106.487 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
20/08/18	3.50
21/08/18	2.70
21/08/18	4.50
23/08/18	2.70
23/08/18	4.50

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT-N, Blow/mm SCR%	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
	1					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Brownish yellow and light grey Slightly gravelly sandy CLAY with concrete debris(FILL)
104.49	2			FILL	BF	
	2.00 SPT1 2.45		3/300			Soft Brownish yellow and light reddish orange Slightly gravelly sandy CLAY with traces of decayed woods(FILL), Brownish yellow and olive grey at 4.0m depth
	3					
	4					
102.19	4.00 SPT2 4.45		4/300	FILL	BF	
	5					Soft Light grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
100.49	6			G(VI)	MS	
	6.00 SPT3 6.45		8/300			Firm Yellowish grey dappled with light brownish yellow SILT Residual Soil (BUKIT TIMAH GRANITE)
	7					
98.49	8			G(VI)	M	Firm Reddish brown, yellow and light grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Slightly Sandy SILT encountered at 8.90m depth TW1 (MC=40.2, BD=1.82, PD=2.65, GRAVEL=1, SAND=20, SILT=67, CLAY=12, LL=55.7, PL=34, Cuu=66.5) SPT4 (MC=39.1)
	8.00 TW1					
	8.90 SPT4 9.35		5/300			
96.49	9			G(VI)	MS	
	10.00 SPT5 10.45		7/300			Firm Reddish brown, yellow and light grey Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (BD=1.79, GRAVEL+SAND=15, SILT=78, CLAY=7)
94.49	11			G(VI)	MS	
	12.00 SPT6 12.45		6/300			Firm Whitish grey and reddish brown Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.65, GRAVEL=3, SAND=10, SILT+CLAY=87)
92.49	13			G(VI)	MS	
	14.00 TW2					Firm to stiff Whitish grey and reddish brown Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=41.5, BD=1.80, PD=2.65, GRAVEL=1, SAND=11, SILT=84, CLAY=4, LL=47.2, PL=31.9, Cuu=87.9) SPT7 (MC=35.3, GRAVEL=9, SAND=41, SILT+CLAY=50) SPT8 (PD=2.66)
	14.90 SPT7 15.35		7/300			
	15					
	16.00 SPT8 16.45		8/300			
	16					
	17					
88.49	18			G(VI)	MS	Stiff Whitish grey and reddish brown Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE), Sandy SILT encountered at 18.90m depth TW3 (MC=29.6, BD=1.97, PD=2.67, GRAVEL=27, SAND=21, SILT=37, CLAY=15, LL=68, PL=42.5, Cuu=81.6) SPT9 (BD=1.84, GRAVEL+SAND=58, SILT=31, CLAY=11)
	18.00 TW3					
	18.90 SPT9 19.35		11/300			
86.49	19			G(VI)	MS	
	20					

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 35 | ER (%): 88

TCR,RQD (%) 20 40 60 80 — 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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cd/os}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cd/os}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Vellamkanni / Aung Thet

DURATION OF FIELD WORK: 20/08/18-23/08/18

Ryobi G
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.: 1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH10
NORTHING: (m): 42662.484 m
EASTING: (m): 16435.415 m
REDUCED LEVEL : 106.487 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
	◉	15/300				20.00 SPT10 20.45					Stiff Yellowish grey mottled with light grey Gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE)
					84.49	21 22			G(V)	MS	
	◉	7/300				22.00 SPT11 22.45					Firm Yellowish grey mottled with light grey Gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE)
					82.49	23 24			G(V)	MS	Stiff Whitish grey, dark grey and yellow Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE),
						24.00 TW4					Yellowish grey mottled with light grey Gravelly slightly Sandy SILT at 24.9m depth TW4 (MC=28.1, BD=1.99, PD=2.66,
	◉	9/300			81.29	24.90 SPT12 25.35			G(V)	MS	GRAVEL=23, SAND=28, SILT=29, CLAY=20, LL=75.1, PL=42, Cuu=88.8)
					80.49	26			G(V)	M	SPT12 (PH=6.2, OMS=0.3, SO3=<0.01, CL=<0.01)
	◉	6/300				26.00 SPT13 26.45					Firm Light grey spotted with yellowish grey SILT Completely Weathered (BUKIT TIMAH GRANITE)
					78.49	27 28			G(V)	MS	Firm Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE)
	◉	10/300				28.00 SPT14 28.45					SPT13 (MC=37, BD=2.00, LL=40, PL=26.2)
						29					Stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE)
					76.49	30			G(V)	MS	SPT14 (PD=2.68, GRAVEL=0, SAND=3, SILT=79, CLAY=18)
	◉	11/300			76.04	30.00 SPT15 30.45			G(V)	MS	Stiff Yellowish grey mottled with grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE)
						31 32 33 34 35 36 37 38 39 40					End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout" WS1 (pH=9, OMS=<0.10, SO3=0.04, Cl=0.03)

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 35
ER (%) : 88

TCR,RQD (%) 0 40 80 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Cu/s/cs	EFFECTIVE COHESION INTERCEPT(kPa)		
Fu/s/cs	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Vellamkanni / Aung Thet

DURATION OF FIELD WORK:
20/08/18-23/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH11

NORTHING: (m): 42693.461 m

EASTING: (m): 16417.895 m

REDUCED LEVEL : 106.949 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
18/08/18	2.11
20/08/18	1.15
20/08/18	3.25
21/08/18	1.05
21/08/18	2.34
23/08/18	0.92
23/08/18	2.91

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE	SPT-N, Blow/mm SCR%	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
	0					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown mottled with yellowish brown Sandy SILT(FILL)
104.95	2			FILL	BF	
	2.00	SPT1 2.45	5/300			Firm Reddish brown mottled with yellowish brown Sandy SILT(FILL)
102.95	4			FILL	BF	
	4.00	SPT2 4.45	4/300			Soft Yellowish brown and red Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=26.4)
100.95	6			G(VI)	MS	
	6.00	SPT3 6.45	8/300			Firm Reddish brown, light grey and yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.74, GRAVEL=1, SAND=16, SILT+CLAY=83)
98.95	8			G(VI)	MS	
	8.00	TW1		G(VI)	MS	Firm Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=46.7, BD=1.77, PD=2.66, GRAVEL=0, SAND=12, SILT=78, CLAY=10, LL=63.8, PL=39.5, Cuu=73.1)
98.05	8.90	SPT4 9.35	4/300			
96.95	10			G(VI)	MS	
	10.00	SPT5 10.45	5/300			Soft Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (PD=2.66, GRAVEL+SAND=5, SILT=72, CLAY=23)
94.95	12			G(VI)	MS	Firm Reddish brown, yellow and light grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (LL=58.9, PL=36.8)
	12.00	SPT6 12.45	5/300			
92.95	14			G(VI)	MS	Firm Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (BD=1.63, GRAVEL+SAND=4, SILT=57, CLAY=39)
	14.00	TW2				Stiff Reddish brown and whitish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Reddish brown and yellow at 14.9m depth TW2 (MC=46.5, BD=1.78, PD=2.66, GRAVEL=0, SAND=25, SILT=66, CLAY=9, LL=53.1, PL=35, Cuu=102) SPT7 (MC=42.7, GRAVEL=0, SAND=33, SILT+CLAY=67) SPT8 (pH=6.2, OMS=<0.1, SO3=<0.01, CL=<0.01)
	14.90	SPT7 15.35	10/300			
	16.00	SPT8 16.45	11/300			
88.95	18			G(VI)	MS	
	18.00	SPT9 18.45	14/300			Stiff Reddish brown, light grey and yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (BD=1.79, GRAVEL+SAND=37, SILT=45, CLAY=18)
86.95	20			G(VI)	MS	

RCG: RCG

DIAMETER(mm): 100

HAMMER NO: 42

ER (%) : 75

TCR,RQD (%) (20 40 60 80)

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cd/os}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cd/os}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Pandi / Nyi Nyi Htut

DURATION OF FIELD WORK: 18/08/18-23/08/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 1 / 2

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
ACCREDITED INSPECTION BODY SAC

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH11
NORTHING: (m): 42693.461 m
EASTING: (m): 16417.895 m
REDUCED LEVEL : 105.949 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
						20.50	TW2				Stiff Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
					86.05				G(VI)	MS	TW3 (MC=34.6, BD=1.98, PD=2.69, GRAVEL=0, SAND=8, SILT=76, CLAY=16, LL=52.3, PL=31.2, Ccu/cp/os=6.9/-/-, Φcu/cp/os=28.7/-/-)
		15/300				21	20.91 SPT10 21.35				
		18/300				22	22.00 SPT11 22.45				Stiff Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT10 (LL=54.1, PL=32.4) SPT11 (MC=33.9)
						23					
					82.95	24			G(VI)	MS	
							24.00 TW4				Very stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE), Light greenish grey at 24.9m depth TW4 (MC=32.9, BD=1.91, PD=2.66, GRAVEL=0, SAND=23, SILT=73, CLAY=4, LL=40.4, PL=27.8, Cuu=173.7) SPT12 (MC=37.7, GRAVEL+SAND=11, SILT=79, CLAY=10)
PMT1 at 26.00–26.50m Em=24.811 MPa Er=79.527 MPa		13/300				25	24.90 SPT12 25.35				
						26					
						27					
					78.95	28			G(V)	MS	
		26/300					28.00 SPT13 28.45				Very stiff Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT13 (BD=1.71, GRAVEL=0, SAND=17, SILT+CLAY=83)
						29					
					76.95	30			G(V)	MS	
		31/300			76.50		30.00 SPT14 30.45		G(V)	MS	Hard Light greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT14 (MC=29.5, LL=41.6, PL=27.5)
											End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement–bentonite–water grout". WS1 (pH=8.7, OMS=<0.10, SO3=0.05, Cl=0.02)
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 42
ER (%) : 75

TCR,RQD (%) 0 20 40 60 80 100
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Ccu/cp/os	EFFECTIVE COHESION INTERCEPT(kPa)		
Φcu/cp/os	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Pandi / Nyi Nyi Htut

DURATION OF FIELD WORK:
18/08/18-23/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH12

NORTHING: (m): 42693.789 m

EASTING: (m): 16348.922 m

REDUCED LEVEL : 106.452 m

FIELD TESTS

SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
27/08/18	3.00
28/08/18	1.00
28/08/18	3.50
29/08/18	1.00
29/08/18	3.50

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)	DESCRIPTION
			104.45	2			FILL	BF	Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown Sandy SILT(FILL)
6/300				2.00 SPT1 2.45					Firm Reddish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
			102.45	4			G(VI)	MS	
7/300				4.00 SPT2 4.45					Firm Reddish brown mottled with yellowish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
			100.45	6			G(VI)	MS	
9/300				6.00 SPT3 6.45					Stiff Yellowish brown and red Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (LL=83.5, PL=51.3)
			98.45	8			G(VI)	MS	
6/300				8.00 TW1 8.90 SPT4 9.35					Firm Yellowish brown and red Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=51.8, BD=1.73, PD=2.65, GRAVEL=0, SAND=2, SILT=63, CLAY=35, LL=93.1, PL=54.9, Cuu=43.7) SPT4 (PD=2.65, GRAVEL=0, SAND=1, SILT+CLAY=99) SPT5 (BD=1.80, GRAVEL+SAND=2, SILT=68, CLAY=30) SPT6 (MC=52.7, GRAVEL=0, SAND=2, SILT+CLAY=98)
7/300				10.00 SPT5 10.45					
5/300				12.00 SPT6 12.45					
			92.45	14			G(VI)	MS	
8/300				14.00 TW2 14.90 SPT7 15.35					Firm to stiff Light grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE), Greenish grey at 16.0m depth TW2 (MC=40.6, BD=1.85, PD=2.68, GRAVEL=0, SAND=2, SILT=79, CLAY=19, LL=66, PL=36.5, Cuu=75.8)
9/300				16.00 SPT8 16.45					
			88.45	18			G(VI)	MS	
12/300				18.00 SPT9 18.45					Stiff Whitish grey and dark grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT9 (BD=1.92, GRAVEL+SAND=57, SILT=28, CLAY=15)
			86.45	20			G(V)	MS	

RCG

DIAMETER(mm) 100

HAMMER NO: 42

ER (%) : 75

TCR,RQD (%) (20 40 60 80)

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{Cu/cb/ps}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{Cu/cb/ps}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR

Pandi / Mang Lian Khual

DURATION OF FIELD WORK:

27/08/18-29/08/18

Ryobi G

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.

1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH12
NORTHING: (m): 42693.789 m
EASTING: (m): 16348.922 m
REDUCED LEVEL : 106.452 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
						20.90 TW2					Stiff Light greenish grey and whitish grey Slightly gravelly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) TW3 (MC=23.4, BD=2.02, PD=2.67, GRAVEL=19, SAND=38, SILT=25, CLAY=18, LL=61.3, PL=37.7, Cuu=128.7) SPT10 (pH=7.1, OMS=0.3, SO3=<0.01, Cl=<0.01)
		10/300				21 20.90 SPT10 21.35					
		11/300				22 22.00 SPT11 22.45					
						23					
					82.45	24			G(V)	MS	
						24.00 TW4					Very stiff Light greenish grey and whitish grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE), Slightly Sandy SILT at 24.9m depth TW4 (MC=24.2, BD=1.98, PD=2.65, GRAVEL=24, SAND=32, SILT=36, CLAY=8, LL=76.2, PL=37.8, Cuu=152.2) SPT12 (MC=32.1, LL=49.5, PL=32.6)
		21/300				25 24.90 SPT12 25.35					
PMT1 at 25.50-26.00m Em=18,714 MPa Er=43,659 MPa					80.45	26			G(V)	MS	
		20/300				26.00 SPT13 26.45					Very stiff Light greenish grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT13 (PD=2.67, GRAVEL=1, SAND=27, SILT+CLAY=72)
					78.45	27			G(V)	MS	
		25/300				28.00 SPT14 28.45					Very stiff Greenish grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT14 (BD=1.99, GRAVEL+SAND=52, SILT=44, CLAY=4)
					76.45	29 30			G(V)	MS	
		78/300			76.00	30.00 SPT15 30.45			G(V)	MS	Hard Greenish grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT15 (MC=19.9)
						31					End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout" WS1 (pH=8.9, OMS=<0.10, SO3=0.05, Cl=0.02)
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 42
ER (%) : 75

TCR,RQD (%) 0 40 60 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC MOISTURE CONTENT (%)
BD BULK DENSITY (Mg/m3)
PD PARTICLE DENSITY (Mg/m3)
LL LIQUID LMT (%)
PL PLASTIC LIMIT (%)
Pc PRECONSOLIDATION PRESSURE(kPa)
Cc COMPRESSION INDEX
Cur UNDRAINED SHEAR STRENGTH (kPa)
Cauveve EFFECTIVE COHESION INTERCEPT(kPa)
Fauveve 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
Salinity SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Pandi / Mang Lian Khual

DURATION OF FIELD WORK:
27/08/18-29/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63626848
SAC ACCREDITED INSPECTION AGENCY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. **BH13**

NORTHING: (m): 42734.778 m

EASTING: (m): 16368.011 m

REDUCED LEVEL : 106.653 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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) | DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
27/08/18	2.83
28/08/18	1.12
28/08/18	3.21
29/08/18	1.35
29/08/18	3.20

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	SPT-N, Blow/mm, SCR%	DESCRIPTION
	1					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown Sandy SILT with hard cores(FILL)
104.65	2		FILL	BF		
	2.00	SPT1			6/300	Firm Reddish brown Sandy SILT(FILL)
	2.45					
	3					
102.65	4		FILL	BF		
	4.00	SPT2			7/300	Firm Reddish brown and yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (PD=2.72)
	4.45					
	5					
100.65	6		G(VI)	MS		
	6.00	SPT3			8/300	Firm Light grey mottled with yellowish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
	6.45					
	7					
98.65	8		G(VI)	MS		Stiff Reddish brown and yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
	8.00	TW1				TW1 (MC=35.2, BD=1.89, PD=2.67, GRAVEL=1, SAND=25, SILT=54, CLAY=20, LL=68.5,
97.75	9		G(VI)	MS		PL=42.2, Cuu=105.3)
	8.90	SPT4			10/300	Stiff Reddish brown and yellow Slightly sandy SILT
	9.35					
96.65	10		G(VI)	MS		Residual Soil (BUKIT TIMAH GRANITE) SPT4 (PD=2.66, GRAVEL+SAND=33, SILT=48, CLAY=19)
	10.00	SPT5			8/300	
	10.45					Firm Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT5 (MC=34.1)
	11					
94.65	12		G(VI)	MS		
	12.00	SPT6			7/300	Firm Light grey mottled with reddish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (pH=4.1, OMS=<0.1, SO3=<0.01, CL=<0.01)
	12.45					
	13					
92.65	14		G(VI)	MS		
	14.00	TW2				Stiff Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW2 (MC=47.2, BD=1.75, PD=2.66, GRAVEL=0, SAND=24, SILT=45, CLAY=31, LL=80.3, PL=46.1, Cuu=106.5)
91.75	15		G(VI)	MS		
	14.90	SPT7			8/300	
	15.35					
90.65	16		G(VI)	MS		
	16.00	SPT8			9/300	Firm Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT7 (BD=1.74, GRAVEL=0, SAND=29, SILT+CLAY=71)
	16.45					
	17					
88.65	18		G(VI)	MS		Stiff Greyish pink Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
	18.00	SPT9			8/300	
	18.45					Firm Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (BD=1.87, GRAVEL+SAND=23, SILT=59, CLAY=18)
	19					
86.65	20		G(VI)	MS		

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 22 | ER (%): 84

TCR,RQD (%) 20 40 60 80 — 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 (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LIMIT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
$C_{cu/cd/ps}$	EFFECTIVE COHESION INTERCEPT(kPa)		
$\phi_{cu/cd/ps}$	EFFECTIVE FRICTION ANGLE (degree)		

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kanan / Nyi Nyi Htut

DURATION OF FIELD WORK: 27/08/18-29/08/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 1 / 2

58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH13
NORTHING: (m): 42734.778 m
EASTING: (m): 16368.011 m
REDUCED LEVEL : 106.653 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
					85.75	21	TW2		G(VI)	MS	Very stiff Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=40.5, BD=1.86, PD=2.68, GRAVEL=0, SAND=15, SILT=62, CLAY=23, LL=66.3, PL=39.3, Cuu/cd/ds=9.8/-/-, ϕcu/cd/ds=33.6/-/-)
		19/300				21.91	SPT10				
		21/300				22.00	SPT11				Very stiff Reddish brown and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT10 (MC=25.4) SPT11 (GRAVEL=27, SAND=24, SILT+CLAY=49)
					82.65	24					
		16/300				24.00	TW4		G(VI)	MS	Stiff to very stiff Reddish brown, yellow and yellowish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW4 (MC=49.3, BD=1.77, PD=2.65, GRAVEL=0, SAND=3, SILT=68, CLAY=29, LL=88.6, PL=47.7, Cuu=119.9) SPT12 (BD=1.63, LL=86.1, PL=45.9)
						24.90	SPT12				
		15/300				26.00	SPT13				
					78.65	28			G(VI)	MS	
		22/300				28.00	SPT14				Very stiff Whitish grey and dark grey Slightly gravelly slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT14 (PD=2.65, GRAVEL=27, SAND=32, SILT+CLAY=41)
					76.65	30			G(V)	MS	
		32/300			76.20	30.00	SPT15		G(V)	MS	Hard Whitish grey and dark grey Sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT15 (MC=19.7, GRAVEL+SAND=63, SILT=27, CLAY=10)
						40					End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". Water standpipe installed at 12.000m. WS1 (pH=8.5, OMS=<0.10, SO3=0.07, Cl=0.02)

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 22
ER (%) : 84

TCR,RQD (%) 20 40 60 80
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Cs/c'vs/cs	EFFECTIVE COHESION INTERCEPT(kPa)		
fcu/c'vs/cs	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Kanan / Nyi Nyi Htut

DURATION OF FIELD WORK:
27/08/18-29/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION BODY

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH14

NORTHING: (m): 42738.052 m

EASTING: (m): 16302.515 m

REDUCED LEVEL : 106.637 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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)

DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
29/08/18	2.98
30/08/18	1.23
30/08/18	3.65

REDUCED LEVEL (m)	DEPTH (m)	SAMPLE TYPE	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	SPT-N, Blow/mm SCR%	DESCRIPTION
	0					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown mottled with dark grey Sandy SILT(FILL)
104.64	2		FILL	BF		
	2.00	SPT1			4/300	Soft Greyish pink Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
	2.45					
102.64	4		G(VI)	MS		
	4.00	SPT2			5/300	Firm Reddish brown and light yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (MC=29.4, PD=2.65)
	4.45					
100.64	6		G(VI)	MS		
	6.00	SPT3			9/300	Stiff Reddish brown and light yellow Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (BD=1.76, GRAVEL=1, SAND=41, SILT+CLAY=58)
	6.45					
98.64	8		G(VI)	MS		
	8.00	TW1				Firm Reddish brown and light yellow Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
97.74	9		G(VI)	MS		
	8.90	SPT4			7/300	TW1 (MC=31.7, BD=1.88, PD=2.66, GRAVEL=9, SAND=19, SILT=56, CLAY=16, LL=68.1, PL=39.6, Cuu=74)
	9.35					
	10					
	10.00	SPT5			8/300	Firm to stiff Reddish brown and light yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=36.5, GRAVEL+SAND=33, SILT=55, CLAY=12) SPT5 (LL=62, PL=37.1)
	10.45					
	11					
	12					
	12.00	SPT6			10/300	
	12.45					
	13					
92.64	14		G(VI)	MS		Stiff Reddish brown, light yellow, light grey and yellow Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE), Sandy SILT at 15.0m and 18.0m depth
	14.00	TW2				TW2 (MC=26.2, BD=1.95, PD=2.65, GRAVEL=28, SAND=23, SILT=31, CLAY=18, LL=64.5, PL=37.7, Cuu=104.2)
	14.90	SPT7			12/300	SPT7 (PD=2.66, GRAVEL+SAND=36, SILT=51, CLAY=13)
	15.35					
90.64	16		G(VI)	MS		
	16.00	SPT8			13/300	Stiff Reddish brown, light grey and yellow Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE) SPT8 (BD=1.46, GRAVEL=34, SAND=18, SILT+CLAY=48)
	16.45					
88.64	18		G(VI)	MS		
	18.00	SPT9			15/300	Stiff Reddish brown mottled with yellowish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
	18.45					
86.64	20		G(VI)	MS		

RCG

DIAMETER(mm) 100

HAMMER NO: 11

ER (%) : 72

TCR,RQD (%) 20 40 60 80

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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
$C_{cu/cd/ds}$	EFFECTIVE COHESION INTERCEPT(kPa)
$\phi_{cu/cd/ds}$	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR

Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK:

29/08/18-30/08/18

58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

PROJECT ENGINEER/PROJECT MANAGER

Harry Chen / Yuet Ling Yen

SHEET NO.

1 / 2

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH14
NORTHING: (m): 42738.052 m
EASTING: (m): 16302.515 m
REDUCED LEVEL : 106.637 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
		16/300				21 SPT10 21.45					Stiff to very stiff Reddish brown, light grey and yellow Slightly sandy slightly gravelly SILT Residual Soil (BUKIT TIMAH GRANITE). Sandy SILT with gravels at 22.0m depth, Sandy SILT at 26.0m depth, Slightly Sandy SILT at 30.0m depth TW3 (MC=24.8, BD=1.98, PD=2.66, GRAVEL=30, SAND=18, SILT=33, CLAY=19, LL=62.4, PL=37, Cuu=118.4) TW4 (MC=24.7, BD=1.95, PD=2.66, GRAVEL=34, SAND=18, SILT=31, CLAY=17, LL=54.2, PL=32.2, Cuu=127.2) SPT12 (MC=26.5) SPT13 (pH=6.3, OMS=<0.1, SO3=<0.01, CL=<0.01) SPT14 (PD=2.66, GRAVEL=16, SAND=17, SILT+CLAY=67) SPT15 (BD=1.85)
		17/300				22 SPT11 22.45					
						23					
						24 TW4					
		20/300				25 SPT12 25.35					
		14/300				26 SPT13 26.45					
						27					
		19/300				28 SPT14 28.45					
						29					
		22/300			76.19	30 SPT15 30.45			G(VI)	MS	
						31					End of borehole at 30.450m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=8.9, OMS=<0.10, SO3=0.06, Cl=0.02)
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 11
ER (%): 72

TCR,RQD (%) 0 20 40 60 80 100
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
WZ MAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC MOISTURE CONTENT (%)
BD BULK DENSITY (Mg/m3)
PD PARTICLE DENSITY (Mg/m3)
LL LIQUID LMT (%)
PL PLASTIC LIMIT (%)
Pc PRECONSOLIDATION PRESSURE(kPa)
Cc COMPRESSION INDEX
Cuu UNDRAINED SHEAR STRENGTH (kPa)
C'cu/c'o EFFECTIVE COHESION INTERCEPT(kPa)
ø'cu/c'o 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
Salinity SALINITY CONTENT (dS/m)

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

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Allwin / Nyi Nyi Htut

DURATION OF FIELD WORK:
29/08/18-30/08/18

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848

PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Lung Yen

SHEET NO.
2 / 2

LOCATION:

Sungei Tengah Road (WA7)

BOREHOLE NO. BH15

NORTHING: (m): 42785.222 m

EASTING: (m): 16354.795 m

REDUCED LEVEL : 106.543 m

FIELD TESTS | SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100) | 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)

DESCRIPTION

DAILY WATER LEVEL

DATE (dd/mm/yy)	READING (m.BGL)
01/09/18	3.10
03/09/18	3.10
03/09/18	5.00

RL	Depth		SPT-N	GEOLOGICAL CLASSIFICATION	Material Code AGS (SG)	DESCRIPTION
	0					Trial Pit : 1.0m x 1.0m x 1.5m Hand Auger : 1.5m – 2.0m Reddish brown Slightly sandy SILT(FILL)
104.54	2.00	SPT1 2.45	4/300	FILL	BF	
						Soft Yellowish brown mottled with reddish brown Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE)
102.54	4.00	SPT2 4.45	5/300	G(VI)	MS	Firm Light grey, reddish brown and yellow Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT2 (GRAVEL+SAND=51, SILT=28, CLAY=21)
100.54	6.00	SPT3 6.45	10/300	G(VI)	MS	Stiff Light grey and reddish brown Sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT3 (PD=2.65, GRAVEL=0, SAND=44, SILT+CLAY=56)
98.54	8.00	TW1		G(VI)	MS	Stiff Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW1 (MC=41.9, BD=1.86, Cuu=101.9)
97.64	8.90	SPT4 9.35	5/300	G(VI)	MS	
	10.00	SPT5 10.45	7/300			Firm Reddish brown, light grey and yellow Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT4 (MC=54.5, LL=101.1, PL=52.1) SPT5 (BD=1.78, GRAVEL+SAND=27, SILT=38, CLAY=35)
94.54	12.00	SPT6 12.45	4/300	G(VI)	MS	Soft Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT6 (PD=2.67, GRAVEL=0, SAND=3, SILT=78, CLAY=19) TW2 (MC=37.5, BD=1.88, PD=2.66, GRAVEL=0, SAND=17, SILT=64, CLAY=19, LL=58.8, PL=36.9, Ccu/cd/ds=4.6/–/–, Φcu/cd/ds=29.8/–/–) SPT7 (MC=43.9, LL=50.8, PL=30.8) SPT8 (PD=2.71, GRAVEL+SAND=5, SILT=78, CLAY=17)
	14.00	TW2				
	14.90	SPT7 15.35	3/300			
	16.00	SPT8 16.45	3/300			
88.54	18.00	SPT9 18.45	8/300	G(VI)	MS	Firm Light greenish grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT9 (BD=1.74, PD=2.68, GRAVEL=0, SAND=4, SILT+CLAY=96)
86.54	20					

RCG: RCG | DIAMETER(mm): 100 | HAMMER NO: 22 | ER (%): 84

TCR,RQD (%) (20 40 60 80) — 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/m3)
PD	PARTICLE DENSITY (Mg/m3)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)
Cc	COMPRESSION INDEX
Cuu	UNDRAINED SHEAR STRENGTH (kPa)
Ccu/cd/ds	EFFECTIVE COHESION INTERCEPT(kPa)
Φcu/cd/ds	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
Salinity	SALINITY CONTENT (dS/m)

CLIENT:

Agri–Food & Veterinary Authority of Singapore (AVA)

LOG OF BORING
GEOTECHNICAL STUDY – FIELD INVESTIGATIONS

PROJECT:

Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR: Kanan / Mang Lian Khual

DURATION OF FIELD WORK: 01/09/18-03/09/18

PROJECT ENGINEER/PROJECT MANAGER: Harry Chen / Yuet Ling Yen

SHEET NO.: 1 / 2

Ryobi G
58A SUNGEI KADUT LOOP
SINGAPORE 729505
TEL: 65 63697100 FAX: 65 63625848
ACCREDITED INSPECTION BODY SAC

LOCATION:
Sungei Tengah Road (WA7)

BOREHOLE NO. BH15
NORTHING: (m): 42785.222 m
EASTING: (m): 16354.795 m
REDUCED LEVEL : 106.543 m

FIELD TESTS	SPT N VALUE (0 10 20 30 40 50 60 70 80 90 100)	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)	DESCRIPTION
					85.64	21	TW2		G(VI)	MS	Stiff Whitish grey and dark grey Slightly gravelly slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW3 (MC=22.4, BD=2.01, PD=2.67, GRAVEL=25, SAND=31, SILT=34, CLAY=10, LL=56.2, PL=34.7, Cuu=112)
		20/300				20.91	SPT10 21.35				
					84.54	22			G(VI)	MS	
		21/300				22.00	SPT11 22.45				Very stiff Whitish grey and dark grey Slightly gravelly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) SPT10 (MC=22.6, GRAVEL=23, SAND=41, SILT=31, CLAY=5)
						23					
					82.54	24			G(VI)	MS	Very stiff Light grey spotted with dark grey Sandy SILT with rock fragments Residual Soil (BUKIT TIMAH GRANITE)
						24.00	TW4				
					81.64	25			G(VI)	MS	SPT11 (pH=8.8, OMS=0.2, SO3=<0.01, Cl=<0.01)
		58/300				24.90	SPT12 25.35				Very stiff Whitish grey and dark grey Slightly sandy SILT Residual Soil (BUKIT TIMAH GRANITE) TW4 (MC=23, BD=1.97, Cuu=212.7)
PMT1 at 25.50-26.00m Em=69.144 MPa Er=162.479 MPa					80.54	26			G(V)	MS	
		100/110				26.00	SPT13 26.24				Hard Whitish grey and dark grey Slightly sandy SILT Completely Weathered (BUKIT TIMAH GRANITE) SPT12 (BD=1.94, PD=2.66)
						27					
		100/15			78.44	28	SPT14 28.10		G(V)	SM	Very dense Dark grey mottled with light grey Silty fine to coarse SAND Completely Weathered (BUKIT TIMAH GRANITE)
											End of borehole at 28.100m and sealed borehole with 3 : 0.75 : 4 "cement-bentonite-water grout". WS1 (pH=8.7, OMS=<0.10, SO3=0.06, Cl=0.03)
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

RCG: RCG
DIAMETER(mm): 100
HAMMER NO: 22
ER (%) : 84

TCR,RQD (%) 0 20 40 60 80 100
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
WZ WAZIER SAMPLE
CR CORE SAMPLE
SPT SPLIT SPOON SAMPLE
WS WATER SAMPLE

MC	MOISTURE CONTENT (%)	k(Lab)	LAB PERMEABILITY (m/sec)
BD	BULK DENSITY (Mg/m3)	UCS	ROCK COMPRESSIVE STRENGTH (MPa)
PD	PARTICLE DENSITY (Mg/m3)	Is(50)	POINT LOAD STRENGTH (MPa)
LL	LIQUID LMT (%)	OMS	ORGANIC MATTER CONTENT (%)
PL	PLASTIC LIMIT (%)	Cl	CHLORIDE CONTENT (%)
Pc	PRECONSOLIDATION PRESSURE(kPa)	SO3	SULPHATE CONTENT (%)
Cc	COMPRESSION INDEX	pH	pH VALUE
Cuu	UNDRAINED SHEAR STRENGTH (kPa)	Salinity	SALINITY CONTENT (dS/m)
Cu/Cv	EFFECTIVE COHESION INTERCEPT(kPa)		
Fu/Fv	EFFECTIVE FRICTION ANGLE (degree)		

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

LOG OF BORING
GEOTECHNICAL STUDY - FIELD INVESTIGATIONS

PROJECT:
Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

DRILLER/SUPERVISOR
Kanan / Mang Lian Khual

DURATION OF FIELD WORK:
01/09/18-03/09/18

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TEL: 65 63697100 FAX: 65 63625848
SAC ACCREDITED INSPECTION BODY

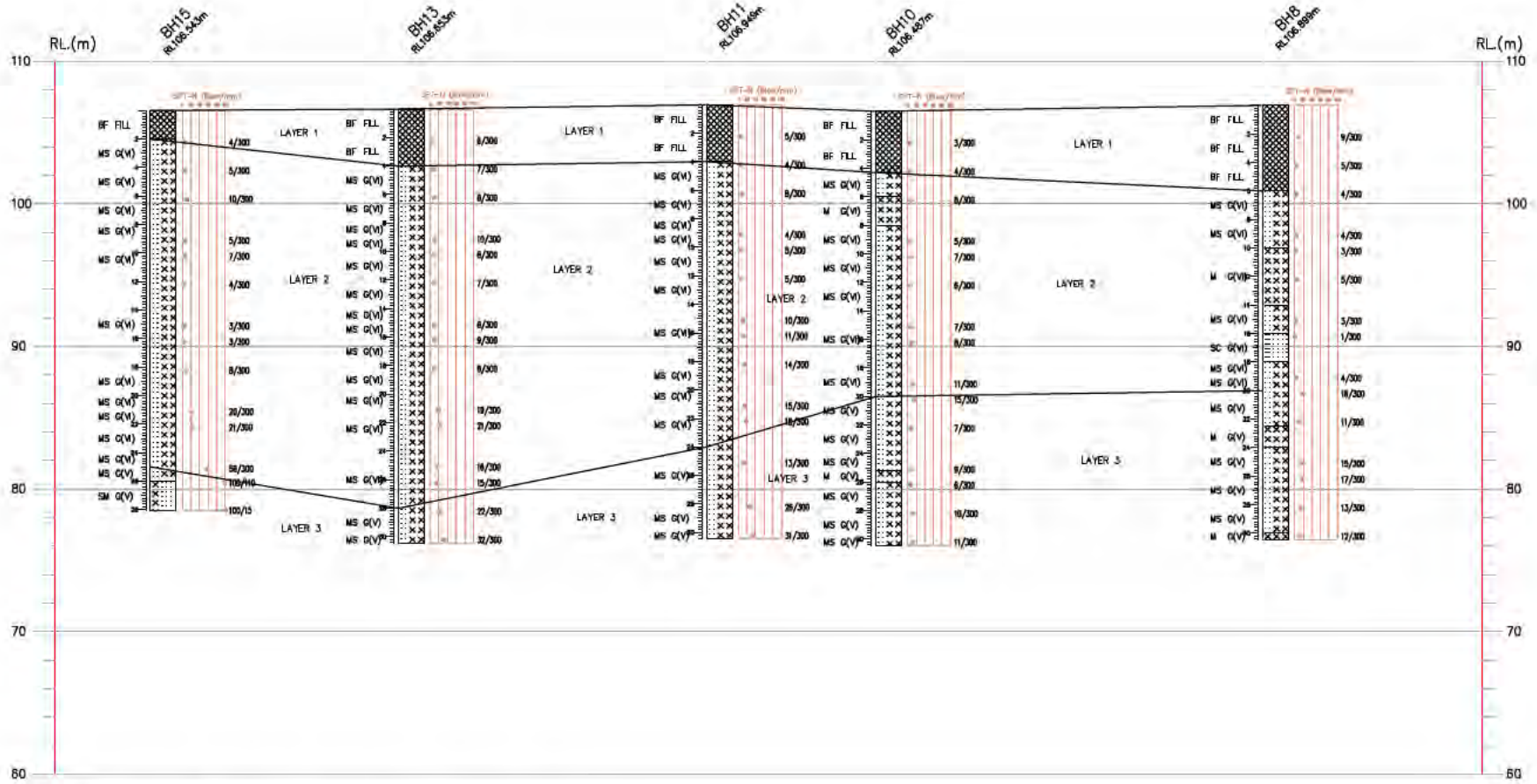
PROJECT ENGINEER/PROJECT MANAGER
Harry Chen / Yuet Ling Yen

SHEET NO.
2 / 2

APPENDIX C
GEOLOGICAL PROFILES

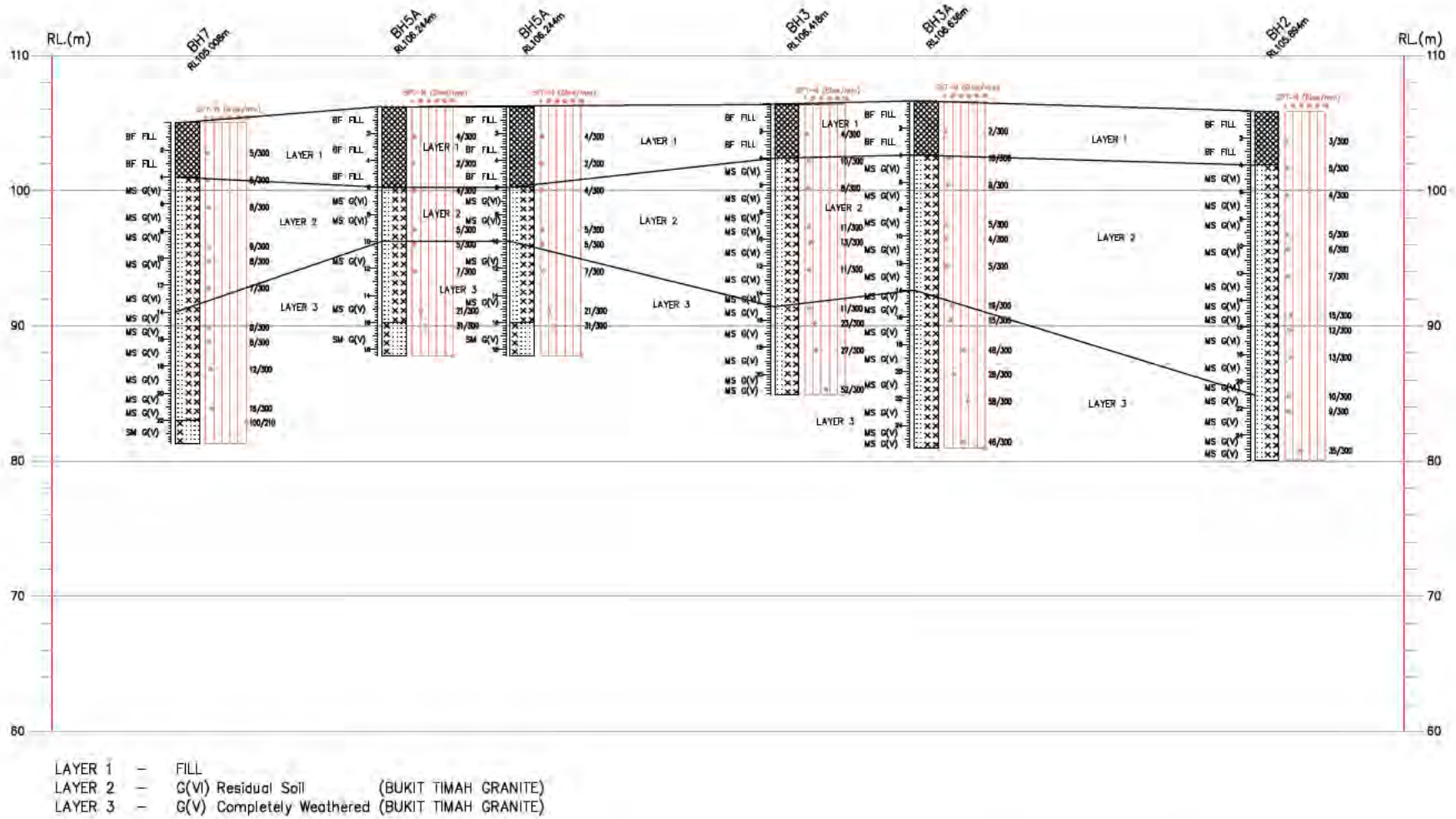
List of Geological Cross-Sections for Geological Profiles

SECTION	BOREHOLES
A-A	BH15-BH13-BH11-BH10-BH8
B-B	BH7-BH5A-BH5-BH3-BH3A-BH2
C-C	BH14-BH12-BH9
D-D	BH6-BH4-BH1



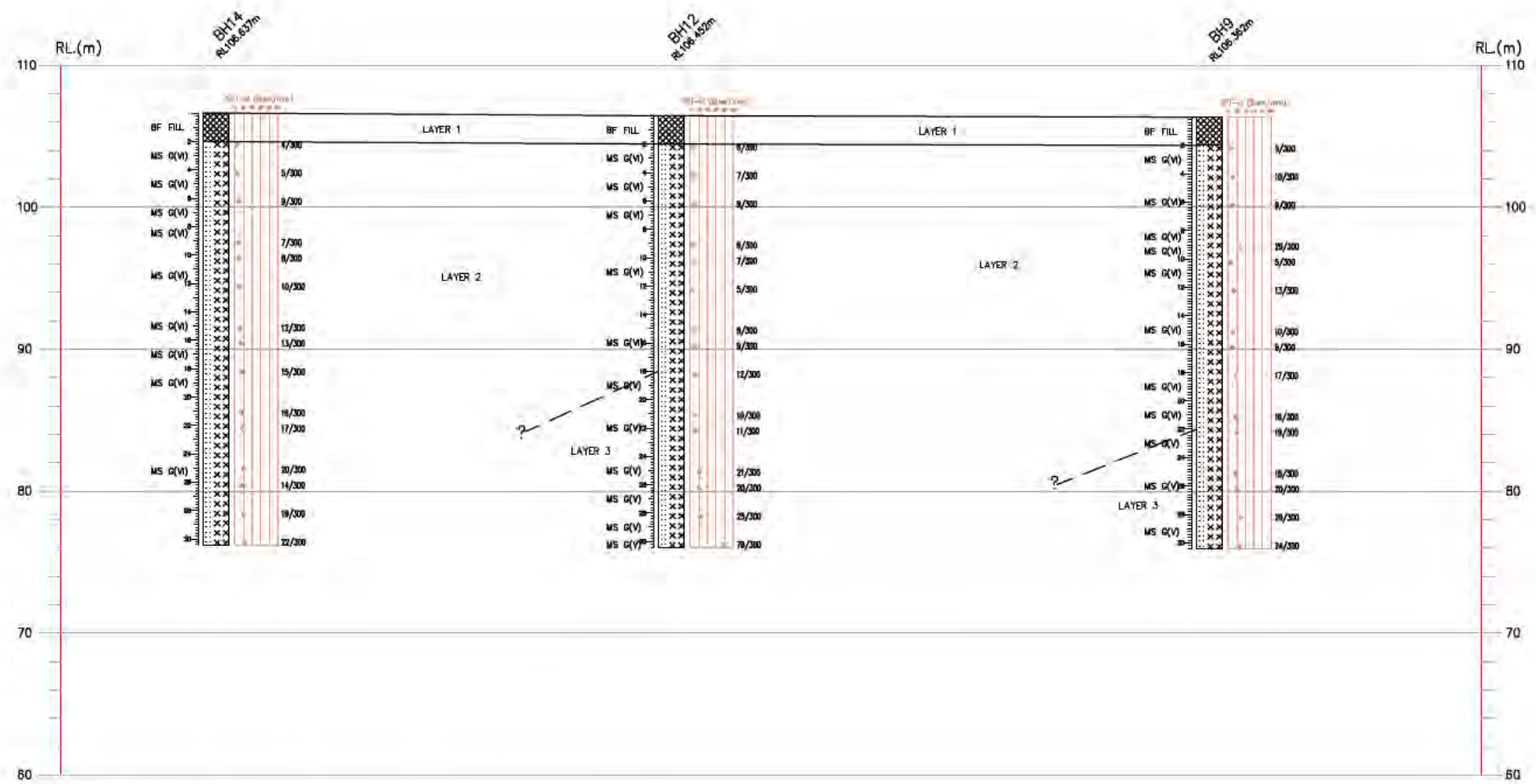
LAYER 1 – FILL
LAYER 2 – G(VI) Residual Soil (BUKIT TIMAH GRANITE)
LAYER 3 – G(V) Completely Weathered (BUKIT TIMAH GRANITE)

Remarks: BH15–BH13–BH11–BH10–BH8	Section No.	A–A	Drawing Title: Geological Profile	Drawn by: Ho Pei Tze	Checked by: Harry Chen	Date: 26/09/2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assumpting that the borehole details accurate EXCEL FILE REF: AutoCAD FILE REF:	Scale	As shown	Project Title: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road	Ryobi G 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		



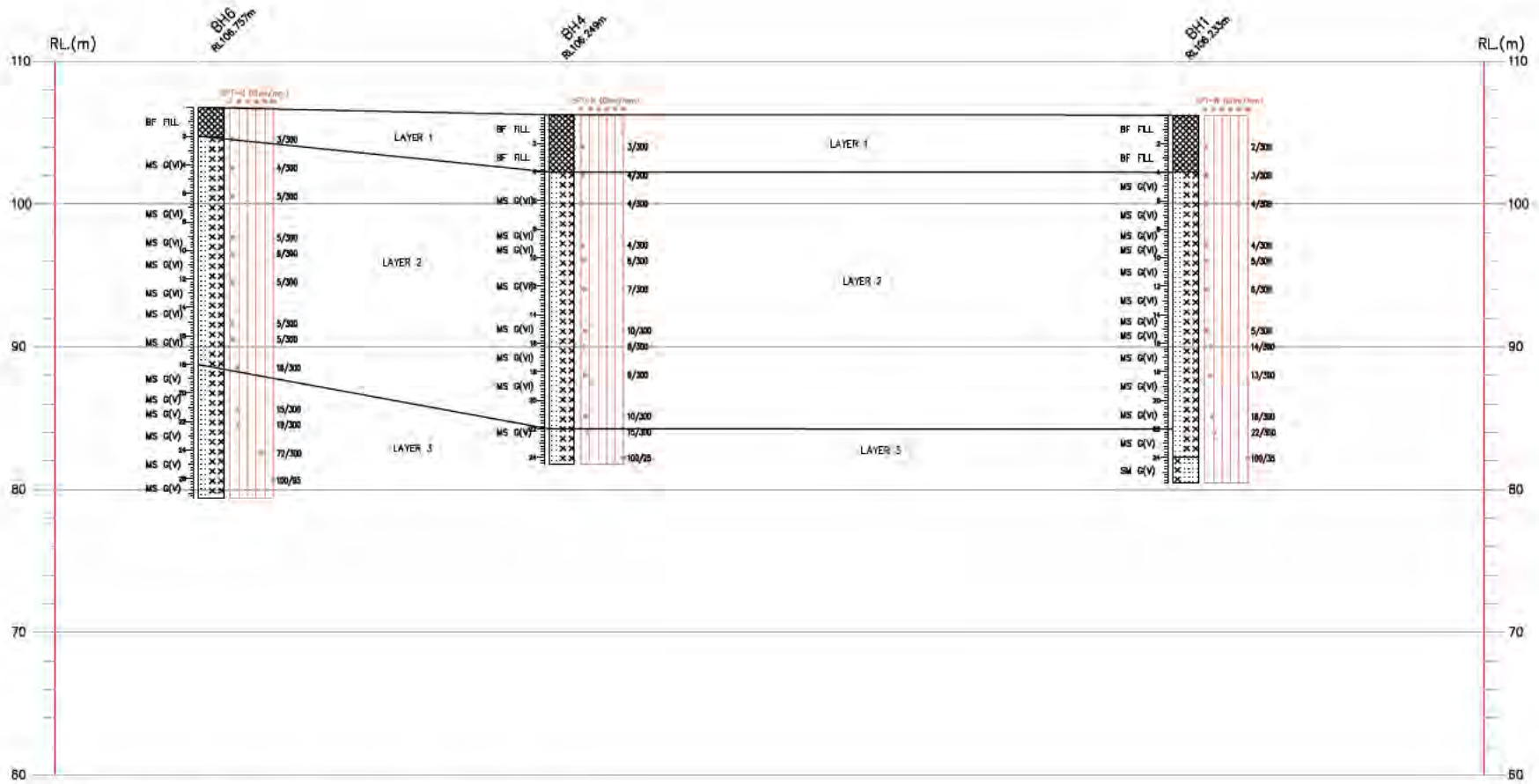
LAYER 1 – FILL
LAYER 2 – G(VI) Residual Soil (BUKIT TIMAH GRANITE)
LAYER 3 – G(V) Completely Weathered (BUKIT TIMAH GRANITE)

Remarks: BH7–BH5A–BH5–BH3–BH3A–BH2	Section No.	B-B	Drawing Title: Geological Profile	Drawn by: Ho Pei Tze	Checked by: Harry Chen	Date: 26/09/2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assumpting that the borehole details accurate	Scale	As shown	Project Title: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road	Ryobi G 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		
EXCEL FILE REF: AutoCAD FILE REF:						



LAYER 1 – FILL
LAYER 2 – G(VI) Residual Soil (BUKIT TIMAH GRANITE)
LAYER 3 – G(V) Completely Weathered (BUKIT TIMAH GRANITE)
--?-- – Uncertainity due to localized existence or significant change

Remarks: BH14-BH12-BH9	Section No.	C-C	Drawing Title: Geological Profile	Drawn by: Ho Pei Tze	Checked by: Harry Chen	Date: 26/09/2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assumpting that the borehole details accurate	Scale	As shown	Project Title: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road	Ryobi G 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		
EXCEL FILE REF: AutoCAD FILE REF:						



LAYER 1 – FILL
LAYER 2 – G(VI) Residual Soil (BUKIT TIMAH GRANITE)
LAYER 3 – G(V) Completely Weathered (BUKIT TIMAH GRANITE)

Remarks: BH6–BH4–BH1	Section No.	D–D	Drawing Title: Geological Profile	Drawn by: Ho Pei Tze	Checked by: Harry Chen	Date: 26/09/2018
Note: Strata are interpolated and may vary considerably between boreholes. Profiles is prepared based on the assumpting that the borehole details accurate	Scale	As shown	Project Title: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road	Ryobi G 58A SUNGEI KADUT LOOP Singapore 729505 Tel: 65 63697100 Fax: 65 63625848		
EXCEL FILE REF: AutoCAD FILE REF:						

APPENDIX D
RESULTS OF LABORATORY TESTS

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH1						
SAMPLE NO :			SPT1	SPT2	SPT3	TW1	SPT4	SPT5	SPT6
SAMPLE DEPTH :		m	2.00-2.45	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	43.1	-	39.1	39.6	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.75	1.87	-	1.73	-
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	2.66	-	-	2.66	-	-	2.65
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	58	3	-	0	-	2	46
	SAND	%		39	-	31	-	34	
	SILT	%	25	58	-	48	-	64	36
	CLAY	%	17		-	21	-		18
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	55.4	63.6	52.9	-	-
	PLASTIC LIMIT	%	-	-	29.9	35.5	31.2	-	-
	PLASTICITY INDEX		-	-	25	28	22	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	-	-
	TOTAL COHESION	kPa	-	-	-	-	-	-	-
	TEST TYPE		-	-	-	$CU^{70\phi}$	-	-	-
	EFFECTIVE COHESION	kPa	-	-	-	6.1	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	-	-	35.5	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 : 06/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 6S- 6369 7100 Fax: 65- 6362 S848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH1						
SAMPLE NO :			TW2	SPT7	SPT8	SPT9	TW3	SPT10	SPT11
SAMPLE DEPTH :		m	14.00-14.90	14.90-15.35	16.00-16.45	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	38.0	31.1	-	-	30.1	33.5	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.84	1.80	-	-	1.98	-	1.77
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	2.66	-	2.67	-	2.69	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	3	-	3	-	1	-	59
	SAND	%	35	-	41	-	49	-	
	SILT	%	46	-	45	-	38	-	31
	CLAY	%	16	-	11	-	12	-	10
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	59.9	40.5	-	-	53.2	(A)	-
	PLASTIC LIMIT	%	35.2	26.7	-	-	32.1		-
	PLASTICITY INDEX		25	14	-	-	21		-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	**UU**	-	-
	TOTAL COHESION	kPa	-	-	-	-	78.9	-	-
	TEST TYPE		**CU**	-	-	-	-	-	-
	EFFECTIVE COHESION	kPa	6.7	-	-	-	-	-	-
	EFFECTIVE PHI ANGLE	degree	35.2	-	-	-	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	4.5	-	-	-
	Chloride Content	%	-	-	-	<0.01	-	-	-
	Organic Content	%	-	-	-	0.3	-	-	-
	Sulphate Content	%	-	-	-	<0.01	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH1						
SAMPLE NO :			SPT12	W1					
SAMPLE DEPTH :		m	24.00-24.10	Water Sample					
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-						
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-					
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	2.71	-					
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	35	-					
	SAND	%	51	-					
	SILT	%	14	-					
	CLAY	%		-					
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-					
	PLASTIC LIMIT	%	-	-					
	PLASTICITY INDEX		-	-					
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-					
	TOTAL COHESION	kPa	-	-					
	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	-	-					
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-					
	Chloride Content	%	-	-					
	Organic Content	%	-	-					
	Sulphate Content	%	-	-					
	pH Value		-	11.6					
	Chloride Content	g/L	-	0.05					
	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 :
-

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH1	SPT1	2.00-2.45	-	-	-	2.66
BH1	SPT2	4.00-4.45	43.1	-	-	-
BH1	SPT3	6.00-6.45	-	1.75	-	-
BH1	TW1	8.00-8.90	39.1	1.87	-	2.66
BH1	SPT4	8.90-9.35	39.6	-	-	-
BH1	SPT5	10.00-10.45	-	1.73	-	-
BH1	SPT6	12.00-12.45	-	-	-	2.65
BH1	TW2	14.00-14.90	38.0	1.84	-	2.66
BH1	SPT7	14.90-15.35	31.1	1.80	-	-
BH1	SPT8	16.00-16.45	-	-	-	2.67
BH1	TW3	20.00-20.90	30.1	1.98	-	2.69
BH1	SPT10	20.90-21.35	33.5	-	-	-
BH1	SPT11	22.00-22.45	-	1.77	-	-
BH1	SPT12	24.00-24.10	-	-	-	2.71

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)

TESTED BY: MONJU
Date : 30.08.2018

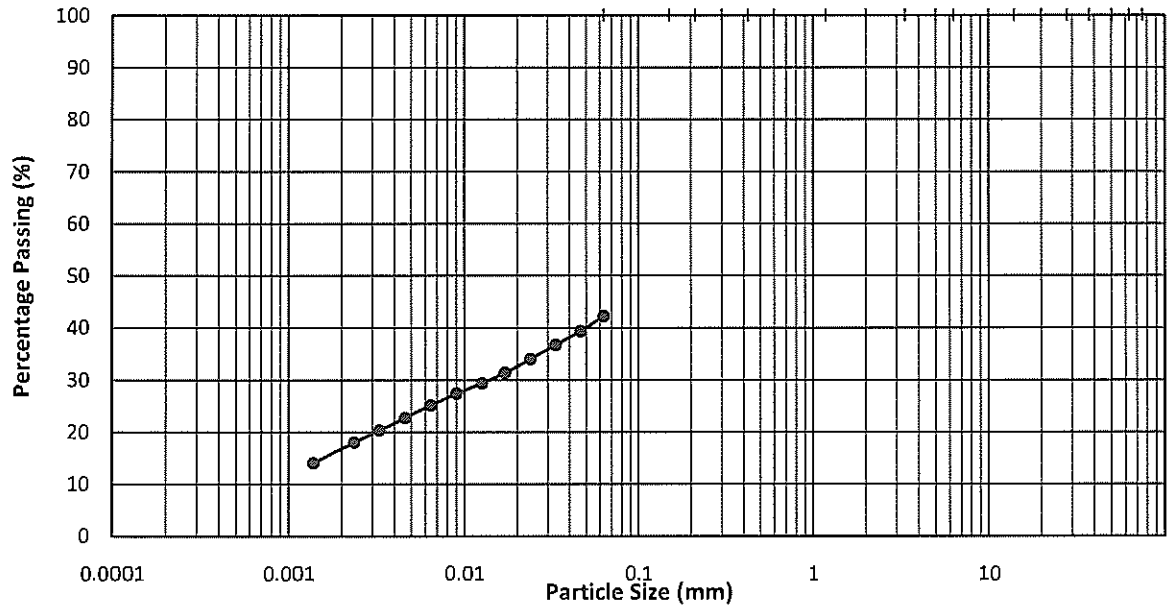
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K572B
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT1
DEPTH (m)	: 2.00-2.45m
TEST DATE	: 02.09.2018



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

SOIL DESCRIPTION : **Brownish yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**58**	%
SILT	=	**25**	%
CLAY	=	**17**	%

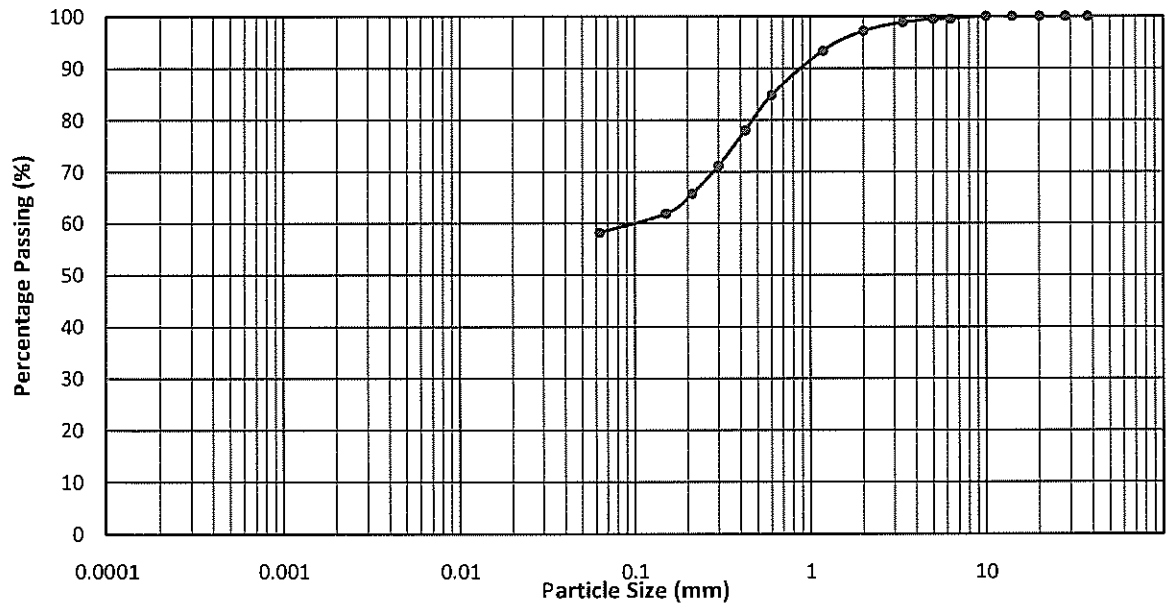
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly gravelly sandy SILT**

SIEVING TEST

GRAVEL	=	**3**	%
SAND	=	**39**	%
SILT + CLAY	=	**58**	%

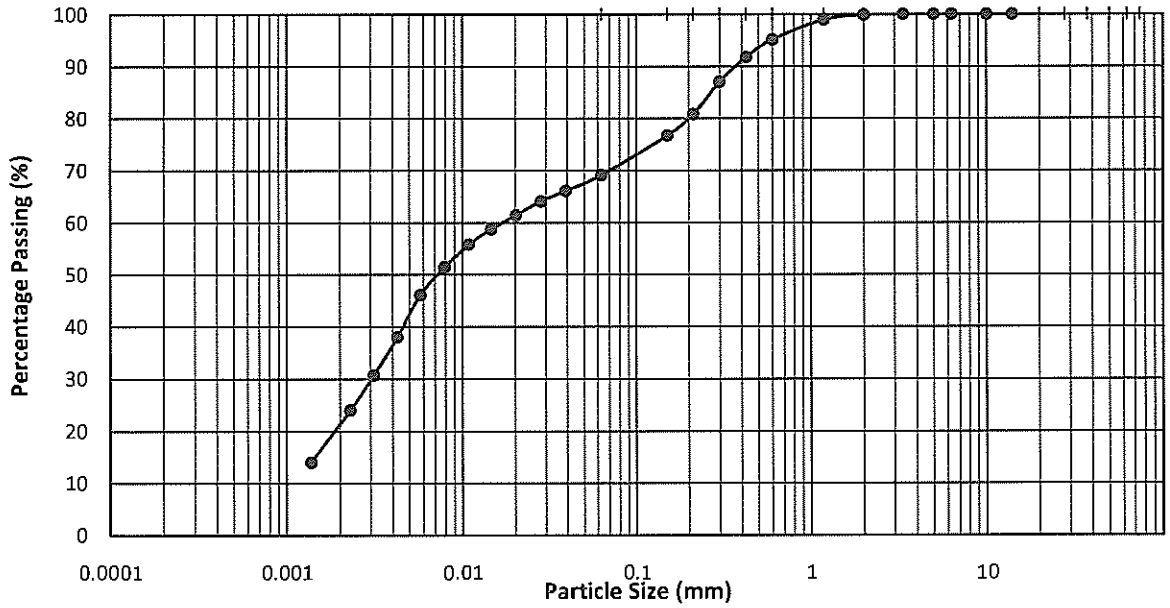
% of Passing 0.425 mm Sieve : 78.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**31**	%
SILT	=	**48**	%
CLAY	=	**21**	%

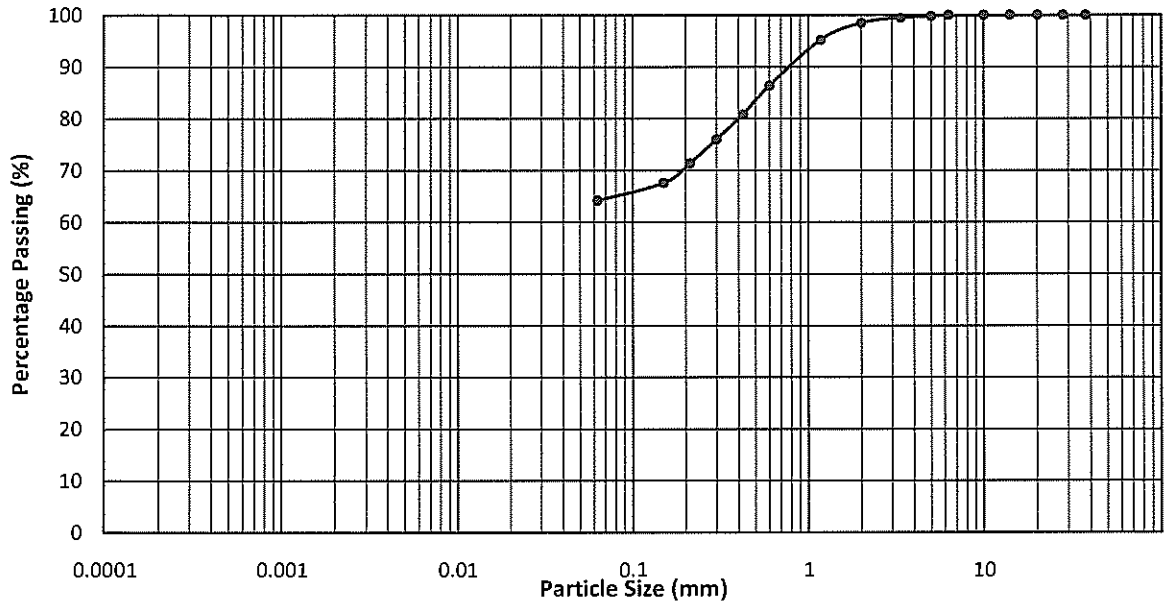
% of Passing 0.425 mm Sieve : 91.8

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	8.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.4Sm
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly gravelly slightly sandy SILT**

SIEVING TEST

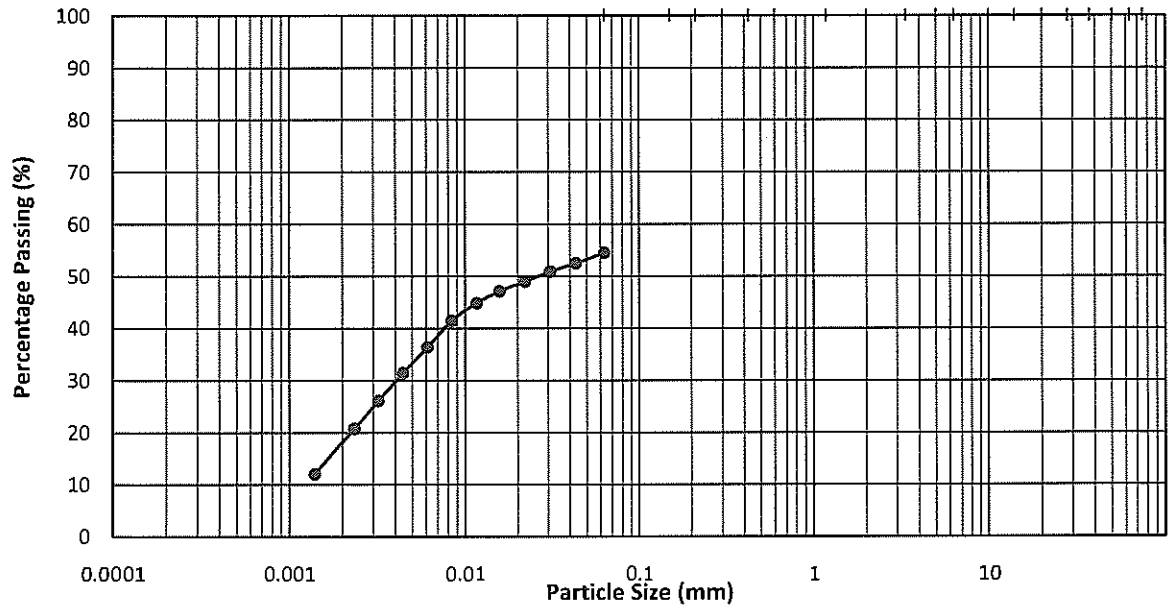
GRAVEL	=	**2**	%	
SAND	=	**34**	%	% of Passing 0.425 mm Sieve : 80.8
SILT + CLAY	=	**64**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 02.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**46**	%
SILT	=	**36**	%
CLAY	=	**18**	%

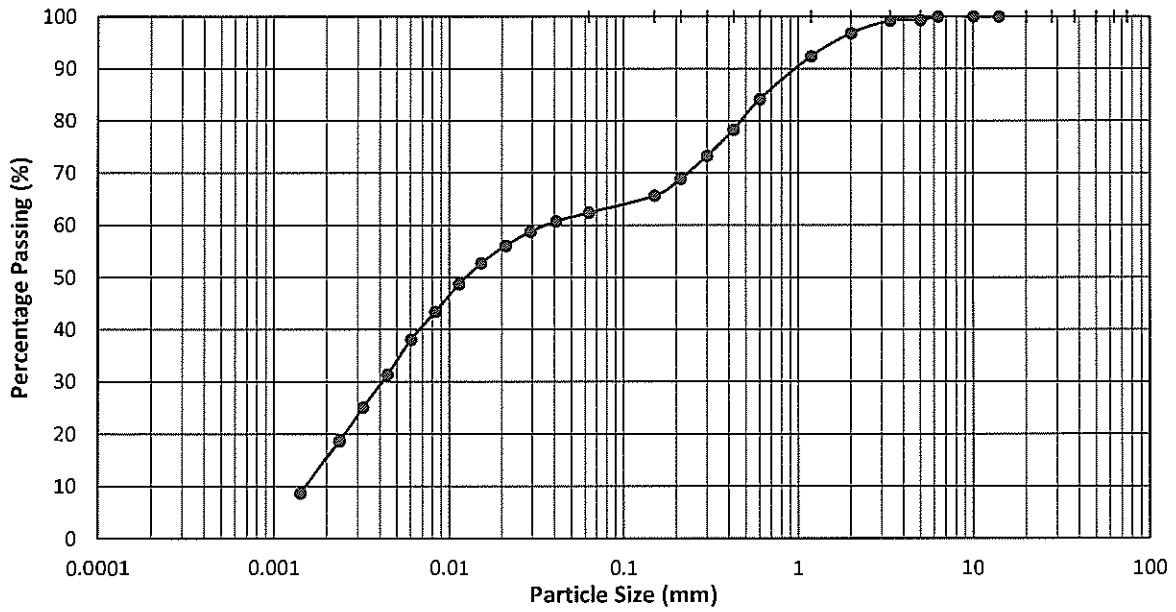
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Reddish brown and whitish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**3**	%
SAND	=	**35**	%
SILT	=	**46**	%
CLAY	=	**16**	%

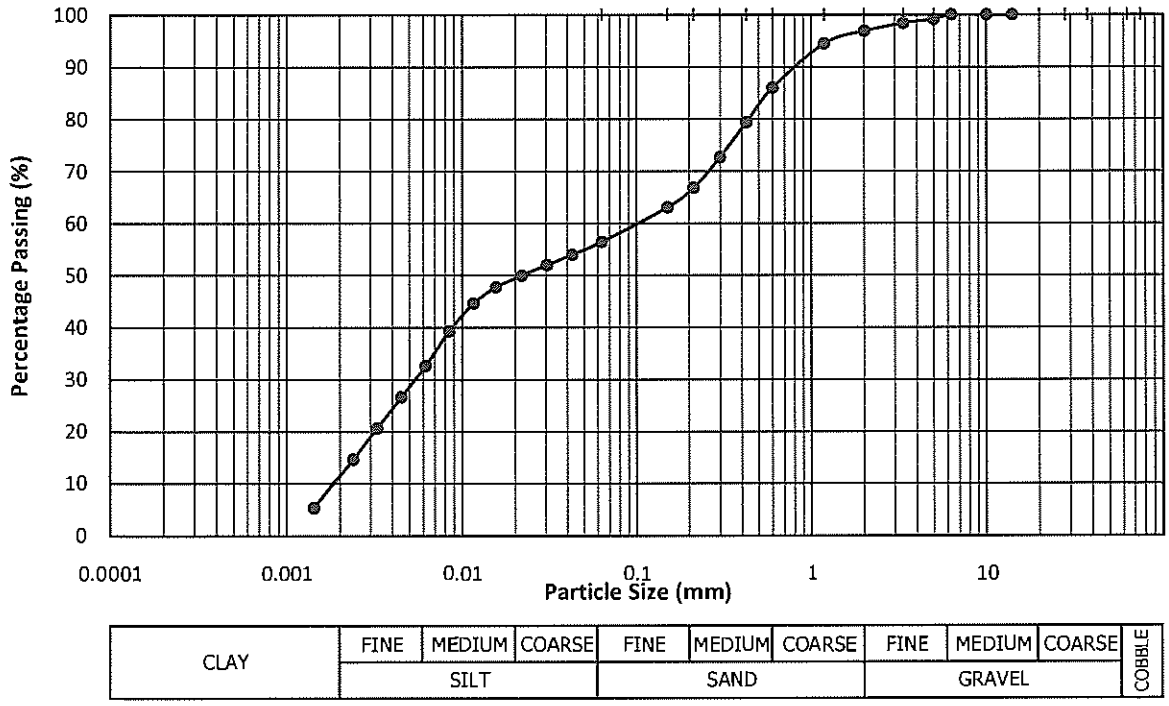
% of Passing 0.425 mm Sieve : 78.3

TESTED BY :	APPROVED BY : (Authorised Signatory - Min Win Htut)	DATE : 6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 02.09.201B



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**3**	%
SAND	=	**41**	%
SILT	=	**45**	%
CLAY	=	**11**	%

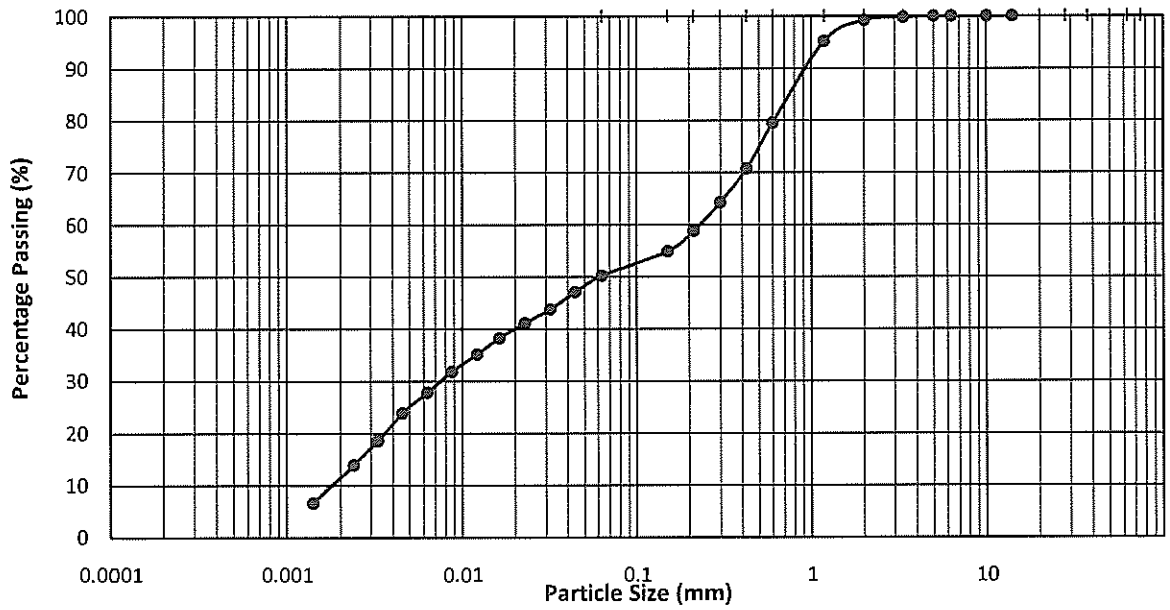
% of Passing 0.425 mm Sieve : 79.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**1**	%
SAND	=	**49**	%
SILT	=	**38**	%
CLAY	=	**12**	%

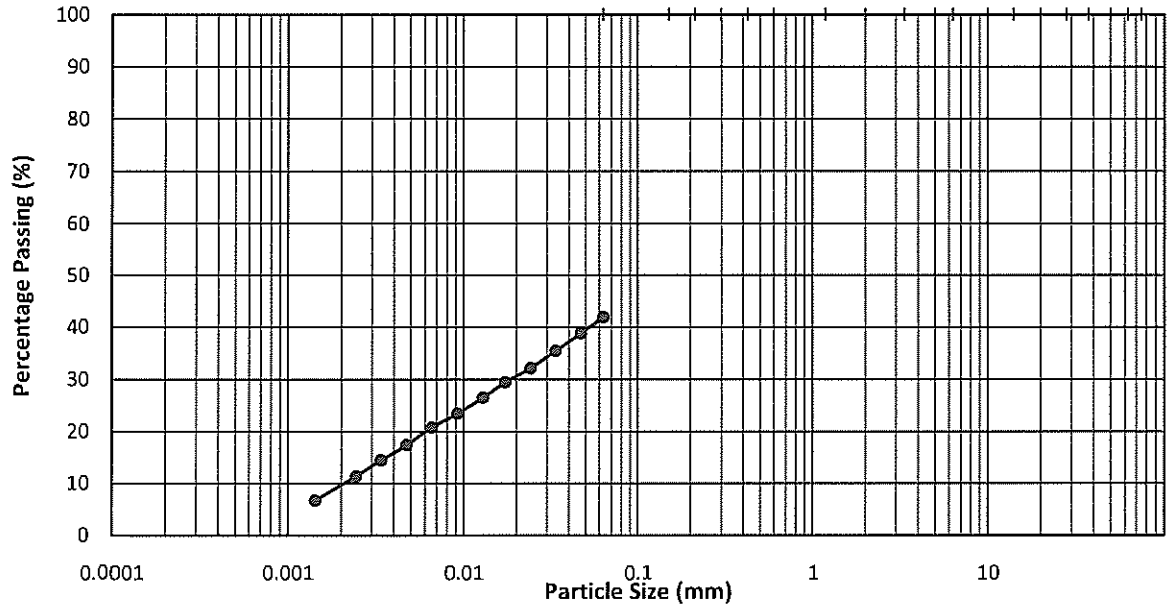
% of Passing 0.425 mm Sieve : 70.7

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.45m
TEST DATE	: 02.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and dark grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**59**	%
SILT	=	**31**	%
CLAY	=	**10**	%

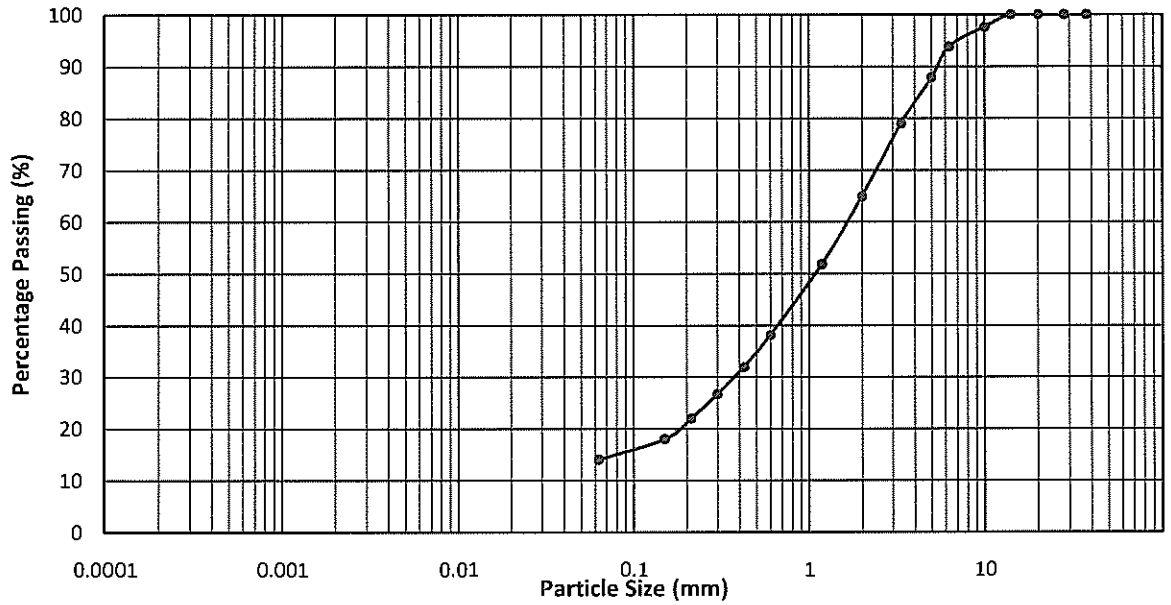
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT12
DEPTH (m)	: 24.00-24.10m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Greenish grey and light yellow grey silty very gravelly SAND**

SIEVING TEST

GRAVEL	=	**35**	%	
SAND	=	**51**	%	% of Passing 0.425 mm Sieve : 32.0
SILT + CLAY	=	**14**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

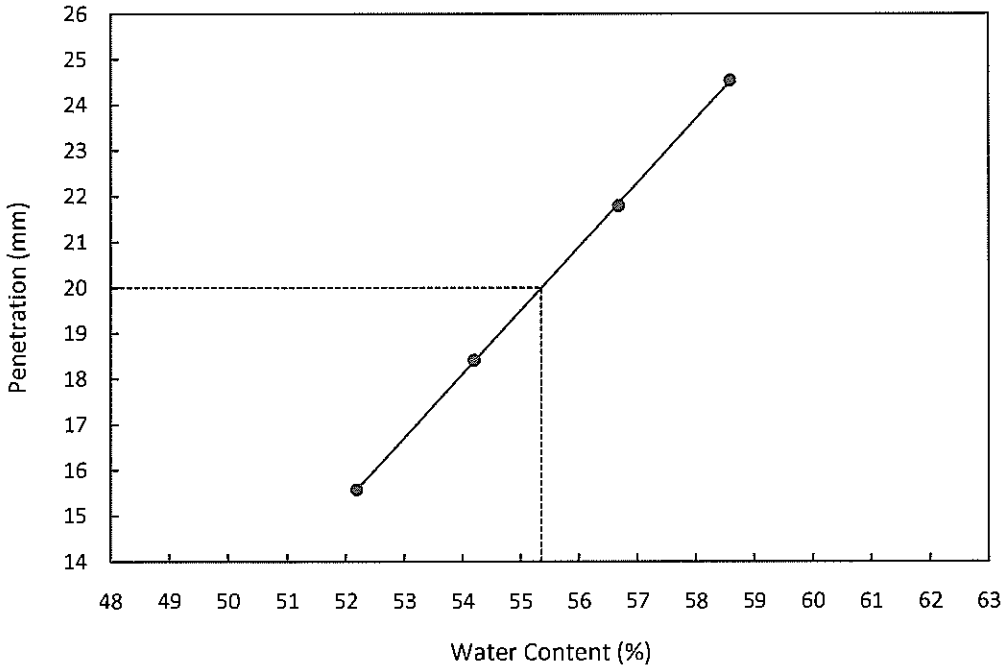
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT3
DEPTH(M)	: 6.00-6.45m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 01.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.40	20.59	20.84	20.46	20.38	20.60
DRY WEIGHT + CUP	(g)	16.57	16.59	16.68	15.92	17.79	17.92
CUP WEIGHT	(g)	9.23	9.21	9.34	8.17	9.17	8.92
WATER CONTENT	(%)	52.2	54.2	56.7	58.6	30.0	29.8
PENETRATION	(mm)	15.6	18.4	21.8	24.5	-	-

LIQUID LIMIT	(%)	**55.4**
PLASTIC LIMIT	(%)	**29.9**
PLASTICITY INDEX		**25**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

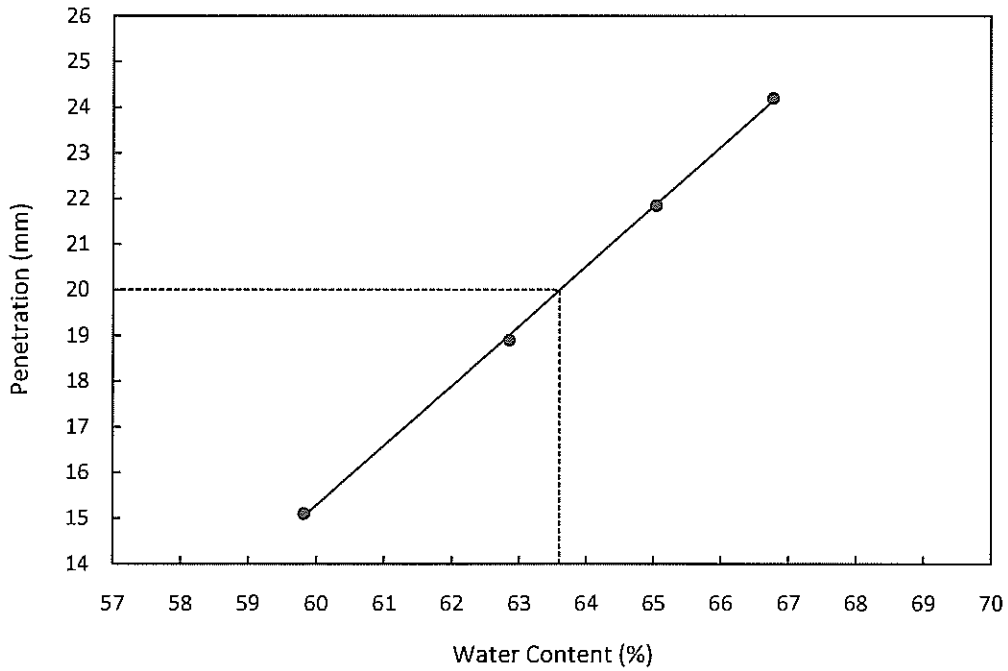
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown, light grey and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 92
TEST DATE	: 01.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.29	20.53	20.24	20.29	20.33	20.46
DRY WEIGHT + CUP	(g)	15.57	16.20	15.31	15.89	17.14	17.50
CUP WEIGHT	(g)	7.68	9.31	7.73	9.30	8.20	9.13
WATER CONTENT	(%)	S9.8	62.8	65.0	66.8	35.7	35.4
PENETRATION	(mm)	15.1	18.9	21.9	24.2	-	-

LIQUID LIMIT	(%)	**63.6**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**35.5**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**28**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

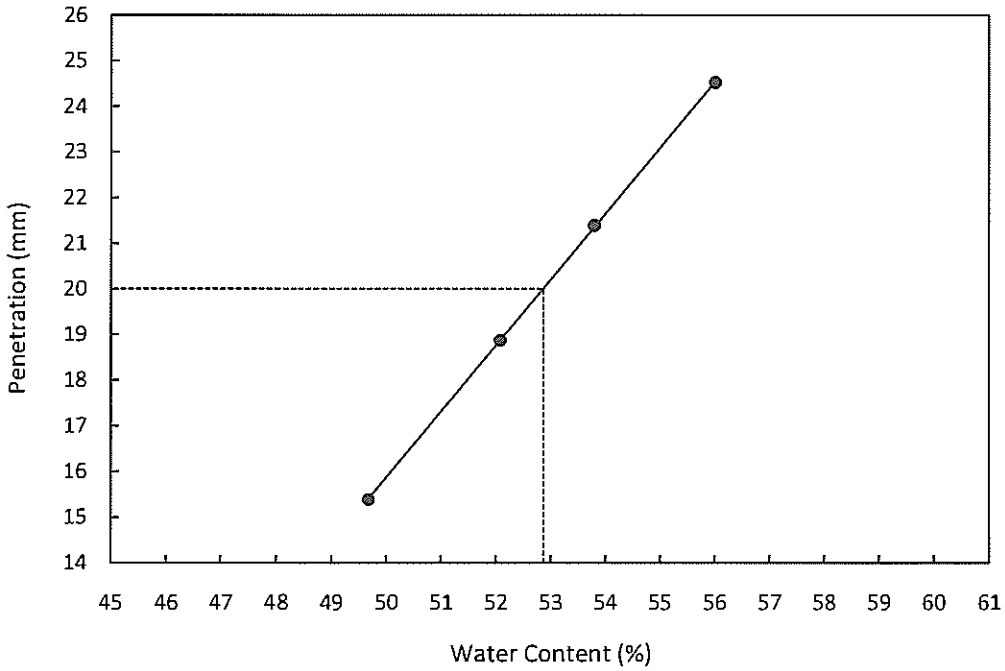
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT4
DEPTH(M)	: 8.90-9.35m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 02.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.78	20.32	20.50	20.19	20.38	20.51
DRY WEIGHT + CUP	(g)	16.96	16.44	16.11	15.72	17.56	17.85
CUP WEIGHT	(g)	9.27	8.99	7.95	7.74	8.47	9.37
WATER CONTENT	(%)	49.7	52.1	53.8	56.0	31.0	31.4
PENETRATION	(mm)	15.4	18.9	21.4	24.5	-	-

LIQUID LIMIT	(%)	**52.9**
PLASTIC LIMIT	(%)	**31.2**
PLASTICITY INDEX		**22**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

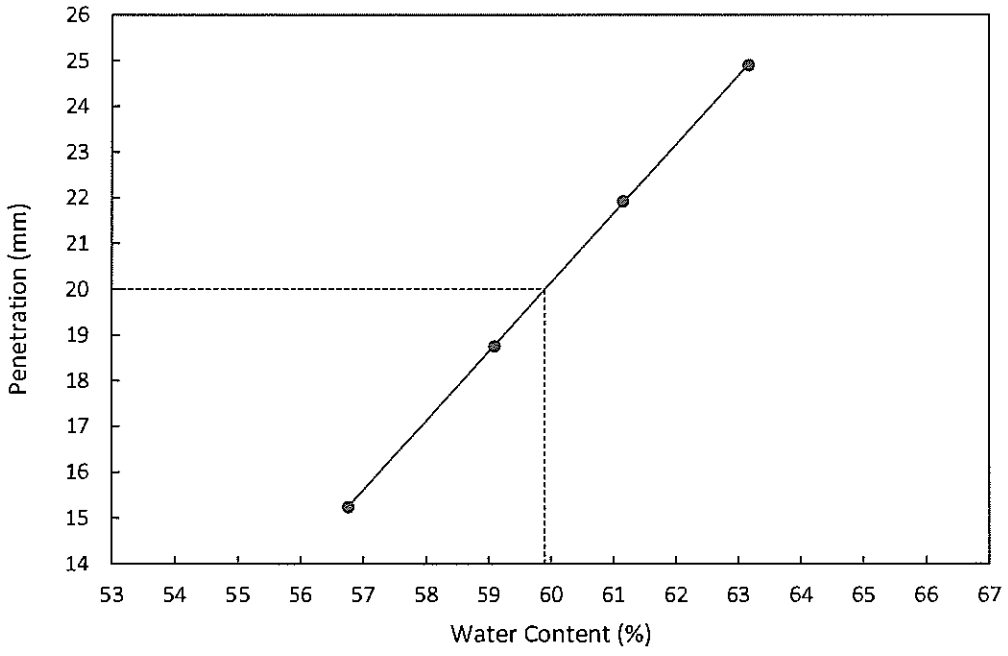
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Reddish brown and whitish grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 73
TEST DATE	: 31.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.46	20.39	20.55	20.50	20.12	20.51
DRY WEIGHT + CUP	(g)	16.01	15.97	15.97	15.82	17.21	17.50
CUP WEIGHT	(g)	8.17	8.49	8.48	8.41	8.98	8.93
WATER CONTENT	(%)	56.8	59.1	61.1	63.2	35.4	35.1
PENETRATION	(mm)	15.2	18.8	21.9	24.9	-	-

LIQUID LIMIT	(%)	**59.9**
PLASTIC LIMIT	(%)	**35.2**
PLASTICITY INDEX		**25**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY : (Authorised Signatory - Min Win Htut)	DATE : 6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

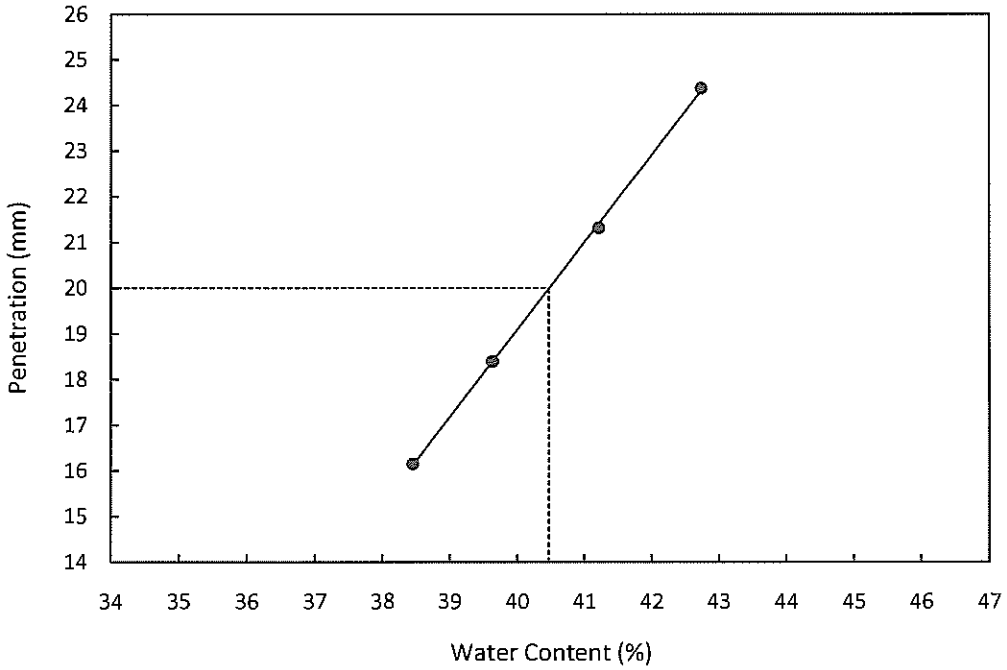
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: SPT7
DEPTH(M)	: 14.90-15.35m
SOIL DESCRIPTION	: Whitish grey and dark grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 02.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.16	20.44	20.37	20.55	20.74	20.50
DRY WEIGHT + CUP	(g)	16.80	17.19	16.64	17.11	17.96	18.10
CUP WEIGHT	(g)	8.06	8.99	7.59	9.06	7.58	9.11
WATER CONTENT	(%)	38.4	39.6	41.2	42.7	26.8	26.7
PENETRATION	(mm)	16.2	18.4	21.3	24.4	-	-

LIQUID LIMIT	(%)	**40.5**
PLASTIC LIMIT	(%)	**26.7**
PLASTICITY INDEX		**14**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Jay.	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

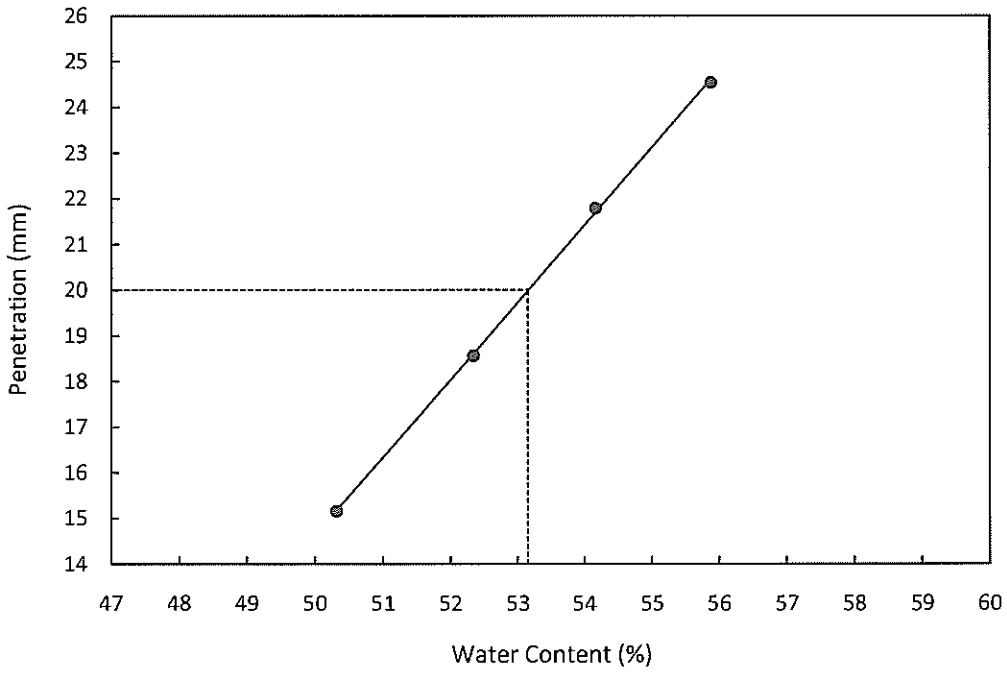
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH1
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Whitish grey and dark grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 58
TEST DATE	: 31.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.11	20.46	20.63	20.64	20.55	20.40
DRY WEIGHT + CUP	(g)	16.13	16.20	16.33	16.12	17.57	17.61
CUP WEIGHT	(g)	8.22	8.06	8.39	8.03	8.22	8.96
WATER CONTENT	(%)	50.3	52.3	54.2	55.9	31.9	32.3
PENETRATION	(mm)	15.2	18.6	21.8	24.5	-	-

LIQUID LIMIT	(%)	**53.2**
PLASTIC LIMIT	(%)	**32.1**
PLASTICITY INDEX		**21**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

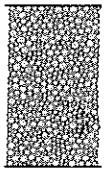


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	6.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

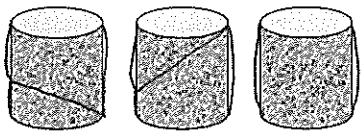
Sample Details					
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m		
	Description		Stiff whitish grey and dark grey slightly gravelly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	170.7	167.8	170.3
	Bulk Density	ρ_0 (Mg/m3)	1.99	1.96	1.99
	Particle Density	ρ_s (Mg/m3)	2.69	2.69	2.69

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	185	370	740
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	ω_i%	(%)	30	32	29
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.53	1.49	1.54
Initial Voids Ratio	e_0	.	0.75	0.81	0.75
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	138.76	155.45	179.13
MembraneCorrection	m_c	(kPa)	1.740	1.730	1.890
Strain At Max Stress	ε_f%	(%)	17.82	17.80	18.85
Shear Strength	c_u	(kPa)	69.38	77.73	89.57
Final Moisture	ω_f%	(%)	30	32	29
Final Dry Density	ρ_{df}	(Mg/m3)	1.53	1.49	1.54
Final Voids Ratio	e_f	.	0.75	0.81	0.75
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	UU3-SungeiTengah-B1T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

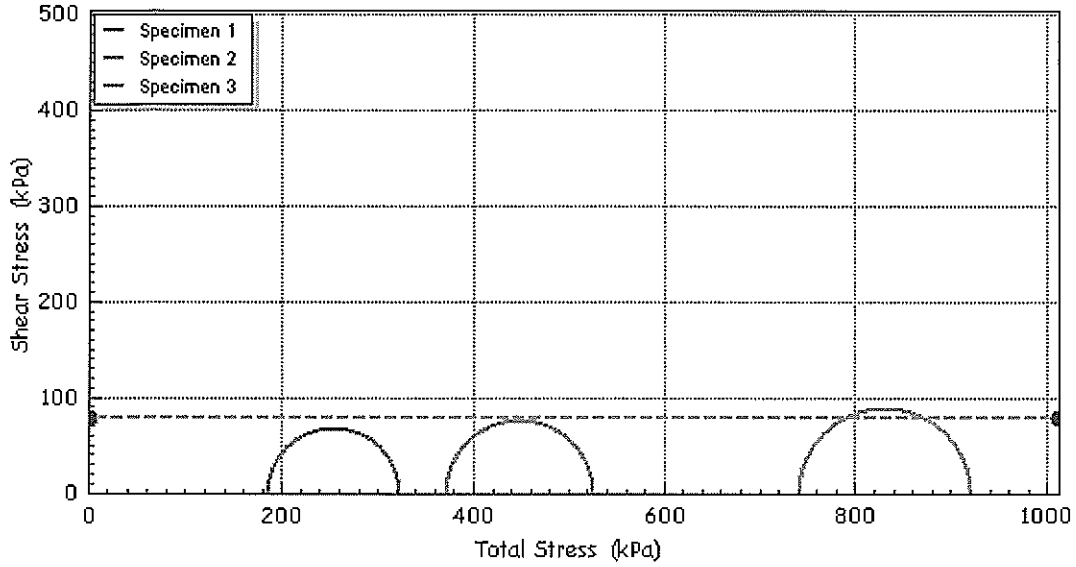
Ryobi Geotechnique International Pte Ltd

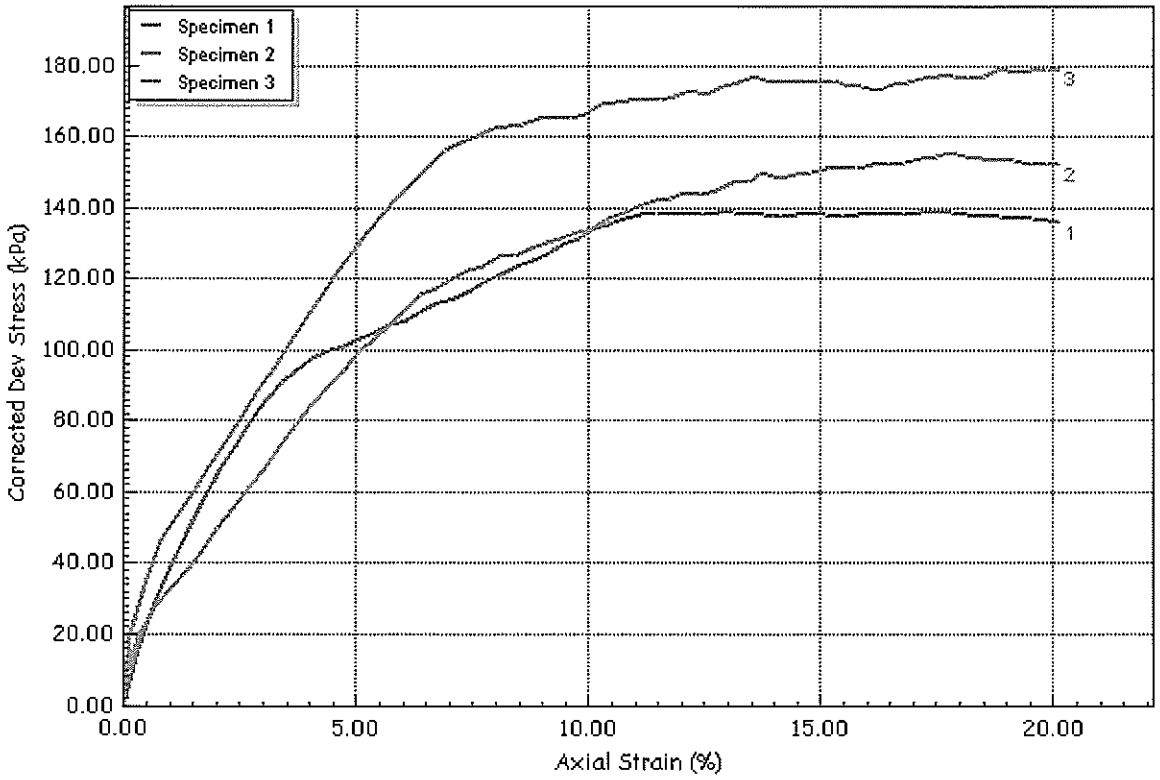
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	78.9
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU3-SungeiTengah-B1T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7			Sample	TW3
Client	AVA			Depth	20.00-20.90m
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

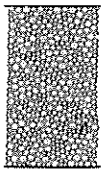
ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0023-B

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

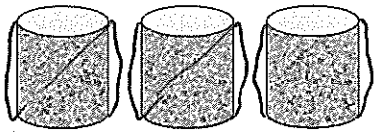
Sample Details					
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m		
	Description		Reddish brown, light grey and yellow slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0 (mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0 (gr)	1012.5	1016.5	986.9
	Initial Bulk Density	ρ_0 (Mg/m3)	1.88	1.89	1.83
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	240	280	360
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	40	40	39
Initial Dry Density	ρ_{di}	(Mg/m3)	1.34	1.35	1.31
Initial Voids Ratio	e_i	.	0.983	0.978	1.025
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	40	39	38
Final Dry Density	ρ_{df}	(Mg/m3)	1.36	1.38	1.37
Final Voids Ratio	e_f	.	0.949	0.933	0.939
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	3.66	5.35	8.86
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	92.6	134.0	168.9
Minor Stress At Failure	σ_3'	(kPa)	24.0	40.0	52.6
Major Stress At Failure	σ_1'	(kPa)	116.6	174.0	221.5
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.858	4.349	4.211

Notes

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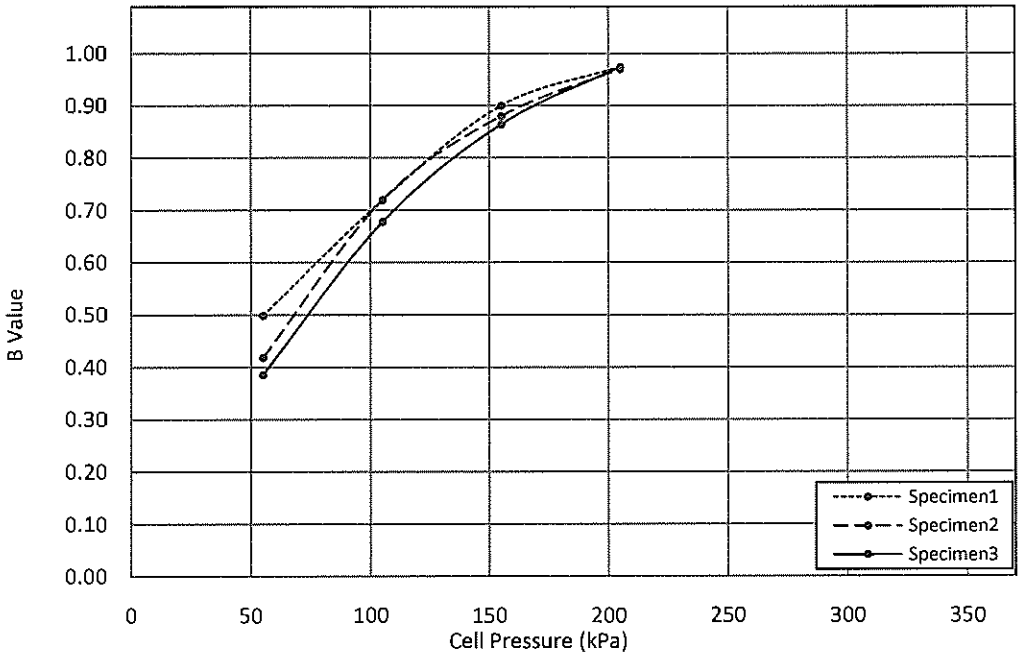
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengahWA7-B1T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	31/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

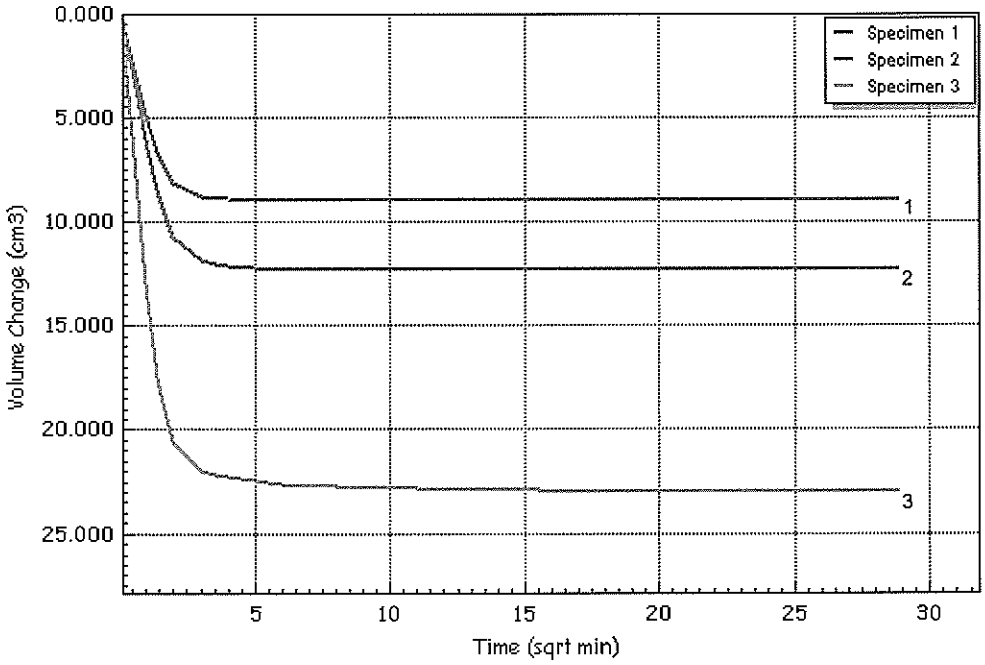
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



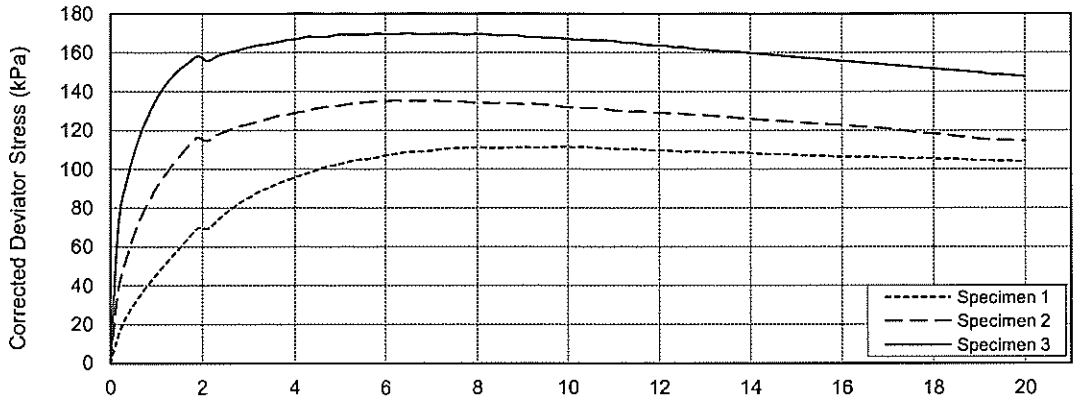
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengahWA7-B1T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	31/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

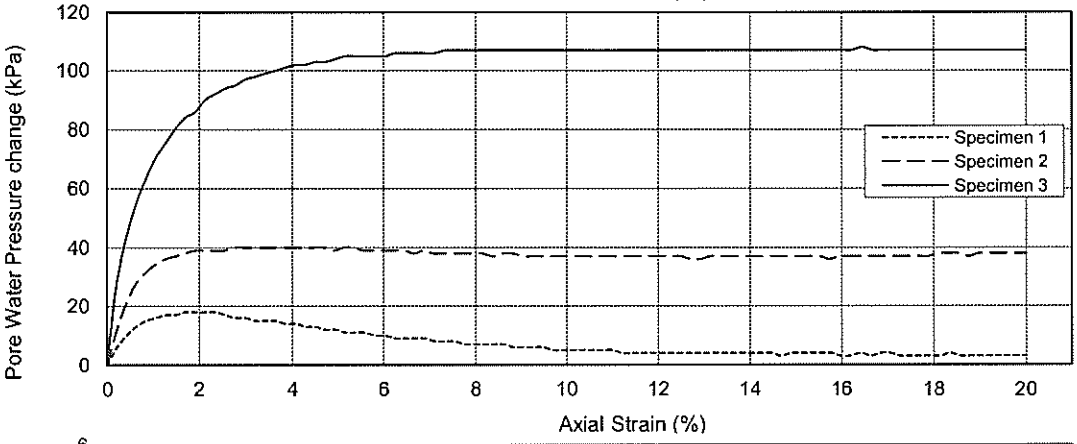
Ryobi Geotechnique International Pte Ltd

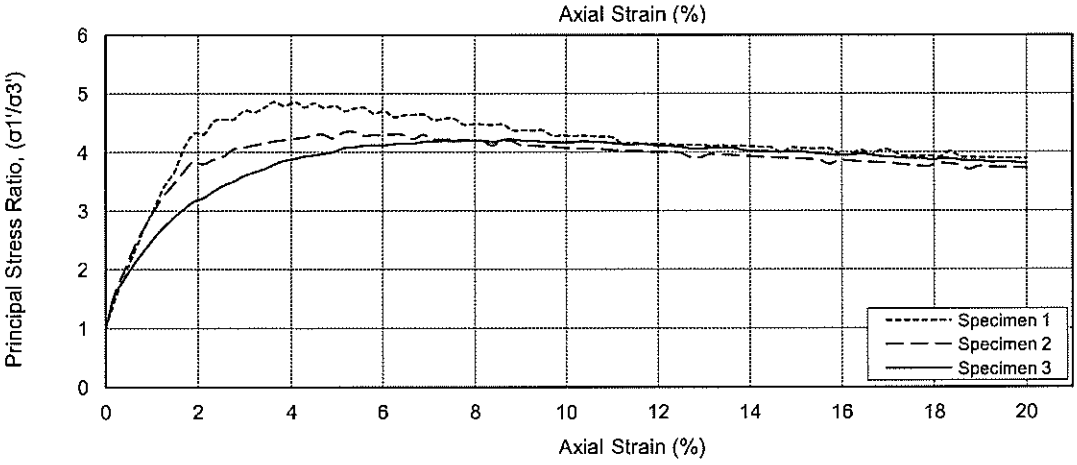
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	201	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	216	240	307
A Value at Max. Stress Ratio	0.162	0.299	0.634

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengah-B1T1
Database :.\SQLEXPRESS\Ryobi-2017		Test Date	31/8/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

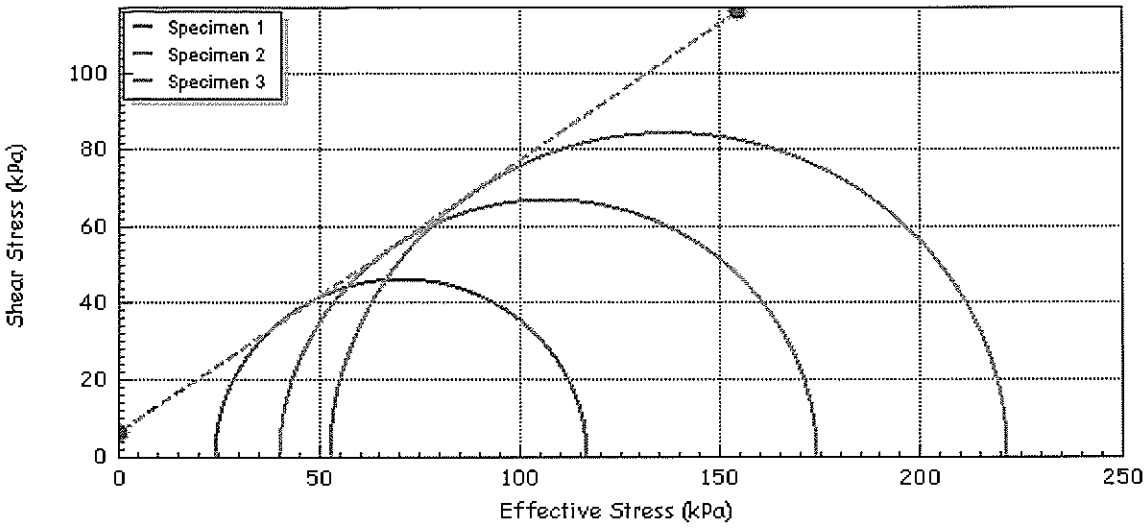
Ryobi Geotechnique International Pte Ltd

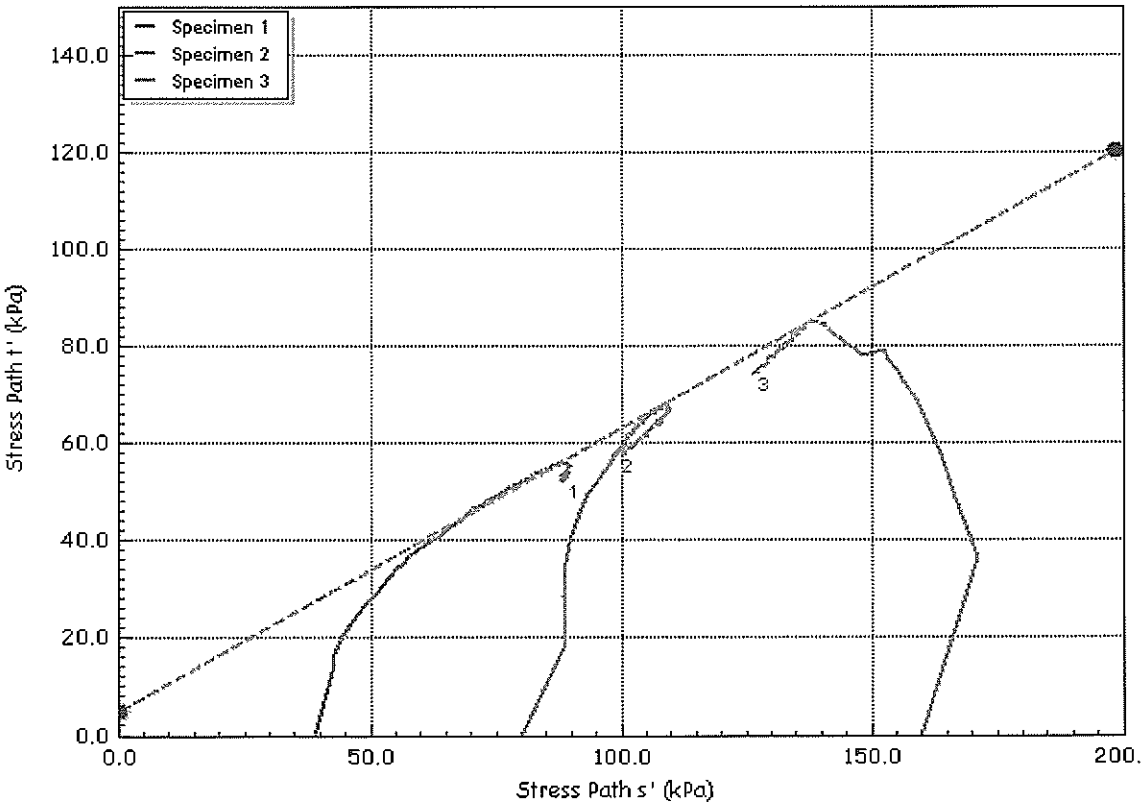
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	6.1	Stress Path Intercept	t_0'	(kPa)	5.0
Effective Friction Angle	ϕ'	(deg)	35.5	Stress Path Inclination	θ	(deg)	30.1





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengahWA7-B1T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	31/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH1
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

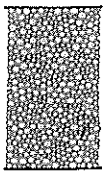
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Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

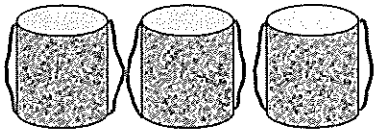
Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Reddish brown and whitish grey slightly gravelly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	76.0	76.0	76.0
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	157.4	156.8	158.3
	Initial Bulk Density	ρ_0 (Mg/m3)	1.83	1.82	1.84
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	265	330	460
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.200	0.200	0.200
Initial Moisture	$\omega_i\%$	(%)	39	39	38
Initial Dry Density	ρ_{di}	(Mg/m3)	1.31	1.31	1.33
Initial Voids Ratio	e_i	.	1.024	1.033	1.004
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.98

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	38	35	34
Final Dry Density	ρ_{df}	(Mg/m3)	1.36	1.41	1.55
Final Voids Ratio	e_f	.	0.961	0.892	0.711
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	7.66	9.12	9.60
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	121.1	169.2	234.1
Minor Stress At Failure	σ_3'	(kPa)	35.0	53.0	77.1
Major Stress At Failure	σ_1'	(kPa)	156.1	222.2	311.2
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.460	4.192	4.037

Notes

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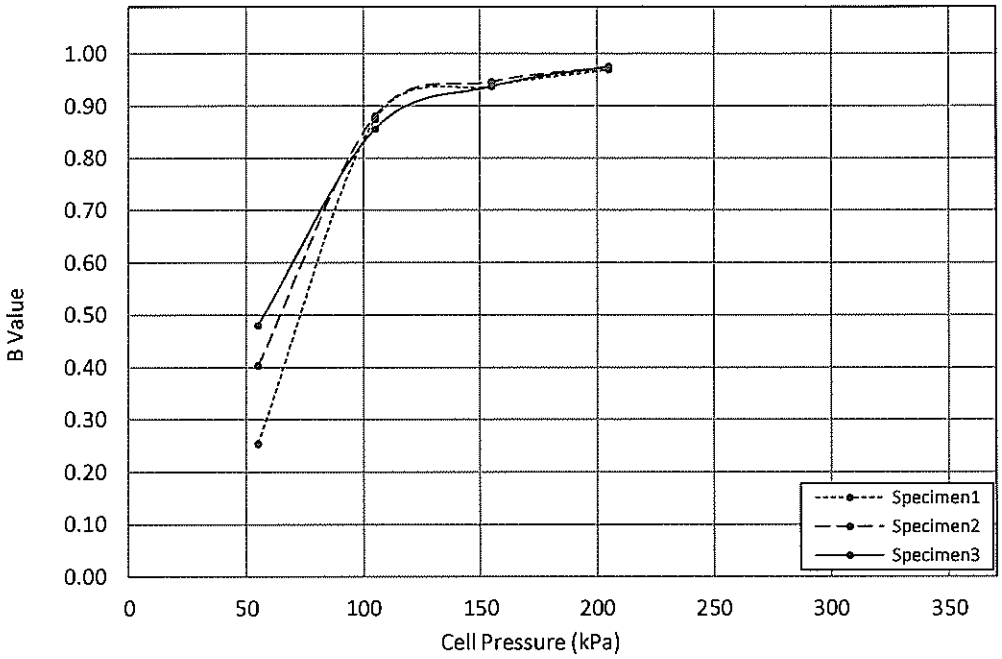
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengah-B1T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	1/9/2018
Site Reference	ST28(LVPlots)Along Sungei TengahRd	Borehole	BH1
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

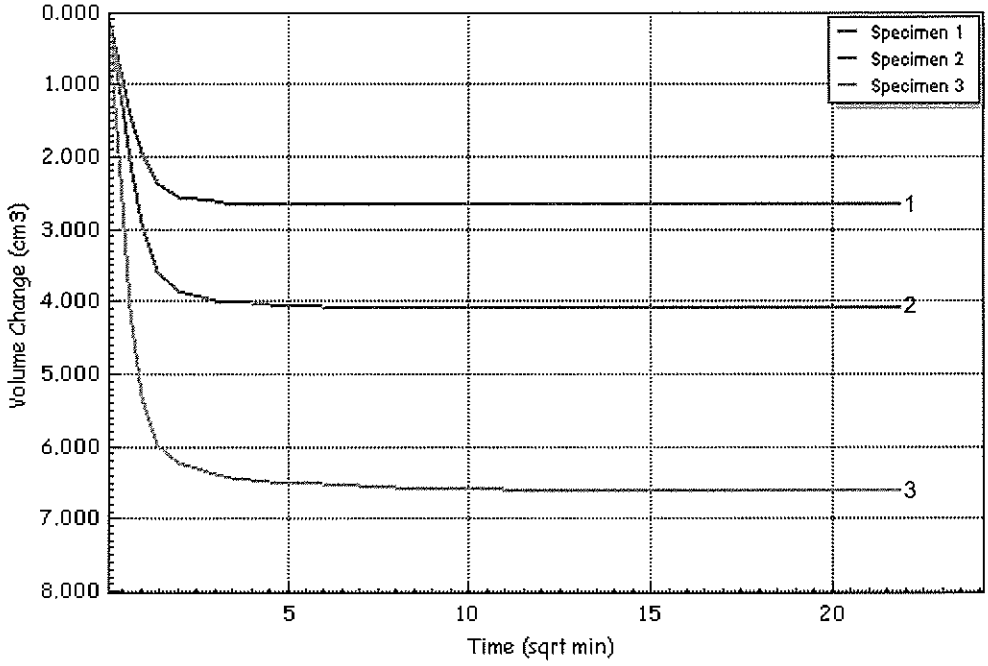
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengah-B1T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH1
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

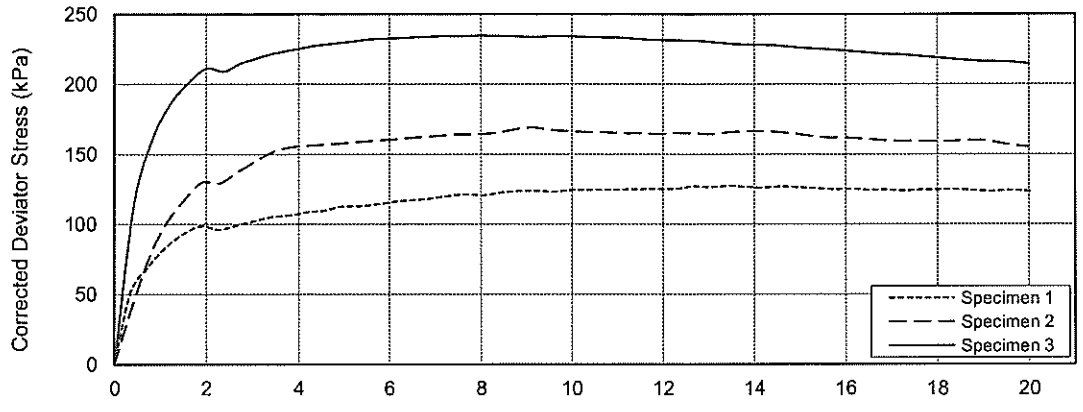
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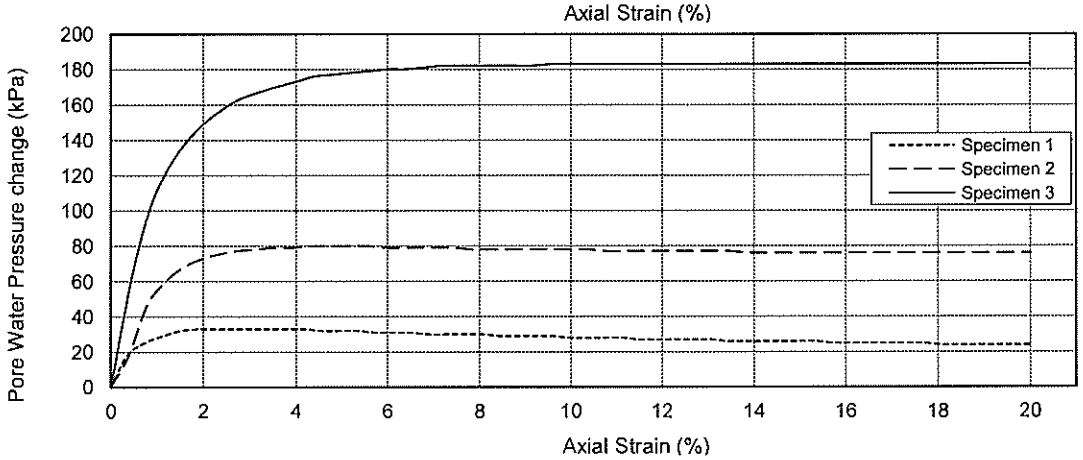
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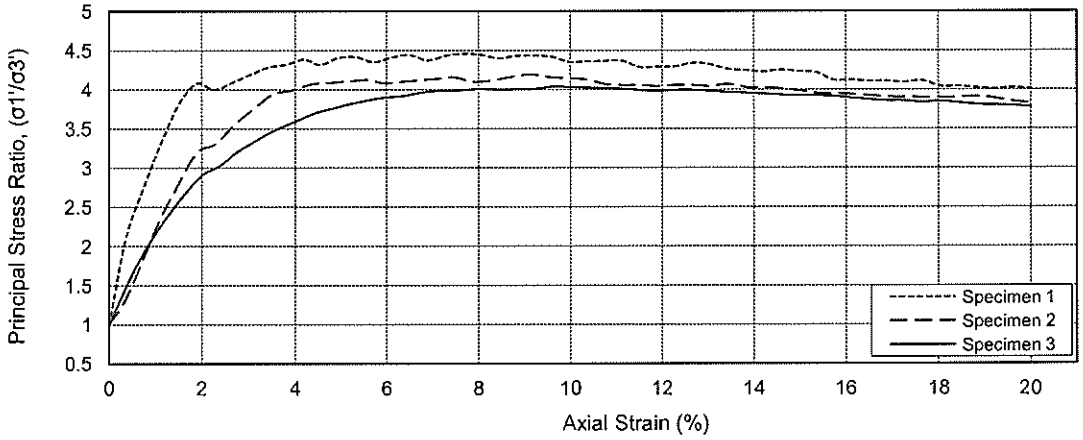
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	199	200
Pore Water Pressure at Max. Stress Ratio (kPa)	230	277	383
A Value at Max. Stress Ratio	2.703	0.461	0.782

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengah-B1T2
Database	:\SQLEXPRESS\Ryobi-2017	Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH1
Jobfile	K5728 ST28 LV Plots Sungei Tengah Road	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Ken	Checked	Min Win Htut
Approved	Sio Keong Kong		

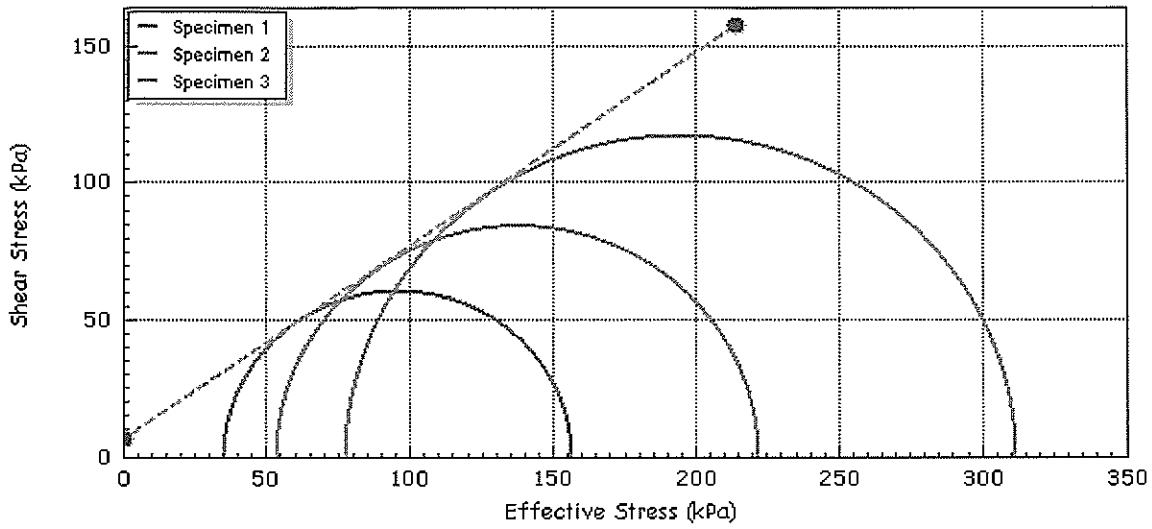
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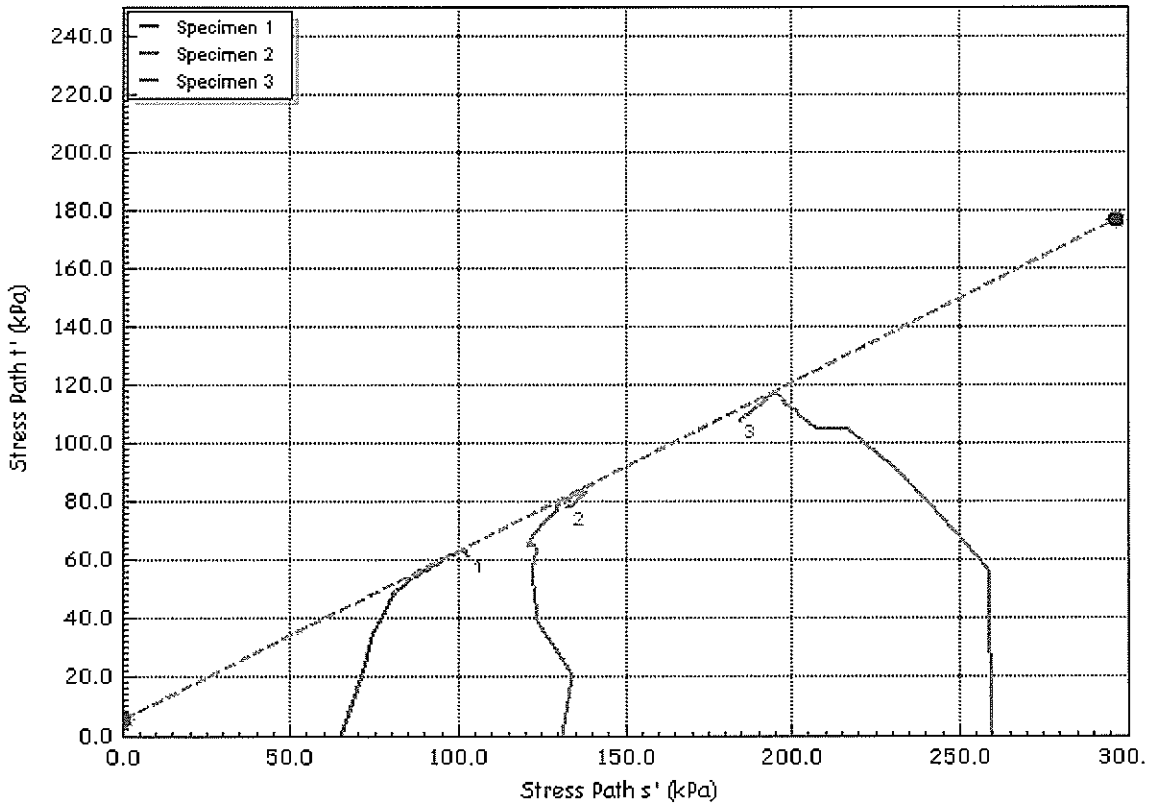
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	6.7	Stress Path Intercept	t_0'	(kPa)	5.5
Effective Friction Angle	ϕ'	(deg)	35.2	Stress Path Inclination	θ	(deg)	30.0





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengah-B1T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH1
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-001	SG1813557-002	SG1813557-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-004	SG1813557-005	SG1813557-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	6.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813564**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 27-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH1 Water Sample	BH2 Water Sample	BH3 Water Sample
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813564-001	SG1813564-002	SG1813564-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.6	11.4	11.7
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	0.05
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	<0.01
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH4 Water Sample	BH6 Water Sample	----
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		SG1813564-004	SG1813564-005	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.3	11.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH2						
SAMPLE NO :			SPT1	SPT2	SPT3	TW1	SPT4	SPT5	SPT6
SAMPLE DEPTH :		m	2.00-2.45	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	31.2	-	57.2	42.4	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.78	1.72	1.72	-	-
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	2.67	-	-	2.66	-	-	2.68
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	3	3	-	0	-	-	0
	SAND	%		30	-	1	-	-	5
	SILT	%	53	67	-	74	-	-	66
	CLAY	%	44		-	25	-	-	29
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	54.3	81.9	81.8	-	-
	PLASTIC LIMIT	%	-	-	33.6	48.4	48.3	-	-
	PLASTICITY INDEX		-	-	21	33	33	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	-	-
	TOTAL COHESION	kPa	-	-	-	-	-	-	-
	TEST TYPE		-	-	-	$CU^{70\phi}$	-	-	-
	EFFECTIVE COHESION	kPa	-	-	-	9.2	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	-	-	32.7	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	5.2	-
	Chloride Content	%	-	-	-	-	-	<0.01	-
	Organic Content	%	-	-	-	-	-	0.3	-
	Sulphate Content	%	-	-	-	-	-	<0.01	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 : 06/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA
PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO. : K5728

BOREHOLE NO :			BH2						
SAMPLE NO :			TW2	SPT7	SPT8	SPT9	TW3	SPT10	SPT11
SAMPLE DEPTH :		m	14.00-14.90	14.90-15.35	16.00-16.90	18.00-18.45	20.00-20.90	20.921.35	22.00-22.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	57.9	42.9	-	-	43.4	42.4	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.72	-	1.77	-	1.83	-	1.83
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	2.68	-	-	2.67	2.70	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	4	2	0	-	6
	SAND	%	2	-		5	4	-	
	SILT	%	72	-	78	93	82	-	75
	CLAY	%	26	-	18		14	-	19
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	69.4	57.1	-	-	51.6	47.5	-
	PLASTIC LIMIT	%	44.1	36.6	-	-	34.1	30.9	-
	PLASTICITY INDEX		25	20	-	-	17	17	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		**UU**	-	-	-	**UU**	-	-
	TOTAL COHESION	kPa	68.2	-	-	-	61.4	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 : 06/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH2						
SAMPLE NO :			TW4	SPT12	W1				
SAMPLE DEPTH :		m	24.00-24.90	24.90-25.35	Water Sample				
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	26.6	-					
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	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	2.73	2.73	-				
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	13	0	-				
	SAND	%	21	18	-				
	SILT	%	54	82	-				
	CLAY	%	12		-				
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	54.6	-	-				
	PLASTIC LIMIT	%	32.9	-	-				
	PLASTICITY INDEX		22	-	-				
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		**UU**	-	-				
	TOTAL COHESION	kPa	109.9	-	-				
	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	-	-	-				
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-				
	Chloride Content	%	-	-	-				
	Organic Content	%	-	-	-				
	Sulphate Content	%	-	-	-				
	pH Value		-	-	11.4				
	Chloride Content	g/L	-	-	0.05				
	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 :

-

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH2	SPT1	2.00-2.45	-	-	-	2.67
BH2	SPT2	4.00-4.45	31.2	-	-	-
BH2	SPT3	6.00-6.45	-	1.78	-	-
BH2	TW1	8.00-8.90	57.2	1.72	-	2.66
BH2	SPT4	8.90-9.35	42.4	1.72	-	-
BH2	SPT6	12.00-12.45	-	-	-	2.68
BH2	TW2	14.00-14.90	57.9	1.72	-	2.68
BH2	SPT7	14.90-15.35	42.9	-	-	-
BH2	SPT8	16.00-16.90	-	1.77	-	-
BH2	SPT9	18.00-18.45	-	-	-	2.67
BH2	TW3	20.00-20.90	43.4	1.83	-	2.70
BH2	SPT10	20.90-21.35	42.4	-	-	-
BH2	SPT11	22.00-22.45	-	1.83	-	-
BH2	TW4	24.00-24.90	26.6	2.05	-	2.73

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)

TESTED BY: MOMJU Date : 31.08.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 6.9.2018

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Construction For Land Reclamation At Changi East

JOB NO. K5448

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH2	SPT12	24.90-25.35	-	-	-	2.73

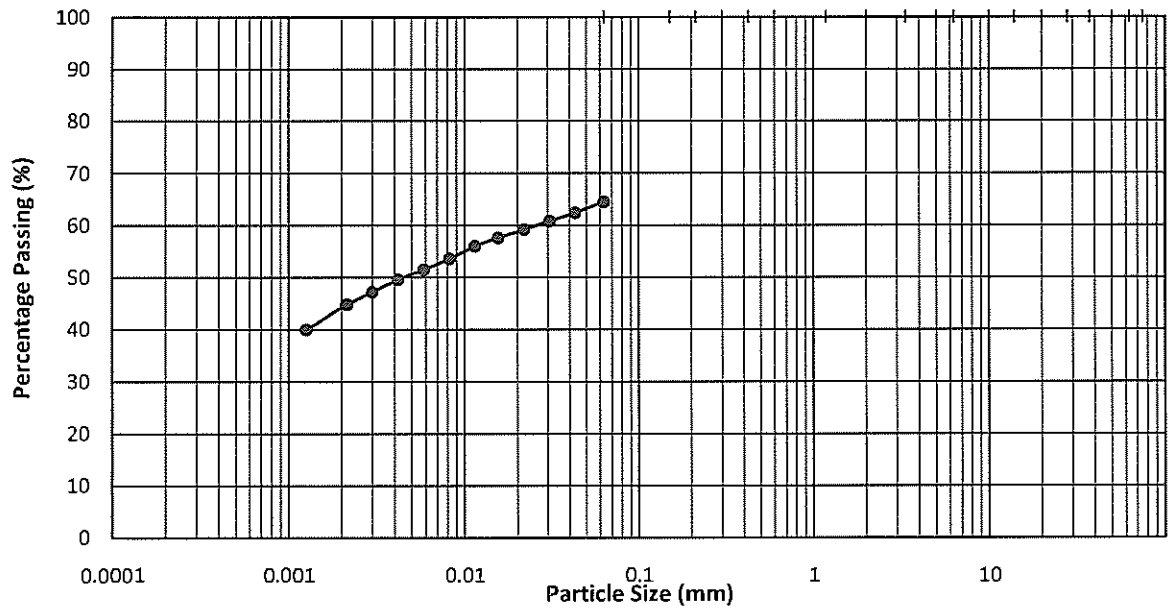
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: Mozzu	APPROVED BY:	DATE : 6.9.2018
Date : 31.08.2018	(Authorised Signatory - Min Win Htut)	

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT1
DEPTH (m)	: 2.00-2.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**3**	%
SILT	=	**53**	%
CLAY	=	**44**	%

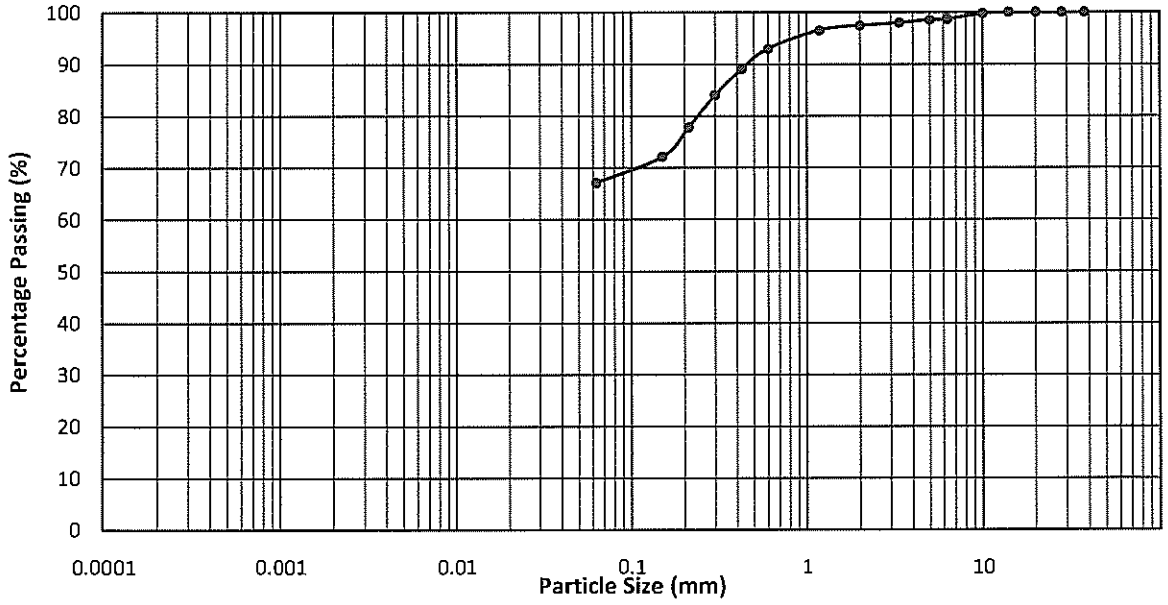
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light grey and brown slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**3**	%
SAND	=	**30**	%
SILT + CLAY	=	**67**	%

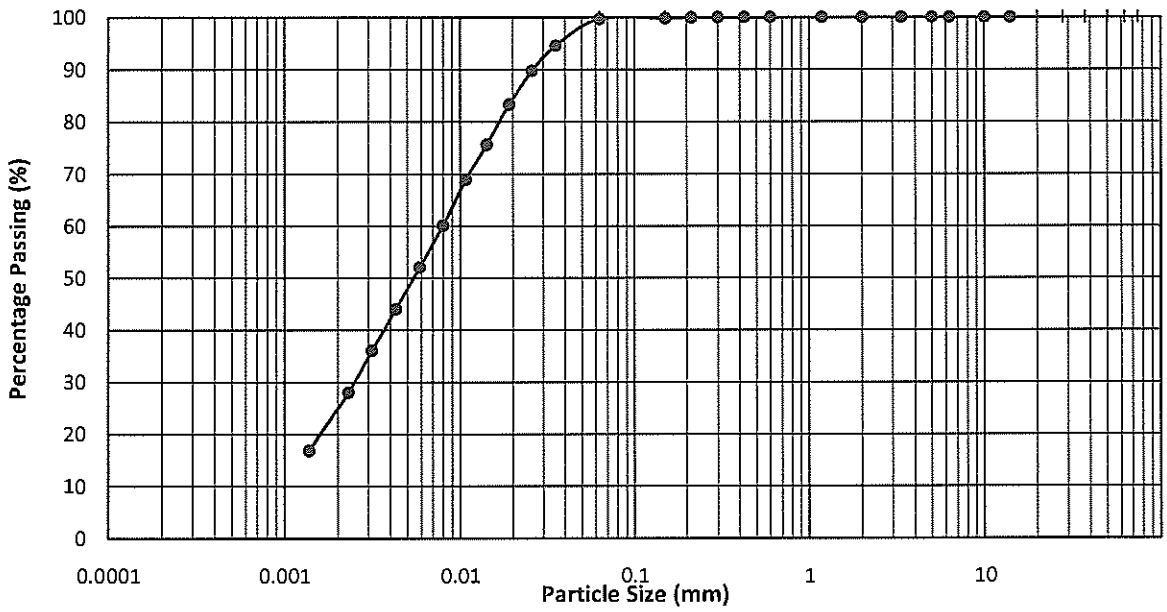
% of Passing 0.425 mm Sieve : 89.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and light yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**1**	%
SILT	=	**74**	%
CLAY	=	**25**	%

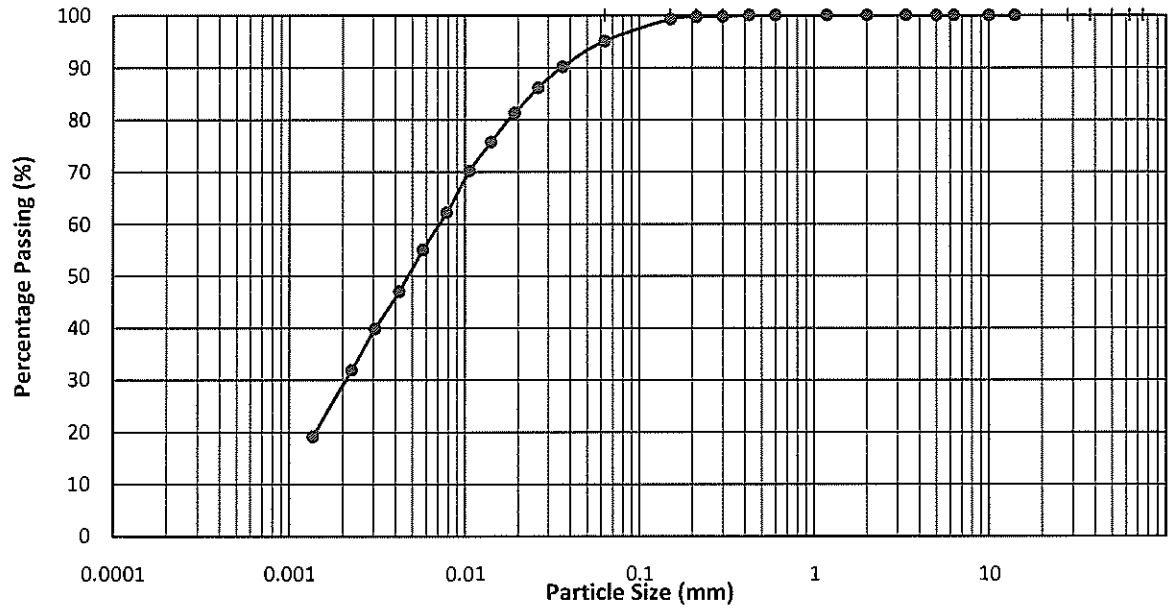
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and light yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**5**	%
SILT	=	**66**	%
CLAY	=	**29**	%

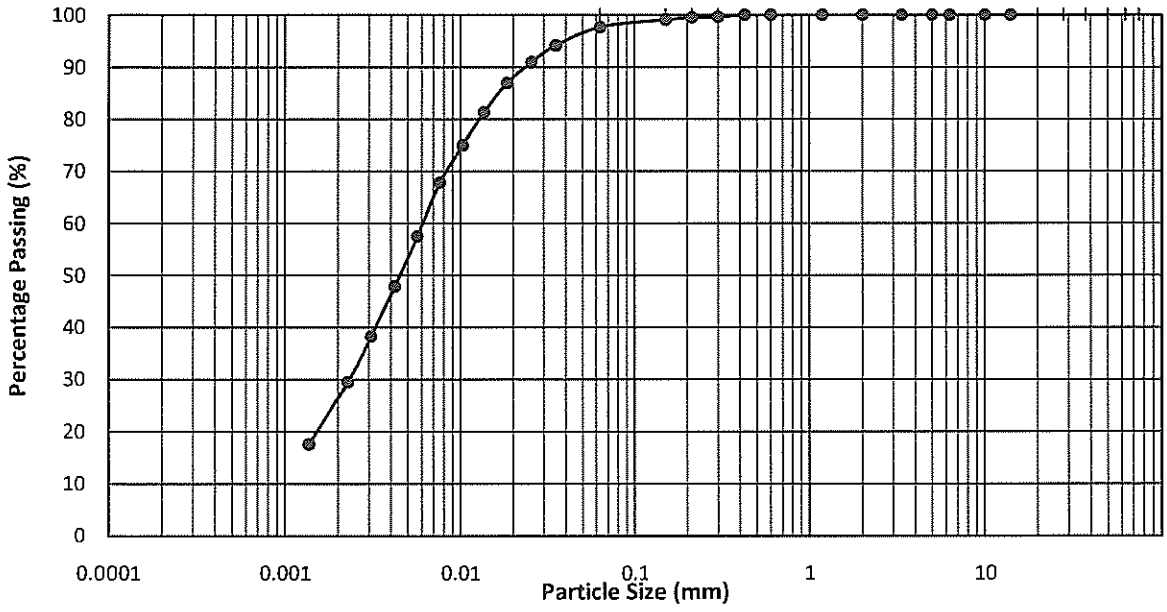
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**2**	%
SILT	=	**72**	%
CLAY	=	**26**	%

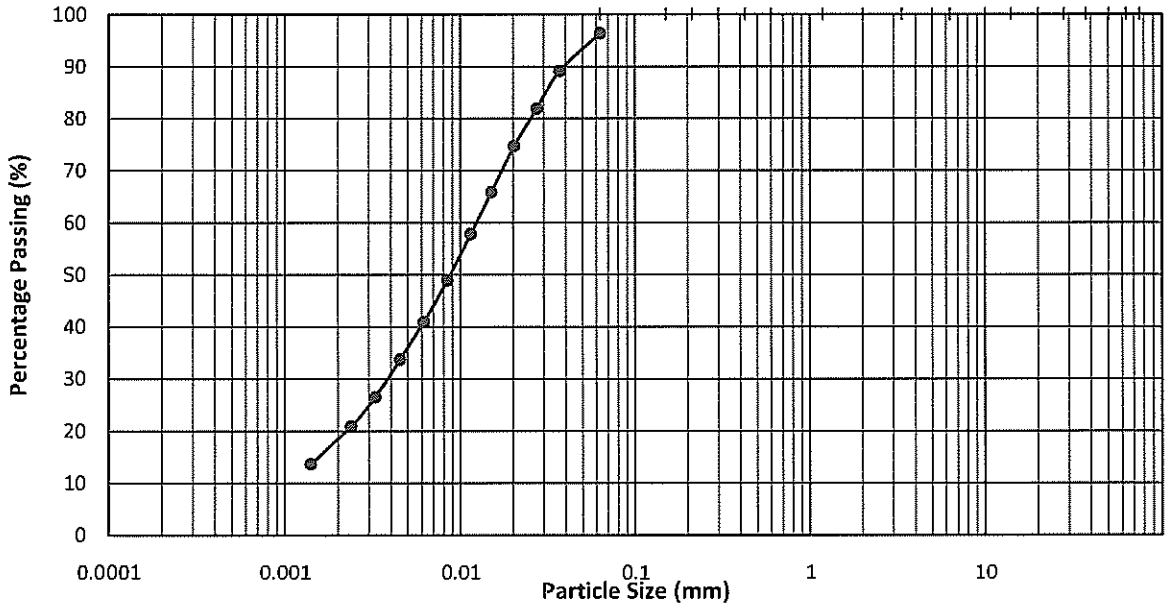
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**4**	%
SILT	=	**78**	%
CLAY	=	**18**	%

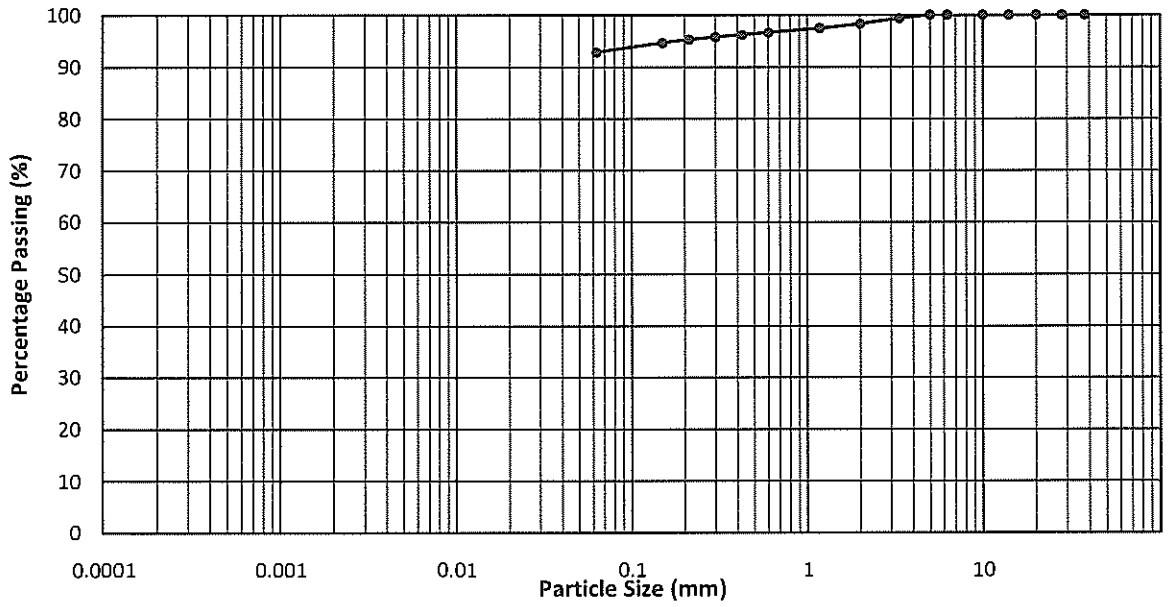
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.4Sm
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light grey slightly gravelly slightly sandy SILT**

SIEVING TEST

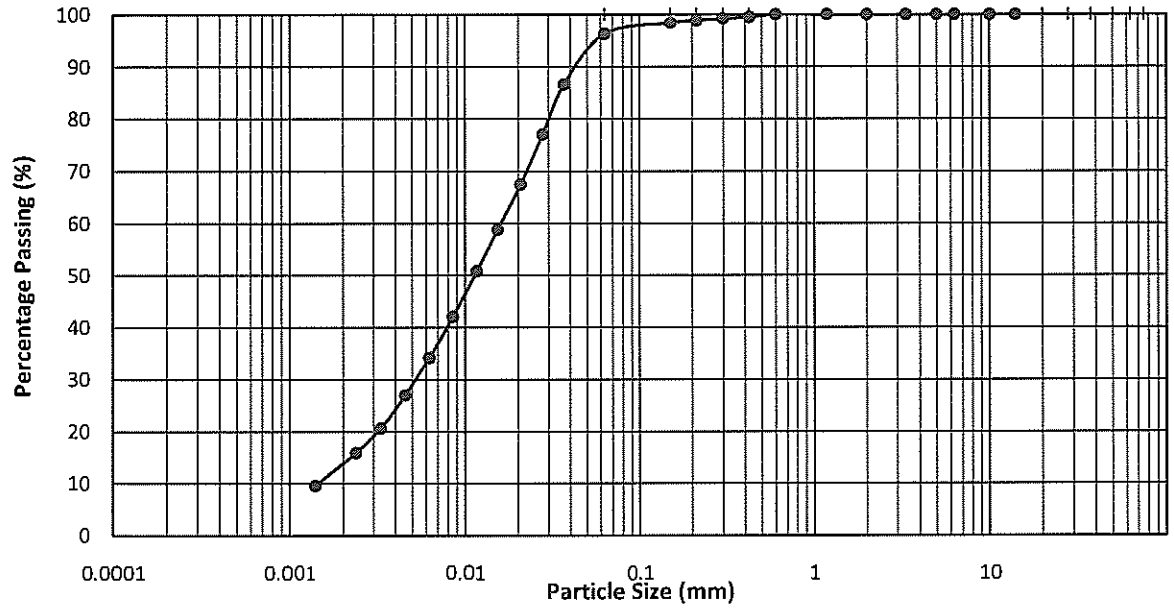
GRAVEL	=	**2**	%	
SAND	=	**5**	%	% of Passing 0.425 mm Sieve : 96.2
SILT + CLAY	=	**93**	%	

TESTED BY :	APPROVED BY :	DATE :
B. Thy.	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**4**	%
SILT	=	**82**	%
CLAY	=	**14**	%

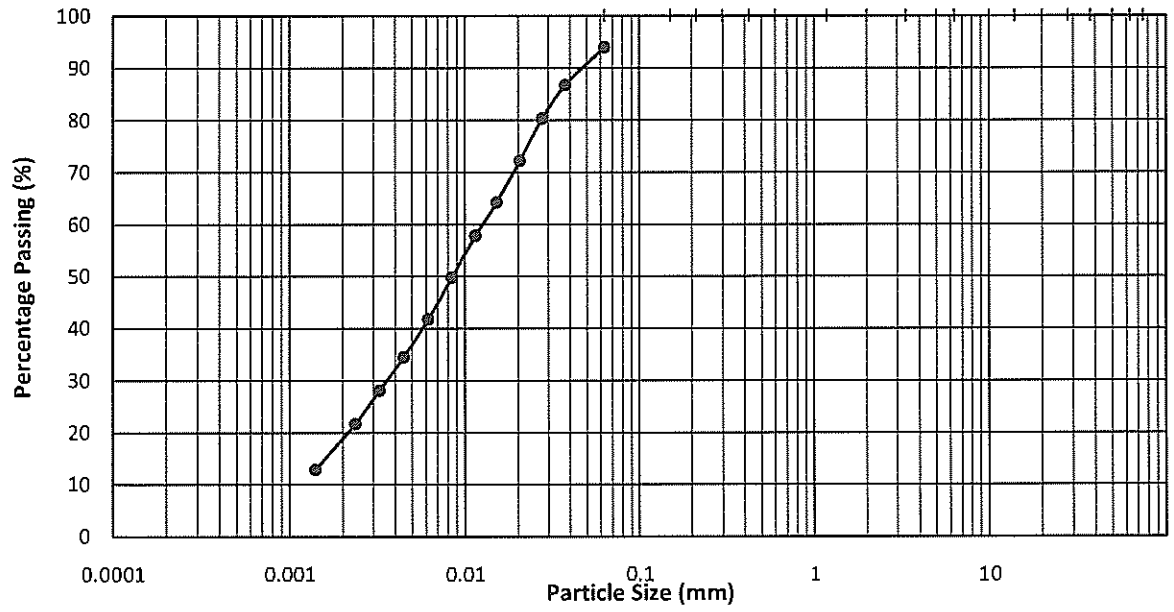
% of Passing 0.425 mm Sieve : 99.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**6**	%
SILT	=	**75**	%
CLAY	=	**19**	%

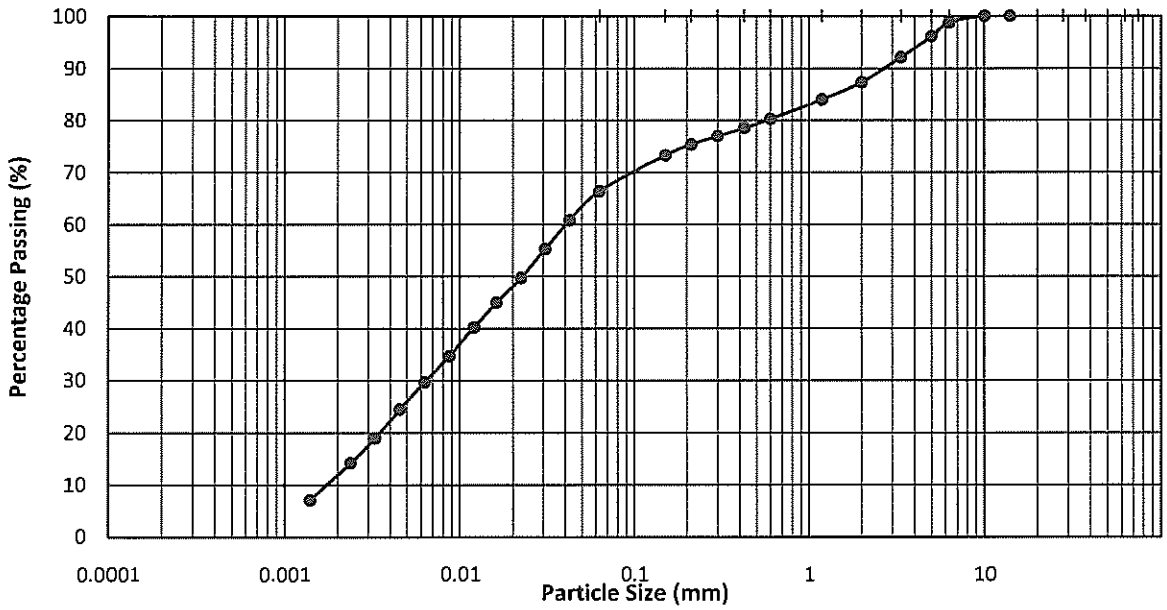
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 04.09.208



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

SOIL DESCRIPTION : **Light greenish grey and yellow slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**13**	%
SAND	=	**21**	%
SILT	=	**54**	%
CLAY	=	**12**	%

% of Passing 0.425 mm Sieve : 78.5

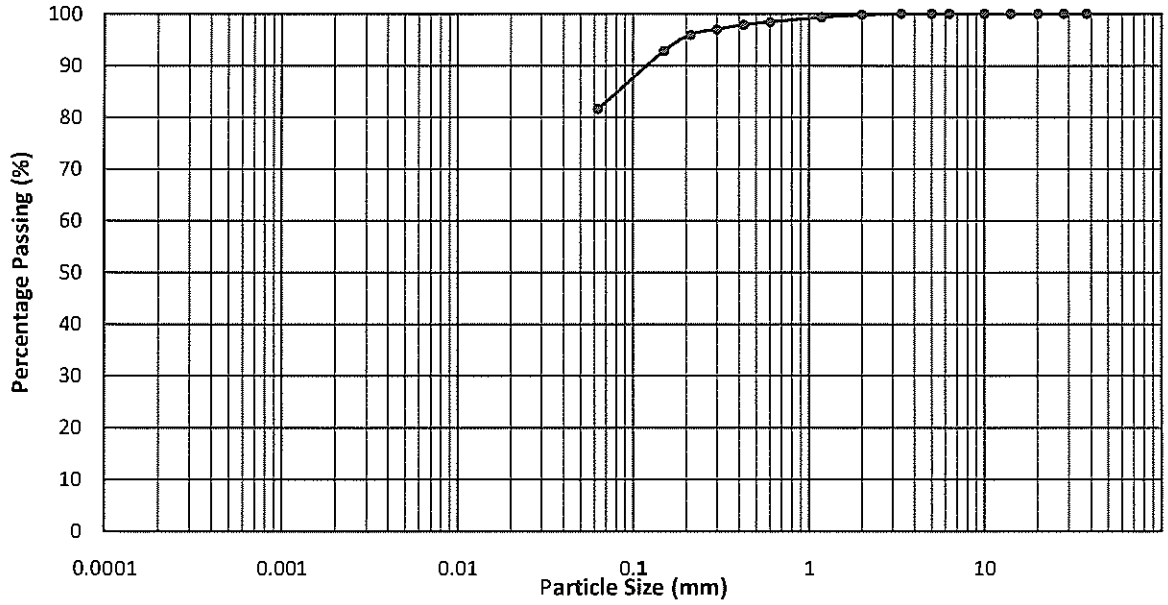
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT12
DEPTH (m)	: 29.00-25.35m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%	
SAND	=	**18**	%	% of Passing 0.425 mm Sieve : 97.9
SILT + CLAY	=	**82**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

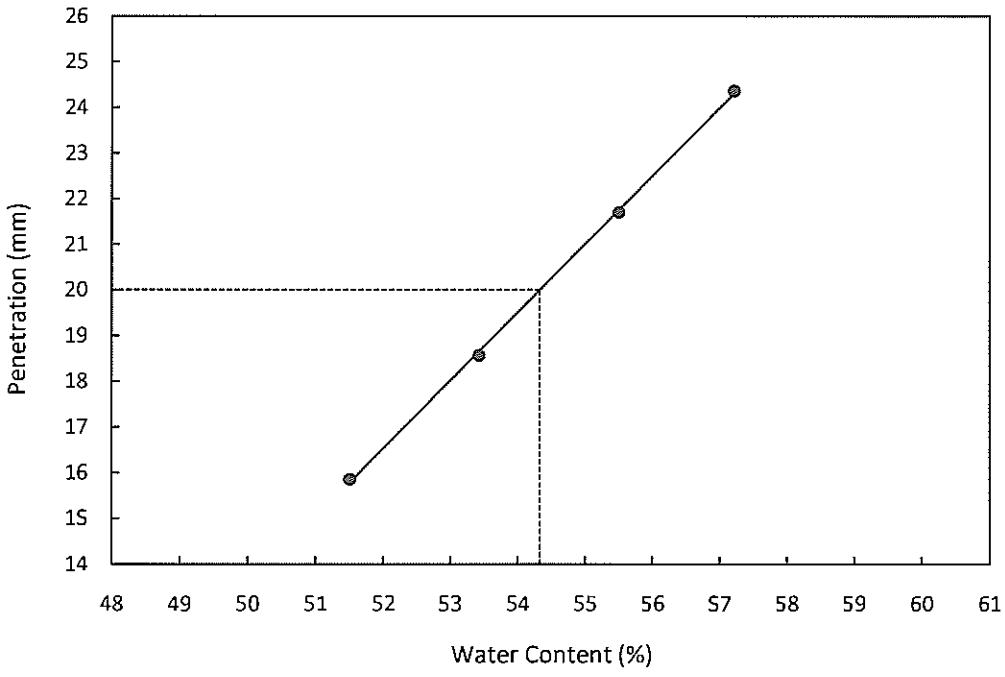
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT3
DEPTH(M)	: 6.00-6.4Sm
SOIL DESCRIPTION	: Light grey and brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 02.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.17	20.14	20.72	20.68	20.05	20.46
DRY WEIGHT + CUP	(g)	16.24	16.24	16.28	16.16	17.09	17.20
CUP WEIGHT	(g)	8.61	8.94	8.28	8.26	8.25	7.53
WATER CONTENT	(%)	51.5	53.4	55.5	57.2	33.5	33.7
PENETRATION	(mm)	15.9	18.6	21.7	24.4	-	-

LIQUID LIMIT	(%)	**54.3**
PLASTIC LIMIT	(%)	**33.6**
PLASTICITY INDEX		**21**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

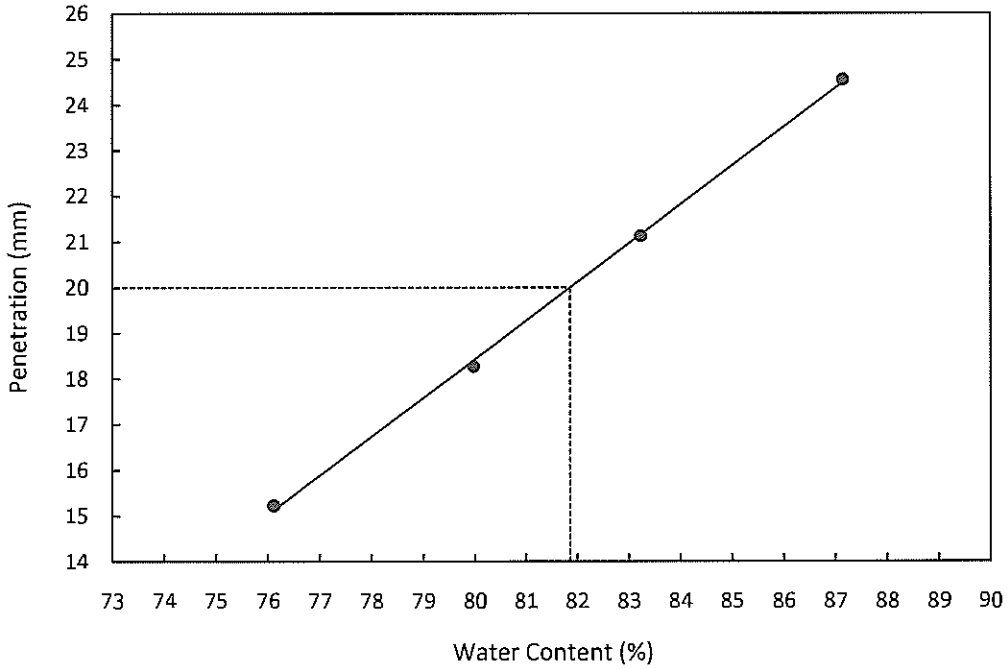
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & S)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Whitish grey and light yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.49	20.53	20.62	20.41	20.05	20.25
DRY WEIGHT + CUP	(g)	15.33	15.30	15.46	15.12	16.43	16.57
CUP WEIGHT	(g)	8.55	8.76	9.26	9.05	8.94	8.98
WATER CONTENT	(%)	76.1	80.0	83.2	87.1	48.3	48.5
PENETRATION	(mm)	15.2	18.3	21.1	24.6	-	-

LIQUID LIMIT	(%)	**81.9**
PLASTIC LIMIT	(%)	**48.4**
PLASTICITY INDEX		**33**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

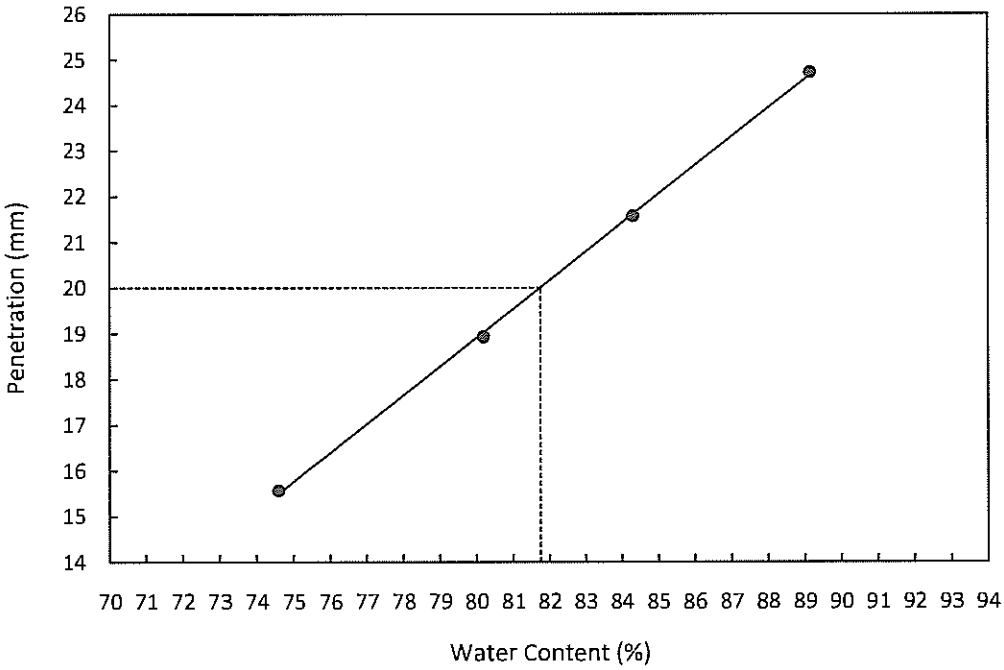
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT4
DEPTH(M)	: 8.90-9.35m
SOIL DESCRIPTION	: Whitish grey and light yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 02.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.60	20.12	20.61	20.25	20.30	20.27
DRY WEIGHT + CUP	(g)	15.32	14.86	15.40	14.83	16.49	16.37
CUP WEIGHT	(g)	8.24	8.30	9.22	8.75	8.60	8.29
WATER CONTENT	(%)	74.6	80.2	84.3	89.1	48.3	48.3
PENETRATION	(mm)	15.6	18.9	21.6	24.7	-	-

LIQUID LIMIT	(%)	**81.8**
PLASTIC LIMIT	(%)	**48.3**
PLASTICITY INDEX		**33**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

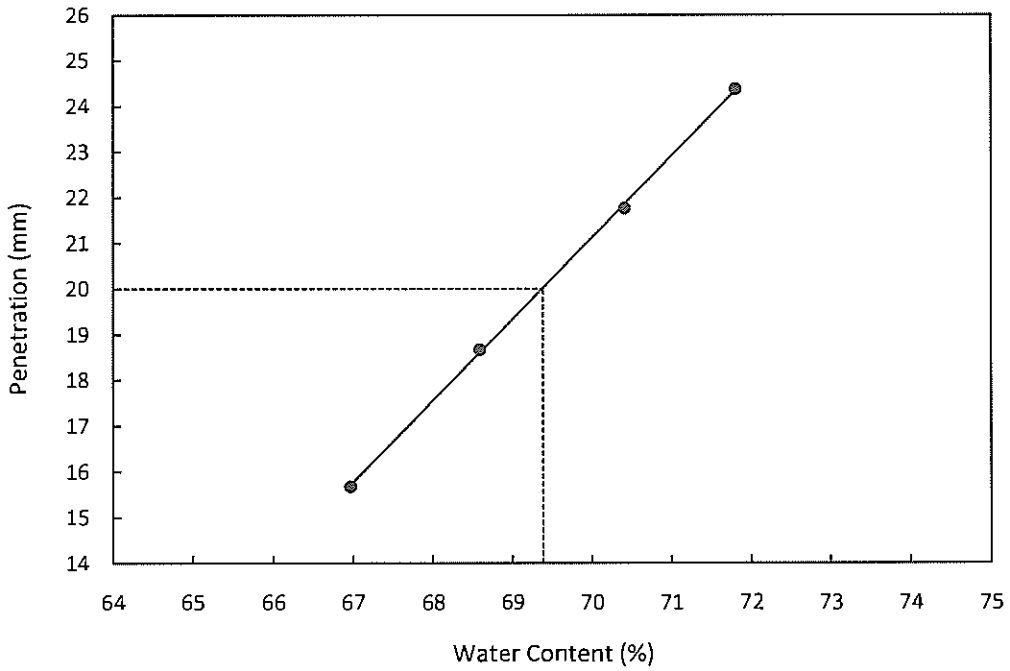
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Whitish grey and light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 80
TEST DATE	: 31.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.72	20.37	20.61	20.62	20.12	20.09
DRY WEIGHT + CUP	(g)	15.43	15.72	15.59	15.68	16.73	16.80
CUP WEIGHT	(g)	7.53	8.94	8.46	8.80	9.03	9.36
WATER CONTENT	(%)	67.0	68.6	70.4	71.8	44.0	44.2
PENETRATION	(mm)	15.7	18.7	21.8	24.4	-	-

LIQUID LIMIT	(%)	**69.4**
PLASTIC LIMIT	(%)	**44.1**
PLASTICITY INDEX		**25**

NOTE:
M : SILT
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L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

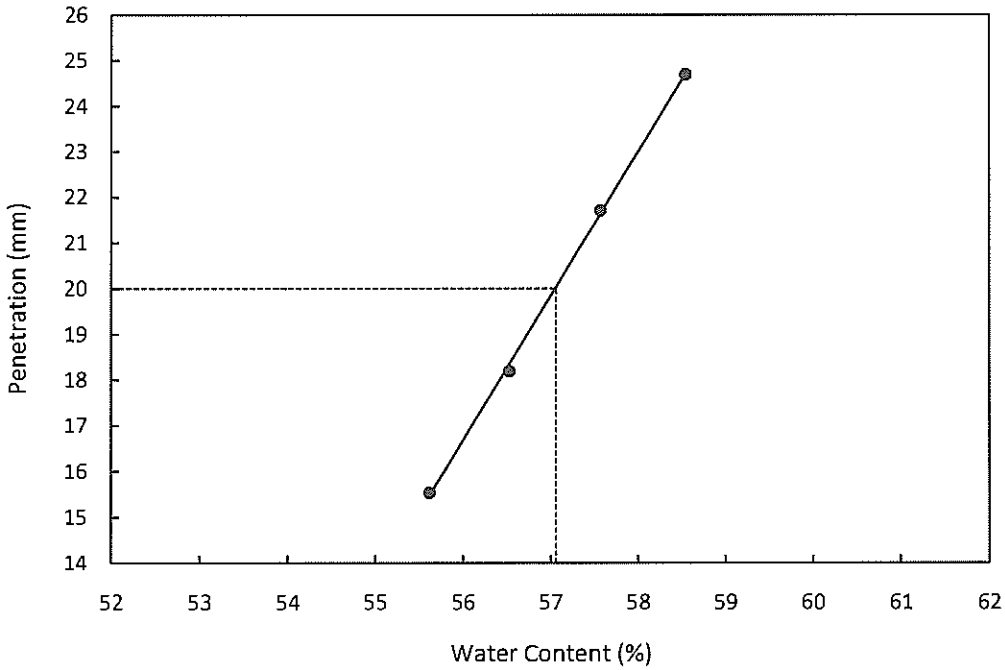
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT7
DEPTH(M)	: 14.90-15.35m
SOIL DESCRIPTION	: Whitish grey and grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.42Smm SIEVE	: -
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.69	20.12	20.63	20.58	20.66	20.47
DRY WEIGHT + CUP	(g)	16.33	15.79	16.33	16.26	17.58	17.46
CUP WEIGHT	(g)	8.49	8.13	8.86	8.88	9.13	9.26
WATER CONTENT	(%)	55.6	56.5	57.6	58.5	36.4	36.7
PENETRATION	(mm)	15.5	18.2	21.7	24.7	-	-

LIQUID LIMIT	(%)	**57.1**
PLASTIC LIMIT	(%)	**36.6**
PLASTICITY INDEX		**20**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

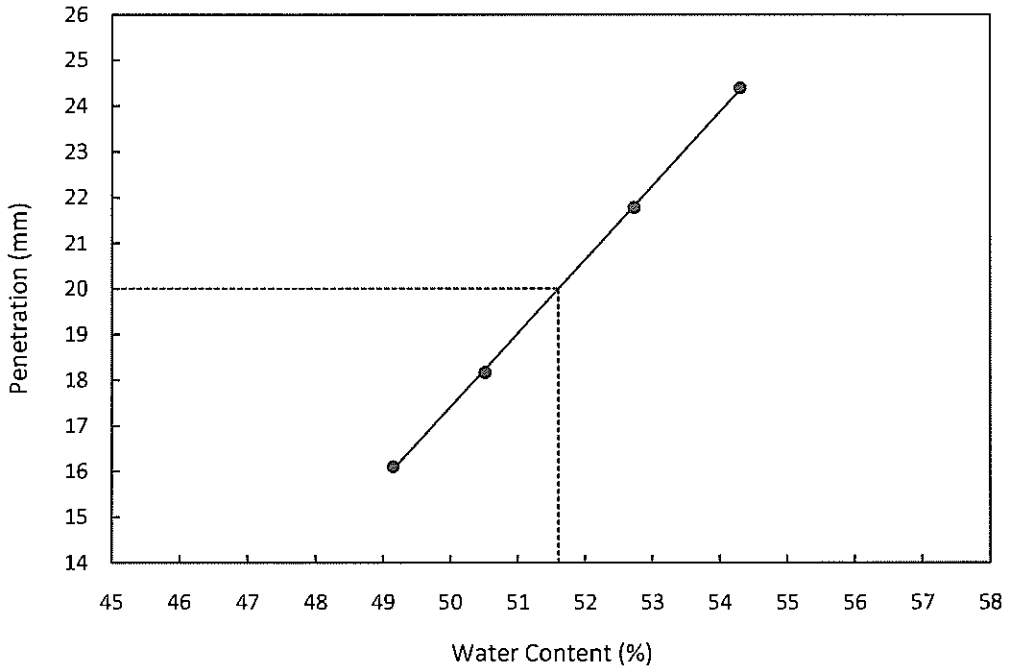
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 31.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.52	20.46	20.57	20.23	20.47	20.34
DRY WEIGHT + CUP	(g)	16.78	16.46	16.32	16.19	17.42	17.41
CUP WEIGHT	(g)	9.17	8.54	8.26	8.75	8.49	8.82
WATER CONTENT	(%)	49.1	50.5	52.7	54.3	34.2	34.1
PENETRATION	(mm)	16.1	18.2	21.8	24.4	-	-

LIQUID LIMIT	(%)	**51.6**
PLASTIC LIMIT	(%)	**34.1**
PLASTICITY INDEX		**17**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Tan.	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

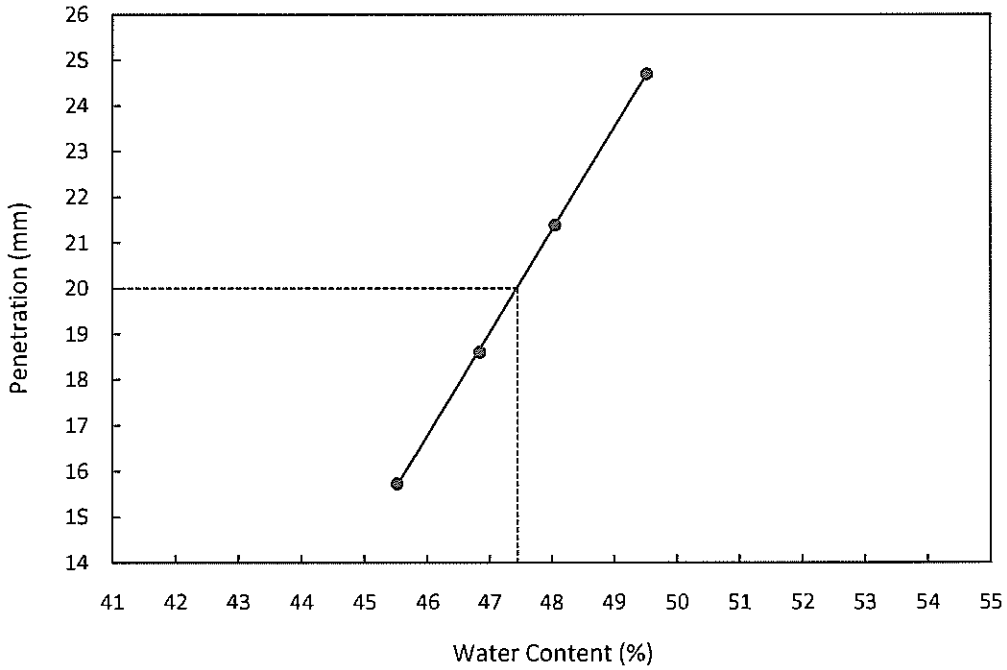
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: SPT10
DEPTH(M)	: 20.90-21.35m
SOIL DESCRIPTION	: Light grey and brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 02.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.48	20.68	20.37	20.41	20.60	20.35
DRY WEIGHT + CUP	(g)	16.83	16.76	16.31	16.32	17.66	17.72
CUP WEIGHT	(g)	8.81	8.39	7.86	8.06	8.19	9.17
WATER CONTENT	(%)	45.5	46.8	48.0	49.5	31.0	30.8
PENETRATION	(mm)	15.7	18.6	21.4	24.7	-	-

LIQUID LIMIT	(%)	**47.5**
PLASTIC LIMIT	(%)	**30.9**
PLASTICITY INDEX		**17**

NOTE:
M : SILT
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I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Jay.	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

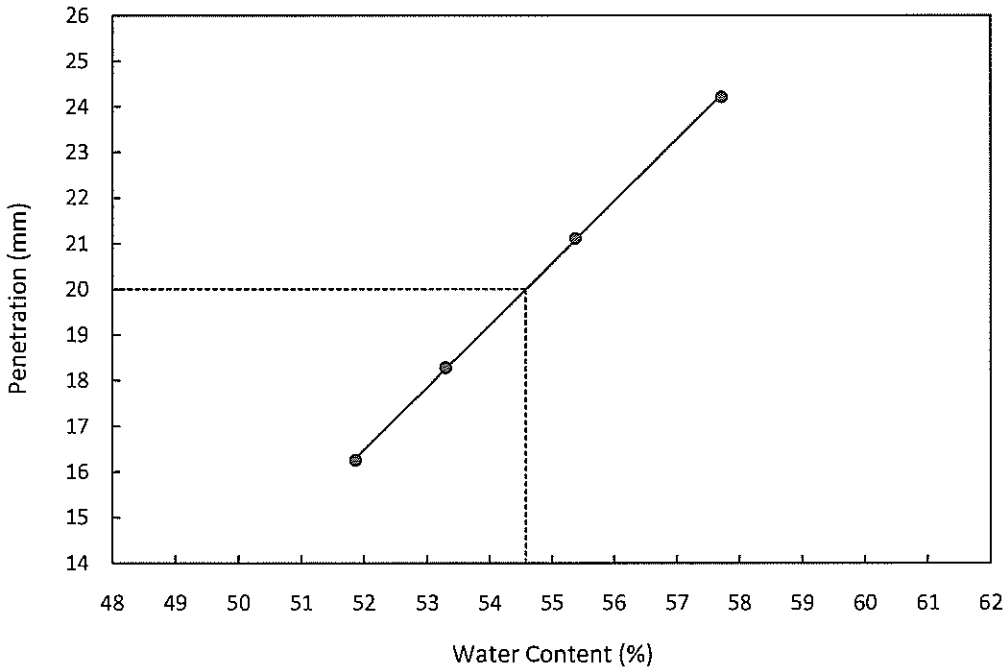
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH2
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Light greenish grey and yellow slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 79
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.45	20.65	20.35	20.38	20.37	20.11
DRY WEIGHT + CUP	(g)	16.27	16.61	16.23	15.85	17.37	17.40
CUP WEIGHT	(g)	8.21	9.03	8.79	8.00	8.22	9.21
WATER CONTENT	(%)	51.9	53.3	55.4	57.7	32.8	33.1
PENETRATION	(mm)	16.3	18.3	21.1	24.2	-	-

LIQUID LIMIT	(%)	**54.6**
PLASTIC LIMIT	(%)	**32.9**
PLASTICITY INDEX		**22**

NOTE:
M : SILT
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H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



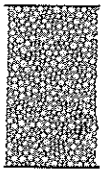
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			14.00-14.90m		
Description			Firm whitish grey and light greenish grey slightly sandy SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	147.1	148.3	146.5
Bulk Density	ρ_0	(Mg/m3)	1.72	1.73	1.71
Particle Density	ρ_s	(Mg/m3)	2.68	2.68	2.68

Initial Conditions

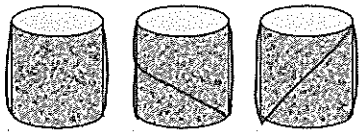
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	54	53	55
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.12	1.13	1.10
Initial Voids Ratio	e_0	.	1.40	1.37	1.43
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	151.06	120.97	137.09
MembraneCorrection	m_c	(kPa)	1.800	1.470	1.310
Strain At Max Stress	$\varepsilon_f\%$	(%)	17.49	13.21	11.27
Shear Strength	c_u	(kPa)	75.53	60.48	68.55
Final Moisture	$\omega_f\%$	(%)	54	53	55
Final Dry Density	ρ_{df}	(Mg/m3)	1.12	1.13	1.10
Final Voids Ratio	e_f	.	1.40	1.37	1.43
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	UU4-SungeiTengah-B2T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

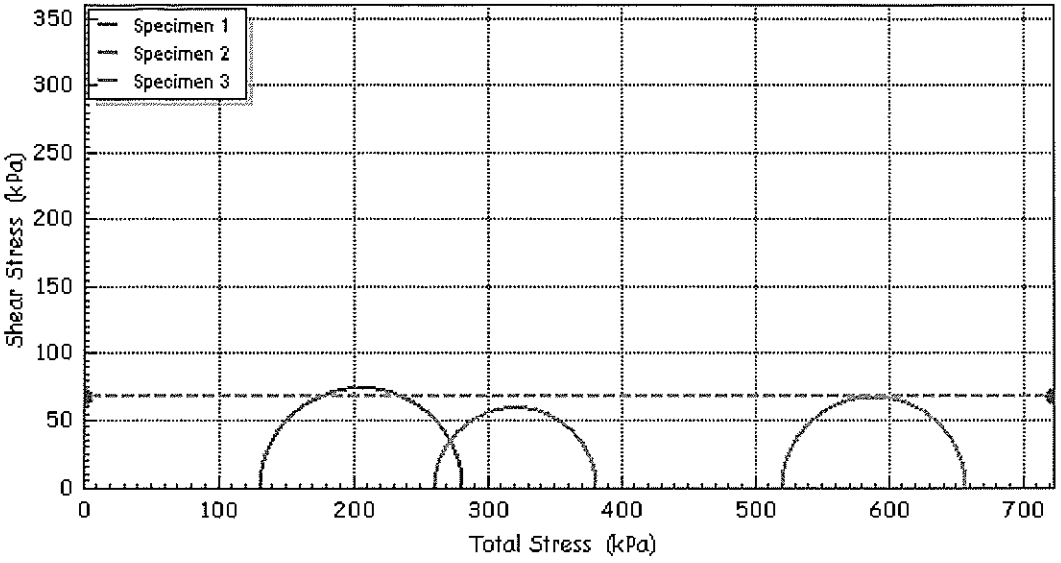
Ryobi Geotechnique International Pte Ltd

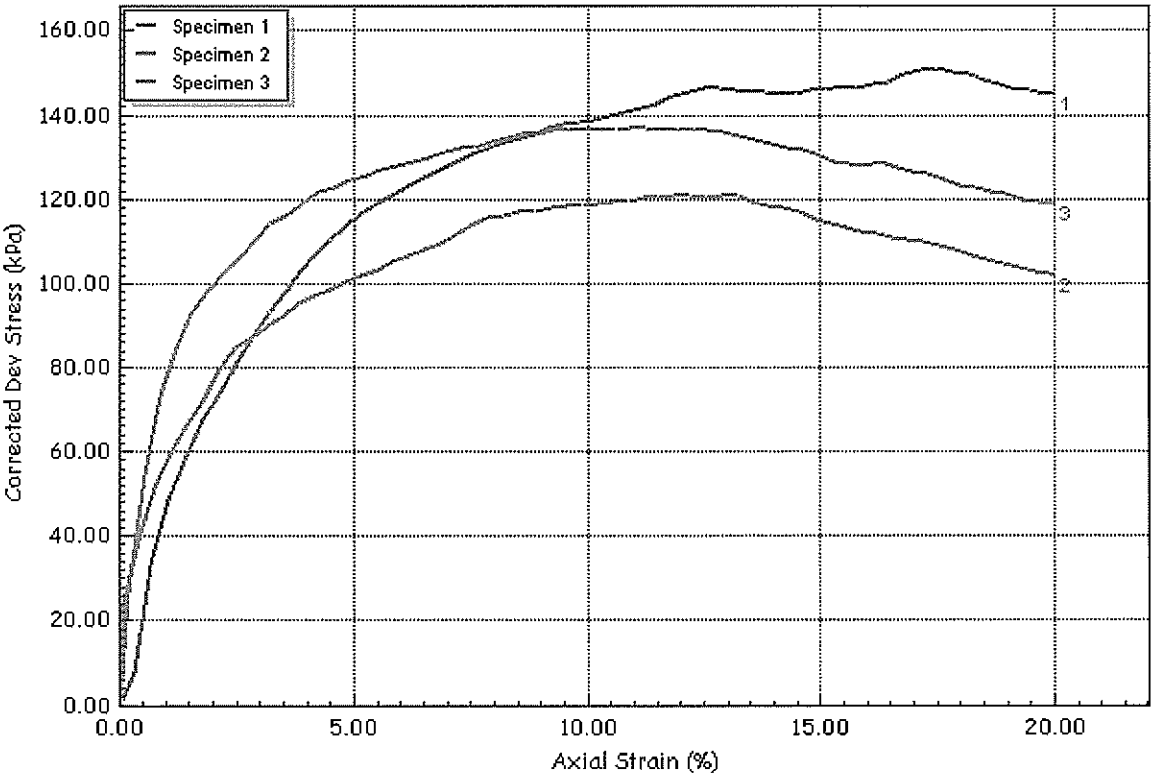
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	68.2
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU4-SungeiTengah-B2T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7			Sample	TW2
Client	AVA			Depth	14.00-14.90m
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA2016-0023-B

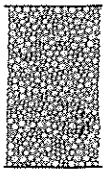
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			20.00-20.90m		
Description			Firm light greenish grey slightly sandy SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	157.2	157.3	157.2
Bulk Density	ρ_0	(Mg/m3)	1.83	1.83	1.83
Particle Density	ρ_s	(Mg/m3)	2.70	2.70	2.70

Initial Conditions

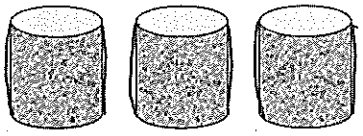
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	185	370	740
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	43	44	44
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.28	1.27	1.27
Initial Voids Ratio	e_0	.	1.11	1.13	1.12
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	121.99	125.70	120.77
MembraneCorrection	m_c	(kPa)	1.590	1.610	1.590
Strain At Max Stress	$\varepsilon_f\%$	(%)	14.75	15.07	14.71
Shear Strength	c_u	(kPa)	60.99	62.85	60.39
Final Moisture	$\omega_f\%$	(%)	43	44	44
Final Dry Density	ρ_{df}	(Mg/m3)	1.28	1.27	1.27
Final Voids Ratio	e_f	.	1.11	1.13	1.12
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	UU5-SungeiTengah-B2T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

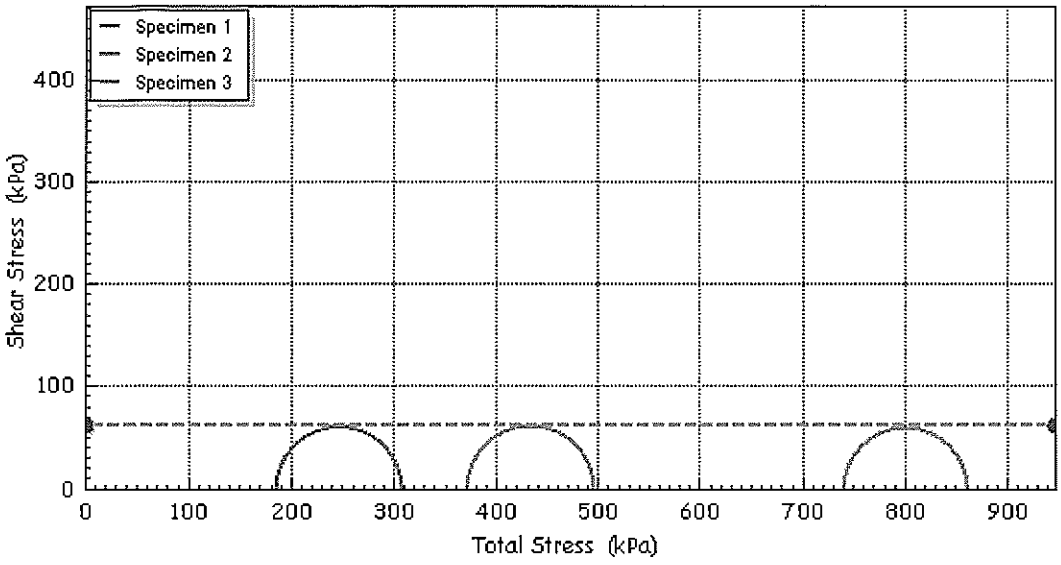
Ryobi Geotechnique International Pte Ltd

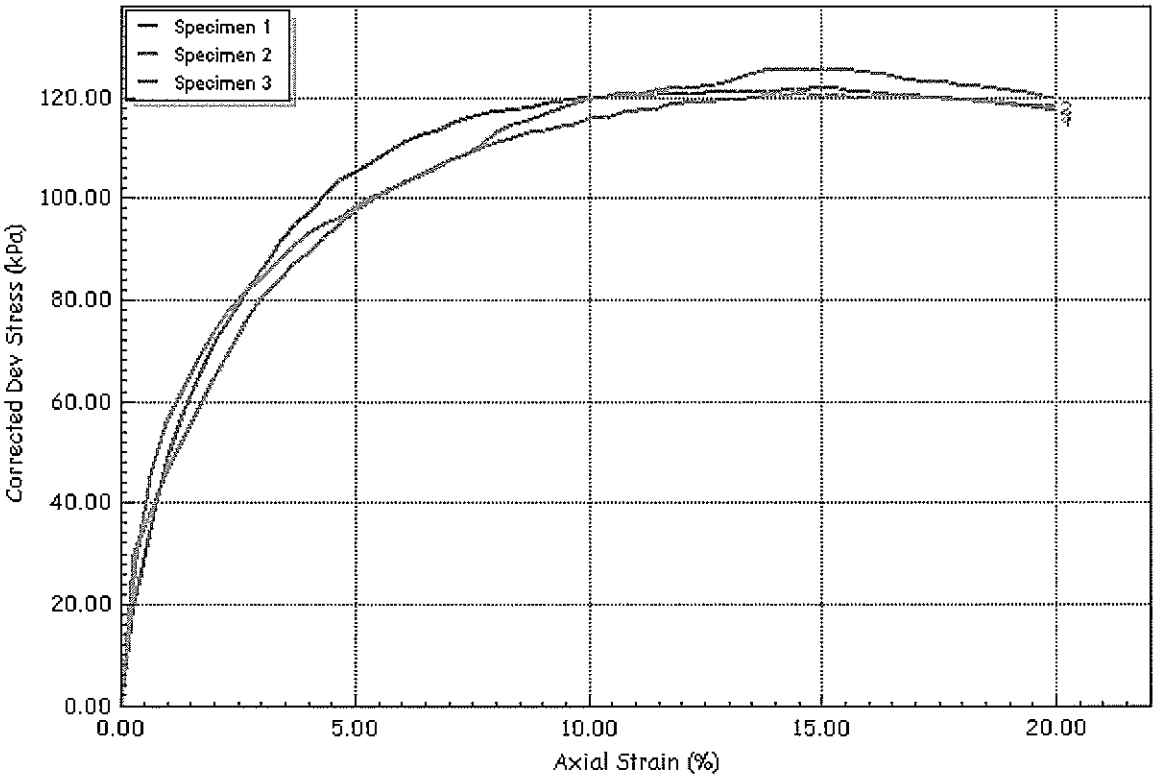
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	61.4
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU5-SungeiTengah-B2T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	3/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7			Sample	TW3
Client	AVA			Depth	20.00-20.90m
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

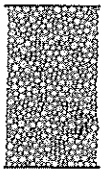
ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA 2016 0823 B

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth			24.00-24.90m
	Description			Stiff light greenish grey and yellow slightly gravelly slightly sandy SILT
	Type			Undisturbed Sample
	Initial Sample Length	L_0	(mm)	75.6
	Initial Sample Diameter	D_0	(mm)	38.0
	Initial Sample Weight	W_0	(gr)	182.9
	Bulk Density	ρ_0	(Mg/m3)	2.13
	Particle Density	ρ_s	(Mg/m3)	2.73

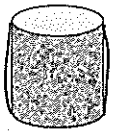
Initial Conditions			
Specimen			
Initial Cell Pressure	σ_3	(kPa)	450
Strain Rate	m_S	(mm/min)	0.76000
MembraneThickness	m_b	(mm)	0.20
Initial Moisture	$\omega_i\%$	(%)	23
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.74
Initial Voids Ratio	e_0	.	0.57
Initial Degree of Saturation	S_o	(%)	100

Final Conditions			
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	219.83
MembraneCorrection	m_C	(kPa)	1.690
Strain At Max Stress	$\varepsilon_f\%$	(%)	16.01
Shear Strength	c_U	(kPa)	109.92
Final Moisture	$\omega_f\%$	(%)	23
Final Dry Density	ρ_{df}	(Mg/m3)	1.74
Final Voids Ratio	e_f	.	0.57
Final Degree of Saturation	S_f	(%)	100.0

Notes

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

Only one specimen tested due to insufficient sample.



