

**PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19
AND ITS ASSOCIATED WORKS AT WESTPORTS, PULAU INDAH,
SELANGOR.**

**FACTUAL REPORT
VOL. 2 LABORATORY TEST RESULT - I**

Job No. : SG/1281/2018

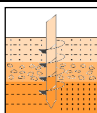
Client : **WESTPORTS MALAYSIA SDN. BHD.**
P.O. Box 266,
Pulau Indah,
42009 Port Klang, Selangor.
Tel : 03 3169 4000

Consultant : **HSS INTEGRATED SDN. BHD.**
Wisma HSS Integrated Sdn Bhd
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Main Contract : **STRATA GEOTECHNICS SDN.BHD.**
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Date Prepared : 28th February 2019

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-	-	1	6	28th February 2019	Hong Li	C.W. Yee



STRATA GEOTECHNICS SDN. BHD

We specialized in Micropile, Slope Stabilization, Ground Improvement, Soil Investigation, Waterwell, Structural Repair and Laboratory Testing

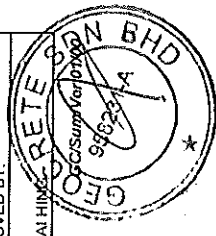
APPENDIX D
LABORATORY TEST RESULTS

SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR												REF : L/081/18/139/18 DATE : 13.12.18											
SAMPLE AND SPECIMEN DETAILS		ATTERBERG				SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST					
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)
BH1	D1	0.00	28	NA	NA					28	19	53	0								1.4	0.11	0.44	5.2	
	UD2	6.00																							
	UD3	9.00	45	1.73	1.20	65	20	45	12.8	50	30	20	0	2.65				74.27	0	48	0.182				
	UD5	15.00	18	2.01	1.71	NP				13	85	2													
	UD6	18.00																							
	D10	22.50	18	NA	NA													NA	NA	NA	0.3	<0.01	0.37	7.4	
	D11	24.00	79	NA	NA	58	25	33		52	34	14	0												
	D16	31.50	67	NA	NA	62	21	41	12.5	54	43	3	0	2.61											
	D19	36.00	51	NA	NA					23	17	59	1												
	D24	42.00	39	NA	NA	51	21	30		47	36	17	0												
	D25	43.50	66	NA	NA	56	22	34	11.8	52	39	9	0												
	D28	48.00	43	NA	NA					47	39	14	0												
	D29	49.50	39	NA	NA	45	22	23	8.5	43	35	22	0												
	D32	54.00	66	NA	NA					51	39	10	0												
	D33	55.50	52	NA	NA	53	22	31		47	39	14	0												
	D36	60.00	38	NA	NA					35	25	39	1												

Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks			
** BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, BH1 UD6 - TRIAXIAL (UU) & CONSOL TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN. (NP)			
APPROVED BY:	LEE KAI HING	CHEMIST	APPROVED BY:
CHECKED BY:	CHRIS		CHECKED BY:



SUM

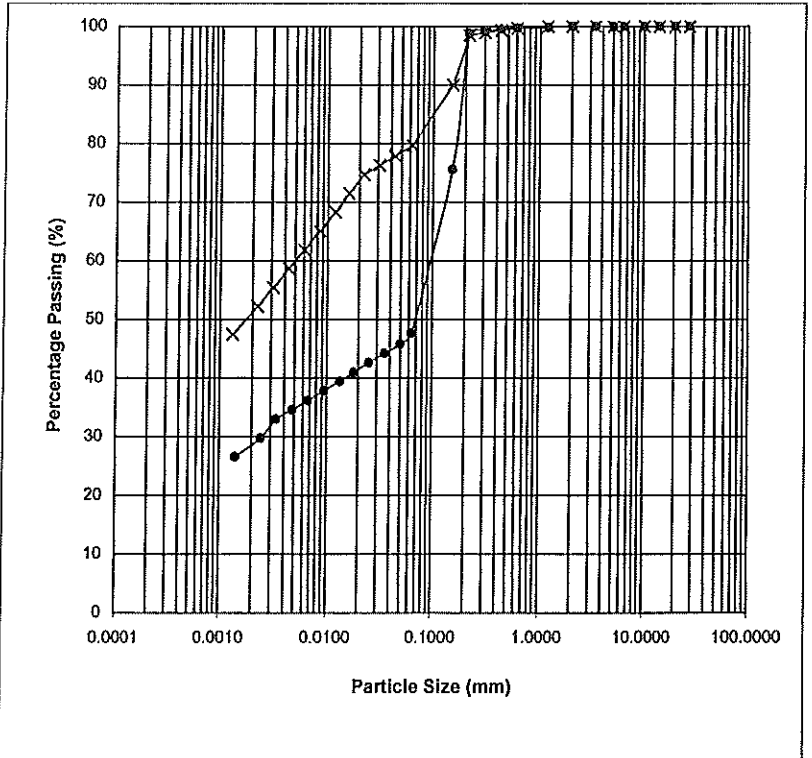
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

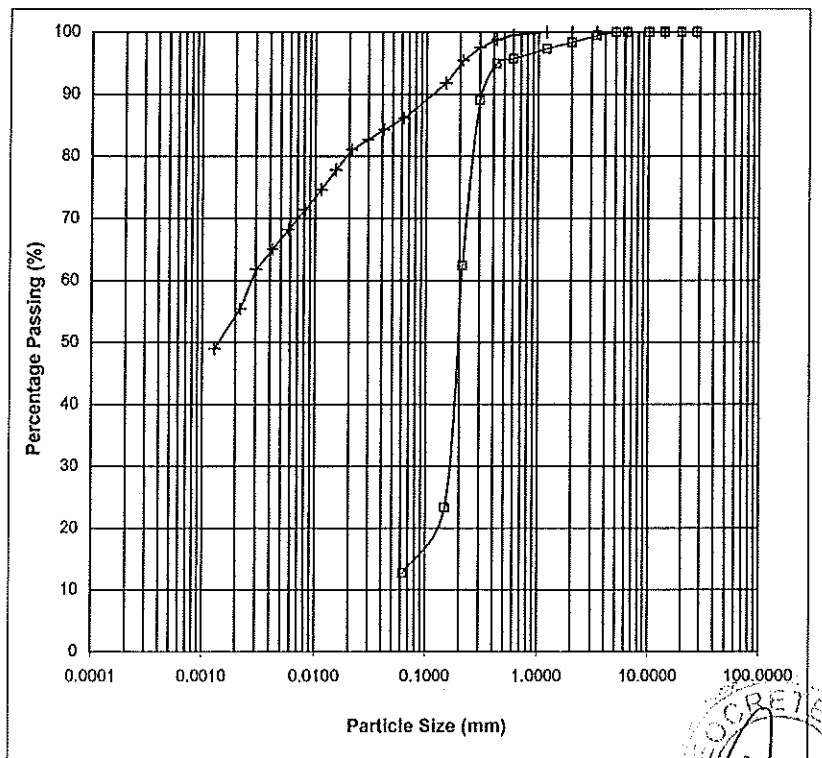
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	99
0.300	99	0.300	99
0.212	99	0.212	98
0.150	76	0.150	90
0.063	48	0.063	80
0.0499	46	0.0431	78
0.0355	44	0.0307	76
0.0253	43	0.0219	75
0.0180	41	0.0157	71
0.0132	39	0.0117	68
0.0094	38	0.0084	65
0.0067	36	0.0060	62
0.0048	35	0.0043	59
0.0034	33	0.0031	55
0.0024	30	0.0022	52
0.0014	27	0.0013	47
Clay (%)	28	Clay (%)	50
Silt (%)	19	Silt (%)	30
Sand (%)	53	Sand (%)	20
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH1	D1	0.00	05.12.18
x	BH1	UD3	9.00	05.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	98	2.00	100
1.18	97	1.18	100
0.600	96	0.600	100
0.425	95	0.425	99
0.300	89	0.300	98
0.212	62	0.212	95
0.150	23	0.150	92
0.063	13	0.063	86
		0.0416	84
		0.0297	83
		0.0212	81
		0.0152	78
		0.0113	75
		0.0081	71
		0.0058	68
		0.0042	65
		0.0030	62
		0.0022	55
		0.0013	49
Clay (%)	13	Clay (%)	52
Silt (%)		Silt (%)	34
Sand (%)	85	Sand (%)	14
Gravel (%)	2	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH1	UD5	15.00	05.12.18
+	BH1	D11	24.00	05.12.18



GEOCRETE SDN BHD (Company No. 958231-A)

Tested :

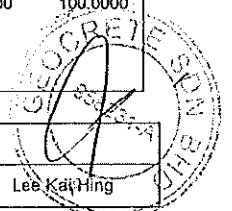
Shyam Nath

Checked :

Chris

Approved

Lee Kai-Hing



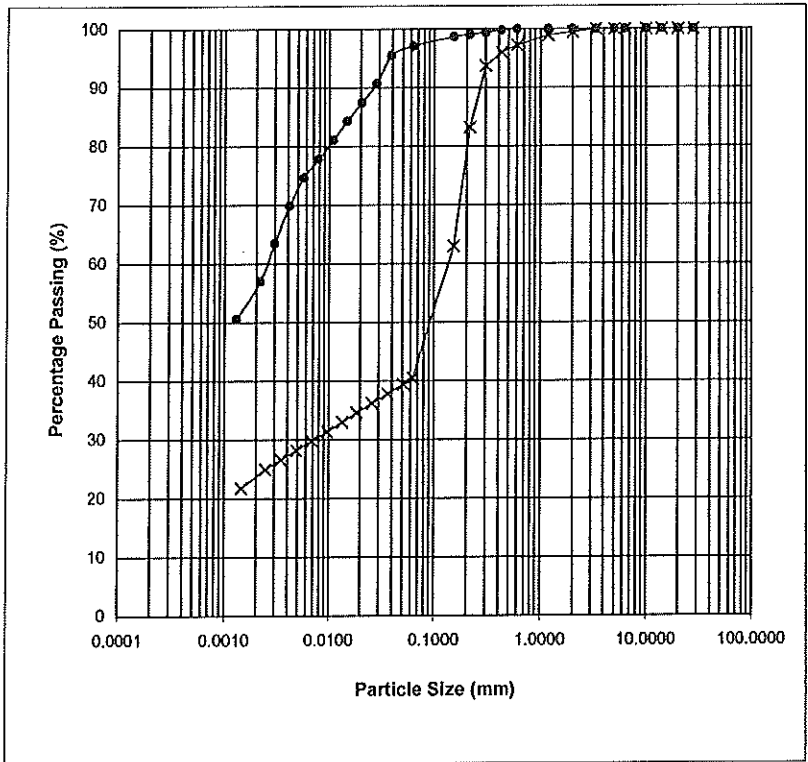
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

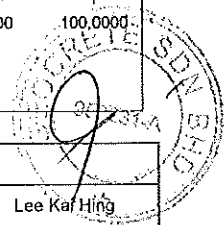
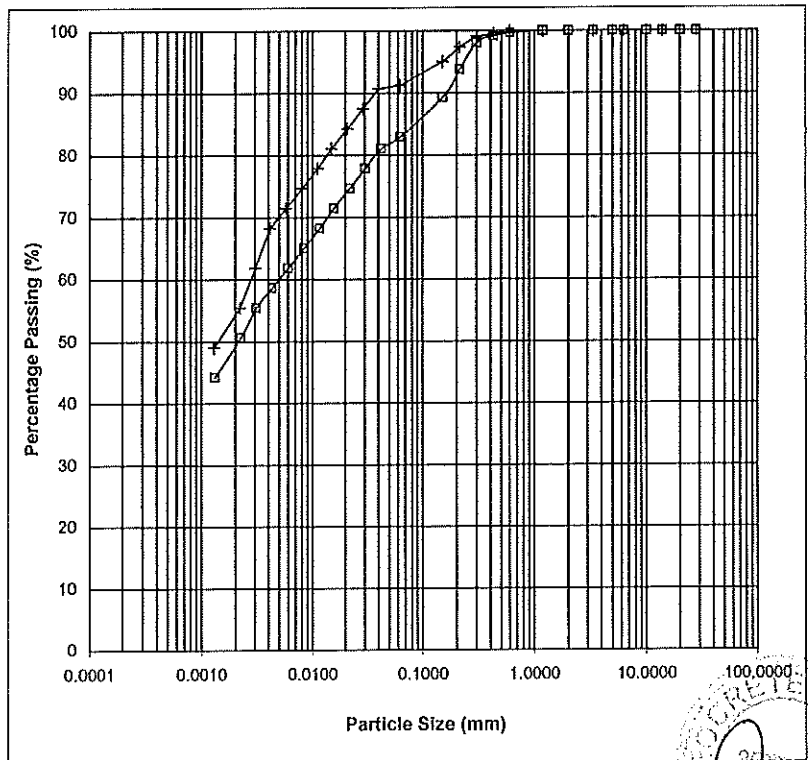
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	99
1.18	100	1.18	99
0.600	100	0.600	97
0.425	100	0.425	96
0.300	99	0.300	94
0.212	99	0.212	83
0.150	99	0.150	63
0.063	97	0.063	41
0.0389	96	0.0512	39
0.0283	91	0.0364	38
0.0204	87	0.0259	36
0.0147	84	0.0184	35
0.0109	81	0.0135	33
0.0079	78	0.0096	31
0.0057	75	0.0068	30
0.0041	70	0.0049	28
0.0030	63	0.0035	27
0.0022	57	0.0025	25
0.0013	51	0.0014	22
Clay (%)	54	Clay (%)	23
Silt (%)	43	Silt (%)	17
Sand (%)	3	Sand (%)	59
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH1	D16	31.50	05.12.18
x	BH1	D19	36.00	05.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	99
0.300	98	0.300	99
0.212	94	0.212	97
0.150	89	0.150	95
0.063	83	0.063	91
0.0424	81	0.0401	91
0.0305	78	0.0289	87
0.0219	75	0.0208	84
0.0157	71	0.0150	81
0.0117	68	0.0111	78
0.0084	65	0.0080	75
0.0060	62	0.0058	71
0.0043	59	0.0041	68
0.0031	55	0.0030	62
0.0022	51	0.0022	55
0.0013	44	0.0013	49
Clay (%)	47	Clay (%)	52
Silt (%)	36	Silt (%)	39
Sand (%)	17	Sand (%)	9
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH1	D24	42.00	05.12.18
+	BH1	D25	43.50	05.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Checked :	Approved :
	Shyam Nath	Chris	Lee Kar Hing

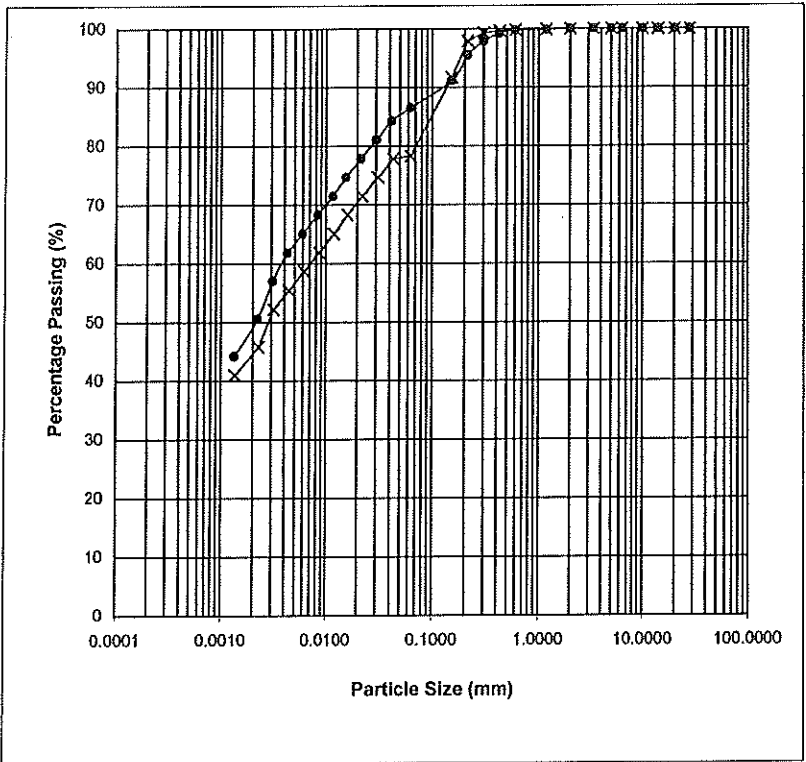
PARTICLE SIZE DISTRIBUTION

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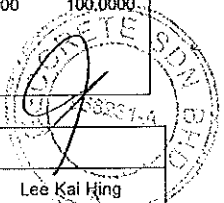
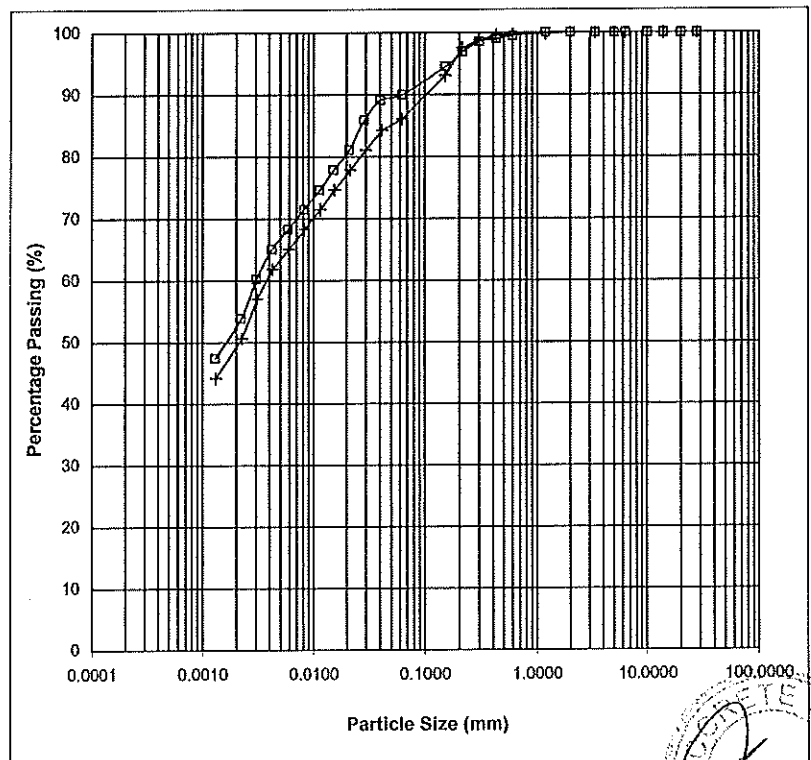
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	99	0.425	100	
0.300	98	0.300	99	
0.212	96	0.212	98	
0.150	91	0.150	92	
0.063	87	0.063	78	
0.0416	84	0.0431	78	
0.0300	81	0.0310	75	
0.0215	78	0.0223	71	
0.0155	75	0.0160	68	
0.0115	71	0.0119	65	
0.0083	68	0.0085	62	
0.0059	65	0.0061	59	
0.0043	62	0.0044	55	
0.0031	57	0.0031	52	
0.0022	51	0.0023	46	
0.0013	44	0.0013	41	
Clay (%)		47	Clay (%)	43
Silt (%)		39	Silt (%)	35
Sand (%)		14	Sand (%)	22
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH1	D28	48.00	05.12.18
X	BH1	D29	49.50	05.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	99	0.600	100	
0.425	99	0.425	100	
0.300	99	0.300	99	
0.212	97	0.212	98	
0.150	95	0.150	93	
0.063	90	0.063	86	
0.0404	89	0.0416	84	
0.0291	86	0.0300	81	
0.0212	81	0.0215	78	
0.0152	78	0.0155	75	
0.0113	75	0.0115	71	
0.0081	71	0.0083	68	
0.0058	68	0.0059	65	
0.0042	65	0.0043	62	
0.0030	60	0.0031	57	
0.0022	54	0.0022	51	
0.0013	47	0.0013	44	
Clay (%)		51	Clay (%)	47
Silt (%)		39	Silt (%)	39
Sand (%)		10	Sand (%)	14
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH1	D32	54.00	05.12.18
+	BH1	D33	55.50	05.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai King

Total Stress Triaxial Compression

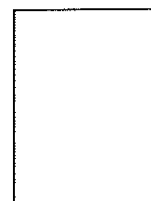
Unconsolidated Undrained

Sample details

Depth : 6.00m
 Description : Grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	155.54	156.37	158.93
Bulk Density ρ (Mg/m ³)	1.81	1.82	1.84
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	50	100	200
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

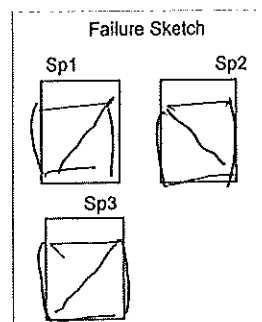
Load Channel	14391	14391	14391
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Moisture Content w_0 %	33	32	32
Dry Density ρ_{d0} (Mg/m ³)	1.35	1.37	1.40
Voids Ratio e_0	0.96	0.94	0.91
Deg of Saturation S_0 %	91.85	91.29	94.54

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	129.87	150.71	165.03
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	129.67	150.51	164.83
Strain at Failure ϵ_f %	13.03	13.49	16.45
Shear Strength c_u (kPa)	64.93	75.35	82.51

Moisture Content w_f %	33	32	32
Dry Density ρ_{df} (Mg/m ³)	1.35	1.37	1.40
Voids Ratio e_f	0.96	0.94	0.91
Deg of Saturation S_f %	91.85	91.29	94.54



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

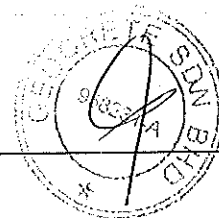
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
 Checked : Chris

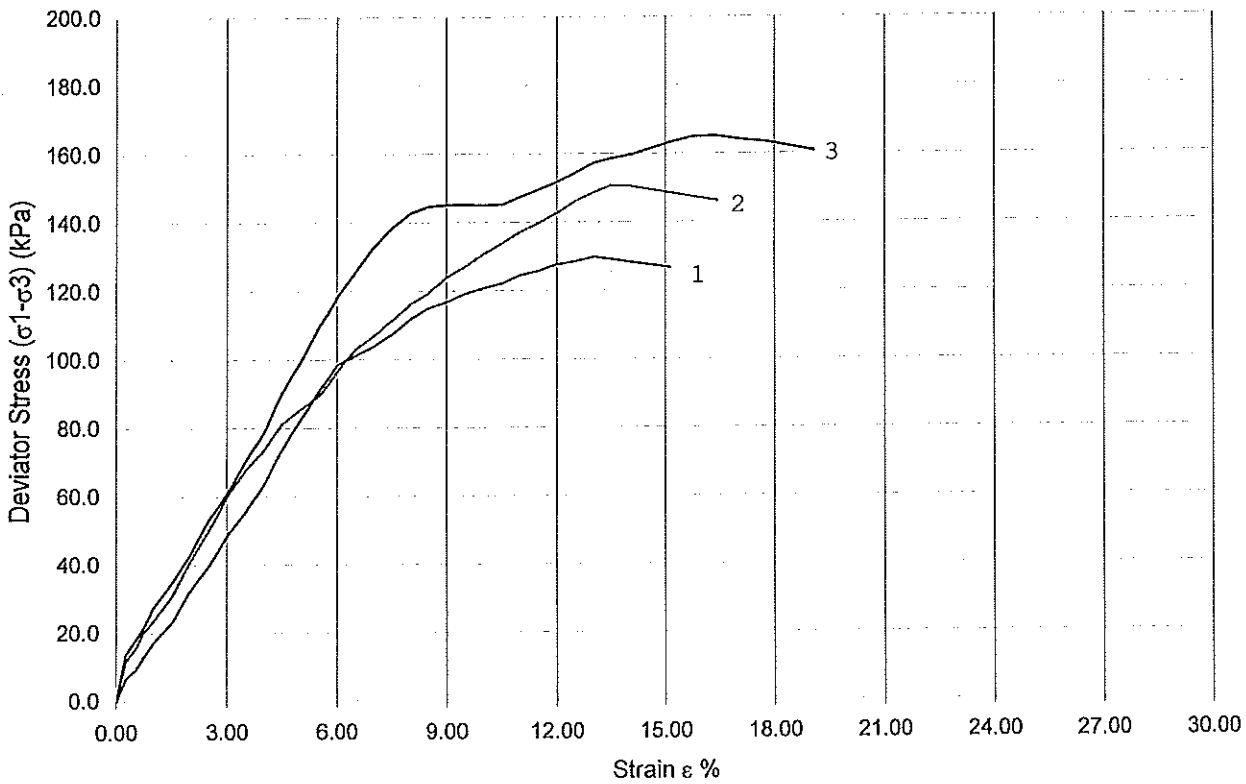
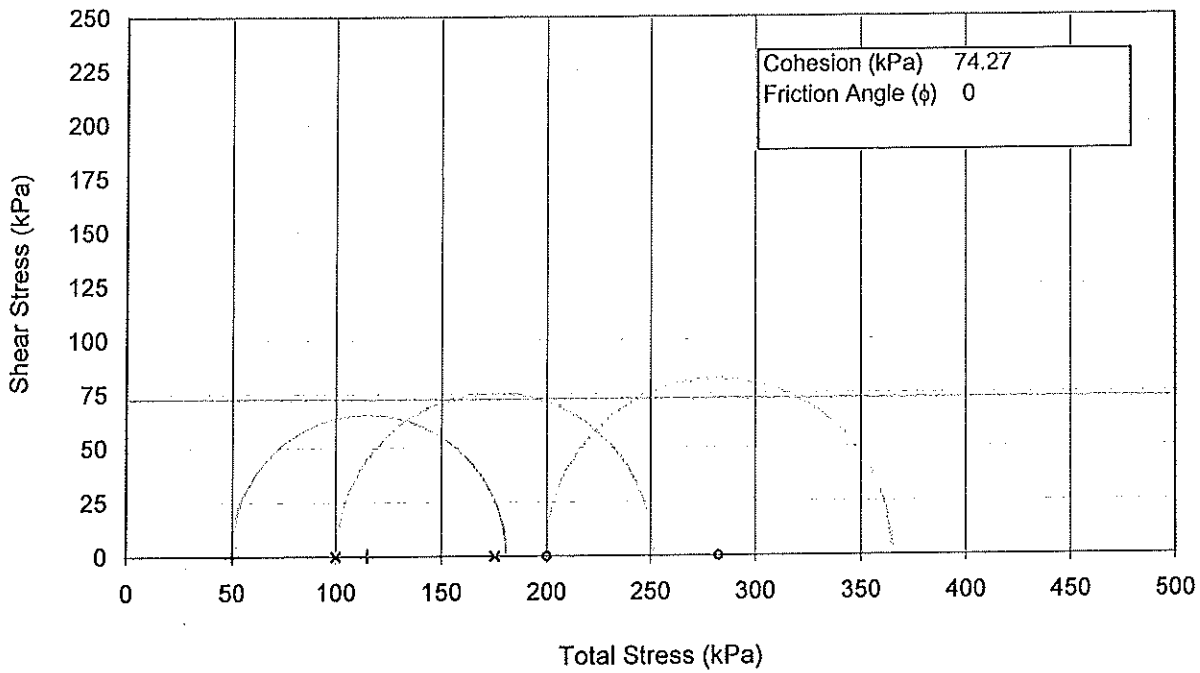
Test Name : UU

Date of Test : 04.12.18

Sample : UD1
 Borehole : BH1
 Approved : Lee Kai Hing



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

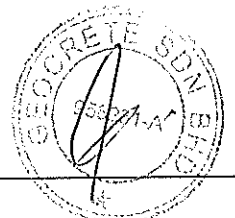
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 04.12.18

Sample : UD1
Borehole : BH1

Approved :
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH1 / UD2 / 3.00m	Test Started	03.12.18
Soil Description	Grey sandy CLAY	Ring No.	7

BEFORE TEST

Moist. Content from trimmings:	=	38 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	126.02 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.61 gm	Area (A)	=	1964 mm ²
Wt of sample	=	66.41 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	48.96 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	17.45 gm	Bulk Density (P)	=	1.690 Mg/m ³
Initial Moisture Content, M_o	=	36 %	Dry Density (PD)	=	1.246 Mg/m ³
Initial Void Ratio, e_o , $\frac{SG}{P_D} - 1$	=	1.1344			
Initial Saturation, S_o ; $\frac{M_o \times SG}{e_o}$	=	84 %			
V. Ratio Change Factor F , $\frac{1+e_o}{H}$	=	0.1067 mm ⁻¹			
Height of Solid H_s	=	9.370 mm			

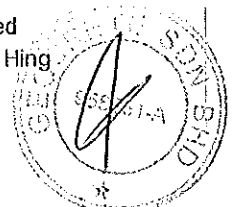
AFTER TEST

Wt of sample + Ring	=	124.18 gm	Overall settlement	=	1.488 mm
Wt of Dry sample + Ring	=	108.57 gm	Volume Change	=	2.923 cm ³
Wt of Ring	=	59.61 gm	Final Volume	=	36.36 cm ³
Wt of Wet sample	=	64.57 gm	Final Bulk Density	=	1.776 Mg/m ³
Wt of Dry sample	=	48.96 gm	Final Dry Density	=	1.346 Mg/m ³
Wt of Moisture	=	15.61 gm	Final Void Ratio, e_f	=	0.9756
Final Moisture Content, M_f	=	32 %			
Final Saturation, S_o , $\frac{M_f \times SG}{e_f}$	=	87 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

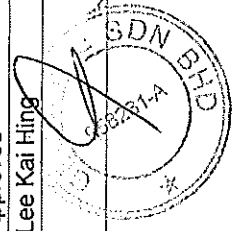
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH1 / UD2 / 3.00m

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 7

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	INDEX	Cc
0	0.000	20.000	0.0000	1.1344	0.0000	0					
6.25	0.130	19.870	0.0139	1.1205	0.0139	6.25	1.0476	2.56	17.23		-0.0461
12.5	0.204	19.796	0.0218	1.1126	0.0079	6.25	0.5986	3.24	13.48		-0.0262
25.0	0.340	19.660	0.0363	1.0981	0.0145	12.5	0.5538	1.96	22.04		-0.0482
50.0	0.540	19.460	0.0576	1.0768	0.0213	25.0	0.4114	2.25	18.87		-0.0709
100	0.940	19.060	0.1003	1.0341	0.0427	50.0	0.4200	4.84	8.51		-0.1418
200	1.394	18.606	0.1488	0.9856	0.0485	99.9	0.2442	2.25	17.50		-0.1610
400	1.906	18.094	0.2034	0.9310	0.0546	199.8	0.1416	1.21	30.89		-0.1815
200	1.824	18.176	0.1947	0.9397	-0.0088	-199.8					
50	1.676	18.324	0.1789	0.9555	-0.0158	-149.9					
12.5	1.488	18.512	0.1588	0.9756	-0.0201	-37.5					

Operator : Shyam Nath
 Checked : Chris
 Approved : Lee Kai Hing



GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

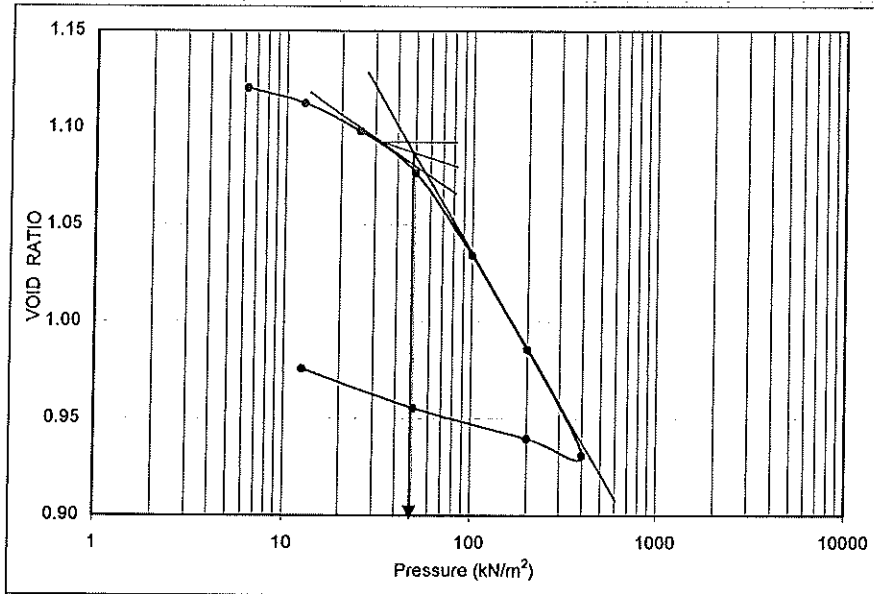
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH1 / UD2 / 3.00m

SOIL SAMPLE Grey sandy CLAY

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 7



INITIAL

Water content 36 %

Dry Density 1.25 Mg/m³

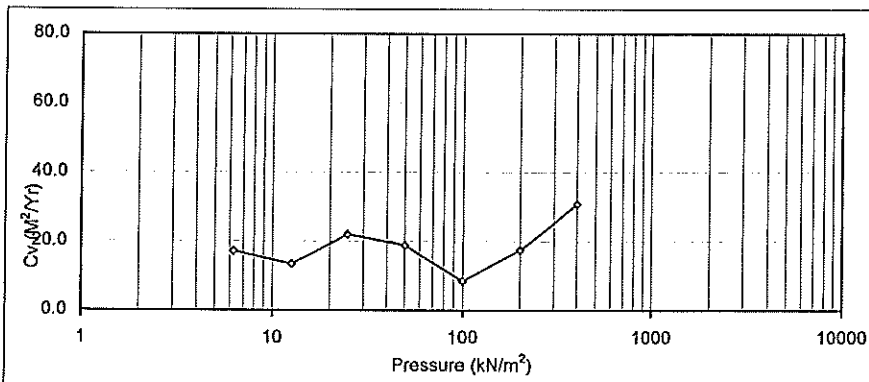
Void Ratio 1.1344

Saturation 84 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.660



FINAL

Water content 32 %

Dry Density 1.35 Mg/m³

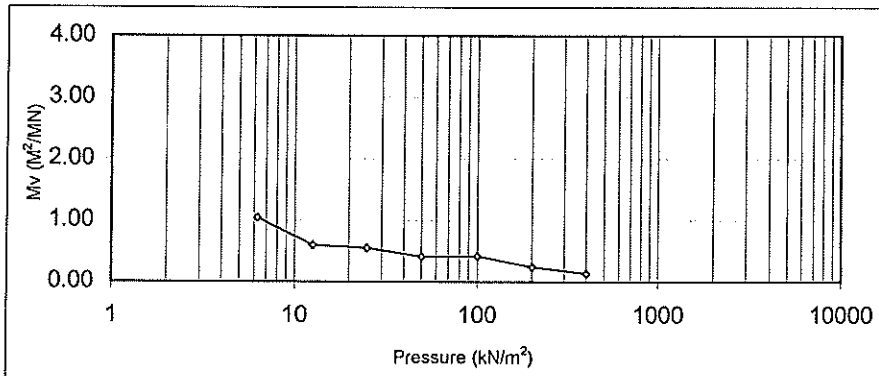
Void Ratio 0.9756

Saturation 87 %

Height 19 mm

Comp. Index, Cc 0.1815

Precons. Load 48 kN/m²



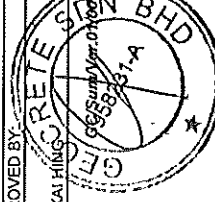
Comp. Ratio, C_R 0.085



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										REF : L/081/18/139/18 DATE : 17.12.18																	
SAMPLE AND SPECIMEN DETAILS	Borehole No.	Specimen	Depth (m)	MOISTURE		DENSITY		ATTERBERG			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST				
				Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH
	BH2	UD1	3.00	49	1.67	1.08	44	22	8.7	35	19	46	0											1.9	0.15	0.72	7.2		
		UD4	12.00	47	1.59	1.04				50	38	12	0																
		UD6	18.00	54	1.50	0.86	71	28	12.0	52	38	10	0	2.58										2.5	0.13	0.57	7.0		
		D13	28.50	73	NA	NA	75	26	13.6	54	39	7	0																
		D14	30.00	69	NA	NA				51	35	14	0																
		D20	39.00	35	NA	NA	58	24	10.3	43	26	30	1																
		D21	40.50	26	NA	NA		NP			24	76	0																
		D24	45.00	26	NA	NA	35	21	14	24	16	60	0																
		D25	46.50	19	2.01	1.68				18	82	0	2.70											0.7	<0.01	0.21	5.4		
		D27	49.50	38	NA	NA				27	19	54	0																
		D29	52.50	22	NA	NA				25	19	56	0											3.0	0.09	0.40	7.3		
		D34	60.00	75	NA	NA				52	45	3	0																

APPROVED BY: _____
LEE KAI HING



CHECKED BY: _____
CHRIS

Notes : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks : * BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

SUM

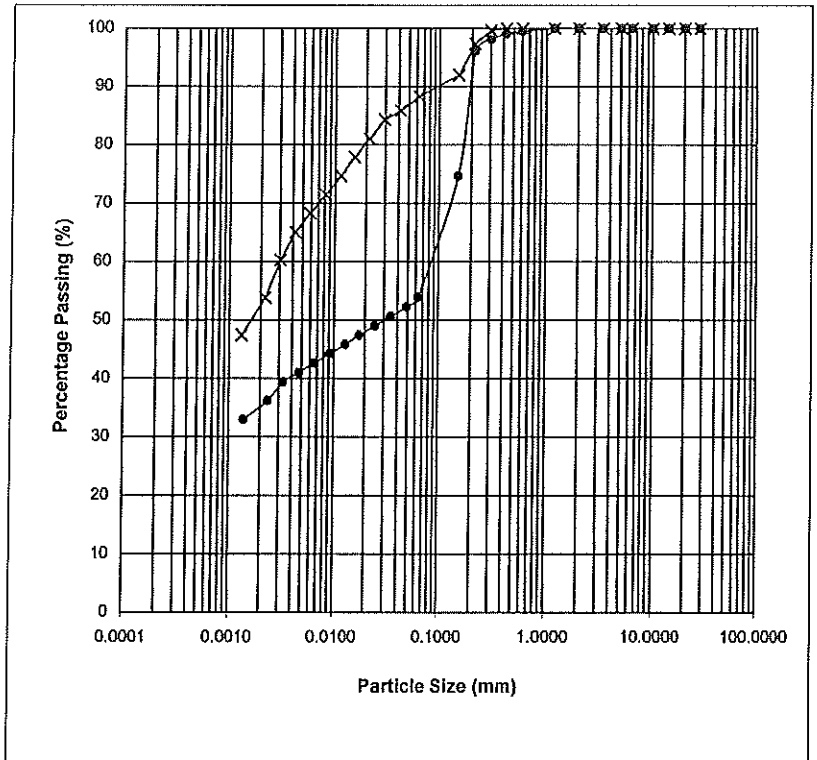
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

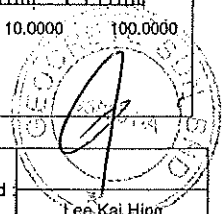
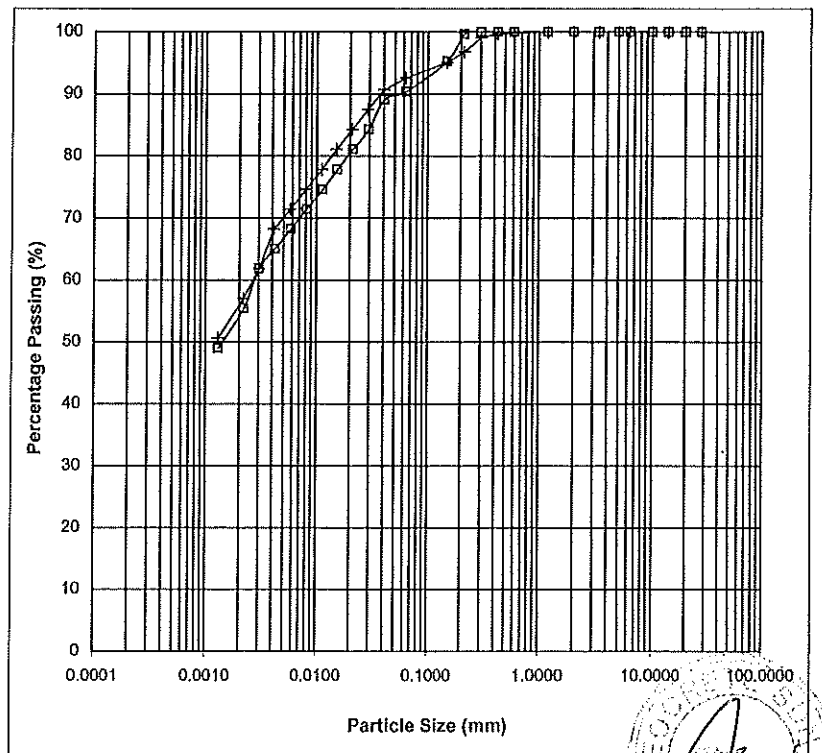
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	100
0.300	98	0.300	100
0.212	95	0.212	97
0.150	75	0.150	92
0.063	54	0.063	86
0.0486	52	0.0412	86
0.0346	51	0.0294	84
0.0246	49	0.0212	81
0.0175	47	0.0152	78
0.0129	46	0.0113	75
0.0092	44	0.0081	71
0.0065	43	0.0058	68
0.0046	41	0.0042	65
0.0033	39	0.0030	60
0.0024	36	0.0022	54
0.0014	33	0.0013	47
Clay (%)	35	Clay (%)	50
Silt (%)	19	Silt (%)	38
Sand (%)	46	Sand (%)	12
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH2	UD1	3.00	13.12.18
X	BH2	UD4	12.00	13.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	99
0.212	100	0.212	97
0.150	95	0.150	95
0.063	90	0.063	93
0.0404	89	0.0401	91
0.0294	84	0.0289	87
0.0212	81	0.0208	84
0.0152	78	0.0150	81
0.0113	75	0.0111	78
0.0081	71	0.0080	75
0.0058	68	0.0058	71
0.0042	65	0.0041	68
0.0030	62	0.0030	62
0.0022	55	0.0022	57
0.0013	49	0.0013	51
Clay (%)	52	Clay (%)	54
Silt (%)	38	Silt (%)	39
Sand (%)	10	Sand (%)	7
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH2	UD6	18.00	13.12.18
+	BH2	D13	28.50	13.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

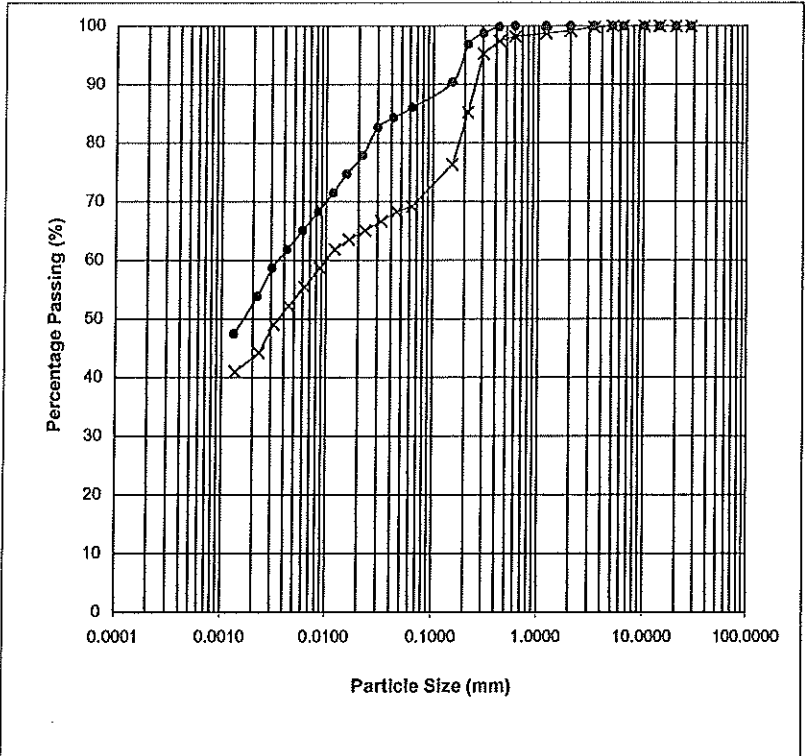
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

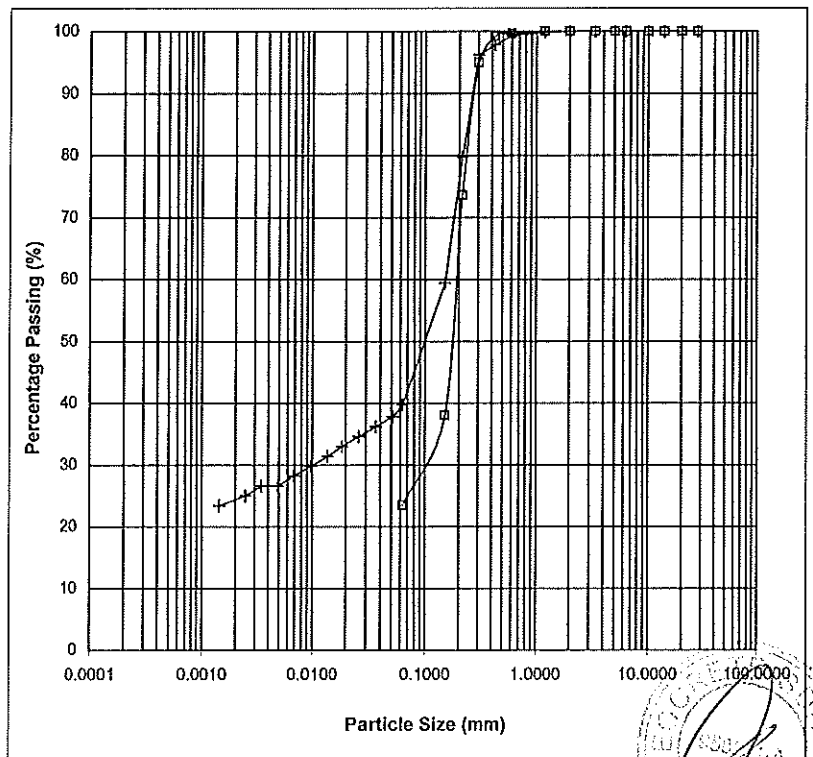
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	99
1.18	100	1.18	99
0.600	100	0.600	98
0.425	100	0.425	97
0.300	99	0.300	95
0.212	97	0.212	85
0.150	90	0.150	76
0.063	86	0.063	69
0.0416	84	0.0452	68
0.0297	83	0.0322	67
0.0215	78	0.0230	65
0.0155	75	0.0164	63
0.0116	71	0.0120	62
0.0083	68	0.0086	59
0.0059	65	0.0062	55
0.0043	62	0.0044	52
0.0031	59	0.0032	49
0.0022	54	0.0023	44
0.0013	47	0.0013	41
Clay (%)	51	Clay (%)	43
Silt (%)	35	Silt (%)	26
Sand (%)	14	Sand (%)	30
Gravel (%)	0	Gravel (%)	1
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH2	D14	30.00	13.12.18
x	BH2	D20	39.00	13.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	99	0.425	98
0.300	95	0.300	96
0.212	74	0.212	80
0.150	38	0.150	59
0.063	24	0.063	40
		0.0515	38
		0.0366	36
		0.0260	35
		0.0185	33
		0.0136	31
		0.0097	30
		0.0069	28
		0.0049	27
		0.0035	27
		0.0025	25
		0.0014	23
Clay (%)	24	Clay (%)	24
Silt (%)		Silt (%)	16
Sand (%)	76	Sand (%)	60
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH2	D21	40.50	13.12.18
+	BH2	D24	45.00	13.12.18



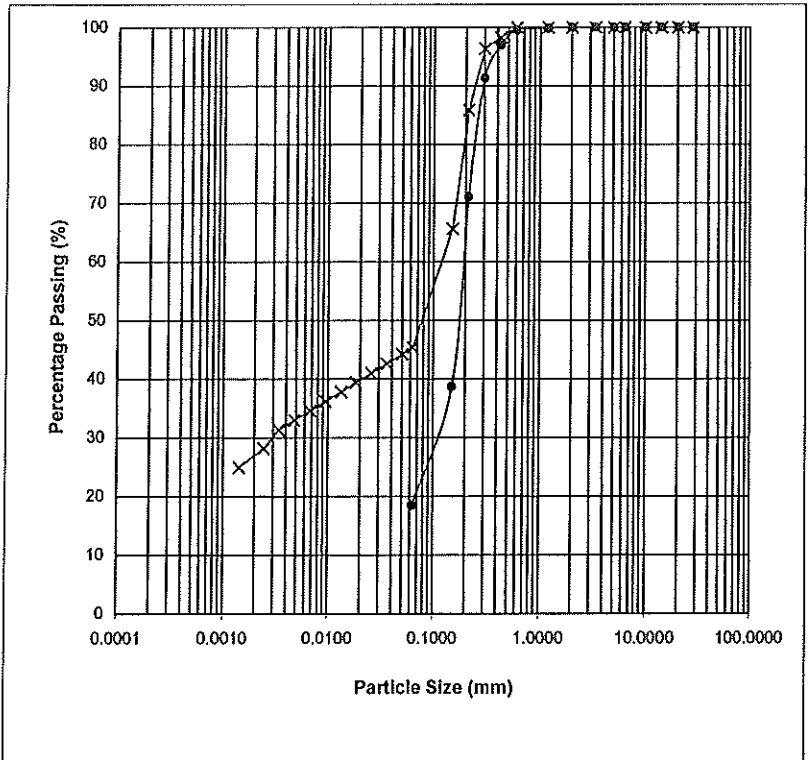
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

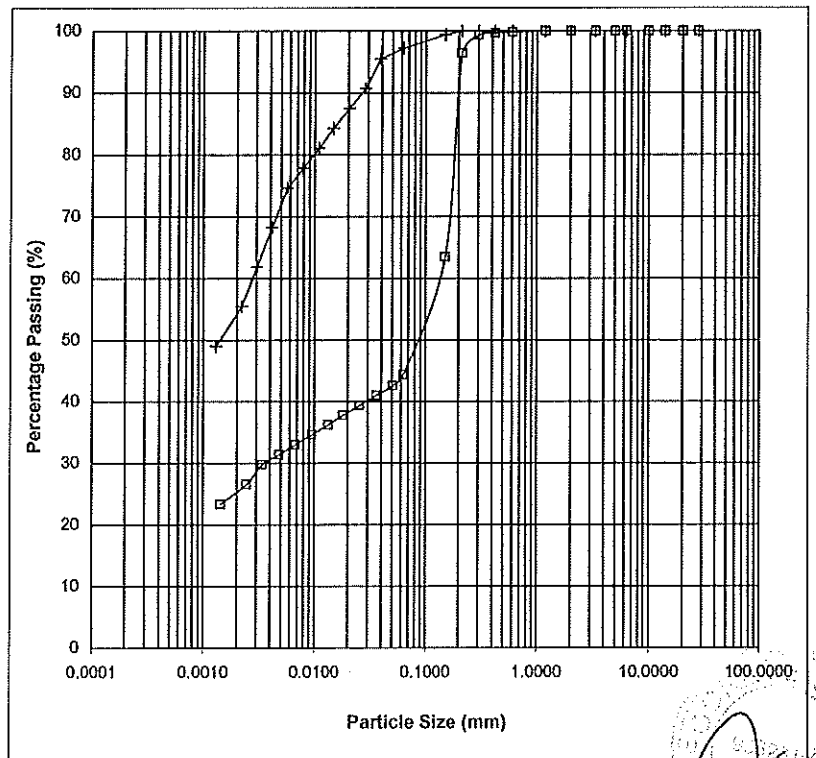
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	97	0.425	98
0.300	91	0.300	96
0.212	71	0.212	86
0.150	39	0.150	66
0.063	18	0.063	45
		0.0502	44
		0.0357	43
		0.0254	41
		0.0181	39
		0.0133	38
		0.0095	36
		0.0067	35
		0.0048	33
		0.0034	31
		0.0024	28
		0.0014	25
Clay (%)	18	Clay (%)	27
Silt (%)		Silt (%)	19
Sand (%)	82	Sand (%)	54
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH2	D25	46.50	13.12.18
X	BH2	D27	49.50	13.12.18

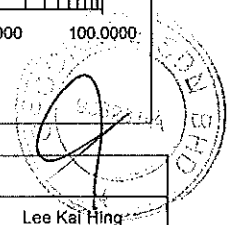


Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	100
0.212	96	0.212	100
0.150	63	0.150	99
0.063	44	0.063	97
0.0505	43	0.0389	96
0.0360	41	0.0283	91
0.0256	39	0.0204	87
0.0182	38	0.0147	84
0.0134	36	0.0109	81
0.0095	35	0.0079	78
0.0068	33	0.0057	75
0.0048	31	0.0041	68
0.0034	30	0.0030	62
0.0024	27	0.0022	55
0.0014	23	0.0013	49
Clay (%)	25	Clay (%)	52
Silt (%)	19	Silt (%)	45
Sand (%)	56	Sand (%)	3
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH2	D29	52.50	13.12.18
+	BH2	D34	60.00	13.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing
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Total Stress Triaxial Compression

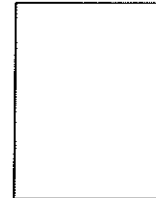
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey sandy CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	142.08	143.62	145.55
Bulk Density ρ (Mg/m ³)	1.649	1.667	1.690
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

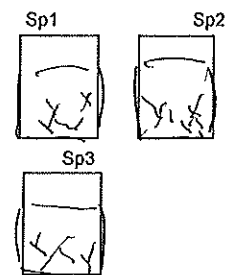
Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	55	54	52
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.08	1.11
Voids Ratio e_0	1.49	1.46	1.39
Deg of Saturation S_0 %	97.19	98.69	99.27

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	8.91	14.85	32.70
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	8.71	14.65	32.50
Strain at Failure ϵ_f %	5.99	5.99	8.03
Shear Strength c_u (kPa)	4.46	7.43	16.35

Failure Sketch



Notes : Intermediate Intermediate Intermediate

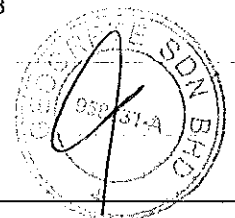
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 07.12.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

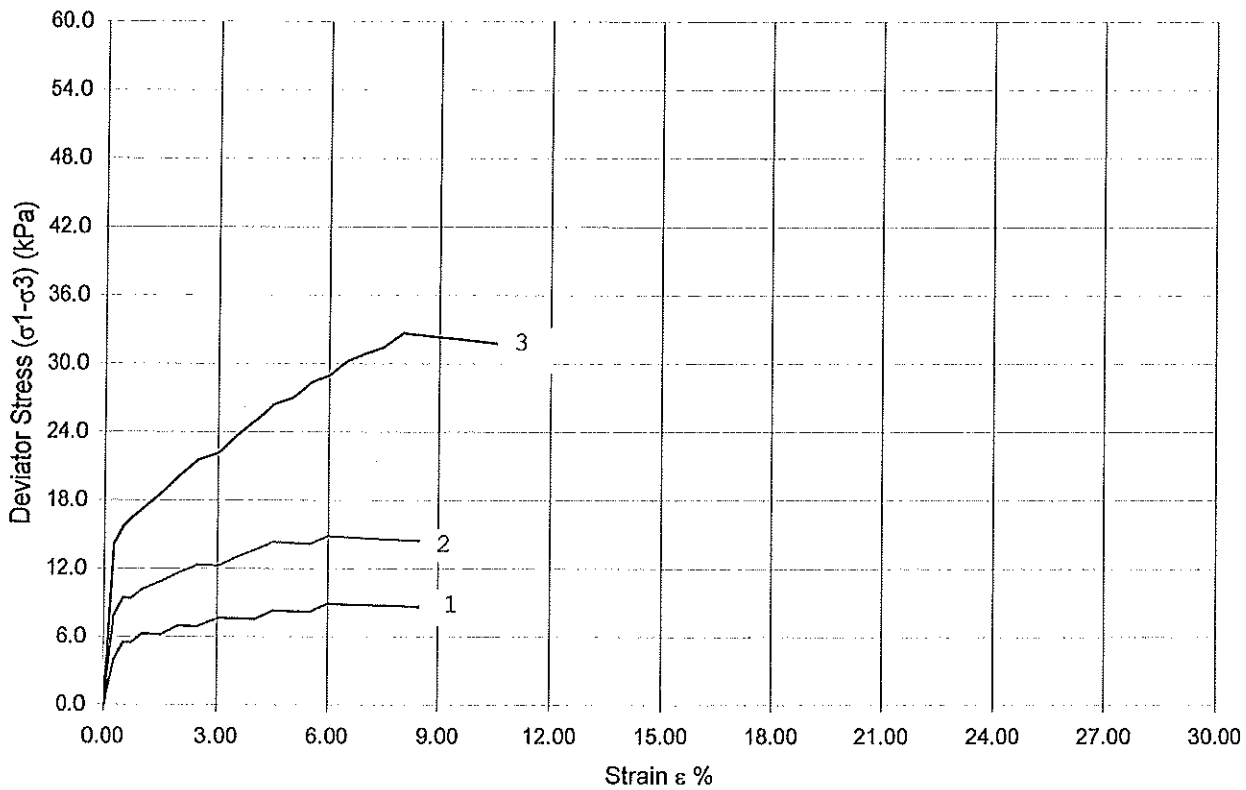
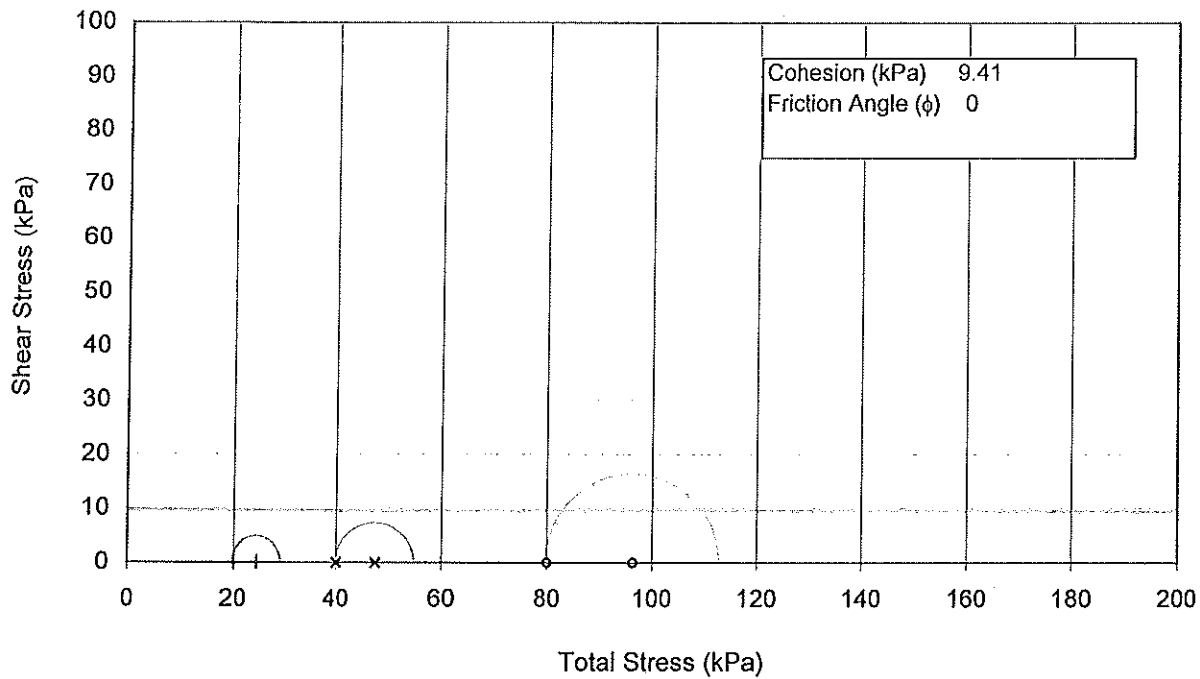
Sample : UD1
 Borehole : BH2
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 07.12.18

Sample : UD1
 Borehole : BH2

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

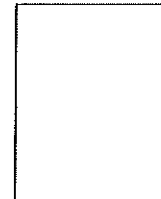
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	135.11	137.72	138.20
Bulk Density ρ (Mg/m ³)	1.568	1.599	1.604
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	90	180	360
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel	14391	14391	14391
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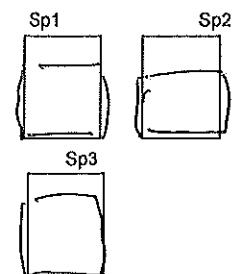
Moisture Content w_0 %	58	57	54
Dry Density ρ_{d0} (Mg/m ³)	0.99	1.02	1.04
Voids Ratio e_0	1.63	1.56	1.51
Deg of Saturation S_0 %	92.80	95.11	93.96

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	33.89	52.62	67.57
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	33.69	52.42	67.37
Strain at Failure ϵ_f %	2.50	7.50	9.01
Shear Strength c_u (kPa)	16.95	26.31	33.79

Moisture Content w_f %	58	57	54
Dry Density ρ_{df} (Mg/m ³)	0.99	1.02	1.04
Voids Ratio e_f	1.63	1.56	1.51
Deg of Saturation S_f %	92.80	95.11	93.96

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

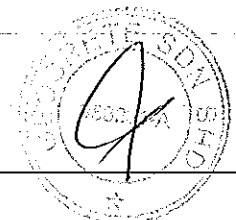
Operator
Shyam Nath

Checked
Chris

Test Name : UU

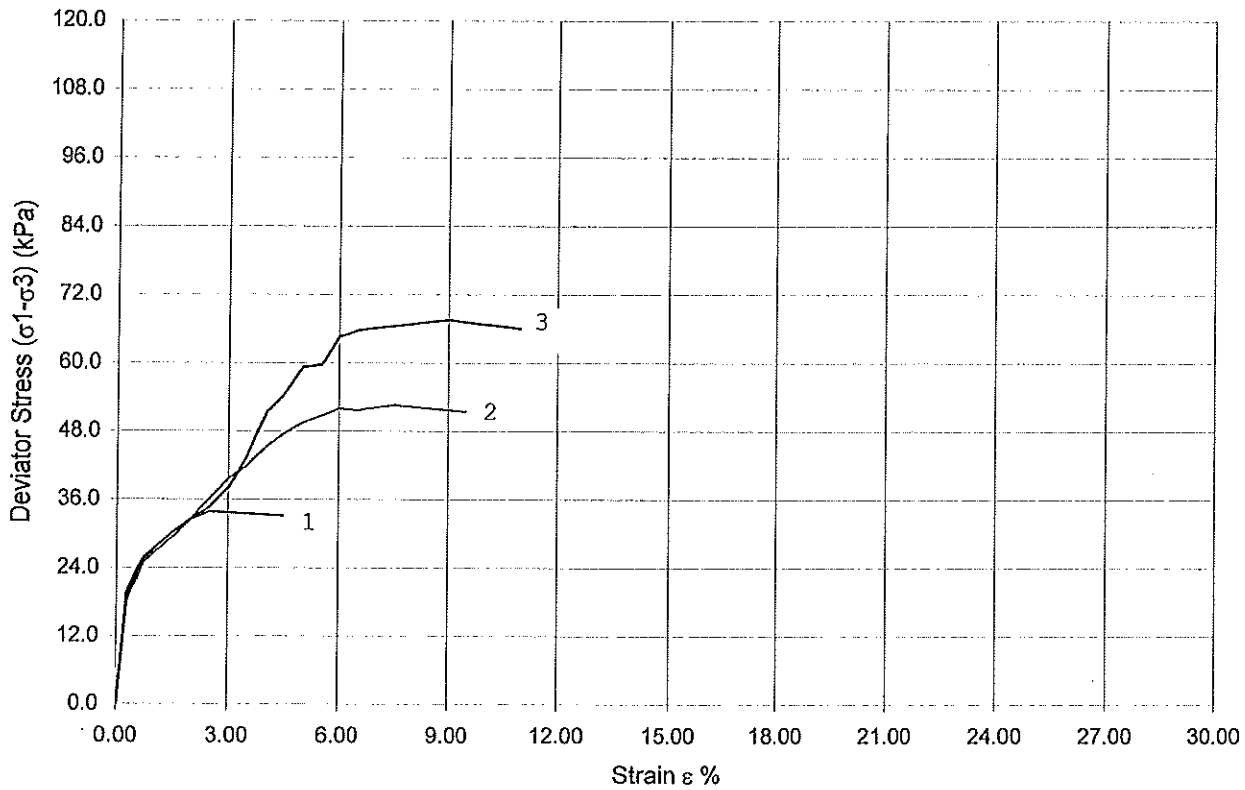
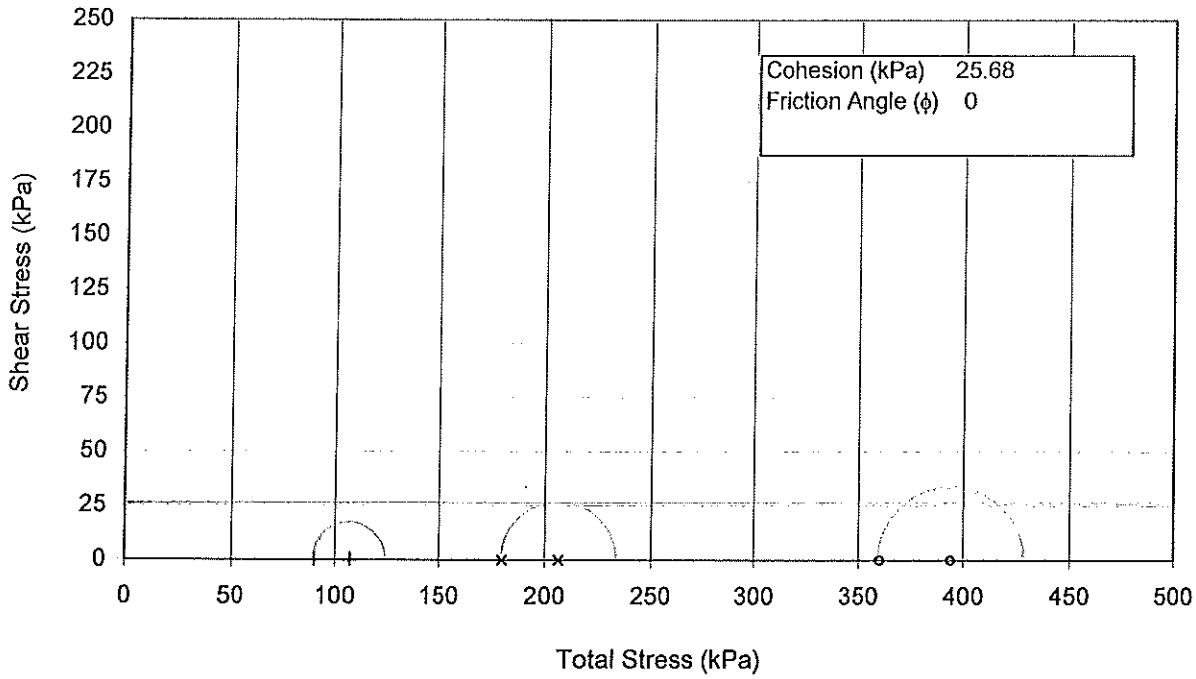
Date of Test : 07.12.18

Sample : UD4
Borehole : BH2
Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 07.12.18

Sample : UD4
Borehole : BH2

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

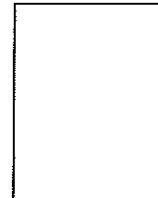
Unconsolidated Undrained

Sample details

Depth : 18.00m
 Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	135.41	138.06	140.99
Bulk Density ρ (Mg/m ³)	1.572	1.603	1.637
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

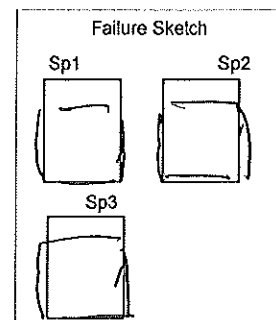
Strain Channel

Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	58	56	55
Dry Density ρ_{d0} (Mg/m ³)	1.00	1.03	1.05
Voids Ratio e_0	1.59	1.51	1.45
Deg of Saturation S_0 %	93.78	95.71	98.51

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	22.16	37.48	46.22
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	21.96	37.28	46.02
Strain at Failure ϵ_f %	6.51	6.97	10.00
Shear Strength c_u (kPa)	11.08	18.74	23.11



Moisture Content w_f %	58	56	55
Dry Density ρ_{df} (Mg/m ³)	1.00	1.03	1.05
Voids Ratio e_f	1.59	1.51	1.45
Deg of Saturation S_f %	93.78	95.71	98.51

Notes : Plastic Plastic Plastic

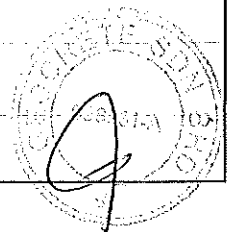
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 07.12.18

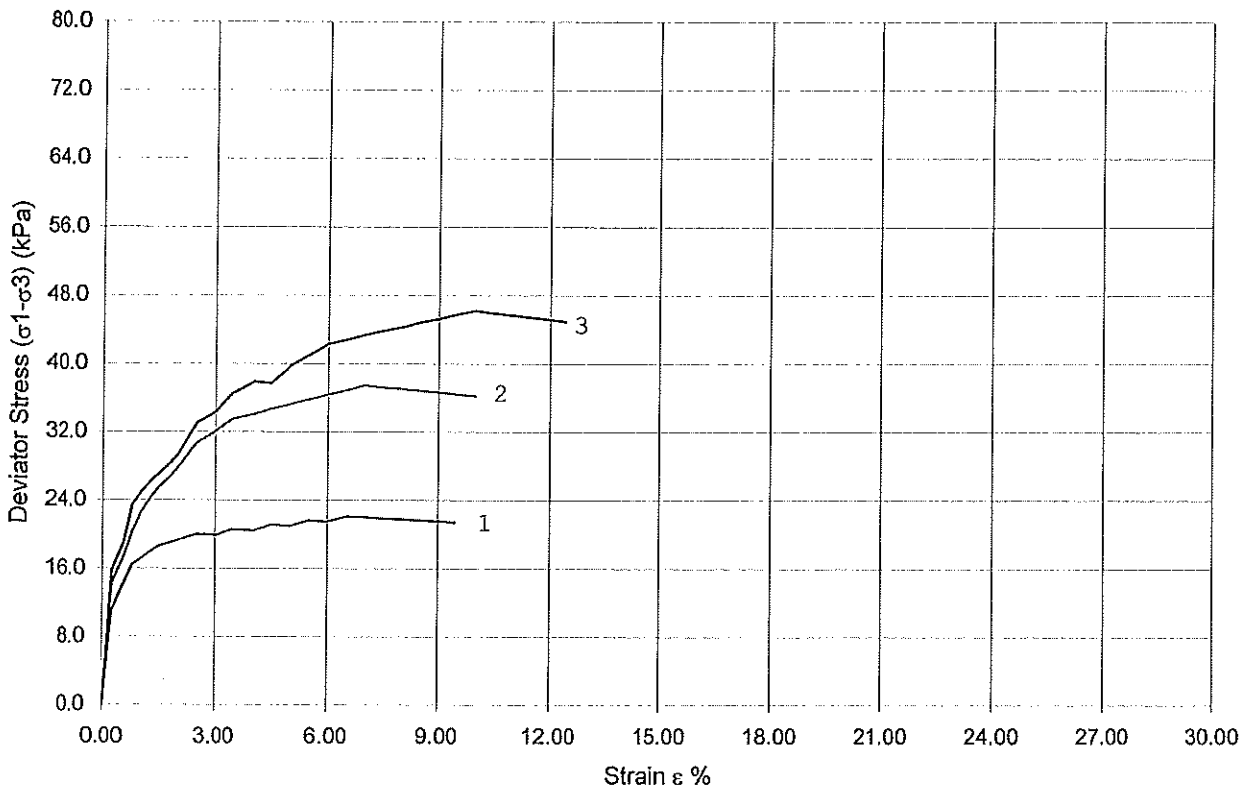
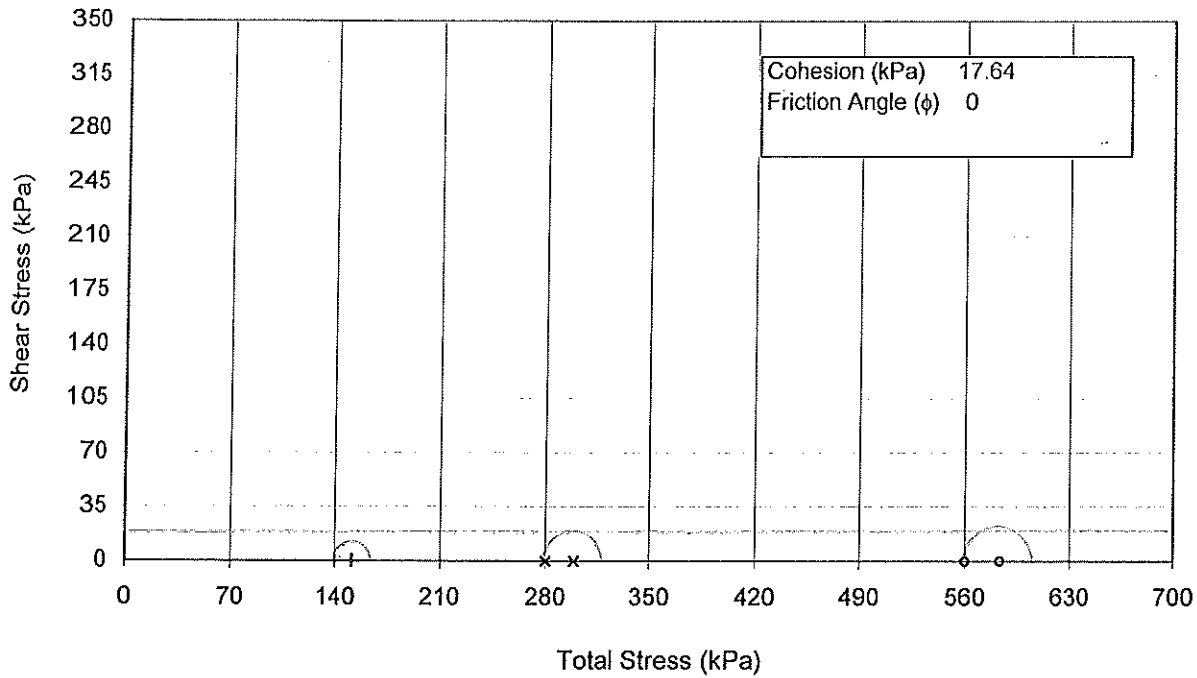
Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Sample : UD6
 Borehole : BH2
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

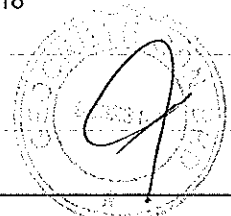
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 07.12.18

Sample : UD6
 Borehole : BH2

Approved :
 Lee Kai Hing



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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	16.12.18
Sample No.	BH2 / UD4 / 12.00m	Test Started	06.12.18
Soil Description	Dark grey CLAY	Ring No.	A1

BEFORE TEST

Moist. Content from trimmings:	=	55 %	SG (Measured)	=	2.610
Wt of sample + Ring	=	123.39 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.77 gm	Area (A)	=	1964 mm ²
Wt of sample	=	62.62 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.87 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.75 gm	Bulk Density (P)	=	1.594 Mg/m ³
Initial Moisture Content, M _o	=	53 %	Dry Density (PD)	=	1.040 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.5088			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F, $\frac{e_o}{1+e_o}$	=	0.1254 mm ⁻¹			
Height of Solid Hs	=	7.972 mm			

AFTER TEST

Wt of sample + Ring	=	120.90 gm	Overall settlement	=	2.374 mm
Wt of Dry sample + Ring	=	101.64 gm	Volume Change	=	4.663 cm ³
Wt of Ring	=	60.77 gm	Final Volume	=	34.62 cm ³
Wt of Wet sample	=	60.13 gm	Final Bulk Density	=	1.737 Mg/m ³
Wt of Dry sample	=	40.87 gm	Final Dry Density	=	1.180 Mg/m ³
Wt of Moisture	=	19.26 gm	Final Void Ratio, e _f	=	1.2110
Final Moisture Content, M _f	=	47 %			
Final Saturation, S _o ; $\frac{M_f \times SG}{e_f}$	=	102 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

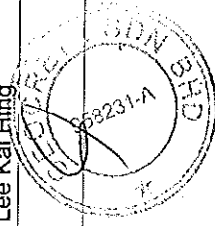
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH2 / UD4 / 12.00m

Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A1

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5088	0.0000	0				
6.25	0.224	19.776	0.0281	1.4807	0.0281	6.25	1.8137	1.69	25.98	-0.0934
12.5	0.344	19.656	0.0432	1.4657	0.0151	6.25	0.9775	1.00	43.15	-0.0500
25.0	0.564	19.436	0.0707	1.4381	0.0276	12.5	0.9062	1.96	21.64	-0.0917
50.0	0.930	19.070	0.1167	1.3922	0.0459	25.0	0.7683	1.69	24.35	-0.1525
100	1.690	18.310	0.2120	1.2968	0.0953	50.0	0.8308	3.61	10.74	-0.3167
200	2.666	17.334	0.3344	1.1744	0.1224	99.9	0.5635	1.69	20.86	-0.4067
100	2.620	17.380	0.3287	1.1802	-0.0058	-99.9				
50	2.580	17.420	0.3236	1.1852	-0.0050	-50.0				
12.5	2.374	17.626	0.2978	1.2110	-0.0258	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

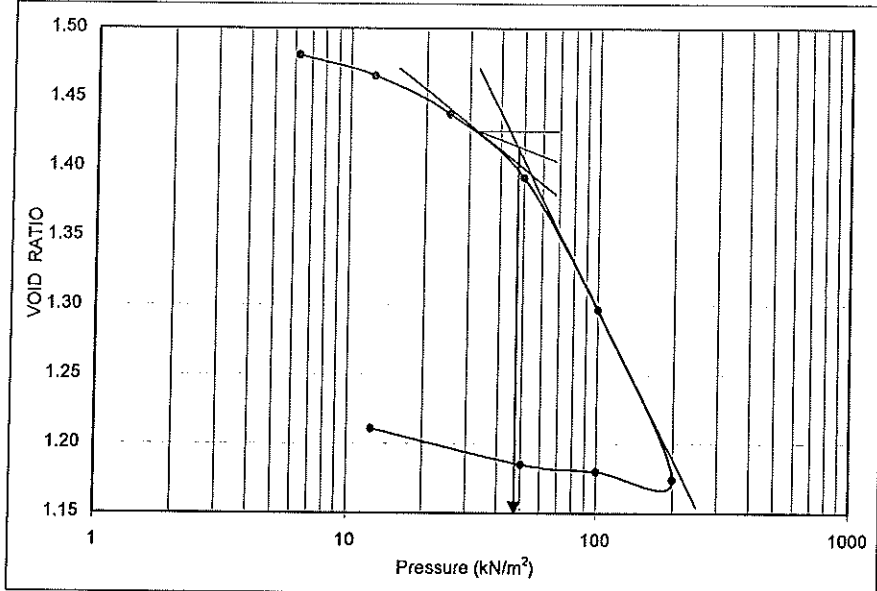


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 (Co. No. 958231-A)

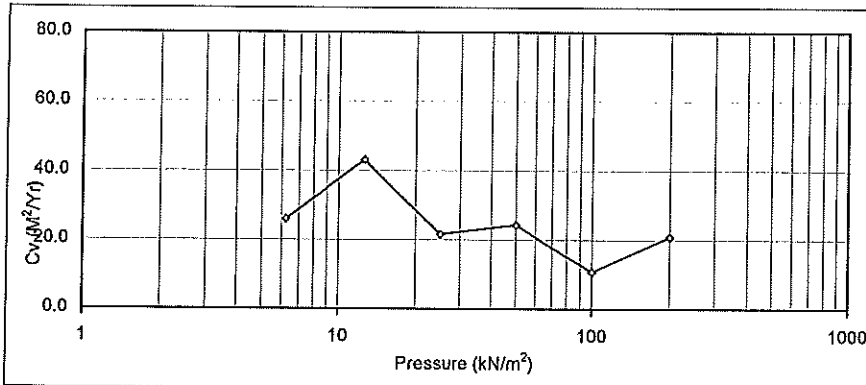
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH2 / UD4 / 12.00m
 SOIL SAMPLE Dark grey CLAY

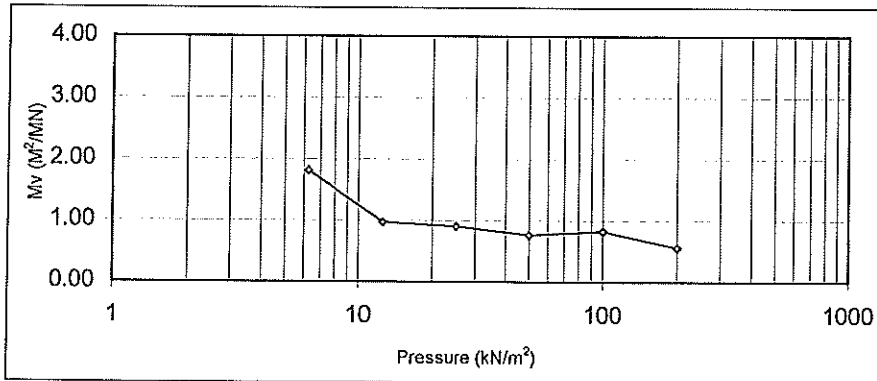
Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A1



INITIAL
 Water content 53 %
 Dry Density 1.04 Mg/m³
 Void Ratio 1.5088
 Saturation 92 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.610



FINAL
 Water content 47 %
 Dry Density 1.18 Mg/m³
 Void Ratio 1.2110
 Saturation 102 %
 Height 18 mm
 Comp. Index, C_c 0.4067
 Precons. Load 48 kN/m²



Comp. Ratio, C_R 0.162

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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GEOCRETE SDN. BHD.

Company No 958231 A

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Bandar Teknologi Kajang,

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	16.12.18
Sample No.	BH2 / UD6 / 18.00m	Test Started	06.12.18
Soil Description	Dark grey CLAY	Ring No.	A2

BEFORE TEST

Moist. Content from trimmings:	=	75 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	119.74 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.95 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.79 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.83 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.96 gm	Bulk Density (P)	=	1.496 Mg/m ³
Initial Moisture Content, M _o	=	74 %	Dry Density (PD)	=	0.861 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.9961			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	95 %			
V. Ratio Change Factor F _v , $\frac{1+e_o}{H}$	=	0.1498 mm ⁻¹			
Height of Solid H _s	=	6.675 mm			

AFTER TEST

Wt of sample + Ring	=	117.53 gm	Overall settlement	=	1.522 mm
Wt of Dry sample + Ring	=	94.78 gm	Volume Change	=	2.990 cm ³
Wt of Ring	=	60.95 gm	Final Volume	=	36.30 cm ³
Wt of Wet sample	=	56.58 gm	Final Bulk Density	=	1.559 Mg/m ³
Wt of Dry sample	=	33.83 gm	Final Dry Density	=	0.932 Mg/m ³
Wt of Moisture	=	22.75 gm	Final Void Ratio, e _r	=	1.7681
Final Moisture Content, M _r	=	67 %			
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	98 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH2 / UD6 / 18.00m

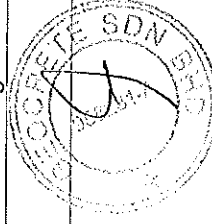
Date of Report
 Test started
 Ring No.

16.12.18
 06.12.18
 A2

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
		$H=H_o-\Delta H$ (mm)	$\Delta e = F \times \Delta H$	$e = e_o - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	
0	0.000	20.000	0.0000	1.9961	0.0000	0			
6.25	0.320	19.680	0.0479	1.9481	0.0479	6.25	2.6036	10.24	4.27
12.5	0.616	19.384	0.0923	1.9038	0.0443	6.25	2.4451	16.00	2.65
25.0	1.156	18.844	0.1732	1.8229	0.0809	12.5	2.2943	19.36	2.09
50.0	2.010	17.990	0.3011	1.6950	0.1279	25.0	1.9003	24.01	1.57
25	1.924	18.076	0.2882	1.7079	-0.0129	-25.0			
12.5	1.768	18.232	0.2649	1.7312	-0.0234	-12.5			
6.25	1.522	18.478	0.2280	1.7681	-0.0369	-6.2			

Operator Shyam Nath
 Checked Chris
 Approved Lee Kai Hing

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)



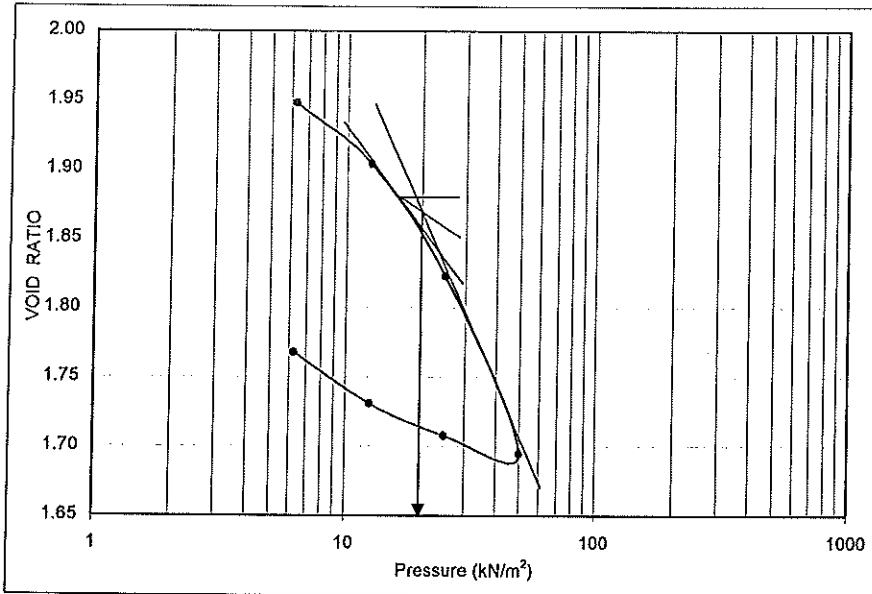
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

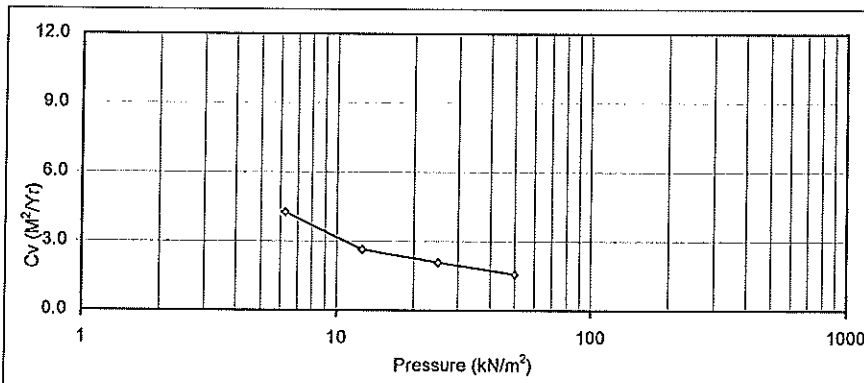
BH REF BH2 / UD6 / 18.00m

SOIL SAMPLE Dark grey CLAY

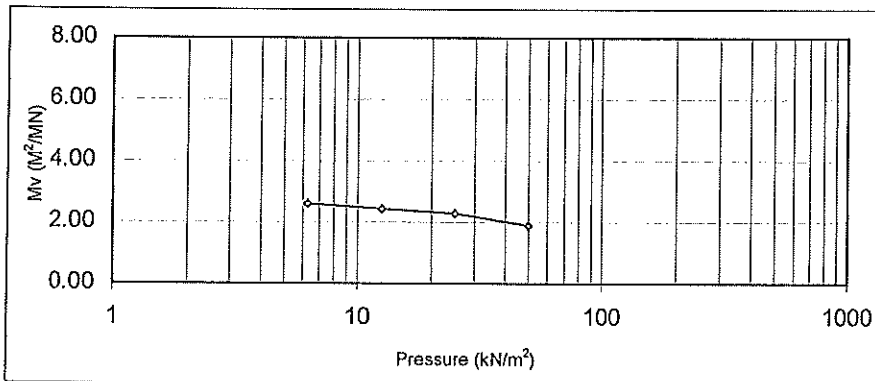
Date of Report 16.12.18
 Test started 06.12.18
 Ring No. A2



INITIAL		
Water content	74	%
Dry Density	0.86	Mg/m ³
Void Ratio	1.9961	
Saturation	95	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL		
Water content	67	%
Dry Density	0.93	Mg/m ³
Void Ratio	1.7681	
Saturation	98	%
Height	18	mm
Comp. Index, C _c	0.4250	
Precons. Load	19	kN/m ²



Comp. Ratio, C _R	0.142	
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GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377: Part 7: 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 2 / D 25 (46.50 m)

Test Size : 60 mm x 60 mm x 20 mm

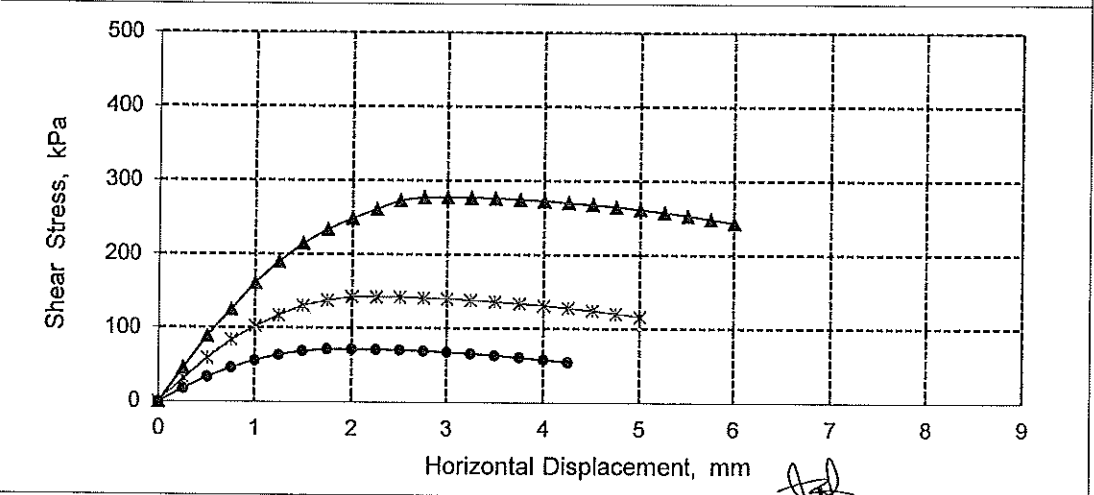
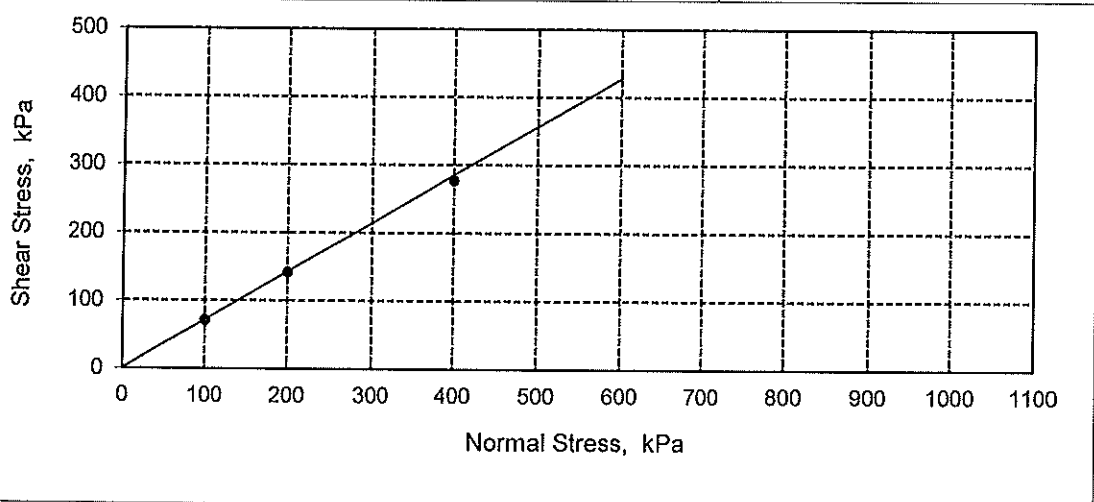
Date Tested : 19 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		146.6	145.0	144.9
Moisture Content (%)		20.4	20.0	20.1
Bulk Density (Mg/m ³)		2.036	2.014	2.013
Dry Density (Mg/m ³)		1.691	1.678	1.676

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		71.6	142.2	277.7
Displ. at Failure (mm)		1.8	2.0	3.0
Settlement (mm)		0.1	0.2	0.4

$c' = 1 \text{ kPa}$

$\phi' = 35.5 \text{ deg.}$



SUMMARY OF TEST RESULTS

SAMPLE AND SPECIMEN DETAILS		PROJECT :				PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR				REF : L/081/18/139/18 DATE : 02.01.19																																										
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST																													
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)																									
BH3	UD1	3.00	23	2.01	1.64					24	75	1	2.69						NA		NA				1.7	0.10	0.33	7.2																								
	UD6	18.00	64	1.53	0.92	71	27	44	13.6	51	13	0	2.61						27.00	0																																
	UD7	21.00	42	1.83	0.96	33	20	13		23	15	62							43.26	0					2.1	0.07	0.46	7.3																								
	D12	28.50	27	NA	NA					28	22	50	0																																							
	D13	30.00	75	NA	NA	85	30	55	14.4	60	38	2	2.58																																							
	D19	39.00	27	NA	NA	40	21	19	8.0	27	19	54	0												1.3	0.17	0.26	2.3																								
	D20	40.50	27	NA	NA					38	24	38	0																																							
	D26	49.50	31	NA	NA	43	22	21	8.8	35	25	40	0	2.65																																						
	D27	51.00	59	NA	NA					59	39	2	0																																							
	D33	60.00	29	NA	NA	48	22	26		38	27	35	0																																							

Note : NES = NOT ENOUGH SAMPLE

NP = NON PLASTIC

NA = NOT APPLICABLE

Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE. ** BH3 UD1 - TRIAXIAL (UU) & CONSOL TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN.

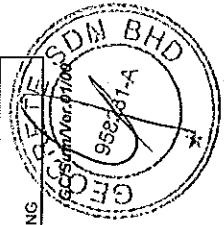
APPROVED BY:

LEE KAI HING

CHECKED BY:

CHRIS

SUM



GEOCRETE SDN. BHD.

Company No 958231 A

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Bandar Teknologi Kajang,

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Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
Sample No.	BH3 / UD6 / 18.00m	Test Started	22.12.18
Soil Description	Greenish grey CLAY	Ring No.	3

BEFORE TEST

Moist. Content from trimmings:	=	69 %	SG (Measured)	=	2.610
Wt of sample + Ring	=	119.30 gm	Diameter (D)	=	50 mm
Wt of Ring	=	64.11 gm	Area (A)	=	1964 mm ²
Wt of sample	=	55.19 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.77 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.42 gm	Bulk Density (P)	=	1.405 Mg/m ³
Initial Moisture Content, M ₀	=	63 %	Dry Density (PD)	=	0.860 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.0363			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	81 %			
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1518 mm ⁻¹			
Height of Solid H _s	=	6.587 mm			

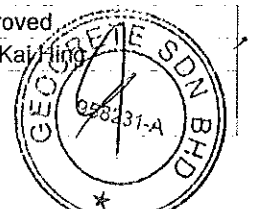
AFTER TEST

Wt of sample + Ring	=	116.02 gm	Overall settlement	=	2.360 mm
Wt of Dry sample + Ring	=	97.88 gm	Volume Change	=	4.636 cm ³
Wt of Ring	=	64.11 gm	Final Volume	=	34.65 cm ³
Wt of Wet sample	=	51.91 gm	Final Bulk Density	=	1.498 Mg/m ³
Wt of Dry sample	=	33.77 gm	Final Dry Density	=	0.975 Mg/m ³
Wt of Moisture	=	18.14 gm	Final Void Ratio, e _r	=	1.6780
Final Moisture Content, M _r	=	54 %			
Final Saturation, S ₀ ; $\frac{M_r \times SG}{e_r}$	=	84 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

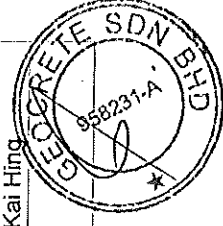
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH3 / UD6 / 18.00m

Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 3

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
		$H=H_0-\Delta H$ (mm)	$A_v = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	
0	0.000	20.000	0.0000	2.0363	0.0000	0			
6.25	0.240	19.760	0.0364	1.9999	0.0364	6.25	1.9448	6.76	6.49
12.5	0.450	19.550	0.0683	1.9680	0.0319	6.25	1.7200	15.21	2.82
25.0	0.878	19.122	0.1333	1.9030	0.0650	12.5	1.7920	17.64	2.35
50.0	1.628	18.372	0.2472	1.7891	0.1139	25.0	1.6342	24.01	1.62
100	2.740	17.260	0.4160	1.6203	0.1688	50.0	1.2895	19.36	1.82
50	2.660	17.340	0.4038	1.6325	-0.0121	-50.0			
25	2.518	17.482	0.3823	1.6540	-0.0216	-25.0			
12.5	2.360	17.640	0.3583	1.6780	-0.0240	-12.5			

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

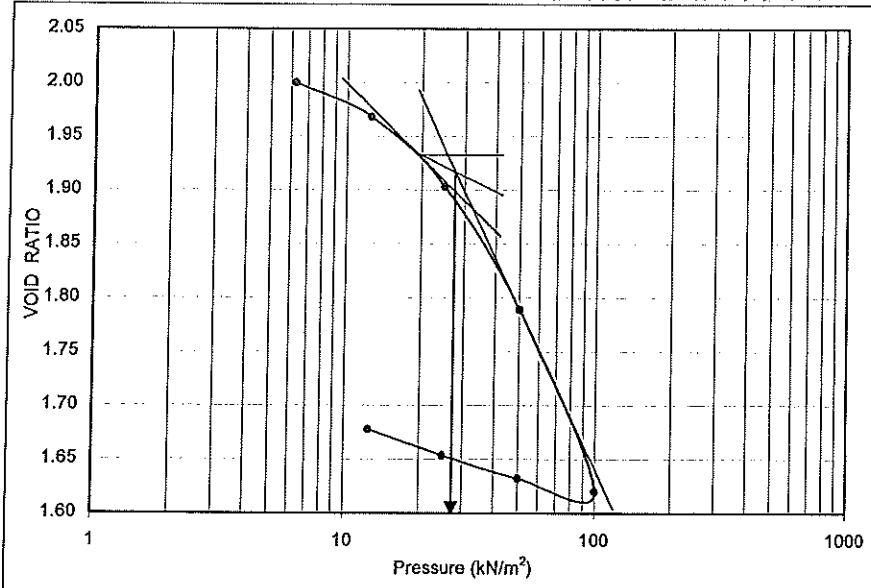


GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

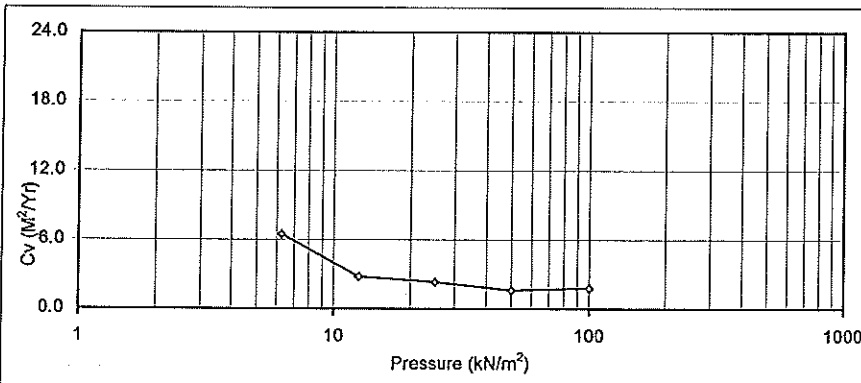
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH3 / UD6 / 18.00m
 SOIL SAMPLE Greenish grey CLAY

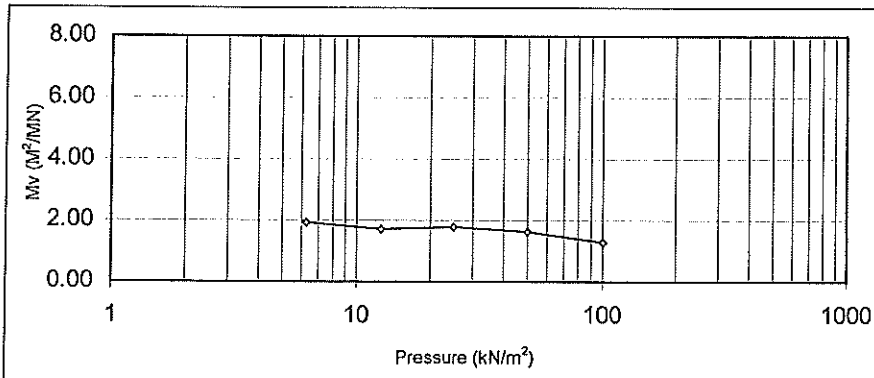
Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 3



INITIAL
 Water content 63 %
 Dry Density 0.86 Mg/m³
 Void Ratio 2.0363
 Saturation 81 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.610



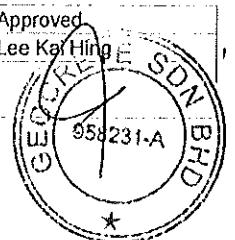
FINAL
 Water content 54 %
 Dry Density 0.97 Mg/m³
 Void Ratio 1.6780
 Saturation 84 %
 Height 18 mm
 Comp. Index, C_c 0.5609
 Precons. Load 27 kN/m²



Comp. Ratio, C_R 0.185

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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Total Stress Triaxial Compression

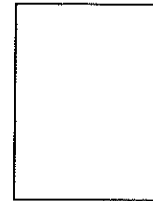
Unconsolidated Undrained

Sample details

Depth : 18.00m
Description : Greenish grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	129.34	131.69	133.14
Bulk Density ρ (Mg/m ³)	1.501	1.529	1.545
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	130	260	520
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

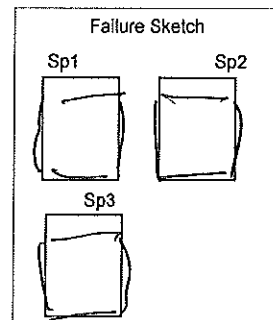
Strain Channel

Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	67	66	64
Dry Density ρ_{d0} (Mg/m ³)	0.90	0.92	0.94
Voids Ratio e_0	1.91	1.84	1.77
Deg of Saturation S_0 %	92.10	93.96	94.52

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	47.82	49.47	64.70
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	47.62	49.27	64.50
Strain at Failure ϵ_f %	10.99	13.03	10.99
Shear Strength c_u (kPa)	23.91	24.74	32.35



Moisture Content w_f %	67	66	64
Dry Density ρ_{df} (Mg/m ³)	0.90	0.92	0.94
Voids Ratio e_f	1.91	1.84	1.77
Deg of Saturation S_f %	92.10	93.96	94.52

Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

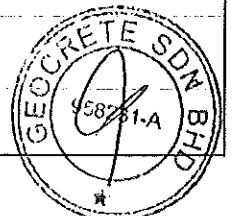
Test Name : UU
Date of Test : 23.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Sample : UD6
Borehole : BH3

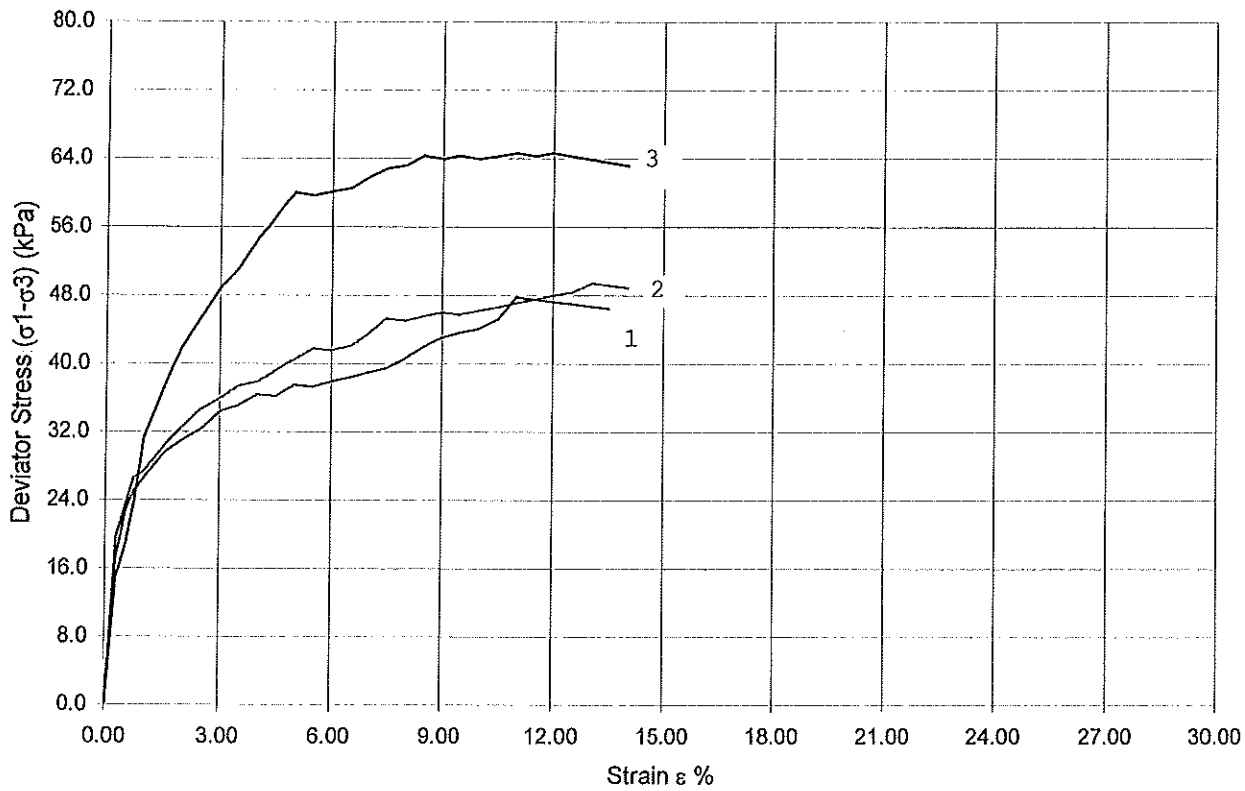
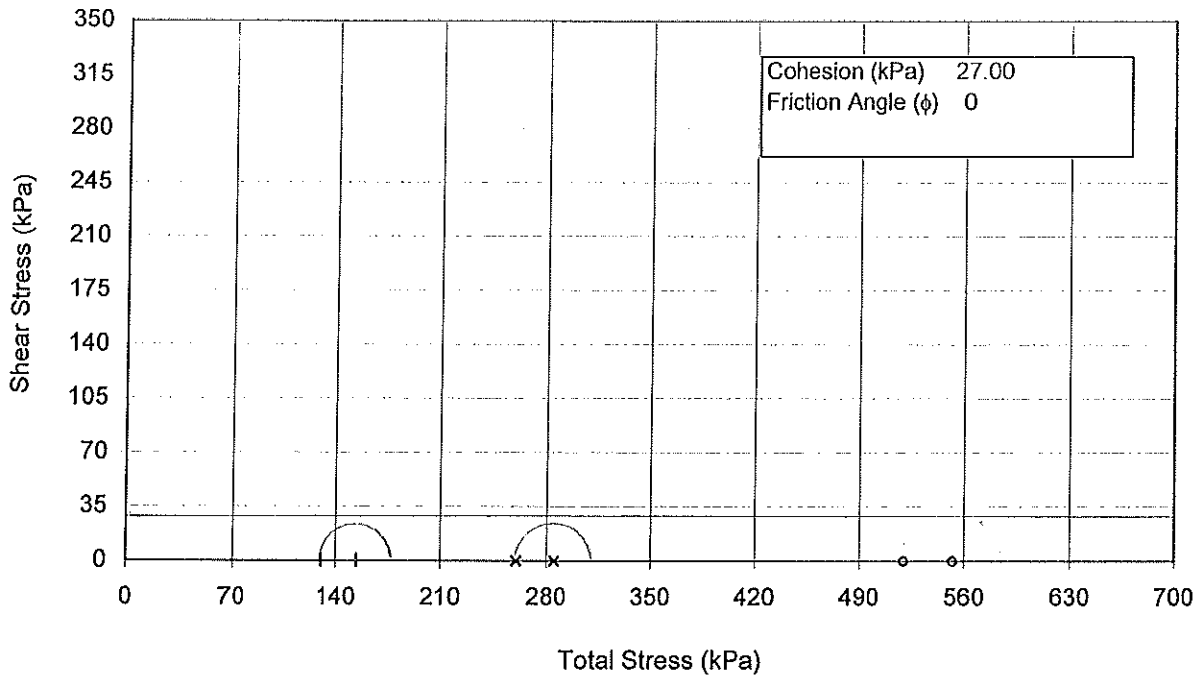
Operator : Shyam Nath
Checked : Chris

Approved : Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

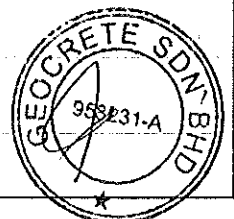
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 23.12.18

Sample : UD6
Borehole : BH3

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

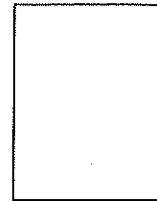
Unconsolidated Undrained

Sample details

Depth : 21.00m
Description : Grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	155.35	157.38	157.59
Bulk Density ρ (Mg/m ³)	1.803	1.827	1.829
Particle Density ρ_s	2.67	2.67	2.67

Sketch showing specimen location in original sample

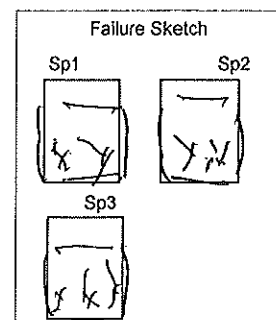


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	190	380	760
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	35	34	33
Dry Density ρ_{d0} (Mg/m ³)	1.34	1.36	1.38
Voids Ratio e_0	1.00	0.96	0.94
Deg of Saturation S_0 %	93.57	94.70	93.37

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	61.39	78.63	119.55
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	61.19	78.43	119.35
Strain at Failure ϵ_f %	16.45	18.42	17.76
Shear Strength c_u (kPa)	30.69	39.32	59.77
Moisture Content w_f %	35	34	33
Dry Density ρ_{df} (Mg/m ³)	1.34	1.36	1.38
Voids Ratio e_f	1.00	0.96	0.94
Deg of Saturation S_f %	93.57	94.70	93.37



Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

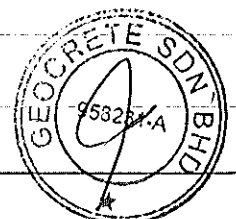
Operator
Shyam Nath

Checked
Chris

Test Name : UU

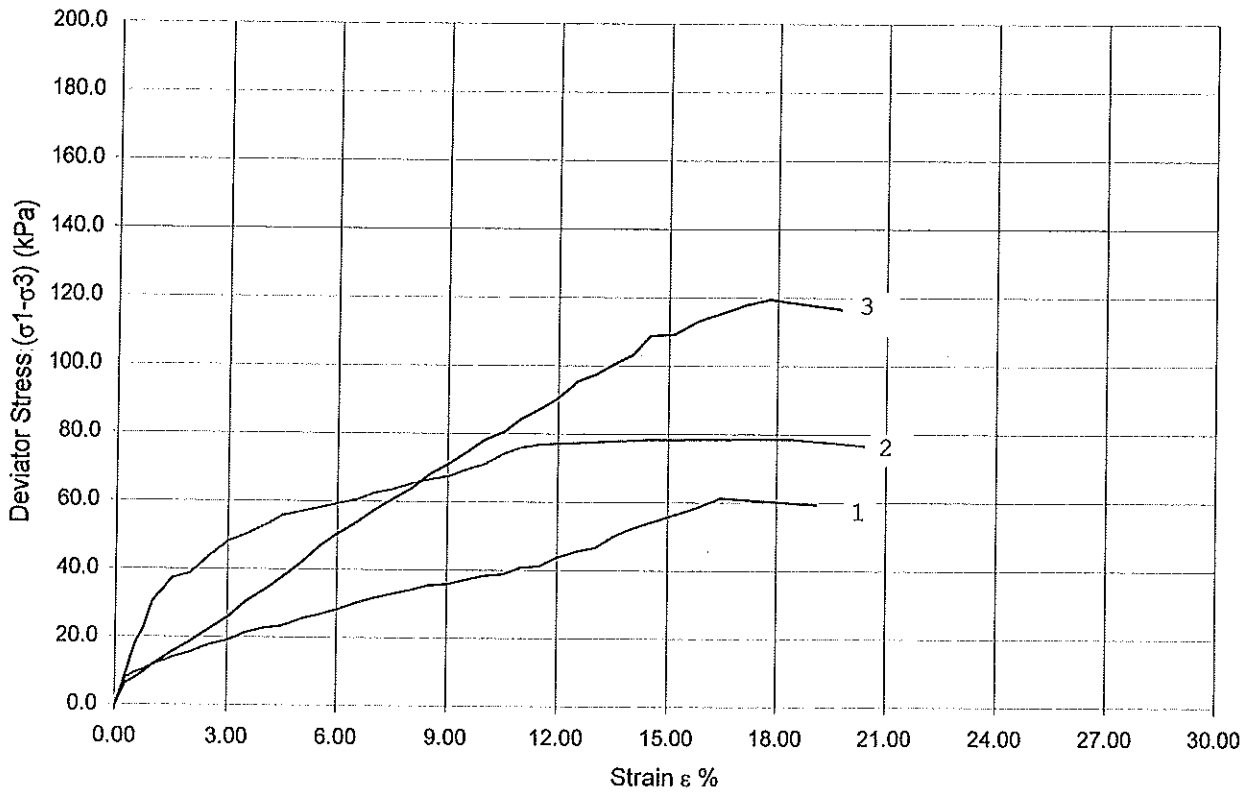
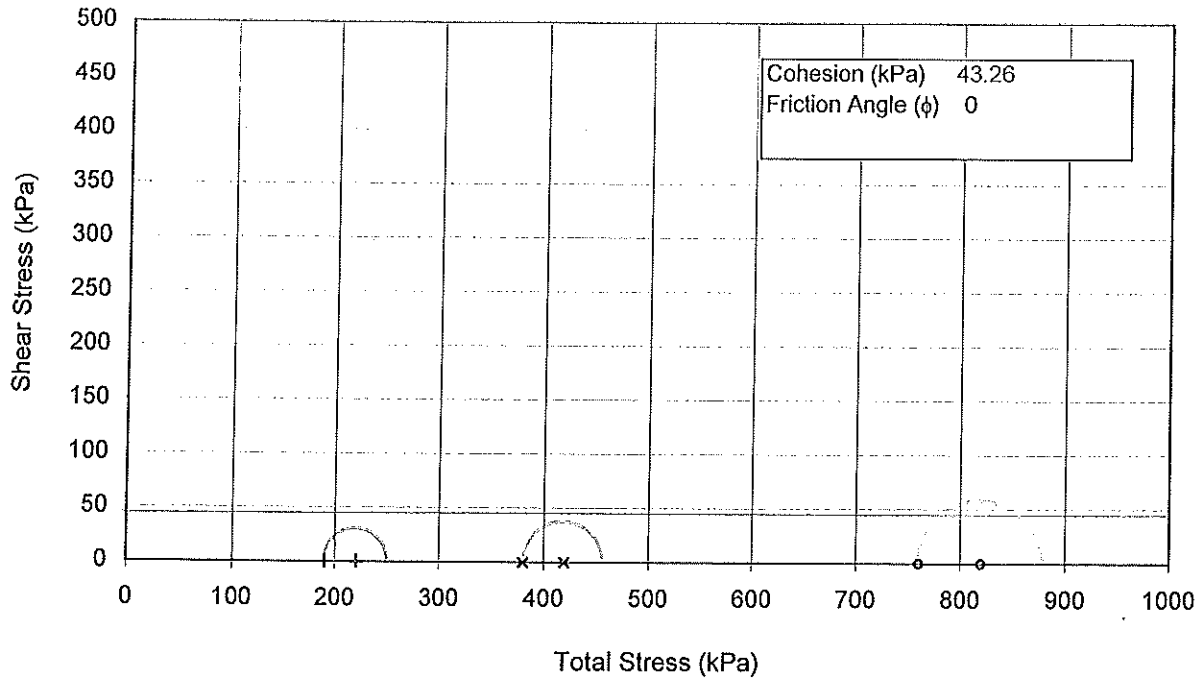
Date of Test : 23.12.18

Sample : UD7
Borehole : BH3
Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 23.12.18

Sample : UD7
Borehole : BH3

Approved :
Lee Kai Hing



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT :		PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										REF : L/081/18/139/18 DATE : 02.01.19																	
SAMPLE AND SPECIMEN DETAILS		ATTERBERG LIMITS		SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST													
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	ϕ' (Deg)	Cu' (kPa)	ϕ' (Deg)	Cu (kPa)	ϕ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)				
BH4	D1	1.50	37	NA	NA	35	23	12		22	14	64	0																		
	UD3	9.00	36	1.62	1.04	79	29	50	13.1	59	37	4	0	2.60	15.61	0	180	0.383					1.9	0.15	0.30	4.3					
	D4	10.50	59	NA	NA	36	22	14		28	19	53	0																		
	UD7	21.00	29	1.56	0.98	83	31	52	15.0	60	37	3	0	2.58	16.80	0	165	0.519													
	D9	24.00	37	NA	NA					23	16	60	1																		
	D14	31.50	31	NA	NA					28	21	51	0																		
	D15	33.00	27	NA	NA				NA	24	76	0													1.1	0.12	0.23	3.2			
	D19	39.00	18	NA	NA					25	74	1	2.69																		
	D20	40.50	48	NA	NA					8	91	1																			
	D24	46.50	42	NA	NA	42	23	19		35	18	47	0																		
	D25	48.00	41	NA	NA					30	21	49	0																		
	D26	49.50	40	NA	NA	35	22	13	5.6	20	14	66	0	2.68																	
	D29	54.00	46	NA	NA					28	21	51	0																		
	D33	60.00	60	NA	NA					38	23	39	0																		

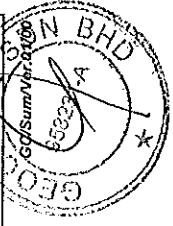
Note : NES = NOT ENOUGH SAMPLE

Remarks : NP = NON PLASTIC

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE.

APPROVED BY: NA = NOT APPLICABLE

CHECKED BY: CHRIS



SUM

GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
Sample No.	BH4 / UD3 / 9.00m	Test Started	22.12.18
Soil Description	Greenish grey CLAY	Ring No.	4

BEFORE TEST

Moist. Content from trimmings:	=	63 %	SG (Measured)	=	2.600
Wt of sample + Ring	=	119.24 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.00 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.24 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	37.82 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.42 gm	Bulk Density (P)	=	1.533 Mg/m ³
Initial Moisture Content, M ₀	=	59 %	Dry Density (PD)	=	0.963 Mg/m ³

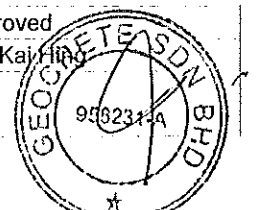
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.7008
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	91 %
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1350 mm ⁻¹
Height of Solid H _s	=	7.405 mm

AFTER TEST

Wt of sample + Ring	=	115.88 gm	Overall settlement	=	2.160 mm
Wt of Dry sample + Ring	=	96.82 gm	Volume Change	=	4.243 cm ³
Wt of Ring	=	59.00 gm	Final Volume	=	35.04 cm ³
Wt of Wet sample	=	56.88 gm	Final Bulk Density	=	1.623 Mg/m ³
Wt of Dry sample	=	37.82 gm	Final Dry Density	=	1.079 Mg/m ³
Wt of Moisture	=	19.06 gm	Final Void Ratio, e _f	=	1.4091
Final Moisture Content, M _f	=	50 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	93 %			

Operator	Checked
Shyam Nath	Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH4 / UD3 / 9.00m

Date of Report

02.01.19

Test started

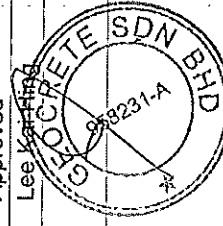
22.12.18

Ring No.

4

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_t$	de	dp kN/m ²	Mv (M ² /MN)	t ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.7008	0.0000	0				
6.25	0.854	19.146	0.1153	1.5854	0.1153	6.25	7.1422	5.76	7.38	-0.3831
12.5	1.180	18.820	0.1593	1.5414	0.0440	6.25	2.7736	40.96	0.98	-0.1463
25.0	1.688	18.312	0.2279	1.4728	0.0686	12.5	2.2210	10.24	3.74	-0.2279
50.0	2.364	17.636	0.3192	1.3815	0.0913	25.0	1.5344	4.00	8.97	-0.3033
25.0	2.320	17.680	0.3133	1.3875	-0.0059	-25.0				
12.5	2.220	17.780	0.2998	1.4010	-0.0135	-12.5				
6.25	2.160	17.840	0.2917	1.4091	-0.0081	-6.2				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kiat Hing

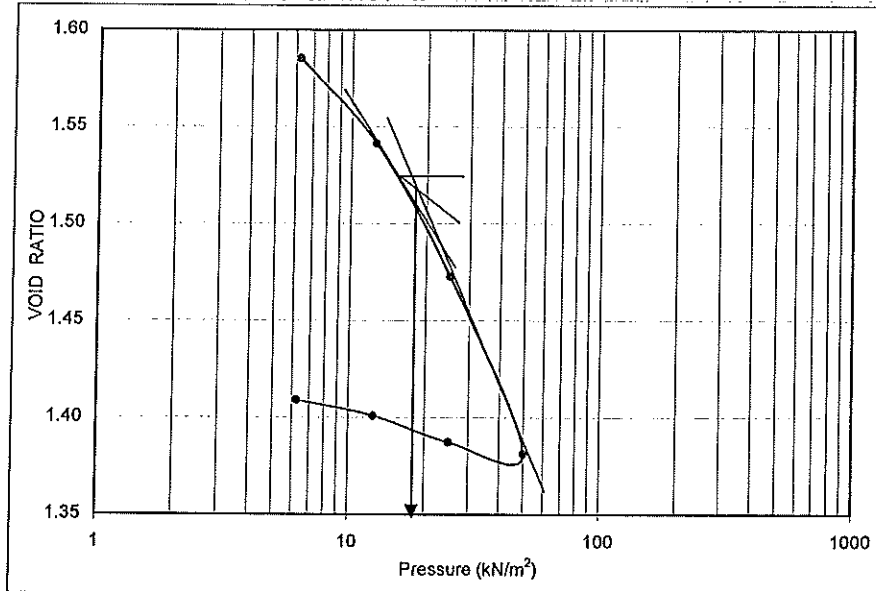


GEocrete SDN. BHD.
(Co. No. 958231-A)

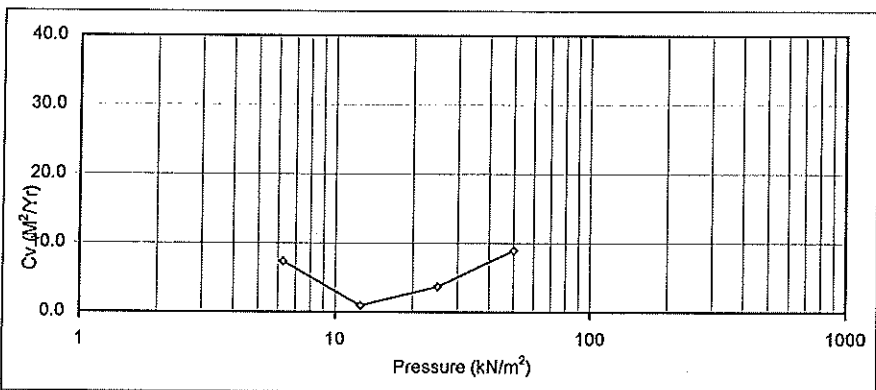
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH4 / UD3 / 9.00m
 SOIL SAMPLE Greenish grey CLAY

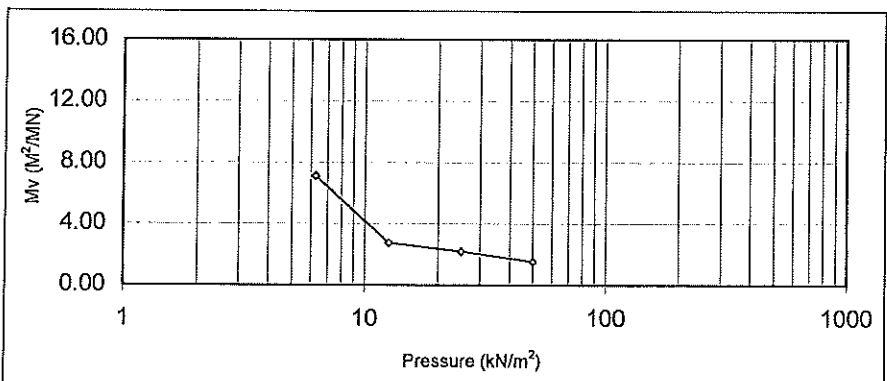
Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 4



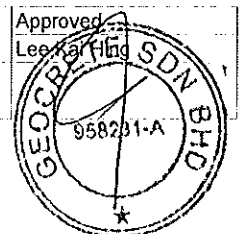
INITIAL
 Water content 59 %
 Dry Density 0.96 Mg/m³
 Void Ratio 1.7008
 Saturation 91 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.600



FINAL
 Water content 50 %
 Dry Density 1.08 Mg/m³
 Void Ratio 1.4091
 Saturation 93 %
 Height 18 mm
 Comp. Index, C_c 0.3831
 Precons. Load 180 kN/m²



Comp. Ratio, C_R 0.142



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

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43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
Sample No.	BH4 / UD7 / 21.00m	Test Started	22.12.18
Soil Description	Dark grey CLAY	Ring No.	5

BEFORE TEST

Moist. Content from trimmings:	=	92 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	113.96 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.10 gm	Area (A)	=	1964 mm ²
Wt of sample	=	55.86 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	29.96 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	25.9 gm	Bulk Density (P)	=	1.422 Mg/m ³
Initial Moisture Content, M _o	=	86 %	Dry Density (PD)	=	0.763 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	2.3831			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	94 %			
V. Ratio Change Factor F _v , $\frac{e_o}{1+e_o} \times \frac{H}{H_s}$	=	0.1692 mm ⁻¹			
Height of Solid	=	5.912 mm			

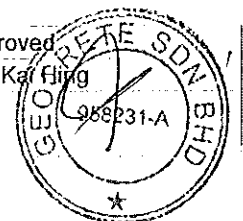
AFTER TEST

Wt of sample + Ring	=	110.54 gm	Overall settlement	=	2.280 mm
Wt of Dry sample + Ring	=	88.06 gm	Volume Change	=	4.479 cm ³
Wt of Ring	=	58.10 gm	Final Volume	=	34.81 cm ³
Wt of Wet sample	=	52.44 gm	Final Bulk Density	=	1.507 Mg/m ³
Wt of Dry sample	=	29.96 gm	Final Dry Density	=	0.861 Mg/m ³
Wt of Moisture	=	22.48 gm	Final Void Ratio, e _f	=	1.9974
Final Moisture Content, M _f	=	75 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	97 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No. BH4 / UD7 / 21.00m

Date of Report

02.01.19

Test started

22.12.18

Ring No.