Failure Sketch

(surface inclination)

Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU6-SungeiTengah-B2T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

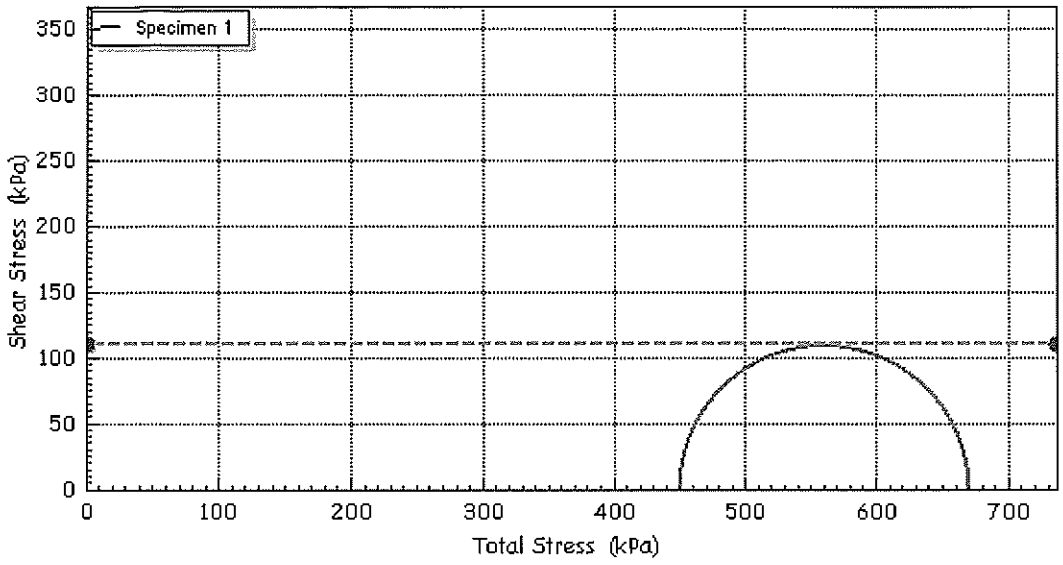
Ryobi Geotechnique International Pte Ltd

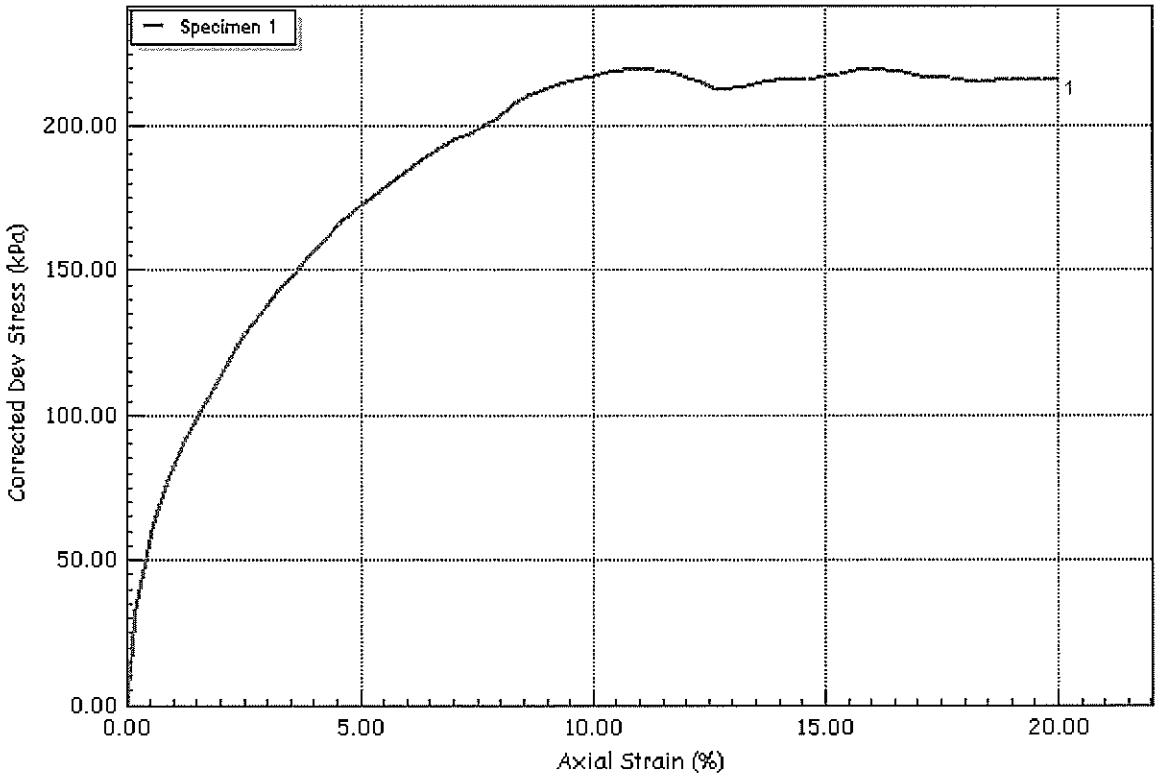
Total Stress Triaxial Compression

Unconsolidated Undrained

Test Results Plots

Cohesion Level	c	(kPa)	109.9
Friction Angle	ϕ	(deg)	0.0





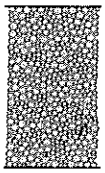
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU6-SungeiTengah-B2T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

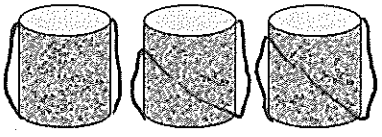
Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Whitish grey and light yellow slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0	(mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0	(gr)	922.8	922.1	937.7
	Initial Bulk Density	ρ_0	(Mg/m3)	1.71	1.71	1.74
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	240	280	360
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	58	57	57
Initial Dry Density	ρ_{di}	(Mg/m3)	1.09	1.09	1.11
Initial Voids Ratio	e_i	.	1.446	1.447	1.394
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.98

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	57	56	54
Final Dry Density	ρ_{df}	(Mg/m3)	1.11	1.13	1.19
Final Voids Ratio	e_f	.	1.389	1.351	1.227
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	5.83	5.86	9.34
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	92.3	132.1	198.8
Minor Stress At Failure	σ_3'	(kPa)	24.0	41.3	70.1
Major Stress At Failure	σ_1'	(kPa)	116.3	173.4	268.9
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.844	4.198	3.836

Notes

-



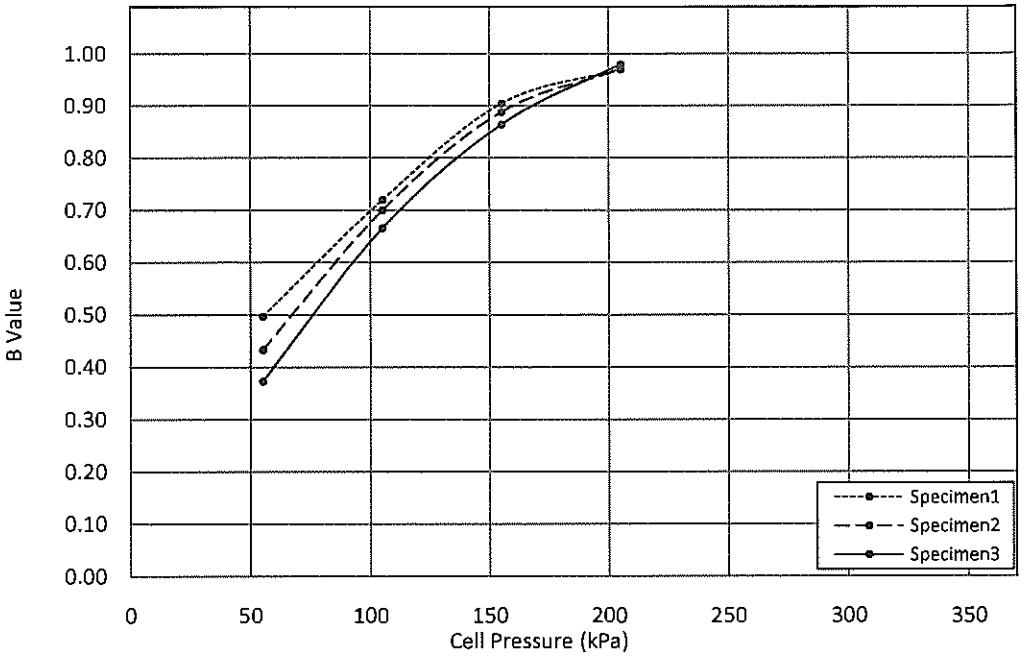
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengahWA7-B2T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator Kar	Checked Min Win Htut	Approved Sio Keong Keng	

Ryobi Geotechnique International Pte Ltd

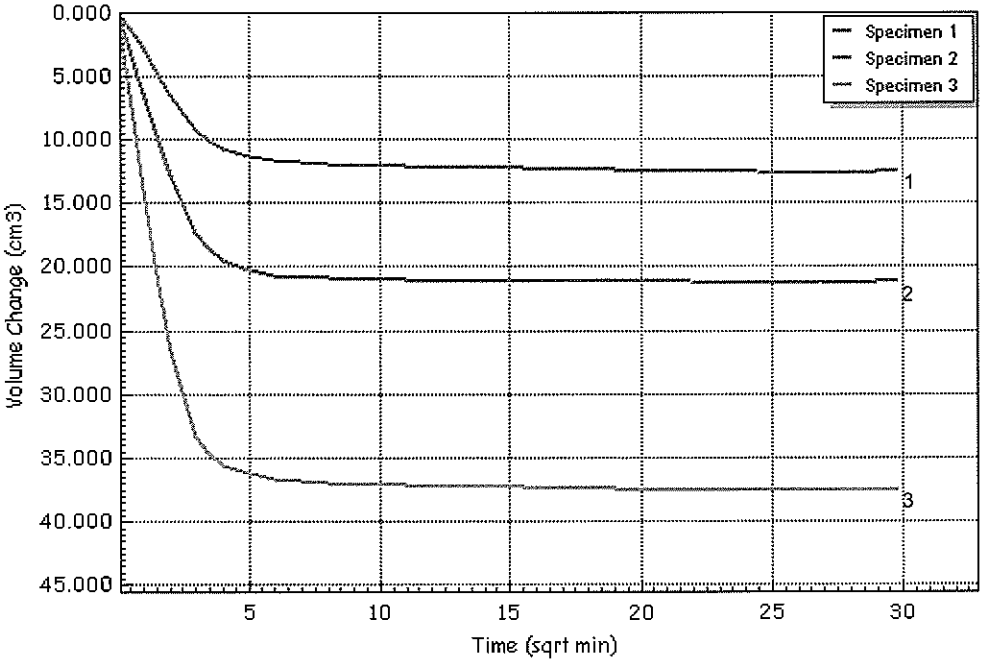
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



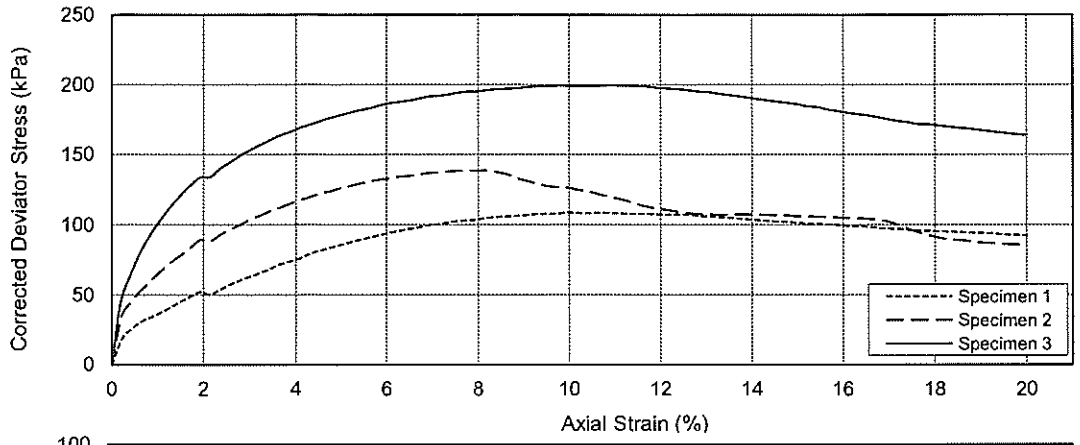
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengahWA7-B2T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Kenng Kong

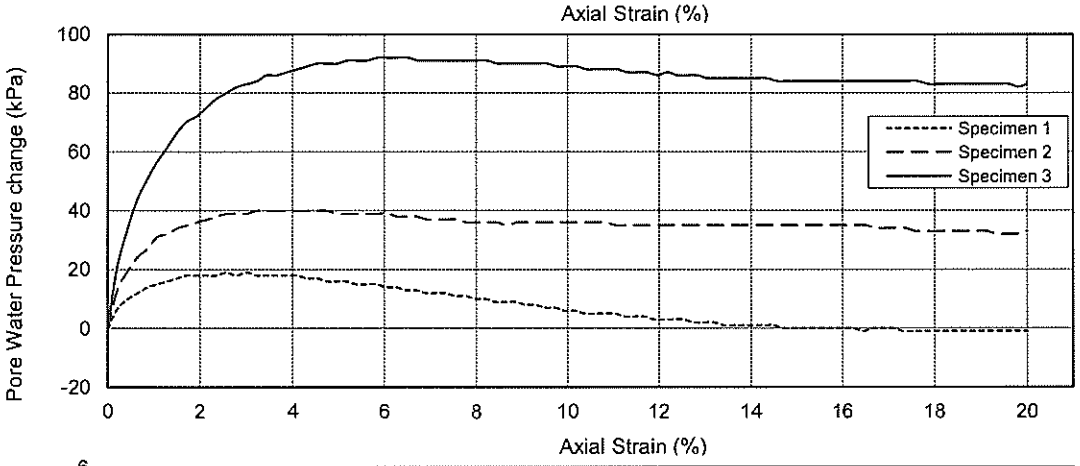
Ryobi Geotechnique International Pte Ltd

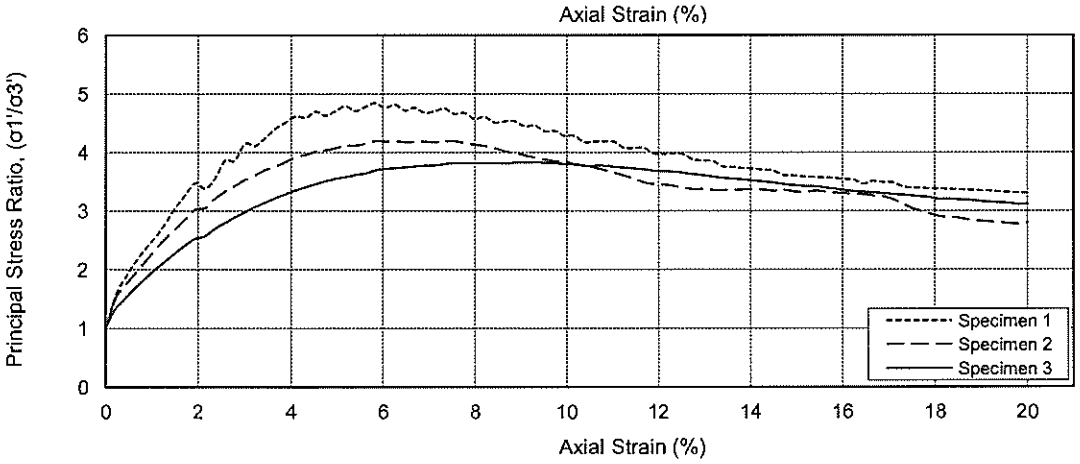
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	201	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	216	239	290
A Value at Max. Stress Ratio	0.163	0.295	0.453

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengah-B2T1
Database	:.\SQLEXPRESS\Ryobi-2017	Test Date	3/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator	Kan	Checked	Min Win Htut
		Approved	Sio Keong Kong

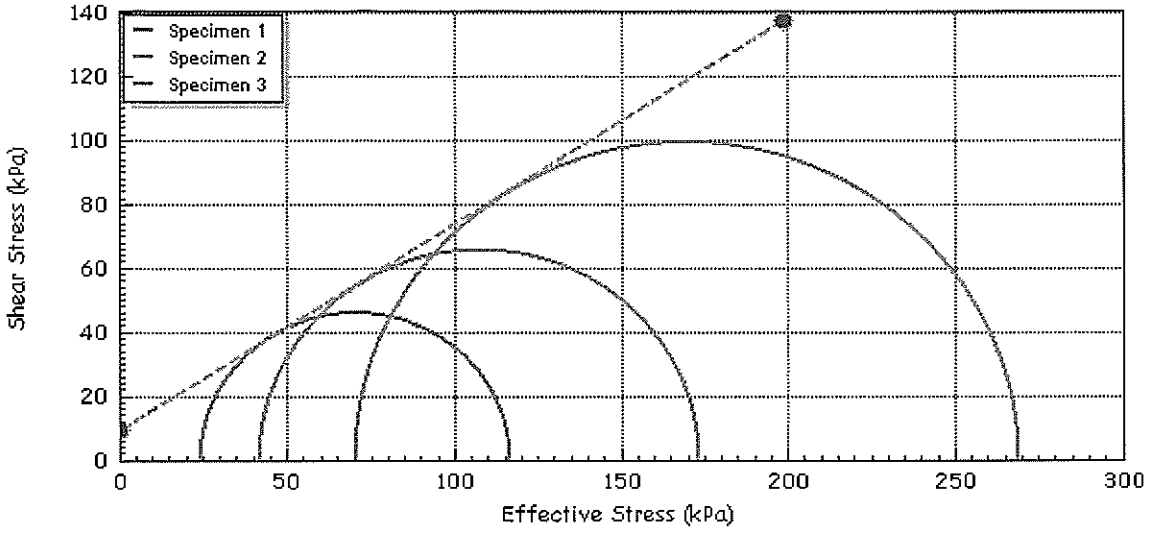
Ryobi Geotechnique International Pte Ltd

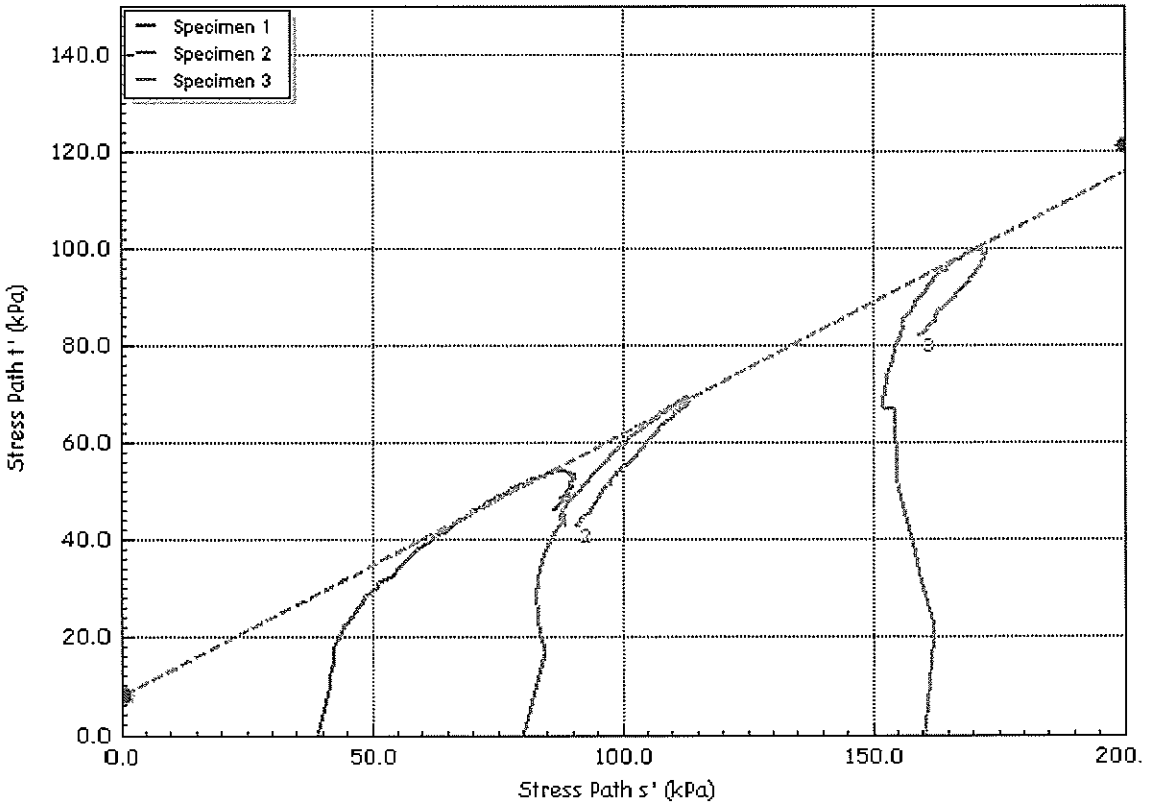
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	9.2	Stress Path Intercept	t_0'	(kPa)	7.7
Effective Friction Angle	ϕ'	(deg)	32.7	Stress Path Inclination	θ	(deg)	28.4





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengahWA7-B2T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH2
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator Kan	Checked Min Win Htut	Approved	Sio Heong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813557-001**	**SG1813557-002**	**SG1813557-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813557-004**	**SG1813557-005**	**SG1813557-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	6.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813564**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 27-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH1 Water Sample	BH2 Water Sample	BH3 Water Sample
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813564-001	SG1813564-002	SG1813564-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.6	11.4	11.7
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	0.05
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	<0.01
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH4 Water Sample	BH6 Water Sample	----
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		SG1813564-004	SG1813564-005	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.3	11.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH3						
SAMPLE NO :			SPT1	SPT2	SPT3	TW1	SPT4	SPT5	SPT6
SAMPLE DEPTH :		m	2.00-2.45	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	30.4	-	48.6	40.7	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.70	1.78	-	1.82	-
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	2.64	-	-	2.66	-	-	2.71
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	25	3	-	0	-	0	45
	SAND	%		44	-	4	-	25	
	SILT	%	30	53	-	73	-	75	45
	CLAY	%	45		-	23	-		10
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	85.9	68.1	52.6	-	-
	PLASTIC LIMIT	%	-	-	49.4	43.1	33.2	-	-
	PLASTICITY INDEX		-	-	36	25	19	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	-	-
	TOTAL COHESION	kPa	-	-	-	-	-	-	-
	TEST TYPE		-	-	-	**CU**	-	-	-
	EFFECTIVE COHESION	kPa	-	-	-	7.0	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	-	-	35.4	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 : 06/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH3						
SAMPLE NO :			TW2	SPT7	SPT8	SPT9	TW3	SPT10	W1
SAMPLE DEPTH :		m	14.00-14.90	14.90-15.35	16.00-16.45	18.00-18.45	20.00-20.90	20.90-21.35	Water Sample
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	28.7	29.0	-	-	33.5	29.9	
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	2.01	1.85	-	-	1.94	-	-
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	2.71	-	2.73	-	2.69	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	0	-	0	-	-
	SAND	%	38	-	51	-	22	-	-
	SILT	%	53	-	46	-	69	-	-
	CLAY	%	9	-	3	-	9	-	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	37.9	(A)	-	-	60.6	45.8	-
	PLASTIC LIMIT	%	25.3		-	-	33.1	30.5	-
	PLASTICITY INDEX		13		-	-	27	15	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	**UU**	-	-
	TOTAL COHESION	kPa	-	-	-	-	248.0	-	-
	TEST TYPE		**$CU^{70\Phi}$**	-	-	-	-	-	-
	EFFECTIVE COHESION	kPa	8.7	-	-	-	-	-	-
	EFFECTIVE PHI ANGLE	degree	36.3	-	-	-	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	7.4	-	-	-
	Chloride Content	%	-	-	-	<0.01	-	-	-
	Organic Content	%	-	-	-	0.5	-	-	-
	Sulphate Content	%	-	-	-	<0.01	-	-	-
	pH Value		-	-	-	-	-	-	11.7
	Chloride Content	g/L	-	-	-	-	-	-	0.05
	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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH3	SPT1	2.00-2.45	-	-	-	2.64
BH3	SPT2	4.00-4.45	30.4	-	-	-
BH3	SPT3	6.00-6.45	-	1.70	-	-
BH3	TW1	8.00-8.90	48.6	1.78	-	2.66
BH3	SPT4	8.90-9.35	40.7	-	-	-
BH3	SPT5	10.00-10.45	-	1.82	-	-
BH3	SPT6	12.00-12.45	-	-	-	2.71
BH3	TW2	14.00-14.90	28.7	2.01	-	2.71
BH3	SPT7	14.90-15.35	29.0	1.85	-	-
BH3	SPT8	16.00-16.45	-	-	-	2.73
BH3	TW3	20.00-20.90	33.5	1.94	-	2.69
BH3	SPT10	20.90-21.35	29.9	-	-	-

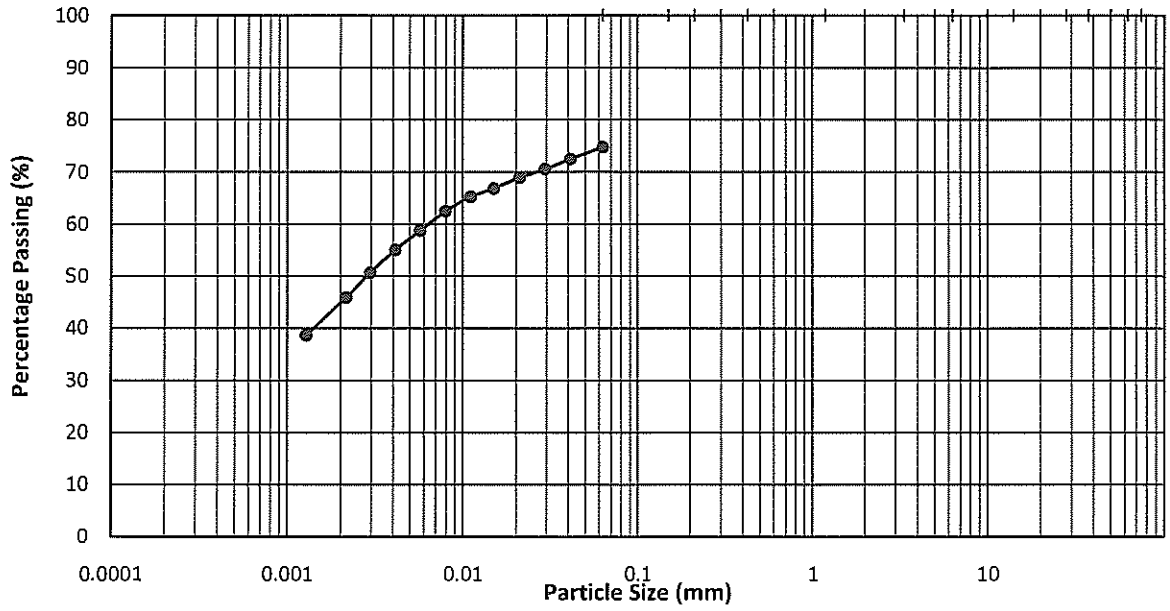
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: MONJU Date : 30.08.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 8.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT1
DEPTH (m)	: 2.00-2.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light grey sandy CLAY with traces of decayed woods**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**25**	%
SILT	=	**30**	%
CLAY	=	**45**	%

% of Passing 0.425 mm Sieve : -

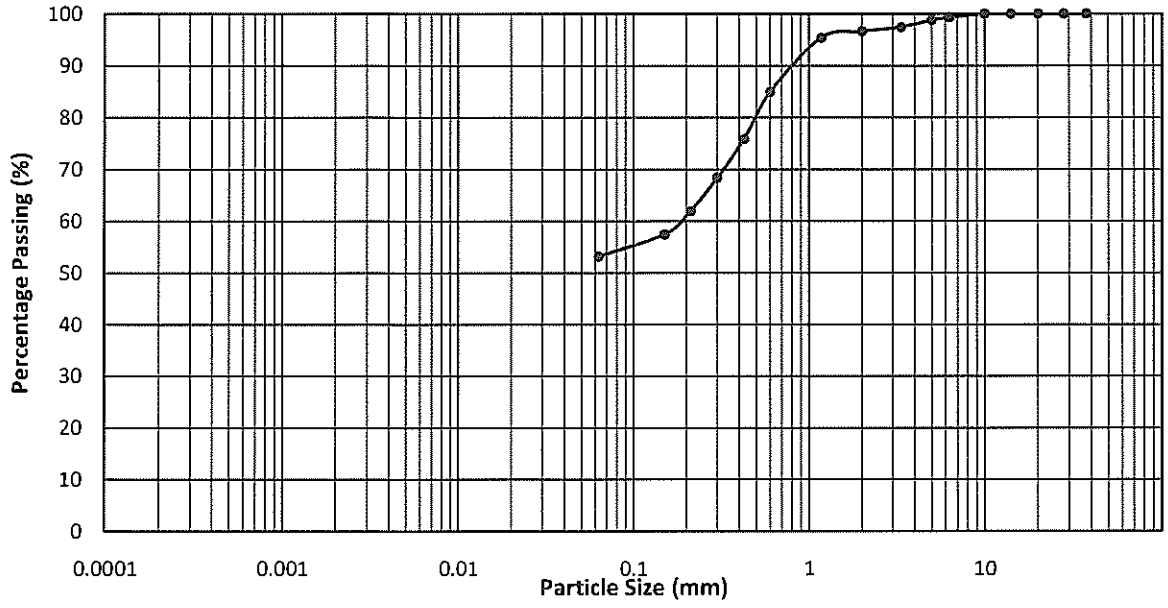
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0023-B

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly gravelly sandy SILT**

SIEVING TEST

GRAVEL	=	**3**	%	
SAND	=	**44**	%	% of Passing 0.42S mm Sieve : 75.8
SILT + CLAY	=	**53**	%	

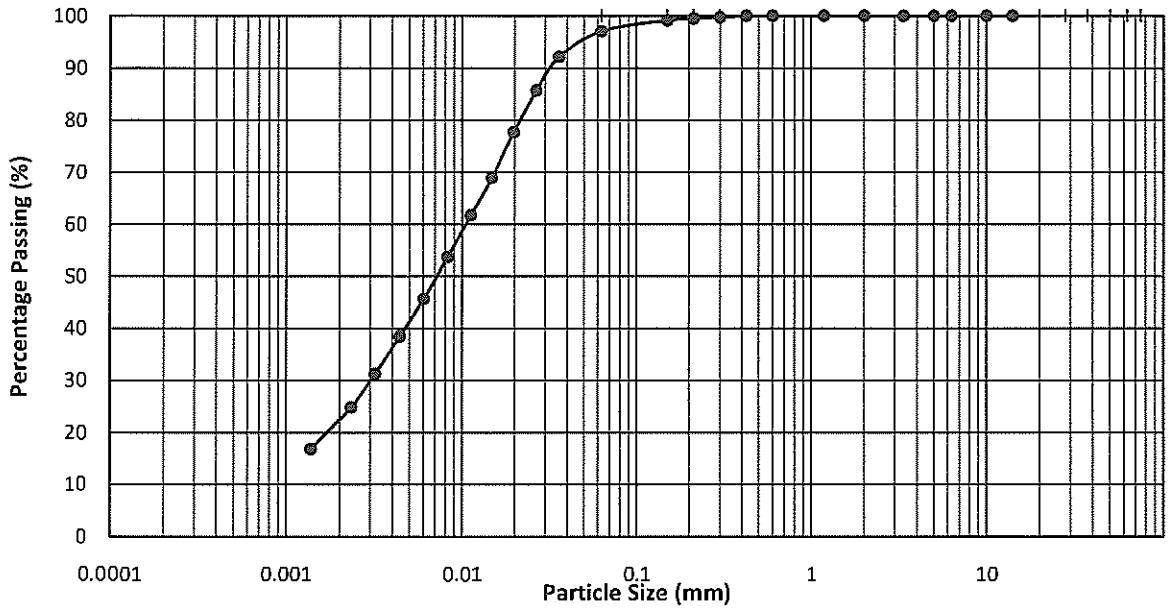
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6-9-2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Yellowish brown slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**4**	%
SILT	=	**73**	%
CLAY	=	**23**	%

% of Passing 0.425 mm Sieve : 100.0

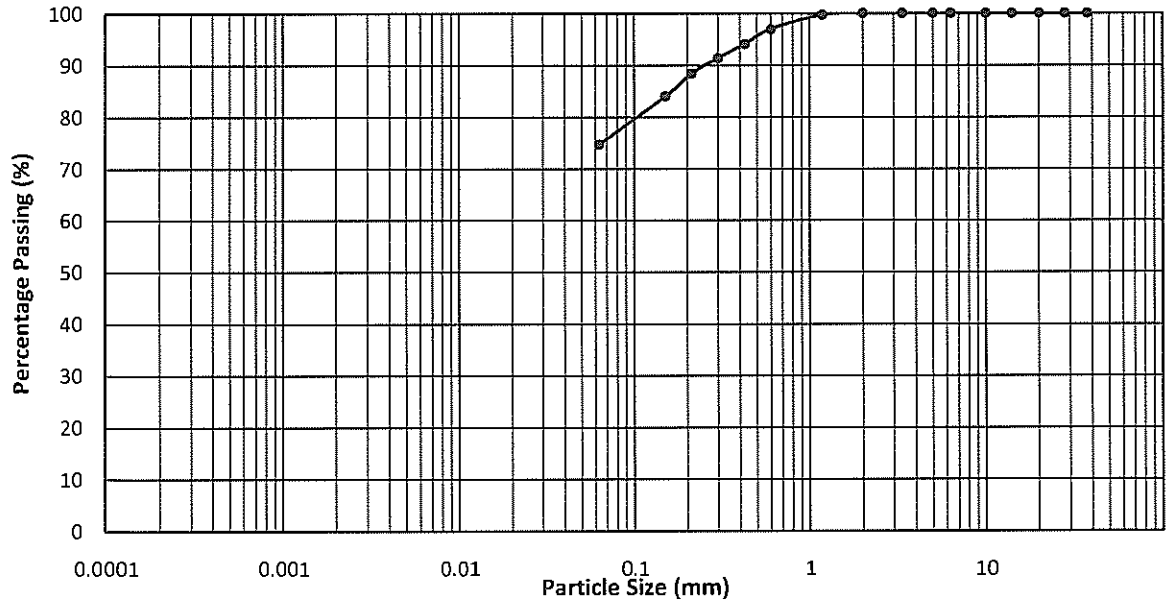
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0823-B

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Greenish grey and yellowish brown slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**25**	%
SILT + CLAY	=	**75**	%

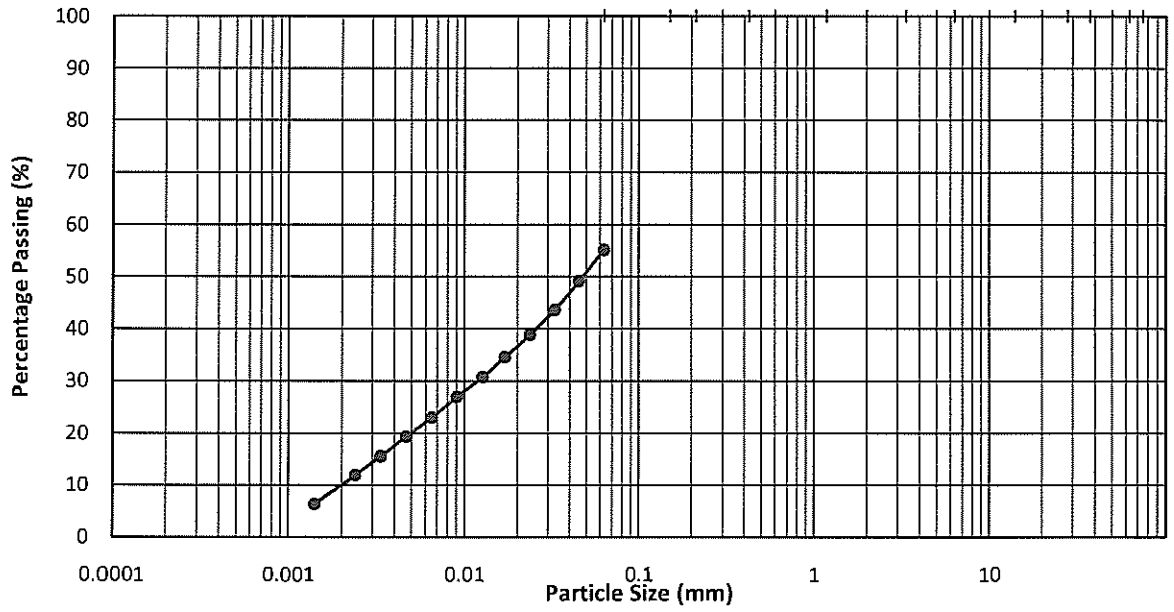
% of Passing 0.425 mm Sieve : 94.1

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light grey and greenish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**45**	%
SILT	=	**45**	%
CLAY	=	**10**	%

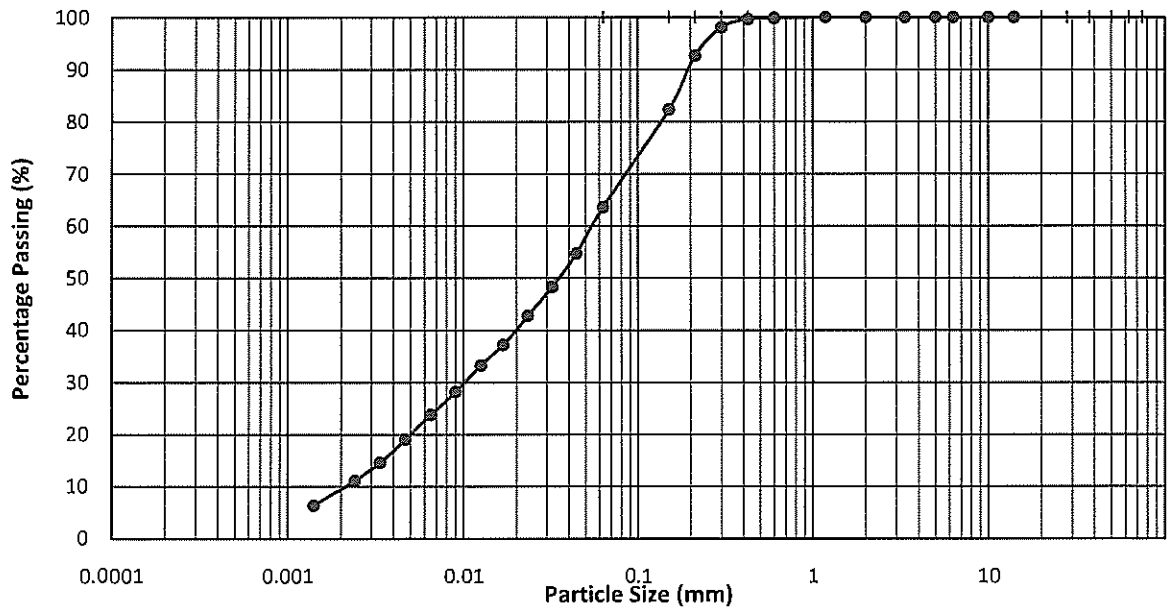
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
S. [illegible]	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light grey and greenish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**38**	%
SILT	=	**53**	%
CLAY	=	**9**	%

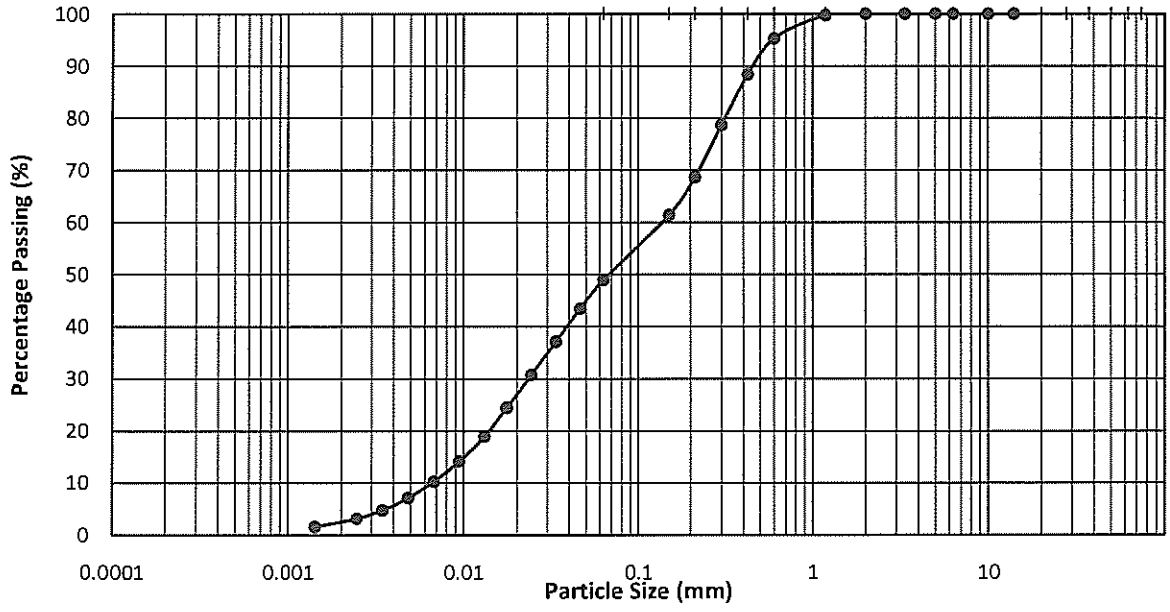
% of Passing 0.425 mm Sieve : 99.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Greenish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**51**	%
SILT	=	**46**	%
CLAY	=	**3**	%

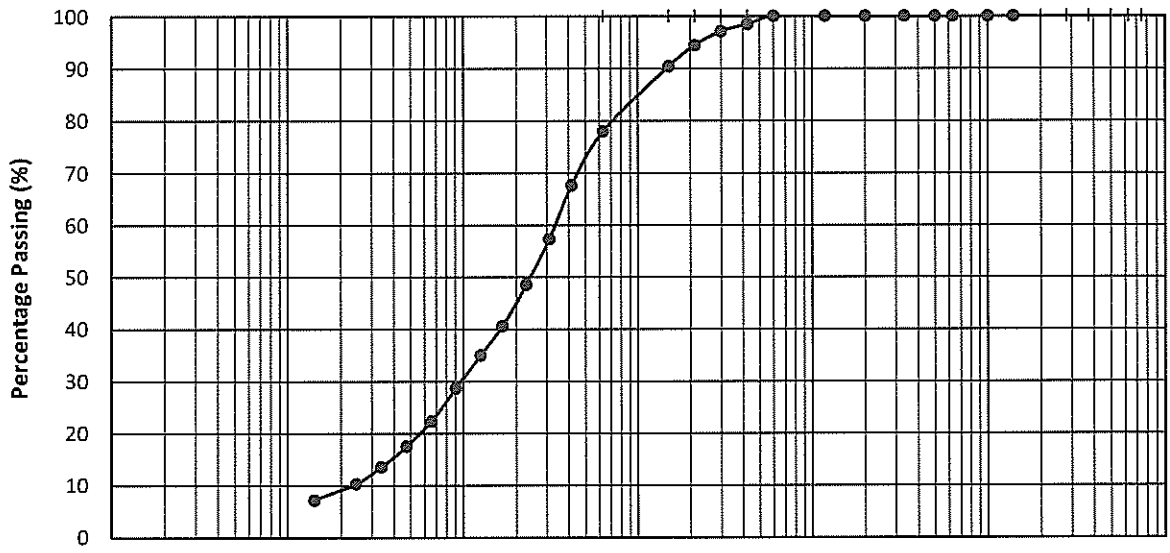
% of Passing 0.425 mm Sieve : 88.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 05.09.2018



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

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

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**22**	%
SILT	=	**69**	%
CLAY	=	**9**	%

% of Passing 0.425 mm Sieve : 98.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

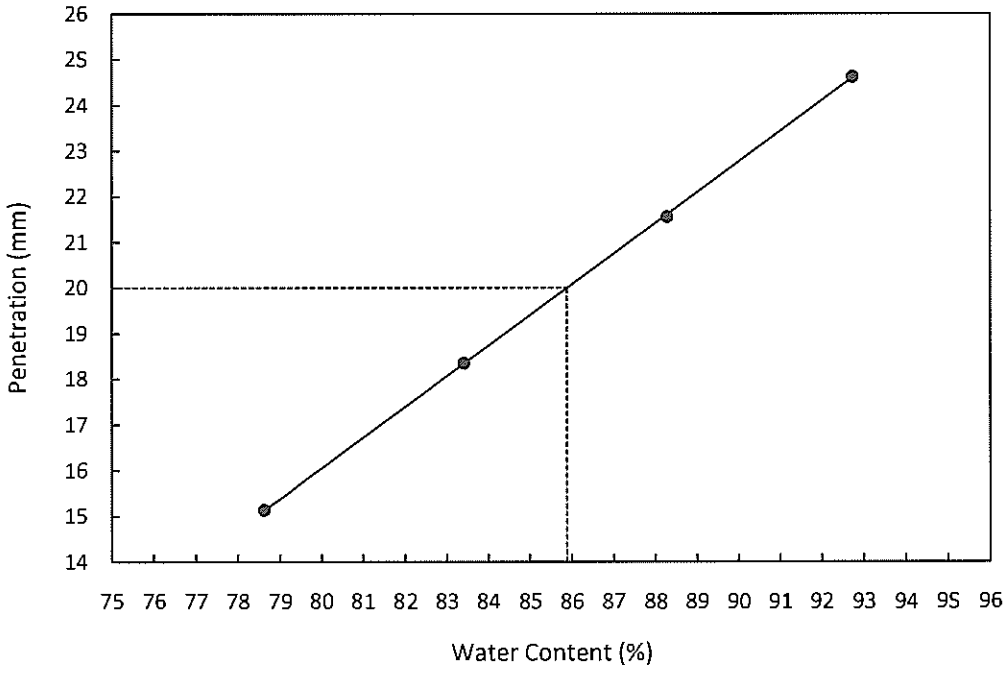
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & S)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT3
DEPTH(M)	: 6.00-6.45m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.37	20.49	20.70	20.66	20.36	20.46
DRY WEIGHT + CUP	(g)	15.22	15.11	15.28	14.80	16.46	16.80
CUP WEIGHT	(g)	8.67	8.66	9.14	8.48	8.60	9.37
WATER CONTENT	(%)	78.6	83.4	88.3	92.7	49.6	49.3
PENETRATION	(mm)	15.1	18.4	21.6	24.6	-	-

LIQUID LIMIT	(%)	**85.9**
PLASTIC LIMIT	(%)	**49.4**
PLASTICITY INDEX		**36**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

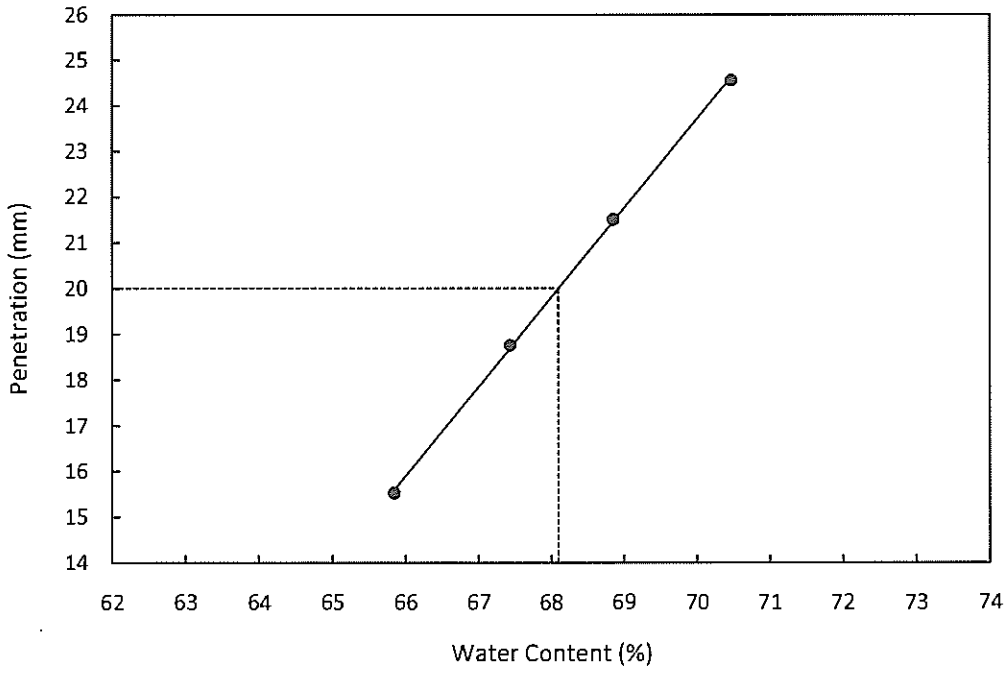
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90
SOIL DESCRIPTION	: Yellowish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 01.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.16	20.42	20.61	20.62	20.14	20.45
DRY WEIGHT + CUP	(g)	15.65	15.99	15.68	15.61	16.56	16.60
CUP WEIGHT	(g)	8.80	9.42	8.52	8.50	8.27	7.64
WATER CONTENT	(%)	65.8	67.4	68.9	70.5	43.2	43.0
PENETRATION	(mm)	15.5	18.8	21.5	24.6	-	-

LIQUID LIMIT	(%)	**68.1**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**43.1**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**25**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

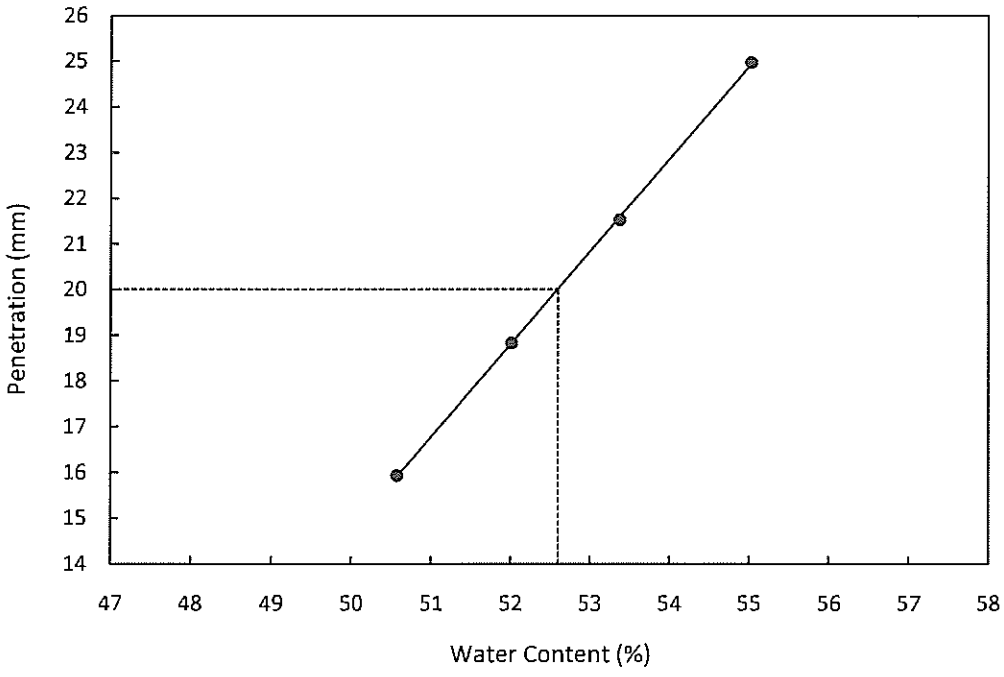
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT4
DEPTH(M)	: 8.90-9.35
SOIL DESCRIPTION	: Yellowish brown and light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.42	20.20	20.25	20.57	20.32	20.45
DRY WEIGHT + CUP	(g)	16.41	16.32	16.38	16.30	17.35	17.65
CUP WEIGHT	(g)	8.48	8.86	9.13	8.54	8.46	9.17
WATER CONTENT	(%)	50.6	52.0	53.4	55.0	33.4	33.0
PENETRATION	(mm)	15.9	18.8	21.5	25.0	-	-

LIQUID LIMIT	(%)	**52.6**
PLASTIC LIMIT	(%)	**33.2**
PLASTICITY INDEX		**19**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

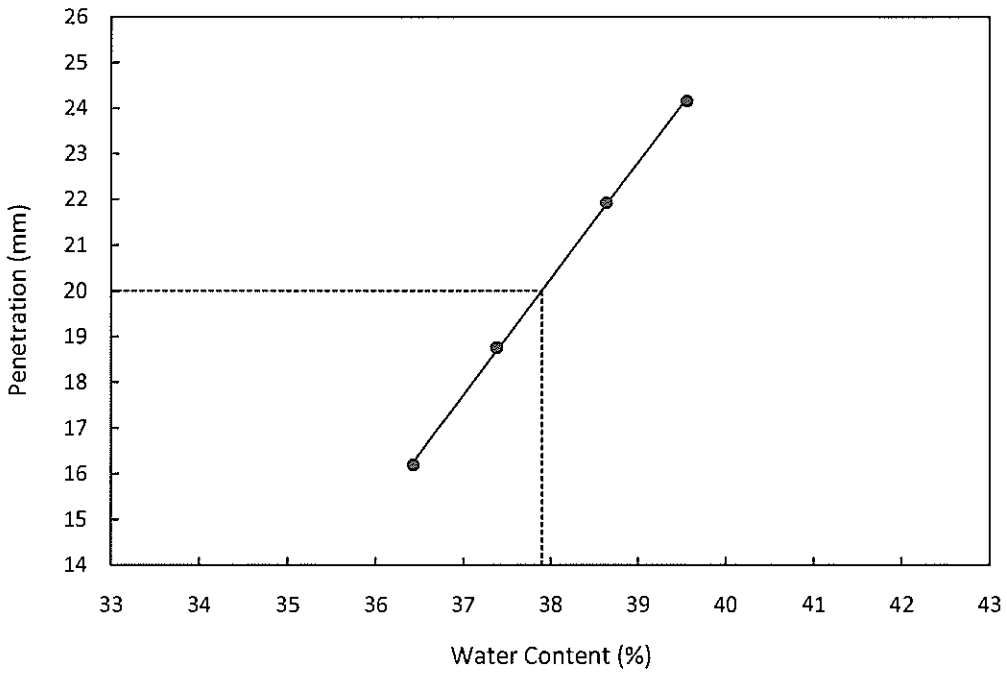
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light grey and greenish grey sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 01.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.47	20.53	20.28	20.67	20.26	20.38
DRY WEIGHT + CUP	(g)	17.17	17.36	16.88	17.47	18.01	18.00
CUP WEIGHT	(g)	8.11	8.88	8.08	9.38	9.13	8.55
WATER CONTENT	(%)	36.4	37.4	38.6	39.6	25.3	25.2
PENETRATION	(mm)	16.2	18.8	21.9	24.2	-	-

LIQUID LIMIT	(%)	**37.9**
PLASTIC LIMIT	(%)	**25.3**
PLASTICITY INDEX		**13**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

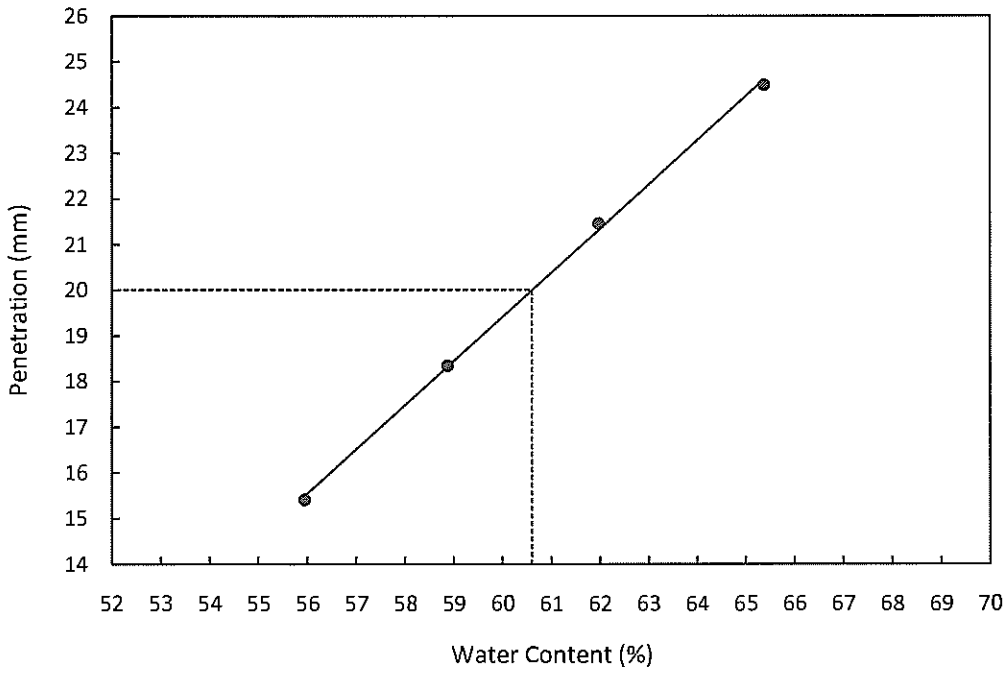
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 98
TEST DATE	: 31.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.48	20.54	20.39	20.50	20.20	20.26
DRY WEIGHT + CUP	(g)	16.24	16.39	16.22	15.80	17.30	17.40
CUP WEIGHT	(g)	8.66	9.34	9.49	8.61	8.57	8.73
WATER CONTENT	(%)	55.9	58.9	62.0	65.4	33.2	33.0
PENETRATION	(mm)	15.4	18.3	21.5	24.5	-	-

LIQUID LIMIT	(%)	**60.6**
PLASTIC LIMIT	(%)	**33.1**
PLASTICITY INDEX		**27**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

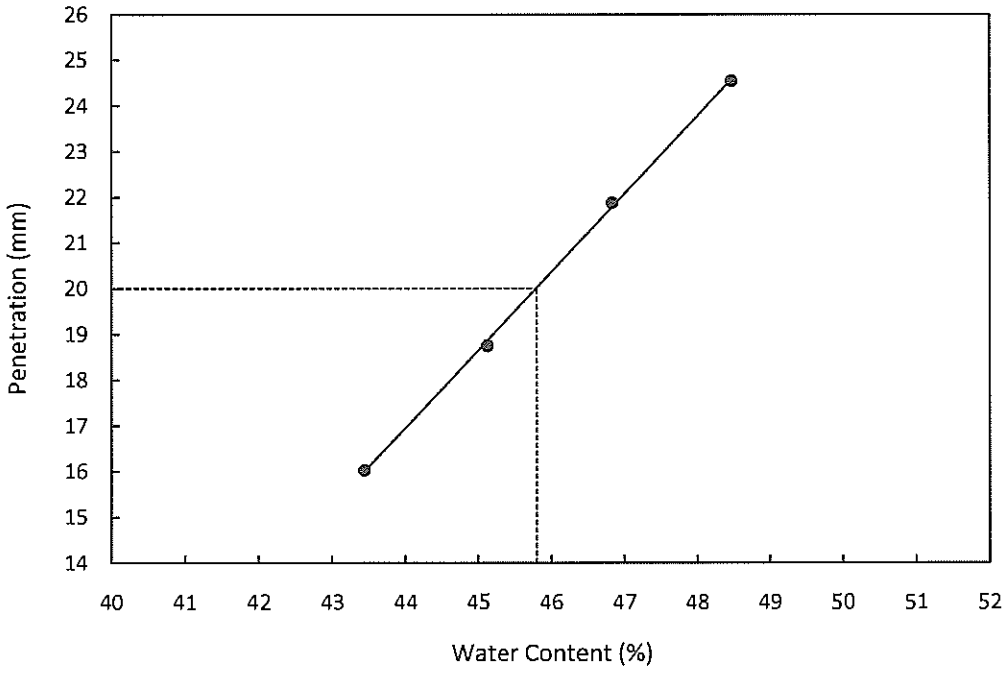
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3
SAMPLE NO.	: SPT10
DEPTH(M)	: 20.90-21.35m
SOIL DESCRIPTION	: Greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.15	20.28	20.31	20.30	20.67	20.60
DRY WEIGHT + CUP	(g)	16.51	16.35	16.47	16.35	17.87	17.74
CUP WEIGHT	(g)	8.13	7.64	8.27	8.20	8.75	8.30
WATER CONTENT	(%)	43.4	45.1	46.8	48.5	30.7	30.3
PENETRATION	(mm)	16.0	18.8	21.9	24.5	-	-

LIQUID LIMIT	(%)	**45.8**
PLASTIC LIMIT	(%)	**30.5**
PLASTICITY INDEX		**15**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



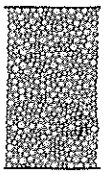
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			20.00-20.90m		
Description			Very stiff greenish grey slightly sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	171.1	165.9	162.2
Bulk Density	ρ_0	(Mg/m3)	2.00	1.93	1.89
Particle Density	ρ_s	(Mg/m3)	2.69	2.69	2.69

Initial Conditions

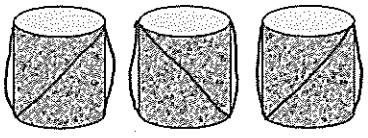
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	32	33	36
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.52	1.45	1.39
Initial Voids Ratio	e_0	.	0.77	0.86	0.93
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	542.34	410.02	535.58
MembraneCorrection	m_c	(kPa)	1.020	1.200	1.390
Strain At Max Stress	$\varepsilon_f\%$	(%)	8.13	10.11	12.28
Shear Strength	c_u	(kPa)	271.17	205.01	267.79
Final Moisture	$\omega_f\%$	(%)	32	33	36
Final Dry Density	ρ_{df}	(Mg/m3)	1.52	1.45	1.39
Final Voids Ratio	e_f	.	0.77	0.86	0.93
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	UU7-SungeiTengah-B3T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH3
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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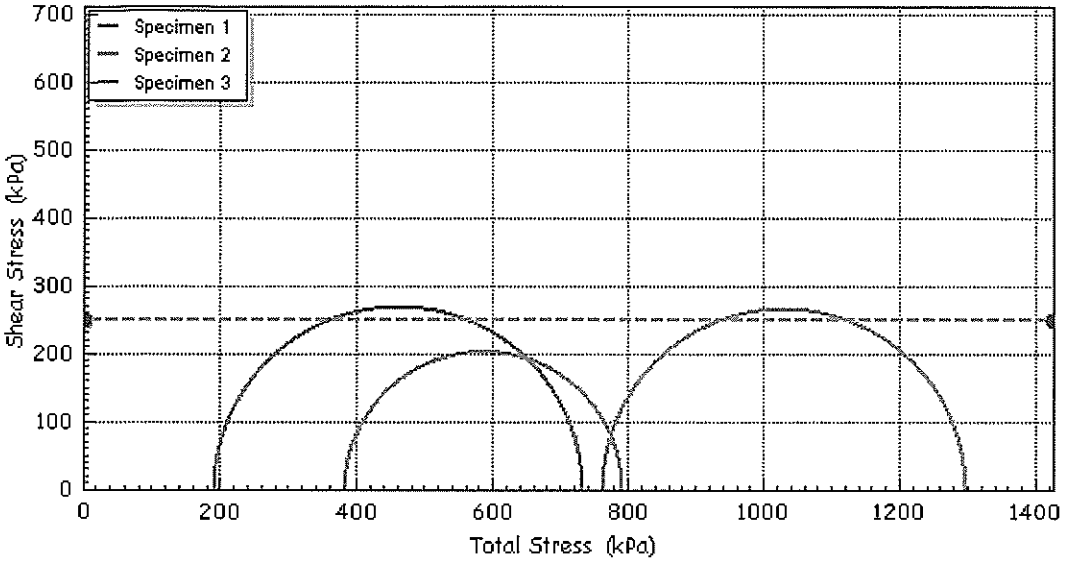
Ryobi Geotechnique International Pte Ltd

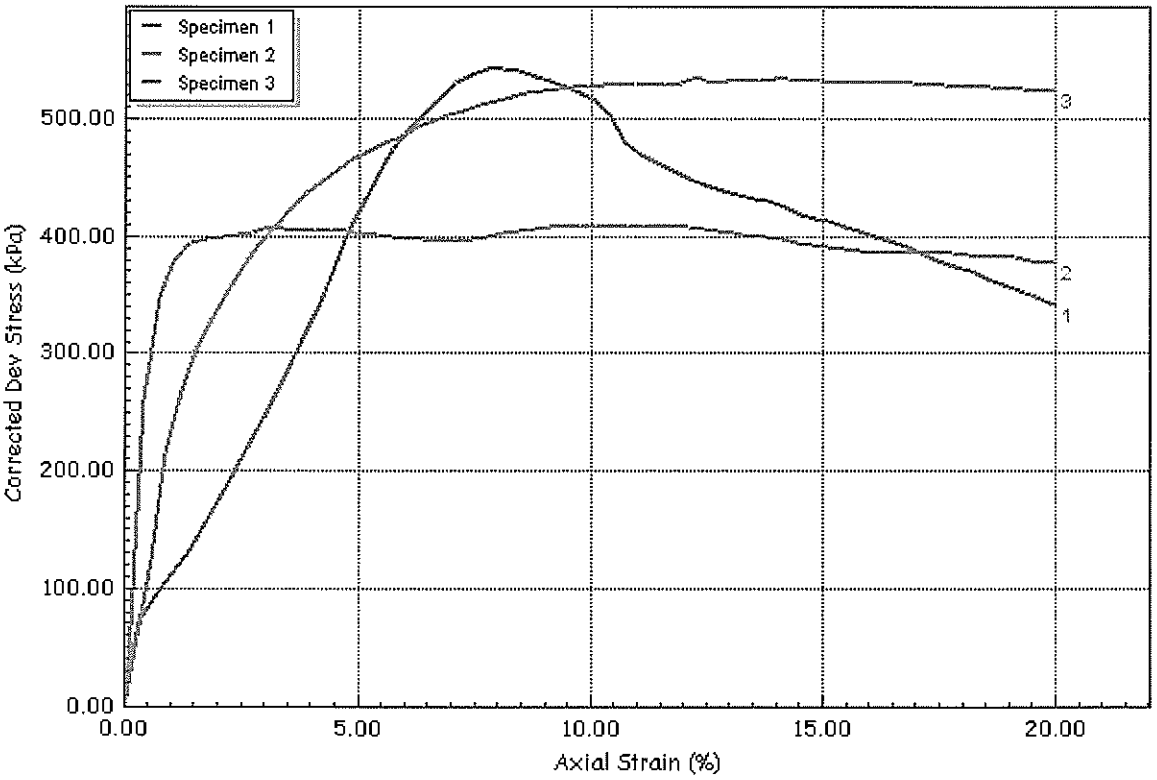
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	248.0
Friction Angle	ϕ	(deg)	0.0





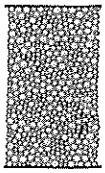
Ryobi G	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU7-SungeiTengah-B3T3
	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	4/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH3
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW3
	Client	AVA		Depth	20.00-20.90m
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

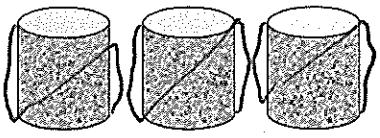
Sample Details					
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m		
	Description		Yellowish brown slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	76.0	76.0	76.0
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	150.2	151.2	156.4
	Initial Bulk Density	ρ_0 (Mg/m3)	1.74	1.75	1.81
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	240	280	360
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.200	0.200	0.200
Initial Moisture	$\omega_i\%$	(%)	51	51	47
Initial Dry Density	ρ_{di}	(Mg/m3)	1.16	1.16	1.23
Initial Voids Ratio	e_i	.	1.297	1.284	1.157
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	51	50	46
Final Dry Density	ρ_{df}	(Mg/m3)	1.18	1.21	1.29
Final Voids Ratio	e_f	.	1.262	1.195	1.067
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	3.15	5.91	3.17
Stress At Failure	$(\sigma_1-\sigma_3)'$	(kPa)	109.4	179.9	263.7
Minor Stress At Failure	σ_3'	(kPa)	29.0	54.0	86.3
Major Stress At Failure	σ_1'	(kPa)	138.4	233.9	350.0
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.773	4.331	4.056

Notes

-



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengah-B3T1
Database: .\SQLEXPRESS \ Ryobi		Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungei Tengah Rd	Borehole	BH3
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

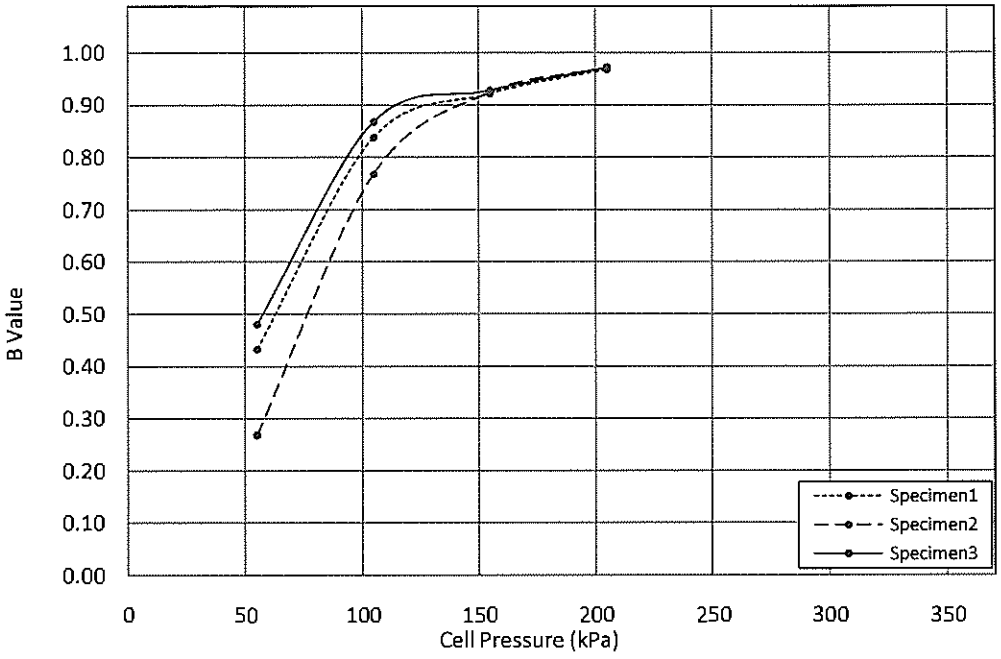
ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA 2018-0022-B

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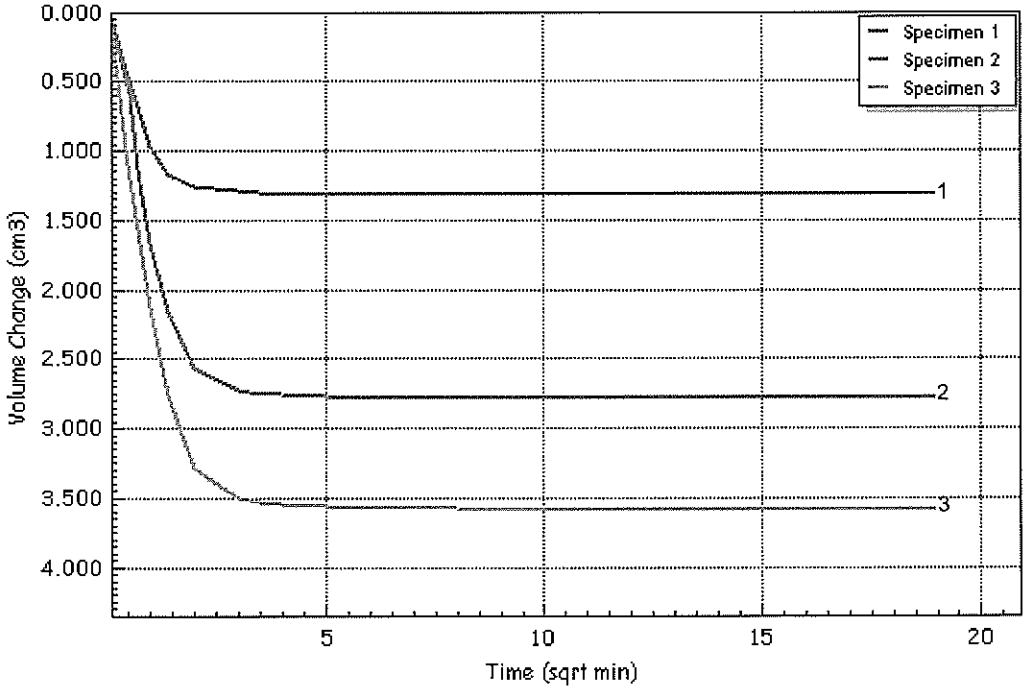
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



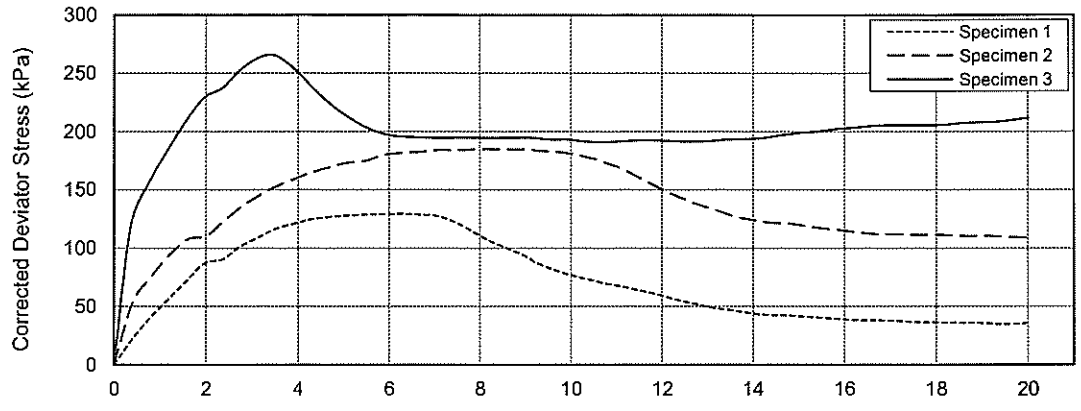
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengah-B3T1
Database: .\SQLEXPRESS \ Ryobi		Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungei Tengah Rd	Borehole	BH3
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

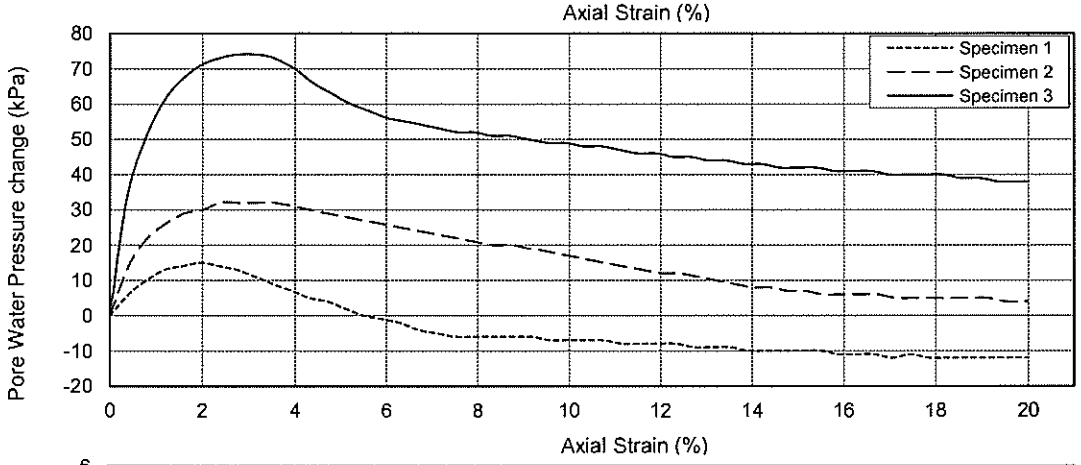
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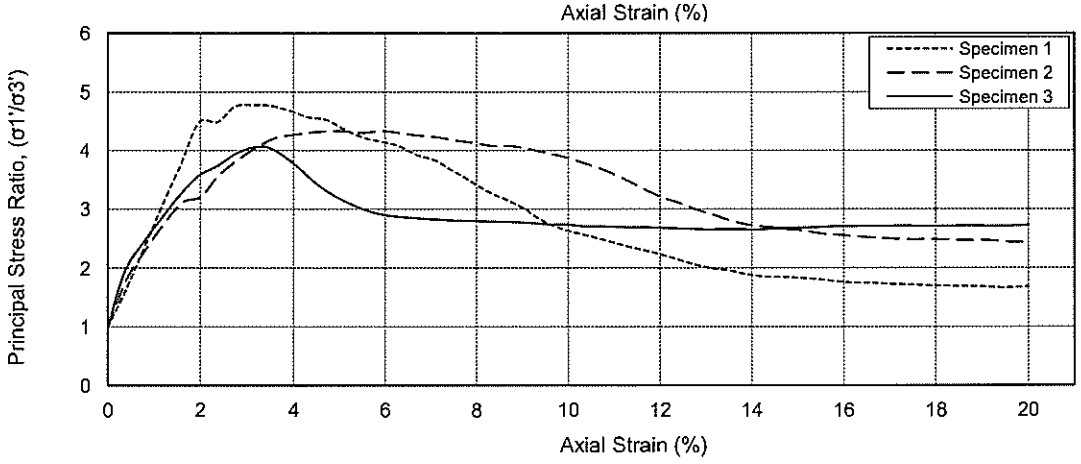
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	211	226	274
A Value at Max. Stress Ratio	0.101	0.145	0.281

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengah-B3T1
Database :	:\SQLEXPRESS\Ryobi-2017	Test Date	1/9/2018
Site Reference	ST28(LVPlot)AlongSungeiTengah Rd	Borehole	BH3
Jobfile	K5728 ST28 LV Plots Sungei Tengah Rd W/	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator	Kan	Checked	Min Win Htut
Approved	Sio Keong Kong		

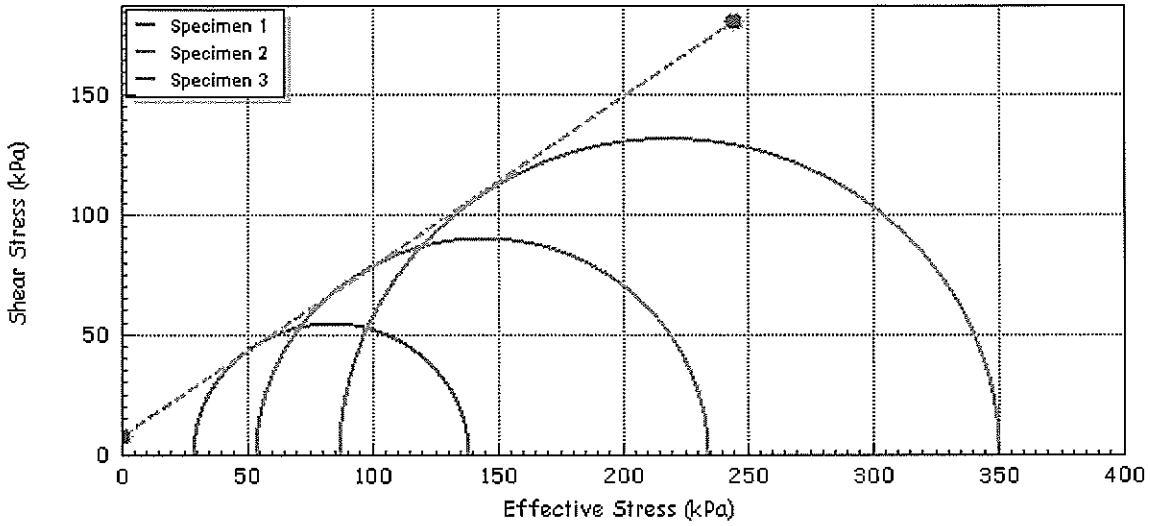
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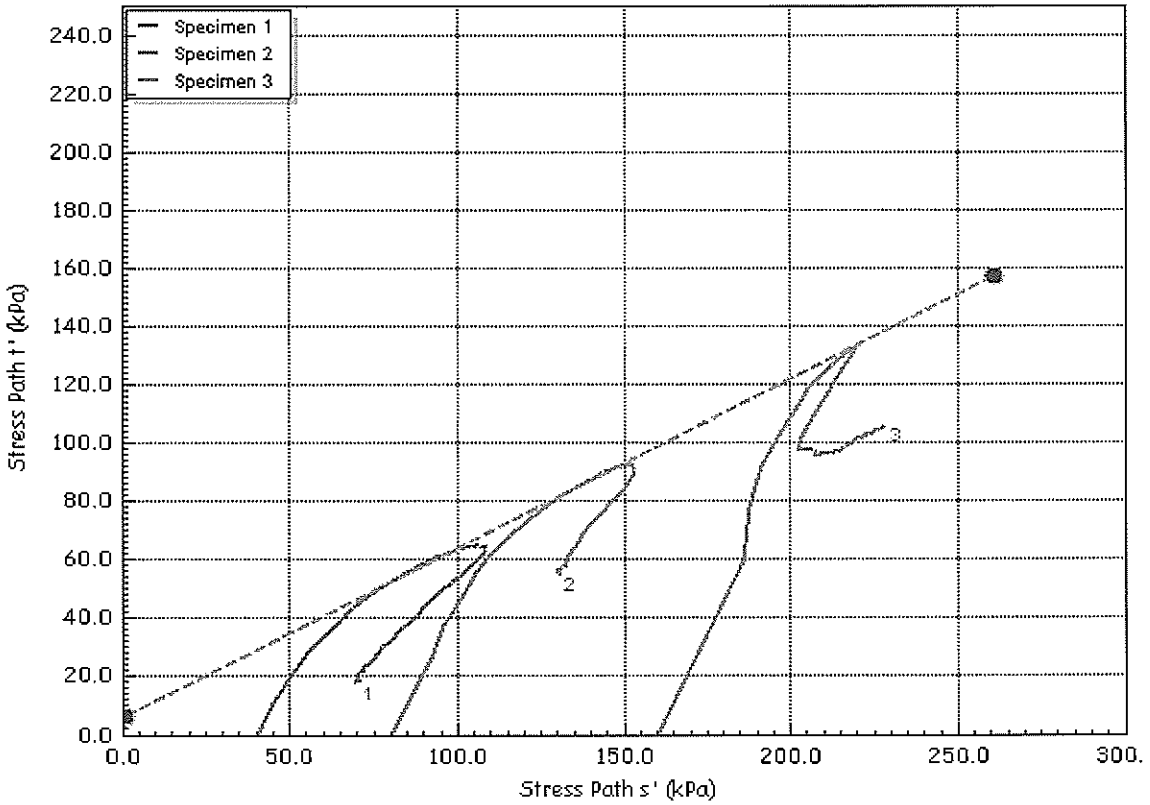
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	7.0	Stress Path Intercept	t_0'	(kPa)	5.7
Effective Friction Angle	ϕ '	(deg)	35.4	Stress Path Inclination	θ	(deg)	30.1





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU2-SungeiTengah-B3T1
Database: .\SQLEXPRESS \ Ryobi		Test Date	1/9/2018
Site Reference	ST28(LVPlots)AlongSungei Tengah	Borehole	BH3
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

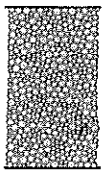
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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

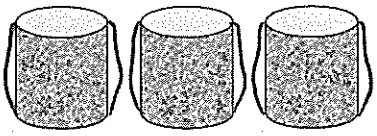
Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Light grey and greenish grey sand SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0 (mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0 (gr)	1055.4	1085.3	1100.3
	Initial Bulk Density	ρ_0 (Mg/m3)	1.96	2.01	2.04
	Particle Density	ρ_s (Mg/m3)	2.71	2.71	2.71

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	270	340	480
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	30	30	31
Initial Dry Density	ρ_{di}	(Mg/m3)	1.50	1.55	1.55
Initial Voids Ratio	e_i	.	0.801	0.750	0.744
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	30	29	29
Final Dry Density	ρ_{df}	(Mg/m3)	1.55	1.63	1.64
Final Voids Ratio	e_f	.	0.745	0.664	0.654
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	3.27	3.70	5.19
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	135.0	255.2	352.5
Minor Stress At Failure	σ_3'	(kPa)	35.0	76.0	109.0
Major Stress At Failure	σ_1'	(kPa)	170.0	331.2	461.5
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.858	4.359	4.234

Notes

-



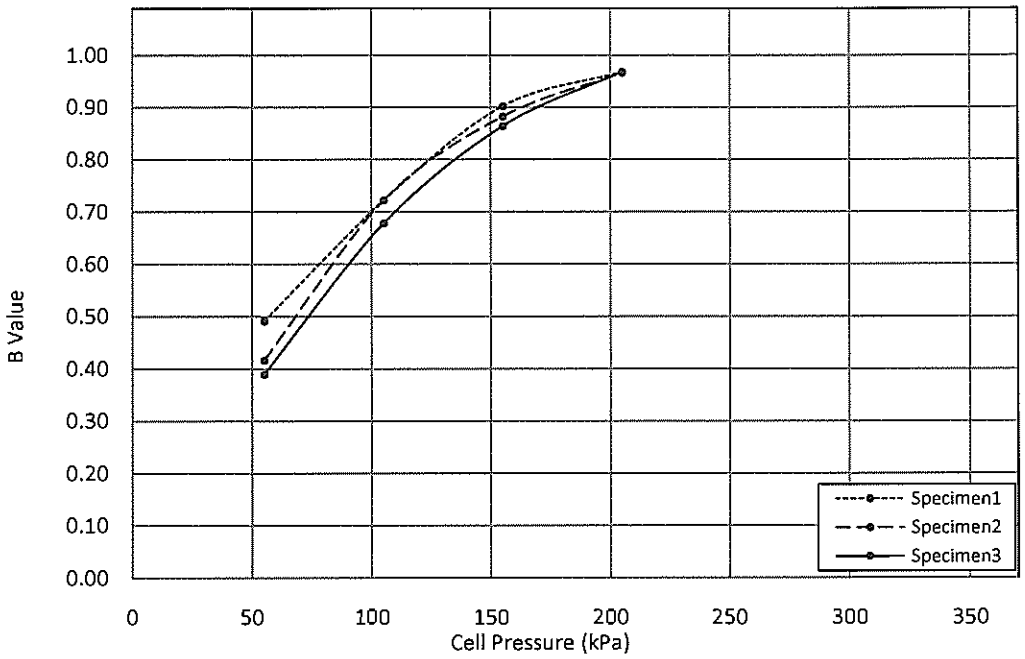
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU4-SungeiTengahWA7-B3T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	1/1/0001
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH3
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator Kan	Checked Min Win Htut	Approved Sio Keong Kong	

Ryobi Geotechnique International Pte Ltd

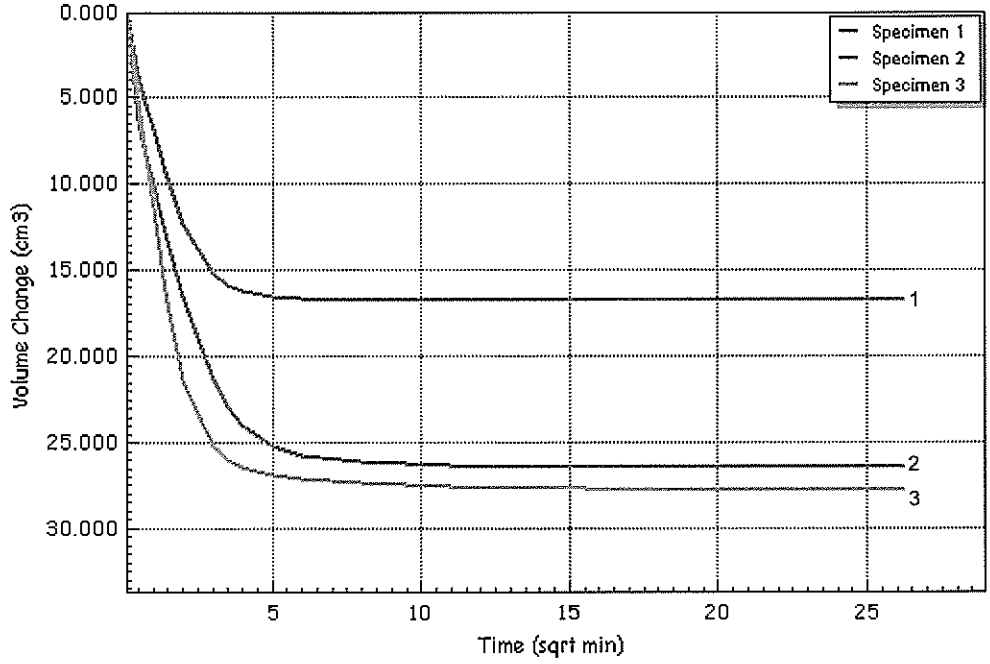
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



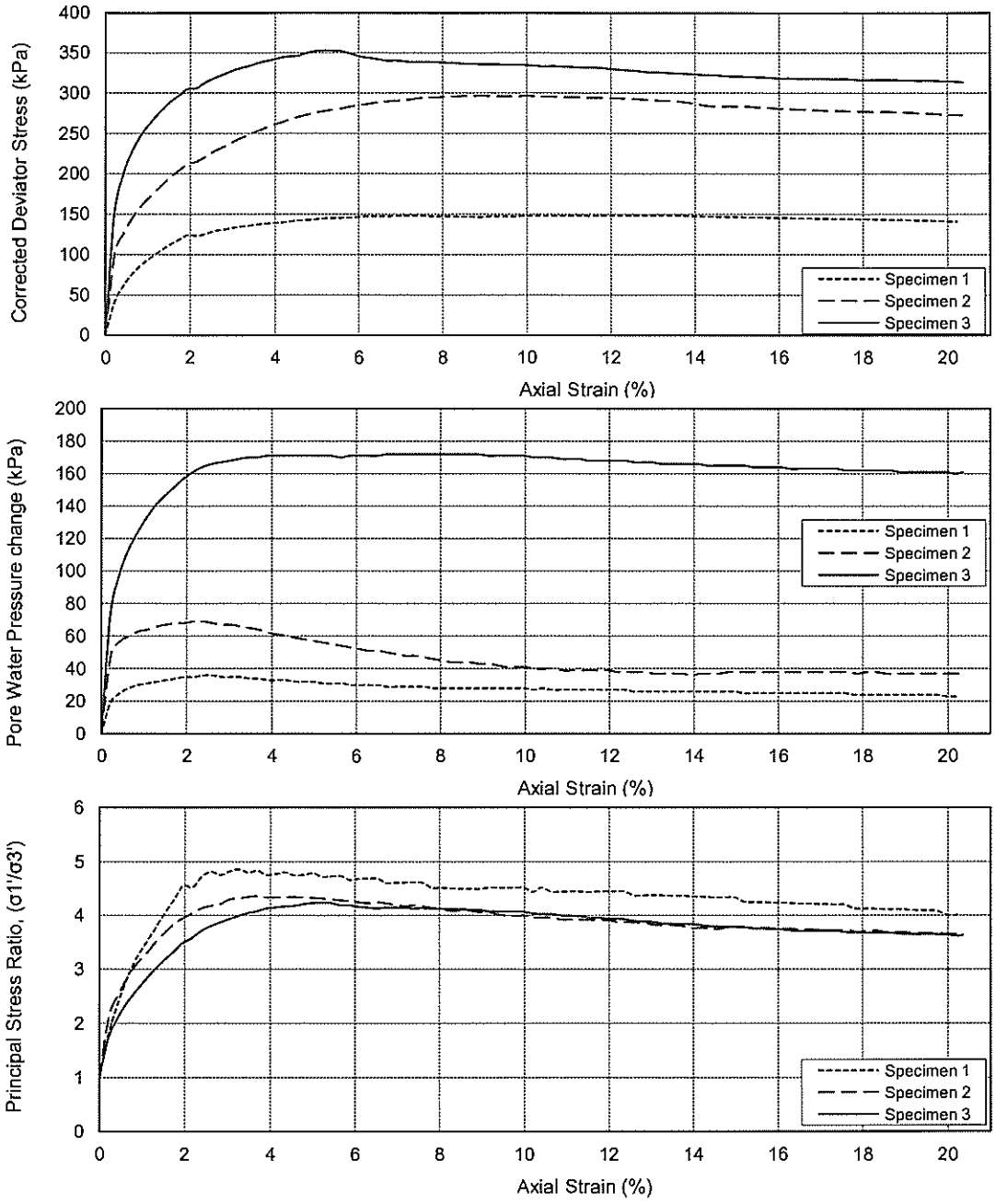
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU4-SungeiTengahWA7-B3T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	1/1/0001
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH3
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots



Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	235	264	371
A Value at Max. Stress Ratio	0.259	0.251	0.485

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU4-SungeiTengah-B3T2
Database	:.\SQLEXPRESS\Ryobi-2017	Test Date	1/1/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH3
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

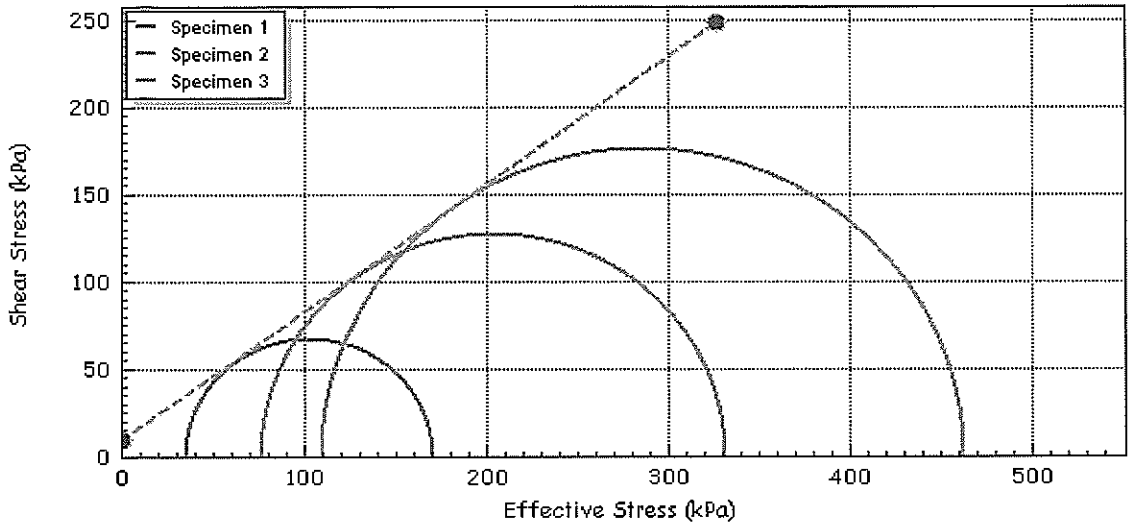
Ryobi Geotechnique International Pte Ltd

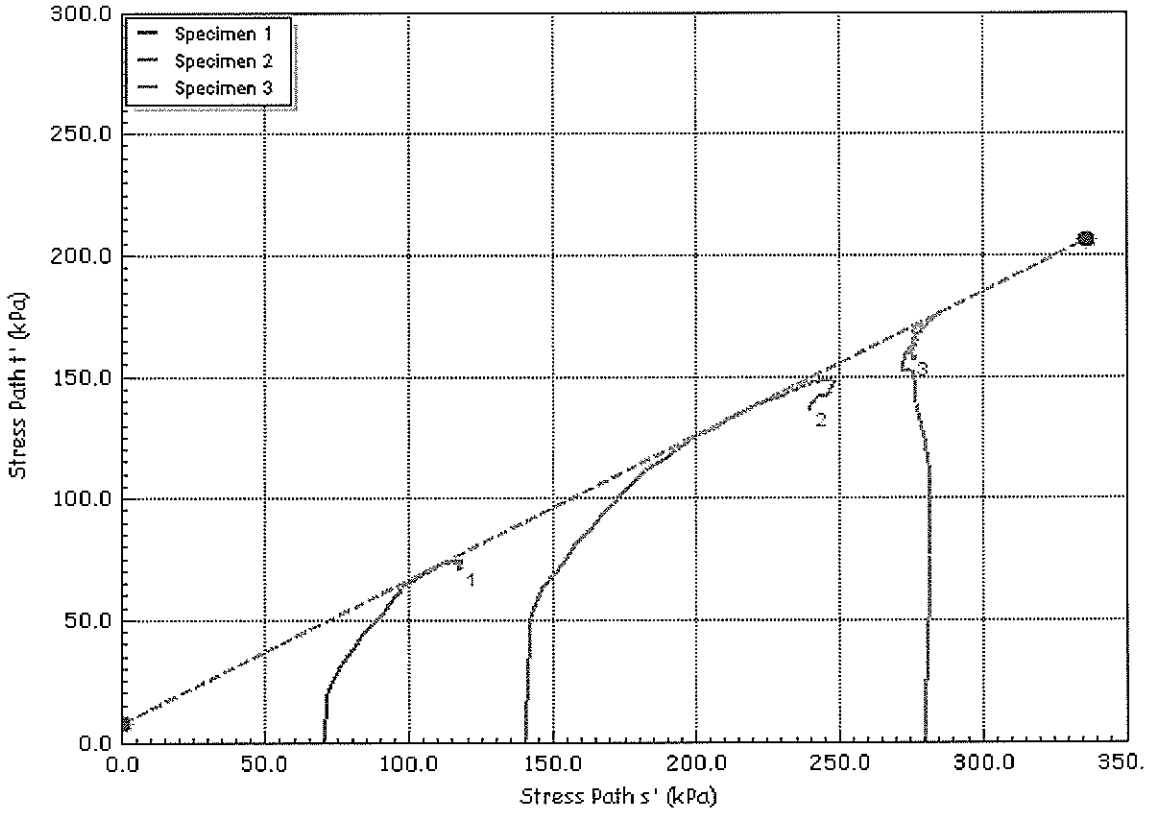
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	8.7	Stress Path Intercept	t_0'	(kPa)	7.0
Effective Friction Angle	ϕ'	(deg)	36.3	Stress Path Inclination	θ	(deg)	30.6





Ryobi G	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU4-SungeiTengahWA7-B3T2	
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	1/1/0001	
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH3	
	Jobfile	Sungei Tengah Rd-WA7	Sample	TW2	
	Client	AVA	Depth	14.00-14.90m	
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS

ALS

Analytical Results

Sub-Matrix: SOIL

				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-001	SG1813557-002	SG1813557-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL

				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-004	SG1813557-005	SG1813557-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	6.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813564**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 27-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

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Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: WATER		Client sample ID		BH1 Water Sample	BH2 Water Sample	BH3 Water Sample
		Sampling date/time		27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*	**SG1813564-001**	**SG1813564-002**	**SG1813564-003**
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	11.6	11.4	11.7
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.05	0.05	0.05
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	<0.01	<0.01	<0.01
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Sub-Matrix: WATER		Client sample ID		BH4 Water Sample	BH6 Water Sample	—
		Sampling date/time		27-Aug-2018 00:00	27-Aug-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*	**SG1813564-004**	**SG1813564-005**	-------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	11.3	11.7	----
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.05	0.05	----
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	<0.01	<0.01	----
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH3A						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	42.7	-	49.0	-	-	-	42.2
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.75	1.77	-	1.95	-	1.84
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	-	-	2.67	-	-	2.71	2.70
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	2	0	(A)	15	0	0
	SAND	%	-	39	4			12	42
	SILT	%	-	59	78		67	88	53
	CLAY	%	-		18		18		5
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	84.5	-	64.4	41.8	-	-	62.5
	PLASTIC LIMIT	%	38.6	-	41.4	26.3	-	-	34.9
	PLASTICITY INDEX		46	-	23	15	-	-	28
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	-
	TOTAL COHESION	kPa	-	-	66.2	-	-	-	-
	TEST TYPE		-	-	-	-	-	-	**$CU^{70\phi}$**
	EFFECTIVE COHESION	kPa	-	-	-	-	-	-	8.1
	EFFECTIVE PHI ANGLE	degree	-	-	-	-	-	-	35.2
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729S05 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH3A						
SAMPLE NO :			SPT7	SPT8	SPT9	SPT10	SPT11	MZ1 (Top)	SPT12
SAMPLE DEPTH :		m	14.90-15.35	16.00-16.45	18.30-18.65	20.00-20.45	22.00-22.45	24.00-24.10	25.00-25.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	33.0	-	26.7	-	28.3	33.4	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	(A)	-	-	1.97	1.77	-
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	-	2.72	2.73	2.74	-	2.72	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	(A)	0	-	4	-	2	-
	SAND	%		39	-	52	-	21	-
	SILT	%		61	-	41	-	71	-
	CLAY	%			-	3	-	6	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	45.6	-	-	-	45.4	38.7	-
	PLASTIC LIMIT	%	27.5	-	-	-	27.0	26.1	-
	PLASTICITY INDEX		18	-	-	-	18	13	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	UU*	-
	TOTAL COHESION	kPa	-	-	-	-	-		-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	7.0
	Chloride Content	%	-	-	-	-	-	-	<0.01
	Organic Content	%	-	-	-	-	-	-	0.4
	Sulphate Content	%	-	-	-	-	-	-	<0.01
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.
For MZ1, where the depth hereby 24.00-24.10m was conducted index test and UU test cancelled due to weathered rock fragments found at depth 24.10-25.00m

PREPARED BY :	CHECKED BY :	DATE :
(Min Win Htut)	(Sio Keong Kong)	17/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH3A						
SAMPLE NO :			W1						
SAMPLE DEPTH :		m	Water Sample						
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%							
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-						
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	-						
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-						
	SAND	%	-						
	SILT	%	-						
	CLAY	%	-						
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-						
	PLASTIC LIMIT	%	-						
	PLASTICITY INDEX		-						
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-						
	TOTAL COHESION	kPa	-						
	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	-						
CHEMICAL CONTENTS ANALYSIS	pH Value		-						
	Chloride Content	%	-						
	Organic Content	%	-						
	Sulphate Content	%	-						
	pH Value		8.5						
	Chloride Content	g/L	0.03						
	Organic Content	% (w/v)	<0.10						
	Sulphate Content	g/L	0.06						

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 : 17/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH3A	SPT2	4.00-4.45	42.7	-	-	-
BH3A	SPT3	6.00-6.45	-	1.75	-	-
BH3A	TW1	8.00-8.90	49.0	1.77	-	2.67
BH3A	SPT5	10.00-10.45	-	1.95	-	-
BH3A	SPT6	12.00-12.45	-	-	-	2.71
BH3A	TW2	14.00-14.90	42.2	1.84	-	2.70
BH3A	SPT7	14.0-15.35	33.0	-	-	-
BH3A	SPT8	16.00-16.45	-	-	-	2.72
BH3A	SPT9	18.30-18.65	26.7	-	-	2.73
BH3A	SPT10	20.00-20.45	-	-	-	2.74
BH3A	SPT11	22.00-22.45	28.3	1.97	-	-
BH3A	MZ1 (Top)	24.00-24.10	33.4	1.77	-	2.72

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)

TESTED BY: MANJU
Date : 05.09.2018

APPROVED BY:
(Authorised Signatory - Min Win Htut)

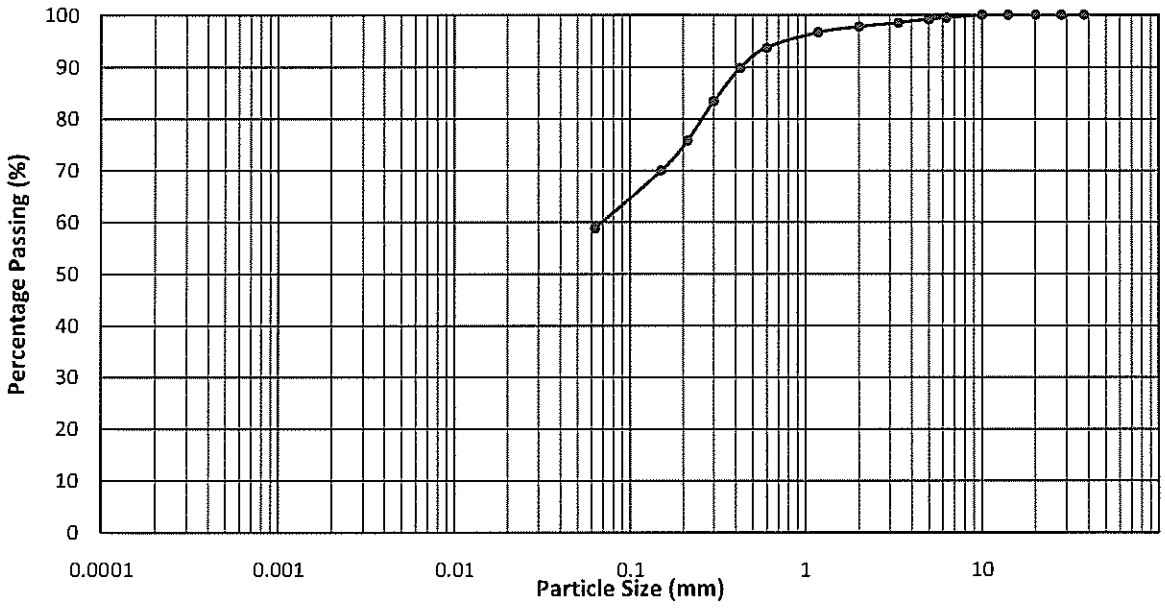
DATE : 17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly gravelly sandy SILT**

SIEVING TEST

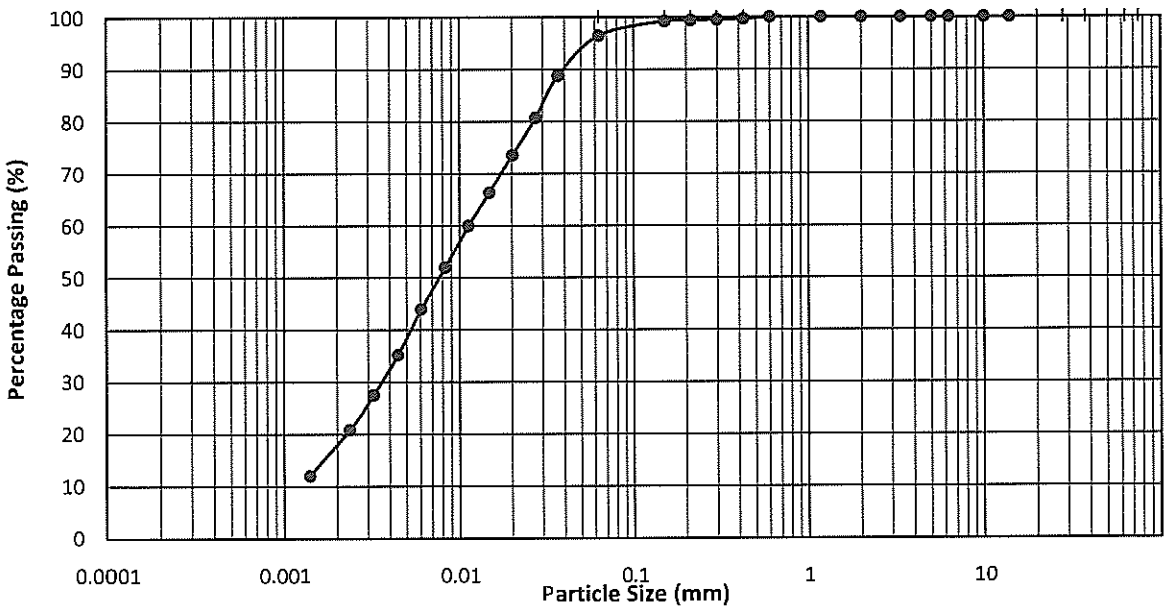
GRAVEL	=	**2**	%	
SAND	=	**39**	%	% of Passing 0.425 mm Sieve : 89.8
SILT + CLAY	=	**59**	%	

TESTED BY :	APPROVED BY :	DATE :
S. Thy.	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Yellowish brown slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**4**	%
SILT	=	**78**	%
CLAY	=	**18**	%

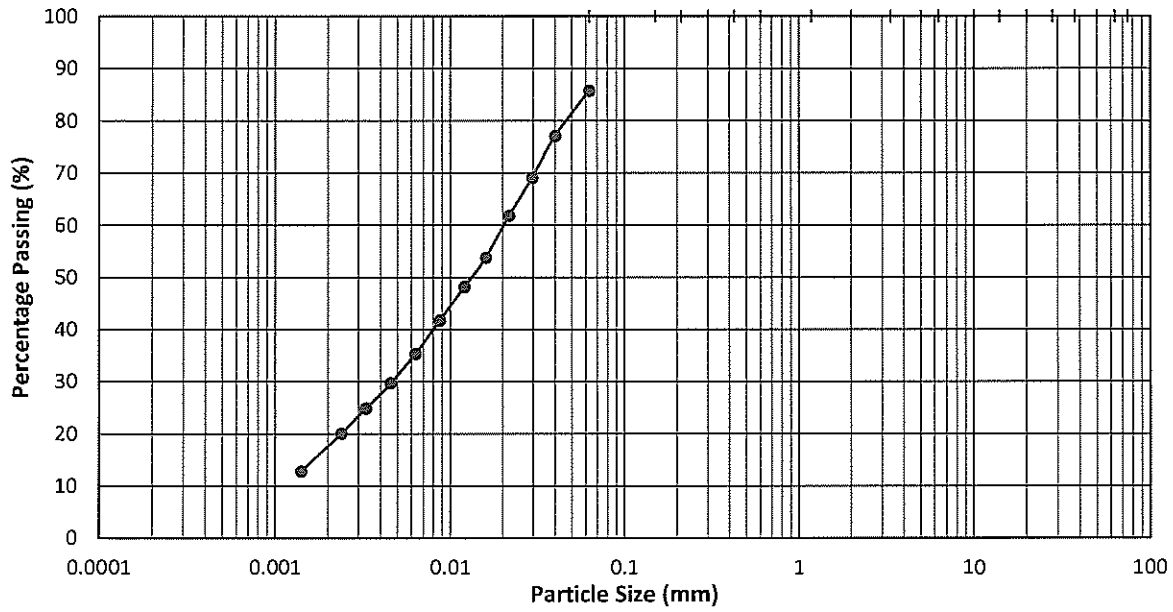
% of Passing 0.425 mm Sieve : 99.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**15**	%
SILT	=	**67**	%
CLAY	=	**18**	%

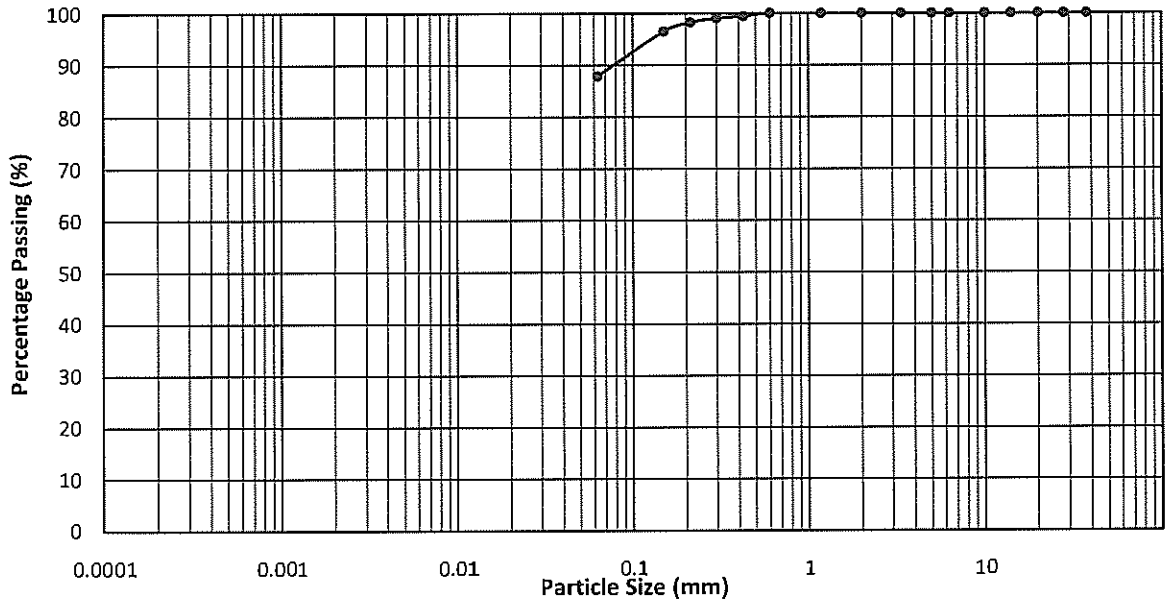
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

SIEVING TEST

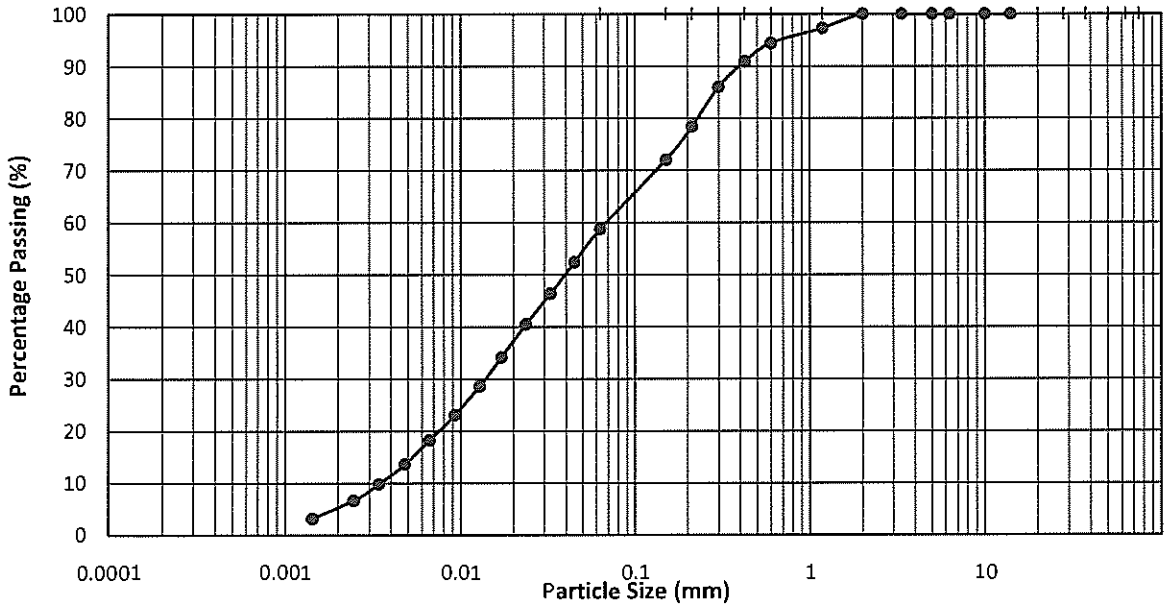
GRAVEL	=	**0**	%	
SAND	=	**12**	%	% of Passing 0.425 mm Sieve : 99.4
SILT + CLAY	=	**88**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Light greenish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**42**	%
SILT	=	**53**	%
CLAY	=	**5**	%

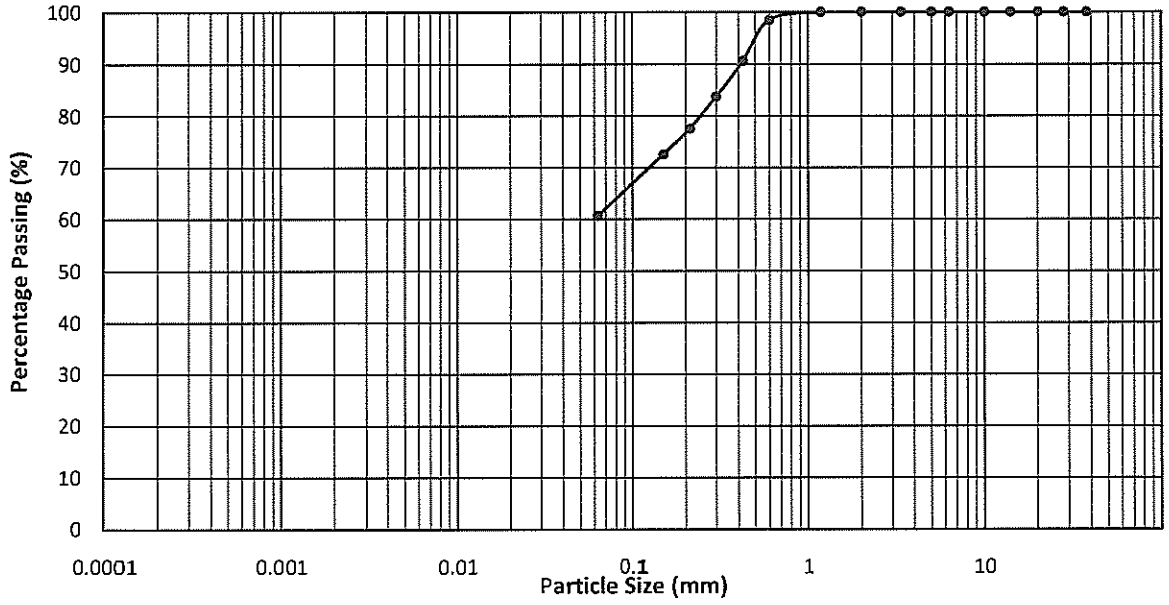
% of Passing 0.425 mm Sieve : 90.9

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey sandy SILT**

SIEVING TEST

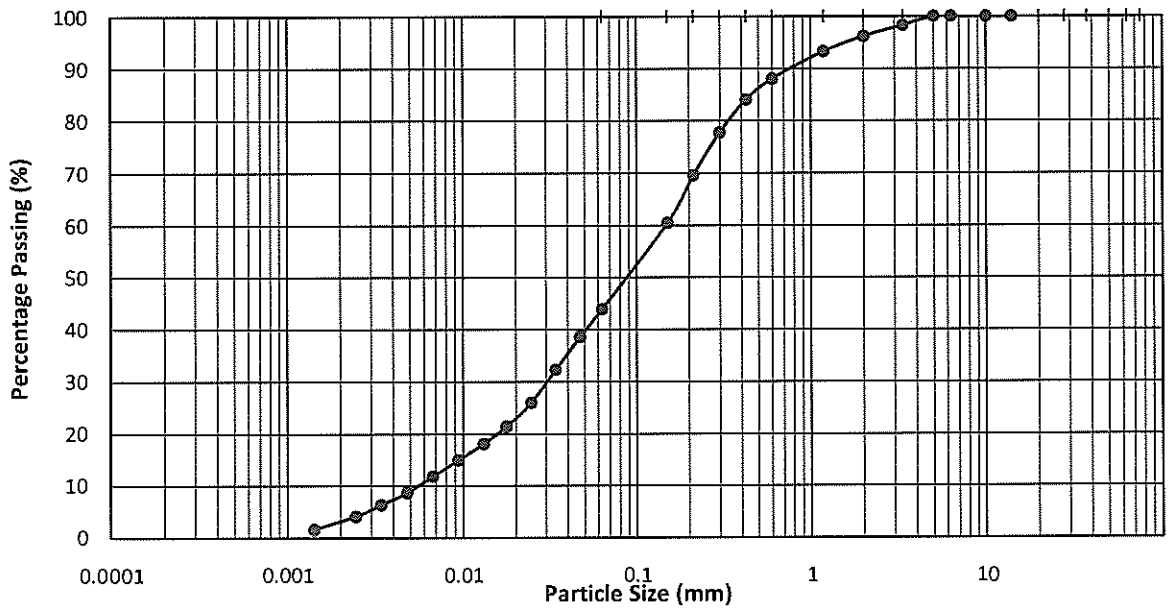
GRAVEL	=	**0**	%	
SAND	=	**39**	%	% of Passing 0.425 mm Sieve : 90.6
SILT + CLAY	=	**61**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT10
DEPTH (m)	: 20.00-20.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**4**	%
SAND	=	**52**	%
SILT	=	**41**	%
CLAY	=	**3**	%

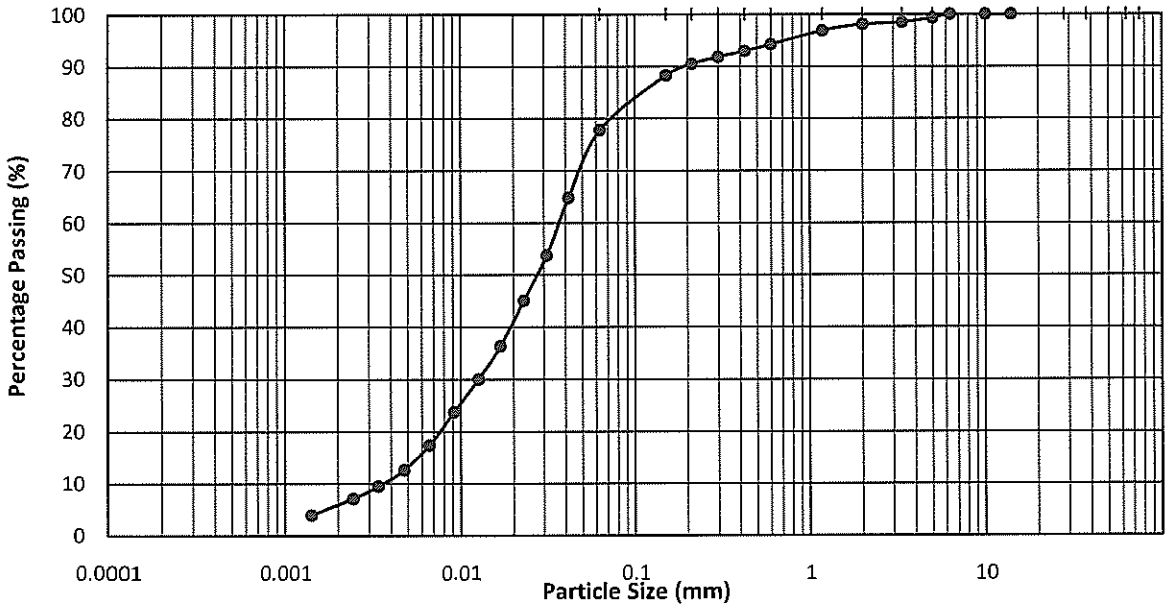
% of Passing 0.425 mm Sieve : 84.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: MZ1 (Top)
DEPTH (m)	: 24.00-24.10m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**2**	%
SAND	=	**21**	%
SILT	=	**71**	%
CLAY	=	**6**	%

% of Passing 0.42S mm Sieve : 93.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

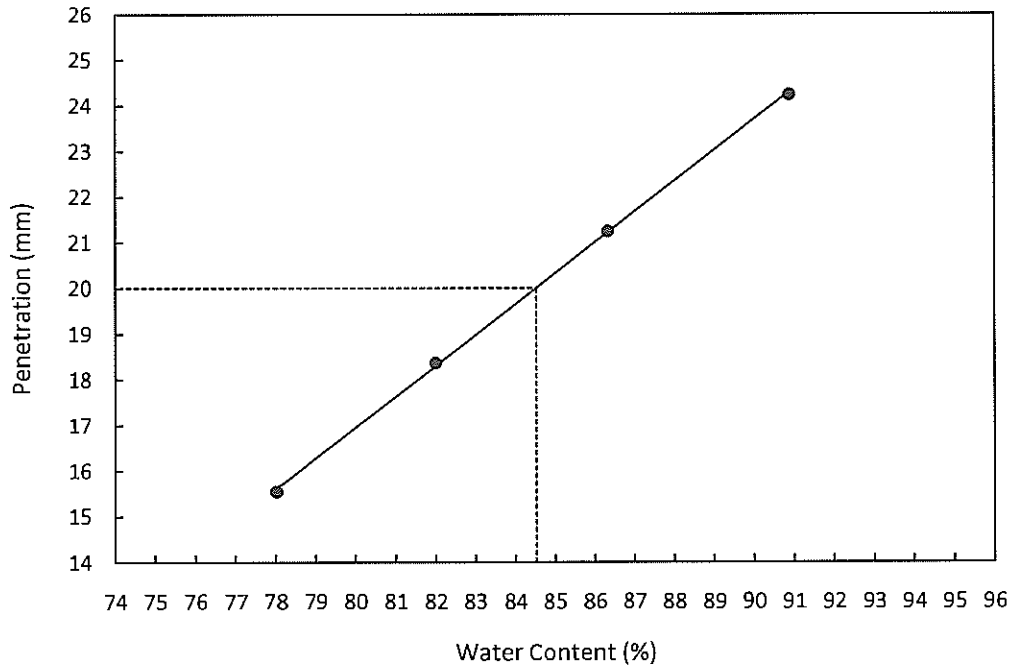
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT2
DEPTH(M)	: 4.00-4.45m
SOIL DESCRIPTION	: Yellow, light grey and reddish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.09	20.40	20.67	20.39	20.25	20.42
DRY WEIGHT + CUP	(g)	15.12	15.21	15.37	15.11	17.05	17.12
CUP WEIGHT	(g)	8.75	8.88	9.23	9.30	8.77	8.57
WATER CONTENT	(%)	78.0	82.0	86.3	90.9	38.6	38.6
PENETRATION	(mm)	15.6	18.4	21.2	24.2	-	-

LIQUID LIMIT	(%)	**84.5**
PLASTIC LIMIT	(%)	**38.6**
PLASTICITY INDEX		**46**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0021-B

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

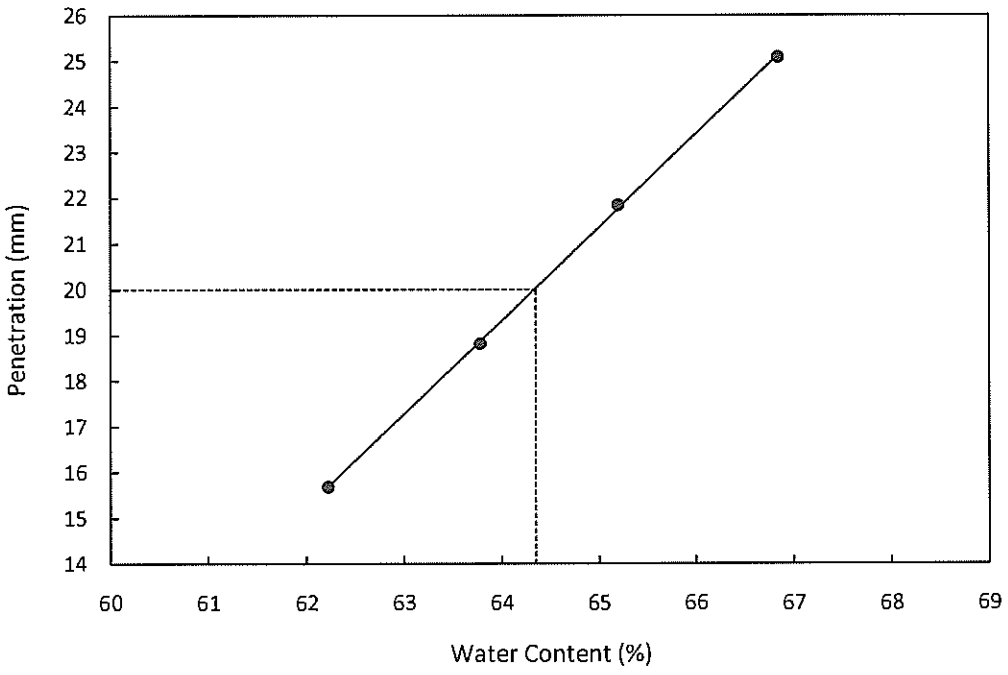
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Yellowish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 07.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.12	20.47	20.64	20.41	20.20	20.25
DRY WEIGHT + CUP	(g)	15.97	16.12	15.75	15.33	16.82	16.80
CUP WEIGHT	(g)	9.30	9.30	8.25	7.73	8.67	8.47
WATER CONTENT	(%)	62.2	63.8	65.2	66.8	41.5	41.4
PENETRATION	(mm)	15.7	18.8	21.8	25.1	-	-

LIQUID LIMIT	(%)	**64.4**
PLASTIC LIMIT	(%)	**41.4**
PLASTICITY INDEX		**23**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

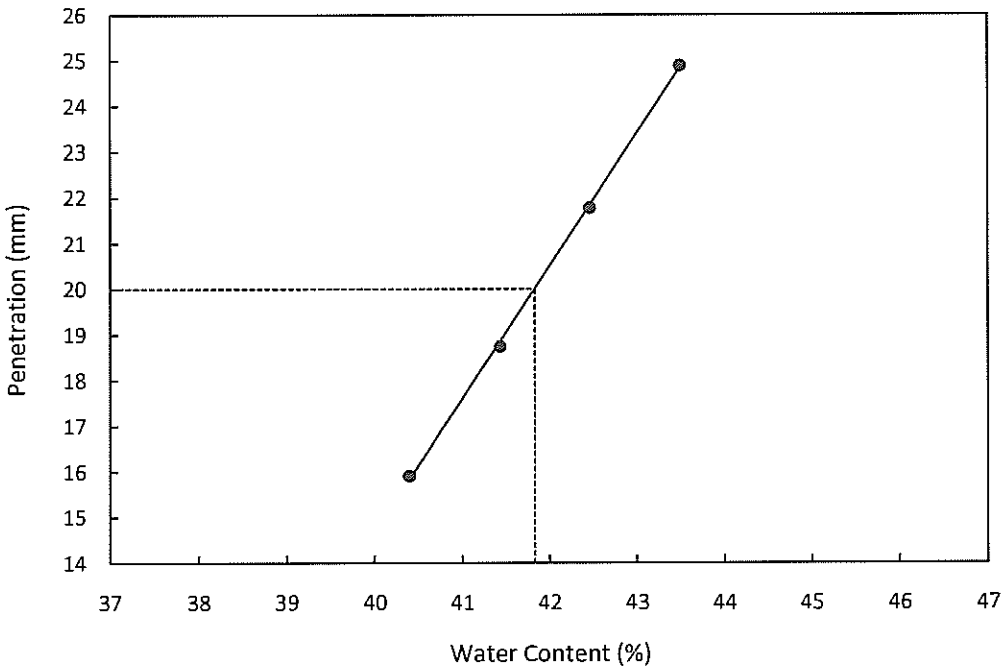
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT4
DEPTH(M)	: 8.90-9.35m
SOIL DESCRIPTION	: Light greenish grey and whitish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 11.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.28	20.29	20.61	20.19	20.23	20.38
DRY WEIGHT + CUP	(g)	16.81	16.76	16.81	16.58	17.91	18.07
CUP WEIGHT	(g)	8.22	8.24	7.86	8.28	9.05	9.35
WATER CONTENT	(%)	40.4	41.4	42.5	43.5	26.2	26.5
PENETRATION	(mm)	15.9	18.7	21.8	24.9	-	-

LIQUID LIMIT	(%)	**41.8**
PLASTIC LIMIT	(%)	**26.3**
PLASTICITY INDEX		**15**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

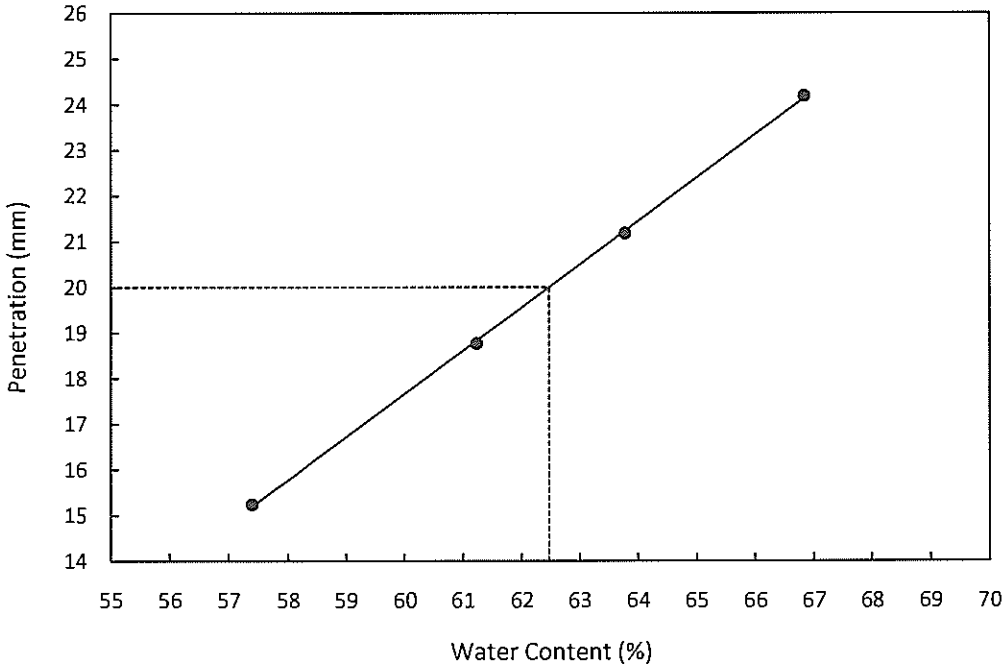
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light greenish grey sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 91
TEST DATE	: 07.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.42	20.14	20.32	20.60	20.02	20.05
DRY WEIGHT + CUP	(g)	16.07	15.56	15.62	15.38	17.02	17.17
CUP WEIGHT	(g)	8.49	8.08	8.25	7.57	8.44	8.88
WATER CONTENT	(%)	57.4	61.2	63.8	66.8	35.0	34.7
PENETRATION	(mm)	15.2	18.8	21.2	24.2	-	-

LIQUID LIMIT	(%)	**62.5**
PLASTIC LIMIT	(%)	**34.9**
PLASTICITY INDEX		**28**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

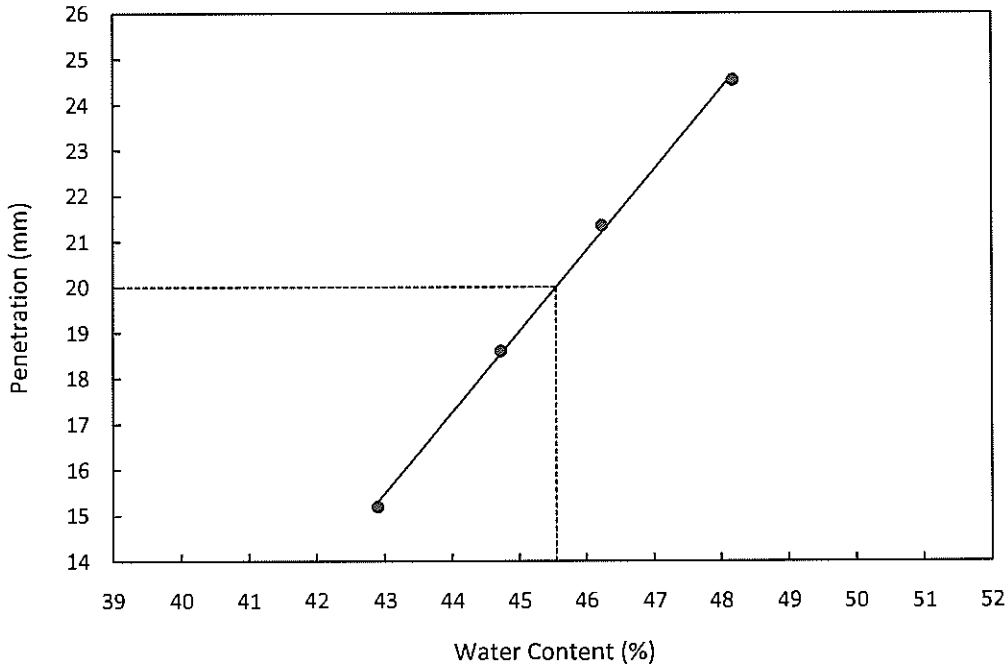
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT7
DEPTH(M)	: 14.90-15.35m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.31	20.69	20.20	20.20	20.25	20.13
DRY WEIGHT + CUP	(g)	16.90	17.13	16.40	16.49	17.70	17.62
CUP WEIGHT	(g)	8.95	9.17	8.18	8.79	8.47	8.46
WATER CONTENT	(%)	42.9	44.7	46.2	48.2	27.6	27.4
PENETRATION	(mm)	15.2	18.6	21.4	24.5	-	-

LIQUID LIMIT	(%)	**45.6**
PLASTIC LIMIT	(%)	**27.5**
PLASTICITY INDEX		**18**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

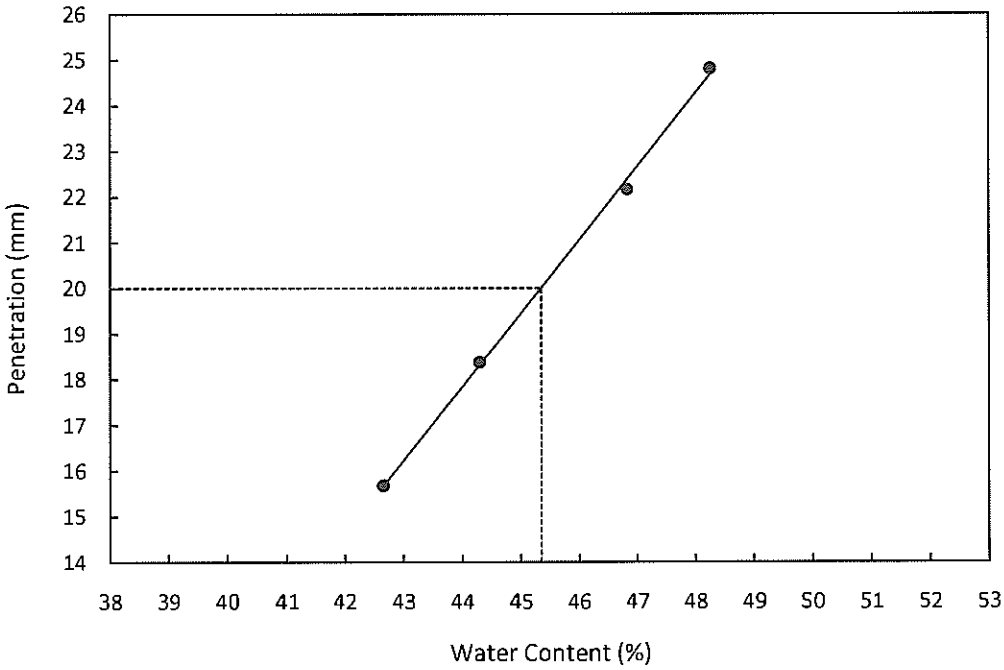
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: SPT11
DEPTH(M)	: 22.00-22.45m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.80	20.76	20.30	20.76	20.21	20.19
DRY WEIGHT + CUP	(g)	17.29	17.03	16.24	17.03	17.75	17.70
CUP WEIGHT	(g)	9.06	8.61	7.57	9.30	8.67	8.47
WATER CONTENT	(%)	42.6	44.3	46.8	48.3	27.1	27.0
PENETRATION	(mm)	15.7	18.4	22.2	24.8	-	-

LIQUID LIMIT	(%)	**45.4**
PLASTIC LIMIT	(%)	**27.0**
PLASTICITY INDEX		**18**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

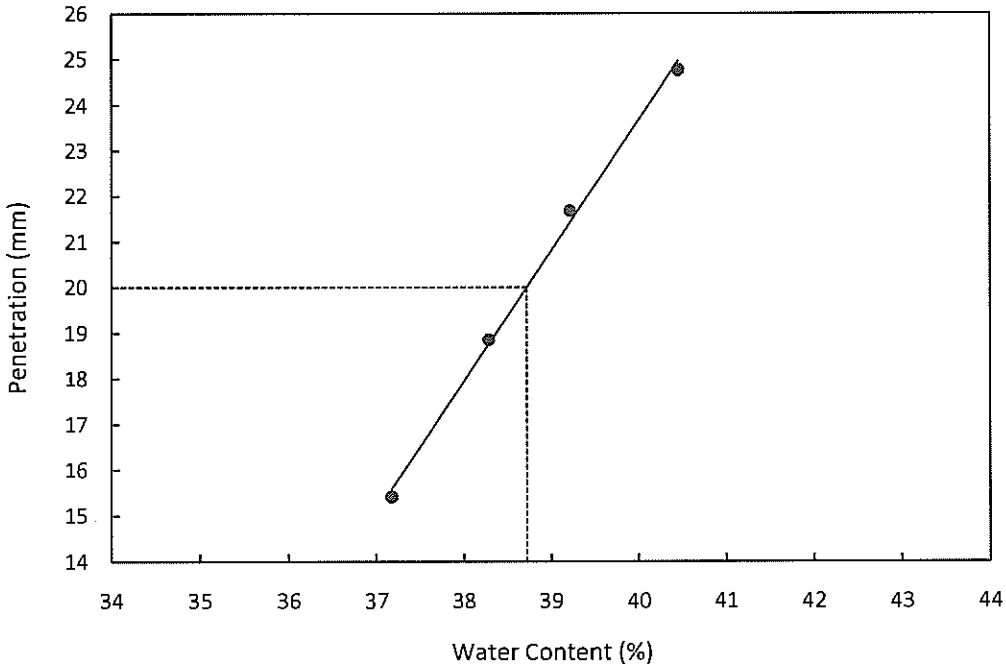
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH3A
SAMPLE NO.	: MZ1 (Top)
DEPTH(M)	: 24.00-24.10m
SOIL DESCRIPTION	: Light greenish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 93
TEST DATE	: 07.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.83	20.29	20.32	20.56	20.47	20.75
DRY WEIGHT + CUP	(g)	17.67	16.94	17.23	17.17	17.94	18.15
CUP WEIGHT	(g)	9.17	8.19	9.35	8.79	8.27	8.20
WATER CONTENT	(%)	37.2	38.3	39.2	40.5	26.2	26.1
PENETRATION	(mm)	15.4	18.9	21.7	24.8	-	-

LIQUID LIMIT	(%)	**38.7**
PLASTIC LIMIT	(%)	**26.1**
PLASTICITY INDEX		**13**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

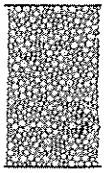


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

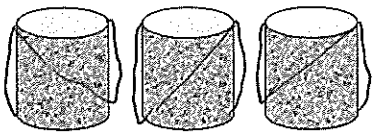
Sample Details						
 *sketch showing specimen location in original sample*	Depth			8.00-8.90m		
	Description			Firm yellowish brown slightly sandy SILT		
	Type			Undisturbed Sample		
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	152.2	152.5	151.1
	Bulk Density	ρ_0	(Mg/m3)	1.78	1.78	1.76
	Particle Density	ρ_s	(Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	51	52	53
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.17	1.17	1.15
Initial Voids Ratio	e_0	.	1.28	1.28	1.32
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	142.36	131.08	123.61
MembraneCorrection	m_c	(kPa)	1.450	0.720	0.330
Strain At Max Stress	$\varepsilon_f\%$	(%)	13.02	5.28	2.25
Shear Strength	c_u	(kPa)	71.18	65.54	61.81
Final Moisture	$\omega_f\%$	(%)	51	52	53
Final Dry Density	ρ_{df}	(Mg/m3)	1.17	1.17	1.15
Final Voids Ratio	e_f	.	1.28	1.28	1.32
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-SungeiTengah-B3AT1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH3A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

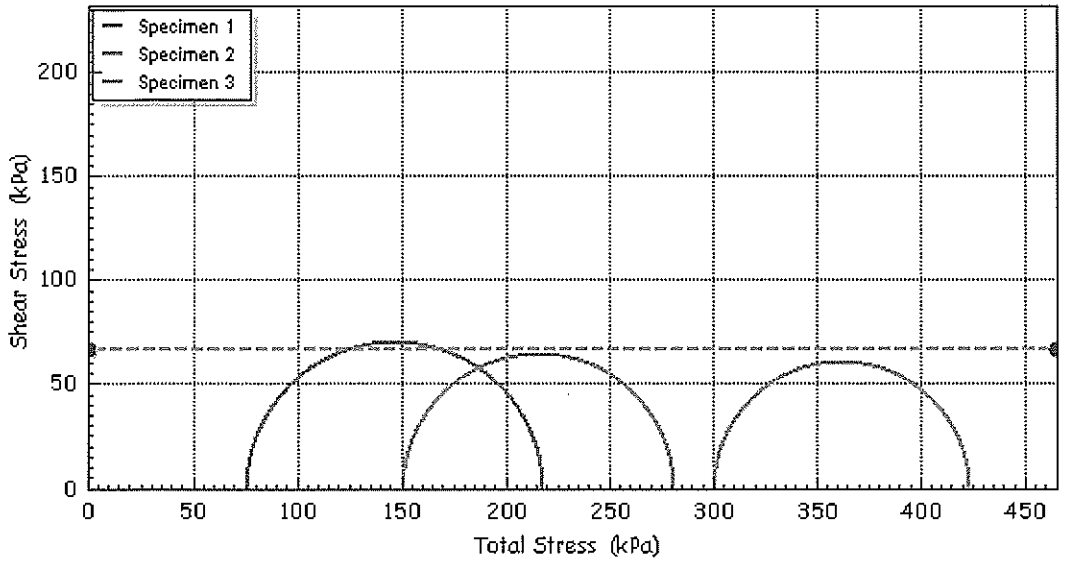
Ryobi Geotechnique International Pte Ltd

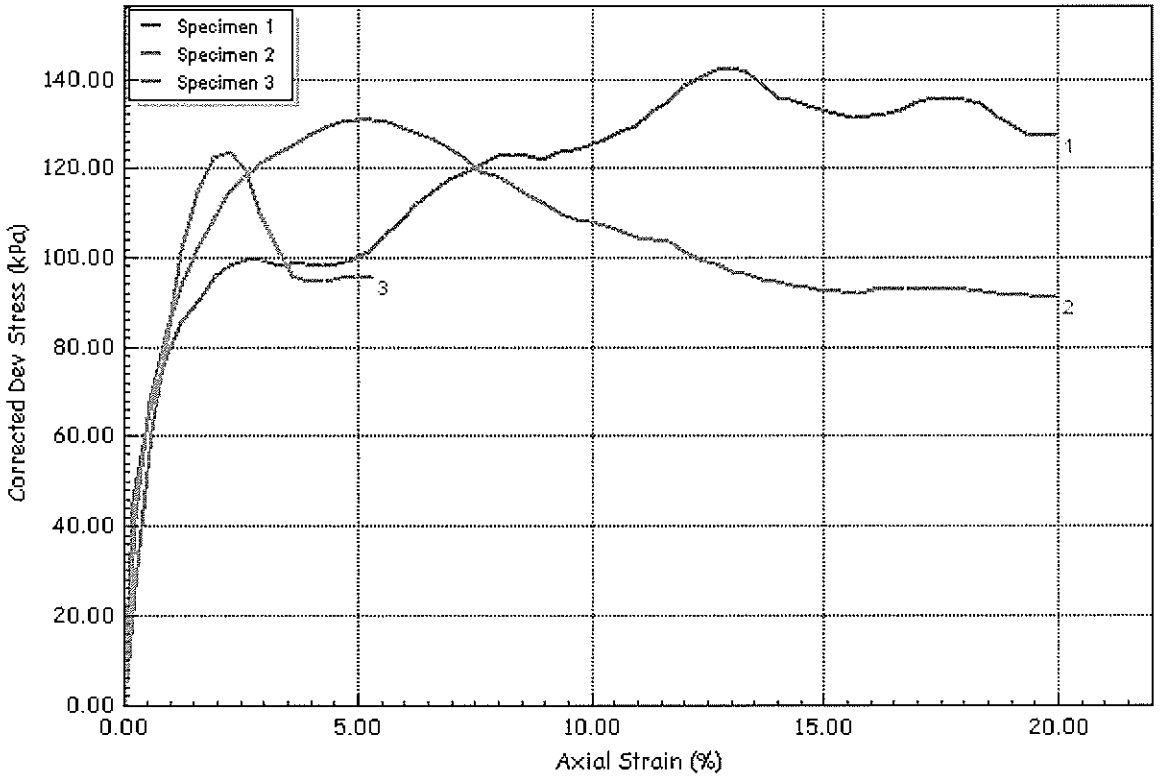
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	66.2
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-SungeiTengah-B3AT1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH3A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

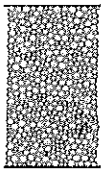
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

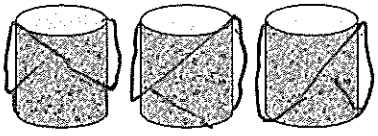
Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Light greenish grey sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0	(mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0	(gr)	967.4	971.3	1038.7
	Initial Bulk Density	ρ_0	(Mg/m3)	1.80	1.80	1.93
	Particle Density	ρ_s	(Mg/m3)	2.70	2.70	2.70

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	275	350	500
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.04167	0.04167
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	44	43	41
Initial Dry Density	ρ_{di}	(Mg/m3)	1.25	1.26	1.37
Initial Voids Ratio	e_i	.	1.162	1.147	0.977
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	43	41	38
Final Dry Density	ρ_{df}	(Mg/m3)	1.27	1.31	1.44
Final Voids Ratio	e_f	.	1.129	1.056	0.869
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	1.95	3.91	4.50
Stress At Failure	$(\sigma_1-\sigma_3)'$	(kPa)	120.0	195.4	288.3
Minor Stress At Failure	σ_3'	(kPa)	32.0	60.0	94.6
Major Stress At Failure	σ_1'	(kPa)	152.0	255.4	382.9
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.751	4.257	4.047

Notes

-



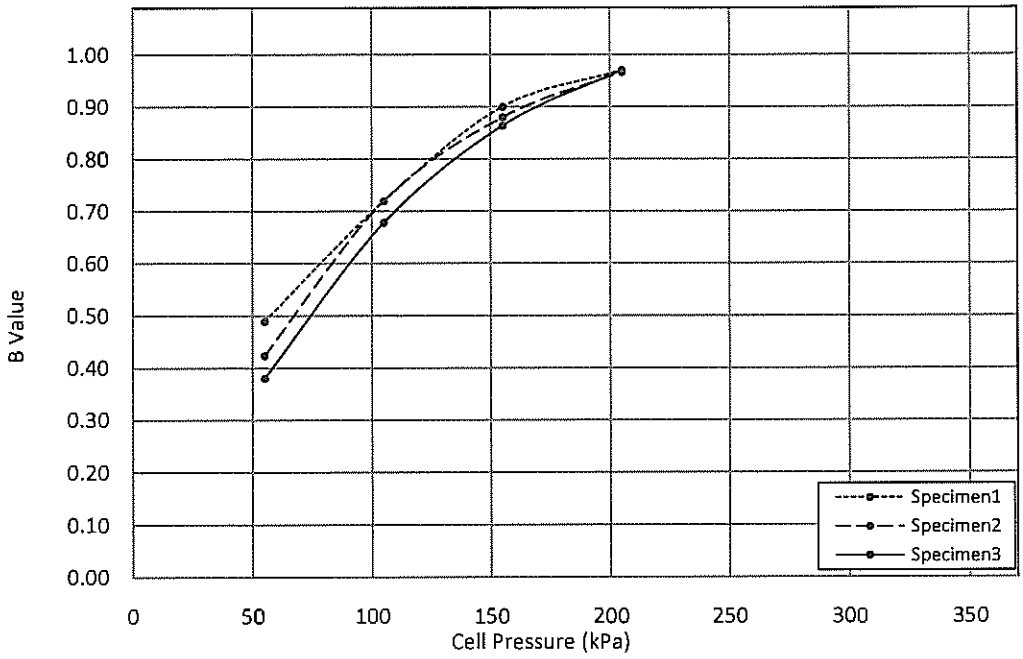
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU5-SungeiTengahWA7-B3AT2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH3A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator Kan	Checked Min Win Htut	Approved Sio Keong Kong	

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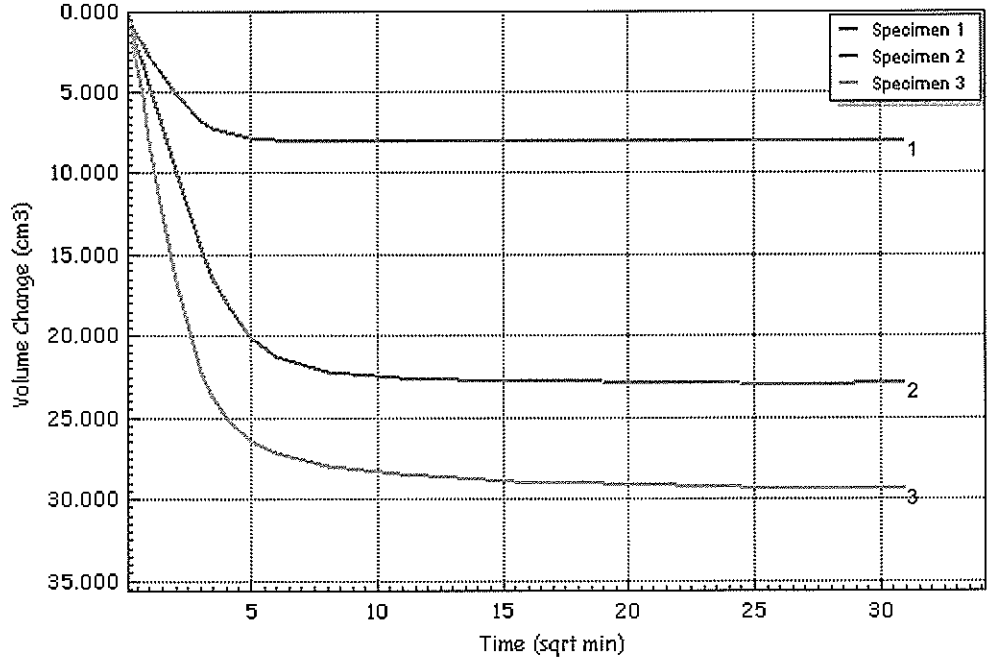
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



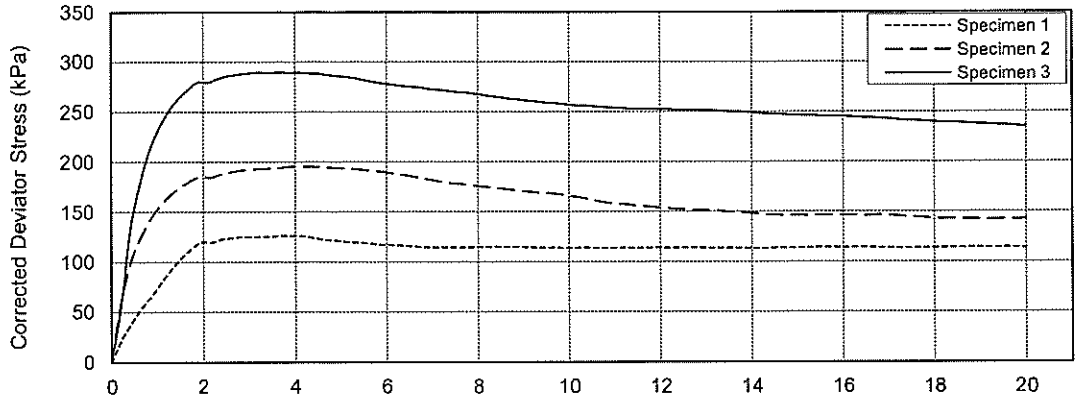
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU5-SungeiTengahWA7-B3AT2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH3A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

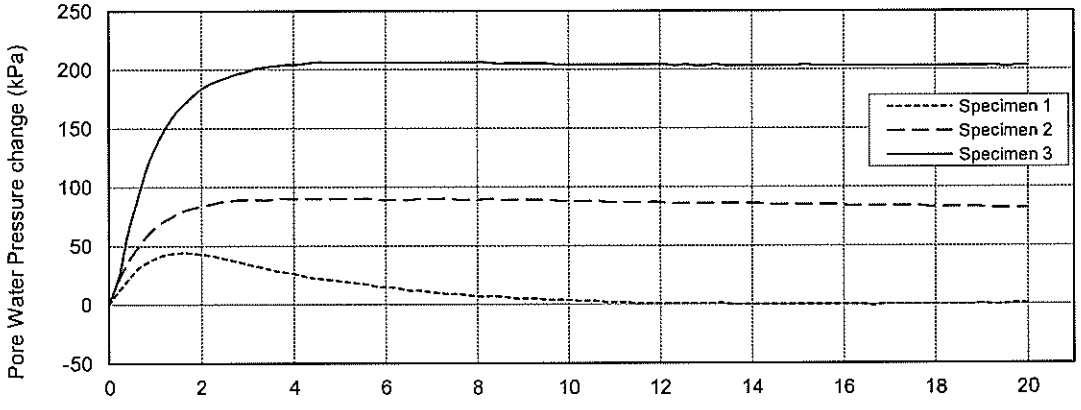
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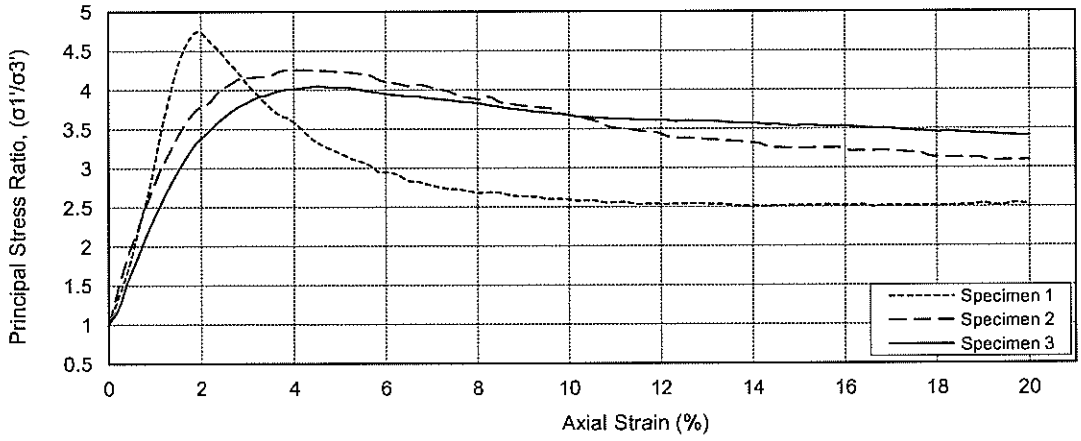
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	243	290	405
A Value at Max. Stress Ratio	0.358	0.461	0.711

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU5-SungeiTengahWA7-B3AT2
Database :	\SQLEXPRESS\Ryobi-2017	Test Date	6/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH3A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

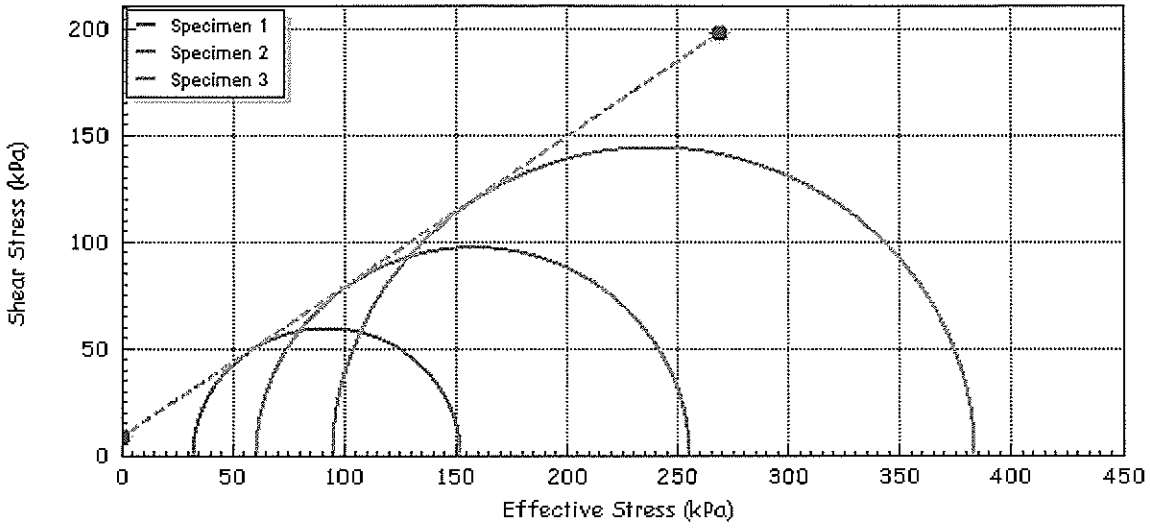
Ryobi Geotechnique International Pte Ltd

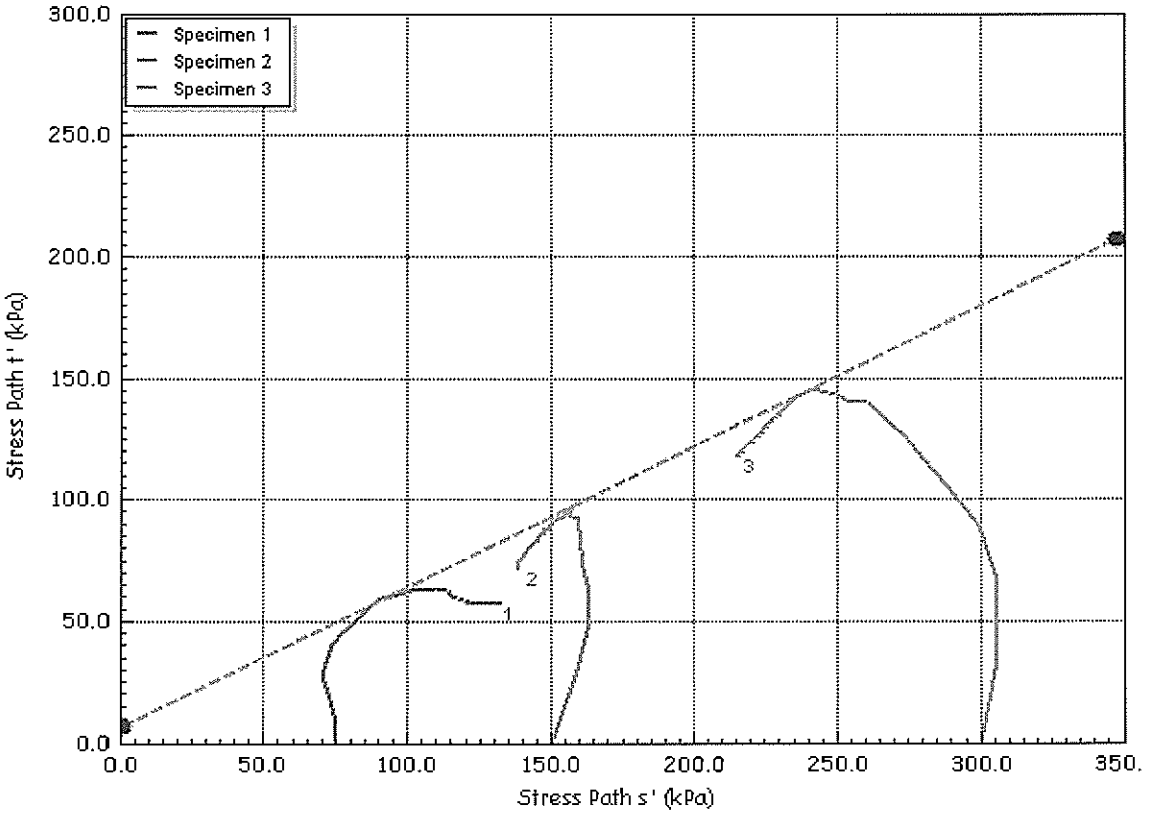
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	8.1	Stress Path Intercept	t_0'	(kPa)	6.6
Effective Friction Angle	ϕ'	(deg)	35.2	Stress Path Inclination	θ	(deg)	29.9





Ryobi G	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU5-SungeiTengahWA7-B3AT2	
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018	
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH3A	
	Jobfile	Sungei Tengah Rd-WA7	Sample	TW2	
	Client	AVA	Depth	14.00-14.90m	
	Operator	Kar	Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation.

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-001**	**SG1813957-002**	**SG1813957-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-004**	**SG1813957-005**	**SG1813957-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	----	----
				Sampling date/time	04-Sep-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1813957-007**	--------	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	----	----
Organic Matter	BS1377	0.1	% DW		<0.1	----	----
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814071**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 06-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 06-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 12-Sep-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

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- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH3A	BH5A	BH 9
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1814071-001	SG1814071-002	SG1814071-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		8.5	8.6	9.0
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	0.04
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.06	0.05	0.04
ORGANICS-General							
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH10	BH11	----
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		SG1814071-004	SG1814071-005	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		9.0	8.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.04	0.05	----
ORGANICS-General							
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH4						
SAMPLE NO :			TW1	SPT4	SPT5	TW2	SPT7	SPT8	SPT9
SAMPLE DEPTH :		m	8.00-8.90	8.90-9.35	10.00-10.45	14.00-14.90	14.90-15.35	16.00-16.45	18.00-18.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	33.9	31.9	-	28.7	32.8	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.87	1.77	-	1.95	1.78	-	-
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	2.66	-	2.65	2.66	-	-	2.65
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	18	4	-	-	7
	SAND	%	41	-	26	44	-	-	47
	SILT	%	38	-	28	34	-	-	35
	CLAY	%	21	-	28	18	-	-	11
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	71.8	(A)	-	72.6	43.9	-	-
	PLASTIC LIMIT	%	41.4		-	47.0	27.9	-	-
	PLASTICITY INDEX		30		-	26	16	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		**UU**	-	-	**UU**	-	-	-
	TOTAL COHESION	kPa	42.4	-	-	74.2	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	3.4	-
	Chloride Content	%	-	-	-	-	-	0.01	-
	Organic Content	%	-	-	-	-	-	0.3	-
	Sulphate Content	%	-	-	-	-	-	<0.01	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 07/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH4						
SAMPLE NO :			TW3	SPT10	SPT11	W1			
SAMPLE DEPTH :		m	20.00-20.90	20.90-21.35	22.00-22.45	Water Sample			
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	32.8	-	27.9				
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.92	-	1.73	-			
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	2.66	2.64	-	-			
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	0	-	-			
	SAND	%	44	44	-	-			
	SILT	%	42	38	-	-			
	CLAY	%	14	18	-	-			
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	35.6	-	(A)	-			
	PLASTIC LIMIT	%	25.2	-		-			
	PLASTICITY INDEX		10	-		-			
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		UU	-	-	-			
	TOTAL COHESION	kPa	85.3	-	-	-			
	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	-	-	-	-			
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-			
	Chloride Content	%	-	-	-	-			
	Organic Content	%	-	-	-	-			
	Sulphate Content	%	-	-	-	-			
	pH Value		-	-	-	11.3			
	Chloride Content	g/L	-	-	-	0.05			
	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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 07/09/2012

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH4	TW1	8.00-8.90	33.9	1.87	-	2.66
BH4	SPT4	8.90-9.35	31.9	1.77	-	-
BH4	SPT5	10.00-10.45	-	-	-	2.65
BH4	TW2	14.00-14.90	28.7	1.95	-	2.66
BH4	SPT7	14.90-15.35	32.8	1.78	-	-
BH4	SPT9	18.00-18.45	-	-	-	2.65
BH4	TW3	20.00-20.90	32.8	1.92	-	2.66
BH4	SPT10	20.90-21.35	-	-	-	2.64
BH4	SPT11	22.00-22.45	27.9	1.73	-	-

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)

TESTED BY: Monju
Date : 29.08.2018

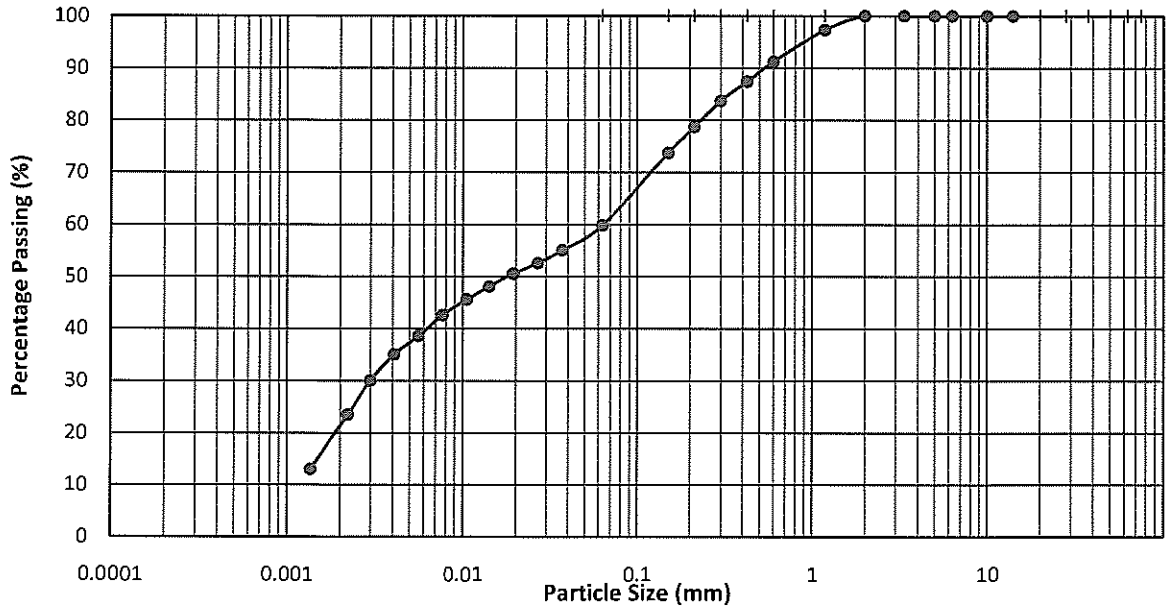
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 03.09.2018



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

SOIL DESCRIPTION : **Whitish grey and light yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**41**	%
SILT	=	**38**	%
CLAY	=	**21**	%

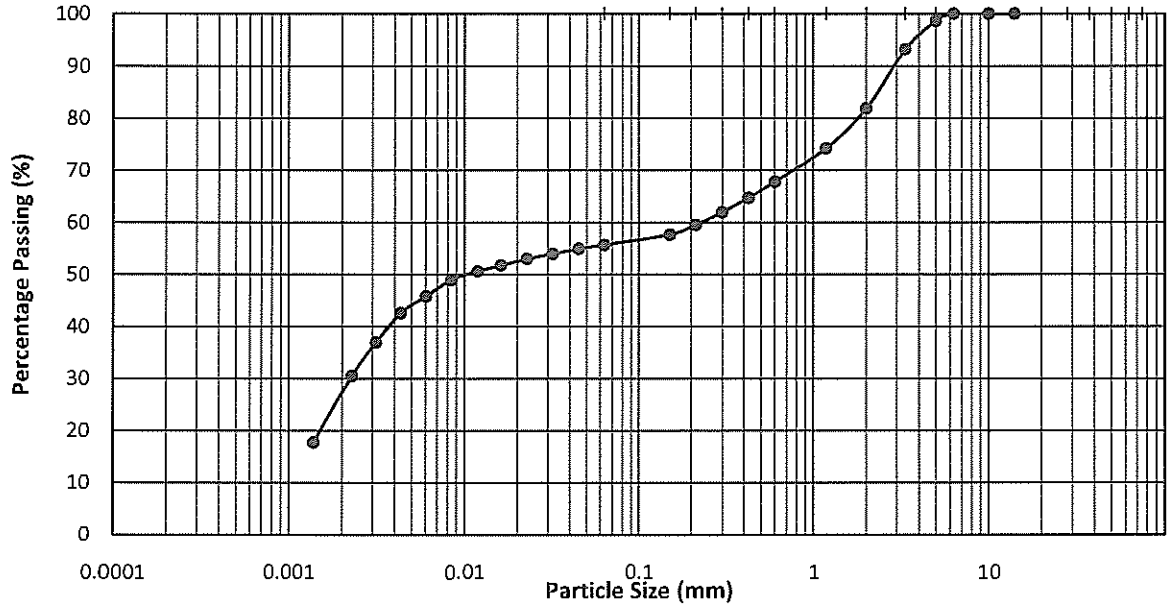
% of Passing 0.425 mm Sieve : 87.4

TESTED BY :	APPROVED BY :	DATE :
S. Thet.	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light brownish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**18**	%
SAND	=	**26**	%
SILT	=	**28**	%
CLAY	=	**28**	%

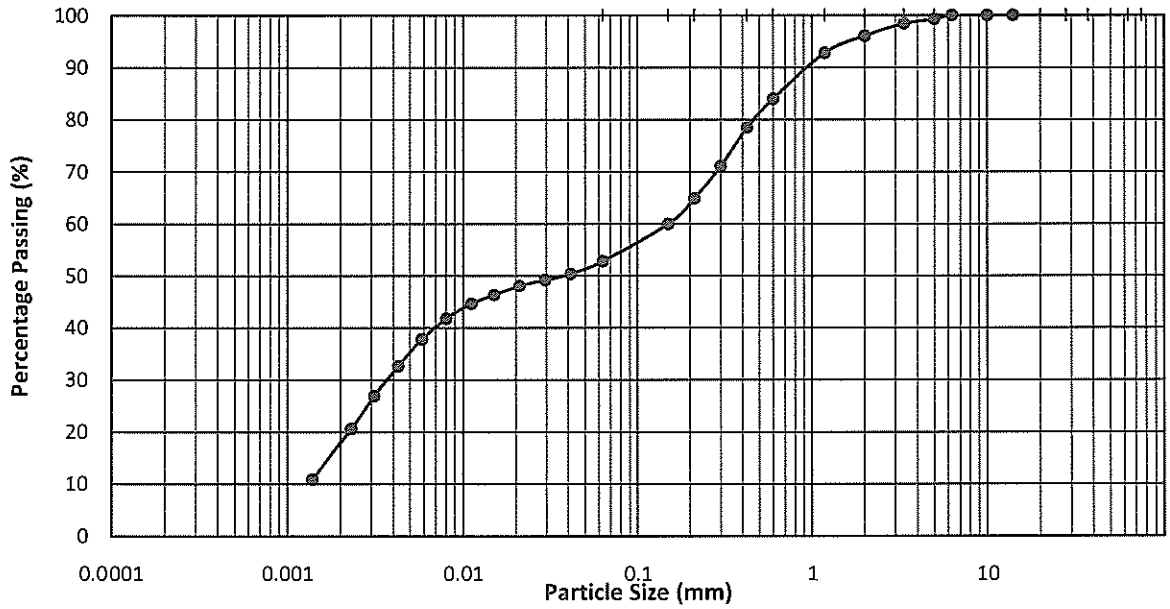
% of Passing 0.425 mm Sieve : 64.7

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 01.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	4	%
SAND	=	44	%
SILT	=	34	%
CLAY	=	18	%

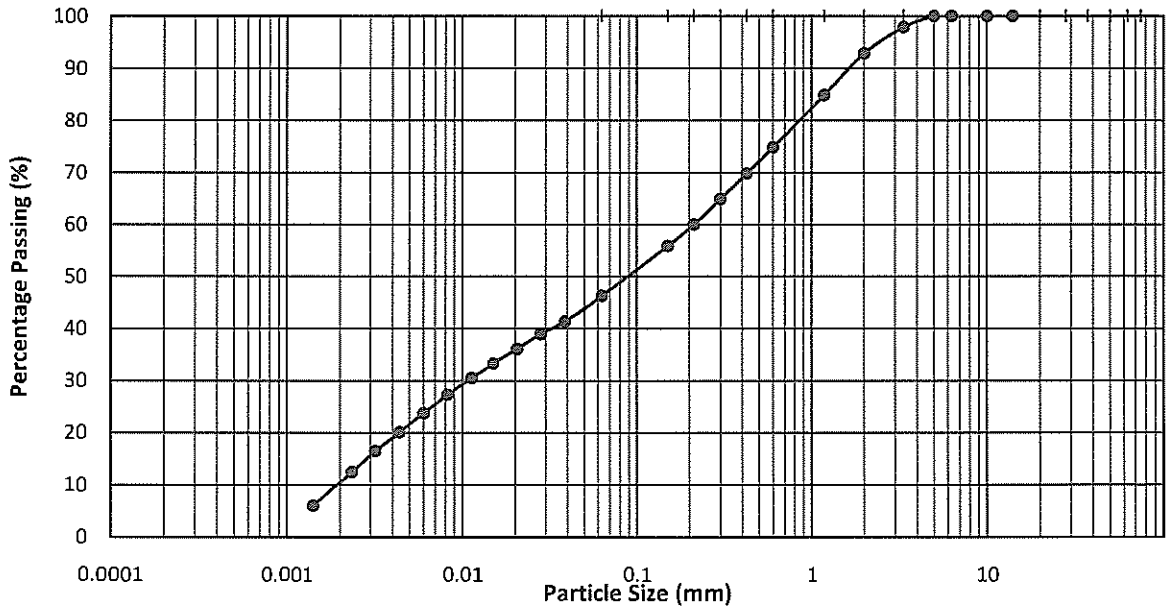
% of Passing 0.425 mm Sieve : 78.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**7**	%
SAND	=	**47**	%
SILT	=	**35**	%
CLAY	=	**11**	%

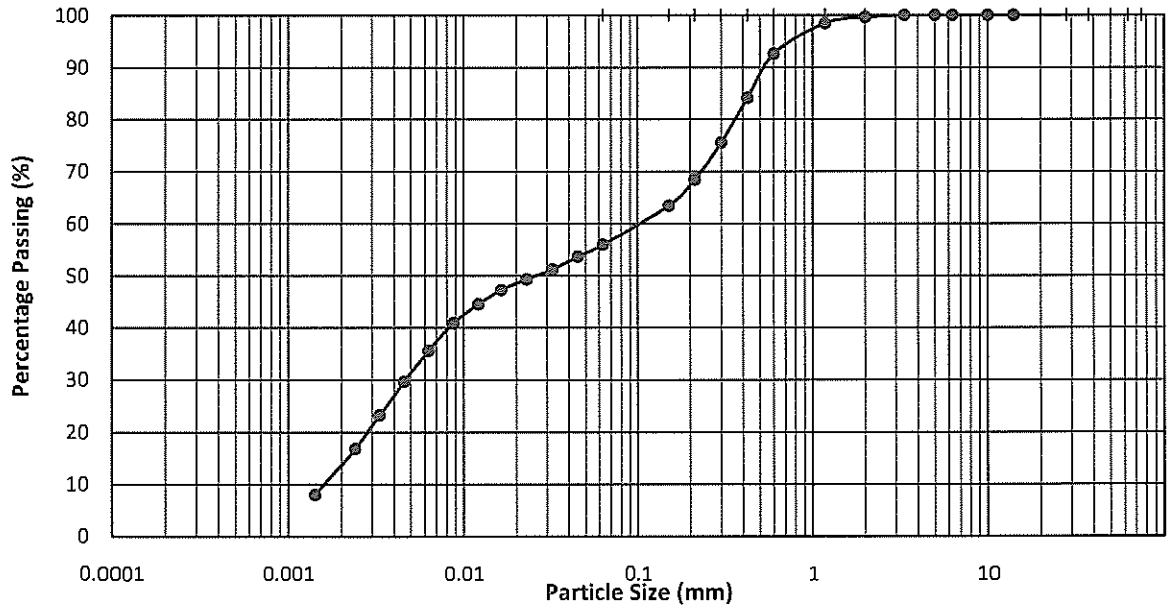
% of Passing 0.425 mm Sieve : 69.8

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 03.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and yellowish brown sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**44**	%
SILT	=	**42**	%
CLAY	=	**14**	%

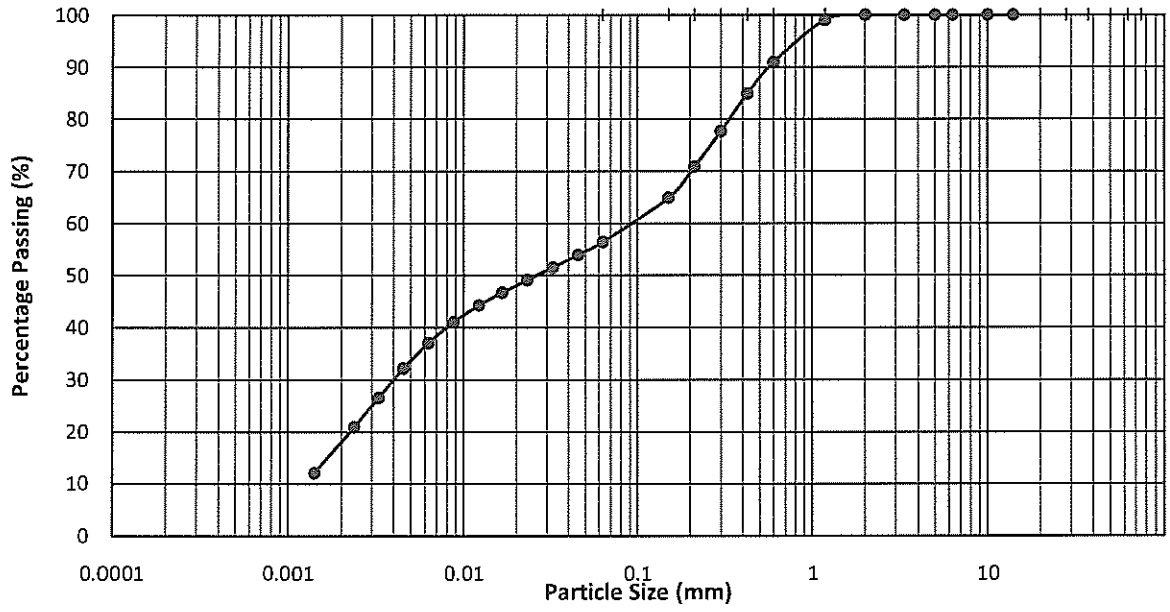
% of Passing 0.425 mm Sieve : 84.1

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: SPT10
DEPTH (m)	: 20.90-21.35m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and yellowish brown sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**44**	%
SILT	=	**38**	%
CLAY	=	**18**	%

% of Passing 0.425 mm Sieve : 84.9

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

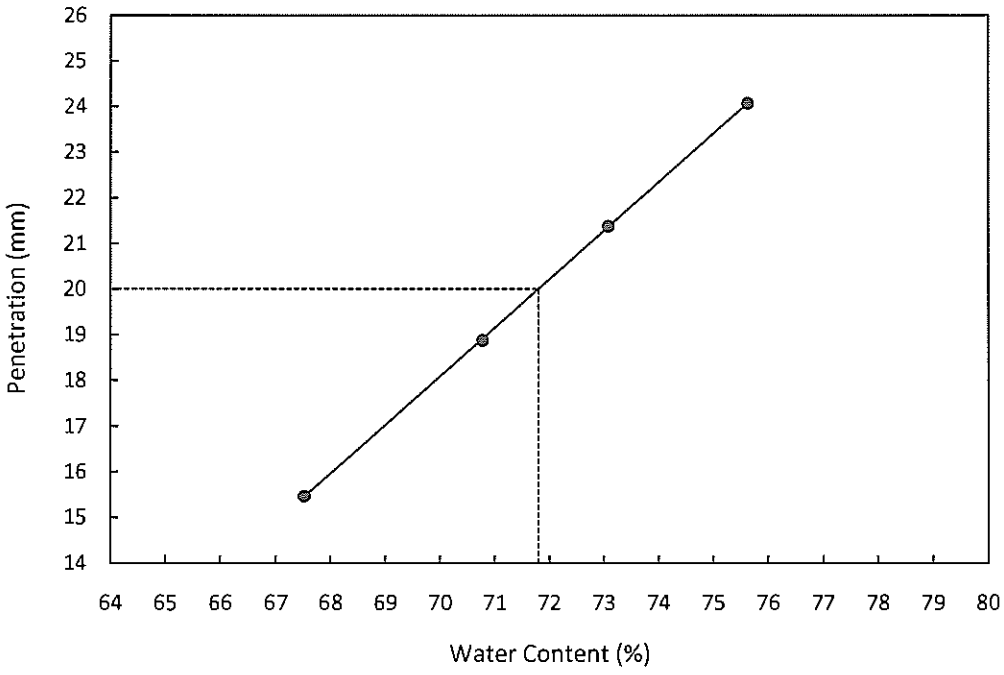
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Whitish grey and light yellow sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 55
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.83	20.75	20.60	20.75	20.33	20.18
DRY WEIGHT + CUP	(g)	15.86	15.86	15.28	15.57	16.99	16.75
CUP WEIGHT	(g)	8.50	8.95	8.00	8.72	8.88	8.49
WATER CONTENT	(%)	67.5	70.8	73.1	75.6	41.2	41.5
PENETRATION	(mm)	15.5	18.9	21.4	24.1	-	-

LIQUID LIMIT	(%)	**71.8**
PLASTIC LIMIT	(%)	**41.4**
PLASTICITY INDEX		**30**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S-Ly.	(Authorised Signatory - Min Win Htut)	7-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

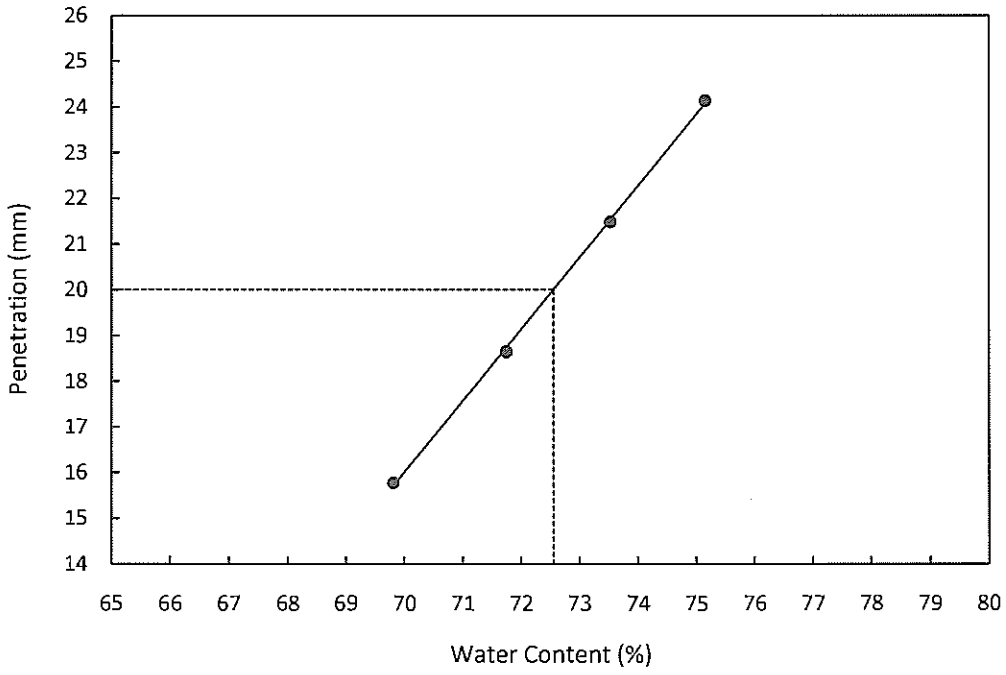
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light greenish grey and dark grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 52
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.28	20.76	20.64	20.24	20.24	20.44
DRY WEIGHT + CUP	(g)	15.75	15.86	15.67	15.22	16.33	16.85
CUP WEIGHT	(g)	9.26	9.03	8.91	8.54	8.03	9.18
WATER CONTENT	(%)	69.8	71.7	73.5	75.1	47.1	46.8
PENETRATION	(mm)	15.8	18.6	21.5	24.1	-	-

LIQUID LIMIT	(%)	**72.6**
PLASTIC LIMIT	(%)	**47.0**
PLASTICITY INDEX		**26**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

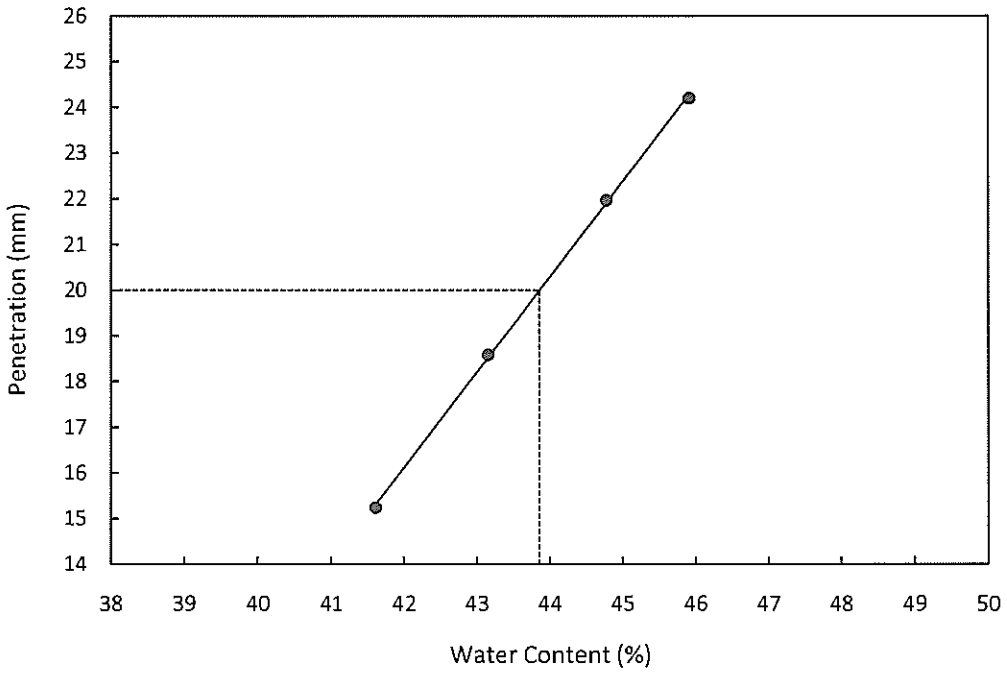
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: SPT7
DEPTH(M)	: 14.90-15.35m
SOIL DESCRIPTION	: Whitish grey and dark grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.61	20.65	20.50	20.71	20.57	20.59
DRY WEIGHT + CUP	(g)	17.14	17.25	16.82	16.78	18.01	17.95
CUP WEIGHT	(g)	8.80	9.37	8.60	8.22	8.80	8.50
WATER CONTENT	(%)	41.6	43.1	44.8	45.9	27.8	27.9
PENETRATION	(mm)	15.2	18.6	22.0	24.2	-	-

LIQUID LIMIT	(%)	**43.9**
PLASTIC LIMIT	(%)	**27.9**
PLASTICITY INDEX		**16**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Thy.	(Authorised Signatory - Min Win Htut)	7-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

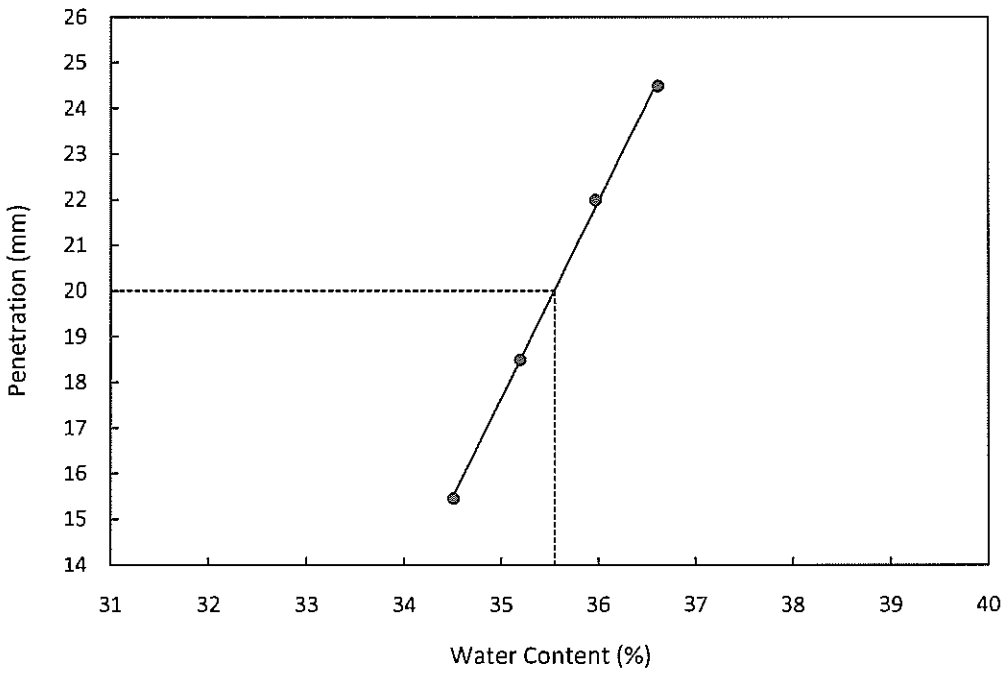
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH4
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light greenish grey and yellowish brown sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 84
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.16	20.50	20.46	20.22	20.46	20.44
DRY WEIGHT + CUP	(g)	17.31	17.28	17.23	17.02	18.10	18.10
CUP WEIGHT	(g)	9.05	8.13	8.25	8.28	8.75	8.79
WATER CONTENT	(%)	34.5	35.2	36.0	36.6	25.2	25.1
PENETRATION	(mm)	15.5	18.5	22.0	24.5	-	-

LIQUID LIMIT	(%)	**35.6**
PLASTIC LIMIT	(%)	**25.2**
PLASTICITY INDEX		**10**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



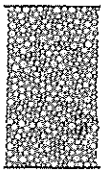
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory : Min Win Htut)	7-9-2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			8.00-8.90m		
Description			Firm whitish grey and light yellow sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	160.7	160.2	160.1
Bulk Density	ρ_0	(Mg/m3)	1.87	1.87	1.87
Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions

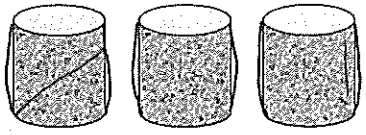
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	32	33	33
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.42	1.40	1.40
Initial Voids Ratio	e_0	.	0.87	0.90	0.90
Initial Degree of Saturation	S_o	(%)	97	99	98

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	76.14	86.52	91.74
MembraneCorrection	m_c	(kPa)	1.980	1.810	1.960
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.89	17.62	19.74
Shear Strength	c_u	(kPa)	38.07	43.26	45.87
Final Moisture	$\omega_f\%$	(%)	32	33	33
Final Dry Density	ρ_{df}	(Mg/m3)	1.42	1.40	1.40
Final Voids Ratio	e_f	.	0.87	0.90	0.90
Final Degree of Saturation	S_f	(%)	97.1	98.8	98.2

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	UU8-SungeiTengah-B4T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

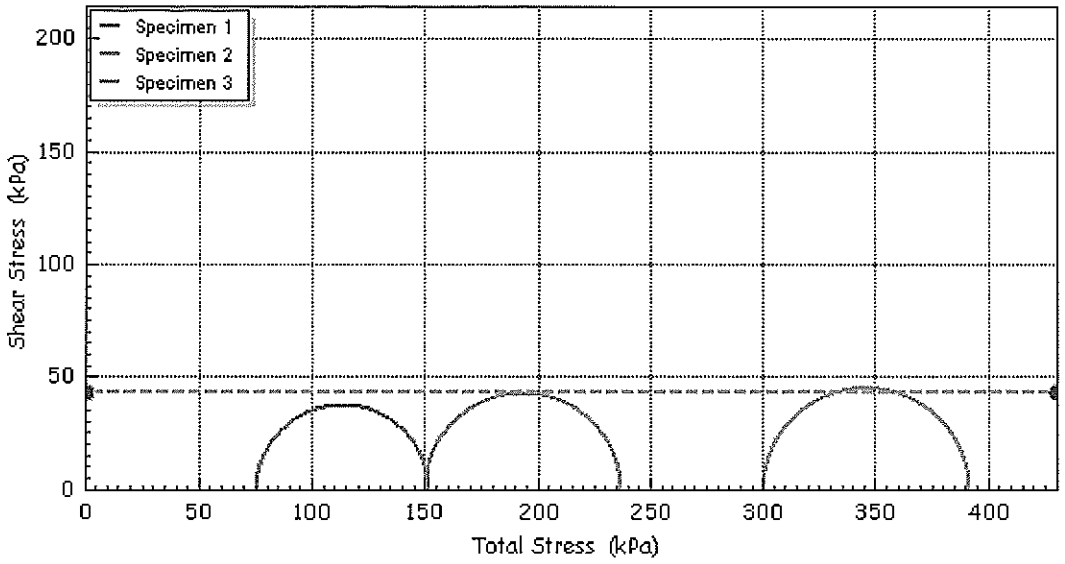
Ryobi Geotechnique International Pte Ltd

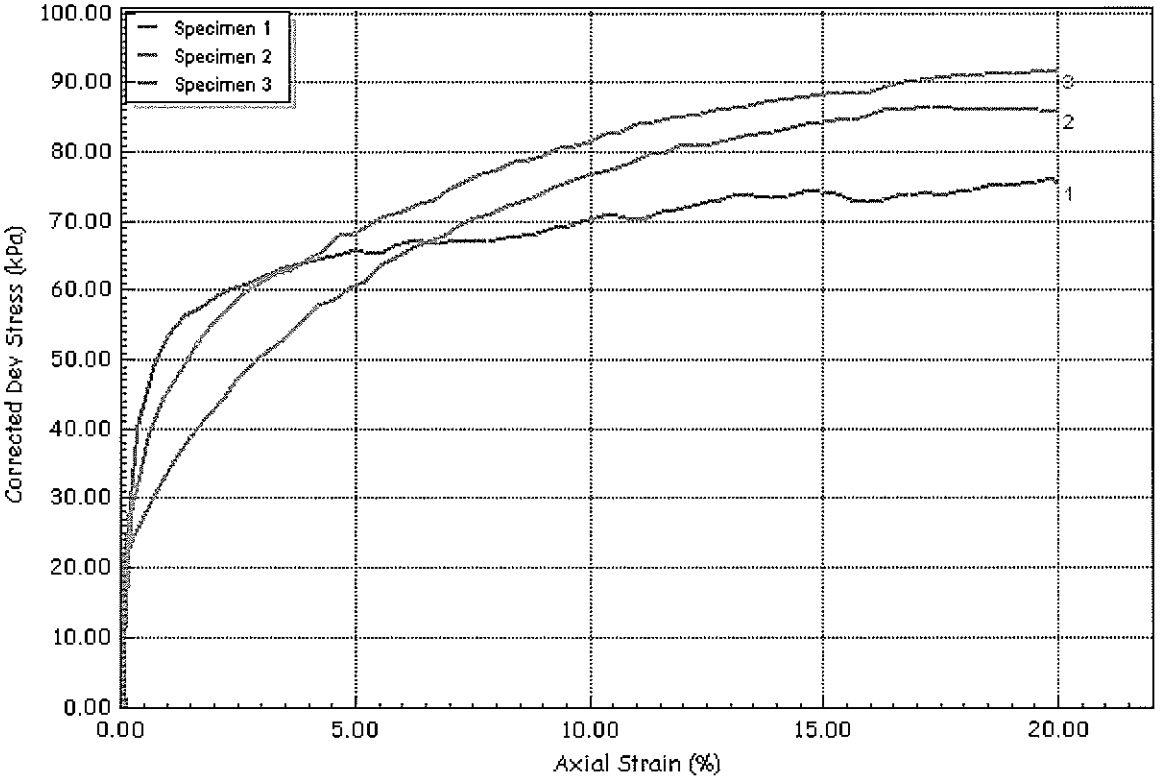
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	42.4
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU8-SungeiTengah-B4T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

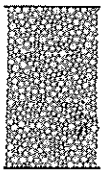
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

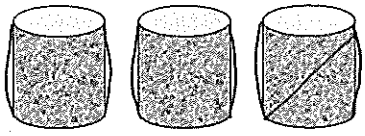
Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Firm light greenish grey and dark grey slightly gravelly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	165.2	167.8	167.7
	Bulk Density	ρ_0 (Mg/m3)	1.93	1.96	1.96
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_S	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	28	26	27
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.50	1.55	1.54
Initial Voids Ratio	e_0	.	0.77	0.72	0.73
Initial Degree of Saturation	S_o	(%)	97	98	99

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	140.37	163.55	141.03
MembraneCorrection	m_C	(kPa)	1.950	1.930	1.640
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.50	19.25	15.33
Shear Strength	c_U	(kPa)	70.19	81.77	70.52
Final Moisture	$\omega_f\%$	(%)	28	26	27
Final Dry Density	ρ_{df}	(Mg/m3)	1.50	1.55	1.54
Final Voids Ratio	e_f	.	0.77	0.72	0.73
Final Degree of Saturation	S_f	(%)	97.4	97.5	99.2

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	UU9-SungeiTengah-B4T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked Min Win Htut	Approved Sio Keong Kong

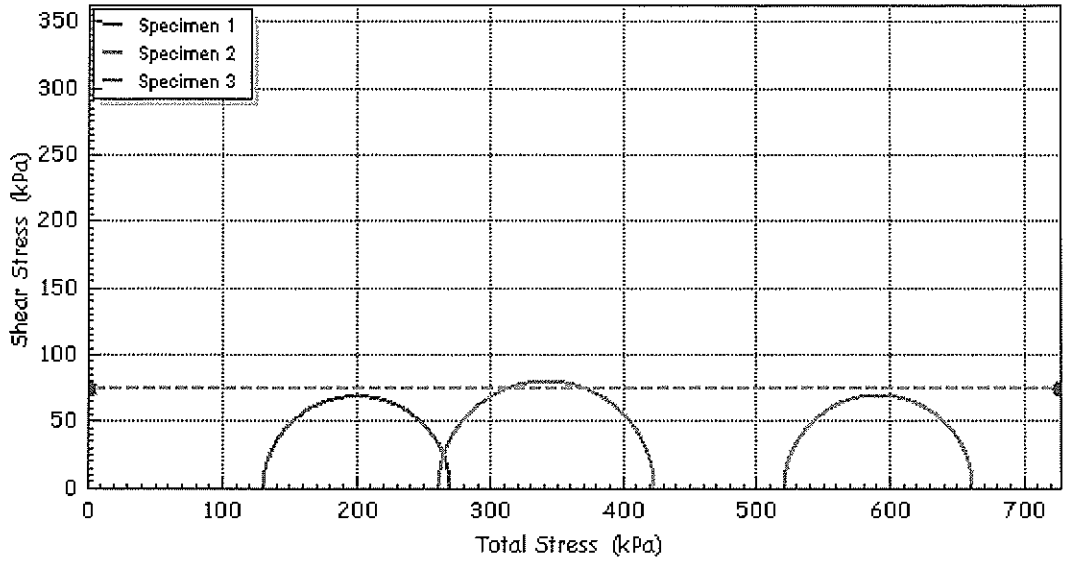
Ryobi Geotechnique International Pte Ltd

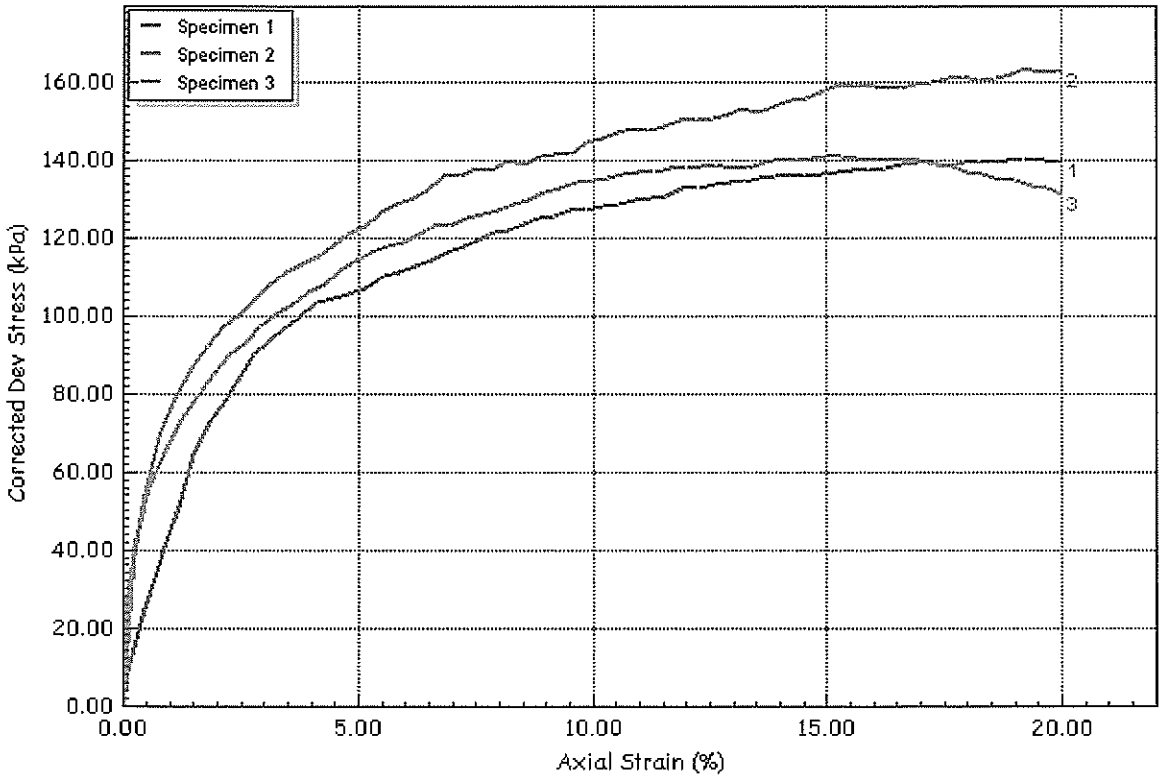
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	74.2
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU9-SungeiTengah-B4T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