5

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
			$\Delta e = F \times \Delta H$	$e = e_0 - e_t$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	INDEX	Cc
0	0.000	20.000	0.0000	2.3831	0.0000	0					
6.25	0.594	19.406	0.1005	2.2826	0.1005	6.25	4.9012	4.84	8.90		-0.3338
12.5	0.990	19.010	0.1675	2.2156	0.0670	6.25	3.3355	16.81	2.44		-0.2225
25.0	1.708	18.292	0.2889	2.0942	0.1215	12.5	3.1426	11.56	3.34		-0.4035
50.0	2.632	17.368	0.4452	1.9379	0.1563	25.0	2.1297	8.41	4.20		-0.5193
25	2.526	17.474	0.4273	1.9558	-0.0179	-25.0					
12.5	2.400	17.600	0.4060	1.9771	-0.0213	-12.5					
6.25	2.280	17.720	0.3857	1.9974	-0.0203	-6.2					

Operator

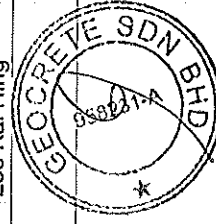
Shyam Nath

Checked

Chris

Approved

Lee Kai Hing



GEocrete SDN. BHD.
(Co. No. 958231-A)

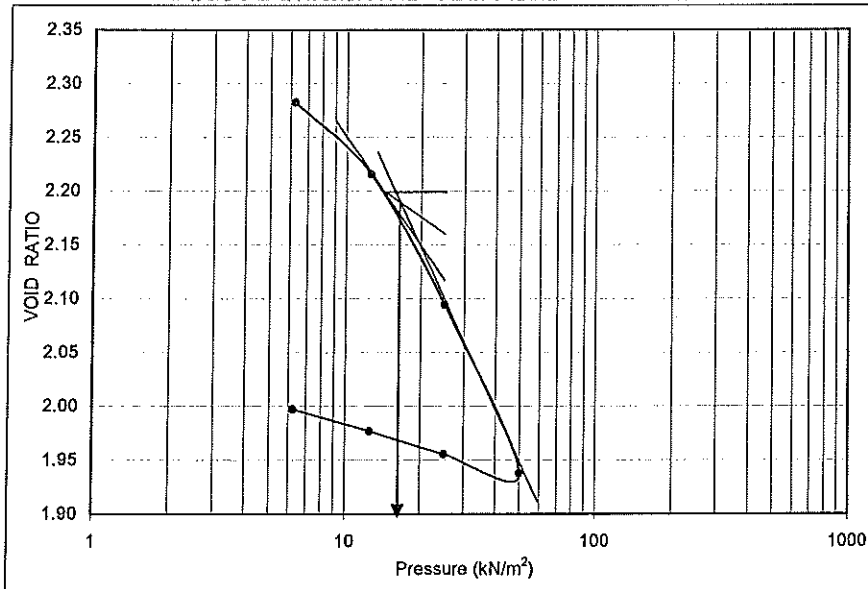
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH4 / UD7 / 21.00m

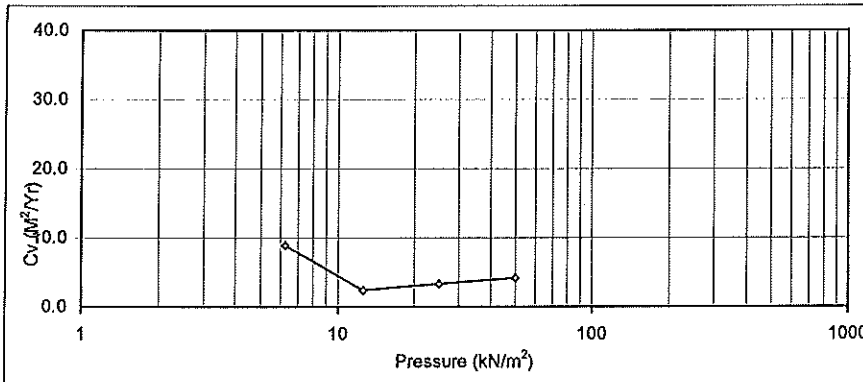
SOIL SAMPLE Dark grey CLAY

Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 5



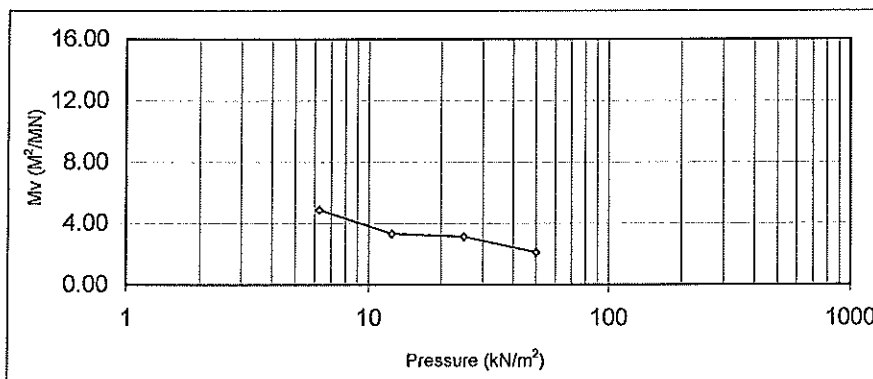
INITIAL

Water content	86	%
Dry Density	0.76	Mg/m ³
Void Ratio	2.3831	
Saturation	94	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



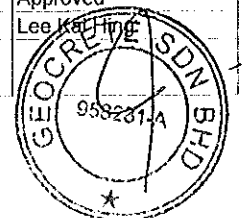
FINAL

Water content	75	%
Dry Density	0.86	Mg/m ³
Void Ratio	1.9974	
Saturation	97	%
Height	18	mm
Comp. Index, C _c	0.5193	
Precons. Load	165	kN/m ²



Comp. Ratio, C_R 0.153

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hong
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Total Stress Triaxial Compression

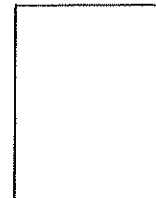
Unconsolidated Undrained

Sample details

Depth : 9.00m
Description : Greenish grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	134.52	139.41	141.10
Bulk Density ρ (Mg/m ³)	1.561	1.618	1.638
Particle Density ρ_s	2.60	2.60	2.60

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	70	140	280
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

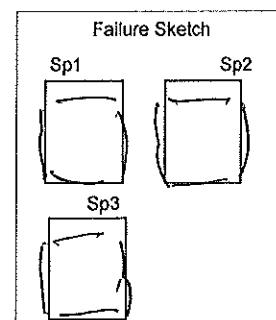
Load Channel 14391 14391 14391

Moisture Content w_0 %	57	56	46
Dry Density ρ_{d0} (Mg/m ³)	0.99	1.04	1.12
Voids Ratio e_0	1.62	1.51	1.32
Deg of Saturation S_0 %	91.90	96.71	90.83

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	13.29	14.93	65.42
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	13.09	14.73	65.22
Strain at Failure ϵ_f %	6.51	5.53	10.00
Shear Strength c_u (kPa)	6.65	7.46	32.71

Moisture Content w_f %	57	56	46
Dry Density ρ_{df} (Mg/m ³)	0.99	1.04	1.12
Voids Ratio e_f	1.62	1.51	1.32
Deg of Saturation S_f %	91.90	96.71	90.83



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU

Date of Test : 23.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

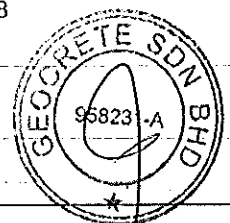
Sample : UD3

Borehole : BH4

Operator
Shyam Nath

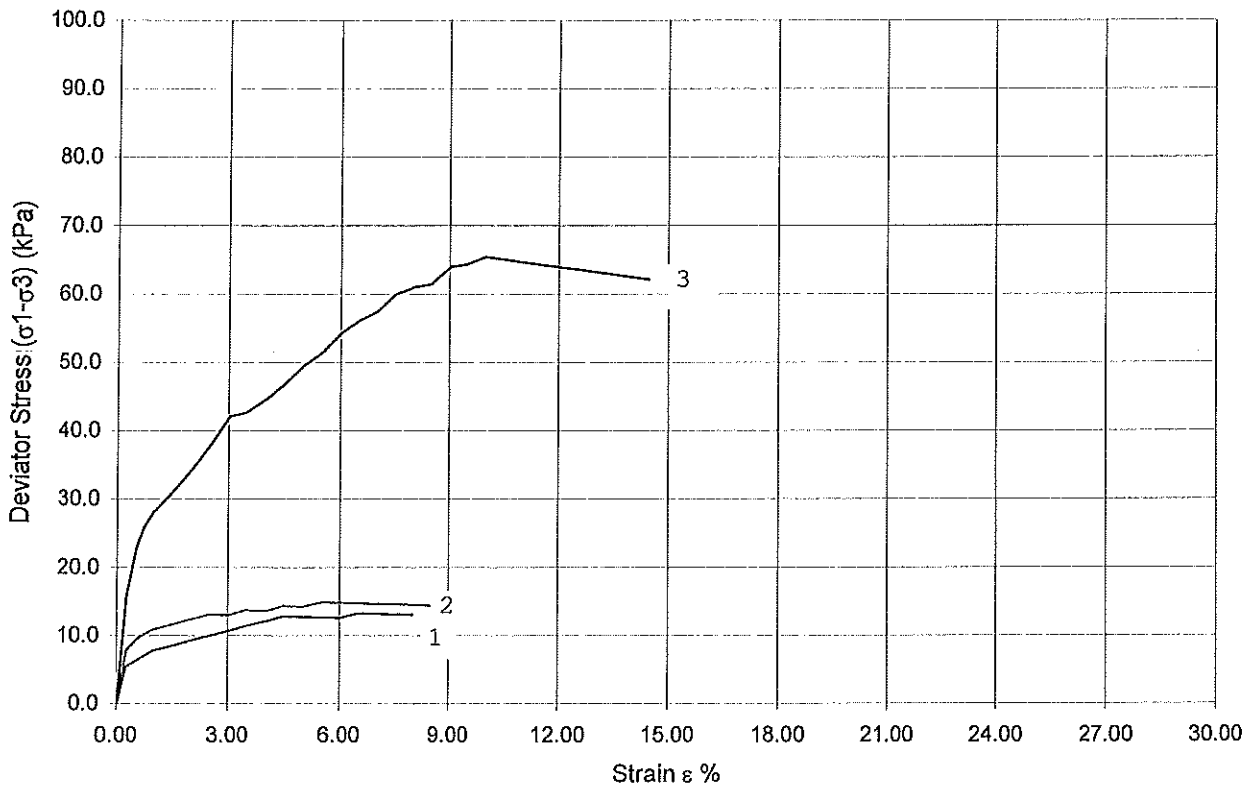
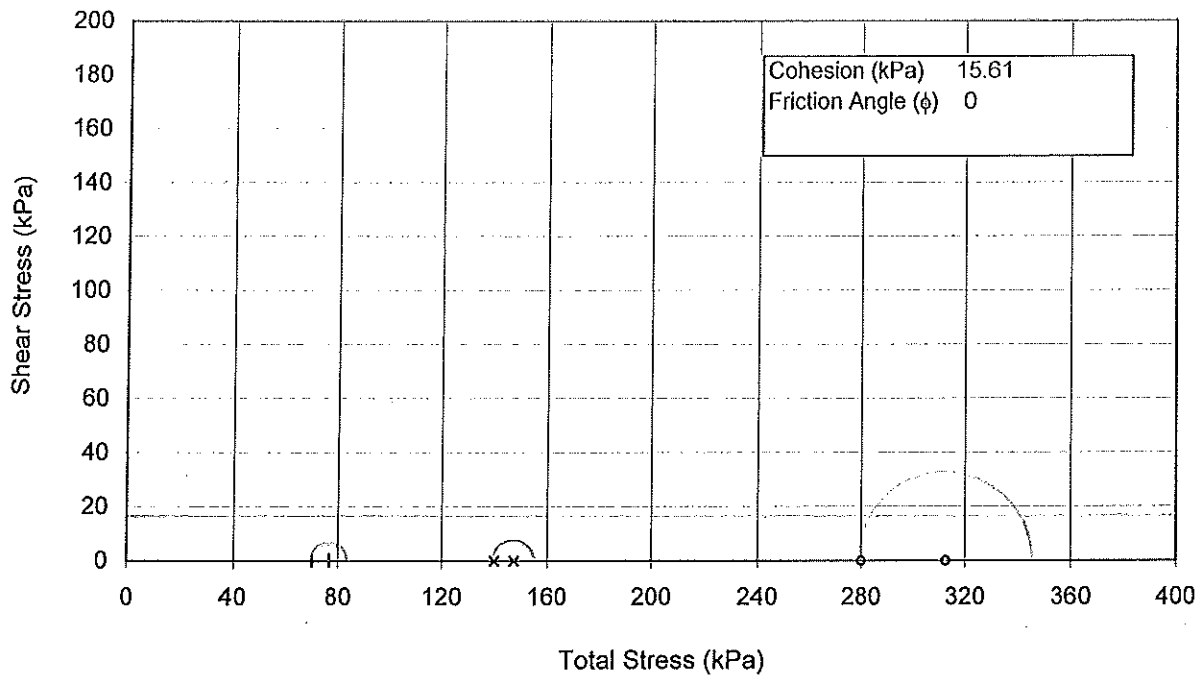
Checked
Chris

Approved
Lee Kai Hing



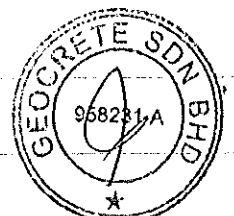
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
Operator : Shyam Nath
Checked : Chris

Test Name : UU
Date of Test : 23.12.18
Sample : UD3
Borehole : BH4
Approved : Lee Kai Hing



Total Stress Triaxial Compression

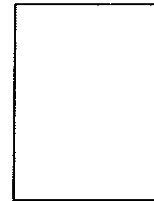
Unconsolidated Undrained

Sample details

Depth : 21.00m
Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	133.05	134.06	136.10
Bulk Density ρ (Mg/m ³)	1.544	1.556	1.580
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



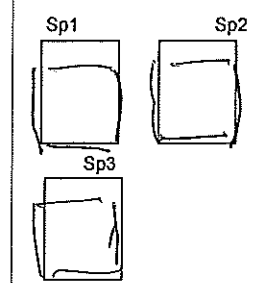
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	160	320	640
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	60	59	57
Dry Density ρ_{d0} (Mg/m ³)	0.97	0.98	1.01
Voids Ratio e_0	1.67	1.63	1.56
Deg of Saturation S_0 %	92.49	92.91	93.93

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	26.60	35.22	38.95
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	26.40	35.02	38.75
Strain at Failure ϵ_f %	9.01	9.01	6.97
Shear Strength c_u (kPa)	13.30	17.61	19.48
Moisture Content w_f %	60	59	57
Dry Density ρ_{df} (Mg/m ³)	0.97	0.98	1.01
Voids Ratio e_f	1.67	1.63	1.56
Deg of Saturation S_f %	92.49	92.91	93.93

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

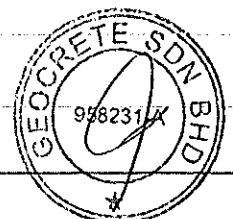
Test Name : UU

Date of Test : 23.12.18

Sample : UD7

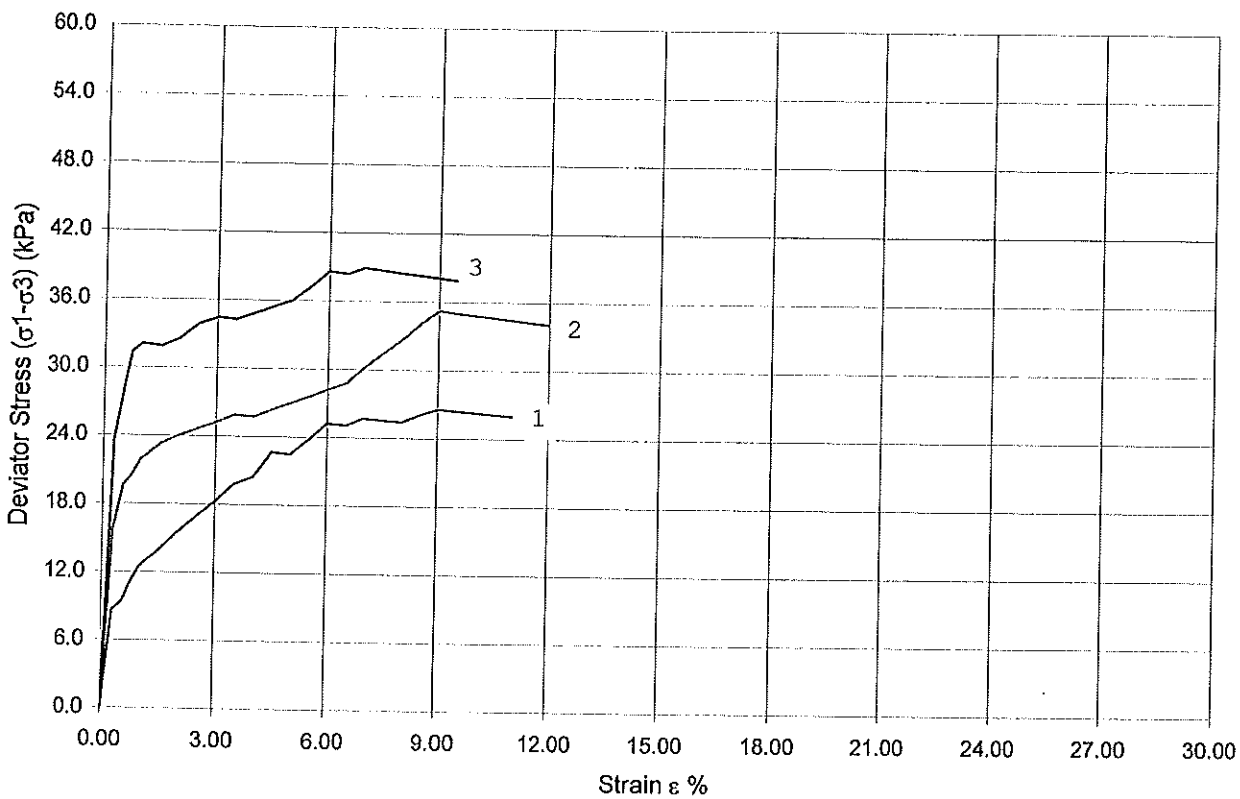
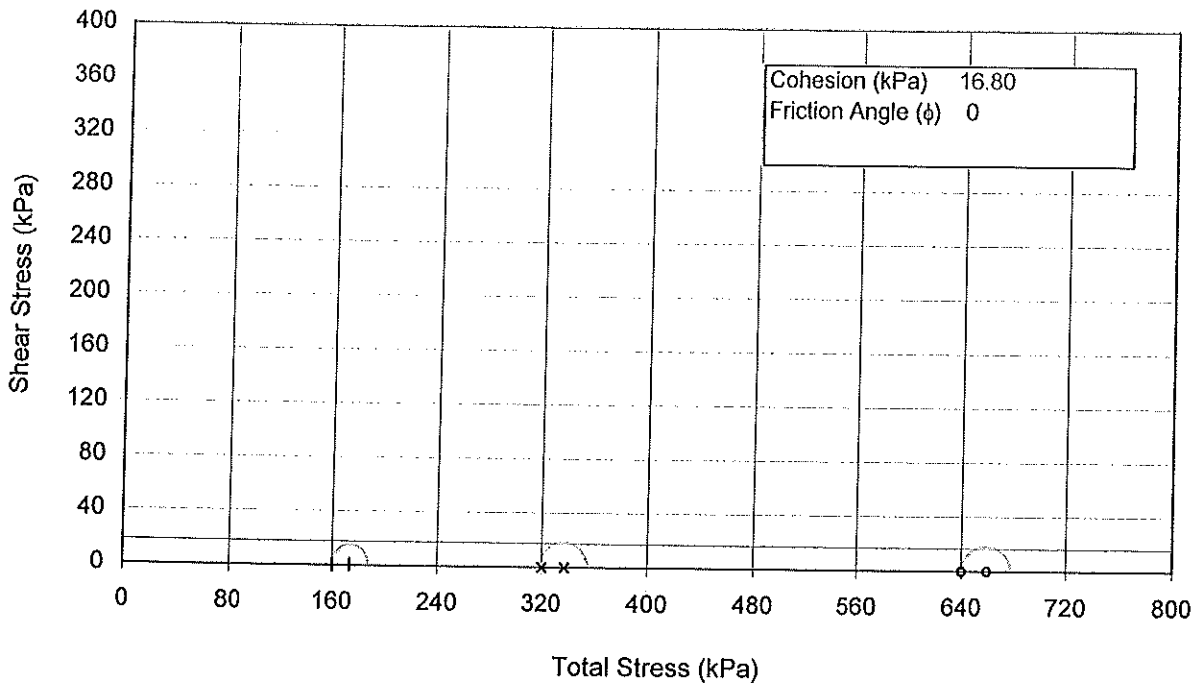
Borehole : BH4

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 23.12.18

Sample : UD7
Borehole : BH4

Approved :
Lee Kai Hing



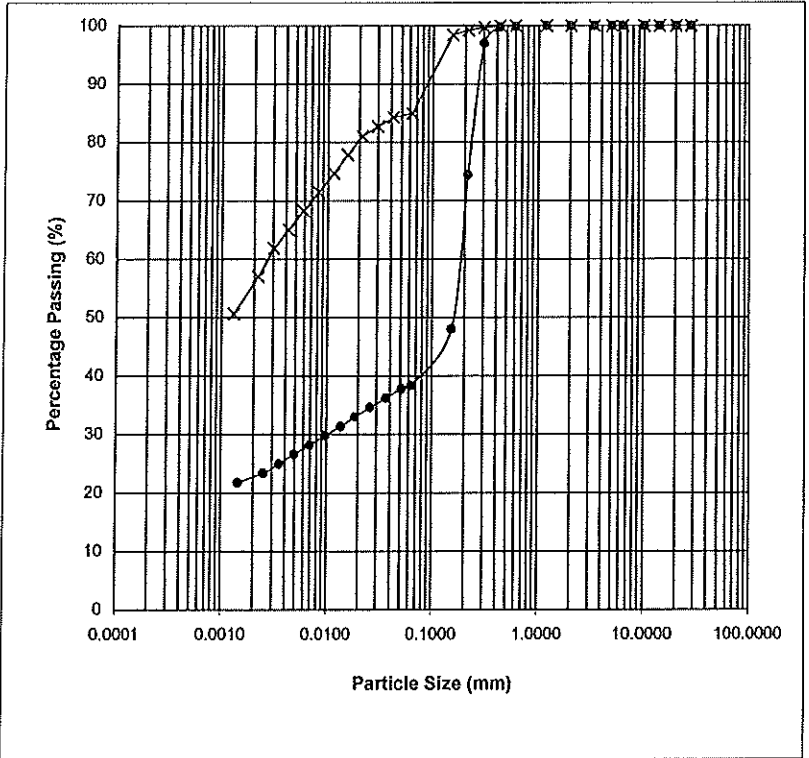
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

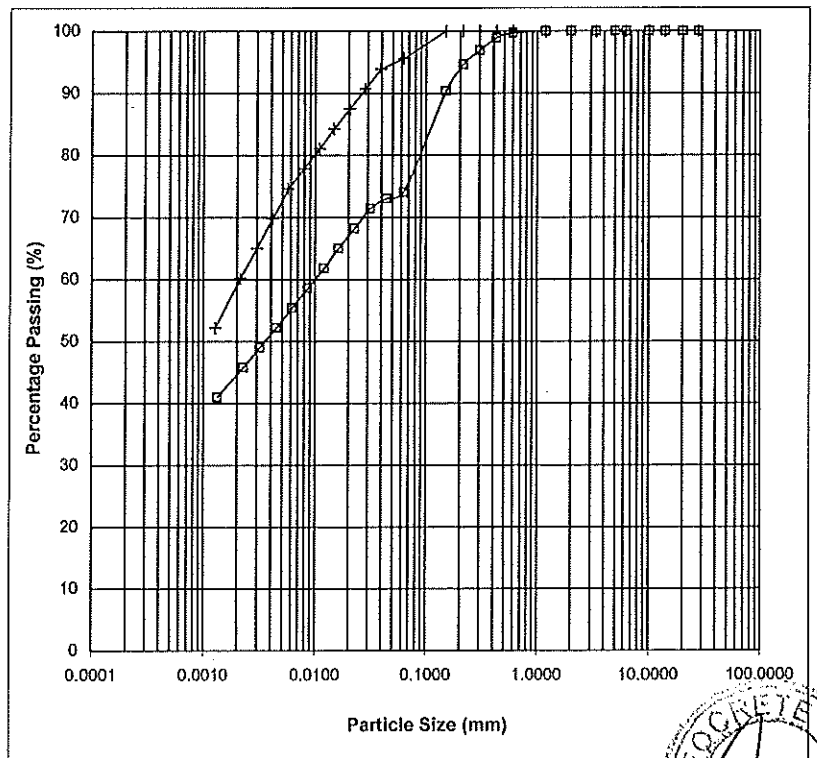
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	97	0.300	100
0.212	74	0.212	99
0.150	48	0.150	98
0.063	38	0.063	85
0.0515	38	0.0416	84
0.0366	36	0.0297	83
0.0260	35	0.0212	81
0.0185	33	0.0152	78
0.0136	31	0.0113	75
0.0097	30	0.0081	71
0.0069	28	0.0058	68
0.0049	27	0.0042	65
0.0035	25	0.0030	62
0.0025	23	0.0022	57
0.0014	22	0.0013	51
Clay (%)	22	Clay (%)	54
Silt (%)	16	Silt (%)	31
Sand (%)	62	Sand (%)	15
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH5	UD1	3.00	04.01.19
x	BH5	UD2	6.00	04.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	100
0.300	97	0.300	100
0.212	95	0.212	100
0.150	90	0.150	100
0.063	74	0.063	96
0.0442	73	0.0393	94
0.0315	71	0.0283	91
0.0226	68	0.0204	87
0.0162	65	0.0147	84
0.0120	62	0.0109	81
0.0086	59	0.0079	78
0.0062	55	0.0057	75
0.0044	52	0.0041	70
0.0032	49	0.0030	65
0.0023	46	0.0021	60
0.0013	41	0.0013	52
Clay (%)	43	Clay (%)	56
Silt (%)	31	Silt (%)	39
Sand (%)	26	Sand (%)	5
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH5	UD3	9.00	04.01.19
+	BH5	UD7	21.00	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved	
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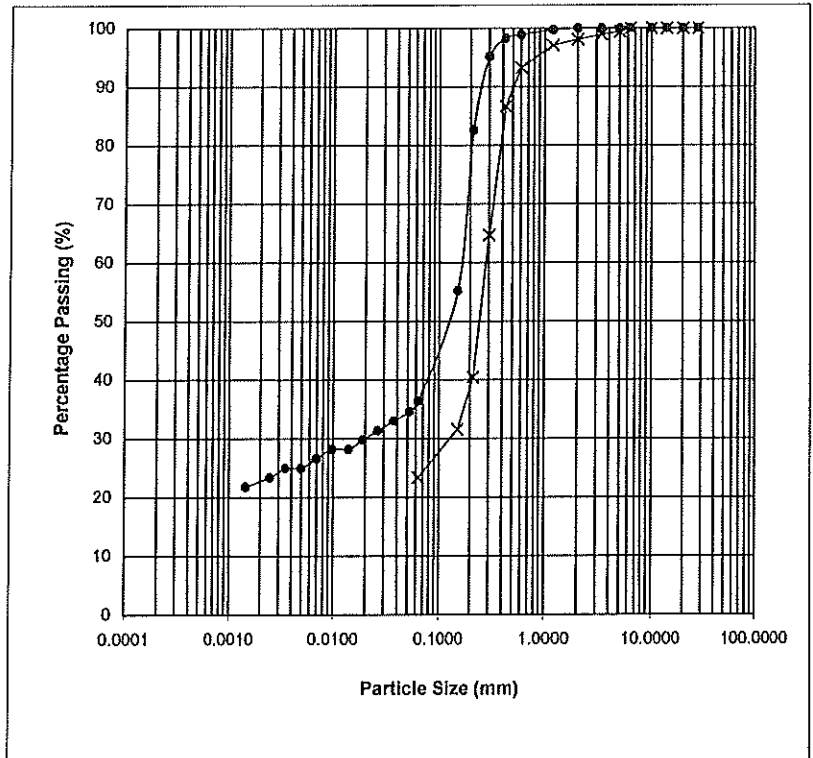
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND
ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

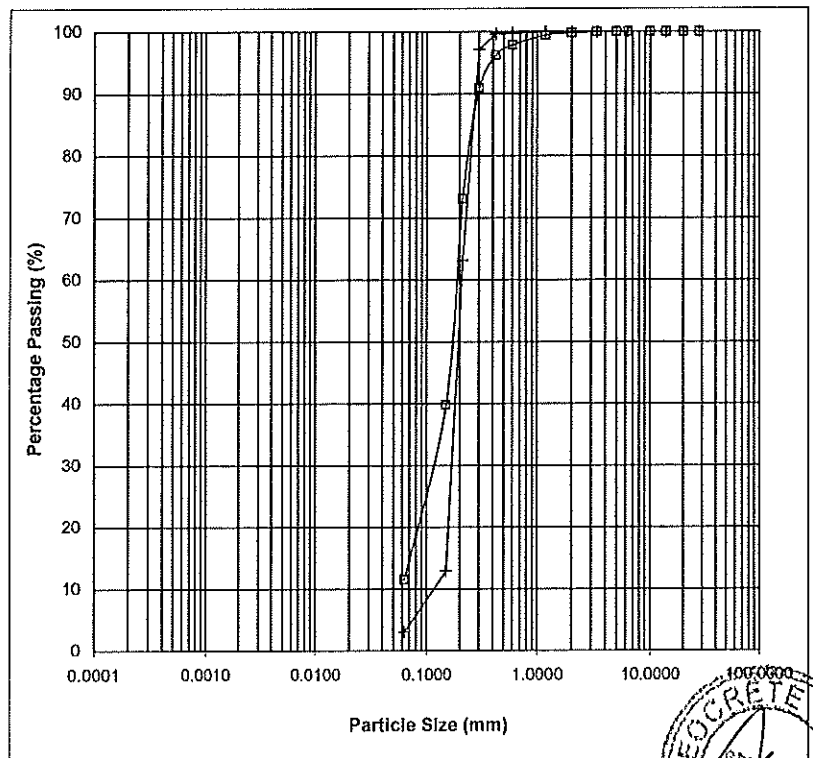
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	99
3.35	100	3.35	99
2.00	100	2.00	98
1.18	100	1.18	97
0.600	99	0.600	93
0.425	98	0.425	87
0.300	95	0.300	65
0.212	83	0.212	40
0.150	55	0.150	32
0.063	36	0.063	23
0.0521	35		
0.0370	33		
0.0263	31		
0.0187	30		
0.0138	28		
0.0097	28		
0.0069	27		
0.0049	25		
0.0035	25		
0.0025	23		
0.0014	22		
Clay (%)	22	Clay (%)	23
Silt (%)	14	Silt (%)	
Sand (%)	64	Sand (%)	75
Gravel (%)	0	Gravel (%)	2
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH5	D14	31.50	04.01.19
x	BH5	D18	37.50	04.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	98	0.600	100
0.425	96	0.425	100
0.300	91	0.300	97
0.212	73	0.212	63
0.150	40	0.150	13
0.063	12	0.063	3
Clay (%)	12	Clay (%)	3
Silt (%)		Silt (%)	
Sand (%)	88	Sand (%)	97
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH5	D23	45.00	04.01.19
+	BH5	D26	49.50	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

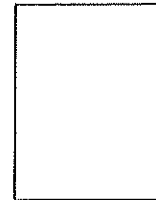
Unconsolidated Undrained

Sample details

Depth : 9.00m
 Description : Grey sandy CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	138.42	140.16	142.05
Bulk Density ρ (Mg/m ³)	1.607	1.627	1.649
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	70	140	280
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

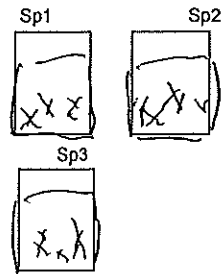
Load Channel : 14391 14391 14391

Moisture Content w_0 %	43	41	38
Dry Density ρ_{d0} (Mg/m ³)	1.12	1.16	1.19
Voids Ratio e_0	1.36	1.29	1.22
Deg of Saturation S_0 %	83.97	83.58	83.11

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	25.43	53.65	59.02
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	25.23	53.45	58.82
Strain at Failure ϵ_f %	8.03	6.97	10.00
Shear Strength c_u (kPa)	12.72	26.83	29.51

Failure Sketch



Moisture Content w_f %	43	41	38
Dry Density ρ_{df} (Mg/m ³)	1.12	1.16	1.19
Voids Ratio e_f	1.36	1.29	1.22
Deg of Saturation S_f %	83.97	83.58	83.11

Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

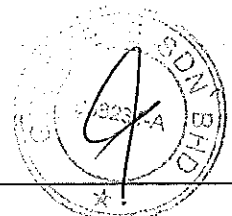
Test Name : UU

Date of Test : 05.01.19

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

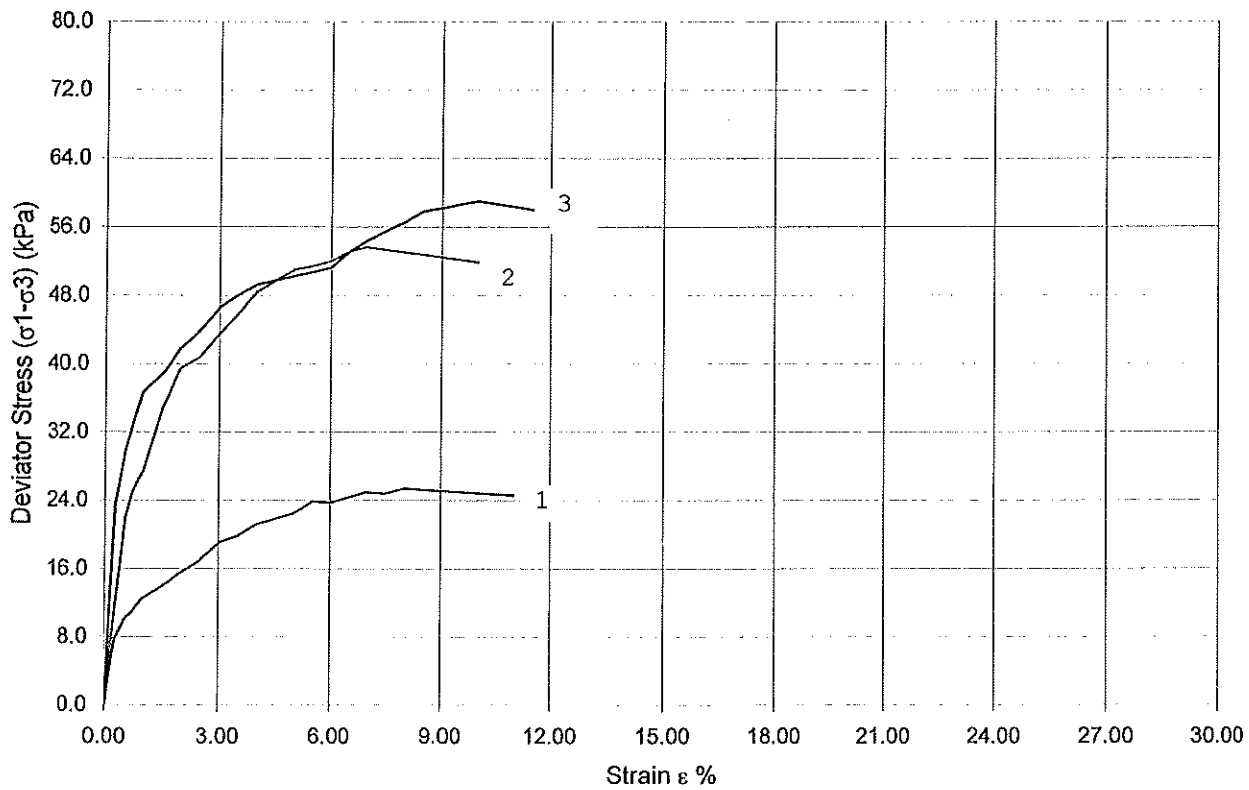
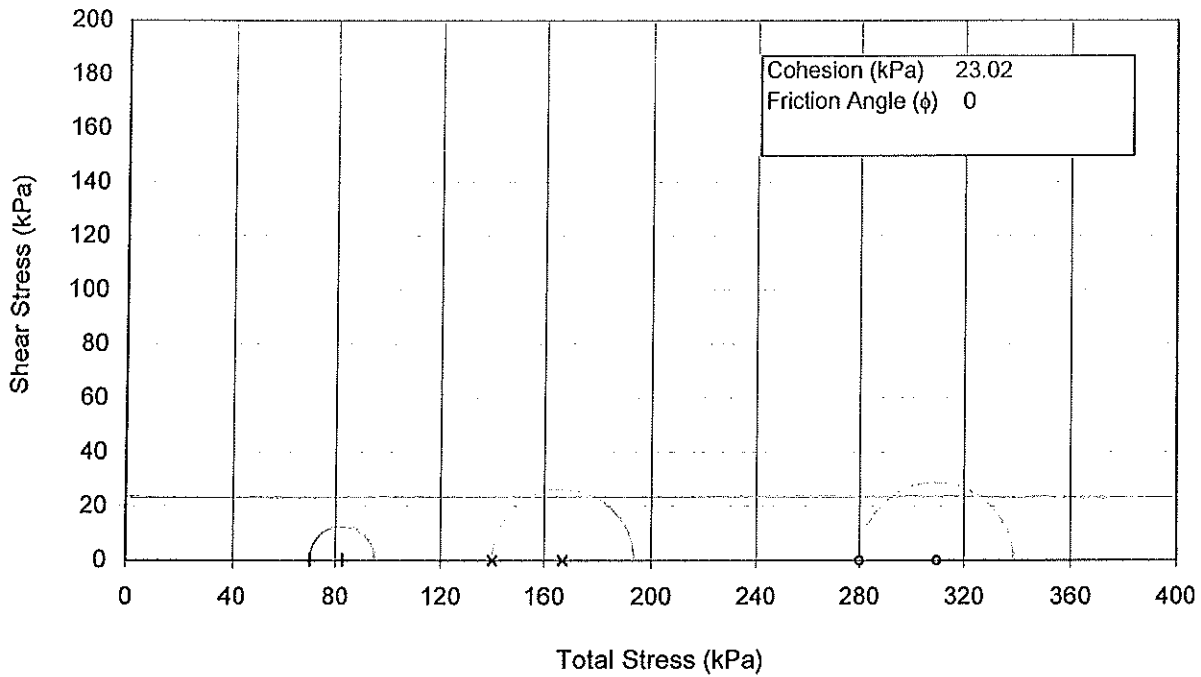
Sample : UD3
 Borehole : BH5
 Approved
 Lee Kai Hing

Operator Checked
 Shyam Nath Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 05.01.19

Sample : UD3
Borehole : BH5

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 21.00m
Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	134.26	135.86	137.44
Bulk Density ρ (Mg/m ³)	1.558	1.577	1.595
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	160	320	640
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

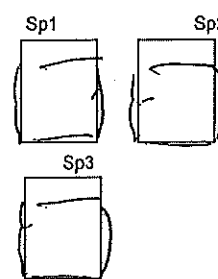
Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	54	53	51
Dry Density ρ_{d0} (Mg/m ³)	1.01	1.03	1.05
Voids Ratio e_0	1.55	1.51	1.45
Deg of Saturation S_0 %	89.85	91.13	91.46

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	33.59	37.60	49.48
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	33.39	37.40	49.28
Strain at Failure ϵ_f %	5.53	8.49	10.53
Shear Strength c_u (kPa)	16.79	18.80	24.74

Failure Sketch



Moisture Content w_f %	54	53	51
Dry Density ρ_{df} (Mg/m ³)	1.01	1.03	1.05
Voids Ratio e_f	1.55	1.51	1.45
Deg of Saturation S_f %	89.85	91.13	91.46

Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU

Date of Test : 05.01.19

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

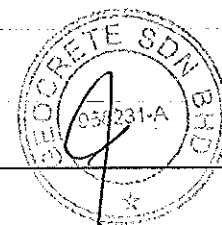
Sample : UD7

Borehole : BH5

Operator
Shyam Nath

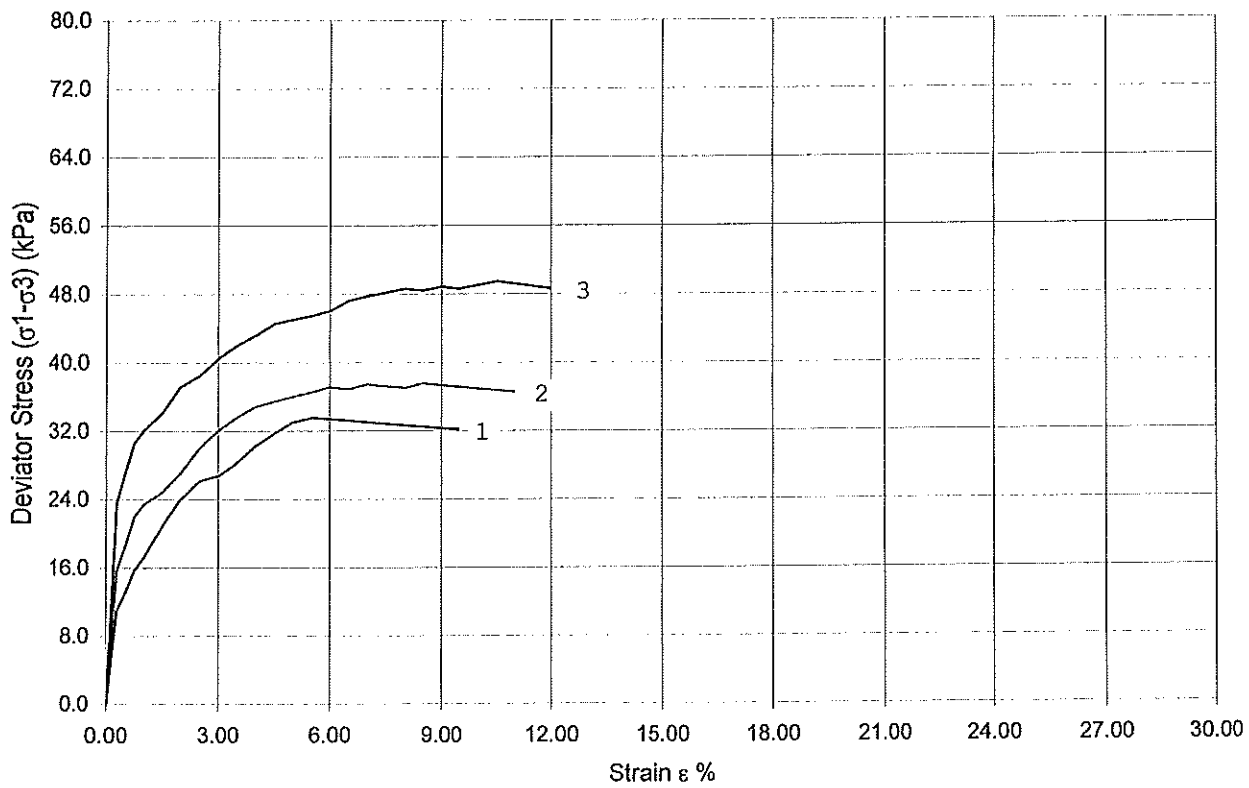
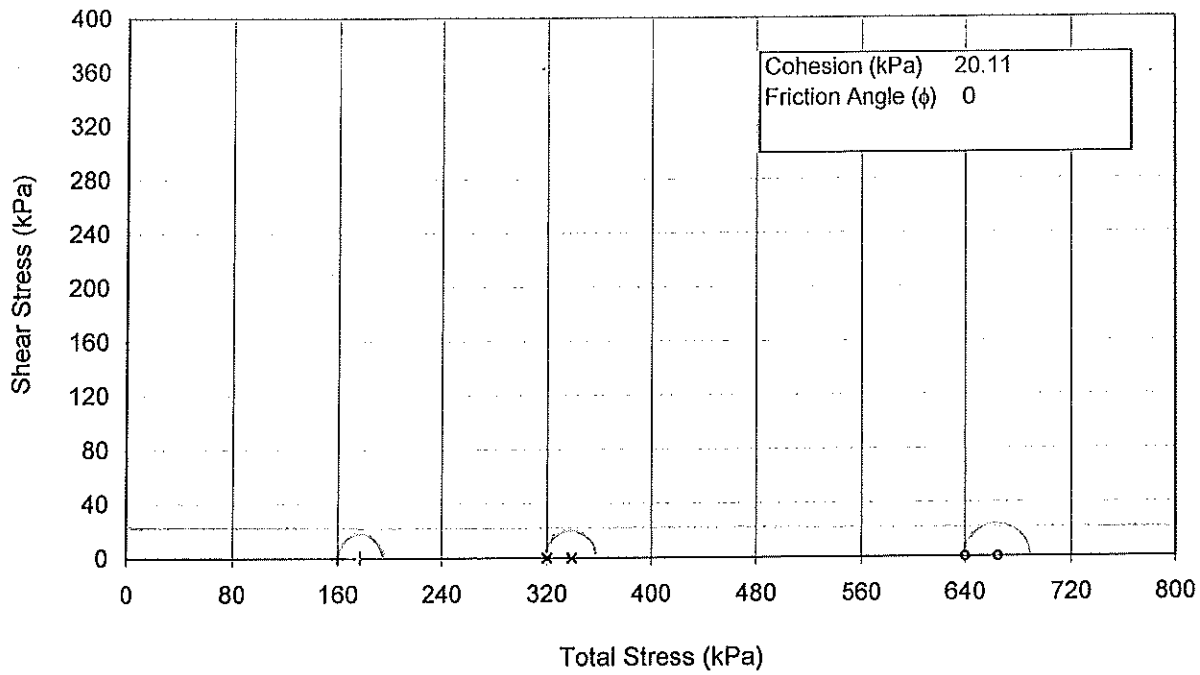
Checked
Chris

Approved
Lee Kai Hing



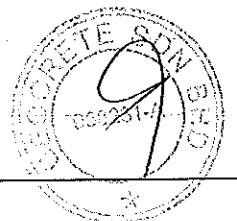
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
Operator : Shyam Nath
Checked : Chris

Test Name : UU
Date of Test : 05.01.19
Sample : UD7
Borehole : BH5
Approved : Lee Kai Hing



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 5 / D 18 (37.50 m)

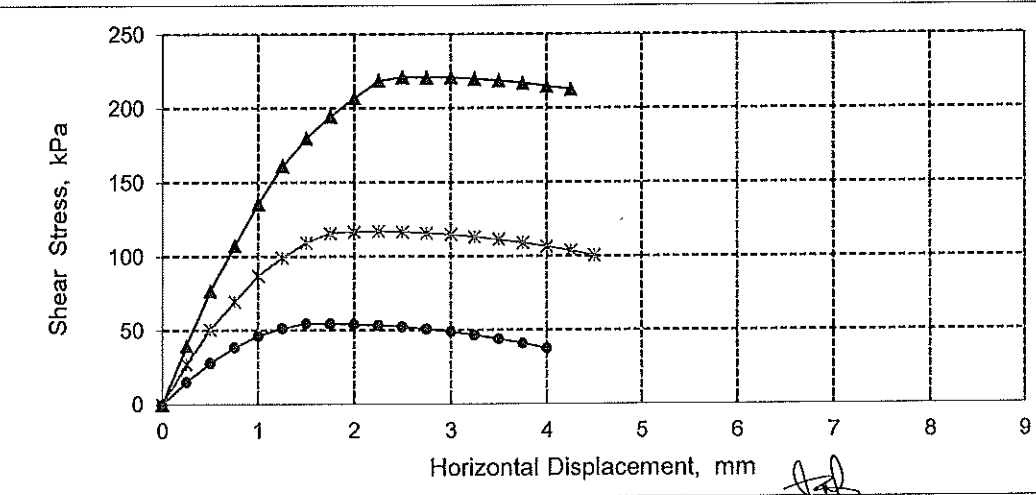
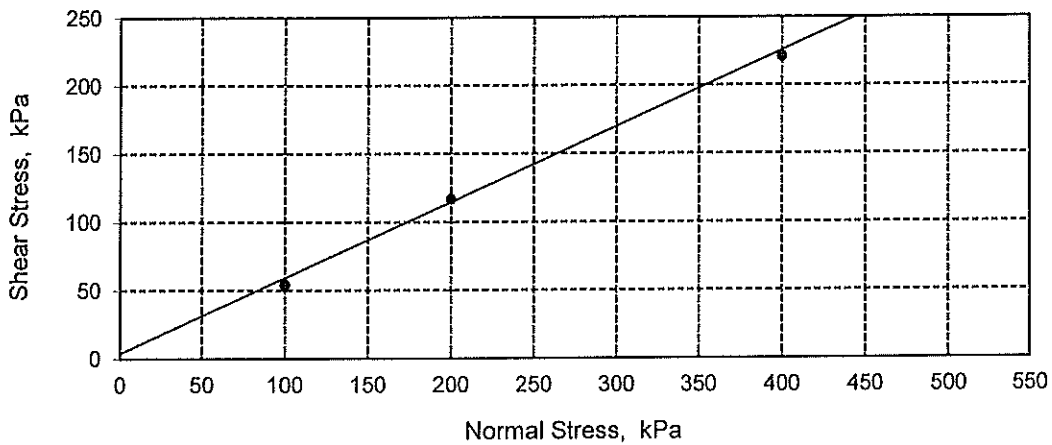
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 9 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		135.7	134.6	135.1
Moisture Content (%)		20.5	20.3	19.8
Bulk Density (Mg/m ³)		1.885	1.870	1.876
Dry Density (Mg/m ³)		1.564	1.554	1.566

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		54.7	117.2	221.2
Displ. at Failure (mm)		1.5	2.3	2.5
Settlement (mm)		0.1	0.2	0.3

	c' 4 kPa
	φ' 29 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 5 / D 26 (49.50 m)

Test Size : 60 mm x 60 mm x 20 mm

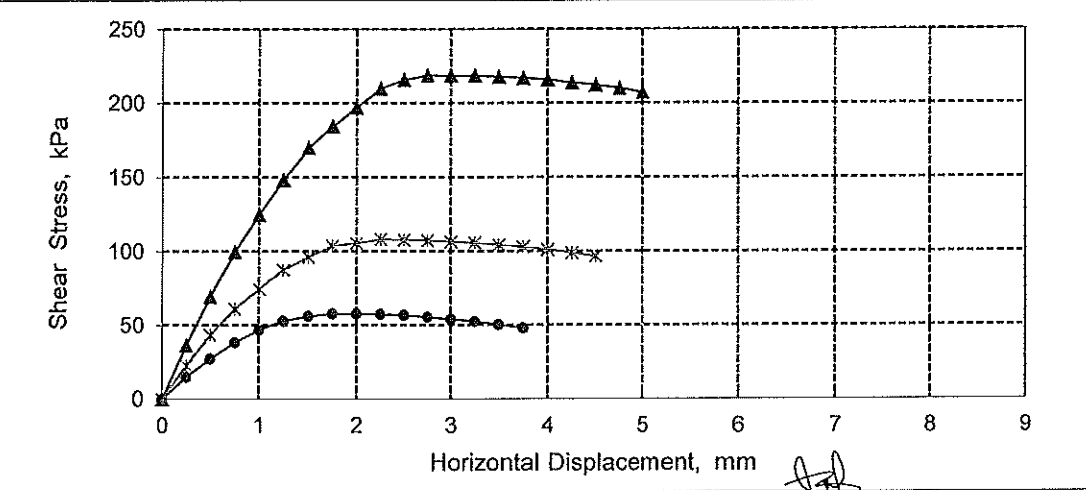
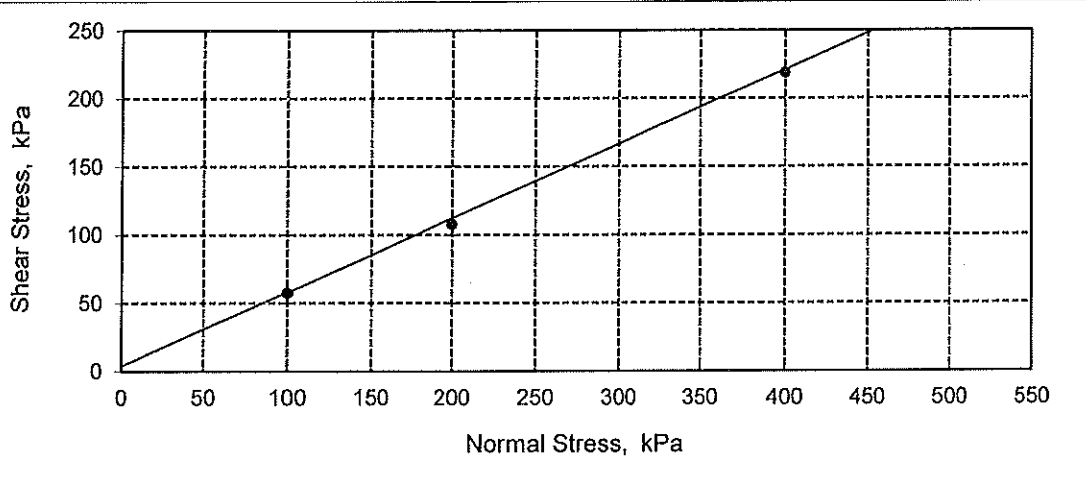
Date Tested : 9 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		142.3	141.9	142.6
Moisture Content (%)		16.5	16.7	17.0
Bulk Density (Mg/m ³)		1.976	1.971	1.981
Dry Density (Mg/m ³)		1.696	1.689	1.693

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		57.7	108.1	219.0
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.2	0.4	0.6

c' 4 kPa

φ' 28.5 deg.



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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No.	BH5 / UD3 / 9.00m	Test Started	03.01.19
Soil Description	Grey sandy CLAY	Ring No.	10

BEFORE TEST

Moist. Content from trimmings:	=	34 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	129.09 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.13 gm	Area (A)	=	1964 mm ²
Wt of sample	=	68.96 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	52.73 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	16.23 gm	Bulk Density (P)	=	1.755 Mg/m ³
Initial Moisture Content, M _o	=	31 %	Dry Density (PD)	=	1.342 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	0.9743			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	84 %			
V. Ratio Change Factor F _v , $\frac{1+e_o}{H}$	=	0.0987 mm ⁻¹			
Height of Solid H _s	=	10.130 mm			

AFTER TEST

Wt of sample + Ring	=	126.66 gm	Overall settlement	=	1.954 mm
Wt of Dry sample + Ring	=	112.86 gm	Volume Change	=	3.838 cm ³
Wt of Ring	=	60.13 gm	Final Volume	=	35.45 cm ³
Wt of Wet sample	=	66.53 gm	Final Bulk Density	=	1.877 Mg/m ³
Wt of Dry sample	=	52.73 gm	Final Dry Density	=	1.488 Mg/m ³
Wt of Moisture	=	13.80 gm	Final Void Ratio, e _r	=	0.7815
Final Moisture Content, M _r	=	26 %			
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	89 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



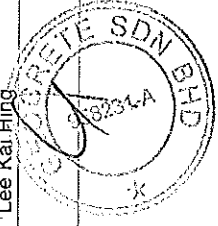
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No	BH5 / UD3 / 9.00m	Test started	03.01.19
		Ring No.	10

Pressure (P) kN/m ²	Settlement ΔH (mm)		VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
	$H=H_0-\Delta H$ (mm)	$\Delta_0 = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)		
0	0.000	0.0000	0.9743	0.0000	0					
12.5	0.208	0.0205	0.9538	0.0205	12.5	0.8414	4.00	10.98	-0.0682	
25.0	0.344	0.0340	0.9404	0.0134	12.5	0.5539	2.89	14.94	-0.0446	
50.0	0.570	0.0563	0.9181	0.0223	25.0	0.4656	4.00	10.60	-0.0741	
100	0.948	0.0936	0.8808	0.0373	50.0	0.3971	1.96	20.97	-0.1240	
200	1.428	0.1410	0.8334	0.0474	99.9	0.2587	2.25	17.46	-0.1574	
400	1.998	0.1972	0.7771	0.0563	199.8	0.1584	1.96	18.94	-0.1869	
800	2.496	0.2464	0.7279	0.0492	400.7	0.0710	1.44	24.29	-0.1633	
400	2.382	0.2351	0.7392	-0.0113	-400.7					
100	2.186	0.2158	0.7585	-0.0193	-299.8					
25	1.954	0.1929	0.7815	-0.0229	-74.9					

Operator : Shyam Nath Checked : Chris Approved : Lee Kai Hing



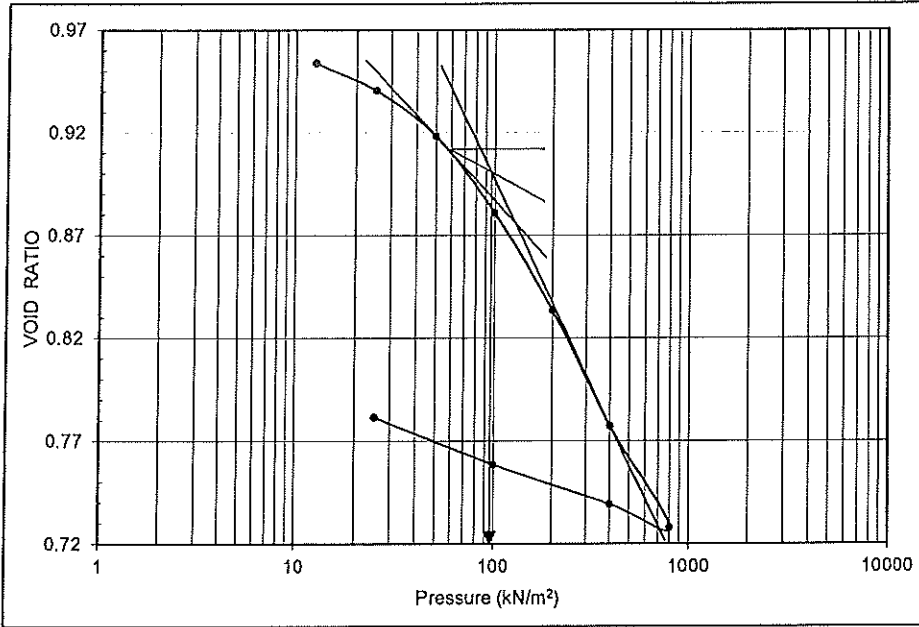
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

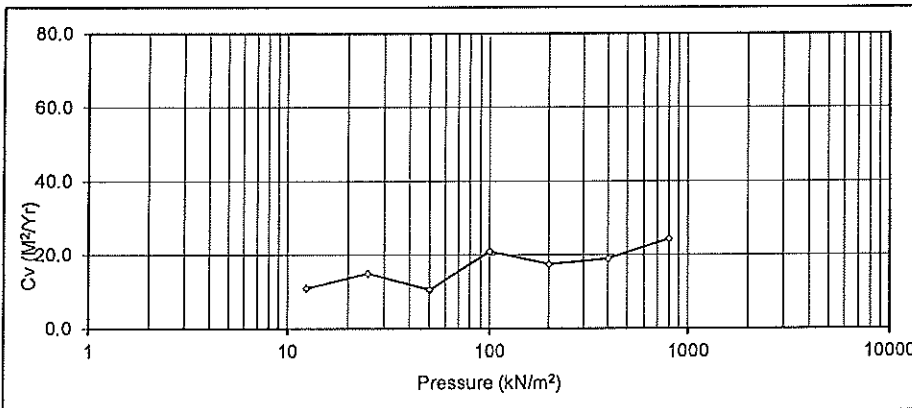
PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH5 / UD3 / 9.00m
 SOIL SAMPLE Grey sandy CLAY

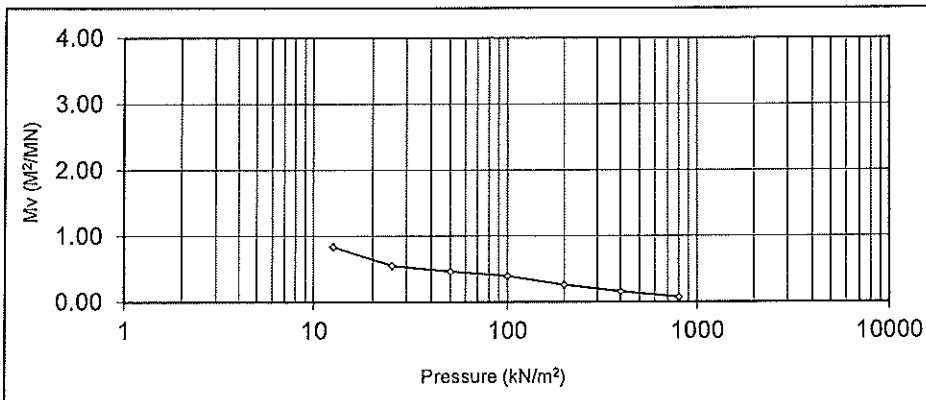
Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 10



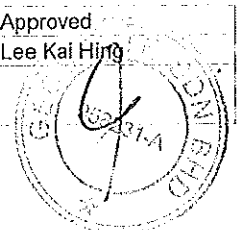
INITIAL		
Water content	31	%
Dry Density	1.34	Mg/m ³
Void Ratio	0.9743	
Saturation	84	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL		
Water content	26	%
Dry Density	1.49	Mg/m ³
Void Ratio	0.7815	
Saturation	89	%
Height	18	mm
Comp. Index, Cc	0.1869	
Precons. Load	95	kN/m ²



Comp. Ratio, C _R	0.095	
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GEOCRETE SDN. BHD.

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
	BH5 / UD7 / 21.00m	Test Started	03.01.19
Sample No.	BH5 / UD7 / 21.00m	Ring No.	11
Soil Description	Dark grey CLAY		

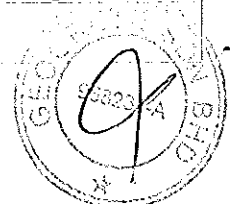
BEFORE TEST

Moist. Content from trimmings:	=	72 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	116.90 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.38 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.52 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	34.91 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	23.61 gm	Bulk Density (P)	=	1.490 Mg/m ³
Initial Moisture Content, M _o	=	68 %	Dry Density (PD)	=	0.889 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.9034			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F _v , $\frac{1+e_o}{H}$	=	0.1452 mm ⁻¹			
Height of Solid H _s	=	6.889 mm			

AFTER TEST

Wt of sample + Ring	=	113.33 gm	Overall settlement	=	2.368 mm
Wt of Dry sample + Ring	=	93.29 gm	Volume Change	=	4.651 cm ³
Wt of Ring	=	58.38 gm	Final Volume	=	34.63 cm ₃
Wt of Wet sample	=	54.95 gm	Final Bulk Density	=	1.587 Mg/m ³
Wt of Dry sample	=	34.91 gm	Final Dry Density	=	1.008 Mg/m ³
Wt of Moisture	=	20.04 gm	Final Void Ratio, e _r	=	1.5596
Final Moisture Content, M _r	=	57 %			
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	95 %			

	Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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ONE DIMENSIONAL CONSOLIDATION TEST

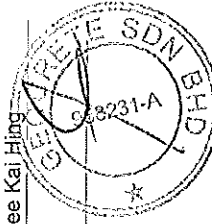
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH5 / UD7 / 21.00m

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 11

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.9034	0.0000	0				
6.25	0.254	19.746	0.0369	1.8665	0.0369	6.25	2.0597	3.61	12.14	-0.1225
12.5	0.550	19.450	0.0798	1.8235	0.0430	6.25	2.4368	3.61	11.81	-0.1428
25.0	1.036	18.954	0.1504	1.7530	0.0706	12.5	2.0518	9.61	4.26	-0.2344
50.0	1.886	18.114	0.2738	1.6296	0.1234	25.0	1.8784	10.24	3.73	-0.4099
100	2.882	17.118	0.4184	1.4850	0.1446	50.0	1.1646	5.29	6.51	-0.4804
50	2.694	17.306	0.3911	1.5123	-0.0273	-50.0				
25	2.518	17.482	0.3655	1.5379	-0.0255	-25.0				
12.5	2.368	17.632	0.3438	1.5596	-0.0218	-12.5				

Operator : Shyam Nath
 Checked : Chris
 Approved : Lee Kai Hing



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 (Co. No. 958231-A)

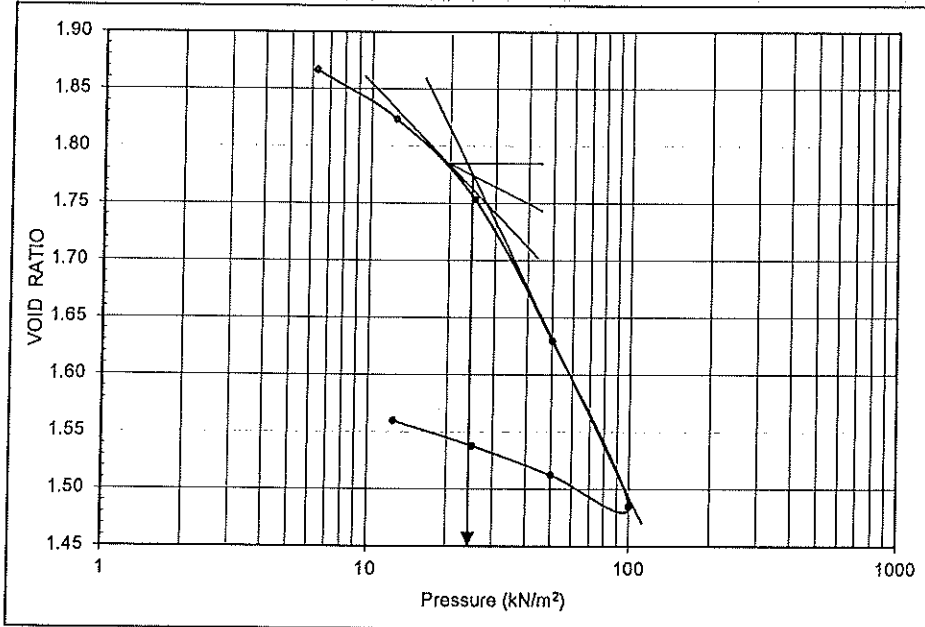
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

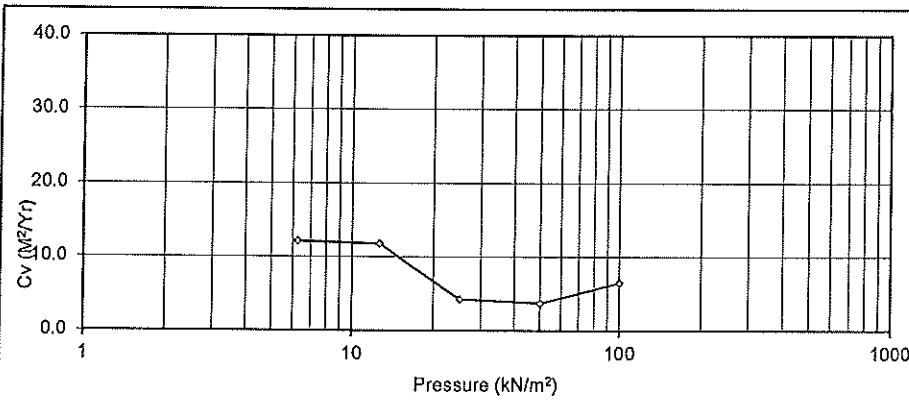
BH REF BH5 / UD7 / 21.00m

SOIL SAMPLE Dark grey CLAY

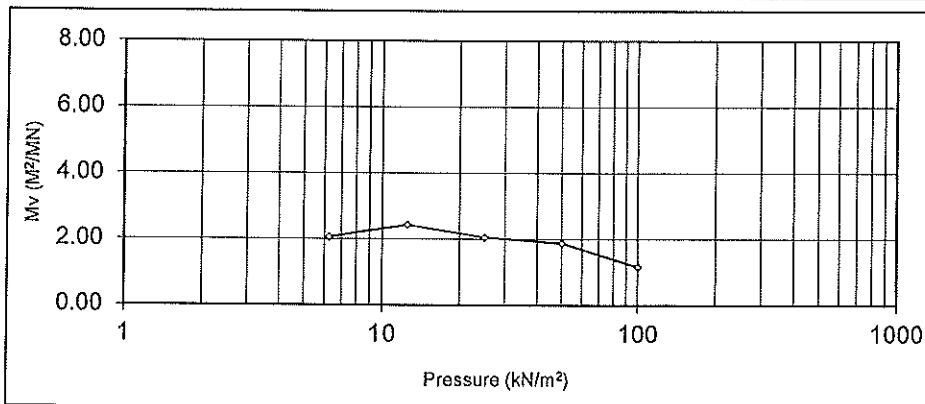
Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 11



INITIAL		
Water content	68	%
Dry Density	0.89	Mg/m ³
Void Ratio	1.9034	
Saturation	92	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL		
Water content	57	%
Dry Density	1.01	Mg/m ³
Void Ratio	1.5596	
Saturation	95	%
Height	18	mm
Comp. Index, Cc	0.4804	
Precons. Load	24	kN/m ²
Comp. Ratio, C _R	0.165	



GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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SUMMARY OF TEST RESULTS

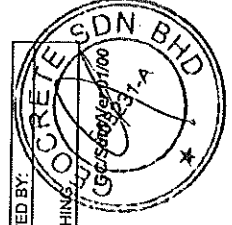
GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR												REF : L081/18/139/18 DATE : 07.12.18																																
SAMPLE AND SPECIMEN DETAILS.	Borehole No.	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	ATTERBERG LIMITS			Linear Shrinkage (%)	SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)	SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST																							
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)		Clay (%)	Silt (%)	Sand (%)	Gravels (%)		Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pe (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)																		
	BH6	UD1	3.00	57	1.60	1.00	58	25	33	9.3	4	4	0	2.58					22.00	0	28	0.428	5.3	0.11	0.59	7.2																				
		UD2	6.00	22	1.89	1.55	NP	NP	NA	NA	18	14	68	0					NA																											
		UD3	9.00	18	1.99	1.68					21	79	0																																	
		UD4	12.00	37	1.76	1.28	43	22	21		32	22	46	0						36.80	0																									
		UD6	18.00	46	1.69	1.16	47	22	25	7.4	41	30	29	0	2.62					44.50	0	46	0.184																							
		D10	22.50	27	NA	NA					8	92	0																																	
		D11	24.00	18	NA	NA					11	89	0																																	
		D15	30.00	21	NA	NA					2	98	0																																	
		D18	34.50	21	NA	NA					5	95	0		2.70																															
		D19	36.00																																											
		D27	46.50	19	NA	NA					9	91	0																																	
		D28	48.00	15	NA	NA					7	93	0																																	
		D30	51.00	13	2.01	1.68					7	93	0																																	
		D32	54.00	15	NA	NA					6	94	0																																	
		D34	57.00	27	1.96	1.65					24	16	60	0																																
		D36	60.00	14	NA	NA					22	78	0																																	

Note : NES = NOT ENOUGH SAMPLE
NP = NON PLASTIC
NA = NOT APPLICABLE

Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT. ** BH6 UD2 - TRIAXIAL TESTS (UU) CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN (NP).

SUM



APPROVED BY:
LEE KAI HING

CHECKED BY:
CHRIS

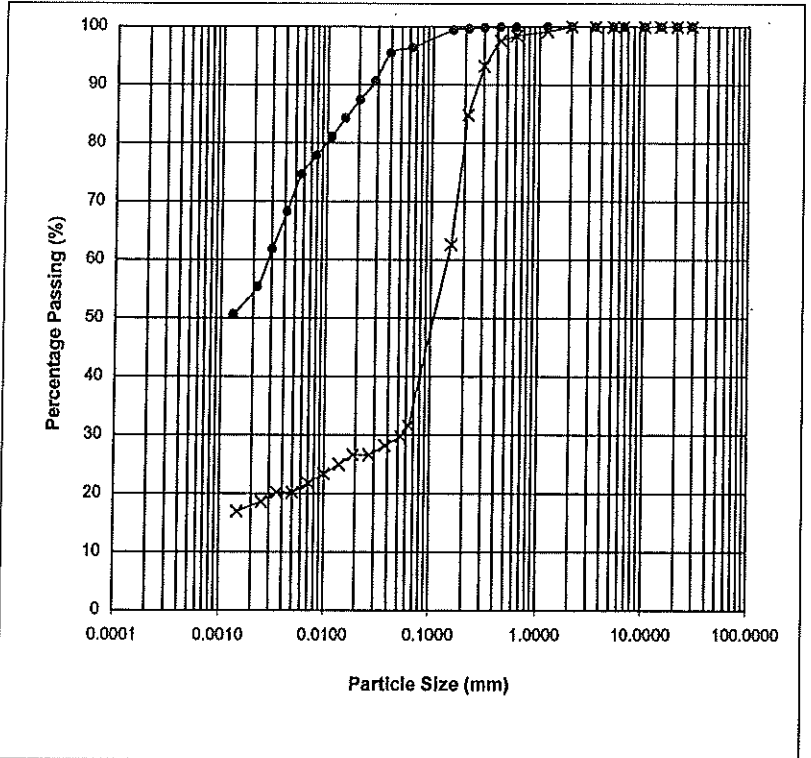
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

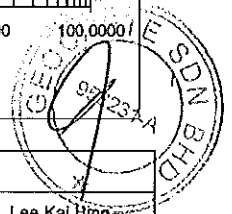
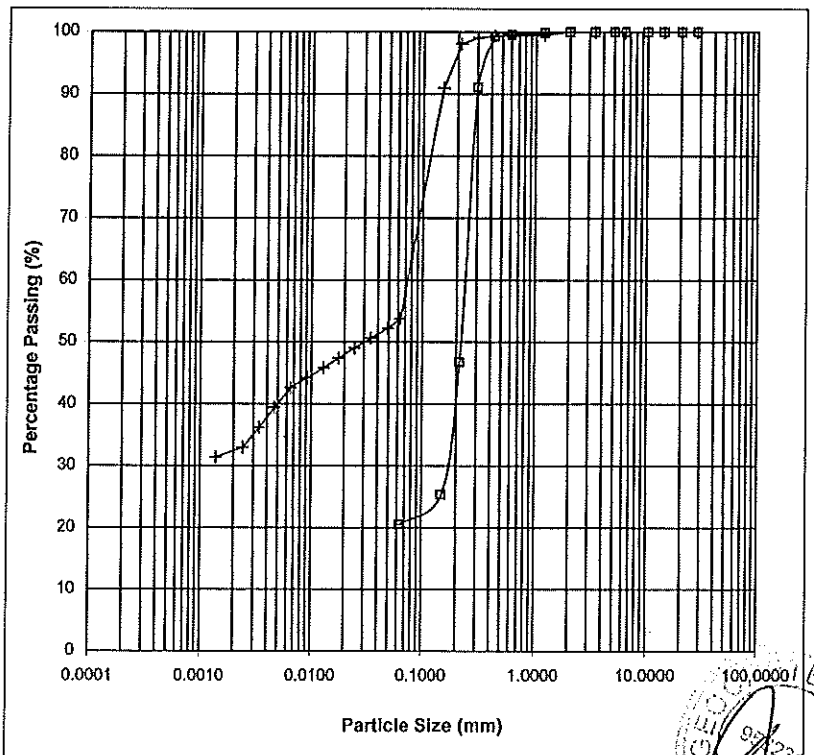
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	99	
0.600	100	0.600	98	
0.425	100	0.425	98	
0.300	100	0.300	93	
0.212	100	0.212	85	
0.150	99	0.150	63	
0.063	96	0.063	32	
0.0389	96	0.0530	30	
0.0283	91	0.0377	28	
0.0204	87	0.0268	27	
0.0147	84	0.0189	27	
0.0109	81	0.0139	25	
0.0079	78	0.0099	23	
0.0057	75	0.0070	22	
0.0041	68	0.0050	20	
0.0030	62	0.0035	20	
0.0022	55	0.0025	19	
0.0013	51	0.0015	17	
Clay (%)		53	Clay (%)	18
Silt (%)		43	Silt (%)	14
Sand (%)		4	Sand (%)	68
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH6	UD1	3.00	29.11.18
x	BH6	UD2	6.00	29.11.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	99	
0.425	99	0.425	99	
0.300	91	0.300	99	
0.212	47	0.212	98	
0.150	25	0.150	91	
0.063	21	0.063	54	
		0.0486	52	
		0.0346	51	
		0.0246	49	
		0.0175	47	
		0.0129	46	
		0.0092	44	
		0.0065	43	
		0.0047	39	
		0.0033	36	
		0.0024	33	
		0.0014	31	
Clay (%)		21	Clay (%)	32
Silt (%)			Silt (%)	22
Sand (%)		79	Sand (%)	46
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH6	UD3	9.00	29.11.18
+	BH6	UD4	12.00	29.11.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :		Checked :		Approved :	
		Shyam Nath		Chris		Lee Kai Hing

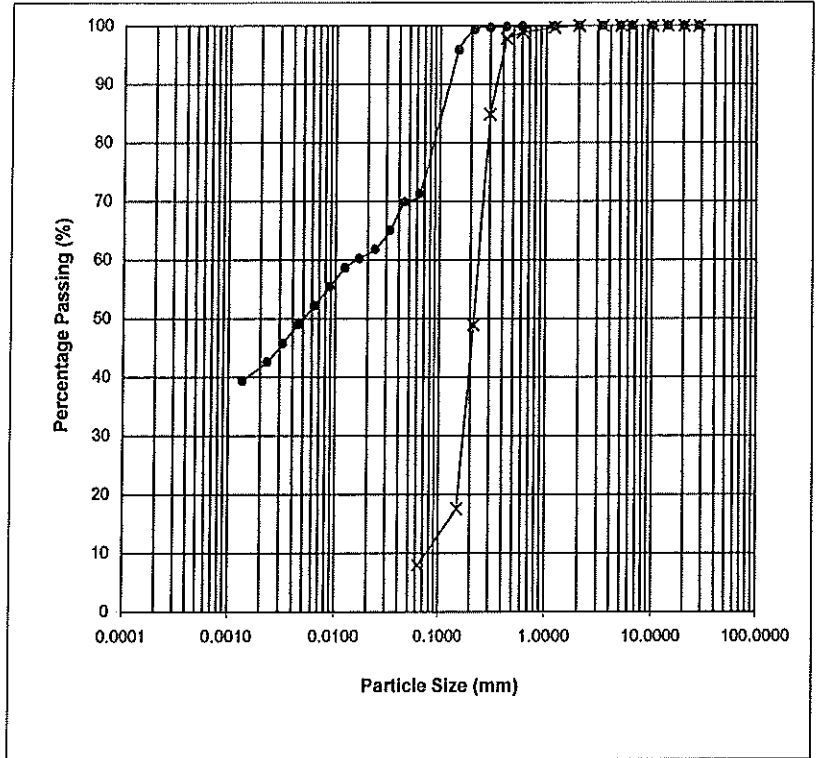
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

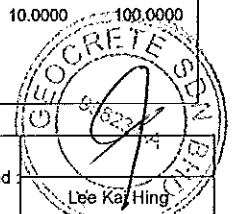
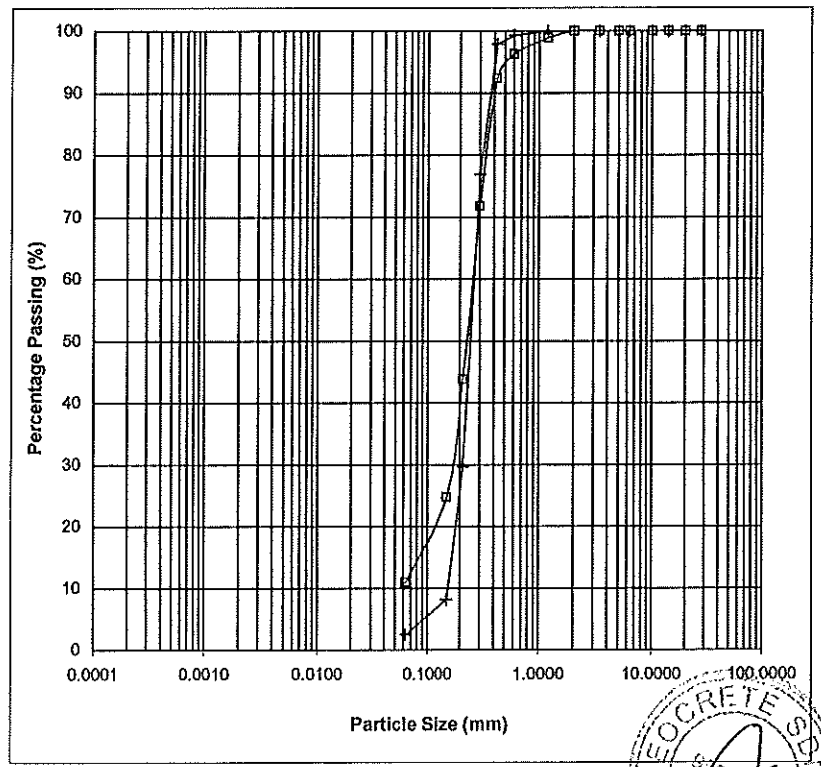
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	98
0.300	100	0.300	85
0.212	99	0.212	49
0.150	96	0.150	18
0.063	71	0.063	8
0.0449	70		
0.0325	65		
0.0233	62		
0.0166	60		
0.0122	59		
0.0088	55		
0.0063	52		
0.0045	49		
0.0032	46		
0.0023	43		
0.0013	39		
Clay (%)	41	Clay (%)	8
Silt (%)	30	Silt (%)	
Sand (%)	29	Sand (%)	92
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH6	UD6	18.00	29.11.18
x	BH6	D10	22.50	29.11.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	98	0.600	99
0.425	92	0.425	98
0.300	72	0.300	77
0.212	44	0.212	30
0.150	25	0.150	8
0.063	11	0.063	2
Clay (%)	11	Clay (%)	2
Silt (%)		Silt (%)	
Sand (%)	89	Sand (%)	98
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH6	D11	24.00	29.11.18
+	BH6	D15	30.00	29.11.18



GEocrete SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

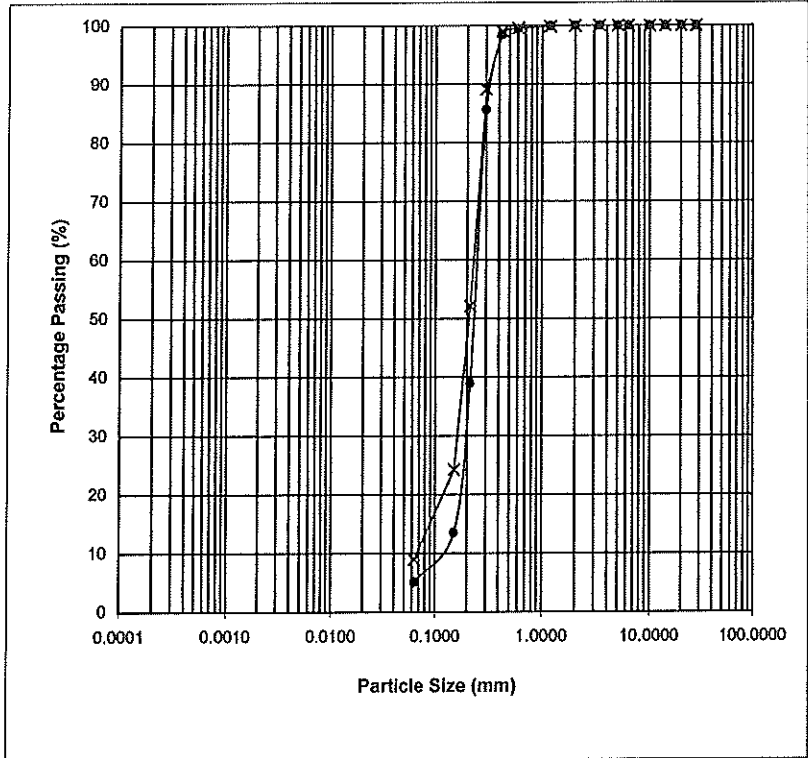
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

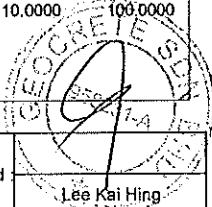
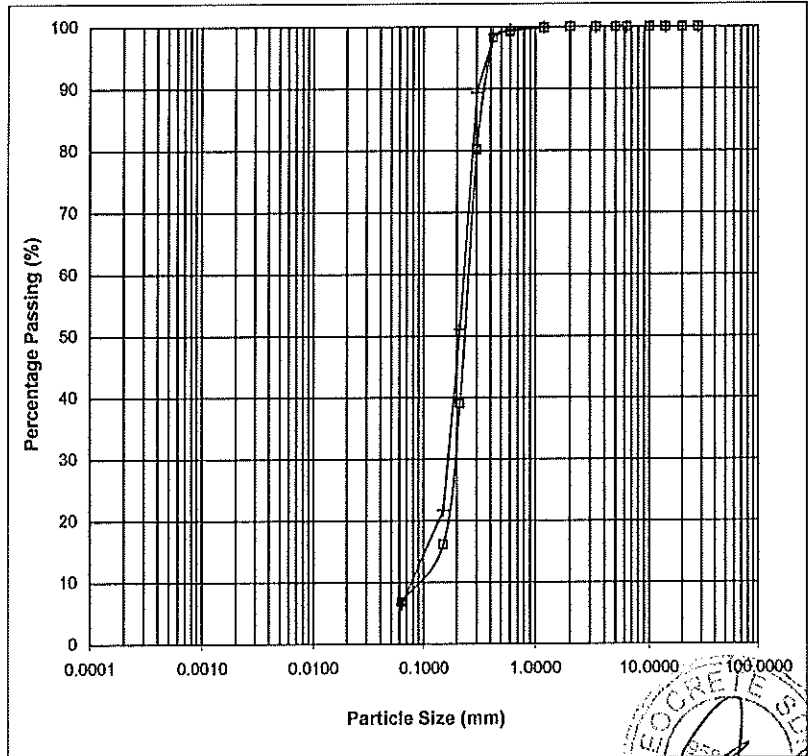
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	99
0.300	86	0.300	89
0.212	39	0.212	52
0.150	14	0.150	24
0.063	5	0.063	9
Clay (%)	5	Clay (%)	9
Silt (%)		Silt (%)	
Sand (%)	95	Sand (%)	91
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH6	D18	34.50	29.11.18
X	BH6	D27	46.50	29.11.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	99
0.300	80	0.300	89
0.212	39	0.212	51
0.150	16	0.150	22
0.063	7	0.063	7
Clay (%)	7	Clay (%)	7
Silt (%)		Silt (%)	
Sand (%)	93	Sand (%)	93
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH6	D28	48.00	29.11.18
+	BH6	D30	51.00	29.11.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing
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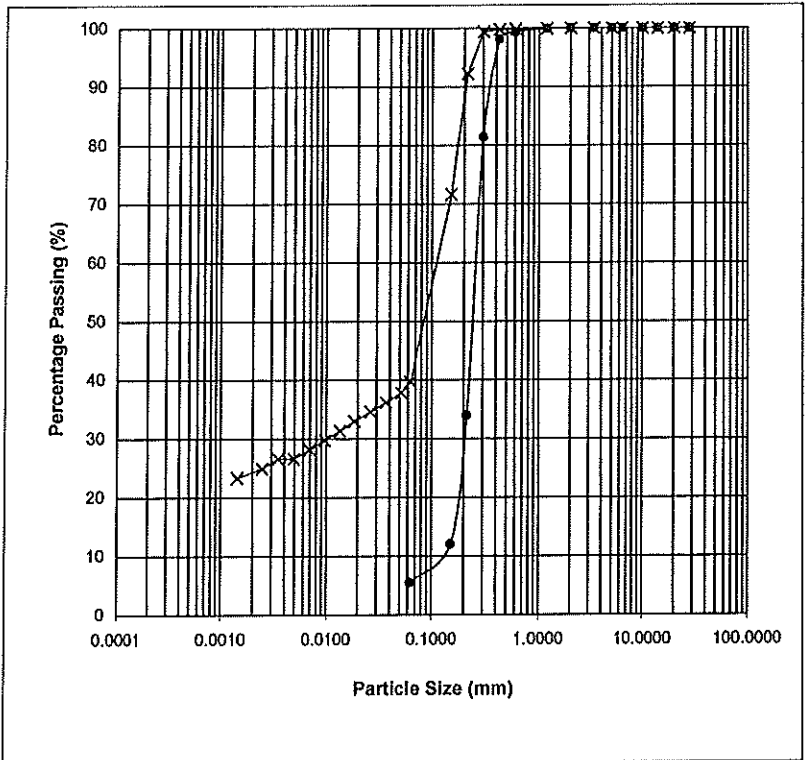
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

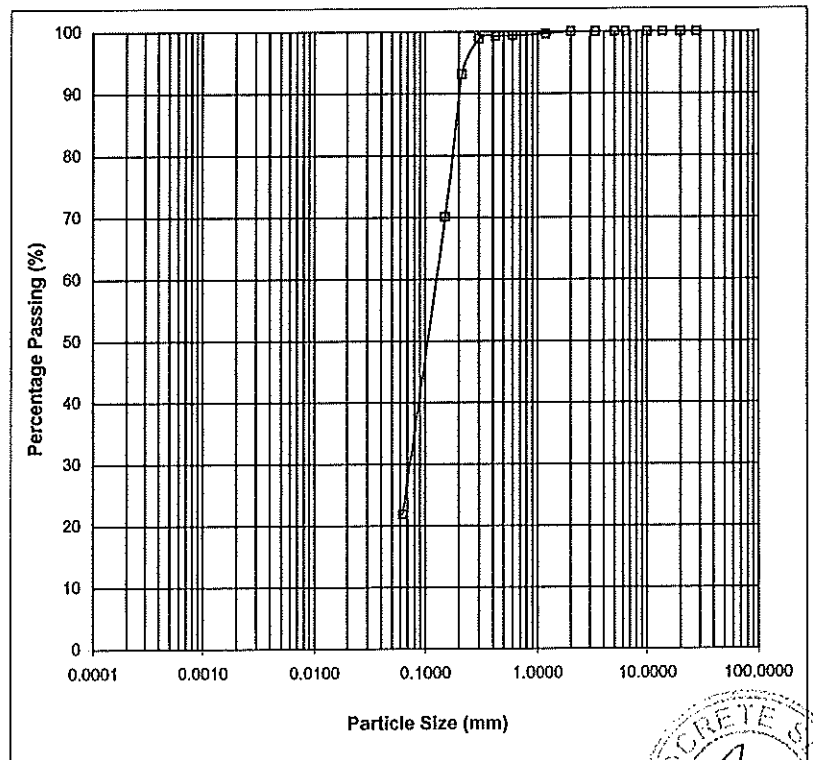
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	100
0.300	81	0.300	99
0.212	34	0.212	92
0.150	12	0.150	72
0.063	6	0.063	40
		0.0515	38
		0.0366	36
		0.0260	35
		0.0185	33
		0.0136	31
		0.0097	30
		0.0069	28
		0.0049	27
		0.0035	27
		0.0025	25
		0.0014	23
Clay (%)	6	Clay (%)	24
Silt (%)		Silt (%)	16
Sand (%)	94	Sand (%)	60
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH6	D32	54.00	29.11.18
X	BH6	D34	57.00	29.11.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100		
20.00	100		
14.00	100		
10.00	100		
6.30	100		
5.00	100		
3.35	100		
2.00	100		
1.18	100		
0.600	99		
0.425	99		
0.300	99		
0.212	93		
0.150	70		
0.063	22		
Clay (%)	22		
Silt (%)			
Sand (%)	78		
Gravel (%)	0		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH6	D36	60.00	29.11.18
+				



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

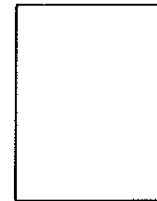
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_D (gr)	136.06	137.70	140.64
Bulk Density ρ (Mg/m ³)	1.58	1.60	1.63
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

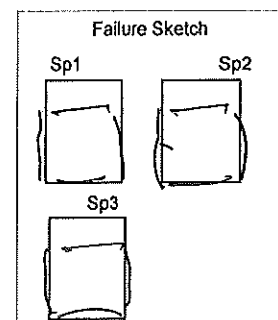
Load Channel 14391 14391 14391

Moisture Content w_{D0} %	59	59	57
Dry Density ρ_{d0} (Mg/m ³)	0.99	1.00	1.04
Voids Ratio e_0	1.59	1.57	1.48
Deg of Saturation S_0 %	95.17	97.27	99.19

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	37.27	41.80	52.92
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	37.07	41.60	52.72
Strain at Failure ϵ_f %	10.99	5.53	6.97
Shear Strength c_u (kPa)	18.64	20.90	26.46

Moisture Content w_f %	59	59	57
Dry Density ρ_{df} (Mg/m ³)	0.99	1.00	1.04
Voids Ratio e_f	1.59	1.57	1.48
Deg of Saturation S_f %	95.17	97.27	99.19



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 28.11.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

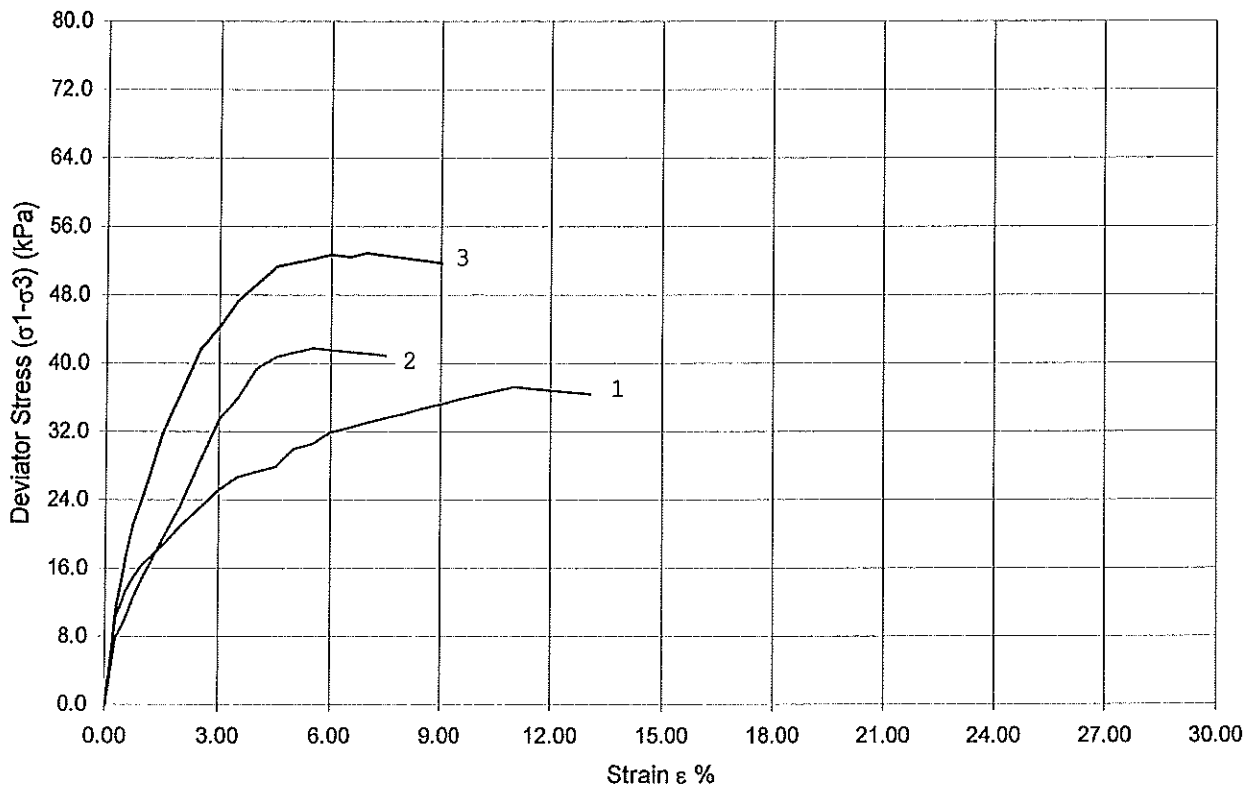
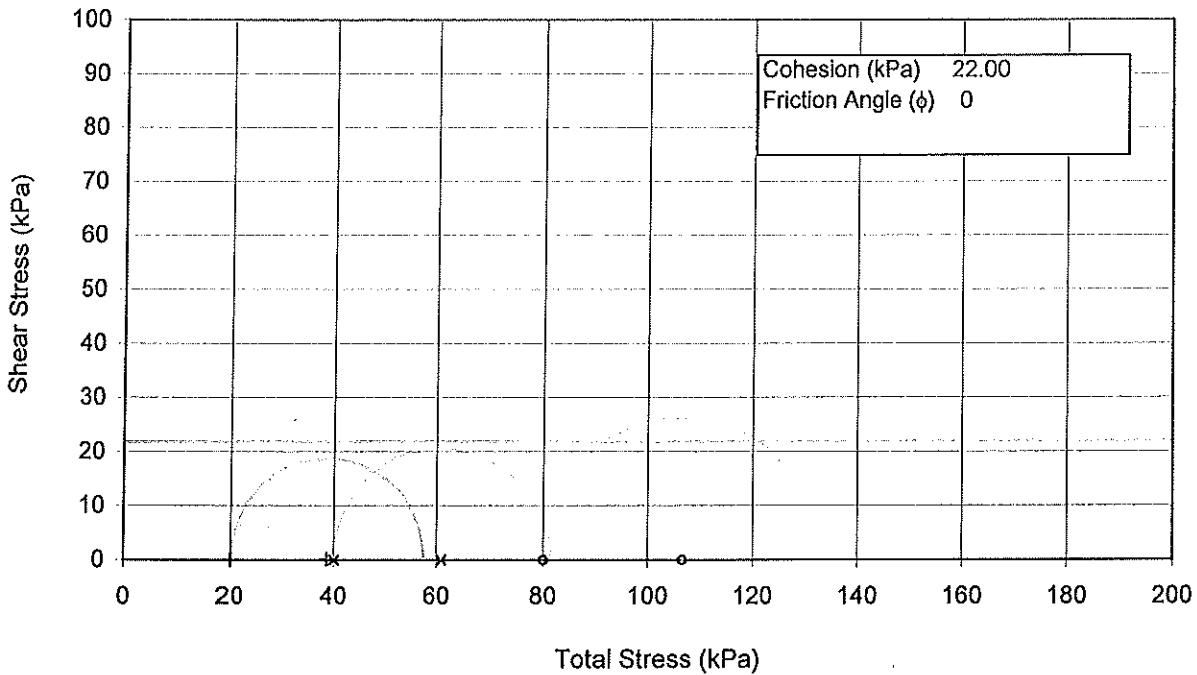
Sample : UD1
Borehole : BH6
Approved
Lee Kai Hing

Operator Checked
Shyam Nath Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

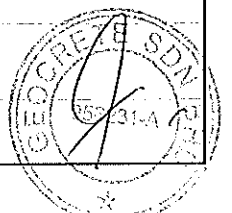
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 28.11.18

Sample : UD1
 Borehole : BH6

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

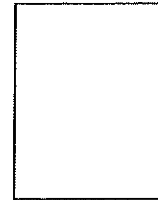
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Dark grey sandy CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	147.98	151.38	153.28
Bulk Density ρ (Mg/m ³)	1.72	1.76	1.78
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	100	200	400
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

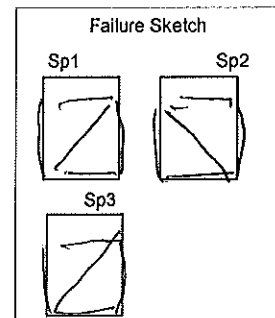
Load Channel	14391	14391	14391
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Moisture Content w_0 %	41	38	37
Dry Density ρ_{d0} (Mg/m ³)	1.22	1.28	1.30
Voids Ratio e_0	1.19	1.08	1.04
Deg of Saturation S_0 %	92.44	92.38	93.48

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	69.60	73.28	77.92
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	69.40	73.08	77.72
Strain at Failure ϵ_f %	14.47	12.50	13.49
Shear Strength c_u (kPa)	34.80	36.64	38.96

Moisture Content w_f %	41	38	37
Dry Density ρ_{df} (Mg/m ³)	1.22	1.28	1.30
Voids Ratio e_f	1.19	1.08	1.04
Deg of Saturation S_f %	92.44	92.38	93.48



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU

Date of Test : 28.11.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

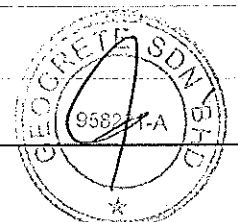
Sample : UD4

Borehole : BH6

Operator
Shyam Nath

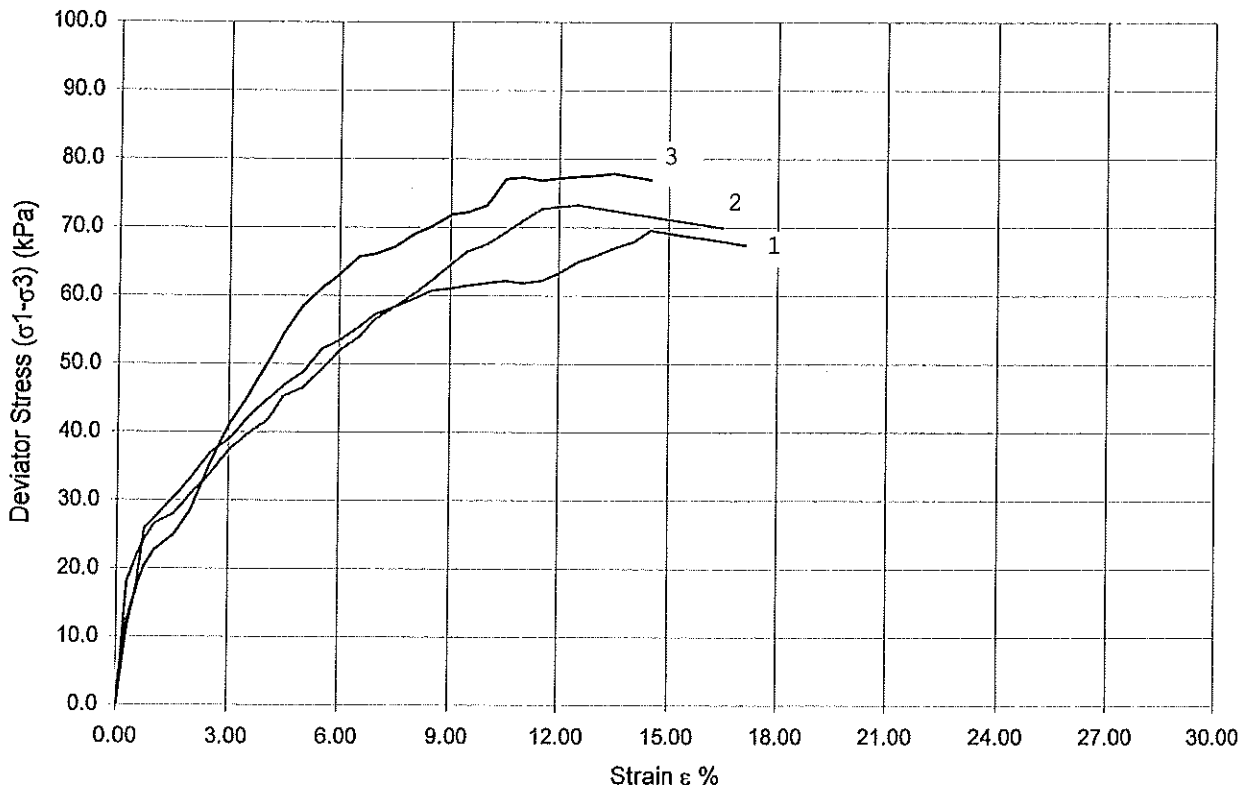
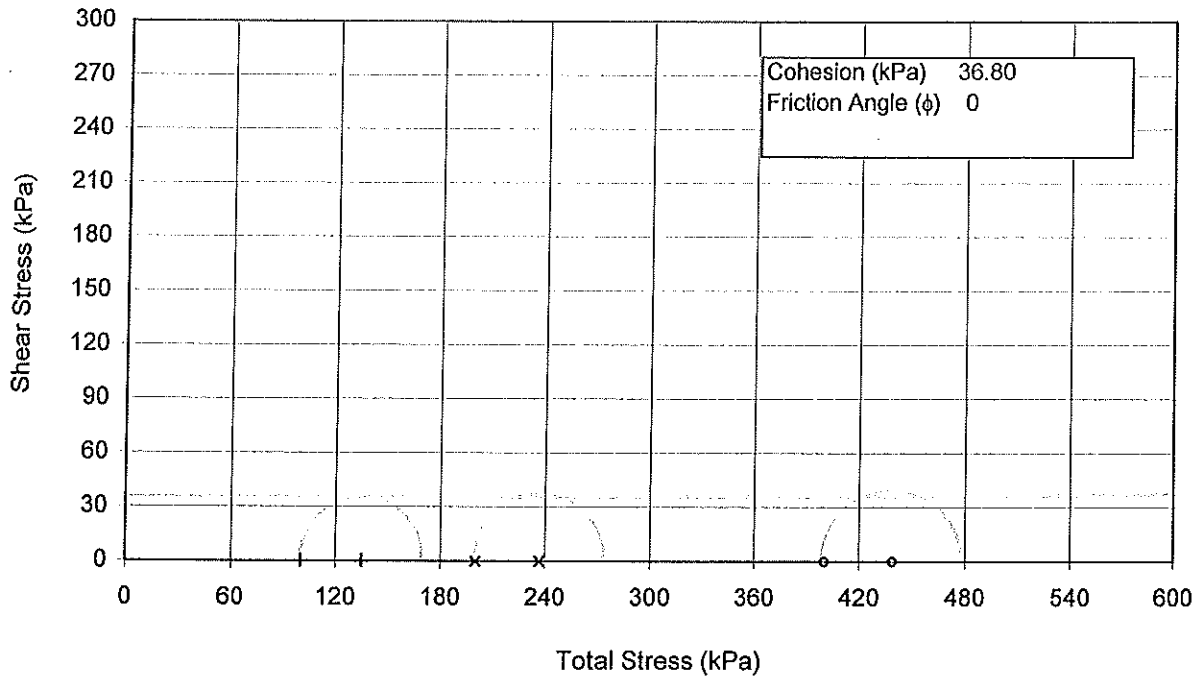
Checked
Chris

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

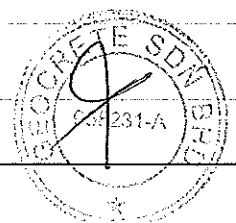
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 28.11.18

Sample : UD4
 Borehole : BH6

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

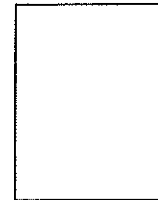
Unconsolidated Undrained

Sample details

Depth : 18.00m
 Description : Dark grey CLAY with some sand

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	143.08	145.35	147.42
Bulk Density ρ (Mg/m ³)	1.66	1.69	1.71
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel	14391	14391	14391
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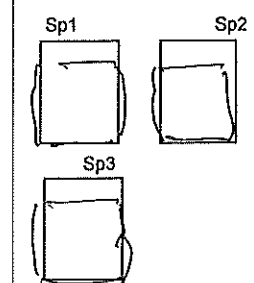
Moisture Content w_0 %	48	46	43
Dry Density ρ_{d0} (Mg/m ³)	1.13	1.16	1.19
Voids Ratio e_0	1.35	1.29	1.22
Deg of Saturation S_0 %	93.01	93.87	94.07

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	77.02	84.29	105.67
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	76.82	84.09	105.47
Strain at Failure ϵ_f %	8.03	8.03	9.01
Shear Strength c_u (kPa)	38.51	42.14	52.83

Moisture Content w_f %	48	46	43
Dry Density ρ_{df} (Mg/m ³)	1.13	1.16	1.19
Voids Ratio e_f	1.35	1.29	1.22
Deg of Saturation S_f %	93.01	93.87	94.07

Failure Sketch



Notes : Plastic Plastic Plastic

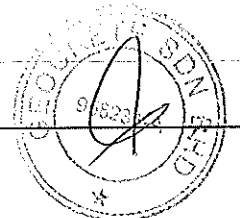
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 28.11.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

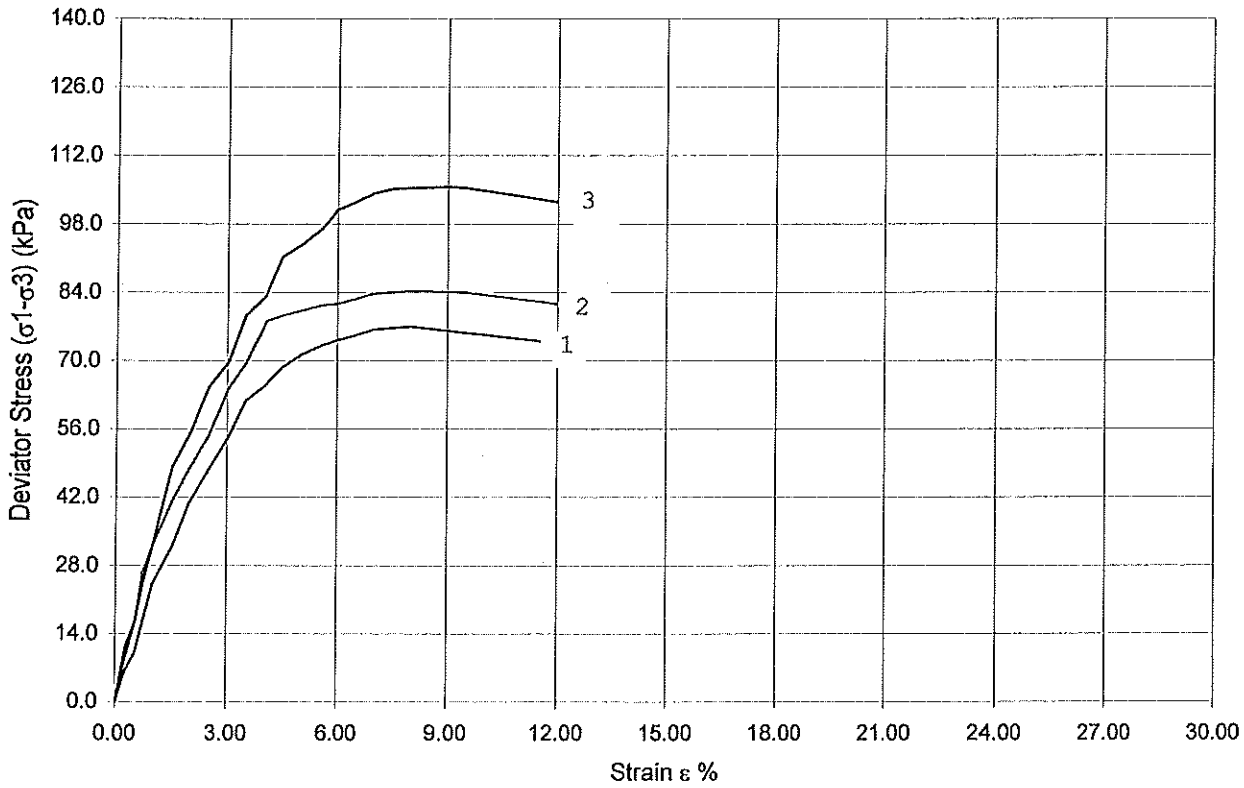
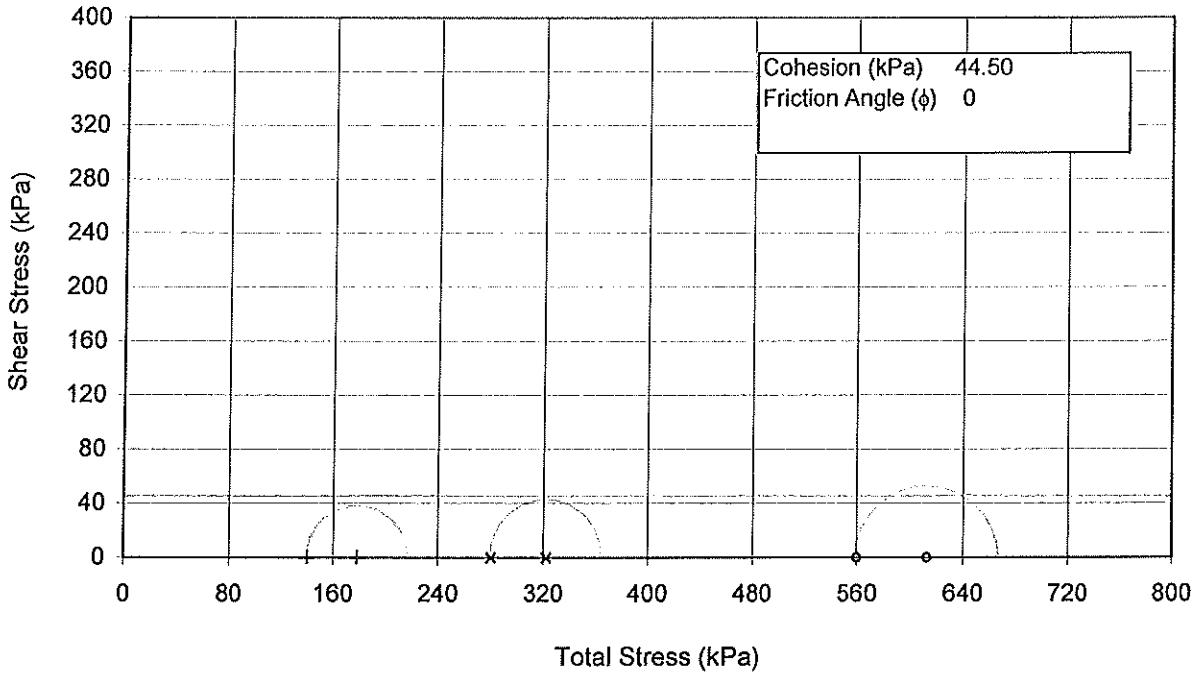
Sample : UD6
 Borehole : BH6
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
Operator : Shyam Nath
Checked : Chris

Test Name : UU
Date of Test : 28.11.18
Sample : UD6
Borehole : BH6
Approved : Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
Sample No.	BH6 / UD1 / 3.00m	Test Started	27.11.18
Soil Description	Dark grey CLAY	Ring No.	1

BEFORE TEST

Moist. Content from trimmings:	=	58 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	123.31 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.54 gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.77 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.36 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.41 gm	Bulk Density (P)	=	1.572 Mg/m ³
Initial Moisture Content, M _o	=	57 %	Dry Density (PD)	=	1.002 Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	1.5751
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	93 %
V. Ratio Change Factor F _v , $\frac{1+e_o}{H}$	=	0.1288 mm ⁻¹
Height of Solid H _s	=	7.767 mm

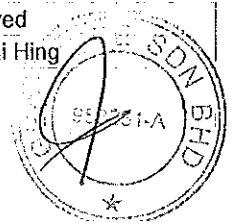
AFTER TEST

Wt of sample + Ring	=	120.21 gm	Overall settlement	=	2.068 mm
Wt of Dry sample + Ring	=	100.90 gm	Volume Change	=	4.062 cm ³
Wt of Ring	=	61.54 gm	Final Volume	=	35.22 cm ³
Wt of Wet sample	=	58.67 gm	Final Bulk Density	=	1.666 Mg/m ³
Wt of Dry sample	=	39.36 gm	Final Dry Density	=	1.117 Mg/m ³
Wt of Moisture	=	19.31 gm	Final Void Ratio, e _f	=	1.3089
Final Moisture Content, M _f	=	49 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	97 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

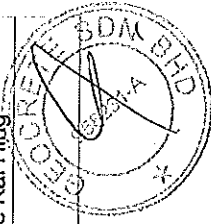
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH6 / UD1 / 3.00m

Date of Report
 Test started
 Ring No.

07.12.18
 27.11.18
 1

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5751	0.0000	0				
3.12	0.326	19.674	0.0420	1.5332	0.0420	3.12	5.3065	3.61	12.10	-0.1395
6.2	0.430	19.570	0.0554	1.5198	0.0134	3.12	1.7019	4.41	9.69	-0.0445
12.5	0.580	19.420	0.0747	1.5005	0.0193	6.2	1.2368	1.21	34.86	-0.0642
25.0	0.812	19.188	0.1046	1.4706	0.0299	12.5	0.9680	1.96	21.10	-0.0992
50	1.424	18.576	0.1833	1.3918	0.0788	25.0	1.3188	5.29	7.48	-0.2618
100	2.424	17.576	0.3121	1.2630	0.1288	50.0	1.1388	7.84	4.63	-0.4278
50	2.386	17.614	0.3072	1.2679	-0.0049	-50.0				
25	2.244	17.756	0.2889	1.2862	-0.0183	-25.0				
12.5	2.068	17.932	0.2663	1.3089	-0.0227	-12.5				

Operator : Shyam Nath
 Checked : Chris
 Approved : Lee Kai Hing



GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

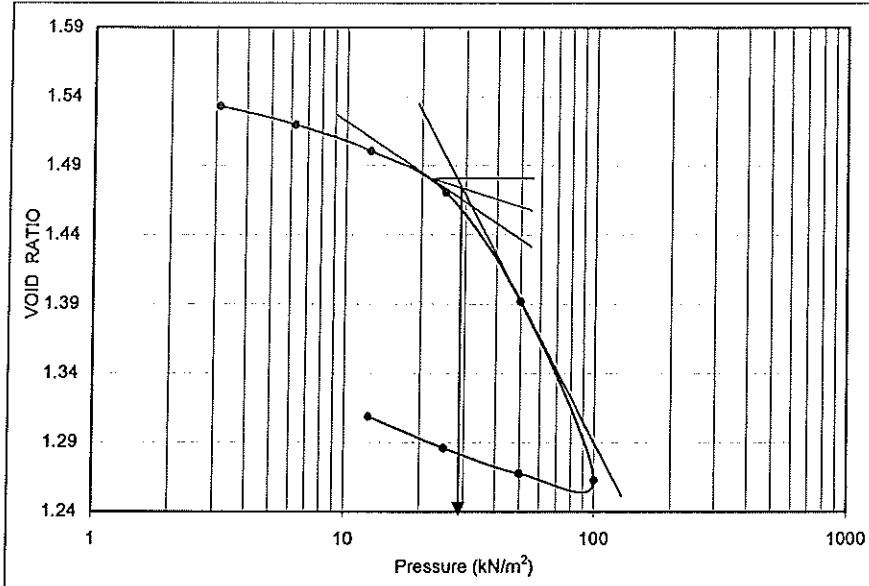
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH6 / UD1 / 3.00m

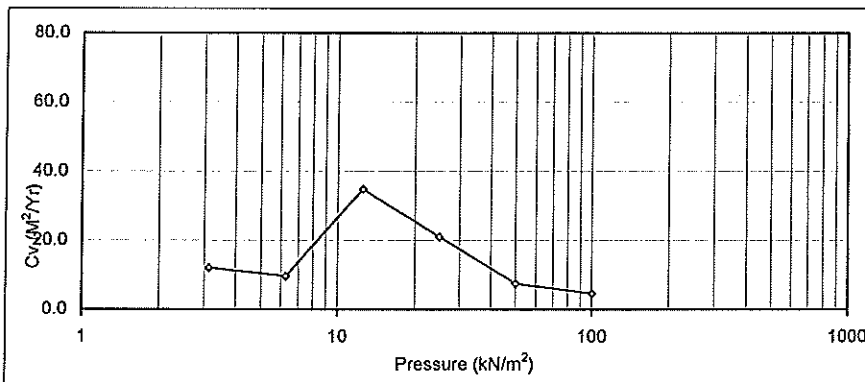
SOIL SAMPLE Dark grey CLAY

Date of Report 07.12.18
 Test started 27.11.18
 Ring No. 1



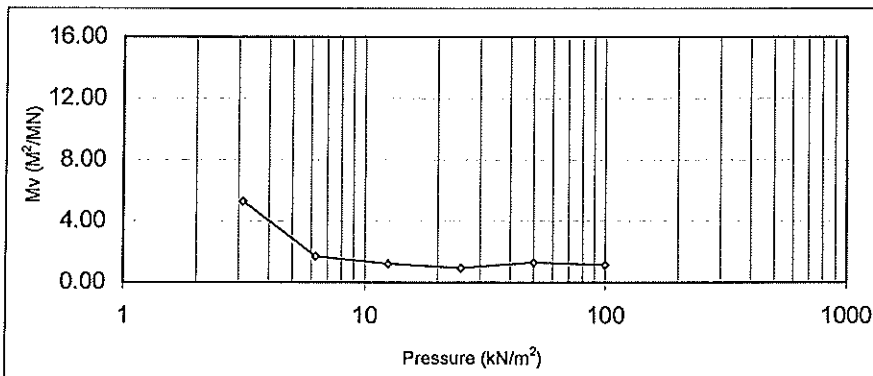
INITIAL

Water content	57	%
Dry Density	1.00	Mg/m ³
Void Ratio	1.5751	
Saturation	93	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL

Water content	49	%
Dry Density	1.12	Mg/m ³
Void Ratio	1.3089	
Saturation	97	%
Height	18	mm
Comp. Index, Cc	0.4278	
Precons. Load	28	kN/m ²



Comp. Ratio, C_R 0.166

GEOCRETE SDN. BHD.