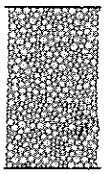
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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			20.00-20.90m		
Description			Stiff light greenish grey and yellowish brown sandy SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	165.3	165.1	163.2
Bulk Density	ρ_0	(Mg/m3)	1.93	1.93	1.90
Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions

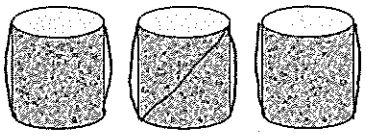
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	34	33	34
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.44	1.45	1.42
Initial Voids Ratio	e_0	.	0.84	0.84	0.87
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	160.76	170.70	180.36
MembraneCorrection	m_c	(kPa)	1.470	1.440	1.420
Strain At Max Stress	$\varepsilon_f\%$	(%)	13.25	12.84	12.65
Shear Strength	c_u	(kPa)	80.38	85.35	90.18
Final Moisture	$\omega_f\%$	(%)	34	33	34
Final Dry Density	ρ_{df}	(Mg/m3)	1.44	1.45	1.42
Final Voids Ratio	e_f	.	0.84	0.84	0.87
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	UU10-SungeiTengah-B4T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

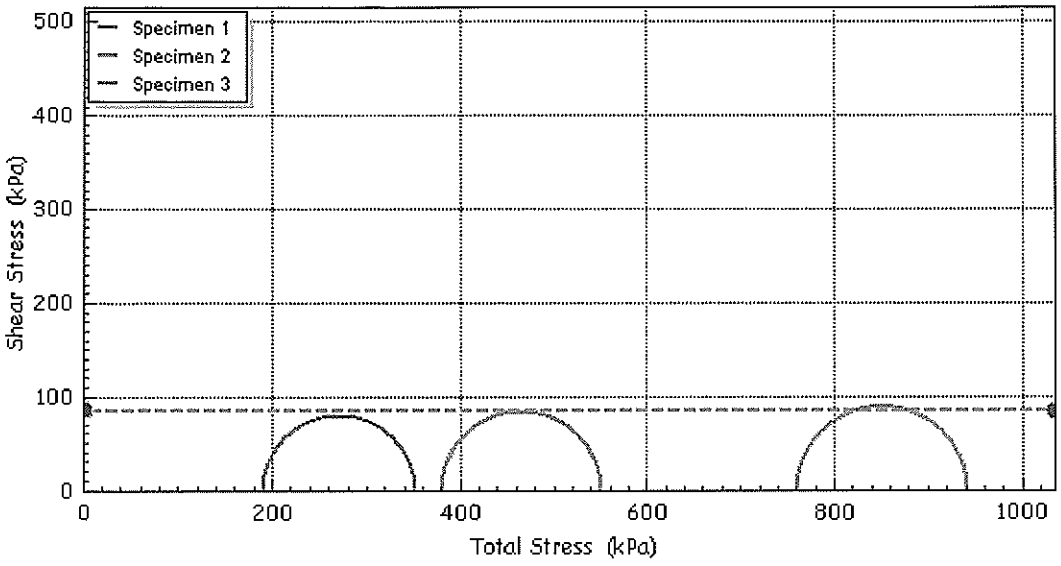
Ryobi Geotechnique International Pte Ltd

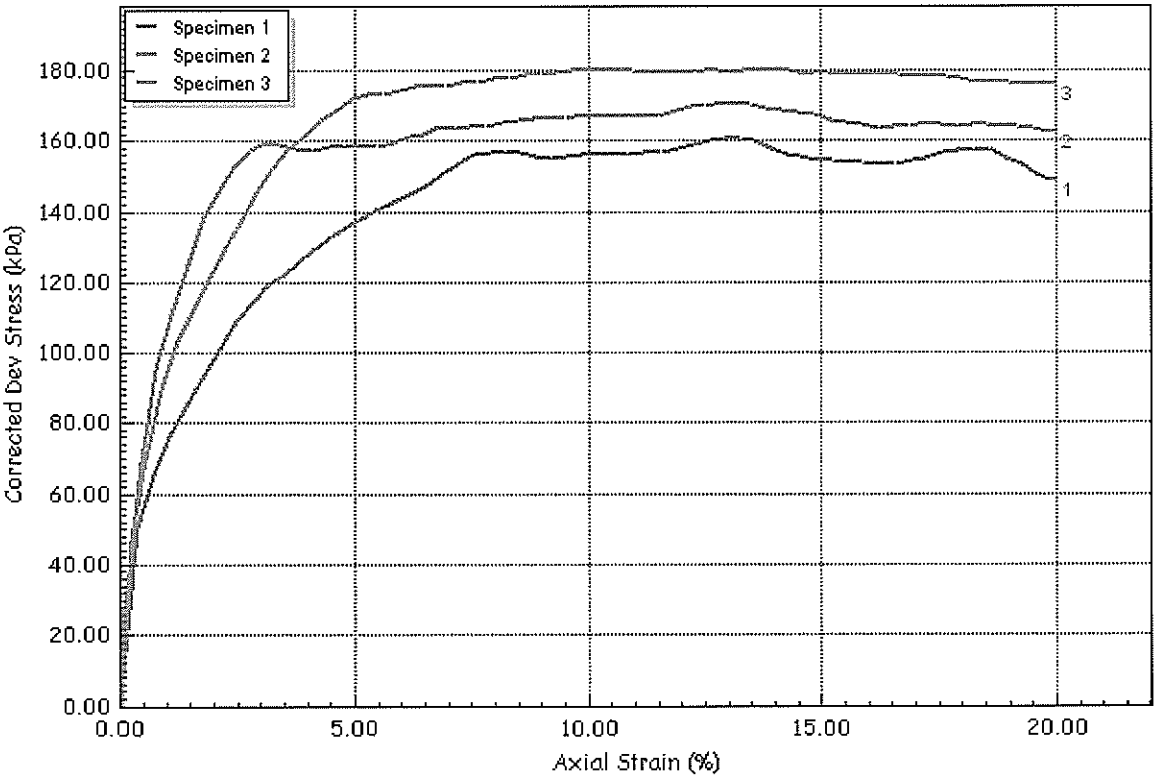
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	85.3
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU10-SungeiTengah-B4T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	4/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH4
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-001	SG1813557-002	SG1813557-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-004	SG1813557-005	SG1813557-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	6.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813564**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 27-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: WATER		Client sample ID		BH1 Water Sample	BH2 Water Sample	BH3 Water Sample
		Sampling date/time		27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*	SG1813564-001	SG1813564-002	SG1813564-003
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	11.6	11.4	11.7
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.05	0.05	0.05
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	<0.01	<0.01	<0.01
ORGANICS-General						
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Sub-Matrix: WATER		Client sample ID		BH4 Water Sample	BH6 Water Sample	—
		Sampling date/time		27-Aug-2018 00:00	27-Aug-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*	SG1813564-004	SG1813564-005	-------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	11.3	11.7	----
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.05	0.05	----
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	<0.01	<0.01	----
ORGANICS-General						
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH5						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	TW2	SPT7
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	14.00-14.90	14.90-15.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	28.0	33.2	32.6	-	38.8	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.80	-	1.92	-	-	1.84	1.78
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	-	-	2.66	-	2.67	2.65	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	31	-	33	-	0	12	58
	SAND	%		-	17	-	6	19	
	SILT	%	37	-	25	-	94	57	33
	CLAY	%	32	-	25	-		12	9
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	(A)	87.8	(A)	-	76.2	-
	PLASTIC LIMIT	%	-		49.5		-	41.0	-
	PLASTICITY INDEX		-		38		-	35	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	**UU**	-
	TOTAL COHESION	kPa	-	-	49.9	-	-	69.3	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (W/V)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand and gravel.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 12/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH5						
SAMPLE NO :			SPT8	SPT9	TW3	W1			
SAMPLE DEPTH :		m	16.00-16.45	18.00-18.45	20.00-20.90	Water Sample			
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	-	31.8				
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.96	-			
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	2.65	-	2.68	-			
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	21	-	1	-			
	SAND	%	18	-	9	-			
	SILT	%	61	-	79	-			
	CLAY	%		-	11	-			
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	52.6	-			
	PLASTIC LIMIT	%	-	-	31.7	-			
	PLASTICITY INDEX		-	-	21	-			
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-			
	TOTAL COHESION	kPa	-	-	124.1	-			
	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	-	-	-	-			
CHEMICAL CONTENTS ANALYSIS	pH Value		-	7.1	-	-			
	Chloride Content	%	-	<0.01	-	-			
	Organic Content	%	-	1.0	-	-			
	Sulphate Content	%	-	<0.01	-	-			
	pH Value		-	-	-	11.4			
	Chloride Content	g/L	-	-	-	0.04			
	Organic Content	% (W/V)	-	-	-	<0.10			
	Sulphate Content	g/L	-	-	-	0.04			

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 : 12/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH5	SPT2	4.00-4.45	-	1.80	-	-
BH5	SPT3	600-6.45	28.0	-	-	-
BH5	TW1	8.00-8.90	33.2	1.92	-	2.66
BH5	SPT4	8.90-9.35	32.6	-	-	-
BH5	SPT5	10.00-10.45	-	-	-	2.67
BH5	TW2	14.00-14.90	38.8	1.84	-	2.65
BH5	SPT7	14.90-15.35	-	1.78	-	-
BH5	SPT8	16.00-16.45	-	-	-	2.65
BH5	TW3	20.00-20.90	31.8	1.96	-	2.68

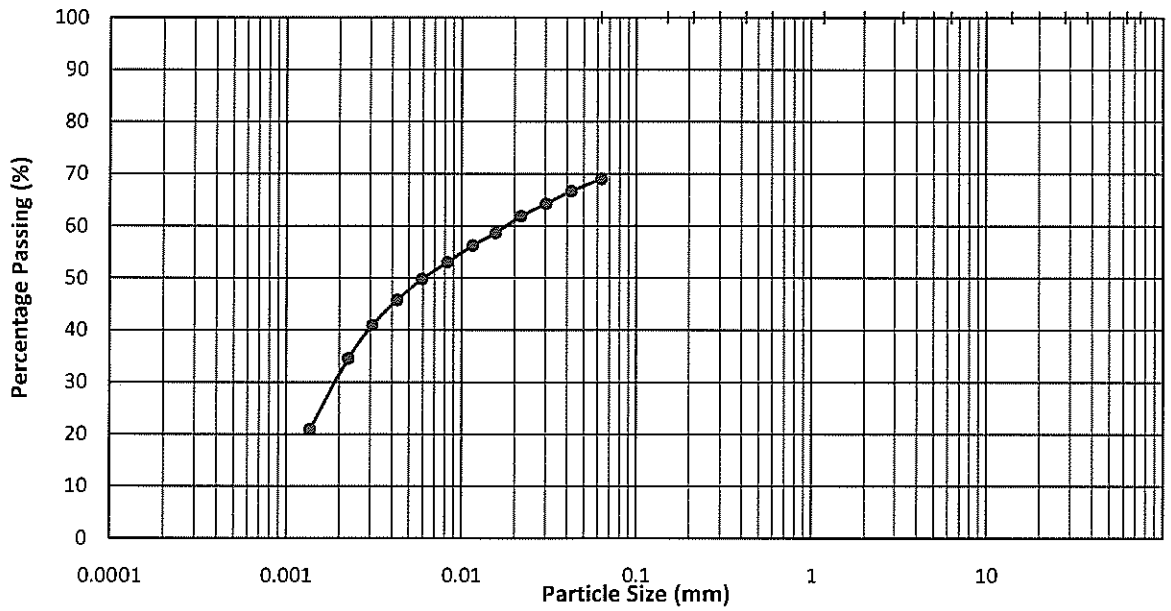
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: MOMJU Date : 01.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Light grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**31**	%
SILT	=	**37**	%
CLAY	=	**32**	%

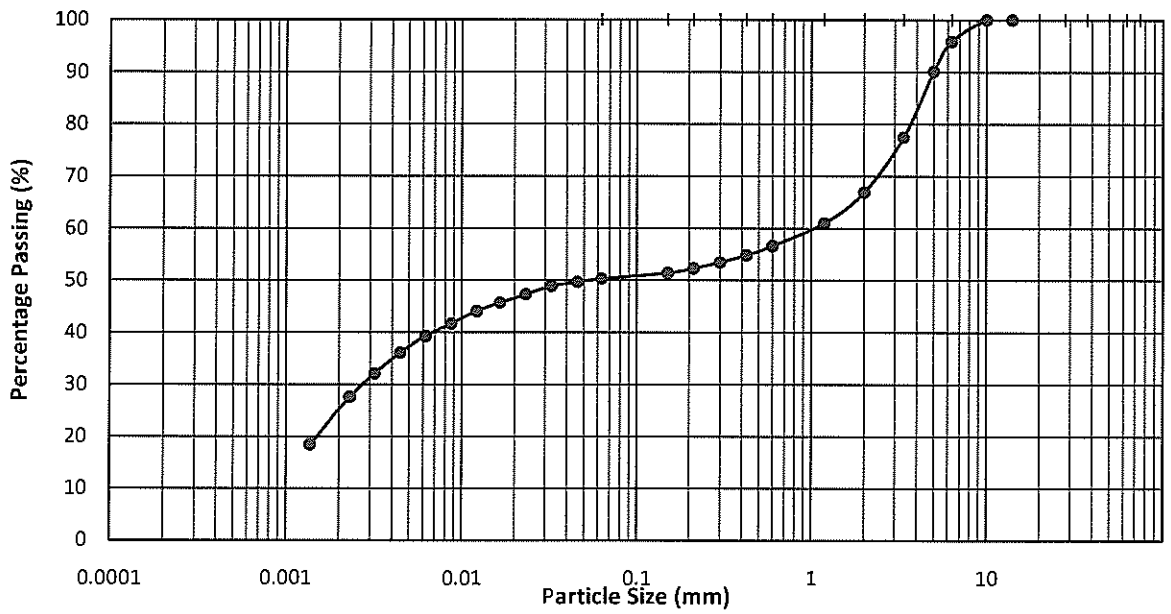
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 06.09.2018



SOIL DESCRIPTION : **Yellowish brown, red and light grey slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**33**	%
SAND	=	**17**	%
SILT	=	**25**	%
CLAY	=	**25**	%

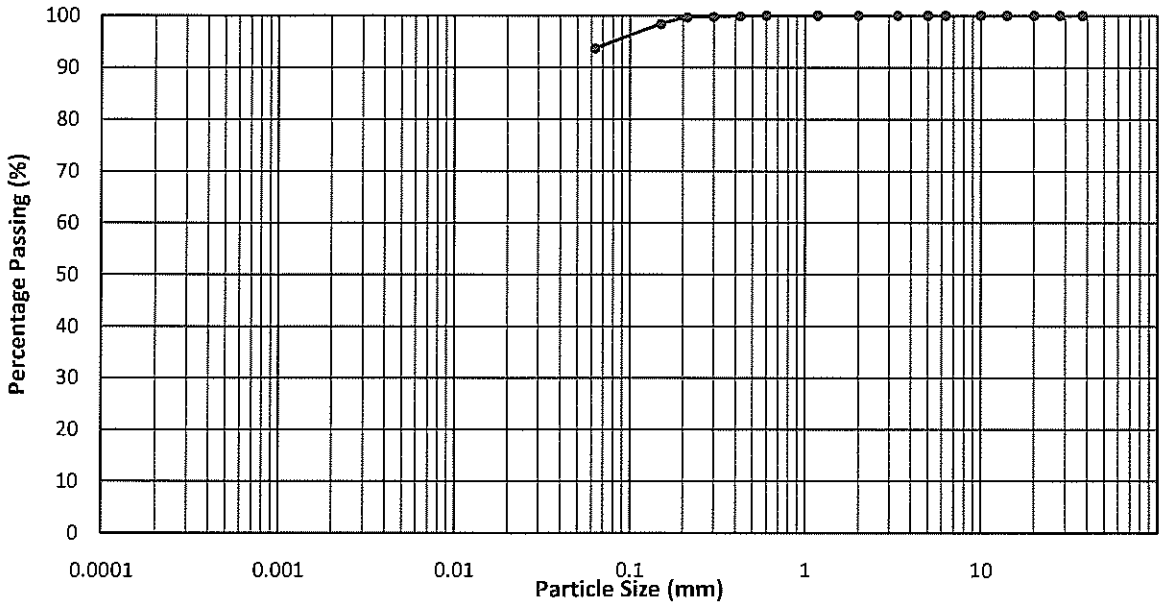
% of Passing 0.425 mm Sieve : 54.8

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 11.09.2018



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

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

SIEVING TEST

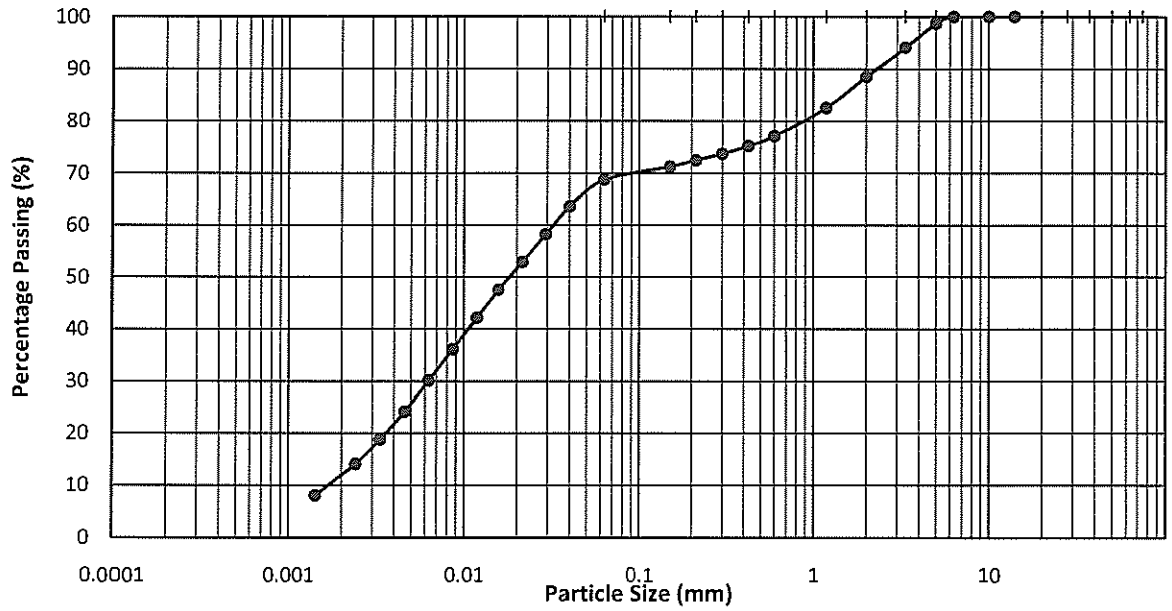
GRAVEL	=	**0**	%	
SAND	=	**6**	%	% of Passing 0.425 mm Sieve : 99.9
SILT + CLAY	=	**94**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 06.09.2018



SOIL DESCRIPTION : **Greenish grey and light yellow slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**12**	%
SAND	=	**19**	%
SILT	=	**57**	%
CLAY	=	**12**	%

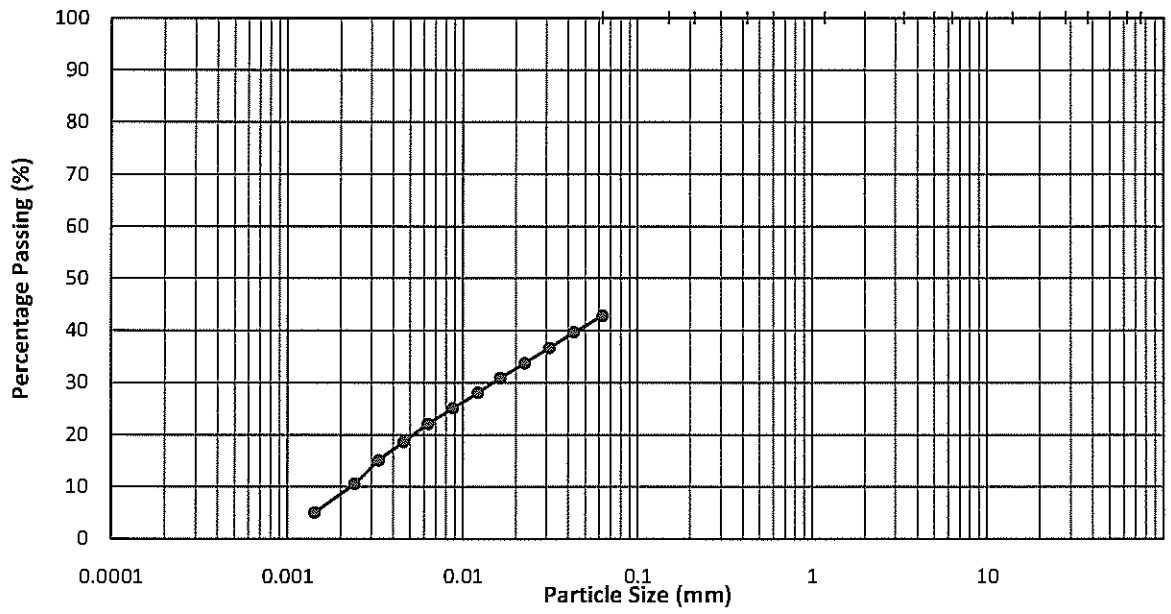
% of Passing 0.425 mm Sieve : 75.2

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 10.09.2018



SOIL DESCRIPTION : **Light greenish grey and whitish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**58**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**33**	%	
CLAY	=	**9**	%	

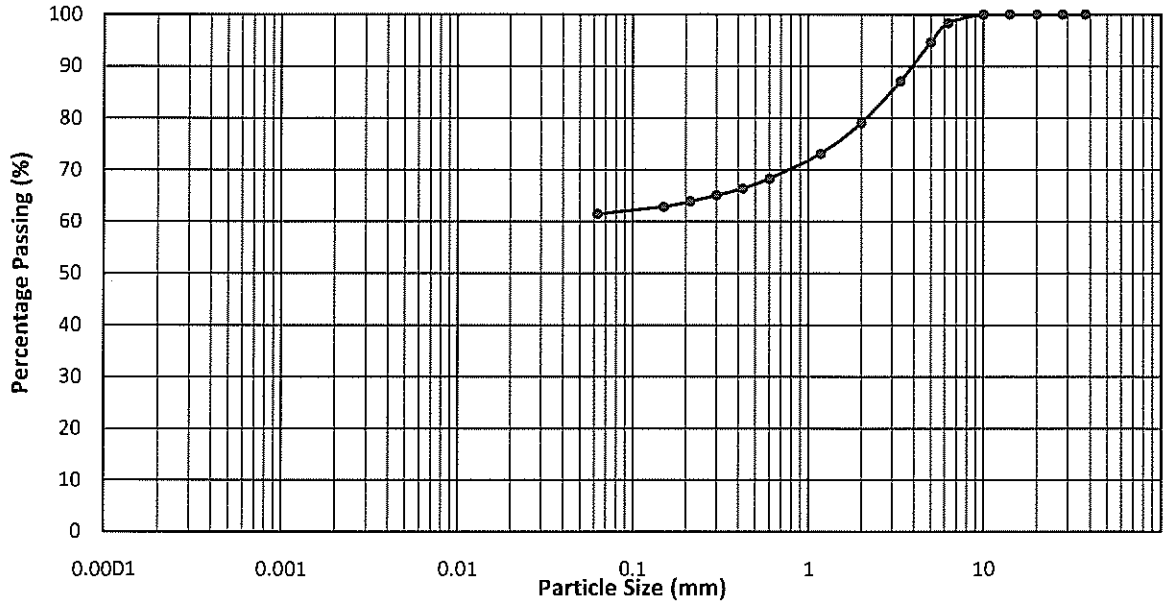
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0023-B

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and whitish grey slightly sandy slightly gravelly SILT**

SIEVING TEST

GRAVEL	=	**21**	%
SAND	=	**18**	%
SILT + CLAY	=	**61**	%

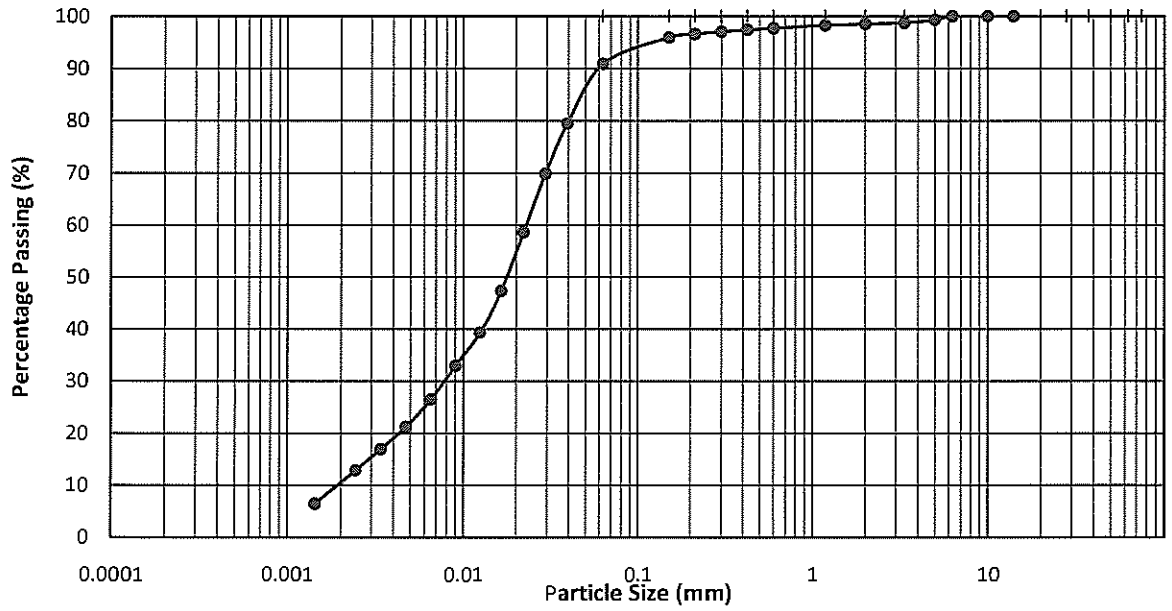
% of Passing 0.425 mm Sieve : 66.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Greenish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**1**	%
SAND	=	**9**	%
SILT	=	**79**	%
CLAY	=	**11**	%

% of Passing 0.425 mm Sieve : 97.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

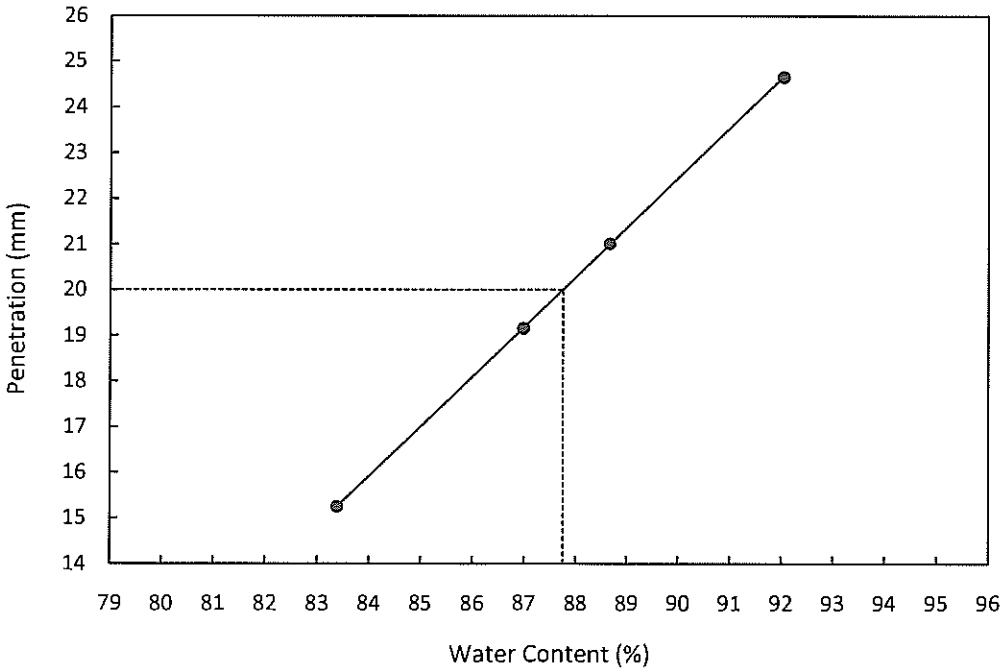
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K572B
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Yellowish brown, red and light grey slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 55
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.97	20.78	20.29	20.54	20.40	20.18
DRY WEIGHT + CUP	(g)	15.80	15.10	14.74	14.99	16.15	16.40
CUP WEIGHT	(g)	9.60	8.57	8.48	8.96	7.53	8.79
WATER CONTENT	(%)	83.4	87.0	88.7	92.0	49.3	49.7
PENETRATION	(mm)	15.3	19.2	21.0	24.7	-	-

LIQUID LIMIT	(%)	**87.8**
PLASTIC LIMIT	(%)	**49.5**
PLASTICITY INDEX		**38**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

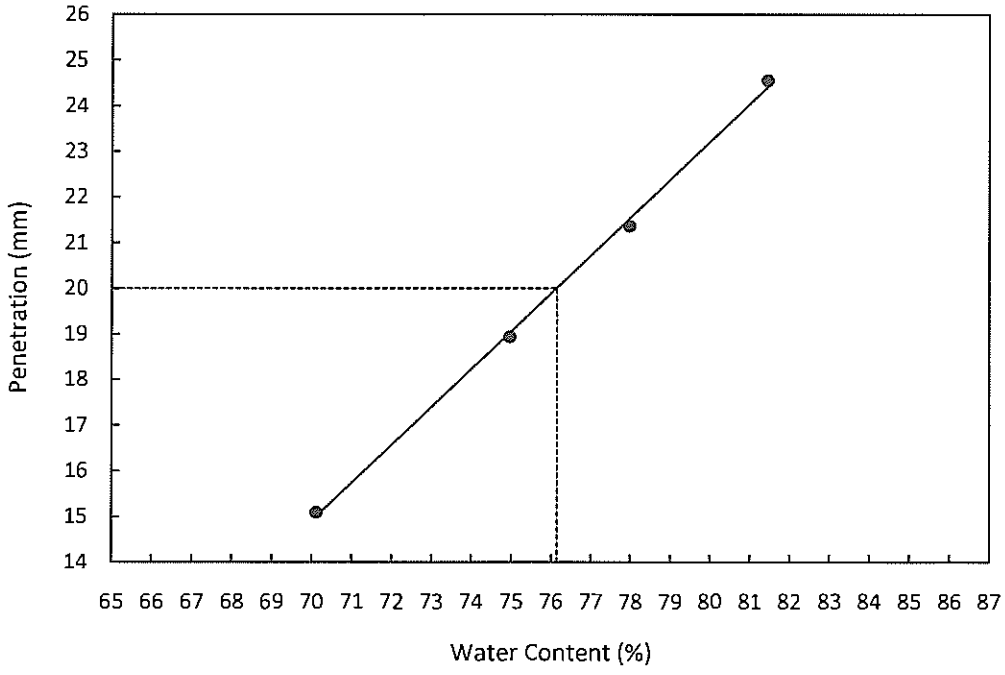
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & S)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Greenish grey and light yellow slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 59
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.12	20.42	20.78	20.55	20.18	20.41
DRY WEIGHT + CUP	(g)	15.17	15.54	15.54	14.93	16.66	16.92
CUP WEIGHT	(g)	8.11	9.03	8.82	8.03	8.10	8.39
WATER CONTENT	(%)	70.1	75.0	78.0	81.4	41.1	40.9
PENETRATION	(mm)	15.1	18.9	21.4	24.6	-	-

LIQUID LIMIT	(%)	**76.2**
PLASTIC LIMIT	(%)	**41.0**
PLASTICITY INDEX		**35**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

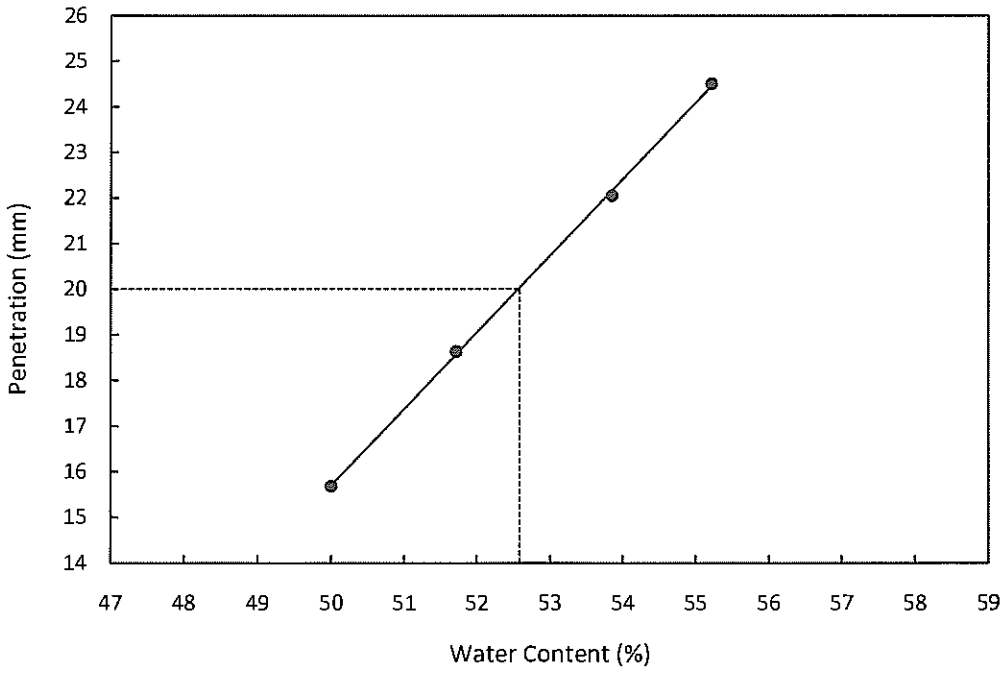
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & S)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Greenish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 97
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.11	20.71	20.78	20.37	20.43	20.41
DRY WEIGHT + CUP	(g)	16.39	16.62	16.72	16.45	17.67	17.72
CUP WEIGHT	(g)	8.95	8.71	9.18	9.35	8.92	9.25
WATER CONTENT	(%)	50.0	51.7	53.8	55.2	31.5	31.8
PENETRATION	(mm)	15.7	18.6	22.1	24.5	-	-

LIQUID LIMIT	(%)	**52.6**
PLASTIC LIMIT	(%)	**31.7**
PLASTICITY INDEX		**21**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

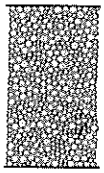


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

Total Stress Triaxial Compression

Unconsolidated Undrained

Summary Report

Sample Details				
 *sketch showing specimen location in original sample*	Depth			8.00-8.90m
	Description			Firm yellowish brown, red and light grey slightly sandy slightly gravelly SILT
	Type			Undisturbed Sample
	Initial Sample Length	L_0	(mm)	75.6
	Initial Sample Diameter	D_0	(mm)	38.0
	Initial Sample Weight	W_0	(gr)	164.2
	Bulk Density	ρ_0	(Mg/m3)	1.92
	Particle Density	ρ_s	(Mg/m3)	2.66

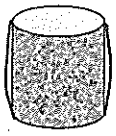
Initial Conditions			
Specimen			
Initial Cell Pressure	σ_3	(kPa)	150
Strain Rate	m_s	(mm/min)	0.76000
MembraneThickness	m_b	(mm)	0.20
Initial Moisture	$\omega_i\%$	(%)	32
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.45
Initial Voids Ratio	e_0	.	0.84
Initial Degree of Saturation	S_o	(%)	100

Final Conditions			
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	99.73
MembraneCorrection	m_c	(kPa)	1.970
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.74
Shear Strength	c_u	(kPa)	49.87
Final Moisture	$\omega_f\%$	(%)	32
Final Dry Density	ρ_{df}	(Mg/m3)	1.45
Final Voids Ratio	e_f	.	0.84
Final Degree of Saturation	S_f	(%)	100.0

Notes

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

Only one specimen tested due to insufficient sample.



Failure Sketch

(surface inclination)

Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU3-SungeiTengah-B5T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

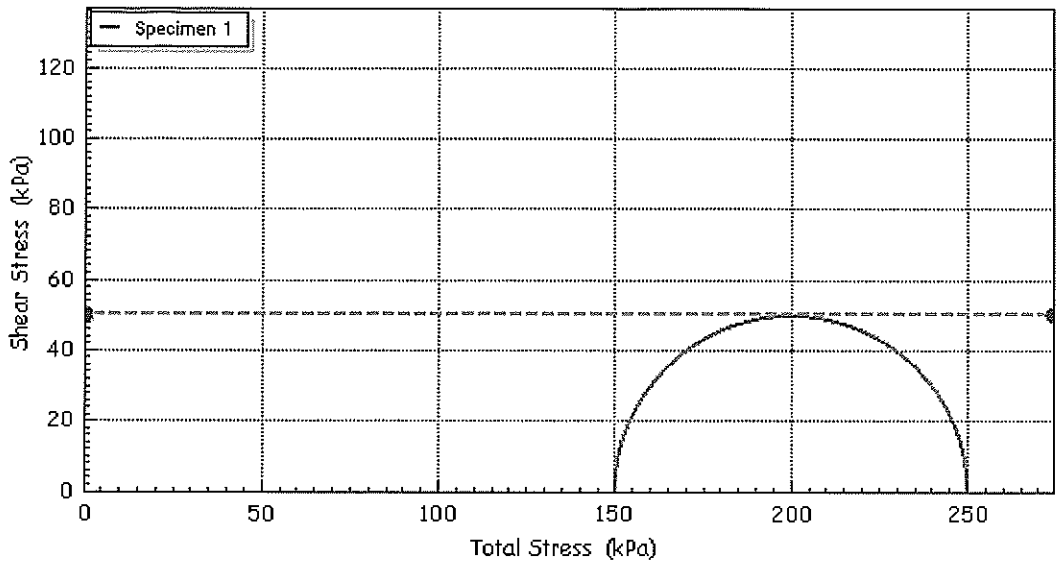
Ryobi Geotechnique International Pte Ltd

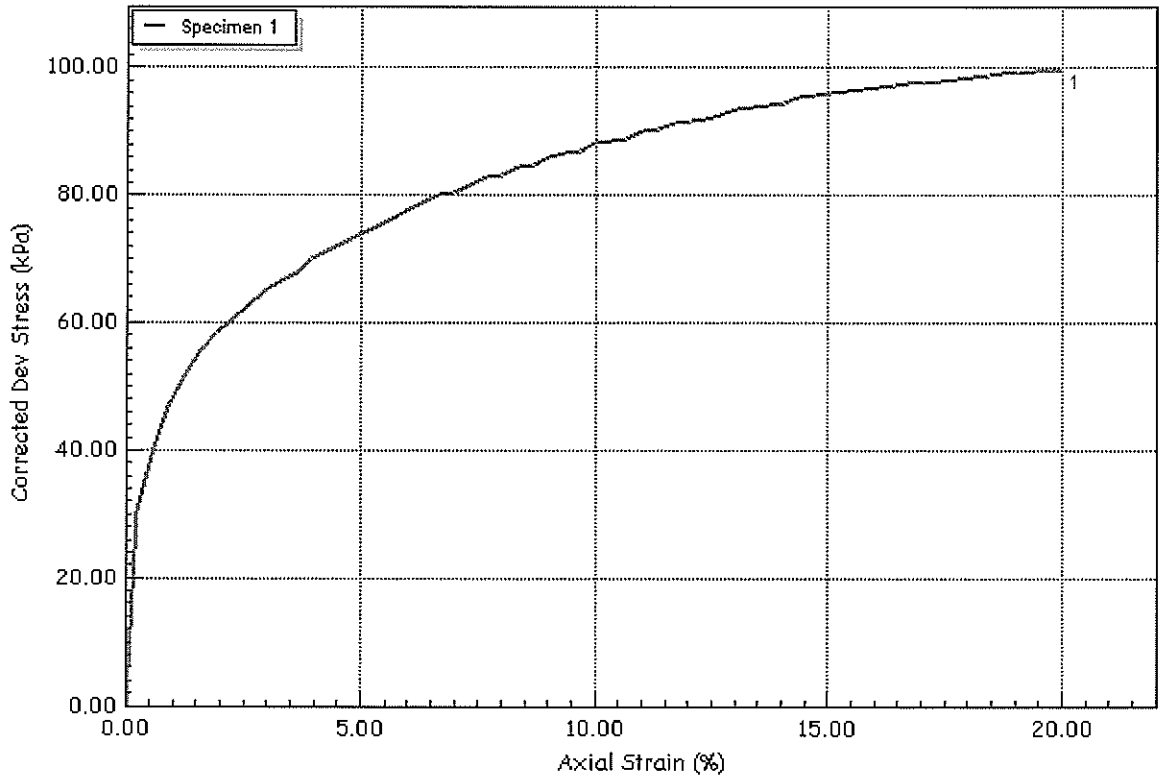
Total Stress Triaxial Compression

Unconsolidated Undrained

Test Results Plots

Cohesion Level	c	(kPa)	49.9
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU3-SungeiTengah-B5T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

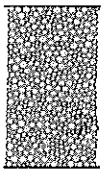
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Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Firm greenish grey and light yellow slightly gravelly slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	156.7	156.7	159.9
	Bulk Density	ρ_0 (Mg/m3)	1.83	1.83	1.86
	Particle Density	ρ_s (Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	43	43	38
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.28	1.28	1.35
Initial Voids Ratio	e_0	.	1.07	1.07	0.96
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	113.17	160.29	142.58
MembraneCorrection	m_c	(kPa)	1.980	1.550	0.910
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.88	14.27	7.01
Shear Strength	c_u	(kPa)	56.59	80.14	71.29
Final Moisture	$\omega_f\%$	(%)	43	43	38
Final Dry Density	ρ_{df}	(Mg/m3)	1.28	1.28	1.35
Final Voids Ratio	e_f	.	1.07	1.07	0.96
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-SungeiTengah-B5T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

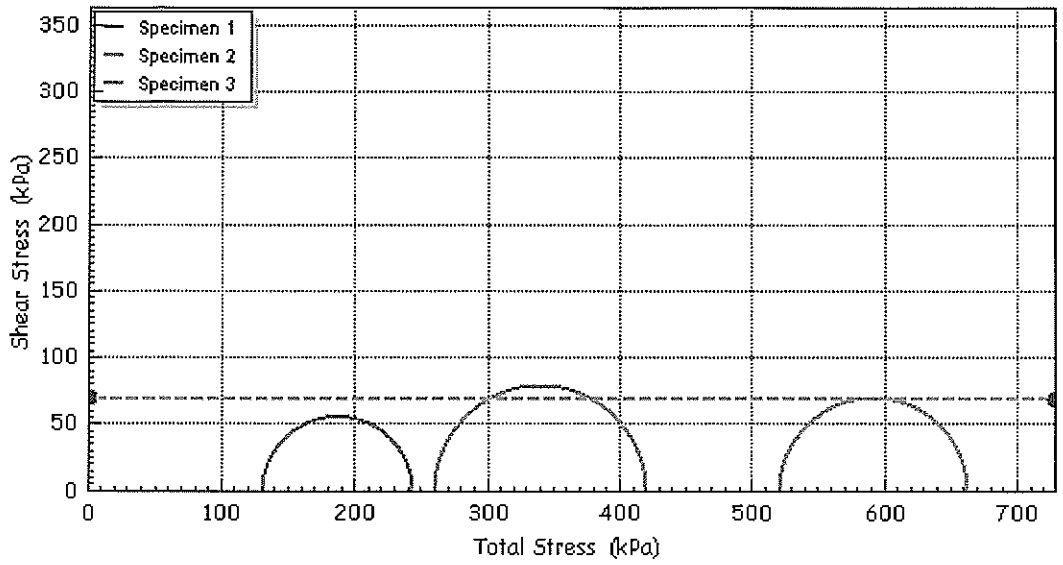
Ryobi Geotechnique International Pte Ltd

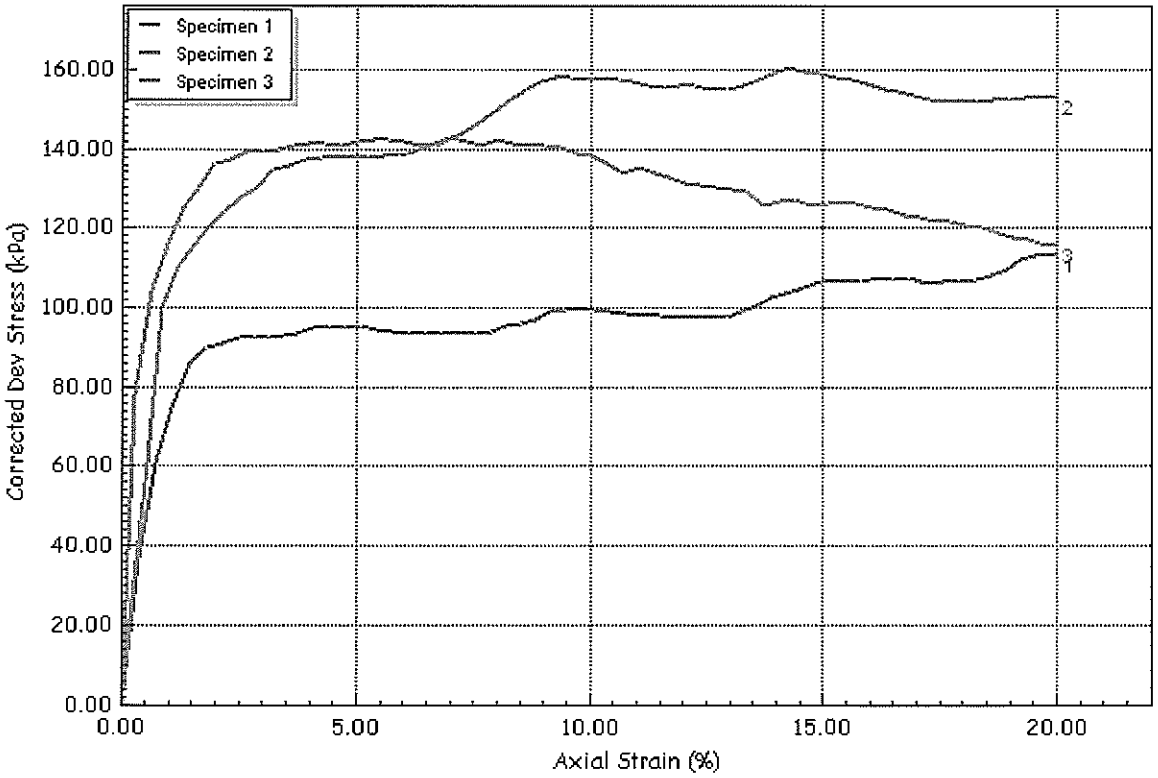
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	69.3
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-SungeiTengah-B5T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Keng

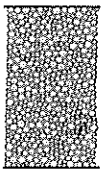
ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA 2016-0023 B

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

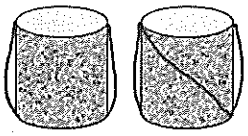
Sample Details					
 *sketch showing specimen location in original sample*	Depth			20.00-20.90m	
	Description			Stiff greenish grey slightly gravelly slightly sandy SILT	
	Type			Undisturbed Sample	
				Spm. 1	2
	Initial Sample Length	L_0	(mm)	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0
	Initial Sample Weight	W_0	(gr)	163.7	171.9
	Bulk Density	ρ_0	(Mg/m3)	1.91	2.00
	Particle Density	ρ_s	(Mg/m3)	2.68	2.68

Initial Conditions				
Specimen			Spm. 1	2
Initial Cell Pressure	σ_3	(kPa)	190	380
Strain Rate	m_s	(mm/min)	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	39	33
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.38	1.51
Initial Voids Ratio	e_0	.	0.95	0.77
Initial Degree of Saturation	S_o	(%)	100	100

Final Conditions				
			Spm. 1	2
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	226.75	269.71
MembraneCorrection	m_c	(kPa)	1.990	1.730
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.93	16.57
Shear Strength	c_u	(kPa)	113.38	134.85
Final Moisture	$\omega_f\%$	(%)	39	33
Final Dry Density	ρ_{df}	(Mg/m3)	1.38	1.51
Final Voids Ratio	e_f	.	0.95	0.77
Final Degree of Saturation	S_f	(%)	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	UU2-SungeiTengah-B5T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

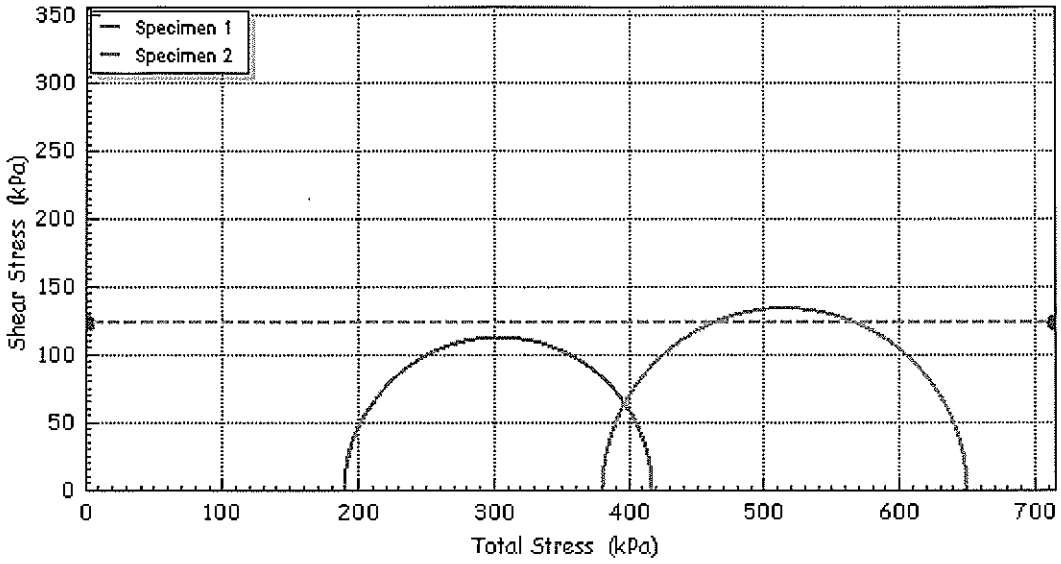
Ryobi Geotechnique International Pte Ltd

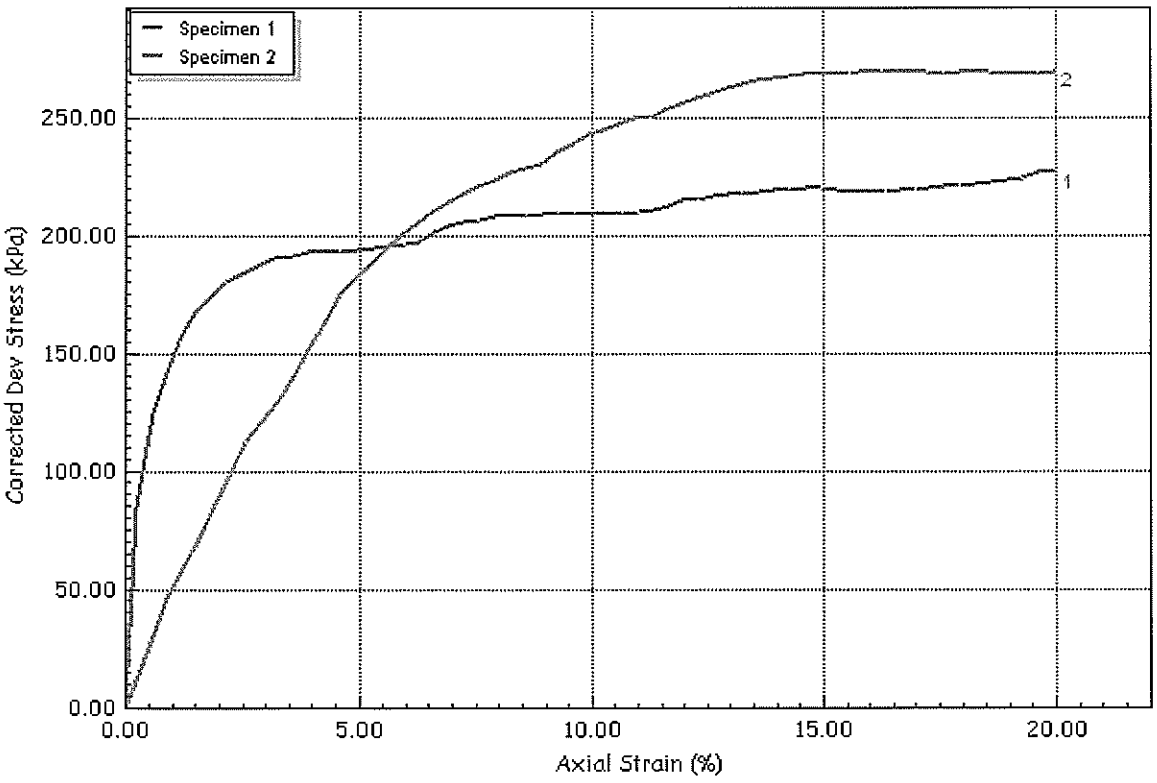
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	124.1
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-SungeiTengah-B5T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

ACCREDITED LABORATORY SAC-SINGLAS
Cert No: LA-1993-0084-A
Cert No: LA-2000-01YER

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-001**	**SG1813957-002**	**SG1813957-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-004**	**SG1813957-005**	**SG1813957-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	---	---
				Sampling date/time	04-Sep-2018 00:00	---	---
Compound	*Method*	*LOR*	*Unit*		**SG1813957-007**	-------	-------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	---	---
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	---	---
Organic Matter	BS1377	0.1	% DW		<0.1	---	---
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	---	---

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813956**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 04-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 2	No. of samples analysed	: 2

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	BH5	BH7	-----
			Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*	**SG1813956-001**	**SG1813956-002**	--------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	11.4	10.0	----
INORGANICS - Nonmetallic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.04	0.04	----
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.04	0.04	----
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH5A						
SAMPLE NO :			SPT1	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	2.00-2.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	22.1	-	34.2	-	30.9	-	24.4
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.83	1.84	1.79	-	-	1.97
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	2.65	-	2.66	-	-	2.67	2.65
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	47	31	25	-	28	29
	SAND	%	-		16	26	-	34	33
	SILT	%	-	26	33	30	-	38	32
	CLAY	%	-	27	20	19	-		6
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	84.9	-	(A)	-	69.5
	PLASTIC LIMIT	%		-	46.2	-		-	44.2
	PLASTICITY INDEX			-	39	-		-	25
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	**UU**
	TOTAL COHESION	kPa	-	-	41.2	-	-	-	144.6
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH5A						
SAMPLE NO :			SPT7	W1					
SAMPLE DEPTH :		m	14.90-15.35	Water Sample					
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-						
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-					
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	-	-					
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	-					
	SAND	%	-	-					
	SILT	%	-	-					
	CLAY	%	-	-					
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-					
	PLASTIC LIMIT	%	-	-					
	PLASTICITY INDEX		-	-					
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-					
	TOTAL COHESION	kPa	-	-					
	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	-	-					
CHEMICAL CONTENTS ANALYSIS	pH Value		7.5	-					
	Chloride Content	%	<0.01	-					
	Organic Content	%	0.2	-					
	Sulphate Content	%	<0.01	-					
	pH Value		-	8.6					
	Chloride Content	g/L	-	0.02					
	Organic Content	% (w/v)	-	<0.10					
	Sulphate Content	g/L	-	0.05					

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 : 17/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH5A	SPT1	2.00-2.45	22.1	-	-	2.65
BH5A	SPT3	6.00-6.45	-	1.83	-	-
BH5A	TW1	8.00-8.90	34.2	1.84	-	2.66
BH5A	SPT4	8.90-9.35	-	1.79	-	-
BH5A	SPT5	10.00-10.45	30.9	-	-	-
BH5A	SPT6	12.00-12.45	-	-	-	2.67
BH5A	TW2	14.00-14.90	24.4	1.97	-	2.65

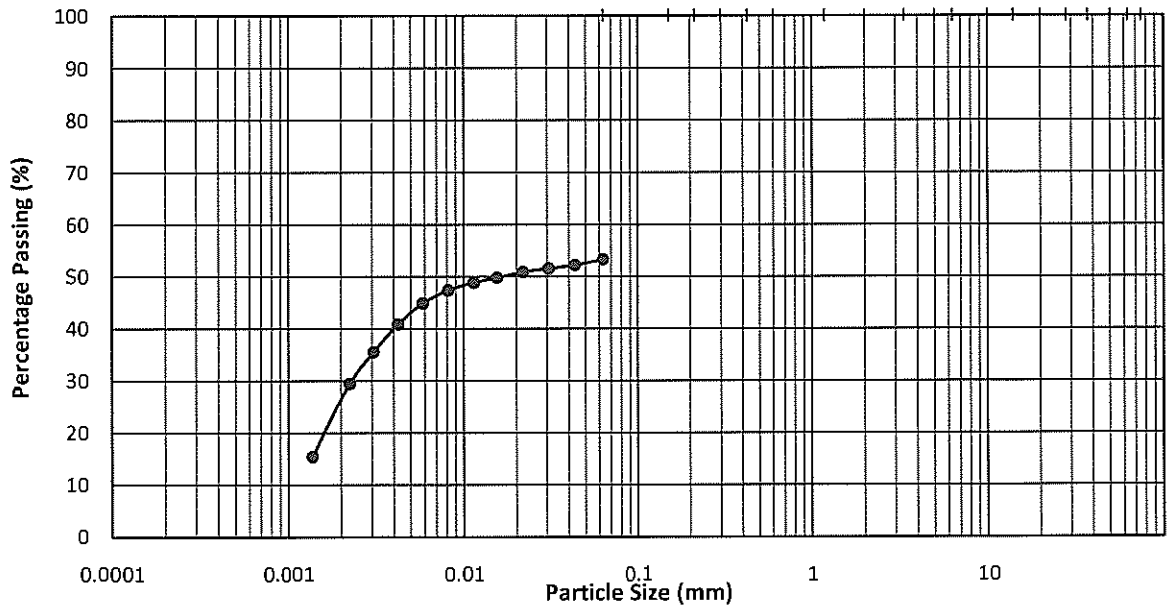
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: Monju Date : 05.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**47**	%
SILT	=	**26**	%
CLAY	=	**27**	%

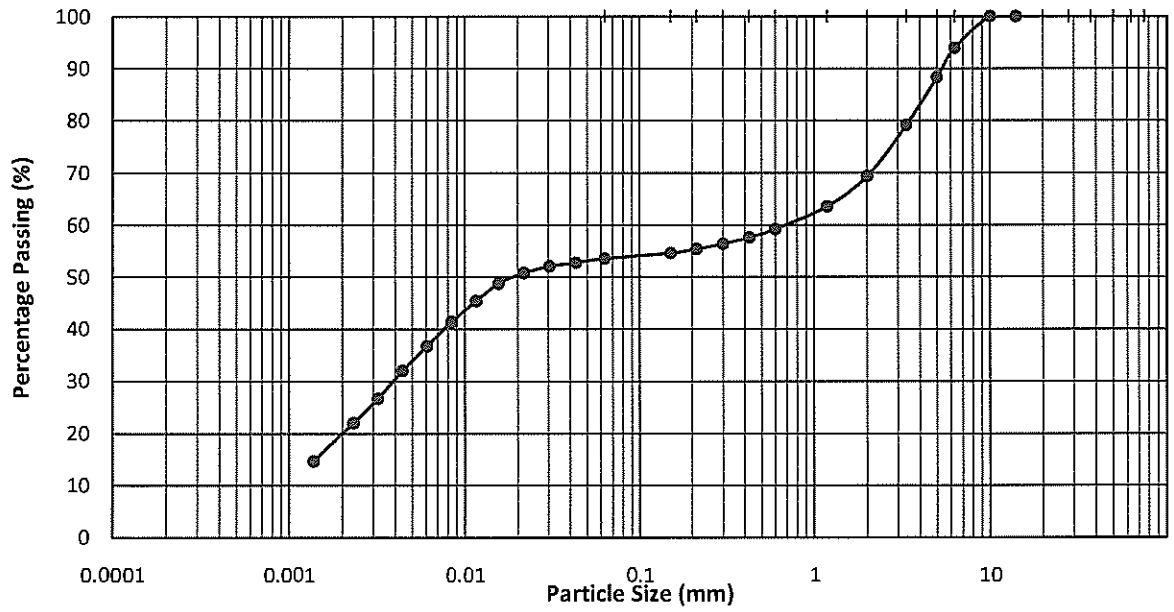
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory : Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Yellowish brown, light grey and red slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**31**	%
SAND	=	**16**	%
SILT	=	**33**	%
CLAY	=	**20**	%

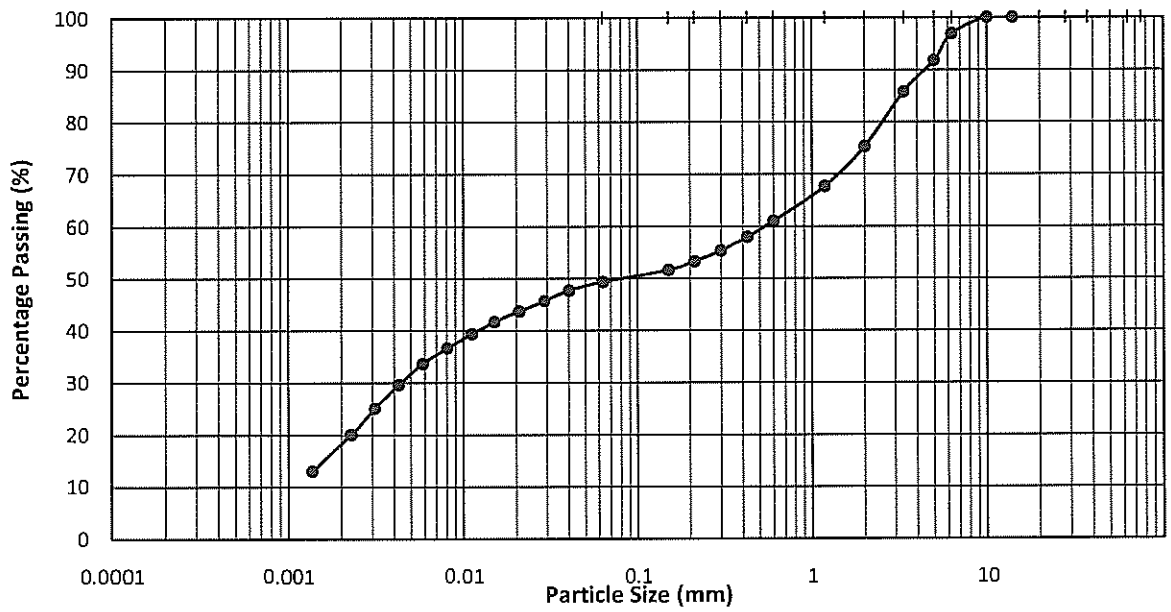
% of Passing 0.425 mm Sieve : 57.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Yellowish brown and red slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**25**	%
SAND	=	**26**	%
SILT	=	**30**	%
CLAY	=	**19**	%

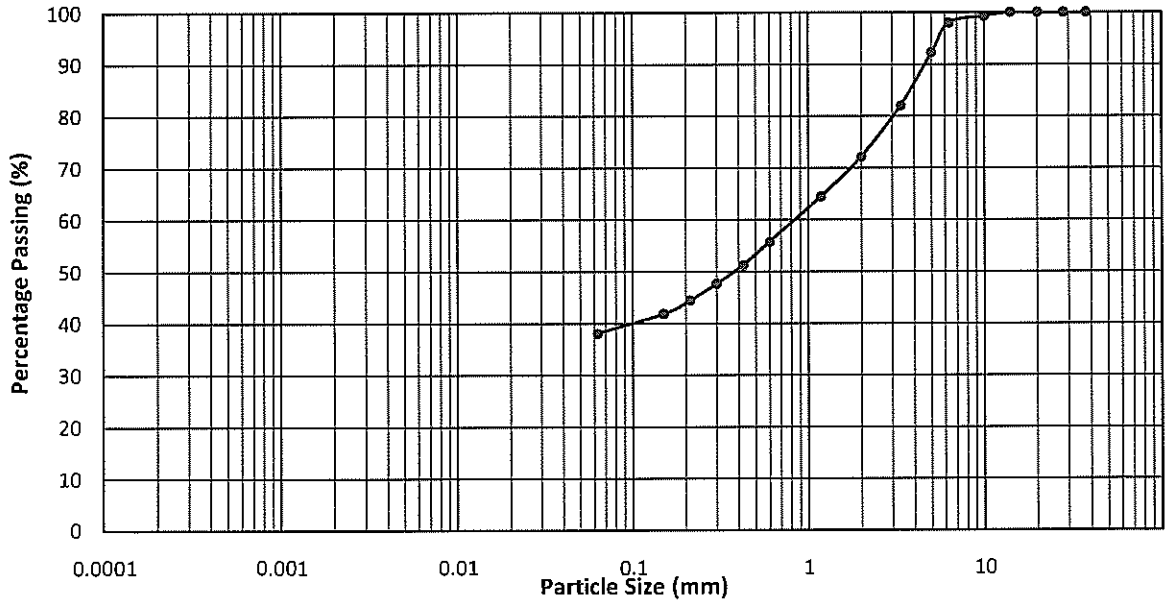
% of Passing 0.425 mm Sieve : 57.9

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 12.09.2018



SOIL DESCRIPTION : **Light grey and dark grey slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**28**	%
SAND	=	**34**	%
SILT + CLAY	=	**38**	%

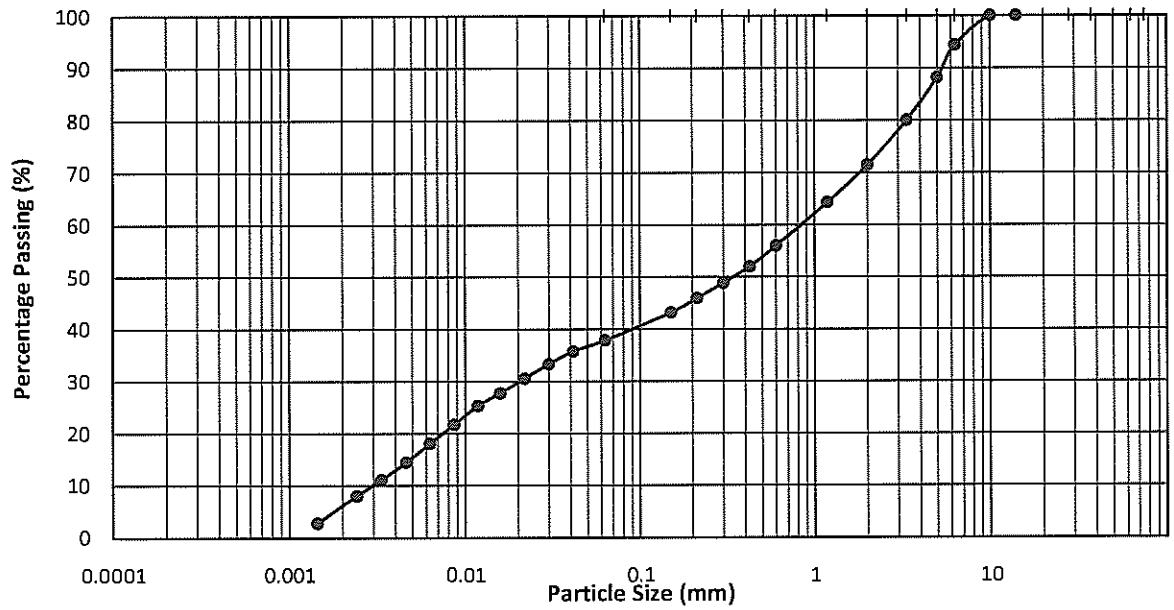
% of Passing 0.425 mm Sieve : 51.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Light grey and dark grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**29**	%
SAND	=	**33**	%
SILT	=	**32**	%
CLAY	=	**6**	%

% of Passing 0.425 mm Sieve : 52.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

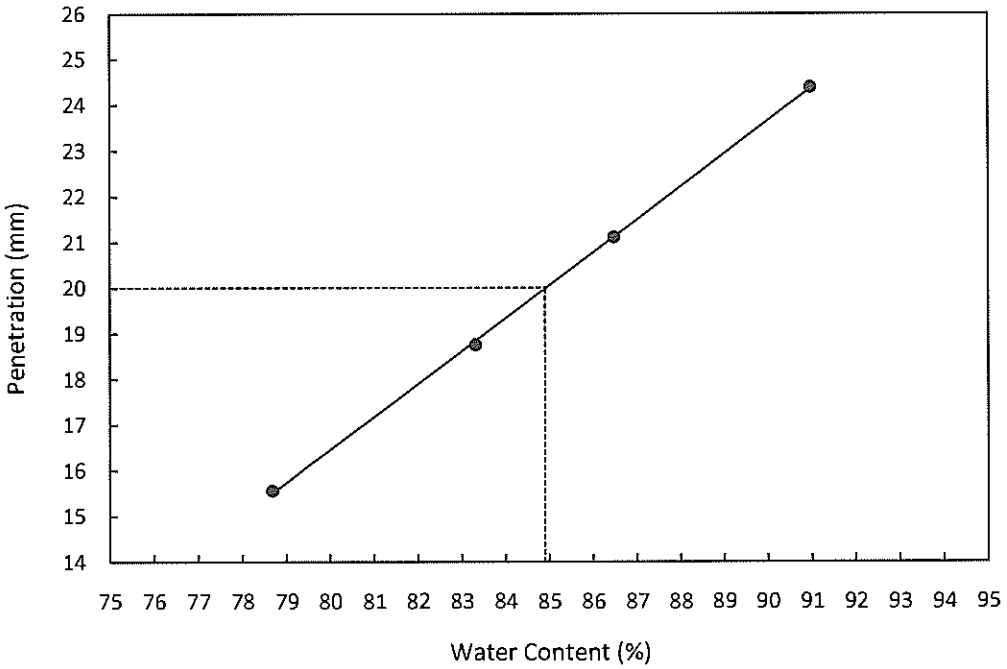
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Yellowish brown, light grey and red slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 53
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.52	20.22	20.09	20.23	20.66	20.47
DRY WEIGHT + CUP	(g)	15.54	15.18	14.53	14.59	17.10	16.67
CUP WEIGHT	(g)	9.21	9.13	8.10	8.39	9.37	8.46
WATER CONTENT	(%)	78.7	83.3	86.5	91.0	46.1	46.3
PENETRATION	(mm)	15.6	18.8	21.1	24.4	-	-

LIQUID LIMIT	(%)	**84.9**
PLASTIC LIMIT	(%)	**46.2**
PLASTICITY INDEX		**39**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

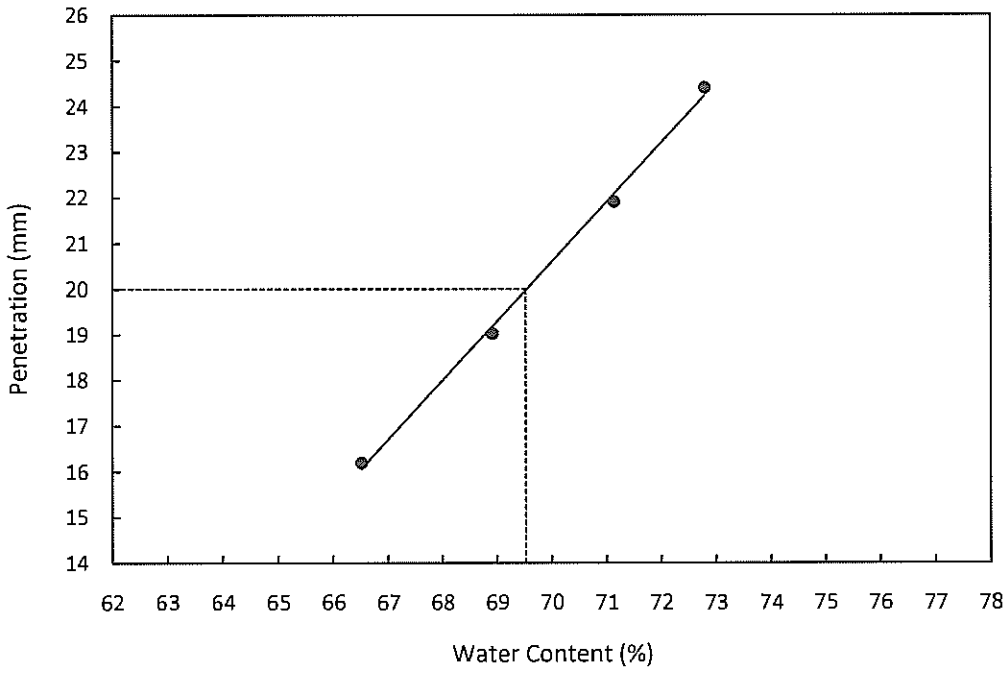
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH5A
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light grey and dark grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 43
TEST DATE	: 07.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.56	20.56	20.56	20.56	20.39	20.18
DRY WEIGHT + CUP	(g)	16.23	15.95	15.73	15.85	16.77	16.78
CUP WEIGHT	(g)	9.72	9.26	8.94	9.38	8.54	9.13
WATER CONTENT	(%)	66.5	68.9	71.1	72.8	44.0	44.4
PENETRATION	(mm)	16.2	19.0	21.9	24.4	-	-

LIQUID LIMIT	(%)	**69.5**
PLASTIC LIMIT	(%)	**44.2**
PLASTICITY INDEX		**25**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

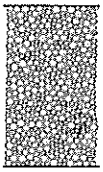


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Firm yellowish brown, light grey and red slightly sandy slightly gravelly SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	159.9	175.7	154.8
	Bulk Density	ρ_0	(Mg/m3)	1.86	2.05	1.81
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	35	36	38
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.38	1.50	1.31
Initial Voids Ratio	e_0	.	0.93	0.77	1.03
Initial Degree of Saturation	S_0	(%)	100	100	98

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	86.54	87.81	73.04
MembraneCorrection	m_c	(kPa)	1.990	1.840	1.970
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	18.07	19.75
Shear Strength	c_u	(kPa)	43.27	43.91	36.52
Final Moisture	$\omega_f\%$	(%)	35	36	38
Final Dry Density	ρ_{df}	(Mg/m3)	1.38	1.50	1.31
Final Voids Ratio	e_f	.	0.93	0.77	1.03
Final Degree of Saturation	S_f	(%)	100.0	100.0	97.9

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	UU2-SungeiTengah-B5AT1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS Cert No: CA-2016-0128

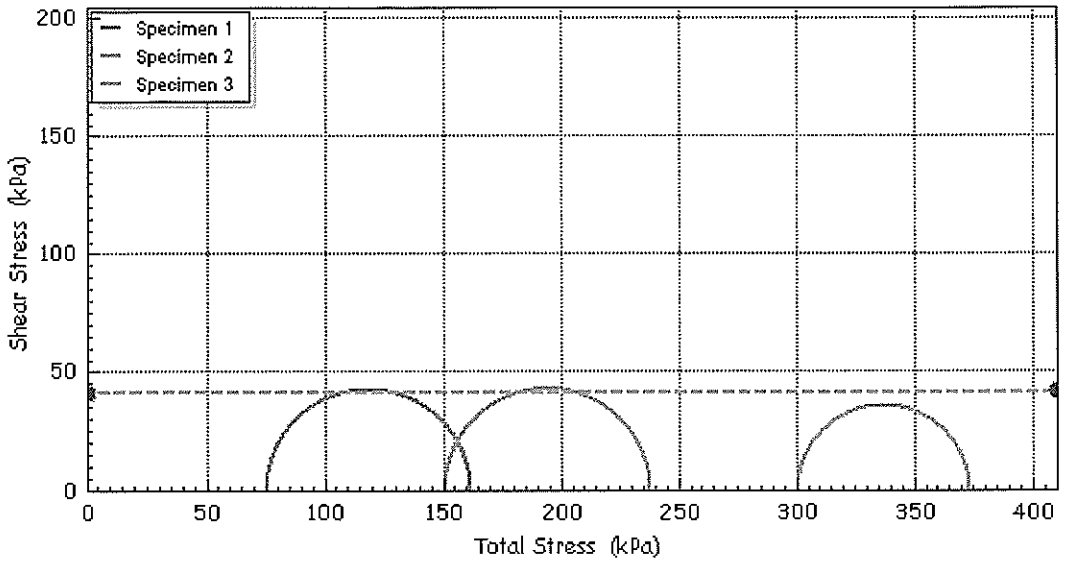
Ryobi Geotechnique International Pte Ltd

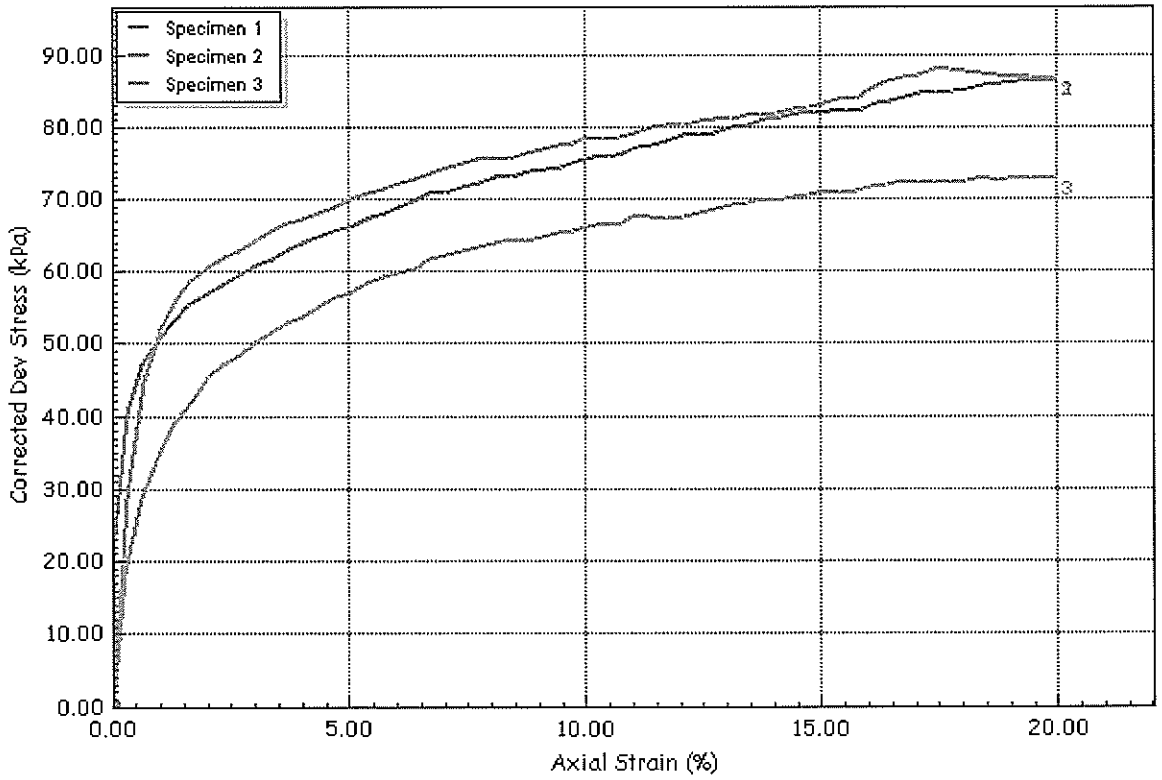
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	41.2
Friction Angle	ϕ	(deg)	0.0





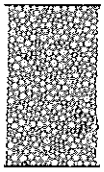
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-SungeiTengah-B5AT1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Yong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

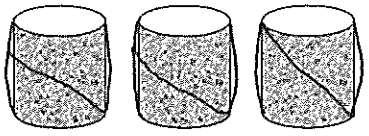
Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Stiff light grey and dark grey slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	170.9	169.5	167.0
	Bulk Density	ρ_0	(Mg/m3)	1.99	1.98	1.95
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	135	270	540
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	24	24	26
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.61	1.60	1.55
Initial Voids Ratio	e_0	.	0.65	0.66	0.71
Initial Degree of Saturation	S_o	(%)	98	96	96

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	258.12	249.61	359.65
MembraneCorrection	m_c	(kPa)	1.840	1.160	1.830
Strain At Max Stress	$\varepsilon_f\%$	(%)	17.92	9.66	17.91
Shear Strength	c_u	(kPa)	129.06	124.80	179.82
Final Moisture	$\omega_f\%$	(%)	24	24	26
Final Dry Density	ρ_{df}	(Mg/m3)	1.61	1.60	1.55
Final Voids Ratio	e_f	.	0.65	0.66	0.71
Final Degree of Saturation	S_f	(%)	98.3	95.7	95.6

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	UU3-SungeiTengah-B5AT2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

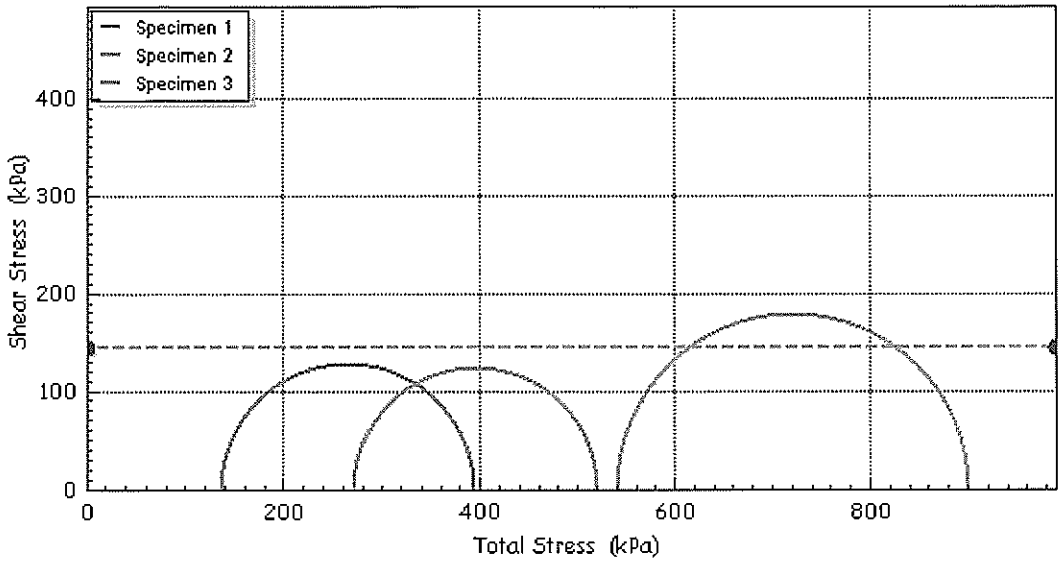
Ryobi Geotechnique International Pte Ltd

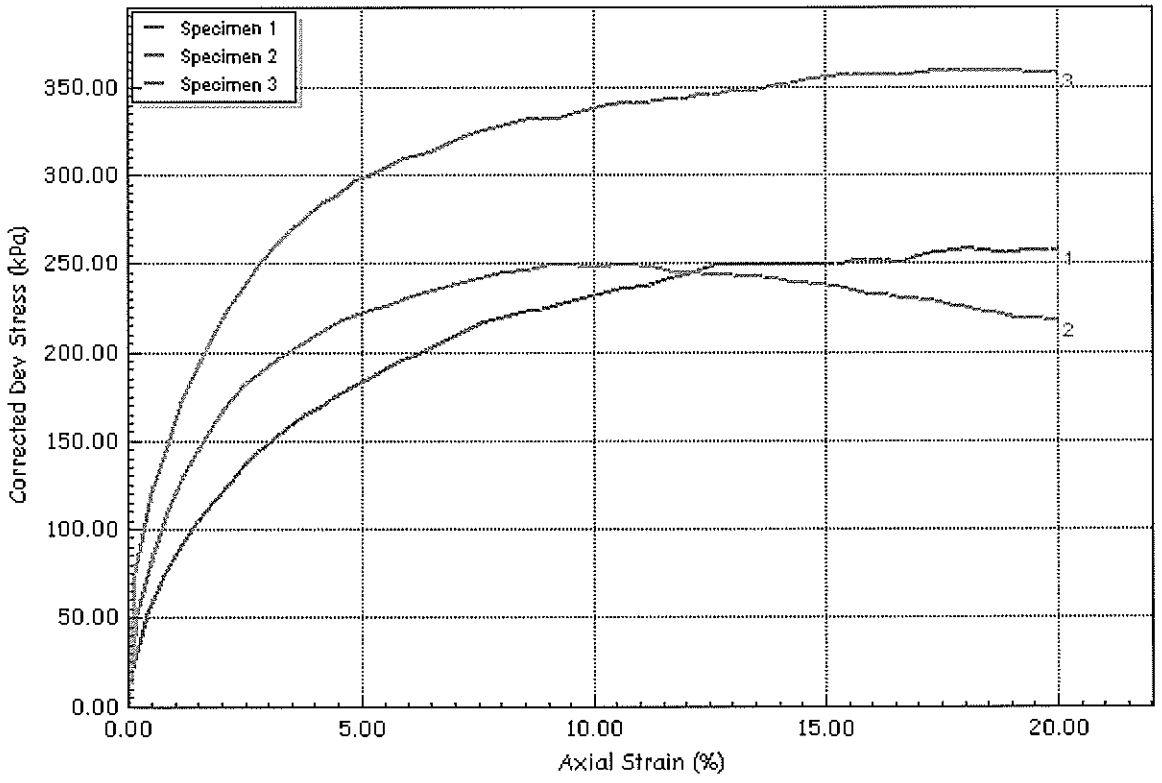
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	144.6
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU3-SungeiTengah-B5AT2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH5A
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-001**	**SG1813957-002**	**SG1813957-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-004**	**SG1813957-005**	**SG1813957-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	---	---
				Sampling date/time	04-Sep-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1813957-007**	----------	----------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	----	----
Organic Matter	BS1377	0.1	% DW		<0.1	----	----
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814071**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 06-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 06-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 12-Sep-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: WATER			Client sample ID	BH3A	BH5A	BH 9
			Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*	**SG1814071-001**	**SG1814071-002**	**SG1814071-003**
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	8.5	8.6	9.0
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.03	0.02	0.04
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.06	0.05	0.04
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Sub-Matrix: WATER			Client sample ID	BH10	BH11	—
			Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*	**SG1814071-004**	**SG1814071-005**	--------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	9.0	8.7	----
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.03	0.02	----
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.04	0.05	----
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH6						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	17.8	-	60.8	-	-	-	45.2
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.65	1.66	-	1.67	-	1.81
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	-	-	2.65	2.69	-	2.65	2.68
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	0	0	6	-	32	0
	SAND	%	-	6	3		-	32	9
	SILT	%	-	94	63	63	-	36	77
	CLAY	%	-		34	31	-		14
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	86.1	-	81.7	-	48.8
	PLASTIC LIMIT	%		-	50.9	-	43.6	-	32.3
	PLASTICITY INDEX			-	35	-	38	-	16
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	**UU**
	TOTAL COHESION	kPa	-	-	59.5	-	-	-	58.9
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 07/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH6						
SAMPLE NO :			SPT7	SPT8	SPT9	TW3	SPT10	SPT11	SPT12
SAMPLE DEPTH :		m	14.90-15.35	16.00-16.90	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45	24.00-24.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	46.4	-	21.0	24.3	-	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	-	2.01	1.84	-	-
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	-	-	-	2.65	-	2.69	2.67
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	20	-	-	14	45	25	27
	SAND	%		-	-	42		40	36
	SILT	%	59	-	-	30	35	35	37
	CLAY	%	21	-	-	14	20		
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	(A)	59.6	-	-	(B)
	PLASTIC LIMIT	%	-	-		41.5	-	-	
	PLASTICITY INDEX		-	-		18	-	-	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	**UU**	-	-	-
	TOTAL COHESION	kPa	-	-	-	112.1	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	6.5	-	-	-	-	-
	Chloride Content	%	-	<0.01	-	-	-	-	-
	Organic Content	%	-	0.4	-	-	-	-	-
	Sulphate Content	%	-	<0.01	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.
(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 07/09/2018

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ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH6						
SAMPLE NO :			SPT13	W1					
SAMPLE DEPTH :		m	26.00-26.23	Water Sample					
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	26.7						
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	(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	-	-					
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	61	-					
	SAND	%		-					
	SILT	%	24	-					
	CLAY	%	15	-					
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-					
	PLASTIC LIMIT	%	-	-					
	PLASTICITY INDEX		-	-					
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-					
	TOTAL COHESION	kPa	-	-					
	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	-	-					
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-					
	Chloride Content	%	-	-					
	Organic Content	%	-	-					
	Sulphate Content	%	-	-					
	pH Value		-	11.7					
	Chloride Content	g/L	-	0.05					
	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 :

(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 07/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH6	SPT2	4.00-4.45	17.8	-	-	-
BH6	SPT3	6.00-6.45	-	1.65	-	-
BH6	TW1	8.00-8.90	60.8	1.66	-	2.65
BH6	SPT4	8.90-9.35	-	-	-	2.69
BH6	SPT5	10.00-10.45	-	1.67	-	-
BH6	SPT6	12.00-12.45	-	-	-	2.65
BH6	TW2	14.00-14.90	45.2	1.81	-	2.68
BH6	SPT7	14.90-15.35	46.4	-	-	-
BH6	SPT9	18.00-18.45	21.0	-	-	-
BH6	TW3	20.00-20.90	24.3	2.01	-	2.65
BH6	SPT10	20.90-21.35	-	1.84	-	-
BH6	SPT11	22.00-22.45	-	-	-	2.69
BH6	SPT12	24.00-24.45	-	-	-	2.67
BH6	SPT13	26.00-26.23	26.7	-	-	-

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)

TESTED BY: MONTU
Date : 29.08.2018

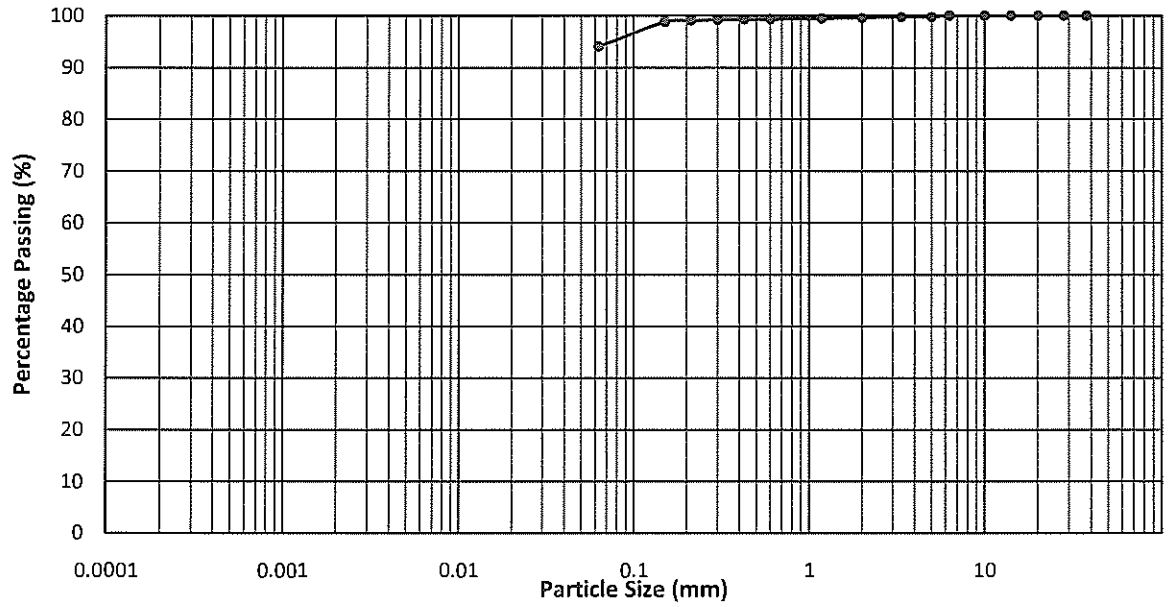
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Whitish grey and yellowish brown slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**6**	%
SILT + CLAY	=	**94**	%

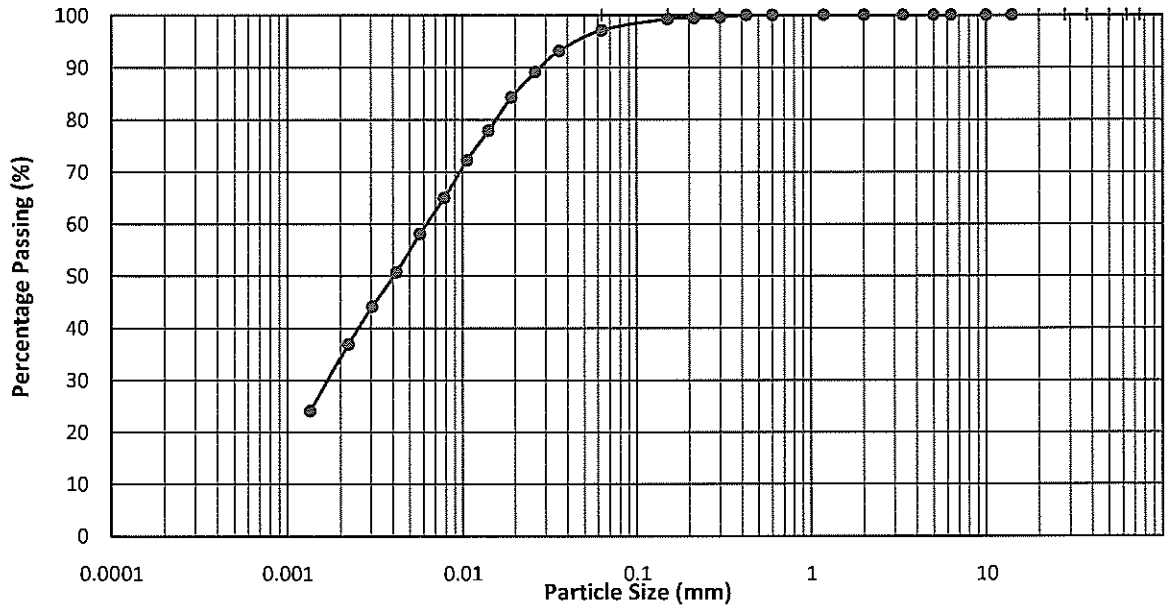
% of Passing 0.425 mm Sieve : 99.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Yellow and reddish brown slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**3**	%
SILT	=	**63**	%
CLAY	=	**34**	%

% of Passing 0.425 mm Sieve : 100.0

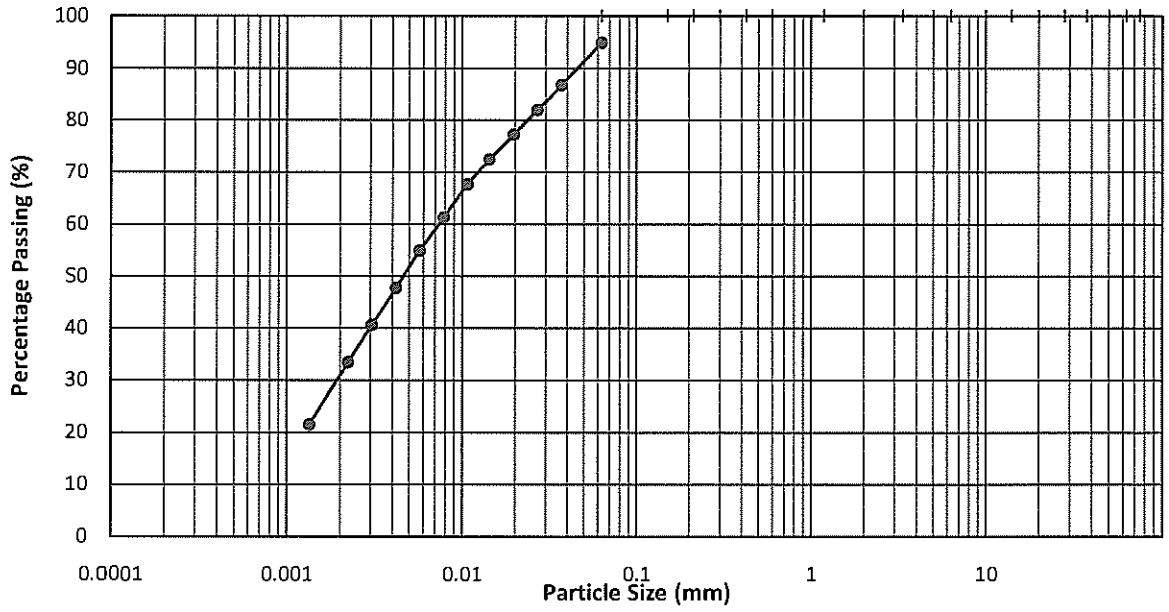
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

ACCREDITED LABORATORY SAC-SINGLAS

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**6**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**63**	%	
CLAY	=	**31**	%	

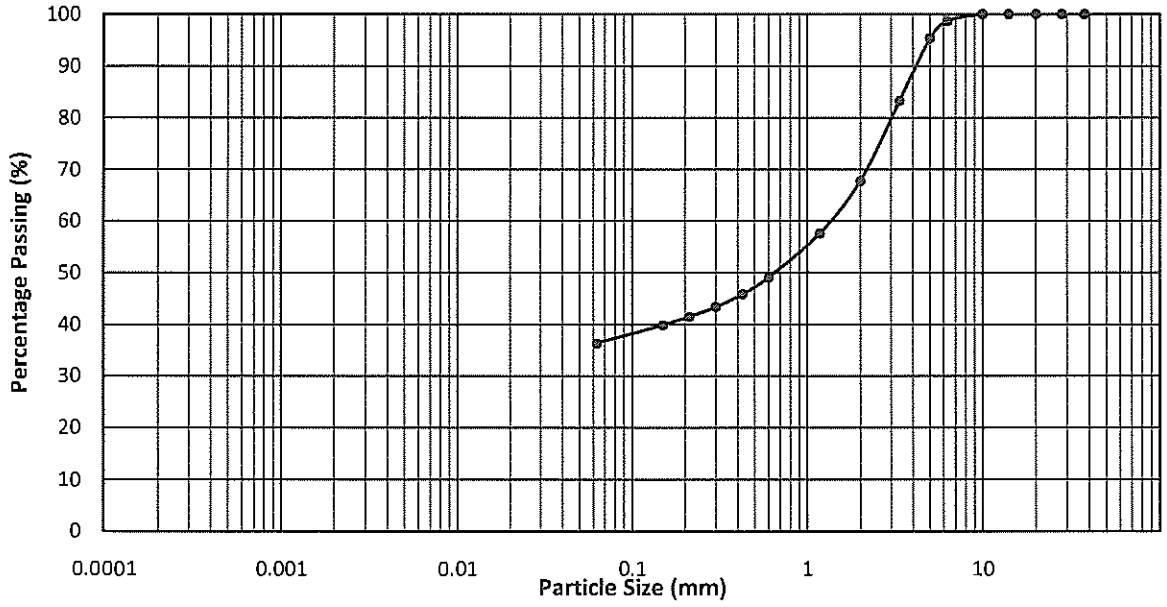
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2018-03213-R

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**32**	%	
SAND	=	**32**	%	% of Passing 0.425 mm Sieve : 45.8
SILT + CLAY	=	**36**	%	

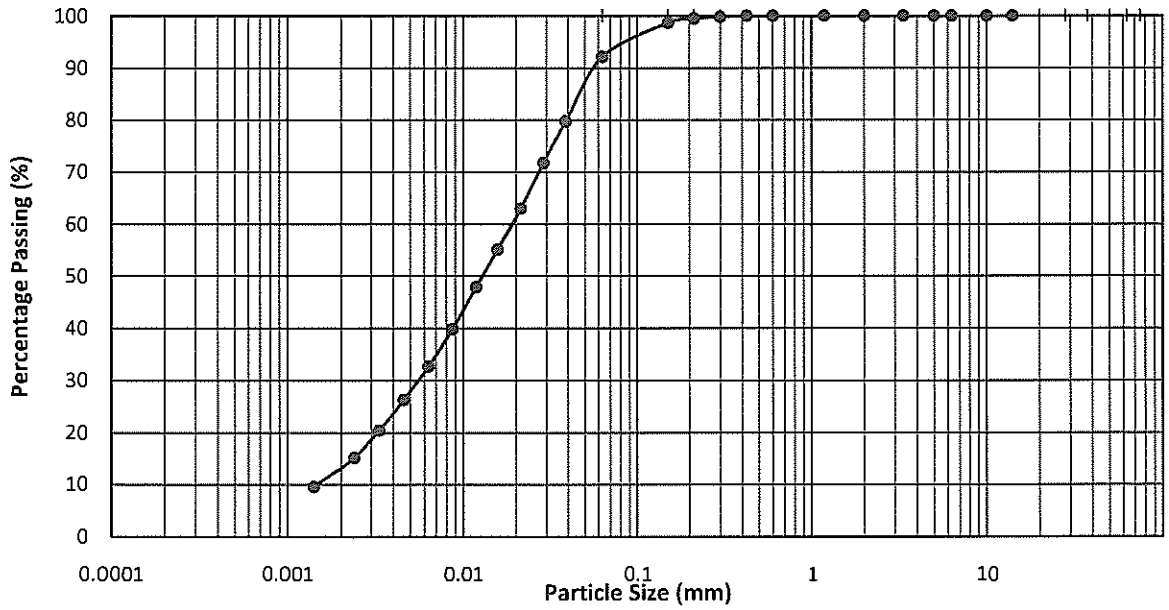
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

ACCREDITED LABORATORY SAC-SINGLAS

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 05.09.2018



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

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

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**9**	%
SILT	=	**77**	%
CLAY	=	**14**	%

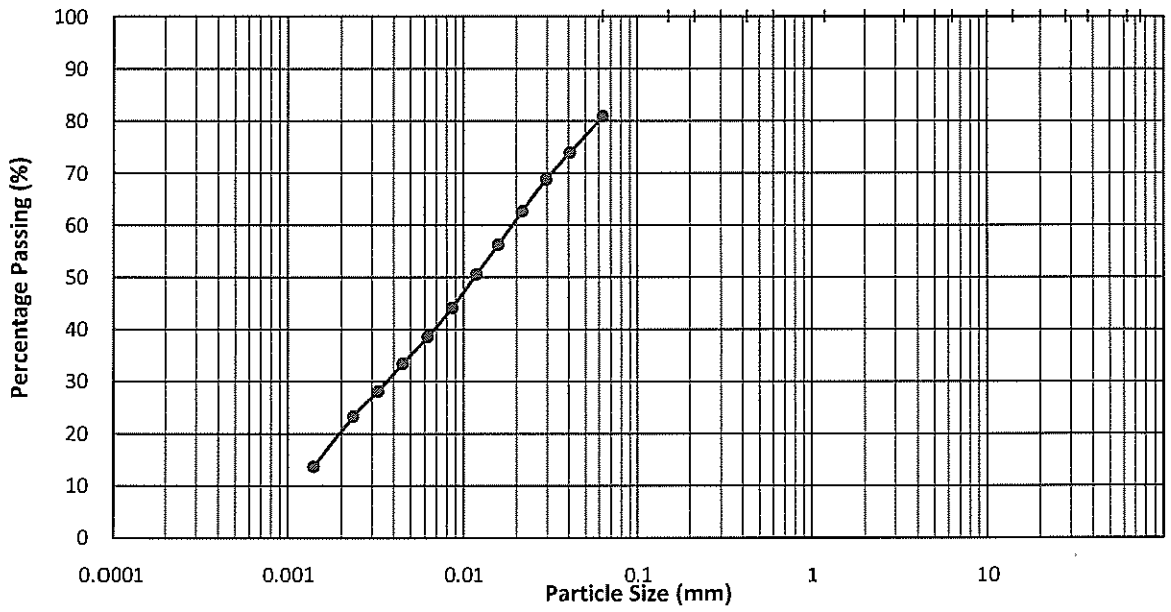
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Greenish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**20**	%
SILT	=	**59**	%
CLAY	=	**21**	%

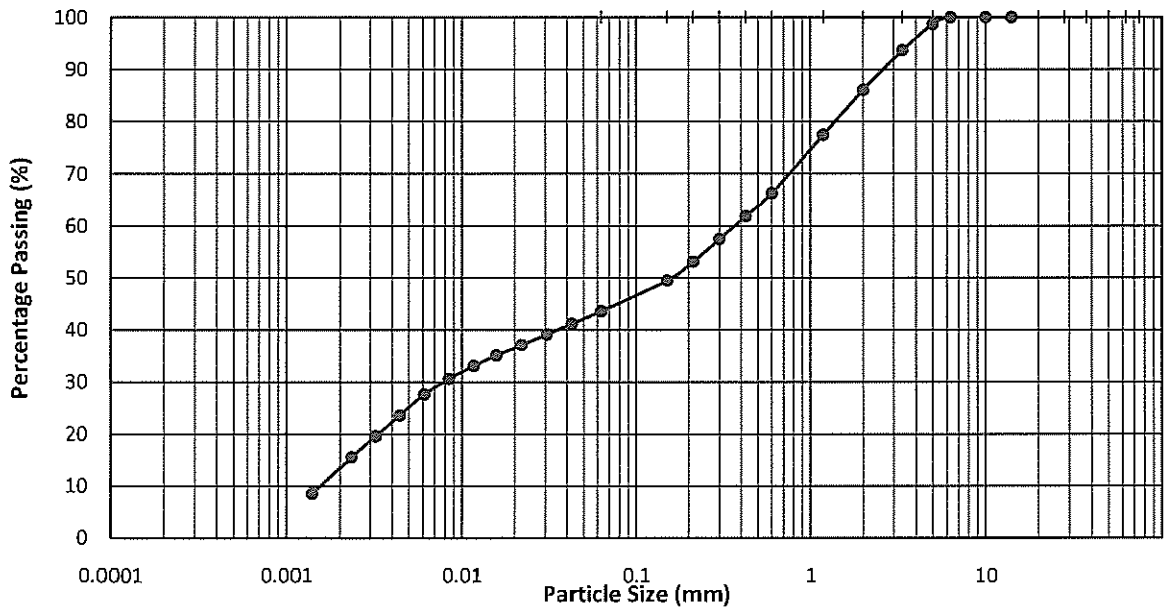
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Light yellowish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**14**	%
SAND	=	**42**	%
SILT	=	**30**	%
CLAY	=	**14**	%

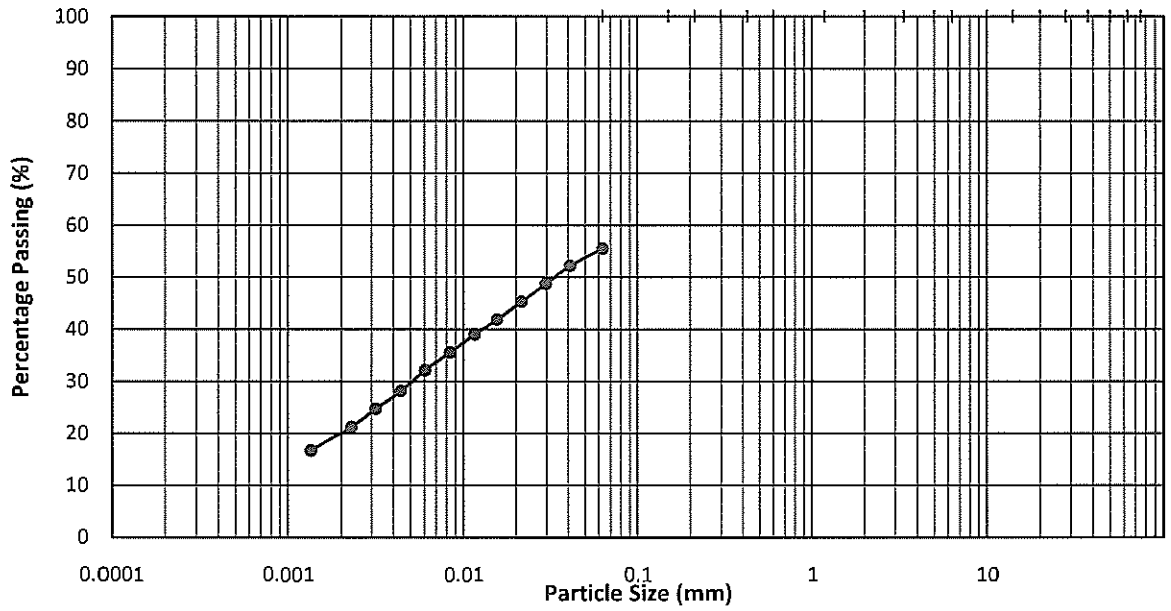
% of Passing 0.425 mm Sieve : 61.9

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT10
DEPTH (m)	: 20.90-21.35m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Light yellowish grey and dark grey sandy SILT**

HYDROMETER + SIEVING

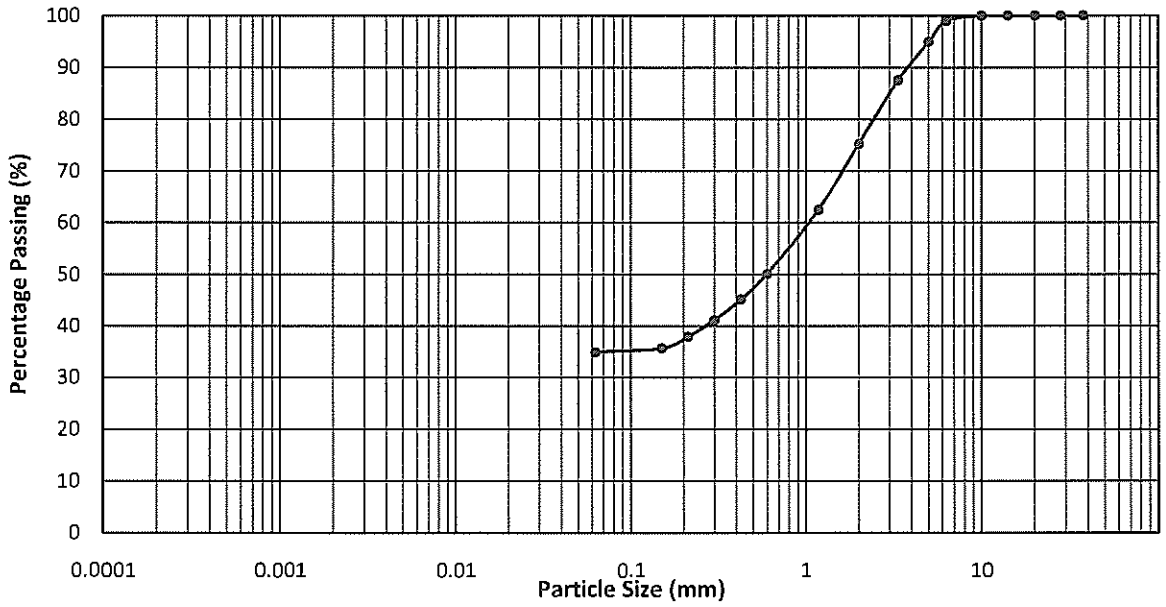
GRAVEL + SAND	=	**45**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**35**	%	
CLAY	=	**20**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.45m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Light yellowish grey and dark grey slightly gravelly sandy SILT**

SIEVING TEST

GRAVEL	=	**25**	%	
SAND	=	**40**	%	% of Passing 0.425 mm Sieve : 45.1
SILT + CLAY	=	**35**	%	

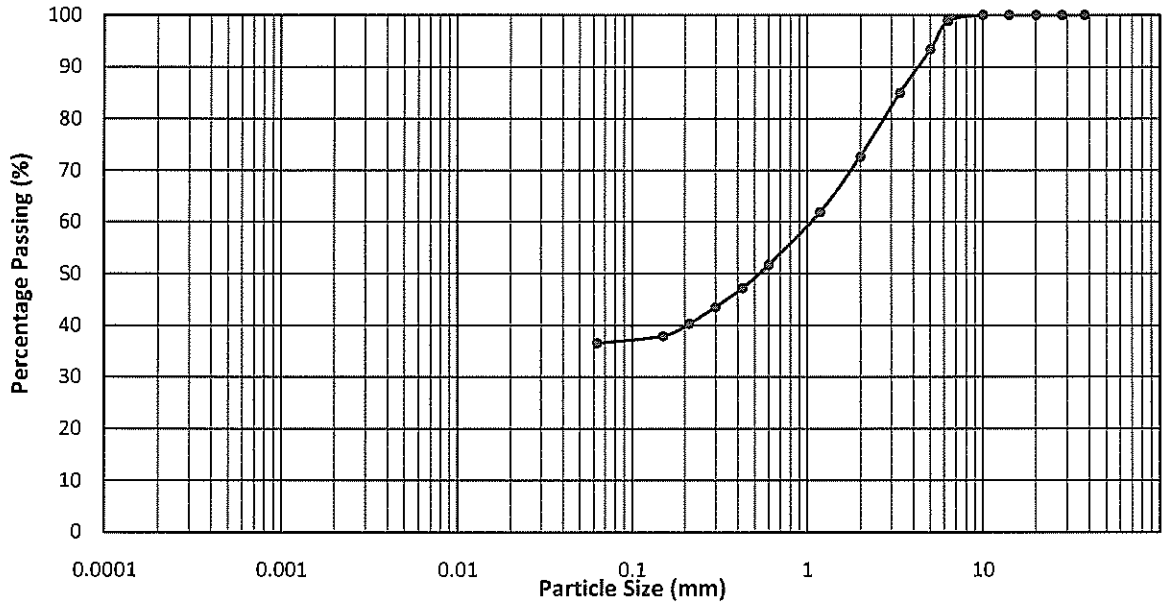
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-00233-II

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT12
DEPTH (m)	: 24.00-24.45m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly sandy SILT**

SIEVING TEST

GRAVEL	=	**27**	%	
SAND	=	**36**	%	% of Passing 0.425 mm Sieve : 47.2
SILT + CLAY	=	**37**	%	

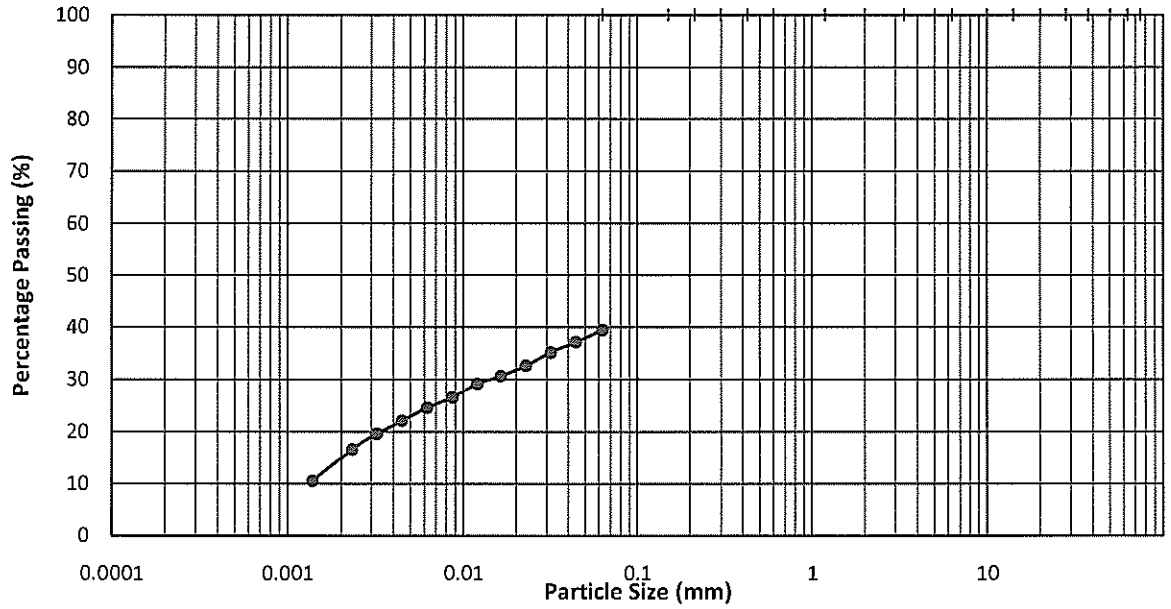
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA 2018-0023-B

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT13
DEPTH (m)	: 26.00-26.23m
TEST DATE	: 04.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**61**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**24**	%	
CLAY	=	**15**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

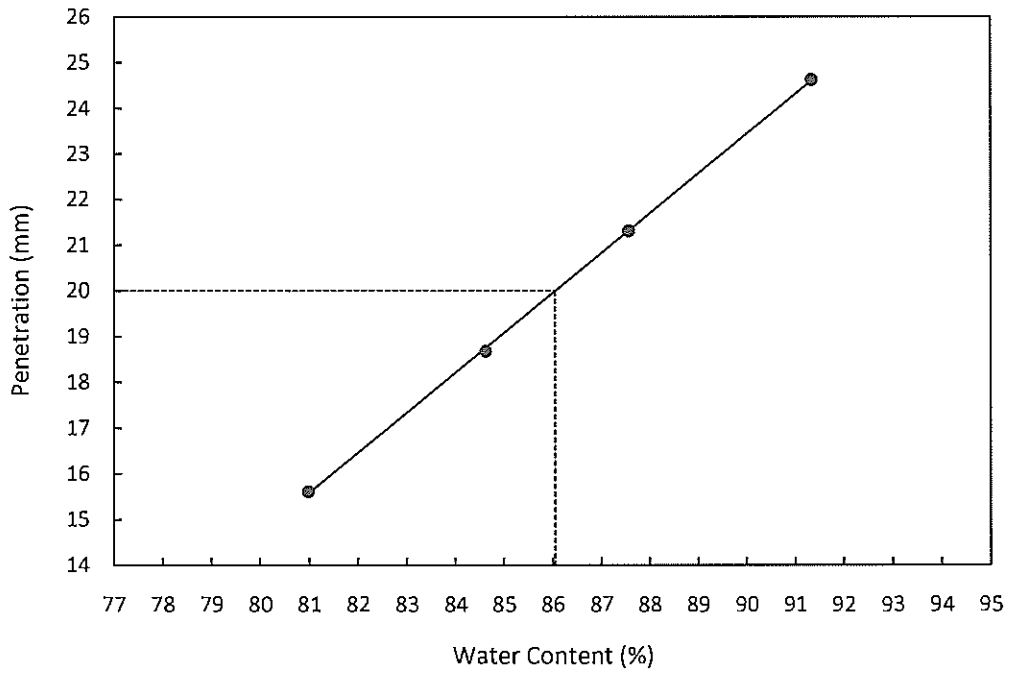
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Yellow and reddish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.62	20.28	20.22	20.93	20.04	20.13
DRY WEIGHT + CUP	(g)	14.79	15.11	15.08	14.82	16.32	16.50
CUP WEIGHT	(g)	7.59	9.00	9.21	8.13	9.03	9.35
WATER CONTENT	(%)	81.0	84.6	87.6	91.3	51.0	50.8
PENETRATION	(mm)	15.6	18.7	21.3	24.6	-	-

LIQUID LIMIT	(%)	**86.1**
PLASTIC LIMIT	(%)	**50.9**
PLASTICITY INDEX		**35**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

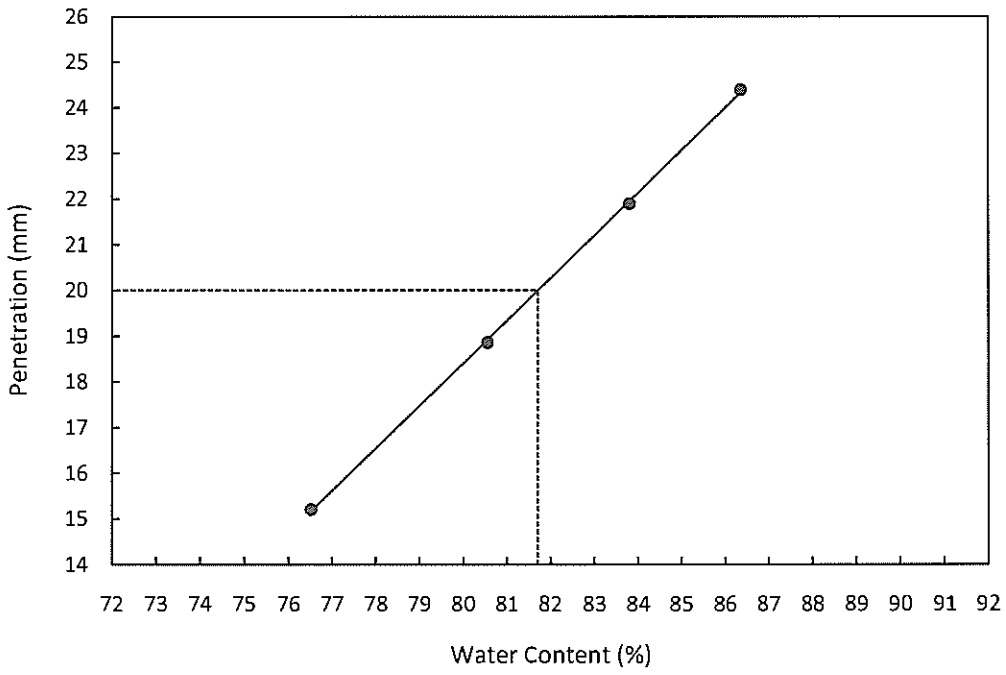
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: SPT5
DEPTH(M)	: 10.00-10.45m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.38	20.13	20.10	20.20	20.26	20.48
DRY WEIGHT + CUP	(g)	15.46	14.83	15.03	14.76	16.63	16.85
CUP WEIGHT	(g)	9.03	8.25	8.98	8.46	8.30	8.52
WATER CONTENT	(%)	76.5	80.5	83.8	86.3	43.6	43.6
PENETRATION	(mm)	15.2	18.9	21.9	24.4	-	-

LIQUID LIMIT	(%)	**81.7**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**43.6**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**38**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

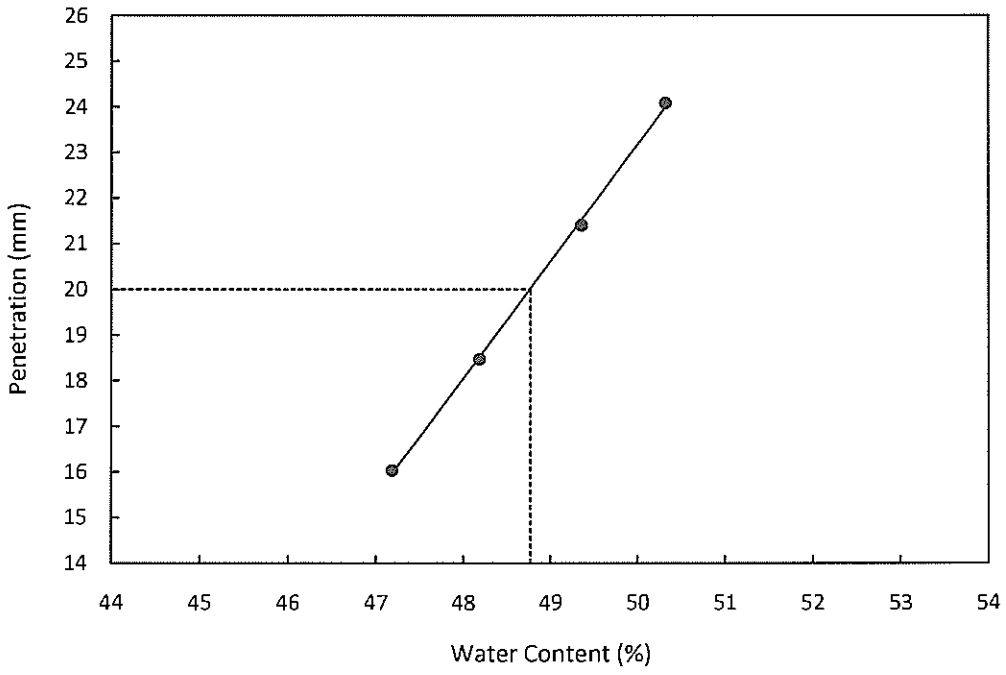
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 29.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.46	20.54	20.35	20.70	20.21	20.35
DRY WEIGHT + CUP	(g)	16.35	16.56	16.51	16.72	17.26	17.58
CUP WEIGHT	(g)	7.64	8.30	8.73	8.81	8.11	9.03
WATER CONTENT	(%)	47.2	48.2	49.4	50.3	32.2	32.4
PENETRATION	(mm)	16.0	18.5	21.4	24.1	-	-

LIQUID LIMIT	(%)	**48.8**
PLASTIC LIMIT	(%)	**32.3**
PLASTICITY INDEX		**16**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

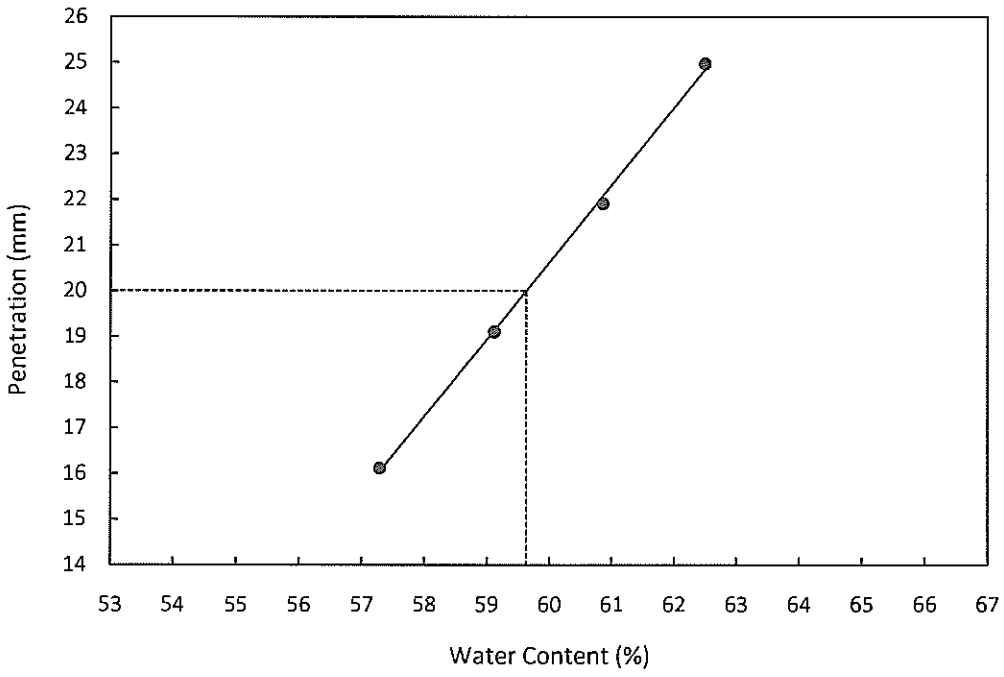
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH6
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light yellowish grey and dark grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 46
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.62	20.43	20.23	20.25	20.64	20.14
DRY WEIGHT + CUP	(g)	16.45	15.89	16.11	15.70	17.43	16.96
CUP WEIGHT	(g)	9.17	8.21	9.34	8.42	9.72	9.29
WATER CONTENT	(%)	57.3	59.1	60.9	62.5	41.6	41.5
PENETRATION	(mm)	16.1	19.1	21.9	25.0	-	-

LIQUID LIMIT	(%)	**59.6**
PLASTIC LIMIT	(%)	**41.5**
PLASTICITY INDEX		**18**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



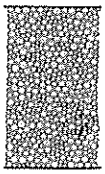
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	7-9-2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			8.00-8.90m		
Description			Firm yellow and reddish brown slightly sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	144.1	142.3	141.3
Bulk Density	ρ_0	(Mg/m3)	1.68	1.66	1.65
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions

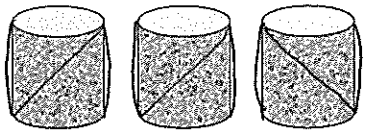
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	$\dot{m}_s$	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	59	62	64
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.05	1.03	1.01
Initial Voids Ratio	e_0	.	1.51	1.58	1.64
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	122.01	118.47	116.27
MembraneCorrection	m_c	(kPa)	0.790	0.850	0.900
Strain At Max Stress	$\varepsilon_f\%$	(%)	5.97	6.48	6.94
Shear Strength	c_u	(kPa)	61.00	59.24	58.14
Final Moisture	$\omega_f\%$	(%)	59	62	64
Final Dry Density	ρ_{df}	(Mg/m3)	1.05	1.03	1.01
Final Voids Ratio	e_f	.	1.51	1.58	1.64
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	UU11-SungeiTengah-B6T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked Min Win Htut	Approved Sio Keong Kong

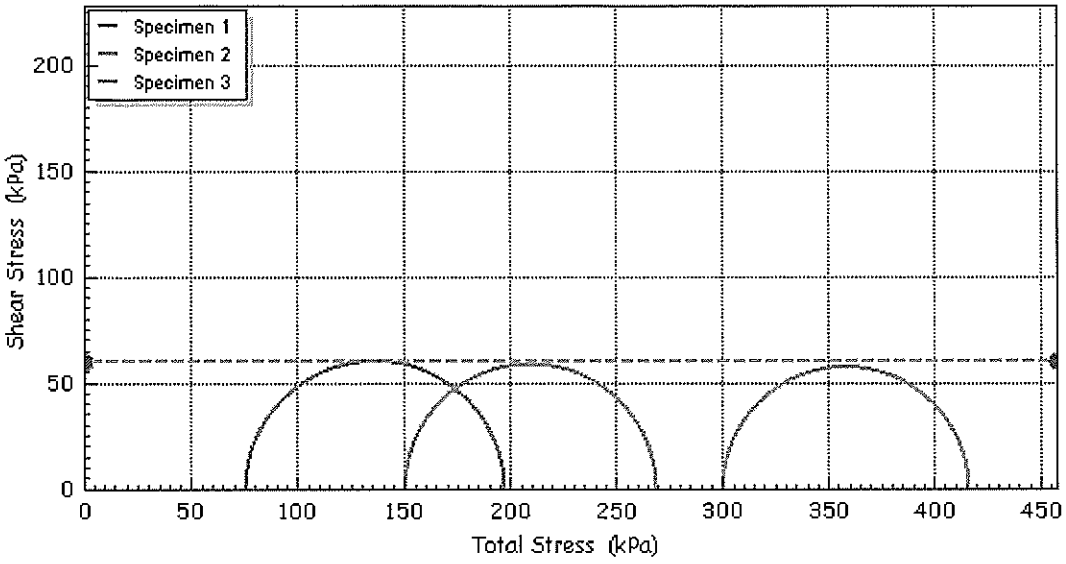
Ryobi Geotechnique International Pte Ltd

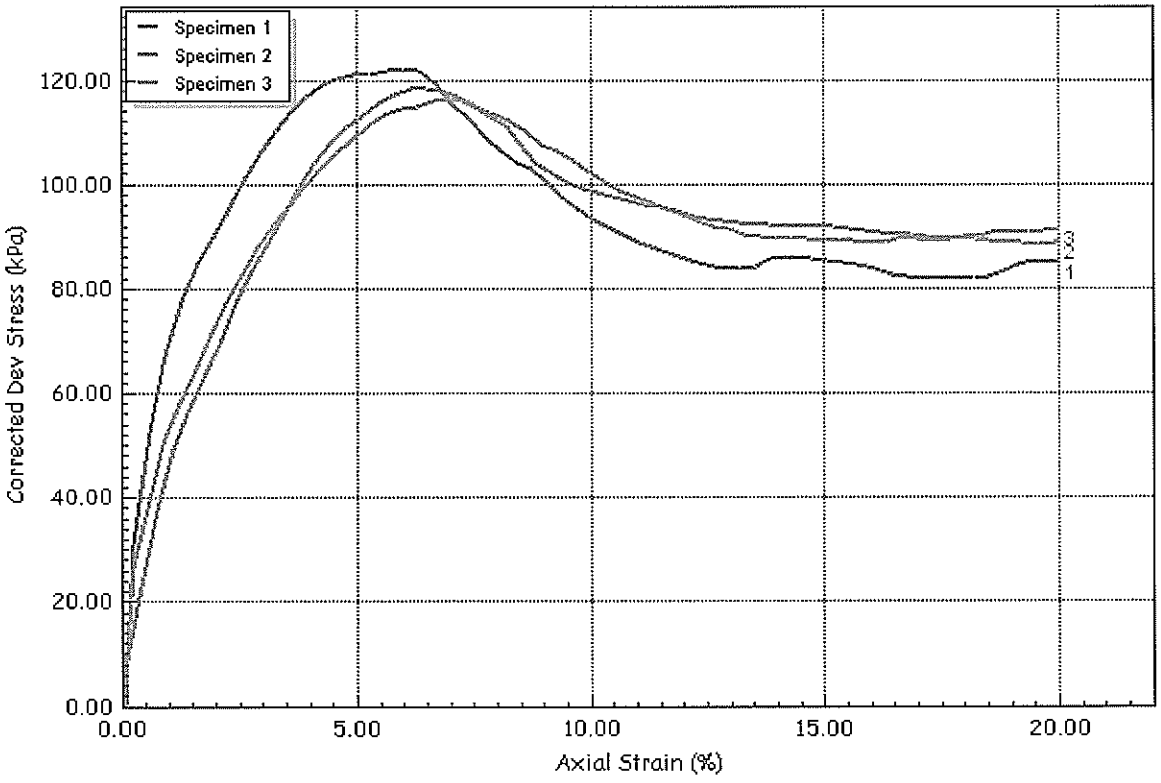
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	59.5
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU11-SungeiTengah-B6T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Kong Kong

ACCREDITED LABORATORY SAC-SINGLAS

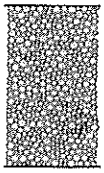
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			14.00-14.90m		
Description			Firm greenish grey slightly sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	155.7	157.7	156.1
Bulk Density	ρ_0	(Mg/m3)	1.82	1.84	1.82
Particle Density	ρ_s	(Mg/m3)	2.68	2.68	2.68

Initial Conditions

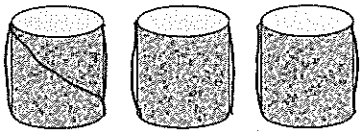
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	48	44	47
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.23	1.28	1.24
Initial Voids Ratio	e_0	.	1.18	1.10	1.16
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	108.82	118.79	126.07
MembraneCorrection	m_c	(kPa)	0.630	1.020	1.400
Strain At Max Stress	$\varepsilon_f\%$	(%)	4.52	8.19	12.38
Shear Strength	c_u	(kPa)	54.41	59.39	63.04
Final Moisture	$\omega_f\%$	(%)	48	44	47
Final Dry Density	ρ_{df}	(Mg/m3)	1.23	1.28	1.24
Final Voids Ratio	e_f	.	1.18	1.10	1.16
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	UU12-SungeiTengah-B6T21
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

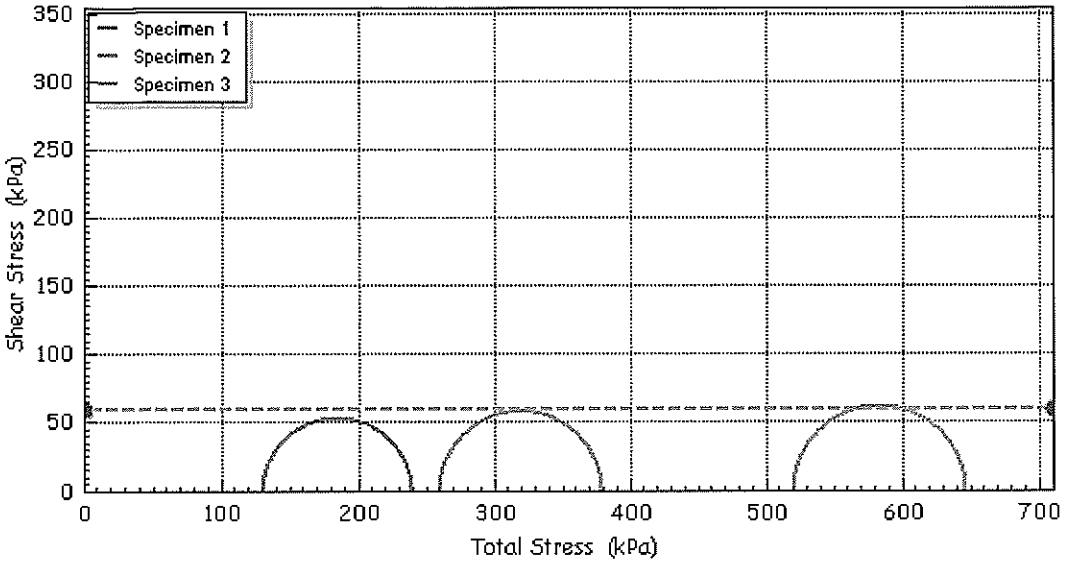
Ryobi Geotechnique International Pte Ltd

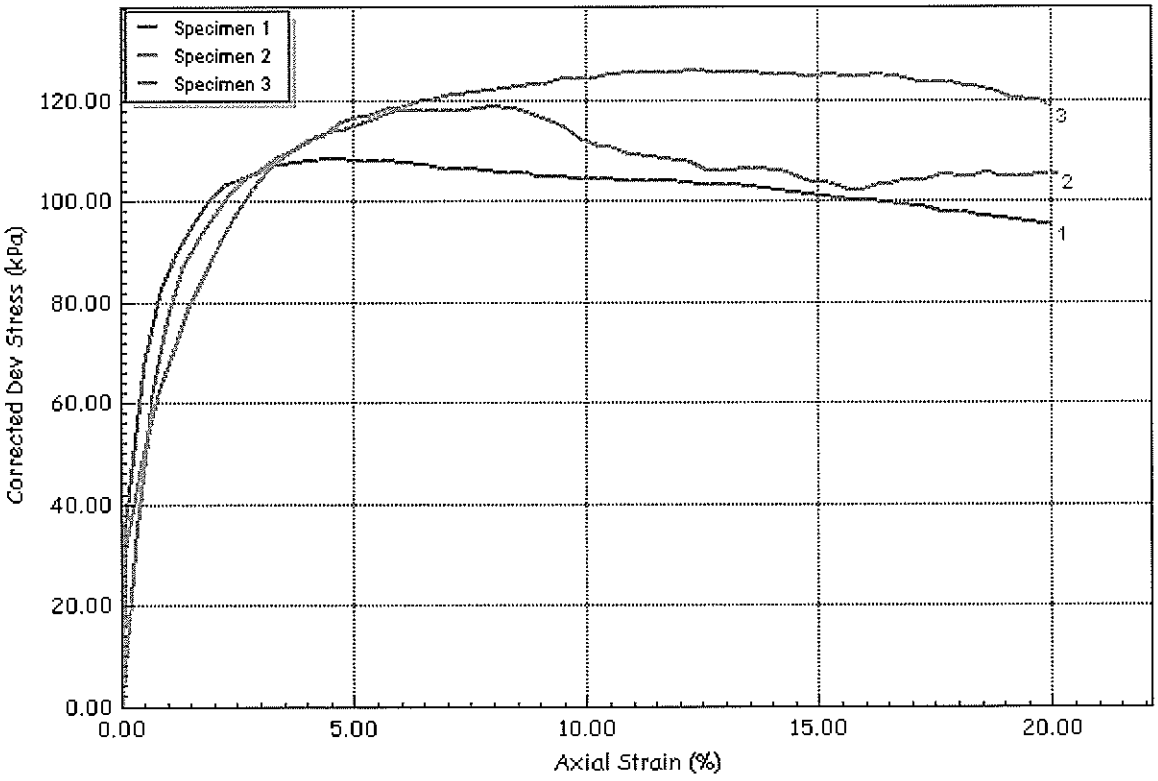
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	58.9
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU12-SungeiTengah-B6T21
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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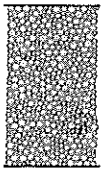
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			20.00-20.90m		
Description			Stiff light yellowish grey and dark grey slightly gravelly sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	171.2	172.3	173.9
Bulk Density	ρ_0	(Mg/m3)	2.00	2.01	2.03
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions

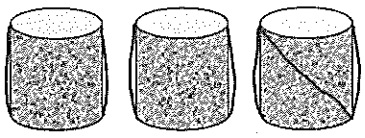
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	22	23	23
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.64	1.64	1.64
Initial Voids Ratio	e_0	.	0.62	0.62	0.61
Initial Degree of Saturation	S_o	(%)	94	98	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	220.92	215.98	235.52
MembraneCorrection	m_c	(kPa)	1.990	1.990	1.990
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	20.00	20.00
Shear Strength	c_u	(kPa)	110.46	107.99	117.76
Final Moisture	$\omega_f\%$	(%)	22	23	23
Final Dry Density	ρ_{df}	(Mg/m3)	1.64	1.64	1.65
Final Voids Ratio	e_f	.	0.62	0.62	0.61
Final Degree of Saturation	S_f	(%)	94.2	97.8	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	UU13-SungeiTengah-B6T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

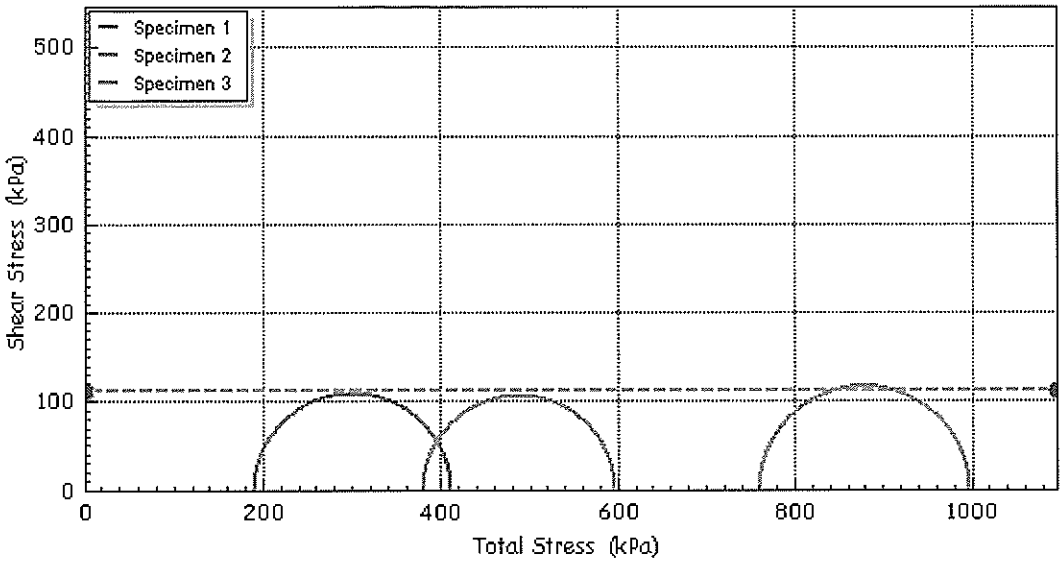
Ryobi Geotechnique International Pte Ltd

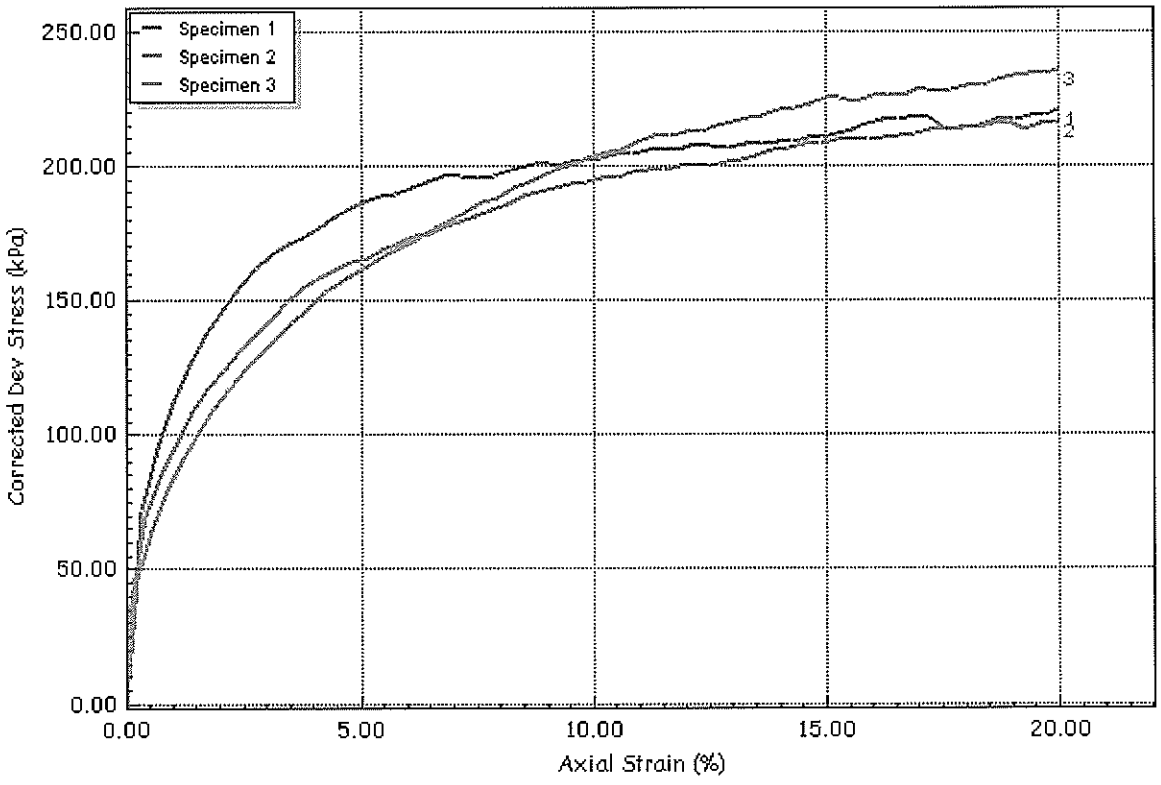
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	112.1
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU13-SungeiTengah-B6T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	5/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH6
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordanca with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS

ALS

Analytical Results

Sub-Matrix: SOIL

				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-001	SG1813557-002	SG1813557-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL

				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813557-004	SG1813557-005	SG1813557-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	5.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813564**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 27-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH1 Water Sample	BH2 Water Sample	BH3 Water Sample
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813564-001	SG1813564-002	SG1813564-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.6	11.4	11.7
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	0.05
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	<0.01
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH4 Water Sample	BH6 Water Sample	-----
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		SG1813564-004	SG1813564-005	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.3	11.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.05	0.05	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		<0.01	<0.01	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA
PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO. : K5728

BOREHOLE NO :			BH7						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	28.1	-	35.1	-	30.2	-	26.0
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.89	1.85	-	-	-	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	-	-	2.65	2.66	-	2.69	2.71
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	48	23	36	56	-	23
	SAND	%	-		24	18		-	23
	SILT	%	-	32	35	46	30	-	38
	CLAY	%	-	20	18		14	-	16
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	71.2	-	-	(A)	77.5
	PLASTIC LIMIT	%		-	41.9	-	-		45.5
	PLASTICITY INDEX			-	29	-	-		32
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	-
	TOTAL COHESION	kPa	-	-	51.3	-	-	-	-
	TEST TYPE		-	-	-	-	-	-	**$CU^{70\Phi}$**
	EFFECTIVE COHESION	kPa	-	-	-	-	-	-	6.3
	EFFECTIVE PHI ANGLE	degree	-	-	-	-	-	-	34.8
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH7						
SAMPLE NO :			SPT7	SPT8	SPT9	TW3	SPT10	SPT11	W1
SAMPLE DEPTH :		m	14.90-15.35	16.00-16.45	18.00-18.90	20.00-20.90	20.90-21.35	22.00-22.33	Water Sample
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	-	20.7	23.7	-	-	
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.87	-	-	2.03	1.75	-	-
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	-	-	-	2.67	2.66	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	30	-	22	15	-	88	-
	SAND	%	26	-	33	39	-		-
	SILT	%	44	-	45	33	-	10	-
	CLAY	%		-		13	-	2	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	-	55.0	-	(B)	-
	PLASTIC LIMIT	%	-	-	-	37.0	-		-
	PLASTICITY INDEX		-	-	-	18	-		-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	**UU**	-	-	-
	TOTAL COHESION	kPa	-	-	-	105.0	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	6.4	-	-	-	-	-
	Chloride Content	%	-	<0.01	-	-	-	-	-
	Organic Content	%	-	0.3	-	-	-	-	-
	Sulphate Content	%	-	<0.01	-	-	-	-	-
	pH Value		-	-	-	-	-	-	10.0
	Chloride Content	g/L	-	-	-	-	-	-	0.04
	Organic Content	% (w/v)	-	-	-	-	-	-	<0.10
	Sulphate Content	g/L	-	-	-	-	-	-	0.04

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 :

(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH7	SPT2	4.00-4.45	28.1	-	-	-
BH7	SPT3	6.00-6.45	-	1.89	-	-
BH7	TW1	8.00-8.90	35.1	1.85	-	2.65
BH7	SPT4	8.90-9.35	-	-	-	2.66
BH7	SPT5	10.00-10.45	30.2	-	-	-
BH7	SPT6	12.00-12.45	-	-	-	2.69
BH7	TW2	14.00-14.90	26.0	2.05	-	2.71
BH7	SPT7	14.90-15.35	-	1.87	-	-
BH7	SPT9	18.00-18.90	20.7	-	-	-
BH7	TW3	20.00-20.90	23.7	2.03	-	2.67
BH7	SPT10	20.90-21.35	-	1.75	-	2.66

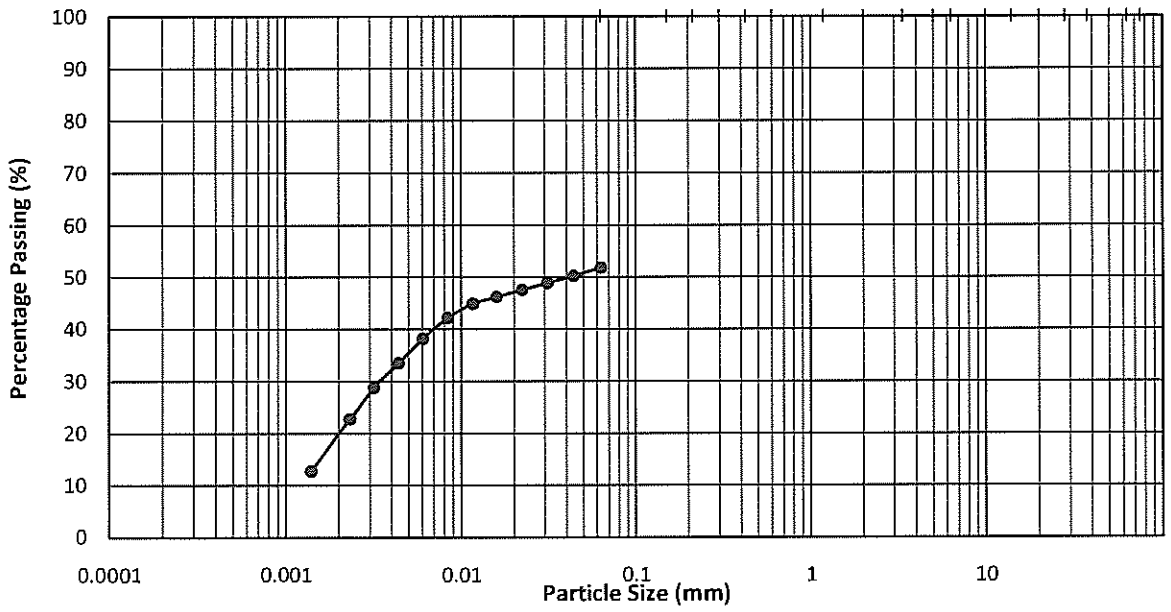
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: Monju Date :	APPROVED BY: (Authorised Signatory : Min Win Htut)	DATE : 17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**48**	%
SILT	=	**32**	%
CLAY	=	**20**	%

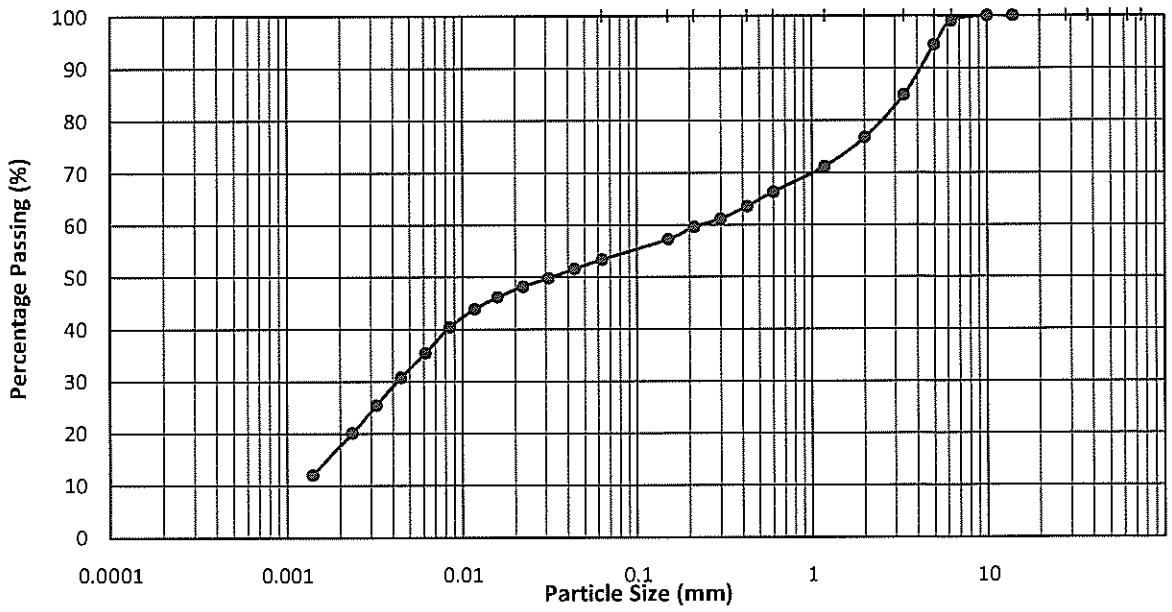
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 07.09.2018



SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**23**	%
SAND	=	**24**	%
SILT	=	**35**	%
CLAY	=	**18**	%

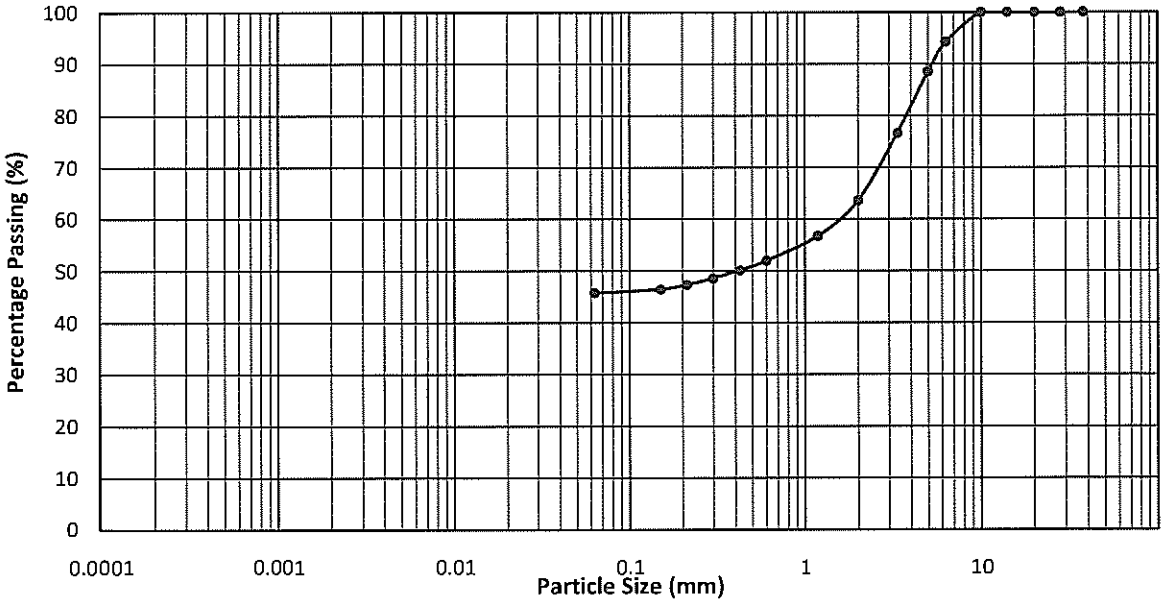
% of Passing 0.425 mm Sieve : 63.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly sandy gravelly SILT**

SIEVING TEST

GRAVEL	=	**36**	%
SAND	=	**18**	%
SILT + CLAY	=	**46**	%

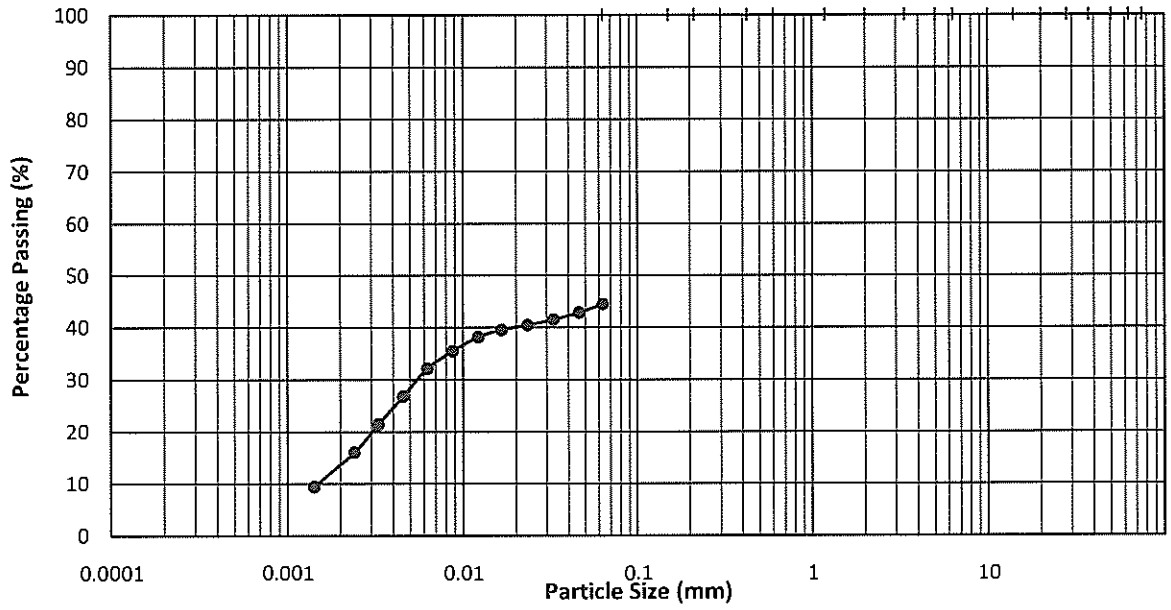
% of Passing 0.425 mm Sieve : 50.1

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Light brownish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**56**	%
SILT	=	**30**	%
CLAY	=	**14**	%

% of Passing 0.425 mm Sieve : -

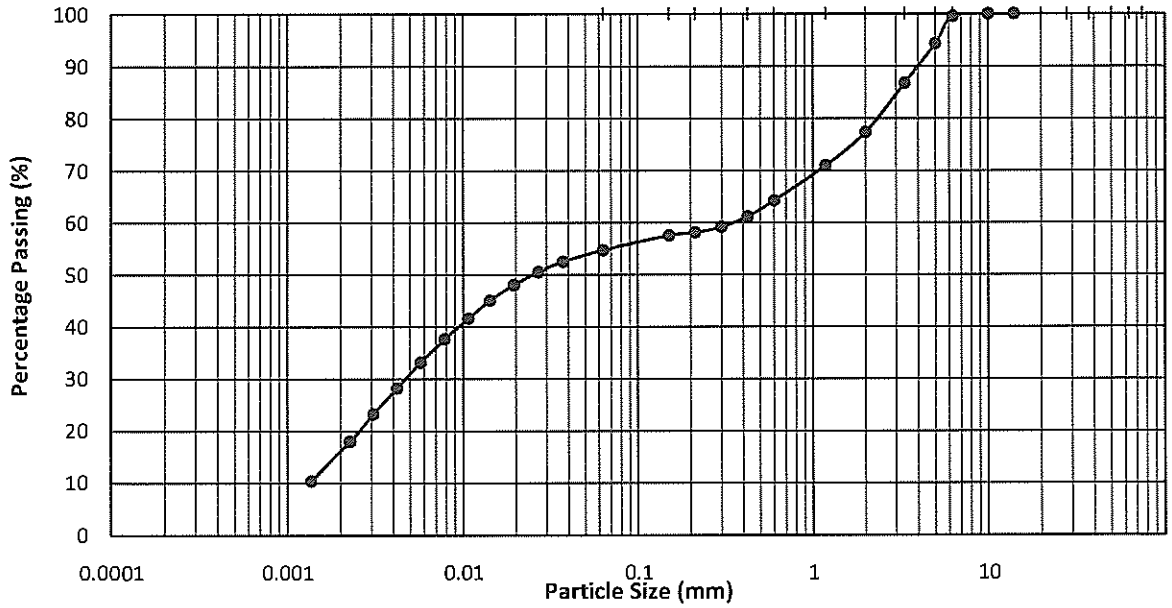
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and whitish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**23**	%
SAND	=	**23**	%
SILT	=	**38**	%
CLAY	=	**16**	%

% of Passing 0.425 mm Sieve : 61.1

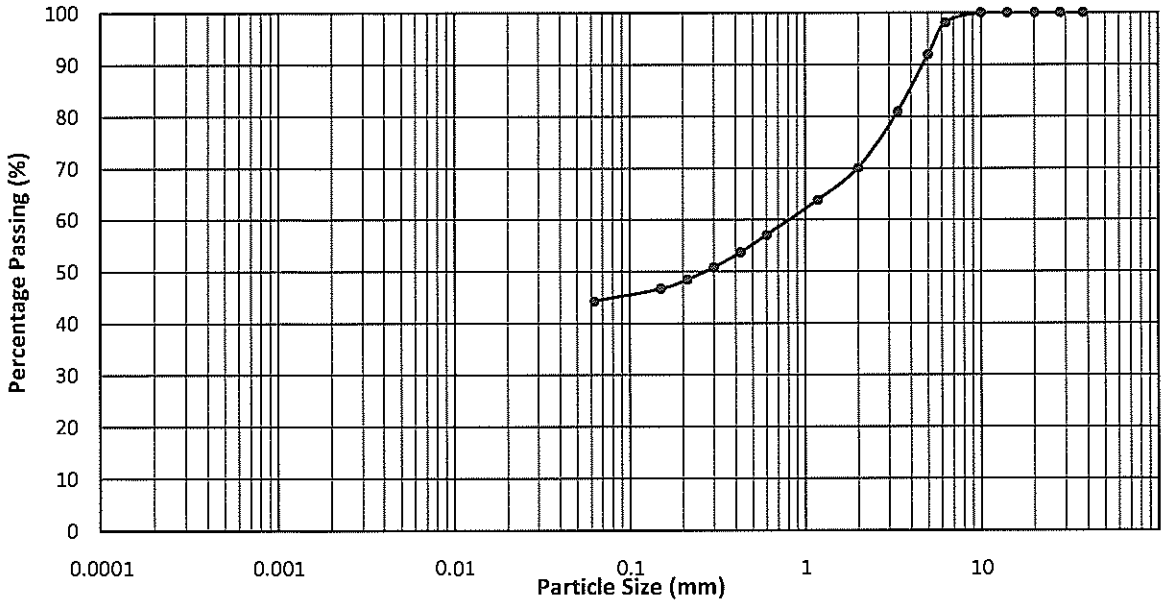
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Light grey slightly sandy slightly gravelly SILT**

SIEVING TEST

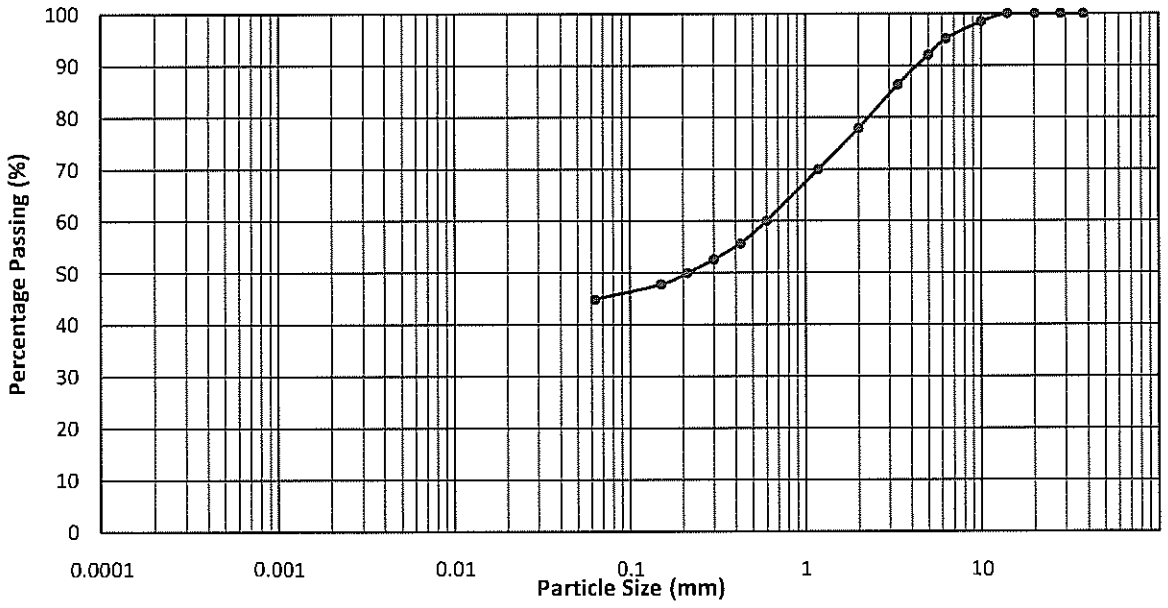
GRAVEL	=	**30**	%	
SAND	=	**26**	%	% of Passing 0.425 mm Sieve : 53.6
SILT + CLAY	=	**44**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.90m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**22**	%
SAND	=	**33**	%
SILT + CLAY	=	**45**	%

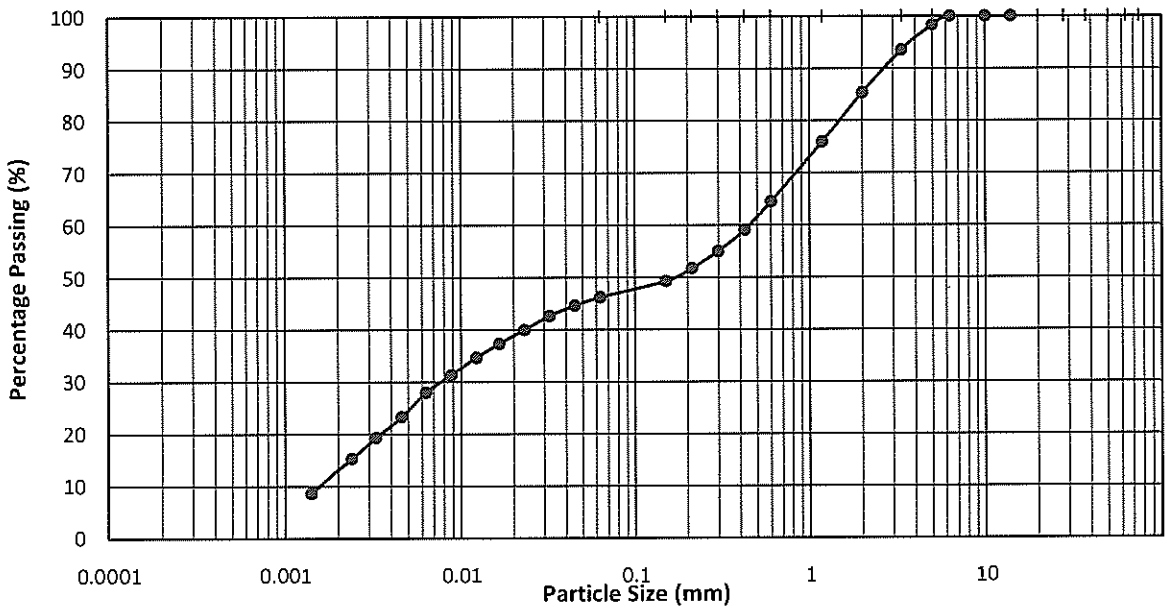
% of Passing 0.425 mm Sieve : 55.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Greenish grey and whitish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**15**	%
SAND	=	**39**	%
SILT	=	**33**	%
CLAY	=	**13**	%

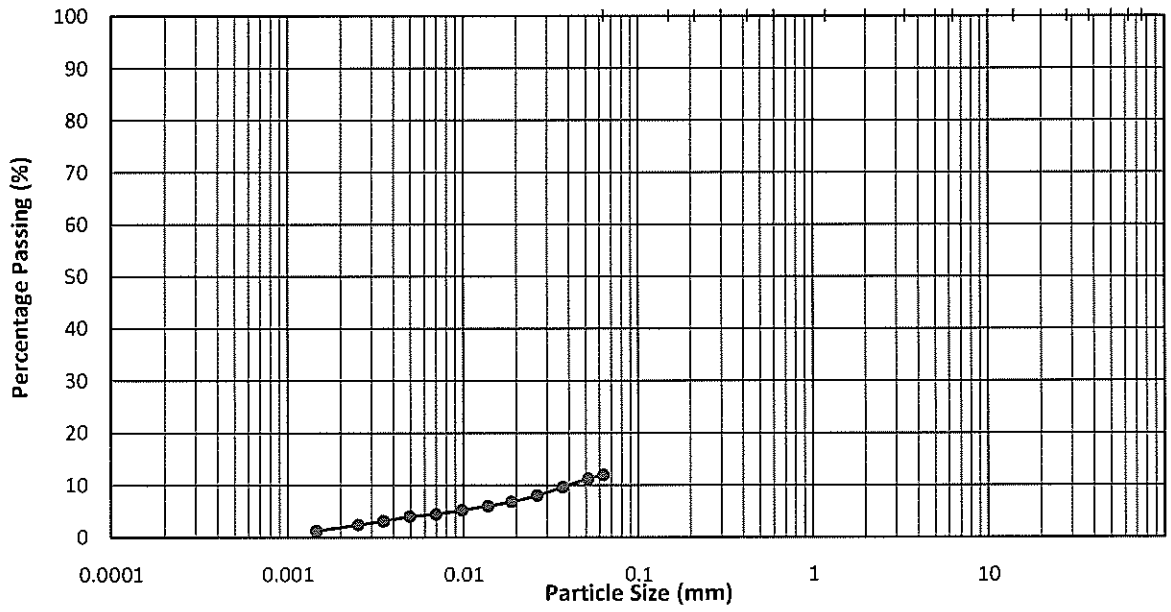
% of Passing 0.425 mm Sieve : S9.1

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.33m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey silty SAND**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**88**	%
SILT	=	**10**	%
CLAY	=	**2**	%

% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

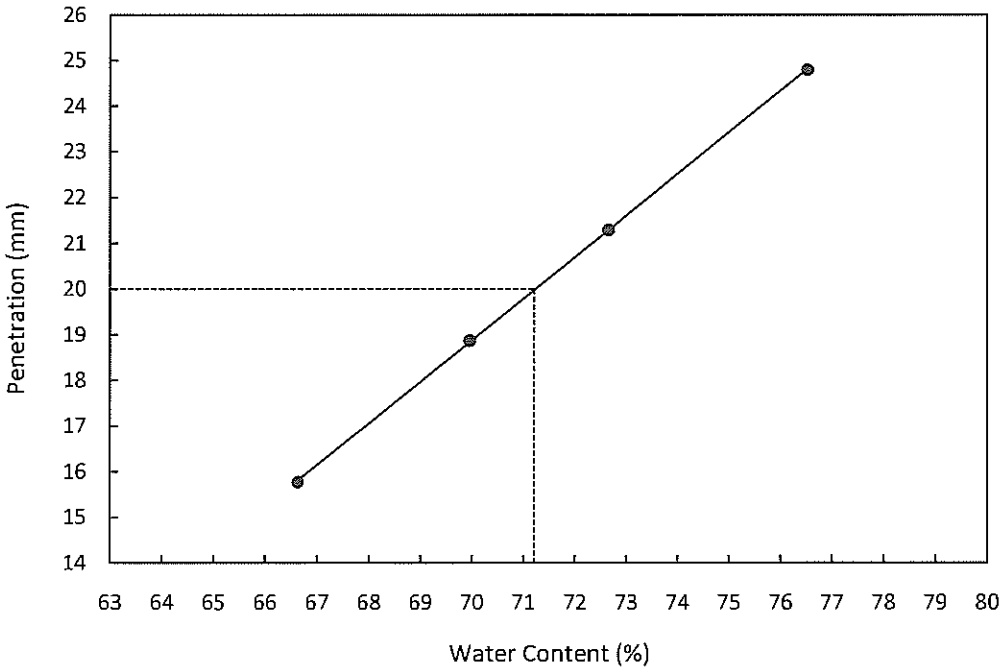
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Whitish grey and dark grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 55
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.38	20.64	20.28	20.28	20.30	20.48
DRY WEIGHT + CUP	(g)	15.63	15.47	15.71	15.52	16.90	17.08
CUP WEIGHT	(g)	8.50	8.08	9.42	9.30	8.79	8.95
WATER CONTENT	(%)	66.6	70.0	72.7	76.5	41.9	41.8
PENETRATION	(mm)	15.8	18.9	21.3	24.8	-	-

LIQUID LIMIT	(%)	**71.2**
PLASTIC LIMIT	(%)	**41.9**
PLASTICITY INDEX		**29**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

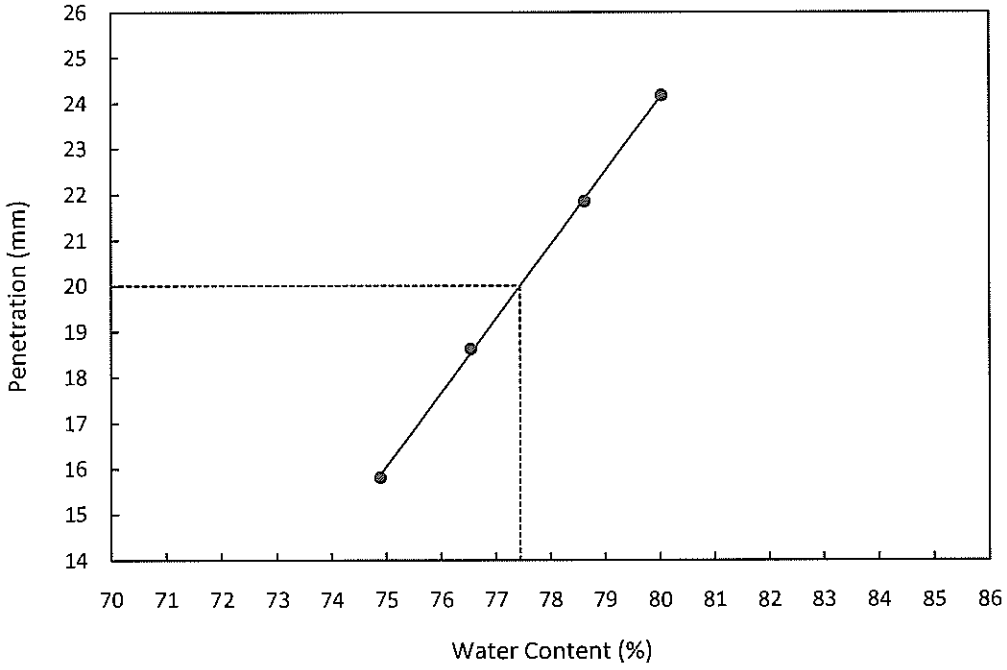
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light greenish grey and whitish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 45
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.74	20.38	20.24	20.63	20.70	20.60
DRY WEIGHT + CUP	(g)	15.82	15.52	15.20	15.42	17.14	16.95
CUP WEIGHT	(g)	9.25	9.17	8.79	8.91	9.31	8.94
WATER CONTENT	(%)	74.9	76.5	78.6	80.0	45.5	45.6
PENETRATION	(mm)	15.8	18.6	21.9	24.2	-	-

LIQUID LIMIT	(%)	**77.5**
PLASTIC LIMIT	(%)	**45.5**
PLASTICITY INDEX		**32**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

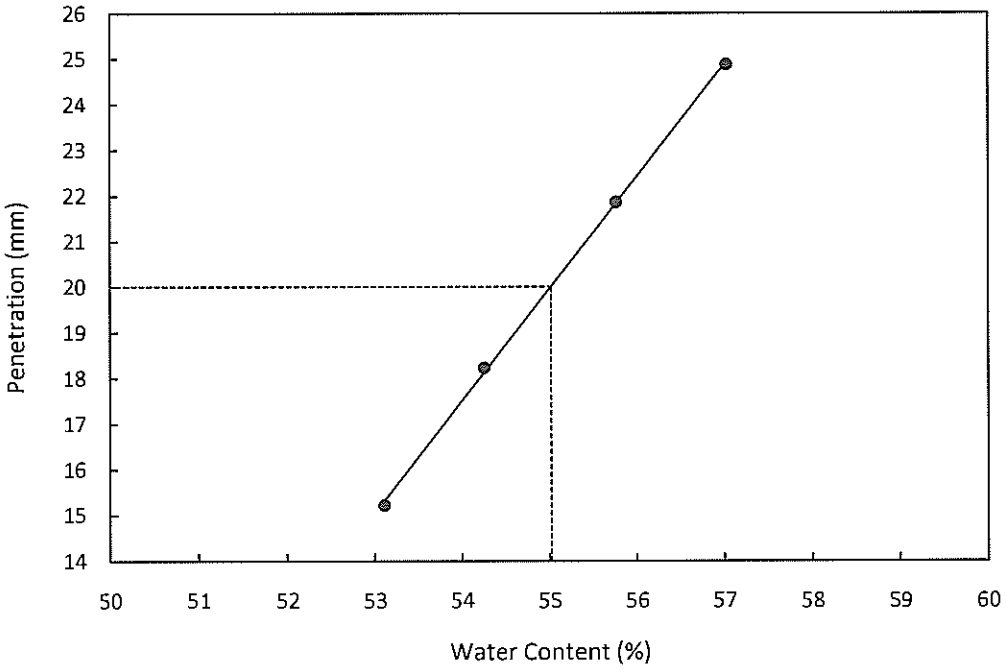
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH7
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Greenish grey and whitish grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 43
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.20	20.32	20.29	20.39	20.31	20.70
DRY WEIGHT + CUP	(g)	16.18	16.17	16.18	15.72	17.19	17.50
CUP WEIGHT	(g)	8.61	8.52	8.81	7.53	8.80	8.81
WATER CONTENT	(%)	53.1	54.2	55.8	57.0	37.2	36.8
PENETRATION	(mm)	15.2	18.2	21.9	24.9	-	-

LIQUID LIMIT	(%)	**55.0**
PLASTIC LIMIT	(%)	**37.0**
PLASTICITY INDEX		**18**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

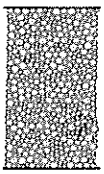


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

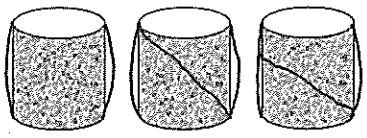
Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Firm whitish grey and dark grey slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	161.5	157.0	157.7
	Bulk Density	ρ_0	(Mg/m3)	1.88	1.83	1.84
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	33	36	36
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.41	1.35	1.35
Initial Voids Ratio	e_0	.	0.88	0.97	0.96
Initial Degree of Saturation	S_o	(%)	100	98	100

Final Conditions			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	105.65	89.11	113.26
MembraneCorrection	m_c	(kPa)	1.700	1.880	1.530
Strain At Max Stress	$\varepsilon_f\%$	(%)	16.15	18.68	13.96
Shear Strength	c_u	(kPa)	52.83	44.55	56.63
Final Moisture	$\omega_f\%$	(%)	33	36	36
Final Dry Density	ρ_{df}	(Mg/m3)	1.41	1.35	1.35
Final Voids Ratio	e_f	.	0.88	0.97	0.96
Final Degree of Saturation	S_f	(%)	100.0	98.3	99.5

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	UU4-SungeiTengah-B7T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

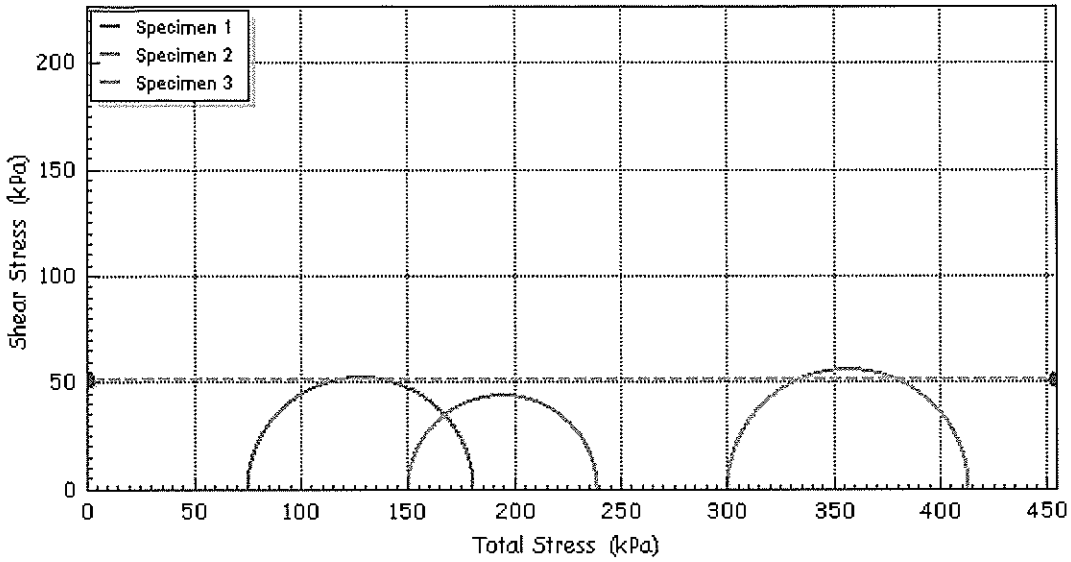
Ryobi Geotechnique International Pte Ltd

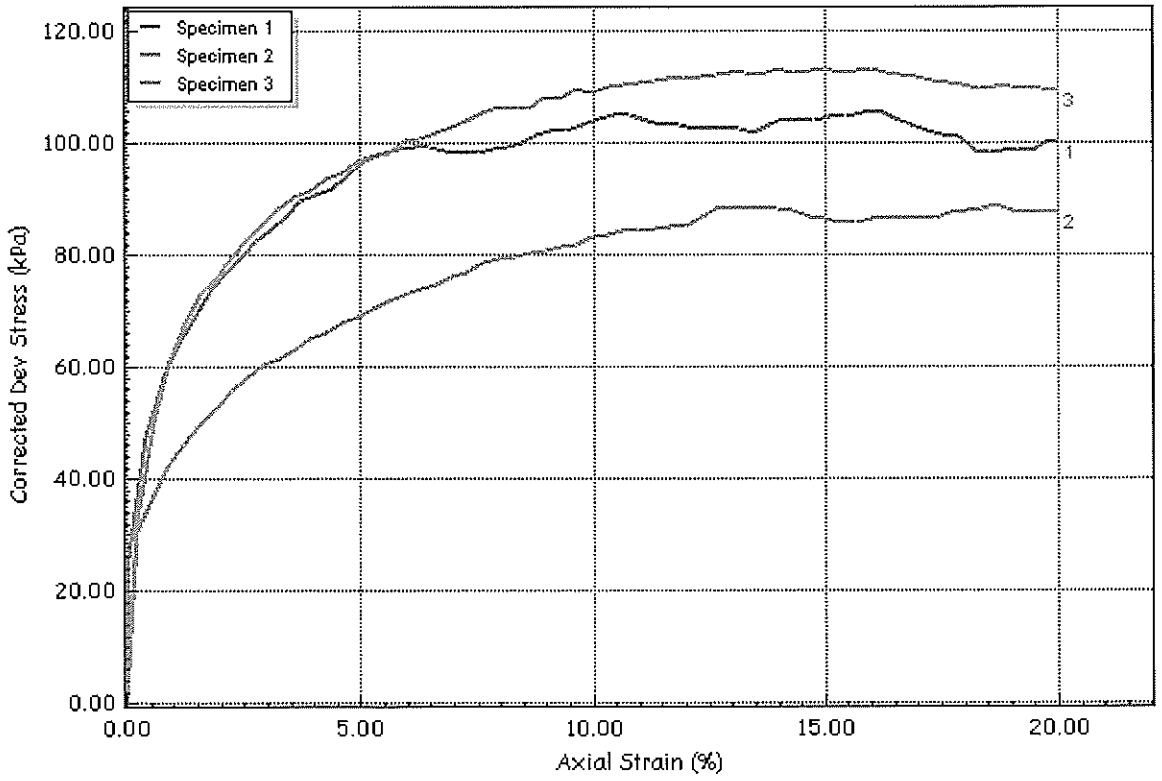
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	51.3
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU4-SungeiTengah-B7T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7			Sample	TW1
Client	AVA			Depth	8.00-8.90m
Operator		Checked	Min Win Htut	Approved	Sig Keong Kong

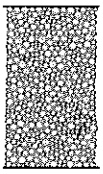
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

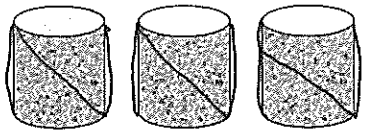
Sample Details					
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m		
	Description		Stiff greenish grey and whitish grey slightly gravelly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	173.3	173.9	174.2
	Bulk Density	ρ_0 (Mg/m3)	2.02	2.03	2.03
	Particle Density	ρ_s (Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	22	25	24
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.66	1.62	1.64
Initial Voids Ratio	e_0	.	0.61	0.65	0.62
Initial Degree of Saturation	S_0	(%)	96	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	209.49	202.14	218.57
MembraneCorrection	m_c	(kPa)	1.410	1.400	1.720
Strain At Max Stress	$\varepsilon_f\%$	(%)	12.42	12.39	16.42
Shear Strength	c_u	(kPa)	104.75	101.07	109.29
Final Moisture	$\omega_f\%$	(%)	22	25	24
Final Dry Density	ρ_{df}	(Mg/m3)	1.66	1.62	1.64
Final Voids Ratio	e_f	.	0.61	0.65	0.62
Final Degree of Saturation	S_f	(%)	95.7	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	UU5-SungeiTengah-B7T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

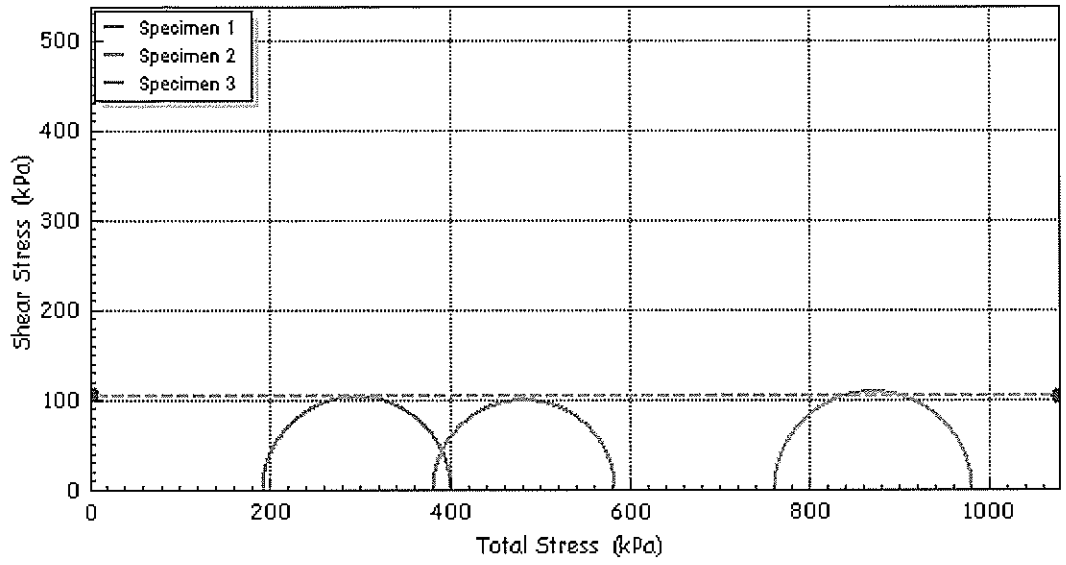
Ryobi Geotechnique International Pte Ltd

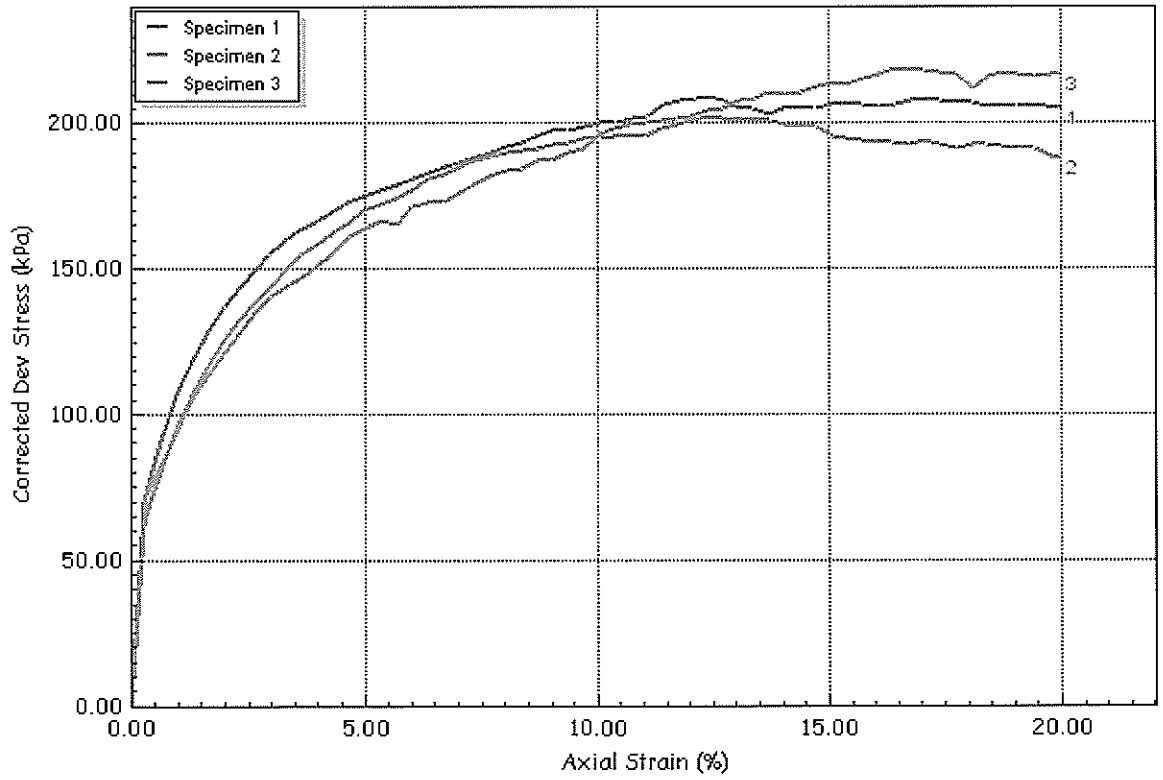
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	105.0
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU5-SungeiTengah-B7T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked Min Win Htut	Approved Sio Keong Wong

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA2016837B

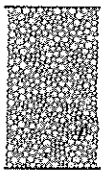
Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details



sketch showing specimen location in original sample

Depth			14.00-14.90m		
Description			Light greenish grey and whitish grey slightly gravelly slightly sandy SILT		
Type			Undisturbed Sample		
			Spm. 1	2	3
Initial Sample Length	L_0	(mm)	140.0	140.0	140.0
Initial Sample Diameter	D_0	(mm)	70.0	70.0	70.0
Initial Sample Weight	W_0	(gr)	1081.2	1109.1	1117.1
Initial Bulk Density	ρ_0	(Mg/m3)	2.01	2.06	2.07
Particle Density	ρ_s	(Mg/m3)	2.71	2.71	2.71

Initial Conditions

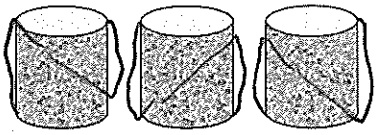
			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	270	340	480
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	27	26	27
Initial Dry Density	ρ_{di}	(Mg/m3)	1.58	1.64	1.63
Initial Voids Ratio	e_i	.	0.719	0.652	0.659
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions

			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	27	25	24
Final Dry Density	ρ_{df}	(Mg/m3)	1.64	1.73	1.75
Final Voids Ratio	e_f	.	0.653	0.568	0.546
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	5.01	4.97	4.74
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	141.2	233.1	360.8
Minor Stress At Failure	σ_3'	(kPa)	43.7	76.9	128.0
Major Stress At Failure	σ_1'	(kPa)	184.9	310.0	488.8
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.231	4.032	3.818

Notes

-



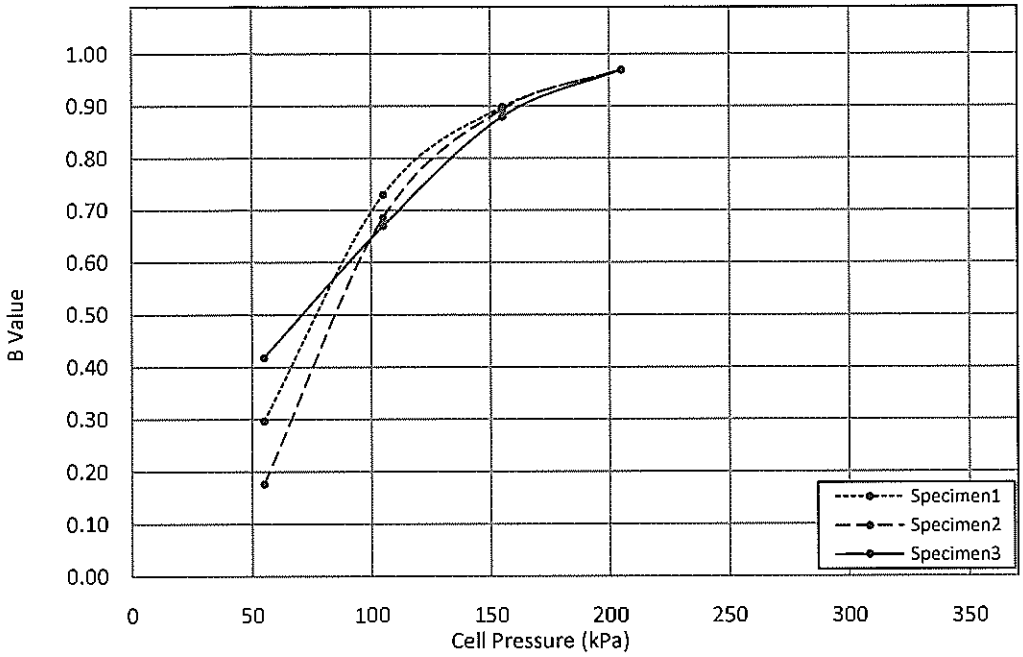
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU7-SungeiTengahWA7-B7T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator Kau	Checked Min Win Htut	Approved Sio Keong Kong	

Ryobi Geotechnique International Pte Ltd

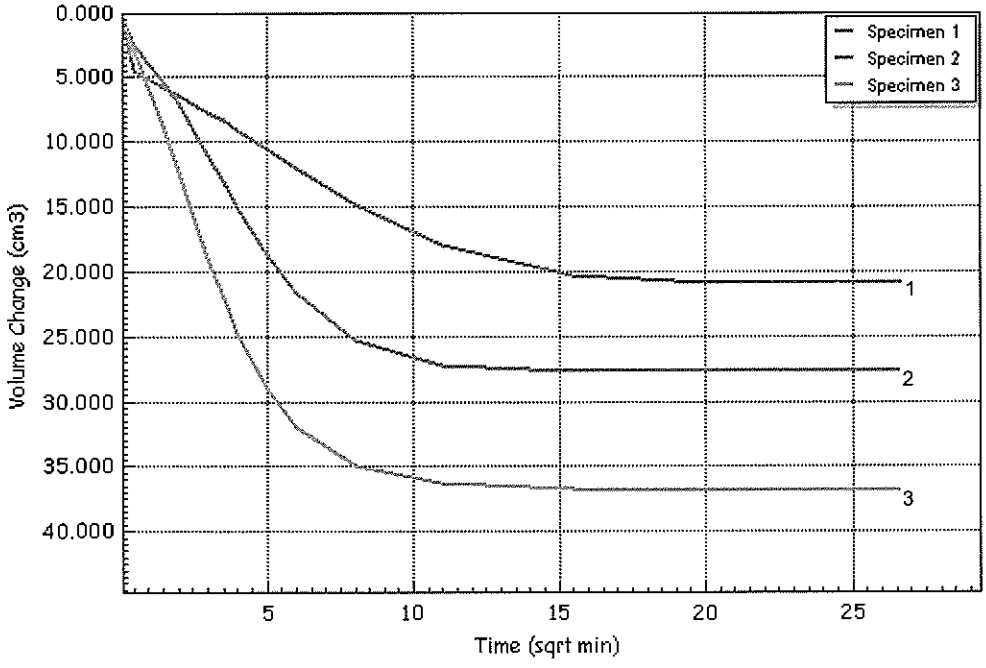
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



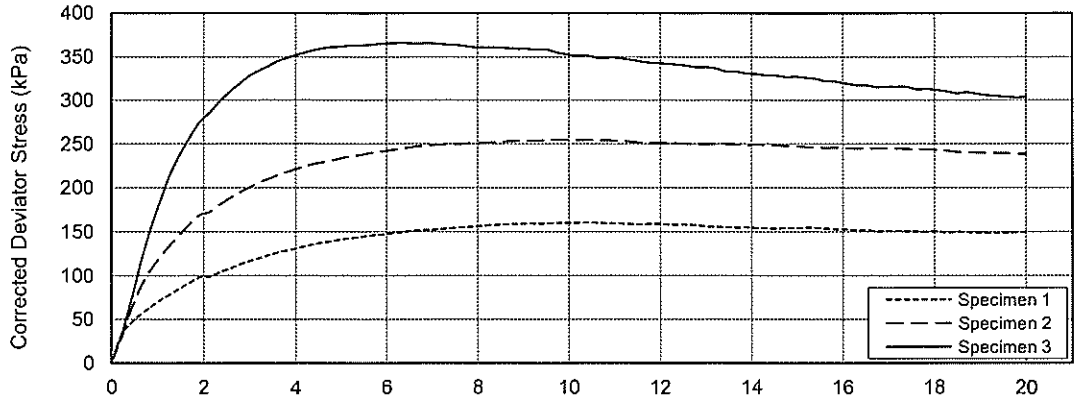
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU7-SungeiTengahWA7-B7T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

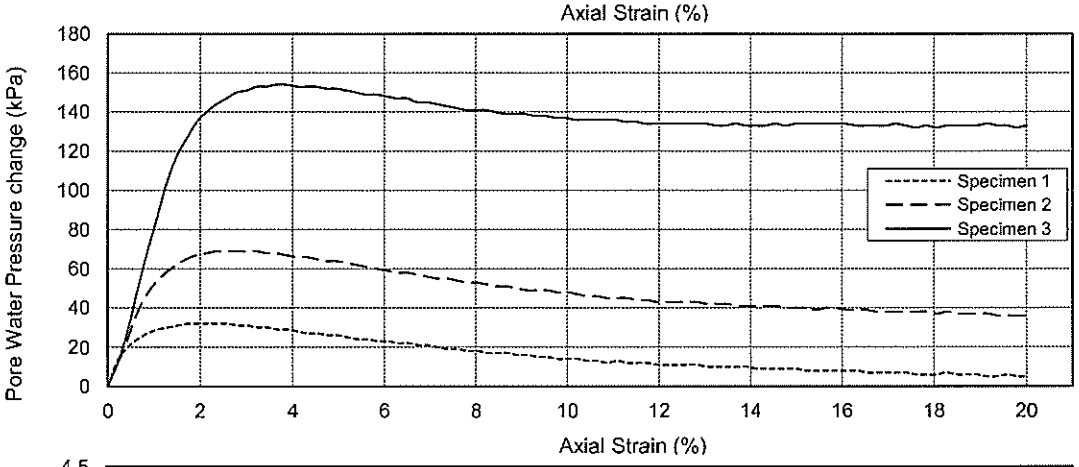
Ryobi Geotechnique International Pte Ltd

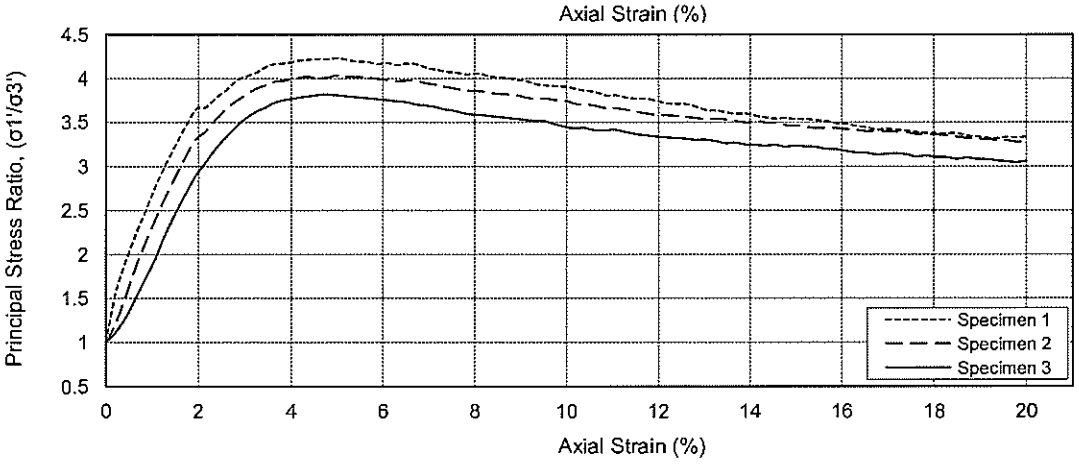
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	201	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	226	263	352
A Value at Max. Stress Ratio	0.177	0.270	0.421

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU7-SungeiTengahWA7-B7T2
Database :.\SQLEXPRESS\Ryobi-2017		Test Date	10/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

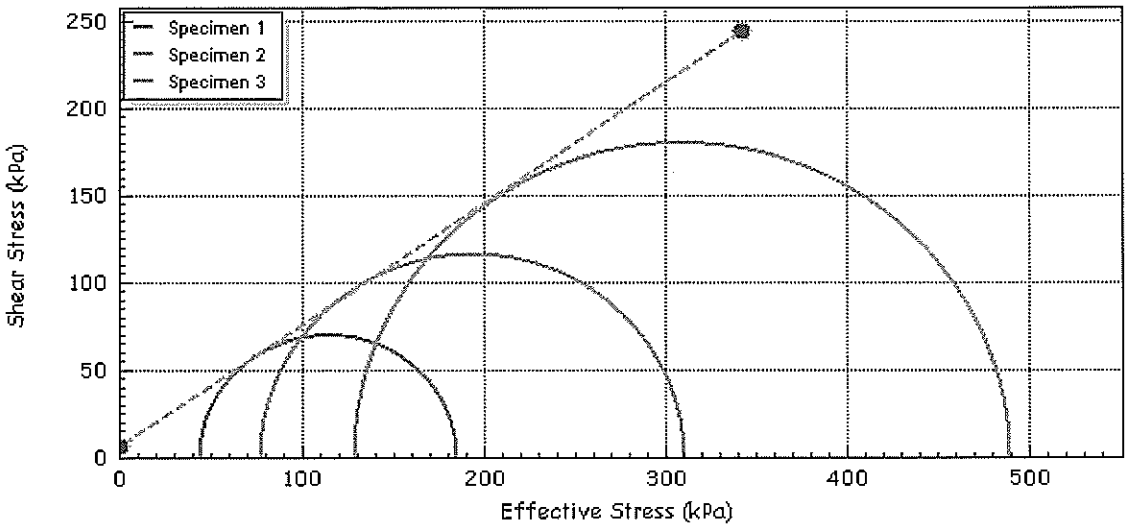
Ryobi Geotechnique International Pte Ltd

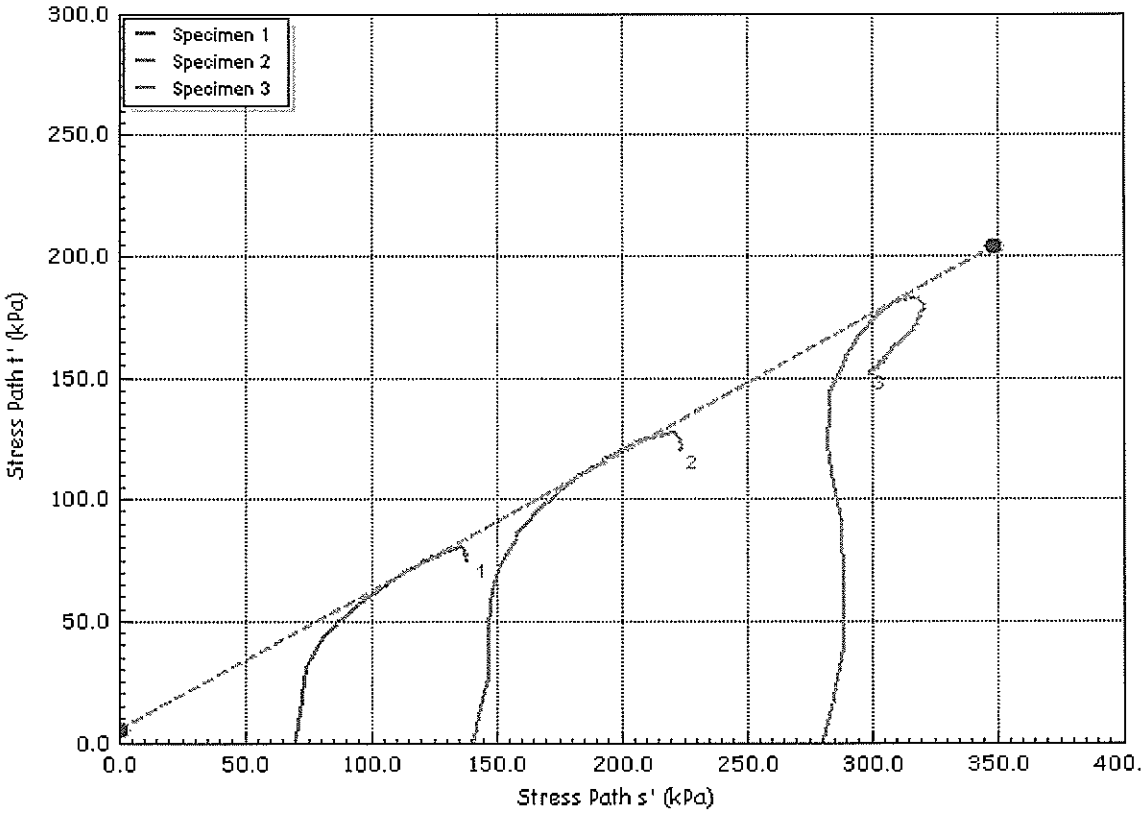
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	6.3	Stress Path Intercept	t_0'	(kPa)	5.2
Effective Friction Angle	ϕ'	(deg)	34.8	Stress Path Inclination	θ	(deg)	29.7





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU7-SungeiTengahWA7-B7T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengahRd	Borehole	BH7
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Accreditation Category	Position
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-001**	**SG1813957-002**	**SG1813957-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-004**	**SG1813957-005**	**SG1813957-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	----	----
				Sampling date/time	04-Sep-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1813957-007**	--------	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	----	----
Organic Matter	BS1377	0.1	% DW		<0.1	----	----
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813956**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 04-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 2	No. of samples analysed	: 2

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

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Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	BH5	BH7	----
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		SG1813956-001	SG1813956-002	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		11.4	10.0	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.04	0.04	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.04	0.04	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH8						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	TW2	SPT7
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	14.00-14.90	14.90-15.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	21.3	-	40.0	45.0	-	29.8	31.5
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.71	1.86	-	1.68	1.90	-
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	-	-	2.67	-	-	2.66	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	74	28	0	0	-	16	19
	SAND	%			28	10	-	42	41
	SILT	%	23	50	47	90	-	35	40
	CLAY	%	3	22	25		-	7	
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	88.9	-	83.9	56.1	-
	PLASTIC LIMIT	%		-	52.2	-	48.5	36.4	-
	PLASTICITY INDEX			-	37	-	35	20	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	-	-
	TOTAL COHESION	kPa	-	-	-	-	-	-	-
	TEST TYPE		-	-	$CU^{70\phi}$	-	-	CU	-
	EFFECTIVE COHESION	kPa	-	-	5.9	-	-	7.7	-
	EFFECTIVE PHI ANGLE	degree	-	-	34.0	-	-	39.4	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
ROCK TEST	BULK DENSITY	Mg/m^3	-	-	-	-	-	-	-
	UNCONFINED COMPRESSIVE STRENGTH	MPa	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH8						
SAMPLE NO :			SPT8	TW3	SPT9	SPT10	SPT11	TW4	SPT12
SAMPLE DEPTH :		m	16.00-16.45	18.00-18.90	18.90-19.35	20.00-20.45	22.00-22.45	24.00-24.90	24.90-25.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	29.0	-	-	46.7	37.0	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	(B)	1.87	-	1.76	-	1.89	-
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	-	2.65	2.65	-	-	2.67	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	16	14	54	-	2	-
	SAND	%	-	39	35		-	29	-
	SILT	%	-	37	51	35	-	57	-
	CLAY	%	-	8		11	-	12	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(B)	57.1	-	-	59.7	50.6	-
	PLASTIC LIMIT	%		41.9	-	-	33.5	30.8	-
	PLASTICITY INDEX			15	-	-	26	20	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	**UU**	-	-	-	**UU**	-
	TOTAL COHESION	kPa	-	40.6	-	-	-	75.8	-
	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	BULK DENSITY	Mg/m^3	-	-	-	-	-	-	-
	UNCONFINED COMPRESSIVE STRENGTH	MPa	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	4.8
	Chloride Content	%	-	-	-	-	-	-	0.01
	Organic Content	%	-	-	-	-	-	-	0.2
	Sulphate Content	%	-	-	-	-	-	-	<0.01
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 :
(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 06/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH8						
SAMPLE NO :			SPT13	SPT14	SPT15	W1			
SAMPLE DEPTH :		m	26.00-26.45	28.00-28.45	30.00-30.45	Water Sample			
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	33.0	-				
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.76	-	-			
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	2.66	-	2.64	-			
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	-	-			
	SAND	%	25	-	-	-			
	SILT	%	56	-	-	-			
	CLAY	%	19	-	-	-			
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	(A)	-	-			
	PLASTIC LIMIT	%	-		-	-			
	PLASTICITY INDEX		-		-	-			
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-			
	TOTAL COHESION	kPa	-	-	-	-			
	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	BULK DENSITY	Mg/m^3	-	-	-	-			
	UNCONFINED COMPRESSIVE STRENGTH	MPa	-	-	-	-			
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-			
	Chloride Content	%	-	-	-	-			
	Organic Content	%	-	-	-	-			
	Sulphate Content	%	-	-	-	-			
	pH Value		-	-	-	10.6			
	Chloride Content	g/L	-	-	-	0.04			
	Organic Content	% (w/v)	-	-	-	<0.10			
	Sulphate Content	g/L	-	-	-	0.04			

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sia Keong Kong)

DATE : 06/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH8	SPT2	4.00-4.45	21.3	-	-	-
BH8	SPT3	6.00-6.45	-	1.71	-	-
BH8	TW1	8.00-8.90	40.0	1.86	-	2.67
BH8	SPT4	8.90-9.35	45.0	-	-	-
BH8	SPT5	10.00-10.45	-	1.68	-	-
BH8	TW2	14.00-14.90	29.8	1.90	-	2.66
BH8	SPT7	14.90-15.35	31.5	-	-	-
BH8	TW3	18.00-18.90	29.0	1.87	-	2.65
BH8	SPT9	18.90-19.35	-	-	-	2.65
BH8	SPT10	20.00-20.45	-	1.76	-	-
BH8	SPT11	22.00-22.45	46.7	-	-	-
BH8	TW4	24.00-24.90	37.0	1.89	-	2.67
BH8	SPT13	26.00-26.45	-	-	-	2.66

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)

TESTED BY: MONJU
Date : 29.08.2018

APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 6.9.2018

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH8	SPT14	28.00-28.45	33.0	1.76	-	-
BH8	SPT15	30.00-30.45	-	-	-	2.64

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)

TESTED BY: Montu
Date : 29.08.2018

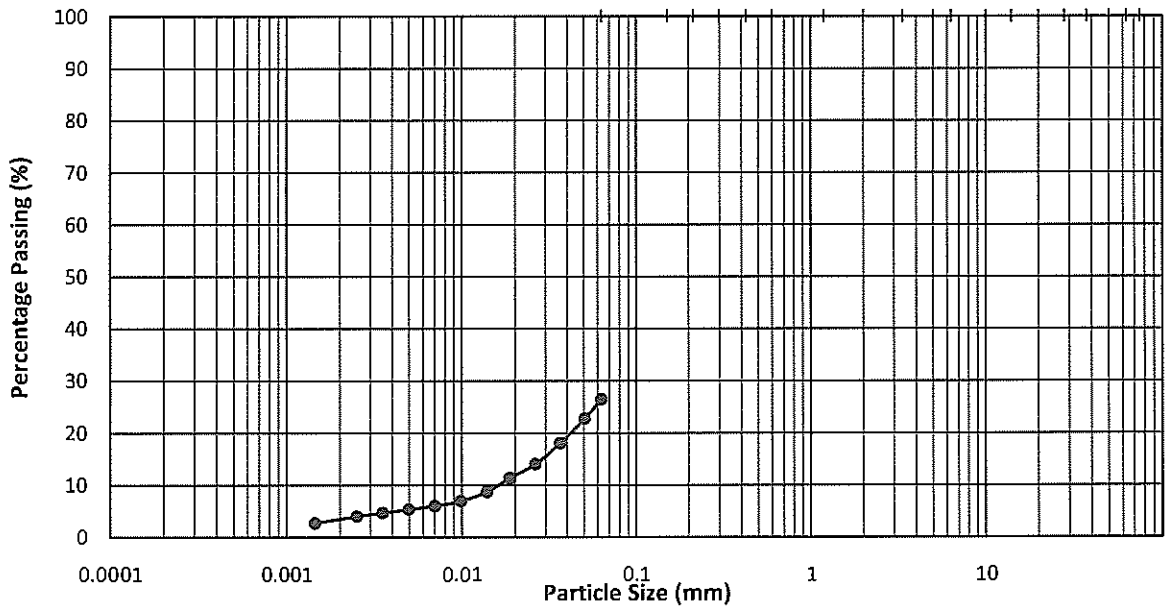
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Dark brownish grey very silty SAND**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**74**	%
SILT	=	**23**	%
CLAY	=	**3**	%

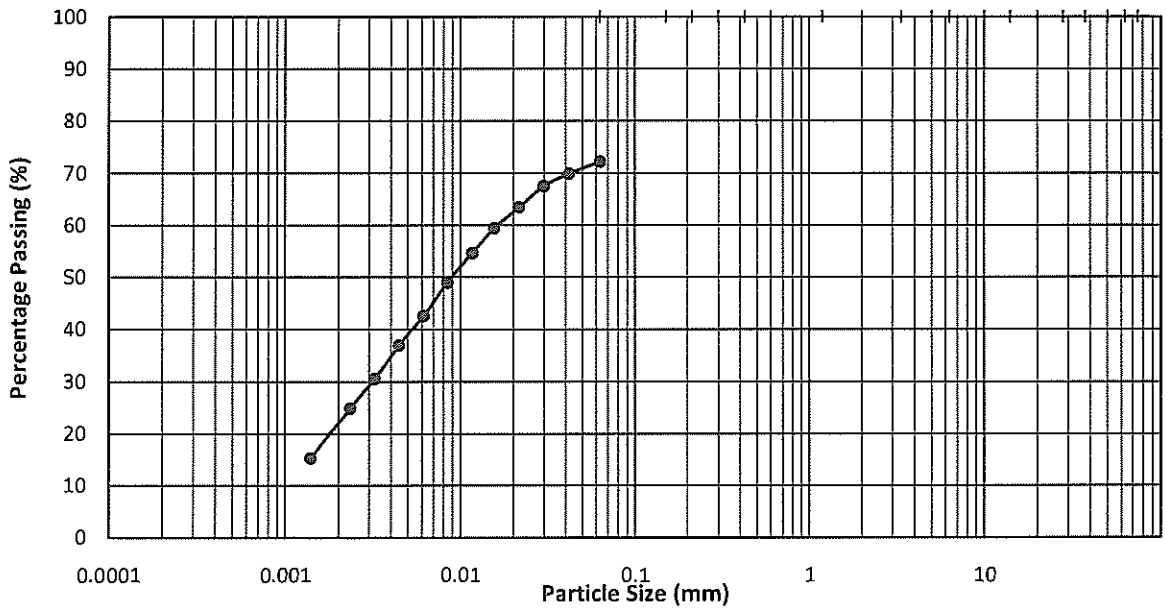
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BHB
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Whitish grey and light yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**28**	%
SILT	=	**50**	%
CLAY	=	**22**	%

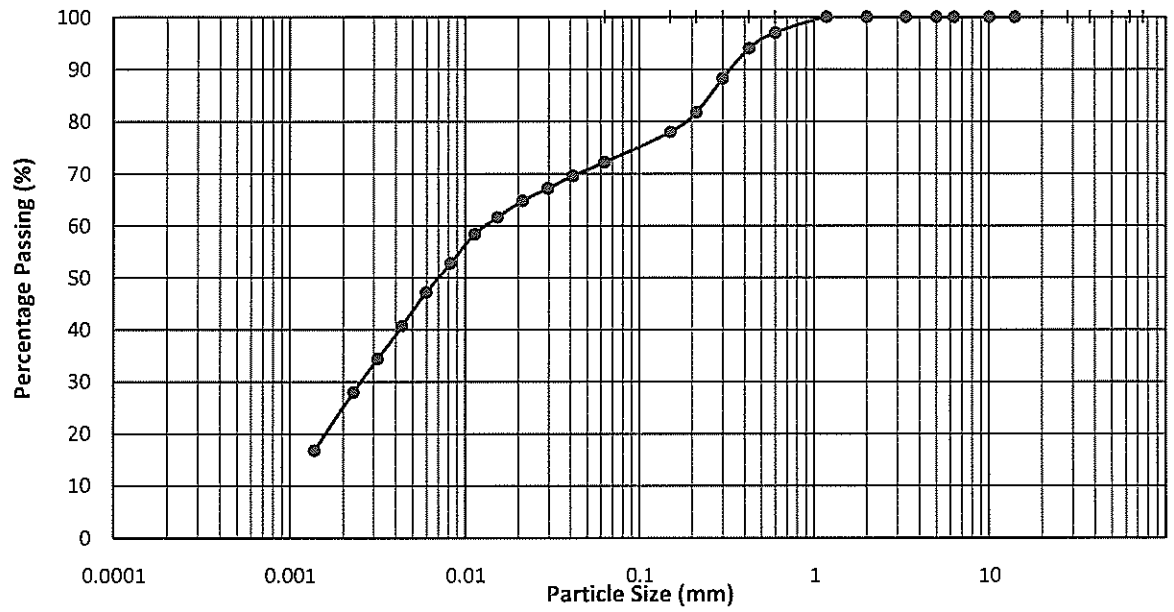
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 01.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**28**	%
SILT	=	**47**	%
CLAY	=	**25**	%

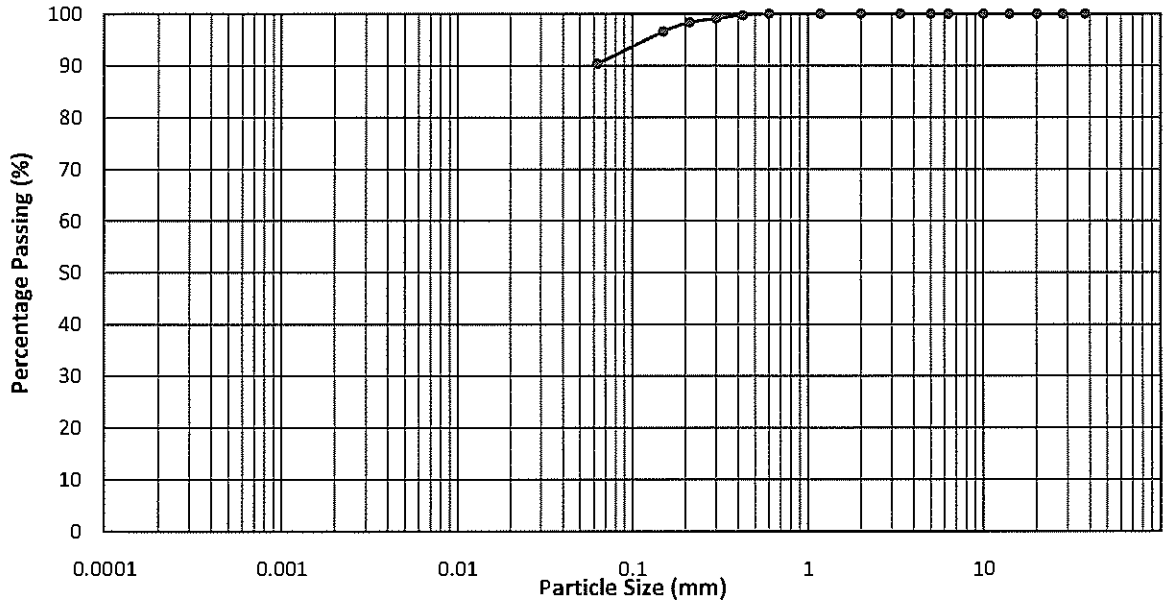
% of Passing 0.425 mm Sieve : 94.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly sandy SILT**

SIEVING TEST

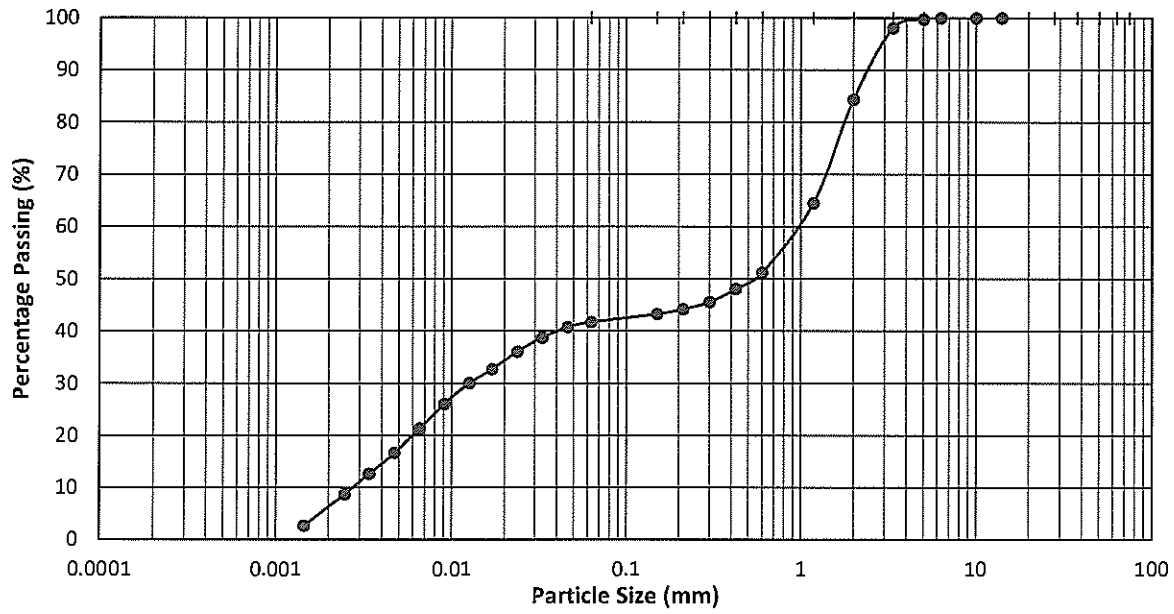
GRAVEL	=	**0**	%	
SAND	=	**10**	%	% of Passing 0.425 mm Sieve : 99.7
SILT + CLAY	=	**90**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 02.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**16**	%
SAND	=	**42**	%
SILT	=	**36**	%
CLAY	=	**6**	%

% of Passing 0.425 mm Sieve : 48.1

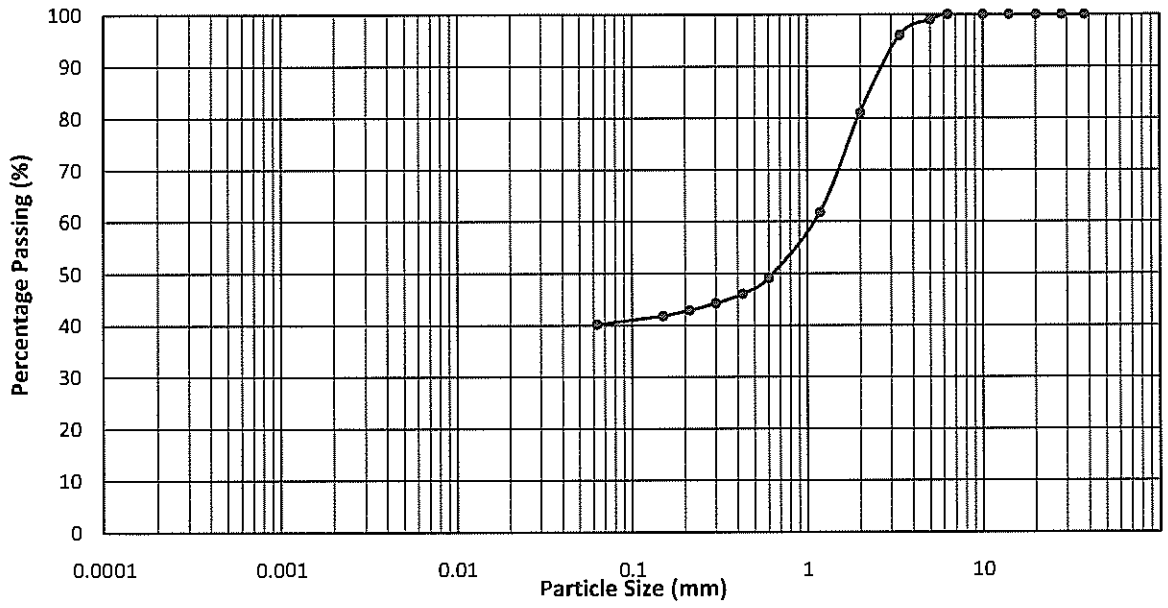
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2015-0923-S

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly gravelly sandy SILT**

SIEVING TEST

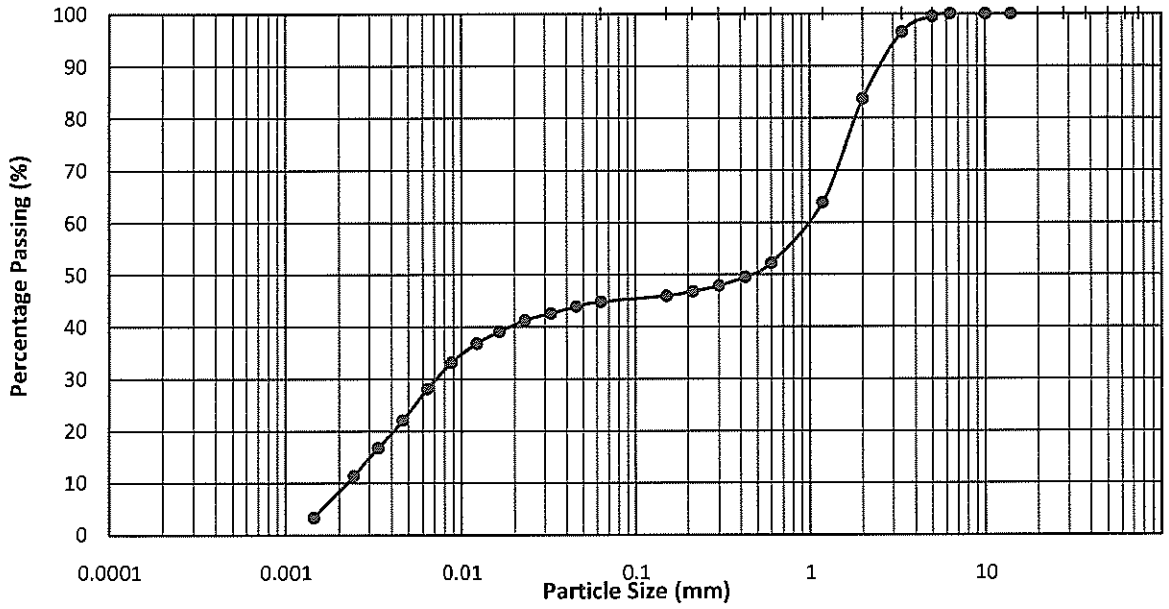
GRAVEL	=	**19**	%	
SAND	=	**41**	%	% of Passing 0.425 mm Sieve : 46.0
SILT + CLAY	=	**40**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW3
DEPTH (m)	: 18.00-18.90m
TEST DATE	: 01.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**16**	%
SAND	=	**39**	%
SILT	=	**37**	%
CLAY	=	**8**	%

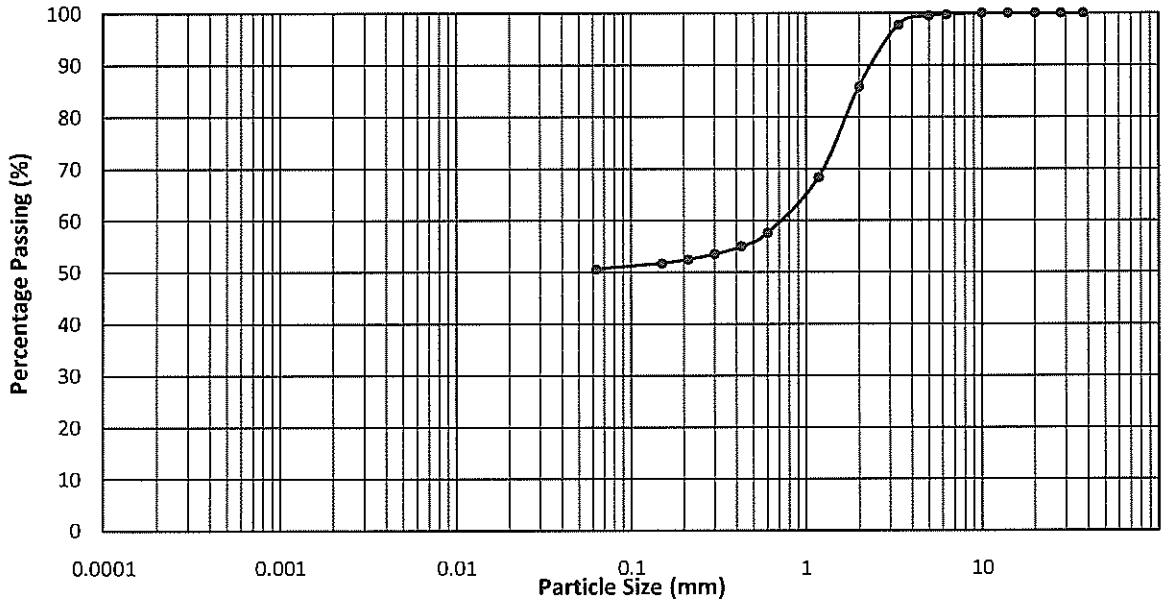
% of Passing 0.425 mm Sieve : 49.5

TESTED BY :	APPROVED BY :	DATE :
S. [illegible]	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BHB
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.90-19.35m
TEST DATE	: 06.09.201B



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

SOIL DESCRIPTION : **Whitish grey slightly gravelly sandy SILT**

SIEVING TEST

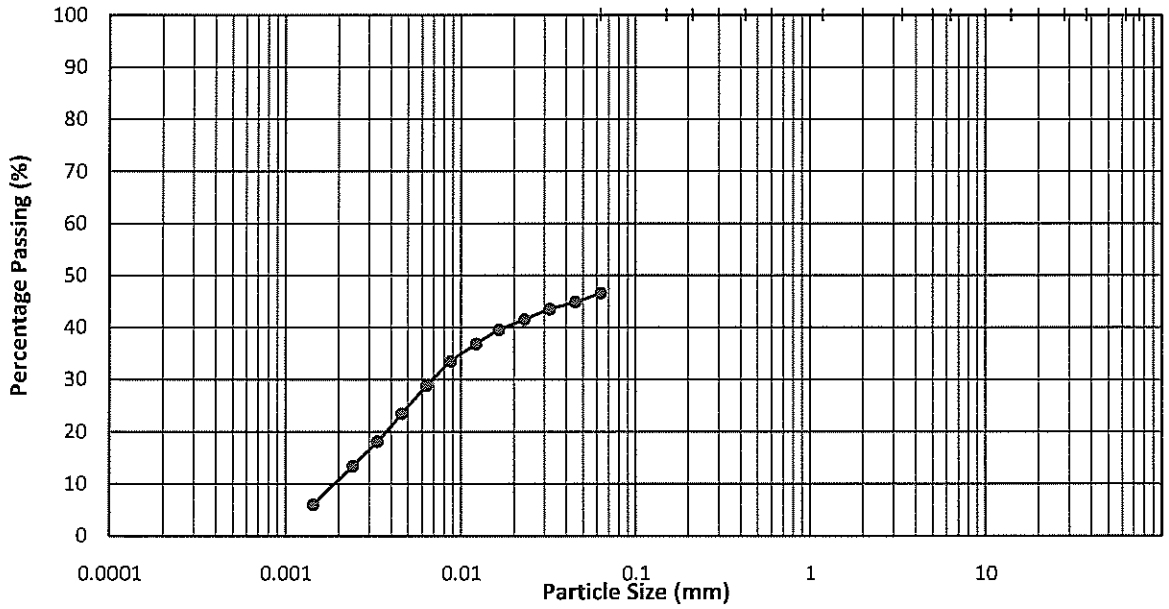
GRAVEL	=	**14**	%	
SAND	=	**35**	%	% of Passing 0.425 mm Sieve : 55.0
SILT + CLAY	=	**51**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT10
DEPTH (m)	: 20.00-20.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Whitish grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**54**	%
SILT	=	**35**	%
CLAY	=	**11**	%

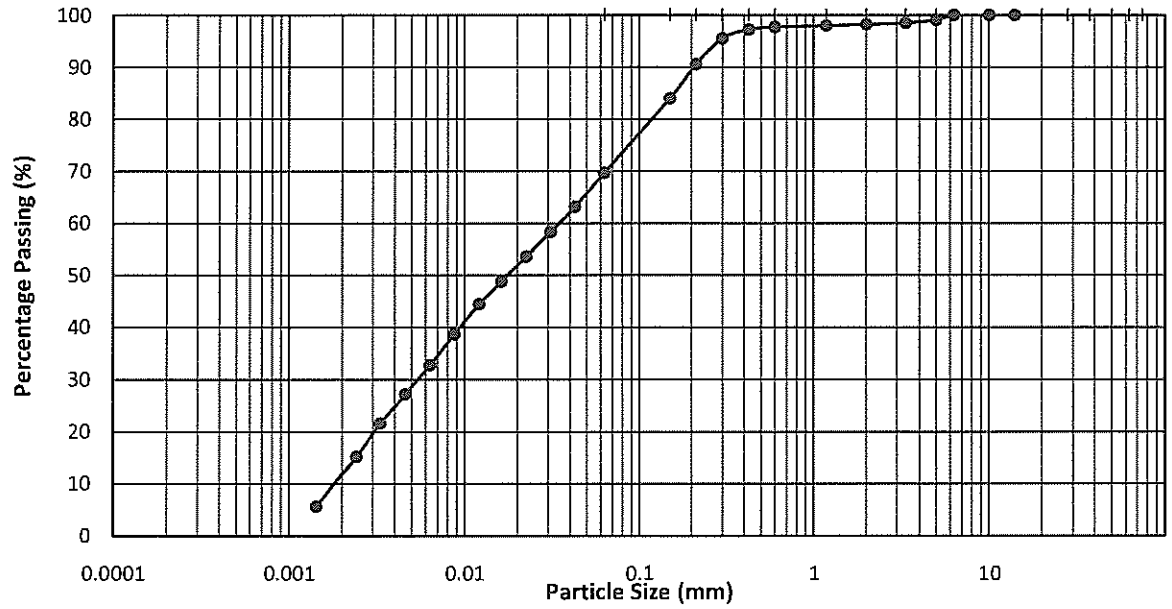
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 03.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**2**	%
SAND	=	**29**	%
SILT	=	**57**	%
CLAY	=	**12**	%

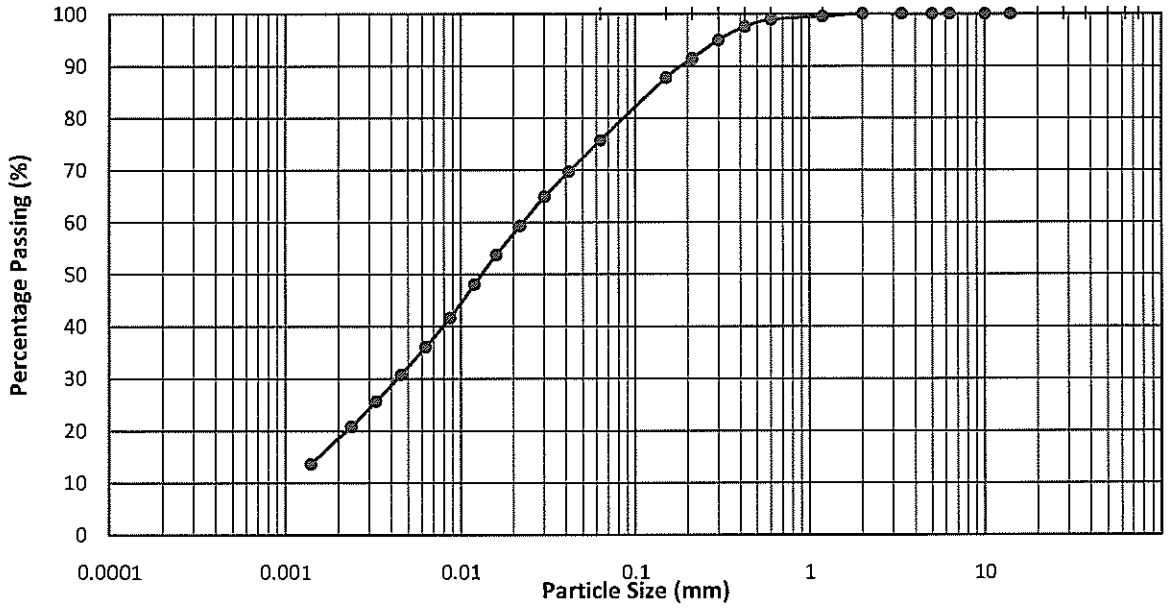
% of Passing 0.425 mm Sieve : 97.2

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT13
DEPTH (m)	: 26.00-26.45m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Whitish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**25**	%
SILT	=	**56**	%
CLAY	=	**19**	%

% of Passing 0.425 mm Sieve : 97.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

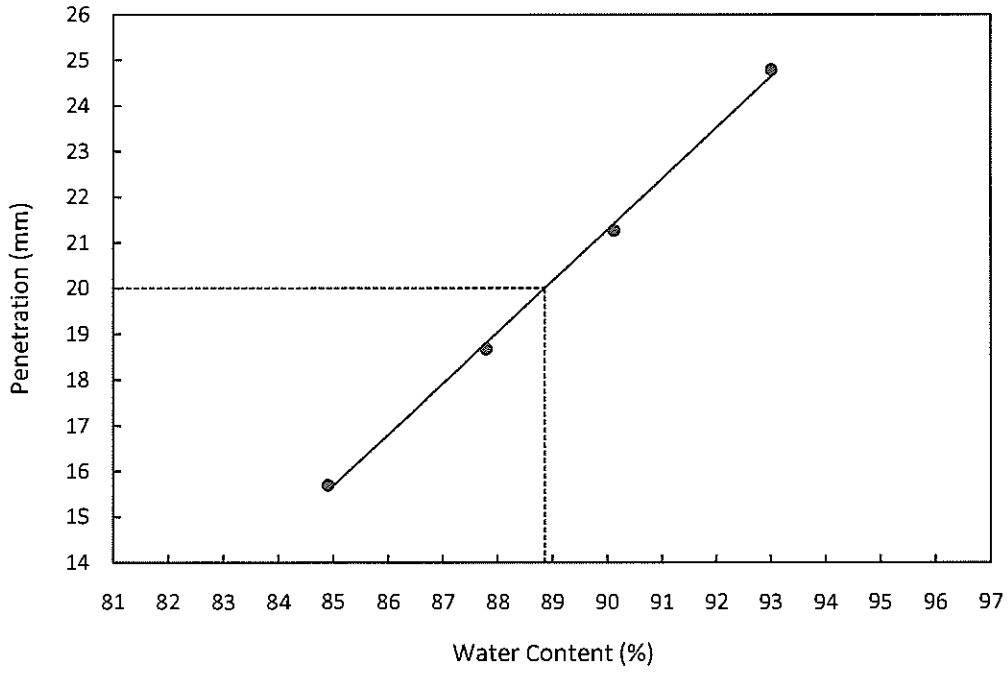
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Whitish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 94
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.25	20.28	20.24	20.19	20.18	20.27
DRY WEIGHT + CUP	(g)	15.19	14.89	14.58	14.34	16.43	16.15
CUP WEIGHT	(g)	9.23	8.75	8.30	8.05	9.26	8.25
WATER CONTENT	(%)	84.9	87.8	90.1	93.0	52.3	52.2
PENETRATION	(mm)	15.7	18.7	21.3	24.8	-	-

LIQUID LIMIT	(%)	**88.9**
PLASTIC LIMIT	(%)	**52.2**
PLASTICITY INDEX		**37**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

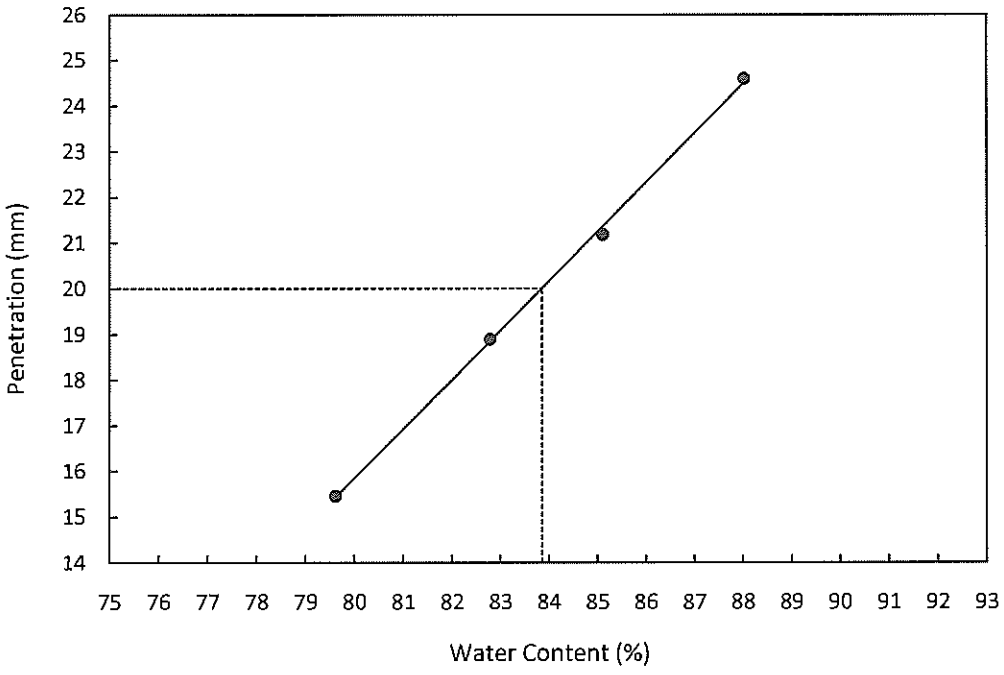
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT5
DEPTH(M)	: 10.00-10.45m
SOIL DESCRIPTION	: Whitish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.45	20.28	20.12	20.55	20.18	20.66
DRY WEIGHT + CUP	(g)	15.53	14.80	15.09	15.48	16.45	16.83
CUP WEIGHT	(g)	9.35	8.18	9.18	9.72	8.76	8.93
WATER CONTENT	(%)	79.6	82.8	85.1	88.0	48.5	48.5
PENETRATION	(mm)	15.5	18.9	21.2	24.6	-	-

LIQUID LIMIT	(%)	**83.9**
PLASTIC LIMIT	(%)	**48.5**
PLASTICITY INDEX		**35**

NOTE:

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TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

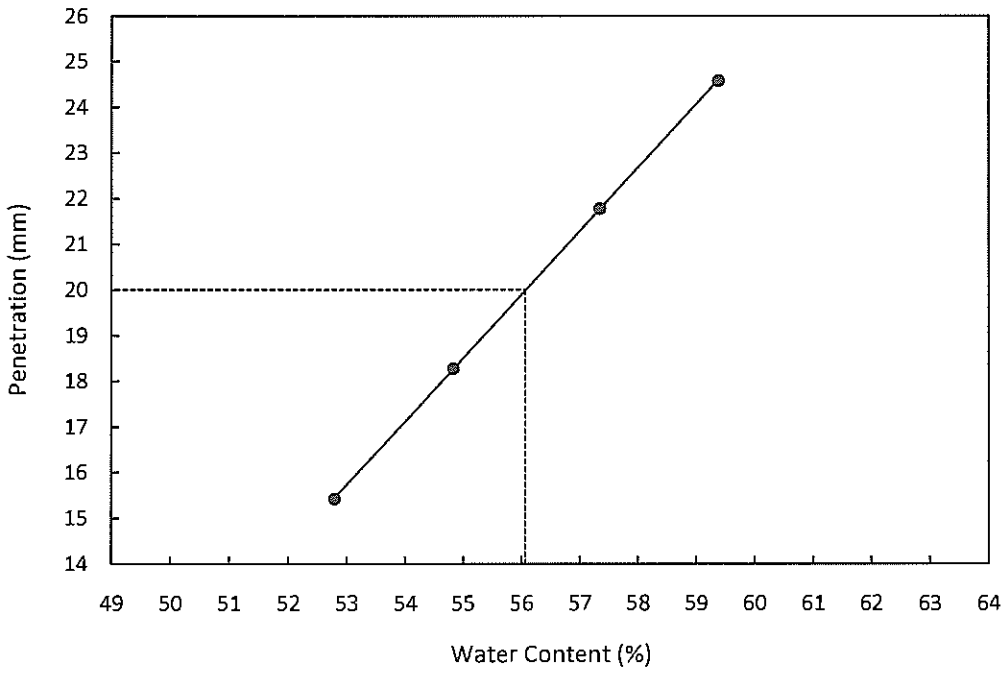
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Whitish grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 49
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.27	20.49	20.23	20.48	20.77	20.52
DRY WEIGHT + CUP	(g)	16.10	16.51	16.09	16.11	17.82	17.53
CUP WEIGHT	(g)	8.20	9.25	8.87	8.75	9.72	9.30
WATER CONTENT	(%)	52.8	54.8	57.3	59.4	36.4	36.3
PENETRATION	(mm)	15.4	18.3	21.8	24.6	-	-

LIQUID LIMIT	(%)	**56.1**
PLASTIC LIMIT	(%)	**36.4**
PLASTICITY INDEX		**20**

NOTE:

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TESTED BY :	APPROVED BY :	DATE :
S. Thu.	(Authorised Signatory - Min Win Htut)	6.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

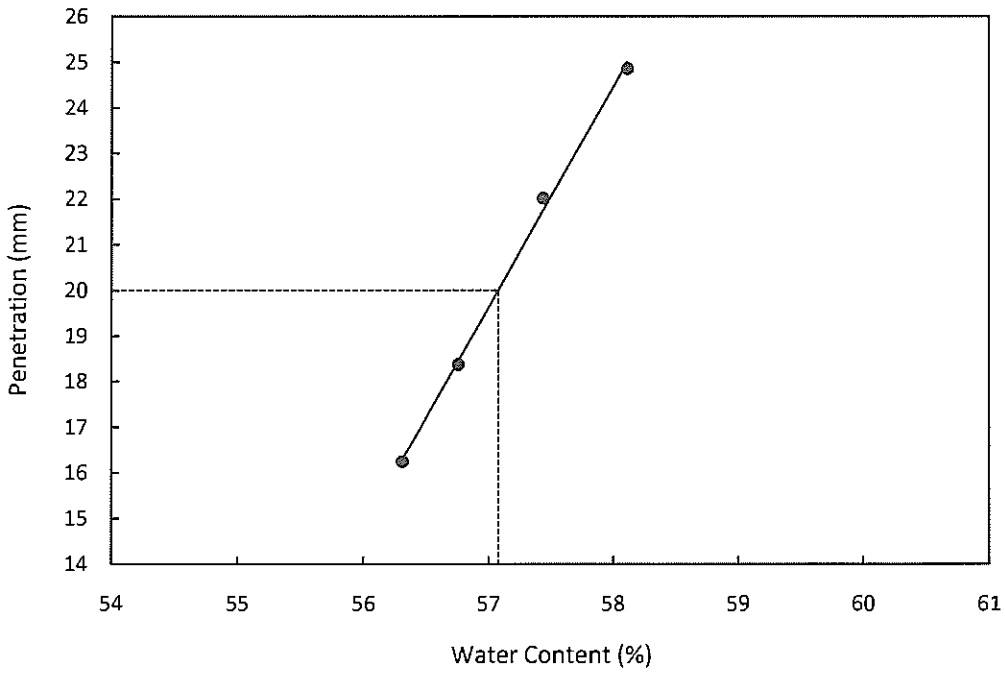
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW3
DEPTH(M)	: 18.00-18.90m
SOIL DESCRIPTION	: Whitish grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 53
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.40	20.62	20.37	20.68	20.79	20.41
DRY WEIGHT + CUP	(g)	16.25	16.25	16.24	16.31	17.34	16.90
CUP WEIGHT	(g)	8.88	8.55	9.05	8.79	9.14	8.48
WATER CONTENT	(%)	56.3	56.8	57.4	58.1	42.1	41.7
PENETRATION	(mm)	16.3	18.4	22.0	24.9	-	-

LIQUID LIMIT	(%)	**57.1**
PLASTIC LIMIT	(%)	**41.9**
PLASTICITY INDEX		**15**

NOTE:

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TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

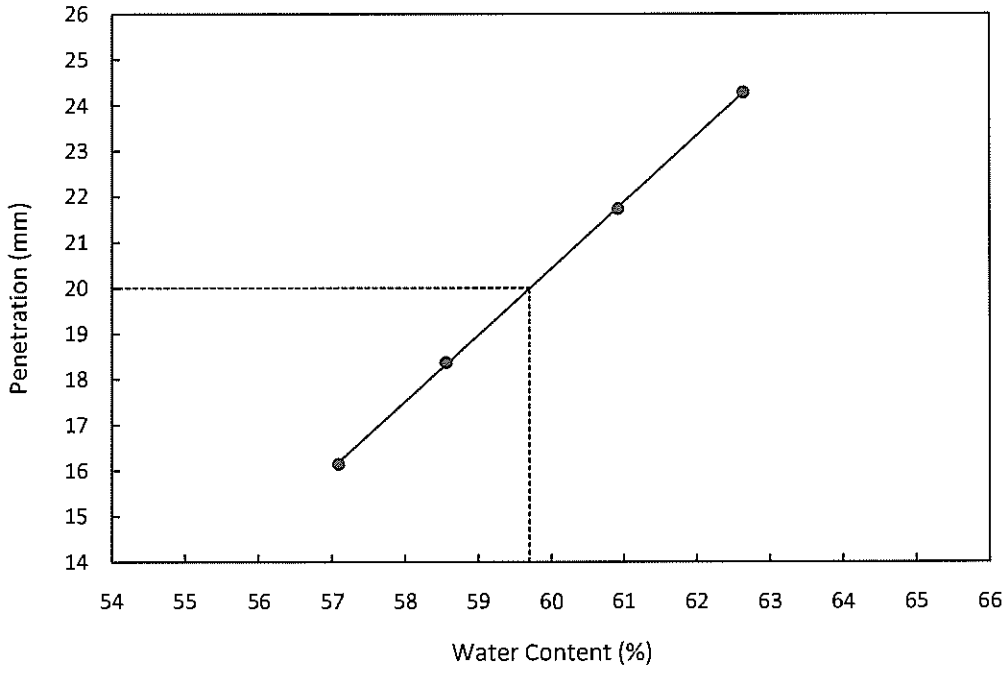
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: SPT11
DEPTH(M)	: 22.00-22.45m
SOIL DESCRIPTION	: Whitish grey and light brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.22	20.51	20.19	20.53	20.15	20.26
DRY WEIGHT + CUP	(g)	15.87	16.37	15.67	15.60	17.32	17.40
CUP WEIGHT	(g)	8.25	9.30	8.25	7.73	8.92	8.79
WATER CONTENT	(%)	57.1	58.6	60.9	62.6	33.7	33.2
PENETRATION	(mm)	16.2	18.4	21.7	24.3	-	-

LIQUID LIMIT	(%)	**59.7**
PLASTIC LIMIT	(%)	**33.5**
PLASTICITY INDEX		**26**

NOTE:

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E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. M.	(Authorised Signatory - Min Win Htut)	6-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

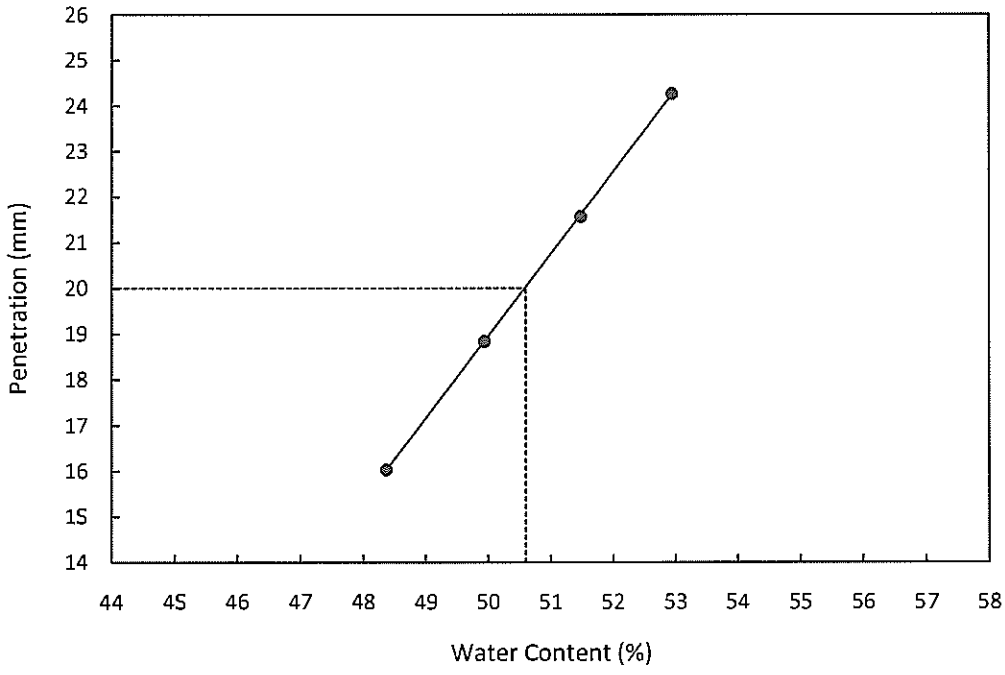
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH8
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Whitish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 97
TEST DATE	: 30.08.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.26	20.46	20.58	20.18	20.26	20.42
DRY WEIGHT + CUP	(g)	16.42	16.71	16.22	15.95	17.55	17.85
CUP WEIGHT	(g)	8.48	9.20	7.75	7.96	8.79	9.49
WATER CONTENT	(%)	48.4	49.9	51.5	52.9	30.9	30.7
PENETRATION	(mm)	16.0	18.8	21.6	24.3	-	-

LIQUID LIMIT	(%)	**50.6**
PLASTIC LIMIT	(%)	**30.8**
PLASTICITY INDEX		**20**

NOTE:

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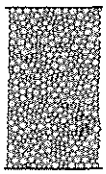


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	6.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

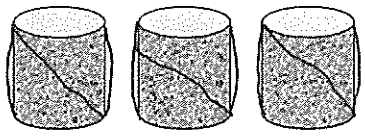
Sample Details						
 *sketch showing specimen location in original sample*	Depth		18.00-18.90m			
	Description		Firm whitish grey slightly gravelly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	76.0	76.0	76.0
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	158.1	164.4	159.2
	Bulk Density	ρ_0	(Mg/m3)	1.83	1.91	1.85
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	165	330	660
Strain Rate	$\dot{m}_s$	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	34	30	32
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.37	1.47	1.40
Initial Voids Ratio	e_0	.	0.94	0.81	0.89
Initial Degree of Saturation	S_o	(%)	96	99	94

Final Conditions			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	67.92	91.11	84.45
MembraneCorrection	m_c	(kPa)	1.980	1.450	1.910
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.92	13.03	19.05
Shear Strength	c_u	(kPa)	33.96	45.55	42.22
Final Moisture	$\omega_f\%$	(%)	34	30	32
Final Dry Density	ρ_{df}	(Mg/m3)	1.37	1.47	1.40
Final Voids Ratio	e_f	.	0.94	0.81	0.89
Final Degree of Saturation	S_f	(%)	96.4	98.6	94.2

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-SungeiTengah-B8T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengah Rd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	18.00-18.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

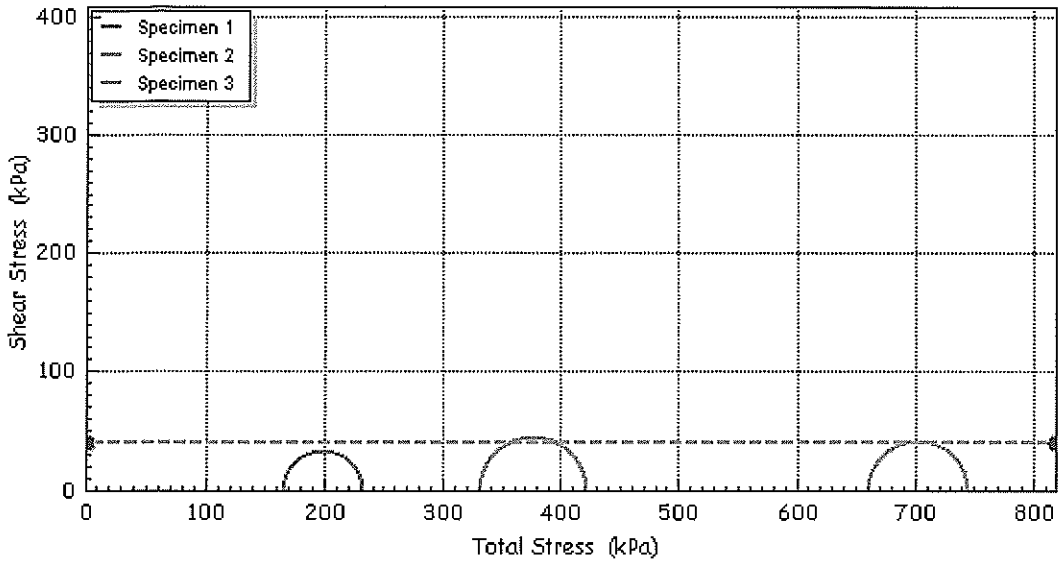
Ryobi Geotechnique International Pte Ltd

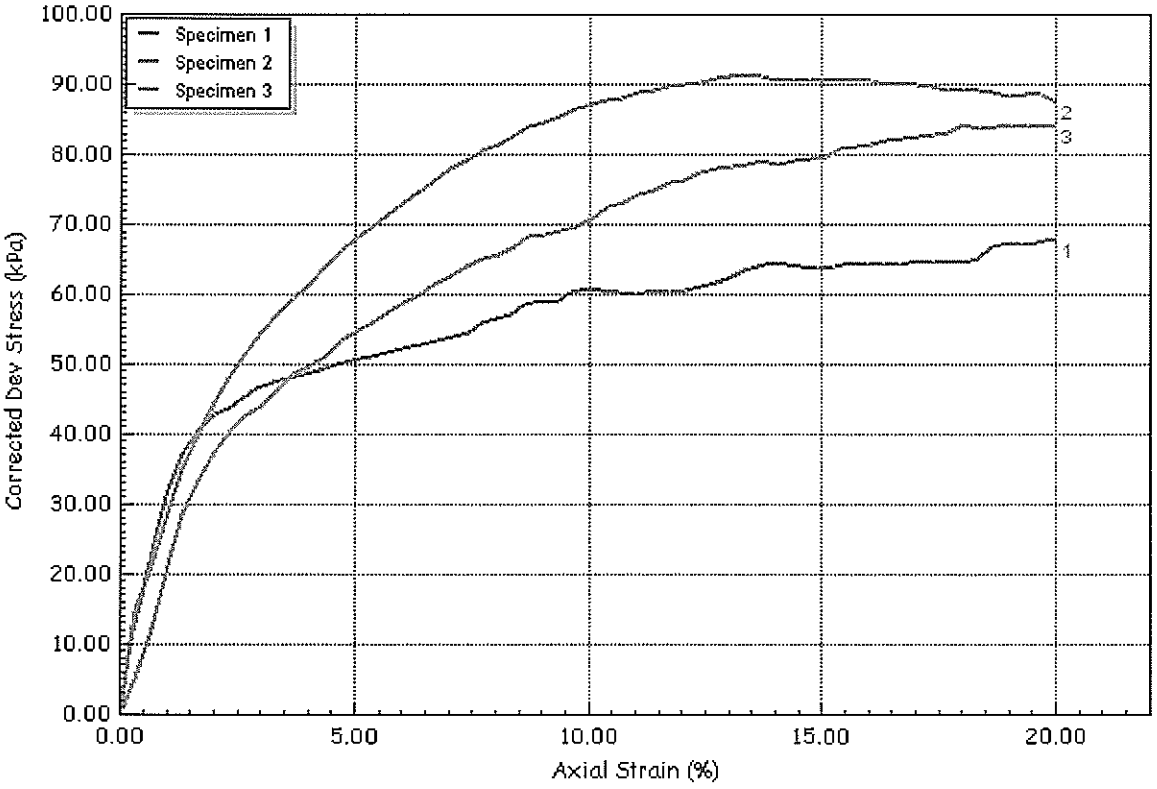
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	40.6
Friction Angle	ϕ	(deg)	0.0





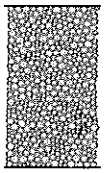
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-SungeiTengah-B8T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengah Rd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	18.00-18.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

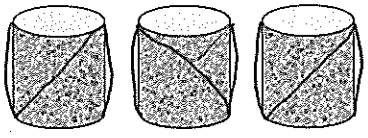
Sample Details					
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m		
	Description		Stiff whitish grey slightly gravelly slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	162.6	160.1	163.9
	Bulk Density	ρ_0 (Mg/m3)	1.90	1.87	1.91
	Particle Density	ρ_s (Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	36	37	34
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.40	1.36	1.43
Initial Voids Ratio	e_0	.	0.91	0.96	0.87
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	144.80	146.12	163.65
MembraneCorrection	m_c	(kPa)	1.200	1.170	0.870
Strain At Max Stress	$\varepsilon_f\%$	(%)	10.01	9.71	6.71
Shear Strength	c_u	(kPa)	72.40	73.06	81.83
Final Moisture	$\omega_f\%$	(%)	36	37	34
Final Dry Density	ρ_{df}	(Mg/m3)	1.40	1.36	1.43
Final Voids Ratio	e_f	.	0.91	0.96	0.87
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	UU2-SungeiTengah-B8T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengah Rd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked Min Win Htut	Approved Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

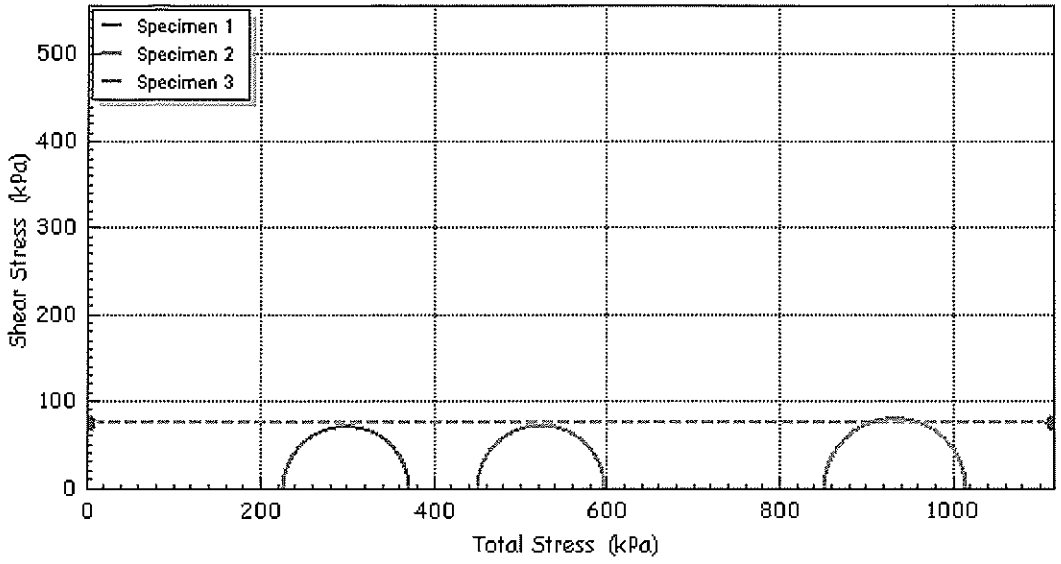
Ryobi Geotechnique International Pte Ltd

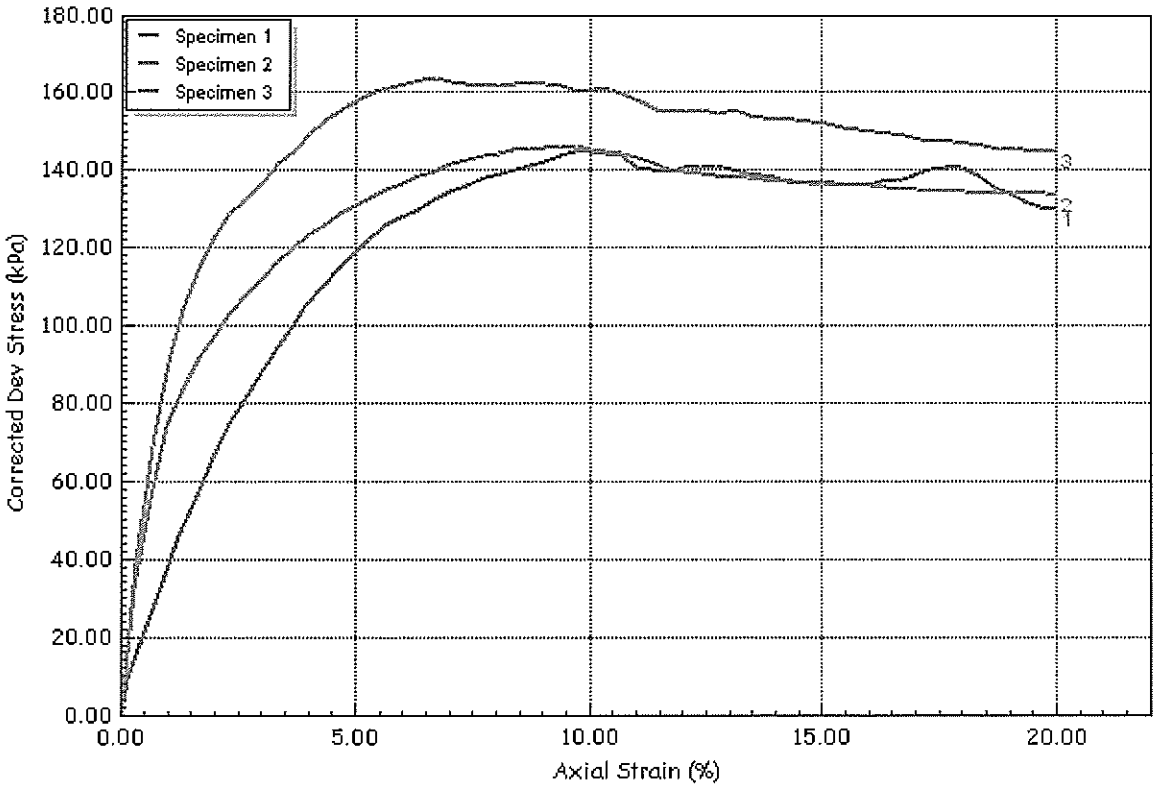
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	75.8
Friction Angle	ϕ	(deg)	0.0





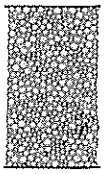
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-SungeiTengah-B8T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	3/9/2018
Site Reference	ST28(LV Plots)Along SungeiTengah Rd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

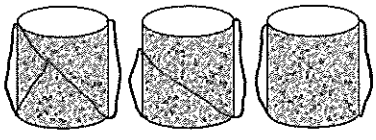
Sample Details					
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m		
	Description		Whitish grey slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0	(mm) 140.0	140.0	140.0
	Initial Sample Diameter	D_0	(mm) 70.0	70.0	70.0
	Initial Sample Weight	W_0	(gr) 941.1	1023.8	1042.1
	Initial Bulk Density	ρ_0	(Mg/m3) 1.75	1.90	1.93
	Particle Density	ρ_s	(Mg/m3) 2.67	2.67	2.67

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	250	300	400
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	43	43	40
Initial Dry Density	ρ_{di}	(Mg/m3)	1.22	1.33	1.38
Initial Voids Ratio	e_i	.	1.192	1.011	0.938
Initial Degree of Saturation	S_i	(%)	97	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	43	41	37
Final Dry Density	ρ_{df}	(Mg/m3)	1.26	1.36	1.43
Final Voids Ratio	e_f	.	1.119	0.961	0.864
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	4.13	4.51	6.22
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	87.2	146.9	223.6
Minor Stress At Failure	σ_3'	(kPa)	25.0	49.2	80.0
Major Stress At Failure	σ_1'	(kPa)	112.2	196.1	303.6
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.487	3.986	3.795

Notes

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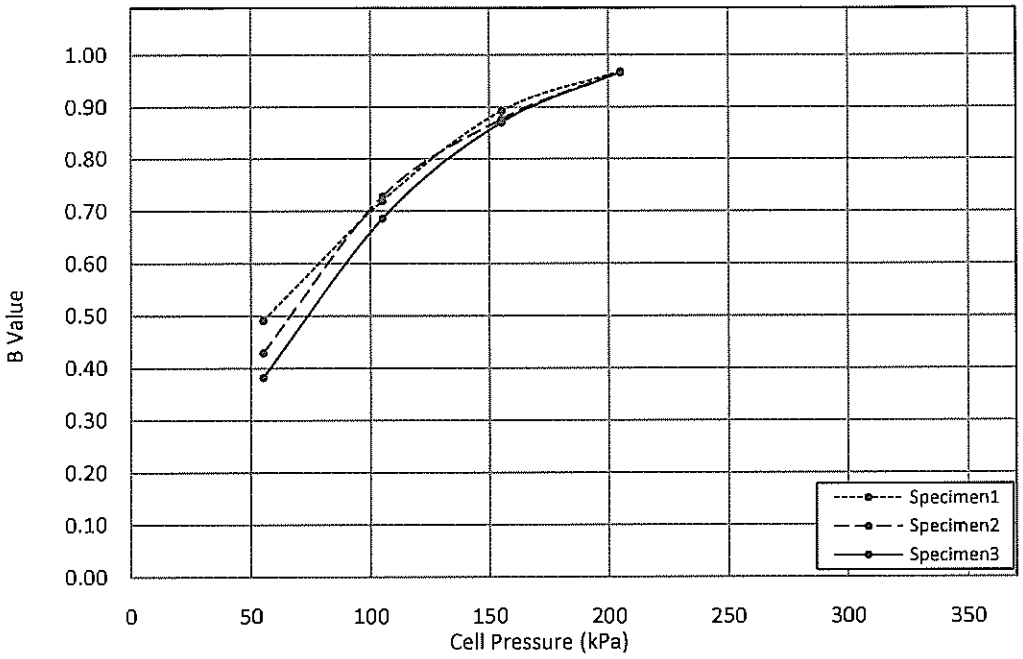
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengahWA7-B8T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	30/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator Kar	Checked Min Win Htut	Approved Sio Keong Kong	

Ryobi Geotechnique International Pte Ltd

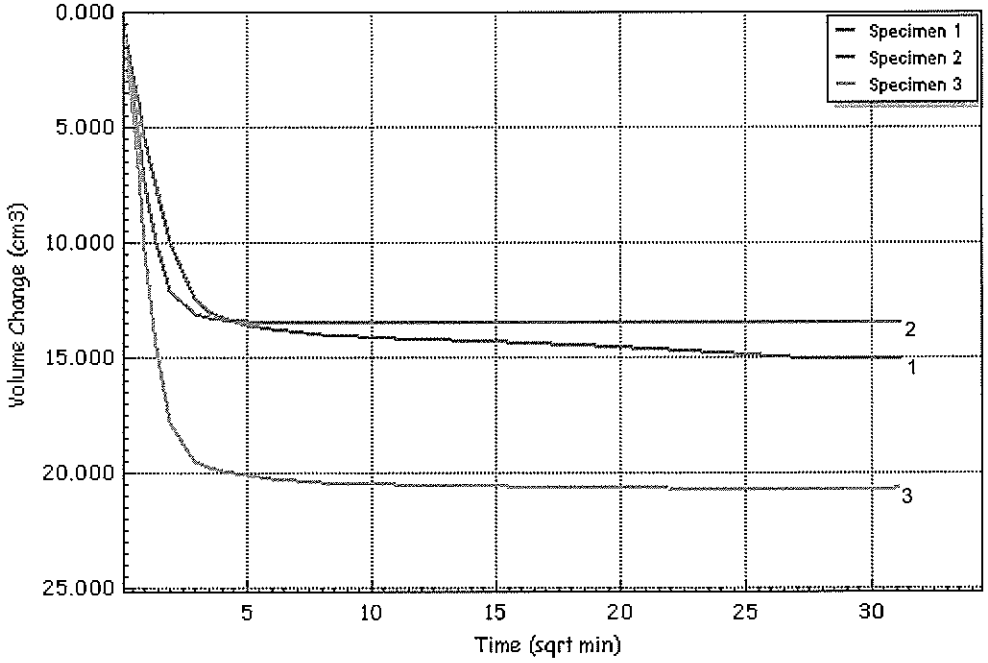
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



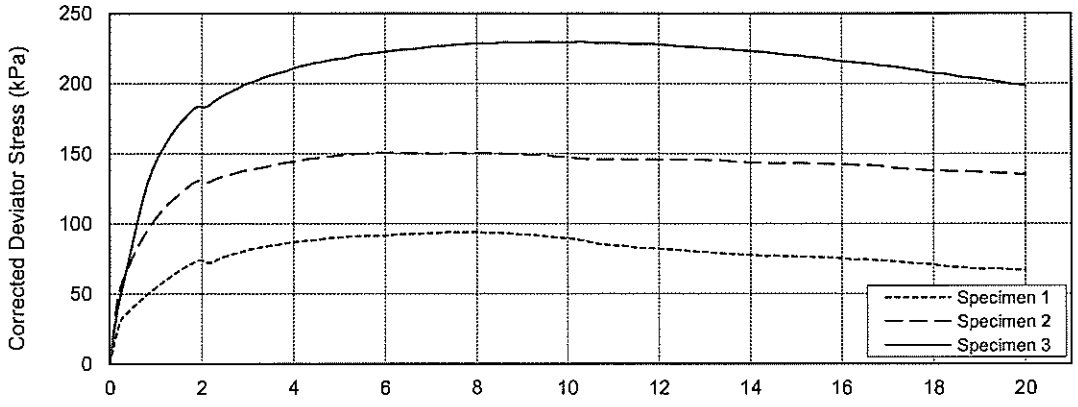
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengahWA7-B8T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	30/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH8
Jobfile	K5728 Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator	ka	Checked	Min Win Htut
		Approved	Sio Keong Kong

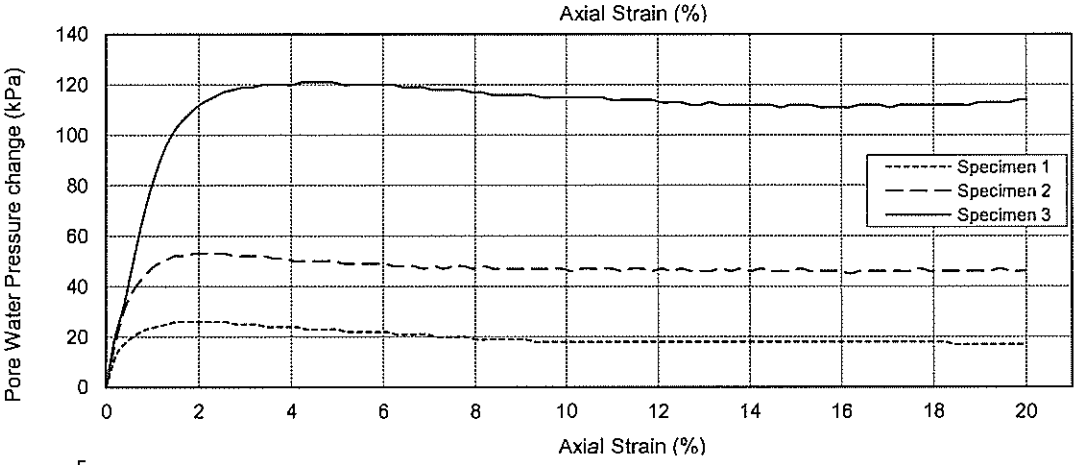
Ryobi Geotechnique International Pte Ltd

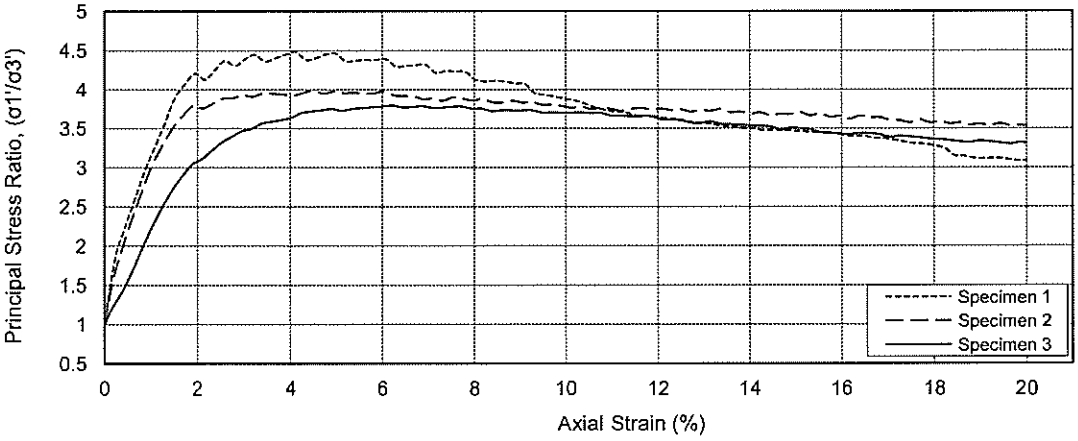
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	201	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	225	251	320
A Value at Max. Stress Ratio	0.275	0.347	0.537

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengahWA7-B8T1
Database	:\SQLEXPRESS\Ryobi-2017	Test Date	30/8/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator	Ka	Checked	Min Win Htut
		Approved	Sio Keong Kong

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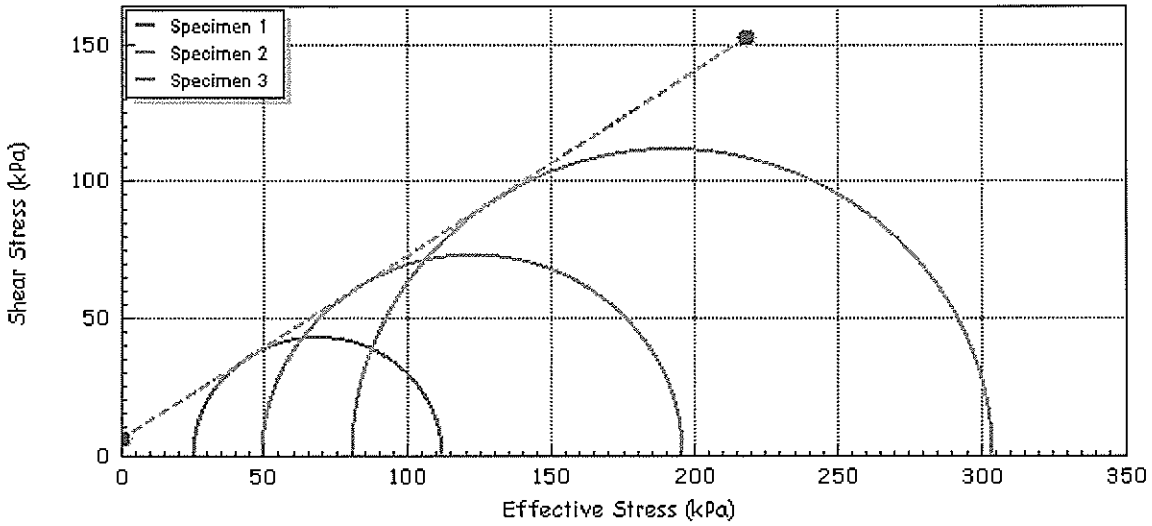
Ryobi Geotechnique International Pte Ltd

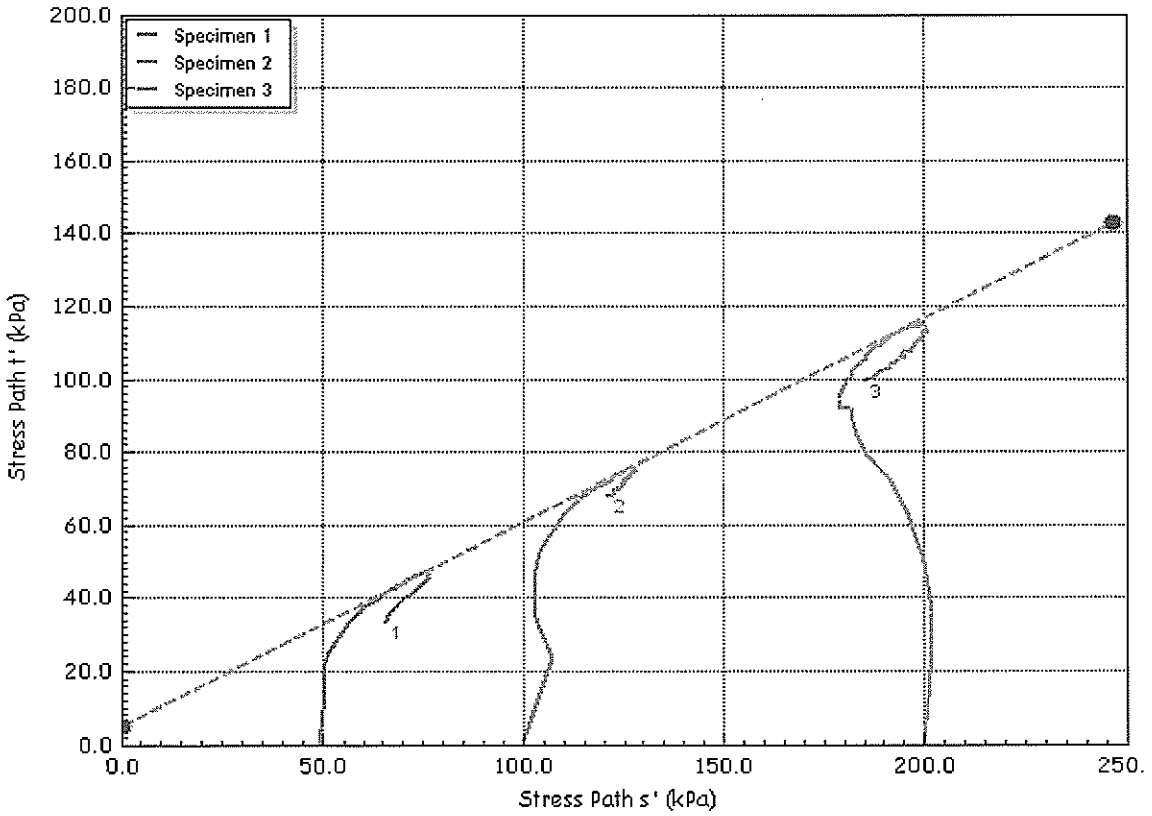
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	5.9	Stress Path Intercept	t_0'	(kPa)	4.9
Effective Friction Angle	ϕ'	(deg)	34.0	Stress Path Inclination	θ	(deg)	29.2





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU1-SungeiTengahWA7-B8T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	30/8/2018
Site Reference	ST28(LV Plots)Along SungeiTengahRd	Borehole	BH8
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

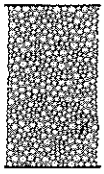
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

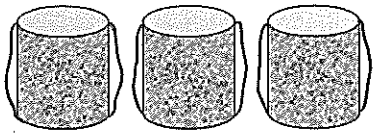
Sample Details						
 *sketch showing specimen location in original sample*	Depth			14.00-14.90m		
	Description			Whitish grey slightly gravelly sandy SILT		
	Type			Undisturbed Sample		
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	76.0	76.0	76.0
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	162.6	163.2	162.6
	Initial Bulk Density	ρ_0	(Mg/m3)	1.89	1.89	1.89
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	275	350	500
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.200	0.200	0.200
Initial Moisture	$\omega_i\%$	(%)	30	30	31
Initial Dry Density	ρ_{di}	(Mg/m3)	1.45	1.46	1.44
Initial Voids Ratio	e_i	.	0.839	0.820	0.845
Initial Degree of Saturation	S_i	(%)	96	96	97
B Value	B	.	0.97	0.98	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	30	29	28
Final Dry Density	ρ_{df}	(Mg/m3)	1.48	1.52	1.53
Final Voids Ratio	e_f	.	0.793	0.751	0.737
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	4.14	5.98	8.32
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	145.8	214.9	368.9
Minor Stress At Failure	σ_3'	(kPa)	32.0	51.8	97.0
Major Stress At Failure	σ_1'	(kPa)	177.8	266.7	465.9
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	5.555	5.149	4.803

Notes

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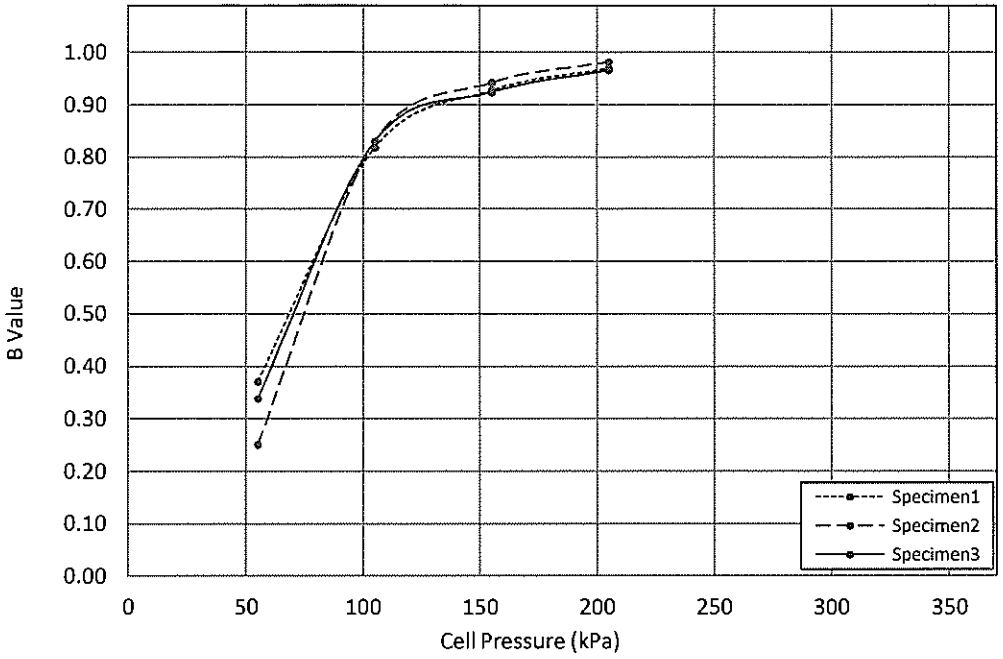
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengah-B8T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	2/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH8
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kou	Checked	Min Win Htut
		Approved	Sio Keong Kong

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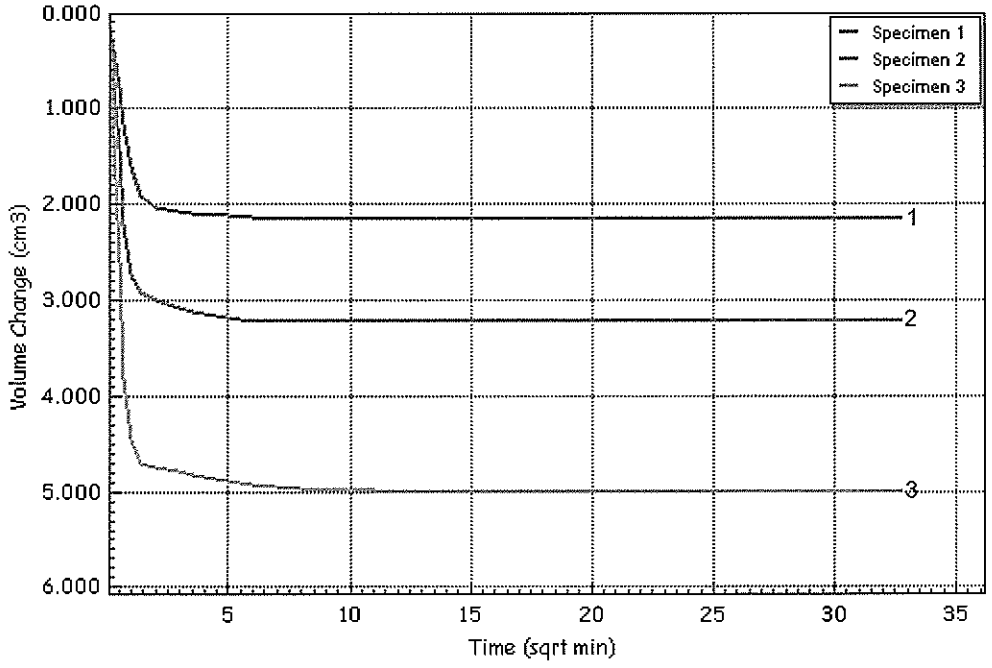
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



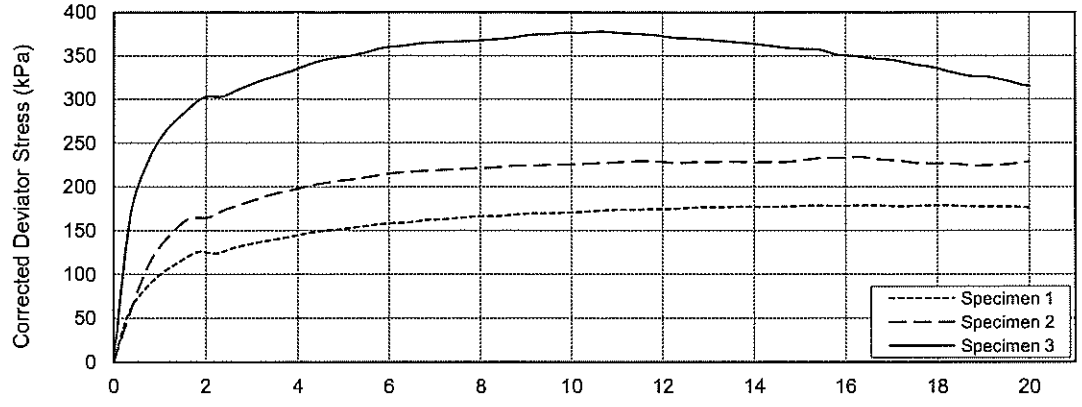
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengah-B8T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	2/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH8
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

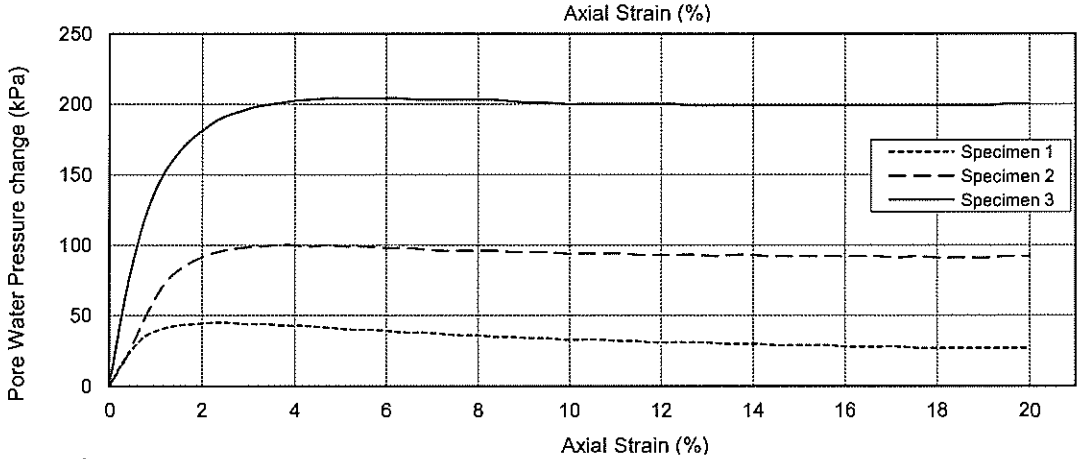
Ryobi Geotechnique International Pte Ltd

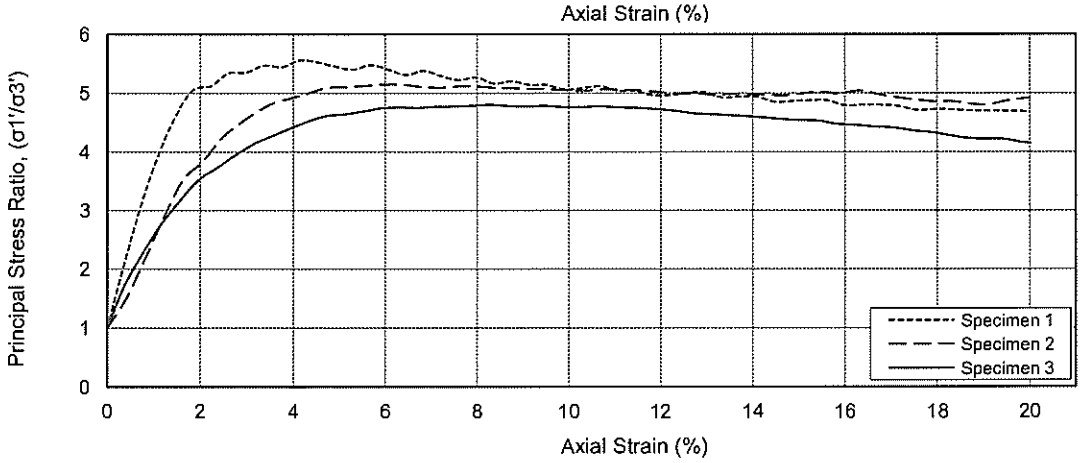
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	243	298	403
A Value at Max. Stress Ratio	0.295	0.456	0.550

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengah-B8T2
Database :.\SQLEXPRESS\Ryobi-2017		Test Date	2/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH8
Jobfile	K5728 ST28 LV Plots Sungei Tengah Road	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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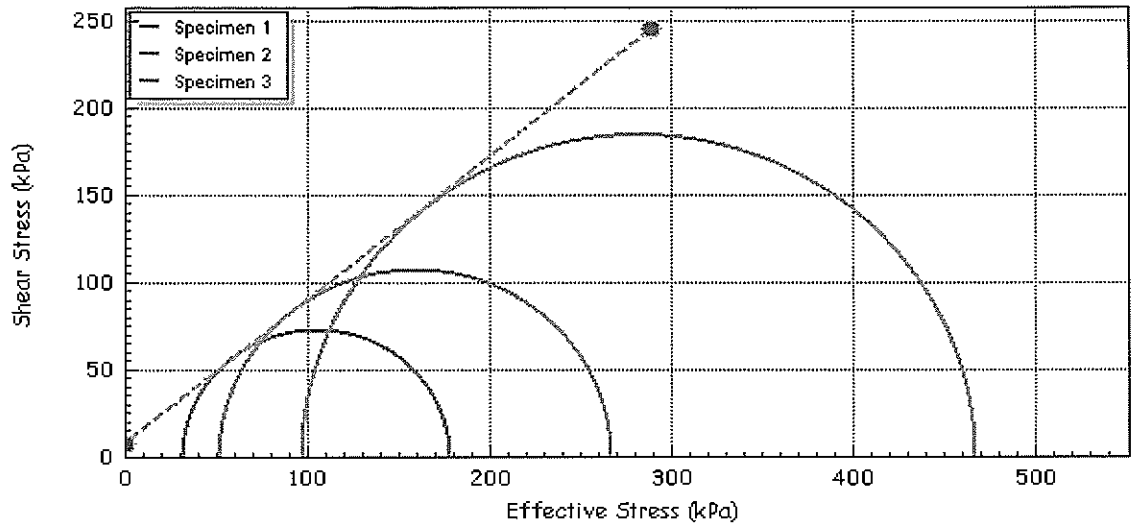
Ryobi Geotechnique International Pte Ltd

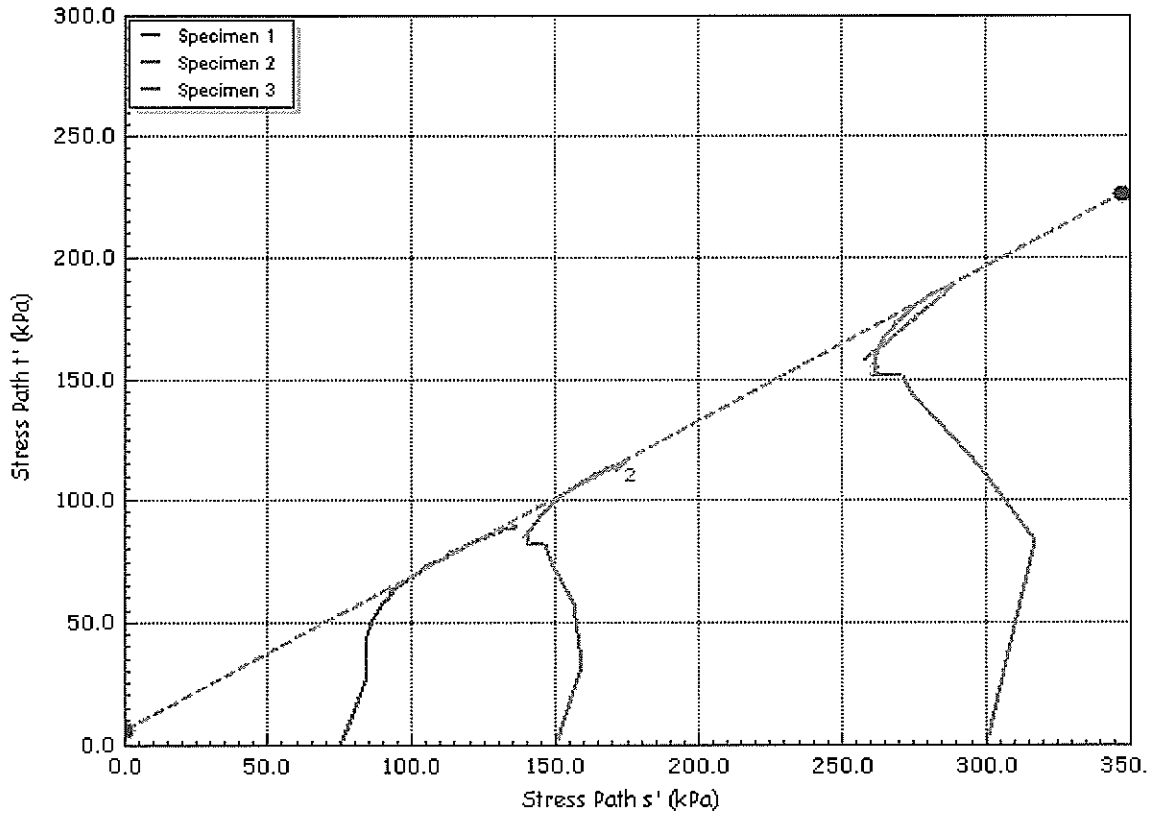
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	7.7	Stress Path Intercept	t_0'	(kPa)	5.9
Effective Friction Angle	ϕ '	(deg)	39.4	Stress Path Inclination	θ	(deg)	32.4





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU3-SungeiTengah-B8T2
Database: .\SQLEXPRESS \ Ryobi-2017		Test Date	2/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH8
Jobfile	K5728 ST28 LV Plots Sungei Tengah	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kau	Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813557**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 27-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 28-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 31-Aug-2018
No. of samples received	: 6	No. of samples analysed	: 6

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH1 SPT9 (18.00-18.45m) - Sandy SILT	BH2 SPT5 (10.00-10.45m) - Sandy SILT	BH3 SPT9 (18.00-18.45m) - Sandy SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813557-001**	**SG1813557-002**	**SG1813557-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		4.5	5.2	7.4
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.3	0.5
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH4 SPT8 (16.00-16.45m) - Sandy SILT	BH6 SPT8 (16.00-16.90m) - Sandy SILT	BH8 SPT12 (24.90-25.35m) - SILT
				Sampling date/time	27-Aug-2018 00:00	27-Aug-2018 00:00	27-Aug-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813557-004**	**SG1813557-005**	**SG1813557-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		3.4	6.5	4.8
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		0.01	<0.01	0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813717**	Page	: 1 of 2
Client	: **RYOBI GEOTECH PTE LTD**	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 30-Aug-2018
Telephone	: +65 6369 7100	Date Analysed	: 30-Aug-2018
Facsimile	: +65 6362 5848	Date Issued	: 05-Sep-2018
No. of samples received	: 1	No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- **Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377**
- **BS method is referenced to British Standard 1377: Part 3/1990**
- **Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377**
- **pH Test is referenced to Clause 9 of Part 3: BS1377**

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	**BH8 W1 - Water Sample**	---	---
				Sampling date/time	30-Aug-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1813717-001**	-------	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		10.6	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.04	----	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.04	----	----
ORGANICS-General							
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	----	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH9						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT6	TW2	SPT7
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	12.00-12.45	14.00-14.90	14.90-15.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	33.0	30.6	-	-	51.3	50.5
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.63	-	1.98	-	-	1.71	-
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	-	-	2.72	2.71	-	2.69	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	16	57	(B)	0	8
	SAND	%	10	-	14			5	
	SILT	%	90	-	53	35		74	67
	CLAY	%		-	17	8		21	25
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	(A)	59.8	-	70.2	74.6	-
	PLASTIC LIMIT	%	-		40.3	-	43.5	44.3	-
	PLASTICITY INDEX		-		19	-	27	30	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	**UU**	-
	TOTAL COHESION	kPa	-	-	111.8	-	-	114.3	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.
(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2012

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA
PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO. : K5728

BOREHOLE NO :			BH9						
SAMPLE NO :			SPT8	SPT9	TW3	SPT10	SPT11	TW4	5PT13
SAMPLE DEPTH :		m	16.00-16.45	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45	24.00-24.90	26.00-26.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	19.8	20.4	-	-	29.5	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.62	-	2.08	-	1.91	1.97	-
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	2.66	-	2.68	-	-	2.65	2.67
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	59	12	-	37	0	-
	SAND	%	-		25	-	17	12	-
	SILT	%	-	28	38	-	46	80	-
	CLAY	%	-	13	25	-		8	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	58.8	-	-	57.2	(A)
	PLASTIC LIMIT	%	-	-	31.7	-	-	31.7	
	PLASTICITY INDEX		-	-	27	-	-	25	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	**UU**	-
	TOTAL COHESION	kPa	-	-	173.3	-	-	177.0	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	5.1	-	-	-
	Chloride Content	%	-	-	-	<0.01	-	-	-
	Organic Content	%	-	-	-	0.4	-	-	-
	Sulphate Content	%	-	-	-	<0.01	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH9						
SAMPLE NO :			SPT14	SPT15	W1				
SAMPLE DEPTH :		m	28.00-28.45	30.00-30.45	Water Sample				
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	36.2					
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.94	-	-				
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	-	-	-				
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	-				
	SAND	%	40	-	-				
	SILT	%	60	-	-				
	CLAY	%		-	-				
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	47.2	-				
	PLASTIC LIMIT	%	-	29.4	-				
	PLASTICITY INDEX		-	18	-				
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-				
	TOTAL COHESION	kPa	-	-	-				
	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	-	-	-				
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-				
	Chloride Content	%	-	-	-				
	Organic Content	%	-	-	-				
	Sulphate Content	%	-	-	-				
	pH Value		-	-	9.0				
	Chloride Content	g/L	-	-	0.04				
	Organic Content	% (w/v)	-	-	<0.10				
	Sulphate Content	g/L	-	-	0.04				

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 : 17/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH9	SPT2	4.00-4.45	-	1.63	-	-
BH9	SPT3	6.00-6.45	33.0	-	-	-
BH9	TW1	8.00-8.90	30.6	1.98	-	2.72
BH9	SPT4	8.90-9.35	-	-	-	2.71
BH9	TW2	14.00-14.90	51.3	1.71	-	2.69
BH9	SPT7	14.90-15.35	50.5	-	-	-
BH9	SPT8	16.00-16.45	-	1.62	-	2.66
BH9	SPT9	18.00-18.45	19.8	-	-	-
BH9	TW3	20.00-20.90	20.4	2.08	-	2.68
BH9	SPT11	22.00-22.45	-	1.91	-	-
BH9	TW4	24.00-24.90	29.5	1.97	-	2.65
BH9	SPT13	26.00-26.45	-	-	-	2.67
BH9	SPT14	28.00-28.45	-	1.94	-	-
BH9	SPT15	30.00-30.45	36.2	-	-	-

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)

TESTED BY: MONJU
Date : 02.09.2018

APPROVED BY:
(Authorised Signatory - Min Win Htut)

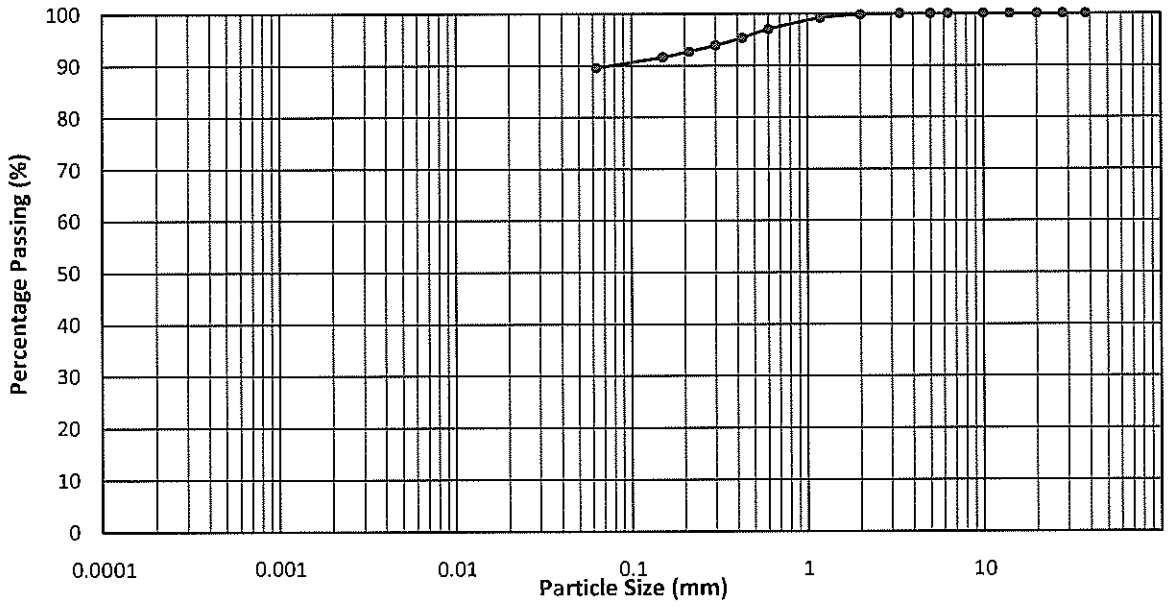
DATE : 17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**10**	%
SILT + CLAY	=	**90**	%

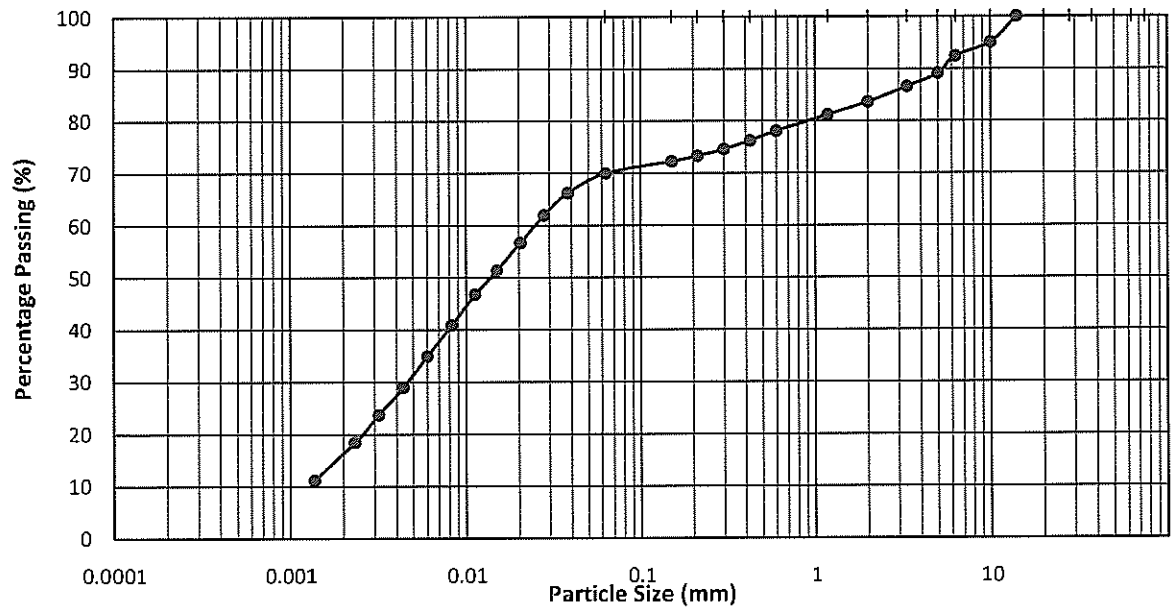
% of Passing 0.425 mm Sieve : 95.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**16**	%
SAND	=	**14**	%
SILT	=	**53**	%
CLAY	=	**17**	%

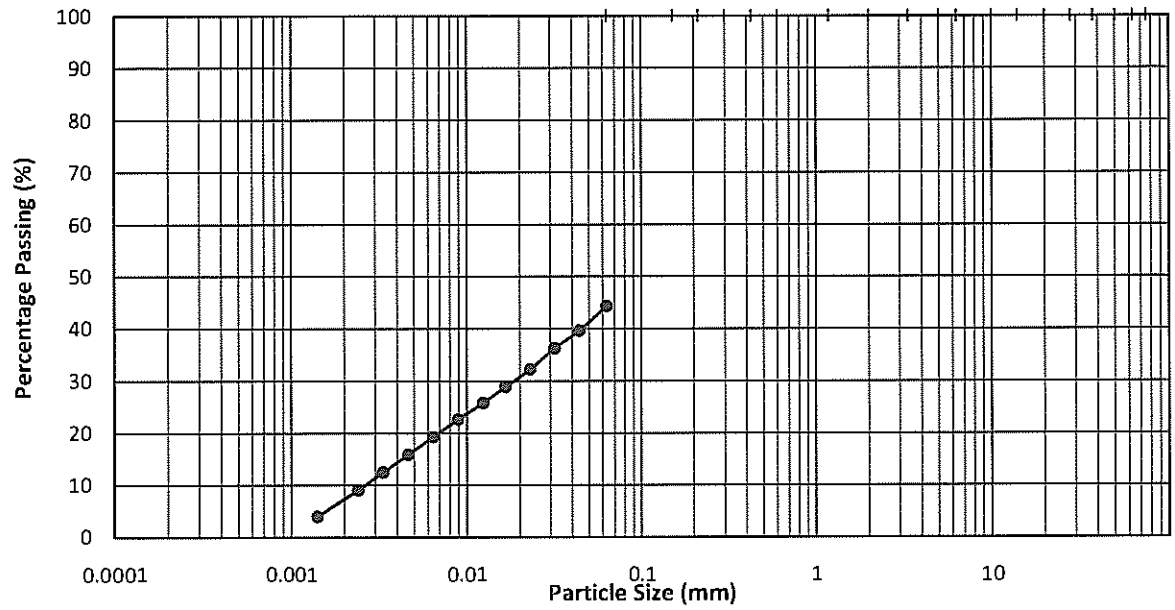
% of Passing 0.425 mm Sieve : 76.2

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory : Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**57**	%
SILT	=	**35**	%
CLAY	=	**8**	%

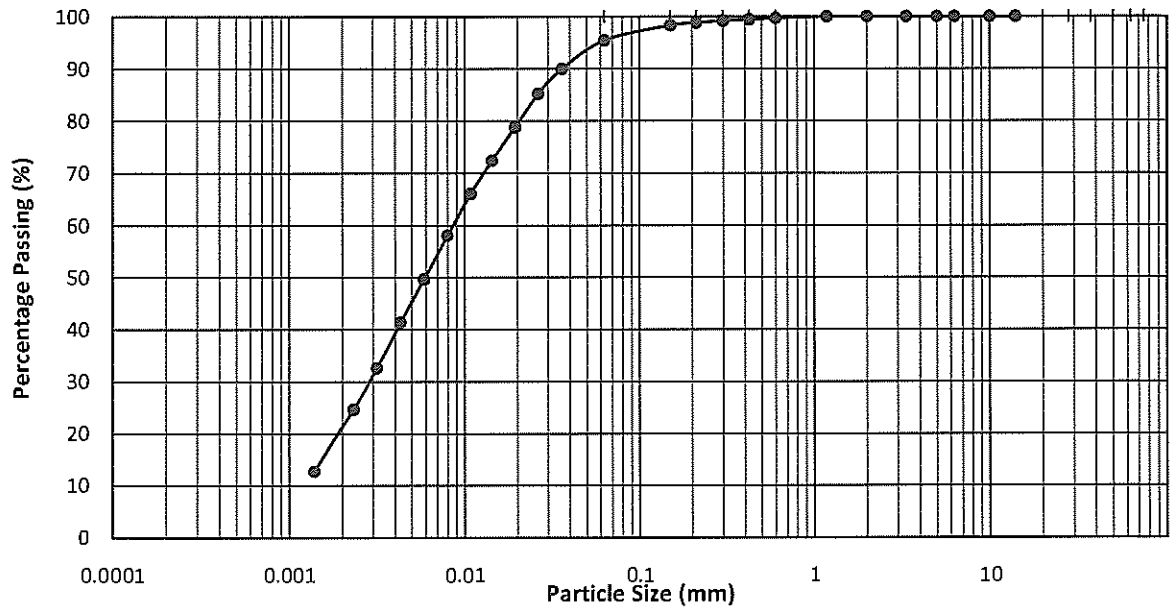
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Whitish grey and yellowish brown slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**5**	%
SILT	=	**74**	%
CLAY	=	**21**	%

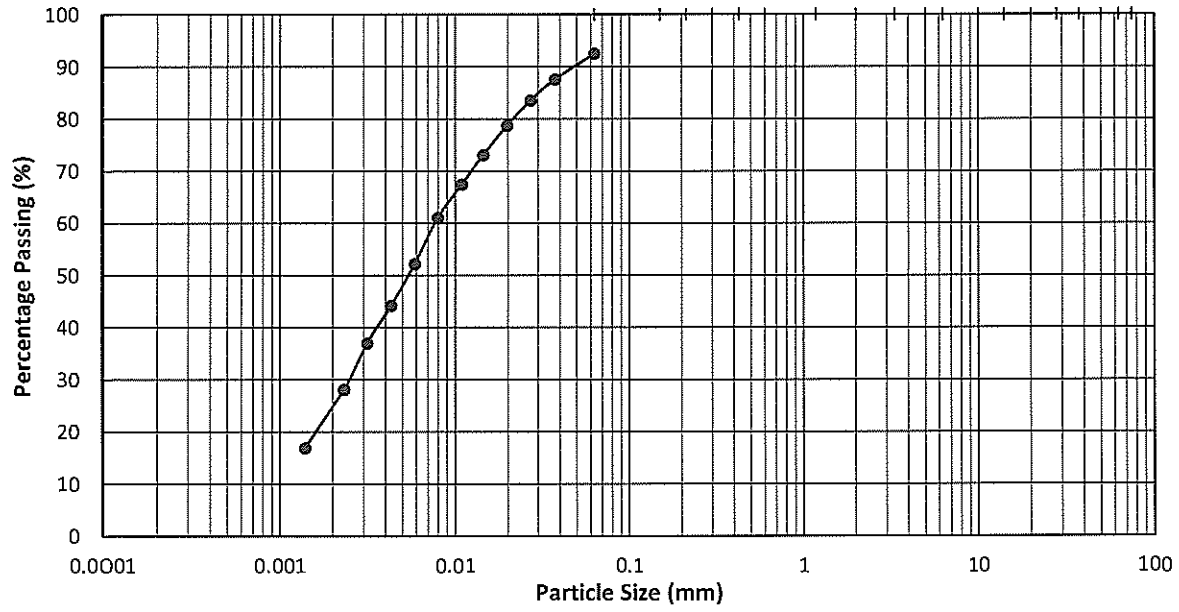
% of Passing 0.425 mm Sieve : 99.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey and yellowish brown slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**8**	%
SILT	=	**67**	%
CLAY	=	**25**	%

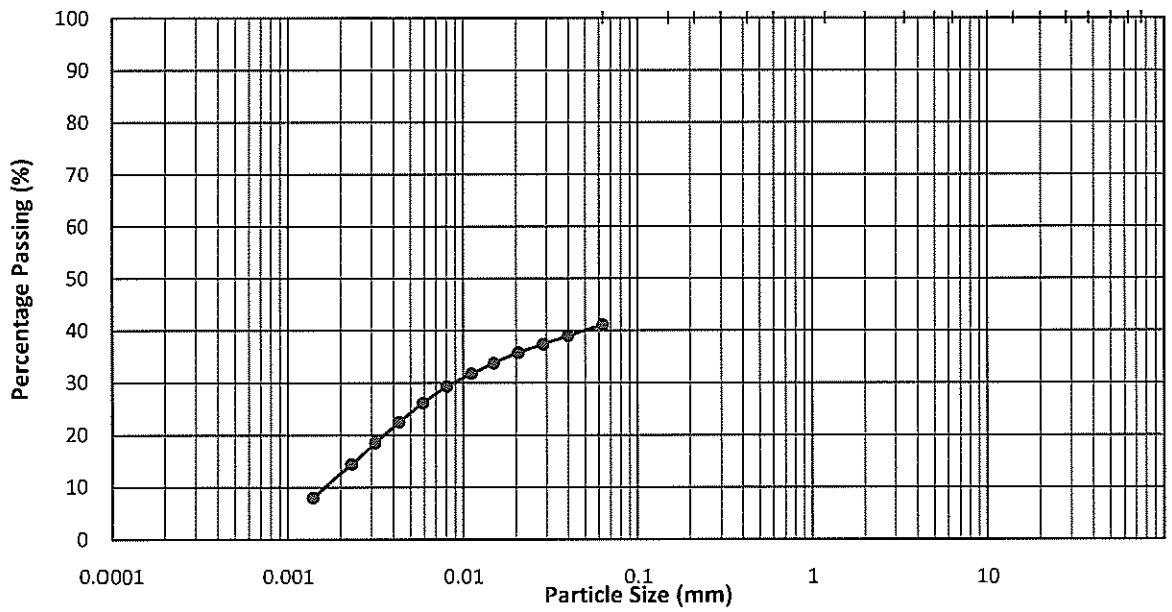
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
S. Thet.	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**59**	%
SILT	=	**28**	%
CLAY	=	**13**	%

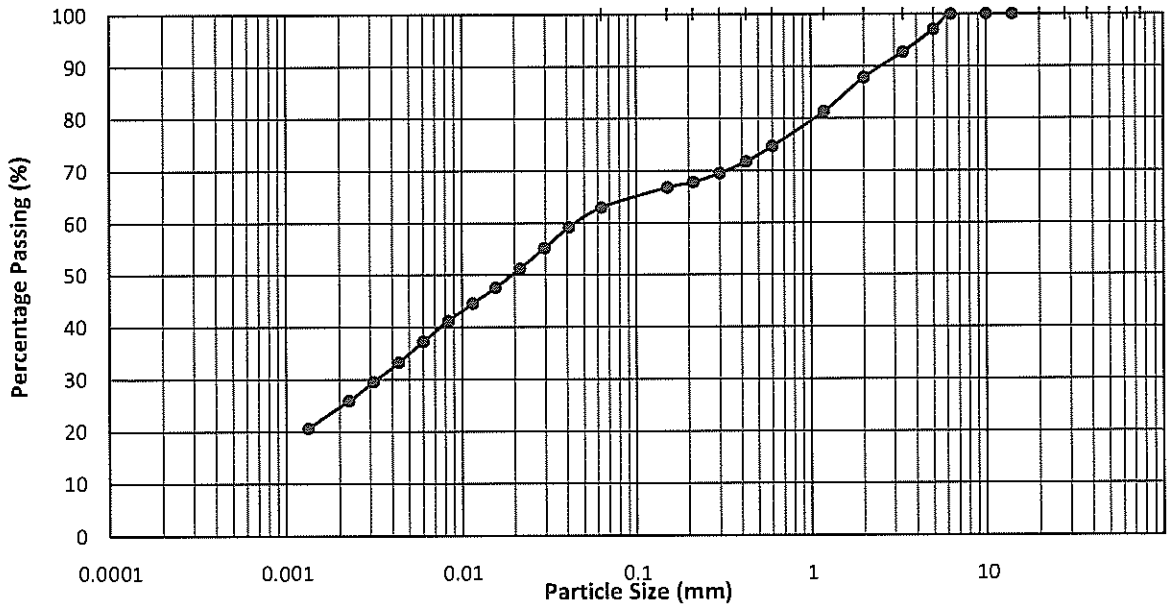
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**12**	%
SAND	=	**25**	%
SILT	=	**38**	%
CLAY	=	**25**	%

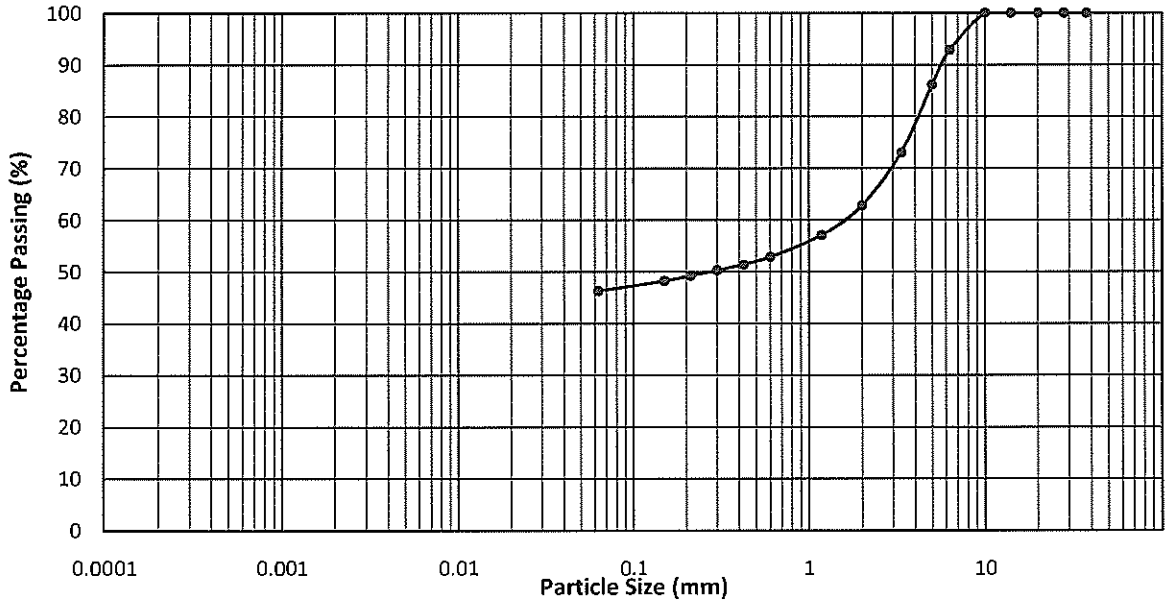
% of Passing 0.425 mm Sieve : 71.7

TESTED BY :	APPROVED BY :	DATE :
S. Tpl.	(Authorised Signatory : Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and whitish grey slightly sandy gravelly SILT**

SIEVING TEST

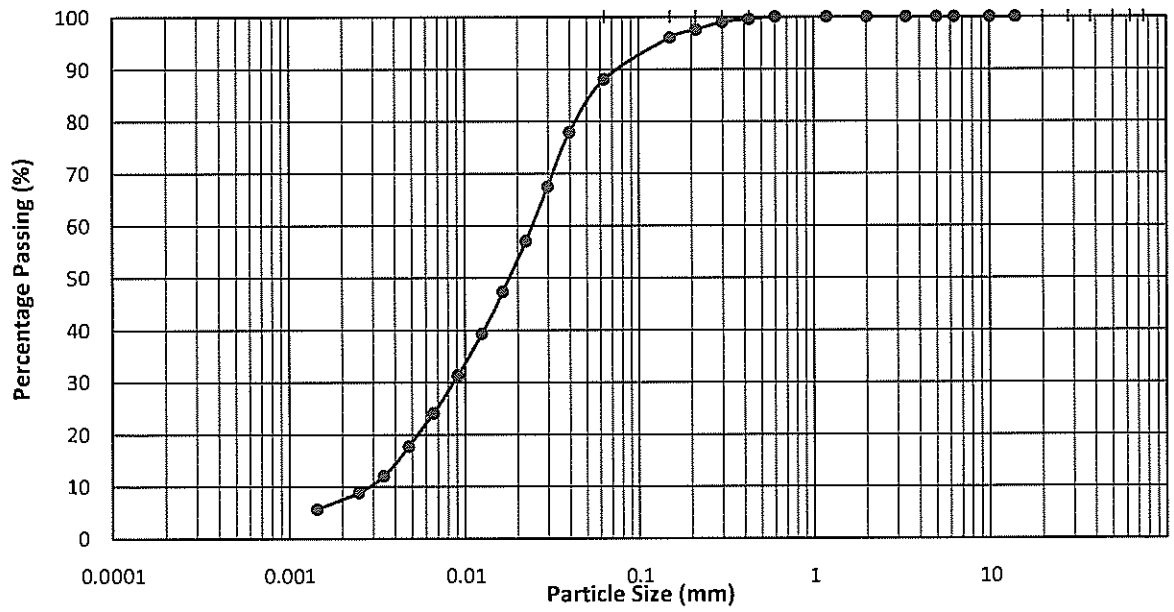
GRAVEL	=	**37**	%	
SAND	=	**17**	%	% of Passing 0.425 mm Sieve : 51.4
SILT + CLAY	=	**46**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**12**	%
SILT	=	**80**	%
CLAY	=	**8**	%

% of Passing 0.425 mm Sieve : 99.5

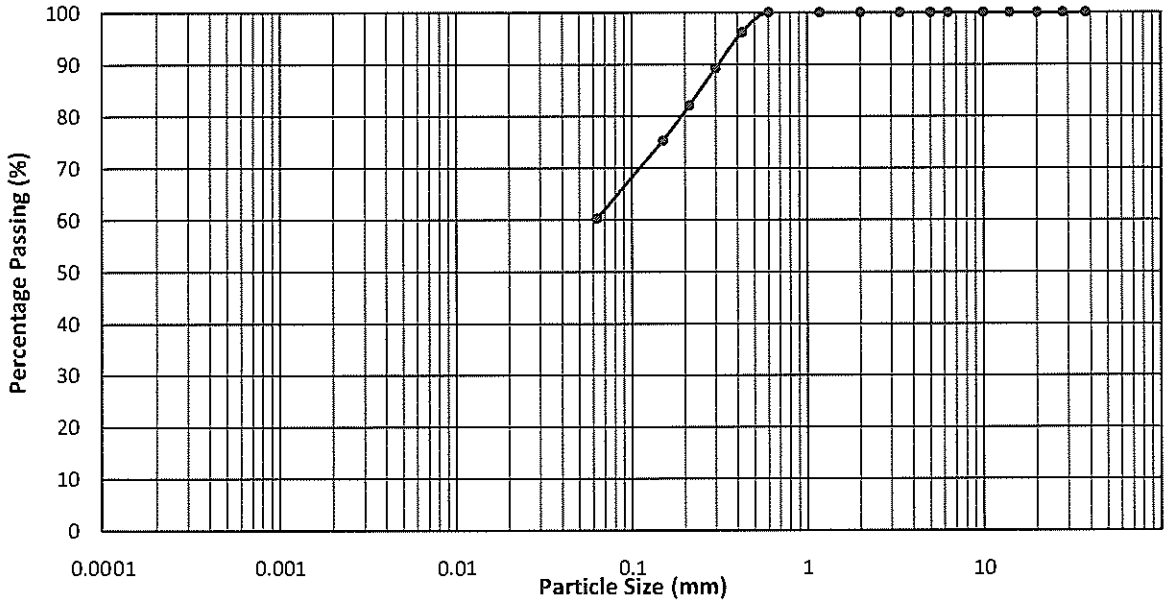
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2018-0523-S

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT14
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 12.09.2018



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

SOIL DESCRIPTION : **Light greenish grey sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%	
SAND	=	**40**	%	% of Passing 0.42S mm Sieve : 96.2
SILT + CLAY	=	**60**	%	

TESTED BY :	APPROVED BY :	DATE :
S. Thy.	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

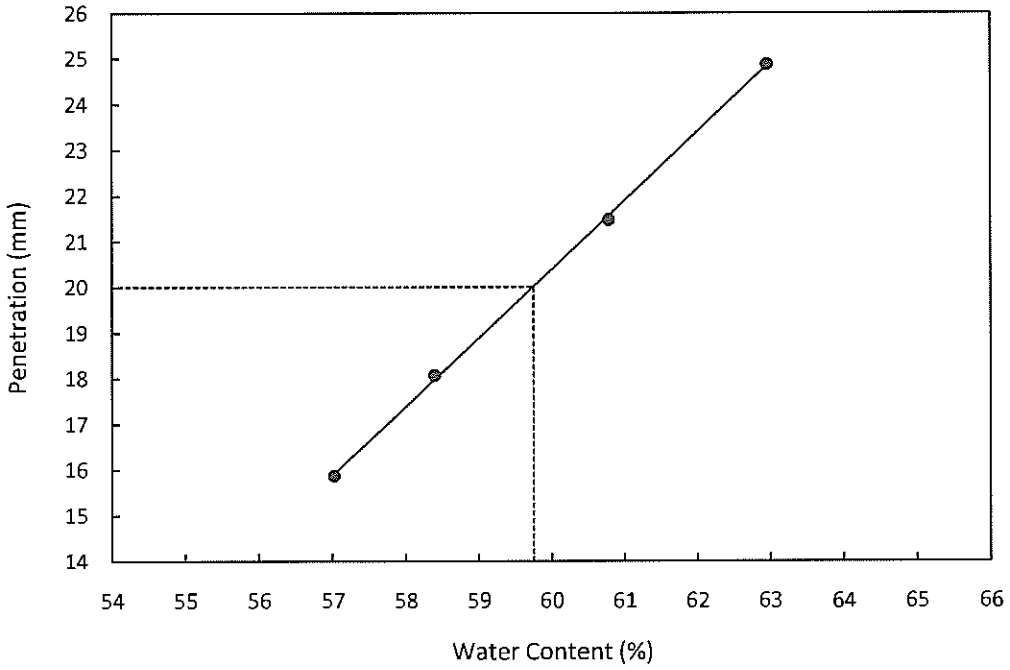
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 54
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.86	20.27	20.21	20.68	20.43	20.30
DRY WEIGHT + CUP	(g)	16.27	15.82	15.87	16.26	17.22	16.85
CUP WEIGHT	(g)	8.22	8.20	8.73	9.24	9.26	8.29
WATER CONTENT	(%)	57.0	58.4	60.8	63.0	40.3	40.3
PENETRATION	(mm)	15.9	18.1	21.5	24.9	-	-

LIQUID LIMIT	(%)	**59.8**
PLASTIC LIMIT	(%)	**40.3**
PLASTICITY INDEX		**19**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

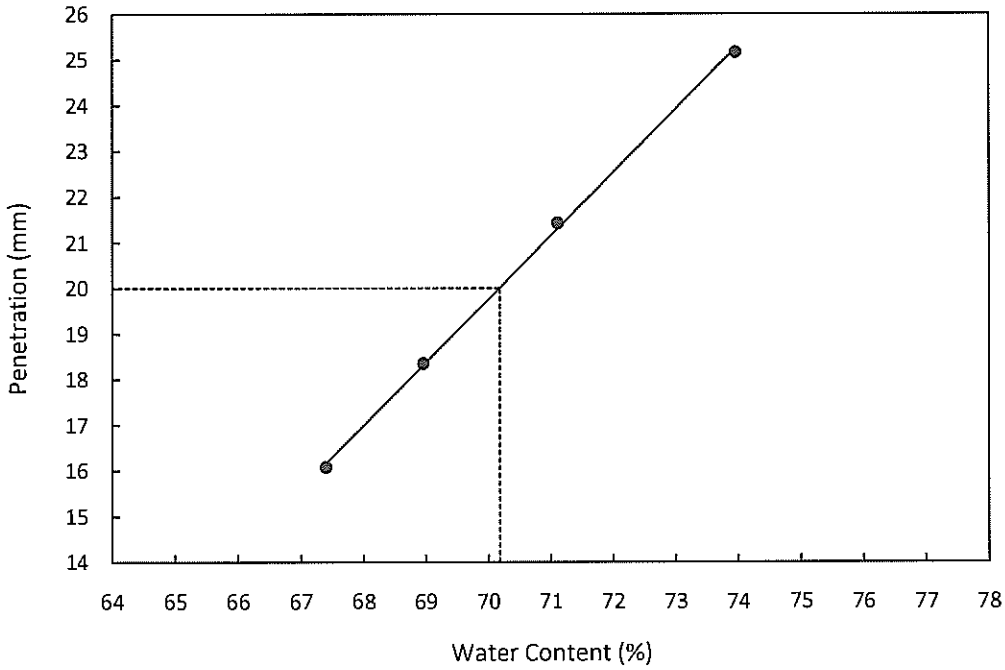
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT6
DEPTH(M)	: 12.00-12.45m
SOIL DESCRIPTION	: Yellowish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.67	20.42	20.52	20.19	20.18	20.20
DRY WEIGHT + CUP	(g)	16.04	15.69	15.40	15.25	16.72	16.55
CUP WEIGHT	(g)	9.17	8.83	8.20	8.57	8.75	8.16
WATER CONTENT	(%)	67.4	69.0	71.1	74.0	43.4	43.5
PENETRATION	(mm)	16.1	18.4	21.4	25.2	-	-

LIQUID LIMIT	(%)	**70.2**
PLASTIC LIMIT	(%)	**43.5**
PLASTICITY INDEX		**27**

NOTE:
M : SILT
C : CLAY
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TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

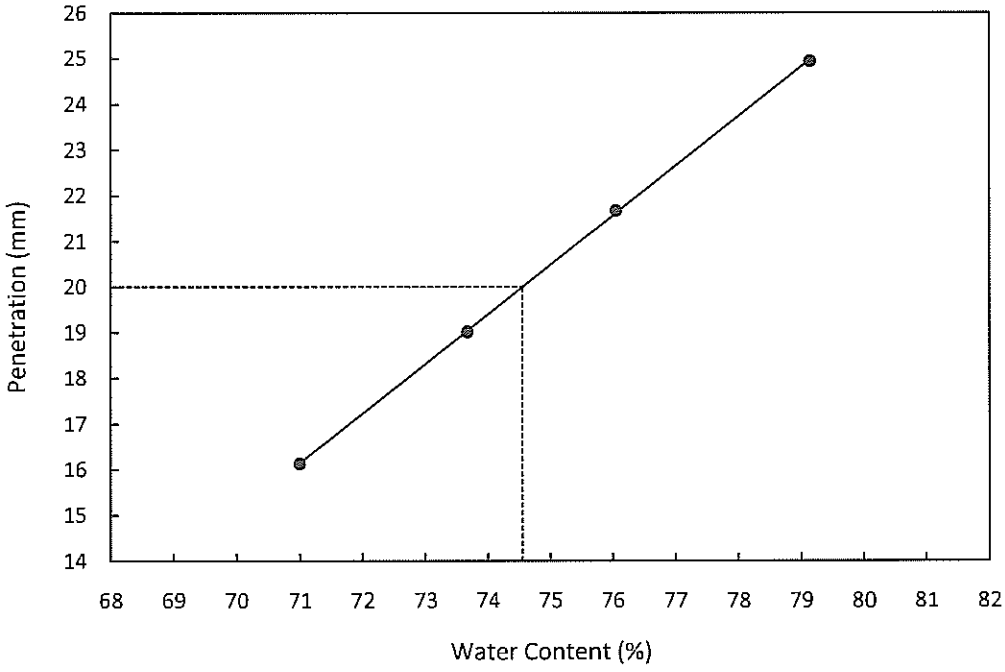
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Whitish grey and yellowish brown slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 99
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.15	20.32	20.27	20.31	20.53	20.41
DRY WEIGHT + CUP	(g)	15.28	15.48	15.00	15.34	17.11	17.07
CUP WEIGHT	(g)	8.42	8.91	8.07	9.06	9.42	9.49
WATER CONTENT	(%)	71.0	73.7	76.0	79.1	44.5	44.1
PENETRATION	(mm)	16.1	19.0	21.7	24.9	-	-

LIQUID LIMIT	(%)	**74.6**
PLASTIC LIMIT	(%)	**44.3**
PLASTICITY INDEX		**30**

NOTE:
M : SILT
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E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

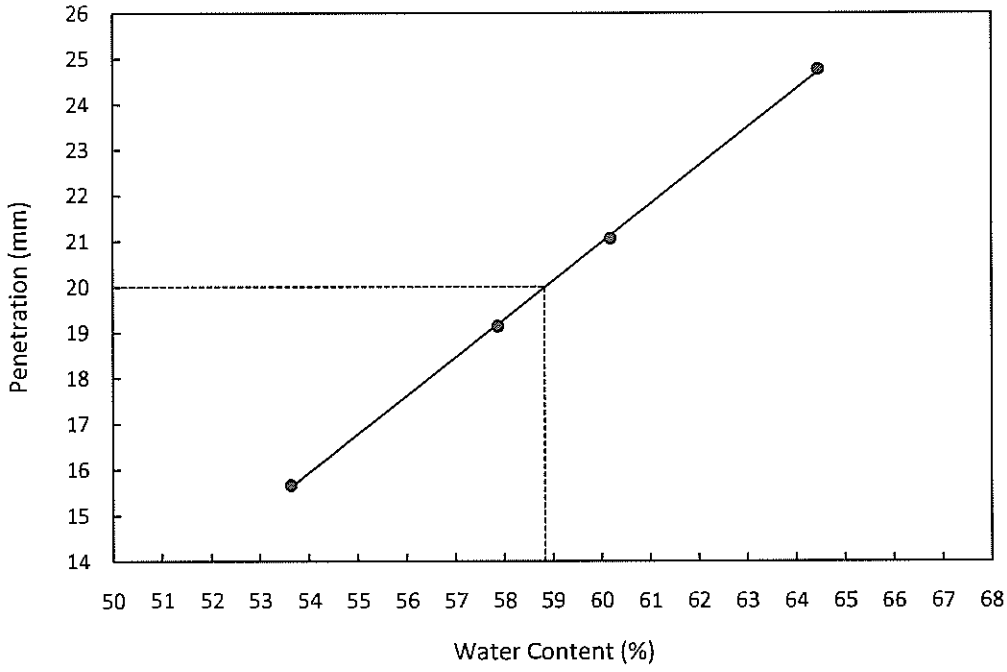
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light greenish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 54
TEST DATE	: 04.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.72	20.75	20.82	20.70	20.62	20.30
DRY WEIGHT + CUP	(g)	16.71	16.52	16.36	16.13	17.87	17.62
CUP WEIGHT	(g)	9.23	9.21	8.95	9.04	9.21	9.14
WATER CONTENT	(%)	53.6	57.9	60.2	64.5	31.8	31.6
PENETRATION	(mm)	15.7	19.1	21.1	24.8	-	-

LIQUID LIMIT	(%)	**58.8**
PLASTIC LIMIT	(%)	**31.7**
PLASTICITY INDEX		**27**

NOTE:

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V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

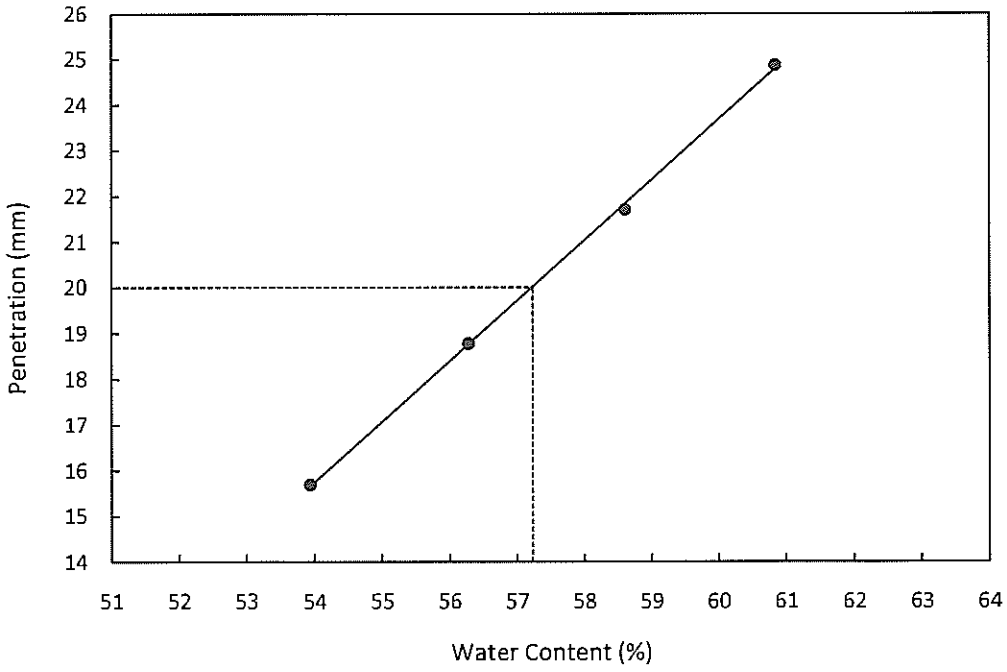
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.15	20.15	20.22	20.49	20.70	20.49
DRY WEIGHT + CUP	(g)	16.17	15.85	15.86	15.97	17.75	17.72
CUP WEIGHT	(g)	8.79	8.21	8.42	8.54	8.46	8.99
WATER CONTENT	(%)	53.9	56.3	58.6	60.8	31.8	31.7
PENETRATION	(mm)	15.7	18.8	21.7	24.9	-	-

LIQUID LIMIT	(%)	**57.2**
PLASTIC LIMIT	(%)	**31.7**
PLASTICITY INDEX		**25**

NOTE:

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V : VERY HIGH PLASTICITY
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TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

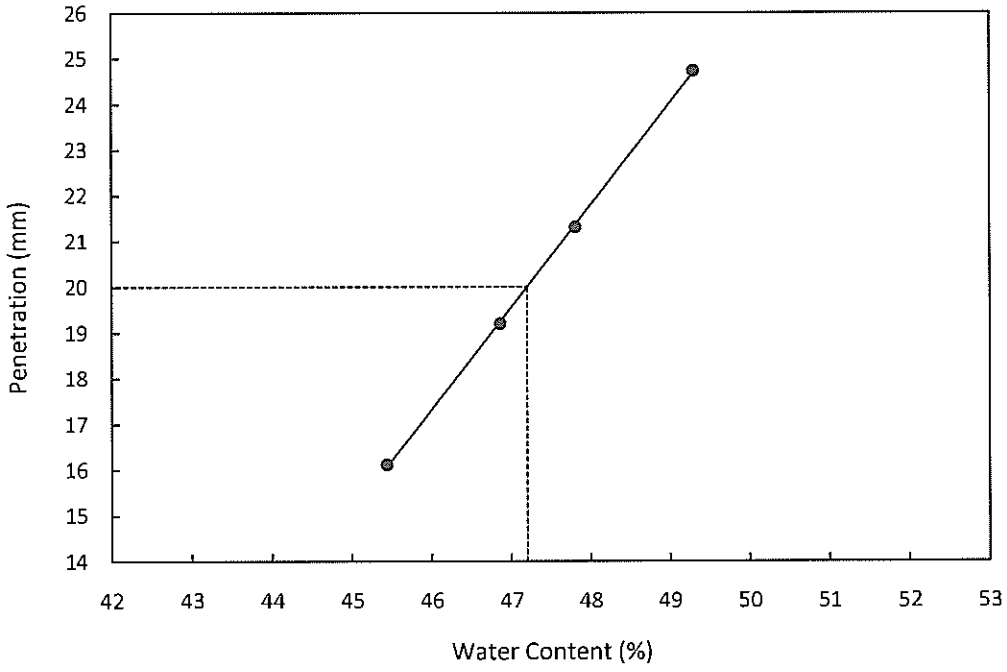
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH9
SAMPLE NO.	: SPT15
DEPTH(M)	: 30.00-30.45m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 11.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.18	20.10	20.08	20.20	20.65	20.60
DRY WEIGHT + CUP	(g)	16.50	16.37	16.48	16.39	17.66	18.03
CUP WEIGHT	(g)	8.40	8.41	8.95	8.66	7.54	9.25
WATER CONTENT	(%)	45.4	46.9	47.8	49.3	29.5	29.3
PENETRATION	(mm)	16.1	19.2	21.3	24.7	-	-

LIQUID LIMIT	(%)	**47.2**
PLASTIC LIMIT	(%)	**29.4**
PLASTICITY INDEX		**18**

NOTE:
M : SILT
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V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

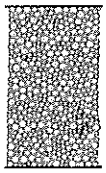


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

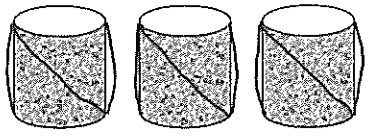
Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Stiff reddish brown and yellow slightly sandy slightly gravelly SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	170.9	170.9	170.4
	Bulk Density	ρ_0	(Mg/m3)	1.99	1.99	1.99
	Particle Density	ρ_s	(Mg/m3)	2.72	2.72	2.72

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	80	160	320
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	31	31	28
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.52	1.52	1.55
Initial Voids Ratio	e_0	.	0.79	0.79	0.75
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	184.33	210.64	275.75
MembraneCorrection	m_c	(kPa)	1.870	0.780	1.480
Strain At Max Stress	$\varepsilon_f\%$	(%)	18.47	5.86	13.39
Shear Strength	c_u	(kPa)	92.16	105.32	137.87
Final Moisture	$\omega_f\%$	(%)	31	31	28
Final Dry Density	ρ_{df}	(Mg/m3)	1.52	1.52	1.55
Final Voids Ratio	e_f	.	0.79	0.79	0.75
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	UU6-SungeiTengah-B9T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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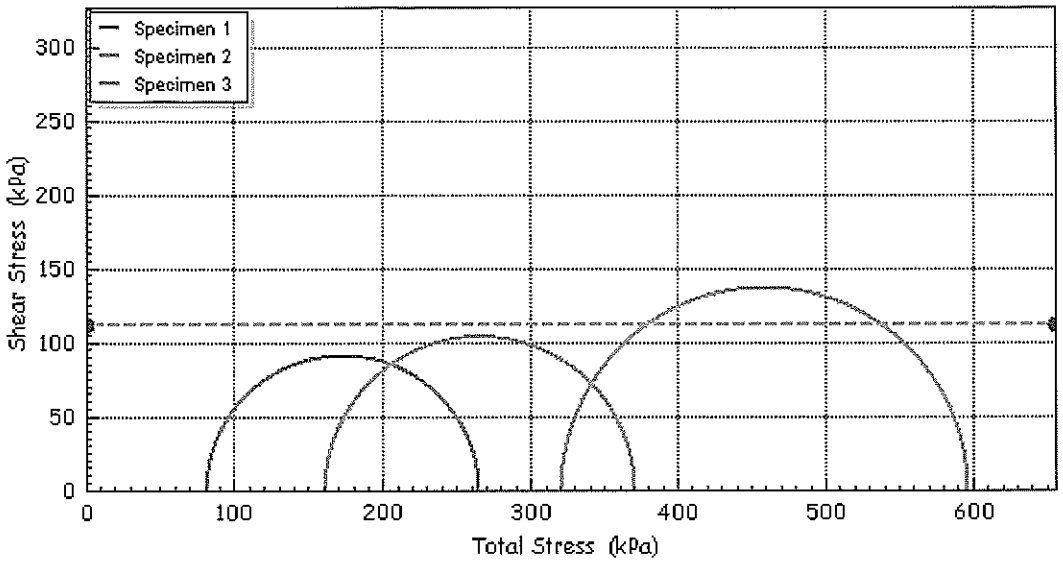
Ryobi Geotechnique International Pte Ltd

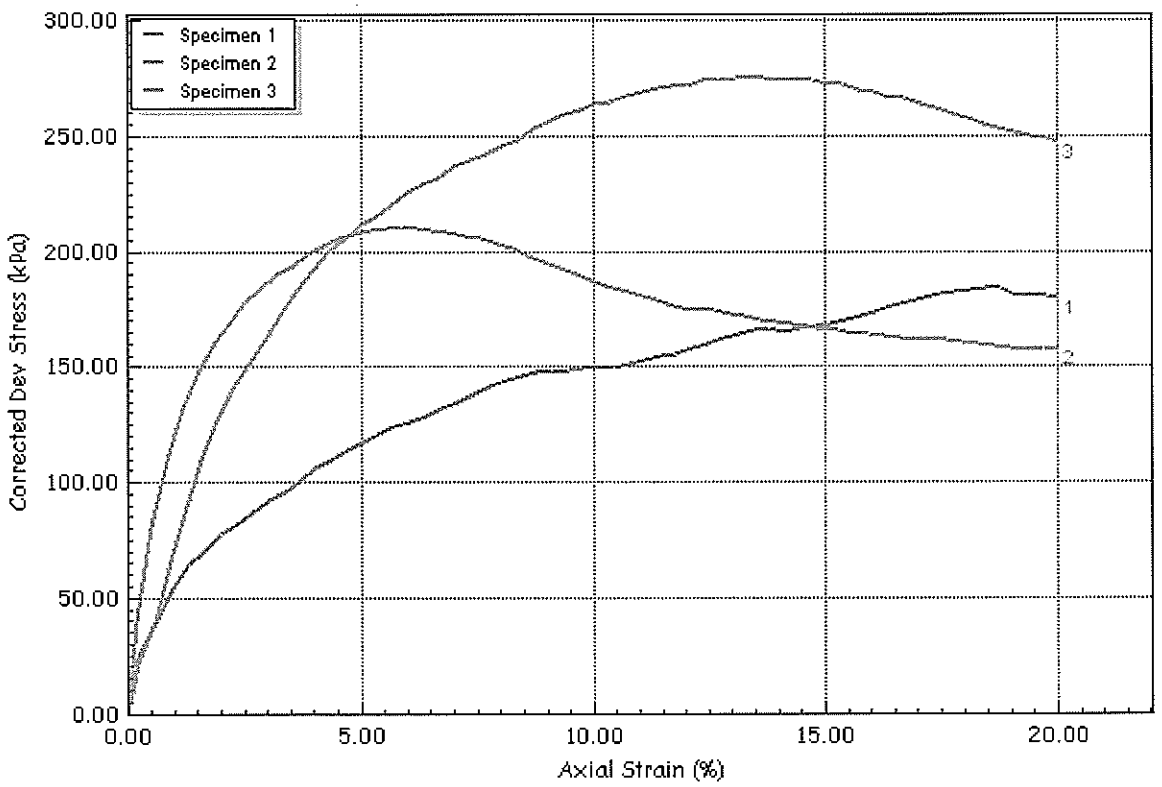
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	111.8
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU6-SungeiTengah-B9T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

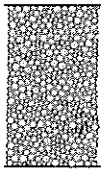
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

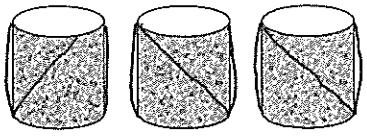
Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Stiff whitish grey and yellowish brown slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	143.0	148.5	149.6
	Bulk Density	ρ_0 (Mg/m3)	1.67	1.73	1.74
	Particle Density	ρ_s (Mg/m3)	2.69	2.69	2.69

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	135	270	540
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	50	52	50
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.11	1.14	1.16
Initial Voids Ratio	e_0	.	1.42	1.36	1.32
Initial Degree of Saturation	S_o	(%)	95	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	211.05	224.73	249.99
MembraneCorrection	m_c	(kPa)	0.880	0.970	1.130
Strain At Max Stress	$\varepsilon_f\%$	(%)	6.84	7.59	9.30
Shear Strength	c_u	(kPa)	105.52	112.37	125.00
Final Moisture	$\omega_f\%$	(%)	50	52	50
Final Dry Density	ρ_{df}	(Mg/m3)	1.11	1.14	1.16
Final Voids Ratio	e_f	.	1.42	1.36	1.32
Final Degree of Saturation	S_f	(%)	94.7	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	UU7-SungeiTengah-B9T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	8/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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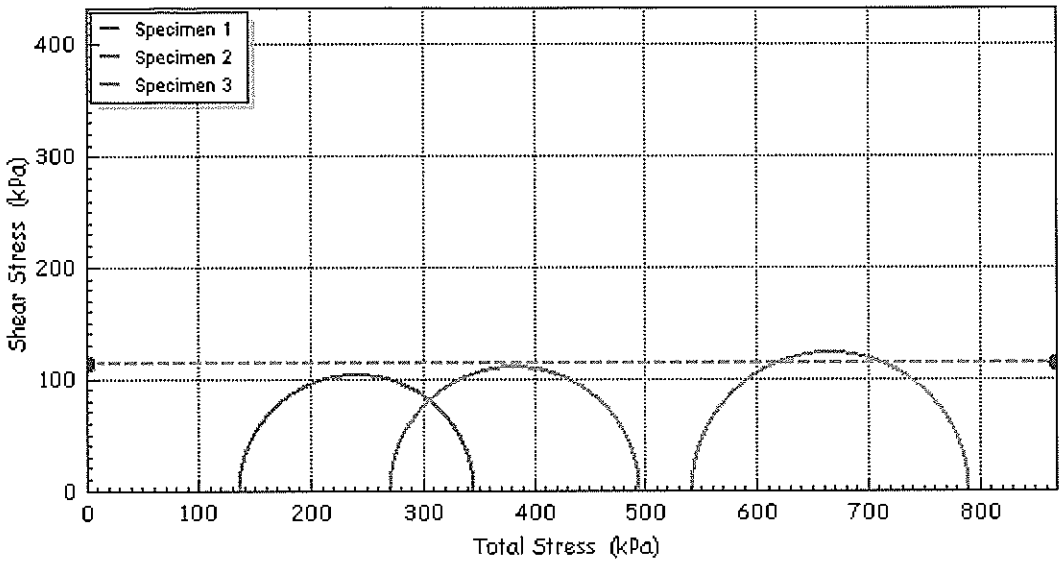
Ryobi Geotechnique International Pte Ltd

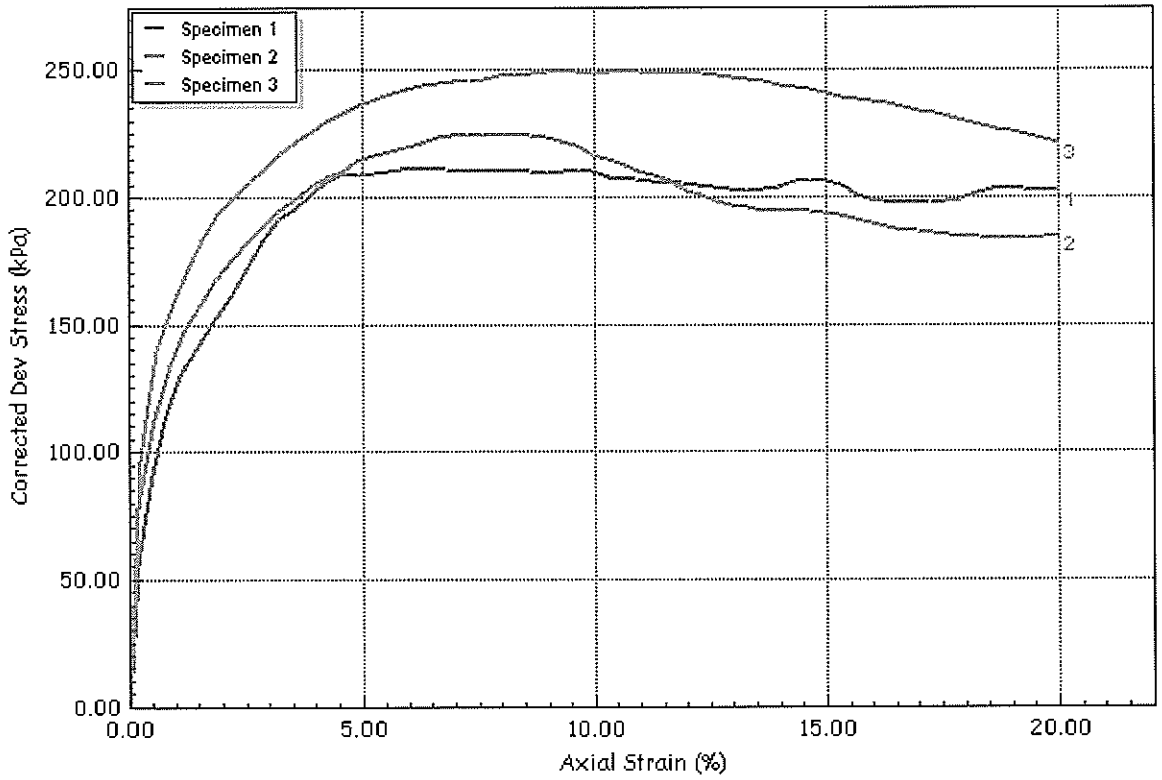
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	114.3
Friction Angle	ϕ	(deg)	0.0





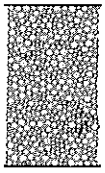
Ryobi G	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU7-SungeiTengah-B9T2
	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	8/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH9
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW2
	Client	AVA		Depth	14.00-14.90m
	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						
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m			
	Description		Very stiff light greenish grey slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	178.9	185.6	188.1
	Bulk Density	ρ_0	(Mg/m3)	2.09	2.16	2.19
	Particle Density	ρ_s	(Mg/m3)	2.68	2.68	2.68

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	17	19	20
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.79	1.83	1.83
Initial Voids Ratio	e_0	.	0.50	0.47	0.46
Initial Degree of Saturation	S_o	(%)	89	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	320.45	335.40	383.65
MembraneCorrection	m_c	(kPa)	1.450	1.120	1.060
Strain At Max Stress	$\varepsilon_f\%$	(%)	13.02	9.26	8.53
Shear Strength	c_u	(kPa)	160.22	167.70	191.83
Final Moisture	$\omega_f\%$	(%)	17	19	20
Final Dry Density	ρ_{df}	(Mg/m3)	1.79	1.83	1.83
Final Voids Ratio	e_f	.	0.50	0.47	0.46
Final Degree of Saturation	S_f	(%)	89.5	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	UU8-SungeiTengah-B9T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

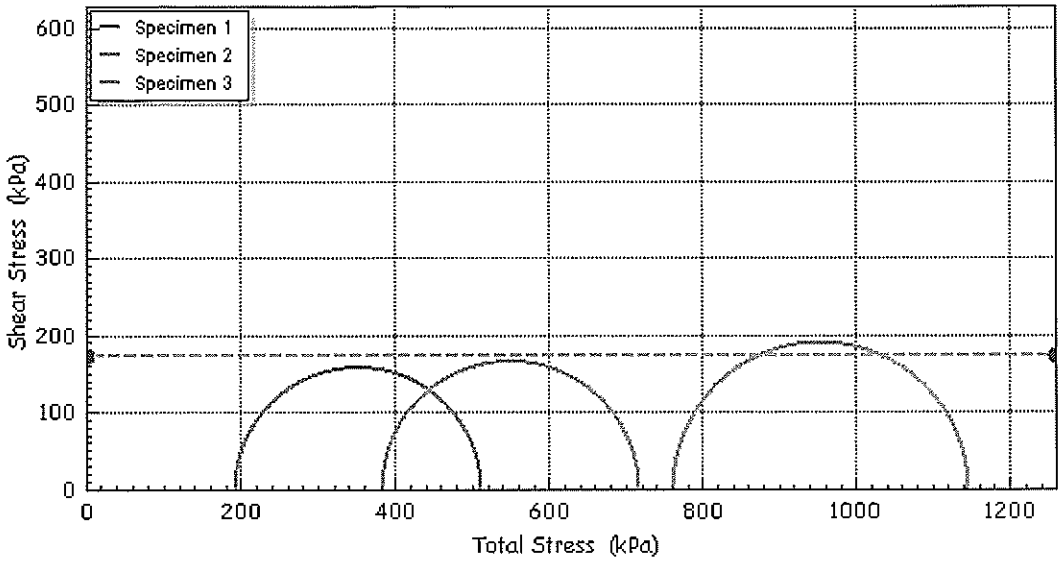
Ryobi Geotechnique International Pte Ltd

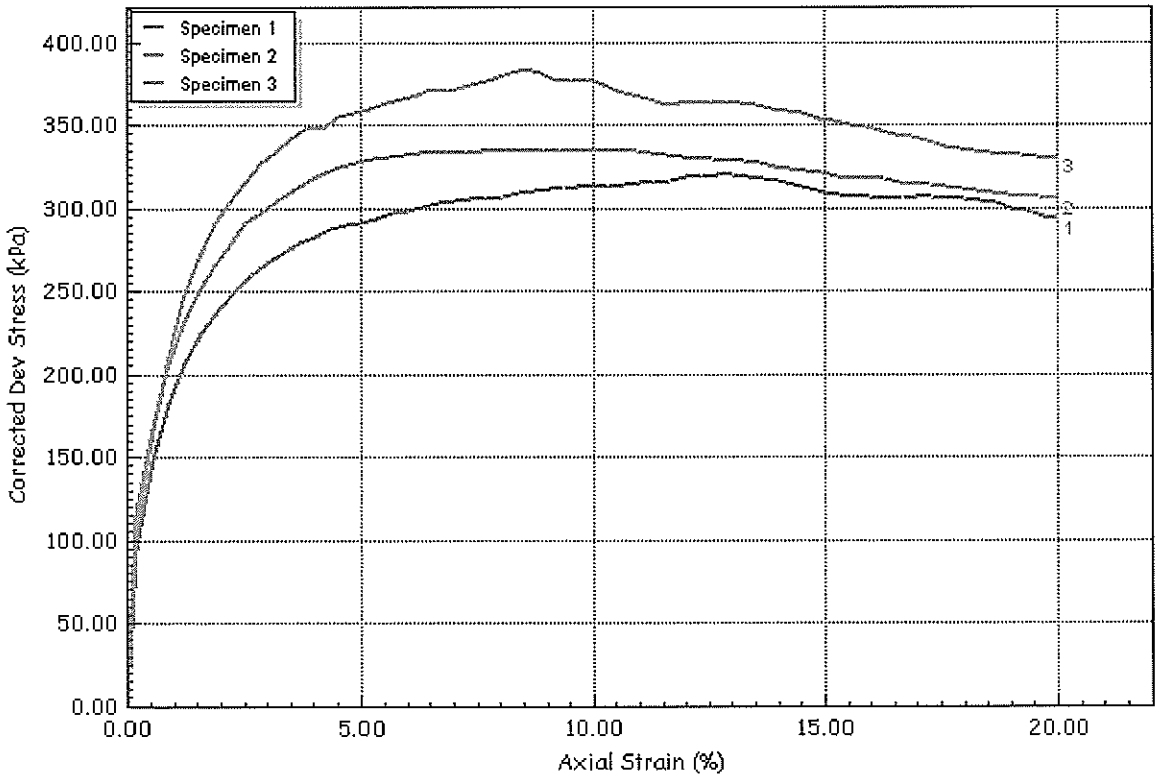
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	173.3
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU8-SungeiTengah-B9T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

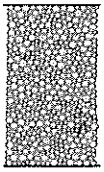
ACCREDITED LABORATORY SAC-SINGLAS

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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

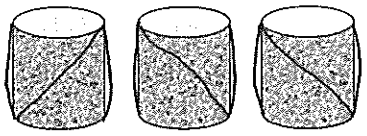
Sample Details					
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m		
	Description		Vert stiff light greenish grey slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	170.6	170.7	169.1
	Bulk Density	ρ_0 (Mg/m3)	1.99	1.99	1.97
	Particle Density	ρ_s (Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	0.00	0.00	0.00
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.99	1.99	1.97
Initial Voids Ratio	e_0	.	0.33	0.33	0.34
Initial Degree of Saturation	S_o	(%)	0.00	0.00	0.00

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	324.91	357.55	379.61
MembraneCorrection	m_c	(kPa)	1.290	1.710	1.430
Strain At Max Stress	$\varepsilon_f\%$	(%)	11.07	16.34	12.70
Shear Strength	c_u	(kPa)	162.45	178.78	189.81
Final Moisture	$\omega_f\%$	(%)	13	13	13
Final Dry Density	ρ_{df}	(Mg/m3)	1.76	1.76	1.74
Final Voids Ratio	e_f	.	0.51	0.51	0.52
Final Degree of Saturation	S_f	(%)	69.4	69.5	67.6

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	UU9-SungeiTengah-B9T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH9
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

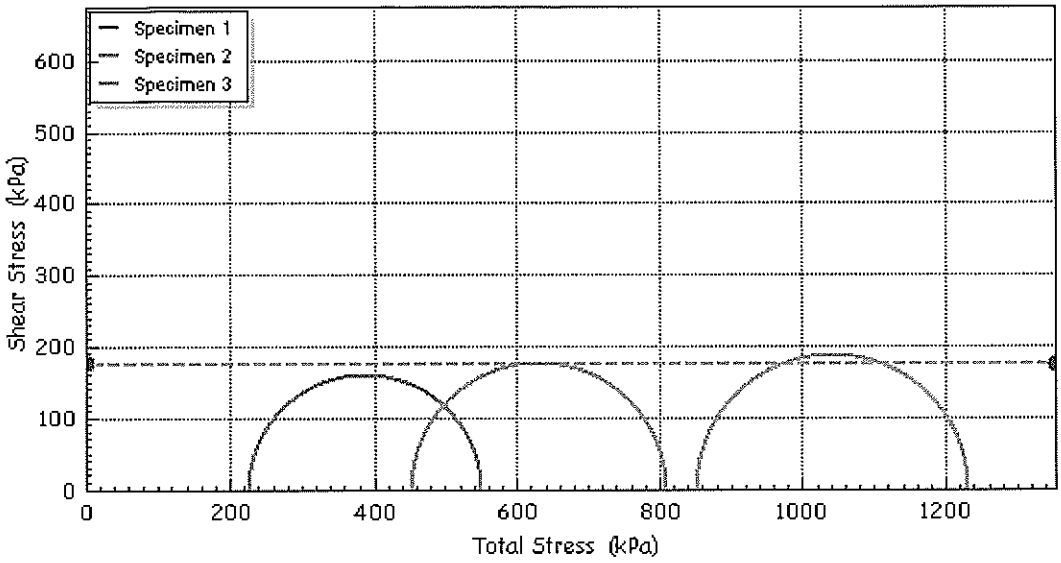
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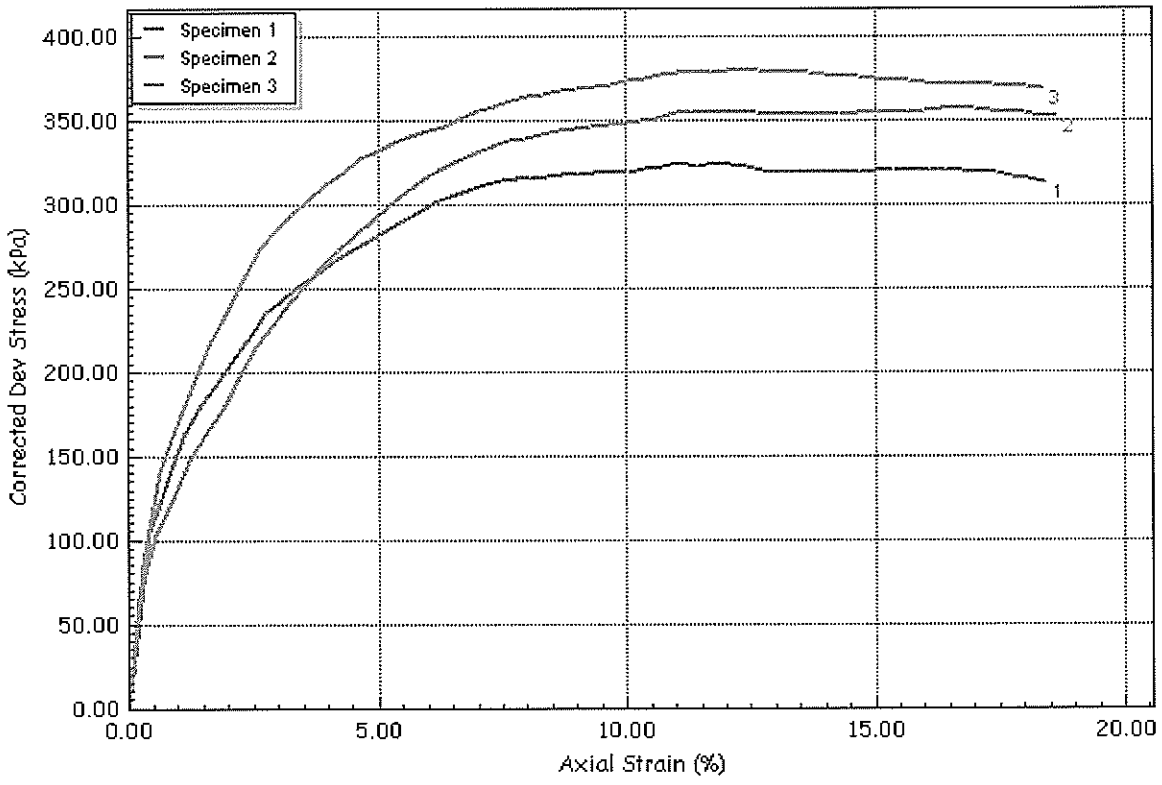
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	177.0
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU9-SungeiTengah-B9T4	
Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	10/9/2018	
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH9	
Jobfile	Sungei Tengah Rd-WA7		Sample	TW4	
Client	AVA		Depth	24.00-24.90m	
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813957-001	SG1813957-002	SG1813957-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813957-004	SG1813957-005	SG1813957-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	---	---
				Sampling date/time	04-Sep-2018 00:00	---	---
Compound	*Method*	*LOR*	*Unit*		SG1813957-007	---------	---------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	---	---
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	---	---
Organic Matter	BS1377	0.1	% DW		<0.1	---	---
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	---	---

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814071**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 06-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 06-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 12-Sep-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- **Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377**
- **BS method is referenced to British Standard 1377: Part 3/1990**
- **Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377**
- **pH Test is referenced to Clause 9 of Part 3: BS1377**

Signatories

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Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH3A	BH5A	BH 9
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814071-001**	**SG1814071-002**	**SG1814071-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		8.5	8.6	9.0
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	0.04
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.06	0.05	0.04
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH10	BH11	-----
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		**SG1814071-004**	**SG1814071-005**	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		9.0	8.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.04	0.05	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA
PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO. : K5728

BOREHOLE NO :			BH10						
SAMPLE NO :			TW1	SPT4	SPT5	SPT6	TW2	SPT7	SPT8
SAMPLE DEPTH :		m	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90	14.90-15.35	16.00-16.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	40.2	39.1	-	-	41.5	35.3	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.82	-	1.79	-	1.80	-	-
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	2.65	-	-	2.65	2.65	-	2.66
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	1	-	15	3	1	9	-
	SAND	%	20	-		10	11	41	-
	SILT	%	67	-	78	87	84	50	-
	CLAY	%	12	-	7		4		-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	55.7	(A)	-	-	47.2	-	(A)
	PLASTIC LIMIT	%	34.0		-	-	31.9	-	
	PLASTICITY INDEX		22		-	-	15	-	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		**UU**	-	-	-	**UU**	-	-
	TOTAL COHESION	kPa	66.5	-	-	-	87.9	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (W/V)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand and gravel.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 12/09/2018

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Ryobi Geotechnique International Pte Ltd
58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA
PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO. : K5728

BOREHOLE NO :			BH10						
SAMPLE NO :			TW3	SPT9	TW4	SPT12	SPT13	SPT14	W1
SAMPLE DEPTH :		m	18.00-18.90	18.90-19.35	24.00-24.90	24.90-25.35	26.00-26.45	28.00-28.45	Water Sample
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	29.6	-	28.1	-	37.0	-	
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.97	1.84	1.99	-	2.00	-	-
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	2.67	-	2.66	-	-	2.68	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	27	58	23	-	-	0	-
	SAND	%	21		28	-	-	3	-
	SILT	%	37	31	29	-	-	79	-
	CLAY	%	15	11	20	-	-	18	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	68.0	-	75.1	-	40.0	-	-
	PLASTIC LIMIT	%	42.5	-	42.0	-	26.2	-	-
	PLASTICITY INDEX		25	-	33	-	14	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		UU	-	UU	-	-	-	-
	TOTAL COHESION	kPa	81.6	-	88.8	-	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	6.2	-	-	-
	Chloride Content	%	-	-	-	<0.01	-	-	-
	Organic Content	%	-	-	-	0.3	-	-	-
	Sulphate Content	%	-	-	-	<0.01	-	-	-
	pH Value		-	-	-	-	-	-	9.0
	Chloride Content	g/L	-	-	-	-	-	-	0.03
	Organic Content	% (W/V)	-	-	-	-	-	-	<0.10
	Sulphate Content	g/L	-	-	-	-	-	-	0.04

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 : 12/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH10	TW1	8.00-8.90	40.2	1.82	-	2.65
BH10	SPT4	8.90-9.35	39.1	-	-	-
BH10	SPT5	10.00-10.45	-	1.79	-	-
BH10	SPT6	12.00-12.45	-	-	-	2.65
BH10	TW2	14.00-14.90	41.5	1.80	-	2.65
BH10	SPT7	14.90-15.35	35.3	-	-	-
BH10	SPT8	16.00-16.45	-	-	-	2.66
BH10	TW3	18.00-18.90	29.6	1.97	-	2.67
BH10	SPT9	18.90-19.35	-	1.84	-	-
BH10	TW4	24.00-24.90	28.1	1.99	-	2.66
BH10	SPT13	26.00-26.45	37.0	2.00	-	-
BH10	SPT14	28.00-28.45	-	-	-	2.68

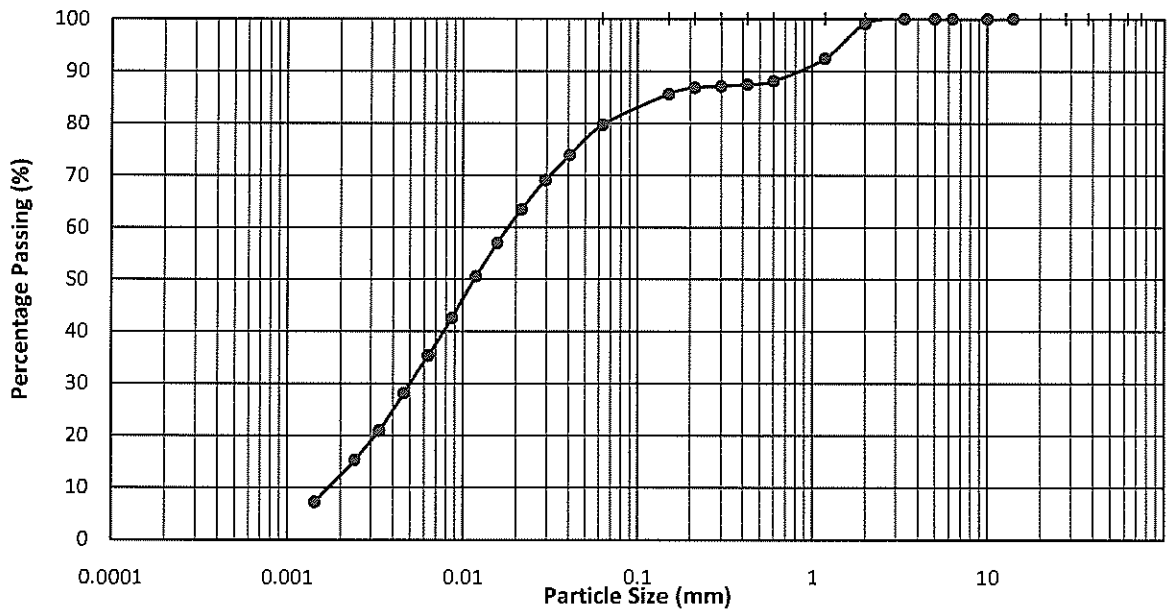
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: Manju Date : 02.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 06.09.20118



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

SOIL DESCRIPTION : **Reddish brown, yellow and light grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**1**	%
SAND	=	**20**	%
SILT	=	**67**	%
CLAY	=	**12**	%

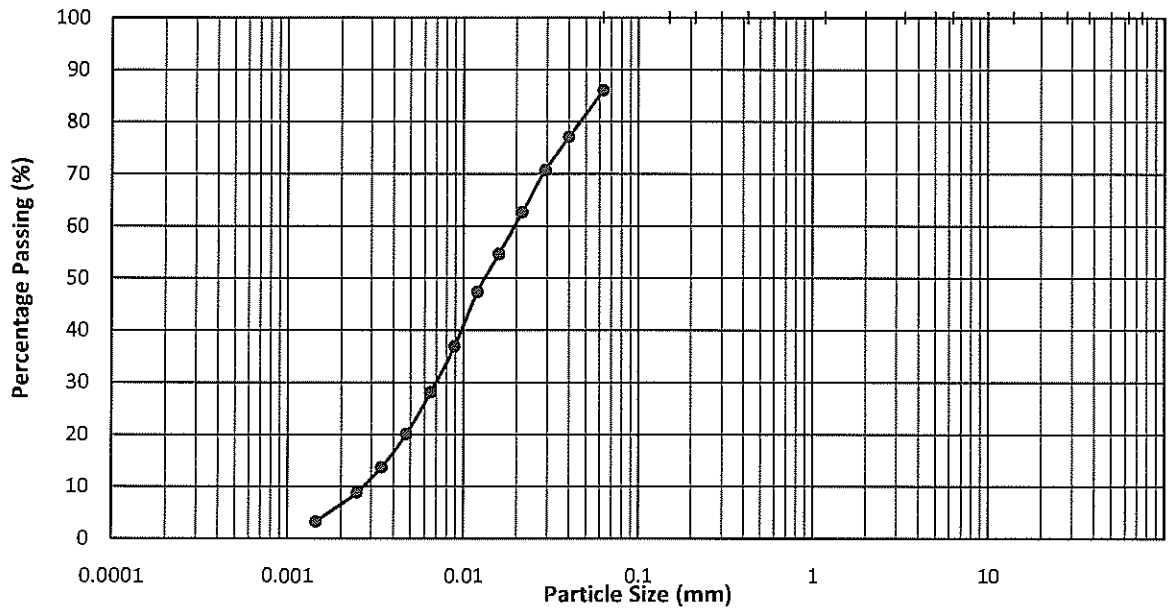
% of Passing 0.425 mm Sieve : 87.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Reddish brown, yellow and light grey sandy SILT**

HYDROMETER + SIEVING

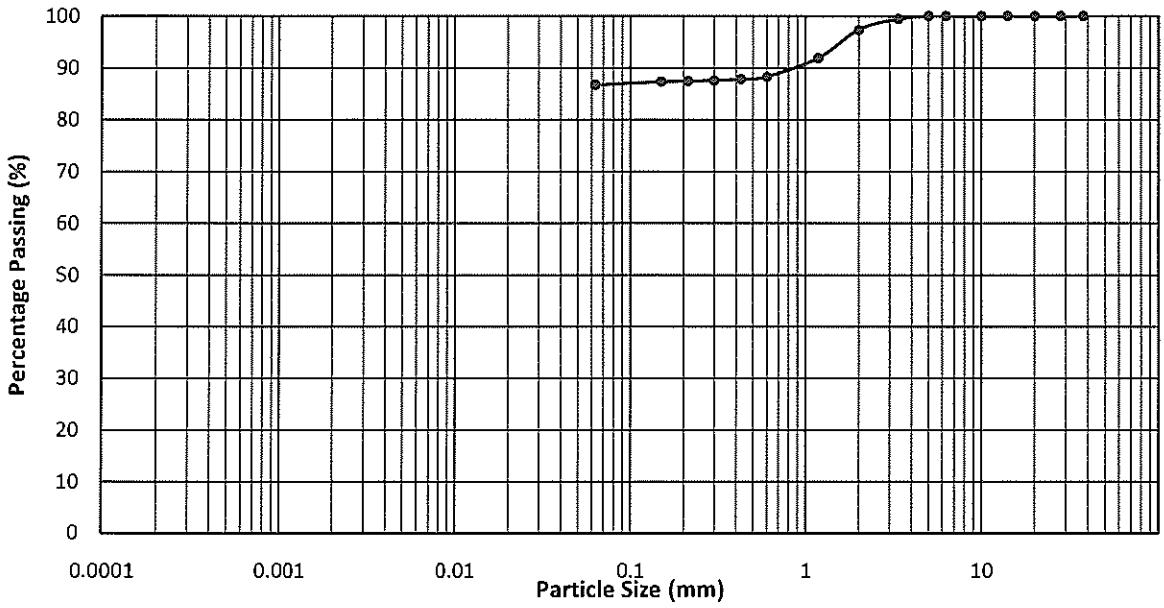
GRAVEL + SAND	=	**15**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**78**	%	
CLAY	=	**7**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Whitish grey and reddish brown slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**3**	%
SAND	=	**10**	%
SILT + CLAY	=	**87**	%

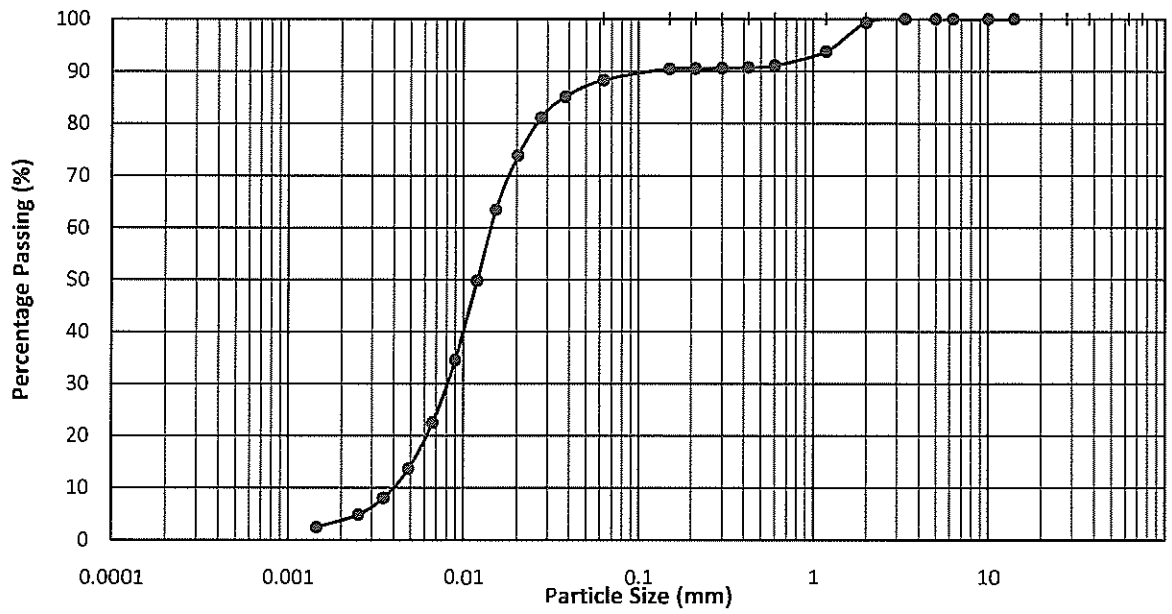
% of Passing 0.425 mm Sieve : 87.8

TESTED BY :	APPROVED BY :	DATE :
B. Thy.	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Whitish grey and reddish brown slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**1**	%
SAND	=	**11**	%
SILT	=	**84**	%
CLAY	=	**4**	%

% of Passing 0.425 mm Sieve : 90.7

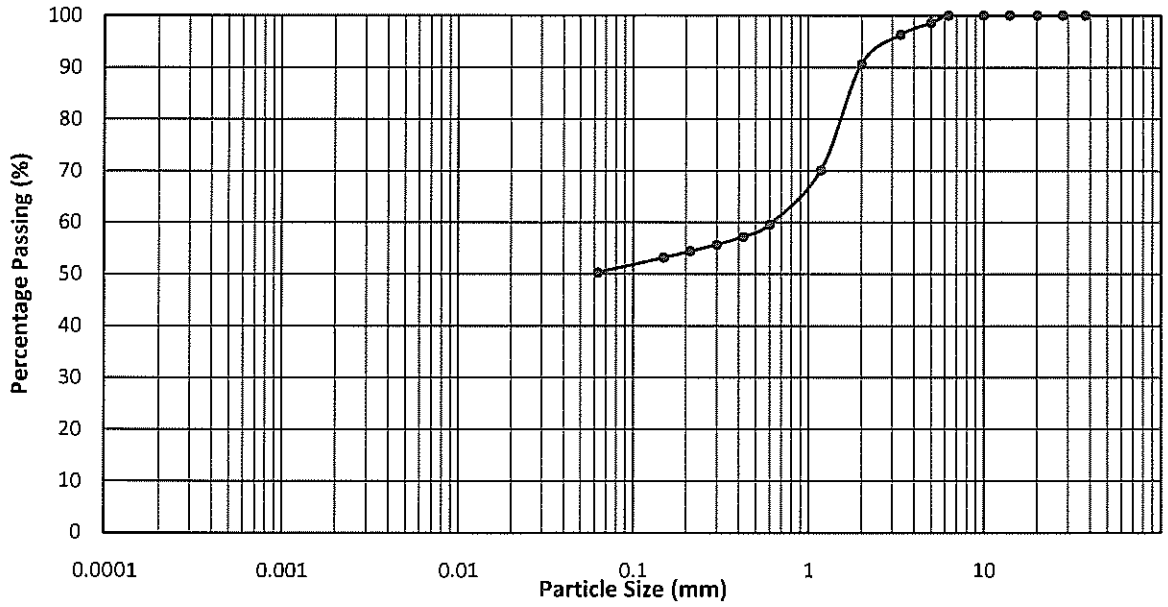
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0573-R

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Whitish grey and reddish brown slightly gravelly sandy SILT**

SIEVING TEST

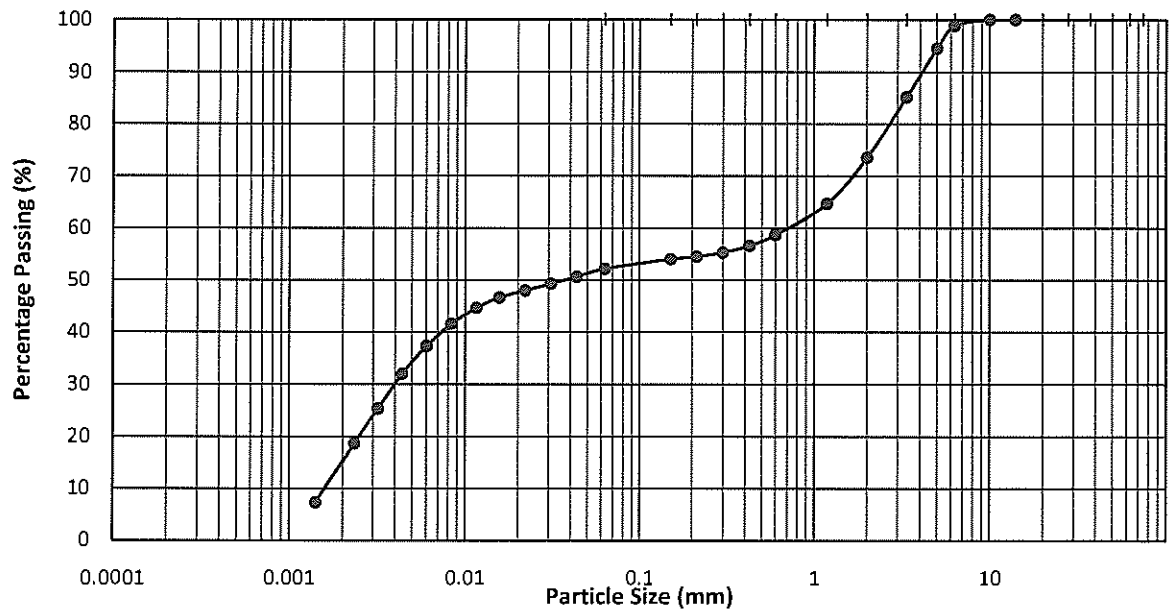
GRAVEL	=	**9**	%	
SAND	=	**41**	%	% of Passing 0.425 mm Sieve : 57.2
SILT + CLAY	=	**50**	%	

TESTED BY :	APPROVED BY :	DATE :
S. Thy.	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW3
DEPTH (m)	: 18.00-18.90m
TEST DATE	: 05.09.2018



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

SOIL DESCRIPTION : **Whitish grey and reddish brown slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**27**	%
SAND	=	**21**	%
SILT	=	**37**	%
CLAY	=	**15**	%

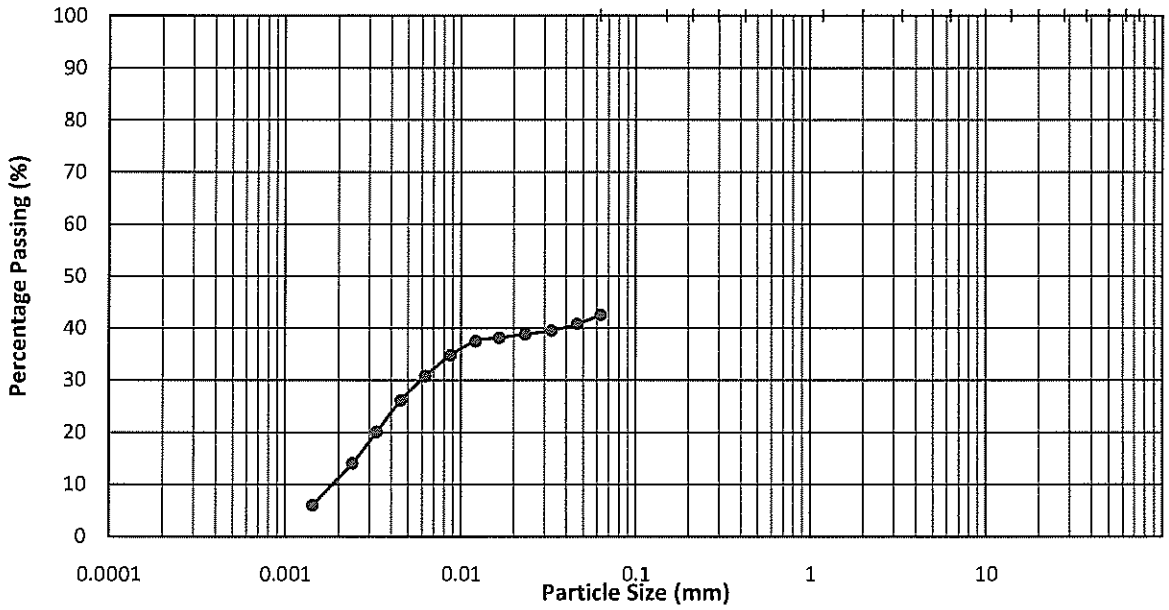
% of Passing 0.425 mm Sieve : 56.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.90-19.35m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Whitish grey and reddish brown sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**58**	%
SILT	=	**31**	%
CLAY	=	**11**	%

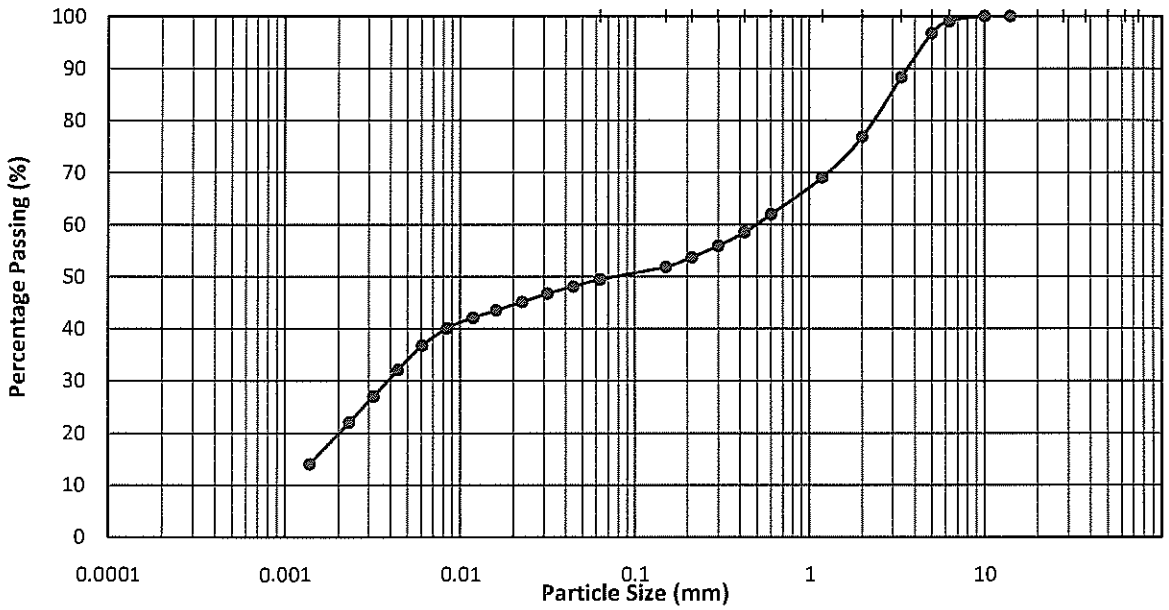
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
S. Thi.	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 06.09.2018



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

SOIL DESCRIPTION : **Whitish grey, dark grey and yellow slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**23**	%
SAND	=	**28**	%
SILT	=	**29**	%
CLAY	=	**20**	%

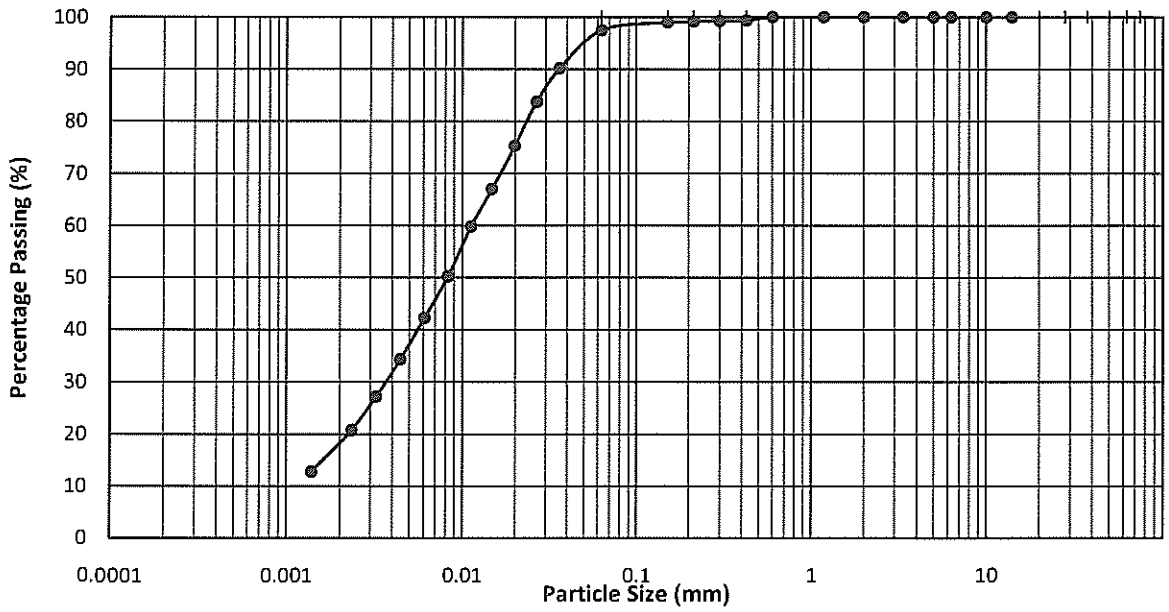
% of Passing 0.425 mm Sieve : 58.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT14
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**3**	%
SILT	=	**79**	%
CLAY	=	**18**	%

% of Passing 0.425 mm Sieve : 99.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

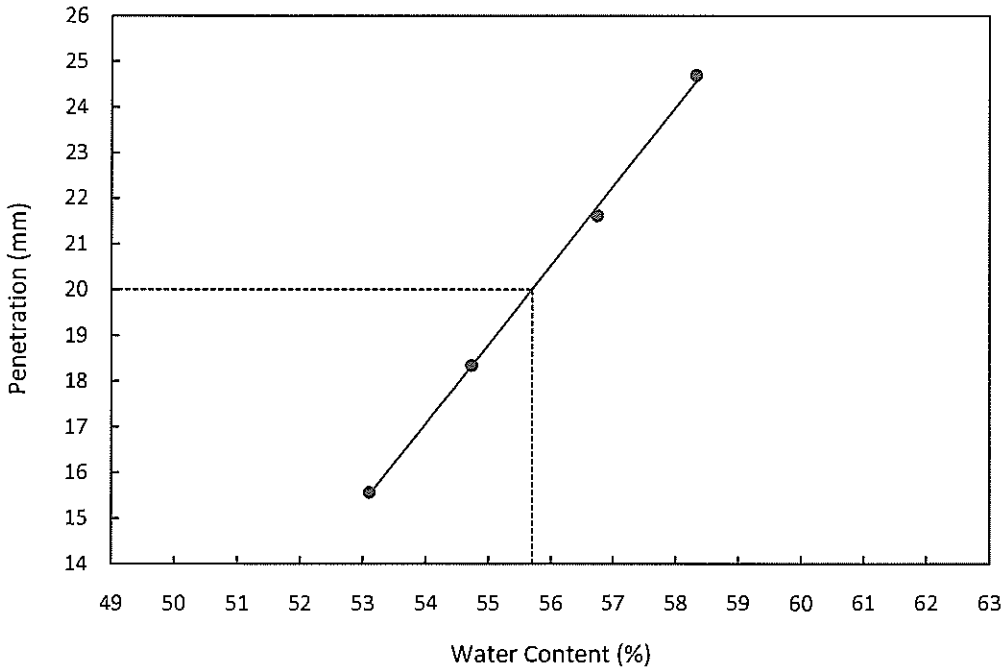
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown, yellow and light grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 87
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.34	20.54	20.76	20.52	20.25	20.48
DRY WEIGHT + CUP	(g)	16.31	16.49	16.55	16.00	17.13	17.51
CUP WEIGHT	(g)	8.72	9.09	9.13	8.25	8.00	8.75
WATER CONTENT	(%)	53.1	54.7	56.7	58.3	34.2	33.9
PENETRATION	(mm)	15.6	18.3	21.6	24.7	-	-

LIQUID LIMIT	(%)	**55.7**
PLASTIC LIMIT	(%)	**34.0**
PLASTICITY INDEX		**22**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S.H.	(Authorised Signatory - Min Win Htut)	11.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