Company No 958231 A

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
Sample No.	BH6 / UD6 / 18.00m	Test Started	27.11.18
Soil Description	Dark grey CLAY with some sand	Ring No.	2

BEFORE TEST

Moist. Content from trimmings:	=	36 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	124.51 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.36 gm	Area (A)	=	1964 mm ²
Wt of sample	=	66.15 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	50.37 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	15.78 gm	Bulk Density (P)	=	1.684 Mg/m ³
Initial Moisture Content, M ₀	=	31 %	Dry Density (PD)	=	1.282 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.0669			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	78 %			
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1033 mm ⁻¹			
Height of Solid H _s	=	9.677 mm			

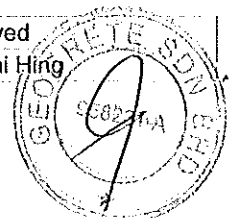
AFTER TEST

Wt of sample + Ring	=	123.82 gm	Overall settlement	=	1.554 mm
Wt of Dry sample + Ring	=	108.73 gm	Volume Change	=	3.053 cm ³
Wt of Ring	=	58.36 gm	Final Volume	=	36.23 cm ³
Wt of Wet sample	=	65.46 gm	Final Bulk Density	=	1.807 Mg/m ³
Wt of Dry sample	=	50.37 gm	Final Dry Density	=	1.390 Mg/m ³
Wt of Moisture	=	15.09 gm	Final Void Ratio, e _f	=	0.9063
Final Moisture Content, M _f	=	30 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	88 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

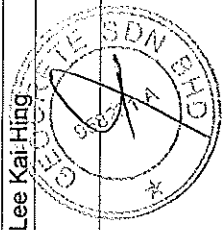
BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH6 / UD6 / 18.00m

Date of Report 07.12.18
 Test started 27.11.18
 Ring No. 2

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H-H_c-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$A_0 = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	MV (M ² /MN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.0669	0.0000	0				
6.25	0.112	19.888	0.0116	1.0553	0.0116	6.25	0.9017	3.61	12.23	-0.0385
12.5	0.174	19.826	0.0180	1.0489	0.0064	6.25	0.5007	4.84	9.04	-0.0213
25.0	0.316	19.684	0.0327	1.0342	0.0147	12.5	0.5776	5.29	8.19	-0.0488
50.0	0.538	19.462	0.0556	1.0113	0.0229	25.0	0.4566	4.41	9.64	-0.0762
100	1.048	18.952	0.1083	0.9585	0.0527	50.0	0.5386	4.84	8.46	-0.1751
200	1.576	18.424	0.1629	0.9040	0.0546	99.9	0.2868	2.56	15.14	-0.1813
400	2.112	17.888	0.2183	0.8486	0.0554	199.8	0.1499	3.61	10.14	-0.1840
200	1.992	18.008	0.2059	0.8610	-0.0124	-199.8				
50	1.768	18.232	0.1827	0.8841	-0.0231	-149.9				
12.5	1.554	18.446	0.1606	0.9063	-0.0221	-37.5				

Operator Shyam Nath
 Checked Chris
 Approved Lee Kai-Hing



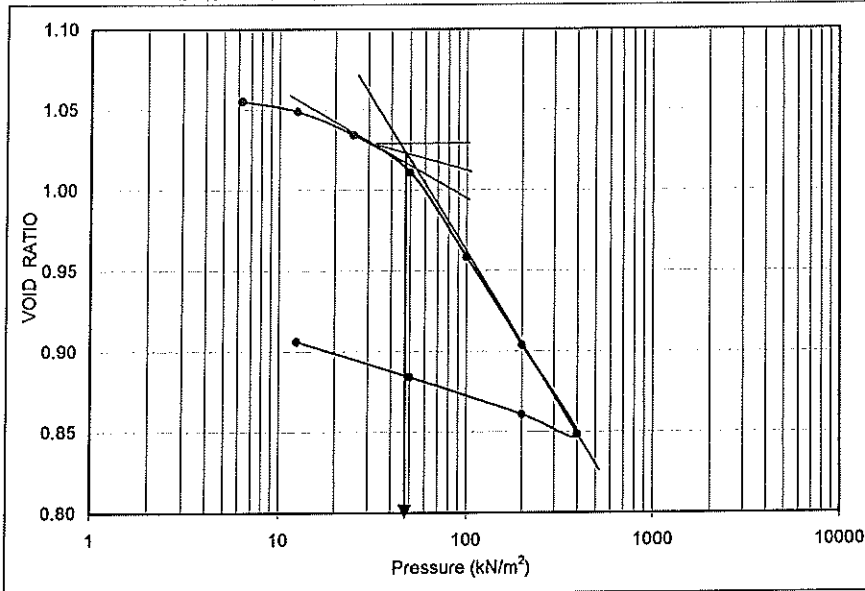
GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

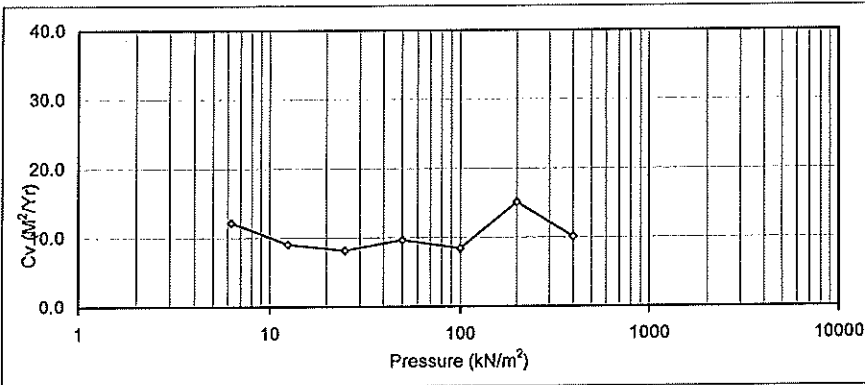
PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Date of Report 07.12.18
Test started 27.11.18
Ring No. 2

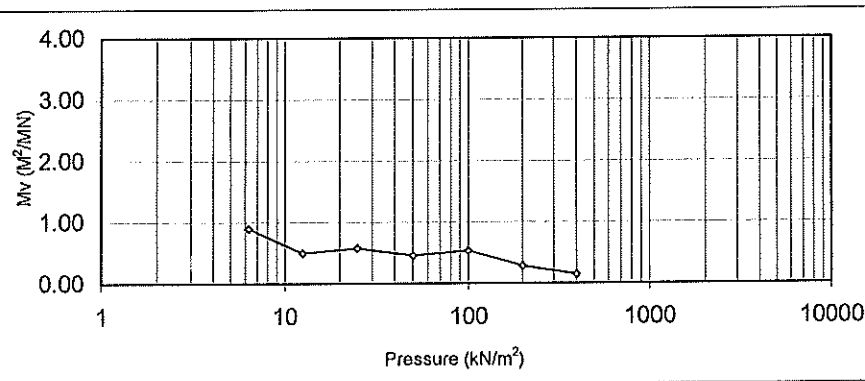
BH REF BH6 / UD6 / 18.00m
SOIL SAMPLE Dark grey CLAY with some sand



INITIAL
Water content 31 %
Dry Density 1.28 Mg/m³
Void Ratio 1.0669
Saturation 78 %
Height 20 mm
Diameter 50 mm
Sp. Gravity 2.650



FINAL
Water content 30 %
Dry Density 1.39 Mg/m³
Void Ratio 0.9063
Saturation 88 %
Height 18 mm
Comp. Index, Cc 0.1840
Precons. Load 46 kN/m²



Comp. Ratio, C_R 0.089



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 6 / D 30 (51.00 m)

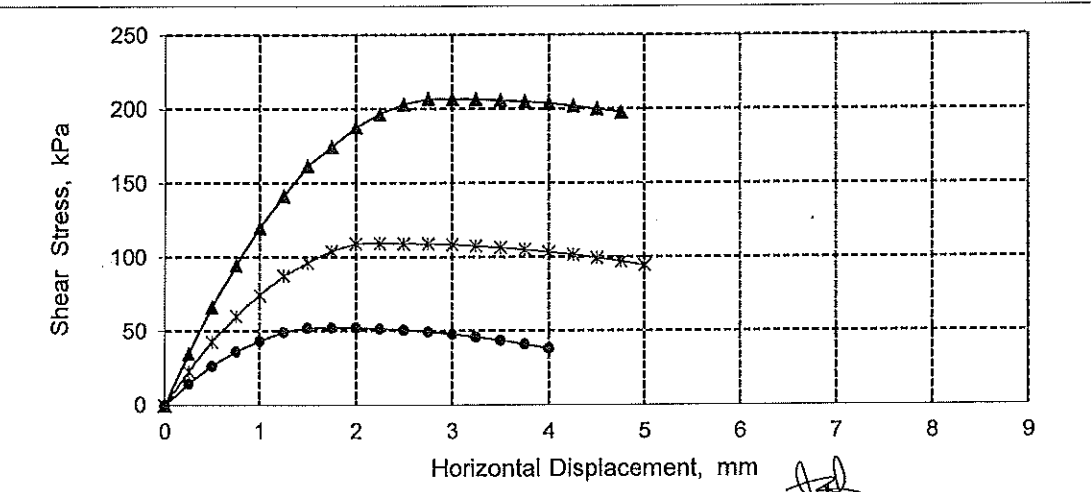
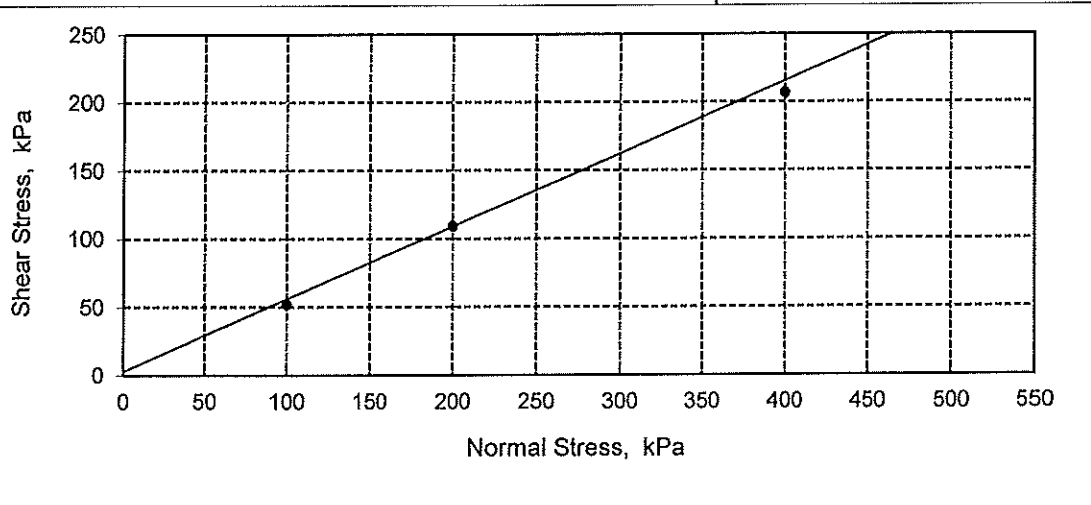
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 7 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		144.2	144.9	145.1
Moisture Content (%)		19.6	19.5	19.7
Bulk Density (Mg/m ³)		2.003	2.012	2.015
Dry Density (Mg/m ³)		1.675	1.684	1.683
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		52.2	109.3	207.1
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.3	0.5	1.0

c' 3 kPa

φ' 28 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 6 / D 34 (57.00 m)

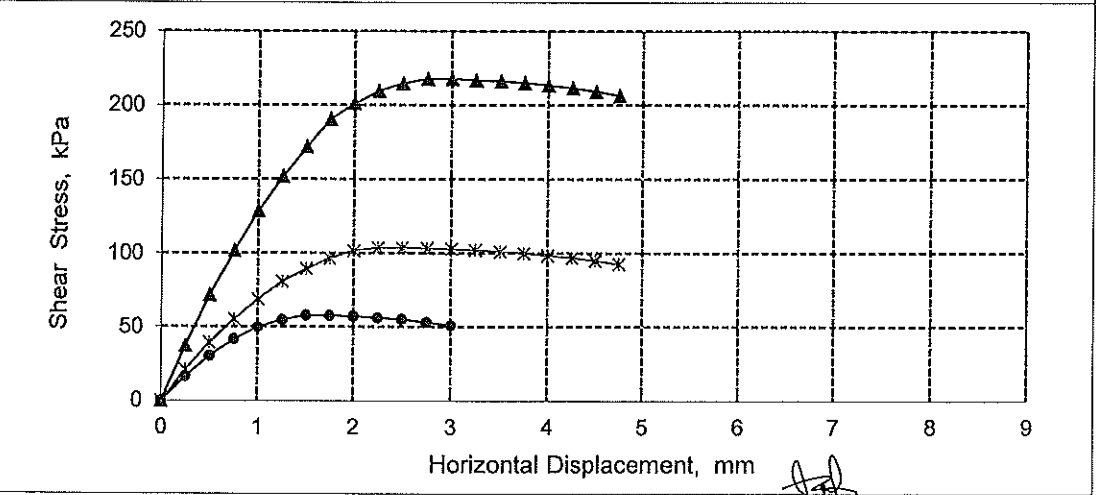
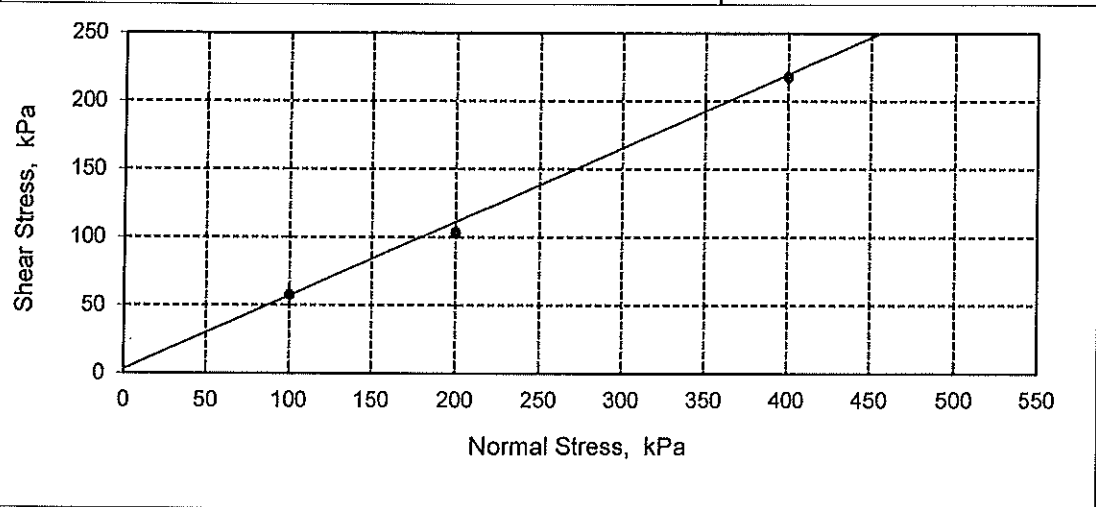
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 7 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		140.1	141.2	140.5
Moisture Content (%)		19.3	18.9	19.0
Bulk Density (Mg/m ³)		1.946	1.961	1.952
Dry Density (Mg/m ³)		1.631	1.649	1.640

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		57.9	103.8	218.0
Displ. at Failure (mm)		1.5	2.3	2.8
Settlement (mm)		0.2	0.3	0.5

	c' 3 kPa φ' 28.5 deg.
--	--



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT :										REF : L/081/18/139/18 DATE : 29.12.18																	
SAMPLE AND SPECIMEN DETAILS.		Moisture Content (%)		Bulk Density (Mg/m ³)		Dry Density (Mg/m ³)		ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS		Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST						
Borehole No.	Specimen	Depth (m)	(%)	(Mg/m ³)	(Mg/m ³)	(Mg/m ³)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
BH7	UD1	3.00	53	1.63	1.05	1.05	71	27	44	13.6	59	32	9	0	2.58	19.10	0			19.10	0								
	UD4	12.00	61	1.53	1.00	1.00	83	26	57		62	38	0	0		22.55	0			22.55	0			1.1	0.11	0.55	7.7		
	UD7	21.00	27	1.77	1.39	1.39					62	38	0	0		57.60	0			57.60	0	45	0.181						
	UD8	24.00	76	1.53	0.90	0.90	75	29	46	14.3	59	38	3	0	2.58	20.05	0			20.05	0	70	0.956	1.1	0.11	0.89	7.8		
	D13	31.50	86	NA	NA	NA					57	39	4	0															
	D14	33.00	26	NA	NA	NA					31	21	45	3															
	D17	37.50	67	NA	NA	NA	66	26	40	11.8	51	39	10	0	2.61														
	D22	45.00	73	NA	NA	NA					57	39	4	0															
	D23	46.50	79	NA	NA	NA					51	34	15	0															
	D25	49.50	40	NA	NA	NA	41	21	20	8.3	35	21	44	0	2.66														
	D27	52.50	62	NA	NA	NA					54	32	14	0															
	D32	60.00	23	NA	NA	NA					35	20	45	0															

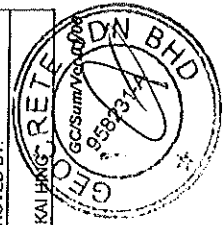
Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks: _____

APPROVED BY: _____

CHECKED BY: _____

LEE KAI HONG



SUM

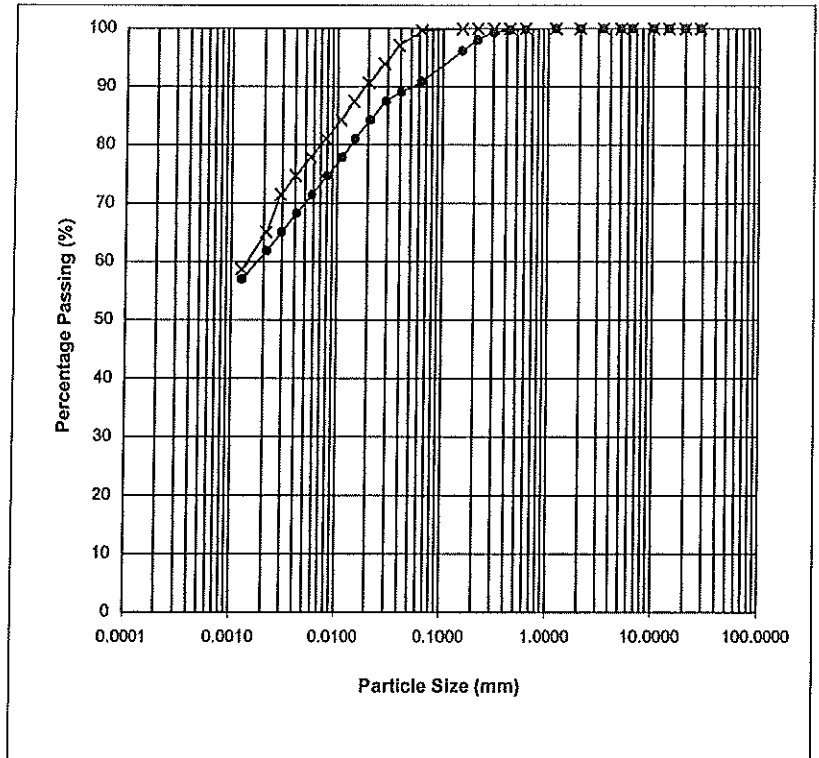
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

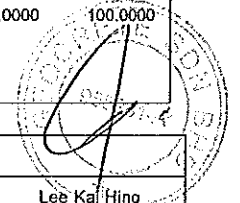
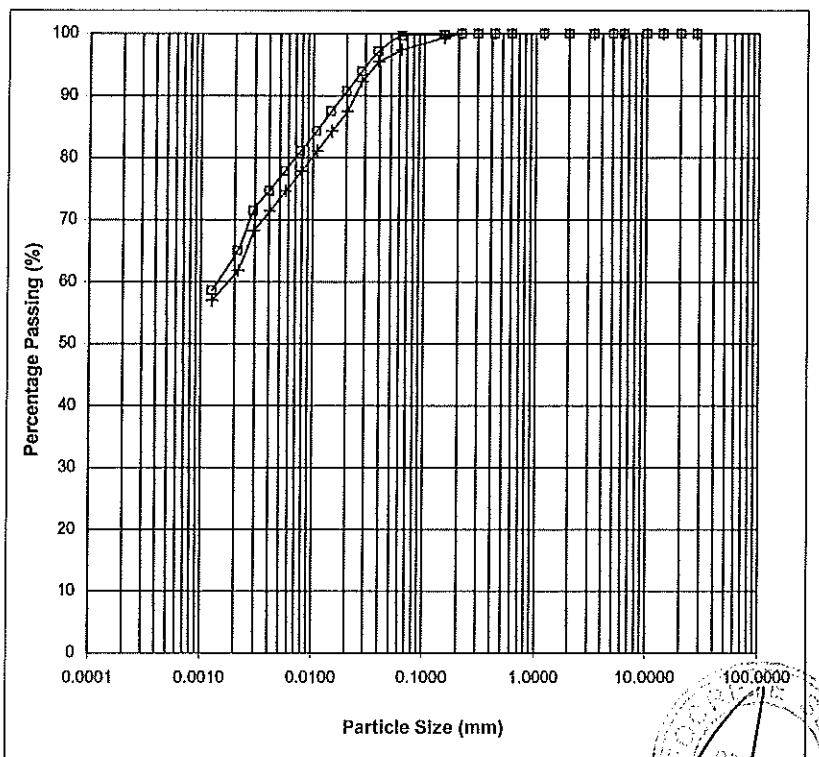
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	100
0.212	98	0.212	100
0.150	96	0.150	100
0.063	91	0.063	100
0.0404	89	0.0384	97
0.0289	87	0.0278	94
0.0208	84	0.0200	91
0.0150	81	0.0144	87
0.0111	78	0.0107	84
0.0080	75	0.0077	81
0.0058	71	0.0056	78
0.0041	68	0.0040	75
0.0030	65	0.0029	71
0.0021	62	0.0021	65
0.0013	57	0.0012	59
Clay (%)	59	Clay (%)	62
Silt (%)	32	Silt (%)	38
Sand (%)	9	Sand (%)	0
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH7	UD1	3.00	21.12.18
x	BH7	UD4	12.00	21.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	100	0.212	100
0.150	100	0.150	99
0.063	100	0.063	97
0.0384	97	0.0389	96
0.0278	94	0.0280	92
0.0200	91	0.0204	87
0.0144	87	0.0147	84
0.0107	84	0.0109	81
0.0077	81	0.0079	78
0.0056	78	0.0057	75
0.0040	75	0.0041	71
0.0029	71	0.0029	68
0.0021	65	0.0021	62
0.0012	59	0.0013	57
Clay (%)	62	Clay (%)	59
Silt (%)	38	Silt (%)	38
Sand (%)	0	Sand (%)	3
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH7	UD7	21.00	21.12.18
+	BH7	UD8	24.00	21.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

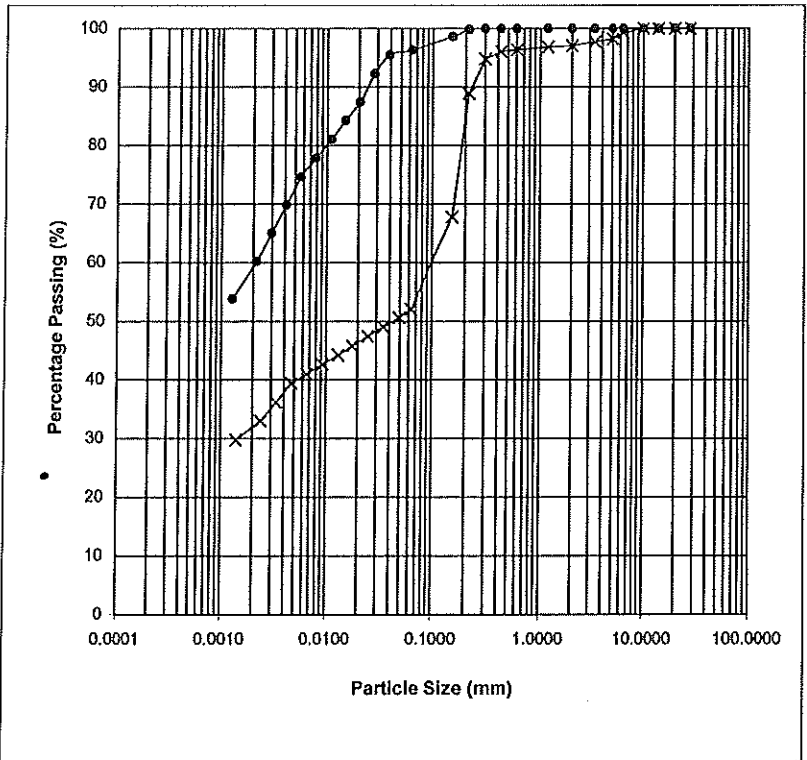
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

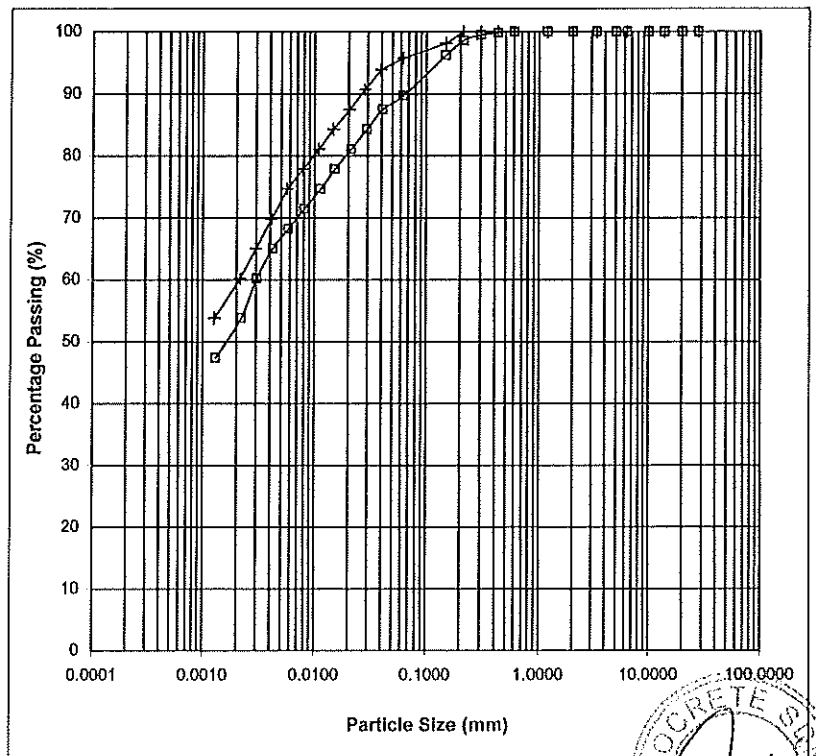
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	99	
5.00	100	5.00	98	
3.35	100	3.35	98	
2.00	100	2.00	97	
1.18	100	1.18	97	
0.600	100	0.600	96	
0.425	100	0.425	96	
0.300	100	0.300	95	
0.212	100	0.212	89	
0.150	99	0.150	68	
0.063	96	0.063	52	
0.0389	96	0.0489	51	
0.0280	92	0.0348	49	
0.0204	87	0.0248	47	
0.0147	84	0.0176	46	
0.0109	81	0.0130	44	
0.0079	78	0.0092	43	
0.0057	75	0.0066	41	
0.0041	70	0.0047	39	
0.0030	65	0.0033	36	
0.0021	60	0.0024	33	
0.0013	54	0.0014	30	
Clay (%)		57	Clay (%)	31
Silt (%)		39	Silt (%)	21
Sand (%)		4	Sand (%)	45
Gravel (%)		0	Gravel (%)	3
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH7	D13	31.50	21.12.18
x	BH7	D14	33.00	21.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	99	0.212	100	
0.150	96	0.150	98	
0.063	90	0.063	96	
0.0408	87	0.0393	94	
0.0294	84	0.0283	91	
0.0212	81	0.0204	87	
0.0152	78	0.0147	84	
0.0113	75	0.0109	81	
0.0081	71	0.0079	78	
0.0058	68	0.0057	75	
0.0042	65	0.0041	70	
0.0030	60	0.0030	65	
0.0022	54	0.0021	60	
0.0013	47	0.0013	54	
Clay (%)		51	Clay (%)	57
Silt (%)		39	Silt (%)	39
Sand (%)		10	Sand (%)	4
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH7	D17	37.50	21.12.18
+	BH7	D22	45.00	21.12.18



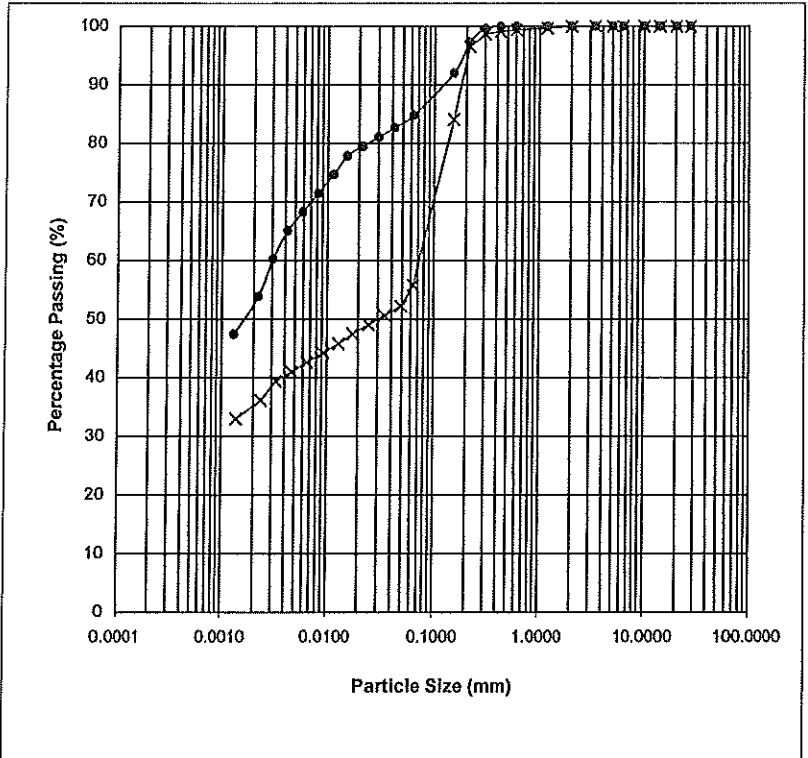
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

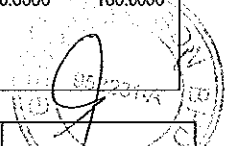
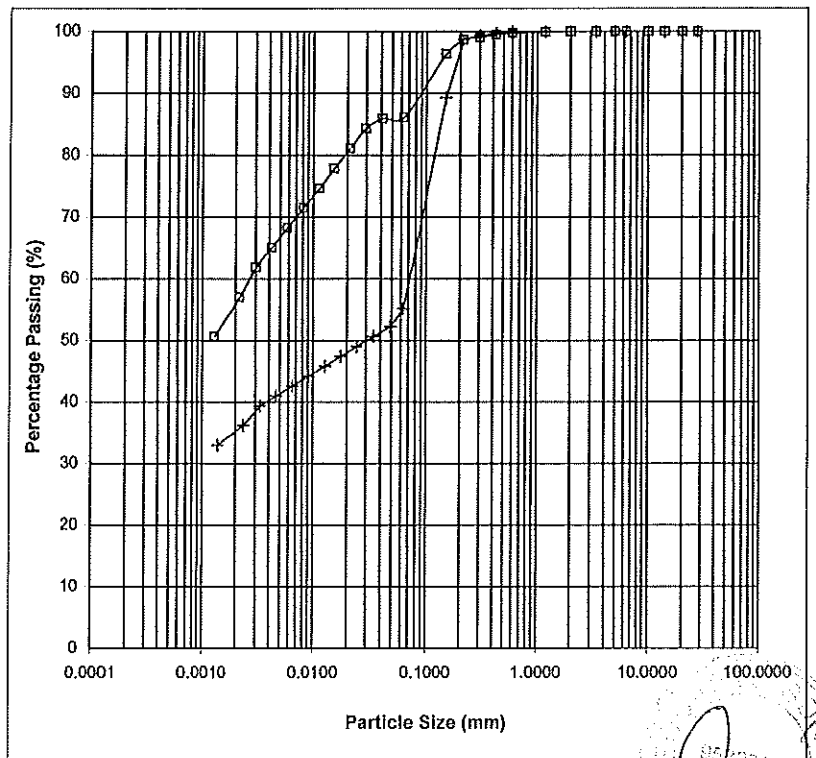
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	99
0.300	100	0.300	99
0.212	97	0.212	97
0.150	92	0.150	84
0.063	85	0.063	56
0.0420	83	0.0486	52
0.0300	81	0.0346	51
0.0214	79	0.0246	49
0.0152	78	0.0175	47
0.0113	75	0.0129	46
0.0081	71	0.0092	44
0.0058	68	0.0065	43
0.0042	65	0.0046	41
0.0030	60	0.0033	39
0.0022	54	0.0024	36
0.0013	47	0.0014	33
Clay (%)	51	Clay (%)	35
Silt (%)	34	Silt (%)	21
Sand (%)	15	Sand (%)	44
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH7	D23	46.50	21.12.18
X	BH7	D25	49.50	21.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	99
0.212	99	0.212	99
0.150	96	0.150	89
0.063	86	0.063	55
0.0412	86	0.0486	52
0.0294	84	0.0346	51
0.0212	81	0.0246	49
0.0152	78	0.0175	47
0.0113	75	0.0129	46
0.0081	71	0.0092	44
0.0058	68	0.0065	43
0.0042	65	0.0046	41
0.0030	62	0.0033	39
0.0022	57	0.0024	36
0.0013	51	0.0014	33
Clay (%)	54	Clay (%)	35
Silt (%)	32	Silt (%)	20
Sand (%)	14	Sand (%)	45
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH7	D27	52.50	21.12.18
+	BH7	D32	60.00	21.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :		Checked :		Approved :	
		Shyam Nath		Chris		Lee Kai Hing

Total Stress Triaxial Compression

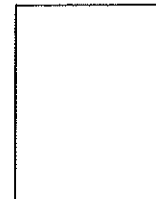
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	137.41	140.38	14.05
Bulk Density ρ (Mg/m ³)	1.595	1.630	0.163
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

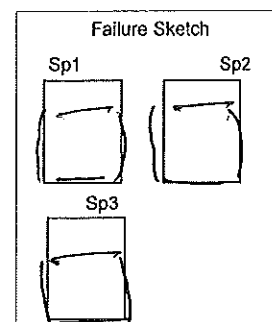


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	57	55	54
Dry Density ρ_{d0} (Mg/m ³)	1.02	1.05	0.11
Voids Ratio e_0	1.53	1.45	23.40
Deg of Saturation S_0 %	95.21	97.50	5.98

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	35.08	37.14	42.39
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	34.88	36.94	42.19
Strain at Failure ϵ_f %	7.50	5.99	7.50
Shear Strength c_u (kPa)	17.54	18.57	21.19
Moisture Content w_f %	57	55	54
Dry Density ρ_{df} (Mg/m ³)	1.02	1.05	0.11
Voids Ratio e_f	1.53	1.45	23.40
Deg of Saturation S_f %	95.21	97.50	5.98



Notes : Plastic Plastic Plastic

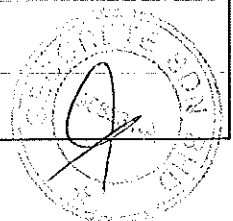
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

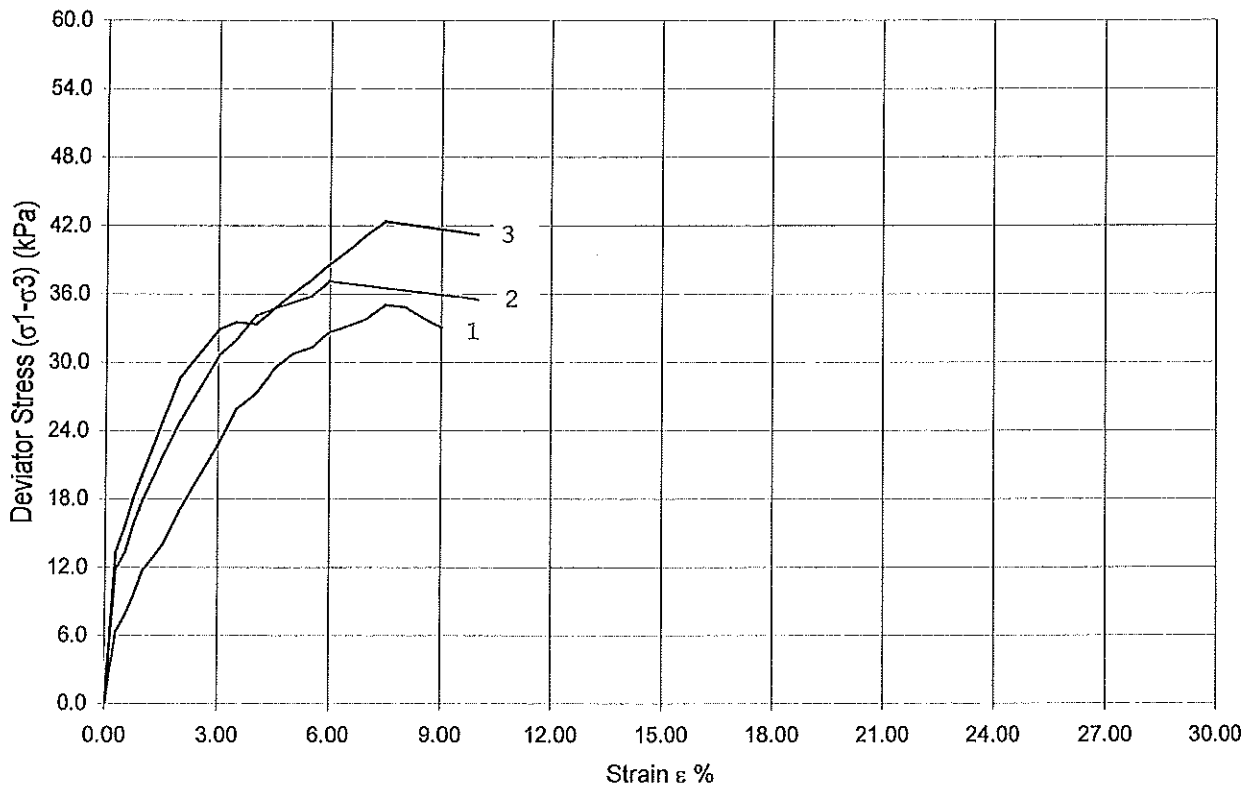
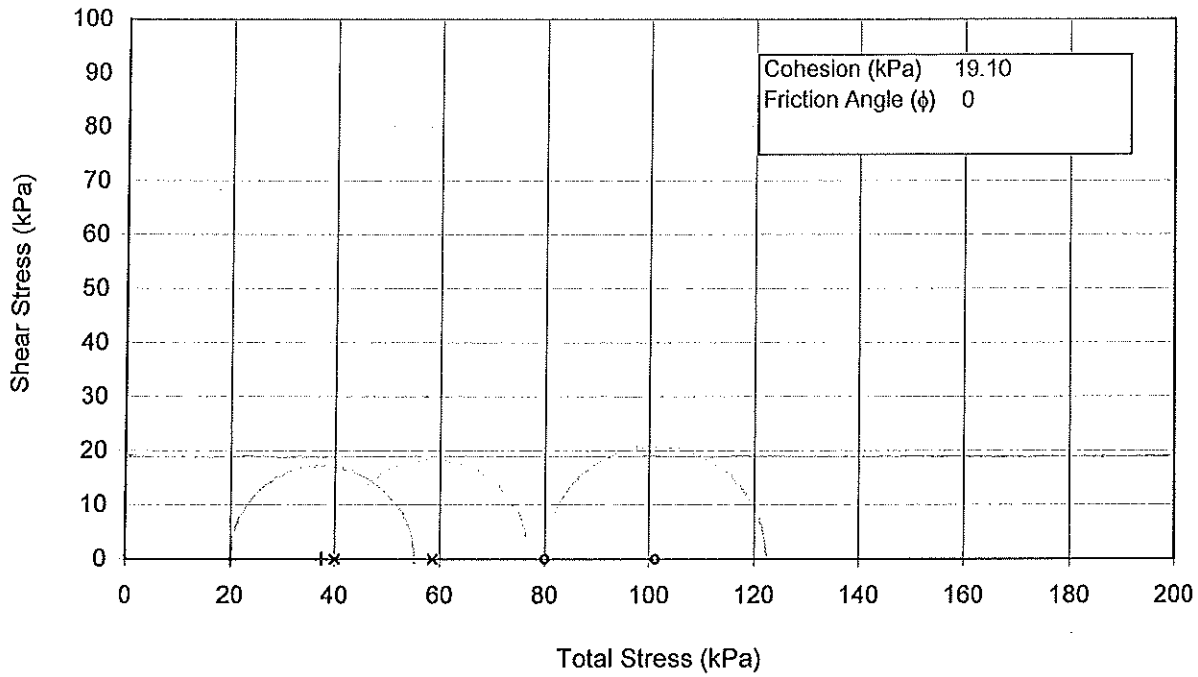
Sample : UD1
 Borehole : BH7
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

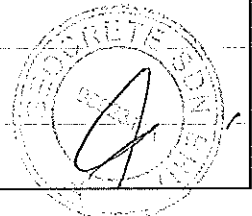
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 20.12.18

Sample : UD1
Borehole : BH7

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

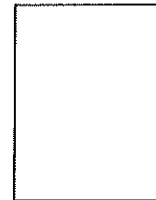
Unconsolidated Undrained

Sample details

Depth : 12.00m
 Description : Greenis grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	138.41	131.53	133.61
Bulk Density ρ (Mg/m ³)	1.607	1.527	1.551
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

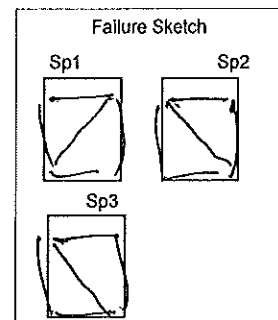


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	90	180	360
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	54	53	51
Dry Density ρ_{d0} (Mg/m ³)	1.04	1.00	1.03
Voids Ratio e_0	1.48	1.59	1.51
Deg of Saturation S_0 %	94.83	86.37	86.80

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	36.51	47.92	50.90
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	36.31	47.72	50.70
Strain at Failure ϵ_f %	8.49	9.47	10.53
Shear Strength c_u (kPa)	18.26	23.96	25.45
Moisture Content w_f %	54	53	51
Dry Density ρ_{df} (Mg/m ³)	1.04	1.00	1.03
Voids Ratio e_f	1.48	1.59	1.51
Deg of Saturation S_f %	94.83	86.37	86.80



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

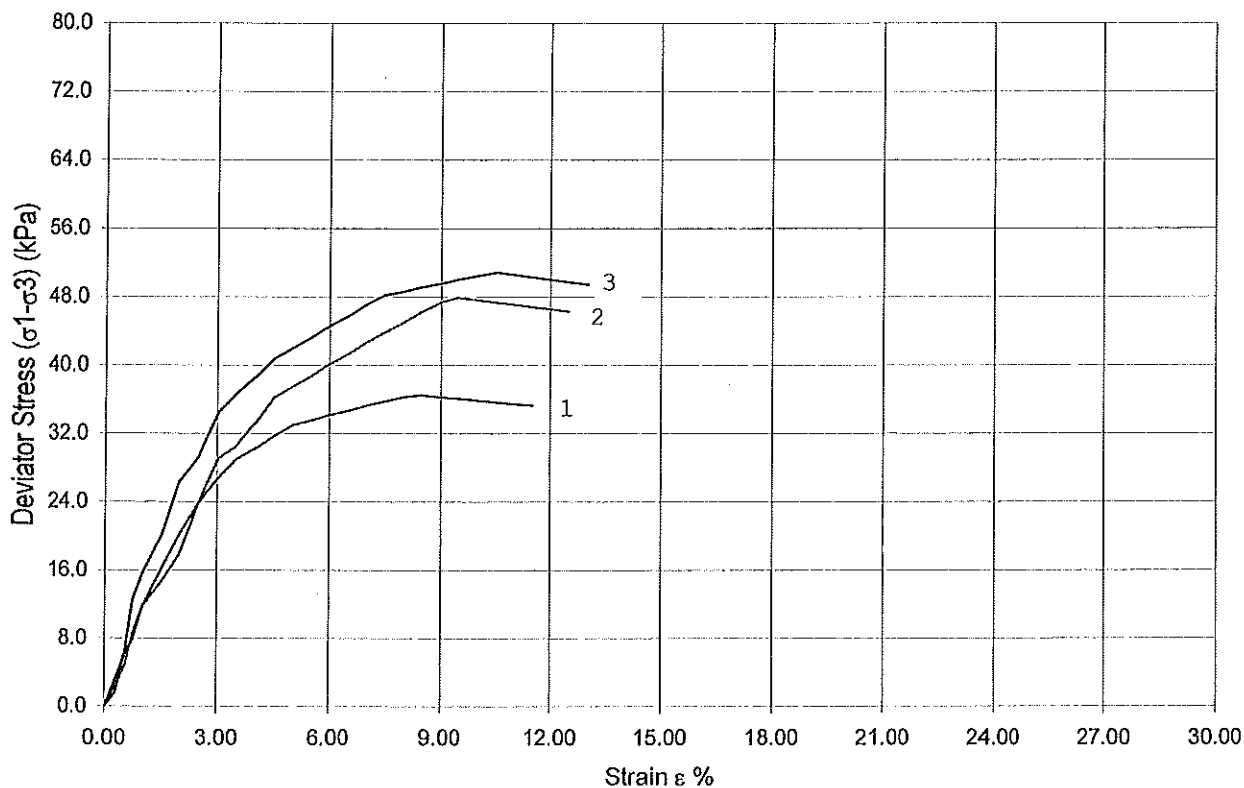
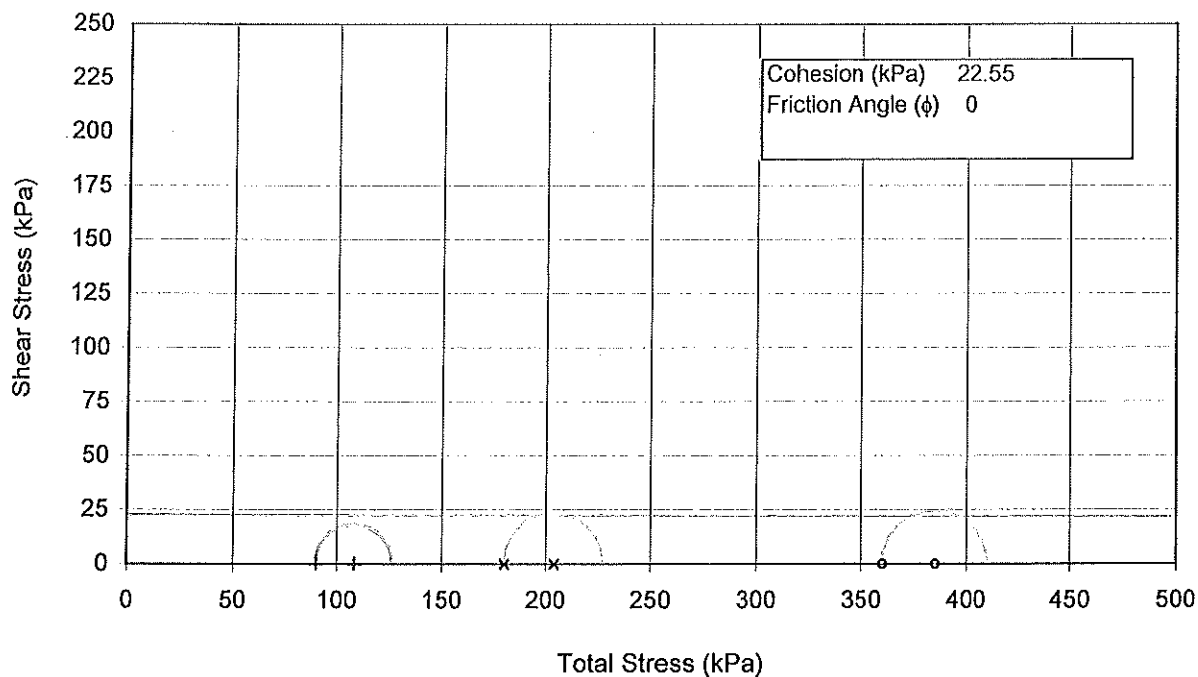
Sample : UD4
 Borehole : BH7
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



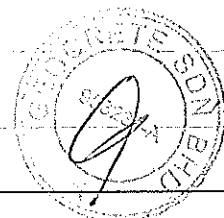
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 20.12.18
 Sample : UD4
 Borehole : BH7
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

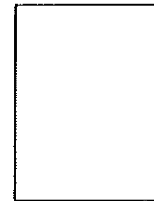
Unconsolidated Undrained

Sample details

Depth : 21.00m
 Description : Dark grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	150.84	152.35	153.26
Bulk Density ρ (Mg/m ³)	1.751	1.768	1.779
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	180	360	720
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

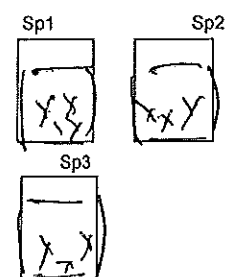
Load Channel : 14391 14391 14391

Moisture Content w_0 %	28	27	26
Dry Density ρ_{d0} (Mg/m ³)	1.37	1.39	1.42
Voids Ratio e_0	0.88	0.85	0.82
Deg of Saturation S_0 %	81.02	81.77	80.54

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	106.09	116.61	122.91
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	105.89	116.41	122.71
Strain at Failure ϵ_f %	8.03	10.00	8.49
Shear Strength c_u (kPa)	53.04	58.31	61.45

Failure Sketch



Moisture Content w_f %	28	27	26
Dry Density ρ_{df} (Mg/m ³)	1.37	1.39	1.42
Voids Ratio e_f	0.88	0.85	0.82
Deg of Saturation S_f %	81.02	81.77	80.54

Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU

Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Sample : UD7

Borehole : BH7

Operator

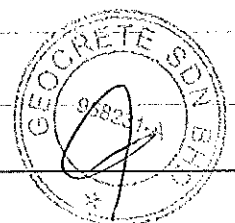
Checked

Approved

Shyam Nath

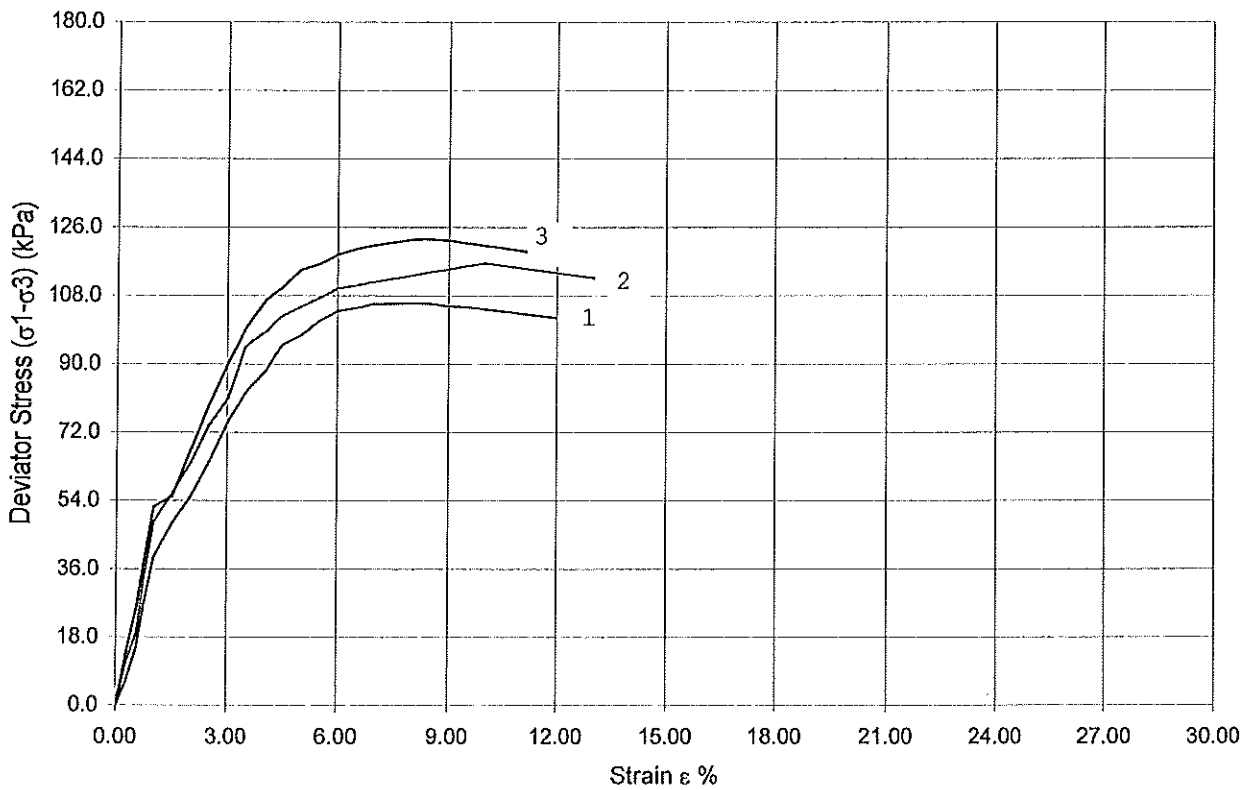
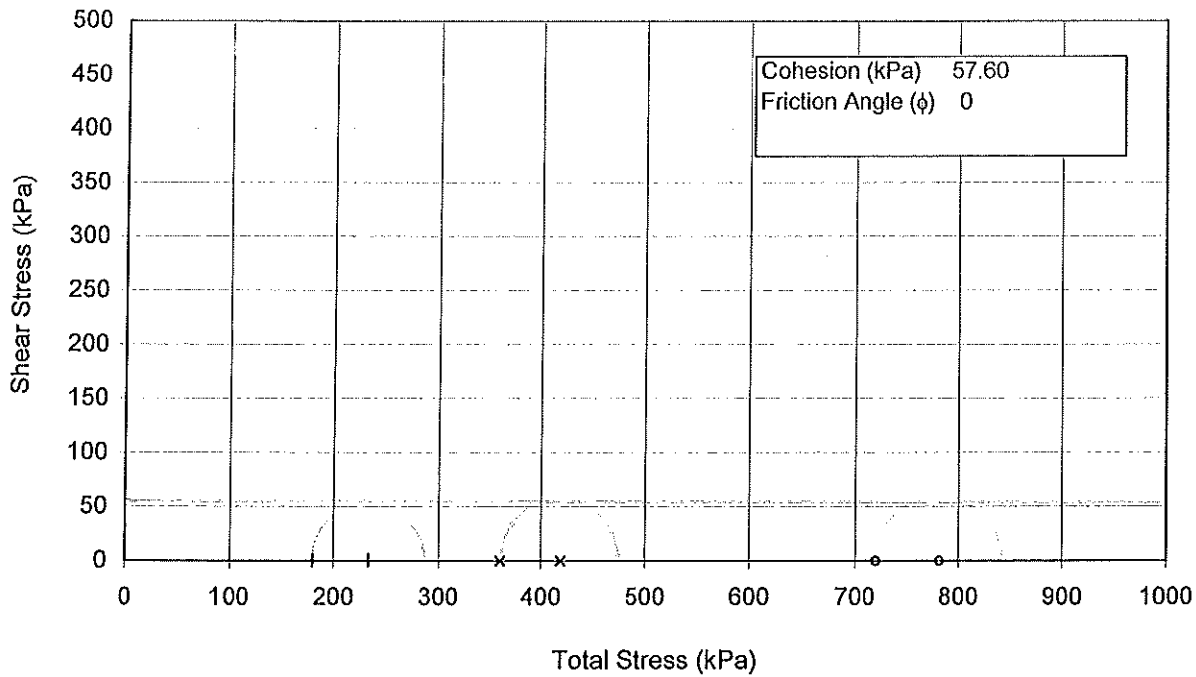
Chris

Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

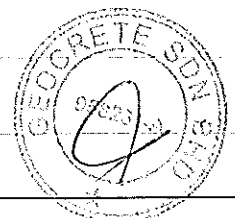
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 20.12.18

Sample : UD7
 Borehole : BH7

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

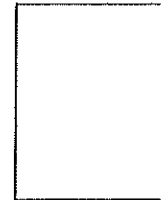
Unconsolidated Undrained

Sample details

Depth : 24.00m
Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_o (gr)	129.72	131.53	133.25
Bulk Density ρ (Mg/m ³)	1.506	1.527	1.547
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

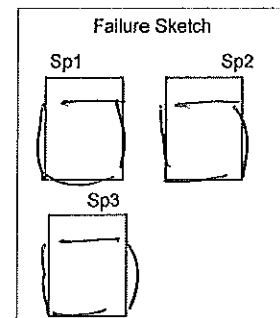


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	180	360	720
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_o %	71	70	68
Dry Density ρ_{d0} (Mg/m ³)	0.88	0.90	0.92
Voids Ratio e_o	1.92	1.87	1.80
Deg of Saturation S_o %	94.76	96.42	97.41

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	35.55	40.92	43.83
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	35.35	40.72	43.63
Strain at Failure ϵ_f %	10.00	7.50	10.53
Shear Strength c_u (kPa)	17.78	20.46	21.91
Moisture Content w_f %	71	70	68
Dry Density ρ_{df} (Mg/m ³)	0.88	0.90	0.92
Voids Ratio e_f	1.92	1.87	1.80
Deg of Saturation S_f %	94.76	96.42	97.41



Notes : Plastic Plastic Plastic

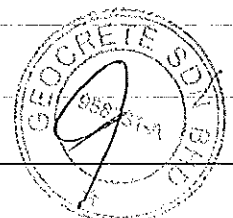
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

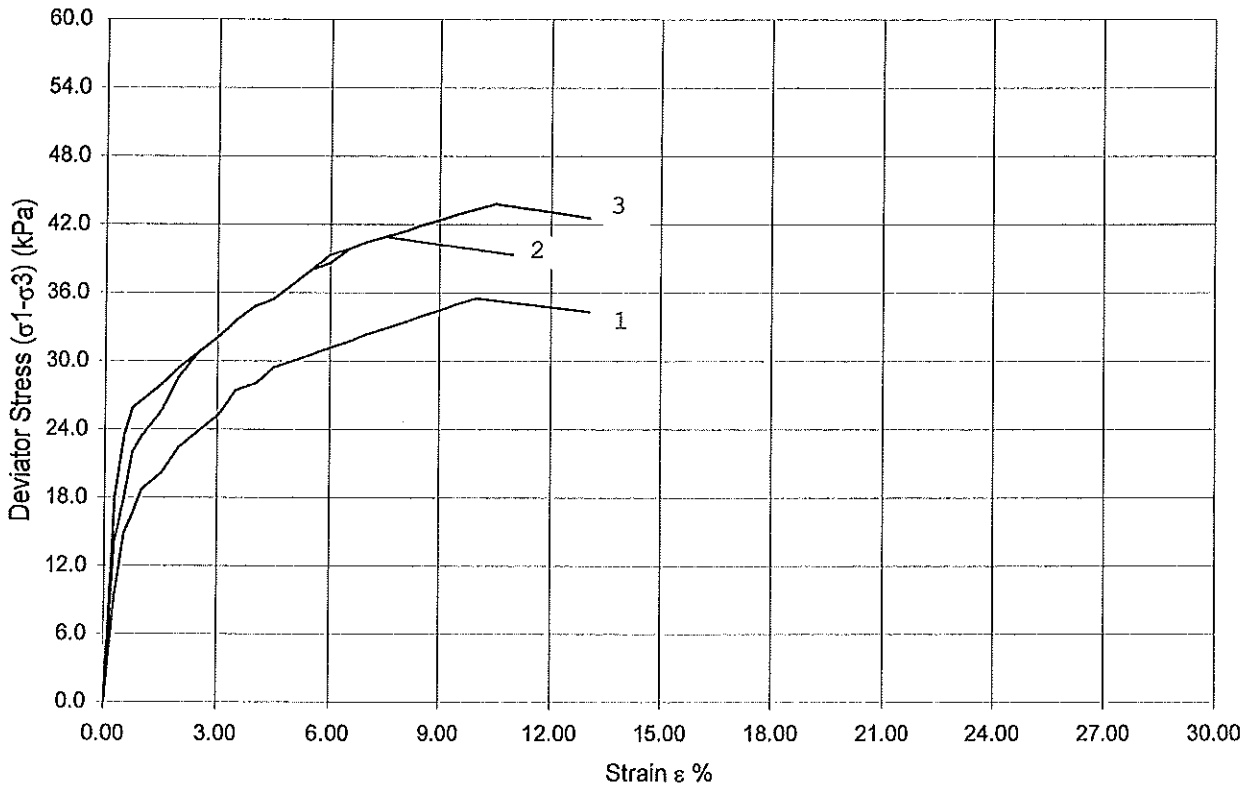
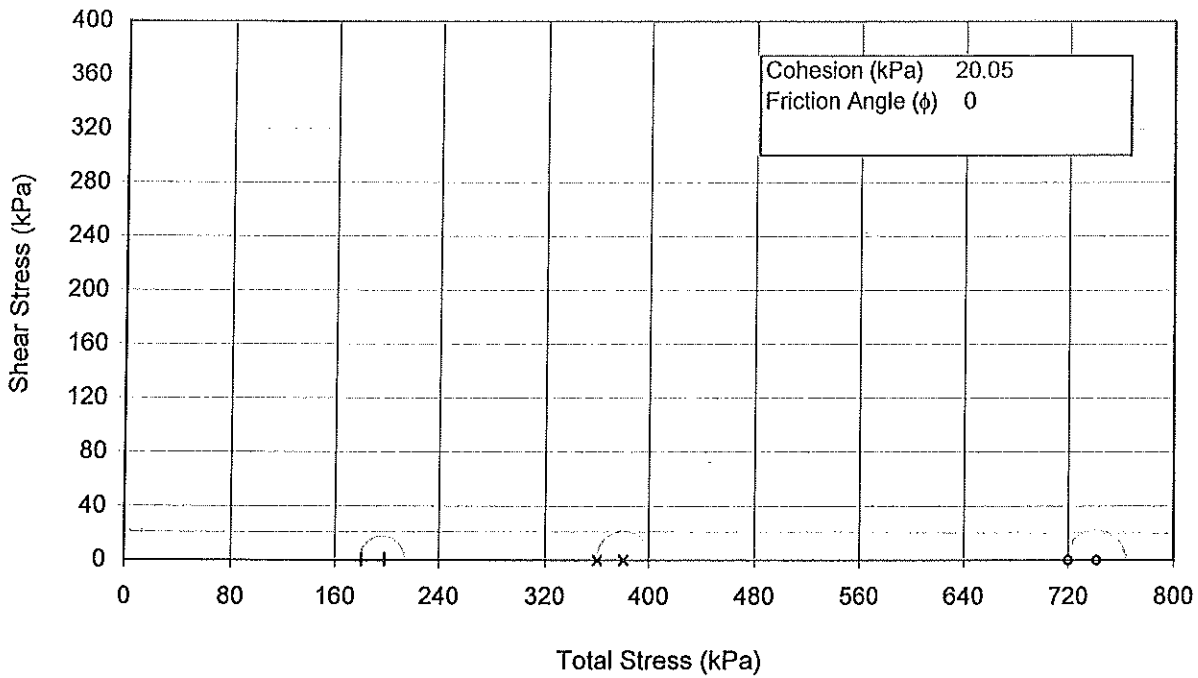
Sample : UD8
Borehole : BH7
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 20.12.18
 Sample : UD8
 Borehole : BH7
 Approved : Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No.	BH7 / UD7 / 21.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY	Ring No.	A8


BEFORE TEST

Moist. Content from trimmings:	=	33 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	124.83 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.28 gm	Area (A)	=	1964 mm ²
Wt of sample	=	66.55 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	50.57 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	15.98 gm	Bulk Density (P)	=	1.694 Mg/m ³
Initial Moisture Content, M ₀	=	32 %	Dry Density (PD)	=	1.287 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _d - 1	=	1.0043			
Initial Saturation, S ₀ ;	$\frac{M_0 \times SG}{e_0}$	=	81 %		
V. Ratio Change Factor F _v ,	$\frac{1+e_0}{H}$	=	0.1002 mm ⁻¹		
Height of Solid	H _s	=	9.979 mm		

AFTER TEST

Wt of sample + Ring	=	123.79 gm	Overall settlement	=	1.686 mm
Wt of Dry sample + Ring	=	108.85 gm	Volume Change	=	3.312 cm ³
Wt of Ring	=	58.28 gm	Final Volume	=	35.97 cm ³
Wt of Wet sample	=	65.51 gm	Final Bulk Density	=	1.821 Mg/m ³
Wt of Dry sample	=	50.57 gm	Final Dry Density	=	1.406 Mg/m ³
Wt of Moisture	=	14.94 gm	Final Void Ratio, e _f	=	0.8353
Final Moisture Content, M _f	=	30 %			
Final Saturation, S ₀	$\frac{M_f \times SG}{e_f}$	=	91 %		

	Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

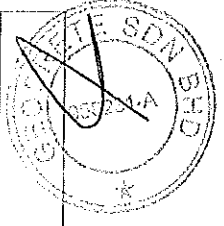
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH7 / UD7 / 21.00m

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A8

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H-H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$A_e = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t_{50} (min)	Cv for t_{50} (m ² /yr)	
0	0.000	20.000	0.0000	1.0043	0.0000	0				
6.25	0.108	19.892	0.0108	0.9935	0.0108	6.25	0.8694	9.00	4.91	-0.0360
12.5	0.186	19.814	0.0186	0.9857	0.0078	6.25	0.6303	3.61	12.12	-0.0260
25.0	0.322	19.678	0.0323	0.9720	0.0136	12.5	0.5533	4.00	10.82	-0.0453
50.0	0.576	19.424	0.0577	0.9466	0.0255	25.0	0.5235	3.61	11.75	-0.0846
100	1.042	18.958	0.1044	0.8999	0.0467	50.0	0.4920	4.84	8.45	-0.1551
200	1.584	18.416	0.1587	0.8456	0.0543	99.9	0.2945	2.56	15.14	-0.1805
400	2.118	17.882	0.2123	0.7920	0.0535	199.8	0.1494	2.56	14.28	-0.1778
200	2.024	17.976	0.2028	0.8015	-0.0094	-199.8				
50	1.862	18.138	0.1866	0.8177	-0.0162	-149.9				
12.5	1.686	18.314	0.1690	0.8353	-0.0176	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)



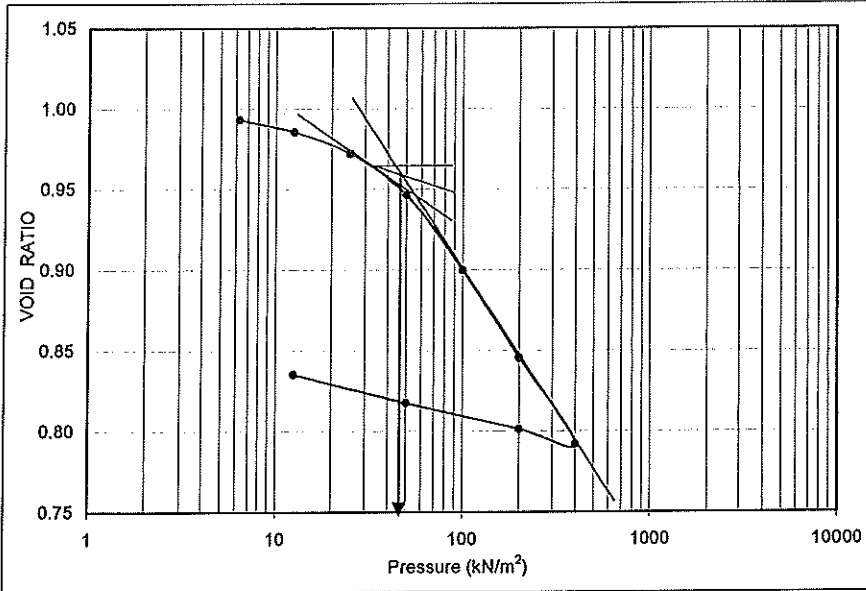
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH7 / UD7 / 21.00m

SOIL SAMPLE Dark grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A8



INITIAL

Water content 32 %

Dry Density 1.29 Mg/m³

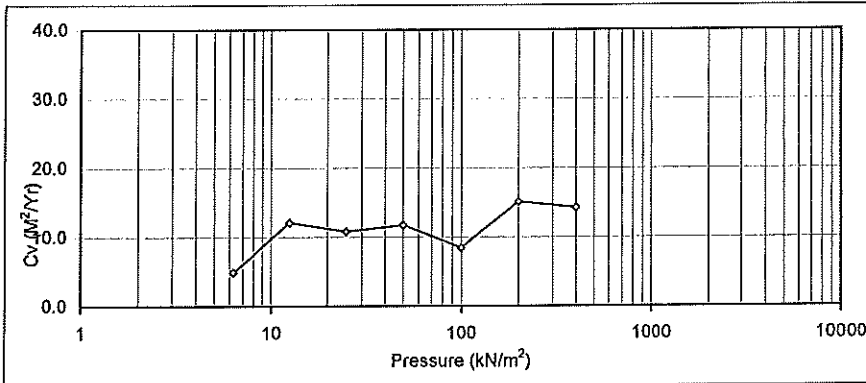
Void Ratio 1.0043

Saturation 81 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.580



FINAL

Water content 30 %

Dry Density 1.41 Mg/m³

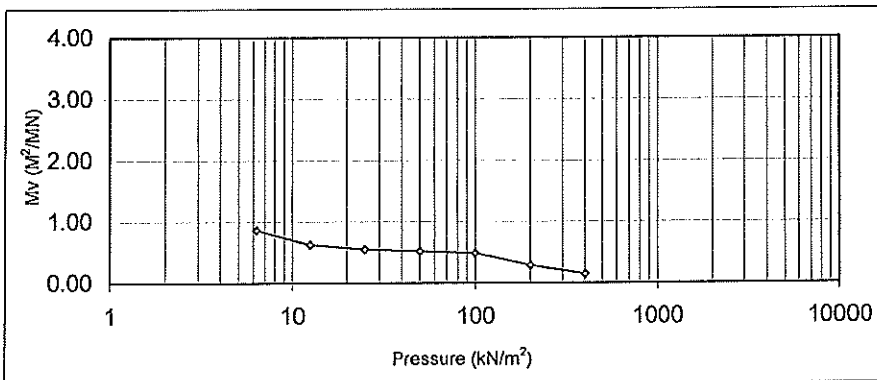
Void Ratio 0.8353

Saturation 91 %

Height 18 mm

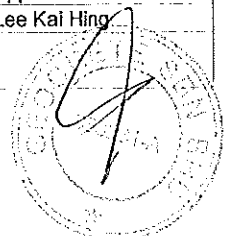
Comp. Index, C_c 0.1805

Precons. Load 45 kN/m²



Comp. Ratio, C_R 0.090

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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GEOCRETE SDN. BHD.

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No.	BH7 / UD8 / 24.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY	Ring No.	A9

BEFORE TEST

Moist. Content from trimmings:	=	71	%	SG (Measured)	=	2.580	
Wt of sample + Ring	=	114.94	gm	Diameter (D)	=	50	mm
Wt of Ring	=	58.38	gm	Area (A)	=	1964	mm ²
Wt of sample	=	56.56	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	33.62	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	22.94	gm	Bulk Density (P)	=	1.440	Mg/m ³
Initial Moisture Content, M ₀	=	68	%	Dry Density (PD)	=	0.856	Mg/m ³

Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.0148	
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	87	%
V. Ratio Change Factor F _v , $\frac{H}{1+e_0}$	=	0.1507	mm ⁻¹
Height of Solid H _s	=	6.634	mm

AFTER TEST

Wt of sample + Ring	=	112.09	gm	Overall settlement	=	3.268	mm
Wt of Dry sample + Ring	=	92.00	gm	Volume Change	=	6.419	cm ³
Wt of Ring	=	58.38	gm	Final Volume	=	32.87	cm ₃
Wt of Wet sample	=	53.71	gm	Final Bulk Density	=	1.634	Mg/m ³
Wt of Dry sample	=	33.62	gm	Final Dry Density	=	1.023	Mg/m ³
Wt of Moisture	=	20.09	gm	Final Void Ratio, e _f	=	1.5222	
Final Moisture Content, M _f	=	60	%				
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	101	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH7 / UD8 / 24.00m

Date of Report

29.12.18

Test started

19.12.18

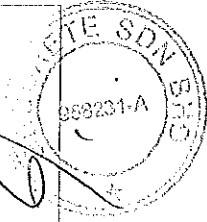
Ring No.

A9

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$A_e = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	2.0148	0.0000	0				
6.25	0.122	19.878	0.0184	1.9964	0.0184	6.25	0.9827	1.21	36.47	-0.0611
12.5	0.188	19.812	0.0283	1.9865	0.0099	6.25	0.5334	5.76	7.59	-0.0331
25.0	0.416	19.584	0.0627	1.9521	0.0344	12.5	0.9321	10.24	4.21	-0.1142
50.0	0.908	19.092	0.1369	1.8779	0.0742	25.0	1.0316	10.24	4.05	-0.2464
100	1.880	18.120	0.2834	1.7314	0.1465	50.0	1.0737	8.41	4.57	-0.4868
200	3.788	16.212	0.5710	1.4438	0.2876	99.9	1.1778	53.29	0.61	-0.9555
100	3.682	16.318	0.5550	1.4598	-0.0160	-99.9				
50	3.482	16.518	0.5249	1.4899	-0.0301	-50.0				
12.5	3.268	16.732	0.4926	1.5222	-0.0323	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kar Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



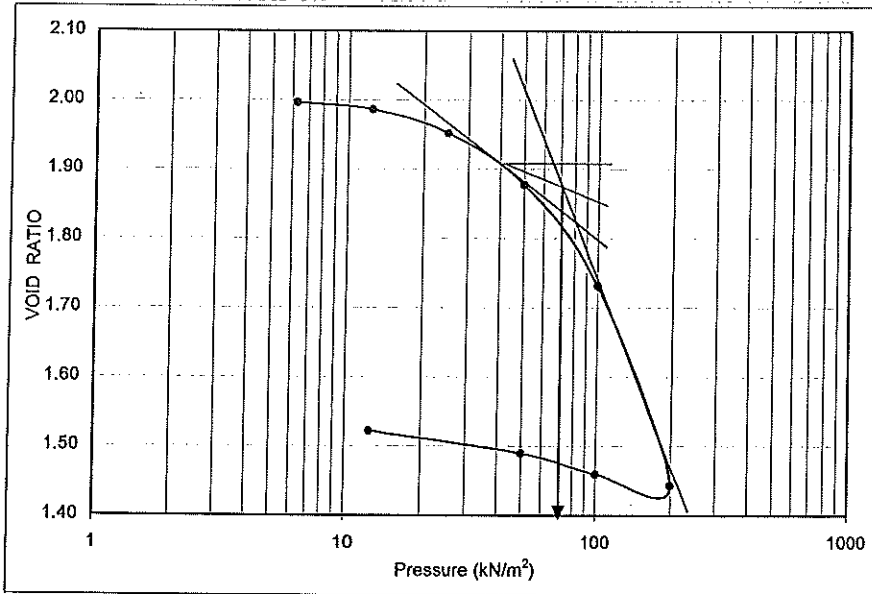
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH7 / UD8 / 24.00m

SOIL SAMPLE Dark grey CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A9



INITIAL

Water content 68 %

Dry Density 0.86 Mg/m³

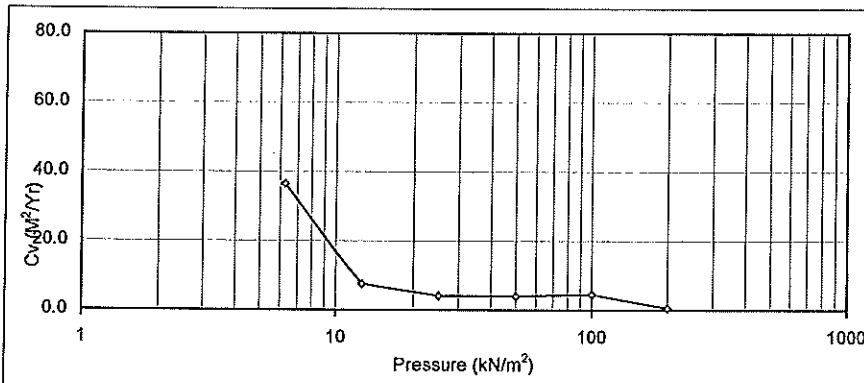
Void Ratio 2.0148

Saturation 87 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.580



FINAL

Water content 60 %

Dry Density 1.02 Mg/m³

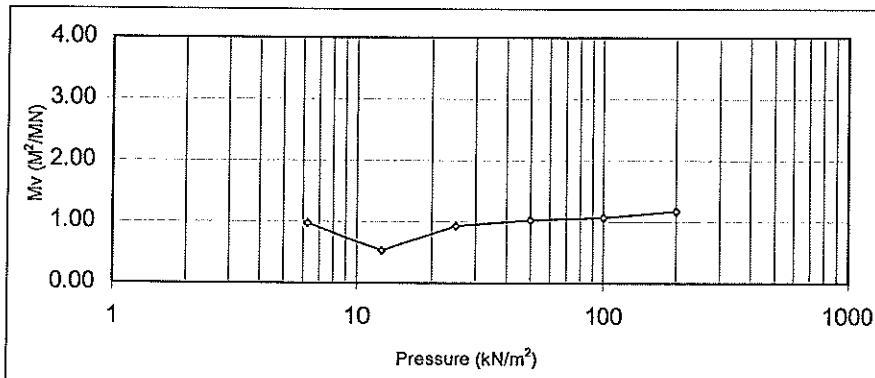
Void Ratio 1.5222

Saturation 101 %

Height 17 mm

Comp. Index, C_c 0.9555

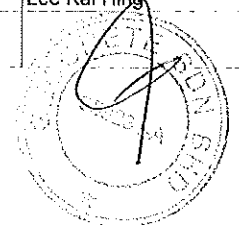
Precons. Load 70 kN/m²



Comp. Ratio, C_R 0.317

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT :																																			
		PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR																																			
SAMPLE AND SPECIMEN DETAILS.		Moisture Content (%)			Bulk Density (Mg/m ³)			Dry Density (Mg/m ³)			ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST									
																																	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)
Borehole No.	Specimen	Depth (m)	3	9	20	2.03	1.81	1.40	1.70	1.43	1.43	1.70	NP	5	38	19	43	0	2.65		3	29.5	3	NA	51.69	0	28	0.231	1.1	0.14	0.28	7.7					
BH8	UD1	3.00	12	37	20	2.03	1.81	1.40	1.70	1.43	1.43	1.70	NP	5	38	19	43	0	2.65		3	29.5	3	NA	51.69	0	28	0.231	1.1	0.14	0.28	7.7					
	UD3	9.00																																			
	UD4	12.00																																			
	UD6	18.00																																			
	UD7	21.00																																			
	D10	25.50																																			
	D15	33.00																																			
	D18	37.50																																			
	D21	42.00																																			
	D25	48.00																																			
	D26	49.50																																			
	D29	54.00																																			
	D33	60.00																																			

Note: NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks: * BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT. ** BH8 UD4 - CONSOL & TRIAXIAL (UU) TEST CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN. (NP)

APPROVED BY: LEE KAI HING	CHECKED BY: CHRIS	
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SUM

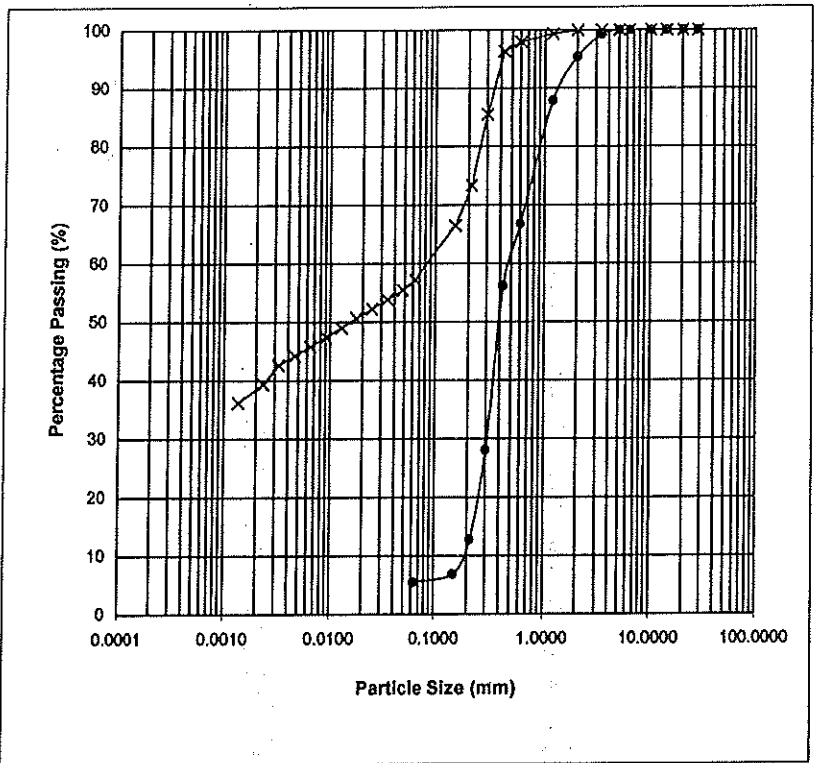
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

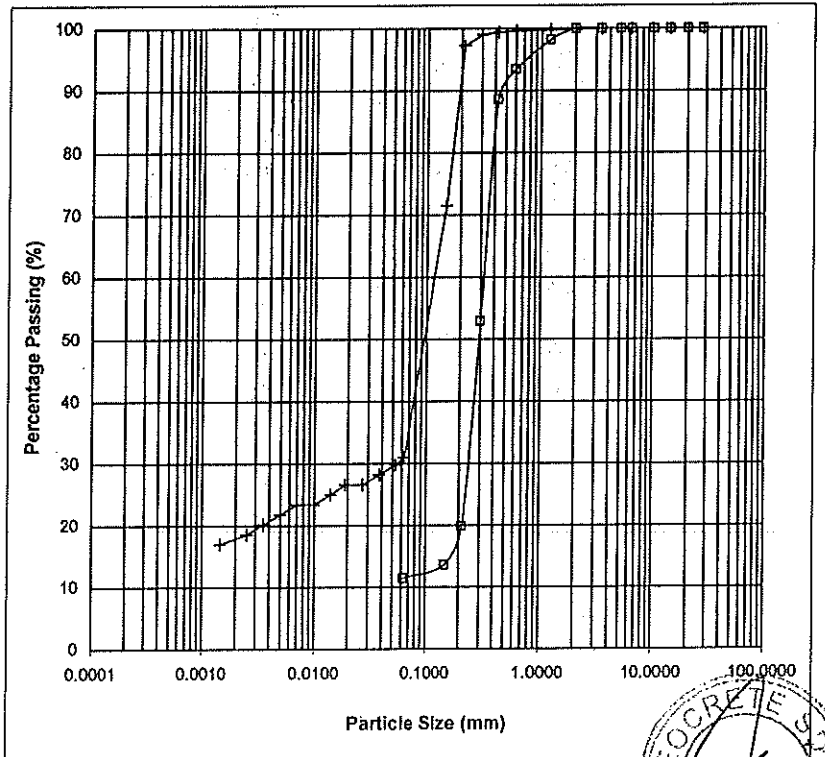
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	99	3.35	100
2.00	95	2.00	100
1.18	88	1.18	99
0.600	67	0.600	98
0.425	56	0.425	96
0.300	26	0.300	86
0.212	13	0.212	73
0.150	7	0.150	66
0.063	5	0.063	57
		0.0480	55
		0.0341	54
		0.0243	52
		0.0173	51
		0.0127	49
		0.0091	47
		0.0064	46
		0.0046	44
		0.0033	43
		0.0023	39
		0.0014	36
Clay (%)	5	Clay (%)	36
Silt (%)		Silt (%)	19
Sand (%)	90	Sand (%)	43
Gravel (%)	5	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH8	UD1	3.00	19.01.19
X	BH8	UD3	9.00	19.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	98	1.18	100
0.600	93	0.600	100
0.425	89	0.425	99
0.300	53	0.300	99
0.212	20	0.212	97
0.150	14	0.150	72
0.063	11	0.063	31
		0.0530	30
		0.0377	28
		0.0268	27
		0.0189	27
		0.0139	25
		0.0099	23
		0.0070	23
		0.0050	22
		0.0035	20
		0.0025	19
		0.0015	17
Clay (%)	11	Clay (%)	18
Silt (%)		Silt (%)	13
Sand (%)	89	Sand (%)	69
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH8	UD4	12.00	19.01.19
+	BH8	UD6	18.00	19.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

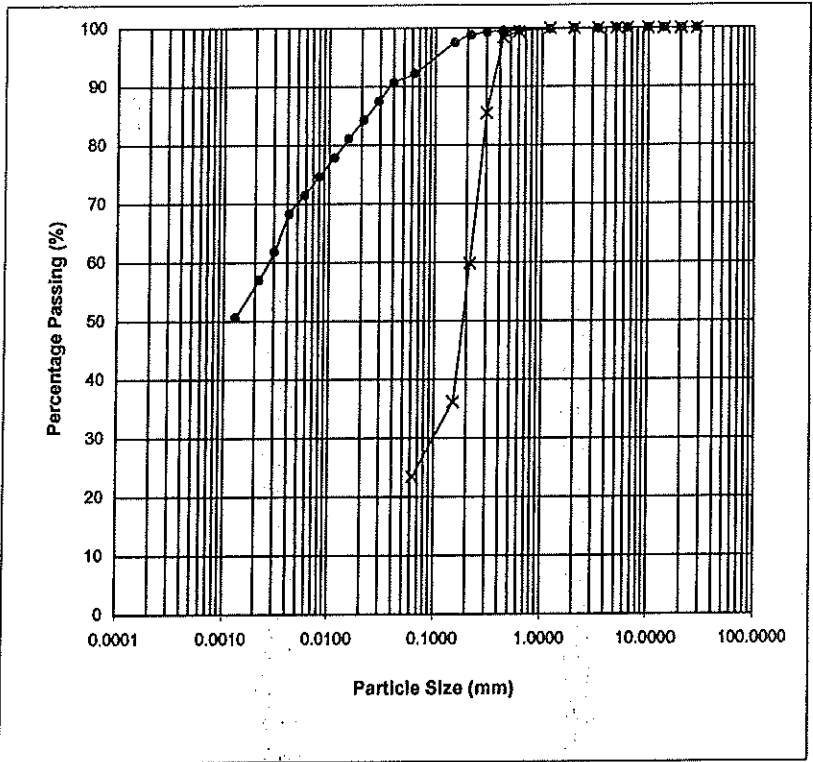
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

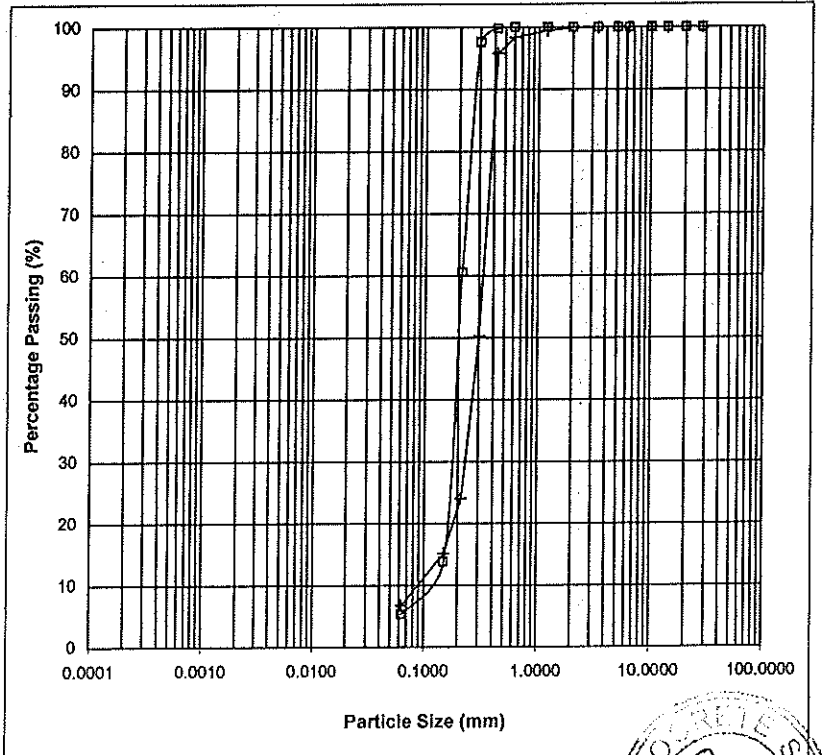
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	98
0.300	99	0.300	86
0.212	99	0.212	60
0.150	98	0.150	36
0.063	92	0.063	23
0.0401	91		
0.0289	87		
0.0208	84		
0.0150	81		
0.0111	78		
0.0080	75		
0.0058	71		
0.0041	68		
0.0030	62		
0.0022	57		
0.0013	51		
Clay (%)	54	Clay (%)	23
Silt (%)	38	Silt (%)	
Sand (%)	8	Sand (%)	77
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH8	UD7	21.00	19.01.19
X	BH8	D10	25.50	19.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	98
0.425	100	0.425	96
0.300	98	0.300	50
0.212	81	0.212	24
0.150	14	0.150	15
0.063	5	0.063	7
Clay (%)	5	Clay (%)	7
Silt (%)		Silt (%)	
Sand (%)	95	Sand (%)	93
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH8	D15	33.00	19.01.19
+	BH8	D18	37.50	19.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	

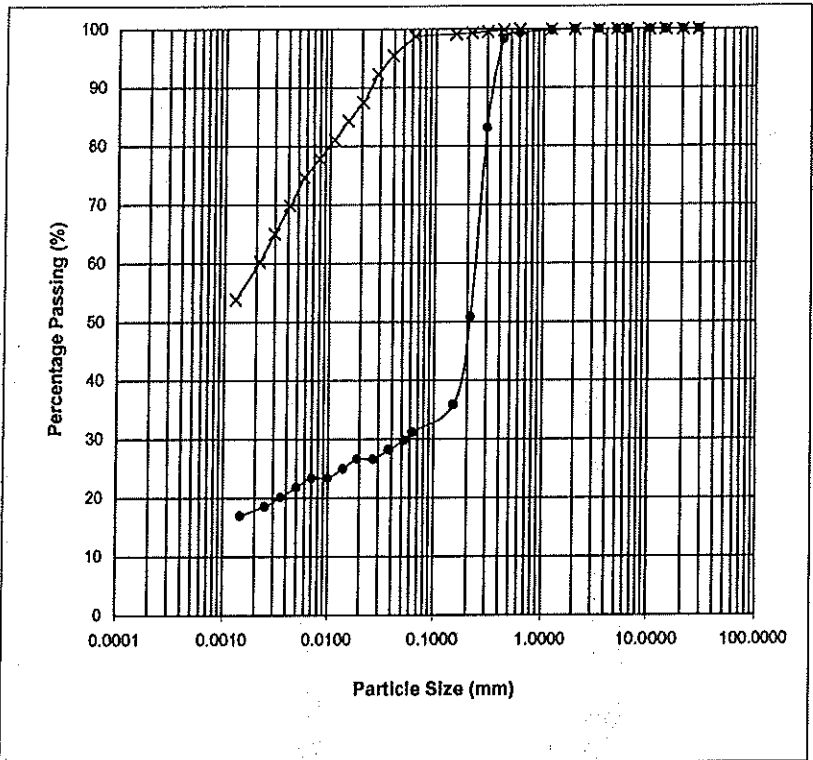
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND
ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

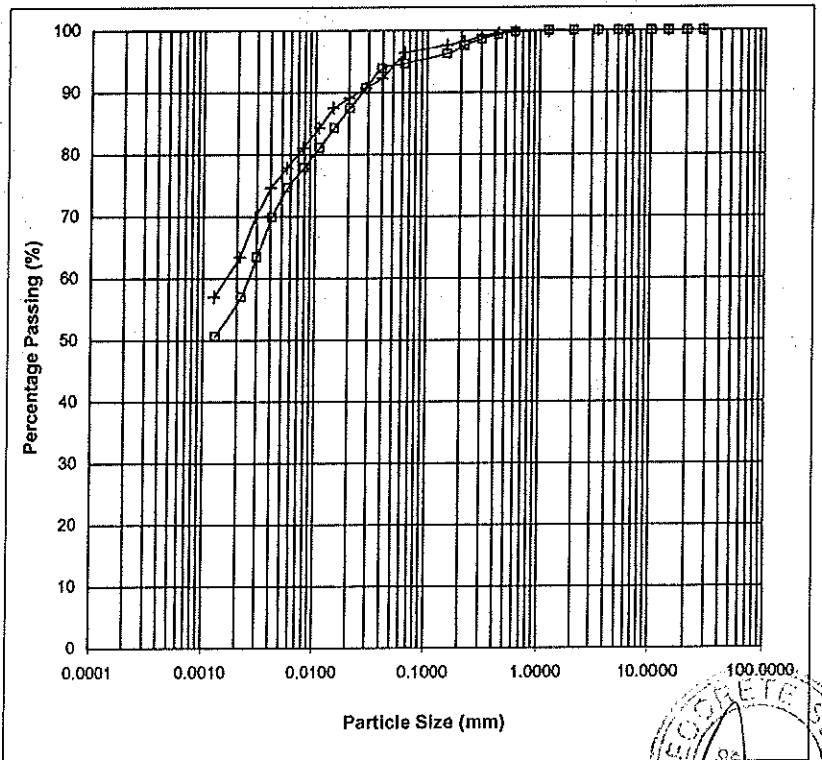
Particle Size Distribution			
●		x	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	99	0.600	100
0.425	98	0.425	100
0.300	83	0.300	100
0.212	51	0.212	99
0.150	36	0.150	99
0.063	31	0.063	99
0.0530	30	0.0389	96
0.0377	28	0.0280	92
0.0268	27	0.0204	87
0.0189	27	0.0147	84
0.0139	25	0.0109	81
0.0099	23	0.0079	78
0.0070	23	0.0057	75
0.0050	22	0.0041	70
0.0035	20	0.0030	65
0.0025	19	0.0021	60
0.0015	17	0.0013	54
Clay (%)	18	Clay (%)	57
Silt (%)	13	Silt (%)	42
Sand (%)	69	Sand (%)	1
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH8	D21	42.00	19.01.19
x	BH8	D26	49.50	19.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	100
0.300	99	0.300	99
0.212	98	0.212	98
0.150	96	0.150	98
0.063	95	0.063	96
0.0393	94	0.0397	92
0.0283	91	0.0283	91
0.0204	87	0.0202	89
0.0147	84	0.0144	87
0.0109	81	0.0107	84
0.0079	78	0.0077	81
0.0057	75	0.0056	78
0.0041	70	0.0040	75
0.0030	63	0.0029	70
0.0022	57	0.0021	63
0.0013	51	0.0013	57
Clay (%)	54	Clay (%)	60
Silt (%)	41	Silt (%)	36
Sand (%)	5	Sand (%)	4
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH8	D29	54.00	19.01.19
+	BH8	D33	60.00	19.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee KaiHing

Total Stress Triaxial Compression

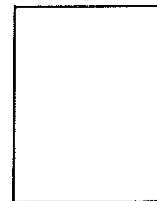
Unconsolidated Undrained

Sample details

Depth : 18.00m
Description : Grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	155.81	158.53	159.45
Bulk Density ρ (Mg/m ³)	1.809	1.840	1.851
Particle Density ρ_s	2.68	2.68	2.68

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	160	320	640
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

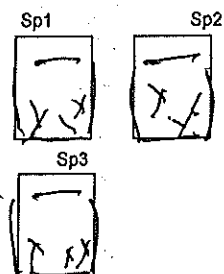
	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	28	28	27
Dry Density ρ_{d0} (Mg/m ³)	1.42	1.43	1.45
Voids Ratio e_0	0.89	0.87	0.85
Deg of Saturation S_0 %	82.92	87.63	86.99

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	77.24	108.45	124.44
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	77.04	108.25	124.24
Strain at Failure ϵ_f %	9.47	8.49	9.47
Shear Strength c_u (kPa)	38.62	54.22	62.22

Failure Sketch



Moisture Content w_f %	28	28	27
Dry Density ρ_{df} (Mg/m ³)	1.42	1.43	1.45
Voids Ratio e_f	0.89	0.87	0.85
Deg of Saturation S_f %	82.92	87.63	86.99

Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

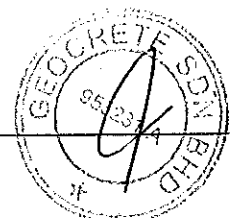
Test Name : UU

Date of Test : 15.01.19

Sample : UD6

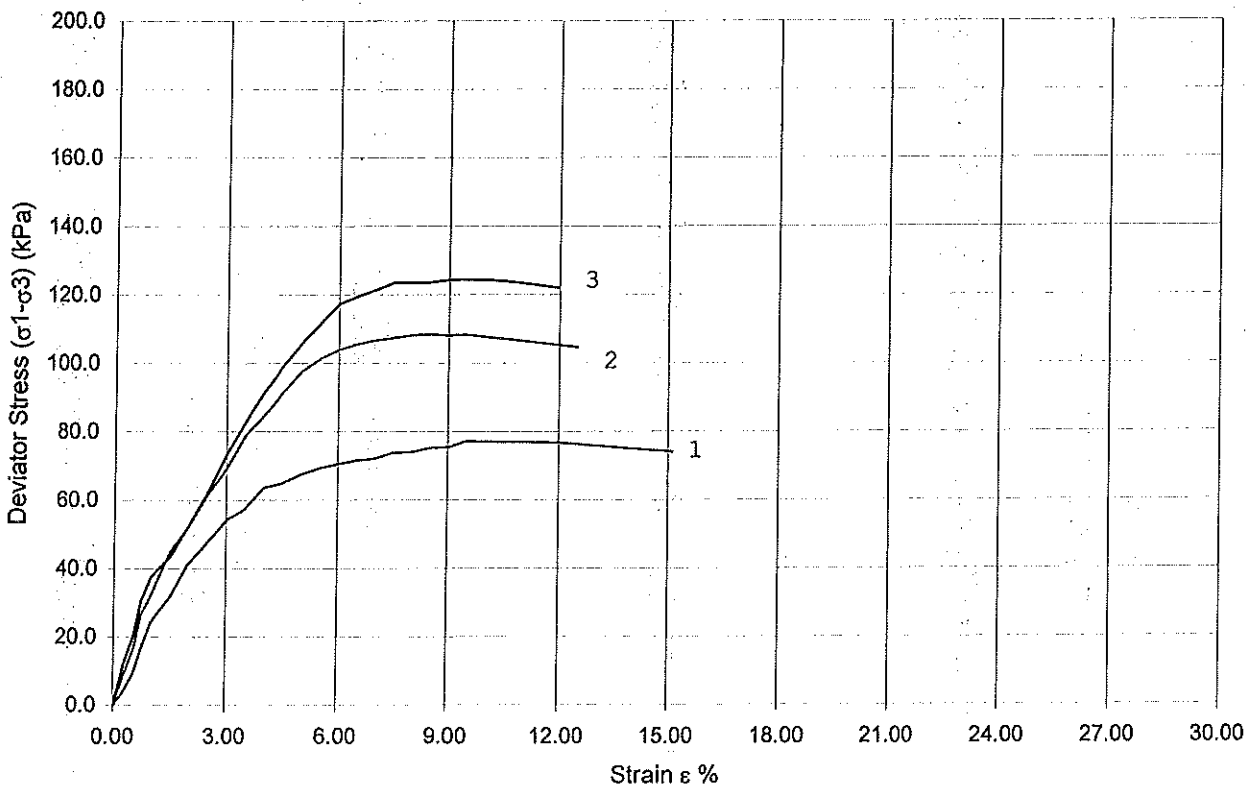
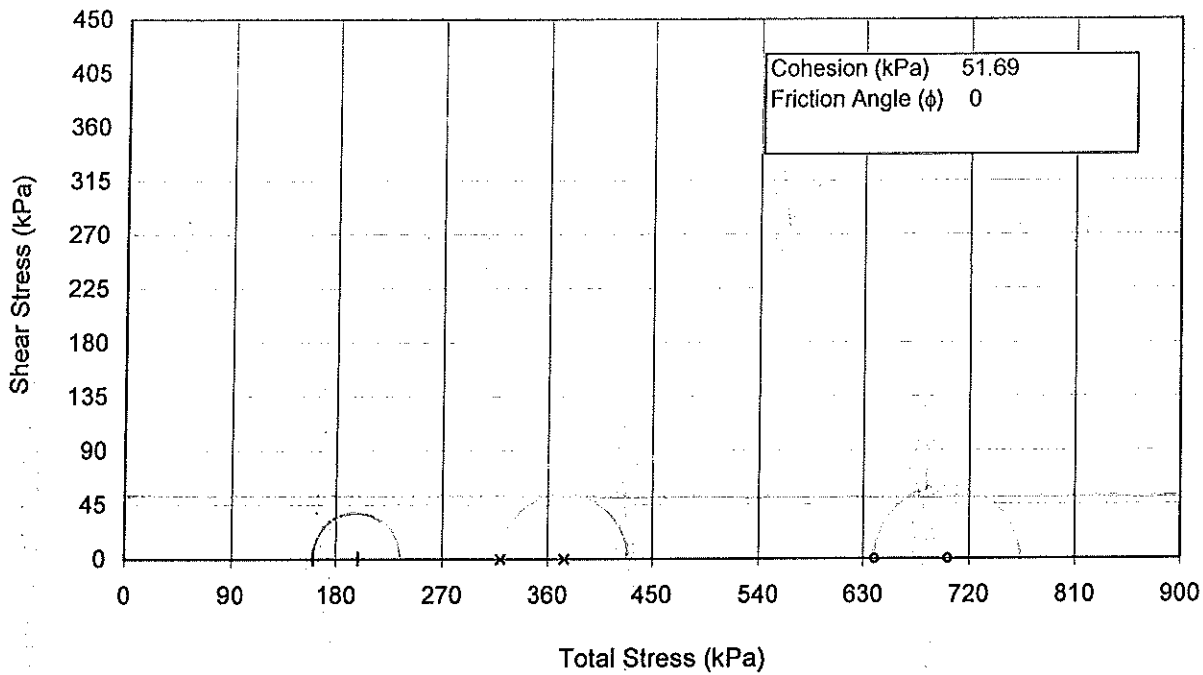
Borehole : BH8

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 15.01.19
 Sample : UD6
 Borehole : BH8
 Approved : Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No.	BH8 / UD6 / 18.00m	Test Started	14.01.19
Soil Description	Grey sandy CLAY	Ring No.	A5

BEFORE TEST

Moist. Content from trimmings:	=	42 %	SG (Measured)	=	2.680
Wt of sample + Ring	=	121.96 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.35 gm	Area (A)	=	1984 mm ²
Wt of sample	=	60.61 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	43.87 gm	Volume (V)	=	39.29 cm ³
Wt of initial Moisture	=	16.74 gm	Bulk Density (P)	=	1.543 Mg/m ³
Initial Moisture Content, M ₀	=	38 %	Dry Density (PD)	=	1.117 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.4000			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	73 %			
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1200 mm ⁻¹			
Height of Solid H _s	=	8.334 mm			

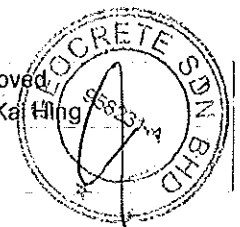
AFTER TEST

Wt of sample + Ring	=	119.92 gm	Overall settlement	=	1.862 mm
Wt of Dry sample + Ring	=	105.22 gm	Volume Change	=	3.658 cm ³
Wt of Ring	=	61.35 gm	Final Volume	=	35.63 cm ³
Wt of Wet sample	=	58.57 gm	Final Bulk Density	=	1.644 Mg/m ³
Wt of Dry sample	=	43.87 gm	Final Dry Density	=	1.231 Mg/m ³
Wt of Moisture	=	14.70 gm	Final Void Ratio, e _f , $\frac{M_f \times SG}{e_f}$	=	1.1765
Final Moisture Content, M _f	=	34 %			
Final Saturation, S ₀	=	76 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



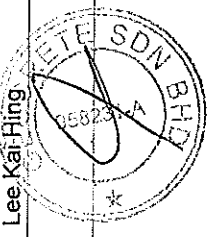
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No	BH8 / UD6 / 18.00m	Test started	14.01.19
		Ring No.	A5

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.4000	0.0000	0				
6.25	0.296	19.704	0.0355	1.3644	0.0355	6.25	2.4054	1.44	30.38	-0.1180
12.5	0.486	19.514	0.0583	1.3416	0.0228	6.25	1.5590	4.41	9.68	-0.0757
25.0	0.744	19.256	0.0893	1.3107	0.0310	12.5	1.0727	3.24	12.87	-0.1029
50.0	1.228	18.772	0.1474	1.2526	0.0581	25.0	1.0321	1.44	27.87	-0.1930
100	1.788	18.212	0.2146	1.1854	0.0672	50.0	0.6154	2.56	14.83	-0.2233
200	2.368	17.632	0.2842	1.1158	0.0696	99.9	0.3292	3.24	11.00	-0.2312
100	2.268	17.732	0.2722	1.1278	-0.0120	-99.9				
50	2.098	17.902	0.2518	1.1482	-0.0204	-50.0				
12.5	1.862	18.138	0.2234	1.1765	-0.0283	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai-Hing



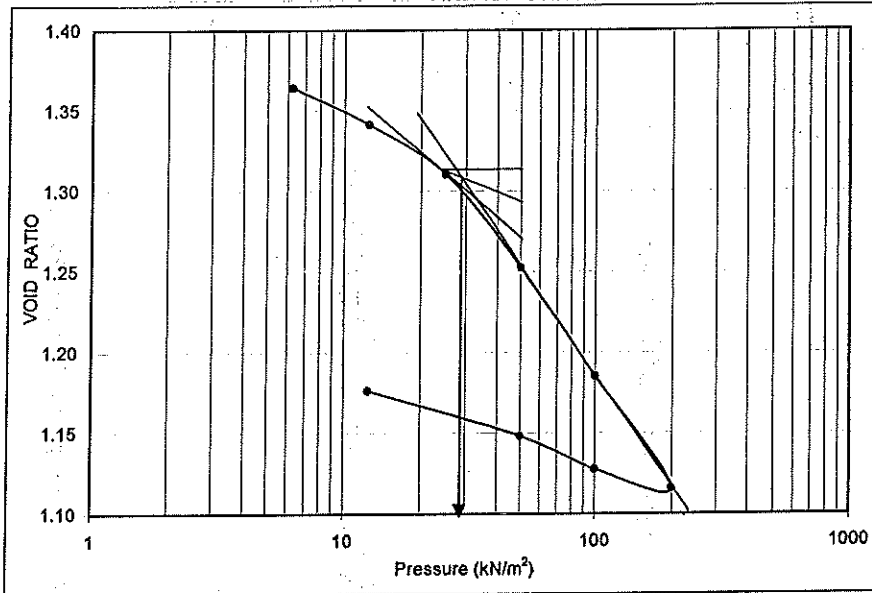
GEOTECHNICAL ENGINEERING (G.E.) SDN BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

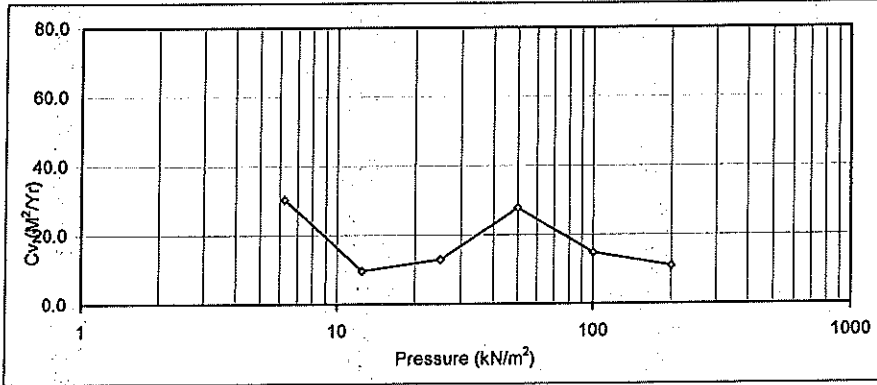
BH REF BH8 / UD6 / 18.00m
 SOIL SAMPLE Grey sandy CLAY

Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A5



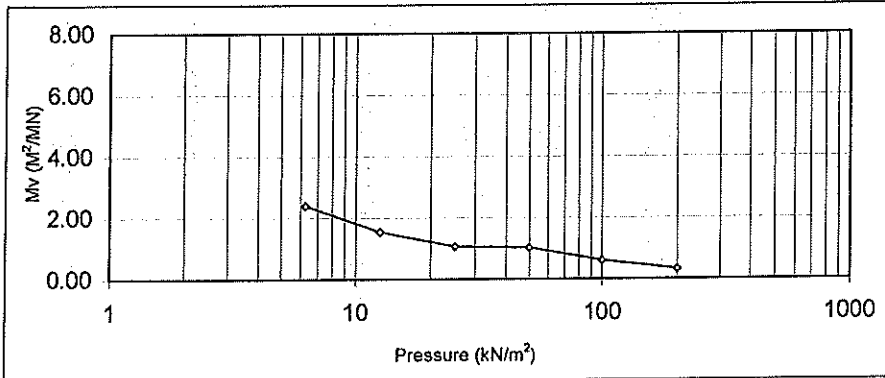
INITIAL

Water content	38	%
Dry Density	1.12	Mg/m ³
Void Ratio	1.4000	
Saturation	73	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.680	

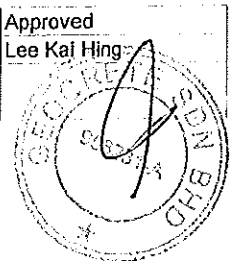


FINAL

Water content	34	%
Dry Density	1.23	Mg/m ³
Void Ratio	1.1765	
Saturation	76	%
Height	18	mm
Comp. Index, Cc	0.2312	
Precons. Load	28	kN/m ²



Comp. Ratio, C_R 0.096



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 8 / D 15 (33.00 m)

Test Size : 60 mm x 60 mm x 20 mm

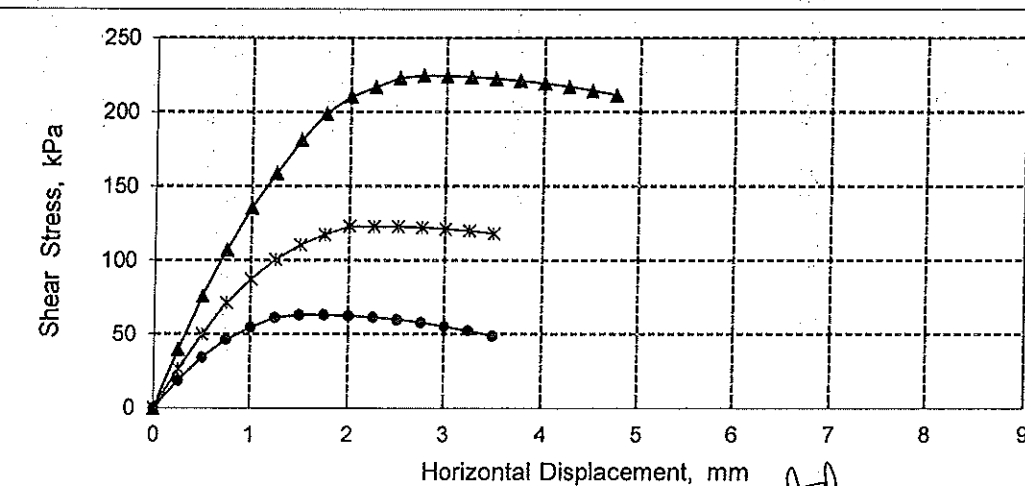
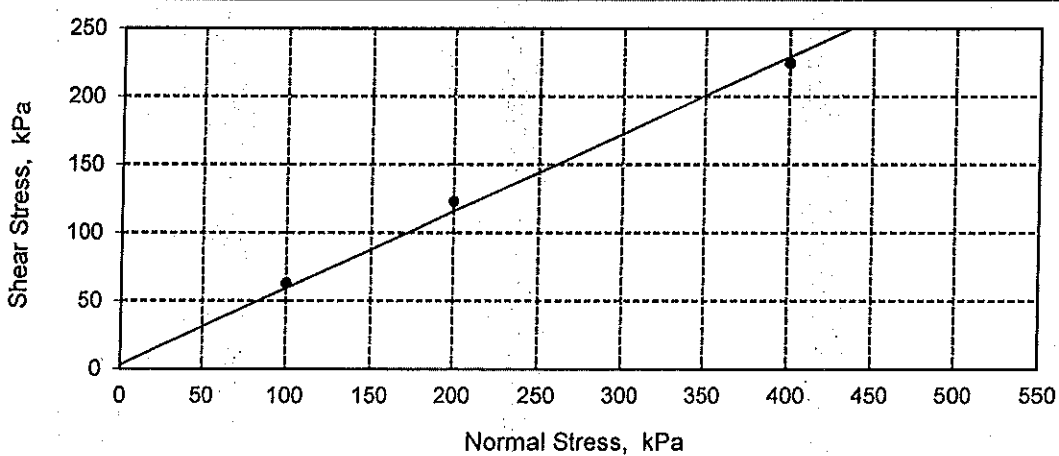
Date Tested : 7 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight	(g)	136.7	136.9	135.9
Moisture Content	(%)	24.5	25.0	24.8
Bulk Density	(Mg/m ³)	1.899	1.901	1.888
Dry Density	(Mg/m ³)	1.525	1.521	1.513

SHEARING STAGE				
Normal Stress	(kPa)	100	200	400
Max. Shear Stress	(kPa)	63.2	123.1	224.7
Displ. at Failure	(mm)	1.5	2.0	2.8
Settlement	(mm)	0.3	0.5	0.8

c' 3 kPa

φ' 29.5 deg.



SUMMARY OF TEST RESULTS

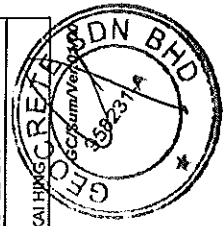
GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										REF : L/081/18/139/18 DATE : 07.12.18															
SAMPLE AND SPECIMEN DETAILS		ATTERBERG			SIEVE AND HYDROMETER ANALYSIS				SHEAR BOX		CIU		UU Triaxial CONSOLIDATION		CHEMICAL TEST												
		Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Unconfined Compression Test (Max Deviator Stress) (kPa)	Cu' (kPa)	φ (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)		
Borehole No.	Specimen	Depth (m)																									
BH9	UD1	3.00	44	1.71	1.25	1.31	1.06	51	23	28	10.3	43	36	21	0	2.65		23.43	0	22	0.250	6.2	0.11	0.51	7.3		
	UD2	6.00	40	1.74	1.31	1.06	48	24	24	24		43	36	21	0			32.02	0			5.2	0.11	0.50	7.6		
	UD3	9.00	66	1.75	1.06	1.06	39	29	32	0		39	29	32	0							5.8	0.23	0.84	7.9		
	UD4	12.00	51	1.64	1.18	1.18	55	21	34	34		53	45	2	0			23.31	0	33	0.252						
	UD6	18.00	45	1.60	1.15	1.15	43	22	21	21	8.3	39	30	31	0	2.65		14.64	0								
	D12	25.50	65	NA	NA	NA	NA	68	26	42	14.4	53	37	10	0												
	D13	27.00	70	NA	NA	NA	NA	68	26	42	14.4	52	40	8	0												
	D17	33.00	63	NA	NA	NA	NA	NA	NP	NP	NA	48	38	14	0												
	D25	43.50	18	NA	NA	NA	NA	NA	NP	NP	NA	10	90	0	2.70												
	D26	45.00	13	1.92	1.59	1.59	8	92	0	0		8	92	0	2.70												
	D30	51.00	15	1.97	1.63	1.63	7	93	0	0		7	93	0	2.70												
	D32	54.00	19	NA	NA	NA	10	90	0	0		10	90	0													
	D34	57.00	15	NA	NA	NA	9	91	0	0		9	91	0													
	D36	60.00	16	NA	NA	NA	9	91	0	0		9	91	0													

Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks : * BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

CHECKED BY: CHRIS

APPROVED BY: LEE KAI HING



SUM

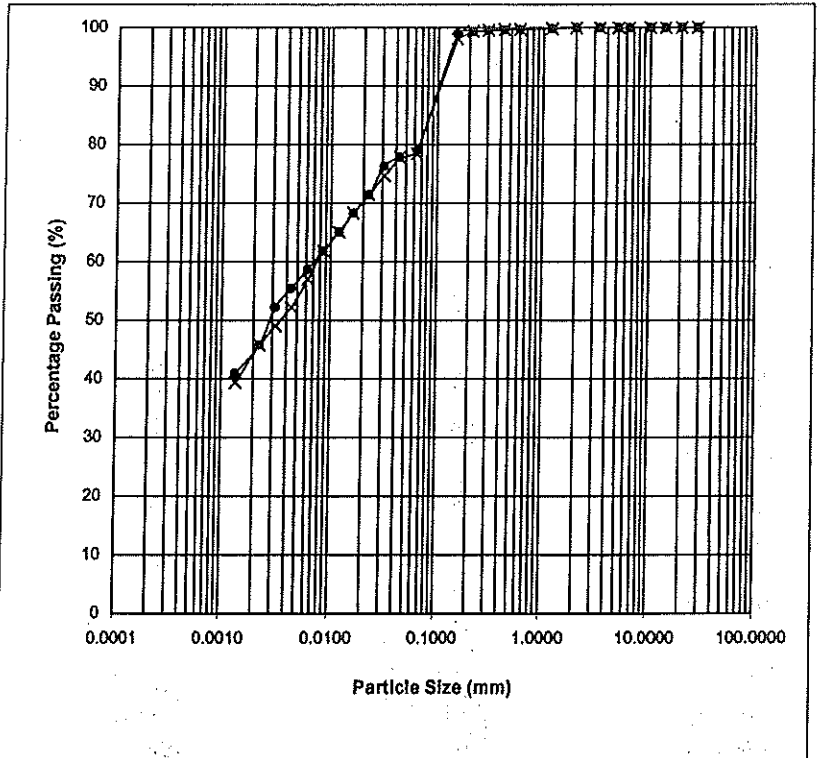
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

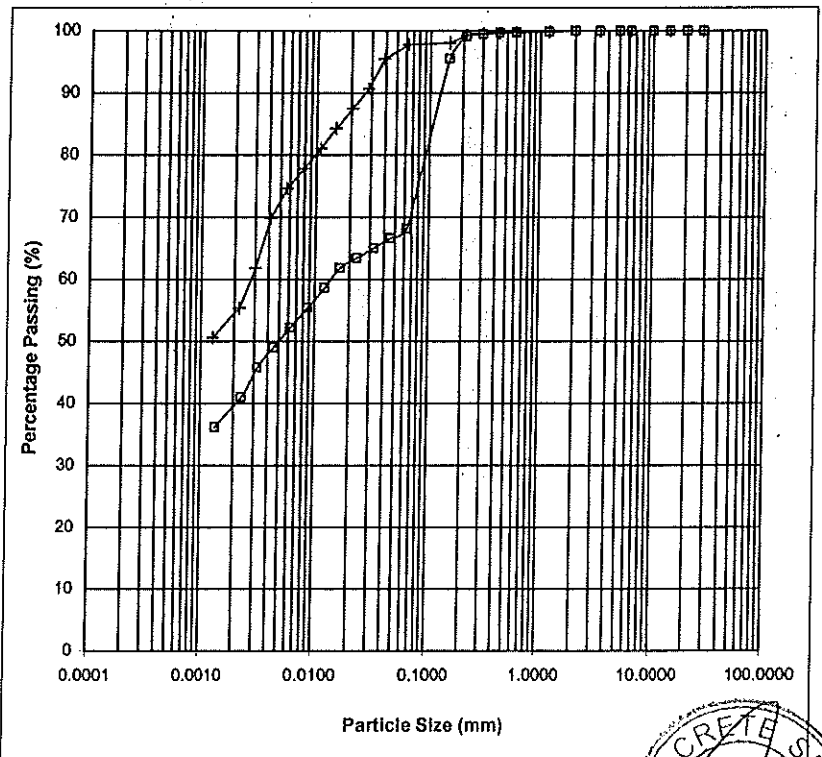
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	99	0.212	99
0.150	99	0.150	98
0.063	79	0.063	78
0.0431	78	0.0431	78
0.0307	76	0.0310	75
0.0223	71	0.0223	71
0.0160	68	0.0160	68
0.0119	65	0.0119	65
0.0085	62	0.0085	62
0.0061	59	0.0061	57
0.0044	55	0.0044	52
0.0031	52	0.0032	49
0.0023	46	0.0023	46
0.0013	41	0.0013	39
Clay (%)	43	Clay (%)	43
Silt (%)	36	Silt (%)	36
Sand (%)	21	Sand (%)	21
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH9	UD1	3.00	30.11.18
x	BH9	UD2	6.00	30.11.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	99	0.212	99
0.150	96	0.150	98
0.063	68	0.063	98
0.0456	67	0.0389	96
0.0325	65	0.0283	91
0.0231	63	0.0204	87
0.0165	62	0.0147	84
0.0122	59	0.0109	81
0.0088	55	0.0079	78
0.0063	52	0.0057	75
0.0045	49	0.0041	70
0.0032	46	0.0030	62
0.0023	41	0.0022	55
0.0014	36	0.0013	51
Clay (%)	39	Clay (%)	53
Silt (%)	29	Silt (%)	45
Sand (%)	32	Sand (%)	2
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH9	UD3	9.00	30.11.18
+	BH9	UD4	12.00	30.11.18



GEOCRETE SDN BHD (Company No. 958231-A)

Tested :

Shyam Nath

Checked :

Chris

Approved :

Lee Kai Hing



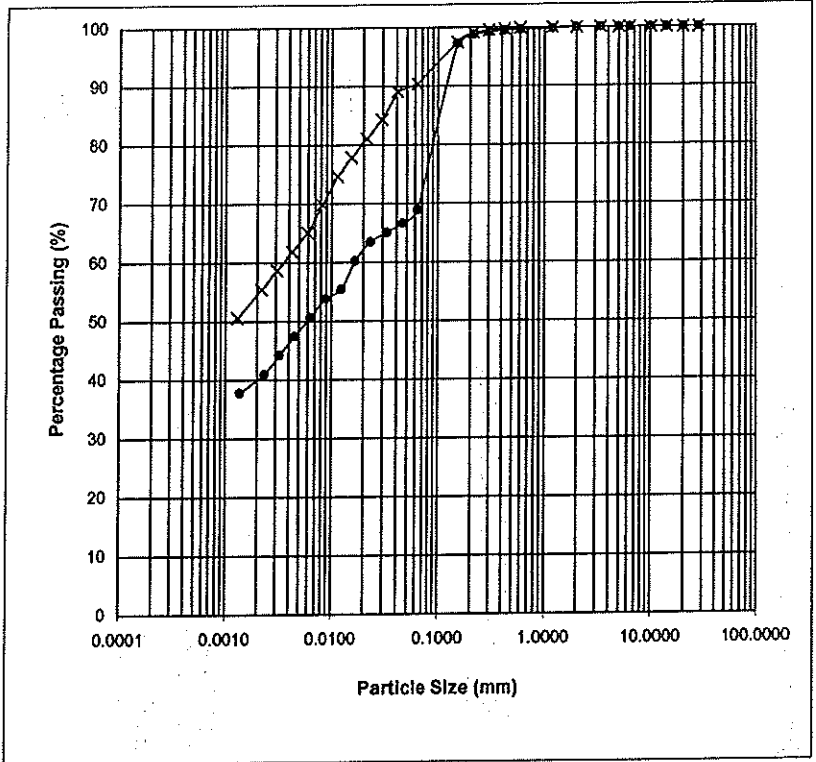
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

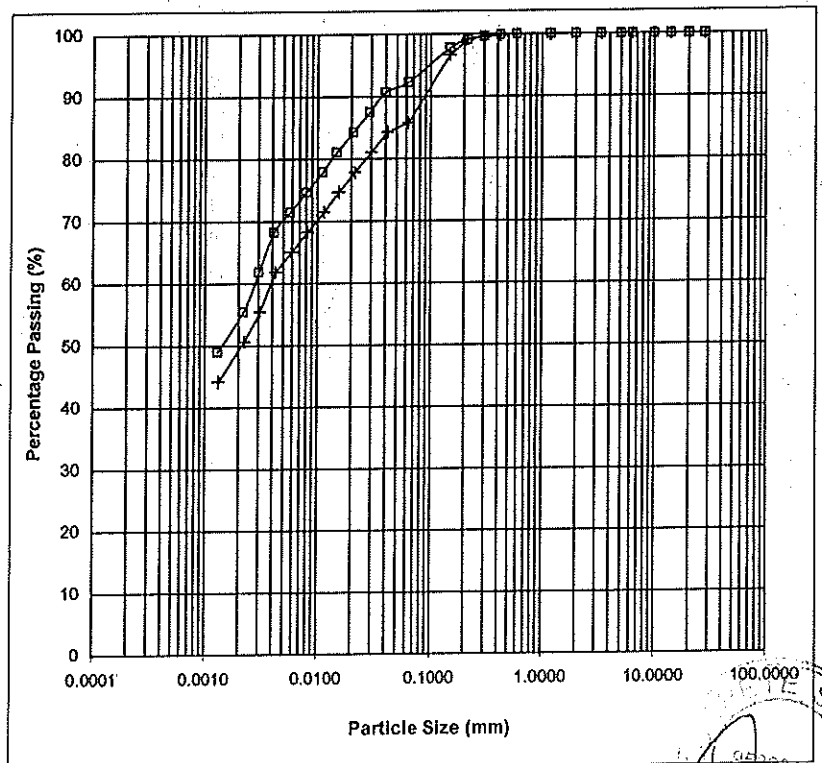
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	100
0.212	99	0.212	99
0.150	97	0.150	97
0.063	69	0.063	90
0.0456	67	0.0404	89
0.0325	65	0.0294	84
0.0231	63	0.0212	81
0.0166	60	0.0152	78
0.0124	55	0.0113	75
0.0088	54	0.0082	70
0.0063	51	0.0059	65
0.0045	47	0.0043	62
0.0032	44	0.0031	59
0.0023	41	0.0022	55
0.0014	38	0.0013	51
Clay (%)	39	Clay (%)	53
Silt (%)	30	Silt (%)	37
Sand (%)	31	Sand (%)	10
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH9	UD6	18.00	30.11.18
X	BH9	D12	25.50	30.11.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	99	0.212	99
0.150	98	0.150	97
0.063	92	0.063	86
0.0401	91	0.0416	84
0.0289	87	0.0300	81
0.0208	84	0.0215	78
0.0150	81	0.0155	75
0.0111	78	0.0115	71
0.0080	75	0.0083	68
0.0058	71	0.0059	65
0.0041	68	0.0043	62
0.0030	62	0.0031	55
0.0022	55	0.0022	51
0.0013	49	0.0013	44
Clay (%)	52	Clay (%)	48
Silt (%)	40	Silt (%)	38
Sand (%)	8	Sand (%)	14
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH9	D13	27.00	30.11.18
+	BH9	D17	33.00	30.11.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Dark grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	144.78	146.86	149.99
Bulk Density ρ (Mg/m ³)	1.68	1.70	1.74
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	30	60	120
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

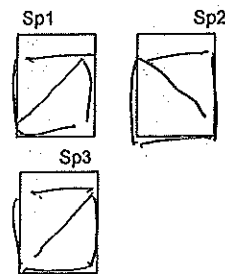
Load Channel : 14391 14391 14391

Moisture Content w_0 %	38	37	36
Dry Density ρ_{d0} (Mg/m ³)	1.22	1.25	1.28
Voids Ratio e_0	1.18	1.13	1.07
Deg of Saturation S_0 %	85.90	86.49	89.13

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	31.10	48.68	60.81
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	30.90	48.48	60.61
Strain at Failure ϵ_f %	10.53	11.97	14.47
Shear Strength c_u (kPa)	15.55	24.34	30.41

Failure Sketch



Moisture Content w_f %	38	37	36
Dry Density ρ_{df} (Mg/m ³)	1.22	1.25	1.28
Voids Ratio e_f	1.18	1.13	1.07
Deg of Saturation S_f %	85.90	86.49	89.13

Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator

Shyam Nath

Checked

Chris

Test Name :

UU

Date of Test :

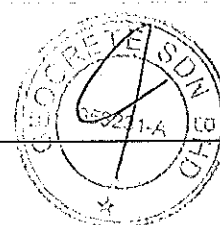
28.11.18

Sample : UD1

Borehole : BH9

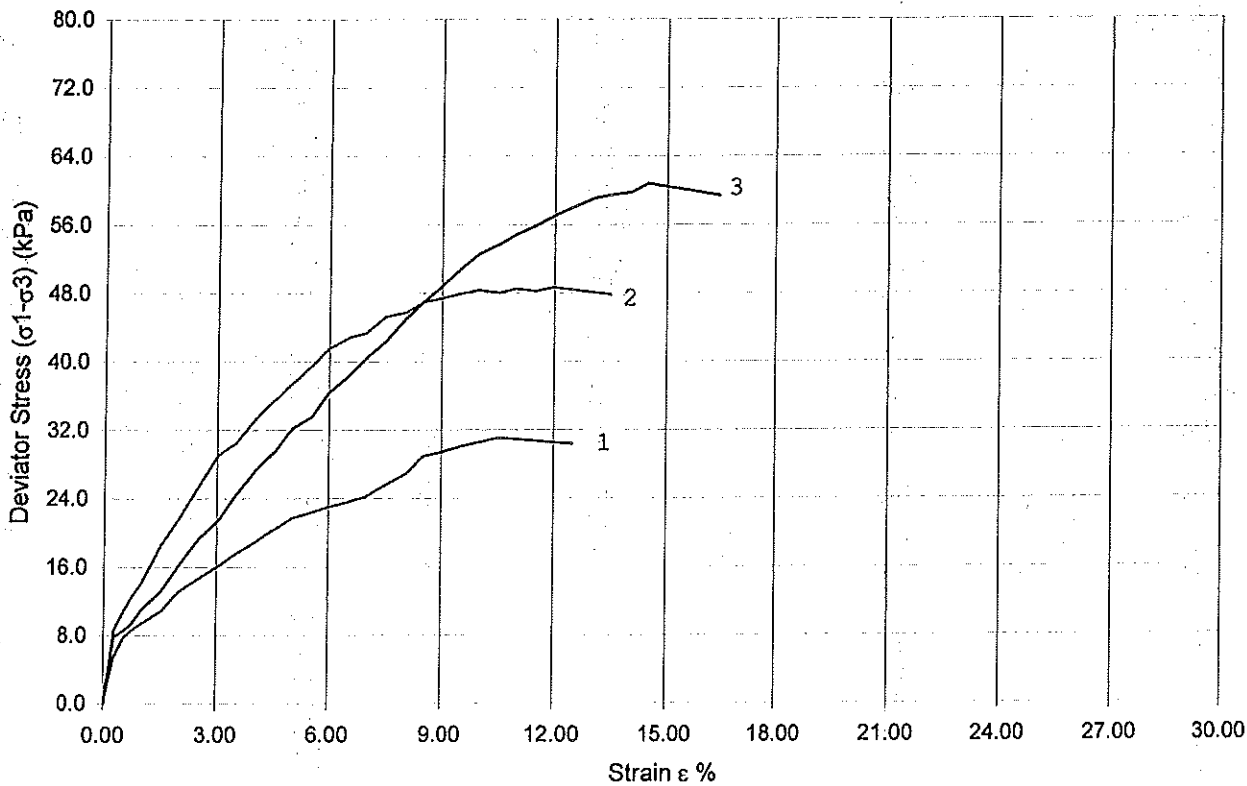
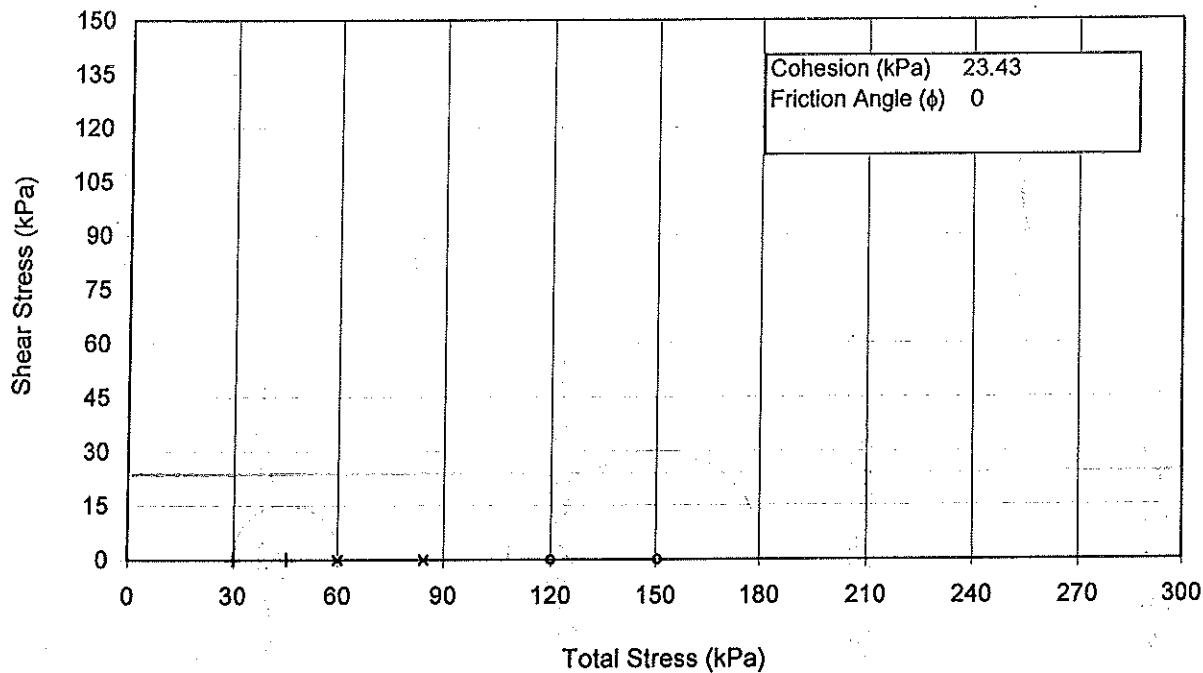
Approved

Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator :

Shyam Nath

Checked :

Chris

Test Name : UU

Date of Test : 28.11.18

Sample : UD1

Borehole : BH9

Approved :

Lee Kai Hing



Total Stress Triaxial Compression

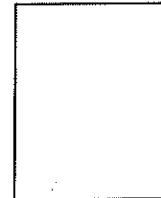
Unconsolidated Undrained

Sample details

Depth : 6.00m
 Description : Dark grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	148.11	150.02	151.12
Bulk Density ρ (Mg/m ³)	1.72	1.74	1.75
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



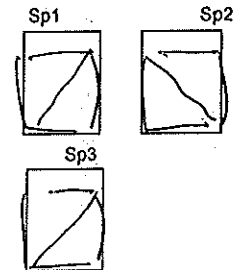
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	50	100	200
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	34	33	32
Dry Density ρ_{d0} (Mg/m ³)	1.29	1.31	1.33
Voids Ratio e_0	1.06	1.02	1.00
Deg of Saturation S_0 %	84.05	84.82	85.61

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	15.91	79.17	97.05
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	15.71	78.97	96.85
Strain at Failure ϵ_f %	8.49	10.53	10.99
Shear Strength c_u (kPa)	7.95	39.59	48.52
Moisture Content w_f %	34	33	32
Dry Density ρ_{df} (Mg/m ³)	1.29	1.31	1.33
Voids Ratio e_f	1.06	1.02	1.00
Deg of Saturation S_f %	84.05	84.82	85.61

Failure Sketch



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

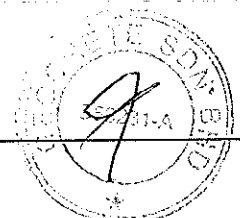
Test Name : UU

Date of Test : 28.11.18

Sample : UD2

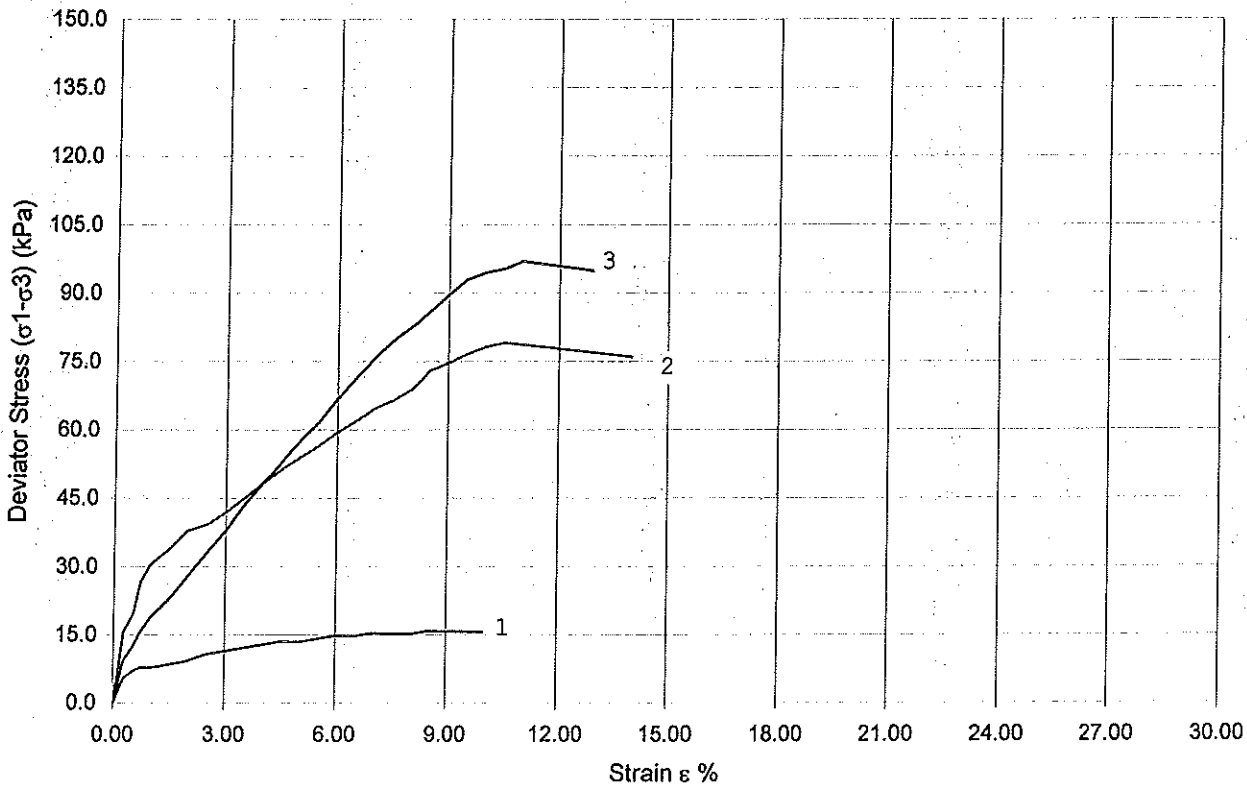
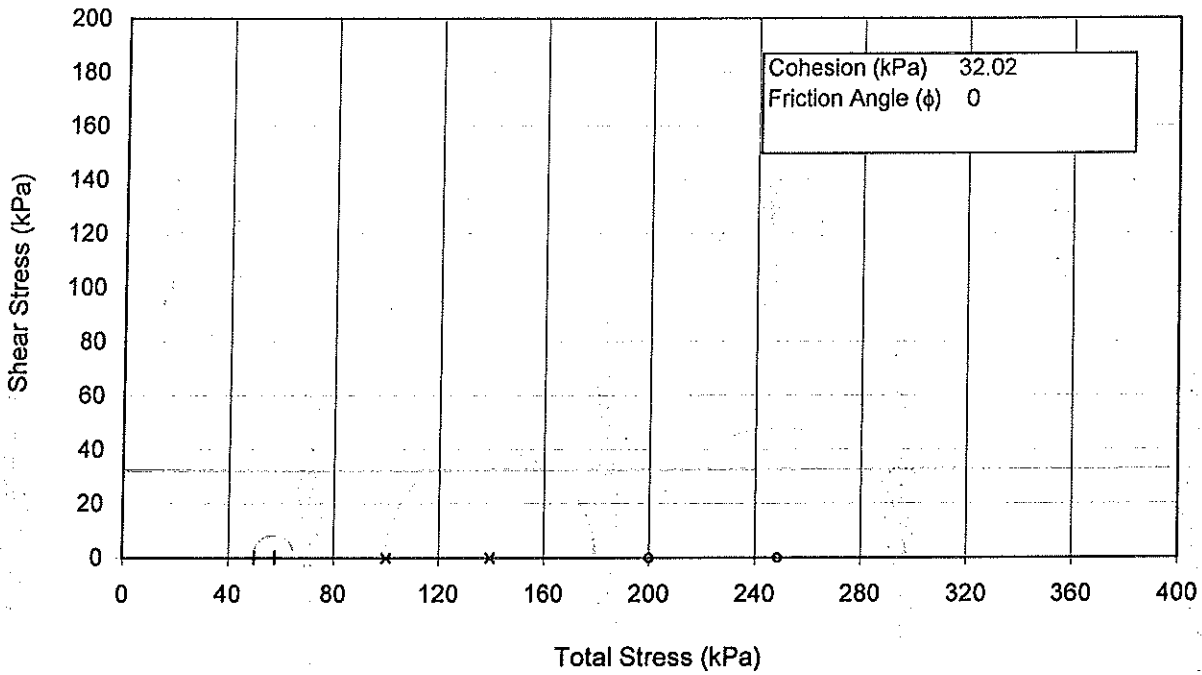
Borehole : BH9

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 28.11.18

Sample : UD2
 Borehole : BH9

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

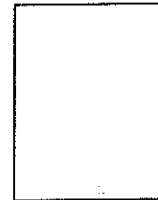
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Dark grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	139.41	141.53	143.54
Bulk Density ρ (Mg/m ³)	1.62	1.64	1.67
Particle Density ρ_s	2.59	2.59	2.59

Sketch showing specimen location in original sample

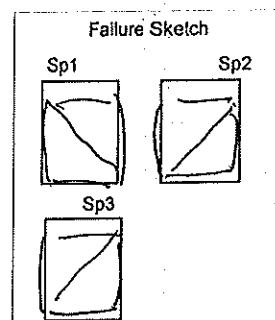


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	100	200	400
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	40	40	38
Dry Density ρ_{d0} (Mg/m ³)	1.16	1.17	1.21
Voids Ratio e_0	1.23	1.21	1.15
Deg of Saturation S_0 %	83.11	85.70	86.06

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	22.28	52.16	65.40
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	22.08	51.96	65.20
Strain at Failure ϵ_f %	9.01	11.97	10.99
Shear Strength c_u (kPa)	11.14	26.08	32.70
Moisture Content w_f %	40	40	38
Dry Density ρ_{df} (Mg/m ³)	1.16	1.17	1.21
Voids Ratio e_f	1.23	1.21	1.15
Deg of Saturation S_f %	83.11	85.70	86.06



Notes : Shear Shear Shear

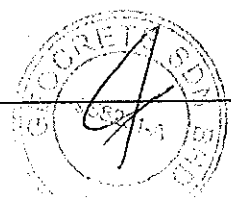
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 28.11.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

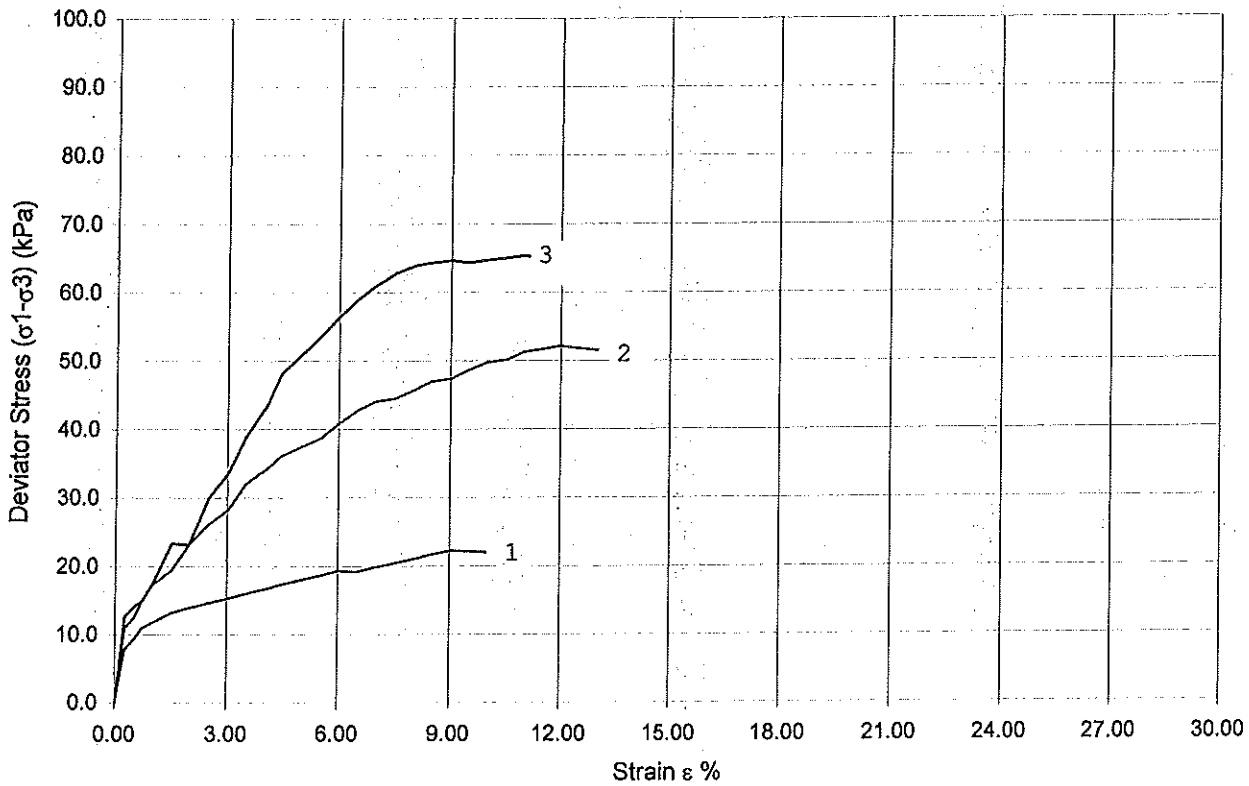
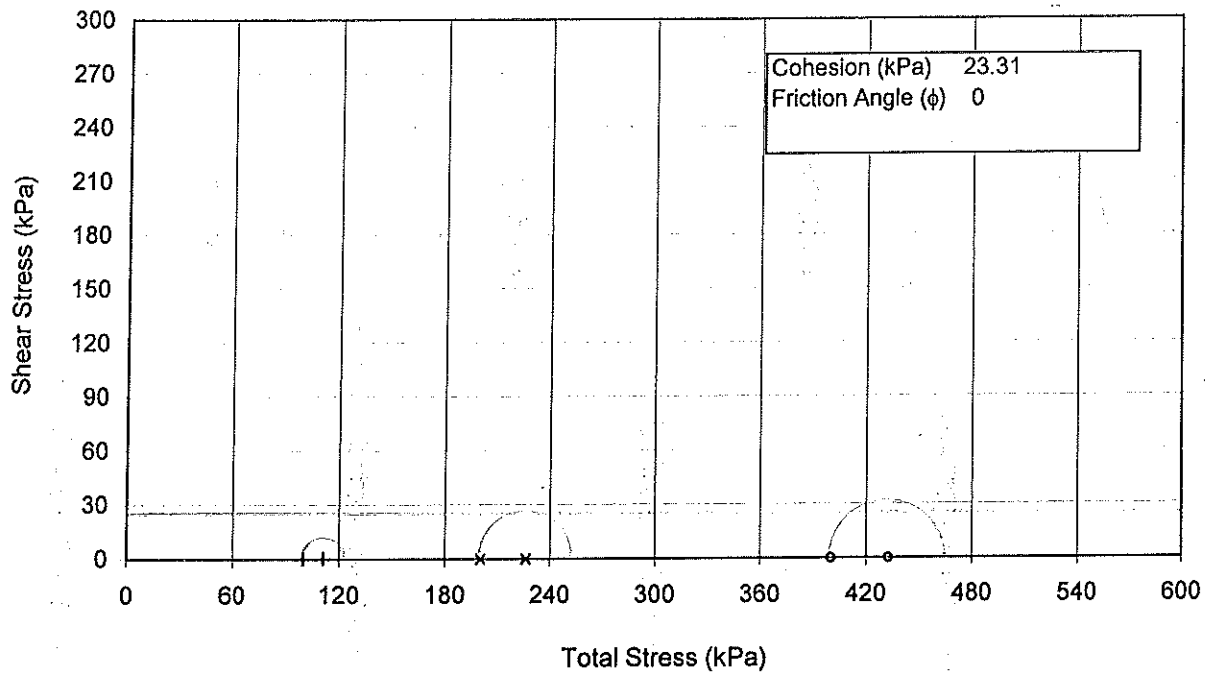
Sample : UD4
Borehole : BH9
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



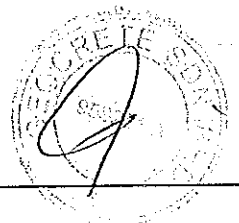
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 28.11.18
 Sample : UD4
 Borehole : BH9
 Approved : Lee Kai Hing



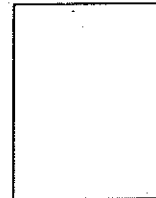
Total Stress Triaxial Compression Unconsolidated Undrained

Sample details

Depth : 18.00m
Description : Dark grey CLAY with little sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_0 (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	134.86	137.42	138.41
Bulk Density ρ (Mg/m ³)	1.57	1.60	1.61
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



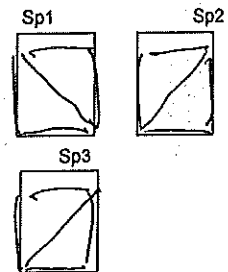
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	40	39	38
Dry Density ρ_{d0} (Mg/m ³)	1.12	1.15	1.17
Voids Ratio e_0	1.38	1.31	1.27
Deg of Saturation S_0 %	77.70	79.23	78.78

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	21.10	30.40	36.35
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	20.90	30.20	36.15
Strain at Failure ϵ_f %	10.99	10.53	11.51
Shear Strength c_u (kPa)	10.55	15.20	18.18
Moisture Content w_f %	40	39	38
Dry Density ρ_{df} (Mg/m ³)	1.12	1.15	1.17
Voids Ratio e_f	1.38	1.31	1.27
Deg of Saturation S_f %	77.70	79.23	78.78

Failure Sketch



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator

Shyam Nath

Checked

Chris

Test Name :

UU

Date of Test :

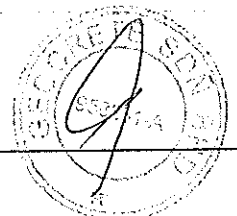
28.11.18

Sample : UD6

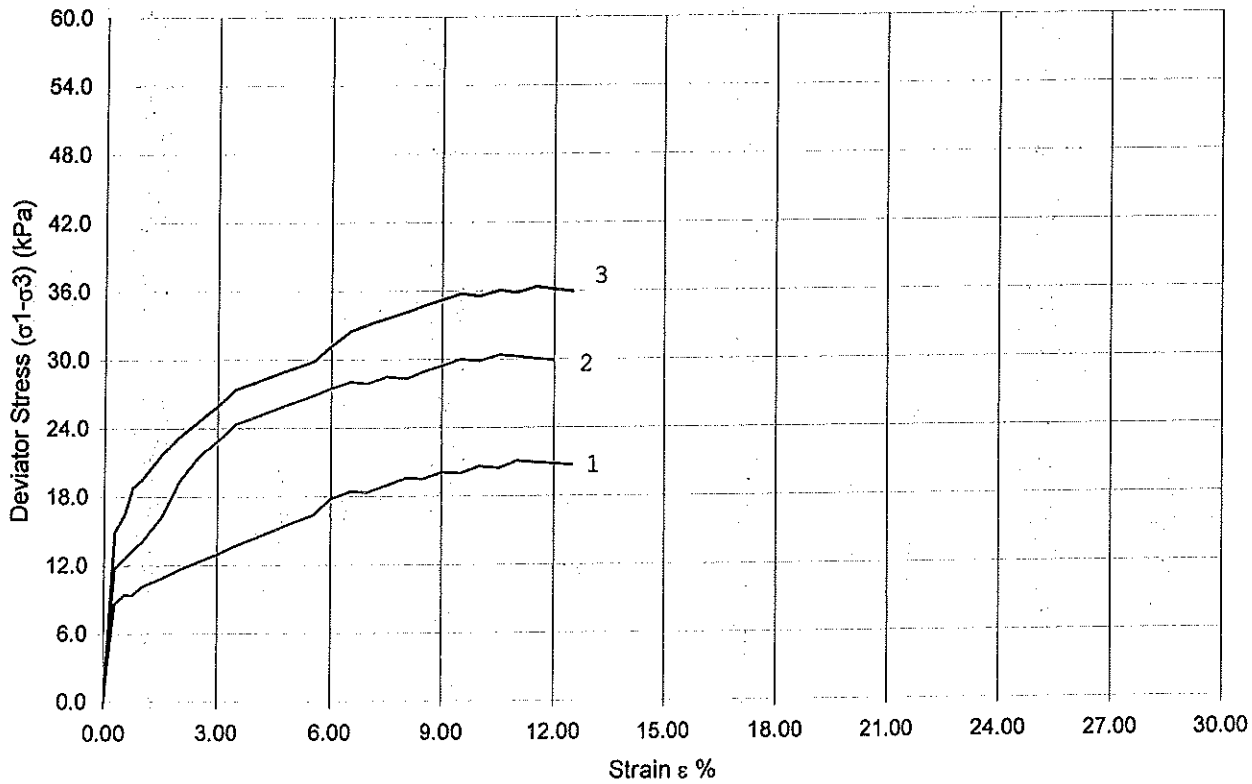
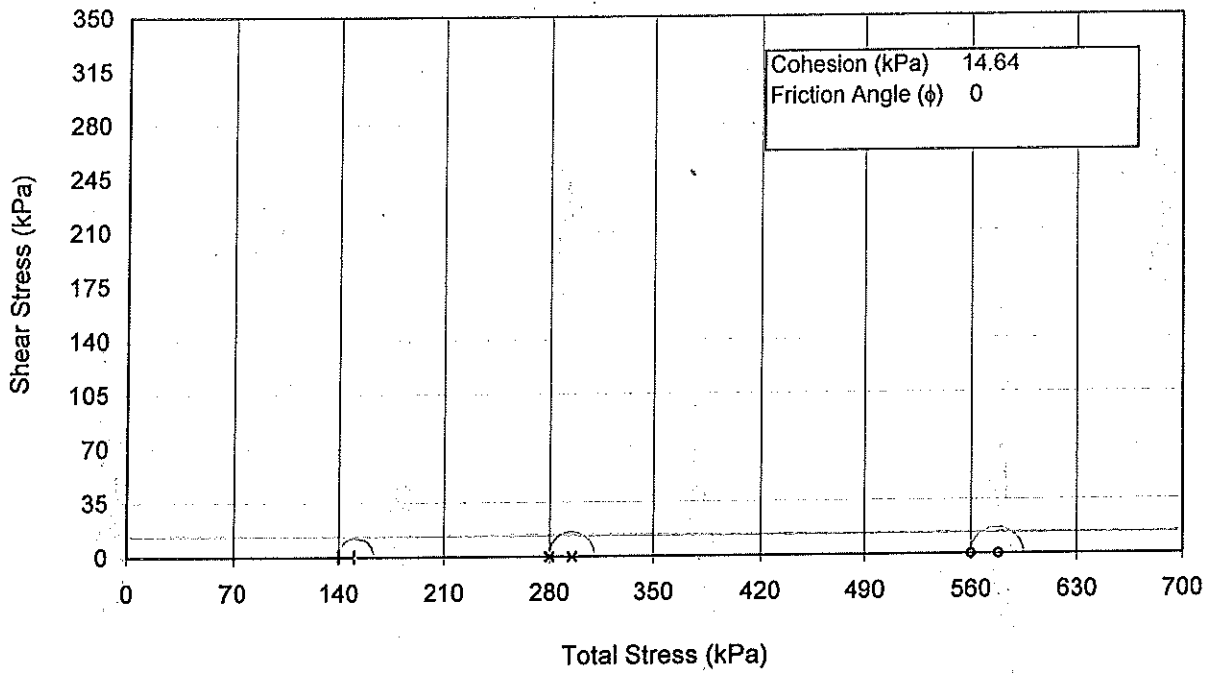
Borehole : BH9

Approved

Lee Kai Hing



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

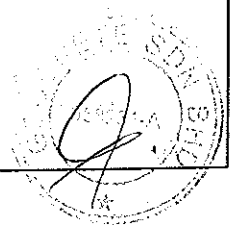
Test Name : UU

Date of Test : 28.11.18

Sample : UD6

Borehole : BH9

Approved :
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jaları P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
	BH9 / UD1 / 3.00m	Test Started	27.11.18
Sample No.	Dark grey CLAY with some sand	Ring No.	3
Soil Description			

BEFORE TEST

Moist. Content from trimmings:	=	54	%	SG (Measured)	=	2.650
Wt of sample + Ring	=	123.57	gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.45	gm	Area (A)	=	1964 mm ²
Wt of sample	=	65.12	gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	42.90	gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	22.22	gm	Bulk Density (P)	=	1.658 Mg/m ³
Initial Moisture Content, M _o	=	52	%	Dry Density (PD)	=	1.092 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4267				
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	96	%			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1213 mm ⁻¹				
Height of Solid H _s	=	8.242 mm				

AFTER TEST

Wt of sample + Ring	=	120.08	gm	Overall settlement	=	2.196 mm
Wt of Dry sample + Ring	=	101.35	gm	Volume Change	=	4.314 cm ³
Wt of Ring	=	58.45	gm	Final Volume	=	34.97 cm ₃
Wt of Wet sample	=	61.63	gm	Final Bulk Density	=	1.762 Mg/m ³
Wt of Dry sample	=	42.90	gm	Final Dry Density	=	1.227 Mg/m ³
Wt of Moisture	=	18.73	gm	Final Void Ratio, e _f	=	1.1603
Final Moisture Content, M _f	=	44 %				
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	100 %				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH9 / UD1 / 3.00m

Date of Report

07.12.18

Test started

27.11.18

Ring No.

3

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	IMv (M ² /MIN)	t ₉₀ (min)	
0	0.000	20.000	0.0000	1.4267	0.0000	0			
3.12	0.190	19.810	0.0231	1.4037	0.0231	3.12	3.0715	4.00	10.99
6.2	0.336	19.664	0.0408	1.3860	0.0177	3.12	2.3777	3.61	11.98
12.5	0.544	19.456	0.0660	1.3607	0.0252	6.2	1.7118	2.25	18.87
25.0	0.860	19.140	0.1043	1.3224	0.0383	12.5	1.3218	1.00	41.34
50	1.410	18.590	0.1711	1.2557	0.0667	25.0	1.1843	2.25	17.56
100	2.010	17.990	0.2439	1.1829	0.0728	50.0	0.6675	1.21	30.69
200	2.630	17.370	0.3191	1.1076	0.0752	99.9	0.3572	1.21	28.67
100	2.566	17.434	0.3114	1.1154	-0.0078	-99.9			
50	2.384	17.616	0.2893	1.1375	-0.0221	-50.0			
12.5	2.196	17.804	0.2665	1.1603	-0.0228	-37.5			

Operator

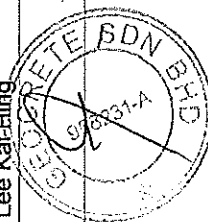
Shyam Nath

Checked

Chris

Approved

Lee Kai-ling



GEORETE SDN. BHD.
(Co. No. 958231-A)

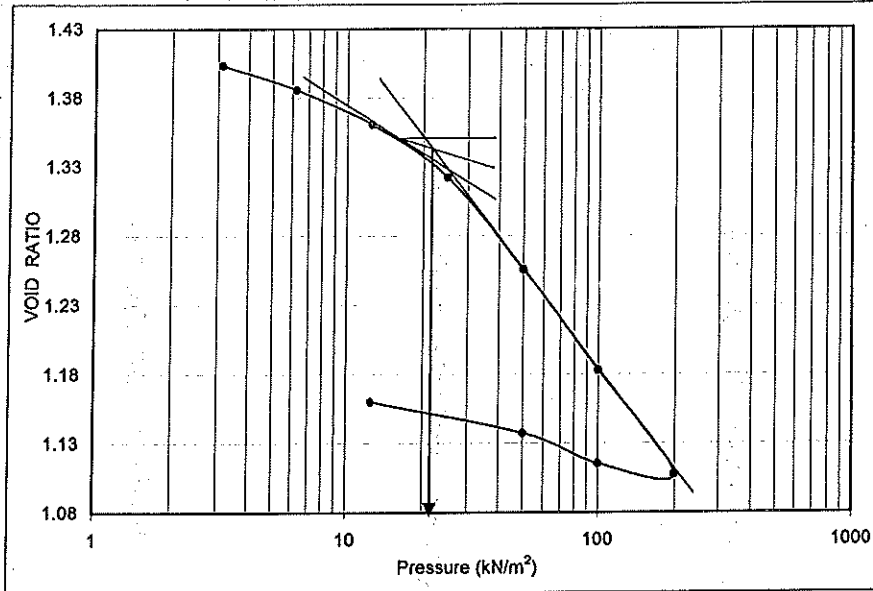
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH9 / UD1 / 3.00m

SOIL SAMPLE Dark grey CLAY with some sand

Date of Report 07.12.18
 Test started 27.11.18
 Ring No. 3



INITIAL

Water content 52 %

Dry Density 1.09 Mg/m³

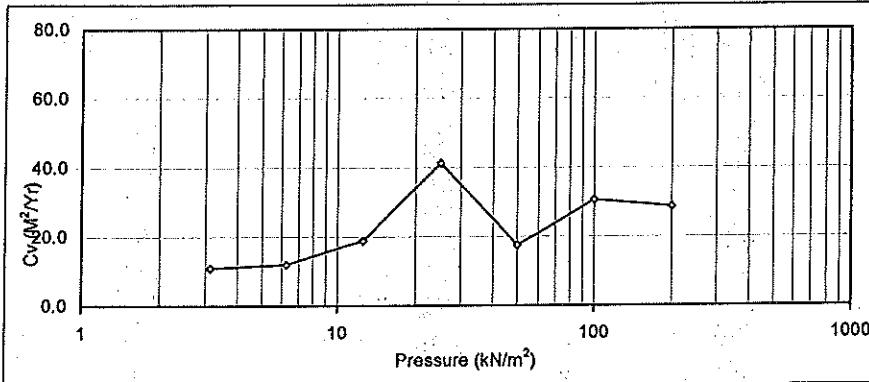
Void Ratio 1.4267

Saturation 96 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.650



FINAL

Water content 44 %

Dry Density 1.23 Mg/m³

Void Ratio 1.1603

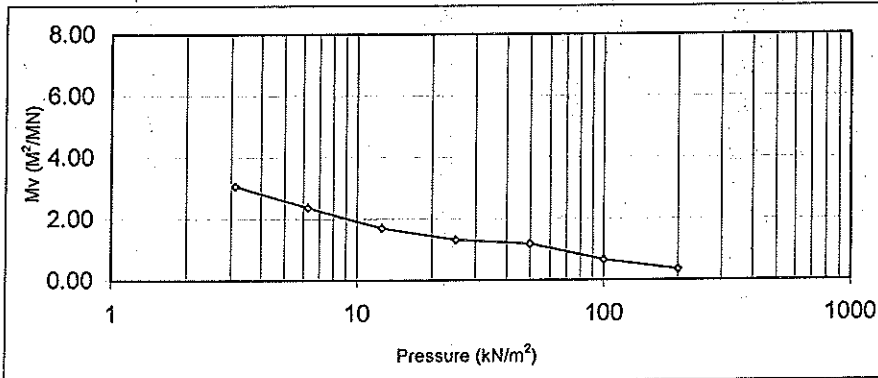
Saturation 100 %

Height 18 mm

Comp. Index, Cc 0.2499

Precons. Load 22 kN/m²

Comp. Ratio, C_R 0.103



Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
Sample No.	BH9 / UD4 / 12.00m	Test Started	27.11.18
Soil Description	Dark grey CLAY	Ring No.	4

BEFORE TEST

Moist. Content from trimmings:	=	55	%	SG (Measured)	=	2.590	
Wt of sample + Ring	=	126.69	gm	Diameter (D)	=	50	mm
Wt of Ring	=	61.65	gm	Area (A)	=	1964	mm ²
Wt of sample	=	65.04	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	43.18	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	21.86	gm	Bulk Density (P)	=	1.656	Mg/m ³
Initial Moisture Content, M _o	=	51	%	Dry Density (PD)	=	1.099	Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	1.3564	
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	97	%
V. Ratio Change Factor F _v , $\frac{H}{1+e_o}$	=	0.1178	mm ⁻¹
Height of Solid H _s	=	8.487	mm

AFTER TEST

Wt of sample + Ring	=	122.86	gm	Overall settlement	=	2.194	mm
Wt of Dry sample + Ring	=	104.83	gm	Volume Change	=	4.310	cm ³
Wt of Ring	=	61.65	gm	Final Volume	=	34.98	cm ³
Wt of Wet sample	=	61.21	gm	Final Bulk Density	=	1.750	Mg/m ³
Wt of Dry sample	=	43.18	gm	Final Dry Density	=	1.235	Mg/m ³
Wt of Moisture	=	18.03	gm	Final Void Ratio, e _r	=	1.0979	
Final Moisture Content, M _f	=	42	%				
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	99	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No BH9 / UD4 / 12.00m

Date of Report

07.12.18

Test started

27.11.18

Ring No.

4

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.3564	0.0000	0				
6.25	0.316	19.684	0.0372	1.3192	0.0372	6.25	2.5705	5.29	8.26	-0.1237
12.5	0.554	19.446	0.0653	1.2911	0.0280	6.25	1.9697	6.25	6.80	-0.0932
25.0	0.906	19.094	0.1067	1.2497	0.0415	12.5	1.4759	5.29	7.79	-0.1378
50.0	1.350	18.650	0.1591	1.1974	0.0523	25.0	0.9530	1.69	23.39	-0.1738
100	1.994	18.006	0.2349	1.1215	0.0759	50.0	0.7159	1.69	22.06	-0.2521
200	2.628	17.372	0.3096	1.0468	0.0747	99.9	0.3652	2.25	15.44	-0.2482
100	2.522	17.478	0.2971	1.0593	-0.0125	-99.9				
50	2.384	17.616	0.2809	1.0755	-0.0163	-50.0				
12.5	2.194	17.806	0.2585	1.0979	-0.0224	-37.5				

Operator

Shyam Nath

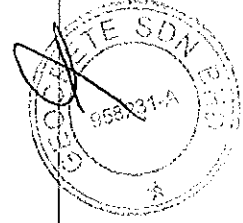
Checked

Chris

Approved

Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



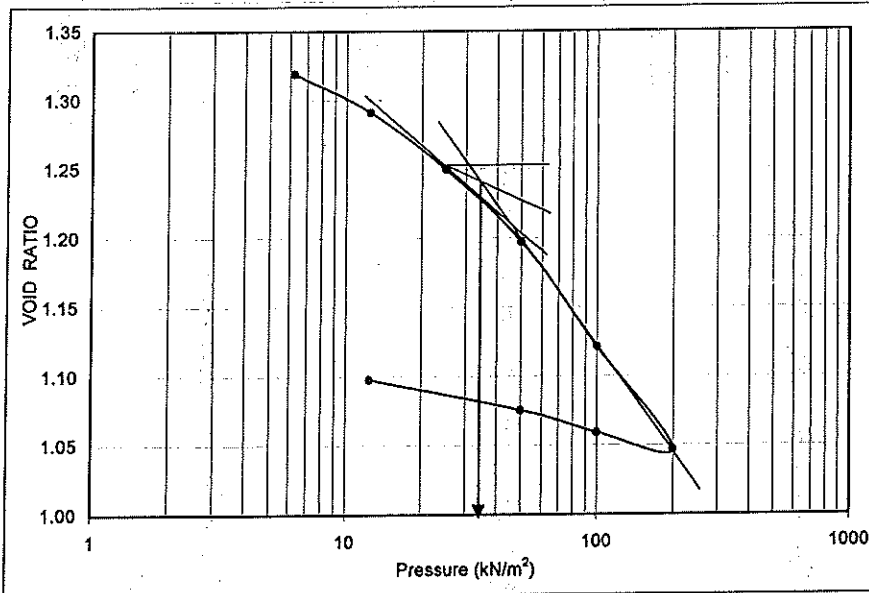
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

BH REF BH9 / UD4 / 12.00m

SOIL SAMPLE Dark grey CLAY

Date of Report 07.12.18
Test started 27.11.18
Ring No. 4



INITIAL

Water content 61 %

Dry Density 1.10 Mg/m^3

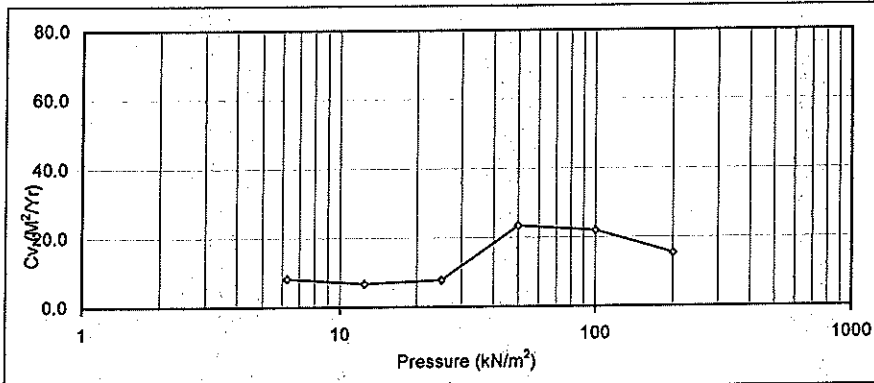
Void Ratio 1.3664

Saturation 97 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.590



FINAL

Water content 42 %

Dry Density 1.23 Mg/m^3

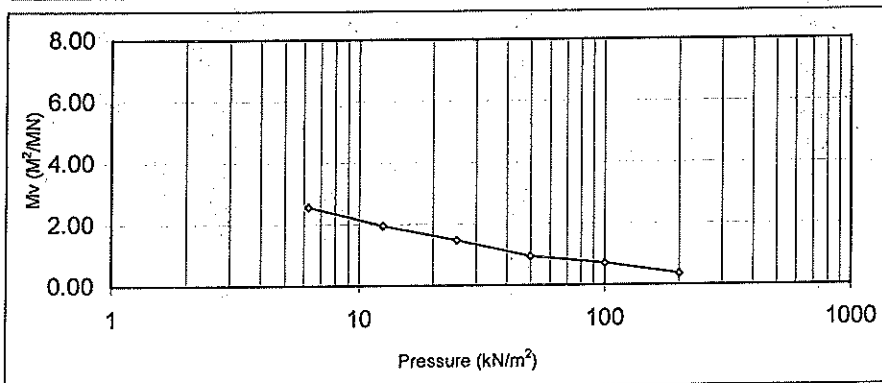
Void Ratio 1.0979

Saturation 99 %

Height 18 mm

Comp. Index, C_c 0.2521

Precons. Load kN/m^2



Comp. Ratio, C_R 0.107



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 9 / D 30 (51.00 m)

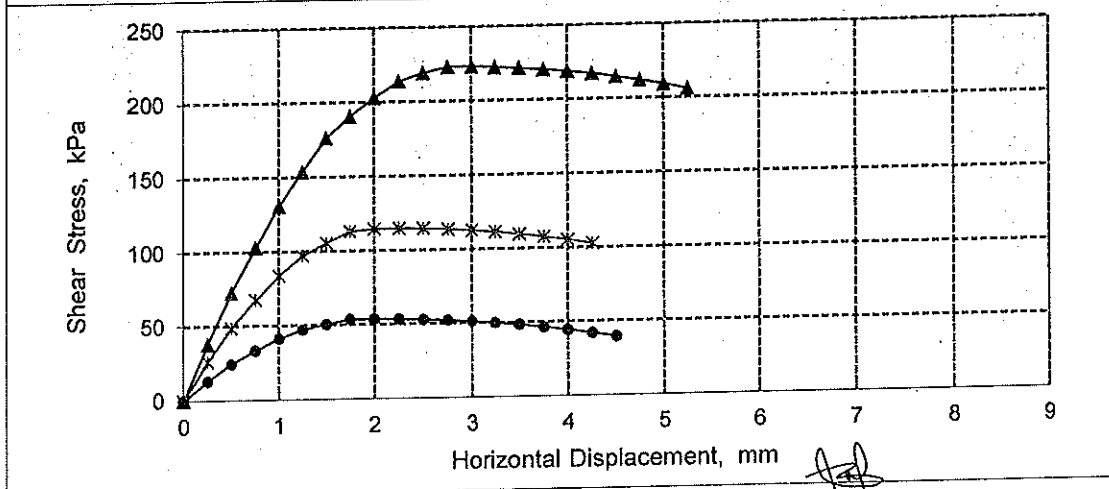
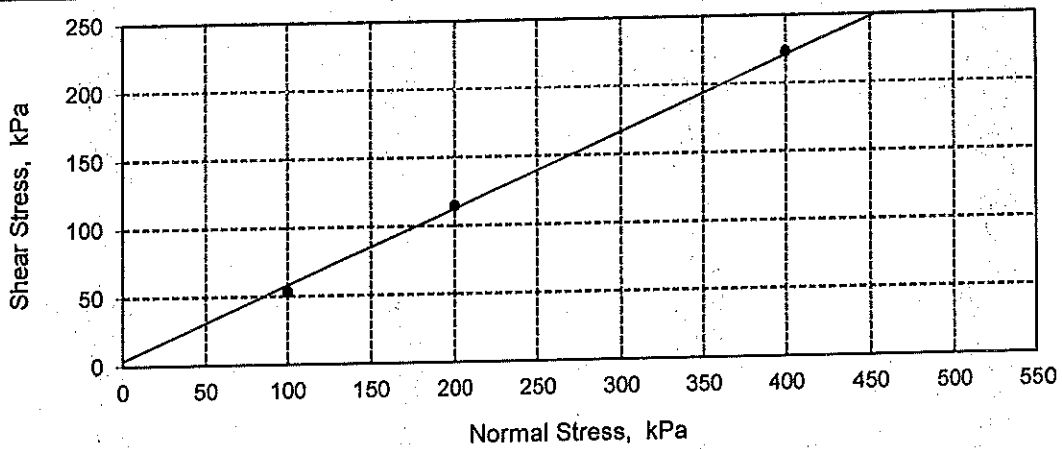
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 8 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		141.5	141.7	141.0
Moisture Content (%)		21.5	20.7	20.9
Bulk Density (Mg/m ³)		1.965	1.968	1.959
Dry Density (Mg/m ³)		1.617	1.630	1.620
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		53.6	114.8	223.4
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.1	0.2	0.3

c' 4 kPa

φ' 28.5 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 9 / D 26 (45.00 m)

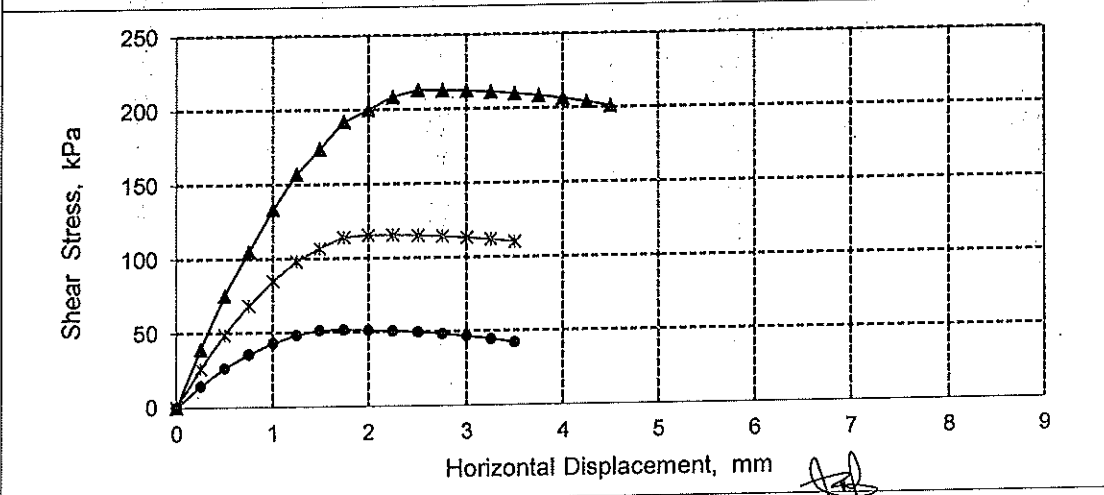
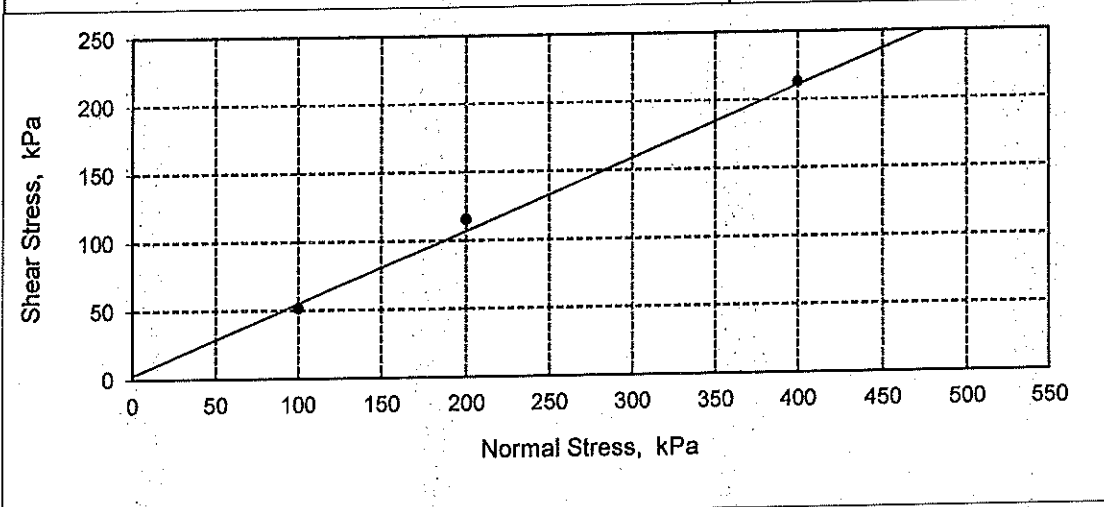
Test Size : 60 mm x 60 mm x 20 mm.

Date Tested : 7 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		136.6	138.0	137.7
Moisture Content (%)		20.1	20.5	20.0
Bulk Density (Mg/m ³)		1.897	1.917	1.913
Dry Density (Mg/m ³)		1.580	1.591	1.594
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		51.8	115.7	213.3
Displ. at Failure (mm)		1.8	2.0	2.5
Settlement (mm)		0.2	0.4	0.7

c' 3 kPa

φ' 27.5 deg.



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										REF : L/081/18/139/18 DATE : 07.12.18																										
SAMPLE AND SPECIMEN DETAILS.	Borehole No.	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST															
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)												
	BH10	UD1	3.00	39	1.58	1.03	35	22	13	4.0	35	18	47	0	2.66						20.78	0	42	0.357				5.4	0.11	0.28	7.6							
		UD2	6.00	31	1.75	1.28	36	23	13		35	21	44	0							33.37	0																
		UD4	12.00	49	1.58	1.00	43	21	22		47	37	16	0							10.54	0																
		UD6	18.00	43	1.64	1.10	38	22	16	4.1	35	25	40	0	2.66						18.42	0	65	0.219														
		D11	24.00	30	NA	NA					25	17	58	0	2.68																							
		D16	31.50	62	NA	NA					43	33	24	0																								
		D17	33.00	53	NA	NA					42	27	31	0																								
		D19	36.00	44	NA	NA	45	23	22	13.6	40	23	37	0																								
		D24	43.50	52	NA	NA					28	19	53	0																								
		D25	45.00	64	NA	NA	50	23	27		44	33	23	0																								
		D29	51.00	72	NA	NA					51	40	9	0																								
		D30	52.50	51	NA	NA	50	22	28	12.1	47	32	21	0	2.65																							
		D32	55.50	38	NA	NA	48	23	25		44	23	33	0																								
		D35	60.00	60	NA	NA					24	16	60	0																								

Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

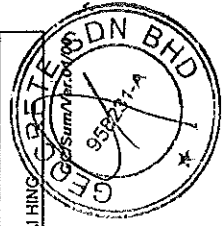
Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE.

SUM

APPROVED BY:
LEE KAI HING

CHECKED BY:
CHRIS



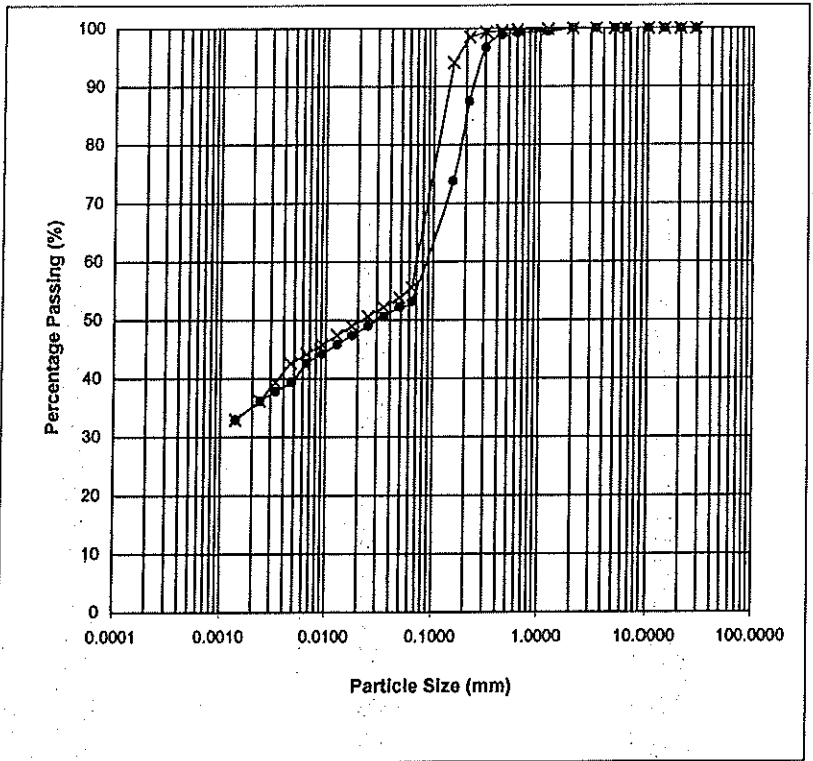
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

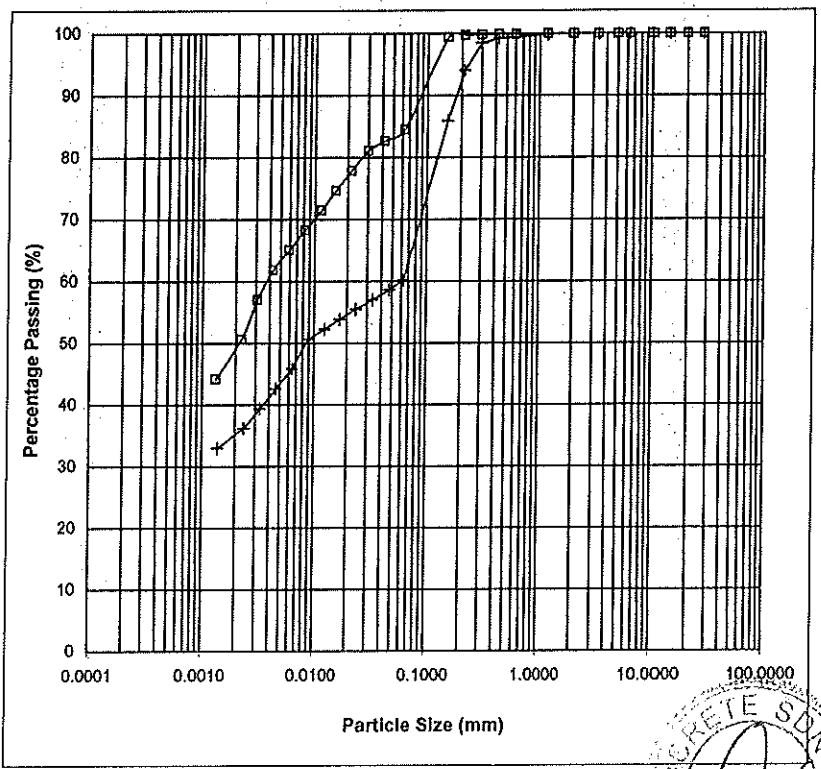
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	99	0.600	100
0.425	99	0.425	100
0.300	97	0.300	99
0.212	87	0.212	99
0.150	74	0.150	94
0.083	53	0.083	56
0.0486	52	0.0483	54
0.0346	51	0.0344	52
0.0246	49	0.0245	51
0.0176	47	0.0174	49
0.0129	46	0.0128	47
0.0092	44	0.0091	46
0.0065	43	0.0065	44
0.0047	39	0.0046	43
0.0033	38	0.0033	39
0.0024	36	0.0024	36
0.0014	33	0.0014	33
Clay (%)	35	Clay (%)	35
Silt (%)	18	Silt (%)	21
Sand (%)	47	Sand (%)	44
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH10	UD1	3.00	01.12.18
x	BH10	UD2	6.00	01.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	99
0.300	100	0.300	99
0.212	100	0.212	94
0.150	99	0.150	86
0.083	85	0.083	80
0.0420	83	0.0473	59
0.0300	81	0.0337	57
0.0215	78	0.0240	55
0.0155	75	0.0171	54
0.0115	71	0.0126	52
0.0083	68	0.0089	51
0.0059	65	0.0064	46
0.0043	62	0.0046	43
0.0031	57	0.0033	39
0.0022	51	0.0024	36
0.0013	44	0.0014	33
Clay (%)	47	Clay (%)	35
Silt (%)	37	Silt (%)	25
Sand (%)	16	Sand (%)	40
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH10	UD4	12.00	01.12.18
+	BH10	UD6	18.00	01.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

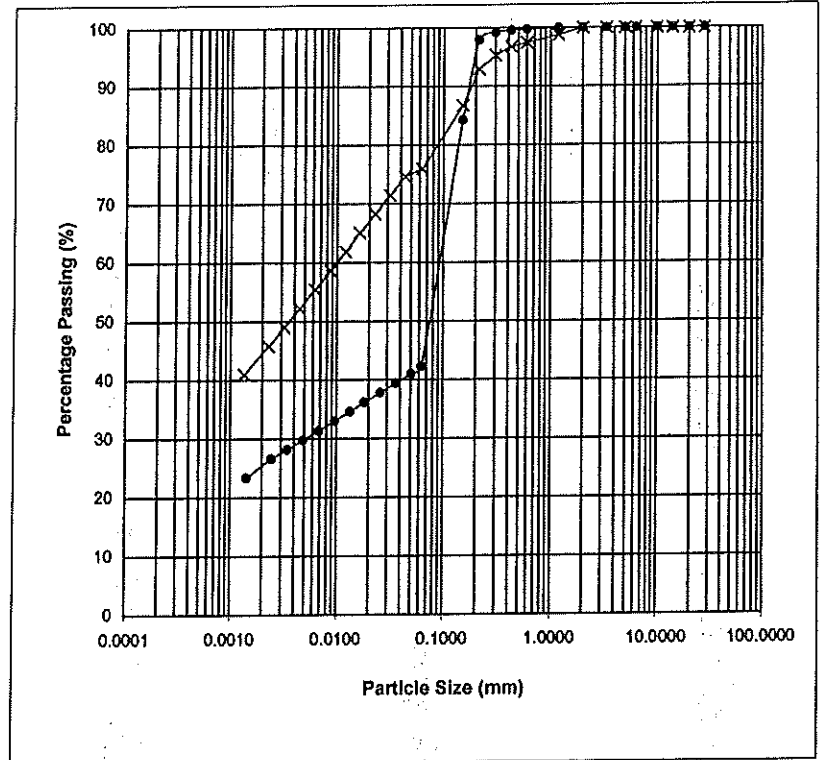
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

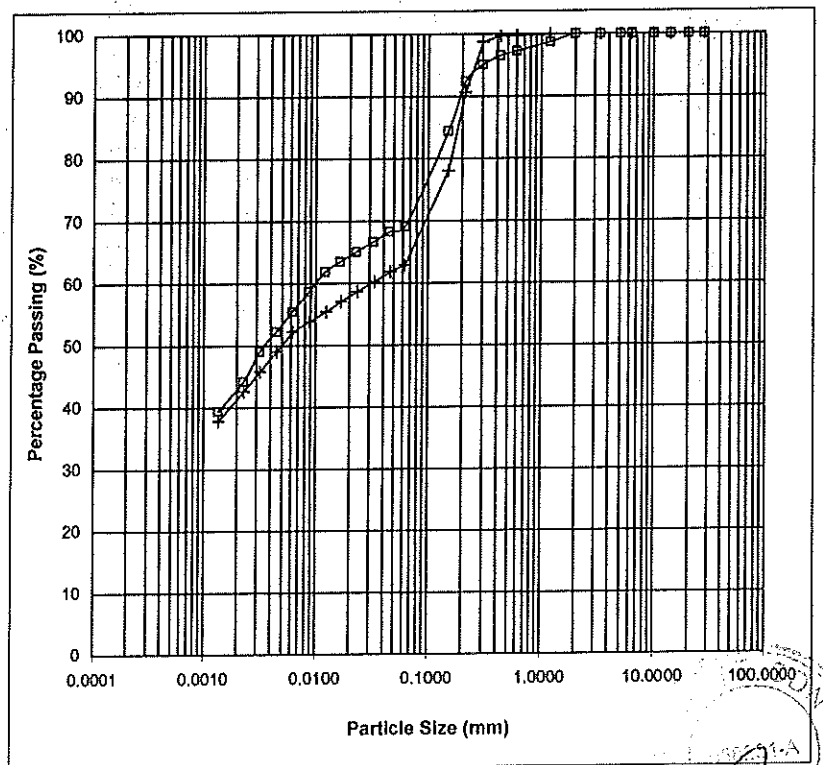
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	100	0.600	97
0.425	100	0.425	97
0.300	99	0.300	95
0.212	98	0.212	93
0.150	84	0.150	87
0.063	42	0.063	76
0.0508	41	0.0438	75
0.0362	39	0.0315	71
0.0257	38	0.0226	68
0.0183	36	0.0162	65
0.0134	35	0.0120	62
0.0096	33	0.0086	59
0.0068	31	0.0062	55
0.0048	30	0.0044	52
0.0034	28	0.0032	49
0.0024	27	0.0023	46
0.0014	23	0.0013	41
Clay (%)		Clay (%)	43
Silt (%)		Silt (%)	33
Sand (%)		Sand (%)	24
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH10	D11	24.00	01.12.18
x	BH10	D16	31.50	01.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	97	0.600	100
0.425	97	0.425	100
0.300	95	0.300	99
0.212	92	0.212	91
0.150	84	0.150	78
0.063	69	0.063	63
0.0452	68	0.0466	62
0.0322	67	0.0332	60
0.0230	65	0.0237	59
0.0164	63	0.0168	57
0.0120	62	0.0124	55
0.0086	59	0.0088	54
0.0062	55	0.0063	52
0.0044	52	0.0045	49
0.0032	49	0.0032	46
0.0023	44	0.0023	43
0.0013	39	0.0014	38
Clay (%)		Clay (%)	40
Silt (%)		Silt (%)	23
Sand (%)		Sand (%)	37
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH10	D17	33.00	01.12.18
+	BH10	D19	36.00	01.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

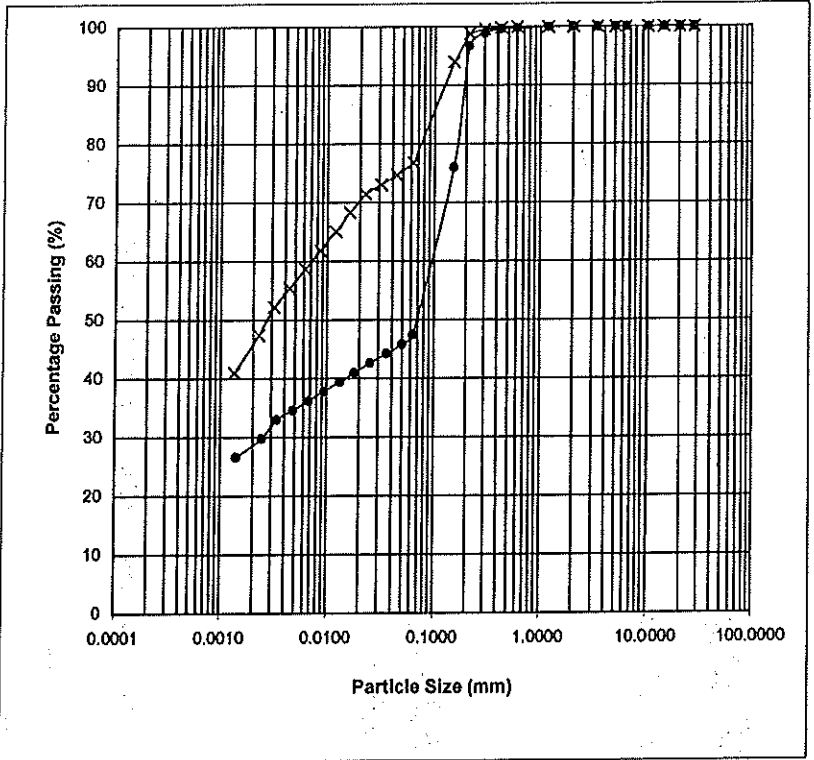
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

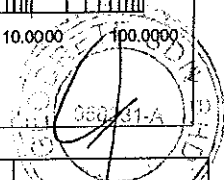
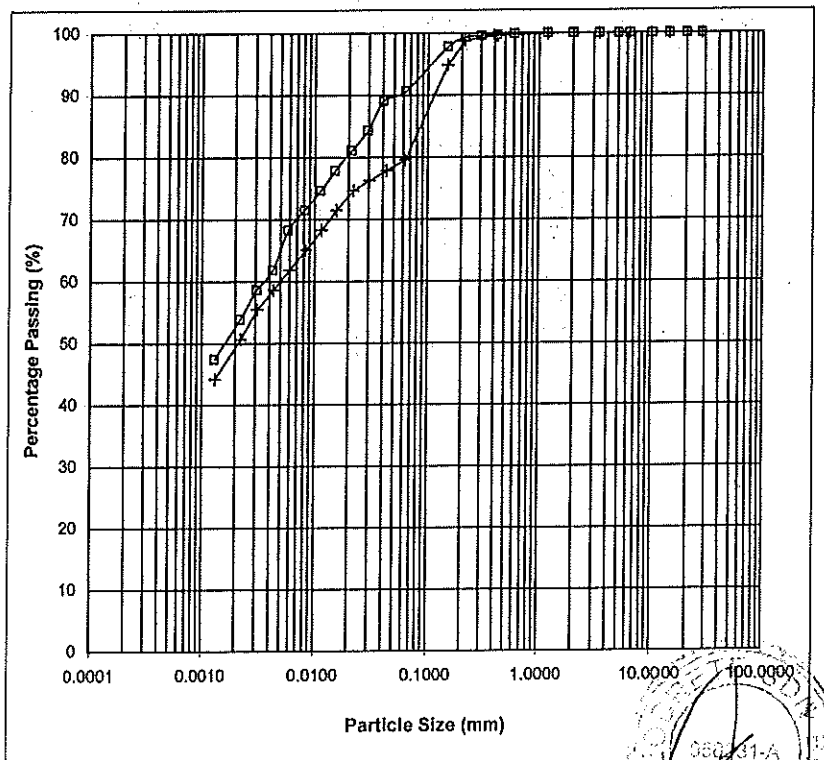
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	97	0.212	99	
0.150	76	0.150	94	
0.063	47	0.063	77	
0.0499	46	0.0438	75	
0.0355	44	0.0312	73	
0.0253	43	0.0223	71	
0.0180	41	0.0160	68	
0.0132	39	0.0119	65	
0.0094	38	0.0085	62	
0.0067	36	0.0081	59	
0.0048	35	0.0044	55	
0.0034	33	0.0031	52	
0.0024	30	0.0023	47	
0.0014	27	0.0013	41	
Clay (%)		28	Clay (%)	44
Silt (%)		19	Silt (%)	33
Sand (%)		53	Sand (%)	23
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH10	D24	43.50	01.12.18
X	BH10	D25	45.00	01.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	99	
0.212	99	0.212	99	
0.150	98	0.150	95	
0.083	91	0.063	80	
0.0404	89	0.0431	78	
0.0294	84	0.0307	76	
0.0212	81	0.0219	75	
0.0152	78	0.0157	71	
0.0113	75	0.0117	68	
0.0081	71	0.0084	65	
0.0058	68	0.0060	62	
0.0043	62	0.0043	59	
0.0031	59	0.0031	55	
0.0022	54	0.0022	51	
0.0013	47	0.0013	44	
Clay (%)		51	Clay (%)	47
Silt (%)		40	Silt (%)	32
Sand (%)		9	Sand (%)	21
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH10	D29	51.00	01.12.18
+	BH10	D30	52.50	01.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai-Hing

Total Stress Triaxial Compression

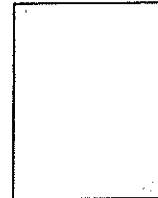
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Dark grey sandy CLAY

Sketch showing specimen location in original sample

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	135.43	136.10	137.35
Bulk Density ρ (Mg/m ³)	1.57	1.58	1.59
Particle Density ρ_s	2.66	2.66	2.66

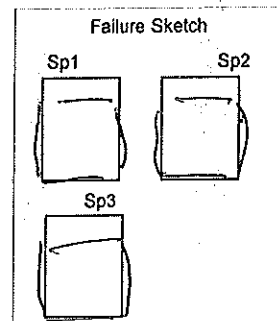


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	54	53	51
Dry Density ρ_{d0} (Mg/m ³)	1.02	1.03	1.05
Voids Ratio e_0	1.60	1.58	1.52
Deg of Saturation S_0 %	89.39	89.70	89.39

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	34.50	39.15	51.04
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	34.30	38.95	50.84
Strain at Failure ϵ_f %	9.01	6.51	9.01
Shear Strength c_u (kPa)	17.25	19.57	25.52
Moisture Content w_f %	54	53	51
Dry Density ρ_{df} (Mg/m ³)	1.02	1.03	1.05
Voids Ratio e_f	1.60	1.58	1.52
Deg of Saturation S_f %	89.39	89.70	89.39



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

Test Name :

UU

Date of Test :

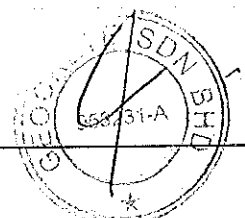
28.11.18

Sample : UD1

Borehole : BH10

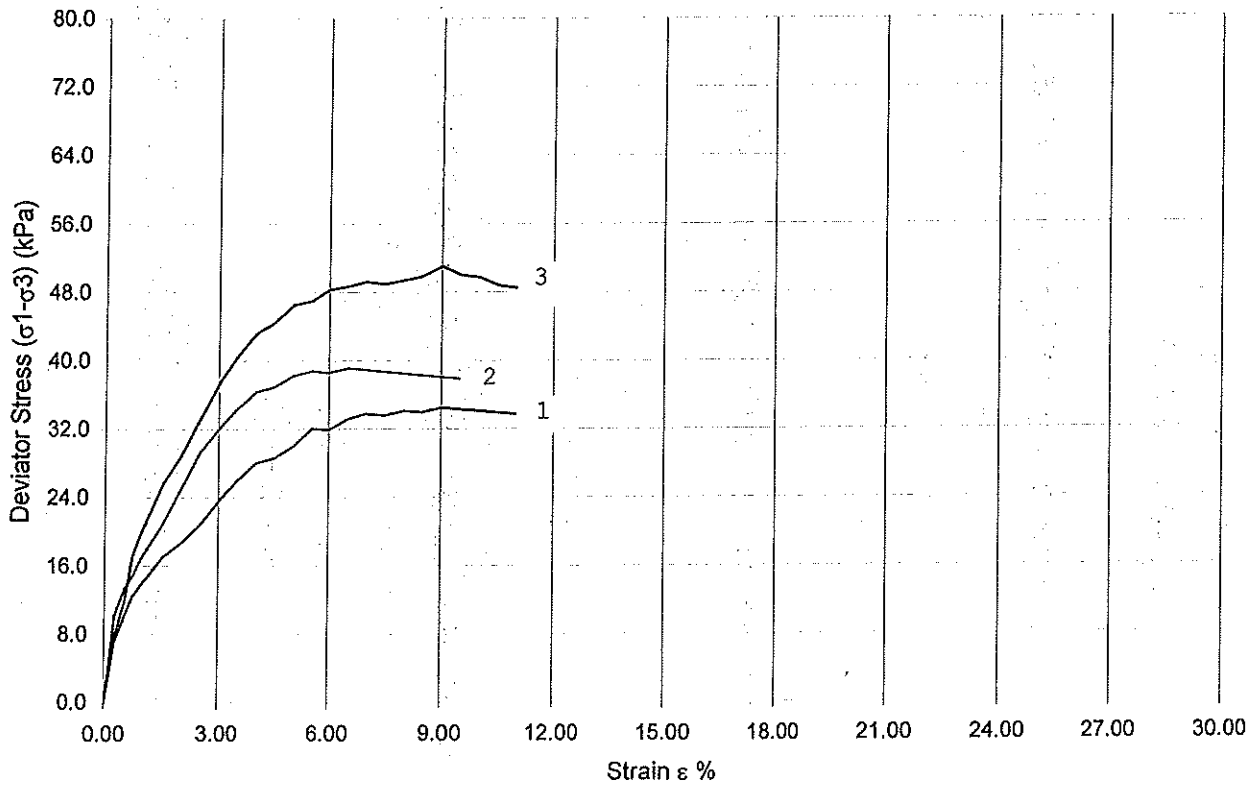
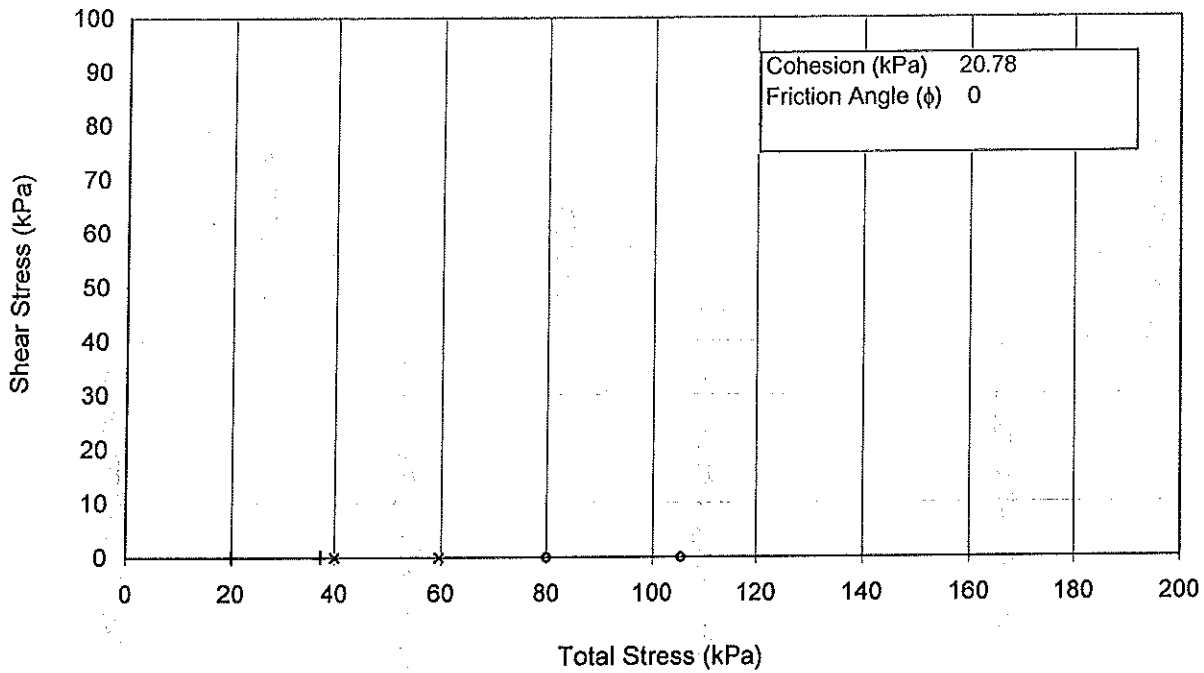
Approved

Lee Kai Hing



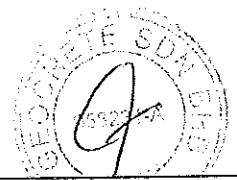
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 28.11.18
 Sample : UD1
 Borehole : BH10
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

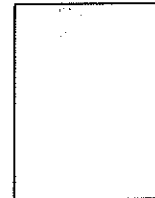
Unconsolidated Undrained

Sample details

Depth : 6.00m
Description : Dark grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	151.08	150.53	153.11
Bulk Density ρ (Mg/m ³)	1.75	1.75	1.78
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



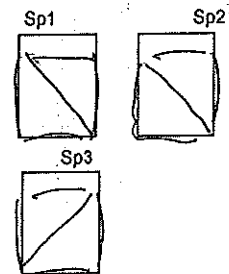
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	50	100	200
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	36	36	35
Dry Density ρ_{d0} (Mg/m ³)	1.29	1.28	1.32
Voids Ratio e_0	1.06	1.08	1.01
Deg of Saturation S_0 %	89.86	89.85	90.73

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	40.09	74.38	85.74
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	39.89	74.18	85.54
Strain at Failure ϵ_f %	12.50	9.47	8.03
Shear Strength c_u (kPa)	20.05	37.19	42.87
Moisture Content w_f %	36	36	35
Dry Density ρ_{df} (Mg/m ³)	1.29	1.28	1.32
Voids Ratio e_f	1.06	1.08	1.01
Deg of Saturation S_f %	89.86	89.85	90.73

Failure Sketch



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator : Shyam Nath
Checked : Chris

Test Name : UU

Date of Test : 28.11.18

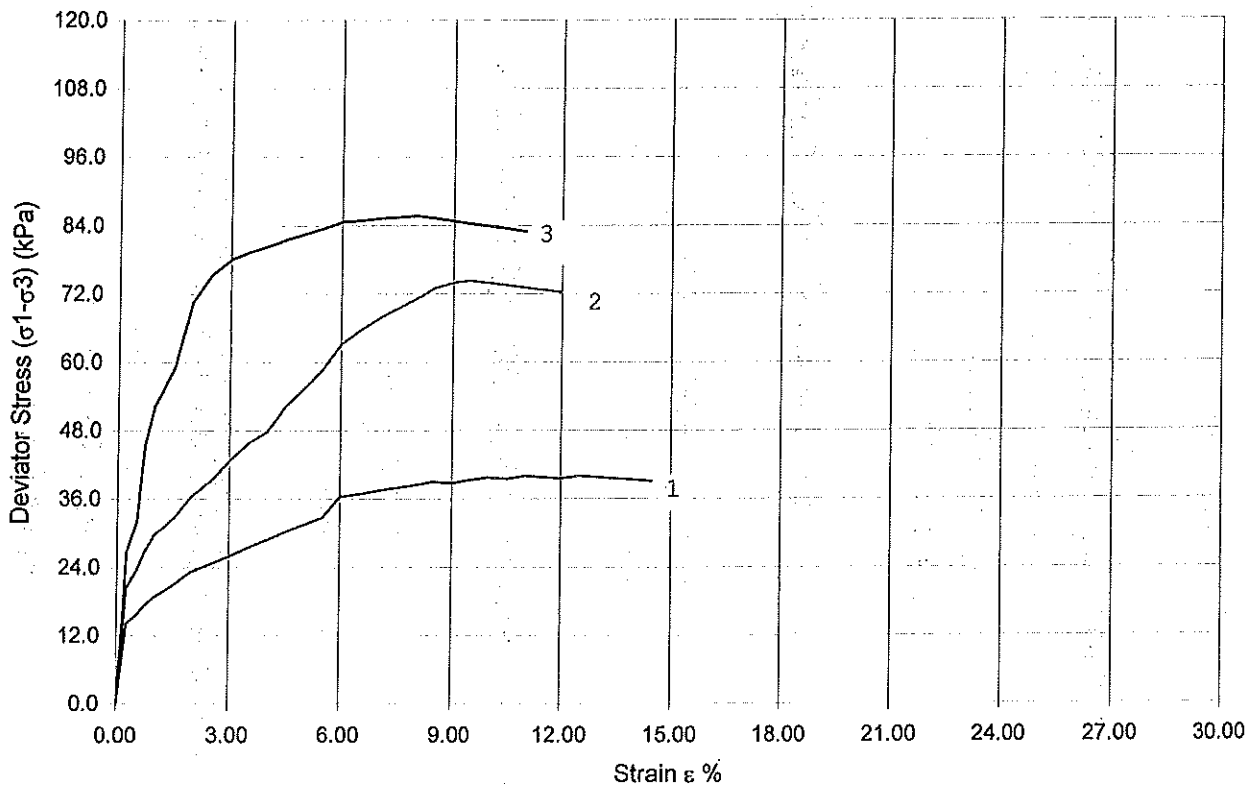
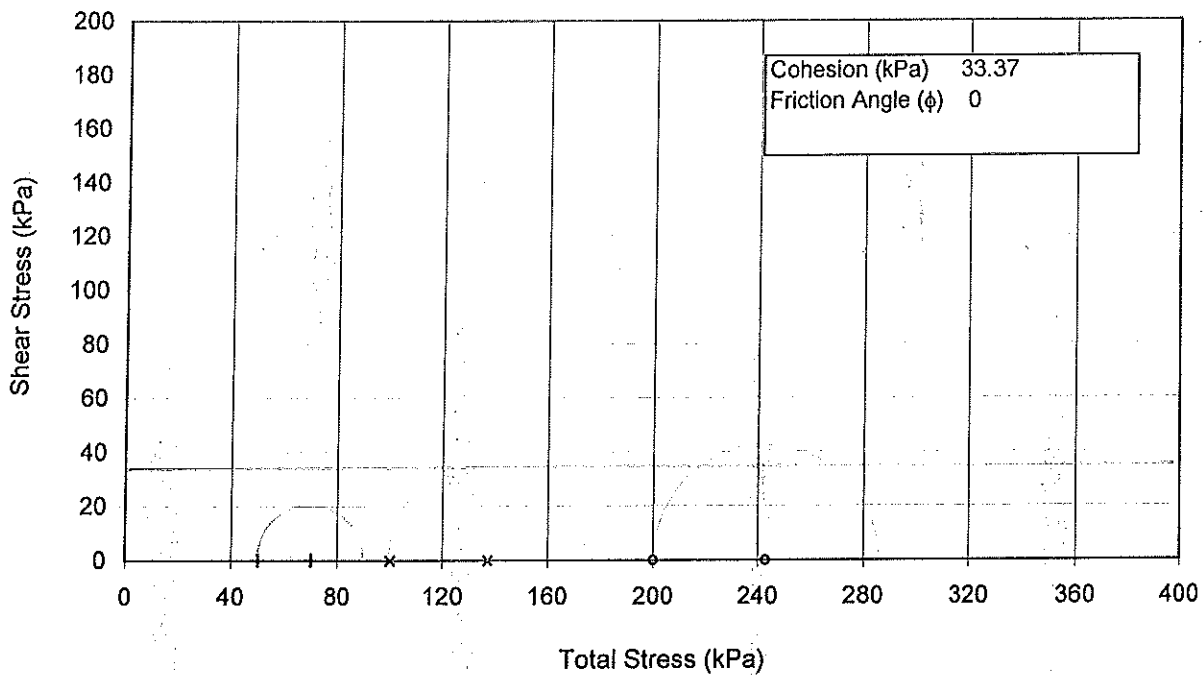
Sample : UD2

Borehole : BH10

Approved : Lee Kai Hing



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 28.11.18
 Sample : UD2
 Borehole : BH10
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

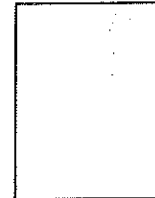
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Dark grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	133.16	135.79	138.02
Bulk Density ρ (Mg/m ³)	1.55	1.58	1.60
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



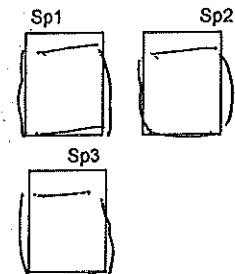
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	90	180	360
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	58	57	55
Dry Density ρ_{d0} (Mg/m ³)	0.98	1.00	1.03
Voids Ratio e_0	1.72	1.65	1.57
Deg of Saturation S_0 %	89.60	92.03	92.88

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	15.76	23.72	23.77
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	15.56	23.52	23.57
Strain at Failure ϵ_f %	5.00	9.01	5.99
Shear Strength c_u (kPa)	7.88	11.86	11.88
Moisture Content w_f %	58	57	55
Dry Density ρ_{df} (Mg/m ³)	0.98	1.00	1.03
Voids Ratio e_f	1.72	1.65	1.57
Deg of Saturation S_f %	89.60	92.03	92.88

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator

Shyam Nath

Checked

Chris

Test Name :

UU

Date of Test :

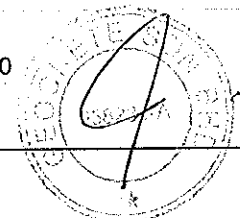
28.11.18

Sample : UD4

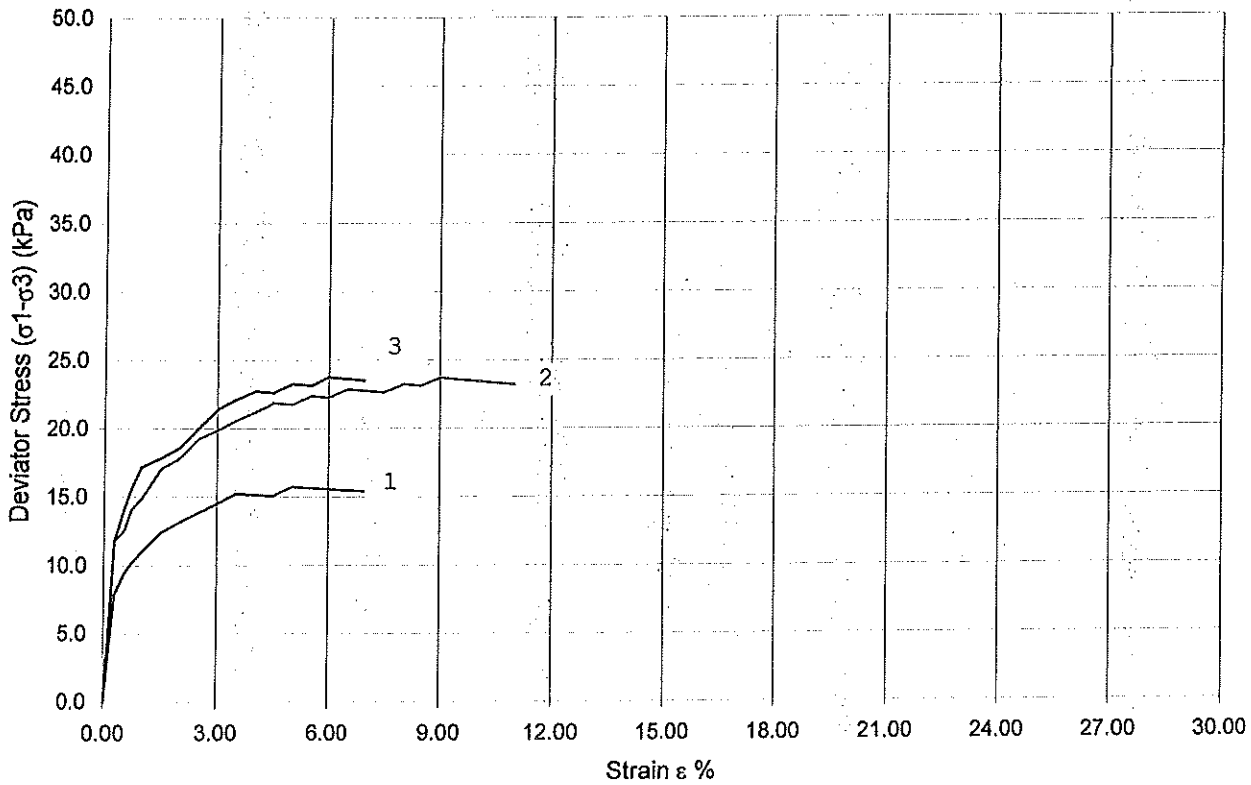
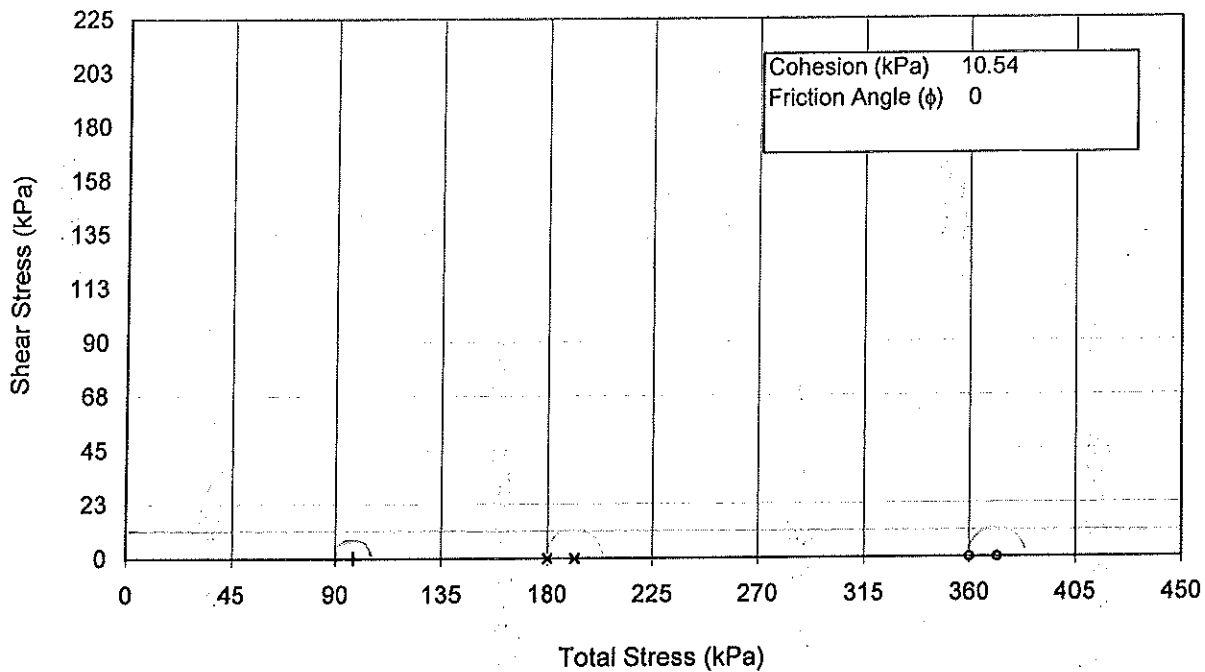
Borehole : BH10

Approved

Lee Kai Hing



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

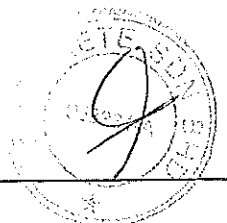
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 28.11.18

Sample : UD4
Borehole : BH10

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

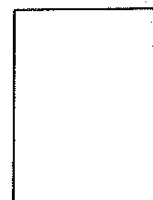
Unconsolidated Undrained

Sample details

Depth : 18.00m
 Description : Dark grey sandy CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	139.62	141.10	144.10
Bulk Density ρ (Mg/m ³)	1.62	1.64	1.67
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

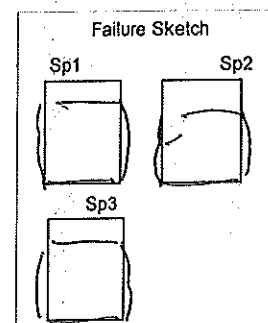
Load Channel 14391 14391 14391

Moisture Content w_0 %	50	49	47
Dry Density ρ_{d0} (Mg/m ³)	1.08	1.10	1.14
Voids Ratio e_0	1.46	1.43	1.34
Deg of Saturation S_0 %	90.64	92.18	93.62

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	23.00	36.16	51.35
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	22.80	35.96	51.15
Strain at Failure ϵ_f %	9.01	11.97	14.47
Shear Strength c_u (kPa)	11.50	18.08	25.68

Moisture Content w_f %	50	49	47
Dry Density ρ_{df} (Mg/m ³)	1.08	1.10	1.14
Voids Ratio e_f	1.46	1.43	1.34
Deg of Saturation S_f %	90.64	92.18	93.62



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

Test Name :

UU

Date of Test :

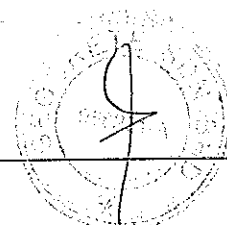
28.11.18

Sample : UD6

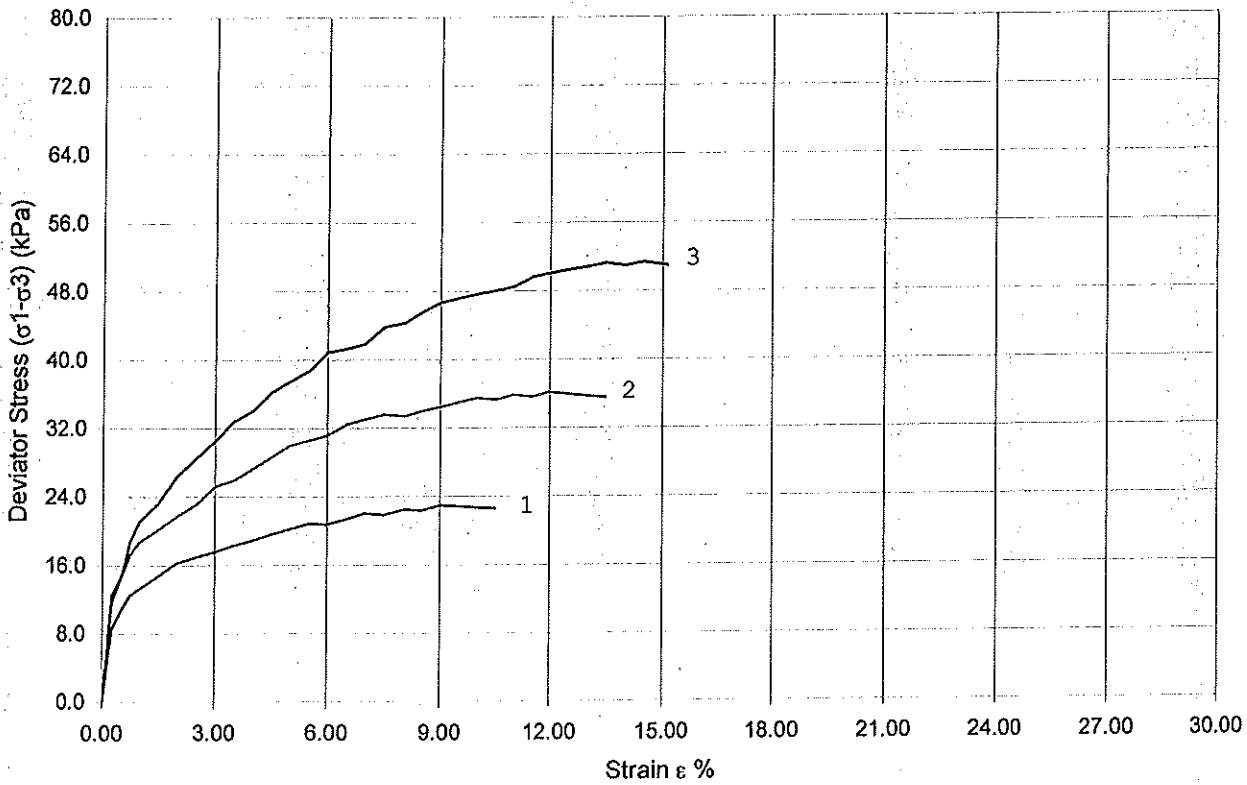
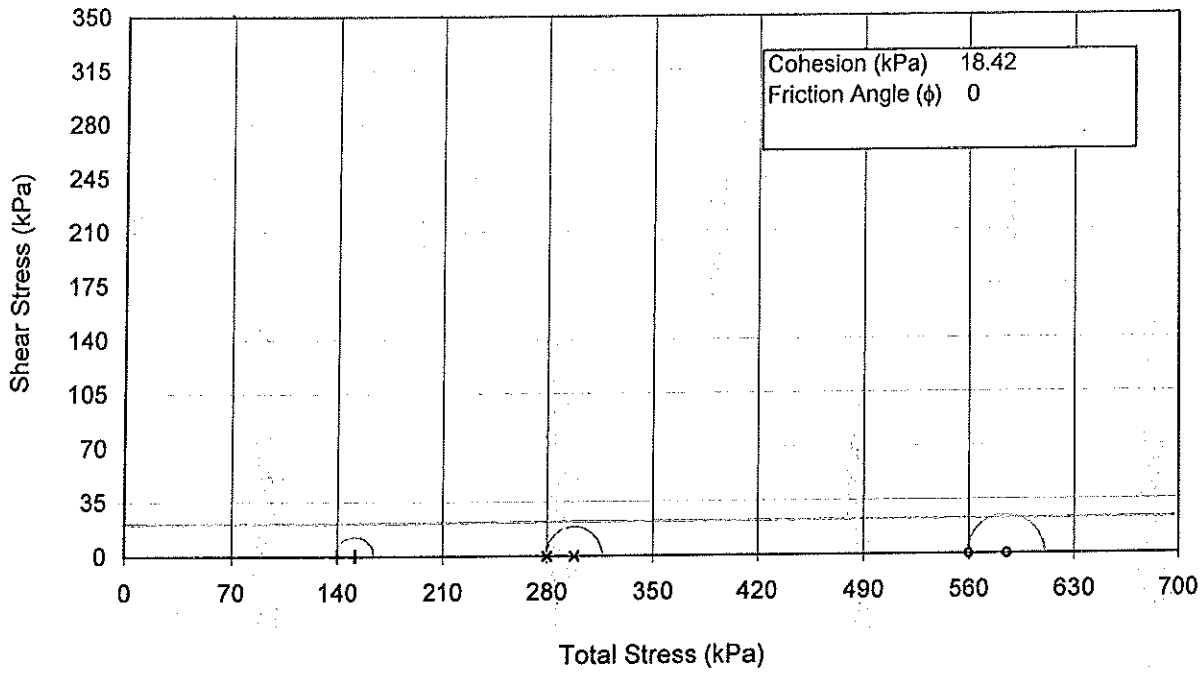
Borehole : BH10

Approved

Lee Kai Hing



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

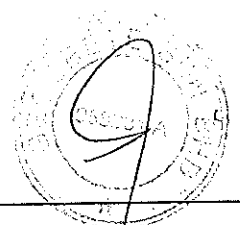
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 28.11.18

Sample : UD6
Borehole : BH10

Approved :
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
Sample No.	BH10 / UD1 / 3.00m	Test Started	27.11.18
Soil Description	Dark grey sandy CLAY	Ring No.	5

BEFORE TEST

Moist. Content from trimmings:	=	53 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	120.64 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.44 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.2 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.28 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.92 gm	Bulk Density (P)	=	1.532 Mg/m ³
Initial Moisture Content, M ₀	=	49 %	Dry Density (PD)	=	1.025 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.5943			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	83 %			
V. Ratio Change Factor, F, $\frac{1+e_0}{H}$	=	0.1297 mm ⁻¹			
Height of Solid H _s	=	7.709 mm			

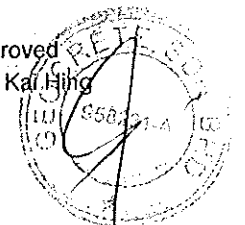
AFTER TEST

Wt of sample + Ring	=	118.03 gm	Overall settlement	=	2.222 mm
Wt of Dry sample + Ring	=	100.72 gm	Volume Change	=	4.365 cm ³
Wt of Ring	=	60.44 gm	Final Volume	=	34.92 cm ₃
Wt of Wet sample	=	57.59 gm	Final Bulk Density	=	1.649 Mg/m ³
Wt of Dry sample	=	40.28 gm	Final Dry Density	=	1.153 Mg/m ³
Wt of Moisture	=	17.31 gm	Final Void Ratio, e _f	=	1.3061
Final Moisture Content, M _f	=	43 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	88 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing

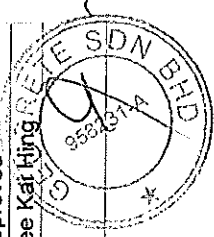


ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL Date of Report 07.12.18
CT10 - CT19 AND ITS ASSOCIATED WORKS AT Test started 27.11.18
WESTPORT, PULAU INDAH, SELANGOR Ring No. 5
 Sample No BH10 / UD1 / 3.00m

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta_e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5943	0.0000	0				
3.12	0.132	19.868	0.0171	1.5772	0.0171	3.12	2.1277	1.44	30.63	-0.0569
6.2	0.240	19.760	0.0311	1.5632	0.0140	3.12	1.7503	1.00	43.58	-0.0465
12.5	0.400	19.600	0.0519	1.5425	0.0208	6.2	1.3071	1.69	25.44	-0.0690
25.0	0.644	19.356	0.0835	1.5108	0.0317	12.5	1.0092	1.00	42.11	-0.1052
50	1.134	18.866	0.1471	1.4472	0.0636	25.0	1.0397	1.21	33.50	-0.2112
100	1.756	18.244	0.2278	1.3666	0.0807	50.0	0.6824	1.21	31.58	-0.2681
200	2.584	17.416	0.3352	1.2592	0.1074	99.9	0.4758	1.21	29.16	-0.3568
100	2.502	17.498	0.3246	1.2698	-0.0106	-99.9				
50	2.430	17.570	0.3152	1.2791	-0.0093	-50.0				
12.5	2.222	17.778	0.2882	1.3061	-0.0270	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing


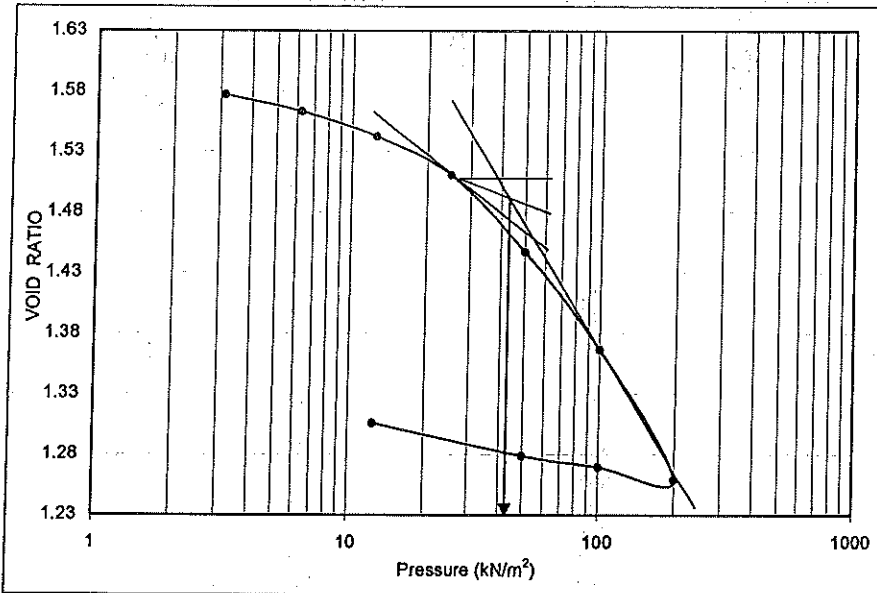
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

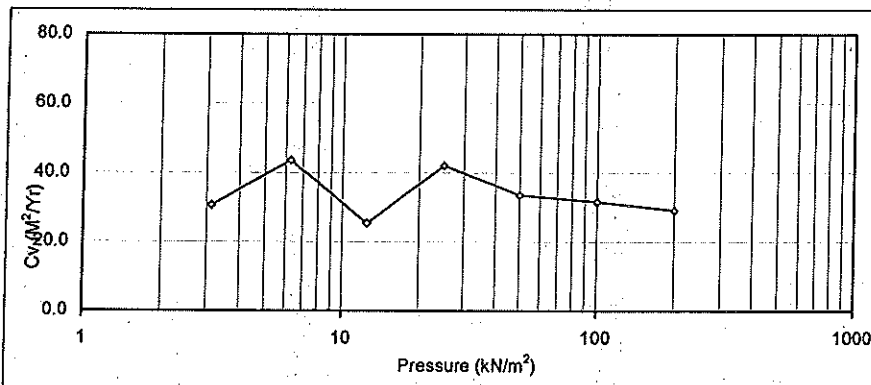
BH REF BH10 / UD1 / 3.00m
 SOIL SAMPLE Dark grey sandy CLAY

Date of Report 07.12.18
 Test started 27.11.18
 Ring No. 5



INITIAL

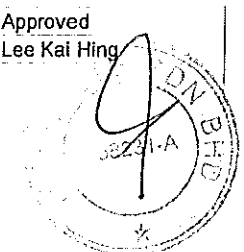
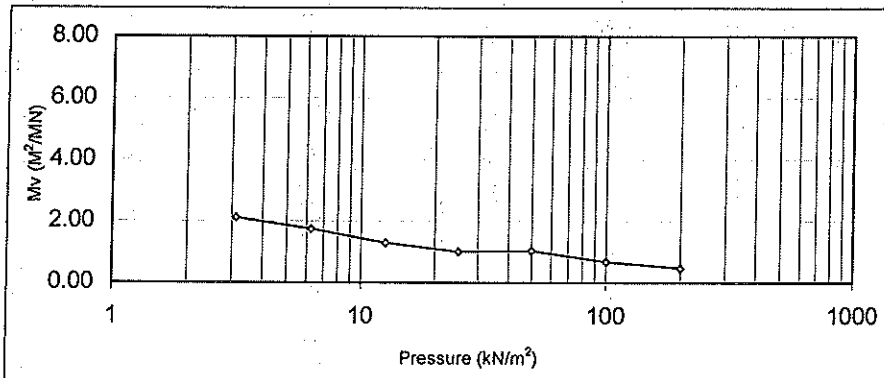
Water content	49	%
Dry Density	1.03	Mg/m ³
Void Ratio	1.5943	
Saturation	83	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	



FINAL

Water content	43	%
Dry Density	1.15	Mg/m ³
Void Ratio	1.3061	
Saturation	88	%
Height	18	mm
Comp. Index, C _c	0.3568	
Precons. Load	42	kN/m ²

Comp. Ratio, C_R 0.138



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	07.12.18
Sample No.	BH10 / UD6 / 18.00m	Test Started	27.11.18
Soil Description	Dark grey sandy CLAY	Ring No.	6

BEFORE TEST

Moist. Content from trimmings:	=	42 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	127.47 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.72 gm	Area (A)	=	1964 mm ²
Wt of sample	=	66.75 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	47.67 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.08 gm	Bulk Density (P)	=	1.699 Mg/m ³
Initial Moisture Content, M _o	=	40 %	Dry Density (PD)	=	1.213 Mg/m ³
Initial Void Ratio, e _o , $\frac{SG}{P_D} - 1$	=	1.1922			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	89 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1096 mm ⁻¹			
Height of Solid H _s	=	9.123 mm			

AFTER TEST

Wt of sample + Ring	=	124.46 gm	Overall settlement	=	1.980 mm
Wt of Dry sample + Ring	=	108.39 gm	Volume Change	=	3.889 cm ³
Wt of Ring	=	60.72 gm	Final Volume	=	35.40 cm ₃
Wt of Wet sample	=	63.74 gm	Final Bulk Density	=	1.801 Mg/m ³
Wt of Dry sample	=	47.67 gm	Final Dry Density	=	1.347 Mg/m ³
Wt of Moisture	=	16.07 gm	Final Void Ratio, e _r	=	0.9751
Final Moisture Content, M _r	=	34 %			
Final Saturation, S _o , $\frac{M_r \times SG}{e_r}$	=	92 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

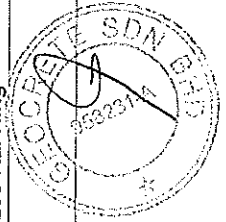
BS 1377 : Part 5 : 1990

Project: PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Sample No: BH10 / UD6 / 18.00m

Date of Report: 07.12.18
 Test started: 27.11.18
 Ring No: 6

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.1922	0.0000	0				
3.12	0.134	19.866	0.0147	1.1775	0.0147	3.12	2.1601	1.96	22.50	-0.0488
6.2	0.214	19.786	0.0235	1.1687	0.0088	3.12	1.2948	6.25	6.98	-0.0291
12.5	0.338	19.662	0.0370	1.1551	0.0136	6.2	1.0098	1.44	29.99	-0.0452
25.0	0.524	19.476	0.0574	1.1347	0.0204	12.5	0.7646	1.21	35.13	-0.0677
50	0.810	19.190	0.0888	1.1034	0.0313	25.0	0.5966	1.21	34.29	-0.1041
100	1.192	18.808	0.1307	1.0615	0.0419	50.0	0.4065	1.21	33.11	-0.1391
200	1.680	18.320	0.1841	1.0080	0.0535	99.9	0.2666	1.00	38.25	-0.1777
400	2.280	17.720	0.2499	0.9423	0.0658	199.8	0.1694	1.21	29.79	-0.2185
200	2.244	17.756	0.2460	0.9462	-0.0039	-199.8				
50	2.122	17.878	0.2326	0.9596	-0.0134	-149.9				
12	1.980	18.020	0.2170	0.9751	-0.0156	-37.5				

Operator: Shyam Nath
 Checked: Chris
 Approved: Lee Kai Hing



GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

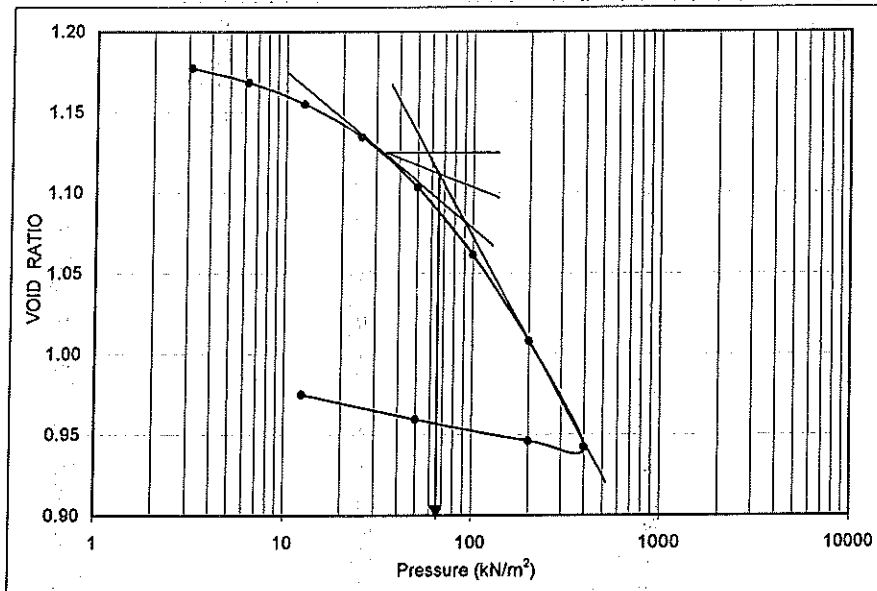
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH10 / UD6 / 18.00m

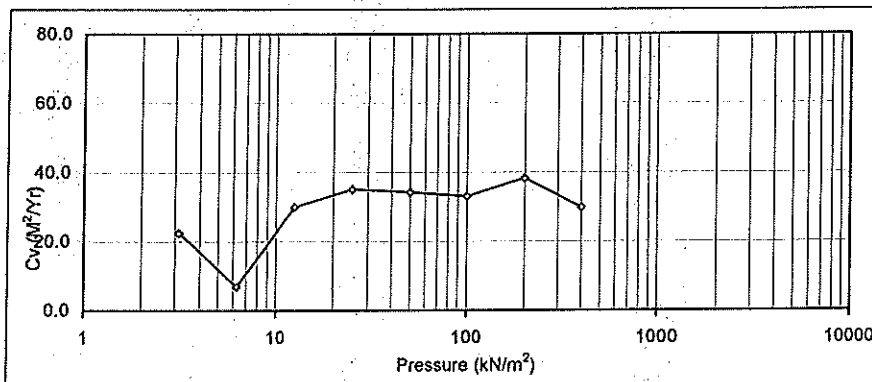
SOIL SAMPLE Dark grey sandy CLAY

Date of Report 07.12.18
 Test started 27.11.18
 Ring No. 6



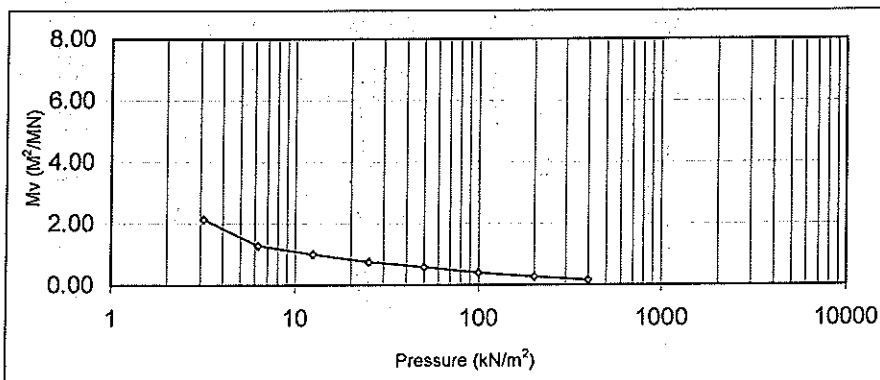
INITIAL

Water content	40	%
Dry Density	1.21	Mg/m ³
Void Ratio	1.1922	
Saturation	89	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	



FINAL

Water content	34	%
Dry Density	1.35	Mg/m ³
Void Ratio	0.9751	
Saturation	92	%
Height	18	mm
Comp. Index, C _c	0.2185	
Precons. Load	65	kN/m ²



Comp. Ratio, C_R 0.100



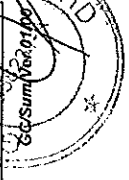
SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										REF : L/081/18/139/18 DATE : 22.10.18																					
SAMPLE AND SPECIMEN DETAILS.	Borehole No.	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS			SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST										
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Cc	Pc (kPa)	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)						
	BH11	UD1	3.00	81	1.31	0.82	86	33	53	12.8	60	34	6	0	2.58					13.69	0	15	0.543			1.5	0.12	0.84	7.5				
		UD2	6.00	8	1.98	1.83	NP				18	13	69	0	2.69					NA													
		UD3	9.00	57	1.65	1.08					54	31	15	0	2.61					29.62	0												
		UD4	12.00	44	1.63	1.33					52	40	8	0	2.58					30.68	0	62	0.248										
		D7	16.50	53	NA	NA	54	21	33	10.7	30	20	50	0	2.65																		
		D8	19.50	78	NA	NA					54	31	15	0																			
		D11	24.00	67	NA	NA					48	37	15	0	2.62																		
		D13	27.00	35	NA	NA					19		81	0																			
		D14	28.50	50	NA	NA	41	21	20	8.1	35	22	43	0	2.66																		
		D15	30.00	153	NA	NA					59	36	5	0	2.58																		
		D17	33.00	23	NA	NA					25		75	0																			
		D21	39.00	23	NA	NA					17		83	0																			
		D24	43.50	32	NA	NA					38	25	35	2	2.65																		
		D25	45.00	30	NA	NA	38	22	16		28	22	48	2	2.65																		
		D28	49.50	45	NA	NA	61	25	36	11.3	47	35	18	0	2.63																		
		D29	51.00	48	NA	NA					59	41	0	0																			
		D31	54.00	14	NA	NA					4		16	80	2.71																		
		D33	57.00	29	NA	NA					18	12	68	2	2.69																		
		D35	60.00	29	NA	NA	55	20	35		40	30	29	1	2.65																		

Notes:
 NES = NOT ENOUGH SAMPLE
 NP = NON PLASTIC
 NA = NOT APPLICABLE

Checked by: CHRIS
 Approved by: LEE KAI HING

Remarks:
 *BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLES. **FOR SHEAR BOX TEST, INSUFFICIENT SAMPLE TO CARRY OUT ON DISTURBED SAMPLES. ***BH11 UD2 - TRIAXIAL (UU) TESTS CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN.