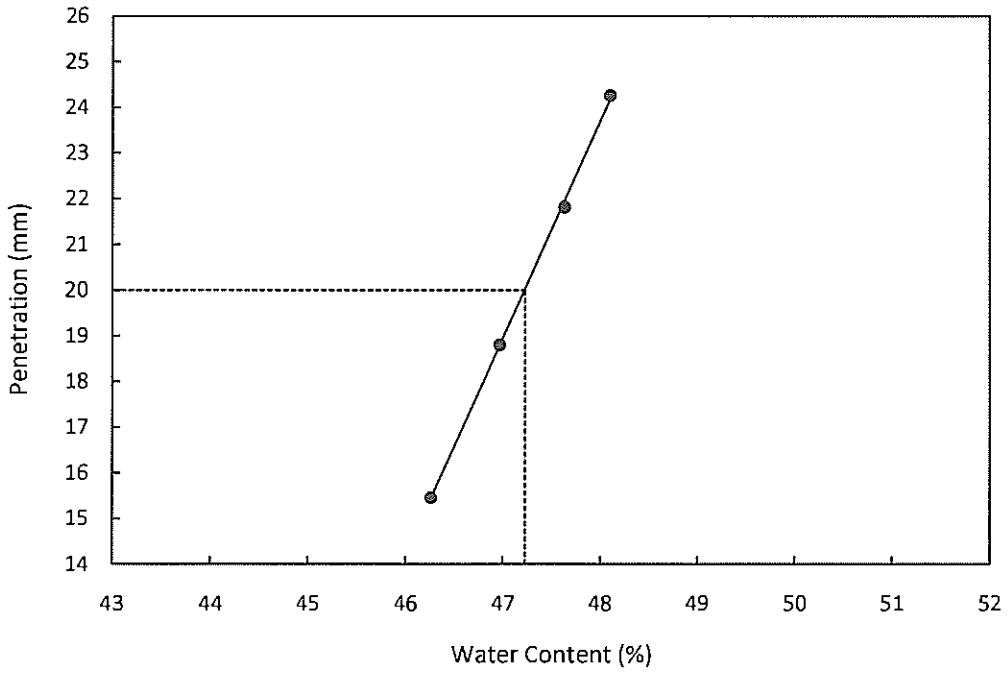
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Whitish grey and reddish brown slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.42Smm SIEVE	: 91
TEST DATE	: 03.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.88	20.33	20.16	20.65	20.70	20.34
DRY WEIGHT + CUP	(g)	16.80	16.54	16.54	16.97	17.91	17.66
CUP WEIGHT	(g)	7.98	8.47	8.94	9.32	9.17	9.25
WATER CONTENT	(%)	46.3	47.0	47.6	48.1	31.9	31.9
PENETRATION	(mm)	15.5	18.8	21.8	24.3	-	-

LIQUID LIMIT	(%)	**47.2**
PLASTIC LIMIT	(%)	**31.9**
PLASTICITY INDEX		**15**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

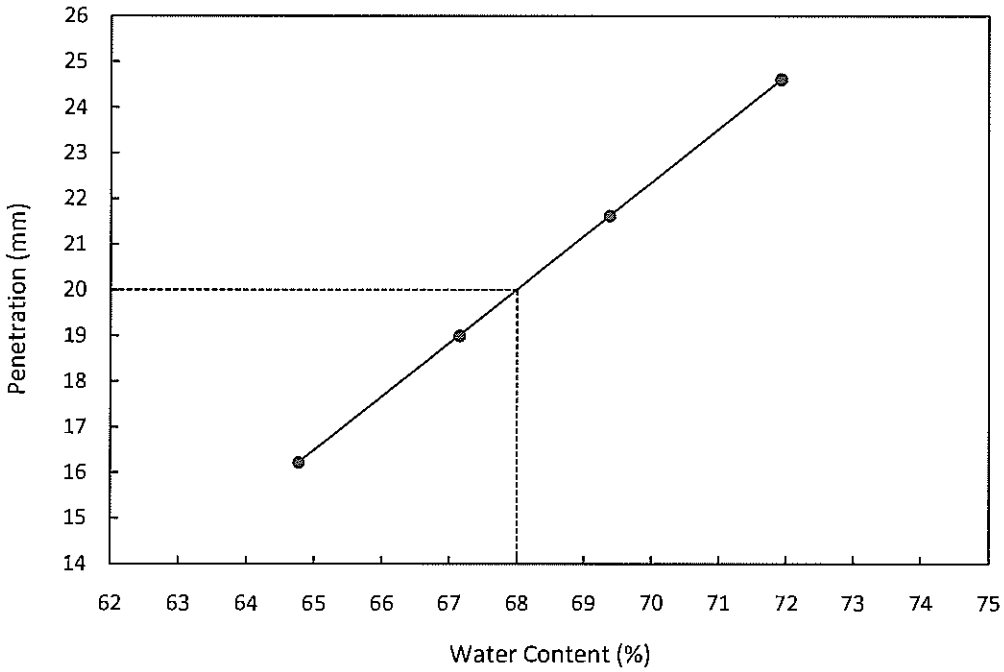
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW3
DEPTH(M)	: 18.00-18.90m
SOIL DESCRIPTION	: Whitish grey and reddish brown slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.42Smm SIEVE	: 52
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.86	20.49	20.33	20.82	20.60	20.13
DRY WEIGHT + CUP	(g)	15.64	15.85	15.89	16.03	17.03	16.91
CUP WEIGHT	(g)	7.58	8.94	9.49	9.37	8.60	9.37
WATER CONTENT	(%)	64.8	67.1	69.4	71.9	42.3	42.7
PENETRATION	(mm)	16.2	19.0	21.6	24.6	-	-

LIQUID LIMIT	(%)	**68.0**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**42.5**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**25**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Joy.	(Authorised Signatory - Min Win Htut)	11-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

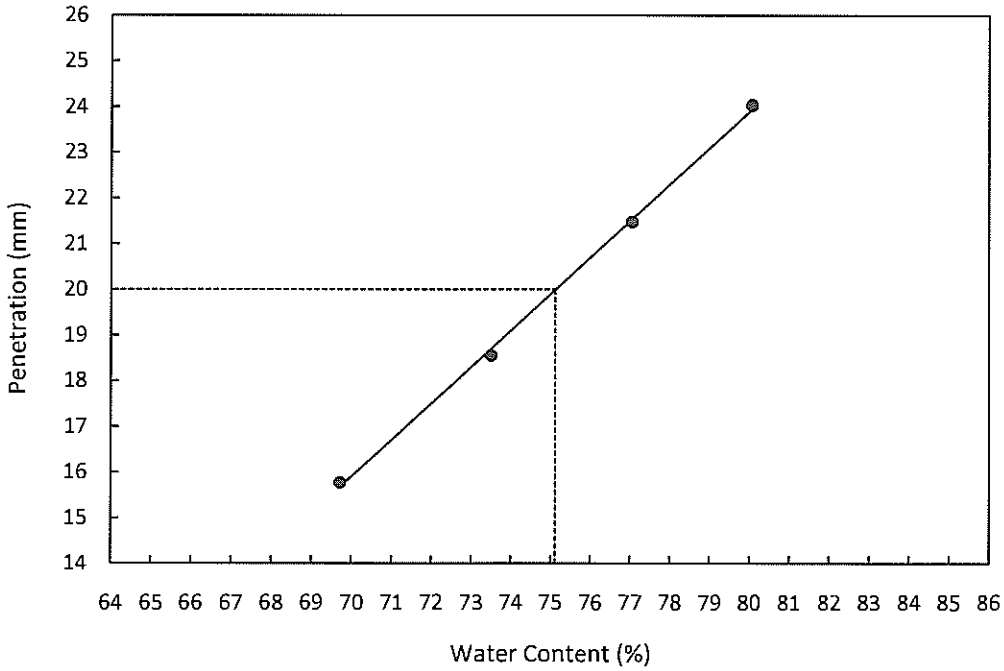
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Whitish grey, dark grey and yellow slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 50
TEST DATE	: 05.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.66	20.23	20.16	20.43	20.25	20.32
DRY WEIGHT + CUP	(g)	15.92	14.99	14.99	14.93	16.93	17.05
CUP WEIGHT	(g)	9.12	7.86	8.28	8.06	9.05	9.25
WATER CONTENT	(%)	69.7	73.5	77.0	80.1	42.1	41.9
PENETRATION	(mm)	15.8	18.6	21.5	24.0	-	-

LIQUID LIMIT	(%)	**75.1**
PLASTIC LIMIT	(%)	**42.0**
PLASTICITY INDEX		**33**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Sy.	(Authorised Signatory - Min Win Htut)	11-9-2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

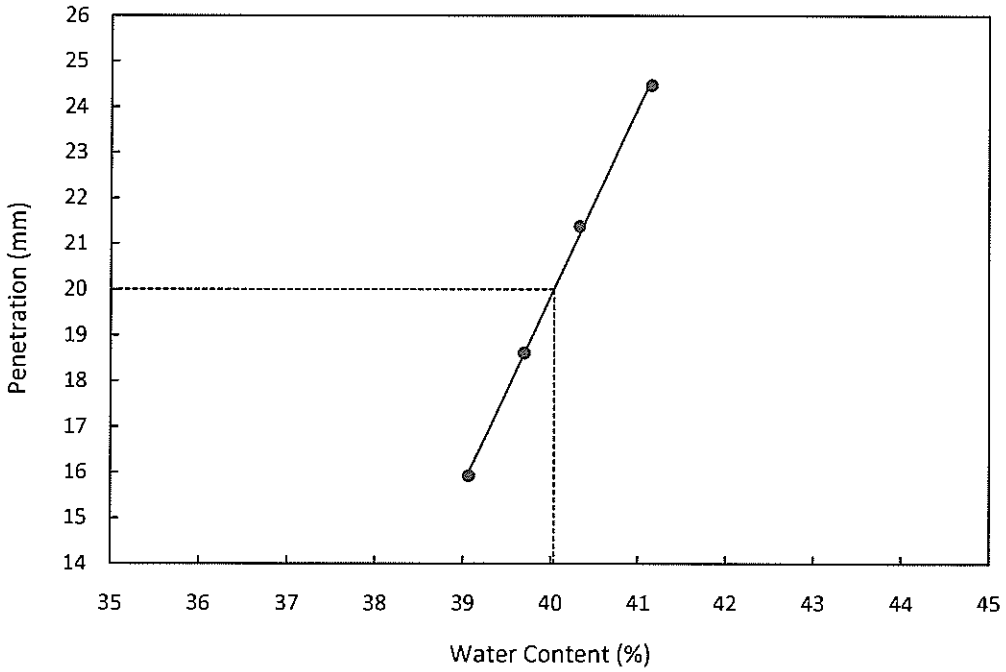
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH10
SAMPLE NO.	: SPT13
DEPTH(M)	: 26.00-26.45m
SOIL DESCRIPTION	: Light greenish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 08.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.37	20.13	20.25	20.46	20.32	20.68
DRY WEIGHT + CUP	(g)	17.10	16.74	16.79	17.16	17.83	18.17
CUP WEIGHT	(g)	8.73	8.20	8.21	9.14	8.22	8.66
WATER CONTENT	(%)	39.1	39.7	40.3	41.1	25.9	26.4
PENETRATION	(mm)	15.9	18.6	21.4	24.5	-	-

LIQUID LIMIT	(%)	**40.0**
PLASTIC LIMIT	(%)	**26.2**
PLASTICITY INDEX		**14**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

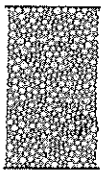


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	11.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

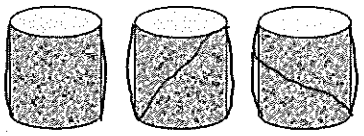
Sample Details					
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m		
	Description		Firm reddish brown, yellow and light grey slightly gravelly slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0	(mm) 75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm) 38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr) 156.4	156.1	155.1
	Bulk Density	ρ_0	(Mg/m3) 1.82	1.82	1.81
	Particle Density	ρ_s	(Mg/m3) 2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	39	39	41
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.31	1.31	1.28
Initial Voids Ratio	e_0	.	1.03	1.02	1.07
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	153.18	112.82	133.22
MembraneCorrection	m_c	(kPa)	1.560	1.920	1.010
Strain At Max Stress	$\varepsilon_f\%$	(%)	14.35	19.13	8.02
Shear Strength	c_u	(kPa)	76.59	56.41	66.61
Final Moisture	$\omega_f\%$	(%)	39	39	41
Final Dry Density	ρ_{df}	(Mg/m3)	1.31	1.31	1.28
Final Voids Ratio	e_f	.	1.03	1.02	1.07
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	UU4-SungeiTengah-B10T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked Min Win Htut	Approved Sio Keong Kong

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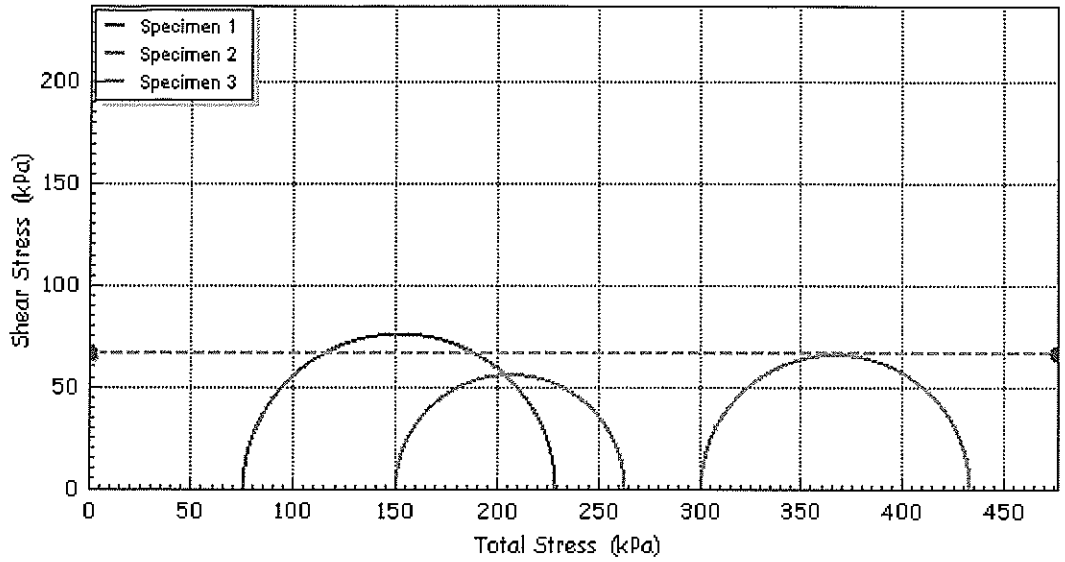
Ryobi Geotechnique International Pte Ltd

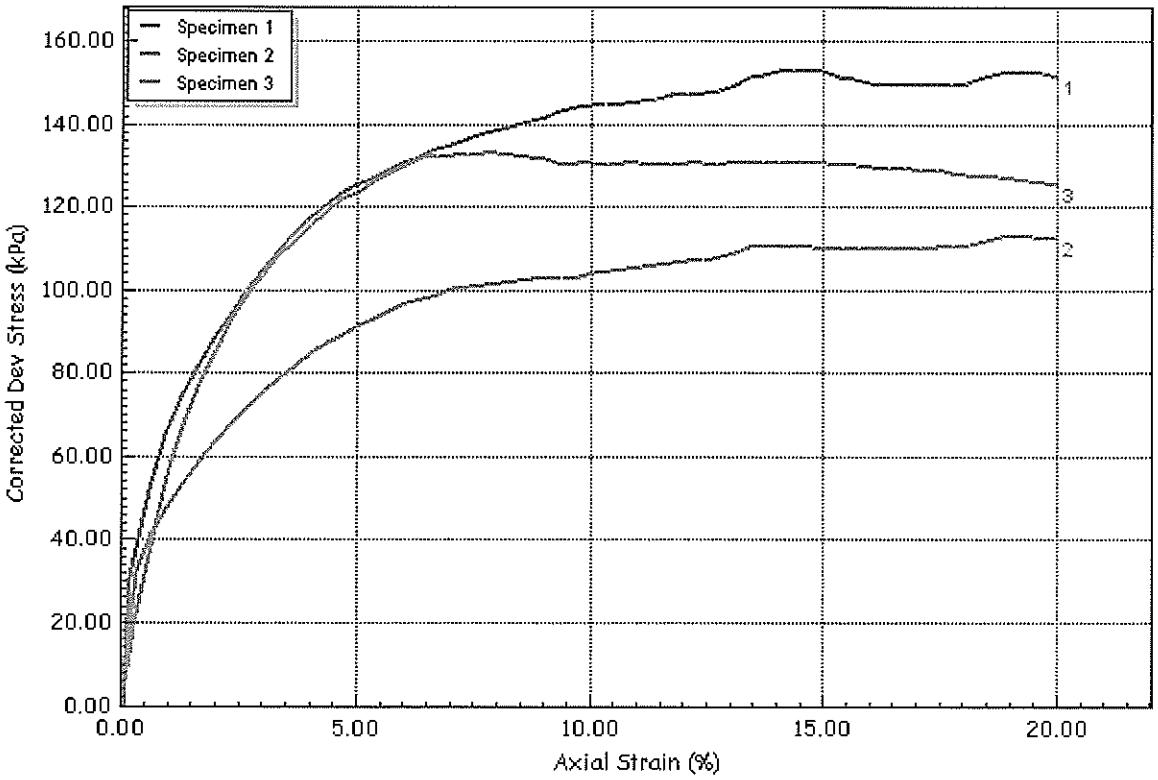
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	66.5
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU4-SungeiTengah-B10T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

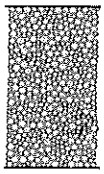
ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0023-B

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

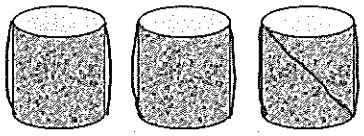
Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Stiff whitish grey and reddish brown slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	156.7	153.3	154.0
	Bulk Density	ρ_0	(Mg/m3)	1.83	1.79	1.80
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	42	43	43
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.28	1.25	1.26
Initial Voids Ratio	e_0	.	1.06	1.13	1.10
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	156.10	194.32	176.71
MembraneCorrection	m_c	(kPa)	1.370	1.990	1.290
Strain At Max Stress	$\varepsilon_f\%$	(%)	11.98	20.00	11.07
Shear Strength	c_u	(kPa)	78.05	97.16	88.35
Final Moisture	$\omega_f\%$	(%)	42	43	43
Final Dry Density	ρ_{df}	(Mg/m3)	1.28	1.25	1.26
Final Voids Ratio	e_f	.	1.06	1.13	1.10
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	UU5-SungeiTengah-B10T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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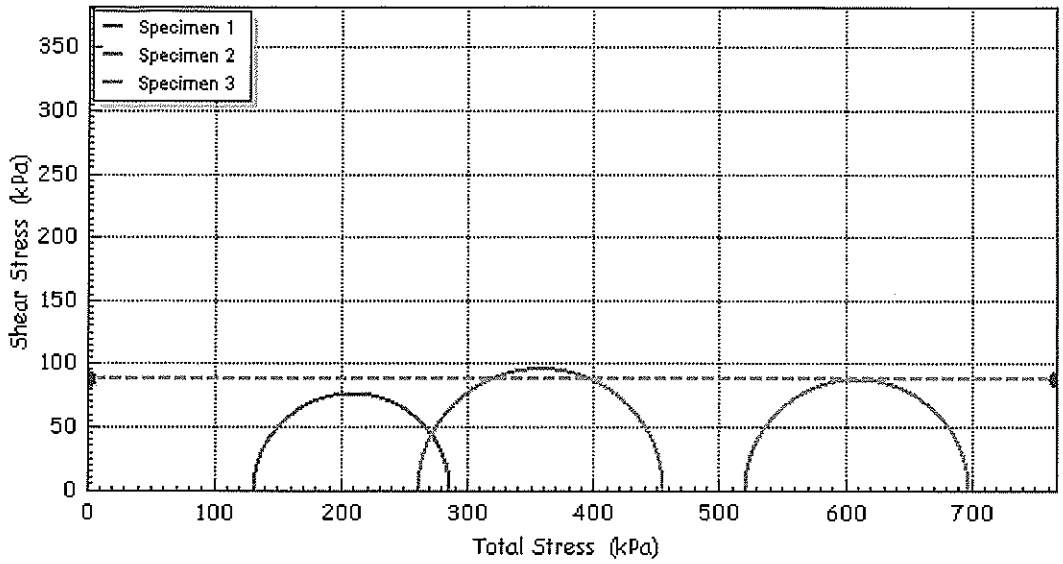
Ryobi Geotechnique International Pte Ltd

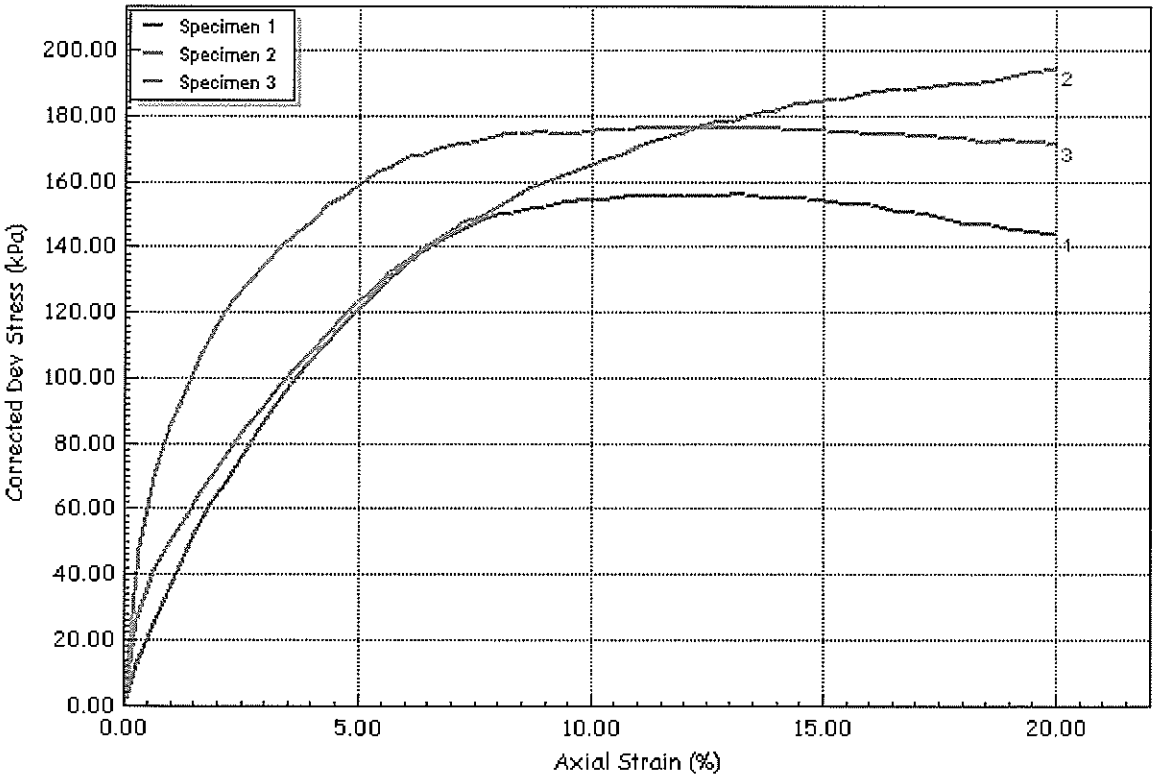
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	87.9
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU5-SungeiTengah-B10T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	6/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

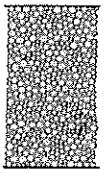
ACCREDITED LABORATORY SAC-SINGLAS Cert No. LA-2018-0611-E

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

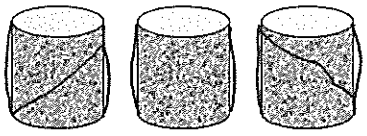
Sample Details					
 *sketch showing specimen location in original sample*	Depth		18.00-18.90m		
	Description		Stiff whitish grey and reddish brown slightly sandy slightly gravelly SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	170.2	168.2	168.2
	Bulk Density	ρ_0 (Mg/m3)	1.99	1.96	1.96
	Particle Density	ρ_s (Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	165	330	660
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	27	28	27
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.56	1.54	1.55
Initial Voids Ratio	e_0	.	0.71	0.74	0.73
Initial Degree of Saturation	S_o	(%)	100	100	99

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	140.97	188.12	160.49
MembraneCorrection	m_c	(kPa)	1.570	1.840	1.510
Strain At Max Stress	$\varepsilon_f\%$	(%)	14.47	18.08	13.74
Shear Strength	c_u	(kPa)	70.48	94.06	80.24
Final Moisture	$\omega_f\%$	(%)	27	28	27
Final Dry Density	ρ_{df}	(Mg/m3)	1.56	1.54	1.55
Final Voids Ratio	e_f	.	0.71	0.74	0.73
Final Degree of Saturation	S_f	(%)	100.0	100.0	98.7

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	UU6-SungeiTengah-B10T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	18.00-18.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Keng

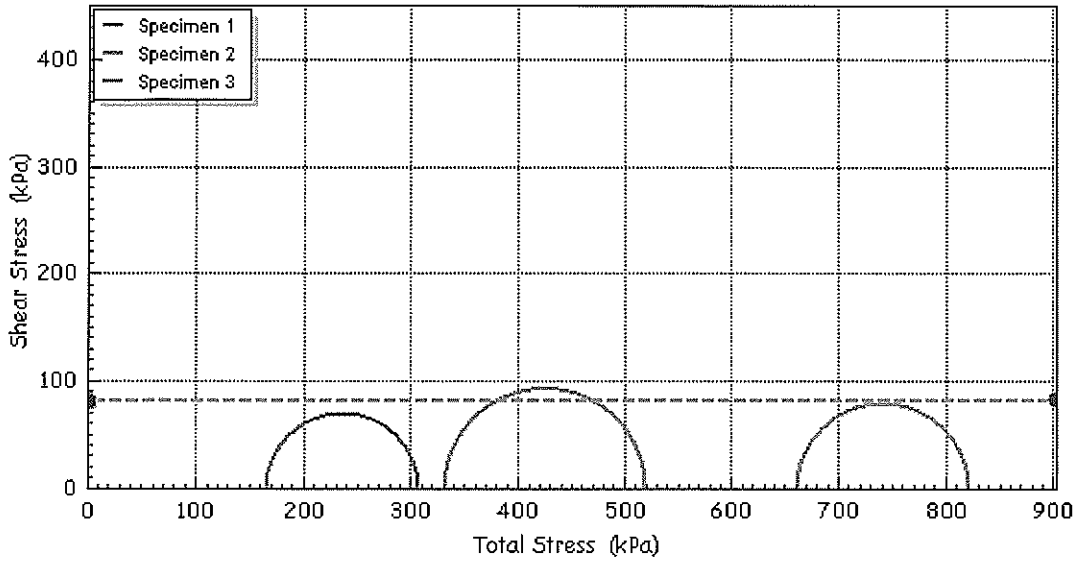
Ryobi Geotechnique International Pte Ltd

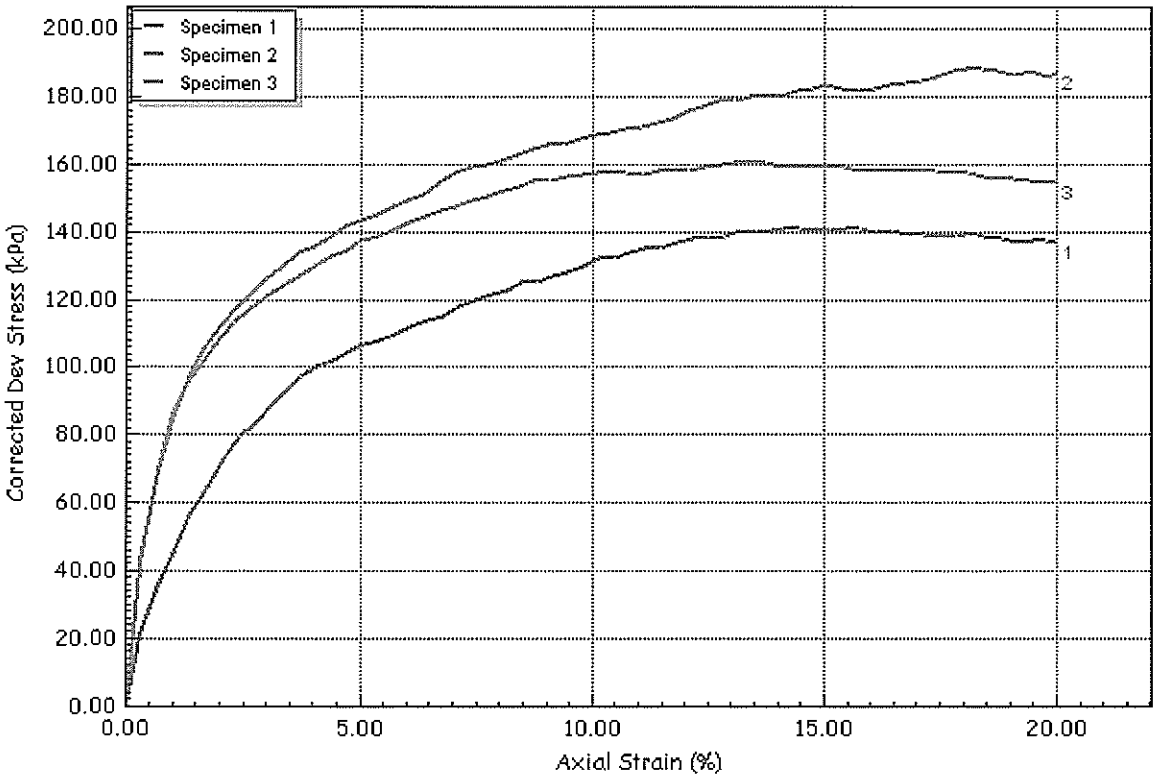
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	81.6
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU6-SungeiTengah-B10T3	
Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	7/9/2018	
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH10	
Jobfile	Sungei Tengah Rd-WA7		Sample	TW3	
Client	AVA		Depth	18.00-18.90m	
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

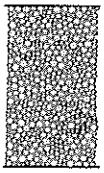
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Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

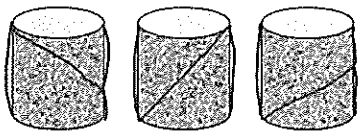
Sample Details					
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m		
	Description		Stiff whitish grey, dark grey and yellow slightly gravelly slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	165.8	171.6	174.9
	Bulk Density	ρ_0 (Mg/m3)	1.93	2.00	2.04
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	30	24	22
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.49	1.62	1.67
Initial Voids Ratio	e_0	.	0.79	0.65	0.60
Initial Degree of Saturation	S_o	(%)	100	98	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	168.41	185.43	178.69
MembraneCorrection	m_c	(kPa)	1.050	1.920	1.980
Strain At Max Stress	$\varepsilon_f\%$	(%)	8.48	19.21	19.96
Shear Strength	c_u	(kPa)	84.21	92.72	89.34
Final Moisture	$\omega_f\%$	(%)	30	24	22
Final Dry Density	ρ_{df}	(Mg/m3)	1.49	1.62	1.67
Final Voids Ratio	e_f	.	0.79	0.65	0.60
Final Degree of Saturation	S_f	(%)	100.0	98.3	99.9

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	UU7-SungeiTengah-B10T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

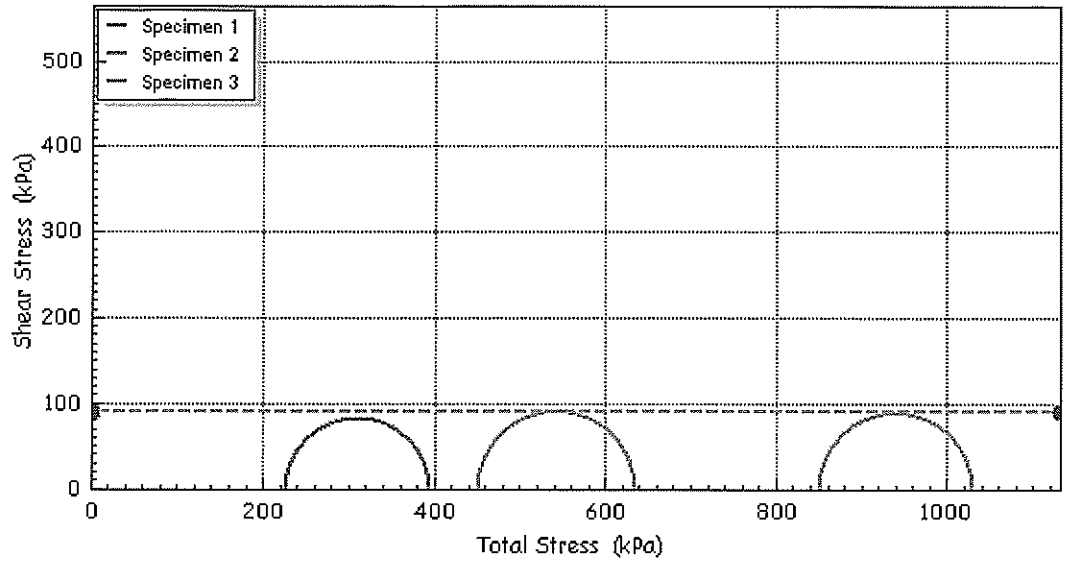
Ryobi Geotechnique International Pte Ltd

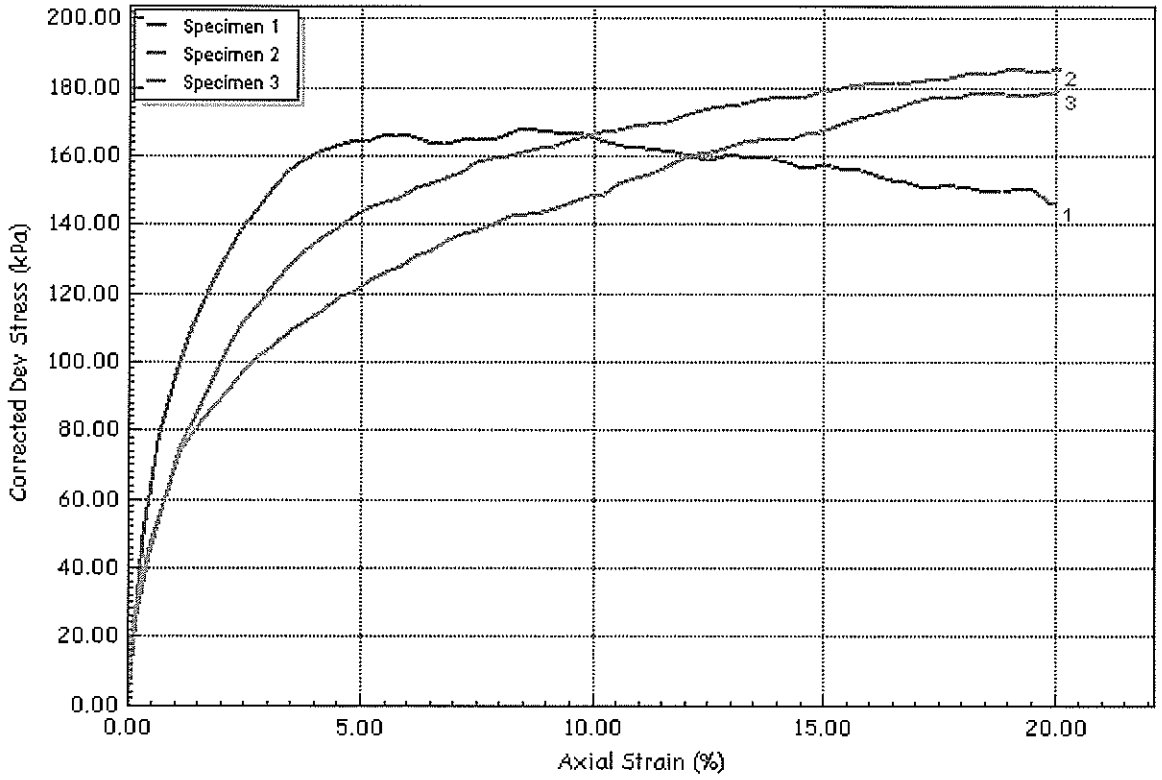
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	88.8
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU7-SungeiTengah-B10T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH10
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3; BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813957-001	SG1813957-002	SG1813957-003
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		SG1813957-004	SG1813957-005	SG1813957-006
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: SOIL				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	---	---
				Sampling date/time	04-Sep-2018 00:00	---	---
Compound	*Method*	*LOR*	*Unit*		SG1813957-007	-------	-------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	---	---
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	---	---
Organic Matter	BS1377	0.1	% DW		<0.1	---	---
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	---	---

ACCREDITED LABORATORY
SAC-SINGLAS
Cert No: LA-1993-0064-A
Cert No: LA-2000-0178-F

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814071**	Page	: 1 of 2
Client	: **RYOBI GEOTECH PTE LTD**	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 06-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 06-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 12-Sep-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- **Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377**
- **BS method is referenced to British Standard 1377: Part 3/1990**
- **Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377**
- **pH Test is referenced to Clause 9 of Part 3: BS1377**

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS

Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	BH3A	BH5A	BH 9
			Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*	**SG1814071-001**	**SG1814071-002**	**SG1814071-003**
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	8.5	8.6	9.0
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.03	0.02	0.04
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.06	0.05	0.04
ORGANICS-General						
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Sub-Matrix: **WATER**

			Client sample ID	BH10	BH11	---
			Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	---
Compound	*Method*	*LOR*	*Unit*	**SG1814071-004**	**SG1814071-005**	--------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	9.0	8.7	---
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.03	0.02	---
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.04	0.05	---
ORGANICS-General						
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	---

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH11						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	26.4	-	46.7	-	-	-	46.5
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.74	1.77	-	-	1.63	1.78
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	-	-	2.66	2.66	(B)	-	2.66
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	1	0	5	-	4	0
	SAND	%	-	16	12		-		25
	SILT	%	-	83	78	72	-	57	66
	CLAY	%	-		10	23	-	39	9
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	63.8	-	58.9	-	53.1
	PLASTIC LIMIT	%		-	39.5	-	36.8	-	35.0
	PLASTICITY INDEX			-	24	-	22	-	18
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	**UU**
	TOTAL COHESION	kPa	-	-	73.1	-	-	-	102.0
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH11						
SAMPLE NO :			SPT7	SPT8	SPT9	TW3	SPT10	SPT11	TW4
SAMPLE DEPTH :		m	14.90-15.35	16.00-16.45	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45	24.00-24.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	42.7	-	-	34.6	-	33.9	32.9
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.79	1.98	-	-	1.91
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	-	-	-	2.69	-	-	2.66
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	0	-	37	0	(B)	-	0
	SAND	%	33	-		8		-	23
	SILT	%	67	-	45	76		-	73
	CLAY	%		-	18	16		-	4
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	-	52.3	54.1	-	40.4
	PLASTIC LIMIT	%	-	-	-	31.2	32.4	-	27.8
	PLASTICITY INDEX		-	-	-	21	22	-	13
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	-	-	**UU**
	TOTAL COHESION	kPa	-	-	-	-	-	-	173.7
	TEST TYPE		-	-	-	**$CU^{70\Phi}$**	-	-	-
	EFFECTIVE COHESION	kPa	-	-	-	6.9	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	-	-	28.7	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	6.2	-	-	-	-	-
	Chloride Content	%	-	<0.01	-	-	-	-	-
	Organic Content	%	-	<0.1	-	-	-	-	-
	Sulphate Content	%	-	<0.01	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 :

(B) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 17/09/2018

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ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH11						
SAMPLE NO :			SPT12	SPT13	SPT14	W1			
SAMPLE DEPTH :		m	24.90-25.35	28.00-28.45	30.00-30.45	Water Sample			
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	37.7	-	29.5				
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.71	-	-			
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	-	-	-	-			
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	11	0	-	-			
	SAND	%		17	-	-			
	SILT	%	79	83	-	-			
	CLAY	%	10		-	-			
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	41.6	-			
	PLASTIC LIMIT	%	-	-	27.5	-			
	PLASTICITY INDEX		-	-	14	-			
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-			
	TOTAL COHESION	kPa	-	-	-	-			
	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	-	-	-	-			
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-			
	Chloride Content	%	-	-	-	-			
	Organic Content	%	-	-	-	-			
	Sulphate Content	%	-	-	-	-			
	pH Value		-	-	-	8.7			
	Chloride Content	g/L	-	-	-	0.02			
	Organic Content	% (w/v)	-	-	-	<0.10			
	Sulphate Content	g/L	-	-	-	0.05			

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 : 13/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH11	SPT2	4.00-4.45	26.4	-	-	-
BH11	SPT3	6.00-6.45	-	1.74	-	-
BH11	TW1	8.00-8.90	46.7	1.77	-	2.66
BH11	SPT4	8.90-9.35	-	-	-	2.66
BH11	SPT6	12.00-12.45	-	1.63	-	-
BH11	TW2	14.00-14.90	46.5	1.78	-	2.66
BH11	SPT7	14.90-15.35	42.7	-	-	-
BH11	SPT9	18.00-18.45	-	1.79	-	-
BH11	TW3	20.00-20.90	34.6	1.98	-	2.69
BH11	SPT11	22.00-22.45	33.9	-	-	-
BH11	TW4	24.00-24.90	32.9	1.91	-	2.66
BH11	SPT12	24.90-25.35	37.7	-	-	-
BH11	SPT13	28.00-28.45	-	1.71	-	-

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)

TESTED BY: MMSU
Date : 03.09.2018

APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 17.9.2018

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH11	SPT14	30.00-30.45	29.5	-	-	-

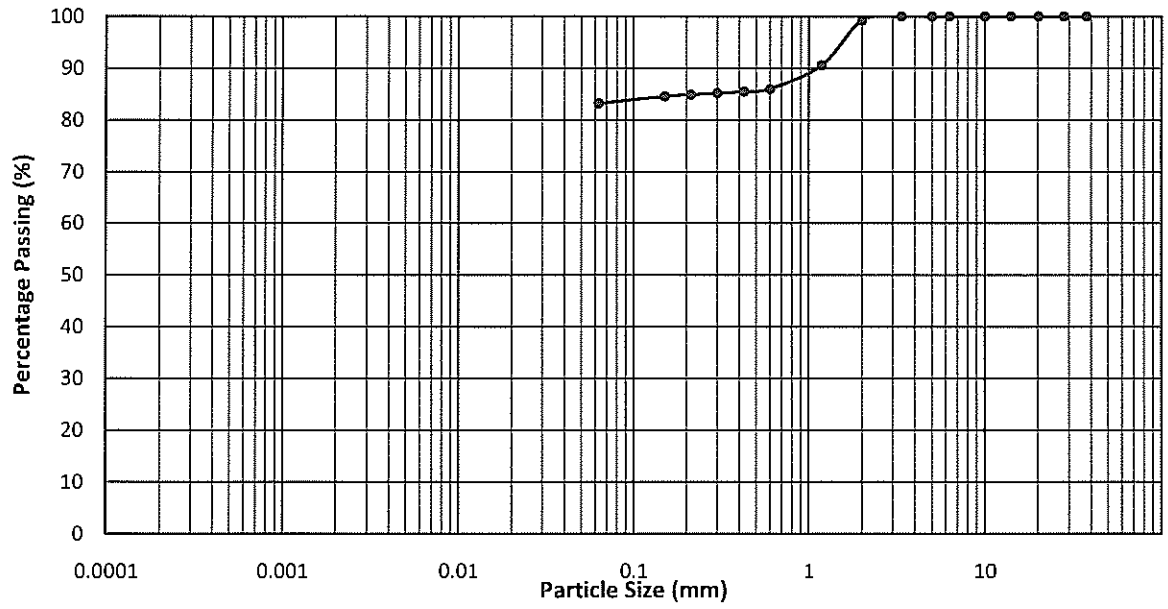
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: Mooju Date : 03.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 17-9-2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**1**	%
SAND	=	**16**	%
SILT + CLAY	=	**83**	%

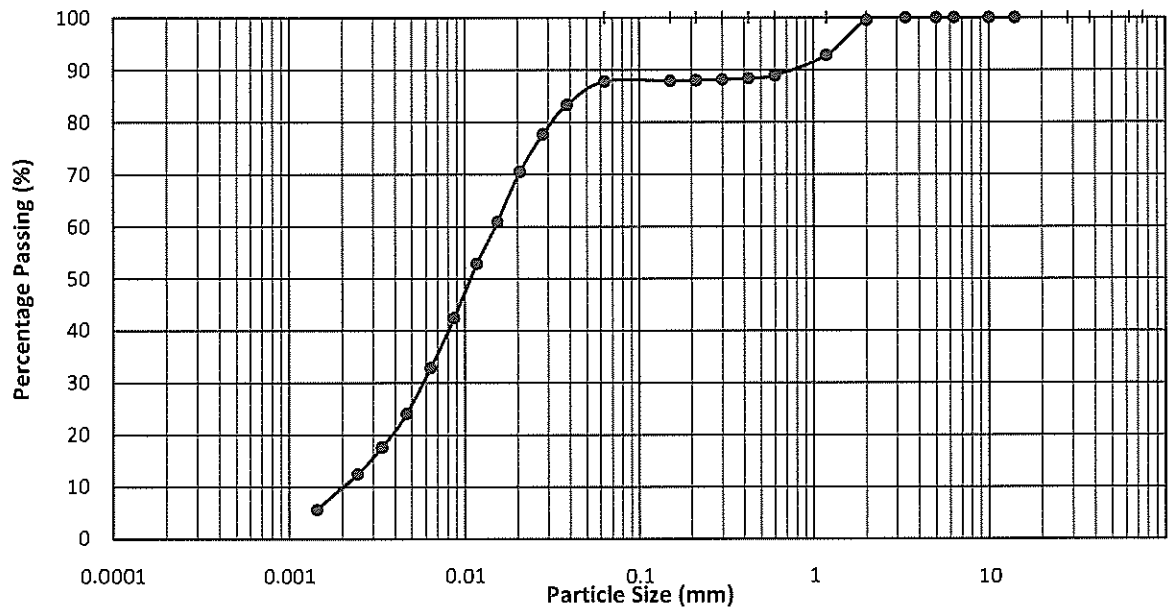
% of Passing 0.425 mm Sieve : 85.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS72B
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 07.09.2018



SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**12**	%
SILT	=	**78**	%
CLAY	=	**10**	%

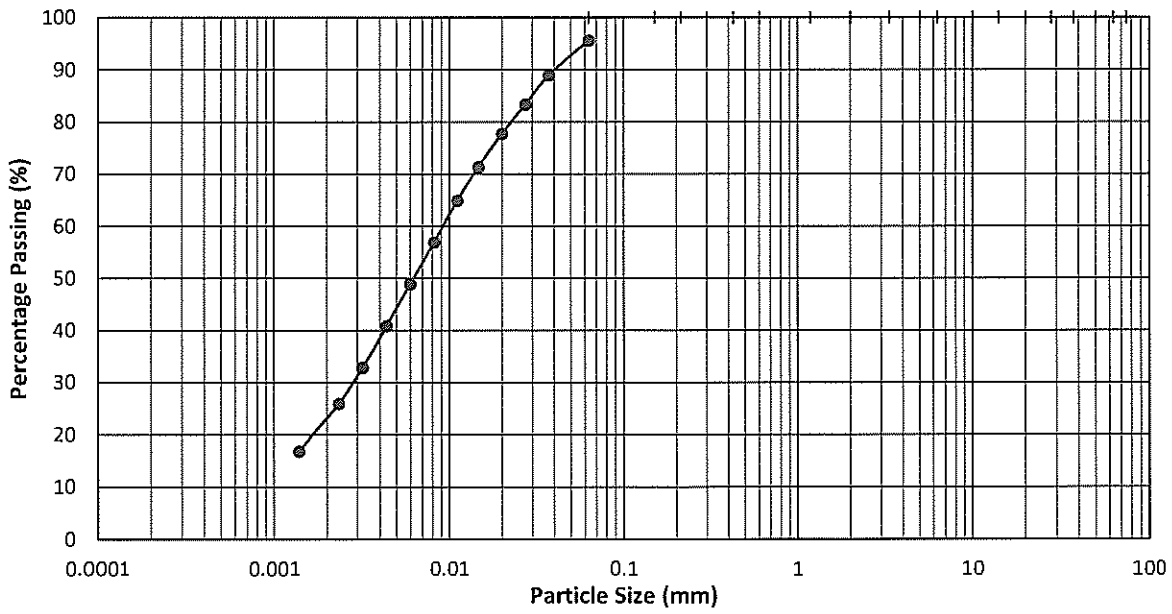
% of Passing 0.425 mm Sieve : 88.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**5**	%
SILT	=	**72**	%
CLAY	=	**23**	%

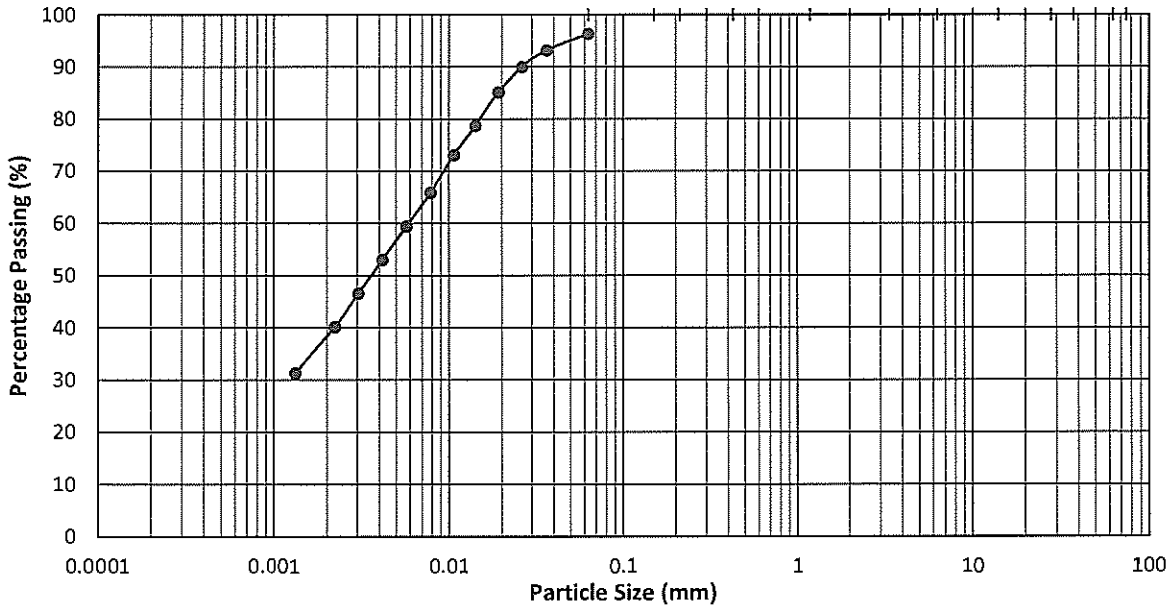
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	4	%
SILT	=	57	%
CLAY	=	39	%

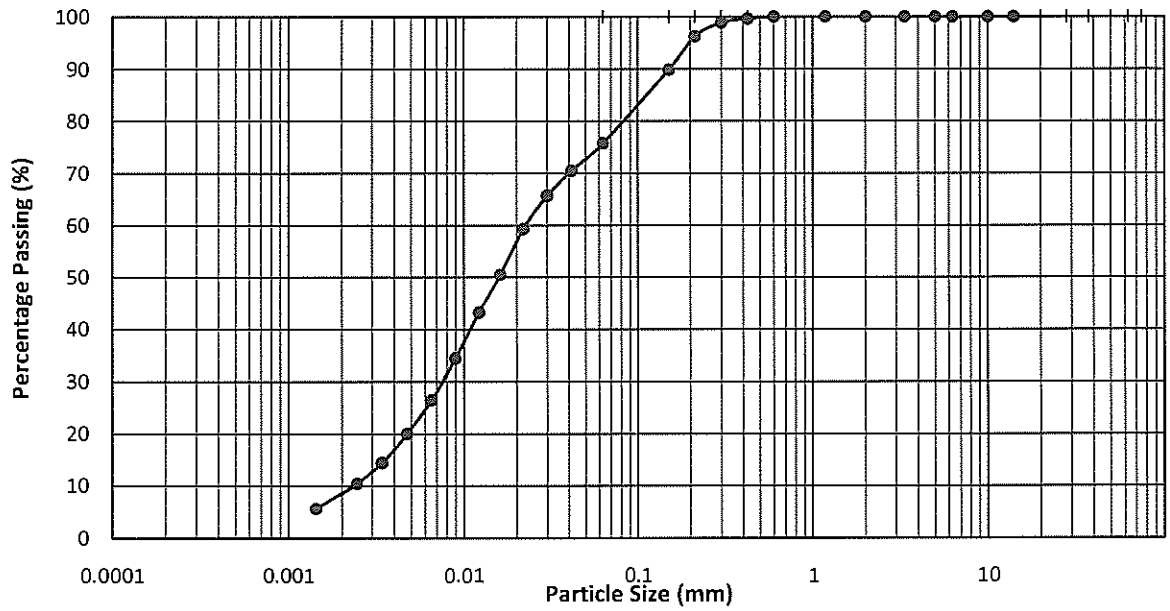
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Reddish brown and whitish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**25**	%
SILT	=	**66**	%
CLAY	=	**9**	%

% of Passing 0.425 mm Sieve : 99.6

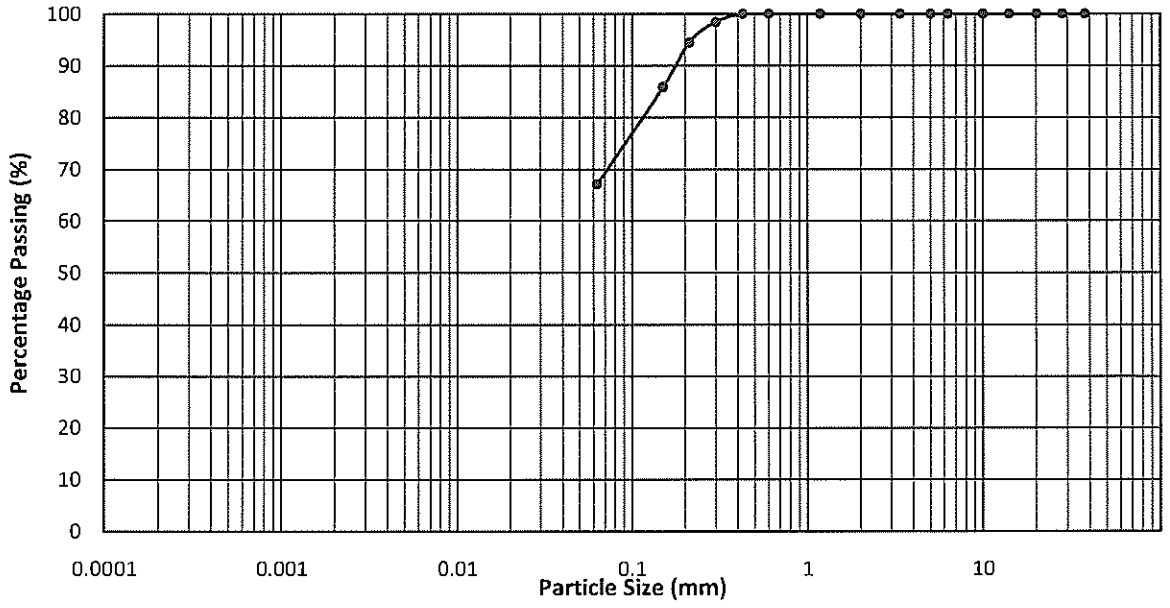
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2015-0023-B

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

SIEVING TEST

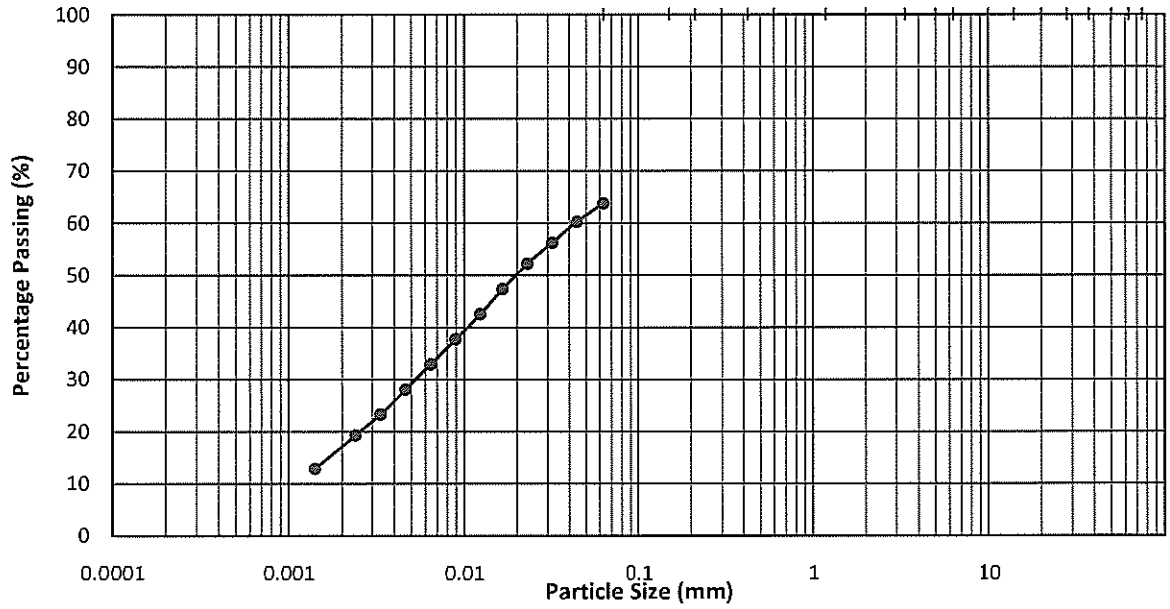
GRAVEL	=	**0**	%	
SAND	=	**33**	%	% of Passing 0.425 mm Sieve : 100.0
SILT + CLAY	=	**67**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**37**	%
SILT	=	**45**	%
CLAY	=	**18**	%

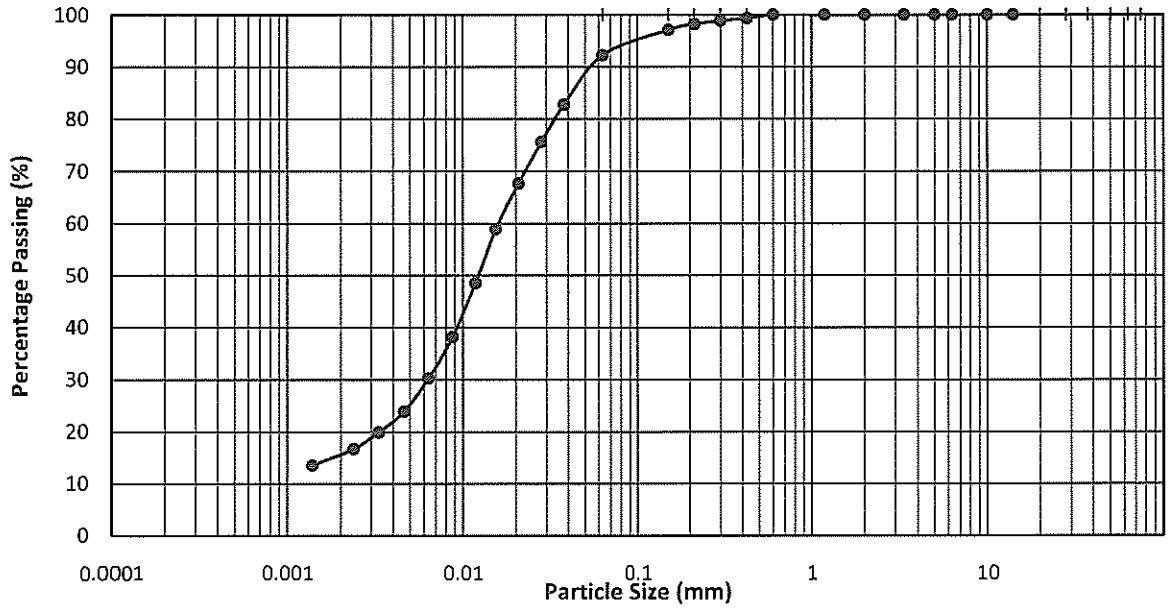
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 07.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**8**	%
SILT	=	**76**	%
CLAY	=	**16**	%

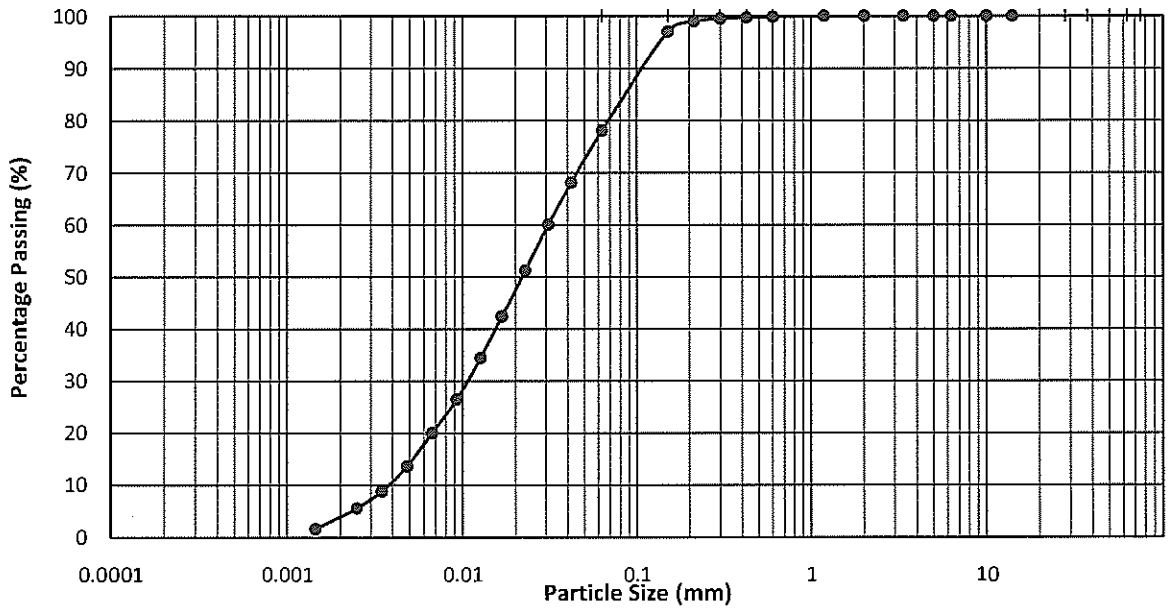
% of Passing 0.425 mm Sieve : 99.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 10.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**23**	%
SILT	=	**73**	%
CLAY	=	**4**	%

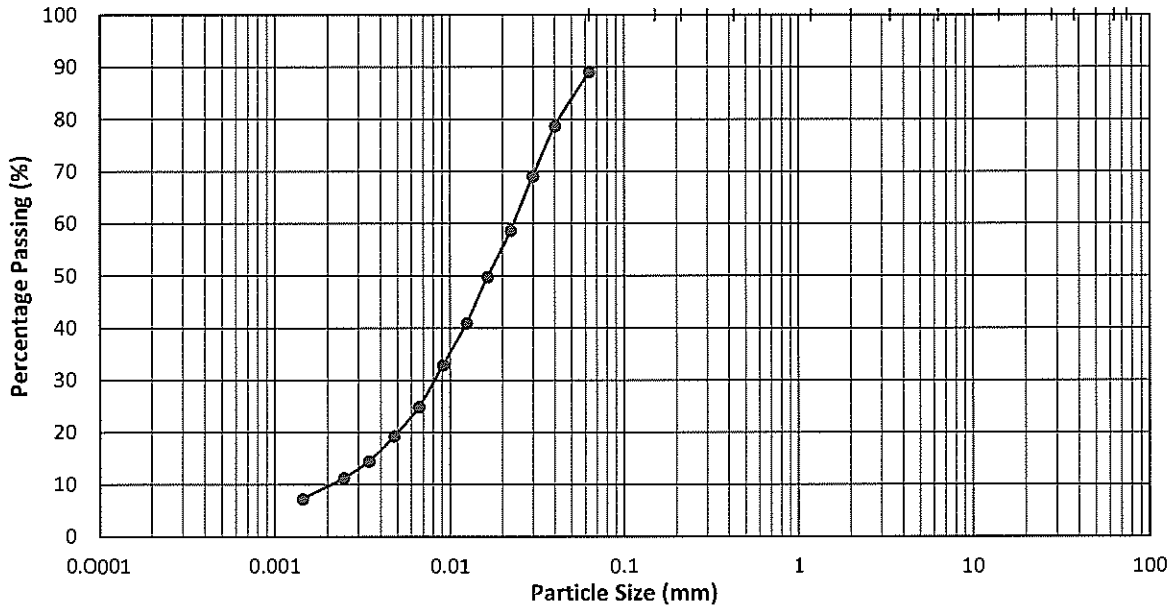
% of Passing 0.425 mm Sieve : 99.7

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT12
DEPTH (m)	: 24.90-25.35m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL + SAND	=	**11**	%	% of Passing 0.425 mm Sieve : -
SILT	=	**79**	%	
CLAY	=	**10**	%	

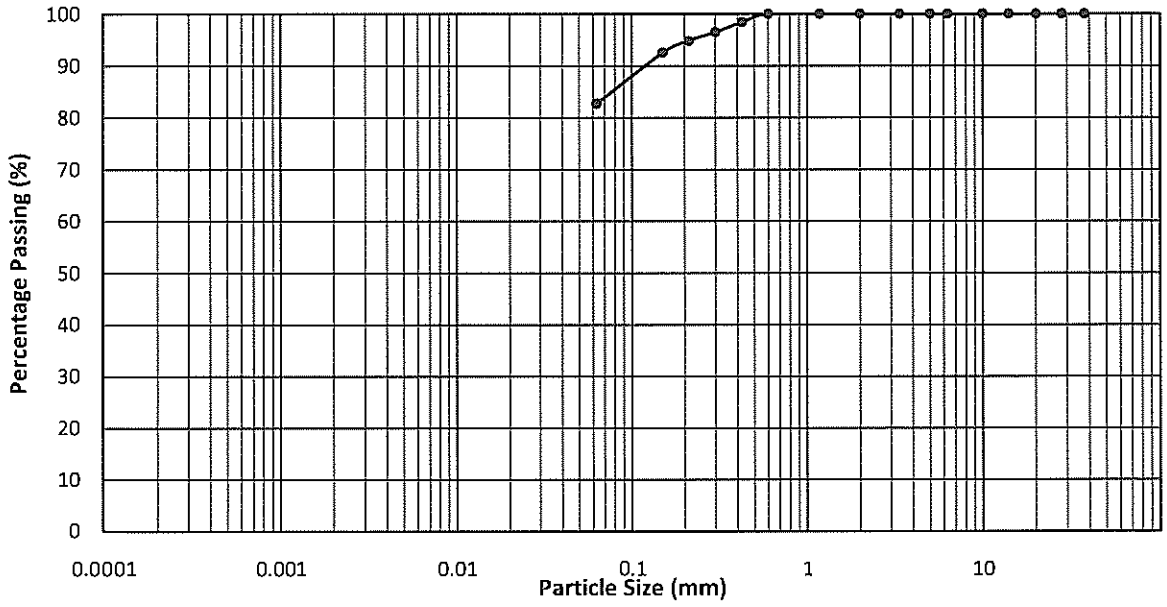
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17-9-2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2011-0023 IR

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT13
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**17**	%
SILT + CLAY	=	**83**	%

% of Passing 0.425 mm Sieve : 98.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

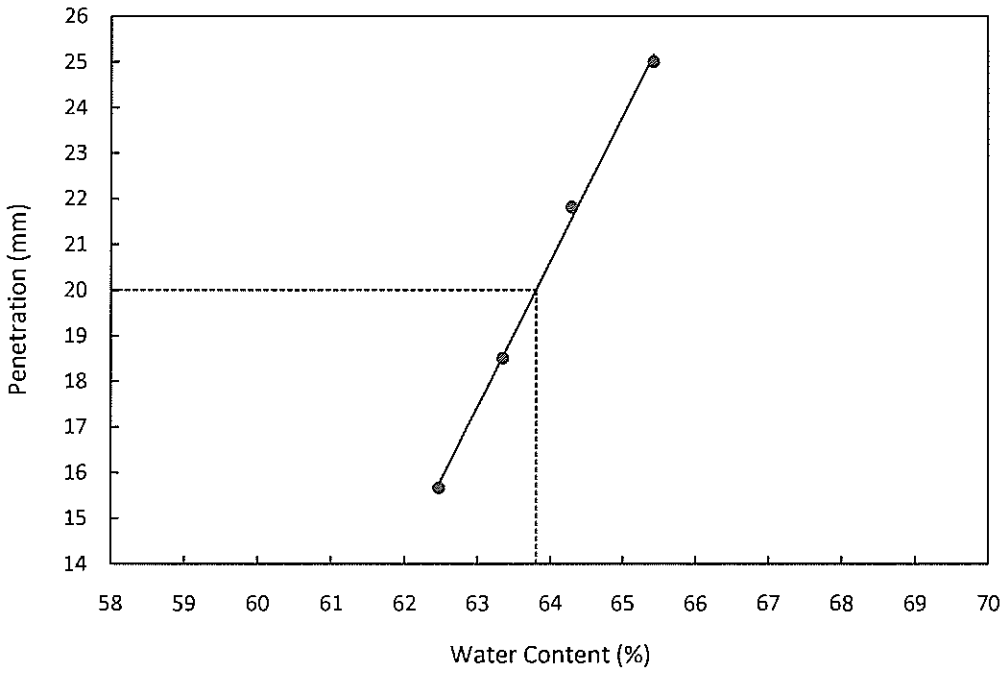
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown, light grey and yellow slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 87
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.61	20.56	20.22	20.56	20.36	20.27
DRY WEIGHT + CUP	(g)	16.05	16.05	15.52	16.00	16.89	17.15
CUP WEIGHT	(g)	8.75	8.93	8.21	9.03	8.12	9.24
WATER CONTENT	(%)	62.5	63.3	64.3	65.4	39.6	39.4
PENETRATION	(mm)	15.7	18.5	21.8	25.0	-	-

LIQUID LIMIT	(%)	**63.8**
PLASTIC LIMIT	(%)	**39.5**
PLASTICITY INDEX		**24**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

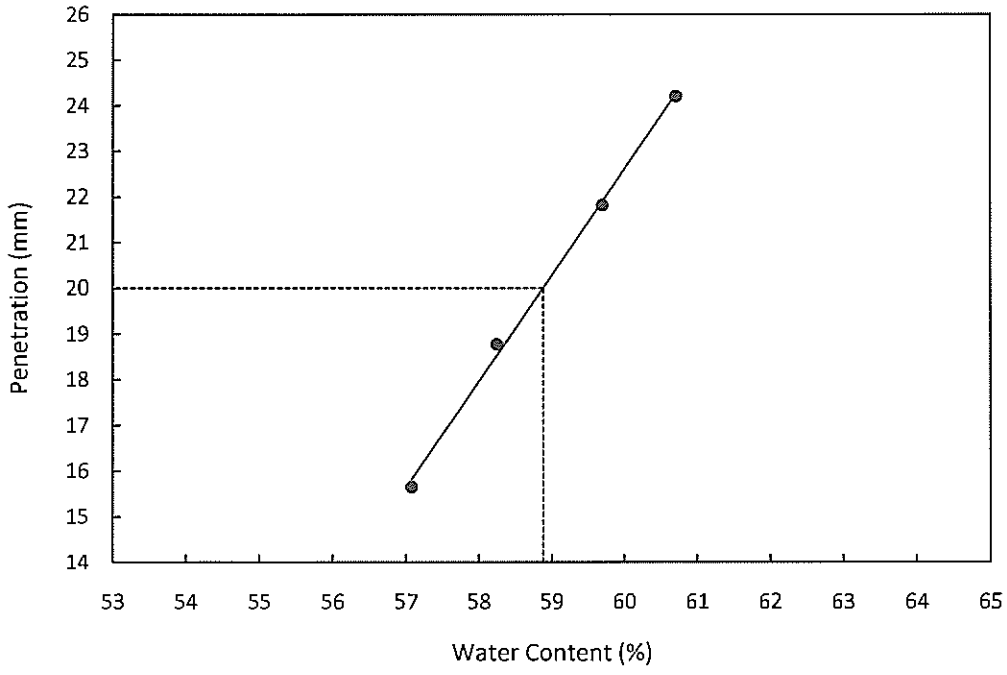
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT5
DEPTH(M)	: 10.00-10.45m
SOIL DESCRIPTION	: Reddish brown, yellow and light grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.30	20.36	20.60	20.47	20.26	20.18
DRY WEIGHT + CUP	(g)	15.74	16.26	16.35	15.85	17.17	17.05
CUP WEIGHT	(g)	7.75	9.22	9.23	8.24	8.79	8.54
WATER CONTENT	(%)	57.1	58.2	59.7	60.7	36.9	36.8
PENETRATION	(mm)	15.7	18.8	21.8	24.2	-	-

LIQUID LIMIT	(%)	**58.9**
PLASTIC LIMIT	(%)	**36.8**
PLASTICITY INDEX		**22**

NOTE:

M : SILT
C : CLAY
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I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :

APPROVED BY :

(Authorised Signatory - Min Win Htut)

DATE : 17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

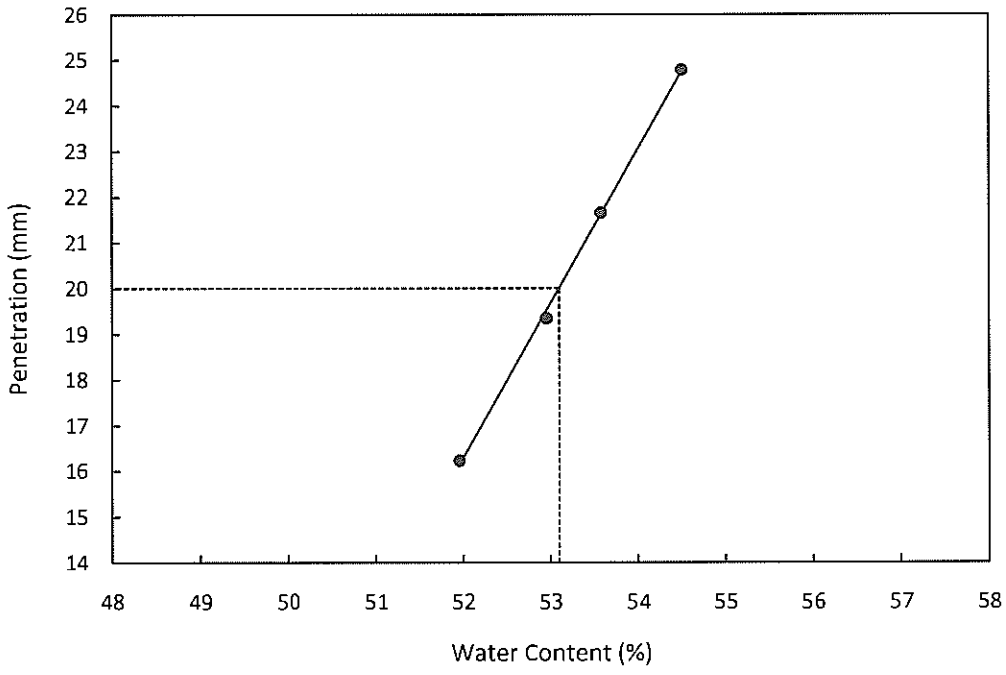
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Reddish brown and whitish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.49	20.45	20.37	20.26	20.16	20.36
DRY WEIGHT + CUP	(g)	16.50	16.15	16.10	16.08	17.03	17.44
CUP WEIGHT	(g)	8.82	8.03	8.13	8.41	8.07	9.12
WATER CONTENT	(%)	52.0	53.0	53.6	54.5	34.9	35.1
PENETRATION	(mm)	16.2	19.4	21.7	24.8	-	-

LIQUID LIMIT	(%)	**53.1**
PLASTIC LIMIT	(%)	**35.0**
PLASTICITY INDEX		**18**

NOTE:
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I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

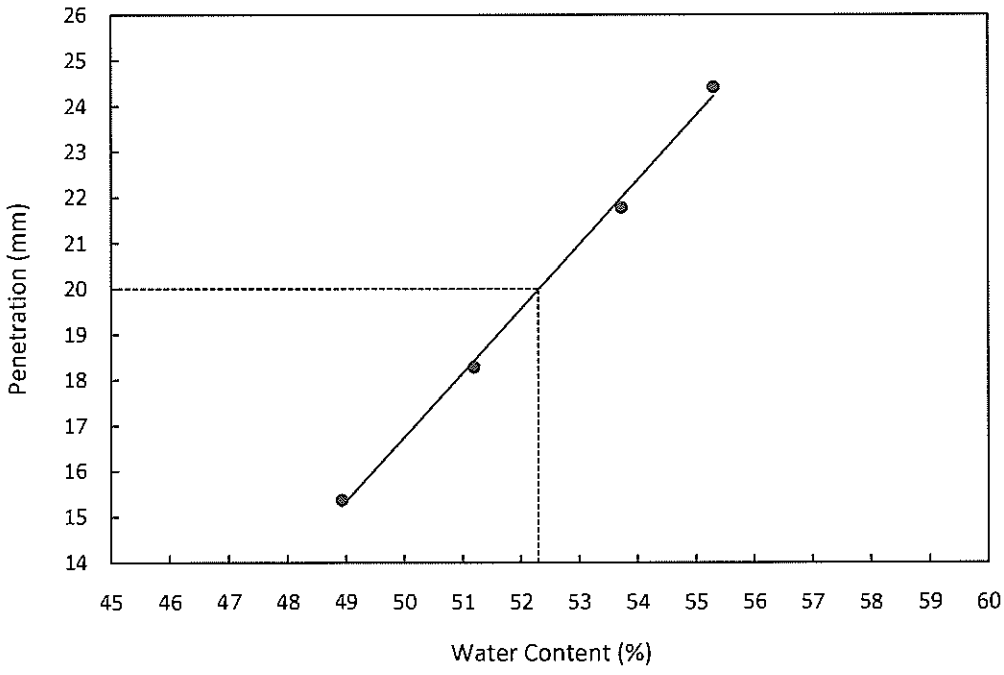
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 99
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.76	20.72	20.31	20.57	20.35	20.75
DRY WEIGHT + CUP	(g)	16.64	16.62	16.20	16.40	17.61	17.83
CUP WEIGHT	(g)	8.22	8.61	8.55	8.86	8.79	8.52
WATER CONTENT	(%)	48.9	51.2	53.7	55.3	31.1	31.4
PENETRATION	(mm)	15.4	18.3	21.8	24.4	-	-

LIQUID LIMIT	(%)	**52.3**
PLASTIC LIMIT	(%)	**31.2**
PLASTICITY INDEX		**21**

NOTE:

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H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Thi.	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

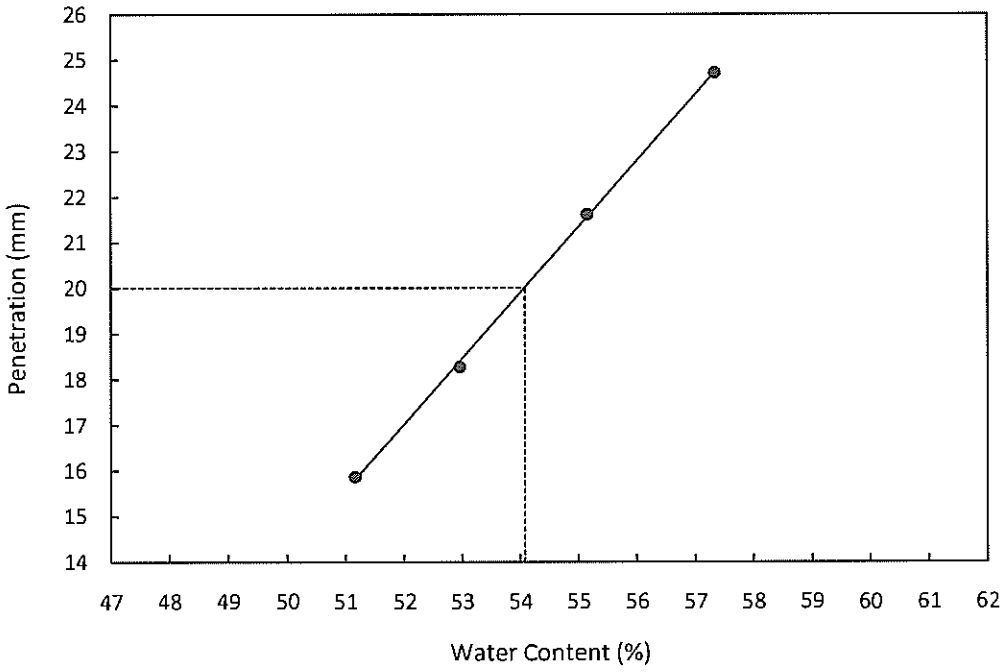
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT10
DEPTH(M)	: 20.90-21.35
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.25	20.47	20.53	20.70	20.17	20.47
DRY WEIGHT + CUP	(g)	16.27	16.17	16.14	16.56	17.48	17.65
CUP WEIGHT	(g)	8.49	8.05	8.18	9.34	9.20	8.93
WATER CONTENT	(%)	51.2	53.0	55.2	57.3	32.5	32.3
PENETRATION	(mm)	15.9	18.3	21.6	24.7	-	-

LIQUID LIMIT	(%)	**54.1**
PLASTIC LIMIT	(%)	**32.4**
PLASTICITY INDEX		**22**

NOTE:
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E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

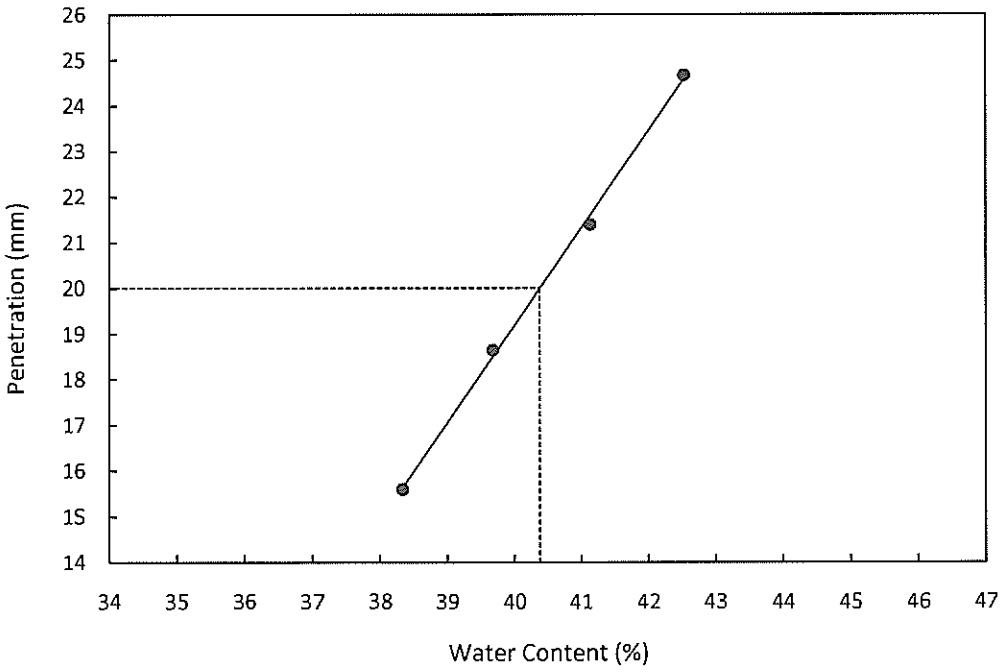
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 06.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.53	20.29	20.60	20.29	20.47	20.71
DRY WEIGHT + CUP	(g)	17.31	17.10	16.96	16.93	17.84	18.06
CUP WEIGHT	(g)	8.91	9.06	8.11	9.03	8.29	8.60
WATER CONTENT	(%)	38.3	39.7	41.1	42.5	27.5	28.0
PENETRATION	(mm)	15.6	18.7	21.4	24.7	-	-

LIQUID LIMIT	(%)	**40.4**
PLASTIC LIMIT	(%)	**27.8**
PLASTICITY INDEX		**13**

NOTE:
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TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	17.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

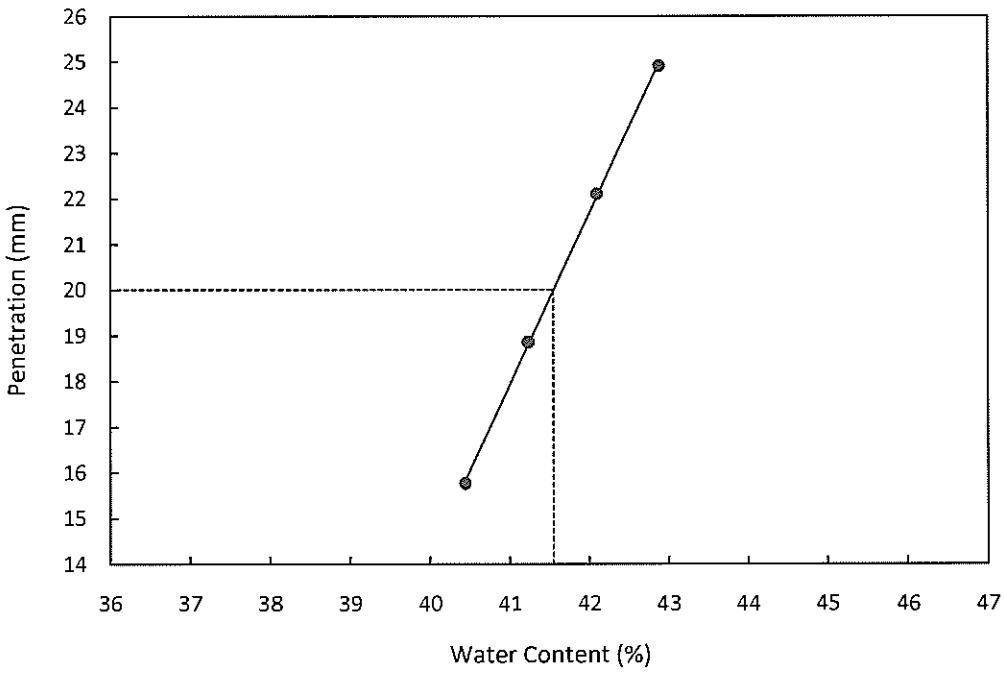
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH11
SAMPLE NO.	: SPT14
DEPTH(M)	: 30.00-30.45m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.42Smm SIEVE	: -
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.75	20.49	20.38	20.63	20.32	20.26
DRY WEIGHT + CUP	(g)	17.22	17.08	16.92	17.08	17.75	17.80
CUP WEIGHT	(g)	8.49	8.81	8.70	8.80	8.47	8.79
WATER CONTENT	(%)	40.4	41.2	42.1	42.9	27.7	27.3
PENETRATION	(mm)	15.8	18.9	22.1	24.9	-	-

LIQUID LIMIT	(%)	**41.6**
PLASTIC LIMIT	(%)	**27.5**
PLASTICITY INDEX		**14**

NOTE:
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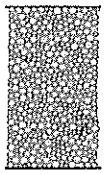


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Firm reddish brown, light grey and yellow slightly sandy SILT			
	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)	151.8	151.2	153.1
	Bulk Density	ρ_0	(Mg/m3)	1.76	1.75	1.78
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_S	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	47	48	46
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.19	1.18	1.21
Initial Voids Ratio	e_0	.	1.23	1.25	1.19
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	138.17	155.79	144.85
MembraneCorrection	m_C	(kPa)	0.990	1.510	1.960
Strain At Max Stress	$\varepsilon_f\%$	(%)	7.82	13.82	19.57
Shear Strength	c_U	(kPa)	69.09	77.89	72.43
Final Moisture	$\omega_f\%$	(%)	47	48	46
Final Dry Density	ρ_{df}	(Mg/m3)	1.19	1.18	1.21
Final Voids Ratio	e_f	.	1.23	1.25	1.19
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	UU10-SungeiTengah-B11T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/09/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

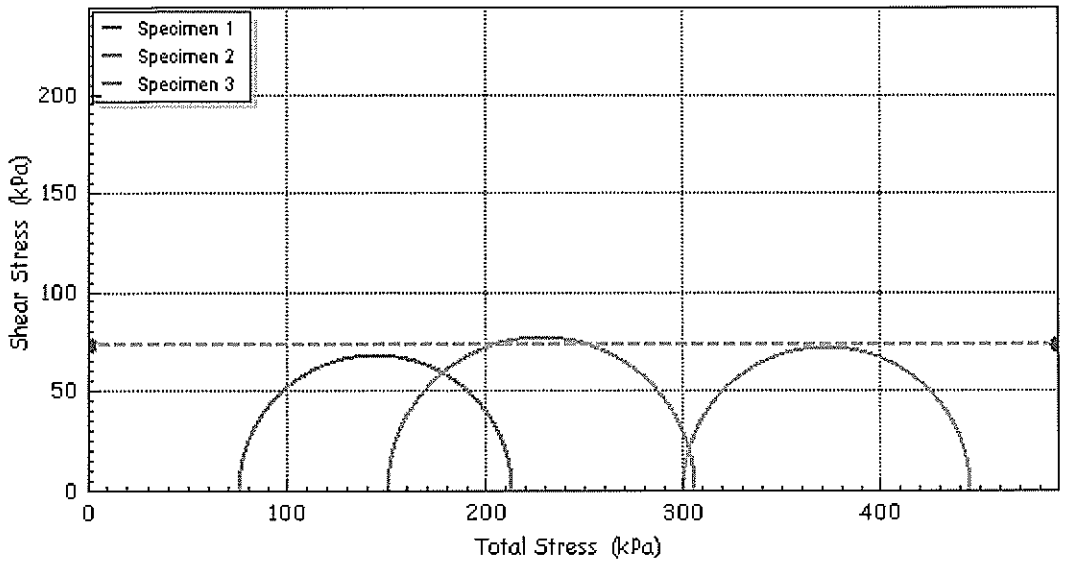
Ryobi Geotechnique International Pte Ltd

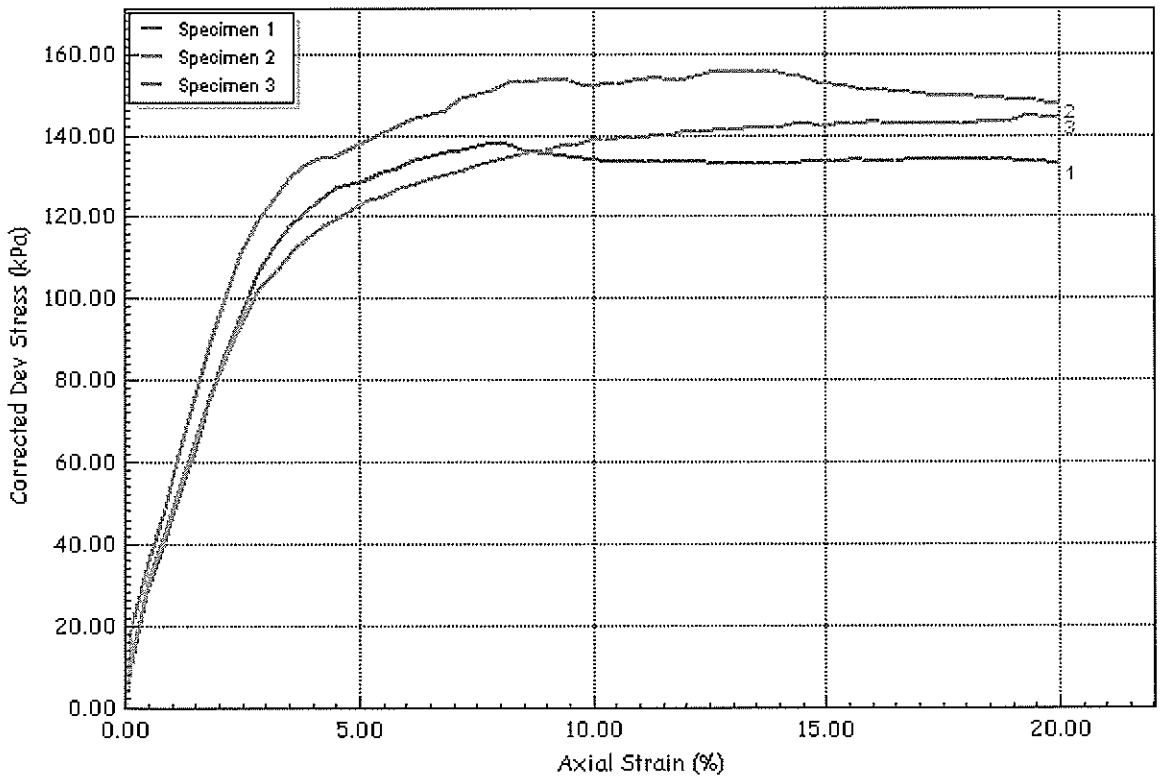
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	73.1
Friction Angle	ϕ	(deg)	0.0





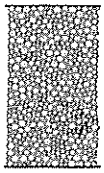
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU10-SungeiTengah-B11T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/09/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

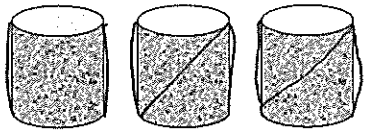
Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Stiff reddish brown and whitish grey slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	153.3	153.2	152.3
	Bulk Density	ρ_0	(Mg/m3)	1.79	1.79	1.78
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	46	46	46
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.22	1.22	1.22
Initial Voids Ratio	e_0	.	1.18	1.17	1.18
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	204.80	187.62	219.47
MembraneCorrection	m_c	(kPa)	1.540	1.790	1.480
Strain At Max Stress	$\varepsilon_f\%$	(%)	14.15	17.38	13.29
Shear Strength	c_u	(kPa)	102.40	93.81	109.74
Final Moisture	$\omega_f\%$	(%)	46	46	46
Final Dry Density	ρ_{df}	(Mg/m3)	1.22	1.22	1.22
Final Voids Ratio	e_f	.	1.18	1.17	1.18
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	UU11-SungeiTengah-B11T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

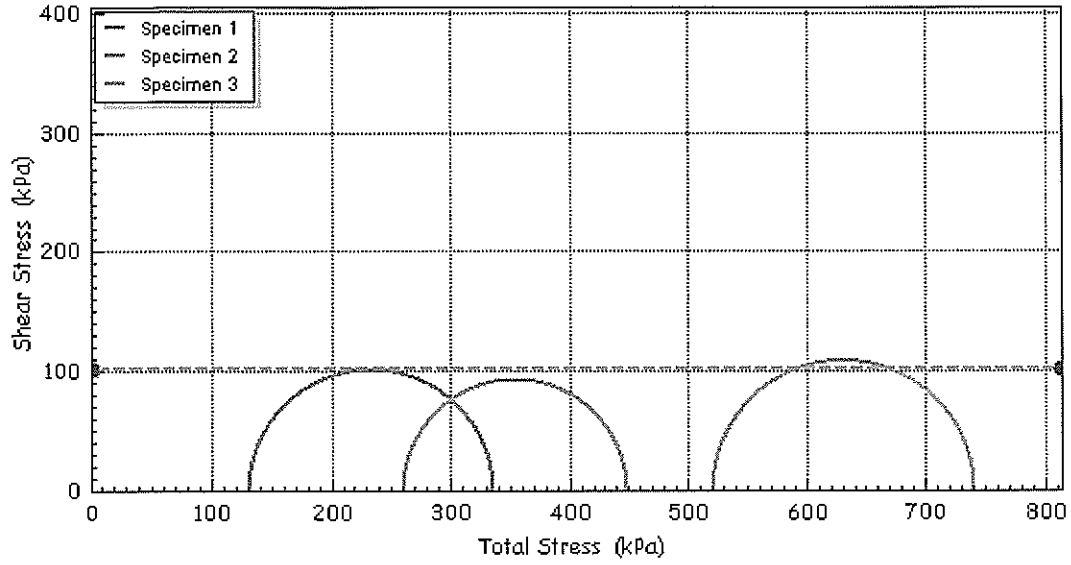
Ryobi Geotechnique International Pte Ltd

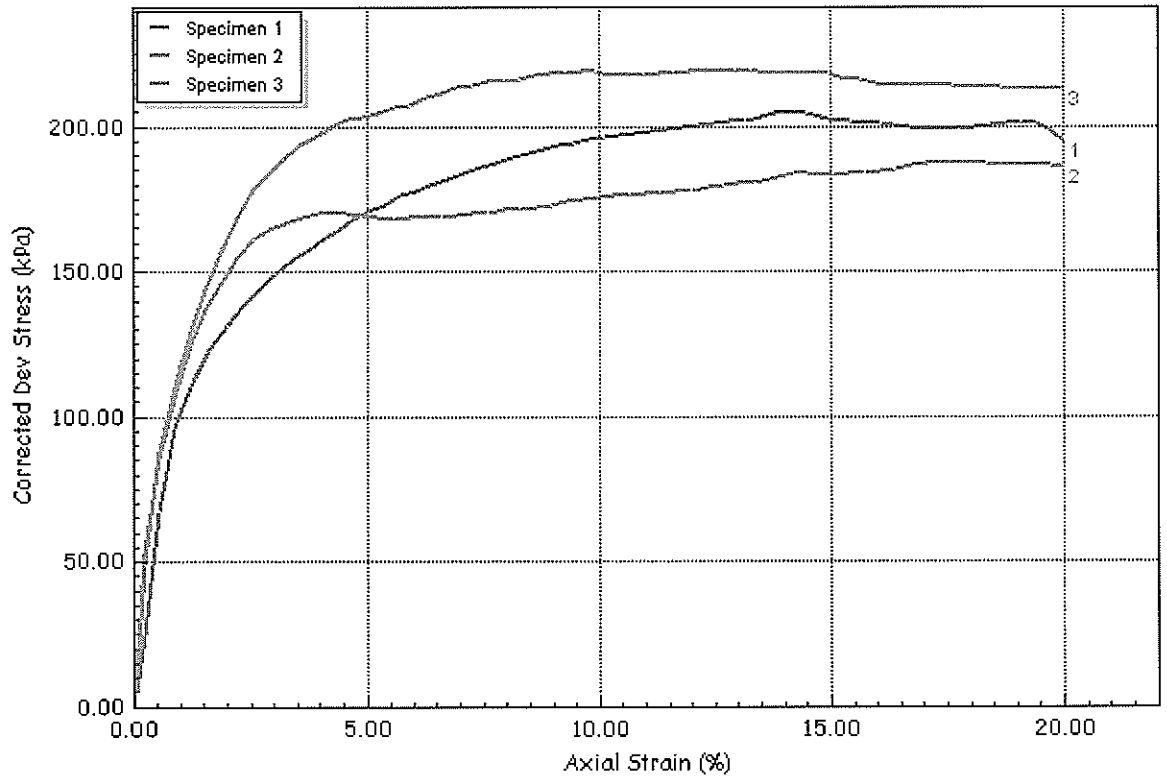
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	102.0
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU11-SungeiTengah-B11T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	10/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

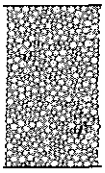
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Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

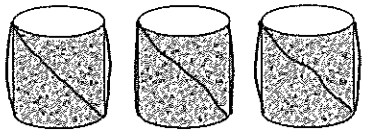
Sample Details						
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m			
	Description		Very stiff light greenish grey slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	166.6	162.0	163.2
	Bulk Density	ρ_0	(Mg/m3)	1.94	1.89	1.90
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	33	36	36
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.46	1.39	1.40
Initial Voids Ratio	e_0	.	0.82	0.91	0.90
Initial Degree of Saturation	S_0	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	390.39	288.09	363.85
MembraneCorrection	m_c	(kPa)	1.520	1.740	1.180
Strain At Max Stress	$\varepsilon_f\%$	(%)	13.86	16.83	9.75
Shear Strength	c_u	(kPa)	195.19	144.04	181.93
Final Moisture	$\omega_f\%$	(%)	33	36	36
Final Dry Density	ρ_{df}	(Mg/m3)	1.46	1.39	1.40
Final Voids Ratio	e_f	.	0.82	0.91	0.90
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	UU12-SungeiTengah-B11T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sie Kyong Kong

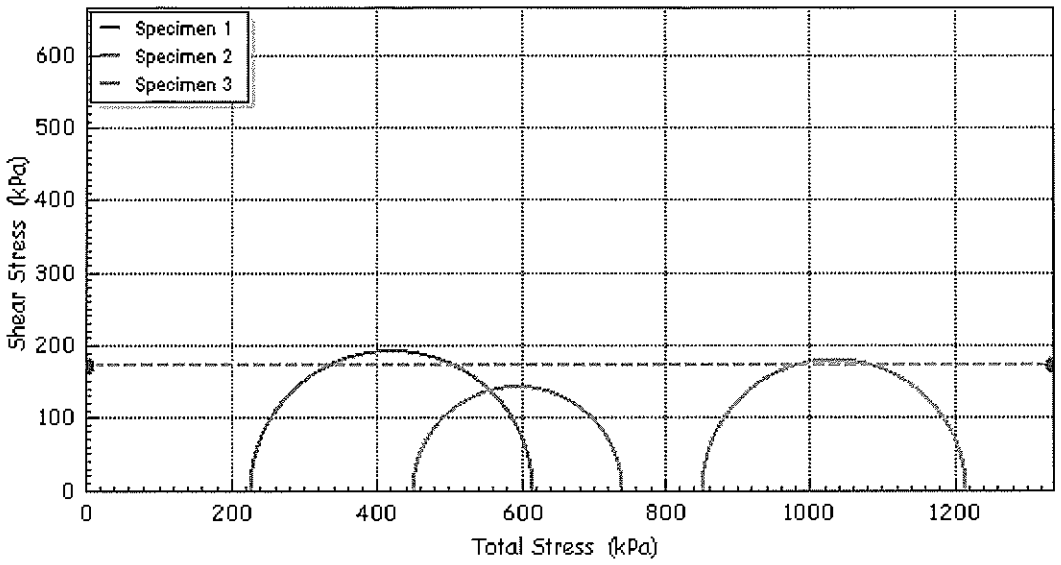
Ryobi Geotechnique International Pte Ltd

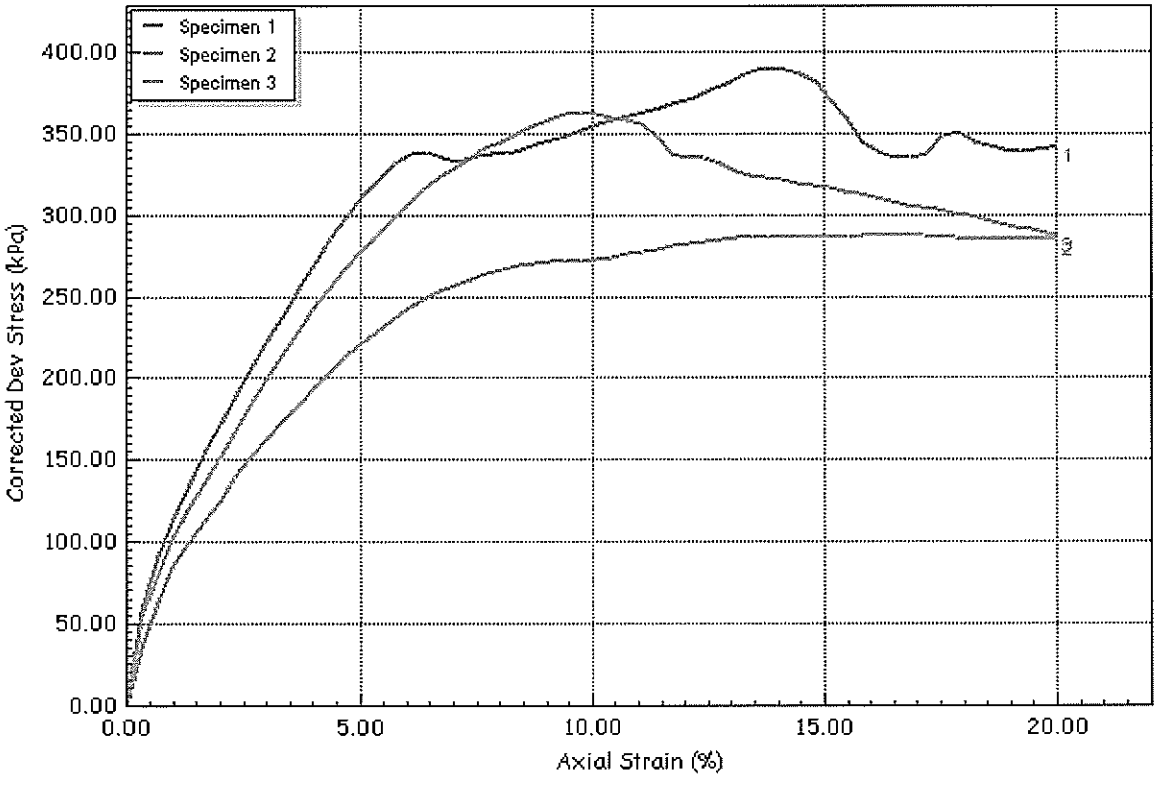
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	173.7
Friction Angle	ϕ	(deg)	0.0





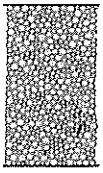
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU12-SungeiTengah-B11T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

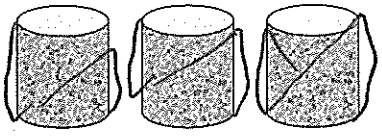
Sample Details					
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m		
	Description		Light greenish grey slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0 (mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0 (gr)	1052.2	1073.1	1074.3
	Initial Bulk Density	ρ_0 (Mg/m3)	1.95	1.99	1.99
	Particle Density	ρ_s (Mg/m3)	2.69	2.69	2.69

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	295	390	580
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	35	35	34
Initial Dry Density	ρ_{di}	(Mg/m3)	1.45	1.48	1.49
Initial Voids Ratio	e_i	.	0.856	0.817	0.809
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	35	34	33
Final Dry Density	ρ_{df}	(Mg/m3)	1.50	1.54	1.57
Final Voids Ratio	e_f	.	0.792	0.751	0.708
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	4.14	13.87	7.53
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	109.8	218.2	345.1
Minor Stress At Failure	σ_3'	(kPa)	48.5	106.0	176.0
Major Stress At Failure	σ_1'	(kPa)	158.3	324.2	521.1
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	3.265	3.059	2.961

Notes

-



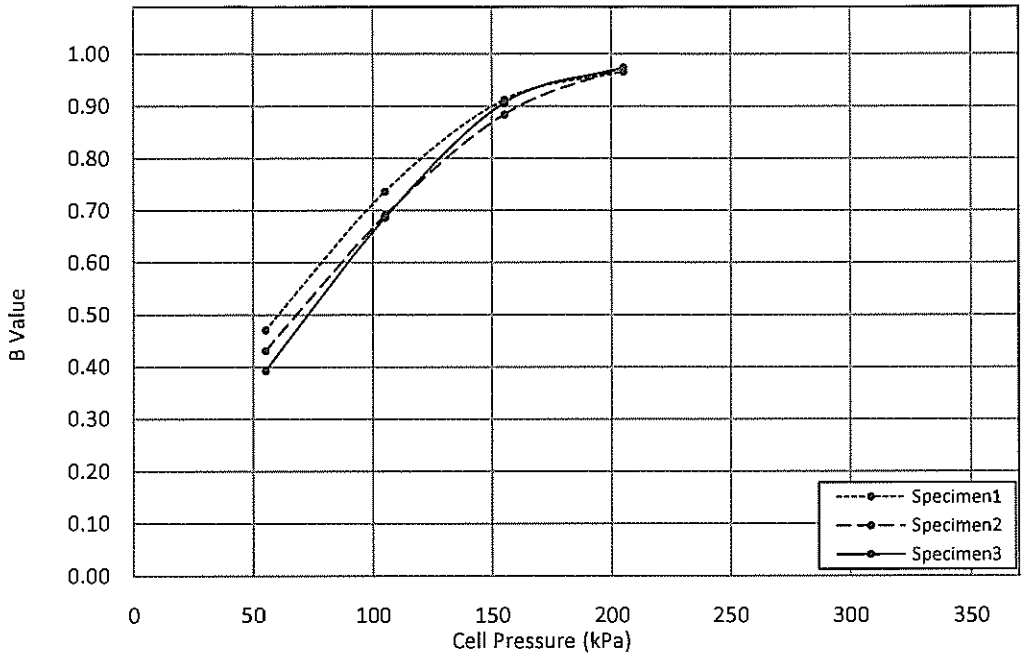
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU6-SungeiTengahWA7-B11T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator Kai	Checked Min Win Htut	Approved Sio Keong Kong	

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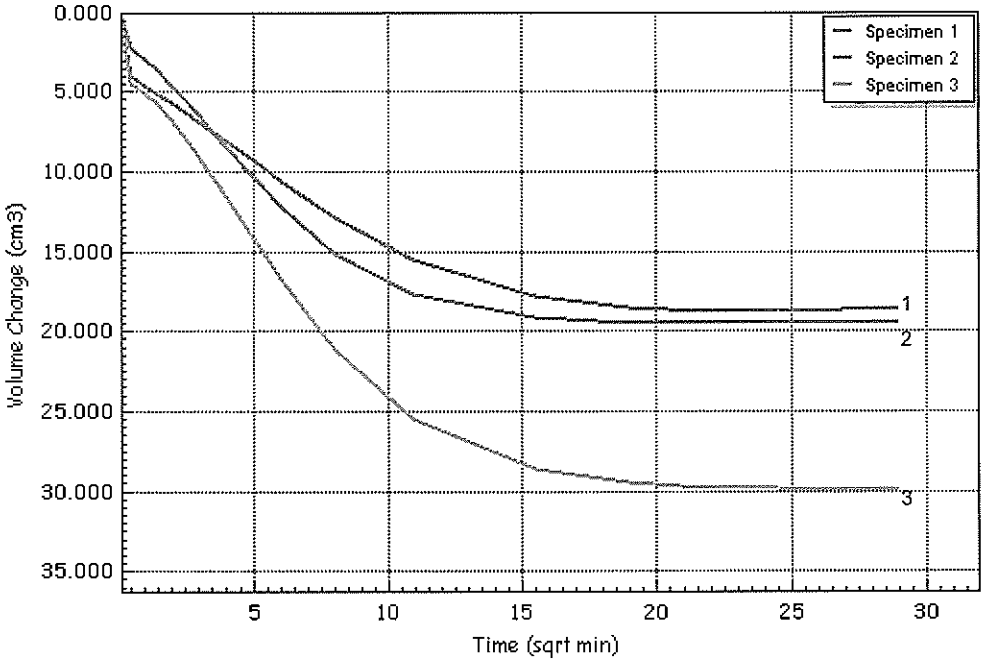
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



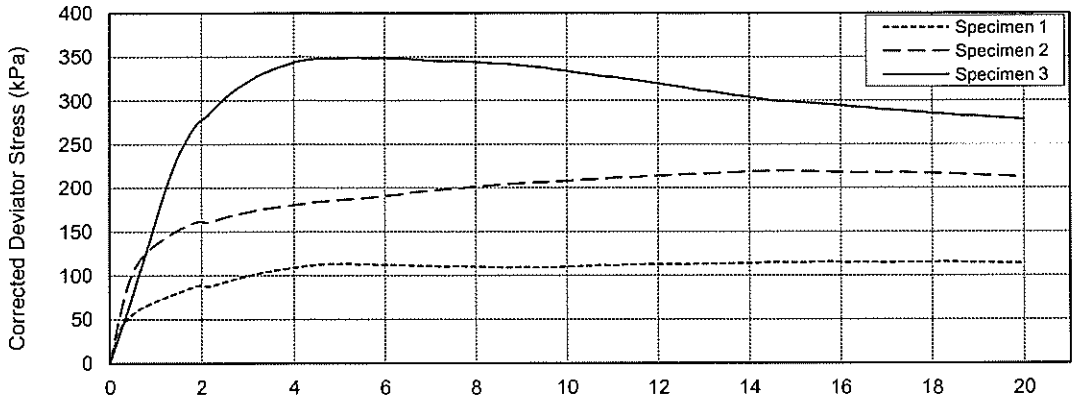
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU6-SungeiTengahWA7-B11T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator	Kar	Checked	Min Win Htut
		Approved	Sio Keong Kong

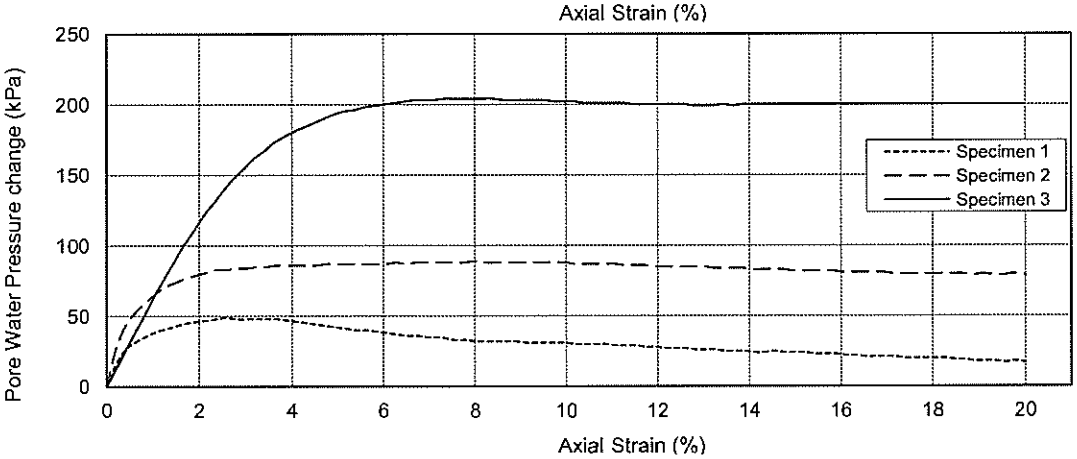
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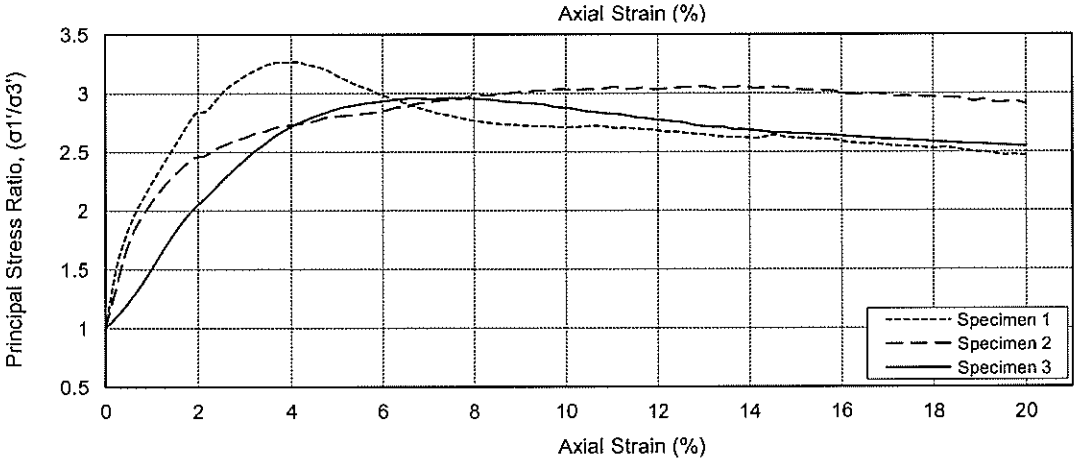
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	247	284	404
A Value at Max. Stress Ratio	0.428	0.385	0.591

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU6-SungeiTengahWA7-B11T3
Database	:\SQLEXPRESS\Ryobi-2017	Test Date	7/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator	Kai	Checked	Min Win Htut
		Approved	Sio Keong Kong

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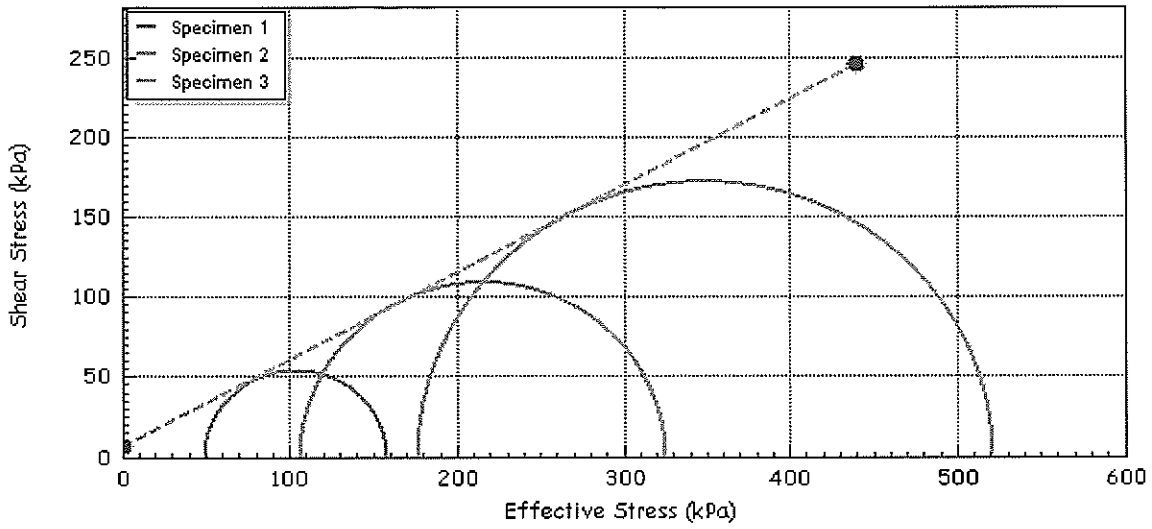
Ryobi Geotechnique International Pte Ltd

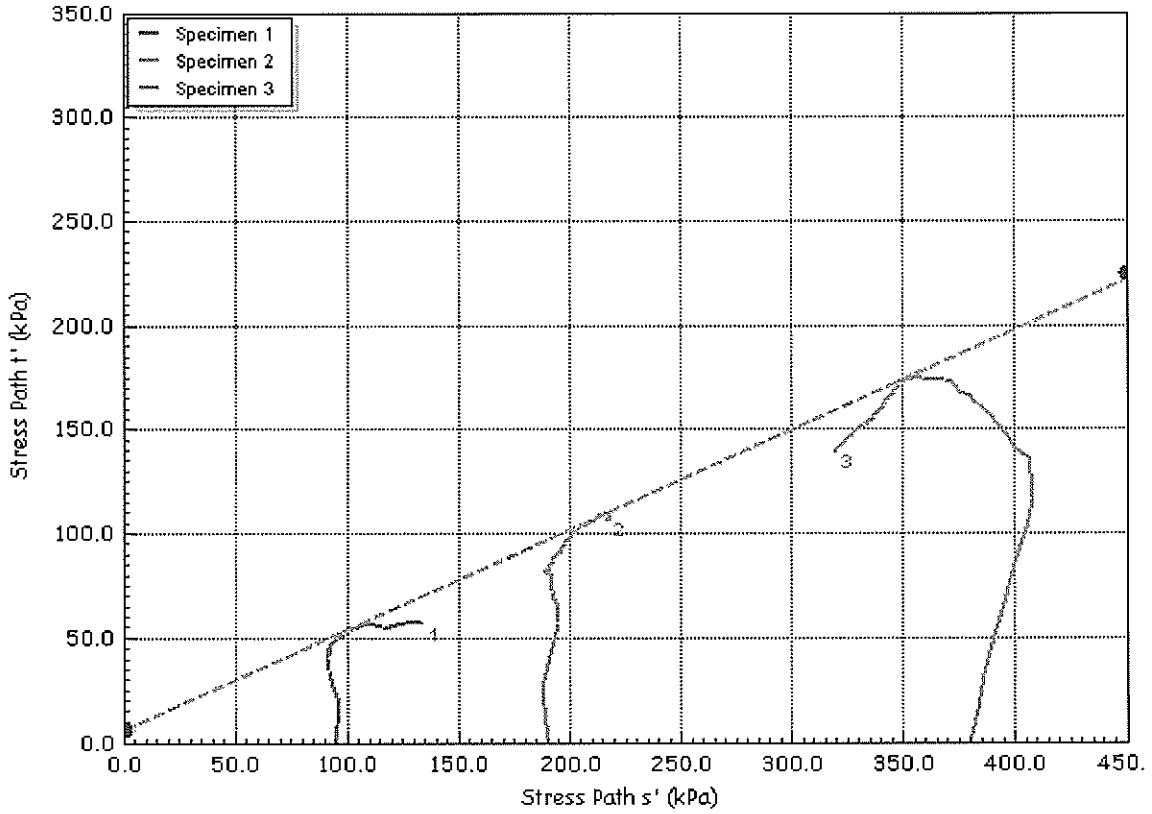
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	6.9	Stress Path Intercept	t_0'	(kPa)	6.1
Effective Friction Angle	ϕ'	(deg)	28.7	Stress Path Inclination	θ	(deg)	25.6





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU6-SungeiTengahWA7-B11T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	7/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH11
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator Kai	Checked Min Win Htut	Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1813957**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 04-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 05-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 10-Sep-2018
No. of samples received	: 7	No. of samples analysed	: 7

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Accreditation Category	Position
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH3A SPT12 (25.00-25.45m) - Fine to coarse Grained Sandy SILT	BH5 SPT9 (18.00-18.45m) - Sandy SILT	BH5A SPT7 (14.90-15.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-001**	**SG1813957-002**	**SG1813957-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.0	7.1	7.5
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.4	1.0	0.2
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH7 SPT8 (16.00-16.45m) - Sandy SILT	BH9 SPT10 (20.90-21.35m) - Sandy SILT	BH10 SPT12 (24.90-25.35m) - Fine to coarse Grained Sandy SILT
				Sampling date/time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1813957-004**	**SG1813957-005**	**SG1813957-006**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.4	5.1	6.2
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	0.4	0.3
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

Sub-Matrix: **SOIL**

				Client sample ID	BH11 SPT8 (16.00-16.45m) - Sandy SILT	---	---
				Sampling date/time	04-Sep-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1813957-007**	-------	-------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		6.2	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	----	----
Organic Matter	BS1377	0.1	% DW		<0.1	----	----
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814071**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 06-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 06-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 12-Sep-2018
No. of samples received	: 5	No. of samples analysed	: 5

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: WATER				Client sample ID	BH3A	BH5A	BH 9
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814071-001**	**SG1814071-002**	**SG1814071-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		8.5	8.6	9.0
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	0.04
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.06	0.05	0.04
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Sub-Matrix: WATER				Client sample ID	BH10	BH11	----
				Sampling date/time	06-Sep-2018 00:00	06-Sep-2018 00:00	----
Compound	*Method*	*LOR*	*Unit*		**SG1814071-004**	**SG1814071-005**	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		9.0	8.7	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	0.02	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.04	0.05	----
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	----

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH12						
SAMPLE NO :			SPT3	TW1	SPT4	SPT5	SPT6	TW2	SPT9
SAMPLE DEPTH :		m	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90	18.00-18.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	51.8	-	-	52.7	40.6	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.73	-	1.80	-	1.85	1.92
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	(A)	2.65	2.65	-	-	2.68	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	0	0	2	0	0	57
	SAND	%	-	2	1		2	2	
	SILT	%	-	63	99	68	98	79	28
	CLAY	%	-	35		30		19	15
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	83.5	93.1	-	-	-	66.0	-
	PLASTIC LIMIT	%	51.3	54.9	-	-	-	36.5	-
	PLASTICITY INDEX		32	38	-	-	-	29	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	**UU**	-	-	-	**UU**	-
	TOTAL COHESION	kPa	-	43.7	-	-	-	75.8	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 19/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH12						
SAMPLE NO :			TW3	SPT10	TW4	SPT12	SPT13	SPT14	SPT15
SAMPLE DEPTH :		m	20.00-20.90	20.90-21.35	24.00-24.90	24.90-35.35	26.00-26.45	28.00-28.45	30.00-30.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	23.4	-	24.2	32.1	-	-	19.9
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	2.02	-	1.98	-	-	1.99	-
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	2.67	-	2.65	-	2.67	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	19	-	24	-	1	52	-
	SAND	%	38	-	32	-	27		-
	SILT	%	25	-	36	-	72	44	-
	CLAY	%	18	-	8	-		4	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	61.3	-	76.2	49.5	-	-	(B)
	PLASTIC LIMIT	%	37.7	-	37.8	32.6	-	-	
	PLASTICITY INDEX		24	-	38	17	-	-	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		**UU**	-	**UU**	-	-	-	-
	TOTAL COHESION	kPa	128.7	-	152.2	-	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	7.1	-	-	-	-	-
	Chloride Content	%	-	<0.01	-	-	-	-	-
	Organic Content	%	-	0.3	-	-	-	-	-
	Sulphate Content	%	-	<0.01	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 :

(B) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 19/09/2012

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Ryobi Geotechnique International Pte Ltd

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ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH12						
SAMPLE NO :			W1						
SAMPLE DEPTH :		m	Water Sample						
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%							
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-						
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	-						
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-						
	SAND	%	-						
	SILT	%	-						
	CLAY	%	-						
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-						
	PLASTIC LIMIT	%	-						
	PLASTICITY INDEX		-						
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-						
	TOTAL COHESION	kPa	-						
	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	-						
CHEMICAL CONTENTS ANALYSIS	pH Value		-						
	Chloride Content	%	-						
	Organic Content	%	-						
	Sulphate Content	%	-						
	pH Value		8.9						
	Chloride Content	g/L	0.02						
	Organic Content	% (w/v)	<0.10						
	Sulphate Content	g/L	0.05						

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 : 19/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH12	TW1	8.00-8.90	51.8	1.73	-	2.65
BH12	SPT4	8.90-9.35	-	-	-	2.65
BH12	SPT5	10.00-10.45	-	1.80	-	-
BH12	SPT6	12.00-12.45	52.7	-	-	-
BH12	TW2	14.00-14.90	40.6	1.85	-	2.68
BH12	SPT9	18.00-18.45	-	1.92	-	-
BH12	TW3	20.00-20.90	23.4	2.02	-	2.67
BH12	TW4	24.00-24.90	24.2	1.98	-	2.65
BH12	SPT12	24.90-25.35	32.1	-	-	-
BH12	SPT13	26.00-26.45	-	-	-	2.67
BH12	SPT14	28.00-28.45	-	1.99	-	-
BH12	SPT15	30.00-30.45	19.9	-	-	-

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)

TESTED BY: MOMJU
Date : 06.09.2018

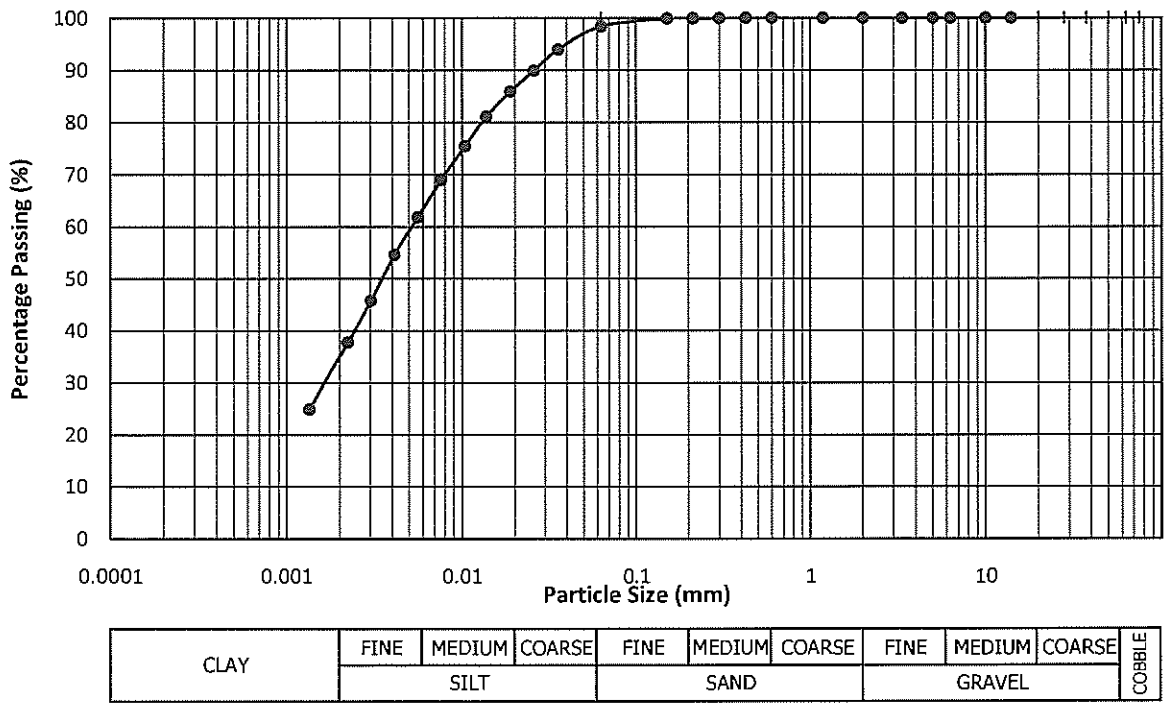
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 11.09.2018



SOIL DESCRIPTION : **Yellowish brown and red slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**2**	%
SILT	=	**63**	%
CLAY	=	**35**	%

% of Passing 0.425 mm Sieve : 100.0

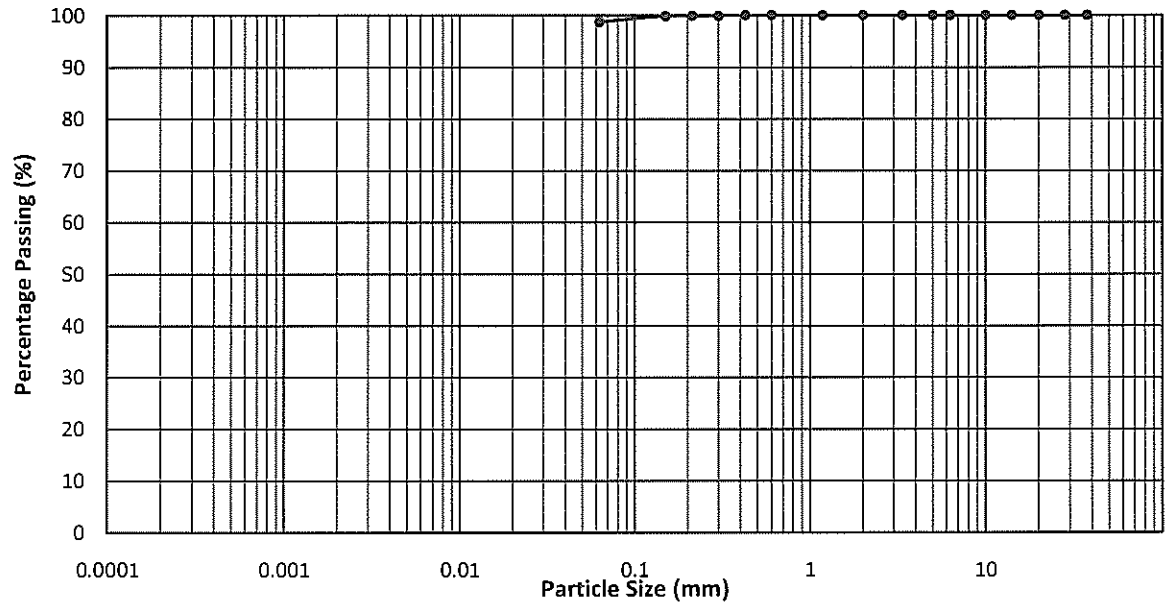
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2015-02273

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Yellowish brown and red slightly sandy SILT**

SIEVING TEST

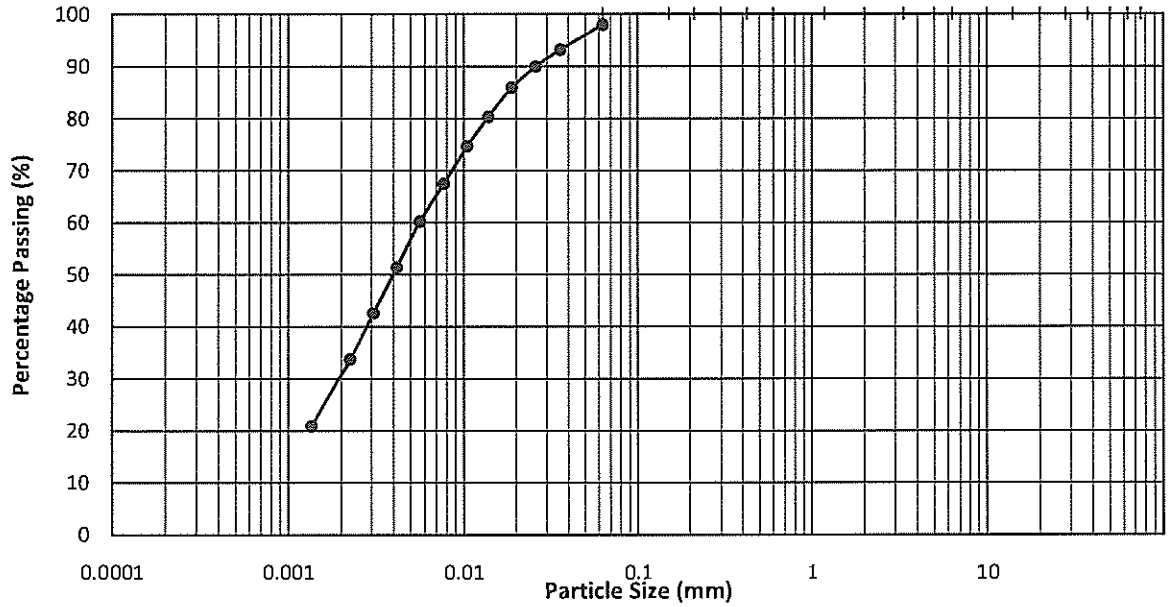
GRAVEL	=	**0**	%	
SAND	=	**1**	%	% of Passing 0.425 mm Sieve : 100.0
SILT + CLAY	=	**99**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Yellowish brown and red slightly sandy SILT**

HYDROMETER TEST

SAND	=	**2**	%
SILT	=	**68**	%
CLAY	=	**30**	%

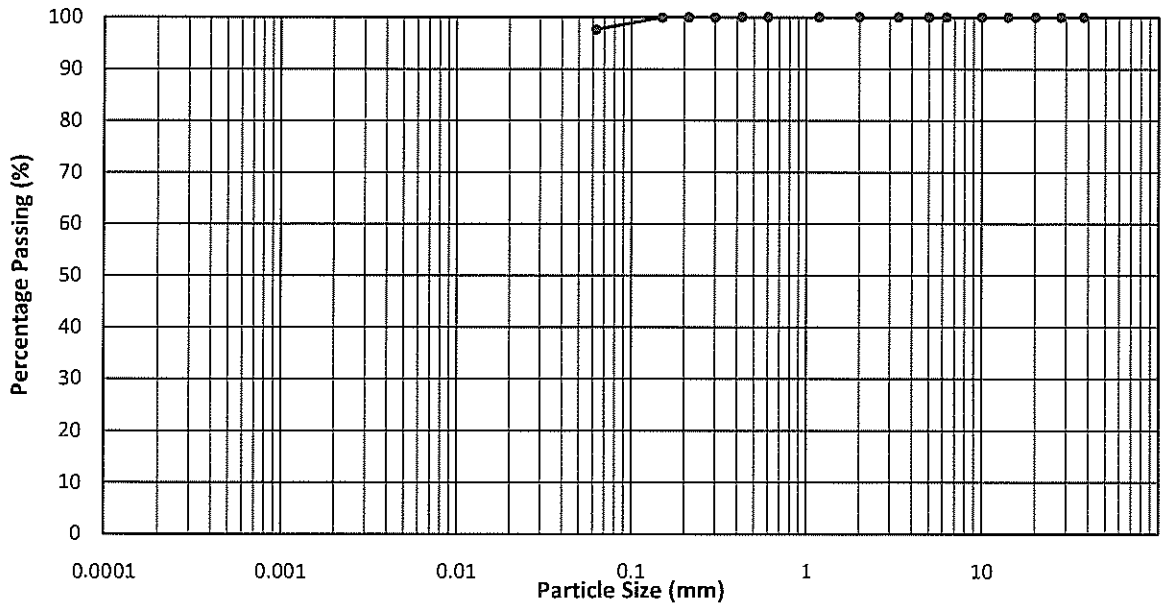
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Yellowish brown and red slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**2**	%
SILT + CLAY	=	**98**	%

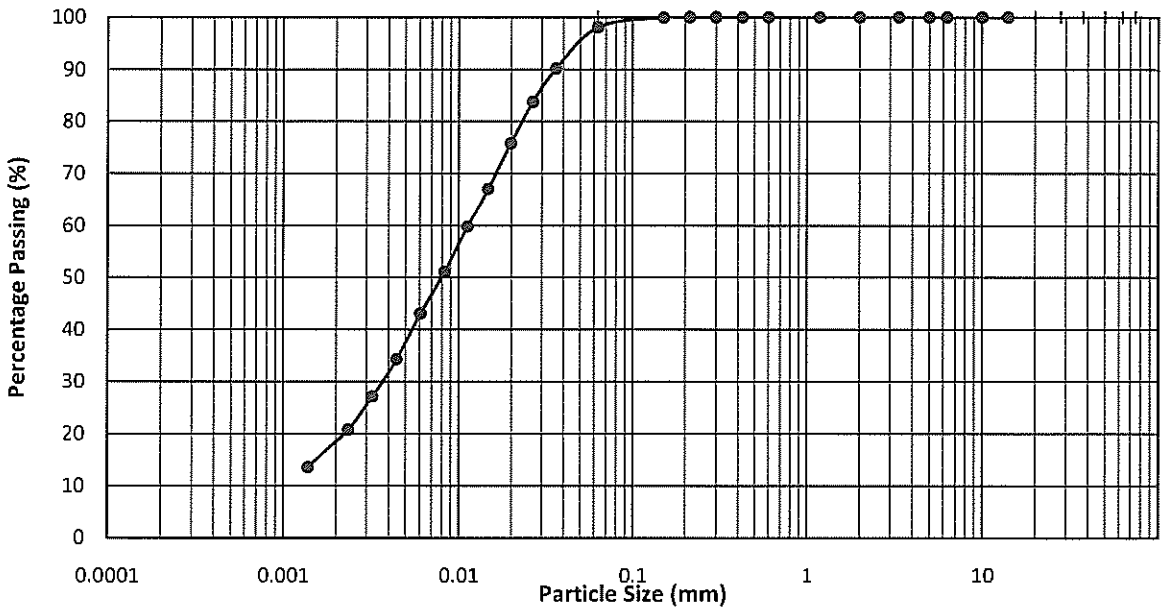
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Light grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**2**	%
SILT	=	**79**	%
CLAY	=	**19**	%

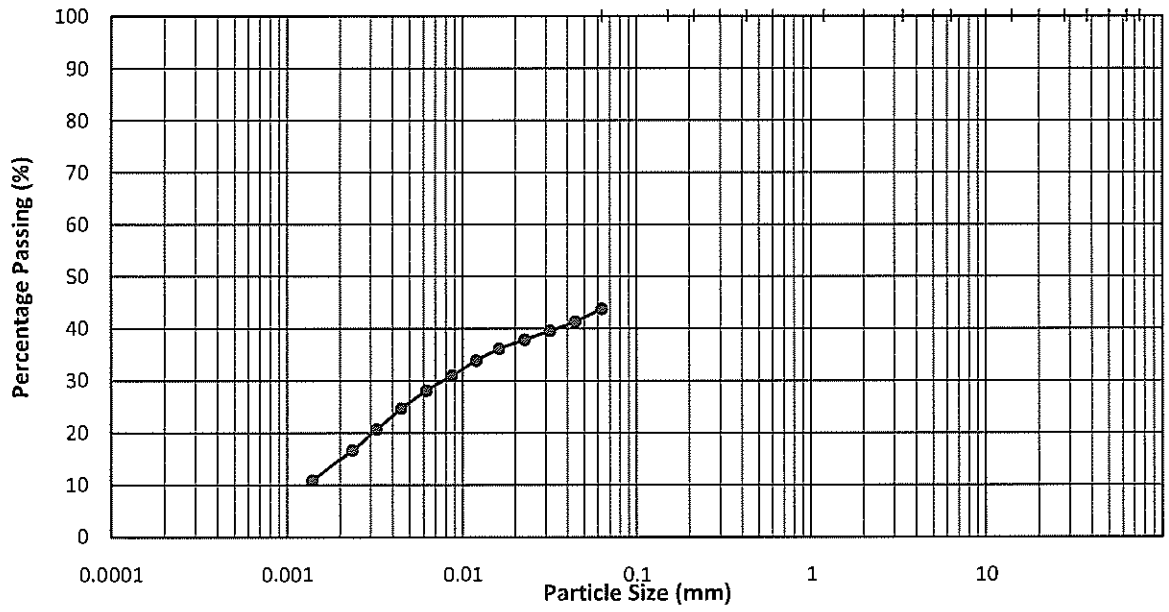
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**57**	%
SILT	=	**28**	%
CLAY	=	**15**	%

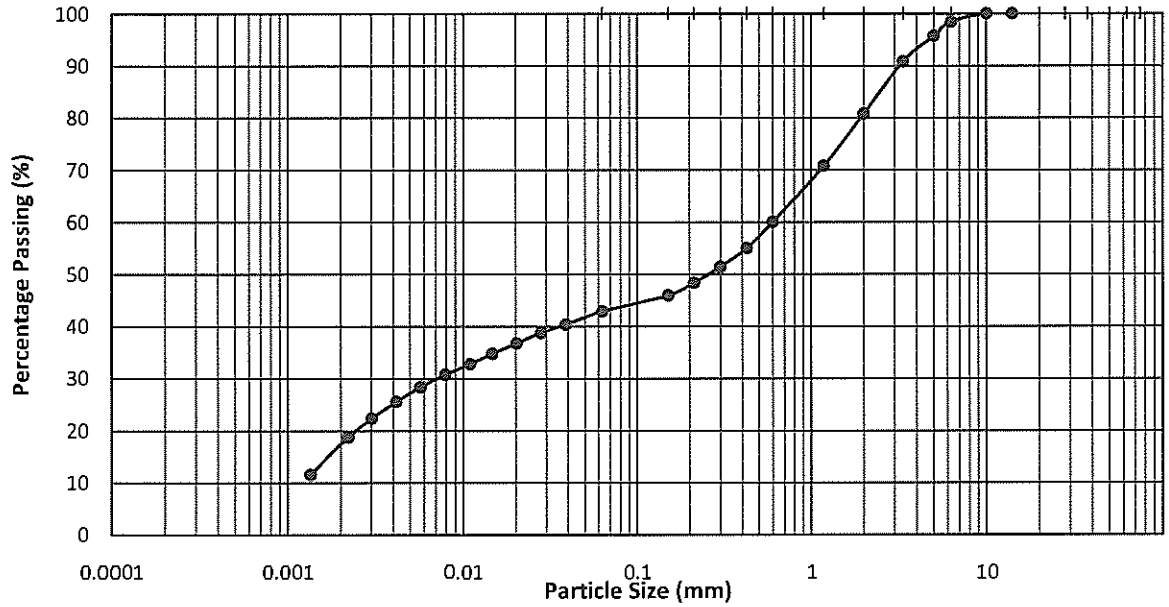
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 11.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and whitish grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**19**	%
SAND	=	**38**	%
SILT	=	**25**	%
CLAY	=	**18**	%

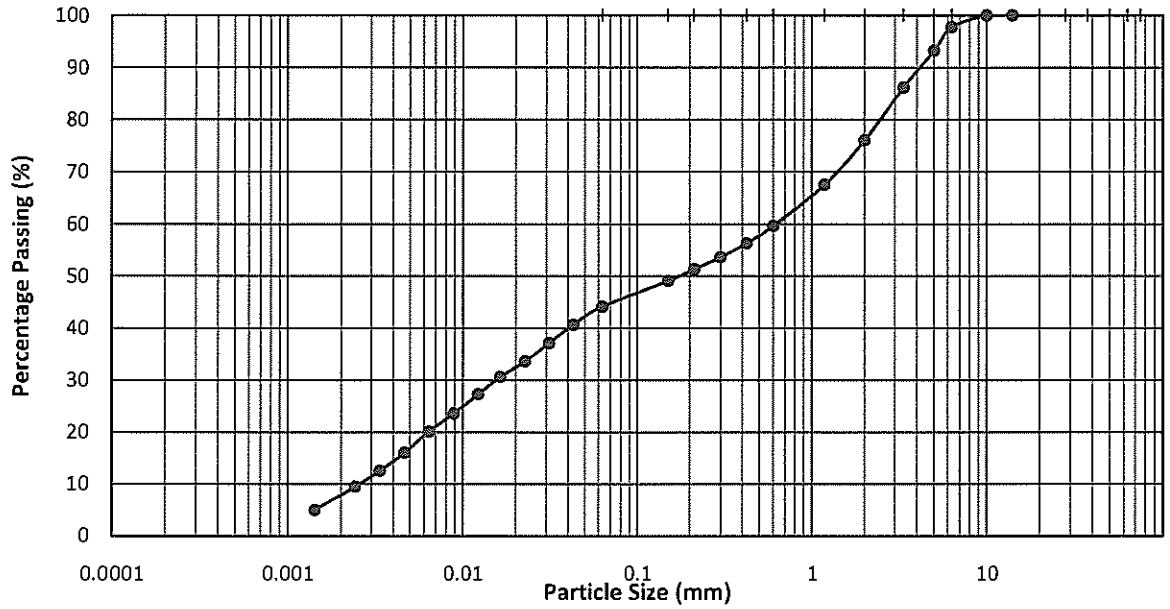
% of Passing 0.425 mm Sieve : 55.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Light greenish grey and whitish grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**24**	%
SAND	=	**32**	%
SILT	=	**36**	%
CLAY	=	**8**	%

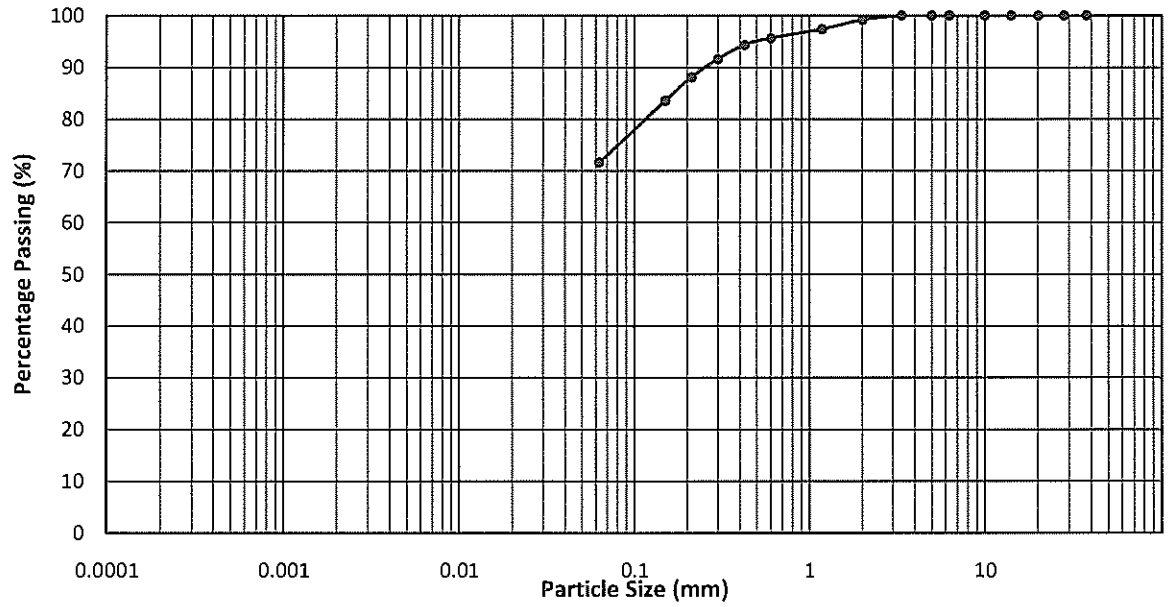
% of Passing 0.425 mm Sieve : 56.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT13
DEPTH (m)	: 26.00-26.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**1**	%
SAND	=	**27**	%
SILT + CLAY	=	**72**	%

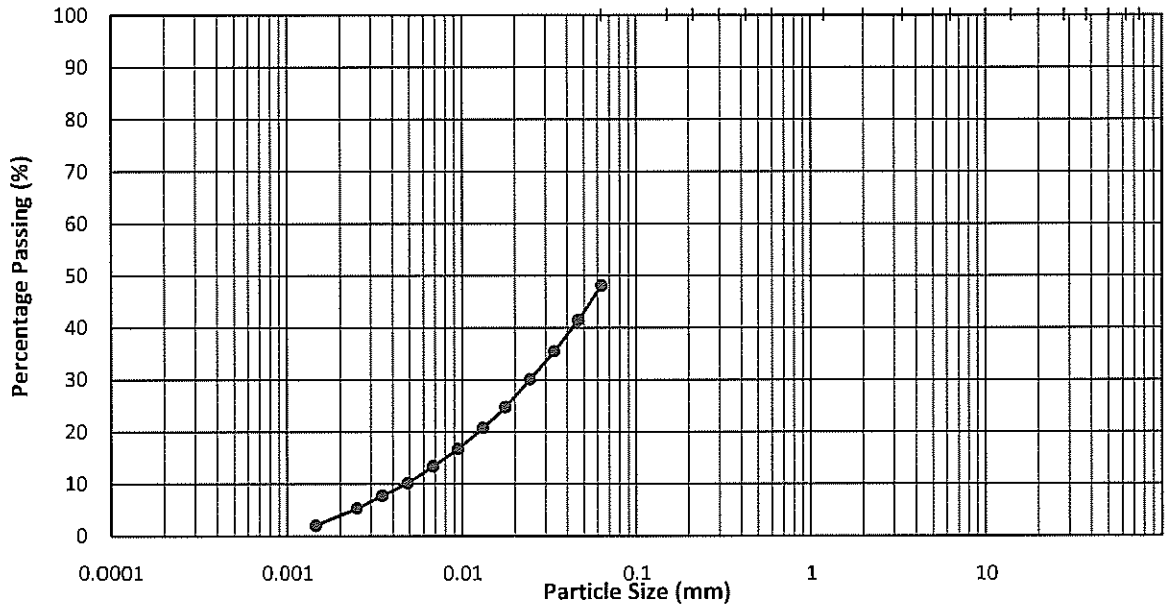
% of Passing 0.425 mm Sieve : 94.3

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT14
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Greenish grey sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**52**	%
SILT	=	**44**	%
CLAY	=	**4**	%

% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory : Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

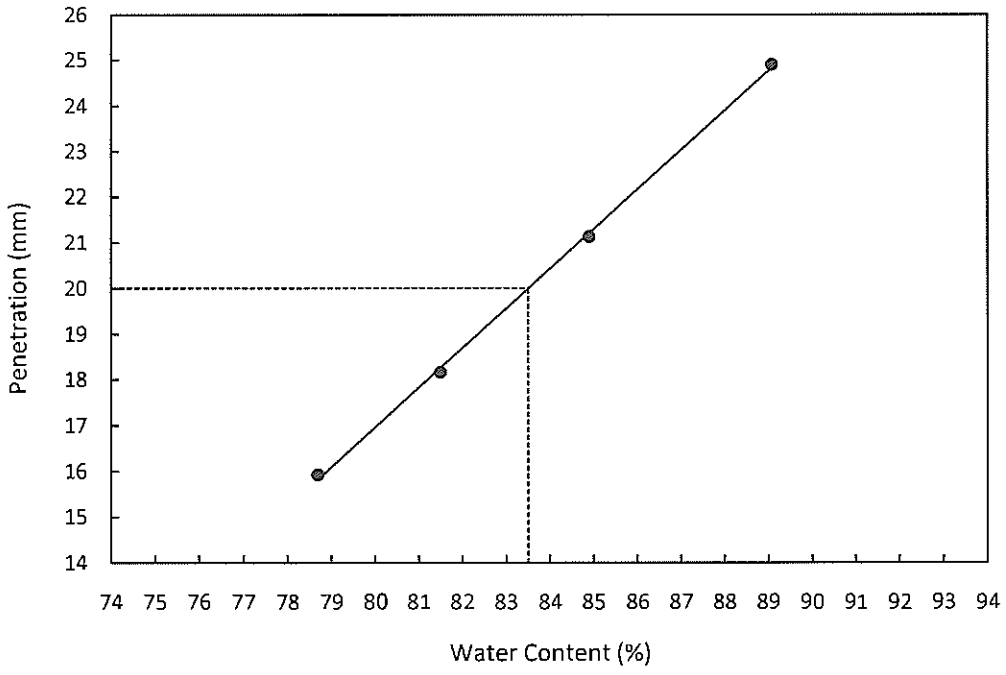
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT3
DEPTH(M)	: 6.00-6.45m
SOIL DESCRIPTION	: Yellowish brown and red slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 14.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.07	20.23	20.09	20.50	20.25	20.14
DRY WEIGHT + CUP	(g)	14.94	15.34	14.92	14.88	16.15	16.30
CUP WEIGHT	(g)	8.42	9.34	8.83	8.57	8.18	8.79
WATER CONTENT	(%)	78.7	81.5	84.9	89.1	51.4	51.1
PENETRATION	(mm)	15.9	18.2	21.1	24.9	-	-

LIQUID LIMIT	(%)	**83.5**
PLASTIC LIMIT	(%)	**51.3**
PLASTICITY INDEX		**32**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

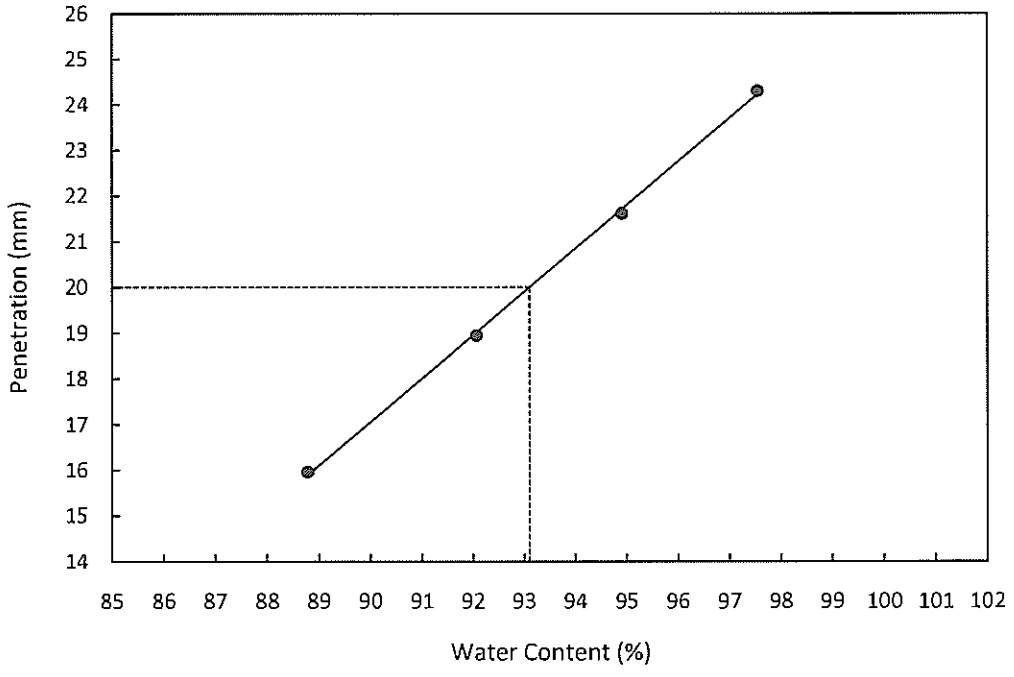
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Yellowish brown and red slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.16	20.35	20.23	20.24	20.40	20.18
DRY WEIGHT + CUP	(g)	14.54	15.02	14.83	14.69	16.16	16.30
CUP WEIGHT	(g)	8.21	9.23	9.14	9.00	8.46	9.21
WATER CONTENT	(%)	88.8	92.1	94.9	97.5	55.1	54.7
PENETRATION	(mm)	16.0	19.0	21.6	24.3	-	-

LIQUID LIMIT	(%)	**93.1**
PLASTIC LIMIT	(%)	**54.9**
PLASTICITY INDEX		**38**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19-9-2018

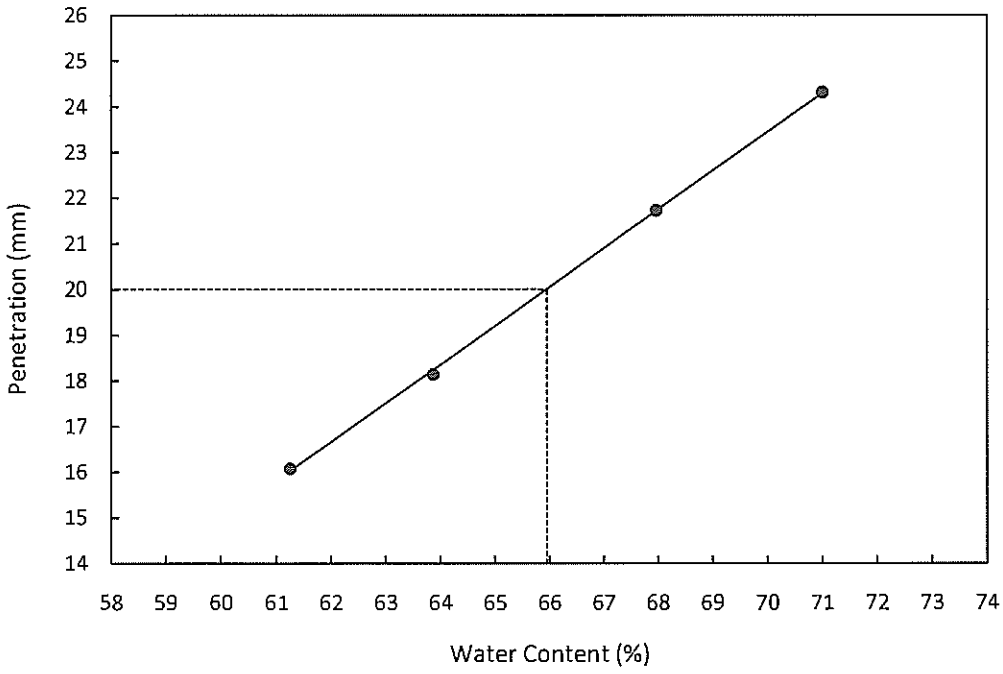
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light grey slightly sandy SILT
SAMPLE CONDITION	: Natutal
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.20	20.59	20.32	20.30	20.30	20.09
DRY WEIGHT + CUP	(g)	15.60	16.19	15.42	15.06	17.28	16.89
CUP WEIGHT	(g)	8.09	9.30	8.21	7.68	9.03	8.11
WATER CONTENT	(%)	61.3	63.9	68.0	71.0	36.6	36.4
PENETRATION	(mm)	16.1	18.1	21.7	24.3	-	-

LIQUID LIMIT	(%)	**66.0**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**36.5**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**29**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

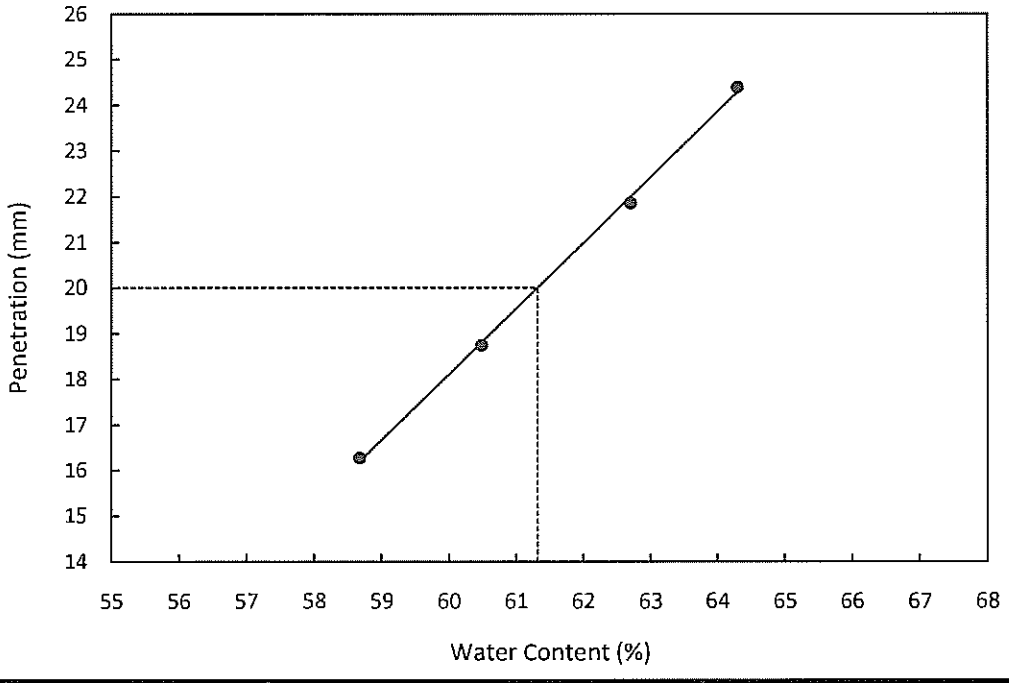
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Light greenish grey and whitish grey slightly gravelly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 47
TEST DATE	: 09.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.41	20.12	20.24	20.43	20.49	20.77
DRY WEIGHT + CUP	(g)	15.81	15.65	15.60	15.91	17.22	17.59
CUP WEIGHT	(g)	7.97	8.26	8.20	8.88	8.54	9.16
WATER CONTENT	(%)	58.7	60.5	62.7	64.3	37.7	37.7
PENETRATION	(mm)	16.3	18.7	21.9	24.4	-	-

LIQUID LIMIT	(%)	**61.3**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**37.7**	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 :	DATE :
	(Authorised Signatory - Min Win Htut)	19-9-2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2015-00723-B

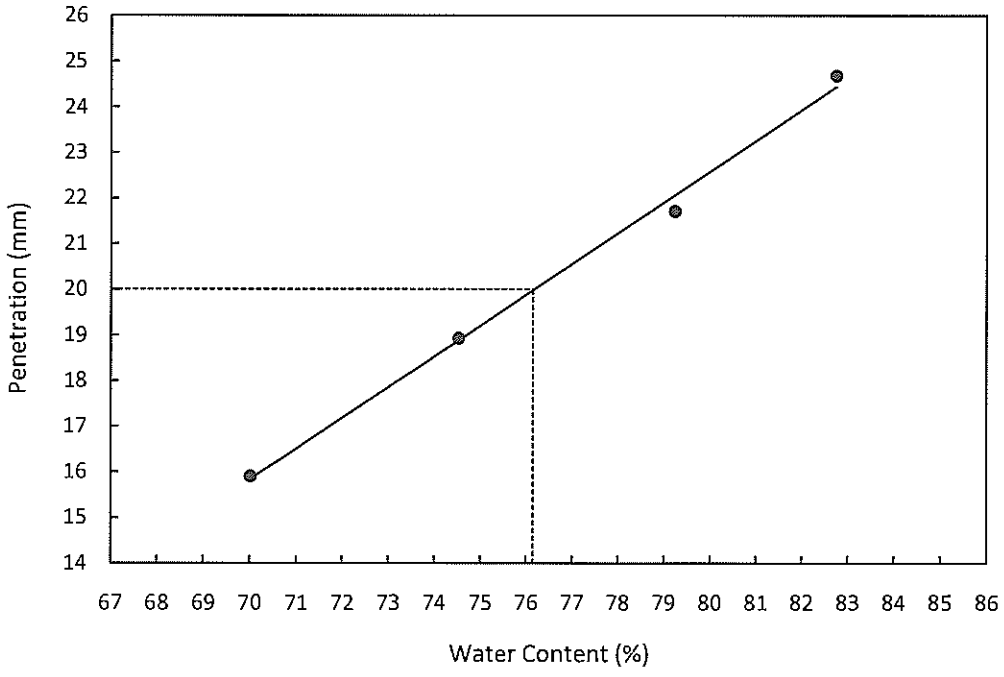
ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Light greenish grey and whitish grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 57
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.17	20.17	20.48	20.65	20.09	20.37
DRY WEIGHT + CUP	(g)	15.71	15.14	15.06	15.47	17.02	17.25
CUP WEIGHT	(g)	9.34	8.39	8.22	9.21	8.91	8.98
WATER CONTENT	(%)	70.0	74.5	79.2	82.7	37.9	37.7
PENETRATION	(mm)	15.9	18.9	21.7	24.7	-	-

LIQUID LIMIT	(%)	**76.2**	NOTE:	I : INTERMEDIATE PLASTICITY
PLASTIC LIMIT	(%)	**37.8**	M : SILT	H : HIGH PLASTICITY
PLASTICITY INDEX		**38**	C : CLAY	V : VERY HIGH PLASTICITY
			L : LOW PLASTICITY	E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

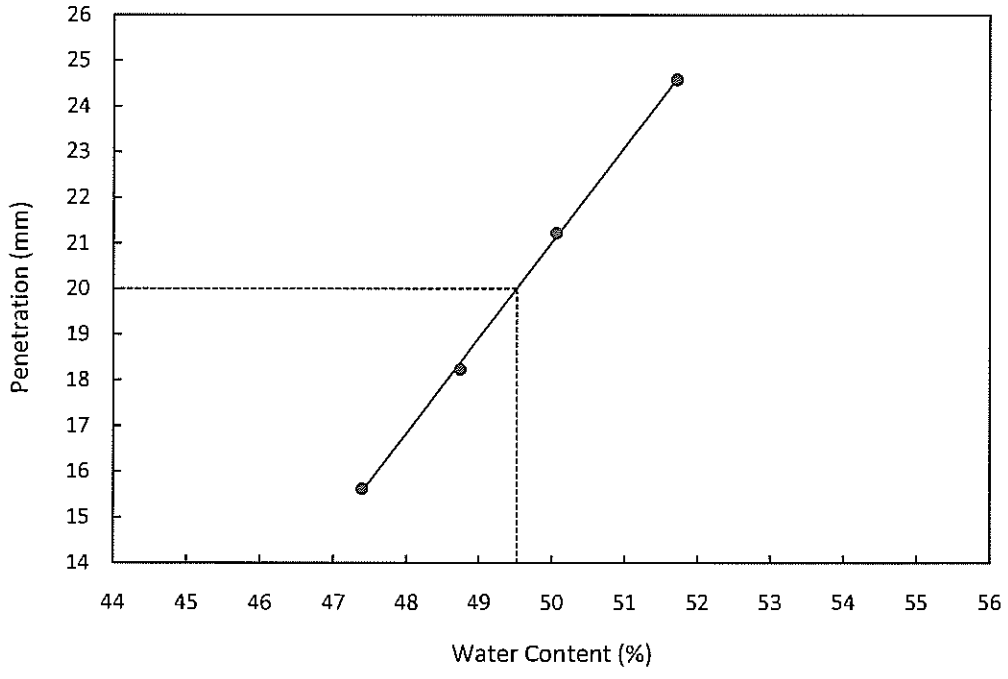
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH12
SAMPLE NO.	: SPT12
DEPTH(M)	: 24.90-25.35m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 14.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.46	20.14	20.69	20.33	20.34	20.44
DRY WEIGHT + CUP	(g)	16.83	16.29	16.49	16.55	17.57	17.45
CUP WEIGHT	(g)	9.17	8.39	8.10	9.24	9.09	8.25
WATER CONTENT	(%)	47.4	48.7	50.1	51.7	32.7	32.5
PENETRATION	(mm)	15.6	18.2	21.2	24.6	-	-

LIQUID LIMIT	(%)	**49.5**
PLASTIC LIMIT	(%)	**32.6**
PLASTICITY INDEX		**17**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

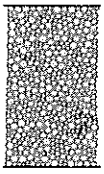


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

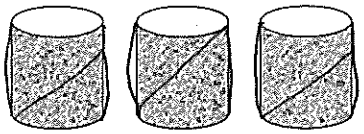
Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Firm yellowish brown and red slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	76.5	76.5	76.5
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	148.3	146.9	148.7
	Bulk Density	ρ_0	(Mg/m3)	1.71	1.69	1.71
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	52	54	53
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.13	1.10	1.12
Initial Voids Ratio	e_0	.	1.35	1.40	1.37
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	75.29	77.72	109.00
MembraneCorrection	m_c	(kPa)	1.380	1.990	1.090
Strain At Max Stress	$\varepsilon_f\%$	(%)	12.17	20.00	8.86
Shear Strength	c_u	(kPa)	37.64	38.86	54.50
Final Moisture	$\omega_f\%$	(%)	52	54	53
Final Dry Density	ρ_{df}	(Mg/m3)	1.13	1.10	1.12
Final Voids Ratio	e_f	.	1.35	1.40	1.37
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-SungeiTengah-B12T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH12
Jobfile	Sungei Tengah Rd-WA7			Sample	TW1
Client	AVA			Depth	8.00-8.90m
Operator		Checked	Min Win Htut	Approved	Sio Koong Kong

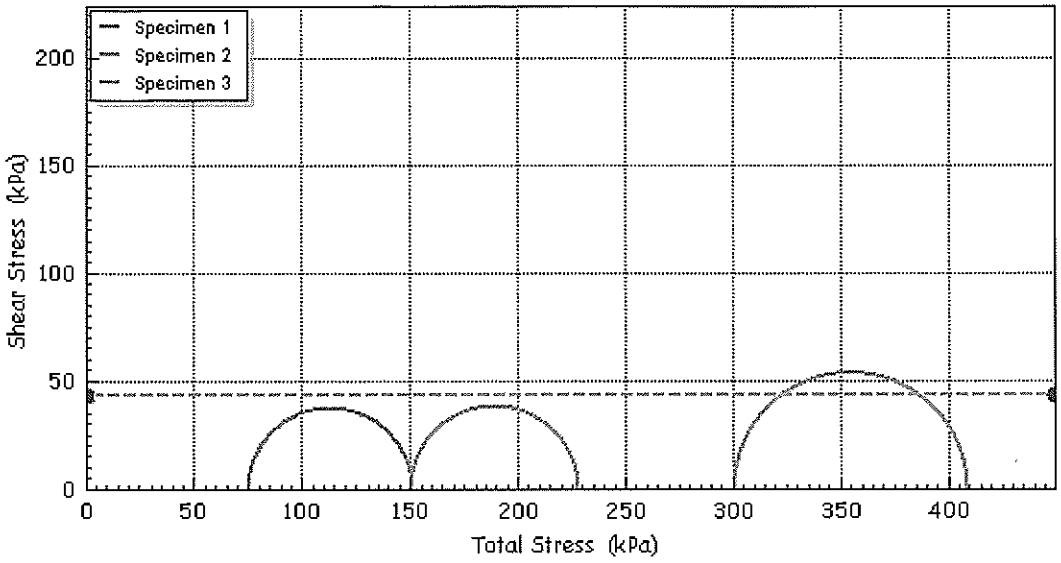
Ryobi Geotechnique International Pte Ltd

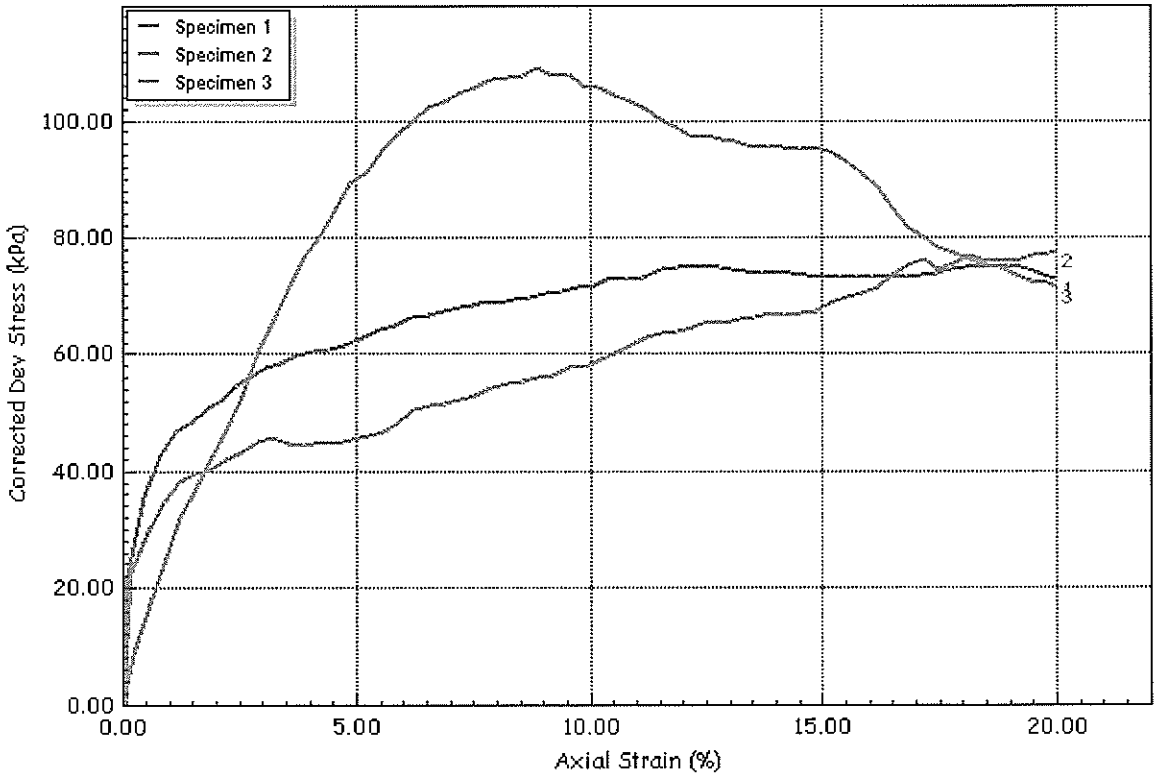
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	43.7
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-SungeiTengah-B12T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH12
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

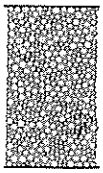
ACCREDITED LABORATORY SAC-SINGLAS

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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

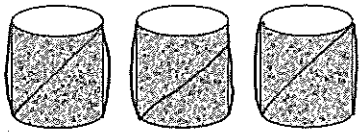
Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Stiff light grey slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	155.5	160.7	159.9
	Bulk Density	ρ_0	(Mg/m3)	1.81	1.87	1.86
	Particle Density	ρ_s	(Mg/m3)	2.68	2.68	2.68

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	130	260	520
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	48	41	41
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.22	1.33	1.32
Initial Voids Ratio	e_0	.	1.19	1.01	1.03
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	163.82	134.51	156.25
MembraneCorrection	m_c	(kPa)	0.770	0.890	1.500
Strain At Max Stress	$\varepsilon_f\%$	(%)	5.82	6.93	13.61
Shear Strength	c_u	(kPa)	81.91	67.25	78.13
Final Moisture	$\omega_f\%$	(%)	48	41	41
Final Dry Density	ρ_{df}	(Mg/m3)	1.22	1.33	1.32
Final Voids Ratio	e_f	.	1.19	1.01	1.03
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)

Ryobi G / ACCREDITED LABORATORY SAC-SINGLAS	Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-SungeiTengah-B12T2	
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018	
	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH12	
	Jobfile	Sungei Tengah Rd-WA7	Sample	TW2	
	Client	AVA	Depth	14.00-14.90m	
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

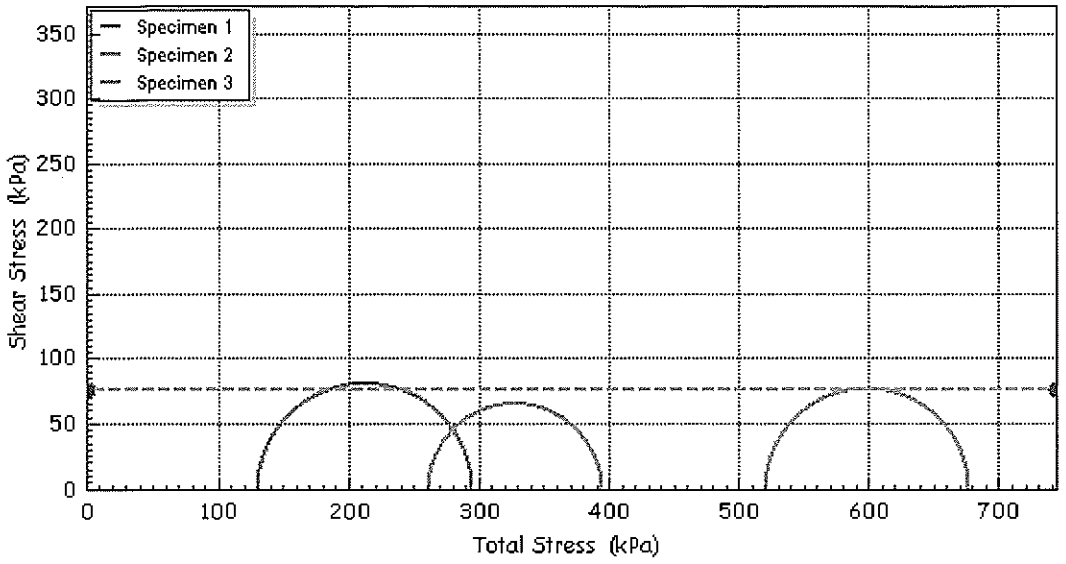
Ryobi Geotechnique International Pte Ltd

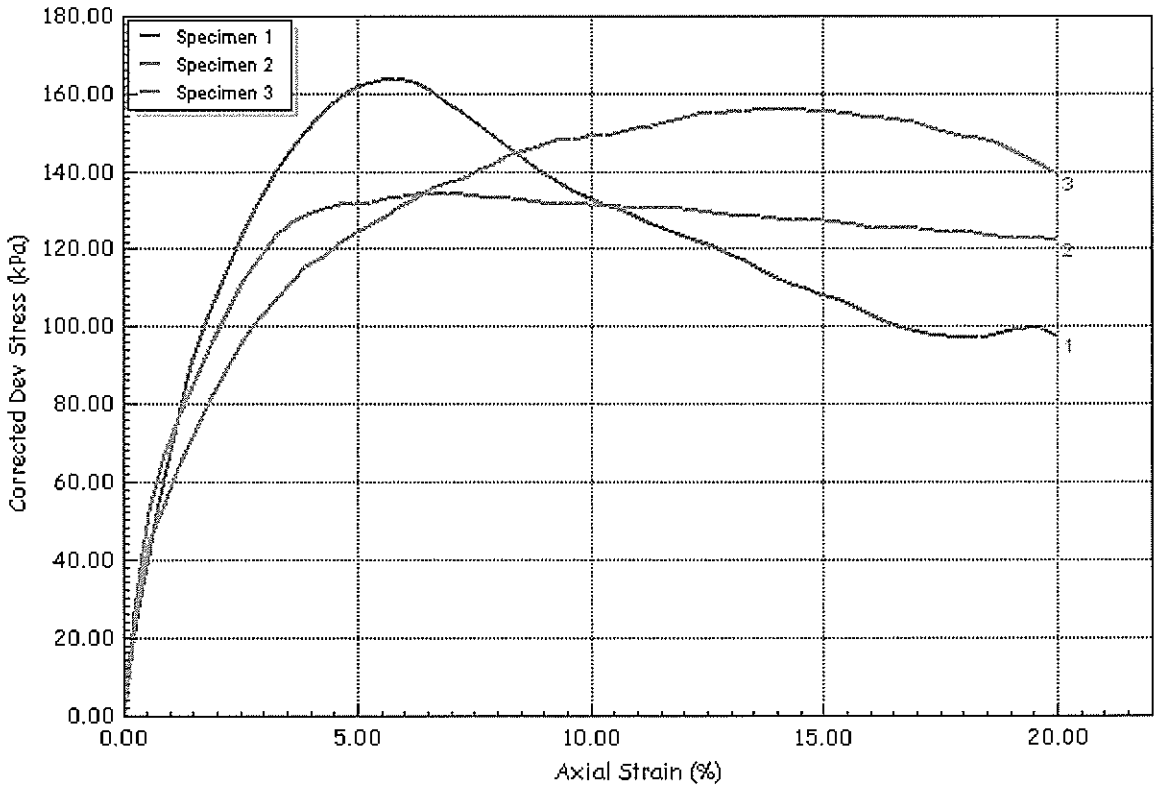
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	75.8
Friction Angle	ϕ	(deg)	0.0





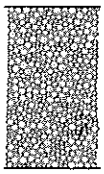
Ryobi G	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU2-SungeiTengah-B12T2
	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	11/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH12
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW2
	Client	AVA		Depth	14.00-14.90m
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

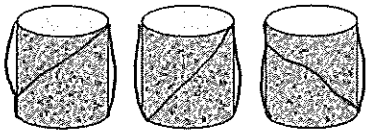
Sample Details						
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m			
	Description		Stiff light greenish grey and whitish grey slightly gravelly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	173.5	173.9	172.0
	Bulk Density	ρ_0	(Mg/m3)	2.02	2.03	2.01
	Particle Density	ρ_s	(Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	185	370	740
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	23	22	23
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.65	1.66	1.63
Initial Voids Ratio	e_0	.	0.62	0.61	0.63
Initial Degree of Saturation	S_o	(%)	98	97	96

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	230.24	270.69	271.16
MembraneCorrection	m_c	(kPa)	1.860	1.940	1.410
Strain At Max Stress	$\varepsilon_f\%$	(%)	18.25	19.42	12.38
Shear Strength	c_u	(kPa)	115.12	135.34	135.58
Final Moisture	$\omega_f\%$	(%)	23	22	23
Final Dry Density	ρ_{df}	(Mg/m3)	1.65	1.66	1.63
Final Voids Ratio	e_f	.	0.62	0.61	0.63
Final Degree of Saturation	S_f	(%)	97.7	97.4	95.9

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	UU3-SungeiTengah-B12T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH12
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

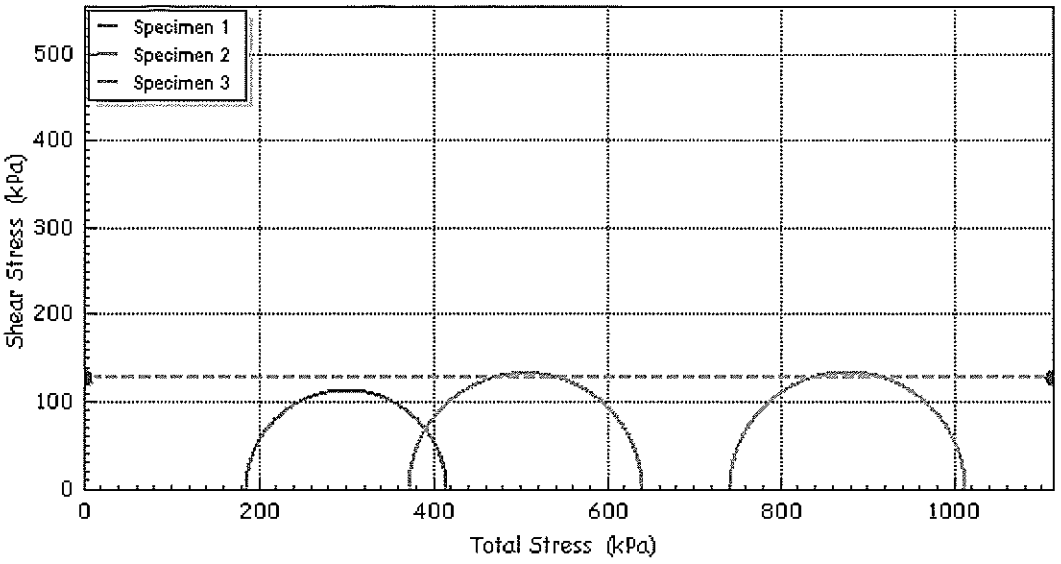
Ryobi Geotechnique International Pte Ltd

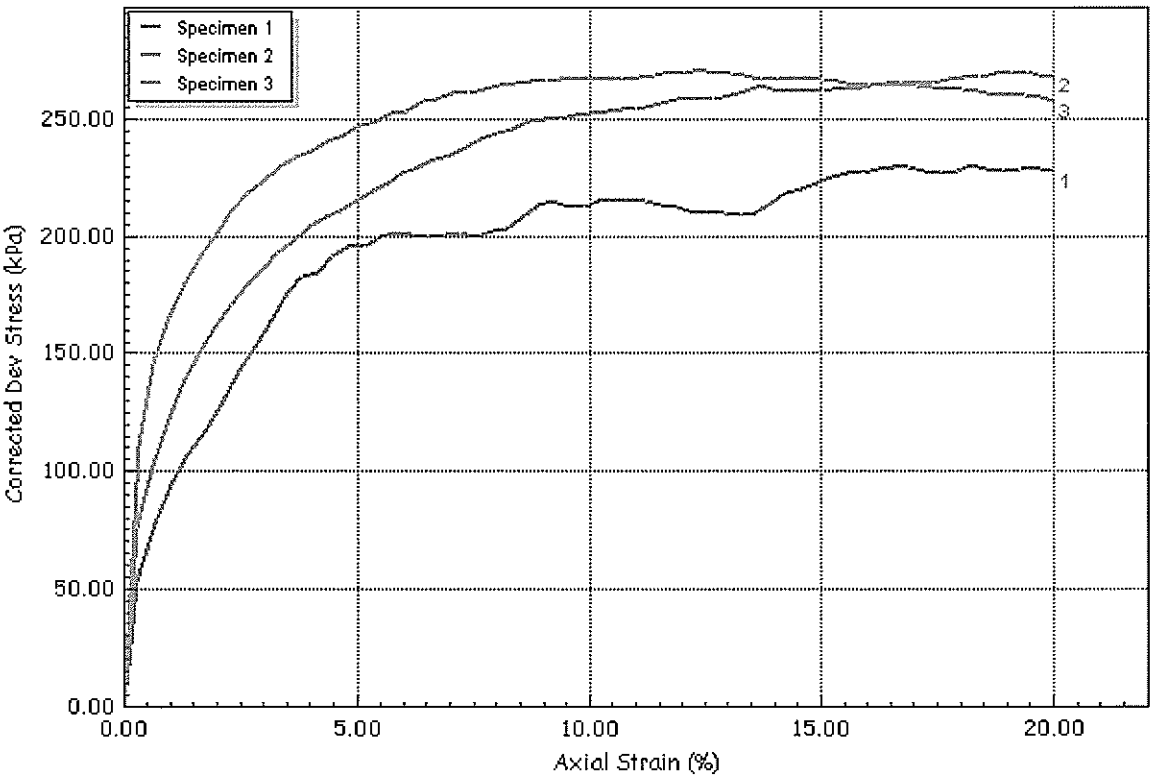
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	128.7
Friction Angle	ϕ	(deg)	0.0





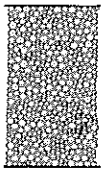
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU3-SungeiTengah-B12T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH12
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

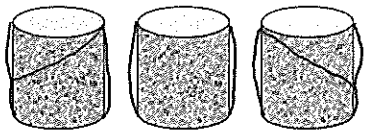
Sample Details						
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m			
	Description		Vert stiff light greenish grey and whitish grey slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	168.8	168.7	170.7
	Bulk Density	ρ_0	(Mg/m3)	1.97	1.97	1.99
	Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	24	27	26
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.59	1.55	1.58
Initial Voids Ratio	e_0	.	0.67	0.71	0.67
Initial Degree of Saturation	S_o	(%)	95	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	284.33	292.66	336.41
MembraneCorrection	m_c	(kPa)	1.990	1.940	1.350
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	19.47	11.76
Shear Strength	c_u	(kPa)	142.17	146.33	168.20
Final Moisture	$\omega_f\%$	(%)	24	27	26
Final Dry Density	ρ_{df}	(Mg/m3)	1.59	1.55	1.58
Final Voids Ratio	e_f	.	0.67	0.71	0.67
Final Degree of Saturation	S_f	(%)	95.3	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	UU4-SungeiTengah-B12T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	11/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH12
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

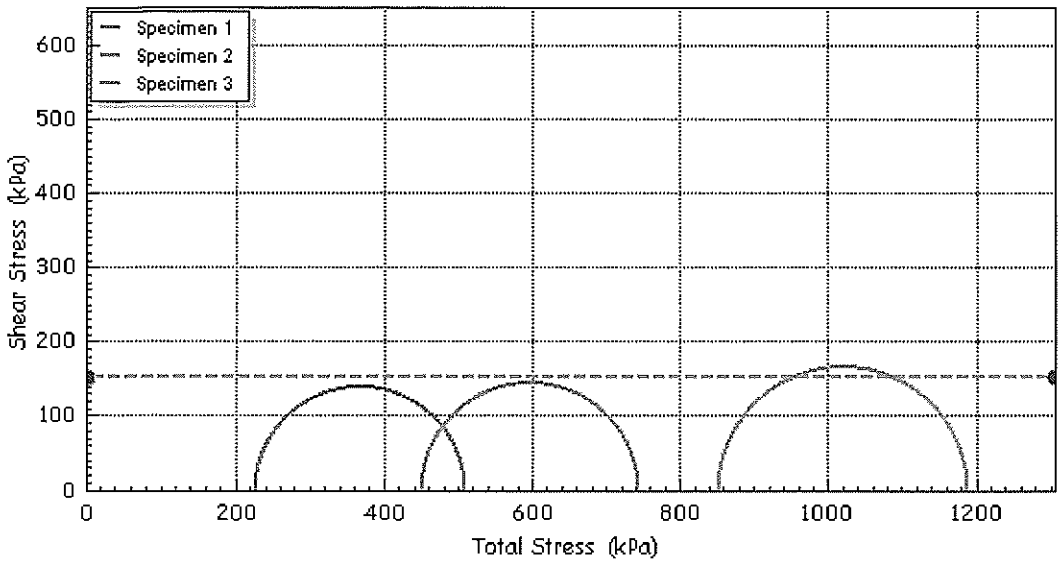
Ryobi Geotechnique International Pte Ltd

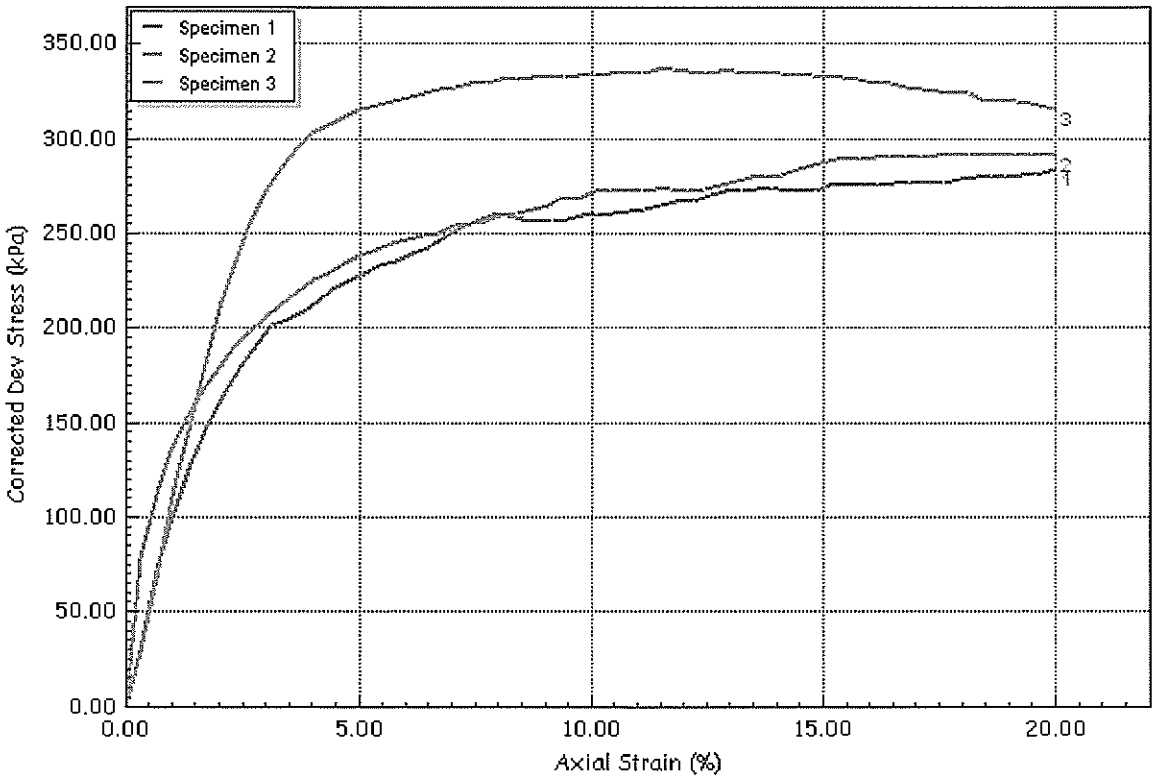
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	152.2
Friction Angle	ϕ	(deg)	0.0





Ryobi G	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU4-SungeiTengah-B12T4
	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	11/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH12
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW4
	Client	AVA		Depth	24.00-24.90m
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814179**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 10-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH12 SPT10 (20.90-21.35m) -Sandy SILT	BH13 SPT6 (12.00-12.45m) - Sandy SILT	BH14 SPT13 (26.00-26.45m) - Sandy SILT
				Sampling date/time	07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814179-001**	**SG1814179-002**	**SG1814179-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.1	4.1	6.3
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	<0.1	<0.1
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814180**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 07-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

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* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: WATER		Client sample ID		BH12	BH13	BH14
		Sampling date/time		07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*	SG1814180-001	SG1814180-002	SG1814180-003
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	8.9	8.5	8.9
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.02	0.02	0.02
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.05	0.07	0.06
ORGANICS-General						
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH13						
SAMPLE NO :			SPT2	TW1	SPT4	SPT5	SPT6	TW2	SPT7
SAMPLE DEPTH :		m	4.00-4.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90	14.90-15.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	35.2	-	34.1	-	47.2	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.89	-	-	-	1.75	1.74
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	2.72	2.67	2.66	-	-	2.66	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	1	33	-	-	0	0
	SAND	%	-	25		-	-	24	29
	SILT	%	-	54	48	-	-	45	71
	CLAY	%	-	20	19	-	-	31	
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	68.5	-	(A)	-	80.3	-
	PLASTIC LIMIT	%		42.2	-		-	46.1	-
	PLASTICITY INDEX			26	-		-	34	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	**UU**	-	-	-	**UU**	-
	TOTAL COHESION	kPa	-	105.3	-	-	-	106.5	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	4.1	-	-
	Chloride Content	%	-	-	-	-	<0.01	-	-
	Organic Content	%	-	-	-	-	<0.1	-	-
	Sulphate Content	%	-	-	-	-	<0.01	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 19/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 72950S Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH13						
SAMPLE NO :			SPT9	TW3	SPT10	SPT11	TW4	SPT12	SPT14
SAMPLE DEPTH :		m	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45	24.00-24.90	24.90-25.35	28.00-28.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	40.5	25.4	-	49.3	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.87	1.86	-	-	1.77	1.63	-
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	-	2.68	-	-	2.65	-	2.65
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	23	0	-	27	0	-	27
	SAND	%		15	-	24	3	-	32
	SILT	%	59	62	-	49	68	-	41
	CLAY	%	18	23	-		29	-	
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	66.3	-	-	88.6	86.1	-
	PLASTIC LIMIT	%	-	39.3	-	-	47.7	45.9	-
	PLASTICITY INDEX		-	27	-	-	41	40	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	-	**UU**	-	-
	TOTAL COHESION	kPa	-	-	-	-	119.9	-	-
	TEST TYPE		-	**$CU^{70\phi}$**	-	-	-	-	-
	EFFECTIVE COHESION	kPa	-	9.8	-	-	-	-	-
	EFFECTIVE PHI ANGLE	degree	-	33.6	-	-	-	-	-
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 : 19/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH13						
SAMPLE NO :			SPT15	W1					
SAMPLE DEPTH :		m	30.00-30.45	Water Sample					
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	19.7						
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-					
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	-	-					
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	63	-					
	SAND	%		-					
	SILT	%	27	-					
	CLAY	%	10	-					
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-					
	PLASTIC LIMIT	%	-	-					
	PLASTICITY INDEX		-	-					
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-					
	TOTAL COHESION	kPa	-	-					
	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	-	-					
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-					
	Chloride Content	%	-	-					
	Organic Content	%	-	-					
	Sulphate Content	%	-	-					
	pH Value		-	8.5					
	Chloride Content	g/L	-	0.02					
	Organic Content	% (w/v)	-	<0.10					
	Sulphate Content	g/L	-	0.07					

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 : 19/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH13	SPT2	4.00-4.45	-	-	-	2.72
BH13	TW1	8.00-8.90	35.2	1.89	-	2.67
BH13	SPT4	8.90-9.35	-	-	-	2.66
BH13	SPT5	10.00-10.45	34.1	-	-	-
BH13	TW2	14.00-14.90	47.2	1.75	-	2.66
BH13	SPT7	14.90-15.35	-	1.74	-	-
BH13	SPT9	18.00-18.45	-	1.87	-	-
BH13	TW3	20.00-20.90	40.5	1.86	-	2.68
BH13	SPT10	20.90-21.35	25.4	-	-	-
BH13	TW4	24.00-24.90	49.3	1.77	-	2.65
BH13	SPT12	24.90-25.35	-	1.63	-	-
BH13	SPT14	28.00-28.45	-	-	-	2.65
BH13	SPT15	30.00-30.45	19.7	-	-	-

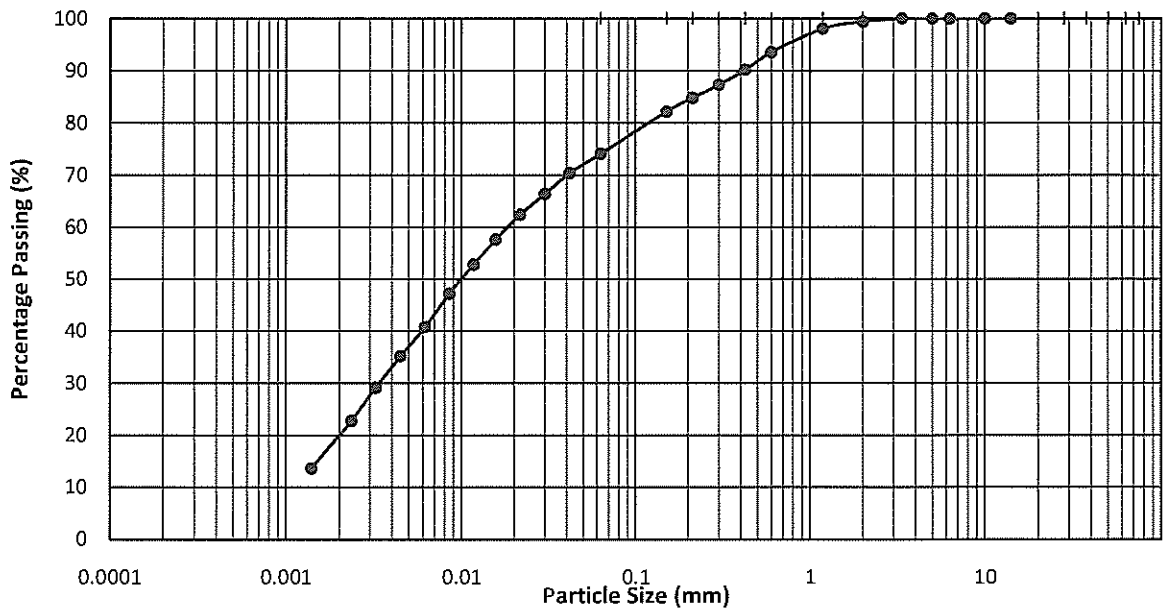
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: MONJU Date : 06.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 13.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**1**	%
SAND	=	**25**	%
SILT	=	**54**	%
CLAY	=	**20**	%

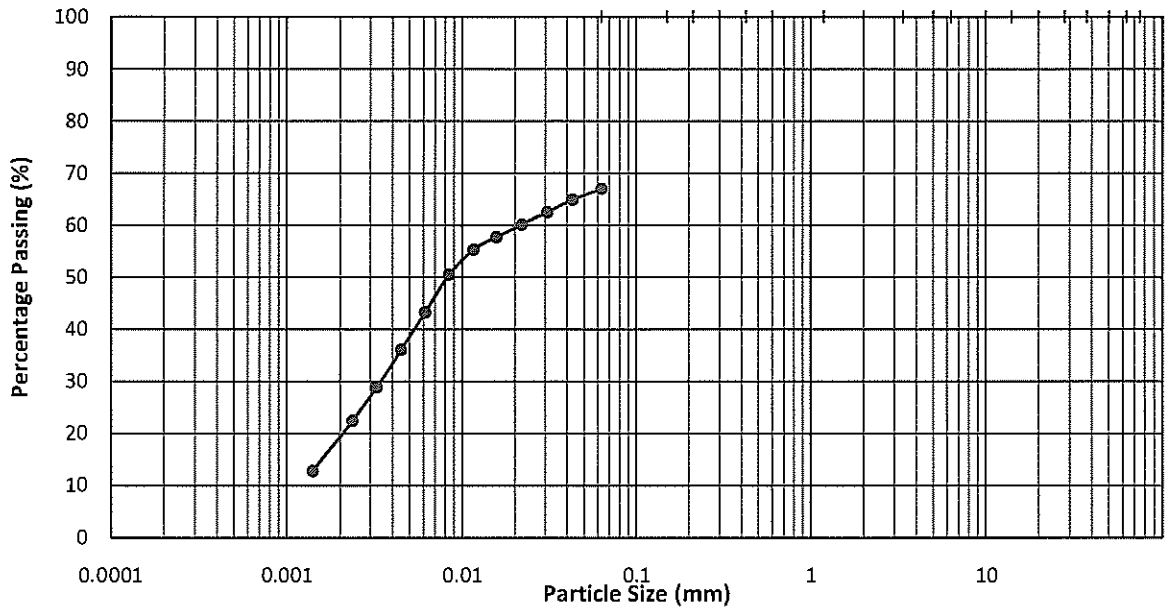
% of Passing 0.425 mm Sieve : 90.2

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.3Sm
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**33**	%
SILT	=	**48**	%
CLAY	=	**19**	%