SUM

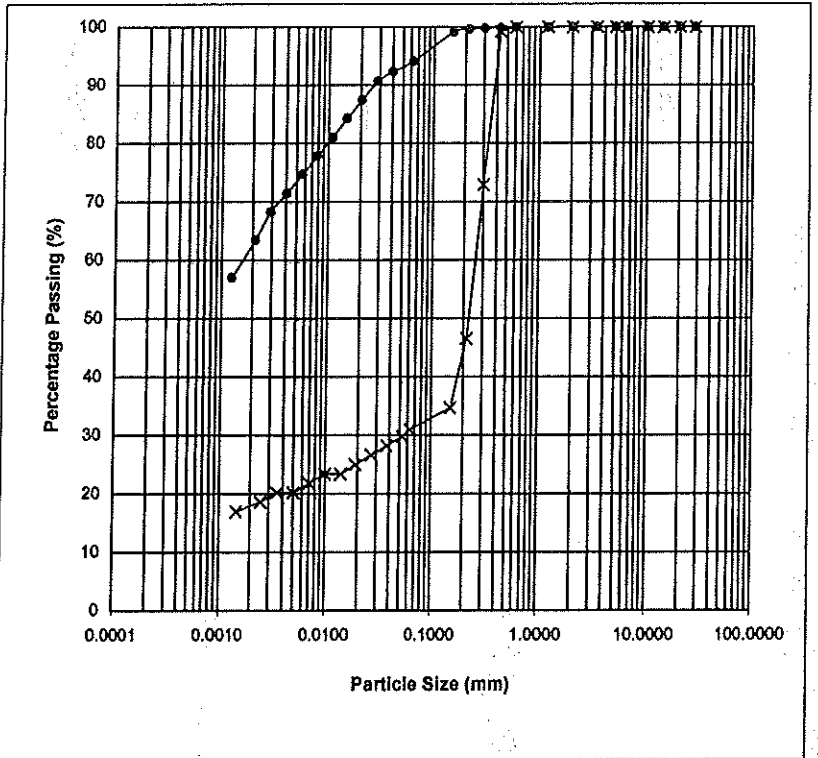
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

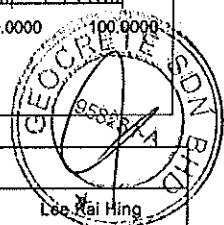
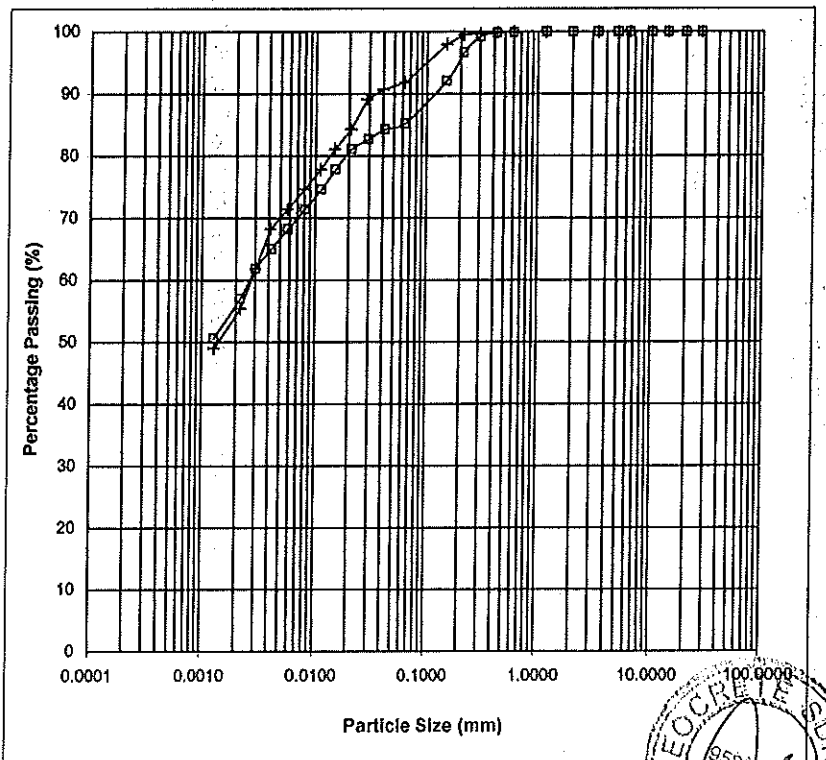
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	99	
0.300	100	0.300	73	
0.212	100	0.212	47	
0.150	99	0.150	35	
0.083	94	0.083	31	
0.0397	92	0.0530	30	
0.0283	91	0.0377	28	
0.0204	87	0.0268	27	
0.0147	84	0.0190	25	
0.0109	81	0.0140	23	
0.0079	78	0.0099	23	
0.0057	75	0.0070	22	
0.0041	71	0.0050	20	
0.0029	68	0.0035	20	
0.0021	63	0.0025	19	
0.0013	57	0.0015	17	
Clay (%)		60	Clay (%)	18
Silt (%)		34	Silt (%)	13
Sand (%)		6	Sand (%)	69
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH11	UD1	3.00	14.10.18
x	BH11	UD2	6.00	14.10.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	97	0.212	100	
0.150	92	0.150	98	
0.083	85	0.083	92	
0.0416	84	0.0401	91	
0.0297	83	0.0286	89	
0.0212	81	0.0208	84	
0.0152	78	0.0150	81	
0.0113	75	0.0111	78	
0.0081	71	0.0080	75	
0.0058	68	0.0058	71	
0.0042	65	0.0041	68	
0.0030	62	0.0030	62	
0.0022	57	0.0022	55	
0.0013	51	0.0013	49	
Clay (%)		54	Clay (%)	52
Silt (%)		31	Silt (%)	40
Sand (%)		15	Sand (%)	8
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH11	UD3	9.00	14.10.18
+	BH11	UD4	12.00	14.10.18



GEocrete Sdn Bhd (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

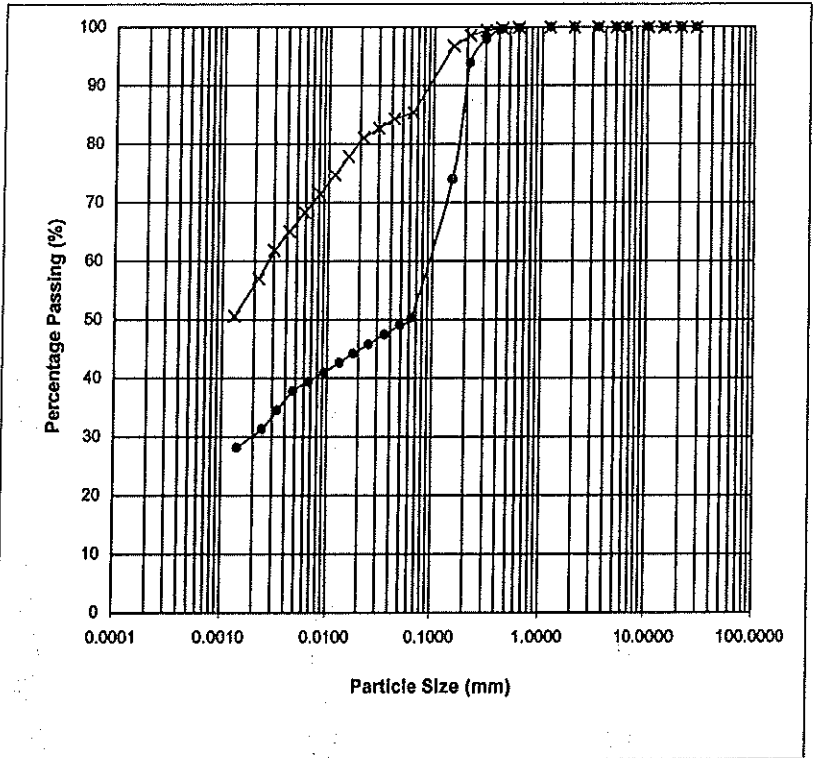
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

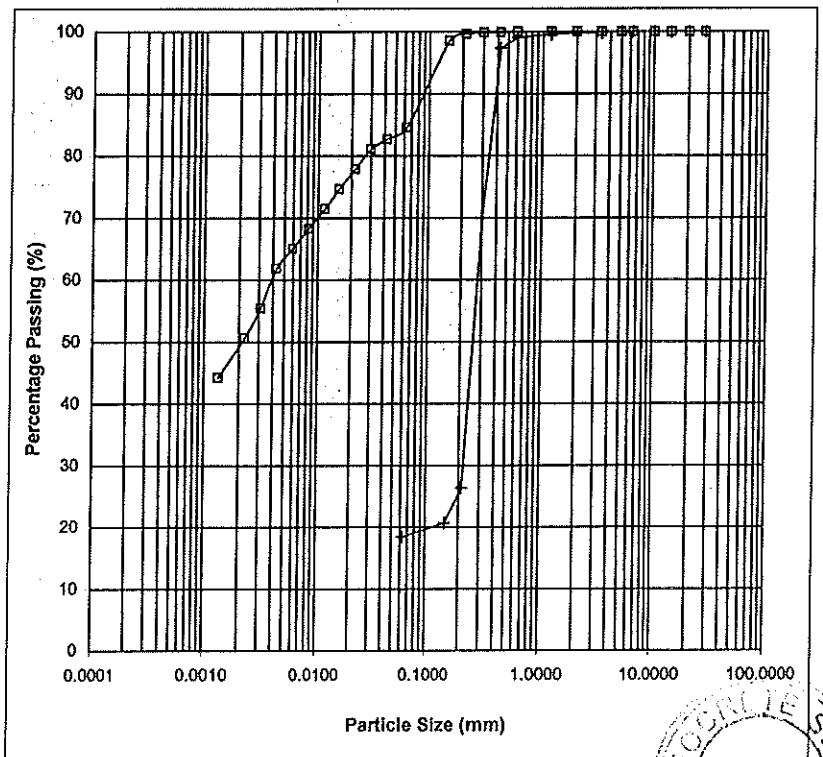
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	98	0.300	99	
0.212	94	0.212	99	
0.150	74	0.150	87	
0.063	50	0.063	85	
0.0493	49	0.0416	84	
0.0351	47	0.0297	83	
0.0250	46	0.0212	81	
0.0178	44	0.0152	78	
0.0130	43	0.0113	75	
0.0093	41	0.0081	71	
0.0066	39	0.0058	68	
0.0047	38	0.0042	65	
0.0034	35	0.0030	62	
0.0024	31	0.0022	57	
0.0014	28	0.0013	51	
Clay (%)		30	Clay (%)	54
Silt (%)		20	Silt (%)	31
Sand (%)		50	Sand (%)	15
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH11	D7	16.50	14.10.18
x	BH11	D8	19.50	14.10.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	99	
0.425	100	0.425	97	
0.300	100	0.300	70	
0.212	100	0.212	26	
0.150	99	0.150	21	
0.063	85	0.063	18	
0.0420	83			
0.0300	81			
0.0215	78			
0.0155	75			
0.0115	71			
0.0083	68			
0.0059	65			
0.0043	62			
0.0031	55			
0.0022	51			
0.0013	44			
Clay (%)		48	Clay (%)	19
Silt (%)		37	Silt (%)	
Sand (%)		15	Sand (%)	81
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH11	D11	24.00	14.10.18
+	BH11	D13	27.00	14.10.18



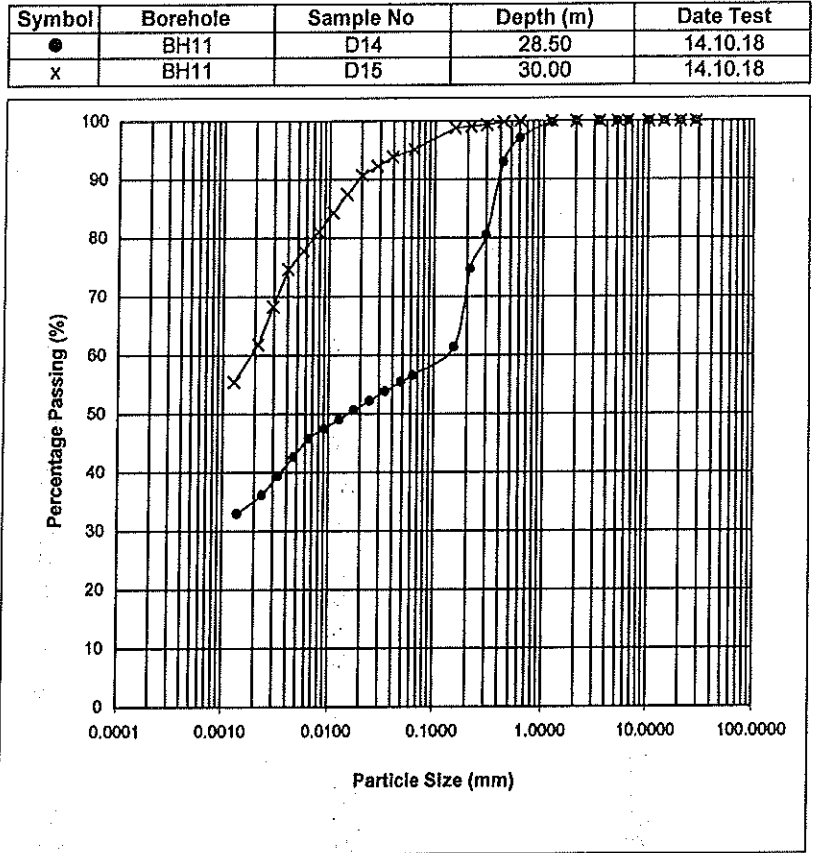
GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

PARTICLE SIZE DISTRIBUTION

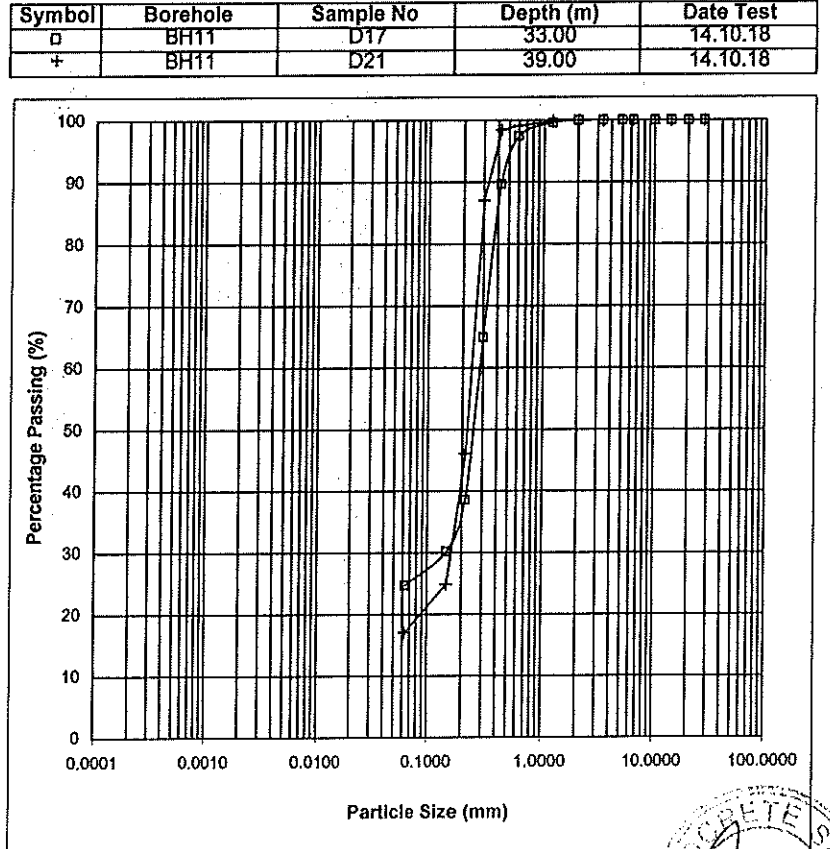
(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	97	0.600	100	
0.425	93	0.425	100	
0.300	81	0.300	99	
0.212	75	0.212	99	
0.150	61	0.150	99	
0.063	57	0.063	95	
0.0480	55	0.0393	94	
0.0341	54	0.0280	92	
0.0243	52	0.0200	91	
0.0173	51	0.0144	87	
0.0127	49	0.0107	84	
0.0091	47	0.0077	81	
0.0064	46	0.0056	78	
0.0046	43	0.0040	75	
0.0033	39	0.0029	68	
0.0024	36	0.0021	62	
0.0014	33	0.0013	55	
Clay (%)		35	Clay (%)	59
Silt (%)		22	Silt (%)	36
Sand (%)		43	Sand (%)	5
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	97	0.600	99	
0.425	90	0.425	98	
0.300	65	0.300	87	
0.212	39	0.212	46	
0.150	30	0.150	25	
0.063	25	0.063	17	
Clay (%)		25	Clay (%)	17
Silt (%)			Silt (%)	
Sand (%)		75	Sand (%)	83
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

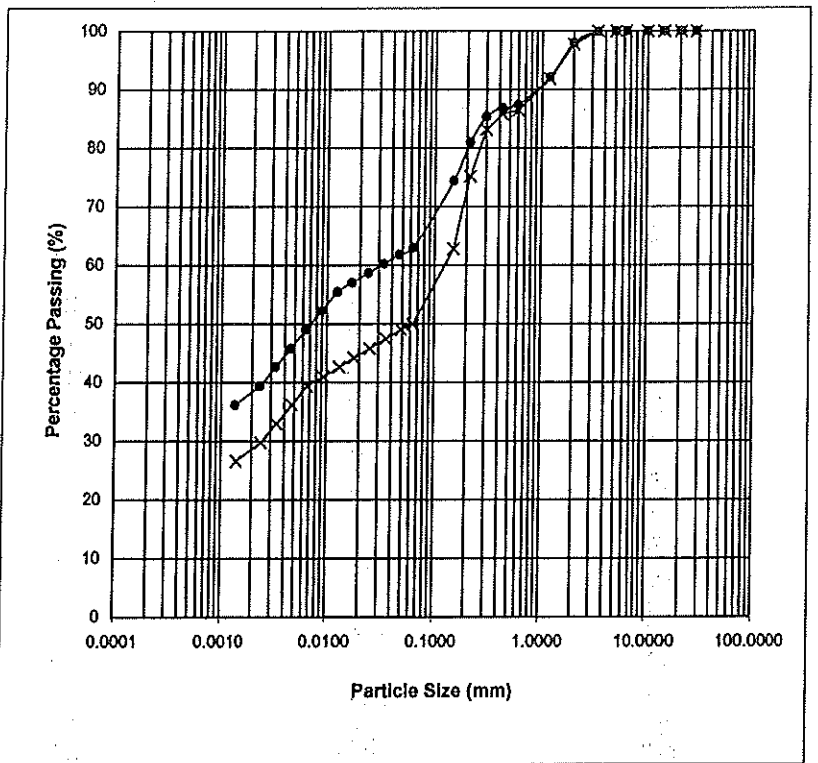
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

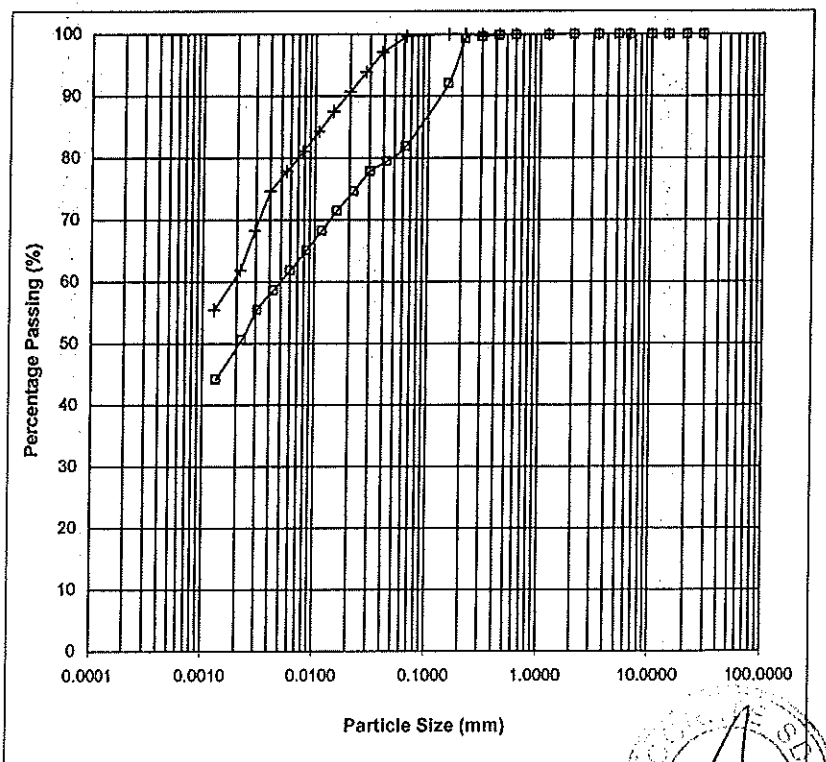
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	98	2.00	98	
1.18	92	1.18	92	
0.600	87	0.600	86	
0.425	87	0.425	86	
0.300	85	0.300	83	
0.212	81	0.212	75	
0.150	74	0.150	63	
0.063	63	0.063	50	
0.0466	62	0.0493	49	
0.0332	60	0.0351	47	
0.0237	59	0.0250	46	
0.0168	57	0.0178	44	
0.0124	55	0.0130	43	
0.0089	52	0.0093	41	
0.0064	49	0.0066	39	
0.0046	46	0.0047	36	
0.0033	43	0.0034	33	
0.0023	39	0.0024	30	
0.0014	36	0.0014	27	
Clay (%)		38	Clay (%)	28
Silt (%)		25	Silt (%)	22
Sand (%)		35	Sand (%)	48
Gravel (%)		2	Gravel (%)	2
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH11	D24	43.50	14.10.18
X	BH11	D25	45.00	14.10.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	100	
0.212	99	0.212	100	
0.150	92	0.150	100	
0.063	82	0.063	100	
0.0427	79	0.0384	97	
0.0305	78	0.0278	94	
0.0219	75	0.0200	91	
0.0157	71	0.0144	87	
0.0117	68	0.0107	84	
0.0084	65	0.0077	81	
0.0060	62	0.0056	78	
0.0043	59	0.0040	75	
0.0031	55	0.0029	68	
0.0022	51	0.0021	62	
0.0013	44	0.0013	55	
Clay (%)		47	Clay (%)	59
Silt (%)		35	Silt (%)	41
Sand (%)		18	Sand (%)	0
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH11	D28	49.50	14.10.18
+	BH11	D29	51.00	14.10.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Ming

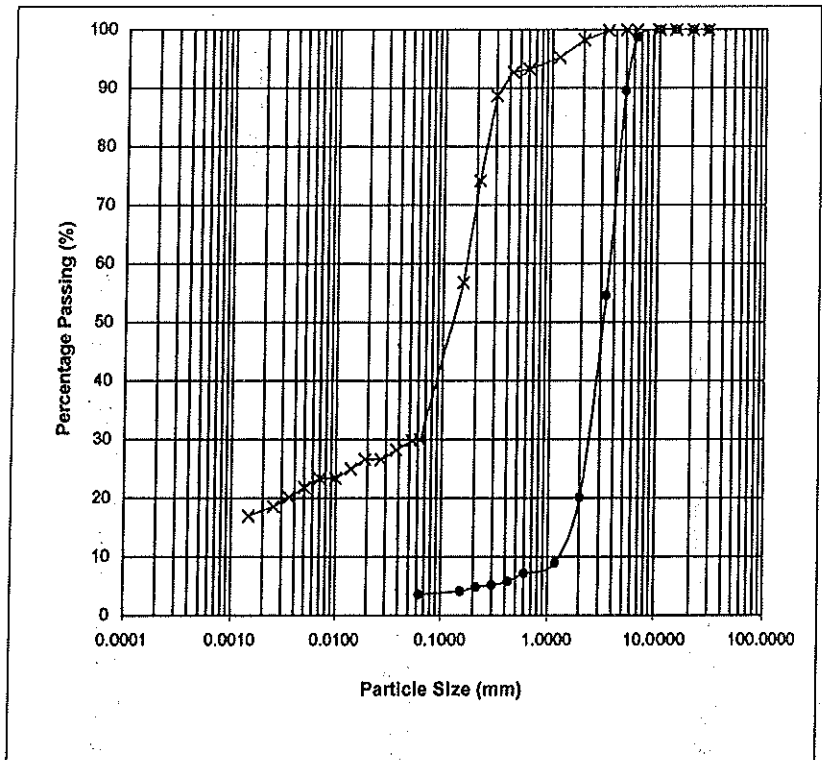
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

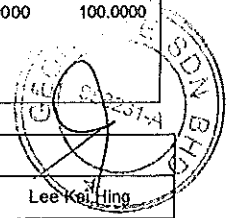
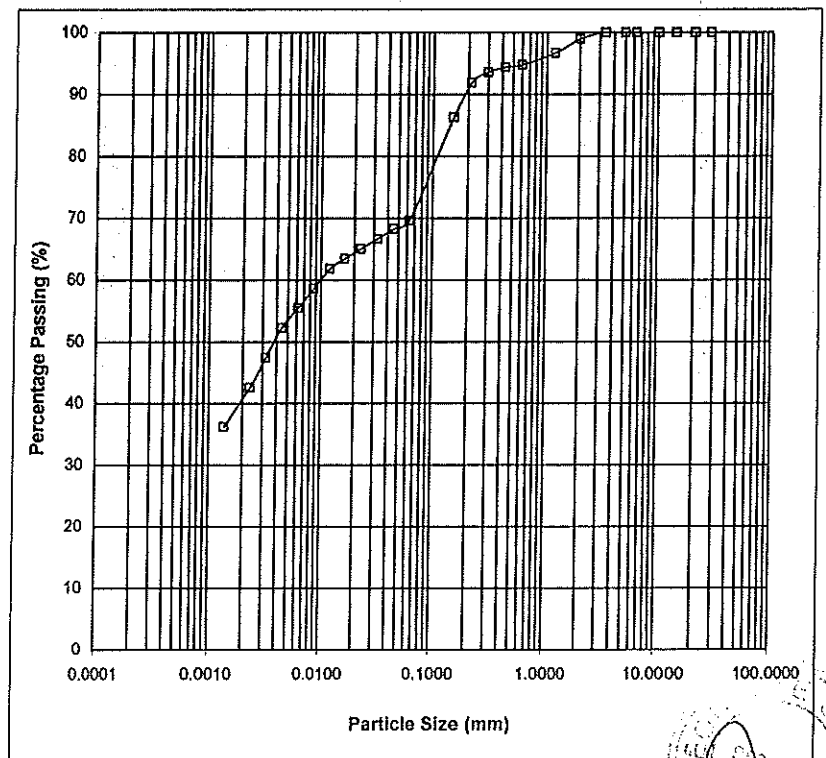
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	99	6.30	100
5.00	90	5.00	100
3.35	55	3.35	100
2.00	20	2.00	98
1.18	9	1.18	95
0.600	7	0.600	93
0.425	6	0.425	93
0.300	5	0.300	89
0.212	5	0.212	74
0.150	4	0.150	57
0.063	4	0.063	30
		0.0530	30
		0.0377	28
		0.0268	27
		0.0189	27
		0.0139	25
		0.0099	23
		0.0070	23
		0.0050	22
		0.0035	20
		0.0025	19
		0.0015	17
Clay (%)		Clay (%)	18
Silt (%)	4	Silt (%)	12
Sand (%)	16	Sand (%)	68
Gravel (%)	80	Gravel (%)	2
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH11	D31	54.00	14.10.18
X	BH11	D33	57.00	14.10.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100		
20.00	100		
14.00	100		
10.00	100		
6.30	100		
5.00	100		
3.35	100		
2.00	99		
1.18	97		
0.600	95		
0.425	94		
0.300	94		
0.212	92		
0.150	86		
0.063	70		
0.0452	68		
0.0322	67		
0.0230	65		
0.0164	63		
0.0120	62		
0.0086	59		
0.0062	55		
0.0044	52		
0.0032	47		
0.0023	43		
0.0014	36		
Clay (%)	40		
Silt (%)	30		
Sand (%)	29		
Gravel (%)	1		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH11	D35	60.00	14.10.18
+				



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

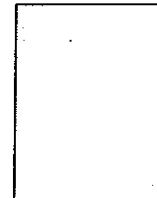
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	113.52	115.81	118.35
Bulk Density ρ (Mg/m ³)	1.318	1.344	1.374
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample

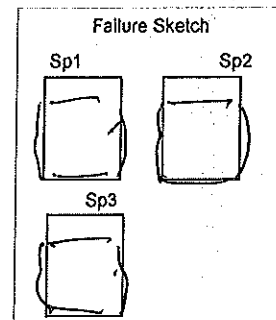


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	81	80	80
Dry Density ρ_{d0} (Mg/m ³)	0.73	0.75	0.76
Voids Ratio e_0	2.55	2.46	2.37
Deg of Saturation S_0 %	82.24	84.10	86.59

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	20.85	29.11	32.17
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	20.65	28.91	31.97
Strain at Failure ϵ_f %	9.01	9.01	8.49
Shear Strength c_u (kPa)	10.42	14.56	16.09
Moisture Content w_f %	81	80	80
Dry Density ρ_{df} (Mg/m ³)	0.73	0.75	0.76
Voids Ratio e_f	2.55	2.46	2.37
Deg of Saturation S_f %	82.24	84.10	86.59



Notes : Plastic Plastic Plastic

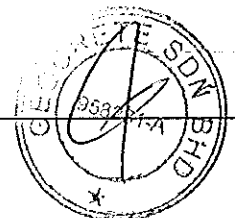
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 13.10.18

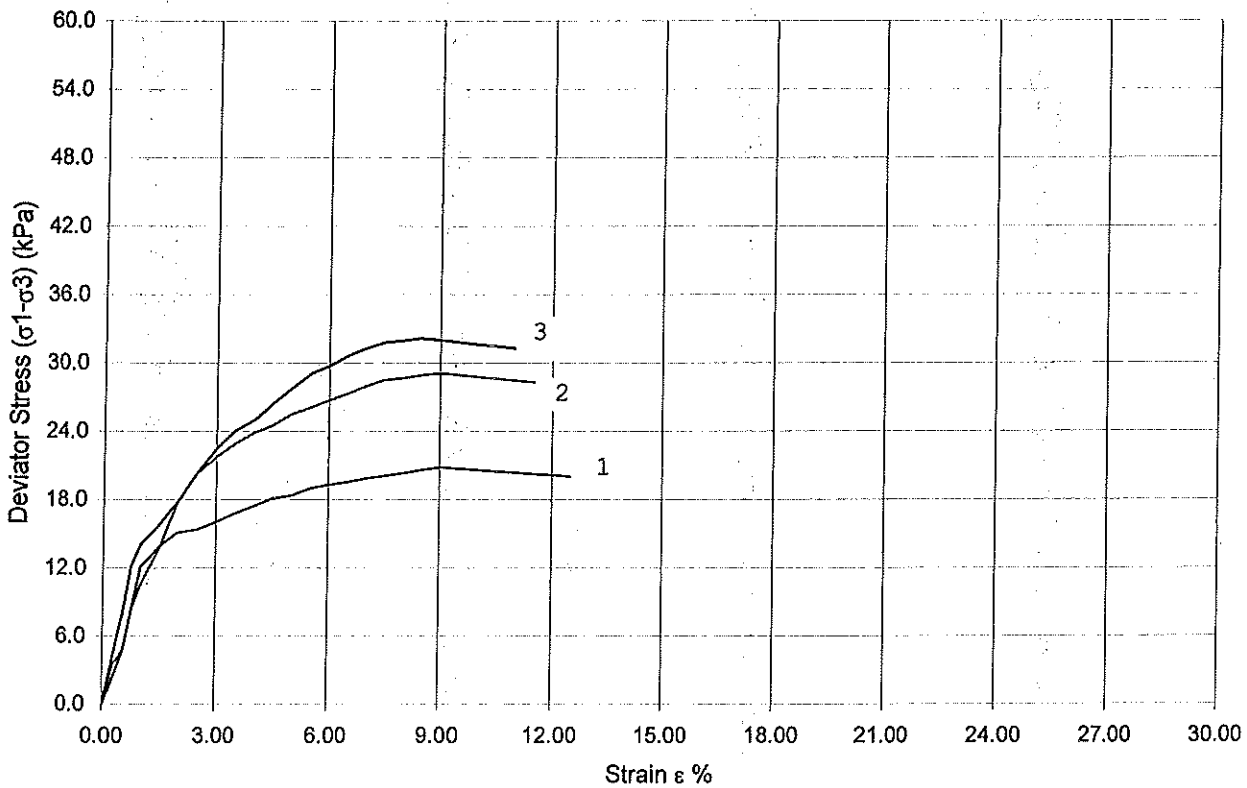
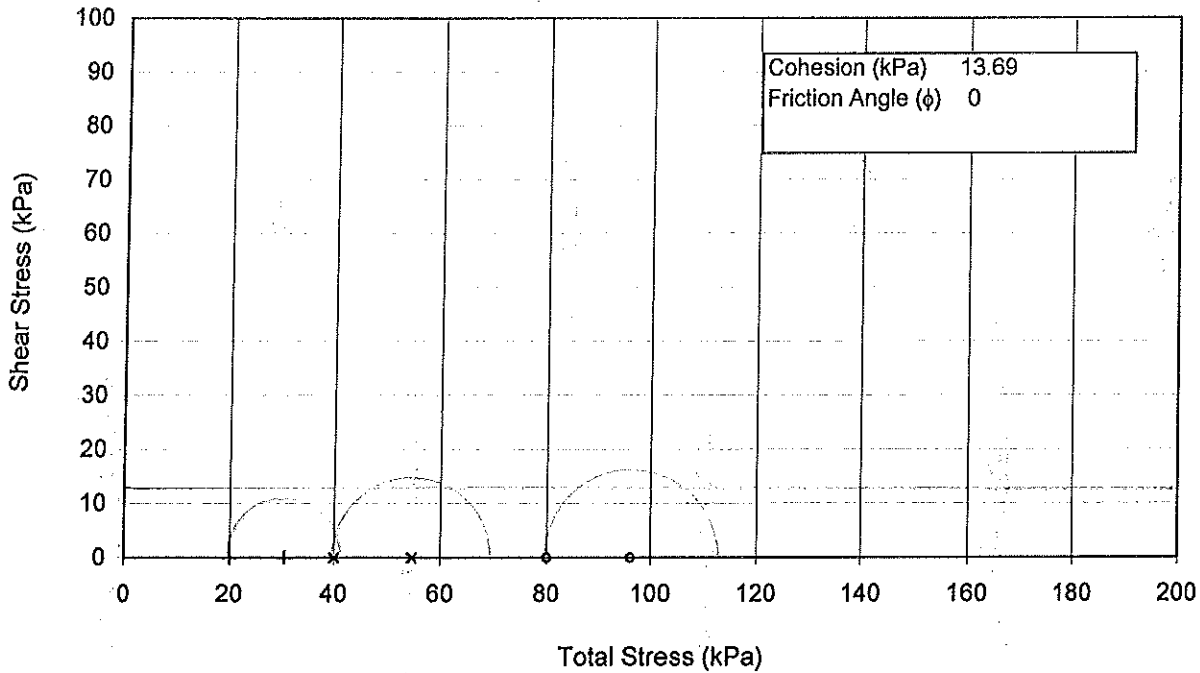
Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Sample : UD1
Borehole : BH11
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

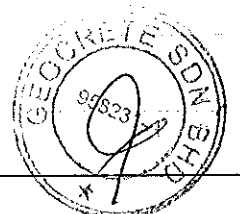
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 13.10.18

Sample : UD1
Borehole : BH11

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

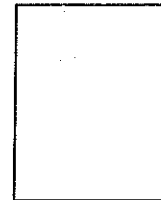
Unconsolidated Undrained

Sample details

Depth : 9.00m
Description : Grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	140.00	141.75	143.65
Bulk Density ρ (Mg/m ³)	1.625	1.645	1.667
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



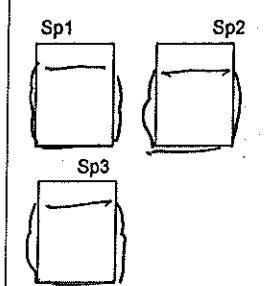
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	70	140	280
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	53	53	51
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.08	1.10
Voids Ratio e_0	1.45	1.43	1.37
Deg of Saturation S_0 %	94.58	96.95	97.88

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	40.00	61.13	76.59
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	39.80	60.93	76.39
Strain at Failure ϵ_f %	4.47	4.47	4.01
Shear Strength c_u (kPa)	20.00	30.57	38.30
Moisture Content w_f %	53	53	51
Dry Density ρ_{df} (Mg/m ³)	1.07	1.08	1.10
Voids Ratio e_f	1.45	1.43	1.37
Deg of Saturation S_f %	94.58	96.95	97.88

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 13.10.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

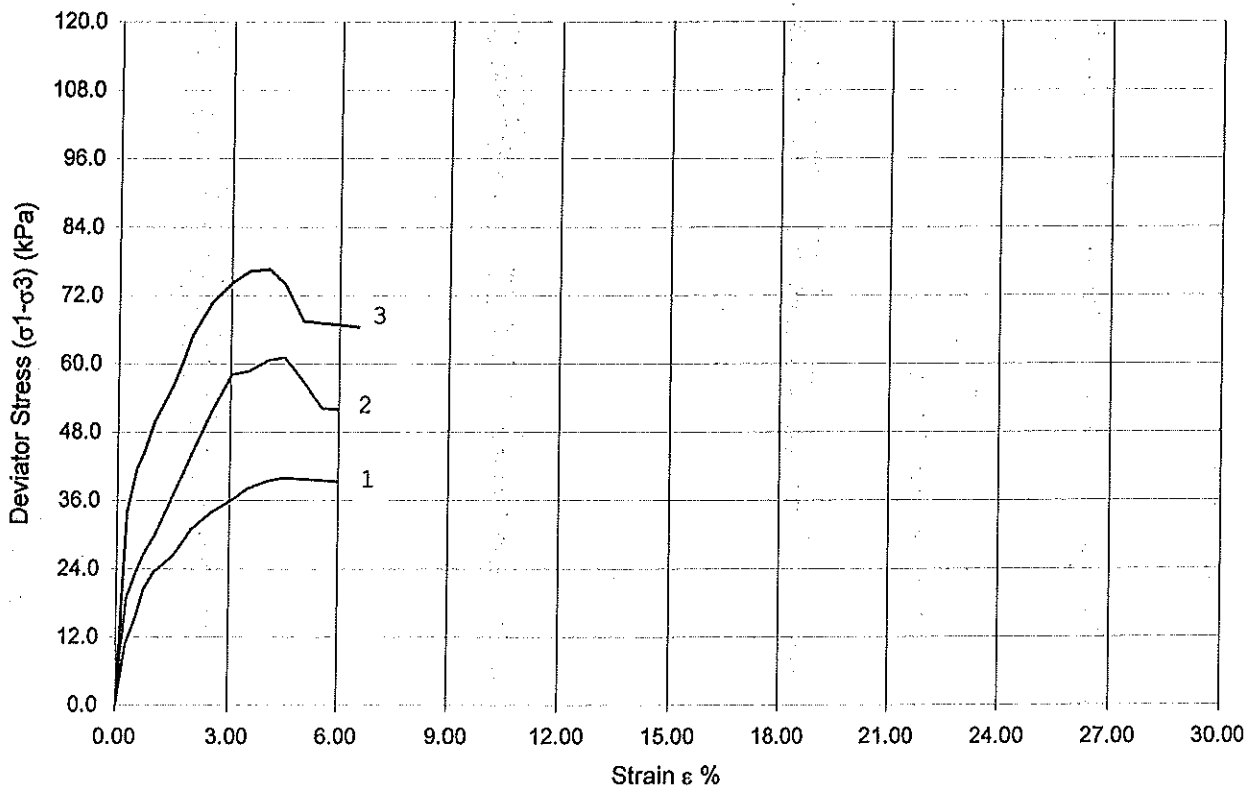
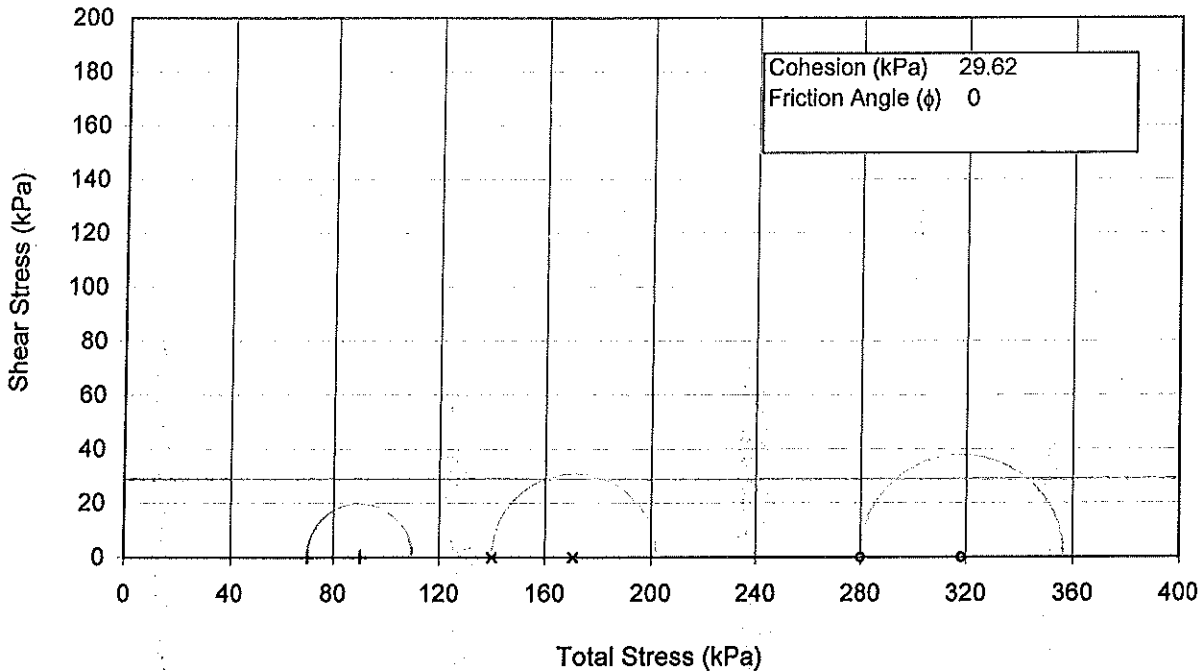
Sample : UD3
Borehole : BH11
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

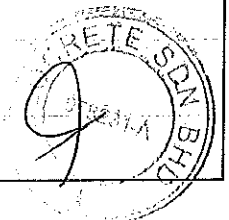
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 13.10.18

Sample : UD3
Borehole : BH11

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

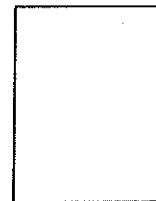
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	143.61	146.25	147.52
Bulk Density ρ (Mg/m ³)	1.667	1.698	1.712
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



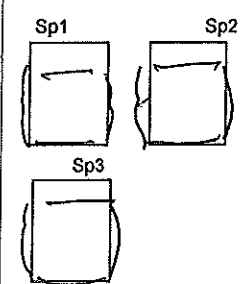
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	100	200	400
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	56	56	55
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.09	1.11
Voids Ratio e_0	1.41	1.36	1.33
Deg of Saturation S_0 %	102.02	105.09	106.19

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	55.98	62.54	65.54
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	55.78	62.34	65.34
Strain at Failure e_f %	5.53	9.01	14.47
Shear Strength c_u (kPa)	27.99	31.27	32.77
Moisture Content w_f %	56	56	55
Dry Density ρ_{df} (Mg/m ³)	1.07	1.09	1.11
Voids Ratio e_f	1.41	1.36	1.33
Deg of Saturation S_f %	102.02	105.09	106.19

Failure Sketch



Notes : Plastic Plastic Plastic

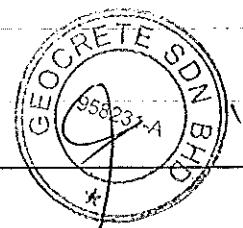
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 13.10.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

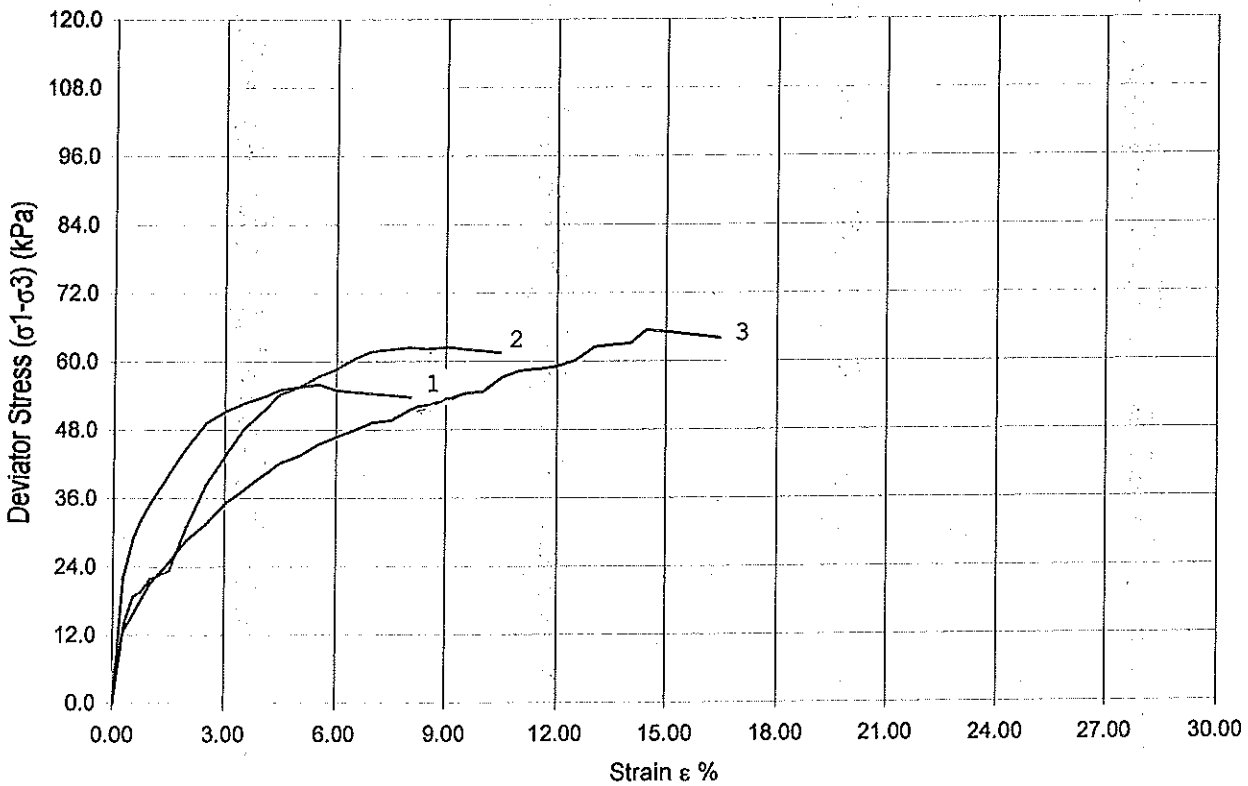
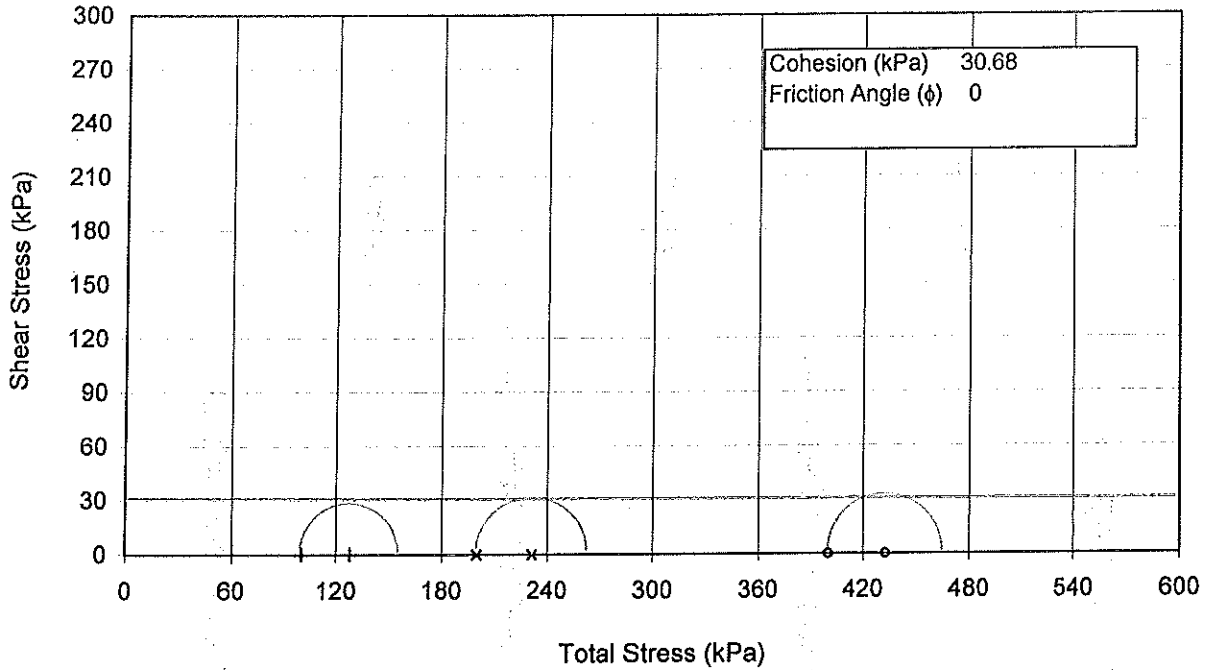
Sample : UD4
Borehole : BH11
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

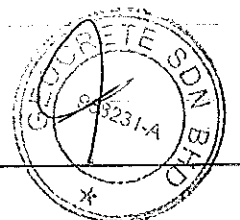
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 13.10.18

Sample : UD4
Borehole : BH11

Approved :
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	22.10.18
Sample No.	BH11 / UD1 / 3.00m	Test Started	12.10.18
Soil Description	Grey CLAY	Ring No.	1

BEFORE TEST

Moist. Content from trimmings:	=	68 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	112.57 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.11 gm	Area (A)	=	1964 mm ²
Wt of sample	=	51.46 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	32.23 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.23 gm	Bulk Density (P)	=	1.310 Mg/m ³
Initial Moisture Content, M ₀	=	60 %	Dry Density (PD)	=	0.820 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.1448			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	72 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_0}$	=	0.1572 mm ⁻¹			
Height of Solid H _s	=	6.360 mm			

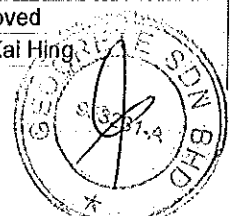
AFTER TEST

Wt of sample + Ring	=	109.86 gm	Overall settlement	=	3.184 mm
Wt of Dry sample + Ring	=	93.34 gm	Volume Change	=	6.254 cm ³
Wt of Ring	=	61.11 gm	Final Volume	=	33.03 cm ₃
Wt of Wet sample	=	48.75 gm	Final Bulk Density	=	1.476 Mg/m ³
Wt of Dry sample	=	32.23 gm	Final Dry Density	=	0.976 Mg/m ³
Wt of Moisture	=	16.52 gm	Final Void Ratio, e _r	=	1.6442
Final Moisture Content, M _f	=	51 %			
Final Saturation, S ₀ ; $\frac{M_f \times SG}{e_r}$	=	80 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



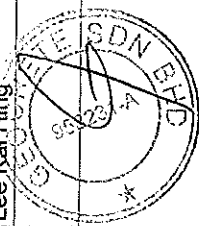
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	22.10.18
Sample No	BH11 / UD1 / 3.00m	Test started	12.10.18
		Ring No.	1

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
		$H = H_0 - \Delta H$ (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	IMV (M ² /MN)	t_{90} (min)	
0	0.000	20.000	0.0000	2.1448	0.0000	0			
3.12	0.802	19.198	0.1261	2.0187	0.1261	3.12	13.3783	17.64	2.42
6.2	1.114	18.886	0.1752	1.9696	0.0491	3.12	5.2905	9.61	4.19
12.5	1.660	18.340	0.2610	1.8838	0.0859	6.2	4.7670	17.64	2.18
25.0	2.460	17.540	0.3868	1.7580	0.1258	12.5	3.6516	37.21	0.96
50	3.500	16.500	0.5503	1.5945	0.1635	25.0	2.5231	21.16	1.52
25.0	3.460	16.540	0.5441	1.6008	-0.0063	-25.0			
12.5	3.284	16.716	0.5164	1.6284	-0.0277	-12.5			
6.25	3.184	16.816	0.5007	1.6442	-0.0157	-6.2			

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

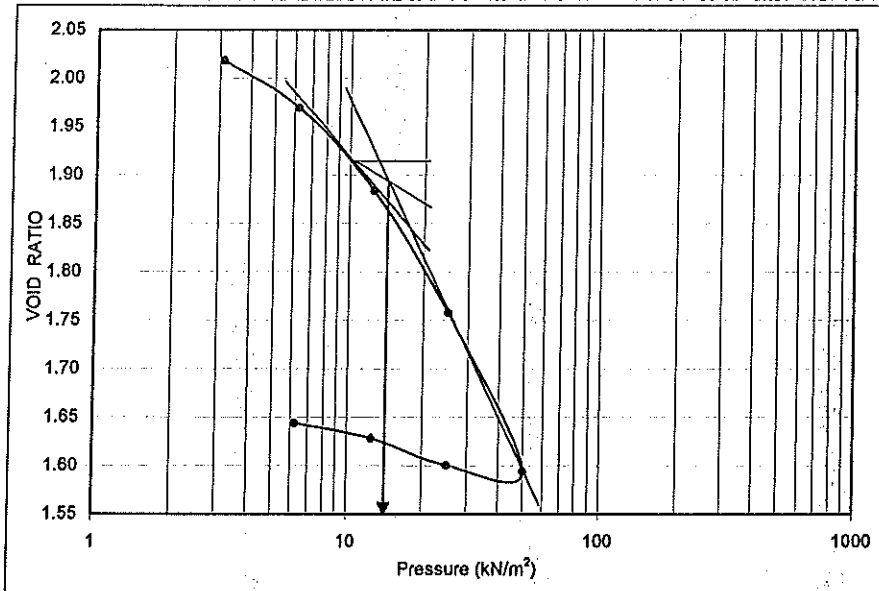


GEOCRETE SDN. BHD.
(Co. No. 958231-A)

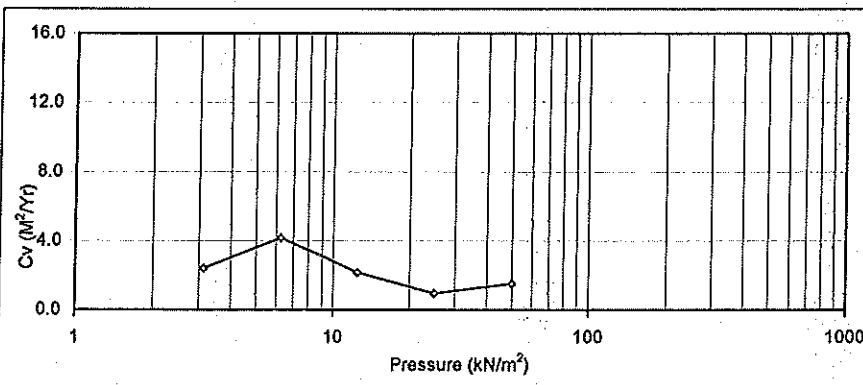
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH11 / UD1 / 3.00m
 SOIL SAMPLE Grey CLAY

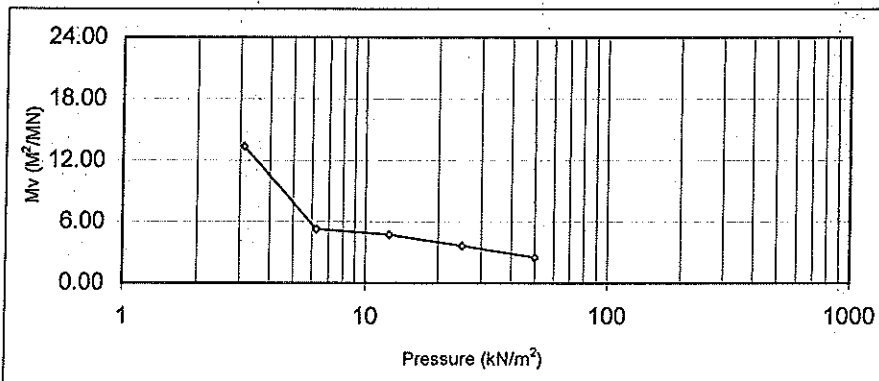
Date of Report 22.10.18
 Test started 12.10.18
 Ring No. 1



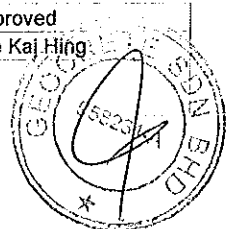
INITIAL
 Water content 60 %
 Dry Density 0.82 Mg/m³
 Void Ratio 2.1448
 Saturation 72 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.580



FINAL
 Water content 51 %
 Dry Density 0.98 Mg/m³
 Void Ratio 1.6442
 Saturation 80 %
 Height 17 mm
 Comp. Index, C_c 0.5433
 Precons. Load 15 kN/m²



Comp. Ratio, C_R 0.173



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	22.10.18
	BH11 / UD4 / 12.00m	Test Started	12.10.18
Sample No.	Grey CLAY with some fine sand	Ring No.	2
Soil Description			

BEFORE TEST

Moist. Content from trimmings:	=	33 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	122.17 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.34 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.83 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	52.12 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	11.71 gm	Bulk Density (P)	=	1.625 Mg/m ³
Initial Moisture Content, M ₀	=	22 %	Dry Density (PD)	=	1.327 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	0.9447			
Initial Saturation, S ₀ ;	$\frac{M_0 \times SG}{e_0}$	=	61 %		
V. Ratio Change Factor F _v	$\frac{e_0}{1+e_0}$	=	0.0972 mm ⁻¹		
Height of Solid	$\frac{H}{H_s}$	=	10.284 mm		

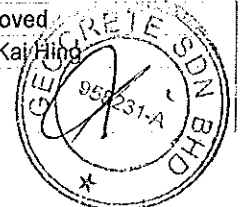
AFTER TEST

Wt of sample + Ring	=	120.56 gm	Overall settlement	=	1.746 mm
Wt of Dry sample + Ring	=	110.46 gm	Volume Change	=	3.430 cm ³
Wt of Ring	=	58.34 gm	Final Volume	=	35.86 cm ³
Wt of Wet sample	=	62.22 gm	Final Bulk Density	=	1.735 Mg/m ³
Wt of Dry sample	=	52.12 gm	Final Dry Density	=	1.454 Mg/m ³
Wt of Moisture	=	10.10 gm	Final Void Ratio, e _r	=	0.7749
Final Moisture Content, M _f	=	19 %			
Final Saturation, S ₀	$\frac{M_f \times SG}{e_r}$	=	65 %		

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



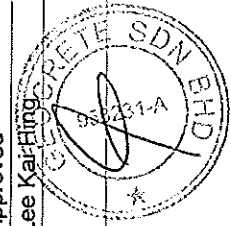
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL	Date of Report	22.10.18
	CT10 - CT19 AND ITS ASSOCIATED WORKS AT	Test started	12.10.18
	WESTPORT, PULAU INDAH, SELANGOR	Ring No.	2
Sample No	BH11 / UD4 / 12.00m		

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
		$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	0.0000	0.9447	0.0000	0				
3.12	0.106	0.0103	0.9344	0.0103	3.12	1.7063	1.69	26.13	-0.0342
6.2	0.156	0.0152	0.9295	0.0049	3.12	0.8069	4.84	9.05	-0.0162
12.5	0.282	0.0274	0.9173	0.0123	6.2	1.0232	2.56	16.97	-0.0407
25.0	0.464	0.0451	0.8996	0.0177	12.5	0.7459	1.21	35.34	-0.0588
50	0.712	0.0692	0.8755	0.0241	25.0	0.5147	1.44	29.05	-0.0801
100	1.178	0.1145	0.8301	0.0453	50.0	0.4955	1.44	27.99	-0.1505
200	1.946	0.1892	0.7555	0.0747	99.9	0.4257	1.21	31.19	-0.2481
100	1.890	0.1838	0.7609	-0.0054	-99.9				
50	1.818	0.1768	0.7679	-0.0070	-50.0				
12.5	1.746	0.1698	0.7749	-0.0070	-37.5				

Operator	Shyam Nath	Checked	Chris	Approved	Lee Kai Hing
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(Co. No. 958231-A)

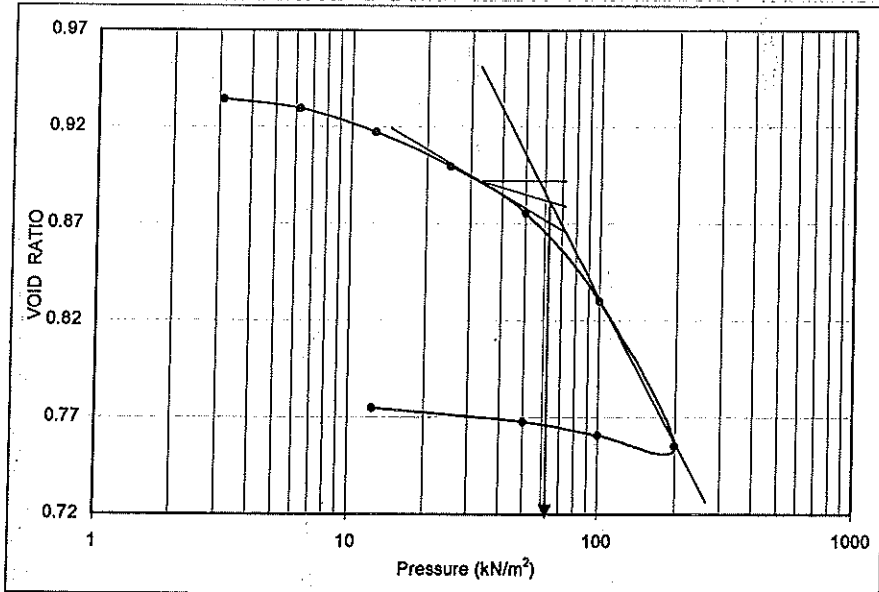
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH11 / UD4 / 12.00m

SOIL SAMPLE Grey CLAY with some fine sand

Date of Report 22.10.18
 Test started 12.10.18
 Ring No. 2



INITIAL

Water content 22 %

Dry Density 1.33 Mg/m³

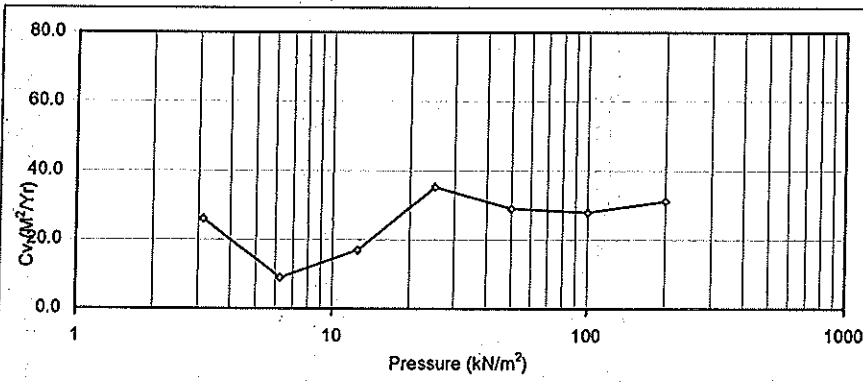
Void Ratio 0.9447

Saturation 61 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.580



FINAL

Water content 19 %

Dry Density 1.45 Mg/m³

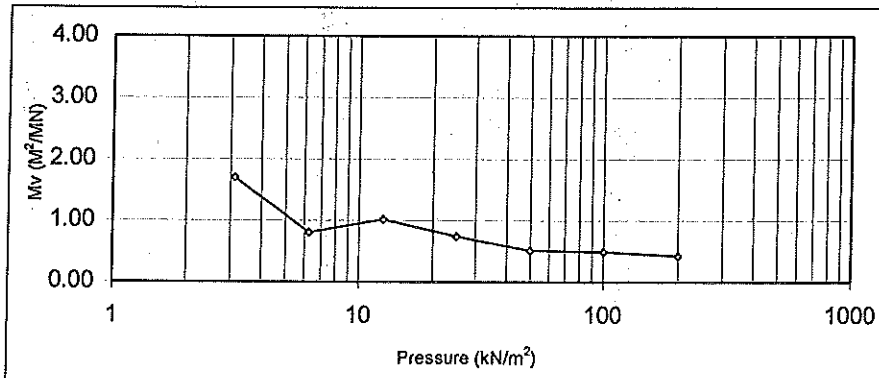
Void Ratio 0.7749

Saturation 65 %

Height 18 mm

Comp. Index, C_c 0.2481

Precons. Load 62 kN/m²



Comp. Ratio, C_R 0.128

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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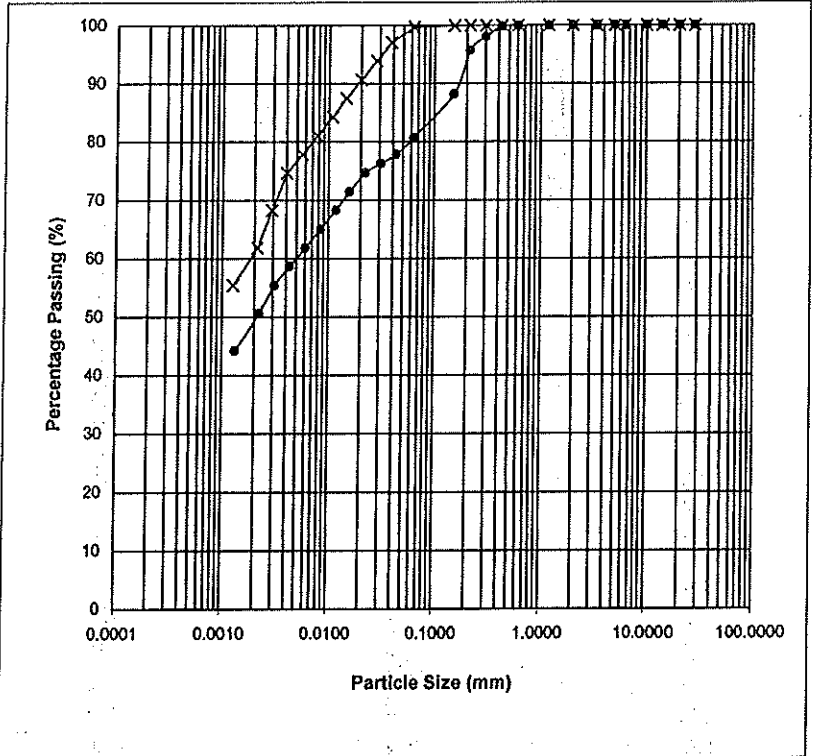
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

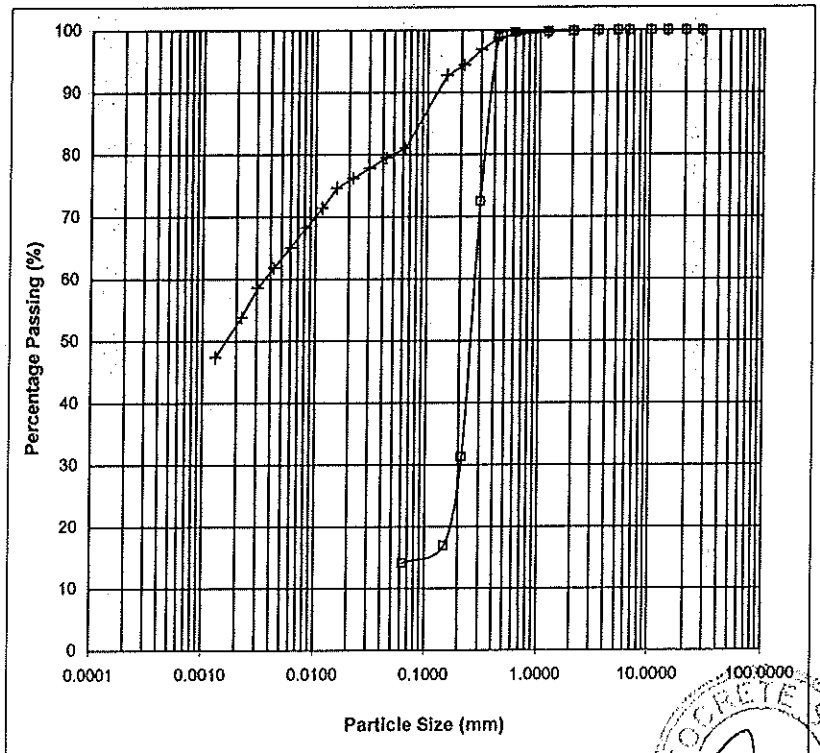
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	98	0.300	100
0.212	96	0.212	100
0.150	88	0.150	100
0.063	81	0.063	100
0.0431	78	0.0384	97
0.0307	76	0.0278	94
0.0219	75	0.0200	91
0.0157	71	0.0144	87
0.0117	68	0.0107	84
0.0084	65	0.0077	81
0.0060	62	0.0056	78
0.0043	59	0.0040	75
0.0031	55	0.0029	68
0.0022	51	0.0021	62
0.0013	44	0.0013	55
Clay (%)	48	Clay (%)	59
Silt (%)	33	Silt (%)	41
Sand (%)	19	Sand (%)	0
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH12	UD1	3.00	19.01.19
x	BH12	UD2	6.00	19.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	99	0.425	99
0.300	72	0.300	97
0.212	31	0.212	94
0.150	17	0.150	93
0.063	14	0.063	81
		0.0427	79
		0.0305	78
		0.0217	76
		0.0155	75
		0.0115	71
		0.0083	68
		0.0059	65
		0.0043	62
		0.0031	59
		0.0022	54
		0.0013	47
Clay (%)	14	Clay (%)	51
Silt (%)	86	Silt (%)	30
Sand (%)	0	Sand (%)	19
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH12	UD4	12.00	19.01.19
+	BH12	UD6	18.00	19.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai-Hing

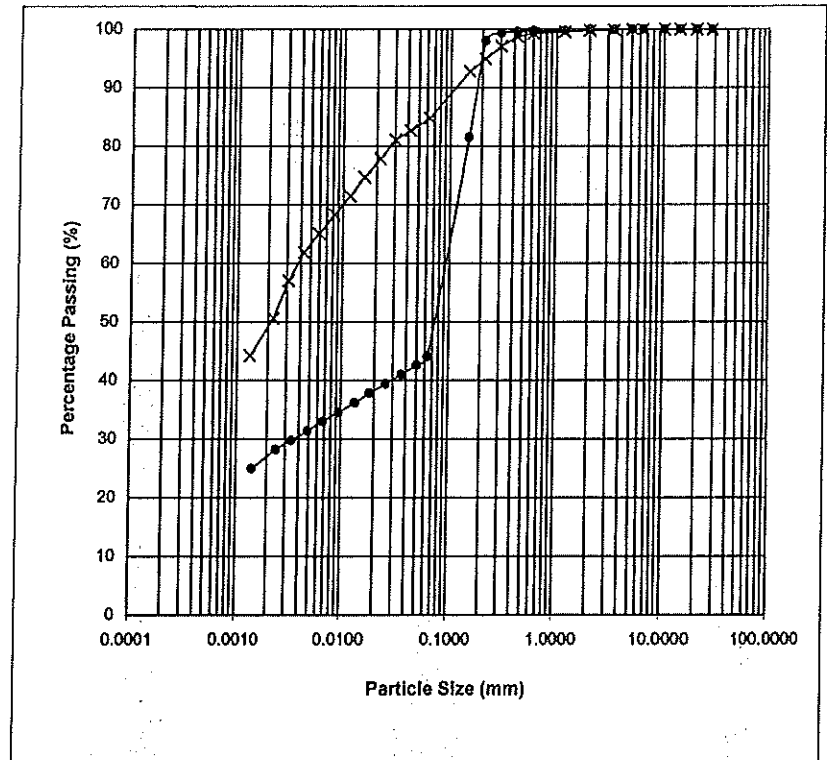
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

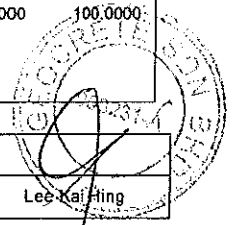
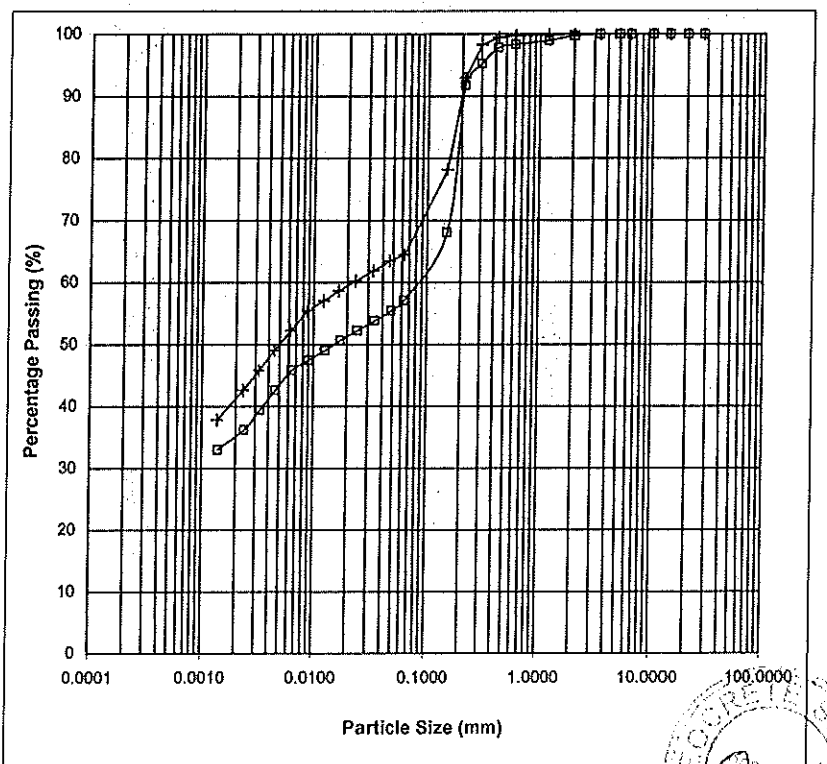
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	99	
0.425	100	0.425	99	
0.300	99	0.300	97	
0.212	98	0.212	95	
0.150	82	0.150	93	
0.083	44	0.083	85	
0.0505	43	0.0420	83	
0.0360	41	0.0300	81	
0.0256	39	0.0215	78	
0.0182	38	0.0155	75	
0.0134	36	0.0115	71	
0.0095	35	0.0083	68	
0.0068	33	0.0059	65	
0.0048	31	0.0043	62	
0.0034	30	0.0031	57	
0.0024	28	0.0022	51	
0.0014	25	0.0013	44	
Clay (%)		27	Clay (%)	48
Silt (%)		17	Silt (%)	37
Sand (%)		56	Sand (%)	15
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH12	UD8	24.00	19.01.19
x	BH12	UD10	30.00	19.01.19



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	99	1.18	100	
0.600	98	0.600	100	
0.425	98	0.425	100	
0.300	95	0.300	98	
0.212	92	0.212	93	
0.150	68	0.150	78	
0.083	57	0.083	64	
0.0480	55	0.0463	63	
0.0341	54	0.0330	62	
0.0243	52	0.0235	60	
0.0173	51	0.0167	59	
0.0127	49	0.0123	57	
0.0091	47	0.0088	55	
0.0064	46	0.0063	52	
0.0046	43	0.0045	49	
0.0033	39	0.0032	46	
0.0024	36	0.0023	43	
0.0014	33	0.0014	38	
Clay (%)		35	Clay (%)	40
Silt (%)		22	Silt (%)	24
Sand (%)		43	Sand (%)	36
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH12	D14	36.00	19.01.19
+	BH12	D17	40.50	19.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

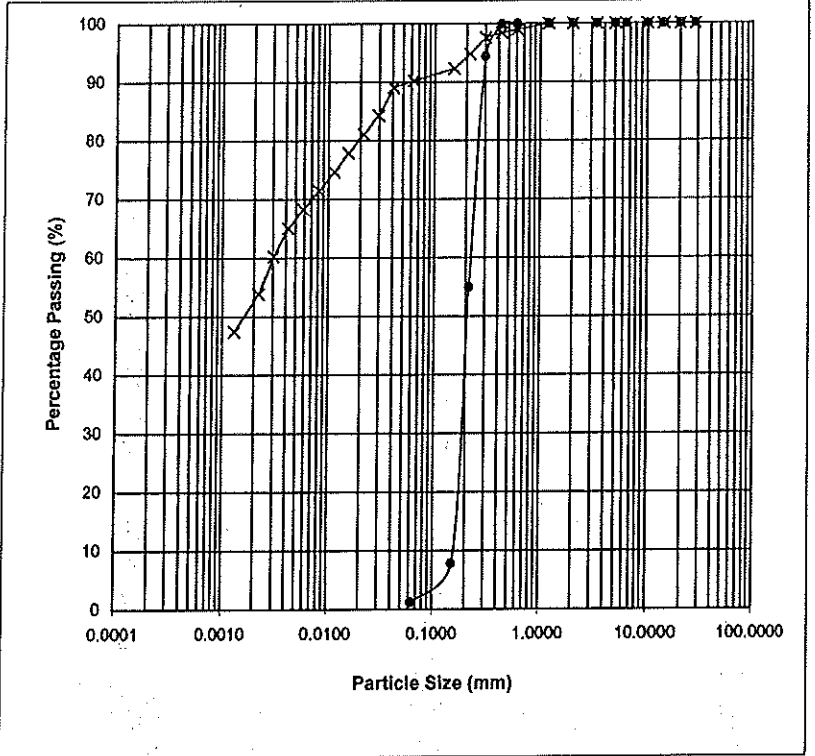
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

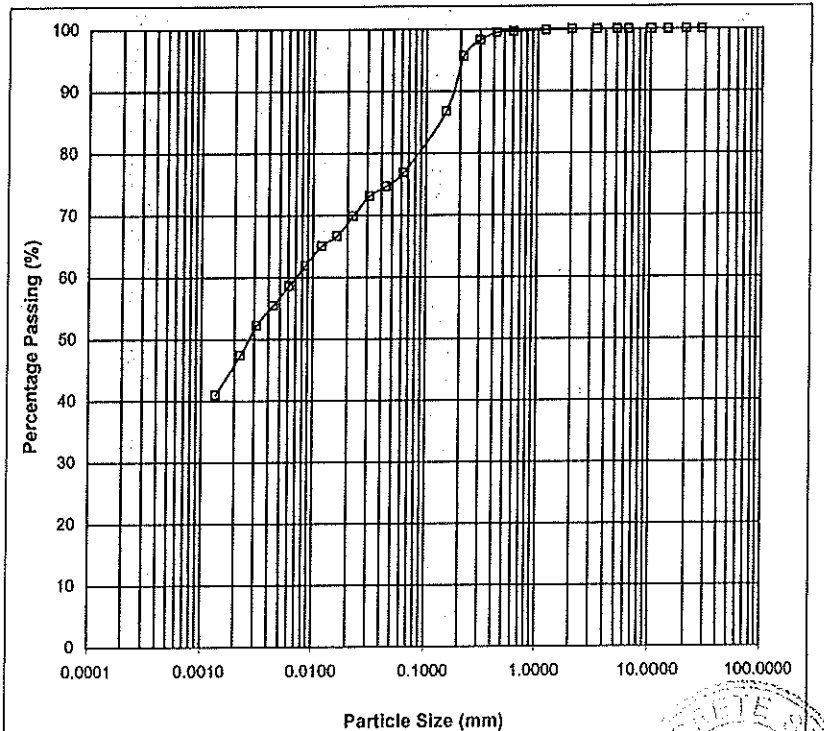
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	98
0.300	94	0.300	98
0.212	55	0.212	95
0.150	8	0.150	92
0.063	1	0.063	90
		0.0404	89
		0.0294	84
		0.0212	81
		0.0152	78
		0.0113	75
		0.0081	71
		0.0058	68
		0.0042	65
		0.0030	60
		0.0022	54
		0.0013	47
Clay (%)	1	Clay (%)	50
Silt (%)		Silt (%)	40
Sand (%)	99	Sand (%)	10
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH12	D23	49.50	19.01.19
x	BH12	D27	55.50	19.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100		
20.00	100		
14.00	100		
10.00	100		
6.30	100		
5.00	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	99		
0.300	98		
0.212	96		
0.150	87		
0.063	77		
0.0438	75		
0.0312	73		
0.0224	70		
0.0161	67		
0.0119	65		
0.0085	62		
0.0061	59		
0.0044	55		
0.0031	52		
0.0023	47		
0.0013	41		
Clay (%)	44		
Silt (%)	33		
Sand (%)	23		
Gravel (%)	0		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH12	D30	60.00	19.01.19
+				



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Yai Hing

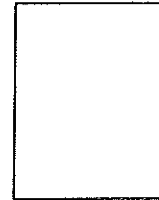
Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey sandy CLAY with little sand

Sketch showing specimen location in original sample



	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	145.30	147.88	149.20
Bulk Density ρ (Mg/m ³)	1.687	1.717	1.732
Particle Density ρ_s	2.63	2.63	2.63

Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

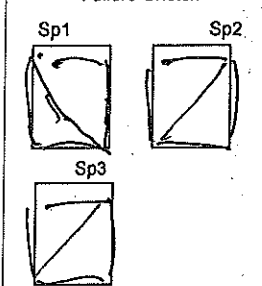
	Specimen 1	Specimen 2	Specimen 3
Load Channel	14391	14391	14391

Moisture Content w_0 %	31	30	30
Dry Density ρ_{d0} (Mg/m ³)	1.29	1.32	1.34
Voids Ratio e_0	1.04	1.00	0.97
Deg of Saturation S_0 %	78.36	79.91	80.28

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	14.62	26.03	33.24
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	14.42	25.83	33.04
Strain at Failure ϵ_f %	7.50	8.49	6.51
Shear Strength c_u (kPa)	7.31	13.01	16.62

Failure Sketch



Moisture Content w_f %	31	30	30
Dry Density ρ_{df} (Mg/m ³)	1.29	1.32	1.34
Voids Ratio e_f	1.04	1.00	0.97
Deg of Saturation S_f %	78.36	79.91	80.28

Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 15.01.19

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

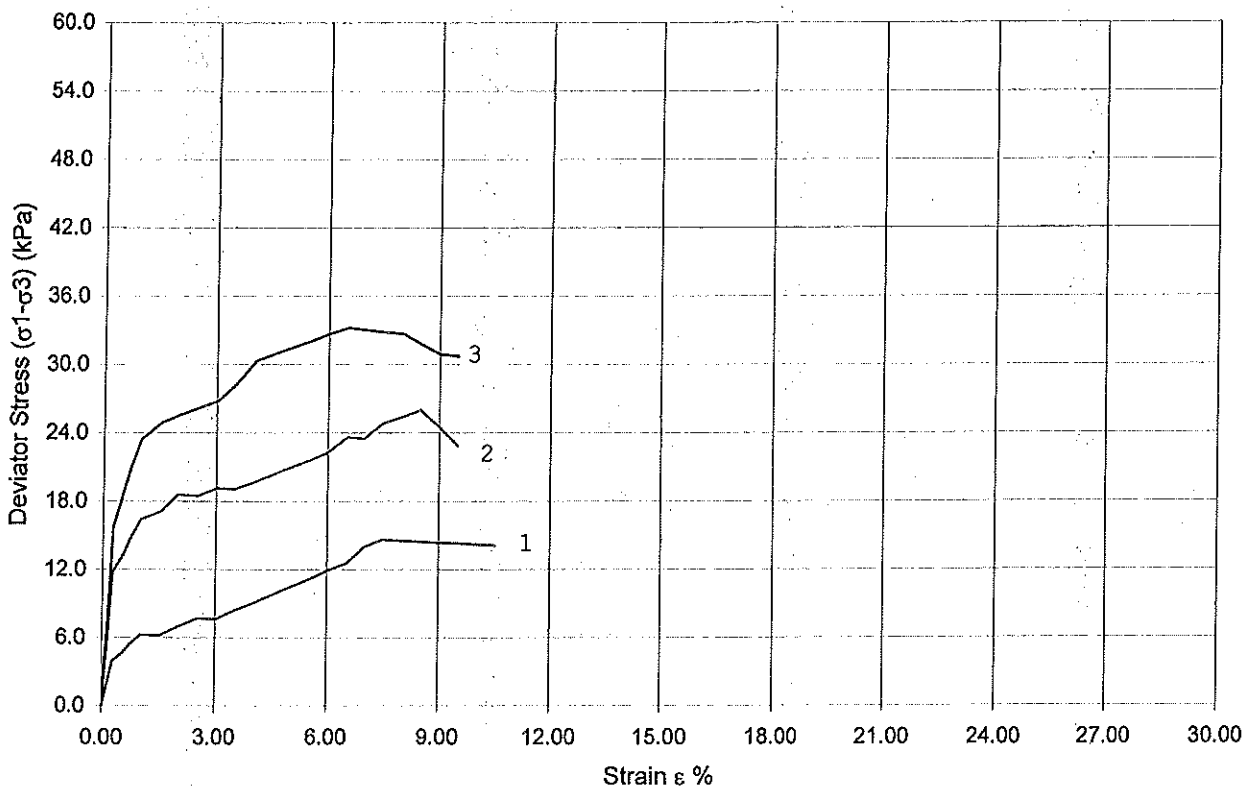
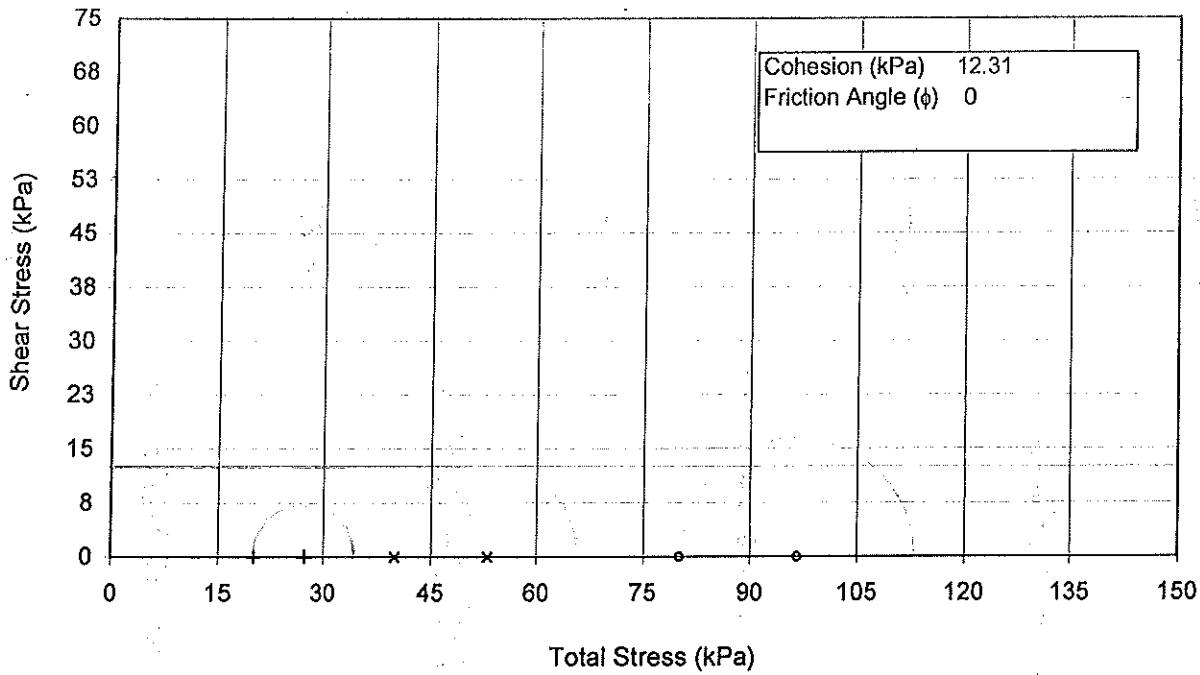
Sample : UD1
 Borehole : BH12
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

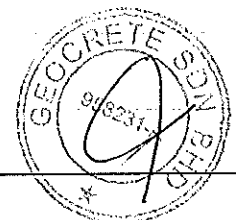
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 15.01.19

Sample : UD1
 Borehole : BH12

Approved :
 Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No.	BH12 / UD1 / 3.00m	Test Started	14.01.19
Soil Description	Greenish grey CLAY with little sand	Ring No.	A6

BEFORE TEST

Moist. Content from trimmings:	=	55 %	SG (Measured)	=	2.630
Wt of sample + Ring	=	124.82 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.74 gm	Area (A)	=	1964 mm ²
Wt of sample	=	63.08 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	41.59 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.49 gm	Bulk Density (P)	=	1.606 Mg/m ³
Initial Moisture Content, M _o	=	52 %	Dry Density (PD)	=	1.059 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4843			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	92 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_o}$	=	0.1242 mm ⁻¹			
Height of Solid H _s	=	8.051 mm			

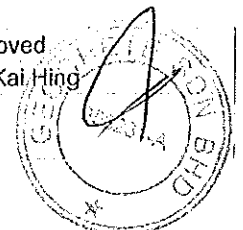
AFTER TEST

Wt of sample + Ring	=	121.40 gm	Overall settlement	=	2.086 mm
Wt of Dry sample + Ring	=	103.33 gm	Volume Change	=	4.098 cm ³
Wt of Ring	=	61.74 gm	Final Volume	=	35.19 cm ₃
Wt of Wet sample	=	59.66 gm	Final Bulk Density	=	1.695 Mg/m ³
Wt of Dry sample	=	41.59 gm	Final Dry Density	=	1.182 Mg/m ³
Wt of Moisture	=	18.07 gm	Final Void Ratio, e _r	=	1.2252
Final Moisture Content, M _f	=	43 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	93 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH12 / UD1 / 3.00m

Date of Report

24.01.19

Test started

14.01.19

Ring No.

A6

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H-H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e-e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.4843	0.0000	0				
6.25	0.568	19.432	0.0706	1.4137	0.0706	6.25	4.6804	8.41	5.13	-0.2344
12.5	0.936	19.064	0.1163	1.3680	0.0457	6.25	3.0909	5.29	7.77	-0.1519
25.0	1.330	18.670	0.1652	1.3191	0.0489	12.5	1.6896	4.41	8.96	-0.1626
50.0	1.916	18.084	0.2380	1.2463	0.0728	25.0	1.2972	3.61	10.38	-0.2418
100	2.504	17.496	0.3110	1.1733	0.0730	50.0	0.6727	3.61	9.73	-0.2427
50	2.442	17.558	0.3033	1.1810	-0.0077	-50.0				
25	2.268	17.732	0.2817	1.2026	-0.0216	-25.0				
12.5	2.086	17.914	0.2591	1.2252	-0.0226	-12.5				

Operator

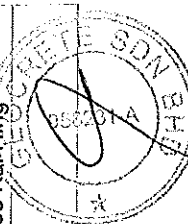
Shyam Nath

Checked

Chris

Approved

Lee KaiHing



GEOCRETE SDN. BHD.
(Co. No. 958231-A)

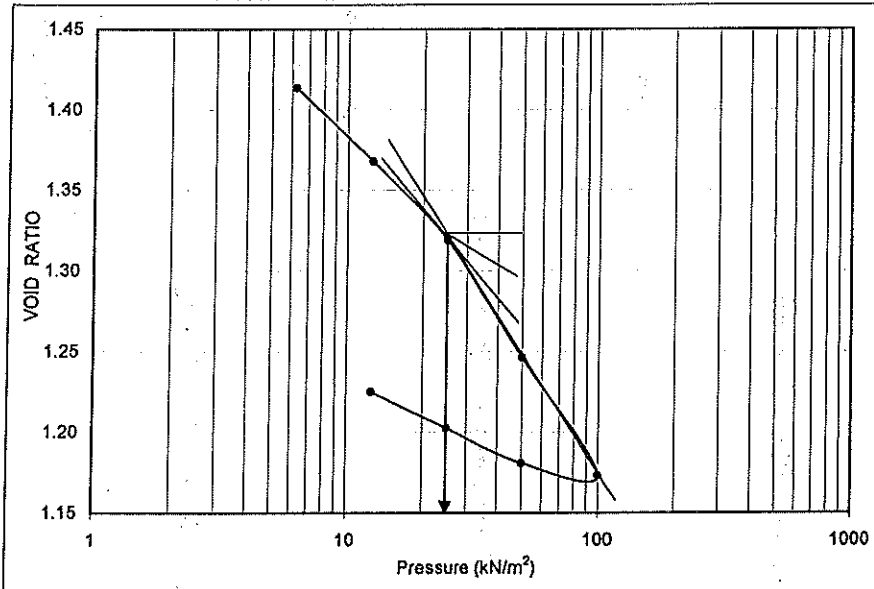
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH12 / UD1 / 3.00m

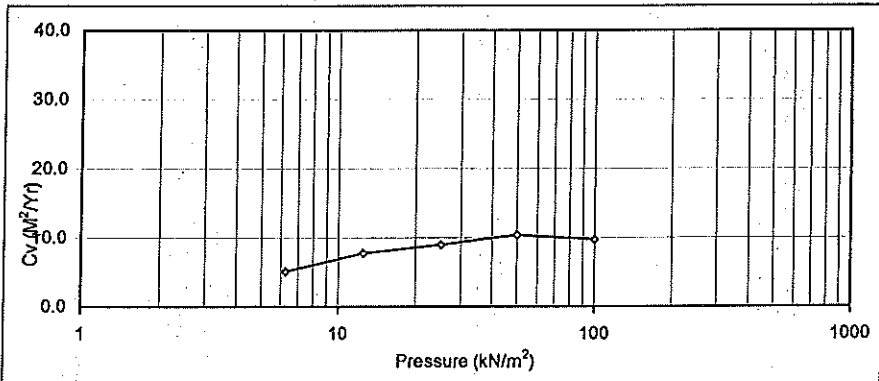
SOIL SAMPLE Greenish grey CLAY with little sand

Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A6



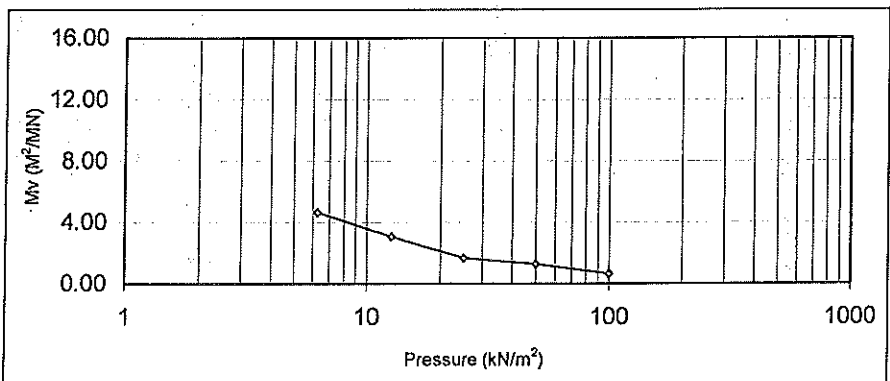
INITIAL

Water content	52	%
Dry Density	1.06	Mg/m ³
Void Ratio	1.4843	
Saturation	92	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.630	

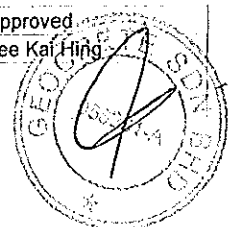


FINAL

Water content	43	%
Dry Density	1.18	Mg/m ³
Void Ratio	1.2252	
Saturation	93	%
Height	18	mm
Comp. Index, Cc	0.2344	
Precons. Load	24	kN/m ²



Comp. Ratio, C_R 0.094



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)			PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR														REF : L081/18/139/18 DATE : 27.01.19											
SAMPLE AND SPECIMEN DETAILS		Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS				Linear Shrinkage (%)	SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)	SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST				
Borehole No.	Specimen					Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Clay (%)		Silt (%)	Sand (%)	Gravels (%)	Specific Gravity		Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)
BH13	UD1	3.00	39	1.69	1.23	51	32	19		43	32	25	0	0	33.59	0	37	0.220	2.1	0.15	0.67	7.9						
	D3	7.50	39	NA	NA	30	30	0		40	30	30	0	0														
	UD5	15.00	43	1.69	1.22	62	25	37	12.5	47	33	20	0	2.64	30.48	0	42	0.351										
	UD7	21.00	36	1.98	1.46	35	22	13	6.0	27	17	56	0															
	UD9	27.00	45	1.74	1.20	55	21	34		47	34	19	0	2.64					1.8	0.10	0.36	8.1						
	UD11	33.00	41	1.68	1.17	72	29	43	13.5	57	31	12	0		31.85	0												
	D13	36.00	7	2.19	1.98					10	90	0	0	2.70		1	33		0.3	0.07	0.27	7.6						
	D16	40.50	8	NA	NA					9	91	0	0															
	D18	43.50	6	NA	NA					9	91	0	0															
	D20	46.50	5	NA	NA					7	92	1	0															
	D23	51.00	45	NA	NA	43	22	21	8.1	40	22	38	0	2.65					1.0	0.27	0.49	7.4						
	D29	60.00	53	NA	NA					53	45	2	0															

Note : NES = NOT ENOUGH SAMPLE

Remarks

* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

NA = NOT APPLICABLE

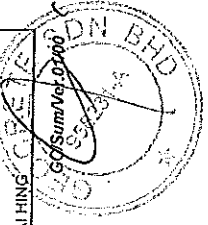
NP = NON PLASTIC

CHECKED BY:

CHRIS

APPROVED BY:

LEE KAI HING



SUM

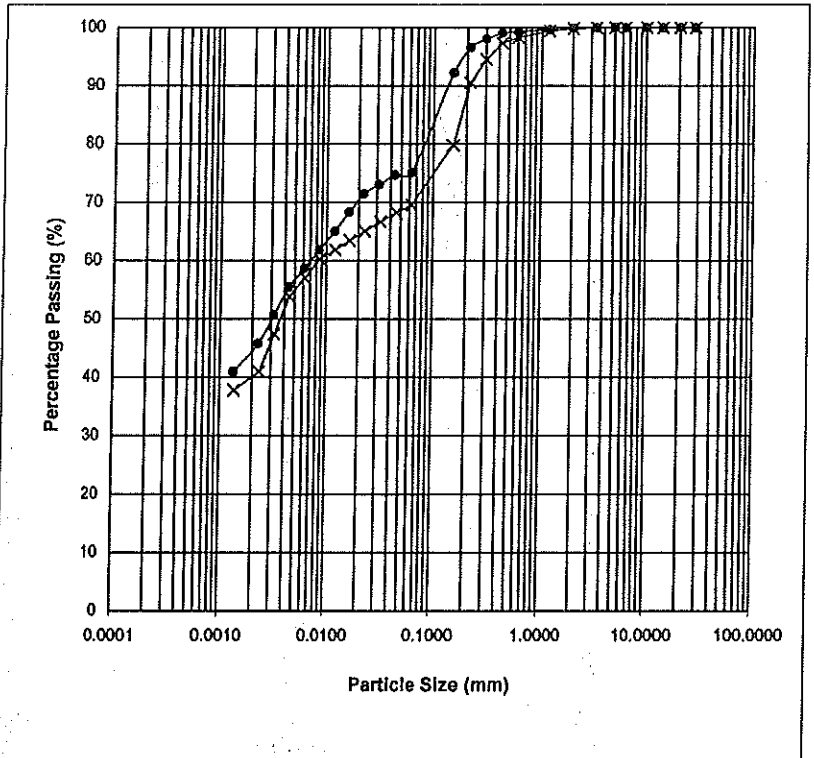
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

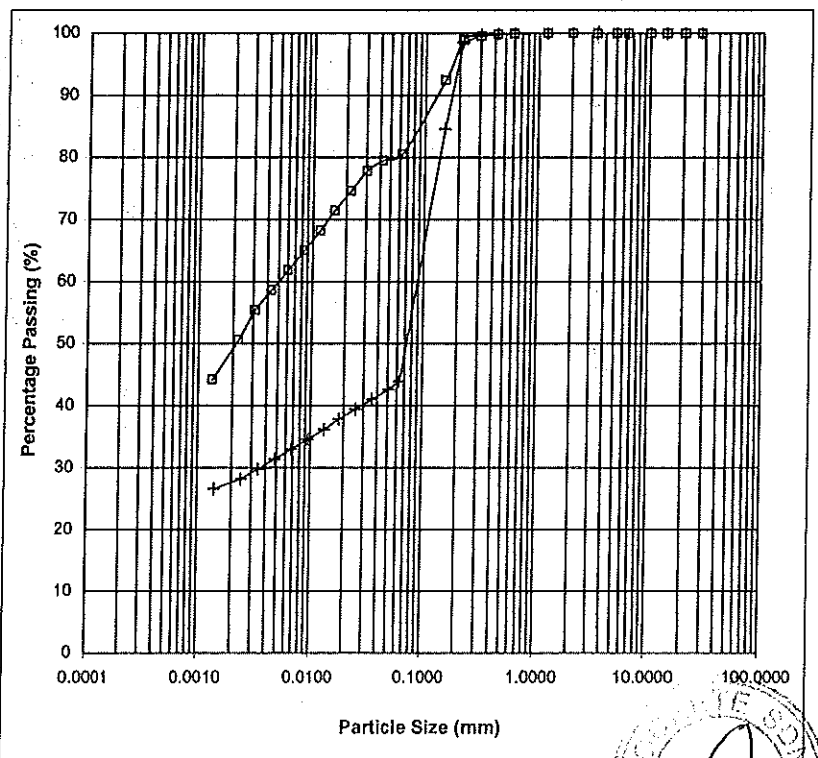
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	99
0.600	99	0.600	98
0.425	99	0.425	97
0.300	98	0.300	95
0.212	97	0.212	91
0.150	92	0.150	80
0.083	75	0.083	70
0.0438	75	0.0452	68
0.0312	73	0.0322	67
0.0223	71	0.0230	65
0.0160	68	0.0164	63
0.0119	65	0.0120	62
0.0085	62	0.0086	60
0.0061	59	0.0061	57
0.0044	55	0.0044	54
0.0032	51	0.0032	47
0.0023	46	0.0023	41
0.0013	41	0.0014	38
Clay (%)	43	Clay (%)	40
Silt (%)	32	Silt (%)	30
Sand (%)	25	Sand (%)	30
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH13	UD1	3.00	20.01.19
x	BH13	D3	7.50	20.01.19

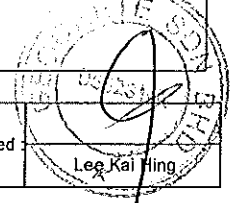


Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	99	0.212	99
0.150	92	0.150	85
0.063	81	0.063	44
0.0427	79	0.0505	43
0.0305	78	0.0380	41
0.0219	75	0.0256	39
0.0157	71	0.0182	38
0.0117	68	0.0134	36
0.0084	65	0.0095	35
0.0060	62	0.0068	33
0.0043	59	0.0048	31
0.0031	55	0.0034	30
0.0022	51	0.0024	28
0.0013	44	0.0014	27
Clay (%)	47	Clay (%)	27
Silt (%)	33	Silt (%)	17
Sand (%)	20	Sand (%)	56
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH13	UD5	15.00	20.01.19
+	BH13	UD7	21.00	20.01.19



GEocreTE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing
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Total Stress Triaxial Compression

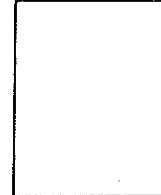
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Greenish grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	143.82	145.22	147.41
Bulk Density ρ (Mg/m ³)	1.669	1.686	1.711
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample



Initial Conditions

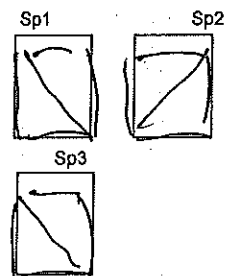
	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	39	37	36
Dry Density ρ_{d0} (Mg/m ³)	1.20	1.23	1.26
Voids Ratio e_0	1.20	1.15	1.10
Deg of Saturation S_0 %	86.11	85.27	86.83

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	52.54	64.68	84.34
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	52.34	64.48	84.14
Strain at Failure ϵ_f %	5.00	6.97	5.53
Shear Strength c_u (kPa)	26.27	32.34	42.17
Moisture Content w_f %	39	37	36
Dry Density ρ_{df} (Mg/m ³)	1.20	1.23	1.26
Voids Ratio e_f	1.20	1.15	1.10
Deg of Saturation S_f %	86.11	85.27	86.83

Failure Sketch



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

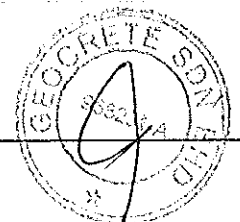
Test Name : UU

Date of Test : 15.01.19

Sample : UD1

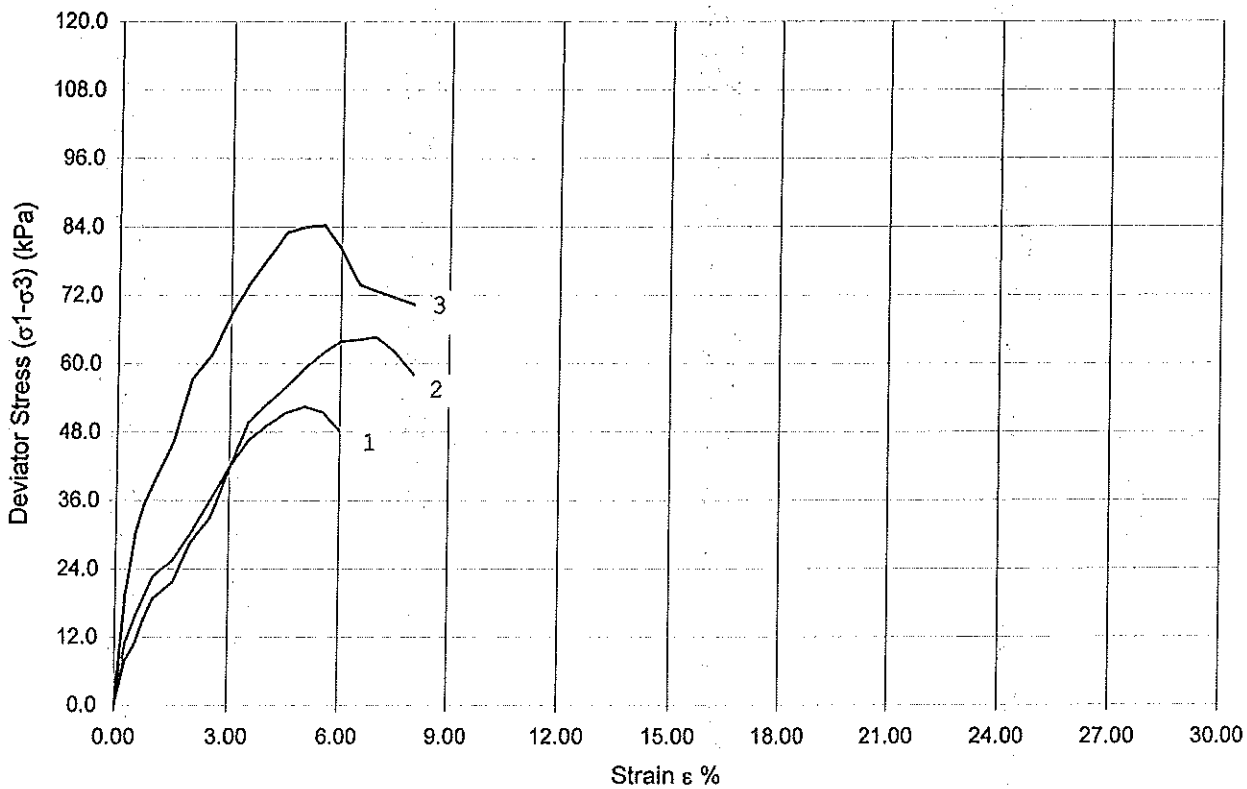
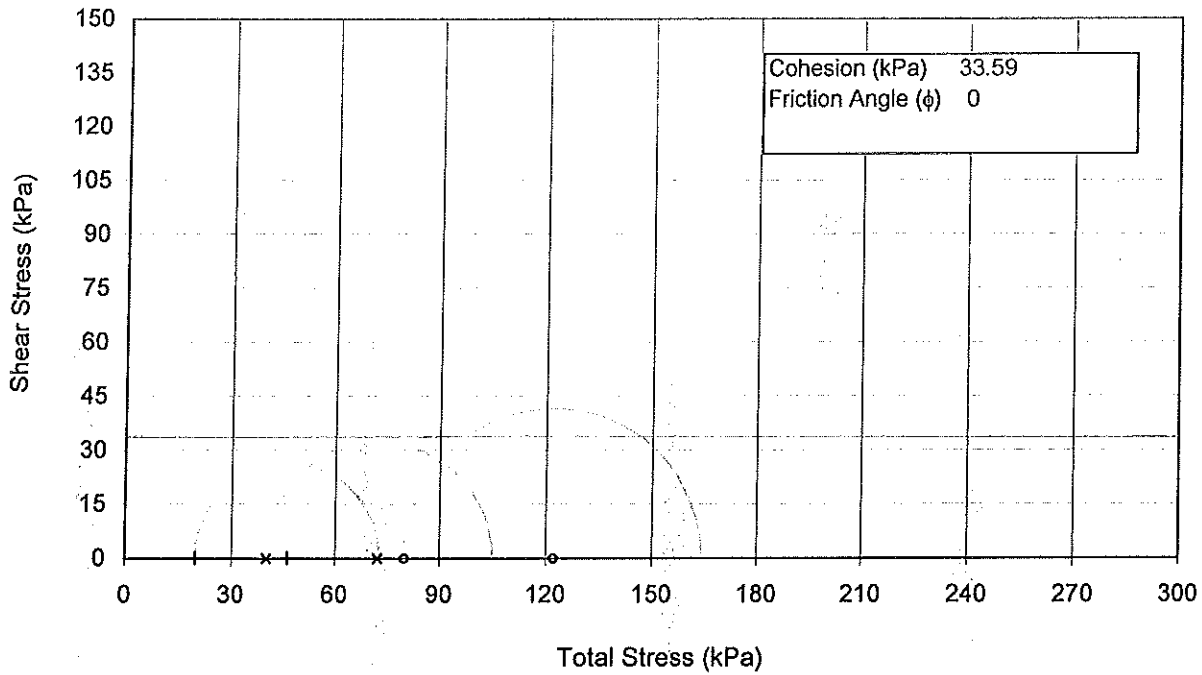
Borehole : BH13

Approved
Lee Kai Hing



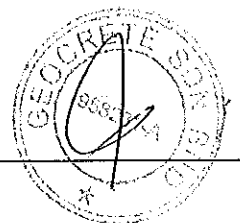
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 15.01.19
 Sample : UD1
 Borehole : BH13
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

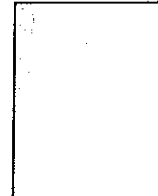
Unconsolidated Undrained

Sample details

Depth : 15.00m
 Description : Greenish grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	143.60	145.41	148.20
Bulk Density ρ (Mg/m ³)	1.667	1.688	1.720
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample



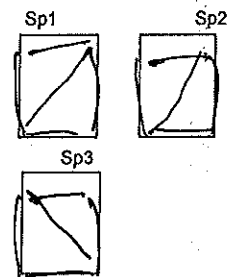
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	120	240	480
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	40	39	38
Dry Density ρ_{d0} (Mg/m ³)	1.19	1.22	1.24
Voids Ratio e_0	1.22	1.17	1.12
Deg of Saturation S_0 %	86.80	87.31	89.99

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	30.52	71.30	81.06
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	30.32	71.10	80.86
Strain at Failure ϵ_f %	8.03	5.99	5.00
Shear Strength c_u (kPa)	15.26	35.65	40.53
Moisture Content w_f %	40	39	38
Dry Density ρ_{df} (Mg/m ³)	1.19	1.22	1.24
Voids Ratio e_f	1.22	1.17	1.12
Deg of Saturation S_f %	86.80	87.31	89.99

Failure Sketch



Notes : Shear Shear Shear

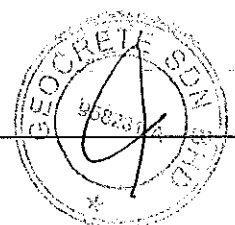
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 15.01.19

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

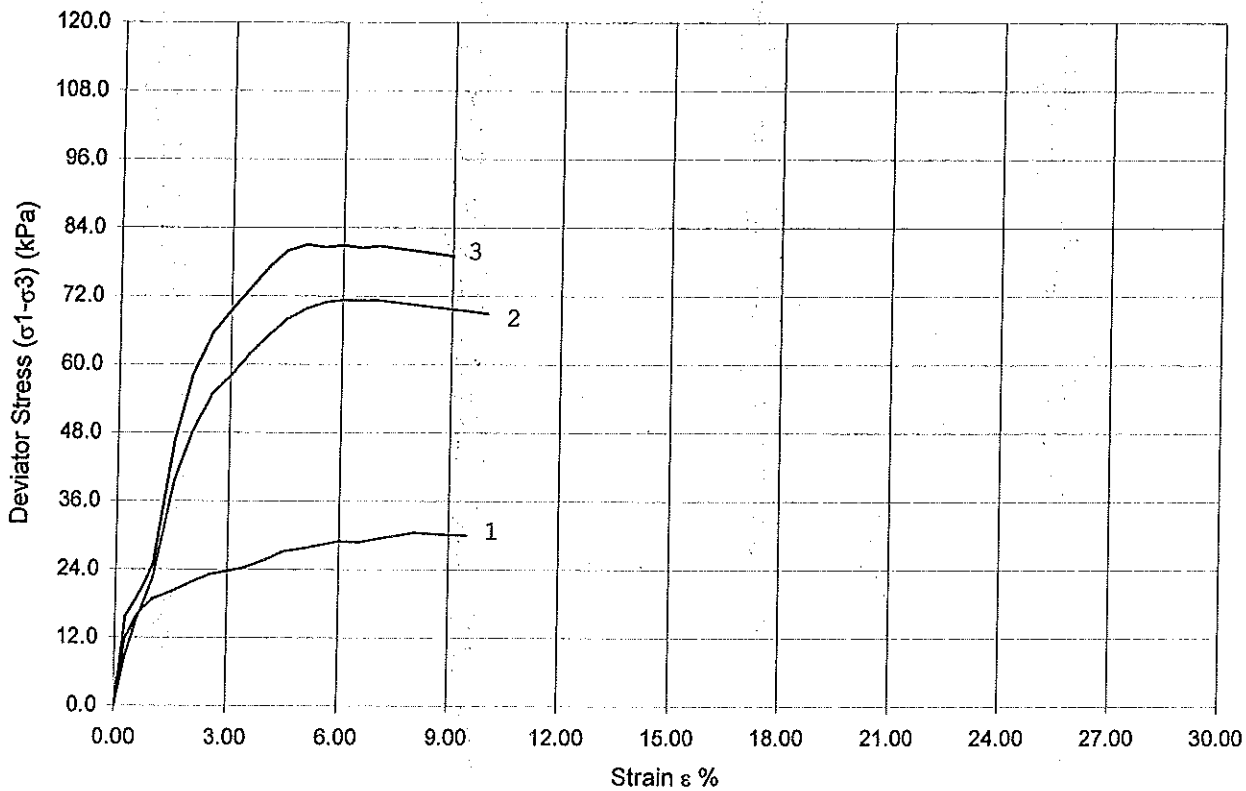
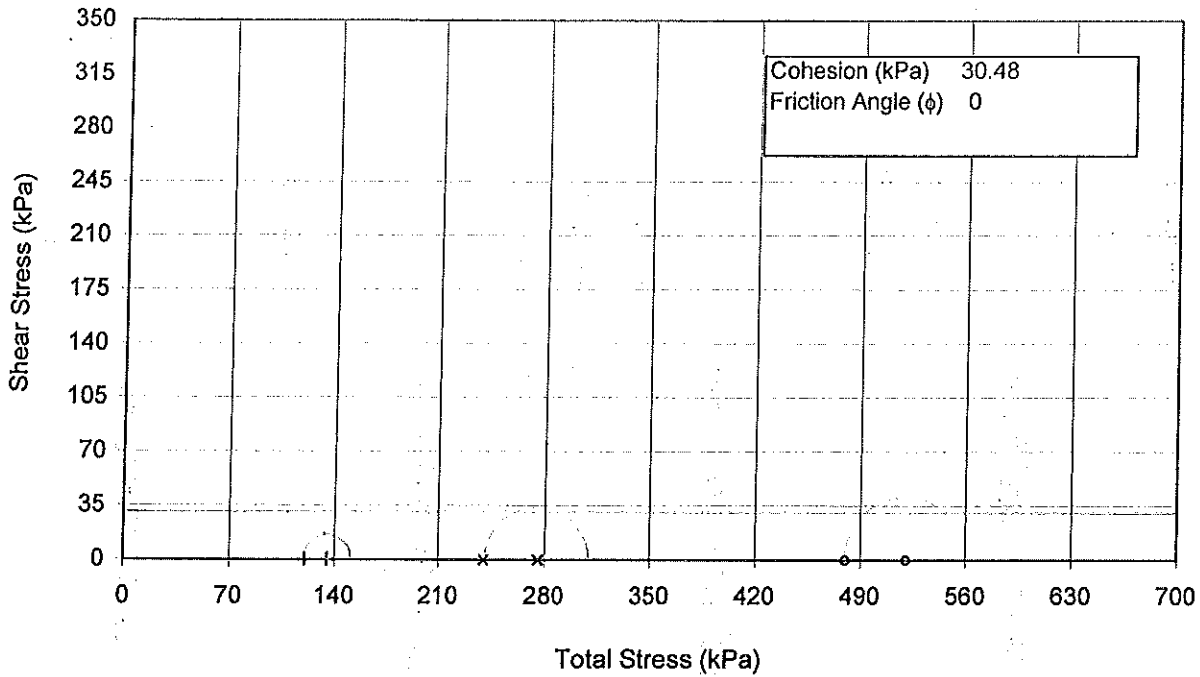
Sample : UD5
 Borehole : BH13
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 15.01.19

Sample : UD5
 Borehole : BH13

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 33.00m
 Description : Grey CLAY with little sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	143.21	144.52	146.08
Bulk Density ρ (Mg/m ³)	1.662	1.678	1.696
Particle Density ρ_s	2.62	2.62	2.62

Sketch showing specimen location in original sample



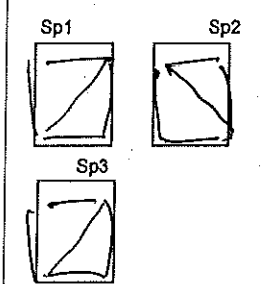
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	270	540	1080
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	45	43	42
Dry Density ρ_{d0} (Mg/m ³)	1.15	1.17	1.19
Voids Ratio e_0	1.29	1.24	1.20
Deg of Saturation S_0 %	91.79	91.59	92.28

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	51.59	62.90	76.64
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	51.39	62.70	76.44
Strain at Failure ϵ_f %	8.03	8.49	8.49
Shear Strength c_u (kPa)	25.80	31.45	38.32
Moisture Content w_f %	45	43	42
Dry Density ρ_{df} (Mg/m ³)	1.15	1.17	1.19
Voids Ratio e_f	1.29	1.24	1.20
Deg of Saturation S_f %	91.79	91.59	92.28

Failure Sketch



Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

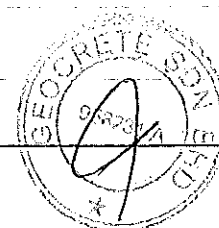
Test Name : UU

Date of Test : 15.01.19

Sample : UD11

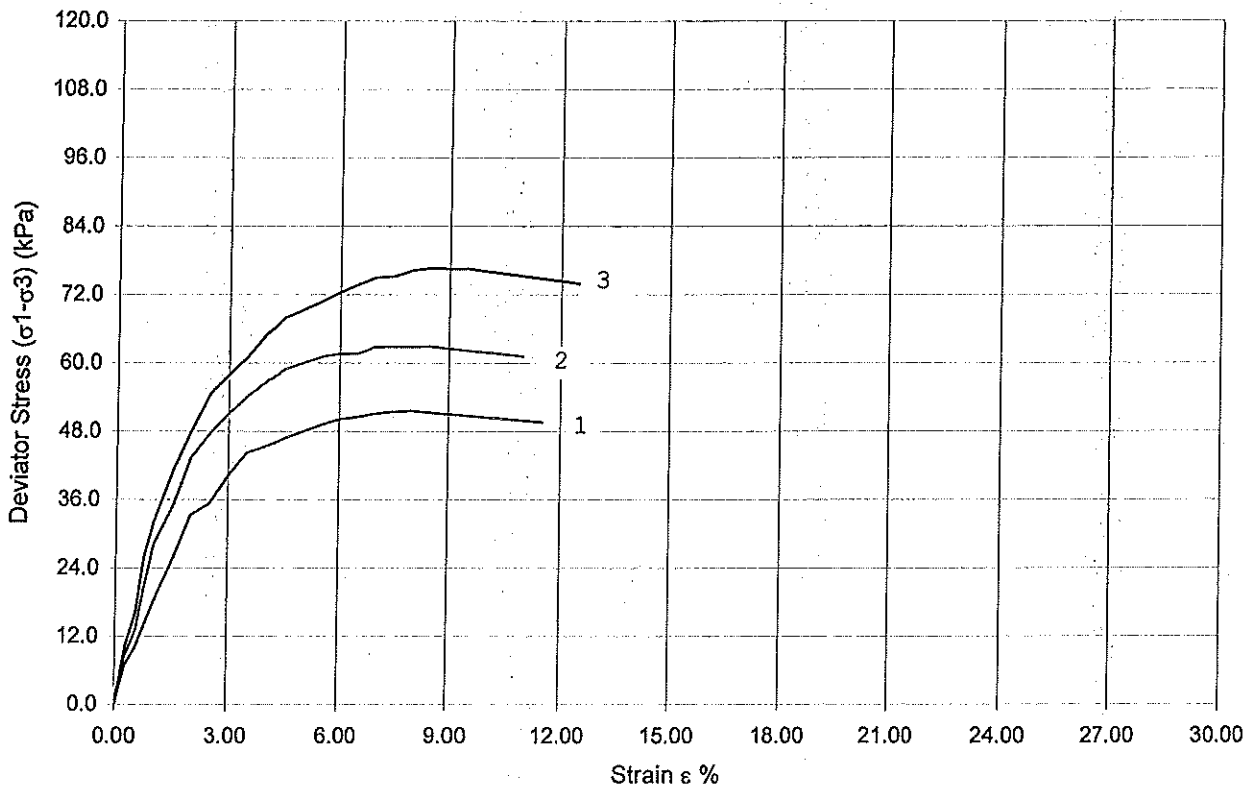
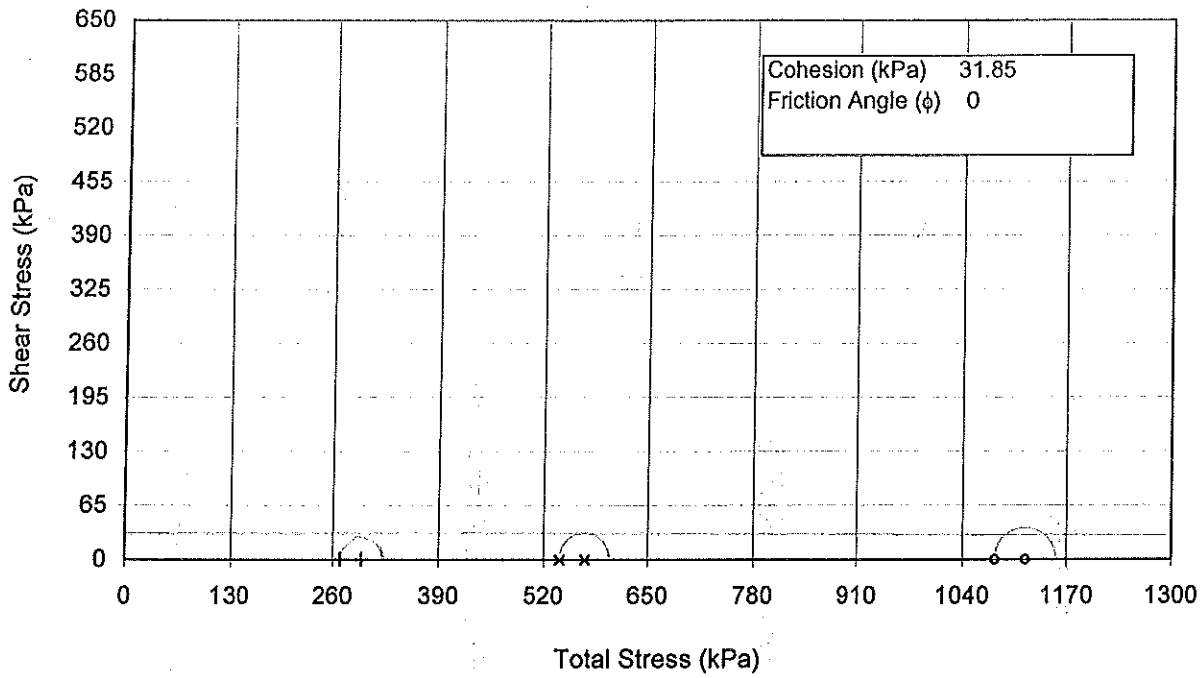
Borehole : BH13

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

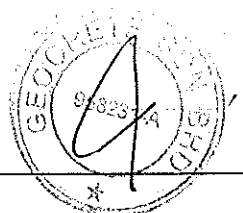
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 15.01.19

Sample : UD11
 Borehole : BH13

Approved :
 Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No.	BH13 / UD1 / 3.00m	Test Started	14.01.19
Soil Description	Greenish grey CLAY with some sand	Ring No.	A7

BEFORE TEST

Moist. Content from trimmings:	=	48 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	124.90 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.52 gm	Area (A)	=	1964 mm ²
Wt of sample	=	64.38 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	44.82 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	19.56 gm	Bulk Density (P)	=	1.639 Mg/m ³
Initial Moisture Content, M ₀	=	44 %	Dry Density (PD)	=	1.141 Mg/m ³

Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.3140
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	88 %
V. Ratio Change Factor F _v , $\frac{H}{1+e_0}$	=	0.1157 mm ⁻¹
Height of Solid H _s	=	8.643 mm

AFTER TEST

Wt of sample + Ring	=	123.91 gm	Overall settlement	=	1.660 mm
Wt of Dry sample + Ring	=	105.34 gm	Volume Change	=	3.261 cm ³
Wt of Ring	=	60.52 gm	Final Volume	=	36.03 cm ₃
Wt of Wet sample	=	63.39 gm	Final Bulk Density	=	1.760 Mg/m ³
Wt of Dry sample	=	44.82 gm	Final Dry Density	=	1.244 Mg/m ³
Wt of Moisture	=	18.57 gm	Final Void Ratio, e _f	=	1.1220
Final Moisture Content, M _f	=	41 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	97 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No BH13 / UD1 / 3.00m

Date of Report

24.01.19

Test started

14.01.19

Ring No.

A7

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.3140	0.0000	0				
6.25	0.320	19.680	0.0370	1.2770	0.0370	6.25	2.6036	1.21	36.11	-0.1230
12.5	0.494	19.506	0.0572	1.2569	0.0201	6.25	1.4283	1.96	21.74	-0.0669
25.0	0.692	19.308	0.0801	1.2340	0.0229	12.5	0.8210	1.21	34.55	-0.0761
50.0	1.064	18.936	0.1231	1.1909	0.0430	25.0	0.7884	1.44	28.19	-0.1430
100	1.576	18.424	0.1823	1.1317	0.0592	50.0	0.5562	1.96	19.76	-0.1968
200	2.148	17.852	0.2485	1.0655	0.0662	99.9	0.3207	1.44	25.36	-0.2199
100	2.024	17.976	0.2342	1.0798	-0.0143	-99.9				
50	1.864	18.136	0.2157	1.0984	-0.0185	-50.0				
12.5	1.660	18.340	0.1921	1.1220	-0.0236	-37.5				

Operator

Shyam Nath

Checked

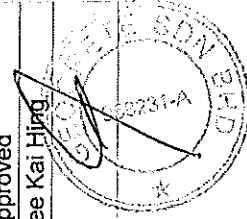
Chris

Approved

Lee Kai Hing

GEOCRETE SDN. BHD.

(Co. No. 958231-A)



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No.	BH13 / UD5 / 15.00m	Test Started	14.01.19
Soil Description	Greenis grey CLAY with some sand	Ring No.	A8

BEFORE TEST

Moist. Content from trimmings:	=	55 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	120.35 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.04 gm	Area (A)	=	1964 mm ²
Wt of sample	=	62.31 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.97 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.34 gm	Bulk Density (P)	=	1.586 Mg/m ³
Initial Moisture Content, M ₀	=	52 %	Dry Density (PD)	=	1.043 Mg/m ³

Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.5315
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	90 %
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1266 mm ⁻¹
Height of Solid H _s	=	7.901 mm

AFTER TEST

Wt of sample + Ring	=	117.35 gm	Overall settlement	=	2.008 mm
Wt of Dry sample + Ring	=	99.01 gm	Volume Change	=	3.944 cm ³
Wt of Ring	=	58.04 gm	Final Volume	=	35.34 cm ³
Wt of Wet sample	=	59.31 gm	Final Bulk Density	=	1.678 Mg/m ³
Wt of Dry sample	=	40.97 gm	Final Dry Density	=	1.159 Mg/m ³
Wt of Moisture	=	18.34 gm	Final Void Ratio, e _f	=	1.2773
Final Moisture Content, M _f	=	45 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	93 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



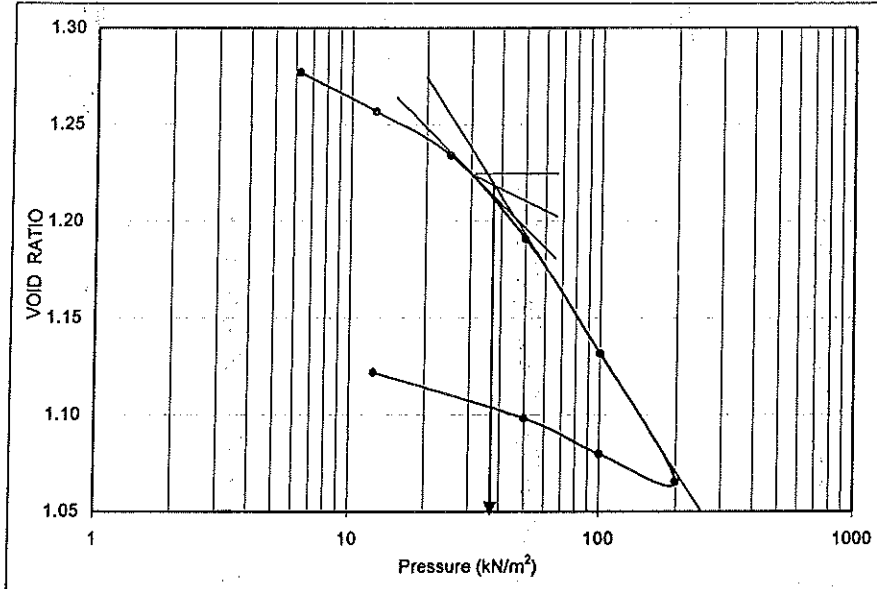
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

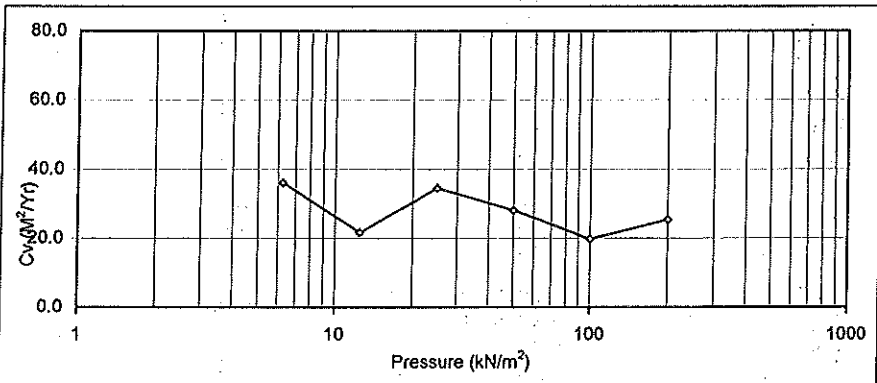
BH REF BH13 / UD1 / 3.00m

SOIL SAMPLE Greenish grey CLAY with some sand

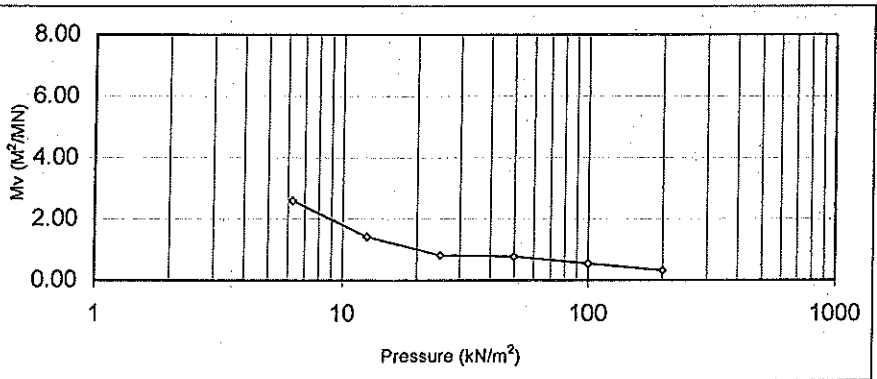
Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A7



INITIAL		
Water content	44	%
Dry Density	1.14	Mg/m ³
Void Ratio	1.3140	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL		
Water content	41	%
Dry Density	1.24	Mg/m ³
Void Ratio	1.1220	
Saturation	97	%
Height	18	mm
Comp. Index, Cc	0.2199	
Precons. Load	37	kN/m ²
Comp. Ratio, C _R	0.095	



Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing

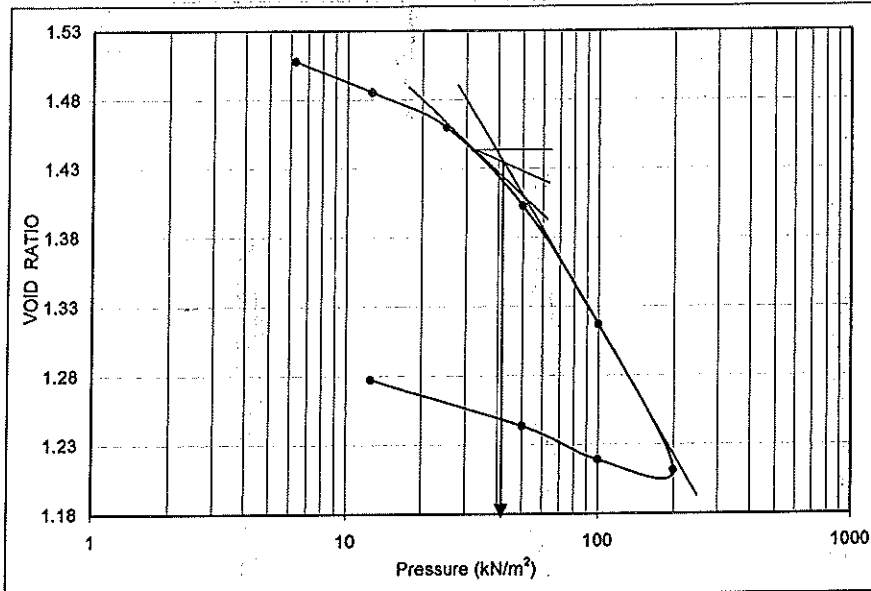


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

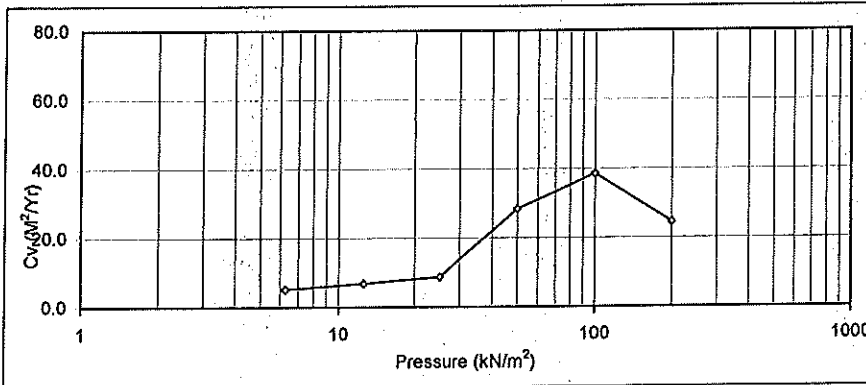
BH REF BH13 / UD5 / 15.00m
 SOIL SAMPLE Greenis grey CLAY with some sand

Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A8



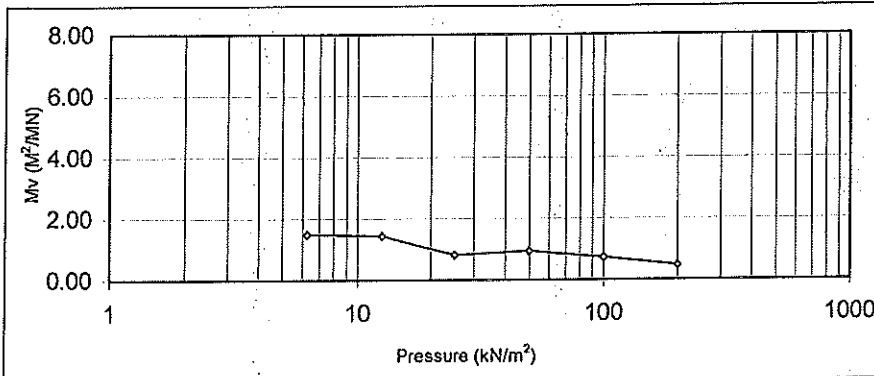
INITIAL

Water content	52	%
Dry Density	1.04	Mg/m ³
Void Ratio	1.5315	
Saturation	90	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	45	%
Dry Density	1.16	Mg/m ³
Void Ratio	1.2773	
Saturation	93	%
Height	18	mm
Comp. Index, C _c	0.3507	
Precons. Load	42	kN/m ²



Comp. Ratio, C_R 0.139

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No. BH13 / UD5 / 15.00m

Date of Report

24.01.19

Test started

14.01.19

Ring No.

A8

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	1.5315	0.0000	0				
6.25	0.186	19.814	0.0235	1.5079	0.0235	6.25	1.5031	8.41	5.23	-0.0782
12.5	0.364	19.636	0.0461	1.4854	0.0225	6.25	1.4515	6.25	6.91	-0.0749
25.0	0.564	19.436	0.0714	1.4601	0.0253	12.5	0.8238	4.84	8.75	-0.0841
50.0	1.016	18.984	0.1286	1.4029	0.0572	25.0	0.9531	1.44	28.45	-0.1901
100	1.694	18.306	0.2144	1.3171	0.0858	50.0	0.7413	1.00	38.59	-0.2851
200	2.528	17.472	0.3200	1.2115	0.1056	99.9	0.4777	1.44	24.67	-0.3507
100	2.468	17.532	0.3124	1.2191	-0.0076	-99.9				
50	2.274	17.726	0.2878	1.2436	-0.0246	-50.0				
12.5	2.008	17.992	0.2542	1.2773	-0.0337	-37.5				

Operator

Shyam Nath

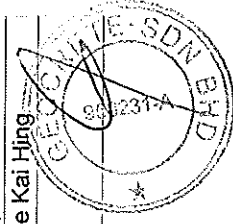
Checked

Chris

Approved

Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 13 / D 13 (36.00 m)

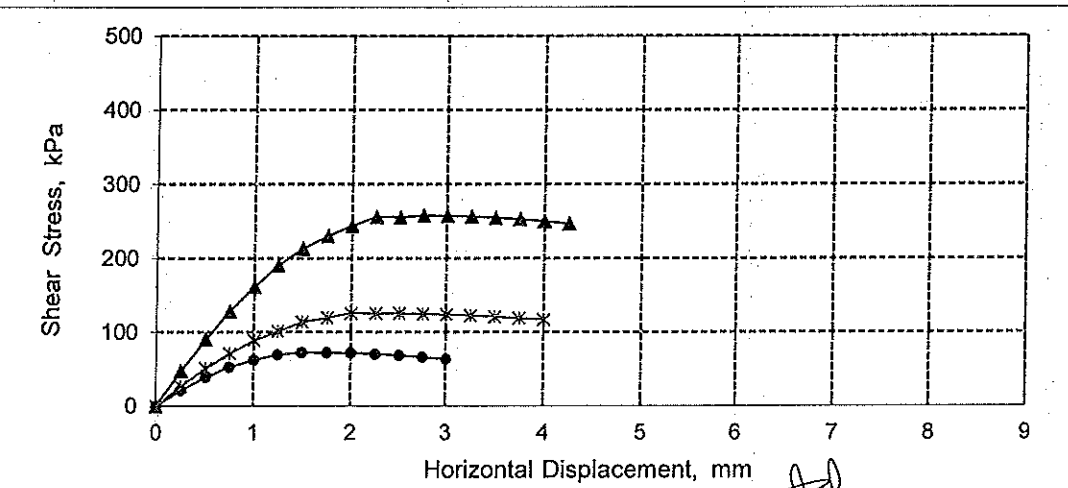
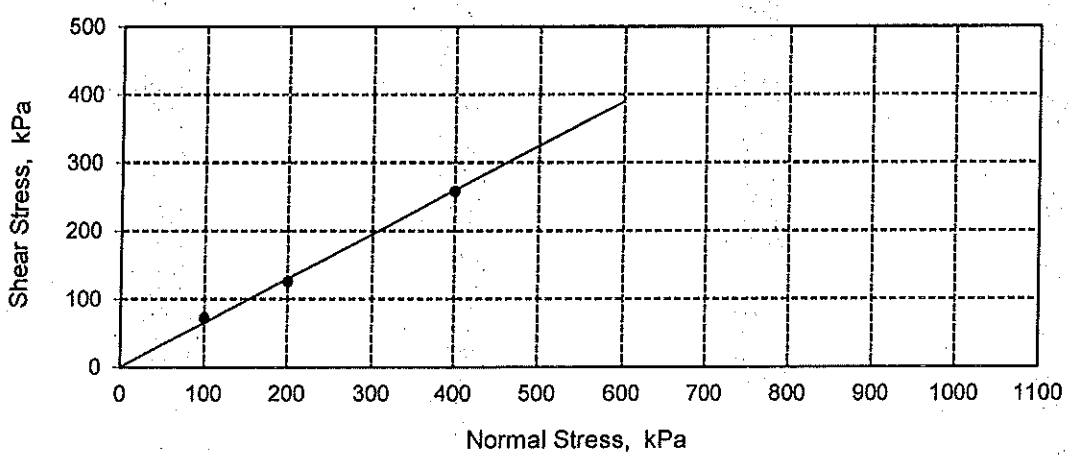
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 7 / 2 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		157.9	157.6	157.5
Moisture Content (%)		9.6	10.5	9.9
Bulk Density (Mg/m ³)		2.193	2.189	2.188
Dry Density (Mg/m ³)		2.001	1.981	1.991
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		72.5	125.6	258.2
Displ. at Failure (mm)		1.5	2.0	2.8
Settlement (mm)		0.1	0.2	0.3

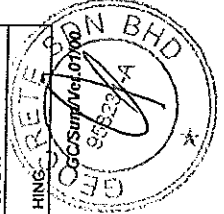
c' 1 kPa

φ' 33 deg.



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No.958231 - A)		PROJECT :														REF : L081/18/139/18 DATE : 27.01.19																								
SAMPLE AND SPECIMEN DETAILS		PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR										CHEMICAL TEST																												
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS				SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)	SHEAR BOX TEST		CIU TEST		UU Triaxial TEST		CONSOLIDATION TEST		Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)													
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)		Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ (Deg)	Pc (kPa)	Cc																			
BH14	UD1	3.00	23	2.03	1.65	NP		15	85	0	2.70							NA						0.7	0.07	0.34	7.9													
	UD3	9.00	53	1.65	1.08			59	36	5	0																													
	UD5	15.00	57	1.57	1.12	61	38	41	35	24	0								16.03	0		24	0.480																	
	UD7	21.00	48	1.74	1.17			44	29	27	0																													
	UD9	27.00	56	1.68	1.08	83	31	53	27	20	0	2.62																												
	D13	33.00		NA	NA			40	27	33	0													1.9	0.26	0.67	8.0													
	D16	37.50	25	NA	NA	44	23	21	28	45	7																													
	D20	43.50	23	NA	NA			4	96	0	2.71																													
	D24	49.50		NA	NA			7	93	0																														
	D27	54.00	41	NA	NA	46	25	21	32	44	2	2.67																												
	D31	60.00	52	NA	NA			57	34	9	0																													
Note :		NES = NOT ENOUGH SAMPLE																									NP = NON PLASTIC					NA = NOT APPLICABLE								
Remarks		BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE. ** BH14 UD1 - CONSOL & TRIAXIAL (UU) TEST CANNOT BE CARRIED OUT DUE TO NON-PLASTICITY NATURE OF SPECIMEN. (NP)																																						
APPROVED BY:		LEE KAI HING																																						
CHECKED BY:		CHRIS																																						
SUM																																								



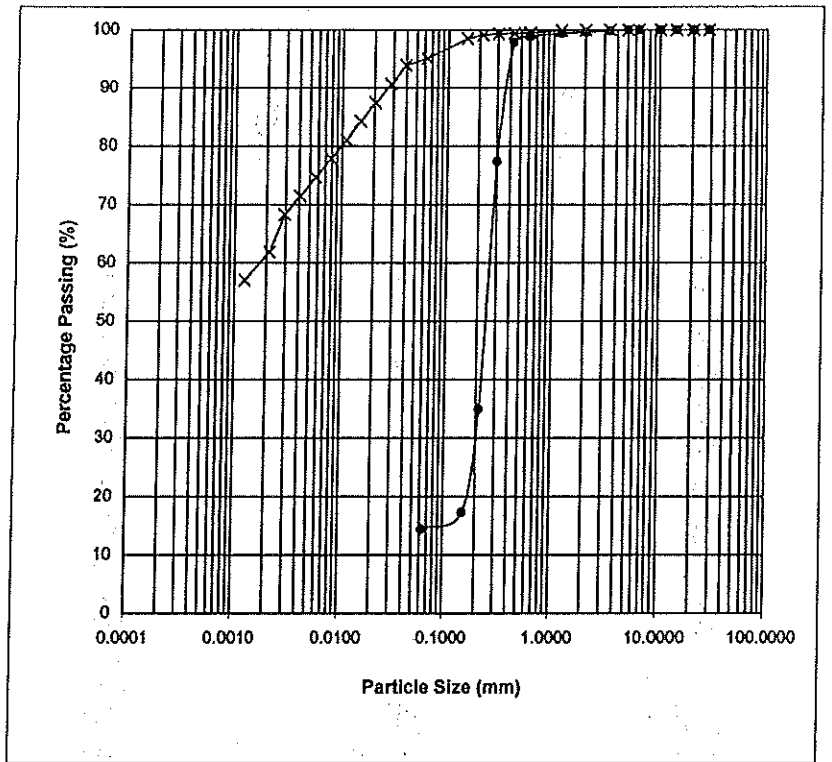
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

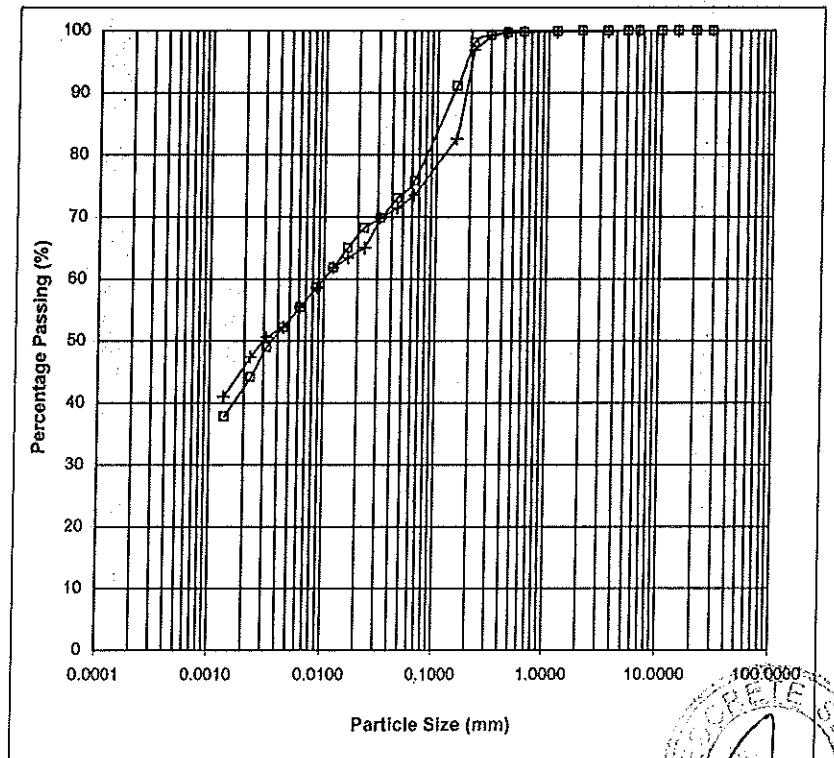
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	99	0.600	99
0.425	98	0.425	99
0.300	77	0.300	99
0.212	35	0.212	99
0.150	17	0.150	99
0.063	14	0.063	95
		0.0393	94
		0.0283	91
		0.0204	87
		0.0147	84
		0.0109	81
		0.0079	78
		0.0057	75
		0.0041	71
		0.0029	68
		0.0021	62
		0.0013	57
Clay (%)		Clay (%)	59
Silt (%)	15	Silt (%)	36
Sand (%)	85	Sand (%)	5
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH14	UD1	3.00	20.01.19
X	BH14	UD3	9.00	20.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	99	0.300	99
0.212	98	0.212	97
0.150	91	0.150	83
0.063	76	0.063	74
0.0442	73	0.0445	71
0.0317	70	0.0317	70
0.0226	68	0.0230	65
0.0162	65	0.0164	63
0.0120	62	0.0120	62
0.0086	59	0.0086	59
0.0062	55	0.0062	55
0.0044	52	0.0044	52
0.0032	49	0.0032	51
0.0023	44	0.0023	47
0.0014	38	0.0013	41
Clay (%)	41	Clay (%)	44
Silt (%)	35	Silt (%)	29
Sand (%)	24	Sand (%)	27
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH14	UD5	15.00	20.01.19
+	BH14	UD7	21.00	20.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Fong

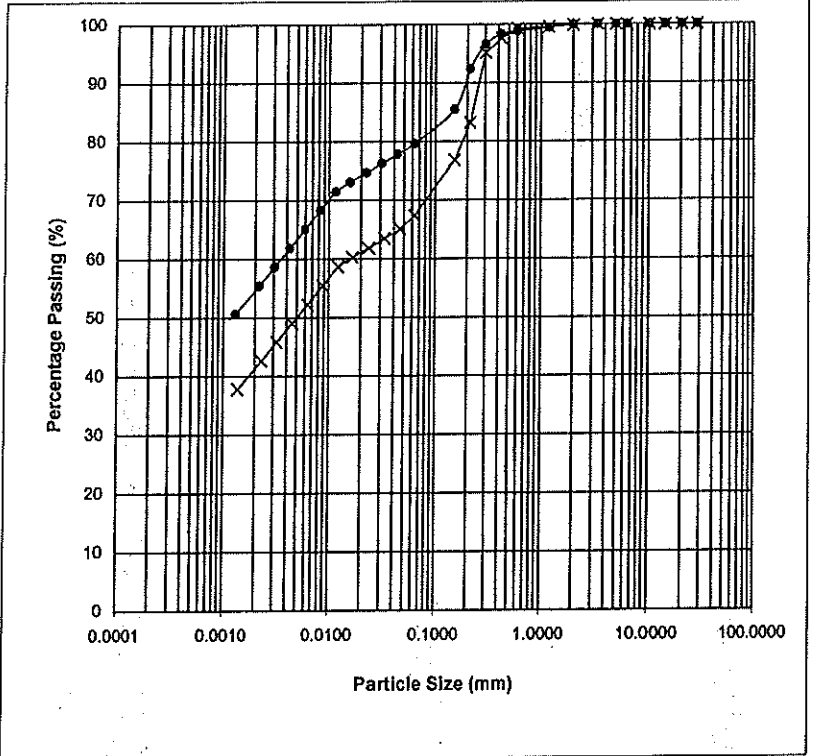
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422- 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

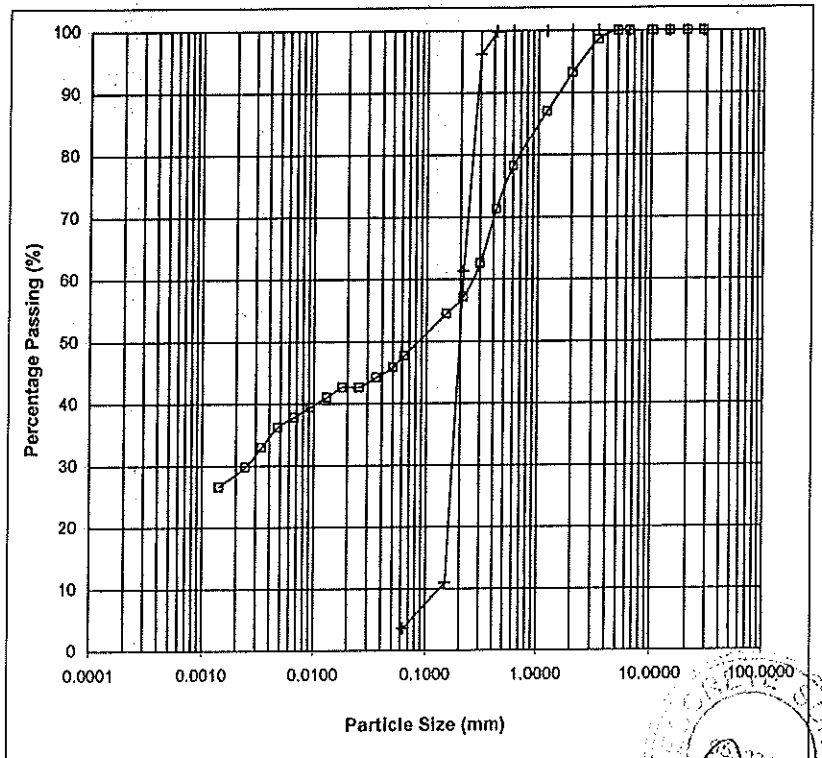
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	99	1.18	100
0.600	99	0.600	99
0.425	98	0.425	98
0.300	97	0.300	95
0.212	92	0.212	83
0.150	85	0.150	77
0.063	80	0.063	67
0.0431	78	0.0459	65
0.0307	76	0.0327	63
0.0219	75	0.0233	62
0.0156	73	0.0166	60
0.0115	71	0.0122	59
0.0083	68	0.0088	55
0.0059	65	0.0063	52
0.0043	62	0.0045	49
0.0031	59	0.0032	46
0.0022	55	0.0023	43
0.0013	51	0.0014	38
Clay (%)	53	Clay (%)	40
Silt (%)	27	Silt (%)	27
Sand (%)	20	Sand (%)	33
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH14	UD9	27.00	20.01.19
X	BH14	D13	33.00	20.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	99	3.35	100
2.00	93	2.00	100
1.18	87	1.18	100
0.600	78	0.600	100
0.425	71	0.425	100
0.300	63	0.300	96
0.212	57	0.212	61
0.150	54	0.150	11
0.063	48	0.063	4
0.0499	46		
0.0355	44		
0.0253	43		
0.0179	43		
0.0131	41		
0.0093	39		
0.0066	38		
0.0047	36		
0.0034	33		
0.0024	30		
0.0014	27		
Clay (%)	28	Clay (%)	4
Silt (%)	20	Silt (%)	
Sand (%)	45	Sand (%)	96
Gravel (%)	7	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH14	D16	37.50	20.01.19
+	BH14	D20	43.50	20.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

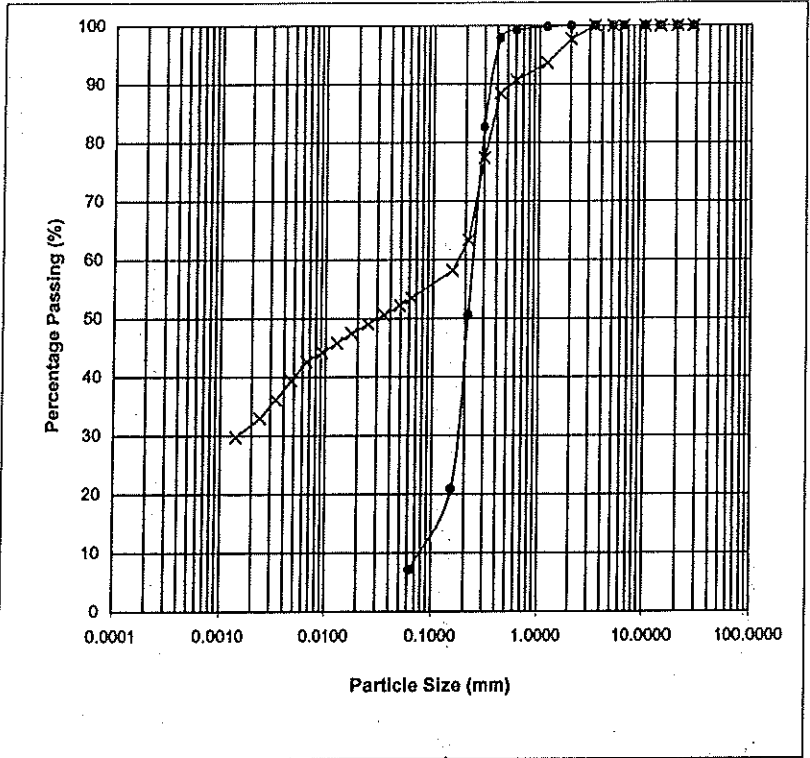
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

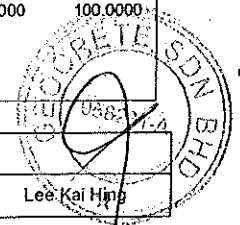
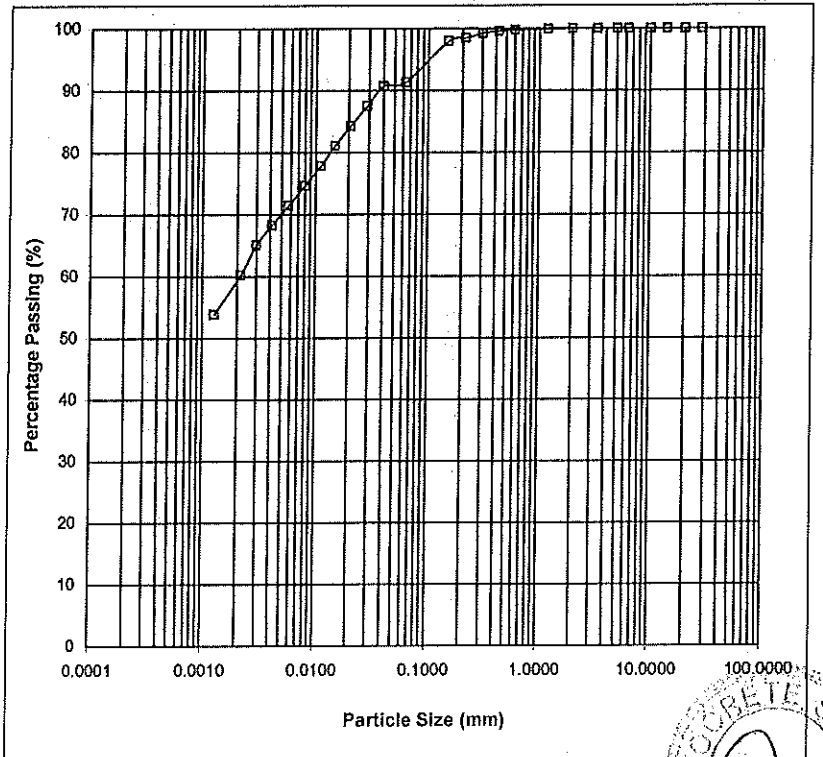
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	98
1.18	100	1.18	94
0.600	99	0.600	91
0.425	98	0.425	88
0.300	83	0.300	77
0.212	51	0.212	63
0.150	21	0.150	58
0.063	7	0.063	53
		0.0486	52
		0.0346	51
		0.0246	49
		0.0175	47
		0.0129	46
		0.0092	44
		0.0065	43
		0.0047	39
		0.0033	36
		0.0024	33
		0.0014	30
Clay (%)	7	Clay (%)	32
Silt (%)		Silt (%)	22
Sand (%)	93	Sand (%)	44
Gravel (%)	0	Gravel (%)	2
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH14	D24	49.50	20.01.19
X	BH14	D27	54.00	20.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100		
20.00	100		
14.00	100		
10.00	100		
6.30	100		
5.00	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	99		
0.212	99		
0.150	98		
0.063	91		
0.0401	91		
0.0289	87		
0.0208	84		
0.0150	81		
0.0111	78		
0.0080	75		
0.0058	71		
0.0041	68		
0.0030	65		
0.0021	60		
0.0013	54		
Clay (%)	57		
Silt (%)	34		
Sand (%)	9		
Gravel (%)	0		
Total (%)	100		

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH14	D31	60.00	20.01.19
+				



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

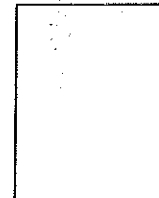
Unconsolidated Undrained

Sample details

Depth : 15.00m
 Description : Greenish grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	133.96	134.80	136.11
Bulk Density ρ (Mg/m ³)	1.555	1.565	1.580
Particle Density ρ_s	2.64	2.64	2.64

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	110	220	440
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

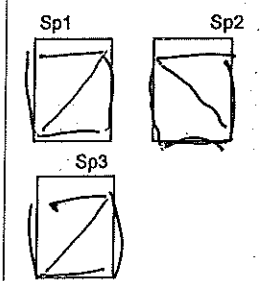
Load Channel : 14391 14391 14391

Moisture Content w_0 %	41	40	40
Dry Density ρ_{d0} (Mg/m ³)	1.10	1.12	1.13
Voids Ratio e_0	1.40	1.36	1.33
Deg of Saturation S_0 %	78.12	77.38	78.52

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	24.40	33.07	38.73
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	24.20	32.87	38.53
Strain at Failure ϵ_f %	3.49	6.97	7.50
Shear Strength c_u (kPa)	12.20	16.54	19.37

Failure Sketch



Moisture Content w_f %	41	40	40
Dry Density ρ_{df} (Mg/m ³)	1.10	1.12	1.13
Voids Ratio e_f	1.40	1.36	1.33
Deg of Saturation S_f %	78.12	77.38	78.52

Notes : Shear Shear Shear

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator
 Shyam Nath

Checked
 Chris

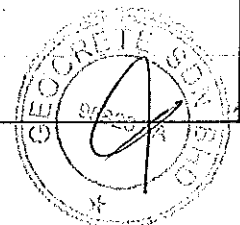
Test Name : UU

Date of Test : 15.01.19

Sample : UD5

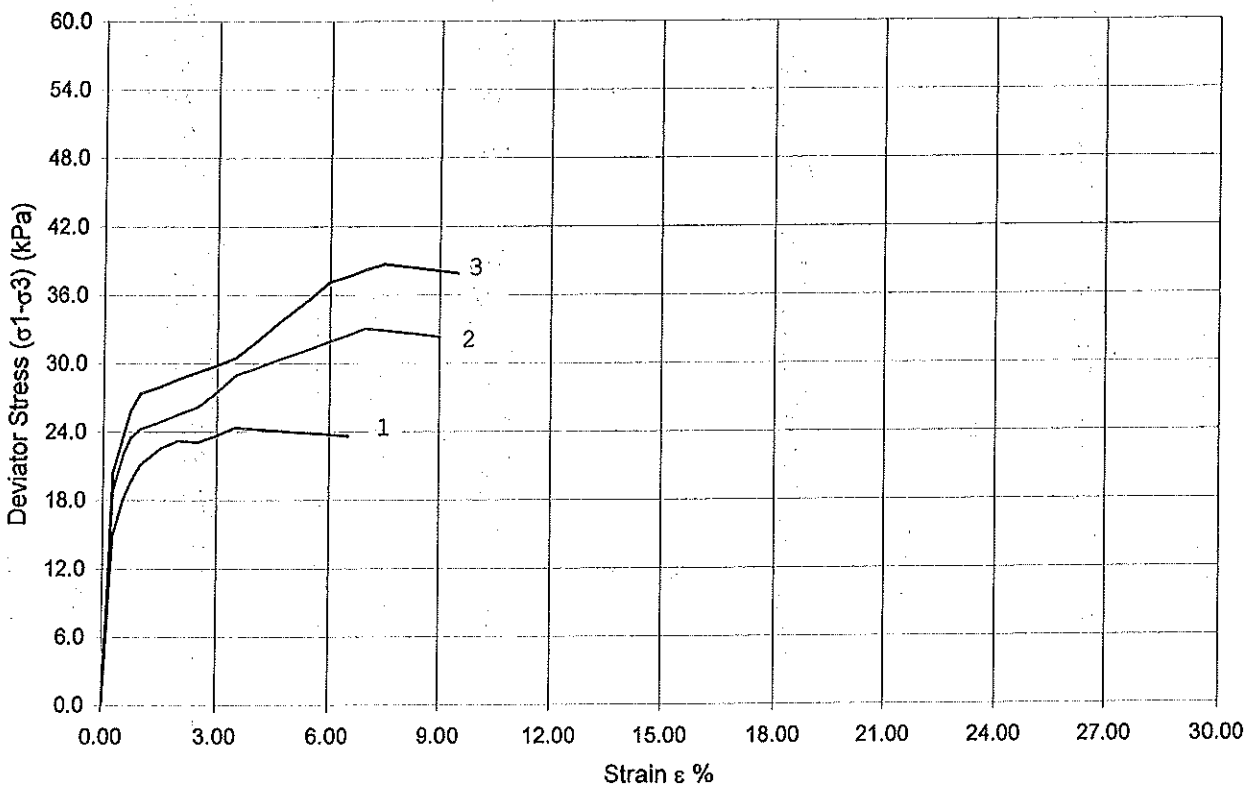
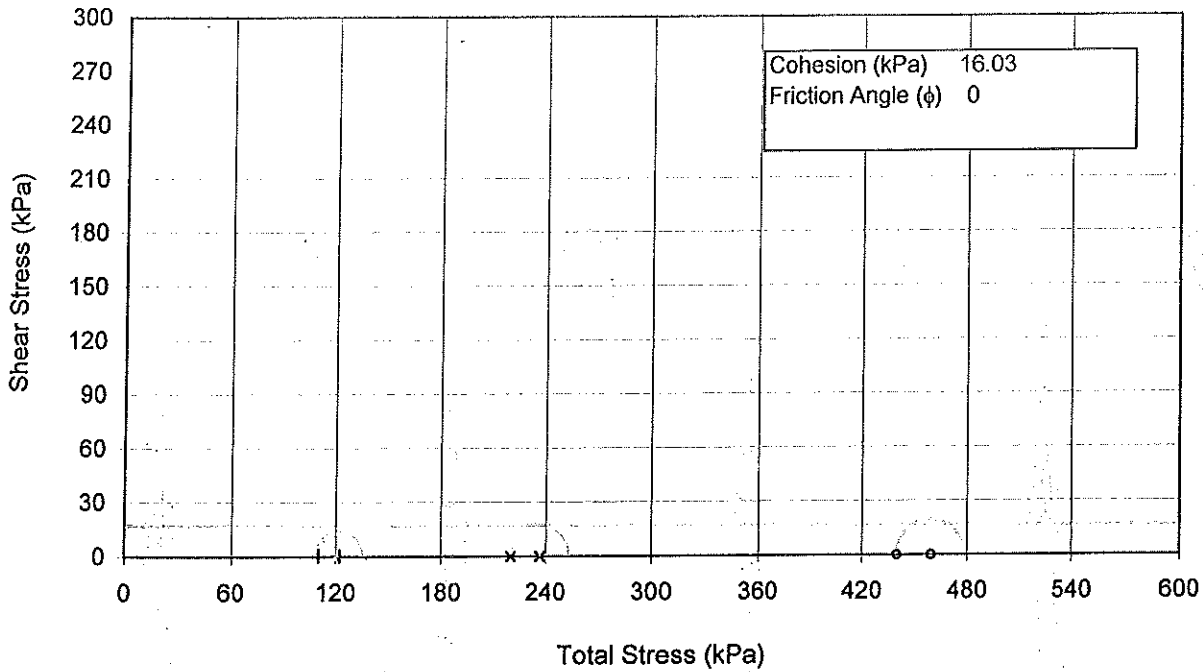
Borehole : BH14

Approved
 Lee Kai Hing



Total Stress Triaxial Compression

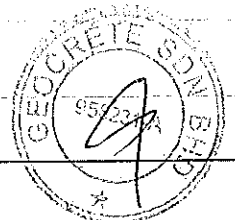
Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 15.01.19
 Sample : UD5
 Borehole : BH14
 Approved :
 Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	24.01.19
Sample No.	BH14 / UD5 / 15.00m	Test Started	14.01.19
Soil Description	Greenish grey CLAY with some sand	Ring No.	A9

BEFORE TEST

Moist. Content from trimmings:	=	68 %	SG (Measured)	=	2.640
Wt of sample + Ring	=	119.73 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.77 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.96 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	35.67 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	23.29 gm	Bulk Density (P)	=	1.501 Mg/m ³
Initial Moisture Content, M ₀	=	65 %	Dry Density (PD)	=	0.908 Mg/m ³
Initial Void Ratio, e ₀ $\frac{SG}{P_D} - 1$	=	1.9076			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	90 %			
V. Ratio Change Factor F _v $\frac{1+e_0}{H}$	=	0.1454 mm ⁻¹			
Height of Solid H _s	=	6.879 mm			

AFTER TEST

Wt of sample + Ring	=	116.28 gm	Overall settlement	=	2.226 mm
Wt of Dry sample + Ring	=	96.44 gm	Volume Change	=	4.373 cm ³
Wt of Ring	=	60.77 gm	Final Volume	=	34.91 cm ³
Wt of Wet sample	=	55.51 gm	Final Bulk Density	=	1.590 Mg/m ³
Wt of Dry sample	=	35.67 gm	Final Dry Density	=	1.022 Mg/m ³
Wt of Moisture	=	19.84 gm	Final Void Ratio, e _f	=	1.5840
Final Moisture Content, M _f	=	56 %			
Final Saturation, S ₀ $\frac{M_f \times SG}{e_f}$	=	93 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

Sample No

CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
BH14 / UD5 / 15.00m

Date of Report

24.01.19

Test started

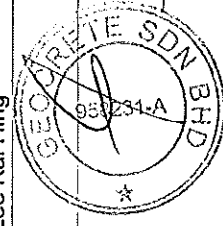
14.01.19

Ring No.

A9

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0 \cdot \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
			$\Delta e = F \cdot \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	Cc	
0	0.000	20.000	0.0000	1.9076	0.0000	0					
6.25	0.188	19.812	0.0273	1.8803	0.0273	6.25	1.5194	12.96	3.39		-0.0908
12.5	0.486	19.514	0.0707	1.8370	0.0433	6.25	2.4452	30.25	1.42		-0.1439
25.0	0.912	19.088	0.1326	1.7750	0.0619	12.5	1.7868	33.64	1.23		-0.2058
50.0	1.786	18.214	0.2596	1.6480	0.1271	25.0	1.9209	37.21	1.04		-0.4221
100	2.780	17.220	0.4042	1.5035	0.1445	50.0	1.1554	38.44	0.91		-0.4801
50	2.664	17.336	0.3873	1.5203	-0.0169	-50.0					
25	2.428	17.572	0.3530	1.5546	-0.0343	-25.0					
12.5	2.226	17.774	0.3236	1.5840	-0.0294	-12.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



GEocrete SDN. BHD.
(Co. No. 958231-A)

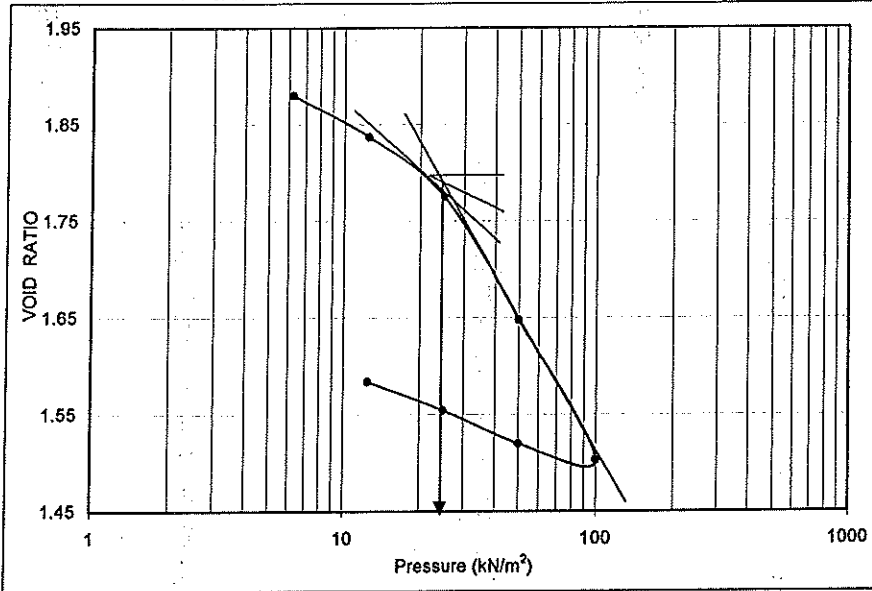
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH14 / UD5 / 15.00m

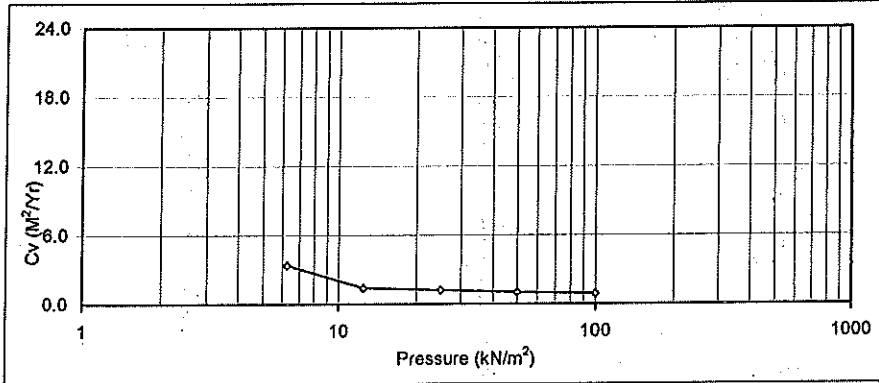
SOIL SAMPLE Greenish grey CLAY with some sand

Date of Report 24.01.19
 Test started 14.01.19
 Ring No. A9



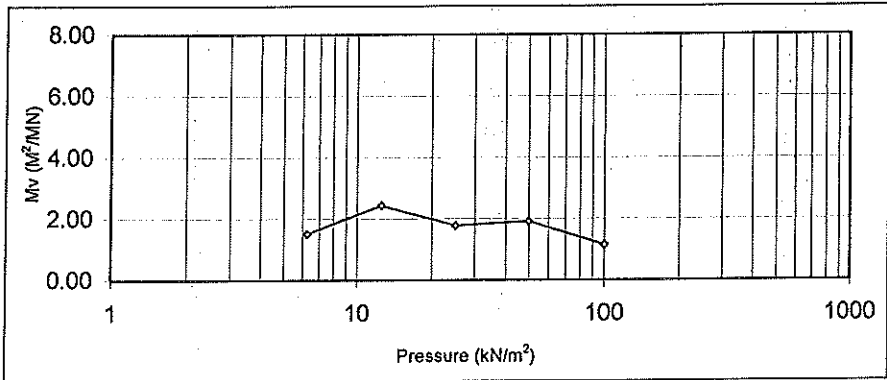
INITIAL

Water content	65	%
Dry Density	0.91	Mg/m ³
Void Ratio	1.9076	
Saturation	90	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.640	



FINAL

Water content	56	%
Dry Density	1.02	Mg/m ³
Void Ratio	1.5840	
Saturation	93	%
Height	18	mm
Comp. Index, C _c	0.4801	
Precons. Load	24	kN/m ²



Comp. Ratio, C_R 0.165



SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT :			PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR		REF : L081/18/139/18 DATE : 12.01.19																			
SAMPLE AND SPECIMEN DETAILS.		ATTERBERG LIMITS		SIEVE AND HYDROMETER ANALYSIS			SHEAR BOX TEST		CIU TEST		UU Triaxial CONSOLIDATION TEST		CHEMICAL TEST													
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Unconfined Compression Test (Max Deviator)	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
BH15	UD1	3.00	52	1.62	1.07	44	50	42	8	0												2.9	0.16	0.36	7.3	
	UD4	12.00	59	1.66	1.16	22	46	24	30	0	2.65				39.00	0				100	0.404					
	UD7	21.00	40	1.68	1.02	23	41	36	23	0																
	UD10	30.00	42	1.77	1.29	22	28	19	53	0	2.66				44.46	0				23	0.269					
	D14	36.00	31	NA	NA	19	38	24	38	0																
	D15	37.50	35	1.82	1.37		39	26	35	0																
	D19	43.50	12	NA	NA		17		83	0																
	D23	49.50	9	2.09	1.79		9		91	0	2.70															
	D24	51.00	40	NA	NA	22	40	33	27	0					3											
	D30	60.00	60	NA	NA																	1.5	0.10	0.42	7.7	

Note : NES = NOT ENOUGH SAMPLE

Remarks

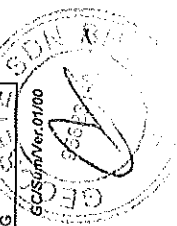
* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE. ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

NP = NON PLASTIC

NA = NOT APPLICABLE

APPROVED BY: LEE KAI HING

CHECKED BY: CHRIS



SUM

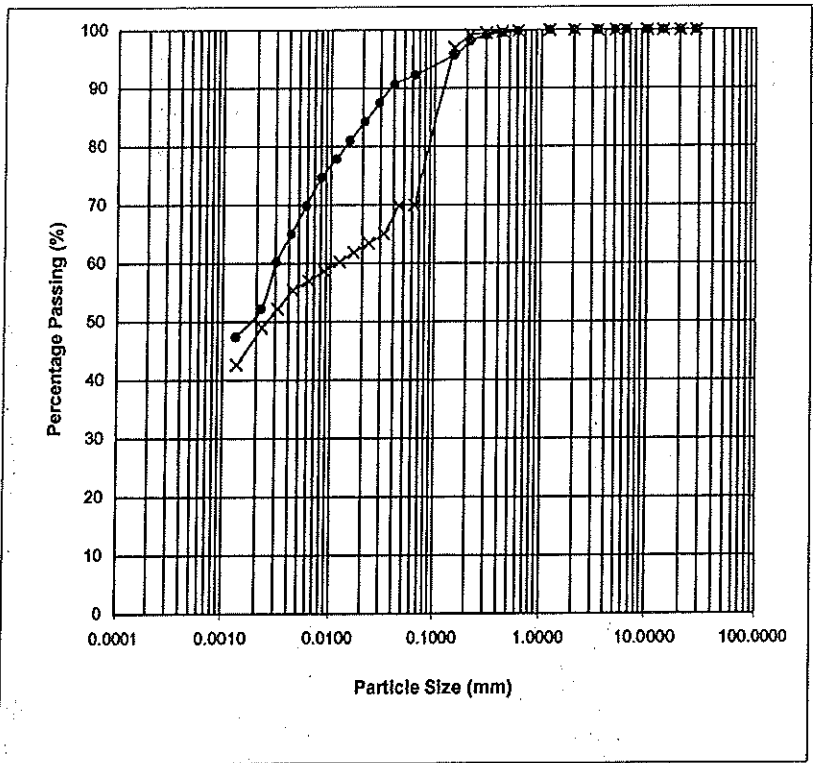
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

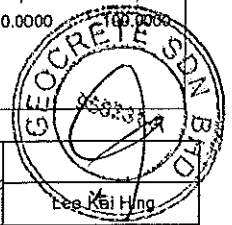
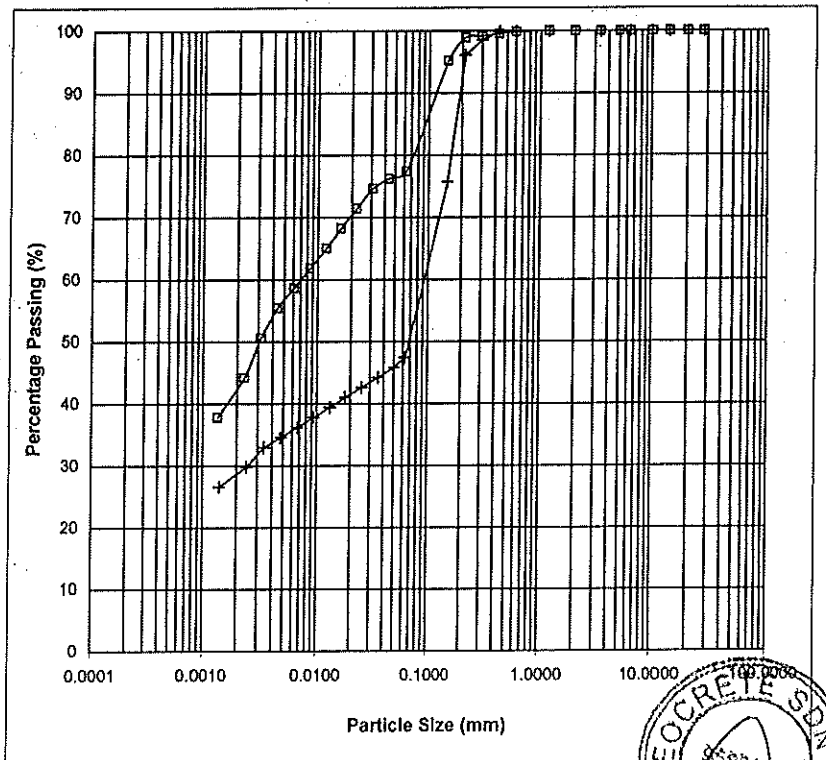
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	100	
0.212	98	0.212	99	
0.150	96	0.150	97	
0.063	92	0.063	70	
0.0401	91	0.0449	70	
0.0269	87	0.0325	65	
0.0208	84	0.0231	63	
0.0150	81	0.0165	62	
0.0111	78	0.0121	60	
0.0080	75	0.0086	59	
0.0058	70	0.0061	57	
0.0042	65	0.0044	55	
0.0030	60	0.0031	52	
0.0022	52	0.0022	49	
0.0013	47	0.0013	43	
Clay (%)		50	Clay (%)	46
Silt (%)		42	Silt (%)	24
Sand (%)		8	Sand (%)	30
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH15	UD1	3.00	04.01.19
x	BH15	UD4	12.00	04.01.19



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	99	
0.212	99	0.212	96	
0.150	95	0.150	76	
0.063	77	0.063	47	
0.0435	76	0.0499	46	
0.0310	75	0.0355	44	
0.0223	71	0.0253	43	
0.0160	68	0.0180	41	
0.0119	65	0.0132	39	
0.0085	62	0.0094	38	
0.0061	59	0.0067	36	
0.0044	55	0.0048	35	
0.0032	51	0.0034	33	
0.0023	44	0.0024	30	
0.0014	38	0.0014	27	
Clay (%)		41	Clay (%)	28
Silt (%)		36	Silt (%)	19
Sand (%)		23	Sand (%)	53
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH15	UD7	21.00	04.01.19
+	BH15	UD10	30.00	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

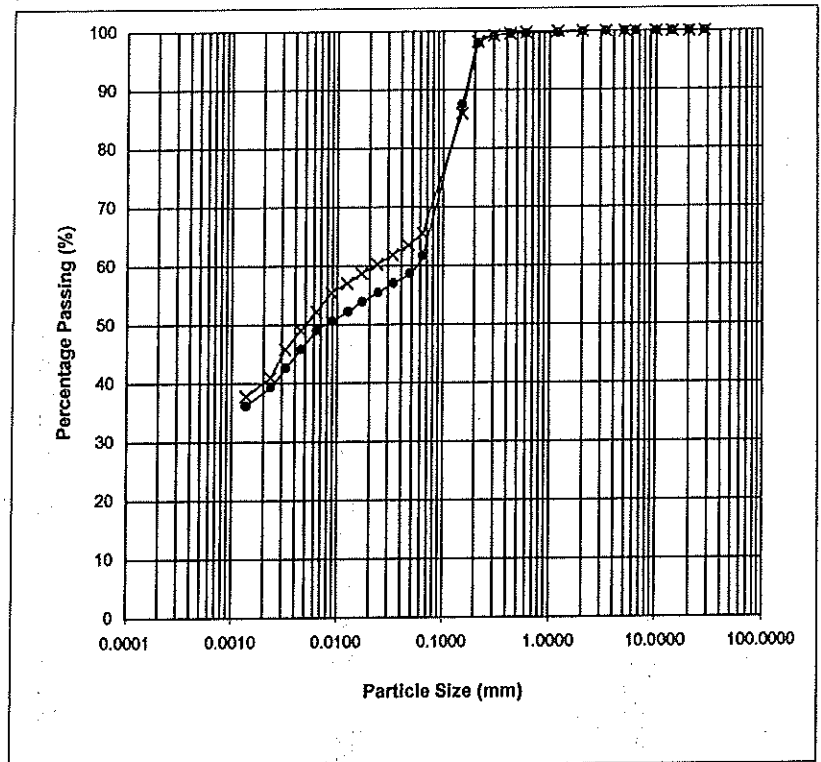
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

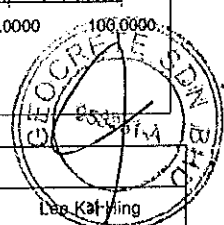
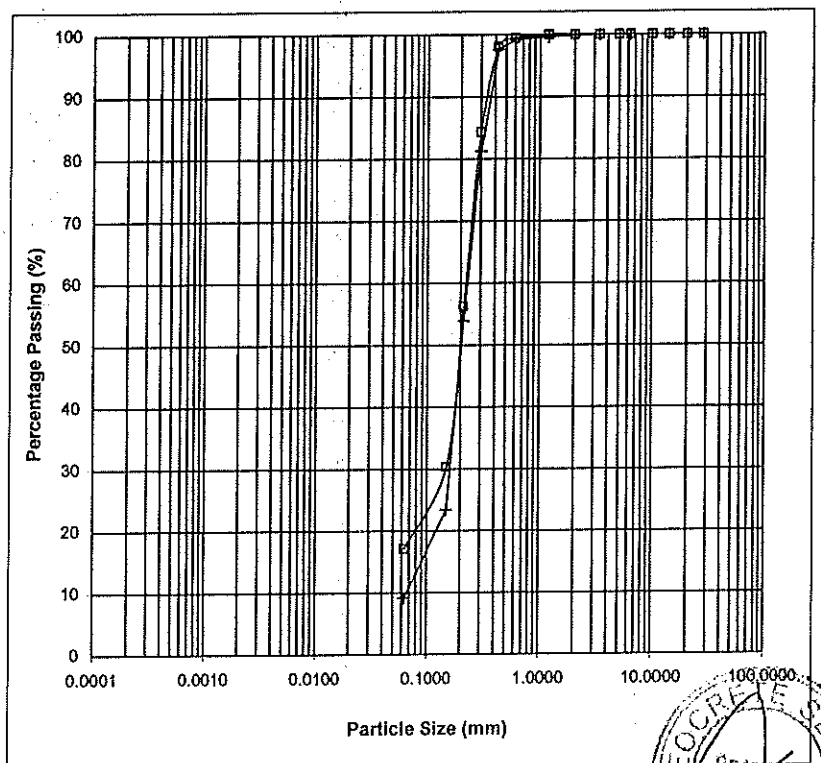
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	99	0.300	99	
0.212	98	0.212	98	
0.150	88	0.150	86	
0.063	62	0.063	65	
0.0473	59	0.0463	63	
0.0337	57	0.0330	62	
0.0240	55	0.0235	60	
0.0171	54	0.0167	59	
0.0126	52	0.0123	57	
0.0089	51	0.0088	55	
0.0064	49	0.0063	52	
0.0046	46	0.0045	49	
0.0033	43	0.0032	46	
0.0023	39	0.0023	41	
0.0014	38	0.0014	38	
Clay (%)		38	Clay (%)	39
Silt (%)		24	Silt (%)	26
Sand (%)		38	Sand (%)	35
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH15	D14	36.00	04.01.19
x	BH15	D15	37.50	04.01.19



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	99	0.600	99	
0.425	98	0.425	98	
0.300	84	0.300	81	
0.212	56	0.212	54	
0.150	30	0.150	23	
0.063	17	0.063	9	
Clay (%)		17	Clay (%)	9
Silt (%)			Silt (%)	
Sand (%)		83	Sand (%)	91
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH15	D19	43.50	04.01.19
+	BH15	D23	49.50	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Checked :	Approved :
	Shyam Nath	Chris	Lee Kah Ying

Total Stress Triaxial Compression

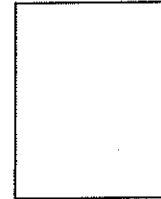
Unconsolidated Undrained

Sample details

Depth : 12.00m
Description : Grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	140.23	142.55	145.02
Bulk Density ρ (Mg/m ³)	1.628	1.655	1.683
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	100	200	400
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel 14391 14391 14391

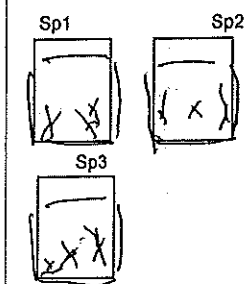
Moisture Content w_0 %	43	42	41
Dry Density ρ_{d0} (Mg/m ³)	1.14	1.16	1.19
Voids Ratio e_0	1.32	1.27	1.23
Deg of Saturation S_0 %	85.44	87.40	89.59

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	50.81	85.09	98.12
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	50.61	84.89	97.92
Strain at Failure ϵ_f %	4.01	5.53	10.00
Shear Strength c_u (kPa)	25.40	42.54	49.06

Moisture Content w_f %	43	42	41
Dry Density ρ_{df} (Mg/m ³)	1.14	1.16	1.19
Voids Ratio e_f	1.32	1.27	1.23
Deg of Saturation S_f %	85.44	87.40	89.59

Failure Sketch



Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

Test Name :

UU

Date of Test :

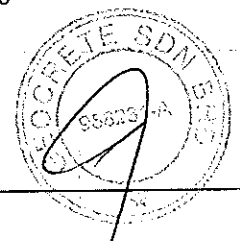
05.01.19

Sample : UD4

Borehole : BH15

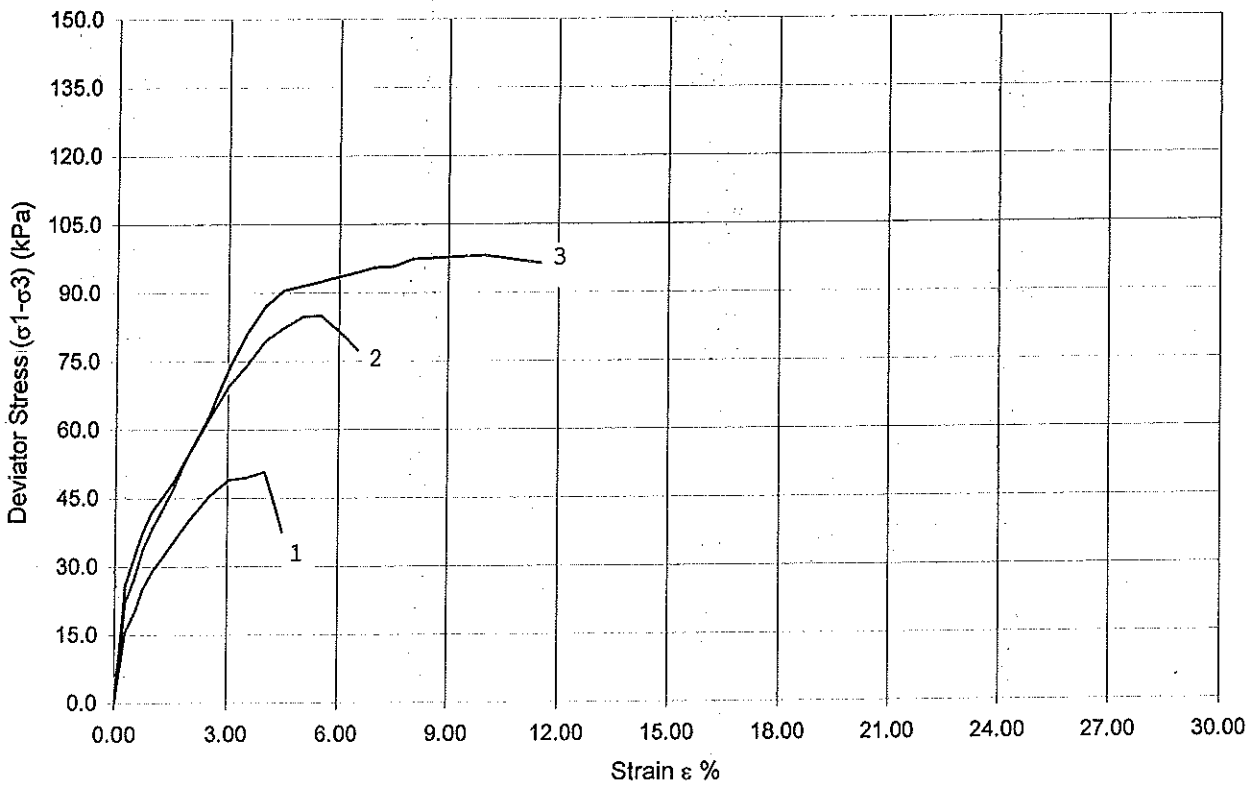
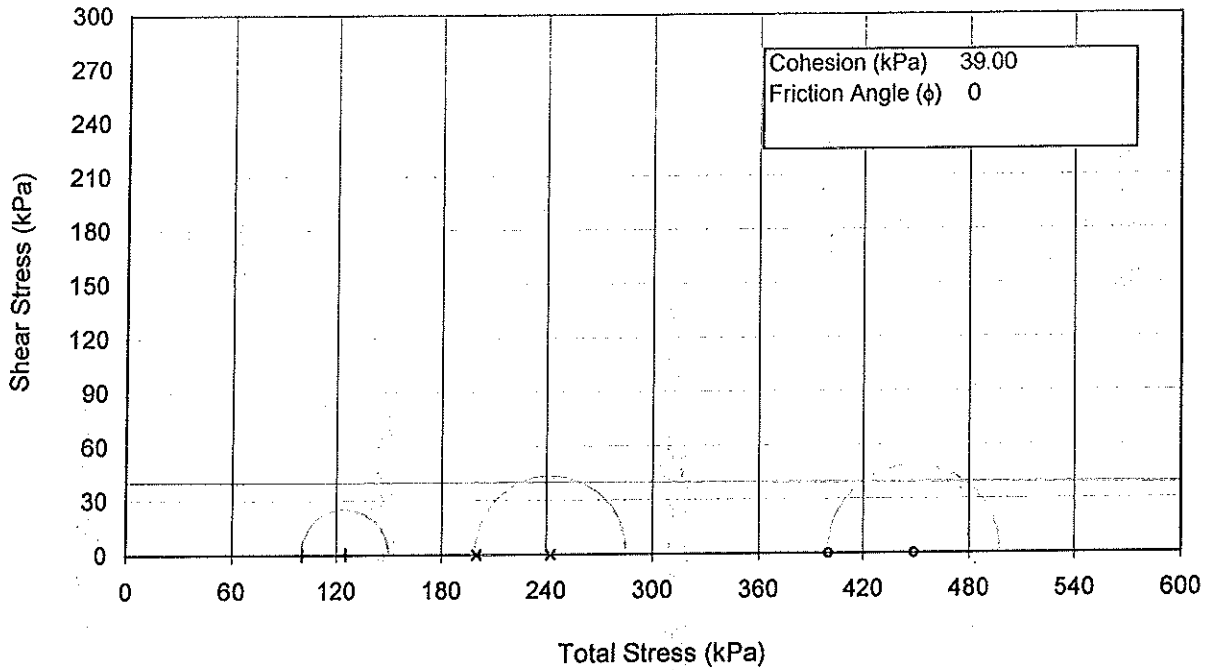
Approved

Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

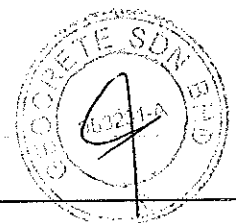
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 05.01.19

Sample : UD4
Borehole : BH15

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

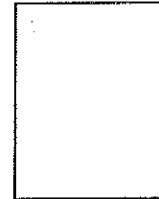
Unconsolidated Undrained

Sample details

Depth : 30.00m
Description : Grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	151.66	152.35	154.08
Bulk Density ρ (Mg/m ³)	1.760	1.768	1.789
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	260	520	1040
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel 14391 14391 14391

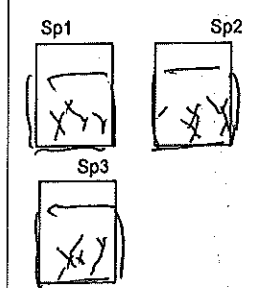
Moisture Content w_0 %	38	37	34
Dry Density ρ_{d0} (Mg/m ³)	1.27	1.29	1.33
Voids Ratio e_0	1.09	1.07	1.00
Deg of Saturation S_0 %	93.50	93.20	91.34

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	77.05	86.04	103.70
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	76.85	85.84	103.50
Strain at Failure ϵ_f %	10.53	10.00	9.47
Shear Strength c_u (kPa)	38.53	43.02	51.85

Moisture Content w_f %	38	37	34
Dry Density ρ_{df} (Mg/m ³)	1.27	1.29	1.33
Voids Ratio e_f	1.09	1.07	1.00
Deg of Saturation S_f %	93.50	93.20	91.34

Failure Sketch



Notes : Intermediate Intermediate Intermediate

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

Test Name :

UU

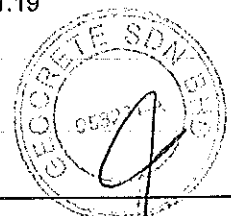
Date of Test :

05.01.19

Sample : UD10

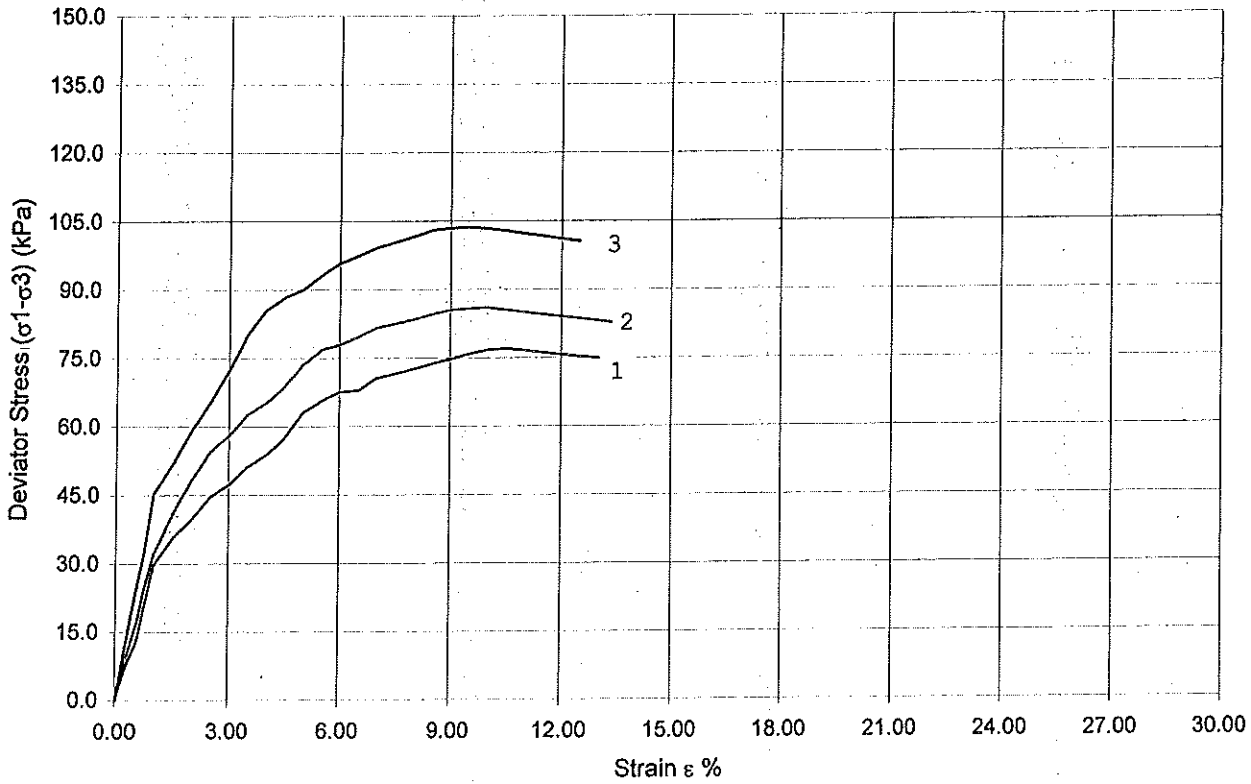
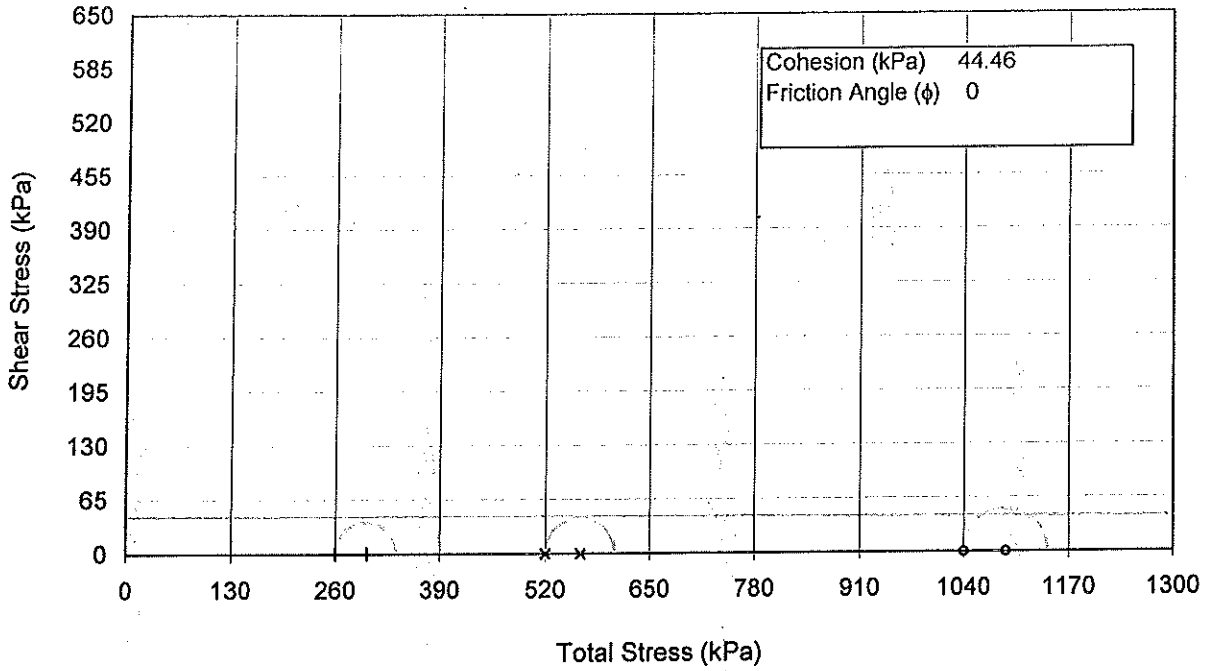
Borehole : BH15

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 05.01.19
 Sample : UD10
 Borehole : BH15
 Approved : Lee Kai Hing



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

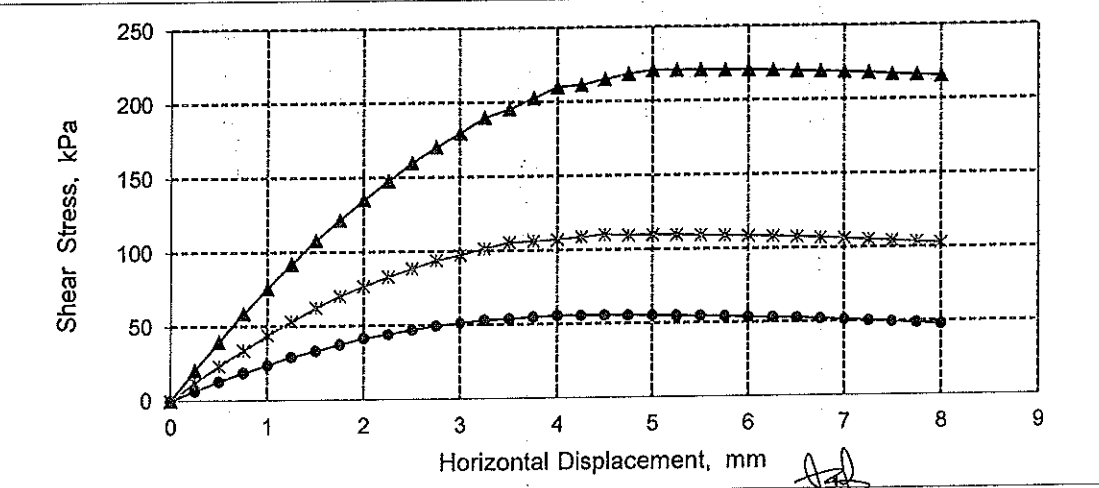
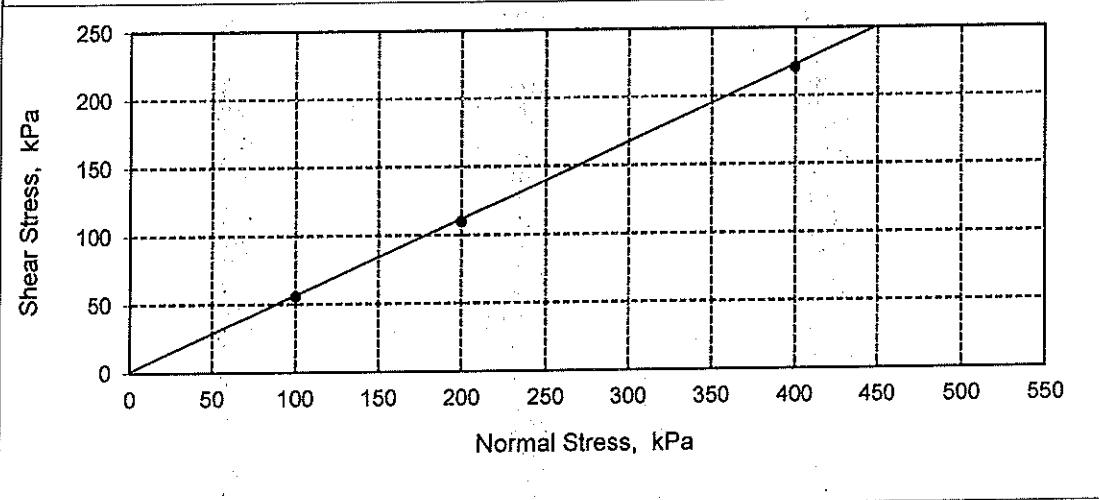
Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 15 / D 15 (37.50 m)

Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 9 / 1 / 2019

INITIAL CONDITIONS					
Specimen No.		S 1	S 2	S 3	
Specimen Weight (g)		131.3	130.8	130.2	
Moisture Content (%)		31.9	32.3	31.9	
Bulk Density (Mg/m ³)		1.823	1.816	1.809	
Dry Density (Mg/m ³)		1.382	1.373	1.371	
SHEARING STAGE					
Normal Stress (kPa)		100	200	400	
Max. Shear Stress (kPa)		55.8	110.1	221.0	c' 1.5 kPa
Displ. at Failure (mm)		4.0	4.5	5.0	
Settlement (mm)		0.2	0.3	0.6	φ' 29 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 15 / D 23 (49.50 m)

Test Size : 60 mm x 60 mm x 20 mm

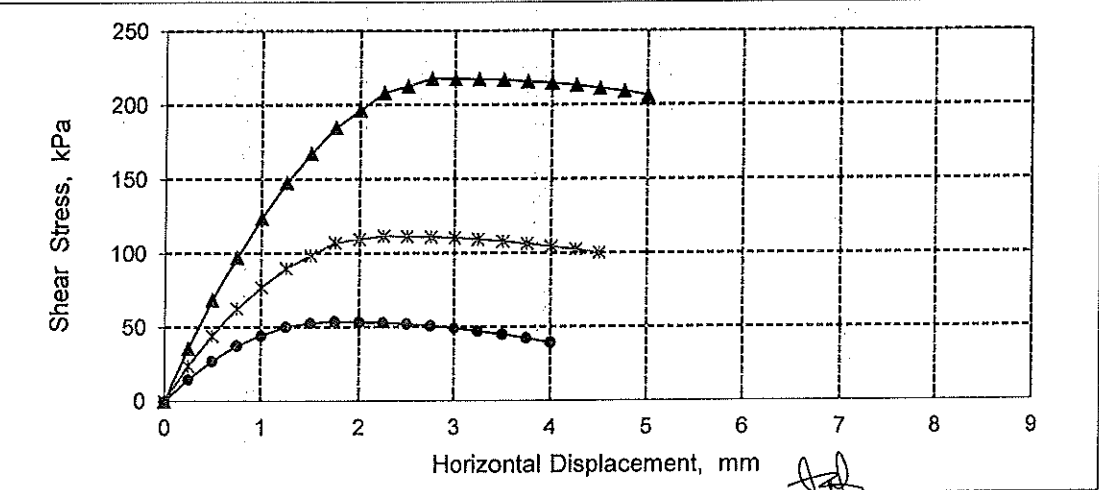
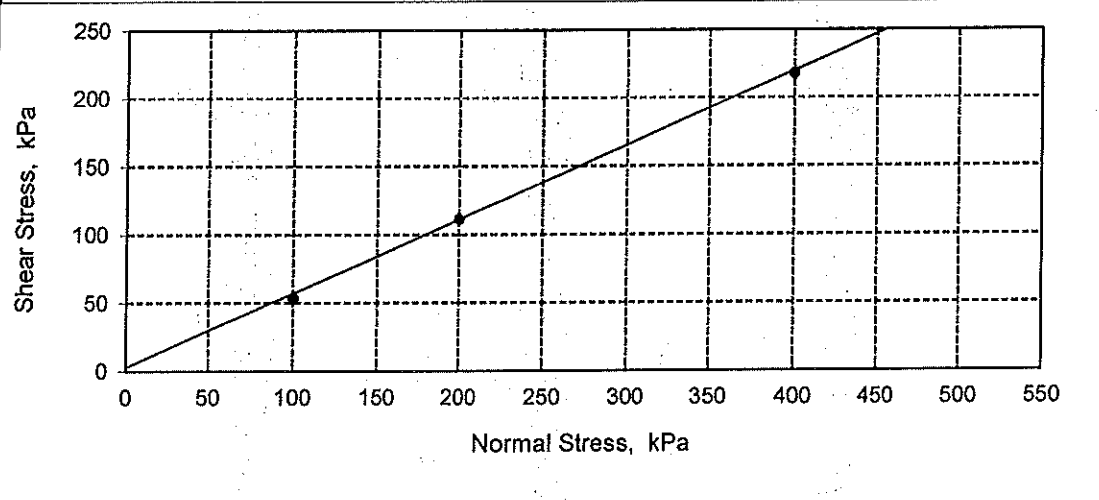
Date Tested : 9 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		150.4	150.2	150.4
Moisture Content (%)		16.2	16.3	16.2
Bulk Density (Mg/m ³)		2.089	2.086	2.089
Dry Density (Mg/m ³)		1.798	1.794	1.798

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		53.9	111.6	218.0
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.2	0.3	0.6

$c' = 3 \text{ kPa}$

$\phi' = 28.5 \text{ deg.}$



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No.	BH15 / UD4 / 12.00m	Test Started	03.01.19
Soil Description	Grey sandy CLAY	Ring No.	12

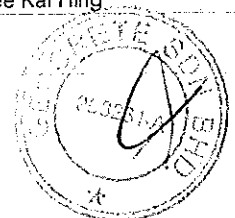
BEFORE TEST

Moist. Content from trimmings:	=	57 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	122.84 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.00 gm	Area (A)	=	1964 mm ²
Wt of sample	=	61.84 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	40.11 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.73 gm	Bulk Density (P)	=	1.574 Mg/m ³
Initial Moisture Content, M _o	=	54 %	Dry Density (PD)	=	1.021 Mg/m ³
Initial Void Ratio, e _o , SG/P _o - 1	=	1.5955			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	90 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1298 mm ⁻¹			
Height of Solid H _s	=	7.706 mm			

AFTER TEST

Wt of sample + Ring	=	120.10 gm	Overall settlement	=	2.072 mm
Wt of Dry sample + Ring	=	101.11 gm	Volume Change	=	4.070 cm ³
Wt of Ring	=	61.00 gm	Final Volume	=	35.22 cm ₃
Wt of Wet sample	=	59.10 gm	Final Bulk Density	=	1.678 Mg/m ³
Wt of Dry sample	=	40.11 gm	Final Dry Density	=	1.139 Mg/m ³
Wt of Moisture	=	18.99 gm	Final Void Ratio, e _f	=	1.3266
Final Moisture Content, M _f	=	47 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	95 %			

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
------------------------	------------------	--------------------------



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No BH15 / UD4 / 12.00m

Date of Report 13.01.19

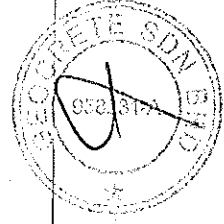
Test started 03.01.19

Ring No. 12

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.5955	0.0000	0				
6.25	0.104	19.896	0.0135	1.5820	0.0135	6.25	0.8370	2.56	17.25	-0.0448
12.5	0.252	19.748	0.0327	1.5628	0.0192	6.25	1.2000	2.25	19.38	-0.0638
25.0	0.380	19.620	0.0493	1.5462	0.0166	12.5	0.5223	1.44	29.87	-0.0552
50.0	0.602	19.398	0.0781	1.5174	0.0288	25.0	0.4581	1.21	34.91	-0.0957
100	0.948	19.052	0.1230	1.4725	0.0449	50.0	0.3635	1.00	41.03	-0.1492
200	1.656	18.344	0.2149	1.3806	0.0919	99.9	0.3863	3.24	11.98	-0.3053
400	2.594	17.406	0.3366	1.2589	0.1217	199.8	0.2697	2.25	15.76	-0.4044
200	2.482	17.518	0.3221	1.2734	-0.0145	-199.8				
50	2.282	17.718	0.2962	1.2994	-0.0260	-149.9				
12.5	2.072	17.928	0.2689	1.3266	-0.0273	-37.5				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)

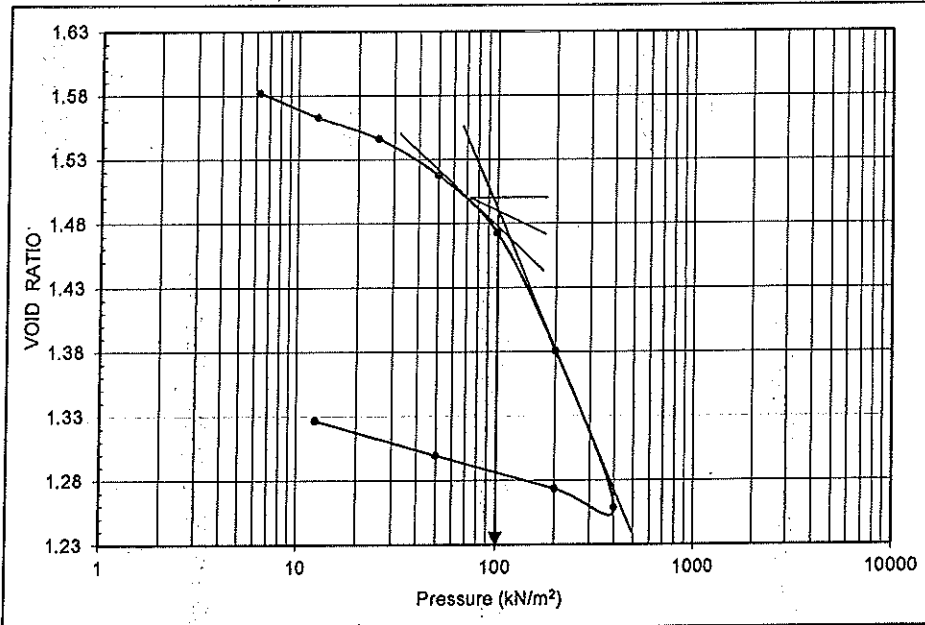


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

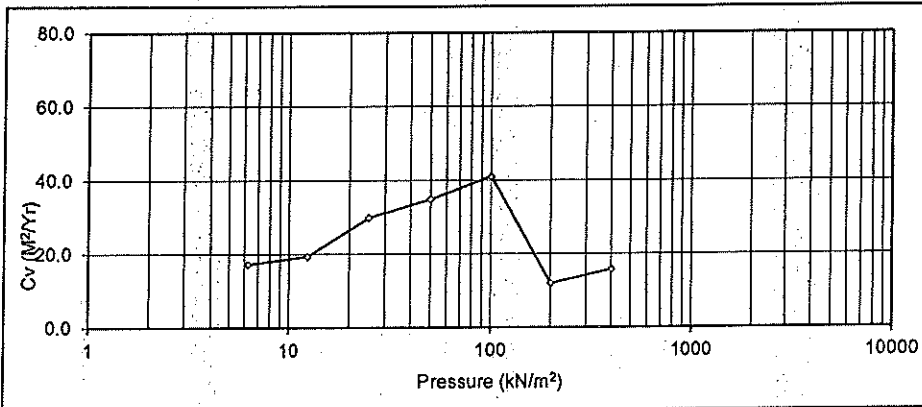
BH REF BH15 / UD4 / 12.00m
 SOIL SAMPLE Grey sandy CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 12



INITIAL

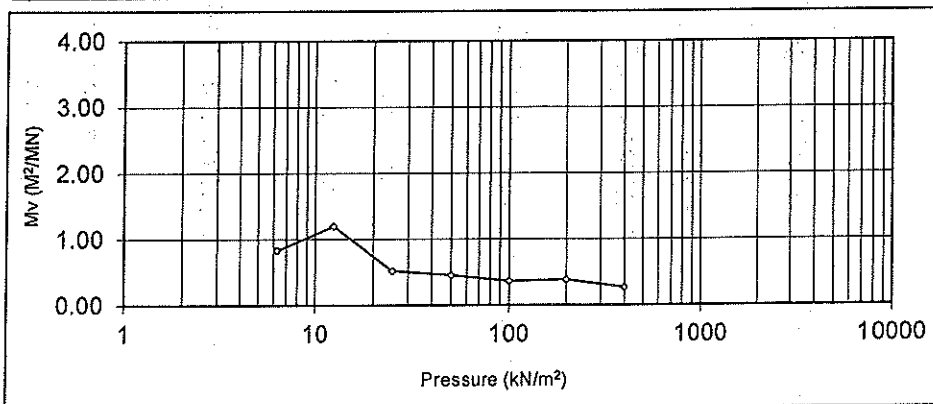
Water content	54	%
Dry Density	1.02	Mg/m ³
Void Ratio	1.5955	
Saturation	90	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL

Water content	47	%
Dry Density	1.14	Mg/m ³
Void Ratio	1.3266	
Saturation	95	%
Height	18	mm
Comp. Index, Cc	0.4044	
Precons. Load	100	kN/m ²

Comp. Ratio, C_R 0.156



GEOCRETE SDN. BHD.

Company No 958231 A

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Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No.	BH15 / UD10 / 30.00m	Test Started	03.01.19
Soil Description	Grey sandy CLAY	Ring No.	13

BEFORE TEST

Moist. Content from trimmings:	=	52 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	123.09 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.43 gm	Area (A)	=	1964 mm ²
Wt of sample	=	62.66 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	42.11 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.55 gm	Bulk Density (P)	=	1.595 Mg/m ³
Initial Moisture Content, M _o	=	49 %	Dry Density (PD)	=	1.072 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	1.4816			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88 %			
V. Ratio Change Factor F, $\frac{e_o}{1+e_o}$	=	0.1241 mm ⁻¹			
Height of Solid Hs	=	8.059 mm			

AFTER TEST

Wt of sample + Ring	=	120.54 gm	Overall settlement	=	2.162 mm
Wt of Dry sample + Ring	=	102.54 gm	Volume Change	=	4.247 cm ³
Wt of Ring	=	60.43 gm	Final Volume	=	35.04 cm ³
Wt of Wet sample	=	60.11 gm	Final Bulk Density	=	1.716 Mg/m ³
Wt of Dry sample	=	42.11 gm	Final Dry Density	=	1.202 Mg/m ³
Wt of Moisture	=	18.00 gm	Final Void Ratio, e _f	=	1.2133
Final Moisture Content, M _f	=	43 %			
Final Saturation, S _f , $\frac{M_f \times SG}{e_f}$	=	94 %			

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
------------------------	------------------	--------------------------



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No	BH15 / UD10 / 30.00m	Test started	03.01.19
		Ring No.	13

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	Δe	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	Cc	
0	0.000	20.000	0.0000	1.4816	0.0000	0					
6.25	0.230	19.770	0.0285	1.4531	0.0285	6.25	1.8628	1.96	22.39		-0.0948
12.5	0.460	19.540	0.0571	1.4245	0.0285	6.25	1.8848	4.00	10.72		-0.0948
25.0	0.804	19.196	0.0998	1.3818	0.0427	12.5	1.4347	1.96	21.24		-0.1418
50.0	1.370	18.630	0.1700	1.3116	0.0702	25.0	1.2162	2.56	15.51		-0.2333
100	1.980	18.020	0.2457	1.2359	0.0757	50.0	0.6775	3.61	10.33		-0.2515
200	2.632	17.368	0.3266	1.1550	0.0809	99.9	0.3757	1.21	28.72		-0.2688
100	2.530	17.470	0.3139	1.1677	-0.0127	-99.9					
50	2.382	17.618	0.2956	1.1860	-0.0184	-50.0					
12.5	2.162	17.898	0.2683	1.2133	-0.0273	-37.5					

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



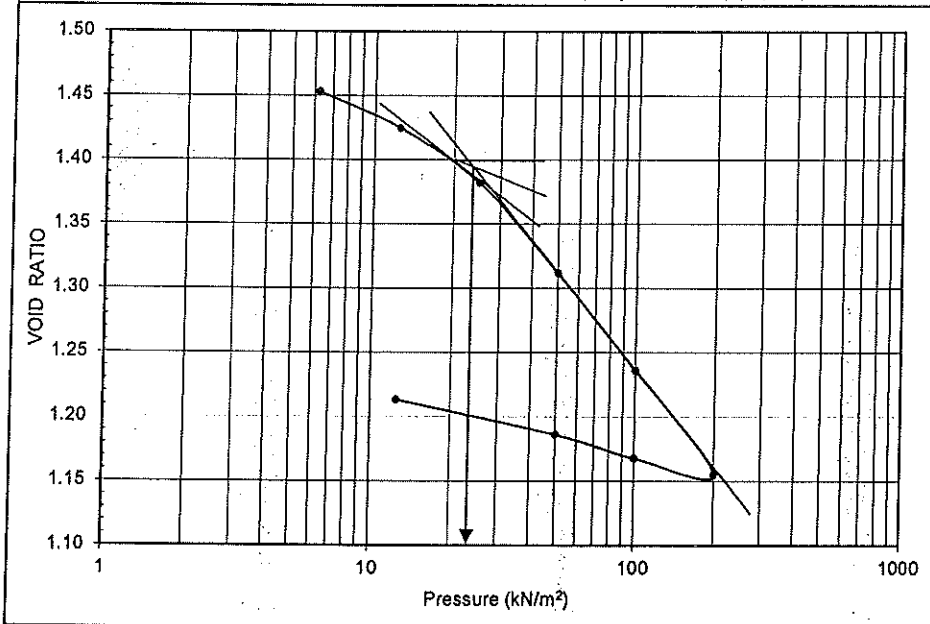
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH15 / UD10 / 30.00m

SOIL SAMPLE Grey sandy CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 13



INITIAL

Water content 49 %

Dry Density 1.07 Mg/m³

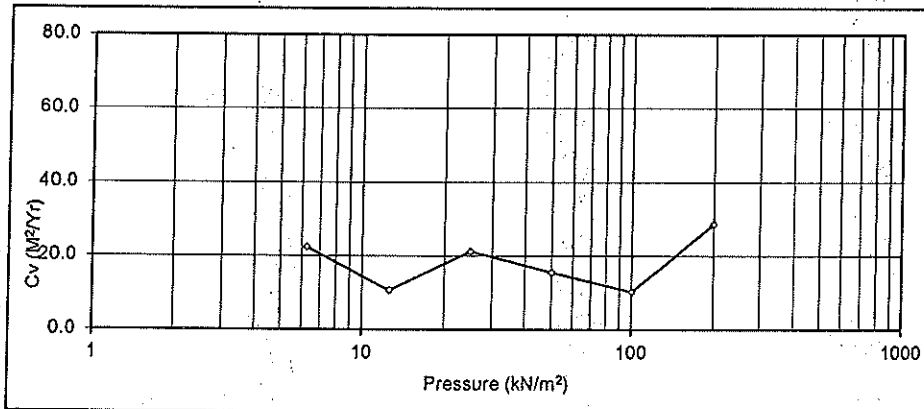
Void Ratio 1.4816

Saturation 88 %

Height 20 mm

Diameter 50 mm

Sp. Gravity 2.660



FINAL

Water content 43 %

Dry Density 1.20 Mg/m³

Void Ratio 1.2133

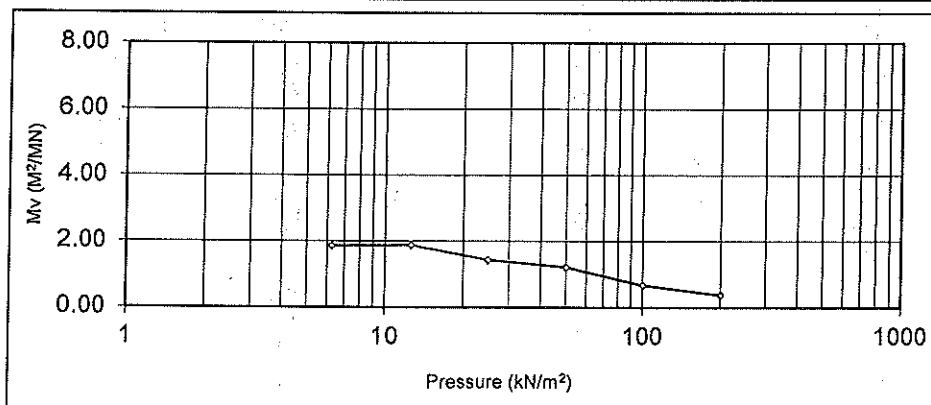
Saturation 94 %

Height 18 mm

Comp. Index, C_c 0.2688

Precons. Load 23 kN/m²

Comp. Ratio, C_R 0.108



Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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GEOCRETE SDN. BHD.

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No. 22, Jalan P4/8,

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
	BH16 / UD5 / 15.00m	Test Started	22.12.18
Sample No.	Greenish grey CLAY	Ring No.	6
Soil Description			

BEFORE TEST

Moist. Content from trimmings:	=	84 %		SG (Measured)	=	2.610
Wt of sample + Ring	=	113.95 gm		Diameter (D)	=	50 mm
Wt of Ring	=	57.21 gm		Area (A)	=	1964 mm ²
Wt of sample	=	56.74 gm		Thickness (H)	=	20 mm
Wt of Dry sample	=	31.35 gm		Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	25.39 gm		Bulk Density (P)	=	1.444 Mg/m ³
Initial Moisture Content, M _o	=	81 %		Dry Density (PD)	=	0.798 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	2.2707				
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	93 %				
V. Ratio Change Factor F, $\frac{1+e_o}{H}$	=	0.1635 mm ⁻¹				
Height of Solid H _s	=	6.115 mm				

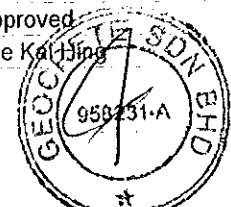
AFTER TEST

Wt of sample + Ring	=	111.07 gm		Overall settlement	=	2.620 mm
Wt of Dry sample + Ring	=	88.56 gm		Volume Change	=	5.146 cm ³
Wt of Ring	=	57.21 gm		Final Volume	=	34.14 cm ³
Wt of Wet sample	=	53.86 gm		Final Bulk Density	=	1.578 Mg/m ³
Wt of Dry sample	=	31.35 gm		Final Dry Density	=	0.918 Mg/m ³
Wt of Moisture	=	22.51 gm		Final Void Ratio, e _r	=	1.8422
Final Moisture Content, M _f	=	72 %				
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	102 %				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Jing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
BH16 / UD5 / 15.00m

Sample No

Date of Report
Test started
Ring No.

02.01.19
22.12.18
6

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION		COMPRESSION INDEX		
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	Cc	
0	0.000	20.000	0.0000	2.2707	0.0000	0					
12.5	0.068	19.932	0.0111	2.2596	0.0111	12.5	0.2731	3.61	12.26		-0.0369
25.0	0.290	19.710	0.0474	2.2233	0.0363	12.5	0.9018	1.69	25.80		-0.1206
50.0	0.858	19.142	0.1403	2.1304	0.0929	25.0	1.1878	3.61	11.60		-0.3086
100	1.850	18.150	0.3025	1.9681	0.1622	50.0	1.0939	3.61	10.69		-0.5390
200	3.486	16.514	0.5701	1.7006	0.2675	99.9	0.9914	4.00	8.34		-0.8888
100	3.292	16.708	0.5384	1.7323	-0.0317	-99.9					
50	2.946	17.054	0.4818	1.7889	-0.0566	-50.0					
12.5	2.620	17.380	0.4285	1.8422	-0.0533	-37.5					

Operator

Shyam Nath

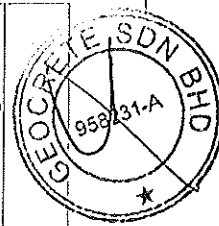
Checked

Chris

Approved

Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)

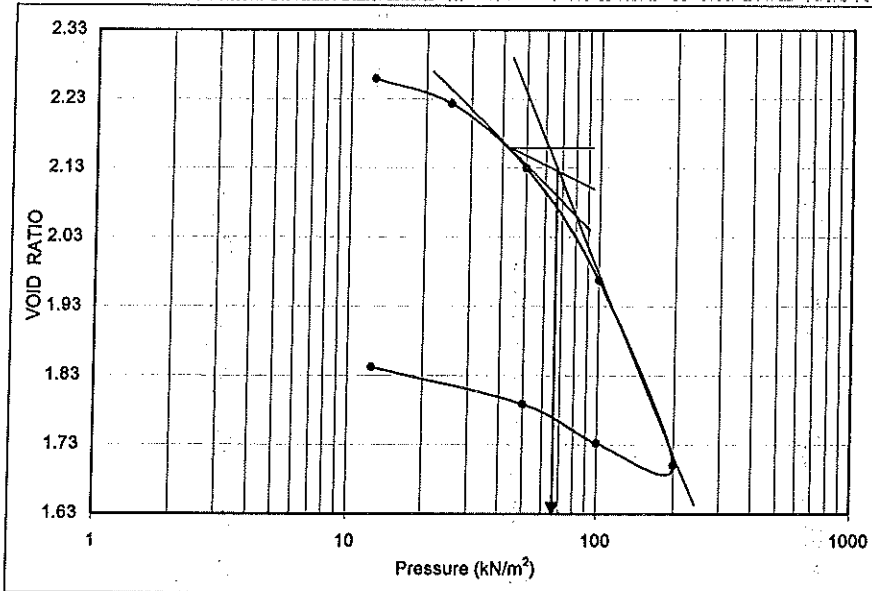


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

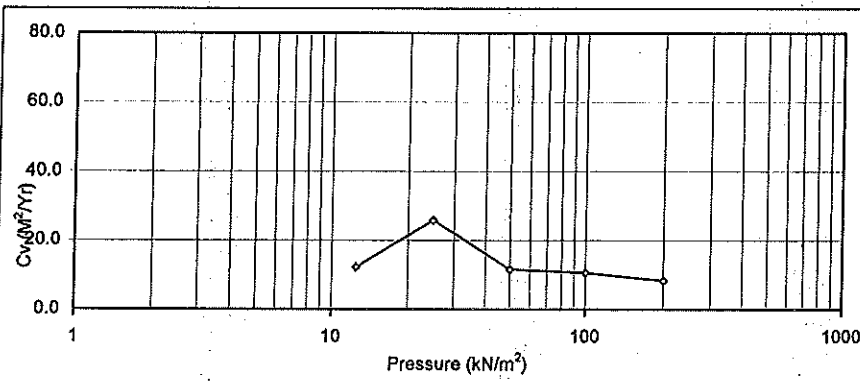
BH REF BH16 / UD5 / 15.00m
 SOIL SAMPLE Greenish grey CLAY

Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 6



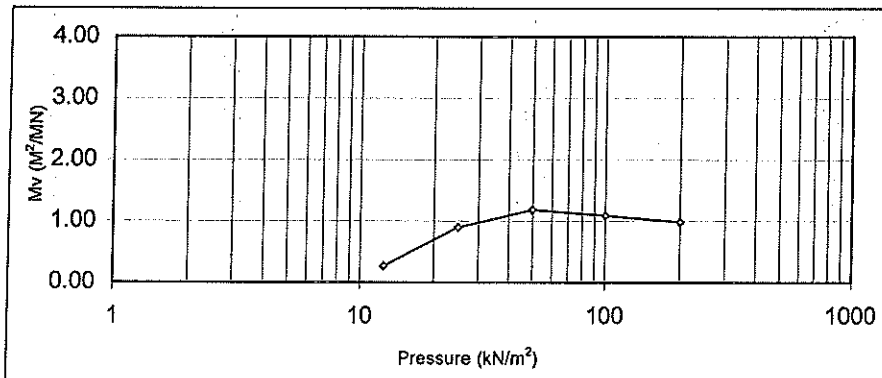
INITIAL

Water content	81	%
Dry Density	0.80	Mg/m ³
Void Ratio	2.2707	
Saturation	93	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.610	



FINAL

Water content	72	%
Dry Density	0.92	Mg/m ³
Void Ratio	1.8422	
Saturation	102	%
Height	17	mm
Comp. Index, C _c	0.8888	
Precons. Load	65	kN/m ²



Comp. Ratio, C_R 0.272

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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GEOCRETE SDN. BHD.

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
Sample No.	BH16 / UD10 / 30.00m	Test Started	22.12.18
Soil Description	Dark grey CLAY	Ring No.	7

BEFORE TEST

Moist. Content from trimmings:	=	61	%	SG (Measured)	=	2.610
Wt of sample + Ring	=	119.62	gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.69	gm	Area (A)	=	1964 mm ²
Wt of sample	=	57.93	gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	37.16	gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	20.77	gm	Bulk Density (P)	=	1.475 Mg/m ³
Initial Moisture Content, M ₀	=	56	%	Dry Density (PD)	=	0.946 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.7593				
Initial Saturation, S ₀ ;	$\frac{M_0 \times SG}{e_0}$	=	83	%		
V. Ratio Change Factor F,	$\frac{1+e_0}{H}$	=	0.1380	mm ⁻¹		
Height of Solid	H _s	=	7.248	mm		

AFTER TEST

Wt of sample + Ring	=	118.40	gm	Overall settlement	=	2.320	mm
Wt of Dry sample + Ring	=	98.85	gm	Volume Change	=	4.557	cm ³
Wt of Ring	=	61.69	gm	Final Volume	=	34.73	cm ³
Wt of Wet sample	=	56.71	gm	Final Bulk Density	=	1.633	Mg/m ³
Wt of Dry sample	=	37.16	gm	Final Dry Density	=	1.070	Mg/m ³
Wt of Moisture	=	19.55	gm	Final Void Ratio, e _r	=	1.4392	
Final Moisture Content, M _f	=	53	%				
Final Saturation, S ₀	$\frac{M_f \times SG}{e_r}$	=	95	%			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



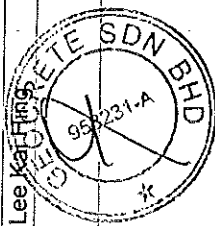
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	02.01.19
Sample No	BH16 / UD10 / 30.00m	Test started	22.12.18
		Ring No.	7

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION			COMPRESSION INDEX Cc
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.7593	0.0000	0				
6.25	0.054	19.946	0.0075	1.7519	0.0075	6.25	0.4335	12.25	3.61	-0.0248
12.5	0.220	19.780	0.0304	1.7290	0.0229	6.25	1.3438	3.61	12.13	-0.0761
25.0	0.742	19.258	0.1024	1.6569	0.0720	12.5	2.1701	4.00	10.57	-0.2393
50.0	1.624	18.376	0.2241	1.5363	0.1217	25.0	1.9214	3.61	10.89	-0.4043
100	2.588	17.412	0.3571	1.4023	0.1330	50.0	1.1081	7.84	4.53	-0.4419
50	2.586	17.414	0.3568	1.4025	-0.0003	-50.0				
25	2.472	17.528	0.3411	1.4183	-0.0157	-25.0				
12.5	2.320	17.680	0.3201	1.4392	-0.0210	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kah King



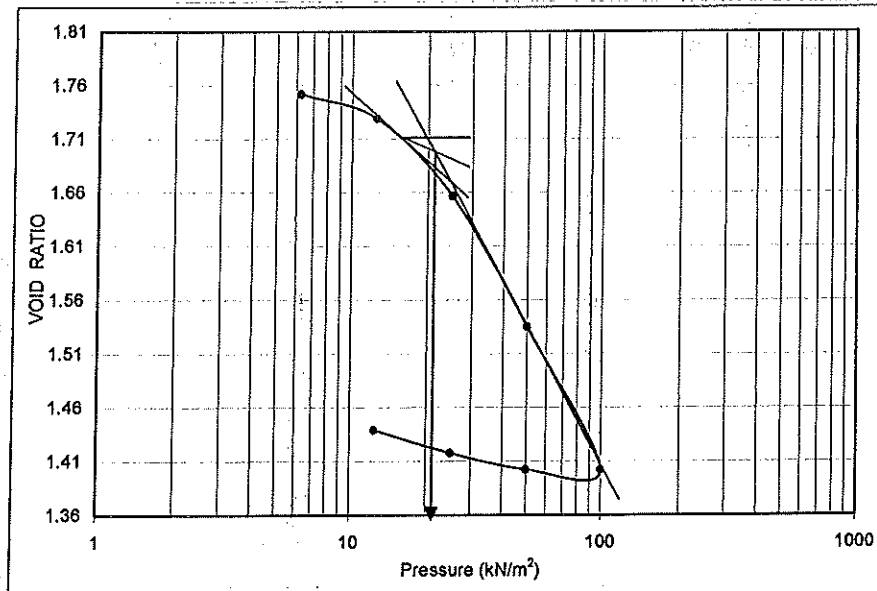
GEOCRETE SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

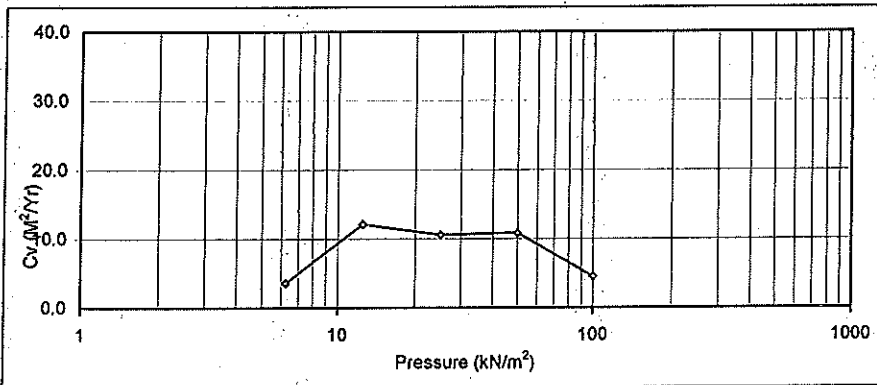
BH REF BH16 / UD10 / 30.00m
 SOIL SAMPLE Dark grey CLAY

Date of Report 02.01.19
 Test started 22.12.18
 Ring No. 7



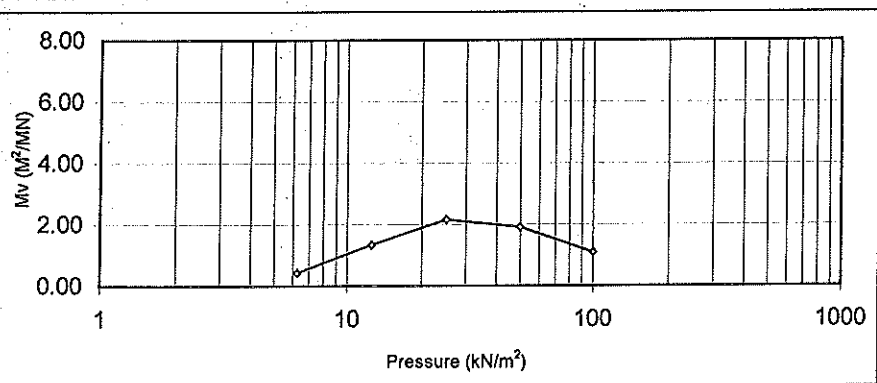
INITIAL

Water content 56 %
 Dry Density 0.95 Mg/m³
 Void Ratio 1.7593
 Saturation 83 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.610



FINAL

Water content 53 %
 Dry Density 1.07 Mg/m³
 Void Ratio 1.4392
 Saturation 95 %
 Height 18 mm
 Comp. Index, C_c 0.4419
 Precons. Load 21 kN/m²



Comp. Ratio, C_R 0.160

Operator Shyam Nath	Checked Chris	Approved Lee Kai Ming
------------------------	------------------	--------------------------



Total Stress Triaxial Compression

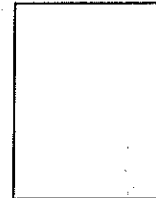
Unconsolidated Undrained

Sample details

Depth : 15.00m
Description : Greenish grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	130.12	130.77	131.63
Bulk Density ρ (Mg/m ³)	1.510	1.518	1.528
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



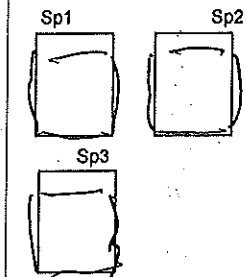
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	110	220	440
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	66	64	60
Dry Density ρ_{d0} (Mg/m ³)	0.91	0.93	0.95
Voids Ratio e_0	1.87	1.81	1.74
Deg of Saturation S_0 %	92.26	91.56	90.46

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	50.06	81.79	85.31
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	49.86	81.59	85.11
Strain at Failure ϵ_f %	9.47	11.51	8.49
Shear Strength c_u (kPa)	25.03	40.90	42.66
Moisture Content w_f %	66	64	60
Dry Density ρ_{df} (Mg/m ³)	0.91	0.93	0.95
Voids Ratio e_f	1.87	1.81	1.74
Deg of Saturation S_f %	92.26	91.56	90.46

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

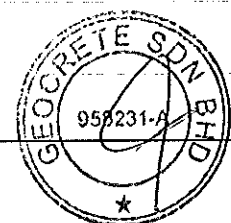
Test Name : UU

Date of Test : 23.12.18

Sample : UD5

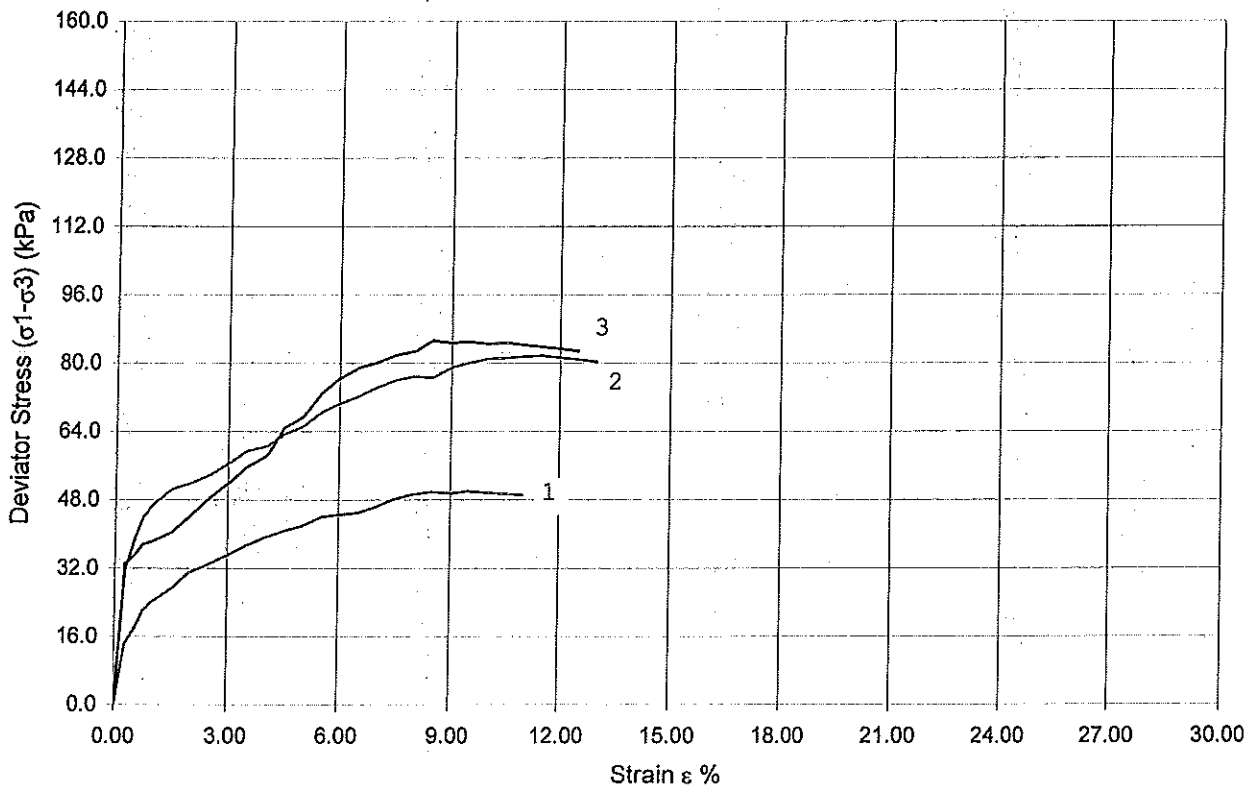
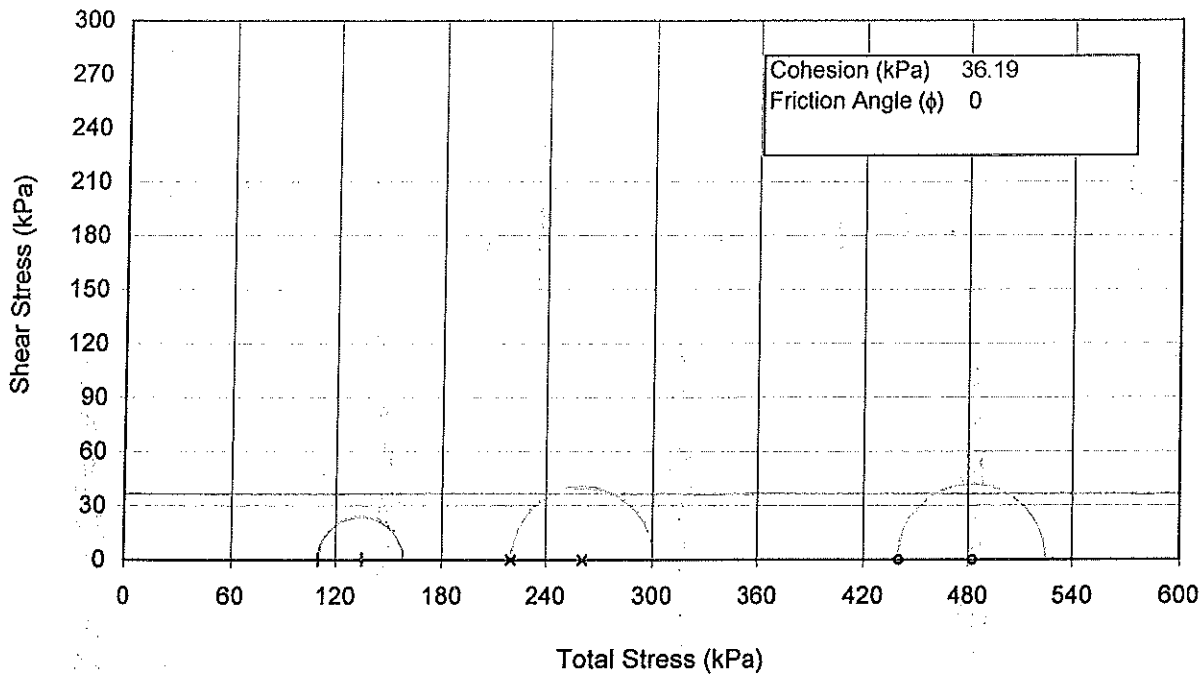
Borehole : BH16

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

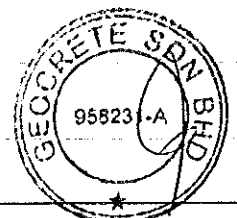
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 23.12.18

Sample : UD5
 Borehole : BH16

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

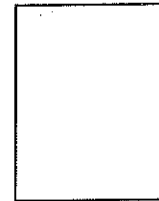
Unconsolidated Undrained

Sample details

Depth : 18.00m
Description : Greenish grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	131.25	133.45	134.50
Bulk Density ρ (Mg/m ³)	1.524	1.549	1.561
Particle Density ρ_s	2.60	2.60	2.60

Sketch showing specimen location in original sample



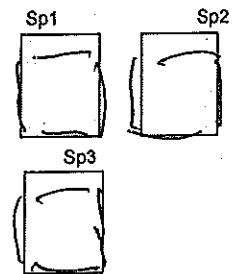
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	65	63	59
Dry Density ρ_{d0} (Mg/m ³)	0.92	0.95	0.98
Voids Ratio e_0	1.82	1.73	1.64
Deg of Saturation S_0 %	93.31	94.32	92.84

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	54.08	67.96	75.37
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	53.88	67.76	75.17
Strain at Failure ϵ_f %	7.50	8.49	10.00
Shear Strength c_u (kPa)	27.04	33.98	37.69

Failure Sketch



Moisture Content w_f %	65	63	59
Dry Density ρ_{df} (Mg/m ³)	0.92	0.95	0.98
Voids Ratio e_f	1.82	1.73	1.64
Deg of Saturation S_f %	93.31	94.32	92.84

Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 23.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

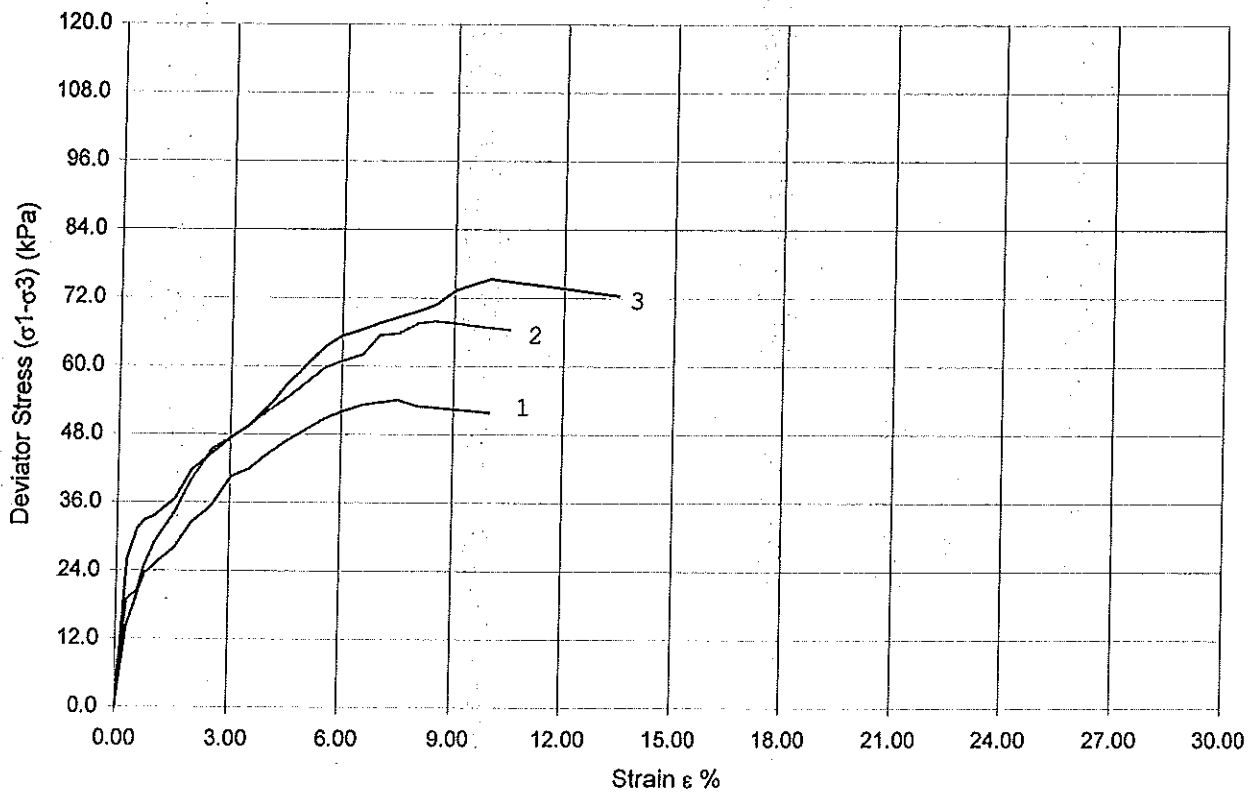
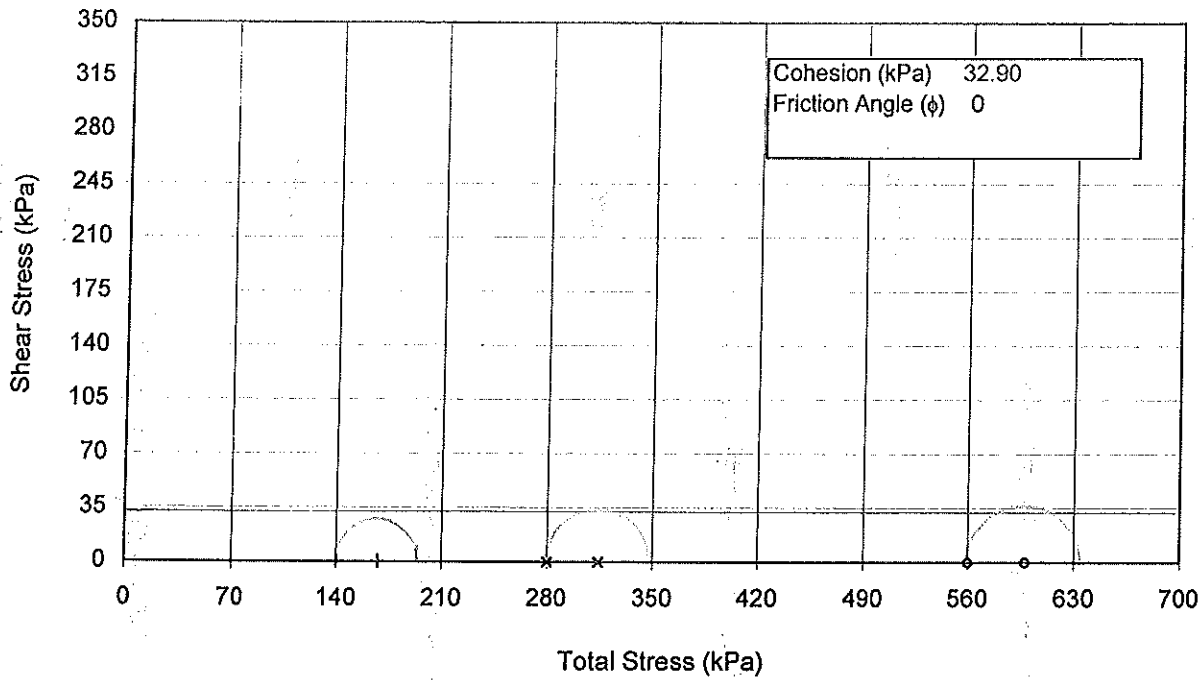
Sample : UD6
Borehole : BH16
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 23.12.18

Sample : UD6
Borehole : BH16

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

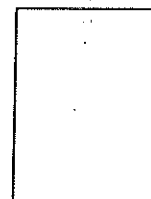
Unconsolidated Undrained

Sample details

Depth : 30.00m
Description : Dark grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	133.35	135.82	138.25
Bulk Density ρ (Mg/m ³)	1.548	1.577	1.605
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



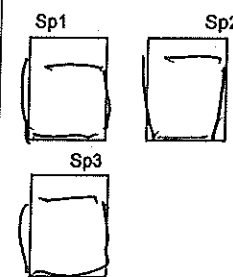
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	230	460	920
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	87	85	83
Dry Density ρ_{d0} (Mg/m ³)	0.83	0.85	0.88
Voids Ratio e_0	2.16	2.06	1.98
Deg of Saturation S_0 %	105.56	107.42	109.73

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	11.08	12.72	15.26
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	10.88	12.52	15.06
Strain at Failure ϵ_f %	6.51	8.03	8.03
Shear Strength c_u (kPa)	5.54	6.36	7.63
Moisture Content w_f %	87	85	83
Dry Density ρ_{df} (Mg/m ³)	0.83	0.85	0.88
Voids Ratio e_f	2.16	2.06	1.98
Deg of Saturation S_f %	105.56	107.42	109.73

Failure Sketch



Notes : Plastic Plastic Plastic

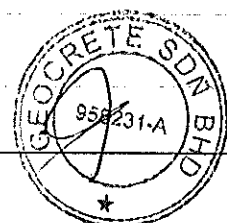
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 23.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

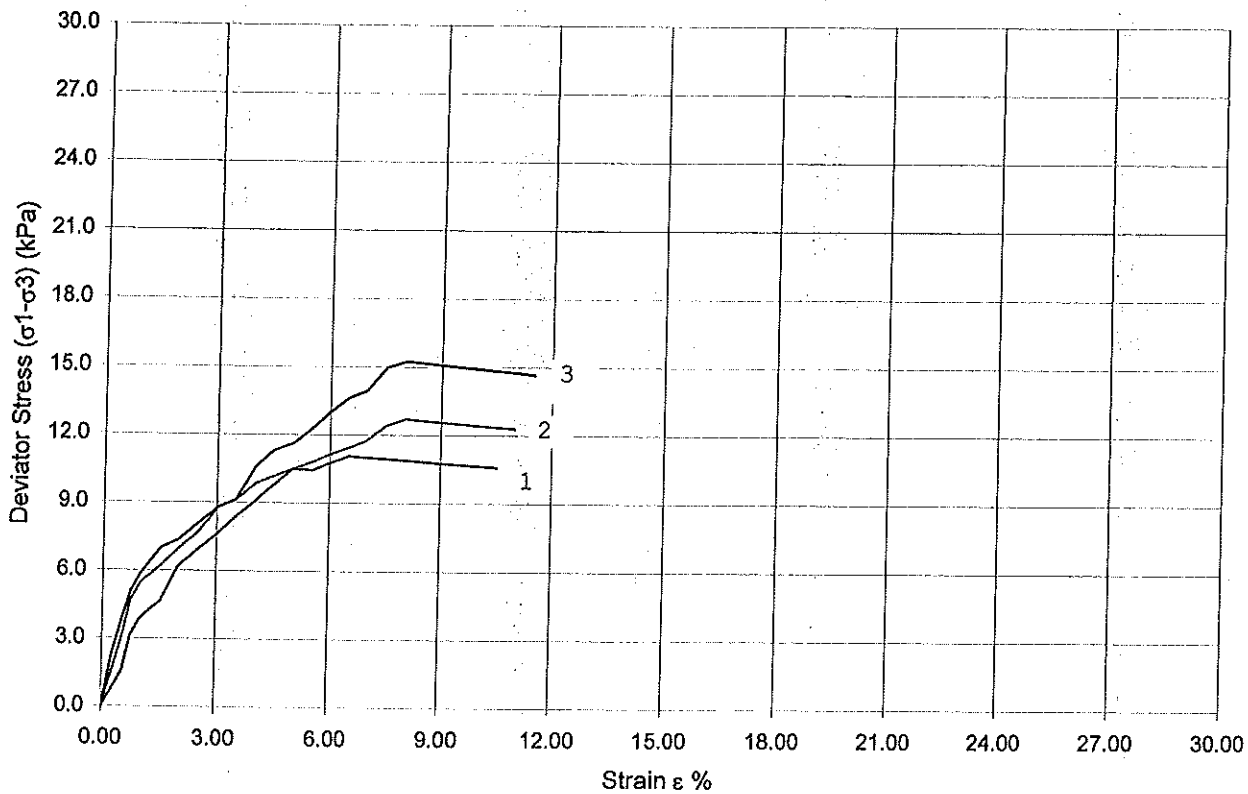
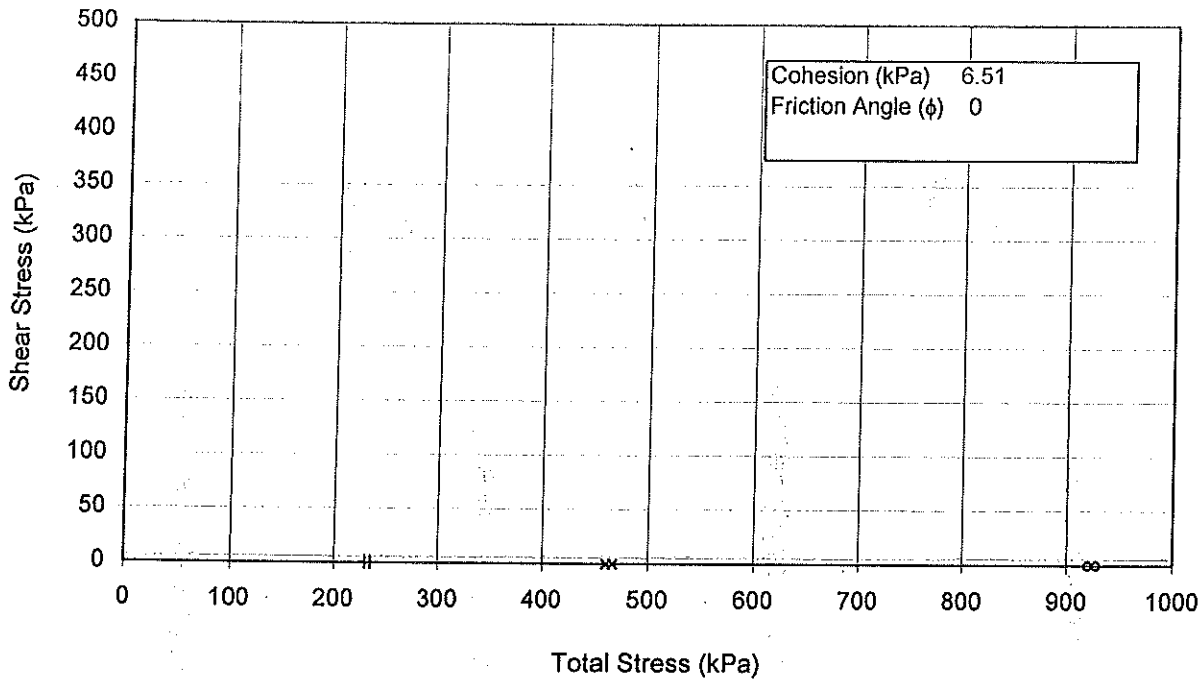
Sample : UD10
Borehole : BH16
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

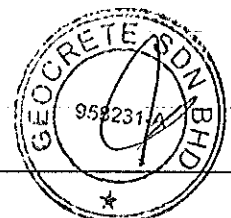
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 23.12.18

Sample : UD10
 Borehole : BH16

Approved :
 Lee Kai Hing

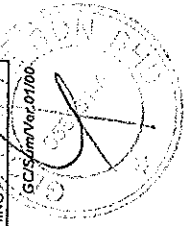


SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BEHEAD (Co. No.958231 - A)			PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR													REF : L/081/18/139/18 DATE : 12.01.19									
SAMPLE AND SPECIMEN DETAILS.		Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG LIMITS			Linear Shrinkage (%)	SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator)	SHEAR BOX TEST		CU TEST		UU Triaxial CONSOLIDATION TEST		CHEMICAL TEST					
Borehole No.	Specimen				Depth (m)	Liquid Limit (%)	Plastic Limit (%)		Plastic Index (%)	Clay (%)	Silt (%)	Sand (%)		Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)
BH17	UD1	3.00	70	1.52	0.90			59	36	5	0														
	UD3	9.00	35	1.67	1.16		38	22	16	6.0	0	2.65									2.8	0.18	0.75	7.8	
	UD6	18.00	22	1.93	1.58		35	21	14		0					10.05	0	75	0.174		1.4	<0.01	0.40	8.0	
	UD11	33.00	64	1.54	0.95		49	25	24	9.5	0					29.92	0	39	0.607		2.6	0.09	0.84	8.1	
	D14	37.50	46	NA	NA		45	24	21		0														
	D19	45.00	47	NA	NA		43	24	19	8.6	0														
	D20	46.50	22	1.99	1.69			28	20	52	0	2.65													
	D24	52.50	19	NA	NA			21	77	2															
	D25	54.00	21	NA	NA			18	13	68	1	2.68													
	D29	60.00	37	NA	NA			47	37	16	0														
Note : NES = NOT ENOUGH SAMPLE													NP = NON PLASTIC					NA = NOT APPLICABLE							