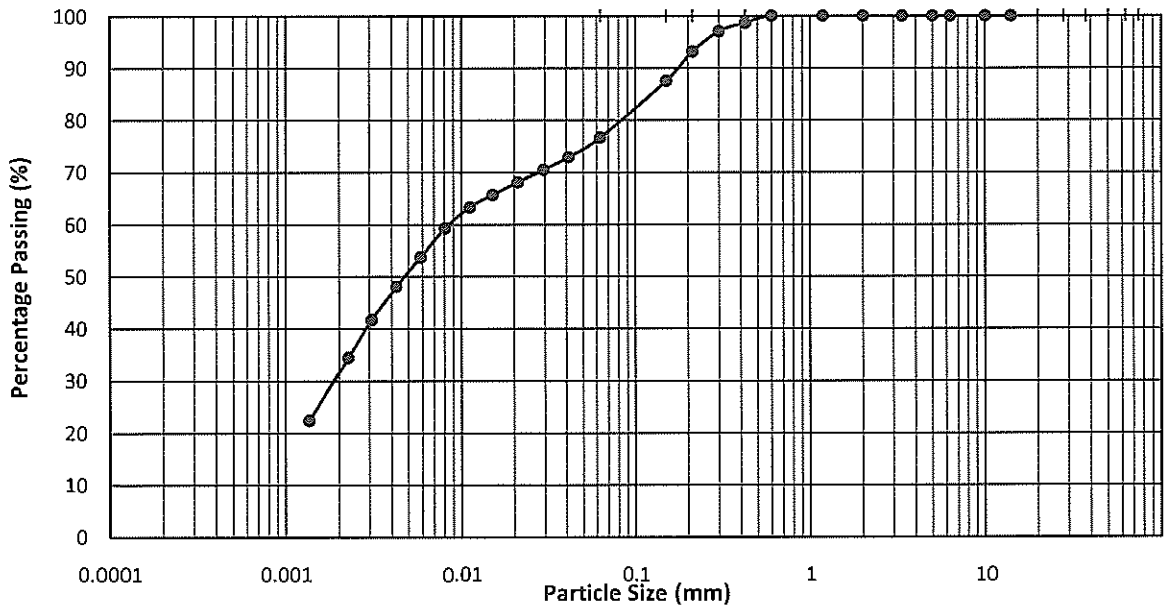
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At 5T28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**24**	%
SILT	=	**45**	%
CLAY	=	**31**	%

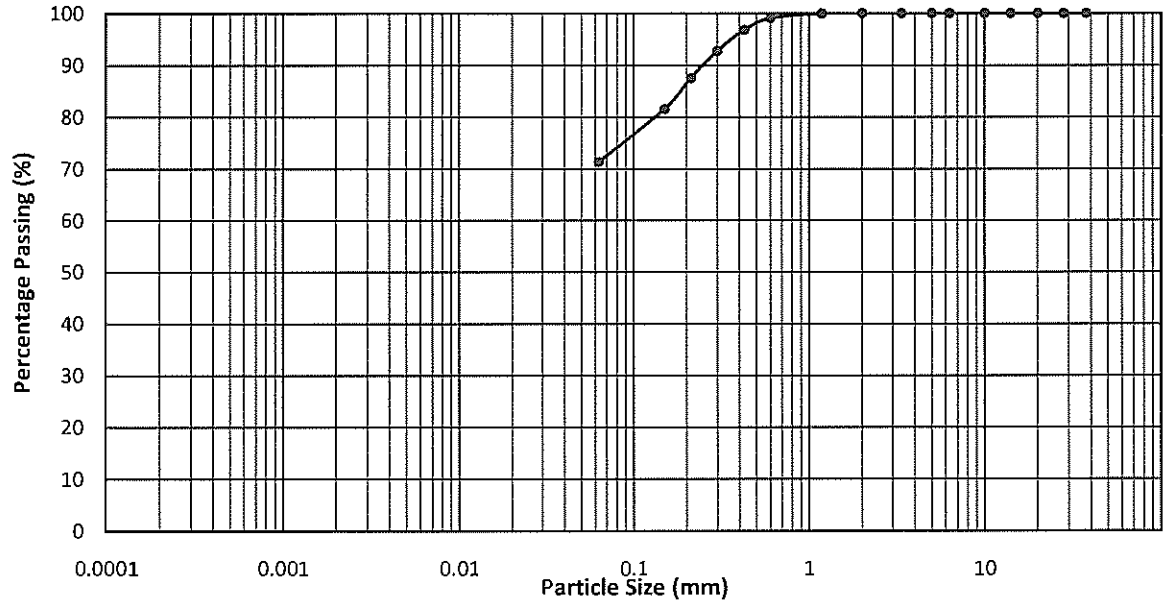
% of Passing 0.425 mm Sieve : 98.7

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**29**	%
SILT + CLAY	=	**71**	%

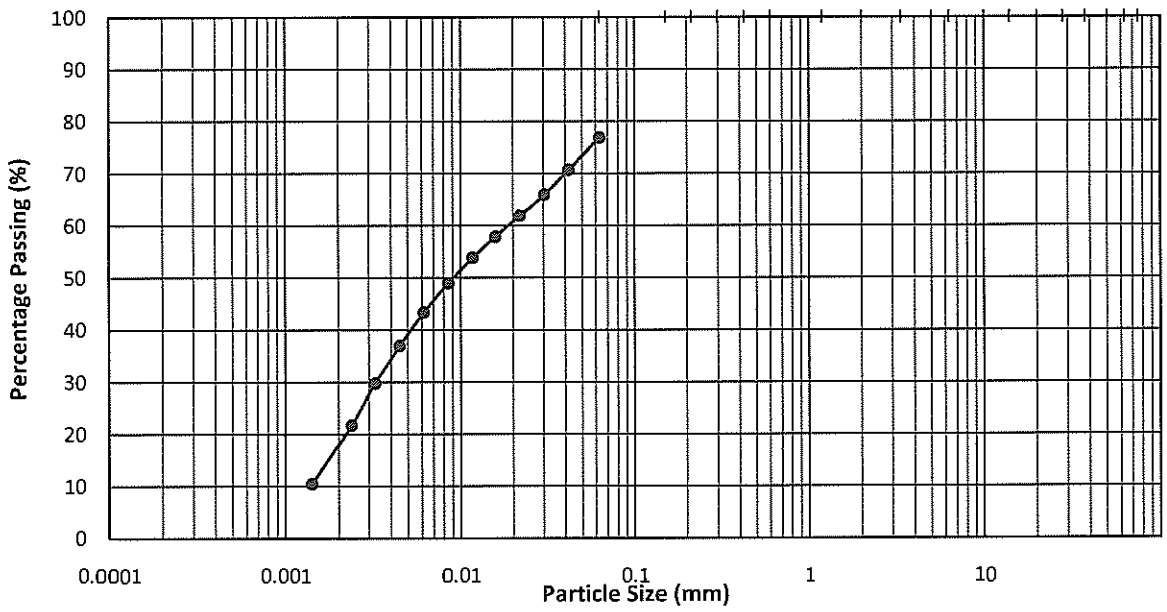
% of Passing 0.425 mm Sieve : 96.8

TESTED BY :	APPROVED BY :	DATE :
B. Thy.	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**23**	%
SILT	=	**59**	%
CLAY	=	**18**	%

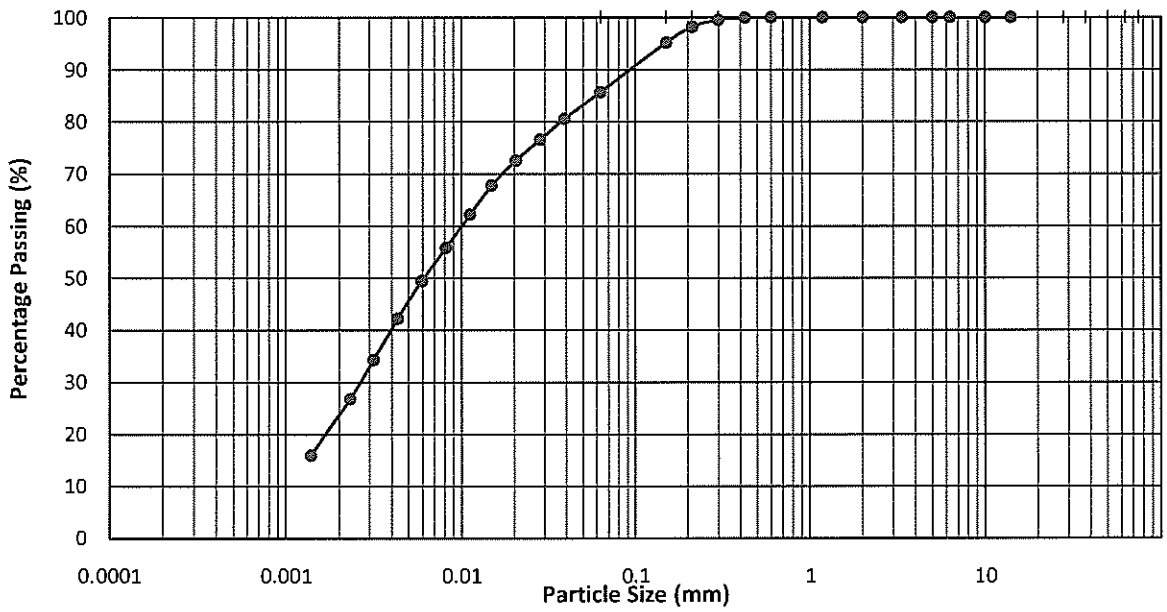
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
S.H.	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**15**	%
SILT	=	**62**	%
CLAY	=	**23**	%

% of Passing 0.425 mm Sieve : 100.0

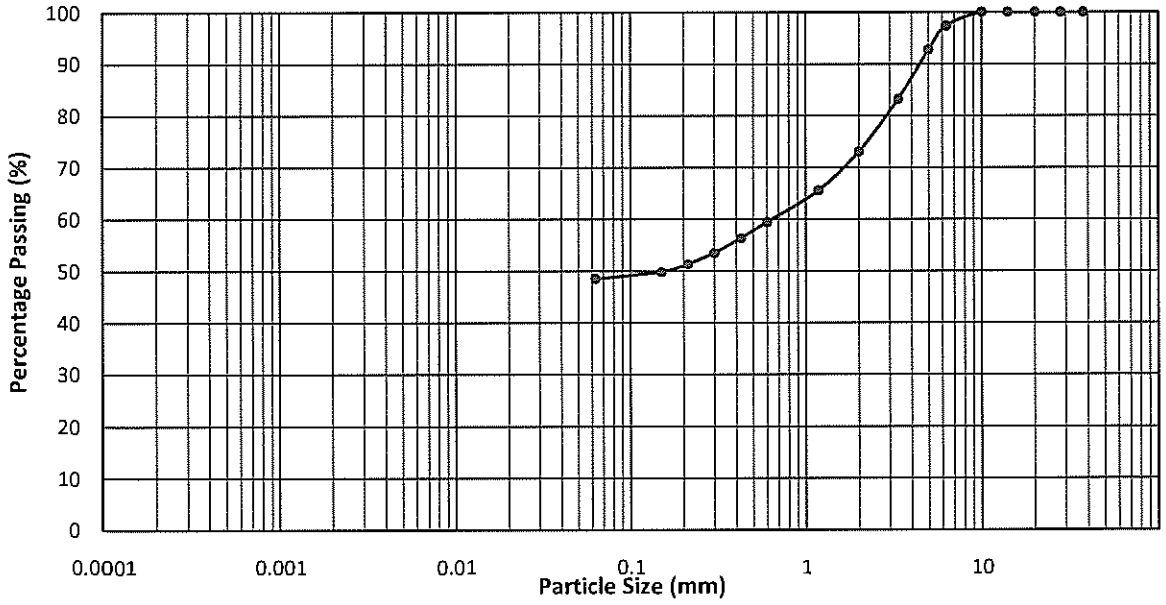
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT11
DEPTH (m)	: 22.00-22.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy slightly gravelly SILT**

SIEVING TEST

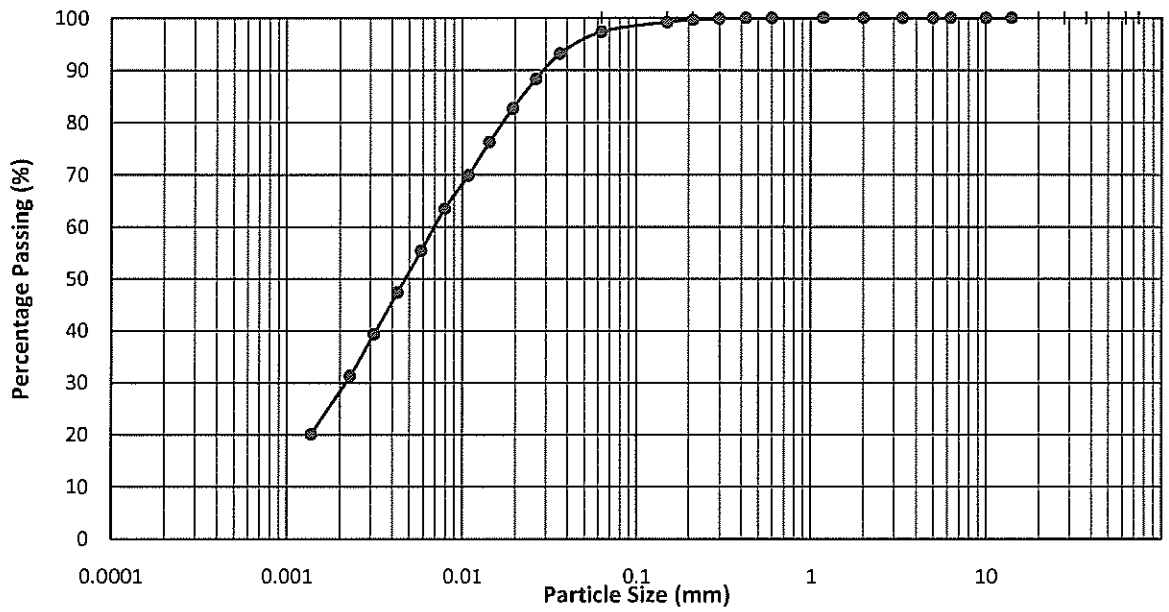
GRAVEL	=	**27**	%	
SAND	=	**24**	%	% of Passing 0.425 mm Sieve : 56.3
SILT + CLAY	=	**49**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory : Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Reddish brown and yellow slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**3**	%
SILT	=	**68**	%
CLAY	=	**29**	%

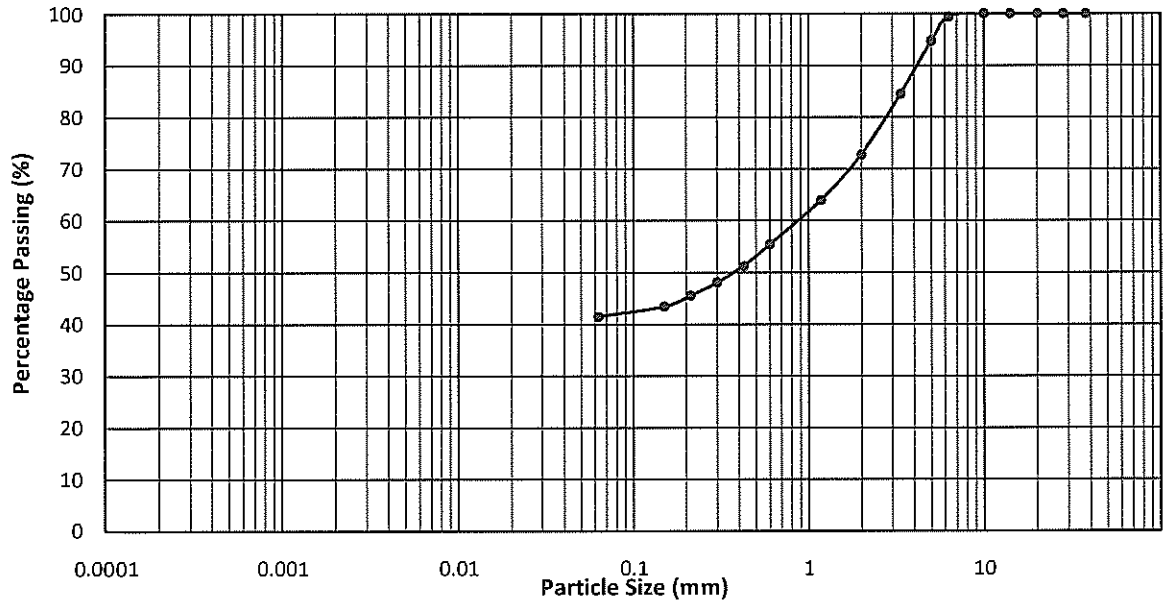
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT14
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly slightly sandy SILT**

SIEVING TEST

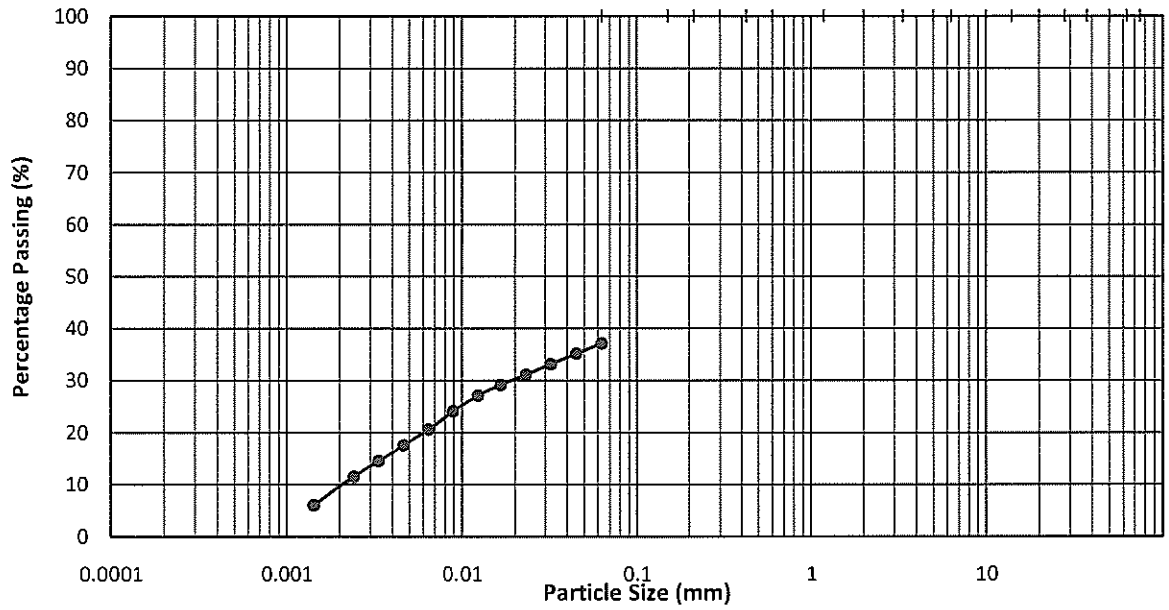
GRAVEL	=	**27**	%	
SAND	=	**32**	%	% of Passing 0.425 mm Sieve : 51.3
SILT + CLAY	=	**41**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT15
DEPTH (m)	: 30.00-30.45m
TEST DATE	: 14.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**63**	%
SILT	=	**27**	%
CLAY	=	**10**	%

% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ACCREDITED LABORATORY SAC-SINGLAS

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

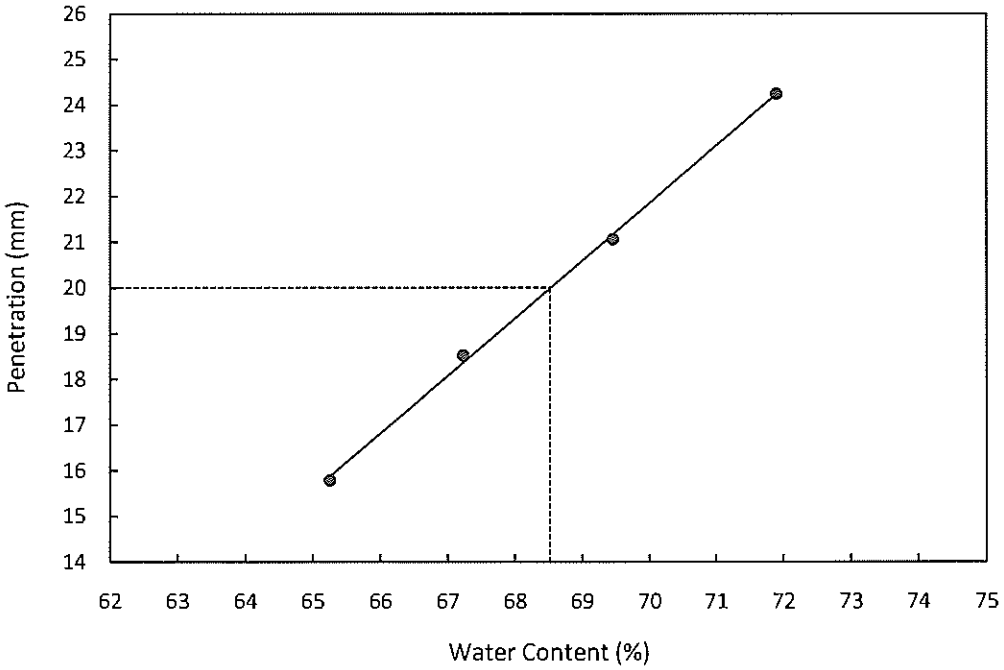
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown and yellow slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 68
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.38	20.19	20.28	20.22	20.25	20.15
DRY WEIGHT + CUP	(g)	15.78	15.76	15.71	15.31	17.02	16.63
CUP WEIGHT	(g)	8.73	9.17	9.13	8.48	9.37	8.30
WATER CONTENT	(%)	65.2	67.2	69.5	71.9	42.2	42.3
PENETRATION	(mm)	15.8	18.5	21.1	24.2	-	-

LIQUID LIMIT	(%)	**68.5**
PLASTIC LIMIT	(%)	**42.2**
PLASTICITY INDEX		**26**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

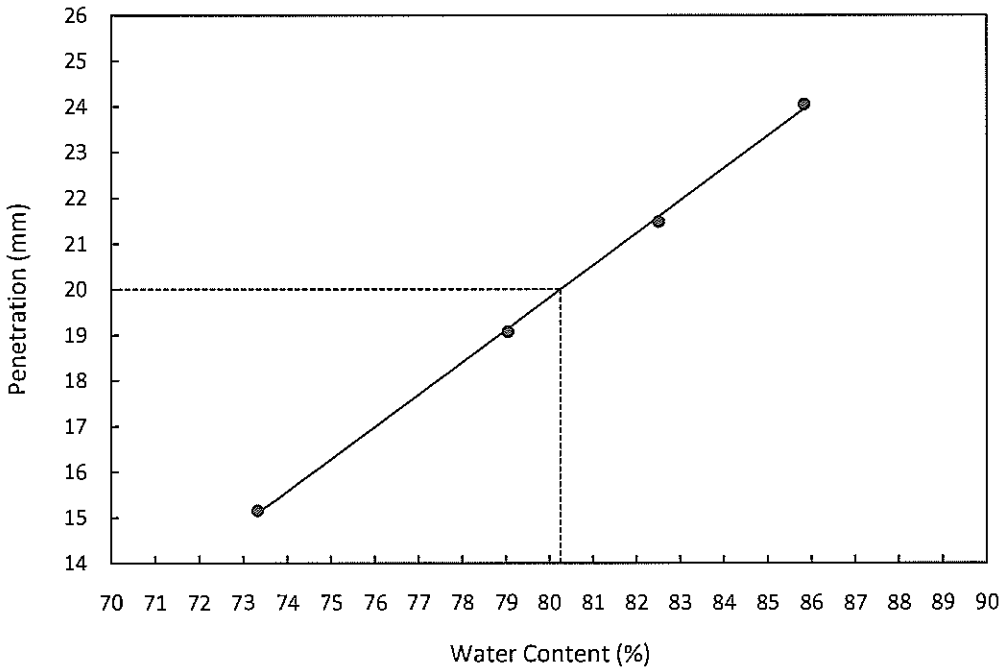
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 99
TEST DATE	: 11.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.27	20.33	20.54	20.53	20.31	20.31
DRY WEIGHT + CUP	(g)	15.57	14.90	14.93	1S.14	16.4S	16.50
CUP WEIGHT	(g)	9.16	8.03	8.13	8.86	8.08	8.25
WATER CONTENT	(%)	73.3	79.0	82.5	85.8	46.1	46.2
PENETRATION	(mm)	15.2	19.1	21.5	24.0	-	-

LIQUID LIMIT	(%)	**80.3**
PLASTIC LIMIT	(%)	**46.1**
PLASTICITY INDEX		**34**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

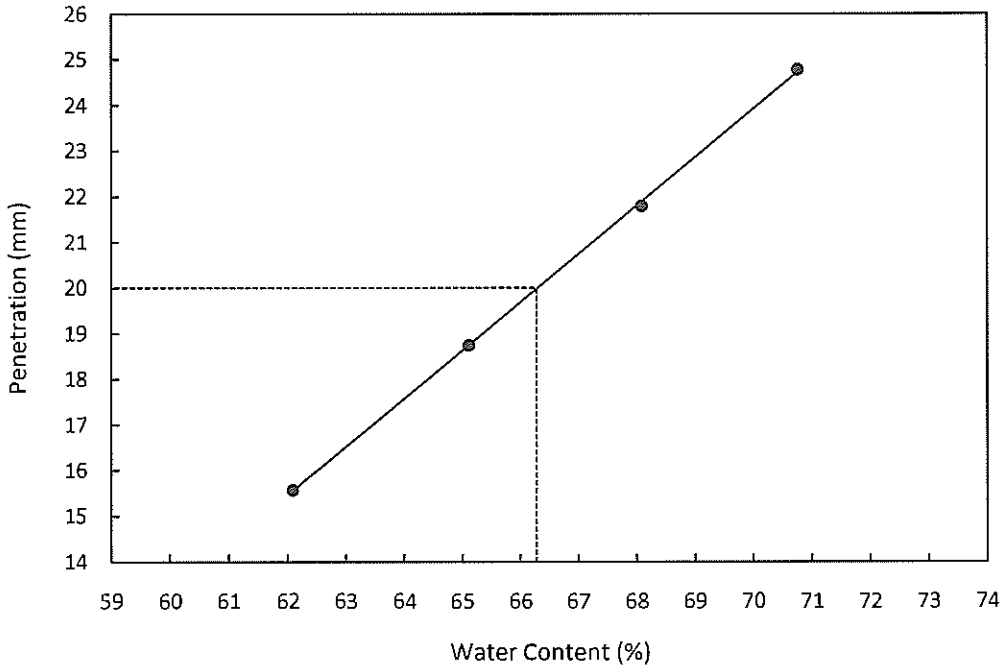
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 12.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.28	20.37	20.64	20.25	20.31	20.28
DRY WEIGHT + CUP	(g)	15.76	15.93	15.50	15.70	16.97	16.92
CUP WEIGHT	(g)	8.48	9.11	7.95	9.27	8.42	8.41
WATER CONTENT	(%)	62.1	65.1	68.1	70.8	39.1	39.5
PENETRATION	(mm)	15.6	18.7	21.8	24.8	-	-

LIQUID LIMIT	(%)	**66.3**
PLASTIC LIMIT	(%)	**39.3**
PLASTICITY INDEX		**27**

NOTE:

M : SILT C : CLAY L : LOW PLASTICITY I : INTERMEDIATE PLASTICITY H : HIGH PLASTICITY V : VERY HIGH PLASTICITY E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

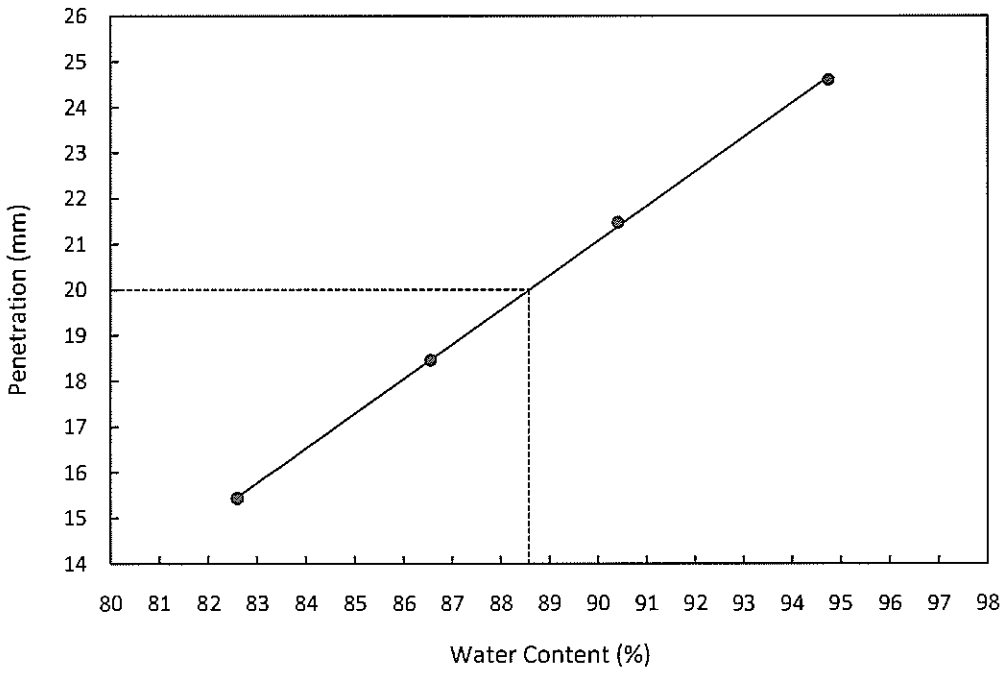
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 10.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.04	20.21	20.17	20.33	20.17	20.03
DRY WEIGHT + CUP	(g)	15.20	14.74	14.98	14.38	16.54	16.48
CUP WEIGHT	(g)	9.34	8.42	9.24	8.10	8.94	9.03
WATER CONTENT	(%)	82.6	86.6	90.4	94.7	47.8	47.7
PENETRATION	(mm)	15.4	18.5	21.5	24.6	-	-

LIQUID LIMIT	(%)	**88.6**
PLASTIC LIMIT	(%)	**47.7**
PLASTICITY INDEX		**41**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

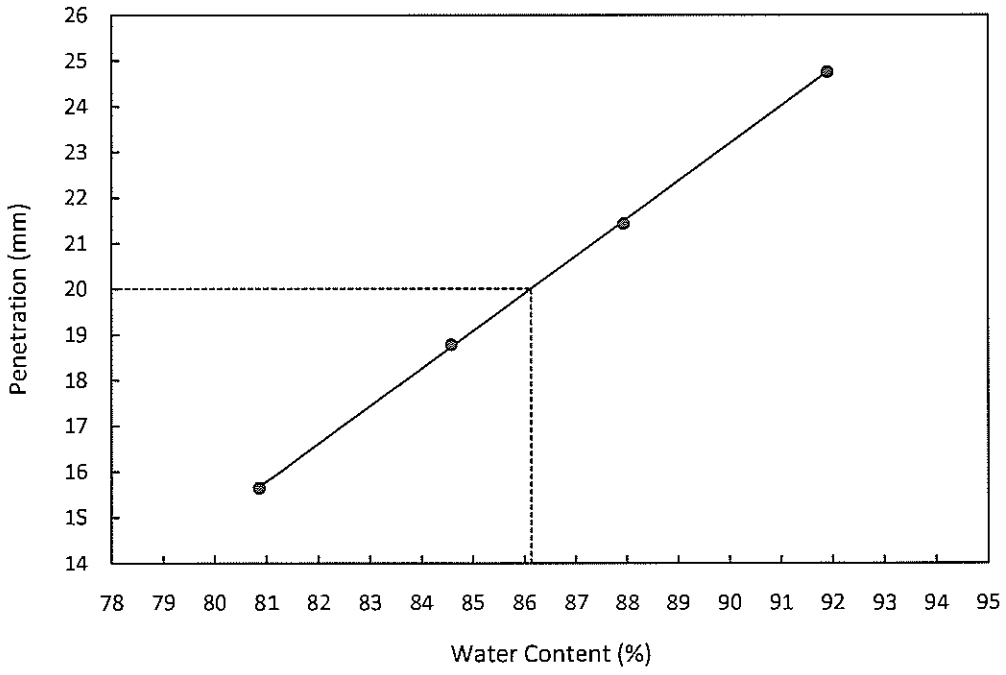
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH13
SAMPLE NO.	: SPT12
DEPTH(M)	: 24.90-25.35m
SOIL DESCRIPTION	: Reddish brown and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 15.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.60	20.29	20.40	20.23	20.35	20.33
DRY WEIGHT + CUP	(g)	15.49	14.70	14.94	14.22	16.52	16.82
CUP WEIGHT	(g)	9.17	8.09	8.73	7.68	8.18	9.17
WATER CONTENT	(%)	80.9	84.6	87.9	91.9	45.9	45.9
PENETRATION	(mm)	15.6	18.8	21.4	24.8	-	-

LIQUID LIMIT	(%)	**86.1**
PLASTIC LIMIT	(%)	**45.9**
PLASTICITY INDEX		**40**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
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V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

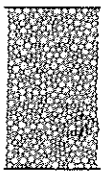


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory) - Min Win Htut)	19.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Stiff reddish brown and yellow slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	164.2	161.8	159.4
	Bulk Density	ρ_0	(Mg/m3)	1.92	1.89	1.86
	Particle Density	ρ_s	(Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	75	150	300
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	32	34	34
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.45	1.41	1.38
Initial Voids Ratio	e_0	.	0.84	0.90	0.93
Initial Degree of Saturation	S_o	(%)	100	100	99

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	206.81	200.39	224.87
MembraneCorrection	m_c	(kPa)	1.990	1.990	1.990
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	20.00	20.00
Shear Strength	c_u	(kPa)	103.40	100.19	112.43
Final Moisture	$\omega_f\%$	(%)	32	34	34
Final Dry Density	ρ_{df}	(Mg/m3)	1.45	1.41	1.38
Final Voids Ratio	e_f	.	0.84	0.90	0.93
Final Degree of Saturation	S_f	(%)	100.0	100.0	98.7

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	UU5-SungeiTengah-B13T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

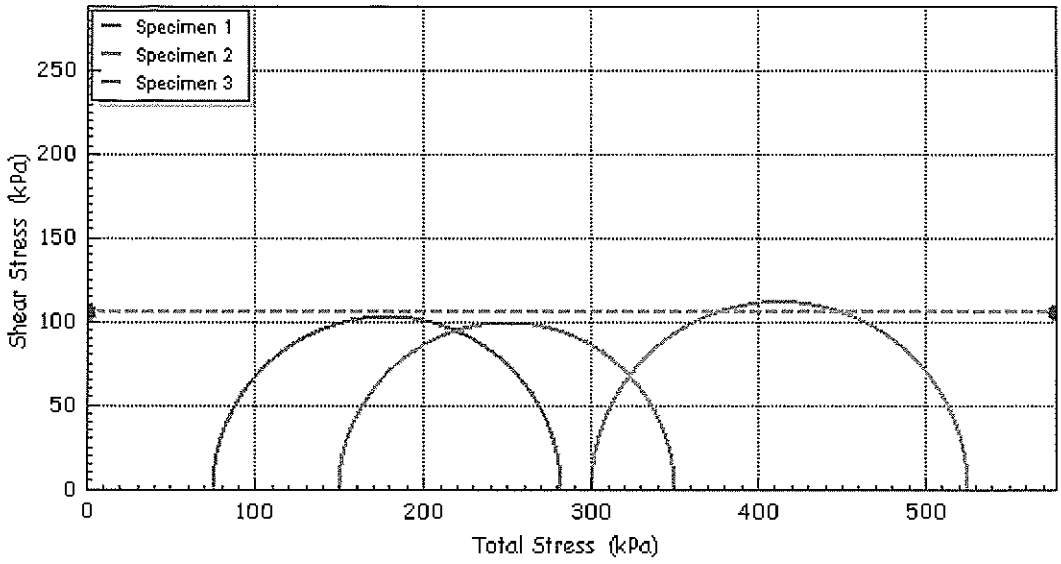
Ryobi Geotechnique International Pte Ltd

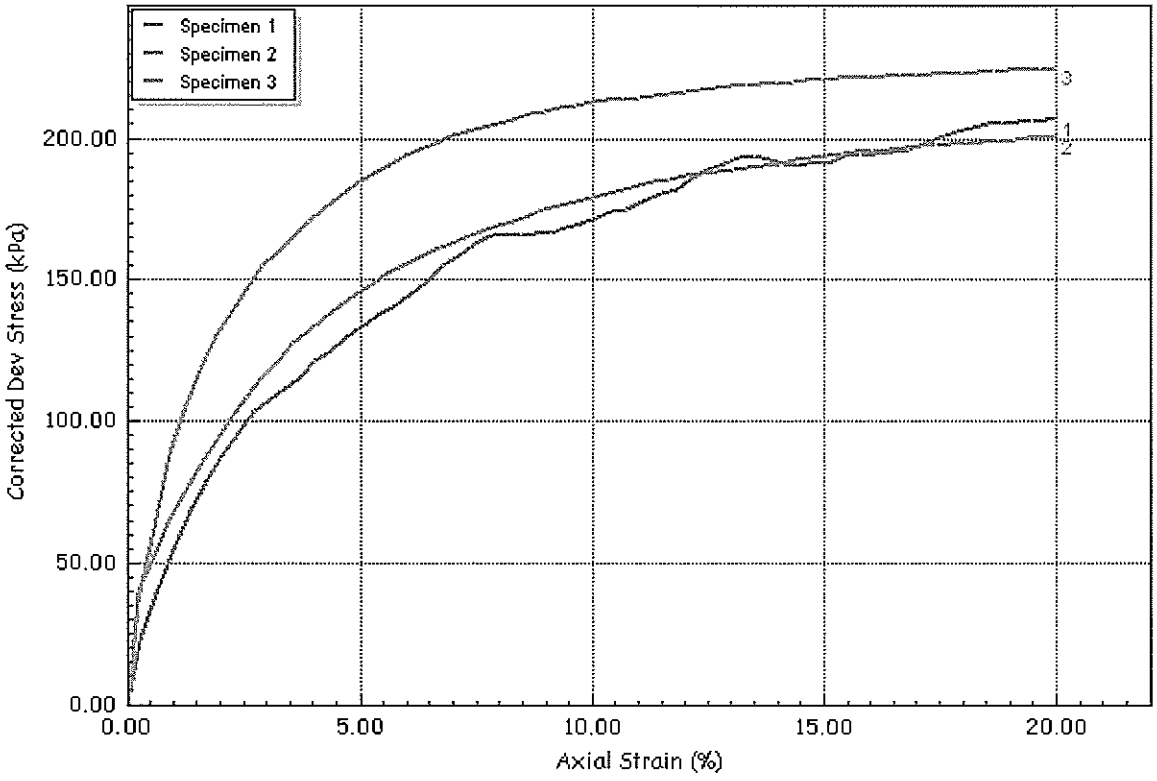
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	105.3
Friction Angle	ϕ	(deg)	0.0





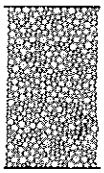
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU5-SungeiTengah-B13T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details						
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m			
	Description		Stiff reddish brown and yellow slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	150.5	150.1	150.2
	Bulk Density	ρ_0	(Mg/m3)	1.76	1.75	1.75
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	135	270	540
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	50	50	50
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.17	1.17	1.17
Initial Voids Ratio	e_0	.	1.27	1.27	1.28
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	206.81	199.95	232.10
MembraneCorrection	m_c	(kPa)	1.990	1.180	0.870
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	9.84	6.64
Shear Strength	c_u	(kPa)	103.40	99.97	116.05
Final Moisture	$\omega_f\%$	(%)	50	50	50
Final Dry Density	ρ_{df}	(Mg/m3)	1.17	1.17	1.17
Final Voids Ratio	e_f	.	1.27	1.27	1.28
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	UU6-SungeiTengah-B13T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

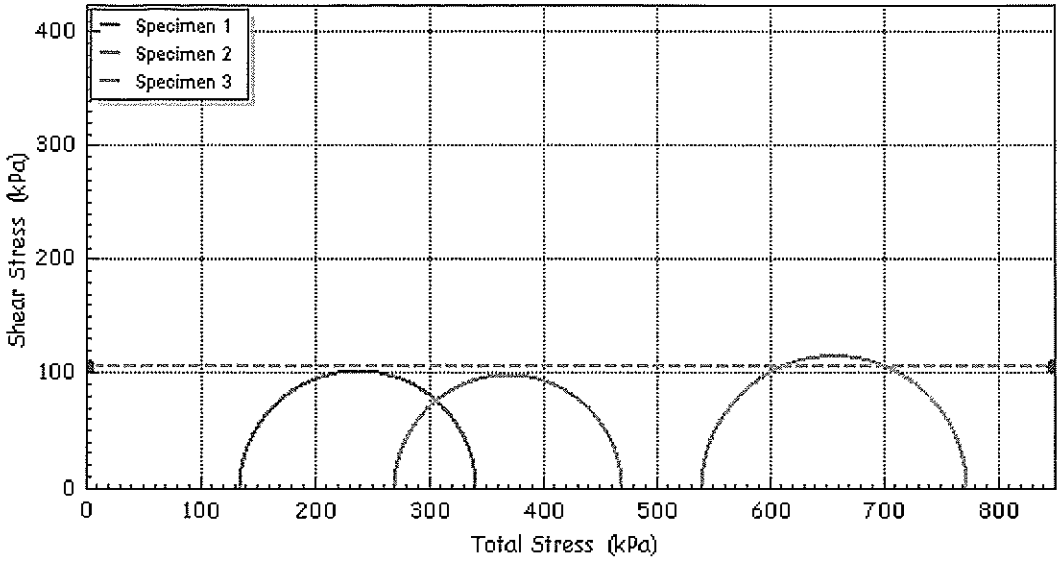
Ryobi Geotechnique International Pte Ltd

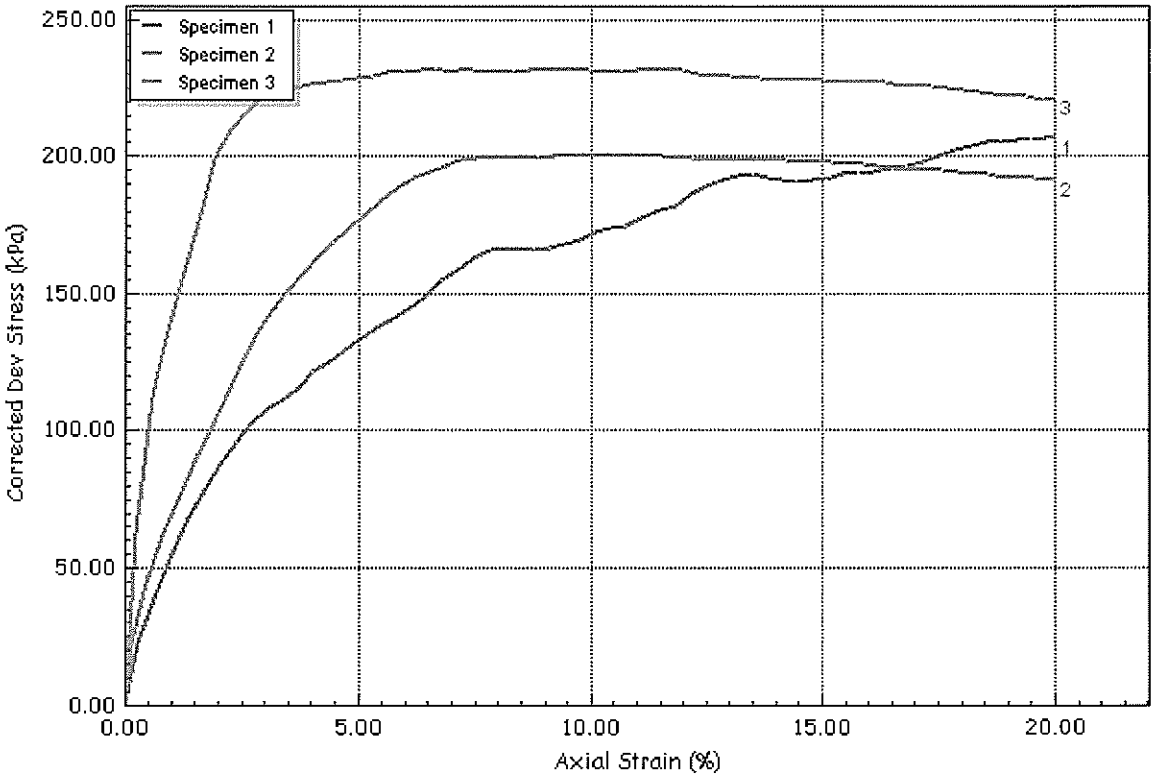
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	106.5
Friction Angle	ϕ	(deg)	0.0





Ryobi G	Test Method	BS1377: Part 7 1990 : Clause 8		Test Name	UU6-SungeiTengah-B13T2
	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	12/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH13
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW2
	Client	AVA		Depth	14.00-14.90m
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

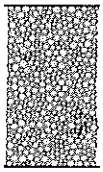
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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			24.00-24.90m		
Description			Stiff reddish brown and yellow slightly sandy SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	152.4	151.6	150.5
Bulk Density	ρ_0	(Mg/m3)	1.78	1.77	1.76
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions

Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	50	51	51
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.18	1.17	1.17
Initial Voids Ratio	e_0	.	1.24	1.26	1.27
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	236.41	230.70	252.54
MembraneCorrection	m_c	(kPa)	0.790	0.330	1.100
Strain At Max Stress	$\varepsilon_f\%$	(%)	5.94	2.24	8.97
Shear Strength	c_u	(kPa)	118.21	115.35	126.27
Final Moisture	$\omega_f\%$	(%)	50	51	51
Final Dry Density	ρ_{df}	(Mg/m3)	1.18	1.17	1.17
Final Voids Ratio	e_f	.	1.24	1.26	1.27
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	UU7-SungeiTengah-B13T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

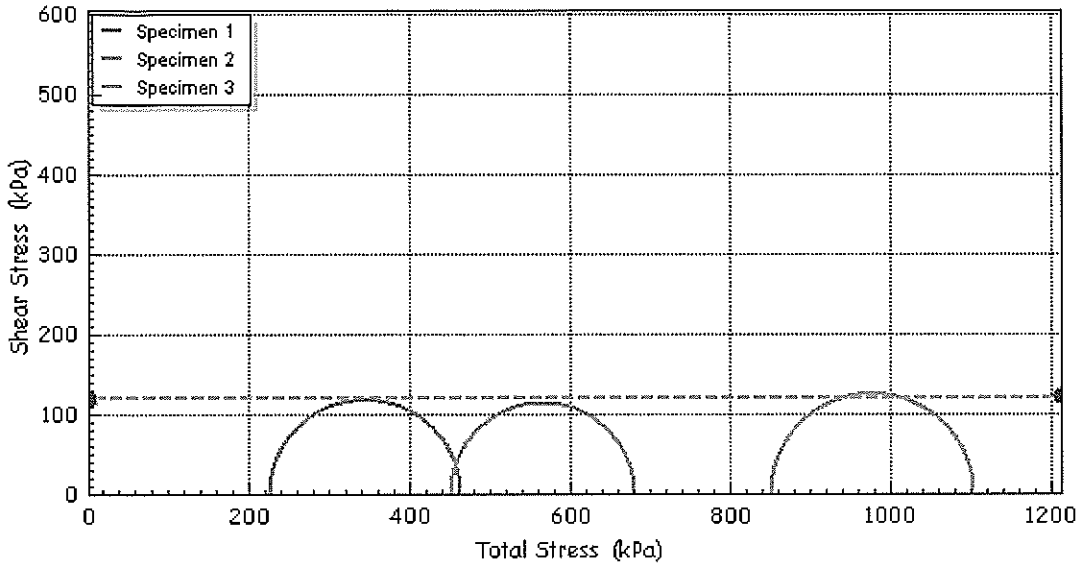
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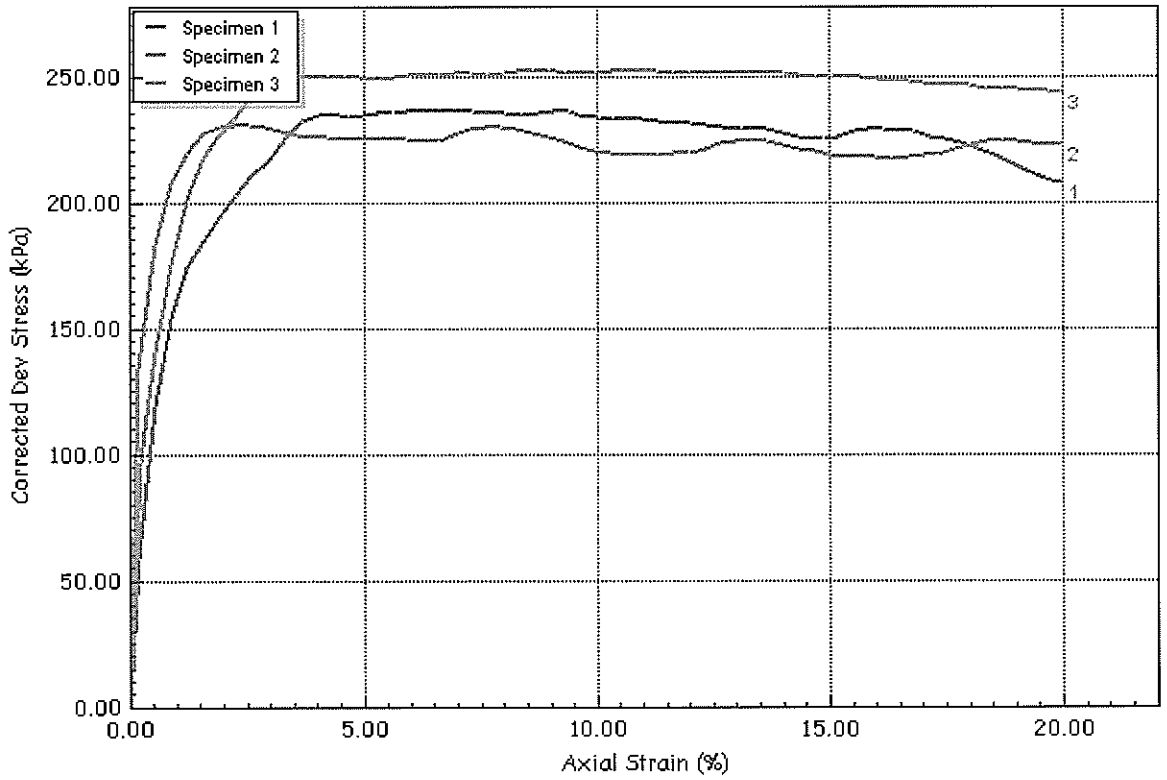
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	119.9
Friction Angle	ϕ	(deg)	0.0





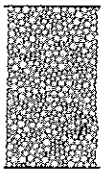
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	Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	12/9/2018
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH13
	Jobfile	Sungei Tengah Rd-WA7		Sample	TW4
	Client	AVA		Depth	24.00-24.90m
	Operator		Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

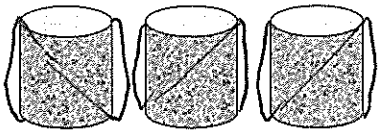
Sample Details						
 *sketch showing specimen location in original sample*	Depth			20.00-20.90m		
	Description			Reddish brown and yellow slightly sandy SILT		
	Type			Undisturbed Sample		
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0	(mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0	(gr)	1015.1	1006.6	978.9
	Initial Bulk Density	ρ_0	(Mg/m3)	1.88	1.87	1.82
	Particle Density	ρ_s	(Mg/m3)	2.68	2.68	2.68

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	295	390	580
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Initial Moisture	$\omega_i\%$	(%)	41	41	40
Initial Dry Density	ρ_{di}	(Mg/m3)	1.34	1.33	1.30
Initial Voids Ratio	e_i	.	1.006	1.018	1.066
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	40	39	38
Final Dry Density	ρ_{df}	(Mg/m3)	1.43	1.41	1.45
Final Voids Ratio	e_f	.	0.874	0.899	0.845
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	4.81	7.62	8.33
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	157.8	233.3	392.9
Minor Stress At Failure	σ_3'	(kPa)	48.0	79.0	144.0
Major Stress At Failure	σ_1'	(kPa)	205.8	312.3	536.9
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	4.287	3.953	3.729

Notes

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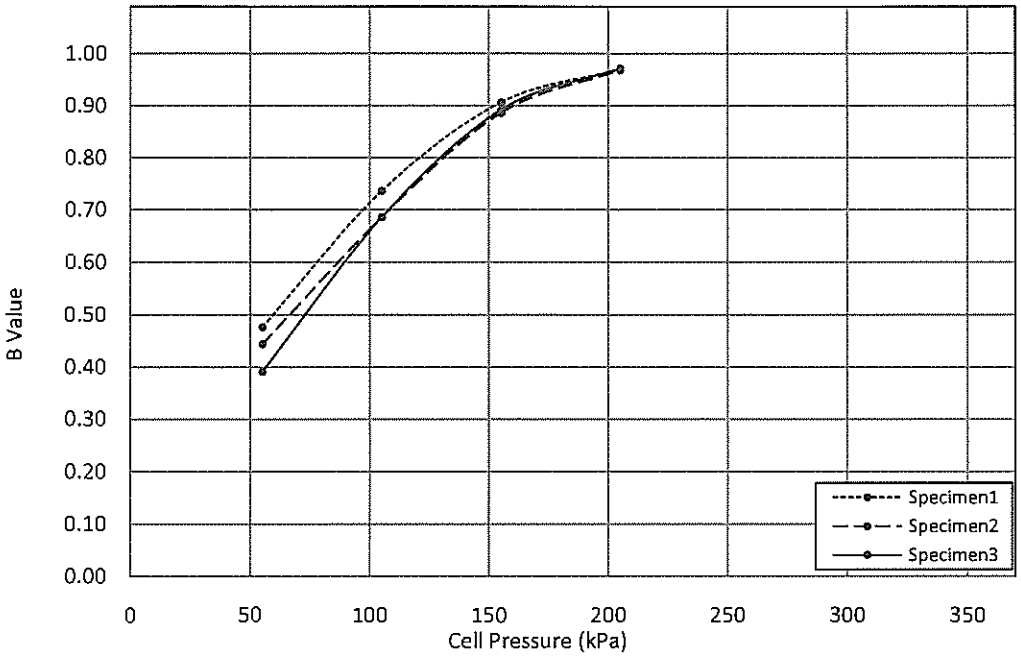
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU8-SungeiTengahWA7-B13T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator Kai	Checked Min Win Htut	Approved Sio Keong Kong	

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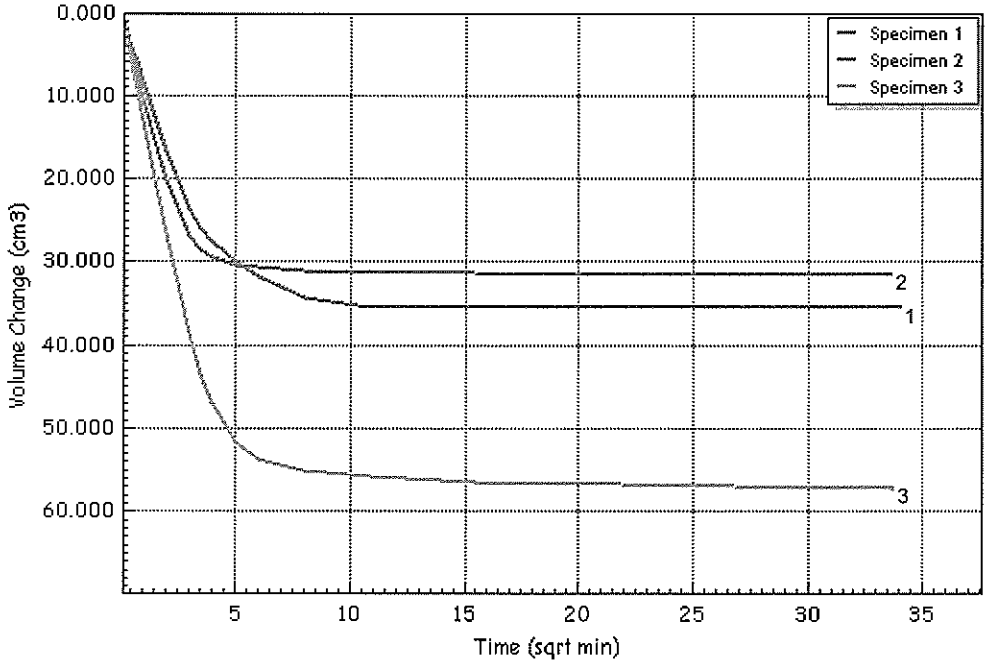
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



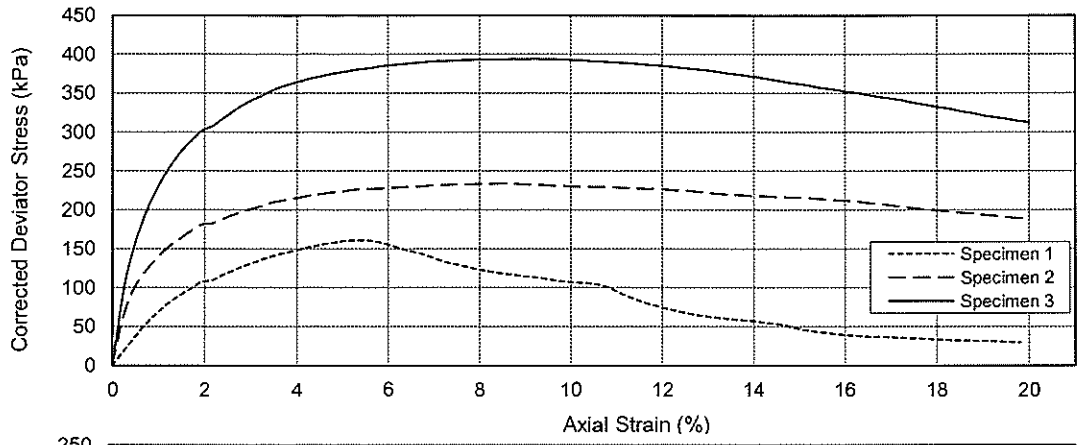
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU8-SungeiTengahWA7-B13T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

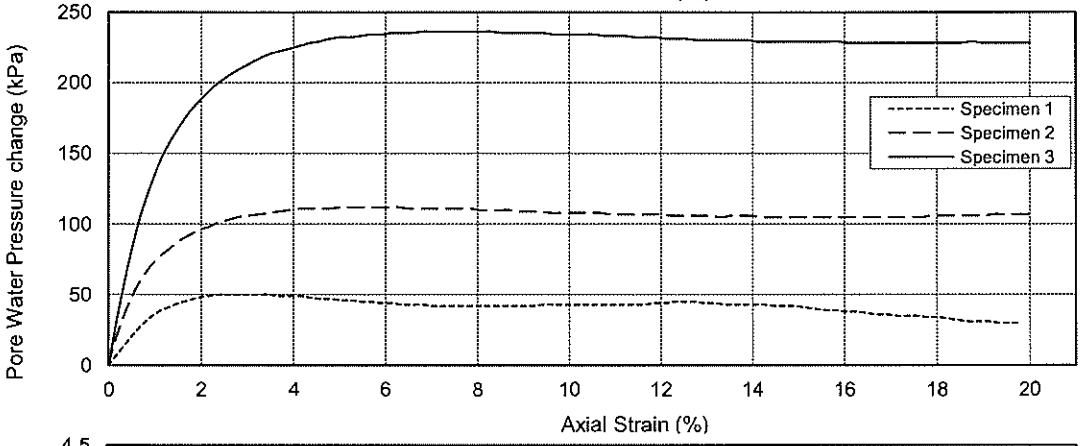
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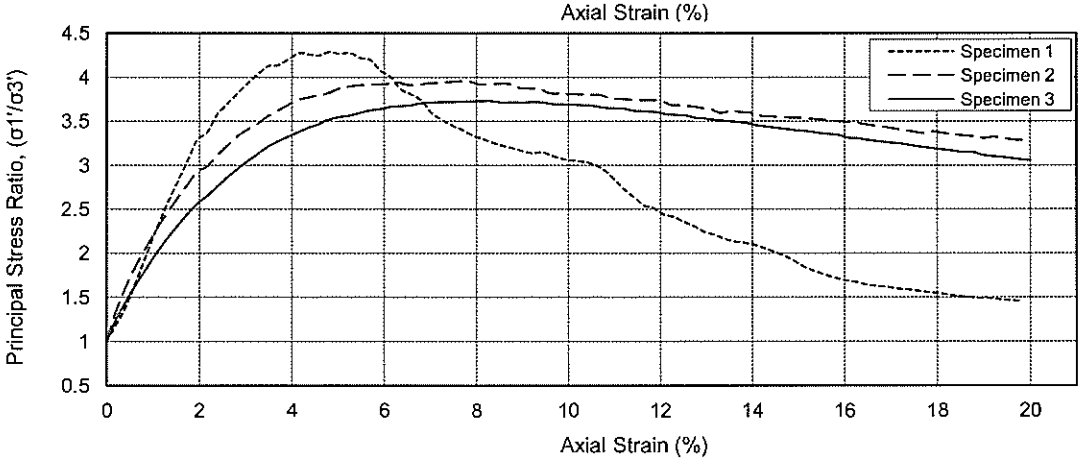
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	247	311	436
A Value at Max. Stress Ratio	0.298	0.476	0.601

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU8-SungeiTengahWA7-B13T3
Database :	\SQLEXPRESS\Ryobi-2017	Test Date	12/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

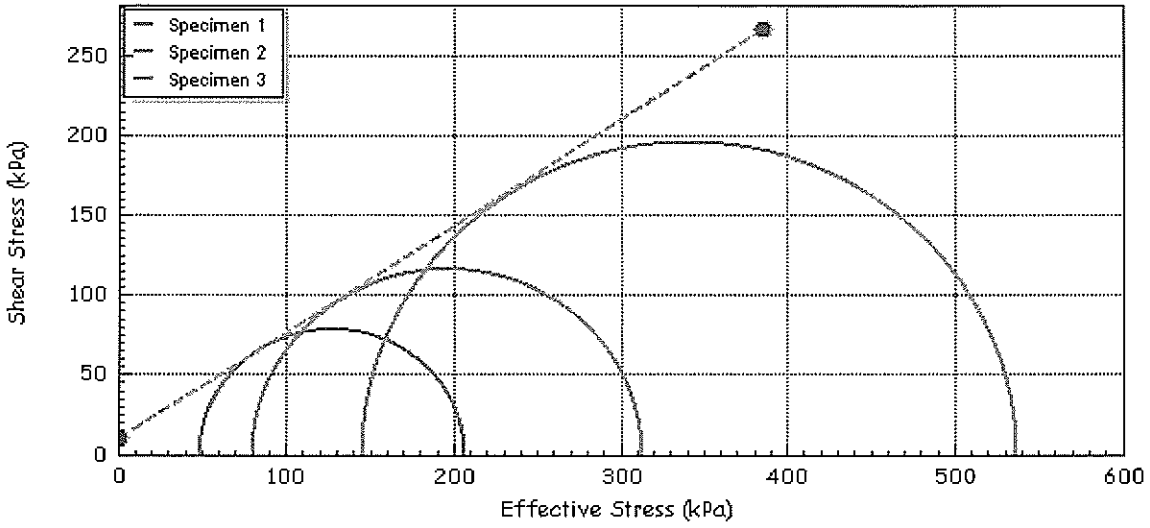
Ryobi Geotechnique International Pte Ltd

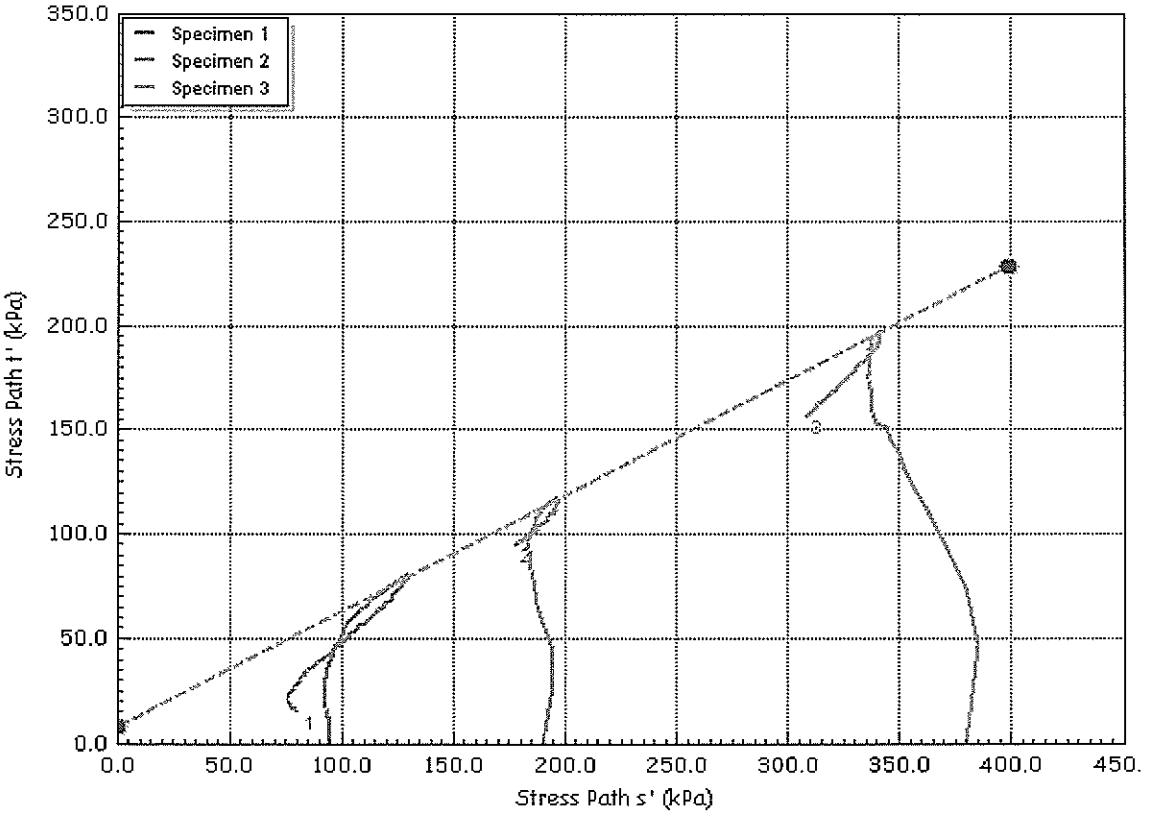
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	9.8	Stress Path Intercept	t_0'	(kPa)	8.1
Effective Friction Angle	ϕ'	(deg)	33.6	Stress Path Inclination	θ	(deg)	28.9





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU8-SungeiTengahWA7-B13T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH13
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator	kau	Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814179**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 10-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS (ALS)

Analytical Results

Sub-Matrix: SOIL

				Client sample ID	BH12 SPT10 (20.90-21.35m) -Sandy SILT	BH13 SPT6 (12.00-12.45m) - Sandy SILT	BH14 SPT13 (26.00-26.45m) - Sandy SILT
				Sampling date/time	07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814179-001**	**SG1814179-002**	**SG1814179-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.1	4.1	6.3
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	<0.1	<0.1
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814180**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 07-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

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Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	BH12	BH13	BH14
				Sampling date/time	07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814180-001**	**SG1814180-002**	**SG1814180-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		8.9	8.5	8.9
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.02	0.02	0.02
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.05	0.07	0.06
ORGANICS-General							
*Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	<0.10	<0.10

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH14						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	TW2	SPT7
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	14.00-14.90	14.90-15.35
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	29.4	-	31.7	36.5	-	26.2	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	1.76	1.88	-	-	1.95	-
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	2.65	-	2.66	-	-	2.65	2.66
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	1	9	33	(A)	28	36
	SAND	%	-	41	19			23	
	SILT	%	-	58	56	55		31	51
	CLAY	%	-		16	12		18	13
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	-	68.1	-	62.0	64.5	-
	PLASTIC LIMIT	%	-	-	39.6	-	37.1	37.7	-
	PLASTICITY INDEX		-	-	29	-	25	27	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	**UU**	-
	TOTAL COHESION	kPa	-	-	74.0	-	-	104.2	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 19/09/2018

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Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH14						
SAMPLE NO :			SPT8	TW3	TW4	SPT12	SPT13	SPT14	SPT15
SAMPLE DEPTH :		m	16.00-16.45	20.00-20.90	24.00-24.90	24.90-25.35	26.00-26.45	28.00-28.45	30.00-30.45
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	24.8	24.7	26.5	-	-	-
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.46	1.98	1.95	-	-	-	1.85
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	-	2.66	2.66	-	-	2.66	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	34	30	34	-	-	16	-
	SAND	%	18	18	18	-	-	17	-
	SILT	%	48	33	31	-	-	67	-
	CLAY	%		19	17	-	-		-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-	62.4	54.2	(B)	-	-	(B)
	PLASTIC LIMIT	%	-	37.0	32.2		-	-	
	PLASTICITY INDEX		-	25	22		-	-	
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	**UU**	**UU**	-	-	-	-
	TOTAL COHESION	kPa	-	118.4	127.2	-	-	-	-
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	6.3	-	-
	Chloride Content	%	-	-	-	-	<0.01	-	-
	Organic Content	%	-	-	-	-	<0.1	-	-
	Sulphate Content	%	-	-	-	-	<0.01	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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 :

(B) - Test cancelled due to high content of sand.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 19/09/2018

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ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH15						
SAMPLE NO :			W1						
SAMPLE DEPTH :		m	Water Sample						
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%							
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-						
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	-						
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-						
	SAND	%	-						
	SILT	%	-						
	CLAY	%	-						
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	-						
	PLASTIC LIMIT	%	-						
	PLASTICITY INDEX		-						
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-						
	TOTAL COHESION	kPa	-						
	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	-						
CHEMICAL CONTENTS ANALYSIS	pH Value		-						
	Chloride Content	%	-						
	Organic Content	%	-						
	Sulphate Content	%	-						
	pH Value		8.9						
	Chloride Content	g/L	0.02						
	Organic Content	% (w/v)	<0.10						
	Sulphate Content	g/L	0.06						

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 : 19/09/2018

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MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH14	SPT2	4.00-4.45	29.4	-	-	2.65
BH14	SPT3	6.00-6.45	-	1.76	-	-
BH14	TW1	8.00-8.90	31.7	1.88	-	2.66
BH14	SPT4	8.90-9.35	36.5	-	-	-
BH14	TW2	14.00-14.90	26.2	1.95	-	2.65
BH14	SPT7	14.90-15.35	-	-	-	2.66
BH14	SPT8	16.00-16.45	-	1.46	-	-
BH14	TW3	20.00-20.90	24.8	1.98	-	2.66
BH14	TW4	24.00-24.90	24.7	1.95	-	2.66
BH14	SPT12	24.90-25.35	26.5	-	-	-
BH14	SPT14	28.00-28.45	-	-	-	2.66
BH14	SPT15	30.00-30.45	-	1.85	-	-

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)

TESTED BY: MONJU
Date :

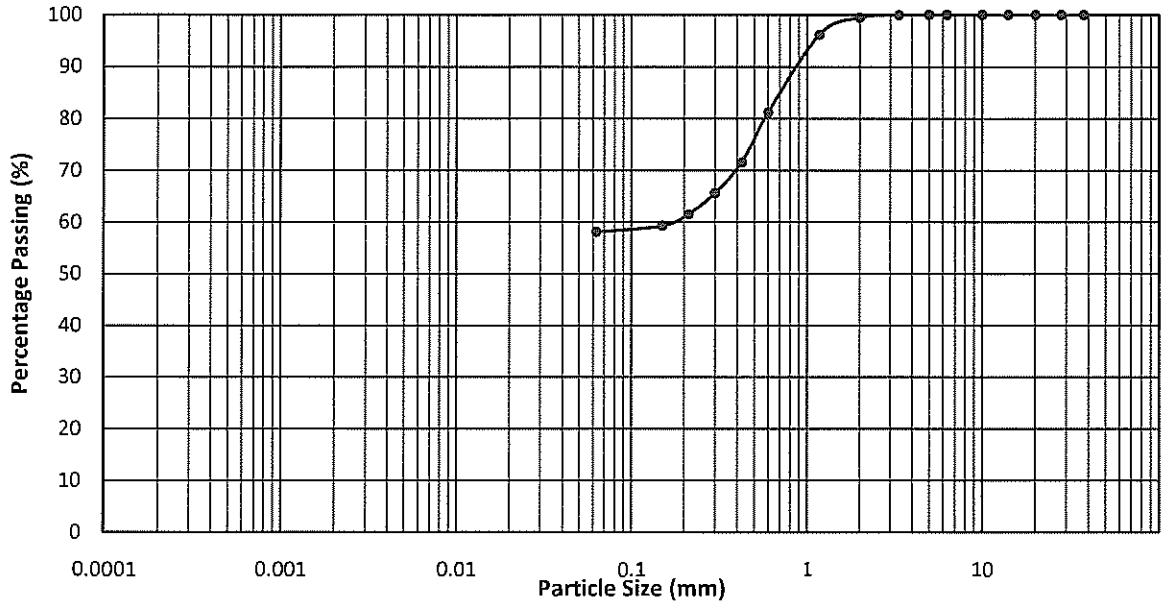
APPROVED BY:
(Authorised Signatory - Min Win Htut)

DATE : 19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 15.09.2018



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

SOIL DESCRIPTION : **Reddish brown and light yellow slightly gravelly sandy SILT**

SIEVING TEST

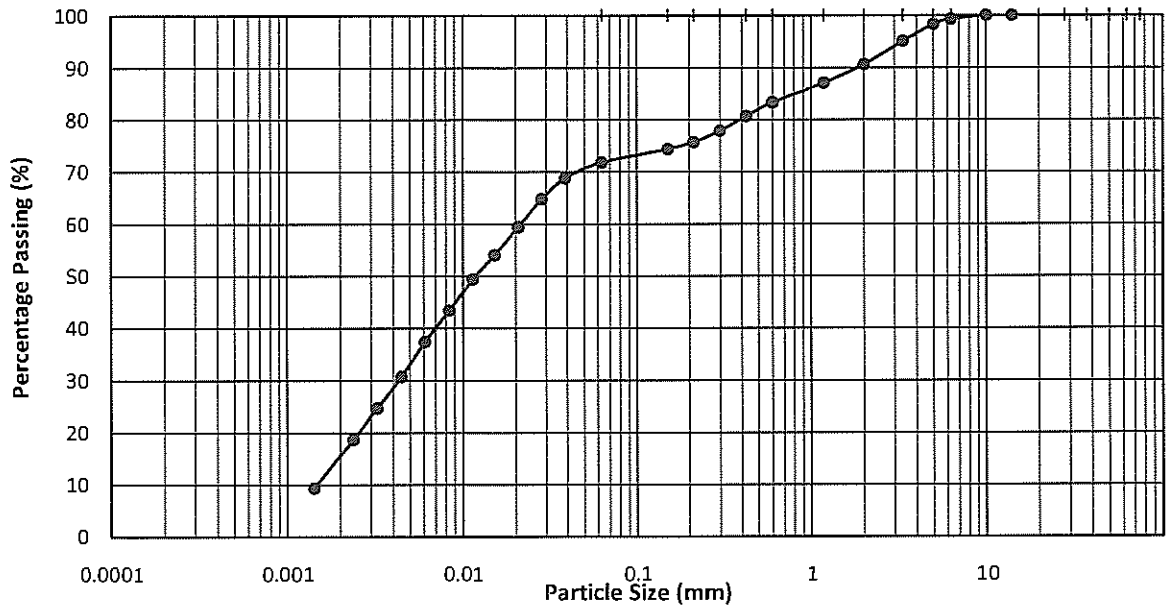
GRAVEL	=	**1**	%	
SAND	=	**41**	%	% of Passing 0.425 mm Sieve : 71.6
SILT + CLAY	=	**58**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW1
DEPTH (m)	: 8.00-8.90m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown and light yellow slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**9**	%
SAND	=	**19**	%
SILT	=	**56**	%
CLAY	=	**16**	%

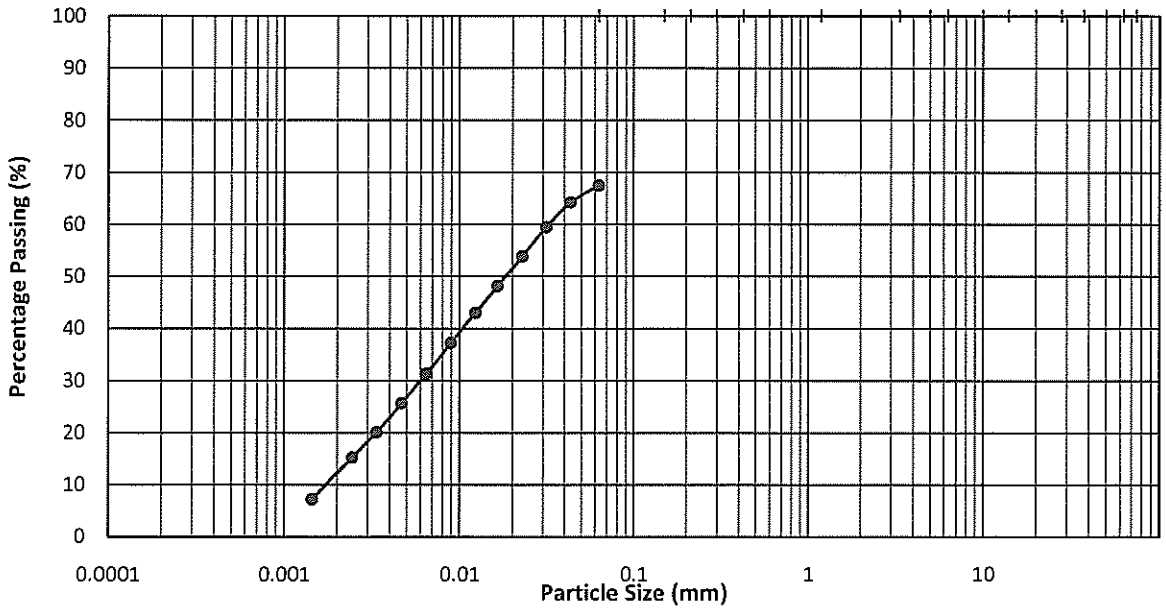
% of Passing 0.425 mm Sieve : 80.7

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT4
DEPTH (m)	: 8.90-9.35m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown and light yellow slightly sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**33**	%
SILT	=	**55**	%
CLAY	=	**12**	%

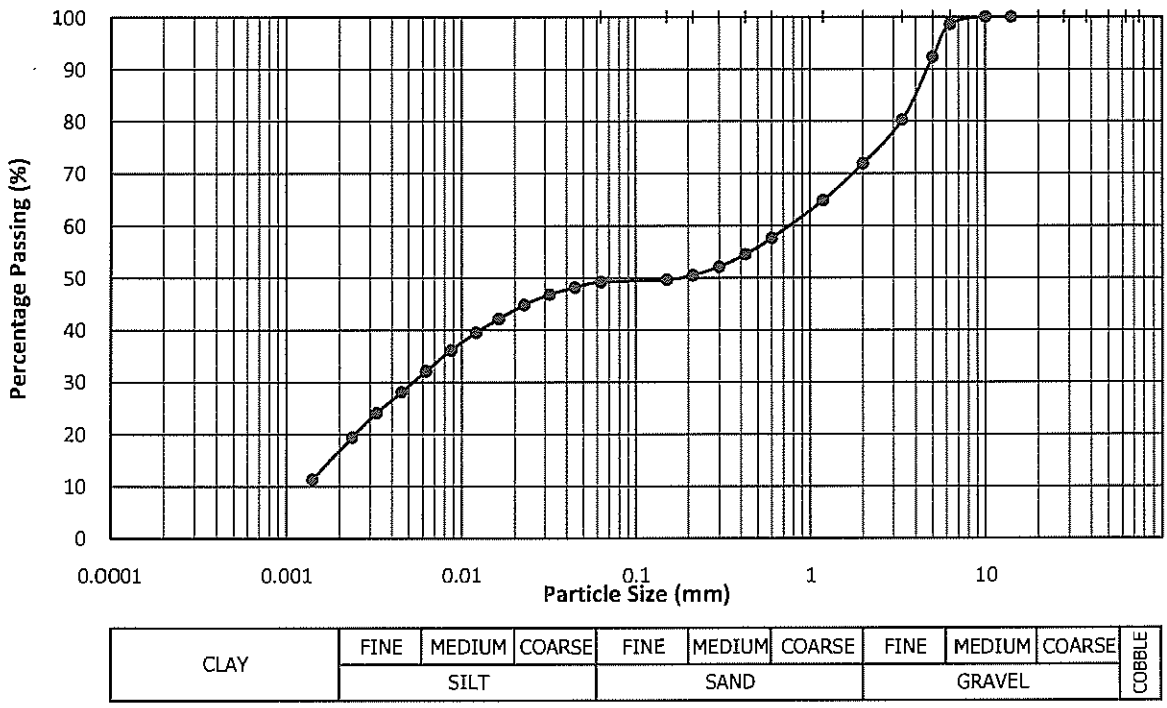
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown and light yellow slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**28**	%
SAND	=	**23**	%
SILT	=	**31**	%
CLAY	=	**18**	%

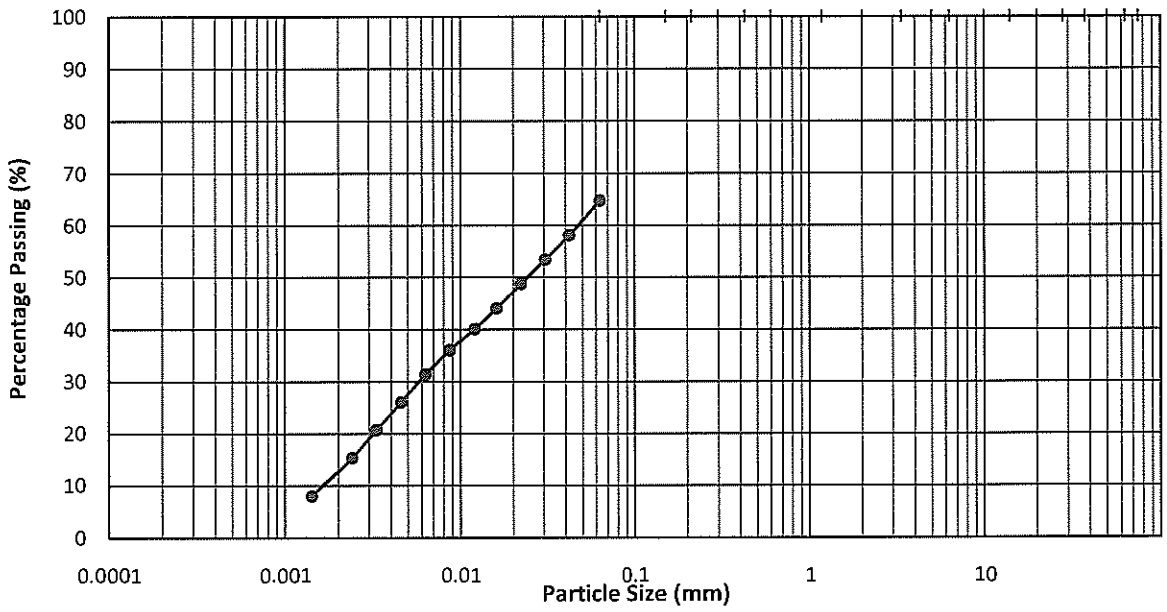
% of Passing 0.425 mm Sieve : 54.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT7
DEPTH (m)	: 14.90-15.35m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**36**	%
SILT	=	**51**	%
CLAY	=	**13**	%

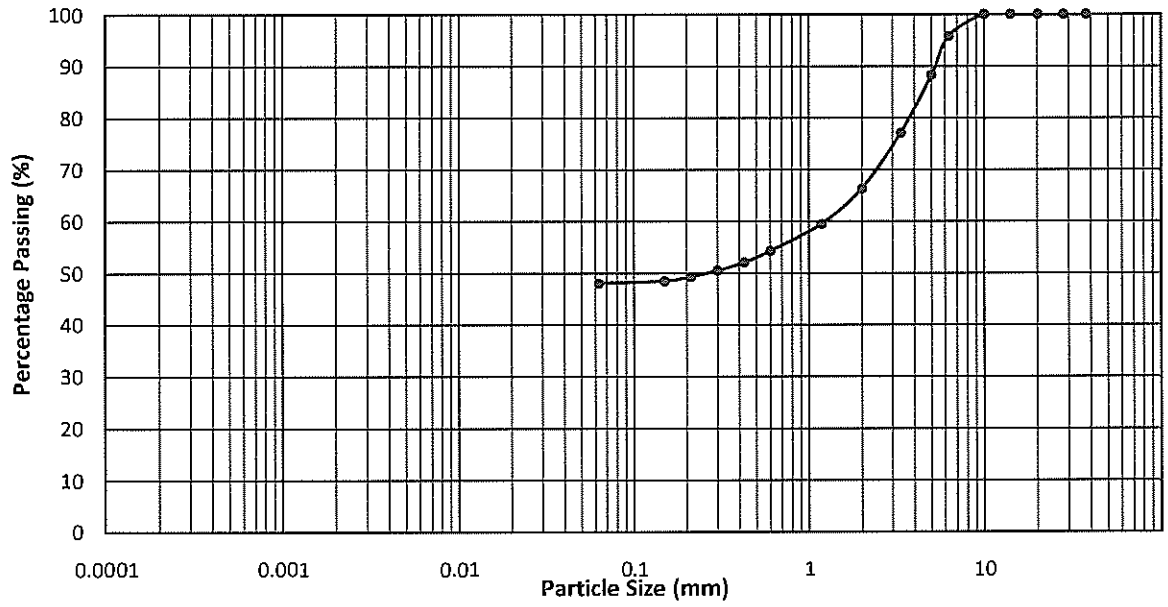
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 15.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy slightly gravelly SILT**

SIEVING TEST

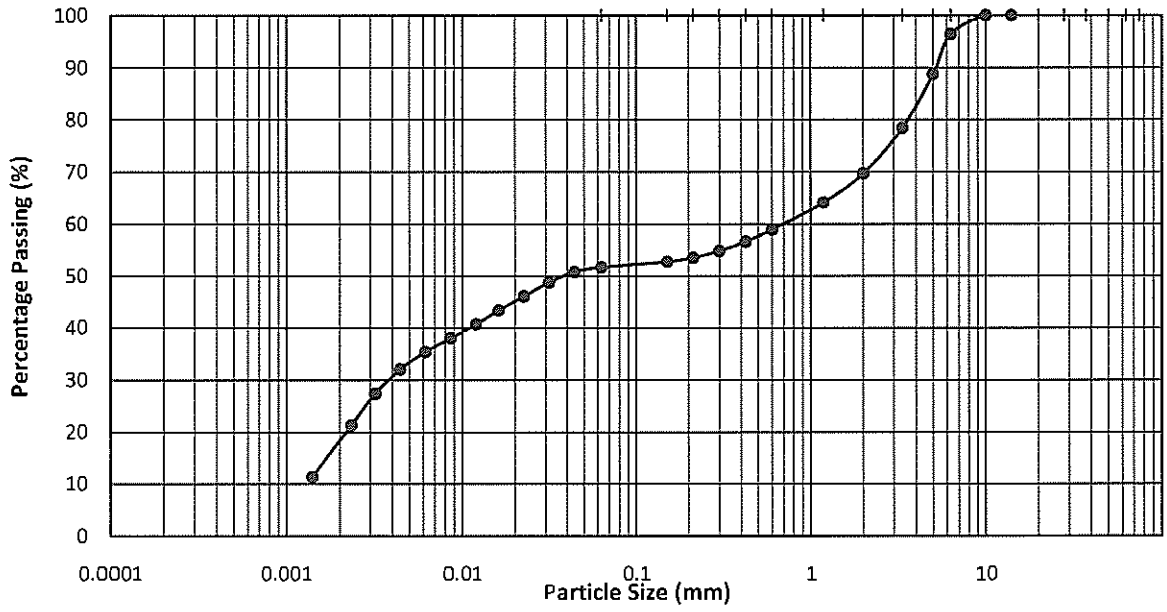
GRAVEL	=	**34**	%	
SAND	=	**18**	%	% of Passing 0.425 mm Sieve : 52.1
SILT + CLAY	=	**48**	%	

TESTED BY :	APPROVED BY :	DATE :
8.-Sy.	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**30**	%
SAND	=	**18**	%
SILT	=	**33**	%
CLAY	=	**19**	%

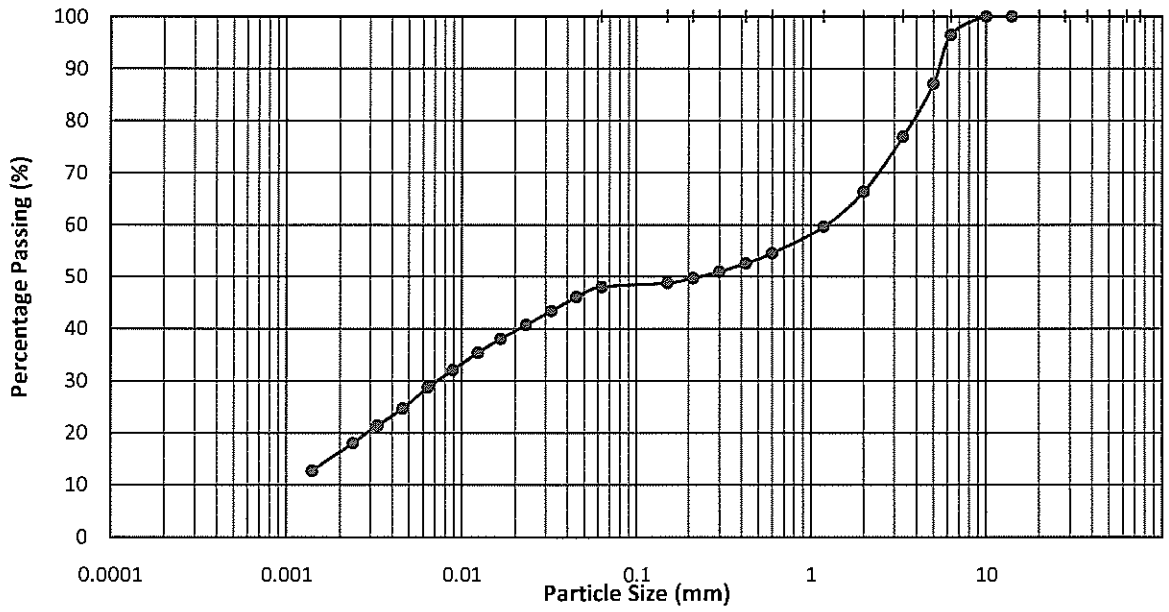
% of Passing 0.425 mm Sieve : 56.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: KS728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW4
DEPTH (m)	: 24.00-24.90m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy slightly gravelly SILT**

HYDROMETER + SIEVING

GRAVEL	=	**34**	%
SAND	=	**18**	%
SILT	=	**31**	%
CLAY	=	**17**	%

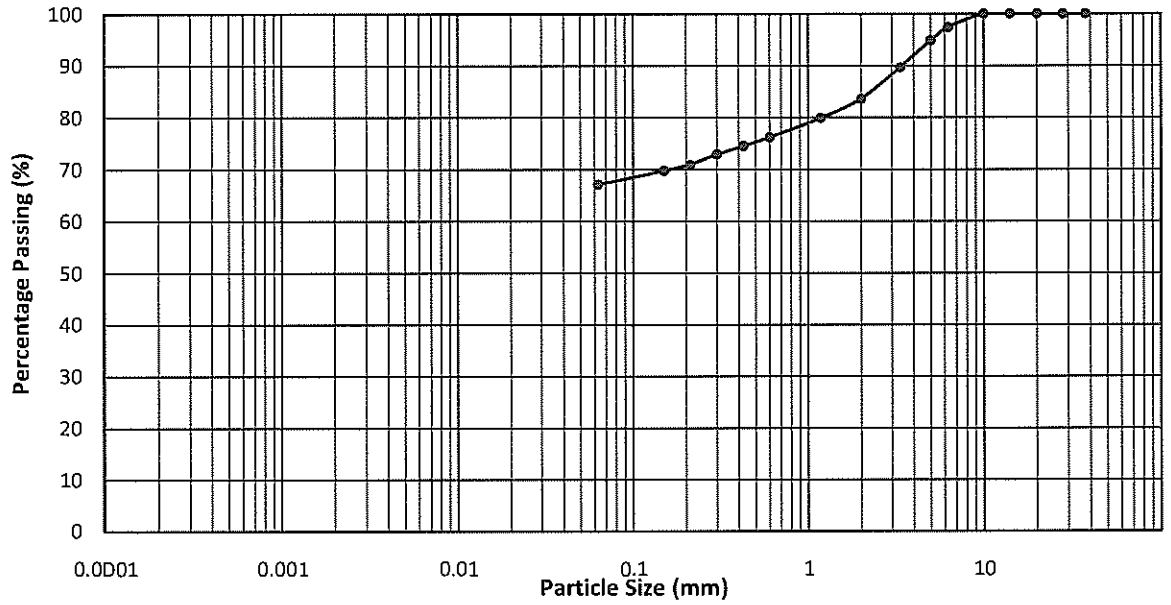
% of Passing 0.425 mm Sieve : 52.6

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT14
DEPTH (m)	: 28.00-28.45m
TEST DATE	: 15.09.2018



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly gravelly slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**16**	%	
SAND	=	**17**	%	% of Passing 0.425 mm Sieve : 74.5
SILT + CLAY	=	**67**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

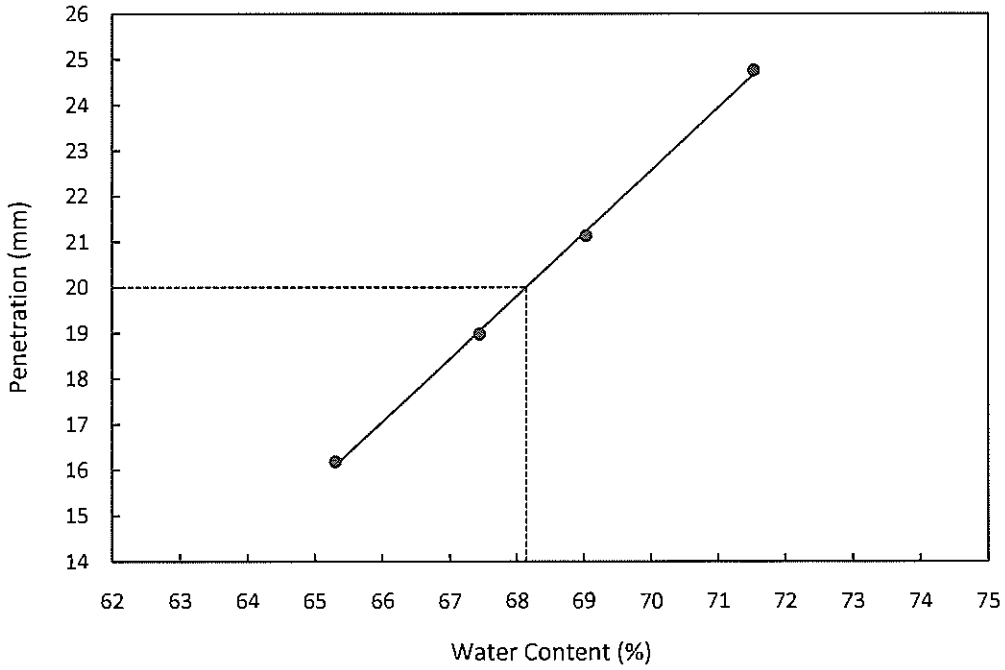
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW1
DEPTH(M)	: 8.00-8.90m
SOIL DESCRIPTION	: Reddish brown and light yellow slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 60
TEST DATE	: 09.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.66	20.79	20.28	20.54	20.22	20.36
DRY WEIGHT + CUP	(g)	16.03	16.19	15.80	15.34	16.75	16.90
CUP WEIGHT	(g)	8.94	9.37	9.31	8.07	8.03	8.13
WATER CONTENT	(%)	65.3	67.4	69.0	71.5	39.8	39.5
PENETRATION	(mm)	16.2	19.0	21.1	24.8	-	-

LIQUID LIMIT	(%)	**68.1**
PLASTIC LIMIT	(%)	**39.6**
PLASTICITY INDEX		**29**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Thy.	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

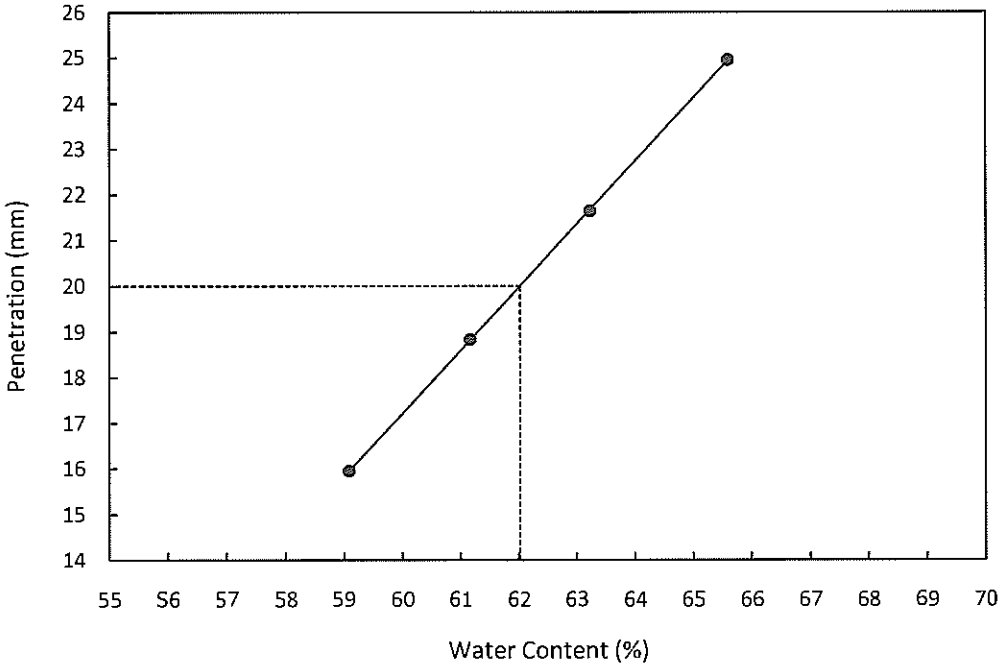
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: SPT5
DEPTH(M)	: 10.00-10.45m
SOIL DESCRIPTION	: Reddish brown and light yellow slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 52
TEST DATE	: 15.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.47	20.25	20.54	20.39	20.13	20.07
DRY WEIGHT + CUP	(g)	16.34	16.06	16.07	15.93	17.19	16.94
CUP WEIGHT	(g)	9.35	9.21	9.00	9.13	9.23	8.52
WATER CONTENT	(%)	59.1	61.2	63.2	65.6	36.9	37.2
PENETRATION	(mm)	16.0	18.8	21.6	25.0	-	-

LIQUID LIMIT	(%)	**62.0**
PLASTIC LIMIT	(%)	**37.1**
PLASTICITY INDEX		**25**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S.H.	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

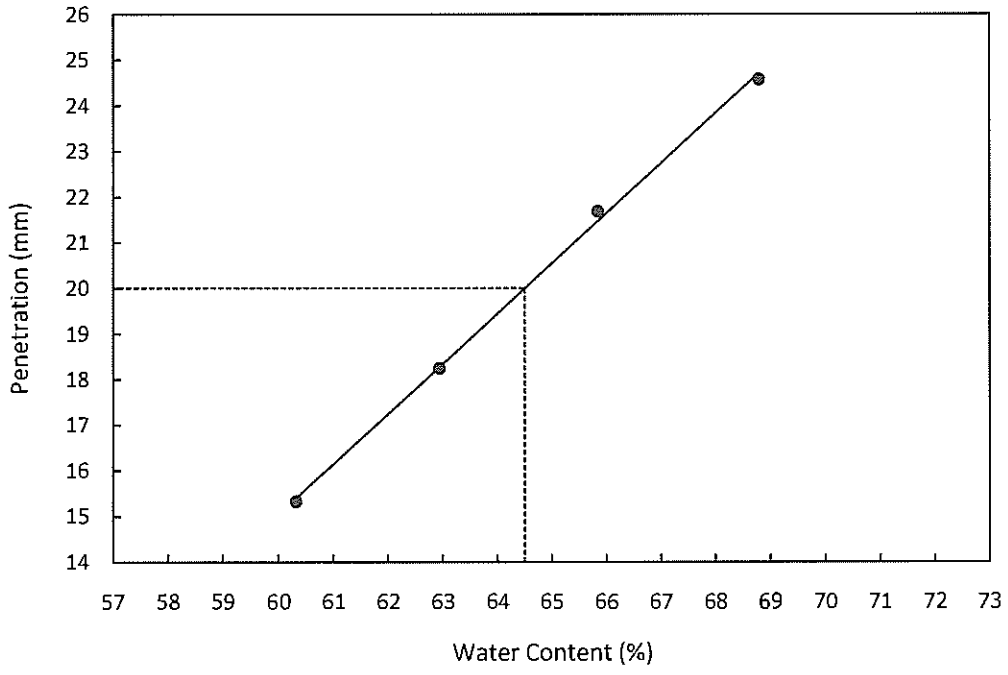
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Reddish brown and light yellow slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 50
TEST DATE	: 09.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.36	20.50	20.24	20.41	20.36	20.32
DRY WEIGHT + CUP	(g)	16.12	15.95	15.48	15.54	17.09	17.18
CUP WEIGHT	(g)	9.09	8.72	8.25	8.46	8.41	8.86
WATER CONTENT	(%)	60.3	62.9	65.8	68.8	37.7	37.7
PENETRATION	(mm)	15.3	18.2	21.7	24.6	-	-

LIQUID LIMIT	(%)	**64.5**
PLASTIC LIMIT	(%)	**37.7**
PLASTICITY INDEX		**27**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

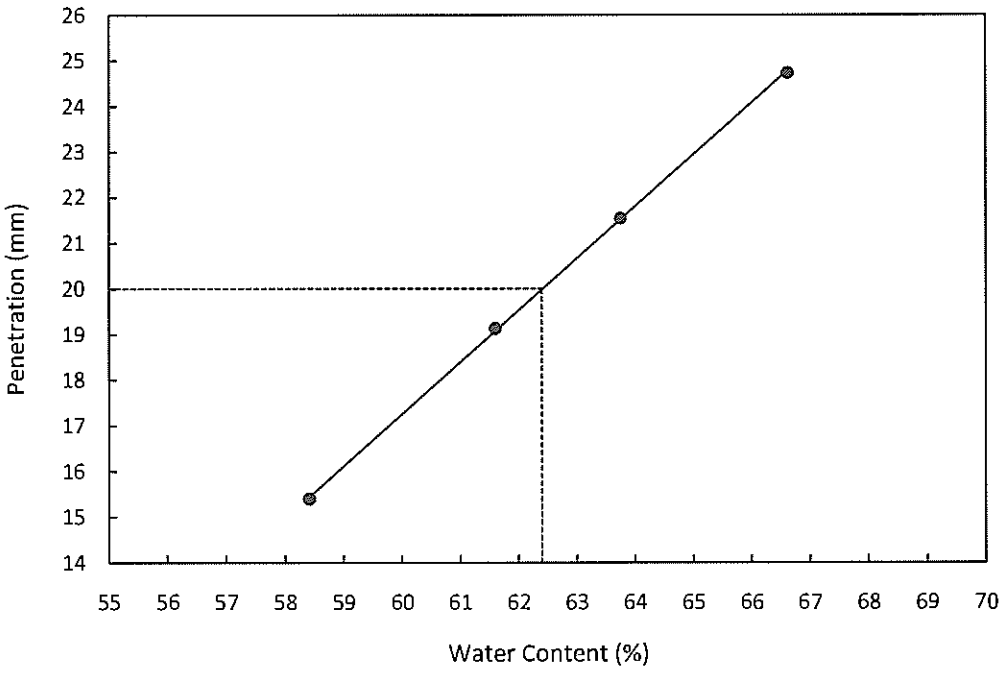
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Reddish brown, light grey and yellow slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 50
TEST DATE	: 09.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.32	20.25	20.26	20.60	20.25	20.24
DRY WEIGHT + CUP	(g)	16.19	15.63	15.97	15.77	16.96	17.20
CUP WEIGHT	(g)	9.12	8.13	9.24	8.52	8.06	9.00
WATER CONTENT	(%)	58.4	61.6	63.7	66.6	37.0	37.1
PENETRATION	(mm)	15.4	19.1	21.6	24.7	-	-

LIQUID LIMIT	(%)	**62.4**
PLASTIC LIMIT	(%)	**37.0**
PLASTICITY INDEX		**25**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

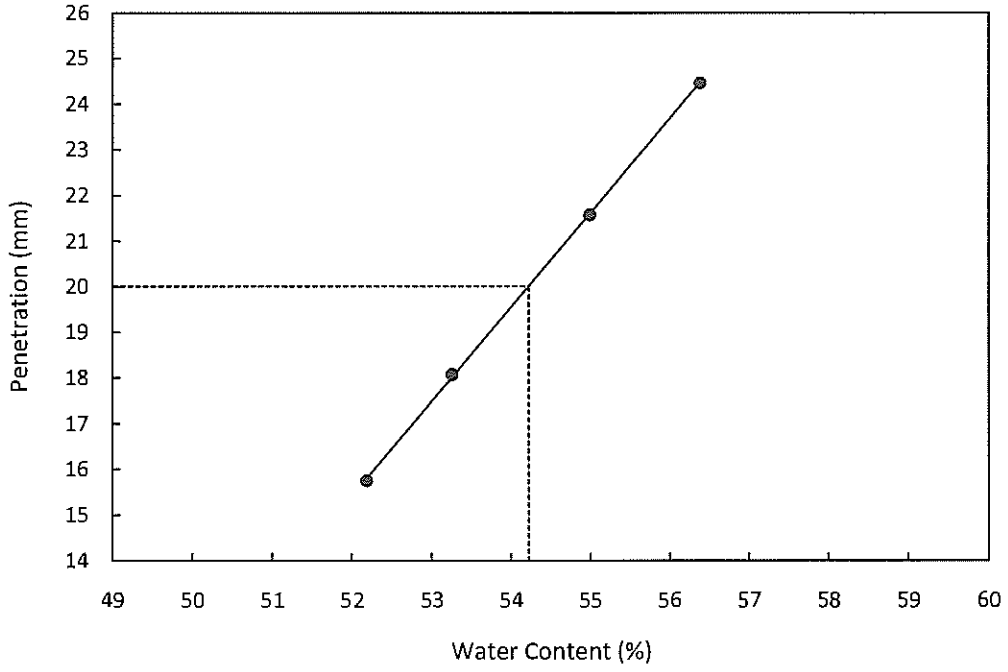
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH14
SAMPLE NO.	: TW4
DEPTH(M)	: 24.00-24.90m
SOIL DESCRIPTION	: Reddish brown, light grey and yellow slightly sandy slightly gravelly SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.42Smm SIEVE	: 44
TEST DATE	: 09.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.66	20.14	20.10	20.51	20.28	20.68
DRY WEIGHT + CUP	(g)	16.59	16.13	15.91	15.87	17.54	17.89
CUP WEIGHT	(g)	8.79	8.60	8.29	7.64	8.99	9.26
WATER CONTENT	(%)	52.2	53.3	55.0	56.4	32.0	32.3
PENETRATION	(mm)	15.8	18.1	21.6	24.5	-	-

LIQUID LIMIT	(%)	**54.2**
PLASTIC LIMIT	(%)	**32.2**
PLASTICITY INDEX		**22**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY

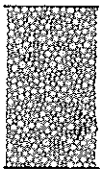


TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

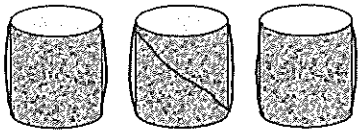
Sample Details						
 *sketch showing specimen location in original sample*	Depth		8.00-8.90m			
	Description		Firm reddish brown and light yellow slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	161.7	158.1	164.2
	Bulk Density	ρ_0	(Mg/m3)	1.89	1.84	1.92
	Particle Density	ρ_s	(Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	80	160	320
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	31	33	30
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.44	1.39	1.47
Initial Voids Ratio	e_0	.	0.85	0.92	0.81
Initial Degree of Saturation	S_o	(%)	98	96	99

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	134.86	133.50	175.77
MembraneCorrection	m_c	(kPa)	1.990	1.810	1.990
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	17.67	20.00
Shear Strength	c_u	(kPa)	67.43	66.75	87.89
Final Moisture	$\omega_f\%$	(%)	31	33	30
Final Dry Density	ρ_{df}	(Mg/m3)	1.44	1.39	1.47
Final Voids Ratio	e_f	.	0.85	0.92	0.81
Final Degree of Saturation	S_f	(%)	97.8	95.5	99.1

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	UU8-SungeiTengah-B14T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

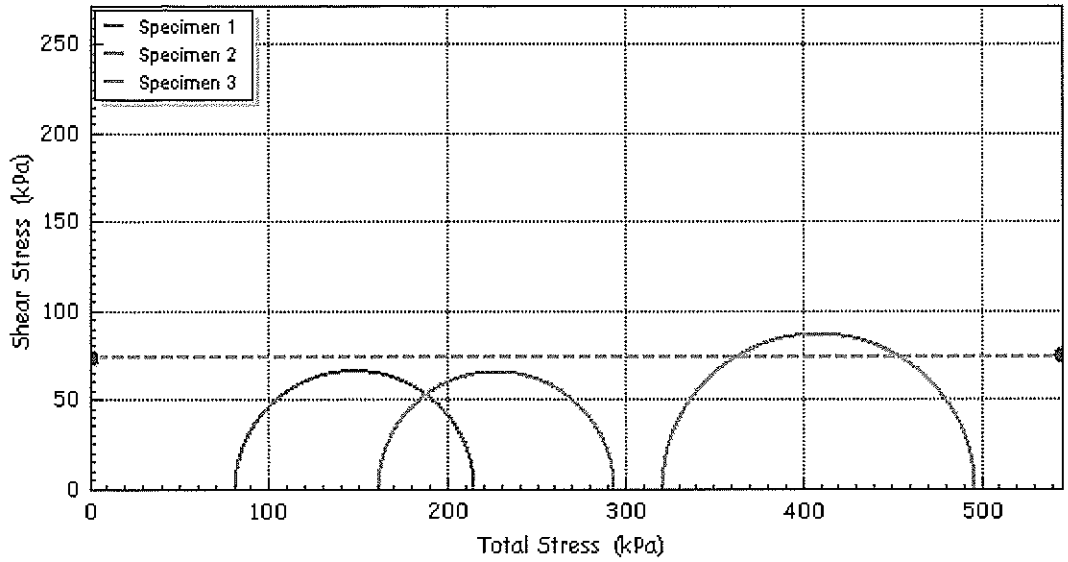
Ryobi Geotechnique International Pte Ltd

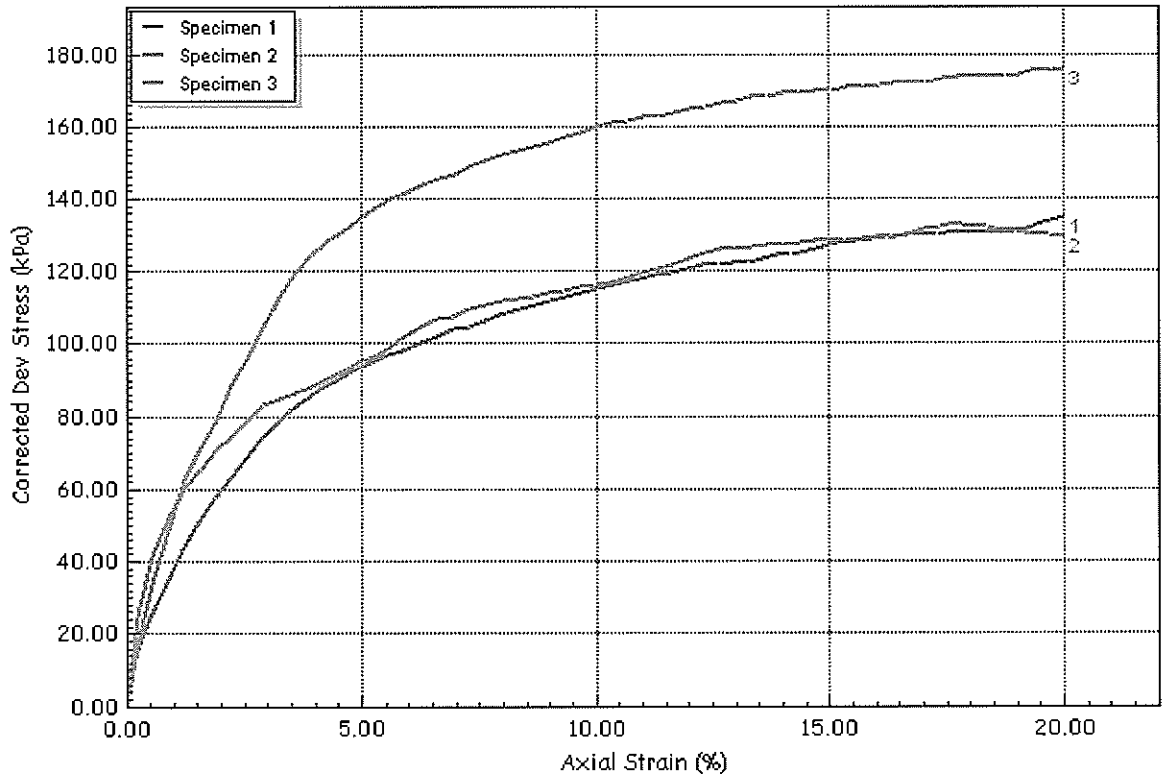
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	74.0
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU8-SungeiTengah-B14T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7			Sample	TW1
Client	AVA			Depth	8.00-8.90m
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

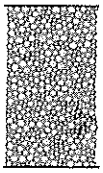
Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			14.00-14.90m		
Description			Stiff reddish brown and light yellow slightly sandy slightly gravelly SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	166.9	167.2	167.1
Bulk Density	ρ_0	(Mg/m3)	1.95	1.95	1.95
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions

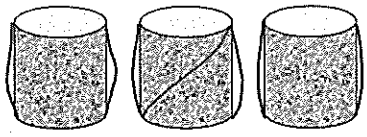
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	135	270	540
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	27	26	28
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.53	1.54	1.52
Initial Voids Ratio	e_0	.	0.73	0.72	0.74
Initial Degree of Saturation	S_o	(%)	99	97	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	199.05	206.04	220.18
MembraneCorrection	m_c	(kPa)	1.990	1.860	1.390
Strain At Max Stress	$\varepsilon_f\%$	(%)	20.00	18.41	12.05
Shear Strength	c_u	(kPa)	99.52	103.02	110.09
Final Moisture	$\omega_f\%$	(%)	27	26	28
Final Dry Density	ρ_{df}	(Mg/m3)	1.53	1.54	1.52
Final Voids Ratio	e_f	.	0.73	0.72	0.74
Final Degree of Saturation	S_f	(%)	98.9	97.3	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	UU9-SungeiTengah-B14T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

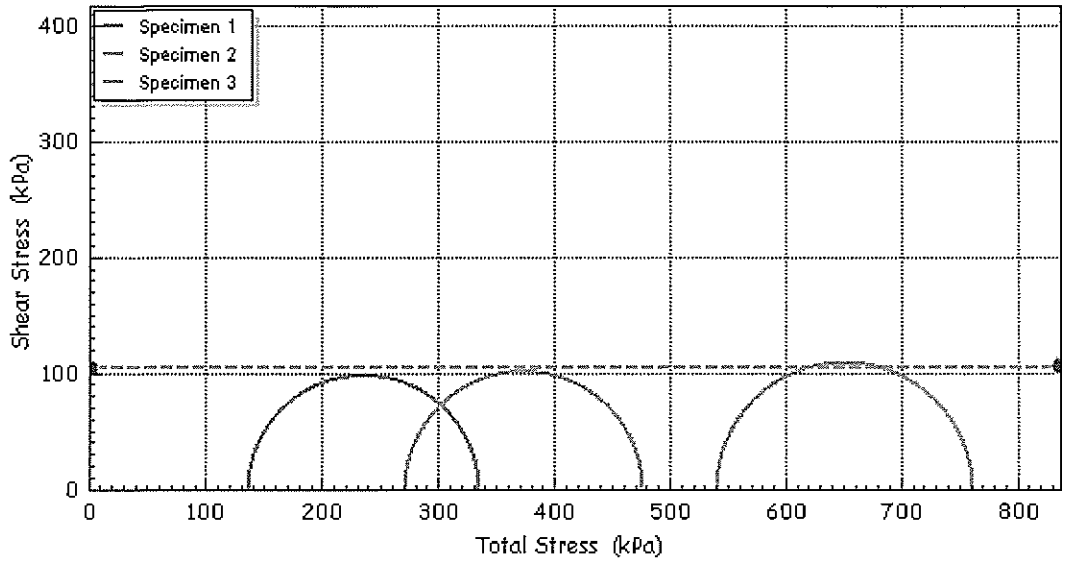
Ryobi Geotechnique International Pte Ltd

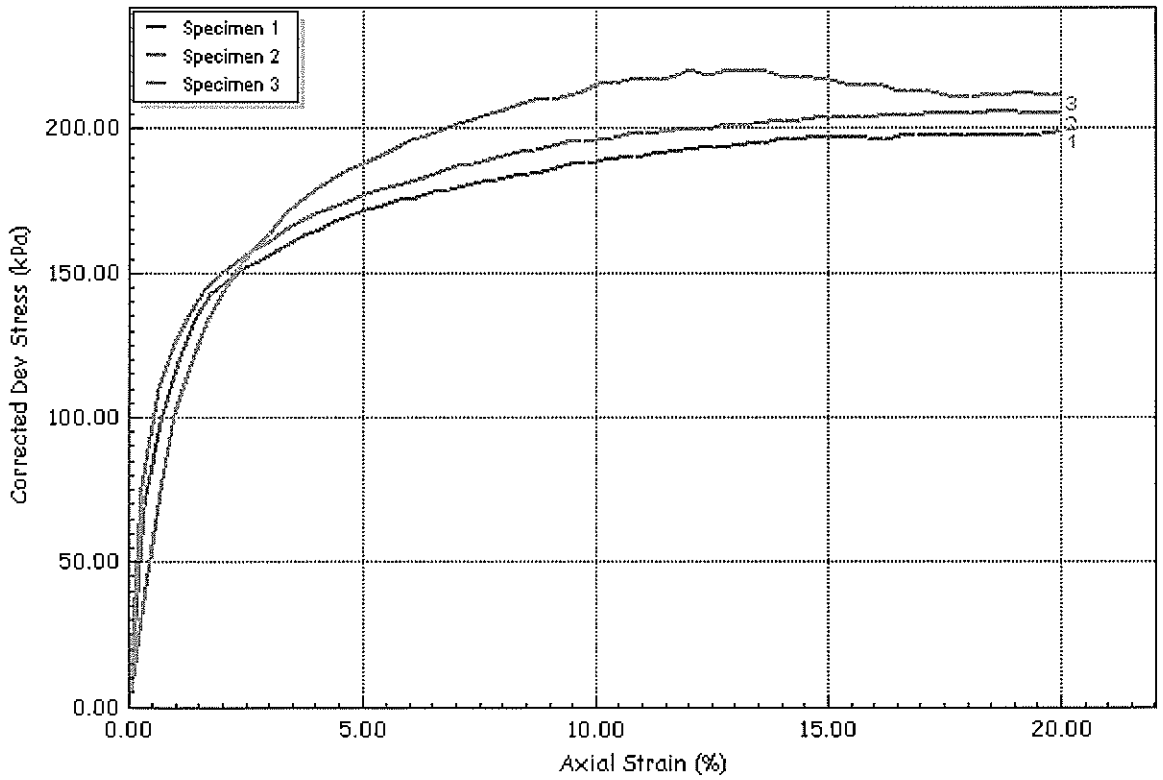
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	104.2
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU9-SungeiTengah-B14T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	12/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keang Kong

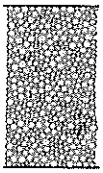
ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

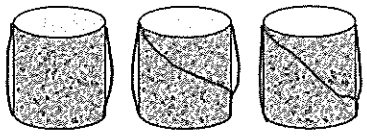
Sample Details					
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m		
	Description		Stiff reddish brown, light grey and yellow slightly sandy slightly gravelly SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	170.1	169.1	171.1
	Bulk Density	ρ_0 (Mg/m3)	1.98	1.97	2.00
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	190	380	760
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	25	26	24
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.59	1.56	1.61
Initial Voids Ratio	e_0	.	0.68	0.70	0.65
Initial Degree of Saturation	S_o	(%)	98	99	97

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	222.26	251.29	236.77
MembraneCorrection	m_c	(kPa)	1.770	1.960	1.780
Strain At Max Stress	$\varepsilon_f\%$	(%)	17.08	19.75	17.31
Shear Strength	c_u	(kPa)	111.13	125.64	118.38
Final Moisture	$\omega_f\%$	(%)	25	26	24
Final Dry Density	ρ_{df}	(Mg/m3)	1.59	1.56	1.61
Final Voids Ratio	e_f	.	0.68	0.70	0.65
Final Degree of Saturation	S_f	(%)	98.3	99.3	97.4

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	UU10-SungeiTengah-B14T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

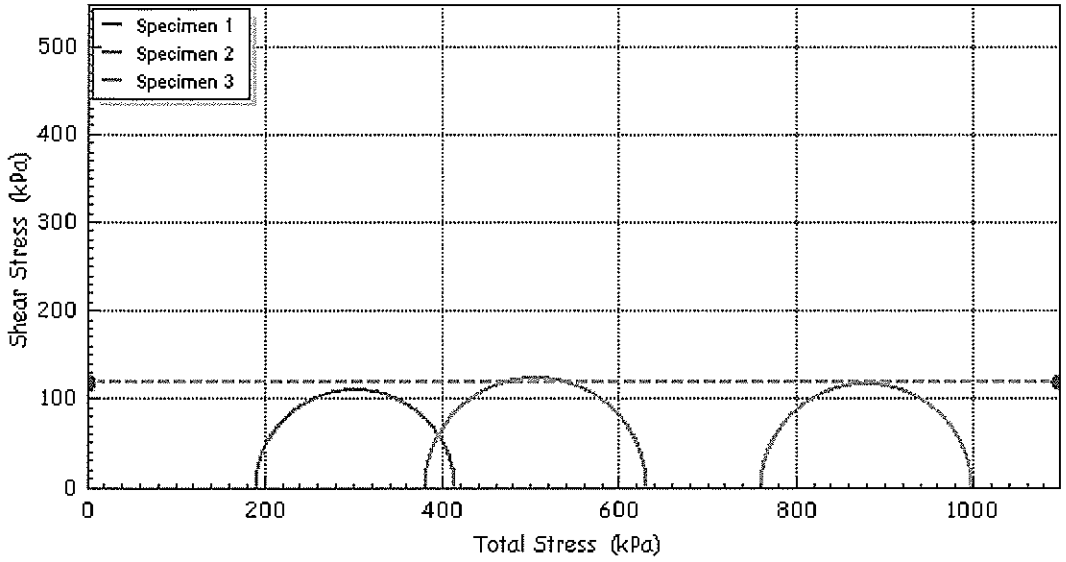
Ryobi Geotechnique International Pte Ltd

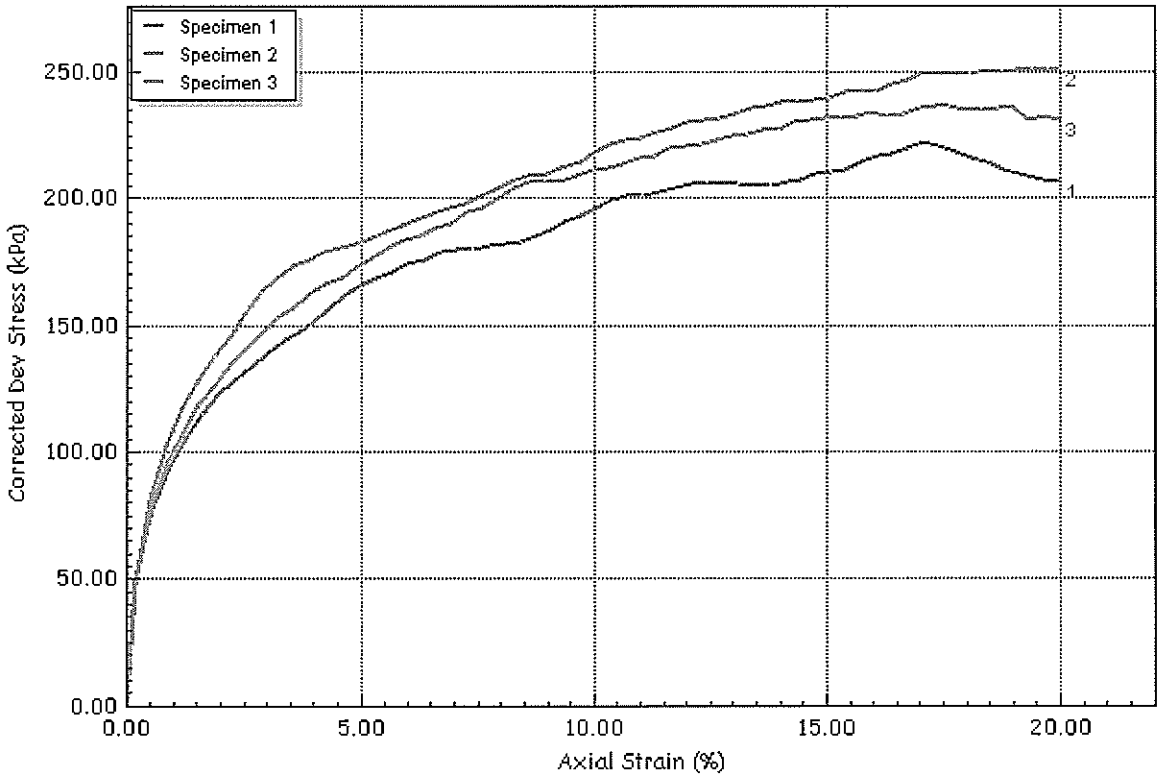
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	118.4
Friction Angle	ϕ	(deg)	0.0





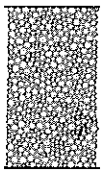
Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU10-SungeiTengah-B14T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details					
 *sketch showing specimen location in original sample*	Depth		24.00-24.90m		
	Description		Stiff reddish brown, light grey and yellow slightly sandy slightly gravelly SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0 (mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0 (gr)	167.4	170.9	164.3
	Bulk Density	ρ_0 (Mg/m3)	1.95	1.99	1.92
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	225	450	850
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	27	24	30
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.53	1.61	1.47
Initial Voids Ratio	e_0	.	0.74	0.65	0.81
Initial Degree of Saturation	S_o	(%)	99	97	100

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	236.33	255.89	271.24
MembraneCorrection	m_c	(kPa)	1.870	1.220	1.430
Strain At Max Stress	$\varepsilon_f\%$	(%)	18.39	10.28	12.65
Shear Strength	c_u	(kPa)	118.17	127.95	135.62
Final Moisture	$\omega_f\%$	(%)	27	24	30
Final Dry Density	ρ_{df}	(Mg/m3)	1.53	1.61	1.47
Final Voids Ratio	e_f	.	0.74	0.65	0.81
Final Degree of Saturation	S_f	(%)	99.2	96.6	99.8

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	UU11-SungeiTengah-B14T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keang Kong

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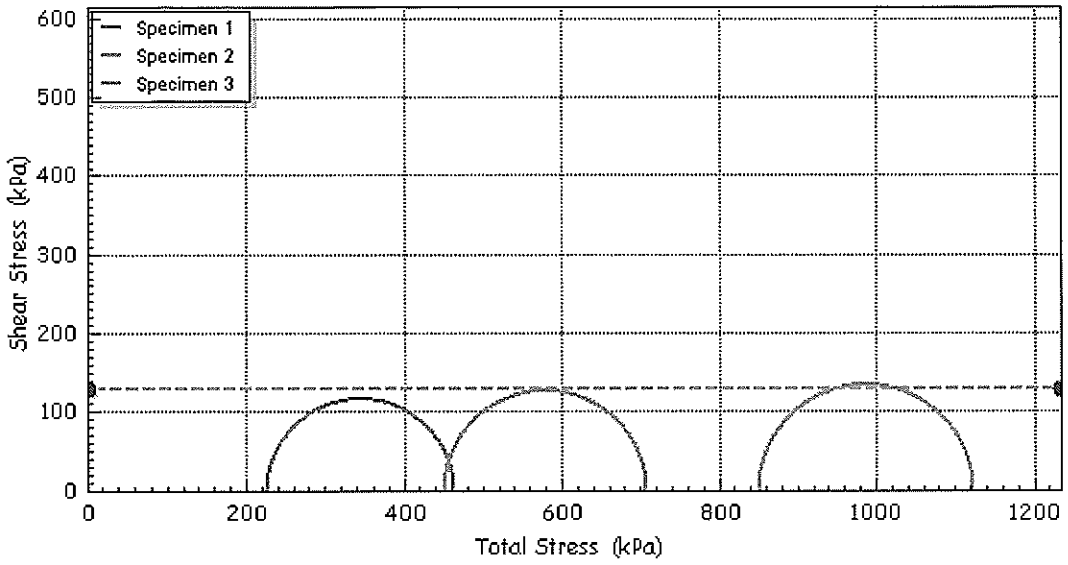
Ryobi Geotechnique International Pte Ltd

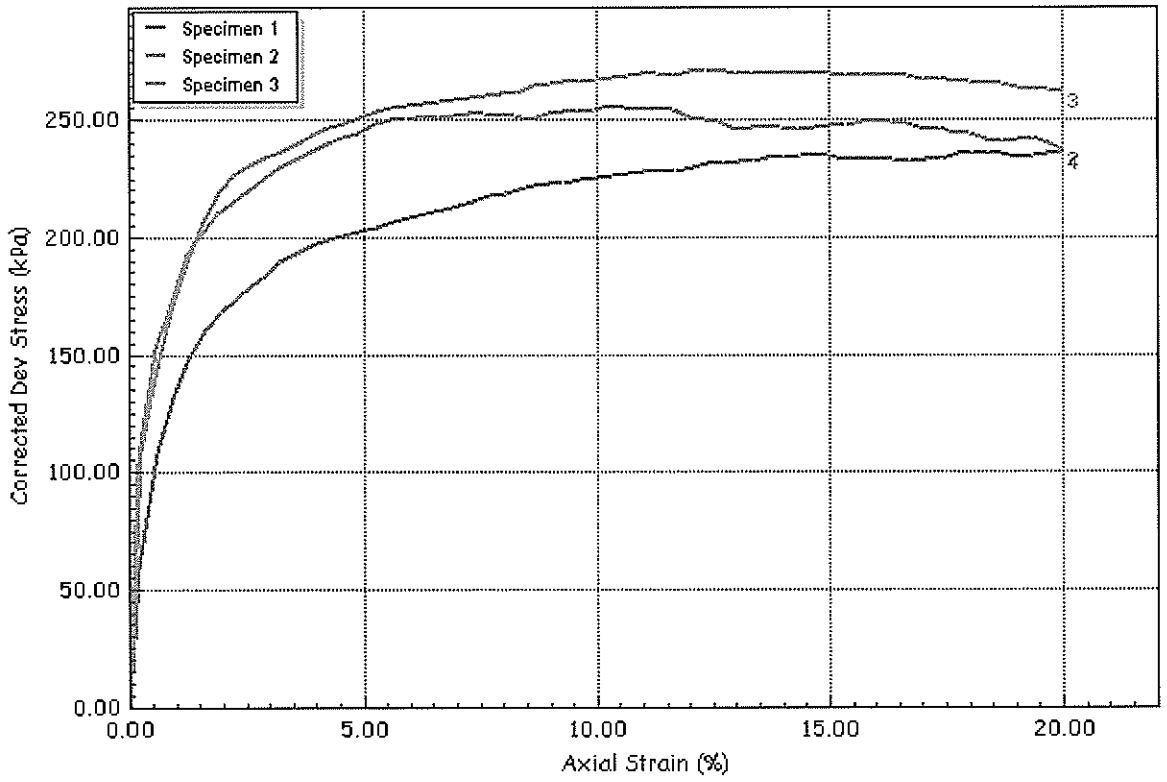
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	127.2
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8			Test Name	UU11-SungeiTengah-B14T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017				Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd			Borehole	BH14
Jobfile	Sungei Tengah Rd-WA7			Sample	TW4
Client	AVA			Depth	24.00-24.90m
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814179**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 10-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- BS method is referenced to British Standard 1377: Part 3/1990
- Organic Content Test is referenced to Clause 3 of Part 3:BS1377
- Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377
- Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Accreditation Category	Position
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	BH12 SPT10 (20.90-21.35m) -Sandy SILT	BH13 SPT6 (12.00-12.45m) - Sandy SILT	BH14 SPT13 (26.00-26.45m) - Sandy SILT
				Sampling date/time	07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*		**SG1814179-001**	**SG1814179-002**	**SG1814179-003**
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		7.1	4.1	6.3
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	% DW		<0.01	<0.01	<0.01
Organic Matter	BS1377	0.1	% DW		0.3	<0.1	<0.1
Sulphate as SO3	BS1377 SO3	0.01	% DW		<0.01	<0.01	<0.01

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814180**	Page	: 1 of 2
Client	: RYOBI GEOTECH PTE LTD	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 07-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 07-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 14-Sep-2018
No. of samples received	: 3	No. of samples analysed	: 3

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- Sulphate Content Test is referenced to Clause 5.2 of Part 3;BS1377
- BS method is referenced to British Standard 1377: Part 3/1990
- Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377
- pH Test is referenced to Clause 9 of Part 3: BS1377

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Accreditation Category	Position
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

Analytical Results

Sub-Matrix: WATER		Client sample ID		BH12	BH13	BH14
		Sampling date/time		07-Sep-2018 00:00	07-Sep-2018 00:00	07-Sep-2018 00:00
Compound	*Method*	*LOR*	*Unit*	**SG1814180-001**	**SG1814180-002**	**SG1814180-003**
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	8.9	8.5	8.9
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	g/L	0.02	0.02	0.02
INORGANICS-Anions						
Sulphate as SO3	BS1377 SO3	0.01	g/L	0.05	0.07	0.06
ORGANICS-General						
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)	<0.10	<0.10	<0.10

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH15						
SAMPLE NO :			SPT2	SPT3	TW1	SPT4	SPT5	SPT6	TW2
SAMPLE DEPTH :		m	4.00-4.45	6.00-6.45	8.00-8.90	8.90-9.35	10.00-10.45	12.00-12.45	14.00-14.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-	-	41.9	54.5	-	-	37.5
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.86	-	1.78	-	1.88
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	-	2.65	-	-	-	2.67	2.66
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	51	0	-	-	27	0	0
	SAND	%		44	-	-		3	17
	SILT	%	28	56	-	-	38	78	64
	CLAY	%	21		-	-	35	19	19
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-	-	101.1	(A)	-	58.8
	PLASTIC LIMIT	%		-	-	52.1		-	36.9
	PLASTICITY INDEX			-	-	49		-	22
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	**UU**	-	-	-	-
	TOTAL COHESION	kPa	-	-	101.9	-	-	-	-
	TEST TYPE		-	-	-	-	-	-	**$CU^{70\Phi}$**
	EFFECTIVE COHESION	kPa	-	-	-	-	-	-	4.6
	EFFECTIVE PHI ANGLE	degree	-	-	-	-	-	-	29.8
CONSOLIDATION TEST (BS 1377 Part 5 : 1990 : Method 3)	PRECONSOLIDATION PRESSURE	kPa	-	-	-	-	-	-	-
	COMPRESSION INDEX	C_c	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	-	-
	Chloride Content	%	-	-	-	-	-	-	-
	Organic Content	%	-	-	-	-	-	-	-
	Sulphate Content	%	-	-	-	-	-	-	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 20/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			8H15						
SAMPLE NO :			SPT7	SPT8	SPT9	TW3	SPT10	SPT11	TW4
SAMPLE DEPTH :		m	14.90-15.35	16.00-16.45	18.00-18.45	20.00-20.90	20.90-21.35	22.00-22.45	24.00-24.90
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	43.9	-	-	22.4	22.6	-	23.0
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	-	-	1.74	2.01	-	-	1.97
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	-	2.71	2.68	2.67	-	-	-
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	(A)	5	0	25	23	-	-
	SAND	%			4	31	41	-	-
	SILT	%		78	96	34	31	-	-
	CLAY	%		17		10	5	-	-
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	50.8	-	-	56.2	-	-	-
	PLASTIC LIMIT	%	30.8	-	-	34.7	-	-	-
	PLASTICITY INDEX		20	-	-	21	-	-	-
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-	-	**UU**	-	-	**UU**
	TOTAL COHESION	kPa	-	-	-	112.0	-	-	212.7
	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	-	-	-	-	-	-	-
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-	-	-	-	8.8	-
	Chloride Content	%	-	-	-	-	-	<0.01	-
	Organic Content	%	-	-	-	-	-	0.2	-
	Sulphate Content	%	-	-	-	-	-	<0.01	-
	pH Value		-	-	-	-	-	-	-
	Chloride Content	g/L	-	-	-	-	-	-	-
	Organic Content	% (w/v)	-	-	-	-	-	-	-
	Sulphate Content	g/L	-	-	-	-	-	-	-

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 20/09/2018

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.

Ryobi Geotechnique International Pte Ltd

58A Sungei Kadut Loop, Ryobi Industrial Bldg., Singapore 729505 Tel: 65- 6369 7100 Fax: 65- 6362 5848

ACCREDITED LABORATORY SAC-SINGLAS

SUMMARY OF LABORATORY TEST RESULTS

CLIENT : AVA

PROJECT : Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. : K5728

BOREHOLE NO :			BH15						
SAMPLE NO :			SPT12	W1					
SAMPLE DEPTH :		m	24.90-25.35	Water Sample					
MOISTURE CONTENT (BS 1377 Part 2 : 1990 : Method 3)		%	-						
BULK DENSITY (BS 1377 Part 2 : 1990 : Method 7)		Mg/m^3	1.94	-					
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	2.66	-					
GRAIN SIZE ANALYSIS (BS 1377 Part 2 : 1990 : Method 9.3 & 9.5)	GRAVEL	%	-	-					
	SAND	%	-	-					
	SILT	%	-	-					
	CLAY	%	-	-					
ATTERBERG LIMITS (BS 1377 Part 2 : 1990 : Method 4.3 & 5)	LIQUID LIMIT	%	(A)	-					
	PLASTIC LIMIT	%		-					
	PLASTICITY INDEX			-					
TRIAXIAL COMPRESSION TEST (BS 1377 Part 7 & 8 : 1990)	TEST TYPE		-	-					
	TOTAL COHESION	kPa	-	-					
	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	-	-					
CHEMICAL CONTENTS ANALYSIS	pH Value		-	-					
	Chloride Content	%	-	-					
	Organic Content	%	-	-					
	Sulphate Content	%	-	-					
	pH Value		-	8.7					
	Chloride Content	g/L	-	0.03					
	Organic Content	% (w/v)	-	<0.10					
	Sulphate Content	g/L	-	0.06					

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) - Test cancelled due to insufficient sample.

PREPARED BY : (Min Win Htut)

CHECKED BY : (Sio Keong Kong)

DATE : 20/09/2018

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.

MOISTURE CONTENT, DENSITY AND PARTICLE DENSITY

(TEST METHOD- BS 1377 Part 2 : 1990)

PROJECT Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road

JOB NO. K5728

BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	MOISTURE CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)	PARTICLE DENSITY (Mg/m^3)
BH15	SPT3	6.00-6.45	-	-	-	2.65
BH15	TW1	8.00-8.90	41.9	1.86	-	-
BH15	SPT4	8.90-9.35	54.5	-	-	-
BH15	SPT5	10.00-10.45	-	1.78	-	-
BH15	SPT6	12.00-12.45	-	-	-	2.67
BH15	TW2	14.00-14.90	37.5	1.88	-	2.66
BH15	SPT7	14.90-15.35	43.9	-	-	-
BH15	SPT8	16.00-16.45	-	-	-	2.71
BH15	SPT9	18.00-18.45	-	1.74	-	2.68
BH15	TW3	20.00-20.90	22.4	2.01	-	2.67
BH15	SPT10	20.90-21.35	22.6	-	-	-
BH15	TW4	24.00-24.90	23.0	1.97	-	-
BH15	SPT12	24.90-25.35	-	1.94	-	2.66

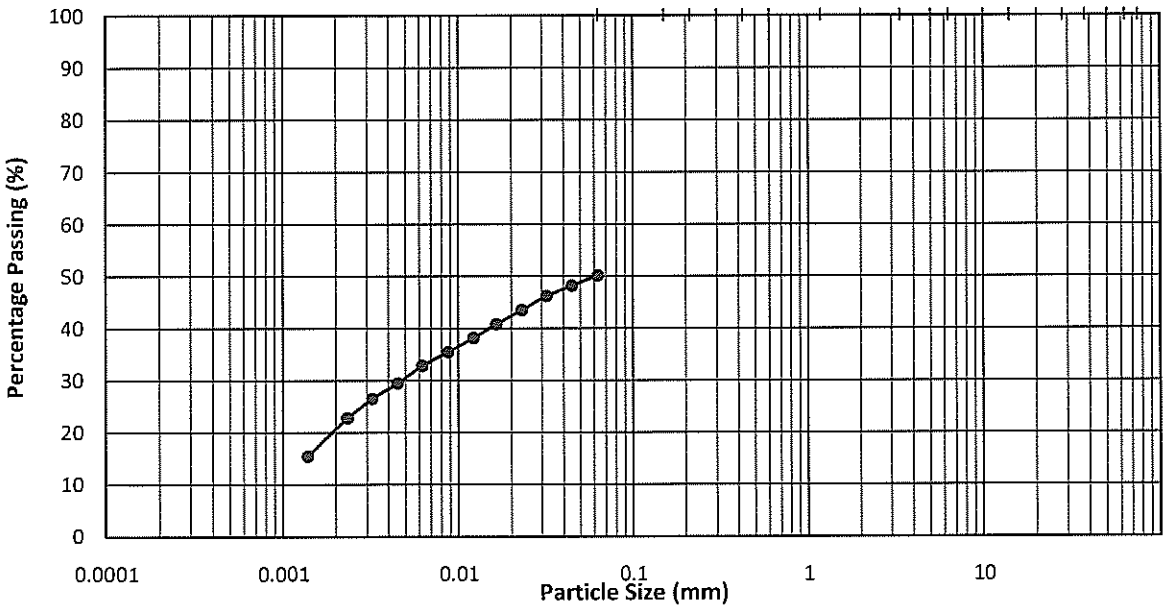
Method Used : MOISTURE CONTENT (BS 1377 Part 2 : 1990 : 3.2)
BULK & DRY DENSITY (BS 1377 Part 2 : 1990 : 7.2)
PARTICLE DENSITY (BS 1377 Part 2 : 1990 : 8.3)

TESTED BY: MONJU Date : 12.09.2018	APPROVED BY: (Authorised Signatory - Min Win Htut)	DATE : 19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT2
DEPTH (m)	: 4.00-4.45m
TEST DATE	: 16.09.2018



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

SOIL DESCRIPTION : **Light grey, reddish brown and yellow sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**51**	%
SILT	=	**28**	%
CLAY	=	**21**	%

% of Passing 0.425 mm Sieve : -

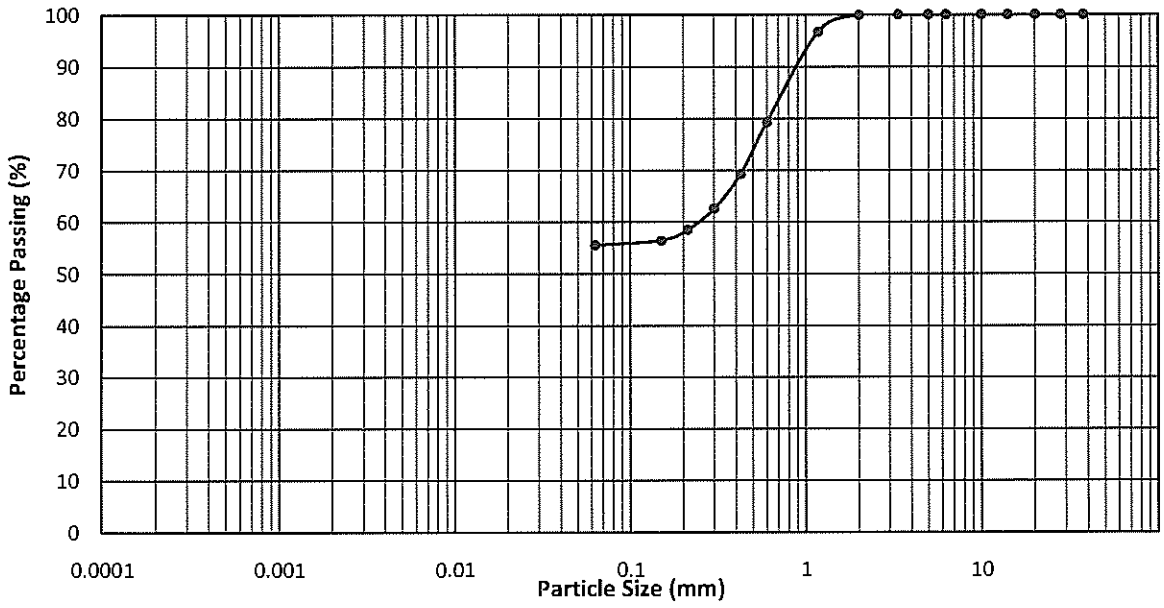
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0023-B

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT3
DEPTH (m)	: 6.00-6.45m
TEST DATE	: 15.09.2018



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

SOIL DESCRIPTION : **Light grey and reddish brown sandy SILT**

SIEVING TEST

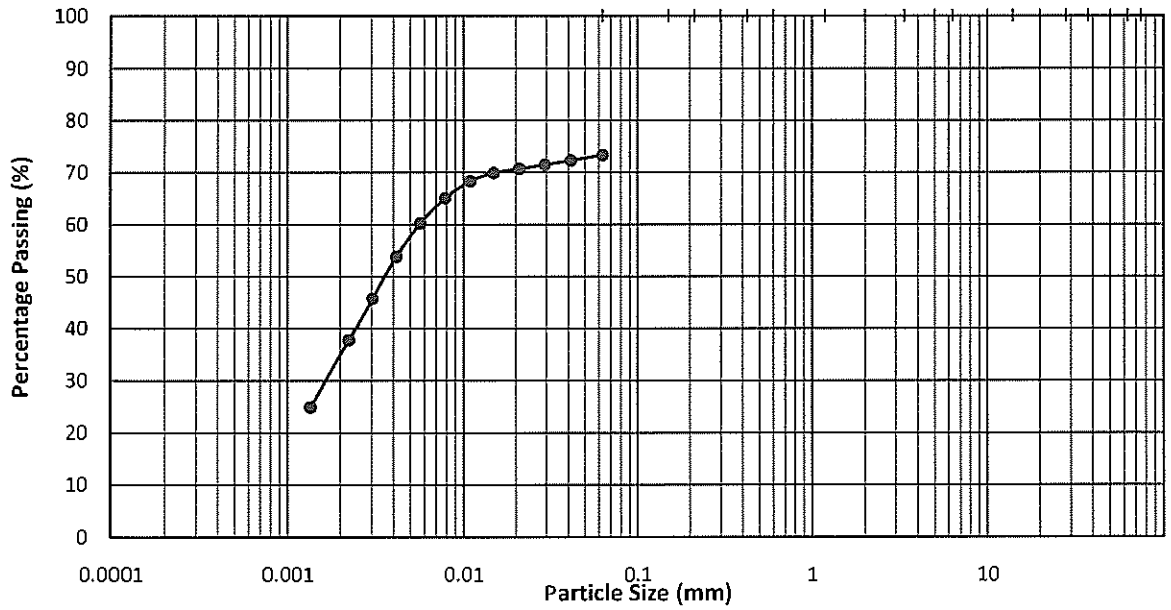
GRAVEL	=	**0**	%	
SAND	=	**44**	%	% of Passing 0.425 mm Sieve : 69.3
SILT + CLAY	=	**56**	%	

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT5
DEPTH (m)	: 10.00-10.45m
TEST DATE	: 16.09.0218



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

SOIL DESCRIPTION : **Reddish brown, light grey and yellow slightly sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**27**	%
SILT	=	**38**	%
CLAY	=	**35**	%

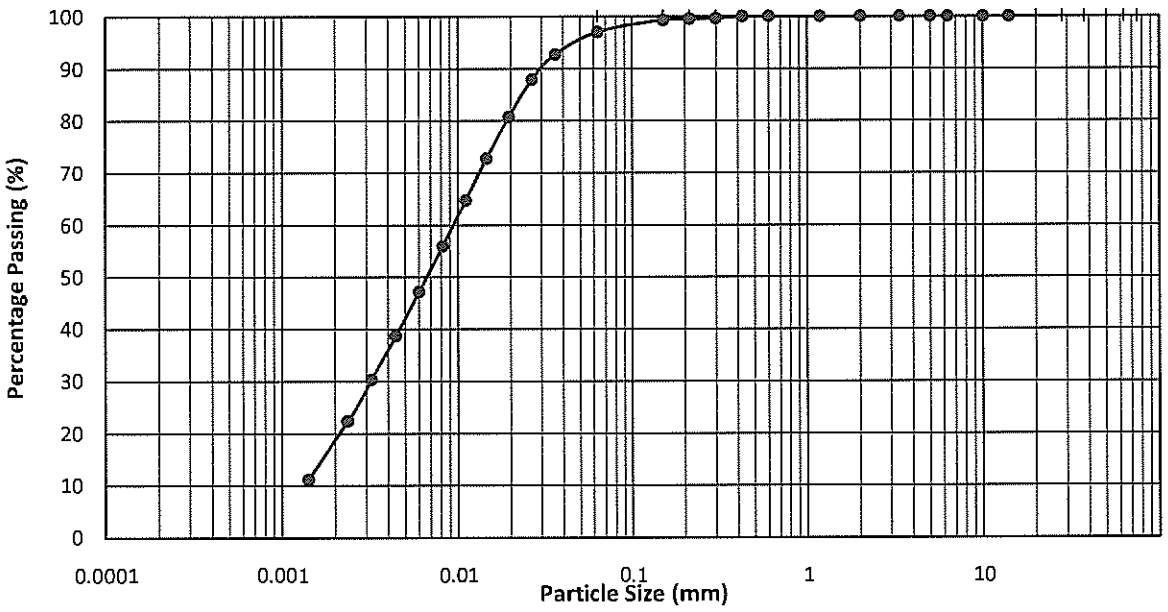
% of Passing 0.425 mm Sieve : -

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT6
DEPTH (m)	: 12.00-12.45m
TEST DATE	: 17.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**3**	%
SILT	=	**78**	%
CLAY	=	**19**	%

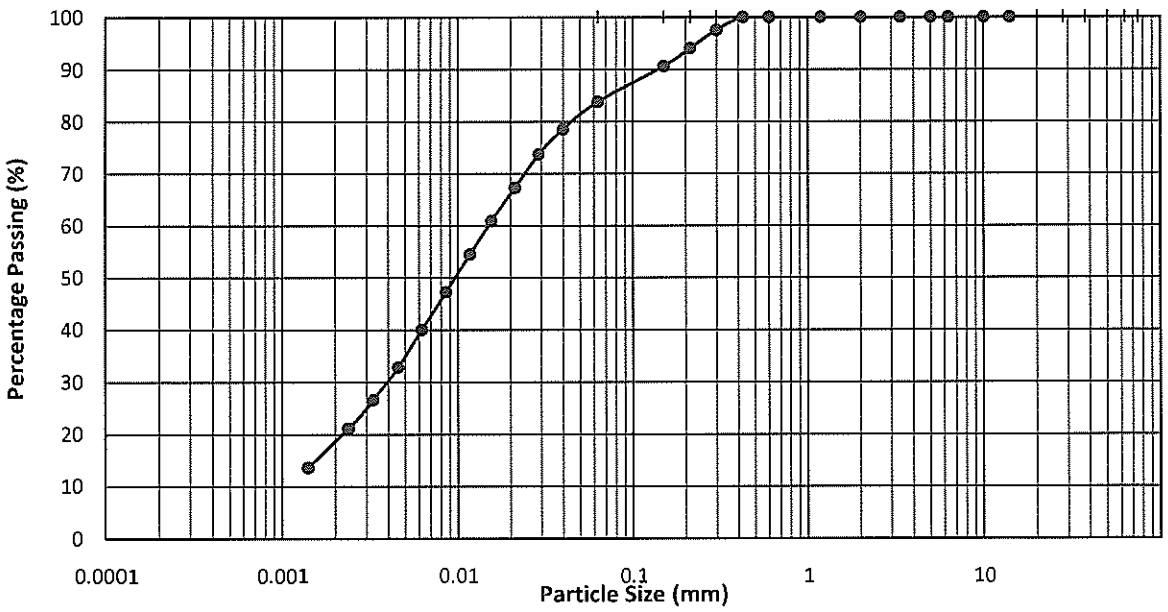
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: TW2
DEPTH (m)	: 14.00-14.90m
TEST DATE	: 17.09.2018



SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**0**	%
SAND	=	**17**	%
SILT	=	**64**	%
CLAY	=	**19**	%

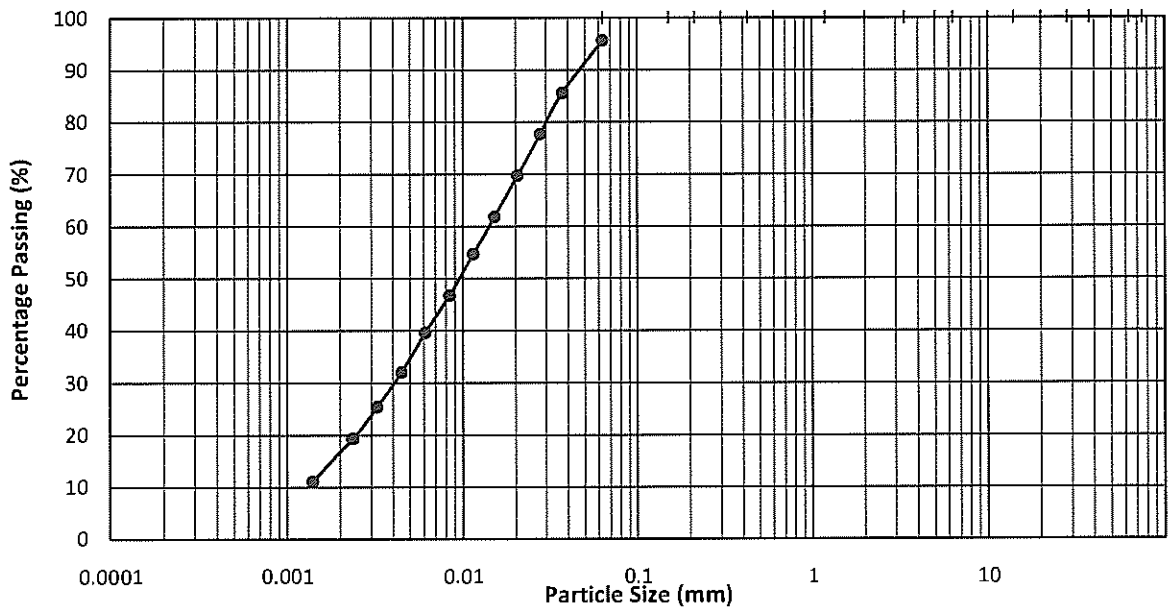
% of Passing 0.425 mm Sieve : 100.0

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT8
DEPTH (m)	: 16.00-16.45m
TEST DATE	: 17.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

HYDROMETER TEST

GRAVEL + SAND	=	**5**	%
SILT	=	**78**	%
CLAY	=	**17**	%

% of Passing 0.425 mm Sieve : -

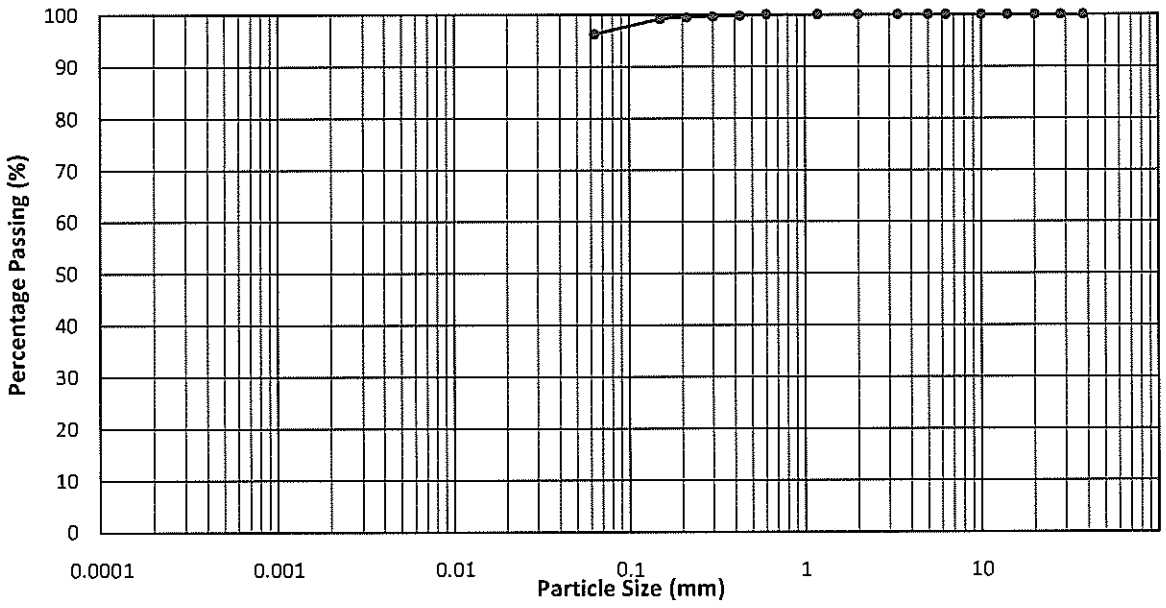
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2016-0161-B

GRAIN SIZE ANALYSIS BY SIEVE METHOD

(TEST METHOD- BS 1377 : Part 2 : 1990 - Clause 9.3)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT9
DEPTH (m)	: 18.00-18.45m
TEST DATE	: 15.09.2018



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

SOIL DESCRIPTION : **Light greenish grey slightly sandy SILT**

SIEVING TEST

GRAVEL	=	**0**	%
SAND	=	**4**	%
SILT + CLAY	=	**96**	%

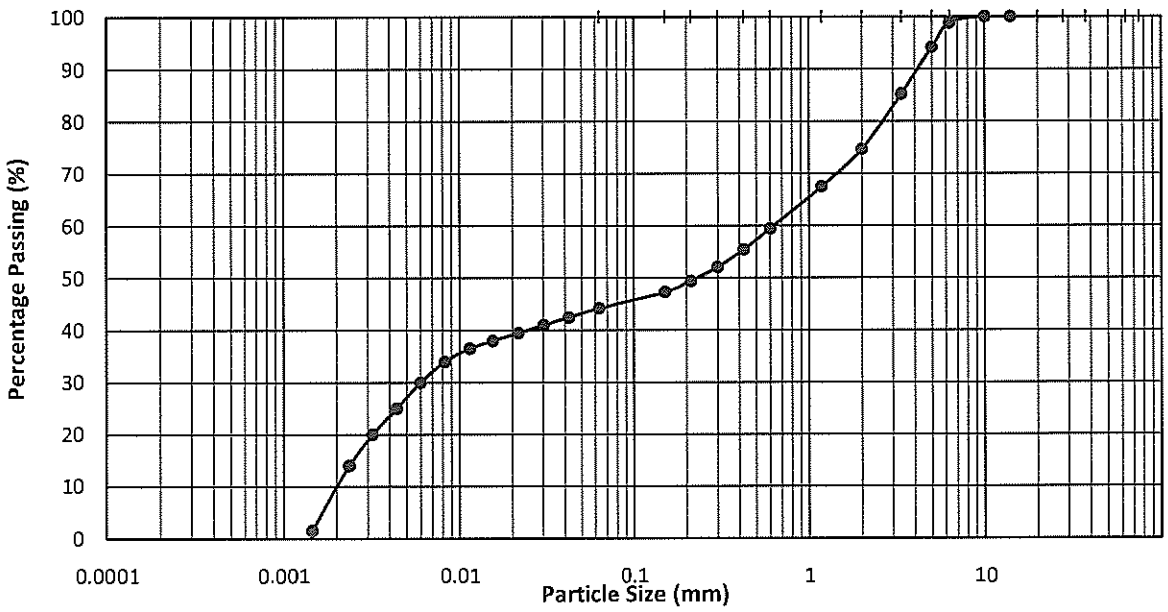
% of Passing 0.425 mm Sieve : 99.8

TESTED BY :	APPROVED BY :	DATE :
S. Thi.	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: TW3
DEPTH (m)	: 20.00-20.90m
TEST DATE	: 17.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly slightly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**25**	%
SAND	=	**31**	%
SILT	=	**34**	%
CLAY	=	**10**	%

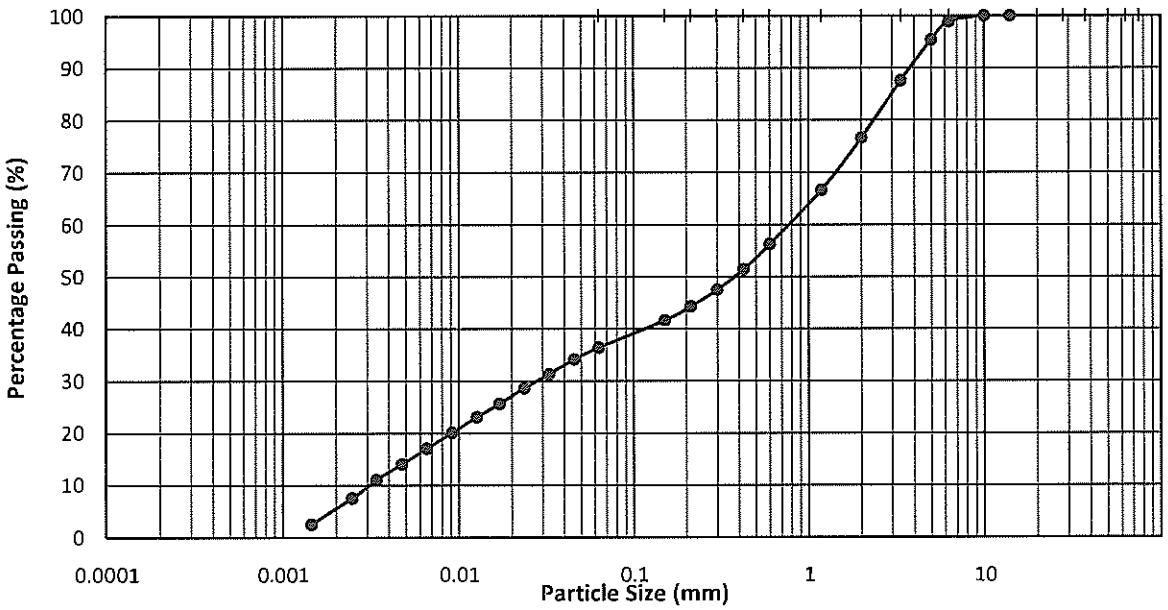
% of Passing 0.425 mm Sieve : 55.4

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

GRAIN SIZE ANALYSIS BY SIEVE AND HYDROMETER METHOD

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

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT10
DEPTH (m)	: 20.90-21.35m
TEST DATE	: 17.09.2018



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

SOIL DESCRIPTION : **Whitish grey and dark grey slightly gravelly sandy SILT**

HYDROMETER + SIEVING

GRAVEL	=	**23**	%
SAND	=	**41**	%
SILT	=	**31**	%
CLAY	=	**5**	%

% of Passing 0.425 mm Sieve : 51.5

TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

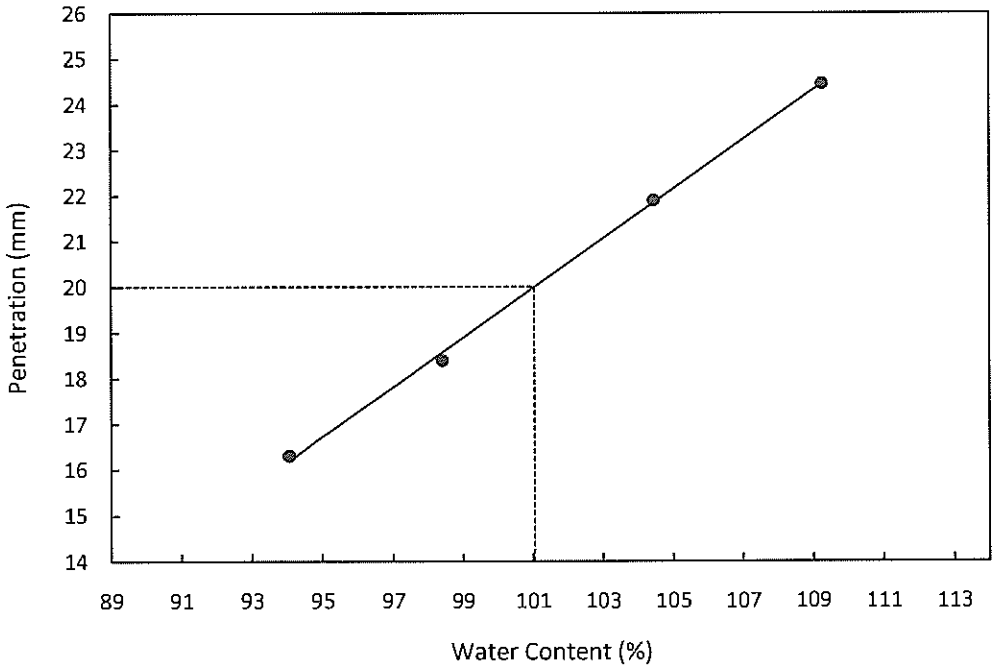
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K572B
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT4
DEPTH(M)	: 8.90-9.35m
SOIL DESCRIPTION	: Reddish brown, light grey and yellow slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 15.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.05	20.33	20.29	20.37	20.35	20.28
DRY WEIGHT + CUP	(g)	14.84	14.74	14.42	14.59	16.59	16.15
CUP WEIGHT	(g)	9.30	9.06	8.80	9.30	9.37	8.24
WATER CONTENT	(%)	94.0	98.4	104.4	109.3	52.1	52.2
PENETRATION	(mm)	16.3	18.4	21.9	24.5	-	-

LIQUID LIMIT	(%)	**101.1**
PLASTIC LIMIT	(%)	**52.1**
PLASTICITY INDEX		**49**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
S. Jim.	(Authorised Signatory : Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

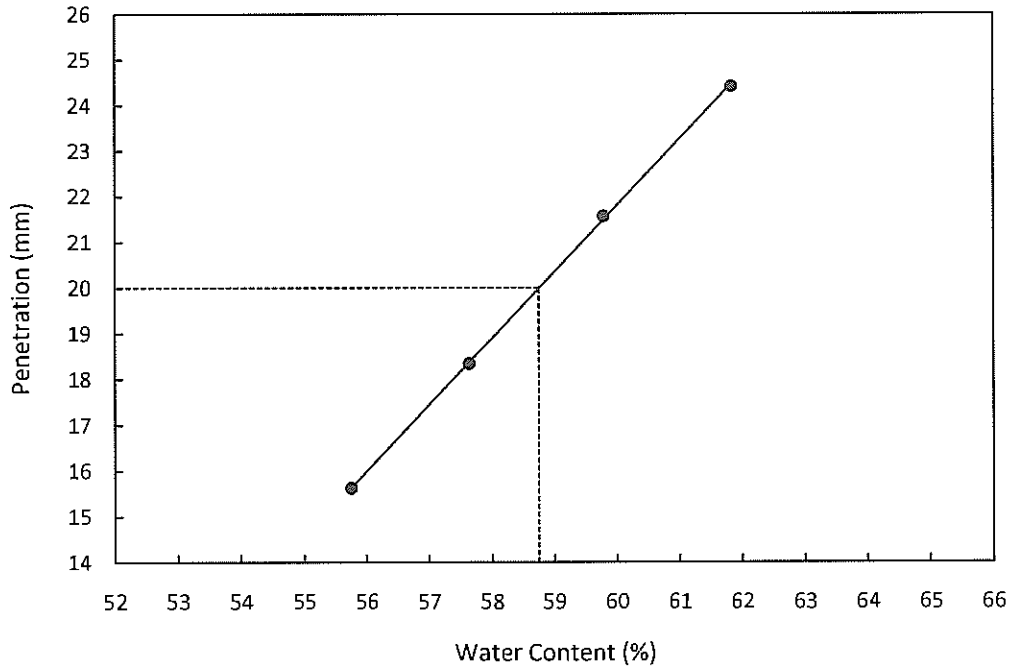
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: TW2
DEPTH(M)	: 14.00-14.90m
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: 100
TEST DATE	: 15.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.74	20.48	20.41	20.62	20.37	20.52
DRY WEIGHT + CUP	(g)	16.62	15.99	15.95	16.23	17.33	17.36
CUP WEIGHT	(g)	9.23	8.20	8.49	9.13	9.09	8.79
WATER CONTENT	(%)	55.8	57.6	59.8	61.8	36.9	36.9
PENETRATION	(mm)	15.6	18.3	21.6	24.4	-	-

LIQUID LIMIT	(%)	**58.8**
PLASTIC LIMIT	(%)	**36.9**
PLASTICITY INDEX		**22**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

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

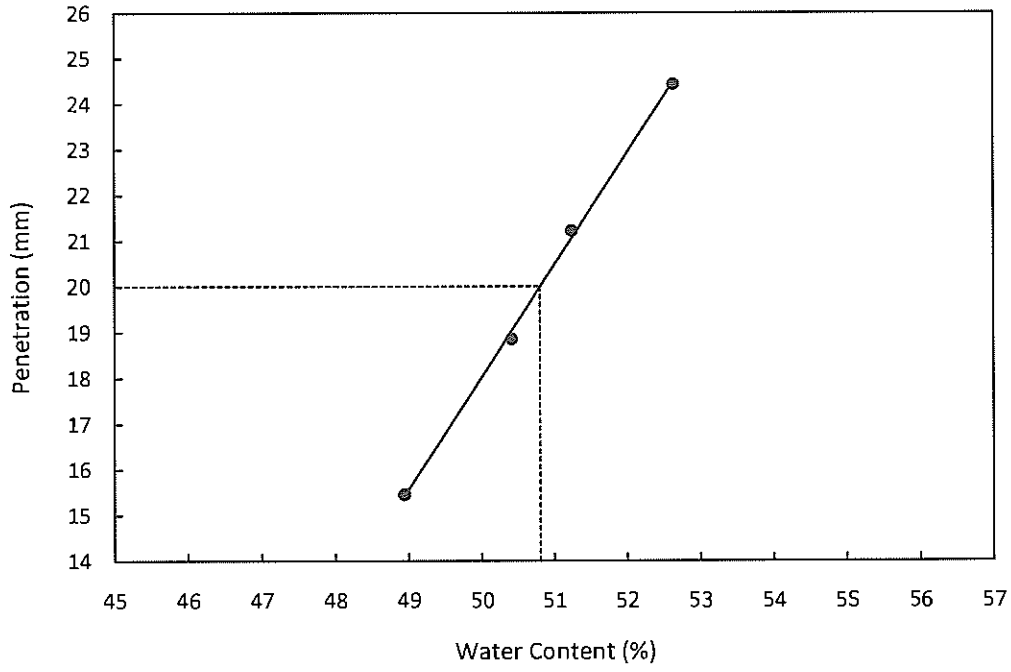
PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: SPT7
DEPTH(M)	: 14.90-1S.3Sm
SOIL DESCRIPTION	: Light greenish grey slightly sandy SILT
SAMPLE CONDITION	: Natural
% OF PASSING 0.425mm SIEVE	: -
TEST DATE	: 15.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.10	20.53	20.49	20.20	20.30	20.21
DRY WEIGHT + CUP	(g)	16.41	16.21	16.36	16.20	17.68	17.40
CUP WEIGHT	(g)	8.87	7.64	8.30	8.60	9.22	8.25
WATER CONTENT	(%)	48.9	50.4	51.2	52.6	31.0	30.7
PENETRATION	(mm)	15.5	18.9	21.2	24.4	-	-

LIQUID LIMIT	(%)	**50.8**
PLASTIC LIMIT	(%)	**30.8**
PLASTICITY INDEX		**20**

NOTE:

M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19-9-2018

ACCREDITED LABORATORY SAC-SINGLAS

ATTERBERG LIMITS TEST BY CONE PENETROMETER METHOD

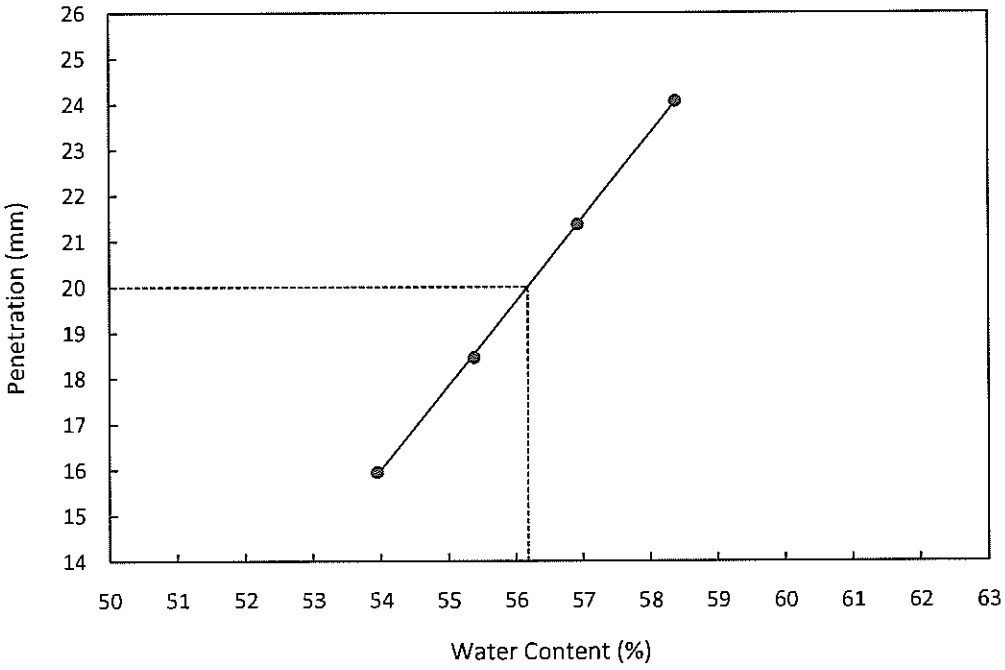
(TEST METHOD- BS 1377 : Part 2 : 1990 - Method 4.3 & 5)

PROJECT	: Soil Investigation Works At ST28 (LV Plots) Along Sungei Tengah Road
JOB NO.	: K5728
BOREHOLE NO.	: BH15
SAMPLE NO.	: TW3
DEPTH(M)	: 20.00-20.90m
SOIL DESCRIPTION	: Whitish grey and dark grey slightly gravelly slightly sandy SILT
SAMPLE CONDITION	: Sieved
% OF PASSING 0.425mm SIEVE	: 44
TEST DATE	: 13.09.2018

		LIQUID LIMIT				PLASTIC LIMIT	
WET WEIGHT + CUP	(g)	20.40	20.83	20.54	20.37	20.14	20.12
DRY WEIGHT + CUP	(g)	16.16	16.35	16.02	16.19	17.17	16.93
CUP WEIGHT	(g)	8.30	8.26	8.08	9.03	8.61	7.74
WATER CONTENT	(%)	53.9	55.4	56.9	58.4	34.7	34.7
PENETRATION	(mm)	16.0	18.5	21.4	24.1	-	-

LIQUID LIMIT	(%)	**56.2**
PLASTIC LIMIT	(%)	**34.7**
PLASTICITY INDEX		**21**

NOTE:
M : SILT
C : CLAY
L : LOW PLASTICITY
I : INTERMEDIATE PLASTICITY
H : HIGH PLASTICITY
V : VERY HIGH PLASTICITY
E : EXTREMELY HIGH PLASTICITY



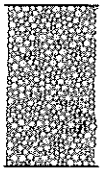
TESTED BY :	APPROVED BY :	DATE :
	(Authorised Signatory - Min Win Htut)	19.9.2018

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details



sketch showing specimen location in original sample

			Spm. 1	2	3
Depth			8.00-8.90m		
Description			Stiff reddish brown, light grey and yellow slightly sandy SILT		
Type			Undisturbed Sample		
Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Sample Weight	W_0	(gr)	155.4	157.9	164.7
Bulk Density	ρ_0	(Mg/m3)	1.81	1.84	1.92
Particle Density(Assumed)	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions

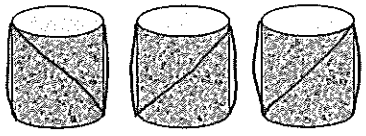
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	80	160	320
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	46	40	33
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.24	1.32	1.44
Initial Voids Ratio	e_0	.	1.14	1.01	0.84
Initial Degree of Saturation	S_o	(%)	100	100	100

Final Conditions

			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	191.72	175.30	244.11
MembraneCorrection	m_c	(kPa)	0.850	1.070	1.760
Strain At Max Stress	$\varepsilon_f\%$	(%)	6.55	8.62	17.01
Shear Strength	c_u	(kPa)	95.86	87.65	122.05
Final Moisture	$\omega_f\%$	(%)	46	40	33
Final Dry Density	ρ_{df}	(Mg/m3)	1.24	1.32	1.44
Final Voids Ratio	e_f	.	1.14	1.01	0.84
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-SungeiTengah-B15T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

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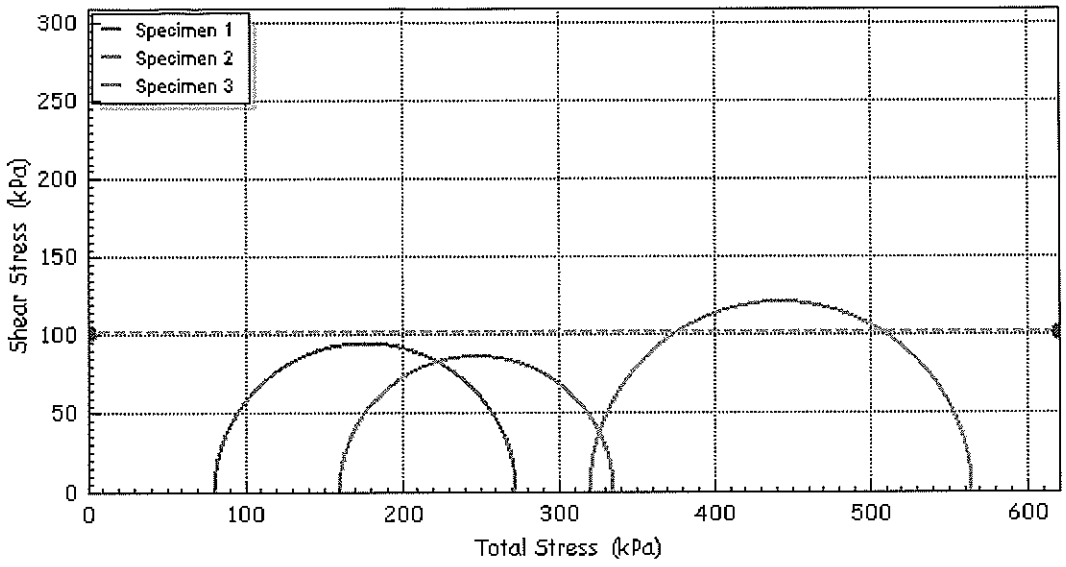
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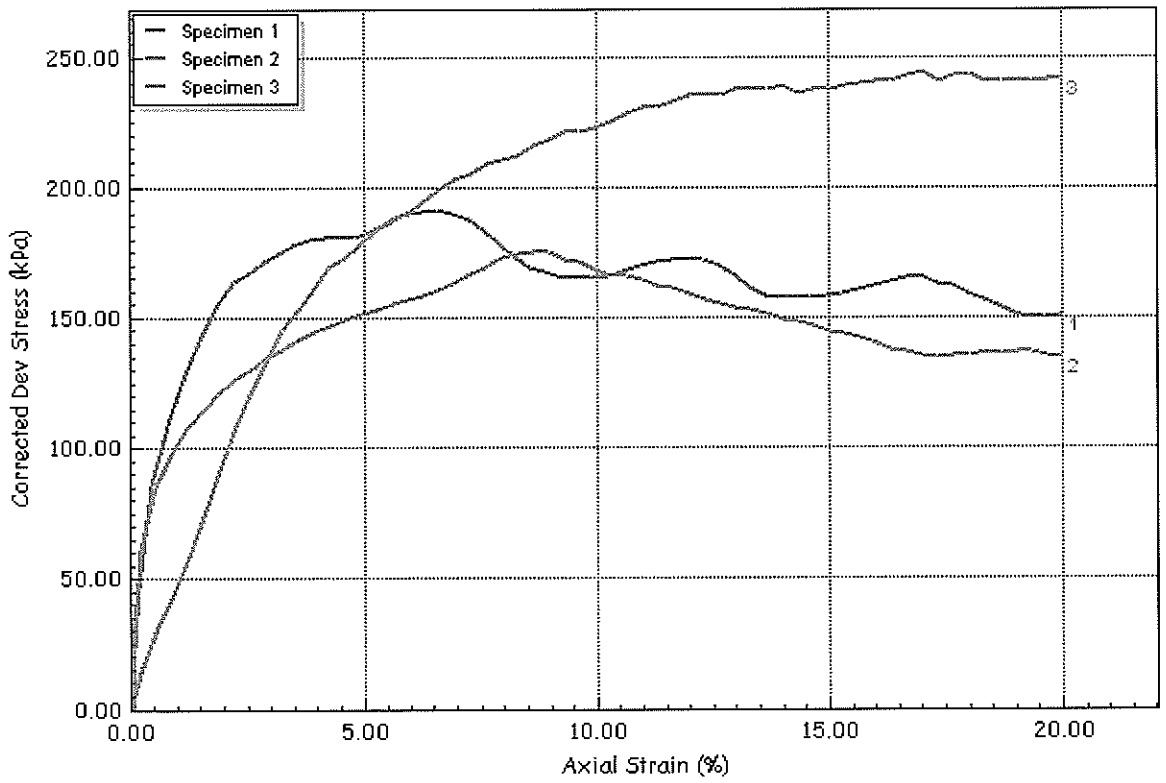
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	101.9
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU1-SungeiTengah-B15T1
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW1
Client	AVA	Depth	8.00-8.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

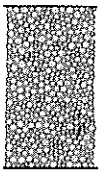
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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

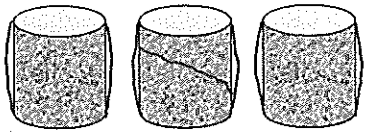
Sample Details						
 *sketch showing specimen location in original sample*	Depth		20.00-20.90m			
	Description		Stiff whitish grey and dark grey slightly gravelly slightly sandy SILT			
	Type		Undisturbed Sample			
				Spm. 1	2	3
	Initial Sample Length	L_0	(mm)	75.6	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0	38.0
	Initial Sample Weight	W_0	(gr)	173.3	170.8	172.8
	Bulk Density	ρ_0	(Mg/m3)	2.02	1.99	2.02
	Particle Density	ρ_s	(Mg/m3)	2.67	2.67	2.67

Initial Conditions					
Specimen			Spm. 1	2	3
Initial Cell Pressure	σ_3	(kPa)	185	370	740
Strain Rate	m_s	(mm/min)	0.76000	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	22	24	23
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.66	1.60	1.64
Initial Voids Ratio	e_0	.	0.61	0.67	0.63
Initial Degree of Saturation	S_o	(%)	96	98	98

Final Conditions					
			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	216.86	227.56	227.55
MembraneCorrection	m_c	(kPa)	1.870	1.940	1.990
Strain At Max Stress	$\varepsilon_f\%$	(%)	18.51	19.39	20.00
Shear Strength	c_u	(kPa)	108.43	113.78	113.77
Final Moisture	$\omega_f\%$	(%)	22	24	23
Final Dry Density	ρ_{df}	(Mg/m3)	1.66	1.60	1.64
Final Voids Ratio	e_f	.	0.61	0.67	0.63
Final Degree of Saturation	S_f	(%)	95.6	97.6	97.5

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	UU2-SungeiTengah-B15T3	
Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	13/9/2018	
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH15	
Jobfile	Sungei Tengah Rd-WA7		Sample	TW3	
Client	AVA		Depth	20.00-20.90m	
Operator		Checked	Min Win Htut	Approved	Sio Keong Kong

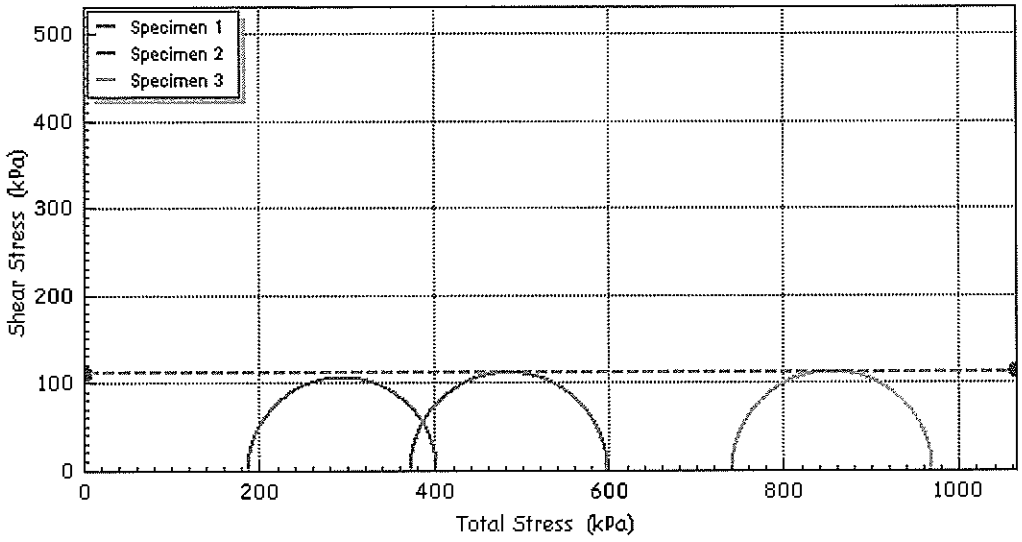
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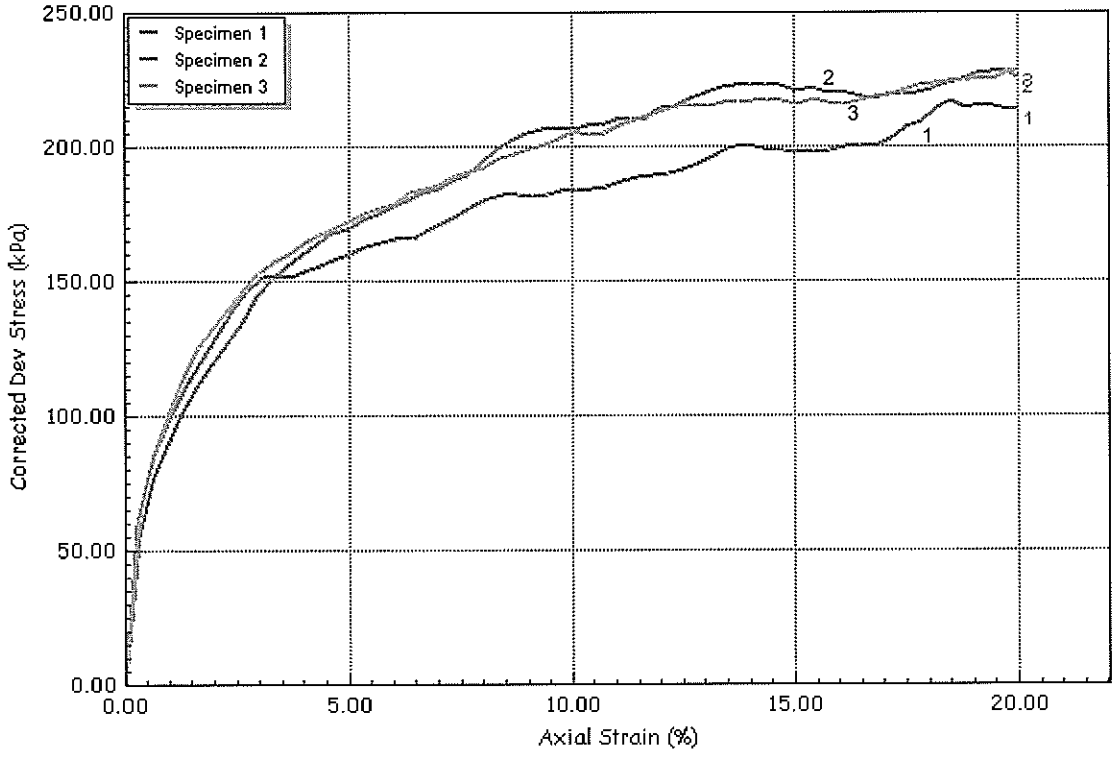
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	112.0
Friction Angle	ϕ	(deg)	0.0





Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU2-SungeiTengah-B15T3
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW3
Client	AVA	Depth	20.00-20.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

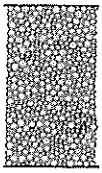
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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Summary Report

Sample Details				Spm. 1	2
 *sketch showing specimen location in original sample*	Depth			24.00-24.90m	
	Description			Very stiff whitish grey and dark grey slightly sandy SILT	
	Type			Undisturbed Sample	
	Initial Sample Length	L_0	(mm)	75.6	75.6
	Initial Sample Diameter	D_0	(mm)	38.0	38.0
	Initial Sample Weight	W_0	(gr)	166.5	172.1
	Bulk Density	ρ_0	(Mg/m3)	1.94	2.01
	Particle Density(Assumed)	ρ_s	(Mg/m3)	2.65	2.65

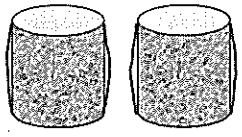
Initial Conditions				
Specimen			Spm. 1	2
Initial Cell Pressure	σ_3	(kPa)	225	450
Strain Rate	m_s	(mm/min)	0.76000	0.76000
MembraneThickness	m_b	(mm)	0.20	0.20
Initial Moisture	$\omega_i\%$	(%)	20	20
Initial Dry Density	ρ_{d0}	(Mg/m3)	1.62	1.68
Initial Voids Ratio	e_0	.	0.64	0.58
Initial Degree of Saturation	S_o	(%)	83	90

Final Conditions				
			Spm. 1	2
Max Deviator Stress	$(\sigma_1-\sigma_3)_f$	(kPa)	381.19	469.71
MembraneCorrection	m_c	(kPa)	1.950	1.960
Strain At Max Stress	$\varepsilon_f\%$	(%)	19.46	19.66
Shear Strength	c_u	(kPa)	190.60	234.85
Final Moisture	$\omega_f\%$	(%)	20	20
Final Dry Density	ρ_{df}	(Mg/m3)	1.62	1.68
Final Voids Ratio	e_f	.	0.64	0.58
Final Degree of Saturation	S_f	(%)	83.0	89.9

Notes

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

Only two specimens tested due to insufficient sample.



Failure Sketch

(surface inclination)

Test Method	BS1377: Part 7 1990 : Clause 8	Test Name	UU3-SungeiTengah-B15T4
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	13/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW4
Client	AVA	Depth	24.00-24.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

ACCREDITED LABORATORY SAC-SINGLAS Cert No: LA-2015-0013-G

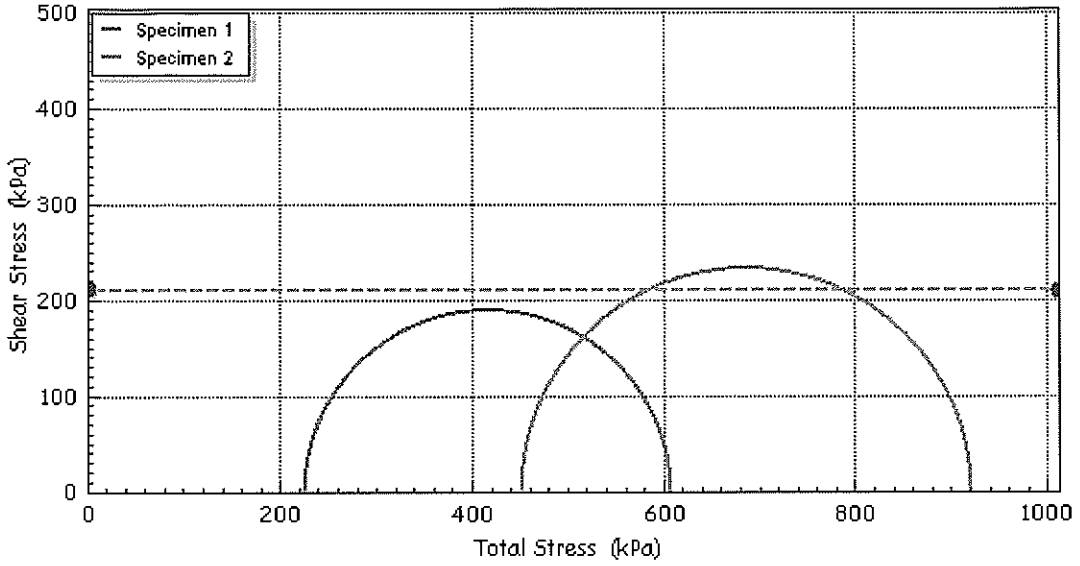
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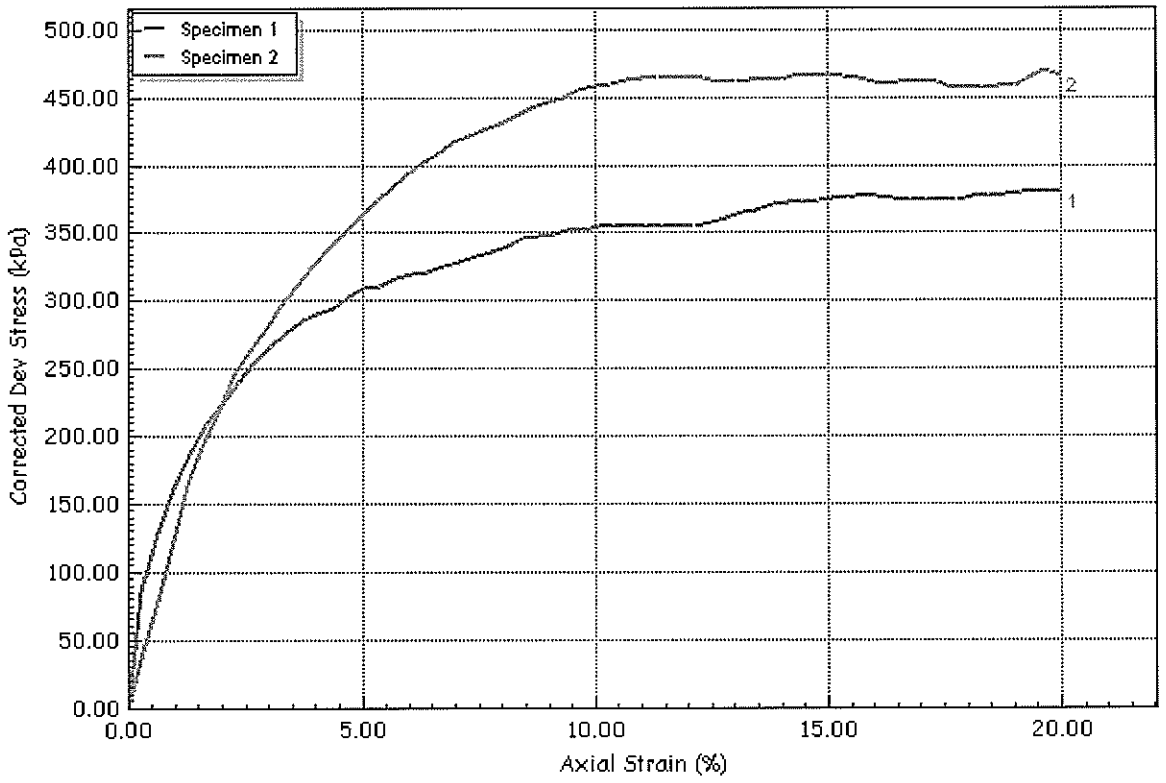
Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	212.7
Friction Angle	ϕ	(deg)	0.0





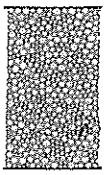
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Database: .\SQLEXPRESS \ RyobiG-L3-2017			Test Date	13/9/2018	
Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd		Borehole	BH15	
Jobfile	Sungei Tengah Rd-WA7		Sample	TW4	
Client	AVA		Depth	24.00-24.90m	
Operator		Checked	Min Win Htut	Approved	Sio Keong Yong

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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

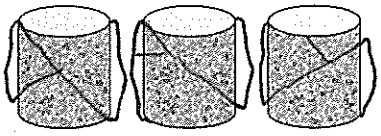
Sample Details					
 *sketch showing specimen location in original sample*	Depth		14.00-14.90m		
	Description		Light greenish grey slightly sandy SILT		
	Type		Undisturbed Sample		
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	140.0	140.0	140.0
	Initial Sample Diameter	D_0 (mm)	70.0	70.0	70.0
	Initial Sample Weight	W_0 (gr)	1009.9	1012.8	1011.6
	Initial Bulk Density	ρ_0 (Mg/m3)	1.87	1.88	1.88
	Particle Density	ρ_s (Mg/m3)	2.66	2.66	2.66

Initial Conditions			Spm. 1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	275	350	500
Initial Back Pressure	U_{bi}	(kPa)	200	200	200
Strain Rate	m_s	(mm/min)	0.06000	0.06000	0.06000
Membrane Thickness	m_b	(mm)	0.200	0.200	0.200
Initial Moisture	$\omega_i\%$	(%)	39	39	39
Initial Dry Density	ρ_{di}	(Mg/m3)	1.35	1.35	1.35
Initial Voids Ratio	e_i	.	0.976	0.969	0.973
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.97	0.97	0.97

Final Conditions			Spm. 1	2	3
Final Moisture	$\omega_f\%$	(%)	37	34	33
Final Dry Density	ρ_{df}	(Mg/m3)	1.40	1.45	1.48
Final Voids Ratio	e_f	.	0.899	0.830	0.796
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Stress Ratio	Max. Stress Ratio	Max. Stress Ratio
Strain At Failure	$\varepsilon\%$	(%)	3.69	3.30	3.26
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	98.7	167.9	279.8
Minor Stress At Failure	σ_3'	(kPa)	39.3	77.4	133.0
Major Stress At Failure	σ_1'	(kPa)	138.0	245.3	412.8
Principal Stress Ratio At Failure	σ_1'/σ_3'	(kPa)	3.511	3.170	3.103

Notes

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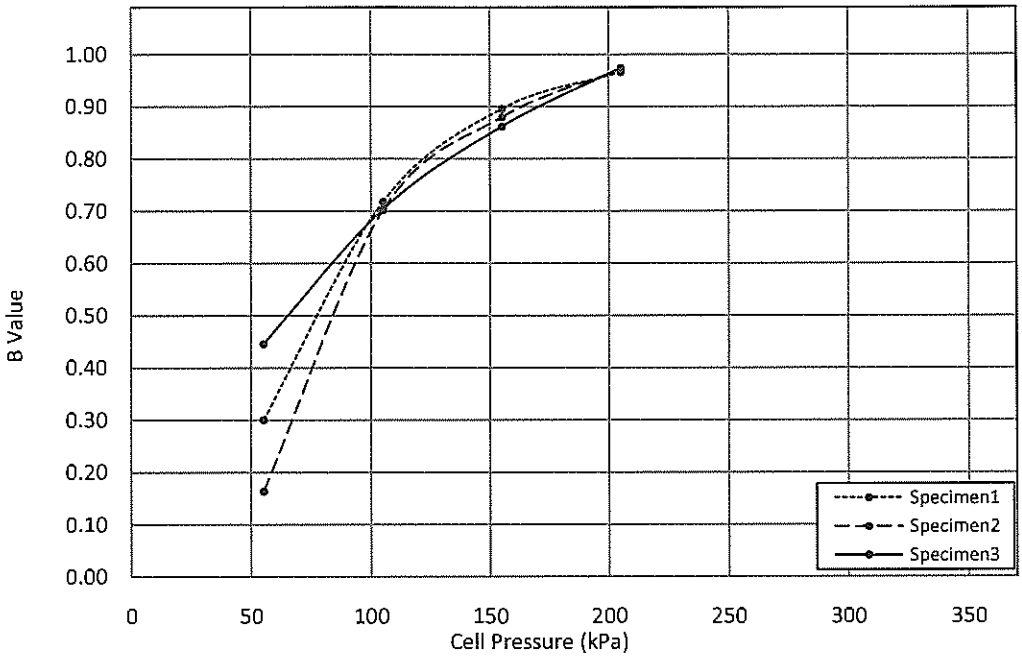
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU9-SungeiTengahWA7-B15T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	15/9/2018
Site Reference	ST28(LV Plots)AlongSungeiTengah Rd	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator	Kar	Checked	Min Win Htut
Approved	Sio Keong Kong		

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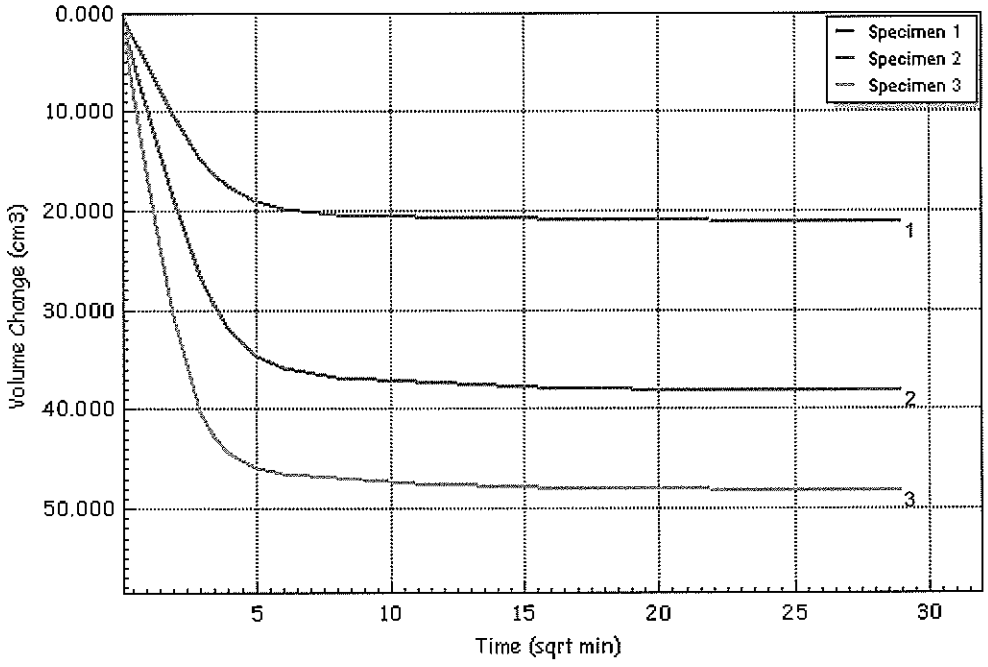
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation and Consolidation Plots



Drainage Method : Both End and Side Drain



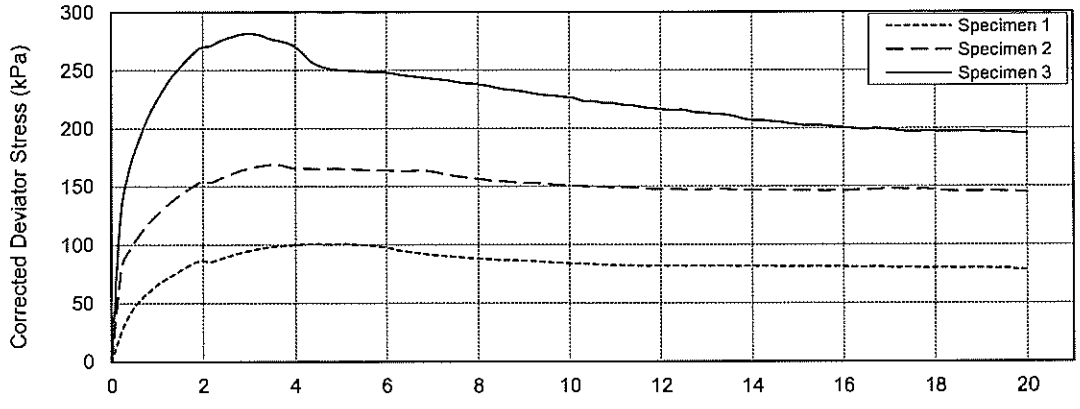
Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU9-SungeiTengahWA7-B15T2
Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	15/9/2018
Site Reference	ST28 (LV Plots) Along Sungei Tengah	Borehole	BH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator		Checked	Min Win Htut
		Approved	Sio Keong Kong

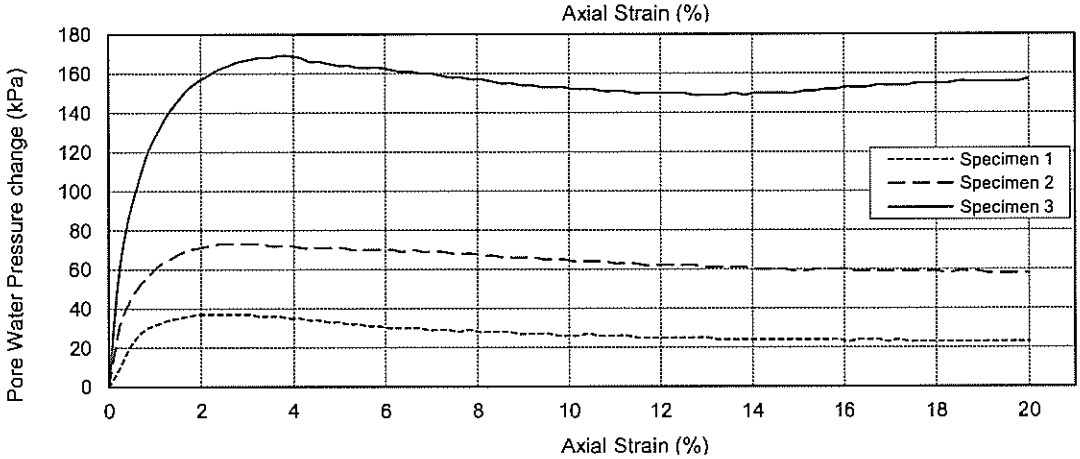
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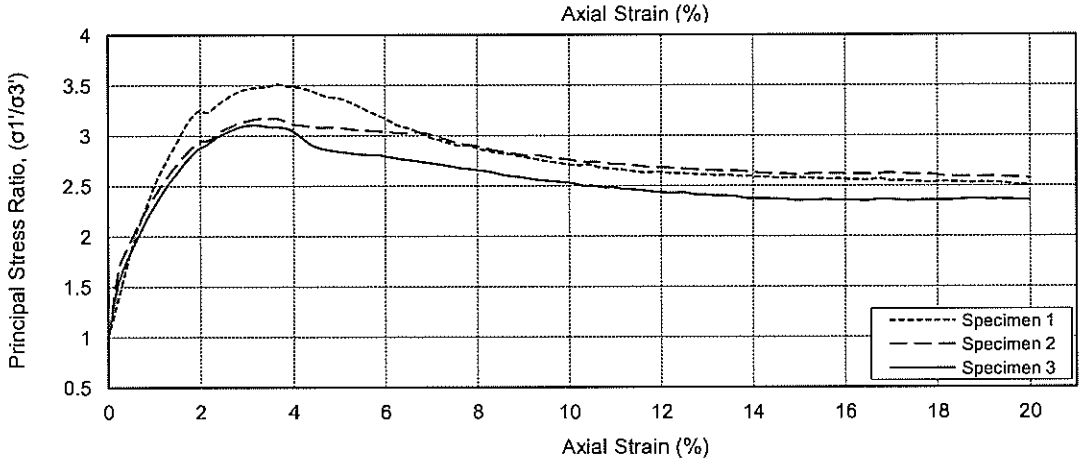
Effective Stress Triaxial Compression

Consolidation Undrained

Shear Stage Plots







Initial and Final Values	Spm.1	Spm.2	Spm.3
Pore Water Pressure at start of shear stage (kPa)	200	200	200
Pore Water Pressure at Max. Stress Ratio (kPa)	236	272	367
A Value at Max. Stress Ratio	0.365	0.427	0.597

Note : Side drain correction has been applied to strain exceeding 2% according to BS 1377.