Remarks : BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

APPROVED BY: LEE KAI HING
 CHECKED BY: CHRIS



SUM

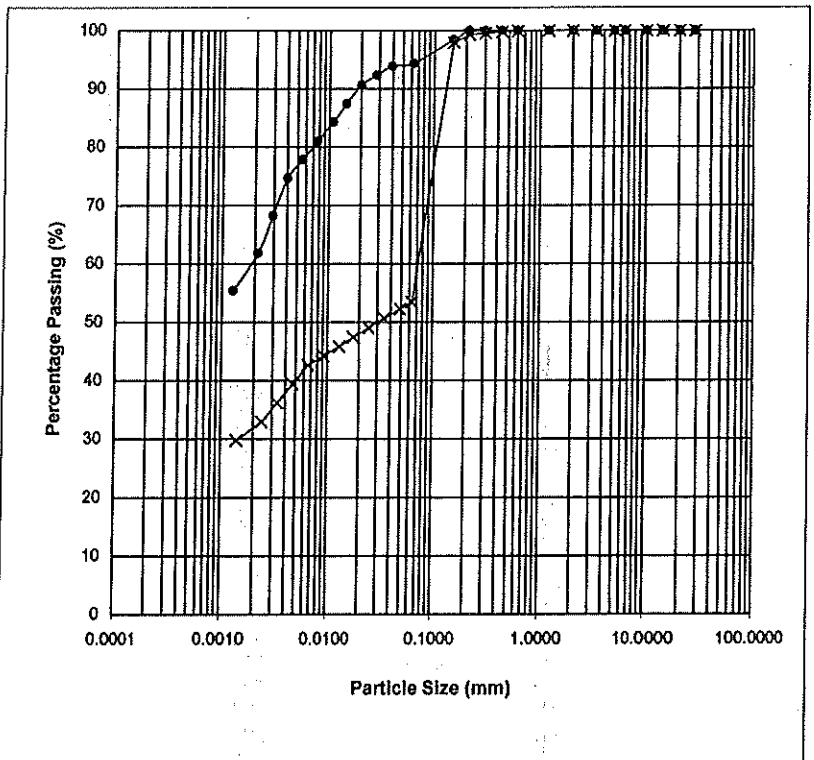
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

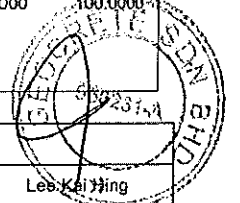
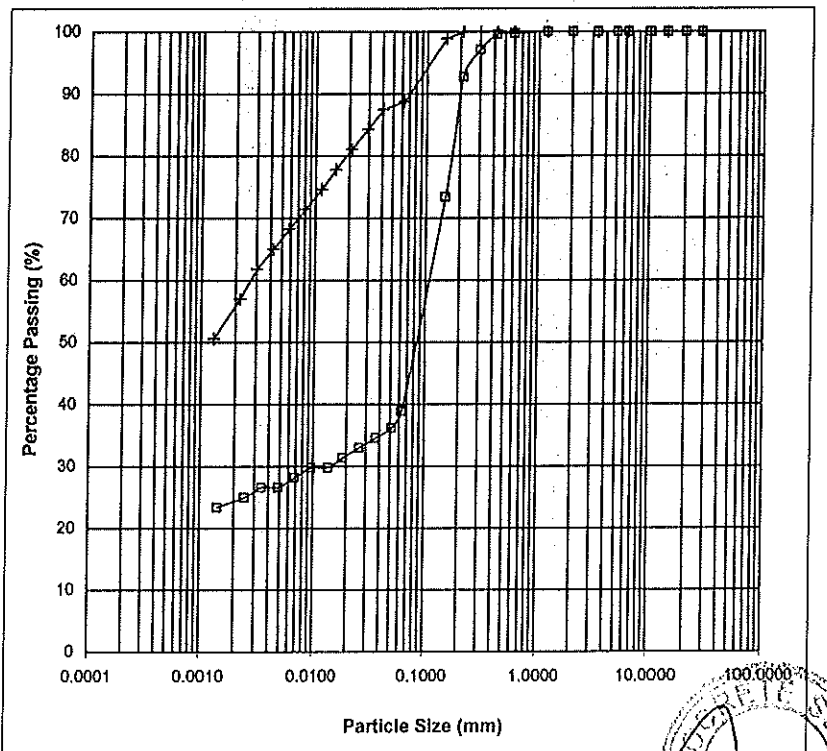
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	100
0.212	100	0.212	99
0.150	98	0.150	98
0.063	94	0.063	53
0.0393	94	0.0486	52
0.0280	92	0.0346	51
0.0200	91	0.0246	49
0.0144	87	0.0175	47
0.0107	84	0.0129	46
0.0077	81	0.0092	44
0.0056	78	0.0065	43
0.0040	75	0.0047	39
0.0029	68	0.0033	36
0.0021	62	0.0024	33
0.0013	55	0.0014	30
Clay (%)	59	Clay (%)	31
Silt (%)	36	Silt (%)	22
Sand (%)	5	Sand (%)	47
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH17	UD1	3.00	04.01.19
x	BH17	UD3	9.00	04.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	97	0.300	100
0.212	93	0.212	100
0.150	73	0.150	99
0.063	39	0.063	89
0.0518	36	0.0408	87
0.0368	35	0.0294	84
0.0262	33	0.0212	81
0.0186	31	0.0152	78
0.0137	30	0.0113	75
0.0097	30	0.0081	71
0.0069	28	0.0058	68
0.0049	27	0.0042	65
0.0035	27	0.0030	62
0.0025	25	0.0022	57
0.0014	23	0.0013	51
Clay (%)	24	Clay (%)	54
Silt (%)	15	Silt (%)	35
Sand (%)	61	Sand (%)	11
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH17	UD6	18.00	04.01.19
+	BH17	UD11	33.00	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Jing
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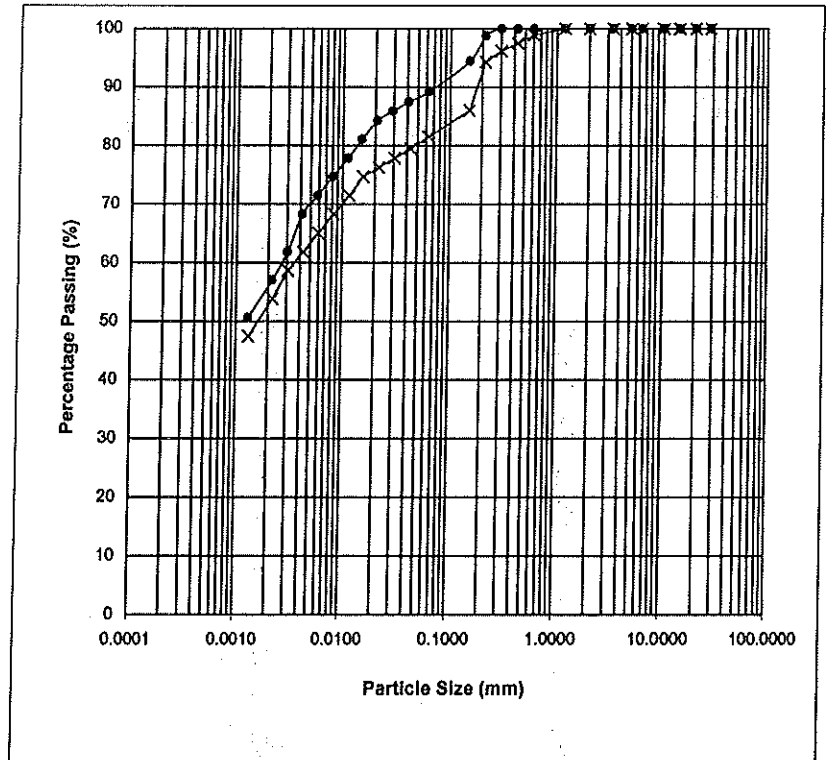
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

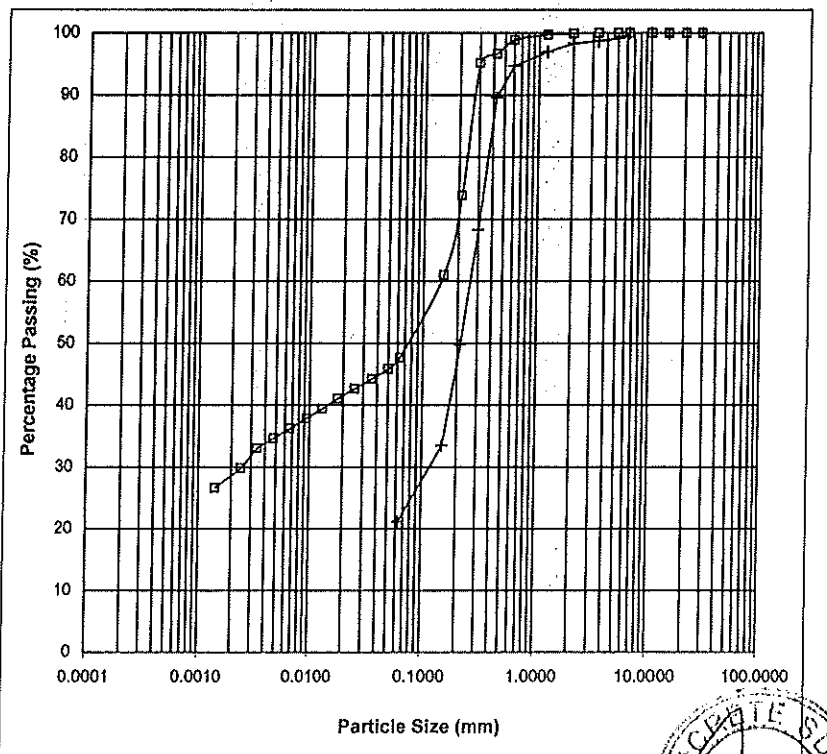
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	99
0.425	100	0.425	98
0.300	100	0.300	96
0.212	99	0.212	94
0.150	94	0.150	86
0.063	89	0.063	82
0.0408	87	0.0427	79
0.0291	86	0.0305	78
0.0208	84	0.0217	76
0.0150	81	0.0155	75
0.0111	78	0.0115	71
0.0080	75	0.0083	68
0.0058	71	0.0059	65
0.0041	68	0.0043	62
0.0030	62	0.0031	59
0.0022	57	0.0022	54
0.0013	51	0.0013	47
Clay (%)		Clay (%)	51
Silt (%)		Silt (%)	31
Sand (%)		Sand (%)	18
Gravel (%)		Gravel (%)	0
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH17	D14	37.50	04.01.19
x	BH17	D19	45.00	04.01.19



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	99
3.35	100	3.35	99
2.00	100	2.00	98
1.18	100	1.18	97
0.600	99	0.600	95
0.425	97	0.425	90
0.300	95	0.300	68
0.212	74	0.212	50
0.150	61	0.150	34
0.063	48	0.063	21
0.0499	46		
0.0355	44		
0.0253	43		
0.0180	41		
0.0132	39		
0.0094	38		
0.0067	36		
0.0048	35		
0.0034	33		
0.0024	30		
0.0014	27		
Clay (%)		Clay (%)	21
Silt (%)		Silt (%)	20
Sand (%)		Sand (%)	77
Gravel (%)		Gravel (%)	2
Total (%)		Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH17	D20	46.50	04.01.19
+	BH17	D24	52.50	04.01.19



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	

Total Stress Triaxial Compression

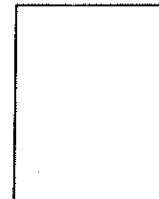
Unconsolidated Undrained

Sample details

Depth : 9.00m
 Description : Grey sandy CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_o (gr)	142.08	144.10	146.34
Bulk Density ρ (Mg/m ³)	1.649	1.673	1.699
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



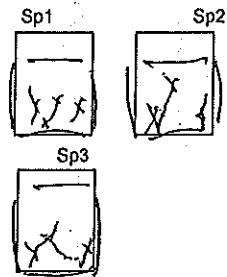
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	70	140	280
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_o %	47	44	43
Dry Density ρ_{d0} (Mg/m ³)	1.12	1.16	1.19
Voids Ratio e_o	1.36	1.29	1.23
Deg of Saturation S_o %	91.58	91.30	92.46

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	11.14	16.34	32.84
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	10.94	16.14	32.64
Strain at Failure ϵ_f %	5.99	5.99	5.53
Shear Strength c_u (kPa)	5.57	8.17	16.42
Moisture Content w_f %	47	44	43
Dry Density ρ_{df} (Mg/m ³)	1.12	1.16	1.19
Voids Ratio e_f	1.36	1.29	1.23
Deg of Saturation S_f %	91.58	91.30	92.46

Failure Sketch



Notes : Intermediate Intermediate Intermediate

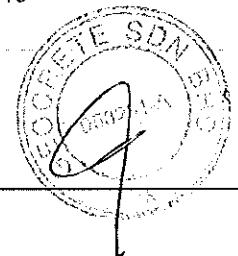
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 05.01.19

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

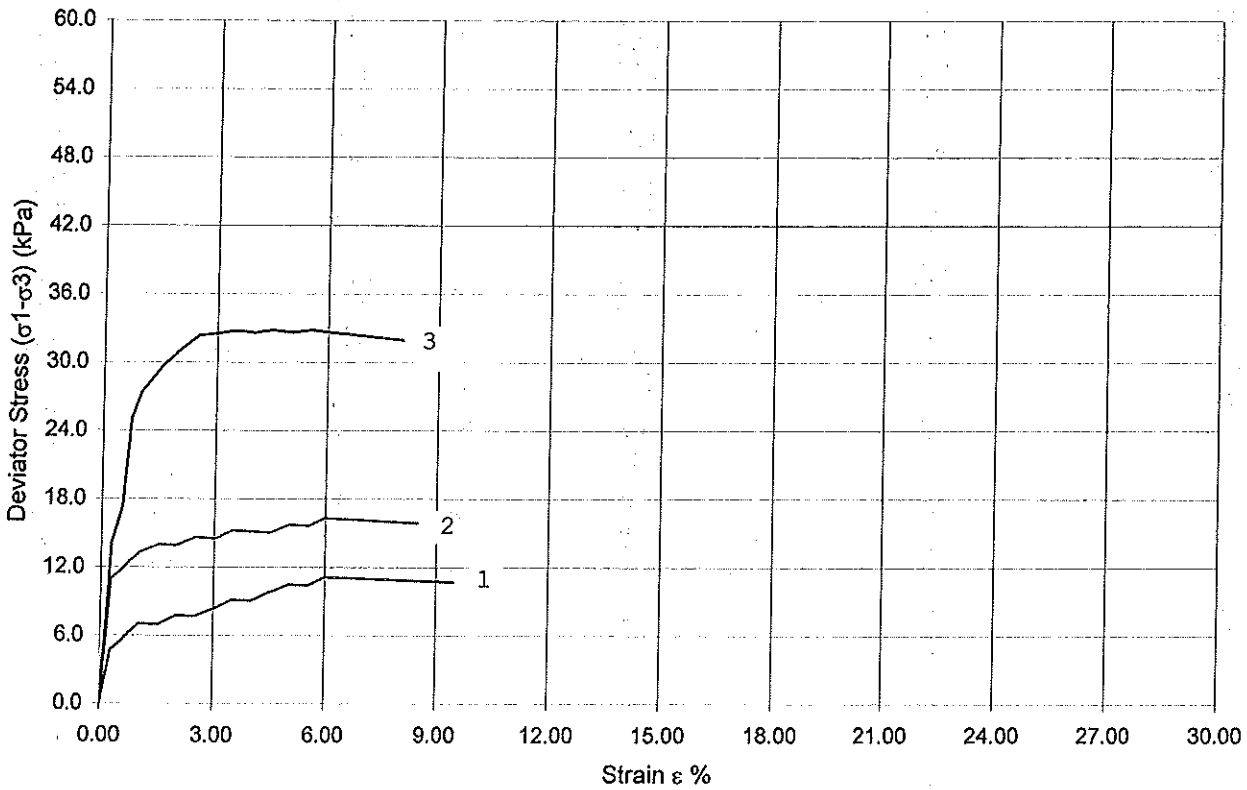
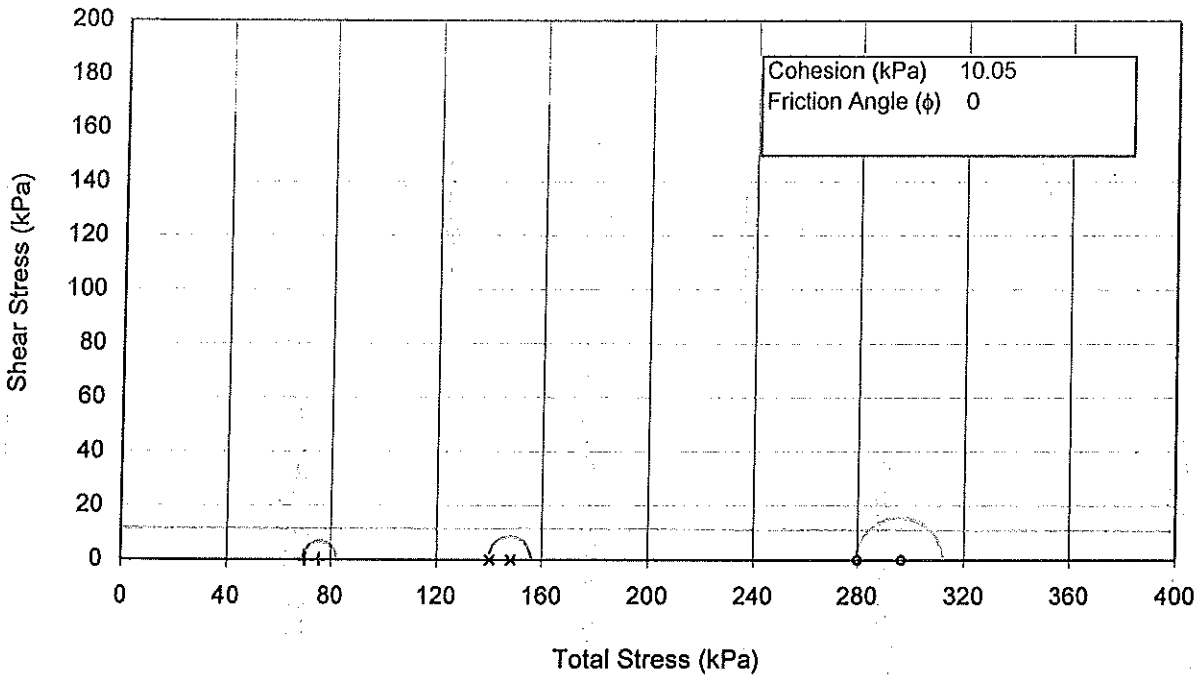
Operator : Shyam Nath
 Checked : Chris

Sample : UD3
 Borehole : BH17
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 05.01.19

Sample : UD3
 Borehole : BH17

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

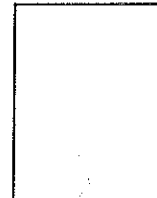
Unconsolidated Undrained

Sample details

Depth : 33.00m
 Description : Dark grey CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	131.52	132.82	134.06
Bulk Density ρ (Mg/m ³)	1.527	1.542	1.556
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	250	500	1000
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel : 14391 14391 14391

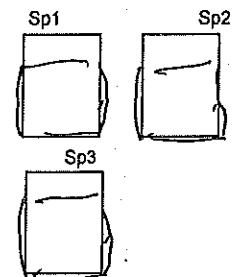
Moisture Content w_0 %	65	63	61
Dry Density ρ_{d0} (Mg/m ³)	0.93	0.95	0.97
Voids Ratio e_0	1.79	1.73	1.67
Deg of Saturation S_0 %	93.76	94.09	94.42

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	50.19	58.41	70.94
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	49.99	58.21	70.74
Strain at Failure ϵ_f %	10.53	13.03	11.97
Shear Strength c_u (kPa)	25.09	29.20	35.47

Moisture Content w_f %	65	63	61
Dry Density ρ_{df} (Mg/m ³)	0.93	0.95	0.97
Voids Ratio e_f	1.79	1.73	1.67
Deg of Saturation S_f %	93.76	94.09	94.42

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

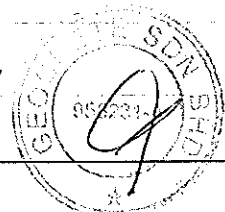
Operator
Shyam Nath

Checked
Chris

Test Name : UU

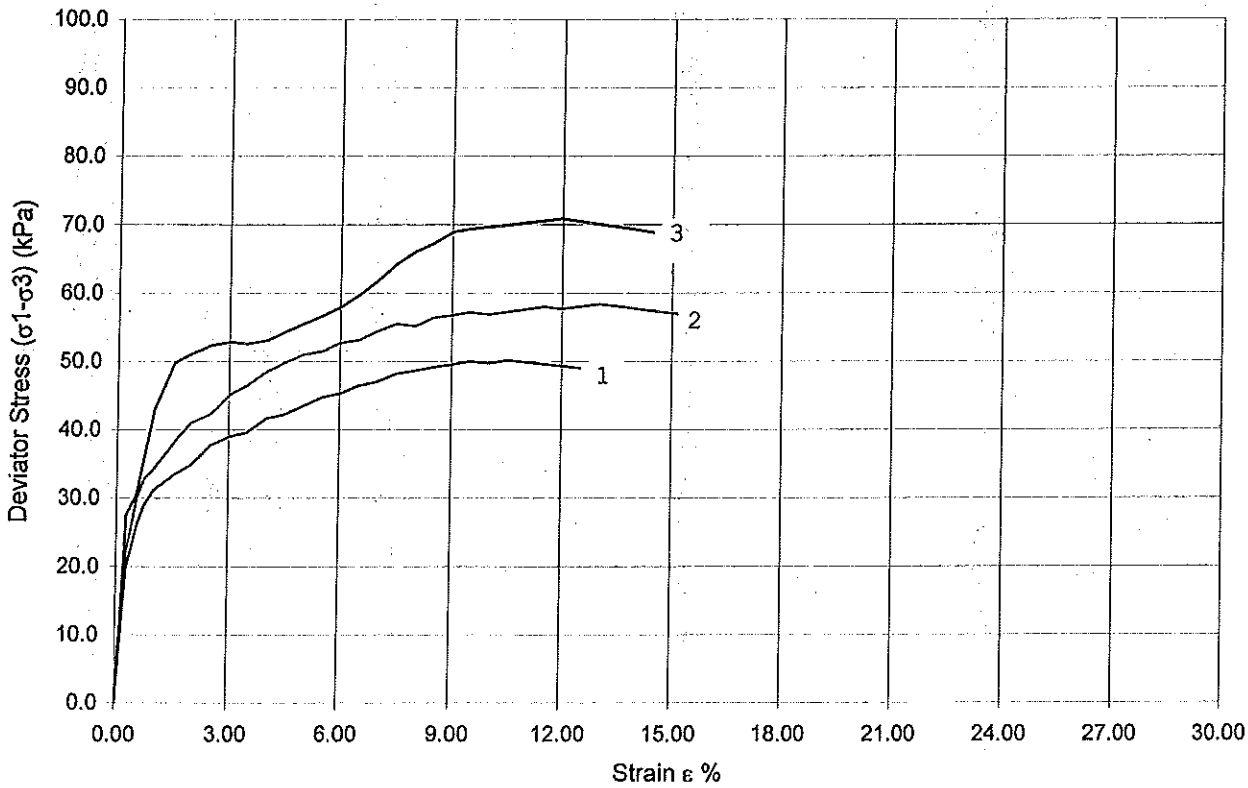
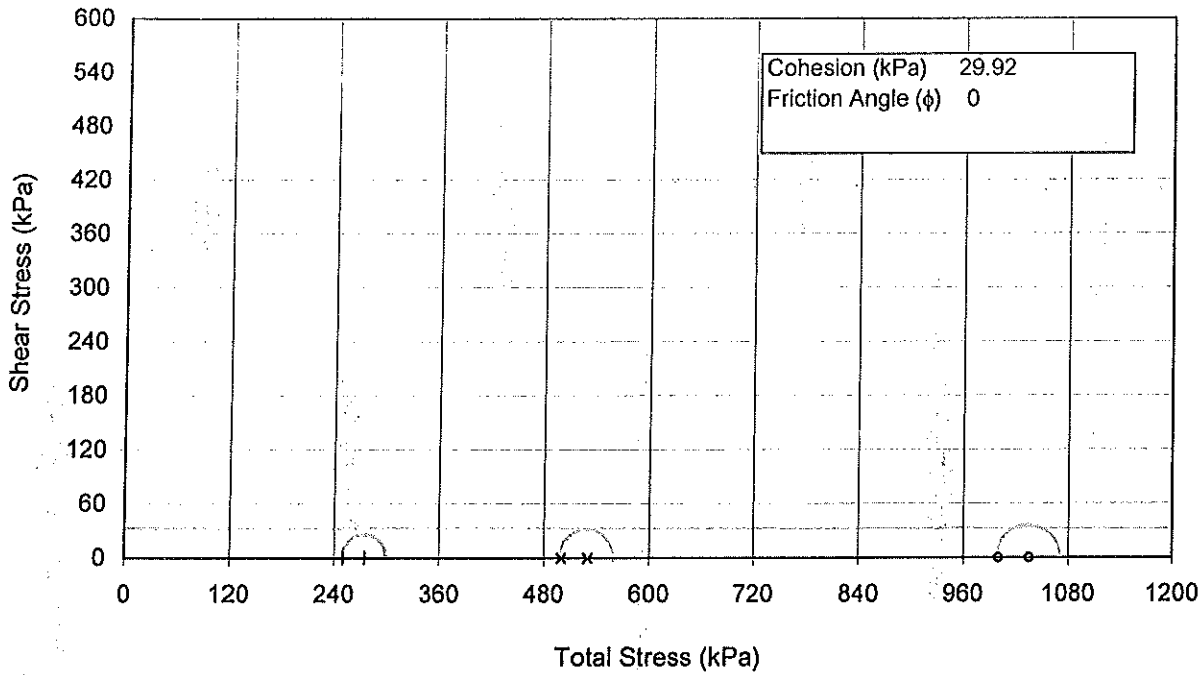
Date of Test : 05.01.19

Sample : UD11
 Borehole : BH17
 Approved
 Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

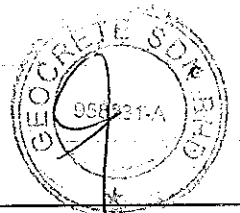
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 05.01.19

Sample : UD11
Borehole : BH17

Approved :
Lee Kai Hing



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 17 / D 20 (46.50 m)

Test Size : 60 mm x 60 mm x 20 mm

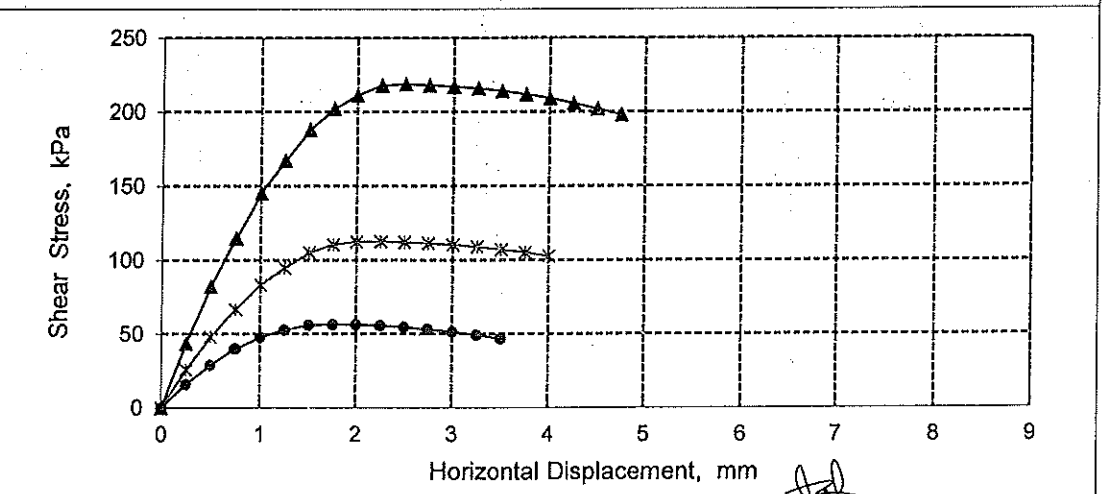
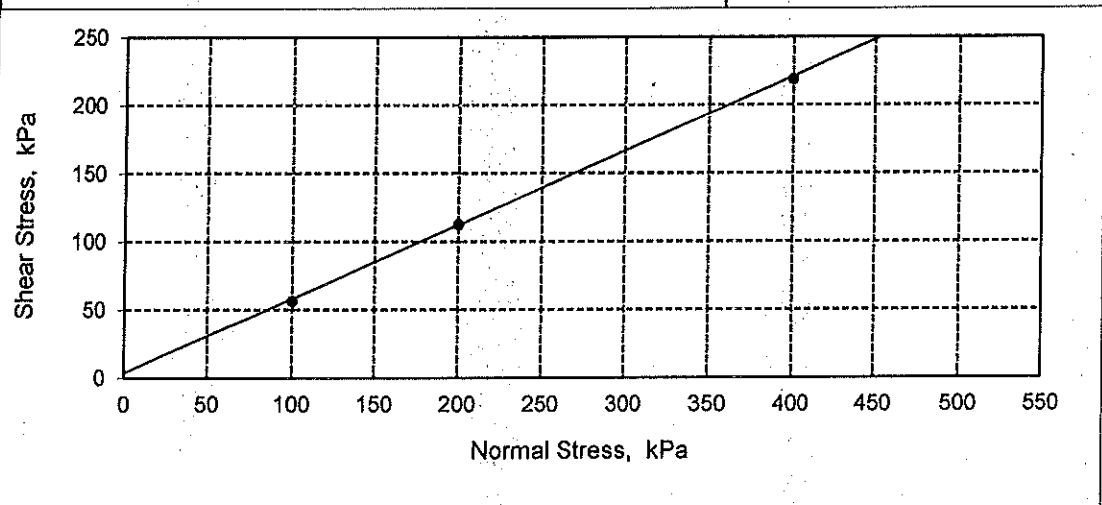
Date Tested : 10 / 1 / 2019

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		142.5	143.5	142.8
Moisture Content (%)		18.5	18.1	18.5
Bulk Density (Mg/m ³)		1.979	1.993	1.983
Dry Density (Mg/m ³)		1.670	1.688	1.673

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		56.5	112.6	219.0
Displ. at Failure (mm)		1.8	2.0	2.5
Settlement (mm)		0.2	0.4	0.6

c' 4 kPa

φ' 28.5 deg.



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No.	BH17 / UD3 / 9.00m	Test Started	03.01.19
Soil Description	Grey sandy CLAY	Ring No.	14

BEFORE TEST

Moist. Content from trimmings:	=	34 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	131.86 gm	Diameter (D)	=	50 mm
Wt of Ring	=	59.26 gm	Area (A)	=	1964 mm ²
Wt of sample	=	72.6 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	54.95 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	17.65 gm	Bulk Density (P)	=	1.848 Mg/m ³
Initial Moisture Content, M ₀	=	32 %	Dry Density (PD)	=	1.399 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	0.8946			
Initial Saturation, S ₀ ;	$\frac{M_0 \times SG}{e_0}$	=	95 %		
V. Ratio Change Factor F _v	$\frac{e_0}{1+e_0}$	=	0.0947 mm ⁻¹		
Height of Solid	$\frac{H}{H_s}$	=	10.556 mm		

AFTER TEST

Wt of sample + Ring	=	128.46 gm	Overall settlement	=	1.962 mm
Wt of Dry sample + Ring	=	114.21 gm	Volume Change	=	3.854 cm ³
Wt of Ring	=	59.26 gm	Final Volume	=	35.43 cm ₃
Wt of Wet sample	=	69.20 gm	Final Bulk Density	=	1.953 Mg/m ³
Wt of Dry sample	=	54.95 gm	Final Dry Density	=	1.551 Mg/m ³
Wt of Moisture	=	14.25 gm	Final Void Ratio, e _f	=	0.7087
Final Moisture Content, M _f	=	26 %			
Final Saturation, S _f	$\frac{M_f \times SG}{e_f}$	=	97 %		

Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH17 / UD3 / 9.00m

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 14

Pressure (P) kN/m ²	Settlement ΔH (mm)		VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
	$H=H_0-\Delta H$ (mm)	ΔH (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₅₀ (min)	Cv for t ₅₀ (m ² /yr)	Cc	
0	20.000	0.000	0.0000	0.8946	0.0000	0					
12.5	19.834	0.166	0.0157	0.8789	0.0157	12.5	0.6701	8.41	5.24		-0.0522
25.0	19.732	0.268	0.0254	0.8692	0.0097	12.5	0.4139	5.76	7.54		-0.0321
50.0	19.548	0.452	0.0428	0.8518	0.0174	25.0	0.3768	4.41	9.71		-0.0579
100	19.244	0.756	0.0716	0.8230	0.0288	50.0	0.3162	4.00	10.44		-0.0957
200	18.756	1.244	0.1178	0.7767	0.0462	99.9	0.2604	3.61	11.10		-0.1536
400	18.204	1.796	0.1701	0.7244	0.0523	199.8	0.1517	1.96	19.34		-0.1737
800	17.686	2.314	0.2192	0.6754	0.0491	400.7	0.0731	1.00	35.74		-0.1630
400	17.716	2.284	0.2164	0.6782	-0.0028	-400.7					
100	17.876	2.124	0.2012	0.6934	-0.0152	-299.8					
25	18.038	1.962	0.1859	0.7087	-0.0153	-74.9					

Operator Shyam Nath Checked Chris Approved Lee Kai Hing



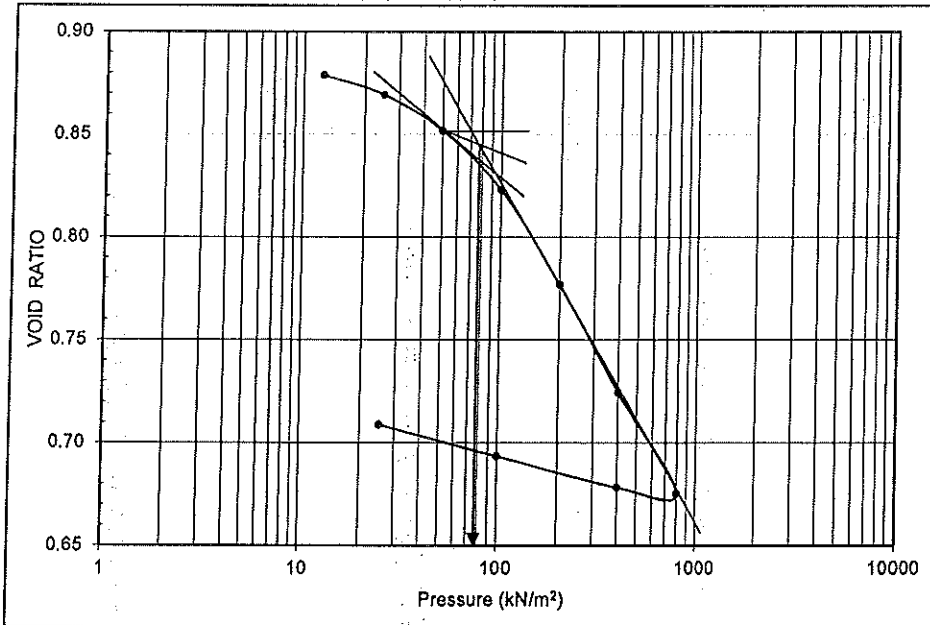
GEocreTE SDN. BHD.
 (Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

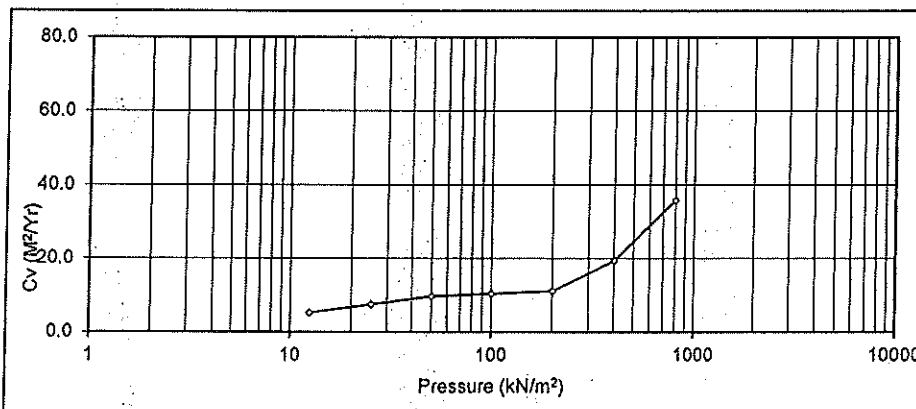
BH REF BH17 / UD3 / 9.00m
 SOIL SAMPLE Grey sandy CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 14



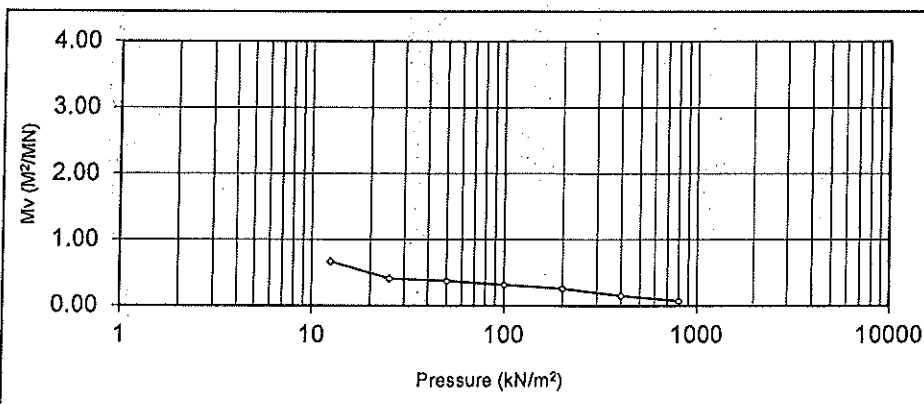
INITIAL

Water content	32	%
Dry Density	1.40	Mg/m ³
Void Ratio	0.8946	
Saturation	95	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL

Water content	26	%
Dry Density	1.55	Mg/m ³
Void Ratio	0.7087	
Saturation	97	%
Height	18	mm
Comp. Index, C _c	0.1737	
Precons. Load	75	kN/m ²



Comp. Ratio, C_R 0.092

GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

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43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.01.19
Sample No.	BH17 / UD11 / 33.00m	Test Started	03.01.19
Soil Description	Dark grey CLAY	Ring No.	15

BEFORE TEST

Moist. Content from trimmings:	=	88 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	118.25 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.73 gm	Area (A)	=	1964 mm ²
Wt of sample	=	57.52 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	31.39 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	26.13 gm	Bulk Density (P)	=	1.464 Mg/m ³
Initial Moisture Content, M _o	=	83 %	Dry Density (PD)	=	0.799 Mg/m ³
Initial Void Ratio, e _o , SG/P _D - 1	=	2.2290			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	96 %			
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1614 mm ⁻¹			
Height of Solid H _s	=	6.194 mm			

AFTER TEST

Wt of sample + Ring	=	116.14 gm	Overall settlement	=	1.604 mm
Wt of Dry sample + Ring	=	92.12 gm	Volume Change	=	3.151 cm ³
Wt of Ring	=	60.73 gm	Final Volume	=	36.14 cm ³
Wt of Wet sample	=	55.41 gm	Final Bulk Density	=	1.533 Mg/m ³
Wt of Dry sample	=	31.39 gm	Final Dry Density	=	0.869 Mg/m ³
Wt of Moisture	=	24.02 gm	Final Void Ratio, e _f	=	1.9700
Final Moisture Content, M _f	=	77 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	100 %			

	Operator Shyam Nath	Checked Chris	Approved Lee Kai Hing
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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

BH17 / UD11 / 33.00m

Date of Report 13.01.19

Test started 03.01.19

Ring No. 15

Pressure (P) kN/m ²	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc	
	Settlement ΔH (mm)	$H = H_0 - \Delta H$ (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)		t_{90} (min)
0	0.000	20.000	0.0000	2.2290	0.0000	0			
12.5	0.106	19.894	0.0171	2.2119	0.0171	12.5	0.4266	16.00	2.76
25.0	0.394	19.606	0.0636	2.1654	0.0465	12.5	1.1760	15.21	2.85
50.0	1.008	18.992	0.1627	2.0662	0.0991	25.0	1.2942	15.21	2.72
100	2.140	17.860	0.3455	1.8835	0.1828	50.0	1.2686	21.16	1.78
50	1.990	18.010	0.3213	1.9077	-0.0242	-50.0			
25	1.784	18.216	0.2880	1.9409	-0.0333	-25.0			
12.5	1.604	18.396	0.2590	1.9700	-0.0291	-12.5			

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



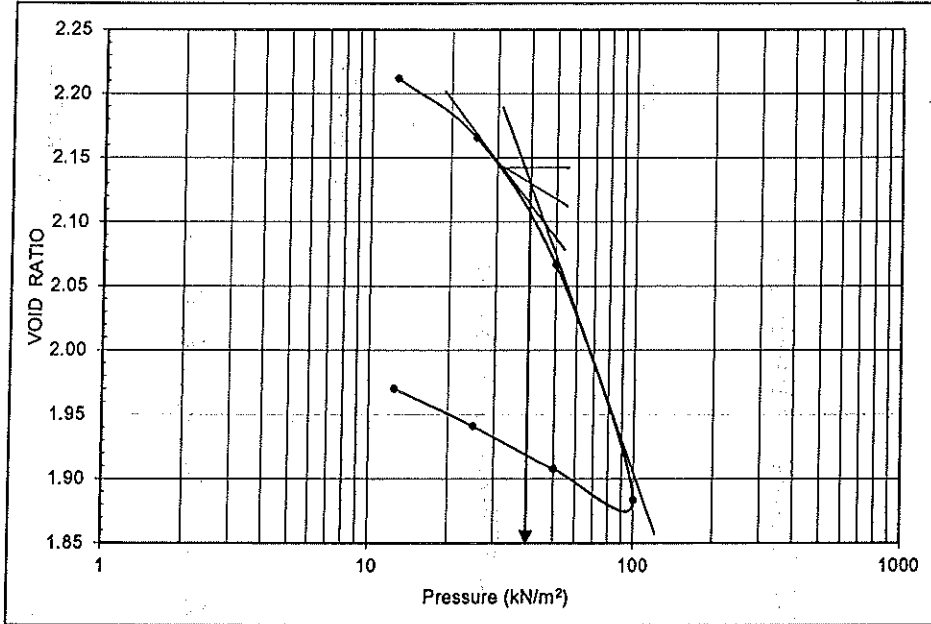
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH17 / UD11 / 33.00m

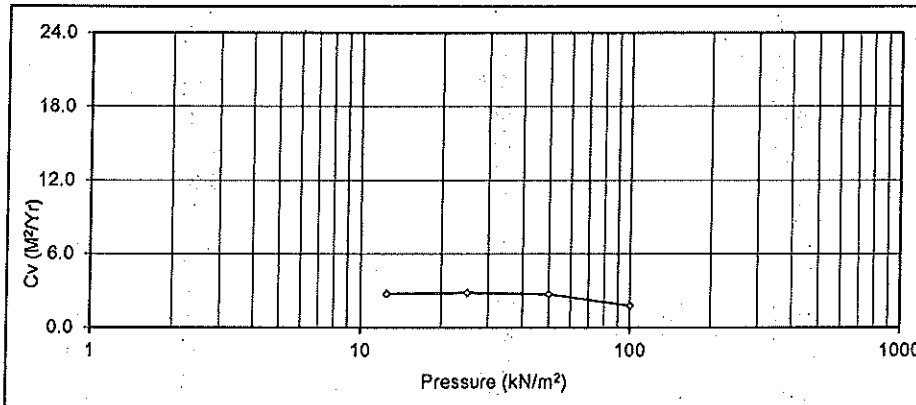
SOIL SAMPLE Dark grey CLAY

Date of Report 13.01.19
 Test started 03.01.19
 Ring No. 15



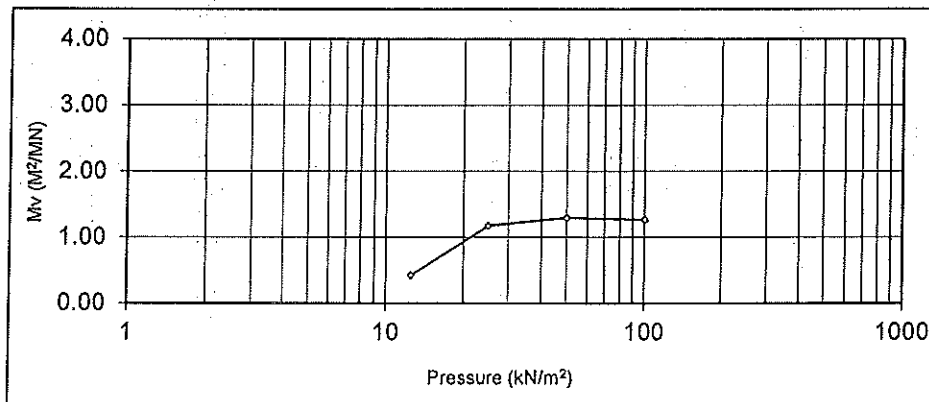
INITIAL

Water content	83	%
Dry Density	0.80	Mg/m ³
Void Ratio	2.2290	
Saturation	96	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.580	



FINAL

Water content	77	%
Dry Density	0.87	Mg/m ³
Void Ratio	1.9700	
Saturation	100	%
Height	18	mm
Comp. Index, C _c	0.6072	
Precons. Load	39	kN/m ²



Comp. Ratio, C_R 0.188

Operator Shyam Nath	Checked Chris
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Approved
 Lee Kai Hing

SUMMARY OF TEST RESULTS

SAMPLE AND SPECIMEN DETAILS		PROJECT : GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)				PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU JINDAH, SELANGOR												REF : L081/18/139/18 DATE : 29.12.18										
						ATTERBERG LIMITS		SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX TEST		CU TEST		UU Triaxial TEST		CONSOLIDATION TEST		CHEMICAL TEST						
Borehole No.	Specimen	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ (Deg)	Cu' (kPa)	φ (Deg)	Cu (kPa)	φ (Deg)	Pc (kPa)	Cc	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)	
BH18	UD1	3.00	45	1.61	1.13	62	24	38	12.7	53	27	20	0	2.66			19.45	0					1.0	0.15	0.61	7.7		
	UD5	15.00	31	1.83	1.40	43	20	23		31	20	46	3				40.35	0			42	0.333						
	UD6	18.00	51	1.55	1.06					59	37	4	0															
	UD7	21.00	79	1.49	0.83	80	28	52		62	36	2	0															
	UD9	27.00	55	1.50	1.05	70	25	45	13.5	59	35	6	0	2.60			22.62	0					1.2	0.12	0.57	8.0		
	UD11	33.00	71	1.54	0.90	55	22	33		47	32	21	0				35.89	0			75	0.989	1.8	<0.01	0.94	7.9		
	D14	37.50	38	NA	NA					32	22	46	0															
	D15	39.00	86	NA	NA					59	38	3	0															
	D17	42.00	83	NA	NA	75	31	44	13.8	60	38	2	0	2.58														
	D18	43.50	81	NA	NA					59	37	4	0															
	D19	45.00	47	NA	NA					38	21	41	0															
	D23	51.00	60	NA	NA	53	25	28	11.1	46	36	18	0	2.62									0.9	0.27	0.84	7.8		

Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks

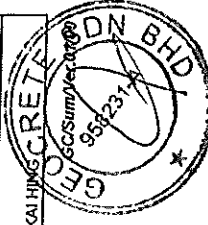
* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE.

APPROVED BY:

LEE KAI HING

CHECKED BY:

CHRIS



SUM

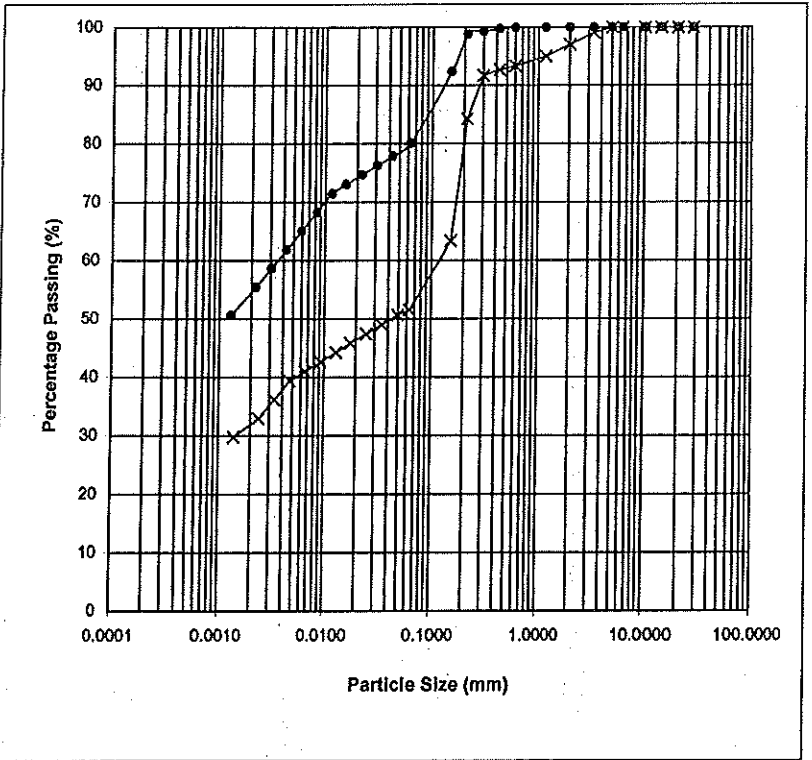
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

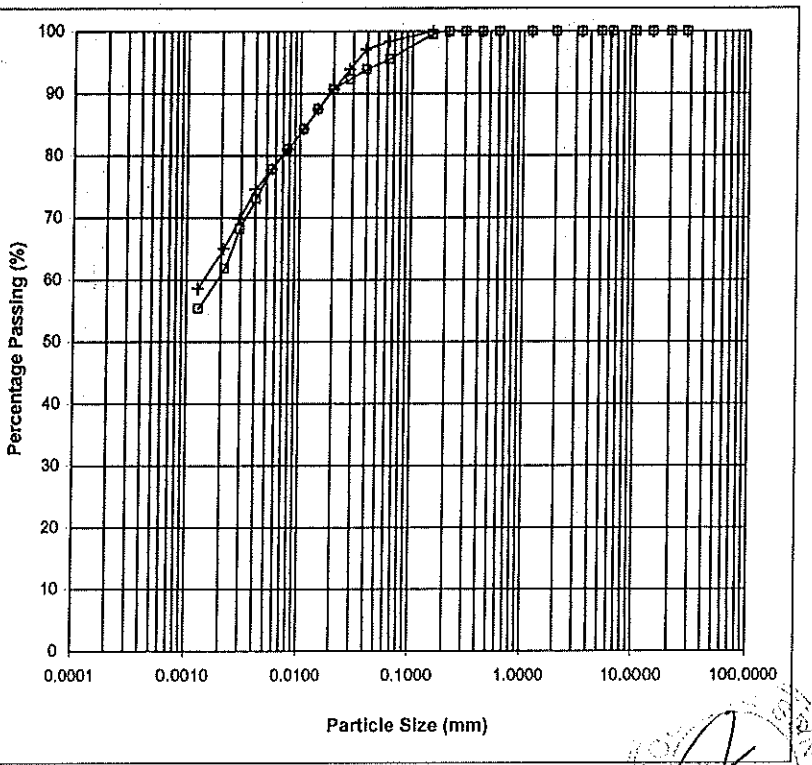
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	99	
2.00	100	2.00	97	
1.18	100	1.18	95	
0.600	100	0.600	93	
0.425	100	0.425	93	
0.300	99	0.300	92	
0.212	99	0.212	84	
0.150	92	0.150	63	
0.063	80	0.063	52	
0.0431	78	0.0489	51	
0.0307	76	0.0348	49	
0.0219	75	0.0248	47	
0.0156	73	0.0176	46	
0.0115	71	0.0130	44	
0.0083	68	0.0092	43	
0.0059	65	0.0066	41	
0.0043	62	0.0047	39	
0.0031	59	0.0033	36	
0.0022	55	0.0024	33	
0.0013	51	0.0014	30	
Clay (%)		53	Clay (%)	31
Silt (%)		27	Silt (%)	20
Sand (%)		20	Sand (%)	46
Gravel (%)		0	Gravel (%)	3
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH18	UD1	3.00	21.12.18
X	BH18	UD5	15.00	21.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	100	
0.212	100	0.212	100	
0.150	100	0.150	100	
0.063	96	0.063	98	
0.0393	94	0.0384	97	
0.0280	92	0.0278	94	
0.0200	91	0.0200	91	
0.0144	87	0.0144	87	
0.0107	84	0.0107	84	
0.0077	81	0.0077	81	
0.0056	78	0.0056	78	
0.0040	73	0.0040	75	
0.0029	68	0.0029	70	
0.0021	62	0.0021	65	
0.0013	55	0.0012	59	
Clay (%)		59	Clay (%)	62
Silt (%)		37	Silt (%)	36
Sand (%)		4	Sand (%)	2
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH18	UD6	18.00	21.12.18
+	BH18	UD7	21.00	21.12.18



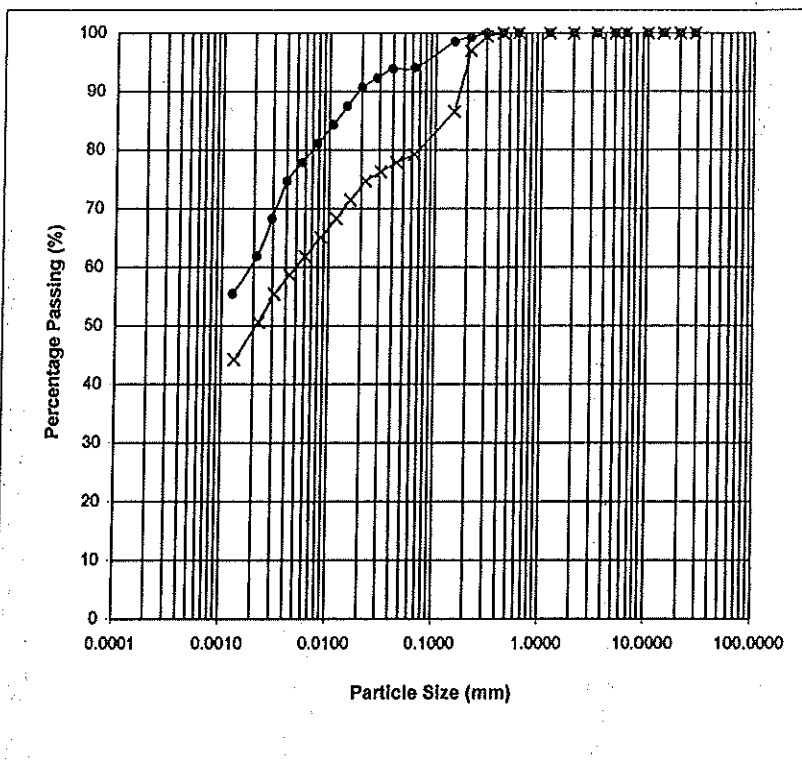
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990))

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

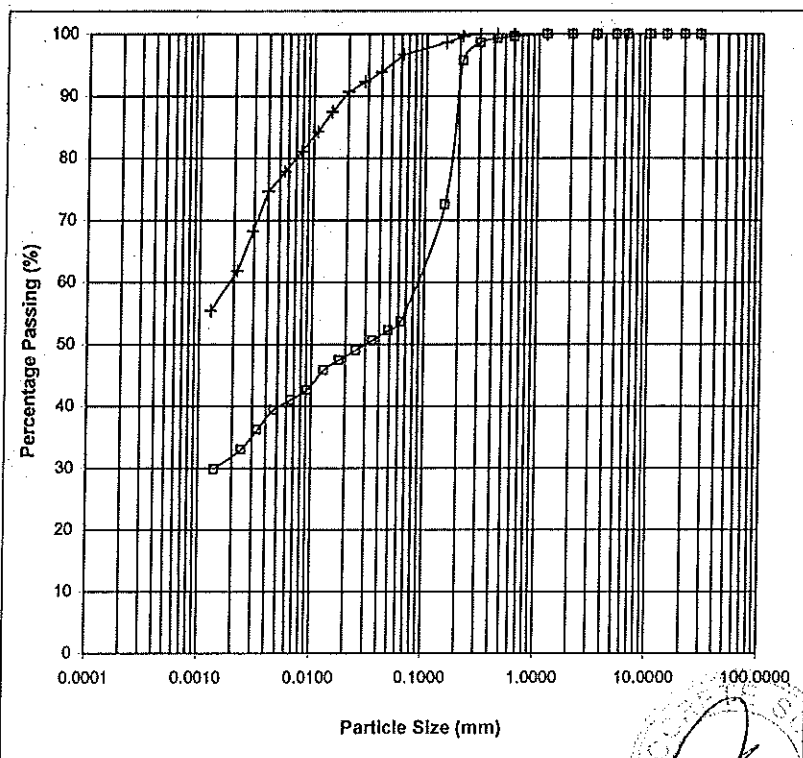
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	99
0.212	99	0.212	97
0.150	99	0.150	87
0.063	94	0.063	79
0.0393	94	0.0431	78
0.0280	92	0.0307	76
0.0200	91	0.0219	75
0.0144	87	0.0157	71
0.0107	84	0.0117	68
0.0077	81	0.0084	65
0.0056	78	0.0060	62
0.0040	75	0.0043	59
0.0029	68	0.0031	55
0.0021	62	0.0022	51
0.0013	55	0.0013	44
Clay (%)	59	Clay (%)	47
Silt (%)	35	Silt (%)	32
Sand (%)	6	Sand (%)	21
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH18	UD9	27.00	21.12.18
X	BH18	UD11	33.00	21.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	100
0.300	99	0.300	100
0.212	98	0.212	100
0.150	73	0.150	99
0.063	54	0.063	97
0.0486	52	0.0393	94
0.0346	51	0.0280	92
0.0246	49	0.0200	91
0.0175	47	0.0144	87
0.0129	46	0.0107	84
0.0092	43	0.0077	81
0.0066	41	0.0056	78
0.0047	39	0.0040	75
0.0033	36	0.0029	68
0.0024	33	0.0021	62
0.0014	30	0.0013	55
Clay (%)	32	Clay (%)	59
Silt (%)	22	Silt (%)	38
Sand (%)	46	Sand (%)	3
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH18	D14	37.50	21.12.18
+	BH18	D15	39.00	21.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :		Checked :		Approved :	
		Shyam Nath		Chris		Lee Kai Hing

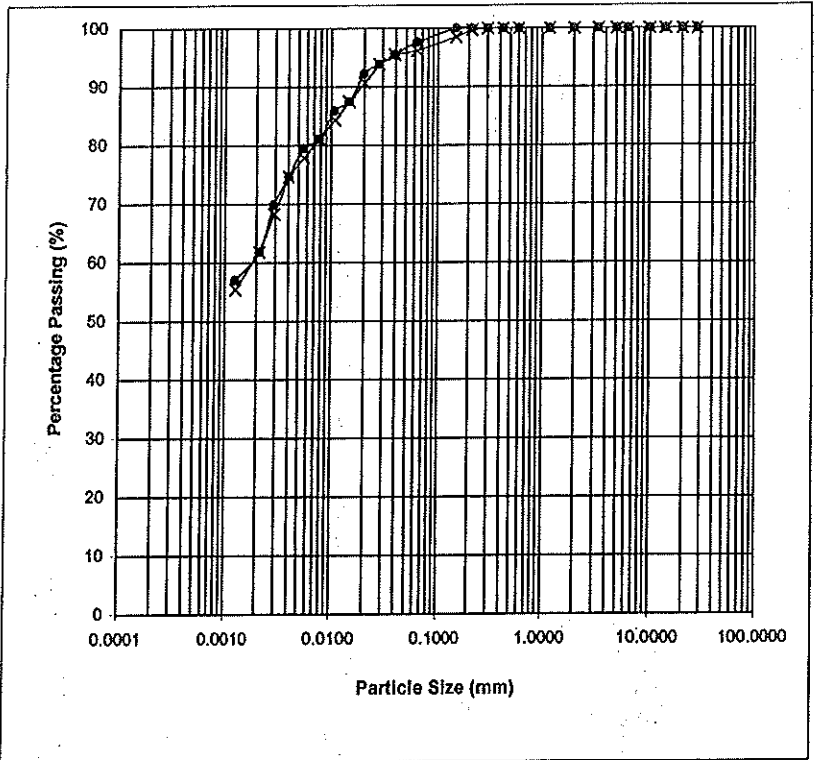
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

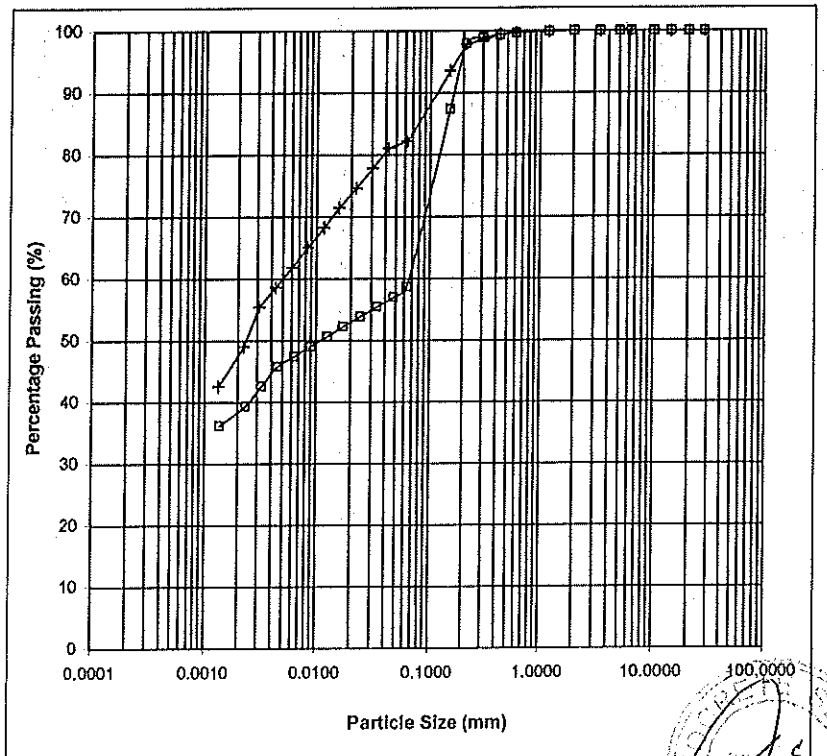
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	100	
0.425	100	0.425	100	
0.300	100	0.300	100	
0.212	100	0.212	100	
0.150	100	0.150	99	
0.063	98	0.063	96	
0.0389	96	0.0389	96	
0.0278	94	0.0278	94	
0.0198	92	0.0200	91	
0.0144	87	0.0144	87	
0.0106	86	0.0107	84	
0.0077	81	0.0077	81	
0.0055	79	0.0056	78	
0.0040	75	0.0040	75	
0.0029	70	0.0029	68	
0.0021	62	0.0021	62	
0.0013	57	0.0013	55	
Clay (%)		60	Clay (%)	59
Silt (%)		38	Silt (%)	37
Sand (%)		2	Sand (%)	4
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH18	D17	42.00	21.12.18
X	BH18	D18	43.50	21.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.800	100	0.600	100	
0.425	99	0.425	99	
0.300	99	0.300	99	
0.212	98	0.212	98	
0.150	87	0.150	94	
0.063	59	0.063	82	
0.0476	57	0.0424	81	
0.0339	55	0.0305	78	
0.0241	54	0.0219	75	
0.0172	52	0.0157	71	
0.0126	51	0.0117	68	
0.0090	49	0.0084	65	
0.0064	47	0.0060	62	
0.0046	46	0.0043	59	
0.0033	43	0.0031	55	
0.0023	39	0.0022	49	
0.0014	36	0.0013	43	
Clay (%)		38	Clay (%)	46
Silt (%)		21	Silt (%)	36
Sand (%)		41	Sand (%)	18
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH18	D19	45.00	21.12.18
+	BH18	D23	51.00	21.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :		Checked :		Approved	
		Shyam Nath		Chris		Lee Kai Hing

Total Stress Triaxial Compression

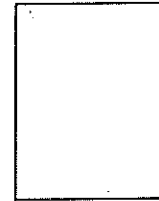
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Greenish grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	137.05	138.55	141.81
Bulk Density ρ (Mg/m ³)	1.591	1.608	1.646
Particle Density ρ_s	2.62	2.62	2.62

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

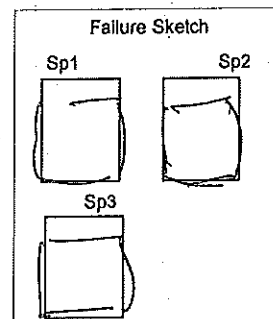
Load Channel	Specimen 1	Specimen 2	Specimen 3
	14391	14391	14391

Moisture Content w_0 %	46	43	42
Dry Density ρ_{d0} (Mg/m ³)	1.09	1.13	1.16
Voids Ratio e_0	1.40	1.32	1.26
Deg of Saturation S_0 %	85.64	84.36	87.42

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	24.03	41.12	51.55
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	23.83	40.92	51.35
Strain at Failure ϵ_f %	10.53	9.47	10.00
Shear Strength c_u (kPa)	12.02	20.56	25.78

Moisture Content w_f %	46	43	42
Dry Density ρ_{df} (Mg/m ³)	1.09	1.13	1.16
Voids Ratio e_f	1.40	1.32	1.26
Deg of Saturation S_f %	85.64	84.36	87.42



Notes : Plastic Plastic Plastic

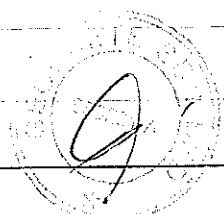
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

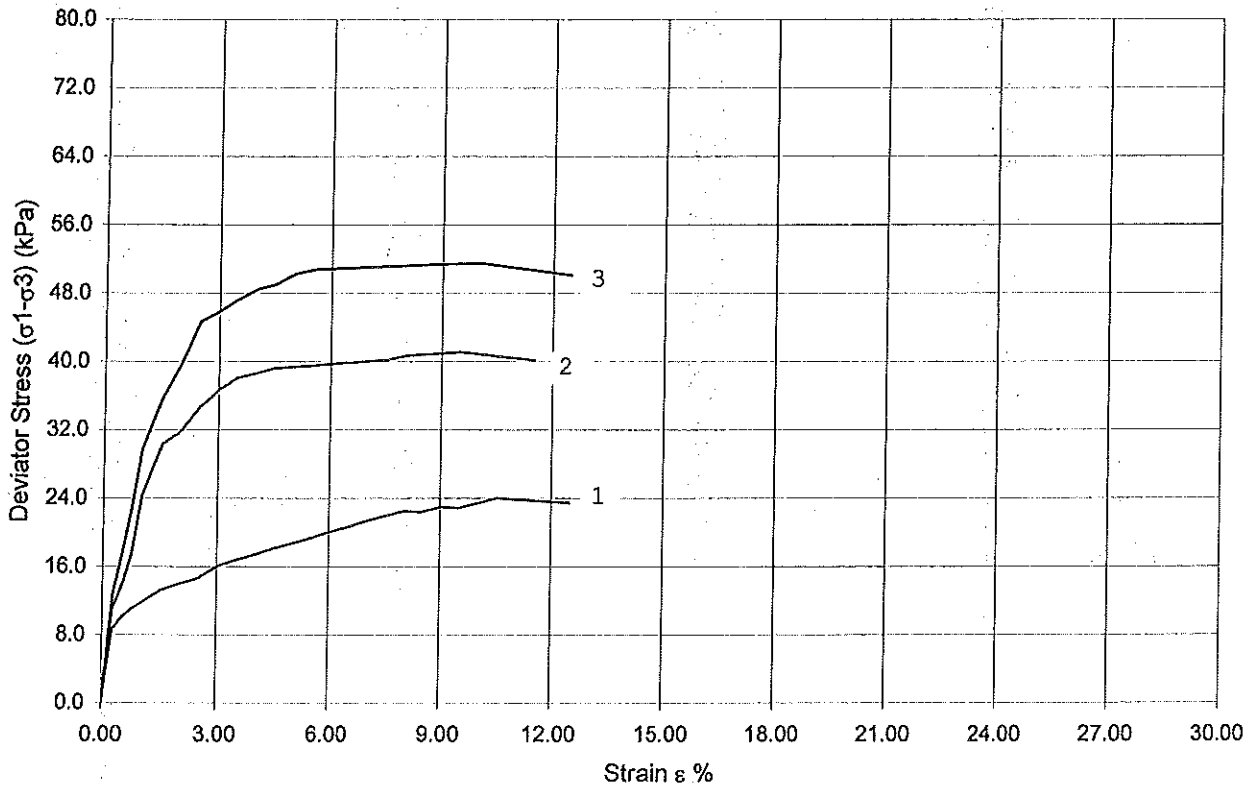
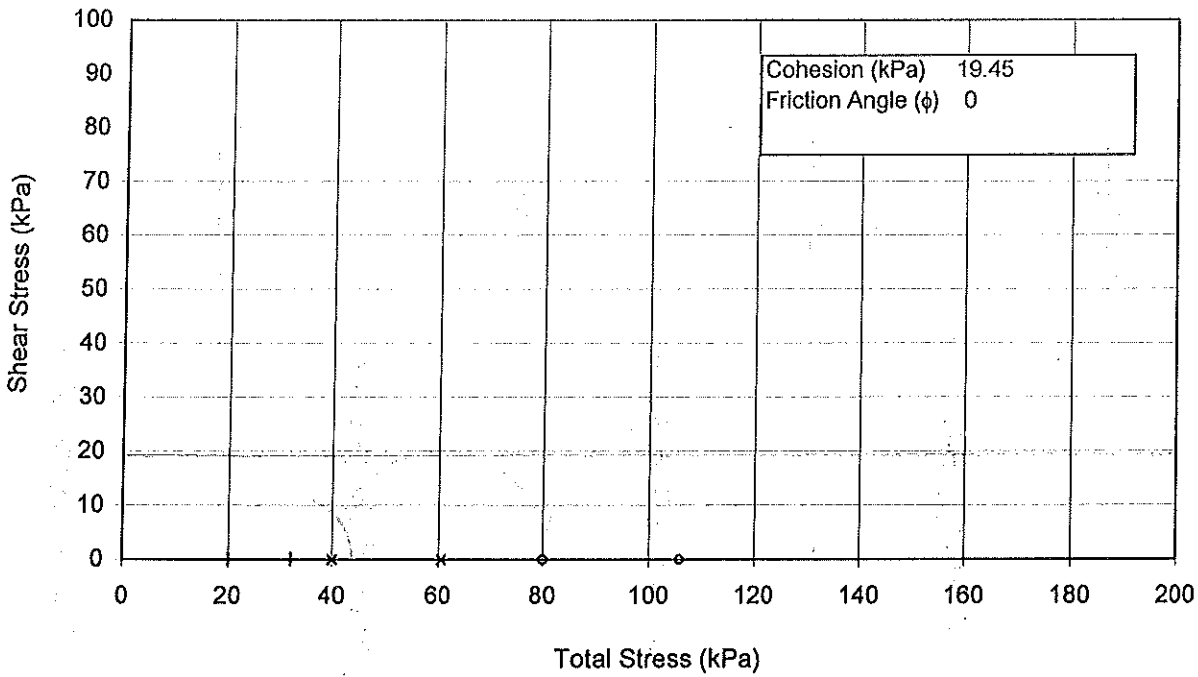
Sample : UD1
Borehole : BH18
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

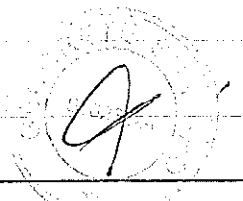
Operator :
Shyam Nath

Checked :
Chris

Test Name : UU
Date of Test : 20.12.18

Sample : UD1
Borehole : BH18

Approved :
Lee Kai Hing



Total Stress Triaxial Compression

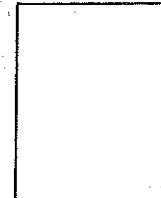
Unconsolidated Undrained

Sample details

Depth : 18.00m
Description : Dark grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	131.43	133.10	134.64
Bulk Density ρ (Mg/m ³)	1.526	1.545	1.563
Particle Density ρ_s	2.66	2.66	2.66

Sketch showing specimen location in original sample

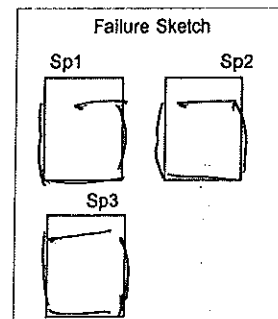


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	140	280	560
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	46	45	43
Dry Density ρ_{d0} (Mg/m ³)	1.04	1.06	1.09
Voids Ratio e_0	1.55	1.50	1.44
Deg of Saturation S_0 %	79.25	80.11	79.97

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	71.70	80.51	89.89
Membrane Correction σ_{rpb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	71.50	80.31	89.69
Strain at Failure ϵ_f %	4.47	9.01	7.50
Shear Strength c_u (kPa)	35.85	40.25	44.94
Moisture Content w_f %	46	45	43
Dry Density ρ_{df} (Mg/m ³)	1.04	1.06	1.09
Voids Ratio e_f	1.55	1.50	1.44
Deg of Saturation S_f %	79.25	80.11	79.97



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Test Name : UU

Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

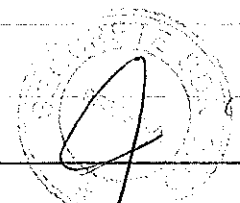
Sample : UD6

Borehole : BH18

Operator
Shyam Nath

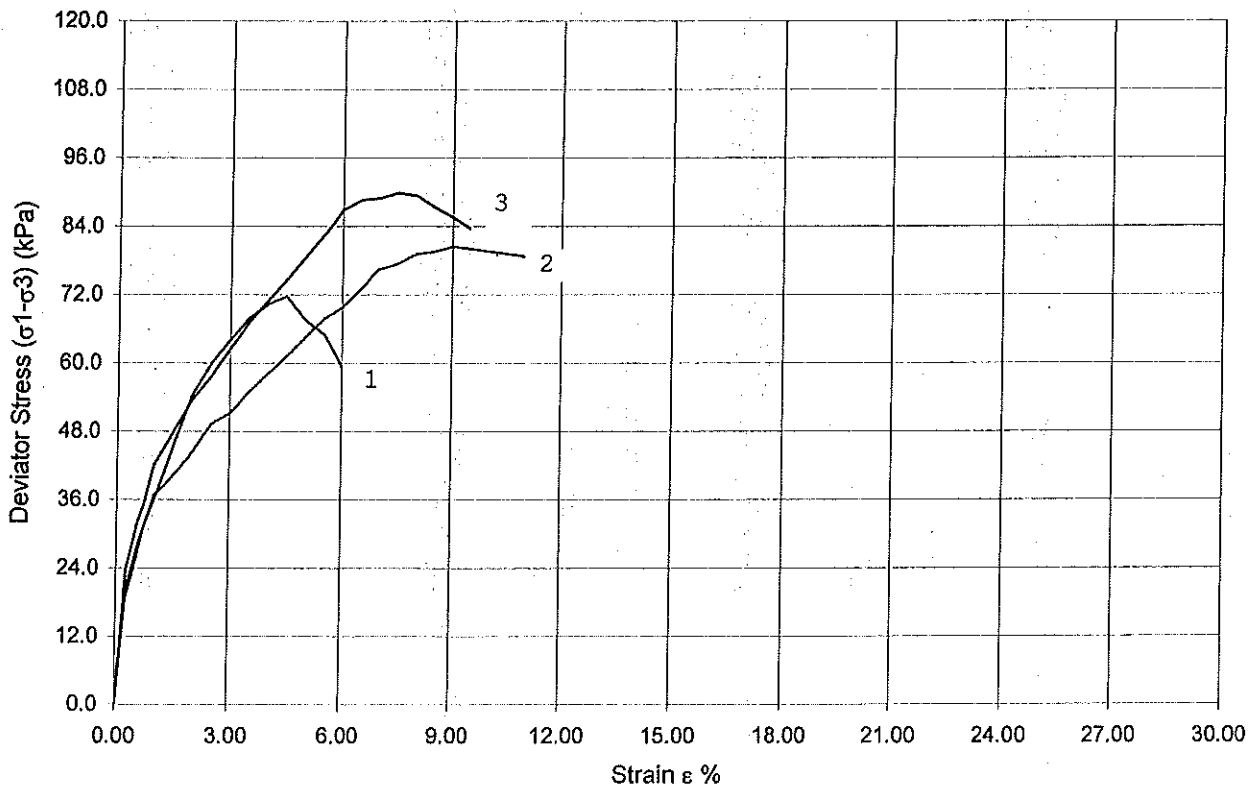
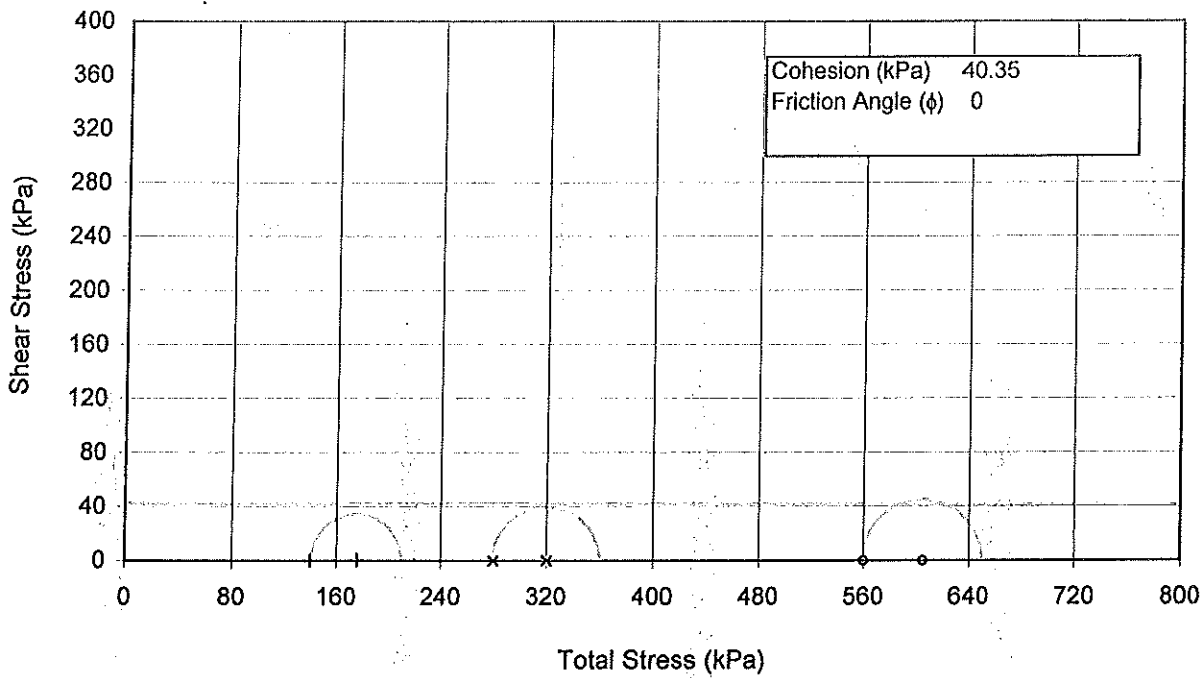
Checked
Chris

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

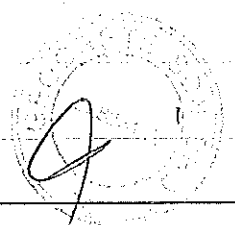
Test Name : UU
 Date of Test : 20.12.18

Sample : UD6
 Borehole : BH18

Operator :
 Shyam Nath

Checked :
 Chris

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained

Sample details

Depth : 27.00m
Description : Dark grey CLAY

Sketch showing specimen location in original sample

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	127.63	129.53	130.05
Bulk Density ρ (Mg/m ³)	1.482	1.504	1.510
Particle Density ρ_s	2.60	2.60	2.60

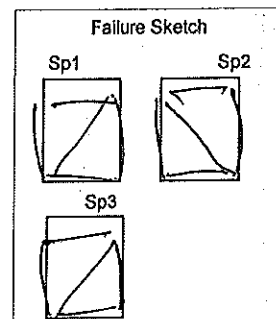


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	200	400	800
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	45	43	42
Dry Density ρ_{d0} (Mg/m ³)	1.02	1.05	1.06
Voids Ratio e_0	1.54	1.48	1.44
Deg of Saturation S_0 %	75.53	76.05	75.46

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	24.85	53.92	56.96
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	24.65	53.72	56.76
Strain at Failure ϵ_f %	7.50	6.51	10.99
Shear Strength c_u (kPa)	12.42	26.96	28.48
Moisture Content w_f %	45	43	42
Dry Density ρ_{df} (Mg/m ³)	1.02	1.05	1.06
Voids Ratio e_f	1.54	1.48	1.44
Deg of Saturation S_f %	75.53	76.05	75.46



Notes : Shear Shear Shear

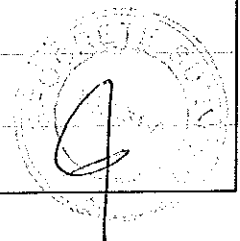
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
(*delete as appropriate)

Test Name : UU
Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

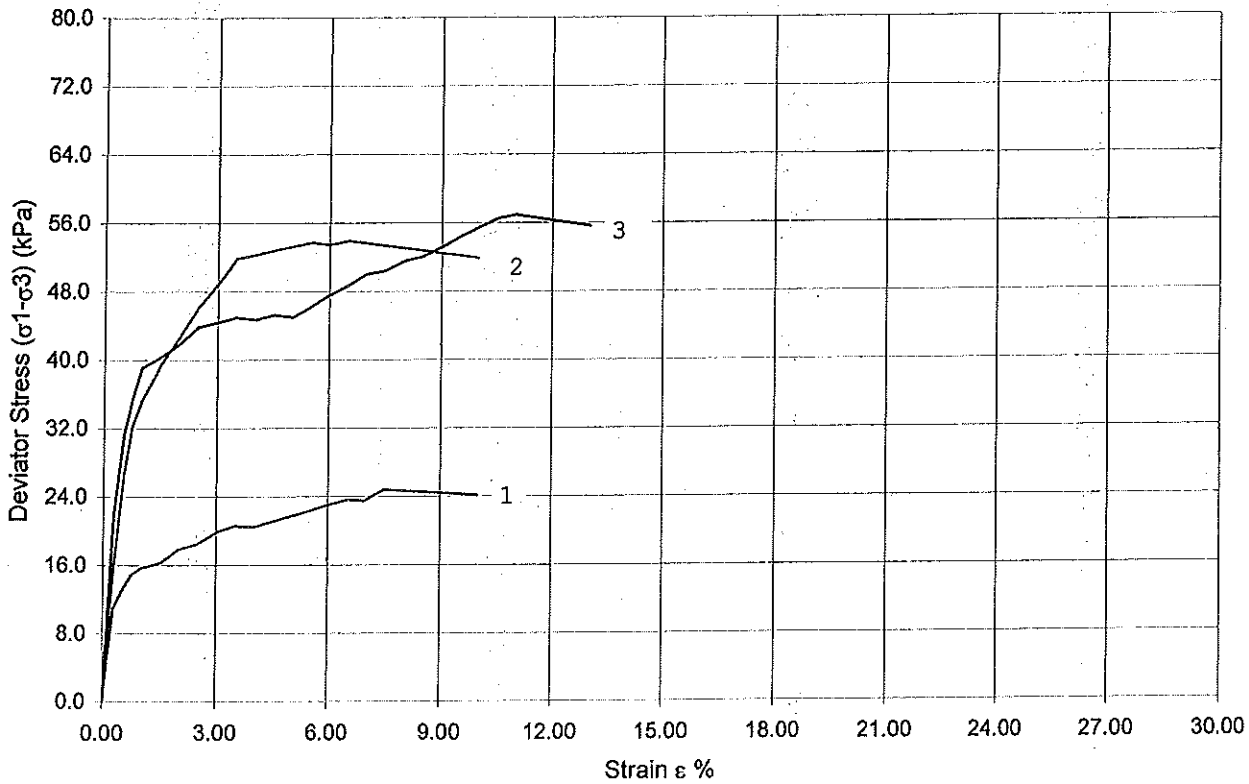
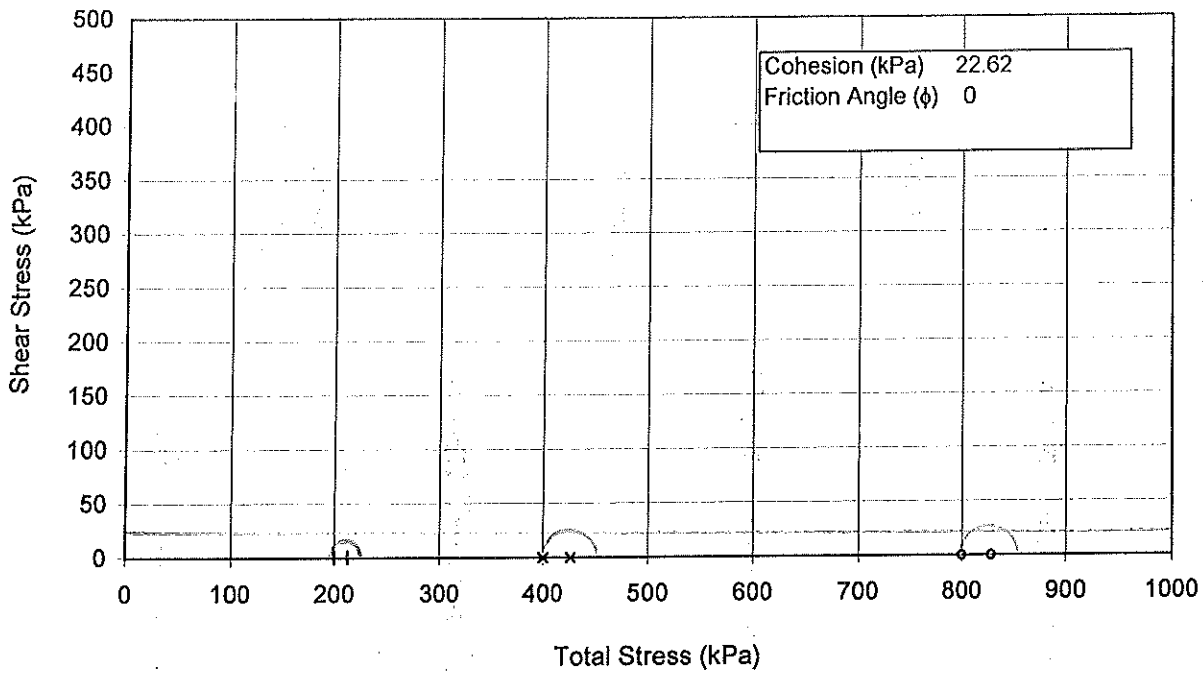
Sample : UD9
Borehole : BH18
Approved
Lee Kai Hing

Operator : Shyam Nath
Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

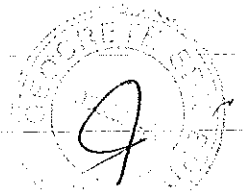
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 20.12.18

Sample : UD9
 Borehole : BH18

Approved :
 Lee Kai Hing



Total Stress Triaxial Compression

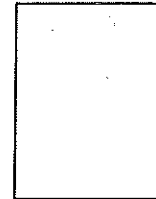
Unconsolidated Undrained

Sample details

Depth : 33.00m
 Description : Dark grey CLAY with some sand

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	131.05	132.53	134.08
Bulk Density ρ (Mg/m ³)	1.521	1.538	1.556
Particle Density ρ_s	2.63	2.63	2.63

Sketch showing specimen location in original sample

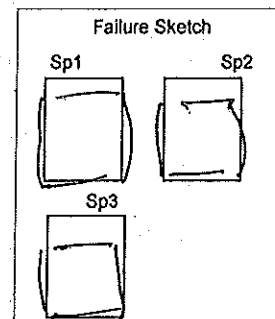


Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	250	500	1000
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	72	70	69
Dry Density ρ_{d0} (Mg/m ³)	0.89	0.90	0.92
Voids Ratio e_0	1.97	1.91	1.85
Deg of Saturation S_0 %	95.76	96.57	97.74

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	35.55	80.10	99.71
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	35.35	79.90	99.51
Strain at Failure ϵ_f %	10.00	9.47	6.51
Shear Strength c_u (kPa)	17.78	40.05	49.85
Moisture Content w_f %	72	70	69
Dry Density ρ_{df} (Mg/m ³)	0.89	0.90	0.92
Voids Ratio e_f	1.97	1.91	1.85
Deg of Saturation S_f %	95.76	96.57	97.74



Notes : Plastic Plastic Plastic

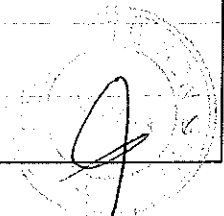
Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Test Name : UU
 Date of Test : 20.12.18

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

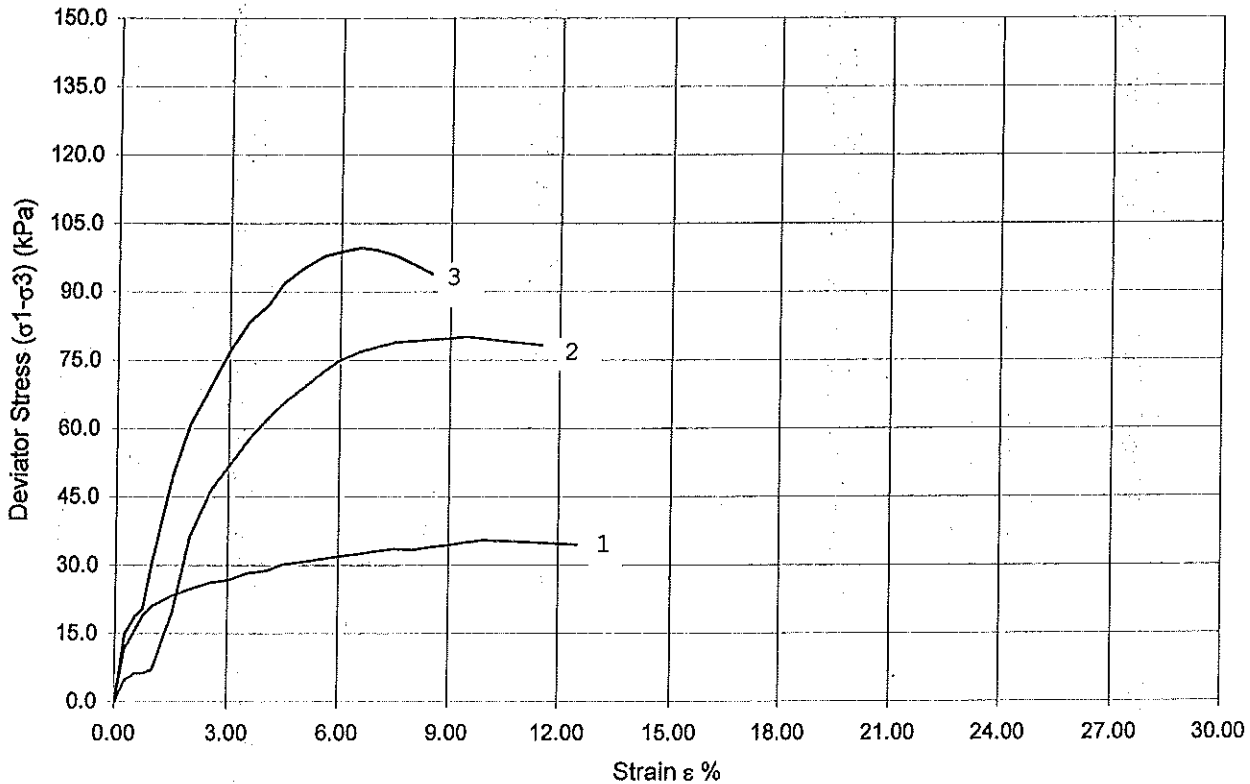
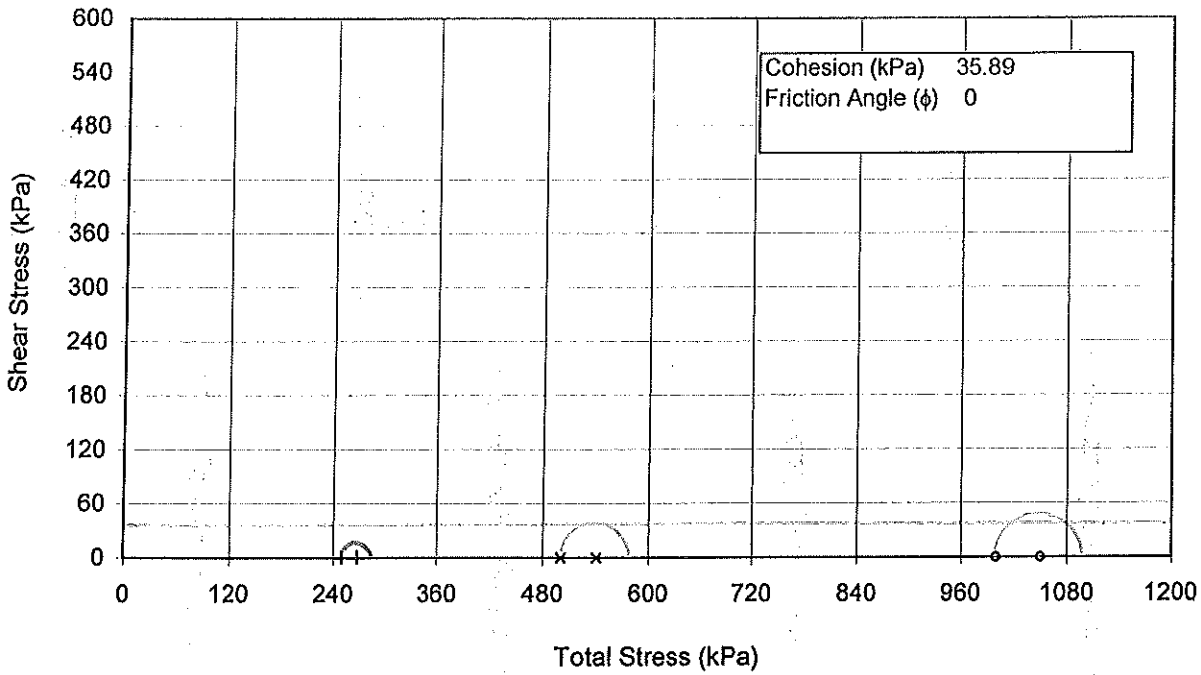
Sample : UD11
 Borehole : BH18
 Approved
 Lee Kai Hing

Operator : Shyam Nath
 Checked : Chris



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator :
Shyam Nath

Checked :
Chris

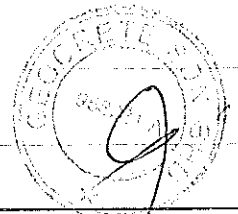
Test Name : UU

Date of Test : 20.12.18

Sample : UD11

Borehole : BH18

Approved :
Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No.	BH18 / UD6 / 18.00m	Test Started	19.12.18
Soil Description	Dark grey sandy CLAY	Ring No.	A10

BEFORE TEST

Moist. Content from trimmings:	=	38 %	SG (Measured)	=	2.660
Wt of sample + Ring	=	122.61 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.63 gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.98 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	44.50 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	16.48 gm	Bulk Density (P)	=	1.552 Mg/m ³
Initial Moisture Content, M _o	=	37 %	Dry Density (PD)	=	1.133 Mg/m ³
Initial Void Ratio, e _o , $\frac{SG}{P_D} - 1$	=	1.3483			
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	73 %			
V. Ratio Change Factor F _v , $\frac{H}{1+e_o}$	=	0.1174 mm ⁻¹			
Height of Solid H _s	=	8.517 mm			

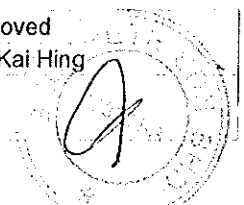
AFTER TEST

Wt of sample + Ring	=	119.65 gm	Overall settlement	=	2.564 mm
Wt of Dry sample + Ring	=	106.13 gm	Volume Change	=	5.036 cm ³
Wt of Ring	=	61.63 gm	Final Volume	=	34.25 cm ³
Wt of Wet sample	=	58.02 gm	Final Bulk Density	=	1.694 Mg/m ³
Wt of Dry sample	=	44.50 gm	Final Dry Density	=	1.299 Mg/m ³
Wt of Moisture	=	13.52 gm	Final Void Ratio, e _f	=	1.0473
Final Moisture Content, M _f	=	30 %			
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	77 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

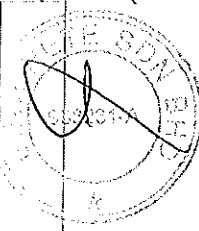
BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR BH18 / UD6 / 18.00m	Date of Report	29.12.18
Sample No		Test started	19.12.18
		Ring No.	A10

Pressure (P) kN/m ²	VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc		
	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²		IMV (M ² /MIN)	t_{90} (min)
0	0.000	20.000	0.0000	1.3483	0.0000	0			
12.5	0.490	19.510	0.0575	1.2908	0.0575	12.5	2.0108	10.89	3.98
25.0	0.852	19.148	0.1000	1.2483	0.0425	12.5	1.5136	8.41	4.93
50.0	1.440	18.560	0.1691	1.1792	0.0690	25.0	1.2682	3.61	10.93
100	2.154	17.846	0.2529	1.0954	0.0838	50.0	0.8008	3.61	10.19
200	3.008	16.992	0.3532	0.9951	0.1003	99.9	0.5030	5.29	6.37
100	2.922	17.078	0.3431	1.0052	-0.0101	-99.9			
50	2.742	17.258	0.3220	1.0264	-0.0211	-50.0			
12.5	2.564	17.436	0.3011	1.0473	-0.0209	-37.5			

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)



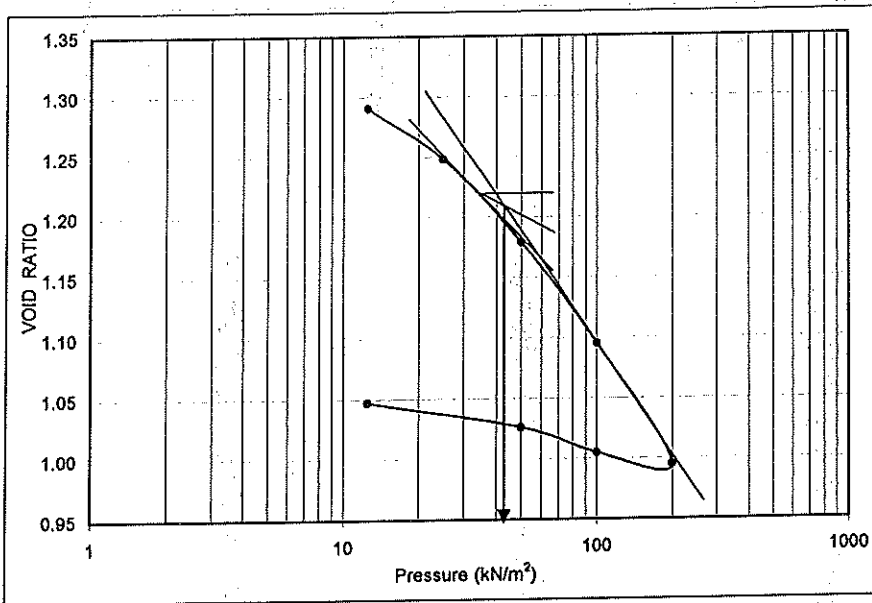
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH18 / UD6 / 18.00m

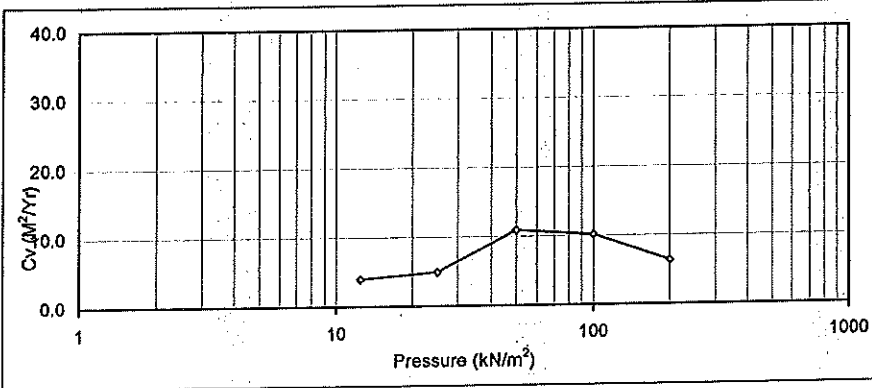
SOIL SAMPLE Dark grey sandy CLAY

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A10



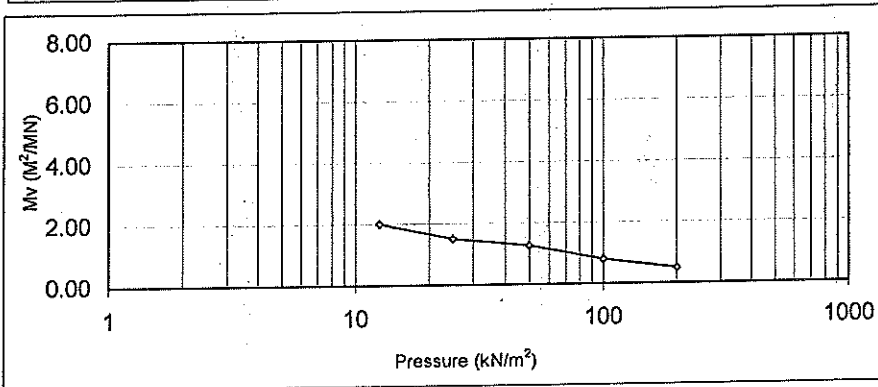
INITIAL

Water content	37	%
Dry Density	1.13	Mg/m ³
Void Ratio	1.3483	
Saturation	73	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.660	

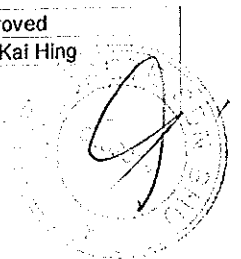


FINAL

Water content	30	%
Dry Density	1.30	Mg/m ³
Void Ratio	1.0473	
Saturation	77	%
Height	17	mm
Comp. Index, C _c	0.3331	
Precons. Load	42	kN/m ²



Comp. Ratio, C_R 0.142



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

Bandar Teknologi Kajang,

43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No.	BH18 / UD11 / 33.00m	Test Started	19.12.18
Soil Description	Dark grey CLAY with some sand	Ring No.	A11

BEFORE TEST

Moist. Content from trimmings:	=	90	%	SG (Measured)	=	2.630	
Wt of sample + Ring	=	115.53	gm	Diameter (D)	=	50	mm
Wt of Ring	=	60.58	gm	Area (A)	=	1964	mm ²
Wt of sample	=	54.95	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	29.15	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	25.8	gm	Bulk Density (P)	=	1.399	Mg/m ³
Initial Moisture Content, M ₀	=	89	%	Dry Density (PD)	=	0.742	Mg/m ³
Initial Void Ratio, e ₀ , $\frac{SG}{P_D} - 1$	=	2.5445					
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	91	%				
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1772	mm ⁻¹				
Height of Solid H _s	=	5.643	mm				

AFTER TEST

Wt of sample + Ring	=	112.54	gm	Overall settlement	=	2.742	mm
Wt of Dry sample + Ring	=	89.73	gm	Volume Change	=	5.386	cm ³
Wt of Ring	=	60.58	gm	Final Volume	=	33.90	cm ³
Wt of Wet sample	=	51.96	gm	Final Bulk Density	=	1.533	Mg/m ³
Wt of Dry sample	=	29.15	gm	Final Dry Density	=	0.860	Mg/m ³
Wt of Moisture	=	22.81	gm	Final Void Ratio, e _f	=	2.0585	
Final Moisture Content, M _f	=	78	%				
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	100	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



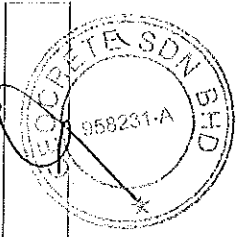
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	29.12.18
Sample No	BH18 / UD11 / 33.00m	Test started	19.12.18
		Ring No.	A11

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc	
			$\Delta_0 = Fx\Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t_{50} (min)		Cv for t_{50} (m ² /yr)
0	0.000	20.000	0.0000	2.5445	0.0000	0				
12.5	0.078	19.922	0.0138	2.5307	0.0138	12.5	0.3135	4.00	11.06	
25.0	0.250	19.750	0.0443	2.5002	0.0305	12.5	0.6972	4.84	9.02	-0.0459
50.0	0.682	19.318	0.1209	2.4236	0.0766	25.0	0.8952	2.89	14.66	-0.1013
100	1.520	18.480	0.2694	2.2751	0.1485	50.0	0.9076	4.41	8.99	-0.2544
200	3.200	16.800	0.5671	1.9774	0.2977	99.9	1.0008	16.00	2.16	-0.4934
100	3.124	16.876	0.5536	1.9908	-0.0135	-99.9				-0.9892
50	2.964	17.036	0.5253	2.0192	-0.0284	-50.0				
12.5	2.742	17.258	0.4859	2.0585	-0.0393	-37.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



GEocrete SDN. BHD.
(Co. No. 958231-A)

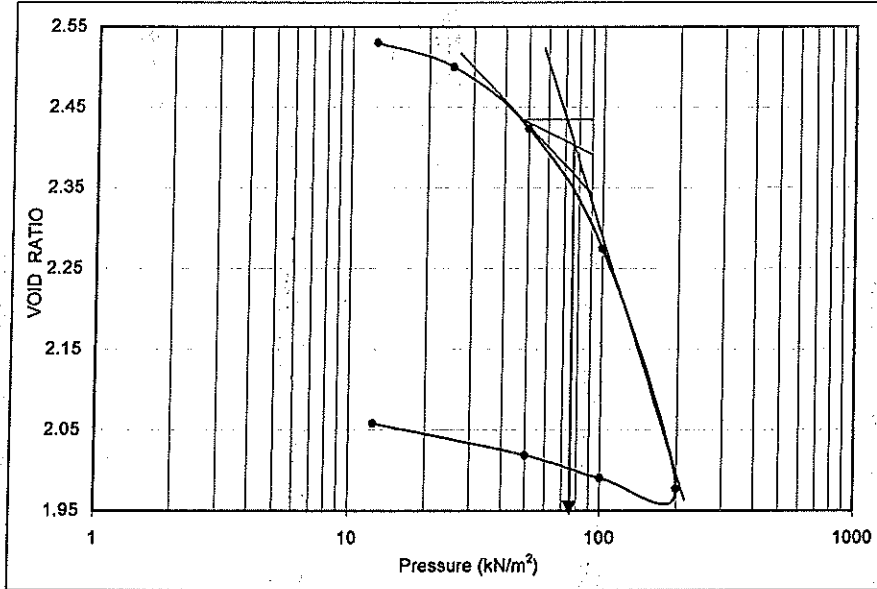
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH18 / UD11 / 33.00m

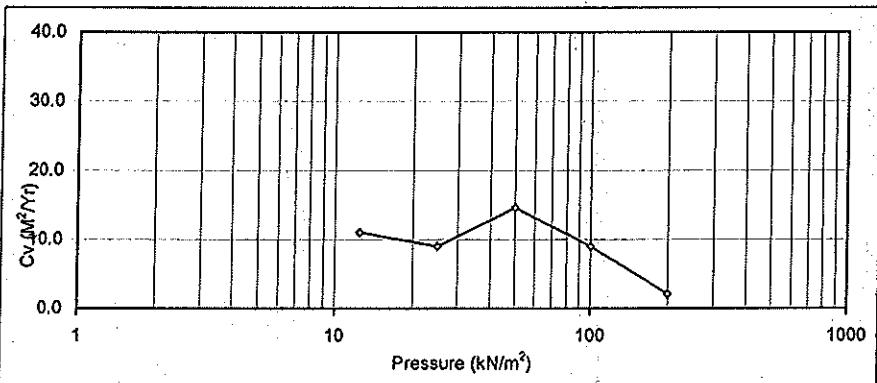
SOIL SAMPLE Dark grey CLAY with some sand

Date of Report 29.12.18
 Test started 19.12.18
 Ring No. A11



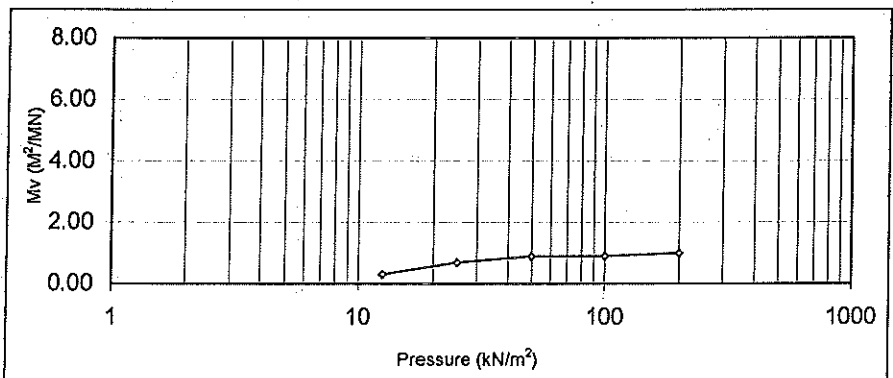
INITIAL

Water content	89	%
Dry Density	0.74	Mg/m ³
Void Ratio	2.5445	
Saturation	91	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.630	



FINAL

Water content	78	%
Dry Density	0.86	Mg/m ³
Void Ratio	2.0585	
Saturation	100	%
Height	17	mm
Comp. Index, C _c	0.9892	
Precons. Load	75	kN/m ²



Comp. Ratio, C_R 0.279



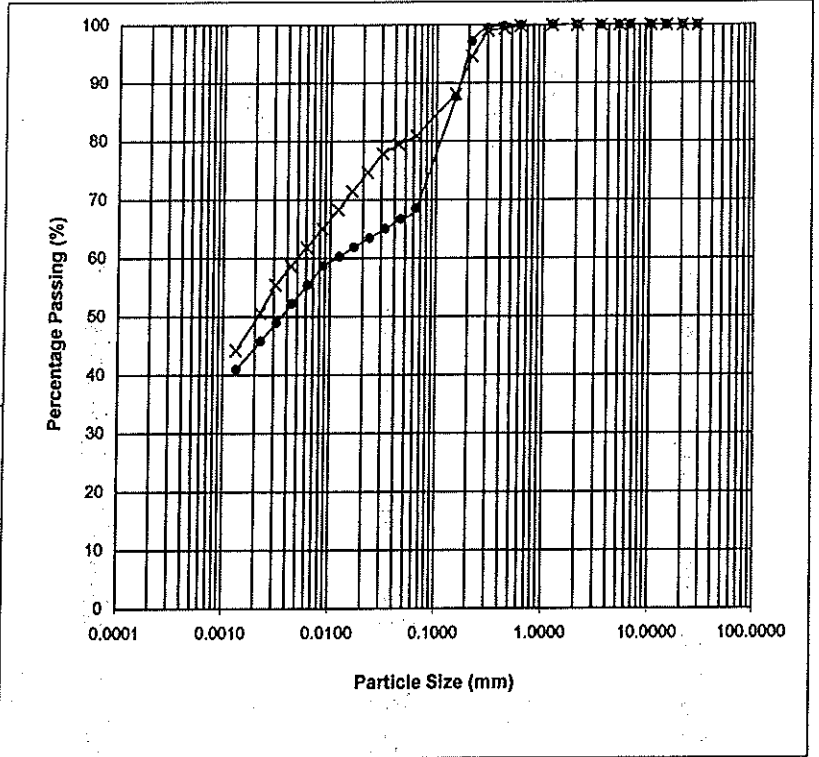
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

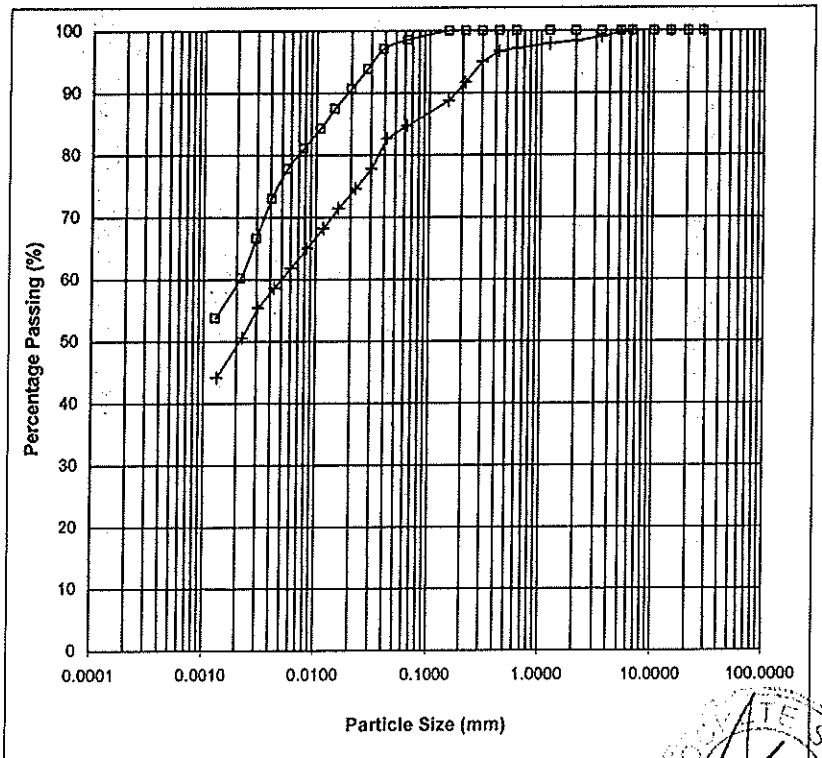
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	99
0.300	99	0.300	99
0.212	97	0.212	95
0.150	88	0.150	88
0.063	69	0.063	81
0.0456	67	0.0427	79
0.0325	65	0.0305	78
0.0231	63	0.0219	75
0.0165	62	0.0157	71
0.0121	60	0.0117	68
0.0086	59	0.0084	65
0.0062	55	0.0060	62
0.0044	52	0.0043	59
0.0032	49	0.0031	55
0.0023	46	0.0022	51
0.0013	41	0.0013	44
Clay (%)	43	Clay (%)	47
Silt (%)	25	Silt (%)	34
Sand (%)	32	Sand (%)	19
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH19	UD1	3.00	06.12.18
x	BH19	UD4	12.00	06.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	99
2.00	100	2.00	98
1.18	100	1.18	98
0.600	100	0.600	97
0.425	100	0.425	97
0.300	100	0.300	95
0.212	100	0.212	92
0.150	100	0.150	89
0.063	99	0.063	85
0.0384	97	0.0420	83
0.0278	94	0.0305	78
0.0200	91	0.0219	75
0.0144	87	0.0157	71
0.0107	84	0.0117	68
0.0077	81	0.0084	65
0.0056	78	0.0060	62
0.0040	73	0.0043	59
0.0029	67	0.0031	55
0.0021	60	0.0022	51
0.0013	54	0.0013	44
Clay (%)	57	Clay (%)	47
Silt (%)	42	Silt (%)	37
Sand (%)	1	Sand (%)	14
Gravel (%)	0	Gravel (%)	2
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH19	UD8	24.00	06.12.18
+	BH19	D10	27.00	06.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved	
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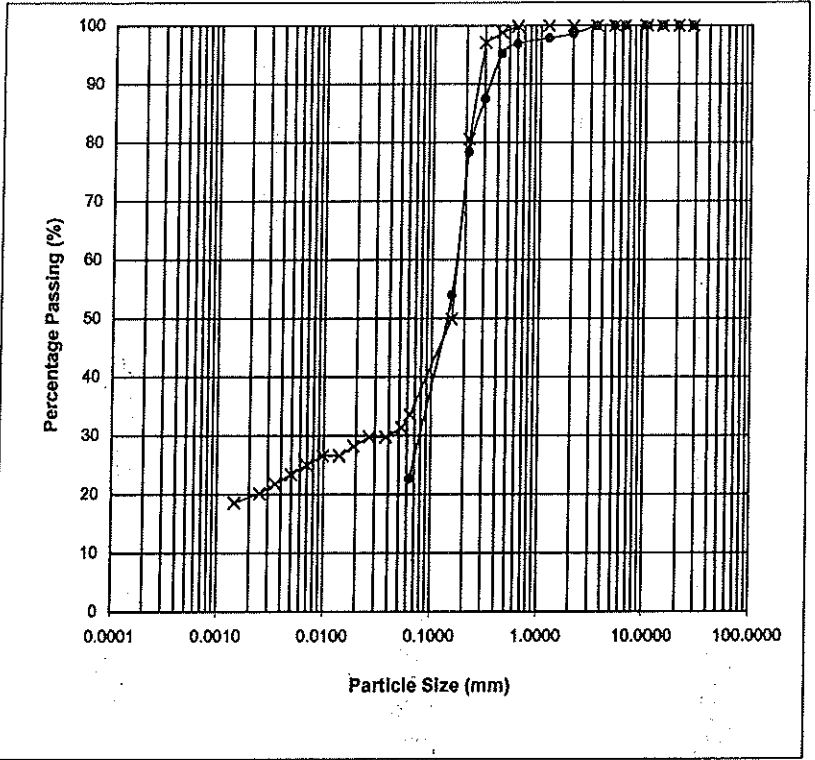
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

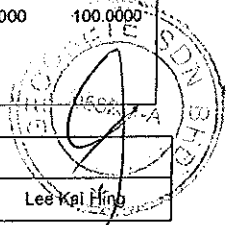
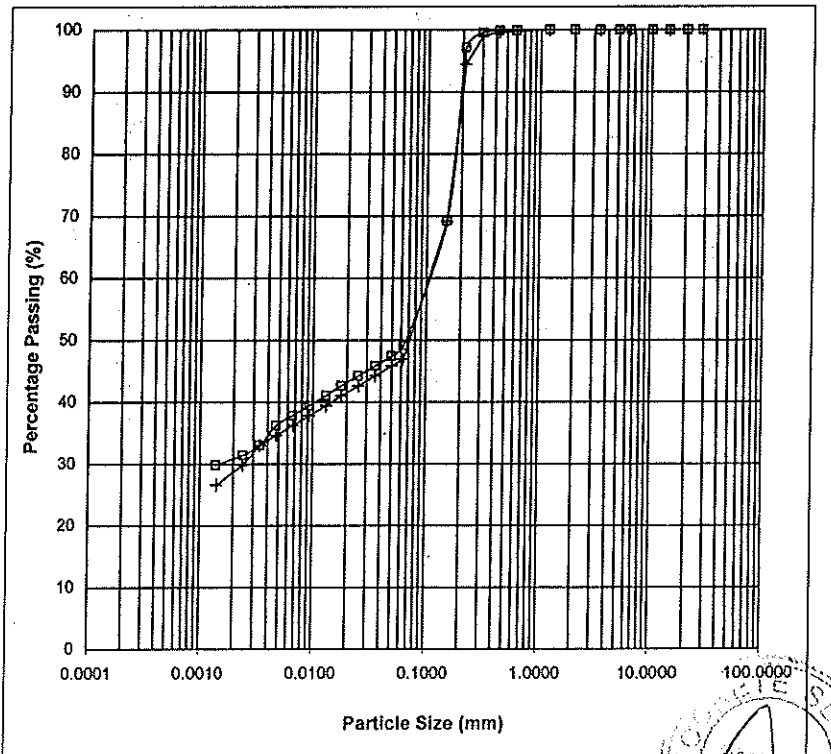
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	99	2.00	100
1.18	98	1.18	100
0.600	97	0.600	100
0.425	95	0.425	99
0.300	88	0.300	97
0.212	78	0.212	81
0.150	54	0.150	50
0.063	23	0.063	34
		0.0527	31
		0.0375	30
		0.0265	30
		0.0188	28
		0.0138	27
		0.0098	27
		0.0070	25
		0.0049	23
		0.0035	22
		0.0025	20
		0.0015	19
Clay (%)	23	Clay (%)	19
Silt (%)		Silt (%)	14
Sand (%)	76	Sand (%)	67
Gravel (%)	1	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH19	D11	28.50	06.12.18
x	BH19	D14	33.00	06.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	99
0.212	97	0.212	94
0.150	69	0.150	69
0.063	49	0.063	47
0.0496	47	0.0499	46
0.0353	46	0.0355	44
0.0251	44	0.0253	43
0.0179	43	0.0180	41
0.0131	41	0.0132	39
0.0093	39	0.0094	38
0.0066	38	0.0067	36
0.0047	36	0.0048	35
0.0034	33	0.0034	33
0.0024	31	0.0024	30
0.0014	30	0.0014	27
Clay (%)	31	Clay (%)	28
Silt (%)	18	Silt (%)	19
Sand (%)	51	Sand (%)	53
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH19	D15	34.50	06.12.18
+	BH19	D18	39.00	06.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Checked :	Approved :	
	Shyam Nath	Chris	Lee Kai Fing	

Total Stress Triaxial Compression

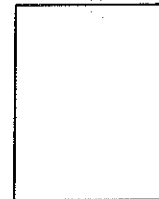
Unconsolidated Undrained

Sample details

Depth : 3.00m
Description : Dark grey sandy CLAY

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	139.88	141.39	143.34
Bulk Density ρ (Mg/m ³)	1.62	1.64	1.66
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

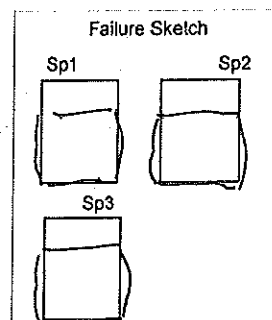
	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	20	40	80
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

	Specimen 1	Specimen 2	Specimen 3
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	51	50	48
Dry Density ρ_{d0} (Mg/m ³)	1.07	1.09	1.12
Voids Ratio e_0	1.47	1.42	1.36
Deg of Saturation S_0 %	92.41	93.13	94.13

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	32.49	41.48	96.47
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	32.29	41.28	96.27
Strain at Failure ϵ_f %	12.50	12.50	11.51
Shear Strength c_u (kPa)	16.25	20.74	48.24

	Specimen 1	Specimen 2	Specimen 3
Moisture Content w_f %	51	50	48
Dry Density ρ_{df} (Mg/m ³)	1.07	1.09	1.12
Voids Ratio e_f	1.47	1.42	1.36
Deg of Saturation S_f %	92.41	93.13	94.13



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

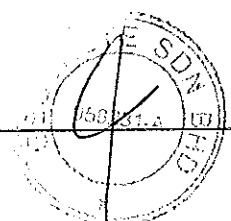
Test Name : UU

Date of Test : 04.12.18

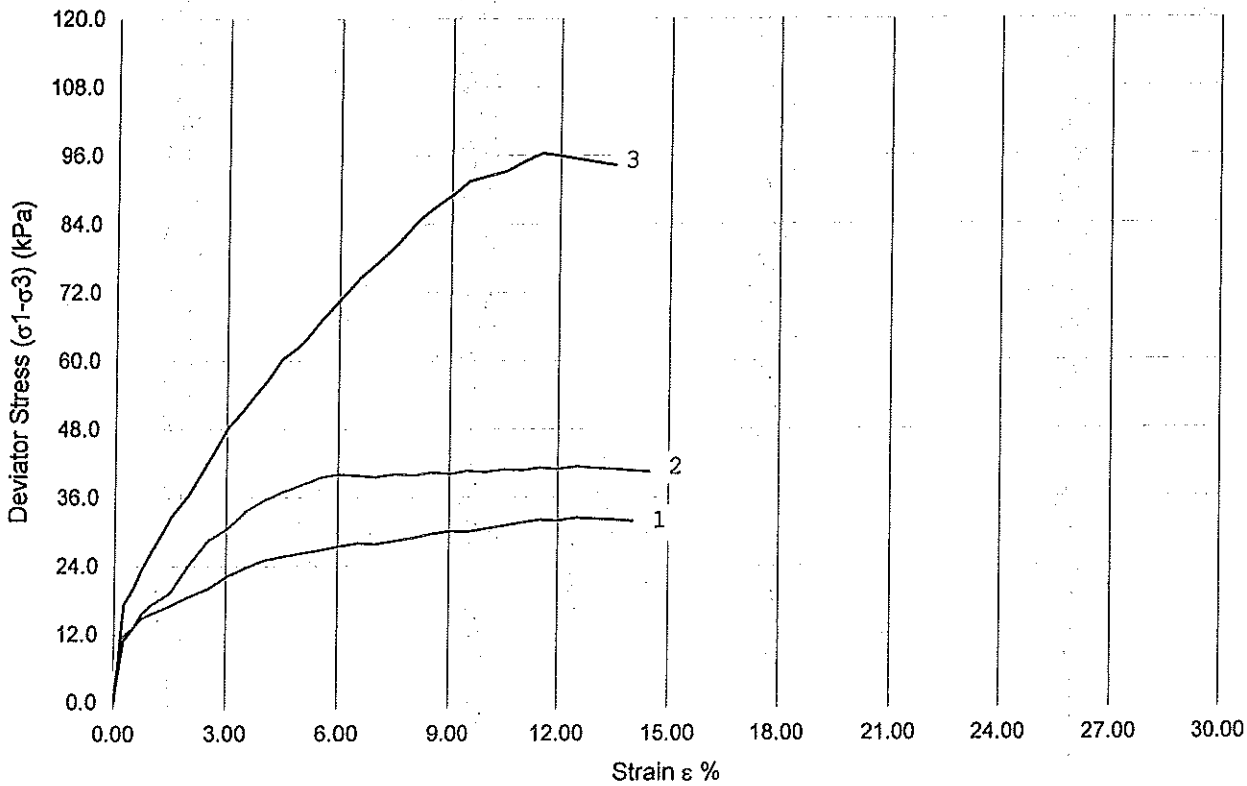
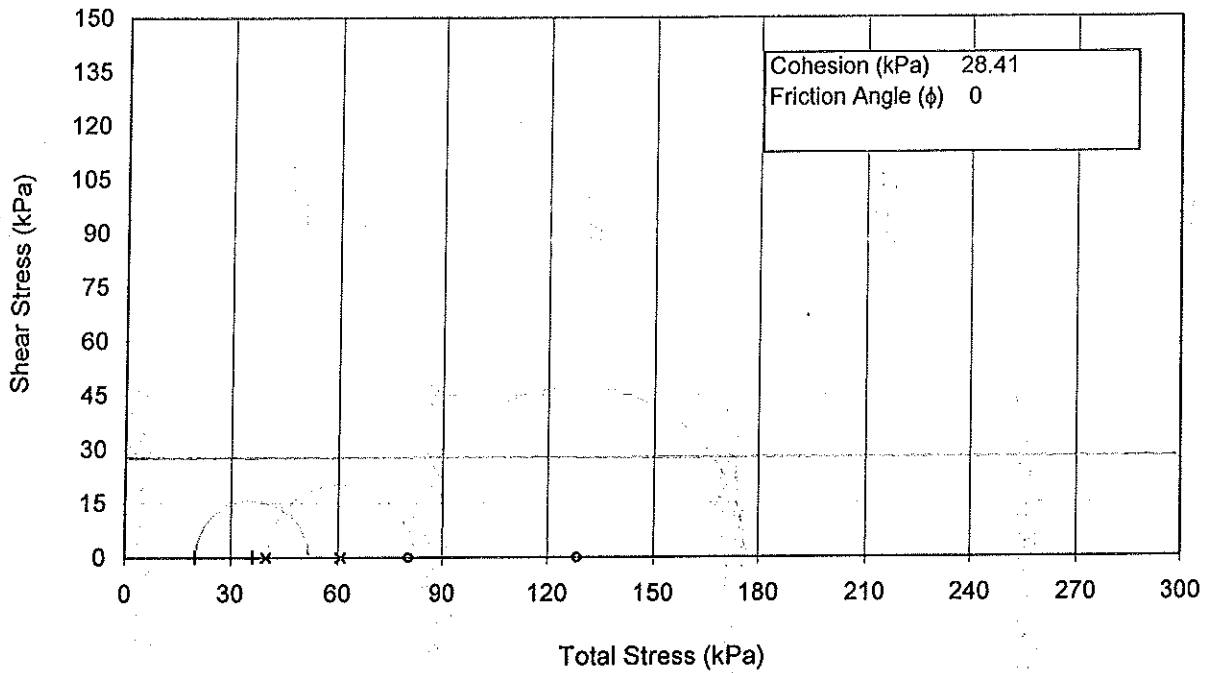
Sample : UD1

Borehole : BH19

Approved
Lee Kai Hing

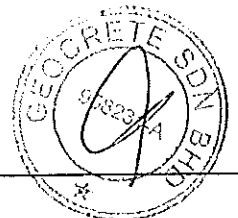


Total Stress Triaxial Compression Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 04.12.18
 Sample : UD1
 Borehole : BH19
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

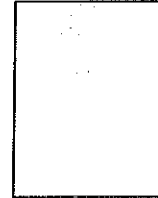
Unconsolidated Undrained

Sample details

Depth : 12.00m
 Description : Grey CLAY with little sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	140.06	141.85	143.15
Bulk Density ρ (Mg/m ³)	1.63	1.65	1.66
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



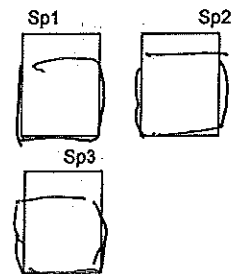
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	100	200	400
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	57	56	55
Dry Density ρ_{d0} (Mg/m ³)	1.04	1.06	1.08
Voids Ratio e_0	1.52	1.47	1.43
Deg of Saturation S_0 %	97.72	99.14	99.74

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	47.96	73.49	87.25
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	47.76	73.29	87.05
Strain at Failure ϵ_f %	8.03	6.97	9.47
Shear Strength c_u (kPa)	23.98	36.75	43.63
Moisture Content w_f %	57	56	55
Dry Density ρ_{df} (Mg/m ³)	1.04	1.06	1.08
Voids Ratio e_f	1.52	1.47	1.43
Deg of Saturation S_f %	97.72	99.14	99.74

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

Operator

Shyam Nath

Checked

Chris

Test Name :

UU

Date of Test :

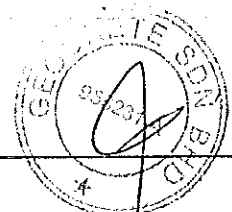
04.12.18

Sample : UD4

Borehole : BH19

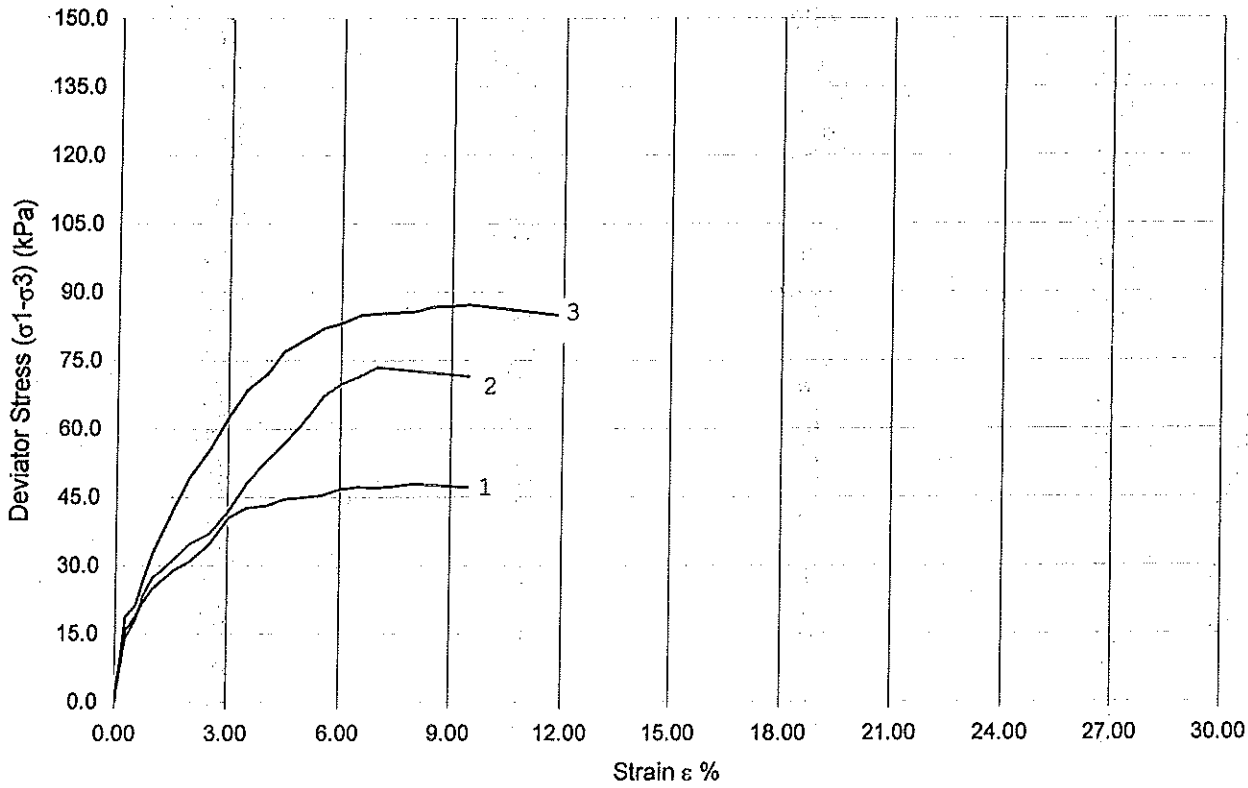
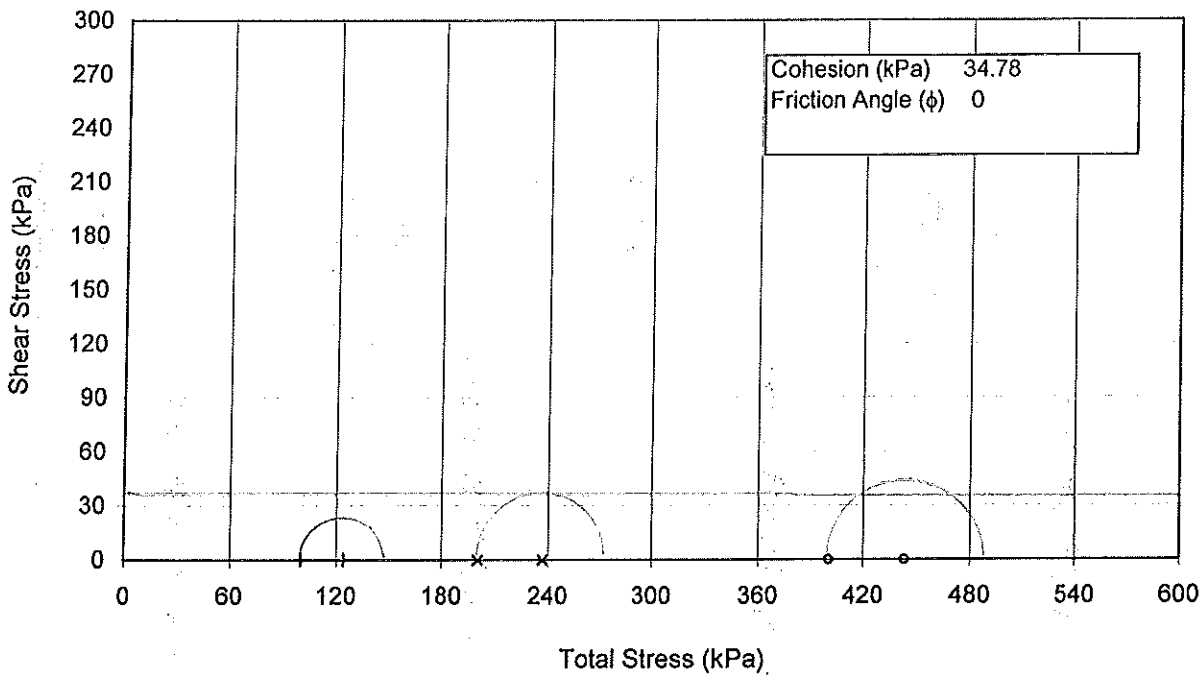
Approved

Lee Kai Hing



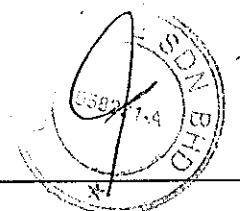
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 04.12.18
 Sample : UD4
 Borehole : BH19
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

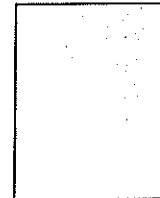
Unconsolidated Undrained

Sample details

Depth : 24.00m
Description : Dark grey CLAY

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	124.71	127.20	131.21
Bulk Density ρ (Mg/m ³)	1.45	1.48	1.52
Particle Density ρ_s	2.61	2.61	2.61

Sketch showing specimen location in original sample



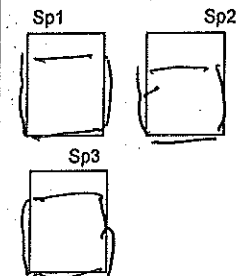
Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	170	340	680
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2
Strain Channel			
Load Channel	14391	14391	14391
Moisture Content w_0 %	74	72	68
Dry Density ρ_{d0} (Mg/m ³)	0.83	0.86	0.91
Voids Ratio e_0	2.15	2.03	1.88
Deg of Saturation S_0 %	90.58	91.88	94.41

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	32.35	46.27	49.98
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	32.15	46.07	49.78
Strain at Failure ϵ_f %	9.01	8.49	6.97
Shear Strength c_u (kPa)	16.17	23.14	24.99
Moisture Content w_f %	74	72	68
Dry Density ρ_{df} (Mg/m ³)	0.83	0.86	0.91
Voids Ratio e_f	2.15	2.03	1.88
Deg of Saturation S_f %	90.58	91.88	94.41

Failure Sketch



Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Operator
Shyam Nath

Checked
Chris

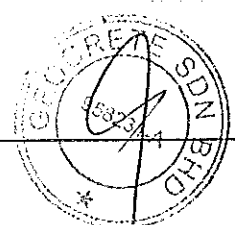
Test Name : UU

Date of Test : 04.12.18

Sample : UD8

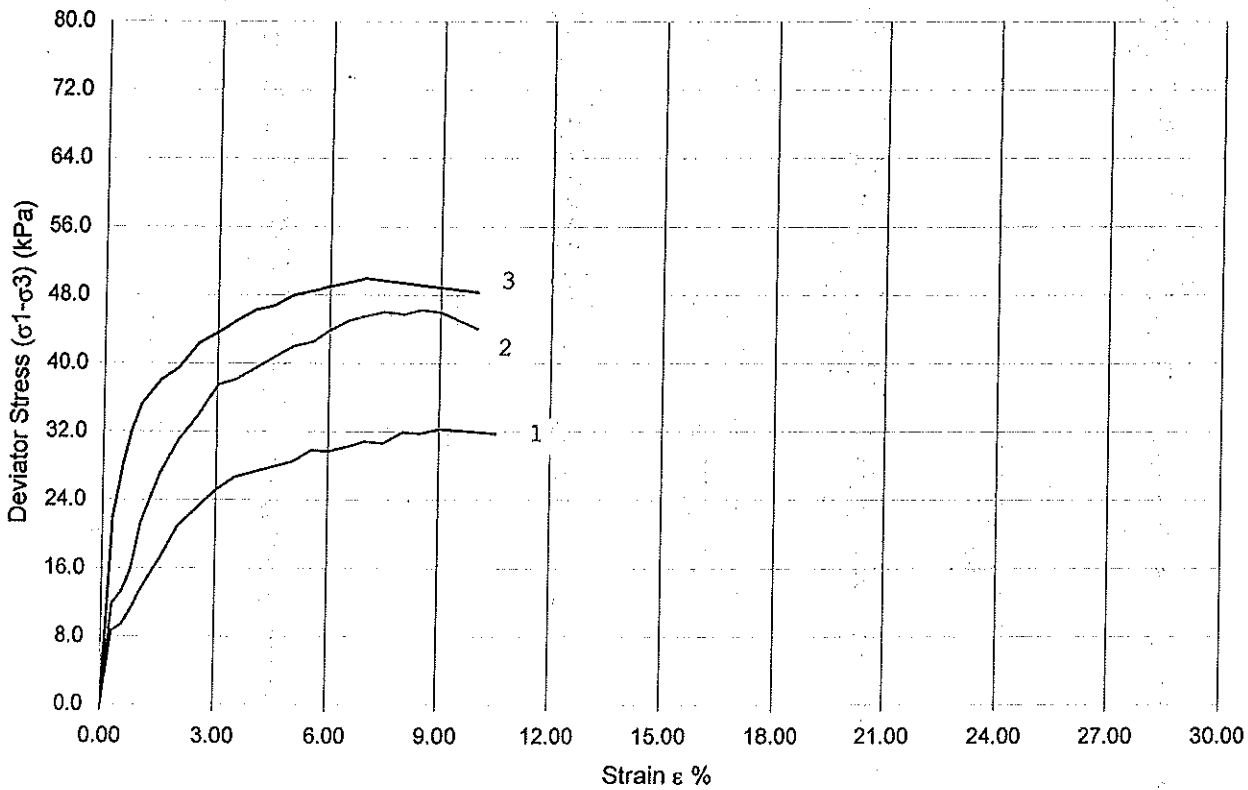
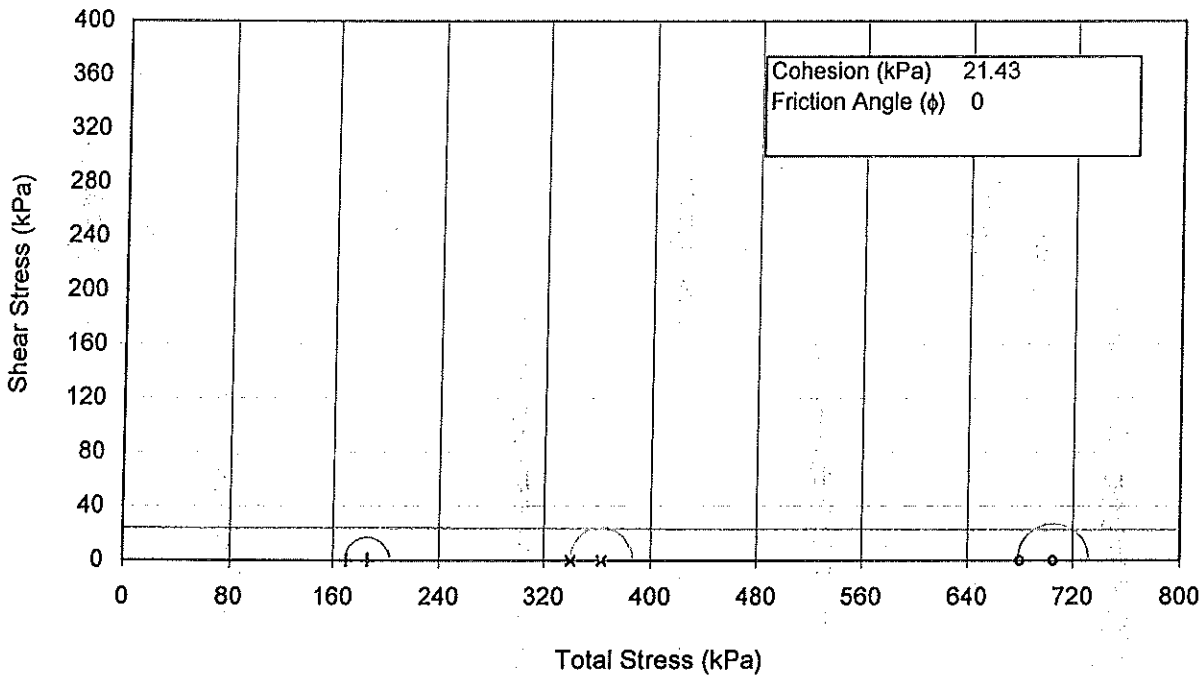
Borehole : BH19

Approved
Lee Kai Hing



Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

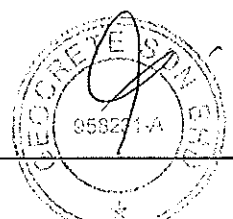
Operator :
 Shyam Nath

Checked :
 Chris

Test Name : UU
 Date of Test : 04.12.18

Sample : UD8
 Borehole : BH19

Approved :
 Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

No. 22, Jalan P4/8,

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43500 Semenyih, Selangor.

Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH19 / UD1 / 3.00m	Test Started	03.12.18
Soil Description	Dark grey sandy CLAY	Ring No.	8

BEFORE TEST

Moist. Content from trimmings:	=	56	%	SG (Measured)	=	2.650	
Wt of sample + Ring	=	118.97	gm	Diameter (D)	=	50	mm
Wt of Ring	=	59.13	gm	Area (A)	=	1964	mm ²
Wt of sample	=	59.84	gm	Thickness (H)	=	20	mm
Wt of Dry sample	=	38.74	gm	Volume (V)	=	39.29	cm ³
Wt of Initial Moisture	=	21.1	gm	Bulk Density (P)	=	1.523	Mg/m ³
Initial Moisture Content, M _o	=	54	%	Dry Density (PD)	=	0.986	Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	1.6873	
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	86	%
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1344	mm ⁻¹
Height of Solid H _s	=	7.442	mm

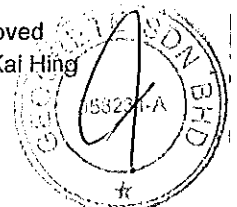
AFTER TEST

Wt of sample + Ring	=	116.27	gm	Overall settlement	=	2.094	mm
Wt of Dry sample + Ring	=	97.87	gm	Volume Change	=	4.113	cm ³
Wt of Ring	=	59.13	gm	Final Volume	=	35.17	cm ³
Wt of Wet sample	=	57.14	gm	Final Bulk Density	=	1.625	Mg/m ³
Wt of Dry sample	=	38.74	gm	Final Dry Density	=	1.101	Mg/m ³
Wt of Moisture	=	18.40	gm	Final Void Ratio, e _f	=	1.4060	
Final Moisture Content, M _f	=	47	%				
Final Saturation, S _o , $\frac{M_f \times SG}{e_f}$	=	90	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

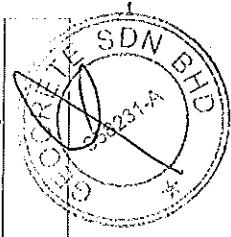
BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No	BH19 / UD1 / 3.00m	Test started	03.12.18
		Ring No.	8

Pressure (P) kN/m ²	Settlement ΔH (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc	
		$H = H_0 - \Delta H$ (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)		Cv for t ₉₀ (m ² /yr)
0	0.000	20.000	0.0000	1.6873	0.0000	0				
6.25	0.420	19.580	0.0564	1.6309	0.0564	6.25	3.4347	1.21	35.93	-0.1875
12.5	0.580	19.420	0.0779	1.6094	0.0215	6.25	1.3192	1.96	21.53	-0.0714
25.0	0.890	19.110	0.1196	1.5677	0.0417	12.5	1.2987	1.69	24.38	-0.1384
50.0	1.400	18.600	0.1881	1.4992	0.0685	25.0	1.0976	2.56	15.41	-0.2277
100	2.400	17.600	0.3225	1.3649	0.1344	50.0	1.1372	1.44	25.25	-0.4464
50	2.316	17.684	0.3112	1.3761	-0.0113	-50.0				
25	2.190	17.810	0.2943	1.3931	-0.0169	-25.0				
12.5	2.094	17.906	0.2814	1.4060	-0.0129	-12.5				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing

GEOCRETE SDN. BHD.
(Co. No. 958231-A)

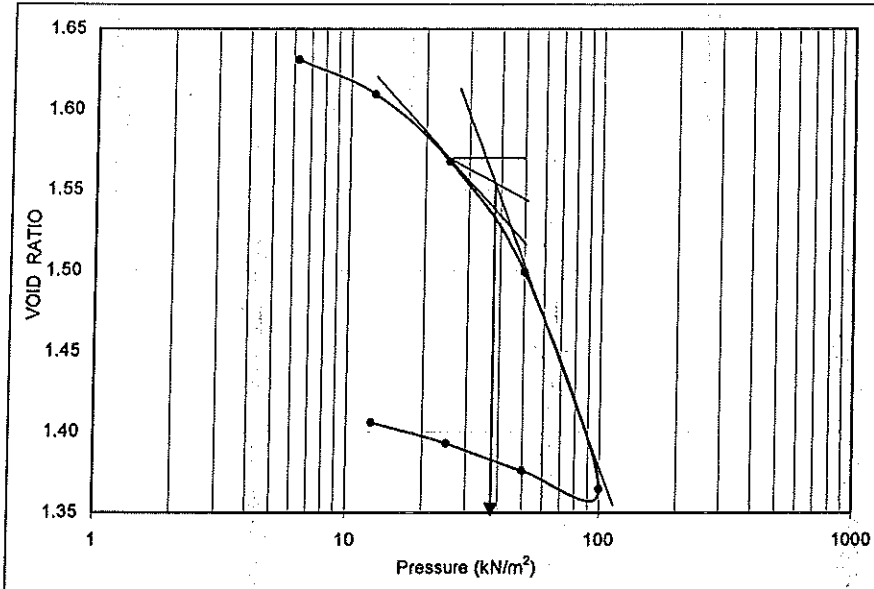


ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

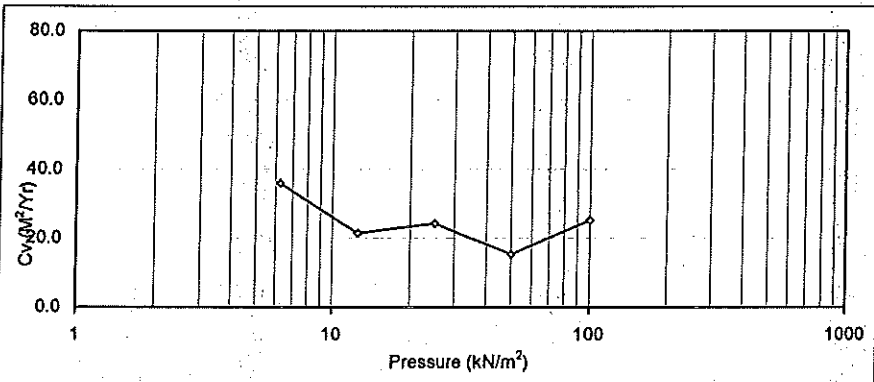
PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH19 / UD1 / 3.00m
 SOIL SAMPLE Dark grey sandy CLAY

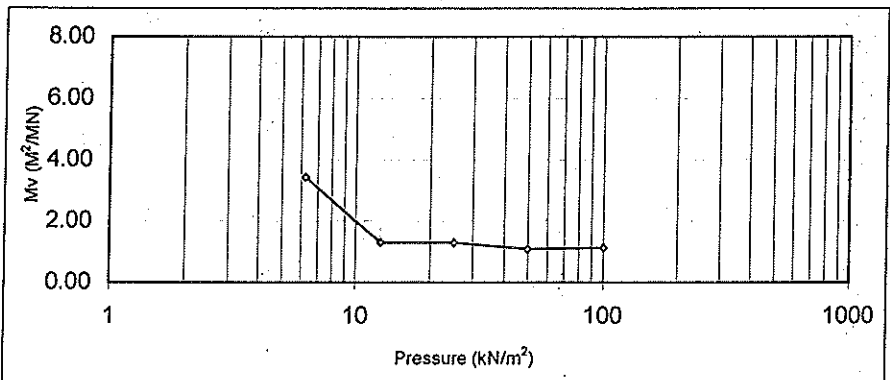
Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 8



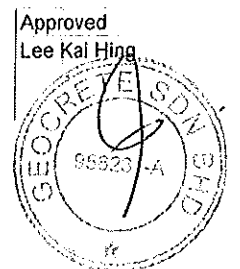
INITIAL		
Water content	54	%
Dry Density	0.99	Mg/m ³
Void Ratio	1.6873	
Saturation	86	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.650	



FINAL		
Water content	47	%
Dry Density	1.10	Mg/m ³
Void Ratio	1.4060	
Saturation	90	%
Height	18	mm
Comp. Index, Cc	0.4464	
Precons. Load	38	kN/m ²



Comp. Ratio, C _R	0.166	
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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH19 / UD4 / 12.00m	Test Started	03.12.18
Soil Description	Grey CLAY with little sand	Ring No.	9

BEFORE TEST

Moist. Content from trimmings:	=	55	%	SG (Measured)	=	2.610
Wt of sample + Ring	=	122.01	gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.05	gm	Area (A)	=	1964 mm ²
Wt of sample	=	60.96	gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.82	gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	21.14	gm	Bulk Density (P)	=	1.552 Mg/m ³
Initial Moisture Content, M _o	=	53	%	Dry Density (PD)	=	1.014 Mg/m ³

Initial Void Ratio, e _o , SG/P _D - 1	=	1.5750	
Initial Saturation, S _o ; $\frac{M_o \times SG}{e_o}$	=	88	%
V. Ratio Change Factor F, $\frac{H}{1+e_o}$	=	0.1287	mm ⁻¹
Height of Solid	=	7.767	mm

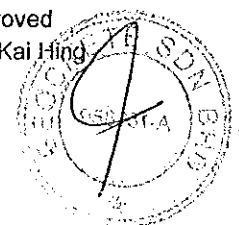
AFTER TEST

Wt of sample + Ring	=	119.21	gm	Overall settlement	=	2.196	mm
Wt of Dry sample + Ring	=	100.87	gm	Volume Change	=	4.314	cm ³
Wt of Ring	=	61.05	gm	Final Volume	=	34.97	cm ₃
Wt of Wet sample	=	58.16	gm	Final Bulk Density	=	1.663	Mg/m ³
Wt of Dry sample	=	39.82	gm	Final Dry Density	=	1.139	Mg/m ³
Wt of Moisture	=	18.34	gm	Final Void Ratio, e _r	=	1.2922	
Final Moisture Content, M _f	=	46	%				
Final Saturation, S _o , $\frac{M_f \times SG}{e_r}$	=	93	%				

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

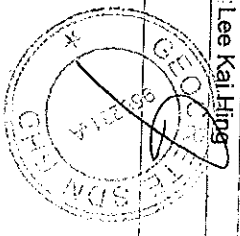
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH19 / UDA / 12.00m

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 9

Pressure (P) KN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta e = F_x \Delta H$	$e = e_0 - e_1$	de	dp KN/m ²	M _v (N ² /MN)	t_{90} (min)	Cv for t_{90} (m ² /yr)	
0	0.000	20.000	0.0000	1.5750	0.0000	0				
6.25	0.138	19.862	0.0178	1.5572	0.0178	6.25	1.1125	2.56	17.22	-0.0590
12.5	0.260	19.740	0.0335	1.5415	0.0157	6.25	0.9896	1.96	22.20	-0.0522
25.0	0.428	19.572	0.0551	1.5199	0.0216	12.5	0.6872	3.61	11.88	-0.0719
50.0	0.618	19.382	0.0796	1.4954	0.0245	25.0	0.3924	1.00	42.11	-0.0813
100	0.982	19.018	0.1264	1.4486	0.0469	50.0	0.3831	1.69	24.21	-0.1557
200	1.602	18.398	0.2063	1.3687	0.0798	99.9	0.3373	1.69	22.99	-0.2652
400	2.510	17.490	0.3232	1.2518	0.1169	199.8	0.2598	3.24	11.03	-0.3884
200	2.456	17.544	0.3162	1.2588	-0.0070	-199.8				
50	2.302	17.698	0.2964	1.2786	-0.0198	-149.9				
12.5	2.196	17.804	0.2827	1.2922	-0.0136	-37.5				

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator Shyam Nath Checked Chris Approved Lee Kai Hing



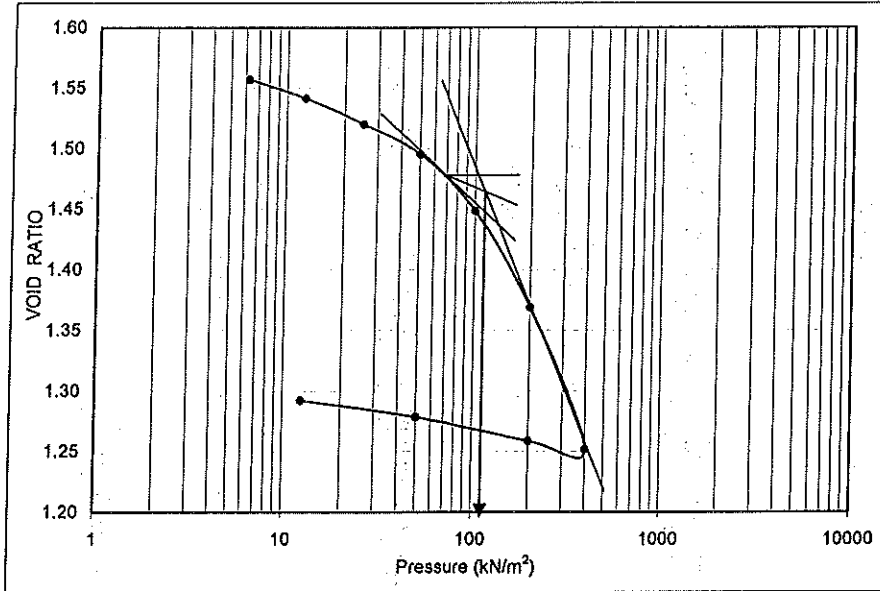
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

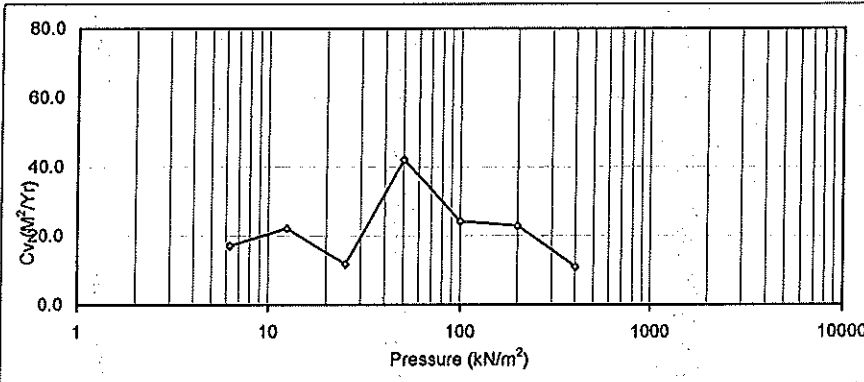
BH REF BH19 / UD4 / 12.00m

SOIL SAMPLE Grey CLAY with little sand

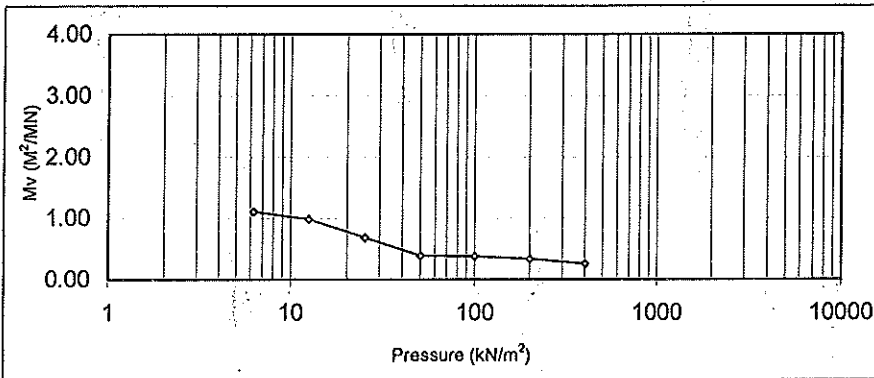
Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 9



INITIAL		
Water content	53	%
Dry Density	1.01	Mg/m ³
Void Ratio	1.5750	
Saturation	88	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.610	



FINAL		
Water content	46	%
Dry Density	1.14	Mg/m ³
Void Ratio	1.2922	
Saturation	93	%
Height	18	mm
Comp. Index, Cc	0.3884	
Precons. Load	115	kN/m ²



Comp. Ratio, C _R	0.161	
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GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing



GEOCRETE SDN. BHD.

Company No 958231 A

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH19 / UD8 / 24.00m	Test Started	03.12.18
Soil Description	Dark grey CLAY	Ring No.	10

BEFORE TEST

Moist. Content from trimmings:	=	88 %	SG (Measured)	=	2.610
Wt of sample + Ring	=	118.14 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.78 gm	Area (A)	=	1964 mm ²
Wt of sample	=	56.36 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	30.31 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	26.05 gm	Bulk Density (P)	=	1.435 Mg/m ³
Initial Moisture Content, M ₀	=	86 %	Dry Density (PD)	=	0.772 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.3829			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	94 %			
V. Ratio Change Factor F _v , $\frac{1+e_0}{H}$	=	0.1691 mm ⁻¹			
Height of Solid H _s	=	5.912 mm			

AFTER TEST

Wt of sample + Ring	=	115.74 gm	Overall settlement	=	2.374 mm
Wt of Dry sample + Ring	=	92.09 gm	Volume Change	=	4.663 cm ³
Wt of Ring	=	61.78 gm	Final Volume	=	34.62 cm ³
Wt of Wet sample	=	53.96 gm	Final Bulk Density	=	1.559 Mg/m ³
Wt of Dry sample	=	30.31 gm	Final Dry Density	=	0.875 Mg/m ³
Wt of Moisture	=	23.65 gm	Final Void Ratio, e _f	=	1.9814
Final Moisture Content, M _f	=	78 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	103 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

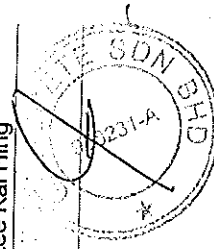
Project PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR
 Sample No BH19 / UD8 / 24.00m

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 10

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
			$\Delta_0 = F \times \Delta H$	$e=e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	0.000	20.000	0.0000	2.3829	0.0000	0				
25.0	0.168	19.832	0.0284	2.3545	0.0284	25.0	0.3391	7.84	5.62	-0.0944
50.0	0.606	19.394	0.1025	2.2804	0.0741	25.0	0.9041	10.89	3.92	-0.2461
100	1.644	18.356	0.2781	2.1048	0.1756	50.0	1.1318	23.04	1.72	-0.5833
200	3.000	17.000	0.5074	1.8755	0.2294	99.9	0.7983	29.16	1.19	-0.7620
100	2.940	17.060	0.4973	1.8856	-0.0101	-99.9				
50	2.692	17.308	0.4553	1.9276	-0.0419	-50.0				
25	2.374	17.626	0.4016	1.9814	-0.0538	-25.0				

Operator Shyam Nath Checked Chris Approved Lee Kai Hing

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)



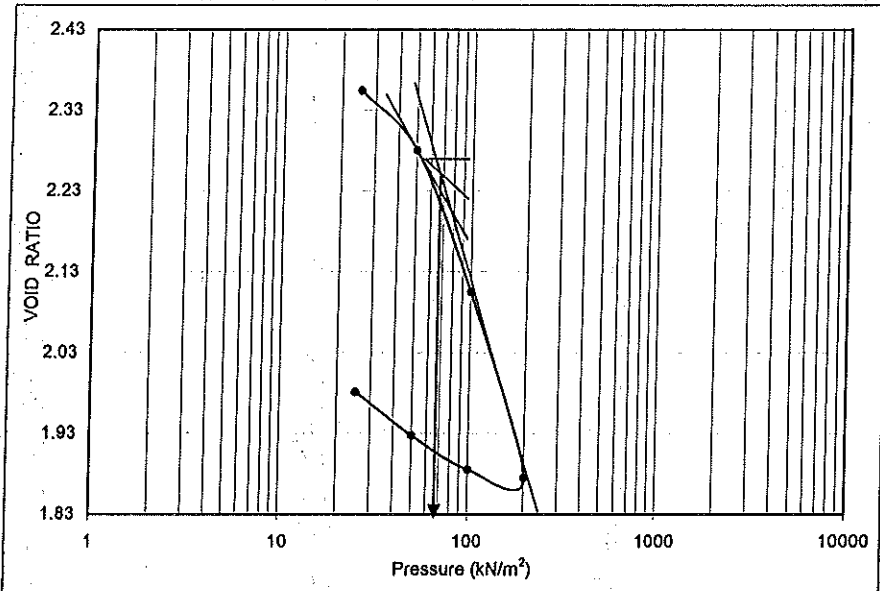
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

BH REF BH19 / UD8 / 24.00m

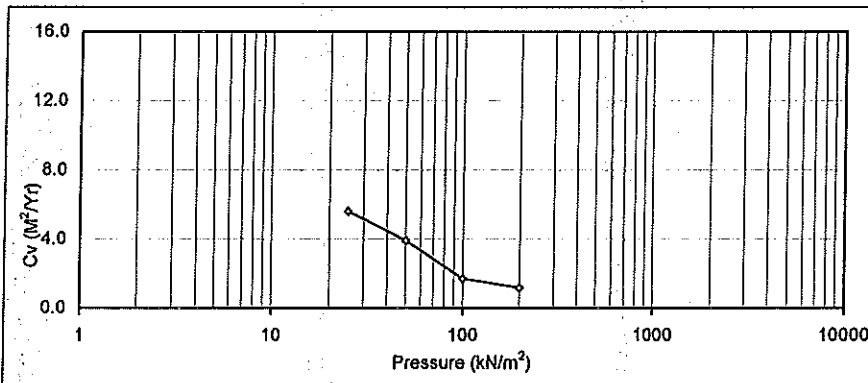
SOIL SAMPLE Dark grey CLAY

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 10



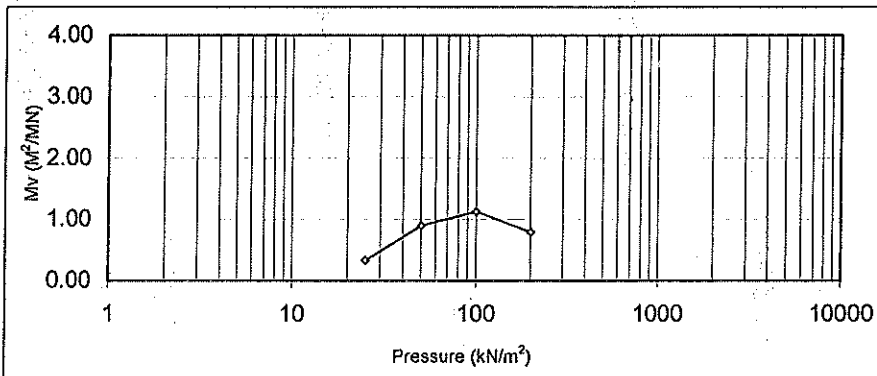
INITIAL

Water content	86	%
Dry Density	0.77	Mg/m ³
Void Ratio	2.3829	
Saturation	94	%
Height	20	mm
Diameter	50	mm
Sp. Gravity	2.610	



FINAL

Water content	78	%
Dry Density	0.88	Mg/m ³
Void Ratio	1.9814	
Saturation	103	%
Height	18	mm
Comp. Index, Cc	0.7620	
Precons. Load	65	kN/m ²



Comp. Ratio, C_R 0.225

GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 19 / D 19 (40.50 m)

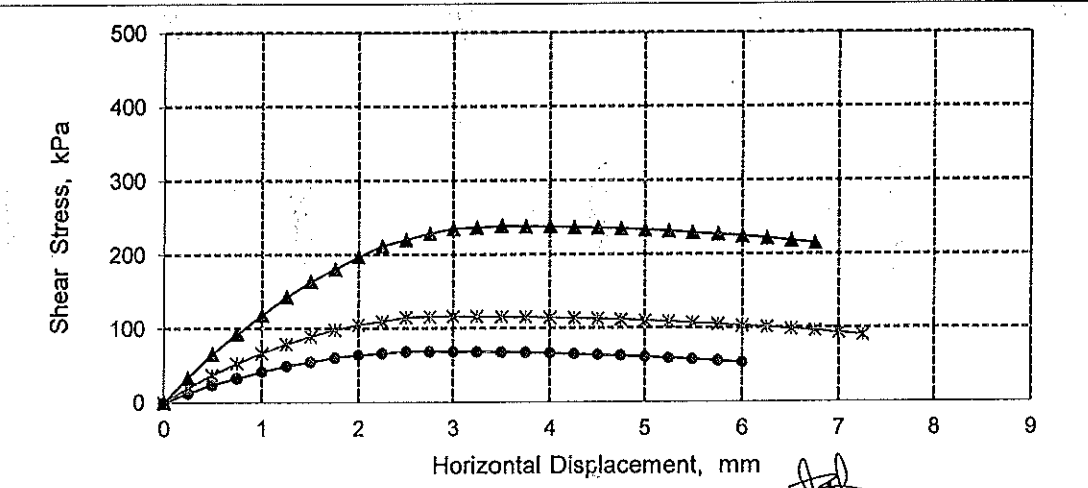
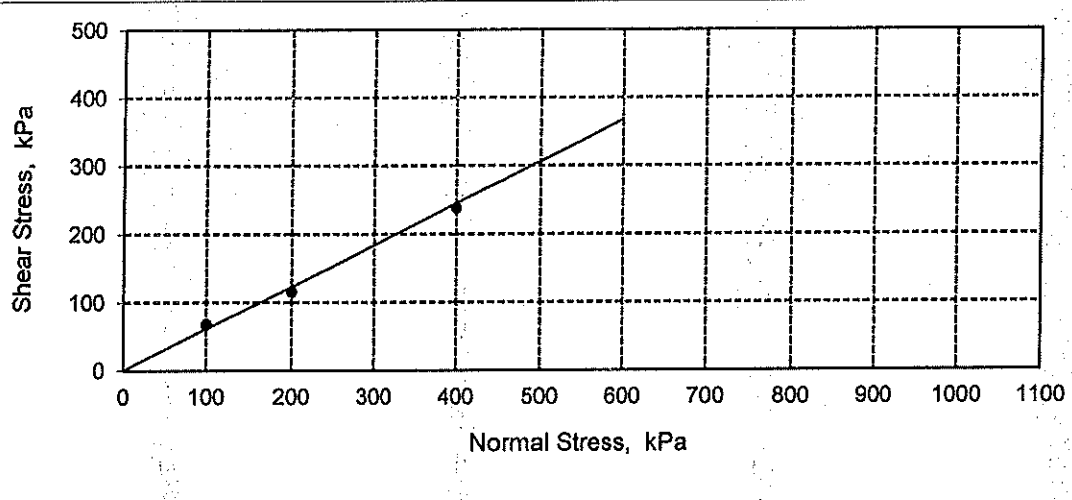
Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 10 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		133.6	133.8	133.9
Moisture Content (%)		28.7	29.0	29.4
Bulk Density (Mg/m ³)		1.856	1.858	1.860
Dry Density (Mg/m ³)		1.442	1.440	1.437
SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		68.5	116.1	238.7
Displ. at Failure (mm)		2.5	3.0	3.5
Settlement (mm)		0.3	0.5	0.8

c' 1 kPa

φ' 31.5 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 19 / D 26 (51.00 m)

Test Size : 60 mm x 60 mm x 20 mm

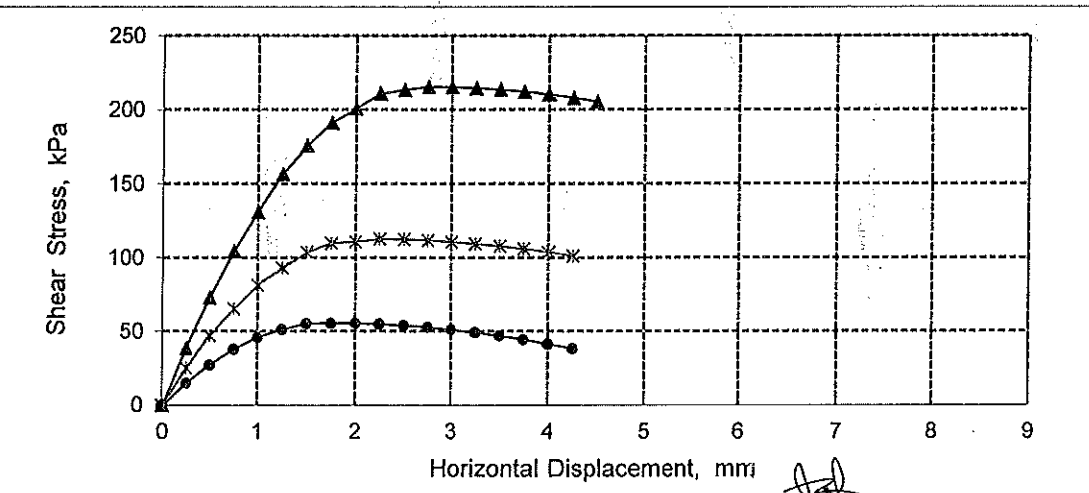
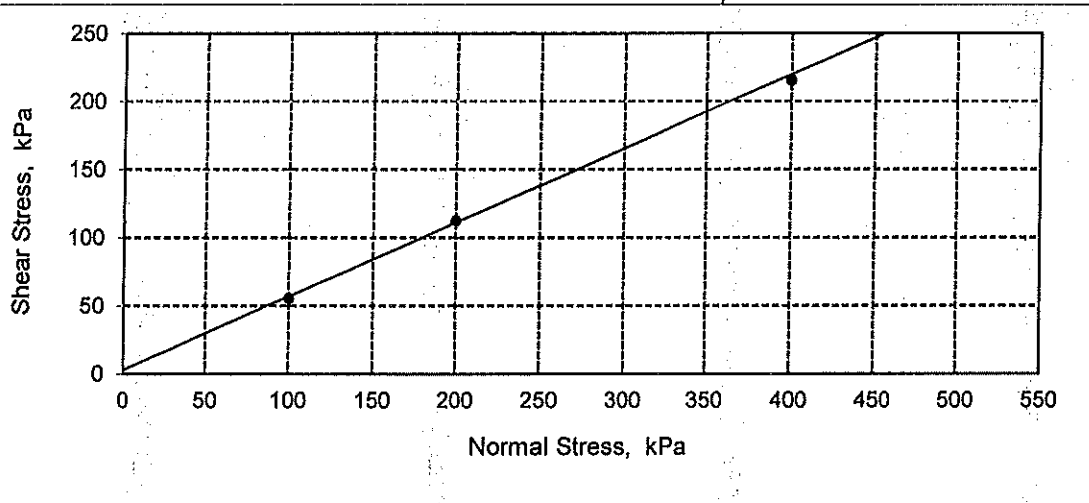
Date Tested : 10 / 12 / 2018

INITIAL CONDITIONS				
Specimen No.		S 1	S 2	S 3
Specimen Weight (g)		143.2	143.4	144.1
Moisture Content (%)		19.8	20.2	20.4
Bulk Density (Mg/m ³)		1.989	1.991	2.002
Dry Density (Mg/m ³)		1.660	1.656	1.663

SHEARING STAGE				
Normal Stress (kPa)		100	200	400
Max. Shear Stress (kPa)		55.6	112.7	215.8
Displ. at Failure (mm)		1.8	2.3	2.8
Settlement (mm)		0.2	0.3	0.6

c' 3 kPa

φ' 28.5 deg.



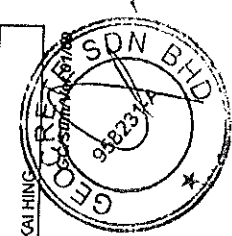
SUMMARY OF TEST RESULTS

GEOCRETE SENDIRIAN BERHAD (Co. No. 958231 - A)		PROJECT : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR				REF : L081/18/139/18 DATE : 13.12.18																															
SAMPLE AND SPECIMEN DETAILS	Borehole No.	Depth (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	ATTERBERG			LIMITS			LINEAR SHRINKAGE		SIEVE AND HYDROMETER ANALYSIS				Unconfined Compression Test (Max Deviator Stress) (kPa)		SHEAR BOX		CIU		UU Triaxial		CONSOLIDATION		CHEMICAL TEST									
						Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Clay (%)	Silt (%)	Sand (%)	Gravels (%)	Specific Gravity	Cu' (kPa)	φ' (Deg)	Cu (kPa)	φ (Deg)	Cu' (kPa)	φ' (Deg)	Cc	Pc (kPa)	Organic Content (%)	Total Sulphate (%)	Chloride (%)	pH	Soluble Sulphate (mg/L)											
	BH20	UD1	3.00	51	1.74	1.14	51	22	29	8.8	8.8	43	37	20	0	0							27.55	0	25	0.332	1.7	0.14	0.33	7.9							
	UD4	12.00	45	1.67	1.15						40	35	25	0	0							57.58	0	180	1.599	2.3	0.09	1.08	8.2								
	UD7	21.00	69	1.52	0.89	65	24	41	13.3	13.3	57	41	2	0	0																						
	D9	25.50	71	NA	NA	78	28	50											2.59																		
	UD10	30.00	47	1.55	0.97	48	25	23	6.8	6.8	40	30	30	0	0							44.02	0	65	0.610												
	D15	37.50	27	NA	NA	40	20	20			30	21	49	0	0											1.4	0.38	0.61	6.2								
	D16	39.00	18	NA	NA						16	84	0																								
	D18	42.00	15	2.01	1.70						7	93	0	2.70								4	28.0														
	D22	48.00	14	1.93	1.59						12	88	0									4	28.0														
	D23	49.50	48	NA	NA	45	22	23	6.5	6.5	40	35	25	0	0																						
	D25	52.50	31	NA	NA	36	20	16			21	15	64	0	0																						
	D26	54.00	34	NA	NA	35	23	13			20	15	65	0	0												1.0	0.23	0.66	7.8							
	D30	60.00	35	NA	NA						23	17	60	0	0																						

Note : NES = NOT ENOUGH SAMPLE NP = NON PLASTIC NA = NOT APPLICABLE

Remarks
* BULK & DRY DENSITY NOT APPLICABLE ON DISTURBED SAMPLE, ONLY AVAILABLE IF REMOULDED SHEAR BOX TEST WAS CARRIED OUT.

CHECKED BY: CHRIS APPROVED BY: LEE KAI HING



SUM

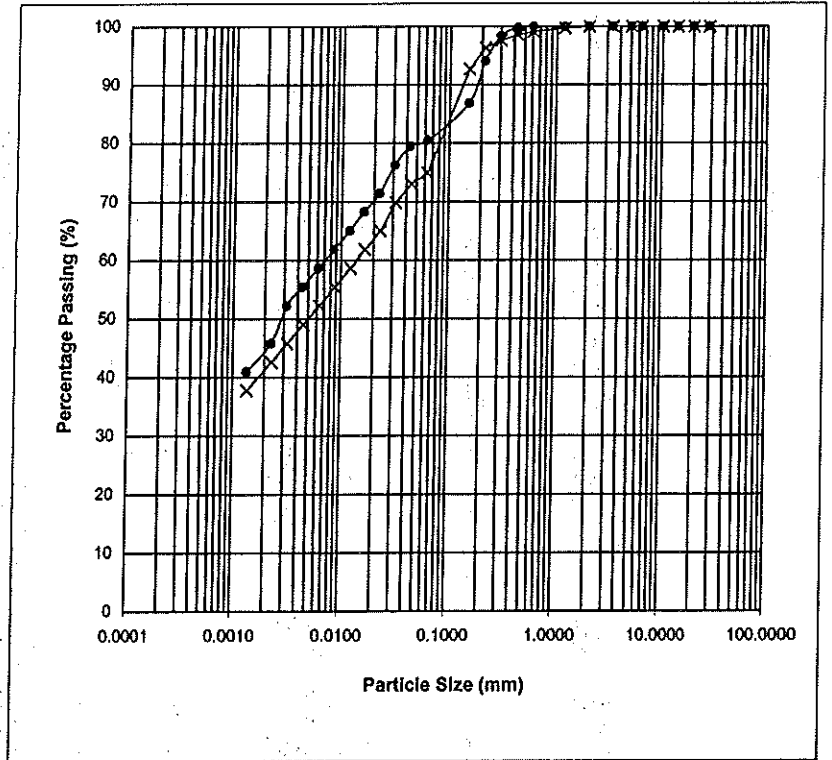
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

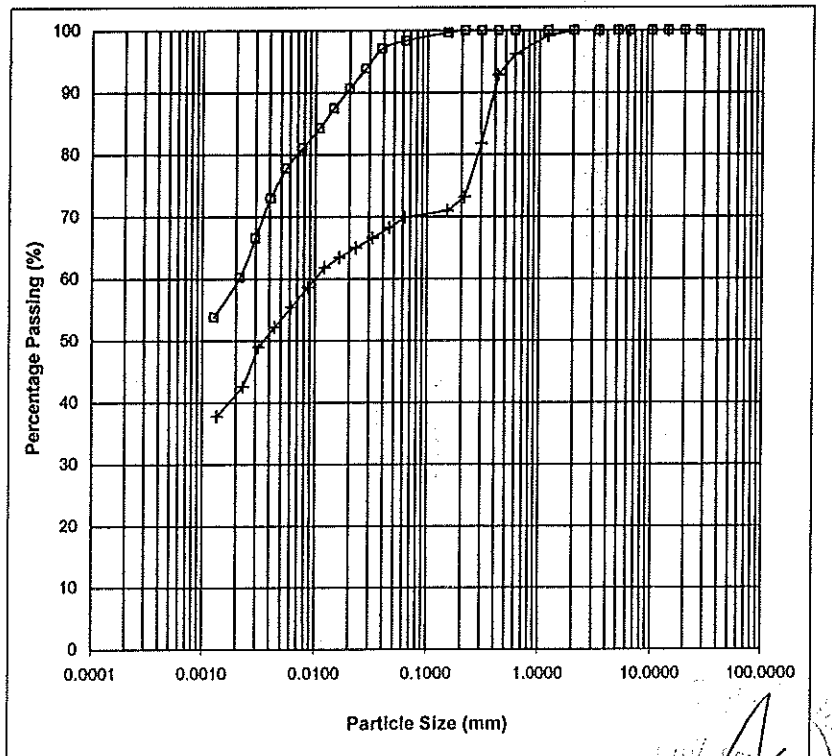
Particle Size Distribution				
●		X		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	100	
0.600	100	0.600	99	
0.425	100	0.425	99	
0.300	98	0.300	98	
0.212	94	0.212	96	
0.150	87	0.150	93	
0.083	81	0.083	75	
0.0427	79	0.0442	73	
0.0307	78	0.0317	70	
0.0223	71	0.0230	65	
0.0160	68	0.0165	62	
0.0119	65	0.0122	59	
0.0085	62	0.0088	55	
0.0061	59	0.0063	52	
0.0044	55	0.0045	49	
0.0031	52	0.0032	46	
0.0023	46	0.0023	43	
0.0013	41	0.0014	38	
Clay (%)		43	Clay (%)	40
Silt (%)		37	Silt (%)	35
Sand (%)		20	Sand (%)	25
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH20	UD1	3.00	07.12.18
X	BH20	UD4	12.00	07.12.18



Particle Size Distribution				
□		+		
Size (mm)	(% Passing)	Size (mm)	(% Passing)	
28.00	100	28.00	100	
20.00	100	20.00	100	
14.00	100	14.00	100	
10.00	100	10.00	100	
6.30	100	6.30	100	
5.00	100	5.00	100	
3.35	100	3.35	100	
2.00	100	2.00	100	
1.18	100	1.18	99	
0.600	100	0.600	96	
0.425	100	0.425	93	
0.300	100	0.300	82	
0.212	100	0.212	73	
0.150	100	0.150	71	
0.063	98	0.063	70	
0.0384	97	0.0452	68	
0.0278	94	0.0322	67	
0.0200	91	0.0230	65	
0.0144	87	0.0164	63	
0.0107	84	0.0120	62	
0.0077	81	0.0086	59	
0.0056	78	0.0062	55	
0.0040	73	0.0044	52	
0.0029	67	0.0032	49	
0.0021	60	0.0023	43	
0.0013	54	0.0014	38	
Clay (%)		57	Clay (%)	40
Silt (%)		41	Silt (%)	30
Sand (%)		2	Sand (%)	30
Gravel (%)		0	Gravel (%)	0
Total (%)		100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH20	UD7	21.00	07.12.18
+	BH20	UD10	30.00	07.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kah Hing

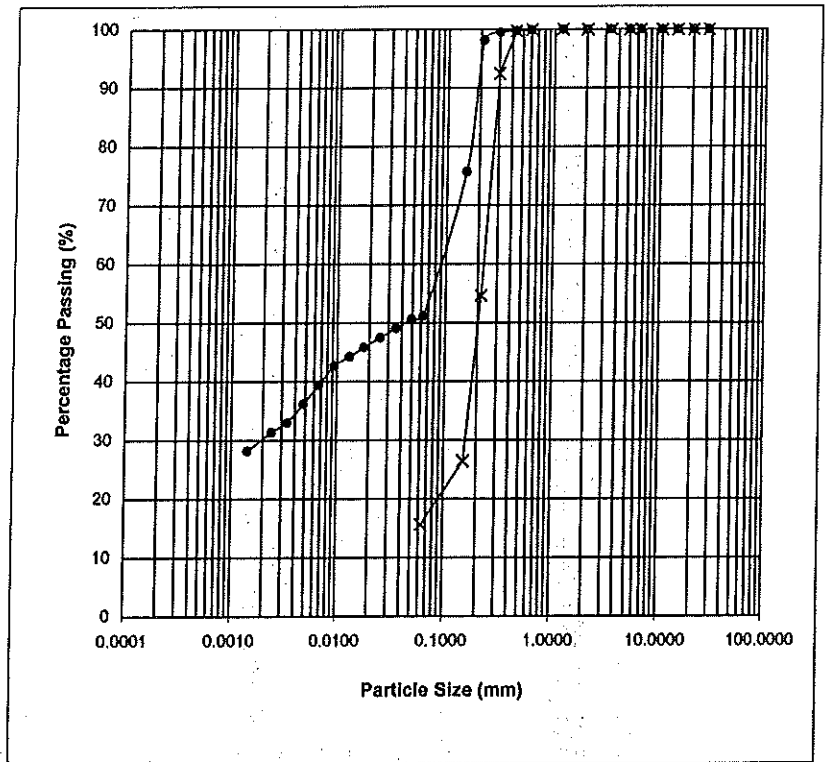
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

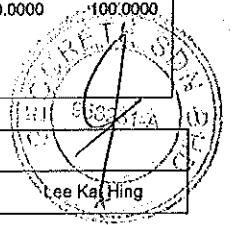
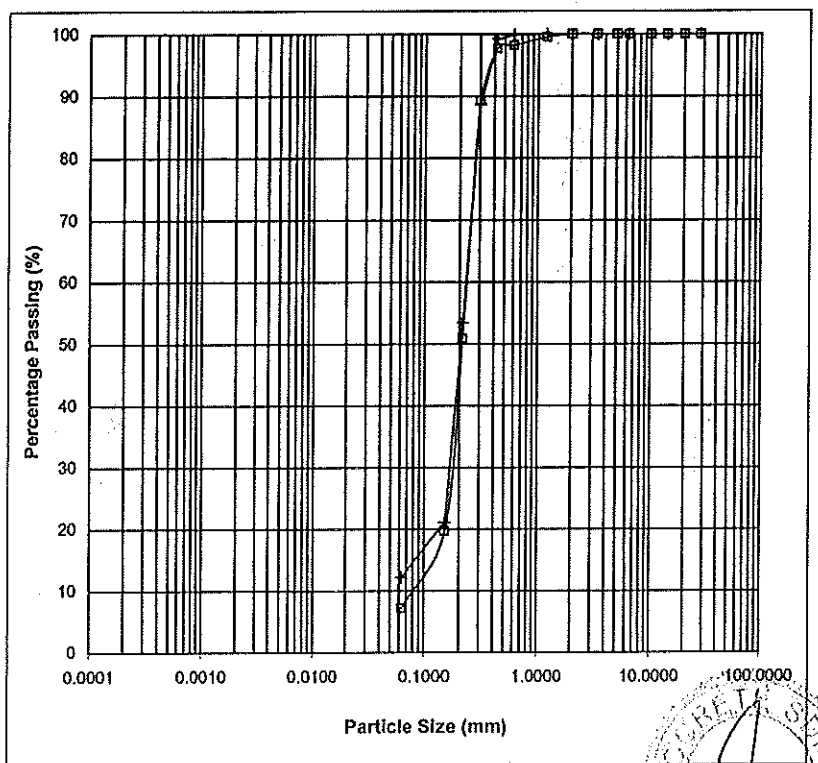
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	100	0.425	100
0.300	100	0.300	92
0.212	98	0.212	55
0.150	76	0.150	26
0.063	51	0.063	16
0.0489	51		
0.0348	49		
0.0248	47		
0.0176	46		
0.0130	44		
0.0092	43		
0.0066	39		
0.0047	36		
0.0034	33		
0.0024	31		
0.0014	28		
Clay (%)	30	Clay (%)	16
Silt (%)	21	Silt (%)	
Sand (%)	49	Sand (%)	84
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH20	D15	37.50	07.12.18
x	BH20	D16	39.00	07.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	98	0.600	100
0.425	98	0.425	99
0.300	89	0.300	89
0.212	51	0.212	53
0.150	20	0.150	21
0.063	7	0.063	12
Clay (%)	7	Clay (%)	12
Silt (%)		Silt (%)	
Sand (%)	93	Sand (%)	88
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH20	D18	42.00	07.12.18
+	BH20	D22	48.00	07.12.18



GEocreTE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing
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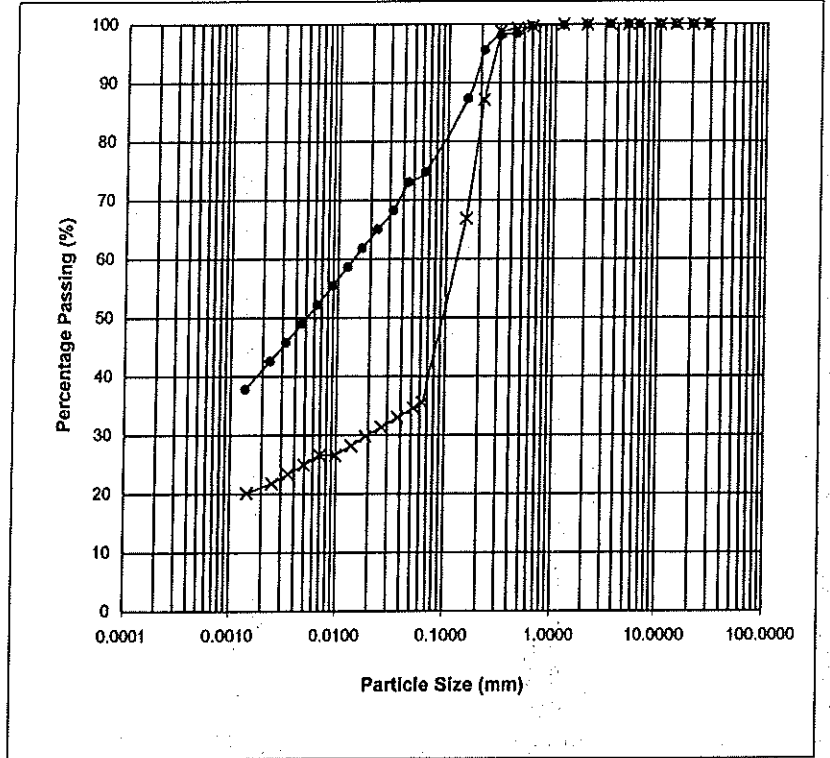
PARTICLE SIZE DISTRIBUTION

(B.S 1377 - Part 2 : Clause 9.2 And ASTM D422 - 63 (Re Approved 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR

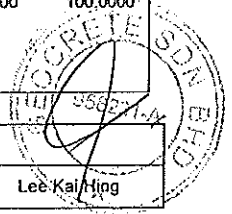
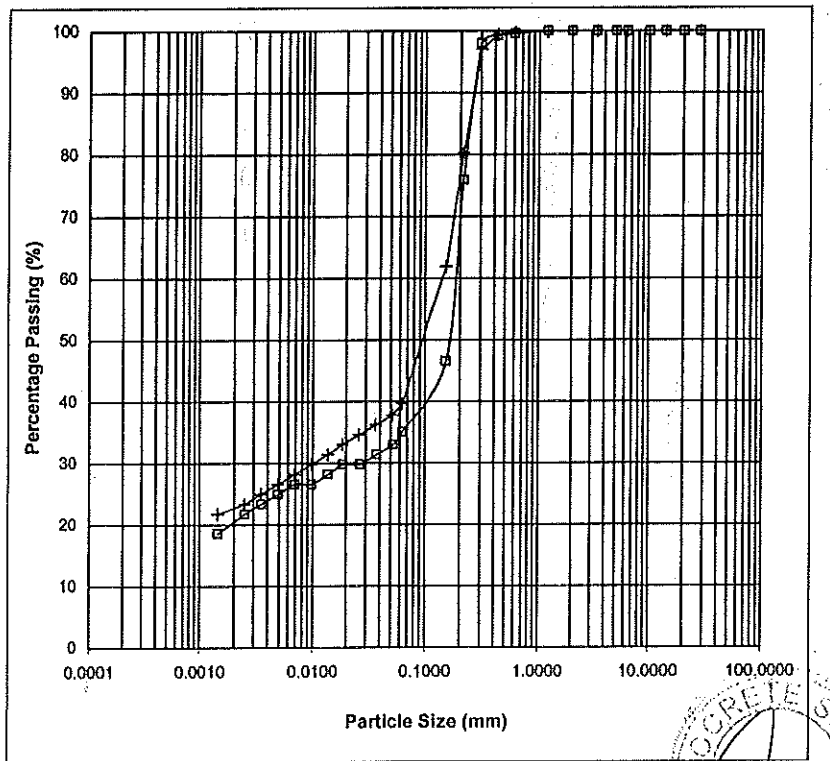
Particle Size Distribution			
●		X	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	98	0.425	99
0.300	98	0.300	99
0.212	96	0.212	87
0.150	87	0.150	67
0.063	75	0.063	36
0.0442	73	0.0521	35
0.0320	68	0.0370	33
0.0230	65	0.0263	31
0.0165	62	0.0187	30
0.0122	59	0.0138	28
0.0088	55	0.0098	27
0.0063	52	0.0069	27
0.0045	49	0.0049	26
0.0032	48	0.0035	23
0.0023	43	0.0025	22
0.0014	38	0.0014	20
Clay (%)	40	Clay (%)	21
Silt (%)	35	Silt (%)	15
Sand (%)	25	Sand (%)	64
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
●	BH20	D23	49.50	07.12.18
X	BH20	D25	52.50	07.12.18



Particle Size Distribution			
□		+	
Size (mm)	(% Passing)	Size (mm)	(% Passing)
28.00	100	28.00	100
20.00	100	20.00	100
14.00	100	14.00	100
10.00	100	10.00	100
6.30	100	6.30	100
5.00	100	5.00	100
3.35	100	3.35	100
2.00	100	2.00	100
1.18	100	1.18	100
0.600	100	0.600	100
0.425	99	0.425	99
0.300	98	0.300	97
0.212	76	0.212	80
0.150	47	0.150	62
0.063	35	0.063	40
0.0524	33	0.0515	38
0.0373	31	0.0366	36
0.0265	30	0.0260	35
0.0187	30	0.0185	33
0.0138	28	0.0136	31
0.0098	27	0.0097	30
0.0069	27	0.0069	28
0.0049	25	0.0049	27
0.0035	23	0.0035	25
0.0025	22	0.0025	23
0.0015	19	0.0014	22
Clay (%)	20	Clay (%)	23
Silt (%)	15	Silt (%)	17
Sand (%)	65	Sand (%)	60
Gravel (%)	0	Gravel (%)	0
Total (%)	100	Total (%)	100

Symbol	Borehole	Sample No	Depth (m)	Date Test
□	BH20	D26	54.00	07.12.18
+	BH20	D30	60.00	07.12.18



GEOCRETE SDN BHD (Company No. 958231-A)	Tested :	Shyam Nath	Checked :	Chris	Approved :	Lee Kai Hing

Total Stress Triaxial Compression

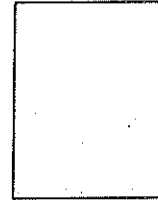
Unconsolidated Undrained

Sample details

Depth : 3.00m
 Description : Dark grey CLAY with sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	145.11	149.55	151.35
Bulk Density ρ (Mg/m ³)	1.68	1.74	1.76
Particle Density ρ_s	2.63	2.63	2.63

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	30	60	120
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

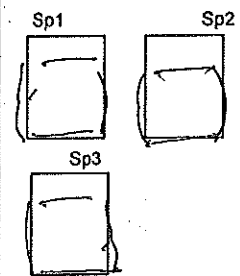
Load Channel 14391 14391 14391

Moisture Content w_0 %	54	53	51
Dry Density ρ_{d0} (Mg/m ³)	1.09	1.14	1.16
Voids Ratio e_0	1.41	1.32	1.26
Deg of Saturation S_0 %	101.42	105.69	106.53

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	25.45	68.92	70.95
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	25.25	68.72	70.75
Strain at Failure ϵ_f %	10.53	14.47	14.47
Shear Strength c_u (kPa)	12.72	34.46	35.47

Failure Sketch



Moisture Content w_f %	54	53	51
Dry Density ρ_{df} (Mg/m ³)	1.09	1.14	1.16
Voids Ratio e_f	1.41	1.32	1.26
Deg of Saturation S_f %	101.42	105.69	106.53

Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator
 Shyam Nath

Checked
 Chris

Test Name :

UU

Date of Test :

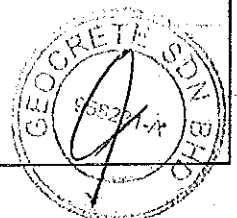
04.12.18

Sample : UD1

Borehole : BH20

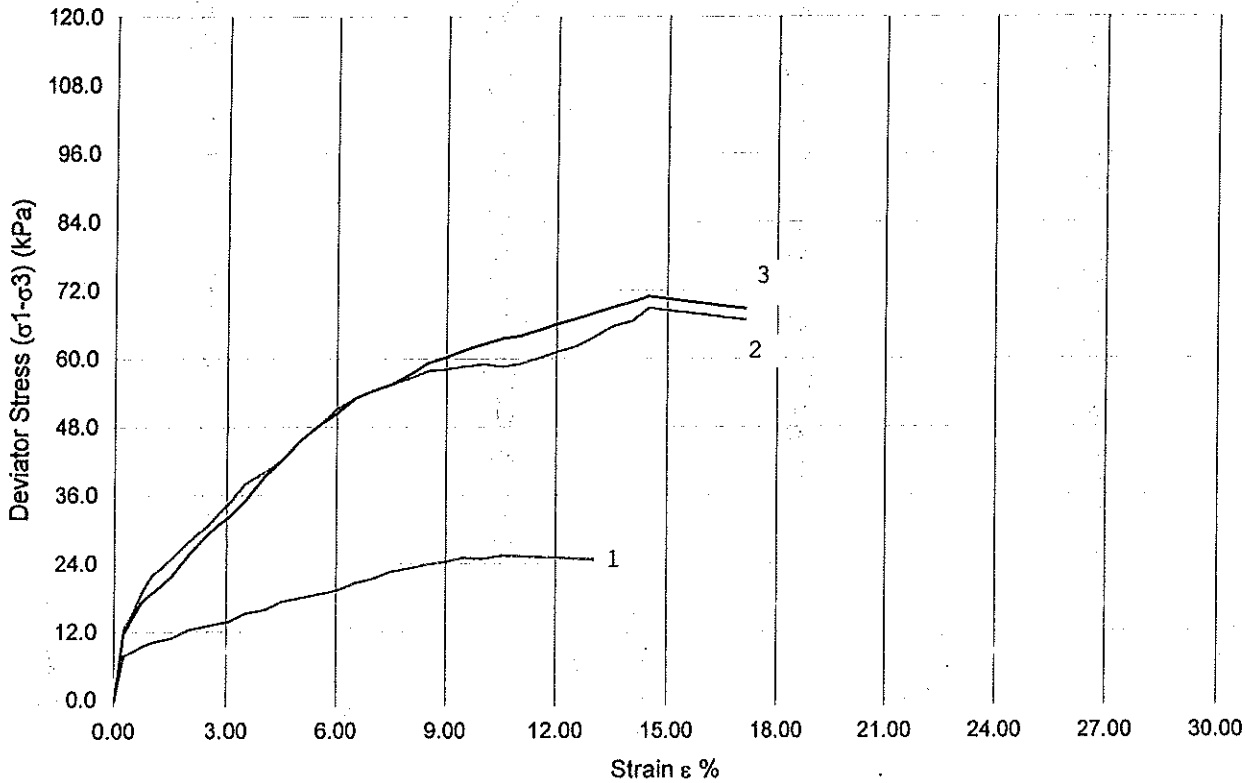
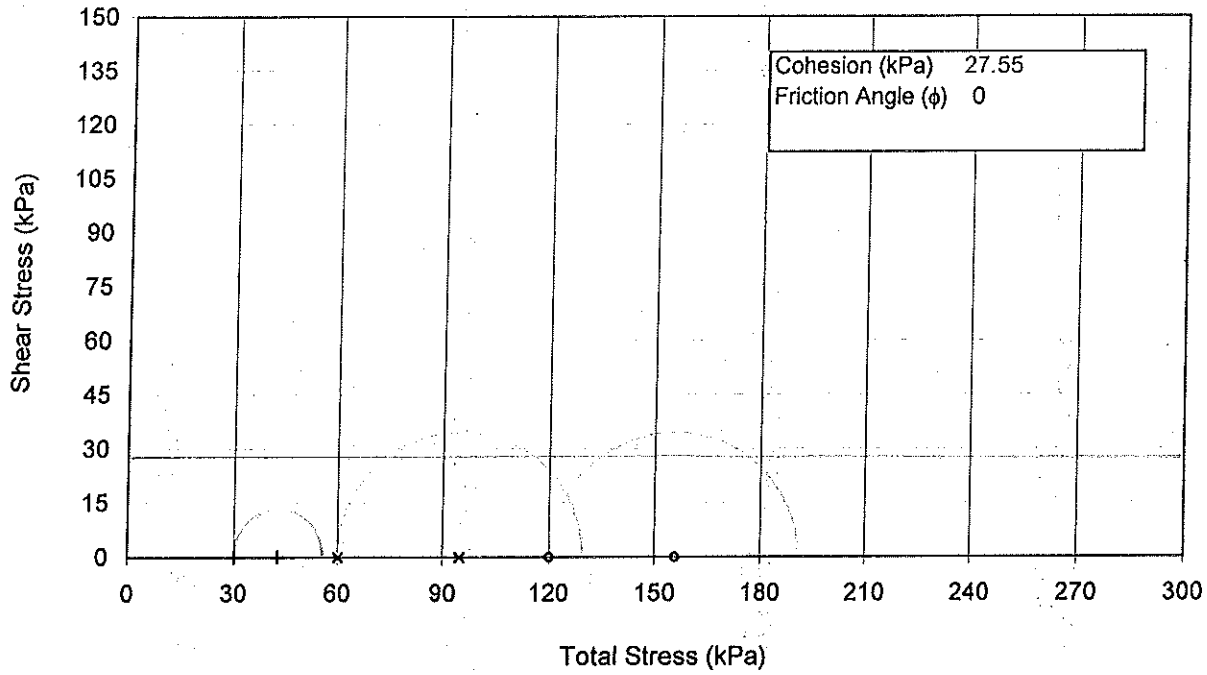
Approved

Lee Kai Hing



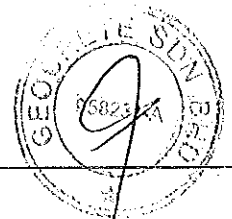
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 04.12.18
 Sample : UD1
 Borehole : BH20
 Approved : Lee Kai Hing



Total Stress Triaxial Compression

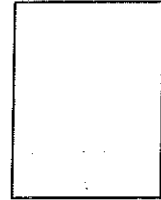
Unconsolidated Undrained

Sample details

Depth : 21.00m
 Description : Dark grey CLAY with some sand

Type	Specimen 1	Specimen 2	Specimen 3
Height, H_D (mm)	76	76	76
Diameter, D_D (mm)	38	38	38
Weight W_0 (gr)	130.66	131.05	134.02
Bulk Density ρ (Mg/m ³)	1.52	1.52	1.56
Particle Density ρ_s	2.58	2.58	2.58

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	150	300	600
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

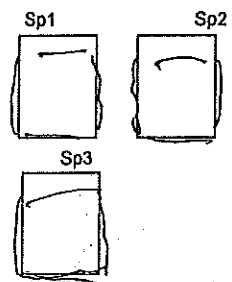
Load Channel 14391 14391 14391

Moisture Content w_0 %	70	70	68
Dry Density ρ_{d0} (Mg/m ³)	0.89	0.89	0.93
Voids Ratio e_0	1.90	1.88	1.79
Deg of Saturation S_0 %	95.57	95.95	98.25

Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	109.88	111.69	123.90
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	109.68	111.49	123.70
Strain at Failure ϵ_f %	11.97	10.53	5.53
Shear Strength c_u (kPa)	54.94	55.84	61.95

Failure Sketch



Moisture Content w_f %	70	70	68
Dry Density ρ_{df} (Mg/m ³)	0.89	0.89	0.93
Voids Ratio e_f	1.90	1.88	1.79
Deg of Saturation S_f %	95.57	95.95	98.25

Notes : Plastic Plastic Plastic

Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER

TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR

Operator
 Shyam Nath

Checked
 Chris

Test Name :

UU

Date of Test :

04.12.18

Sample : UD7

Borehole : BH20

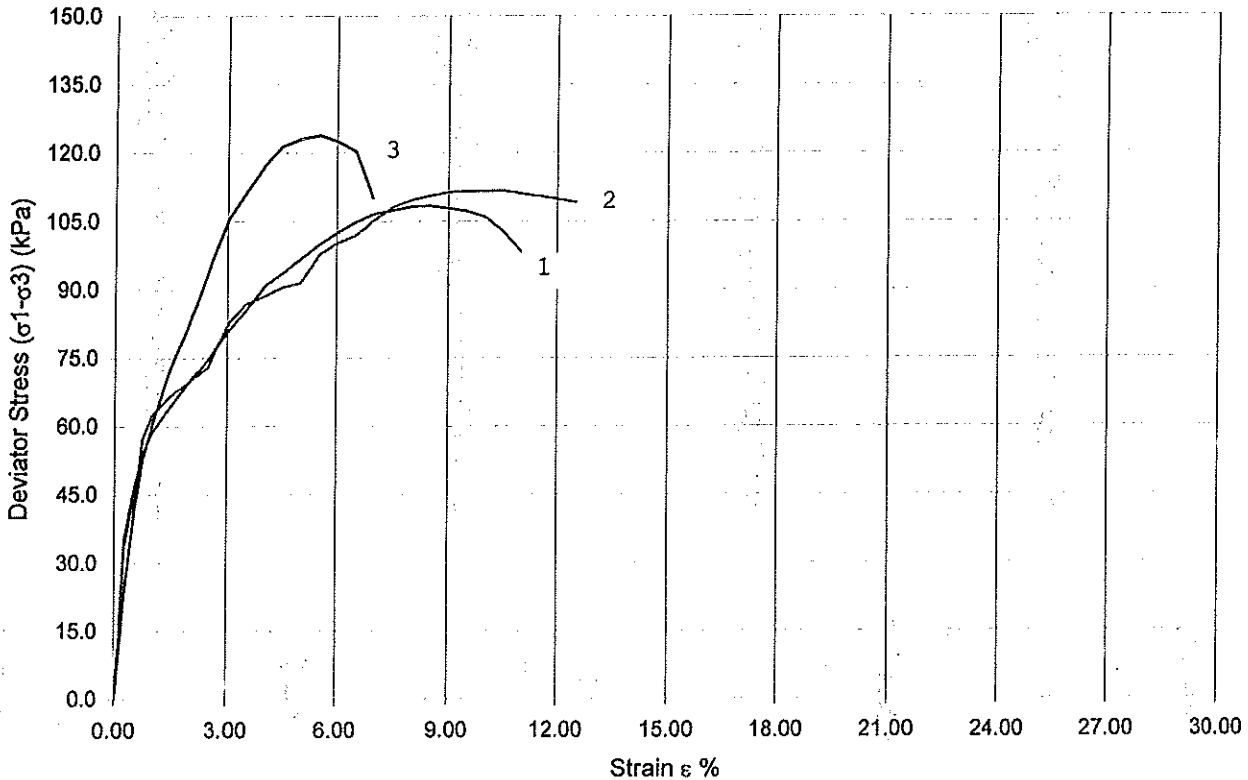
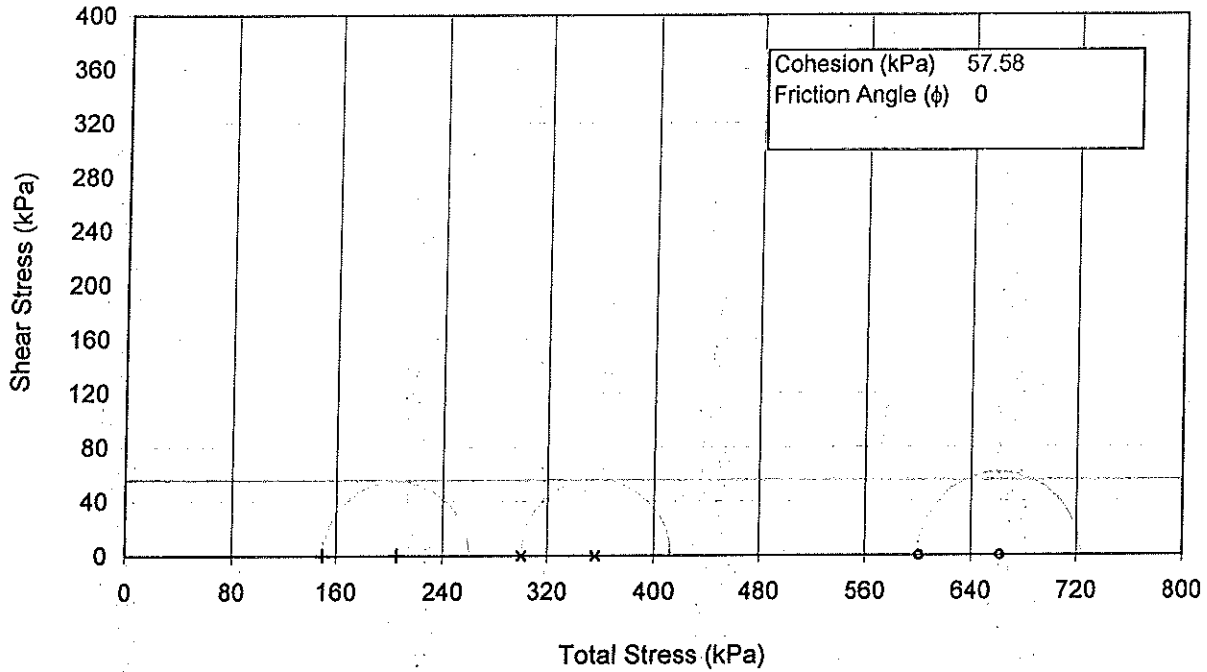
Approved

Lee Kai Hing



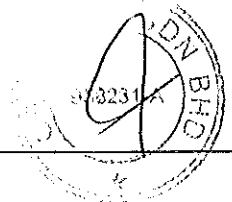
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 04.12.18
 Sample : UD7
 Borehole : BH20
 Approved : Lee Kai Hing



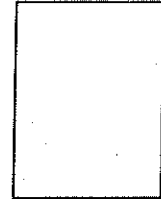
Total Stress Triaxial Compression Unconsolidated Undrained

Sample details

Depth : 30.00m
Description : Grey CLAY with some sand

	Specimen 1	Specimen 2	Specimen 3
Type			
Height, H_0 (mm)	76	76	76
Diameter, D_0 (mm)	38	38	38
Weight W_0 (gr)	132.18	133.90	135.10
Bulk Density ρ (Mg/m ³)	1.53	1.55	1.57
Particle Density ρ_s	2.65	2.65	2.65

Sketch showing specimen location in original sample



Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (kPa)	230	460	920
Machine Speed d_r (mm/min)	1.52	1.52	1.52
No. of Membranes	1	1	1
Total Thickness (mm)	0.2	0.2	0.2

Strain Channel

Load Channel 14391 14391 14391

Moisture Content w_0 %	60	60	58
Dry Density ρ_{d0} (Mg/m ³)	0.96	0.97	0.99
Voids Ratio e_0	1.76	1.73	1.67
Deg of Saturation S_0 %	90.13	92.13	92.20

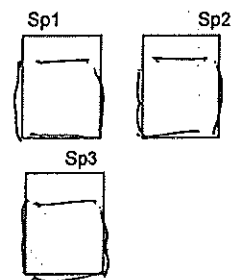
Final Condition

	Specimen 1	Specimen 2	Specimen 3
Max Deviator Stress (kPa)	72.30	79.28	112.54
Membrane Correction σ_{mb} (kPa)	0.20	0.20	0.20
Corr Stress $(\sigma_1 - \sigma_3)_c$ (kPa)	72.10	79.08	112.34
Strain at Failure ϵ_f %	8.49	11.97	7.50
Shear Strength c_u (kPa)	36.15	39.64	56.27

Moisture Content w_f %	60	60	58
Dry Density ρ_{df} (Mg/m ³)	0.96	0.97	0.99
Voids Ratio e_f	1.76	1.73	1.67
Deg of Saturation S_f %	90.13	92.13	92.20

Notes : Plastic Plastic Plastic

Failure Sketch



Test Method : BS 1377 : Part 7 : 1990 : 8/9*

(*delete as appropriate)

Project : PROPOSED EXPANSION OF CONTAINER
TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

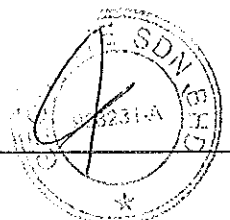
Operator
Shyam Nath

Checked
Chris

Test Name : UU

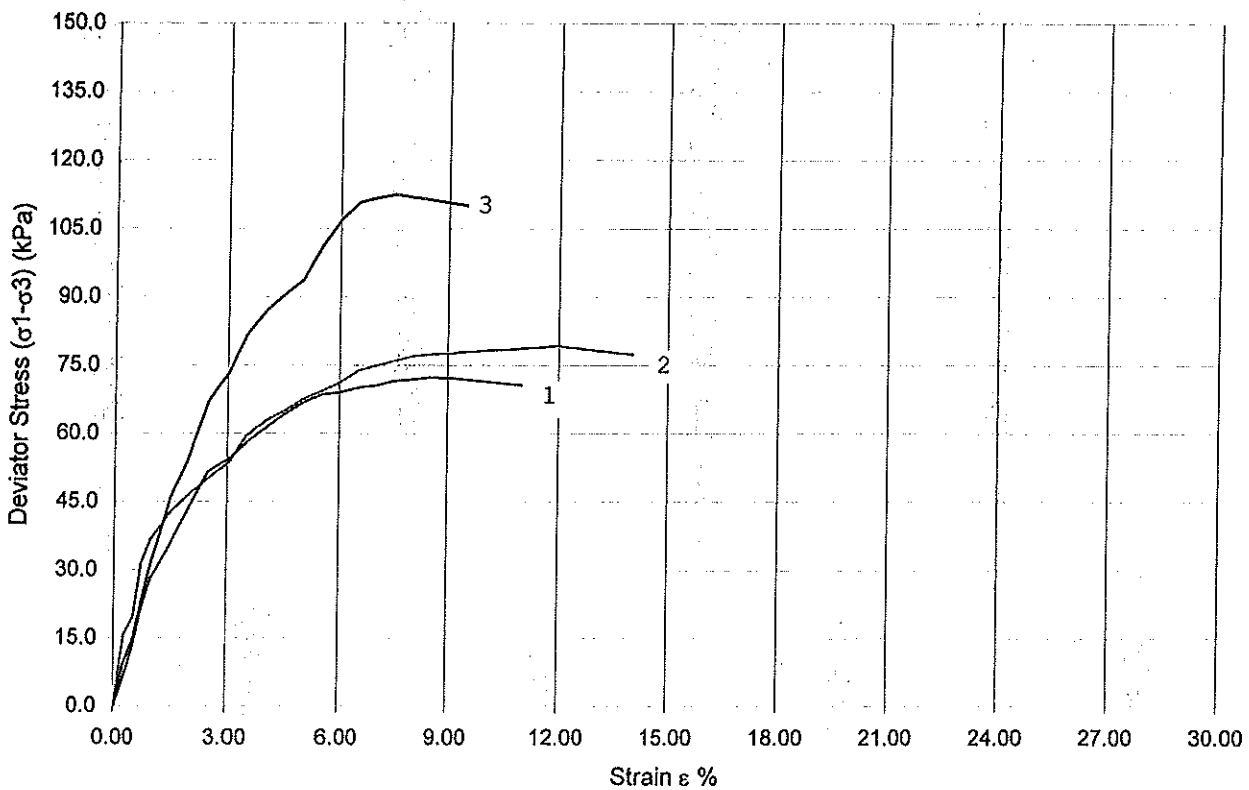
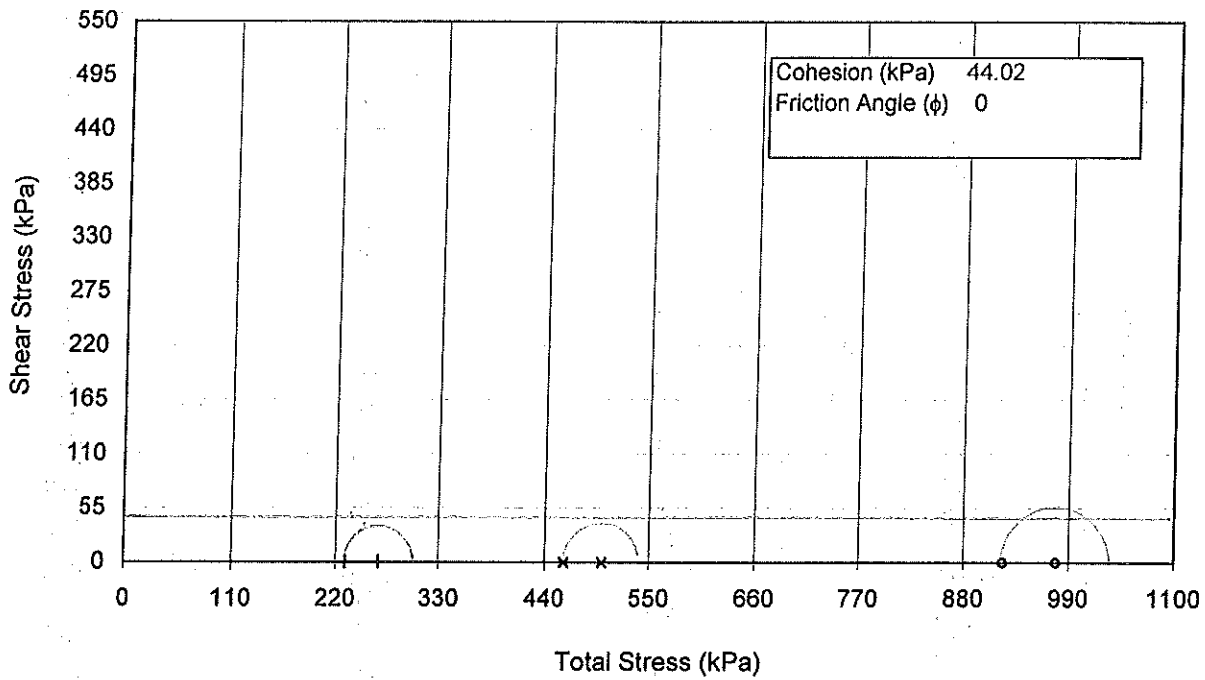
Date of Test : 04.12.18

Sample : UD10
Borehole : BH20
Approved
Lee Kai Hing



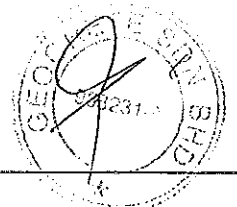
Total Stress Triaxial Compression

Unconsolidated Undrained



Test Method : BS 1377 : Part 7 : 1990 : 8/9*
 (*delete as appropriate)
 Project : PROPOSED EXPANSION OF CONTAINER
 TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 Operator : Shyam Nath
 Checked : Chris

Test Name : UU
 Date of Test : 04.12.18
 Sample : UD10
 Borehole : BH20
 Approved : Lee Kai Hing



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

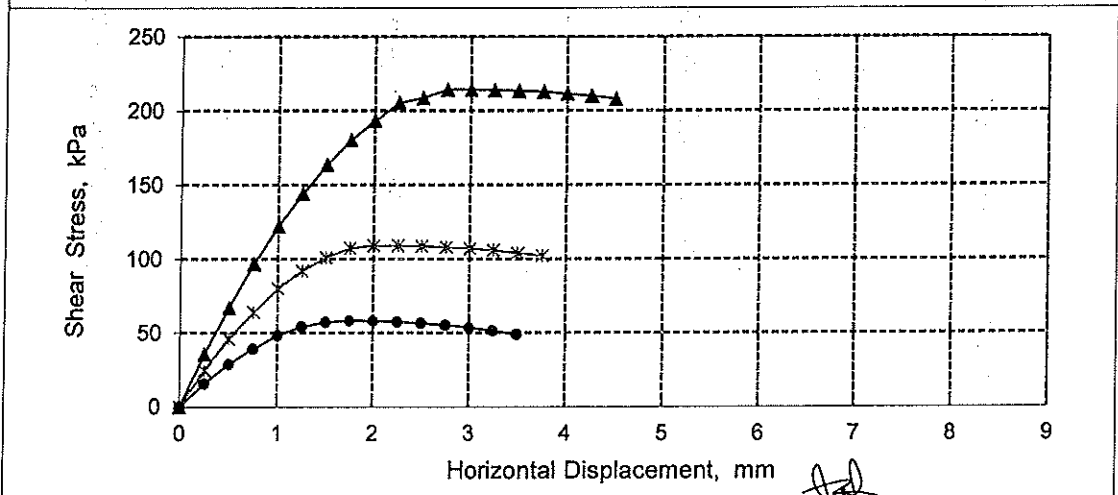
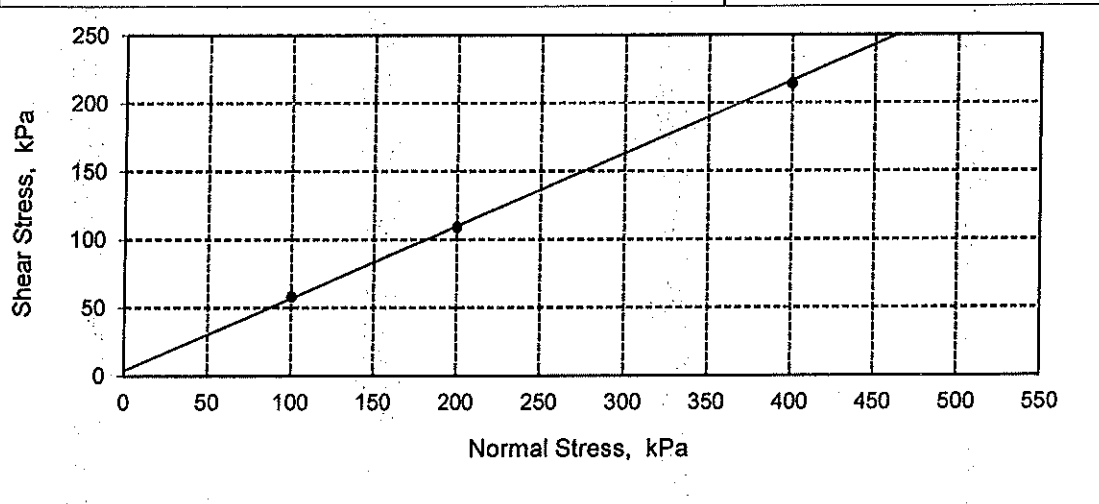
Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 20 / D 18 (42.00 m)

Test Size : 60 mm x 60 mm x 20 mm

Date Tested : 10 / 12 / 2018

INITIAL CONDITIONS					
Specimen No.		S 1	S 2	S 3	
Specimen Weight (g)		144.7	144.7	144.1	
Moisture Content (%)		17.5	18.1	17.5	
Bulk Density (Mg/m ³)		2.010	2.010	2.001	
Dry Density (Mg/m ³)		1.711	1.702	1.703	
SHEARING STAGE					
Normal Stress (kPa)		100	200	400	
Max. Shear Stress (kPa)		58.3	109.2	214.5	c' 4 kPa
Displ. at Failure (mm)		1.8	2.0	2.8	
Settlement (mm)		0.2	0.3	0.5	φ' 28 deg.



GEOSOIL ENGINEERING

DIRECT SHEAR BOX TEST (BS 1377 : Part 7 : 1990)

Project : PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR.

Sample No. : BH 20 / D 22 (48.00 m)

Test Size : 60 mm x 60 mm x 20 mm

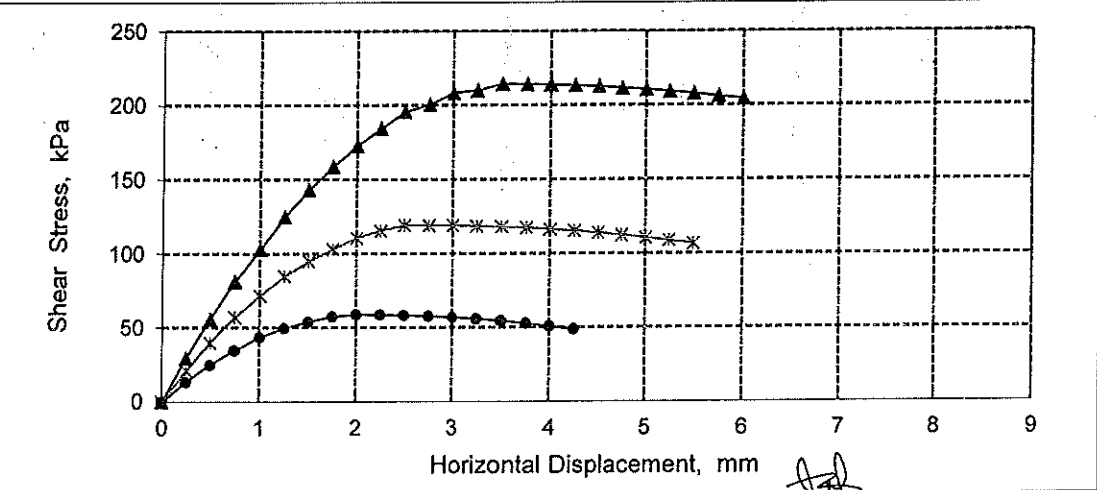
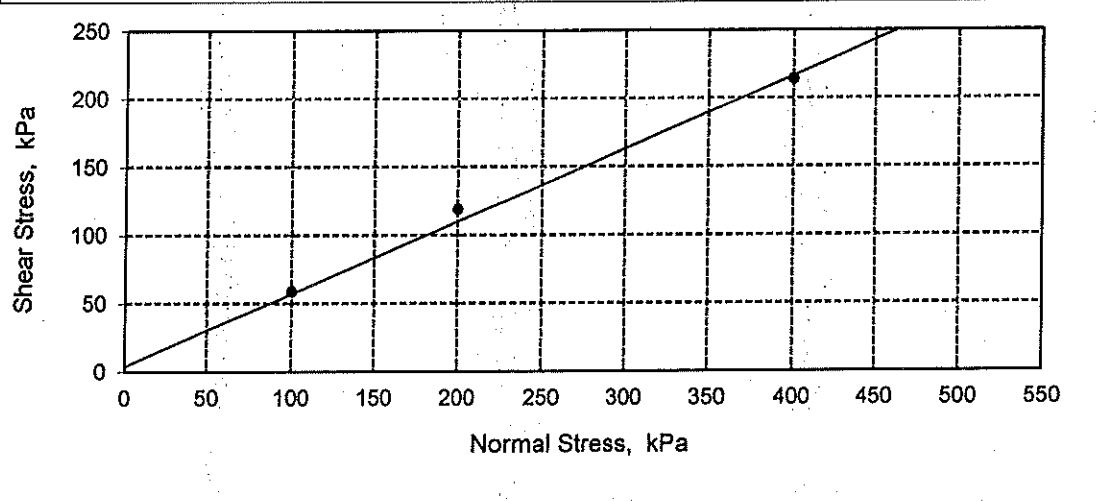
Date Tested : 12 / 12 / 2018

INITIAL CONDITIONS			
Specimen No.	S 1	S 2	S 3
Specimen Weight (g)	138.8	138.7	138.2
Moisture Content (%)	22.3	21.6	22.1
Bulk Density (Mg/m ³)	1.928	1.927	1.920
Dry Density (Mg/m ³)	1.576	1.585	1.572

SHEARING STAGE			
Normal Stress (kPa)	100	200	400
Max. Shear Stress (kPa)	58.9	119.2	214.5
Displ. at Failure (mm)	2.0	2.5	3.5
Settlement (mm)	0.3	0.4	0.7

c' 4 kPa

ϕ' 28 deg.



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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH20 / UD1 / 3.00m	Test Started	03.12.18
Soil Description	Drak grey CLAY with sand	Ring No.	11

BEFORE TEST

Moist. Content from trimmings:	=	62 %	SG (Measured)	=	2.630
Wt of sample + Ring	=	124.82 gm	Diameter (D)	=	50 mm
Wt of Ring	=	60.74 gm	Area (A)	=	1964 mm ²
Wt of sample	=	64.08 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	39.86 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.22 gm	Bulk Density (P)	=	1.631 Mg/m ³
Initial Moisture Content, M ₀	=	61 %	Dry Density (PD)	=	1.015 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	1.5921			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	100 %			
V. Ratio Change Factor F, $\frac{1+e_0}{H}$	=	0.1296 mm ⁻¹			
Height of Solid H _s	=	7.716 mm			

AFTER TEST

Wt of sample + Ring	=	120.84 gm	Overall settlement	=	2.282 mm
Wt of Dry sample + Ring	=	100.60 gm	Volume Change	=	4.483 cm ³
Wt of Ring	=	60.74 gm	Final Volume	=	34.80 cm ³
Wt of Wet sample	=	60.10 gm	Final Bulk Density	=	1.727 Mg/m ³
Wt of Dry sample	=	39.86 gm	Final Dry Density	=	1.145 Mg/m ³
Wt of Moisture	=	20.24 gm	Final Void Ratio, e _f	=	1.2964
Final Moisture Content, M _f	=	51 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	103 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH20 / UD1 / 3.00m

Date of Report

13.12.18

Test started

03.12.18

Ring No.

11

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_0 \Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION		COMPRESSION INDEX	
			$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	INDEX	Cc
0	0.000	20.000	0.0000	1.5921	0.0000	0					
3.12	0.480	19.520	0.0622	1.5299	0.0622	3.12	7.8749	1.69	25.65		-0.2067
6.2	0.700	19.300	0.0907	1.5014	0.0285	3.12	3.6505	1.21	34.56		-0.0947
12.5	0.980	19.020	0.1270	1.4651	0.0363	6.2	2.3572	1.69	24.11		-0.1206
25.0	1.380	18.620	0.1789	1.4133	0.0518	12.5	1.7199	1.21	32.49		-0.1722
50	1.980	18.020	0.2566	1.3355	0.0778	25.0	1.3329	1.21	30.79		-0.2583
100	2.750	17.250	0.3564	1.2357	0.0998	50.0	0.8934	1.44	23.97		-0.3315
50	2.642	17.358	0.3424	1.2497	-0.0140	-50.0					
25	2.462	17.538	0.3191	1.2730	-0.0233	-25.0					
12.5	2.282	17.718	0.2958	1.2964	-0.0233	-12.5					

Operator

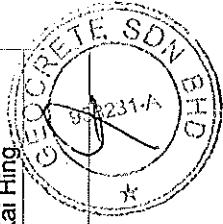
Shyam Nath

Checked

Chris

Approved

Lee Kai Hing

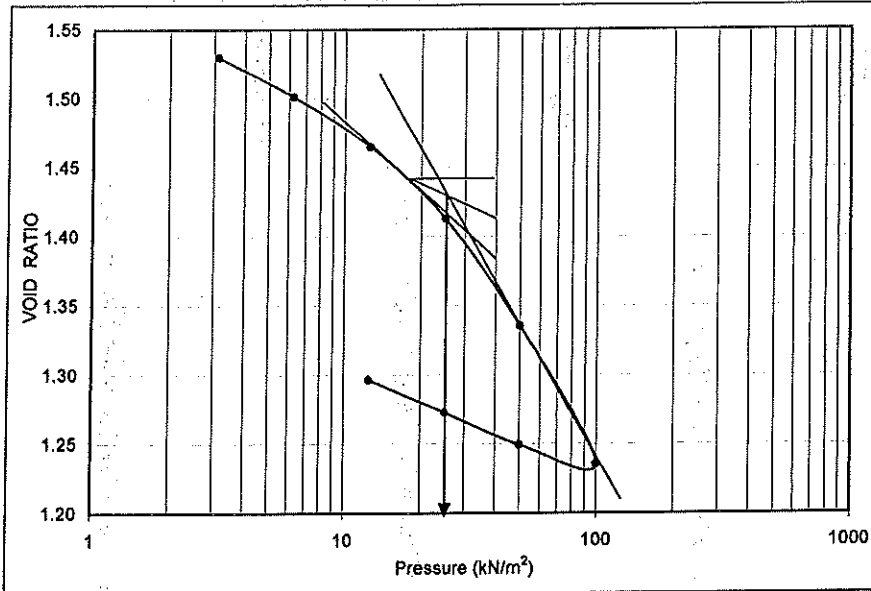


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(Co. No. 958231-A)

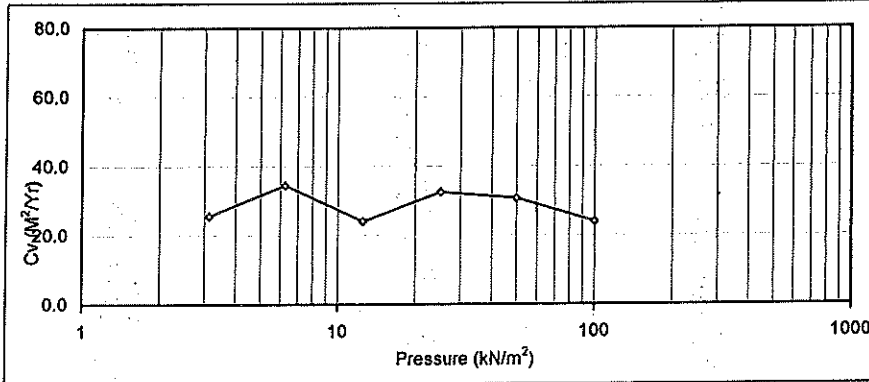
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
 CT10 - CT19 AND ITS ASSOCIATED WORKS AT
 WESTPORT, PULAU INDAH, SELANGOR
 BH REF BH20 / UD1 / 3.00m
 SOIL SAMPLE Drak grey CLAY with sand

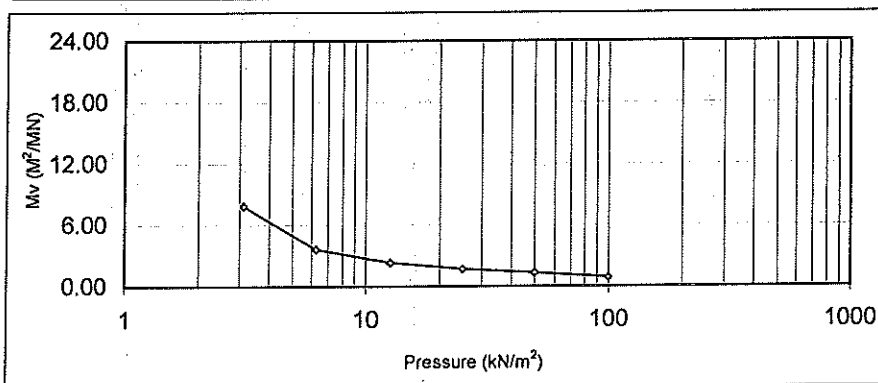
Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 11



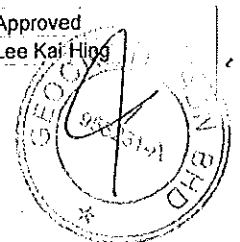
INITIAL
 Water content 81 %
 Dry Density 1.01 Mg/m³
 Void Ratio 1.5921
 Saturation 100 %
 Height 20 mm
 Diameter 50 mm
 Sp. Gravity 2.630



FINAL
 Water content 51 %
 Dry Density 1.15 Mg/m³
 Void Ratio 1.2964
 Saturation 103 %
 Height 18 mm
 Comp. Index, C_c 0.3315
 Precons. Load 25 kN/m²



Comp. Ratio, C_R 0.128



GEOCRETE SDN. BHD.

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Tel : 03-87242829, 87242830 Fax : 03-87242824

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH20 / UD7 / 21.00m	Test Started	03.12.18
Soil Description	Dark grey CLAY with little sand	Ring No.	12

BEFORE TEST

Moist. Content from trimmings:	=	87 %	SG (Measured)	=	2.580
Wt of sample + Ring	=	118.27 gm	Diameter (D)	=	50 mm
Wt of Ring	=	61.48 gm	Area (A)	=	1964 mm ²
Wt of sample	=	56.79 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	30.56 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	26.23 gm	Bulk Density (P)	=	1.446 Mg/m ³
Initial Moisture Content, M ₀	=	86 %	Dry Density (PD)	=	0.778 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.3167			
Initial Saturation, S ₀ ; $\frac{M_0 \times SG}{e_0}$	=	96 %			
V. Ratio Change Factor F, $\frac{H}{1+e_0}$	=	0.1658 mm ⁻¹			
Height of Solid $\frac{H}{H_s}$	=	6.030 mm			

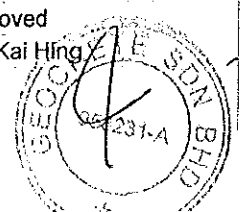
AFTER TEST

Wt of sample + Ring	=	113.07 gm	Overall settlement	=	3.704 mm
Wt of Dry sample + Ring	=	92.04 gm	Volume Change	=	7.276 cm ³
Wt of Ring	=	61.48 gm	Final Volume	=	32.01 cm ³
Wt of Wet sample	=	51.59 gm	Final Bulk Density	=	1.612 Mg/m ³
Wt of Dry sample	=	30.56 gm	Final Dry Density	=	0.955 Mg/m ³
Wt of Moisture	=	21.03 gm	Final Void Ratio, e _f	=	1.7024
Final Moisture Content, M _f	=	69 %			
Final Saturation, S ₀ , $\frac{M_f \times SG}{e_f}$	=	104 %			

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project

PROPOSED EXPANSION OF CONTAINER TERMINAL

CT10 - CT19 AND ITS ASSOCIATED WORKS AT

WESTPORT, PULAU INDAH, SELANGOR

Sample No

BH20 / UD7 / 21.00m

Date of Report

13.12.18

Test started

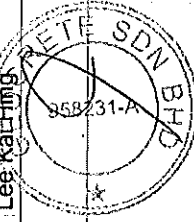
03.12.18

Ring No.

12

Pressure (P) kN/m ²	Settlement ΔH (mm)	$H=H_c-\Delta H$ (mm)	VOIDS RATIO		VOLUME COMPRESSIBILITY			COEFF. OF CONSOLIDATION			COMPRESSION INDEX	
			$\Delta_o = F \times \Delta H$	$e=e_o - e_1$	de	dp kN/m ²	Mv (M ² /MN)	t_{90} (min)	C_v for t_{90} (m ² /yr)	Cc		
0	0.000	20.000	0.0000	2.3167	0.0000	0						
25.0	0.100	19.900	0.0166	2.3001	0.0166	25.0	0.2012	1.96	22.54			-0.0551
50.0	0.280	19.720	0.0464	2.2702	0.0298	25.0	0.3654	8.41	5.18			-0.0992
100	0.666	19.334	0.1104	2.2062	0.0640	50.0	0.3996	5.76	7.35			-0.2127
200	1.630	18.370	0.2703	2.0464	0.1599	99.9	0.5252	6.76	5.84			-0.5311
400	4.532	15.468	0.7516	1.5651	0.4812	199.8	0.9388	70.56	0.45			-1.5988
200	4.368	15.632	0.7244	1.5923	-0.0272	-199.8						
100	4.082	15.918	0.6769	1.6397	-0.0474	-99.9						
25.0	3.704	16.296	0.6142	1.7024	-0.0627	-74.9						

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kah Hing



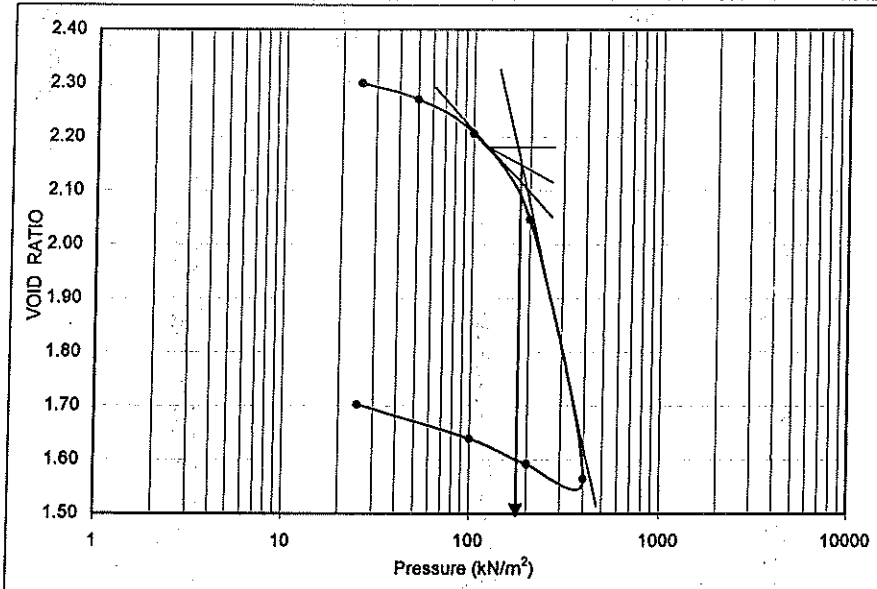
GEocrete SDN. BHD.
(Co. No. 958231-A)

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

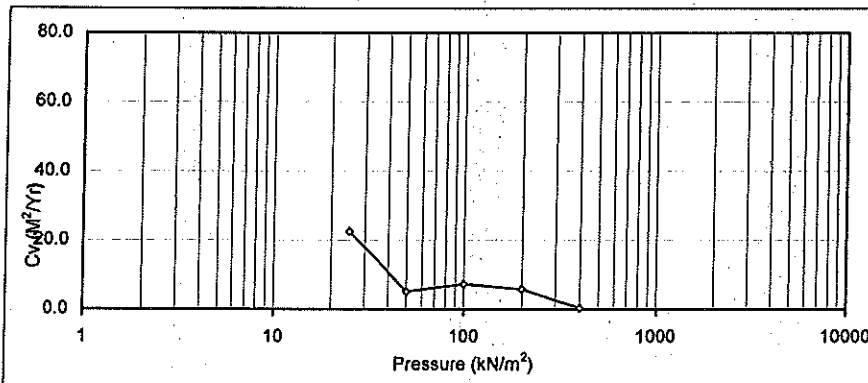
PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

Date of Report 13.12.18
Test started 03.12.18
Ring No. 12

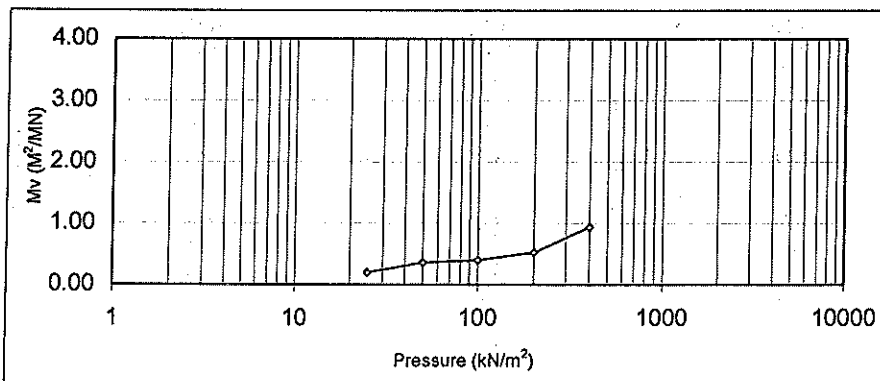
BH REF BH20 / UD7 / 21.00m
SOIL SAMPLE Dark grey CLAY with little sand



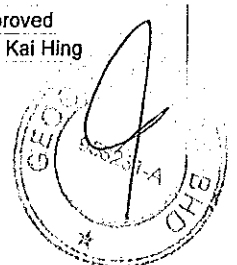
INITIAL
Water content 86 %
Dry Density 0.78 Mg/m^3
Void Ratio 2.3167
Saturation 96 %
Height 20 mm
Diameter 50 mm
Sp. Gravity 2.580



FINAL
Water content 69 %
Dry Density 0.95 Mg/m^3
Void Ratio 1.7024
Saturation 104 %
Height 16 mm
Comp. Index, C_c 1.5988
Precons. Load 180 kN/m^2



Comp. Ratio, C_R 0.482



GEOCRETE SDN. BHD.

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No.	BH20 / UD10 / 30.00m	Test Started	03.12.18
Soil Description	Grey CLAY with some sand	Ring No.	13

BEFORE TEST

Moist. Content from trimmings:	=	75 %	SG (Measured)	=	2.650
Wt of sample + Ring	=	116.52 gm	Diameter (D)	=	50 mm
Wt of Ring	=	58.44 gm	Area (A)	=	1964 mm ²
Wt of sample	=	58.08 gm	Thickness (H)	=	20 mm
Wt of Dry sample	=	33.74 gm	Volume (V)	=	39.29 cm ³
Wt of Initial Moisture	=	24.34 gm	Bulk Density (P)	=	1.478 Mg/m ³
Initial Moisture Content, M ₀	=	72 %	Dry Density (PD)	=	0.859 Mg/m ³
Initial Void Ratio, e ₀ , SG/P _D - 1	=	2.0856			
Initial Saturation, S ₀ ;	$\frac{M_0 \times SG}{e_0}$	=	92 %		
V. Ratio Change Factor F,	$\frac{H}{1+e_0}$	=	0.1543 mm ⁻¹		
Height of Solid	H _s	=	6.482 mm		

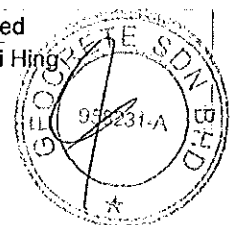
AFTER TEST

Wt of sample + Ring	=	113.73 gm	Overall settlement	=	2.012 mm
Wt of Dry sample + Ring	=	92.18 gm	Volume Change	=	3.952 cm ³
Wt of Ring	=	58.44 gm	Final Volume	=	35.33 cm ₃
Wt of Wet sample	=	55.29 gm	Final Bulk Density	=	1.565 Mg/m ³
Wt of Dry sample	=	33.74 gm	Final Dry Density	=	0.955 Mg/m ³
Wt of Moisture	=	21.55 gm	Final Void Ratio, e _f	=	1.7752
Final Moisture Content, M _f	=	64 %			
Final Saturation, S ₀	$\frac{M_f \times SG}{e_f}$	=	95 %		

Operator
Shyam Nath

Checked
Chris

Approved
Lee Kai Hing



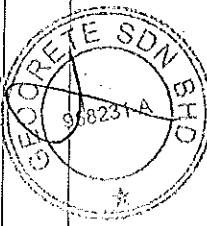
ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990

Project	PROPOSED EXPANSION OF CONTAINER TERMINAL CT10 - CT19 AND ITS ASSOCIATED WORKS AT WESTPORT, PULAU INDAH, SELANGOR	Date of Report	13.12.18
Sample No	BH20 / UD10 / 30.00m	Test started	03.12.18
		Ring No.	13

Pressure (P) kN/m ²	Settlement ΔH (mm)		VOIDS RATIO		VOLUME COMPRESSIBILITY		COEFF. OF CONSOLIDATION		COMPRESSION INDEX Cc
	$H=H_0-\Delta H$ (mm)	ΔH (mm)	$\Delta e = F \times \Delta H$	$e = e_0 - e_1$	dp kN/m ²	Mv (M ² /MIN)	t ₉₀ (min)	Cv for t ₉₀ (m ² /yr)	
0	20.000	0.000	0.0000	2.0856	0				
25.0	19.790	0.210	0.0324	2.0532	25.0	0.4248	4.84	9.08	-0.1076
50.0	19.390	0.610	0.0941	1.9915	25.0	0.8258	12.25	3.48	-0.2050
100	18.560	1.440	0.2222	1.8634	50.0	0.8951	15.21	2.63	-0.4254
200	17.370	2.630	0.4058	1.6798	99.9	0.6856	16.00	2.24	-0.6099
100	17.518	2.482	0.3829	1.7027	-99.9				
50	17.736	2.264	0.3493	1.7363	-50.0				
25.0	17.988	2.012	0.3104	1.7752	-25.0				

Operator	Checked	Approved
Shyam Nath	Chris	Lee Kai Hing



GEOCRETE SDN. BHD.
(Co. No. 958231-A)

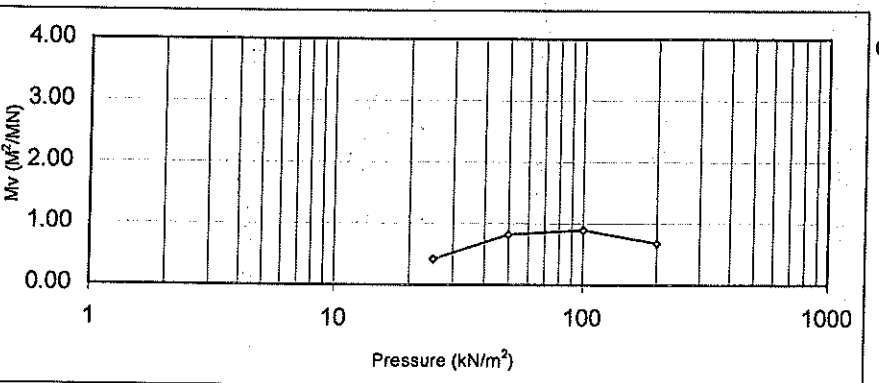
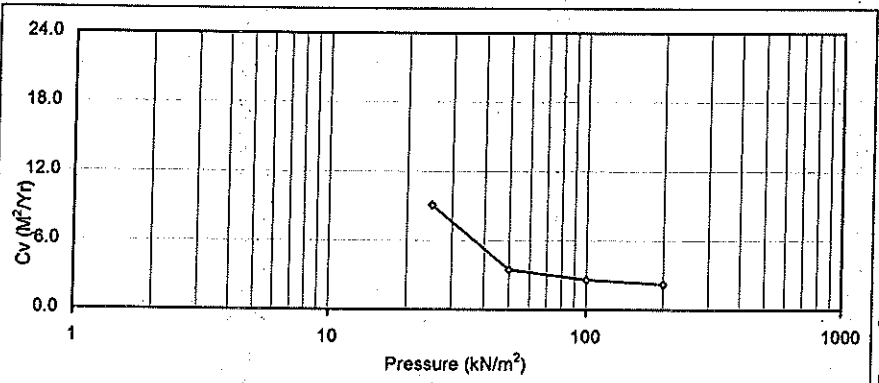
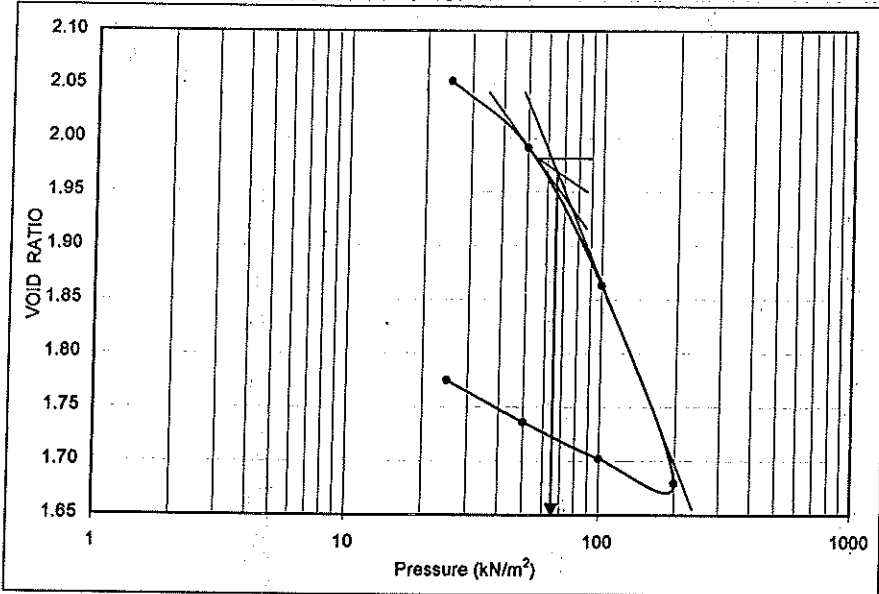
ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PROJECT PROPOSED EXPANSION OF CONTAINER TERMINAL
CT10 - CT19 AND ITS ASSOCIATED WORKS AT
WESTPORT, PULAU INDAH, SELANGOR

BH REF BH20 / UD10 / 30.00m

SOIL SAMPLE Grey CLAY with some sand

Date of Report 13.12.18
 Test started 03.12.18
 Ring No. 13



GEOCRETE SDN. BHD.
 (Co. No. 958231-A)

Operator
 Shyam Nath

Checked
 Chris

Approved
 Lee Kai Hing