Test Method	BS1337-8 : 1990 : Clause 7	Test Name	CU9-SungeiTengahWA7-B15T2
Database :.\SQLEXPRESS\Ryobi-2017		Test Date	15/9/2018
Site Reference	ST28(LVPlots)AlongSungeiTengahRd	Borehole	ABH15
Jobfile	Sungei Tengah Rd-WA7	Sample	TW2
Client	AVA	Depth	14.00-14.90m
Operator Kow	Checked Min Win Htut	Approved Sio Keong Kong	

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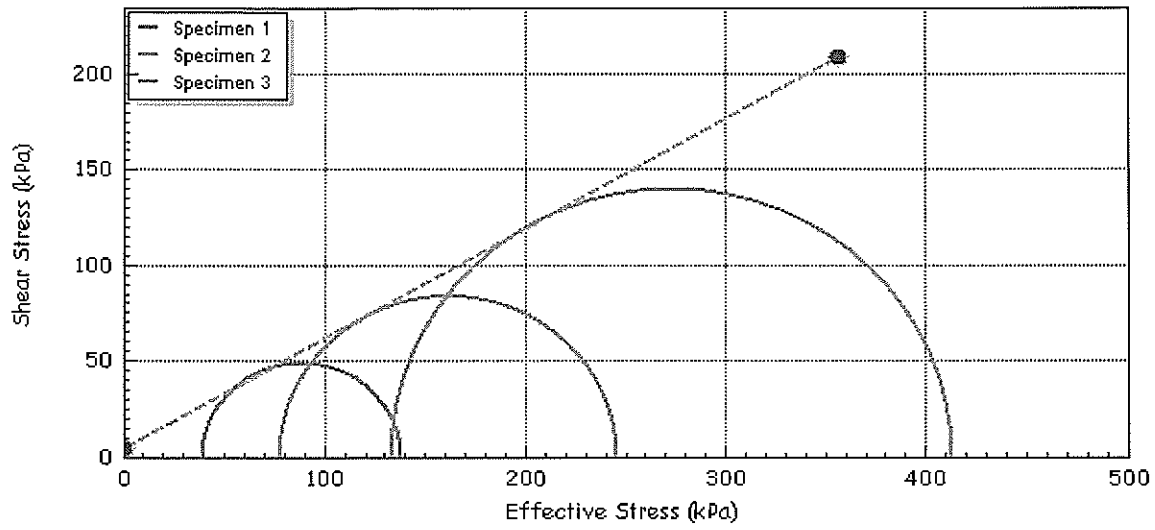
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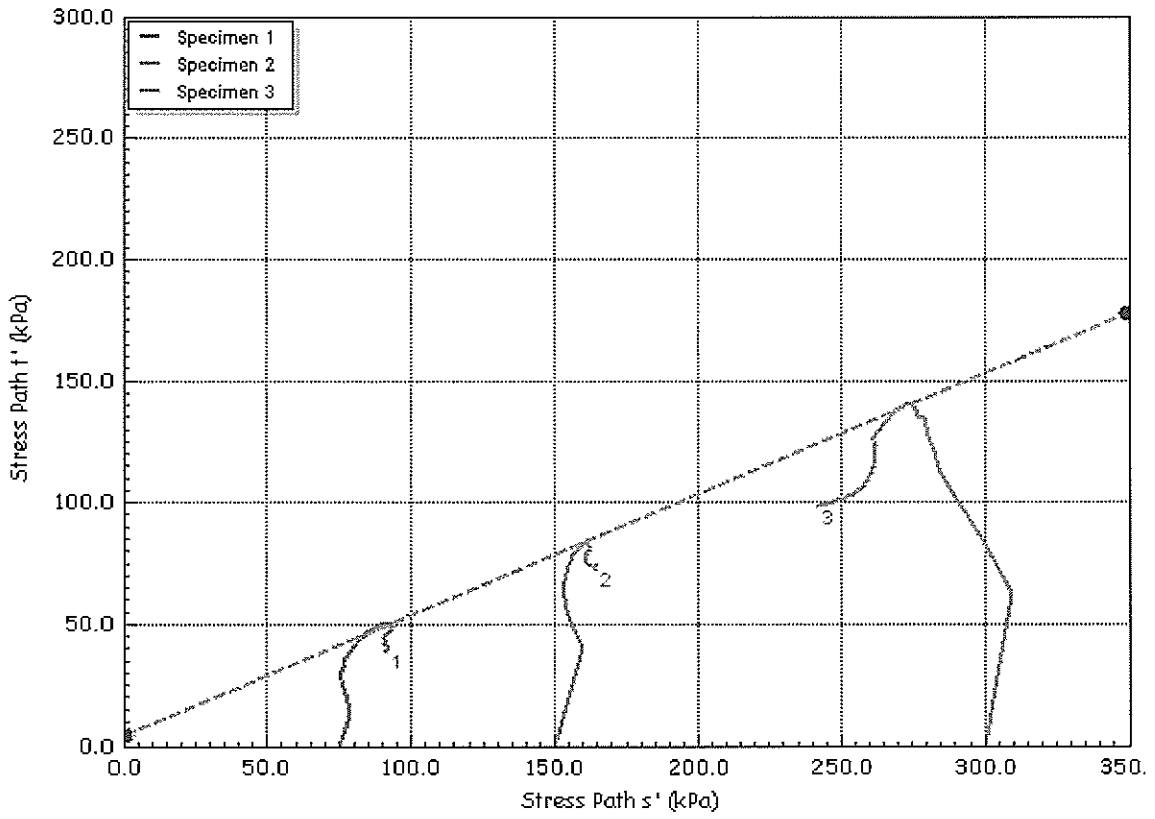
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	4.6	Stress Path Intercept	t_0'	(kPa)	4.0
Effective Friction Angle	ϕ'	(deg)	29.8	Stress Path Inclination	θ	(deg)	26.4





Ryobi G	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	CU9-SungeiTengahWA7-B15T2	
	Database: .\SQLEXPRESS \ RyobiG-L3-2017		Test Date	15/9/2018	
ACCREDITED LABORATORY SAC-SINGLAS	Site Reference	ST28 (LV Plots) Along Sungei Tengah Rd	Borehole	BH15	
	Jobfile	Sungei Tengah Rd-WA7	Sample	TW2	
	Client	AVA	Depth	14.00-14.90m	
	Operator	Kan	Checked	Min Win Htut	Approved Sio Keong Kong

Ryobi Geotechnique International Pte Ltd

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814509**	Page	: 1 of 2
Client	: **RYOBI GEOTECH PTE LTD**	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0001 (Soil - Organic Content, Total Sulphate, pH Value, Chloride Content & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 13-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 14-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 19-Sep-2018
No. of samples received	: 1	No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- **BS method is referenced to British Standard 1377: Part 3/1990**
- **Organic Content Test is referenced to Clause 3 of Part 3:BS1377**
- **Chloride Content Test is referenced to Clause 7.3 or Part 3:BS1377**
- **Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377**
- **pH Test is referenced to Clause 9 of Part 3: BS1377**

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **SOIL**

	Client sample ID	**BH15 SPT11 (22.00-22.45m)- Fine to Coarse Grained Sandy SILT**	----	----
	Sampling date/time	13-Sep-2018 00:00	----	----

Compound	*Method*	*LOR*	*Unit*	**SG1814509-001**	--------	--------
INORGANIC- Physical Properties						
pH Value	BS1377 pH	0.1	pH Unit	8.8	----	----
INORGANICS - Nonmetalllic Constituents						
Chloride	BS1377 Cl	0.01	% DW	<0.01	----	----
Organic Matter	BS1377	0.1	% DW	0.2	----	----
Sulphate as SO3	BS1377 SO3	0.01	% DW	<0.01	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **SG1814510**	Page	: 1 of 2
Client	: **RYOBI GEOTECH PTE LTD**	Project	: Soil Investigation Works at ST28 (LV Plots) Along Sungei Tengah Road
Contact	: Mr Min Win Htut	Order number	: GTPO2161
Address	: 58A Sungei Kadut Loop Ryobi Industrial Bldg, Singapore 729505	Quote number	: SG2016RYOGEO0002 (Water - Organic Content, Sulphate Content, Chloride, pH, Salinity & Soluble Sulphate)
E-mail	: min.win.htut@ryobi-g.com	Date Received	: 13-Sep-2018
Telephone	: +65 6369 7100	Date Analysed	: 13-Sep-2018
Facsimile	: +65 6362 5848	Date Issued	: 19-Sep-2018
No. of samples received	: 1	No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. Results apply to the sample(s) as submitted. The laboratory declares that the test results relate only to the items tested and do not substitute any other documents. This report may not be reproduced except with prior written approval from the testing laboratory. This report may not be used for advertising purposes.

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, BS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. LOR = Limit of reporting

* Preceeding indicates non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited.

- **Sulphate Content Test is referenced to Clause 5.2 of Part 3:BS1377**
- **BS method is referenced to British Standard 1377: Part 3/1990**
- **Chloride ContentTest is referenced to Clause 7.3 of Part 3: BS1377**
- **pH Test is referenced to Clause 9 of Part 3: BS1377**

Signatories

This laboratory is accredited under SAC - SINGLAS. The tests reported herein have been performed in accordance with the laboratory's Terms of Accreditation. This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Accreditation Category*	*Position*
Pansy Teo	SG - Inorganics SG - Organics	Senior Environmental Manager

ACCREDITED LABORATORY SAC-SINGLAS ALS

Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	BH15 W1	----	----
				Sampling date/time	13-Sep-2018 00:00	----	----
Compound	*Method*	*LOR*	*Unit*		**SG1814510-001**	--------	--------
INORGANIC- Physical Properties							
pH Value	BS1377 pH	0.1	pH Unit		8.7	----	----
INORGANICS - Nonmetalllic Constituents							
Chloride	BS1377 Cl	0.01	g/L		0.03	----	----
INORGANICS-Anions							
Sulphate as SO3	BS1377 SO3	0.01	g/L		0.06	----	----
ORGANICS-General							
•Organic Content	Ashing/Gravimetric	0.10	% (w/v)		<0.10	----	----

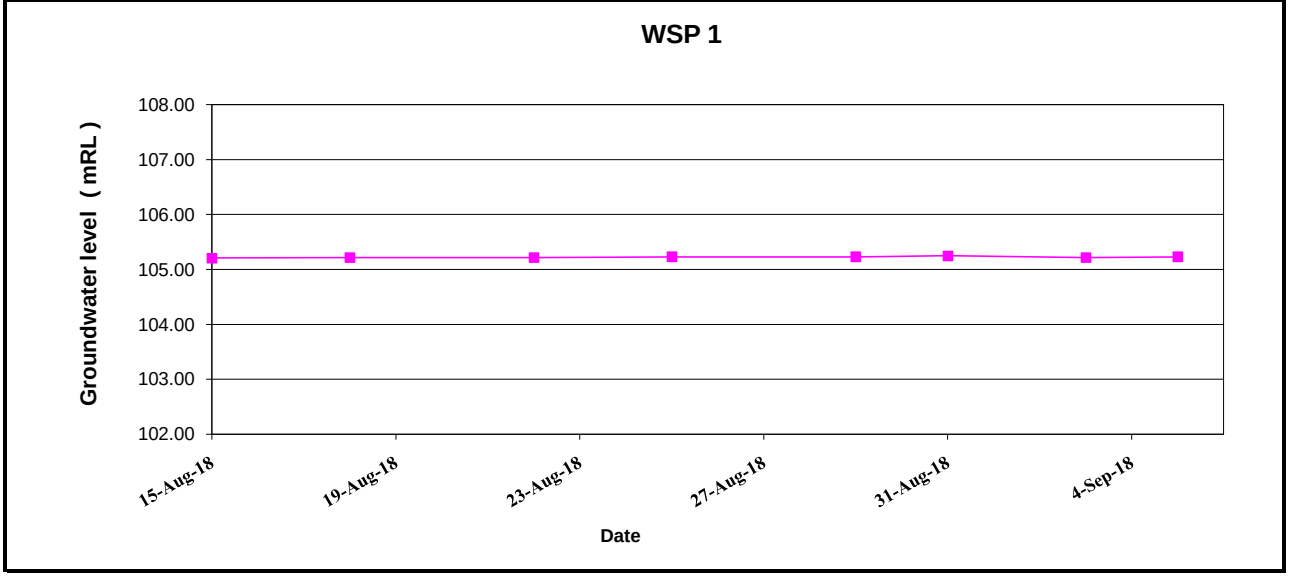
APPENDIX E
WATER STANDPIPE READINGS

Ryobi Geotechnique International Pte Ltd
58 A Sungei Kadut Loop, Ryobi Industrial Building, Singapore 729505 Tel: 65-6369 7100 Fax: 65-6362 5848
Co Reg No 200500891W

Groundwater Data Sheet

CLIENT : Agri-Food & Veterinary Authority of Singapore
PROJECT TITLE: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road
WATER STANDPIPE: WSP1
BOREHOLE NO. : BH3
GROUND RL (m) : 106.418
INSTALLED DATE : 13-Aug-18
REMARKS : Installed at 12.00m

Date	Monitoring Time	Elapsed Time (days)	Groundwater Readings (m)	Groundwater Level (m)	Difference From Previous (m)	Remark
15-Aug-18	A.M	0	1.21	105.21	-	Initial Reading
18-Aug-18	A.M	3	1.2	105.22	0.01	
22-Aug-18	A.M	7	1.2	105.22	0.00	
25-Aug-18	A.M	10	1.19	105.23	0.01	
29-Aug-18	A.M	14	1.19	105.23	0.00	
31-Aug-18	A.M	16	1.17	105.25	0.02	
3-Sep-18	A.M	19	1.2	105.22	-0.03	
5-Sep-18	A.M	21	1.19	105.23	0.01	

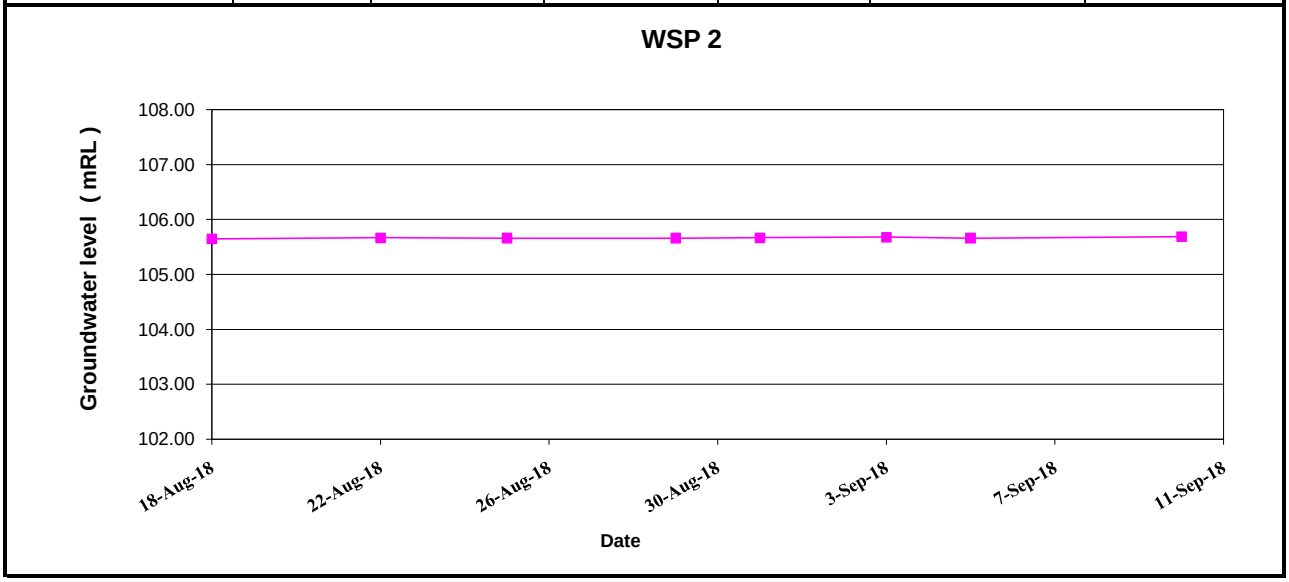


Ryobi Geotechnique International Pte Ltd
58 A Sungei Kadut Loop, Ryobi Industrial Building, Singapore 729505 Tel: 65-6369 7100 Fax: 65-6362 5848
Co Reg No 200500891W

Groundwater Data Sheet

CLIENT : Agri-Food & Veterinary Authority of Singapore
PROJECT TITLE: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road
WATER STANDPIPE: WSP2
BOREHOLE NO. : BH8
GROUND RL (m) : 106.899
INSTALLED DATE : 17-Aug-18
REMARKS : Installed at 12.00m

Date	Monitoring Time	Elapsed Time (days)	Groundwater Readings (m)	Groundwater Level (m)	Difference From Previous (m)	Remark
18-Aug-18	A.M	0	1.25	105.65	-	Initial Reading
22-Aug-18	A.M	4	1.23	105.67	0.02	
25-Aug-18	A.M	7	1.24	105.66	-0.01	
29-Aug-18	A.M	11	1.24	105.66	0.00	
31-Aug-18	A.M	13	1.23	105.67	0.01	
3-Sep-18	A.M	16	1.22	105.68	0.01	
5-Sep-18	A.M	18	1.24	105.66	-0.02	
10-Sep-18	A.M	23	1.21	105.69	0.03	

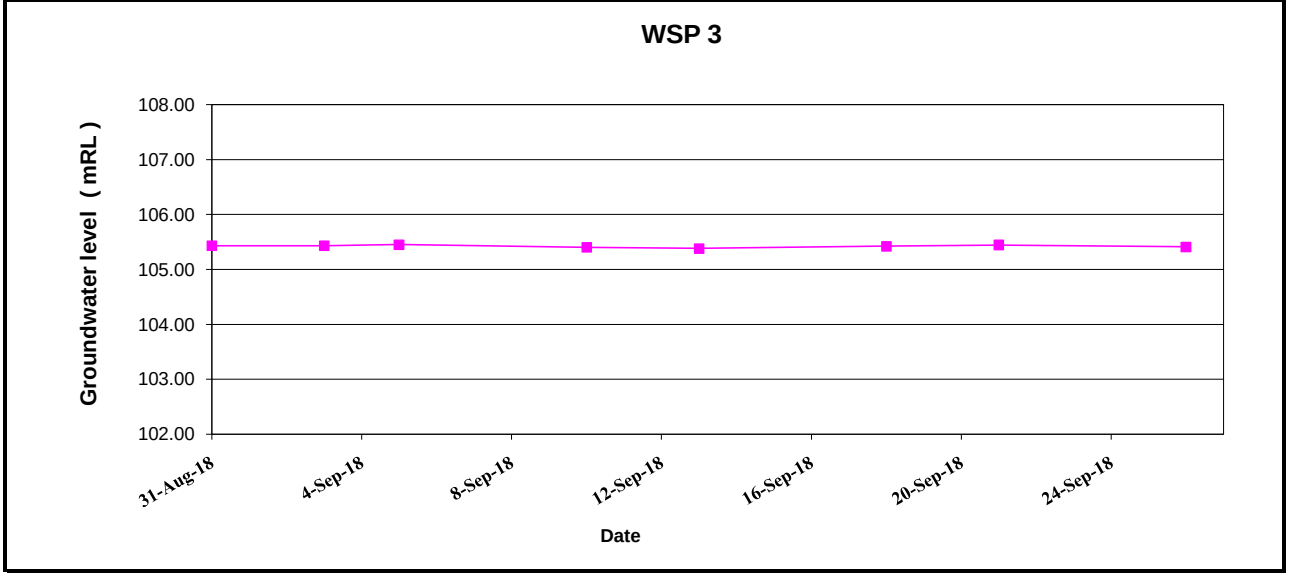


Ryobi Geotechnique International Pte Ltd
58 A Sungei Kadut Loop, Ryobi Industrial Building, Singapore 729505 Tel: 65-6369 7100 Fax: 65-6362 5848
Co Reg No 200500891W

Groundwater Data Sheet

CLIENT : Agri-Food & Veterinary Authority of Singapore
PROJECT TITLE: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road
WATER STANDPIPE: WSP3
BOREHOLE NO. : BH13
GROUND RL (m) : 106.653
INSTALLED DATE : 30-Aug-18
REMARKS : Installed at 12.00m

Date	Monitoring Time	Elapsed Time (days)	Groundwater Readings (m)	Groundwater Level (m)	Difference From Previous (m)	Remark
31-Aug-18	A.M	0	1.22	105.43	-	Initial Reading
3-Sep-18	A.M	3	1.22	105.43	0.00	
5-Sep-18	A.M	5	1.2	105.45	0.02	
10-Sep-18	A.M	10	1.25	105.40	-0.05	
13-Sep-18	A.M	13	1.27	105.38	-0.02	
18-Sep-18	A.M	18	1.23	105.42	0.04	
21-Sep-18	A.M	21	1.21	105.44	0.02	
26-Sep-18	A.M	26	1.24	105.41	-0.03	

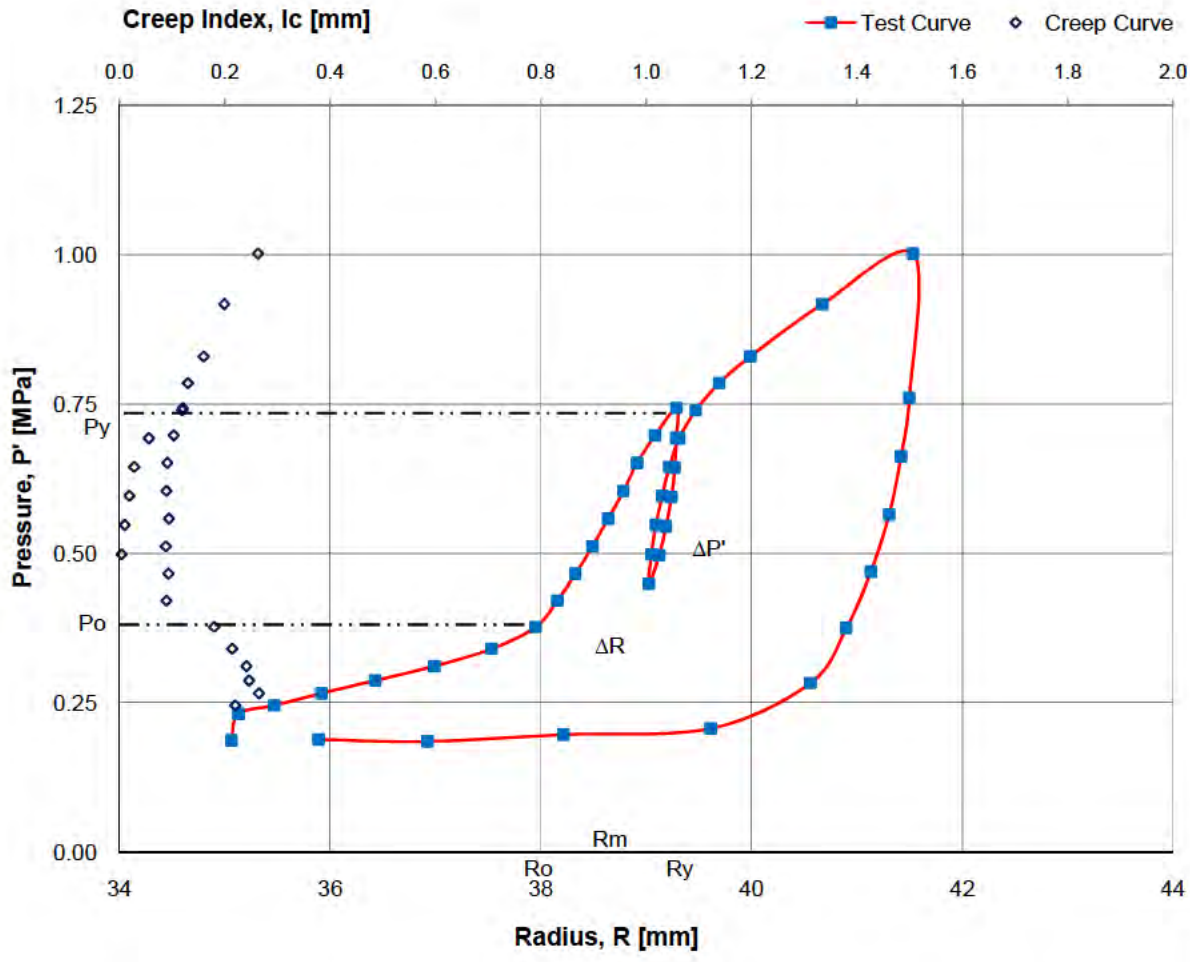


APPENDIX F
RESULTS OF PRESSUREMETER TESTS

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

Client	: AVA	**BH No**	: **BH8**
Project	: K5728	Test No	: PMT1
Location	: Sungei Tengah Rd (WA7)	Depth	: 23.00 - 23.50m
Measured By	: Lian	Soil Type	: SILT
Date	: 16/08/2018	SPT (N)	: 15
		Rubber Type	: Soft

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)
	0.380	**0.740**	**2.687**	**12.969**	**3.862**
	Km = ΔP'/ΔR = (0.740 - 0.380) / (3.929 - 3.795) = 2.687 MPa/cm				
	Em = (1+μ) x Km x Rm = (1 + 0.25) x 2.687 x 3.862 = 12.969 MPa				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	**-**	**6.444**	**31.614**	**3.925**
	Kr = ΔP'/ΔR = (0.740 - 0.450) / (3.947 - 3.902) = 6.444 MPa/cm				
	Er = (1+μ) x Kr x Rr = (1 + 0.25) x 6.444 x 3.925 = 31.614 MPa				



OYO

ELAST LOGGER2 DATA

FILE ID.	1
DATE	16/08/2018
TIME	10:57:30 AM
HOLE NO.	BH8 (WA7)
DEPTH[m]	23.5
TUBE	NXS

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	0.21	-1.113	35.06		0.19	0.02
2	0:00:30	0.26	-0.994	35.13		0.23	0.03
3	0:01:00	0.30	-0.625	35.34		0.25	0.05
4	0:01:30	0.30	-0.517	35.40		0.25	0.05
5	0:02:00	0.30	-0.438	35.45		0.25	0.05
6	0:02:30	0.30	-0.405	35.47	0.220	0.25	0.05
7	0:03:00	0.35	0.097	35.76		0.28	0.07
8	0:03:30	0.35	0.126	35.78		0.27	0.08
9	0:04:00	0.35	0.225	35.84		0.27	0.08
10	0:04:30	0.35	0.362	35.92	0.265	0.27	0.08
11	0:05:00	0.40	0.965	36.28		0.30	0.10
12	0:05:30	0.40	1.054	36.33		0.29	0.11
13	0:06:00	0.40	1.182	36.41		0.29	0.11
14	0:06:30	0.40	1.211	36.43	0.246	0.29	0.11
15	0:07:00	0.45	1.884	36.84		0.32	0.13
16	0:07:30	0.45	1.997	36.91		0.31	0.14
17	0:08:00	0.45	2.021	36.93		0.31	0.14
18	0:08:30	0.45	2.125	36.99	0.241	0.31	0.14
19	0:09:00	0.50	2.771	37.40		0.35	0.15
20	0:09:30	0.50	2.822	37.43		0.34	0.16
21	0:10:00	0.50	2.884	37.47		0.34	0.16
22	0:10:30	0.50	2.985	37.53	0.214	0.34	0.16
23	0:11:00	0.55	3.454	37.83		0.38	0.17
24	0:11:30	0.55	3.511	37.87		0.38	0.17
25	0:12:00	0.55	3.596	37.92		0.38	0.17
26	0:12:30	0.55	3.634	37.95	0.180	0.38	0.17
27	0:13:00	0.60	3.865	38.10		0.42	0.18
28	0:13:30	0.60	3.884	38.11		0.42	0.18
29	0:14:00	0.60	3.927	38.14		0.42	0.18
30	0:14:30	0.60	3.954	38.16	0.089	0.42	0.18
31	0:15:00	0.65	4.122	38.27		0.47	0.18
32	0:15:30	0.65	4.156	38.29		0.47	0.18
33	0:16:00	0.65	4.173	38.30		0.47	0.18
34	0:16:30	0.65	4.215	38.33	0.093	0.47	0.18
35	0:17:00	0.70	4.376	38.43		0.51	0.19
36	0:17:30	0.70	4.395	38.45		0.51	0.19
37	0:18:00	0.70	4.427	38.47		0.51	0.19
38	0:18:30	0.70	4.464	38.49	0.088	0.51	0.19
39	0:19:00	0.75	4.593	38.58		0.56	0.19
40	0:19:30	0.75	4.611	38.59		0.56	0.19
41	0:20:00	0.75	4.635	38.60		0.56	0.19

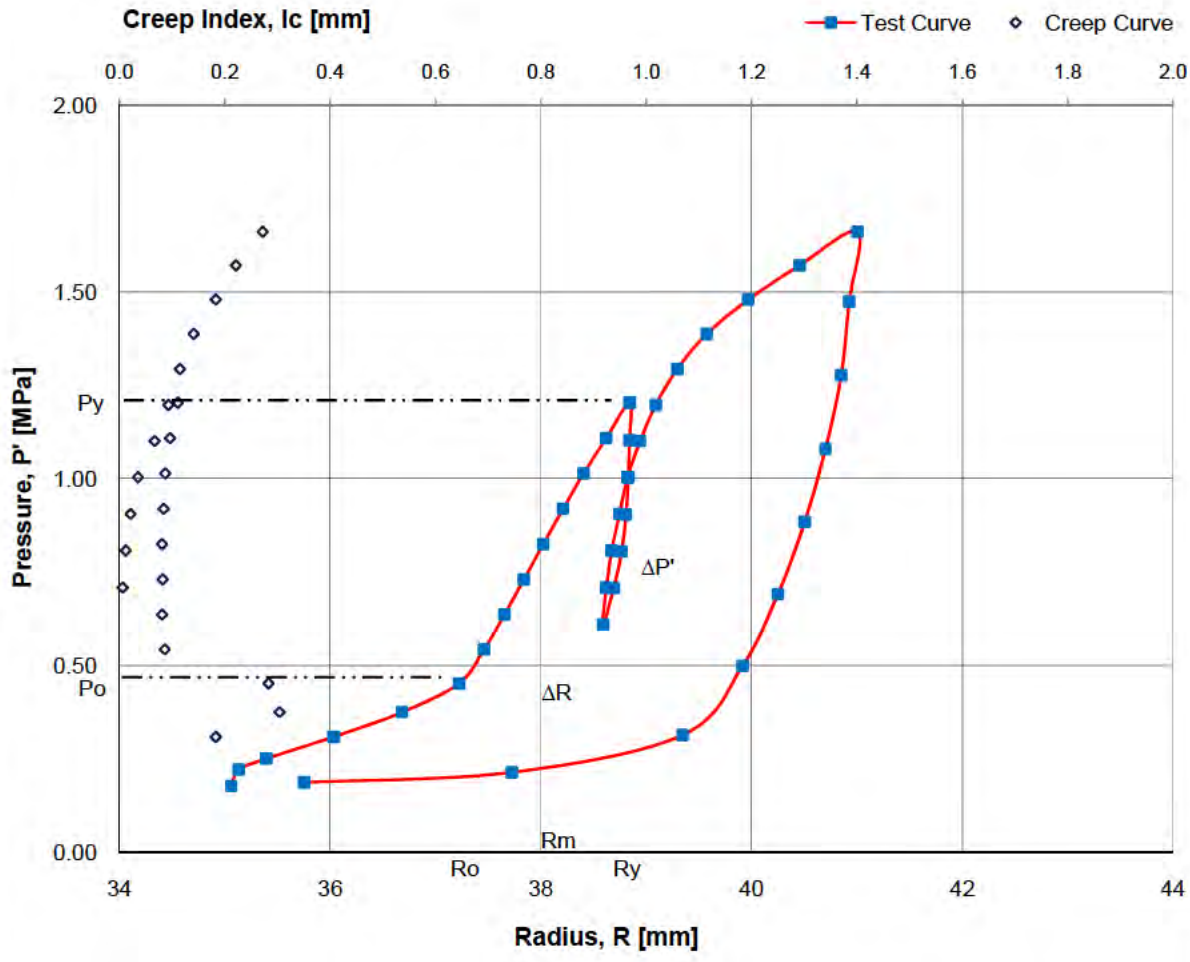
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	0.75	4.687	38.64	0.094	0.56	0.19
43	0:21:00	0.80	4.816	38.72		0.61	0.19
44	0:21:30	0.80	4.831	38.73		0.61	0.19
45	0:22:00	0.80	4.866	38.76		0.61	0.19
46	0:22:30	0.80	4.905	38.78	0.089	0.60	0.20
47	0:23:00	0.85	5.006	38.85		0.65	0.20
48	0:23:30	0.85	5.037	38.87		0.65	0.20
49	0:24:00	0.85	5.064	38.89		0.65	0.20
50	0:24:30	0.85	5.097	38.91	0.091	0.65	0.20
51	0:25:00	0.90	5.254	39.02		0.70	0.20
52	0:25:30	0.90	5.288	39.04		0.70	0.20
53	0:26:00	0.90	5.322	39.06		0.70	0.20
54	0:26:30	0.90	5.357	39.09	0.103	0.70	0.20
55	0:27:00	0.95	5.536	39.21		0.75	0.20
56	0:27:30	0.95	5.573	39.23		0.74	0.21
57	0:28:00	0.95	5.627	39.27		0.74	0.21
58	0:28:30	0.95	5.656	39.29	0.120	0.74	0.21
59	0:29:00	0.90	5.656	39.29		0.69	0.21
60	0:29:30	0.90	5.656	39.29		0.69	0.21
61	0:30:00	0.90	5.656	39.29		0.69	0.21
62	0:30:30	0.90	5.655	39.29		0.69	0.21
63	0:31:00	0.85	5.632	39.27		0.64	0.21
64	0:31:30	0.85	5.631	39.27		0.64	0.21
65	0:32:00	0.85	5.630	39.27		0.64	0.21
66	0:32:30	0.85	5.629	39.27		0.64	0.21
67	0:33:00	0.80	5.593	39.25		0.59	0.21
68	0:33:30	0.80	5.591	39.24		0.59	0.21
69	0:34:00	0.80	5.588	39.24		0.59	0.21
70	0:34:30	0.80	5.586	39.24		0.59	0.21
71	0:35:00	0.75	5.514	39.19		0.55	0.20
72	0:35:30	0.75	5.512	39.19		0.55	0.20
73	0:36:00	0.75	5.510	39.19		0.55	0.20
74	0:36:30	0.75	5.508	39.19		0.55	0.20
75	0:37:00	0.70	5.418	39.13		0.50	0.20
76	0:37:30	0.70	5.415	39.13		0.50	0.20
77	0:38:00	0.70	5.413	39.12		0.50	0.20
78	0:38:30	0.70	5.411	39.12		0.50	0.20
79	0:39:00	0.65	5.305	39.05		0.45	0.20
80	0:39:30	0.65	5.300	39.05		0.45	0.20
81	0:40:00	0.65	5.289	39.04		0.45	0.20
82	0:40:30	0.65	5.265	39.02		0.45	0.20
83	0:41:00	0.70	5.297	39.05		0.50	0.20
84	0:41:30	0.70	5.297	39.05		0.50	0.20
85	0:42:00	0.70	5.298	39.05		0.50	0.20
86	0:42:30	0.70	5.301	39.05	0.004	0.50	0.20
87	0:43:00	0.75	5.354	39.08		0.55	0.20
88	0:43:30	0.75	5.355	39.09		0.55	0.20
89	0:44:00	0.75	5.358	39.09		0.55	0.20
90	0:44:30	0.75	5.364	39.09	0.010	0.55	0.20
91	0:45:00	0.80	5.436	39.14		0.60	0.20
92	0:45:30	0.80	5.439	39.14		0.60	0.20
93	0:46:00	0.80	5.443	39.14		0.60	0.20
94	0:46:30	0.80	5.455	39.15	0.019	0.60	0.20

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	0.85	5.528	39.20		0.65	0.20
96	0:47:30	0.85	5.532	39.20		0.65	0.20
97	0:48:00	0.85	5.537	39.21		0.65	0.20
98	0:48:30	0.85	5.556	39.22	0.028	0.64	0.21
99	0:49:00	0.90	5.637	39.28		0.69	0.21
100	0:49:30	0.90	5.655	39.29		0.69	0.21
101	0:50:00	0.90	5.668	39.30		0.69	0.21
102	0:50:30	0.90	5.693	39.31	0.056	0.69	0.21
103	0:51:00	0.95	5.805	39.39		0.74	0.21
104	0:51:30	0.95	5.863	39.43		0.74	0.21
105	0:52:00	0.95	5.901	39.45		0.74	0.21
106	0:52:30	0.95	5.924	39.47	0.119	0.74	0.21
107	0:53:00	1.00	6.121	39.60		0.79	0.21
108	0:53:30	1.00	6.155	39.63		0.79	0.21
109	0:54:00	1.00	6.197	39.66		0.79	0.21
110	0:54:30	1.00	6.251	39.69	0.130	0.79	0.21
111	0:55:00	1.05	6.521	39.88		0.83	0.22
112	0:55:30	1.05	6.585	39.92		0.83	0.22
113	0:56:00	1.05	6.627	39.95		0.83	0.22
114	0:56:30	1.05	6.681	39.99	0.160	0.83	0.22
115	0:57:00	1.15	7.463	40.53		0.92	0.23
116	0:57:30	1.15	7.515	40.57		0.92	0.23
117	0:58:00	1.15	7.564	40.62		0.92	0.23
118	0:58:30	1.15	7.662	40.67	0.199	0.92	0.23
119	0:59:00	1.25	8.611	41.35		1.01	0.24
120	0:59:30	1.25	8.685	41.40		1.00	0.25
121	1:00:00	1.25	8.744	41.44		1.00	0.25
122	1:00:30	1.25	8.874	41.53	0.263	1.00	0.25
123	1:01:00	1.00	8.822	41.50		0.76	0.24
124	1:01:30	0.90	8.715	41.42		0.66	0.24
125	1:02:00	0.80	8.556	41.31		0.57	0.23
126	1:02:30	0.70	8.314	41.13		0.47	0.23
127	1:03:00	0.60	7.982	40.90		0.37	0.23
128	1:03:30	0.50	7.502	40.56		0.28	0.22
129	1:04:00	0.40	6.131	39.61		0.21	0.19
130	1:04:30	0.35	4.044	38.22		0.20	0.15
131	1:05:00	0.29	2.022	36.93		0.19	0.10
132	1:05:30	0.24	0.315	35.89		0.19	0.05

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

Client	: AVA	**BH No**	: **BH9**
Project	: K5728	Test No	: PMT1
Location	: Sungei Tengah Rd (WA7)	Depth	: 21.50 - 22.00m
Measured By	: Lian	Soil Type	: Slightly sandy SILT
Date	: 21/8/2018	SPT (N)	: 19
		Rubber Type	: Soft

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)
	0.450	**1.200**	**4.630**	**22.008**	**3.803**
	Km = ΔP'/ΔR = (1.200 - 0.450) / (3.884 - 3.722) = 4.630 MPa/cm				
	Em = (1+μ) x Km x Rm = (1 + 0.25) x 4.630 x 3.803 = 22.008 MPa				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	-	**11.800**	**57.289**	**3.884**
	Kr = ΔP'/ΔR = (1.200 - 0.610) / (3.909 - 3.859) = 11.800 MPa/cm				
	Er = (1+μ) x Kr x Rr = (1 + 0.25) x 11.800 x 3.884 = 57.289 MPa				



OYO

ELAST LOGGER2 DATA

FILE ID.	1
DATE	21/8/2018
TIME	10:42:23 AM
HOLE NO.	BH9 (WA7)
DEPTH[m]	22
TUBE	NXS

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	0.20	-1.115	35.06		0.18	0.02
2	0:00:30	0.25	-0.992	35.13		0.22	0.03
3	0:01:00	0.30	-0.531	35.40		0.25	0.05
4	0:01:30	0.40	0.373	35.92		0.32	0.08
5	0:02:00	0.40	0.421	35.95		0.31	0.09
6	0:02:30	0.40	0.485	35.99		0.31	0.09
7	0:03:00	0.40	0.556	36.03	0.183	0.31	0.09
8	0:03:30	0.50	1.322	36.50		0.38	0.12
9	0:04:00	0.50	1.465	36.58		0.38	0.12
10	0:04:30	0.50	1.512	36.61		0.38	0.12
11	0:05:00	0.50	1.626	36.68	0.304	0.37	0.13
12	0:05:30	0.60	2.214	37.05		0.46	0.14
13	0:06:00	0.60	2.330	37.12		0.46	0.14
14	0:06:30	0.60	2.443	37.19		0.45	0.15
15	0:07:00	0.60	2.497	37.22	0.283	0.45	0.15
16	0:07:30	0.70	2.785	37.41		0.55	0.15
17	0:08:00	0.70	2.811	37.42		0.54	0.16
18	0:08:30	0.70	2.846	37.44		0.54	0.16
19	0:09:00	0.70	2.871	37.46	0.086	0.54	0.16
20	0:09:30	0.80	3.095	37.60		0.64	0.16
21	0:10:00	0.80	3.117	37.62		0.64	0.16
22	0:10:30	0.80	3.134	37.63		0.64	0.16
23	0:11:00	0.80	3.176	37.65	0.081	0.64	0.16
24	0:11:30	0.90	3.382	37.79		0.73	0.17
25	0:12:00	0.90	3.407	37.80		0.73	0.17
26	0:12:30	0.90	3.435	37.82		0.73	0.17
27	0:13:00	0.90	3.464	37.84	0.082	0.73	0.17
28	0:13:30	1.00	3.666	37.97		0.83	0.17
29	0:14:00	1.00	3.684	37.98		0.83	0.17
30	0:14:30	1.00	3.720	38.00		0.83	0.17
31	0:15:00	1.00	3.747	38.02	0.081	0.82	0.18
32	0:15:30	1.10	3.951	38.16		0.92	0.18
33	0:16:00	1.10	3.984	38.18		0.92	0.18
34	0:16:30	1.10	4.011	38.19		0.92	0.18
35	0:17:00	1.10	4.035	38.21	0.084	0.92	0.18
36	0:17:30	1.20	4.245	38.35		1.02	0.18
37	0:18:00	1.20	4.271	38.36		1.02	0.18
38	0:18:30	1.20	4.296	38.38		1.01	0.19
39	0:19:00	1.20	4.332	38.40	0.087	1.01	0.19
40	0:19:30	1.30	4.561	38.56		1.11	0.19
41	0:20:00	1.30	4.584	38.57		1.11	0.19

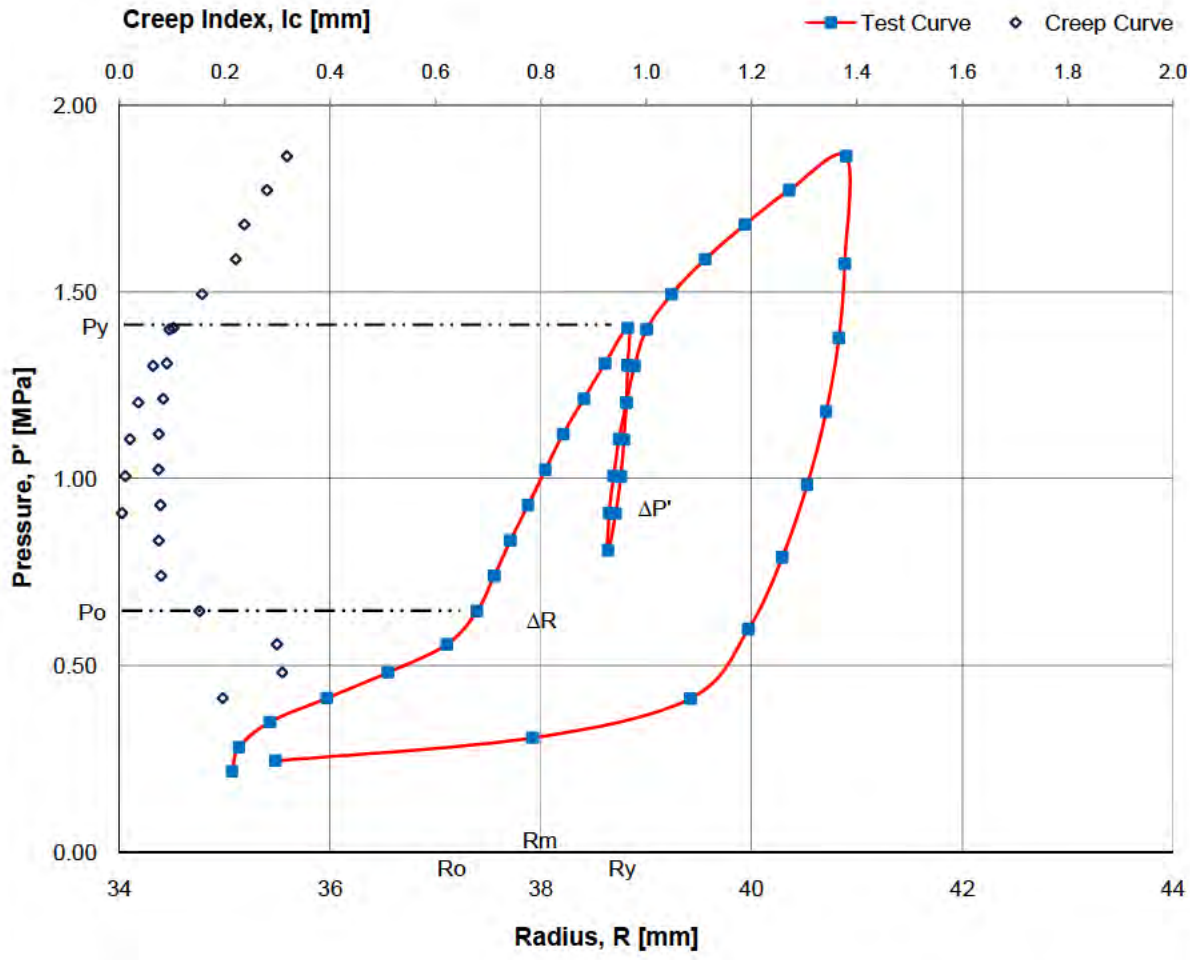
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	1.30	4.617	38.59		1.11	0.19
43	0:21:00	1.30	4.657	38.62	0.096	1.11	0.19
44	0:21:30	1.40	4.882	38.77		1.20	0.20
45	0:22:00	1.40	4.915	38.79		1.20	0.20
46	0:22:30	1.40	4.946	38.81		1.20	0.20
47	0:23:00	1.40	4.993	38.84	0.111	1.20	0.20
48	0:23:30	1.30	4.993	38.84		1.10	0.20
49	0:24:00	1.30	4.993	38.84		1.10	0.20
50	0:24:30	1.30	4.993	38.84		1.10	0.20
51	0:25:00	1.30	4.992	38.84		1.10	0.20
52	0:25:30	1.20	4.975	38.83		1.00	0.20
53	0:26:00	1.20	4.975	38.83		1.00	0.20
54	0:26:30	1.20	4.975	38.83		1.00	0.20
55	0:27:00	1.20	4.975	38.83		1.00	0.20
56	0:27:30	1.10	4.941	38.81		0.90	0.20
57	0:28:00	1.10	4.941	38.81		0.90	0.20
58	0:28:30	1.10	4.941	38.81		0.90	0.20
59	0:29:00	1.10	4.941	38.81		0.90	0.20
60	0:29:30	1.00	4.877	38.77		0.81	0.19
61	0:30:00	1.00	4.877	38.77		0.81	0.19
62	0:30:30	1.00	4.877	38.77		0.81	0.19
63	0:31:00	1.00	4.877	38.77		0.81	0.19
64	0:31:30	0.90	4.765	38.69		0.71	0.19
65	0:32:00	0.90	4.765	38.69		0.71	0.19
66	0:32:30	0.90	4.765	38.69		0.71	0.19
67	0:33:00	0.90	4.765	38.69		0.71	0.19
68	0:33:30	0.80	4.620	38.59		0.61	0.19
69	0:34:00	0.80	4.617	38.59		0.61	0.19
70	0:34:30	0.80	4.615	38.59		0.61	0.19
71	0:35:00	0.80	4.614	38.59		0.61	0.19
72	0:35:30	0.90	4.652	38.62		0.71	0.19
73	0:36:00	0.90	4.655	38.62		0.71	0.19
74	0:36:30	0.90	4.657	38.62		0.71	0.19
75	0:37:00	0.90	4.658	38.62	0.006	0.71	0.19
76	0:37:30	1.00	4.726	38.67		0.81	0.19
77	0:38:00	1.00	4.728	38.67		0.81	0.19
78	0:38:30	1.00	4.732	38.67		0.81	0.19
79	0:39:00	1.00	4.738	38.67	0.012	0.81	0.19
80	0:39:30	1.10	4.825	38.73		0.91	0.19
81	0:40:00	1.10	4.831	38.73		0.91	0.19
82	0:40:30	1.10	4.837	38.74		0.91	0.19
83	0:41:00	1.10	4.846	38.74	0.021	0.91	0.19
84	0:41:30	1.20	4.932	38.80		1.00	0.20
85	0:42:00	1.20	4.938	38.81		1.00	0.20
86	0:42:30	1.20	4.945	38.81		1.00	0.20
87	0:43:00	1.20	4.967	38.83	0.035	1.00	0.20
88	0:43:30	1.30	5.074	38.90		1.10	0.20
89	0:44:00	1.30	5.096	38.91		1.10	0.20
90	0:44:30	1.30	5.112	38.92		1.10	0.20
91	0:45:00	1.30	5.141	38.94	0.067	1.10	0.20
92	0:45:30	1.40	5.272	39.03		1.20	0.20
93	0:46:00	1.40	5.297	39.05		1.20	0.20
94	0:46:30	1.40	5.321	39.06		1.20	0.20

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	1.40	5.365	39.09	0.093	1.20	0.20
96	0:47:30	1.50	5.552	39.22		1.29	0.21
97	0:48:00	1.50	5.581	39.24		1.29	0.21
98	0:48:30	1.50	5.623	39.27		1.29	0.21
99	0:49:00	1.50	5.667	39.30	0.115	1.29	0.21
100	0:49:30	1.60	5.935	39.48		1.39	0.21
101	0:50:00	1.60	5.973	39.50		1.39	0.21
102	0:50:30	1.60	6.025	39.54		1.39	0.21
103	0:51:00	1.60	6.076	39.57	0.141	1.39	0.21
104	0:51:30	1.70	6.468	39.84		1.48	0.22
105	0:52:00	1.70	6.512	39.87		1.48	0.22
106	0:52:30	1.70	6.598	39.93		1.48	0.22
107	0:53:00	1.70	6.651	39.97	0.183	1.48	0.22
108	0:53:30	1.80	7.132	40.30		1.57	0.23
109	0:54:00	1.80	7.198	40.35		1.57	0.23
110	0:54:30	1.80	7.245	40.38		1.57	0.23
111	0:55:00	1.80	7.353	40.46	0.221	1.57	0.23
112	0:55:30	1.90	7.863	40.81		1.66	0.24
113	0:56:00	1.90	7.924	40.86		1.66	0.24
114	0:56:30	1.90	8.033	40.93		1.66	0.24
115	0:57:00	1.90	8.135	41.01	0.272	1.66	0.24
116	0:57:30	1.70	8.022	40.93		1.47	0.23
117	0:58:00	1.50	7.914	40.85		1.28	0.22
118	0:58:30	1.30	7.702	40.70		1.08	0.22
119	0:59:00	1.10	7.423	40.51		0.88	0.22
120	0:59:30	0.90	7.056	40.25		0.69	0.21
121	1:00:00	0.70	6.574	39.92		0.50	0.20
122	1:00:30	0.50	5.741	39.35		0.31	0.19
123	1:01:00	0.35	3.286	37.72		0.21	0.14
124	1:01:30	0.23	0.085	35.75		0.19	0.04

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

Client	: AVA	**BH No**	: **BH11**
Project	: K5728	Test No	: PMT1
Location	: Sungei Tengah Rd (WA7)	Depth	: 26.00 - 26.50m
Measured By	: Lian	Soil Type	: Slightly sandy SILT
Date	: 21/8/2018	SPT (N)	: 26
		Rubber Type	: Soft

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)
	0.650	**1.400**	**5.208**	**24.811**	**3.811**
	Km = ΔP'/ΔR = (1.400 - 0.650) / (3.883 - 3.739) = 5.208 MPa/cm				
	Em = (1+μ) x Km x Rm = (1 + 0.25) x 5.208 x 3.811 = 24.811 MPa				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	**-**	**16.389**	**79.527**	**3.882**
	Kr = ΔP'/ΔR = (1.400 - 0.810) / (3.900 - 3.864) = 16.389 MPa/cm				
	Er = (1+μ) x Kr x Rr = (1 + 0.25) x 16.389 x 3.882 = 79.527 MPa				



OYO

ELAST LOGGER2 DATA

FILE ID.	1
DATE	21/8/2018
TIME	4:17:21 PM
HOLE NO.	BH11 (WA7)
DEPTH[m]	26.5
TUBE	NXS

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	-1.104	35.07		0.22	0.02
2	0:00:30	0.31	-0.987	35.13		0.28	0.03
3	0:01:00	0.40	-0.474	35.43		0.35	0.05
4	0:01:30	0.50	0.251	35.85		0.42	0.08
5	0:02:00	0.50	0.305	35.88		0.42	0.08
6	0:02:30	0.50	0.364	35.92		0.42	0.08
7	0:03:00	0.50	0.447	35.97	0.196	0.41	0.09
8	0:03:30	0.60	1.102	36.36		0.49	0.11
9	0:04:00	0.60	1.212	36.43		0.49	0.11
10	0:04:30	0.60	1.305	36.48		0.48	0.12
11	0:05:00	0.60	1.411	36.55	0.309	0.48	0.12
12	0:05:30	0.70	2.015	36.92		0.56	0.14
13	0:06:00	0.70	2.121	36.99		0.56	0.14
14	0:06:30	0.70	2.208	37.04		0.56	0.14
15	0:07:00	0.70	2.314	37.11	0.299	0.56	0.14
16	0:07:30	0.80	2.613	37.30		0.65	0.15
17	0:08:00	0.80	2.687	37.34		0.65	0.15
18	0:08:30	0.80	2.721	37.36		0.65	0.15
19	0:09:00	0.80	2.765	37.39	0.152	0.65	0.15
20	0:09:30	0.90	2.945	37.51		0.74	0.16
21	0:10:00	0.90	2.961	37.52		0.74	0.16
22	0:10:30	0.90	2.982	37.53		0.74	0.16
23	0:11:00	0.90	3.024	37.56	0.079	0.74	0.16
24	0:11:30	1.00	3.186	37.66		0.84	0.16
25	0:12:00	1.00	3.204	37.67		0.84	0.16
26	0:12:30	1.00	3.233	37.69		0.84	0.16
27	0:13:00	1.00	3.261	37.71	0.075	0.83	0.17
28	0:13:30	1.10	3.447	37.83		0.93	0.17
29	0:14:00	1.10	3.468	37.84		0.93	0.17
30	0:14:30	1.10	3.484	37.85		0.93	0.17
31	0:15:00	1.10	3.525	37.88	0.078	0.93	0.17
32	0:15:30	1.20	3.704	37.99		1.03	0.17
33	0:16:00	1.20	3.716	38.00		1.03	0.17
34	0:16:30	1.20	3.752	38.03		1.02	0.18
35	0:17:00	1.20	3.778	38.04	0.074	1.02	0.18
36	0:17:30	1.30	3.963	38.16		1.12	0.18
37	0:18:00	1.30	3.985	38.18		1.12	0.18
38	0:18:30	1.30	4.006	38.19		1.12	0.18
39	0:19:00	1.30	4.038	38.21	0.075	1.12	0.18
40	0:19:30	1.40	4.255	38.35		1.22	0.18
41	0:20:00	1.40	4.284	38.37		1.21	0.19

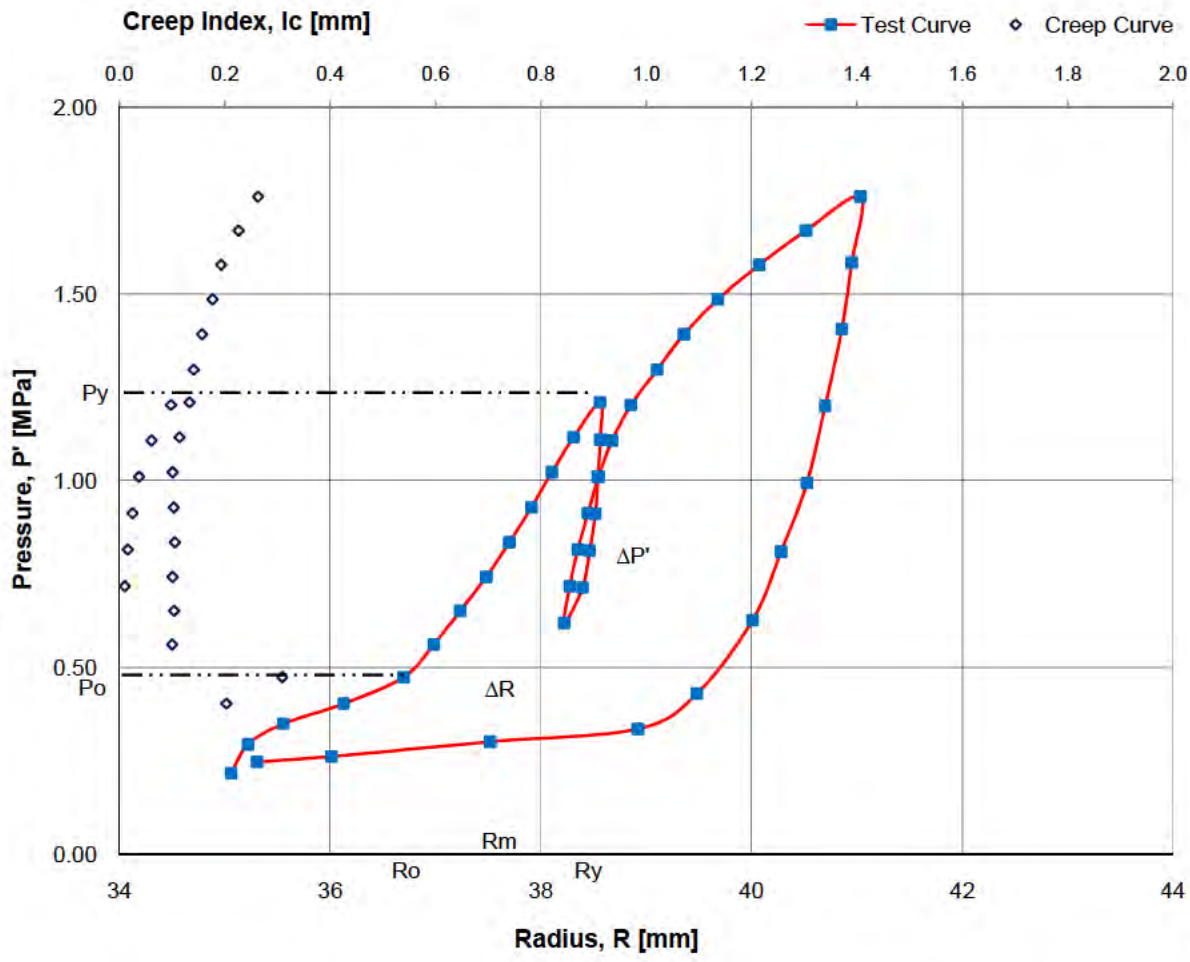
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	1.40	4.303	38.39		1.21	0.19
43	0:21:00	1.40	4.338	38.41	0.083	1.21	0.19
44	0:21:30	1.50	4.552	38.55		1.31	0.19
45	0:22:00	1.50	4.574	38.56		1.31	0.19
46	0:22:30	1.50	4.598	38.58		1.31	0.19
47	0:23:00	1.50	4.642	38.61	0.090	1.31	0.19
48	0:23:30	1.60	4.865	38.76		1.41	0.19
49	0:24:00	1.60	4.892	38.78		1.40	0.20
50	0:24:30	1.60	4.925	38.80		1.40	0.20
51	0:25:00	1.60	4.967	38.83	0.102	1.40	0.20
52	0:25:30	1.50	4.964	38.82		1.30	0.20
53	0:26:00	1.50	4.964	38.82		1.30	0.20
54	0:26:30	1.50	4.964	38.82		1.30	0.20
55	0:27:00	1.50	4.964	38.82		1.30	0.20
56	0:27:30	1.40	4.945	38.81		1.20	0.20
57	0:28:00	1.40	4.945	38.81		1.20	0.20
58	0:28:30	1.40	4.945	38.81		1.20	0.20
59	0:29:00	1.40	4.945	38.81		1.20	0.20
60	0:29:30	1.30	4.911	38.79		1.10	0.20
61	0:30:00	1.30	4.911	38.79		1.10	0.20
62	0:30:30	1.30	4.911	38.79		1.10	0.20
63	0:31:00	1.30	4.911	38.79		1.10	0.20
64	0:31:30	1.20	4.865	38.76		1.01	0.19
65	0:32:00	1.20	4.865	38.76		1.01	0.19
66	0:32:30	1.20	4.865	38.76		1.01	0.19
67	0:33:00	1.20	4.865	38.76		1.01	0.19
68	0:33:30	1.10	4.793	38.71		0.91	0.19
69	0:34:00	1.10	4.793	38.71		0.91	0.19
70	0:34:30	1.10	4.793	38.71		0.91	0.19
71	0:35:00	1.10	4.793	38.71		0.91	0.19
72	0:35:30	1.00	4.685	38.64		0.81	0.19
73	0:36:00	1.00	4.685	38.64		0.81	0.19
74	0:36:30	1.00	4.685	38.64		0.81	0.19
75	0:37:00	1.00	4.685	38.64		0.81	0.19
76	0:37:30	1.10	4.697	38.65		0.91	0.19
77	0:38:00	1.10	4.697	38.65		0.91	0.19
78	0:38:30	1.10	4.698	38.65		0.91	0.19
79	0:39:00	1.10	4.702	38.65	0.005	0.91	0.19
80	0:39:30	1.20	4.754	38.68		1.01	0.19
81	0:40:00	1.20	4.757	38.69		1.01	0.19
82	0:40:30	1.20	4.761	38.69		1.01	0.19
83	0:41:00	1.20	4.765	38.69	0.011	1.01	0.19
84	0:41:30	1.30	4.822	38.73		1.11	0.19
85	0:42:00	1.30	4.827	38.73		1.11	0.19
86	0:42:30	1.30	4.835	38.74		1.11	0.19
87	0:43:00	1.30	4.842	38.74	0.020	1.11	0.19
88	0:43:30	1.40	4.912	38.79		1.20	0.20
89	0:44:00	1.40	4.918	38.79		1.20	0.20
90	0:44:30	1.40	4.925	38.80		1.20	0.20
91	0:45:00	1.40	4.948	38.81	0.036	1.20	0.20
92	0:45:30	1.50	4.998	38.85		1.30	0.20
93	0:46:00	1.50	5.014	38.86		1.30	0.20
94	0:46:30	1.50	5.046	38.88		1.30	0.20

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	1.50	5.062	38.89	0.064	1.30	0.20
96	0:47:30	1.60	5.140	38.94		1.40	0.20
97	0:48:00	1.60	5.162	38.96		1.40	0.20
98	0:48:30	1.60	5.171	38.96		1.40	0.20
99	0:49:00	1.60	5.235	39.00	0.095	1.40	0.20
100	0:49:30	1.70	5.430	39.14		1.50	0.20
101	0:50:00	1.70	5.455	39.15		1.50	0.20
102	0:50:30	1.70	5.502	39.18		1.50	0.20
103	0:51:00	1.70	5.587	39.24	0.157	1.49	0.21
104	0:51:30	1.80	5.835	39.41		1.59	0.21
105	0:52:00	1.80	5.873	39.44		1.59	0.21
106	0:52:30	1.80	5.925	39.47		1.59	0.21
107	0:53:00	1.80	6.056	39.56	0.221	1.59	0.21
108	0:53:30	1.90	6.368	39.77		1.68	0.22
109	0:54:00	1.90	6.412	39.80		1.68	0.22
110	0:54:30	1.90	6.498	39.86		1.68	0.22
111	0:55:00	1.90	6.605	39.94	0.237	1.68	0.22
112	0:55:30	2.00	6.932	40.16		1.78	0.22
113	0:56:00	2.00	6.978	40.19		1.78	0.22
114	0:56:30	2.00	6.925	40.16		1.78	0.22
115	0:57:00	2.00	7.212	40.36	0.280	1.77	0.23
116	0:57:30	2.10	7.663	40.67		1.87	0.23
117	0:58:00	2.10	7.724	40.72		1.87	0.23
118	0:58:30	2.10	7.833	40.79		1.86	0.24
119	0:59:00	2.10	7.981	40.90	0.318	1.86	0.24
120	0:59:30	1.80	7.963	40.88		1.58	0.22
121	1:00:00	1.60	7.885	40.83		1.38	0.22
122	1:00:30	1.40	7.711	40.71		1.18	0.22
123	1:01:00	1.20	7.455	40.53		0.98	0.22
124	1:01:30	1.00	7.116	40.29		0.79	0.21
125	1:02:00	0.80	6.654	39.97		0.60	0.20
126	1:02:30	0.60	5.850	39.42		0.41	0.19
127	1:03:00	0.45	3.593	37.92		0.31	0.14
128	1:03:30	0.27	-0.385	35.48		0.24	0.03

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

Client	: AVA	**BH No**	: **BH12**
Project	: K5728	Test No	: PMT1
Location	: Sungei Tengah Rd (WA7)	Depth	: 25.50 - 26.00m
Measured By	: Lian	Soil Type	: Slightly sandy SILT
Date	: 28/8/2018	SPT (N)	: 21
		Rubber Type	: Soft

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)
	0.470	**1.210**	**3.978**	**18.714**	**3.763**
	Km = ΔP'/ΔR = (1.210 - 0.470) / (3.856 - 3.670) = 3.978 MPa/cm				
	Em = (1+μ) x Km x Rm = (1 + 0.25) x 3.978 x 3.763 = 18.714 MPa				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	-	**9.062**	**43.659**	**3.854**
	Kr = ΔP'/ΔR = (1.200 - 0.620) / (3.886 - 3.822) = 9.062 MPa/cm				
	Er = (1+μ) x Kr x Rr = (1 + 0.25) x 9.062 x 3.854 = 43.659 MPa				



OYO

ELAST LOGGER2 DATA

FILE ID.	1
DATE	28/8/2018
TIME	9:51:42 AM
HOLE NO.	BH12 (WA7)
DEPTH[m]	26
TUBE	NXS

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	-1.117	35.06		0.22	0.02
2	0:00:30	0.33	-0.832	35.22		0.29	0.04
3	0:01:00	0.41	-0.255	35.55		0.35	0.06
4	0:01:30	0.50	0.514	36.01		0.41	0.09
5	0:02:00	0.50	0.587	36.05		0.41	0.09
6	0:02:30	0.50	0.653	36.09		0.41	0.09
7	0:03:00	0.50	0.717	36.13	0.203	0.40	0.10
8	0:03:30	0.60	1.345	36.51		0.48	0.12
9	0:04:00	0.60	1.428	36.56		0.48	0.12
10	0:04:30	0.60	1.516	36.61		0.48	0.12
11	0:05:00	0.60	1.654	36.70	0.309	0.47	0.13
12	0:05:30	0.70	2.015	36.92		0.56	0.14
13	0:06:00	0.70	2.031	36.93		0.56	0.14
14	0:06:30	0.70	2.072	36.96		0.56	0.14
15	0:07:00	0.70	2.115	36.98	0.100	0.56	0.14
16	0:07:30	0.80	2.412	37.17		0.65	0.15
17	0:08:00	0.80	2.445	37.19		0.65	0.15
18	0:08:30	0.80	2.478	37.21		0.65	0.15
19	0:09:00	0.80	2.516	37.23	0.104	0.65	0.15
20	0:09:30	0.90	2.807	37.42		0.74	0.16
21	0:10:00	0.90	2.832	37.43		0.74	0.16
22	0:10:30	0.90	2.874	37.46		0.74	0.16
23	0:11:00	0.90	2.908	37.48	0.101	0.74	0.16
24	0:11:30	1.00	3.146	37.63		0.84	0.16
25	0:12:00	1.00	3.181	37.66		0.84	0.16
26	0:12:30	1.00	3.224	37.68		0.84	0.16
27	0:13:00	1.00	3.251	37.70	0.105	0.83	0.17
28	0:13:30	1.10	3.472	37.84		0.93	0.17
29	0:14:00	1.10	3.503	37.86		0.93	0.17
30	0:14:30	1.10	3.534	37.88		0.93	0.17
31	0:15:00	1.10	3.575	37.91	0.103	0.93	0.17
32	0:15:30	1.20	3.773	38.04		1.02	0.18
33	0:16:00	1.20	3.805	38.06		1.02	0.18
34	0:16:30	1.20	3.842	38.08		1.02	0.18
35	0:17:00	1.20	3.874	38.10	0.101	1.02	0.18
36	0:17:30	1.30	4.078	38.24		1.12	0.18
37	0:18:00	1.30	4.114	38.26		1.12	0.18
38	0:18:30	1.30	4.157	38.29		1.12	0.18
39	0:19:00	1.30	4.192	38.31	0.114	1.12	0.18
40	0:19:30	1.40	4.441	38.48		1.21	0.19
41	0:20:00	1.40	4.478	38.50		1.21	0.19

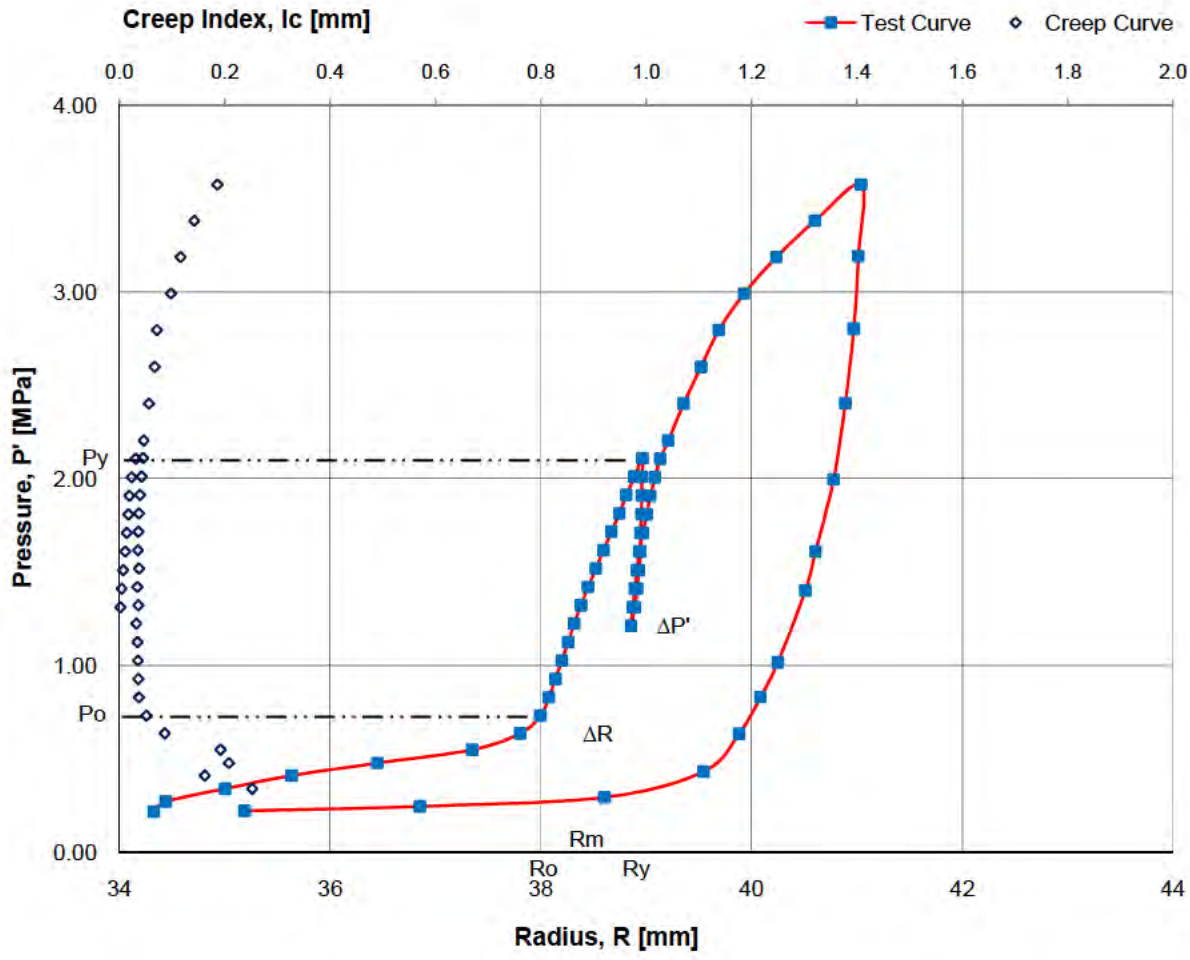
DATA NO.	TIME	Pressure P[MPa]	Inner Radius Ri[mm]	Radius R[mm]	Creep Index Ic[mm]	P'=P-RG [MPa]	RG [MPa]
42	0:20:30	1.40	4.503	38.52		1.21	0.19
43	0:21:00	1.40	4.574	38.56	0.133	1.21	0.19
44	0:21:30	1.30	4.574	38.56		1.11	0.19
45	0:22:00	1.30	4.574	38.56		1.11	0.19
46	0:22:30	1.30	4.574	38.56		1.11	0.19
47	0:23:00	1.30	4.574	38.56		1.11	0.19
48	0:23:30	1.20	4.542	38.54		1.01	0.19
49	0:24:00	1.20	4.541	38.54		1.01	0.19
50	0:24:30	1.20	4.542	38.54		1.01	0.19
51	0:25:00	1.20	4.540	38.54		1.01	0.19
52	0:25:30	1.10	4.508	38.52		0.91	0.19
53	0:26:00	1.10	4.507	38.52		0.91	0.19
54	0:26:30	1.10	4.505	38.52		0.91	0.19
55	0:27:00	1.10	4.503	38.52		0.91	0.19
56	0:27:30	1.00	4.425	38.47		0.81	0.19
57	0:28:00	1.00	4.423	38.46		0.81	0.19
58	0:28:30	1.00	4.421	38.46		0.81	0.19
59	0:29:00	1.00	4.420	38.46		0.81	0.19
60	0:29:30	0.90	4.326	38.40		0.71	0.19
61	0:30:00	0.90	4.324	38.40		0.71	0.19
62	0:30:30	0.90	4.321	38.40		0.71	0.19
63	0:31:00	0.90	4.318	38.39		0.71	0.19
64	0:31:30	0.80	4.112	38.26		0.62	0.18
65	0:32:00	0.80	4.108	38.26		0.62	0.18
66	0:32:30	0.80	4.072	38.23		0.62	0.18
67	0:33:00	0.80	4.055	38.22		0.62	0.18
68	0:33:30	0.90	4.123	38.27		0.72	0.18
69	0:34:00	0.90	4.125	38.27		0.72	0.18
70	0:34:30	0.90	4.130	38.27		0.72	0.18
71	0:35:00	0.90	4.133	38.27	0.010	0.72	0.18
72	0:35:30	1.00	4.235	38.34		0.82	0.18
73	0:36:00	1.00	4.238	38.34		0.82	0.18
74	0:36:30	1.00	4.243	38.35		0.82	0.18
75	0:37:00	1.00	4.251	38.35	0.016	0.82	0.18
76	0:37:30	1.10	4.372	38.43		0.91	0.19
77	0:38:00	1.10	4.376	38.43		0.91	0.19
78	0:38:30	1.10	4.382	38.44		0.91	0.19
79	0:39:00	1.10	4.397	38.45	0.025	0.91	0.19
80	0:39:30	1.20	4.514	38.52		1.01	0.19
81	0:40:00	1.20	4.521	38.53		1.01	0.19
82	0:40:30	1.20	4.533	38.54		1.01	0.19
83	0:41:00	1.20	4.551	38.55	0.037	1.01	0.19
84	0:41:30	1.30	4.684	38.64		1.11	0.19
85	0:42:00	1.30	4.692	38.64		1.11	0.19
86	0:42:30	1.30	4.718	38.66		1.11	0.19
87	0:43:00	1.30	4.745	38.68	0.061	1.11	0.19
88	0:43:30	1.40	4.916	38.79		1.20	0.20
89	0:44:00	1.40	4.937	38.80		1.20	0.20
90	0:44:30	1.40	4.961	38.82		1.20	0.20
91	0:45:00	1.40	5.014	38.86	0.098	1.20	0.20
92	0:45:30	1.50	5.243	39.01		1.30	0.20
93	0:46:00	1.50	5.287	39.04		1.30	0.20
94	0:46:30	1.50	5.329	39.07		1.30	0.20

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	1.50	5.384	39.10	0.141	1.30	0.20
96	0:47:30	1.60	5.606	39.25		1.39	0.21
97	0:48:00	1.60	5.642	39.28		1.39	0.21
98	0:48:30	1.60	5.701	39.32		1.39	0.21
99	0:49:00	1.60	5.763	39.36	0.157	1.39	0.21
100	0:49:30	1.70	6.055	39.56		1.49	0.21
101	0:50:00	1.70	6.102	39.59		1.49	0.21
102	0:50:30	1.70	6.163	39.63		1.49	0.21
103	0:51:00	1.70	6.232	39.68	0.177	1.49	0.21
104	0:51:30	1.80	6.612	39.94		1.58	0.22
105	0:52:00	1.80	6.701	40.00		1.58	0.22
106	0:52:30	1.80	6.773	40.05		1.58	0.22
107	0:53:00	1.80	6.805	40.07	0.193	1.58	0.22
108	0:53:30	1.90	7.215	40.36		1.67	0.23
109	0:54:00	1.90	7.302	40.42		1.67	0.23
110	0:54:30	1.90	7.388	40.48		1.67	0.23
111	0:55:00	1.90	7.441	40.52	0.226	1.67	0.23
112	0:55:30	2.00	7.912	40.85		1.76	0.24
113	0:56:00	2.00	8.010	40.92		1.76	0.24
114	0:56:30	2.00	8.104	40.98		1.76	0.24
115	0:57:00	2.00	8.175	41.03	0.263	1.76	0.24
116	0:57:30	1.81	8.057	40.95		1.58	0.23
117	0:58:00	1.63	7.923	40.80		1.41	0.22
118	0:58:30	1.42	7.699	40.70		1.20	0.22
119	0:59:00	1.21	7.455	40.53		0.99	0.22
120	0:59:30	1.02	7.103	40.28		0.81	0.21
121	1:00:00	0.83	6.712	40.01		0.63	0.20
122	1:00:30	0.62	5.941	39.48		0.43	0.19
123	1:01:00	0.51	5.112	38.92		0.34	0.17
124	1:01:30	0.43	2.965	37.52		0.30	0.13
125	1:02:00	0.32	0.522	36.01		0.26	0.06
126	1:02:30	0.26	-0.685	35.31		0.25	0.01

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

Client	: AVA	**BH No**	: **BH15**
Project	: K5728	Test No	: PMT1
Location	: Sungei Tengah Rd (WA7)	Depth	: 25.50 - 26.00m
Measured By	: Lian	Soil Type	: Silty SAND
Date	: 3/9/2018	SPT (N)	: 58
		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)
	0.730	**2.110**	**14.375**	**69.144**	**3.848**
	Km = ΔP'/ΔR = (2.110 - 0.730) / (3.896 - 3.800) = 14.375 MPa/cm				
	Em = (1+μ) x Km x Rm = (1 + 0.25) x 14.375 x 3.848 = 69.144 MPa				
2nd	Po' (MPa)	Py' (MPa)	Kr (MPa/cm)	Er (MPa)	Rr (cm)
	-	**-**	**33.333**	**162.479**	**3.900**
	Kr = ΔP'/ΔR = (2.110 - 1.210) / (3.913 - 3.886) = 33.333 MPa/cm				
	Er = (1+μ) x Kr x Rr = (1 + 0.25) x 33.333 x 3.900 = 162.479 MPa				



OYO

ELAST LOGGER2 DATA

FILE ID.	1
DATE	3/9/2018
TIME	1:40:25 PM
HOLE NO.	BH15 (WA7)
DEPTH[m]	26
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	-1.127	34.33		0.22	0.02
2	0:00:30	0.30	-0.981	34.44		0.27	0.03
3	0:01:00	0.40	-0.520	34.80		0.35	0.05
4	0:01:30	0.40	-0.441	34.87		0.35	0.05
5	0:02:00	0.40	-0.372	34.92		0.34	0.06
6	0:02:30	0.40	-0.268	35.00	0.252	0.34	0.06
7	0:03:00	0.50	0.363	35.51		0.42	0.08
8	0:03:30	0.50	0.437	35.56		0.41	0.09
9	0:04:00	0.50	0.481	35.60		0.41	0.09
10	0:04:30	0.50	0.525	35.63	0.162	0.41	0.09
11	0:05:00	0.60	1.326	36.28		0.48	0.12
12	0:05:30	0.60	1.465	36.39		0.48	0.12
13	0:06:00	0.60	1.492	36.41		0.48	0.12
14	0:06:30	0.60	1.534	36.45	0.208	0.48	0.12
15	0:07:00	0.70	2.446	37.19		0.55	0.15
16	0:07:30	0.70	2.545	37.27		0.55	0.15
17	0:08:00	0.70	2.600	37.32		0.55	0.15
18	0:08:30	0.70	2.638	37.35	0.192	0.55	0.15
19	0:09:00	0.80	3.105	37.73		0.64	0.16
20	0:09:30	0.80	3.136	37.76		0.64	0.16
21	0:10:00	0.80	3.172	37.79		0.64	0.16
22	0:10:30	0.80	3.191	37.80	0.086	0.64	0.16
23	0:11:00	0.90	3.371	37.95		0.73	0.17
24	0:11:30	0.90	3.391	37.97		0.73	0.17
25	0:12:00	0.90	3.403	37.98		0.73	0.17
26	0:12:30	0.90	3.422	38.00	0.051	0.73	0.17
27	0:13:00	1.00	3.482	38.05		0.83	0.17
28	0:13:30	1.00	3.495	38.06		0.83	0.17
29	0:14:00	1.00	3.502	38.06		0.83	0.17
30	0:14:30	1.00	3.519	38.08	0.037	0.83	0.17
31	0:15:00	1.10	3.557	38.11		0.93	0.17
32	0:15:30	1.10	3.571	38.12		0.93	0.17
33	0:16:00	1.10	3.587	38.13		0.93	0.17
34	0:16:30	1.10	3.593	38.14	0.036	0.93	0.17
35	0:17:00	1.20	3.632	38.17		1.03	0.17
36	0:17:30	1.20	3.641	38.18		1.03	0.17
37	0:18:00	1.20	3.658	38.19		1.03	0.17
38	0:18:30	1.20	3.667	38.20	0.035	1.03	0.17
39	0:19:00	1.30	3.706	38.23		1.13	0.17
40	0:19:30	1.30	3.715	38.24		1.13	0.17
41	0:20:00	1.30	3.728	38.25		1.13	0.17

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	3.740	38.26	0.034	1.12	0.18
43	0:21:00	1.40	3.776	38.29		1.22	0.18
44	0:21:30	1.40	3.787	38.30		1.22	0.18
45	0:22:00	1.40	3.796	38.31		1.22	0.18
46	0:22:30	1.40	3.808	38.32	0.032	1.22	0.18
47	0:23:00	1.50	3.850	38.35		1.32	0.18
48	0:23:30	1.50	3.861	38.36		1.32	0.18
49	0:24:00	1.50	3.874	38.37		1.32	0.18
50	0:24:30	1.50	3.886	38.38	0.036	1.32	0.18
51	0:25:00	1.60	3.933	38.42		1.42	0.18
52	0:25:30	1.60	3.939	38.42		1.42	0.18
53	0:26:00	1.60	3.955	38.44		1.42	0.18
54	0:26:30	1.60	3.967	38.45	0.034	1.42	0.18
55	0:27:00	1.70	4.020	38.49		1.52	0.18
56	0:27:30	1.70	4.036	38.51		1.52	0.18
57	0:28:00	1.70	4.044	38.51		1.52	0.18
58	0:28:30	1.70	4.057	38.52	0.037	1.52	0.18
59	0:29:00	1.80	4.108	38.57		1.62	0.18
60	0:29:30	1.80	4.124	38.58		1.62	0.18
61	0:30:00	1.80	4.136	38.59		1.62	0.18
62	0:30:30	1.80	4.143	38.59	0.035	1.62	0.18
63	0:31:00	1.90	4.195	38.64		1.72	0.18
64	0:31:30	1.90	4.211	38.65		1.72	0.18
65	0:32:00	1.90	4.221	38.66		1.72	0.18
66	0:32:30	1.90	4.231	38.67	0.036	1.72	0.18
67	0:33:00	2.00	4.285	38.71		1.81	0.19
68	0:33:30	2.00	4.292	38.72		1.81	0.19
69	0:34:00	2.00	4.307	38.73		1.81	0.19
70	0:34:30	2.00	4.322	38.74	0.037	1.81	0.19
71	0:35:00	2.10	4.363	38.78		1.91	0.19
72	0:35:30	2.10	4.374	38.79		1.91	0.19
73	0:36:00	2.10	4.383	38.79		1.91	0.19
74	0:36:30	2.10	4.402	38.81	0.039	1.91	0.19
75	0:37:00	2.20	4.452	38.85		2.01	0.19
76	0:37:30	2.20	4.466	38.86		2.01	0.19
77	0:38:00	2.20	4.473	38.87		2.01	0.19
78	0:38:30	2.20	4.494	38.89	0.042	2.01	0.19
79	0:39:00	2.30	4.540	38.93		2.11	0.19
80	0:39:30	2.30	4.552	38.94		2.11	0.19
81	0:40:00	2.30	4.564	38.95		2.11	0.19
82	0:40:30	2.30	4.585	38.96	0.045	2.11	0.19
83	0:41:00	2.20	4.579	38.96		2.01	0.19
84	0:41:30	2.20	4.579	38.96		2.01	0.19
85	0:42:00	2.20	4.579	38.96		2.01	0.19
86	0:42:30	2.20	4.579	38.96		2.01	0.19
87	0:43:00	2.10	4.577	38.96		1.91	0.19
88	0:43:30	2.10	4.577	38.96		1.91	0.19
89	0:44:00	2.10	4.577	38.96		1.91	0.19
90	0:44:30	2.10	4.577	38.96		1.91	0.19
91	0:45:00	2.00	4.573	38.95		1.81	0.19
92	0:45:30	2.00	4.573	38.95		1.81	0.19
93	0:46:00	2.00	4.573	38.95		1.81	0.19
94	0:46:30	2.00	4.573	38.95		1.81	0.19

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	4.565	38.95		1.71	0.19
96	0:47:30	1.90	4.565	38.95		1.71	0.19
97	0:48:00	1.90	4.565	38.95		1.71	0.19
98	0:48:30	1.90	4.565	38.95		1.71	0.19
99	0:49:00	1.80	4.562	38.94		1.61	0.19
100	0:49:30	1.80	4.562	38.94		1.61	0.19
101	0:50:00	1.80	4.562	38.94		1.61	0.19
102	0:50:30	1.80	4.562	38.94		1.61	0.19
103	0:51:00	1.70	4.548	38.93		1.51	0.19
104	0:51:30	1.70	4.547	38.93		1.51	0.19
105	0:52:00	1.70	4.547	38.93		1.51	0.19
106	0:52:30	1.70	4.547	38.93		1.51	0.19
107	0:53:00	1.60	4.525	38.91		1.41	0.19
108	0:53:30	1.60	4.525	38.91		1.41	0.19
109	0:54:00	1.60	4.526	38.91		1.41	0.19
110	0:54:30	1.60	4.525	38.91		1.41	0.19
111	0:55:00	1.50	4.499	38.89		1.31	0.19
112	0:55:30	1.50	4.498	38.89		1.31	0.19
113	0:56:00	1.50	4.498	38.89		1.31	0.19
114	0:56:30	1.50	4.498	38.89		1.31	0.19
115	0:57:00	1.40	4.463	38.86		1.21	0.19
116	0:57:30	1.40	4.463	38.86		1.21	0.19
117	0:58:00	1.40	4.461	38.86		1.21	0.19
118	0:58:30	1.40	4.457	38.86		1.21	0.19
119	0:59:00	1.50	4.473	38.87		1.31	0.19
120	0:59:30	1.50	4.473	38.87		1.31	0.19
121	1:00:00	1.50	4.474	38.87		1.31	0.19
122	1:00:30	1.50	4.475	38.87	0.002	1.31	0.19
123	1:01:00	1.60	4.493	38.89		1.41	0.19
124	1:01:30	1.60	4.495	38.89		1.41	0.19
125	1:02:00	1.60	4.495	38.89		1.41	0.19
126	1:02:30	1.60	4.497	38.89	0.004	1.41	0.19
127	1:03:00	1.70	4.515	38.91		1.51	0.19
128	1:03:30	1.70	4.515	38.91		1.51	0.19
129	1:04:00	1.70	4.521	38.91		1.51	0.19
130	1:04:30	1.70	4.522	38.91	0.007	1.51	0.19
131	1:05:00	1.80	4.539	38.93		1.61	0.19
132	1:05:30	1.80	4.543	38.93		1.61	0.19
133	1:06:00	1.80	4.546	38.93		1.61	0.19
134	1:06:30	1.80	4.550	38.93	0.011	1.61	0.19
135	1:07:00	1.90	4.575	38.96		1.71	0.19
136	1:07:30	1.90	4.578	38.96		1.71	0.19
137	1:08:00	1.90	4.580	38.96		1.71	0.19
138	1:08:30	1.90	4.589	38.97	0.014	1.71	0.19
139	1:09:00	2.00	4.615	38.99		1.81	0.19
140	1:09:30	2.00	4.617	38.99		1.81	0.19
141	1:10:00	2.00	4.623	39.00		1.81	0.19
142	1:10:30	2.00	4.632	39.00	0.017	1.81	0.19
143	1:11:00	2.10	4.656	39.02		1.91	0.19
144	1:11:30	2.10	4.660	39.03		1.91	0.19
145	1:12:00	2.10	4.666	39.03		1.91	0.19
146	1:12:30	2.10	4.675	39.04	0.019	1.91	0.19
147	1:13:00	2.20	4.702	39.06		2.01	0.19

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	2.20	4.707	39.07		2.01	0.19
149	1:14:00	2.20	4.714	39.07		2.01	0.19
150	1:14:30	2.20	4.725	39.08	0.023	2.01	0.19
151	1:15:00	2.30	4.756	39.11		2.11	0.19
152	1:15:30	2.30	4.760	39.11		2.11	0.19
153	1:16:00	2.30	4.771	39.12		2.11	0.19
154	1:16:30	2.30	4.787	39.13	0.031	2.11	0.19
155	1:17:00	2.40	4.832	39.17		2.21	0.19
156	1:17:30	2.40	4.846	39.18		2.21	0.19
157	1:18:00	2.40	4.858	39.19		2.21	0.19
158	1:18:30	2.40	4.878	39.21	0.046	2.21	0.19
159	1:19:00	2.60	4.995	39.31		2.40	0.20
160	1:19:30	2.60	5.015	39.32		2.40	0.20
161	1:20:00	2.60	5.036	39.34		2.40	0.20
162	1:20:30	2.60	5.051	39.35	0.056	2.40	0.20
163	1:21:00	2.80	5.180	39.46		2.60	0.20
164	1:21:30	2.80	5.194	39.47		2.60	0.20
165	1:22:00	2.80	5.206	39.48		2.60	0.20
166	1:22:30	2.80	5.247	39.52	0.067	2.60	0.20
167	1:23:00	3.00	5.377	39.63		2.80	0.20
168	1:23:30	3.00	5.400	39.65		2.80	0.20
169	1:24:00	3.00	5.414	39.66		2.80	0.20
170	1:24:30	3.00	5.448	39.69	0.071	2.80	0.20
171	1:25:00	3.20	5.635	39.85		2.99	0.21
172	1:25:30	3.20	5.657	39.87		2.99	0.21
173	1:26:00	3.20	5.677	39.88		2.99	0.21
174	1:26:30	3.20	5.733	39.93	0.098	2.99	0.21
175	1:27:00	3.40	5.979	40.14		3.19	0.21
176	1:27:30	3.40	5.996	40.15		3.19	0.21
177	1:28:00	3.40	6.019	40.17		3.19	0.21
178	1:28:30	3.40	6.095	40.24	0.116	3.19	0.21
179	1:29:00	3.60	6.382	40.48		3.38	0.22
180	1:29:30	3.60	6.450	40.54		3.38	0.22
181	1:30:00	3.60	6.482	40.56		3.38	0.22
182	1:30:30	3.60	6.524	40.60	0.142	3.38	0.22
183	1:31:00	3.80	6.852	40.88		3.58	0.22
184	1:31:30	3.80	6.907	40.93		3.58	0.22
185	1:32:00	3.80	6.958	40.97		3.58	0.22
186	1:32:30	3.80	7.038	41.04	0.186	3.57	0.23
187	1:33:00	3.40	7.008	41.01		3.19	0.21
188	1:33:30	3.01	6.958	40.97		2.80	0.21
189	1:34:00	2.61	6.865	40.89		2.40	0.21
190	1:34:30	2.20	6.732	40.78		2.00	0.20
191	1:35:00	1.81	6.533	40.61		1.61	0.20
192	1:35:30	1.60	6.419	40.51		1.40	0.20
193	1:36:00	1.21	6.112	40.25		1.02	0.19
194	1:36:30	1.02	5.916	40.08		0.83	0.19
195	1:37:00	0.82	5.676	39.88		0.63	0.19
196	1:37:30	0.61	5.276	39.54		0.43	0.18
197	1:38:00	0.45	4.154	38.60		0.29	0.16
198	1:38:30	0.35	2.032	36.85		0.25	0.10
199	1:39:00	0.26	-0.035	35.19		0.22	0.04

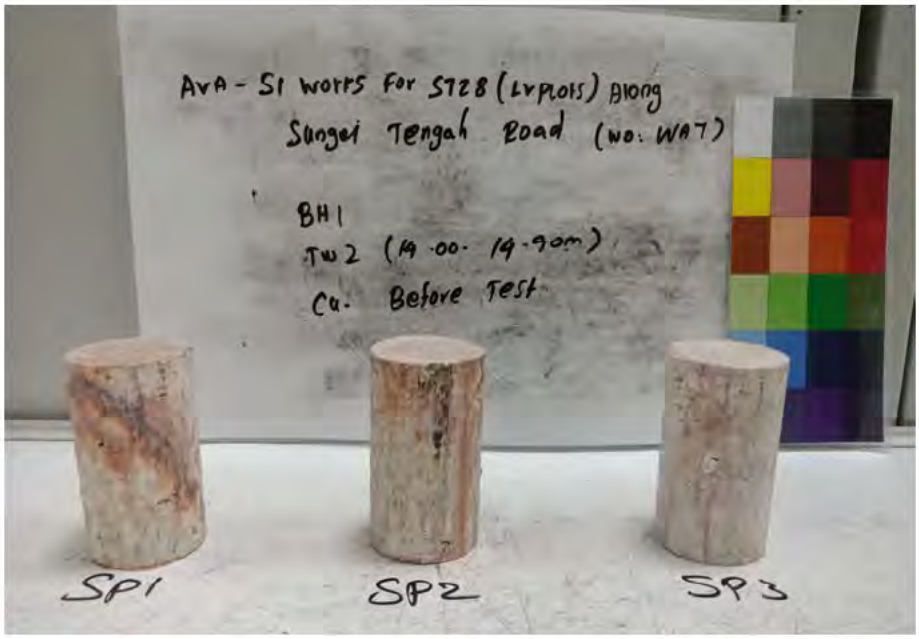
APPENDIX G
SAMPLE PHOTOGRAPHS



Ryobi G 58A Sungei Kadut Loop Singapore 729505 Tel: 6369 7100 Fax: 6362 5848 SAC ACCREDITED INSPECTION BODY	**Thin-Walled Tube Sample (BH1-TW1)-Consolidated Undrained Triaxial Compression Test (Before Test)**
	Client: Agri-Food & Veterinary Authority of Singapore (AVA)
	Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G 58A Sungei Kadut Loop Singapore 729505 Tel: 6369 7100 Fax: 6362 5848 SAC ACCREDITED INSPECTION BODY	**Thin-Walled Tube Sample (BH1-TW1)-Consolidated Undrained Triaxial Compression Test (After Test)**
	Client: Agri-Food & Veterinary Authority of Singapore (AVA)
	Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



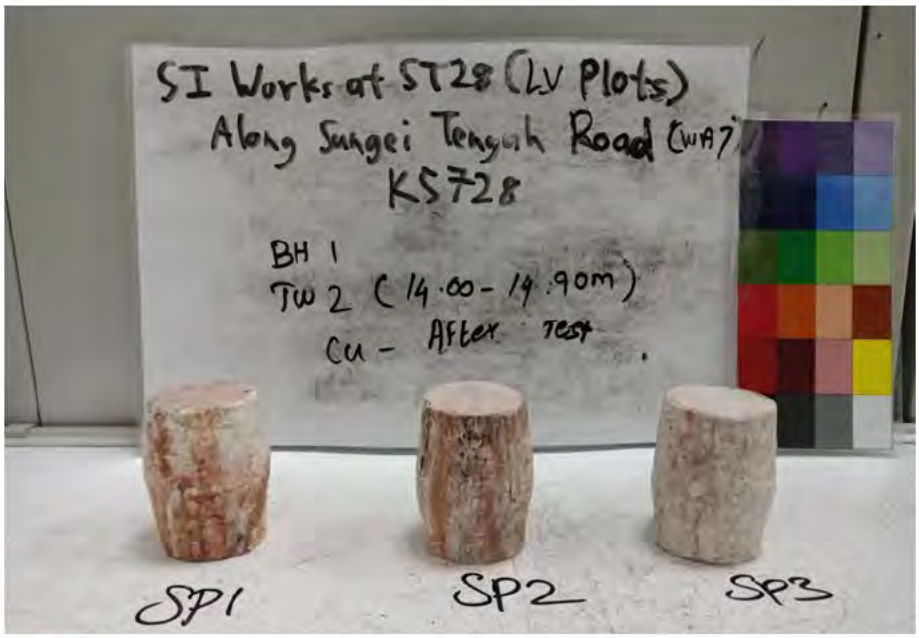
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH1-TW2)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH1-TW2)-Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

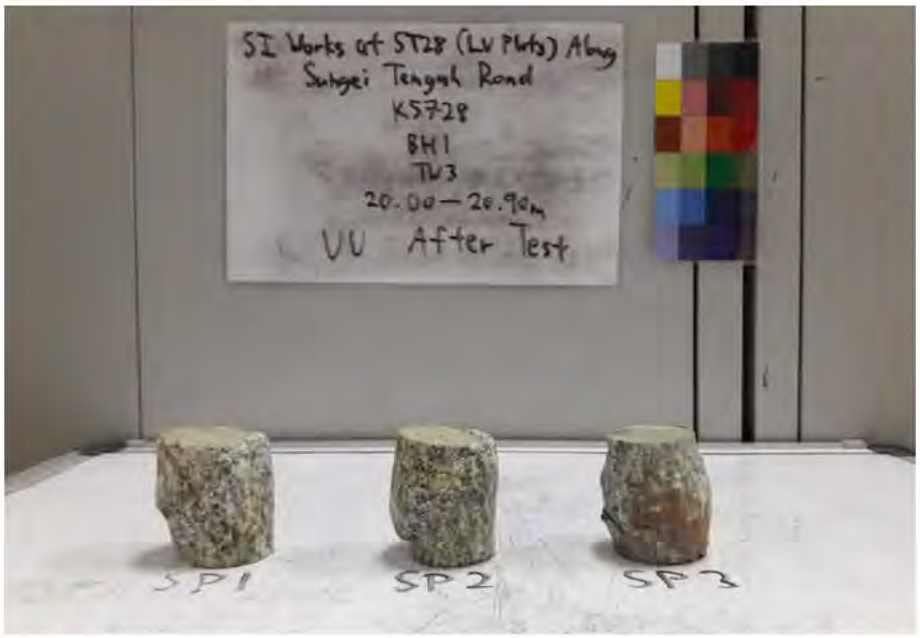


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH1-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH1-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH2-TW1)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH2-TW1)-Consolidated Undrained Triaxial Compression Test (After Test)

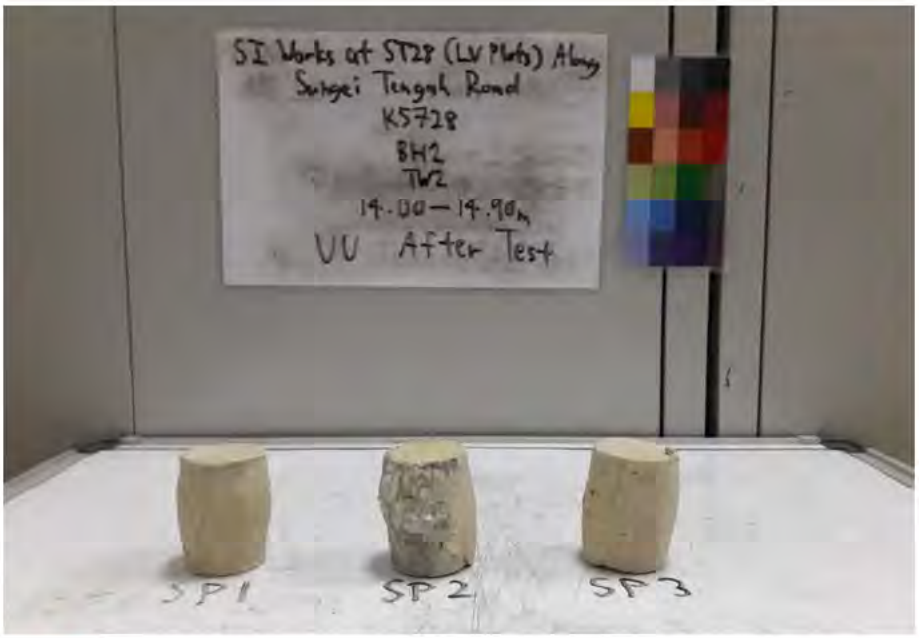
Client: Agri-Food & Veterinary Authority of Singapore (AVA)

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



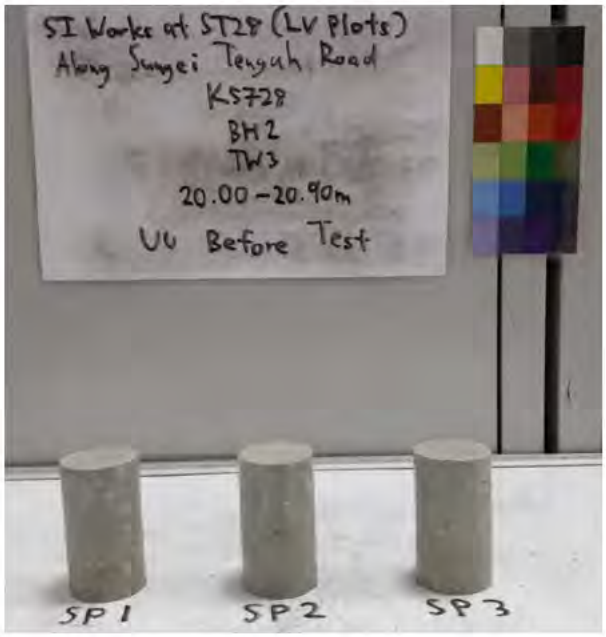
Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**



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Singapore 729505
Tel: 6369 7100
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ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**

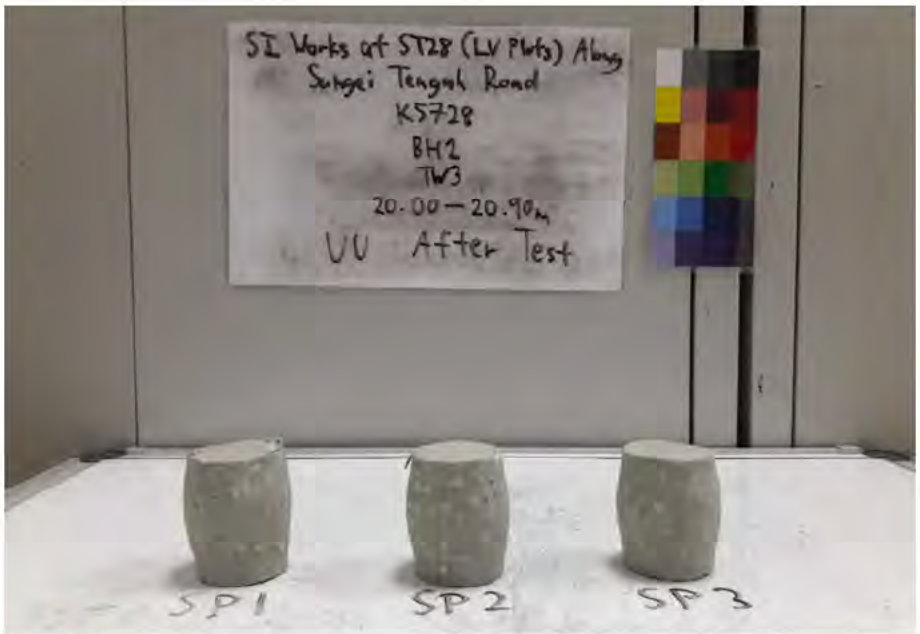


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

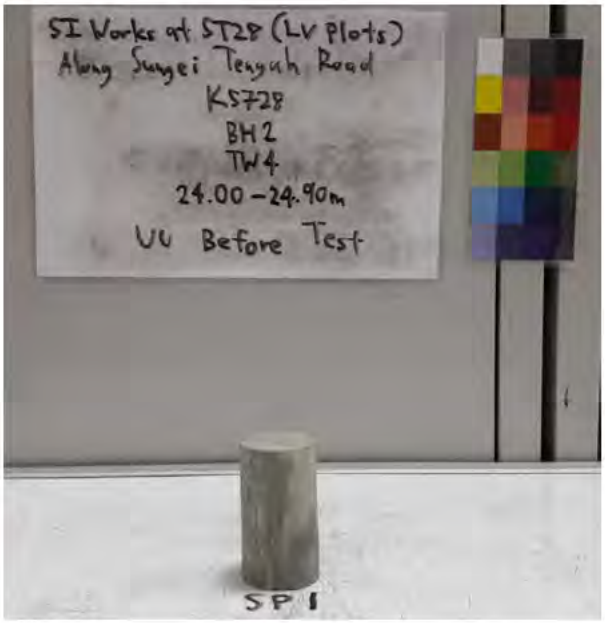


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

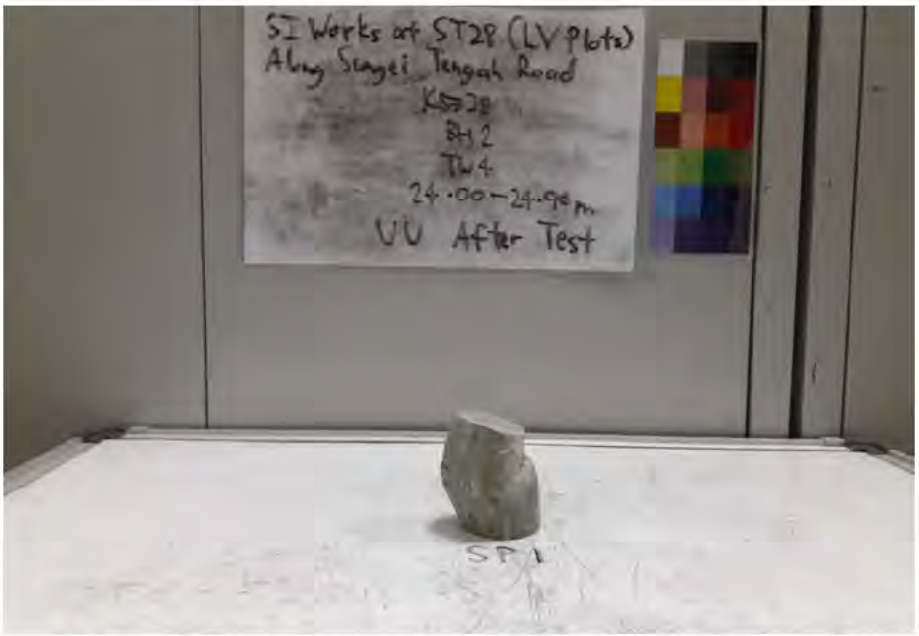


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

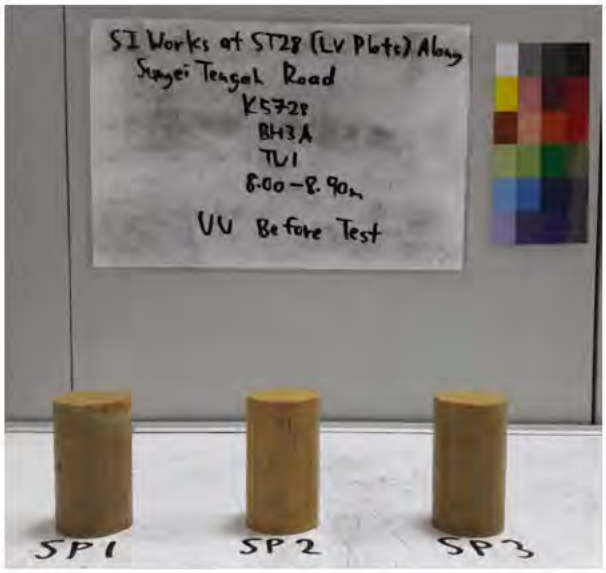


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH2-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3A-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3A-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

Thin-Walled Tube Sample (BH3A-TW2)-Consolidated Undrained Triaxial Compression Test (Before Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**



58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

Thin-Walled Tube Sample (BH3A-TW2)-Consolidated Undrained Triaxial Compression Test (After Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3-TW1)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3-TW1)-Consolidated Undrained Triaxial Compression Test (After Test)

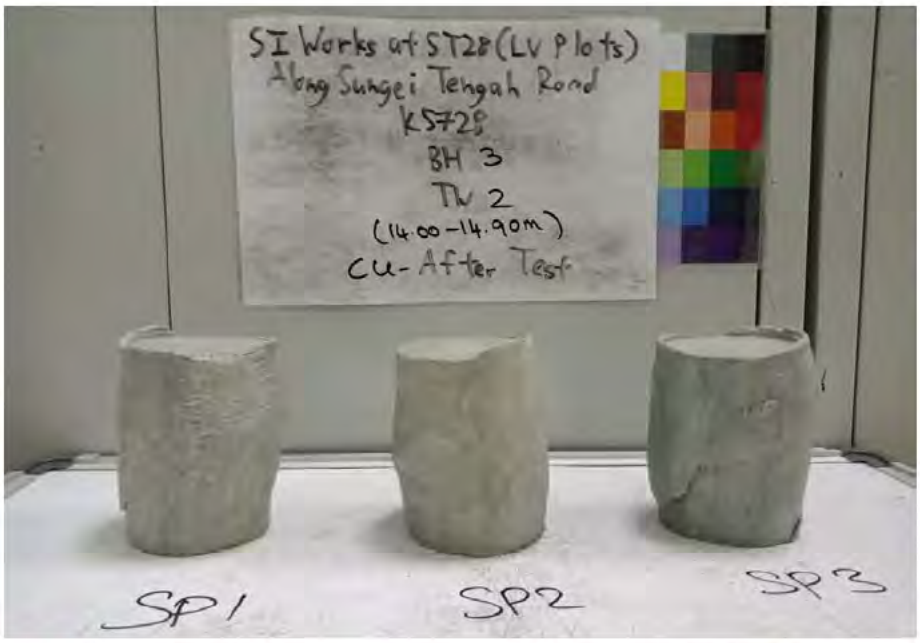
Client: Agri-Food & Veterinary Authority of Singapore (AVA)

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



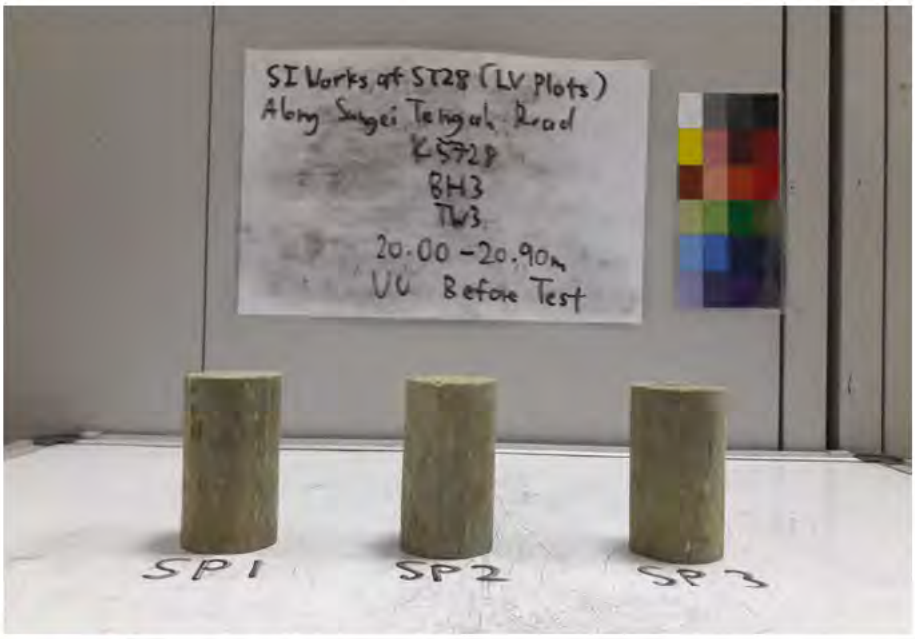
Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3-TW2)-Consolidated Undrained Triaxial Compression Test (Before Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3-TW2)-Consolidated Undrained Triaxial Compression Test (After Test)	
Client:	**Agri-Food & Veterinary Authority of Singapore (AVA)**
Project:	**Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road**

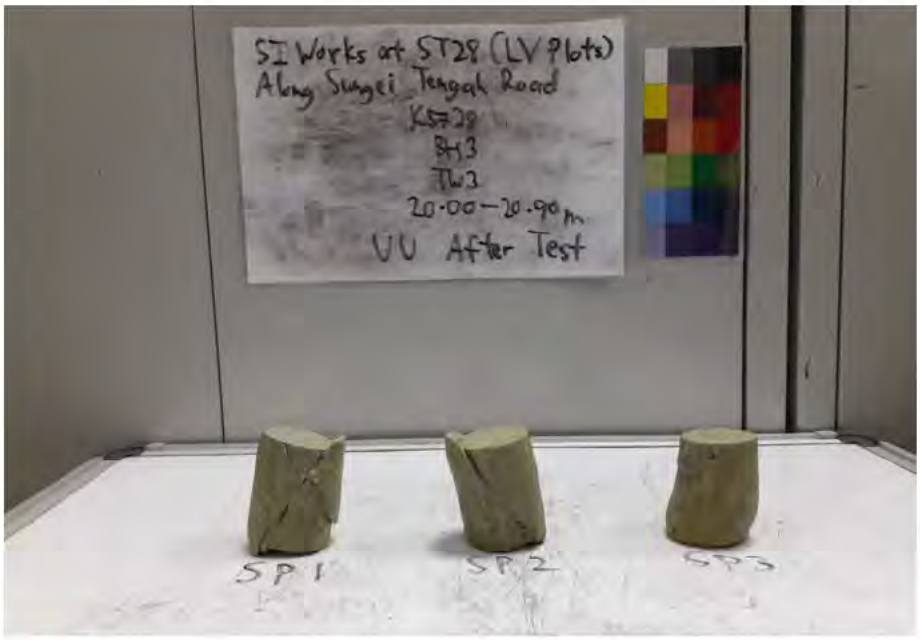


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH3-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

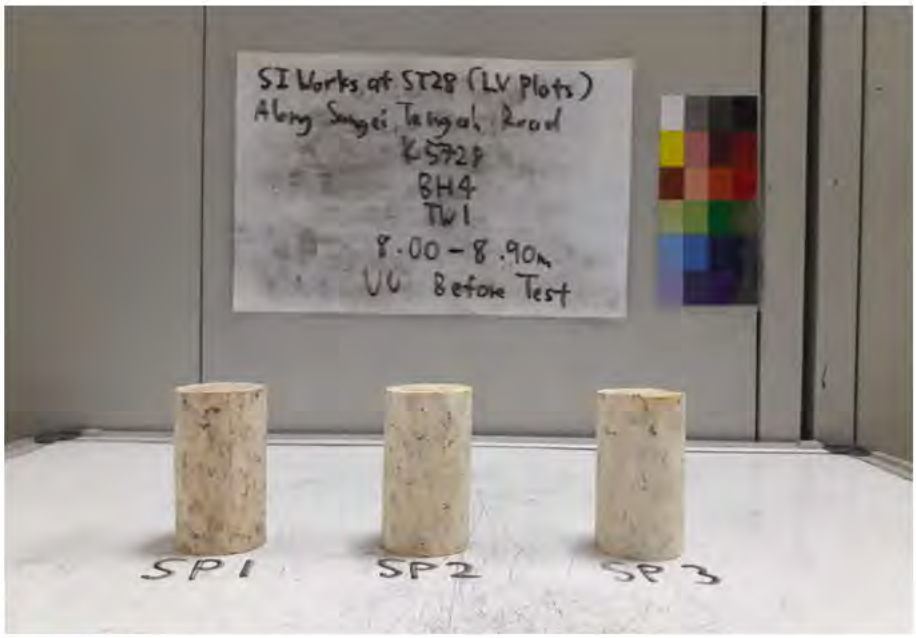


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH3-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

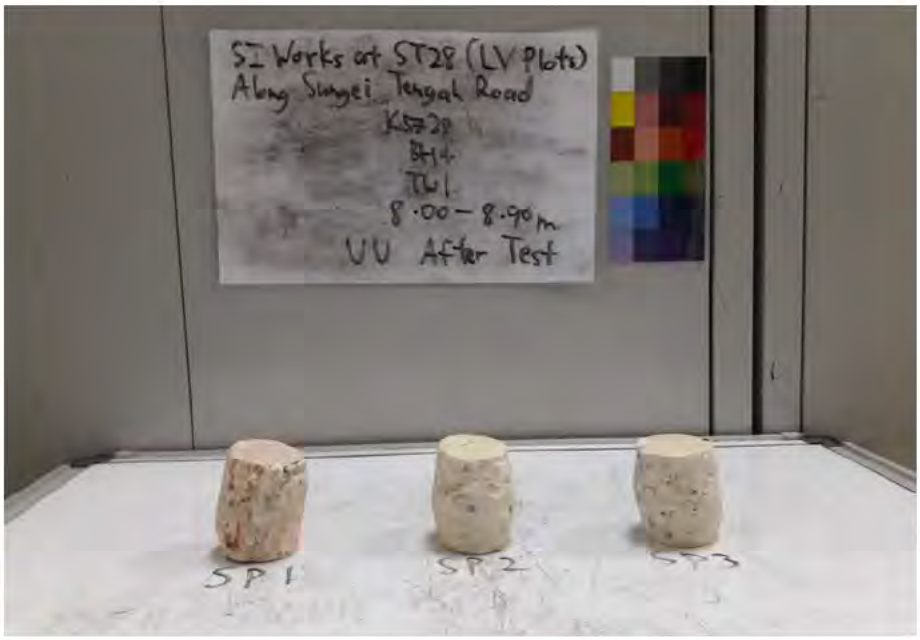


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH4-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

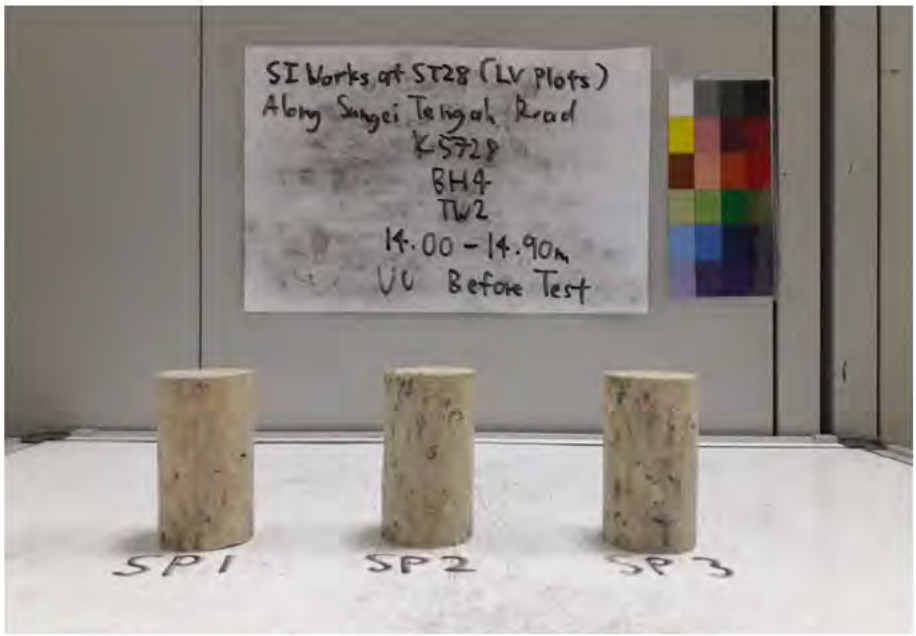


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH4-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

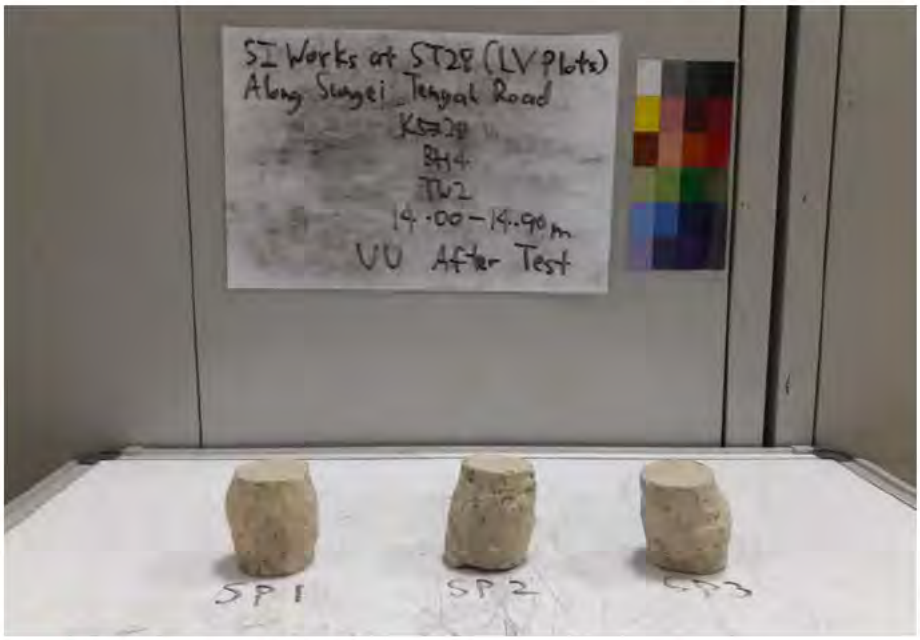


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH4-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

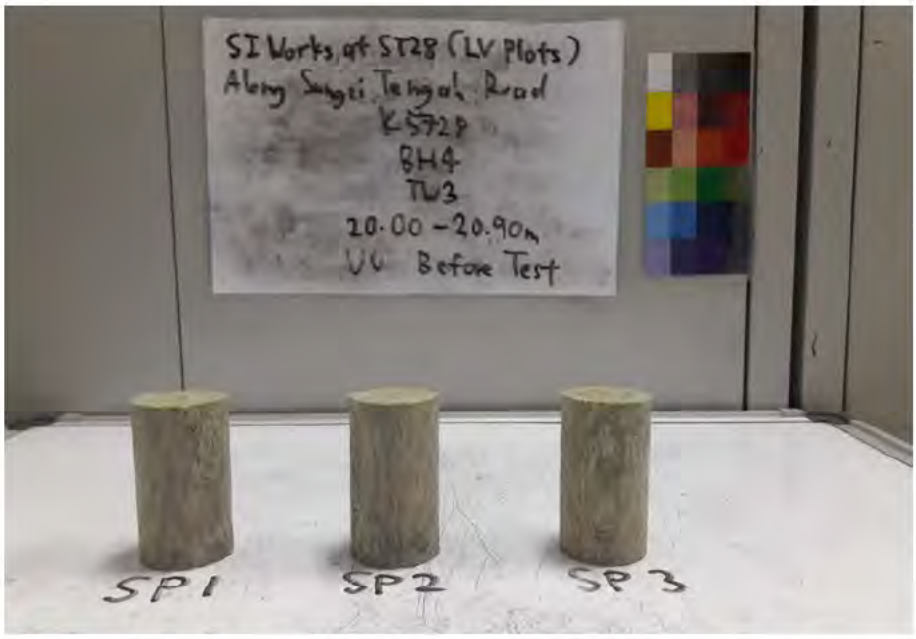


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH4-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

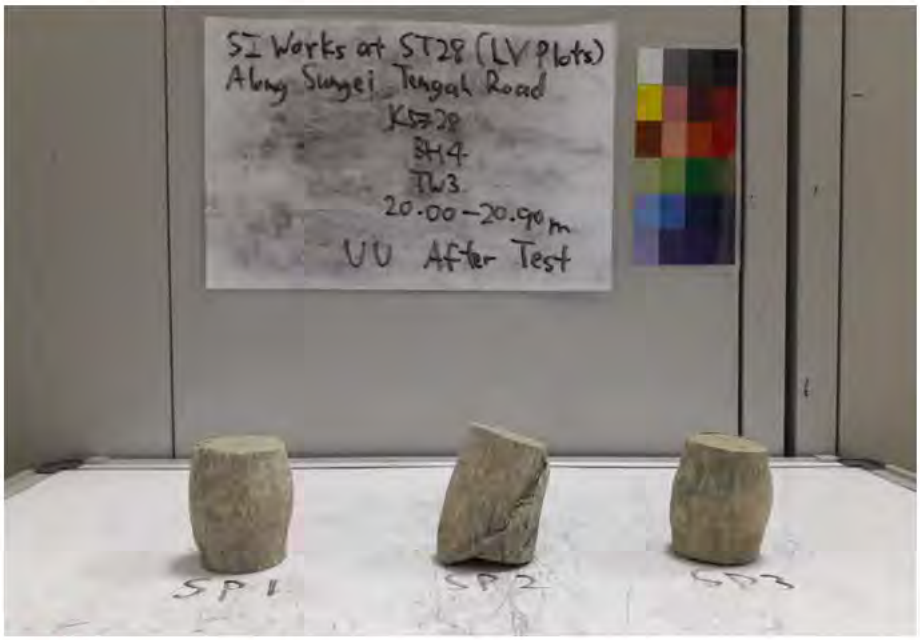


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY
SAC

Thin-Walled Tube Sample (BH4-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

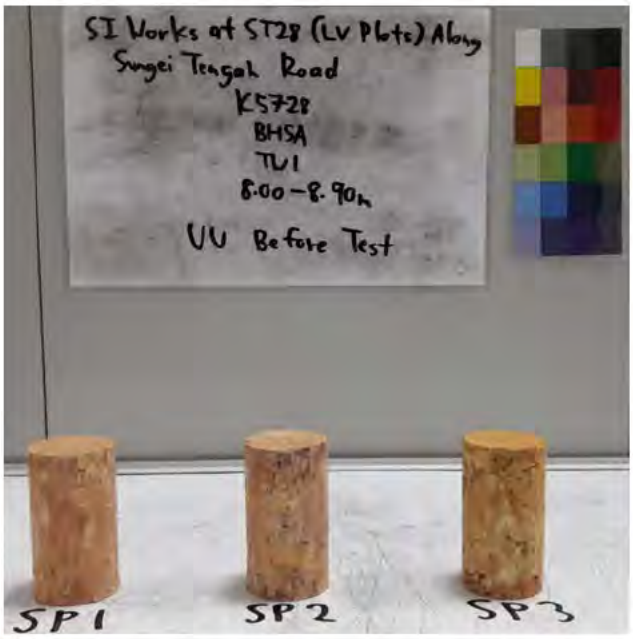


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY
SAC

Thin-Walled Tube Sample (BH4-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5A-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

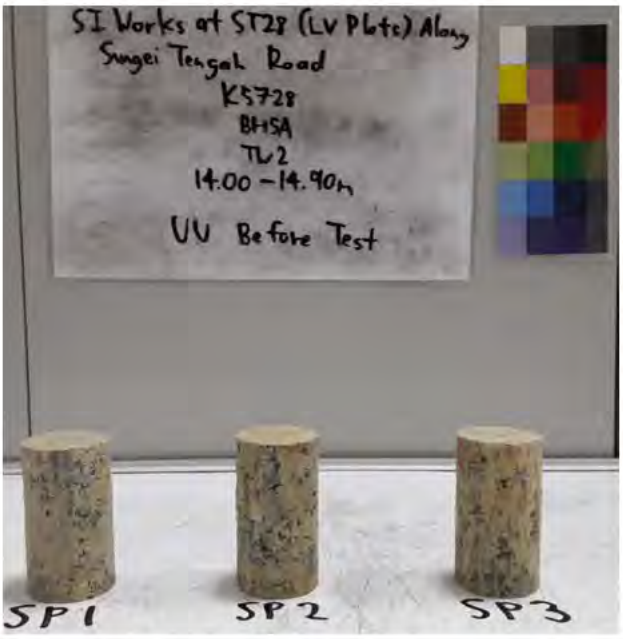


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5A-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

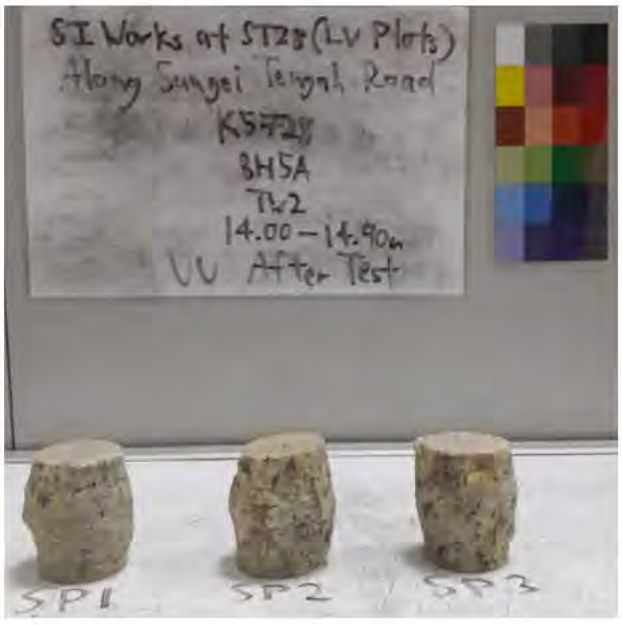


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY
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Thin-Walled Tube Sample (BH5A-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

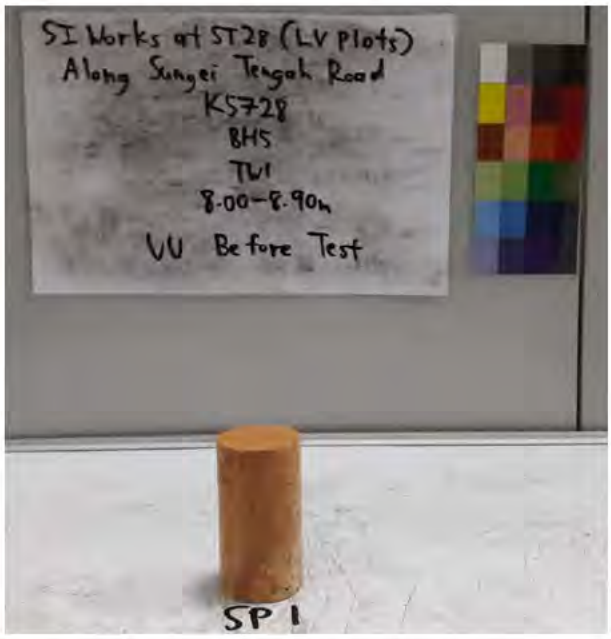


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY
SAC

Thin-Walled Tube Sample (BH5A-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

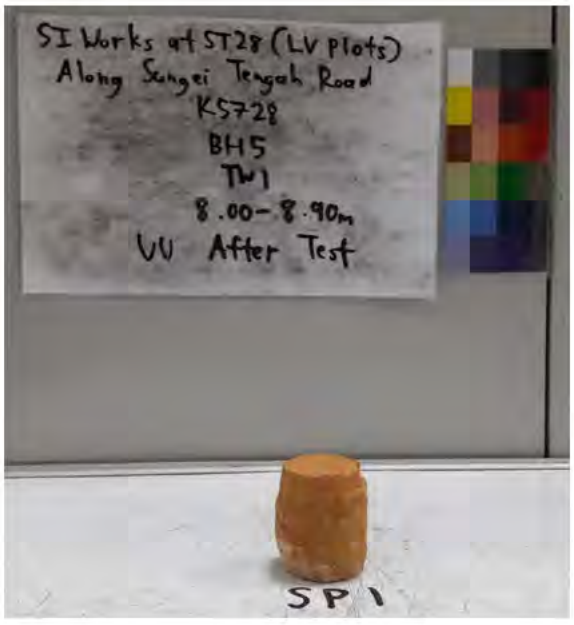


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

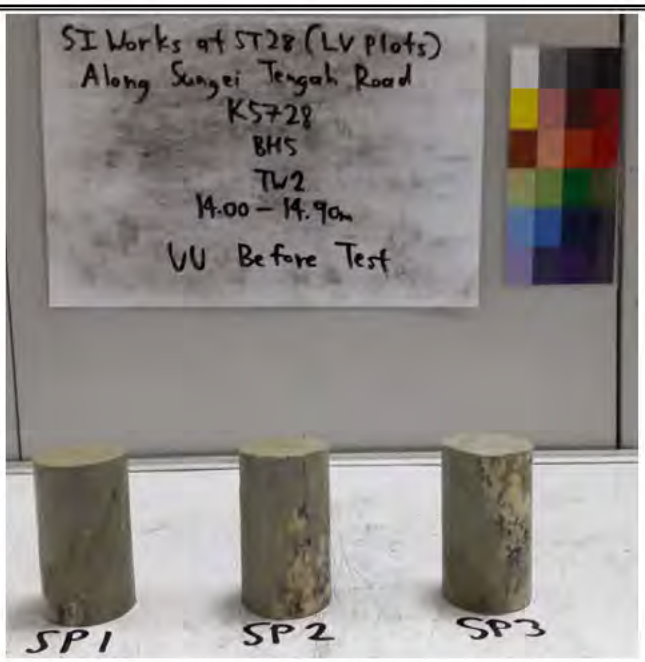


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH5-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

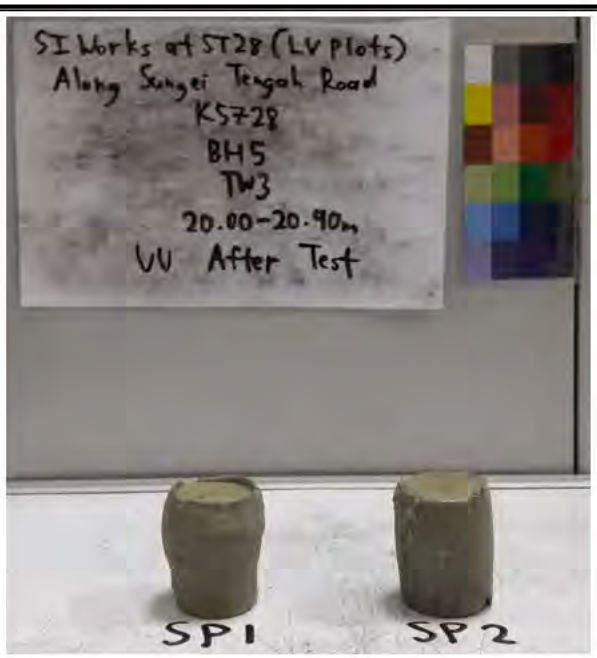


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

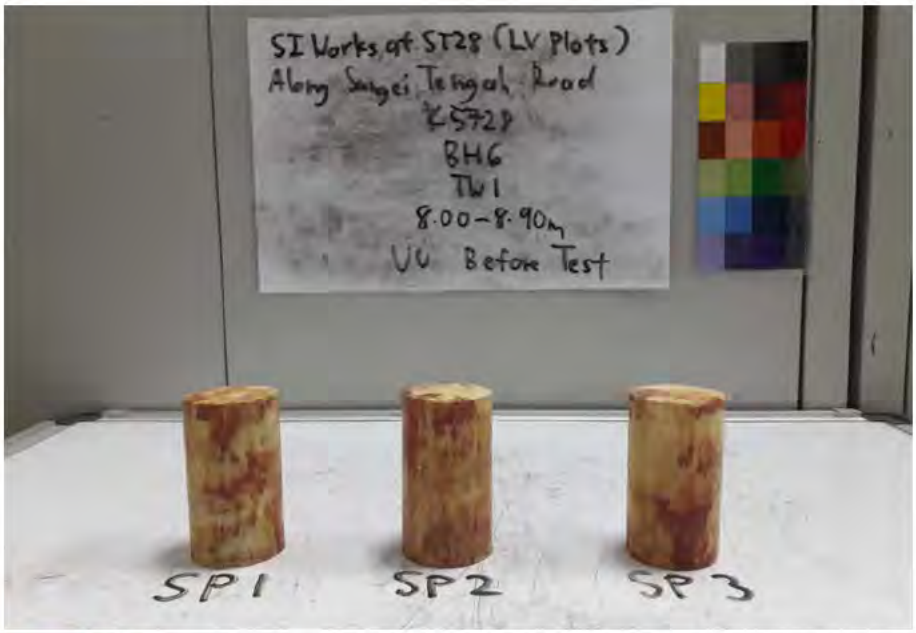


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH5-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

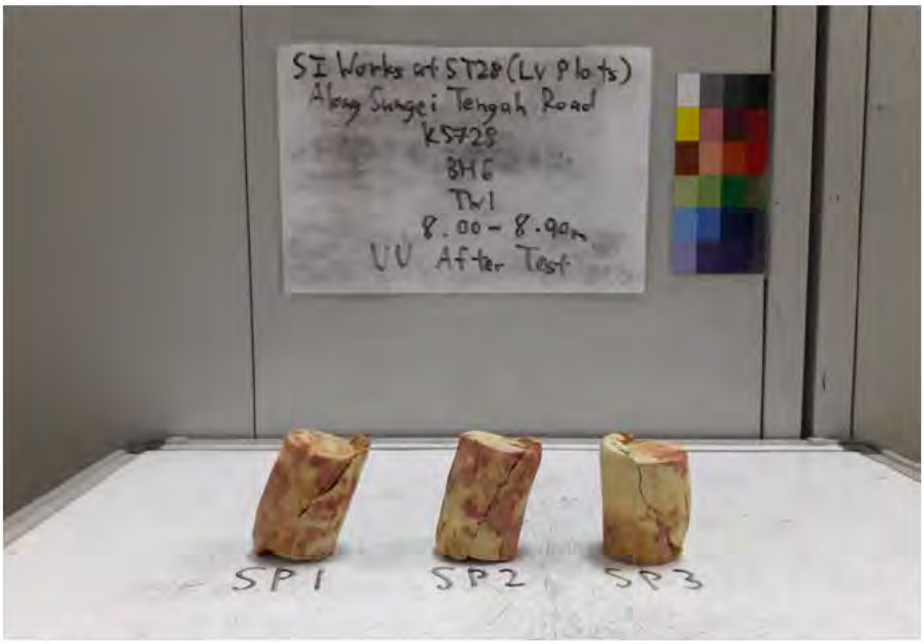


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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

Thin-Walled Tube Sample (BH6-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848

Thin-Walled Tube Sample (BH6-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

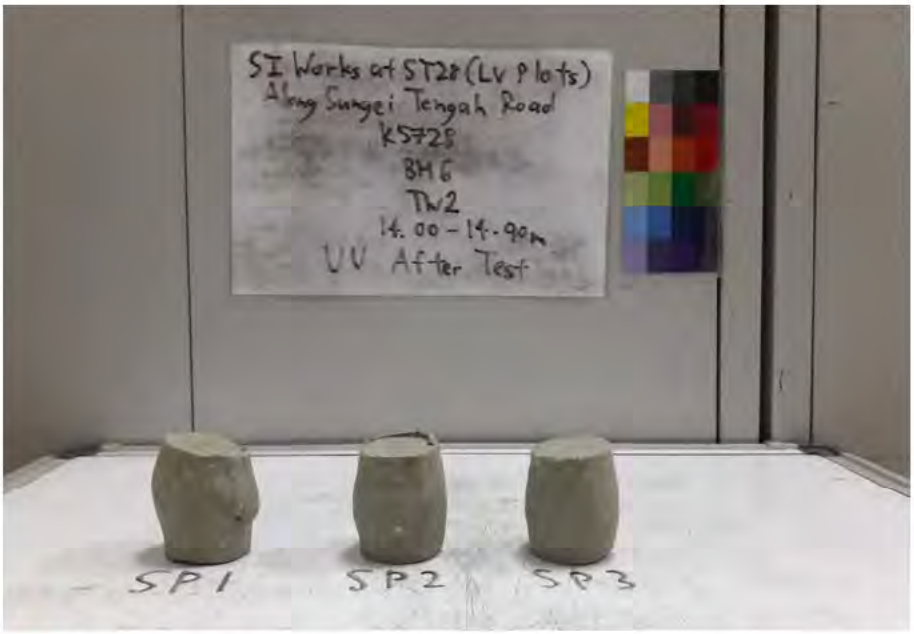


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH6-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

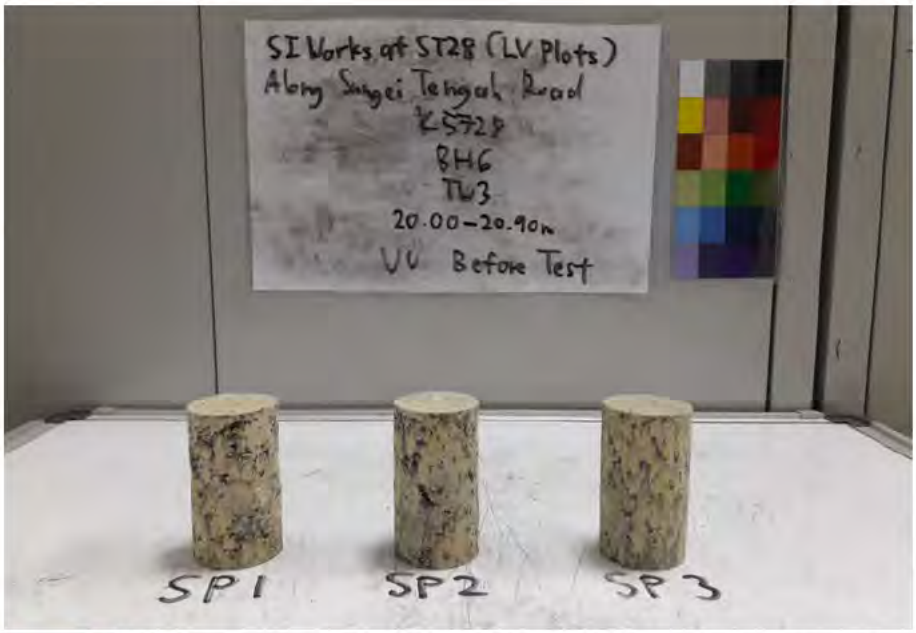


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH6-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

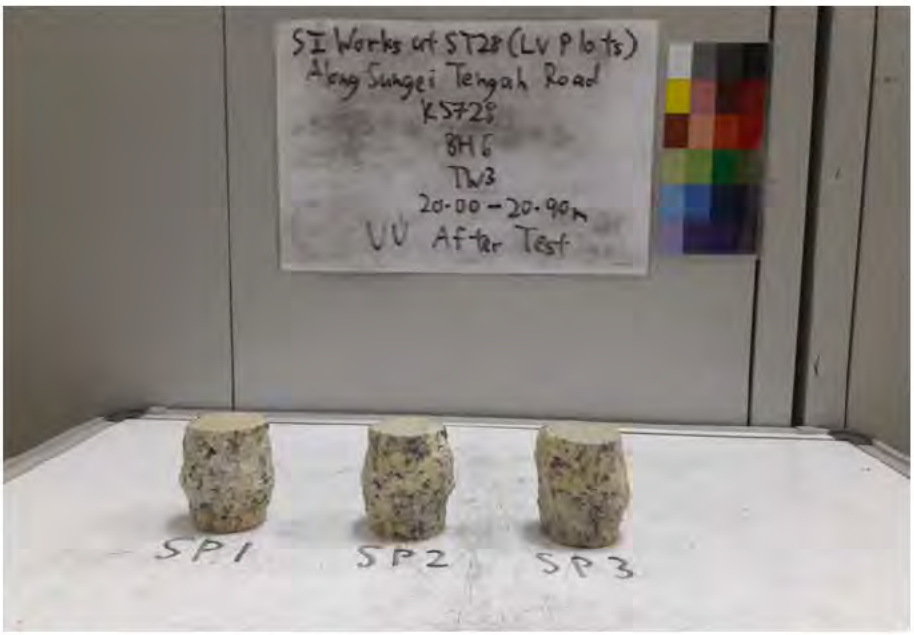


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH6-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

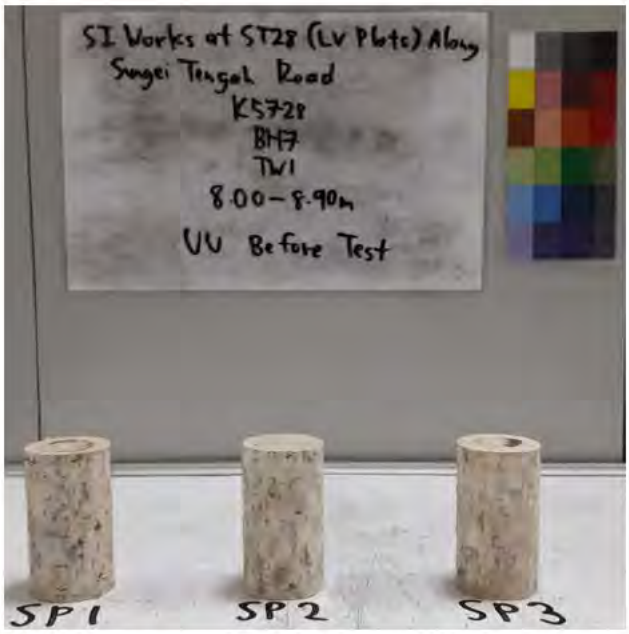


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH6-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

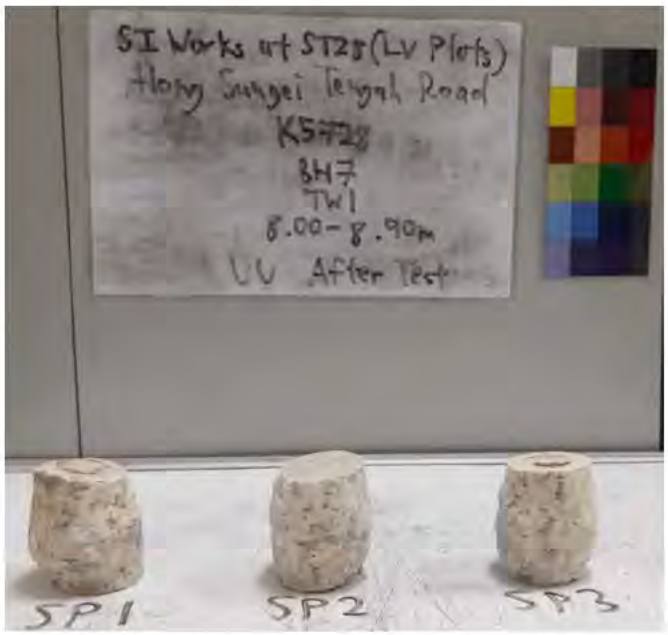


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH7-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH7-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

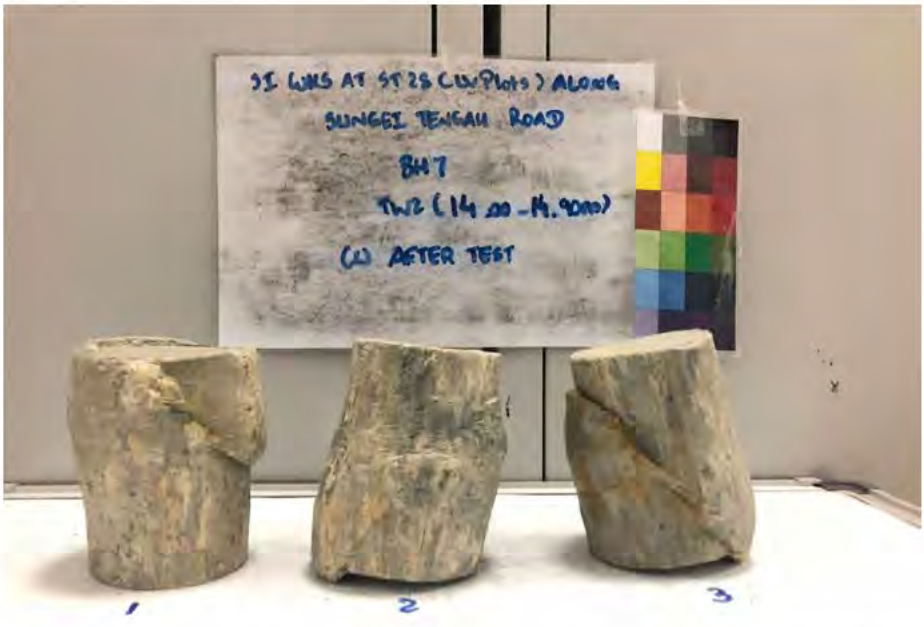


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH7-TW2)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

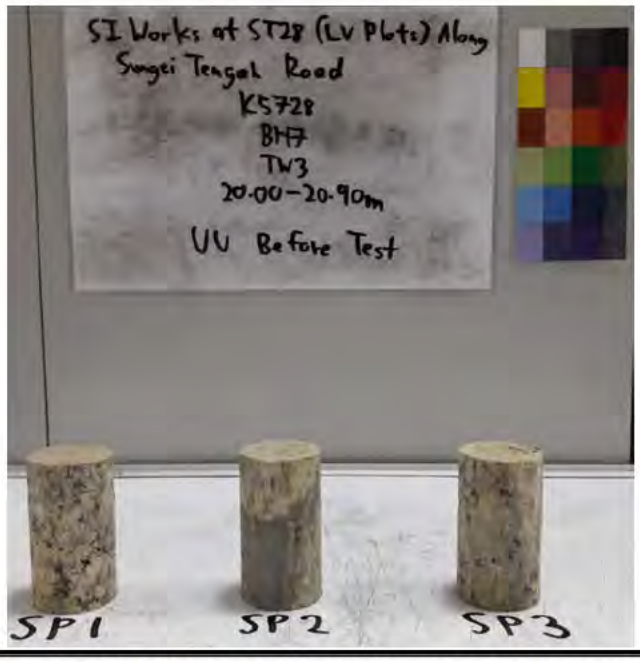


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH7-TW2)-Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

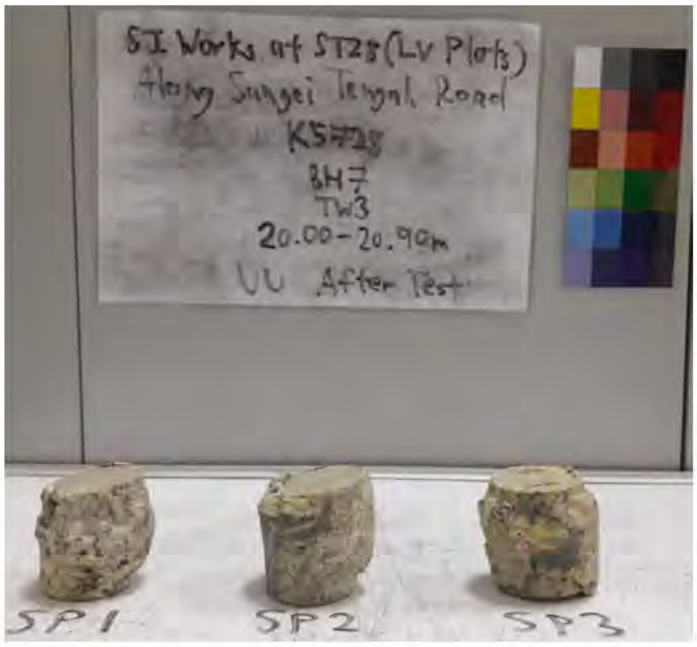


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH7-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH7-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH8-TW1)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

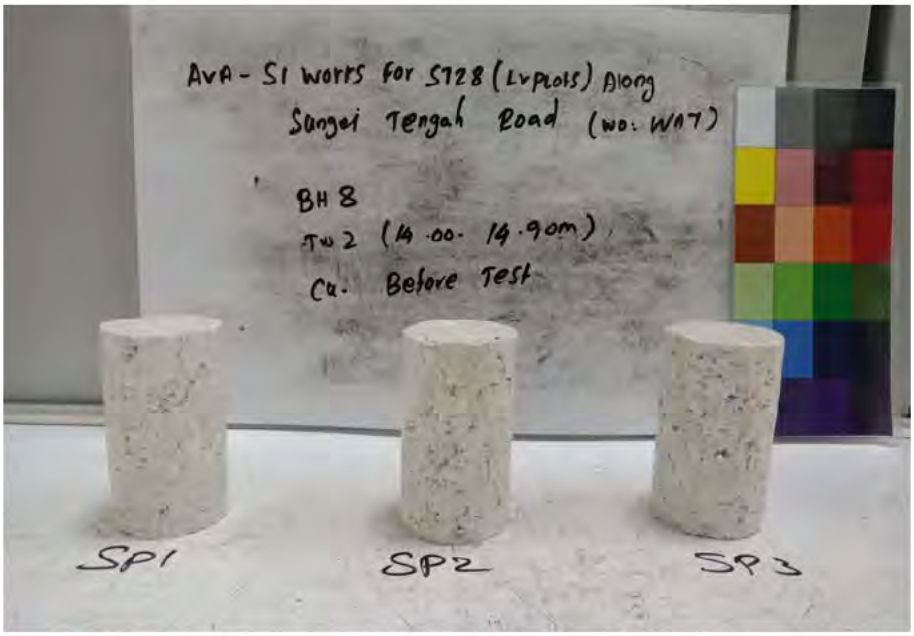


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH8-TW1)-Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

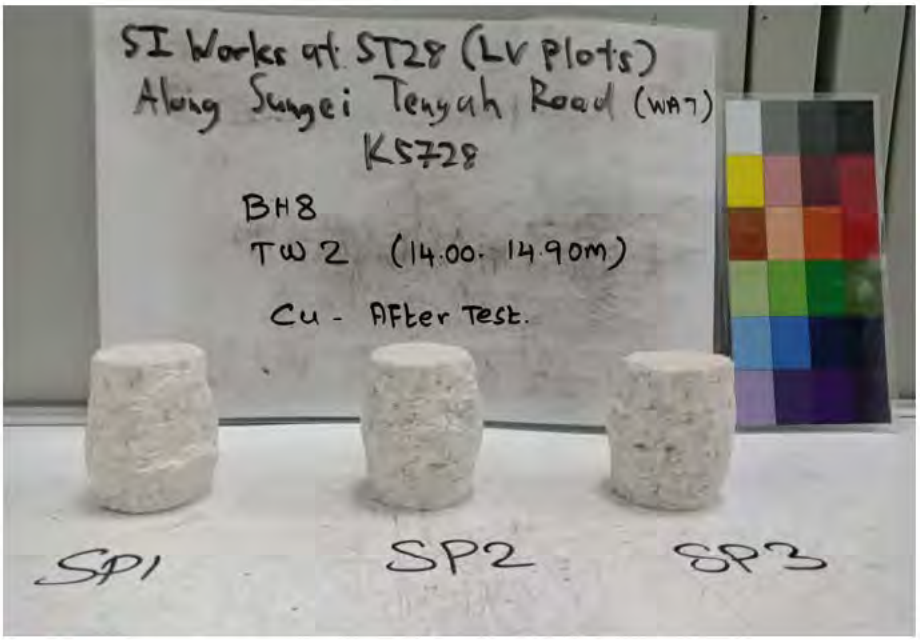


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH8-TW2)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

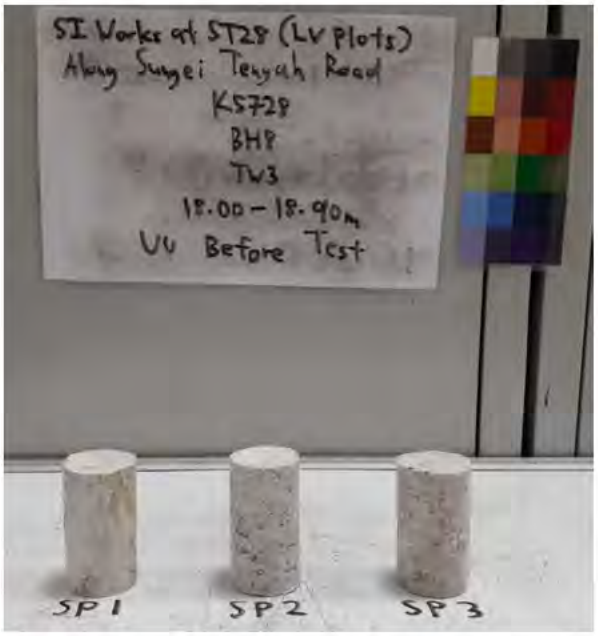


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH8-TW2)-Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

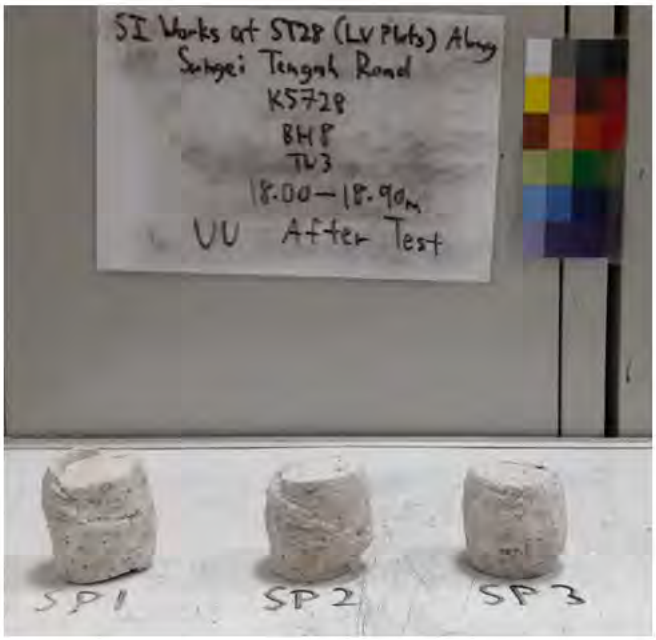


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH8-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

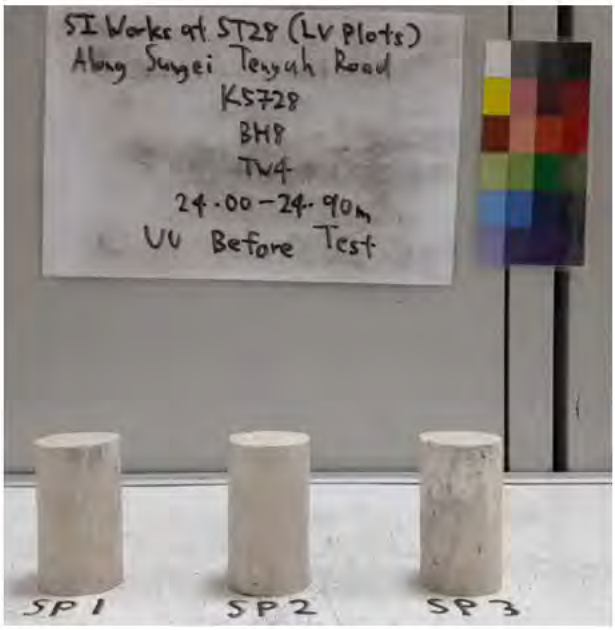


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH8-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH8-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH8-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

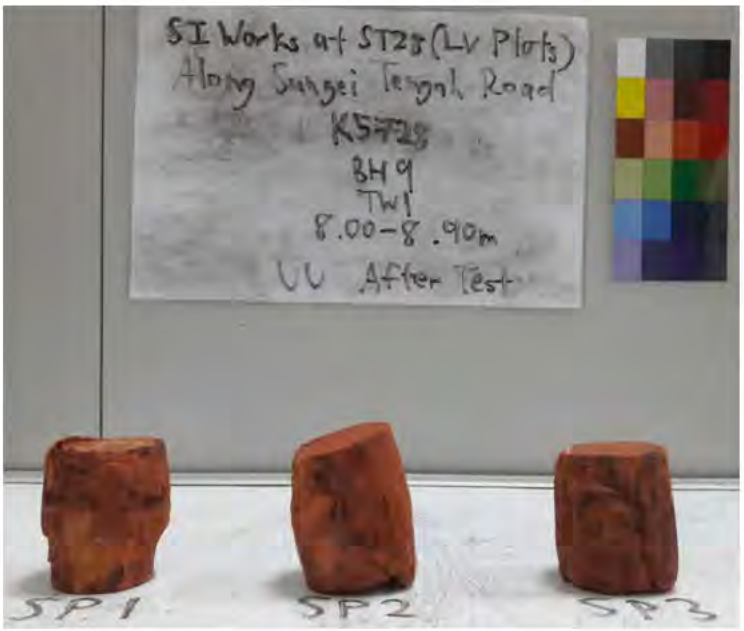


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

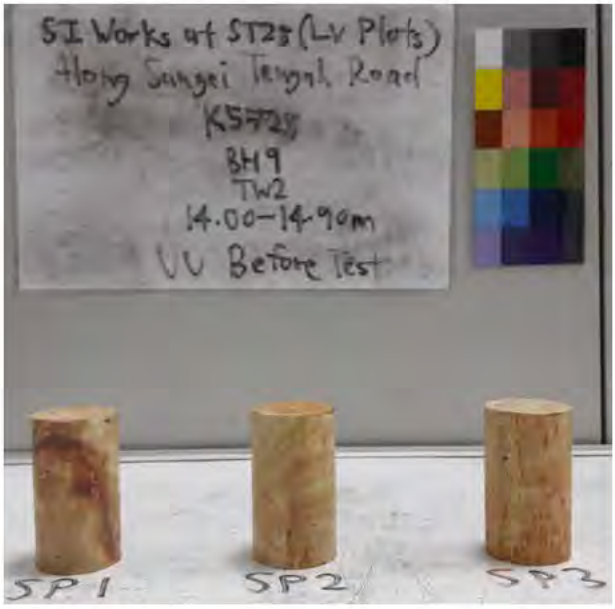


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

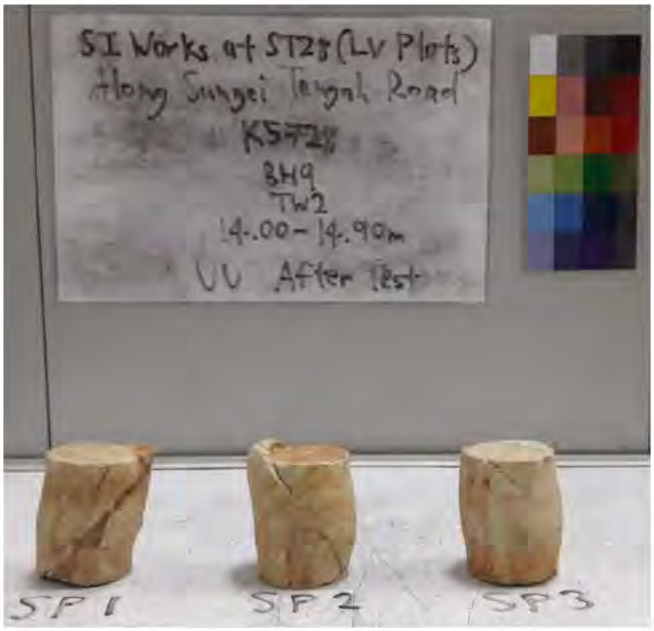


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

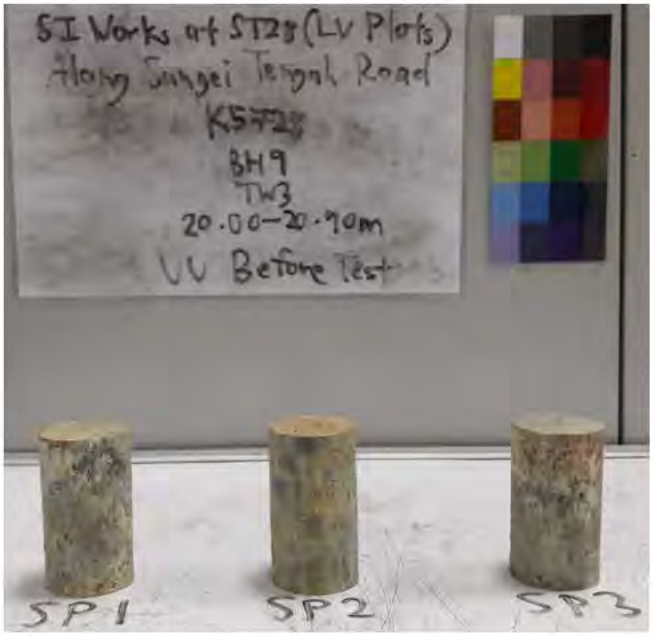


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

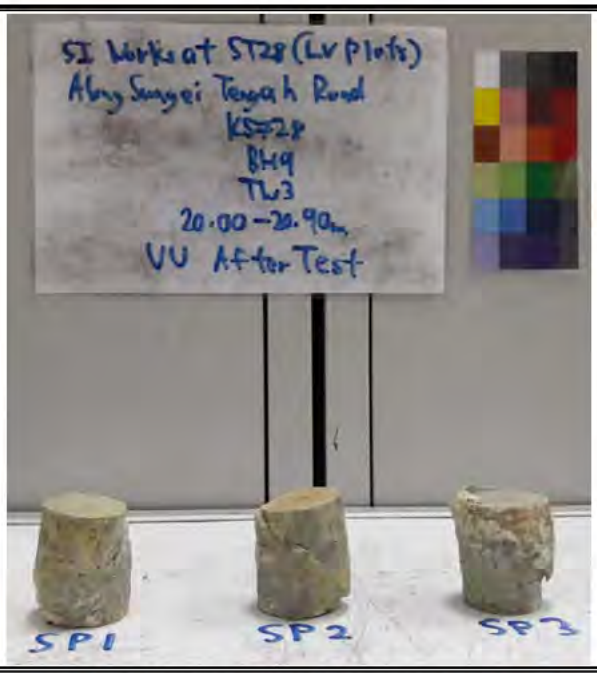


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH9-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH9-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH9-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

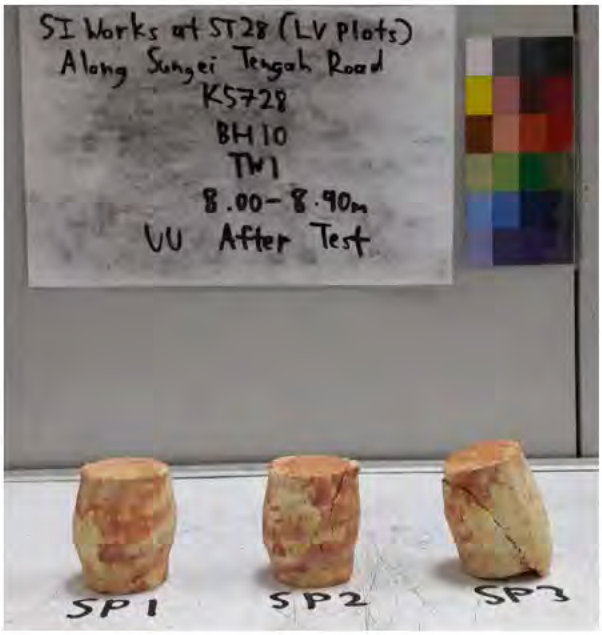


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

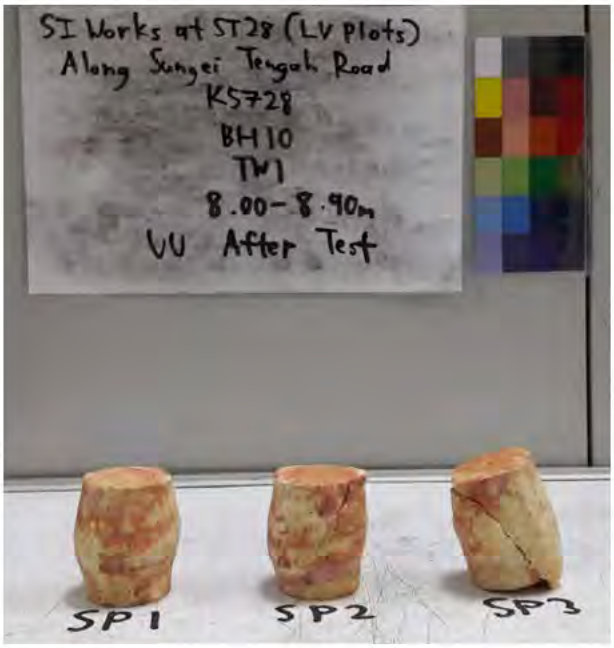


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH10-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

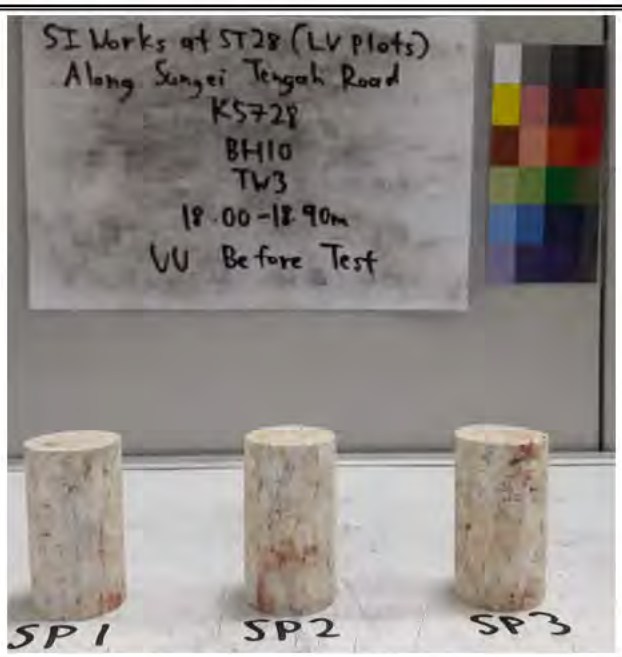


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH10-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

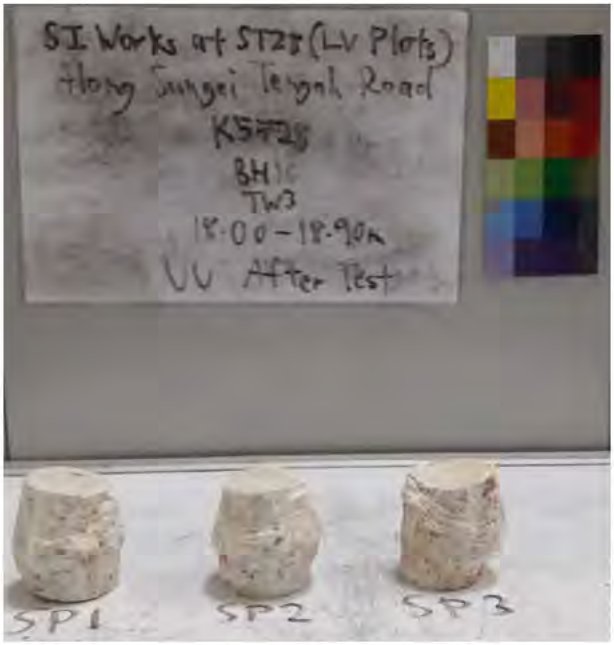


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

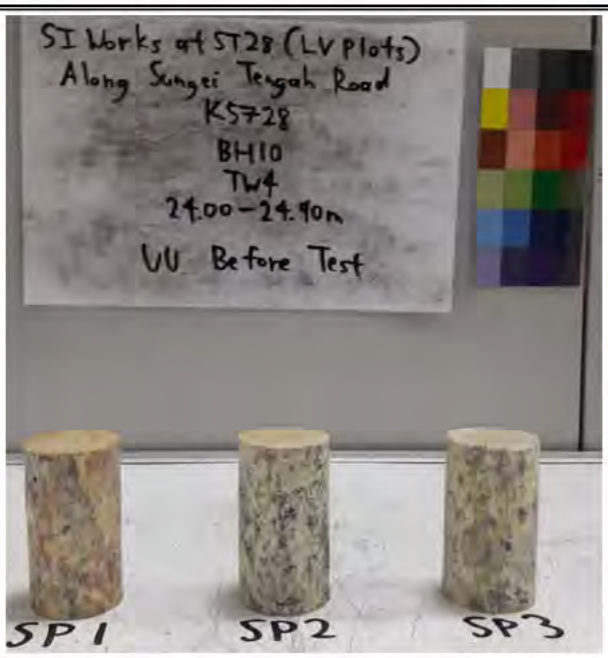


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

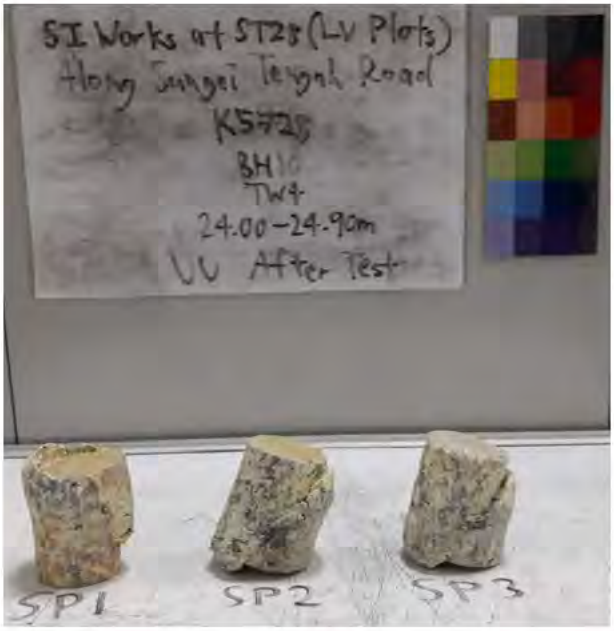


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

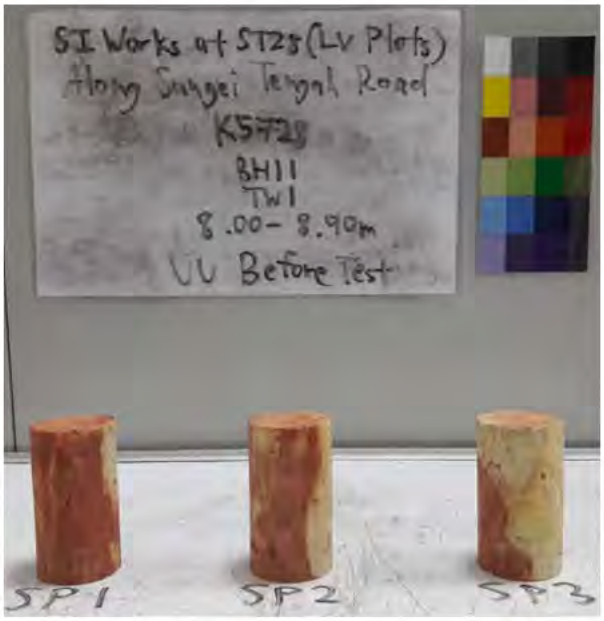


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH10-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

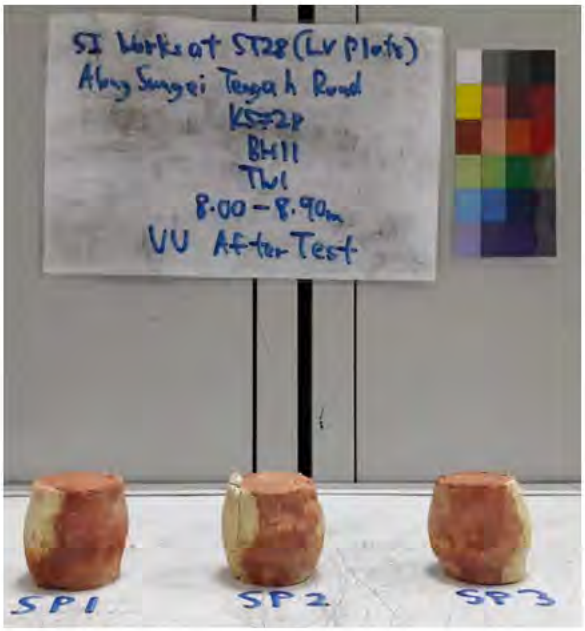


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

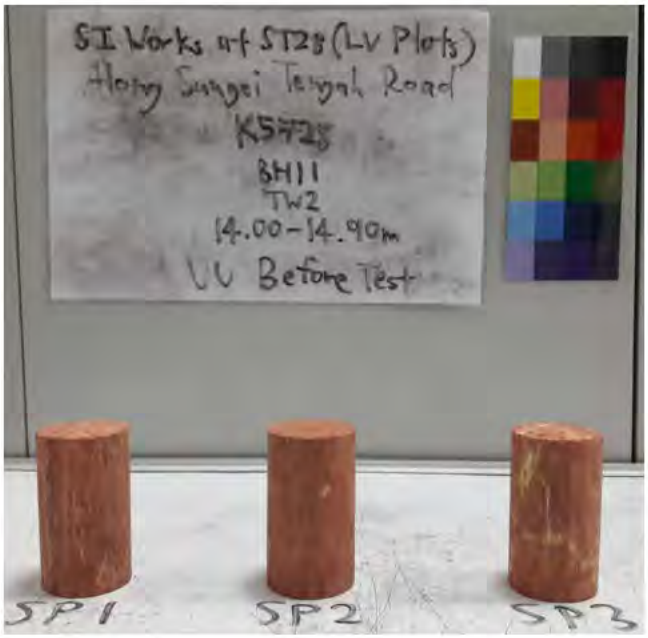


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH11-TW3)-Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
SAC ACCREDITED INSPECTION BODY

Thin-Walled Tube Sample (BH11-TW3)-Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

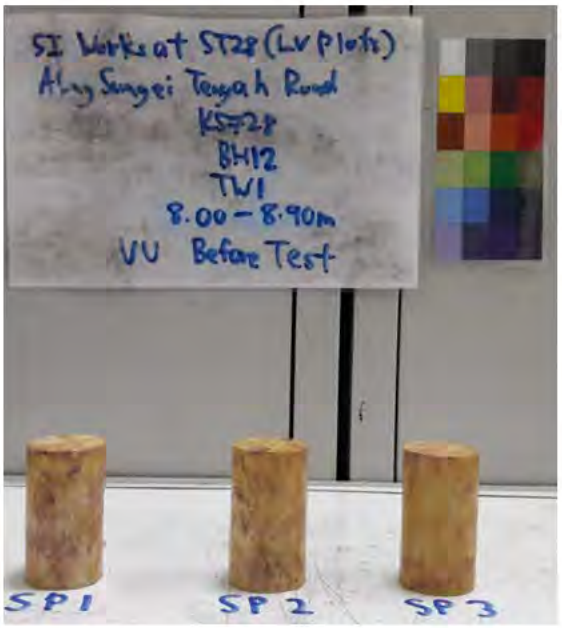


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH11-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

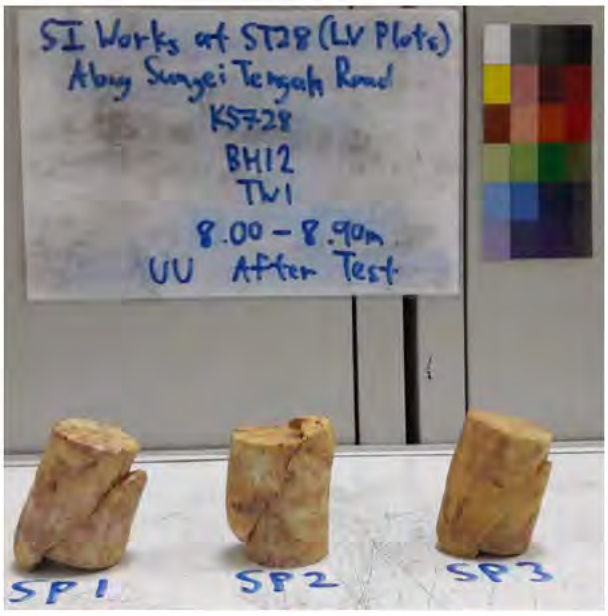


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

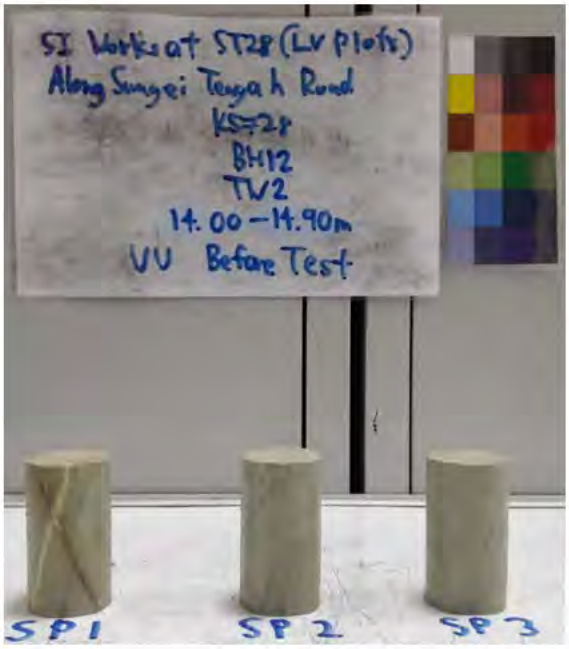


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW1)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

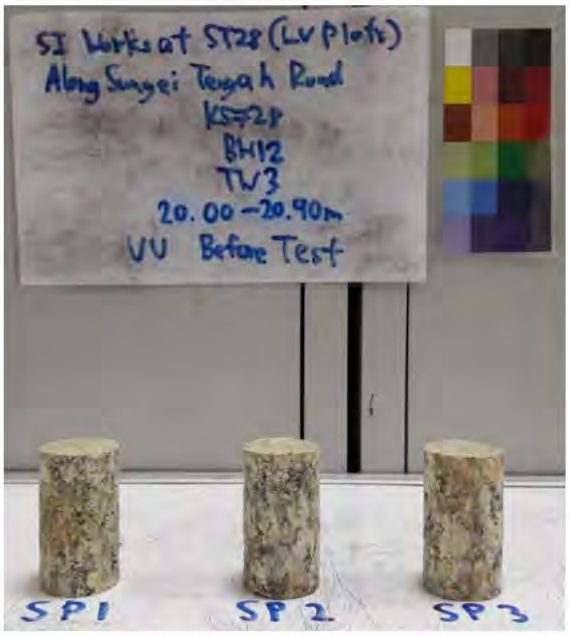


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
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ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW3)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

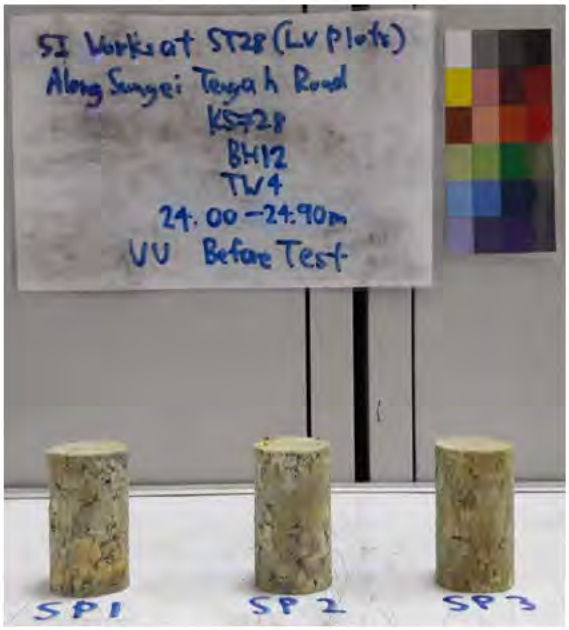


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH12-TW3)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

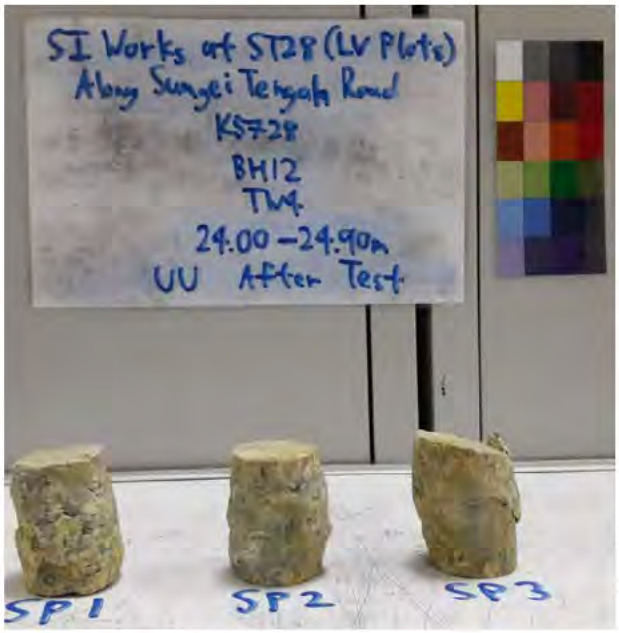


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW4)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH12-TW4)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH13-TW1)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

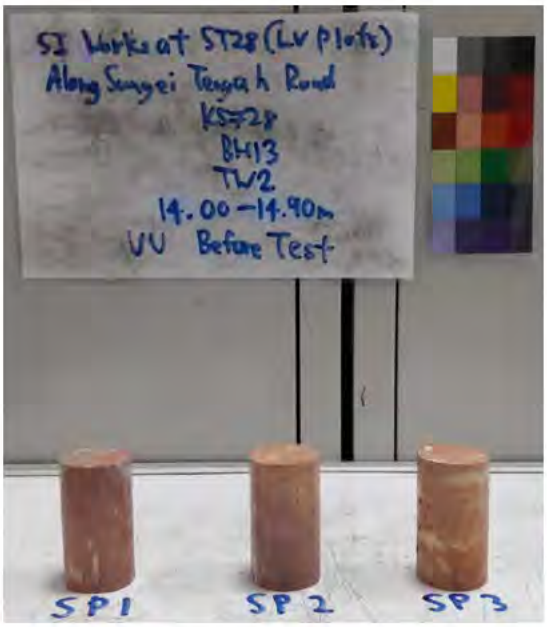


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Singapore 729505
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Client: Agri-Food & Veterinary Authority of Singapore (AVA)

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

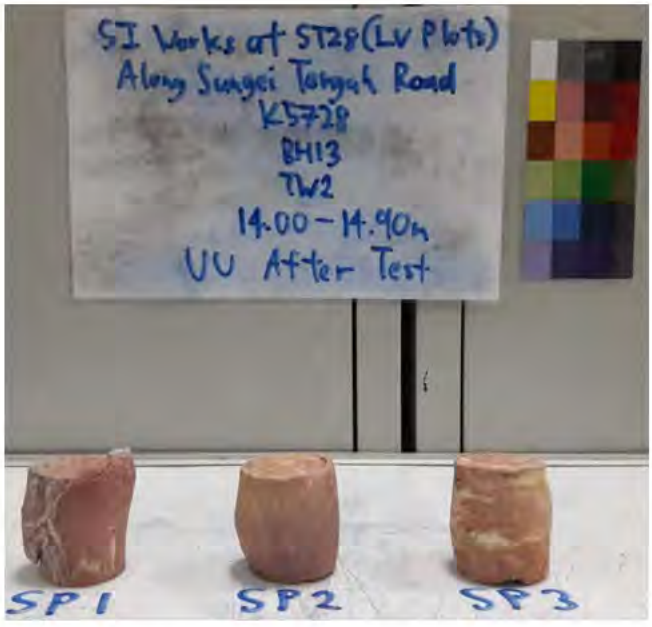


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH13-TW2)-Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH13-TW2)-Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH13-TW3)- Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

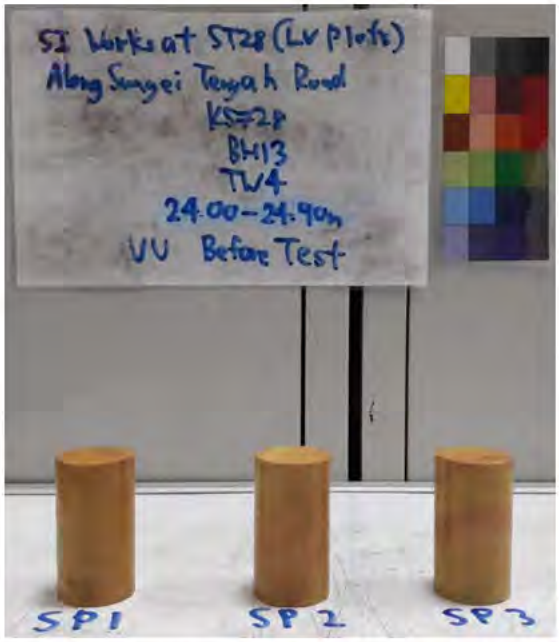


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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH13-TW3)- Consolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

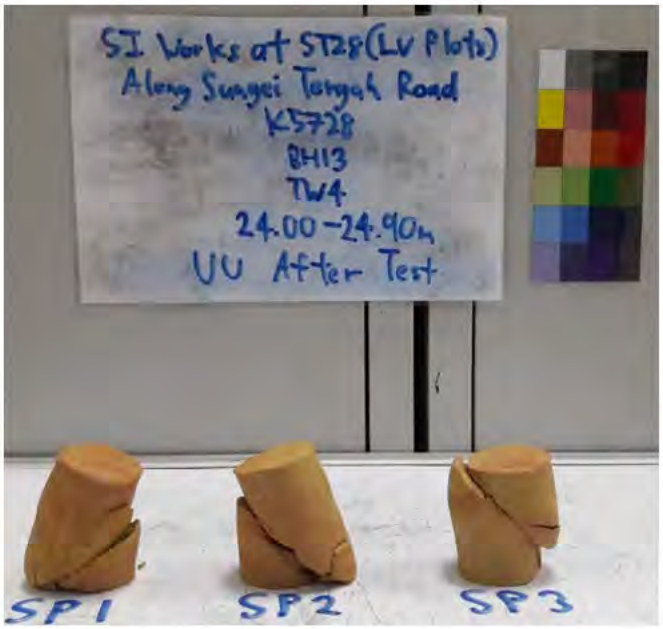


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH13-TW4)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

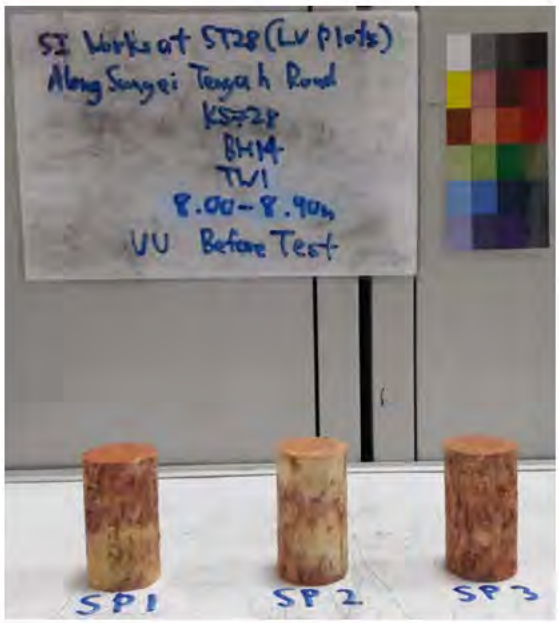


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH13-TW4)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW1)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

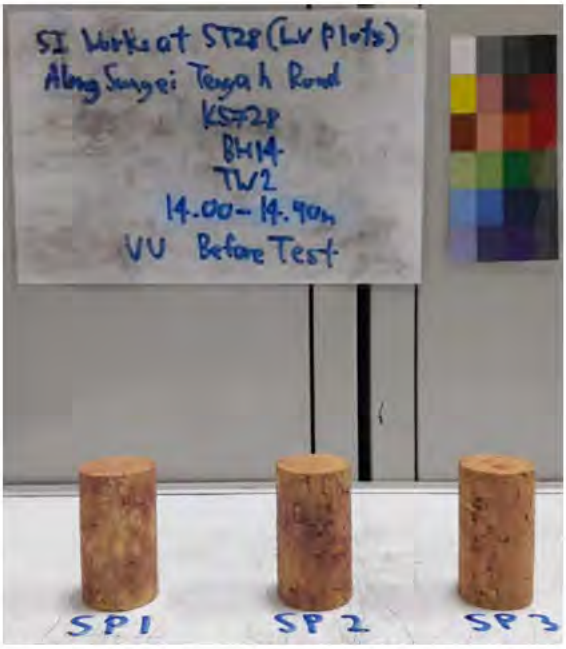


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW1)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

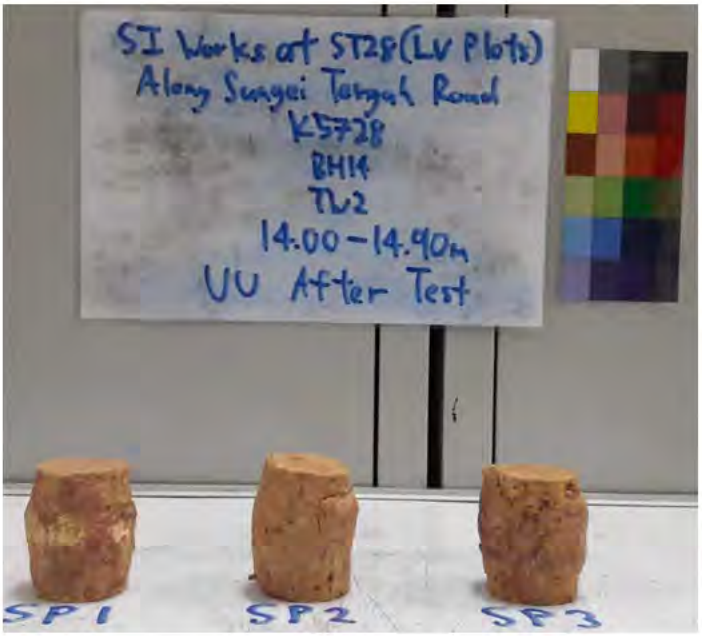


Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW2)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH14-TW2)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW3)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH14-TW3)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

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Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW4)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH14-TW4)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH15-TW1)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
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Thin-Walled Tube Sample (BH15-TW1)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

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Ryobi G
58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH15-TW2)- Consolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

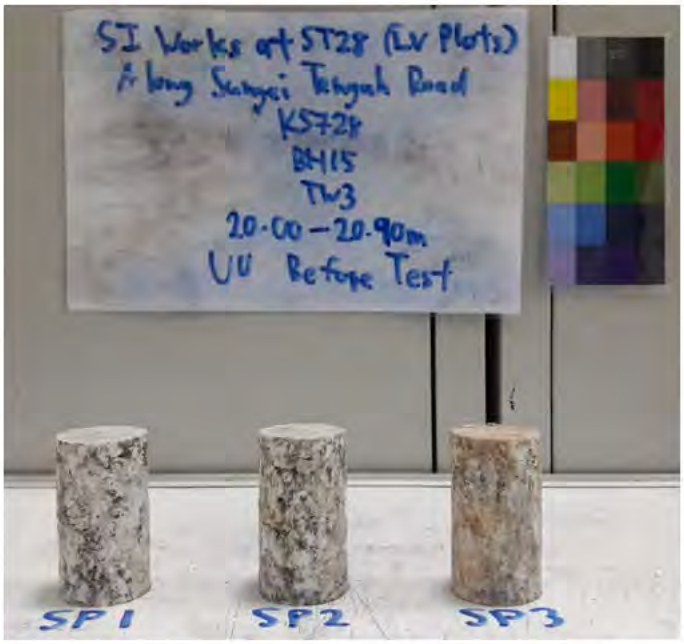


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58A Sungei Kadut Loop
Singapore 729505
Tel: 6369 7100
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Client: Agri-Food & Veterinary Authority of Singapore (AVA)

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

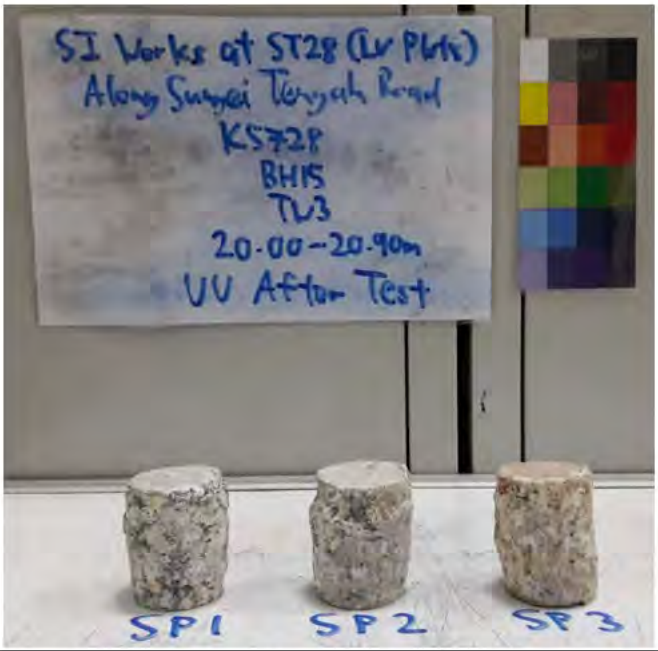


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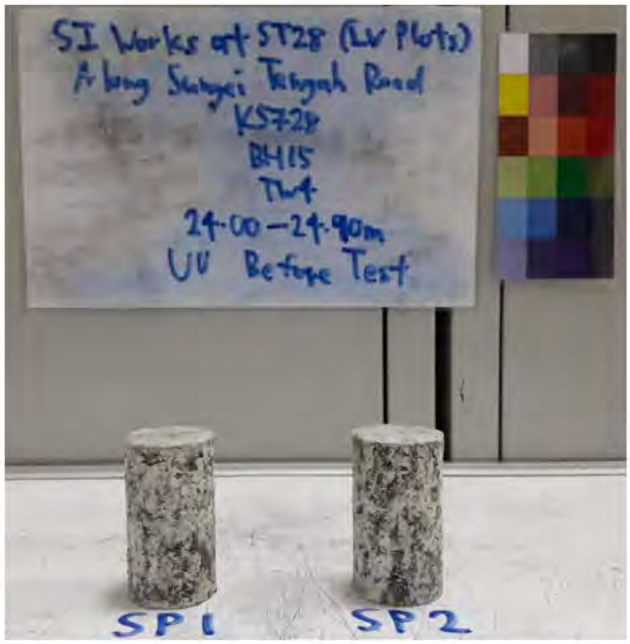


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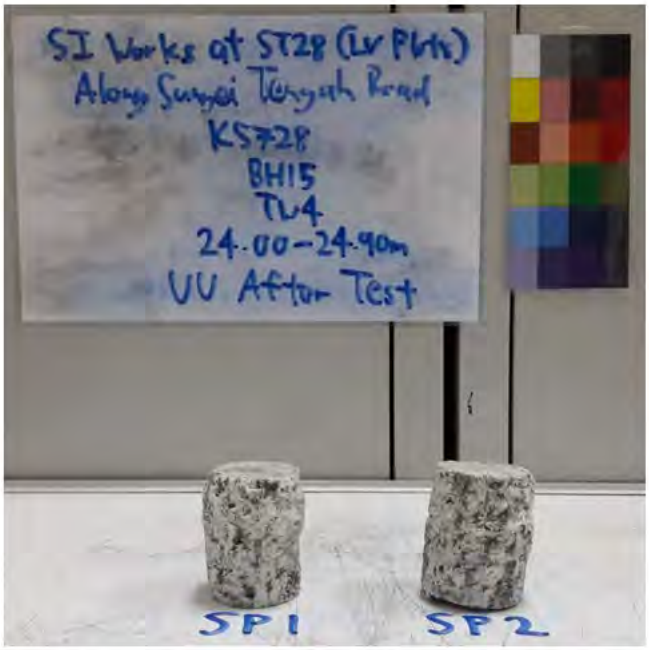


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Singapore 729505
Tel: 6369 7100
Fax: 6362 5848
ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH15-TW4)- Unconsolidated Undrained Triaxial Compression Test (Before Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road



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Singapore 729505
Tel: 6369 7100
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ACCREDITED INSPECTION BODY SAC

Thin-Walled Tube Sample (BH15-TW4)- Unconsolidated Undrained Triaxial Compression Test (After Test)

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

Project: Soil Investigation Works for ST28 (LV Plots) along Sungei Tengah Road

APPENDIX H
HAMMER CALIBRATION REPORTS

APS ASIA PDA ENTERPRISE PTE LTD

TEST REPORT

STANDARD PENETRATION TEST (SPT)
HAMMER ENERGY MEASUREMENT

CLIENT
RYOBI GEOTECH PTE LTD
(SPT HAMMER H-11)

PROJECT TITLE

(GI for CAG-ITT & ART)

REPORT SUBMITTED
20TH JANUARY 2018

REPORT REFERENCE NO. : APS/SPT/2018/003

No. 65 Ubi Crescent #03-04/05 Hola Centre Singapore 408559 Tel (65) 68968926 Fax: (65) 62212003

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

CONTENTS

1. INTRODUCTION

2. TEST EQUIPMENT

3. SUMMARY

4. RESULTS

APPENDIX I SPT HAMMER ENERGY MEASUREMENT RESULTS

1. INTRODUCTION

This report presents the results of the standard penetration test, SPT, hammer energy measurement using the Pile Driving Analyzer, PDA, carried out for Ryobi Geotech Pte Ltd on 19 January 2018. The aim of testing was to provide an estimate of the hammer energy transferred by the SPT hammer in accordance to American Standard Test Method ASTM D4633-10.

The SPT testing was performed at GI for CAG-ITT & ART.

The SPT hammer tested was identified as H-11 and was operated by YBM drilling machine (RIG-11).

2. TEST EQUIPMENT

Pile Driving Analyser (Model PAX)	:	Serial No. 4192L
Instrumented Rod	:	Serial No. 462BW (Length 600mm)
Strain Transducers	:	Serial Nos. 462BW - Bridge 1 & 2
Accelerometers	:	Serial Nos. K3429 & K3430
Weighing Scale (Teraseiko: TBW)	:	Serial No. 20150821116

3. SUMMARY

SPT Hammer Serial No.	-	H-11
Project Site	-	GI for CAG-ITT & ART
Borehole	-	BH-17 - Diameter : - 100 mm - Depth : 20.50 m
Drilling Rig	-	RIG-11
Drilling Operator	-	Awlwin
Drill Rod Type	-	BW
Shoe Type / Length	-	Split Spoon Sampler / 600mm
Drill Rod Segments	-	(6 x 3m) + 2.5 + 0.6
Total Length	-	21.40 m (Instrumented Rod Top To Shoe Base)
SPT Ram Mass	-	63.40 kg
SPT Anvil Mass	-	20.80 kg
SPT Total Mass	-	84.20 kg
SPT Ram Drop Height	-	764 mm
Theoretical Energy	-	0.4752 kN-m

4. RESULTS (SPT HAMMER ENERGY MEASUREMENT)

No. Of Blow = 10

Min. / Max. EMX Value = 0.2940 kN-m / 0.3752 kN-m

Mean Measured Energy = 0.3408 kN-m

Standard Deviation = 0.0208 kN-m

Energy Ratio, Er = Mean Measured Energy / Theoretical Energy

= 0.72 (72 %)

Report prepared by



Mohd Sapri A Rahmin
Operation Manager
APS Asia PDA Enterprise Pte Ltd

APPENDIX I

SPT HAMMER ENERGY MEASURMENT RESULTS

SPT HAMMER ENERGY MEASUREMENT

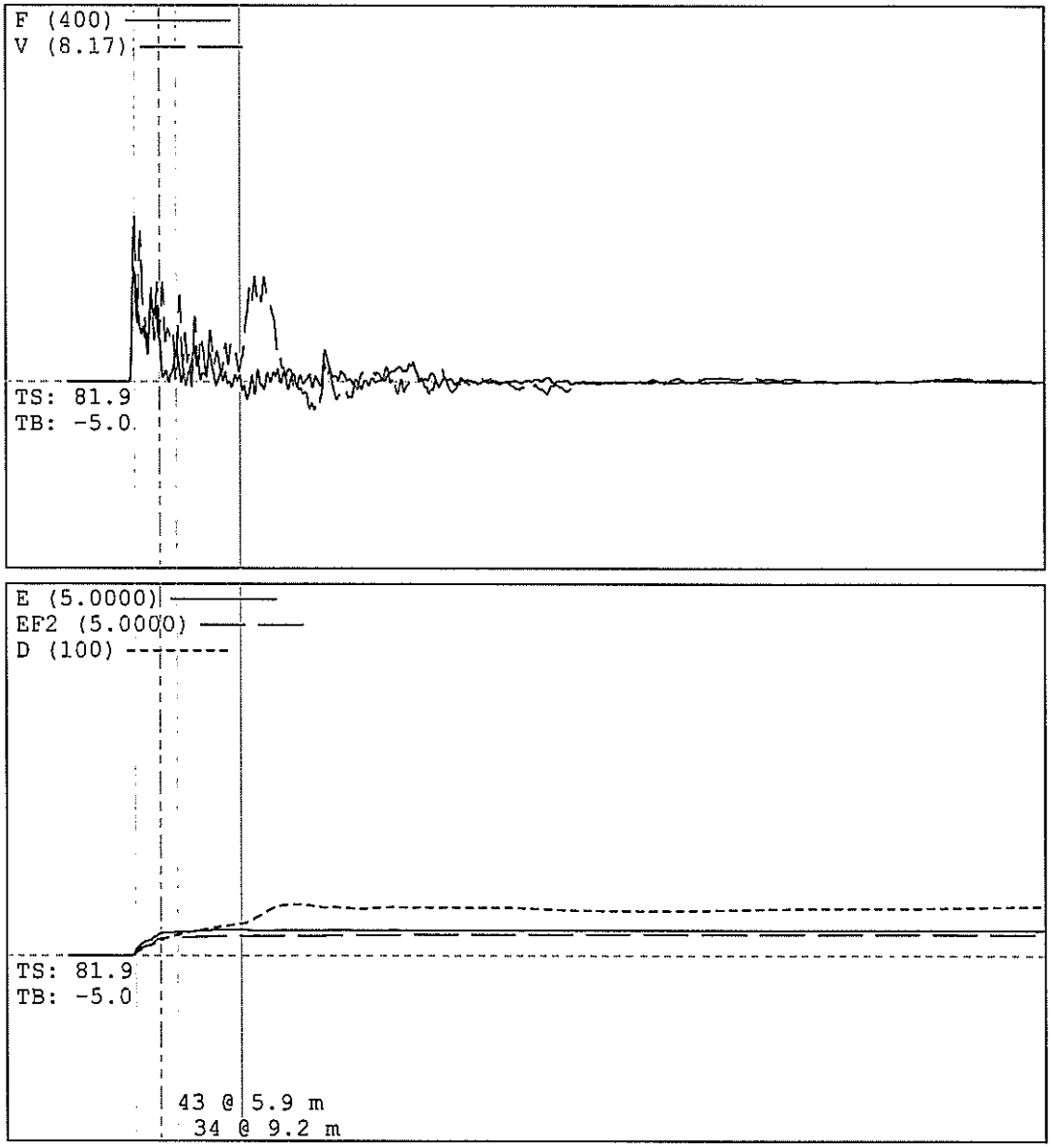
Conducted By : APS Asia PDA Enterprise Pte Ltd (Joseph Ling Ka Jun)

Conducted For : Ryobi Geotech Pte Ltd (Machine : RIG-11 / SPT : H-11)

BLOW NO.	EMX	EF2	DMX	FMX	CSX	TSX	VMX	AMX
3	0.3462	0.2362	14	121	99.5	45	3.61	2184
4	0.2940	0.2122	11	103	85.2	31.5	2.93	2344
5	0.3301	0.2185	13	108	88.7	31.3	3.08	2390
6	0.3553	0.2459	13	142	116.8	41.5	3.78	2693
7	0.3387	0.2271	13	109	89.9	36.2	3.39	2570
8	0.3329	0.2311	12	115	95.2	39.4	3.60	2594
9	0.3426	0.2413	12	121	99.7	36.9	4.03	2338
10	0.3496	0.2458	13	127	104.9	39.8	4.11	2503
11	0.3752	0.2522	14	129	106.2	45.4	4.02	2672
12	0.3436	0.2521	12	131	107.6	44.2	4.19	2587
MINIMUM	**0.2940**	**0.2122**	**11**	**103**	**85.2**	**31.3**	**2.93**	**2184**
MAXIMUM	**0.3752**	**0.2522**	**14**	**142**	**116.8**	**45.4**	**4.19**	**2693**
AVERAGE	**0.3408**	**0.2362**	**12.7**	**121**	**99.4**	**39.1**	**3.67**	**2488**
STANDARD DEV.	**0.0208**	**0.0138**	**0.95**	**12**	**9.8**	**5.1**	**0.44**	**166**

OUTPUT QUANTITIES

EMX	maximum energy transmitted past the transducers.
EF2	maximum energy transmitted past the transducers from integral of force squared.
DMX	maximum downward displacement at the transducers' location.
FMX	maximum compressive force at the transducers' location.
CSX	maximum compressive stress at transducers' location.
TSX	maximum tensile stress along the length of rod.
VMX	maximum velocity at the transducers' location.
AMX	maximum acceleration at the transducers' location.



Project Information

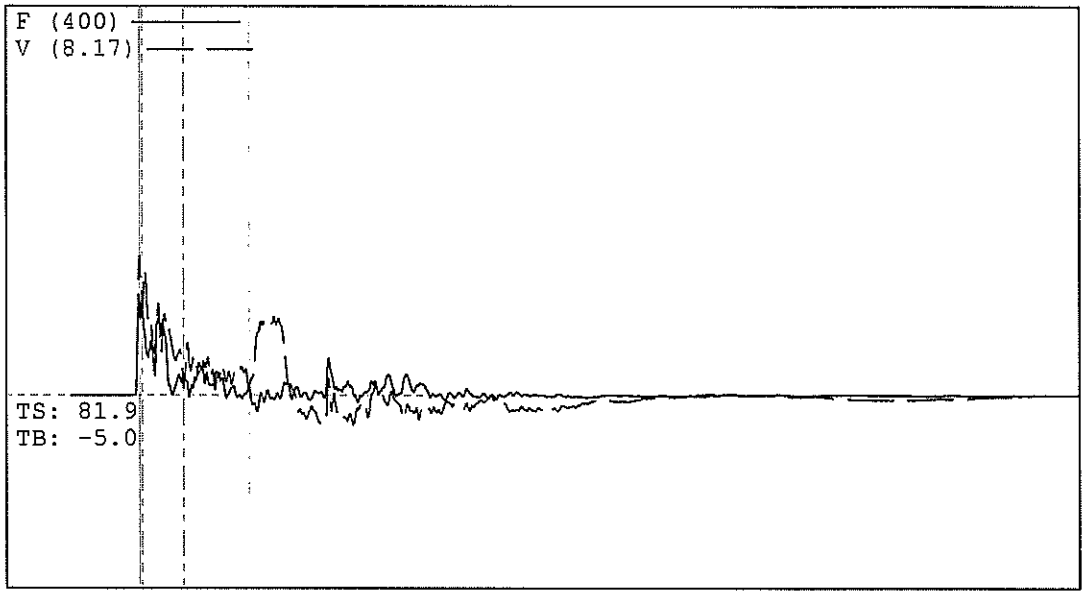
PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:14:48 AM
Blow Number 3

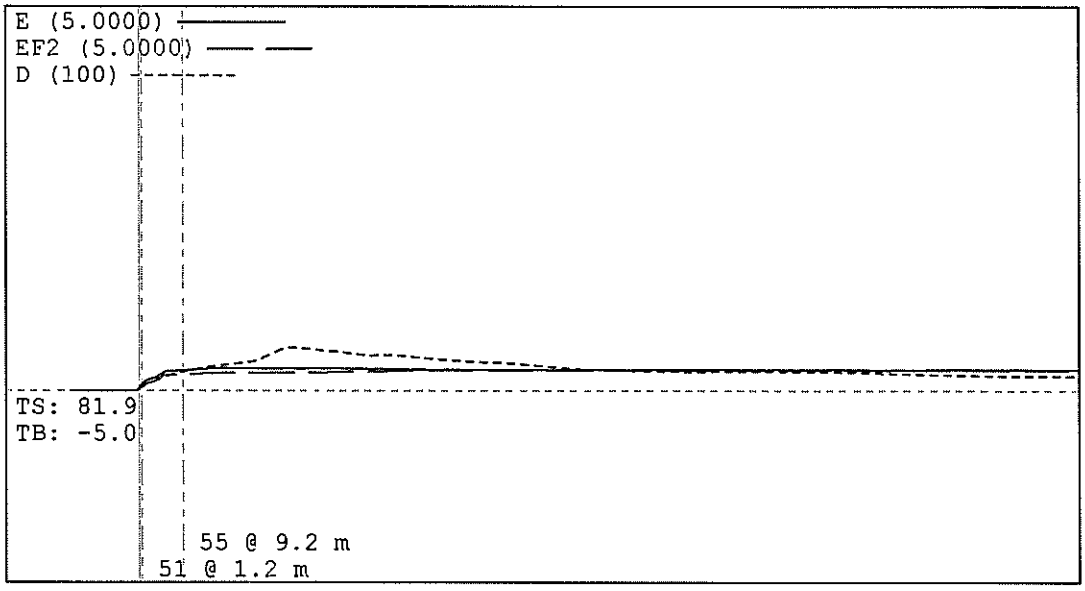
Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC	[]	

Quantity Results

EMX	0.3462	kN-m
EF2	0.2362	kN-m
DMX	14	mm
FMX	121	kN
CSX	99.5	MPa
TSX	45.0	MPa
VMX	3.61	m/s
AMX	2184	g's
RX5		kN





Project Information

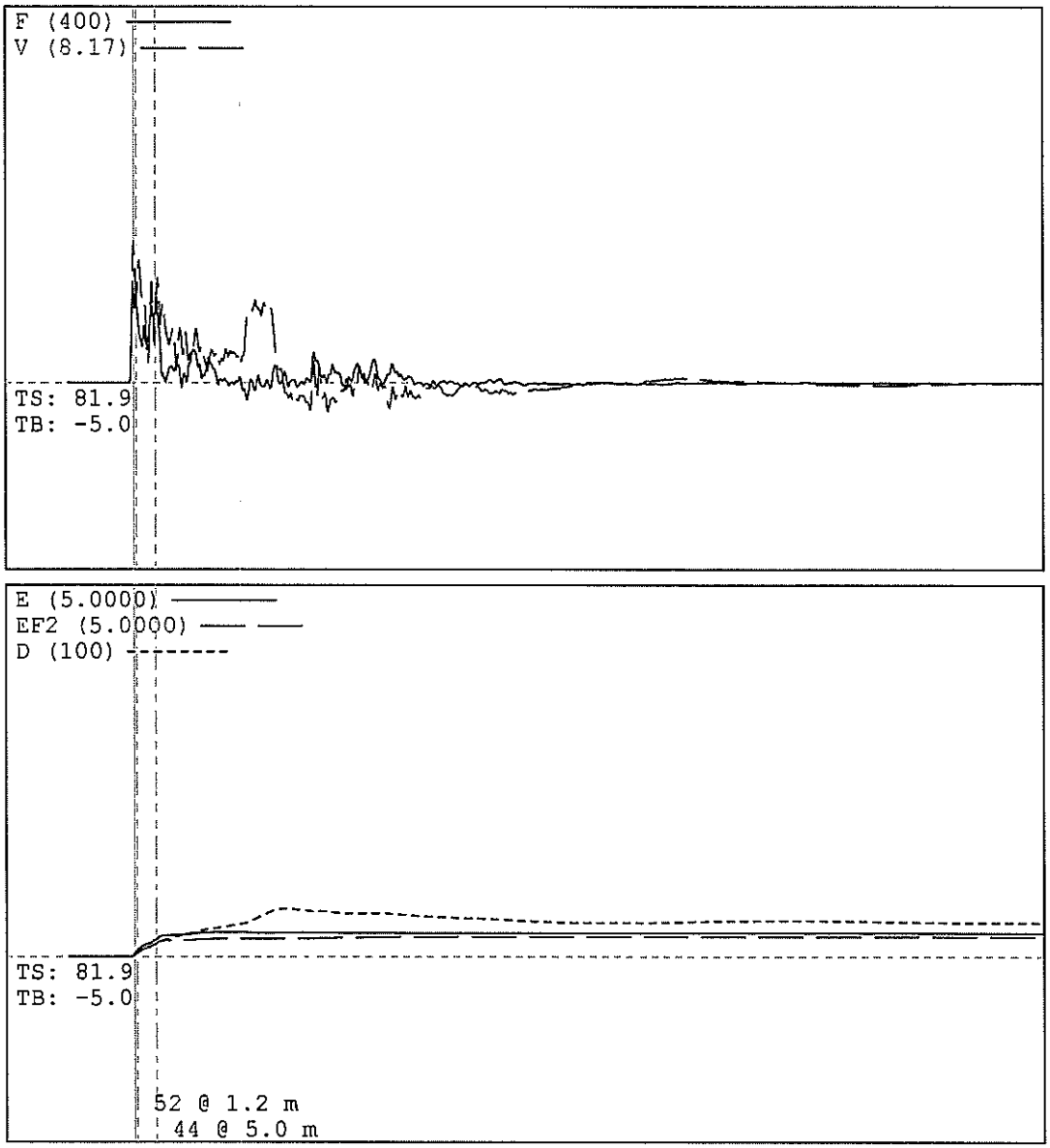
PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:14:51 AM
Blow Number 4

Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC	[]	

Quantity Results

EMX	0.2940	kN-m
EF2	0.2122	kN-m
DMX	11	mm
FMX	103	kN
CSX	85.2	MPa
TSX	31.5	MPa
VMX	2.93	m/s
AMX	2344	g's
RX5		kN



Project Information

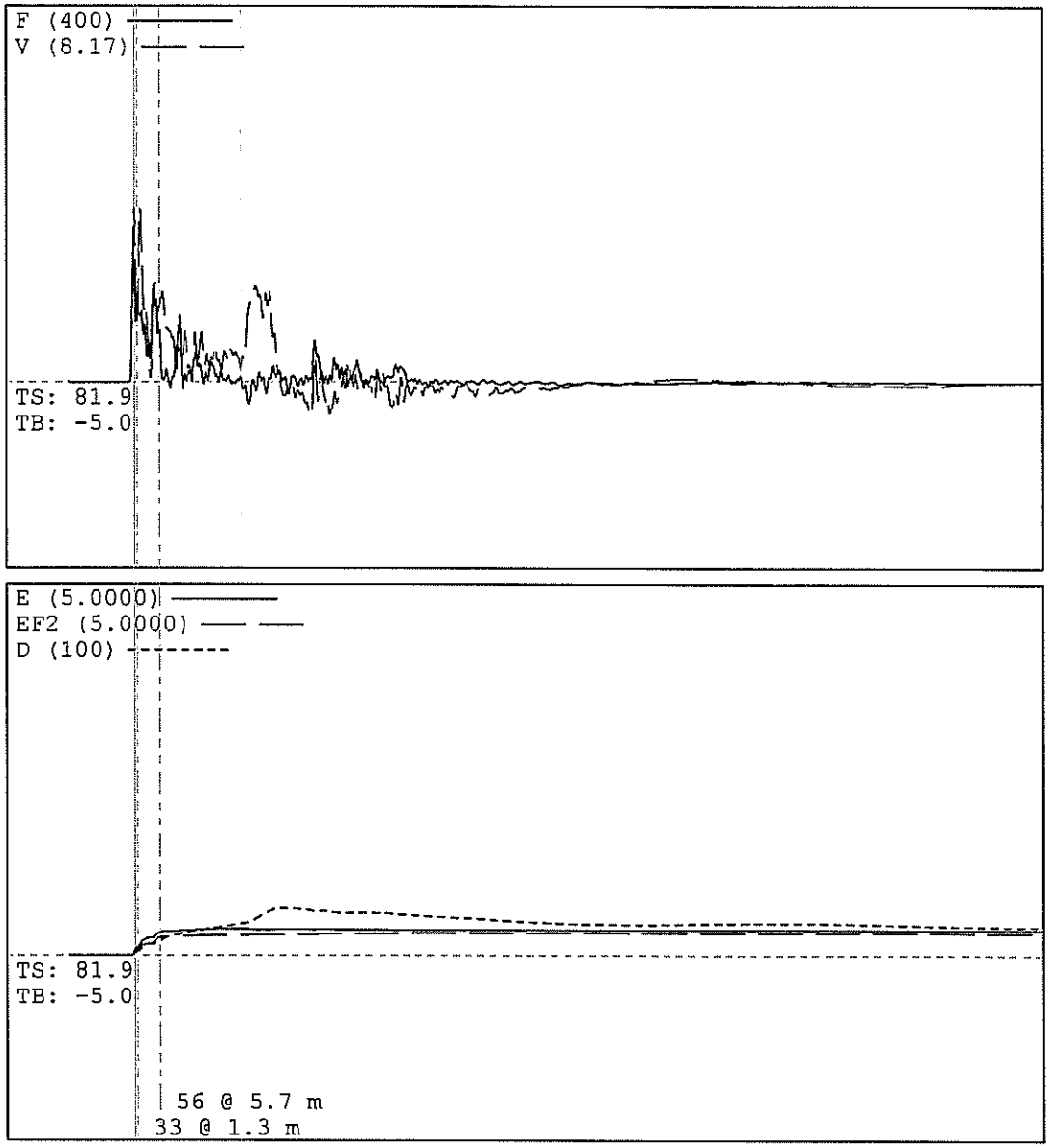
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Blow Number 5

Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC	[]	

Quantity Results

EMX	0.3301	kN-m
EF2	0.2185	kN-m
DMX	13	mm
FMX	108	kN
CSX	88.7	MPa
TSX	31.3	MPa
VMX	3.08	m/s
AMX	2390	g's
RX5		kN



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
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Blow Number 6

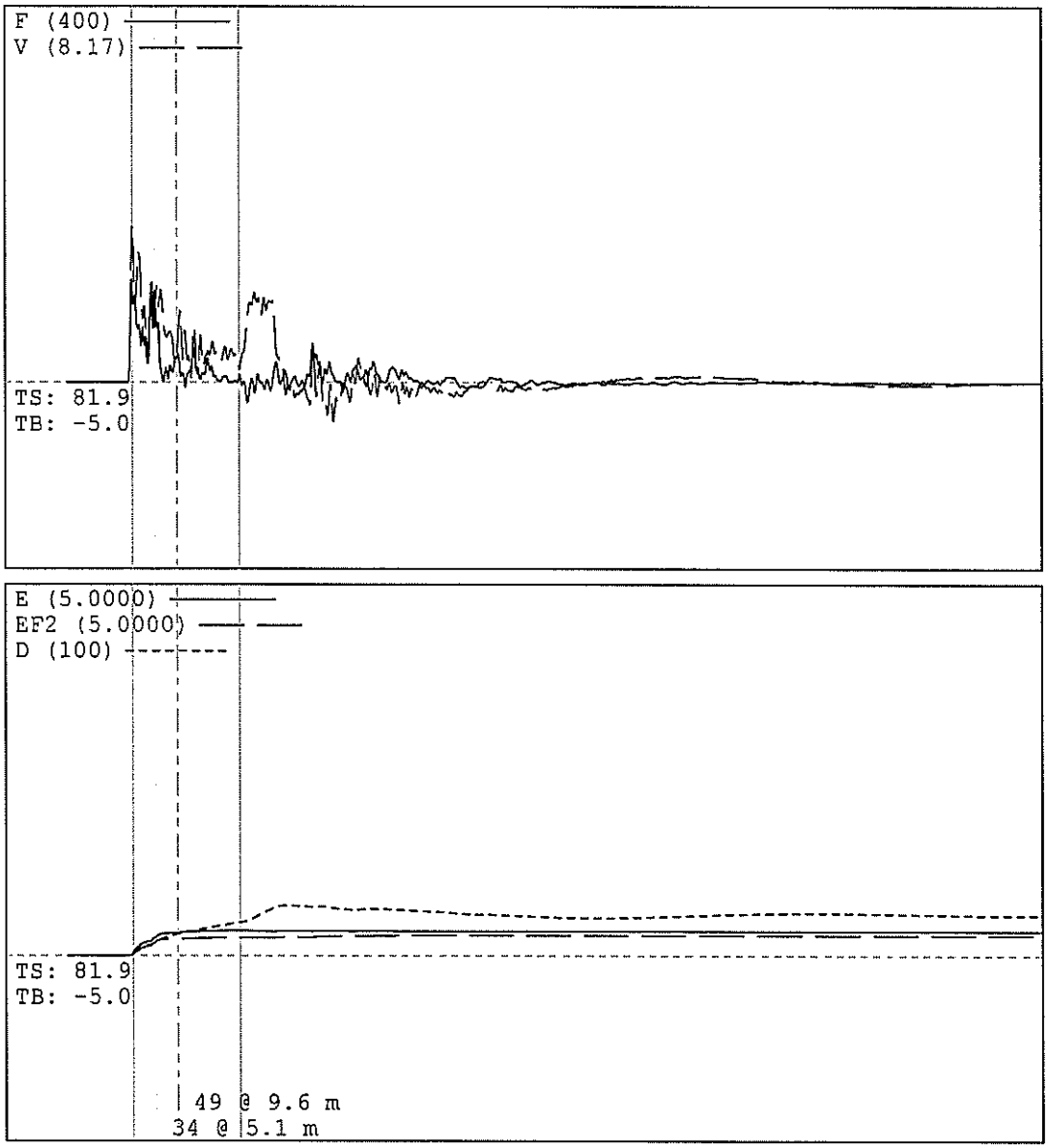
Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC		[]

Quantity Results

EMX	0.3553	kN-m
EF2	0.2459	kN-m
DMX	13	mm
FMX	142	kN
CSX	116.8	MPa
TSX	41.5	MPa
VMX	3.78	m/s
AMX	2693	g's
RX5		kN

GI FOR CAG-ITT&ART H-11



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:14:58 AM
Blow Number 7

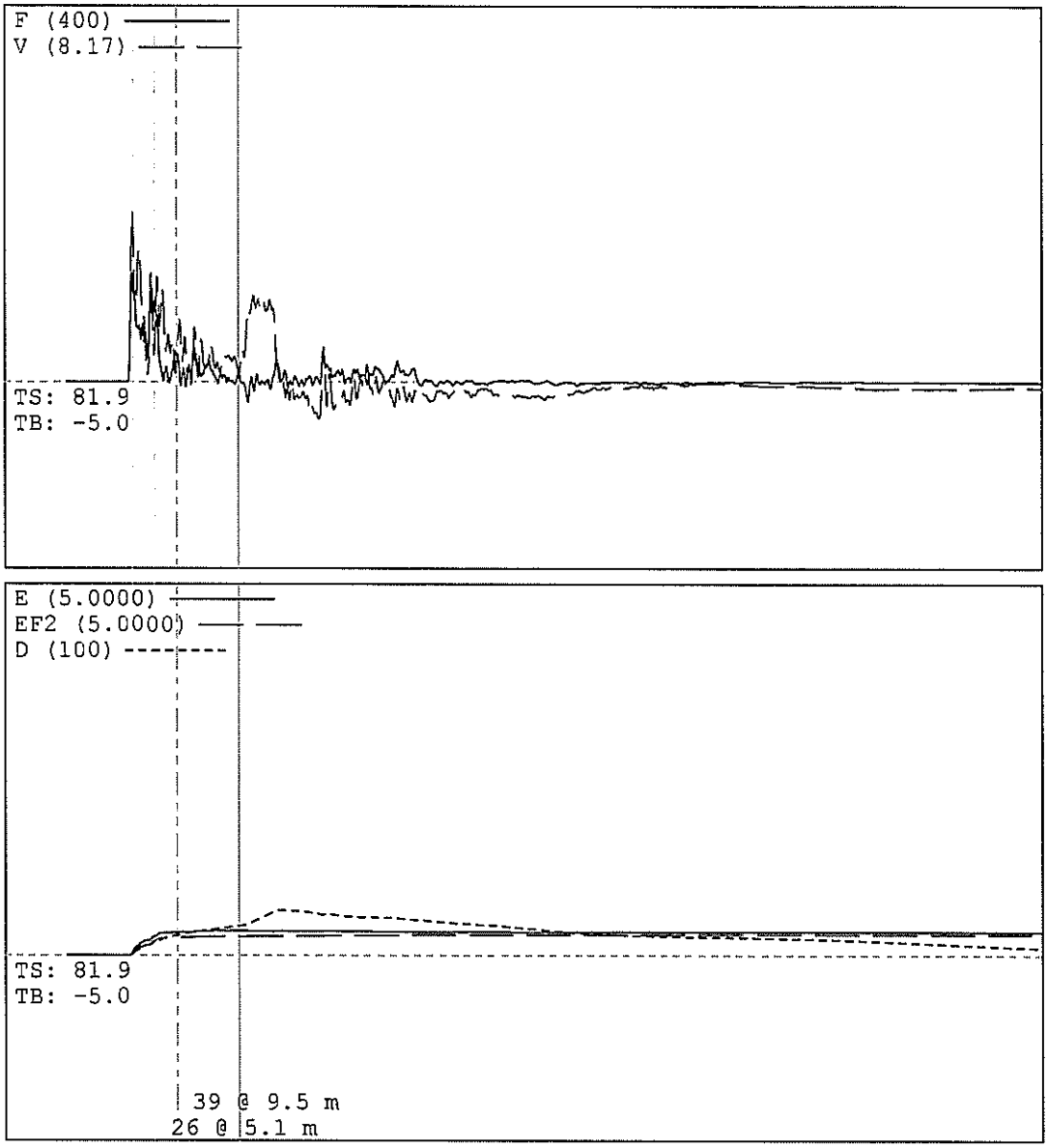
Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC		[]

Quantity Results

EMX	0.3387	kN-m
EF2	0.2271	kN-m
DMX	13	mm
FMX	109	kN
CSX	89.9	MPa
TSX	36.2	MPa
VMX	3.39	m/s
AMX	2570	g's
RX5		kN

GI FOR CAG-ITT&ART H-11



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:15:02 AM
Blow Number 8

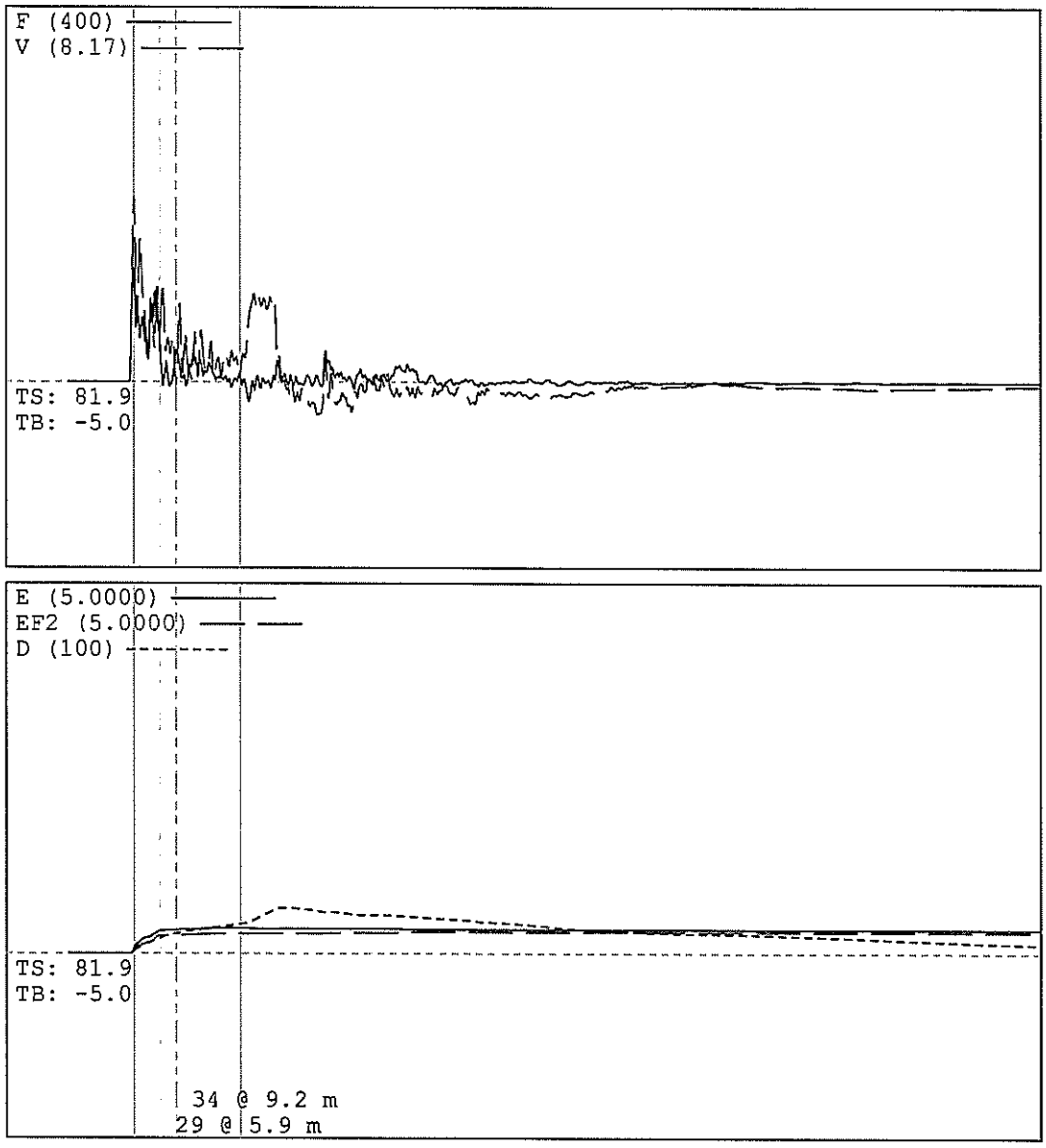
Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC		[]

Quantity Results

EMX	0.3329	kN-m
EF2	0.2311	kN-m
DMX	12	mm
FMX	115	kN
CSX	95.2	MPa
TSX	39.4	MPa
VMX	3.66	m/s
AMX	2594	g's
RX5		kN

GI FOR CAG-ITT&ART H-11



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:15:04 AM
Blow Number 9

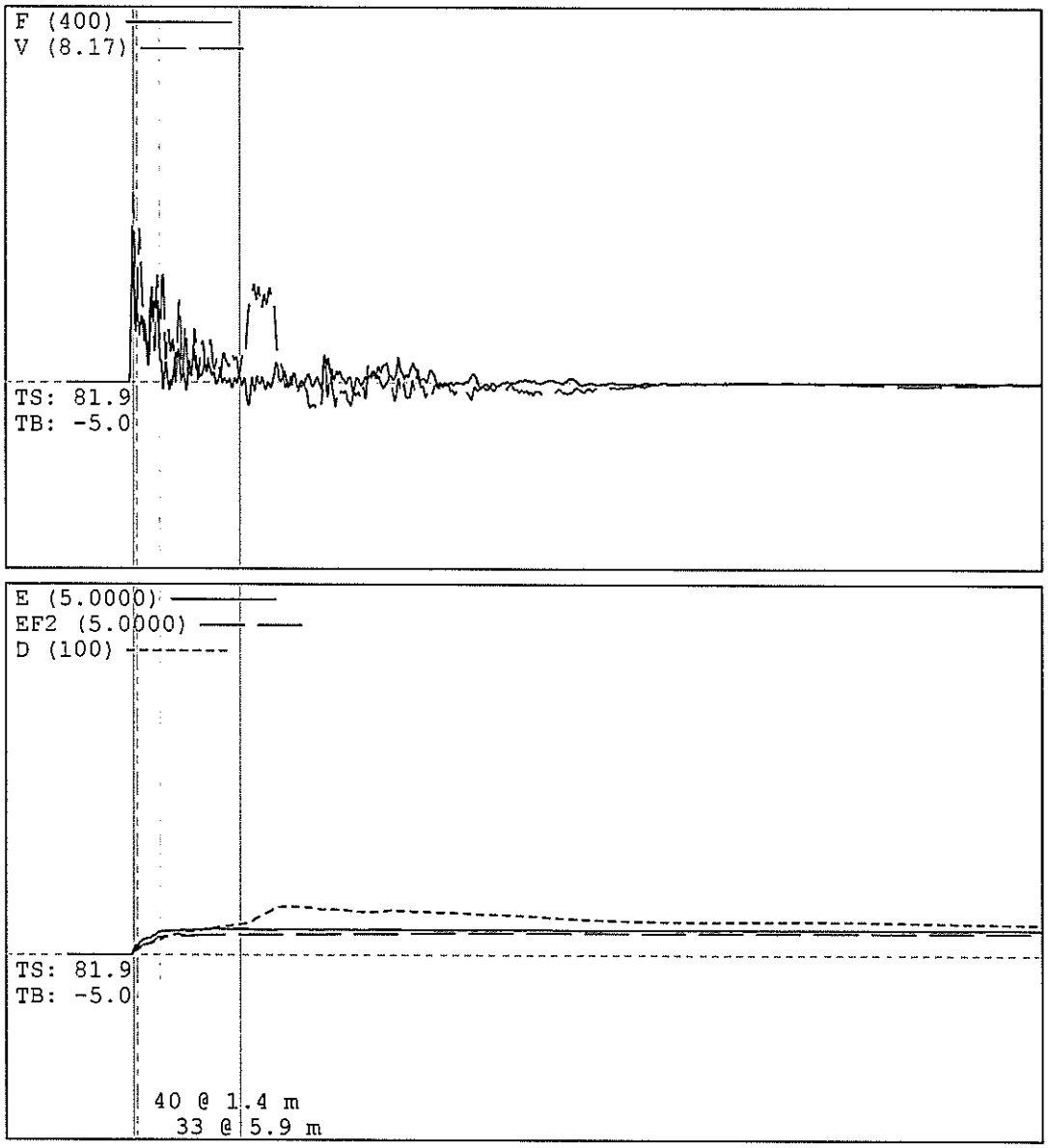
Pile Properties

LE	21.4 m
AR	12.13 cm^2
EM	206843 MPa
SP	77.3 kN/m3
WS	5123.0 m/s
EA/C	49 kN-s/m
2L/C	8.36 ms
JC	[]

Quantity Results

EMX	0.3426 kN-m
EF2	0.2413 kN-m
DMX	12 mm
FMX	121 kN
CSX	99.7 MPa
TSX	36.9 MPa
VMX	4.03 m/s
AMX	2338 g's
RX5	kN

GI FOR CAG-ITT&ART H-11



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
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Blow Number 10

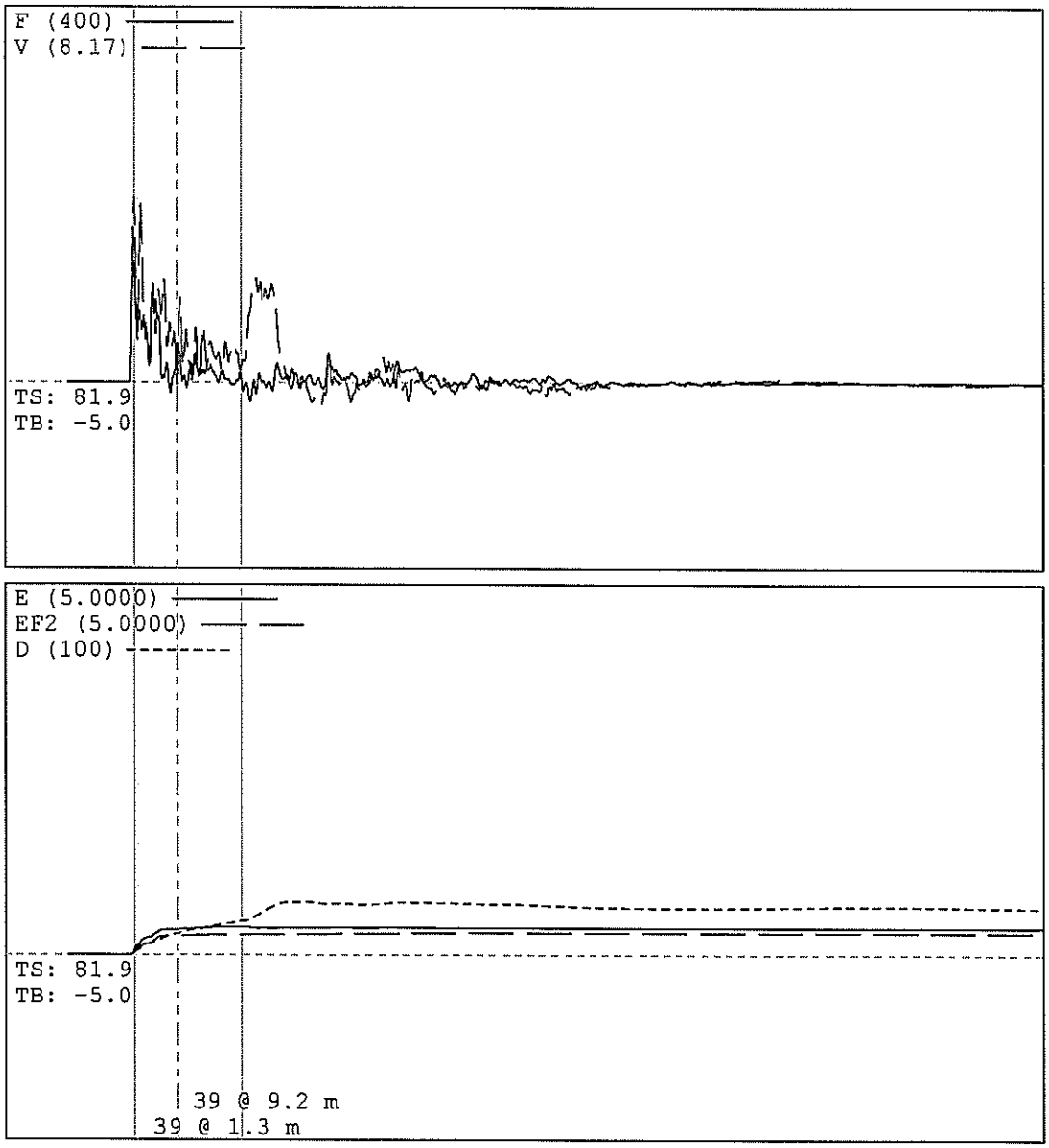
Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC	[]	

Quantity Results

EMX	0.3496	kN-m
EF2	0.2458	kN-m
DMX	13	mm
FMX	127	kN
CSX	104.9	MPa
TSX	39.8	MPa
VMX	4.11	m/s
AMX	2503	g's
RX5		kN

GI FOR CAG-ITT&ART H-11



Project Information

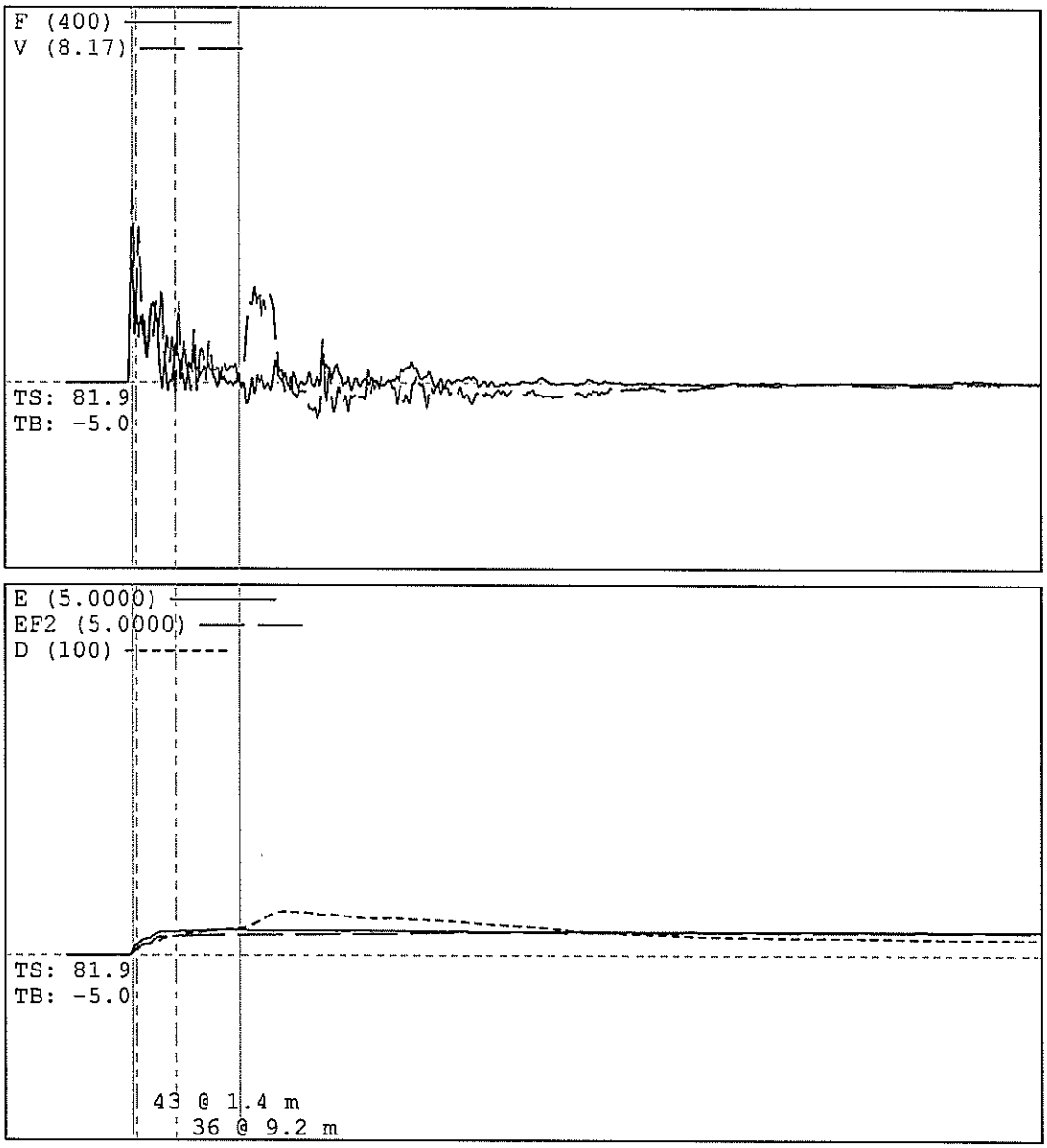
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PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:15:09 AM
Blow Number 11

Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC	[]	

Quantity Results

EMX	0.3752	kN-m
EF2	0.2522	kN-m
DMX	14	mm
FMX	129	kN
CSX	106.2	MPa
TSX	45.4	MPa
VMX	4.02	m/s
AMX	2672	g's
RX5		kN



Project Information

PROJECT: GI FOR CAG-ITT&ART
PILE NAME: H-11
DESCR: APS
OPERATOR: JOSEPH
FILE: H-11
19/1/2018 11:15:11 AM
Blow Number 12

Pile Properties

LE	21.4	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.36	ms
JC		[]

Quantity Results

EMX	0.3436	kN-m
EF2	0.2521	kN-m
DMX	12	mm
FMX	131	kN
CSX	107.6	MPa
TSX	44.2	MPa
VMX	4.19	m/s
AMX	2587	g's
RX5		kN

APS ASIA PDA ENTERPRISE PTE LTD

TEST REPORT

STANDARD PENETRATION TEST (SPT)
HAMMER ENERGY MEASUREMENT

CLIENT
RYOBI GEOTECH PTE LTD
(SPT HAMMER H-22)

PROJECT TITLE

(T5-HSJV)

REPORT SUBMITTED
30TH APRIL 2018

REPORT REFERENCE NO. : APS/SPT/2018/013

No. 65 Ubi Crescent #03-04/05 Hola Centre Singapore 408559 Tel (65) 68968926 Fax: (65) 62212003

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CONTENTS

1. INTRODUCTION

2. TEST EQUIPMENT

3. SUMMARY

4. RESULTS

APPENDIX I SPT HAMMER ENERGY MEASUREMENT RESULTS

1. INTRODUCTION

This report presents the results of the standard penetration test, SPT, hammer energy measurement using the Pile Driving Analyzer, PDA, carried out for Ryobi Geotech Pte Ltd on 25 April 2018. The aim of testing was to provide an estimate of the hammer energy transferred by the SPT hammer in accordance to American Standard Test Method ASTM D4633-10.

The SPT testing was performed at T5-HSJV.

The SPT hammer tested was identified as H-22 and was operated by AFRAME YWE machine (RIG-2).

2. TEST EQUIPMENT

Pile Driving Analyser (Model PAX)	:	Serial No. 4192L
Instrumented Rod	:	Serial No. 462BW (Length 600mm)
Strain Transducers	:	Serial Nos. 462BW - Bridge 1 & 2
Accelerometers	:	Serial Nos. K3429 & K3430
Weighing Scale (Teraseiko: TBW)	:	Serial No. 20150821116

3. SUMMARY

SPT Hammer Serial No.	- H-22
Project Site	- T5-HSJV
Borehole	- BH-6 - Diameter : - 115 mm - Depth : 24.00 m
Drilling Rig	- RIG-2
Drilling Operator	- JAKIR
Drill Rod Type	- BW
Shoe Type / Length	- Split Spoon Sampler / 600mm
Drill Rod Segments	- 8 x 3m + 0.6
Total Length	- 24.90 m (Instrumented Rod Top To Shoe Base)
SPT Ram Mass	- 63.60 kg
SPT Anvil Mass	- 21.40 kg
SPT Total Mass	- 85.00 kg
SPT Ram Drop Height	- 766 mm
Theoretical Energy	- 0.4779 kN-m

4. RESULTS (SPT HAMMER ENERGY MEASUREMENT)

No. Of Blow = 10

Min. / Max. EMX Value = 0.3767 kN-m / 0.4425 kN-m

Mean Measured Energy = 0.4020 kN-m

Standard Deviation = 0.0242 kN-m

Energy Ratio, Er = Mean Measured Energy / Theoretical Energy

= 0.84 (84 %)

Report prepared by

Mohd Sapri A Rahmin
Operation Manager
APS Asia PDA Enterprise Pte Ltd

APPENDIX I

SPT HAMMER ENERGY MEASURMENT RESULTS

SPT HAMMER ENERGY MEASUREMENT

Conducted By : APS Asia PDA Enterprise Pte Ltd (Joseph Ling Ka Jun)

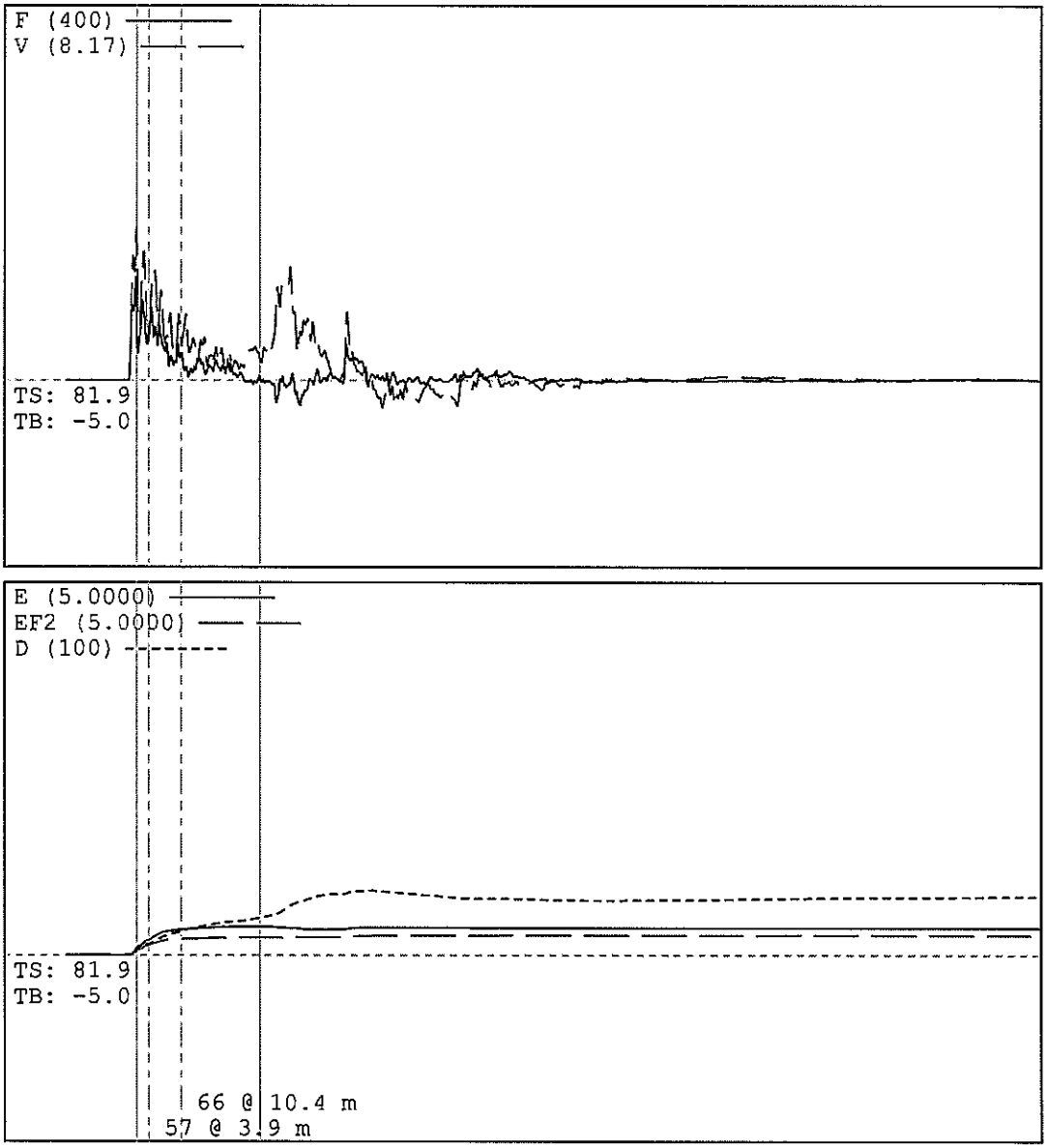
Conducted For : Ryobi Geotech Pte Ltd (Machine : RIG-2/ SPT : H-22)

BLOW NO.	EMX	EF2	DMX	FMX	CSX	TSX	VMX	AMX
3	0.3800	0.2315	17	110	90.7	45.2	3.33	1912
4	0.3767	0.2378	16	115	94.8	46.8	3.34	1978
5	0.3835	0.2123	20	95	78.7	41.2	3.26	2461
6	0.3828	0.2119	22	87	71.9	37.5	3.12	2192
7	0.3910	0.2071	23	91	75.0	35.2	3.27	2187
8	0.4008	0.2059	25	93	76.7	33.2	3.18	2317
9	0.4079	0.2018	29	91	75.4	33.2	3.17	2158
10	0.4402	0.2064	36	94	77.1	31.4	3.28	2152
11	0.4425	0.2071	33	97	80.0	30.7	3.37	2265
12	0.4149	0.2063	30	96	78.8	30.6	3.27	2242
MINIMUM	**0.3767**	**0.2018**	**16**	**87**	**71.9**	**30.6**	**3.12**	**1912**
MAXIMUM	**0.4425**	**0.2378**	**36**	**115**	**94.8**	**46.8**	**3.37**	**2461**
AVERAGE	**0.4020**	**0.2128**	**25.1**	**97**	**79.9**	**36.5**	**3.26**	**2186**
STANDARD DEV.	**0.0242**	**0.0120**	**6.74**	**9**	**7.2**	**6.0**	**0.08**	**157**

OUTPUT QUANTITIES

EMX	maximum energy transmitted past the transducers.
EF2	maximum energy transmitted past the transducers from integral of force squared.
DMX	maximum downward displacement at the transducers' location.
FMX	maximum compressive force at the transducers' location.
CSX	maximum compressive stress at transducers' location.
TSX	maximum tensile stress along the length of rod.
VMX	maximum velocity at the transducers' location.
AMX	maximum acceleration at the transducers' location.

T5(250418) H-22



Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:15 AM
Blow Number 3

Pile Properties

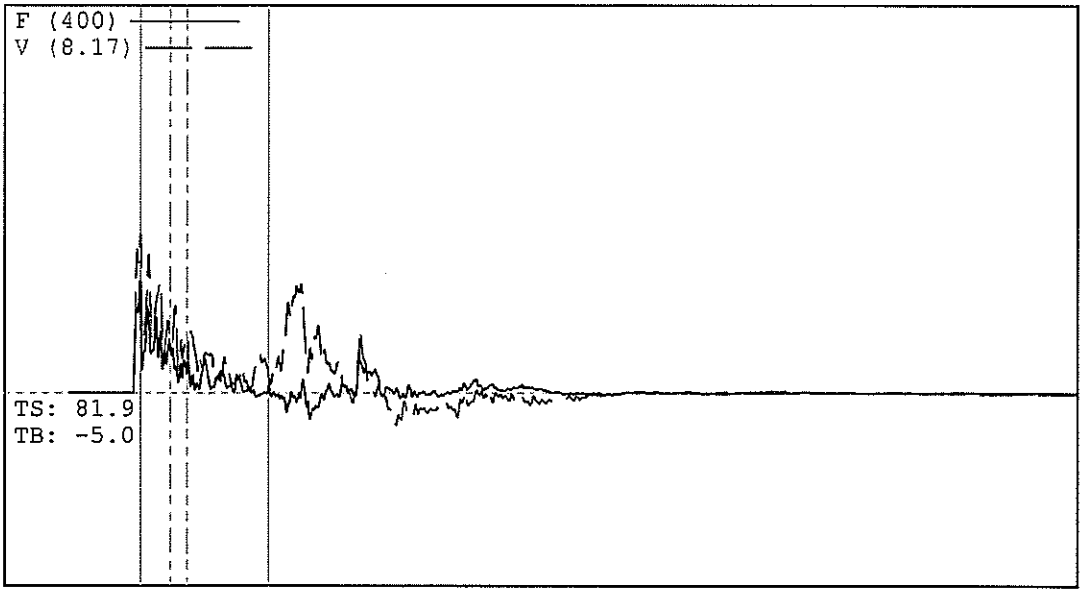
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

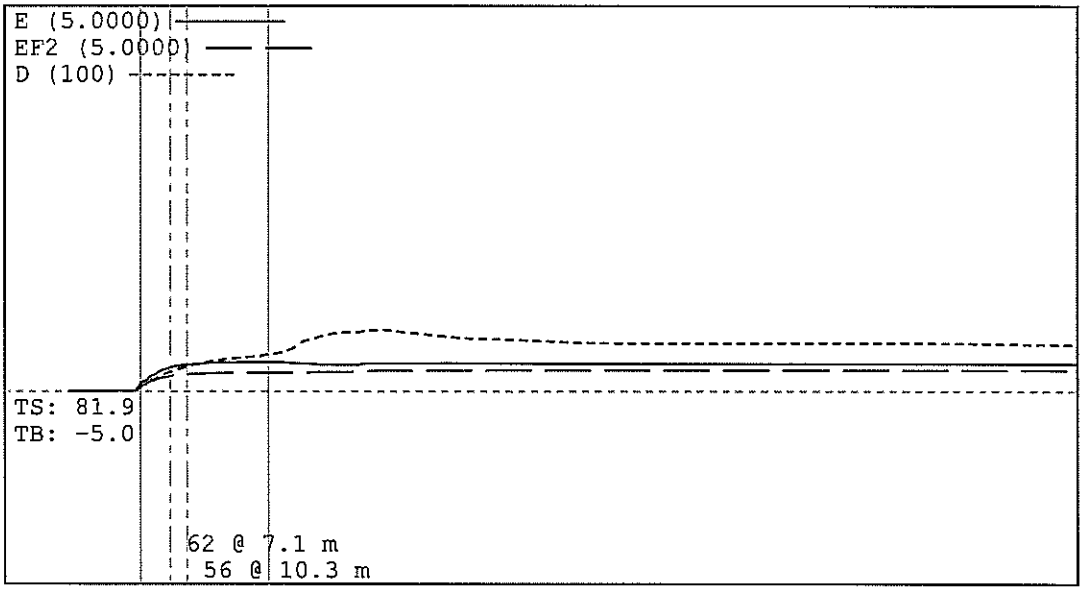
Quantity Results

EMX	0.3800	kN-m
EF2	0.2315	kN-m
DMX	17	mm
FMX	110	kN
CSX	90.7	MPa
TSX	45.2	MPa
VMX	3.33	m/s
AMX	1912	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:18 AM
Blow Number 4

Pile Properties

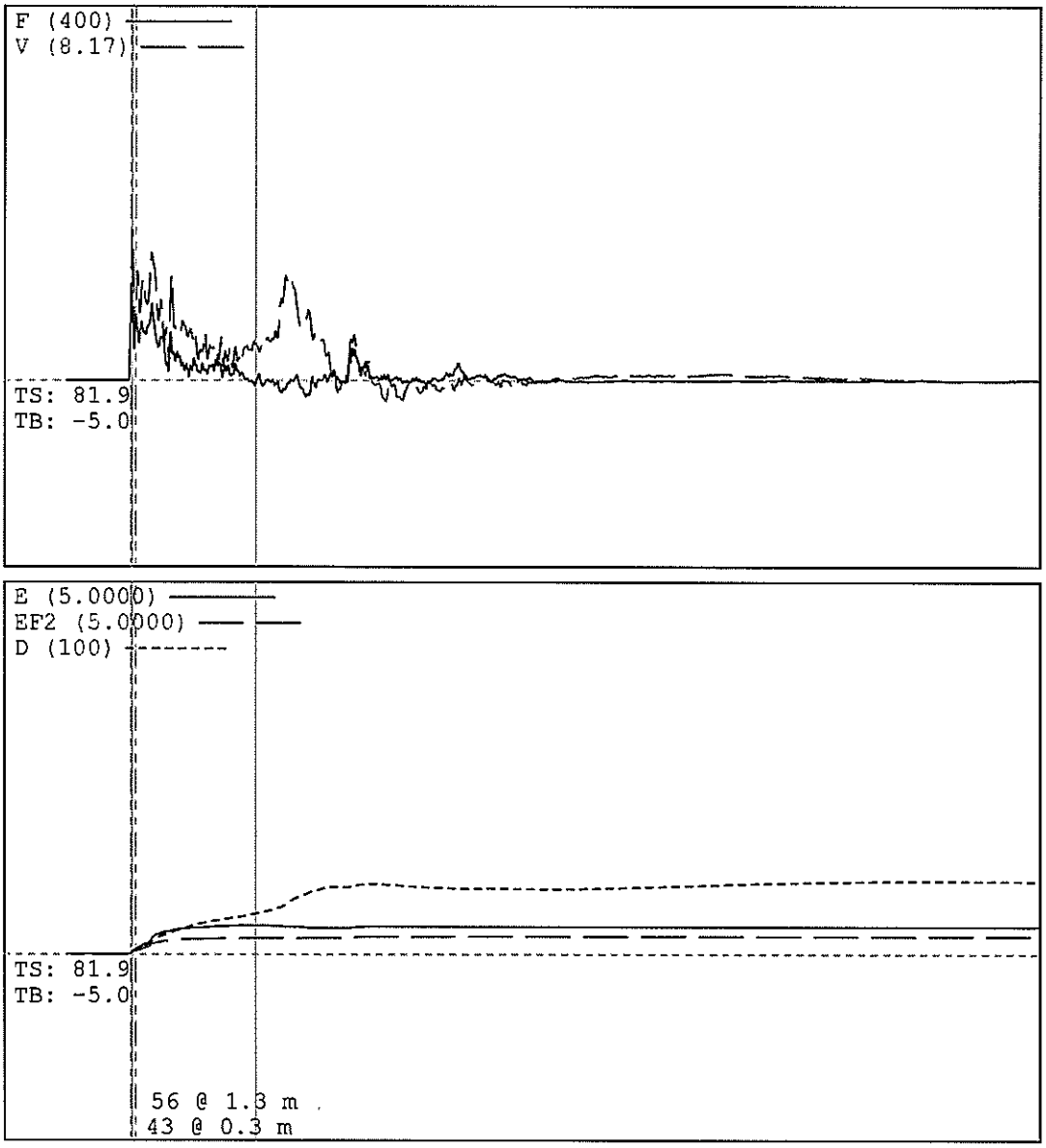
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

Quantity Results

EMX	0.3767	kN-m
EF2	0.2378	kN-m
DMX	16	mm
FMX	115	kN
CSX	94.8	MPa
TSX	46.8	MPa
VMX	3.34	m/s
AMX	1978	g's
RX5		kN

Version 2012.114

T5(250418) H-22



Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:20 AM
Blow Number 5

Pile Properties

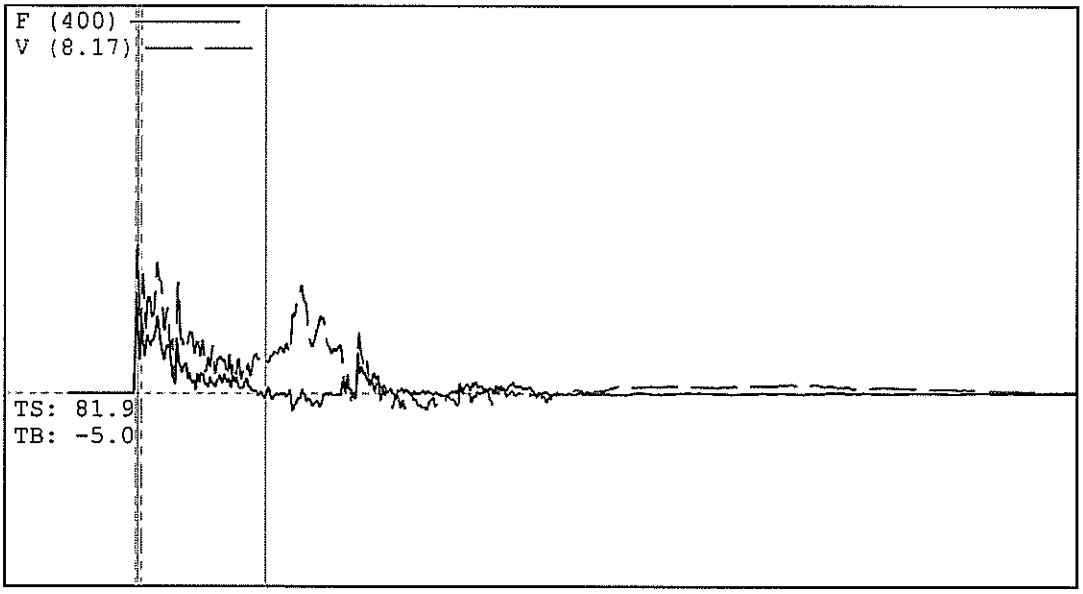
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

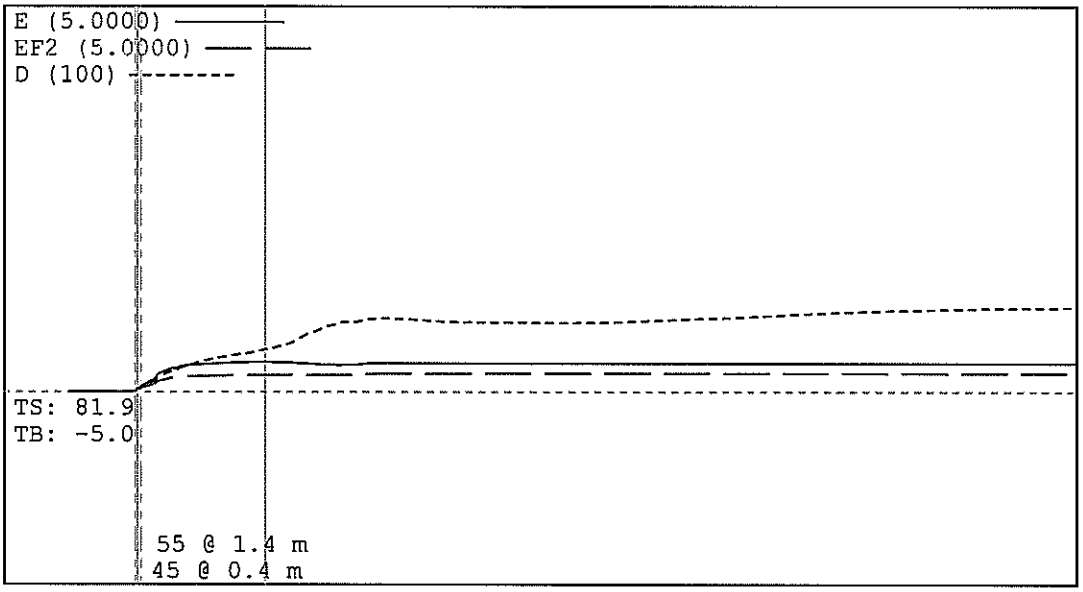
Quantity Results

EMX	0.3835	kN-m
EF2	0.2123	kN-m
DMX	20	mm
FMX	95	kN
CSX	78.7	MPa
TSX	41.2	MPa
VMX	3.26	m/s
AMX	2461	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information

PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:24 AM
Blow Number 6

Pile Properties

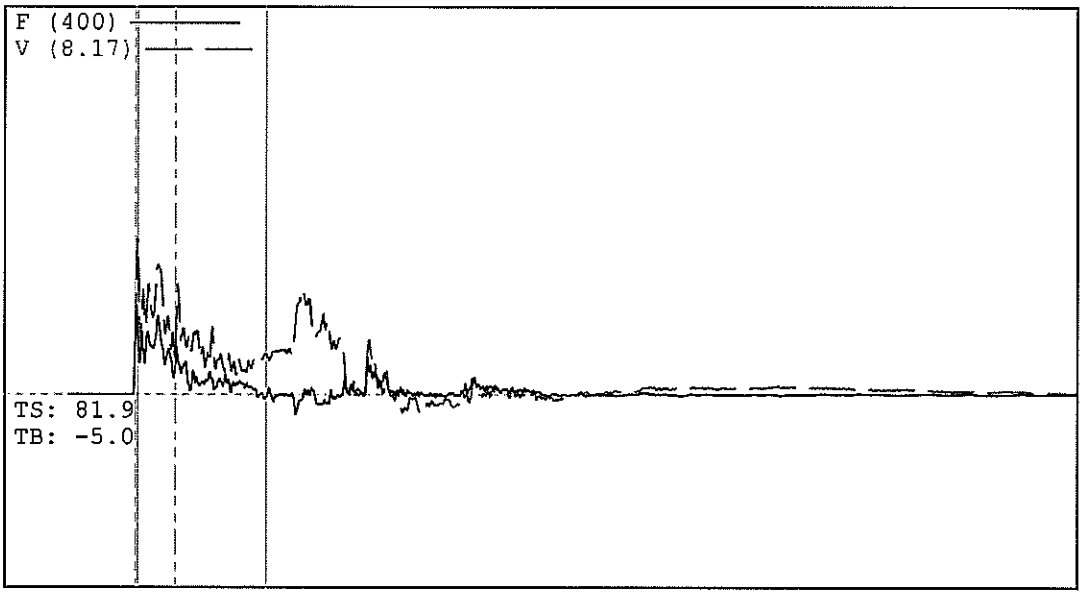
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

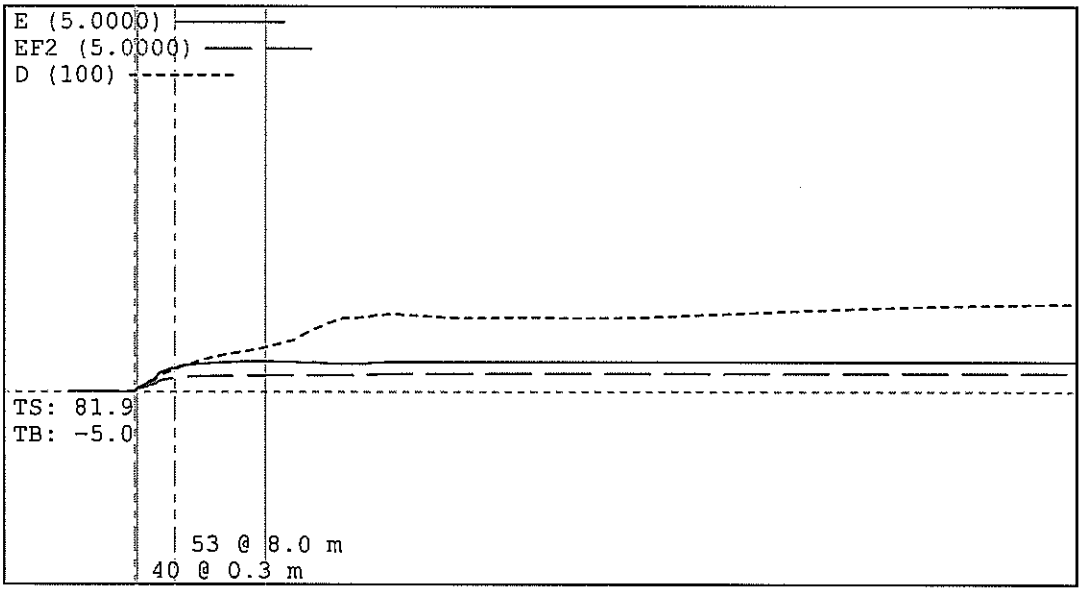
Quantity Results

EMX	0.3828	kN-m
EF2	0.2119	kN-m
DMX	22	mm
FMX	87	kN
CSX	71.9	MPa
TSX	37.5	MPa
VMX	3.12	m/s
AMX	2192	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information

PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:27 AM
Blow Number 7

Pile Properties

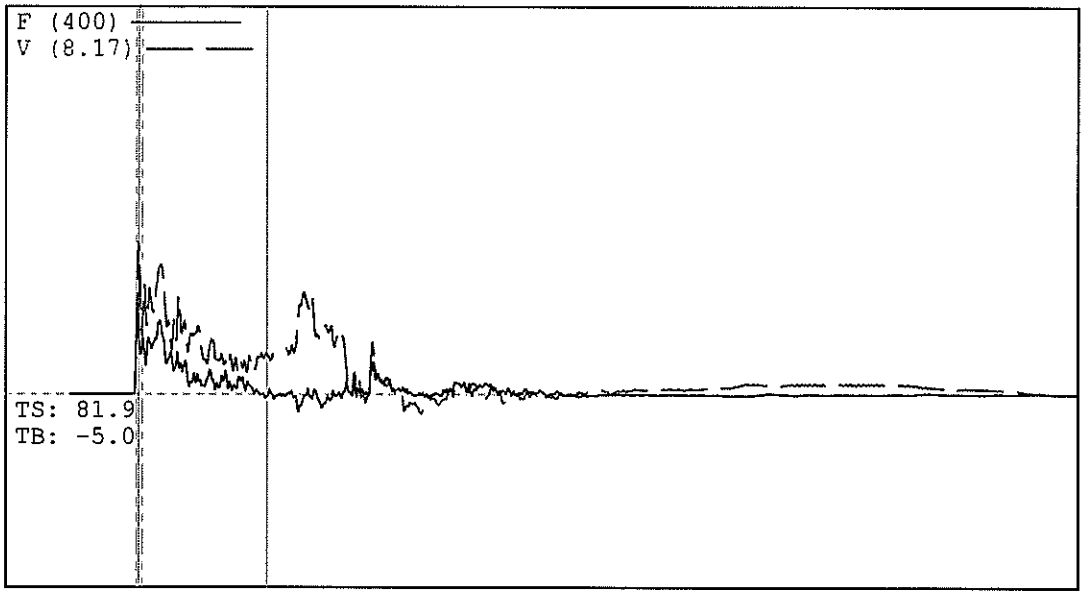
LE	24.9 m
AR	12.13 cm^2
EM	206843 MPa
SP	77.3 kN/m3
WS	5123.0 m/s
EA/C	49 kN-s/m
2L/C	9.74 ms
JC	[]

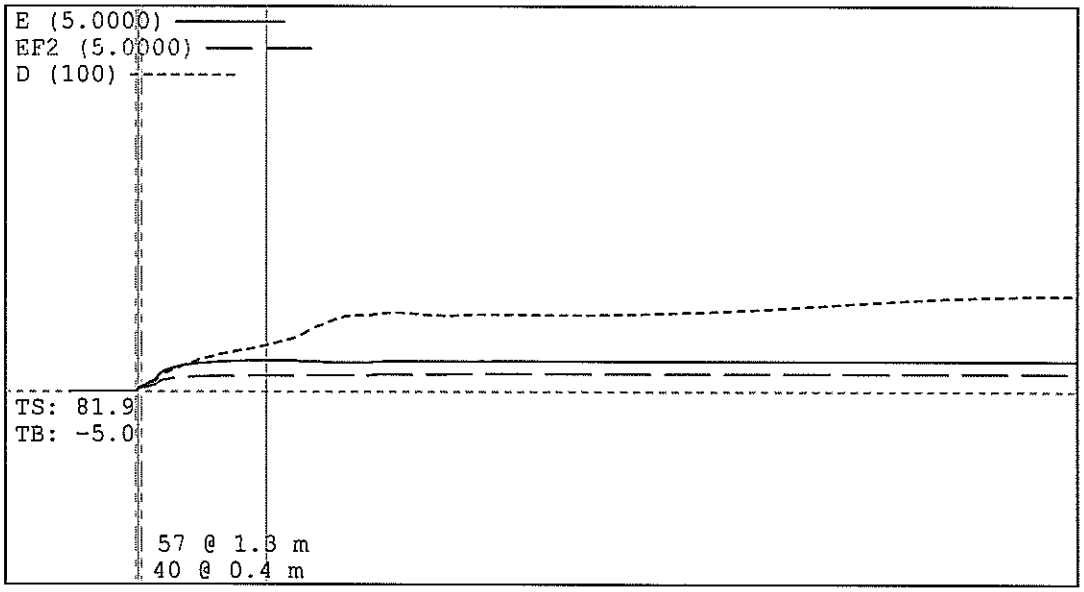
Quantity Results

EMX	0.3910 kN-m
EF2	0.2071 kN-m
DMX	23 mm
FMX	91 kN
CSX	75.0 MPa
TSX	35.2 MPa
VMX	3.27 m/s
AMX	2187 g's
RX5	kN

Version 2012.114

T5(250418) H-22





Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:30 AM
Blow Number 8

Pile Properties

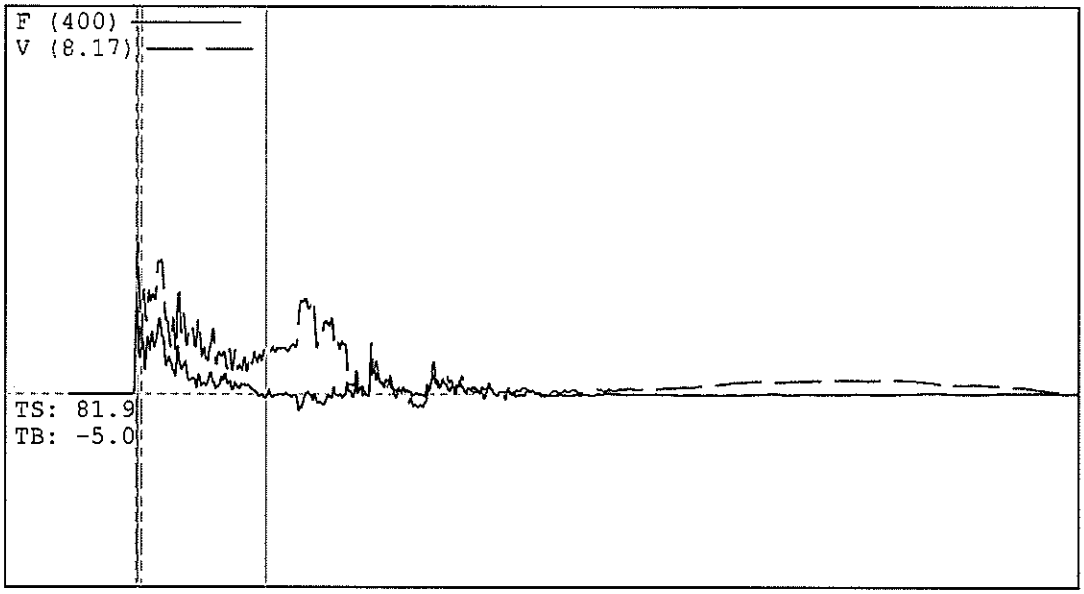
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

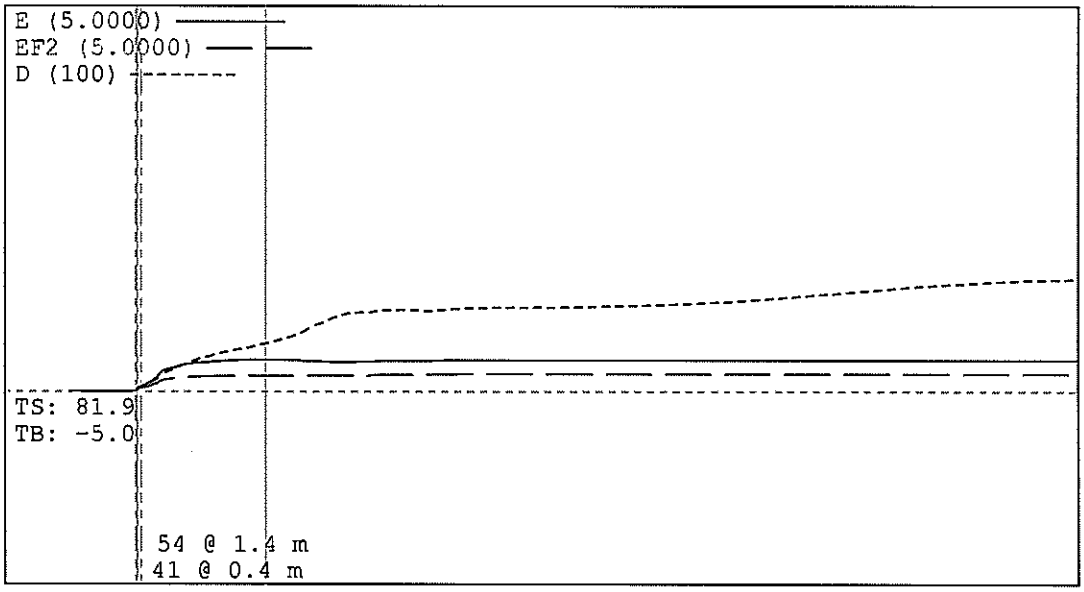
Quantity Results

EMX	0.4008	kN-m
EF2	0.2059	kN-m
DMX	25	mm
FMX	93	kN
CSX	76.7	MPa
TSX	33.2	MPa
VMX	3.18	m/s
AMX	2317	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:33 AM
Blow Number 9

Pile Properties

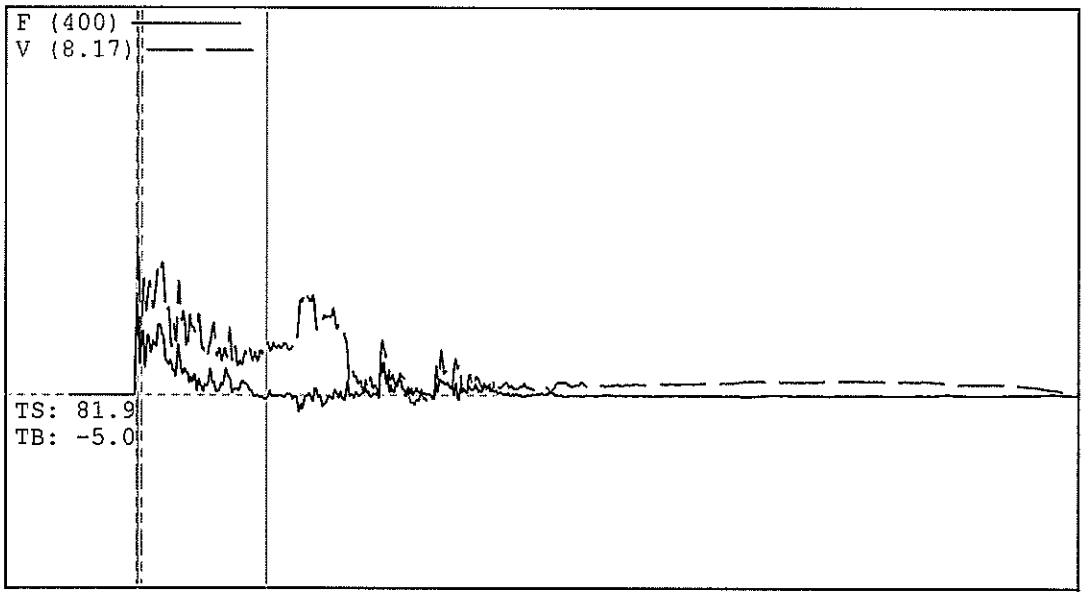
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

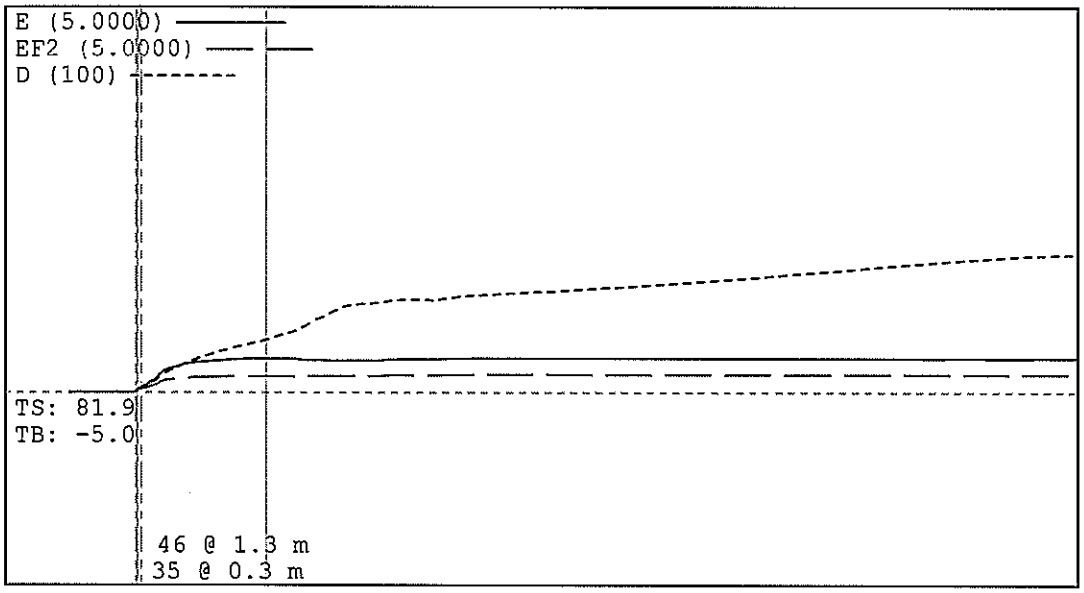
Quantity Results

EMX	0.4079	kN-m
EF2	0.2018	kN-m
DMX	29	mm
FMX	91	kN
CSX	75.4	MPa
TSX	33.2	MPa
VMX	3.17	m/s
AMX	2158	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information

PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:36 AM
Blow Number 10

Pile Properties

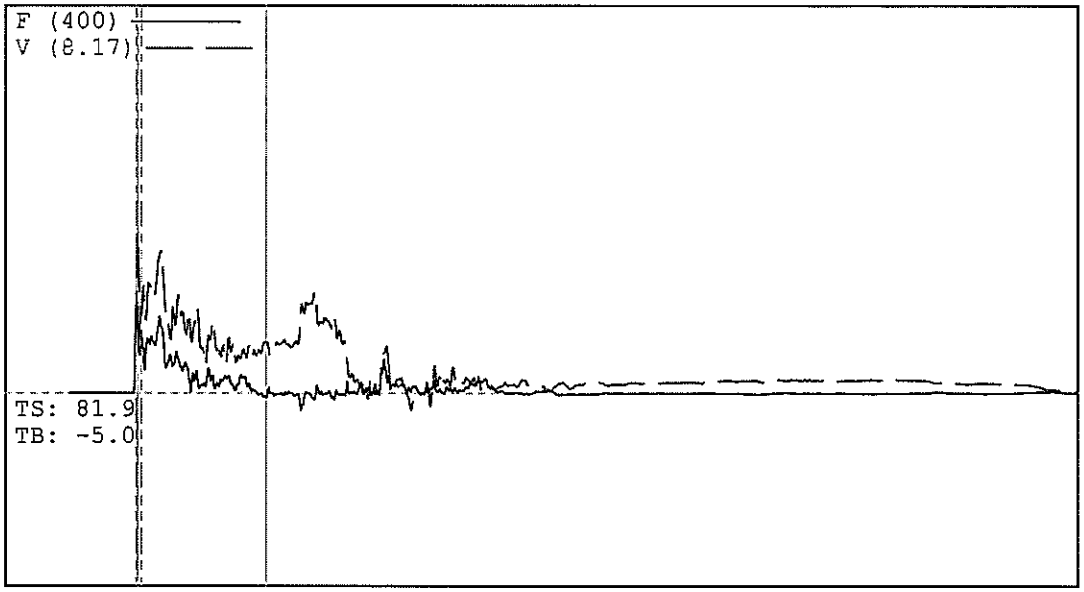
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

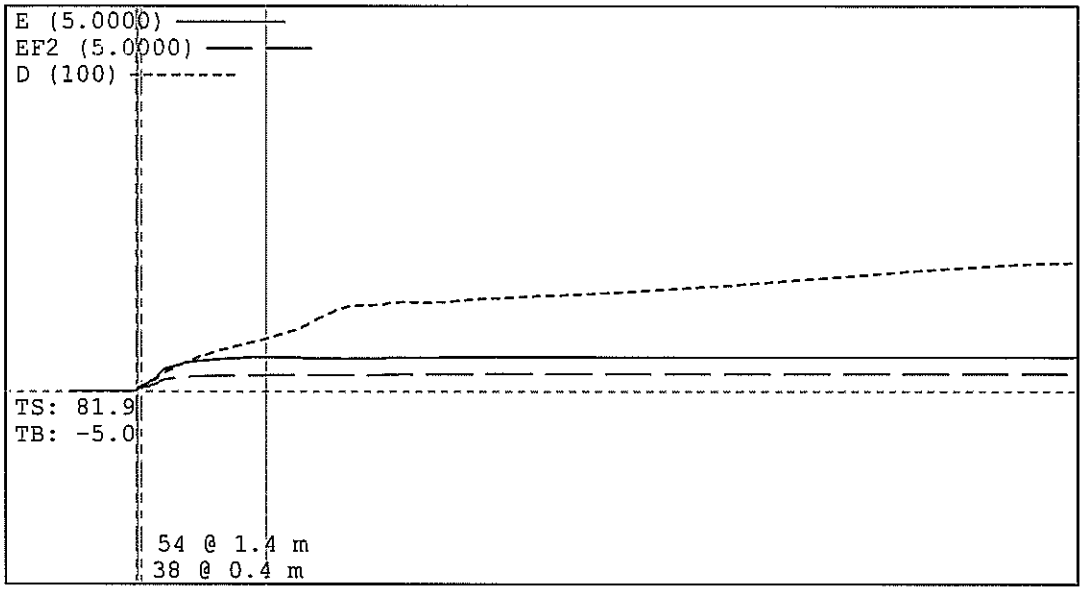
Quantity Results

EMX	0.4402	kN-m
EF2	0.2064	kN-m
DMX	36	mm
FMX	94	kN
CSX	77.1	MPa
TSX	31.4	MPa
VMX	3.28	m/s
AMX	2152	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information

PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:38 AM
Blow Number 11

Pile Properties

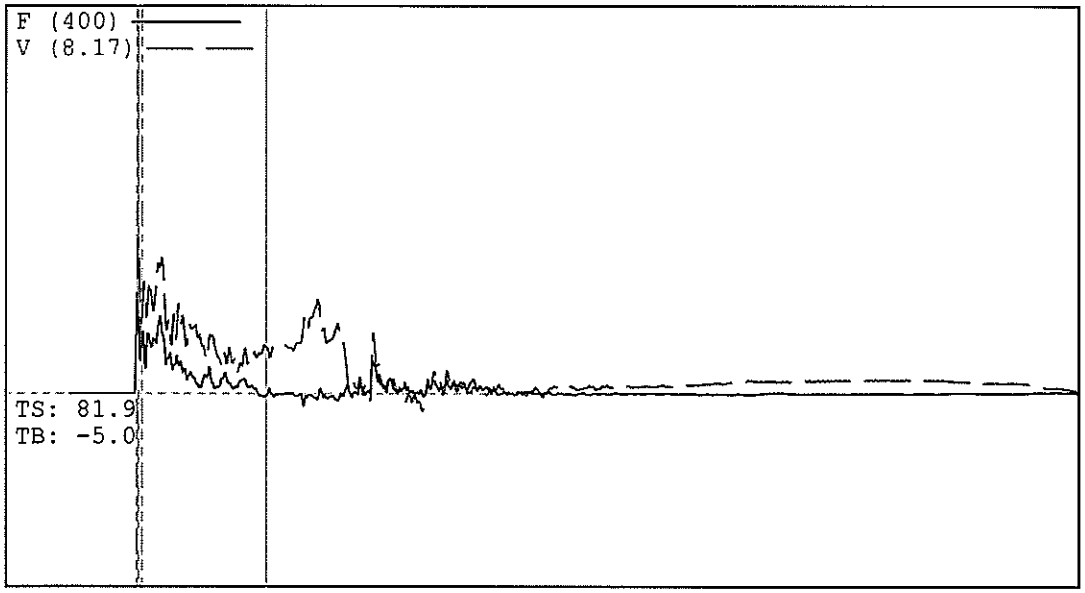
LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC		[]

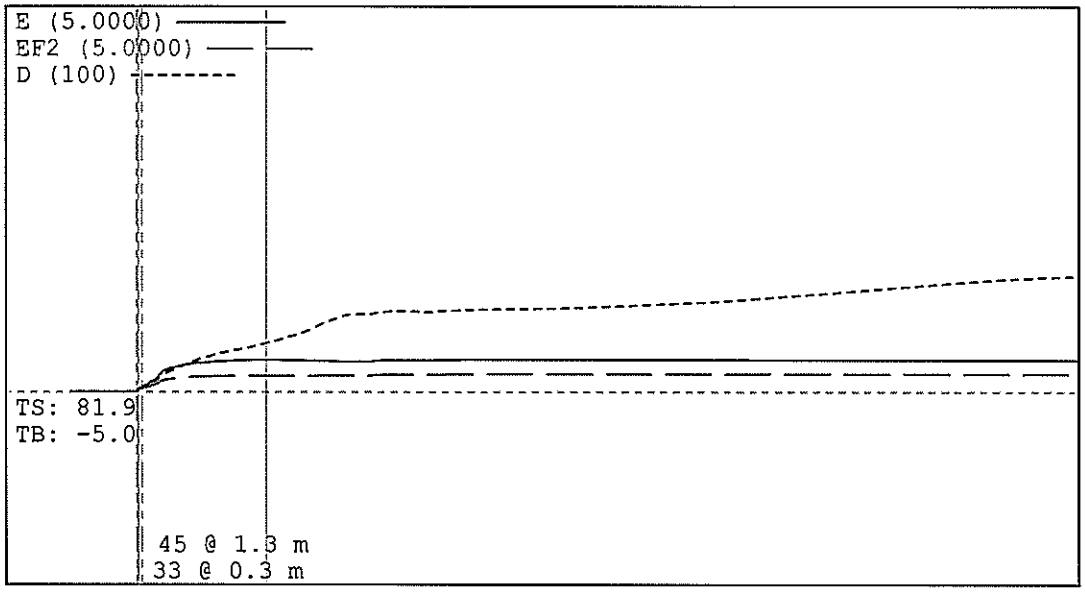
Quantity Results

EMX	0.4425	kN-m
EF2	0.2071	kN-m
DMX	33	mm
FMX	97	kN
CSX	80.0	MPa
TSX	30.7	MPa
VMX	3.37	m/s
AMX	2265	g's
RX5		kN

Version 2012.114

T5(250418) H-22





Project Information
PROJECT: T5(250418)
PILE NAME: H-22
DESCR: APS
OPERATOR: JOSEPH
FILE: H-22_2
24/4/2018 11:38:41 AM
Blow Number 12

Pile Properties

LE	24.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	9.74	ms
JC	[]	

Quantity Results

EMX	0.4149	kN-m
EF2	0.2063	kN-m
DMX	30	mm
FMX	96	kN
CSX	78.8	MPa
TSX	30.6	MPa
VMX	3.27	m/s
AMX	2242	g's
RX5		kN

Version 2012.114

APS ASIA PDA ENTERPRISE PTE LTD

PROJECT TITLE:
SI WORK FOR ST28 (WA7)

TEST REPORT:
STANDARD PENETRATION TEST (SPT)
HAMMER ENERGY MEASUREMENT
(SPT HAMMER H-35)

TEST DATE:
15th AUGUST 2018

CLIENT:
RYOBI GEOTECH PTE LTD

REPORT SUBMITTED: 18th AUGUST 2018

REPORT REFERENCE NO. : APS/SPT/2018/030

No. 65 Ubi Crescent #03-04/05 Hola Centre Singapore 408559 Tel (65) 68968926 Fax: (65) 62212003

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CONTENTS

1. INTRODUCTION

2. TEST EQUIPMENT

3. SUMMARY

4. RESULTS

APPENDIX I SPT HAMMER ENERGY MEASUREMENT RESULTS

1. INTRODUCTION

This report presents the results of the standard penetration test, SPT, hammer energy measurement using the Pile Driving Analyzer, PDA, carried out for Ryobi Geotech Pte Ltd on 15 August 2018. The aim of testing was to provide an estimate of the hammer energy transferred by the SPT hammer in accordance to American Standard Test Method ASTM D4633-10.

The SPT testing was performed SI Work for ST28 (WA7).

The SPT hammer tested was identified as H-35 and was operated by PAX 4192LA.

2. TEST EQUIPMENT

Pile Driving Analyser (Model PAX)	:	Serial No. 4192L
Instrumented Rod	:	Serial No. 462BW (Length 600mm)
Strain Transducers	:	Serial Nos. 462BW - Bridge 1 & 2
Accelerometers	:	Serial Nos. K3429 & K3430
Weighing Scale (Teraseiko: TBW)	:	Serial No. 20150821116

3. SUMMARY

SPT Hammer Serial No.	-	H-35
Project Site	-	SI Work for ST28 (WA7)
Borehole	-	BH-8 - Diameter : - 100 mm - Depth : 22.00 m
Drilling Rig	-	Rig-35
Drilling Operator	-	KV.RAJ
Drill Rod Type	-	BW
Shoe Type / Length	-	Split Spoon Sampler / 600mm
Drill Rod Segments	-	7 x 3m + 1m + 0.6
Total Length	-	22.90 m (Instrumented Rod Top To Shoe Base)
SPT Ram Mass	-	63.60 kg
SPT Anvil Mass	-	6.80 kg
SPT Total Mass	-	70.40kg
SPT Ram Drop Height	-	765 mm
Theoretical Energy	-	0.4773 kN-m

4. RESULTS (SPT HAMMER ENERGY MEASUREMENT)

No. Of Blow = 10

Min. / Max. EMX Value = 0.4172 kN-m / 0.4307 kN-m

Mean Measured Energy = 0.4216 kN-m

Standard Deviation = 0.0040 kN-m

Energy Ratio, Er = Mean Measured Energy / Theoretical Energy

= 0.88 (88 %)

Report prepared by



Mohd Sapri A Rahmin
Operation Manager
APS Asia PDA Enterprise Pte Ltd

APPENDIX I

SPT HAMMER ENERGY MEASURMENT RESULTS

SPT HAMMER ENERGY MEASUREMENT

Conducted By : APS Asia PDA Enterprise Pte Ltd (Joseph Ling Ka Jun)

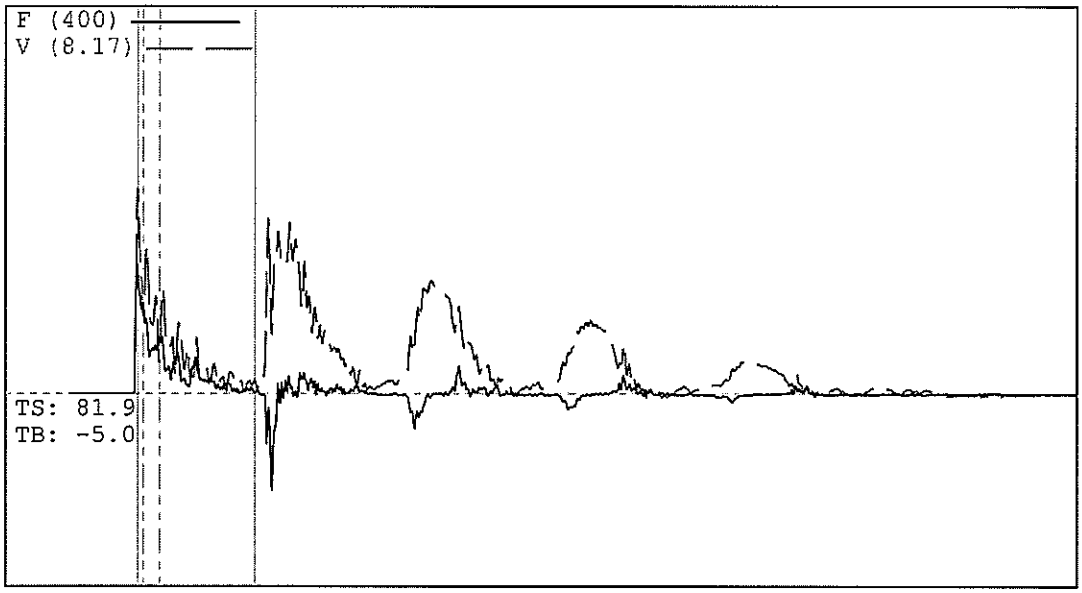
Conducted For : APS ASIA PDA Enterprise Pte Ltd (Machine : Rig - 35 / SPT : H-35)

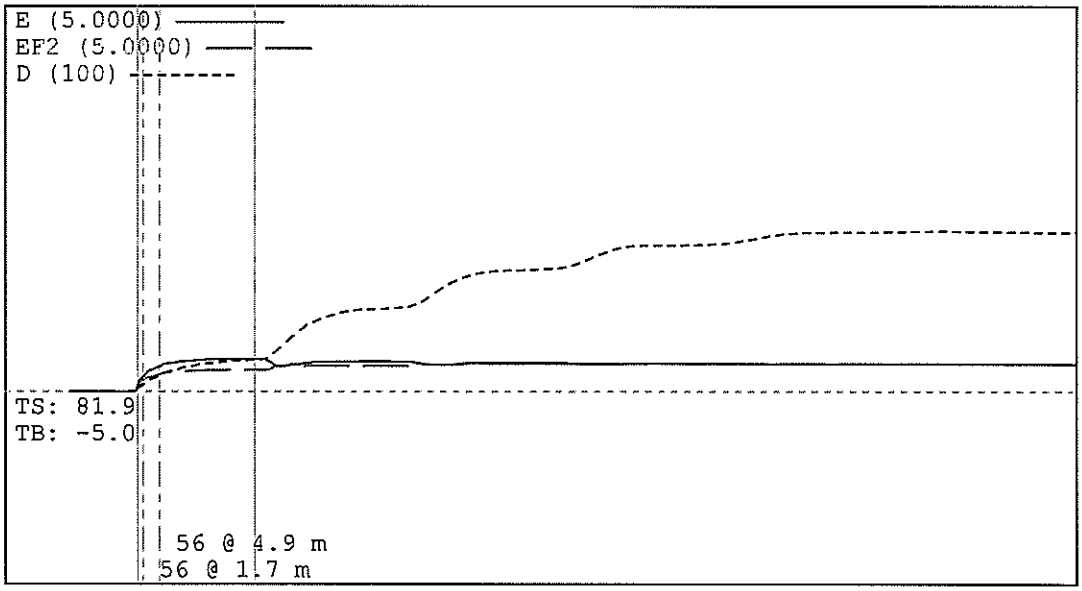
BLOW NO.	EMX	EF2	DMX	FMX	CSX	TSX	VMX	AMX
4	0.4182	0.2794	42	136	112	87.7	4.31	3424
5	0.4187	0.2797	34	138	113.9	79.3	4.37	3405
6	0.4222	0.2848	36	147	121.3	80.7	4.25	3493
7	0.4307	0.2876	33	147	121.3	82.1	4.54	3583
8	0.4204	0.2807	34	139	114.4	80.0	4.44	3381
9	0.4255	0.2834	34	148	121.9	82.1	4.51	3284
10	0.4203	0.2830	27	149	123.2	83.8	4.52	3140
11	0.4209	0.2841	29	154	127.1	85.7	4.38	3218
12	0.4216	0.2865	31	155	127.9	85.4	4.35	3286
13	0.4172	0.2847	29	155	127.7	84.2	4.37	3400
MINIMUM	**0.4172**	**0.2794**	**27**	**136**	**112.0**	**79.3**	**4.25**	**3140**
MAXIMUM	**0.4307**	**0.2876**	**42**	**155**	**127.9**	**87.7**	**4.54**	**3583**
AVERAGE	**0.4216**	**0.2834**	**32.9**	**147**	**121.1**	**83.1**	**4.40**	**3361**
STANDARD DEV.	**0.0040**	**0.0028**	**4.28**	**7**	**5.9**	**2.7**	**0.10**	**131**

OUTPUT QUANTITIES

EMX	maximum energy transmitted past the transducers.
EF2	maximum energy transmitted past the transducers from integral of force squared.
DMX	maximum downward displacement at the transducers' location.
FMX	maximum compressive force at the transducers' location.
CSX	maximum compressive stress at transducers' location.
TSX	maximum tensile stress along the length of rod.
VMX	maximum velocity at the transducers' location.
AMX	maximum acceleration at the transducers' location.

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:38:32 PM
Blow Number 4

Pile Properties

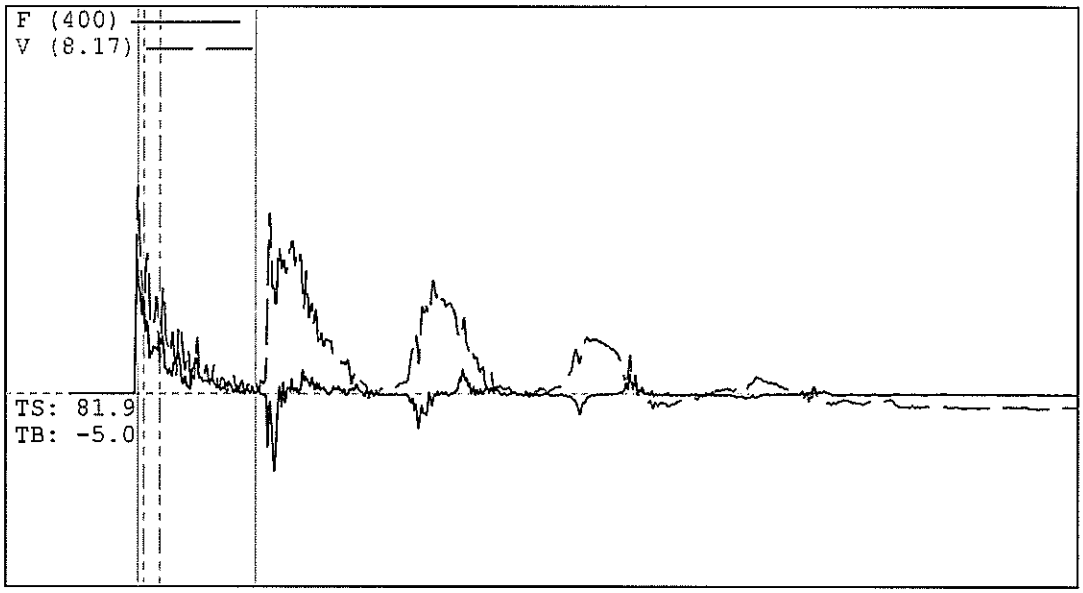
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC	[]	

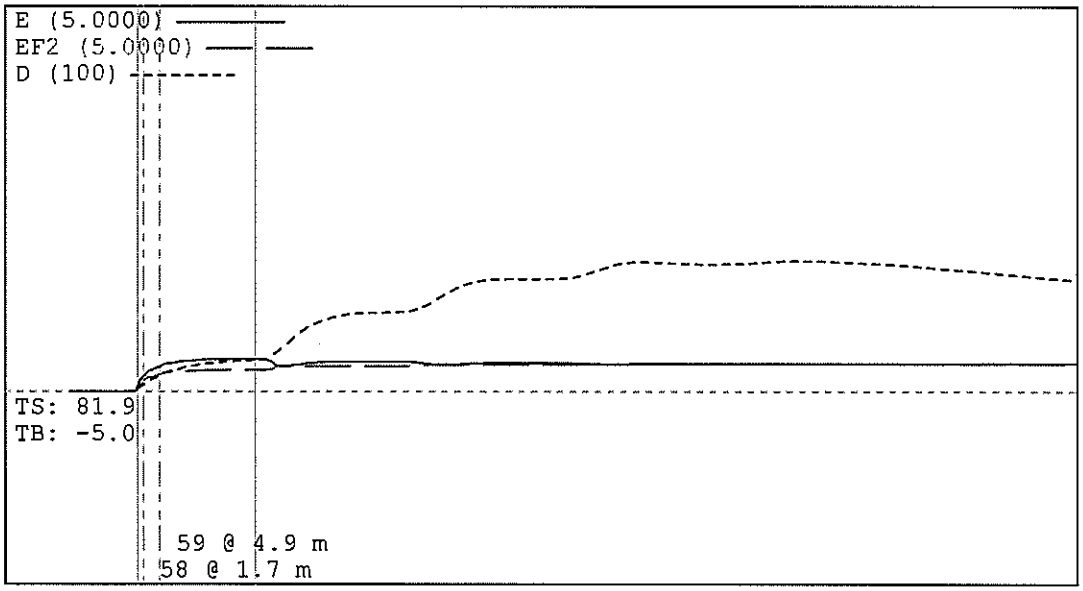
Quantity Results

EMX	0.4182	kN-m
EF2	0.2794	kN-m
DMX	42	mm
FMX	136	kN
CSX	112.0	MPa
TSX	87.7	MPa
VMX	4.31	m/s
AMX	3424	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:38:38 PM
Blow Number 5

Pile Properties

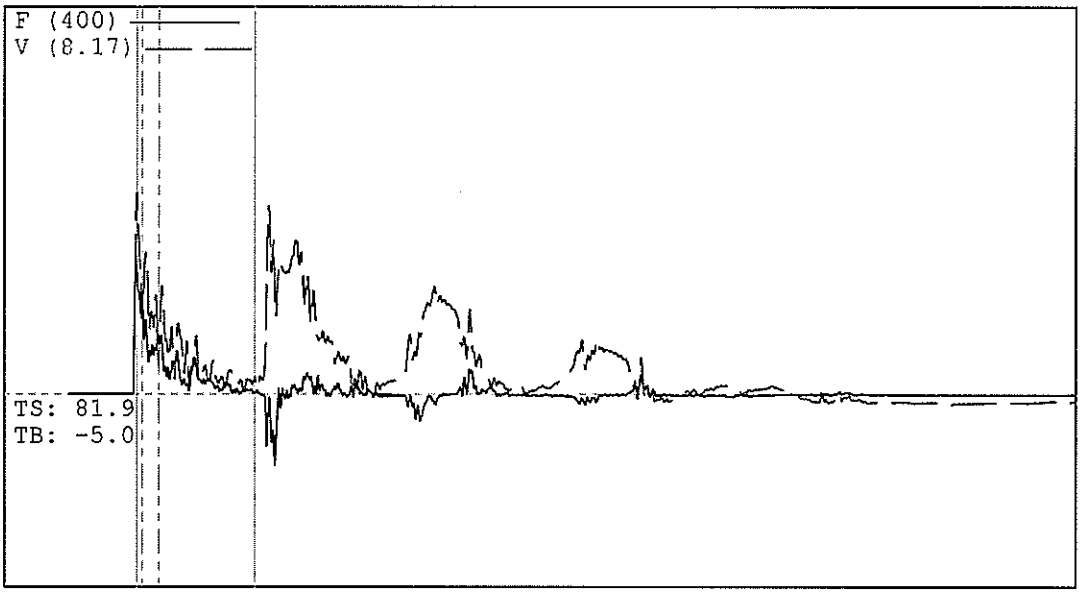
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

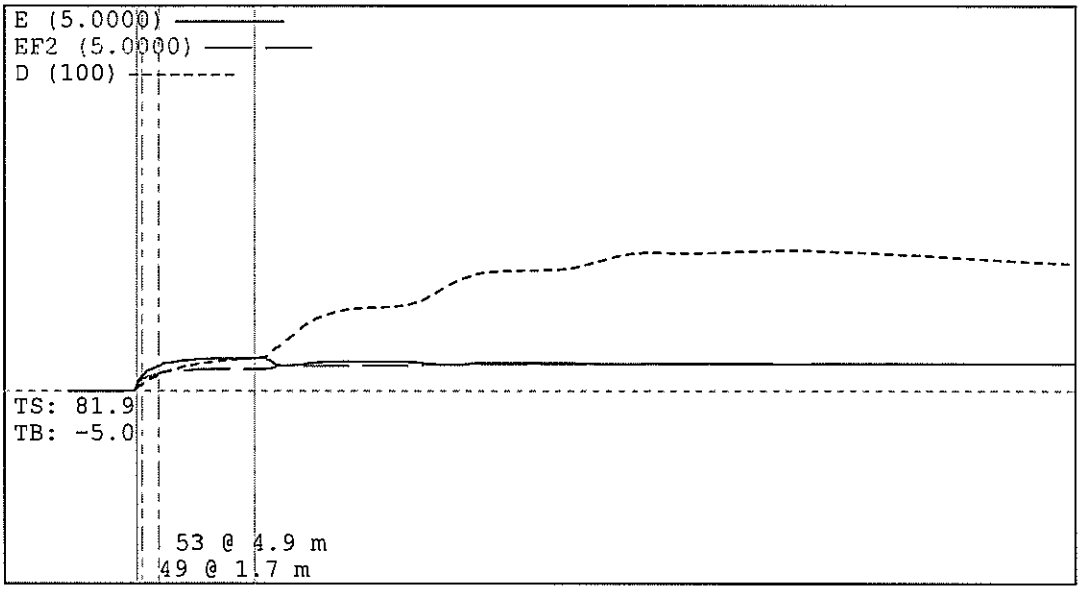
Quantity Results

EMX	0.4187	kN-m
EF2	0.2797	kN-m
DMX	34	mm
FMX	138	kN
CSX	113.9	MPa
TSX	79.3	MPa
VMX	4.37	m/s
AMX	3405	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:38:43 PM
Blow Number 6

Pile Properties

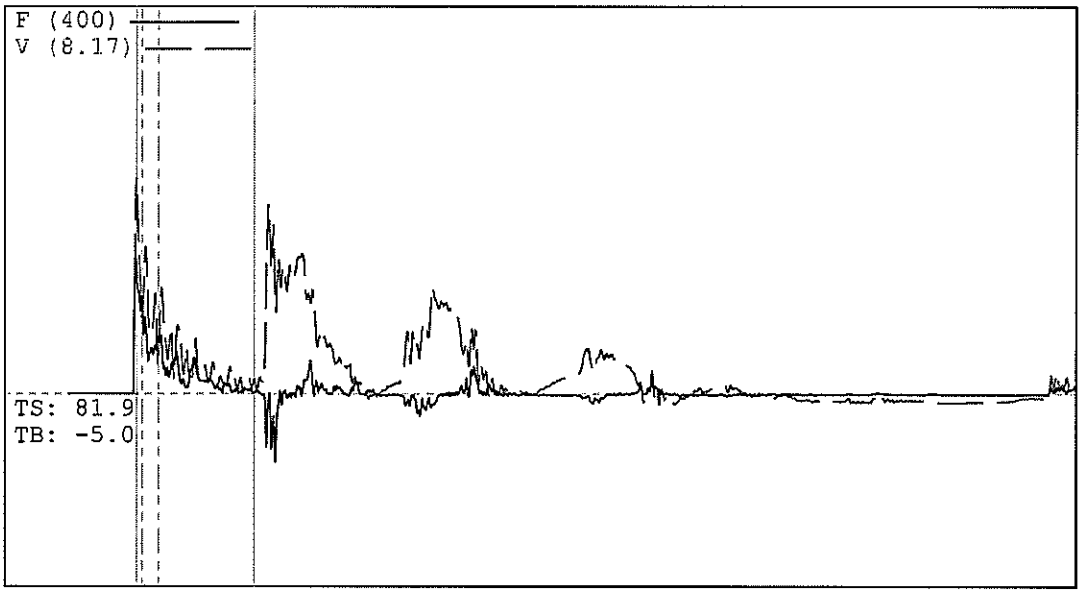
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

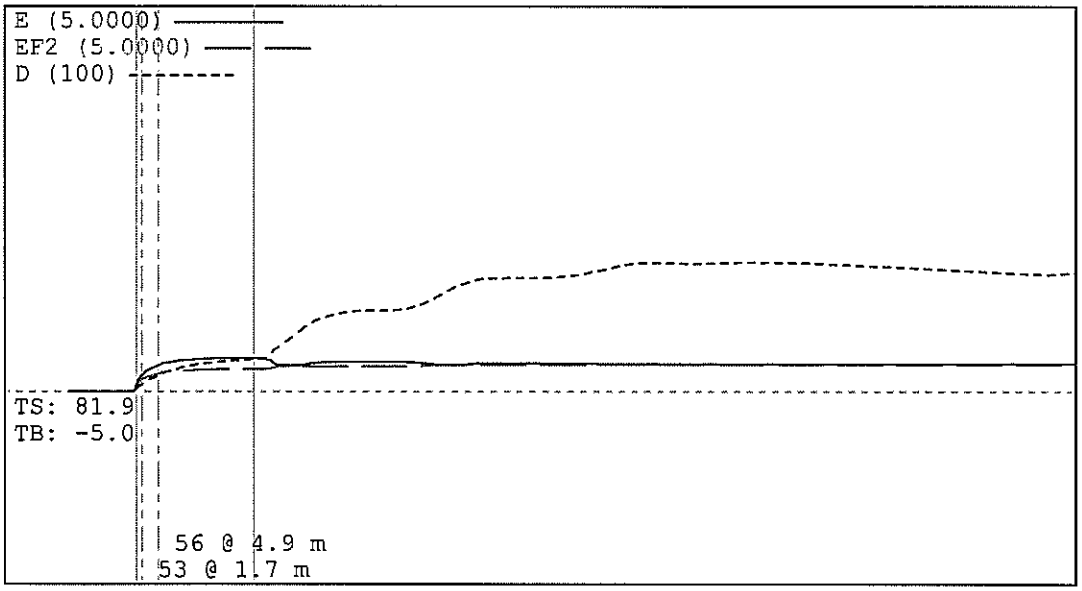
Quantity Results

EMX	0.4222	kN-m
EF2	0.2848	kN-m
DMX	36	mm
FMX	147	kN
CSX	121.3	MPa
TSX	80.7	MPa
VMX	4.25	m/s
AMX	3493	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:38:49 PM
Blow Number 7

Pile Properties

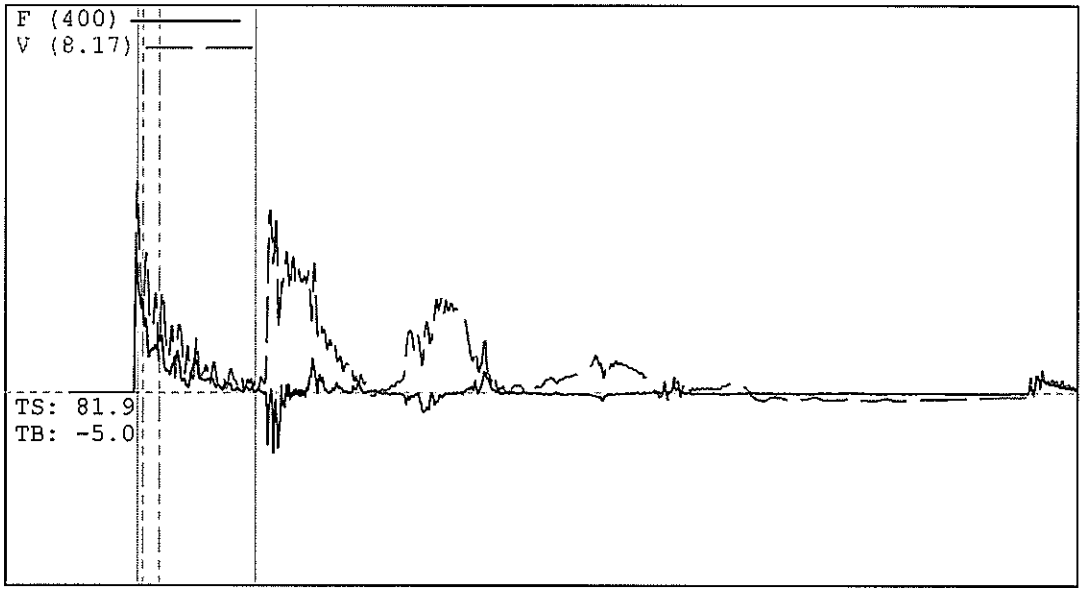
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

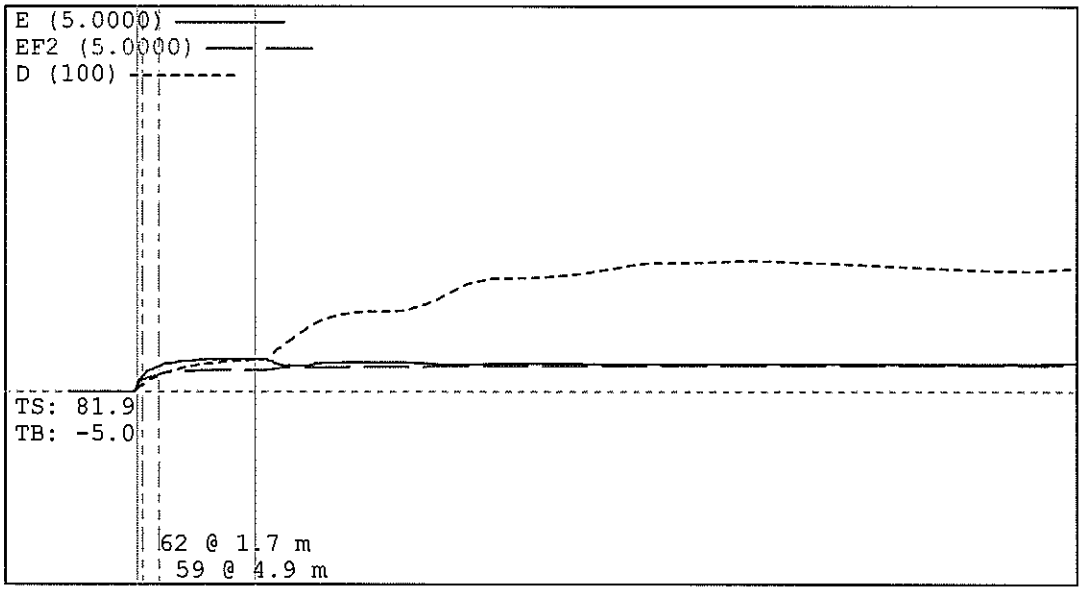
Quantity Results

EMX	0.4307	kN-m
EF2	0.2876	kN-m
DMX	33	mm
FMX	147	kN
CSX	121.3	MPa
TSX	82.1	MPa
VMX	4.54	m/s
AMX	3583	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:38:54 PM
Blow Number 8

Pile Properties

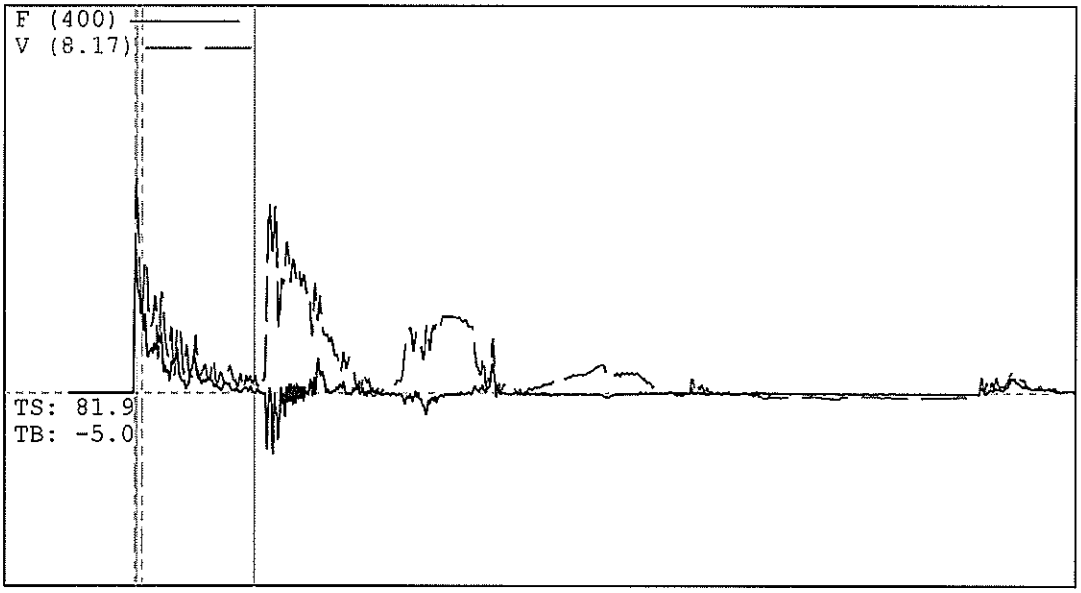
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC	[]	

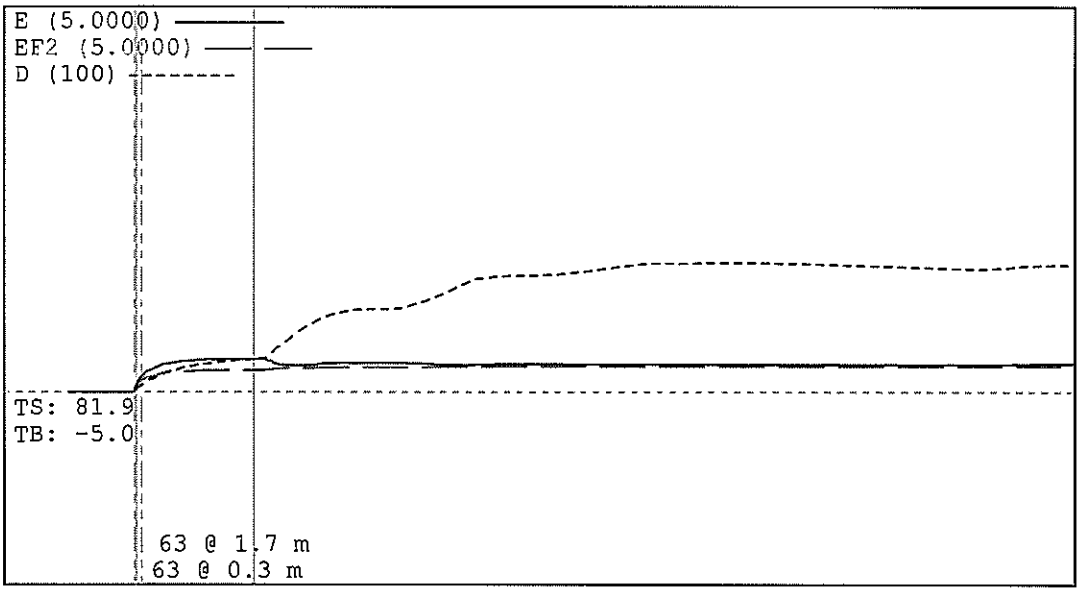
Quantity Results

EMX	0.4204	kN-m
EF2	0.2807	kN-m
DMX	34	mm
FMX	139	kN
CSX	114.4	MPa
TSX	80.0	MPa
VMX	4.44	m/s
AMX	3381	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:39:00 PM
Blow Number 9

Pile Properties

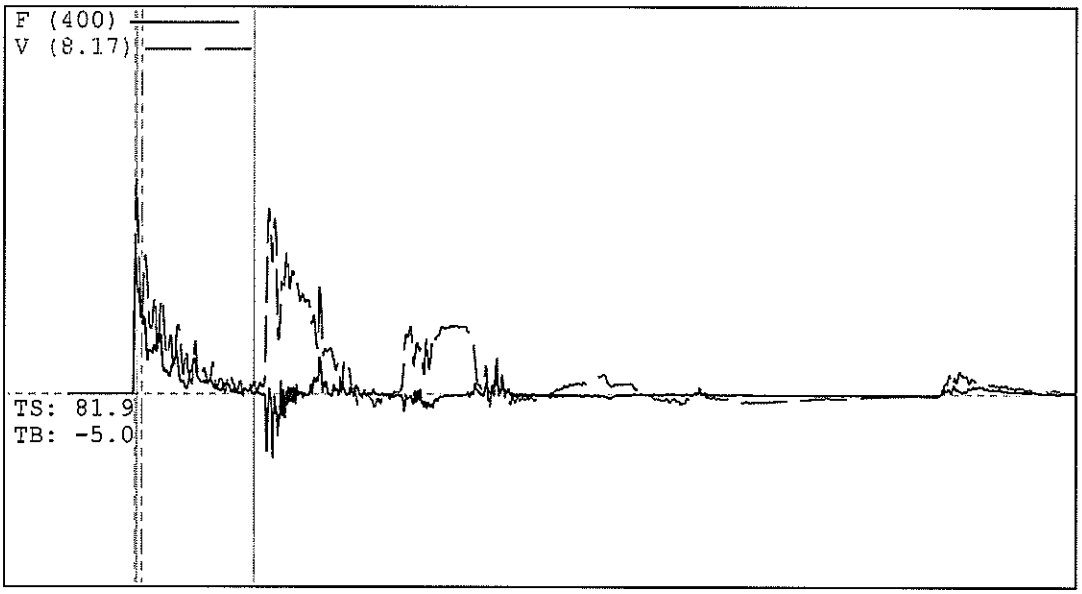
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC	[]	

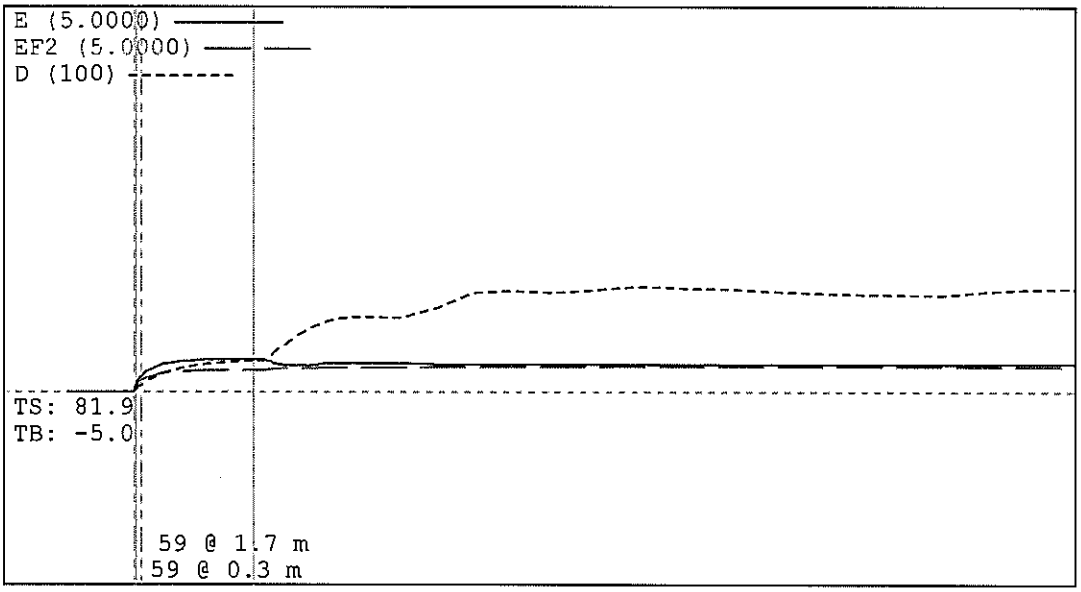
Quantity Results

EMX	0.4255	kN-m
EF2	0.2834	kN-m
DMX	34	mm
FMX	148	kN
CSX	121.9	MPa
TSX	82.1	MPa
VMX	4.51	m/s
AMX	3284	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:39:05 PM
Blow Number 10

Pile Properties

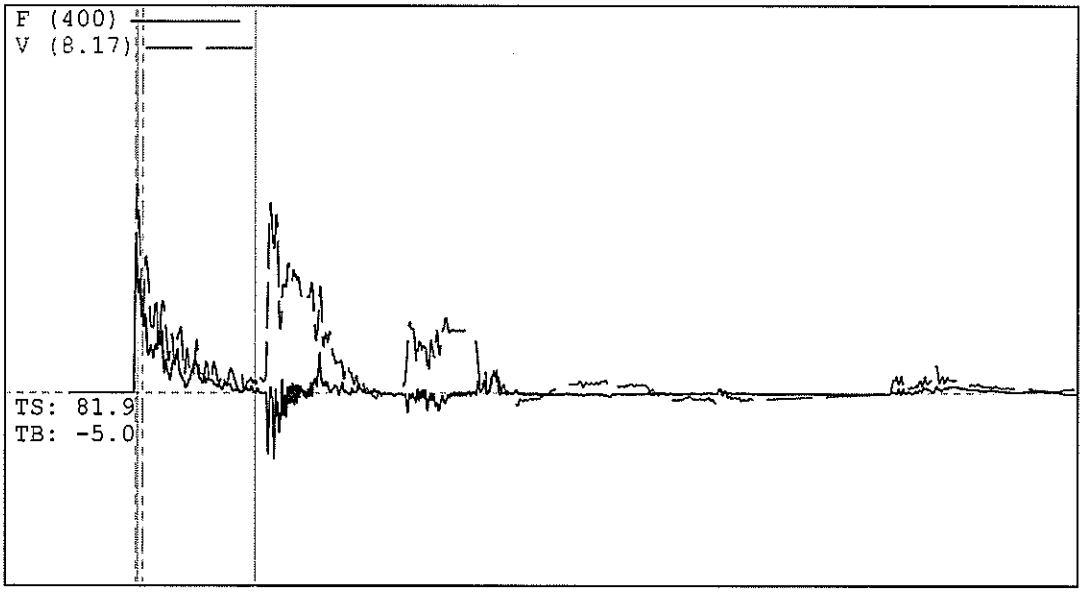
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

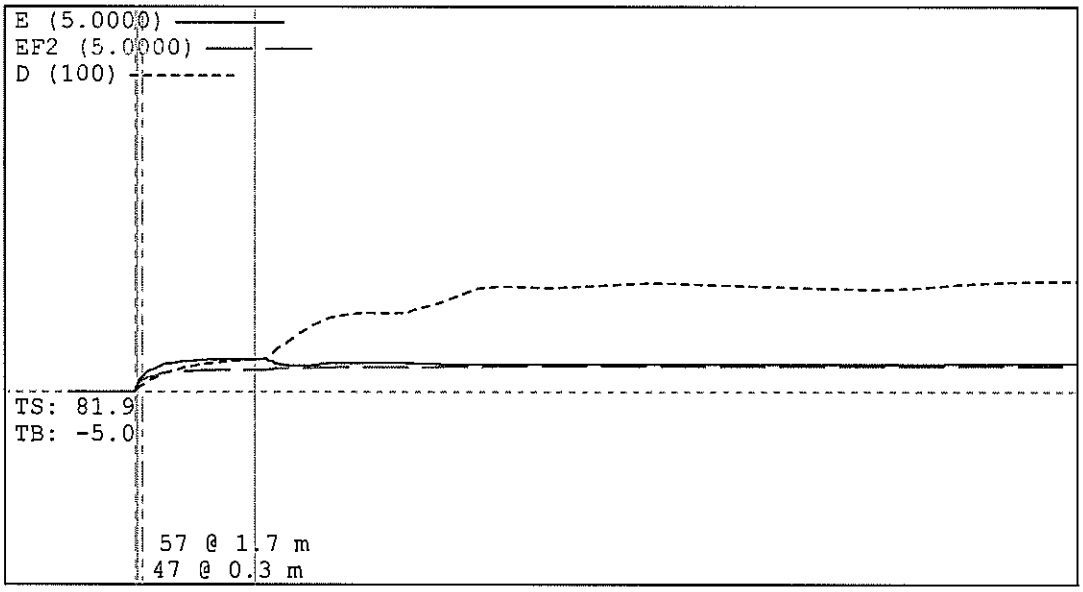
Quantity Results

EMX	0.4203	kN-m
EF2	0.2830	kN-m
DMX	27	mm
FMX	149	kN
CSX	123.2	MPa
TSX	83.8	MPa
VMX	4.52	m/s
AMX	3140	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:39:11 PM
Blow Number 11

Pile Properties

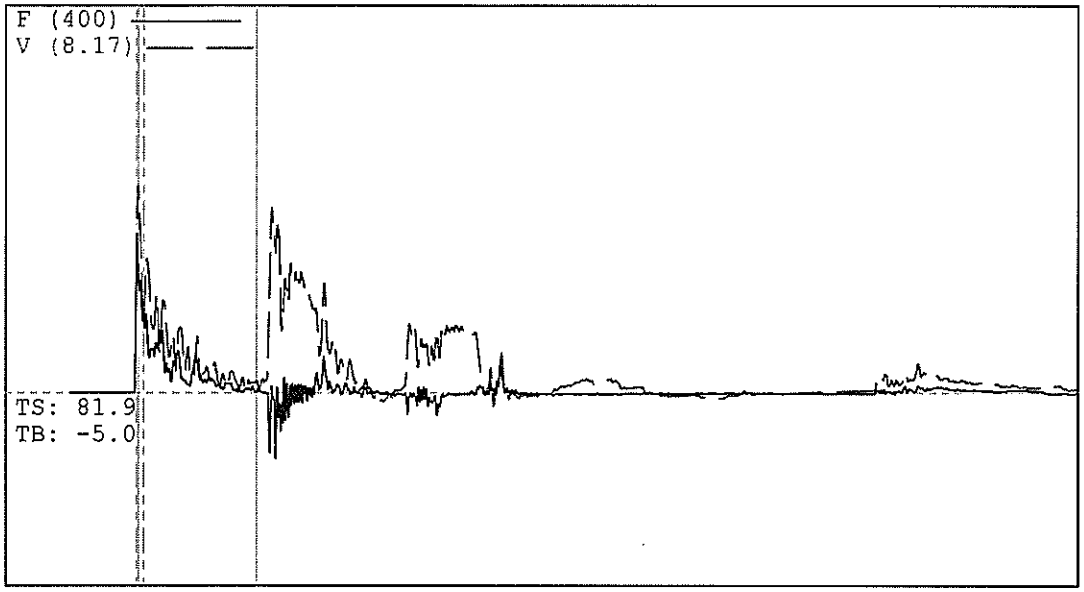
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC	[]	

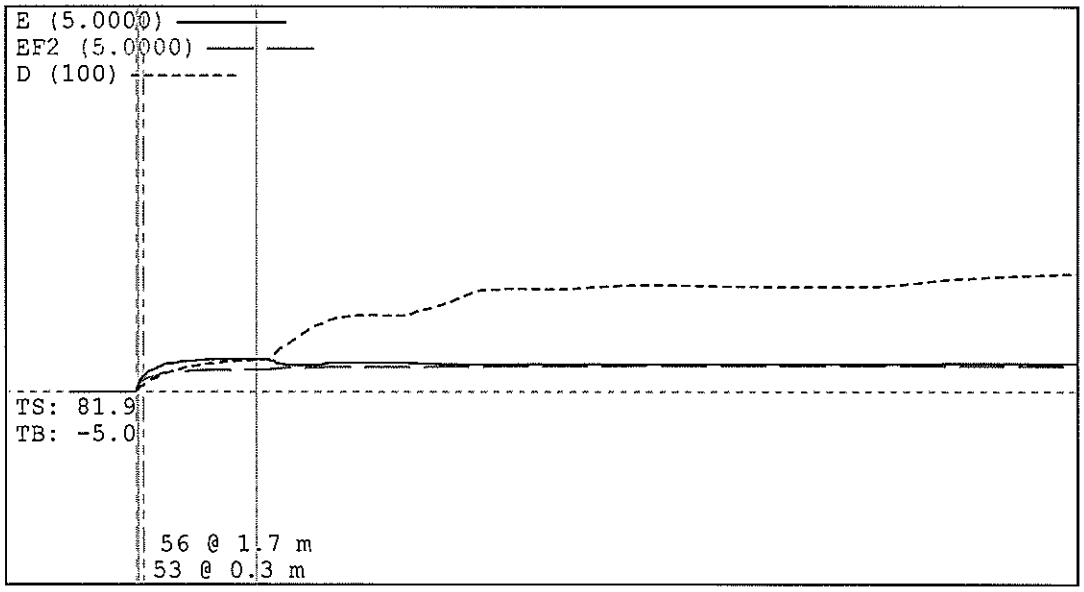
Quantity Results

EMX	0.4209	kN-m
EF2	0.2841	kN-m
DMX	29	mm
FMX	154	kN
CSX	127.1	MPa
TSX	85.7	MPa
VMX	4.38	m/s
AMX	3218	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:39:16 PM
Blow Number 12

Pile Properties

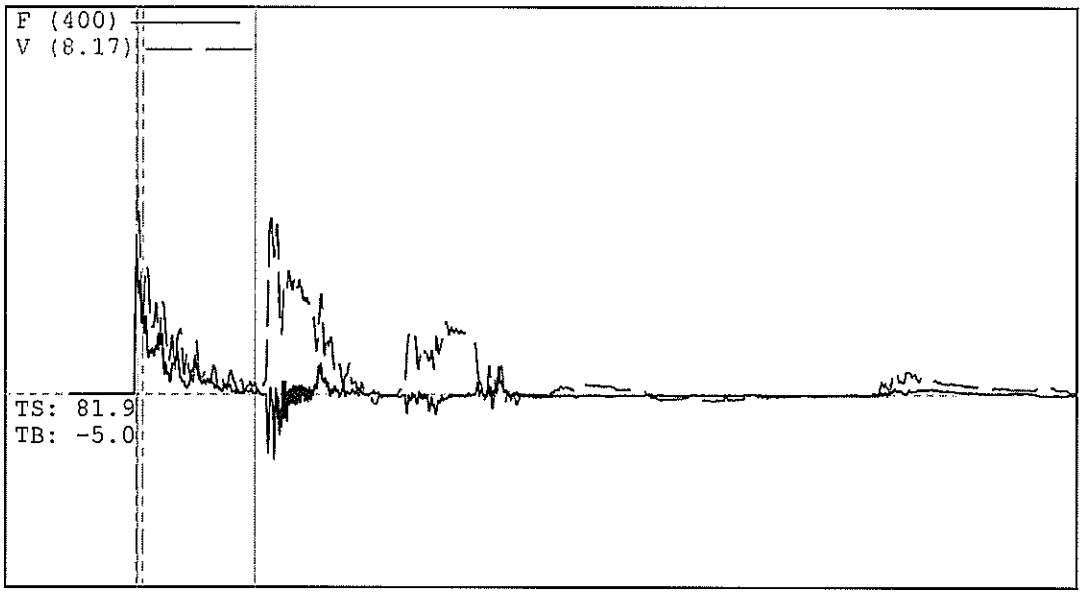
LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

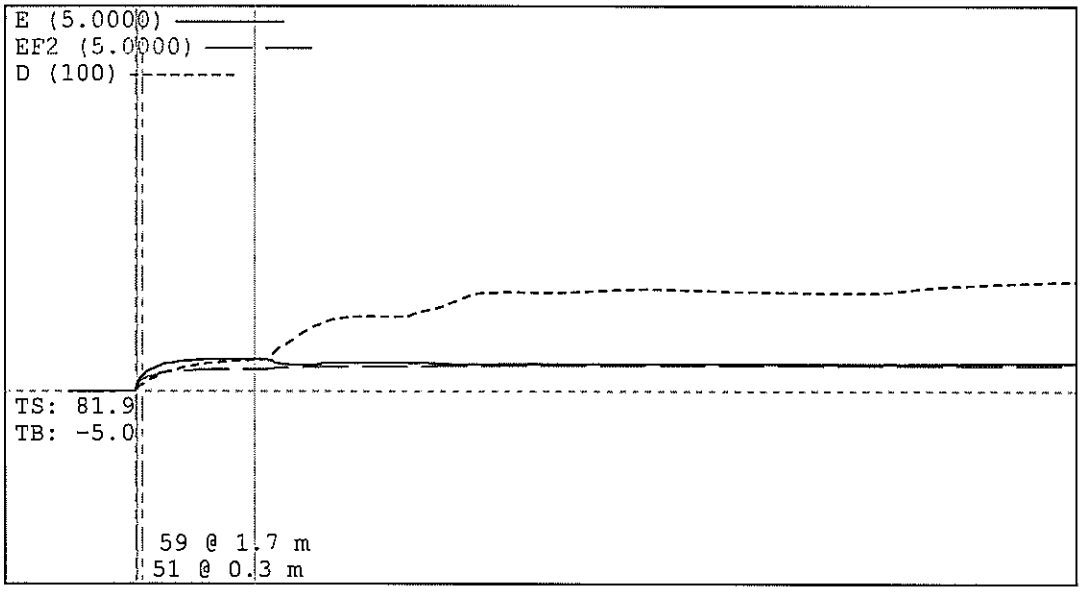
Quantity Results

EMX	0.4216	kN-m
EF2	0.2865	kN-m
DMX	31	mm
FMX	155	kN
CSX	127.9	MPa
TSX	85.4	MPa
VMX	4.35	m/s
AMX	3286	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-35





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-35
DESCR: APS
OPERATOR: JOSEPH
FILE: H-35
15/8/2018 2:39:22 PM
Blow Number 13

Pile Properties

LE	22.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	8.95	ms
JC		[]

Quantity Results

EMX	0.4172	kN-m
EF2	0.2847	kN-m
DMX	29	mm
FMX	155	kN
CSX	127.7	MPa
TSX	84.2	MPa
VMX	4.37	m/s
AMX	3400	g's
RX5		kN

Version 2012.114

APS ASIA PDA ENTERPRISE PTE LTD

PROJECT TITLE:
SI WORK FOR ST28 (WA7)

TEST REPORT:
STANDARD PENETRATION TEST (SPT)
HAMMER ENERGY MEASUREMENT
(SPT HAMMER H-42)

TEST DATE:
15th AUGUST 2018

CLIENT:
RYOBI GEOTECH PTE LTD

REPORT SUBMITTED: 18th AUGUST 2018

REPORT REFERENCE NO. : APS/SPT/2018/033

No. 65 Ubi Crescent #03-04/05 Hola Centre Singapore 408559 Tel (65) 68968926 Fax: (65) 62212003

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CONTENTS

1. INTRODUCTION

2. TEST EQUIPMENT

3. SUMMARY

4. RESULTS

APPENDIX I SPT HAMMER ENERGY MEASUREMENT RESULTS

1. INTRODUCTION

This report presents the results of the standard penetration test, SPT, hammer energy measurement using the Pile Driving Analyzer, PDA, carried out for Ryobi Geotech Pte Ltd on 15 August 2018. The aim of testing was to provide an estimate of the hammer energy transferred by the SPT hammer in accordance to American Standard Test Method ASTM D4633-10.

The SPT testing was performed SI Work for ST28 (WA7).

The SPT hammer tested was identified as H-8 and was operated by PAX 4192LA.

2. TEST EQUIPMENT

Pile Driving Analyser (Model PAX)	:	Serial No. 4192L
Instrumented Rod	:	Serial No. 462BW (Length 600mm)
Strain Transducers	:	Serial Nos. 462BW - Bridge 1 & 2
Accelerometers	:	Serial Nos. K3429 & K3430
Weighing Scale (Teraseiko: TBW)	:	Serial No. 20150821116

3. SUMMARY

SPT Hammer Serial No.	-	H-42
Project Site	-	SI Work for ST28 (WA7)
Borehole	-	BH-6 - Diameter : - 100 mm - Depth : 26.00 m
Drilling Rig	-	Rig-42
Drilling Operator	-	PANDISELVAM
Drill Rod Type	-	BW
Shoe Type / Length	-	Split Spoon Sampler / 600mm
Drill Rod Segments	-	8 x 3m + 1 + 1 + 0.6
Total Length	-	26.90 m (Instrumented Rod Top To Shoe Base)
SPT Ram Mass	-	63.90 kg
SPT Anvil Mass	-	21.30 kg
SPT Total Mass	-	85.20 kg
SPT Ram Drop Height	-	765 mm
Theoretical Energy	-	0.4795 kN-m

4. RESULTS (SPT HAMMER ENERGY MEASUREMENT)

No. Of Blow = 10

Min. / Max. EMX Value = 0.3331 kN-m / 0.4189 kN-m

Mean Measured Energy = 0.3591 kN-m

Standard Deviation = 0.0237 kN-m

Energy Ratio, Er = Mean Measured Energy / Theoretical Energy

= 0.75 (75 %)

Report prepared by



Mohd Sapri A Rahmin
Operation Manager
APS Asia PDA Enterprise Pte Ltd

APPENDIX I

SPT HAMMER ENERGY MEASURMENT RESULTS

SPT HAMMER ENERGY MEASUREMENT

Conducted By : APS Asia PDA Enterprise Pte Ltd (Joseph Ling Ka Jun)

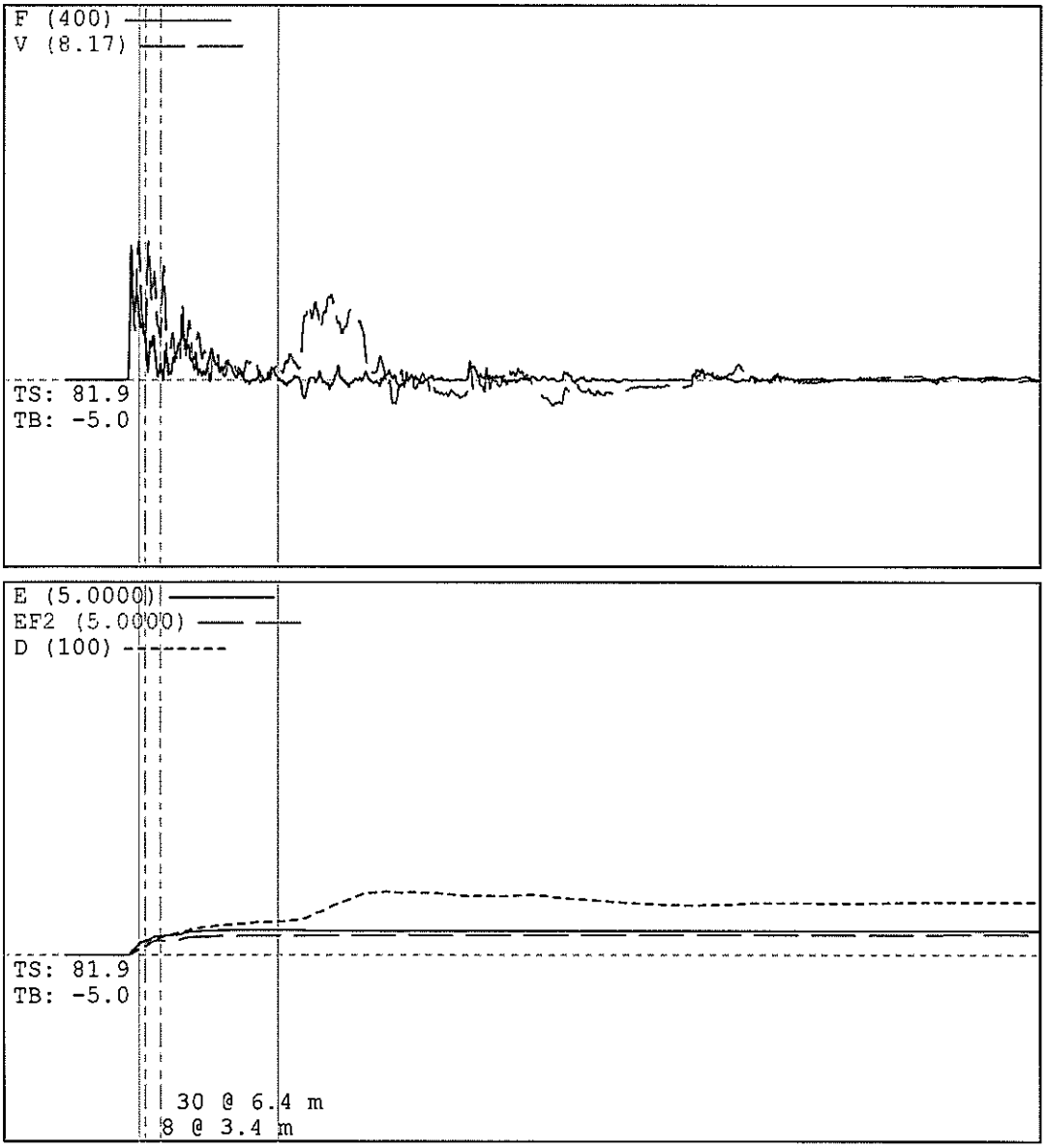
Conducted For : APS ASIA PDA Enterprise Pte Ltd (Machine : Rig - 42 / SPT : H-42)

BLOW NO.	EMX	EF2	DMX	FMX	CSX	TSX	VMX	AMX
2	0.3331	0.1885	17	143	117.9	40.7	3.01	1537
3	0.3489	0.1802	17	124	101.9	44.6	3.25	1870
5	0.3420	0.1951	15	153	126.0	42.3	3.30	2039
6	0.3615	0.1930	16	124	101.9	43.8	3.39	2028
7	0.3474	0.2615	13	106	87.7	39.9	3.30	2142
8	0.3537	0.2549	13	114	93.7	42.7	3.09	1903
9	0.3712	0.2362	15	114	93.8	32.3	3.30	1621
10	0.3633	0.2581	15	152	125.2	38.6	3.70	2447
11	0.3508	0.2538	14	120	99.0	47.3	3.40	2192
12	0.4189	0.2597	20	142	116.7	41.3	4.00	2511
MINIMUM	**0.3331**	**0.1802**	**13**	**106**	**87.7**	**32.3**	**3.01**	**1537**
MAXIMUM	**0.4189**	**0.2615**	**20**	**153**	**126.0**	**47.3**	**4.00**	**2511**
AVERAGE	**0.3591**	**0.2281**	**15.5**	**129**	**106.4**	**41.4**	**3.37**	**2029**
STANDARD DEV.	**0.0237**	**0.0344**	**2.12**	**17**	**13.9**	**4.0**	**0.29**	**316**

OUTPUT QUANTITIES

EMX	maximum energy transmitted past the transducers.
EF2	maximum energy transmitted past the transducers from integral of force squared.
DMX	maximum downward displacement at the transducers' location.
FMX	maximum compressive force at the transducers' location.
CSX	maximum compressive stress at transducers' location.
TSX	maximum tensile stress along the length of rod.
VMX	maximum velocity at the transducers' location.
AMX	maximum acceleration at the transducers' location.

SUNGEI TENGAH RD(150818) H-42



Project Information
PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:13:14 PM
Blow Number 2

Pile Properties

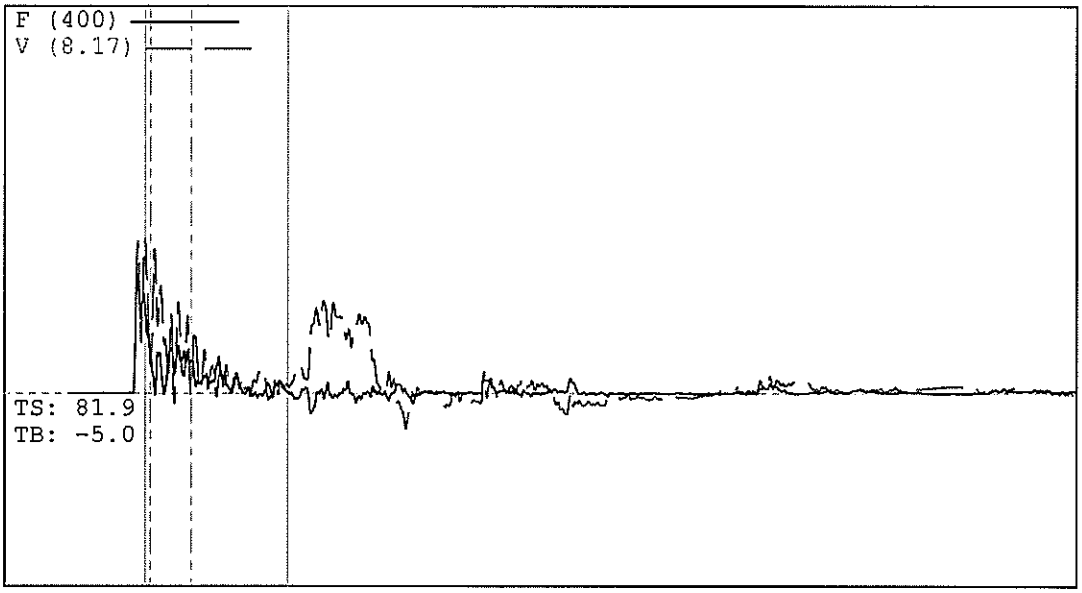
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

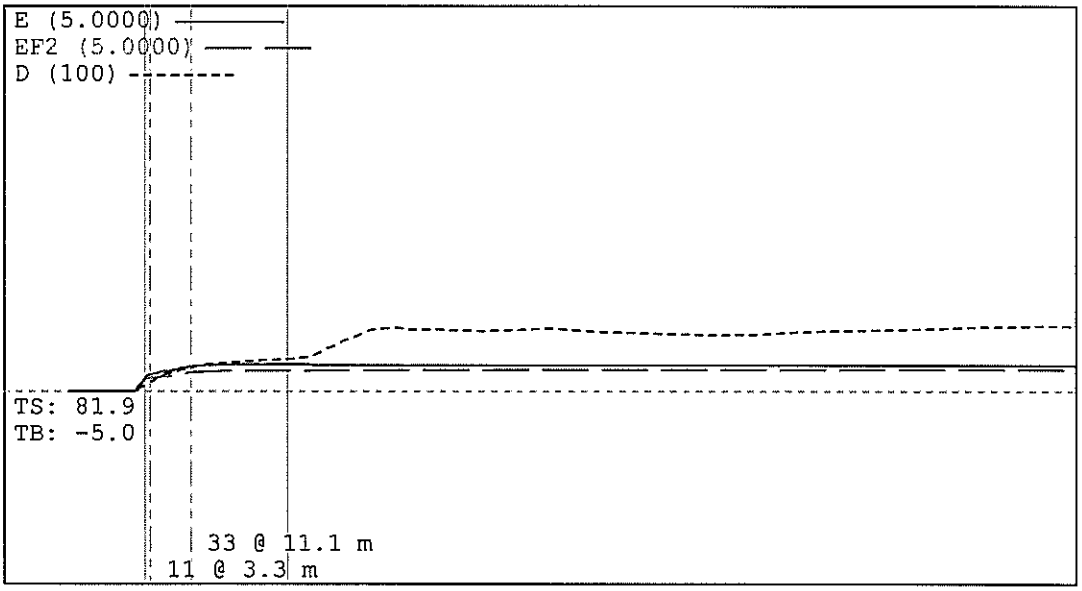
Quantity Results

EMX	0.3331	kN-m
EF2	0.1885	kN-m
DMX	17	mm
FMX	143	kN
CSX	117.9	MPa
TSX	40.7	MPa
VMX	3.01	m/s
AMX	1537	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:13:39 PM
Blow Number 3

Pile Properties

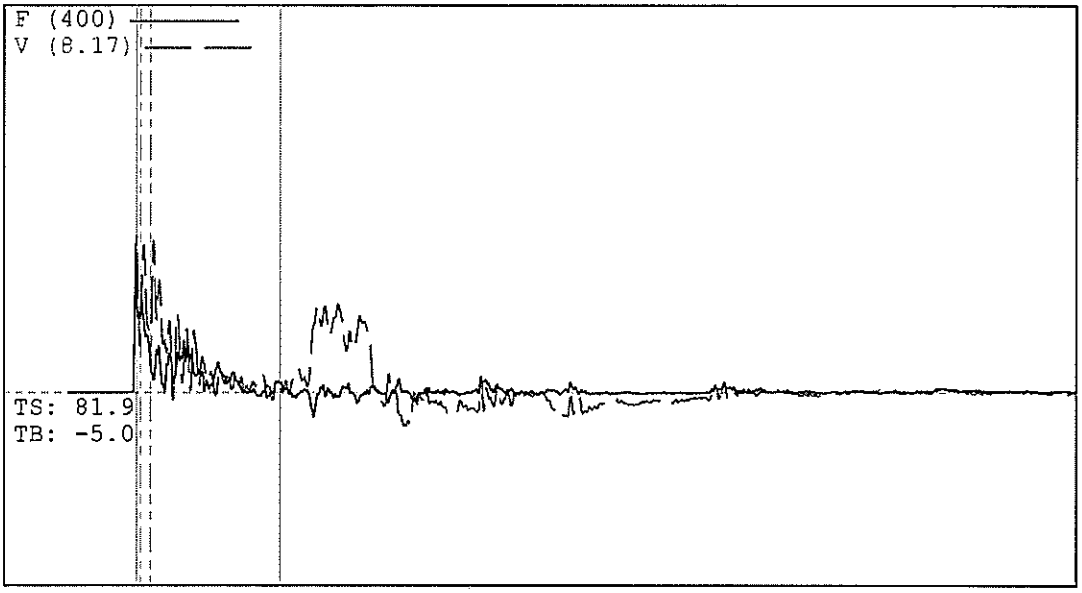
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

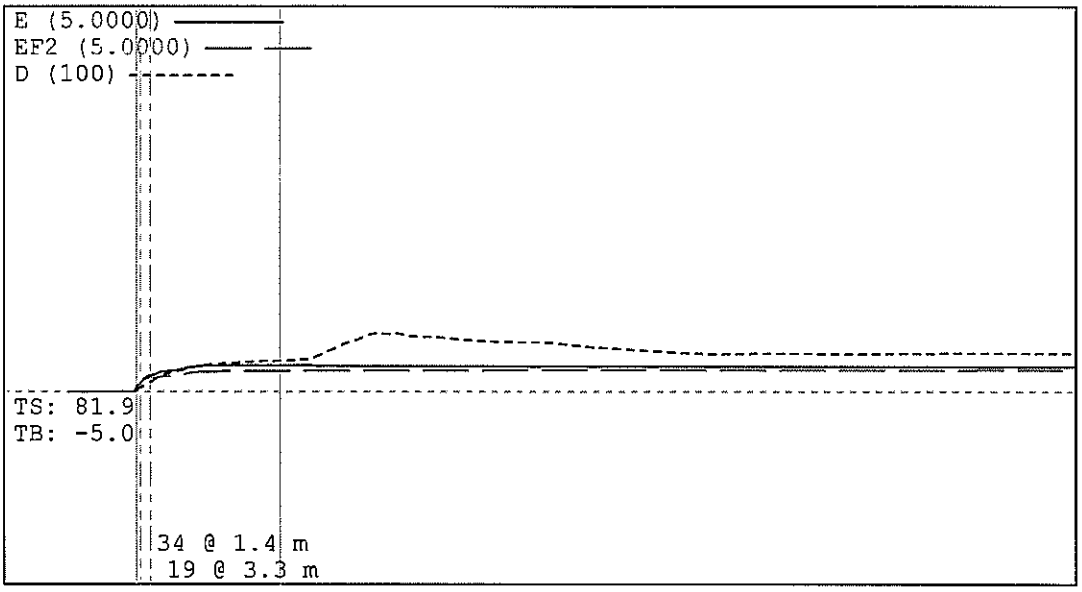
Quantity Results

EMX	0.3489	kN-m
EF2	0.1802	kN-m
DMX	17	mm
FMX	124	kN
CSX	101.9	MPa
TSX	44.6	MPa
VMX	3.25	m/s
AMX	1870	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:13:49 PM
Blow Number 5

Pile Properties

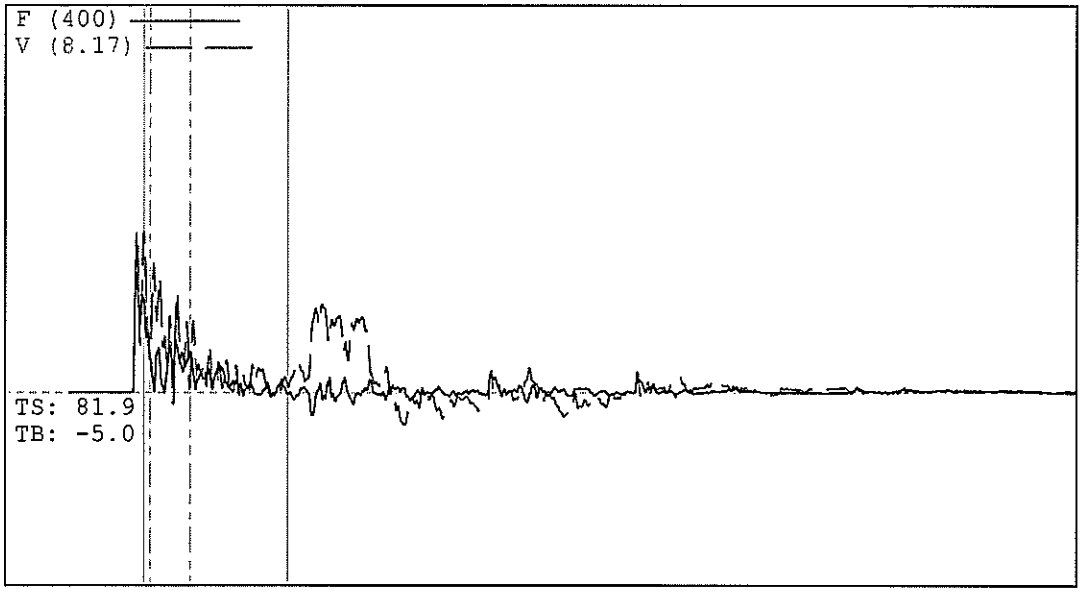
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

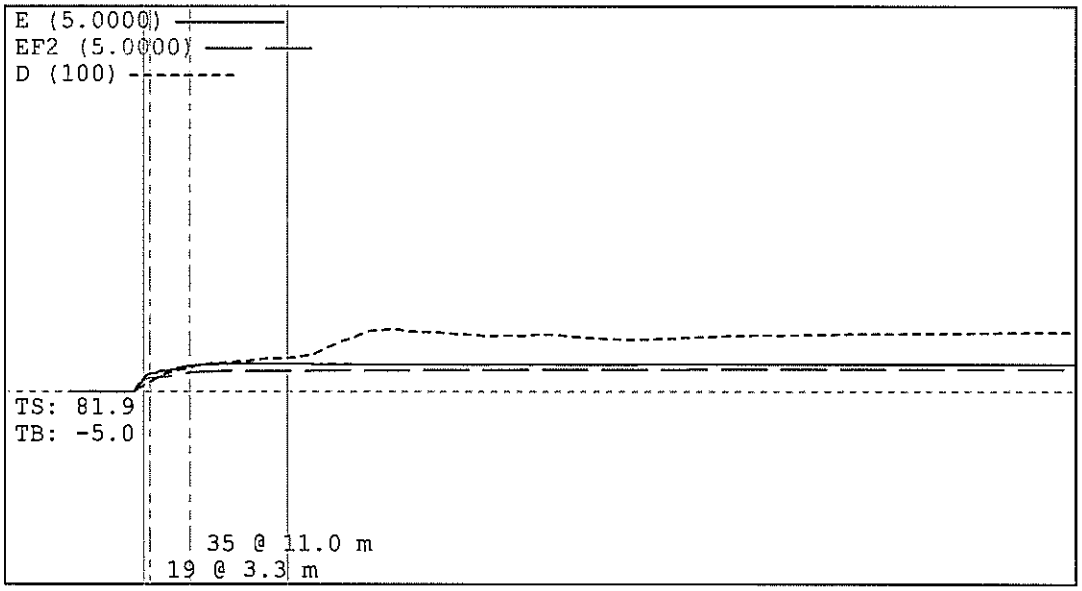
Quantity Results

EMX	0.3420	kN-m
EF2	0.1951	kN-m
DMX	15	mm
FMX	153	kN
CSX	126.0	MPa
TSX	42.3	MPa
VMX	3.30	m/s
AMX	2039	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:13:52 PM
Blow Number 6

Pile Properties

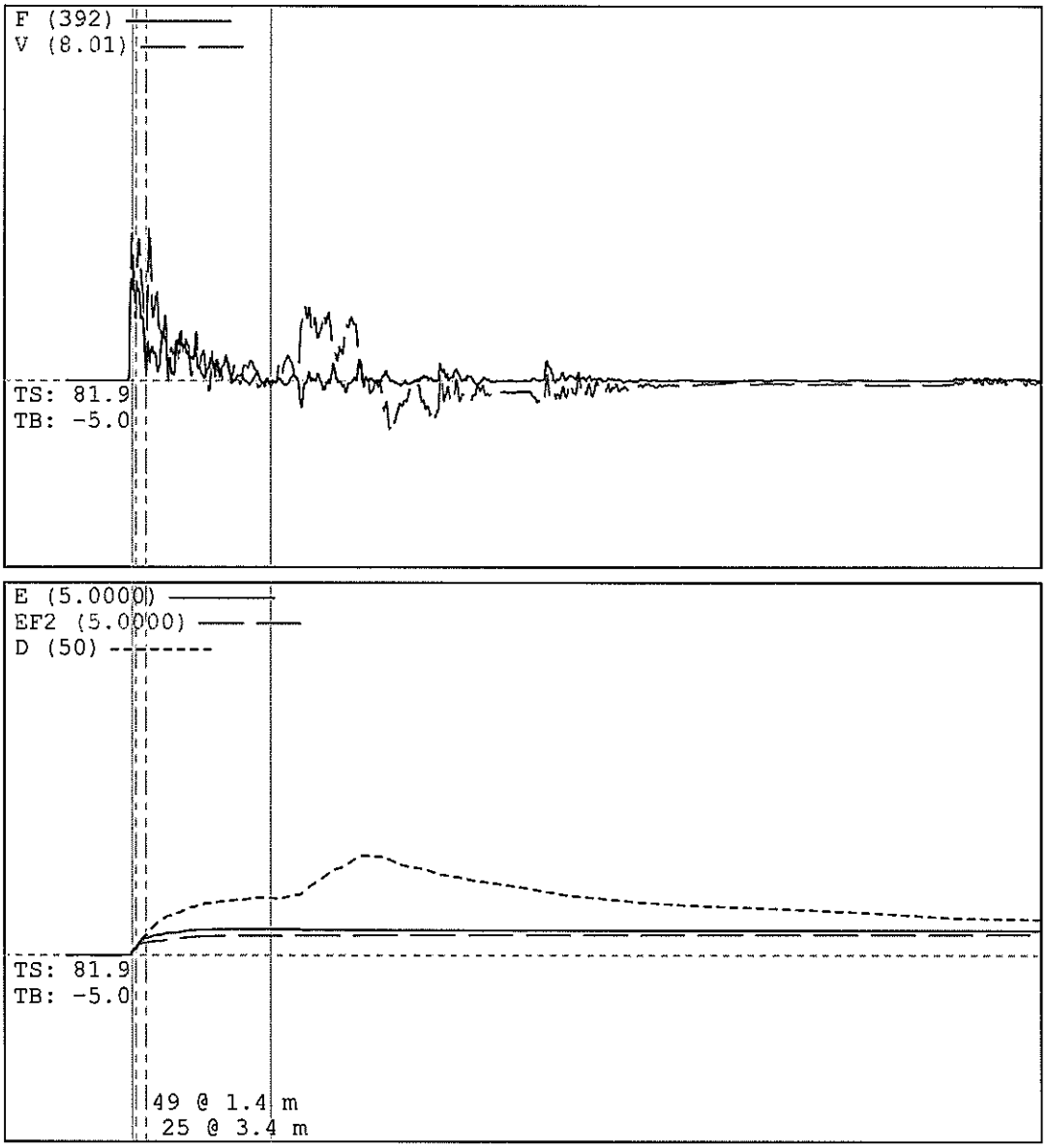
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

Quantity Results

EMX	0.3615	kN-m
EF2	0.1930	kN-m
DMX	16	mm
FMX	124	kN
CSX	101.9	MPa
TSX	43.8	MPa
VMX	3.39	m/s
AMX	2028	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42



Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:13:55 PM
Blow Number 7

Pile Properties

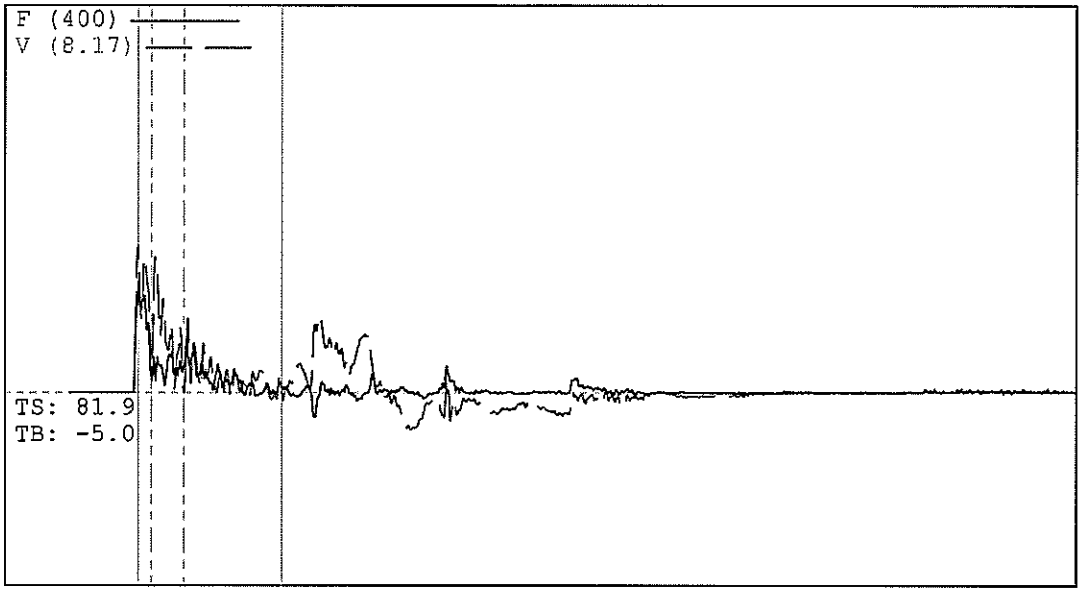
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

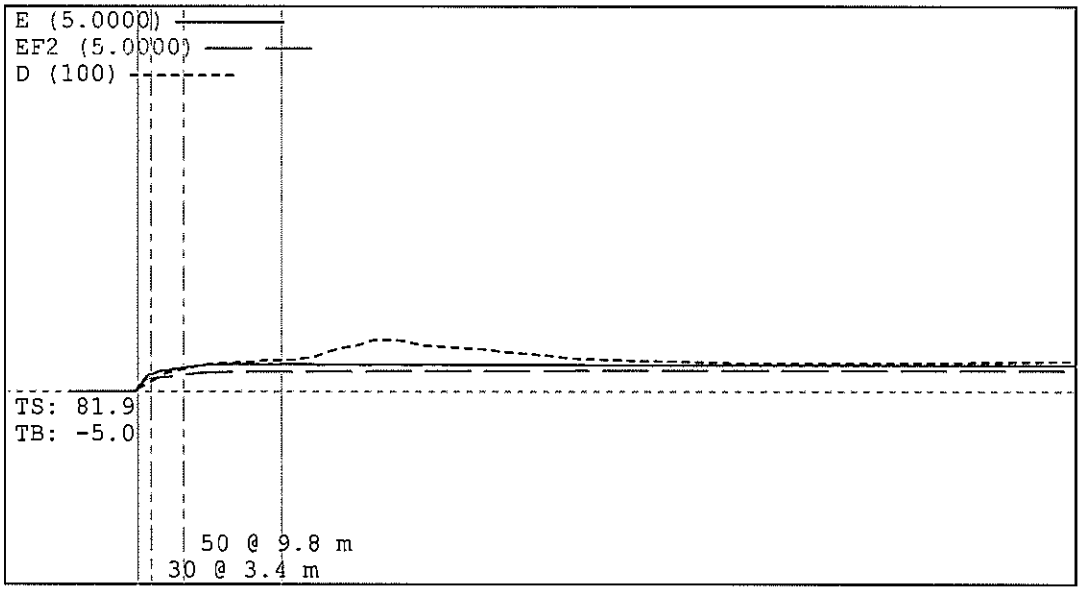
Quantity Results

EMX	0.3474	kN-m
EF2	0.2615	kN-m
DMX	13	mm
FMX	106	kN
CSX	87.7	MPa
TSX	39.9	MPa
VMX	3.30	m/s
AMX	2142	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:14:03 PM
Blow Number 8

Pile Properties

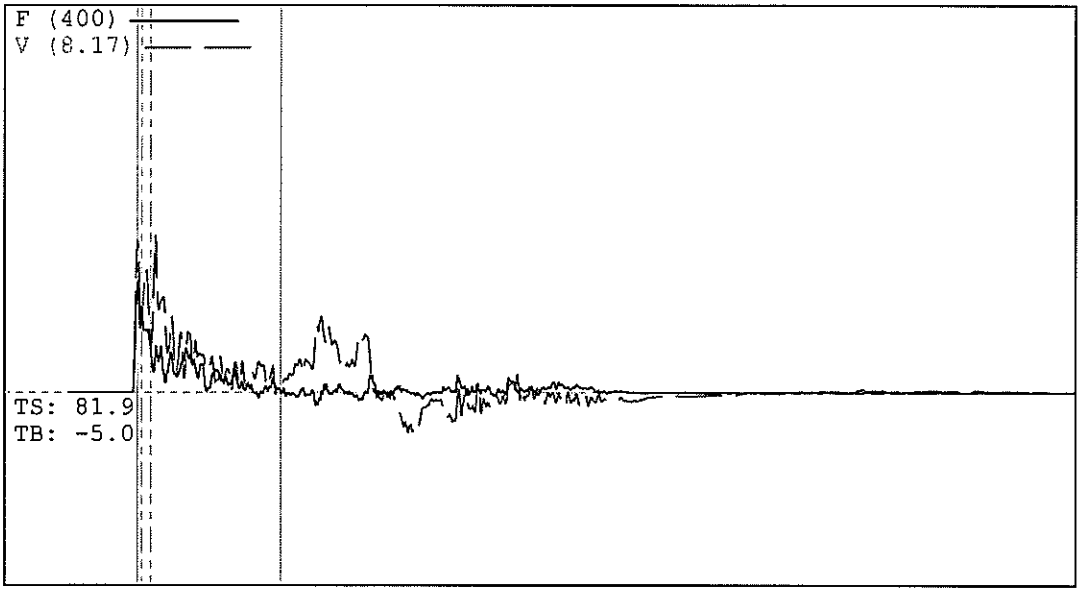
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC		[]

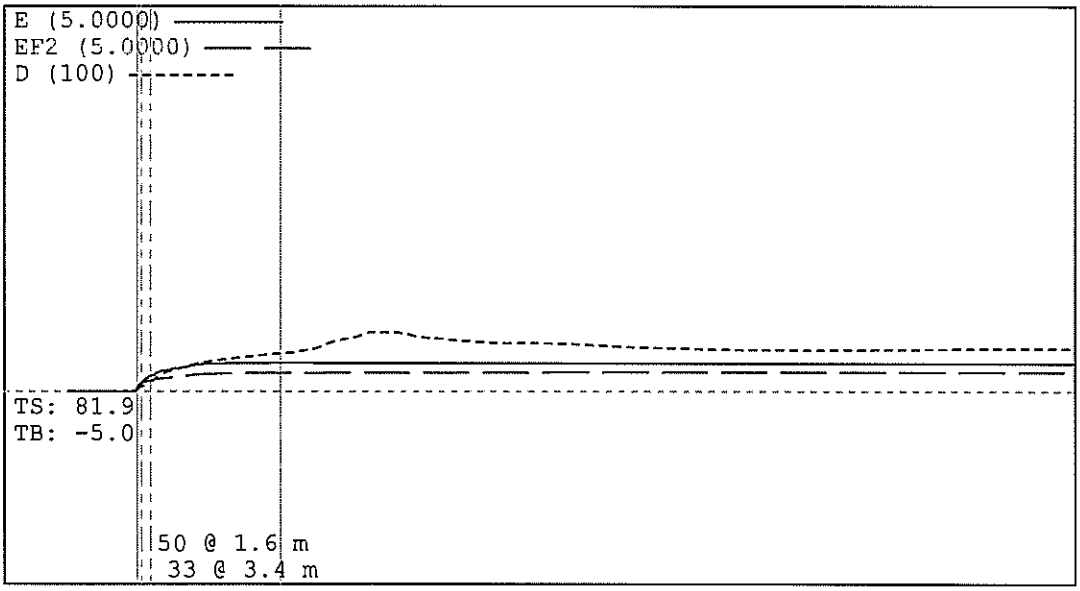
Quantity Results

EMX	0.3537	kN-m
EF2	0.2549	kN-m
DMX	13	mm
FMX	114	kN
CSX	93.7	MPa
TSX	42.7	MPa
VMX	3.09	m/s
AMX	1903	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:14:06 PM
Blow Number 9

Pile Properties

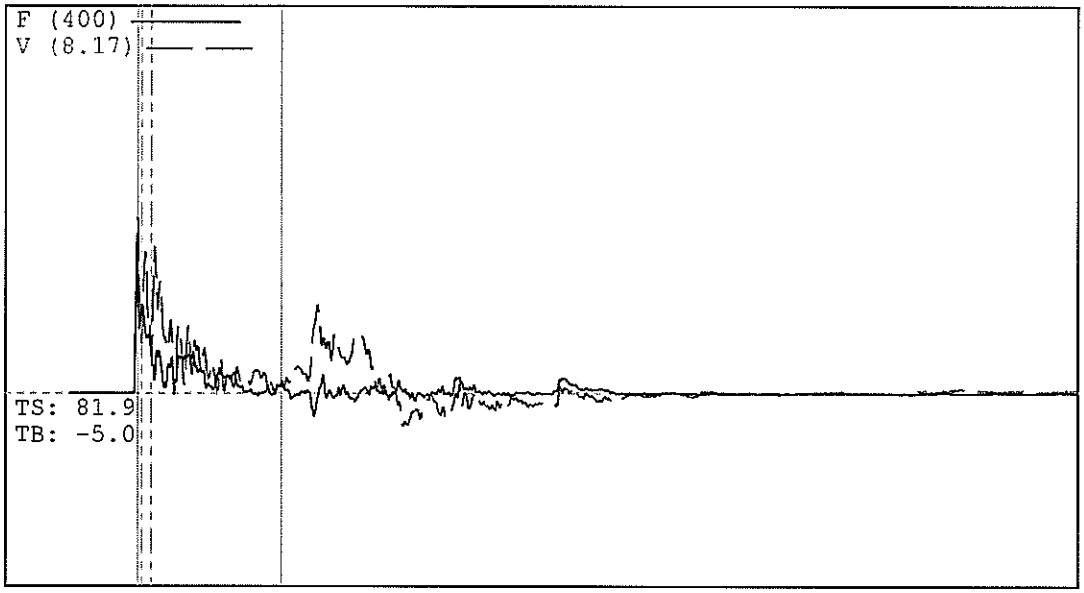
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC		[]

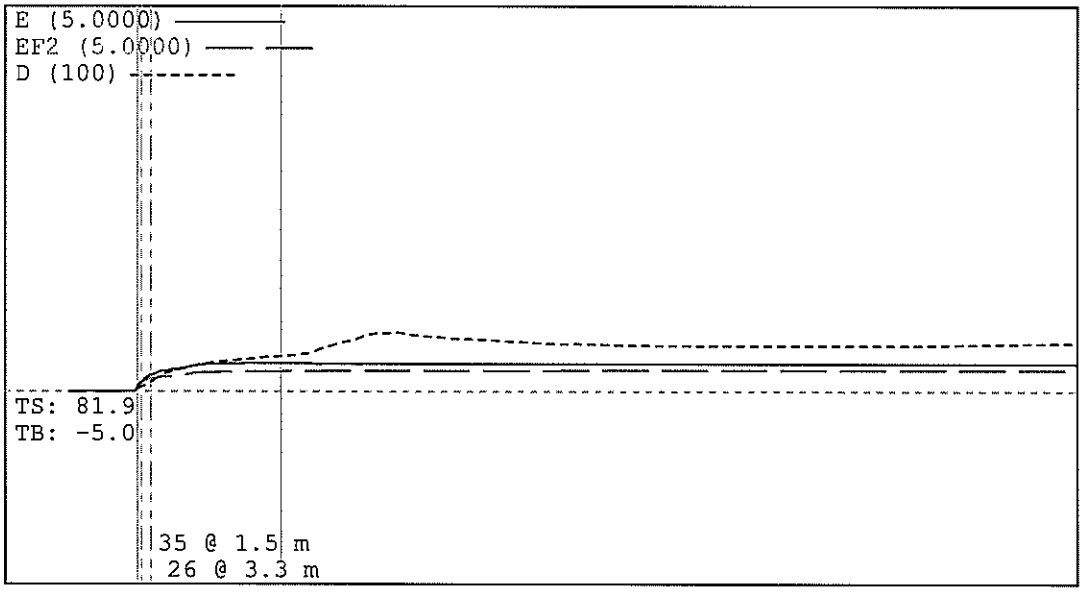
Quantity Results

EMX	0.3712	kN-m
EF2	0.2362	kN-m
DMX	15	mm
FMX	114	kN
CSX	93.8	MPa
TSX	32.3	MPa
VMX	3.30	m/s
AMX	1621	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:14:09 PM
Blow Number 10

Pile Properties

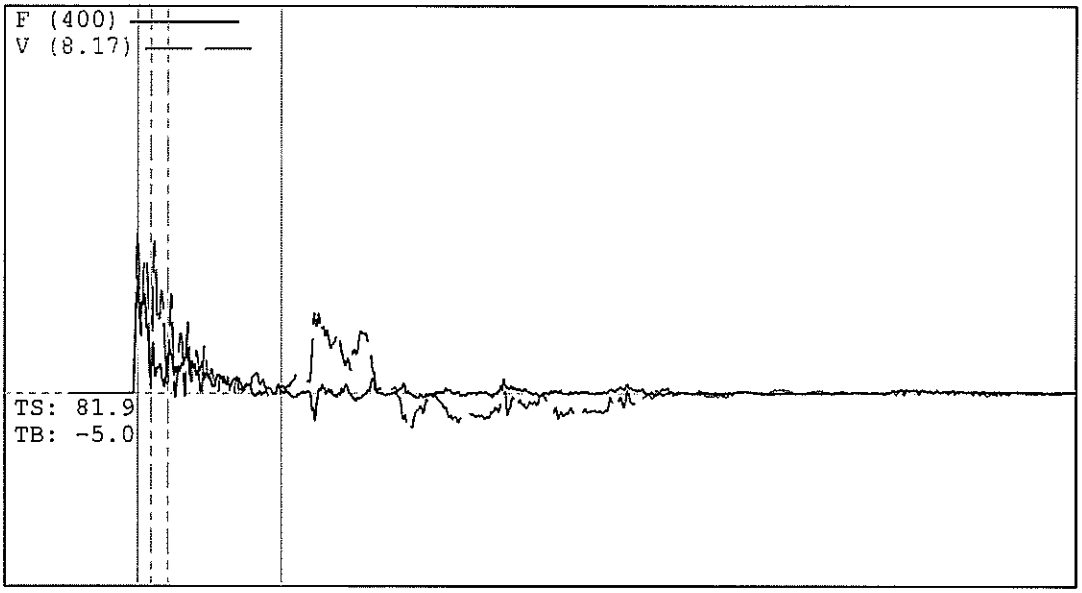
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

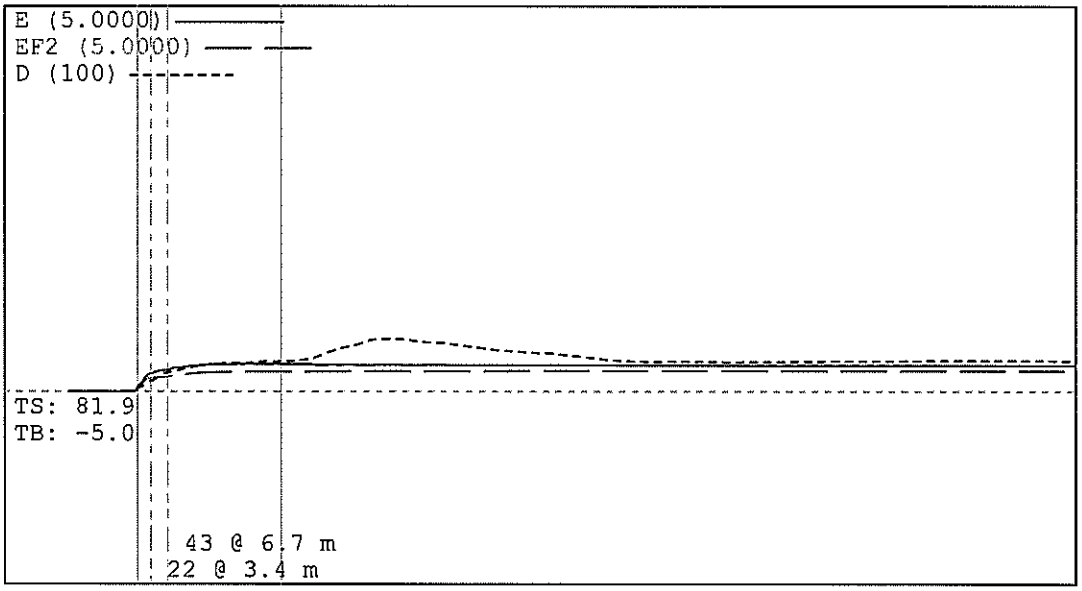
Quantity Results

EMX	0.3633	kN-m
EF2	0.2581	kN-m
DMX	15	mm
FMX	152	kN
CSX	125.2	MPa
TSX	38.6	MPa
VMX	3.70	m/s
AMX	2447	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42





Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:14:12 PM
Blow Number 11

Pile Properties

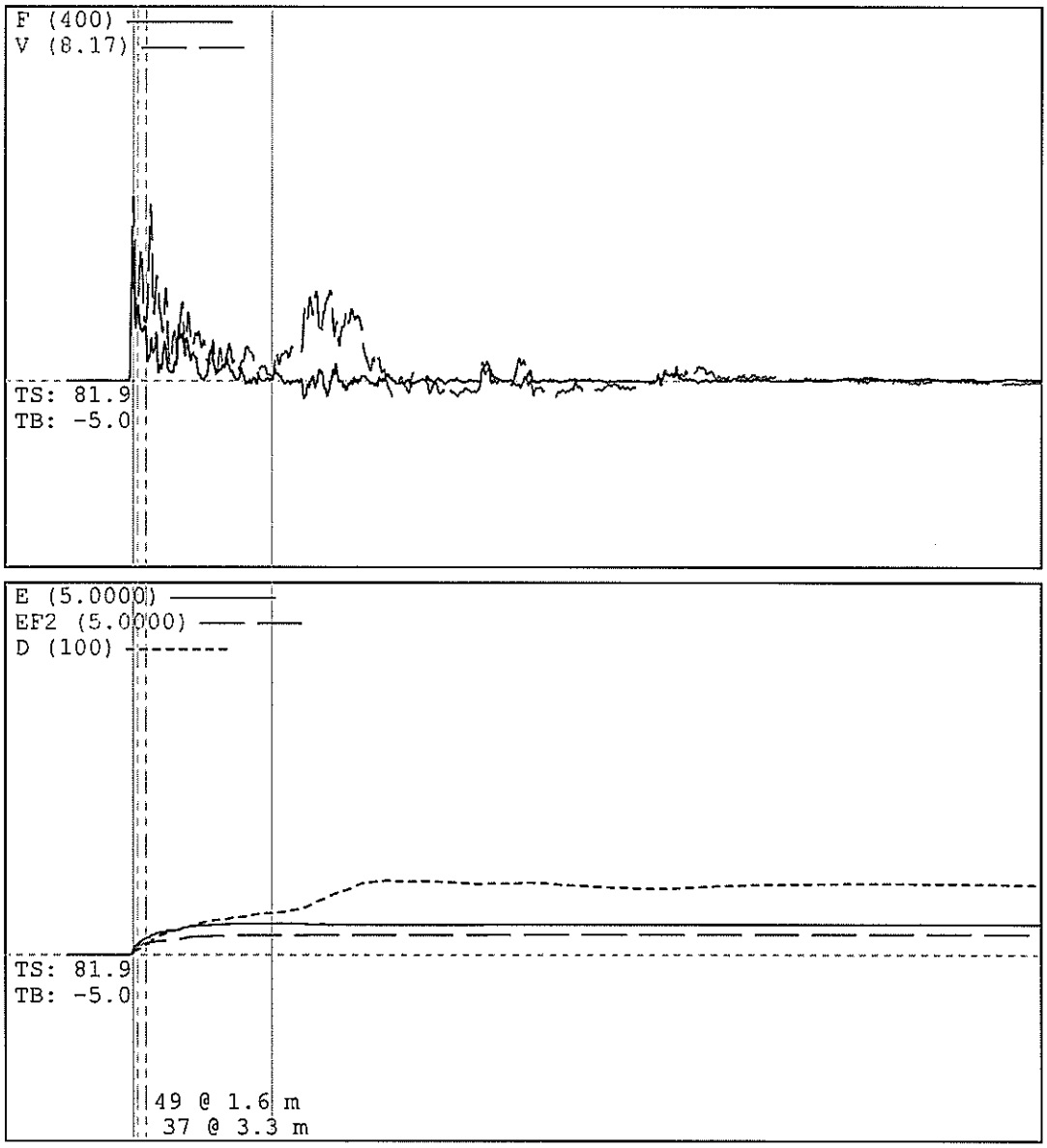
LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

Quantity Results

EMX	0.3508	kN-m
EF2	0.2538	kN-m
DMX	14	mm
FMX	120	kN
CSX	99.0	MPa
TSX	47.3	MPa
VMX	3.40	m/s
AMX	2192	g's
RX5		kN

Version 2012.114

SUNGEI TENGAH RD(150818) H-42



Project Information

PROJECT: SUNGEI TENGAH RD(150818)
PILE NAME: H-42
DESCR: APS
OPERATOR: JOSEPH
FILE: H-42
15/8/2018 3:14:15 PM
Blow Number 12

Pile Properties

LE	27.9	m
AR	12.13	cm^2
EM	206843	MPa
SP	77.3	kN/m3
WS	5123.0	m/s
EA/C	49	kN-s/m
2L/C	10.92	ms
JC	[]	

Quantity Results

EMX	0.4189	kN-m
EF2	0.2597	kN-m
DMX	20	mm
FMX	142	kN
CSX	116.7	MPa
TSX	41.3	MPa
VMX	4.00	m/s
AMX	2511	g's
RX5		kN

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